STORMWATER REPORT

1440 Main Street
Concord, Massachusetts

July 11, 2019

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WILLIAMS & SPARAGES
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1 | Mitigative Drainage Analysis

1.1 Purpose

The purpose of this analysis is to compare the pre-development watershed condition to the post development watershed condition for the property located along Main Street and Highland Street, Concord, MA. This is accomplished by analyzing the stormwater surface runoff rates to the limit of watershed analysis as shown on the accompanying watershed maps. The results of this analysis are presented below in the Peak Rate of Runoff table.

1.2 Introduction

The site is located in West Concord at the intersection of Main Street and Highland Street, and consists of four parcels of land (1440, 1450, 146B Main Street and 10B Highland Street). The site lies entirely within the Residence C zoning district and a smaller portion of the northeast corner of the site is also located within the Wetlands Conservancy Overlay District.

The site is bounded to the north by the commuter rail, to the northeast by open space associated with Junction Square, to the east and south by residential dwellings along Highland Street and Main Street and to the west by Center Village Condominium, a previously approved Planned Residential Development and to the northwest by the associated open space from Center Village which has been conveyed to the Town of Concord.

The site is currently occupied by a single-family dwelling (#1450) and a two-family dwelling (#1440) which have access via a paved common driveway originating from Highland Street. There is also a detached garage with a paved driveway (10B Highland). Additional access to the site to a gravel parking area is from a paved curb-cut along Main Street. The site contains an open green area along Main street with mature trees along a sidewalk and steps leading up from the Main Street to the dwellings. The dwellings are served by town water and town sewer located adjacent to the sidewalk access from Main Street with overhead electrical service originating from Highland Street. The site is primarily vegetated with a large lawn area along the frontage of Main Street with some deciduous and coniferous tree cover. The rear of the site is woodland and contains an isolated wetland.

The site varies in elevation from approximately 156 along the frontage of both Main Street and Highland Street to elevation 170 near the dwellings and quickly down to elevation 134 behind the single-family dwelling. The elevation 170 also runs along the westerly boundary with Center Village near its dwellings, with an elevation drop along the fence line to elevation 144 to elevation 130 along the Town of Concord Land. There is a gravel path that begins at elevation 160 at the stonewall near Highland Street which provides access down to the rear of the site to elevation of 136 at the Junction Square open space. All elevations mentioned above drain towards the isolated wetlands on site at elevation 126 with low areas at elevation 124. Runoff from the drain outlets from the Junction Square catch basins also drains into this isolated wetland from the east along the base of the commuter rail berm.

There is an isolated wetland located on-site which has been reviewed and confirmed by the Natural Resources Commission (See ORAD Dep File #137-1408; dated December 7, 2017). In addition to the edge of wetland confirmation, it has also been confirmed that this depression does not meet the criteria as an isolated land subject to flooding.

The project proposal is to construct thirty-seven residential dwelling units, 36 as part of a Planned Residential Development and 1 ANR Lot. The existing structures will be razed and the site regraded with primary access from Main Street for the PRD and use of the current driveway curb-cut of the detached garage for the ANR lot at 10B Highland Street.

This PRD project will be serviced by street access from Main Street via a private driveway, common areas, dedicated open space, walking paths, sidewalks, landscaping, town water, limited town sewer for three PRD buildings and one ANR building, while the remaining PRD buildings will be served a Title V on-site subsurface sewage disposal system, underground utilities and a drainage system for attenuation and treatment of stormwater runoff.

1.3 Existing Condition Soils Analysis

In order to model the excess runoff for both the existing and proposed watershed condition, the parent soils on site were mapped using the Web Soil Survey (WSS) made available on the United States Department of Agriculture (USDA) National Resources Conservation Service (NRCS) website. The WSS provides vital soil data and information such as Hydrologic Soil Group (HSG), which is then input into a mathematical model to generate runoff curve numbers.

The user inputs the soil cover type as well as the hydrologic soil group to generate a weighted curve number (CN) and also uses the topography of the land to generate a time of concentration (Tc) from which the stormwater runoff rate and volume can be calculated for a given watershed for comparison.

On-site soils are comprised of Merrimac-Urban Land Complex and Hinckley loamy sand which have Hydrologic Soil Group (HSG) ratings of A; while Deerfield loamy sand has a rating of B. Scarboro mucky fine sandy loam within the area of the isolated wetland has a Hydrologic Soil Group (HSG) rating of D.

1.4 Stormwater Modeling Methodology

The mathematical model used in this analysis for post development is computed using the stormwater modeling software HydroCAD, v10.00, developed by HydroCAD Software Solutions LLC. HydroCAD is a program used to model the hydrology and hydraulics of stormwater runoff and is based largely on programs and techniques developed by the NRCS, specifically TR-20 and TR-55 and other hydraulic calculation methods.

HydroCAD allows the user, for a given rainfall event, to generate runoff hydrographs for single or multiple watersheds and is used to determine if a given drainage system is adequate under the desired conditions and to predict flooding or other hydraulic impacts such as erosion at specified locations.

Four design storm events are analyzed and the result is summarized in Tables 1 through 8 below.

1.5 Pre-Development Watershed

The pre-development watershed area is separated into four watersheds resulting from the existing topography and for comparison with the post-development condition.

The selected Comparison Edge 1L represents flow to the isolated wetland (S1). The area tributary to this selected edge of comparison is 247,652 square feet.

The selected Comparison Edge 2L represents flow tributary towards Highland Street (S2). The area tributary to this selected edge of comparison is 14,494 square feet.

The selected Comparison Edge 3L represents flow tributary towards a low point in the southeast lawn area along Main Street behind the sidewalk (S3). The area tributary to this selected edge of comparison is 39,043 square feet.

The selected Comparison Edge 4L represents flow tributary towards a low point located at the southwest property corner along Main Street behind the sidewalk (S4). The area tributary to this selected edge of comparison is 55,943 square feet.

The total watershed area within the limit of watershed analysis is 357,132 square feet.

Using the methods described in the stormwater modeling methodology above, runoff curve numbers and times of concentration are generated for each watershed for the pre-development condition to be used for comparison with the post-development condition described below. A schematic of the mathematical model and the results of the calculations for the 2-year, 10-year, 25-year and 100-year Type III, 24-hour storm events are included in this analysis.

1.6 Post-Development Watershed

The post-development watershed is separated into four distinct watershed groups (H1 & H2 - Highland Street; M1, M2 & M3 -Main Street; R1 thru R37 for each dwelling unit roof area; P1 thru P-15 representing area directed to each respective catch basin. P16 thru P18 represent the lower rear yard areas down gradient of dwelling units 14 thru 26 along the edge of isolated wetlands. Lawn Area drains AD-1, AD-2 & AD-3 have been provided to collect and direct residual runoff to recharge areas RD 14 & RD15+, until rates and volumes of P18 sheet flow towards edge of isolated wetland returned to below existing conditions comparative to S1.

Similar to the pre development watershed Comparison Edge 1L represents flow tributary to the isolated wetlands. The area tributary to this selected edge of comparison is 33,851 ft^2.

The selected Comparison Edge 2L represents flow tributary towards Highland Street. The area tributary to this selected edge of comparison is 7,371 ft^2.

The selected Comparison Edge 3L represents flow tributary towards a low point to remain in the southeast lawn area along Main Street behind the sidewalk. The area tributary to this selected edge of comparison is 31,924 $ft^{2,}$.

The selected Comparison Edge 4L represents flow tributary towards a low point located at the southwest property corner along Main Street behind the sidewalk. The area tributary to this selected edge of comparison is 9,461$ft^{2,}$.

The total watershed area within the limit of watershed analysis is 357,132 square feet.

Post-development design provides for the construction of nine primary subsurface infiltration systems, SWMA-1P thru SWMA-9P which are mostly associated with the collection and treatment of roadway runoff. SWM-2P is specifically for roof runoff only. In addition, many individual and common roof drywell areas have also been provided across the site. These systems consist of plastic chamber systems. The systems located adjacent to the proposed catch basin locations provide peak rate of runoff mitigation, water quality and groundwater recharge in the volume provided below the required emergency overflow

outlets that have been set above the 100-year storm event storage elevation. Stormwater runoff from all dwelling roof areas will be piped into underground piping network which discharges into the subsurface roof drywells.

Using the methods described in the stormwater modeling methodology above, runoff curve numbers and times of concentration are generated for each watershed for the pre-development condition to be used for comparison with the post-development condition described below. A schematic of the mathematical model and the results of the calculations for the 2-year, 10-year and 100-year Type III, 24-hour storm events are included in this analysis.

1.7 Compliance with DEP Stormwater Management Standards

Standard 1

No new stormwater conveyances (e.g. outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.

New stormwater runoff requiring treatment will be treated prior to being discharged towards the selected edge of comparison. Only emergency stormwater outfalls are proposed.

Standard 2

Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates. This Standard may be waived for discharges to land subject to coastal storm flowage as defined in 310 CMR 10.04.

See Tables 1 through 9 below which demonstrate the post-development peak discharge rates and volume of runoff are both less than or equal to the pre-development values towards **1L**, **2L** & **4L** which respectfully are to the onsite Isolated Wetland, the Highland Street Catch Basins and the southwest property corner boundary along Main Street.

Due to the sidewalk network within the Park, there will be a slight increase in both the rate and volume to the low areas of **3L** which will be mitigated by the lower elevation of the lawn areas. Runoff from the Oval in the Park will be diverted to vegetative lawn cover for mitigation and remain onsite for recharge as the preferred alternative.

Standard 3

Loss of annual recharge to groundwater shall be eliminated or minimized through the use of infiltration measures including environmentally sensitive site design, low impact development techniques, stormwater best management practices, and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from the pre-development conditions based on soil type. This Standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook.

The project site is analyzed using Hydrologic Soil Group A, Group B and a minor area of Group D. Groundwater recharge is provided by subsurface infiltration systems which lie within an area of loamy sand and sands as determined by on site soil testing performed by a certified soil evaluator. An exfiltration rate of 8.27 inches per hour are used as found in Table 2-1 of the Hydrology Handbook of Conservation Commissioners, March 2002 using Rawls, Brakensiek and Saxton, 1982.

Any unsuitable material encountered during construction of the surface infiltration pipe network will be removed and replaced with either on-site parent material or imported granular material. Should

refusal/ledge be encountered during construction it shall be removed to a depth of four feet below infiltration system and backfilled with clean blasted rock fragments.

Standard 4

Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS). This Standard is met when:
a. Suitable practices for source control and pollution prevention are identified in a long-term pollution prevention plan, and thereafter are implemented and maintained;
b. Structural stormwater best management practices are sized to capture the required water quality volume determined in accordance with the Massachusetts Stormwater Handbook; and
c. Pretreatment is provided in accordance with the Massachusetts Stormwater Handbook

The project will utilize deep-sump catch basins equipped with a hood/trap, followed by an oil grit separators which will direct runoff to an Isolator Rows which is comparable to a sediment forebay. Excess runoff following the Isolator Row will be sent to the chamber rows via a manifold system.

The project site is not considered a LUHPPL, within a Zone II or Interim Wellhead Protection Area or Critical Area. Given the stormwater management systems lie within an area of rapid infiltration water quality volume is based on a runoff of one inch.

Standard 5

For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable. If through source control and/or pollution prevention all land uses with higher potential pollutant loads cannot be completely protected from exposure to rain, snow melt, and stormwater runoff, the proponent shall use specific structural stormwater BMPs determined by the Department to be suitable for such uses as provided in the Massachusetts Stormwater Handbook. Stormwater discharges from land uses with higher potential pollutant loads shall also comply with the requirements of the Massachusetts Clean Waters Act, M.G.L. c. 21, §§ 26-53 and the regulations promulgated there under at 314 CMR 3.00, 314 CMR 4.00 and 314 CMR 5.00.

This project is not being considered a LUHPPL.

Standard 6

Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply, and stormwater discharges near or to any other critical area, require the use of the specific source control and pollution prevention measures and the specific structural stormwater best management practices determined by the Department to be suitable for managing discharges to such areas, as provided in the Massachusetts Stormwater Handbook. A discharge is near a critical area if there is a strong likelihood of a significant impact occurring to said area, taking into account site-specific factors. Stormwater discharges to Outstanding Resource Waters and Special Resource Waters shall be removed and set back from the receiving water or wetland and receive the highest and best practical method of treatment. A "storm water discharge" as defined in 314 CMR 3.04(2) (a) (1 or (b) to an Outstanding Resource Water or Special Resource Water shall comply with 314 CMR 3.00 and 314 CMR 4.00. Stormwater discharges to a Zone I or Zone A are prohibited unless essential to the operation of public water supply.

Stormwater discharge from this property is not within a Zone II, Interim Wellhead Protection Area of a public water supply or a critical area.

Standard 7

A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable: Standard 2, Standard 3, and the pretreatment and structural best management

practice requirements of Standards 4, 5, and 6. Existing stormwater discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Stormwater Management Standards and improve existing conditions.

This project is not considered a redevelopment.

Standard 8
A plan to control construction-related impacts including erosion, sedimentation and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plan) shall be developed and implemented.

A Stormwater Pollution Prevention Plan (SWPPP) will be prepared prior to land disturbance.

Standard 9
A long-term operation and maintenance plan shall be developed and implemented to ensure that stormwater management systems function as designed.

Refer to Section 4 Long Term Operation and Maintenance Plan (O&M).

Standard 10
All illicit discharges to the stormwater management system are prohibited.

Illicit Discharge Compliance Statement
No connection between the stormwater and wastewater management systems is proposed. Per requirements of Standard 10 it is herein stated that there are no proposed illicit discharges into the Stormwater Management System to be constructed as shown on the site plan.

1.8 Conclusion

Examining the following Peak Rate of Runoff and Basin Performance tables, the proposed stormwater management system is effective for mitigating the peak flow rates and volume of runoff from the limit of the watershed analysis for the 2, 10, 25 and 100-year storm events.

Table 1.0: Peak Rate of Runoff | Comparison Location 1L

Description	**2 Year**	**10 Year**	**25 Year**	**100 Year**
Existing Peak Rate of Runoff (cfs)	0.00	0.08	0.49	1.28
Proposed Peak Rate of Runoff (cfs)	0.00	0.08	0.27	0.54
Difference	**0.00**	**0.00**	**-0.32**	**-0.74**

Table 2.0: Peak Rate of Runoff | Comparison Location 2L

Description	**2 Year**	**10 Year**	**25 Year**	**100 Year**
Existing Peak Rate of Runoff (cfs)	0.03	0.20	0.40	0.59
Proposed Peak Rate of Runoff (cfs)	0.02	0.12	0.24	0.35
Difference	**-0.01**	**-0.08**	**-0.16**	**-0.24**

Table 3.0: Peak Rate of Runoff | Comparison Location 3L

Description	2 Year	10 Year	25 Year	100 Year	
Existing Peak Rate of Runoff (cfs)	0.00	0.01	0.10	0.24	
Proposed Peak Rate of Runoff (cfs)	0.00	0.02	0.13	0.28	Oval Park Sidewalk
Difference	**0.00**	**+0.01**	**+0.03**	**+0.04**	**In lawn area**

Table 4.0: Peak Rate of Runoff | Comparison Location 4L

Description	2 Year	10 Year	25 Year	100 Year	
Existing Peak Rate of Runoff (cfs)	0.00	0.00	0.02	0.08	
Proposed Peak Rate of Runoff (cfs)	0.00	0.00	0.01	0.03	
Difference	**0.00**	**0.00**	**-0.01**	**-0.05**	

Table 5.0: Volume of Runoff | Comparison Location 1L

Description	2 Year	10 Year	25 Year	100 Year	
Existing Volume of Runoff (cf)	0	2,283	6,961	12,341	
Proposed Volume of Runoff (cf)	84	835	1,827	2,850	
Difference	**+84**	**-1,448**	**-5,134**	**-9,491**	

Table 6.0: Volume of Runoff | Comparison Location 2L

Description	2 Year	10 Year	25 Year	100 Year	
Existing Volume of Runoff (cf)	301	960	1,649	2,295	
Proposed Volume of Runoff (cf)	158	497	850	1,179	
Difference	**-143**	**-463**	**-799**	**-1,116**	

Table 7.0: Volume of Runoff | Comparison Location 3L

Description	2 Year	10 Year	25 Year	100 Year	
Existing Volume of Runoff (cf)	0	360	1,097	1,946	
Proposed Volume of Runoff (cf)	9	437	1,152	1,938	To low area East of Oval Sidewalk
Difference	**+9**	**+77**	**+55**	**-8.0**	**In lawn area**

Table 8.0: Volume of Runoff | Comparison Location 4L

Description	2 Year	10 Year	25 Year	100 Year
Existing Volume of Runoff (cf)	0	89	651	1,450
Proposed Volume of Runoff (cf)	0	46	155	300
Difference	**0**	**-43**	**-496**	**-1150**

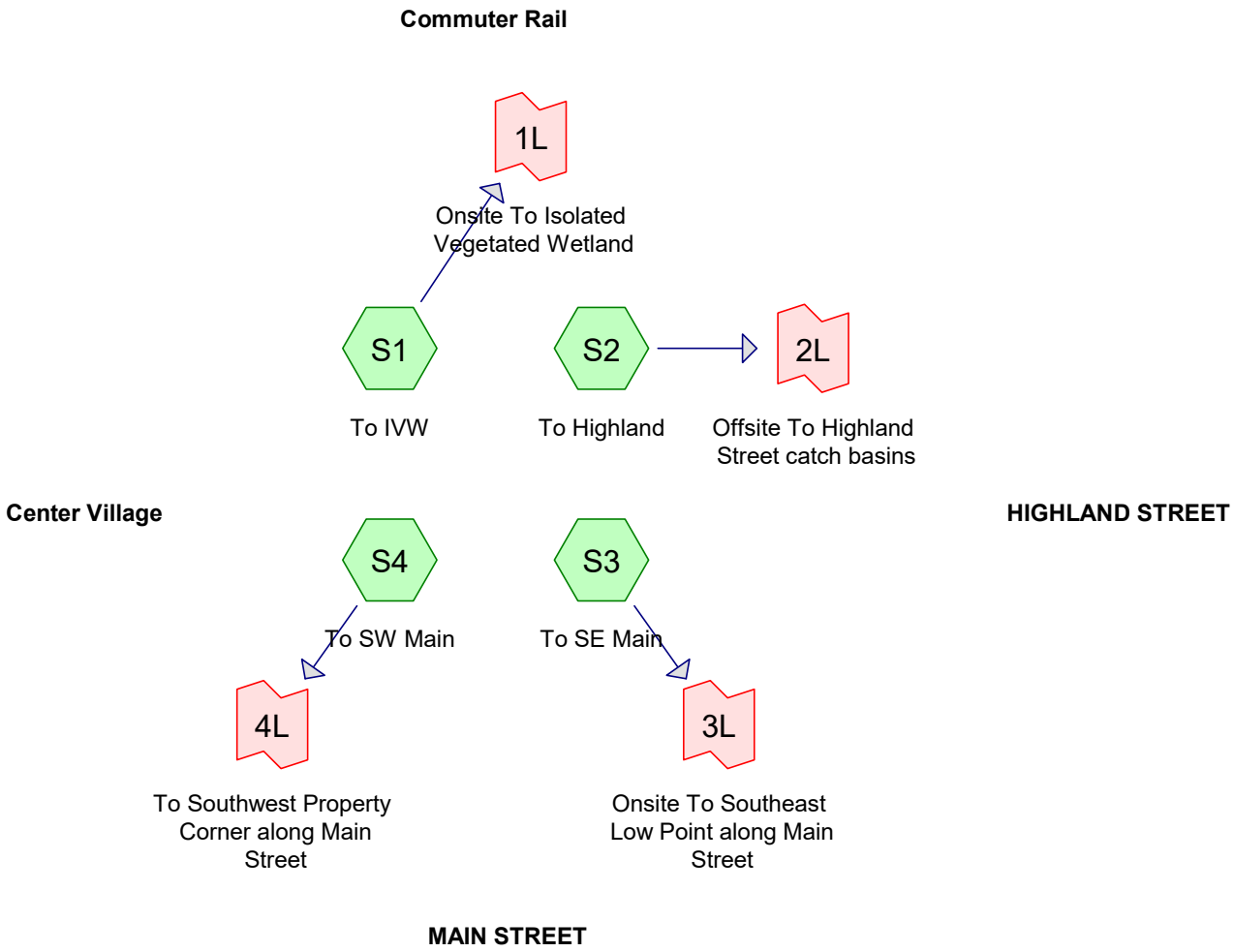
Table 9.0: Infiltration Chambers | SWMA-1P Through SWMA-9P

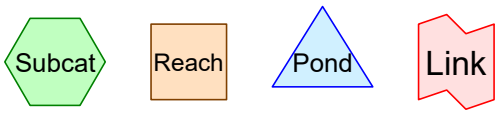
Description	Chamber System Provided	Surface Area Provided (sf)	Total Storage Volume Provided (cf)	100-Year Max Storage Volume (cf)	100 Year Max Elevation (ft)	Proposed Overflow Elevation (ft)
SWMA-1P	4500 1R8C	406	1,650	984	149.83	150.00
SWMA-2P	4500 2R10C	920	3,846	1,747	140.76	141.75
SWMA-3P	4500 2R17C	1,467	6,218	2,785	136.71	137.75
SWMA-4P	4500 2R10C	1,702	7,235	1,529	128.57	130.85
SWMA-5P	3500 2R10C	1,206	4,008	2,224	129.30	130.25
SWMA-6P	4500 4R6C	1,175	4,877	2,642	130.75	131.25
SWMA-7P	4500 3R10C	1,350	5,690	3,525	134.19	134.25
SWMA-8P	4500 2R9C	842	3,508	2,018	131.69	132.00
SWMA-9P	4500 1R12C	573	2,356	1,114	129.47	130.35

1.9 HydroCAD Data

1.9.1 Existing Condition

PREDEVELOPMENT





Routing Diagram for EXISTING_R1
Prepared by HP Inc., Printed 6/19/2019
HydroCAD® 10.00-25 s/n 06611 © 2019 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
44,621	39	>75% Grass cover, Good, HSG A (S1, S2, S3, S4)
2,420	76	Gravel cart path, HSG A (S1)
2,563	96	Gravel drive & parking area, HSG A (S3)
3,837	98	Impervious, HSG A (S2)
1,049	98	Paved parking, HSG A (S3, S4)
3,524	98	Roofs, HSG A (S1, S2)
631	98	Unconnected pavement, HSG A (S1)
665	98	Unconnected roofs, HSG A (S4)
234,189	30	Woods, Good, HSG A (S1, S2, S3, S4)
56,931	55	Woods, Good, HSG B (S1)
6,702	77	Woods, Good, HSG D (S1)
357,132	**39**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
293,499	HSG A	S1, S2, S3, S4
56,931	HSG B	S1
0	HSG C	
6,702	HSG D	S1
0	Other	
357,132		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover
44,621	0	0	0	0	44,621	>75% Grass cover, Good
2,420	0	0	0	0	2,420	Gravel cart path
2,563	0	0	0	0	2,563	Gravel drive & parking area
3,837	0	0	0	0	3,837	Impervious
1,049	0	0	0	0	1,049	Paved parking
3,524	0	0	0	0	3,524	Roofs
631	0	0	0	0	631	Unconnected pavement
665	0	0	0	0	665	Unconnected roofs
234,189	56,931	0	6,702	0	297,822	Woods, Good
293,499	**56,931**	**0**	**6,702**	**0**	**357,132**	**TOTAL AREA**

Time span=0.00-40.00 hrs, dt=0.05 hrs, 801 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 S1: To IVW Runoff Area=247,652 sf 1.17% Impervious Runoff Depth=0.00"
Flow Length=235' Slope=0.0200 '/' Tc=23.2 min CN=39 Runoff=0.00 cfs 0 cf

Subcatchment S2: To Highland Runoff Area=14,494 sf 35.15% Impervious Runoff Depth=0.25"
Flow Length=156' Tc=9.9 min CN=56 Runoff=0.03 cfs 301 cf

Subcatchment S3: To SE Main Runoff Area=39,043 sf 1.80% Impervious Runoff Depth=0.00"
Flow Length=160' Tc=9.4 min CN=39 Runoff=0.00 cfs 0 cf

Subcatchment S4: To SW Main Runoff Area=55,943 sf 1.81% Impervious Runoff Depth=0.00"
Flow Length=224' Tc=17.4 min CN=34 Runoff=0.00 cfs 0 cf

Link 1L: Onsite To Isolated Vegetated Wetland delayed by 6.0 min Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Link 2L: Offsite To Highland Street catch basins Inflow=0.03 cfs 301 cf
Primary=0.03 cfs 301 cf

Link 3L: Onsite To Southeast Low Point along Main Street Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Link 4L: To Southwest Property Corner along Main Street Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Total Runoff Area = 357,132 sf Runoff Volume = 301 cf Average Runoff Depth = 0.01"
97.28% Pervious = 347,426 sf 2.72% Impervious = 9,706 sf

Summary for Subcatchment S1: To IVW

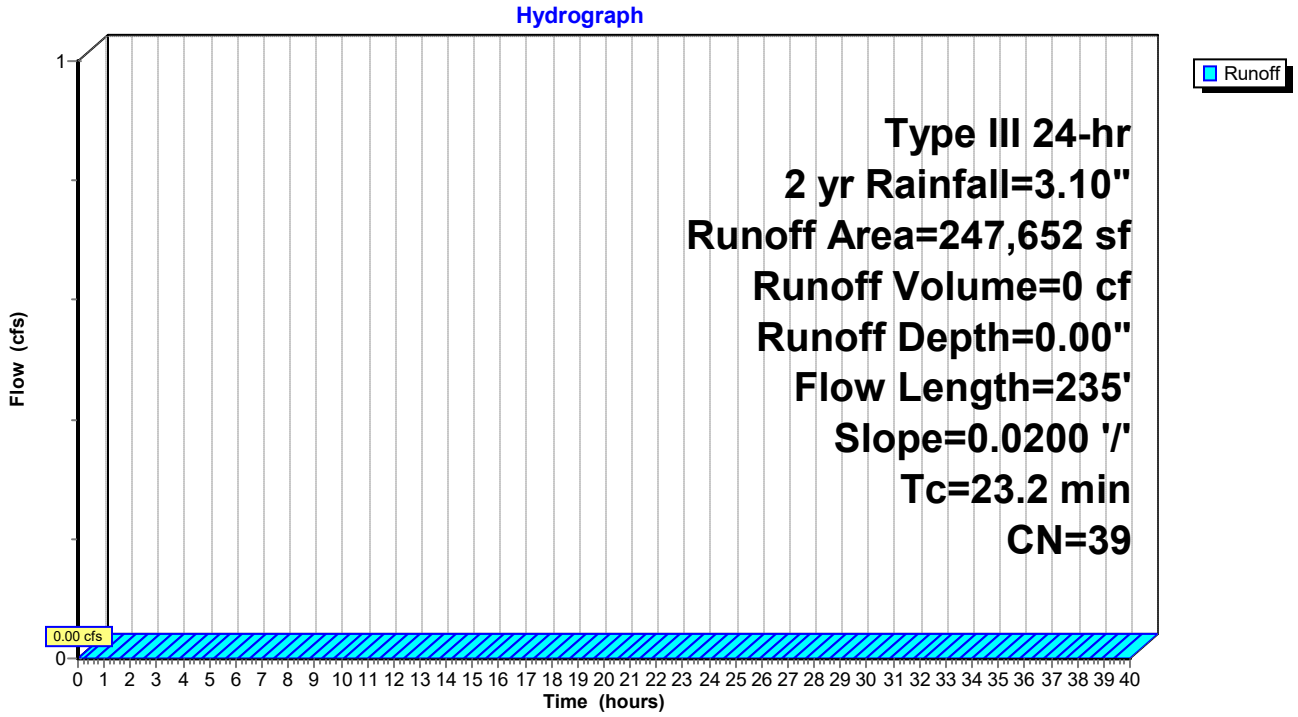
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

	Area (sf)	CN	Description
	168,807	30	Woods, Good, HSG A
	56,931	55	Woods, Good, HSG B
	6,702	77	Woods, Good, HSG D
*	2,420	76	Gravel cart path, HSG A
	9,895	39	>75% Grass cover, Good, HSG A
	2,266	98	Roofs, HSG A
	631	98	Unconnected pavement, HSG A
	247,652	39	Weighted Average
	244,755		98.83% Pervious Area
	2,897		1.17% Impervious Area
	631		21.78% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.8	50	0.0200	0.04		**Sheet Flow, A-B** Woods: Dense underbrush n= 0.800 P2= 3.10"
1.4	185	0.0200	2.28		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
23.2	235	Total			

Subcatchment S1: To IVW



Summary for Subcatchment S2: To Highland

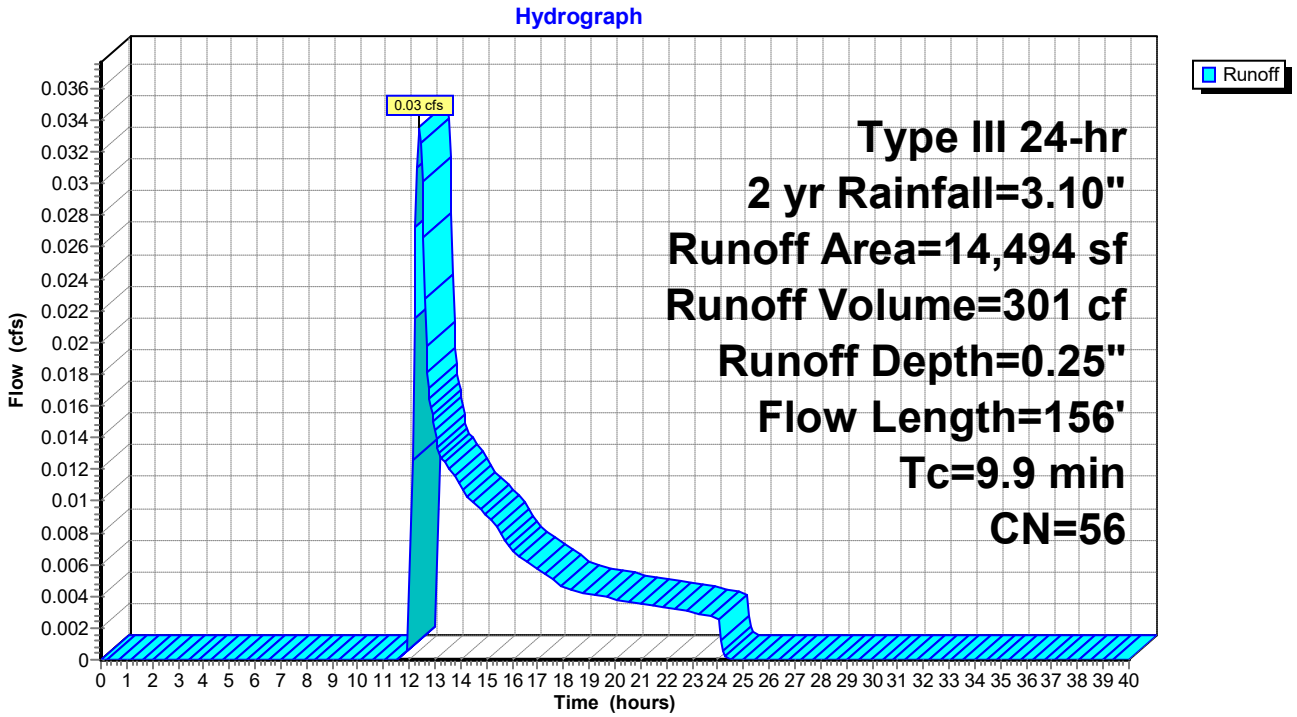
Runoff = 0.03 cfs @ 12.39 hrs, Volume= 301 cf, Depth= 0.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

	Area (sf)	CN	Description
	6,462	30	Woods, Good, HSG A
	2,937	39	>75% Grass cover, Good, HSG A
*	3,837	98	Impervious, HSG A
	1,258	98	Roofs, HSG A
	14,494	56	Weighted Average
	9,399		64.85% Pervious Area
	5,095		35.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.6	50	0.0140	0.09		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.10"
0.1	39	0.1300	5.80		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
0.2	67	0.1000	5.09		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
9.9	156	Total			

Subcatchment S2: To Highland



Summary for Subcatchment S3: To SE Main

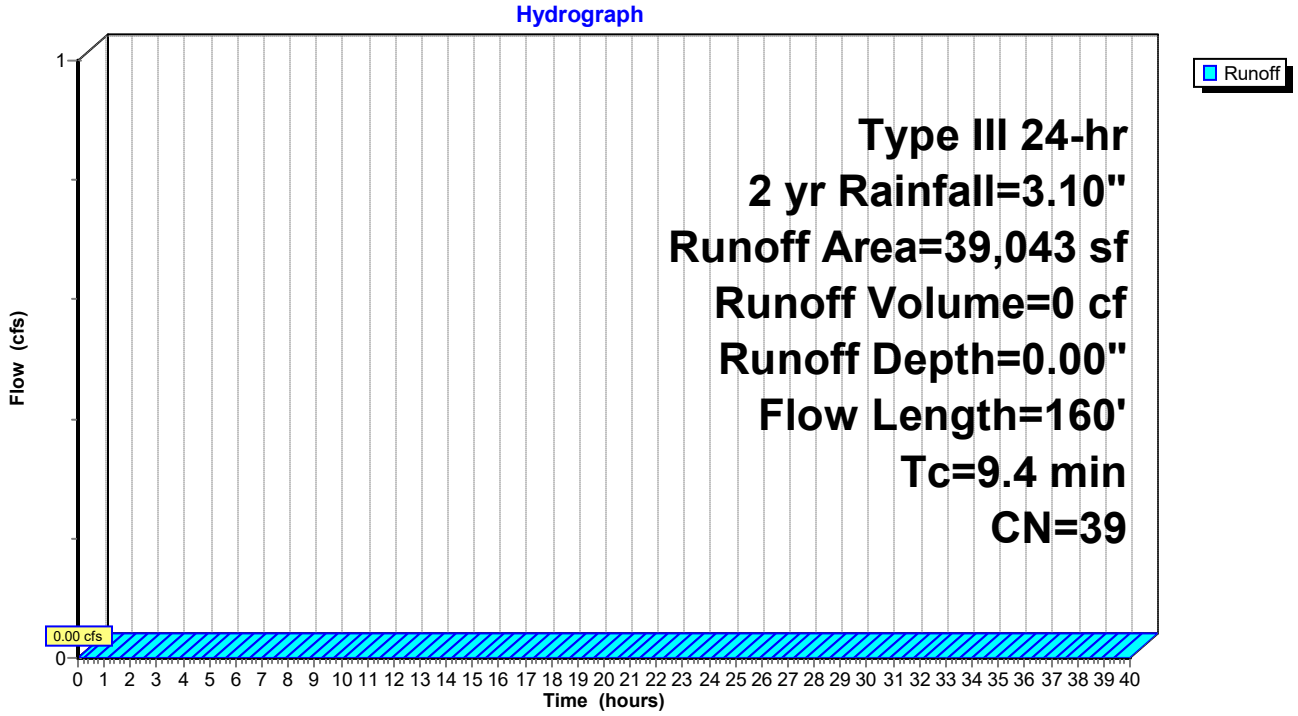
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

	Area (sf)	CN	Description
	21,276	30	Woods, Good, HSG A
	14,500	39	>75% Grass cover, Good, HSG A
	704	98	Paved parking, HSG A
*	2,563	96	Gravel drive & parking area, HSG A
	39,043	39	Weighted Average
	38,339		98.20% Pervious Area
	704		1.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	50	0.0500	0.10		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
0.7	110	0.0300	2.79		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
9.4	160	Total			

Subcatchment S3: To SE Main



Summary for Subcatchment S4: To SW Main

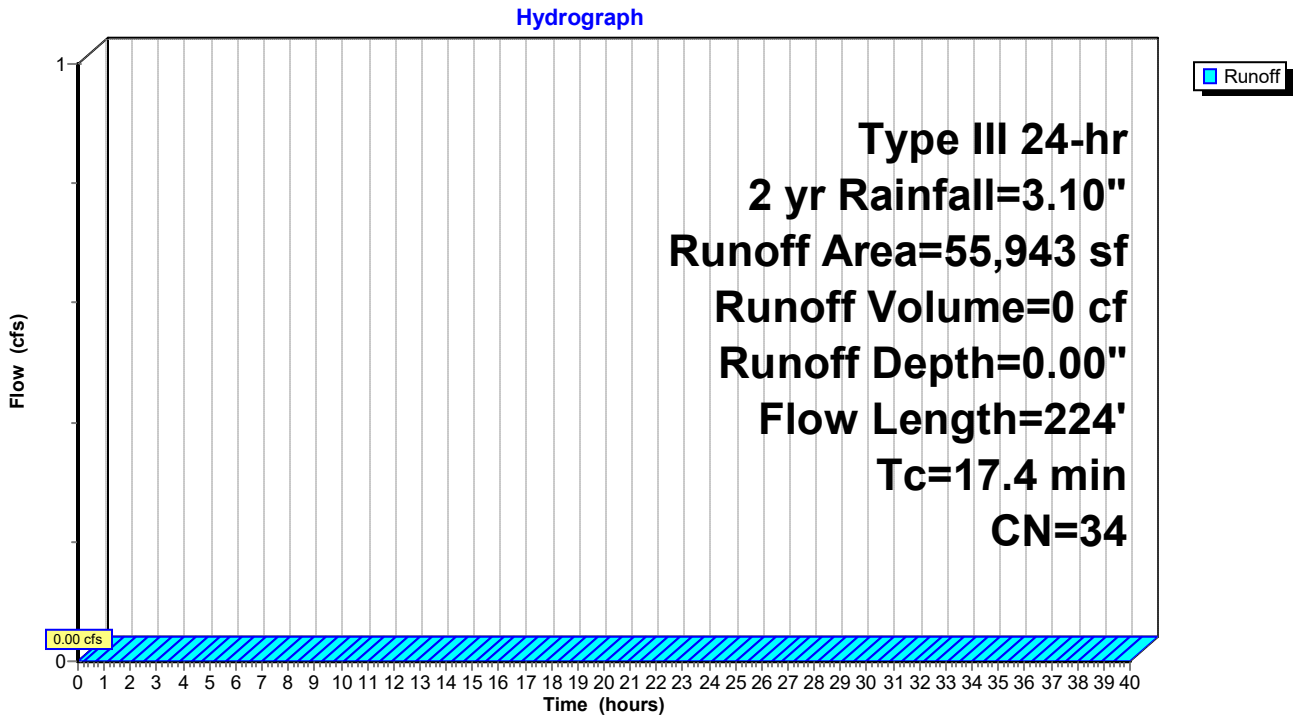
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

Area (sf)	CN	Description
37,644	30	Woods, Good, HSG A
17,289	39	>75% Grass cover, Good, HSG A
345	98	Paved parking, HSG A
665	98	Unconnected roofs, HSG A
55,943	34	Weighted Average
54,933		98.19% Pervious Area
1,010		1.81% Impervious Area
665		65.84% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	50	0.0100	0.05		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
0.1	53	0.1500	6.24		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
0.8	121	0.0240	2.49		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
17.4	224	Total			

Subcatchment S4: To SW Main

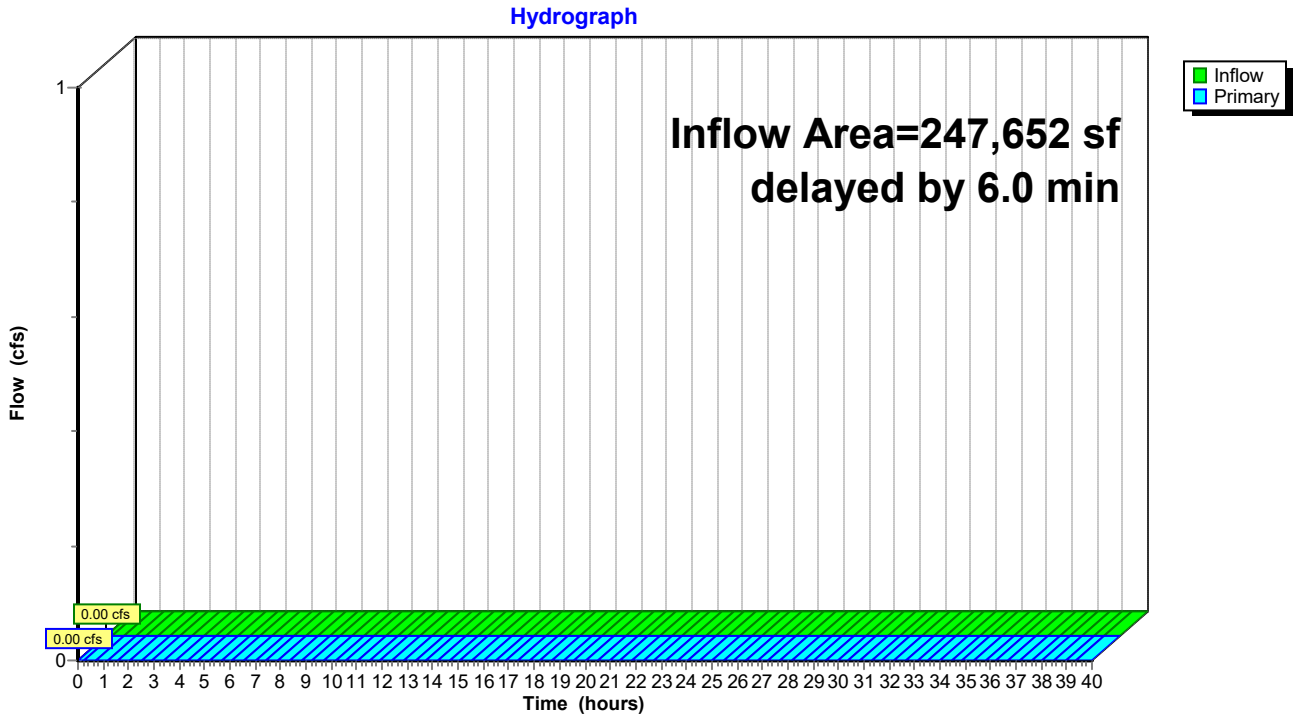


Summary for Link 1L: Onsite To Isolated Vegetated Wetland

Inflow Area = 247,652 sf, 1.17% Impervious, Inflow Depth = 0.00" for 2 yr event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow delayed by 6.0 min, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Link 1L: Onsite To Isolated Vegetated Wetland

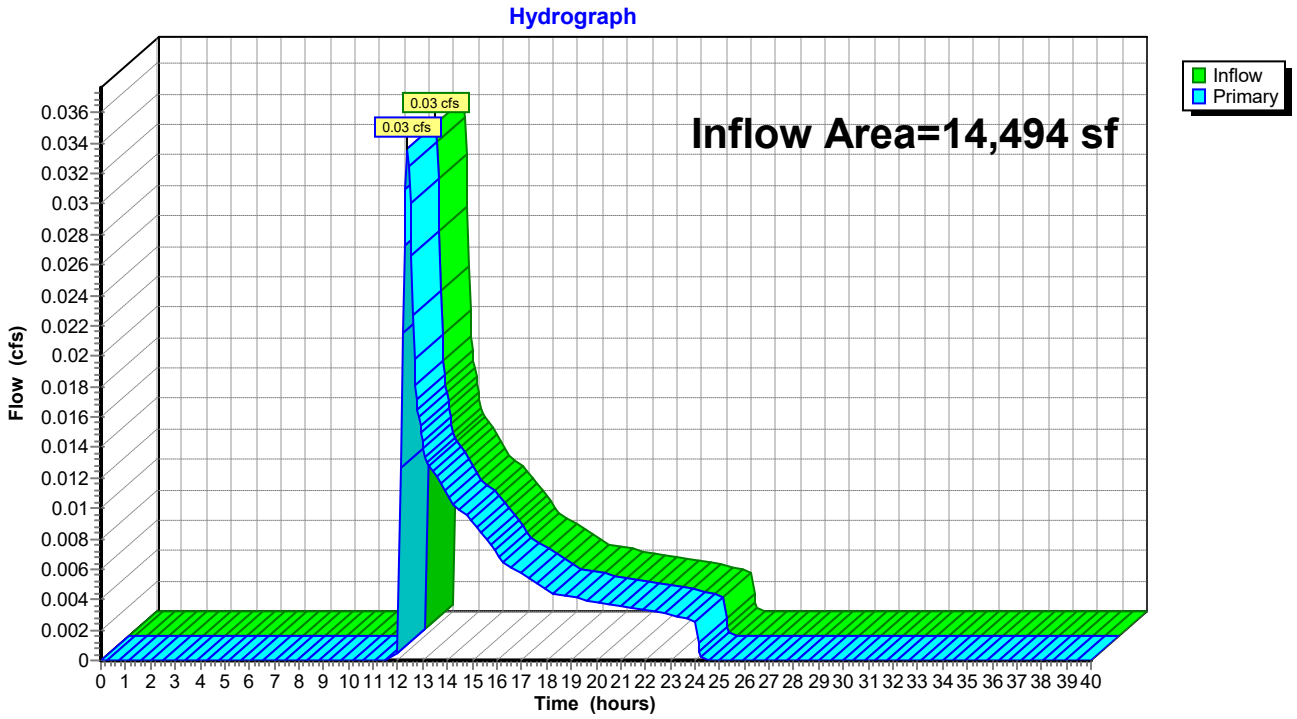


Summary for Link 2L: Offsite To Highland Street catch basins

Inflow Area = 14,494 sf, 35.15% Impervious, Inflow Depth = 0.25" for 2 yr event
Inflow = 0.03 cfs @ 12.39 hrs, Volume= 301 cf
Primary = 0.03 cfs @ 12.39 hrs, Volume= 301 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Link 2L: Offsite To Highland Street catch basins

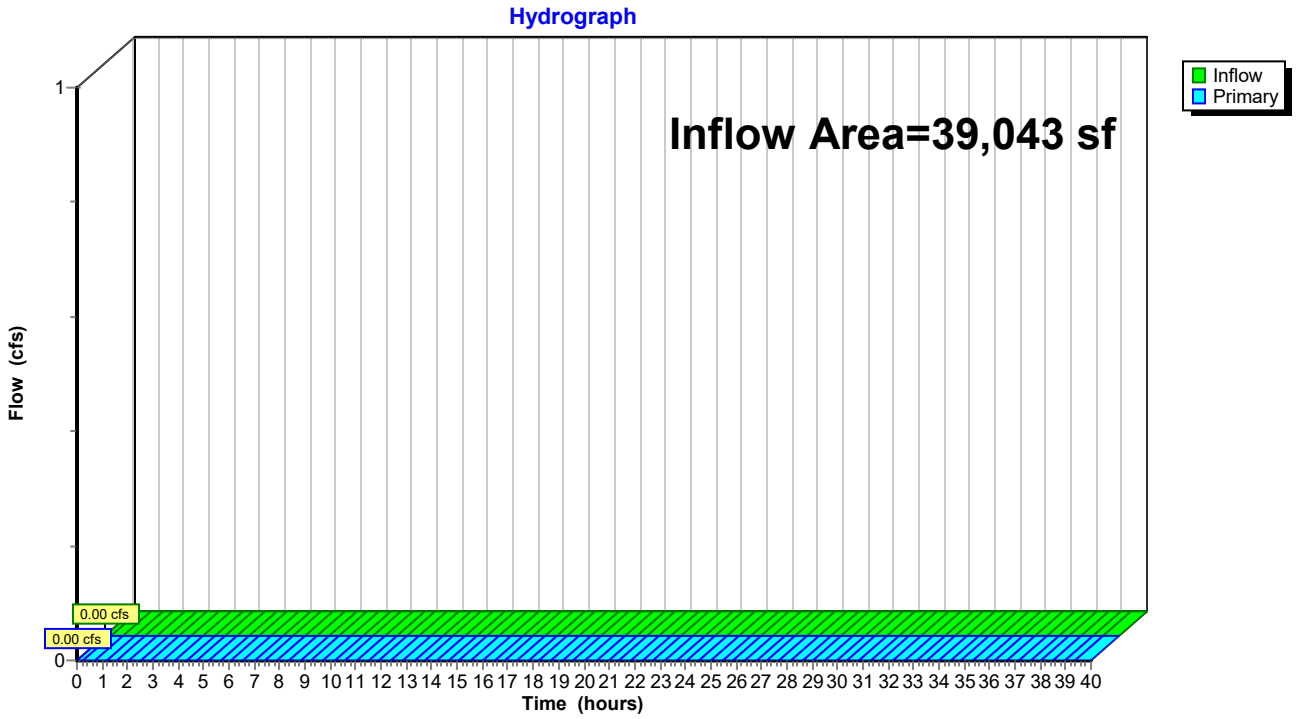


Summary for Link 3L: Onsite To Southeast Low Point along Main Street

Inflow Area = 39,043 sf, 1.80% Impervious, Inflow Depth = 0.00" for 2 yr event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Link 3L: Onsite To Southeast Low Point along Main Street

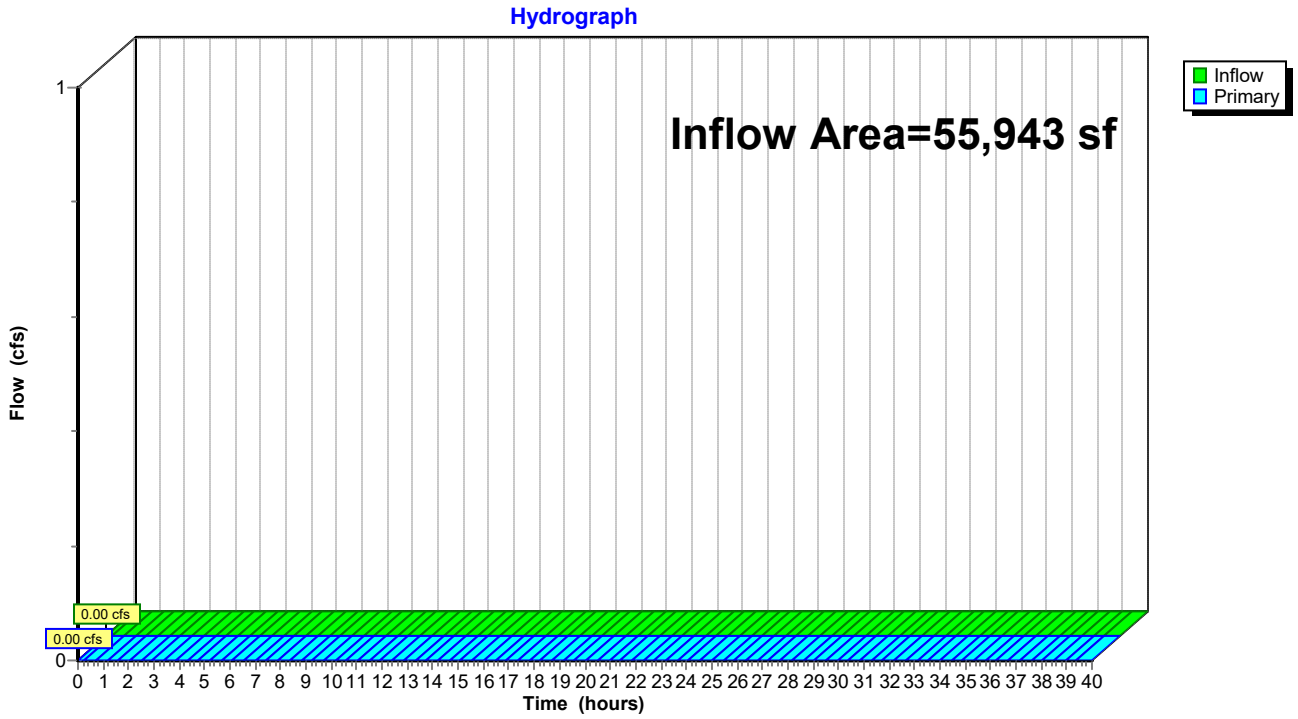


Summary for Link 4L: To Southwest Property Corner along Main Street

Inflow Area = 55,943 sf, 1.81% Impervious, Inflow Depth = 0.00" for 2 yr event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Link 4L: To Southwest Property Corner along Main Street



Time span=0.00-40.00 hrs, dt=0.05 hrs, 801 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 S1: To IVW Runoff Area=247,652 sf 1.17% Impervious Runoff Depth=0.11"
Flow Length=235' Slope=0.0200 '/' Tc=23.2 min CN=39 Runoff=0.08 cfs 2,283 cf

Subcatchment S2: To Highland Runoff Area=14,494 sf 35.15% Impervious Runoff Depth=0.80"
Flow Length=156' Tc=9.9 min CN=56 Runoff=0.20 cfs 960 cf

Subcatchment S3: To SE Main Runoff Area=39,043 sf 1.80% Impervious Runoff Depth=0.11"
Flow Length=160' Tc=9.4 min CN=39 Runoff=0.01 cfs 360 cf

Subcatchment S4: To SW Main Runoff Area=55,943 sf 1.81% Impervious Runoff Depth=0.02"
Flow Length=224' Tc=17.4 min CN=34 Runoff=0.00 cfs 89 cf

Link 1L: Onsite To Isolated Vegetated Wetland delayed by 6.0 min Inflow=0.08 cfs 2,283 cf
Primary=0.08 cfs 2,283 cf

Link 2L: Offsite To Highland Street catch basins Inflow=0.20 cfs 960 cf
Primary=0.20 cfs 960 cf

Link 3L: Onsite To Southeast Low Point along Main Street Inflow=0.01 cfs 360 cf
Primary=0.01 cfs 360 cf

Link 4L: To Southwest Property Corner along Main Street Inflow=0.00 cfs 89 cf
Primary=0.00 cfs 89 cf

Total Runoff Area = 357,132 sf Runoff Volume = 3,692 cf Average Runoff Depth = 0.12"
97.28% Pervious = 347,426 sf 2.72% Impervious = 9,706 sf

Summary for Subcatchment S1: To IVW

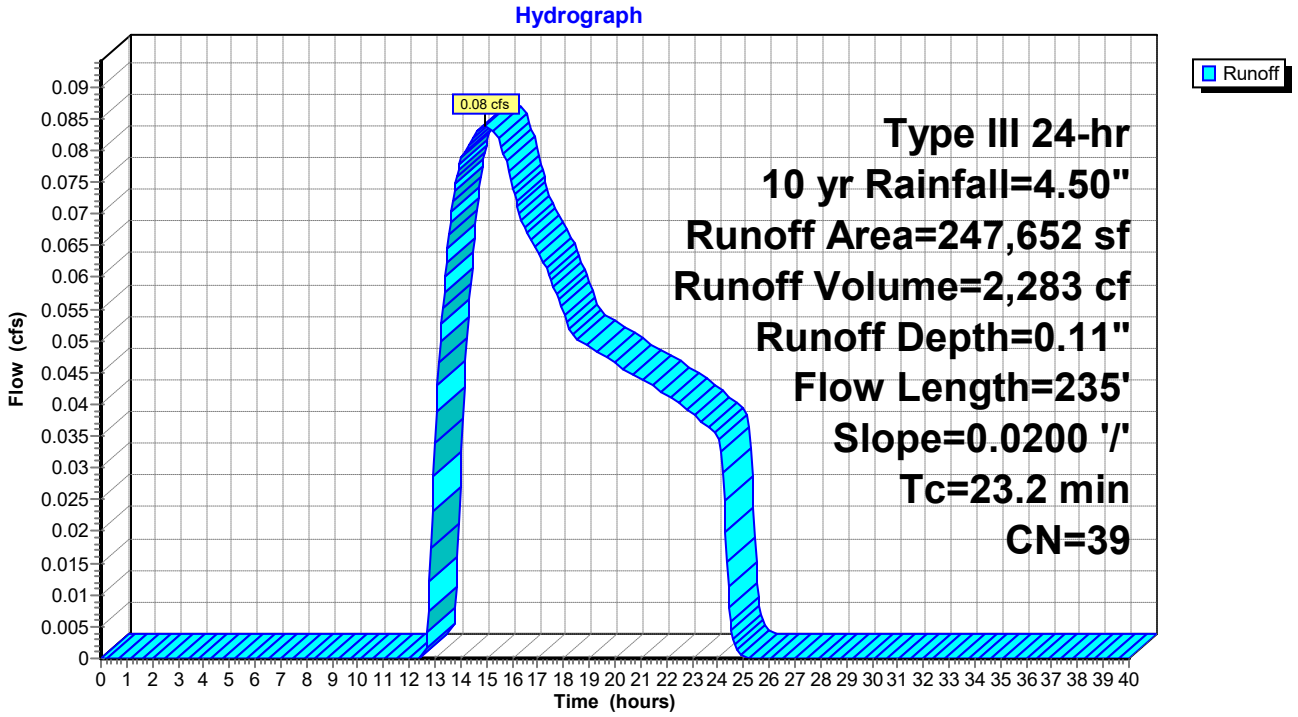
Runoff = 0.08 cfs @ 14.97 hrs, Volume= 2,283 cf, Depth= 0.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr Rainfall=4.50"

	Area (sf)	CN	Description
	168,807	30	Woods, Good, HSG A
	56,931	55	Woods, Good, HSG B
	6,702	77	Woods, Good, HSG D
*	2,420	76	Gravel cart path, HSG A
	9,895	39	>75% Grass cover, Good, HSG A
	2,266	98	Roofs, HSG A
	631	98	Unconnected pavement, HSG A
	247,652	39	Weighted Average
	244,755		98.83% Pervious Area
	2,897		1.17% Impervious Area
	631		21.78% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.8	50	0.0200	0.04		**Sheet Flow, A-B**
					Woods: Dense underbrush n= 0.800 P2= 3.10"
1.4	185	0.0200	2.28		**Shallow Concentrated Flow, B-C**
					Unpaved Kv= 16.1 fps
23.2	235	Total			

Subcatchment S1: To IVW



Summary for Subcatchment S2: To Highland

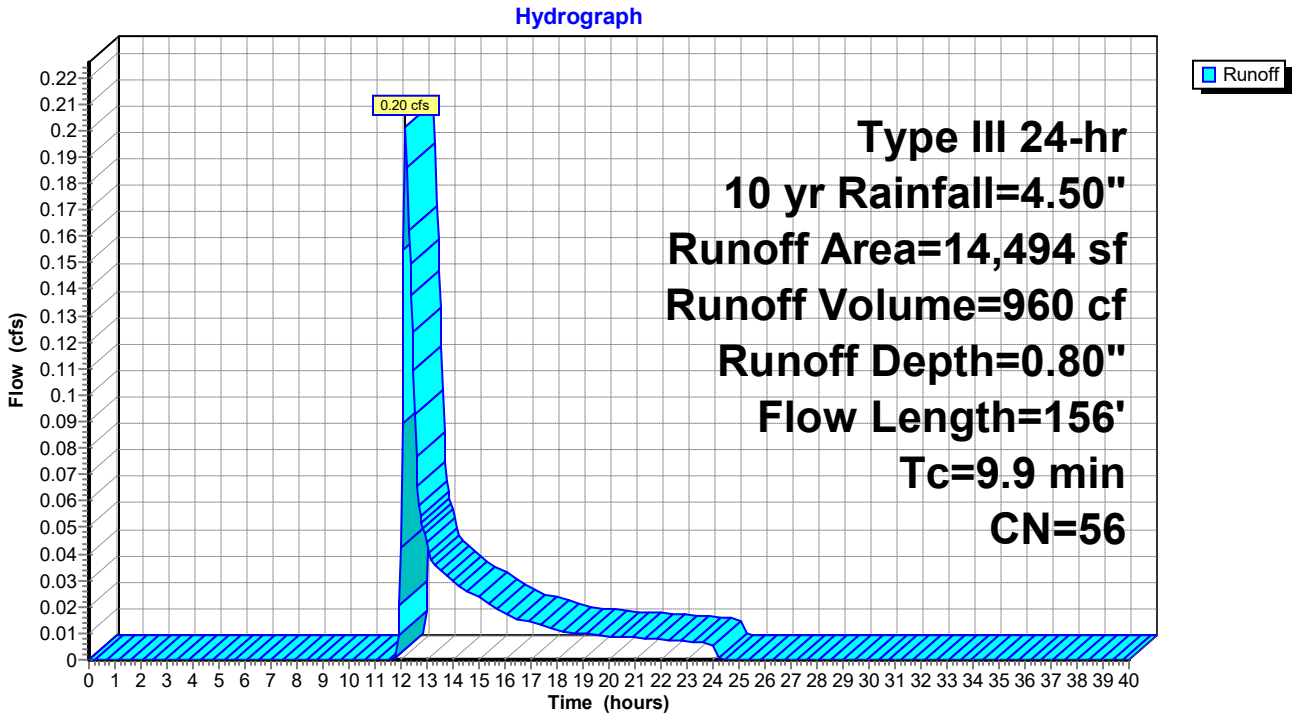
Runoff = 0.20 cfs @ 12.17 hrs, Volume= 960 cf, Depth= 0.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr Rainfall=4.50"

	Area (sf)	CN	Description
	6,462	30	Woods, Good, HSG A
	2,937	39	>75% Grass cover, Good, HSG A
*	3,837	98	Impervious, HSG A
	1,258	98	Roofs, HSG A
	14,494	56	Weighted Average
	9,399		64.85% Pervious Area
	5,095		35.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.6	50	0.0140	0.09		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.10"
0.1	39	0.1300	5.80		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
0.2	67	0.1000	5.09		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
9.9	156	Total			

Subcatchment S2: To Highland



Summary for Subcatchment S3: To SE Main

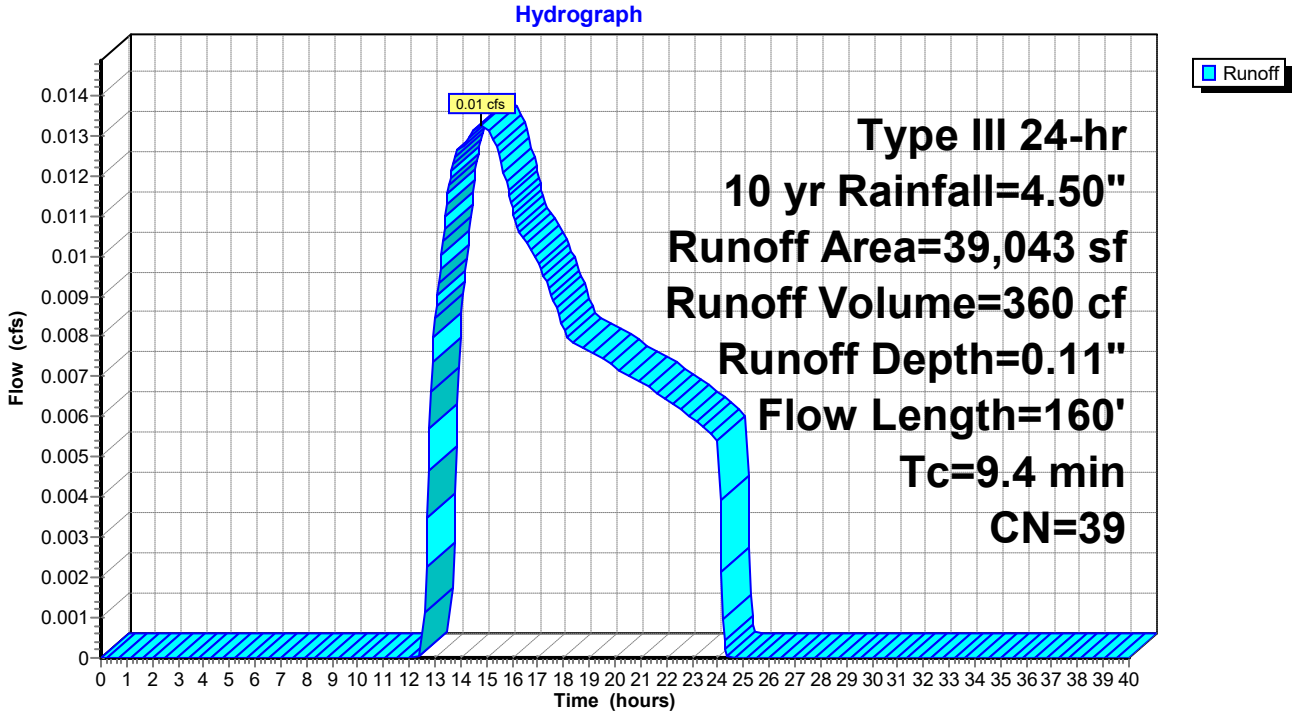
Runoff = 0.01 cfs @ 14.77 hrs, Volume= 360 cf, Depth= 0.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr Rainfall=4.50"

	Area (sf)	CN	Description
	21,276	30	Woods, Good, HSG A
	14,500	39	>75% Grass cover, Good, HSG A
	704	98	Paved parking, HSG A
*	2,563	96	Gravel drive & parking area, HSG A
	39,043	39	Weighted Average
	38,339		98.20% Pervious Area
	704		1.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	50	0.0500	0.10		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
0.7	110	0.0300	2.79		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
9.4	160	Total			

Subcatchment S3: To SE Main



Summary for Subcatchment S4: To SW Main

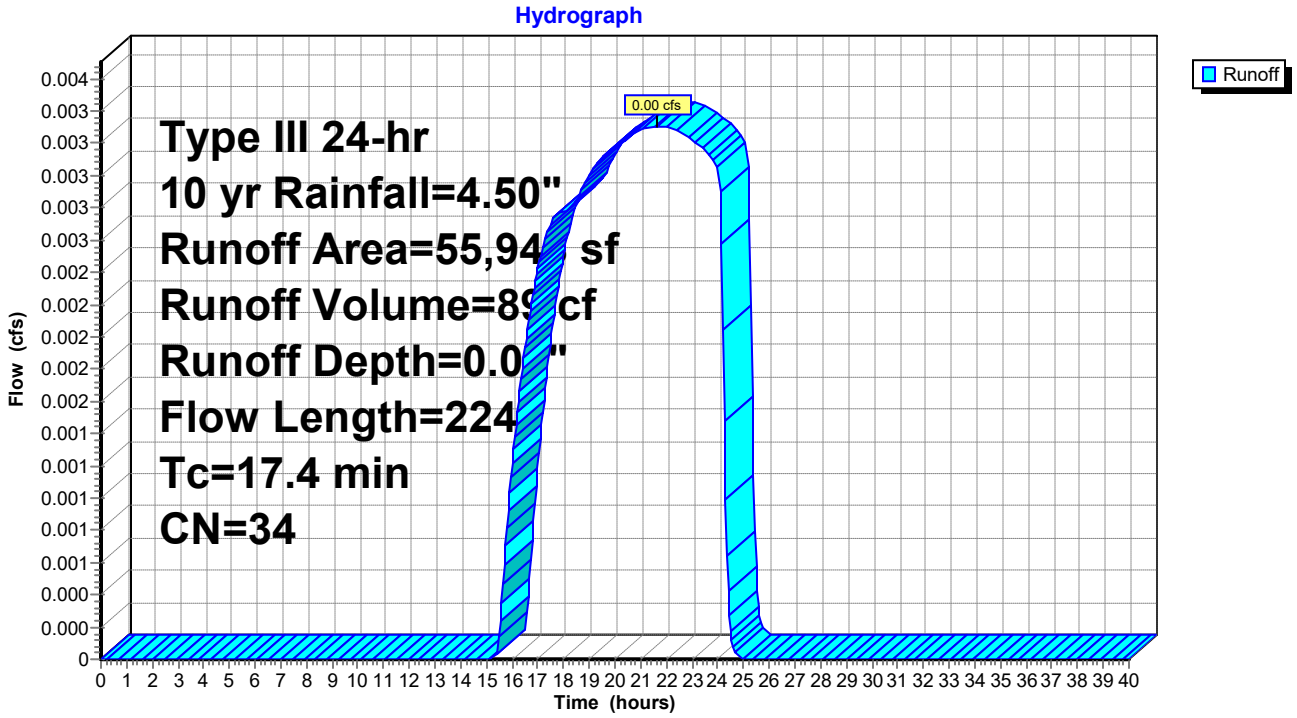
Runoff = 0.00 cfs @ 21.66 hrs, Volume= 89 cf, Depth= 0.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr Rainfall=4.50"

Area (sf)	CN	Description
37,644	30	Woods, Good, HSG A
17,289	39	>75% Grass cover, Good, HSG A
345	98	Paved parking, HSG A
665	98	Unconnected roofs, HSG A
55,943	34	Weighted Average
54,933		98.19% Pervious Area
1,010		1.81% Impervious Area
665		65.84% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	50	0.0100	0.05		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
0.1	53	0.1500	6.24		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
0.8	121	0.0240	2.49		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
17.4	224	Total			

Subcatchment S4: To SW Main

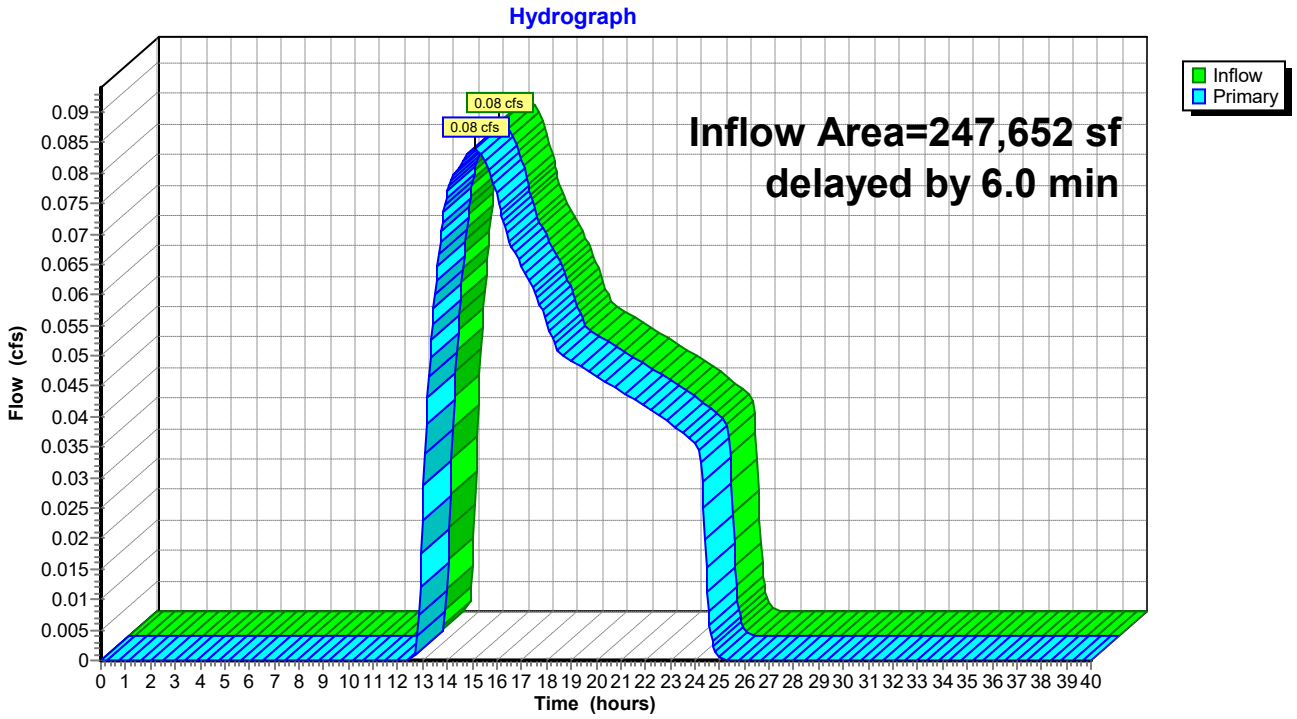


Summary for Link 1L: Onsite To Isolated Vegetated Wetland

Inflow Area = 247,652 sf, 1.17% Impervious, Inflow Depth = 0.11" for 10 yr event
Inflow = 0.08 cfs @ 14.97 hrs, Volume= 2,283 cf
Primary = 0.08 cfs @ 15.07 hrs, Volume= 2,283 cf, Atten= 0%, Lag= 6.0 min

Primary outflow = Inflow delayed by 6.0 min, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Link 1L: Onsite To Isolated Vegetated Wetland

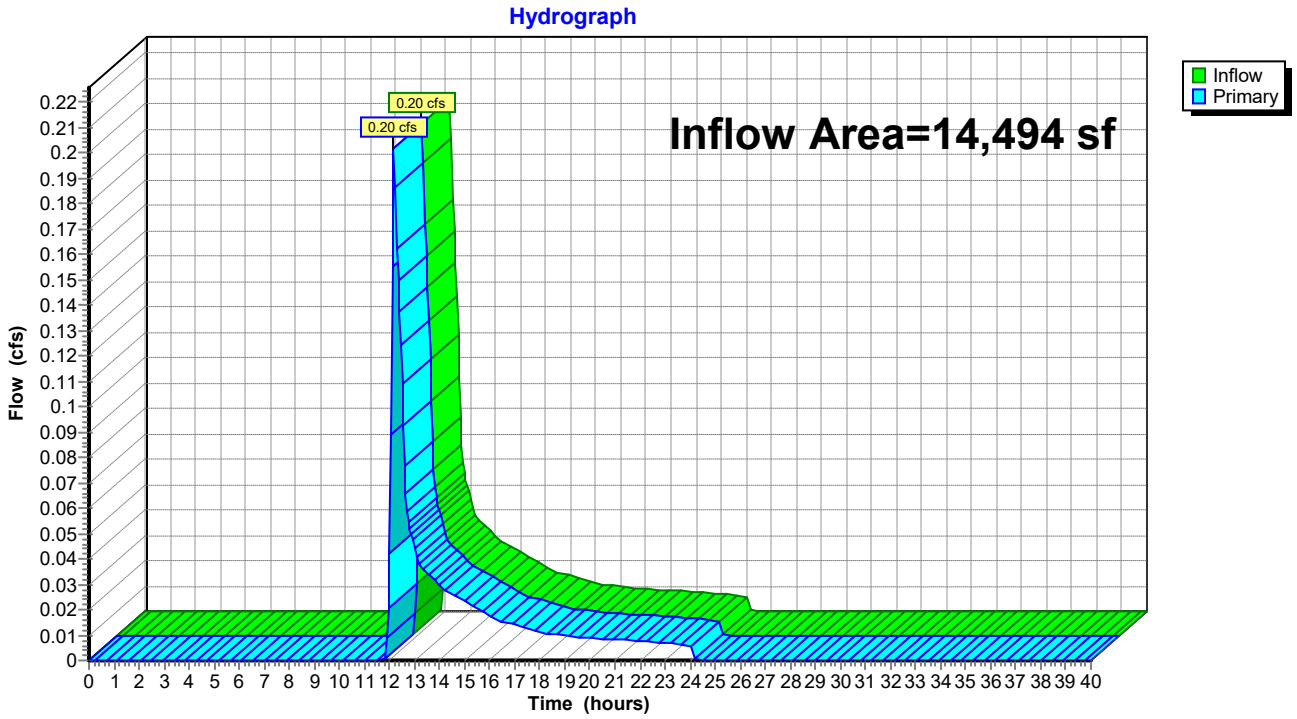


Summary for Link 2L: Offsite To Highland Street catch basins

Inflow Area = 14,494 sf, 35.15% Impervious, Inflow Depth = 0.80" for 10 yr event
Inflow = 0.20 cfs @ 12.17 hrs, Volume= 960 cf
Primary = 0.20 cfs @ 12.17 hrs, Volume= 960 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Link 2L: Offsite To Highland Street catch basins

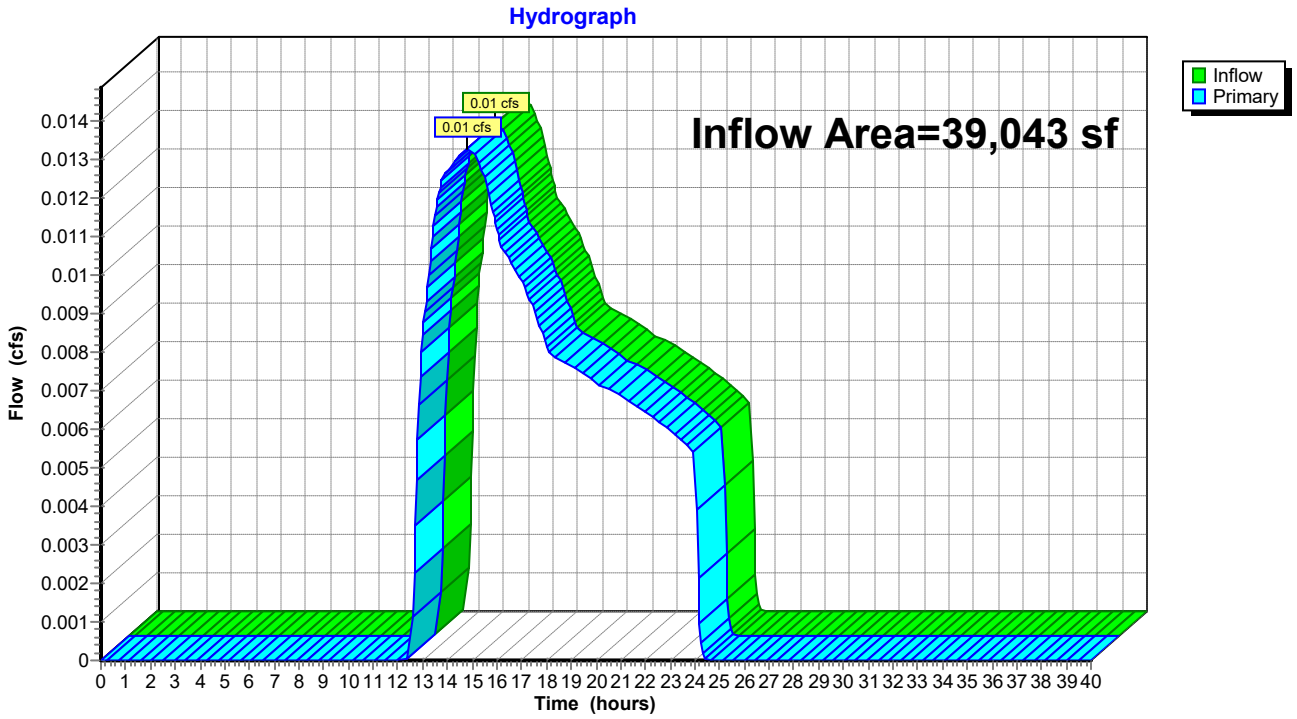


Summary for Link 3L: Onsite To Southeast Low Point along Main Street

Inflow Area = 39,043 sf, 1.80% Impervious, Inflow Depth = 0.11" for 10 yr event
Inflow = 0.01 cfs @ 14.77 hrs, Volume= 360 cf
Primary = 0.01 cfs @ 14.77 hrs, Volume= 360 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Link 3L: Onsite To Southeast Low Point along Main Street

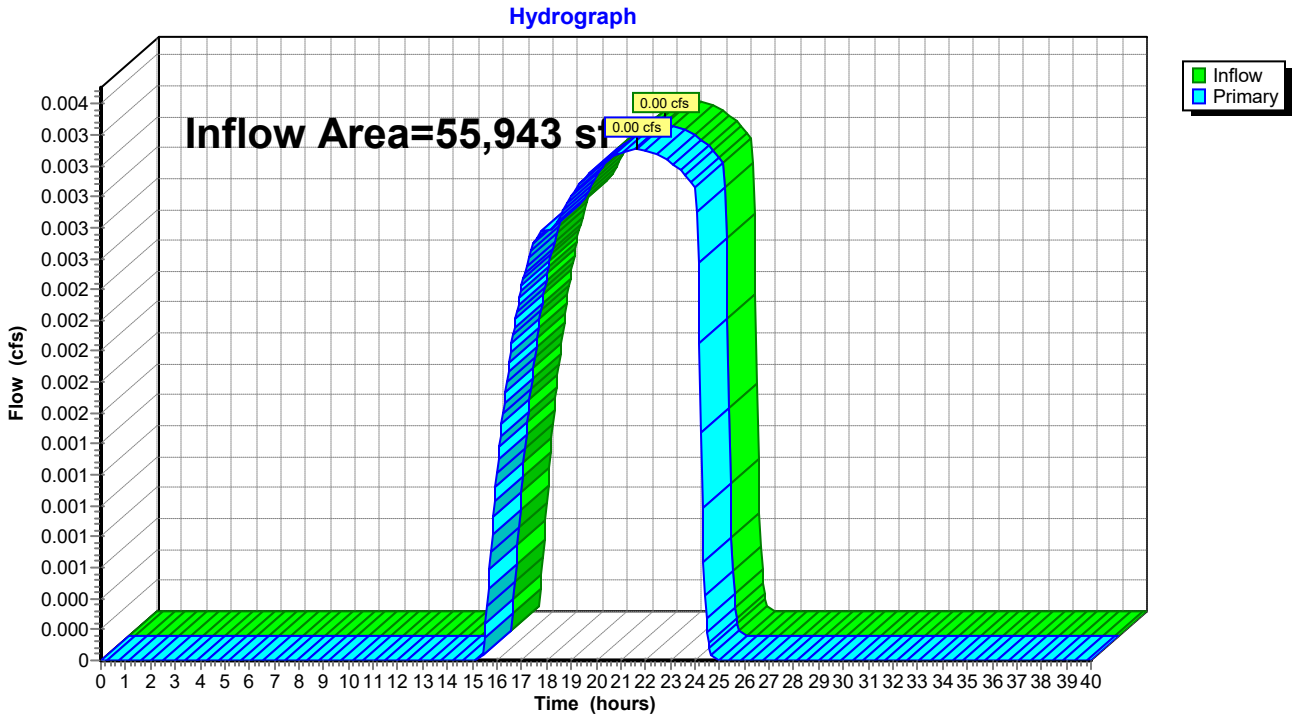


Summary for Link 4L: To Southwest Property Corner along Main Street

Inflow Area = 55,943 sf, 1.81% Impervious, Inflow Depth = 0.02" for 10 yr event
Inflow = 0.00 cfs @ 21.66 hrs, Volume= 89 cf
Primary = 0.00 cfs @ 21.66 hrs, Volume= 89 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Link 4L: To Southwest Property Corner along Main Street



Time span=0.00-40.00 hrs, dt=0.05 hrs, 801 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 S1: To IVW Runoff Area=247,652 sf 1.17% Impervious Runoff Depth=0.34"
Flow Length=235' Slope=0.0200 '/' Tc=23.2 min CN=39 Runoff=0.49 cfs 6,961 cf

Subcatchment S2: To Highland Runoff Area=14,494 sf 35.15% Impervious Runoff Depth=1.37"
Flow Length=156' Tc=9.9 min CN=56 Runoff=0.40 cfs 1,649 cf

Subcatchment S3: To SE Main Runoff Area=39,043 sf 1.80% Impervious Runoff Depth=0.34"
Flow Length=160' Tc=9.4 min CN=39 Runoff=0.10 cfs 1,097 cf

Subcatchment S4: To SW Main Runoff Area=55,943 sf 1.81% Impervious Runoff Depth=0.14"
Flow Length=224' Tc=17.4 min CN=34 Runoff=0.02 cfs 651 cf

Link 1L: Onsite To Isolated Vegetated Wetland delayed by 6.0 min Inflow=0.49 cfs 6,961 cf
Primary=0.49 cfs 6,961 cf

Link 2L: Offsite To Highland Street catch basins Inflow=0.40 cfs 1,649 cf
Primary=0.40 cfs 1,649 cf

Link 3L: Onsite To Southeast Low Point along Main Street Inflow=0.10 cfs 1,097 cf
Primary=0.10 cfs 1,097 cf

Link 4L: To Southwest Property Corner along Main Street Inflow=0.02 cfs 651 cf
Primary=0.02 cfs 651 cf

Total Runoff Area = 357,132 sf Runoff Volume = 10,359 cf Average Runoff Depth = 0.35"
97.28% Pervious = 347,426 sf 2.72% Impervious = 9,706 sf

Summary for Subcatchment S1: To IVW

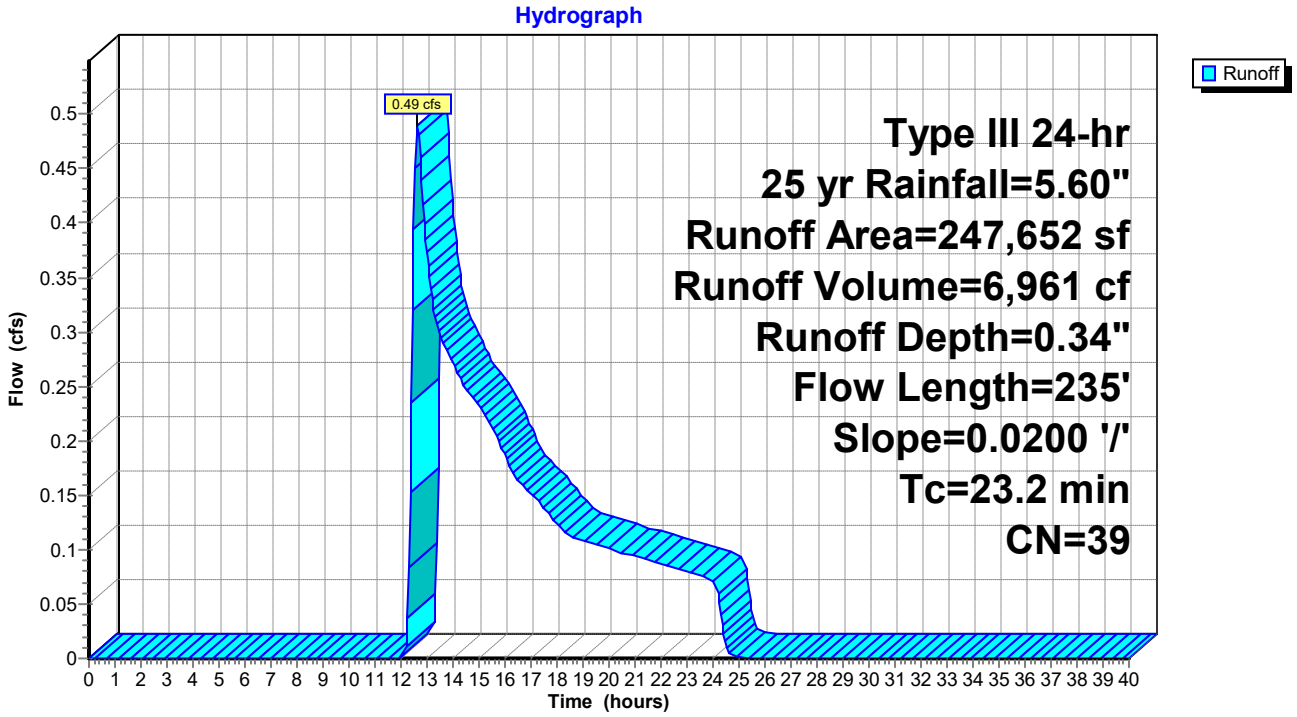
Runoff = 0.49 cfs @ 12.65 hrs, Volume= 6,961 cf, Depth= 0.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 yr Rainfall=5.60"

	Area (sf)	CN	Description
	168,807	30	Woods, Good, HSG A
	56,931	55	Woods, Good, HSG B
	6,702	77	Woods, Good, HSG D
*	2,420	76	Gravel cart path, HSG A
	9,895	39	>75% Grass cover, Good, HSG A
	2,266	98	Roofs, HSG A
	631	98	Unconnected pavement, HSG A
	247,652	39	Weighted Average
	244,755		98.83% Pervious Area
	2,897		1.17% Impervious Area
	631		21.78% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.8	50	0.0200	0.04		**Sheet Flow, A-B**
					Woods: Dense underbrush n= 0.800 P2= 3.10"
1.4	185	0.0200	2.28		**Shallow Concentrated Flow, B-C**
					Unpaved Kv= 16.1 fps
23.2	235	Total			

Subcatchment S1: To IVW



Summary for Subcatchment S2: To Highland

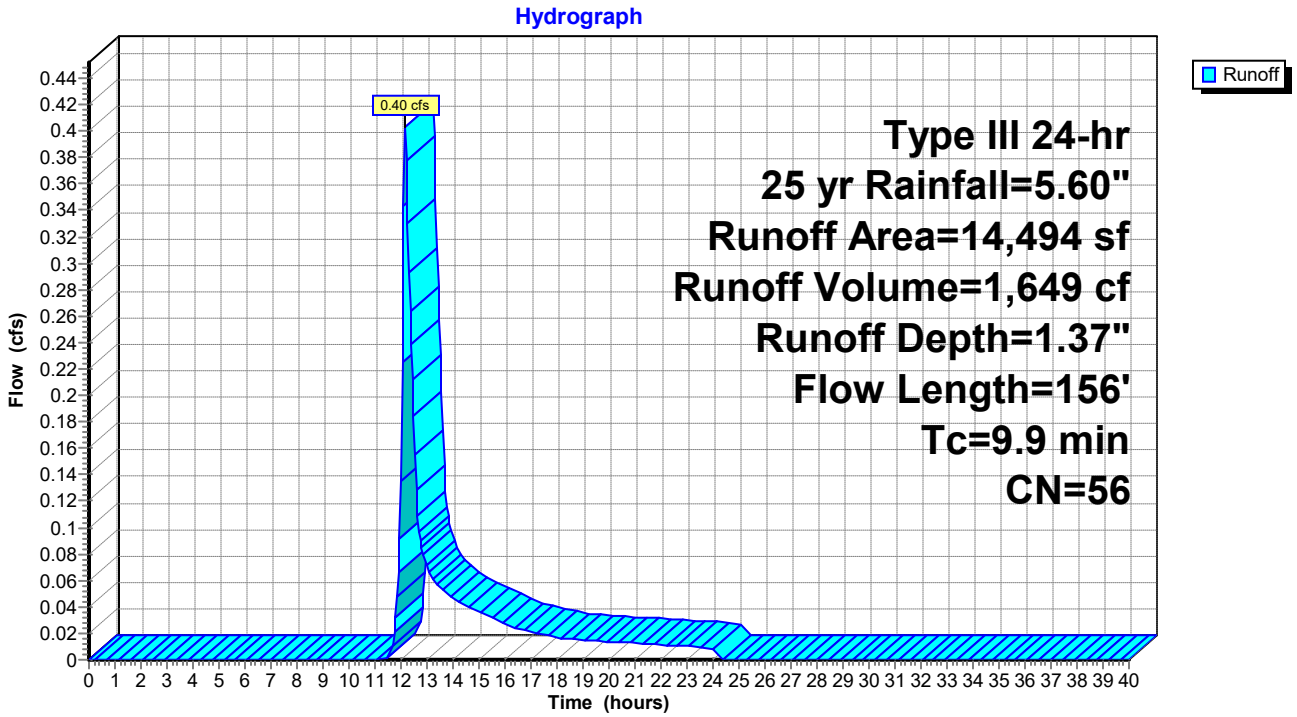
Runoff = 0.40 cfs @ 12.16 hrs, Volume= 1,649 cf, Depth= 1.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 yr Rainfall=5.60"

	Area (sf)	CN	Description
	6,462	30	Woods, Good, HSG A
	2,937	39	>75% Grass cover, Good, HSG A
*	3,837	98	Impervious, HSG A
	1,258	98	Roofs, HSG A
	14,494	56	Weighted Average
	9,399		64.85% Pervious Area
	5,095		35.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.6	50	0.0140	0.09		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.10"
0.1	39	0.1300	5.80		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
0.2	67	0.1000	5.09		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
9.9	156	Total			

Subcatchment S2: To Highland



Summary for Subcatchment S3: To SE Main

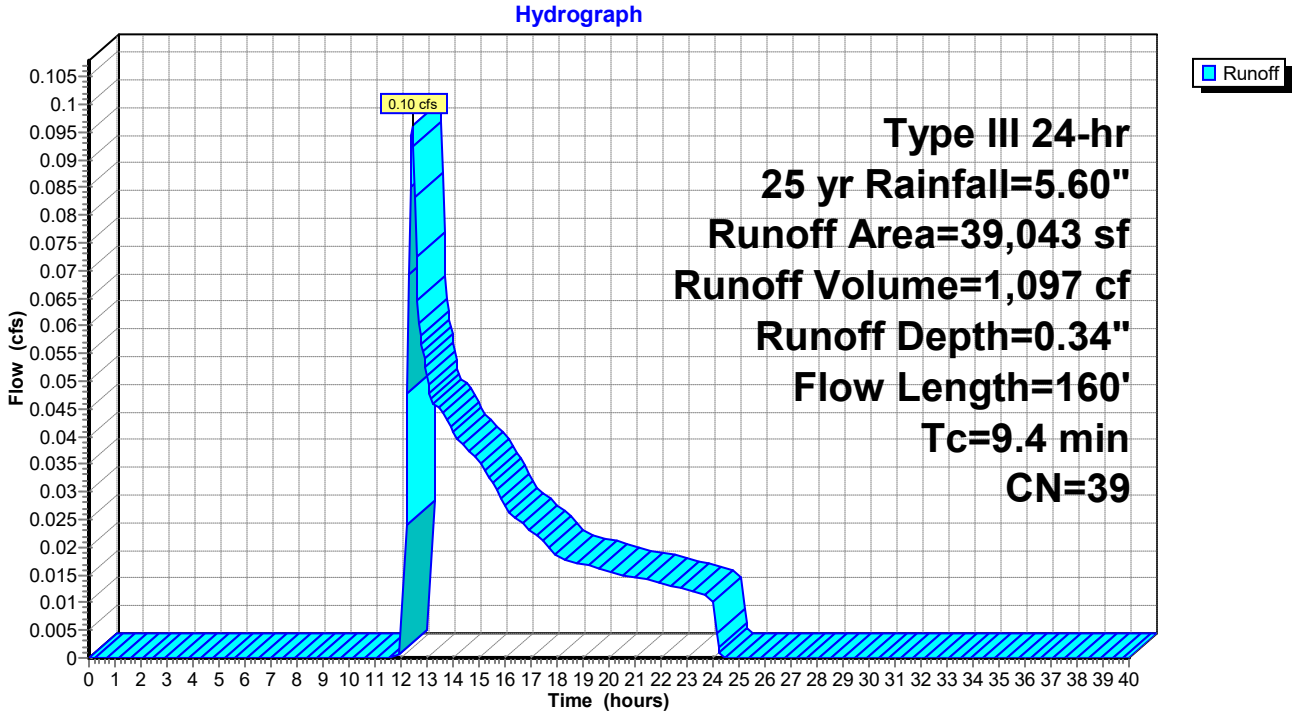
Runoff = 0.10 cfs @ 12.44 hrs, Volume= 1,097 cf, Depth= 0.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 yr Rainfall=5.60"

	Area (sf)	CN	Description
	21,276	30	Woods, Good, HSG A
	14,500	39	>75% Grass cover, Good, HSG A
	704	98	Paved parking, HSG A
*	2,563	96	Gravel drive & parking area, HSG A
	39,043	39	Weighted Average
	38,339		98.20% Pervious Area
	704		1.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	50	0.0500	0.10		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
0.7	110	0.0300	2.79		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
9.4	160	Total			

Subcatchment S3: To SE Main



Summary for Subcatchment S4: To SW Main

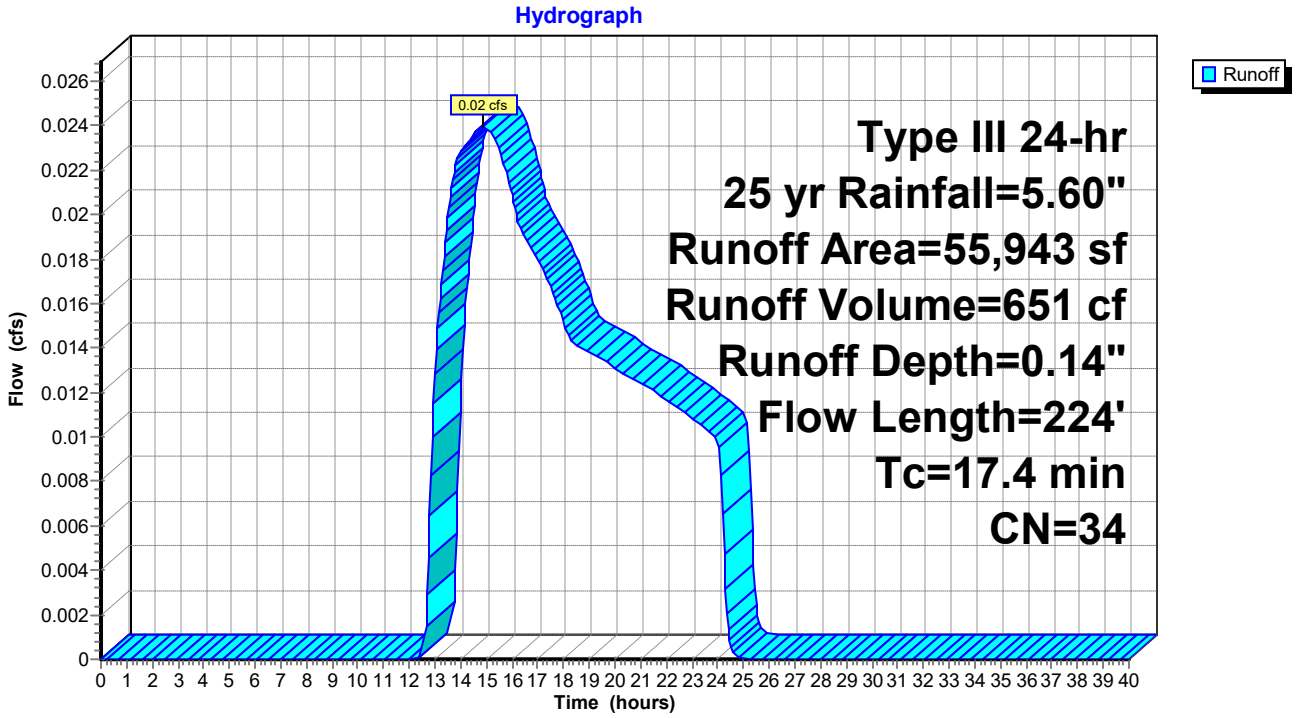
Runoff = 0.02 cfs @ 14.86 hrs, Volume= 651 cf, Depth= 0.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 yr Rainfall=5.60"

Area (sf)	CN	Description
37,644	30	Woods, Good, HSG A
17,289	39	>75% Grass cover, Good, HSG A
345	98	Paved parking, HSG A
665	98	Unconnected roofs, HSG A
55,943	34	Weighted Average
54,933		98.19% Pervious Area
1,010		1.81% Impervious Area
665		65.84% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	50	0.0100	0.05		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
0.1	53	0.1500	6.24		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
0.8	121	0.0240	2.49		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
17.4	224	Total			

Subcatchment S4: To SW Main

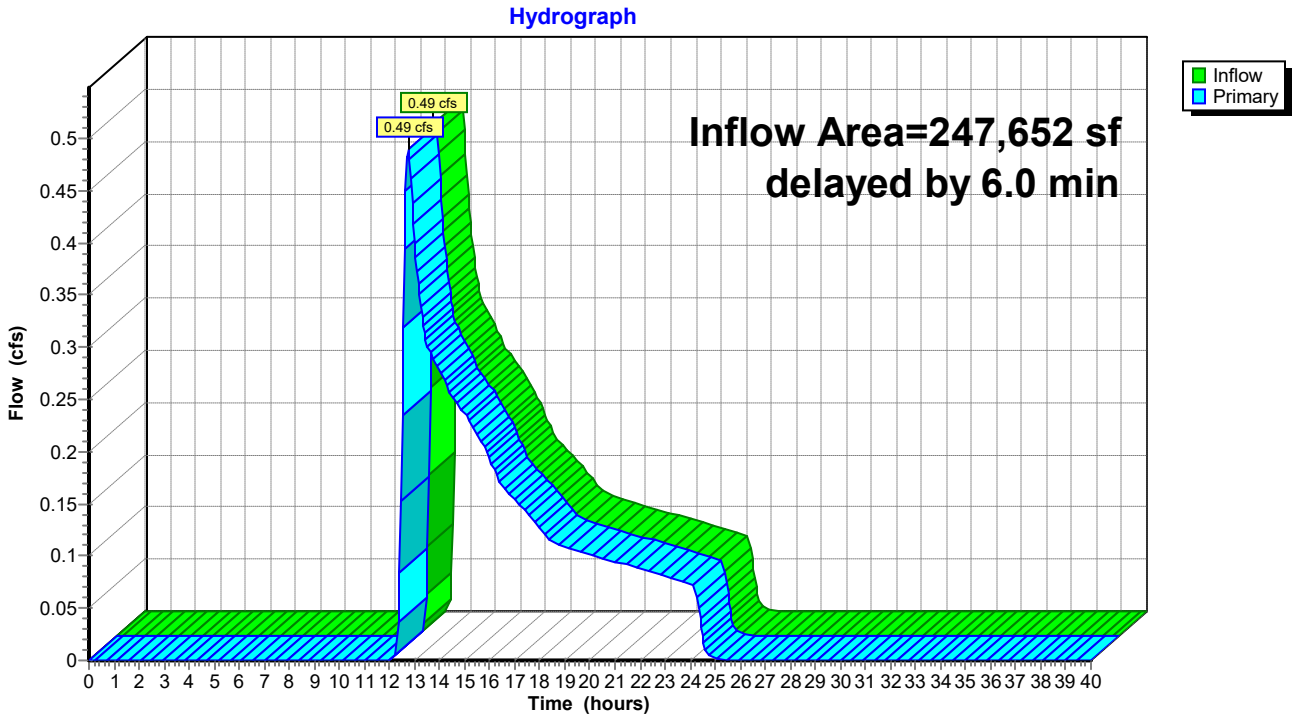


Summary for Link 1L: Onsite To Isolated Vegetated Wetland

Inflow Area = 247,652 sf, 1.17% Impervious, Inflow Depth = 0.34" for 25 yr event
Inflow = 0.49 cfs @ 12.65 hrs, Volume= 6,961 cf
Primary = 0.49 cfs @ 12.75 hrs, Volume= 6,961 cf, Atten= 0%, Lag= 6.0 min

Primary outflow = Inflow delayed by 6.0 min, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Link 1L: Onsite To Isolated Vegetated Wetland

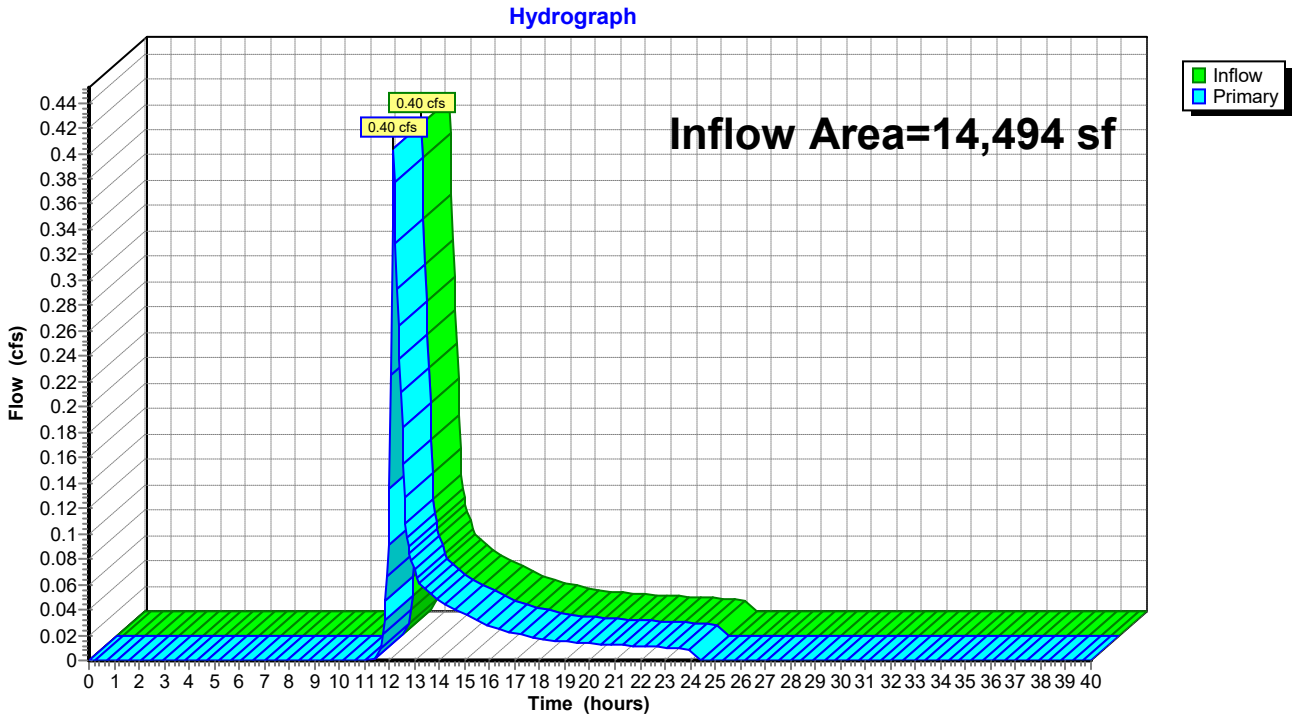


Summary for Link 2L: Offsite To Highland Street catch basins

Inflow Area = 14,494 sf, 35.15% Impervious, Inflow Depth = 1.37" for 25 yr event
Inflow = 0.40 cfs @ 12.16 hrs, Volume= 1,649 cf
Primary = 0.40 cfs @ 12.16 hrs, Volume= 1,649 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Link 2L: Offsite To Highland Street catch basins

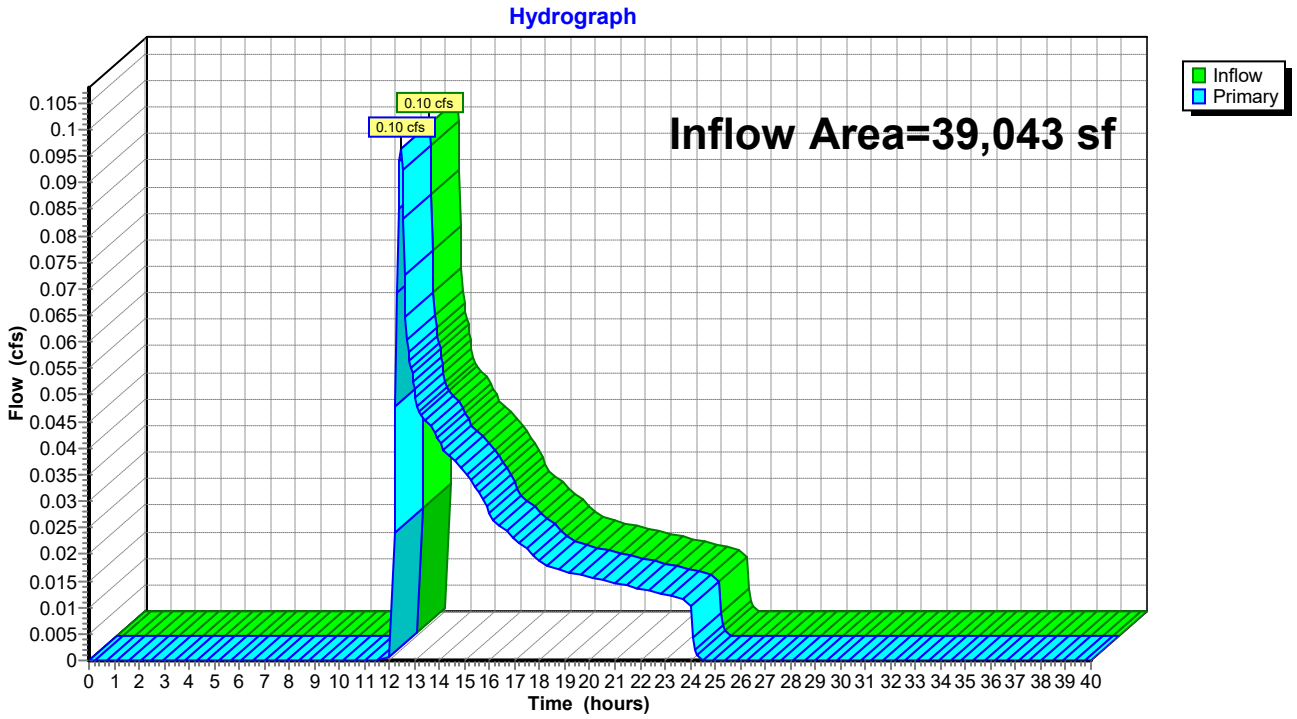


Summary for Link 3L: Onsite To Southeast Low Point along Main Street

Inflow Area = 39,043 sf, 1.80% Impervious, Inflow Depth = 0.34" for 25 yr event
Inflow = 0.10 cfs @ 12.44 hrs, Volume= 1,097 cf
Primary = 0.10 cfs @ 12.44 hrs, Volume= 1,097 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Link 3L: Onsite To Southeast Low Point along Main Street

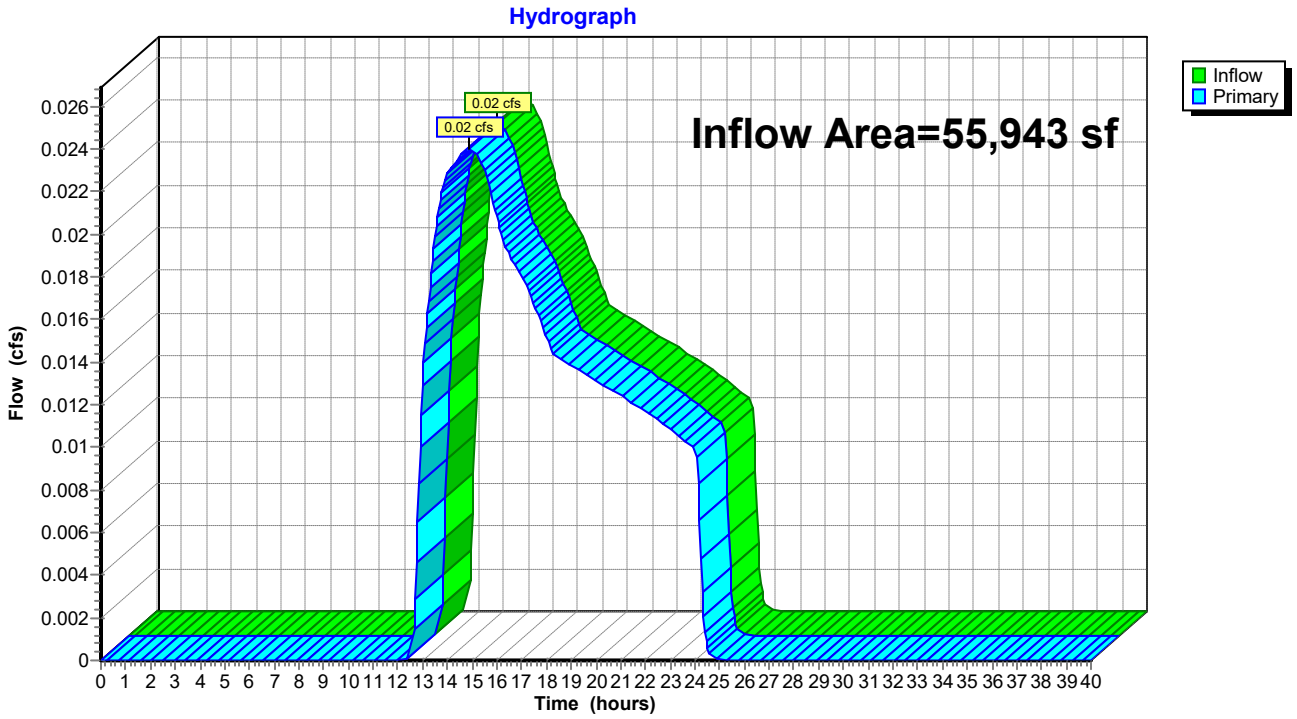


Summary for Link 4L: To Southwest Property Corner along Main Street

Inflow Area = 55,943 sf, 1.81% Impervious, Inflow Depth = 0.14" for 25 yr event
Inflow = 0.02 cfs @ 14.86 hrs, Volume= 651 cf
Primary = 0.02 cfs @ 14.86 hrs, Volume= 651 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Link 4L: To Southwest Property Corner along Main Street



Time span=0.00-40.00 hrs, dt=0.05 hrs, 801 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 S1: To IVW Runoff Area=247,652 sf 1.17% Impervious Runoff Depth=0.60"
Flow Length=235' Slope=0.0200 '/' Tc=23.2 min CN=39 Runoff=1.28 cfs 12,341 cf

Subcatchment S2: To Highland Runoff Area=14,494 sf 35.15% Impervious Runoff Depth=1.90"
Flow Length=156' Tc=9.9 min CN=56 Runoff=0.59 cfs 2,295 cf

Subcatchment S3: To SE Main Runoff Area=39,043 sf 1.80% Impervious Runoff Depth=0.60"
Flow Length=160' Tc=9.4 min CN=39 Runoff=0.24 cfs 1,946 cf

Subcatchment S4: To SW Main Runoff Area=55,943 sf 1.81% Impervious Runoff Depth=0.31"
Flow Length=224' Tc=17.4 min CN=34 Runoff=0.08 cfs 1,450 cf

Link 1L: Onsite To Isolated Vegetated Wetland delayed by 6.0 min Inflow=1.28 cfs 12,341 cf
Primary=1.28 cfs 12,341 cf

Link 2L: Offsite To Highland Street catch basins Inflow=0.59 cfs 2,295 cf
Primary=0.59 cfs 2,295 cf

Link 3L: Onsite To Southeast Low Point along Main Street Inflow=0.24 cfs 1,946 cf
Primary=0.24 cfs 1,946 cf

Link 4L: To Southwest Property Corner along Main Street Inflow=0.08 cfs 1,450 cf
Primary=0.08 cfs 1,450 cf

Total Runoff Area = 357,132 sf Runoff Volume = 18,031 cf Average Runoff Depth = 0.61"
97.28% Pervious = 347,426 sf 2.72% Impervious = 9,706 sf

Summary for Subcatchment S1: To IVW

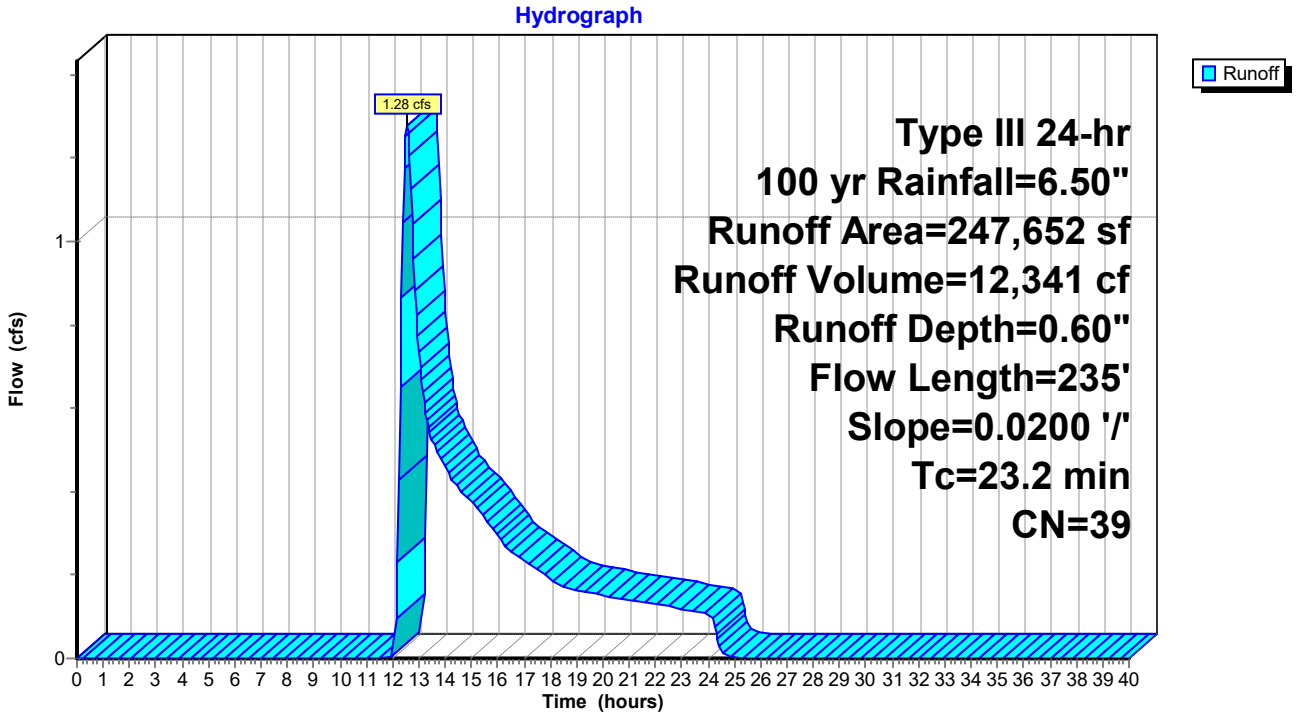
Runoff = 1.28 cfs @ 12.56 hrs, Volume= 12,341 cf, Depth= 0.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr Rainfall=6.50"

	Area (sf)	CN	Description
	168,807	30	Woods, Good, HSG A
	56,931	55	Woods, Good, HSG B
	6,702	77	Woods, Good, HSG D
*	2,420	76	Gravel cart path, HSG A
	9,895	39	>75% Grass cover, Good, HSG A
	2,266	98	Roofs, HSG A
	631	98	Unconnected pavement, HSG A
	247,652	39	Weighted Average
	244,755		98.83% Pervious Area
	2,897		1.17% Impervious Area
	631		21.78% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.8	50	0.0200	0.04		**Sheet Flow, A-B** Woods: Dense underbrush n= 0.800 P2= 3.10"
1.4	185	0.0200	2.28		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
23.2	235	Total			

Subcatchment S1: To IVW



Summary for Subcatchment S2: To Highland

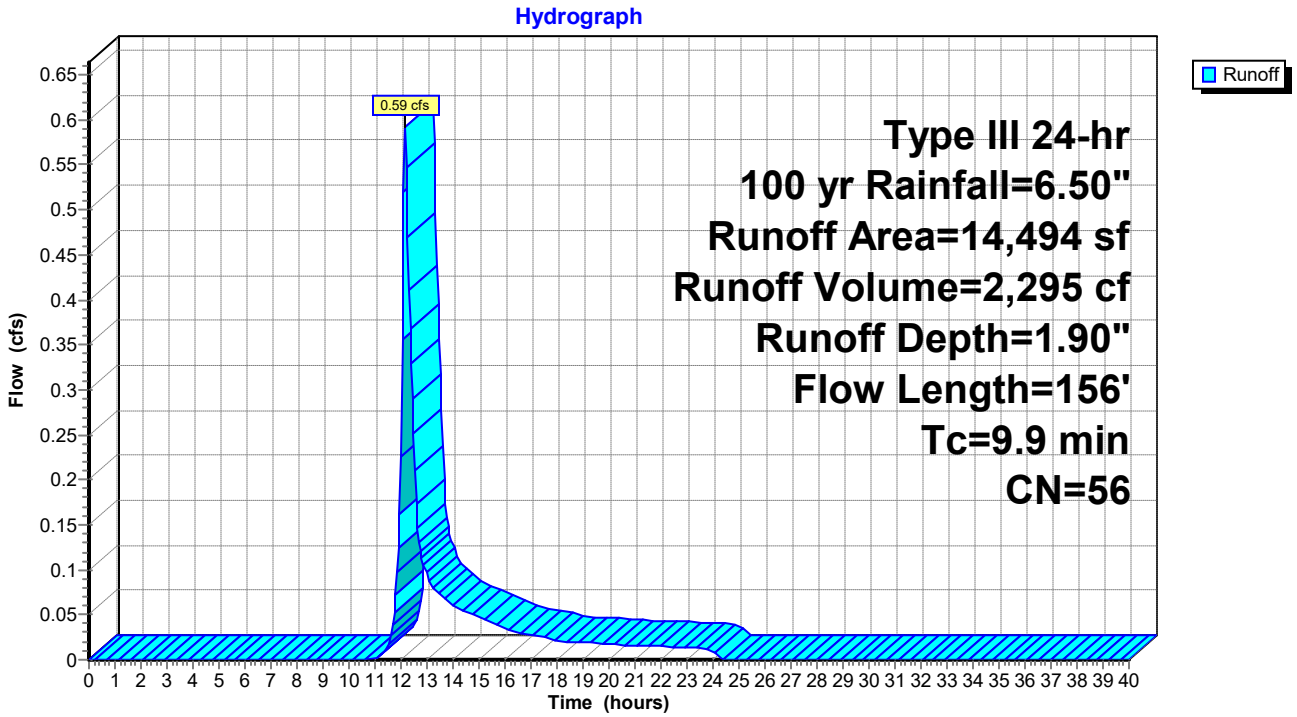
Runoff = 0.59 cfs @ 12.16 hrs, Volume= 2,295 cf, Depth= 1.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr Rainfall=6.50"

	Area (sf)	CN	Description
	6,462	30	Woods, Good, HSG A
	2,937	39	>75% Grass cover, Good, HSG A
*	3,837	98	Impervious, HSG A
	1,258	98	Roofs, HSG A
	14,494	56	Weighted Average
	9,399		64.85% Pervious Area
	5,095		35.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.6	50	0.0140	0.09		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.10"
0.1	39	0.1300	5.80		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
0.2	67	0.1000	5.09		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
9.9	156	Total			

Subcatchment S2: To Highland



Summary for Subcatchment S3: To SE Main

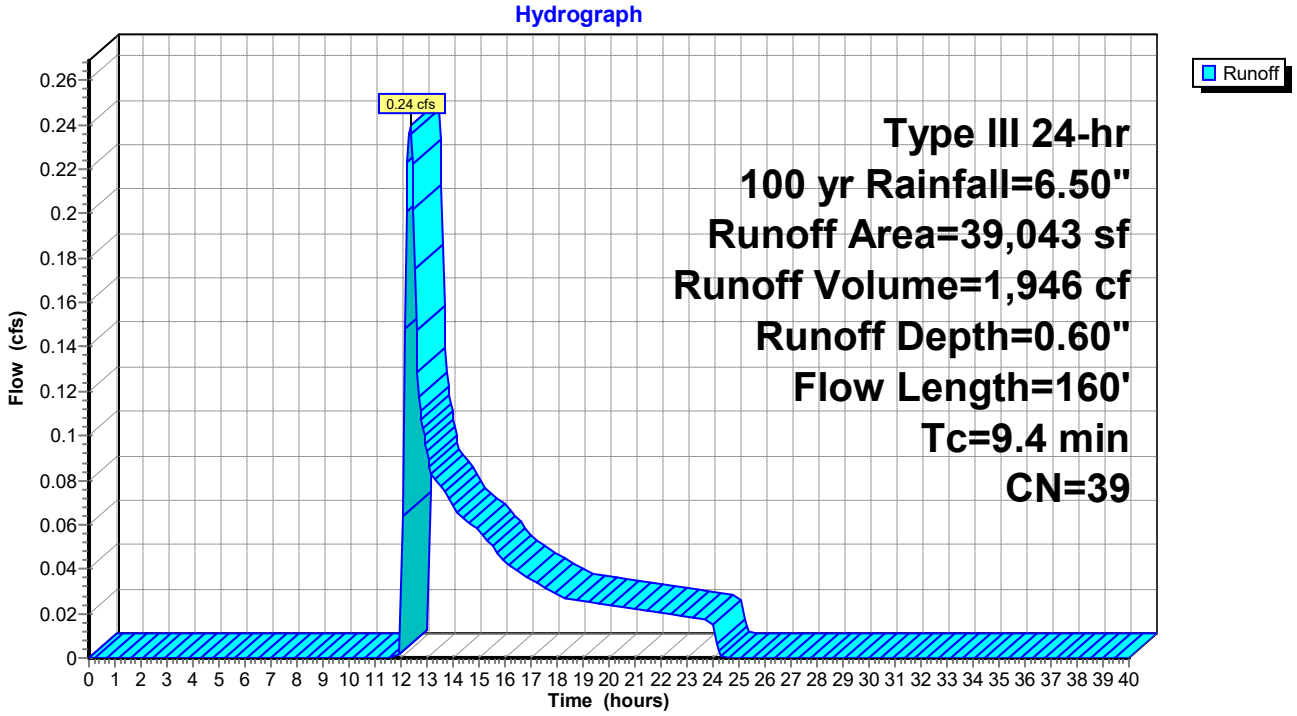
Runoff = 0.24 cfs @ 12.35 hrs, Volume= 1,946 cf, Depth= 0.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr Rainfall=6.50"

	Area (sf)	CN	Description
	21,276	30	Woods, Good, HSG A
	14,500	39	>75% Grass cover, Good, HSG A
	704	98	Paved parking, HSG A
*	2,563	96	Gravel drive & parking area, HSG A
	39,043	39	Weighted Average
	38,339		98.20% Pervious Area
	704		1.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	50	0.0500	0.10		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
0.7	110	0.0300	2.79		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
9.4	160	Total			

Subcatchment S3: To SE Main



Summary for Subcatchment S4: To SW Main

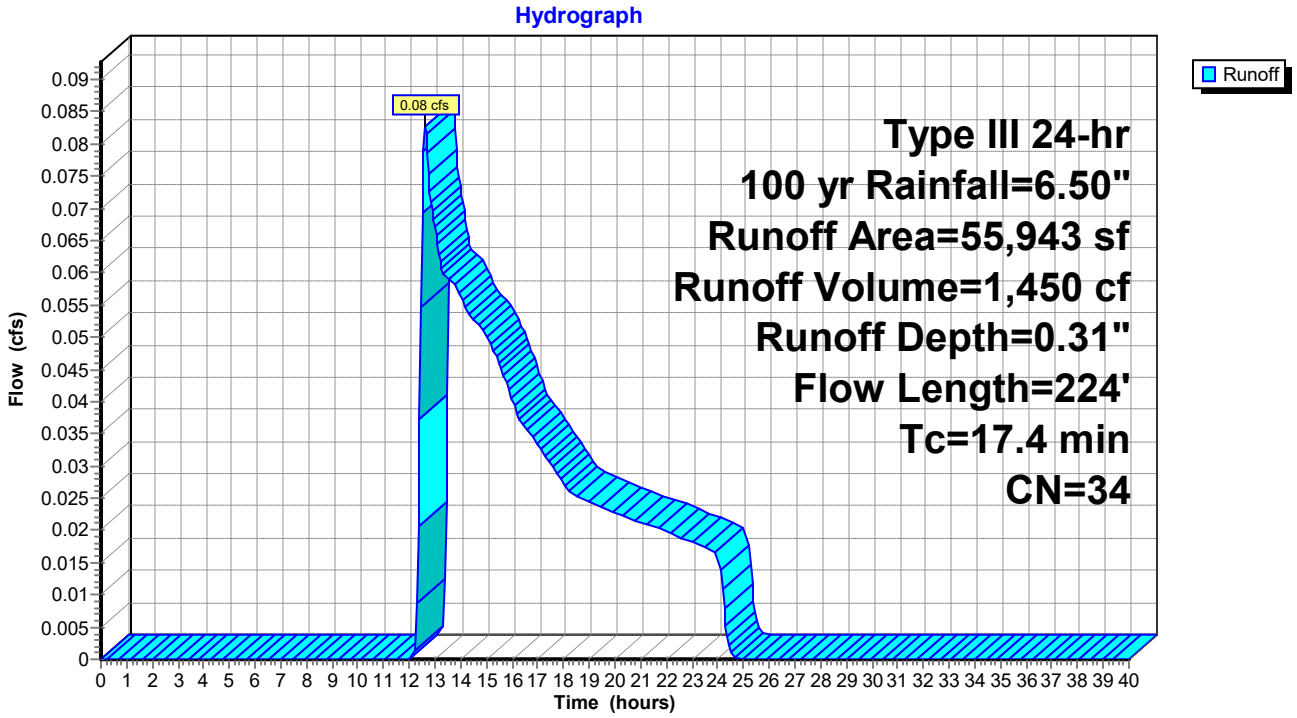
Runoff = 0.08 cfs @ 12.62 hrs, Volume= 1,450 cf, Depth= 0.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr Rainfall=6.50"

Area (sf)	CN	Description
37,644	30	Woods, Good, HSG A
17,289	39	>75% Grass cover, Good, HSG A
345	98	Paved parking, HSG A
665	98	Unconnected roofs, HSG A
55,943	34	Weighted Average
54,933		98.19% Pervious Area
1,010		1.81% Impervious Area
665		65.84% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	50	0.0100	0.05		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
0.1	53	0.1500	6.24		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
0.8	121	0.0240	2.49		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
17.4	224	Total			

Subcatchment S4: To SW Main

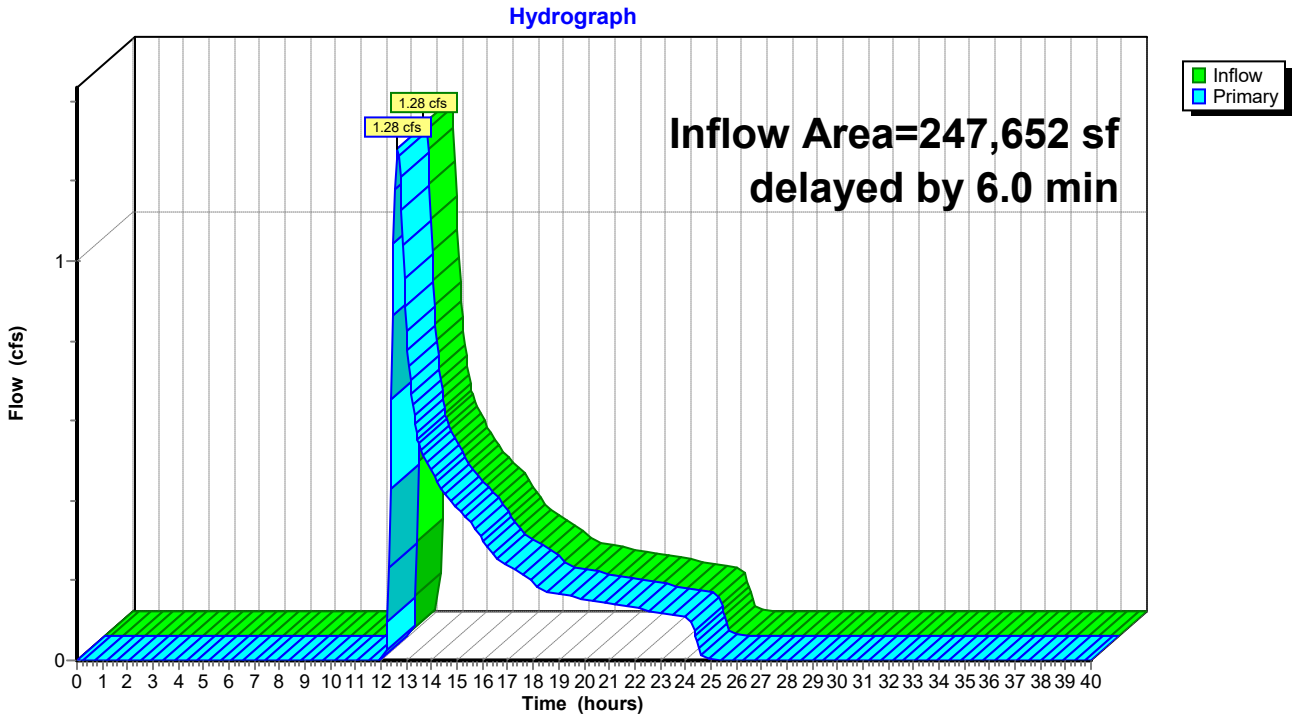


Summary for Link 1L: Onsite To Isolated Vegetated Wetland

Inflow Area = 247,652 sf, 1.17% Impervious, Inflow Depth = 0.60" for 100 yr event
Inflow = 1.28 cfs @ 12.56 hrs, Volume= 12,341 cf
Primary = 1.28 cfs @ 12.66 hrs, Volume= 12,341 cf, Atten= 0%, Lag= 6.0 min

Primary outflow = Inflow delayed by 6.0 min, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Link 1L: Onsite To Isolated Vegetated Wetland

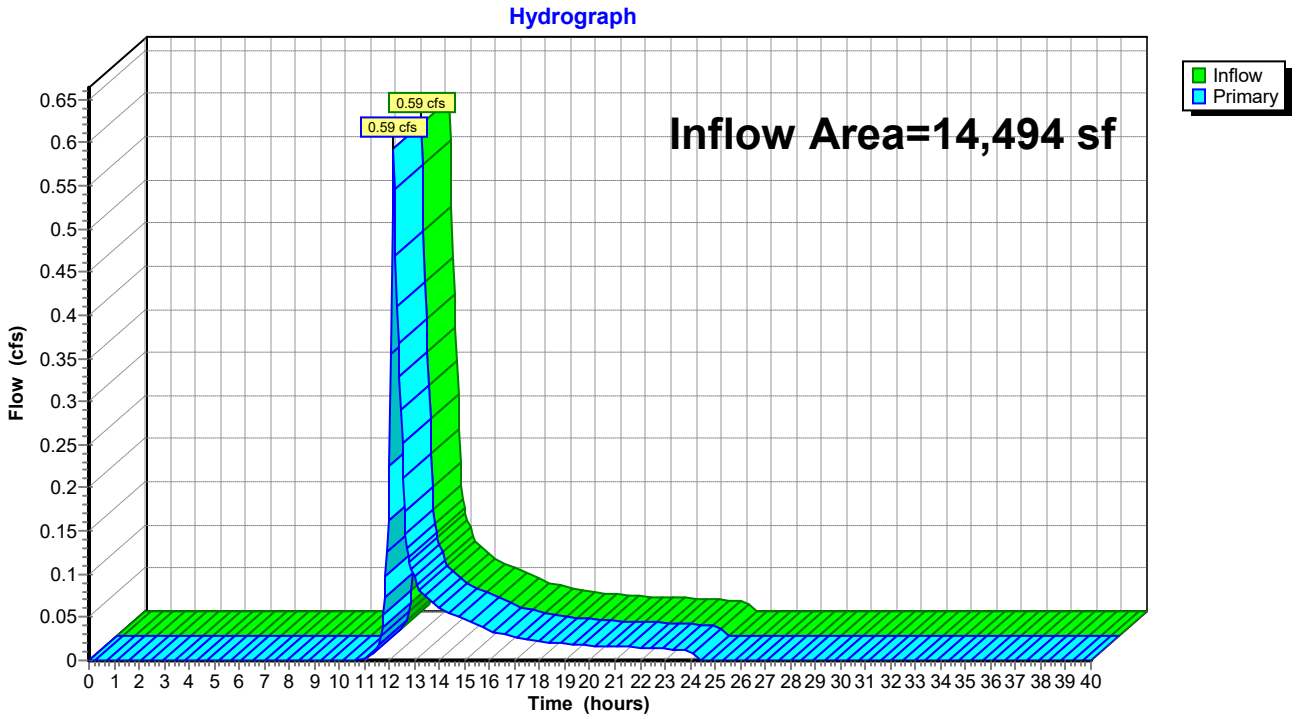


Summary for Link 2L: Offsite To Highland Street catch basins

Inflow Area = 14,494 sf, 35.15% Impervious, Inflow Depth = 1.90" for 100 yr event
Inflow = 0.59 cfs @ 12.16 hrs, Volume= 2,295 cf
Primary = 0.59 cfs @ 12.16 hrs, Volume= 2,295 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Link 2L: Offsite To Highland Street catch basins

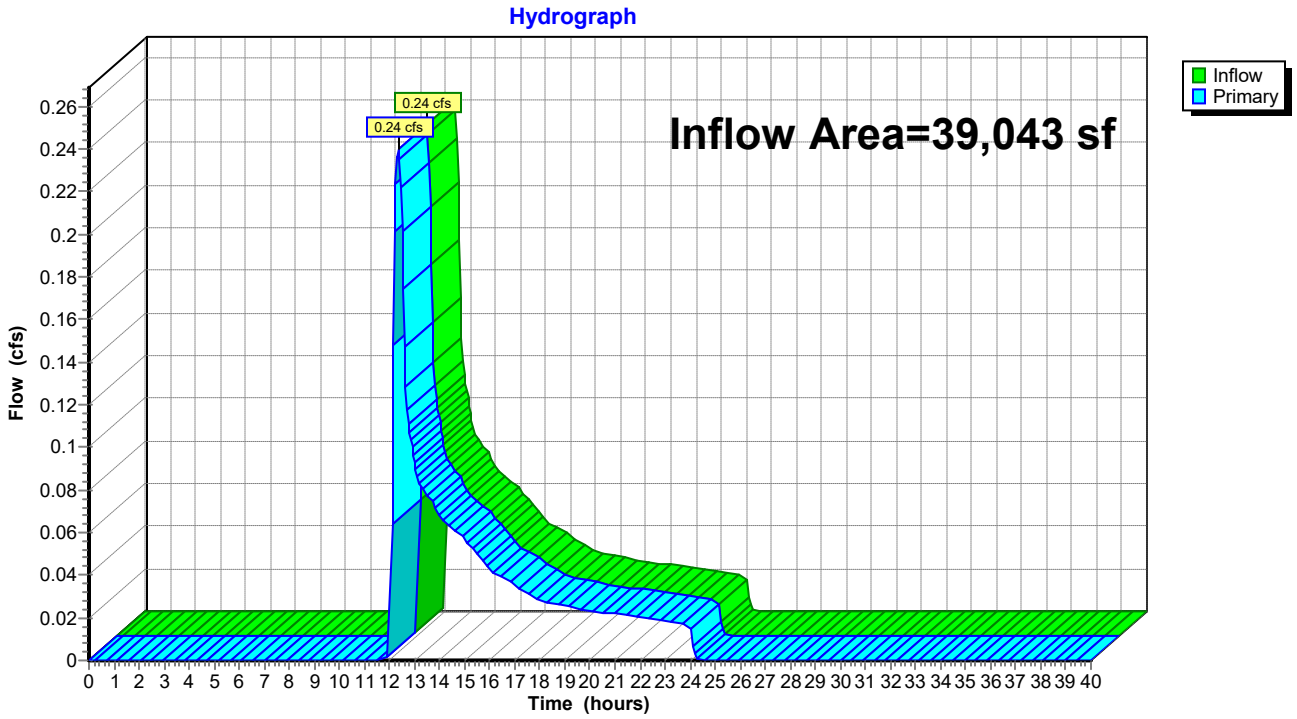


Summary for Link 3L: Onsite To Southeast Low Point along Main Street

Inflow Area = 39,043 sf, 1.80% Impervious, Inflow Depth = 0.60" for 100 yr event
Inflow = 0.24 cfs @ 12.35 hrs, Volume= 1,946 cf
Primary = 0.24 cfs @ 12.35 hrs, Volume= 1,946 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Link 3L: Onsite To Southeast Low Point along Main Street

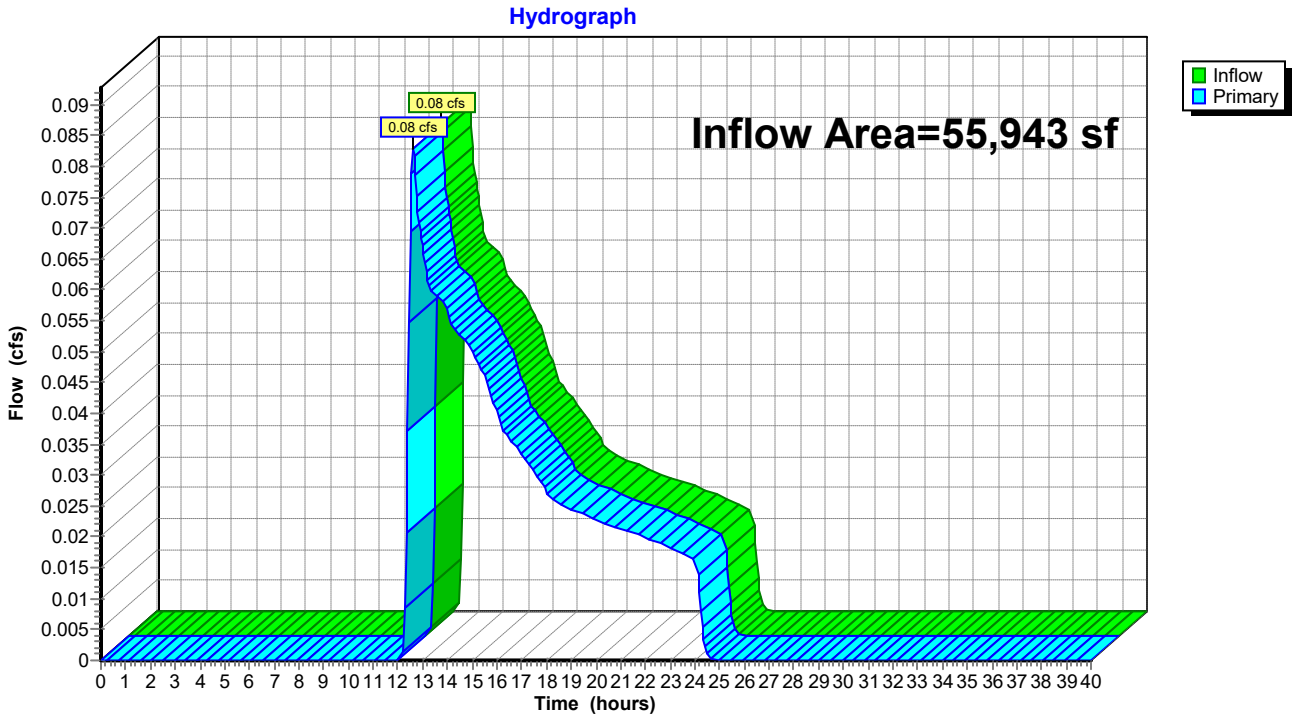


Summary for Link 4L: To Southwest Property Corner along Main Street

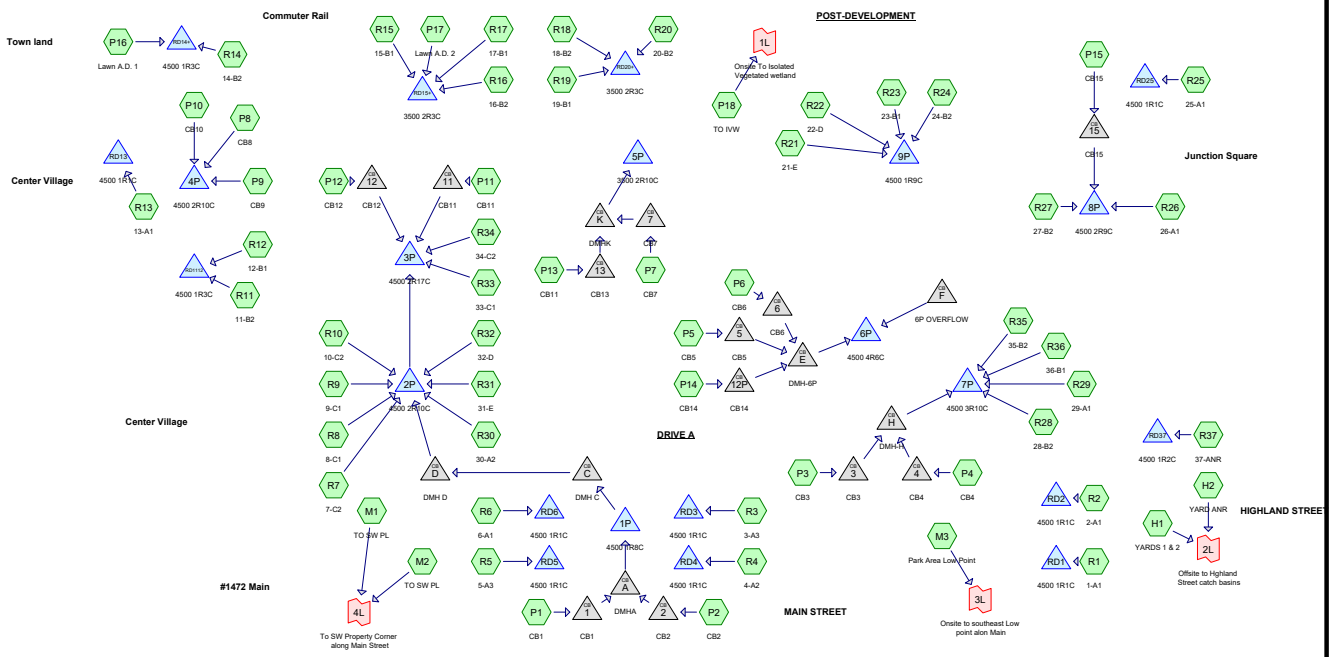
Inflow Area = 55,943 sf, 1.81% Impervious, Inflow Depth = 0.31" for 100 yr event
Inflow = 0.08 cfs @ 12.62 hrs, Volume= 1,450 cf
Primary = 0.08 cfs @ 12.62 hrs, Volume= 1,450 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Link 4L: To Southwest Property Corner along Main Street



1.9.2 Proposed Condition



Subcat Reach Pond Link

Routing Diagram for Proposed PRD
Prepared by HP Inc., Printed 7/12/2019
HydroCAD® 10.00-25 s/n 06611 © 2019 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
122,153	39	>75% Grass cover, Good, HSG A (H1, H2, M2, M3, P1, P11, P12, P13, P14, P15, P17, P18, P2, P3, P4, P5, P6, P7, P8, P9)
35,606	61	>75% Grass cover, Good, HSG B (P10, P11, P12, P13, P14, P16, P17, P5, P7, P8, P9)
1,254	80	>75% Grass cover, Good, HSG D (P18)
15,097	30	Brush, Good, HSG A (P12, P18, P8)
320	48	Brush, Good, HSG B (P8)
3,653	73	Brush, Good, HSG D (P18)
1,835	98	Paved Driveway Highland, HSG A (H1, H2)
48,428	98	Paved roads w/curbs & sewers, HSG A (P1, P11, P12, P14, P15, P2, P3, P4, P5, P6, P7, P8, P9)
9,271	98	Paved roads w/curbs & sewers, HSG B (P10, P11, P12, P5, P7, P8, P9)
252	98	Roof accessory - Mail, HSG A (P13)
58,703	98	Roofs, HSG A (R1, R10, R11, R15, R16, R17, R18, R19, R2, R20, R21, R22, R23, R24, R25, R26, R27, R28, R29, R3, R30, R31, R32, R33, R35, R36, R37, R4, R5, R6, R7, R8, R9)
10,824	98	Roofs, HSG B (R11, R12, R13, R14, R15, R33, R34, R35)
10,045	98	Sidewalk, HSG A (H1, M3, P1, P12, P15, P18, P2, P4, P6, P7)
609	98	Sidewalk, HSG B (P12, P8)
1,071	98	Unconnected Offsite roof, HSG A (P12, P8)
35,915	30	Woods, Good, HSG A (M1, M3, P12, P15, P18, P4, P8)
301	55	Woods, Good, HSG B (P10, P8)
1,795	77	Woods, Good, HSG D (P18)
357,132	**64**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
293,499	HSG A	H1, H2, M1, M2, M3, P1, P11, P12, P13, P14, P15, P17, P18, P2, P3, P4, P5, P6, P7, P8, P9, R1, R10, R11, R15, R16, R17, R18, R19, R2, R20, R21, R22, R23, R24, R25, R26, R27, R28, R29, R3, R30, R31, R32, R33, R35, R36, R37, R4, R5, R6, R7, R8, R9
56,931	HSG B	P10, P11, P12, P13, P14, P16, P17, P5, P7, P8, P9, R11, R12, R13, R14, R15, R33, R34, R35
0	HSG C	
6,702	HSG D	P18
0	Other	
357,132		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover
122,153	35,606	0	1,254	0	159,013	>75% Grass cover, Good
15,097	320	0	3,653	0	19,070	Brush, Good
1,835	0	0	0	0	1,835	Paved Driveway Highland
48,428	9,271	0	0	0	57,699	Paved roads w/curbs & sewers
252	0	0	0	0	252	Roof accessory - Mail
58,703	10,824	0	0	0	69,527	Roofs
10,045	609	0	0	0	10,654	Sidewalk
1,071	0	0	0	0	1,071	Unconnected Offsite roof
35,915	301	0	1,795	0	38,011	Woods, Good
293,499	**56,931**	**0**	**6,702**	**0**	**357,132**	**TOTAL AREA**

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	1	150.95	150.85	5.0	0.0200	0.012	12.0	0.0	0.0
2	1P	150.00	149.47	30.0	0.0177	0.012	12.0	0.0	0.0
3	2	150.95	150.85	10.0	0.0100	0.012	12.0	0.0	0.0
4	2P	141.75	137.15	100.0	0.0460	0.012	12.0	0.0	0.0
5	3	139.70	139.50	10.0	0.0200	0.012	12.0	0.0	0.0
6	3P	137.75	133.15	100.0	0.0460	0.012	12.0	0.0	0.0
7	4	139.70	139.50	10.0	0.0200	0.012	12.0	0.0	0.0
8	4P	130.85	126.50	50.0	0.0870	0.012	12.0	0.0	0.0
9	5	129.50	129.10	20.0	0.0200	0.012	12.0	0.0	0.0
10	5P	130.25	129.75	50.0	0.0100	0.012	12.0	0.0	0.0
11	6	130.00	129.20	40.0	0.0200	0.012	12.0	0.0	0.0
12	6P	131.25	131.00	25.0	0.0100	0.012	12.0	0.0	0.0
13	7	129.70	129.60	5.0	0.0200	0.012	12.0	0.0	0.0
14	7P	134.25	130.15	50.0	0.0820	0.012	12.0	0.0	0.0
15	8P	132.00	131.00	25.0	0.0400	0.012	12.0	0.0	0.0
16	9P	130.25	129.75	50.0	0.0100	0.012	12.0	0.0	0.0
17	11	137.40	137.20	10.0	0.0200	0.012	12.0	0.0	0.0
18	12	137.40	137.20	10.0	0.0200	0.012	12.0	0.0	0.0
19	12P	129.50	129.02	24.0	0.0200	0.012	12.0	0.0	0.0
20	13	129.70	129.60	5.0	0.0200	0.012	12.0	0.0	0.0
21	15	134.00	133.70	10.0	0.0300	0.012	12.0	0.0	0.0
22	A	150.25	150.00	10.0	0.0250	0.012	12.0	0.0	0.0
23	C	149.37	142.55	124.0	0.0550	0.012	12.0	0.0	0.0
24	D	142.45	141.75	25.0	0.0280	0.012	12.0	0.0	0.0
25	E	128.85	128.35	25.0	0.0200	0.012	12.0	0.0	0.0
26	F	128.85	128.35	25.0	0.0200	0.012	12.0	0.0	0.0
27	H	139.40	138.65	25.0	0.0300	0.012	12.0	0.0	0.0
28	K	129.60	128.90	35.0	0.0200	0.012	12.0	0.0	0.0

Time span=0.00-40.00 hrs, dt=0.05 hrs, 801 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 H1: YARDS 1 & 2 Runoff Area=5,593 sf 26.69% Impervious Runoff Depth=0.22"
Tc=6.0 min CN=55 Runoff=0.01 cfs 104 cf

Subcatchment H2: YARD ANR Runoff Area=1,778 sf 36.33% Impervious Runoff Depth=0.37"
Tc=6.0 min CN=60 Runoff=0.01 cfs 55 cf

Subcatchment M1: TO SW PL Runoff Area=4,423 sf 0.00% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=30 Runoff=0.00 cfs 0 cf

Subcatchment M2: TO SW PL Runoff Area=5,038 sf 0.00% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=39 Runoff=0.00 cfs 0 cf

Subcatchment M3: Park Area Low Point Runoff Area=31,924 sf 7.63% Impervious Runoff Depth=0.00"
Flow Length=150' Slope=0.0200 '/' Tc=9.0 min CN=41 Runoff=0.00 cfs 9 cf

Subcatchment P1: CB1 Runoff Area=5,217 sf 53.29% Impervious Runoff Depth=0.77"
Tc=6.0 min CN=70 Runoff=0.09 cfs 335 cf

Subcatchment P10: CB10 Runoff Area=6,285 sf 47.97% Impervious Runoff Depth=1.26"
Tc=6.0 min CN=79 Runoff=0.21 cfs 661 cf

Subcatchment P11: CB11 Runoff Area=8,207 sf 65.64% Impervious Runoff Depth=1.26"
Tc=6.0 min CN=79 Runoff=0.27 cfs 863 cf

Subcatchment P12: CB12 Runoff Area=35,107 sf 25.33% Impervious Runoff Depth=0.13"
Flow Length=316' Tc=9.1 min CN=51 Runoff=0.02 cfs 377 cf

Subcatchment P13: CB11 Runoff Area=12,793 sf 1.97% Impervious Runoff Depth=0.22"
Flow Length=316' Tc=9.1 min CN=55 Runoff=0.02 cfs 237 cf

Subcatchment P14: CB14 Runoff Area=28,247 sf 2.36% Impervious Runoff Depth=0.09"
Tc=6.0 min CN=49 Runoff=0.01 cfs 214 cf

Subcatchment P15: CB15 Runoff Area=13,422 sf 49.79% Impervious Runoff Depth=0.68"
Tc=6.0 min CN=68 Runoff=0.20 cfs 759 cf

Subcatchment P16: Lawn A.D. 1 Runoff Area=3,825 sf 0.00% Impervious Runoff Depth=0.40"
Flow Length=150' Tc=8.8 min CN=61 Runoff=0.02 cfs 129 cf

Subcatchment P17: Lawn A.D. 2 Runoff Area=6,392 sf 0.00% Impervious Runoff Depth=0.13"
Flow Length=170' Slope=0.0200 '/' Tc=9.2 min CN=51 Runoff=0.00 cfs 69 cf

Subcatchment P18: TO IVW Runoff Area=33,851 sf 0.95% Impervious Runoff Depth=0.03"
Flow Length=296' Tc=9.6 min CN=45 Runoff=0.00 cfs 94 cf

Subcatchment P2: CB2 Runoff Area=6,210 sf 37.86% Impervious Runoff Depth=0.40"
Tc=6.0 min CN=61 Runoff=0.04 cfs 209 cf

Subcatchment P3: CB3 Runoff Area=7,310 sf 63.73% Impervious Runoff Depth=1.14"
Tc=6.0 min CN=77 Runoff=0.21 cfs 695 cf

Subcatchment P4: CB4 Runoff Area=27,482 sf 28.14% Impervious Runoff Depth=0.13"
Tc=6.0 min CN=51 Runoff=0.02 cfs 295 cf

Subcatchment P5: CB5 Runoff Area=6,260 sf 55.38% Impervious Runoff Depth=0.97"
Tc=6.0 min CN=74 Runoff=0.15 cfs 507 cf

Subcatchment P6: CB6 Runoff Area=6,087 sf 89.63% Impervious Runoff Depth=2.26"
Tc=6.0 min CN=92 Runoff=0.35 cfs 1,144 cf

Subcatchment P7: CB7 Runoff Area=13,769 sf 66.11% Impervious Runoff Depth=1.20"
Tc=6.0 min CN=78 Runoff=0.43 cfs 1,378 cf

Subcatchment P8: CB8 Runoff Area=15,913 sf 27.36% Impervious Runoff Depth=0.28"
Flow Length=316' Tc=9.1 min UI Adjusted CN=57 Runoff=0.04 cfs 368 cf

Subcatchment P9: CB9 Runoff Area=2,472 sf 73.50% Impervious Runoff Depth=1.83"
Tc=6.0 min CN=87 Runoff=0.12 cfs 376 cf

Subcatchment R1: 1-A1 Runoff Area=2,103 sf 100.00% Impervious Runoff Depth=2.87"
Tc=6.0 min CN=98 Runoff=0.14 cfs 503 cf

Subcatchment R10: 10-C2 Runoff Area=1,628 sf 100.00% Impervious Runoff Depth=2.87"
Tc=6.0 min CN=98 Runoff=0.11 cfs 389 cf

Subcatchment R11: 11-B2 Runoff Area=2,242 sf 100.00% Impervious Runoff Depth=2.87"
Tc=6.0 min CN=98 Runoff=0.15 cfs 536 cf

Subcatchment R12: 12-B1 Runoff Area=1,509 sf 100.00% Impervious Runoff Depth=2.87"
Tc=6.0 min CN=98 Runoff=0.10 cfs 361 cf

Subcatchment R13: 13-A1 Runoff Area=2,103 sf 100.00% Impervious Runoff Depth=2.87"
Tc=6.0 min CN=98 Runoff=0.14 cfs 503 cf

Subcatchment R14: 14-B2 Runoff Area=2,242 sf 100.00% Impervious Runoff Depth=2.87"
Tc=6.0 min CN=98 Runoff=0.15 cfs 536 cf

Subcatchment R15: 15-B1 Runoff Area=1,509 sf 100.00% Impervious Runoff Depth=2.87"
Tc=6.0 min CN=98 Runoff=0.10 cfs 361 cf

Subcatchment R16: 16-B2 Runoff Area=2,242 sf 100.00% Impervious Runoff Depth=2.87"
Tc=6.0 min CN=98 Runoff=0.15 cfs 536 cf

Subcatchment R17: 17-B1 Runoff Area=1,509 sf 100.00% Impervious Runoff Depth=2.87"
Tc=6.0 min CN=98 Runoff=0.10 cfs 361 cf

Subcatchment R18: 18-B2 Runoff Area=2,242 sf 100.00% Impervious Runoff Depth=2.87"
Tc=6.0 min CN=98 Runoff=0.15 cfs 536 cf

Subcatchment R19: 19-B1 Runoff Area=1,509 sf 100.00% Impervious Runoff Depth=2.87"
Tc=6.0 min CN=98 Runoff=0.10 cfs 361 cf

Subcatchment R2: 2-A1 Runoff Area=2,103 sf 100.00% Impervious Runoff Depth=2.87"
Tc=6.0 min CN=98 Runoff=0.14 cfs 503 cf

Subcatchment R20: 20-B2 Runoff Area=2,242 sf 100.00% Impervious Runoff Depth=2.87"
Tc=6.0 min CN=98 Runoff=0.15 cfs 536 cf

Subcatchment R21: 21-E Runoff Area=1,363 sf 100.00% Impervious Runoff Depth=2.87"
Tc=6.0 min CN=98 Runoff=0.09 cfs 326 cf

Subcatchment R22: 22-D Runoff Area=1,718 sf 100.00% Impervious Runoff Depth=2.87"
Tc=6.0 min CN=98 Runoff=0.12 cfs 411 cf

Subcatchment R23: 23-B1 Runoff Area=1,509 sf 100.00% Impervious Runoff Depth=2.87"
Tc=6.0 min CN=98 Runoff=0.10 cfs 361 cf

Subcatchment R24: 24-B2 Runoff Area=2,242 sf 100.00% Impervious Runoff Depth=2.87"
Tc=6.0 min CN=98 Runoff=0.15 cfs 536 cf

Subcatchment R25: 25-A1 Runoff Area=2,103 sf 100.00% Impervious Runoff Depth=2.87"
Tc=6.0 min CN=98 Runoff=0.14 cfs 503 cf

Subcatchment R26: 26-A1 Runoff Area=2,103 sf 100.00% Impervious Runoff Depth=2.87"
Tc=6.0 min CN=98 Runoff=0.14 cfs 503 cf

Subcatchment R27: 27-B2 Runoff Area=2,242 sf 100.00% Impervious Runoff Depth=2.87"
Tc=6.0 min CN=98 Runoff=0.15 cfs 536 cf

Subcatchment R28: 28-B2 Runoff Area=2,242 sf 100.00% Impervious Runoff Depth=2.87"
Tc=6.0 min CN=98 Runoff=0.15 cfs 536 cf

Subcatchment R29: 29-A1 Runoff Area=2,103 sf 100.00% Impervious Runoff Depth=2.87"
Tc=6.0 min CN=98 Runoff=0.14 cfs 503 cf

Subcatchment R3: 3-A3 Runoff Area=2,004 sf 100.00% Impervious Runoff Depth=2.87"
Tc=6.0 min CN=98 Runoff=0.14 cfs 479 cf

Subcatchment R30: 30-A2 Runoff Area=1,912 sf 100.00% Impervious Runoff Depth=2.87"
Tc=6.0 min CN=98 Runoff=0.13 cfs 457 cf

Subcatchment R31: 31-E Runoff Area=1,363 sf 100.00% Impervious Runoff Depth=2.87"
Tc=6.0 min CN=98 Runoff=0.09 cfs 326 cf

Subcatchment R32: 32-D Runoff Area=1,718 sf 100.00% Impervious Runoff Depth=2.87"
Tc=6.0 min CN=98 Runoff=0.12 cfs 411 cf

Subcatchment R33: 33-C1 Runoff Area=1,270 sf 100.00% Impervious Runoff Depth=2.87"
Tc=6.0 min CN=98 Runoff=0.09 cfs 304 cf

Subcatchment R34: 34-C2 Runoff Area=1,628 sf 100.00% Impervious Runoff Depth=2.87"
Tc=6.0 min CN=98 Runoff=0.11 cfs 389 cf

Subcatchment R35: 35-B2 Runoff Area=2,242 sf 100.00% Impervious Runoff Depth=2.87"
Tc=6.0 min CN=98 Runoff=0.15 cfs 536 cf

Subcatchment R36: 36-B1 Runoff Area=1,509 sf 100.00% Impervious Runoff Depth=2.87"
Tc=6.0 min CN=98 Runoff=0.10 cfs 361 cf

Subcatchment R37: 37-ANR Runoff Area=2,886 sf 100.00% Impervious Runoff Depth=2.87"
Tc=6.0 min CN=98 Runoff=0.19 cfs 690 cf

Subcatchment R4: 4-A2 Runoff Area=1,912 sf 100.00% Impervious Runoff Depth=2.87"
Tc=6.0 min CN=98 Runoff=0.13 cfs 457 cf

Subcatchment R5: 5-A3 Runoff Area=2,004 sf 100.00% Impervious Runoff Depth=2.87"
Tc=6.0 min CN=98 Runoff=0.14 cfs 479 cf

Subcatchment R6: 6-A1 Runoff Area=2,103 sf 100.00% Impervious Runoff Depth=2.87"
Tc=6.0 min CN=98 Runoff=0.14 cfs 503 cf

Subcatchment R7: 7-C2 Runoff Area=1,628 sf 100.00% Impervious Runoff Depth=2.87"
Tc=6.0 min CN=98 Runoff=0.11 cfs 389 cf

Subcatchment R8: 8-C1 Runoff Area=1,270 sf 100.00% Impervious Runoff Depth=2.87"
Tc=6.0 min CN=98 Runoff=0.09 cfs 304 cf

Subcatchment R9: 9-C1 Runoff Area=1,270 sf 100.00% Impervious Runoff Depth=2.87"
Tc=6.0 min CN=98 Runoff=0.09 cfs 304 cf

Pond 1: CB1 Peak Elev=151.10' Inflow=0.09 cfs 335 cf
12.0" Round Culvert n=0.012 L=5.0' S=0.0200 '/' Outflow=0.09 cfs 335 cf

Pond 1P: 4500 1R8C Peak Elev=146.48' Storage=38 cf Inflow=0.13 cfs 544 cf
Discarded=0.08 cfs 544 cf Primary=0.00 cfs 0 cf Outflow=0.08 cfs 544 cf

Pond 2: CB2 Peak Elev=151.05' Inflow=0.04 cfs 209 cf
12.0" Round Culvert n=0.012 L=10.0' S=0.0100 '/' Outflow=0.04 cfs 209 cf

Pond 2P: 4500 2R10C Peak Elev=139.09' Storage=532 cf Inflow=0.73 cfs 2,578 cf
Discarded=0.18 cfs 2,578 cf Primary=0.00 cfs 0 cf Outflow=0.18 cfs 2,578 cf

Pond 3: CB3 Peak Elev=139.93' Inflow=0.21 cfs 695 cf
12.0" Round Culvert n=0.012 L=10.0' S=0.0200 '/' Outflow=0.21 cfs 695 cf

Pond 3P: 4500 2R17C Peak Elev=134.22' Storage=127 cf Inflow=0.46 cfs 1,932 cf
Discarded=0.28 cfs 1,932 cf Primary=0.00 cfs 0 cf Outflow=0.28 cfs 1,932 cf

Pond 4: CB4 Peak Elev=139.76' Inflow=0.02 cfs 295 cf
12.0" Round Culvert n=0.012 L=10.0' S=0.0200 '/' Outflow=0.02 cfs 295 cf

Pond 4P: 4500 2R10C Peak Elev=127.16' Storage=44 cf Inflow=0.34 cfs 1,405 cf
Discarded=0.31 cfs 1,405 cf Primary=0.00 cfs 0 cf Outflow=0.31 cfs 1,405 cf

Pond 5: CB5 Peak Elev=129.69' Inflow=0.15 cfs 507 cf
12.0" Round Culvert n=0.012 L=20.0' S=0.0200 '/' Outflow=0.15 cfs 507 cf

Pond 5P: 3500 2R10C Peak Elev=126.86' Storage=125 cf Inflow=0.43 cfs 1,614 cf
Discarded=0.23 cfs 1,614 cf Primary=0.00 cfs 0 cf Outflow=0.23 cfs 1,614 cf

Pond 6: CB6 Peak Elev=130.29' Inflow=0.35 cfs 1,144 cf
12.0" Round Culvert n=0.012 L=40.0' S=0.0200 '/' Outflow=0.35 cfs 1,144 cf

Pond 6P: 4500 4R6C Peak Elev=127.90' Storage=187 cf Inflow=0.50 cfs 1,865 cf
Discarded=0.22 cfs 1,865 cf Primary=0.00 cfs 0 cf Outflow=0.22 cfs 1,865 cf

Pond 7: CB7 Peak Elev=130.05' Inflow=0.43 cfs 1,378 cf
12.0" Round Culvert n=0.012 L=5.0' S=0.0200 '/' Outflow=0.43 cfs 1,378 cf

Pond 7P: 4500 3R10C Peak Elev=131.27' Storage=427 cf Inflow=0.76 cfs 2,925 cf
Discarded=0.26 cfs 2,925 cf Primary=0.00 cfs 0 cf Outflow=0.26 cfs 2,925 cf

Pond 8P: 4500 2R9C Peak Elev=129.03' Storage=273 cf Inflow=0.49 cfs 1,798 cf
Discarded=0.16 cfs 1,798 cf Primary=0.00 cfs 0 cf Outflow=0.16 cfs 1,798 cf

Pond 9P: 4500 1R9C Peak Elev=128.24' Storage=420 cf Inflow=0.46 cfs 1,633 cf
Discarded=0.08 cfs 1,633 cf Primary=0.00 cfs 0 cf Outflow=0.08 cfs 1,633 cf

Pond 11: CB11 Peak Elev=137.65' Inflow=0.27 cfs 863 cf
12.0" Round Culvert n=0.012 L=10.0' S=0.0200 '/' Outflow=0.27 cfs 863 cf

Pond 12: CB12 Peak Elev=137.46' Inflow=0.02 cfs 377 cf
12.0" Round Culvert n=0.012 L=10.0' S=0.0200 '/' Outflow=0.02 cfs 377 cf

Pond 12P: CB14 Peak Elev=129.53' Inflow=0.01 cfs 214 cf
12.0" Round Culvert n=0.012 L=24.0' S=0.0200 '/' Outflow=0.01 cfs 214 cf

Pond 13: CB13 Peak Elev=129.77' Inflow=0.02 cfs 237 cf
12.0" Round Culvert n=0.012 L=5.0' S=0.0200 '/' Outflow=0.02 cfs 237 cf

Pond 15: CB15 Peak Elev=134.22' Inflow=0.20 cfs 759 cf
12.0" Round Culvert n=0.012 L=10.0' S=0.0300 '/' Outflow=0.20 cfs 759 cf

Pond A: DMHA Peak Elev=150.42' Inflow=0.13 cfs 544 cf
12.0" Round Culvert n=0.012 L=10.0' S=0.0250 '/' Outflow=0.13 cfs 544 cf

Pond C: DMH C Peak Elev=149.37' Inflow=0.00 cfs 0 cf
12.0" Round Culvert n=0.012 L=124.0' S=0.0550 '/' Outflow=0.00 cfs 0 cf

Pond D: DMH D Peak Elev=142.45' Inflow=0.00 cfs 0 cf
12.0" Round Culvert n=0.012 L=25.0' S=0.0280 '/' Outflow=0.00 cfs 0 cf

Pond E: DMH-6P Peak Elev=129.20' Inflow=0.50 cfs 1,865 cf
12.0" Round Culvert n=0.012 L=25.0' S=0.0200 '/' Outflow=0.50 cfs 1,865 cf

Pond F: 6P OVERFLOW Peak Elev=0.00'
12.0" Round Culvert n=0.012 L=25.0' S=0.0200 '/' Primary=0.00 cfs 0 cf

Pond H: DMH-H Peak Elev=139.62' Inflow=0.21 cfs 990 cf
12.0" Round Culvert n=0.012 L=25.0' S=0.0300 '/' Outflow=0.21 cfs 990 cf

Pond K: DMHK Peak Elev=129.91' Inflow=0.43 cfs 1,614 cf
12.0" Round Culvert n=0.012 L=35.0' S=0.0200 '/' Outflow=0.43 cfs 1,614 cf

Pond RD1: 4500 1R1C Peak Elev=2.14' Storage=139 cf Inflow=0.14 cfs 503 cf
Outflow=0.02 cfs 503 cf

Pond RD1112: 4500 1R3C Peak Elev=2.09' Storage=252 cf Inflow=0.25 cfs 896 cf
Outflow=0.04 cfs 896 cf

Pond RD13: 4500 1R1C Peak Elev=2.14' Storage=139 cf Inflow=0.14 cfs 503 cf
Outflow=0.02 cfs 503 cf

Pond RD14+: 4500 1R3C Peak Elev=1.28' Storage=137 cf Inflow=0.17 cfs 665 cf
Outflow=0.04 cfs 665 cf

Pond RD15+: 3500 2R3C Peak Elev=1.18' Storage=271 cf Inflow=0.35 cfs 1,326 cf
Outflow=0.08 cfs 1,326 cf

Pond RD2: 4500 1R1C Peak Elev=2.14' Storage=139 cf Inflow=0.14 cfs 503 cf
Outflow=0.02 cfs 503 cf

Pond RD20+: 3500 2R3C Peak Elev=1.39' Storage=338 cf Inflow=0.40 cfs 1,432 cf
Outflow=0.08 cfs 1,432 cf

Pond RD25: 4500 1R1C Peak Elev=130.39' Storage=139 cf Inflow=0.14 cfs 503 cf
Outflow=0.02 cfs 503 cf

Pond RD3: 4500 1R1C Peak Elev=2.00' Storage=129 cf Inflow=0.14 cfs 479 cf
Outflow=0.02 cfs 479 cf

Pond RD37: 4500 1R2C Peak Elev=2.07' Storage=192 cf Inflow=0.19 cfs 690 cf
Outflow=0.03 cfs 690 cf

Pond RD4: 4500 1R1C Peak Elev=1.88' Storage=120 cf Inflow=0.13 cfs 457 cf
Outflow=0.02 cfs 457 cf

Pond RD5: 4500 1R1C Peak Elev=2.00' Storage=129 cf Inflow=0.14 cfs 479 cf
Outflow=0.02 cfs 479 cf

Pond RD6: 4500 1R1C Peak Elev=2.14' Storage=139 cf Inflow=0.14 cfs 503 cf
Outflow=0.02 cfs 503 cf

Link 1L: Onsite To Isolated Vegetated wetland Inflow=0.00 cfs 94 cf
Primary=0.00 cfs 94 cf

Link 2L: Offsite to Hghland Street catch basins Inflow=0.02 cfs 158 cf
Primary=0.02 cfs 158 cf

Link 3L: Onsite to southeast Low point alon Main delayed by 6.0 min Inflow=0.00 cfs 9 cf
Primary=0.00 cfs 9 cf

Link 4L: To SW Property Corner along Main Street Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Total Runoff Area = 357,132 sf Runoff Volume = 25,492 cf Average Runoff Depth = 0.86"
60.51% Pervious = 216,094 sf 39.49% Impervious = 141,038 sf

Summary for Subcatchment H1: YARDS 1 & 2

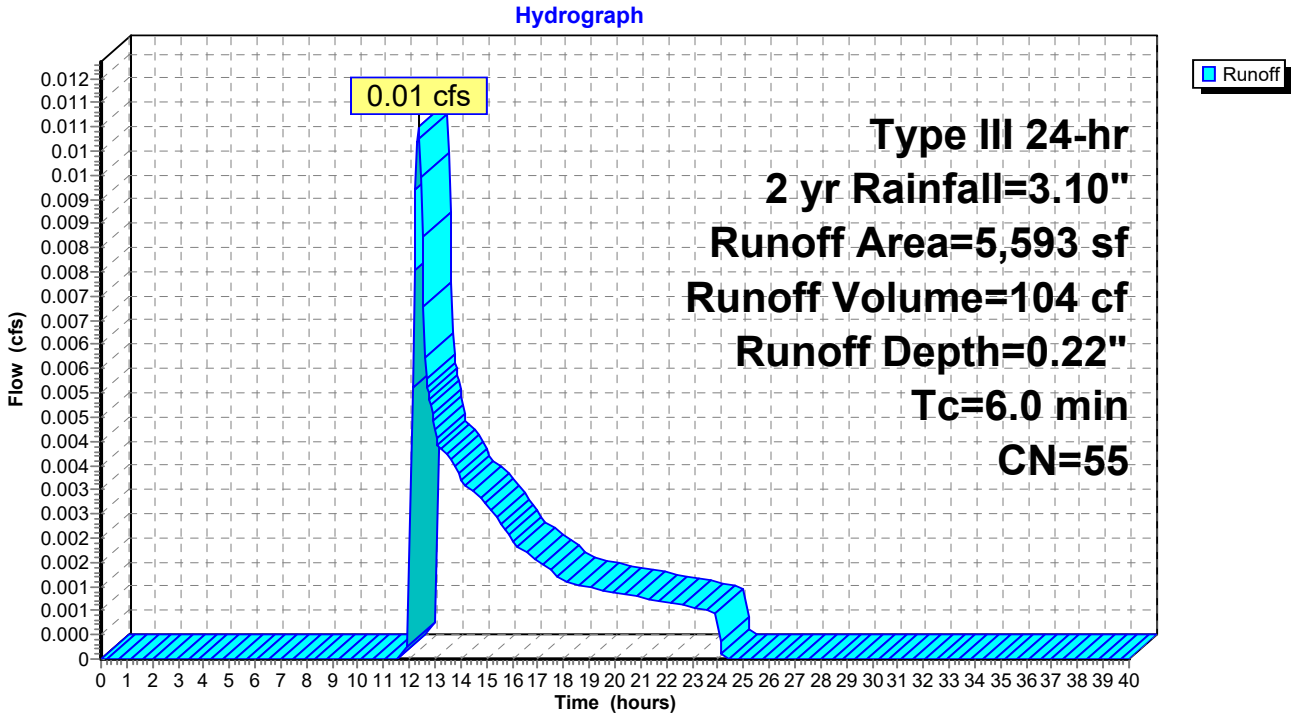
Runoff = 0.01 cfs @ 12.35 hrs, Volume= 104 cf, Depth= 0.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

	Area (sf)	CN	Description
*	1,189	98	Paved Driveway Highland, HSG A
*	304	98	Sidewalk, HSG A
	4,100	39	>75% Grass cover, Good, HSG A
	5,593	55	Weighted Average
	4,100		73.31% Pervious Area
	1,493		26.69% Impervious Area

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

Subcatchment H1: YARDS 1 & 2



Summary for Subcatchment H2: YARD ANR

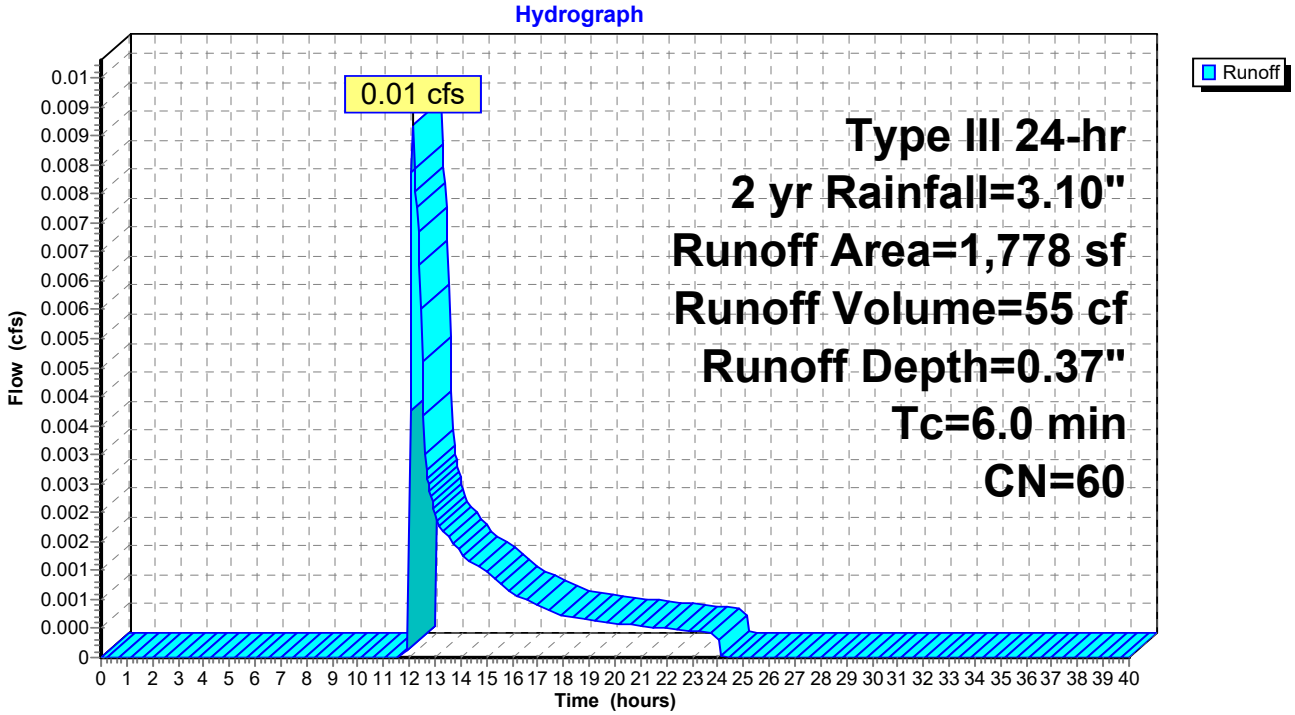
Runoff = 0.01 cfs @ 12.15 hrs, Volume= 55 cf, Depth= 0.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

	Area (sf)	CN	Description
*	646	98	Paved Driveway Highland, HSG A
	1,132	39	>75% Grass cover, Good, HSG A
	1,778	60	Weighted Average
	1,132		63.67% Pervious Area
	646		36.33% Impervious Area

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

Subcatchment H2: YARD ANR



Summary for Subcatchment M1: TO SW PL

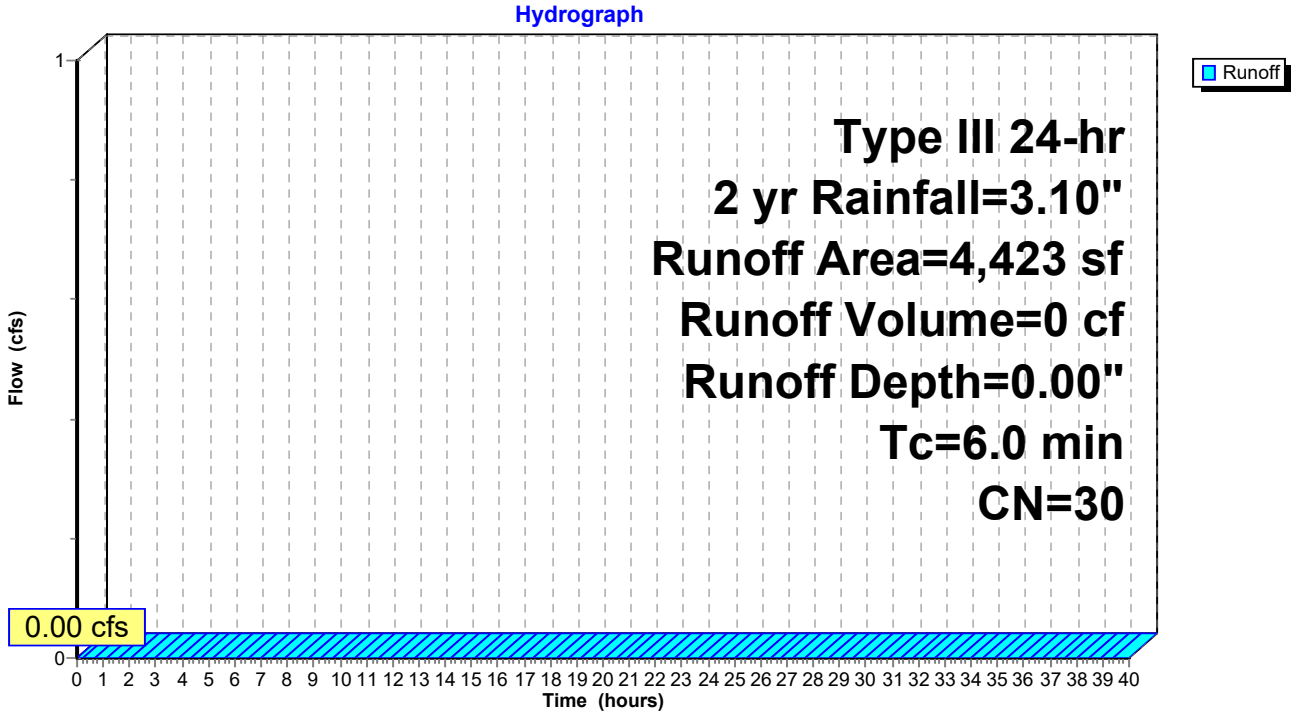
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

Area (sf)	CN	Description
4,423	30	Woods, Good, HSG A
4,423		100.00% Pervious Area

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

Subcatchment M1: TO SW PL



Summary for Subcatchment M2: TO SW PL

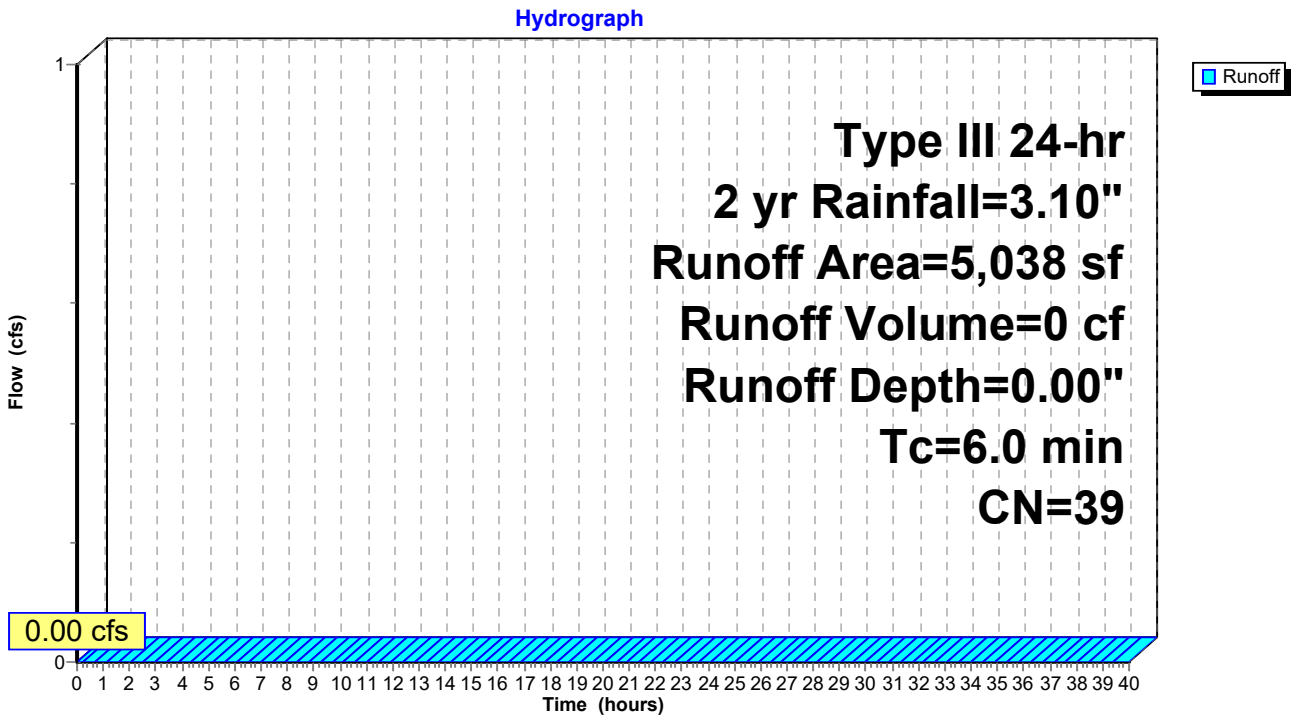
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

Area (sf)	CN	Description
5,038	39	>75% Grass cover, Good, HSG A
5,038		100.00% Pervious Area

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

Subcatchment M2: TO SW PL



Summary for Subcatchment M3: Park Area Low Point

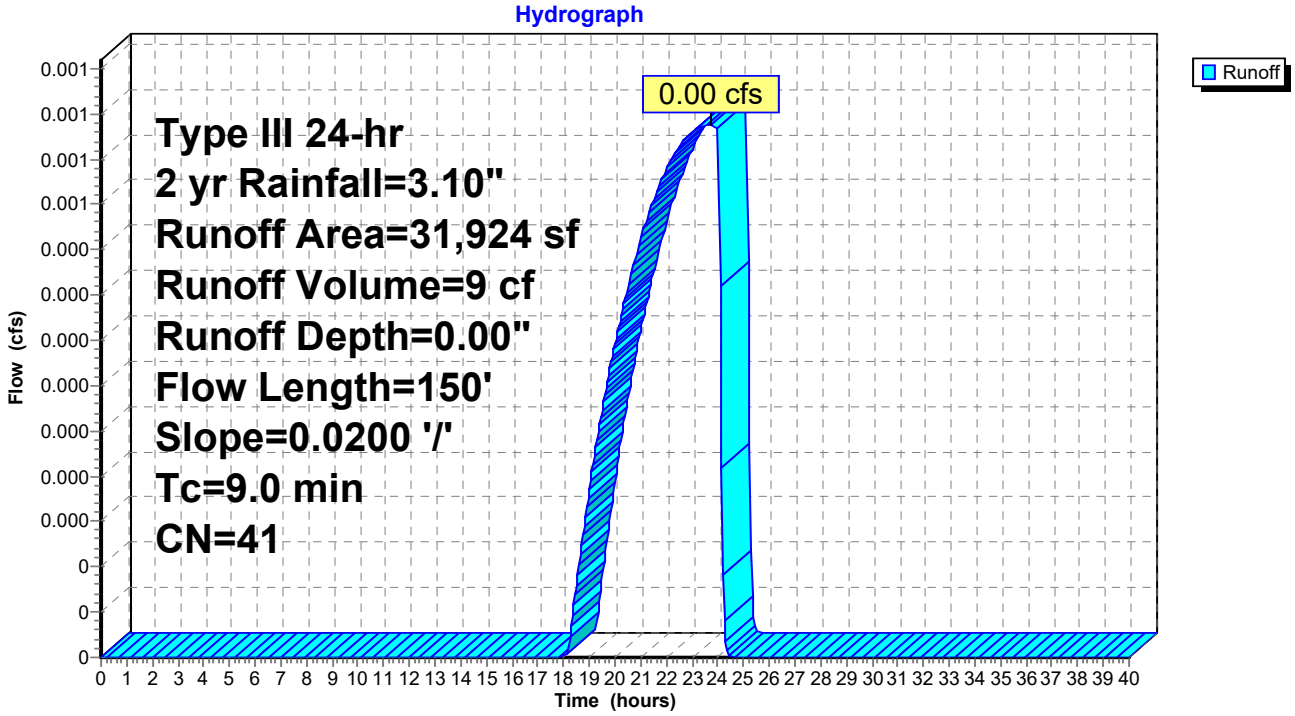
Runoff = 0.00 cfs @ 23.75 hrs, Volume= 9 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

	Area (sf)	CN	Description
	19,178	39	>75% Grass cover, Good, HSG A
*	2,436	98	Sidewalk, HSG A
	10,310	30	Woods, Good, HSG A
	31,924	41	Weighted Average
	29,488		92.37% Pervious Area
	2,436		7.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.3	50	0.0200	0.10		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.10"
0.7	100	0.0200	2.28		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
9.0	150	Total			

Subcatchment M3: Park Area Low Point



Summary for Subcatchment P1: CB1

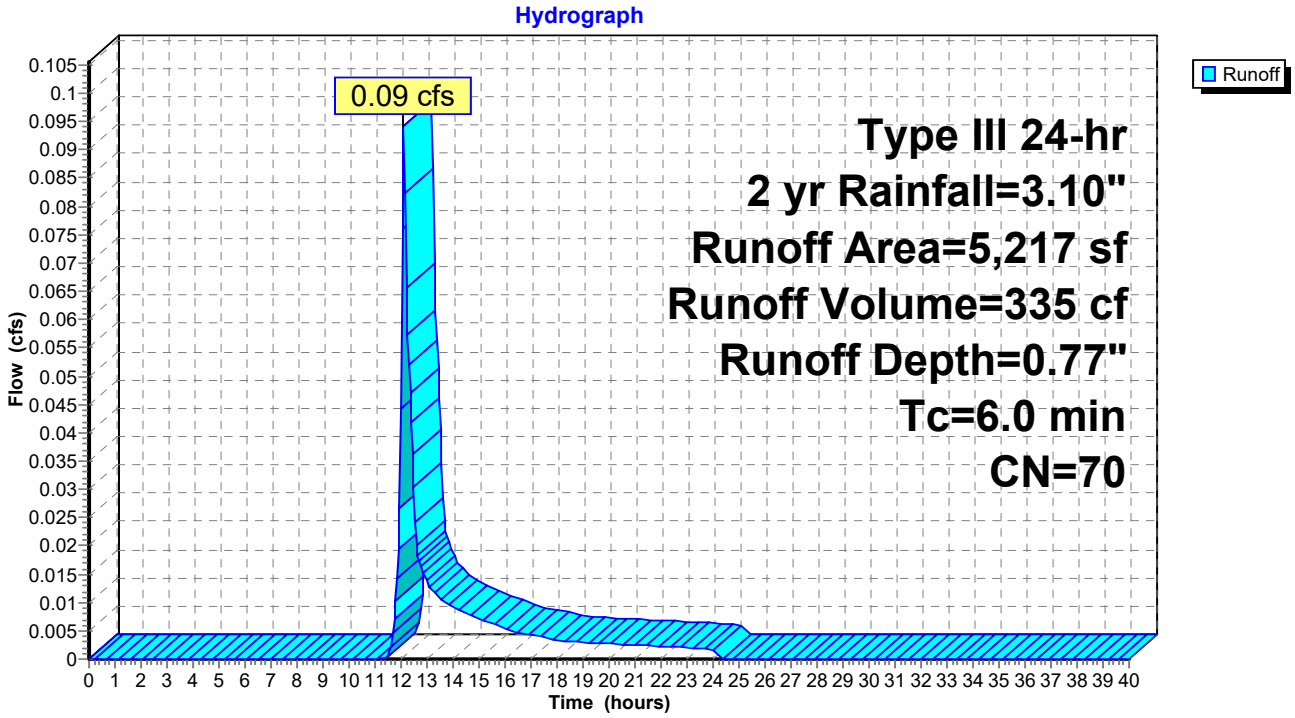
Runoff = 0.09 cfs @ 12.11 hrs, Volume= 335 cf, Depth= 0.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

	Area (sf)	CN	Description
	2,512	98	Paved roads w/curbs & sewers, HSG A
*	268	98	Sidewalk, HSG A
	2,437	39	>75% Grass cover, Good, HSG A
	5,217	70	Weighted Average
	2,437		46.71% Pervious Area
	2,780		53.29% Impervious Area

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

Subcatchment P1: CB1



Summary for Subcatchment P10: CB10

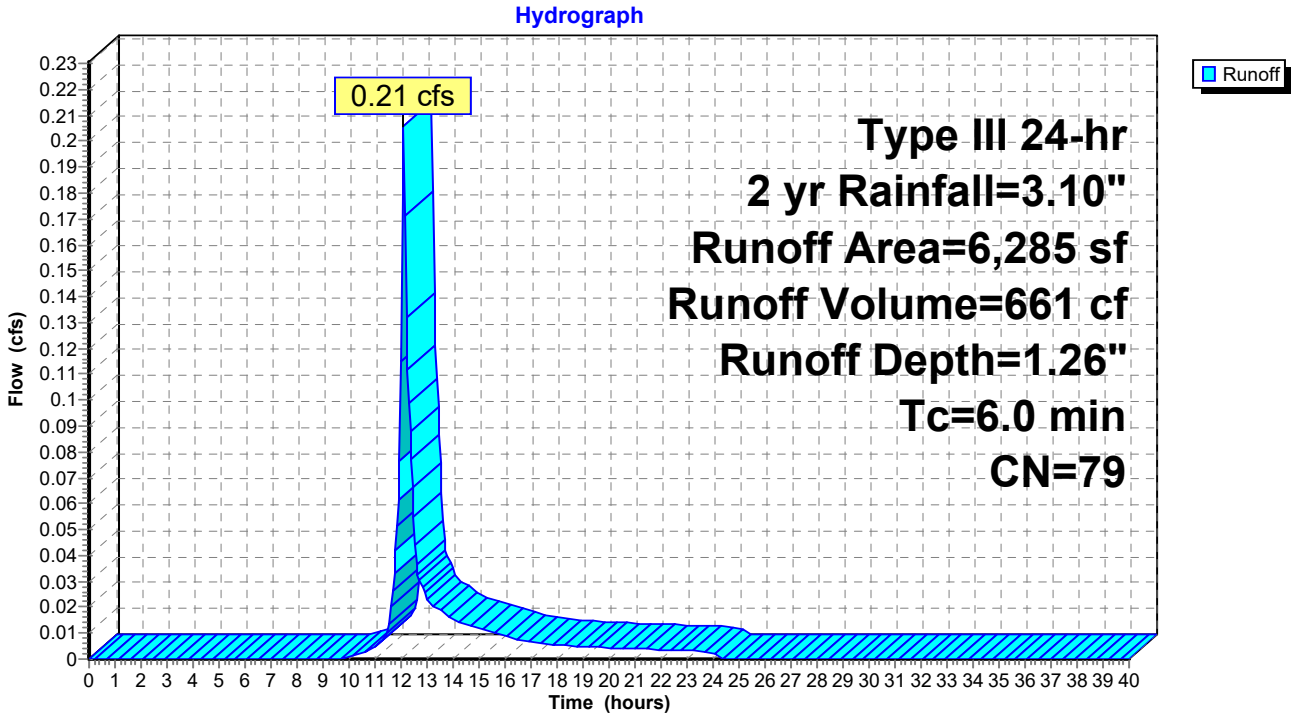
Runoff = 0.21 cfs @ 12.10 hrs, Volume= 661 cf, Depth= 1.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

Area (sf)	CN	Description
3,015	98	Paved roads w/curbs & sewers, HSG B
3,035	61	>75% Grass cover, Good, HSG B
235	55	Woods, Good, HSG B
6,285	79	Weighted Average
3,270		52.03% Pervious Area
3,015		47.97% Impervious Area

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

Subcatchment P10: CB10



Summary for Subcatchment P11: CB11

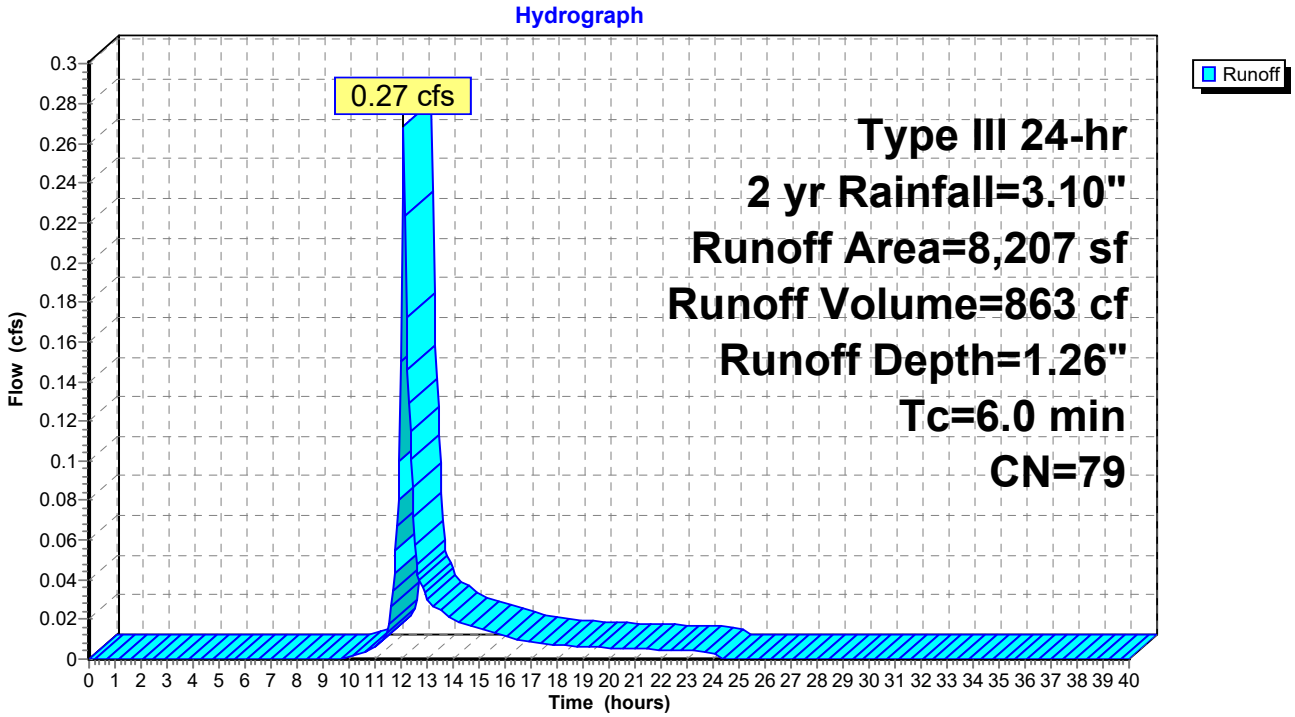
Runoff = 0.27 cfs @ 12.10 hrs, Volume= 863 cf, Depth= 1.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

Area (sf)	CN	Description
4,211	98	Paved roads w/curbs & sewers, HSG A
1,176	98	Paved roads w/curbs & sewers, HSG B
0	98	Roofs, HSG A
2,362	39	>75% Grass cover, Good, HSG A
458	61	>75% Grass cover, Good, HSG B
8,207	79	Weighted Average
2,820		34.36% Pervious Area
5,387		65.64% Impervious Area

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

Subcatchment P11: CB11



Summary for Subcatchment P12: CB12

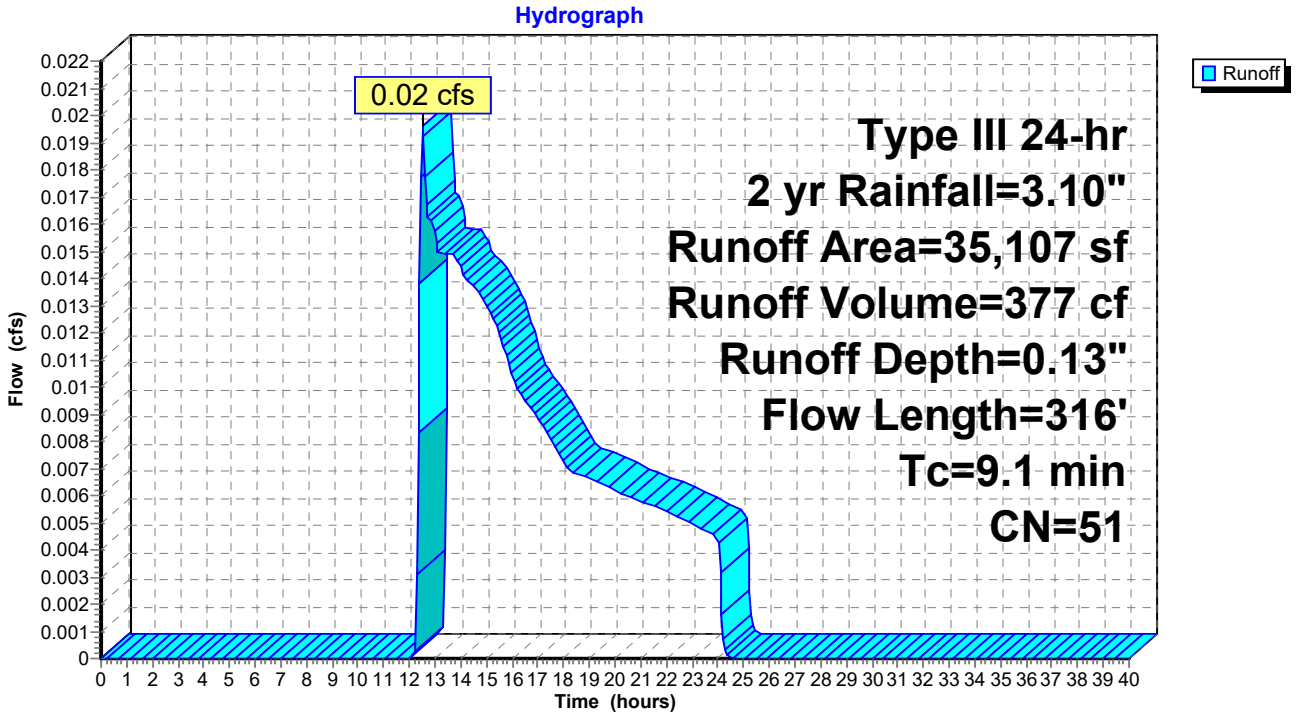
Runoff = 0.02 cfs @ 12.52 hrs, Volume= 377 cf, Depth= 0.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

	Area (sf)	CN	Description
	6,285	98	Paved roads w/curbs & sewers, HSG A
	536	98	Paved roads w/curbs & sewers, HSG B
*	1,435	98	Sidewalk, HSG A
*	182	98	Sidewalk, HSG B
	14,260	39	>75% Grass cover, Good, HSG A
	232	61	>75% Grass cover, Good, HSG B
	3,180	30	Woods, Good, HSG A
	8,542	30	Brush, Good, HSG A
*	455	98	Unconnected Offsite roof, HSG A
	35,107	51	Weighted Average
	26,214		74.67% Pervious Area
	8,893		25.33% Impervious Area
	455		5.12% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	48	0.0200	0.10		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.10"
1.0	268	0.0460	4.35		**Shallow Concentrated Flow, BC** Paved Kv= 20.3 fps
9.1	316	Total			

Subcatchment P12: CB12



Summary for Subcatchment P13: CB11

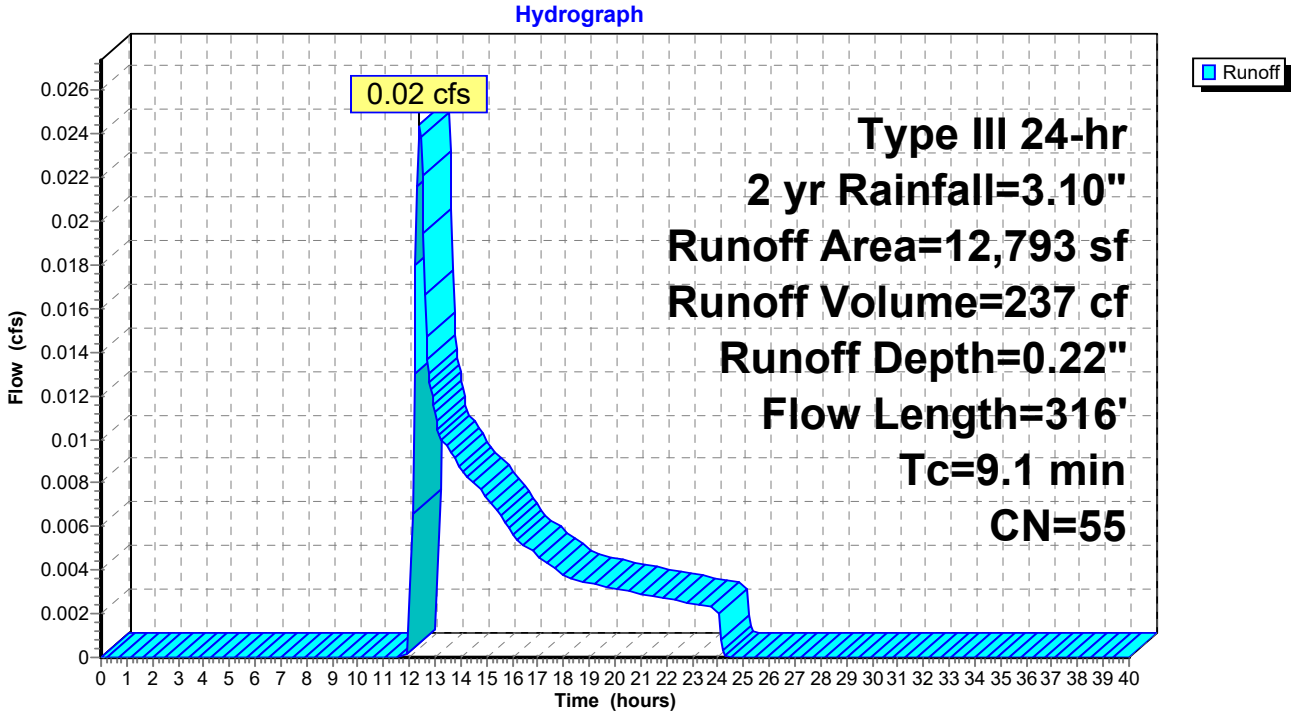
Runoff = 0.02 cfs @ 12.40 hrs, Volume= 237 cf, Depth= 0.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

	Area (sf)	CN	Description
*	252	98	Roof accessory - Mail, HSG A
	4,153	39	>75% Grass cover, Good, HSG A
	8,388	61	>75% Grass cover, Good, HSG B
	12,793	55	Weighted Average
	12,541		98.03% Pervious Area
	252		1.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	48	0.0200	0.10		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.10"
1.0	268	0.0460	4.35		**Shallow Concentrated Flow, BC** Paved Kv= 20.3 fps
9.1	316	Total			

Subcatchment P13: CB11



Summary for Subcatchment P14: CB14

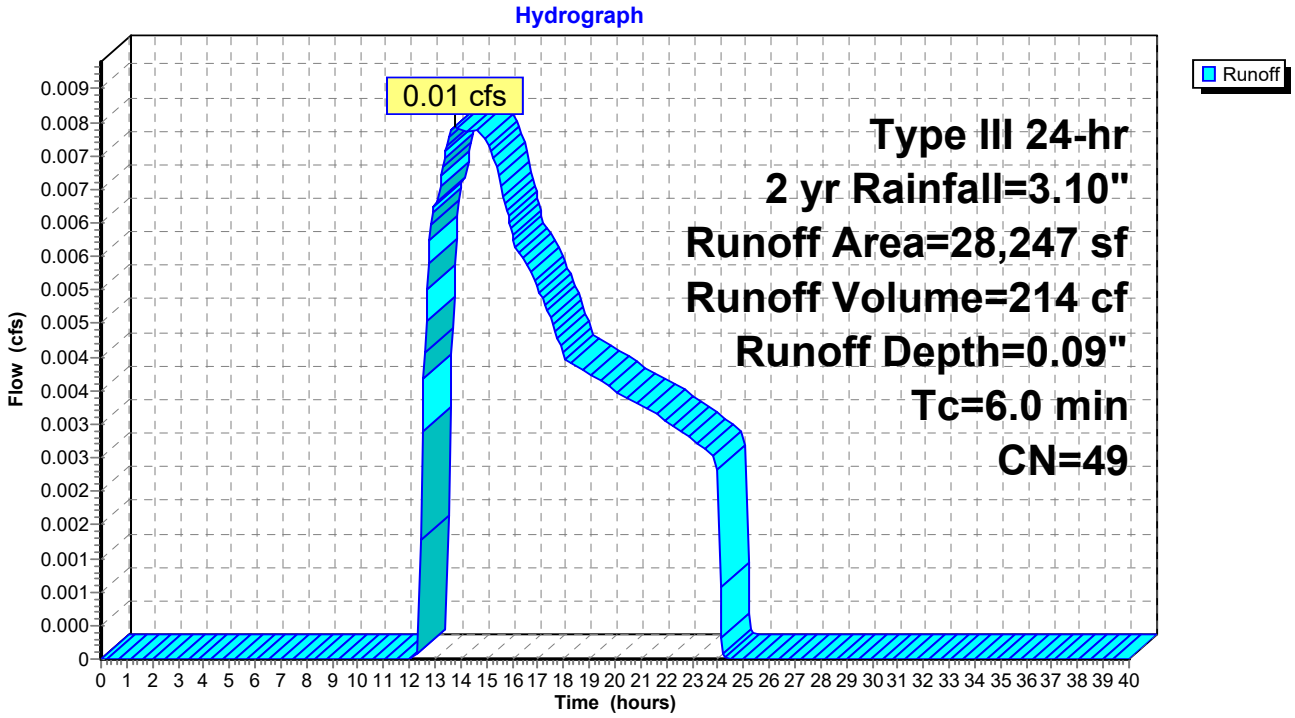
Runoff = 0.01 cfs @ 13.80 hrs, Volume= 214 cf, Depth= 0.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

Area (sf)	CN	Description
667	98	Paved roads w/curbs & sewers, HSG A
16,113	39	>75% Grass cover, Good, HSG A
11,467	61	>75% Grass cover, Good, HSG B
28,247	49	Weighted Average
27,580		97.64% Pervious Area
667		2.36% Impervious Area

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

Subcatchment P14: CB14



Summary for Subcatchment P15: CB15

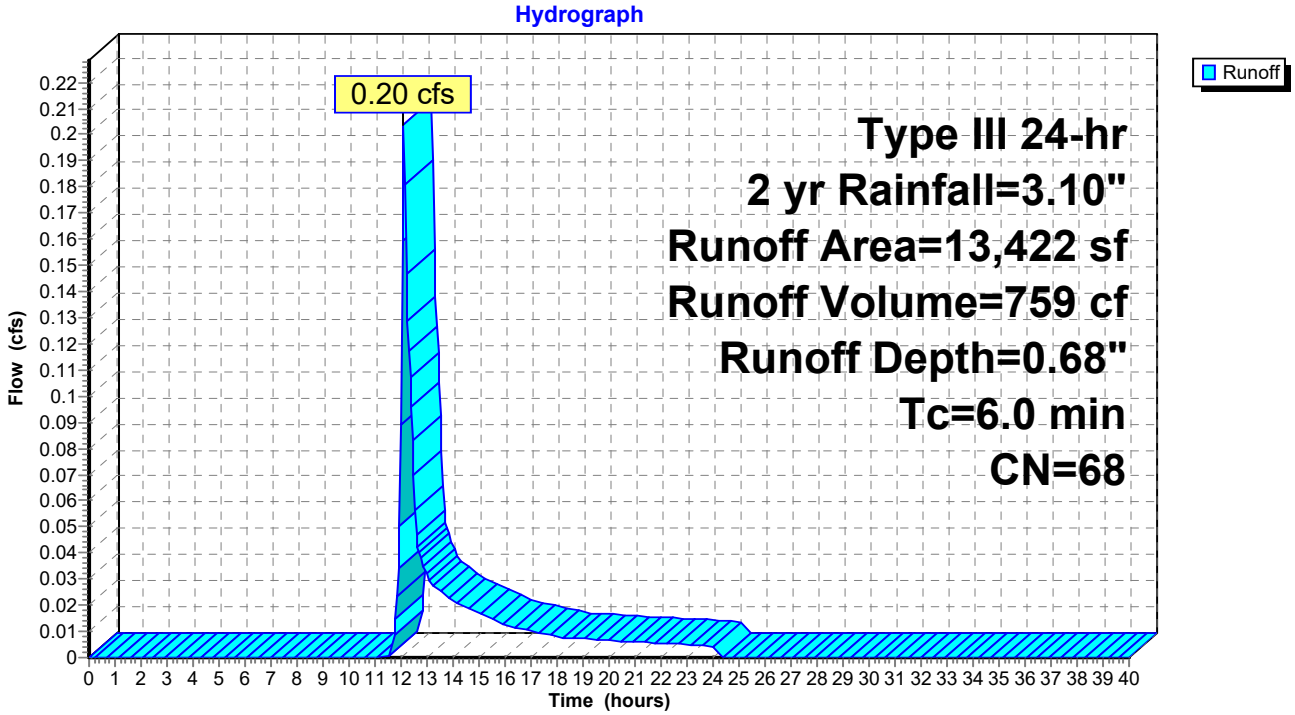
Runoff = 0.20 cfs @ 12.11 hrs, Volume= 759 cf, Depth= 0.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

	Area (sf)	CN	Description
	6,514	98	Paved roads w/curbs & sewers, HSG A
*	169	98	Sidewalk, HSG A
	5,567	39	>75% Grass cover, Good, HSG A
	1,172	30	Woods, Good, HSG A
	13,422	68	Weighted Average
	6,739		50.21% Pervious Area
	6,683		49.79% Impervious Area

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

Subcatchment P15: CB15



Summary for Subcatchment P16: Lawn A.D. 1

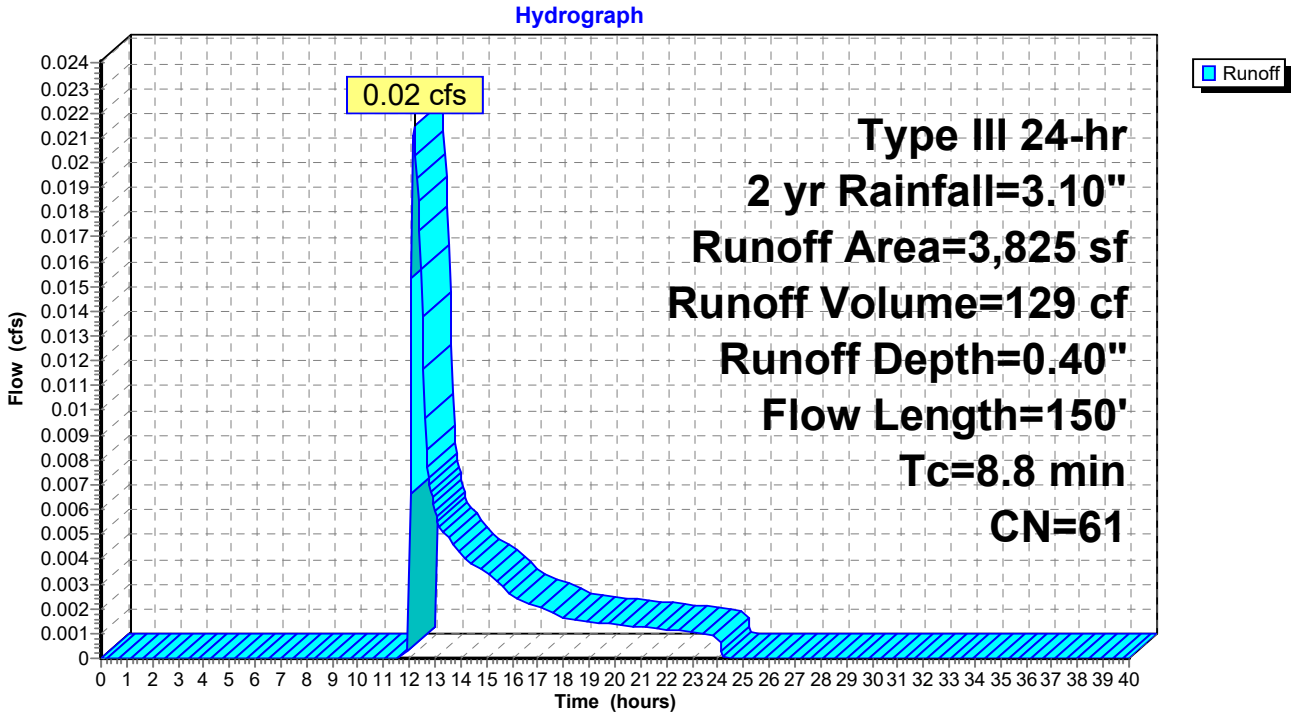
Runoff = 0.02 cfs @ 12.19 hrs, Volume= 129 cf, Depth= 0.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

Area (sf)	CN	Description
3,825	61	>75% Grass cover, Good, HSG B
3,825		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.3	50	0.0200	0.10		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.10"
0.5	100	0.0400	3.22		**Shallow Concentrated Flow, BC** Unpaved Kv= 16.1 fps
8.8	150	Total			

Subcatchment P16: Lawn A.D. 1



Summary for Subcatchment P17: Lawn A.D. 2

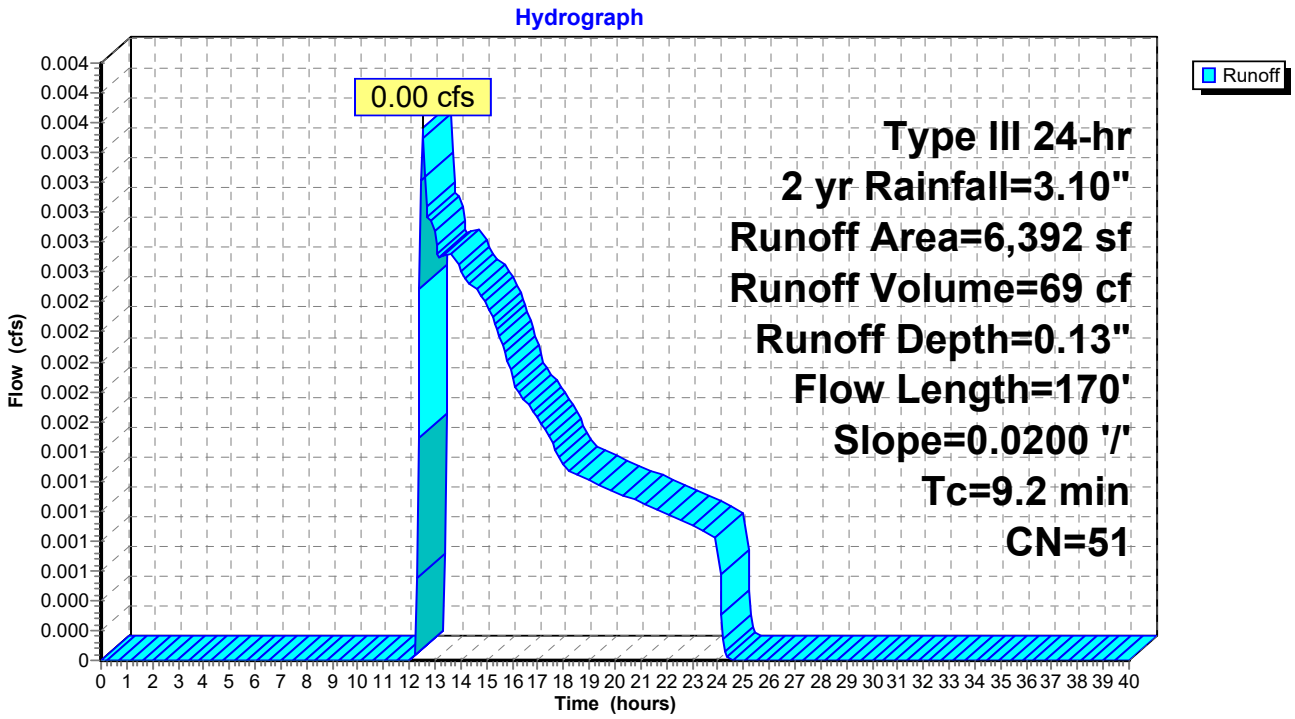
Runoff = 0.00 cfs @ 12.52 hrs, Volume= 69 cf, Depth= 0.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

Area (sf)	CN	Description
2,987	39	>75% Grass cover, Good, HSG A
3,405	61	>75% Grass cover, Good, HSG B
6,392	51	Weighted Average
6,392		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.3	50	0.0200	0.10		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.10"
0.9	120	0.0200	2.28		**Shallow Concentrated Flow, BC** Unpaved Kv= 16.1 fps
9.2	170	Total			

Subcatchment P17: Lawn A.D. 2



Summary for Subcatchment P18: TO IVW

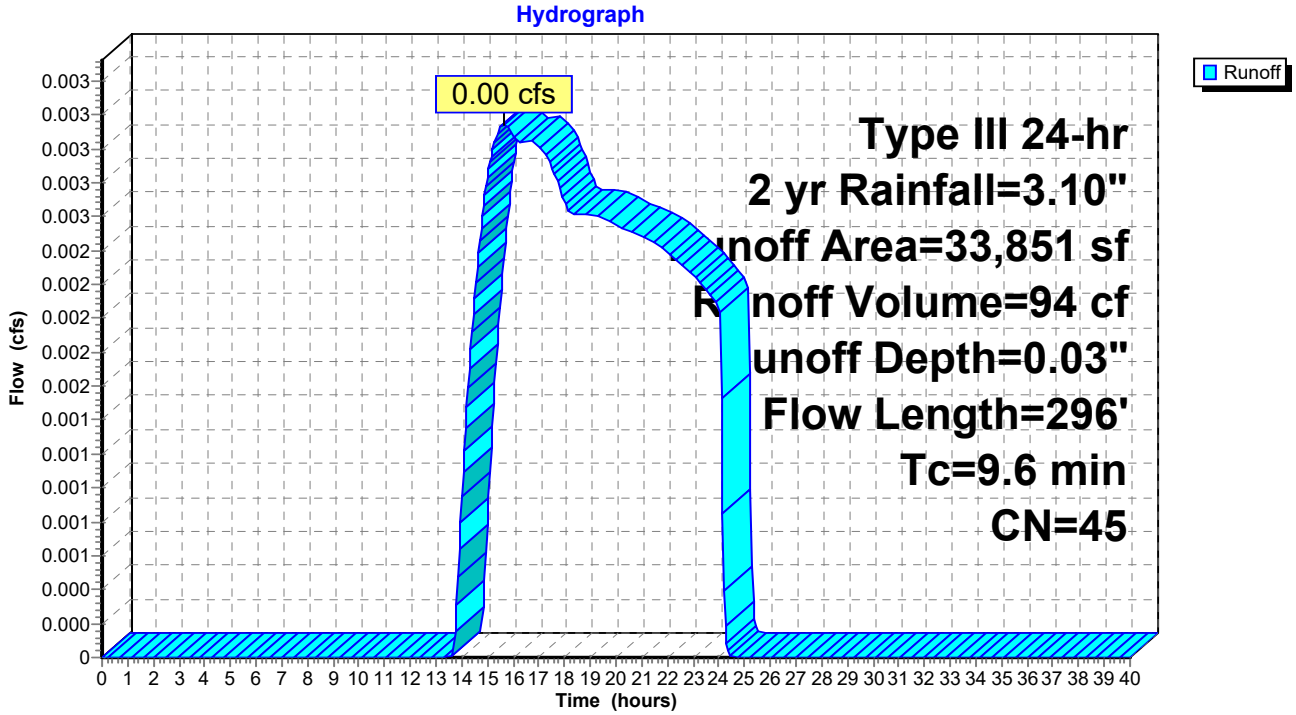
Runoff = 0.00 cfs @ 15.67 hrs, Volume= 94 cf, Depth= 0.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

	Area (sf)	CN	Description
*	320	98	Sidewalk, HSG A
	20,911	39	>75% Grass cover, Good, HSG A
	1,254	80	>75% Grass cover, Good, HSG D
	2,043	30	Woods, Good, HSG A
	1,795	77	Woods, Good, HSG D
	3,875	30	Brush, Good, HSG A
	3,653	73	Brush, Good, HSG D
	33,851	45	Weighted Average
	33,531		99.05% Pervious Area
	320		0.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.3	50	0.0200	0.10		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.10"
1.3	246	0.0400	3.22		**Shallow Concentrated Flow, BC** Unpaved Kv= 16.1 fps
9.6	296	Total			

Subcatchment P18: TO IVW



Summary for Subcatchment P2: CB2

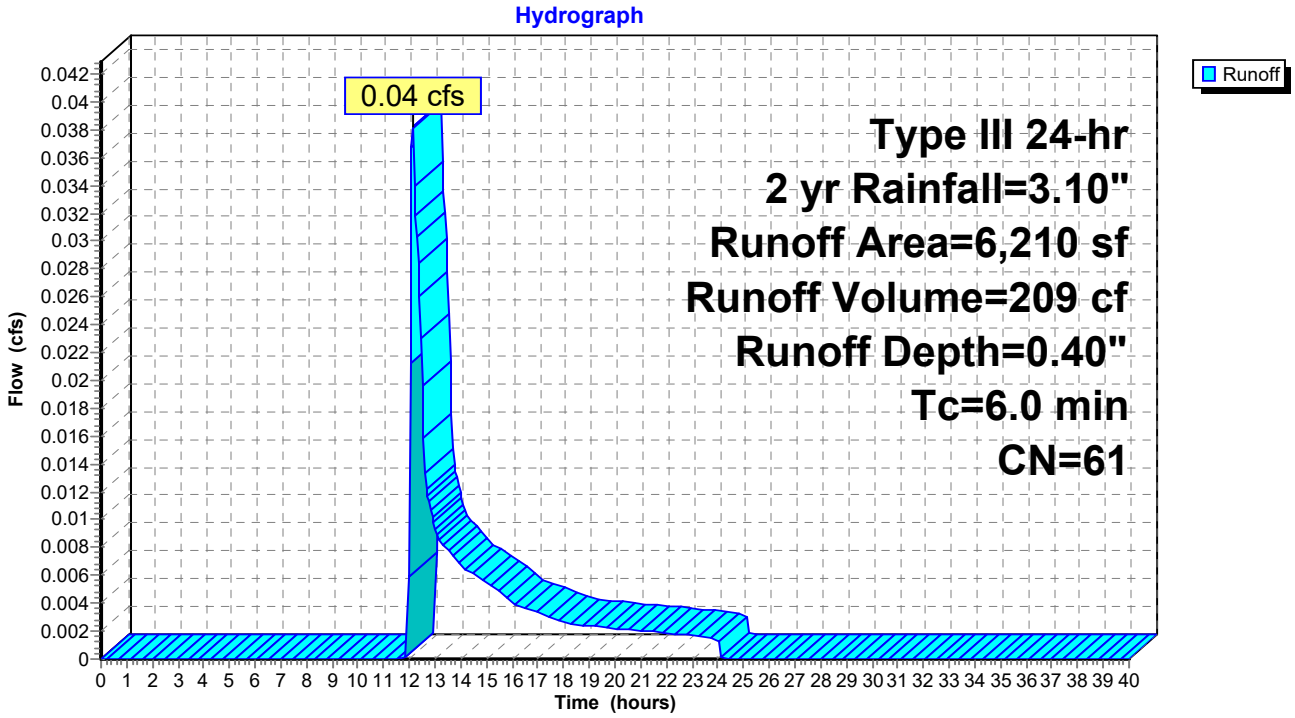
Runoff = 0.04 cfs @ 12.14 hrs, Volume= 209 cf, Depth= 0.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

	Area (sf)	CN	Description
	1,961	98	Paved roads w/curbs & sewers, HSG A
*	390	98	Sidewalk, HSG A
	3,859	39	>75% Grass cover, Good, HSG A
	6,210	61	Weighted Average
	3,859		62.14% Pervious Area
	2,351		37.86% Impervious Area

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

Subcatchment P2: CB2



Summary for Subcatchment P3: CB3

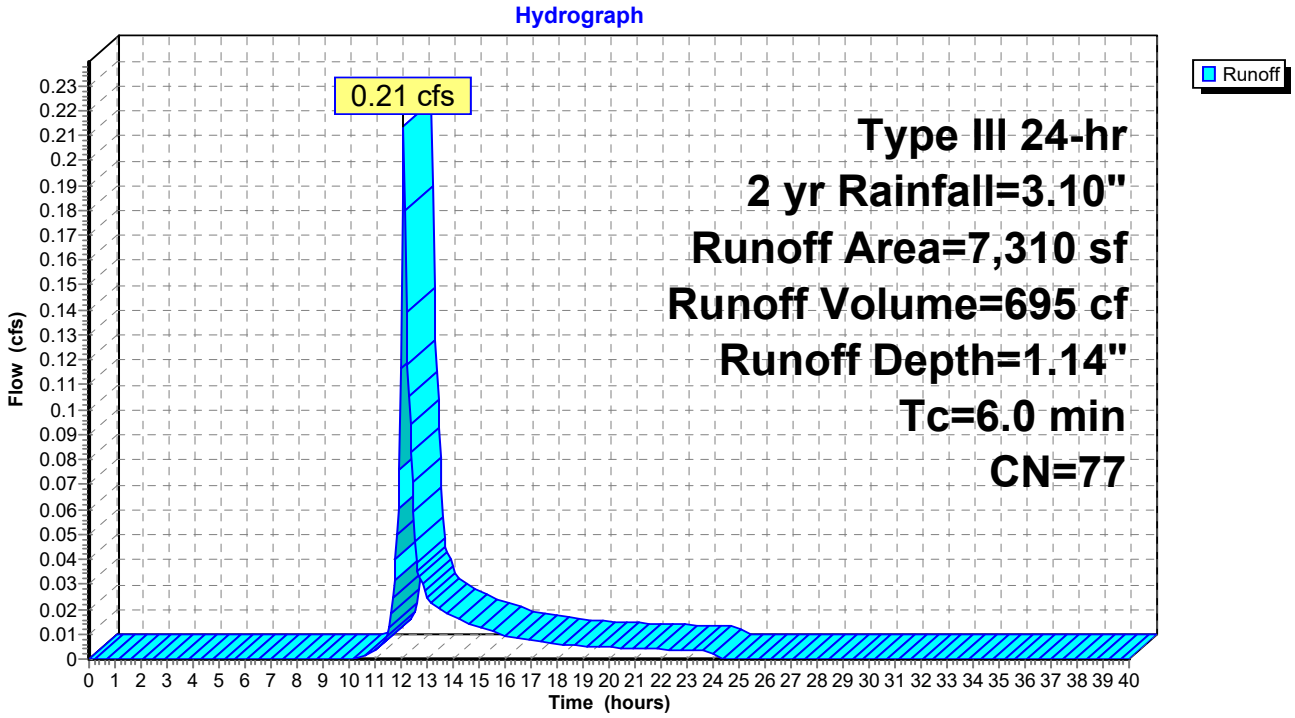
Runoff = 0.21 cfs @ 12.10 hrs, Volume= 695 cf, Depth= 1.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

Area (sf)	CN	Description
4,659	98	Paved roads w/curbs & sewers, HSG A
0	98	Roofs, HSG A
2,651	39	>75% Grass cover, Good, HSG A
7,310	77	Weighted Average
2,651		36.27% Pervious Area
4,659		63.73% Impervious Area

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

Subcatchment P3: CB3



Summary for Subcatchment P4: CB4

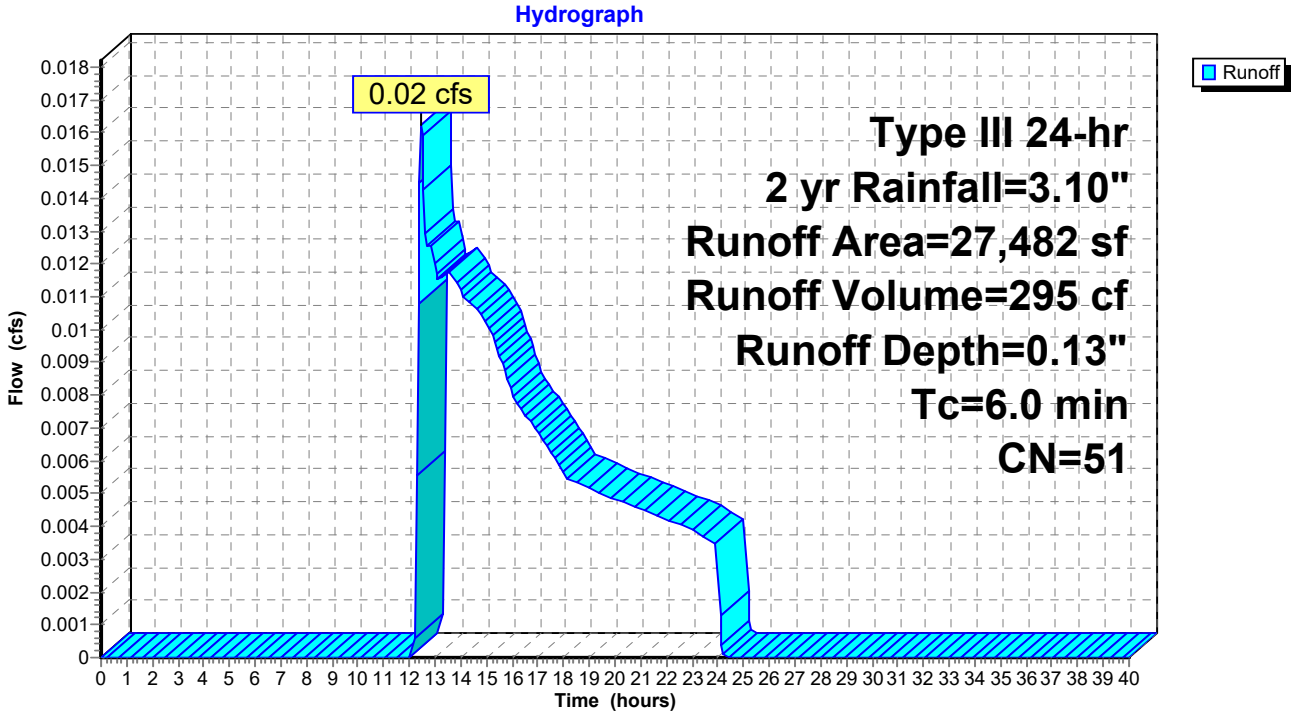
Runoff = 0.02 cfs @ 12.47 hrs, Volume= 295 cf, Depth= 0.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

	Area (sf)	CN	Description
	4,724	98	Paved roads w/curbs & sewers, HSG A
*	3,009	98	Sidewalk, HSG A
	6,107	39	>75% Grass cover, Good, HSG A
	13,642	30	Woods, Good, HSG A
	27,482	51	Weighted Average
	19,749		71.86% Pervious Area
	7,733		28.14% Impervious Area

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

Subcatchment P4: CB4



Summary for Subcatchment P5: CB5

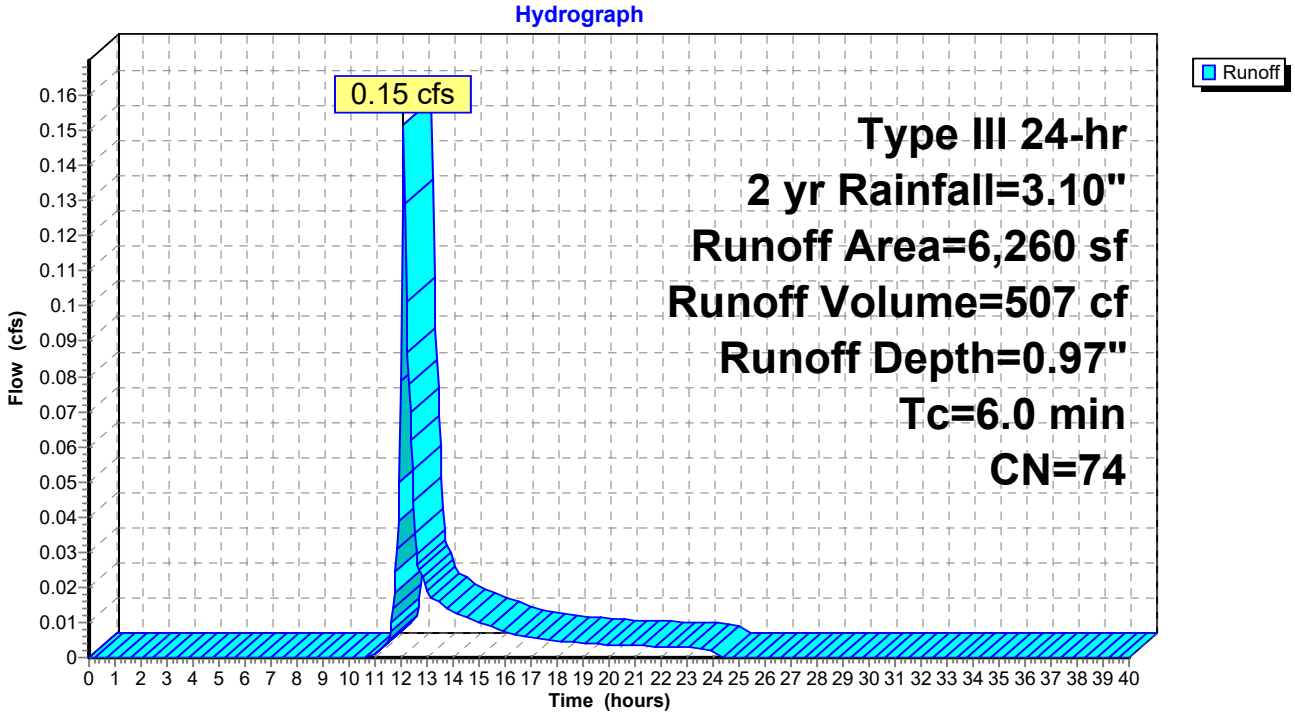
Runoff = 0.15 cfs @ 12.10 hrs, Volume= 507 cf, Depth= 0.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

Area (sf)	CN	Description
3,310	98	Paved roads w/curbs & sewers, HSG A
157	98	Paved roads w/curbs & sewers, HSG B
2,151	39	>75% Grass cover, Good, HSG A
642	61	>75% Grass cover, Good, HSG B
6,260	74	Weighted Average
2,793		44.62% Pervious Area
3,467		55.38% Impervious Area

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

Subcatchment P5: CB5



Summary for Subcatchment P6: CB6

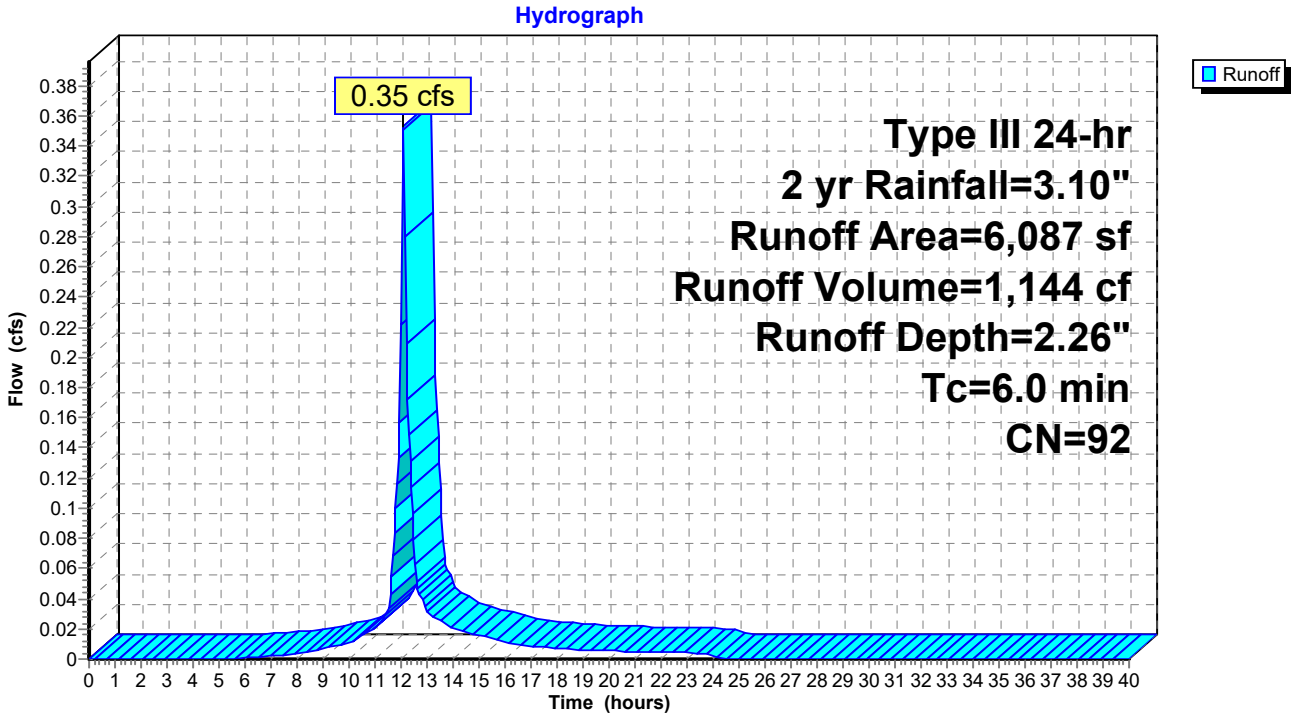
Runoff = 0.35 cfs @ 12.09 hrs, Volume= 1,144 cf, Depth= 2.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

	Area (sf)	CN	Description
	4,620	98	Paved roads w/curbs & sewers, HSG A
*	836	98	Sidewalk, HSG A
	631	39	>75% Grass cover, Good, HSG A
	6,087	92	Weighted Average
	631		10.37% Pervious Area
	5,456		89.63% Impervious Area

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

Subcatchment P6: CB6



Summary for Subcatchment P7: CB7

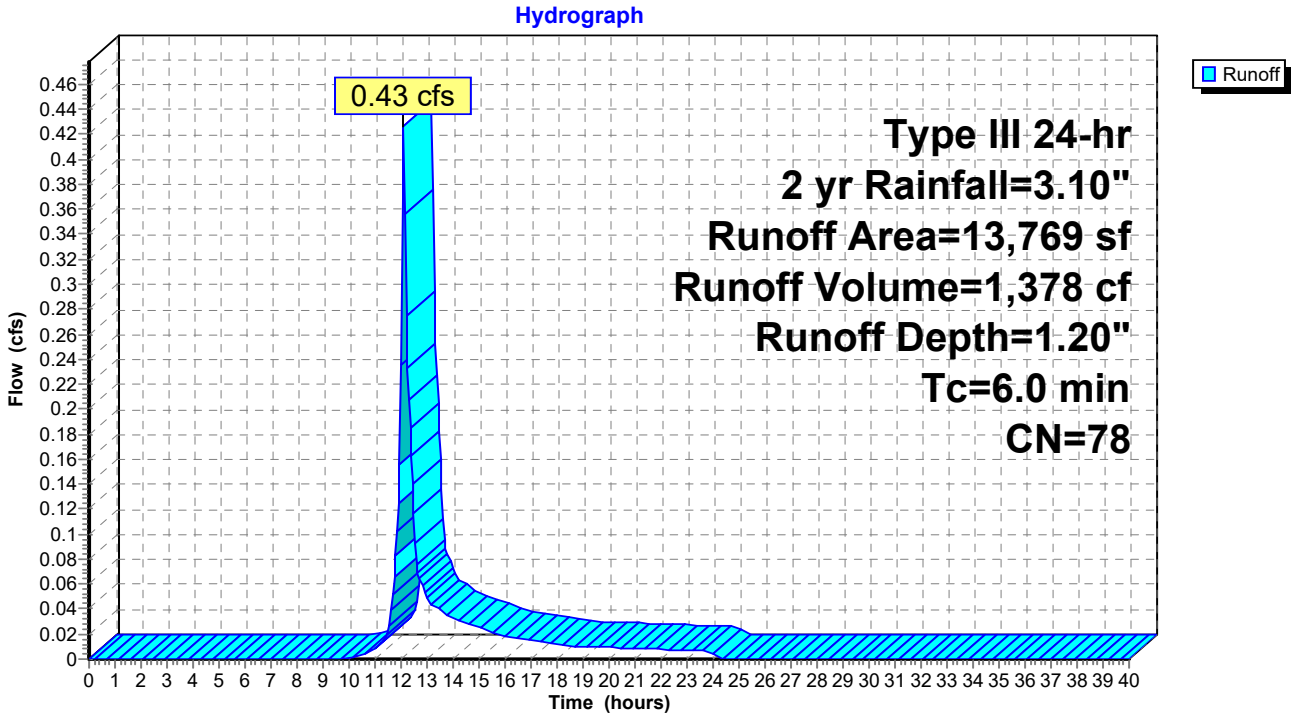
Runoff = 0.43 cfs @ 12.10 hrs, Volume= 1,378 cf, Depth= 1.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

	Area (sf)	CN	Description
	8,178	98	Paved roads w/curbs & sewers, HSG A
	46	98	Paved roads w/curbs & sewers, HSG B
*	878	98	Sidewalk, HSG A
	4,593	39	>75% Grass cover, Good, HSG A
	74	61	>75% Grass cover, Good, HSG B
	13,769	78	Weighted Average
	4,667		33.89% Pervious Area
	9,102		66.11% Impervious Area

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

Subcatchment P7: CB7



Summary for Subcatchment P8: CB8

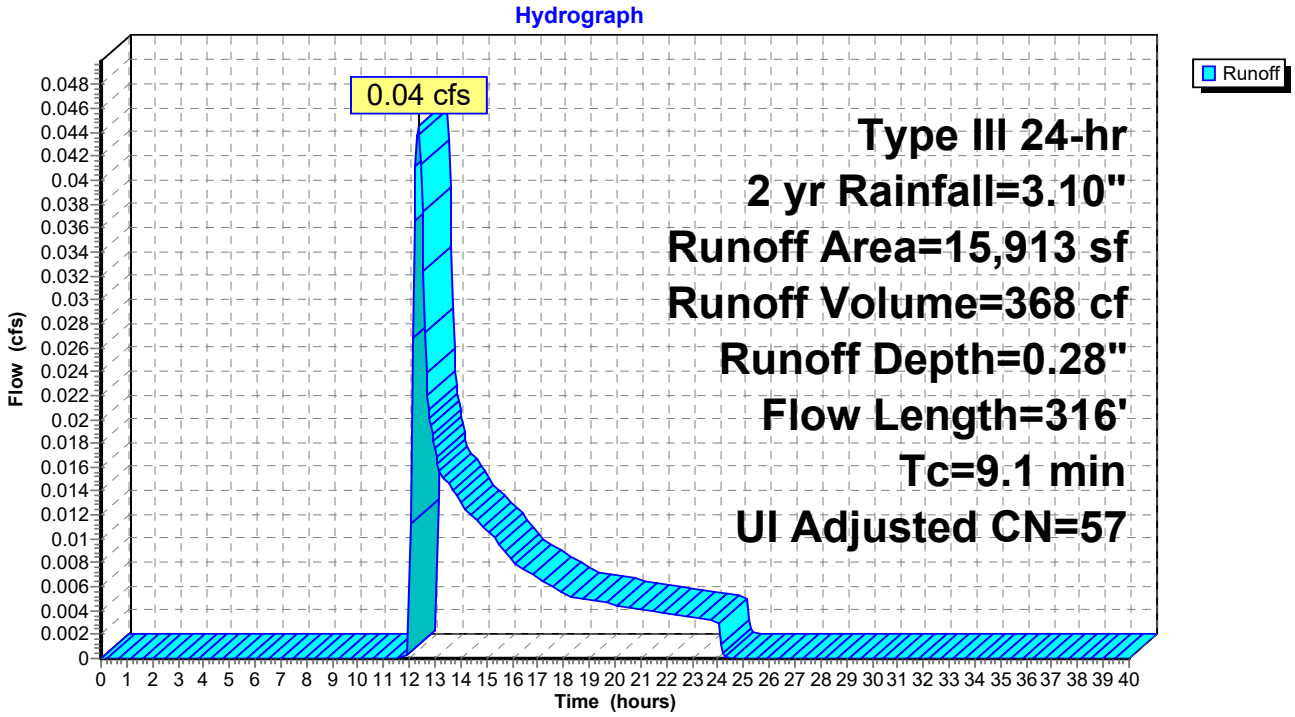
Runoff = 0.04 cfs @ 12.35 hrs, Volume= 368 cf, Depth= 0.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

	Area (sf)	CN	Adj	Description
	437	98		Paved roads w/curbs & sewers, HSG A
	2,874	98		Paved roads w/curbs & sewers, HSG B
*	427	98		Sidewalk, HSG B
	3,783	39		>75% Grass cover, Good, HSG A
	3,565	61		>75% Grass cover, Good, HSG B
	1,145	30		Woods, Good, HSG A
	66	55		Woods, Good, HSG B
	2,680	30		Brush, Good, HSG A
	320	48		Brush, Good, HSG B
*	616	98		Unconnected Offsite roof, HSG A
	15,913	58	57	Weighted Average, UI Adjusted
	11,559			72.64% Pervious Area
	4,354			27.36% Impervious Area
	616			14.15% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	48	0.0200	0.10		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.10"
1.0	268	0.0460	4.35		**Shallow Concentrated Flow, BC** Paved Kv= 20.3 fps
9.1	316	Total			

Subcatchment P8: CB8



Summary for Subcatchment P9: CB9

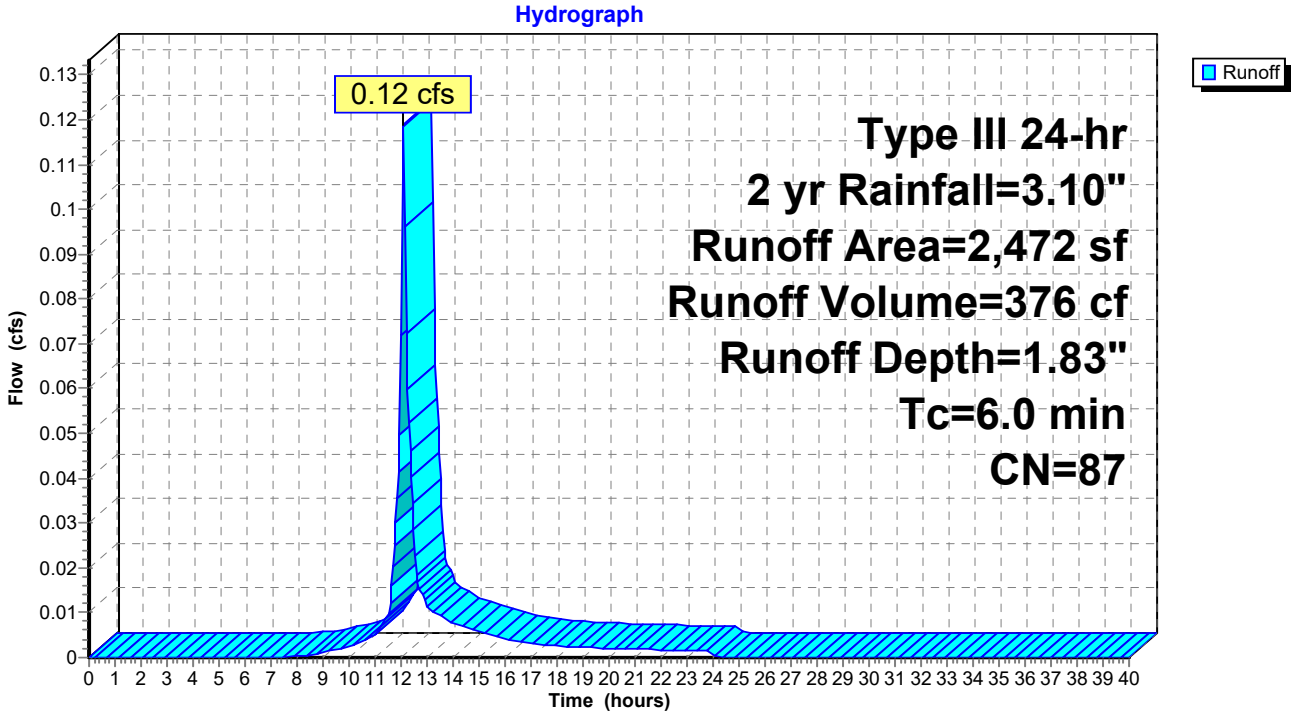
Runoff = 0.12 cfs @ 12.09 hrs, Volume= 376 cf, Depth= 1.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

Area (sf)	CN	Description
350	98	Paved roads w/curbs & sewers, HSG A
1,467	98	Paved roads w/curbs & sewers, HSG B
140	39	>75% Grass cover, Good, HSG A
515	61	>75% Grass cover, Good, HSG B
2,472	87	Weighted Average
655		26.50% Pervious Area
1,817		73.50% Impervious Area

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

Subcatchment P9: CB9



Summary for Subcatchment R1: 1-A1

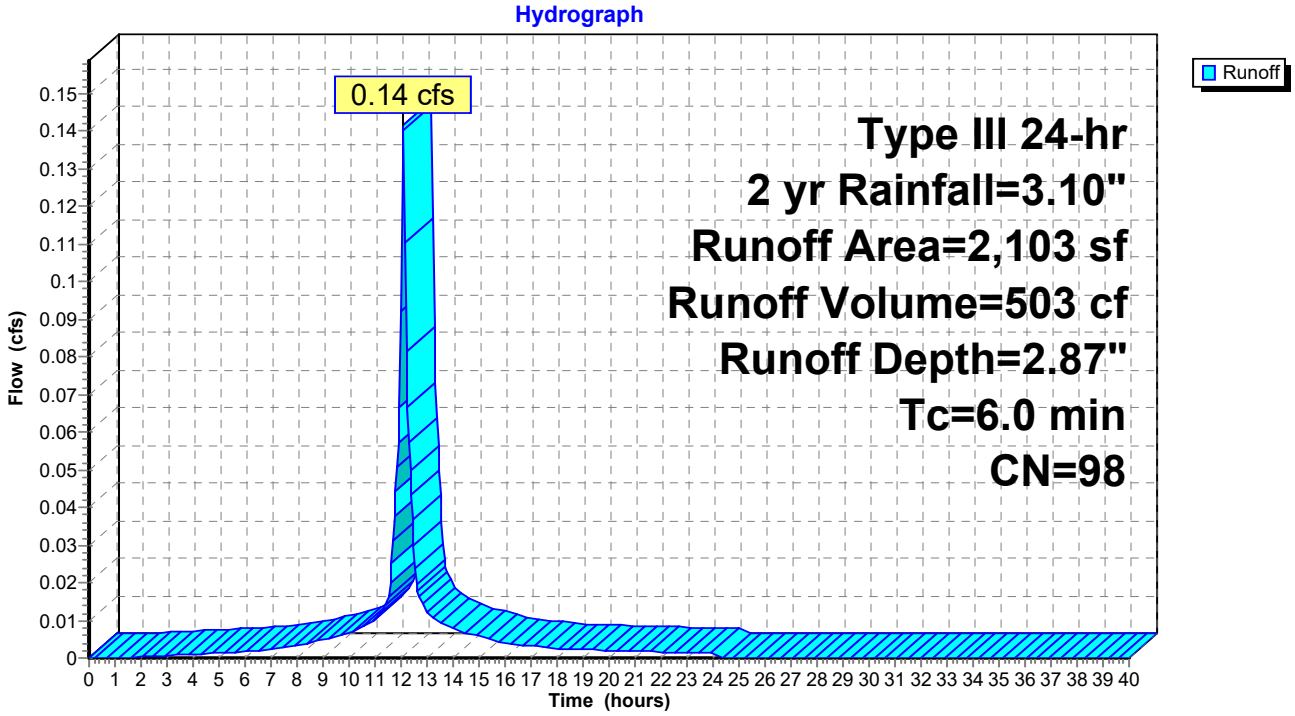
Runoff = 0.14 cfs @ 12.09 hrs, Volume= 503 cf, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

Area (sf)	CN	Description
2,103	98	Roofs, HSG A
2,103		100.00% Impervious Area

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

Subcatchment R1: 1-A1



Summary for Subcatchment R10: 10-C2

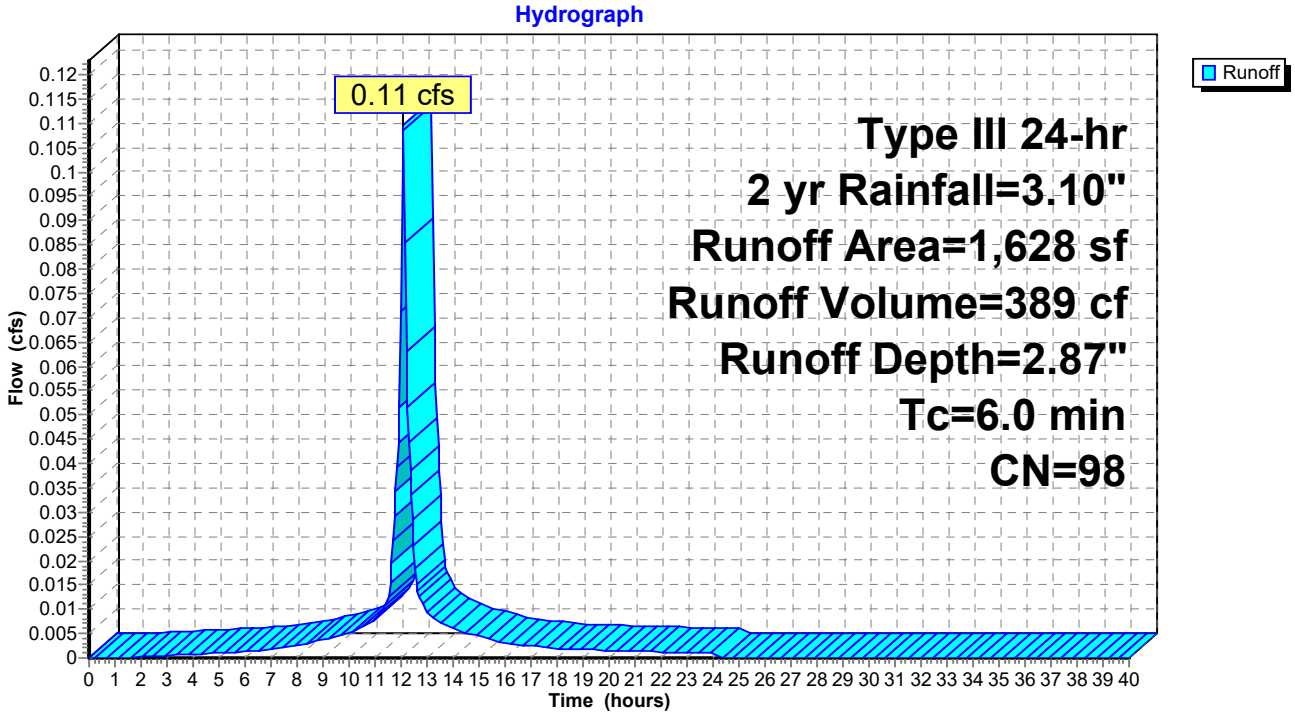
Runoff = 0.11 cfs @ 12.09 hrs, Volume= 389 cf, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

Area (sf)	CN	Description
1,628	98	Roofs, HSG A
1,628		100.00% Impervious Area

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

Subcatchment R10: 10-C2



Summary for Subcatchment R11: 11-B2

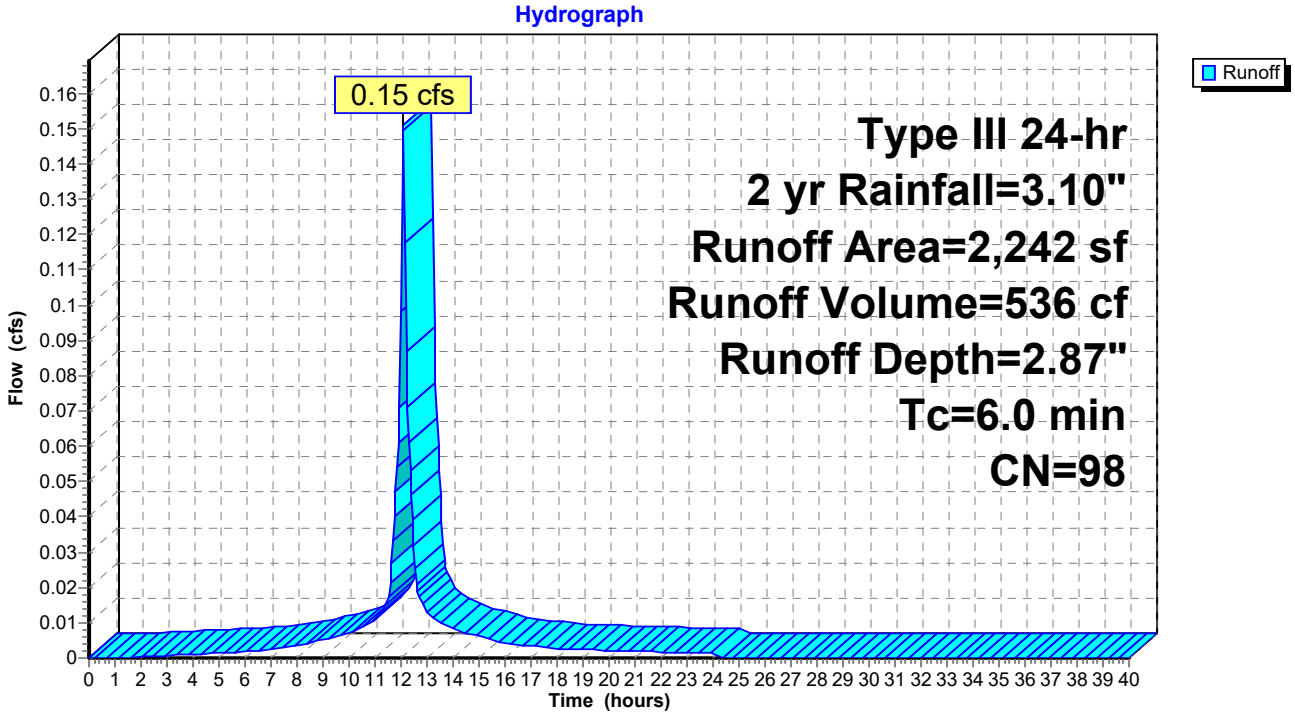
Runoff = 0.15 cfs @ 12.09 hrs, Volume= 536 cf, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

Area (sf)	CN	Description
1,369	98	Roofs, HSG A
873	98	Roofs, HSG B
2,242	98	Weighted Average
2,242		100.00% Impervious Area

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

Subcatchment R11: 11-B2



Summary for Subcatchment R12: 12-B1

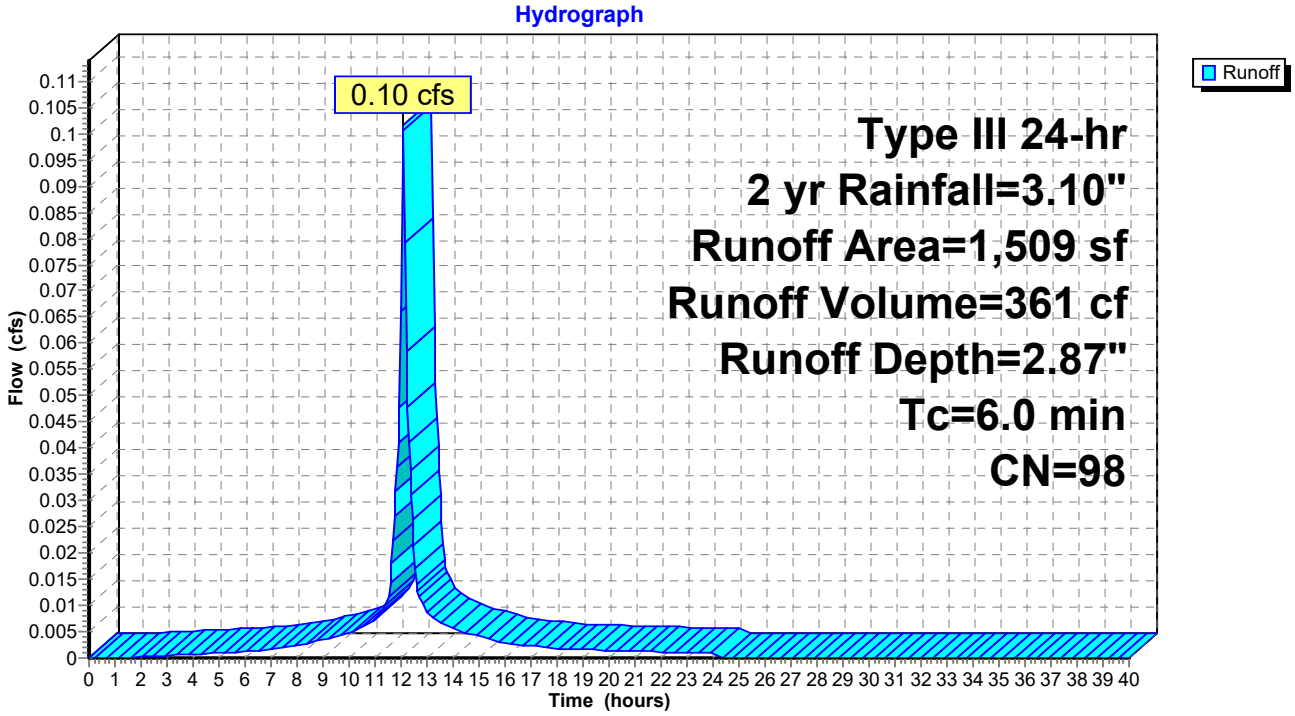
Runoff = 0.10 cfs @ 12.09 hrs, Volume= 361 cf, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

Area (sf)	CN	Description
1,509	98	Roofs, HSG B
1,509		100.00% Impervious Area

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

Subcatchment R12: 12-B1



Summary for Subcatchment R13: 13-A1

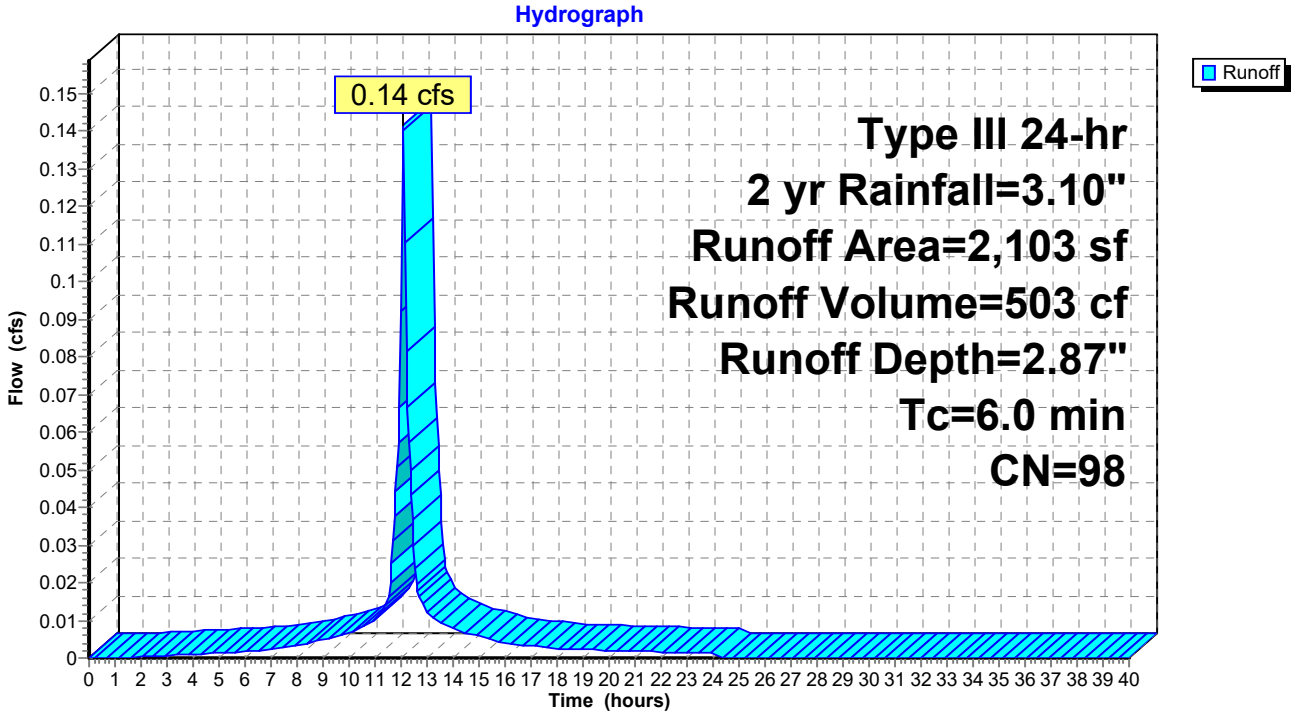
Runoff = 0.14 cfs @ 12.09 hrs, Volume= 503 cf, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

Area (sf)	CN	Description
2,103	98	Roofs, HSG B
2,103		100.00% Impervious Area

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

Subcatchment R13: 13-A1



Summary for Subcatchment R14: 14-B2

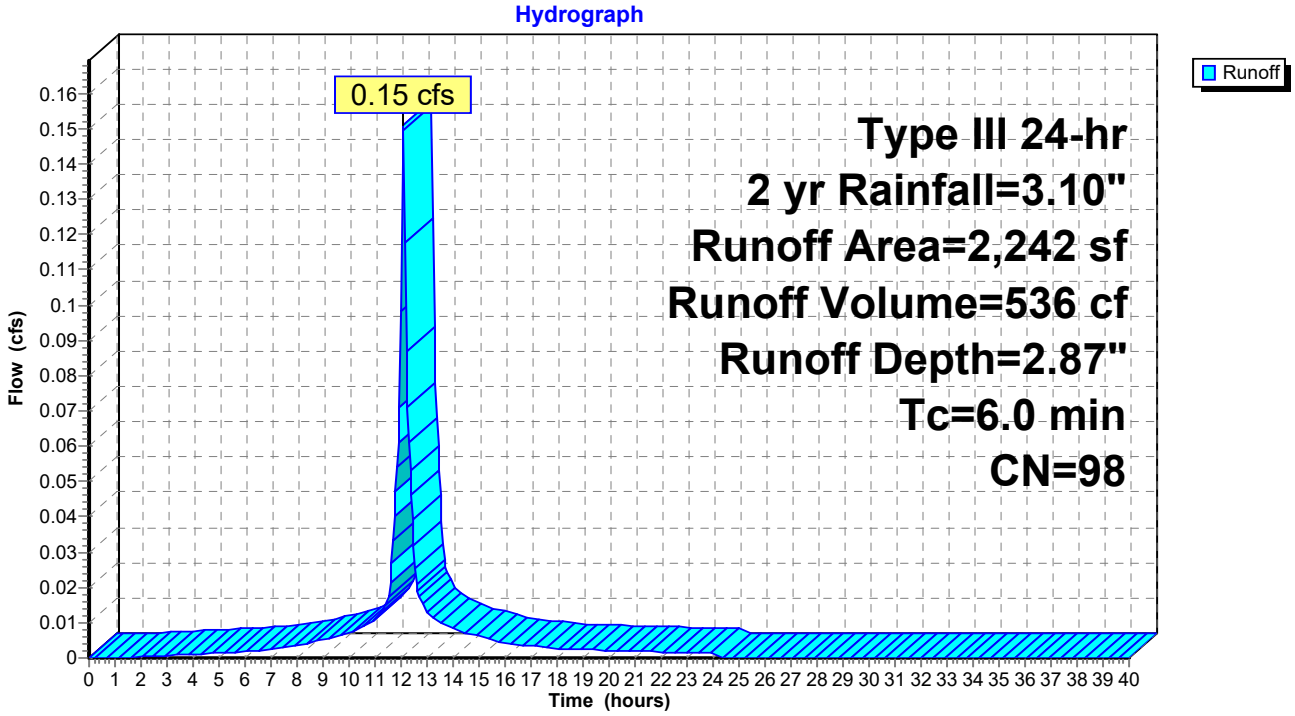
Runoff = 0.15 cfs @ 12.09 hrs, Volume= 536 cf, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

Area (sf)	CN	Description
2,242	98	Roofs, HSG B
2,242		100.00% Impervious Area

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

Subcatchment R14: 14-B2



Summary for Subcatchment R15: 15-B1

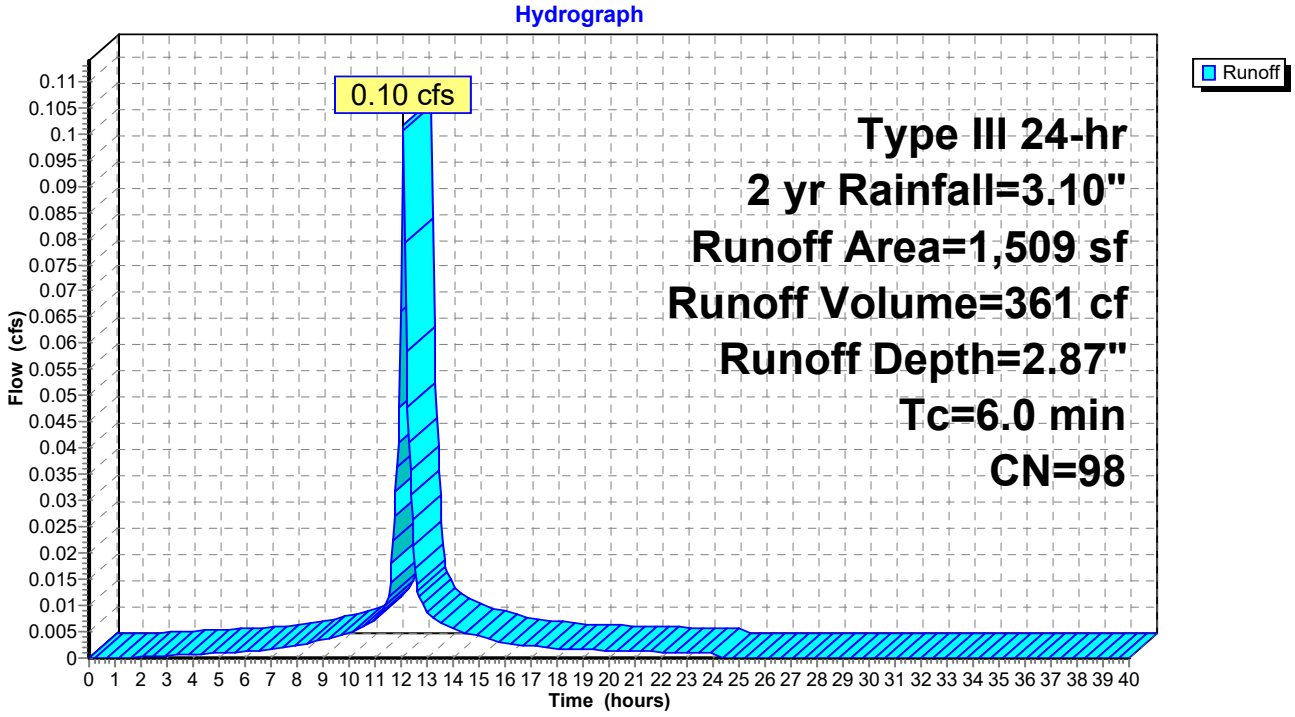
Runoff = 0.10 cfs @ 12.09 hrs, Volume= 361 cf, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

Area (sf)	CN	Description
295	98	Roofs, HSG A
1,214	98	Roofs, HSG B
1,509	98	Weighted Average
1,509		100.00% Impervious Area

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

Subcatchment R15: 15-B1



Summary for Subcatchment R16: 16-B2

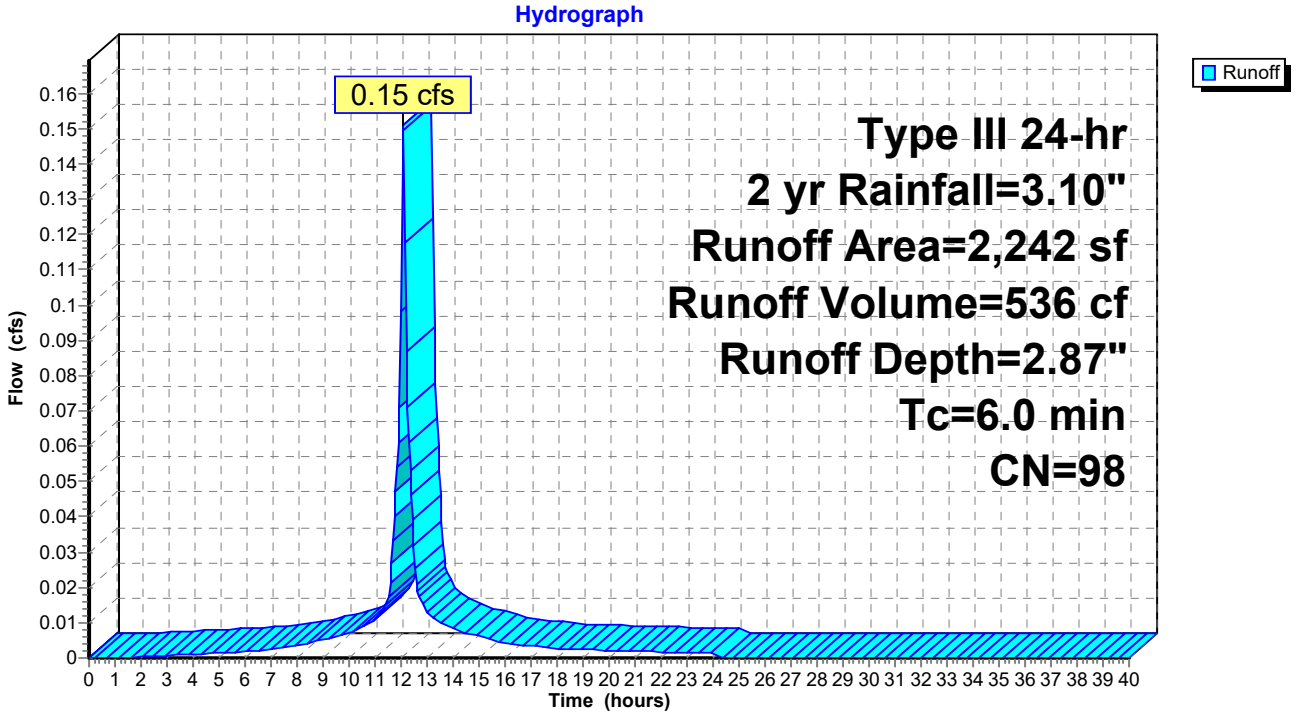
Runoff = 0.15 cfs @ 12.09 hrs, Volume= 536 cf, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

Area (sf)	CN	Description
2,242	98	Roofs, HSG A
2,242		100.00% Impervious Area

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

Subcatchment R16: 16-B2



Summary for Subcatchment R17: 17-B1

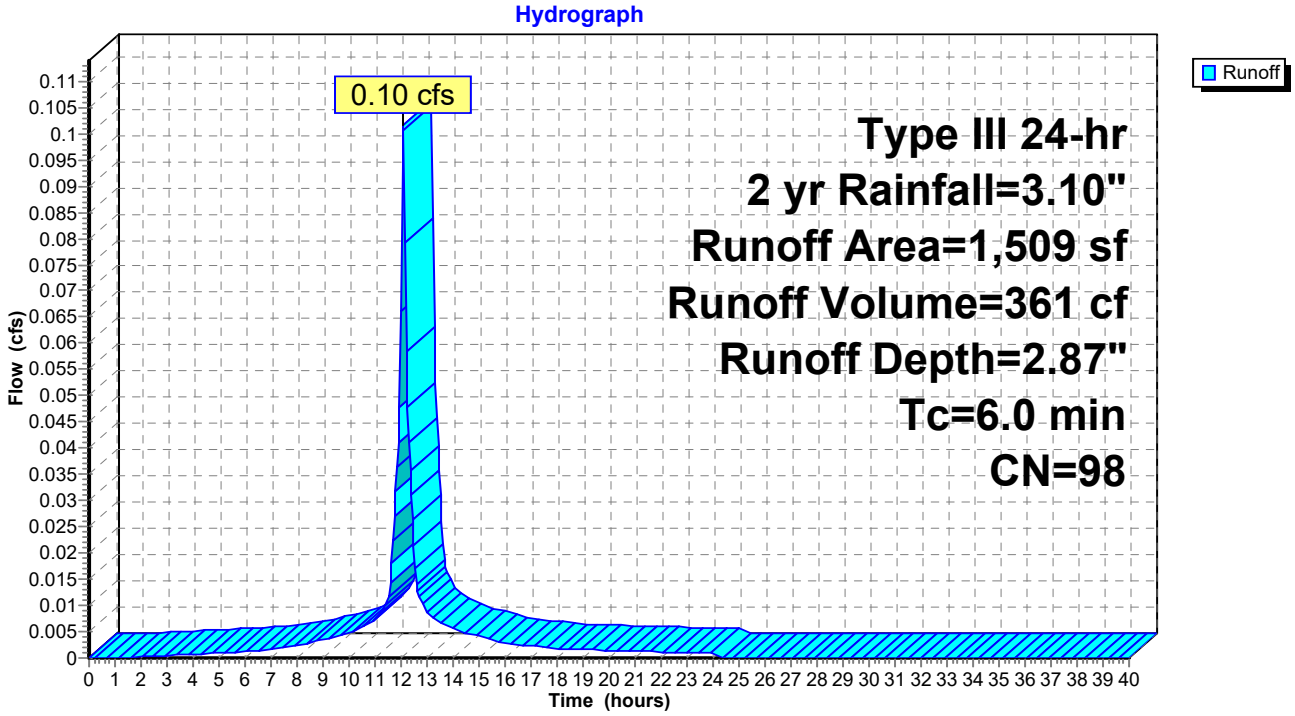
Runoff = 0.10 cfs @ 12.09 hrs, Volume= 361 cf, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

Area (sf)	CN	Description
1,509	98	Roofs, HSG A
1,509		100.00% Impervious Area

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

Subcatchment R17: 17-B1



Summary for Subcatchment R18: 18-B2

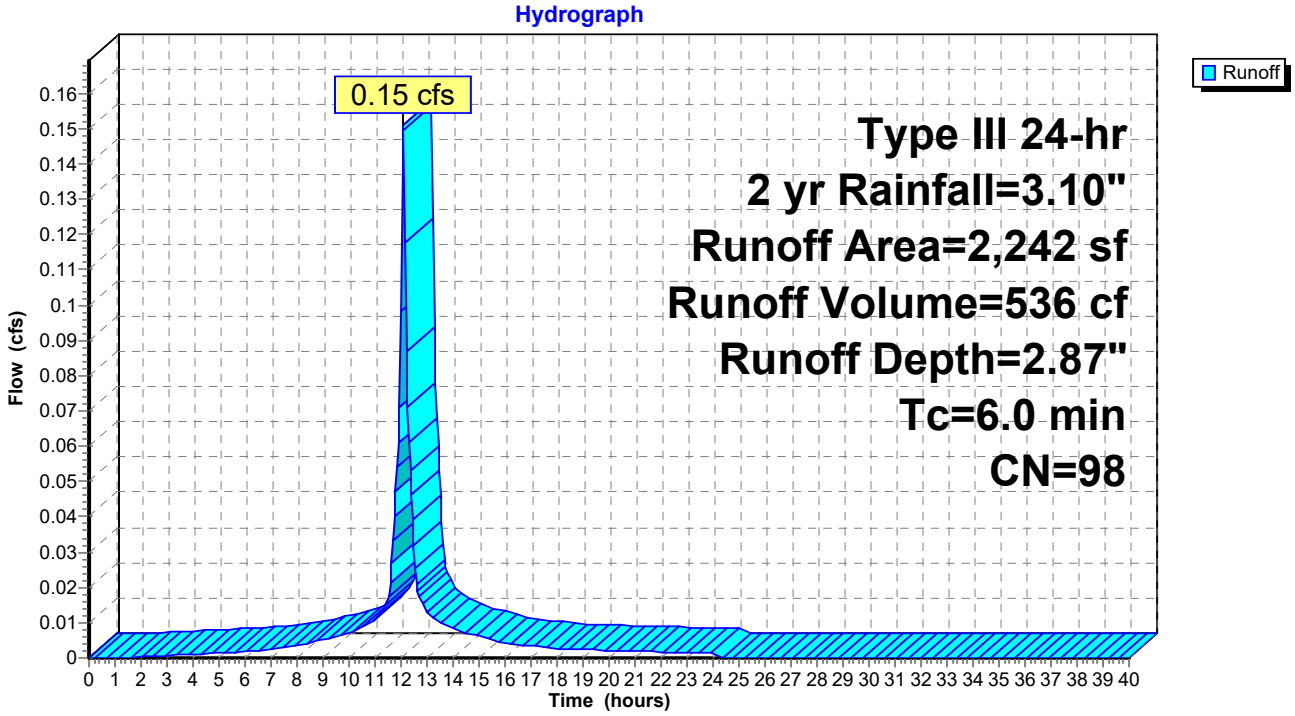
Runoff = 0.15 cfs @ 12.09 hrs, Volume= 536 cf, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

Area (sf)	CN	Description
2,242	98	Roofs, HSG A
2,242		100.00% Impervious Area

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

Subcatchment R18: 18-B2



Summary for Subcatchment R19: 19-B1

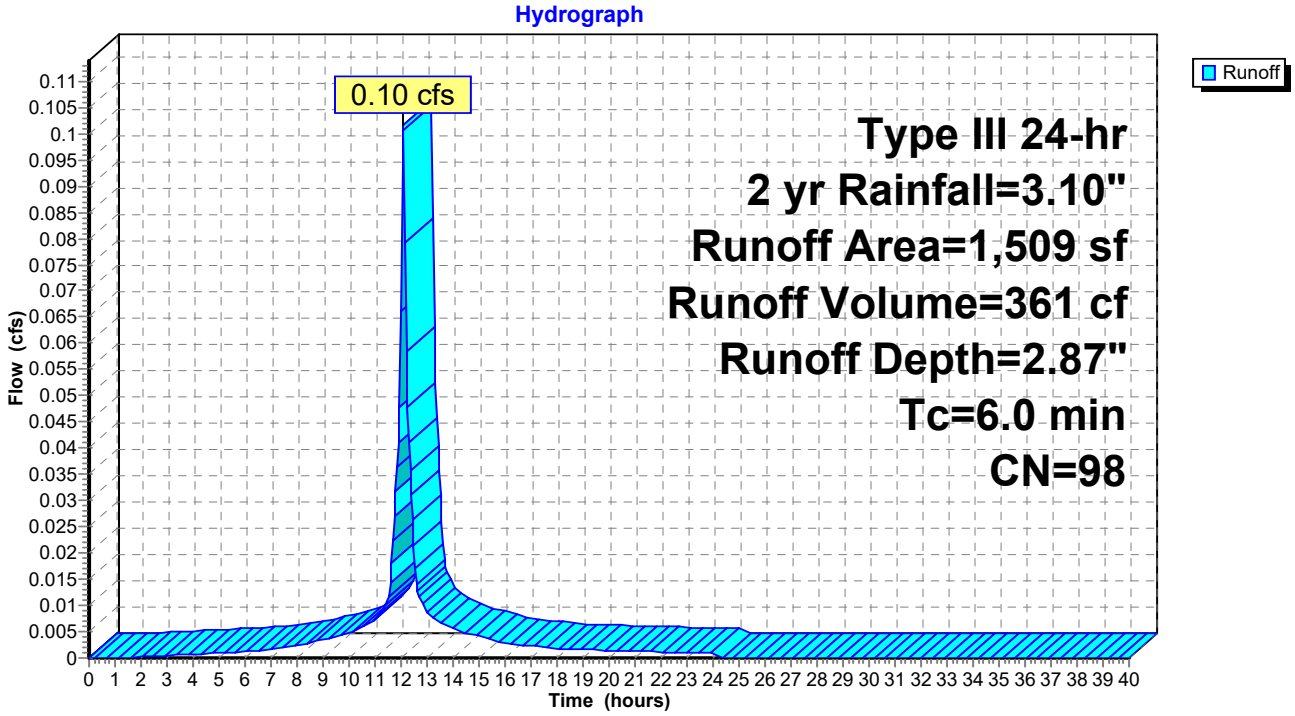
Runoff = 0.10 cfs @ 12.09 hrs, Volume= 361 cf, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

Area (sf)	CN	Description
1,509	98	Roofs, HSG A
1,509		100.00% Impervious Area

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

Subcatchment R19: 19-B1



Summary for Subcatchment R2: 2-A1

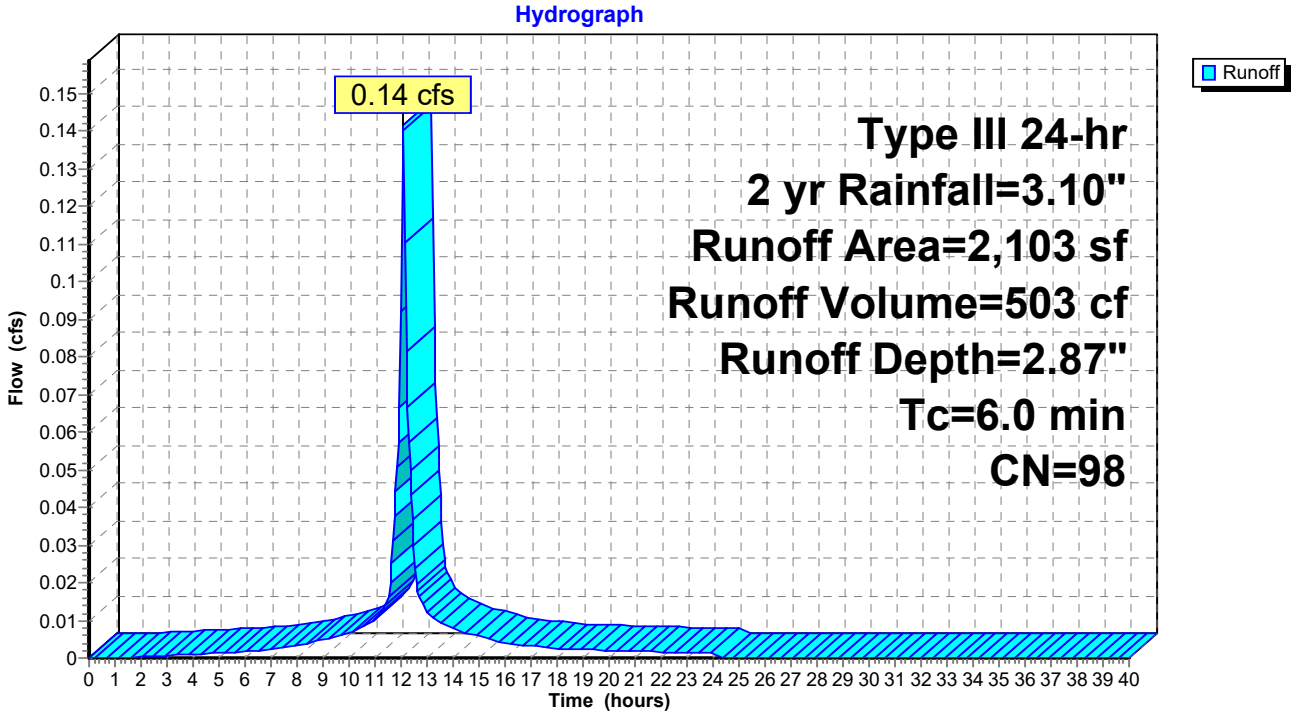
Runoff = 0.14 cfs @ 12.09 hrs, Volume= 503 cf, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

Area (sf)	CN	Description
2,103	98	Roofs, HSG A
2,103		100.00% Impervious Area

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

Subcatchment R2: 2-A1



Summary for Subcatchment R20: 20-B2

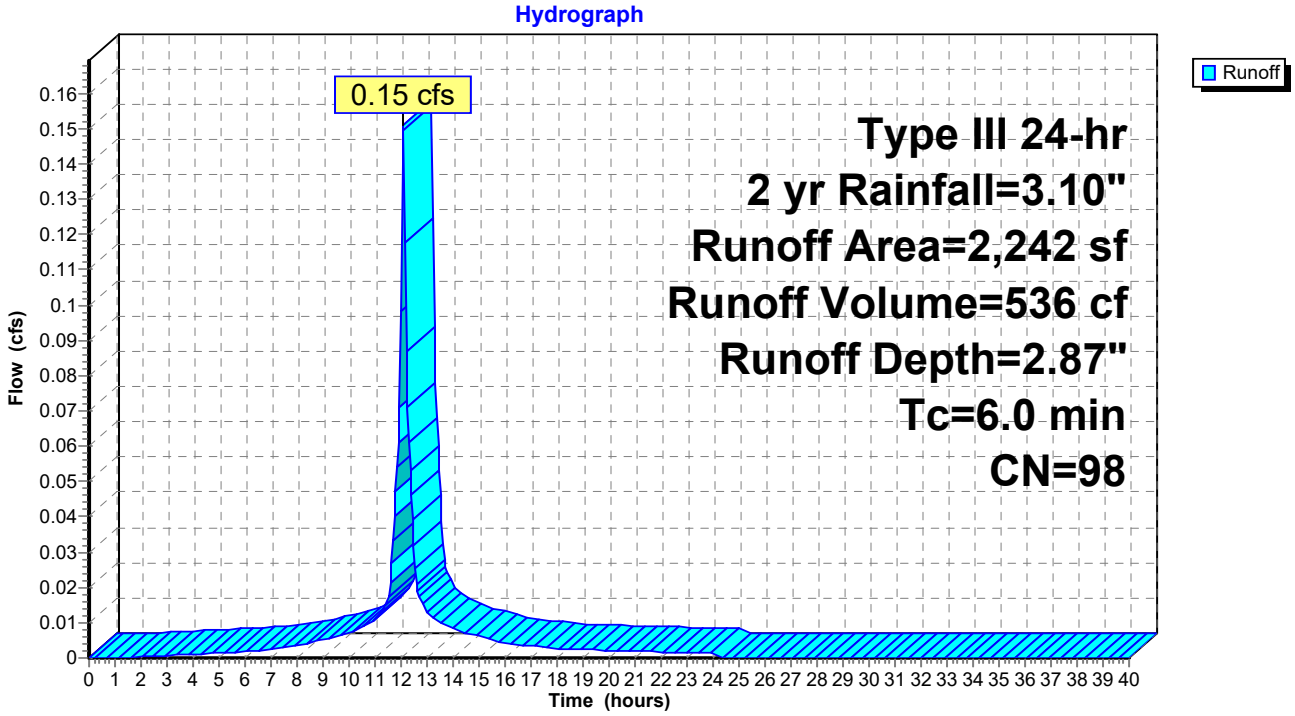
Runoff = 0.15 cfs @ 12.09 hrs, Volume= 536 cf, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

Area (sf)	CN	Description
2,242	98	Roofs, HSG A
2,242		100.00% Impervious Area

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

Subcatchment R20: 20-B2



Summary for Subcatchment R21: 21-E

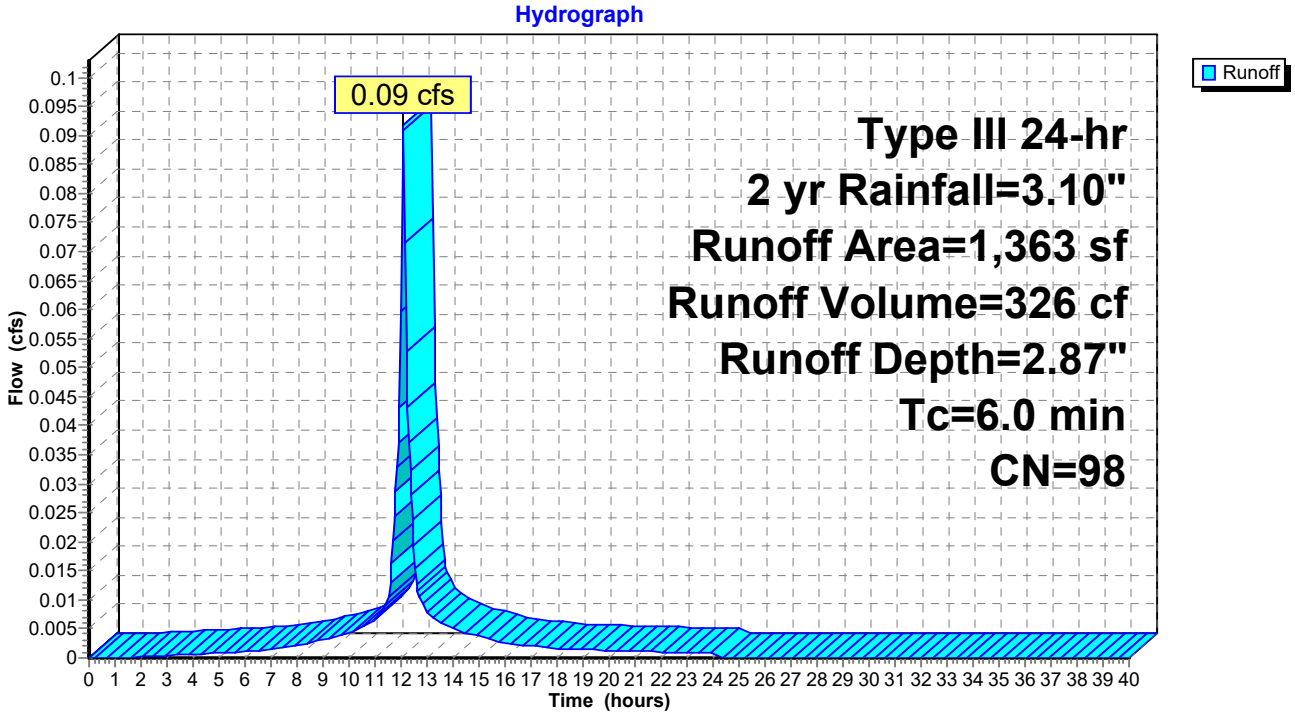
Runoff = 0.09 cfs @ 12.09 hrs, Volume= 326 cf, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

Area (sf)	CN	Description
1,363	98	Roofs, HSG A
1,363		100.00% Impervious Area

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

Subcatchment R21: 21-E



Summary for Subcatchment R22: 22-D

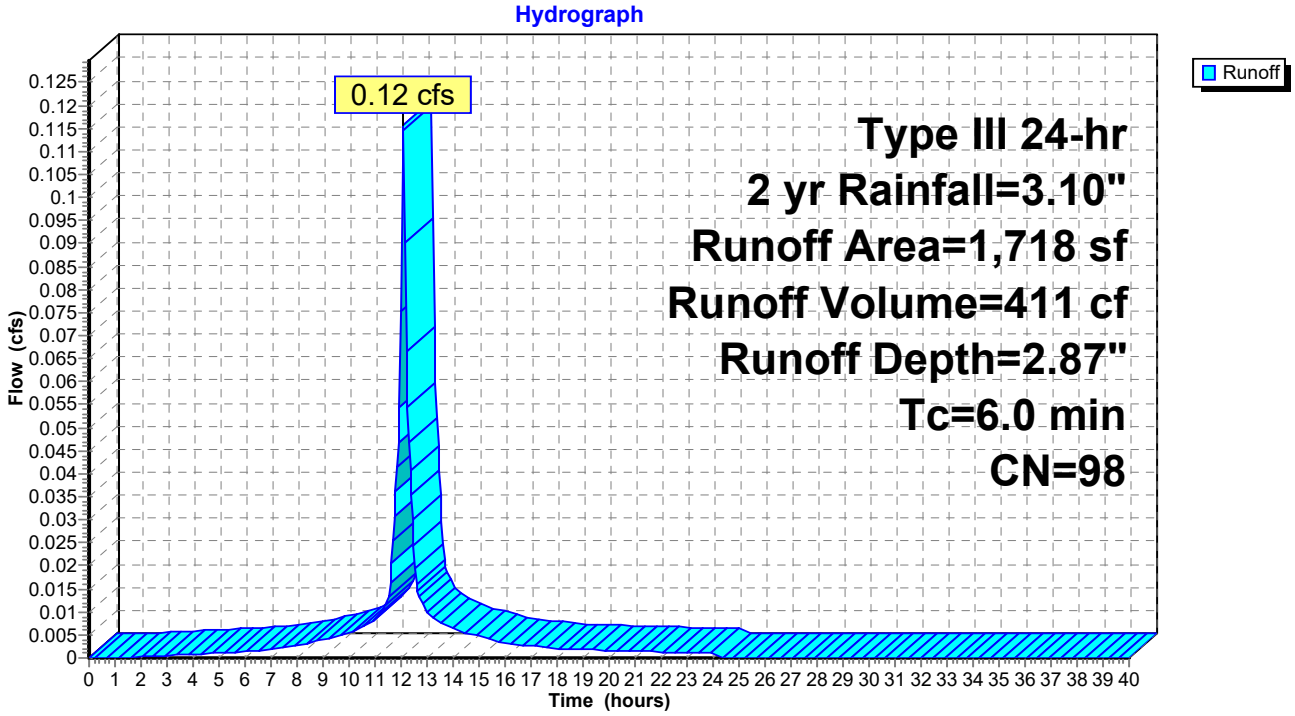
Runoff = 0.12 cfs @ 12.09 hrs, Volume= 411 cf, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

Area (sf)	CN	Description
1,718	98	Roofs, HSG A
1,718		100.00% Impervious Area

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

Subcatchment R22: 22-D



Summary for Subcatchment R23: 23-B1

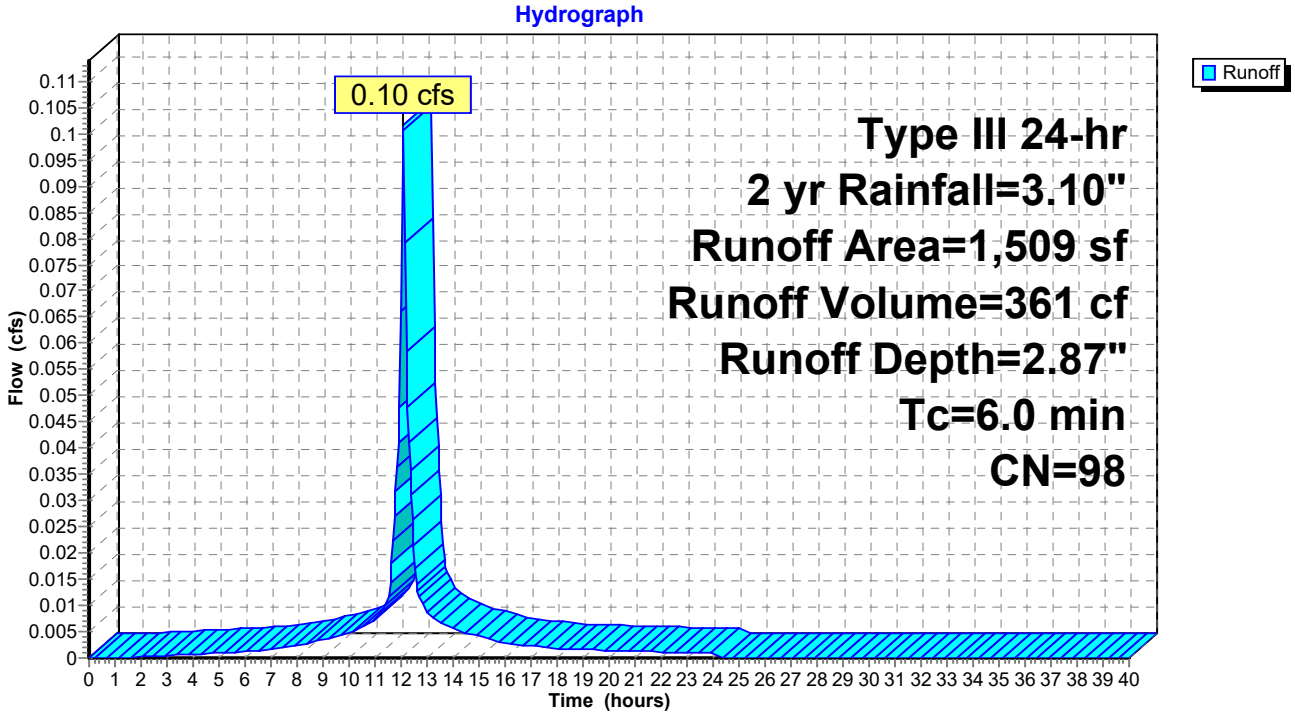
Runoff = 0.10 cfs @ 12.09 hrs, Volume= 361 cf, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

Area (sf)	CN	Description
1,509	98	Roofs, HSG A
1,509		100.00% Impervious Area

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

Subcatchment R23: 23-B1



Summary for Subcatchment R24: 24-B2

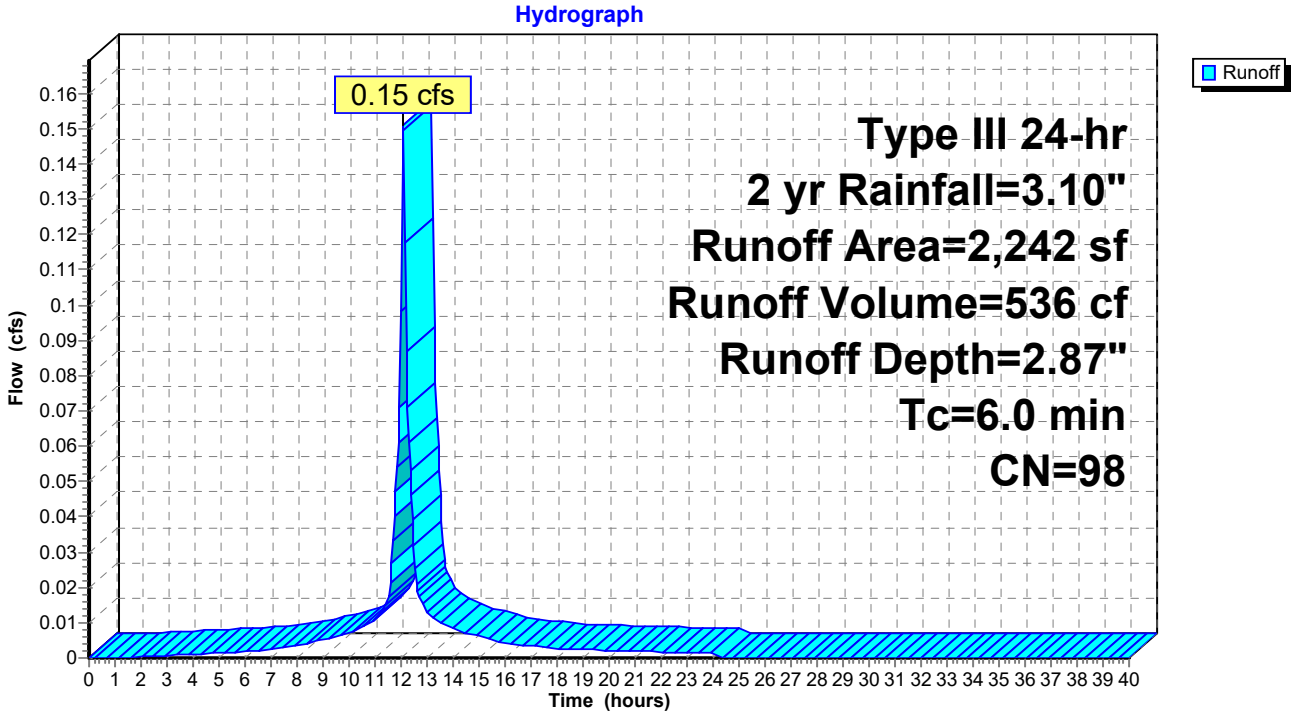
Runoff = 0.15 cfs @ 12.09 hrs, Volume= 536 cf, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

Area (sf)	CN	Description
2,242	98	Roofs, HSG A
2,242		100.00% Impervious Area

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

Subcatchment R24: 24-B2



Summary for Subcatchment R25: 25-A1

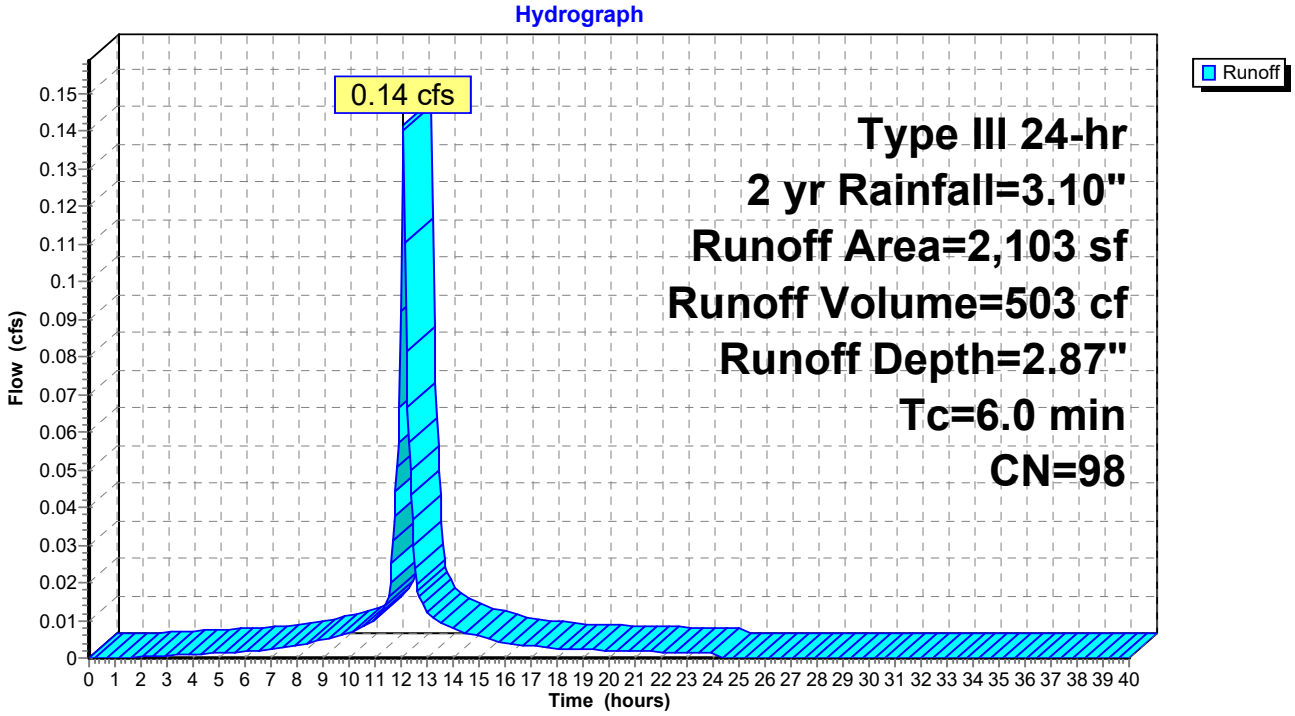
Runoff = 0.14 cfs @ 12.09 hrs, Volume= 503 cf, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

Area (sf)	CN	Description
2,103	98	Roofs, HSG A
2,103		100.00% Impervious Area

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

Subcatchment R25: 25-A1



Summary for Subcatchment R26: 26-A1

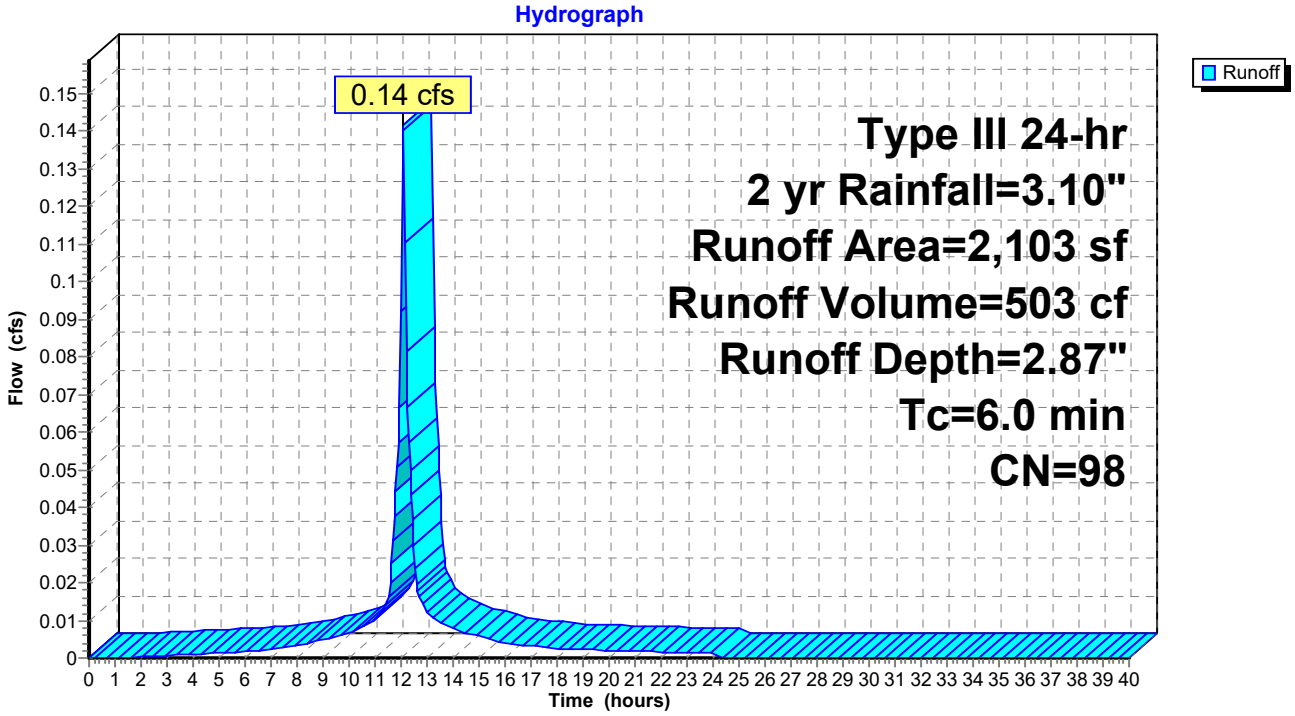
Runoff = 0.14 cfs @ 12.09 hrs, Volume= 503 cf, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

Area (sf)	CN	Description
2,103	98	Roofs, HSG A
2,103		100.00% Impervious Area

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

Subcatchment R26: 26-A1



Summary for Subcatchment R27: 27-B2

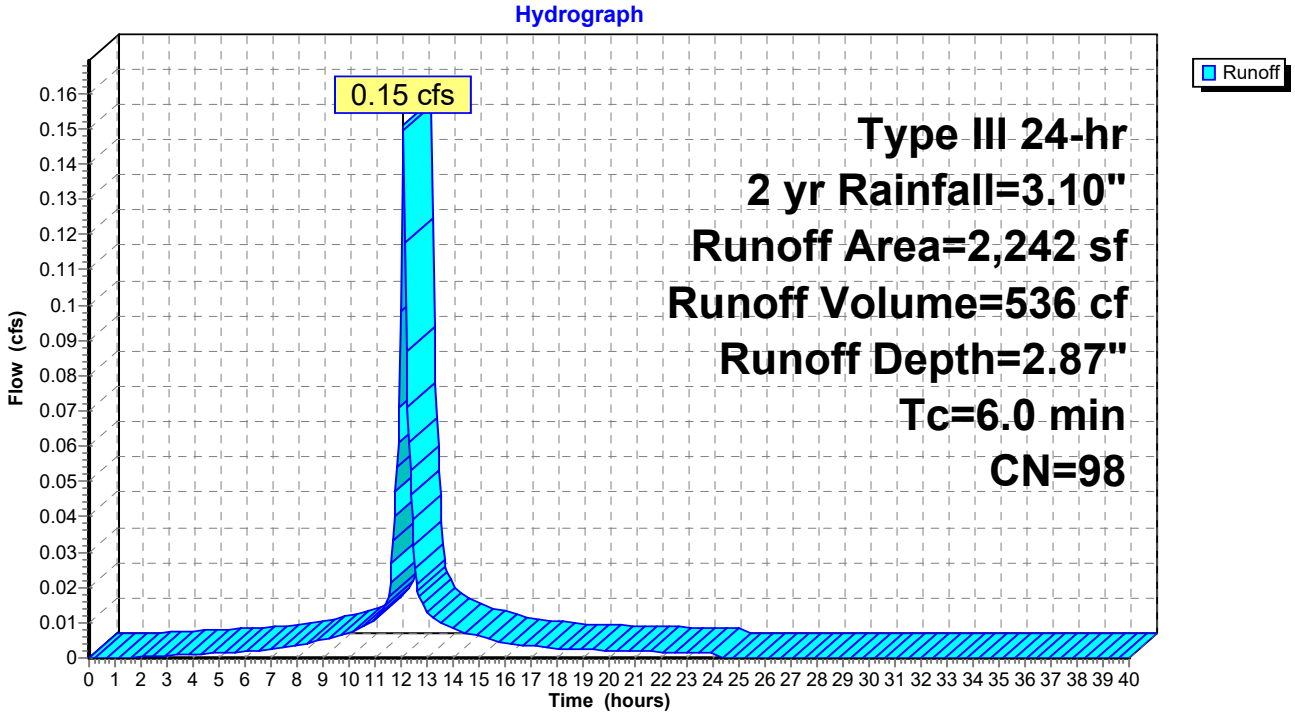
Runoff = 0.15 cfs @ 12.09 hrs, Volume= 536 cf, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

Area (sf)	CN	Description
2,242	98	Roofs, HSG A
2,242		100.00% Impervious Area

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

Subcatchment R27: 27-B2



Summary for Subcatchment R28: 28-B2

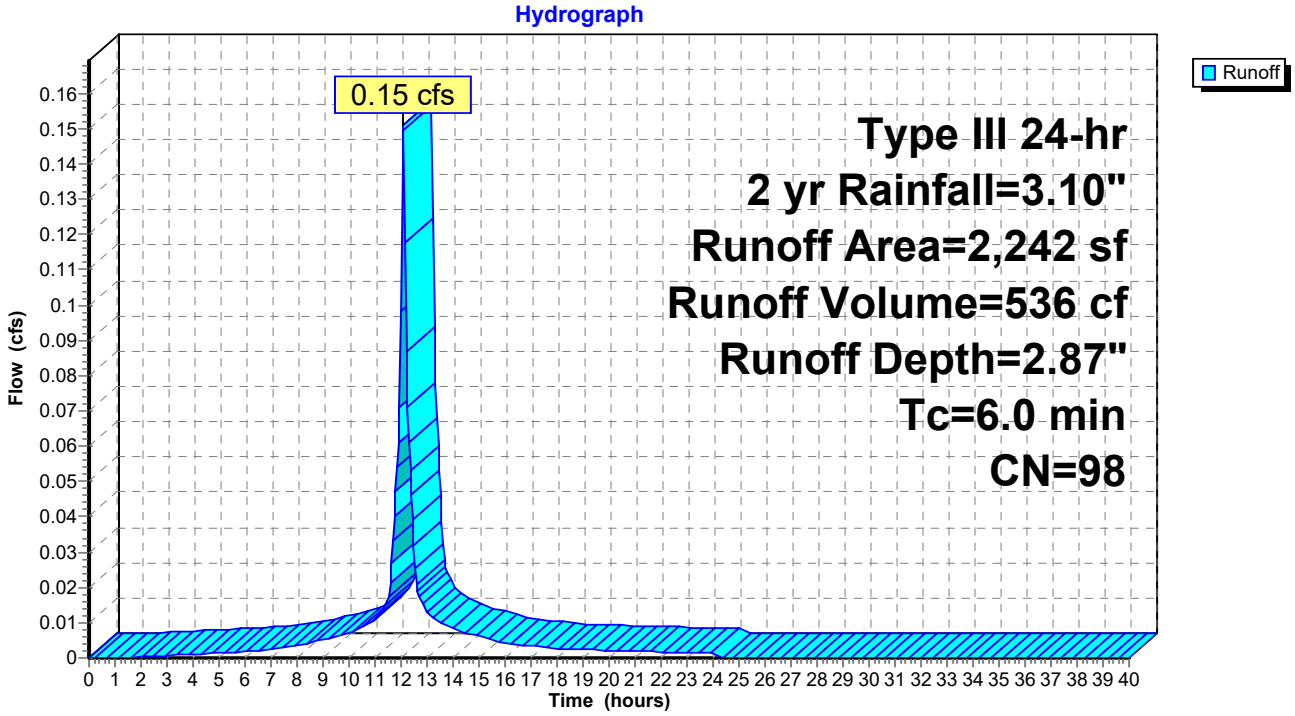
Runoff = 0.15 cfs @ 12.09 hrs, Volume= 536 cf, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

Area (sf)	CN	Description
2,242	98	Roofs, HSG A
2,242		100.00% Impervious Area

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

Subcatchment R28: 28-B2



Summary for Subcatchment R29: 29-A1

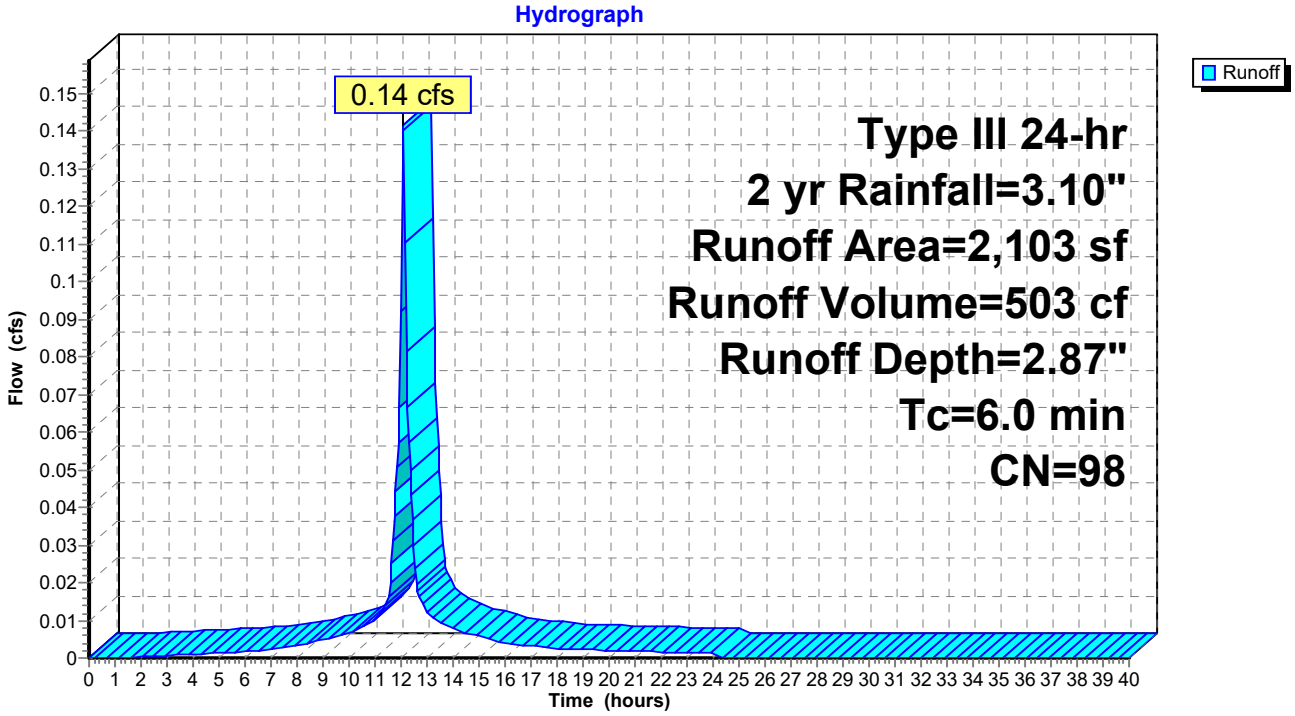
Runoff = 0.14 cfs @ 12.09 hrs, Volume= 503 cf, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

Area (sf)	CN	Description
2,103	98	Roofs, HSG A
2,103		100.00% Impervious Area

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

Subcatchment R29: 29-A1



Summary for Subcatchment R3: 3-A3

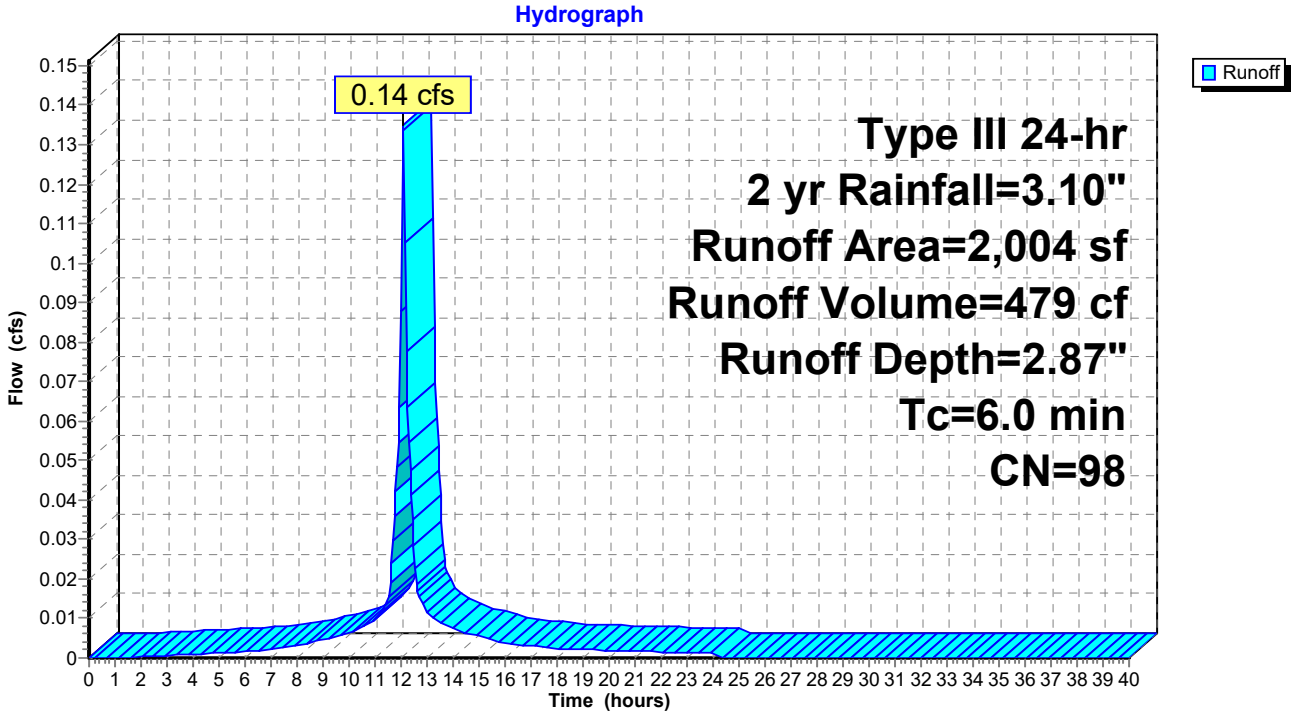
Runoff = 0.14 cfs @ 12.09 hrs, Volume= 479 cf, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

Area (sf)	CN	Description
2,004	98	Roofs, HSG A
2,004		100.00% Impervious Area

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

Subcatchment R3: 3-A3



Summary for Subcatchment R30: 30-A2

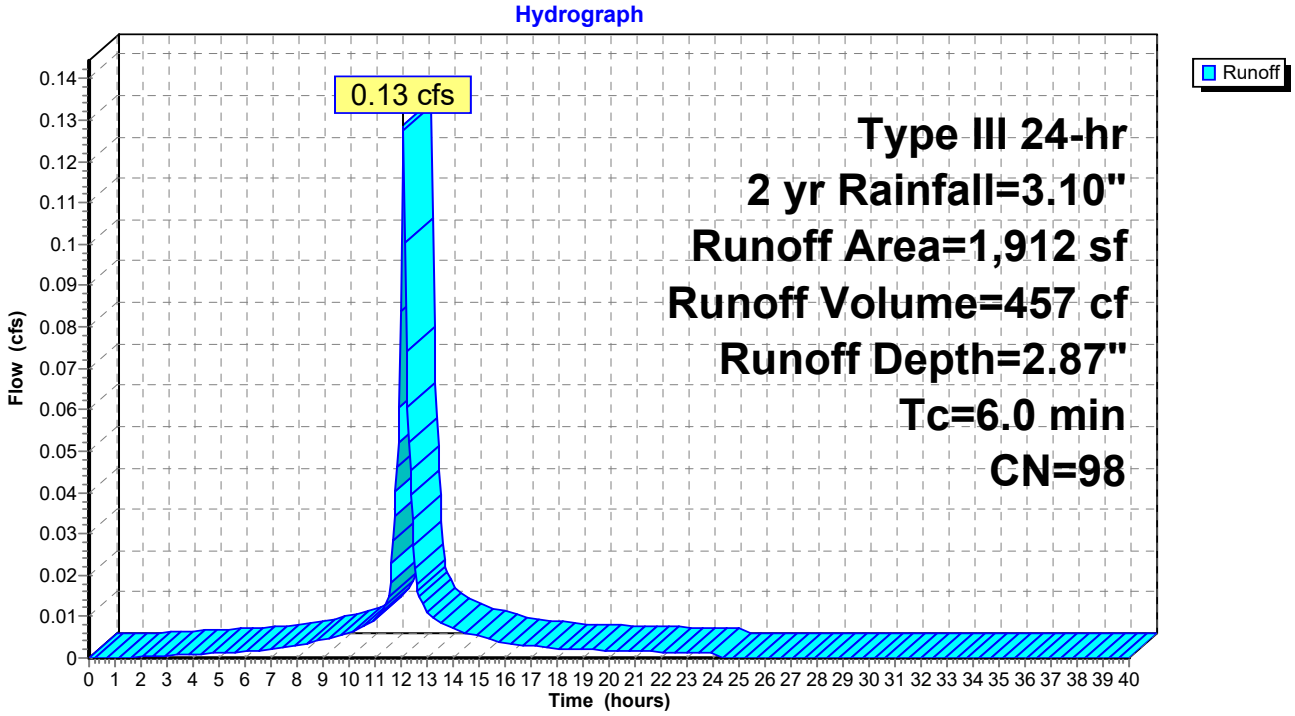
Runoff = 0.13 cfs @ 12.09 hrs, Volume= 457 cf, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

Area (sf)	CN	Description
1,912	98	Roofs, HSG A
1,912		100.00% Impervious Area

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

Subcatchment R30: 30-A2



Summary for Subcatchment R31: 31-E

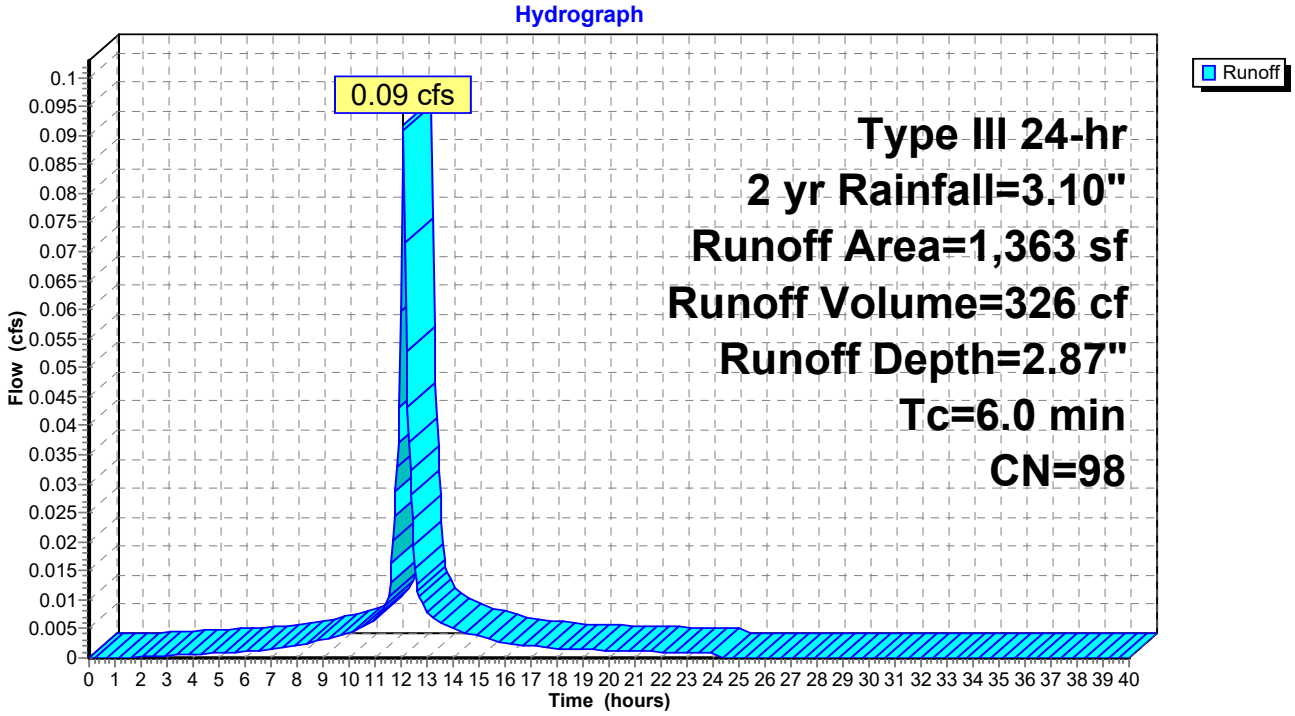
Runoff = 0.09 cfs @ 12.09 hrs, Volume= 326 cf, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

Area (sf)	CN	Description
1,363	98	Roofs, HSG A
1,363		100.00% Impervious Area

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

Subcatchment R31: 31-E



Summary for Subcatchment R32: 32-D

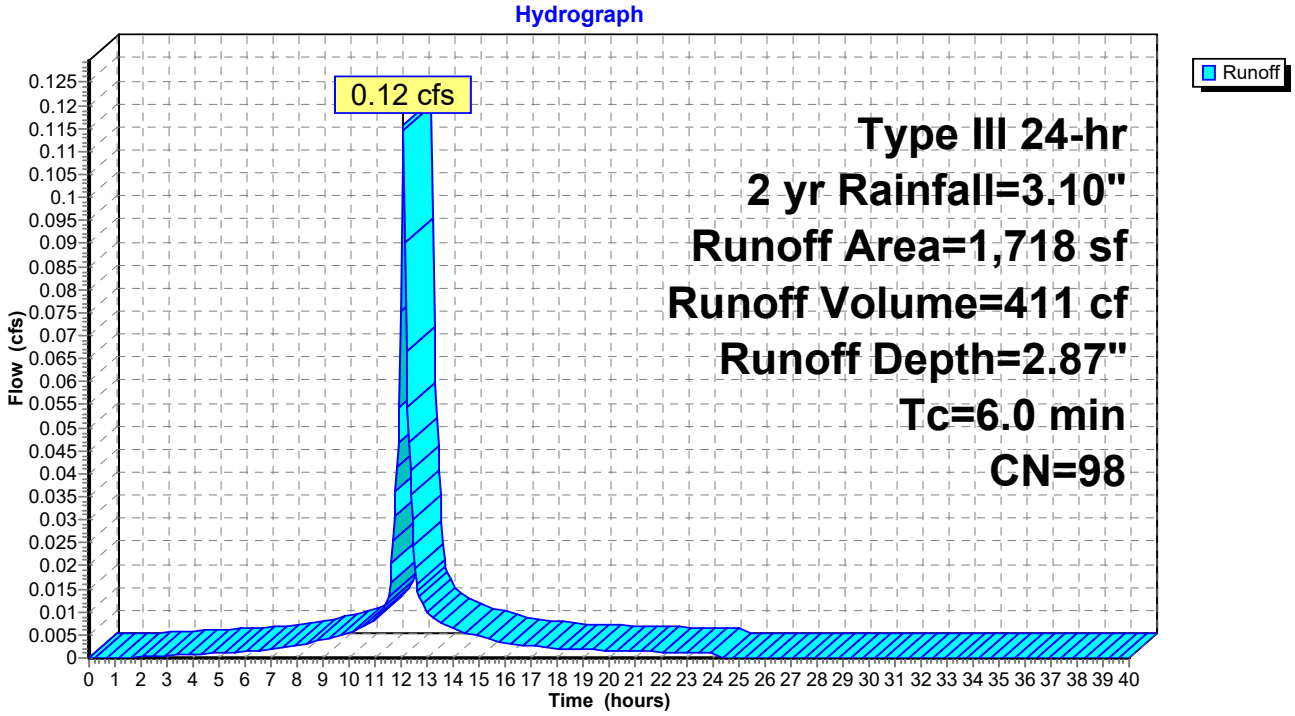
Runoff = 0.12 cfs @ 12.09 hrs, Volume= 411 cf, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

Area (sf)	CN	Description
1,718	98	Roofs, HSG A
1,718		100.00% Impervious Area

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

Subcatchment R32: 32-D



Summary for Subcatchment R33: 33-C1

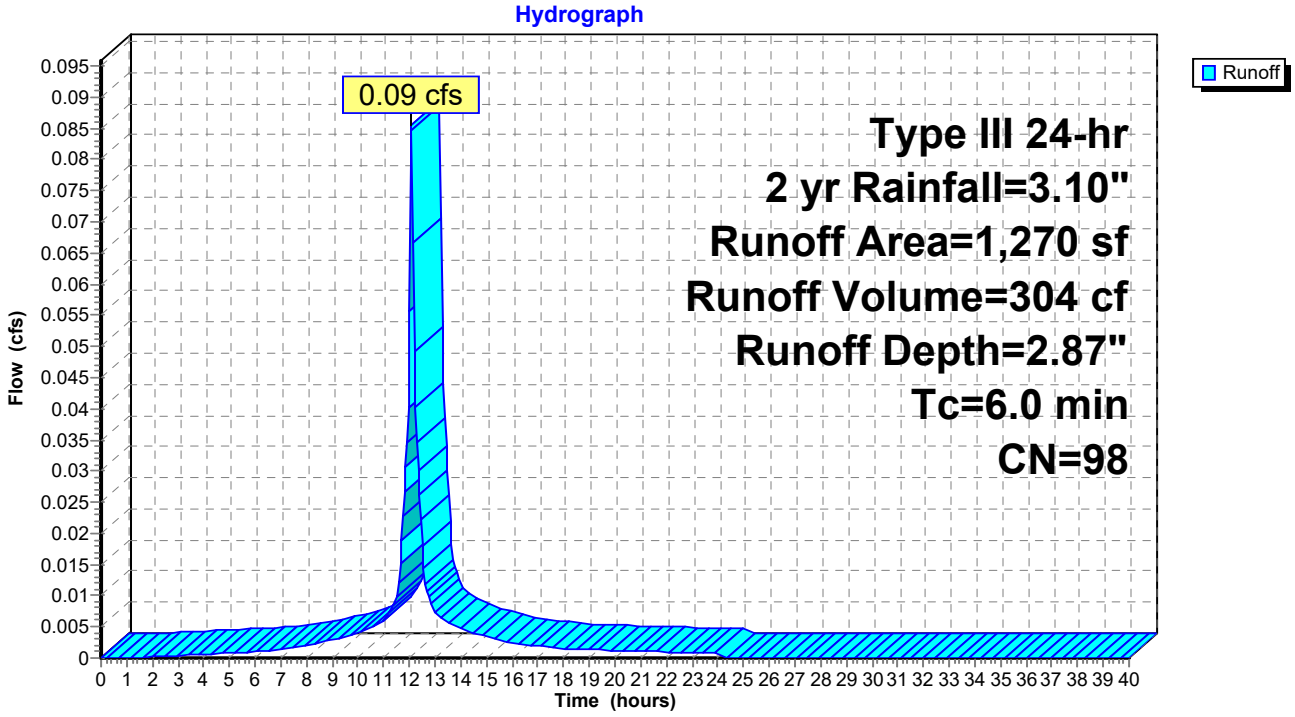
Runoff = 0.09 cfs @ 12.09 hrs, Volume= 304 cf, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

Area (sf)	CN	Description
965	98	Roofs, HSG A
305	98	Roofs, HSG B
1,270	98	Weighted Average
1,270		100.00% Impervious Area

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

Subcatchment R33: 33-C1



Summary for Subcatchment R34: 34-C2

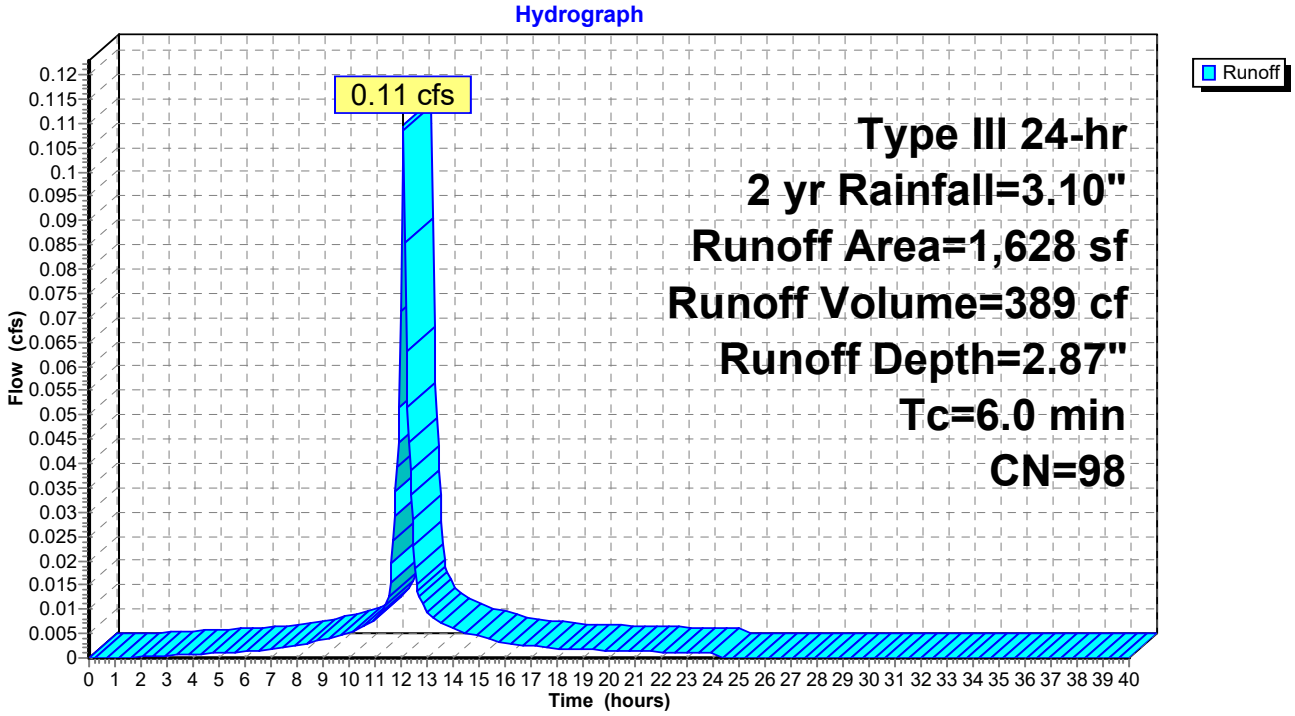
Runoff = 0.11 cfs @ 12.09 hrs, Volume= 389 cf, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

Area (sf)	CN	Description
1,628	98	Roofs, HSG B
1,628		100.00% Impervious Area

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

Subcatchment R34: 34-C2



Summary for Subcatchment R35: 35-B2

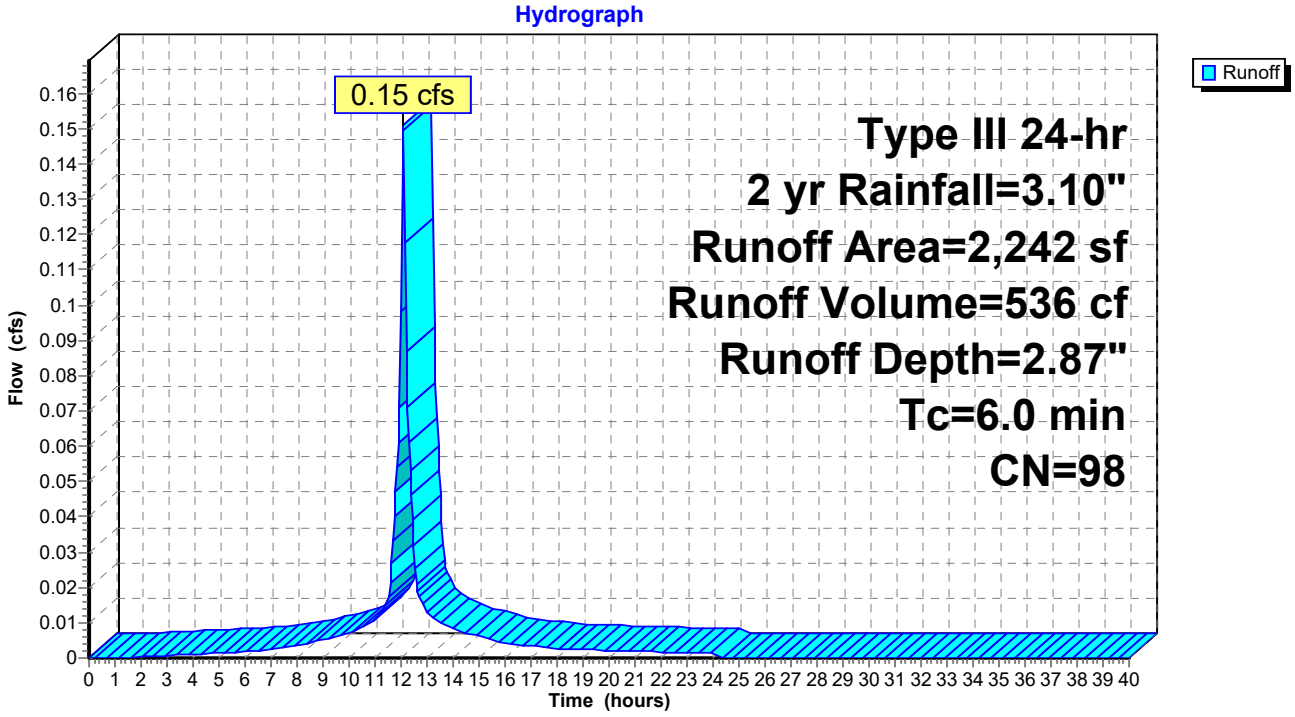
Runoff = 0.15 cfs @ 12.09 hrs, Volume= 536 cf, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

Area (sf)	CN	Description
1,292	98	Roofs, HSG A
950	98	Roofs, HSG B
2,242	98	Weighted Average
2,242		100.00% Impervious Area

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

Subcatchment R35: 35-B2



Summary for Subcatchment R36: 36-B1

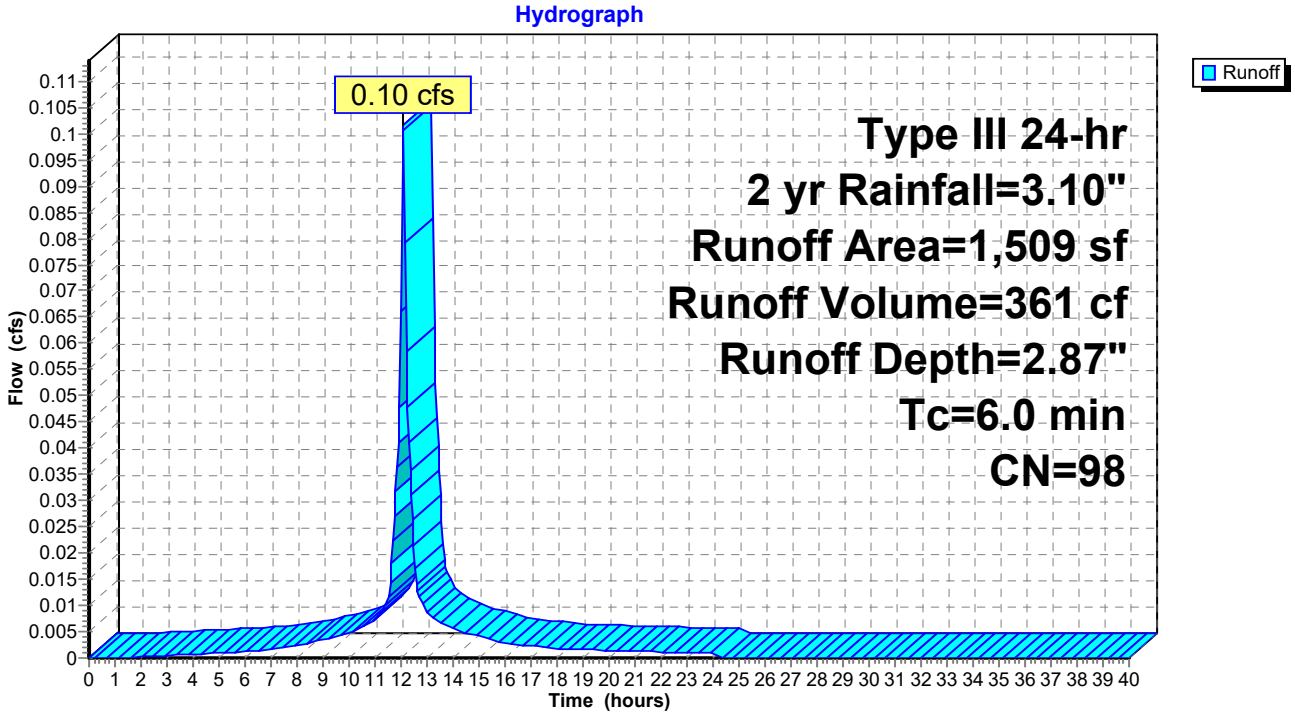
Runoff = 0.10 cfs @ 12.09 hrs, Volume= 361 cf, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

Area (sf)	CN	Description
1,509	98	Roofs, HSG A
1,509		100.00% Impervious Area

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

Subcatchment R36: 36-B1



Summary for Subcatchment R37: 37-ANR

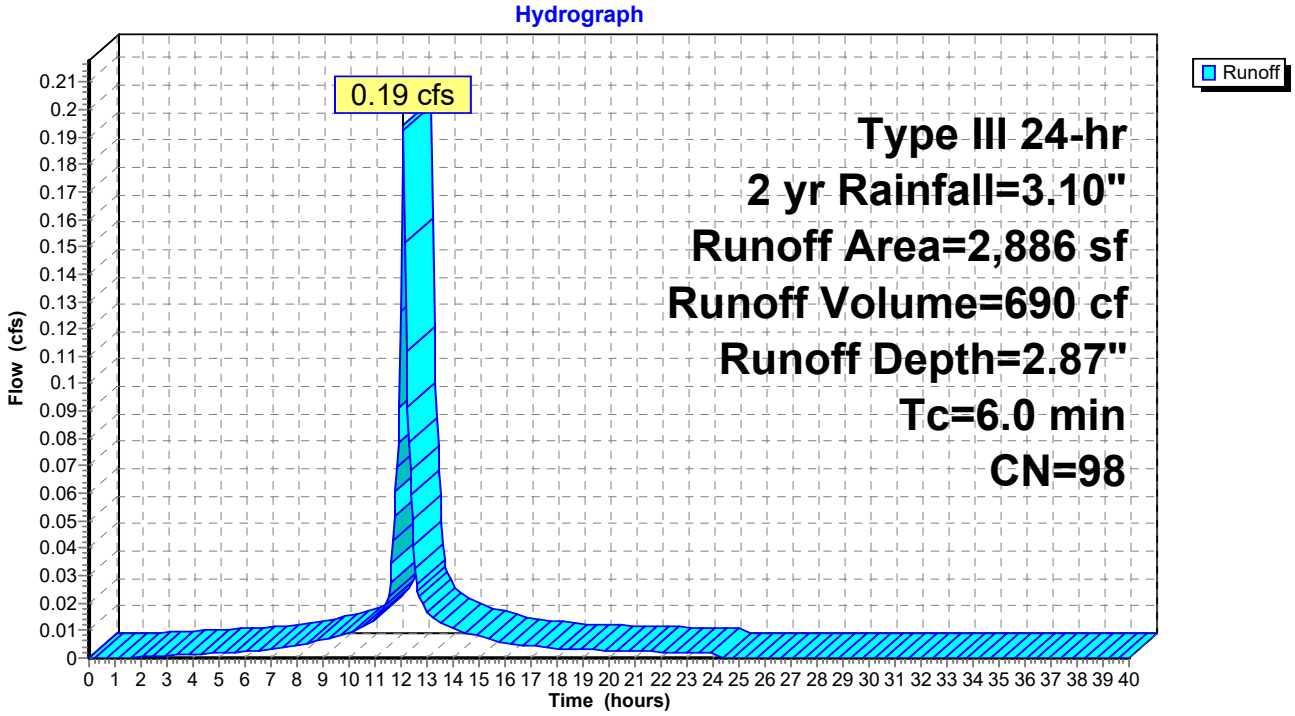
Runoff = 0.19 cfs @ 12.09 hrs, Volume= 690 cf, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

Area (sf)	CN	Description
2,886	98	Roofs, HSG A
2,886		100.00% Impervious Area

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

Subcatchment R37: 37-ANR



Summary for Subcatchment R4: 4-A2

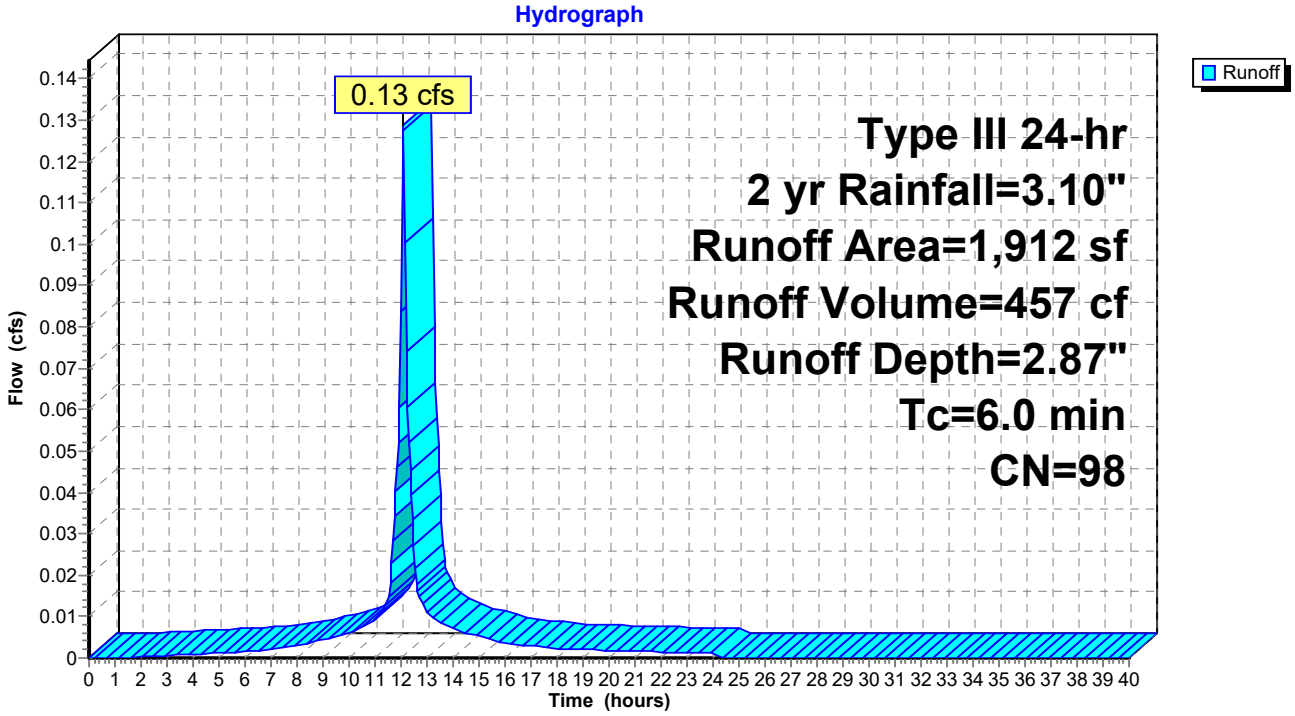
Runoff = 0.13 cfs @ 12.09 hrs, Volume= 457 cf, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

Area (sf)	CN	Description
1,912	98	Roofs, HSG A
1,912		100.00% Impervious Area

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

Subcatchment R4: 4-A2



Summary for Subcatchment R5: 5-A3

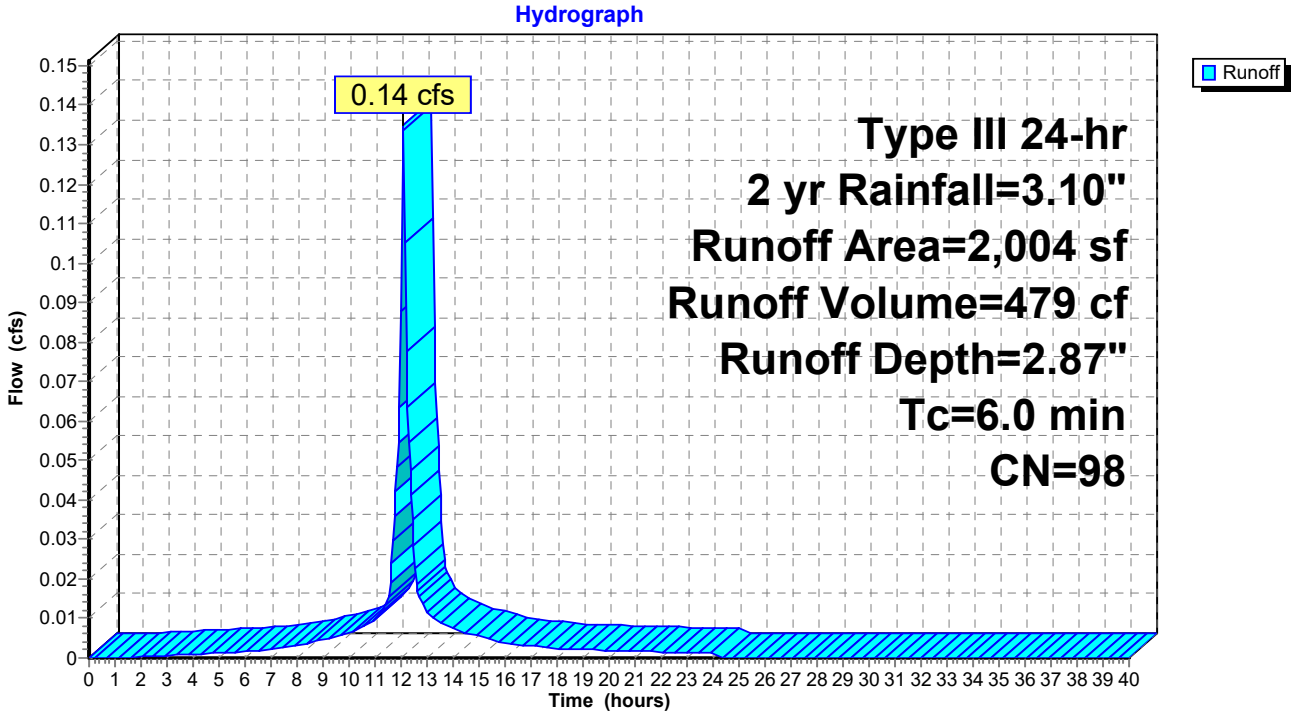
Runoff = 0.14 cfs @ 12.09 hrs, Volume= 479 cf, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

Area (sf)	CN	Description
2,004	98	Roofs, HSG A
2,004		100.00% Impervious Area

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

Subcatchment R5: 5-A3



Summary for Subcatchment R6: 6-A1

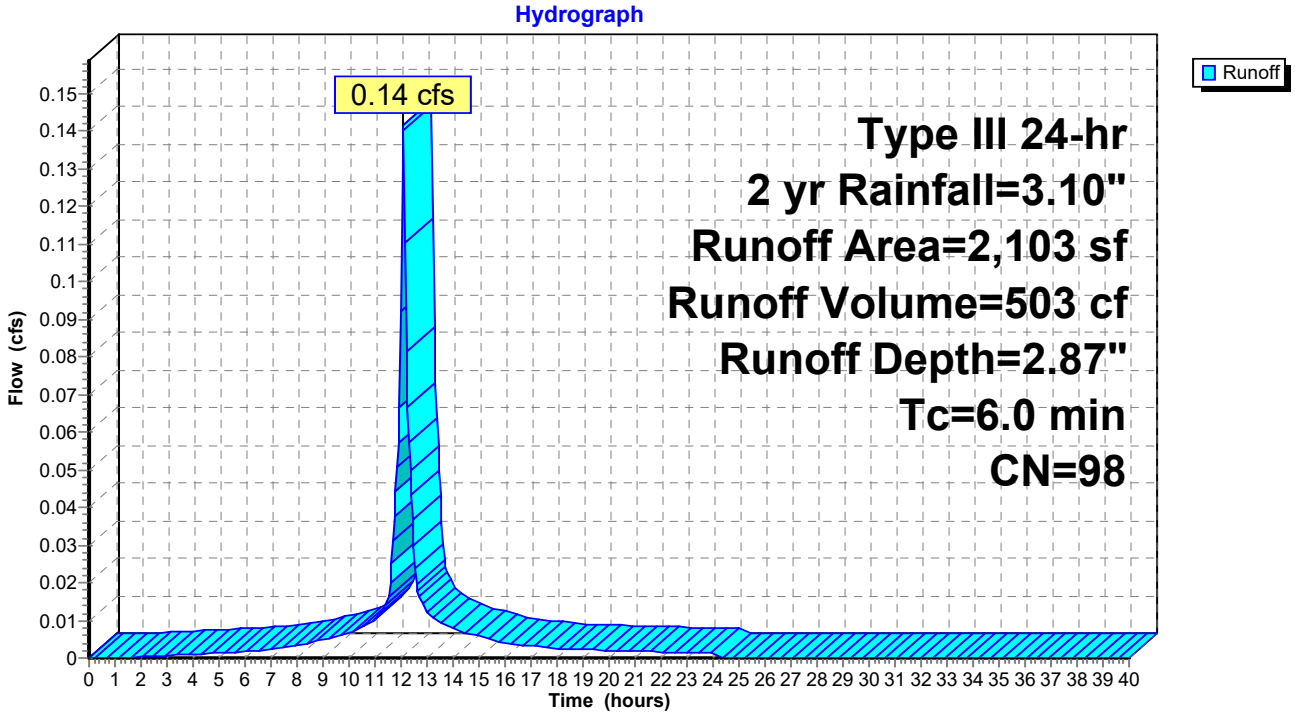
Runoff = 0.14 cfs @ 12.09 hrs, Volume= 503 cf, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

Area (sf)	CN	Description
2,103	98	Roofs, HSG A
2,103		100.00% Impervious Area

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

Subcatchment R6: 6-A1



Summary for Subcatchment R7: 7-C2

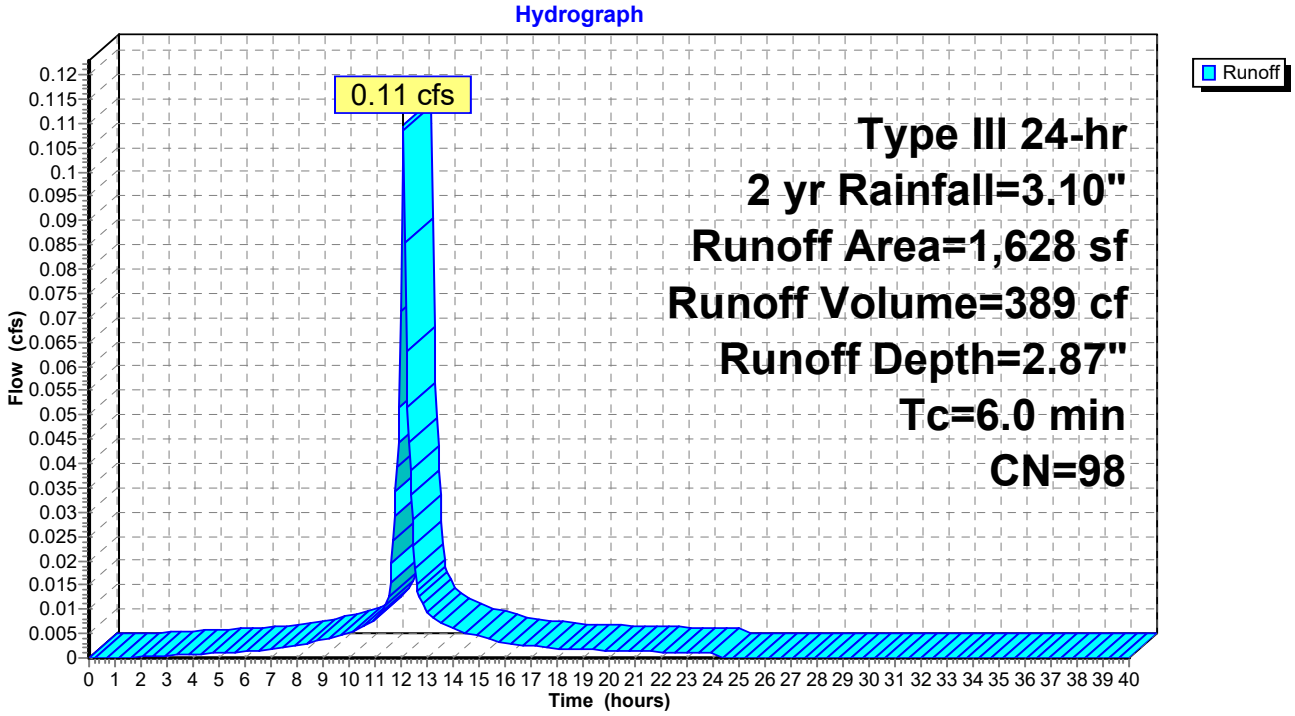
Runoff = 0.11 cfs @ 12.09 hrs, Volume= 389 cf, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

Area (sf)	CN	Description
1,628	98	Roofs, HSG A
1,628		100.00% Impervious Area

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

Subcatchment R7: 7-C2



Summary for Subcatchment R8: 8-C1

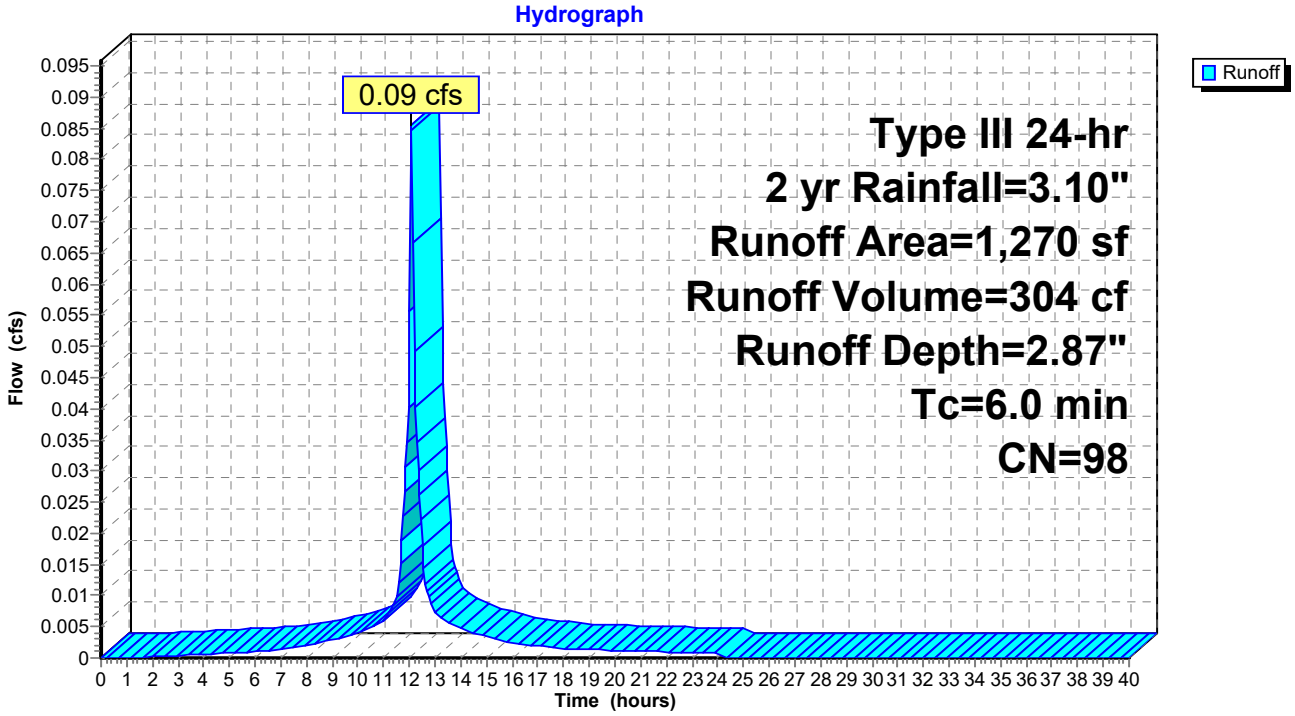
Runoff = 0.09 cfs @ 12.09 hrs, Volume= 304 cf, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

Area (sf)	CN	Description
1,270	98	Roofs, HSG A
1,270		100.00% Impervious Area

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

Subcatchment R8: 8-C1



Summary for Subcatchment R9: 9-C1

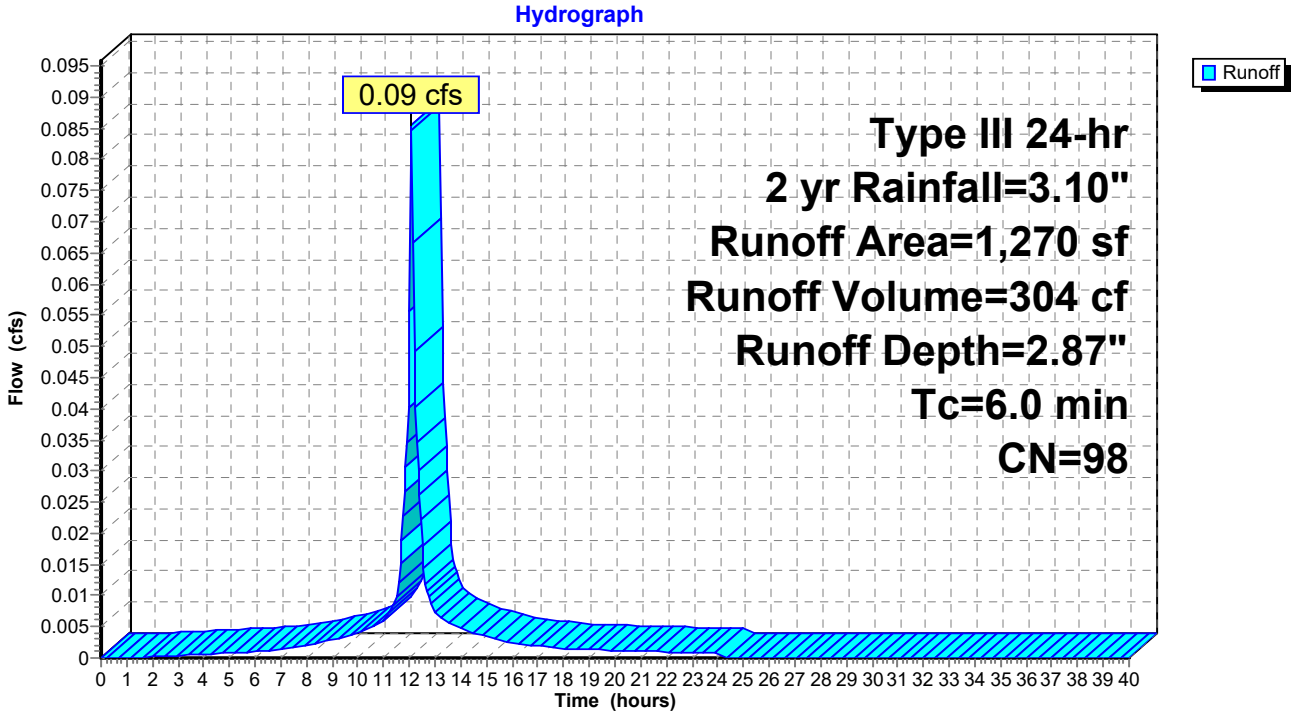
Runoff = 0.09 cfs @ 12.09 hrs, Volume= 304 cf, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.10"

Area (sf)	CN	Description
1,270	98	Roofs, HSG A
1,270		100.00% Impervious Area

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

Subcatchment R9: 9-C1



Summary for Pond 1: CB1

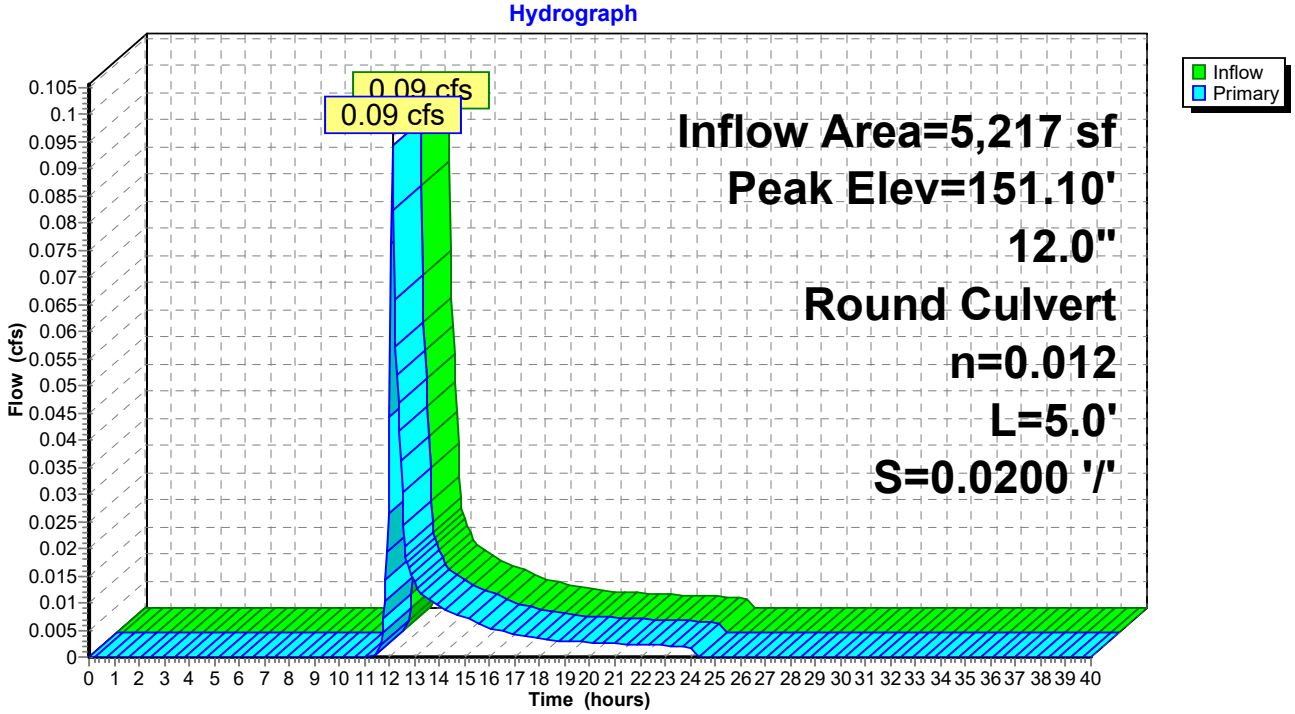
Inflow Area =	5,217 sf, 53.29% Impervious, Inflow Depth = 0.77" for 2 yr event				
Inflow =	0.09 cfs @	12.11 hrs,	Volume=	335 cf	
Outflow =	0.09 cfs @	12.11 hrs,	Volume=	335 cf,	Atten= 0%, Lag= 0.0 min
Primary =	0.09 cfs @	12.11 hrs,	Volume=	335 cf	

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 151.10' @ 12.11 hrs
Flood Elev= 154.95'

Device	Routing	Invert	Outlet Devices
#1	Primary	150.95'	**12.0" Round Culvert** L= 5.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 150.95' / 150.85' S= 0.0200 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=0.09 cfs @ 12.11 hrs HW=151.10' (Free Discharge)
└**1=Culvert** (Inlet Controls 0.09 cfs @ 1.30 fps)

Pond 1: CB1



Summary for Pond 1P: 4500 1R8C

Inflow Area =	11,427 sf, 44.90% Impervious, Inflow Depth = 0.57" for 2 yr event				
Inflow =	0.13 cfs @	12.11 hrs,	Volume=	544 cf	
Outflow =	0.08 cfs @	12.10 hrs,	Volume=	544 cf,	Atten= 41%, Lag= 0.0 min
Discarded =	0.08 cfs @	12.10 hrs,	Volume=	544 cf	
Primary =	0.00 cfs @	0.00 hrs,	Volume=	0 cf	

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 146.48' @ 12.33 hrs Surf.Area= 406 sf Storage= 38 cf
Flood Elev= 155.00' Surf.Area= 406 sf Storage= 1,651 cf

Plug-Flow detention time= 4.1 min calculated for 544 cf (100% of inflow)
Center-of-Mass det. time= 4.0 min (897.9 - 893.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	146.25'	728 cf	**10.33'W x 39.32'L x 6.75'H Field A** 2,742 cf Overall - 923 cf Embedded = 1,819 cf x 40.0% Voids
#2A	147.00'	923 cf	**ADS_StormTech MC-4500 +Cap** x 8 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +35.7 cf x 2 x 1 rows = 71.4 cf
		1,651 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	150.00'	**12.0" Round Culvert** L= 30.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 150.00' / 149.47' S= 0.0177 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Discarded	146.25'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.08 cfs @ 12.10 hrs HW=146.37' (Free Discharge)
└─**2=Exfiltration** (Exfiltration Controls 0.08 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=146.25' (Free Discharge)
└─**1=Culvert** (Controls 0.00 cfs)

Pond 1P: 4500 1R8C - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-4500 +Cap (ADS StormTech® MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= +35.7 cf x 2 x 1 rows = 71.4 cf

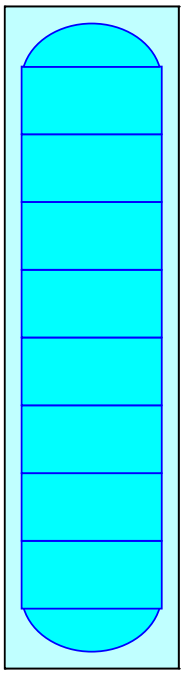
8 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 37.32' Row Length +12.0" End Stone x 2 = 39.32' Base Length
1 Rows x 100.0" Wide + 12.0" Side Stone x 2 = 10.33' Base Width
9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

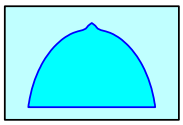
8 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 1 Rows = 923.3 cf Chamber Storage

2,742.3 cf Field - 923.3 cf Chambers = 1,819.0 cf Stone x 40.0% Voids = 727.6 cf Stone Storage

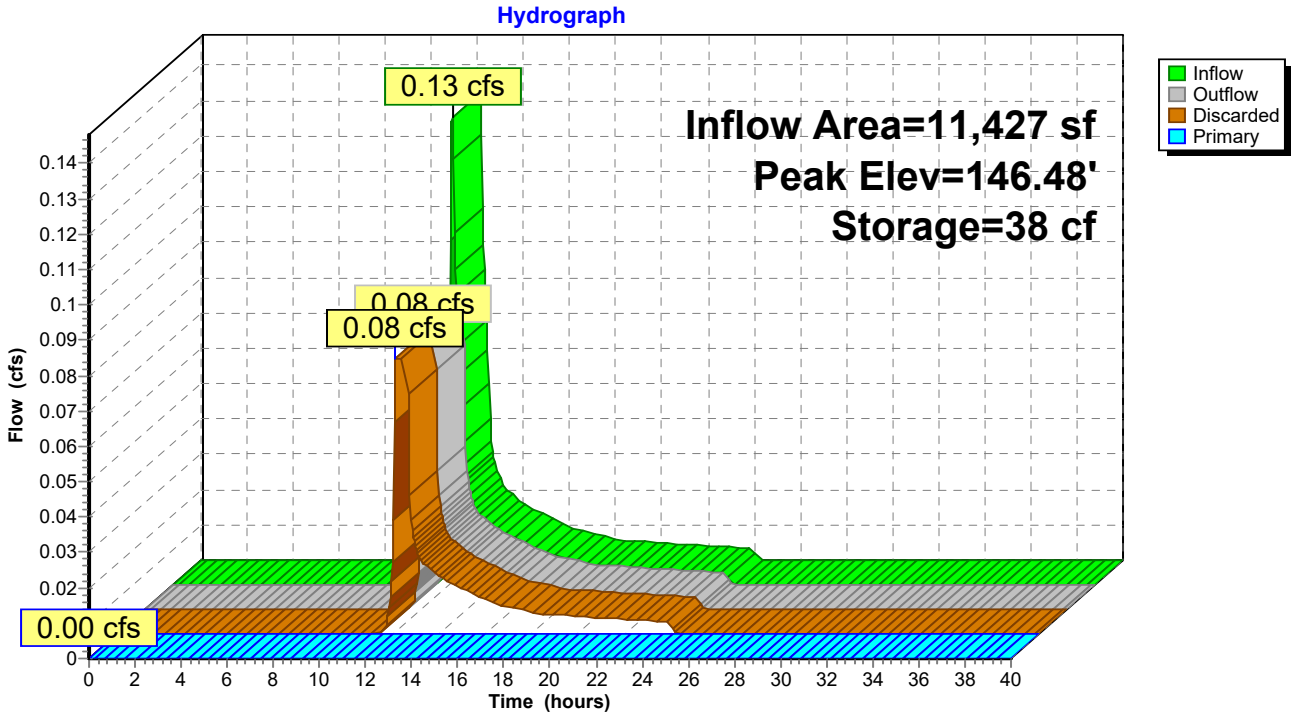
Chamber Storage + Stone Storage = 1,650.9 cf = 0.038 af
Overall Storage Efficiency = 60.2%
Overall System Size = 39.32' x 10.33' x 6.75'

8 Chambers
101.6 cy Field
67.4 cy Stone





Pond 1P: 4500 1R8C



Summary for Pond 2: CB2

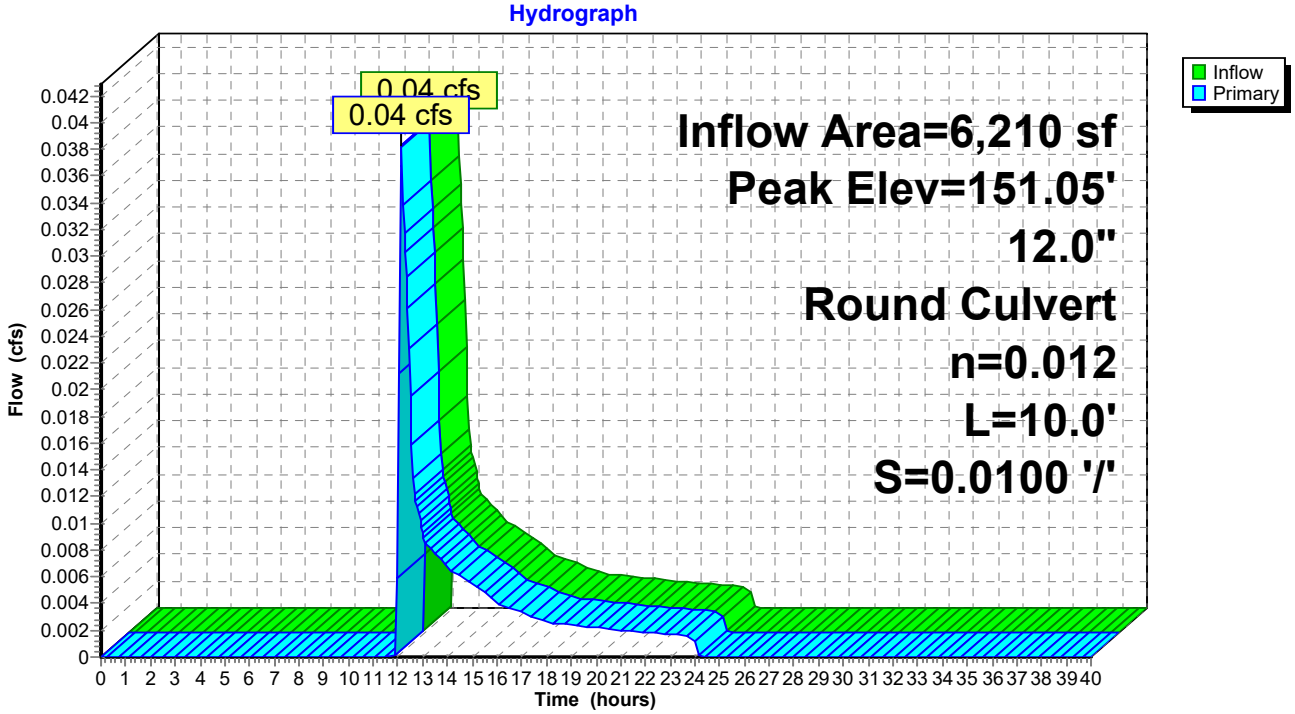
Inflow Area = 6,210 sf, 37.86% Impervious, Inflow Depth = 0.40" for 2 yr event
Inflow = 0.04 cfs @ 12.14 hrs, Volume= 209 cf
Outflow = 0.04 cfs @ 12.14 hrs, Volume= 209 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.04 cfs @ 12.14 hrs, Volume= 209 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 151.05' @ 12.14 hrs
Flood Elev= 154.95'

Device	Routing	Invert	Outlet Devices
#1	Primary	150.95'	**12.0" Round Culvert** L= 10.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 150.95' / 150.85' S= 0.0100 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=0.04 cfs @ 12.14 hrs HW=151.05' (Free Discharge)
└**1=Culvert** (Barrel Controls 0.04 cfs @ 1.42 fps)

Pond 2: CB2



Summary for Pond 2P: 4500 2R10C

Inflow Area =	22,216 sf, 71.66% Impervious, Inflow Depth = 1.39" for 2 yr event				
Inflow =	0.73 cfs @	12.09 hrs,	Volume=	2,578 cf	
Outflow =	0.18 cfs @	11.80 hrs,	Volume=	2,578 cf,	Atten= 76%, Lag= 0.0 min
Discarded =	0.18 cfs @	11.80 hrs,	Volume=	2,578 cf	
Primary =	0.00 cfs @	0.00 hrs,	Volume=	0 cf	

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 139.09' @ 12.47 hrs Surf.Area= 920 sf Storage= 532 cf
Flood Elev= 145.00' Surf.Area= 920 sf Storage= 3,847 cf

Plug-Flow detention time= 15.4 min calculated for 2,578 cf (100% of inflow)
Center-of-Mass det. time= 15.4 min (772.5 - 757.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	138.00'	1,574 cf	**19.42'W x 47.37'L x 6.75'H Field A** 6,208 cf Overall - 2,273 cf Embedded = 3,935 cf x 40.0% Voids
#2A	138.75'	2,273 cf	**ADS_StormTech MC-4500 +Cap** x 20 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 20 Chambers in 2 Rows Cap Storage= +35.7 cf x 2 x 2 rows = 142.8 cf
		3,847 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	141.75'	**12.0" Round Culvert** L= 100.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 141.75' / 137.15' S= 0.0460 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Discarded	138.00'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.18 cfs @ 11.80 hrs HW=138.09' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.18 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=138.00' (Free Discharge)
└**1=Culvert** (Controls 0.00 cfs)

Pond 2P: 4500 2R10C - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-4500 +Cap (ADS StormTech® MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= +35.7 cf x 2 x 2 rows = 142.8 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

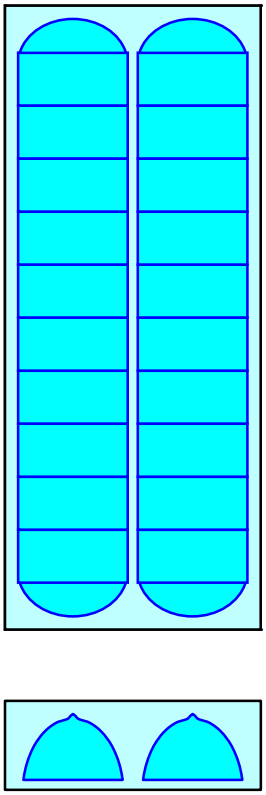
10 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 45.37' Row Length +12.0" End Stone x 2 = 47.37' Base Length
2 Rows x 100.0" Wide + 9.0" Spacing x 1 + 12.0" Side Stone x 2 = 19.42' Base Width
9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

20 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 2 Rows = 2,272.6 cf Chamber Storage

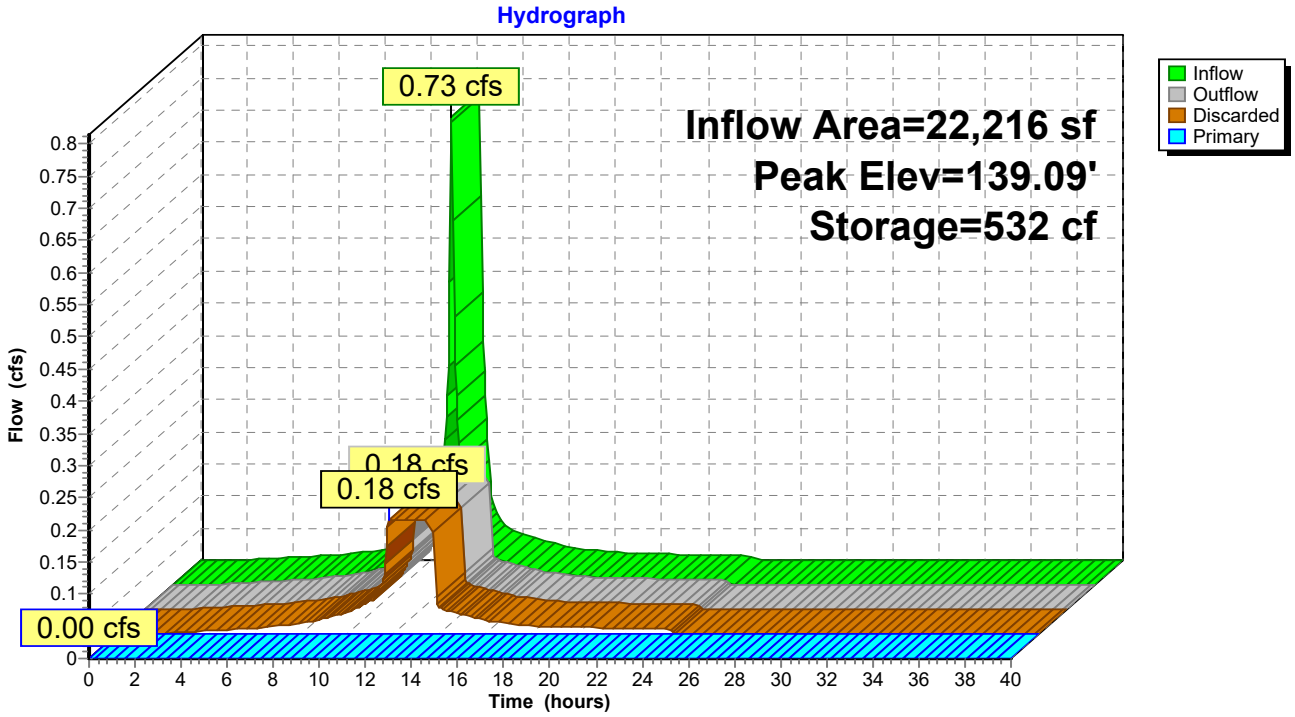
6,208.0 cf Field - 2,272.6 cf Chambers = 3,935.4 cf Stone x 40.0% Voids = 1,574.2 cf Stone Storage

Chamber Storage + Stone Storage = 3,846.8 cf = 0.088 af
Overall Storage Efficiency = 62.0%
Overall System Size = 47.37' x 19.42' x 6.75'

20 Chambers
229.9 cy Field
145.8 cy Stone



Pond 2P: 4500 2R10C



Summary for Pond 3: CB3

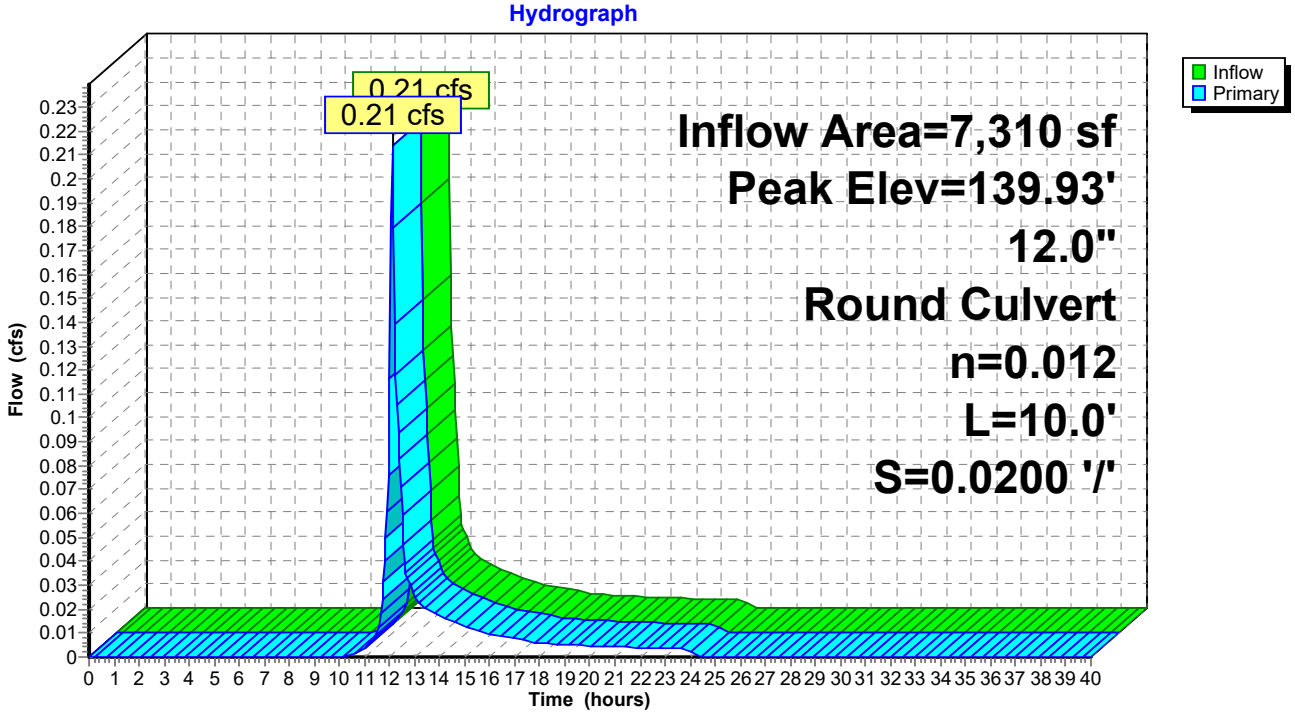
Inflow Area = 7,310 sf, 63.73% Impervious, Inflow Depth = 1.14" for 2 yr event
Inflow = 0.21 cfs @ 12.10 hrs, Volume= 695 cf
Outflow = 0.21 cfs @ 12.10 hrs, Volume= 695 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.21 cfs @ 12.10 hrs, Volume= 695 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 139.93' @ 12.10 hrs
Flood Elev= 144.20'

Device	Routing	Invert	Outlet Devices
#1	Primary	139.70'	**12.0" Round Culvert** L= 10.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 139.70' / 139.50' S= 0.0200 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=0.21 cfs @ 12.10 hrs HW=139.92' (Free Discharge)
└**1=Culvert** (Inlet Controls 0.21 cfs @ 1.61 fps)

Pond 3: CB3



Summary for Pond 3P: 4500 2R17C

Inflow Area = 68,428 sf, 48.37% Impervious, Inflow Depth = 0.34" for 2 yr event
Inflow = 0.46 cfs @ 12.09 hrs, Volume= 1,932 cf
Outflow = 0.28 cfs @ 12.05 hrs, Volume= 1,932 cf, Atten= 39%, Lag= 0.0 min
Discarded = 0.28 cfs @ 12.05 hrs, Volume= 1,932 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 134.22' @ 12.21 hrs Surf.Area= 1,467 sf Storage= 127 cf
Flood Elev= 145.00' Surf.Area= 1,467 sf Storage= 6,218 cf

Plug-Flow detention time= 4.3 min calculated for 1,930 cf (100% of inflow)
Center-of-Mass det. time= 4.3 min (851.1 - 846.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	134.00'	2,455 cf	**19.42'W x 75.54'L x 6.75'H Field A** 9,901 cf Overall - 3,763 cf Embedded = 6,137 cf x 40.0% Voids
#2A	134.75'	3,763 cf	**ADS_StormTech MC-4500 +Cap** x 34 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 34 Chambers in 2 Rows Cap Storage= +35.7 cf x 2 x 2 rows = 142.8 cf
		6,218 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	137.75'	**12.0" Round Culvert** L= 100.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 137.75' / 133.15' S= 0.0460 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Discarded	134.00'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.28 cfs @ 12.05 hrs HW=134.11' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.28 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=134.00' (Free Discharge)
└**1=Culvert** (Controls 0.00 cfs)

Pond 3P: 4500 2R17C - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-4500 +Cap (ADS StormTech® MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= +35.7 cf x 2 x 2 rows = 142.8 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

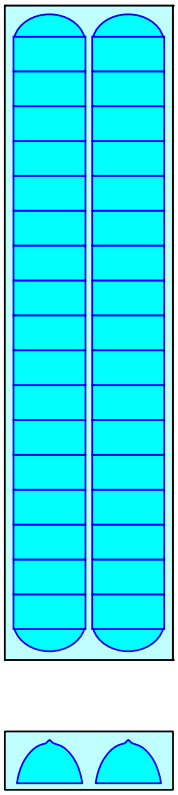
17 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 73.54' Row Length +12.0" End Stone x 2 = 75.54' Base Length
2 Rows x 100.0" Wide + 9.0" Spacing x 1 + 12.0" Side Stone x 2 = 19.42' Base Width
9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

34 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 2 Rows = 3,763.5 cf Chamber Storage

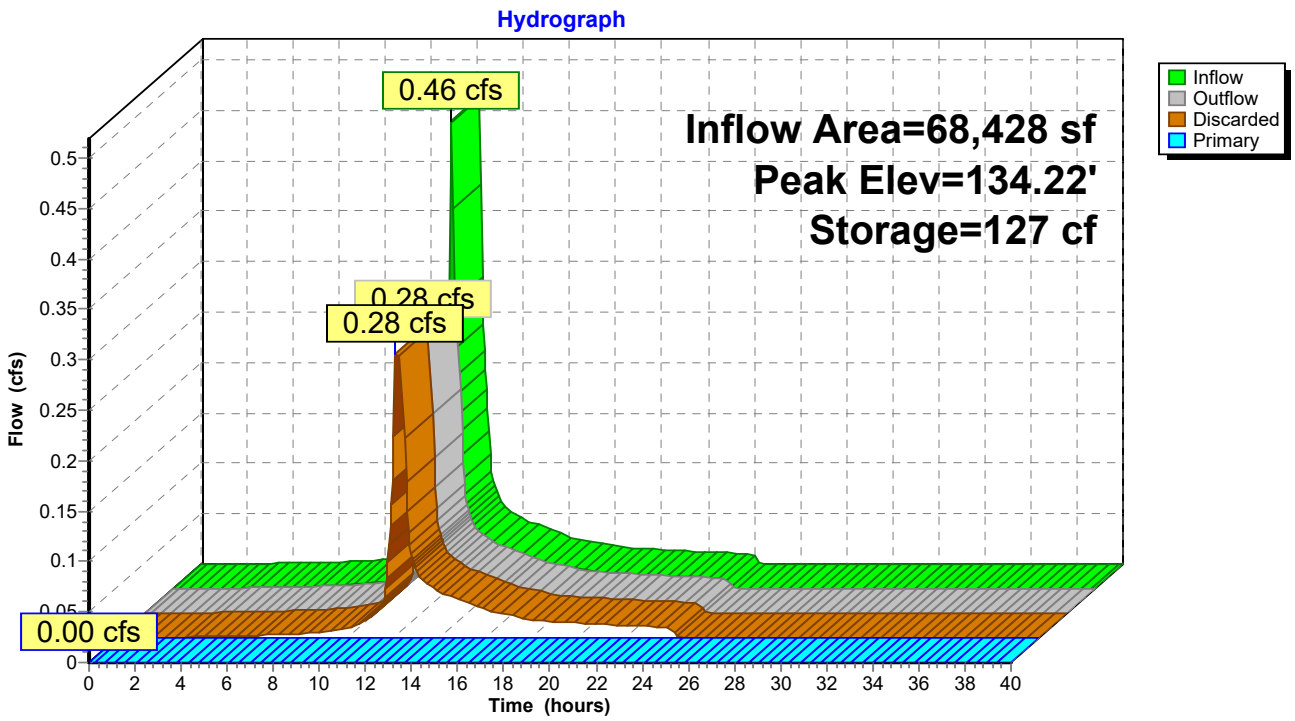
9,900.7 cf Field - 3,763.5 cf Chambers = 6,137.2 cf Stone x 40.0% Voids = 2,454.9 cf Stone Storage

Chamber Storage + Stone Storage = 6,218.4 cf = 0.143 af
Overall Storage Efficiency = 62.8%
Overall System Size = 75.54' x 19.42' x 6.75'

34 Chambers
366.7 cy Field
227.3 cy Stone



Pond 3P: 4500 2R17C



Summary for Pond 4: CB4

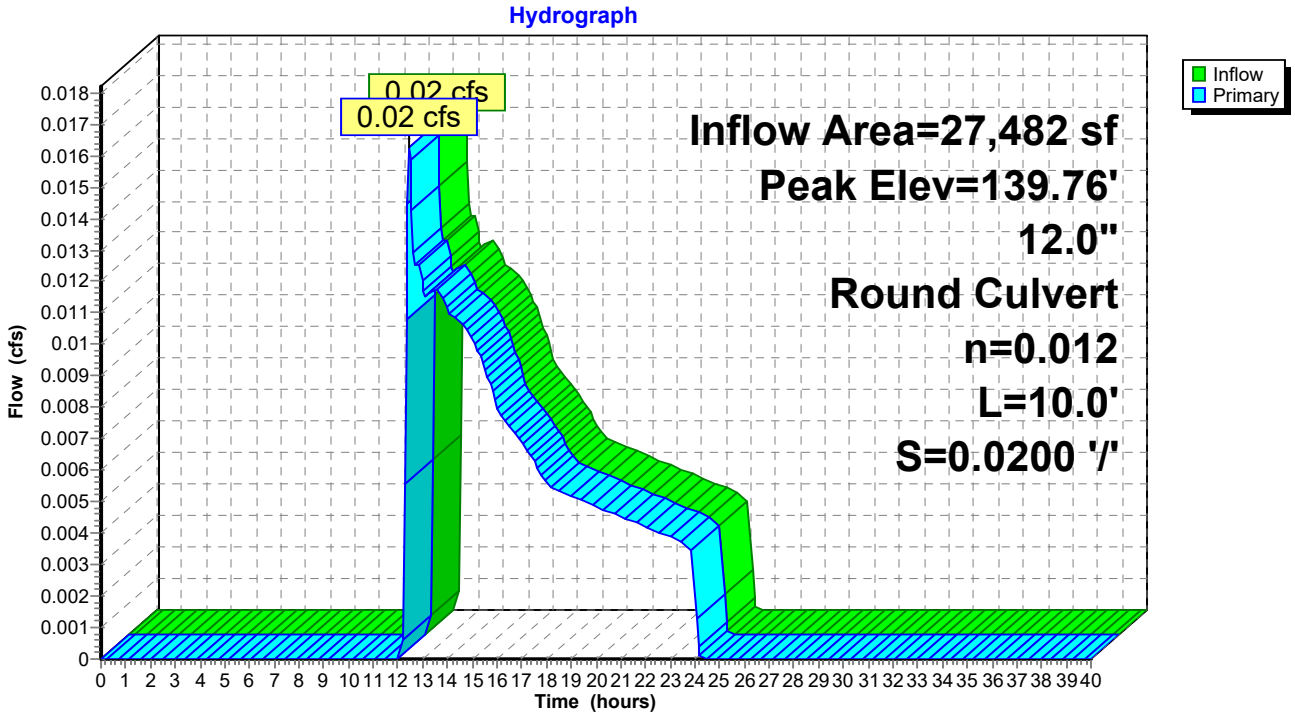
Inflow Area =	27,482 sf, 28.14% Impervious, Inflow Depth = 0.13" for 2 yr event				
Inflow =	0.02 cfs @	12.47 hrs,	Volume=	295 cf	
Outflow =	0.02 cfs @	12.47 hrs,	Volume=	295 cf,	Atten= 0%, Lag= 0.0 min
Primary =	0.02 cfs @	12.47 hrs,	Volume=	295 cf	

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 139.76' @ 12.47 hrs
Flood Elev= 144.20'

Device	Routing	Invert	Outlet Devices
#1	Primary	139.70'	**12.0" Round Culvert** L= 10.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 139.70' / 139.50' S= 0.0200 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=0.01 cfs @ 12.47 hrs HW=139.76' (Free Discharge)
└**1=Culvert** (Inlet Controls 0.01 cfs @ 0.81 fps)

Pond 4: CB4



Summary for Pond 4P: 4500 2R10C

Inflow Area = 24,670 sf, 37.24% Impervious, Inflow Depth = 0.68" for 2 yr event
Inflow = 0.34 cfs @ 12.10 hrs, Volume= 1,405 cf
Outflow = 0.31 cfs @ 12.14 hrs, Volume= 1,405 cf, Atten= 8%, Lag= 2.5 min
Discarded = 0.31 cfs @ 12.14 hrs, Volume= 1,405 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 127.16' @ 12.14 hrs Surf.Area= 1,701 sf Storage= 44 cf
Flood Elev= 132.50' Surf.Area= 1,701 sf Storage= 6,302 cf

Plug-Flow detention time= 2.3 min calculated for 1,403 cf (100% of inflow)
Center-of-Mass det. time= 2.4 min (869.0 - 866.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	127.10'	2,832 cf	**19.42'W x 87.62'L x 6.75'H Field A** 11,483 cf Overall - 4,402 cf Embedded = 7,081 cf x 40.0% Voids
#2A	127.85'	4,402 cf	**ADS_StormTech MC-4500 +Cap** x 40 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.02'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 40 Chambers in 2 Rows Cap Storage= +35.7 cf x 2 x 2 rows = 142.8 cf
		7,235 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	130.85'	**12.0" Round Culvert** L= 50.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 130.85' / 126.50' S= 0.0870 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Discarded	127.10'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.33 cfs @ 12.14 hrs HW=127.16' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.33 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=127.10' (Free Discharge)
└**1=Culvert** (Controls 0.00 cfs)

Pond 4P: 4500 2R10C - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-4500 +Cap (ADS StormTech® MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.02'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= +35.7 cf x 2 x 2 rows = 142.8 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

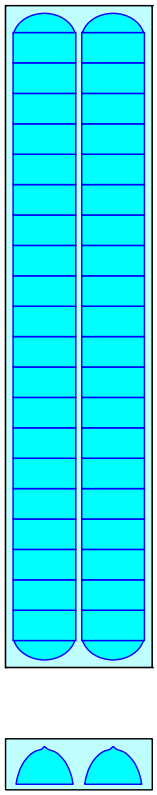
20 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 85.62' Row Length +12.0" End Stone x 2 = 87.62' Base Length
2 Rows x 100.0" Wide + 9.0" Spacing x 1 + 12.0" Side Stone x 2 = 19.42' Base Width
9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

40 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 2 Rows = 4,402.4 cf Chamber Storage

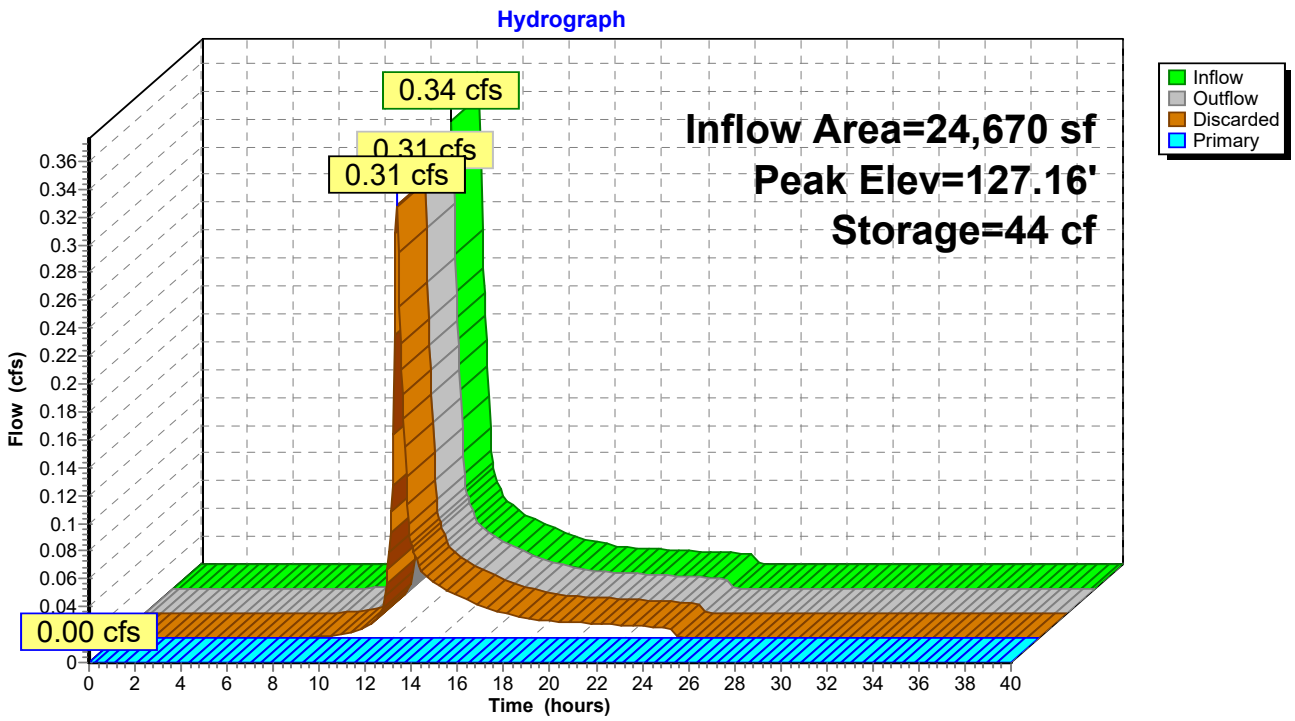
11,483.3 cf Field - 4,402.4 cf Chambers = 7,080.8 cf Stone x 40.0% Voids = 2,832.3 cf Stone Storage

Chamber Storage + Stone Storage = 7,234.8 cf = 0.166 af
Overall Storage Efficiency = 63.0%
Overall System Size = 87.62' x 19.42' x 6.75'

40 Chambers
425.3 cy Field
262.3 cy Stone



Pond 4P: 4500 2R10C



Summary for Pond 5: CB5

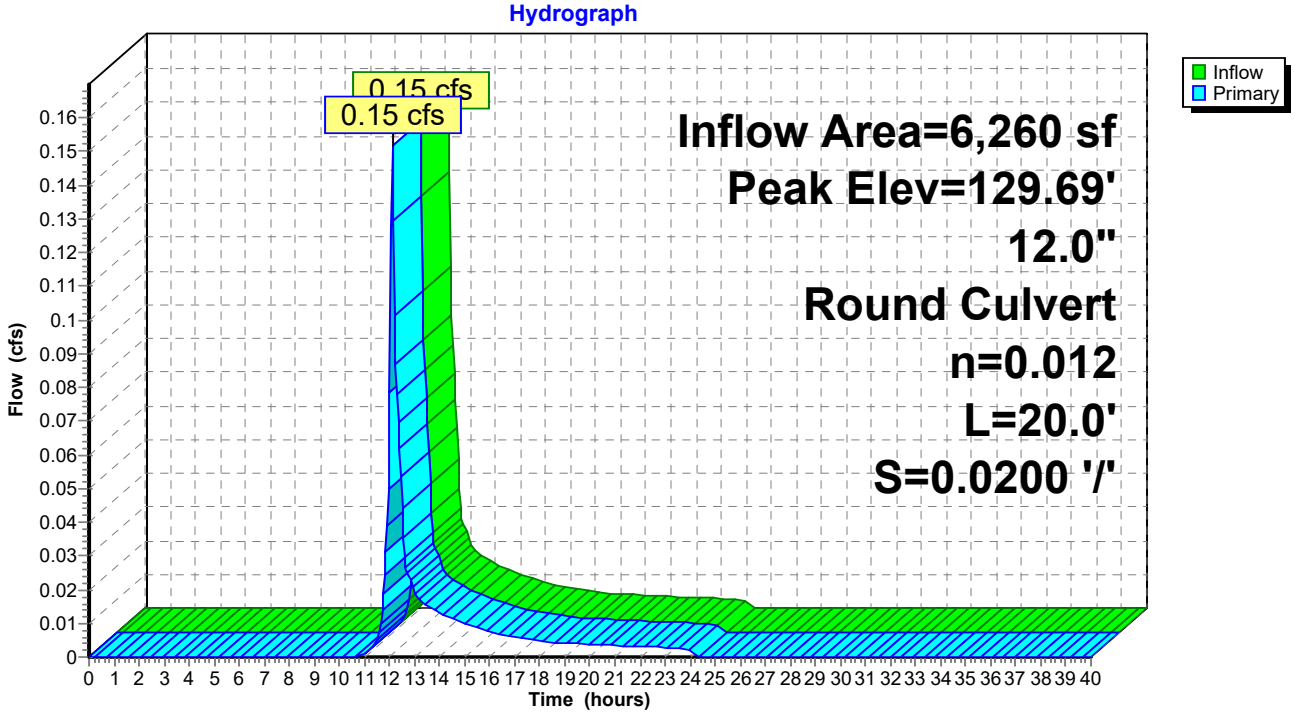
Inflow Area =	6,260 sf, 55.38% Impervious, Inflow Depth = 0.97" for 2 yr event				
Inflow =	0.15 cfs @	12.10 hrs,	Volume=	507 cf	
Outflow =	0.15 cfs @	12.10 hrs,	Volume=	507 cf,	Atten= 0%, Lag= 0.0 min
Primary =	0.15 cfs @	12.10 hrs,	Volume=	507 cf	

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 129.69' @ 12.10 hrs
Flood Elev= 135.45'

Device	Routing	Invert	Outlet Devices
#1	Primary	129.50'	**12.0" Round Culvert** L= 20.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 129.50' / 129.10' S= 0.0200 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=0.15 cfs @ 12.10 hrs HW=129.69' (Free Discharge)
└**1=Culvert** (Inlet Controls 0.15 cfs @ 1.47 fps)

Pond 5: CB5



Summary for Pond 5P: 3500 2R10C

Inflow Area = 26,562 sf, 35.22% Impervious, Inflow Depth = 0.73" for 2 yr event
Inflow = 0.43 cfs @ 12.10 hrs, Volume= 1,614 cf
Outflow = 0.23 cfs @ 12.05 hrs, Volume= 1,614 cf, Atten= 46%, Lag= 0.0 min
Discarded = 0.23 cfs @ 12.05 hrs, Volume= 1,614 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 126.86' @ 12.30 hrs Surf.Area= 1,206 sf Storage= 125 cf
Flood Elev= 132.50' Surf.Area= 1,206 sf Storage= 4,009 cf

Plug-Flow detention time= 3.5 min calculated for 1,612 cf (100% of inflow)
Center-of-Mass det. time= 3.5 min (871.2 - 867.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	126.60'	1,750 cf	**15.58'W x 77.40'L x 5.50'H Field A** 6,634 cf Overall - 2,259 cf Embedded = 4,375 cf x 40.0% Voids
#2A	127.35'	2,259 cf	**ADS_StormTech MC-3500 d +Cap** x 20 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 20 Chambers in 2 Rows Cap Storage= +14.9 cf x 2 x 2 rows = 59.6 cf
		4,009 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	130.25'	**12.0" Round Culvert** L= 50.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 130.25' / 129.75' S= 0.0100 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Discarded	126.60'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.23 cfs @ 12.05 hrs HW=126.68' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.23 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=126.60' (Free Discharge)
└**1=Culvert** (Controls 0.00 cfs)

Pond 5P: 3500 2R10C - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-3500 d +Cap (ADS StormTech® MC-3500 d rev 03/14 with Cap volume)
Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf
Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap
Cap Storage= +14.9 cf x 2 x 2 rows = 59.6 cf

77.0" Wide + 9.0" Spacing = 86.0" C-C Row Spacing

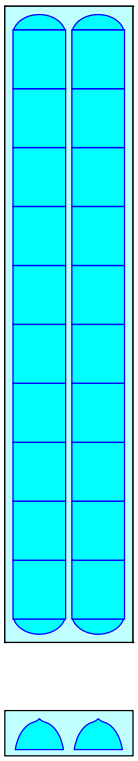
10 Chambers/Row x 7.17' Long +1.85' Cap Length x 2 = 75.40' Row Length +12.0" End Stone x 2 = 77.40' Base Length
2 Rows x 77.0" Wide + 9.0" Spacing x 1 + 12.0" Side Stone x 2 = 15.58' Base Width
9.0" Base + 45.0" Chamber Height + 12.0" Cover = 5.50' Field Height

20 Chambers x 110.0 cf + 14.9 cf Cap Volume x 2 x 2 Rows = 2,258.6 cf Chamber Storage

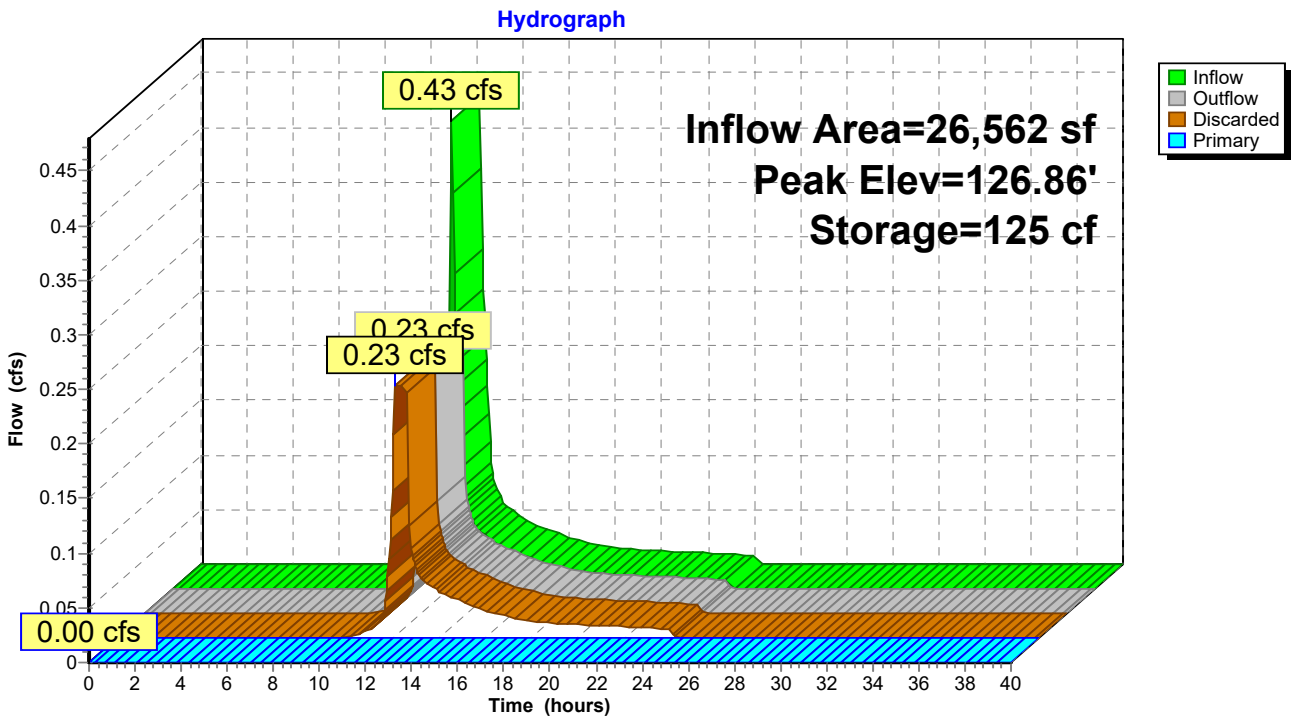
6,633.8 cf Field - 2,258.6 cf Chambers = 4,375.2 cf Stone x 40.0% Voids = 1,750.1 cf Stone Storage

Chamber Storage + Stone Storage = 4,008.7 cf = 0.092 af
Overall Storage Efficiency = 60.4%
Overall System Size = 77.40' x 15.58' x 5.50'

20 Chambers
245.7 cy Field
162.0 cy Stone



Pond 5P: 3500 2R10C



Summary for Pond 6: CB6

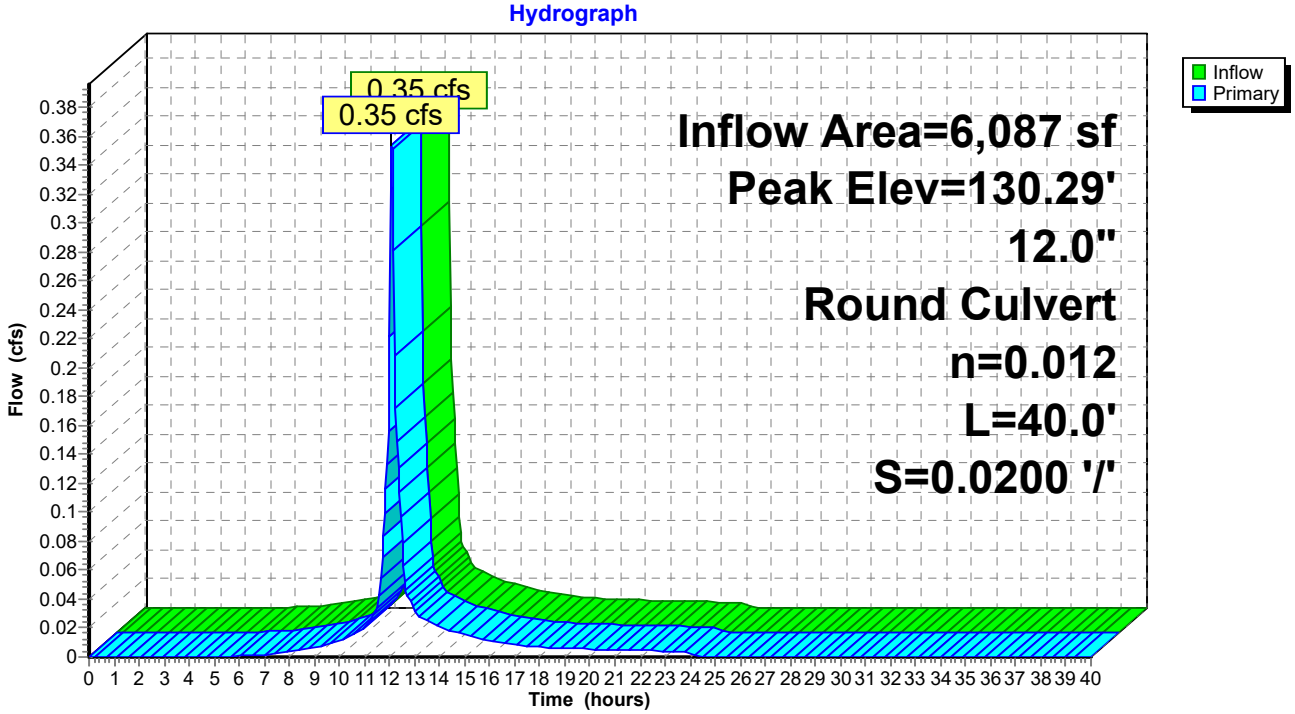
Inflow Area = 6,087 sf, 89.63% Impervious, Inflow Depth = 2.26" for 2 yr event
Inflow = 0.35 cfs @ 12.09 hrs, Volume= 1,144 cf
Outflow = 0.35 cfs @ 12.09 hrs, Volume= 1,144 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.35 cfs @ 12.09 hrs, Volume= 1,144 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 130.29' @ 12.09 hrs
Flood Elev= 134.10'

Device	Routing	Invert	Outlet Devices
#1	Primary	130.00'	**12.0" Round Culvert** L= 40.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 130.00' / 129.20' S= 0.0200 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=0.34 cfs @ 12.09 hrs HW=130.29' (Free Discharge)
└**1=Culvert** (Inlet Controls 0.34 cfs @ 1.83 fps)

Pond 6: CB6



Summary for Pond 6P: 4500 4R6C

Inflow Area = 40,594 sf, 23.62% Impervious, Inflow Depth = 0.55" for 2 yr event
Inflow = 0.50 cfs @ 12.09 hrs, Volume= 1,865 cf
Outflow = 0.22 cfs @ 12.00 hrs, Volume= 1,865 cf, Atten= 55%, Lag= 0.0 min
Discarded = 0.22 cfs @ 12.00 hrs, Volume= 1,865 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 127.90' @ 12.31 hrs Surf.Area= 1,175 sf Storage= 187 cf
Flood Elev= 132.50' Surf.Area= 1,175 sf Storage= 3,997 cf

Plug-Flow detention time= 4.7 min calculated for 1,863 cf (100% of inflow)
Center-of-Mass det. time= 4.7 min (848.8 - 844.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	127.50'	2,036 cf	**37.58'W x 31.27'L x 6.75'H Field A** 7,932 cf Overall - 2,841 cf Embedded = 5,091 cf x 40.0% Voids
#2A	128.25'	2,841 cf	**ADS_StormTech MC-4500 +Cap** x 24 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 24 Chambers in 4 Rows Cap Storage= +35.7 cf x 2 x 4 rows = 285.6 cf
		4,878 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	131.25'	**12.0" Round Culvert** L= 25.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 131.25' / 131.00' S= 0.0100 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Discarded	127.50'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.22 cfs @ 12.00 hrs HW=127.57' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.22 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=127.50' (Free Discharge)
└**1=Culvert** (Controls 0.00 cfs)

Pond 6P: 4500 4R6C - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-4500 +Cap (ADS StormTech® MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= +35.7 cf x 2 x 4 rows = 285.6 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

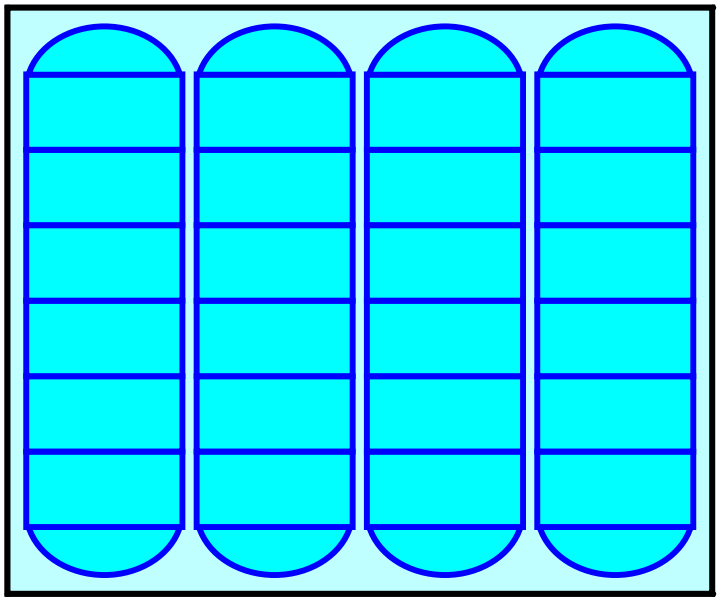
6 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 29.27' Row Length +12.0" End Stone x 2 = 31.27' Base Length
4 Rows x 100.0" Wide + 9.0" Spacing x 3 + 12.0" Side Stone x 2 = 37.58' Base Width
9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

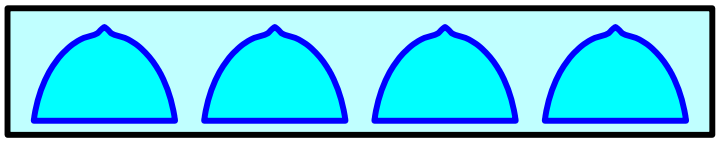
24 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 4 Rows = 2,841.4 cf Chamber Storage

7,932.0 cf Field - 2,841.4 cf Chambers = 5,090.6 cf Stone x 40.0% Voids = 2,036.2 cf Stone Storage

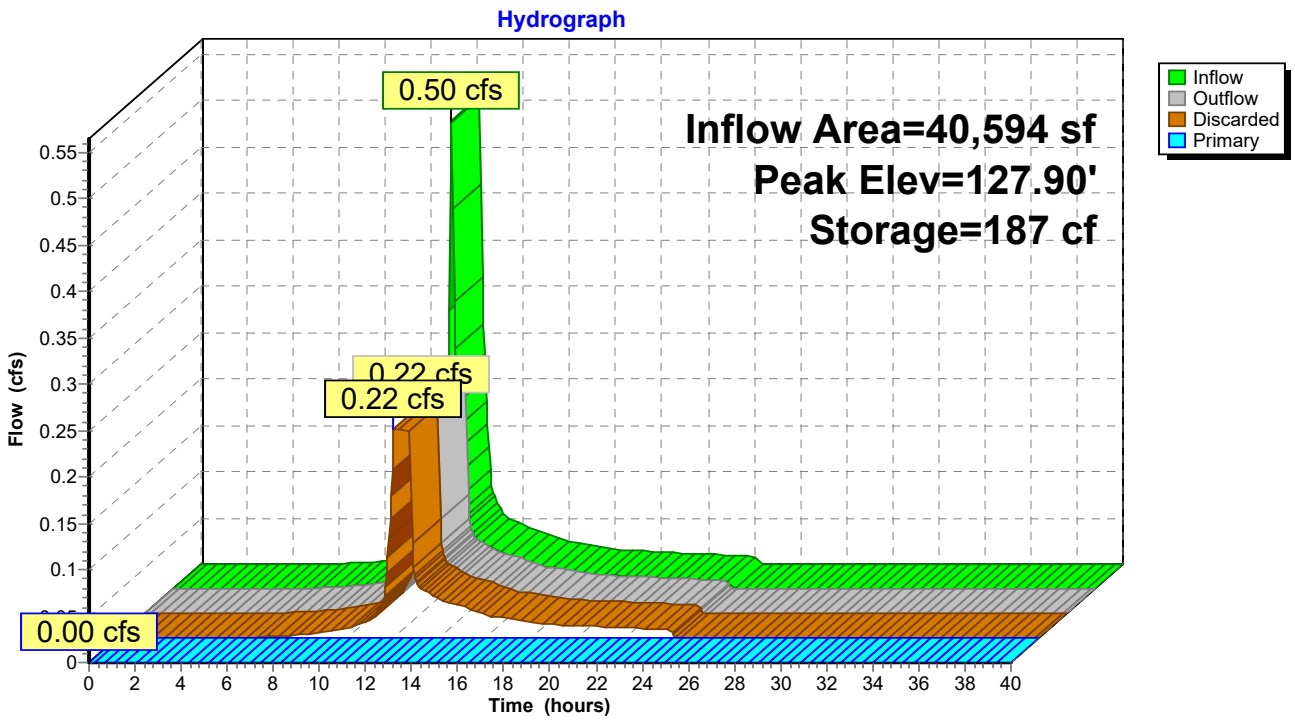
Chamber Storage + Stone Storage = 4,877.6 cf = 0.112 af
Overall Storage Efficiency = 61.5%
Overall System Size = 31.27' x 37.58' x 6.75'

24 Chambers
293.8 cy Field
188.5 cy Stone





Pond 6P: 4500 4R6C



Summary for Pond 7: CB7

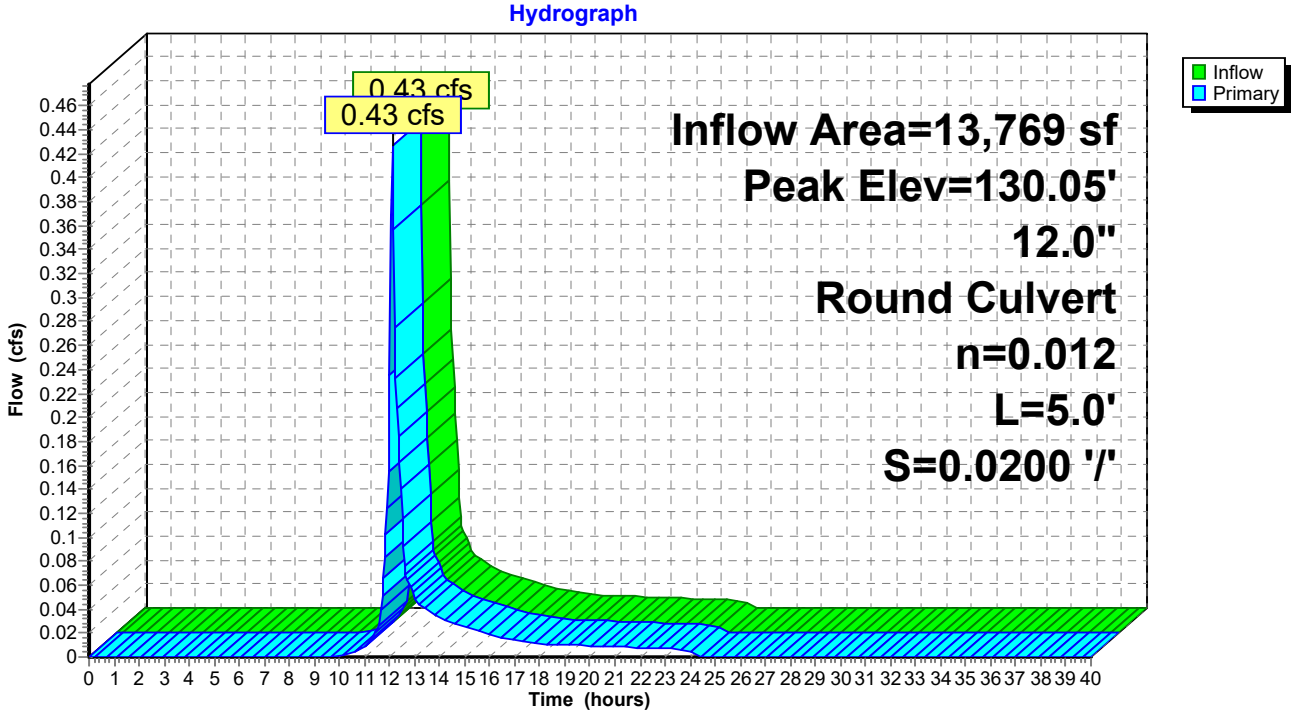
Inflow Area = 13,769 sf, 66.11% Impervious, Inflow Depth = 1.20" for 2 yr event
Inflow = 0.43 cfs @ 12.10 hrs, Volume= 1,378 cf
Outflow = 0.43 cfs @ 12.10 hrs, Volume= 1,378 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.43 cfs @ 12.10 hrs, Volume= 1,378 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 130.05' @ 12.10 hrs
Flood Elev= 132.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	129.70'	**12.0" Round Culvert** L= 5.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 129.70' / 129.60' S= 0.0200 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=0.42 cfs @ 12.10 hrs HW=130.05' (Free Discharge)
└**1=Culvert** (Barrel Controls 0.42 cfs @ 2.61 fps)

Pond 7: CB7



Summary for Pond 7P: 4500 3R10C

Inflow Area = 42,888 sf, 47.77% Impervious, Inflow Depth = 0.82" for 2 yr event
Inflow = 0.76 cfs @ 12.09 hrs, Volume= 2,925 cf
Outflow = 0.26 cfs @ 11.95 hrs, Volume= 2,925 cf, Atten= 66%, Lag= 0.0 min
Discarded = 0.26 cfs @ 11.95 hrs, Volume= 2,925 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 131.27' @ 12.41 hrs Surf.Area= 1,350 sf Storage= 427 cf
Flood Elev= 144.20' Surf.Area= 1,350 sf Storage= 5,690 cf

Plug-Flow detention time= 10.0 min calculated for 2,925 cf (100% of inflow)
Center-of-Mass det. time= 9.9 min (815.3 - 805.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	130.50'	2,281 cf	**28.50'W x 47.37'L x 6.75'H Field A** 9,112 cf Overall - 3,409 cf Embedded = 5,703 cf x 40.0% Voids
#2A	131.25'	3,409 cf	**ADS_StormTech MC-4500 +Cap** x 30 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 30 Chambers in 3 Rows Cap Storage= +35.7 cf x 2 x 3 rows = 214.2 cf
		5,690 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	134.25'	**12.0" Round Culvert** L= 50.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 134.25' / 130.15' S= 0.0820 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Discarded	130.50'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.26 cfs @ 11.95 hrs HW=130.64' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.26 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=130.50' (Free Discharge)
└**1=Culvert** (Controls 0.00 cfs)

Pond 7P: 4500 3R10C - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-4500 +Cap (ADS StormTech® MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= +35.7 cf x 2 x 3 rows = 214.2 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

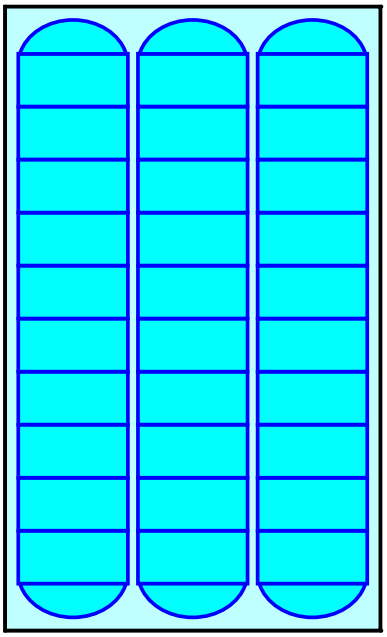
10 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 45.37' Row Length +12.0" End Stone x 2 = 47.37' Base Length
3 Rows x 100.0" Wide + 9.0" Spacing x 2 + 12.0" Side Stone x 2 = 28.50' Base Width
9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

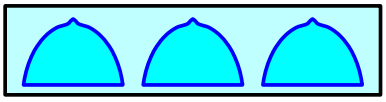
30 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 3 Rows = 3,408.9 cf Chamber Storage

9,112.2 cf Field - 3,408.9 cf Chambers = 5,703.2 cf Stone x 40.0% Voids = 2,281.3 cf Stone Storage

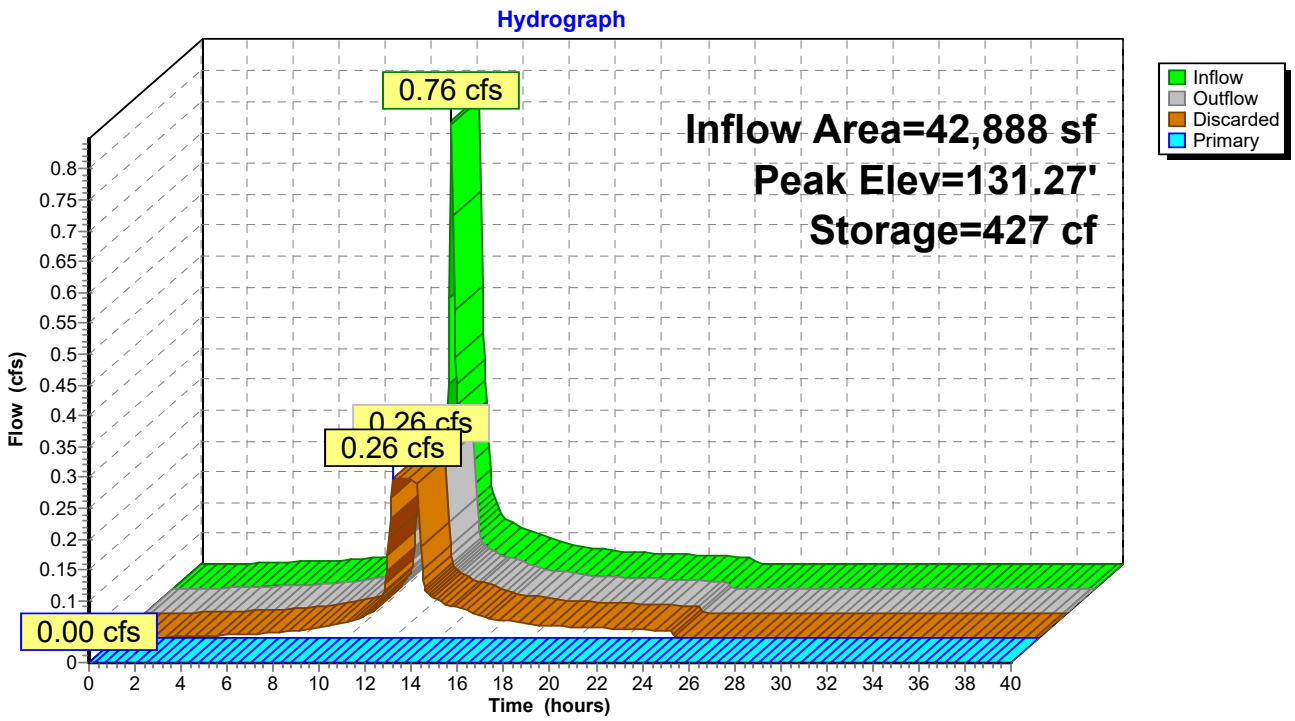
Chamber Storage + Stone Storage = 5,690.2 cf = 0.131 af
Overall Storage Efficiency = 62.4%
Overall System Size = 47.37' x 28.50' x 6.75'

30 Chambers
337.5 cy Field
211.2 cy Stone





Pond 7P: 4500 3R10C



Summary for Pond 8P: 4500 2R9C

Inflow Area =	17,767 sf, 62.07% Impervious, Inflow Depth = 1.21" for 2 yr event				
Inflow =	0.49 cfs @	12.10 hrs,	Volume=	1,798 cf	
Outflow =	0.16 cfs @	11.95 hrs,	Volume=	1,798 cf,	Atten= 67%, Lag= 0.0 min
Discarded =	0.16 cfs @	11.95 hrs,	Volume=	1,798 cf	
Primary =	0.00 cfs @	0.00 hrs,	Volume=	0 cf	

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 129.03' @ 12.45 hrs Surf.Area= 842 sf Storage= 273 cf
Flood Elev= 132.50' Surf.Area= 842 sf Storage= 2,490 cf

Plug-Flow detention time= 8.8 min calculated for 1,796 cf (100% of inflow)
Center-of-Mass det. time= 8.8 min (820.2 - 811.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	128.25'	1,448 cf	**19.42'W x 43.34'L x 6.75'H Field A** 5,680 cf Overall - 2,060 cf Embedded = 3,621 cf x 40.0% Voids
#2A	129.00'	2,060 cf	**ADS_StormTech MC-4500 +Cap** x 18 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 18 Chambers in 2 Rows Cap Storage= +35.7 cf x 2 x 2 rows = 142.8 cf
		3,508 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	132.00'	**12.0" Round Culvert** L= 25.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 132.00' / 131.00' S= 0.0400 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Discarded	128.25'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.16 cfs @ 11.95 hrs HW=128.32' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.16 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=128.25' (Free Discharge)
└**1=Culvert** (Controls 0.00 cfs)

Pond 8P: 4500 2R9C - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-4500 +Cap (ADS StormTech® MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= +35.7 cf x 2 x 2 rows = 142.8 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

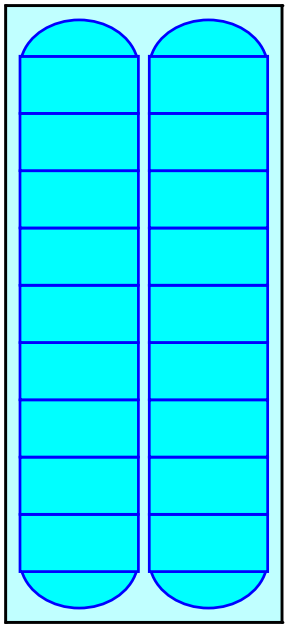
9 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 41.34' Row Length +12.0" End Stone x 2 = 43.34' Base Length
2 Rows x 100.0" Wide + 9.0" Spacing x 1 + 12.0" Side Stone x 2 = 19.42' Base Width
9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

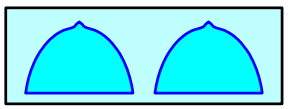
18 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 2 Rows = 2,059.6 cf Chamber Storage

5,680.5 cf Field - 2,059.6 cf Chambers = 3,620.8 cf Stone x 40.0% Voids = 1,448.3 cf Stone Storage

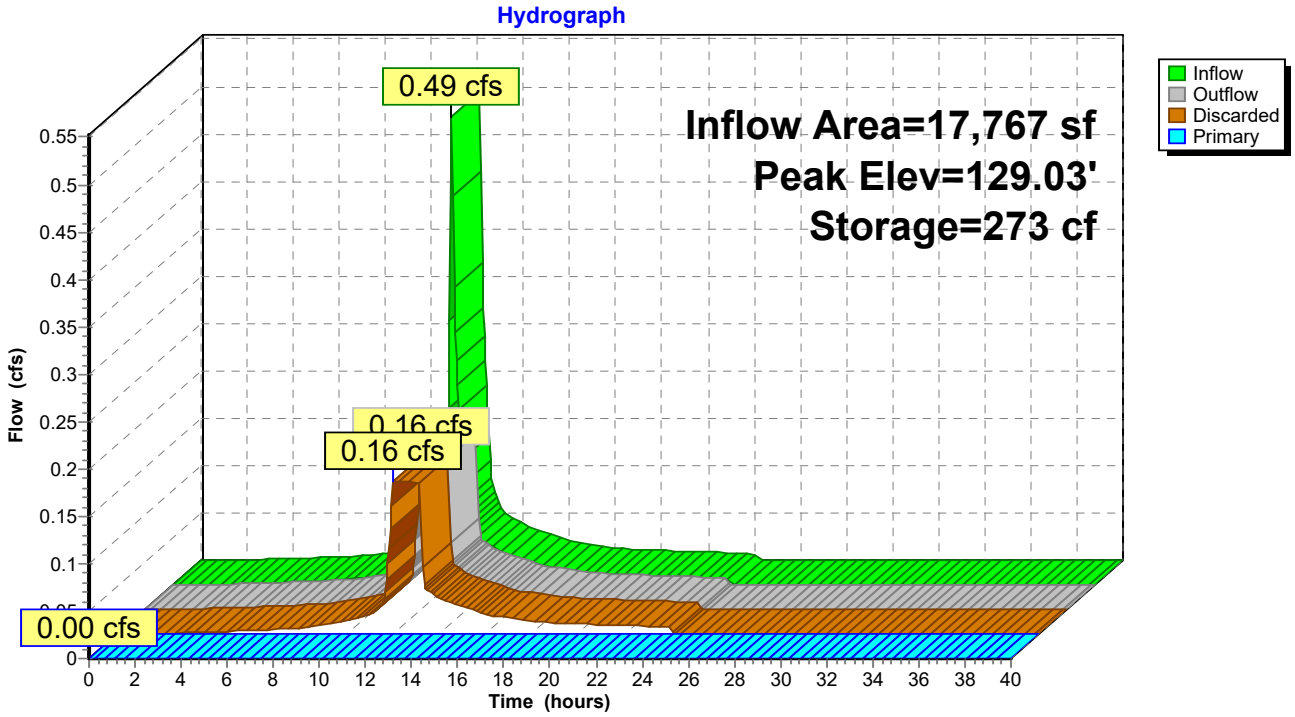
Chamber Storage + Stone Storage = 3,508.0 cf = 0.081 af
Overall Storage Efficiency = 61.8%
Overall System Size = 43.34' x 19.42' x 6.75'

18 Chambers
210.4 cy Field
134.1 cy Stone





Pond 8P: 4500 2R9C



Summary for Pond 9P: 4500 1R9C

Inflow Area = 6,832 sf,100.00% Impervious, Inflow Depth = 2.87" for 2 yr event
Inflow = 0.46 cfs @ 12.09 hrs, Volume= 1,633 cf
Outflow = 0.08 cfs @ 11.70 hrs, Volume= 1,633 cf, Atten= 82%, Lag= 0.0 min
Discarded = 0.08 cfs @ 11.70 hrs, Volume= 1,633 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 128.24' @ 12.54 hrs Surf.Area= 424 sf Storage= 420 cf
Flood Elev= 132.50' Surf.Area= 424 sf Storage= 1,364 cf

Plug-Flow detention time= 28.4 min calculated for 1,631 cf (100% of inflow)
Center-of-Mass det. time= 28.4 min (785.4 - 757.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	126.60'	645 cf	**15.58'W x 27.21'L x 5.50'H Field A** 2,332 cf Overall - 719 cf Embedded = 1,613 cf x 40.0% Voids
#2A	127.35'	719 cf	**ADS_StormTech MC-3500 d +Cap** x 6 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 6 Chambers in 2 Rows Cap Storage= +14.9 cf x 2 x 2 rows = 59.6 cf
		1,364 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	130.25'	**12.0" Round Culvert** L= 50.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 130.25' / 129.75' S= 0.0100 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Discarded	126.60'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.08 cfs @ 11.70 hrs HW=126.67' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.08 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=126.60' (Free Discharge)
└**1=Culvert** (Controls 0.00 cfs)

Pond 9P: 4500 1R9C - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-3500 d +Cap (ADS StormTech® MC-3500 d rev 03/14 with Cap volume)
Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf
Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap
Cap Storage= +14.9 cf x 2 x 2 rows = 59.6 cf

77.0" Wide + 9.0" Spacing = 86.0" C-C Row Spacing

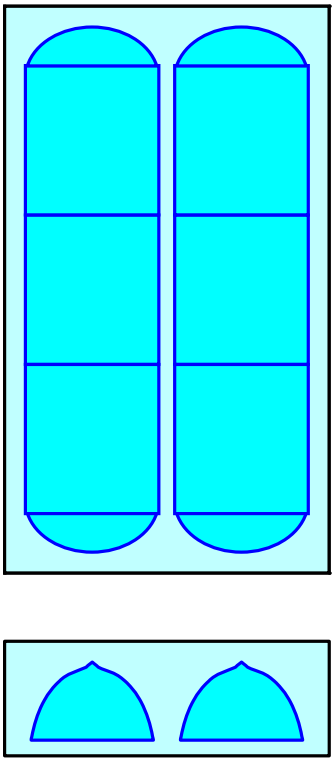
3 Chambers/Row x 7.17' Long +1.85' Cap Length x 2 = 25.21' Row Length +12.0" End Stone x 2 = 27.21' Base Length
2 Rows x 77.0" Wide + 9.0" Spacing x 1 + 12.0" Side Stone x 2 = 15.58' Base Width
9.0" Base + 45.0" Chamber Height + 12.0" Cover = 5.50' Field Height

6 Chambers x 110.0 cf + 14.9 cf Cap Volume x 2 x 2 Rows = 719.3 cf Chamber Storage

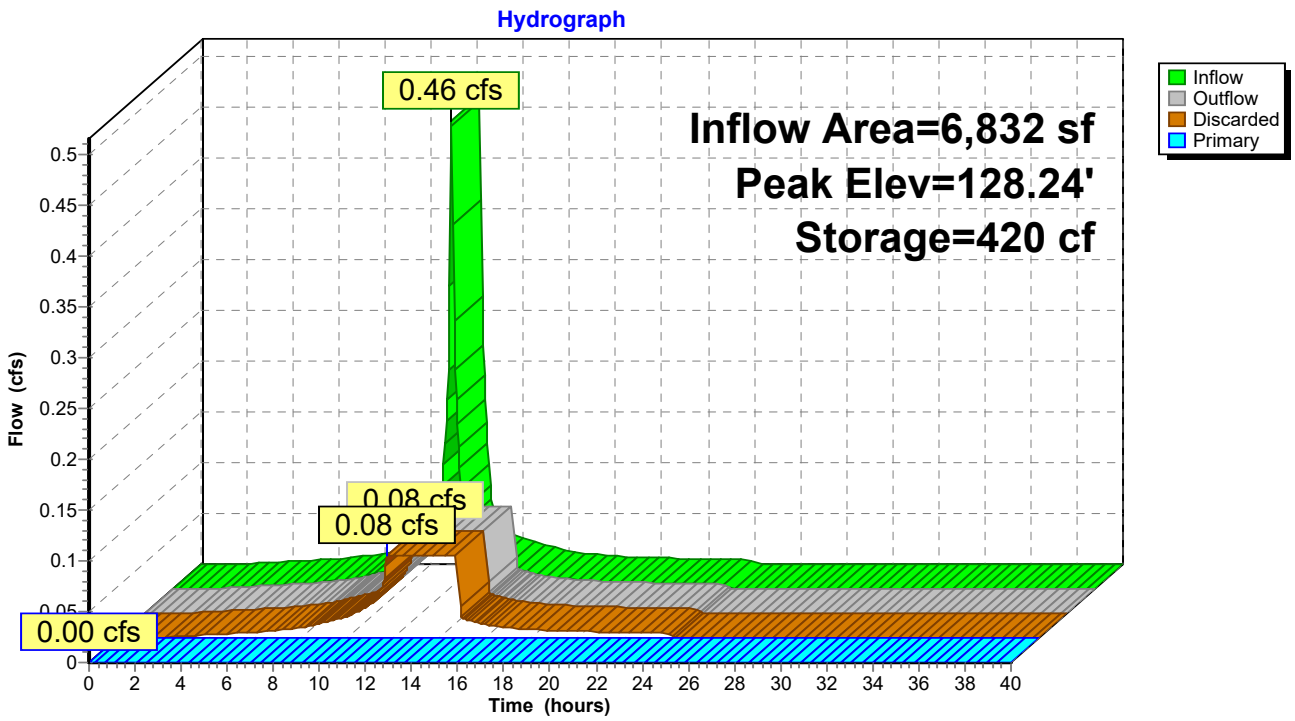
2,332.1 cf Field - 719.3 cf Chambers = 1,612.8 cf Stone x 40.0% Voids = 645.1 cf Stone Storage

Chamber Storage + Stone Storage = 1,364.4 cf = 0.031 af
Overall Storage Efficiency = 58.5%
Overall System Size = 27.21' x 15.58' x 5.50'

6 Chambers
86.4 cy Field
59.7 cy Stone



Pond 9P: 4500 1R9C



Summary for Pond 11: CB11

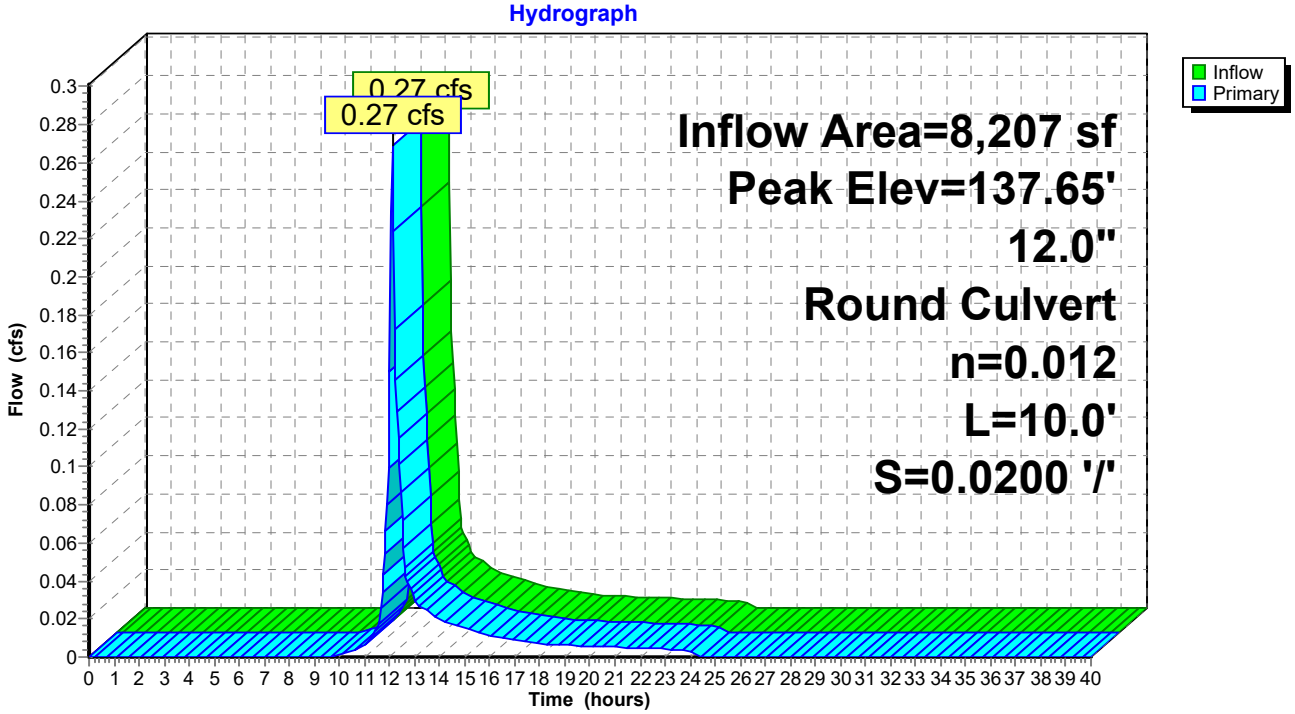
Inflow Area = 8,207 sf, 65.64% Impervious, Inflow Depth = 1.26" for 2 yr event
Inflow = 0.27 cfs @ 12.10 hrs, Volume= 863 cf
Outflow = 0.27 cfs @ 12.10 hrs, Volume= 863 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.27 cfs @ 12.10 hrs, Volume= 863 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 137.65' @ 12.10 hrs
Flood Elev= 141.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	137.40'	**12.0" Round Culvert** L= 10.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 137.40' / 137.20' S= 0.0200 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=0.27 cfs @ 12.10 hrs HW=137.65' (Free Discharge)
└**1=Culvert** (Inlet Controls 0.27 cfs @ 1.71 fps)

Pond 11: CB11



Summary for Pond 12: CB12

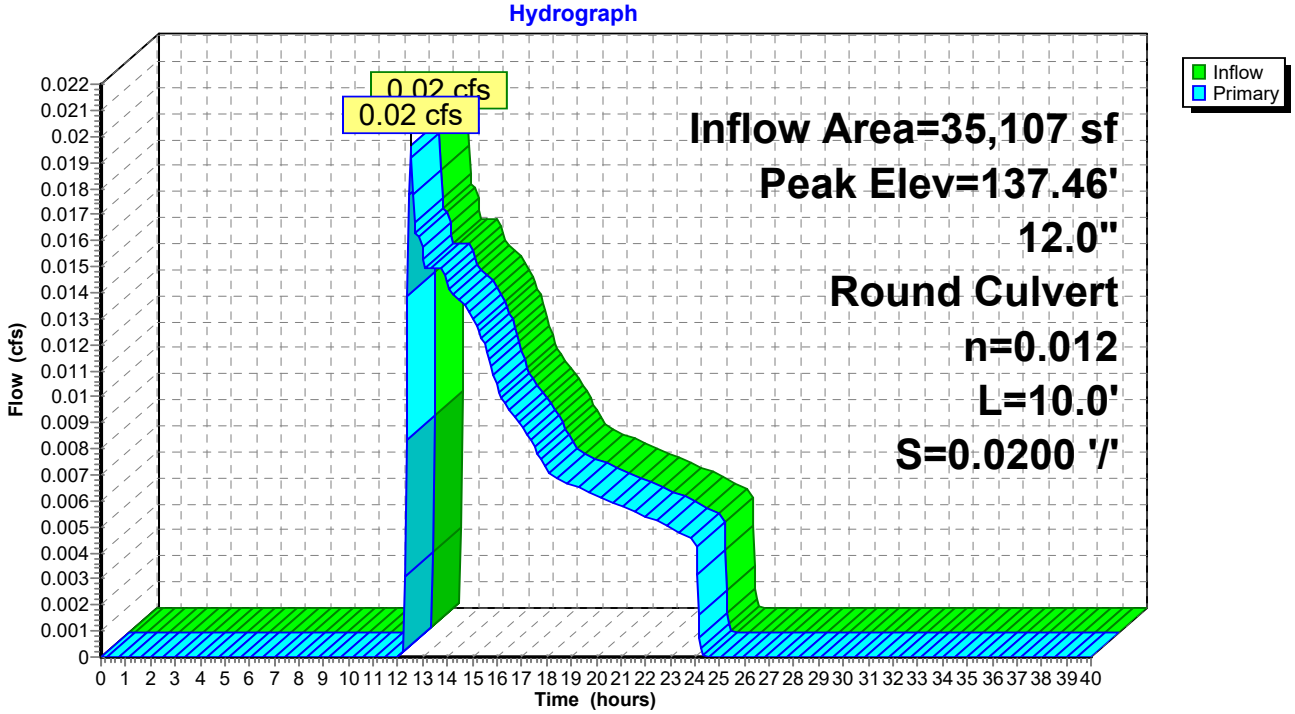
Inflow Area =	35,107 sf, 25.33% Impervious, Inflow Depth = 0.13" for 2 yr event				
Inflow =	0.02 cfs @	12.52 hrs,	Volume=	377 cf	
Outflow =	0.02 cfs @	12.52 hrs,	Volume=	377 cf,	Atten= 0%, Lag= 0.0 min
Primary =	0.02 cfs @	12.52 hrs,	Volume=	377 cf	

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 137.46' @ 12.52 hrs
Flood Elev= 141.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	137.40'	**12.0" Round Culvert** L= 10.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 137.40' / 137.20' S= 0.0200 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=0.02 cfs @ 12.52 hrs HW=137.46' (Free Discharge)
└**1=Culvert** (Inlet Controls 0.02 cfs @ 0.85 fps)

Pond 12: CB12



Summary for Pond 12P: CB14

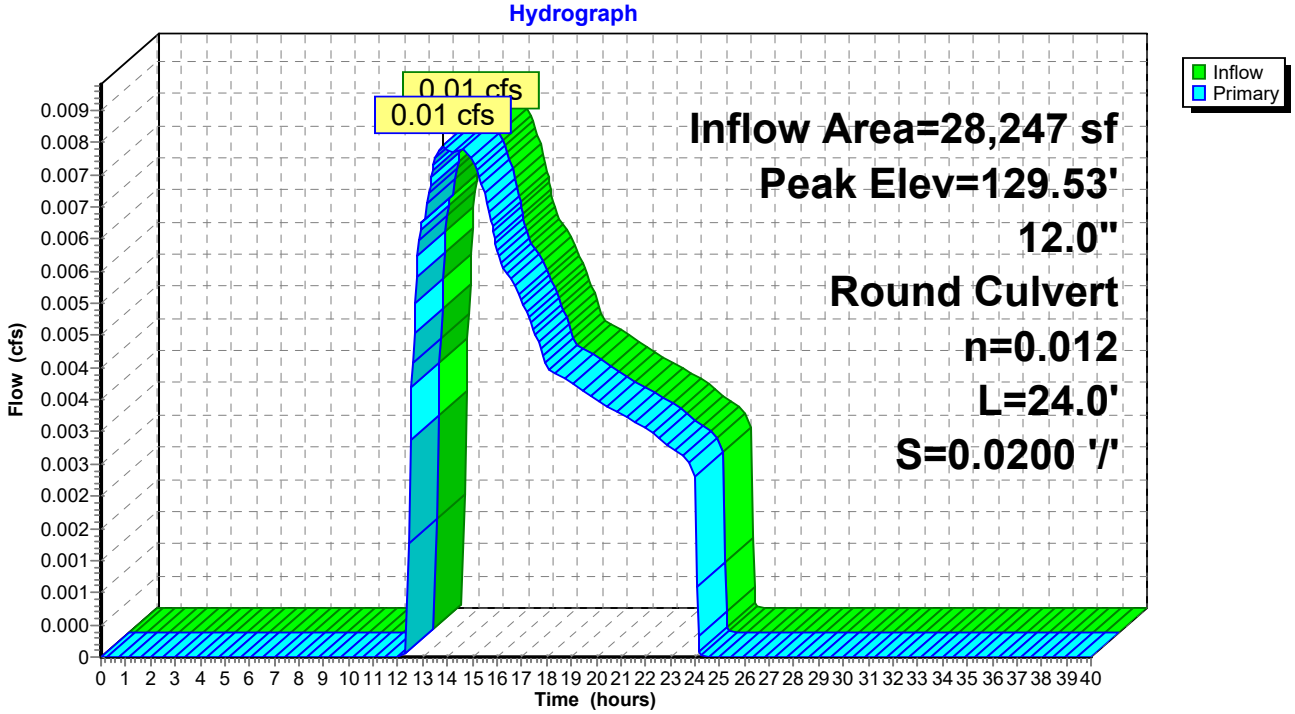
Inflow Area =	28,247 sf,	2.36% Impervious,	Inflow Depth =	0.09"	for 2 yr event
Inflow =	0.01 cfs @	13.80 hrs,	Volume=	214 cf	
Outflow =	0.01 cfs @	13.80 hrs,	Volume=	214 cf,	Atten= 0%, Lag= 0.0 min
Primary =	0.01 cfs @	13.80 hrs,	Volume=	214 cf	

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 129.53' @ 13.80 hrs
Flood Elev= 135.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	129.50'	**12.0" Round HPDE** L= 24.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 129.50' / 129.02' S= 0.0200 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 13.80 hrs HW=129.53' (Free Discharge)
└**1=HPDE** (Inlet Controls 0.00 cfs @ 0.59 fps)

Pond 12P: CB14



Summary for Pond 13: CB13

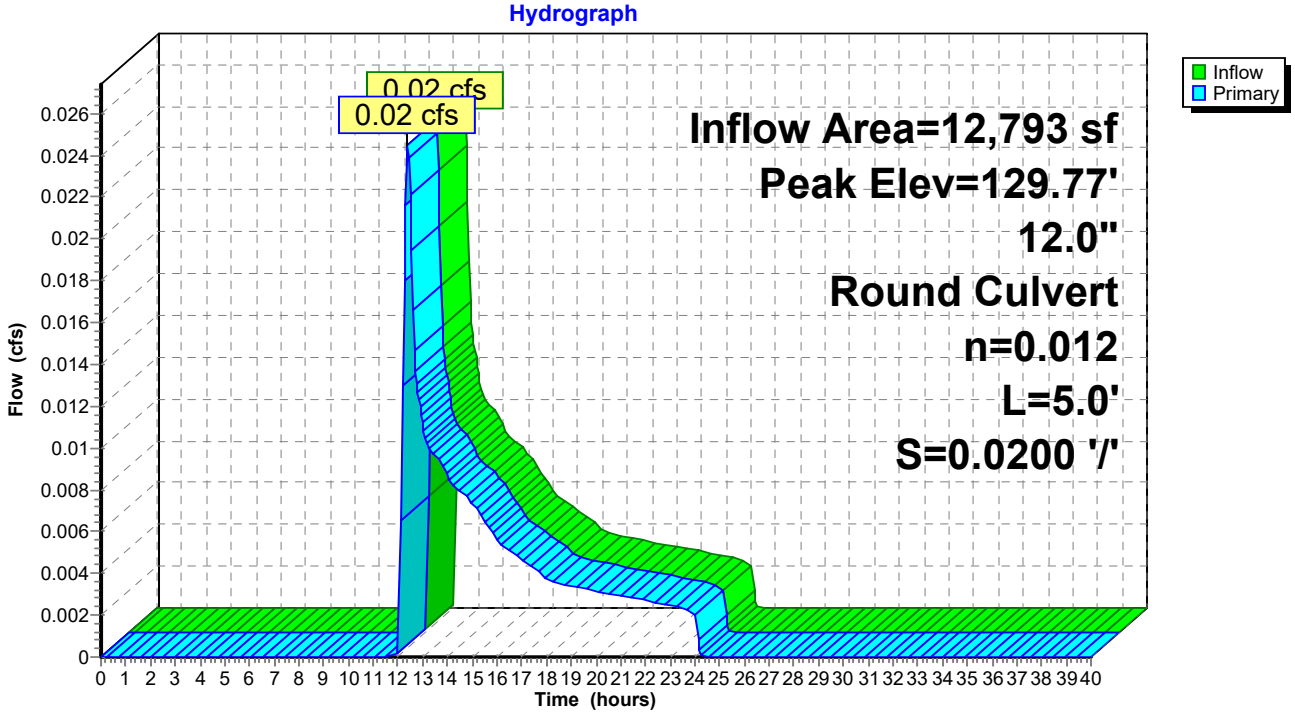
Inflow Area = 12,793 sf, 1.97% Impervious, Inflow Depth = 0.22" for 2 yr event
Inflow = 0.02 cfs @ 12.40 hrs, Volume= 237 cf
Outflow = 0.02 cfs @ 12.40 hrs, Volume= 237 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.02 cfs @ 12.40 hrs, Volume= 237 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 129.77' @ 12.40 hrs
Flood Elev= 133.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	129.70'	**12.0" Round Culvert** L= 5.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 129.70' / 129.60' S= 0.0200 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=0.02 cfs @ 12.40 hrs HW=129.77' (Free Discharge)
└**1=Culvert** (Inlet Controls 0.02 cfs @ 0.92 fps)

Pond 13: CB13



Summary for Pond 15: CB15

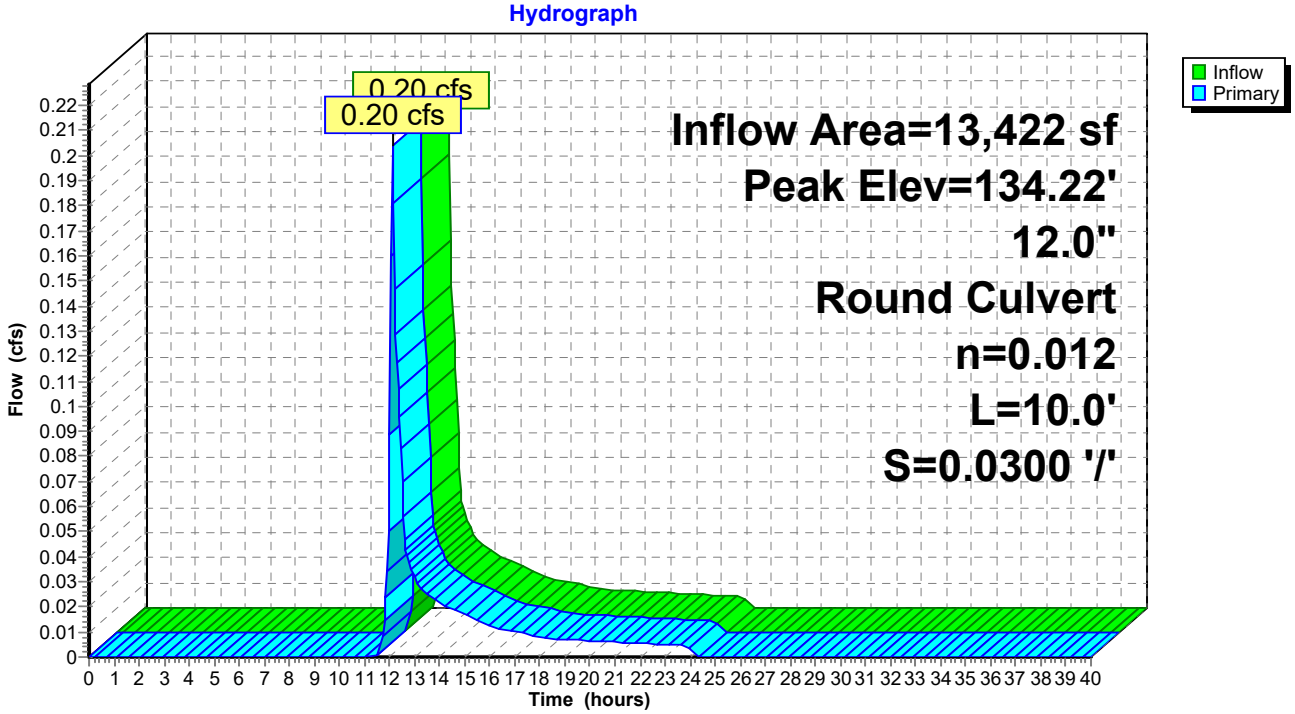
Inflow Area =	13,422 sf, 49.79% Impervious, Inflow Depth = 0.68" for 2 yr event				
Inflow =	0.20 cfs @	12.11 hrs,	Volume=	759 cf	
Outflow =	0.20 cfs @	12.11 hrs,	Volume=	759 cf,	Atten= 0%, Lag= 0.0 min
Primary =	0.20 cfs @	12.11 hrs,	Volume=	759 cf	

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 134.22' @ 12.11 hrs
Flood Elev= 137.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	134.00'	**12.0" Round Culvert** L= 10.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 134.00' / 133.70' S= 0.0300 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=0.20 cfs @ 12.11 hrs HW=134.22' (Free Discharge)
└**1=Culvert** (Inlet Controls 0.20 cfs @ 1.58 fps)

Pond 15: CB15



Summary for Pond A: DMHA

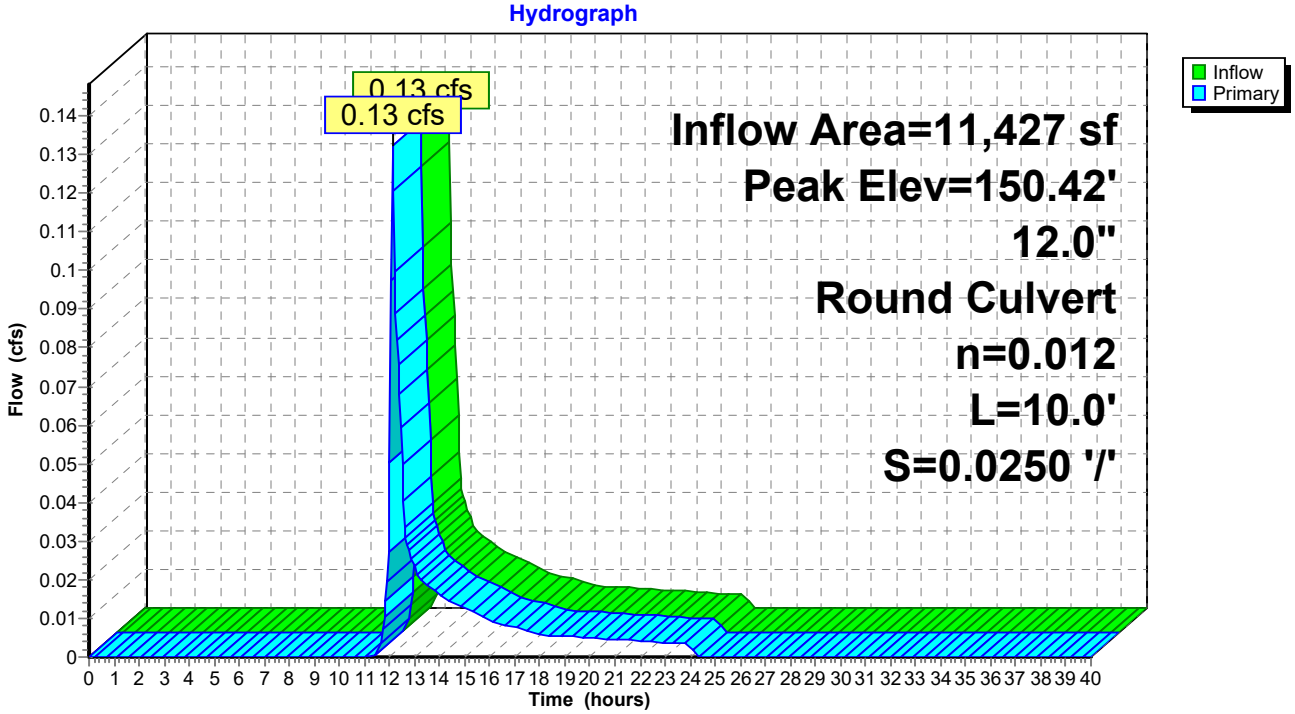
Inflow Area = 11,427 sf, 44.90% Impervious, Inflow Depth = 0.57" for 2 yr event
Inflow = 0.13 cfs @ 12.11 hrs, Volume= 544 cf
Outflow = 0.13 cfs @ 12.11 hrs, Volume= 544 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.13 cfs @ 12.11 hrs, Volume= 544 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 150.42' @ 12.11 hrs
Flood Elev= 155.10'

Device	Routing	Invert	Outlet Devices
#1	Primary	150.25'	**12.0" Round Culvert** L= 10.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 150.25' / 150.00' S= 0.0250 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=0.13 cfs @ 12.11 hrs HW=150.42' (Free Discharge)
└**1=Culvert** (Inlet Controls 0.13 cfs @ 1.41 fps)

Pond A: DMHA



Summary for Pond C: DMH C

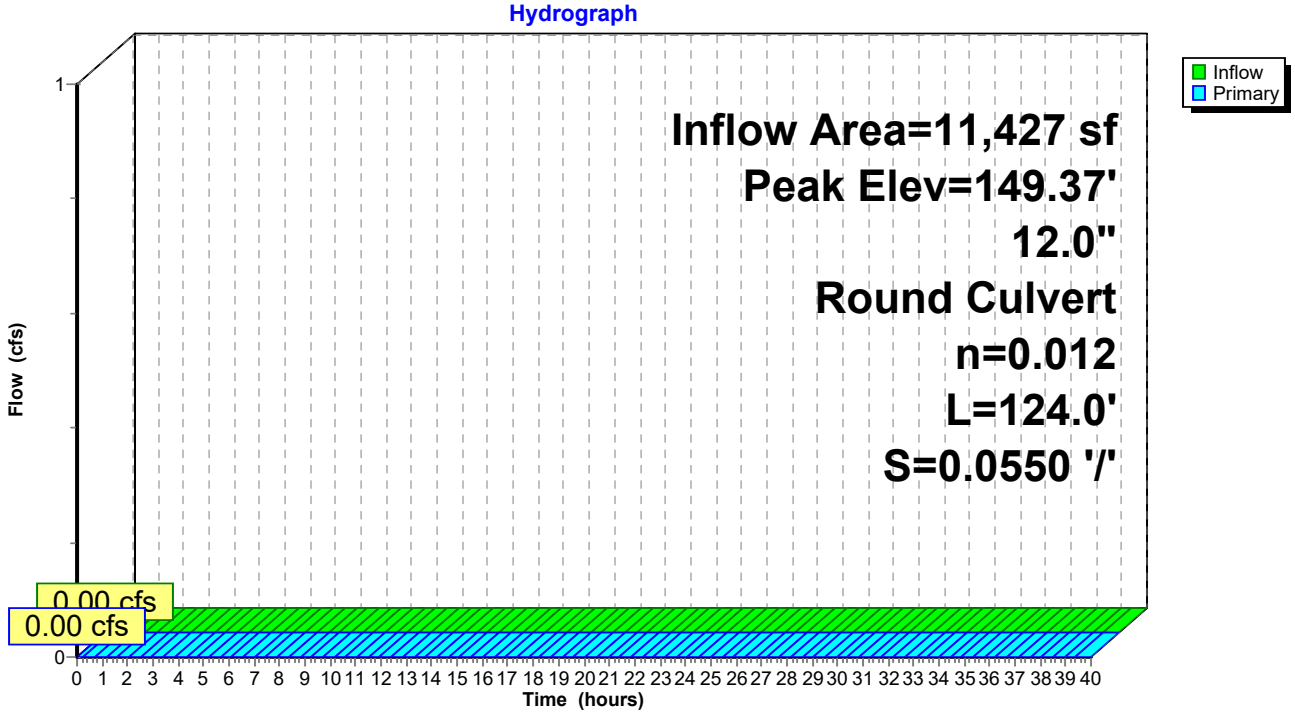
Inflow Area =	11,427 sf,	44.90% Impervious,	Inflow Depth =	0.00"	for 2 yr event
Inflow =	0.00 cfs @	0.00 hrs,	Volume=	0 cf	
Outflow =	0.00 cfs @	0.00 hrs,	Volume=	0 cf,	Atten= 0%, Lag= 0.0 min
Primary =	0.00 cfs @	0.00 hrs,	Volume=	0 cf	

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 149.37' @ 0.00 hrs
Flood Elev= 155.10'

Device	Routing	Invert	Outlet Devices
#1	Primary	149.37'	**12.0" Round Culvert** L= 124.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 149.37' / 142.55' S= 0.0550 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=149.37' (Free Discharge)
└**1=Culvert** (Controls 0.00 cfs)

Pond C: DMH C



Summary for Pond D: DMH D

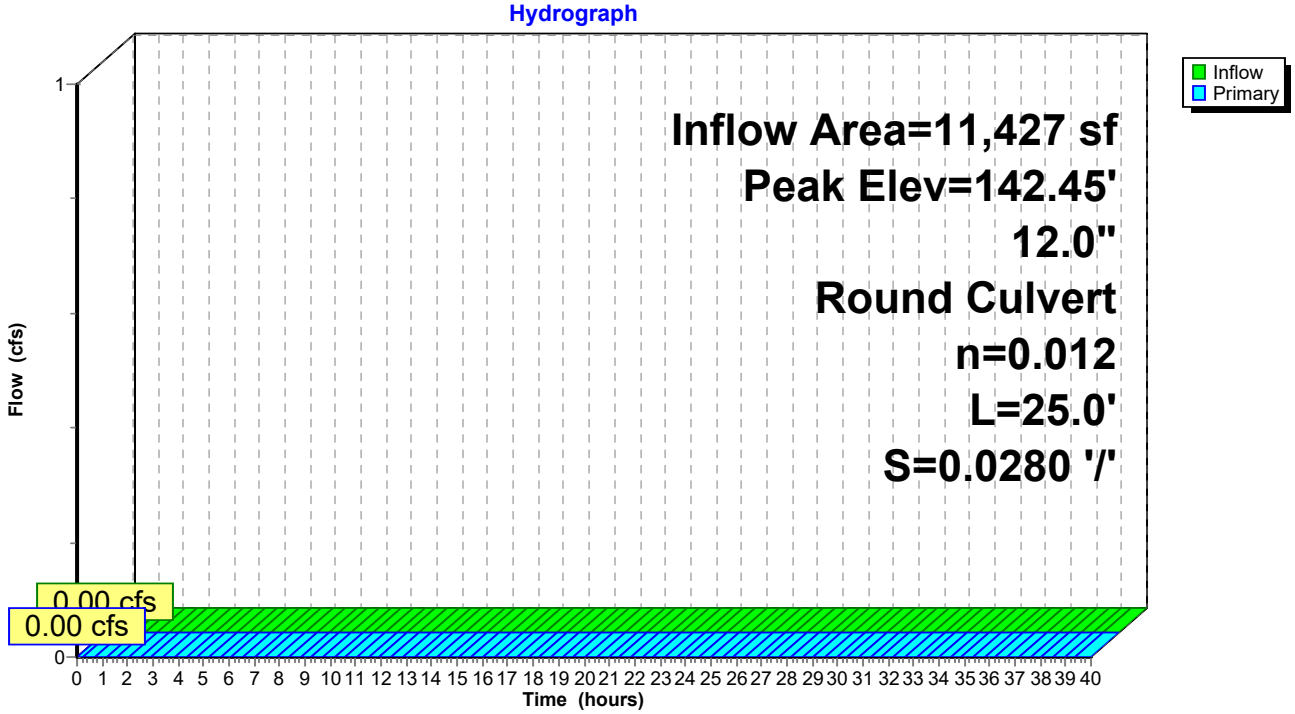
Inflow Area =	11,427 sf,	44.90% Impervious,	Inflow Depth =	0.00"	for 2 yr event
Inflow =	0.00 cfs @	0.00 hrs,	Volume=	0 cf	
Outflow =	0.00 cfs @	0.00 hrs,	Volume=	0 cf,	Atten= 0%, Lag= 0.0 min
Primary =	0.00 cfs @	0.00 hrs,	Volume=	0 cf	

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 142.45' @ 0.00 hrs
Flood Elev= 151.40'

Device	Routing	Invert	Outlet Devices
#1	Primary	142.45'	**12.0" Round Culvert** L= 25.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 142.45' / 141.75' S= 0.0280 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=142.45' (Free Discharge)
└**1=Culvert** (Controls 0.00 cfs)

Pond D: DMH D



Summary for Pond E: DMH-6P

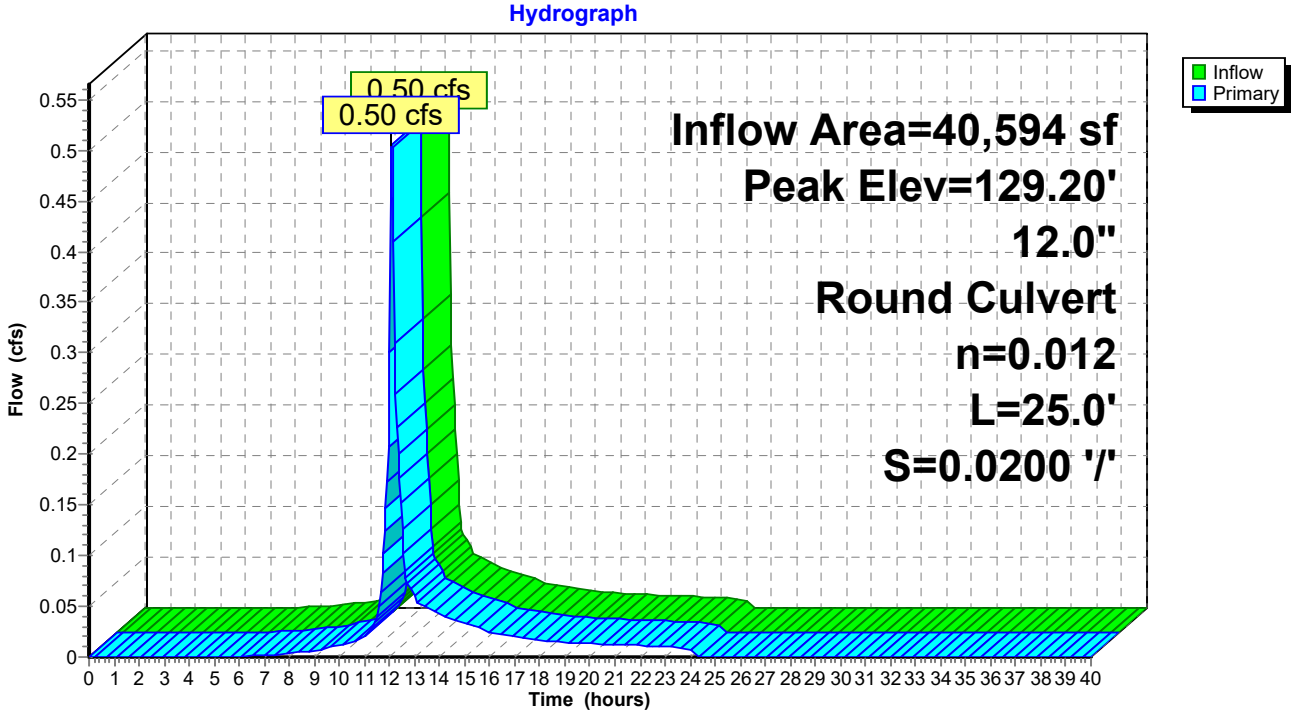
Inflow Area = 40,594 sf, 23.62% Impervious, Inflow Depth = 0.55" for 2 yr event
Inflow = 0.50 cfs @ 12.09 hrs, Volume= 1,865 cf
Outflow = 0.50 cfs @ 12.09 hrs, Volume= 1,865 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.50 cfs @ 12.09 hrs, Volume= 1,865 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 129.20' @ 12.09 hrs
Flood Elev= 144.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	128.85'	**12.0" Round Culvert** L= 25.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 128.85' / 128.35' S= 0.0200 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=0.48 cfs @ 12.09 hrs HW=129.20' (Free Discharge)
└**1=Culvert** (Inlet Controls 0.48 cfs @ 2.00 fps)

Pond E: DMH-6P

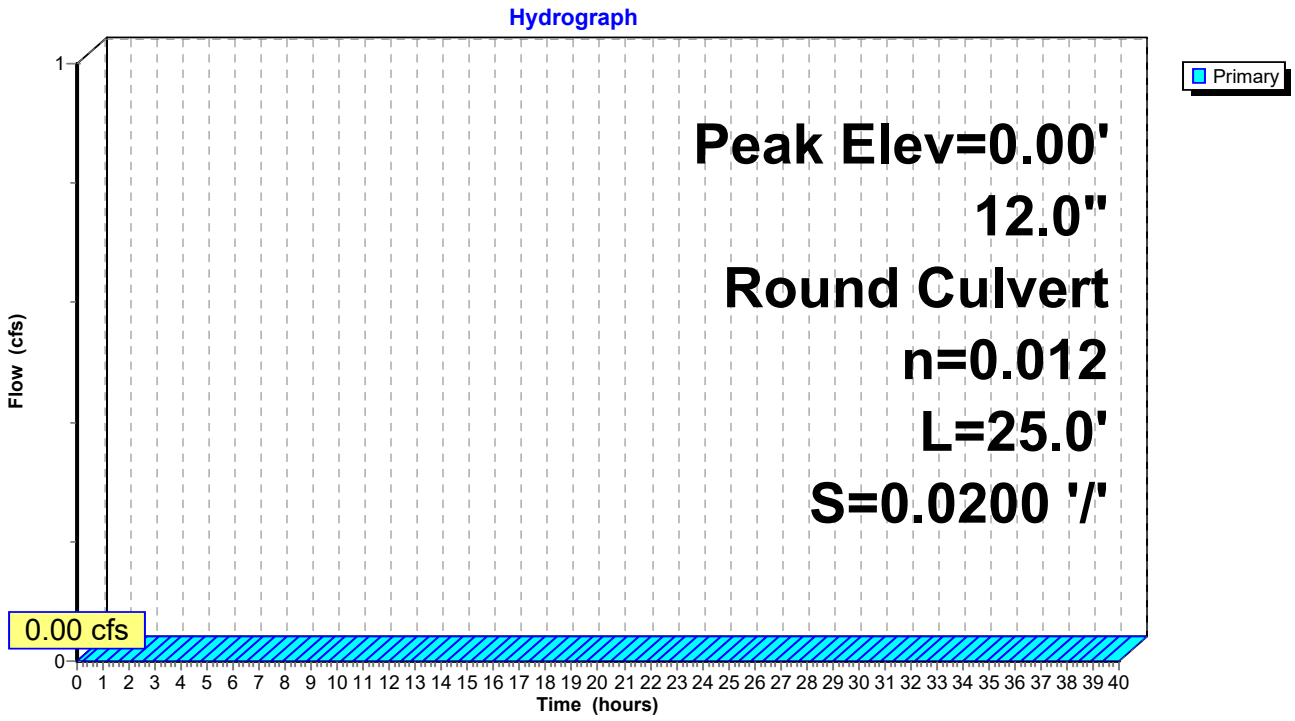


Summary for Pond F: 6P OVERFLOW

Device	Routing	Invert	Outlet Devices
#1	Primary	128.85'	**12.0" Round Culvert** L= 25.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 128.85' / 128.35' S= 0.0200 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
└─**1=Culvert** (Controls 0.00 cfs)

Pond F: 6P OVERFLOW



Summary for Pond H: DMH-H

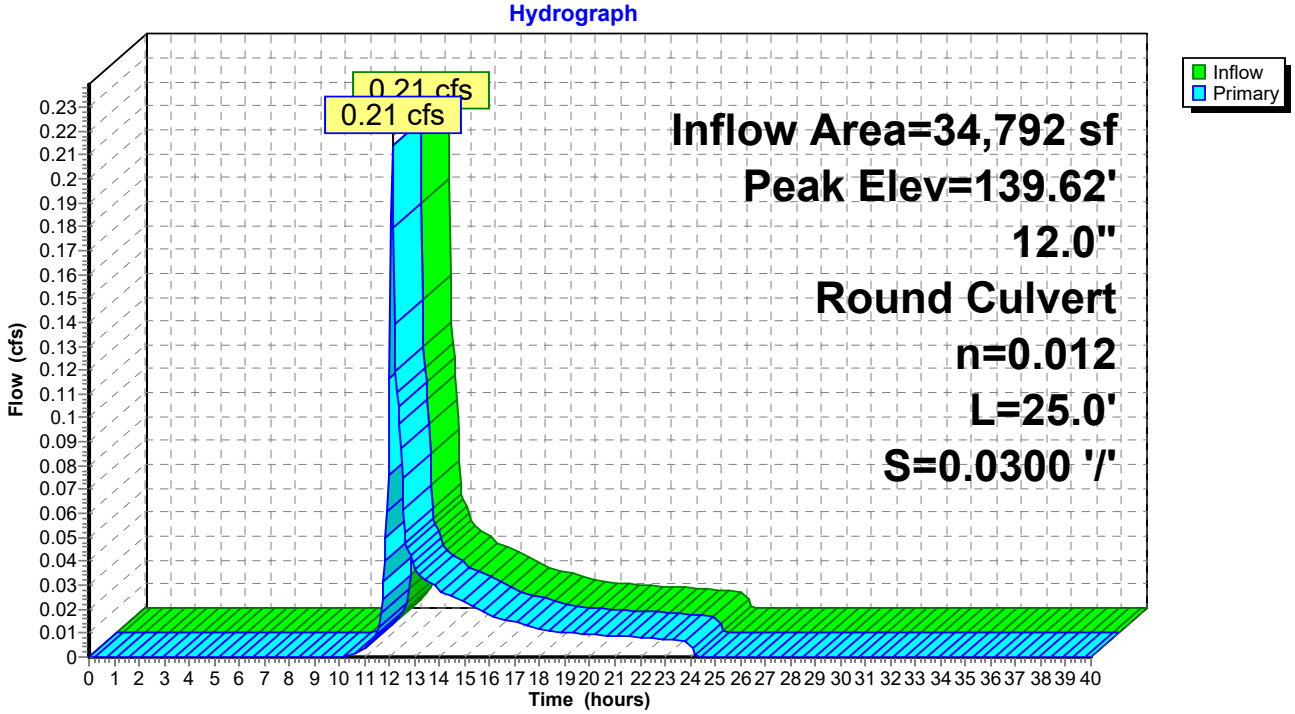
Inflow Area = 34,792 sf, 35.62% Impervious, Inflow Depth = 0.34" for 2 yr event
Inflow = 0.21 cfs @ 12.10 hrs, Volume= 990 cf
Outflow = 0.21 cfs @ 12.10 hrs, Volume= 990 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.21 cfs @ 12.10 hrs, Volume= 990 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 139.62' @ 12.10 hrs
Flood Elev= 144.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	139.40'	**12.0" Round Culvert** L= 25.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 139.40' / 138.65' S= 0.0300 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=0.21 cfs @ 12.10 hrs HW=139.62' (Free Discharge)
└**1=Culvert** (Inlet Controls 0.21 cfs @ 1.61 fps)

Pond H: DMH-H



Summary for Pond K: DMHK

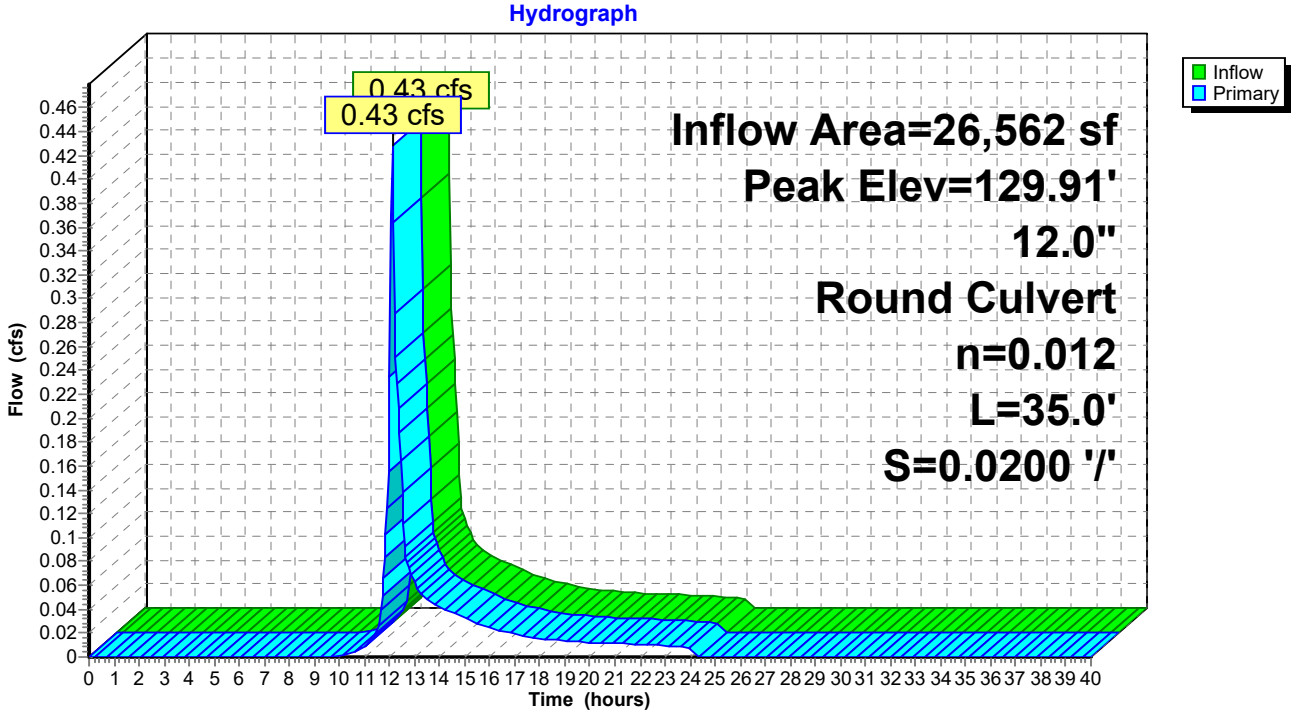
Inflow Area = 26,562 sf, 35.22% Impervious, Inflow Depth = 0.73" for 2 yr event
Inflow = 0.43 cfs @ 12.10 hrs, Volume= 1,614 cf
Outflow = 0.43 cfs @ 12.10 hrs, Volume= 1,614 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.43 cfs @ 12.10 hrs, Volume= 1,614 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 129.91' @ 12.10 hrs
Flood Elev= 155.10'

Device	Routing	Invert	Outlet Devices
#1	Primary	129.60'	**12.0" Round Culvert** L= 35.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 129.60' / 128.90' S= 0.0200 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=0.40 cfs @ 12.10 hrs HW=129.91' (Free Discharge)
└**1=Culvert** (Inlet Controls 0.40 cfs @ 1.90 fps)

Pond K: DMHK



Summary for Pond RD1: 4500 1R1C

Inflow Area = 2,103 sf,100.00% Impervious, Inflow Depth = 2.87" for 2 yr event
Inflow = 0.14 cfs @ 12.09 hrs, Volume= 503 cf
Outflow = 0.02 cfs @ 11.70 hrs, Volume= 503 cf, Atten= 84%, Lag= 0.0 min
Discarded = 0.02 cfs @ 11.70 hrs, Volume= 503 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 2.14' @ 12.57 hrs Surf.Area= 115 sf Storage= 139 cf

Plug-Flow detention time= 36.4 min calculated for 503 cf (100% of inflow)
Center-of-Mass det. time= 36.4 min (793.4 - 757.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	240 cf	**10.33'W x 11.14'L x 6.75'H Field A** 777 cf Overall - 178 cf Embedded = 599 cf x 40.0% Voids
#2A	0.75'	178 cf	**ADS_StormTech MC-4500 +Cap** Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +35.7 cf x 2 x 1 rows = 71.4 cf
		418 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.02 cfs @ 11.70 hrs HW=0.09' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Pond RD1: 4500 1R1C - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-4500 +Cap (ADS StormTech® MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= +35.7 cf x 2 x 1 rows = 71.4 cf

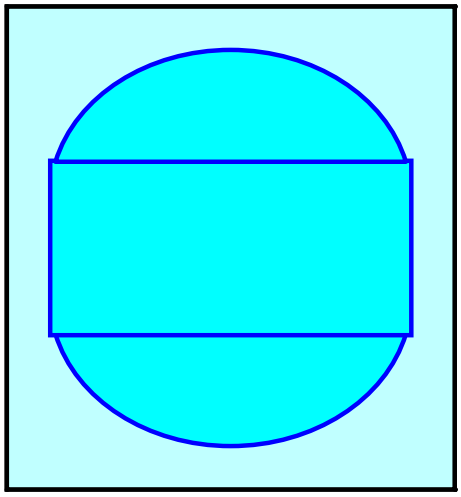
1 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 9.14' Row Length +12.0" End Stone x 2 = 11.14' Base Length
1 Rows x 100.0" Wide + 12.0" Side Stone x 2 = 10.33' Base Width
9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

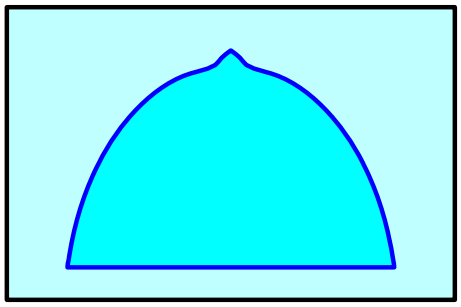
1 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 1 Rows = 177.9 cf Chamber Storage

777.1 cf Field - 177.9 cf Chambers = 599.2 cf Stone x 40.0% Voids = 239.7 cf Stone Storage

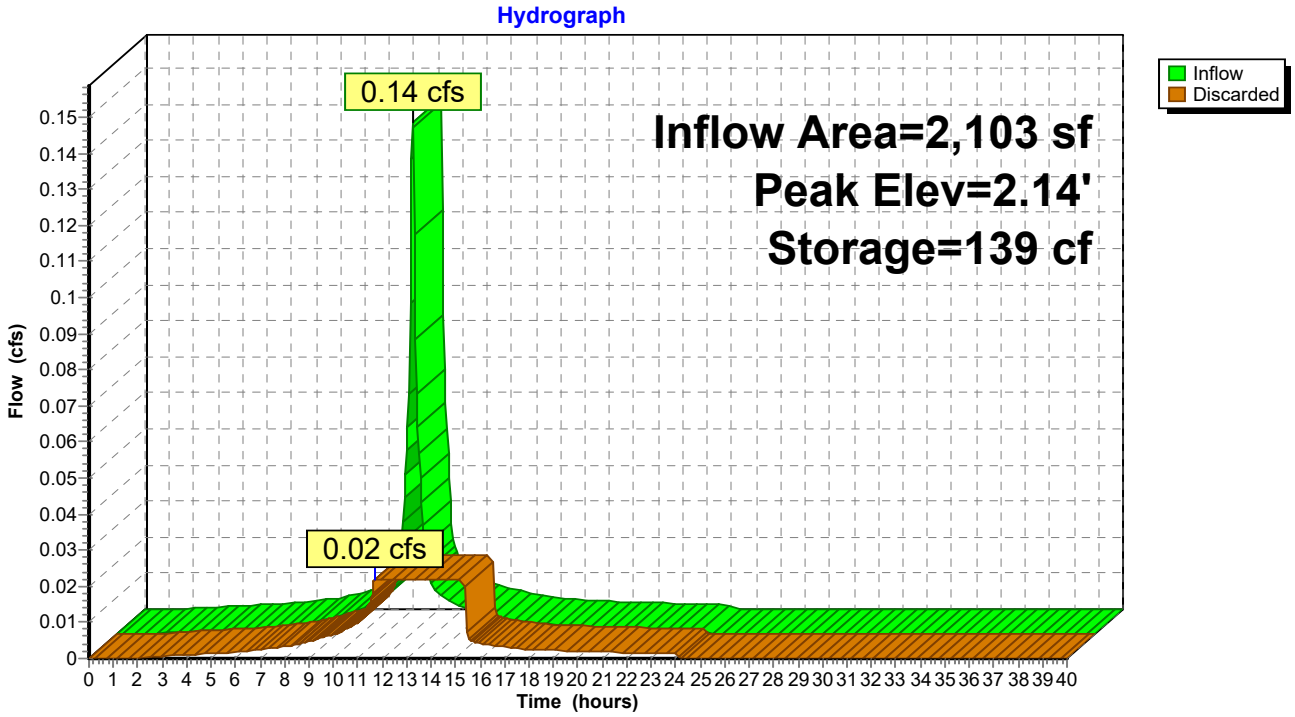
Chamber Storage + Stone Storage = 417.6 cf = 0.010 af
Overall Storage Efficiency = 53.7%
Overall System Size = 11.14' x 10.33' x 6.75'

1 Chambers
28.8 cy Field
22.2 cy Stone





Pond RD1: 4500 1R1C



Summary for Pond RD1112: 4500 1R3C

Inflow Area = 3,751 sf,100.00% Impervious, Inflow Depth = 2.87" for 2 yr event
Inflow = 0.25 cfs @ 12.09 hrs, Volume= 896 cf
Outflow = 0.04 cfs @ 11.65 hrs, Volume= 896 cf, Atten= 85%, Lag= 0.0 min
Discarded = 0.04 cfs @ 11.65 hrs, Volume= 896 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 2.09' @ 12.58 hrs Surf.Area= 198 sf Storage= 252 cf

Plug-Flow detention time= 38.9 min calculated for 895 cf (100% of inflow)
Center-of-Mass det. time= 38.8 min (795.9 - 757.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	379 cf	**10.33'W x 19.19'L x 6.75'H Field A** 1,339 cf Overall - 391 cf Embedded = 948 cf x 40.0% Voids
#2A	0.75'	391 cf	**ADS_StormTech MC-4500 +Cap** x 3 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +35.7 cf x 2 x 1 rows = 71.4 cf
		770 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.04 cfs @ 11.65 hrs HW=0.07' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

Pond RD1112: 4500 1R3C - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-4500 +Cap (ADS StormTech® MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= +35.7 cf x 2 x 1 rows = 71.4 cf

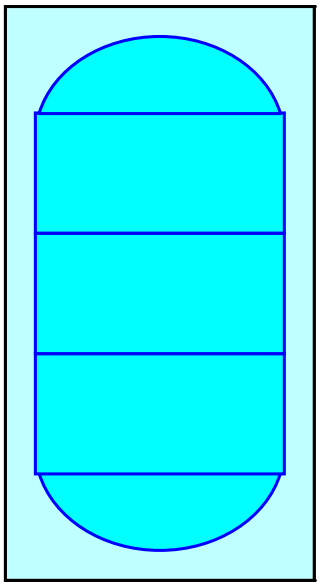
3 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 17.19' Row Length +12.0" End Stone x 2 = 19.19' Base Length
1 Rows x 100.0" Wide + 12.0" Side Stone x 2 = 10.33' Base Width
9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

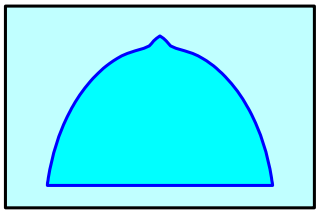
3 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 1 Rows = 390.9 cf Chamber Storage

1,338.6 cf Field - 390.9 cf Chambers = 947.7 cf Stone x 40.0% Voids = 379.1 cf Stone Storage

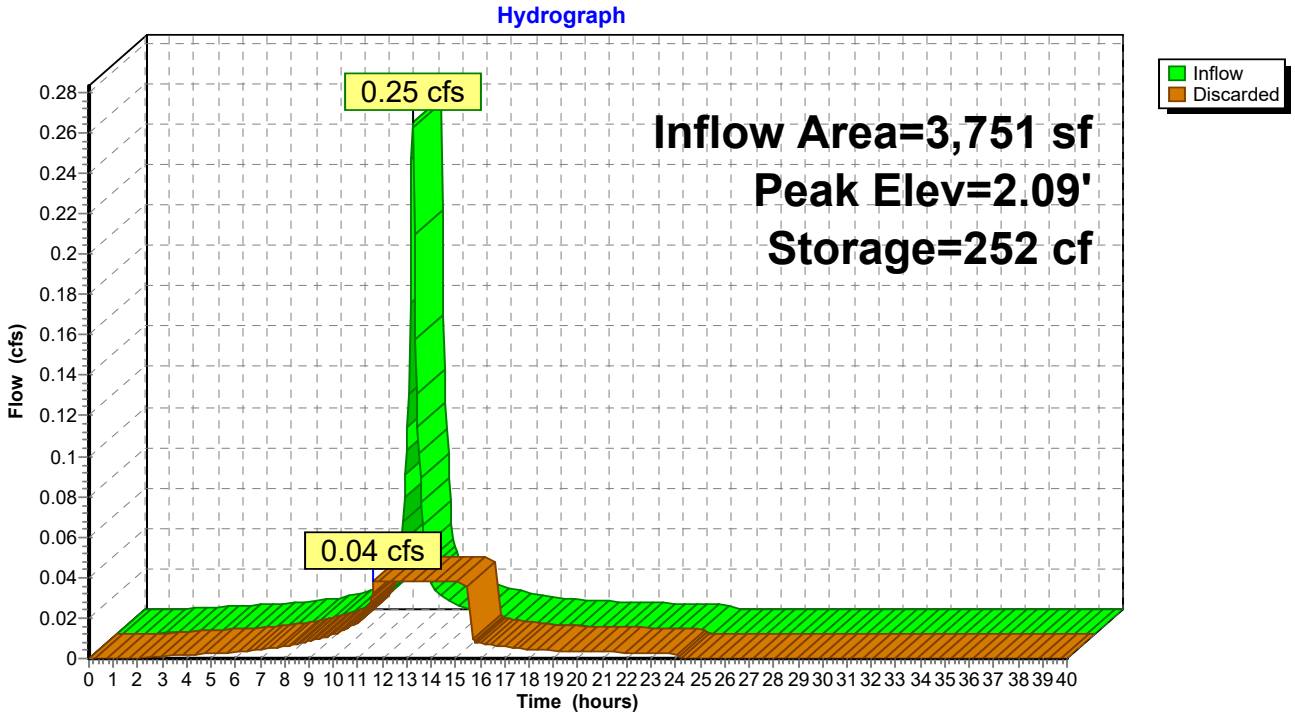
Chamber Storage + Stone Storage = 770.0 cf = 0.018 af
Overall Storage Efficiency = 57.5%
Overall System Size = 19.19' x 10.33' x 6.75'

3 Chambers
49.6 cy Field
35.1 cy Stone





Pond RD1112: 4500 1R3C



Summary for Pond RD13: 4500 1R1C

Inflow Area = 2,103 sf,100.00% Impervious, Inflow Depth = 2.87" for 2 yr event
Inflow = 0.14 cfs @ 12.09 hrs, Volume= 503 cf
Outflow = 0.02 cfs @ 11.70 hrs, Volume= 503 cf, Atten= 84%, Lag= 0.0 min
Discarded = 0.02 cfs @ 11.70 hrs, Volume= 503 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 2.14' @ 12.57 hrs Surf.Area= 115 sf Storage= 139 cf

Plug-Flow detention time= 36.4 min calculated for 503 cf (100% of inflow)
Center-of-Mass det. time= 36.4 min (793.4 - 757.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	240 cf	**10.33'W x 11.14'L x 6.75'H Field A** 777 cf Overall - 178 cf Embedded = 599 cf x 40.0% Voids
#2A	0.75'	178 cf	**ADS_StormTech MC-4500 +Cap** Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +35.7 cf x 2 x 1 rows = 71.4 cf
		418 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.02 cfs @ 11.70 hrs HW=0.09' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Pond RD13: 4500 1R1C - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-4500 +Cap (ADS StormTech® MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= +35.7 cf x 2 x 1 rows = 71.4 cf

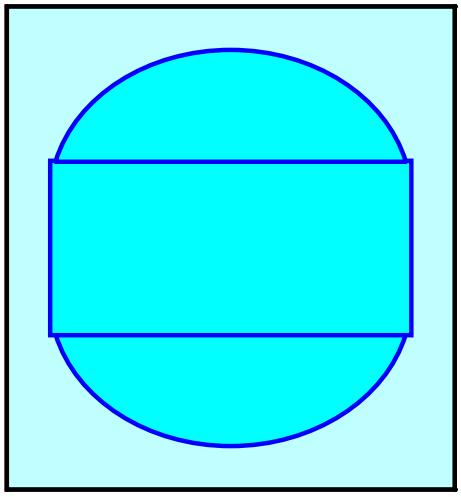
1 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 9.14' Row Length +12.0" End Stone x 2 = 11.14' Base Length
1 Rows x 100.0" Wide + 12.0" Side Stone x 2 = 10.33' Base Width
9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

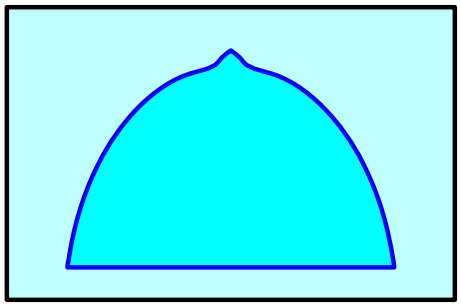
1 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 1 Rows = 177.9 cf Chamber Storage

777.1 cf Field - 177.9 cf Chambers = 599.2 cf Stone x 40.0% Voids = 239.7 cf Stone Storage

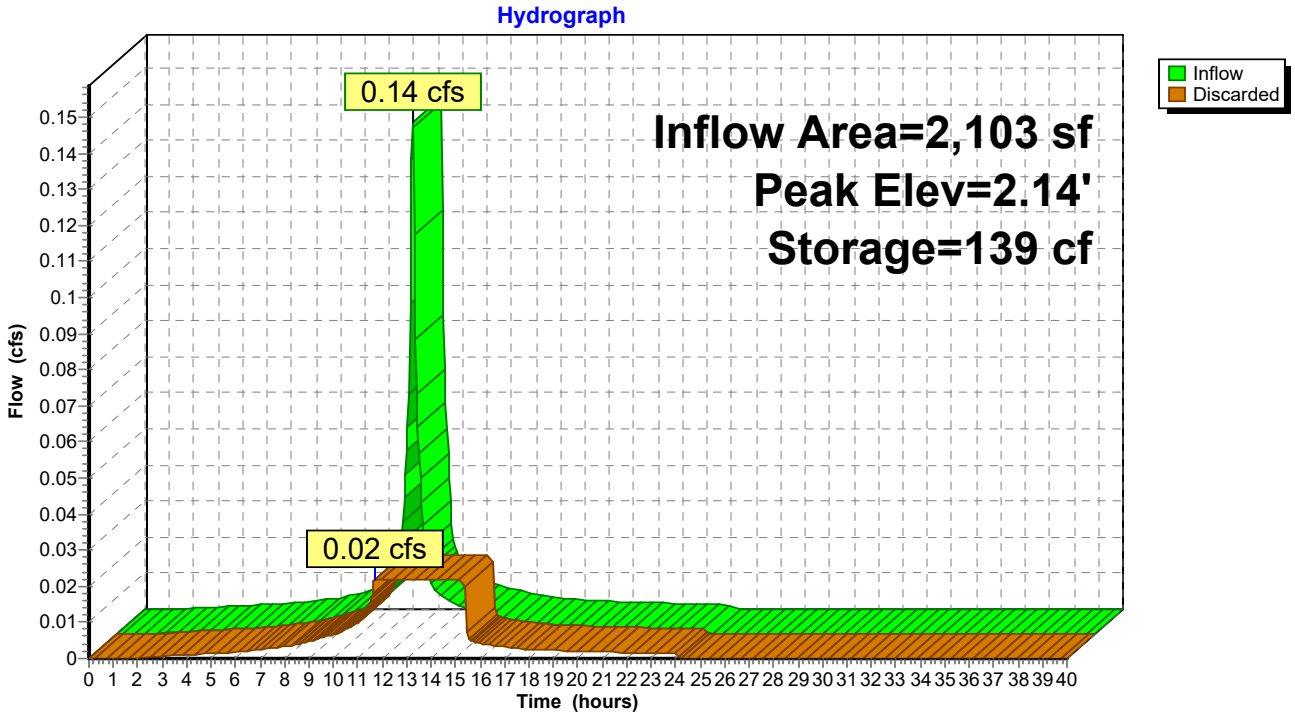
Chamber Storage + Stone Storage = 417.6 cf = 0.010 af
Overall Storage Efficiency = 53.7%
Overall System Size = 11.14' x 10.33' x 6.75'

1 Chambers
28.8 cy Field
22.2 cy Stone





Pond RD13: 4500 1R1C



Summary for Pond RD14+: 4500 1R3C

Inflow Area = 6,067 sf, 36.95% Impervious, Inflow Depth = 1.31" for 2 yr event
Inflow = 0.17 cfs @ 12.10 hrs, Volume= 665 cf
Outflow = 0.04 cfs @ 11.80 hrs, Volume= 665 cf, Atten= 77%, Lag= 0.0 min
Discarded = 0.04 cfs @ 11.80 hrs, Volume= 665 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 1.28' @ 12.55 hrs Surf.Area= 198 sf Storage= 137 cf

Plug-Flow detention time= 18.9 min calculated for 665 cf (100% of inflow)
Center-of-Mass det. time= 18.9 min (807.8 - 788.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	379 cf	**10.33'W x 19.19'L x 6.75'H Field A** 1,339 cf Overall - 391 cf Embedded = 948 cf x 40.0% Voids
#2A	0.75'	391 cf	**ADS_StormTech MC-4500 +Cap** x 3 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +35.7 cf x 2 x 1 rows = 71.4 cf
		770 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.04 cfs @ 11.80 hrs HW=0.08' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

Pond RD14+: 4500 1R3C - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-4500 +Cap (ADS StormTech® MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= +35.7 cf x 2 x 1 rows = 71.4 cf

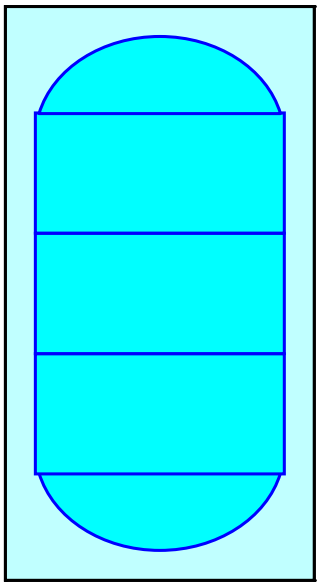
3 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 17.19' Row Length +12.0" End Stone x 2 = 19.19' Base Length
1 Rows x 100.0" Wide + 12.0" Side Stone x 2 = 10.33' Base Width
9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

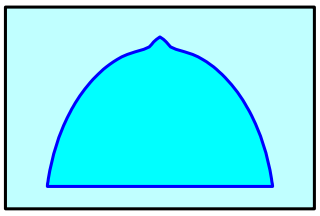
3 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 1 Rows = 390.9 cf Chamber Storage

1,338.6 cf Field - 390.9 cf Chambers = 947.7 cf Stone x 40.0% Voids = 379.1 cf Stone Storage

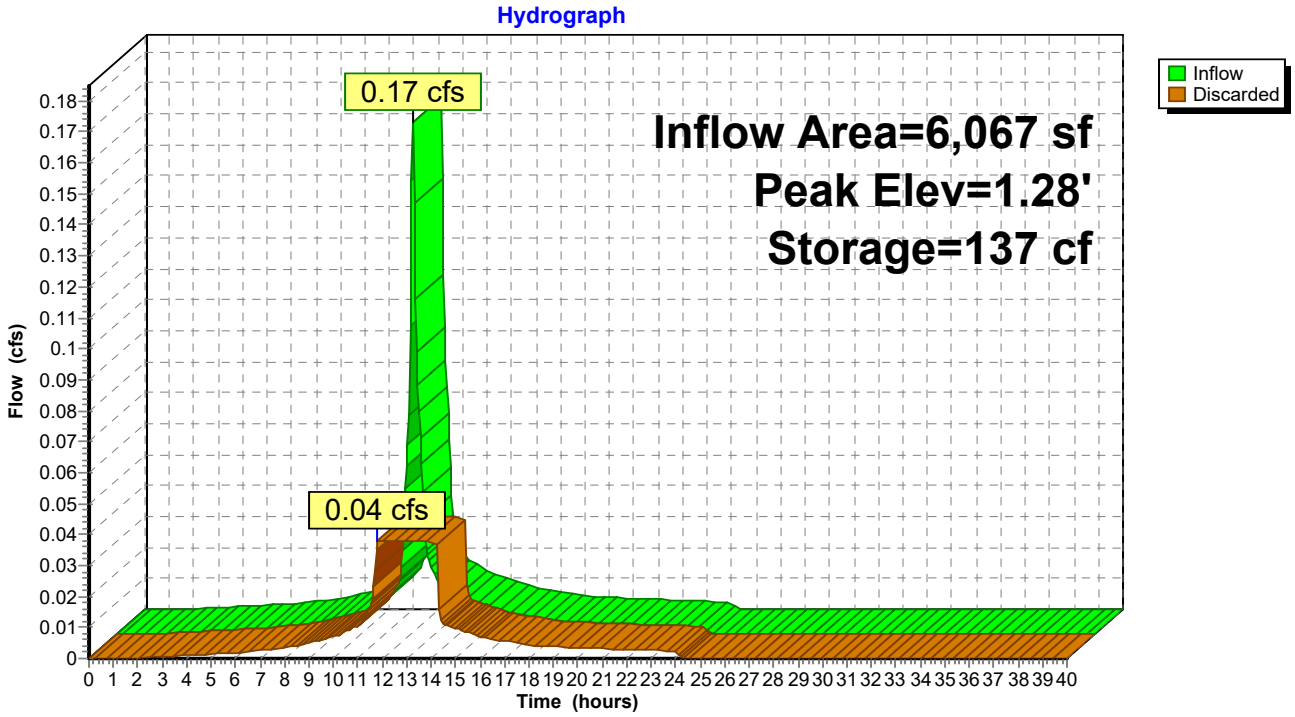
Chamber Storage + Stone Storage = 770.0 cf = 0.018 af
Overall Storage Efficiency = 57.5%
Overall System Size = 19.19' x 10.33' x 6.75'

3 Chambers
49.6 cy Field
35.1 cy Stone





Pond RD14+: 4500 1R3C



Summary for Pond RD15+: 3500 2R3C

Inflow Area = 11,652 sf, 45.14% Impervious, Inflow Depth = 1.37" for 2 yr event
Inflow = 0.35 cfs @ 12.09 hrs, Volume= 1,326 cf
Outflow = 0.08 cfs @ 11.75 hrs, Volume= 1,326 cf, Atten= 77%, Lag= 0.0 min
Discarded = 0.08 cfs @ 11.75 hrs, Volume= 1,326 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 1.18' @ 12.49 hrs Surf.Area= 424 sf Storage= 271 cf

Plug-Flow detention time= 16.6 min calculated for 1,324 cf (100% of inflow)
Center-of-Mass det. time= 16.6 min (786.7 - 770.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	645 cf	**15.58'W x 27.21'L x 5.50'H Field A** 2,332 cf Overall - 719 cf Embedded = 1,613 cf x 40.0% Voids
#2A	0.75'	719 cf	**ADS_StormTech MC-3500 d +Cap** x 6 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 6 Chambers in 2 Rows Cap Storage= +14.9 cf x 2 x 2 rows = 59.6 cf
		1,364 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.08 cfs @ 11.75 hrs HW=0.06' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.08 cfs)

Pond RD15+: 3500 2R3C - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-3500 d +Cap (ADS StormTech® MC-3500 d rev 03/14 with Cap volume)
Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf
Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap
Cap Storage= +14.9 cf x 2 x 2 rows = 59.6 cf

77.0" Wide + 9.0" Spacing = 86.0" C-C Row Spacing

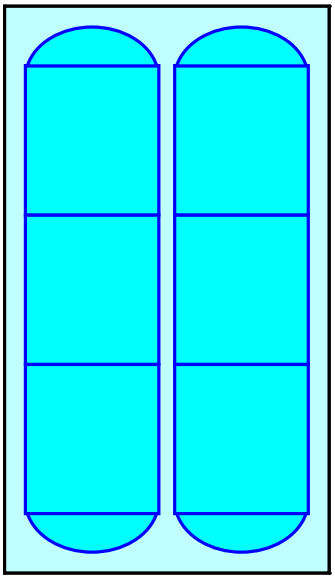
3 Chambers/Row x 7.17' Long +1.85' Cap Length x 2 = 25.21' Row Length +12.0" End Stone x 2 = 27.21' Base Length
2 Rows x 77.0" Wide + 9.0" Spacing x 1 + 12.0" Side Stone x 2 = 15.58' Base Width
9.0" Base + 45.0" Chamber Height + 12.0" Cover = 5.50' Field Height

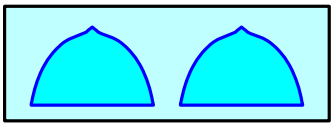
6 Chambers x 110.0 cf + 14.9 cf Cap Volume x 2 x 2 Rows = 719.3 cf Chamber Storage

2,332.1 cf Field - 719.3 cf Chambers = 1,612.8 cf Stone x 40.0% Voids = 645.1 cf Stone Storage

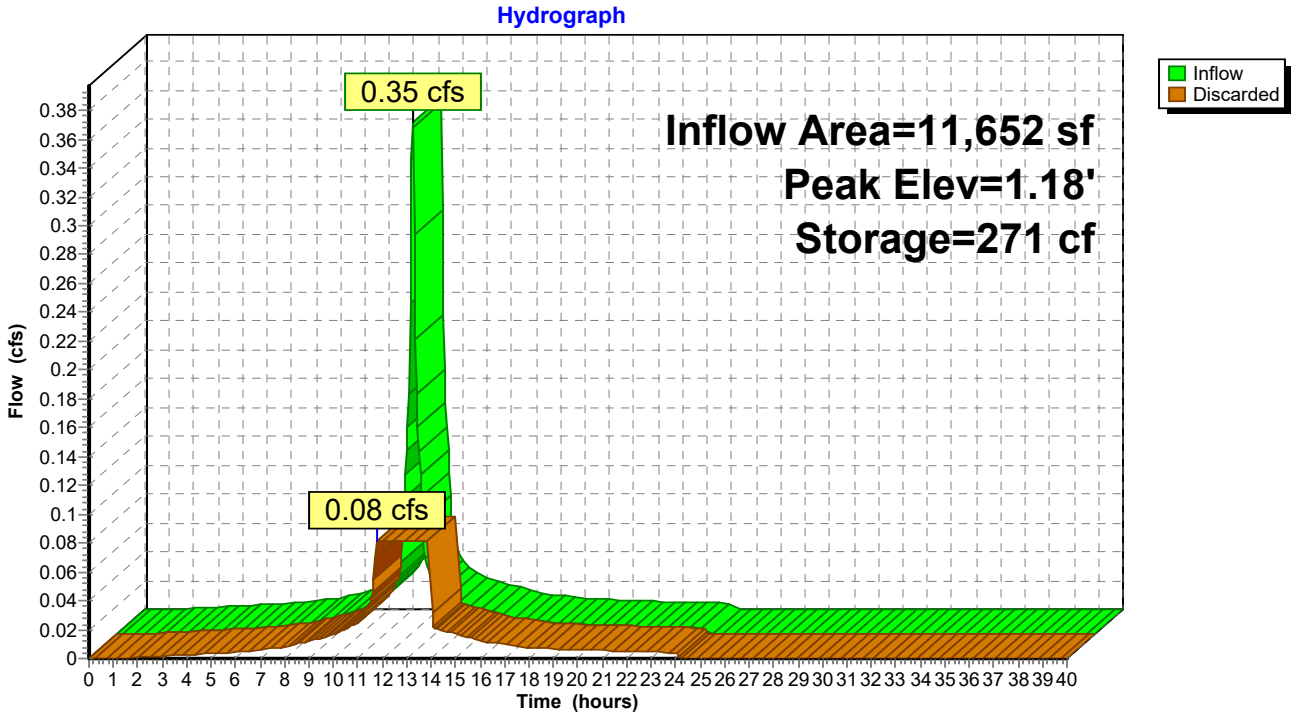
Chamber Storage + Stone Storage = 1,364.4 cf = 0.031 af
Overall Storage Efficiency = 58.5%
Overall System Size = 27.21' x 15.58' x 5.50'

6 Chambers
86.4 cy Field
59.7 cy Stone





Pond RD15+: 3500 2R3C



Summary for Pond RD2: 4500 1R1C

Inflow Area = 2,103 sf,100.00% Impervious, Inflow Depth = 2.87" for 2 yr event
Inflow = 0.14 cfs @ 12.09 hrs, Volume= 503 cf
Outflow = 0.02 cfs @ 11.70 hrs, Volume= 503 cf, Atten= 84%, Lag= 0.0 min
Discarded = 0.02 cfs @ 11.70 hrs, Volume= 503 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 2.14' @ 12.57 hrs Surf.Area= 115 sf Storage= 139 cf

Plug-Flow detention time= 36.4 min calculated for 503 cf (100% of inflow)
Center-of-Mass det. time= 36.4 min (793.4 - 757.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	240 cf	**10.33'W x 11.14'L x 6.75'H Field A** 777 cf Overall - 178 cf Embedded = 599 cf x 40.0% Voids
#2A	0.75'	178 cf	**ADS_StormTech MC-4500 +Cap** Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +35.7 cf x 2 x 1 rows = 71.4 cf
		418 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.02 cfs @ 11.70 hrs HW=0.09' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Pond RD2: 4500 1R1C - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-4500 +Cap (ADS StormTech® MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= +35.7 cf x 2 x 1 rows = 71.4 cf

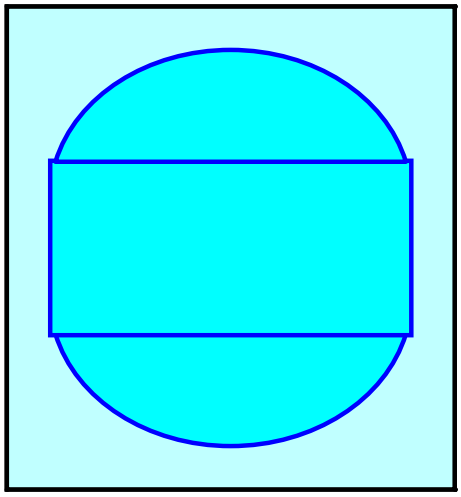
1 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 9.14' Row Length +12.0" End Stone x 2 = 11.14' Base Length
1 Rows x 100.0" Wide + 12.0" Side Stone x 2 = 10.33' Base Width
9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

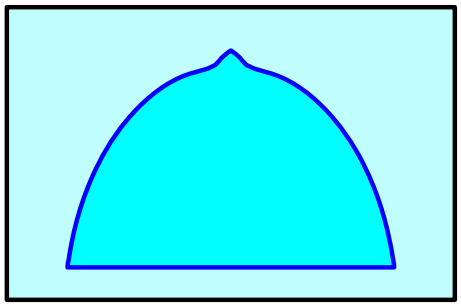
1 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 1 Rows = 177.9 cf Chamber Storage

777.1 cf Field - 177.9 cf Chambers = 599.2 cf Stone x 40.0% Voids = 239.7 cf Stone Storage

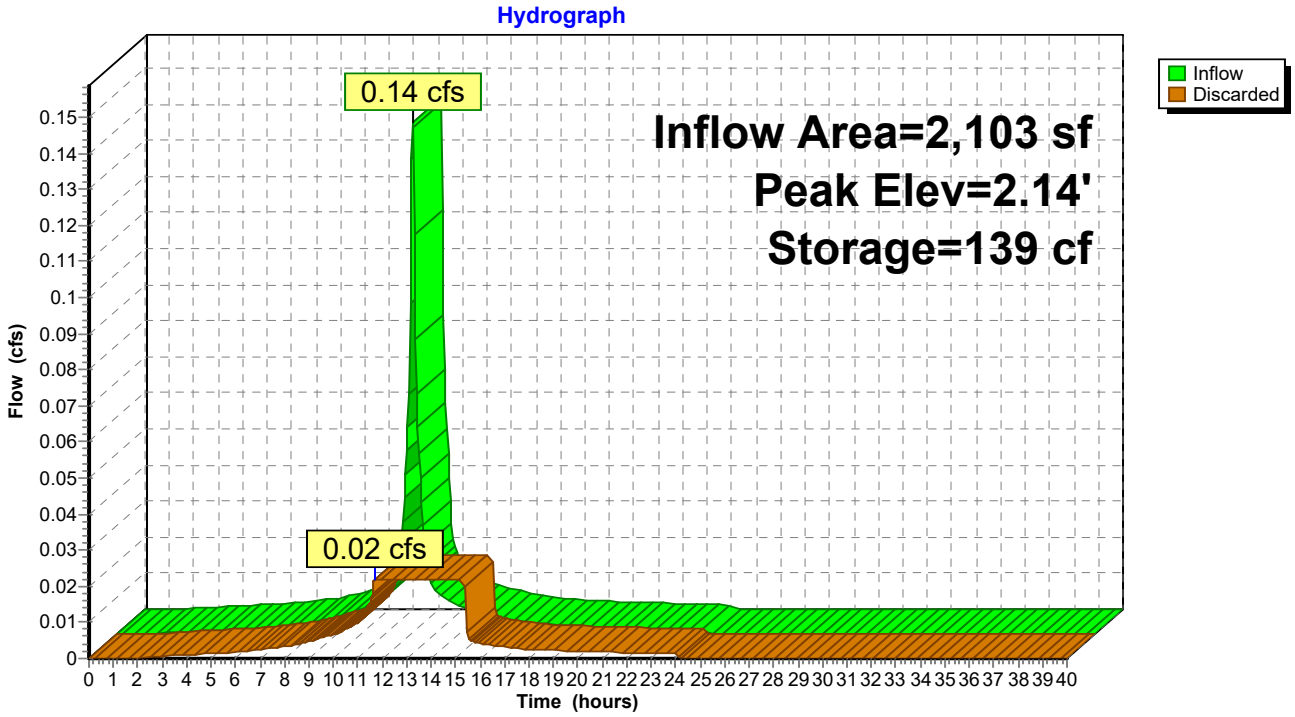
Chamber Storage + Stone Storage = 417.6 cf = 0.010 af
Overall Storage Efficiency = 53.7%
Overall System Size = 11.14' x 10.33' x 6.75'

1 Chambers
28.8 cy Field
22.2 cy Stone





Pond RD2: 4500 1R1C



Summary for Pond RD20+: 3500 2R3C

Inflow Area = 5,993 sf,100.00% Impervious, Inflow Depth = 2.87" for 2 yr event
Inflow = 0.40 cfs @ 12.09 hrs, Volume= 1,432 cf
Outflow = 0.08 cfs @ 11.75 hrs, Volume= 1,432 cf, Atten= 80%, Lag= 0.0 min
Discarded = 0.08 cfs @ 11.75 hrs, Volume= 1,432 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 1.39' @ 12.51 hrs Surf.Area= 424 sf Storage= 338 cf

Plug-Flow detention time= 21.8 min calculated for 1,432 cf (100% of inflow)
Center-of-Mass det. time= 21.8 min (778.8 - 757.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	645 cf	**15.58'W x 27.21'L x 5.50'H Field A** 2,332 cf Overall - 719 cf Embedded = 1,613 cf x 40.0% Voids
#2A	0.75'	719 cf	**ADS_StormTech MC-3500 d +Cap** x 6 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 6 Chambers in 2 Rows Cap Storage= +14.9 cf x 2 x 2 rows = 59.6 cf
		1,364 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.08 cfs @ 11.75 hrs HW=0.07' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.08 cfs)

Pond RD20+: 3500 2R3C - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-3500 d +Cap (ADS StormTech® MC-3500 d rev 03/14 with Cap volume)
Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf
Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap
Cap Storage= +14.9 cf x 2 x 2 rows = 59.6 cf

77.0" Wide + 9.0" Spacing = 86.0" C-C Row Spacing

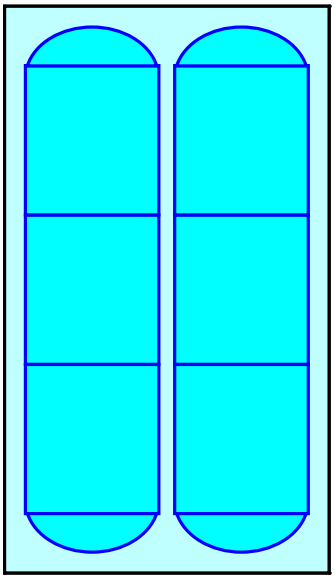
3 Chambers/Row x 7.17' Long +1.85' Cap Length x 2 = 25.21' Row Length +12.0" End Stone x 2 = 27.21' Base Length
2 Rows x 77.0" Wide + 9.0" Spacing x 1 + 12.0" Side Stone x 2 = 15.58' Base Width
9.0" Base + 45.0" Chamber Height + 12.0" Cover = 5.50' Field Height

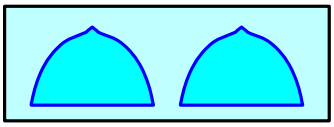
6 Chambers x 110.0 cf + 14.9 cf Cap Volume x 2 x 2 Rows = 719.3 cf Chamber Storage

2,332.1 cf Field - 719.3 cf Chambers = 1,612.8 cf Stone x 40.0% Voids = 645.1 cf Stone Storage

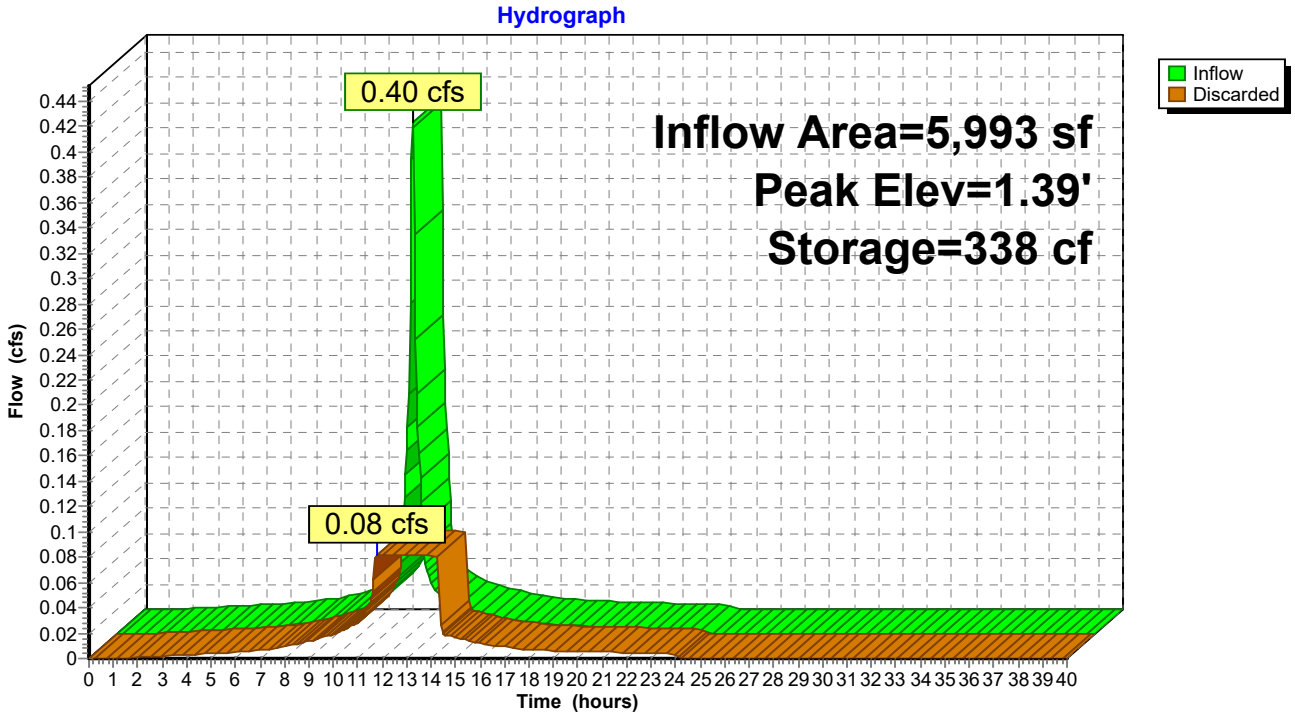
Chamber Storage + Stone Storage = 1,364.4 cf = 0.031 af
Overall Storage Efficiency = 58.5%
Overall System Size = 27.21' x 15.58' x 5.50'

6 Chambers
86.4 cy Field
59.7 cy Stone





Pond RD20+: 3500 2R3C



Summary for Pond RD25: 4500 1R1C

Inflow Area = 2,103 sf,100.00% Impervious, Inflow Depth = 2.87" for 2 yr event
Inflow = 0.14 cfs @ 12.09 hrs, Volume= 503 cf
Outflow = 0.02 cfs @ 11.70 hrs, Volume= 503 cf, Atten= 84%, Lag= 0.0 min
Discarded = 0.02 cfs @ 11.70 hrs, Volume= 503 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 130.39' @ 12.57 hrs Surf.Area= 115 sf Storage= 139 cf

Plug-Flow detention time= 36.4 min calculated for 503 cf (100% of inflow)
Center-of-Mass det. time= 36.4 min (793.4 - 757.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	128.25'	240 cf	**10.33'W x 11.14'L x 6.75'H Field A** 777 cf Overall - 178 cf Embedded = 599 cf x 40.0% Voids
#2A	129.00'	178 cf	**ADS_StormTech MC-4500 +Cap** Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +35.7 cf x 2 x 1 rows = 71.4 cf
		418 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	128.25'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.02 cfs @ 11.70 hrs HW=128.34' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Pond RD25: 4500 1R1C - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-4500 +Cap (ADS StormTech® MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= +35.7 cf x 2 x 1 rows = 71.4 cf

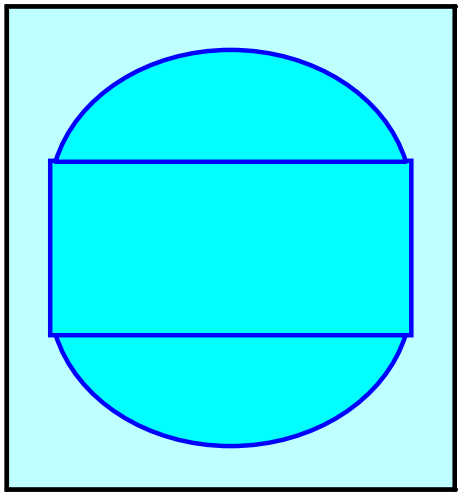
1 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 9.14' Row Length +12.0" End Stone x 2 = 11.14' Base Length
1 Rows x 100.0" Wide + 12.0" Side Stone x 2 = 10.33' Base Width
9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

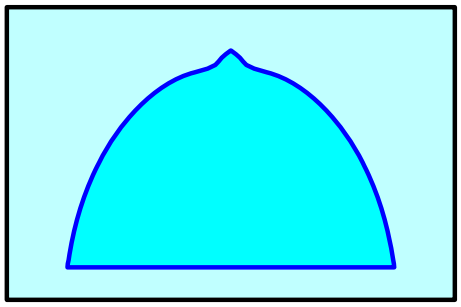
1 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 1 Rows = 177.9 cf Chamber Storage

777.1 cf Field - 177.9 cf Chambers = 599.2 cf Stone x 40.0% Voids = 239.7 cf Stone Storage

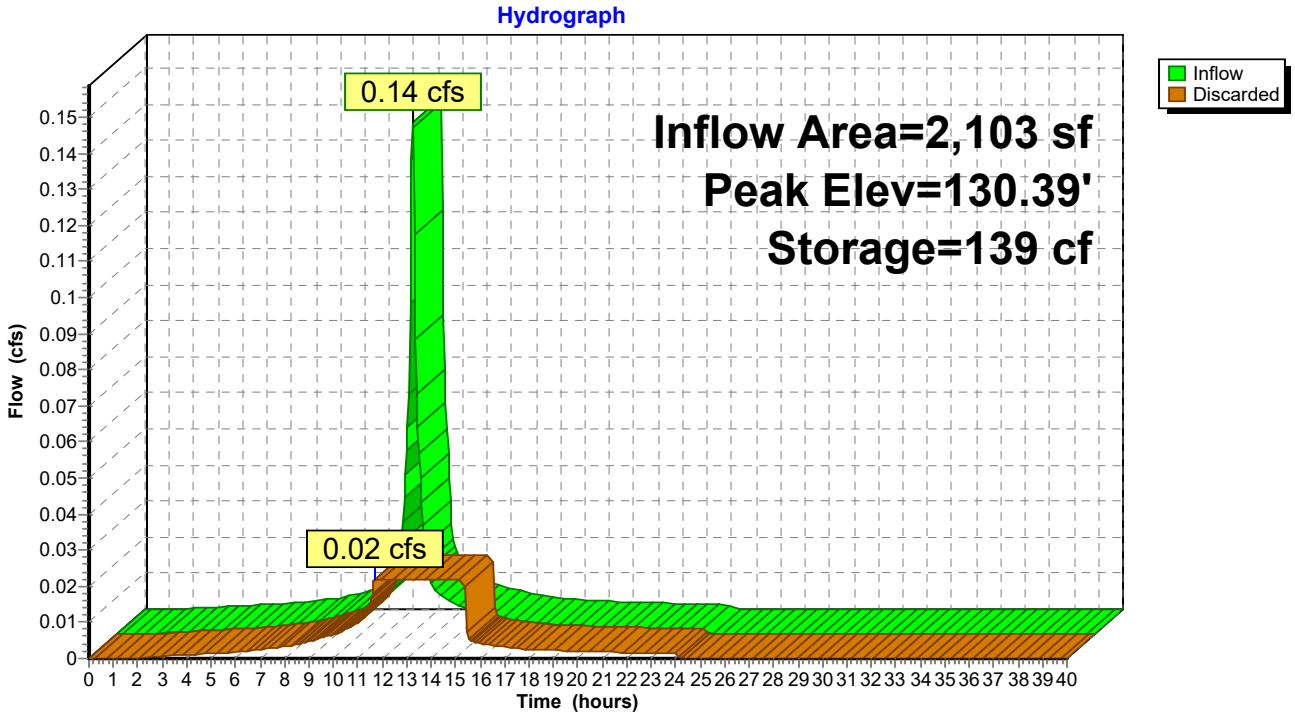
Chamber Storage + Stone Storage = 417.6 cf = 0.010 af
Overall Storage Efficiency = 53.7%
Overall System Size = 11.14' x 10.33' x 6.75'

1 Chambers
28.8 cy Field
22.2 cy Stone





Pond RD25: 4500 1R1C



Summary for Pond RD3: 4500 1R1C

Inflow Area = 2,004 sf,100.00% Impervious, Inflow Depth = 2.87" for 2 yr event
Inflow = 0.14 cfs @ 12.09 hrs, Volume= 479 cf
Outflow = 0.02 cfs @ 11.70 hrs, Volume= 479 cf, Atten= 84%, Lag= 0.0 min
Discarded = 0.02 cfs @ 11.70 hrs, Volume= 479 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 2.00' @ 12.56 hrs Surf.Area= 115 sf Storage= 129 cf

Plug-Flow detention time= 33.2 min calculated for 479 cf (100% of inflow)
Center-of-Mass det. time= 33.2 min (790.3 - 757.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	240 cf	**10.33'W x 11.14'L x 6.75'H Field A** 777 cf Overall - 178 cf Embedded = 599 cf x 40.0% Voids
#2A	0.75'	178 cf	**ADS_StormTech MC-4500 +Cap** Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +35.7 cf x 2 x 1 rows = 71.4 cf
		418 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.02 cfs @ 11.70 hrs HW=0.08' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Pond RD3: 4500 1R1C - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-4500 +Cap (ADS StormTech® MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= +35.7 cf x 2 x 1 rows = 71.4 cf

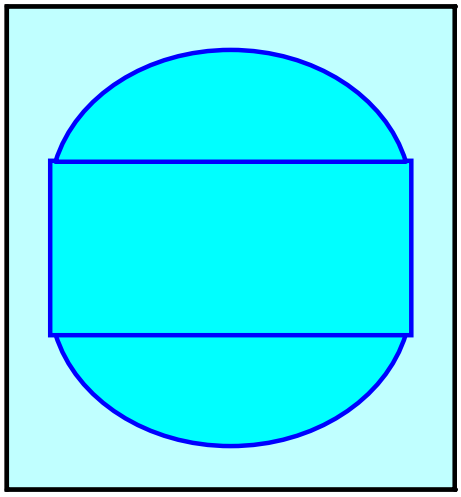
1 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 9.14' Row Length +12.0" End Stone x 2 = 11.14' Base Length
1 Rows x 100.0" Wide + 12.0" Side Stone x 2 = 10.33' Base Width
9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

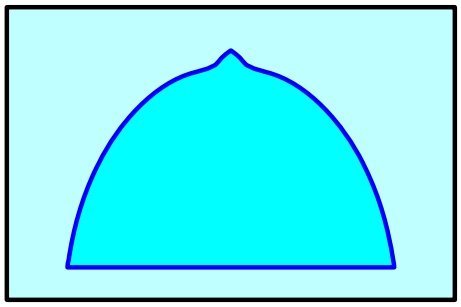
1 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 1 Rows = 177.9 cf Chamber Storage

777.1 cf Field - 177.9 cf Chambers = 599.2 cf Stone x 40.0% Voids = 239.7 cf Stone Storage

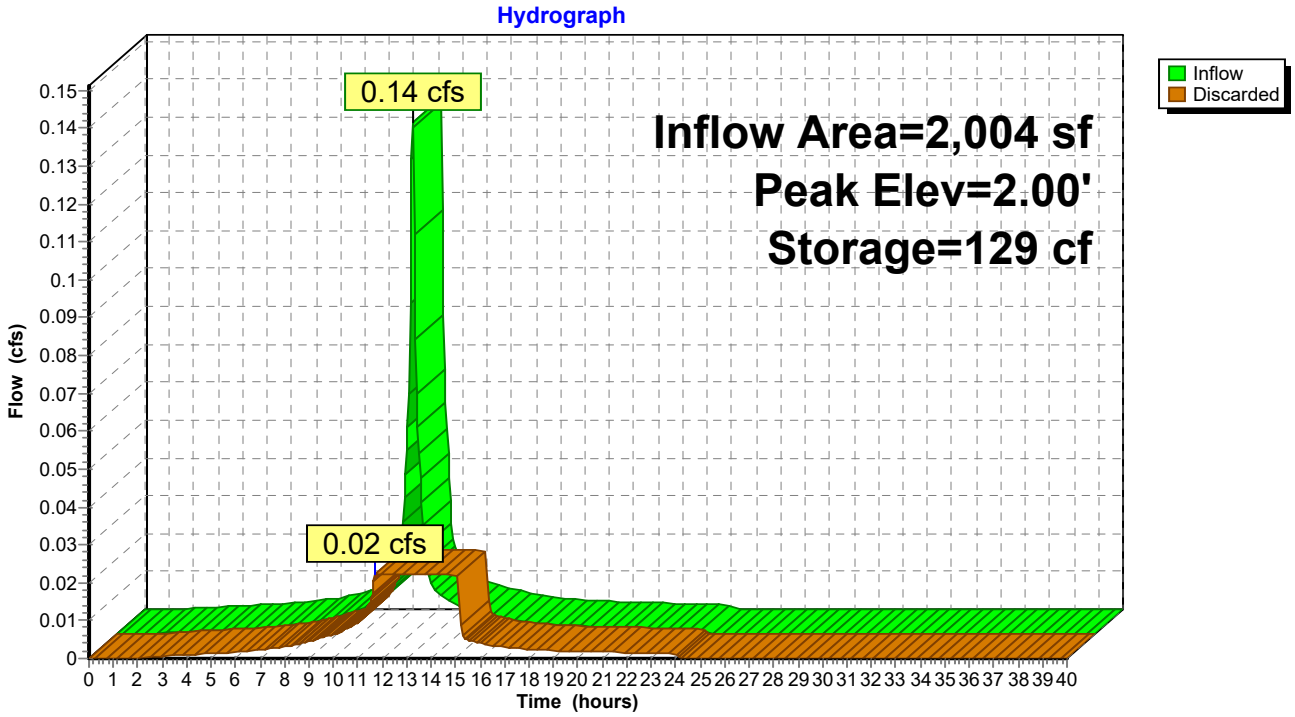
Chamber Storage + Stone Storage = 417.6 cf = 0.010 af
Overall Storage Efficiency = 53.7%
Overall System Size = 11.14' x 10.33' x 6.75'

1 Chambers
28.8 cy Field
22.2 cy Stone





Pond RD3: 4500 1R1C



Summary for Pond RD37: 4500 1R2C

Inflow Area = 2,886 sf,100.00% Impervious, Inflow Depth = 2.87" for 2 yr event
Inflow = 0.19 cfs @ 12.09 hrs, Volume= 690 cf
Outflow = 0.03 cfs @ 11.70 hrs, Volume= 690 cf, Atten= 85%, Lag= 0.0 min
Discarded = 0.03 cfs @ 11.70 hrs, Volume= 690 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 2.07' @ 12.57 hrs Surf.Area= 157 sf Storage= 192 cf

Plug-Flow detention time= 37.0 min calculated for 689 cf (100% of inflow)
Center-of-Mass det. time= 36.9 min (794.0 - 757.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	309 cf	**10.33'W x 15.17'L x 6.75'H Field A** 1,058 cf Overall - 284 cf Embedded = 773 cf x 40.0% Voids
#2A	0.75'	284 cf	**ADS_StormTech MC-4500 +Cap** x 2 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +35.7 cf x 2 x 1 rows = 71.4 cf
		594 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.03 cfs @ 11.70 hrs HW=0.09' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Pond RD37: 4500 1R2C - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-4500 +Cap (ADS StormTech® MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= +35.7 cf x 2 x 1 rows = 71.4 cf

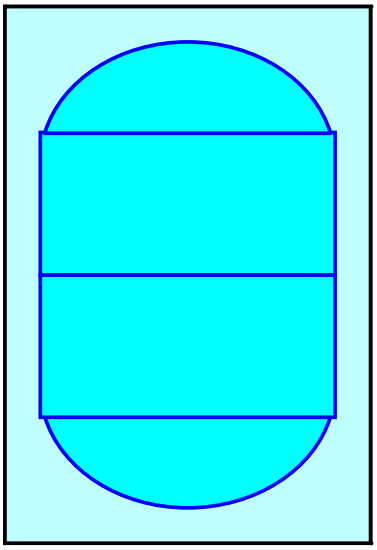
2 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 13.17' Row Length +12.0" End Stone x 2 = 15.17' Base Length
1 Rows x 100.0" Wide + 12.0" Side Stone x 2 = 10.33' Base Width
9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

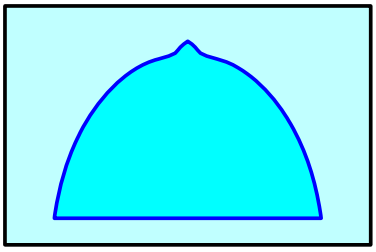
2 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 1 Rows = 284.4 cf Chamber Storage

1,057.9 cf Field - 284.4 cf Chambers = 773.5 cf Stone x 40.0% Voids = 309.4 cf Stone Storage

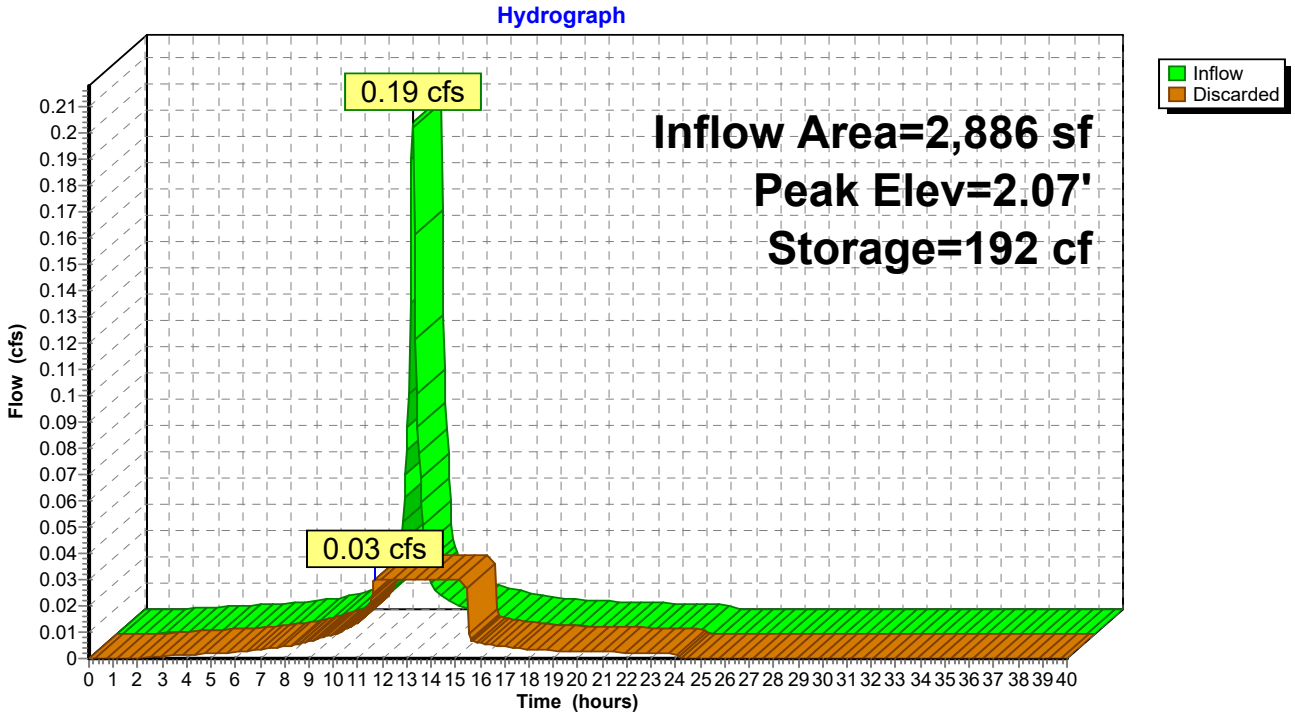
Chamber Storage + Stone Storage = 593.8 cf = 0.014 af
Overall Storage Efficiency = 56.1%
Overall System Size = 15.17' x 10.33' x 6.75'

2 Chambers
39.2 cy Field
28.6 cy Stone





Pond RD37: 4500 1R2C



Summary for Pond RD4: 4500 1R1C

Inflow Area = 1,912 sf,100.00% Impervious, Inflow Depth = 2.87" for 2 yr event
Inflow = 0.13 cfs @ 12.09 hrs, Volume= 457 cf
Outflow = 0.02 cfs @ 11.70 hrs, Volume= 457 cf, Atten= 83%, Lag= 0.0 min
Discarded = 0.02 cfs @ 11.70 hrs, Volume= 457 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 1.88' @ 12.55 hrs Surf.Area= 115 sf Storage= 120 cf

Plug-Flow detention time= 30.4 min calculated for 456 cf (100% of inflow)
Center-of-Mass det. time= 30.4 min (787.4 - 757.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	240 cf	**10.33'W x 11.14'L x 6.75'H Field A** 777 cf Overall - 178 cf Embedded = 599 cf x 40.0% Voids
#2A	0.75'	178 cf	**ADS_StormTech MC-4500 +Cap** Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +35.7 cf x 2 x 1 rows = 71.4 cf
		418 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.02 cfs @ 11.70 hrs HW=0.08' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Pond RD4: 4500 1R1C - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-4500 +Cap (ADS StormTech® MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= +35.7 cf x 2 x 1 rows = 71.4 cf

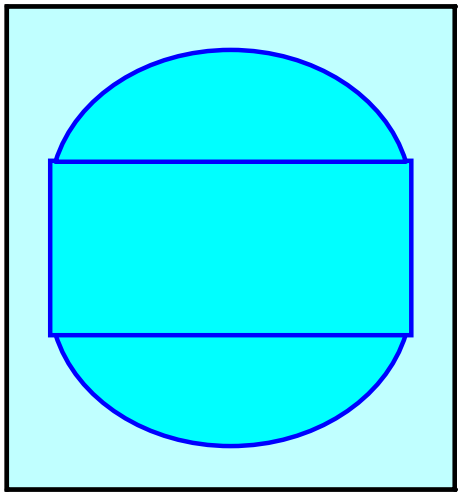
1 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 9.14' Row Length +12.0" End Stone x 2 = 11.14' Base Length
1 Rows x 100.0" Wide + 12.0" Side Stone x 2 = 10.33' Base Width
9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

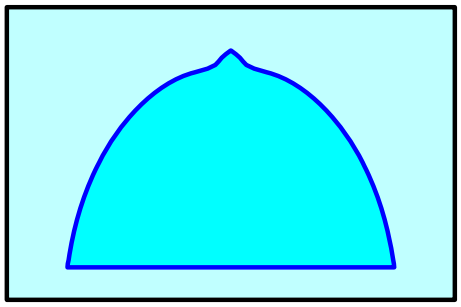
1 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 1 Rows = 177.9 cf Chamber Storage

777.1 cf Field - 177.9 cf Chambers = 599.2 cf Stone x 40.0% Voids = 239.7 cf Stone Storage

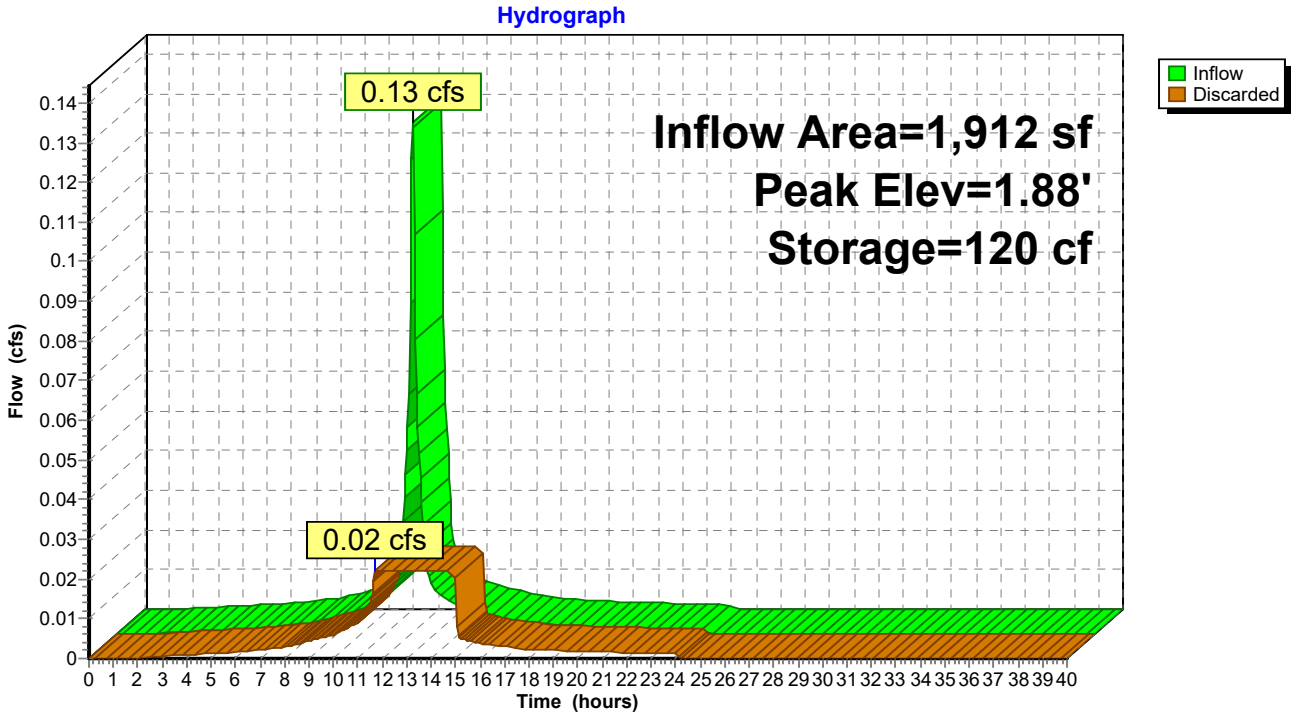
Chamber Storage + Stone Storage = 417.6 cf = 0.010 af
Overall Storage Efficiency = 53.7%
Overall System Size = 11.14' x 10.33' x 6.75'

1 Chambers
28.8 cy Field
22.2 cy Stone





Pond RD4: 4500 1R1C



Summary for Pond RD5: 4500 1R1C

Inflow Area = 2,004 sf,100.00% Impervious, Inflow Depth = 2.87" for 2 yr event
Inflow = 0.14 cfs @ 12.09 hrs, Volume= 479 cf
Outflow = 0.02 cfs @ 11.70 hrs, Volume= 479 cf, Atten= 84%, Lag= 0.0 min
Discarded = 0.02 cfs @ 11.70 hrs, Volume= 479 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 2.00' @ 12.56 hrs Surf.Area= 115 sf Storage= 129 cf

Plug-Flow detention time= 33.2 min calculated for 479 cf (100% of inflow)
Center-of-Mass det. time= 33.2 min (790.3 - 757.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	240 cf	**10.33'W x 11.14'L x 6.75'H Field A** 777 cf Overall - 178 cf Embedded = 599 cf x 40.0% Voids
#2A	0.75'	178 cf	**ADS_StormTech MC-4500 +Cap** Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +35.7 cf x 2 x 1 rows = 71.4 cf
		418 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.02 cfs @ 11.70 hrs HW=0.08' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Pond RD5: 4500 1R1C - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-4500 +Cap (ADS StormTech® MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= +35.7 cf x 2 x 1 rows = 71.4 cf

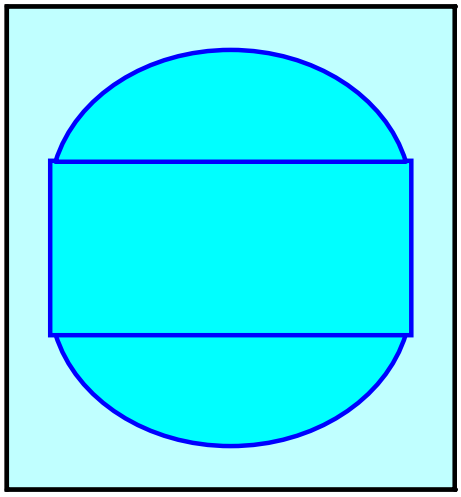
1 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 9.14' Row Length +12.0" End Stone x 2 = 11.14' Base Length
1 Rows x 100.0" Wide + 12.0" Side Stone x 2 = 10.33' Base Width
9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

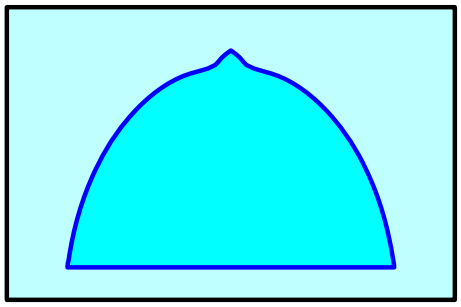
1 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 1 Rows = 177.9 cf Chamber Storage

777.1 cf Field - 177.9 cf Chambers = 599.2 cf Stone x 40.0% Voids = 239.7 cf Stone Storage

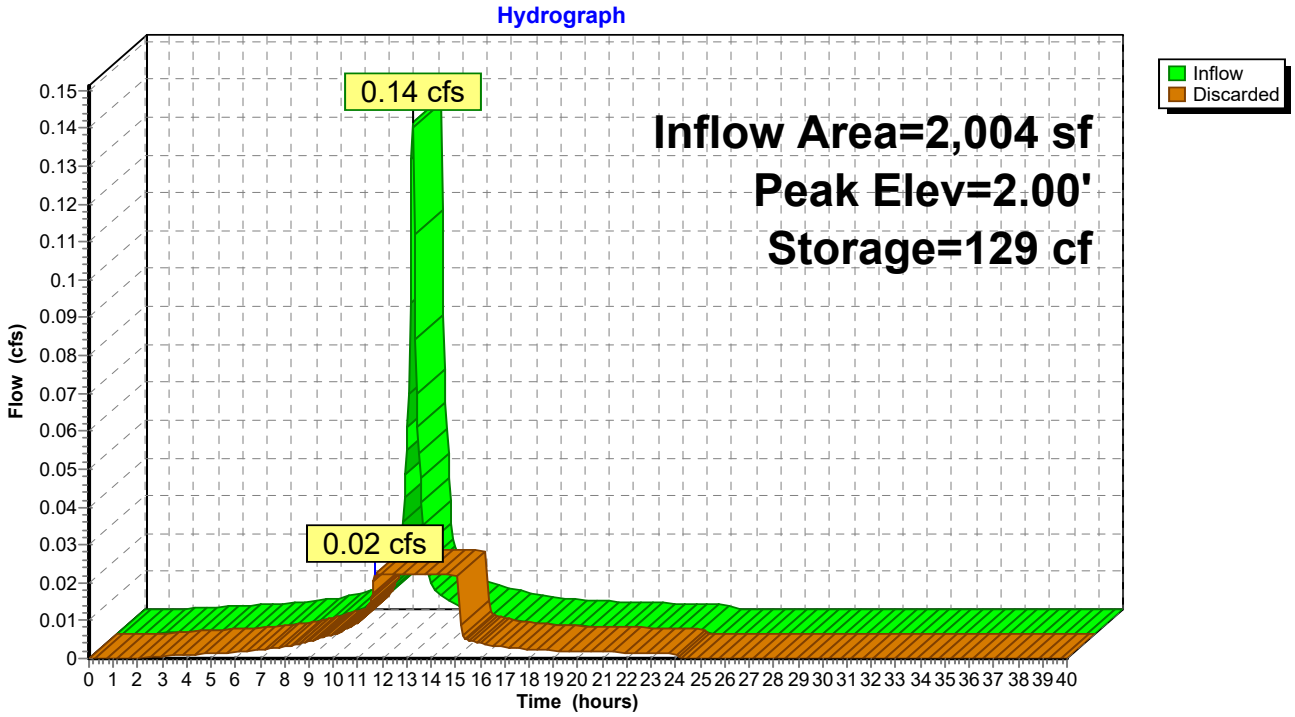
Chamber Storage + Stone Storage = 417.6 cf = 0.010 af
Overall Storage Efficiency = 53.7%
Overall System Size = 11.14' x 10.33' x 6.75'

1 Chambers
28.8 cy Field
22.2 cy Stone





Pond RD5: 4500 1R1C



Summary for Pond RD6: 4500 1R1C

Inflow Area = 2,103 sf,100.00% Impervious, Inflow Depth = 2.87" for 2 yr event
Inflow = 0.14 cfs @ 12.09 hrs, Volume= 503 cf
Outflow = 0.02 cfs @ 11.70 hrs, Volume= 503 cf, Atten= 84%, Lag= 0.0 min
Discarded = 0.02 cfs @ 11.70 hrs, Volume= 503 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 2.14' @ 12.57 hrs Surf.Area= 115 sf Storage= 139 cf

Plug-Flow detention time= 36.4 min calculated for 503 cf (100% of inflow)
Center-of-Mass det. time= 36.4 min (793.4 - 757.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	240 cf	**10.33'W x 11.14'L x 6.75'H Field A** 777 cf Overall - 178 cf Embedded = 599 cf x 40.0% Voids
#2A	0.75'	178 cf	**ADS_StormTech MC-4500 +Cap** Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +35.7 cf x 2 x 1 rows = 71.4 cf
		418 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.02 cfs @ 11.70 hrs HW=0.09' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Pond RD6: 4500 1R1C - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-4500 +Cap (ADS StormTech® MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= +35.7 cf x 2 x 1 rows = 71.4 cf

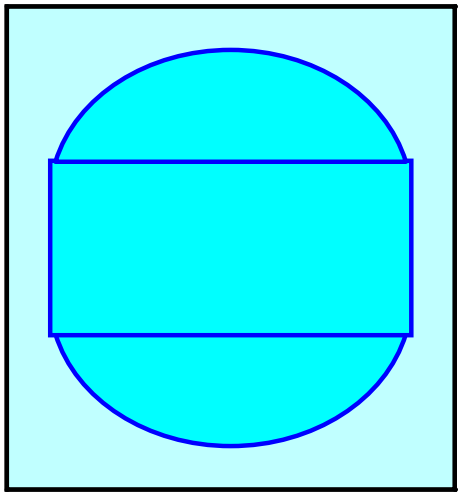
1 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 9.14' Row Length +12.0" End Stone x 2 = 11.14' Base Length
1 Rows x 100.0" Wide + 12.0" Side Stone x 2 = 10.33' Base Width
9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

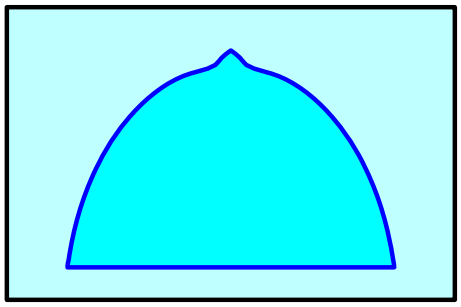
1 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 1 Rows = 177.9 cf Chamber Storage

777.1 cf Field - 177.9 cf Chambers = 599.2 cf Stone x 40.0% Voids = 239.7 cf Stone Storage

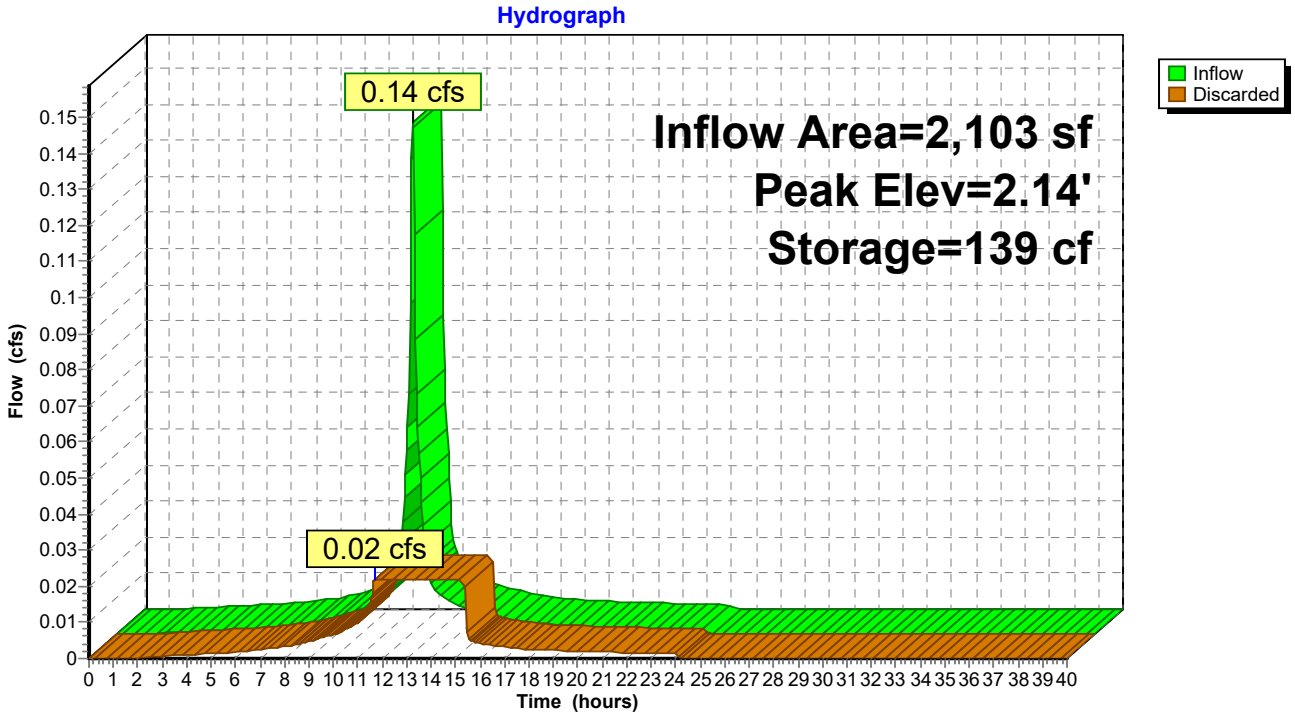
Chamber Storage + Stone Storage = 417.6 cf = 0.010 af
Overall Storage Efficiency = 53.7%
Overall System Size = 11.14' x 10.33' x 6.75'

1 Chambers
28.8 cy Field
22.2 cy Stone





Pond RD6: 4500 1R1C

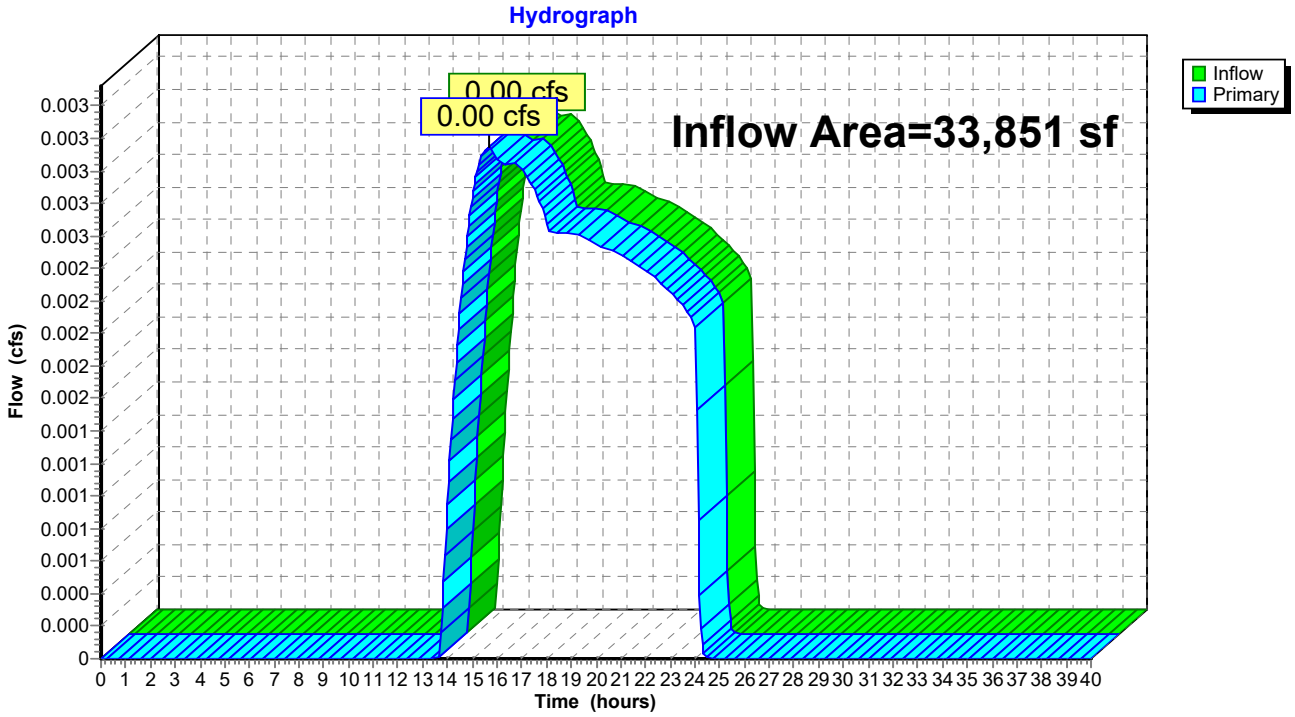


Summary for Link 1L: Onsite To Isolated Vegetated wetland

Inflow Area = 33,851 sf, 0.95% Impervious, Inflow Depth = 0.03" for 2 yr event
Inflow = 0.00 cfs @ 15.67 hrs, Volume= 94 cf
Primary = 0.00 cfs @ 15.67 hrs, Volume= 94 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Link 1L: Onsite To Isolated Vegetated wetland

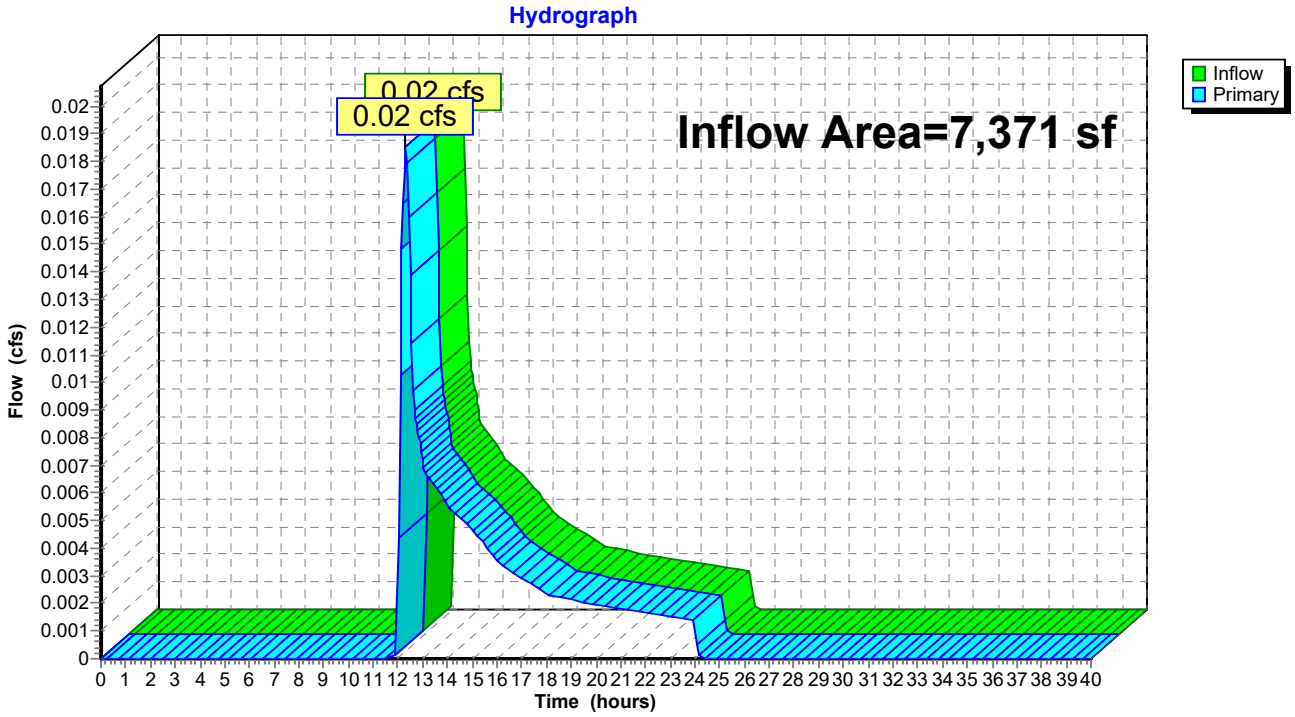


Summary for Link 2L: Offsite to Hghland Street catch basins

Inflow Area = 7,371 sf, 29.02% Impervious, Inflow Depth = 0.26" for 2 yr event
Inflow = 0.02 cfs @ 12.32 hrs, Volume= 158 cf
Primary = 0.02 cfs @ 12.32 hrs, Volume= 158 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Link 2L: Offsite to Hghland Street catch basins

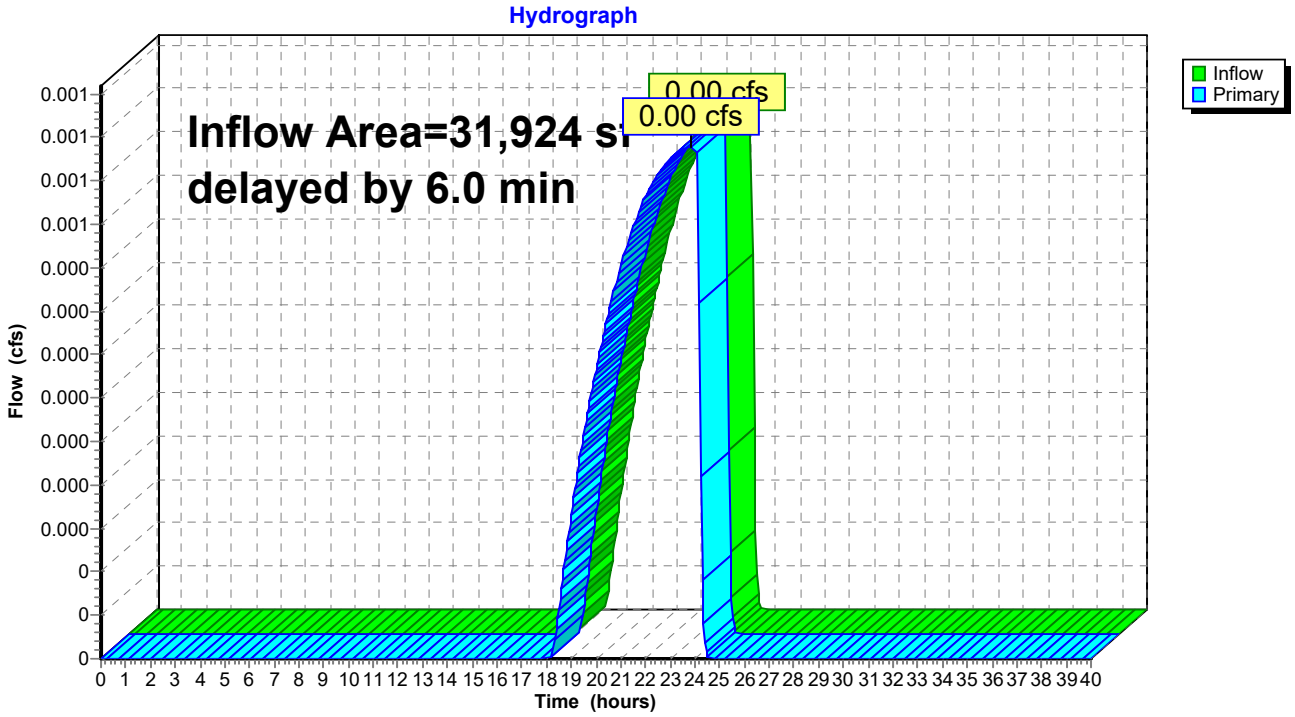


Summary for Link 3L: Onsite to southeast Low point alon Main

Inflow Area = 31,924 sf, 7.63% Impervious, Inflow Depth = 0.00" for 2 yr event
Inflow = 0.00 cfs @ 23.75 hrs, Volume= 9 cf
Primary = 0.00 cfs @ 23.85 hrs, Volume= 9 cf, Atten= 0%, Lag= 6.0 min

Primary outflow = Inflow delayed by 6.0 min, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Link 3L: Onsite to southeast Low point alon Main

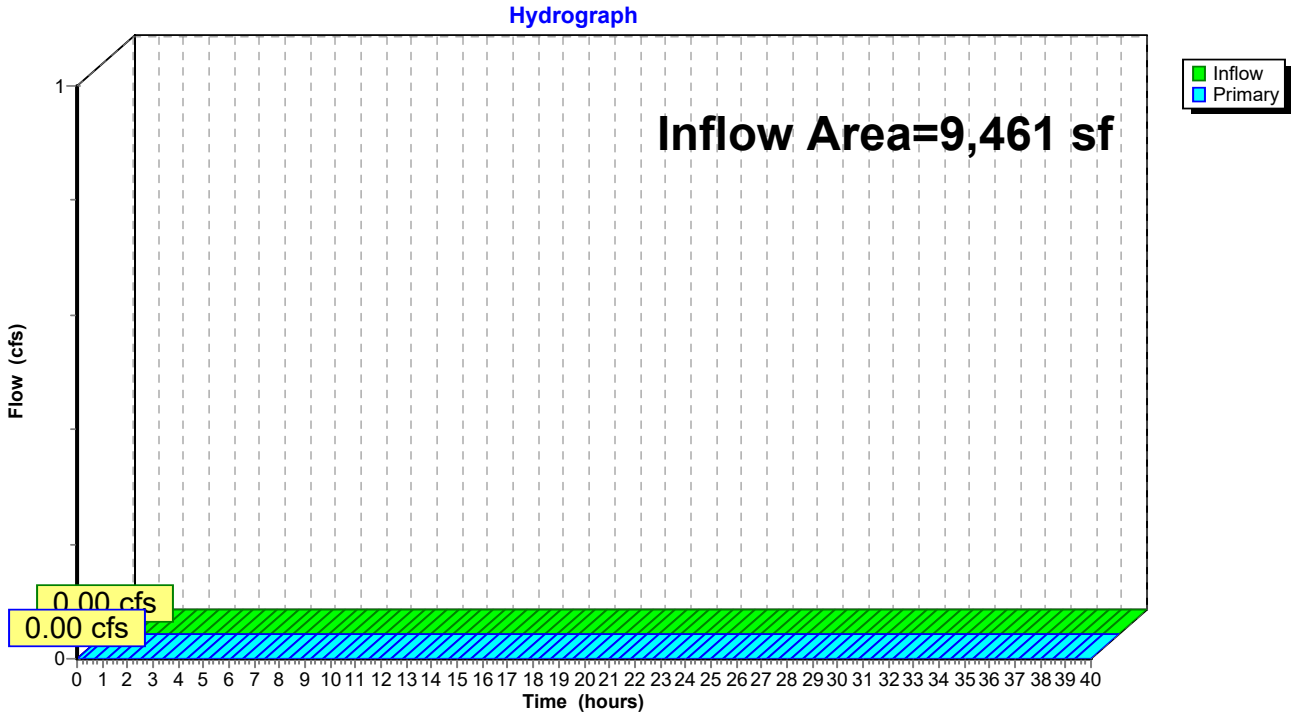


Summary for Link 4L: To SW Property Corner along Main Street

Inflow Area = 9,461 sf, 0.00% Impervious, Inflow Depth = 0.00" for 2 yr event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs

Link 4L: To SW Property Corner along Main Street



Time span=0.00-40.00 hrs, dt=0.05 hrs, 801 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 H1: YARDS 1 & 2 Runoff Area=5,593 sf 26.69% Impervious Runoff Depth=0.74"
Tc=6.0 min CN=55 Runoff=0.08 cfs 346 cf

Subcatchment H2: YARD ANR Runoff Area=1,778 sf 36.33% Impervious Runoff Depth=1.02"
Tc=6.0 min CN=60 Runoff=0.04 cfs 151 cf

Subcatchment M1: TO SW PL Runoff Area=4,423 sf 0.00% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=30 Runoff=0.00 cfs 0 cf

Subcatchment M2: TO SW PL Runoff Area=5,038 sf 0.00% Impervious Runoff Depth=0.11"
Tc=6.0 min CN=39 Runoff=0.00 cfs 46 cf

Subcatchment M3: Park Area Low Point Runoff Area=31,924 sf 7.63% Impervious Runoff Depth=0.16"
Flow Length=150' Slope=0.0200 '/' Tc=9.0 min CN=41 Runoff=0.02 cfs 437 cf

Subcatchment P1: CB1 Runoff Area=5,217 sf 53.29% Impervious Runoff Depth=1.67"
Tc=6.0 min CN=70 Runoff=0.22 cfs 728 cf

Subcatchment P10: CB10 Runoff Area=6,285 sf 47.97% Impervious Runoff Depth=2.38"
Tc=6.0 min CN=79 Runoff=0.39 cfs 1,245 cf

Subcatchment P11: CB11 Runoff Area=8,207 sf 65.64% Impervious Runoff Depth=2.38"
Tc=6.0 min CN=79 Runoff=0.51 cfs 1,625 cf

Subcatchment P12: CB12 Runoff Area=35,107 sf 25.33% Impervious Runoff Depth=0.55"
Flow Length=316' Tc=9.1 min CN=51 Runoff=0.25 cfs 1,596 cf

Subcatchment P13: CB11 Runoff Area=12,793 sf 1.97% Impervious Runoff Depth=0.74"
Flow Length=316' Tc=9.1 min CN=55 Runoff=0.16 cfs 791 cf

Subcatchment P14: CB14 Runoff Area=28,247 sf 2.36% Impervious Runoff Depth=0.46"
Tc=6.0 min CN=49 Runoff=0.15 cfs 1,073 cf

Subcatchment P15: CB15 Runoff Area=13,422 sf 49.79% Impervious Runoff Depth=1.53"
Tc=6.0 min CN=68 Runoff=0.52 cfs 1,714 cf

Subcatchment P16: Lawn A.D. 1 Runoff Area=3,825 sf 0.00% Impervious Runoff Depth=1.08"
Flow Length=150' Tc=8.8 min CN=61 Runoff=0.09 cfs 344 cf

Subcatchment P17: Lawn A.D. 2 Runoff Area=6,392 sf 0.00% Impervious Runoff Depth=0.55"
Flow Length=170' Slope=0.0200 '/' Tc=9.2 min CN=51 Runoff=0.05 cfs 291 cf

Subcatchment P18: TO IVW Runoff Area=33,851 sf 0.95% Impervious Runoff Depth=0.30"
Flow Length=296' Tc=9.6 min CN=45 Runoff=0.08 cfs 835 cf

Subcatchment P2: CB2 Runoff Area=6,210 sf 37.86% Impervious Runoff Depth=1.08"
Tc=6.0 min CN=61 Runoff=0.16 cfs 559 cf

Subcatchment P3: CB3 Runoff Area=7,310 sf 63.73% Impervious Runoff Depth=2.21"
Tc=6.0 min CN=77 Runoff=0.43 cfs 1,347 cf

Subcatchment P4: CB4 Runoff Area=27,482 sf 28.14% Impervious Runoff Depth=0.55"
Tc=6.0 min CN=51 Runoff=0.21 cfs 1,249 cf

Subcatchment P5: CB5 Runoff Area=6,260 sf 55.38% Impervious Runoff Depth=1.97"
Tc=6.0 min CN=74 Runoff=0.32 cfs 1,029 cf

Subcatchment P6: CB6 Runoff Area=6,087 sf 89.63% Impervious Runoff Depth=3.60"
Tc=6.0 min CN=92 Runoff=0.55 cfs 1,827 cf

Subcatchment P7: CB7 Runoff Area=13,769 sf 66.11% Impervious Runoff Depth=2.29"
Tc=6.0 min CN=78 Runoff=0.83 cfs 2,631 cf

Subcatchment P8: CB8 Runoff Area=15,913 sf 27.36% Impervious Runoff Depth=0.85"
Flow Length=316' Tc=9.1 min UI Adjusted CN=57 Runoff=0.25 cfs 1,126 cf

Subcatchment P9: CB9 Runoff Area=2,472 sf 73.50% Impervious Runoff Depth=3.10"
Tc=6.0 min CN=87 Runoff=0.20 cfs 638 cf

Subcatchment R1: 1-A1 Runoff Area=2,103 sf 100.00% Impervious Runoff Depth=4.26"
Tc=6.0 min CN=98 Runoff=0.21 cfs 747 cf

Subcatchment R10: 10-C2 Runoff Area=1,628 sf 100.00% Impervious Runoff Depth=4.26"
Tc=6.0 min CN=98 Runoff=0.16 cfs 578 cf

Subcatchment R11: 11-B2 Runoff Area=2,242 sf 100.00% Impervious Runoff Depth=4.26"
Tc=6.0 min CN=98 Runoff=0.22 cfs 797 cf

Subcatchment R12: 12-B1 Runoff Area=1,509 sf 100.00% Impervious Runoff Depth=4.26"
Tc=6.0 min CN=98 Runoff=0.15 cfs 536 cf

Subcatchment R13: 13-A1 Runoff Area=2,103 sf 100.00% Impervious Runoff Depth=4.26"
Tc=6.0 min CN=98 Runoff=0.21 cfs 747 cf

Subcatchment R14: 14-B2 Runoff Area=2,242 sf 100.00% Impervious Runoff Depth=4.26"
Tc=6.0 min CN=98 Runoff=0.22 cfs 797 cf

Subcatchment R15: 15-B1 Runoff Area=1,509 sf 100.00% Impervious Runoff Depth=4.26"
Tc=6.0 min CN=98 Runoff=0.15 cfs 536 cf

Subcatchment R16: 16-B2 Runoff Area=2,242 sf 100.00% Impervious Runoff Depth=4.26"
Tc=6.0 min CN=98 Runoff=0.22 cfs 797 cf

Subcatchment R17: 17-B1 Runoff Area=1,509 sf 100.00% Impervious Runoff Depth=4.26"
Tc=6.0 min CN=98 Runoff=0.15 cfs 536 cf

Subcatchment R18: 18-B2 Runoff Area=2,242 sf 100.00% Impervious Runoff Depth=4.26"
Tc=6.0 min CN=98 Runoff=0.22 cfs 797 cf

Subcatchment R19: 19-B1 Runoff Area=1,509 sf 100.00% Impervious Runoff Depth=4.26"
Tc=6.0 min CN=98 Runoff=0.15 cfs 536 cf

Subcatchment R2: 2-A1 Runoff Area=2,103 sf 100.00% Impervious Runoff Depth=4.26"
Tc=6.0 min CN=98 Runoff=0.21 cfs 747 cf

Subcatchment R20: 20-B2 Runoff Area=2,242 sf 100.00% Impervious Runoff Depth=4.26"
Tc=6.0 min CN=98 Runoff=0.22 cfs 797 cf

Subcatchment R21: 21-E Runoff Area=1,363 sf 100.00% Impervious Runoff Depth=4.26"
Tc=6.0 min CN=98 Runoff=0.13 cfs 484 cf

Subcatchment R22: 22-D Runoff Area=1,718 sf 100.00% Impervious Runoff Depth=4.26"
Tc=6.0 min CN=98 Runoff=0.17 cfs 610 cf

Subcatchment R23: 23-B1 Runoff Area=1,509 sf 100.00% Impervious Runoff Depth=4.26"
Tc=6.0 min CN=98 Runoff=0.15 cfs 536 cf

Subcatchment R24: 24-B2 Runoff Area=2,242 sf 100.00% Impervious Runoff Depth=4.26"
Tc=6.0 min CN=98 Runoff=0.22 cfs 797 cf

Subcatchment R25: 25-A1 Runoff Area=2,103 sf 100.00% Impervious Runoff Depth=4.26"
Tc=6.0 min CN=98 Runoff=0.21 cfs 747 cf

Subcatchment R26: 26-A1 Runoff Area=2,103 sf 100.00% Impervious Runoff Depth=4.26"
Tc=6.0 min CN=98 Runoff=0.21 cfs 747 cf

Subcatchment R27: 27-B2 Runoff Area=2,242 sf 100.00% Impervious Runoff Depth=4.26"
Tc=6.0 min CN=98 Runoff=0.22 cfs 797 cf

Subcatchment R28: 28-B2 Runoff Area=2,242 sf 100.00% Impervious Runoff Depth=4.26"
Tc=6.0 min CN=98 Runoff=0.22 cfs 797 cf

Subcatchment R29: 29-A1 Runoff Area=2,103 sf 100.00% Impervious Runoff Depth=4.26"
Tc=6.0 min CN=98 Runoff=0.21 cfs 747 cf

Subcatchment R3: 3-A3 Runoff Area=2,004 sf 100.00% Impervious Runoff Depth=4.26"
Tc=6.0 min CN=98 Runoff=0.20 cfs 712 cf

Subcatchment R30: 30-A2 Runoff Area=1,912 sf 100.00% Impervious Runoff Depth=4.26"
Tc=6.0 min CN=98 Runoff=0.19 cfs 679 cf

Subcatchment R31: 31-E Runoff Area=1,363 sf 100.00% Impervious Runoff Depth=4.26"
Tc=6.0 min CN=98 Runoff=0.13 cfs 484 cf

Subcatchment R32: 32-D Runoff Area=1,718 sf 100.00% Impervious Runoff Depth=4.26"
Tc=6.0 min CN=98 Runoff=0.17 cfs 610 cf

Subcatchment R33: 33-C1 Runoff Area=1,270 sf 100.00% Impervious Runoff Depth=4.26"
Tc=6.0 min CN=98 Runoff=0.13 cfs 451 cf

Subcatchment R34: 34-C2 Runoff Area=1,628 sf 100.00% Impervious Runoff Depth=4.26"
Tc=6.0 min CN=98 Runoff=0.16 cfs 578 cf

Subcatchment R35: 35-B2 Runoff Area=2,242 sf 100.00% Impervious Runoff Depth=4.26"
Tc=6.0 min CN=98 Runoff=0.22 cfs 797 cf

Subcatchment R36: 36-B1 Runoff Area=1,509 sf 100.00% Impervious Runoff Depth=4.26"
Tc=6.0 min CN=98 Runoff=0.15 cfs 536 cf

Subcatchment R37: 37-ANR Runoff Area=2,886 sf 100.00% Impervious Runoff Depth=4.26"
Tc=6.0 min CN=98 Runoff=0.28 cfs 1,026 cf

Subcatchment R4: 4-A2 Runoff Area=1,912 sf 100.00% Impervious Runoff Depth=4.26"
Tc=6.0 min CN=98 Runoff=0.19 cfs 679 cf

Subcatchment R5: 5-A3 Runoff Area=2,004 sf 100.00% Impervious Runoff Depth=4.26"
Tc=6.0 min CN=98 Runoff=0.20 cfs 712 cf

Subcatchment R6: 6-A1 Runoff Area=2,103 sf 100.00% Impervious Runoff Depth=4.26"
Tc=6.0 min CN=98 Runoff=0.21 cfs 747 cf

Subcatchment R7: 7-C2 Runoff Area=1,628 sf 100.00% Impervious Runoff Depth=4.26"
Tc=6.0 min CN=98 Runoff=0.16 cfs 578 cf

Subcatchment R8: 8-C1 Runoff Area=1,270 sf 100.00% Impervious Runoff Depth=4.26"
Tc=6.0 min CN=98 Runoff=0.13 cfs 451 cf

Subcatchment R9: 9-C1 Runoff Area=1,270 sf 100.00% Impervious Runoff Depth=4.26"
Tc=6.0 min CN=98 Runoff=0.13 cfs 451 cf

Pond 1: CB1 Peak Elev=151.19' Inflow=0.22 cfs 728 cf
12.0" Round Culvert n=0.012 L=5.0' S=0.0200 '/' Outflow=0.22 cfs 728 cf

Pond 1P: 4500 1R8C Peak Elev=147.61' Storage=315 cf Inflow=0.38 cfs 1,286 cf
Discarded=0.08 cfs 1,286 cf Primary=0.00 cfs 0 cf Outflow=0.08 cfs 1,286 cf

Pond 2: CB2 Peak Elev=151.16' Inflow=0.16 cfs 559 cf
12.0" Round Culvert n=0.012 L=10.0' S=0.0100 '/' Outflow=0.16 cfs 559 cf

Pond 2P: 4500 2R10C Peak Elev=139.73' Storage=1,011 cf Inflow=1.06 cfs 3,834 cf
Discarded=0.18 cfs 3,834 cf Primary=0.00 cfs 0 cf Outflow=0.18 cfs 3,834 cf

Pond 3: CB3 Peak Elev=140.02' Inflow=0.43 cfs 1,347 cf
12.0" Round Culvert n=0.012 L=10.0' S=0.0200 '/' Outflow=0.43 cfs 1,347 cf

Pond 3P: 4500 2R17C Peak Elev=135.00' Storage=747 cf Inflow=0.95 cfs 4,251 cf
Discarded=0.28 cfs 4,251 cf Primary=0.00 cfs 0 cf Outflow=0.28 cfs 4,251 cf

Pond 4: CB4 Peak Elev=139.92' Inflow=0.21 cfs 1,249 cf
12.0" Round Culvert n=0.012 L=10.0' S=0.0200 '/' Outflow=0.21 cfs 1,249 cf

Pond 4P: 4500 2R10C Peak Elev=127.69' Storage=399 cf Inflow=0.81 cfs 3,009 cf
Discarded=0.33 cfs 3,009 cf Primary=0.00 cfs 0 cf Outflow=0.33 cfs 3,009 cf

Pond 5: CB5 Peak Elev=129.78' Inflow=0.32 cfs 1,029 cf
12.0" Round Culvert n=0.012 L=20.0' S=0.0200 '/' Outflow=0.32 cfs 1,029 cf

Pond 5P: 3500 2R10C Peak Elev=127.74' Storage=751 cf Inflow=0.96 cfs 3,422 cf
Discarded=0.23 cfs 3,422 cf Primary=0.00 cfs 0 cf Outflow=0.23 cfs 3,422 cf

Pond 6: CB6 Peak Elev=130.37' Inflow=0.55 cfs 1,827 cf
12.0" Round Culvert n=0.012 L=40.0' S=0.0200 '/' Outflow=0.55 cfs 1,827 cf

Pond 6P: 4500 4R6C Peak Elev=128.74' Storage=814 cf Inflow=0.98 cfs 3,929 cf
Discarded=0.22 cfs 3,929 cf Primary=0.00 cfs 0 cf Outflow=0.22 cfs 3,929 cf

Pond 7: CB7 Peak Elev=130.22' Inflow=0.83 cfs 2,631 cf
12.0" Round Culvert n=0.012 L=5.0' S=0.0200 '/' Outflow=0.83 cfs 2,631 cf

Pond 7P: 4500 3R10C Peak Elev=132.08' Storage=1,324 cf Inflow=1.41 cfs 5,473 cf
Discarded=0.26 cfs 5,473 cf Primary=0.00 cfs 0 cf Outflow=0.26 cfs 5,473 cf

Pond 8P: 4500 2R9C Peak Elev=129.90' Storage=867 cf Inflow=0.95 cfs 3,258 cf
Discarded=0.16 cfs 3,258 cf Primary=0.00 cfs 0 cf Outflow=0.16 cfs 3,258 cf

Pond 9P: 4500 1R9C Peak Elev=129.28' Storage=744 cf Inflow=0.67 cfs 2,428 cf
Discarded=0.08 cfs 2,428 cf Primary=0.00 cfs 0 cf Outflow=0.08 cfs 2,428 cf

Pond 11: CB11 Peak Elev=137.76' Inflow=0.51 cfs 1,625 cf
12.0" Round Culvert n=0.012 L=10.0' S=0.0200 '/' Outflow=0.51 cfs 1,625 cf

Pond 12: CB12 Peak Elev=137.64' Inflow=0.25 cfs 1,596 cf
12.0" Round Culvert n=0.012 L=10.0' S=0.0200 '/' Outflow=0.25 cfs 1,596 cf

Pond 12P: CB14 Peak Elev=129.68' Inflow=0.15 cfs 1,073 cf
12.0" Round Culvert n=0.012 L=24.0' S=0.0200 '/' Outflow=0.15 cfs 1,073 cf

Pond 13: CB13 Peak Elev=129.90' Inflow=0.16 cfs 791 cf
12.0" Round Culvert n=0.012 L=5.0' S=0.0200 '/' Outflow=0.16 cfs 791 cf

Pond 15: CB15 Peak Elev=134.36' Inflow=0.52 cfs 1,714 cf
12.0" Round Culvert n=0.012 L=10.0' S=0.0300 '/' Outflow=0.52 cfs 1,714 cf

Pond A: DMHA Peak Elev=150.55' Inflow=0.38 cfs 1,286 cf
12.0" Round Culvert n=0.012 L=10.0' S=0.0250 '/' Outflow=0.38 cfs 1,286 cf

Pond C: DMH C Peak Elev=149.37' Inflow=0.00 cfs 0 cf
12.0" Round Culvert n=0.012 L=124.0' S=0.0550 '/' Outflow=0.00 cfs 0 cf

Pond D: DMH D Peak Elev=142.45' Inflow=0.00 cfs 0 cf
12.0" Round Culvert n=0.012 L=25.0' S=0.0280 '/' Outflow=0.00 cfs 0 cf

Pond E: DMH-6P Peak Elev=129.36' Inflow=0.98 cfs 3,929 cf
12.0" Round Culvert n=0.012 L=25.0' S=0.0200 '/' Outflow=0.98 cfs 3,929 cf

Pond F: 6P OVERFLOW Peak Elev=0.00'
12.0" Round Culvert n=0.012 L=25.0' S=0.0200 '/' Primary=0.00 cfs 0 cf

Pond H: DMH-H Peak Elev=139.80' Inflow=0.63 cfs 2,596 cf
12.0" Round Culvert n=0.012 L=25.0' S=0.0300 '/' Outflow=0.63 cfs 2,596 cf

Pond K: DMHK Peak Elev=130.10' Inflow=0.96 cfs 3,422 cf
12.0" Round Culvert n=0.012 L=35.0' S=0.0200 '/' Outflow=0.96 cfs 3,422 cf

Pond RD1: 4500 1R1C Peak Elev=3.57' Storage=242 cf Inflow=0.21 cfs 747 cf
Outflow=0.02 cfs 747 cf

Pond RD1112: 4500 1R3C Peak Elev=3.46' Storage=438 cf Inflow=0.37 cfs 1,333 cf
Outflow=0.04 cfs 1,333 cf

Pond RD13: 4500 1R1C Peak Elev=3.57' Storage=242 cf Inflow=0.21 cfs 747 cf
Outflow=0.02 cfs 747 cf

Pond RD14+: 4500 1R3C Peak Elev=2.74' Storage=343 cf Inflow=0.30 cfs 1,141 cf
Outflow=0.04 cfs 1,141 cf

Pond RD15+: 3500 2R3C Peak Elev=2.13' Storage=577 cf Inflow=0.54 cfs 2,160 cf
Outflow=0.08 cfs 2,160 cf

Pond RD2: 4500 1R1C Peak Elev=3.57' Storage=242 cf Inflow=0.21 cfs 747 cf
Outflow=0.02 cfs 747 cf

Pond RD20+: 3500 2R3C Peak Elev=2.25' Storage=615 cf Inflow=0.59 cfs 2,130 cf
Outflow=0.08 cfs 2,130 cf

Pond RD25: 4500 1R1C Peak Elev=131.82' Storage=242 cf Inflow=0.21 cfs 747 cf
Outflow=0.02 cfs 747 cf

Pond RD3: 4500 1R1C Peak Elev=3.34' Storage=226 cf Inflow=0.20 cfs 712 cf
Outflow=0.02 cfs 712 cf

Pond RD37: 4500 1R2C Peak Elev=3.43' Storage=333 cf Inflow=0.28 cfs 1,026 cf
Outflow=0.03 cfs 1,026 cf

Pond RD4: 4500 1R1C Peak Elev=3.13' Storage=211 cf Inflow=0.19 cfs 679 cf
Outflow=0.02 cfs 679 cf

Pond RD5: 4500 1R1C Peak Elev=3.34' Storage=226 cf Inflow=0.20 cfs 712 cf
Outflow=0.02 cfs 712 cf

Pond RD6: 4500 1R1C Peak Elev=3.57' Storage=242 cf Inflow=0.21 cfs 747 cf
Outflow=0.02 cfs 747 cf

Link 1L: Onsite To Isolated Vegetated wetland Inflow=0.08 cfs 835 cf
Primary=0.08 cfs 835 cf

Link 2L: Offsite to Hghland Street catch basins Inflow=0.12 cfs 497 cf
Primary=0.12 cfs 497 cf

Link 3L: Onsite to southeast Low point alon Main delayed by 6.0 min Inflow=0.02 cfs 437 cf
Primary=0.02 cfs 437 cf

Link 4L: To SW Property Corner along Main Street Inflow=0.00 cfs 46 cf
Primary=0.00 cfs 46 cf

Total Runoff Area = 357,132 sf Runoff Volume = 46,334 cf Average Runoff Depth = 1.56"
60.51% Pervious = 216,094 sf 39.49% Impervious = 141,038 sf

Time span=0.00-40.00 hrs, dt=0.05 hrs, 801 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 H1: YARDS 1 & 2 Runoff Area=5,593 sf 26.69% Impervious Runoff Depth=1.29"
Tc=6.0 min CN=55 Runoff=0.17 cfs 603 cf

Subcatchment H2: YARD ANR Runoff Area=1,778 sf 36.33% Impervious Runoff Depth=1.67"
Tc=6.0 min CN=60 Runoff=0.07 cfs 247 cf

Subcatchment M1: TO SW PL Runoff Area=4,423 sf 0.00% Impervious Runoff Depth=0.04"
Tc=6.0 min CN=30 Runoff=0.00 cfs 13 cf

Subcatchment M2: TO SW PL Runoff Area=5,038 sf 0.00% Impervious Runoff Depth=0.34"
Tc=6.0 min CN=39 Runoff=0.01 cfs 142 cf

Subcatchment M3: Park Area Low Point Runoff Area=31,924 sf 7.63% Impervious Runoff Depth=0.43"
Flow Length=150' Slope=0.0200 '/' Tc=9.0 min CN=41 Runoff=0.13 cfs 1,152 cf

Subcatchment P1: CB1 Runoff Area=5,217 sf 53.29% Impervious Runoff Depth=2.49"
Tc=6.0 min CN=70 Runoff=0.34 cfs 1,083 cf

Subcatchment P10: CB10 Runoff Area=6,285 sf 47.97% Impervious Runoff Depth=3.32"
Tc=6.0 min CN=79 Runoff=0.55 cfs 1,741 cf

Subcatchment P11: CB11 Runoff Area=8,207 sf 65.64% Impervious Runoff Depth=3.32"
Tc=6.0 min CN=79 Runoff=0.72 cfs 2,274 cf

Subcatchment P12: CB12 Runoff Area=35,107 sf 25.33% Impervious Runoff Depth=1.02"
Flow Length=316' Tc=9.1 min CN=51 Runoff=0.65 cfs 2,979 cf

Subcatchment P13: CB11 Runoff Area=12,793 sf 1.97% Impervious Runoff Depth=1.29"
Flow Length=316' Tc=9.1 min CN=55 Runoff=0.34 cfs 1,379 cf

Subcatchment P14: CB14 Runoff Area=28,247 sf 2.36% Impervious Runoff Depth=0.89"
Tc=6.0 min CN=49 Runoff=0.47 cfs 2,092 cf

Subcatchment P15: CB15 Runoff Area=13,422 sf 49.79% Impervious Runoff Depth=2.32"
Tc=6.0 min CN=68 Runoff=0.81 cfs 2,592 cf

Subcatchment P16: Lawn A.D. 1 Runoff Area=3,825 sf 0.00% Impervious Runoff Depth=1.74"
Flow Length=150' Tc=8.8 min CN=61 Runoff=0.15 cfs 556 cf

Subcatchment P17: Lawn A.D. 2 Runoff Area=6,392 sf 0.00% Impervious Runoff Depth=1.02"
Flow Length=170' Slope=0.0200 '/' Tc=9.2 min CN=51 Runoff=0.12 cfs 542 cf

Subcatchment P18: TO IVW Runoff Area=33,851 sf 0.95% Impervious Runoff Depth=0.65"
Flow Length=296' Tc=9.6 min CN=45 Runoff=0.27 cfs 1,827 cf

Subcatchment P2: CB2 Runoff Area=6,210 sf 37.86% Impervious Runoff Depth=1.74"
Tc=6.0 min CN=61 Runoff=0.27 cfs 902 cf

Subcatchment P3: CB3 Runoff Area=7,310 sf 63.73% Impervious Runoff Depth=3.13"
Tc=6.0 min CN=77 Runoff=0.60 cfs 1,908 cf

Subcatchment P4: CB4 Runoff Area=27,482 sf 28.14% Impervious Runoff Depth=1.02"
Tc=6.0 min CN=51 Runoff=0.57 cfs 2,332 cf

Subcatchment P5: CB5 Runoff Area=6,260 sf 55.38% Impervious Runoff Depth=2.85"
Tc=6.0 min CN=74 Runoff=0.47 cfs 1,488 cf

Subcatchment P6: CB6 Runoff Area=6,087 sf 89.63% Impervious Runoff Depth=4.68"
Tc=6.0 min CN=92 Runoff=0.71 cfs 2,372 cf

Subcatchment P7: CB7 Runoff Area=13,769 sf 66.11% Impervious Runoff Depth=3.23"
Tc=6.0 min CN=78 Runoff=1.17 cfs 3,704 cf

Subcatchment P8: CB8 Runoff Area=15,913 sf 27.36% Impervious Runoff Depth=1.44"
Flow Length=316' Tc=9.1 min UI Adjusted CN=57 Runoff=0.49 cfs 1,908 cf

Subcatchment P9: CB9 Runoff Area=2,472 sf 73.50% Impervious Runoff Depth=4.14"
Tc=6.0 min CN=87 Runoff=0.26 cfs 852 cf

Subcatchment R1: 1-A1 Runoff Area=2,103 sf 100.00% Impervious Runoff Depth=5.36"
Tc=6.0 min CN=98 Runoff=0.26 cfs 940 cf

Subcatchment R10: 10-C2 Runoff Area=1,628 sf 100.00% Impervious Runoff Depth=5.36"
Tc=6.0 min CN=98 Runoff=0.20 cfs 727 cf

Subcatchment R11: 11-B2 Runoff Area=2,242 sf 100.00% Impervious Runoff Depth=5.36"
Tc=6.0 min CN=98 Runoff=0.28 cfs 1,002 cf

Subcatchment R12: 12-B1 Runoff Area=1,509 sf 100.00% Impervious Runoff Depth=5.36"
Tc=6.0 min CN=98 Runoff=0.19 cfs 674 cf

Subcatchment R13: 13-A1 Runoff Area=2,103 sf 100.00% Impervious Runoff Depth=5.36"
Tc=6.0 min CN=98 Runoff=0.26 cfs 940 cf

Subcatchment R14: 14-B2 Runoff Area=2,242 sf 100.00% Impervious Runoff Depth=5.36"
Tc=6.0 min CN=98 Runoff=0.28 cfs 1,002 cf

Subcatchment R15: 15-B1 Runoff Area=1,509 sf 100.00% Impervious Runoff Depth=5.36"
Tc=6.0 min CN=98 Runoff=0.19 cfs 674 cf

Subcatchment R16: 16-B2 Runoff Area=2,242 sf 100.00% Impervious Runoff Depth=5.36"
Tc=6.0 min CN=98 Runoff=0.28 cfs 1,002 cf

Subcatchment R17: 17-B1 Runoff Area=1,509 sf 100.00% Impervious Runoff Depth=5.36"
Tc=6.0 min CN=98 Runoff=0.19 cfs 674 cf

Subcatchment R18: 18-B2 Runoff Area=2,242 sf 100.00% Impervious Runoff Depth=5.36"
Tc=6.0 min CN=98 Runoff=0.28 cfs 1,002 cf

Subcatchment R19: 19-B1 Runoff Area=1,509 sf 100.00% Impervious Runoff Depth=5.36"
Tc=6.0 min CN=98 Runoff=0.19 cfs 674 cf

Subcatchment R2: 2-A1 Runoff Area=2,103 sf 100.00% Impervious Runoff Depth=5.36"
Tc=6.0 min CN=98 Runoff=0.26 cfs 940 cf

Subcatchment R20: 20-B2 Runoff Area=2,242 sf 100.00% Impervious Runoff Depth=5.36"
Tc=6.0 min CN=98 Runoff=0.28 cfs 1,002 cf

Subcatchment R21: 21-E Runoff Area=1,363 sf 100.00% Impervious Runoff Depth=5.36"
Tc=6.0 min CN=98 Runoff=0.17 cfs 609 cf

Subcatchment R22: 22-D Runoff Area=1,718 sf 100.00% Impervious Runoff Depth=5.36"
Tc=6.0 min CN=98 Runoff=0.21 cfs 768 cf

Subcatchment R23: 23-B1 Runoff Area=1,509 sf 100.00% Impervious Runoff Depth=5.36"
Tc=6.0 min CN=98 Runoff=0.19 cfs 674 cf

Subcatchment R24: 24-B2 Runoff Area=2,242 sf 100.00% Impervious Runoff Depth=5.36"
Tc=6.0 min CN=98 Runoff=0.28 cfs 1,002 cf

Subcatchment R25: 25-A1 Runoff Area=2,103 sf 100.00% Impervious Runoff Depth=5.36"
Tc=6.0 min CN=98 Runoff=0.26 cfs 940 cf

Subcatchment R26: 26-A1 Runoff Area=2,103 sf 100.00% Impervious Runoff Depth=5.36"
Tc=6.0 min CN=98 Runoff=0.26 cfs 940 cf

Subcatchment R27: 27-B2 Runoff Area=2,242 sf 100.00% Impervious Runoff Depth=5.36"
Tc=6.0 min CN=98 Runoff=0.28 cfs 1,002 cf

Subcatchment R28: 28-B2 Runoff Area=2,242 sf 100.00% Impervious Runoff Depth=5.36"
Tc=6.0 min CN=98 Runoff=0.28 cfs 1,002 cf

Subcatchment R29: 29-A1 Runoff Area=2,103 sf 100.00% Impervious Runoff Depth=5.36"
Tc=6.0 min CN=98 Runoff=0.26 cfs 940 cf

Subcatchment R3: 3-A3 Runoff Area=2,004 sf 100.00% Impervious Runoff Depth=5.36"
Tc=6.0 min CN=98 Runoff=0.25 cfs 896 cf

Subcatchment R30: 30-A2 Runoff Area=1,912 sf 100.00% Impervious Runoff Depth=5.36"
Tc=6.0 min CN=98 Runoff=0.24 cfs 854 cf

Subcatchment R31: 31-E Runoff Area=1,363 sf 100.00% Impervious Runoff Depth=5.36"
Tc=6.0 min CN=98 Runoff=0.17 cfs 609 cf

Subcatchment R32: 32-D Runoff Area=1,718 sf 100.00% Impervious Runoff Depth=5.36"
Tc=6.0 min CN=98 Runoff=0.21 cfs 768 cf

Subcatchment R33: 33-C1 Runoff Area=1,270 sf 100.00% Impervious Runoff Depth=5.36"
Tc=6.0 min CN=98 Runoff=0.16 cfs 568 cf

Subcatchment R34: 34-C2 Runoff Area=1,628 sf 100.00% Impervious Runoff Depth=5.36"
Tc=6.0 min CN=98 Runoff=0.20 cfs 727 cf

Subcatchment R35: 35-B2 Runoff Area=2,242 sf 100.00% Impervious Runoff Depth=5.36"
Tc=6.0 min CN=98 Runoff=0.28 cfs 1,002 cf

Subcatchment R36: 36-B1 Runoff Area=1,509 sf 100.00% Impervious Runoff Depth=5.36"
Tc=6.0 min CN=98 Runoff=0.19 cfs 674 cf

Subcatchment R37: 37-ANR Runoff Area=2,886 sf 100.00% Impervious Runoff Depth=5.36"
Tc=6.0 min CN=98 Runoff=0.35 cfs 1,290 cf

Subcatchment R4: 4-A2 Runoff Area=1,912 sf 100.00% Impervious Runoff Depth=5.36"
Tc=6.0 min CN=98 Runoff=0.24 cfs 854 cf

Subcatchment R5: 5-A3 Runoff Area=2,004 sf 100.00% Impervious Runoff Depth=5.36"
Tc=6.0 min CN=98 Runoff=0.25 cfs 896 cf

Subcatchment R6: 6-A1 Runoff Area=2,103 sf 100.00% Impervious Runoff Depth=5.36"
Tc=6.0 min CN=98 Runoff=0.26 cfs 940 cf

Subcatchment R7: 7-C2 Runoff Area=1,628 sf 100.00% Impervious Runoff Depth=5.36"
Tc=6.0 min CN=98 Runoff=0.20 cfs 727 cf

Subcatchment R8: 8-C1 Runoff Area=1,270 sf 100.00% Impervious Runoff Depth=5.36"
Tc=6.0 min CN=98 Runoff=0.16 cfs 568 cf

Subcatchment R9: 9-C1 Runoff Area=1,270 sf 100.00% Impervious Runoff Depth=5.36"
Tc=6.0 min CN=98 Runoff=0.16 cfs 568 cf

Pond 1: CB1 Peak Elev=151.25' Inflow=0.34 cfs 1,083 cf
12.0" Round Culvert n=0.012 L=5.0' S=0.0200 '/' Outflow=0.34 cfs 1,083 cf

Pond 1P: 4500 1R8C Peak Elev=148.68' Storage=648 cf Inflow=0.61 cfs 1,985 cf
Discarded=0.08 cfs 1,985 cf Primary=0.00 cfs 0 cf Outflow=0.08 cfs 1,985 cf

Pond 2: CB2 Peak Elev=151.23' Inflow=0.27 cfs 902 cf
12.0" Round Culvert n=0.012 L=10.0' S=0.0100 '/' Outflow=0.27 cfs 902 cf

Pond 2P: 4500 2R10C Peak Elev=140.28' Storage=1,408 cf Inflow=1.33 cfs 4,821 cf
Discarded=0.18 cfs 4,821 cf Primary=0.00 cfs 0 cf Outflow=0.18 cfs 4,821 cf

Pond 3: CB3 Peak Elev=140.09' Inflow=0.60 cfs 1,908 cf
12.0" Round Culvert n=0.012 L=10.0' S=0.0200 '/' Outflow=0.60 cfs 1,908 cf

Pond 3P: 4500 2R17C Peak Elev=135.80' Storage=1,720 cf Inflow=1.63 cfs 6,548 cf
Discarded=0.28 cfs 6,548 cf Primary=0.00 cfs 0 cf Outflow=0.28 cfs 6,548 cf

Pond 4: CB4 Peak Elev=140.08' Inflow=0.57 cfs 2,332 cf
12.0" Round Culvert n=0.012 L=10.0' S=0.0200 '/' Outflow=0.57 cfs 2,332 cf

Pond 4P: 4500 2R10C Peak Elev=128.17' Storage=961 cf Inflow=1.25 cfs 4,501 cf
Discarded=0.33 cfs 4,501 cf Primary=0.00 cfs 0 cf Outflow=0.33 cfs 4,501 cf

Pond 5: CB5 Peak Elev=129.84' Inflow=0.47 cfs 1,488 cf
12.0" Round Culvert n=0.012 L=20.0' S=0.0200 '/' Outflow=0.47 cfs 1,488 cf

Pond 5P: 3500 2R10C Peak Elev=128.51' Storage=1,493 cf Inflow=1.47 cfs 5,083 cf
Discarded=0.23 cfs 5,083 cf Primary=0.00 cfs 0 cf Outflow=0.23 cfs 5,083 cf

Pond 6: CB6 Peak Elev=130.42' Inflow=0.71 cfs 2,372 cf
12.0" Round Culvert n=0.012 L=40.0' S=0.0200 '/' Outflow=0.71 cfs 2,372 cf

Pond 6P: 4500 4R6C Peak Elev=129.68' Storage=1,691 cf Inflow=1.63 cfs 5,952 cf
Discarded=0.22 cfs 5,952 cf Primary=0.00 cfs 0 cf Outflow=0.22 cfs 5,952 cf

Pond 7: CB7 Peak Elev=130.33' Inflow=1.17 cfs 3,704 cf
12.0" Round Culvert n=0.012 L=5.0' S=0.0200 '/' Outflow=1.17 cfs 3,704 cf

Pond 7P: 4500 3R10C Peak Elev=133.08' Storage=2,408 cf Inflow=2.15 cfs 7,858 cf
Discarded=0.26 cfs 7,858 cf Primary=0.00 cfs 0 cf Outflow=0.26 cfs 7,858 cf

Pond 8P: 4500 2R9C Peak Elev=130.80' Storage=1,462 cf Inflow=1.34 cfs 4,534 cf
Discarded=0.16 cfs 4,534 cf Primary=0.00 cfs 0 cf Outflow=0.16 cfs 4,534 cf

Pond 9P: 4500 1R9C Peak Elev=130.27' Storage=1,021 cf Inflow=0.84 cfs 3,053 cf
Discarded=0.08 cfs 3,051 cf Primary=0.00 cfs 2 cf Outflow=0.08 cfs 3,053 cf

Pond 11: CB11 Peak Elev=137.83' Inflow=0.72 cfs 2,274 cf
12.0" Round Culvert n=0.012 L=10.0' S=0.0200 '/' Outflow=0.72 cfs 2,274 cf

Pond 12: CB12 Peak Elev=137.81' Inflow=0.65 cfs 2,979 cf
12.0" Round Culvert n=0.012 L=10.0' S=0.0200 '/' Outflow=0.65 cfs 2,979 cf

Pond 12P: CB14 Peak Elev=129.84' Inflow=0.47 cfs 2,092 cf
12.0" Round Culvert n=0.012 L=24.0' S=0.0200 '/' Outflow=0.47 cfs 2,092 cf

Pond 13: CB13 Peak Elev=130.00' Inflow=0.34 cfs 1,379 cf
12.0" Round Culvert n=0.012 L=5.0' S=0.0200 '/' Outflow=0.34 cfs 1,379 cf

Pond 15: CB15 Peak Elev=134.46' Inflow=0.81 cfs 2,592 cf
12.0" Round Culvert n=0.012 L=10.0' S=0.0300 '/' Outflow=0.81 cfs 2,592 cf

Pond A: DMHA Peak Elev=150.64' Inflow=0.61 cfs 1,985 cf
12.0" Round Culvert n=0.012 L=10.0' S=0.0250 '/' Outflow=0.61 cfs 1,985 cf

Pond C: DMH C Peak Elev=149.37' Inflow=0.00 cfs 0 cf
12.0" Round Culvert n=0.012 L=124.0' S=0.0550 '/' Outflow=0.00 cfs 0 cf

Pond D: DMH D Peak Elev=142.45' Inflow=0.00 cfs 0 cf
12.0" Round Culvert n=0.012 L=25.0' S=0.0280 '/' Outflow=0.00 cfs 0 cf

Pond E: DMH-6P Peak Elev=129.54' Inflow=1.63 cfs 5,952 cf
12.0" Round Culvert n=0.012 L=25.0' S=0.0200 '/' Outflow=1.63 cfs 5,952 cf

Pond F: 6P OVERFLOW Peak Elev=0.00'
12.0" Round Culvert n=0.012 L=25.0' S=0.0200 '/' Primary=0.00 cfs 0 cf

Pond H: DMH-H Peak Elev=139.96' Inflow=1.17 cfs 4,240 cf
12.0" Round Culvert n=0.012 L=25.0' S=0.0300 '/' Outflow=1.17 cfs 4,240 cf

Pond K: DMHK Peak Elev=130.24' Inflow=1.47 cfs 5,083 cf
12.0" Round Culvert n=0.012 L=35.0' S=0.0200 '/' Outflow=1.47 cfs 5,083 cf

Pond RD1: 4500 1R1C Peak Elev=4.99' Storage=333 cf Inflow=0.26 cfs 940 cf
Outflow=0.02 cfs 940 cf

Pond RD1112: 4500 1R3C Peak Elev=4.80' Storage=602 cf Inflow=0.46 cfs 1,676 cf
Outflow=0.04 cfs 1,676 cf

Pond RD13: 4500 1R1C Peak Elev=4.99' Storage=333 cf Inflow=0.26 cfs 940 cf
Outflow=0.02 cfs 940 cf

Pond RD14+: 4500 1R3C Peak Elev=4.39' Storage=554 cf Inflow=0.41 cfs 1,557 cf
Outflow=0.04 cfs 1,557 cf

Pond RD15+: 3500 2R3C Peak Elev=3.23' Storage=904 cf Inflow=0.74 cfs 2,893 cf
Outflow=0.08 cfs 2,893 cf

Pond RD2: 4500 1R1C Peak Elev=4.99' Storage=333 cf Inflow=0.26 cfs 940 cf
Outflow=0.02 cfs 940 cf

Pond RD20+: 3500 2R3C Peak Elev=3.02' Storage=846 cf Inflow=0.74 cfs 2,678 cf
Outflow=0.08 cfs 2,678 cf

Pond RD25: 4500 1R1C Peak Elev=133.24' Storage=333 cf Inflow=0.26 cfs 940 cf
Outflow=0.02 cfs 940 cf

Pond RD3: 4500 1R1C Peak Elev=4.62' Storage=311 cf Inflow=0.25 cfs 896 cf
Outflow=0.02 cfs 896 cf

Pond RD37: 4500 1R2C Peak Elev=4.76' Storage=458 cf Inflow=0.35 cfs 1,290 cf
Outflow=0.03 cfs 1,290 cf

Pond RD4: 4500 1R1C Peak Elev=4.30' Storage=290 cf Inflow=0.24 cfs 854 cf
Outflow=0.02 cfs 854 cf

Pond RD5: 4500 1R1C Peak Elev=4.62' Storage=311 cf Inflow=0.25 cfs 896 cf
Outflow=0.02 cfs 896 cf

Pond RD6: 4500 1R1C Peak Elev=4.99' Storage=333 cf Inflow=0.26 cfs 940 cf
Outflow=0.02 cfs 940 cf

Link 1L: Onsite To Isolated Vegetated wetland Inflow=0.27 cfs 1,827 cf
Primary=0.27 cfs 1,827 cf

Link 2L: Offsite to Hghland Street catch basins Inflow=0.24 cfs 850 cf
Primary=0.24 cfs 850 cf

Link 3L: Onsite to southeast Low point alon Main delayed by 6.0 min Inflow=0.13 cfs 1,152 cf
Primary=0.13 cfs 1,152 cf

Link 4L: To SW Property Corner along Main Street Inflow=0.01 cfs 155 cf
Primary=0.01 cfs 155 cf

Total Runoff Area = 357,132 sf Runoff Volume = 65,757 cf Average Runoff Depth = 2.21"
60.51% Pervious = 216,094 sf 39.49% Impervious = 141,038 sf

Time span=0.00-40.00 hrs, dt=0.05 hrs, 801 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 H1: YARDS 1 & 2 Runoff Area=5,593 sf 26.69% Impervious Runoff Depth=1.81"
Tc=6.0 min CN=55 Runoff=0.25 cfs 845 cf

Subcatchment H2: YARD ANR Runoff Area=1,778 sf 36.33% Impervious Runoff Depth=2.26"
Tc=6.0 min CN=60 Runoff=0.10 cfs 334 cf

Subcatchment M1: TO SW PL Runoff Area=4,423 sf 0.00% Impervious Runoff Depth=0.13"
Tc=6.0 min CN=30 Runoff=0.00 cfs 49 cf

Subcatchment M2: TO SW PL Runoff Area=5,038 sf 0.00% Impervious Runoff Depth=0.60"
Tc=6.0 min CN=39 Runoff=0.03 cfs 251 cf

Subcatchment M3: Park Area Low Point Runoff Area=31,924 sf 7.63% Impervious Runoff Depth=0.73"
Flow Length=150' Slope=0.0200 '/' Tc=9.0 min CN=41 Runoff=0.28 cfs 1,938 cf

Subcatchment P1: CB1 Runoff Area=5,217 sf 53.29% Impervious Runoff Depth=3.21"
Tc=6.0 min CN=70 Runoff=0.44 cfs 1,394 cf

Subcatchment P10: CB10 Runoff Area=6,285 sf 47.97% Impervious Runoff Depth=4.13"
Tc=6.0 min CN=79 Runoff=0.68 cfs 2,163 cf

Subcatchment P11: CB11 Runoff Area=8,207 sf 65.64% Impervious Runoff Depth=4.13"
Tc=6.0 min CN=79 Runoff=0.89 cfs 2,824 cf

Subcatchment P12: CB12 Runoff Area=35,107 sf 25.33% Impervious Runoff Depth=1.48"
Flow Length=316' Tc=9.1 min CN=51 Runoff=1.05 cfs 4,323 cf

Subcatchment P13: CB11 Runoff Area=12,793 sf 1.97% Impervious Runoff Depth=1.81"
Flow Length=316' Tc=9.1 min CN=55 Runoff=0.50 cfs 1,933 cf

Subcatchment P14: CB14 Runoff Area=28,247 sf 2.36% Impervious Runoff Depth=1.32"
Tc=6.0 min CN=49 Runoff=0.80 cfs 3,099 cf

Subcatchment P15: CB15 Runoff Area=13,422 sf 49.79% Impervious Runoff Depth=3.01"
Tc=6.0 min CN=68 Runoff=1.06 cfs 3,367 cf

Subcatchment P16: Lawn A.D. 1 Runoff Area=3,825 sf 0.00% Impervious Runoff Depth=2.35"
Flow Length=150' Tc=8.8 min CN=61 Runoff=0.21 cfs 748 cf

Subcatchment P17: Lawn A.D. 2 Runoff Area=6,392 sf 0.00% Impervious Runoff Depth=1.48"
Flow Length=170' Slope=0.0200 '/' Tc=9.2 min CN=51 Runoff=0.19 cfs 787 cf

Subcatchment P18: TO IVW Runoff Area=33,851 sf 0.95% Impervious Runoff Depth=1.01"
Flow Length=296' Tc=9.6 min CN=45 Runoff=0.54 cfs 2,850 cf

Subcatchment P2: CB2 Runoff Area=6,210 sf 37.86% Impervious Runoff Depth=2.35"
Tc=6.0 min CN=61 Runoff=0.37 cfs 1,215 cf

Subcatchment P3: CB3 Runoff Area=7,310 sf 63.73% Impervious Runoff Depth=3.92"
Tc=6.0 min CN=77 Runoff=0.75 cfs 2,387 cf

Subcatchment P4: CB4 Runoff Area=27,482 sf 28.14% Impervious Runoff Depth=1.48"
Tc=6.0 min CN=51 Runoff=0.92 cfs 3,384 cf

Subcatchment P5: CB5 Runoff Area=6,260 sf 55.38% Impervious Runoff Depth=3.61"
Tc=6.0 min CN=74 Runoff=0.60 cfs 1,883 cf

Subcatchment P6: CB6 Runoff Area=6,087 sf 89.63% Impervious Runoff Depth=5.56"
Tc=6.0 min CN=92 Runoff=0.83 cfs 2,821 cf

Subcatchment P7: CB7 Runoff Area=13,769 sf 66.11% Impervious Runoff Depth=4.02"
Tc=6.0 min CN=78 Runoff=1.46 cfs 4,617 cf

Subcatchment P8: CB8 Runoff Area=15,913 sf 27.36% Impervious Runoff Depth=1.99"
Flow Length=316' Tc=9.1 min UI Adjusted CN=57 Runoff=0.70 cfs 2,635 cf

Subcatchment P9: CB9 Runoff Area=2,472 sf 73.50% Impervious Runoff Depth=5.00"
Tc=6.0 min CN=87 Runoff=0.31 cfs 1,029 cf

Subcatchment R1: 1-A1 Runoff Area=2,103 sf 100.00% Impervious Runoff Depth=6.26"
Tc=6.0 min CN=98 Runoff=0.30 cfs 1,097 cf

Subcatchment R10: 10-C2 Runoff Area=1,628 sf 100.00% Impervious Runoff Depth=6.26"
Tc=6.0 min CN=98 Runoff=0.23 cfs 849 cf

Subcatchment R11: 11-B2 Runoff Area=2,242 sf 100.00% Impervious Runoff Depth=6.26"
Tc=6.0 min CN=98 Runoff=0.32 cfs 1,170 cf

Subcatchment R12: 12-B1 Runoff Area=1,509 sf 100.00% Impervious Runoff Depth=6.26"
Tc=6.0 min CN=98 Runoff=0.22 cfs 787 cf

Subcatchment R13: 13-A1 Runoff Area=2,103 sf 100.00% Impervious Runoff Depth=6.26"
Tc=6.0 min CN=98 Runoff=0.30 cfs 1,097 cf

Subcatchment R14: 14-B2 Runoff Area=2,242 sf 100.00% Impervious Runoff Depth=6.26"
Tc=6.0 min CN=98 Runoff=0.32 cfs 1,170 cf

Subcatchment R15: 15-B1 Runoff Area=1,509 sf 100.00% Impervious Runoff Depth=6.26"
Tc=6.0 min CN=98 Runoff=0.22 cfs 787 cf

Subcatchment R16: 16-B2 Runoff Area=2,242 sf 100.00% Impervious Runoff Depth=6.26"
Tc=6.0 min CN=98 Runoff=0.32 cfs 1,170 cf

Subcatchment R17: 17-B1 Runoff Area=1,509 sf 100.00% Impervious Runoff Depth=6.26"
Tc=6.0 min CN=98 Runoff=0.22 cfs 787 cf

Subcatchment R18: 18-B2 Runoff Area=2,242 sf 100.00% Impervious Runoff Depth=6.26"
Tc=6.0 min CN=98 Runoff=0.32 cfs 1,170 cf

Subcatchment R19: 19-B1 Runoff Area=1,509 sf 100.00% Impervious Runoff Depth=6.26"
Tc=6.0 min CN=98 Runoff=0.22 cfs 787 cf

Subcatchment R2: 2-A1 Runoff Area=2,103 sf 100.00% Impervious Runoff Depth=6.26"
Tc=6.0 min CN=98 Runoff=0.30 cfs 1,097 cf

Subcatchment R20: 20-B2 Runoff Area=2,242 sf 100.00% Impervious Runoff Depth=6.26"
Tc=6.0 min CN=98 Runoff=0.32 cfs 1,170 cf

Subcatchment R21: 21-E Runoff Area=1,363 sf 100.00% Impervious Runoff Depth=6.26"
Tc=6.0 min CN=98 Runoff=0.19 cfs 711 cf

Subcatchment R22: 22-D Runoff Area=1,718 sf 100.00% Impervious Runoff Depth=6.26"
Tc=6.0 min CN=98 Runoff=0.25 cfs 896 cf

Subcatchment R23: 23-B1 Runoff Area=1,509 sf 100.00% Impervious Runoff Depth=6.26"
Tc=6.0 min CN=98 Runoff=0.22 cfs 787 cf

Subcatchment R24: 24-B2 Runoff Area=2,242 sf 100.00% Impervious Runoff Depth=6.26"
Tc=6.0 min CN=98 Runoff=0.32 cfs 1,170 cf

Subcatchment R25: 25-A1 Runoff Area=2,103 sf 100.00% Impervious Runoff Depth=6.26"
Tc=6.0 min CN=98 Runoff=0.30 cfs 1,097 cf

Subcatchment R26: 26-A1 Runoff Area=2,103 sf 100.00% Impervious Runoff Depth=6.26"
Tc=6.0 min CN=98 Runoff=0.30 cfs 1,097 cf

Subcatchment R27: 27-B2 Runoff Area=2,242 sf 100.00% Impervious Runoff Depth=6.26"
Tc=6.0 min CN=98 Runoff=0.32 cfs 1,170 cf

Subcatchment R28: 28-B2 Runoff Area=2,242 sf 100.00% Impervious Runoff Depth=6.26"
Tc=6.0 min CN=98 Runoff=0.32 cfs 1,170 cf

Subcatchment R29: 29-A1 Runoff Area=2,103 sf 100.00% Impervious Runoff Depth=6.26"
Tc=6.0 min CN=98 Runoff=0.30 cfs 1,097 cf

Subcatchment R3: 3-A3 Runoff Area=2,004 sf 100.00% Impervious Runoff Depth=6.26"
Tc=6.0 min CN=98 Runoff=0.29 cfs 1,046 cf

Subcatchment R30: 30-A2 Runoff Area=1,912 sf 100.00% Impervious Runoff Depth=6.26"
Tc=6.0 min CN=98 Runoff=0.27 cfs 998 cf

Subcatchment R31: 31-E Runoff Area=1,363 sf 100.00% Impervious Runoff Depth=6.26"
Tc=6.0 min CN=98 Runoff=0.19 cfs 711 cf

Subcatchment R32: 32-D Runoff Area=1,718 sf 100.00% Impervious Runoff Depth=6.26"
Tc=6.0 min CN=98 Runoff=0.25 cfs 896 cf

Subcatchment R33: 33-C1 Runoff Area=1,270 sf 100.00% Impervious Runoff Depth=6.26"
Tc=6.0 min CN=98 Runoff=0.18 cfs 663 cf

Subcatchment R34: 34-C2 Runoff Area=1,628 sf 100.00% Impervious Runoff Depth=6.26"
Tc=6.0 min CN=98 Runoff=0.23 cfs 849 cf

Subcatchment R35: 35-B2 Runoff Area=2,242 sf 100.00% Impervious Runoff Depth=6.26"
Tc=6.0 min CN=98 Runoff=0.32 cfs 1,170 cf

Subcatchment R36: 36-B1 Runoff Area=1,509 sf 100.00% Impervious Runoff Depth=6.26"
Tc=6.0 min CN=98 Runoff=0.22 cfs 787 cf

Subcatchment R37: 37-ANR Runoff Area=2,886 sf 100.00% Impervious Runoff Depth=6.26"
Tc=6.0 min CN=98 Runoff=0.41 cfs 1,506 cf

Subcatchment R4: 4-A2 Runoff Area=1,912 sf 100.00% Impervious Runoff Depth=6.26"
Tc=6.0 min CN=98 Runoff=0.27 cfs 998 cf

Subcatchment R5: 5-A3 Runoff Area=2,004 sf 100.00% Impervious Runoff Depth=6.26"
Tc=6.0 min CN=98 Runoff=0.29 cfs 1,046 cf

Subcatchment R6: 6-A1 Runoff Area=2,103 sf 100.00% Impervious Runoff Depth=6.26"
Tc=6.0 min CN=98 Runoff=0.30 cfs 1,097 cf

Subcatchment R7: 7-C2 Runoff Area=1,628 sf 100.00% Impervious Runoff Depth=6.26"
Tc=6.0 min CN=98 Runoff=0.23 cfs 849 cf

Subcatchment R8: 8-C1 Runoff Area=1,270 sf 100.00% Impervious Runoff Depth=6.26"
Tc=6.0 min CN=98 Runoff=0.18 cfs 663 cf

Subcatchment R9: 9-C1 Runoff Area=1,270 sf 100.00% Impervious Runoff Depth=6.26"
Tc=6.0 min CN=98 Runoff=0.18 cfs 663 cf

Pond 1: CB1 Peak Elev=151.30' Inflow=0.44 cfs 1,394 cf
12.0" Round Culvert n=0.012 L=5.0' S=0.0200 '/' Outflow=0.44 cfs 1,394 cf

Pond 1P: 4500 1R8C Peak Elev=149.83' Storage=984 cf Inflow=0.81 cfs 2,609 cf
Discarded=0.08 cfs 2,609 cf Primary=0.00 cfs 0 cf Outflow=0.08 cfs 2,609 cf

Pond 2: CB2 Peak Elev=151.28' Inflow=0.37 cfs 1,215 cf
12.0" Round Culvert n=0.012 L=10.0' S=0.0100 '/' Outflow=0.37 cfs 1,215 cf

Pond 2P: 4500 2R10C Peak Elev=140.76' Storage=1,747 cf Inflow=1.54 cfs 5,629 cf
Discarded=0.18 cfs 5,629 cf Primary=0.00 cfs 0 cf Outflow=0.18 cfs 5,629 cf

Pond 3: CB3 Peak Elev=140.15' Inflow=0.75 cfs 2,387 cf
12.0" Round Culvert n=0.012 L=10.0' S=0.0200 '/' Outflow=0.75 cfs 2,387 cf

Pond 3P: 4500 2R17C Peak Elev=136.71' Storage=2,785 cf Inflow=2.25 cfs 8,659 cf
Discarded=0.28 cfs 8,659 cf Primary=0.00 cfs 0 cf Outflow=0.28 cfs 8,659 cf

Pond 4: CB4 Peak Elev=140.21' Inflow=0.92 cfs 3,384 cf
12.0" Round Culvert n=0.012 L=10.0' S=0.0200 '/' Outflow=0.92 cfs 3,384 cf

Pond 4P: 4500 2R10C Peak Elev=128.57' Storage=1,529 cf Inflow=1.64 cfs 5,828 cf
Discarded=0.33 cfs 5,828 cf Primary=0.00 cfs 0 cf Outflow=0.33 cfs 5,828 cf

Pond 5: CB5 Peak Elev=129.89' Inflow=0.60 cfs 1,883 cf
12.0" Round Culvert n=0.012 L=20.0' S=0.0200 '/' Outflow=0.60 cfs 1,883 cf

Pond 5P: 3500 2R10C Peak Elev=129.30' Storage=2,224 cf Inflow=1.91 cfs 6,550 cf
Discarded=0.23 cfs 6,550 cf Primary=0.00 cfs 0 cf Outflow=0.23 cfs 6,550 cf

Pond 6: CB6 Peak Elev=130.46' Inflow=0.83 cfs 2,821 cf
12.0" Round Culvert n=0.012 L=40.0' S=0.0200 '/' Outflow=0.83 cfs 2,821 cf

Pond 6P: 4500 4R6C Peak Elev=130.75' Storage=2,642 cf Inflow=2.22 cfs 7,804 cf
Discarded=0.22 cfs 7,804 cf Primary=0.00 cfs 0 cf Outflow=0.22 cfs 7,804 cf

Pond 7: CB7 Peak Elev=130.42' Inflow=1.46 cfs 4,617 cf
12.0" Round Culvert n=0.012 L=5.0' S=0.0200 '/' Outflow=1.46 cfs 4,617 cf

Pond 7P: 4500 3R10C Peak Elev=134.19' Storage=3,525 cf Inflow=2.82 cfs 9,996 cf
Discarded=0.26 cfs 9,996 cf Primary=0.00 cfs 0 cf Outflow=0.26 cfs 9,996 cf

Pond 8P: 4500 2R9C Peak Elev=131.69' Storage=2,018 cf Inflow=1.68 cfs 5,634 cf
Discarded=0.16 cfs 5,634 cf Primary=0.00 cfs 0 cf Outflow=0.16 cfs 5,634 cf

Pond 9P: 4500 1R9C Peak Elev=130.49' Storage=1,073 cf Inflow=0.98 cfs 3,565 cf
Discarded=0.08 cfs 3,320 cf Primary=0.23 cfs 244 cf Outflow=0.32 cfs 3,565 cf

Pond 11: CB11 Peak Elev=137.89' Inflow=0.89 cfs 2,824 cf
12.0" Round Culvert n=0.012 L=10.0' S=0.0200 '/' Outflow=0.89 cfs 2,824 cf

Pond 12: CB12 Peak Elev=137.95' Inflow=1.05 cfs 4,323 cf
12.0" Round Culvert n=0.012 L=10.0' S=0.0200 '/' Outflow=1.05 cfs 4,323 cf

Pond 12P: CB14 Peak Elev=129.96' Inflow=0.80 cfs 3,099 cf
12.0" Round Culvert n=0.012 L=24.0' S=0.0200 '/' Outflow=0.80 cfs 3,099 cf

Pond 13: CB13 Peak Elev=130.08' Inflow=0.50 cfs 1,933 cf
12.0" Round Culvert n=0.012 L=5.0' S=0.0200 '/' Outflow=0.50 cfs 1,933 cf

Pond 15: CB15 Peak Elev=134.53' Inflow=1.06 cfs 3,367 cf
12.0" Round Culvert n=0.012 L=10.0' S=0.0300 '/' Outflow=1.06 cfs 3,367 cf

Pond A: DMHA Peak Elev=150.71' Inflow=0.81 cfs 2,609 cf
12.0" Round Culvert n=0.012 L=10.0' S=0.0250 '/' Outflow=0.81 cfs 2,609 cf

Pond C: DMH C Peak Elev=149.37' Inflow=0.00 cfs 0 cf
12.0" Round Culvert n=0.012 L=124.0' S=0.0550 '/' Outflow=0.00 cfs 0 cf

Pond D: DMH D Peak Elev=142.45' Inflow=0.00 cfs 0 cf
12.0" Round Culvert n=0.012 L=25.0' S=0.0280 '/' Outflow=0.00 cfs 0 cf

Pond E: DMH-6P Peak Elev=129.70' Inflow=2.22 cfs 7,804 cf
12.0" Round Culvert n=0.012 L=25.0' S=0.0200 '/' Outflow=2.22 cfs 7,804 cf

Pond F: 6P OVERFLOW Peak Elev=0.00'
12.0" Round Culvert n=0.012 L=25.0' S=0.0200 '/' Primary=0.00 cfs 0 cf

Pond H: DMH-H Peak Elev=140.10' Inflow=1.67 cfs 5,771 cf
12.0" Round Culvert n=0.012 L=25.0' S=0.0300 '/' Outflow=1.67 cfs 5,771 cf

Pond K: DMHK Peak Elev=130.36' Inflow=1.91 cfs 6,550 cf
12.0" Round Culvert n=0.012 L=35.0' S=0.0200 '/' Outflow=1.91 cfs 6,550 cf

Pond RD1: 4500 1R1C Peak Elev=6.62' Storage=412 cf Inflow=0.30 cfs 1,097 cf
Outflow=0.02 cfs 1,097 cf

Pond RD1112: 4500 1R3C Peak Elev=6.44' Storage=745 cf Inflow=0.54 cfs 1,957 cf
Outflow=0.04 cfs 1,957 cf

Pond RD13: 4500 1R1C Peak Elev=6.62' Storage=412 cf Inflow=0.30 cfs 1,097 cf
Outflow=0.02 cfs 1,097 cf

Pond RD14+: 4500 1R3C Peak Elev=6.63' Storage=760 cf Inflow=0.51 cfs 1,918 cf
Outflow=0.04 cfs 1,918 cf

Pond RD15+: 3500 2R3C Peak Elev=4.67' Storage=1,224 cf Inflow=0.91 cfs 3,532 cf
Outflow=0.08 cfs 3,532 cf

Pond RD2: 4500 1R1C Peak Elev=6.62' Storage=412 cf Inflow=0.30 cfs 1,097 cf
Outflow=0.02 cfs 1,097 cf

Pond RD20+: 3500 2R3C Peak Elev=3.79' Storage=1,051 cf Inflow=0.86 cfs 3,127 cf
Outflow=0.08 cfs 3,127 cf

Pond RD25: 4500 1R1C Peak Elev=134.87' Storage=412 cf Inflow=0.30 cfs 1,097 cf
Outflow=0.02 cfs 1,097 cf

Pond RD3: 4500 1R1C Peak Elev=6.03' Storage=384 cf Inflow=0.29 cfs 1,046 cf
Outflow=0.02 cfs 1,046 cf

Pond RD37: 4500 1R2C Peak Elev=6.32' Storage=567 cf Inflow=0.41 cfs 1,506 cf
Outflow=0.03 cfs 1,506 cf

Pond RD4: 4500 1R1C Peak Elev=5.50' Storage=360 cf Inflow=0.27 cfs 998 cf
Outflow=0.02 cfs 998 cf

Pond RD5: 4500 1R1C Peak Elev=6.03' Storage=384 cf Inflow=0.29 cfs 1,046 cf
Outflow=0.02 cfs 1,046 cf

Pond RD6: 4500 1R1C Peak Elev=6.62' Storage=412 cf Inflow=0.30 cfs 1,097 cf
Outflow=0.02 cfs 1,097 cf

Link 1L: Onsite To Isolated Vegetated wetland Inflow=0.54 cfs 2,850 cf
Primary=0.54 cfs 2,850 cf

Link 2L: Offsite to Hghland Street catch basins Inflow=0.35 cfs 1,179 cf
Primary=0.35 cfs 1,179 cf

Link 3L: Onsite to southeast Low point alon Main delayed by 6.0 min Inflow=0.28 cfs 1,938 cf
Primary=0.28 cfs 1,938 cf

Link 4L: To SW Property Corner along Main Street Inflow=0.03 cfs 300 cf
Primary=0.03 cfs 300 cf

Total Runoff Area = 357,132 sf Runoff Volume = 83,156 cf Average Runoff Depth = 2.79"
60.51% Pervious = 216,094 sf 39.49% Impervious = 141,038 sf

2 | *Stormwater Report Compliance Calculations*

2.1 Standard 1 | No Untreated Discharges Or Erosion To Wetlands

Untreated Discharges
To document compliance that new discharges are adequately treated refer to calculations for Standards 4 through 6.

Erosion To Wetlands

The project proposes the filling of up to 5,000 square feet of Isolated Wetlands. Use of Erosion controls, erosion mats and implementation of area drains will be utilized to minimize impacts.

2.2 Standard 2 | Peak Rate Attenuation

Refer to Peak Rate of Runoff table below (see Mitigative Drainage Analysis)

Table 1.0: Peak Rate of Runoff | Comparison Location 1L

Description	**2 Year**	**10 Year**	**25 Year**	**100 Year**	
Existing Peak Rate of Runoff (cfs)	0.00	0.08	0.49	1.28	
Proposed Peak Rate of Runoff (cfs)	0.00	0.08	0.27	0.54	
Difference	**0.00**	**0.00**	**-0.32**	**-0.74**	

Table 2.0: Peak Rate of Runoff | Comparison Location 2L

Description	**2 Year**	**10 Year**	**25 Year**	**100 Year**	
Existing Peak Rate of Runoff (cfs)	0.03	0.20	0.40	0.59	
Proposed Peak Rate of Runoff (cfs)	0.02	0.12	0.24	0.35	
Difference	**-0.01**	**-0.08**	**-0.16**	**-0.24**	

Table 3.0: Peak Rate of Runoff | Comparison Location 3L

Description	**2 Year**	**10 Year**	**25 Year**	**100 Year**	
Existing Peak Rate of Runoff (cfs)	0.00	0.01	0.10	0.24	
Proposed Peak Rate of Runoff (cfs)	0.00	0.02	0.13	0.28	Oval Park Sidewalk
Difference	**0.00**	**+0.01**	**+0.03**	**+0.04**	**In lawn area**

Table 4.0: Peak Rate of Runoff | Comparison Location 4L

Description	**2 Year**	**10 Year**	**25 Year**	**100 Year**	

Existing Peak Rate of Runoff (cfs)	0.00	0.00	0.02	0.08	
Proposed Peak Rate of Runoff (cfs)	0.00	0.00	0.01	0.03	
Difference	**0.00**	**0.00**	**-0.01**	**-0.05**	

Table 5.0: Volume of Runoff | Comparison Location 1L

Description	**2 Year**	**10 Year**	**25 Year**	**100 Year**	
Existing Volume of Runoff (cf)	0	2,283	6,961	12,341	
Proposed Volume of Runoff (cf)	84	835	1,827	2,850	
Difference	**+84**	**-1,448**	**-5,134**	**-9,491**	

Table 6.0: Volume of Runoff | Comparison Location 2L

Description	**2 Year**	**10 Year**	**25 Year**	**100 Year**	
Existing Volume of Runoff (cf)	301	960	1,649	2,295	
Proposed Volume of Runoff (cf)	158	497	850	1,179	
Difference	**-143**	**-463**	**-799**	**-1,116**	

Table 7.0: Volume of Runoff | Comparison Location 3L

Description	**2 Year**	**10 Year**	**25 Year**	**100 Year**	
Existing Volume of Runoff (cf)	0	360	1,097	1,946	
Proposed Volume of Runoff (cf)	9	437	1,152	1,938	To low area East of Oval Sidewalk
Difference	**+9**	**+77**	**+55**	**-8.0**	**In lawn area**

Table 8.0: Volume of Runoff | Comparison Location 4L

Description	**2 Year**	**10 Year**	**25 Year**	**100 Year**	
Existing Volume of Runoff (cf)	0	89	651	1,450	
Proposed Volume of Runoff (cf)	0	46	155	300	
Difference	**0**	**-43**	**-496**	**-1150**	

2.3 Standard 3 | Stormwater Recharge

Recharge Volume:

$R_{v\ required}$ = (Impervious Area)(F)

Site consists of Hydrologic Soils Group A: F_A = 0.60 in.; Group B: F_A = 0.35 in.

***Site Impervious Area Draining to Recharge Facilities*:**

Stormwater Management Area 1P
(SWMA-1P)
$A_{imp\ A\ soils}$ = 5131 ft^2
$R_{v\ required}$ = [(5131)(0.6)/12] = 257 ft^3
Infiltration Chamber (MC-4500 Chamber storage Only below 12″ Standard Outlet Height = 36″)
Storage per Cap at 36″= 29.56 cf; Storage per Chamber at 36″ = 81.21 cf [Table 9 & Table 10]
$V_{wq\ provided}$ = 2 caps + 8 chambers (below 12″ outlet)
$V_{wq\ provided}$ = (2 x 29.56) + (8 x 81.21) = 709 ft^3 [Stormtech MC-4500 Cumulative Storage Values]

709 ft^3 > 257 ft^3 k

Stormwater Management Area 2P
(SWMA-2P)
$A_{imp\ A\ soils}$ = 10,789 ft^2
$R_{v\ required}$ = [(10,789)(0.6)/12] = 540 ft^3
Infiltration Chamber (MC-4500 Chamber storage Only below 12″ Standard Outlet Height = 36″)
Storage per Cap at 36″= 29.56 cf; Storage per Chamber at 36″ = 81.21 cf [Table 9 & Table 10]
$V_{wq\ provided}$ = 4 caps + 20 chambers
$V_{wq\ provided}$ = (4 x 29.56) + (20 x 81.21) = 1,742 ft^3 [Stormtech MC-4500 Cumulative Storage Values]

1,742 ft^3 > 540 ft^3 ok

Stormwater Management Area 3P
$A_{imp\ A\ soils}$ = (CB11=4,211, CB12=7,720, R33=965 & R34=0) = 12,896
$A_{imp\ B\ soils}$ = (CB11=1,176, CB12=718, R33=305 & R34=1,628) =3,827
$R_{v\ required}$ = [(12,896)(0.60)/12] + [(3,827)(0.35)/12]= 757 ft^3
(MC-4500 Chamber storage Only below 12″ Standard Outlet Height = 36″)
Storage per Cap at 36″= 29.56 cf; Storage per Chamber at 36″ = 81.21 cf [Table 9 & Table 10]
$V_{wq\ provided}$ = 4 caps + 34 chambers
$V_{wq\ provided}$ = (4 x 29.56) + (34 x 81.21) = 2,879 ft^3 [Stormtech MC-4500 Cumulative Storage Values]

2,879 ft^3 > 757 ft^3 ok

Stormwater Management Area 4P

$A_{imp\ A\ soils}$ = (CB8=437, CB9=350 & CB10=0) = 787 ft^2
$A_{imp\ B\ soils}$ = (CB8=3,301, CB9=1,467 & CB10= 3,015) = 7,783 ft^2
$R_{v\ required}$ = [(787)(.6)/12] + [(7,783)(0.35)/12] = 267 ft^3
(MC-4500 Chamber storage Only below 12″ Standard Outlet Height = 36″)
Storage per Cap at 36″= 29.56 cf; Storage per Chamber at 36″ = 81.21 cf [Table 9 & Table 10]
$V_{wq\ provided}$ = 4 caps + 36 chambers
$V_{wq\ provided}$ = (4 x 29.56) + (36 x 81.21) = 3,041 ft^3 [Stormtech MC-4500 Cumulative Storage Values]

3,042ft^3 > 267 ft^3 ok

Stormwater Management Area 5P

$A_{imp\ A\ soils}$ = (CB7= 9,056 & CB13=252) = 9,308 ft^2
$A_{imp\ B\ soils}$ = (CB7=46 & CB13=0) = 46 ft^2
$R_{v\ required}$ = [(9,308)(0.6)/12] + [(46)(0.35)/12] = 467 ft^3
(MC-3500 Chamber storage at 24″)
Storage per Cap = 12.53 cf; Storage per Chamber = 76.24 cf [Table 7 & Table 8]
$V_{wq\ provided}$ = 4 caps + 20 chambers
$V_{wq\ provided}$ = (4 x 12.53) + (20 x 76.24) = ft^3 [Stormtech MC-4500 Cumulative Storage Values]

1,575 ft^3 > 467 ft^3 ok

Stormwater Management Area 6P

$A_{imp\ A\ soils}$ = (CB5=3,310 & CB6=5,456 & CB14=667) = 9,433 ft^2
$A_{imp\ B\ soils}$ = (CB5=157, CB6=0 & CB14=0) = 157 ft^2
$R_{v\ required}$ = [(9,433)(0.6)/12] + [(157)(0.35)/12] = 476 ft^3
(MC-4500 Chamber storage Only below 12″ Standard Outlet Height = 36″)
Storage per Cap at 36″= 29.56 cf; Storage per Chamber at 36″ = 81.21 cf [Table 9 & Table 10]
$V_{wq\ provided}$ = 8 caps + 24 chambers
$V_{wq\ provided}$ = (8 x 29.56) + (24 x 81.21) = 2,185 ft^3 [Stormtech MC-4500 Cumulative Storage Values]

2,185 ft^3 > 476 ft^3 ok

Stormwater Management Area 7P

$A_{imp\ A\ soils}$ = (CB3=4,659, CB4=7,733, R28=2,103, R29=2,242, R35=2,242 & R36=1,509) = 20,488 ft^2
$A_{imp\ B\ soils}$ = 0 ft^2
$R_{v\ required}$ = [(20,488)(0.6)/12] =1,025 ft^3
(MC-4500 Chamber storage Only below 12″ Standard Outlet Height = 36″)
Storage per Cap at 36″= 29.56 cf; Storage per Chamber at 36″ = 81.21 cf [Table 9 & Table 10]
$V_{wq\ provided}$ = 6 caps + 30 chambers
$V_{wq\ provided}$ = (6 x 29.56) + (30 x 81.21) = 2614 ft^3 [Stormtech MC-4500 Cumulative Storage Values]

2,614 ft^3 > 1,025 ft^3 ok

Stormwater Management Area 8P

$A_{imp\ A\ soils}$ = (CB15= 6,683, R26=2,103, R27=2,242)=11,028 ft^2
$A_{imp\ B\ soils}$ = 0 ft^2

$R_{v\ required}$ = [(11,028)(0.6)/12] =552 ft^3
(MC-4500 Chamber storage Only below 12″ Standard Outlet Height = 36″)
Storage per Cap at 36″= 29.56 cf; Storage per Chamber at 36″ = 81.21 cf [Table 9 & Table 10]
$V_{wq\ provided}$ = 4 caps + 18 chambers
$V_{wq\ provided}$ = (4 x 29.56) + (18 x 81.21) = 1,580 ft^3 [Stormtech MC-4500 Cumulative Storage Values]

1,580 ft^3 > 552 ft^3 ok

Stormwater Management Area 9P
$A_{imp\ A\ soils}$ = (Roof area Units 21, 22, 23 + 24) = E+ D + B1 + B2
$A_{imp\ A\ soils}$ = (1363 + 1718 + 1509 + 2242) = 6,832 sf
$R_{v\ required}$ = [(6,832)(0.6)/12] = 342 ft^3
(MC-4500 Chamber storage Only below 12″ Standard Outlet Height = 36″)
Storage per Cap at 36″= 29.56 cf; Storage per Chamber at 36″ = 81.21 cf [Table 9 & Table 10]
$V_{wq\ provided}$ = 2 caps + 12 chambers
$V_{wq\ provided}$ = (2 x 29.56) + (12 x 81.21) = 1,033ft^3 [Stormtech MC-4500 Cumulative Storage Values]

1,033 ft^3 > 342 ft^3 ok

Individual Roof Drywells (RD-1,2,3,4,5,6,13,25&37)

Water Quality Volume per Dwelling style – Elise Stone Architect

See Standard 4 – Water Quality

Total Recharge Volume Required

$A_{imp\ total}$ = 139,967 ft^2
$R_{v\ required}$ = [(139,967)(0.60)/12] =6,998 ft^3
Adjusted minimum required recharge volume = [(6998)(1.02)] = 7,138 ft^3

Total Recharge Volume Provided

$R_{v\ provided}$ = >17,359 ft^3 (within SWMA-1P Thru 9P) + additional volume in roof drywells

Capture Area Percentage:
Site impervious areas draining to recharge facilities: 138,132 ft^2
Total impervious area: 139,967
Percent Captured: [(138,132/139,967](100) = 99% > 65%

Drawdown Within 72 Hours:

$T_{drawdown}$ = [$R_{v\ total}$ / (K)(Bottom Area)]

Stormwater Management Area 1P (Drive A STA 1+00)
$R_{v\ 1P}$ = 1,651 ft^3 (100 year water level)
K = 8.27 in/hr (Rawls Rate)
Bottom Area = 406 ft^2 (Bottom Area excluding Isolator Row footprint)

$T_{drawdown}$ = 1651 / [(8.27)(406)/12] = 6.0 hours < 72 hours

Stormwater Management Area 2P
$R_{v\ 1P}$ = 1,747 ft^3 (100 year water level)
K = 8.27 in/hr (Rawls Rate)
Bottom Area = 920 ft^2 (Bottom Area including Isolator Row footprint)
$T_{drawdown}$ = 1747 / [(8.27)(920)/12] = 2.8 hours < 72 hours

Stormwater Management Area 3P
$R_{v\ 1P}$ = 2,785 ft^3 (100 year water level)
K = 8.27 in/hr (Rawls Rate)
Bottom Area = 1,467ft^2 (Bottom Area excludes Isolator Row footprint)
$T_{drawdown}$ = 2,785 / [(8.27)(1467)/12] = 2.80 hours < 72 hours

Stormwater Management Area 4P
$R_{v\ 1P}$ = 1,529 ft^3 (100 year water level)
K = 8.27 in/hr (Rawls Rate)
Bottom Area = 1,702 ft^2 (Bottom Area excluding Isolator Row footprint)
$T_{drawdown}$ = 1529 / [(8.27)(1702)/12] = 1.3 hours < 72 hours

Stormwater Management Area 5P
$R_{v\ 1P}$ = 2,224 ft^3 (100 year water level)
K = 8.27 in/hr (Rawls Rate)
Bottom Area = 1,206 ft^2 (Bottom Area excluding Isolator Row footprint)
$T_{drawdown}$ = 2224 / [(8.27)(1206)/12] = 2.7 hours < 72 hours

Stormwater Management Area 6P
$R_{v\ 1P}$ = 2,642 ft^3 (100 year water level)
K = 8.27 in/hr (Rawls Rate)
Bottom Area = 1,175 ft^2 (Bottom Area excluding Isolator Row footprint)
$T_{drawdown}$ = 2642 / [(8.27)(1175)/12] = 3.3 hours < 72 hours

Stormwater Management Area 7P
$R_{v\ 1P}$ = 3,525 ft^3 (100 year water level)
K = 8.27 in/hr (Rawls Rate)
Bottom Area = 1,350 ft^2 (Bottom Area excluding Isolator Row footprint)
$T_{drawdown}$ = 3525 / [(8.27)(1350)/12] = 3.8 hours < 72 hours

Stormwater Management Area 8P
$R_{v\ 1P}$ = 2,018 ft^3 (100 year water level)
K = 8.27 in/hr (Rawls Rate)
Bottom Area = 842 ft^2 (Bottom Area excluding Isolator Row footprint)
$T_{drawdown}$ = 2,018 / [(8.27)(842)/12] = 3.5 hours < 72 hours

Stormwater Management Area 9P
$R_{v\ 1P}$ = 1,114 ft^3 (100 year water level)
K = 8.27 in/hr (Rawls Rate)
Bottom Area = 573 ft^2 (Bottom Area excluding Isolator Row footprint)
$T_{drawdown}$ = 1,114 / [(8.27)(573)/12] = 3.0 hours < 72 hours

Roof Drywell Area RD1 – 4500 1R1C
$R_{v\ 1P}$ = 413 ft^3 (100 year water level)
K = 8.27 in/hr (Rawls Rate)
Bottom Area = 115 ft^2 (Bottom Area)
$T_{drawdown}$ = 413 / [(8.27)(115)/12] = 5.3 hours < 72 hours

Roof Drywell Area (RD14)
$R_{v\ 1P}$ = 760 ft^3 (100 year water level)
K = 8.27 in/hr (Rawls Rate)
Bottom Area = 198 ft^2 (Bottom Area)
$T_{drawdown}$ = 760 / [(8.27)(198)/12] = 5.6 hours < 72 hours

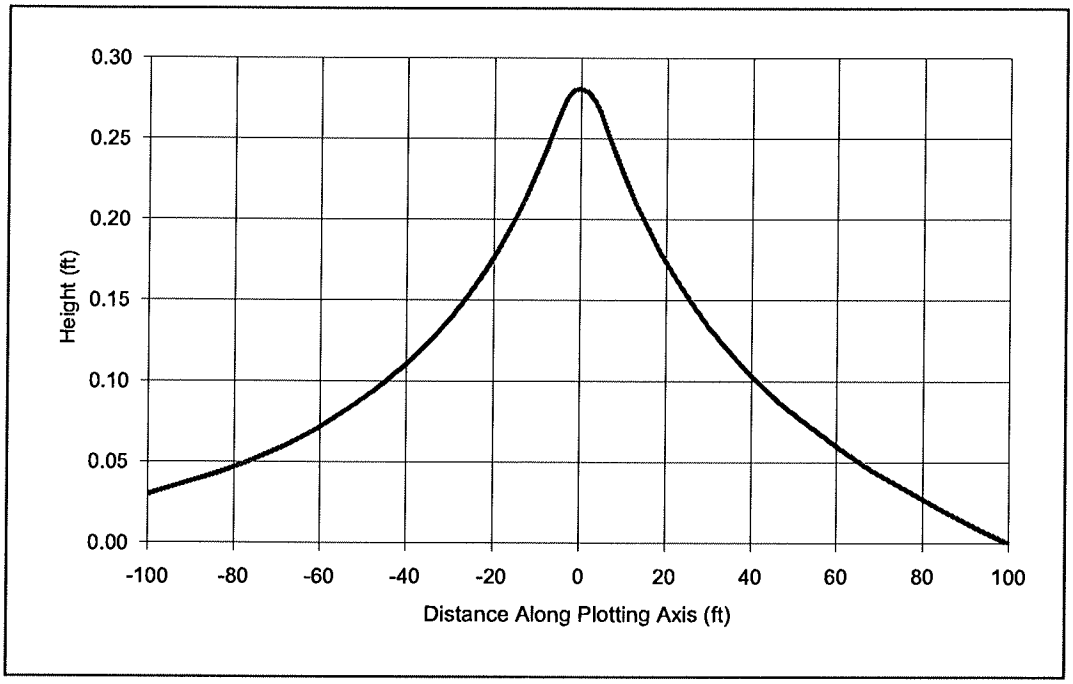
Roof Drywell Area (RD15+)
$R_{v\ 1P}$ = 1,224 ft^3 (100 year water level)
K = 8.27 in/hr (Rawls Rate)
Bottom Area = 424 ft^2 (Bottom Area)
$T_{drawdown}$ = 1224 / [(8.27)(424)/12] = 4.2 hours < 72 hours

Roof Drywell Area (RD20+)
$R_{v\ 1P}$ = 1,114 ft^3 (100 year water level)
K = 8.27 in/hr (Rawls Rate)
Bottom Area = 572 ft^2 (Bottom Area)
$T_{drawdown}$ = 1,114 / [(8.27)(572)/12] = 3.0 hours < 72 hours

Groundwater Mounding:

Mounding Calculation - Appicaton Rate:					
Center & Main				100-yr	Rate of
SWMA	Width	Length	Area	Volume	Application
1P	10.33	39.32	406	984	2.42
2P	19.42	47.37	920	1747	1.90
3P	19.42	74.54	1448	2785	1.92
4P	19.42	87.62	1702	1529	0.90
5P	15.58	77.4	1206	2224	1.84
6P	37.58	31.27	1175	2642	2.25
7P	28.5	47.37	1350	3525	2.61
8P	19.42	43.34	842	2018	2.40
9P	10.33	55.42	572	1073	1.87
RD14	10.33	19.19	198	760	3.83
RD15+	15.58	27.21	424	1224	2.89
RD20+	15.58	27.21	424	1051	2.48

Groundwater Mounding Analysis (Hantush's Method using Glover's Solution)



COMPANY: Williams & Sparages LLC

PROJECT: SWMA1P - Center & Main

ANALYST: Richard J. Harrington

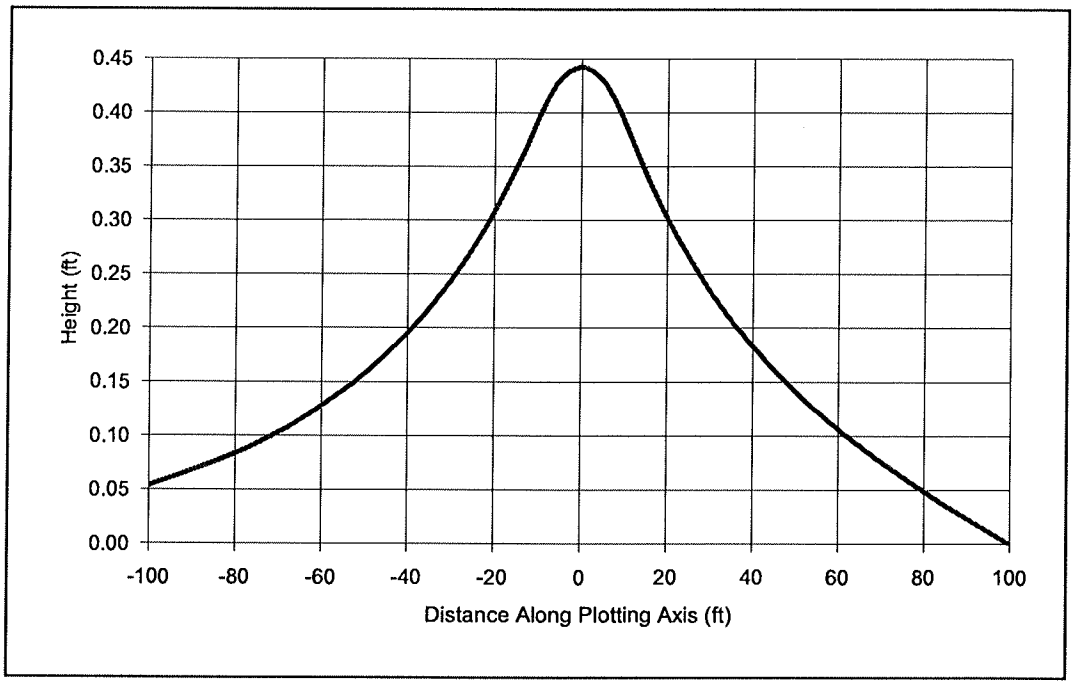
INPUT PARAMETERS

Application rate: 2.42 c.ft/day/sq. ft
Duration of application: 1 days
Fillable porosity: 0.28
Hydraulic conductivity: 39 ft/day
Initial saturated thickness: 35 ft
Length of application area: 39.32 ft
Width of application area: 10.33 ft
Constant head boundary used at: 100 ft
Plotting axis from Y-Axis: 75 degrees
Edge of recharge area:
positive X: 5.2 ft
positive Y: 1.4 ft
Total volume applied: 982.9449 c.ft

MODEL RESULTS

X (ft)	Y (ft)	Plot Axis (ft)	Mound Height (ft)
-96.6	-25.9	-100	0.03
-81.2	-21.8	-84	0.04
-65.9	-17.6	-68	0.06
-50.5	-13.5	-52	0.08
-38.4	-10.3	-40	0.11
-29.1	-7.8	-30	0.14
-21.4	-5.7	-22	0.17
-15	-4	-15	0.2
-9.4	-2.5	-10	0.23
-5.6	-1.5	-6	0.26
-3	-0.8	-3	0.28
0	0	0	0.28
3	0.8	3	0.27
5.6	1.5	6	0.26
9.4	2.5	10	0.23
15	4	15	0.2
21.4	5.7	22	0.16
29.1	7.8	30	0.13
38.4	10.3	40	0.1
50.5	13.5	52	0.08
65.9	17.6	68	0.04
81.2	21.8	84	0.02
96.6	25.9	100	0

Groundwater Mounding Analysis (Hantush's Method using Glover's Solution)



COMPANY: Williams & Sparages LLC

PROJECT: SWMA2P - Center & Main

ANALYST: Richard J. Harrington

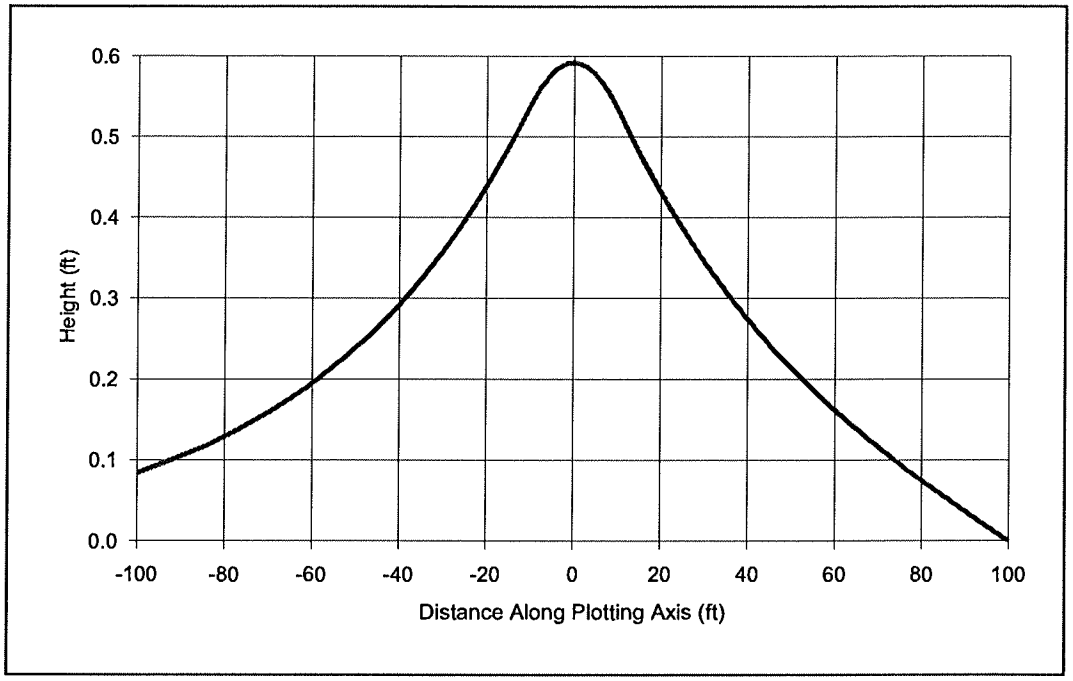
INPUT PARAMETERS

Application rate: 1.9 c.ft/day/sq. ft
Duration of application: 1 days
Fillable porosity: 0.28
Hydraulic conductivity: 39 ft/day
Initial saturated thickness: 35 ft
Length of application area: 47.37 ft
Width of application area: 19.42 ft
Constant head boundary used at: 100 ft
Plotting axis from Y-Axis: 75 degrees
Edge of recharge area:
positive X: 9.7 ft
positive Y: 2.6 ft
Total volume applied: 1747.858 c.ft

MODEL RESULTS

X (ft)	Y (ft)	Plot Axis (ft)	Mound Height (ft)
-96.6	-25.9	-100	0.05
-81.2	-21.8	-84	0.08
-65.9	-17.6	-68	0.11
-50.5	-13.5	-52	0.15
-38.4	-10.3	-40	0.2
-29.1	-7.8	-30	0.24
-21.4	-5.7	-22	0.29
-15	-4	-15	0.34
-9.4	-2.5	-10	0.4
-5.6	-1.5	-6	0.43
-3	-0.8	-3	0.44
0	0	0	0.44
3	0.8	3	0.44
5.6	1.5	6	0.42
9.4	2.5	10	0.39
15	4	15	0.34
21.4	5.7	22	0.29
29.1	7.8	30	0.23
38.4	10.3	40	0.18
50.5	13.5	52	0.13
65.9	17.6	68	0.08
81.2	21.8	84	0.04
96.6	25.9	100	0

Groundwater Mounding Analysis (Hantush's Method using Glover's Solution)



COMPANY: Williams & Sparages LLC

PROJECT: SWMA3P - Center & Main

ANALYST: Richard J. Harrington

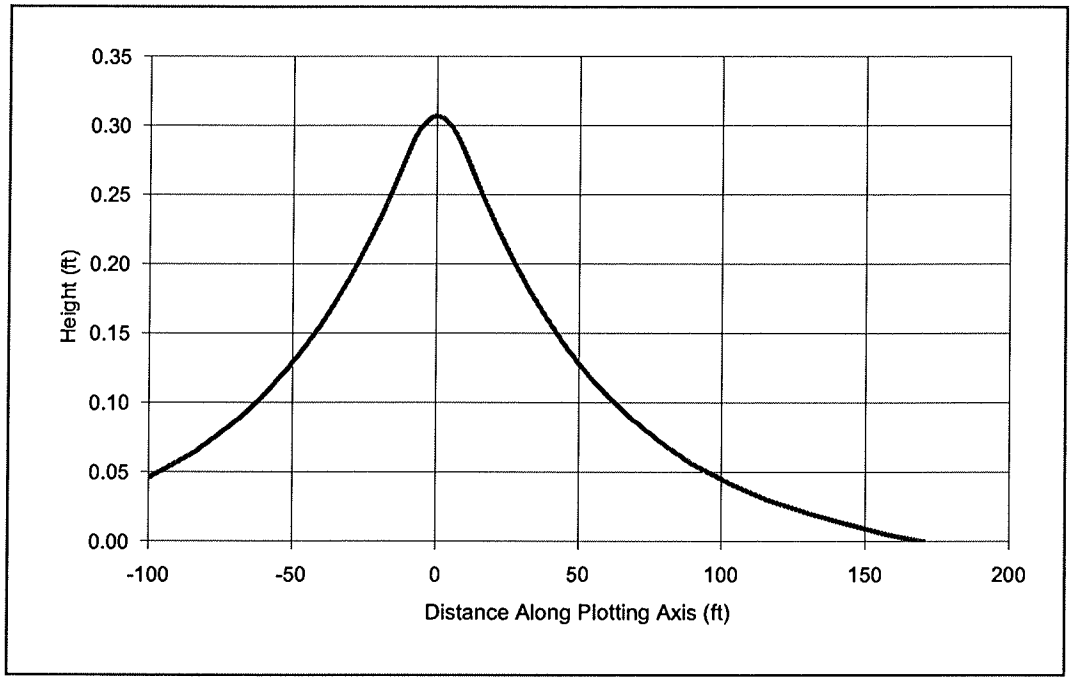
INPUT PARAMETERS

Application rate: 1.92 c.ft/day/sq. ft
Duration of application: 1 days
Fillable porosity: 0.28
Hydraulic conductivity: 39 ft/day
Initial saturated thickness: 35 ft
Length of application area: 74.54 ft
Width of application area: 19.42 ft
Constant head boundary used at: 100 ft
Plotting axis from Y-Axis: 75 degrees
Edge of recharge area:
positive X: 9.7 ft
positive Y: 2.6 ft
Total volume applied: 2779.328 c.ft

MODEL RESULTS

X (ft)	Y (ft)	Plot Axis (ft)	Mound Height (ft)
-96.6	-25.9	-100	0.08
-81.2	-21.8	-84	0.12
-65.9	-17.6	-68	0.16
-50.5	-13.5	-52	0.23
-38.4	-10.3	-40	0.29
-29.1	-7.8	-30	0.36
-21.4	-5.7	-22	0.42
-15	-4	-15	0.48
-9.4	-2.5	-10	0.54
-5.6	-1.5	-6	0.57
-3	-0.8	-3	0.59
0	0	0	0.59
3	0.8	3	0.59
5.6	1.5	6	0.57
9.4	2.5	10	0.54
15	4	15	0.48
21.4	5.7	22	0.41
29.1	7.8	30	0.34
38.4	10.3	40	0.28
50.5	13.5	52	0.2
65.9	17.6	68	0.12
81.2	21.8	84	0.06
96.6	25.9	100	0

Groundwater Mounding Analysis (Hantush's Method using Glover's Solution)



COMPANY: Williams & Sparages LLC

PROJECT: SWMA4P - Center & Main

ANALYST: Richard J. Harrington

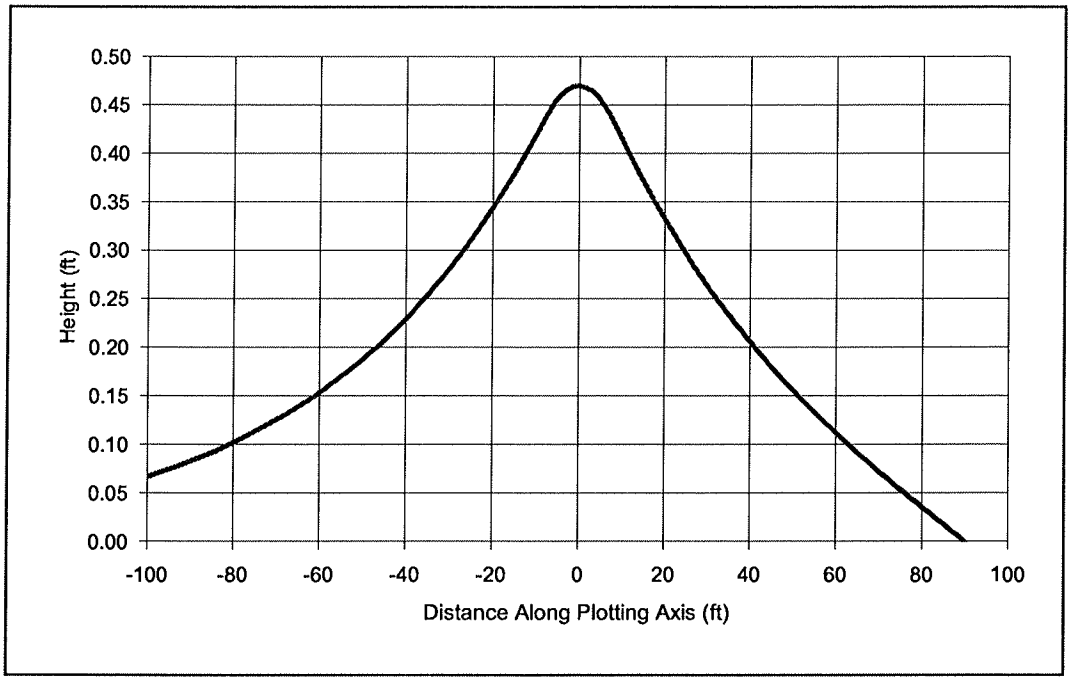
INPUT PARAMETERS

Application rate: 0.9 c.ft/day/sq. ft
Duration of application: 1 days
Fillable porosity: 0.28
Hydraulic conductivity: 39 ft/day
Initial saturated thickness: 35 ft
Length of application area: 87.62 ft
Width of application area: 19.42 ft
Constant head boundary used at: 170 ft
Plotting axis from Y-Axis: 75 degrees
Edge of recharge area:
positive X: 9.7 ft
positive Y: 2.6 ft
Total volume applied: 1531.422 c.ft

MODEL RESULTS

X (ft)	Y (ft)	Plot Axis (ft)	Mound Height (ft)
-96.6	-25.9	-100	0.05
-81.2	-21.8	-84	0.06
-65.9	-17.6	-68	0.09
-50.5	-13.5	-52	0.12
-38.4	-10.3	-40	0.16
-29.1	-7.8	-30	0.19
-21.4	-5.7	-22	0.22
-15	-4	-15	0.25
-9.4	-2.5	-10	0.28
-5.6	-1.5	-6	0.3
-3	-0.8	-3	0.3
0	0	0	0.31
5.2	1.4	5	0.3
9.5	2.6	10	0.28
15.9	4.3	16	0.25
25.4	6.8	26	0.2
36.4	9.8	38	0.16
49.4	13.2	51	0.12
65.3	17.5	68	0.09
85.9	23	89	0.06
112	30	116	0.03
138.1	37	143	0.01
164.2	44	170	0

Groundwater Mounding Analysis (Hantush's Method using Glover's Solution)



COMPANY: Williams & Sparages LLC

PROJECT: SWMA5P - Center & Main

ANALYST: Richard J. Harrington

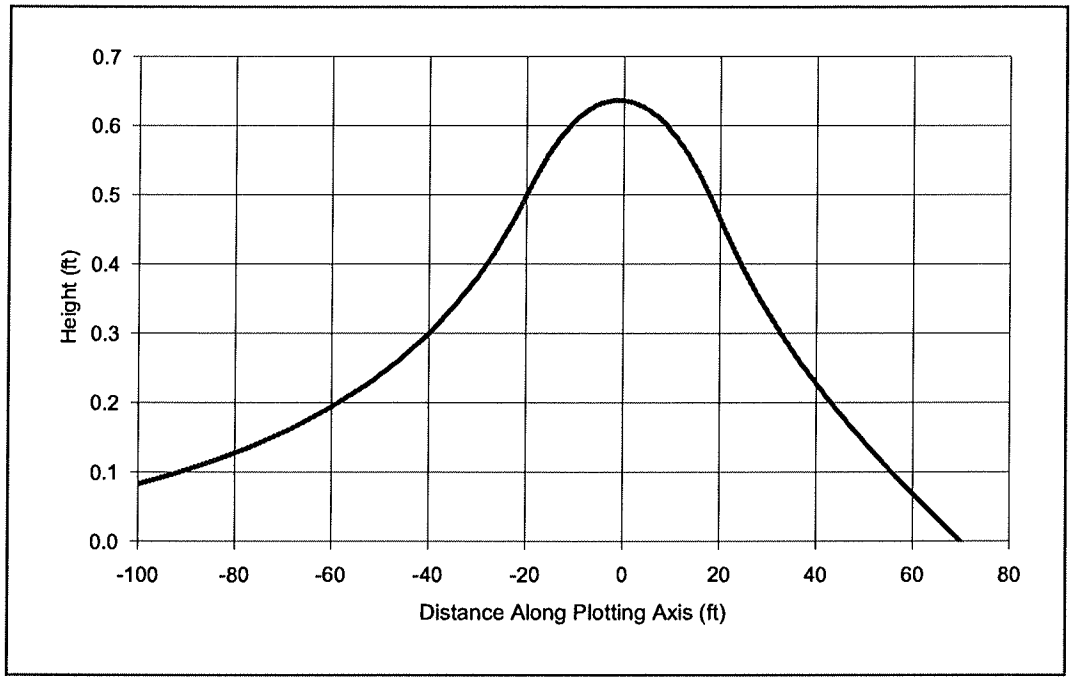
INPUT PARAMETERS

Application rate: 1.84 c.ft/day/sq. ft
Duration of application: 1 days
Fillable porosity: 0.28
Hydraulic conductivity: 39 ft/day
Initial saturated thickness: 35 ft
Length of application area: 77.4 ft
Width of application area: 15.58 ft
Constant head boundary used at: 90 ft
Plotting axis from Y-Axis: 75 degrees
Edge of recharge area:
positive X: 7.8 ft
positive Y: 2.1 ft
Total volume applied: 2218.841 c.ft

MODEL RESULTS

X (ft)	Y (ft)	Plot Axis (ft)	Mound Height (ft)
-96.6	-25.9	-100	0.07
-81.2	-21.8	-84	0.09
-65.9	-17.6	-68	0.13
-50.5	-13.5	-52	0.18
-38.4	-10.3	-40	0.23
-29.1	-7.8	-30	0.28
-21.4	-5.7	-22	0.33
-15	-4	-15	0.38
-9.4	-2.5	-10	0.42
-5.6	-1.5	-6	0.45
-3	-0.8	-3	0.46
0	0	0	0.47
2.7	0.7	3	0.46
5	1.4	5	0.45
8.4	2.3	9	0.43
13.5	3.6	14	0.38
19.3	5.2	20	0.33
26.2	7	27	0.28
34.6	9.3	36	0.23
45.5	12.2	47	0.17
59.3	15.9	61	0.11
73.1	19.6	76	0.05
86.9	23.3	90	0

Groundwater Mounding Analysis (Hantush's Method using Glover's Solution)



COMPANY: Williams & Sparages LLC

PROJECT: SWMA6P - Center & Main

ANALYST: Richard J. Harrington

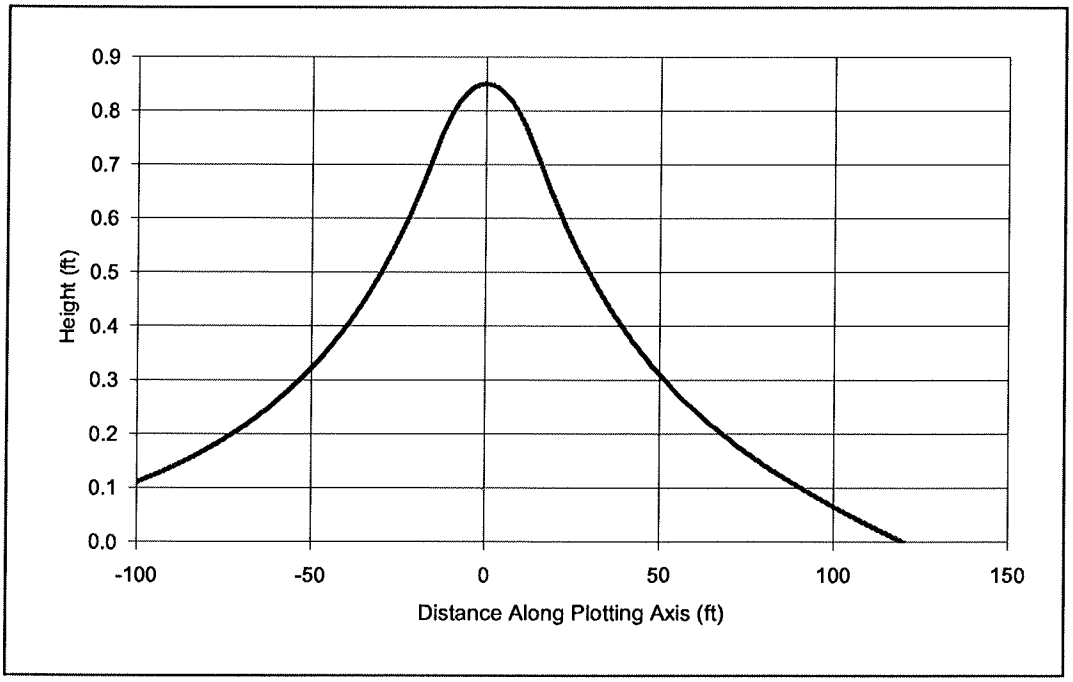
INPUT PARAMETERS

Application rate: 2.25 c.ft/day/sq. ft
Duration of application: 1 days
Fillable porosity: 0.28
Hydraulic conductivity: 39 ft/day
Initial saturated thickness: 35 ft
Length of application area: 31.27 ft
Width of application area: 37.58 ft
Constant head boundary used at: 70 ft
Plotting axis from Y-Axis: 75 degrees
Edge of recharge area:
positive X: 18.8 ft
positive Y: 5 ft
Total volume applied: 2644.035 c.ft

MODEL RESULTS

X (ft)	Y (ft)	Plot Axis (ft)	Mound Height (ft)
-96.6	-25.9	-100	0.08
-81.2	-21.8	-84	0.12
-65.9	-17.6	-68	0.16
-50.5	-13.5	-52	0.23
-38.4	-10.3	-40	0.3
-29.1	-7.8	-30	0.38
-21.4	-5.7	-22	0.47
-15	-4	-15	0.56
-9.4	-2.5	-10	0.61
-5.6	-1.5	-6	0.63
-3	-0.8	-3	0.64
0	0	0	0.64
2.1	0.6	2	0.63
3.9	1.1	4	0.63
6.6	1.8	7	0.61
10.5	2.8	11	0.58
15	4	16	0.53
20.4	5.5	21	0.45
26.9	7.2	28	0.35
35.4	9.5	37	0.26
46.1	12.4	48	0.16
56.9	15.2	59	0.08
67.6	18.1	70	0

Groundwater Mounding Analysis (Hantush's Method using Glover's Solution)



COMPANY: Williams & Sparages LLC

PROJECT: SWMA7P - Center & Main

ANALYST: Richard J. Harrington

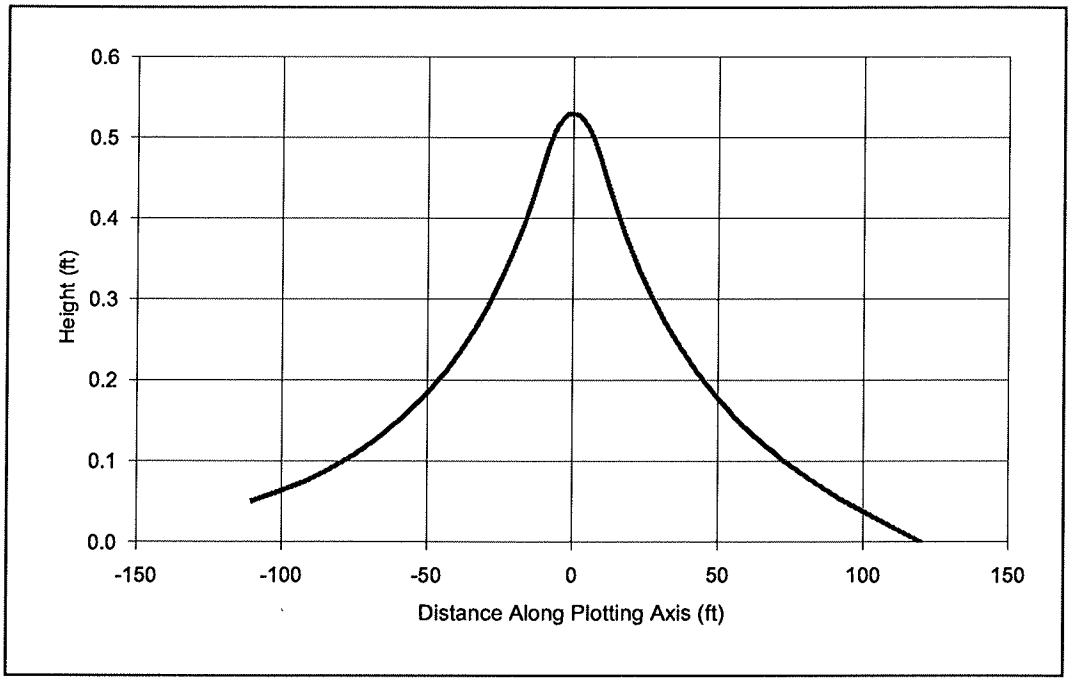
INPUT PARAMETERS

Application rate: 2.61 c.ft/day/sq. ft
Duration of application: 1 days
Fillable porosity: 0.28
Hydraulic conductivity: 39 ft/day
Initial saturated thickness: 35 ft
Length of application area: 47.37 ft
Width of application area: 28.5 ft
Constant head boundary used at: 120 ft
Plotting axis from Y-Axis: 75 degrees
Edge of recharge area:
positive X: 14.2 ft
positive Y: 3.8 ft
Total volume applied: 3523.617 c.ft

MODEL RESULTS

X (ft)	Y (ft)	Plot Axis (ft)	Mound Height (ft)
-96.6	-25.9	-100	0.11
-81.2	-21.8	-84	0.16
-65.9	-17.6	-68	0.22
-50.5	-13.5	-52	0.31
-38.4	-10.3	-40	0.4
-29.1	-7.8	-30	0.5
-21.4	-5.7	-22	0.6
-15	-4	-15	0.71
-9.4	-2.5	-10	0.8
-5.6	-1.5	-6	0.83
-3	-0.8	-3	0.84
0	0	0	0.85
3.7	1	4	0.84
6.7	1.8	7	0.82
11.2	3	12	0.77
18	4.8	19	0.65
25.7	6.9	27	0.54
34.9	9.3	36	0.43
46.1	12.4	48	0.33
60.6	16.2	63	0.23
79	21.2	82	0.14
97.5	26.1	101	0.06
115.9	31.1	120	0

Groundwater Mounding Analysis (Hantush's Method using Glover's Solution)



COMPANY: Williams & Sparages LLC

PROJECT: SWMA8P - Center & Main

ANALYST: Richard J. Harrington

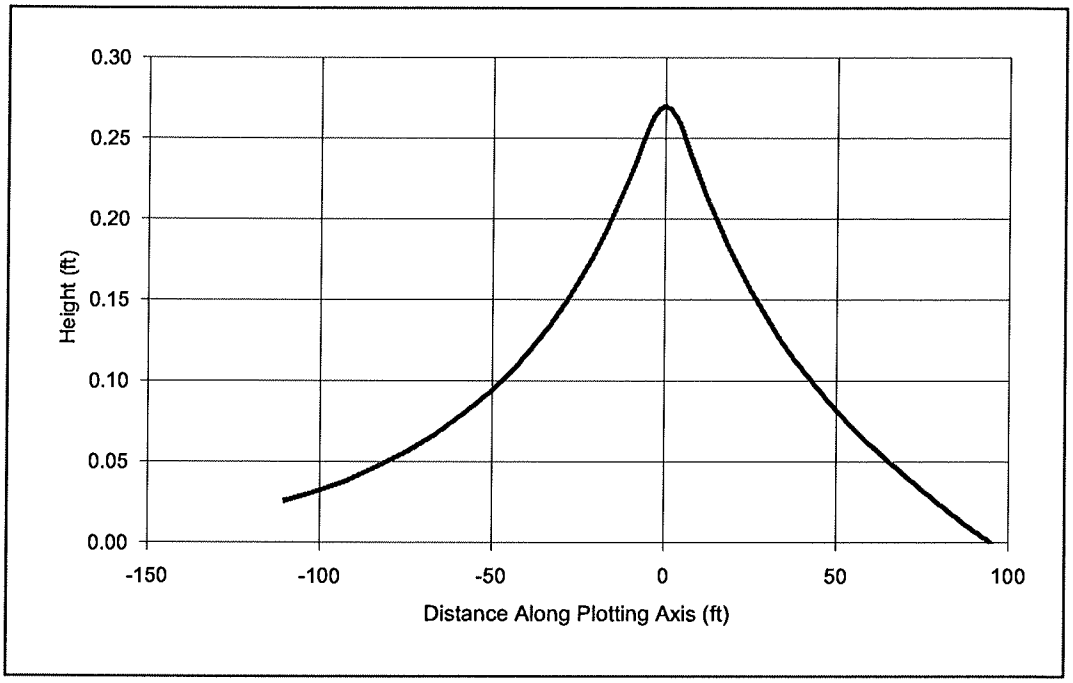
INPUT PARAMETERS

Application rate: 2.4 c.ft/day/sq. ft
Duration of application: 1 days
Fillable porosity: 0.28
Hydraulic conductivity: 39 ft/day
Initial saturated thickness: 35 ft
Length of application area: 43.34 ft
Width of application area: 19.42 ft
Constant head boundary used at: 120 ft
Plotting axis from Y-Axis: 75 degrees
Edge of recharge area:
positive X: 9.7 ft
positive Y: 2.6 ft
Total volume applied: 2019.991 c.ft

MODEL RESULTS

X (ft)	Y (ft)	Plot Axis (ft)	Mound Height (ft)
-106.3	-28.5	-110	0.05
-89.4	-23.9	-93	0.07
-72.5	-19.4	-75	0.11
-55.6	-14.9	-58	0.16
-42.3	-11.3	-44	0.21
-32	-8.6	-33	0.27
-23.6	-6.3	-24	0.33
-16.5	-4.4	-17	0.39
-10.3	-2.8	-11	0.46
-6.2	-1.7	-6	0.51
-3.3	-0.9	-3	0.52
0	0	0	0.53
3.7	1	4	0.52
6.7	1.8	7	0.5
11.2	3	12	0.45
18	4.8	19	0.37
25.7	6.9	27	0.31
34.9	9.3	36	0.24
46.1	12.4	48	0.19
60.6	16.2	63	0.13
79	21.2	82	0.08
97.5	26.1	101	0.04
115.9	31.1	120	0

Groundwater Mounding Analysis (Hantush's Method using Glover's Solution)



COMPANY: Williams & Sparages LLC

PROJECT: SWMA9P - Center & Main

ANALYST: Richard J. Harrington

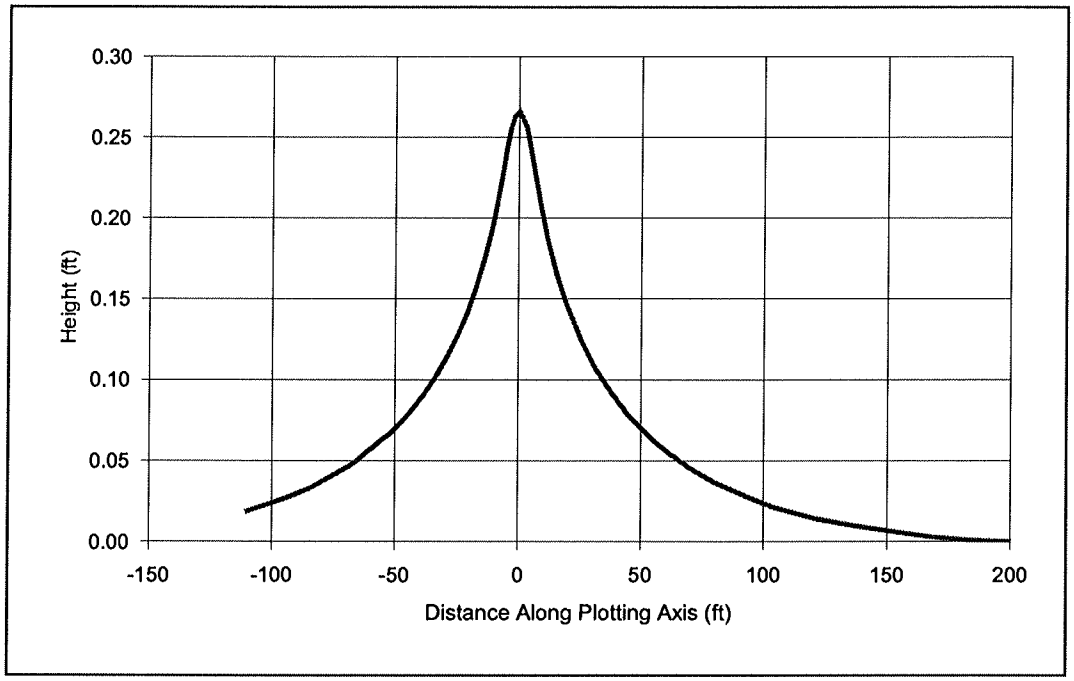
INPUT PARAMETERS

Application rate: 1.87 c.ft/day/sq. ft
Duration of application: 1 days
Fillable porosity: 0.28
Hydraulic conductivity: 39 ft/day
Initial saturated thickness: 35 ft
Length of application area: 55.42 ft
Width of application area: 10.33 ft
Constant head boundary used at: 95 ft
Plotting axis from Y-Axis: 75 degrees
Edge of recharge area:
positive X: 5.2 ft
positive Y: 1.4 ft
Total volume applied: 1070.554 c.ft

MODEL RESULTS

X (ft)	Y (ft)	Plot Axis (ft)	Mound Height (ft)
-106.3	-28.5	-110	0.03
-89.4	-23.9	-93	0.04
-72.5	-19.4	-75	0.06
-55.6	-14.9	-58	0.08
-42.3	-11.3	-44	0.11
-32	-8.6	-33	0.14
-23.6	-6.3	-24	0.16
-16.5	-4.4	-17	0.19
-10.3	-2.8	-11	0.22
-6.2	-1.7	-6	0.25
-3.3	-0.9	-3	0.26
0	0	0	0.27
2.9	0.8	3	0.26
5.3	1.4	6	0.25
8.9	2.4	9	0.23
14.2	3.8	15	0.2
20.4	5.5	21	0.17
27.6	7.4	29	0.14
36.5	9.8	38	0.11
48	12.9	50	0.08
62.6	16.8	65	0.05
77.2	20.7	80	0.02
91.8	24.6	95	0

Groundwater Mounding Analysis (Hantush's Method using Glover's Solution)



COMPANY: Williams & Sparages LLC

PROJECT: RD14 - Center & Main

ANALYST: Richard J. Harrington

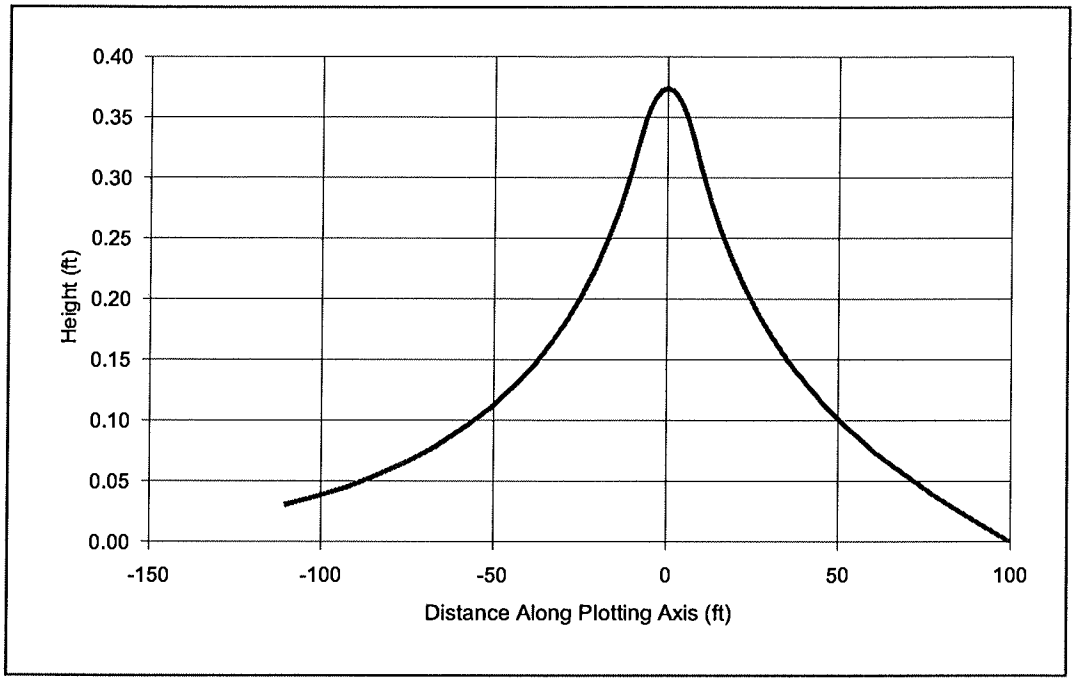
INPUT PARAMETERS

Application rate: 3.83 c.ft/day/sq. ft
Duration of application: 1 days
Fillable porosity: 0.28
Hydraulic conductivity: 39 ft/day
Initial saturated thickness: 35 ft
Length of application area: 19.19 ft
Width of application area: 10.3 ft
Constant head boundary used at: 200 ft
Plotting axis from Y-Axis: 75 degrees
Edge of recharge area:
positive X: 5.2 ft
positive Y: 1.4 ft
Total volume applied: 757.0263 c.ft

MODEL RESULTS

X (ft)	Y (ft)	Plot Axis (ft)	Mound Height (ft)
-106.3	-28.5	-110	0.02
-89.4	-23.9	-93	0.03
-72.5	-19.4	-75	0.04
-55.6	-14.9	-58	0.06
-42.3	-11.3	-44	0.08
-32	-8.6	-33	0.1
-23.6	-6.3	-24	0.13
-16.5	-4.4	-17	0.16
-10.3	-2.8	-11	0.19
-6.2	-1.7	-6	0.23
-3.3	-0.9	-3	0.26
0	0	0	0.27
6.1	1.6	6	0.23
11.2	3	12	0.19
18.7	5	19	0.15
29.9	8	31	0.11
42.8	11.5	44	0.08
58.1	15.6	60	0.06
76.9	20.6	80	0.04
101	27.1	105	0.02
131.7	35.3	136	0.01
162.5	43.5	168	0
193.2	51.8	200	0

Groundwater Mounding Analysis (Hantush's Method using Glover's Solution)



COMPANY: Williams & Sparages LLC

PROJECT: RD15+ - Center & Main

ANALYST: Richard J. Harrington

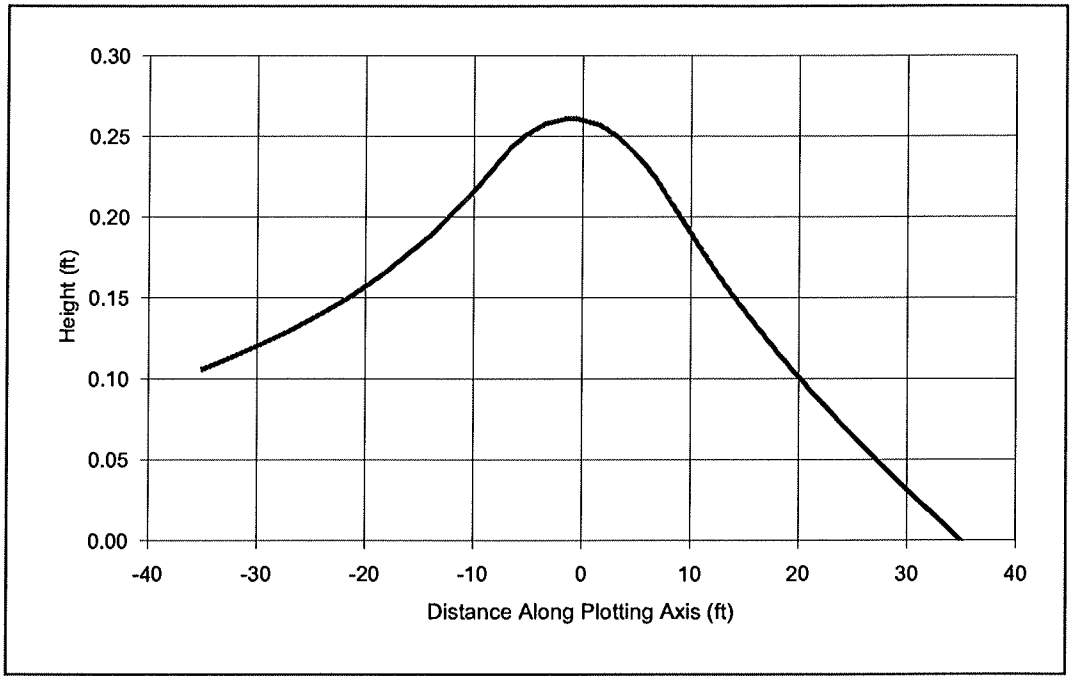
INPUT PARAMETERS

Application rate: 2.89 c.ft/day/sq. ft
Duration of application: 1 days
Fillable porosity: 0.28
Hydraulic conductivity: 39 ft/day
Initial saturated thickness: 35 ft
Length of application area: 27.21 ft
Width of application area: 15.58 ft
Constant head boundary used at: 100 ft
Plotting axis from Y-Axis: 75 degrees
Edge of recharge area:
positive X: 7.8 ft
positive Y: 2.1 ft
Total volume applied: 1225.163 c.ft

MODEL RESULTS

X (ft)	Y (ft)	Plot Axis (ft)	Mound Height (ft)
-106.3	-28.5	-110	0.03
-89.4	-23.9	-93	0.04
-72.5	-19.4	-75	0.07
-55.6	-14.9	-58	0.1
-42.3	-11.3	-44	0.13
-32	-8.6	-33	0.16
-23.6	-6.3	-24	0.2
-16.5	-4.4	-17	0.25
-10.3	-2.8	-11	0.3
-6.2	-1.7	-6	0.35
-3.3	-0.9	-3	0.37
0	0	0	0.37
3	0.8	3	0.37
5.6	1.5	6	0.35
9.4	2.5	10	0.31
15	4	15	0.26
21.4	5.7	22	0.21
29.1	7.8	30	0.17
38.4	10.3	40	0.13
50.5	13.5	52	0.1
65.9	17.6	68	0.06
81.2	21.8	84	0.03
96.6	25.9	100	0

Groundwater Mounding Analysis (Hantush's Method using Glover's Solution)



COMPANY: Williams & Sparages LLC

PROJECT: RD20+ - Center & Main

ANALYST: Richard J. Harrington

INPUT PARAMETERS

Application rate: 2.48 c.ft/day/sq. ft
Duration of application: 1 days
Fillable porosity: 0.28
Hydraulic conductivity: 39 ft/day
Initial saturated thickness: 35 ft
Length of application area: 27.21 ft
Width of application area: 15.58 ft
Constant head boundary used at: 35 ft
Plotting axis from Y-Axis: 75 degrees
Edge of recharge area:
positive X: 7.8 ft
positive Y: 2.1 ft
Total volume applied: 1051.351 c.ft

MODEL RESULTS

X (ft)	Y (ft)	Plot Axis (ft)	Mound Height (ft)
-33.8	-9.1	-35	0.11
-28.4	-7.6	-29	0.12
-23.1	-6.2	-24	0.14
-17.7	-4.7	-18	0.16
-13.5	-3.6	-14	0.19
-10.2	-2.7	-11	0.21
-7.5	-2	-8	0.23
-5.2	-1.4	-5	0.25
-3.3	-0.9	-3	0.26
-2	-0.5	-2	0.26
-1.1	-0.3	-1	0.26
0	0	0	0.26
1.1	0.3	1	0.26
2	0.5	2	0.26
3.3	0.9	3	0.25
5.2	1.4	5	0.24
7.5	2	8	0.21
10.2	2.7	11	0.18
13.5	3.6	14	0.15
17.7	4.7	18	0.11
23.1	6.2	24	0.07
28.4	7.6	29	0.04
33.8	9.1	35	0

2.4 Standard 4 | Water Quality

Water Quality:

Water quality is provided through three structural stormwater best management practices.

1) Deep Sump Catch Basin with Hood/Trap
2) Oil Grit Separator
3) Subsurface Infiltration Chambers

Water Quality Volume:

$V_{wq\ required} = (D_{wq})(A_{imp})$

Stormwater Management Area 1P

$A_{imp\ A\ soils}$ = 5131 ft^2 (CB1=2780 & CB2=2351)
$R_{v\ required}$ = [(5131)(1.0)/12] = 428 ft^3
(MC-4500 Chamber storage Only below 12″ Standard Outlet Height = 36″)
Storage per Cap at 36″= 29.56 cf; Storage per Chamber at 36″ = 81.21 cf [Table 9 & Table 10]
$V_{wq\ provided}$ = 2 caps + 8 chambers
$V_{wq\ provided}$ = (2 x 29.56) + (8 x 81.21) = 709 ft^3 [Stormtech MC-4500 Cumulative Storage Values]

709 ft^3 > 428 ft^3 ok

Stormwater Management Area 2P

$A_{imp\ A\ soils}$ = (Roof area Units 7, 8, 9, 10, 30, 31 & 32) = C1+C2+C1+C2+A2+D+E
$A_{imp\ A\ soils}$ = (1270 + 1628 + 1270 + 1628 + 1912 + 1363 + 1718) = 10,789 sf
$R_{v\ required}$ = [(10,789)(1.0)/12] = 899 ft^3
(MC-4500 Chamber storage Only below 12″ Standard Outlet Height = 36″)
Storage per Cap at 36″= 29.56 cf; Storage per Chamber at 36″ = 81.21 cf [Table 9 & Table 10]
$V_{wq\ provided}$ = 4 caps + 20 chambers
$V_{wq\ provided}$ = (4 x 29.56) + (20 x 81.21) = 1,742ft^3 [Stormtech MC-4500 Cumulative Storage Values]

1,742 ft^3 > 899 ft^3 ok

Stormwater Management Area 3P

$A_{imp\ A\ soils}$ = (CB11=4,211, CB12=7,720, R33=965 & R34=0) = 12,896
$A_{imp\ B\ soils}$ = (CB11=1,176, CB12=718, R33=305 & R34=1,628) =3,827
$R_{v\ required}$ = [(16,723)(1.0)/12] = 1,394 ft^3
(MC-4500 Chamber storage Only below 12″ Standard Outlet Height = 36″)
Storage per Cap at 36″= 29.56 cf; Storage per Chamber at 36″ = 81.21 cf [Table 9 & Table 10]
$V_{wq\ provided}$ = 4 caps + 34 chambers
$V_{wq\ provided}$ = (4 x 29.56) + (34 x 81.21) = 2,879 ft^3 [Stormtech MC-4500 Cumulative Storage Values]

2,879 ft^3 > 1,394 ft^3 ok

Stormwater Management Area 4P

$A_{imp\ A\ soils}$ = (CB8=437, CB9=350 & CB10=0) = 787 ft^2
$A_{imp\ B\ soils}$ = (CB8=3,301, CB9=1,467 & CB10= 3,015) = 7,783 ft^2
$R_{v\ required}$ = [(8,570)(1.0)/12] = 715 ft^3
(MC-4500 Chamber storage Only below 12″ Standard Outlet Height = 36″)

Storage per Cap at 36″= 29.56 cf; Storage per Chamber at 36″ = 81.21 cf [Table 9 & Table 10]
$V_{wq\ provided}$ = 4 caps + 36 chambers
$V_{wq\ provided}$ = (4 x 29.56) + (36 x 81.21) = 3,041 ft^3 [Stormtech MC-4500 Cumulative Storage Values]

3,041ft^3 > 715 ft^3 ok

Stormwater Management Area 5P
$A_{imp\ A\ soils}$ = (CB7= 9,056 & CB13=252) = 9,308 ft^2
$A_{imp\ B\ soils}$ = (CB7=46 & CB13=0) = 46 ft^2
$R_{v\ required}$ = [(9,354)(1.0)/12] = 780 ft^3
(MC-3500 Chamber storage at 24″)
Storage per Cap = 12.53 cf; Storage per Chamber = 76.24 cf [Table 7 & Table 8]
$V_{wq\ provided}$ = 4 caps + 20 chambers
$V_{wq\ provided}$ = (4 x 12.53) + (20 x 76.24) = ft^3 [Stormtech MC-4500 Cumulative Storage Values]

1,575 ft^3 > 780 ft^3 ok

Stormwater Management Area 6P
$A_{imp\ A\ soils}$ = (CB5=3,310 & CB6=5,456 & CB14=667) = 9,433 ft^2
$A_{imp\ B\ soils}$ = (CB5=157, CB6=0 & CB14=0) = 157 ft^2
$R_{v\ required}$ = [(9,590)(1.0)/12] =800 ft^3
(MC-4500 Chamber storage Only below 12″ Standard Outlet Height = 36″)
Storage per Cap at 36″= 29.56 cf; Storage per Chamber at 36″ = 81.21 cf [Table 9 & Table 10]
$V_{wq\ provided}$ = 8 caps + 24 chambers
$V_{wq\ provided}$ = (8 x 29.56) + (24 x 81.21) = 2,185 ft^3 [Stormtech MC-4500 Cumulative Storage Values]

2,185 ft^3 > 800 ft^3 ok

Stormwater Management Area 7P
$A_{imp\ A\ soils}$ = (CB3=4,659, CB4=7,733, R28=2,103, R29=2,242, R35=2,242 & R36=1,509) = 20,488 ft^2
$A_{imp\ B\ soils}$ = 0 ft^2
$R_{v\ required}$ = [(20,488)(1.0)/12] =1,708 ft^3
(MC-4500 Chamber storage Only below 12″ Standard Outlet Height = 36″)
Storage per Cap at 36″= 29.56 cf; Storage per Chamber at 36″ = 81.21 cf [Table 9 & Table 10]
$V_{wq\ provided}$ = 6 caps + 30 chambers
$V_{wq\ provided}$ = (6 x 29.56) + (30 x 81.21) = 2614 ft^3 [Stormtech MC-4500 Cumulative Storage Values]

2,614 ft^3 > 1,708 ft^3 ok

Stormwater Management Area 8P
$A_{imp\ A\ soils}$ = (CB15= 6,683, R26=2,103, R27=2,242)=11,028 ft^2
$A_{imp\ B\ soils}$ = 0 ft^2
$R_{v\ required}$ = [(11,028)(1.0)/12] =919 ft^3
(MC-4500 Chamber storage Only below 12″ Standard Outlet Height = 36″)
Storage per Cap at 36″= 29.56 cf; Storage per Chamber at 36″ = 81.21 cf [Table 9 & Table 10]
$V_{wq\ provided}$ = 4 caps + 18 chambers
$V_{wq\ provided}$ = (4 x 29.56) + (18 x 81.21) = 1,580 ft^3 [Stormtech MC-4500 Cumulative Storage Values]

1,580 ft^3 > 919 ft^3 ok

Stormwater Management Area 9P

$A_{imp\ A\ soils}$ = (Roof area Units 21, 22, 23 + 24) = E+ D + B1 + B2
$A_{imp\ A\ soils}$ = (1363 + 1718 + 1509 + 2242) = 6,832 sf
$R_{v\ required}$ = [(6,832)(1.0)/12] = 569 ft^3
(MC-4500 Chamber storage Only below 12″ Standard Outlet Height = 36″)
Storage per Cap at 36″= 29.56 cf; Storage per Chamber at 36″ = 81.21 cf [Table 9 & Table 10]
$V_{wq\ provided}$ = 2 caps + 12 chambers
$V_{wq\ provided}$ = (2 x 29.56) + (12 x 81.21) = 1,033ft^3 [Stormtech MC-4500 Cumulative Storage Values]

1,033 ft^3 > 569 ft^3 ok

SWMA-Roof Drywells (RD-1,….RD-37)

Water Quality Volume per Dwelling style – Elise Stone Architect

A1 = 2,103 sf x 1.0 / 12 = 176 ft^3
A2 = 1,912 sf x 1.0 / 12 = 160 ft^3
A3 = 2,004 sf x 1.0 / 12 = 167 ft^3
B1 = 1,509 sf x 1.0 / 12 = 126 ft^3
B2 = 2,242 sf x 1.0 / 12 = 187 ft^3
C1 = 1,270 sf x 1.0 / 12 = 106 ft^3
C2 = 1,628 sf x 1.0 / 12 = 136 ft^3
D = 1,718 sf x 1.0 / 12 = 144 ft^3
E = 1,363 sf x 1.0 / 12 = 114 ft^3

4500 1R1C (1 Row – 1 Chamber); RD1, RD2, RD3, RD4, RD5, RD6, RD13 & RD25

Storage per Cap at 60″= 35.71 cf; Storage per Chamber at 60″ = 106.51 cf [Depth = 69″ - Table 9 & 10]
$V_{wq\ provided}$ = 2 caps + 1 chamber = (2 x 35.71) + (1 x 106.51) = 178.ft^3
$V_{wq\ provided}$ = 178 ft^3 [Stormtech MC-4500 Cumulative Storage Values – Excludes Voids in Stone]

178 ft^3 > Unit A1 = 176 ft^3 ok [Compatible for Units A1, A2, A3, B1, C1, C2, D & E]

4500 1R3C (1 Row – 3 Chambers); RD 11&12; RD14

Storage per Cap at 60″= 35.71 cf; Storage per Chamber at 60″ = 106.51 cf [Depth = 69″ - Table 9 & 10]
$V_{wq\ provided}$ = 2 caps + 3 chambers = (2 x 35.71) + (3 x 106.51) = 391 ft^3
$V_{wq\ provided}$ = 391 ft^3 [Stormtech MC-4500 Cumulative Storage Values – Excludes Voids in Stone]

391 ft^3 > Unit 11(B2) + Unit 12(B1) = (187 + 126) = 313 ft^3 ok
391 ft^3 > Unit 14(B2) = 187 ft^3 ok

3500 1R3C (2 Rows–3 Chambers); RD 15+(Units 15,16&17), RD 20+(Units 19,20&21)

Storage per Cap at 45″= 14.9 cf; Storage per Chamber at 45″ = 110 cf [Depth = 54″ - Table 7 & 8]
$V_{wq\ provided}$ = 4 caps + 6 chambers = (4 x 14.9) + (6 x 110) = 719 ft^3
$V_{wq\ provided}$ = 719 ft^3 [Stormtech MC-3500 Cumulative Storage Values – Excludes Voids in Stone]

719 ft^3 > Unit 15(B1) + Unit 16(B2) + Unit 17(B1) = (126 + 187 + 126) = 439 ft^3 ok
719 ft^3 > Unit 18(B2) + Unit 19(B1) + Unit 20(B2) = (187 + 126 + 187) = 500 ft^3 ok

Isolator Row Sizing

SWMA-1P

$A_{imp\ A\ soils}$ = 5131 ft^2 (CB1=2780 & CB2=2351)
$R_{v\ required}$ = [(5,131)(0.5)/12] = 214 ft^3
Isolator Row Sizing (MC-4500 Chamber storage Only below 12″ Standard Outlet Height = 36″)
Storage per Cap at 36″= 29.56 cf; Storage per Chamber at 36″ = 81.21 cf [Table 9 & Table 10]
$V_{wq\ provided}$ = 2 caps + 6 chambers
$V_{wq\ provided}$ = (2 x 29.56) + (6 x 81.21) = 546 ft^3 [Stormtech MC-4500 Cumulative Storage Values]

546 ft^3 > 214 ft^3 ok

SWMA-2P - Roof Runoff Only – Isolator Row not provided.

SWMA-3P

$A_{imp\ A\ soils}$ = (CB11=4,211 & CB12=7,720) = 11,931
$A_{imp\ B\ soils}$ = (CB11=1,176 & CB12=718) =1,894
$R_{v\ required}$ = [(13,855)(0.5)/12] = 578 ft^3
Isolator Row (MC-4500 Chamber storage Only below 12″ Standard Outlet Height = 36″)
Storage per Cap at 36″= 29.56 cf; Storage per Chamber at 36″ = 81.21 cf [Table 9 & Table 10]
$V_{wq\ provided}$ = 2 caps + 7 chambers
$V_{wq\ provided}$ = (2 x 29.56) + (7 x 81.21) = 627 ft^3 [Stormtech MC-4500 Cumulative Storage Values]

627 ft^3 > 578 ft^3 ok

SWMA-4P

$A_{imp\ A\ soils}$ = (CB8=437, CB9=350 & CB10=0) = 787 ft^2
$A_{imp\ B\ soils}$ = (CB8=3,301, CB9=1,467 & CB10= 3,015) = 7,783 ft^2
$R_{v\ required}$ = [(8,570)(0.5)/12] = 357 ft^3
Isolator Row (MC-4500 Chamber storage Only below 12″ Standard Outlet Height = 36″)
Storage per Cap at 36″= 29.56 cf; Storage per Chamber at 36″ = 81.21 cf [Table 9 & Table 10]
$V_{wq\ provided}$ = 2 caps + 6 chambers
$V_{wq\ provided}$ = (2 x 29.56) + (6 x 81.21) = 546 ft^3 [Stormtech MC-4500 Cumulative Storage Values]

546 ft^3 > 357 ft^3 ok

SWMA-5P

$A_{imp\ A\ soils}$ = (CB7= 9,056 & CB13=252) = 9,308 ft^2
$A_{imp\ B\ soils}$ = (CB7=46 & CB13=0) = 46 ft^2
$R_{v\ required}$ = [(9,354)(0.5)/12] = 390 ft^3
Isolator Row (MC-3500 Chamber storage at 24″ Depth″)
Storage per Cap at 24″= 12.53 cf; Storage per Chamber at 24″ = 76.24 [Table 7 & Table 8]
$V_{wq\ provided}$ = 2 caps + 6 chambers
$V_{wq\ provided}$ = (2 x 12.53) + (5 x 76.24) = 546 ft^3 [Stormtech MC-4500 Cumulative Storage Values]

406 ft^3 > 390 ft^3 ok

L

SWMA-6P

$A_{imp\ A\ soils}$ = (CB5=3,310 & CB6=5,456 & CB14=667) = 9,433 ft^2
$A_{imp\ B\ soils}$ = (CB5=157, CB6=0 & CB14=0) = 157 ft^2
$R_{v\ required}$ = [(9,590)(0.5)/12] =400 ft^3
Isolator Row (MC-4500 Chamber storage Only below 12″ Standard Outlet Height = 36″)
Storage per Cap at 36″= 29.56 cf; Storage per Chamber at 36″ = 81.21 cf [Table 9 & Table 10]
$V_{wq\ provided}$ = 2 caps + 6 chambers
$V_{wq\ provided}$ = (2 x 29.56) + (6 x 81.21) = 465 ft^3 [Stormtech MC-4500 Cumulative Storage Values]

465 ft^3 > 400 ft^3 ok

SWMA-7P

$A_{imp\ A\ soils}$ = (CB3=4,659 & CB4=7,730) = 12,392 ft^2
$A_{imp\ B\ soils}$ = (CB3=0 & CB4=0) = 0 ft^2
$R_{v\ required}$ = [(12,392)(0.5)/12] =517 ft^3
Isolator Row (MC-4500 Chamber storage Only below 12″ Standard Outlet Height = 36″)
Storage per Cap at 36″= 29.56 cf; Storage per Chamber at 36″ = 81.21 cf [Table 9 & Table 10]
$V_{wq\ provided}$ = 2 caps + 6 chambers
$V_{wq\ provided}$ = (2 x 29.56) + (6 x 81.21) = 546 ft^3 [Stormtech MC-4500 Cumulative Storage Values]

546 ft^3 > 517 ft^3 ok

SWMA-8P

$A_{imp\ A\ soils}$ = CB15= 6,683 ft^2
$A_{imp\ B\ soils}$ = CB15=0 ft^2
$R_{v\ required}$ = [(6,683)(0.5)/12] =279 ft^3
Isolator Row (MC-4500 Chamber storage Only below 12″ Standard Outlet Height = 36″)
Storage per Cap at 36″= 29.56 cf; Storage per Chamber at 36″ = 81.21 cf [Table 9 & Table 10]
$V_{wq\ provided}$ = 2 caps + 6 chambers
$V_{wq\ provided}$ = (2 x 29.56) + (6 x 81.21) = 546 ft^3 [Stormtech MC-4500 Cumulative Storage Values]

546 ft^3 > 279 ft^3 ok

SWMA-9P - Roof Runoff Only – Isolator Row not provided.

TSS Removal:

Pretreatment Chain SWMA1P, 3P, 4P, 5P, 6P, 7P & 8P = 58%

- Deep Sump Catch Bain = 25%
- Oil Grit Separator = 25%
- Isolator Row = 25%

Treatment Chain SWMA1P, 3P, 4P, 5P, 6P, 7P & 8P = 85%

- Deep Sump Catch Basin = 25%
- Subsurface Infiltration Chambers = 80%

Treatment Chain SWMA2P & 9P = 80%

- Roof Runoff Direct Connect to Chambers
- Subsurface Infiltration Chambers = 80%

TSS Removal Calculation Worksheet

Location: Pretreatment Infiltration Chamber SWMA-1P

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	0.25	1.00	0.25	0.75
Oil Grit Separator	0.25	0.75	0.19	0.56
Isolator Row (Sediment Forebay)	0.25	0.56	0.14	0.42
	0.00	0.42	0.00	0.42
	0.00	0.42	0.00	0.42

Total TSS Removal = 58%

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

Project: CONC-0020
Prepared By: RJH
Date: 6/6/2019

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

TSS Removal Calculation Worksheet

Location: Pretreatment Infiltration Chamber SWMA-3P

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	0.25	1.00	0.25	0.75
Oil Grit Separator	0.25	0.75	0.19	0.56
Isolator Row (Sediment Forebay)	0.25	0.56	0.14	0.42
	0.00	0.42	0.00	0.42
	0.00	0.42	0.00	0.42

Total TSS Removal = 58%

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

Project: CONC-0020
Prepared By: RJH
Date: 6/6/2019

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

TSS Removal Calculation Worksheet

Location: Pretreatment Infiltration Chamber SWMA-4P

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	0.25	1.00	0.25	0.75
Oil Grit Separator	0.25	0.75	0.19	0.56
Isolator Row (Sediment Forebay)	0.25	0.56	0.14	0.42
	0.00	0.42	0.00	0.42
	0.00	0.42	0.00	0.42

Total TSS Removal = 58%

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

Project: CONC-0020
Prepared By: RJH
Date: 6/6/2019

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

Location: Pretreatment Infiltration Chamber SWMA-5P

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	0.25	1.00	0.25	0.75
Oil Grit Separator	0.25	0.75	0.19	0.56
Isolator Row (Sediment Forebay)	0.25	0.56	0.14	0.42
	0.00	0.42	0.00	0.42
	0.00	0.42	0.00	0.42

Total TSS Removal = 58%

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

Project: CONC-0020
Prepared By: RJH
Date: 6/6/2019

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

Location: Pretreatment Infiltration Chamber SWMA-6P

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	0.25	1.00	0.25	0.75
Oil Grit Separator	0.25	0.75	0.19	0.56
Isolator Row (Sediment Forebay)	0.25	0.56	0.14	0.42
	0.00	0.42	0.00	0.42
	0.00	0.42	0.00	0.42

Total TSS Removal = 58%

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

Project: CONC-0020
Prepared By: RJH
Date: 6/6/2019

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

Location: Pretreatment Infiltration Chamber SWMA-7P

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	0.25	1.00	0.25	0.75
Oil Grit Separator	0.25	0.75	0.19	0.56
Isolator Row (Sediment Forebay)	0.25	0.56	0.14	0.42
	0.00	0.42	0.00	0.42
	0.00	0.42	0.00	0.42

Total TSS Removal = 58%

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

Project: CONC-0020
Prepared By: RJH
Date: 6/6/2019

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

Location: Pretreatment Infiltration Chamber SWMA-8P

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	0.25	1.00	0.25	0.75
Oil Grit Separator	0.25	0.75	0.19	0.56
Isolator Row (Sediment Forebay)	0.25	0.56	0.14	0.42
	0.00	0.42	0.00	0.42
	0.00	0.42	0.00	0.42

Total TSS Removal = 58%

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

Project: CONC-0020
Prepared By: RJH
Date: 6/6/2019

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

Location: Subsurface Infiltration Chamber SWMA-1P

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	0.25	1.00	0.25	0.75
Subsurface Infiltration Structure	0.80	0.75	0.60	0.15
	0.00	0.15	0.00	0.15
	0.00	0.15	0.00	0.15
	0.00	0.15	0.00	0.15

Total TSS Removal = 85%

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

Project: CONC-0020
Prepared By: RJH
Date: 6/6/2019

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

Location: Subsurface Infiltration Chamber SWMA-2P Roof Only

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Subsurface Infiltration Structure	0.80	1.00	0.80	0.20
	0.00	0.20	0.00	0.20
	0.00	0.20	0.00	0.20
	0.00	0.20	0.00	0.20
	0.00	0.20	0.00	0.20

Total TSS Removal = 80%

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

Project: CONC-0020
Prepared By: RJH
Date: 6/6/2019

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

Location: Subsurface Infiltration Chamber SWMA-3P

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	0.25	1.00	0.25	0.75
Subsurface Infiltration Structure	0.80	0.75	0.60	0.15
	0.00	0.15	0.00	0.15
	0.00	0.15	0.00	0.15
	0.00	0.15	0.00	0.15

Total TSS Removal = 85%

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

Project: CONC-0020
Prepared By: RJH
Date: 6/6/2019

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

Location: Subsurface Infiltration Chamber SWMA-4P

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	0.25	1.00	0.25	0.75
Subsurface Infiltration Structure	0.80	0.75	0.60	0.15
	0.00	0.15	0.00	0.15
	0.00	0.15	0.00	0.15
	0.00	0.15	0.00	0.15

Total TSS Removal = 85%

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

Project: CONC-0020
Prepared By: RJH
Date: 6/6/2019

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

Location: Subsurface Infiltration Chamber SWMA-5P

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	0.25	1.00	0.25	0.75
Subsurface Infiltration Structure	0.80	0.75	0.60	0.15
	0.00	0.15	0.00	0.15
	0.00	0.15	0.00	0.15
	0.00	0.15	0.00	0.15

Total TSS Removal = 85%

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

Project: CONC-0020
Prepared By: RJH
Date: 6/6/2019

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

Location: Subsurface Infiltration Chamber SWMA-6P

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	0.25	1.00	0.25	0.75
Subsurface Infiltration Structure	0.80	0.75	0.60	0.15
	0.00	0.15	0.00	0.15
	0.00	0.15	0.00	0.15
	0.00	0.15	0.00	0.15

Total TSS Removal = 85%

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

Project: CONC-0020
Prepared By: RJH
Date: 6/6/2019

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

Location: Subsurface Infiltration Chamber SWMA-7P

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	0.25	1.00	0.25	0.75
Subsurface Infiltration Structure	0.80	0.75	0.60	0.15
	0.00	0.15	0.00	0.15
	0.00	0.15	0.00	0.15
	0.00	0.15	0.00	0.15

Total TSS Removal = 85%

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

Project: CONC-0020
Prepared By: RJH
Date: 6/6/2019

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

Location: Subsurface Infiltration Chamber SWMA-8P

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	0.25	1.00	0.25	0.75
Subsurface Infiltration Structure	0.80	0.75	0.60	0.15
	0.00	0.15	0.00	0.15
	0.00	0.15	0.00	0.15
	0.00	0.15	0.00	0.15

Total TSS Removal = 85%

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

Project: CONC-0020
Prepared By: RJH
Date: 6/6/2019

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

Location: Subsurface Infiltration Chamber SWMA-9P Roof Only

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Subsurface Infiltration Structure	0.80	1.00	0.80	0.20
	0.00	0.20	0.00	0.20
	0.00	0.20	0.00	0.20
	0.00	0.20	0.00	0.20
	0.00	0.20	0.00	0.20

Total TSS Removal = 80%

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

Project: CONC-0020
Prepared By: RJH
Date: 6/6/2019

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

2.5 Standard 5 | Land Uses With Higher Potential Pollutant Loading

This project is not considered a LUHPPL.

2.6 Standard 6 | Critical Areas

Stormwater discharge from this property is not within a Zone II, Interim Wellhead Protection Area of a public water supply or a critical area.

2.7 Standard 7 |Redevelopment

This project is not considered a redevelopment.

2.8 Standard 8 | Construction Period Controls

A Stormwater Pollution Prevention Plan (SWPPP) is provided. A Construction Sequencing Schedule will be provided following selection of Site Contractor prior to land disturbance.

2.9 Standard 9 | Long Term Operation And Maintenance Plan

Refer to Section 4 Long Term Operation and Maintenance Plan.

2.10 Standard 10 |Illicit Discharges To Drainage System

There are no proposed illicit discharges into the Stormwater Management Systems to be constructed as shown on the site plan.

3 | MassDEP Stormwater Checklist

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

Checklist for Stormwater Report

A. Introduction

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

The Stormwater Report must include:

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

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

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

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the

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

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

B. Stormwater Checklist and Certification

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

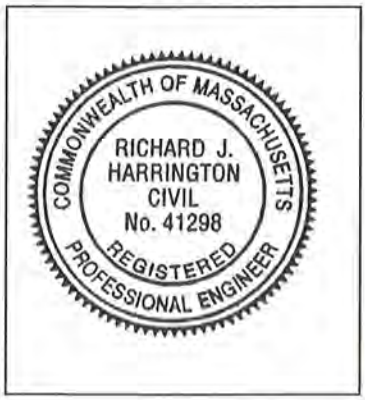
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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

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

Registered Professional Engineer's Certification

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

Registered Professional Engineer Block and Signature



7/11/2019

Signature and Date

Checklist

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

☒ New development

☐ Redevelopment

☐ Mix of New Development and Redevelopment

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

☐ No disturbance to any Wetland Resource Areas

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

☐ Reduced Impervious Area (Redevelopment Only)

☐ Minimizing disturbance to existing trees and shrubs

☐ LID Site Design Credit Requested:

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

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

☐ Bioretention Cells (includes Rain Gardens)

☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)

☐ Treebox Filter

☐ Water Quality Swale

☐ Grass Channel

☐ Green Roof

☒ Other (describe): Roof Drywells

Standard 1: No New Untreated Discharges

☒ No new untreated discharges

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

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

Standard 2: Peak Rate Attenuation

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

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

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

post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

☒ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

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

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

☐ Static ☒ Simple Dynamic ☐ Dynamic Field[1]

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

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

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

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

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

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

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

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

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

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

Standard 4: Water Quality

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

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

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

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

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

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

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

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

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

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

☒ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided. (see Massachusetts Stormwater Handbook, Volume 2, Chapter 2, page 86)

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

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

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

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

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

☐ All exposure has been eliminated.

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

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

Standard 6: Critical Areas

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Standard 9: Operation and Maintenance Plan

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

☒ Name of the stormwater management system owners;

☒ Party responsible for operation and maintenance;

☒ Schedule for implementation of routine and non-routine maintenance tasks;

- ☒ Plan showing the location of all stormwater BMPs maintenance access areas; (See Definitive/SWPPP plan set)
- ☐ Description and delineation of public safety features;
- ☐ Estimated operation and maintenance budget; and
- ☒ Operation and Maintenance Log Form.

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

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

Standard 10: Prohibition of Illicit Discharges

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

☐ An Illicit Discharge Compliance Statement is attached; (See section 1.7 of the Mitigative Drainage Analysis)

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

4 | Long Term Operation & Maintenance Plan

This Operation & Maintenance Plan is prepared to comply with provisions set forth in the Massachusetts Department of Environmental Protection (MassDEP) Stormwater Management Standards.

Structural Best Management Practices (BMPs) require periodic maintenance to ensure proper function and efficiency in pollutant removal from stormwater discharges that would otherwise reach wetland resource areas untreated. Maintenance schedules found below are as recommended in MassDEP's Massachusetts Stormwater Handbook and as recommended in the manufacturer's specifications.

The stormwater management system owner and the party responsible for maintenance of the stormwater management system shall be Symes Development & Permitting, LLC and its designated employees.

4.1 The following BMPs provide pollutant removal and groundwater recharge

1. Deep Sump Catch Basin with Hood/Trap
2. Oil Grit Separator
3. Subsurface Infiltration Chambers

Deep-Sump Catch Basin with Hood/Trap

Inspect and/or clean at least four times per year with special consideration given to the end of foliage and snow removal seasons. This shall also be applicable to all drop inlet catch basins located outside of pavement areas within low areas associated with landscaping features.

Sediments must also be removed once per year or whenever the depth of deposits is greater than or equal to one half the depth from the bottom of the sump or one half the depth of the invert of the outlet pipe.

Clamshell buckets and/or vacuum trucks are typically used to remove sediment in Massachusetts.

Cleanings may be taken to a landfill or other facility permitted by MassDEP to accept solid waste without any prior approval by MassDEP. However, some landfills require catch basin cleanings to be tested before they are accepted. For information on all of the MassDEP requirements pertaining to the disposal of catch basin cleanings go to
http://www.mass.gov/eea/agencies/massdep/recycle/regulations/management-of-catch-basin-cleanings.html

Oil Grit Separator

Inspect and maintain the Oil Grit Separator according to the MassDEP recommendations, see below.

Sediments and associated pollutants and trash are removed only when inlets or sumps are cleaned out, so regular maintenance is essential. Most studies have linked the failure of oil grit separators to the lack of regular maintenance. The more frequent the cleaning, the less likely sediments will be resuspended and subsequently discharged. In addition, frequent cleaning also makes more volume available for future storms and enhances overall performance.

Cleaning includes removal of accumulated oil and grease and sediment using a vacuum truck or other ordinary catch basin cleaning device.

In areas of high sediment loading, inspect and clean inlets after every major storm.

At a minimum, inspect oil grit separators monthly, and clean them out at least twice per year.

Polluted water or sediments removed from an oil grit separator should be disposed of in accordance with all applicable local, state and federal laws and regulations including M.G.L.c. 21C and 310 CMR 30.00.

Subsurface Infiltration Chambers
Each Stormtech detention system accepting runoff from roadway pavement has been provided with an isolator row sized for the one-inch water quality volume per local town standards. Access to this isolator row is provided from the diversion manhole located at the entrance to the isolator row. Each diversion manhole is also provided with a two-foot sump which shall also be inspected and cleaned when an inspection reveals accumulated sediment or trash is clogging the 24-inch orifice to the isolator row.

Accumulated sediment and trash can typically be evacuated through the manhole over the diversion wall. If maintenance is not performed as recommended, sediment and trash may accumulate. Manhole covers should be securely seated following cleaning activities. Manufacturer suggests that all systems be designed with an access/inspection manhole situated at or near the inlet and the emergency outlet orifice. Should it be necessary to get inside the system to perform maintenance activities, all appropriate precautions regarding confined space entry and OSHA regulations should be followed.

Isolator Rows are to be cleaned per the most recently available manufacturers operation manuals.

Maintaining an underground detention or infiltration system is easiest when there is no flow entering the system. For this reason, it is a good idea to schedule the cleanout during dry weather.

4.2 The following BMPs are recommended to minimize impacts to wetland resource areas

Private Driveway Sweeping
Pavement sweeping is recommended to be conducted four times annually within the main access driveways. Special attention will be given to the spring (March or April) and late fall (November or December).

Snow Removal
Snow will be placed along each side of the driveways outside of ANY public right-of-way. Snow from sidewalks will also be placed along shoulder opposite from vehicular travel to maintain additional width for emergency vehicles. Snow from individual dwelling unit driveways will be placed in each respective front and side yard areas as space allows. Provisions shall also be established to stockpile snow within the site within the central common areas and outside of any dedicated common open space. Itr may be deemed necessary to have excess snow to be removed from site to maintain safe emergency vehicle access to each dwelling unit. Snow will be stockpiled in the designated "Snow Storage" locations shown on the

site plan. Snow disposal/removal shall be in compliance with MassDEP's Bureau of Water Resources guidelines, effective December 21, 2015. See Section 8 Snow Disposal Guidelines.

Provisions will be made to remove snow from the site when the designated areas have reached their capacity.

4.3 Permanent Seeding

Permanent Seeding & Plantings

Once final grades have been established and the weather permits, every effort shall be made to establish permanent vegetation on disturbed and exposed areas no later than September of that year, otherwise temporary seeding practices shall be used until permanent seeding practices can resume the following spring, April 1st through May 31st.

In addition to grass seed, tree and shrub plantings shall be an integral part of the permanent stabilization plan in accordance with the Landscape Plan. Care shall be taken by the owner, builder, and/or site contractor to select native trees, shrubs, and seed mixes that are best suited to the soil conditions on the site. Soil moisture, depth to seasonal groundwater, and exposure to sunlight shall be carefully considered when selecting species. In recent years, the emphasis on using plant species native to Massachusetts has grown. Information on the use of non-native and native species can be found on the web and in many local nursery catalogs.

Permanent seeding shall be performed in accordance with the guidelines set forth in the "Massachusetts Erosion and Sediment Control Guidelines for Urban and Suburban Areas, May 2003, prepared by Franklin, Hampden, and Hampshire Conservation Districts."

Inspection and Maintenance Form

Refer to Sections above for frequency of inspection

Inspector: Date:

Inspector Title:

Days since last rainfall: Amount of last rainfall:

Structural Controls: Catch Basins / Grates and Drop Inlet Structures

Structure Identification	Location	Catch basin at grade	Hood/trap installed	Sediment buildup (in.)	Overall condition
CB1	South Drive Main Entrance	Yes☐No☐	Yes☐No☐		Poor☐ Fair☐ Good☐
CB2	South Drive Main Entrance	Yes☐No☐	Yes☐No☐		Poor☐ Fair☐ Good☐
CB3	East Drive at Path	Yes☐No☐	Yes☐No☐		Poor☐ Fair☐ Good☐
CB4	East Drive at Path	Yes☐No☐	Yes☐No☐		Poor☐ Fair☐ Good☐
CB5	East Edge Common Area	Yes☐No☐	Yes☐No☐		Poor☐ Fair☐ Good☐
CB6	East Edge Common Area	Yes☐No☐	Yes☐No☐		Poor☐ Fair☐ Good☐

Maintenance required

To be performed by: On or before:

Inspection and Maintenance Form

Refer to Sections above for frequency of inspection

Inspector: Date:

Inspector Title:

Days since last rainfall: Amount of last rainfall:

Structural Controls: Catch Basins / Grates and Drop Inlet Structures

Structure Identification	Location	Catch basin at grade	Hood/trap installed	Sediment buildup (in.)	Overall condition
CB7	North Drive Low Point	Yes☐No☐	Yes☐No☐		Poor☐ Fair☐ Good☐
CB8	North Drive Mail Station	Yes☐No☐	Yes☐No☐		Poor☐ Fair☐ Good☐
CB9	North Drive Mail Station	Yes☐No☐	Yes☐No☐		Poor☐ Fair☐ Good☐
CB10	Northwest Drive Town Path	Yes☐No☐	Yes☐No☐		Poor☐ Fair☐ Good☐
CB11	West Drive Center Village	Yes☐No☐	Yes☐No☐		Poor☐ Fair☐ Good☐
CB12	West Drive Center Village	Yes☐No☐	Yes☐No☐		Poor☐ Fair☐ Good☐

Maintenance required

To be performed by: On or before:

Inspection and Maintenance Form

Refer to Sections above for frequency of inspection

Inspector: Date:

Inspector Title:

Days since last rainfall: Amount of last rainfall:

Structural Controls: Catch Basins / Grates and Drop Inlet Structures

Structure Identification	Location	Catch basin at grade	Hood/trap installed	Sediment buildup (in.)	Overall condition
CB13	Common Area Lawn near Mail Station	Yes☐No☐	Yes☐No☐		Poor☐ Fair☐ Good☐
CB14	Common Area Easterly Lawn	Yes☐No☐	Yes☐No☐		Poor☐ Fair☐ Good☐
CB15	Northeast Drive near Junction Square	Yes☐No☐	Yes☐No☐		Poor☐ Fair☐ Good☐
Area Drain AD-1	Northwest Corner Site Rear Lawn	Yes☐No☒	Yes☐No☐		Poor☐ Fair☐ Good☐
Area Drain AD-2	Northwest Corner Site Rear Lawn	Yes☐No☐	Yes☐No☐		Poor☐ Fair☐ Good☐
Area Drain AD-3	Northwest Corner Site Rear Lawn	Yes☐No☐	Yes☐No☐		Poor☐ Fair☐ Good☐

Maintenance required

To be performed by: On or before:

Inspection and Maintenance Form

Refer to Sections above for frequency of inspection

Inspector: Date:

Inspector Title:

Days since last rainfall: Amount of last rainfall:

Structural Controls: Oil Grit Separator

Structure Identification	Location	Sediment buildup inlet (in.)	Sediment buildup outlet (in.)	Overall condition
OGS1	South Drive (CB1 & CB2)			Poor☐ Fair☐ Good☐
OGS3	West Drive (CB11 & CB12)			Poor☐ Fair☐ Good☐
OGS4	Northwest Drive (CB8,CB9,CB10)			Poor☐ Fair☐ Good☐
OGS5	North Drive (CB7 & CB13)			Poor☐ Fair☐ Good☐
OGS6_	North Drive East Common Area (CB5, CB6, CB14)			Poor☐ Fair☐ Good☐
OGS7	East Drive (CB3 & CB4)			Poor☐ Fair☐ Good☐
OGS8_	Northeast Drive Near Junction Sq. (CB15)			Poor☐ Fair☐ Good☐

Maintenance required

To be performed by: On or before:

Inspection and Maintenance Form

Refer to Sections above for frequency of inspection

Inspector: Date:

Inspector Title:

Days since last rainfall: Amount of last rainfall:

Structural Controls: Subsurface Infiltration Chambers

Structure Identification	Location	Condition of stone bed	Filter fabric installed	Sediment buildup at inlet (in.)	Sediment buildup at outlet (in.)
SWMA1P	South Drive (CB1 & CB2)		Yes☐No☐		
SWMA2P	West Drive		Yes☐No☐		
SWMA3P	West Drive		Yes☐No☐		
SWMA4P	Northwest Drive		Yes☐No☐		
SWMA5P	North Drive		Yes☐No☐		
SWMA6P	North Drive		Yes☐No☐		
SWMA7P	East Drive		Yes☐No☐		
SWMA8P	Northeast Drive		Yes☐No☐		
SWMA9P	Northeast Drive		Yes☐No☐		

Maintenance required

To be performed by: On or before:

5 | Long Term Pollution Prevention Plan

This Long Term Pollution Prevention Plan is prepared to comply with the provisions set forth in the Massachusetts Department of Environmental Protection (DEP) Stormwater Management Standards. Structural Best Management Practices (BMPs) require periodic maintenance to ensure proper function and efficiency in pollutant removal from stormwater discharges that would otherwise reach wetland resource areas untreated.

Maintenance schedules found below are as recommended in Department of Environmental Protection's Massachusetts Stormwater Handbook and as recommended in manufacturer's specifications.

5.1 Pavement Sweeping

Annual sweeping of sediment from parking spaces & access drives is recommended with special attention given to spring (March/April) and late fall (November/December).

5.2 Trash and Litter Cleanup

In addition to pavement sweeping, the condominium association shall perform trash and litter cleanup once per month in and around the site. Trash and litter shall be properly disposed of off-site.

5.3 Ownership and Maintenance Responsibilities

After completion, the condominium association will assume full responsibility of continuing the operation and maintenance of the stormwater management system as well as the long term pollution prevention plan outlined below. The exception would be if a legal agreement is made with another party to perform such duties for the owner(s).

5.4 DEP Standard 4 Water Quality

The Long Term Pollution Prevention Plan includes the following:

Good housekeeping practices
Prevent or reduce pollutant runoff from reaching the wetland resource areas through pavement sweeping, stabilizing all disturbed areas with vegetative cover and catch basin cleaning.

Provisions for storing materials and waste products inside or under cover
During construction, all materials on site are to be stored in a neat and orderly fashion in their appropriate containers and, if possible, under a roof or other secure enclosure. All waste products are to be placed in secure receptacles until they are emptied by a solid waste management company licensed in the Commonwealth of Massachusetts.

Following construction, all residents are expected to adhere to standard applicable practices in the use and storage of materials normally associated with residential uses only. All common area materials shall be the responsibility of the condominium association.

Vehicle washing controls
During construction, removal of sediment from construction vehicles leaving the site shall be conducted on approved stabilized construction entrances per Stormwater Pollution Prevention Plan details.

Following construction, it is anticipated that a percentage of the residents may wash their vehicles on-site. Residents will be encouraged to wash vehicles per recommended guidance available from local agencies.

Requirements for routine inspections and maintenance of Stormwater BMP's

Follow the procedures outlined in Section 4 Long Term Operation and Maintenance Plan and the provided Inspection and Maintenance Forms. Condominium Documents will include provisions.

Spill prevention and response plans

Spill Prevention: As mentioned previously, all materials on site are antiicpated to be residential grade which typically stored in smaller amounts in a neat and orderly fashion in their appropriate containers and, if possible, under a roof or other secure enclosure. Products shall be kept in their original containers with the original manufacturer's label. Products should not be mixed unless recommended by the manufacturer. The manufacturer's recommendations for proper use, storage and disposal shall be followed at all times and, if possible, all of the product should be used up before proper disposal.

Response: The manufacturer's recommended methods for cleanup must be followed and spills cleaned up immediately after discovery. Spills shall be kept well ventilated and personnel must wear appropriate protective gear to prevent injury from contact with hazardous substances. Spills of toxic or hazardous material must be reported to the appropriate local and/or State agencies in accordance with the local and/or Commonwealth of Massachusetts regulations.

Requirements for storage and use of fertilizers, herbicides and pesticides

The condominium association will likely contract with a professional company relative to lawn care and maintenance of common areas. All materials shall be stored offsite. Materials utilized shall be minimized and be free of phosphorus. Consult the Town of Concord, MA official website for recommended guidelines and for any questions regarding these materials.

Fertilizers: Fertilizers are to be applied at the minimum amounts recommended by the manufacturer and once applied any residual shall be swept from the pavement to limit the possibility of entering the storm drains. Storage procedures are to be followed as previously stated and the contents of any partially used bags should be transferred to a sealable container, either bag or bin to avoid spilling.

Herbicides and Pesticides: Storage of these materials are to be as outlined previously and especially out of the reach of pets and children, away from damp areas where their containers may succumb to moisture or rust and should not be stored near food. These materials must not be placed in the trash or washed down the drain. Handle using rubber gloves and use an appropriate mask when using these products for extensive periods of time.

Provisions for maintenance of lawns, gardens, and other landscaped areas

These activities are left to the owner(s) to schedule and perform.

Pet waste management provisions

These activities are left to the owner(s) to schedule and perform.

Operation and Management of septic system

The condominium association shall be responsible for the inspection, maintenance, and upgrade of the system serving the units, unless otherwise noted. Each system shall be inspected at least once every three years per 310 CMR 15.301 System Inspection; the State Environmental Code, Title 5.

Snow disposal and plowing plans relative to Wetland Resource Areas

Snow disposal/removal shall be in compliance with MassDEP's Bureau of Water Resources guidelines, effective December 21, 2015. See Section 8 Snow Disposal Guidelines.

Winter Road Salt and/or Sand Use and Storage restrictions

Road Salt use must be in compliance with the Guidelines on Deicing Chemical (Road Salt) Storage effective date December 19, 1997, Guideline No. DWSG97-1 found in the BRP's Drinking Water Program. Sand Use: Encourage the use of environmentally friendly alternatives such as calcium chloride and/or sand instead of road salt for melting ice whenever possible.

Pavement Sweeping schedules

Pavement sweeping can be performed by the owner(s) on a monthly average; however, at the very least sweeping is recommended to occur once a year in the spring and fall in order to minimize the amount of Total Suspended Solids load on the deep-sump catch basins and the other Best Management Practices tributary thereto.

Provisions for prevention of illicit discharges to the stormwater management systems

According to Standard 10 in the Massachusetts Stormwater Handbook, Illicit discharges to the stormwater management system are discharges that are not entirely comprised of stormwater. Notwithstanding the foregoing, an illicit discharge does not include discharges from the following activities or facilities: firefighting, water line flushing, landscape irrigation, uncontaminated groundwater, potable water sources, foundation drains, air conditioning condensation, footing drains, individual resident car washing, flows from riparian habitats and wetlands, dechlorinated water from swimming pools, water used for street washing and water used to clean residential buildings without detergents.

Documentation that Stormwater BMP's are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from land uses with higher potential pollutant loads (LUHPPL)

Not applicable as this project does not meet the criteria for a LUHPPL.

Training for staff or personnel involved with implementing LTPPP

This responsibility lies with the owner(s) unless a legally-binding agreement is made with another party to perform such duties for the owner(s).

List of Emergency contacts for implementing Long-Term Pollution Prevention Plan

This responsibility lies with the owner(s) unless a legally-binding agreement is made with another party to perform such duties for the owner(s).

6 | Construction Period Pollution Prevention Plan & Erosion & Sediment Control

This Construction Period Pollution Prevention Plan and Erosion and Sediment Control Plan is prepared to comply with the provisions set forth in the Massachusetts Department of Environmental Protection (DEP) Stormwater Management Standards.

6.1 Site Description

Project name and location

Center & Main
A Planned Residential Development
1440 Main Street
Concord, Massachusetts

Applicant Name and Address

Symes Development & Permitting, LLC
50 Dodge Street, Suite 202
Beverly, MA 01915

Description (Purpose and Types of Soil Disturbing Activities)

Project involves removing two existing residential structures and constructing a new residential cluster development including an ANR frontage lot on Highland Street. Removal of existing vegetation and proposed cuts and fills will be conducted to properly grade the site for the intended use. Excess material will be removed from site following installation of foundations and access/egress drives. Activities to also include installation of materials and structures associated with an onsite private sewage disposal system along with decentralized subsurface infiltration systems to control and recharge stormwater runoff.

Soil disturbing activities include: Clearing and grubbing; installation of erosion and sediment control device; cut and fill; installation of onsite private sewage disposal system; installation of decentralized subsurface infiltration systems to control and recharge stormwater runoff. pavement installation; utility installation; building construction; stormwater management systems and preparation for final loaming, seeding and installation of required Landscaping.

Site Runoff Coefficient

The final composite runoff coefficient for the area of construction is approximately ___ .

Site Area

The site is 9.2 acres of which 7.8 acres will be disturbed by construction activities.

Sequence of Major Activities

1. Construct Dwelling on ANR lot for current Owner to relocate.
2. Install tree protection devices within open space
3. construction entrance
4. Install erosion control devices
5. Raze existing Structures of Owner.
6. Clearing, cutting and grubbing
7. Rough grading of cuts and fills and removal of excess material from site
8. Water Main Installation
9. Install onsite Sewage Disposal System
10. Underground Utility Installation
11. Stabilize perimeter cut slopes with vegetation and erosion controls.
12. Install limited landscaping items in select areas along perimeter.
13. Install stormwater Management systems.
14. Gravel and pavement binder course installation
15. Phased pad site preparation for each dwelling unit
16. Curbing and sidewalk construction
17. Finished grading and slope stabilization
18. Finished Paving
19. Loam and seed all disturbed areas
20. Final cleanup including inspection and cleanout of all stormwater structures

Name of Receiving Waters

The Assabet River Watershed

6.2 Erosion and Sediment Controls

In order to limit the amount of erosion and sedimentation that takes place during and after construction, it is important to implement a management plan, which will protect and limit the amount of land area that is devoid of vegetation at any given time.

Prior to Construction

Prior to start of construction activities, the owner, builder, and site contractor shall clearly identify areas that may be affected by the proposed clearing and earth moving activities by reviewing the approved grading plan as part of an initial site visit. During the site visit, the limit of work line shall be reviewed to confirm the type of erosion control measure to be used to protect downstream wetland resources and abutting property. Limits of tree clearing shall be verified during the initial site visit with emphasis on identifying "save areas" for existing trees and vegetation where practicable.

Erosion and Sediment Control Device

Siltfence and bales are proposed as the primary erosion control device for this project (see detail provided on site plan). It is important for the owner, builder, and/or site contractor to have access to a supply of compost BMPs should the need arise for additional erosion and sediment control measures. A mulch sock or approved equal may be used along a slope and/or together with siltfence to protect against concentrated stormwater runoff over exposed surfaces. Erosion and sediment control devices shall be inspected every 7 days or within 24-hours of a 1/2-inch (or greater) rainfall event to ensure that they are operating properly. Should sediment levels begin to build up on the erosion control devices, it may be necessary to remove the accumulated sediment to ensure that the erosion control devices continue to operate as designed. Sediment shall be removed when it reaches one third the height of the fence.

Earth-moving Activities

After trees and other vegetation are cleared, earth-moving (or grading) activities can begin. The approved grading plan shall be used to help guide the site contractor during regrading activities. Often times it is helpful to have a land surveyor establish benchmark elevations and/or lines of grade to aid the site contractor during regrading activities. This is the time during which the site is most vulnerable to erosion. Therefore, it is important for the site contractor to finalize grading activities as soon as practicable following land clearing. Areas than remain exposed longer than 30 working days in an interim condition shall be stabilized in a temporary fashion. Once final grades have been established, permanent vegetation can be established.

Temporary Seeding

During construction it may be necessary to temporarily stabilize areas that will not be brought to final grade for a period longer than 30 working days. Temporary seeding is accomplished using fast-growing grass seed species such as ryegrass. Seeding shall be performed in accordance with the guidelines set forth in the attached **Temporary Seeding Guidance**, which is an excerpt from the publication entitled, "Massachusetts Erosion and Sediment Control Guidelines for Urban and Suburban Areas, May 2003, prepared by Franklin, Hampden, and Hampshire Conservation Districts."

Permanent Seeding & Plantings

Once final grades have been established and the weather permits, every effort shall be made to establish permanent vegetation on disturbed and exposed areas. In addition to grass seed, tree and shrub plantings shall be an integral part of the permanent stabilization plan. Care shall be taken by the owner, builder, and/or site contractor to select trees, shrubs, and seed mixes that are best suited to the soil conditions on the site. Soil moisture, depth to seasonal groundwater, and exposure to sunlight shall be carefully considered when selecting species. In recent years, the emphasis on using plant species native to Massachusetts has grown. Information on the use of non-native and native species can be found on the web and in many local nursery catalogs.

Permanent seeding shall be performed in accordance with the guidelines set forth in the attached **Permanent Seeding Guidance**, which is an excerpt from a publication entitled, "Massachusetts Erosion and Sediment Control Guidelines for Urban and Suburban Areas, May 2003, prepared by Franklin, Hampden, and Hampshire Conservation Districts."

Consultation with the Registered Landscape Architect is recommended.

Seeding, Permanent

The establishment of perennial vegetative cover on disturbed areas.

Purpose

Permanent seeding of grass and planting trees and shrubs provides stabilization to the soil by holding soil particles in place.

Vegetation reduces sediments and runoff to downstream areas by slowing the velocity of runoff and permitting greater infiltration of the runoff.

Vegetation also filters sediments, helps the soil absorb water, improves wildlife habitats, and enhances the aesthetics of a site.

Where Practice Applies

- Permanent seeding and planting is appropriate for any graded or cleared area where long-lived plant cover is needed to stabilize the soil.
- Areas which will not be brought to final grade for a year or more.
- Some areas where permanent seeding is especially important are filter strips, buffer areas, vegetated swales, steep slopes, and stream banks.
- This practice is effective on areas where soils are unstable because of their texture or structure, high water table, winds, or steep slope.

Advantages

Advantages of seeding over other means of establishing plants include the small initial establishment cost, the wide variety of grasses and legumes available, low labor requirement, and ease of establishment in difficult areas.

Seeding is usually the most economical way to stabilize large areas.

Well established grass and ground covers can give an aesthetically pleasing, finished look to a development.

Once established, the vegetation will serve to prevent erosion and retard the velocity of runoff.

Disadvantages/Problems

Disadvantages which must be dealt with are the potential for erosion during the establishment stage, a need to reseed areas that fail to establish, limited periods during the year suitable for seeding, and a need for water and appropriate climatic conditions during germination. Vegetation and mulch cannot prevent soil slippage and erosion if soil is not inherently stable.

Coarse, high grasses that are not mowed can create a fire hazard in some locales. Very short mowed grass, however, provides less stability and sediment filtering capacity.

Grass planted to the edge of a watercourse may encourage fertilizing and mowing near the water's edge and increase nutrient and pesticide contamination.

Depends initially on climate and weather for success.

May require regular irrigation to establish and maintain.

Planning considerations

Selection of the right plant materials for the site, good seedbed preparation, timing, and conscientious maintenance are important. Whenever possible, native species of plants should be used for landscaping. These plants are already adapted to the locale and survivability should be higher than with "introduced" species.

Native species are also less likely to require irrigation, which can be a large maintenance burden and is neither cost-effective nor ecologically sound.

If non-native plant species are used, they should be tolerant of a large range of growing conditions, as low-maintenance as possible, and not invasive.

Consider the microclimate within the development area. Low areas may be frost pockets and require hardier vegetation since cold air tends to sink and flow towards low spots. South-facing slopes may be more difficult to re-vegetate because they tend to be sunnier and drier.

Divert as much surface water as possible from the area to be planted.

Remove seepage water that would continue to have adverse effects on soil stability or the protecting vegetation. Subsurface drainage or other engineering practices may be needed. In this situation, a permit may be needed from the local Conservation Commission: check ahead of time to avoid construction delays.

Provide protection from equipment, trampling and other destructive agents.

Vegetation cannot be expected to supply an erosion control cover and prevent slippage on a soil that is not stable due to its texture, structure, water movement, or excessive slope.

Seeding Grasses and Legumes

Install needed surface runoff control measures such as gradient terraces, berms, dikes, level spreaders, waterways, and sediment basins prior to seeding or planting.

Seedbed Preparation

If infertile or coarse-textured subsoil will be exposed during land shaping, it is best to stockpile topsoil and respread it over the finished slope at a minimum 2- to 6-inch depth and roll it to provide a firm seedbed. If construction fill operations have left soil exposed with a loose, rough, or irregular surface, smooth with blade and roll.

Loosen the soil to a depth of 3-5 inches with suitable agricultural or construction equipment.

Areas not to receive top soil shall be treated to firm the seedbed after incorporation of the lime and fertilizer so that it is depressed no more than ½ - 1 inch when stepped on with a shoe. Areas to receive topsoil shall not be firmed until after topsoiling and lime and fertilizer is applied and incorporated, at which time it shall be treated to firm the seedbed as described above. This can be done by rolling or cultipacking.

Cool Season Grasses

Cool Season Grasses grow rapidly in the cool weather of spring and fall, and set seed in June and July. Cool season grasses become dormant when summer temperatures persist above 85 degrees and moisture is scarce.

Lime and Fertilizer

Apply lime and fertilizer according to soil test and current Extension Service recommendations. In absence of a soil test, apply lime (a pH of 5.5 - 6.0 is desired) at a rate of 2.5 tons per acre and 10-20-20 analysis fertilizer at a rate of 500 pounds per acre (40 % of N to be in an organic or slow release form). Incorporate lime and fertilizer into the top 2-3 inches of soil.

Seeding Dates

Seeding operations should be performed within one of the following periods:

- April 1 - May 31,
- August 1 - September 10,
- November 1 - December 15 as a dormant seeding (seeding rates shall be increased by 50% for dormant seedings).

Seeding Methods

Seeding should be performed by one of the following methods. Seed should be planted to a depth of ¼ to ½ inches.

- Drill seedings,
- Broadcast and rolled, cultipacked or tracked with a small track piece of construction equipment,
- Hydroseeding, with subsequent tracking.

Mulch

Mulch the seedings with straw applied at the rate of ½ tons per acre. Anchor the mulch with erosion control netting or fabric on sloping areas.

Warm Season Grasses

Warm Season Grasses begin growth slowly in the spring, grow rapidly in the hot summer months and set seed in the fall. Many warm season grasses are sensitive to frost in the fall, and the top growth may die back. Growth begins from the plant base the following spring.

Lime and Fertilizer

Lime to attain a pH of at least 5.5. Apply a 0-10-10 analysis fertilizer at the rate of 600 lbs./acre.

Incorporate both into the top 2-3 inches of soil. (30 lbs. of slow release nitrogen should be applied after emergence of grass in the late spring.)

Seeding Dates

Seeding operations should be performed as an early spring seeding (April 1-May 15) with the use of cold treated seed. A late fall early winter dormant seeding (November 1 - December 15) can also be made, however the seeding rate will need to be increased by 50%.

Seeding Methods

Seeding should be performed by one of the following methods:

- Drill seedings (de-awned or de-bearded seed should be used unless the drill is equipped with special features to accept awned seed).
- Broadcast seeding with subsequent rolling, cultipacking or tracking the seeding with small track construction equipment. Tracking should be oriented up and down the slope.
- Hydroseeding with subsequent tracking. If wood fiber mulch is used, it should be applied as a separate operation after seeding and tracking to assure good seed to soil contact.

Mulch

Mulch the seedings with straw applied at the rate of ½ tons per acre. Anchor the mulch with erosion control netting or fabric on sloping areas.

Seed Mixtures for Permanent Cover

Recommended mixtures for permanent seeding are provided on the following pages. Select plant species which are suited to the site conditions and planned use. Soil moisture conditions, often the major limiting site factor, are usually classified as follows:

Dry - Sands and gravels to sandy loams. No effective moisture supply from seepage or a high water table.

Moist - Well drained to moderately well drained sandy loams, loams, and finer; or coarser textured material with moderate influence on root zone from seepage or a high water table.

Wet - All textures with a water table at or very near the soil surface, or with enduring seepage.

When other factors strongly influence site conditions, the plants selected must also be tolerant of these conditions.

Permanent Seeding Mixtures

Mix	Site	Seed Mixture	Seed, Pounds per: Acre	1,000 sf	Remarks
1	Dry	Little Bluestem			* Use Warm Season planting procedure.
		or Broomsedge	10	0.25	* Roadsides
		Tumble Lovegrass*	1	0.10	* Sand and Gravel Stabilization
		Switchgrass	10	0.25	* Clover requires inoculation with nitrogen-fixing bacteria
		Bush Clover*	2	0.10	
		Red Top	1	0.10	* Rates for this mix are for PLS.
2	Dry	Deertongue	15	0.35	* Use Warm Season planting procedures.
		Broomsedge	10	0.25	* Acid sites/Mine spoil
		Bush Clover*	2	0.10	* Clover requires inoculation with nitrogen-fixing bacteria.
		Red Top	1	0.10	*Rates for this mix are for PLS.
3	Dry	Big Bluestem	10	0.25	* Use Warm Season planting procedures.
		Indian Grass	10	0.25	* Eastern Prairie appearance
		Switchgrass	10	0.25	* Sand and Gravel pits.
		Little Bluestem	10	0.25	* Golf Course Wild Areas
		Red Top or	1	0.10	* Sanitary Landfill Cover seeding
		Perennial Ryegrass	10	0.25	* Wildlife Areas *OK to substitute Poverty Dropseed in place of Red Top/Ryegrass. *Rates for this mix are for PLS.
4	Dry	Flat Pea	25	0.60	* Use Cool Season planting procedures
		Red Top or	2	0.10	* Utility Rights-of-Ways (tends to suppress
		Perennial Ryegrass	15	0.35	woody growth)
5	Dry	Little Bluestem	5	0.10	* Use Warm Season planting procedures.
		Switchgrass	10	0.25	* Coastal sites
		Beach Pea*	20	0.45	* Rates for Bluestein and Switchgrass are for
		Perennial Ryegrass	10	0.25	PLS.
6	Dry -	Red Fescue	10	0.25	* Use Cool Season planting procedure.
	Moist	Canada Bluegrass	10	0.25	* Provides quick cover but is non-aggressive;
		Perennial Ryegrass	10	0.25	will tend to allow indigenous plant colonization.
		Red Top	1	0.10	* General erosion control on variety of sites, including forest roads, skid trails and landings.
7	Moist-	Switchgrass	10	0.25	* Use Warm Season planting procedure.
	Wet	Virginia Wild Rye	5	0.10	* Coastal plain/flood plain
		Big Bluestem	15	0.35	* Rates for Bluestem and Switchgrass are for
		Red Top	1	0.10	PLS.

Permanent Seeding Mixtures

Mix	Site	Seed Mixture	Seed, Pounds per: Acre	1,000 sf	Remarks
8	Moist	Creeping Bentgrass	5	0.10	* Use Cool Season planting procedures.
	Wet	Fringed Bromegrass	5	0.10	* Pond Banks
		Fowl Meadowgrass	5	0.10	* Waterways/ditch banks
		Bluejoint Reedgrass or Rice Cutgrass	2	0.10	
		Perennial Ryegrass	10	0.25	
9	Moist	Red Fescue	5	0.10	*Salt Tolerant
	Wet	Creeping Bentgrass	2	0.10	* Fescue and Bentgrass provide low growing appearance, while Switchgrass provides tall cover for wildlife.
		Switchgrass	8	0.20	
		Perennial Ryegrass	10	0.25	
10	Moist	Red Fescue	5	0.10	* Use Cool Season planting procedure.
	Wet	Creeping Bentgrass	5	0.10	* Trefoil requires inoculation with nitrogen fixing bacteria.
		Virginia Wild Rye	8	0.20	
		Wood Reed Grass*	1	0.10	* Suitable for forest access roads, skid trails and other partial shade situations.
		Showy Tick Trefoil*	1	0.10	
11	Moist	Creeping Bentgrass	5	0.10	* Use Cool Season planting procedure.
	Wet	Bluejoint Reed Grass	1	0.10	* Suitable for waterways, pond or ditch banks.
		Virginia Wild Rye	3	0.10	* Trefoil requires inoculation with nitrogen fixing bacteria.
		Fowl Meadow Grass	10	0.25	
		Showy Tick Trefoil*	1	0.10	
		Red Top	1	0.10	
12	Wet	Blue Joint Reed Grass	1	0.10	* Use Cool Season planting procedure.
		Canada Manna Grass	1	0.10	* OK to seed in saturated soil conditions, but not in standing water.
		Rice Cut Grass	1	0.10	
		Creeping Bent Grass	5	0.10	* Suitable as stabilization seeding for created wetland.
		Fowl Meadow Grass	5	0.10	* All species in this mix are native to Massachusetts.
13	Dry-Moist	American Beachgrass	18" centers	18' centers	*Vegetative planting with dormant culms, 3-5 culms per planting
14	Inter-Tidal	Smooth Cordgrass Saltmeadow Cordgrass	12-18" centers	12-18" centers	* Vegetative planting with transplants.

Notes:
* Species such as Tumble Lovegrass, Fringed Bromegrass, Wood Reedgrass, Bush Clover and Beach Pea, while known to be commercially available from specific seed suppliers, may not always be available from your particular seed suppliers. The local Natural Resources Conservation Service office may be able to help with a source of supply. In the event a particular species listed in a mix can not be obtained, however, it may be possible to substitute another species.

Seed mixtures by courtesy of Natural Resources Conservation Service, Amherst, MA.

(PLS) Pure Live Seed

Warm Season grass seed is sold and planted on the basis of pure live seed. An adjustment is made to the bulk rate of the seed to compensate for inert material and non-viable seed. Percent of pure live seed is calculated by multiplying the percent purity by the percent germination; **(% purity) x (% germination) = percent PLS.**

For example, if the seeding rate calls for 10 lbs./acre PLS and the seed lot has a purity of 70% and germination of 75%, the PLS factor is:

(.70 x .75) =.53

10 lbs. divided by .53 = approx. 19 lbs.

Therefore, 19 lbs of seed from the particular lot will need to be applied to obtain 10 lbs. of pure live seed.

Special Note

Tall Fescue, Reed Canary Grass, Crownvetch and Birdsfoot Trefoil are no longer recommended for general erosion control use in Massachusetts due to the invasive characteristics of each. If these species are used, it is recommended that the ecosystem of the site be analyzed for the effects species invasiveness may impose. The mixes listed in the above mixtures include either species native to Massachusetts or non-native species that are not perceived to be invasive, as per the Massachusetts Native Plant Advisory Committee.

Wetlands Seed Mixtures

For newly created wetlands, a wetlands specialist should design plantings to provide the best chance of success. Do not use introduced, invasive plants like reed canarygrass (Phalaris arundinacea) or purple loosestrife (Lythrum salicaria). Using plants such as these will cause many more problems than they will solve.

The following grasses all thrive in wetland situations:

- Fresh Water Cordgrass (*Spartina pectinata*)
- Marsh/Creeping Bentgrass (*Agrostis stolonifera, var. Palustric*)
- Broomsedge (*Andropogon virginicus*)
- Fringed Bromegrass (*Bromus ciliatus*)
- Blue Joint Reed Grass (*Calamagrostis cavedensis*)
- Fowl Meadow Grass (*Glyceria striata*)
- Riverbank Wild Rye (*Elymus riparius*)
- Rice Cutgrass (*Leersia oryzoides*)
- Stout Wood Reed (*Cinna arundinacea*)
- Canada Manna Grass (*Glyceria canadensis*)

A sample wetlands seed mix developed by The New England Environmental Wetland Plant Nursery is shown on the following page.

Wetland Seed Mixture

The New England Environmental Wetland Plant Nursery has developed a seed mixture which is specifically designed to be used in wetland replication projects and stormwater detention basins. It is composed of seeds from a variety of indigenous wetland species. Establishing a native wetland plant understory in these areas provides quick erosion control, wildlife food and cover, and helps to reduce the establishment of undesirable invasive species such as Phragmites and purple loosestrife (Lythrum salicaria). The species have been selected to represent varying degrees of drought tolerance, and will establish themselves based upon microtopography and the resulting variation in soil moisture.

Common Name (*Scientific Name*)	% in Mix	Comments
Lurid Sedge (*Carex lurida*)	30	A low ground cover that tolerates mesic sites in addition to saturated areas; prolific seeder in second growing season.
Fowl Meadow Grass (*Glyceria Canadensis*)	25	Prolific seed producer that is a valuable wildlife food source.
Fringed Sedge (*Carex crinita*)	10	A medium to large sedge that tolerates saturated areas; good seed producer.
Joe-Pye Weed (*Eupatoriadelphus maculatus*)	10	Flowering plant that is valuable for wildlife cover. Grows to 4 feet.
Brook Sedge (*Carex spp., Ovales group*)	10	Tolerates a wide range of hydrologic conditions.
Woolgrass (*Scirpus cyperinus*)	5	Tolerates fluctuating hydrology.
Boneset (*Eupatorium perfoliatum*)	5	Flowering Plant that is valuable for wildlife cover. Grows to 3 feet.
Tussock Sedge (*Carex stricta*)	<5	Grows in elevated hummocks on wet sites, may grow rhizomonously on drier sites.
Blue Vervain (*Verbena hastata*)	<5	A native plant that bears attractive, blue flowers.

The recommended application rate is one pound per 5,000 square feet when used as an understory cover. This rate should be increased to one pound per 2,500 square feet for detention basins and other sites which require a very dense cover. For best results, a late fall application is recommended. This mix is not recommended for standing water.

Maintenance

Inspect seeded areas for failure and make necessary repairs and reseed immediately. Conduct or follow-up survey after one year and replace failed plants where necessary.

If vegetative cover is inadequate to prevent rill erosion, overseed and fertilize in accordance with soil test results.

If a stand has less than 40% cover, reevaluate choice of plant materials and quantities of lime and fertilizer. Re-establish the stand following seedbed preparation and seeding recommendations, omitting lime and fertilizer in the absence of soil test results. If the season prevents resowing, mulch or jute netting is an effective temporary cover.

Seeded areas should be fertilized during the second growing season. Lime and fertilize thereafter at periodic intervals, as needed.

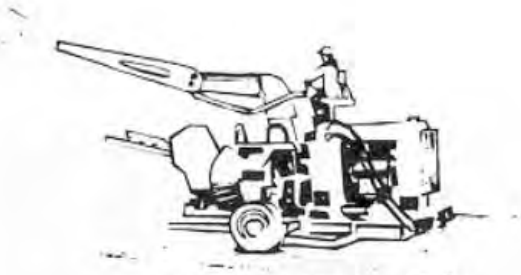
References

North Carolina Department of Environment, Health, and Natural Resources, ***Erosion and Sediment Control Field Manual***, Raleigh, NC, February 1991.

Personal communication, Richard J. DeVergilio, USDA, Natural Resources Conservation Service, Amherst, MA.

U.S. Environmental Protection Agency, ***Storm Water Management For Construction Activities***, EPA-832-R- 92-005, Washington, DC, September, 1992.

Washington State Department of Ecology, ***Stormwater Management Manual for the Puget Sound Basin***, Olympia, WA, February, 1992.

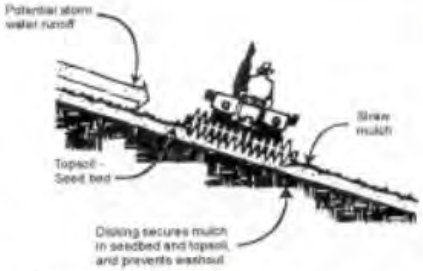


HYDRO-SEEDING

Seeding, Temporary

Planting rapid-growing annual grasses, small grains, or legumes to provide initial, temporary cover for erosion control on disturbed areas.

Purpose



To temporarily stabilize areas that will not be brought to final grade for a period of more than 30 working days.
To stabilize disturbed areas before final grading or in a season not suitable for permanent seeding.
Temporary seeding controls runoff and erosion until permanent vegetation or other erosion control measures can be established.
Root systems hold down the soils so that they are less apt to be carried offsite by storm water runoff or wind.
Temporary seeding also reduces the problems associated with mud and dust from bare soil surfaces during construction.

Where Practice Applies

On any cleared, unvegetated, or sparsely vegetated soil surface where vegetative cover is needed for less than one year. Applications of this practice include diversions, dams, temporary sediment basins, temporary road banks, and topsoil stockpiles.

Where permanent structures are to be installed or extensive re-grading of the area will occur prior to the establishment of permanent vegetation.

Areas which will not be subjected to heavy wear by construction traffic.

Areas sloping up to 10% for 100 feet or less, where temporary seeding is the only practice used.

Advantages

This is a relatively inexpensive form of erosion control but should only be used on sites awaiting permanent planting or grading. Those sites should have permanent measures used.

Vegetation will not only prevent erosion from occurring, but will also trap sediment in runoff from other parts of the site.

Temporary seeding offers fairly rapid protection to exposed areas.

Disadvantages/Problems

Temporary seeding is only viable when there is a sufficient window in time for plants to grow and establish cover. It depends heavily on the season and rainfall rate for success.

If sown on subsoil, growth will be poor unless heavily fertilized and limed. Because overfertilization can cause pollution of stormwater runoff, other practices such as mulching alone may be more appropriate. The potential for over-fertilization is an even worse problem in or near aquatic systems.

Once seeded, areas should not be travelled over.

Irrigation may be needed for successful growth. Regular irrigation is not encouraged because of the expense and the potential for erosion in areas that are not regularly inspected.

Planning Considerations

Temporary seedings provide protective cover for less than one year. Areas must be reseeded annual or planted with perennial vegetation.

Temporary seeding is used to protect earthen sediment control practices and to stabilize denuded areas that will not be brought into final grade for several weeks or months. Temporary seeding can provide a nurse crop for permanent vegetation, provide residue for soil protection and seedbed preparation, and help prevent dust production during construction.

Use low-maintenance native species wherever possible.

Planting should be timed to minimize the need for irrigation.

Sheet erosion, caused by the impact of rain on bare soil, is the source of most fine particles in sediment. To reduce this sediment load in runoff, the soil surface itself should be protected. The most efficient and economical means of controlling sheet and rill erosion is to establish vegetative cover. Annual plants which sprout rapidly and survive for only one growing season are suitable for establishing temporary vegetative cover. Temporary seeding is effective when combined with construction phasing so bare areas of the site are minimized at all times.

Temporary seeding may prevent costly maintenance operations on other erosion control systems. For example, sediment basin clean-outs will be reduced if the drainage area of the basin is seeded where grading and construction are not taking place. Perimeter dikes will be more effective if not choked with sediment.

Proper seedbed preparation and the use of quality seed are important in this practice just as in permanent seeding. Failure to carefully follow sound agronomic recommendations will often result in an inadequate stand of vegetation that provides little or no erosion control.

Soil that has been compacted by heavy traffic or machinery may need to be loosened. Successful growth usually requires that the soil be tilled before the seed is applied. Topsoiling is not necessary for temporary seeding; however, it may improve the chances of establishing temporary vegetation in an area.

Planting Procedures

Time of Planting

Planting should preferably be done between April 1 and June 30, and September 1 through September 30. If planting is done in the months of July and August, irrigation may be required. If planting is done between October 1 and March 31, mulching should be applied immediately after planting. If seeding is done during the summer months, irrigation of some sort will probably be necessary.

Site Preparation

Before seeding, install needed surface runoff control measures such as gradient terraces, interceptor dike/swales, level spreaders, and sediment basins.

Seedbed Preparation

The seedbed should be firm with a fairly fine surface.

Perform all cultural operations across or at right angles to the slope. See **Topsoiling** and **Surface Roughening** for more information on seedbed preparation. A minimum of 2 to 4 inches of tilled topsoil is required.

Liming and Fertilization

Apply uniformly 2 tons of ground limestone per acre (100 lbs. per 1,000 Sq. Ft.) or according to soil test.

Apply uniformly 10-10-10 analysis fertilizer at the rate of 400 lbs. per acre (14 lbs. per 1,000 Sq. Ft.) or as indicated by soil test. Forty percent of the nitrogen should be in organic form.

Work in lime and fertilizer to a depth of 4 inches using any suitable equipment.

Seedings for Temporary Cover

Species	Seeding Rates lbs/sq.ft. 1,000 Sq.Ft.	Seeding Rates lbs/sq.ft. Acre	Recommended Seeding Dates
Annual Ryegrass	1	40	April 1 to June 1 Aug. 15 to Sept. 15
Foxtail Millet	0.7	30	May 1 to June 30
Oats	2	80	April 1 to July 1 August 15 to Sept. 15
Winter Rye	3	120	Aug. 15 to Oct. 15

"Hydro-seeding" applications with appropriate seed-mulch-fertilizer mixtures may also be used.

Seeding

Select adapted species from the accompanying table.
Apply seed uniformly according to the rate indicated in the table by broadcasting, drilling or hydraulic application.
Cover seeds with suitable equipment as follows:

Rye grass	¼ inch
Millet	½ to ¾ inch
Oats	1 to 1-1/2 inches
Winter rye	1 to 1-1/2 inches.

Mulch

Use an effective mulch, such as clean grain straw; tacked and/or tied down with netting to protect seedbed and encourage plant growth.

Common Trouble Points

Lime and fertilizer not incorporated to at least 4 inches
May be lost to runoff or remain concentrated near the surface where they may inhibit germination.

Mulch rate inadequate or straw mulch not tacked down
Results in poor germination or failure, and erosion damage. Repair damaged areas, reseed and mulch.

Annual ryegrass used for temporary seeding
Ryegrass reseeds itself and makes it difficult to establish a good cover of permanent vegetation.

Seed not broadcast evenly or rate too low
Results in patchy growth and erosion.

Maintenance

Inspect within 6 weeks of planting to see if stands are adequate. Check for damage after heavy rains. Stands should be uniform and dense. Fertilize, reseed, and mulch damaged and sparse areas immediately. Tack or tie down mulch as necessary.

Seeds should be supplied with adequate moisture. Furnish water as needed, especially in abnormally hot or dry weather or on adverse sites. Water application rates should be controlled to prevent runoff.

Structural Practices
Silt fence with a mulch sock or approved equal shall be installed as shown on the approved Site Plan/NOI Plan to help prevent erosion and sedimentation of the downstream wetland resources identified on the project.

Catch Basins identified on the Site Plan shall be fitted with a siltsack or approved equal during construction to prevent the accumulation of sediments in the catch basin sump. Catch Basins shall be cleaned as specified in the Long Term Pollution Prevention Plan or the Long Term Operation and Maintenance Plan.

Stormwater Management
The stormwater runoff shall be managed through the use of several best management practices:

Deep Sump Catch Basin with Hood/Trap;
Oil Grit Separator;
Subsurface Infiltration Chambers;

6.3 Other Controls

Waste Materials
All waste materials shall be collected and stored in secure metal dumpsters rented from a licensed solid waste management company in Massachusetts. The dumpsters shall meet all local and state solid waste management regulations as outlined in 310 CMR 19.00. All trash and construction debris generated on site shall be disposed of in the dumpsters. The dumpsters shall be emptied as often as necessary during construction and transferred to an approved solid waste facility licensed to accept municipal solid waste and/or construction and demolition debris. No construction waste shall be buried on site. All personnel shall be instructed regarding the correct procedure for waste disposal.

Hazardous Waste
All hazardous waste materials shall be disposed of in a manner specified by local or State regulation or by the manufacturer. Site personnel shall be instructed in these practices.

Sanitary Waste
All sanitary shall be collected from portable units, as needed, by a licensed septage hauler in Massachusetts, in accordance with the requirements of the local Board of Health.

Offsite Vehicle Tracking
Construction entrance and exit shall be via Main Street

6.4 Timing of Controls/Measures

As indicated in the Sequence of Major Activities, the installation of erosion and sediment control devices shall be in place prior to earth excavating activities.

6.5 Certification of Compliance with Federal, State, and Local Regulations

The Construction Period Pollution Prevention Plan reflects the requirements of the Massachusetts Wetlands Protection Act (310 CMR 10.00). There is no bordering vegetated wetland filling associated with this project. The filling of up to 5,000 square feet of Isolated Wetland is proposed.

Applicant shall also become familiar with Local stormwater regulations and procedures of the Town Of Concord General Bylaws. Applicant shall also review guidelines and standards available from the Engineering Division of the Concord Public Works.

6.6 Maintenance and Inspection Procedures

Erosion and Sediment Control Inspection and Maintenance Practices

The following items represent the inspection and maintenance practices that will be used to maintain sediment and erosion control.

1. All control measures shall be inspected at least once every fourteen (14) days and following any storm event of 0.5 inches or greater.
2. All measures shall be maintained in good working order; if a repair is necessary, it shall be initiated within 24 hours of the report.
3. Built up sediment shall be removed from silt fencing when it has reached one-third the height of the fence.
4. Silt fence shall be inspected for depth of sediment, tears, to see if the fabric is securely attached to the fence posts, and to see that the fence posts are firmly set in the ground.
5. The catch basin grates shall be inspected for grate elevation relative to current surface condition; condition of silt sack, and degree to which sediment has accumulated on the grate and in the sump of the catch basin.
6. Temporary and permanent seeding and any plantings shall be inspected for bare spots, washouts, and healthy growth.
7. A maintenance inspection report shall be prepared following each inspection. A copy of the form to be completed by the inspector is attached to this document.
8. Symes Development & Permitting, LLC shall select three individuals who will be responsible for inspections, maintenance and repair activities as well as who shall be responsible for filling out the inspection and maintenance report.
9. Personnel selected for inspection and maintenance responsibilities shall receive training from Symes Development & Permitting, LLC or their designated representative. They will be trained in all the inspection and maintenance practices necessary for keeping the erosion and sediment control devices used on site in good working order.

6.7 Non Stormwater Discharges

It is expected that the following non-stormwater discharges will occur from the site during the construction period

1. Water from water line flushing.
2. Pavement wash waters.

All non-stormwater discharges shall be directed to the proposed site BMPs prior to discharge.

6.8 Inventory for Pollution Prevention Plan

The materials or substances listed below are expected to be present on site during construction

1. Concrete
2. Wood
3. Masonry Block
4. Residential Building Materials
5. Fiber Glass Insulation
6. Fertilizers
7. Petroleum Based Products
8. Cleaning Solvents
9. Paints (enamel and latex)
10. Tar
11. Waterproofing Materials

6.9 Spill Prevention

Material Management Practices

The following are the material management practices that shall be used to reduce the risk of spills or other accidental exposure of materials and substances to stormwater runoff.

Good Housekeeping

The following good housekeeping practices will be followed on site during the construction project.

1. A concerted effort shall be made to store only enough product required to complete a particular task.
2. All materials stored on site shall be stored in a neat and orderly fashion in their appropriate containers and, if possible, under a roof or other secure enclosure.
3. Products shall be kept in their original containers with the original manufacturer's label.
4. Substances shall not be mixed with one another unless recommended by the manufacturer.
5. Whenever possible, all of a product shall be used up before disposing of the container.
6. Manufacturer's recommendations for proper use and disposal shall be followed.
7. The site superintendent shall perform a daily site inspection to ensure proper use and disposal of materials on site.

Hazardous Products

The following practices are intended to reduce the risks associated with hazardous materials.

1. Products shall be kept in original containers unless they are not resealable.
2. Where feasible, the original labels and material safety data shall be retained, whereas they contain important product information.
3. If surplus product must be disposed, follow manufacturer's or local and state recommended methods for proper disposal.

Product Specific Practices

The following product specific practices shall be followed on site:

Petroleum Products

All on site vehicles shall be monitored for leaks and receive regular preventative maintenance to reduce the risk of leakage. Petroleum products shall be stored in tightly sealed containers which are clearly labeled. Any bituminous concrete or asphalt substances used on site shall be applied according to the manufacturer's recommendations.

Fertilizers

Fertilizers shall be applied in the minimum amounts recommended by the manufacturer. Once applied, fertilizers shall be worked into the soil to limit exposure to stormwater. Storage shall be in a covered shed or trailer. The contents of any partially used bags of fertilizers shall be transferred to a sealable plastic bag or bin to avoid spills. Fertilizers shall be applied in the minimum amounts recommended by the manufacturer. Once applied, fertilizers shall be worked into the soil to limit exposure to stormwater. Storage shall be in a covered shed or trailer. The contents of any partially used bags of fertilizers shall be transferred to a sealable plastic bag or bin to avoid spills.

Paints
All containers shall be tightly sealed and stored when not required for use. Excess paint shall not be discharged into any catch basin, drain manhole, or any portion of the stormwater management system. Excess paint shall be properly disposed of according to manufacturer's recommendations or State and local regulations.

Concrete Trucks
Concrete trucks shall not be allowed to wash out or discharge surplus concrete or drum wash water on site.

Spill Control Practices
In addition to the good housekeeping and material management practices discussed in the previous sections of this plan, the following practices shall be followed for spill prevention and cleanup:

1. Manufacturer's recommended methods for cleanup shall be readily available at the on site trailer and site personnel shall be made aware of the procedures and the location of the information.
2. Materials and equipment necessary for spill cleanup shall be kept in the material storage area on site. Equipment and materials shall include, but not be limited to
3. brooms, dust pans, mops, rags, gloves, goggles, kitty litter, sand, sawdust, and plastic and metal trash containers specifically for this purpose.
4. All spills shall be cleaned up immediately after discovery.
5. The spill area shall be kept well ventilated and personnel shall wear appropriate protective clothing to prevent injury from contact with a hazardous substance.
6. Spills of toxic or hazardous material shall be reported to the appropriate State and/or local authority in accordance with local and/or State regulations.
7. The spill prevention plan shall be adjusted to include measures to prevent a particular type of spill from reoccurring and how to clean up the spill if there is another occurrence. A description of the spill, what caused it, and the cleanup measures shall also be included.
8. Symes Development & Permitting, LLC or their assigned designee shall be the spill prevention and cleanup coordinator. Symes Development & Permitting, LLC shall designate at least three other site personnel who will be trained in the spill control practices identified above.

6.10 Pollution Prevention Plan Certificate

I certify under penalty of law that this document and all its attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signed:_____Date:_____
Symes Development & Permitting, LLC

Inspection and Maintenance Form

To be completed every 14 days and within 24 hours of a rainfall event of 0.5 inches or greater

Inspector: Date:

Inspector Title:

Days since last rainfall: Amount of last rainfall:

Structural Controls: Silt Fence/Silt Sock

From	To	Avg. depth of sediment (in.)	Tear	Posts secure	Overall condition
			Yes☐No☐	Yes☐No☐	Poor☐ Fair☐ Good☐
			Yes☐No☐	Yes☐No☐	Poor☐ Fair☐ Good☐
			Yes☐No☐	Yes☐No☐	Poor☐ Fair☐ Good☐
			Yes☐No☐	Yes☐No☐	Poor☐ Fair☐ Good☐
			Yes☐No☐	Yes☐No☐	Poor☐ Fair☐ Good☐
			Yes☐No☐	Yes☐No☐	Poor☐ Fair☐ Good☐

Maintenance required

To be performed by: On or before:

Inspection and Maintenance Form

To be completed every 14 days and within 24 hours of a rainfall event of 0.5 inches or greater

Inspector: Date:

Inspector Title:

Days since last rainfall: Amount of last rainfall:

Structural Controls: Catch Basins / Grates

Structure Identification	Location	Catch basin at grade	Hood/trap installed	Sediment buildup (in.)	Overall condition
CB1	South Drive Main Entrance	Yes☐No☐	Yes☐No☐		Poor☐ Fair☐ Good☐
CB2	South Drive Main Entrance	Yes☐No☐	Yes☐No☐		Poor☐ Fair☐ Good☐
CB3	East Drive at Path	Yes☐No☐	Yes☐No☐		Poor☐ Fair☐ Good☐
CB4	East Drive at Path	Yes☐No☐	Yes☐No☐		Poor☐ Fair☐ Good☐
CB5	East Edge Common Area	Yes☐No☐	Yes☐No☐		Poor☐ Fair☐ Good☐
CB6	East Edge Common Area	Yes☐No☐	Yes☐No☐		Poor☐ Fair☐ Good☐

Maintenance required

To be performed by: On or before:

Inspection and Maintenance Form

To be completed every 14 days and within 24 hours of a rainfall event of 0.5 inches or greater

Inspector: Date:

Inspector Title:

Days since last rainfall: Amount of last rainfall:

Structural Controls: Catch Basins / Grates

Structure Identification	Location	Catch basin at grade	Hood/trap installed	Sediment buildup (in.)	Overall condition
CB7	North Drive Mail Station	Yes☐No☐	Yes☐No☐		Poor☐ Fair☐ Good☐
CB8	North Drive Mail Station	Yes☐No☐	Yes☐No☐		Poor☐ Fair☐ Good☐
CB9	West Edge Common Area	Yes☐No☐	Yes☐No☐		Poor☐ Fair☐ Good☐
CB10	West Edge Common Area	Yes☐No☐	Yes☐No☐		Poor☐ Fair☐ Good☐
CB11	West Drive Center Village	Yes☐No☐	Yes☐No☐		Poor☐ Fair☐ Good☐
CB12	West Drive Center Village	Yes☐No☐	Yes☐No☐		Poor☐ Fair☐ Good☐

Maintenance required

To be performed by: On or before:

Inspection and Maintenance Form

To be completed every 14 days and within 24 hours of a rainfall event of 0.5 inches or greater

Inspector: Date:

Inspector Title:

Days since last rainfall: Amount of last rainfall:

Structural Controls: Catch Basins / Grates

Structure Identification	Location	Catch basin at grade	Hood/trap installed	Sediment buildup (in.)	Overall condition
CB13	Northwest Drive Town Path	Yes☐No☐	Yes☐No☐		Poor☐ Fair☐ Good☐
CB14	Northeast Drive Junction Square	Yes☐No☐	Yes☐No☐		Poor☐ Fair☐ Good☐
CB15	Individual Driveway Unit 22	Yes☐No☐	Yes☐No☐		Poor☐ Fair☐ Good☐
AD-1	West Lawn Daniel Hayes Park Oval	Yes☐No☐	Yes☐No☐		Poor☐ Fair☐ Good☐
AD-2	East Lawn Daniel Hayes Park Oval	Yes☐No☐	Yes☐No☐		Poor☐ Fair☐ Good☐
AD-3		Yes☐No☐	Yes☐No☐		Poor☐ Fair☐ Good☐

Maintenance required

To be performed by: On or before:

Inspection and Maintenance Form

To be completed every 14 days and within 24 hours of a rainfall event of 0.5 inches or greater

Inspector: Date:

Inspector Title:

Days since last rainfall: Amount of last rainfall:

Structural Controls: Oil Grit Separator

Structure Identification	Location	Sediment buildup inlet (in.)	Sediment buildup outlet (in.)	Overall condition
OGS1				Poor☐ Fair☐ Good☐
OGS3				Poor☐ Fair☐ Good☐
OGS4				Poor☐ Fair☐ Good☐
OGS5				Poor☐ Fair☐ Good☐
OGS6				Poor☐ Fair☐ Good☐
OGS7				Poor☐ Fair☐ Good☐
OGS8				Poor☐ Fair☐ Good☐

Maintenance required

To be performed by: On or before:

Inspection and Maintenance Form

To be completed every 14 days and within 24 hours of a rainfall event of 0.5 inches or greater

Inspector: Date:

Inspector Title:

Days since last rainfall: Amount of last rainfall:

Structural Controls: Subsurface Infiltration Chambers

Structure Identification	Location	Condition of stone bed	Filter fabric installed	Sediment buildup at inlet (in.)	Sediment buildup at outlet (in.)
SWMA1P			Yes☐No☐		
SWMA2P			Yes☐No☐		
SWMA3P			Yes☐No☐		
SWMA4P			Yes☐No☐		
SWMA5P			Yes☐No☐		
SWMA6P			Yes☐No☐		
SWMA7P			Yes☐No☐		
SWMA8P			Yes☐No☐		
SWMA9P			Yes☐No☐		

Maintenance required

To be performed by: On or before:

Inspection and Maintenance Form

To be completed every 14 days and within 24 hours of a rainfall event of 0.5 inches or greater

Changes required to the Construction Period Pollution Prevention Plan:

Reason for changes:

I certify under penalty of law that the above changes to the document and all its attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

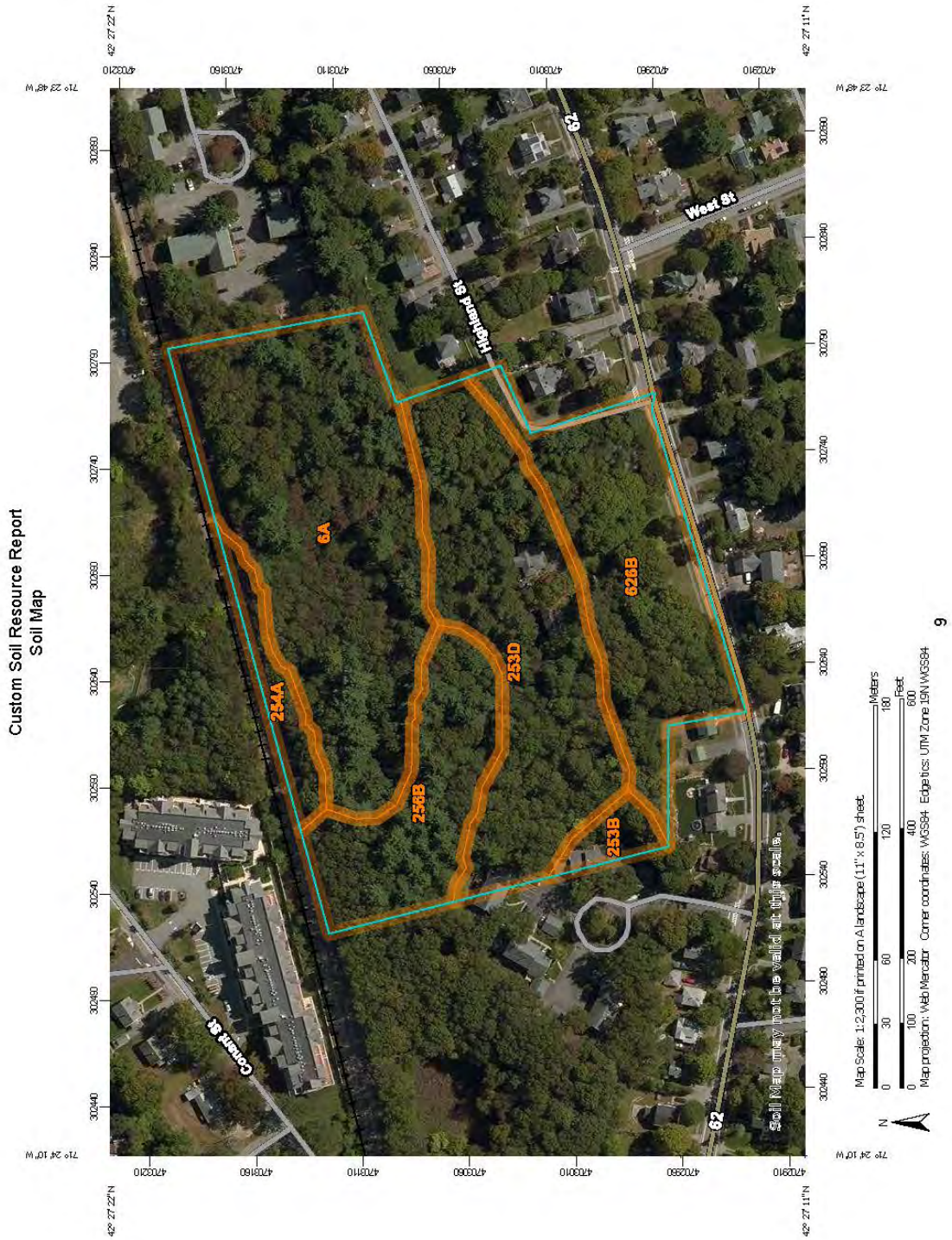
Signature: Date:

7 | NRCS Web Soil Survey

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

8


Custom Soil Resource Report
Soil Map
6A
254A
256B
253D
626B
253B
62
Highland St
West St
Conant St
Soil Map may not be valid at this scale.
Map Scale: 1:2,300 if printed on A landscape (11" x 8.5") sheet.
Meters
Feet
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84
9

Custom Soil Resource Report

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

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

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

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

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

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

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

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

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

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

Soil Survey Area: Middlesex County, Massachusetts
Survey Area Data: Version 18, Sep 7, 2018

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

Date(s) aerial images were photographed: Sep 12, 2014—Sep 28, 2014

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.

Custom Soil Resource Report

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
6A	Scarboro mucky fine sandy loam, 0 to 3 percent slopes	4.4	35.0%
253B	Hinckley loamy sand, 3 to 8 percent slopes	0.3	2.1%
253D	Hinckley loamy sand, 15 to 25 percent slopes	3.3	26.0%
254A	Merrimac fine sandy loam, 0 to 3 percent slopes	0.5	3.7%
256B	Deerfield loamy fine sand, 3 to 8 percent slopes	1.6	13.1%
626B	Merrimac-Urban land complex, 0 to 8 percent slopes	2.5	20.1%
Totals for Area of Interest		**12.6**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it

8 | Snow Disposal Guidelines

The following Snow Disposal Guidance is reproduced from the Mass.gov website:
https://www.mass.gov/guides/snow-disposal-guidance

The Massachusetts Department of Environmental Protection's Snow Disposal Guidance offers information on the proper steps to take when locating sites for the disposal of snow. Finding a place to dispose of collected snow poses a challenge to municipalities and businesses as they clear roads, parking lots, bridges, and sidewalks. Public safety is of the utmost importance. However, care must be taken to ensure that collected snow, which may be contaminated with road salt, sand, litter, and automotive pollutants such as oil, is disposed of in a manner that will minimize threats to nearby sensitive resource areas.

In order to avoid potential contamination to wetlands, water supplies, and waterbodies, MassDEP recommends that municipalities and businesses identify and map appropriate upland snow disposal locations. To assist municipalities and businesses in this planning effort, and to avoid use of snow disposal at sites which compromise wetlands resources or public water supplies, MassDEP has developed this snow disposal mapping tool:

https://maps.env.state.ma.us/dep/arcgis/js/templates/PSF/

If a community or business demonstrates that there is no remaining capacity at upland snow disposal locations, local conservation commissions are authorized to issue Emergency Certifications under the Massachusetts Wetlands Protection Act for snow disposal in certain wetland resource areas. In such cases, Emergency Certifications can only be issued at the request of a public agency or by order of a public agency for the protection of the health or safety of citizens, and are limited to those activities necessary to abate the emergency.

In the event of a regional or statewide severe weather event, MassDEP may also issue a broader Emergency Declaration under the Wetlands Protect Act which allows greater flexibility in snow disposal practices. Details of this approval process are found below.

Snow Disposal Guidance

Effective Date: December 21, 2015

Applicability: Applies to all federal, state, regional and local agencies, as well as to private businesses.

Supersedes: BRP Snow Disposal Guideline No. BRPG01-01 issued March 8, 2001, and all previous snow disposal guidance.

Approved by: Douglas Fine, Assistant Commissioner for Water

PURPOSE: To provide guidelines to all government agencies and private businesses regarding snow disposal site selection, site preparation and maintenance, and emergency snow disposal options that are protective of wetlands, drinking water, and water bodies, and are acceptable to the Massachusetts Department of Environmental Protection (MassDEP), Bureau of Water Resources.

APPLICABILITY: These Guidelines are issued by MassDEP's Bureau of Water Resources on behalf of all Bureau Programs (including Drinking Water Supply, Wetlands and Waterways, Wastewater Management, and Watershed Planning and Permitting). They apply to public agencies and private businesses disposing of snow in the Commonwealth of Massachusetts.

INTRODUCTION

Finding a place to dispose of collected snow poses a challenge to municipalities and businesses as they clear roads, parking lots, bridges, and sidewalks. While we are all aware of the threats to public safety caused by snow, collected snow that is contaminated with road salt, sand, litter, and automotive pollutants such as oil also threatens public health and the environment.

As snow melts, road salt, sand, litter, and other pollutants are transported into surface water or through the soil where they may eventually reach the groundwater. Road salt and other pollutants can contaminate water supplies and are toxic to aquatic life at certain levels. Sand washed into waterbodies can create sand bars or fill in wetlands and ponds, impacting aquatic life, causing flooding, and affecting our use of these resources.

There are several steps that communities can take to minimize the impacts of snow disposal on public health and the environment. These steps will help communities avoid the costs of a contaminated water supply, degraded waterbodies, and flooding. Everything we do on the land has the potential to impact our water resources. Given the authority of local government over the use of the land, municipal officials and staff have a critically important role to play in protecting our water resources.

The purpose of these guidelines is to help municipalities and businesses select, prepare, and maintain appropriate snow disposal sites before the snow begins to accumulate through the winter. Following these guidelines and obtaining the necessary approvals may also help municipalities in cases when seeking reimbursement for snow disposal costs from the Federal Emergency Management Agency is possible.

RECOMMENDED GUIDELINES

These snow disposal guidelines address: (1) site selection; (2) site preparation and maintenance; and (3) emergency snow disposal.

1. SITE SELECTION

The key to selecting effective snow disposal sites is to locate them adjacent to or on pervious surfaces in upland areas or upland locations on impervious surfaces that have functioning and maintained storm water management systems away from water resources and drinking water wells. At these locations, the snow meltwater can filter in to the soil, leaving behind sand and debris which can be removed in the springtime. The following areas should be avoided:

- Avoid importing snow from outside a Zone II or Interim Wellhead Protection Area (IWPA) of a public water supply well or within 75 feet of a private well, where road salt may contaminate water supplies. Only snow from within the Zone II or IWPA should be disposed of within this resource area so as not to increase the potential for pollution of water supplies.

- Avoid dumping of snow into any waterbody, including rivers, the ocean, reservoirs, ponds, or wetlands. In addition to water quality impacts and flooding, snow disposed of in open water can cause navigational hazards when it freezes into ice blocks.
- Avoid dumping snow on MassDEP-designated high and medium-yield aquifers where it may contaminate groundwater.
- Avoid dumping snow in sanitary landfills and gravel pits. Snow meltwater will create more contaminated leachate in landfills posing a greater risk to groundwater, and in gravel pits, there is little opportunity for pollutants to be filtered out of the meltwater because groundwater is close to the land surface.
- Avoid disposing of snow on top of storm drain catch basins or in stormwater drainage swales or ditches. Snow combined with sand and debris may block a storm drainage system, causing localized flooding. A high volume of sand, sediment, and litter released from melting snow also may be quickly transported through the system into surface water.

Recommended Site Selection Procedures

It is important that the municipal Department of Public Works or Highway Department, Conservation Commission, and Board of Health work together to select appropriate snow disposal sites. The following steps should be taken:

1. Estimate how much snow disposal capacity may be needed for the season so that an adequate number of disposal sites can be selected and prepared.
2. Identify sites that could potentially be used for snow disposal, such as municipal open space (e.g., parking lots or parks).
3. Sites located in upland locations that are not likely to impact sensitive environmental resources should be selected first.
4. If more storage space is still needed, prioritize the sites with the least environmental impact (using the site selection criteria, and local or MassGIS maps as a guide).

Snow Disposal Mapping Assistance

MassDEP has an online mapping tool to assist municipalities and businesses in identifying possible locations to potentially dispose of snow, should the need arise. The disposal locations depicted on these maps will also aid MassDEP and the Massachusetts Emergency Management Agency assist communities with snow disposal in the event of severe winter storm emergencies. The tool identifies wetland resource areas, public drinking water supplies and other sensitive locations where snow should not be disposed. The tool may be accessed through the Internet at the following web address: **https://maps.env.state.ma.us/dep/arcgis/js/templates/PSF/**.

By clicking on the link for the OLIVER Online Data Viewer, communities can select your town and overlay different resource areas. The MassGIS site includes MassDEP orthophoto maps depicting local wetland resources, hard copies of which were mailed to each Conservation Commission in the past.

2. SITE PREPARATION AND MAINTENANCE

In addition to carefully selecting disposal sites before the winter begins, it is important to prepare and maintain these sites to maximize their effectiveness. The following maintenance measures should be undertaken for all snow disposal sites:

- A silt fence or equivalent barrier should be placed securely on the downgradient side of the snow disposal site.
- To filter pollutants out of the meltwater, wherever possible a 50-foot vegetative buffer strip should be maintained during the growth season between the disposal site and adjacent waterbodies.
- Debris should be cleared from the site prior to using the site for snow disposal.

Debris should be cleared from the site and properly disposed of at the end of the snow season and no later than May 15.

3. SNOW DISPOSAL APPROVALS

Proper snow disposal may be undertaken through one of the following approval procedures:

1. Routine snow disposal – Minimal, if any, administrative review is required in these cases when upland and pervious snow disposal locations or upland locations on impervious surfaces that have functioning and maintained storm water management systems have been identified, mapped, and used for snow disposal following ordinary snowfalls. Use of upland and pervious snow disposal sites avoids wetland resource areas and allows snow meltwater to recharge groundwater and will help filter pollutants, sand, and other debris. This process will address the majority of snow removal efforts until a community exhausts all available upland snow disposal sites. The location and mapping of snow disposal sites will help facilitate each municipality's routine snow management efforts.
2. Emergency Certifications – If a community or business demonstrates that there is no remaining capacity at upland snow disposal locations, local conservation commissions are authorized to issue Emergency Certifications under the Massachusetts Wetlands Protection Act for snow disposal in buffer zones to wetlands, certain open water areas, and certain wetland resource areas, i.e. within flood plains. In such cases, Emergency Certifications can only be issued at the request of a public agency for the protection of the health or safety of citizens or by order of a public agency, and limited to those activities necessary to abate the emergency. Use the following guidelines in these emergency situations:
    a. Dispose of snow in open water with adequate flow and mixing to prevent ice dams from forming.
    b. Do not dispose of snow in salt marshes, vegetated wetlands, certified vernal pools, shellfish beds, mudflats, drinking water reservoirs and their tributaries, Zone IIs or IWPAs of public water supply wells, Outstanding Resource Waters, or Areas of Critical Environmental Concern.
    c. Do not dispose of snow where trucks may cause shoreline damage or erosion.
    d. Consult with the municipal Conservation Commission to ensure that snow disposal in open water complies with local ordinances and bylaws.
3. Emergency Declarations – In the event of a large-scale severe weather event, MassDEP may issue a broader Emergency Declaration under the Wetlands Protection Act which allows municipalities greater flexibility in snow disposal practices. Emergency Declarations typically authorize greater snow disposal options while protecting especially sensitive resources such as public drinking water supplies, vernal pools, land containing shellfish, FEMA designated floodways, coastal dunes, and salt marsh. In the event of severe winter storm emergencies, the snow disposal site maps created by municipalities will assist MassDEP and the Massachusetts Emergency

Management Agency in helping communities identify appropriate snow disposal locations.

If upland disposal sites have been exhausted, the Emergency Declaration issued by MassDEP allows for snow disposal near water bodies. A buffer of at least 50 feet, preferably vegetated, should still be maintained between the site and the waterbody in these situations. Furthermore, it is essential that the other guidelines for preparing and maintaining snow disposal sites be followed to minimize the threat to adjacent waterbodies.

Under extraordinary conditions, when all land-based snow disposal options are exhausted, the Emergency Declaration issued by MassDEP may allow disposal of snow in certain waterbodies under certain conditions. ***A municipality seeking to dispose of snow in a waterbody should take the following steps***:

a. Call the emergency contact phone number - 1-888-304-1133 - and notify the MEMA bunker personnel of the municipality's intent.
b. The MEMA bunker personnel will ask for some information about where the requested disposal will take place.
c. The MEMA bunker personnel will confirm that the disposal is consistent with MassDEP's Emergency Declaration and these guidelines and is therefore approved.

During declared statewide snow emergency events, MassDEP's website will also highlight the emergency contact phone number (1-888-304-1133) for authorizations and inquiries. For further non-emergency information about this Guidance you may contact your MassDEP Regional Office Service Center:

Northeast Regional Office, Wilmington, 978-694-3249
Southeast Regional Office, Lakeville, 508-946-2714
Central Regional Office, Worcester, 508-767-2722
Western Regional Office, Springfield, 413-784-1100

9 | Deicing Chemical (Road Salt) Storage

The following Snow Disposal Guidance is reproduced from the Mass.gov website:
https://www.mass.gov/guides/guidelines-on-road-salt-storage

Effective Date: December 19, 1997
Guideline No. DWSG97-1

Applicability: Applies to all parties storing road salt or other chemical deicing agents.

Supersedes: Fact Sheet: DEICING CHEMICAL (ROAD SALT) STORAGE (January 1996)

Approved by: Arleen O'Donnell, Asst. Commissioner for Resource Protection

PURPOSE: To summarize salt storage prohibition standards around drinking water supplies and current salt storage practices.

APPLICABILITY: These guidelines are issued on behalf of the Bureau of Resource Protection's Drinking Water Program. They apply to all parties storing road salt or other chemical deicing agents.

The Road Salt Problem

Historically, there have been incidents in Massachusetts where improperly stored road salt has polluted public and private drinking water supplies. Recognizing the problem, state and local governments have taken steps in recent years to remediate impacted water supplies and to protect water supplies from future contamination. As a result of properly designing storage sheds, new incidents are uncommon. These guidelines summarize salt storage prohibition standards around drinking water supplies and current salt storage practices.

Salt Pile Restrictions in Water Supply Protection Areas

Uncovered storage of salt is forbidden by Massachusetts General Law Chapter 85, section 7A in areas that would threaten water supplies. The Drinking Water Regulations, 310 CMR 22.21(2)(b), also restrict deicing chemical storage within wellhead protection areas (Zone I and Zone II) for public water supply wells, as follows: "storage of sodium chloride, chemically treated abrasives or other chemicals used for the removal of ice and snow on roads [are prohibited], unless such storage is within a structure designed to prevent the generation and escape of contaminated runoff or leachate." For drinking water reservoirs, 310 CMR 22.20C prohibits, through local bylaw, uncovered or uncontained storage of road or parking lot de-icing and sanding materials within Zone A at new reservoirs and at those reservoirs increasing their withdrawals under MGL Chapter 21G, the Water Management Act.

For people on a low-sodium diet, 20 mg/L of sodium in drinking water is consistent with the bottled water regulations' meaning of "sodium free." At 20 mg/L, sodium contributes 10% or less to the sodium level in people on a sodium-restricted diet.

Salt Storage Best Management Practices

Components of an "environment-friendly" roadway deicing salt storage facility include:
the right site = a flat site;
adequate space for salt piles;

storage on a pad (impervious/paved area);
storage under a roof; and
runoff collection/containment.
For more information, see The Salt Storage Handbook, 6th ed. Virginia: Salt Institute, 2006.

Salt Storage Practices of the Massachusetts Highway Department

The Massachusetts Highway Department (MHD) has 216 permanent salt storage sheds at 109 locations in the state. On leased land and state land under arteries and ramps, where the MHD cannot build sheds, salt piles are stored under impermeable material. This accounts for an additional 15 sites. The MHD also administers a program to assist municipalities with the construction of salt storage sheds. Of 351 communities, 201 municipalities have used state funds for salt storage facilities.

Appendix A – General Location Map

Locus Map
1440 Main Street
Concord, MA

Appendix B – Site Maps

LEGEND:
SUBCATCHMENT
SOIL DIVIDE
EXISTING CONTOUR
EXISTING CONTOUR
WETLAND FLAG
PROPOSED SUBSURFACE DRAINAGE AREA (SWMA-5P)
REQUIRED SUBSURFACE DRAINAGE AREA OVERFLOW OUTLET #1 TO DAYLIGHT (SWMA - 1P, 2P, 3P, 4P & 5P)
PROPOSED ISOLATED WETLAND FILL AREA = 4,910± S.F. (5,000 S.F. MAXIMUM)
PROPOSED SUBSURFACE DRAINAGE AREA (SWMA-4P)
REQUIRED SUBSURFACE DRAINAGE AREA OVERFLOW OUTLET #2 (SWMA - 6P, 7P, 8P & 9P)
PROPOSED SUBSURFACE DRAINAGE AREA (SWMA-9P)
(SWMA-6P)
(SWMA-3P)
(SWMA-8P)
(SWMA-7P)
PROPOSED SUBSURFACE DRAINAGE AREA (SWMA-2P)
PROPOSED SUBSURFACE DRAINAGE AREA (SWMA-1P)
PROPOSED ROOF DRYWELL (TYPICAL)
B 256B
A 253D
D 6A
1L
2L
3L
4L
M1
M2
M3
H1
H2
R37 ANR
CENTER VILLAGE DRIVE
HIGHLAND STREET
MAIN STREET
PROPOSED WATERSHED MAP
CENTER & MAIN
1440 MAIN STREET, CONCORD, MA
SCALE 1"=40'
JULY 2, 2018
SHEET 1 OF 1
WILLIAMS & SPARAGES

Appendix C – Soil Logs

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

Prepared For: Symes Development & Permitting, LLC - Jeffrey Rhuda, Manager CONC-0020 **(TP D50 thru TP D66) Stormwater Ares**
Owner Name

1440, 1450 & 146B Main Street — D/
Street Address — Map/Lot #

Concord — MA — 01742
City — State — Zip Code

B. Site Information

1. (Check one) ☒ New Construction ☐ Upgrade ☐ Repair
2. Soil Survey Available? ☒ Yes ☐ No If yes: NRCS WEB SOIL SURVEY — 253B, 253D, 254A, 256B (Soil Map Unit)

   Hinckley, Merrimac, Deerfield (Soil Name) — Soil Limitations

   Soil Parent material — Landform
3. Surficial Geological Report Available? ☒ Yes ☐ No If yes: Year Published/Source — Map Unit

   Description of Geologic Map Unit:
4. Flood Rate Insurance Map Within a regulatory floodway? ☐ Yes ☒ No
5. Within a velocity zone? ☐ Yes ☒ No
6. Within a Mapped Wetland Area? ☐ Yes ☒ No If yes, MassGIS Wetland Data Layer: Wetland Type
7. Current Water Resource Conditions (USGS): Month/Day/ Year Range: ☐ Above Normal ☐ Normal ☐ Below Normal
8. Other references reviewed:

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

Prepared For: Symes Development & Permitting, LLC - Jeffrey Rhuda, Manager CONC-0020 **(TP D50 thru TP D66) Stormwater Ares**
Owner Name

1440, 1450 & 146B Main Street — Street Address
D/ — Map/Lot #

Concord — City
MA — State
01742 — Zip Code

B. Site Information

1. (Check one) ☒ New Construction ☐ Upgrade ☐ Repair
2. Soil Survey Available? ☒ Yes ☐ No If yes: NRCS WEB SOIL SURVEY — 253B, 253D, 254A, 256B (Soil Map Unit)

   Hinckley, Merrimac, Deerfield — Soil Name
   Soil Limitations

   Soil Parent material
   Landform
3. Surficial Geological Report Available? ☒ Yes ☐ No If yes: Year Published/Source — Map Unit

   Description of Geologic Map Unit:
4. Flood Rate Insurance Map Within a regulatory floodway? ☐ Yes ☒ No
5. Within a velocity zone? ☐ Yes ☒ No
6. Within a Mapped Wetland Area? ☐ Yes ☒ No If yes, MassGIS Wetland Data Layer: Wetland Type
7. Current Water Resource Conditions (USGS): Month/Day/ Year Range: ☐ Above Normal ☐ Normal ☐ Below Normal
8. Other references reviewed:

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: D50 (Hole #) 4/17/19 (Date) _____ (Time) Sun, 60 (Weather) _____ (Latitude) Longitude:

1. Land Use Woodland (e.g., woodland, agricultural field, vacant lot, etc.) Pine/deciduous (Vegetation) None (Surface Stones (e.g., cobbles, stones, boulders, etc.) 3-5% (Slope (%)

Description of Location: _____

2. Soil Parent Material: _____ Landform _____ Position on Landscape (SU, SH, BS, , TS) _____

3. Distances from: Open Water Body 100+ feet Drainage Way 100+ feet Wetlands 100+ feet
Property Line 10+ feet Drinking Water Well 100+ feet Other _____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: >136 Depth Weeping from Pit >136 Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-12	A	SL	10YR 3/2						M	F	
12-26	B	LS	10YR 5/6						M	F	
26-136	C	Sand	2.5Y 5/6	104	High Chroma	>10	15		Sg	Loose	

Additional Notes:
Williams & Sparages LLC – CONC-0020

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: D51 (Hole #) | 4/17/19 (Date) | Time | Sun, 60 (Weather) | Latitude | Longitude:

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) | Pine/deciduous (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 3-5% (Slope (%))

Description of Location:

2. Soil Parent Material: | Landform | Position on Landscape (SU, SH, BS, , TS)

3. Distances from: Open Water Body 100+ feet | Drainage Way 100+ feet | Wetlands 100+ feet
Property Line 10+ feet | Drinking Water Well 100+ feet | Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 48 Depth Weeping from Pit 54 Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-10	A	SL	10YR 3/2						M	F	
10-24	B	LS	10YR 5/6						M	F	
24-80 Collapse	C	Sand	2.5Y 5/6	46	High Chroma	>10	15		Sg	Loose	

Additional Notes:
Williams & Sparages LLC – CONC-0020

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole # D50	Obs. Hole # D51
☒ Depth observed standing water in observation hole	>136 inches	48 inches
☐ Depth weeping from side of observation hole	_____ inches	_____ inches
☒ Depth to soil redoximorphic features (mottles)	>136 inches	46 inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

_____ Index Well Number _____ Reading Date

$S_h = S_c - [S_r \times (OW_c - OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: _____ inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)? Upper boundary: 24 inches Lower boundary: 136 inches

c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: D52 (Hole #) 4/17/19 (Date) _____ (Time) Sun, 60 (Weather) _____ (Latitude) Longitude:

1. Land Use Woodland (e.g., woodland, agricultural field, vacant lot, etc.) Pine/deciduous (Vegetation) None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) 3-5% (Slope (%))

Description of Location: _____

2. Soil Parent Material: _____ Landform _____ Position on Landscape (SU, SH, BS, , TS) _____

3. Distances from: Open Water Body 100+ feet; Drainage Way 100+ feet; Wetlands 100+ feet; Property Line 10+ feet; Drinking Water Well 100+ feet; Other _____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 110 Depth Weeping from Pit 120 Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-8	A	SL	10YR 3/2						M	F	
8-26	B	LS	10YR 5/6						M	F	
26-120	C	Sand	2.5Y 5/6	102	High Chroma	>10	15		Sg	Loose	

Additional Notes: _____

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: D53 (Hole #) | 4/17/19 (Date) | Time | Sun, 60 (Weather) | Latitude | Longitude:

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) | Pine/deciduous (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 3-5% (Slope (%))

Description of Location:

2. Soil Parent Material: | Landform | Position on Landscape (SU, SH, BS, , TS)

3. Distances from: Open Water Body 100+ feet | Drainage Way 100+ feet | Wetlands 100+ feet
Property Line 10+ feet | Drinking Water Well 100+ feet | Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 34 Depth Weeping from Pit 52- Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-6	A	SL	10YR 3/2						M	F	
6-18	B	LS	10YR 5/6						M	F	
18-72 Collapse	C	Sand	2.5Y 6/3	26	High Chroma	>10			Sg	Loose	

Additional Notes:
Williams & Sparages LLC – CONC-0020

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole # D52	Obs. Hole # D53
☒ Depth observed standing water in observation hole	110 inches	34 inches
☐ Depth weeping from side of observation hole	_____ inches	_____ inches
☒ Depth to soil redoximorphic features (mottles)	102 inches	26 inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

_____ Index Well Number _____ Reading Date

$S_h = S_c - [S_r \times (OW_c - OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: _____ inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)? Upper boundary: 18 inches Lower boundary: 120 inches

c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: D54 (Hole #) | 4/17/19 (Date) | (Time) | Sun, 60 (Weather) | (Latitude) | Longitude:

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) | Pine/deciduous (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 3-5% (Slope (%))

Description of Location:

2. Soil Parent Material: | Landform | Position on Landscape (SU, SH, BS, , TS)

3. Distances from: Open Water Body 100+ feet | Drainage Way 100+ feet | Wetlands 100+ feet
Property Line 10+ feet | Drinking Water Well 100+ feet | Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 23 Depth Weeping from Pit 36 Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-12	A	SL	10YR 3/2						M	F	
12-16	B	LS	10YR 5/6						M	F	
16-72	C	Sand	2.5Y 5/6	16	High Chroma	>15	15		Sg	Loose	
Collapse											

Additional Notes:

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: D55 (Hole #) | 4/17/19 (Date) | Time | Sun, 60 (Weather) | Latitude | Longitude:

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) | Pine/deciduous (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 3-5% (Slope (%))

Description of Location:

2. Soil Parent Material: | Landform | Position on Landscape (SU, SH, BS, , TS)

3. Distances from: Open Water Body 100+ feet | Drainage Way 100+ feet | Wetlands 100+ feet
Property Line 10+ feet | Drinking Water Well 100+ feet | Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 36 Depth Weeping from Pit -49 Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-12	A	SL	10YR 3/2						M	F	
12-16	B	LS	10YR 5/6						M	F	
16-72	C	Sand	2.5Y 6/3	30	High Chroma	>10-	15		Sg	Loose	

Additional Notes:
Williams & Sparages LLC – CONC-0020

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole # D54	Obs. Hole # D55
☒ Depth observed standing water in observation hole	23 inches	36 inches
☐ Depth weeping from side of observation hole	_____ inches	_____ inches
☒ Depth to soil redoximorphic features (mottles)	16 inches	-30 inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

_____ Index Well Number _____ Reading Date

$S_h = S_c - [S_r \times (OW_c - OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: _____ inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)? Upper boundary: 30 inches Lower boundary: 156 inches

c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: D56 (Hole #) 4/17/19 (Date) _____ (Time) Sun, 60 (Weather) _____ (Latitude) Longitude:

1. Land Use Woodland (e.g., woodland, agricultural field, vacant lot, etc.) Pine/deciduous (Vegetation) None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) 3-5% (Slope (%))

Description of Location: _____

2. Soil Parent Material: _____ Landform _____ Position on Landscape (SU, SH, BS, , TS) _____

3. Distances from: Open Water Body 100+ feet; Drainage Way 100+ feet; Wetlands 100+ feet; Property Line 10+ feet; Drinking Water Well 100+ feet; Other _____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: ---- Depth Weeping from Pit --- Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-6	A	SL	10YR 3/2						M	F	
6-28	B	LS	10YR 5/6						M	F	
28-132	C	Sand	2.5Y 5/6	--	--	---	15		Sg	Loose	

Additional Notes: _____

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: D57 (Hole #) | 4/17/19 (Date) | Time | Sun, 60 (Weather) | Latitude | Longitude:

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) | Pine/deciduous (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 3-5% (Slope (%))

Description of Location:

2. Soil Parent Material: | Landform | Position on Landscape (SU, SH, BS, , TS)

3. Distances from: Open Water Body 100+ feet | Drainage Way 100+ feet | Wetlands 100+ feet
Property Line 10+ feet | Drinking Water Well 100+ feet | Other ____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 38 Depth Weeping from Pit 66 Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-8	A	SL									
8-24	B	LS	10YR 3/2								
24-72+	C	Sand	2.5Y 5/6	33	High Chroma	>10	15		Sg	Loose	

Additional Notes:
Williams & Sparages LLC – CONC-0020

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole # D56	Obs. Hole # D57
☒ Depth observed standing water in observation hole	>132 inches	38 inches
☐ Depth weeping from side of observation hole	_____ inches	_____ inches
☒ Depth to soil redoximorphic features (mottles)	>132 inches	33 inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

_____ Index Well Number _____ Reading Date

$S_h = S_c - [S_r \times (OW_c - OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: _____ inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)? Upper boundary: 28 inches Lower boundary: 72+ inches

c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: D58 (Hole #) 4/17/19 (Date) _____ (Time) Sun, 60 (Weather) _____ (Latitude) Longitude:

1. Land Use Woodland (e.g., woodland, agricultural field, vacant lot, etc.) Pine/deciduous (Vegetation) None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) 3-5% (Slope (%))

Description of Location: _____

2. Soil Parent Material: _____ Landform _____ Position on Landscape (SU, SH, BS, , TS) _____

3. Distances from: Open Water Body 100+ feet; Drainage Way 100+ feet; Wetlands 100+ feet; Property Line 10+ feet; Drinking Water Well 100+ feet; Other _____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 20 Depth Weeping from Pit 42 Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-9	A	SL	10YR 3/2						M	F	
9-12	B	LS	10YR 5/6						M	F	
12-72	C	Med Sand	2.5Y 5/6	16	High Chroma	>10	10		Sg	Loose	

Additional Notes: _____

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: D59 (Hole #) | 4/17/19 (Date) | Time | Sun, 60 (Weather) | Latitude | Longitude:

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) | Pine/deciduous (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 3-5% (Slope (%))

Description of Location:

2. Soil Parent Material: | Landform | Position on Landscape (SU, SH, BS, , TS)

3. Distances from: Open Water Body 100+ feet | Drainage Way 100+ feet | Wetlands 100+ feet | Property Line 10+ feet | Drinking Water Well 100+ feet | Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: --- Depth Weeping from Pit ---- Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-60	FILL									FILL	
60-68	A	SL	10YR 3/2						M	F	
68-90	B	LS	10YR 5/6						M	F	
90-264	C	Coarse Sand	2.5Y 5/6	----	----	----	15		Sg	Loose	
[22'-0"]											

Additional Notes:
Williams & Sparages LLC – CONC-0020

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole # D58	Obs. Hole # D59
☒ Depth observed standing water in observation hole	16 inches	>264 inches
☐ Depth weeping from side of observation hole	_____ inches	_____ inches
☒ Depth to soil redoximorphic features (mottles)	20 inches	->264 inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

_____ Index Well Number _____ Reading Date

$S_h = S_c - [S_r \times (OW_c - OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: _____ inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)? Upper boundary: 72 inches Lower boundary: 180 inches

c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: D60 (Hole #) | 4/17/19 (Date) | Time | Sun, 60 (Weather) | Latitude | Longitude:

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) | Pine/deciduous (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 3-5% (Slope (%))

Description of Location:

2. Soil Parent Material: | Landform | Position on Landscape (SU, SH, BS, , TS)

3. Distances from: Open Water Body 100+ feet | Drainage Way 100+ feet | Wetlands 100+ feet | Property Line 10+ feet | Drinking Water Well 100+ feet | Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: --- Depth Weeping from Pit ---- Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
No	A or B										
0-264	C	Coarse Sand	2.5Y 6/3	----	----	----	15		Sg	Loose	
(22'-0)'											

Additional Notes:
Williams & Sparages LLC – CONC-0020

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: D61 (Hole #) | 4/17/19 (Date) | Time | Sun, 60 (Weather) | Latitude | Longitude:

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) | Pine/deciduous (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 3-5% (Slope (%))

Description of Location:

2. Soil Parent Material: | Landform | Position on Landscape (SU, SH, BS, , TS)

3. Distances from: Open Water Body 100+ feet | Drainage Way 100+ feet | Wetlands 100+ feet
Property Line 10+ feet | Drinking Water Well 100+ feet | Other ____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: --- Depth Weeping from Pit ---- Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-8	A	SL	10YR 3/2						M	F	
8-26	B	LS	10YR 5/6						M	F	
26-252	C	Coarse Sand	2.5Y 5/6	----	----	---	20		Sg	Loose	
(21'-0")											

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole # D60	Obs. Hole # D61
☒ Depth observed standing water in observation hole	>264 inches	>252 inches
☐ Depth weeping from side of observation hole	_____ inches	_____ inches
☒ Depth to soil redoximorphic features (mottles)	>264 inches	>252 inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

_____ Index Well Number _____ Reading Date

$S_h = S_c - [S_r \times (OW_c - OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: _____ inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)? Upper boundary: 26 inches Lower boundary: 264+ inches

c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: D62 (Hole #) 4/17/19 (Date) _____ (Time) Sun, 60 (Weather) _____ (Latitude) Longitude:

1. Land Use Woodland (e.g., woodland, agricultural field, vacant lot, etc.) Pine/deciduous (Vegetation) None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) 3-5% (Slope (%))

Description of Location: _____

2. Soil Parent Material: _____ Landform _____ Position on Landscape (SU, SH, BS, , TS) _____

3. Distances from: Open Water Body 100+ feet; Drainage Way 100+ feet; Wetlands 100+ feet; Property Line 10+ feet; Drinking Water Well 100+ feet; Other _____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 96 Depth Weeping from Pit 100 Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-8	A	SL	10YR 3/2						M	F	
8-12	B	LS	10YR 5/6						M	F	
12-120	C	Med Sand	2.5Y 5/6	84	High Chroma	>10	10		Sg	Loose	

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: D63 (Hole #) 4/17/19 (Date) _____ (Time) Sun, 60 (Weather) _____ (Latitude) Longitude:

1. Land Use Woodland (e.g., woodland, agricultural field, vacant lot, etc.) Pine/deciduous (Vegetation) None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) 3-5% (Slope (%))

Description of Location: _____

2. Soil Parent Material: _____ Landform _____ Position on Landscape (SU, SH, BS, , TS) _____

3. Distances from: Open Water Body 100+ feet; Drainage Way 100+ feet; Wetlands 100+ feet; Property Line 10+ feet; Drinking Water Well 100+ feet; Other _____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 54 Depth Weeping from Pit 60 Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-8	A	SL	10YR 3/2						M	F	
8-21	B	LS	10YR 5/6						M	F	
21-72+	C	Med Sand	2.5Y 5/6	54	High Chroma	>10	10		Sg	Loose	

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole # D62	Obs. Hole # D63
☒ Depth observed standing water in observation hole	inches	inches
☐ Depth weeping from side of observation hole	96 inches	54 inches
☒ Depth to soil redoximorphic features (mottles)	84 inches	54 inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

_____ Index Well Number _____ Reading Date

$S_h = S_c - [S_r \times (OW_c - OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: _____ inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)? Upper boundary: 60 inches Lower boundary: 132 inches

c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches

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Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: D64 (Hole #) | 4/17/19 (Date) | _____ (Time) | Sun, 60 (Weather) | _____ (Latitude) | Longitude:

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) | Pine/deciduous (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 3-5% (Slope (%))

Description of Location: _____

2. Soil Parent Material: _____ | Landform _____ | Position on Landscape (SU, SH, BS, , TS) _____

3. Distances from: Open Water Body 100+ feet | Drainage Way 100+ feet | Wetlands 100+ feet
Property Line 10+ feet | Drinking Water Well 100+ feet | Other _____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 50 Depth Weeping from Pit 56 Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-8	A	SL	10YR 3/2						M	F	
8-23	B	LS	10YR 5/6						M	F	
23-72+	C	Med Sand	2.5Y 5/6	50	High Chroma	>10	10		Sg	Loose	

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: D65 (Hole #) 4/17/19 (Date) _____ (Time) Sun, 60 (Weather) _____ (Latitude) Longitude:

1. Land Use Woodland (e.g., woodland, agricultural field, vacant lot, etc.) Pine/deciduous (Vegetation) None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) 3-5% (Slope (%))

Description of Location: _____

2. Soil Parent Material: _____ Landform _____ Position on Landscape (SU, SH, BS, , TS) _____

3. Distances from: Open Water Body 100+ feet; Drainage Way 100+ feet; Wetlands 100+ feet; Property Line 10+ feet; Drinking Water Well 100+ feet; Other _____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 114 Depth Weeping from Pit 120 Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-9	A	SL	10YR 3/2						M	F	
9-27	B	LS	10YR 5/6						M	F	
27-132	C	Med Sand	2.5Y 5/6	110	High Chroma	>10	10		Sg	Loose	

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City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole # D64	Obs. Hole # D65
☒ Depth observed standing water in observation hole	inches	inches
☐ Depth weeping from side of observation hole	50 inches	114 inches
☒ Depth to soil redoximorphic features (mottles)	50 inches	110 inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

_____ Index Well Number _____ Reading Date

$S_h = S_c - [S_r \times (OW_c - OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: _____ inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)? Upper boundary: 60 inches Lower boundary: 132 inches

c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches

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City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: D66 (Hole #) 4/17/19 (Date) _____ (Time) Sun, 60 (Weather) _____ (Latitude) Longitude:

1. Land Use Woodland (e.g., woodland, agricultural field, vacant lot, etc.) Pine/deciduous (Vegetation) None (Surface Stones (e.g., cobbles, stones, boulders, etc.) 3-5% (Slope (%)

Description of Location: _____

2. Soil Parent Material: _____ Landform _____ Position on Landscape (SU, SH, BS, , TS)

3. Distances from: Open Water Body 100+ feet Drainage Way 100+ feet Wetlands 100+ feet
Property Line 10+ feet Drinking Water Well 100+ feet Other _____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: ------Depth Weeping from Pit --- Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-8	A	SL	10YR 3/2						M	F	
8-26	B	LS	10YR 5/6						M	F	
26-174	C	Sand	2.5Y 5/6	----					Sg	Loose	
14'-6"											

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole # D66	Obs. Hole #
☒ Depth observed standing water in observation hole	inches	inches
☐ Depth weeping from side of observation hole	>174 inches	_____ inches
☒ Depth to soil redoximorphic features (mottles)	>174 inches	inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

_____ Index Well Number _____ Reading Date

$S_h = S_c - [S_r \times (OW_c - OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: _____ inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)? Upper boundary: 26 inches Lower boundary: 174 inches

c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches

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Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

Signature of Soil Evaluator	4/17/19 (TP D50 thru TP D66) – Stormwater Areas Only Date
Richard J. Harrington / #1012 Typed or Printed Name of Soil Evaluator / License #	6/30/2019 Expiration Date of License
Stormwater Management Areas – Not Witnessed Name of Approving Authority Witness	---------- Approving Authority

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.

Field Diagrams: Use this area for field diagrams:

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: D50 (Hole #) 4/17/19 (Date) _____ (Time) Sun, 60 (Weather) _____ (Latitude) Longitude:

1. Land Use Woodland (e.g., woodland, agricultural field, vacant lot, etc.) Pine/deciduous (Vegetation) None (Surface Stones (e.g., cobbles, stones, boulders, etc.) 3-5% (Slope (%)

Description of Location: _____

2. Soil Parent Material: _____ Landform _____ Position on Landscape (SU, SH, BS, , TS) _____

3. Distances from: Open Water Body 100+ feet Drainage Way 100+ feet Wetlands 100+ feet
Property Line 10+ feet Drinking Water Well 100+ feet Other _____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: >136 Depth Weeping from Pit >136 Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-12	A	SL	10YR 3/2						M	F	
12-26	B	LS	10YR 5/6						M	F	
26-136	C	Sand	2.5Y 5/6	104	High Chroma	>10	15		Sg	Loose	

Additional Notes:
Williams & Sparages LLC – CONC-0020

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: D51 (Hole #) | 4/17/19 (Date) | Time | Sun, 60 (Weather) | Latitude | Longitude:

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) | Pine/deciduous (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 3-5% (Slope (%))

Description of Location:

2. Soil Parent Material: | Landform | Position on Landscape (SU, SH, BS, , TS)

3. Distances from: Open Water Body 100+ feet | Drainage Way 100+ feet | Wetlands 100+ feet
Property Line 10+ feet | Drinking Water Well 100+ feet | Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 48 Depth Weeping from Pit 54 Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-10	A	SL	10YR 3/2						M	F	
10-24	B	LS	10YR 5/6						M	F	
24-80 Collapse	C	Sand	2.5Y 5/6	46	High Chroma	>10	15		Sg	Loose	

Additional Notes:
Williams & Sparages LLC – CONC-0020

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole # D50	Obs. Hole # D51
☒ Depth observed standing water in observation hole	>136 inches	48 inches
☐ Depth weeping from side of observation hole	_____ inches	_____ inches
☒ Depth to soil redoximorphic features (mottles)	>136 inches	46 inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

_____ Index Well Number _____ Reading Date

$S_h = S_c - [S_r \times (OW_c - OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: _____ inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)? Upper boundary: 24 inches Lower boundary: 136 inches

c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: D52 (Hole #) 4/17/19 (Date) _____ (Time) Sun, 60 (Weather) _____ (Latitude) Longitude:

1. Land Use Woodland (e.g., woodland, agricultural field, vacant lot, etc.) Pine/deciduous (Vegetation) None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) 3-5% (Slope (%))

Description of Location: _____

2. Soil Parent Material: _____ Landform _____ Position on Landscape (SU, SH, BS, , TS) _____

3. Distances from: Open Water Body 100+ feet; Drainage Way 100+ feet; Wetlands 100+ feet; Property Line 10+ feet; Drinking Water Well 100+ feet; Other _____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 110 Depth Weeping from Pit 120 Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-8	A	SL	10YR 3/2						M	F	
8-26	B	LS	10YR 5/6						M	F	
26-120	C	Sand	2.5Y 5/6	102	High Chroma	>10	15		Sg	Loose	

Additional Notes: _____

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Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: D53 (Hole #) | 4/17/19 (Date) | Time | Sun, 60 (Weather) | Latitude | Longitude:

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) | Pine/deciduous (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 3-5% (Slope (%))

Description of Location:

2. Soil Parent Material: | Landform | Position on Landscape (SU, SH, BS, , TS)

3. Distances from: Open Water Body 100+ feet | Drainage Way 100+ feet | Wetlands 100+ feet
Property Line 10+ feet | Drinking Water Well 100+ feet | Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 34 Depth Weeping from Pit 52- Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-6	A	SL	10YR 3/2						M	F	
6-18	B	LS	10YR 5/6						M	F	
18-72 Collapse	C	Sand	2.5Y 6/3	26	High Chroma	>10			Sg	Loose	

Additional Notes:
Williams & Sparages LLC – CONC-0020

Commonwealth of Massachusetts
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Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole # D52	Obs. Hole # D53
☒ Depth observed standing water in observation hole	110 inches	34 inches
☐ Depth weeping from side of observation hole	_____ inches	_____ inches
☒ Depth to soil redoximorphic features (mottles)	102 inches	26 inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

_____ Index Well Number _____ Reading Date

$S_h = S_c - [S_r \times (OW_c - OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: _____ inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)? Upper boundary: 18 inches Lower boundary: 120 inches

c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches

Commonwealth of Massachusetts
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Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: D54 (Hole #) | 4/17/19 (Date) | (Time) | Sun, 60 (Weather) | (Latitude) | Longitude:

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) | Pine/deciduous (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 3-5% (Slope (%))

Description of Location:

2. Soil Parent Material: | Landform | Position on Landscape (SU, SH, BS, , TS)

3. Distances from: Open Water Body 100+ feet | Drainage Way 100+ feet | Wetlands 100+ feet
Property Line 10+ feet | Drinking Water Well 100+ feet | Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 23 Depth Weeping from Pit 36 Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-12	A	SL	10YR 3/2						M	F	
12-16	B	LS	10YR 5/6						M	F	
16-72	C	Sand	2.5Y 5/6	16	High Chroma	>15	15		Sg	Loose	
Collapse											

Additional Notes:

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: D55 (Hole #) | 4/17/19 (Date) | Time | Sun, 60 (Weather) | Latitude | Longitude:

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) | Pine/deciduous (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 3-5% (Slope (%))

Description of Location:

2. Soil Parent Material: | Landform | Position on Landscape (SU, SH, BS, , TS)

3. Distances from: Open Water Body 100+ feet | Drainage Way 100+ feet | Wetlands 100+ feet
Property Line 10+ feet | Drinking Water Well 100+ feet | Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 36 Depth Weeping from Pit -49 Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-12	A	SL	10YR 3/2						M	F	
12-16	B	LS	10YR 5/6						M	F	
16-72	C	Sand	2.5Y 6/3	30	High Chroma	>10-	15		Sg	Loose	

Additional Notes:
Williams & Sparages LLC – CONC-0020

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole # D54	Obs. Hole # D55
☒ Depth observed standing water in observation hole	23 inches	36 inches
☐ Depth weeping from side of observation hole	_____ inches	_____ inches
☒ Depth to soil redoximorphic features (mottles)	16 inches	-30 inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

_____ Index Well Number _____ Reading Date

$S_h = S_c - [S_r \times (OW_c - OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: _____ inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)? Upper boundary: 30 inches Lower boundary: 156 inches

c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: D56 (Hole #) 4/17/19 (Date) _____ (Time) Sun, 60 (Weather) _____ (Latitude) Longitude:

1. Land Use Woodland (e.g., woodland, agricultural field, vacant lot, etc.) Pine/deciduous (Vegetation) None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) 3-5% (Slope (%))

Description of Location: _____

2. Soil Parent Material: _____ Landform _____ Position on Landscape (SU, SH, BS, , TS) _____

3. Distances from: Open Water Body 100+ feet; Drainage Way 100+ feet; Wetlands 100+ feet; Property Line 10+ feet; Drinking Water Well 100+ feet; Other _____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: ---- Depth Weeping from Pit --- Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-6	A	SL	10YR 3/2						M	F	
6-28	B	LS	10YR 5/6						M	F	
28-132	C	Sand	2.5Y 5/6	--	--	---	15		Sg	Loose	

Additional Notes: _____

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: D57 (Hole #) | 4/17/19 (Date) | Time | Sun, 60 (Weather) | Latitude | Longitude:

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) | Pine/deciduous (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 3-5% (Slope (%))

Description of Location:

2. Soil Parent Material: | Landform | Position on Landscape (SU, SH, BS, , TS)

3. Distances from: Open Water Body 100+ feet | Drainage Way 100+ feet | Wetlands 100+ feet
Property Line 10+ feet | Drinking Water Well 100+ feet | Other ____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 38 Depth Weeping from Pit 66 Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-8	A	SL									
8-24	B	LS	10YR 3/2								
24-72+	C	Sand	2.5Y 5/6	33	High Chroma	>10	15		Sg	Loose	

Additional Notes:
Williams & Sparages LLC – CONC-0020

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole # D56	Obs. Hole # D57
☒ Depth observed standing water in observation hole	>132 inches	38 inches
☐ Depth weeping from side of observation hole	_____ inches	_____ inches
☒ Depth to soil redoximorphic features (mottles)	>132 inches	33 inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

_____ Index Well Number _____ Reading Date

$S_h = S_c - [S_r \times (OW_c - OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: _____ inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)? Upper boundary: 28 inches Lower boundary: 72+ inches

c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: D58 (Hole #) 4/17/19 (Date) _____ (Time) Sun, 60 (Weather) _____ (Latitude) Longitude:

1. Land Use Woodland (e.g., woodland, agricultural field, vacant lot, etc.) Pine/deciduous (Vegetation) None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) 3-5% (Slope (%))

Description of Location: _____

2. Soil Parent Material: _____ Landform _____ Position on Landscape (SU, SH, BS, , TS) _____

3. Distances from: Open Water Body 100+ feet; Drainage Way 100+ feet; Wetlands 100+ feet; Property Line 10+ feet; Drinking Water Well 100+ feet; Other _____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 20 Depth Weeping from Pit 42 Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-9	A	SL	10YR 3/2						M	F	
9-12	B	LS	10YR 5/6						M	F	
12-72	C	Med Sand	2.5Y 5/6	16	High Chroma	>10	10		Sg	Loose	

Additional Notes: _____

Commonwealth of Massachusetts
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Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: D59 (Hole #) | 4/17/19 (Date) | Time | Sun, 60 (Weather) | Latitude | Longitude:

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) | Pine/deciduous (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 3-5% (Slope (%))

Description of Location:

2. Soil Parent Material: | Landform | Position on Landscape (SU, SH, BS, , TS)

3. Distances from: Open Water Body 100+ feet | Drainage Way 100+ feet | Wetlands 100+ feet | Property Line 10+ feet | Drinking Water Well 100+ feet | Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: --- Depth Weeping from Pit ---- Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-60	FILL									FILL	
60-68	A	SL	10YR 3/2						M	F	
68-90	B	LS	10YR 5/6						M	F	
90-264	C	Coarse Sand	2.5Y 5/6	----	----	----	15		Sg	Loose	
[22'-0"]											

Additional Notes:
Williams & Sparages LLC – CONC-0020

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole # D58	Obs. Hole # D59
☒ Depth observed standing water in observation hole	16 inches	>264 inches
☐ Depth weeping from side of observation hole	_____ inches	_____ inches
☒ Depth to soil redoximorphic features (mottles)	20 inches	->264 inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

_____ Index Well Number _____ Reading Date

$S_h = S_c - [S_r \times (OW_c - OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: _____ inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)? Upper boundary: 72 inches Lower boundary: 180 inches

c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches

Commonwealth of Massachusetts
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Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: D60 (Hole #) | 4/17/19 (Date) | Time | Sun, 60 (Weather) | Latitude | Longitude:

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) | Pine/deciduous (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 3-5% (Slope (%))

Description of Location:

2. Soil Parent Material: | Landform | Position on Landscape (SU, SH, BS, , TS)

3. Distances from: Open Water Body 100+ feet | Drainage Way 100+ feet | Wetlands 100+ feet | Property Line 10+ feet | Drinking Water Well 100+ feet | Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: --- Depth Weeping from Pit ---- Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
No	A or B										
0-264	C	Coarse Sand	2.5Y 6/3	----	----	----	15		Sg	Loose	
(22'-0)'											

Additional Notes:
Williams & Sparages LLC – CONC-0020

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: D61 (Hole #) | 4/17/19 (Date) | Time | Sun, 60 (Weather) | Latitude | Longitude:

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) | Pine/deciduous (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 3-5% (Slope (%))

Description of Location:

2. Soil Parent Material: | Landform | Position on Landscape (SU, SH, BS, , TS)

3. Distances from: Open Water Body 100+ feet | Drainage Way 100+ feet | Wetlands 100+ feet
Property Line 10+ feet | Drinking Water Well 100+ feet | Other ____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: --- Depth Weeping from Pit ---- Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-8	A	SL	10YR 3/2						M	F	
8-26	B	LS	10YR 5/6						M	F	
26-252	C	Coarse Sand	2.5Y 5/6	----	----	---	20		Sg	Loose	
(21'-0")											

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole # D60	Obs. Hole # D61
☒ Depth observed standing water in observation hole	>264 inches	>252 inches
☐ Depth weeping from side of observation hole	_____ inches	_____ inches
☒ Depth to soil redoximorphic features (mottles)	>264 inches	>252 inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

_____ Index Well Number _____ Reading Date

$S_h = S_c - [S_r \times (OW_c - OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: _____ inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)? Upper boundary: 26 inches Lower boundary: 264+ inches

c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: D62 (Hole #) 4/17/19 (Date) _____ (Time) Sun, 60 (Weather) _____ (Latitude) Longitude:

1. Land Use Woodland (e.g., woodland, agricultural field, vacant lot, etc.) Pine/deciduous (Vegetation) None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) 3-5% (Slope (%))

Description of Location: _____

2. Soil Parent Material: _____ Landform _____ Position on Landscape (SU, SH, BS, , TS) _____

3. Distances from: Open Water Body 100+ feet; Drainage Way 100+ feet; Wetlands 100+ feet; Property Line 10+ feet; Drinking Water Well 100+ feet; Other _____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 96 Depth Weeping from Pit 100 Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-8	A	SL	10YR 3/2						M	F	
8-12	B	LS	10YR 5/6						M	F	
12-120	C	Med Sand	2.5Y 5/6	84	High Chroma	>10	10		Sg	Loose	

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: D63 (Hole #) 4/17/19 (Date) _____ (Time) Sun, 60 (Weather) _____ (Latitude) Longitude:

1. Land Use Woodland (e.g., woodland, agricultural field, vacant lot, etc.) Pine/deciduous (Vegetation) None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) 3-5% (Slope (%))

Description of Location: _____

2. Soil Parent Material: _____ Landform _____ Position on Landscape (SU, SH, BS, , TS) _____

3. Distances from: Open Water Body 100+ feet; Drainage Way 100+ feet; Wetlands 100+ feet; Property Line 10+ feet; Drinking Water Well 100+ feet; Other _____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 54 Depth Weeping from Pit 60 Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-8	A	SL	10YR 3/2						M	F	
8-21	B	LS	10YR 5/6						M	F	
21-72+	C	Med Sand	2.5Y 5/6	54	High Chroma	>10	10		Sg	Loose	

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole # D62	Obs. Hole # D63
☒ Depth observed standing water in observation hole	inches	inches
☐ Depth weeping from side of observation hole	96 inches	54 inches
☒ Depth to soil redoximorphic features (mottles)	84 inches	54 inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

_____ Index Well Number _____ Reading Date

$S_h = S_c - [S_r \times (OW_c - OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: _____ inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)? Upper boundary: 60 inches Lower boundary: 132 inches

c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches

Commonwealth of Massachusetts
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Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: D64 (Hole #) | 4/17/19 (Date) | _____ (Time) | Sun, 60 (Weather) | _____ (Latitude) | Longitude:

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) | Pine/deciduous (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 3-5% (Slope (%))

Description of Location: _____

2. Soil Parent Material: _____ | Landform _____ | Position on Landscape (SU, SH, BS, , TS) _____

3. Distances from: Open Water Body 100+ feet | Drainage Way 100+ feet | Wetlands 100+ feet
Property Line 10+ feet | Drinking Water Well 100+ feet | Other _____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 50 Depth Weeping from Pit 56 Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-8	A	SL	10YR 3/2						M	F	
8-23	B	LS	10YR 5/6						M	F	
23-72+	C	Med Sand	2.5Y 5/6	50	High Chroma	>10	10		Sg	Loose	

Commonwealth of Massachusetts
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Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: D65 (Hole #) 4/17/19 (Date) _____ (Time) Sun, 60 (Weather) _____ (Latitude) Longitude:

1. Land Use Woodland (e.g., woodland, agricultural field, vacant lot, etc.) Pine/deciduous (Vegetation) None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) 3-5% (Slope (%))

Description of Location: _____

2. Soil Parent Material: _____ Landform _____ Position on Landscape (SU, SH, BS, , TS) _____

3. Distances from: Open Water Body 100+ feet; Drainage Way 100+ feet; Wetlands 100+ feet; Property Line 10+ feet; Drinking Water Well 100+ feet; Other _____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 114 Depth Weeping from Pit 120 Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-9	A	SL	10YR 3/2						M	F	
9-27	B	LS	10YR 5/6						M	F	
27-132	C	Med Sand	2.5Y 5/6	110	High Chroma	>10	10		Sg	Loose	

Commonwealth of Massachusetts
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Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole # D64	Obs. Hole # D65
☒ Depth observed standing water in observation hole	inches	inches
☐ Depth weeping from side of observation hole	50 inches	114 inches
☒ Depth to soil redoximorphic features (mottles)	50 inches	110 inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

_____ Index Well Number _____ Reading Date

$S_h = S_c - [S_r \times (OW_c - OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: _____ inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)? Upper boundary: 60 inches Lower boundary: 132 inches

c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches

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Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: D66 (Hole #) 4/17/19 (Date) _____ (Time) Sun, 60 (Weather) _____ (Latitude) Longitude:

1. Land Use Woodland (e.g., woodland, agricultural field, vacant lot, etc.) Pine/deciduous (Vegetation) None (Surface Stones (e.g., cobbles, stones, boulders, etc.) 3-5% (Slope (%)

Description of Location: _____

2. Soil Parent Material: _____ Landform _____ Position on Landscape (SU, SH, BS, , TS)

3. Distances from: Open Water Body 100+ feet Drainage Way 100+ feet Wetlands 100+ feet
Property Line 10+ feet Drinking Water Well 100+ feet Other _____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: ------Depth Weeping from Pit --- Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-8	A	SL	10YR 3/2						M	F	
8-26	B	LS	10YR 5/6						M	F	
26-174	C	Sand	2.5Y 5/6	----					Sg	Loose	
14'-6"											

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Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole # D66	Obs. Hole #
☒ Depth observed standing water in observation hole	inches	inches
☐ Depth weeping from side of observation hole	>174 inches	_____ inches
☒ Depth to soil redoximorphic features (mottles)	>174 inches	inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

_____ Index Well Number _____ Reading Date

$S_h = S_c - [S_r \times (OW_c - OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: _____ inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)? Upper boundary: 26 inches Lower boundary: 174 inches

c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

Signature of Soil Evaluator	4/17/19 (TP D50 thru TP D66) – Stormwater Areas Only Date
Richard J. Harrington / #1012 Typed or Printed Name of Soil Evaluator / License #	6/30/2019 Expiration Date of License
Stormwater Management Areas – Not Witnessed Name of Approving Authority Witness	---------- Approving Authority

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.

Field Diagrams: Use this area for field diagrams:

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

Prepared For: Symes Development & Permitting, LLC - Jeffrey Rhuda, Manager CONC-0020 **(TP 19-1 thru 19-13)**
Owner Name

1440, 1450 & 146B Main Street — Street Address
D/ — Map/Lot #

Concord — City
MA — State
01742 — Zip Code

B. Site Information

1. (Check one) ☒ New Construction ☐ Upgrade ☐ Repair
2. Soil Survey Available? ☒ Yes ☐ No If yes: NRCS WEB SOIL SURVEY — 253B, 253D, 254A, 256B (Soil Map Unit)

   Hinckley, Merrimac, Deerfield — Soil Name
   Soil Limitations

   Soil Parent material
   Landform
3. Surficial Geological Report Available? ☒ Yes ☐ No If yes: Year Published/Source — Map Unit

   Description of Geologic Map Unit:
4. Flood Rate Insurance Map Within a regulatory floodway? ☐ Yes ☒ No
5. Within a velocity zone? ☐ Yes ☒ No
6. Within a Mapped Wetland Area? ☐ Yes ☒ No If yes, MassGIS Wetland Data Layer: Wetland Type
7. Current Water Resource Conditions (USGS): Month/Day/ Year Range: ☐ Above Normal ☐ Normal ☐ Below Normal
8. Other references reviewed:

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: 19-1 (Hole #) 4/16/19 (Date) _____ (Time) Sun, 60 (Weather) _____ (Latitude) Longitude:

1. Land Use Woodland (e.g., woodland, agricultural field, vacant lot, etc.) Pine/deciduous (Vegetation) None (Surface Stones (e.g., cobbles, stones, boulders, etc.) 3-5% (Slope (%)

Description of Location: _____

2. Soil Parent Material: _____ Landform _____ Position on Landscape (SU, SH, BS, , TS) _____

3. Distances from: Open Water Body 100+ feet Drainage Way 100+ feet Wetlands 100+ feet
Property Line 10+ feet Drinking Water Well 100+ feet Other _____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 110 Depth Weeping from Pit 120 Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-6	A	SL	10YR 3/2						M	F	
6-30	B	LS	10YR 5/6						M	F	
30-104	C1	Sand	2.5Y 5/6						Sg	Loose	
104-132	C2	Sand	2.5Y 6/3	104	High Chroma	>10	15		Sg	Loose	

Additional Notes:
Williams & Sparages LLC – CONC-0020

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: 19-2 (Hole #) | 4/16/19 (Date) | Time | Sun, 60 (Weather) | Latitude | Longitude:

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) | Pine/deciduous (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 3-5% (Slope (%))

Description of Location:

2. Soil Parent Material: | Landform | Position on Landscape (SU, SH, BS, , TS)

3. Distances from: Open Water Body 100+ feet | Drainage Way 100+ feet | Wetlands 100+ feet
Property Line 10+ feet | Drinking Water Well 100+ feet | Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 104 Depth Weeping from Pit 110 Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-6	A	SL	10YR 3/2						M	F	
6-26	B	LS	10YR 5/6						M	F	
26-130	C1	Medium Sand	2.5Y 5/6	100	High Chroma	>10	15		Sg	Loose	

Additional Notes:
Williams & Sparages LLC – CONC-0020

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole # 19-1	Obs. Hole # 19-2
☒ Depth observed standing water in observation hole	110 inches	104 inches
☐ Depth weeping from side of observation hole	_____ inches	_____ inches
☒ Depth to soil redoximorphic features (mottles)	104" inches	100" inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

Index Well Number _____ Reading Date _____

$S_h = S_c - [S_r \times (OW_c - OW_{max})/OW_f]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_f _____ S_h _____

2. Estimated Depth to High Groundwater: _____ inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)? Upper boundary: 30 inches Lower boundary: 132 inches

c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches

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Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: 19-3 (Hole #) | 4/16/19 (Date) | (Time) | Sun, 60 (Weather) | (Latitude) | Longitude:

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) | Pine/deciduous (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 3-5% (Slope (%))

Description of Location:

2. Soil Parent Material: | Landform | Position on Landscape (SU, SH, BS, , TS)

3. Distances from: Open Water Body 100+ feet | Drainage Way 100+ feet | Wetlands 100+ feet
Property Line 10+ feet | Drinking Water Well 100+ feet | Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 100 Depth Weeping from Pit 100 Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-6	A	SL	10YR 3/2						M	F	
6-28	B	LS	10YR 5/6						M	F	
28-130	C	Medium Sand	2.5Y 5/6	96	High Chroma	>10	15		Sg	Loose	

Additional Notes:

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: 19-4 (Hole #) | 4/16/19 (Date) | Time | Sun, 60 (Weather) | Latitude | Longitude:

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) | Pine/deciduous (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 3-5% (Slope (%))

Description of Location:

2. Soil Parent Material: | Landform | Position on Landscape (SU, SH, BS, , TS)

3. Distances from: Open Water Body 100+ feet | Drainage Way 100+ feet | Wetlands 100+ feet
Property Line 10+ feet | Drinking Water Well 100+ feet | Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: --- Depth Weeping from Pit ---- Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-8	A	SL	10YR 3/2						M	F	
8-30	B	LS	10YR 5/6						M	F	
30-180	C	Medium Sand	2.5Y 6/3	----	----	----	15		Sg	Loose	

Additional Notes:
Williams & Sparages LLC – CONC-0020

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole # 19-3	Obs. Hole # 19-4
☒ Depth observed standing water in observation hole	100 inches	>180 inches
☐ Depth weeping from side of observation hole	_____ inches	_____ inches
☒ Depth to soil redoximorphic features (mottles)	96" inches	->180" inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

_____ Index Well Number _____ Reading Date

$S_h = S_c - [S_r \times (OW_c - OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: _____ inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)? Upper boundary: 30 inches Lower boundary: 180 inches

c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches

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Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: 19-5 (Hole #) | 4/16/19 (Date) | (Time) | Sun, 60 (Weather) | (Latitude) | Longitude:

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) | Pine/deciduous (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 3-5% (Slope (%))

Description of Location:

2. Soil Parent Material: | Landform | Position on Landscape (SU, SH, BS, , TS)

3. Distances from: Open Water Body 100+ feet | Drainage Way 100+ feet | Wetlands 100+ feet
Property Line 10+ feet | Drinking Water Well 100+ feet | Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 104 Depth Weeping from Pit 106 Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-7	A	SL	10YR 3/2						M	F	
7-30	B	LS	10YR 5/6						M	F	
30-150	C	Medium Sand	2.5Y 5/6	104	High Chroma	>15	15		Sg	Loose	

Additional Notes:

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: 19-6 (Hole #) | 4/16/19 (Date) | Time | Sun, 60 (Weather) | Latitude | Longitude:

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) | Pine/deciduous (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 3-5% (Slope (%))

Description of Location:

2. Soil Parent Material: | Landform | Position on Landscape (SU, SH, BS, , TS)

3. Distances from: Open Water Body 100+ feet | Drainage Way 100+ feet | Wetlands 100+ feet | Property Line 10+ feet | Drinking Water Well 100+ feet | Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: --- Depth Weeping from Pit ---- Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-4	A	SL	10YR 3/2						M	F	
4-18	B	LS	10YR 5/6						M	F	
18-156	C	Medium Sand	2.5Y 6/3	----	----	----	15		Sg	Loose	

Additional Notes:
Williams & Sparages LLC – CONC-0020

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole # 19-5	Obs. Hole # 19-6
☒ Depth observed standing water in observation hole	104 inches	>156 inches
☐ Depth weeping from side of observation hole	_____ inches	_____ inches
☒ Depth to soil redoximorphic features (mottles)	104" inches	->156" inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

_____ Index Well Number _____ Reading Date

$S_h = S_c - [S_r \times (OW_c - OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: _____ inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)? Upper boundary: 30 inches Lower boundary: 156 inches

c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: 19-7 (Hole #) | 4/16/19 (Date) | (Time) | Sun, 60 (Weather) | (Latitude) | Longitude:

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) | Pine/deciduous (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 3-5% (Slope (%))

Description of Location:

2. Soil Parent Material: | Landform | Position on Landscape (SU, SH, BS, , TS)

3. Distances from: Open Water Body 100+ feet | Drainage Way 100+ feet | Wetlands 100+ feet | Property Line 10+ feet | Drinking Water Well 100+ feet | Other ____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 132 Depth Weeping from Pit 140 Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-106	FILL	FILL									
106-116	A	SL	10YR 3/2						M	F	
116-130	B	LS	10YR 5/6						M	F	
130-190	C	Med Sand	2.5Y 5/6	132	High Chroma	>10	15		Sg	Loose	

Additional Notes:

Commonwealth of Massachusetts
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Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: 19-8 (Hole #) | 4/16/19 (Date) | Time | Sun, 60 (Weather) | Latitude | Longitude:

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) | Pine/deciduous (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 3-5% (Slope (%))

Description of Location:

2. Soil Parent Material: | Landform | Position on Landscape (SU, SH, BS, , TS)

3. Distances from: Open Water Body 100+ feet | Drainage Way 100+ feet | Wetlands 100+ feet | Property Line 10+ feet | Drinking Water Well 100+ feet | Other ____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 144 Depth Weeping from Pit 150 Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-108	FILL, A & B	FILL									
108-132	A & B	SL & LS	10YR 3/2								
132-192	C	Med Sand	2.5Y 5/6	144	High Chroma	>10	15		Sg	Loose	

Additional Notes:
Williams & Sparages LLC – CONC-0020

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City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole # 19-7	Obs. Hole # 19-8
☒ Depth observed standing water in observation hole	132 inches	144 inches
☐ Depth weeping from side of observation hole	_____ inches	_____ inches
☒ Depth to soil redoximorphic features (mottles)	132 inches	144 inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

_____ Index Well Number _____ Reading Date

$S_h = S_c - [S_r \times (OW_c - OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: _____ inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)? Upper boundary: 132 inches Lower boundary: 192 inches

c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches

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Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: 19-9 (Hole #) | 4/16/19 (Date) | Time | Sun, 60 (Weather) | Latitude | Longitude:

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) | Pine/deciduous (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 3-5% (Slope (%))

Description of Location:

2. Soil Parent Material: | Landform | Position on Landscape (SU, SH, BS, , TS)

3. Distances from: Open Water Body 100+ feet | Drainage Way 100+ feet | Wetlands 100+ feet | Property Line 10+ feet | Drinking Water Well 100+ feet | Other ____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 106 Depth Weeping from Pit 130 Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-48	FILL	FILL									
48-54	A	SL	10YR 3/2						M	F	
54-72	B	LS	10YR 5/6						M	F	
72-150	C	Med Sand	2.5Y 5/6	106	High Chroma	>10	10		Sg	Loose	

Additional Notes:

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Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: 19-10 (Hole #) | 4/16/19 (Date) | Time | Sun, 60 (Weather) | Latitude | Longitude:

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) | Pine/deciduous (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 3-5% (Slope (%))

Description of Location:

2. Soil Parent Material: | Landform | Position on Landscape (SU, SH, BS, , TS)

3. Distances from: Open Water Body 100+ feet | Drainage Way 100+ feet | Wetlands 100+ feet | Property Line 10+ feet | Drinking Water Well 100+ feet | Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: --- Depth Weeping from Pit ---- Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-6	A	SL	10YR 3/2						M	F	
6-30	B	LS	10YR 5/6						M	F	
30-180	C	Coarse Sand	2.5Y 5/6	----	----	----	15		Sg	Loose	

Additional Notes:
Williams & Sparages LLC – CONC-0020

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole # 19-9	Obs. Hole # 19-10
☒ Depth observed standing water in observation hole	106 inches	>180 inches
☐ Depth weeping from side of observation hole	_____ inches	_____ inches
☒ Depth to soil redoximorphic features (mottles)	106" inches	->180 inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

_____ Index Well Number _____ Reading Date

$S_h = S_c - [S_r \times (OW_c - OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: _____ inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)? Upper boundary: 72 inches Lower boundary: 180 inches

c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches

Commonwealth of Massachusetts
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Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: 19-11 (Hole #) | 4/16/19 (Date) | Time | Sun, 60 (Weather) | Latitude | Longitude:

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) | Pine/deciduous (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 3-5% (Slope (%))

Description of Location:

2. Soil Parent Material: | Landform | Position on Landscape (SU, SH, BS, , TS)

3. Distances from: Open Water Body 100+ feet | Drainage Way 100+ feet | Wetlands 100+ feet | Property Line 10+ feet | Drinking Water Well 100+ feet | Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: --- Depth Weeping from Pit ---- Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-12	A	SL	10YR 3/2						M	F	
12-36	B	LS	10YR 5/6						M	F	
36-144	C	Coarse Sand	2.5Y 6/3	----	----	----	15		Sg	Loose	

Additional Notes:
Williams & Sparages LLC – CONC-0020

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: 19-12 (Hole #) | 4/16/19 (Date) | Time | Sun, 60 (Weather) | Latitude | Longitude:

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) | Pine/deciduous (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 3-5% (Slope (%))

Description of Location:

2. Soil Parent Material: | Landform | Position on Landscape (SU, SH, BS, , TS)

3. Distances from: Open Water Body 100+ feet | Drainage Way 100+ feet | Wetlands 100+ feet
Property Line 10+ feet | Drinking Water Well 100+ feet | Other ____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 120 Depth Weeping from Pit 120 Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-96	FILL	FILL									
96-106	A	SL	10YR 3/2						M	F	
106-120	B	LS	10YR 5/6						M	F	
120-180	C	Med Sand	2.5Y 5/6	120	High Chroma	>10			Sg	Loose	

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City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole # 19-11	Obs. Hole # 19-12
☒ Depth observed standing water in observation hole	>144 inches	120 inches
☐ Depth weeping from side of observation hole	_____ inches	_____ inches
☒ Depth to soil redoximorphic features (mottles)	>144 inches	-120 inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

Index Well Number _____ Reading Date _____

$S_h = S_c - [S_r \times (OW_c - OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: _____ inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)? Upper boundary: 36-120 inches Lower boundary: 180 inches

c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: 19-13 (Hole #) | 4/16/19 (Date) | Time | Sun, 60 (Weather) | Latitude | Longitude:

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) | Pine/deciduous (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 3-5% (Slope (%))

Description of Location:

2. Soil Parent Material: | Landform | Position on Landscape (SU, SH, BS, , TS)

3. Distances from: Open Water Body 100+ feet | Drainage Way 100+ feet | Wetlands 100+ feet
Property Line 10+ feet | Drinking Water Well 100+ feet | Other ____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 106 Depth Weeping from Pit 120 Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-42	FILL	FILL									
42-50	A	SL	10YR 3/2						M	F	
50-60	B	LS	10YR 5/6						M	F	
60-132	C	Med Sand	2.5Y 5/6	96	High Chroma	>10	10		Sg	Loose	

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole # 19-13	Obs. Hole #
☒ Depth observed standing water in observation hole	106 inches	inches
☐ Depth weeping from side of observation hole	_____ inches	_____ inches
☒ Depth to soil redoximorphic features (mottles)	96 inches	inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

_____ Index Well Number _____ Reading Date

$S_h = S_c - [S_r \times (OW_c - OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: _____ inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)? Upper boundary: 60 inches Lower boundary: 132 inches

c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches

Commonwealth of Massachusetts
City/Town of Concord

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

Richard J. Harrington	4/16/19 (TP 19-1 thru TP 19-13)
Signature of Soil Evaluator	Date
Richard J. Harrington / #1012	6/30/2019
Typed or Printed Name of Soil Evaluator / License #	Expiration Date of License
Stanley Sosnicki	Concord Health Department
Name of Approving Authority Witness	Approving Authority

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.

Field Diagrams: Use this area for field diagrams:

STAMSKI AND McNARY, INC.
1000 Main Street
ACTON, MA 01720
Engineering • Planning • Surveying

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

DEP has provided this form for use by on-site professionals and local Boards of Health. Other forms may be used, but the information must be substantially the same as provided here. Before using this form, check with your local Board of Health to determine the form they use.

A. Facility Information

1. Facility Information

Owner Name: FAYE HAYES

Street Address: 1440 & 1450 MAIN STREET Map/Lot: ____

City/Town: CONCORD State: MA Zip Code: ____

B. Site Information

1. (Check one) New Construction ☒ Upgrade ☐ Repair ☐

2. Published Soil Survey available? Yes ☒ No ☐ If yes: Year Published ____ Publication Scale ____ Soil Map Unit ____

   Soil Name ____ Soil limitations: RAPID PERMEABILITY

3. Surficial Geological Report available? Yes ☐ No ☐ If yes: Year Published ____ Publication Scale ____ Map Unit ____

   Geologic Material ____ Landform ____

4. Flood Rate Insurance Map:

   Above the 500 year flood boundary? Yes ☒ No ☐ Within the 100 year flood boundary? Yes ☐ No ☒

   Within the 500 year flood boundary? Yes ☐ No ☒ Within a Velocity Zone? Yes ☐ No ☒

5. Wetland Area: National Wetland Inventory Map — Map Unit: ISOLATED WETLAND Name: DELINEATED ON-SITE

   Wetlands Conservancy Program Map — Map Unit: ____ Name: ____

Commonwealth of Massachusetts
City/Town of
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

STAMSKI AND McNARY, INC.
1000 Main Street
ACTON, MA 01720
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C. On-Site Review
(minimum of two holes required at every proposed disposal area)

Deep Observation Hole Number: TP 17-1 Date: 12/18/2017 Time: _____ Weather: RAIN 40°

1. Location

Ground Elevation at Surface of Hole 157.5

Location (Identify on Plan) _____

2. Land Use: WOODLAND LAWN LANDSCAPE (e.g. woodland, agricultural field, vacant lot, etc.) Surface Stones: — Slope (%): _____

Vegetation: GRASS BRUSH TREES Landform: _____ Position on landscape (attach sheet): _____

3. Distances from: Open Water Body — feet Drainage Way _____ feet Possible Wet Area INW- feet

Property Line 25 feet Drinking Water Well _____ feet Other ISOLATED VEGETATED WETLAND

4. Parent Material: Pedgl acial Unsuitable Materials Present: Yes ☐ No ☐

If Yes: Disturbed Soil☐ Fill Material☐ Impervious Layer(s) ☐ Weathered/Fractured Rock☐ Bedrock☐

5. Groundwater Observed: Yes ☐ No ☒

If Yes: Depth Weeping from Pit — Depth Standing Water in Hole _____

Estimated Depth to High Groundwater: 168

Deep Observation Hole Number: TP 17-1

Depth (In:)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles) Depth	Color	Percent	Soil Texture (USDA)	Coarse Fragments % by Volume Gravel	Cobbles & Stones	Soil Structure	Soil Consistence (Moist)	Other
12	A_p	10YR 2/2	—	—	—	SL	—	—	M	F	
40	B	10YR 3/4	—	—	—	LS	—	—	M	F	
168	C	2.5Y 6/3	—	—	—	COARSE TO MEDIUM SAND	TRACE GRAVEL		SG	LOOSE	

Additional Notes _____

Commonwealth of Massachusetts
City/Town of
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

STAMSKI AND McNARY, INC.
1000 Main Street
ACTON, MA 01720
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C. On-Site Review *(minimum of two holes required at every proposed disposal area)*

Deep Observation Hole Number: TP 17-2 Date: 12/18/2017 Time: _____ Weather: RAIN 40°

1. Location

   Ground Elevation at Surface of Hole 157.1

   Location (Identify on Plan) _____

2. Land Use: WOODLAND LAWN LANDSCAPE (e.g. woodland, agricultural field, vacant lot, etc.) Surface Stones: — Slope (%): _____

   Vegetation: GRASS BRUSH TREES Landform: _____ Position on landscape (attach sheet): _____

3. Distances from: Open Water Body — feet Drainage Way _____ feet Possible Wet Area IVW- feet

   Property Line 20 feet Drinking Water Well _____ feet Other ISOLATED VEGETATED WETLAND

4. Parent Material: Prog/alluv Unsuitable Materials Present: Yes ☐ No ☒

   If Yes: Disturbed Soil☐ Fill Material☐ Impervious Layer(s) ☐ Weathered/Fractured Rock☐ Bedrock☐

5. Groundwater Observed: Yes ☐ No ☒

   If Yes: Depth Weeping from Pit — Depth Standing Water in Hole —

   Estimated Depth to High Groundwater: BELOW 156

Deep Observation Hole Number: TP 17-2

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles) Depth	Color	Percent	Soil Texture (USDA)	Coarse Fragments % by Volume Gravel	Cobbles & Stones	Soil Structure	Soil Consistence (Moist)	Other
12	Ap	10YR 2/2	—	—	—	SL	—	—	M	F	
30	BW	10YR 3/4	—	—	—	LS	—	—	M	F	
156	C	10YR 6/3	—	—	—	COARSE TO MEDIUM SAND	THREE GRAVEL <2%	—	SG	LOOSE	

Additional Notes _____

Commonwealth of Massachusetts
City/Town of
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STAMSKI AND McNARY, INC.
1000 Main Street
ACTON, MA 01720
Engineering • Planning • Surveying

C. On-Site Review
(minimum of two holes required at every proposed disposal area)

Deep Observation Hole Number: TP 17-3 Date: 12/18/2017 Time: _____ Weather: RAIN 40°

1. Location

Ground Elevation at Surface of Hole 156.7

Location (Identify on Plan) _____

2. Land Use: WOODLAND LAWN LANDSCAPE (e.g. woodland, agricultural field, vacant lot, etc.) Surface Stones: — Slope (%): _____

Vegetation: GRASS BRUSH TREES Landform: _____ Position on landscape (attach sheet): _____

3. Distances from: Open Water Body — feet Drainage Way _____ feet Possible Wet Area INV- feet

Property Line 30 feet Drinking Water Well _____ feet Other ISOLATED VEGETATED WETLAND

4. Parent Material: Proglacial Unsuitable Materials Present: Yes ☐ No ☐

If Yes: Disturbed Soil☐ Fill Material☐ Impervious Layer(s) ☐ Weathered/Fractured Rock☐ Bedrock☐

5. Groundwater Observed: Yes ☐ No ☑

If Yes: Depth Weeping from Pit — Depth Standing Water in Hole —

Estimated Depth to High Groundwater: Below 156

Deep Observation Hole Number: TP 17-3

Depth (In:)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
8	Ap	10YR	—	—	—	SL	—	—	M		
14	B	10YR	—	—	—	LS	—	—	M		
156	C	2.5Y	—	—	—	COARSE SAND	4	—	SG	LOOSE	

Additional Notes _____

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

STAMSKI AND McNARY, INC.
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ACTON, MA 01720
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C. On-Site Review

(minimum of two holes required at every proposed disposal area)

Deep Observation Hole Number: TP 17-4 Date 12/18/2017 Time 1-3 Weather RAIN 40°

1. Location

Ground Elevation at Surface of Hole 126.8

Location (Identify on Plan) _____

2. Land Use: WOODLAND LAWN LANDSCAPE (~~e.g. woodland, agricultural field~~, vacant lot, etc.) Surface Stones — Slope (%) _____

Vegetation GRASS BRUSH TREES Landform _____ Position on landscape (attach sheet) _____

3. Distances from: Open Water Body — feet Drainage Way _____ feet Possible Wet Area INW feet

Property Line _____ feet Drinking Water Well _____ feet Other ISOLATED VEGETATED WETLAND

4. Parent Material: Pwyglacial Unsuitable Materials Present: Yes ☐ No ☒

If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5. Groundwater Observed: Yes ☒ No ☐

If Yes: Depth Weeping from Pit 60 Depth Standing Water in Hole 100

Estimated Depth to High Groundwater: 28 124.47'

Deep Observation Hole Number: TP 17-4

Depth (In:)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
10	A	10YR 3/2	—	—	—	SL	—	—	M	F	
20	B	10YR 4/4	—	—	—	LS	—	—	M	F	
120	C	2.5Y 4/4	28	High	>10	SANDY	—	—	M	VERY FRIABLE	
				CATHOWN		MEDIUM					

Additional Notes _____

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Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

STAMSKI AND McNARY, INC.
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C. On-Site Review
(minimum of two holes required at every proposed disposal area)

Deep Observation Hole Number: TP 17-5 Date 12/12/2017 Time 13 Weather ~~RAIN~~ 40° SM 3.0"

1. Location

Ground Elevation at Surface of Hole 129.0

Location (Identify on Plan) _____

2. Land Use: WOODLAND LAWN LANDSCAPE (e.g. woodland, agricultural field, vacant lot, etc.) Surface Stones — Slope (%) _____

Vegetation GRASS BRUSH TREES Landform _____ Position on landscape (attach sheet) _____

3. Distances from: Open Water Body — feet Drainage Way _____ feet Possible Wet Area IVW- feet

Property Line 30 feet Drinking Water Well _____ feet Other ISOLATED VEGETATED WETLAND

4. Parent Material: PROGLACIAL Unsuitable Materials Present: Yes ☐ No ☒

If Yes: Disturbed Soil☐ Fill Material☐ Impervious Layer(s) ☐ Weathered/Fractured Rock☐ Bedrock☐

5. Groundwater Observed: Yes ☒ No ☐

If Yes: Depth Weeping from Pit 75 Depth Standing Water in Hole 90

Estimated Depth to High Groundwater: ~~48~~ 62 123.80

Deep Observation Hole Number: TP 17-5

Depth (In:)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles) Depth	Color	Percent	Soil Texture (USDA)	Coarse Fragments % by Volume Gravel	Cobbles & Stones	Soil Structure	Soil Consistence (Moist)	Other
6	A	10YR 3/2	—			SL	—	—	M	F	
15	B_2	10YR 4/4	—			LS	—		M		
170	C	2.5Y 4/1	62			SMS	—			VERY	

Additional Notes _____

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C. On-Site Review

(minimum of two holes required at every proposed disposal area)

Deep Observation Hole Number: TP 17-6 Date: 12/18/2017 Time: 13 Weather: ~~RAIN~~ 40° SUN 30

1. Location

   Ground Elevation at Surface of Hole 128.8

   Location (Identify on Plan) _____

2. Land Use: WOODLAND LAWN LANDSCAPE (e.g. woodland, agricultural field, vacant lot, etc.) Surface Stones: — Slope (%): _____

   Vegetation: GRASS BRUSH TREES Landform: _____ Position on landscape (attach sheet): _____

3. Distances from: Open Water Body — feet Drainage Way _____ feet Possible Wet Area IVW- feet

   Property Line _____ feet Drinking Water Well _____ feet Other ISOLATED VEGETATED WETLAND

4. Parent Material: Glacial Till Unsuitable Materials Present: Yes ☐ No ☑

   If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5. Groundwater Observed: Yes ☑ No ☐

   If Yes: Depth Weeping from Pit 50 Depth Standing Water in Hole 54

   Estimated Depth to High Groundwater: 50 124.03

17-4

Deep Observation Hole Number: TP 17-6

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
10	A	10YR 3/2	—	—	—	SL	—	—	M	F	
20	B	10YR 4/4	—	—	—	LS	—	—	M	F	
170	C	2.5Y 4/4	—	10YR 6/2	2	SAND MEDIUM	—	—	M	VERY FRIABLE	

Additional Notes _____

Commonwealth of Massachusetts
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C. On-Site Review

(minimum of two holes required at every proposed disposal area)

Deep Observation Hole Number: TP 17-7 Date 12/18/2017 Time _____ Weather RAIN 40°

1. Location

   Ground Elevation at Surface of Hole 132.3 13

   Location (Identify on Plan) _____

2. Land Use: WOODLAND (e.g. woodland, agricultural field, vacant lot, etc.) LAWN LANDSCAPE Surface Stones — Slope (%) _____

   GRASS BRUSH TREES Vegetation Landform _____ Position on landscape (attach sheet) _____

3. Distances from: Open Water Body — feet Drainage Way _____ feet Possible Wet Area IVW- feet

   Property Line _____ feet Drinking Water Well _____ feet Other ISOLATED VEGETATED WETLAND

4. Parent Material: BOULDERS Unsuitable Materials Present: Yes ☐ No ☐

   If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5. Groundwater Observed: Yes ☐ No ☒

   If Yes: Depth Weeping from Pit — Depth Standing Water in Hole —

   Estimated Depth to High Groundwater: 92 124.63

Deep Observation Hole Number: TP 17-7

Depth (In:)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
10	A	10YR 2/2	—	—	—	SL	—	—	M	F	
20	B	10YR 4/4	—	—	—	LS	—	—	M	F	
120	C	2.5Y 4/4	92		75	SAND MEDIUM	TRACE	—	M	VERY FRIABLE	
						VARIABLE					

Additional Notes _____

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Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

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C. On-Site Review

(minimum of two holes required at every proposed disposal area)

Deep Observation Hole Number: TP 17-8 Date: 12/18/2017 Time: _____ Weather: RAIN 40°

1. Location

   Ground Elevation at Surface of Hole 130.9

   Location (Identify on Plan) _____

2. Land Use: WOODLAND LAWN LANDSCAPE (e.g. woodland, agricultural field, vacant lot, etc.) Surface Stones: — Slope (%): _____

   Vegetation: GRASS BRUSH TREES Landform: _____ Position on landscape (attach sheet): _____

3. Distances from: Open Water Body — feet Drainage Way _____ feet Possible Wet Area IVO- feet

   Property Line _____ feet Drinking Water Well _____ feet Other ISOLATED VEGETATED WETLAND

4. Parent Material: Pmoglacial Unsuitable Materials Present: Yes ☐ No ☐

   If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5. Groundwater Observed: Yes ☒ No ☐

   If Yes: Depth Weeping from Pit 120 Depth Standing Water in Hole _____

   Estimated Depth to High Groundwater: 78 124.40

Deep Observation Hole Number: TP 17-8

Depth (In:)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
8	A		—			SL			M		
20	B					LS			M		
120	C		78			SAND MEDIUM			P		

Additional Notes _____

Commonwealth of Massachusetts
City/Town of
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

STAMSKI AND McNARY, INC.
1000 Main Street
ACTON, MA 01720
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C. On-Site Review
(minimum of two holes required at every proposed disposal area)

Deep Observation Hole Number: TP 17-9 Date: 12/18/2017 Time: _____ Weather: RAIN 40°

1. Location

Ground Elevation at Surface of Hole 128.0

Location (Identify on Plan) _____

2. Land Use: WOODLAND LAWN LANDSCAPE (e.g. woodland, agricultural field, vacant lot, etc.) Surface Stones: — Slope (%): _____

Vegetation: GRASS BRUSH TREES Landform: _____ Position on landscape (attach sheet): _____

3. Distances from: Open Water Body — feet Drainage Way _____ feet Possible Wet Area INW- feet

Property Line _____ feet Drinking Water Well _____ feet Other ISOLATED VEGETATED WETLAND

4. Parent Material: [illegible] Unsuitable Materials Present: Yes ☐ No ☐

If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5. Groundwater Observed: Yes ☒ No ☐

If Yes: Depth Weeping from Pit [illegible] Depth Standing Water in Hole [illegible]

Estimated Depth to High Groundwater: 60 123.00'

Deep Observation Hole Number: TP 17-9

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
	A	[illegible]	—	—	—	[illegible]	—		[illegible]		
	B	[illegible]	—	—		[illegible]			[illegible]		
	C	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			[illegible]	[illegible]	
				CHANNEL							

Additional Notes _____

Commonwealth of Massachusetts
City/Town of
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

STAMSKI AND McNARY, INC.
1000 Main Street
ACTON, MA 01720
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C. On-Site Review
(minimum of two holes required at every proposed disposal area)

Deep Observation Hole Number: TP 17-10 Date 12/12/2017 Time _____ Weather RAIN 40°

1. Location

Ground Elevation at Surface of Hole 128.8 13

Location (Identify on Plan) _____

2. Land Use: WOODLAND (e.g. woodland, agricultural field, vacant lot, etc.) LAWN LANDSCAPE Surface Stones — Slope (%) _____

Vegetation GRASS BRUSH TREES Landform _____ Position on landscape (attach sheet) _____

3. Distances from: Open Water Body — feet Drainage Way _____ feet Possible Wet Area IVW- feet

Property Line _____ feet Drinking Water Well _____ feet Other ISOLATED VEGETATED WETLAND

4. Parent Material: PM Unsuitable Materials Present: Yes ☐ No ☐

If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5. Groundwater Observed: Yes ☒ No ☐

If Yes: Depth Weeping from Pit 88 Depth Standing Water in Hole 94

Estimated Depth to High Groundwater: 4 122.63

Deep Observation Hole Number: TP 17-10

Depth (In:)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
10	A	10	—	—	—	SL	—	—	M	F	
22	B	10	—	—		LS	—	—	M	F	
120	C	2.5	74		>50	SAND MOD	—	—	M	VF	

Additional Notes _____

Commonwealth of Massachusetts
City/Town of
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

STAMSKI AND McNARY, INC.
1000 Main Street
ACTON, MA 01720
Engineering • Planning • Surveying

C. On-Site Review
(minimum of two holes required at every proposed disposal area)

Deep Observation Hole Number: TP 17-11 Date 12/18/2017 Time _____ Weather RAIN 40°

1. Location

Ground Elevation at Surface of Hole 128.8 13

Location (Identify on Plan) _____

2. Land Use: WOODLAND (e.g. woodland, agricultural field, vacant lot, etc.) LAWN LANDSCAPE Surface Stones — Slope (%) _____

Vegetation GRASS BRUSH TREES Landform _____ Position on landscape (attach sheet) _____

3. Distances from: Open Water Body — feet Drainage Way _____ feet Possible Wet Area IVW feet

Property Line _____ feet Drinking Water Well _____ feet Other ISOLATED VEGETATED WETLAND

4. Parent Material: Till Unsuitable Materials Present: Yes ☐ No ☐

If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5. Groundwater Observed: Yes ☒ No ☐

If Yes: Depth Weeping from Pit 9" Depth Standing Water in Hole 1.5'

Estimated Depth to High Groundwater: 60 123.8'

Deep Observation Hole Number: TP 17-11

Depth (In:)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
10	A	10YR 2/2	—	—	—	SL	—	—	M	F	
21	B	10YR 4/4	—	—	—	LS	—	—	M	F	
120	C	10YR 4/4	60	10 YR 6/2	35	MED SAND	—	—	M	VF	

Additional Notes _____

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(minimum of two holes required at every proposed disposal area)

Deep Observation Hole Number: TP 17-12 Date 12/18/2017 Time _____ Weather RAIN 40°

1. Location

Ground Elevation at Surface of Hole 132.8

Location (Identify on Plan) _____

2. Land Use: WOODLAND LAWN LANDSCAPE (e.g. woodland, agricultural field, vacant lot, etc.) Surface Stones — Slope (%) _____

Vegetation GRASS BRUSH TREES Landform _____ Position on landscape (attach sheet) _____

3. Distances from: Open Water Body — feet Drainage Way _____ feet Possible Wet Area IVW — feet

Property Line _____ feet Drinking Water Well _____ feet Other ISOLATED VEGETATED WETLAND

4. Parent Material: Proglacial Unsuitable Materials Present: Yes ☐ No ☐

If Yes: Disturbed Soil☐ Fill Material☐ Impervious Layer(s) ☐ Weathered/Fractured Rock☐ Bedrock☐

5. Groundwater Observed: Yes ☒ No ☐

If Yes: Depth Weeping from Pit 132 Depth Standing Water in Hole _____

Estimated Depth to High Groundwater: 125 122.38'

12 ⊕ 13
⊕
11 ⊕ 10

Deep Observation Hole Number: TP 17-12

Depth (in:)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
12	A	10YR 3/2	—	—	—	SL	—	—	M	F	
23	B	10YR 4/4	—	—	—	LS	—	—	M	F	
144	C	2.5Y 4/4		High chroma		SAND medium	—	—	M	V F	

Additional Notes _____

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(minimum of two holes required at every proposed disposal area)

Deep Observation Hole Number: TP 17-13 Date 12/18/2017 Time _____ Weather RAIN 40°

1. Location

Ground Elevation at Surface of Hole 131.9'

Location (Identify on Plan) _____

2. Land Use: WOODLAND LAWN LANDSCAPE (e.g. woodland, agricultural field, vacant lot, etc.) Surface Stones — Slope (%) _____

Vegetation GRASS BRUSH TREES Landform _____ Position on landscape (attach sheet) _____

3. Distances from: Open Water Body — feet Drainage Way _____ feet Possible Wet Area INW- feet

Property Line _____ feet Drinking Water Well _____ feet Other ISOLATED VEGETATED WETLAND

4. Parent Material: PRO Unsuitable Materials Present: Yes ☐ No ☐

If Yes: Disturbed Soil☐ Fill Material☐ Impervious Layer(s) ☐ Weathered/Fractured Rock☐ Bedrock☐

5. Groundwater Observed: Yes ☐ No ☐

If Yes: Depth Weeping from Pit 90 IN Depth Standing Water in Hole 101

Estimated Depth to High Groundwater: 90 124.40'

Deep Observation Hole Number: TP 17-13

Depth (In:)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
9	A		—	—	—	SL	—	—	M	F	
20	B		L		—	LS	—	—	M	F	
120	C		90		75	SAND MOIST			M	VF	

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Deep Observation Hole Number: TP 17-14 Date: 12/18/2017 Time: _____ Weather: RAIN 40°

1. Location

   Ground Elevation at Surface of Hole 129.0

   Location (Identify on Plan) _____

2. Land Use: WOODLAND LAWN LANDSCAPE (e.g. woodland, agricultural field, vacant lot, etc.) Surface Stones: — Slope (%): _____

   Vegetation: GRASS BRUSH TREES Landform: _____ Position on landscape (attach sheet): _____

3. Distances from: Open Water Body — feet Drainage Way _____ feet Possible Wet Area INW- feet

   Property Line _____ feet Drinking Water Well _____ feet Other ISOLATED VEGETATED WETLAND

4. Parent Material: _____ Unsuitable Materials Present: Yes ☐ No ☐

   If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5. Groundwater Observed: Yes ☐ No ☐

   If Yes: Depth Weeping from Pit 90 Depth Standing Water in Hole 96

   Estimated Depth to High Groundwater: 70 123.20'

Deep Observation Hole Number: TP 17-14

Depth (In:)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
12	A					SL			M		
22	B					LS			M		
120	C		70		5%	SAND			M		
						water					

Additional Notes _____

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(minimum of two holes required at every proposed disposal area)

Deep Observation Hole Number: TP 17-15 | Date: 12/12/2017 | Time: | Weather: RAIN 40°

1. Location

   Ground Elevation at Surface of Hole 133.8'

   Location (Identify on Plan) _____

2. Land Use: WOODLAND (e.g. woodland, agricultural field, vacant lot, etc.) | LAWN LANDSCAPE | Surface Stones: — | Slope (%): _____

   Vegetation: GRASS BRUSH TREES | Landform: _____ | Position on landscape (attach sheet): _____

3. Distances from: Open Water Body — feet | Drainage Way _____ feet | Possible Wet Area IVW- feet

   Property Line _____ feet | Drinking Water Well _____ feet | Other: ISOLATED VEGETATED WETLAND

4. Parent Material: _____ Unsuitable Materials Present: Yes ☐ No ☐

   If Yes: Disturbed Soil☐ Fill Material☐ Impervious Layer(s) ☐ Weathered/Fractured Rock☐ Bedrock☐

5. Groundwater Observed: Yes ☒ No ☐ NO

   If Yes: Depth Weeping from Pit _____ Depth Standing Water in Hole _____

   Estimated Depth to High Groundwater: — | 121.8' OR LOW BEL MSL 144'

Deep Observation Hole Number: TP 17-15

Depth (In:)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles) Depth	Color	Percent	Soil Texture (USDA)	Coarse Fragments % by Volume Gravel	Cobbles & Stones	Soil Structure	Soil Consistence (Moist)	Other
30	FILL	—	—	—	—	LS FILL	—	—	FILL	LS	—
36	A	3/2	—	—	—	SL	—	—	M	F	
52	B	4/4	—	—		LS	—	—	M	F	
62	C1	2.5Y 6/4	—		—	SAND COARSE	5		M	V	
144	C2	2.5Y 4/2	—	—		SAND SAND			M	VF	
						MOTTLED					

Additional Notes _____

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(minimum of two holes required at every proposed disposal area)

Deep Observation Hole Number: TP 17-16 Date: 12/18/2017 Time: _____ Weather: RAIN 40°

1. Location

   Ground Elevation at Surface of Hole 128.4

   Location (Identify on Plan) _____

2. Land Use: WOODLAND LAWN LANDSCAPE (e.g. woodland, agricultural field, vacant lot, etc.) Surface Stones: — Slope (%): _____

   Vegetation: GRASS BRUSH TREES Landform: _____ Position on landscape (attach sheet): _____

3. Distances from: Open Water Body — feet Drainage Way _____ feet Possible Wet Area INW- feet

   Property Line _____ feet Drinking Water Well _____ feet Other ISOLATED VEGETATED WETLAND

4. Parent Material: Protolaurite Unsuitable Materials Present: Yes ☐ No ☐

   If Yes: Disturbed Soil☐ Fill Material☐ Impervious Layer(s) ☐ Weathered/Fractured Rock☐ Bedrock☐

5. Groundwater Observed: Yes ☐ No ☐

   If Yes: Depth Weeping from Pit 80 Depth Standing Water in Hole 80

   Estimated Depth to High Groundwater: 60 123.40

Deep Observation Hole Number: TP 17-16

Depth (In:)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
10	A	10YR	—			SL	—	—	M	F	
40	B	10YR				LS			M	F	
120	C	2.5Y	60	High Chroma	Y	SFLS MSS			M	F	

Additional Notes _____

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(minimum of two holes required at every proposed disposal area)

Deep Observation Hole Number: TP 17-17 Date 12/12/2017 Time 12 Weather RAIN 40°

1. Location

   Ground Elevation at Surface of Hole 127.60

   Location (Identify on Plan) _____

2. Land Use: WOODLAND LAWN LANDSCAPE (e.g. woodland, agricultural field, vacant lot, etc.) Surface Stones — Slope (%) _____

   Vegetation GRASS BRUSH TREES Landform _____ Position on landscape (attach sheet) _____

3. Distances from: Open Water Body — feet Drainage Way _____ feet Possible Wet Area IVW- feet

   Property Line _____ feet Drinking Water Well _____ feet Other ISOLATED VEGETATED WETLAND

4. Parent Material: Postglacial Unsuitable Materials Present: Yes ☐ No ☐

   If Yes: Disturbed Soil☐ Fill Material☐ Impervious Layer(s) ☐ Weathered/Fractured Rock☐ Bedrock☐

5. Groundwater Observed: Yes ☒ No ☐

   If Yes: Depth Weeping from Pit _____ Depth Standing Water in Hole _____

   Estimated Depth to High Groundwater: _____ 123.00

Deep Observation Hole Number: TP 17-17

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
12	A	10YR	—	—	—	SL	—	—	M	F	
28	B	[illegible]	—	—	—	LS	—	—	M	F	
12-	C	[illegible]	[illegible]	[illegible]	[illegible]	SAND	—	—	M	F	
						MATRIX					

Additional Notes _____

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(minimum of two holes required at every proposed disposal area)

Deep Observation Hole Number: TP 17-18 Date 12/18/2017 Time _____ Weather RAIN 40°

1. Location

   Ground Elevation at Surface of Hole 129.0

   Location (Identify on Plan) _____

2. Land Use: WOODLAND LAWN LANDSCAPE (e.g. woodland, agricultural field, vacant lot, etc.) Surface Stones — Slope (%) _____

   Vegetation GRASS BRUSH TREES Landform _____ Position on landscape (attach sheet) _____

3. Distances from: Open Water Body — feet Drainage Way _____ feet Possible Wet Area IVW- feet

   Property Line _____ feet Drinking Water Well _____ feet Other ISOLATED VEGETATED WETLAND

4. Parent Material: Morainal Unsuitable Materials Present: Yes ☐ No ☒

   If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5. Groundwater Observed: Yes ☒ No ☐

   If Yes: Depth Weeping from Pit 104 Depth Standing Water in Hole 108

   Estimated Depth to High Groundwater: 84 122.00

Deep Observation Hole Number: TP 17-18

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
12	A	10YR			—	SL	—	—	M	F	
26	B	10YR			—	LS	—		M	F	
120	C	2.5Y	84		75	SANDY	—	—	M	VF	

Additional Notes _____

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Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

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C. On-Site Review
(minimum of two holes required at every proposed disposal area)

Deep Observation Hole Number: TP 17- 12 | 2017 (Date) _____ (Time) _____ (Weather)

1. Location

   Ground Elevation at Surface of Hole _____

   Location (Identify on Plan) _____

2. Land Use: WOODLAND LAWN LANDSCAPE (e.g. woodland, agricultural field, vacant lot, etc.) — (Surface Stones) _____ (Slope (%))

   TREE (Vegetation) _____ (Landform) _____ (Position on landscape (attach sheet))

3. Distances from: Open Water Body — feet Drainage Way _____ feet Possible Wet Area IVW- feet

   Property Line 50 feet Drinking Water Well _____ feet Other ISOLATED VEGETATED WETLAND

4. Parent Material: [illegible] Unsuitable Materials Present: Yes ☐ No ☐

   If Yes: Disturbed Soil☐ Fill Material☐ Impervious Layer(s) ☐ Weathered/Fractured Rock☐ Bedrock☐

5. Groundwater Observed: Yes ☐ No ☒

   If Yes: Depth Weeping from Pit — Depth Standing Water in Hole —

   Estimated Depth to High Groundwater: BELOW 13'

Deep Observation Hole Number: TP 17- 19

Depth (In:)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
4	A	10YR 3/2				LS					
14	B	10YR 5/6				LS					
16	C	2.5Y 4/1				SAND	5				

Additional Notes _____

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(minimum of two holes required at every proposed disposal area)

Deep Observation Hole Number: TP 17-20 Date: 12/14/2017 Time: _____ Weather: ~~PM~~ CLEAR 25°

1. Location

   Ground Elevation at Surface of Hole _____

   Location (Identify on Plan) _____

2. Land Use: WOODLAND LAWN LANDSCAPE (e.g. woodland, agricultural field, vacant lot, etc.) Surface Stones: — Slope (%): _____

   Vegetation _____ Landform _____ Position on landscape (attach sheet) _____

3. Distances from: Open Water Body — feet Drainage Way _____ feet Possible Wet Area INV- feet

   Property Line _____ feet Drinking Water Well _____ feet Other ISOLATED VEGETATED WETLAND

4. Parent Material: Proglacial Unsuitable Materials Present: Yes ☐ No ☐

   If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5. Groundwater Observed: Yes ☐ No ☒

   If Yes: Depth Weeping from Pit — Depth Standing Water in Hole _____

   Estimated Depth to High Groundwater: BELOW 132

Deep Observation Hole Number: TP 17-20

Depth (In:)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
6	A	10YR 3/2	—	—	—	LS	—	—	M	F	
12	B	10YR 5/6	—	—	—	LS	—	—	M	F	
132	C	2.5Y 4/4	—	—	—	SAND	5	—	SG	loose	
						COARSE					

Additional Notes _____

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STAMSKI AND McNARY, INC.
1000 Main Street
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C. On-Site Review *(minimum of two holes required at every proposed disposal area)*

Deep Observation Hole Number: TP 17-22 | 12 | 14 | 2017 (Date) _____ (Time) PM Sun (Weather)

1. Location

   Ground Elevation at Surface of Hole _____

   Location (Identify on Plan) _____

2. Land Use: WOODLAND LAWN LANDSCAPE (e.g. woodland, agricultural field, vacant lot, etc.) — (Surface Stones) _____ (Slope (%))

   Vegetation _____ Landform _____ Position on landscape (attach sheet) _____

3. Distances from: Open Water Body — feet Drainage Way _____ feet Possible Wet Area INV- feet

   Property Line 4.0ft feet Drinking Water Well _____ feet Other ISOLATED VEGETATED WETLAND

4. Parent Material: Proglacial Unsuitable Materials Present: Yes ☐ No ☐

   If Yes: Disturbed Soil☐ Fill Material☐ Impervious Layer(s) ☐ Weathered/Fractured Rock☐ Bedrock☐

5. Groundwater Observed: Yes ☐ No ☑

   If Yes: Depth Weeping from Pit — Depth Standing Water in Hole _____

   Estimated Depth to High Groundwater: BELOW 144

Deep Observation Hole Number: TP 17-22

Depth (In:)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
24	FILL	—	—	—	—	FILL	SANDY	COBBLES	—	—	—
36	A	[illegible]	—	—	—	SL	—	—	M	F	
48	B	[illegible]	—	—	—	LS	—	—	M	F	
56 144	C_1	[illegible]	—	—	—	SANDY MOD	—	—	M	VF	
144	C_2	[illegible]	—	—		SAND COARSE	10	2	SG	LOOSE	

Additional Notes _____

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(minimum of two holes required at every proposed disposal area)

Deep Observation Hole Number: TP 17-23 Date 12 / 2017 Time _____ Weather RM

1. Location

   Ground Elevation at Surface of Hole _____

   Location (Identify on Plan) _____

2. Land Use: WOODLAND LAWN LANDSCAPE (e.g. woodland, agricultural field, vacant lot, etc.) Surface Stones — Slope (%) _____

   Vegetation _____ Landform _____ Position on landscape (attach sheet) _____

3. Distances from: Open Water Body — feet Drainage Way _____ feet Possible Wet Area INW- feet

   Property Line _____ feet Drinking Water Well _____ feet Other ISOLATED VEGETATED WETLAND

4. Parent Material: Proglacial Unsuitable Materials Present: Yes ☐ No ☒

   If Yes: Disturbed Soil☐ Fill Material☐ Impervious Layer(s) ☐ Weathered/Fractured Rock☐ Bedrock☐

5. Groundwater Observed: Yes ☐ No ☒

   If Yes: Depth Weeping from Pit — Depth Standing Water in Hole —

   Estimated Depth to High Groundwater: Known 144

Deep Observation Hole Number: TP 17-23

Depth (In:)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
24	Fill	—	—	—	—	—	SANDY FILL		—	—	
30	A	10YR 3/2	—	—	—	SL	—	—	M	F	
36	B	10YR 5/6	—	—	—	LS	—	—	M	F	
46	C1	2.5Y 6/6	—	—	—	SAND VFGR	—	—	M	F	
144	C2	2.5Y 6/4	—	—	—	SAND COARSE	10	2	SG	loose	

Additional Notes _____

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(minimum of two holes required at every proposed disposal area)

Deep Observation Hole Number: TP 17-24 Date 12/14/2017 Time _____ Weather RM

1. Location

   Ground Elevation at Surface of Hole _____

   Location (Identify on Plan) _____

2. Land Use: WOODLAND LAWN LANDSCAPE (e.g. woodland, agricultural field, vacant lot, etc.) Surface Stones — Slope (%) _____

   Vegetation _____ Landform _____ Position on landscape (attach sheet) _____

3. Distances from: Open Water Body — feet Drainage Way _____ feet Possible Wet Area IVW- feet

   Property Line _____ feet Drinking Water Well _____ feet Other ISOLATED VEGETATED WETLAND

4. Parent Material: Morainal Unsuitable Materials Present: Yes ☐ No ☒

   If Yes: Disturbed Soil☐ Fill Material☐ Impervious Layer(s) ☐ Weathered/Fractured Rock☐ Bedrock☐

5. Groundwater Observed: Yes ☐ No ☒

   If Yes: Depth Weeping from Pit _____ Depth Standing Water in Hole _____

   Estimated Depth to High Groundwater: BELOW 144

Deep Observation Hole Number: TP 17-24

Depth (In:)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
16	A	10YR 3/2	—	—	—	SL	—	—	M	F	
26	B	10YR 5/6	—	—	—	LS	—	—	M	F	
54	C1	2.5Y 6/6	—	—	—	SAND MED	—	—	M	F	
108	C2	2.5Y 6/4	—	—	—	SAND FINE	2	—	SG	Loose	
144	C3	2.5Y 6/3	—	—	—	SAND VERY FINE	—	—	M	F	

Additional Notes _____

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(minimum of two holes required at every proposed disposal area)

Deep Observation Hole Number: TP 17-25 Date 12/14/2017 Time _____ Weather RM Sun 25

1. Location

   Ground Elevation at Surface of Hole _____

   Location (Identify on Plan) _____

2. Land Use: WOODLAND LAWN LANDSCAPE (e.g. woodland, agricultural field, vacant lot, etc.) Surface Stones — Slope (%) _____

   Vegetation _____ Landform _____ Position on landscape (attach sheet) _____

3. Distances from: Open Water Body — feet Drainage Way _____ feet Possible Wet Area INW- feet

   Property Line _____ feet Drinking Water Well _____ feet Other ISOLATED VEGETATED WETLAND

4. Parent Material: Proglacial Unsuitable Materials Present: Yes ☐ No ☐

   If Yes: Disturbed Soil☐ Fill Material☐ Impervious Layer(s) ☐ Weathered/Fractured Rock☐ Bedrock☐

5. Groundwater Observed: Yes ☐ No ☒

   If Yes: Depth Weeping from Pit — Depth Standing Water in Hole —

   Estimated Depth to High Groundwater: _____ _____

Deep Observation Hole Number: TP 17-25

Depth (In:)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
24	FW	—	—	—	—	—	—	—	M	F	
30	B	[illegible]	—	—	—	SL	—	—	M	F	
36	B2	[illegible]	—	—	—	LS	—	—	M	F	
72	C1	[illegible]	—	—	—	Sand Gravel	15	5	SG	loose	
144	C2	2.5Y 6/4			—	Sand med	—		M	VF	

Additional Notes _____

Commonwealth of Massachusetts
City/Town of
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

STAMSKI AND McNARY, INC.
1000 Main Street
ACTON, MA 01720
Engineering • Planning • Surveying

C. On-Site Review
(minimum of two holes required at every proposed disposal area)

Deep Observation Hole Number: TP 17-26 Date 12/14/2017 Time _____ Weather RM

1. Location

   Ground Elevation at Surface of Hole _____

   Location (Identify on Plan) _____

2. Land Use: WOODLAND LAWN LANDSCAPE (e.g. woodland, agricultural field, vacant lot, etc.) Surface Stones — Slope (%) _____

   Vegetation _____ Landform _____ Position on landscape (attach sheet) _____

3. Distances from: Open Water Body — feet Drainage Way _____ feet Possible Wet Area IVW- feet

   Property Line 15 feet Drinking Water Well _____ feet Other ISOLATED VEGETATED WETLAND

4. Parent Material: Proglacial Unsuitable Materials Present: Yes ☐ No ☐

   If Yes: Disturbed Soil☐ Fill Material☐ Impervious Layer(s) ☐ Weathered/Fractured Rock☐ Bedrock☐

5. Groundwater Observed: Yes ☐ No ☒

   If Yes: Depth Weeping from Pit — Depth Standing Water in Hole —

   Estimated Depth to High Groundwater: BELOW 144

Deep Observation Hole Number: TP 17-26

Depth (In:)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
20	FILL	—	—	—	—	—	—	—	SANDY FILL		
27	A	10YR 3/2	—	—	—	SL	—	—	M	F	
40	B	10YR 5/6	—	—	—	LS	—	—	M	F	
100	C1	2.5Y 6/4	—	—	—	FINE COARSE	10	3	SG	loose	
144	C2	2.5Y 6/4	—	—	—	SAND MEDIUM	—	—	SG	loose	

Additional Notes _____

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City/Town of
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1000 Main Street
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Engineering • Planning • Surveying

C. On-Site Review
(minimum of two holes required at every proposed disposal area)

Deep Observation Hole Number: TP 17-27 Date 12/14/2017 Time _____ Weather RM

1. Location

   Ground Elevation at Surface of Hole 157.5

   Location (Identify on Plan) _____

2. Land Use: WOODLAND LAWN LANDSCAPE (e.g. woodland, agricultural field, vacant lot, etc.) Surface Stones — Slope (%) _____

   Vegetation _____ Landform _____ Position on landscape (attach sheet) _____

3. Distances from: Open Water Body — feet Drainage Way _____ feet Possible Wet Area Two feet

   Property Line _____ feet Drinking Water Well _____ feet Other ISOLATED VEGETATED WETLAND

4. Parent Material: Glacial Till Unsuitable Materials Present: Yes ☐ No ☐

   If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5. Groundwater Observed: Yes ☐ No ☐

   If Yes: Depth Weeping from Pit _____ Depth Standing Water in Hole _____

   Estimated Depth to High Groundwater: 144.0' or lower

Deep Observation Hole Number: TP 17-27

Depth (In:)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
12	A	10YR 3/2	—	—	—	SL	—		M	F	
24	B1	10YR 5/6	—	—	—	LS			M	V F	
36	C1	7.5YR 6/6	—	—	—	SANDY LOAM			M	V F	
84	C2	7.5YR 6/4	—	—	—	SANDY LOAM			M	V F	
142	C3	2.5Y 6/4	—	—	—	SAND	—		M	V F	

Additional Notes _____

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C. On-Site Review
(minimum of two holes required at every proposed disposal area)

Deep Observation Hole Number: TP 17-28 | 12/14/2017 (Date) | _____ (Time) | RM (Weather)

1. Location

   Ground Elevation at Surface of Hole _____

   Location (Identify on Plan) _____

2. Land Use: WOODLAND LAWN LANDSCAPE (e.g. woodland, agricultural field, vacant lot, etc.) | — (Surface Stones) | _____ (Slope (%))

   _____ (Vegetation) | _____ (Landform) | _____ (Position on landscape (attach sheet))

3. Distances from: Open Water Body — feet | Drainage Way _____ feet | Possible Wet Area IVW- feet

   Property Line 30 feet | Drinking Water Well _____ feet | Other ISOLATED VEGETATED WETLAND

4. Parent Material: Probable till | Unsuitable Materials Present: Yes ☐ No ☒

   If Yes: Disturbed Soil☐ Fill Material☐ Impervious Layer(s) ☐ Weathered/Fractured Rock☐ Bedrock☐

5. Groundwater Observed: Yes ☐ No ☒

   If Yes: Depth Weeping from Pit — | Depth Standing Water in Hole _____

   Estimated Depth to High Groundwater: Below 150

Deep Observation Hole Number: TP 17-28

Depth (In:)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
1-30	A	10YR 3/2	—			SL	—		M	F	
2<		10YR [illegible]	—			LS	—		M	[illegible]	
30-[illegible]	C	[illegible]	—			SAND COARSE	—	—	SG	[illegible]	
[illegible]	C	[illegible]	—			SAND MEDIUM	—		M	VERY FRIABLE	

Additional Notes _____

Commonwealth of Massachusetts
City/Town of
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

STAMSKI AND McNARY, INC.
1000 Main Street
ACTON, MA 01720
Engineering • Planning • Surveying

C. On-Site Review
(minimum of two holes required at every proposed disposal area)

Deep Observation Hole Number: TP 17- 29 Date: 12/14/2017 Time: _____ Weather: RAT

1. Location

   Ground Elevation at Surface of Hole _____

   Location (Identify on Plan) _____

2. Land Use: WOODLAND LAWN LANDSCAPE (e.g. woodland, agricultural field, vacant lot, etc.) Surface Stones: — Slope (%): _____

   Vegetation: Green Landform: _____ Position on landscape (attach sheet): _____

3. Distances from: Open Water Body — feet Drainage Way _____ feet Possible Wet Area IVW- feet

   Property Line 15 feet Drinking Water Well _____ feet Other ISOLATED VEGETATED WETLAND

4. Parent Material: Probable Till Unsuitable Materials Present: Yes ☐ No ☒

   If Yes: Disturbed Soil☐ Fill Material☐ Impervious Layer(s) ☐ Weathered/Fractured Rock☐ Bedrock☐

5. Groundwater Observed: Yes ☐ No ☒

   If Yes: Depth Weeping from Pit _____ Depth Standing Water in Hole _____

   Estimated Depth to High Groundwater: Probable 150

Deep Observation Hole Number: TP 17- 29

Depth (In:)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
16	A	10YR 2/1	—	—	—	SL	—	—	M	F	
26	B	10YR 3/6	—	—		LS	—	—	M	—	
[illegible]	C1	2.5Y 6/4	—		—	[illegible]	10	3	[illegible]	loose	
[illegible]	C2	7.5Y 6/4				[illegible]	—	—	[illegible]	[illegible]	

Additional Notes _____

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City/Town of
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

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C. On-Site Review
(minimum of two holes required at every proposed disposal area)

Deep Observation Hole Number: TP 17-30 Date 12/14/2017 Time _____ Weather RM

1. Location

   Ground Elevation at Surface of Hole _____

   Location (Identify on Plan) _____

2. Land Use: WOODLAND LAWN LANDSCAPE (e.g. woodland, agricultural field, vacant lot, etc.) Surface Stones — Slope (%) _____

   Vegetation _____ Landform _____ Position on landscape (attach sheet) _____

3. Distances from: Open Water Body — feet Drainage Way _____ feet Possible Wet Area INW- feet

   Property Line _____ feet Drinking Water Well _____ feet Other ISOLATED VEGETATED WETLAND

4. Parent Material: Basalt Unsuitable Materials Present: Yes ☐ No ☐

   If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5. Groundwater Observed: Yes ☐ No ☒

   If Yes: Depth Weeping from Pit — Depth Standing Water in Hole —

   Estimated Depth to High Groundwater: BELOW 150

Deep Observation Hole Number: TP 17-30

Depth (In:)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
12	A	10YR 3/2	—	—	—	SL	—	—	M	F	
24	B	10YR 5/6	—	—	—	LS	—	—	M	F	
150	C	2.5Y 6/4	—	—		SAND GRAVEL	10	—	SG	loose	

Additional Notes _____

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Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

STAMSKI AND McNARY, INC.
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C. On-Site Review *(minimum of two holes required at every proposed disposal area)*

Deep Observation Hole Number: TP 17- 31 Date 12/11/2017 Time _____ Weather PM 75

1. Location

   Ground Elevation at Surface of Hole _____

   Location (Identify on Plan) _____

2. Land Use: WOODLAND LAWN LANDSCAPE (e.g. woodland, agricultural field, vacant lot, etc.) Surface Stones — Slope (%) _____

   Vegetation TREES Landform _____ Position on landscape (attach sheet) _____

3. Distances from: Open Water Body — feet Drainage Way _____ feet Possible Wet Area IVW- feet

   Property Line _____ feet Drinking Water Well _____ feet Other ISOLATED VEGETATED WETLAND

4. Parent Material: _____ Unsuitable Materials Present: Yes ☐ No ☐

   If Yes: Disturbed Soil☐ Fill Material☐ Impervious Layer(s) ☐ Weathered/Fractured Rock☐ Bedrock☐

5. Groundwater Observed: Yes ☐ No ☐

   If Yes: Depth Weeping from Pit _____ Depth Standing Water in Hole _____

   Estimated Depth to High Groundwater: _____

Deep Observation Hole Number: TP 17- 31

Depth (In:)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
12	A	10YR [illegible]	—	—		SL	—	—	M	F	
24	B	10YR [illegible]	—			LS	—	—	M	F	
154	C	[illegible]			—	Sand [illegible]	10	[illegible]	[illegible]	[illegible]	

Additional Notes _____

City/Town of
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

STAMSKI AND McNARY, INC.
1000 Main Street
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C. On-Site Review *(minimum of two holes required at every proposed disposal area)*

Deep Observation Hole Number: 17-32 Date 12/14/2017 Time _____ Weather CLEAR

1. Location

   Ground Elevation at Surface of Hole _____

   Location (Identify on Plan) _____

2. Land Use: WOODLAND, VACANT LOT (e.g. woodland, agricultural field, vacant lot, etc.) Surface Stones _____ Slope (%) _____

   Vegetation GRASS Landform _____ Position on landscape (attach sheet) _____

3. Distances from: Open Water Body — feet Drainage Way — feet Possible Wet Area — feet

   Property Line — feet Drinking Water Well — feet Other _____

4. Parent Material: Prog lacial Unsuitable Materials Present: Yes ☐ No ☐

   If Yes: Disturbed Soil☐ Fill Material☐ Impervious Layer(s) ☐ Weathered/Fractured Rock☐ Bedrock☐

5. Groundwater Observed: Yes ☐ No ☑

   If Yes: Depth Weeping from Pit — Depth Standing Water in Hole —

   Estimated Depth to High Groundwater: Below 150

Deep Observation Hole Number: 17-37

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
16	A					SL			M		
34	B					LS			M		
84	C_1					Sand Coarse			SG		
150	C_2					Sand Medium			M		

Additional Notes _____

STAMSKI AND McNARY, INC.
1000 Main Street
ACTON, MA 01720
Engineering • Planning • Surveying

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method used:
   - ☐ Depth observed standing water in observation hole A. ____ inches B. ____ inches
   - ☐ Depth weeping from side of observation hole A. ____ inches B. ____ inches
   - ☐ Depth to soil redoximorphic features (mottles) A. ____ inches B. ____ inches
   - ☐ Groundwater adjustment (USGS methodology) A. ____ inches B. ____ inches

   SEE INDIVIDUAL SOIL LOGS

2. Index Well Number ____ Reading Date ____ Index Well Level ____

   Adjustment Factor ____ Adjusted Groundwater Level ____

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

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

   b. If yes, at what depth was it observed? Upper boundary: SEE LOGS inches Lower boundary: SEE LOGS inches

F. Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

Signature of Soil Evaluator — Date: 12/14/2017

RICHARD J. HARRINGTON SE1012
Typed or Printed Name of Soil Evaluator/License Number — *Date of Soil Evaluator Exam: 10/25/1994

STAN SOSNICKI
Name of Board of Health Witness — Board of Health: CONCORD

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.

Appendix D – ADS

MC-4500 CHAMBER

Designed to meet the most stringent industry performance standards for superior structural integrity while providing designers with a cost-effective method to save valuable land and protect water resources. The StormTech system is designed primarily to be used under parking lots, thus maximizing land usage for private (commercial) and public applications. StormTech chambers can also be used in conjunction with Green Infrastructure, thus enhancing the performance and extending the service life of these practices.

STORMTECH MC-4500 CHAMBER
(not to scale)

Nominal Chamber Specifications

Size (L x W x H)
52" x 100" x 60"
1,321 mm x 2,540 mm x 1,524 mm

Chamber Storage
106.5 ft³ (3.01 m³)

Min. Installed Storage*
162.6 ft³ (4.60 m³)

Weight
120 lbs (54.4 kg)

Shipping
7 chambers/pallet
11 pallets/truck

*Assumes a minimum of 12" (300 mm) of stone above, 9" (230 mm) of stone below chambers, 9" (230 mm) of stone between chambers/end caps and 40% stone porosity.

STORMTECH MC-4500 END CAP
(not to scale)

Nominal End Cap Specifications

Size (L x W x H)
35.1" x 90.2" x 59.4"
891 mm x 2,291 mm x 1,509 mm

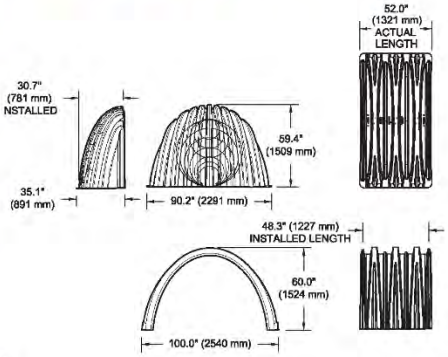
End Cap Storage
35.7 ft³ (1.01 m³)

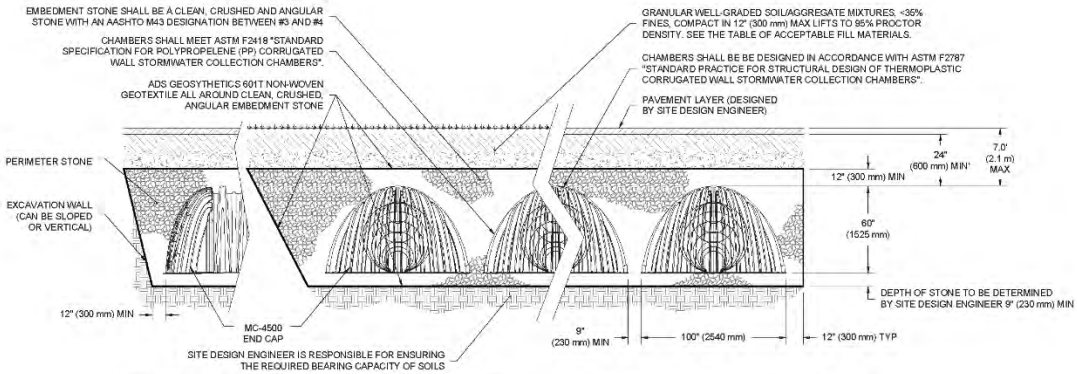
Min. Installed Storage*
108.7 ft³ (3.08 m³)

Weight
120 lbs (54.4 kg)

Shipping
7 end caps/pallet
11 pallets/truck

*Assumes a minimum of 12" (300 mm) of stone above, 9" (230 mm) of stone below, 6" (150 mm) of stone perimeter, 9" (230 mm) of stone between chambers/end caps and 40% stone porosity.





*MINIMUM COVER TO BOTTOM OF FLEXIBLE PAVEMENT. FOR UNPAVED INSTALLATIONS WHERE RUTTING FROM VEHICLES MAY OCCUR, INCREASE COVER TO 30" (750 mm).

StormTech®

ADS®

MC-4500 CHAMBER SPECIFICATIONS

STORAGE VOLUME PER CHAMBER FT³ (M³)

	Bare Chamber Storage ft³ (m³)	Chamber and Stone Foundation Depth in. (mm)			
		9" (230 mm)	12" (300 mm)	15" (375 mm)	18" (450 mm)
MC-4500 Chamber	106.5 (3.02)	162.6 (4.60)	166.3 (4.71)	169.6 (4.81)	173.6 (4.91)
MC-4500 End Cap	35.7 (1.0)	108.7 (3.08)	111.9 (3.17)	115.2 (3.26)	118.4 (3.35)

Note: Assumes 9" (230 mm) row spacing, 40% stone porosity, 12" (300 mm) stone above and includes the bare chamber/end cap volume. End cap volume assumes 12" (300 mm) stone perimeter.

AMOUNT OF STONE PER CHAMBER

ENGLISH TONS (yds³)	Stone Foundation Depth			
	9"	12"	15"	18"
MC-4500 Chamber	7.4 (5.2)	7.8 (5.5)	8.3 (5.9)	8.8 (6.2)
MC-4500 End Cap	9.6 (6.8)	10.0 (7.1)	10.4 (7.4)	10.9 (7.7)
METRIC KILOGRAMS (m³)	230 mm	300 mm	375 mm	450 mm
MC-4500 Chamber	6,681 (4.0)	7,117 (4.2)	7,552 (4.5)	7,987 (4.7)
MC-4500 End Cap	8,691 (5.2)	9,075 (5.4)	9,460 (5.6)	9,845 (5.9)

Note: Assumes 12" (300 mm) of stone above and 9" (230 mm) row spacing and 12" (300 mm) of perimeter stone in front of end caps.

VOLUME EXCAVATION PER CHAMBER YD³ (M³)

	Stone Foundation Depth			
	9" (230 mm)	12" (300 mm)	15" (375mm)	18" (450 mm)
MC-4500 Chamber	10.5 (8.0)	10.8 (8.3)	11.2 (8.5)	11.5 (8.8)
MC-4500 End Cap	9.3 (7.1)	9.6 (7.3)	9.9 (7.6)	10.2 (7.8)

Note: Assumes 9" (230 mm) of separation between chamber rows, 12" (300 mm) of perimeter in front of the end caps, and 24" (600 mm) of cover. The volume of excavation will varyas depth of cover increases.

Working on a project?
Visit us at www.stormtech.com
and utilize the StormTech Design Tool

For more information on the StormTech MC-4500 Chamber and other ADS products, please contact our Customer Service Representatives at 1-800-821-6710

*THE MOST **ADVANCED** NAME IN WATER MANAGEMENT SOLUTIONS™*

Advanced Drainage Systems, Inc.
4640 Trueman Blvd., Hilliard, OH 43026
1-800-821-6710 www.ads-pipe.com

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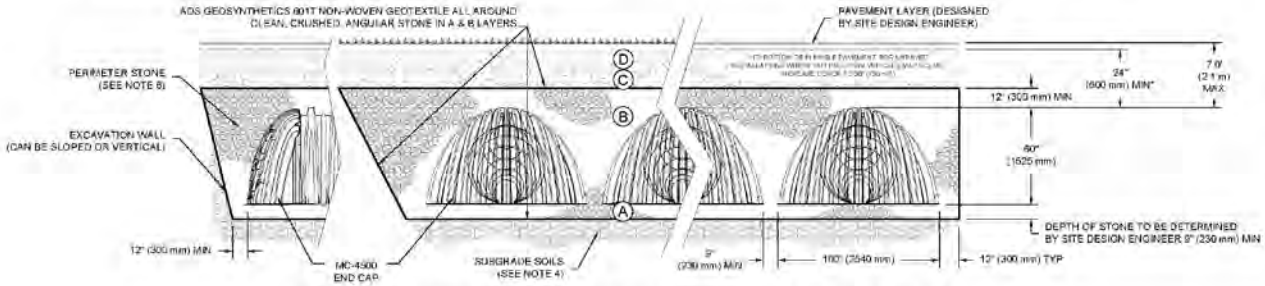
ACCEPTABLE FILL MATERIALS: STORMTECH MC-4500 CHAMBER SYSTEMS

	MATERIAL LOCATION	DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 24" (600 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 24" (600 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 12" (300 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS.
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 4	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 4	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE. [2]

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 9" (230 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.



*FOR COVER DEPTHS GREATER THAN 7.0' (2.1 m) PLEASE CONTACT STORMTECH

NOTES:

1. MC-4500 CHAMBERS SHALL CONFORM TO THE REQUIREMENTS OF ASTM F2418 "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
2. MC-4500 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. 'ACCEPTABLE FILL MATERIALS' TABLE ABOVE PROVIDES MATERIAL LOCATIONS, DESCRIPTIONS, GRADATIONS, AND COMPACTION REQUIREMENTS FOR FOUNDATION, EMBEDMENT, AND FILL MATERIALS.
4. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
5. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
6. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.

MC-4500
STANDARD CROSS SECTION

REV	DRW	CHK	DESCRIPTION

DATE: 11/16/14 DRAWN: JLM
PROJECT #: CHECKED: JLM

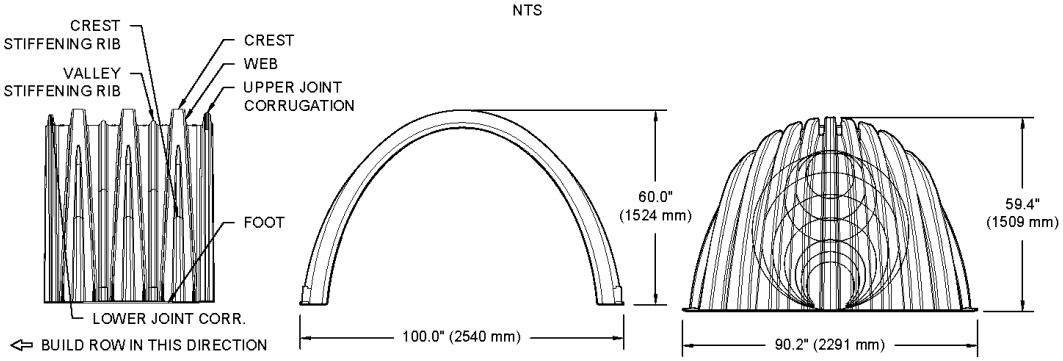
ADS
4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

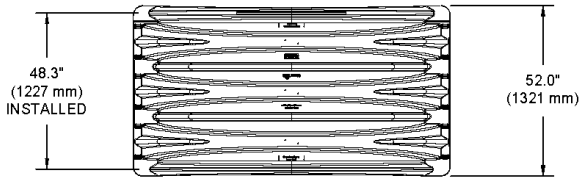
StormTech
70 MAXCESS ROAD, SUITE 3 | NOORWALK, CT 06857
P: 203-294-1001 | F: 203-294-1004 | WWW.STORMTECH.COM

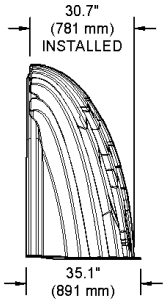
SHEET
1 OF 1

MC-4500 TECHNICAL SPECIFICATION

NTS







NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	100.0" X 60.0" X 48.3"	(2540 mm X 1524 mm X 1227 mm)
CHAMBER STORAGE	106.5 CUBIC FEET	(3.01 m^3)
MINIMUM INSTALLED STORAGE*	162.6 CUBIC FEET	(4.60 m^3)
WEIGHT	130.0 lbs.	(59.0 kg)

NOMINAL END CAP SPECIFICATIONS

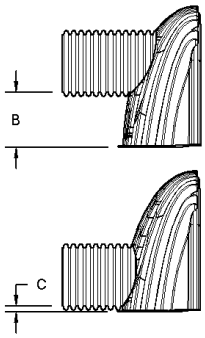
SIZE (W X H X INSTALLED LENGTH)	90.2" X 59.4" X 30.7"	(2291 mm X 1509 mm X 781 mm)
END CAP STORAGE	35.7 CUBIC FEET	(1.01 m^3)
MINIMUM INSTALLED STORAGE*	108.7 CUBIC FEET	(3.08 m^3)
WEIGHT	135.0 lbs.	(61.2 kg)

*ASSUMES 12" (305 mm) STONE ABOVE, 9" (229 mm) STONE FOUNDATION AND BETWEEN CHAMBERS, 12" (305 mm) STONE PERIMETER IN FRONT OF END CAPS AND 40% STONE POROSITY.

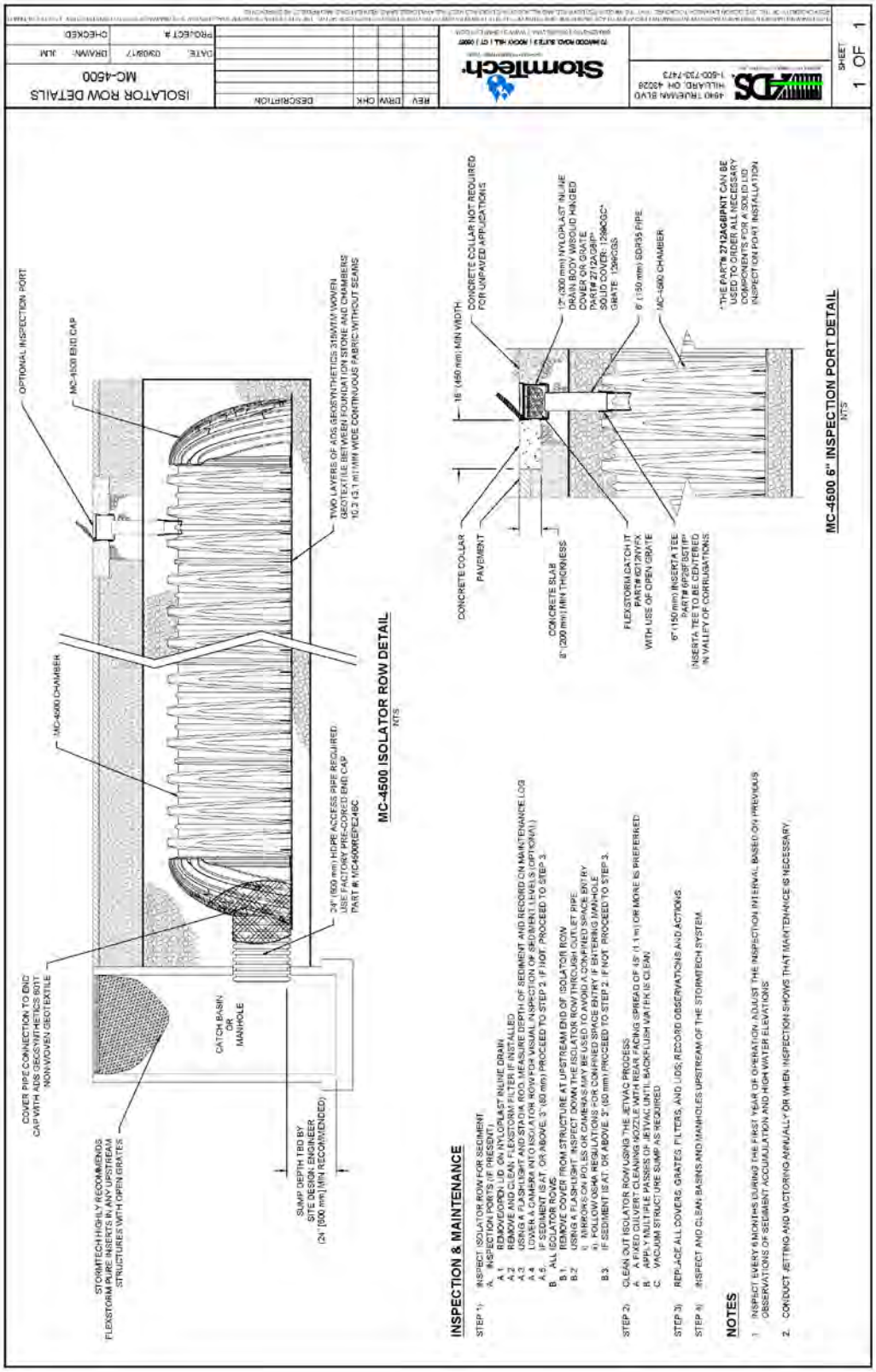
STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
END CAPS WITH A WELDED CROWN PLATE END WITH "C"
END CAPS WITH A PREFABRICATED WELDED STUB END WITH "W"

PART #	STUB	B	C
MC4500REPE06T	6" (150 mm)	42.54" (1.081 m)	---
MC4500REPE06B		---	0.86" (22 mm)
MC4500REPE08T	8" (200 mm)	40.50" (1.029 m)	---
MC4500REPE08B		---	1.01" (26 mm)
MC4500REPE10T	10" (250 mm)	38.37" (975 mm)	---
MC4500REPE10B		---	1.33" (34 mm)
MC4500REPE12T	12" (300 mm)	35.69" (907 mm)	---
MC4500REPE12B		---	1.55" (39 mm)
MC4500REPE15T	15" (375 mm)	32.72" (831 mm)	---
MC4500REPE15B		---	1.70" (43 mm)
MC4500REPE18TC	18" (450 mm)	29.36" (746 mm)	---
MC4500REPE18TW			
MC4500REPE18BC		---	1.97" (50 mm)
MC4500REPE18BW			
MC4500REPE24TC	24" (600 mm)	23.05" (585 mm)	---
MC4500REPE24TW			
MC4500REPE24BC		---	2.26" (57 mm)
MC4500REPE24BW			
MC4500REPE30BC	30" (750 mm)	---	2.95" (75 mm)
MC4500REPE36BC	36" (900 mm)	---	3.25" (83 mm)
MC4500REPE42BC	42" (1050 mm)	---	3.55" (90 mm)

NOTE: ALL DIMENSIONS ARE NOMINAL



CUSTOM PRECORED INVERTS ARE AVAILABLE UPON REQUEST. INVENTORIED MANIFOLDS INCLUDE 12-24" (300-600 mm) SIZE ON SIZE AND 15-48" (375-1200 mm) ECCENTRIC MANIFOLDS. CUSTOM INVERT LOCATIONS ON THE MC-4500 END CAP CUT IN THE FIELD ARE NOT RECOMMENDED FOR PIPE SIZES GREATER THAN 10" (250 mm). THE INVERT LOCATION IN COLUMN 'B' ARE THE HIGHEST POSSIBLE FOR THE PIPE SIZE.


ISOLATOR ROW DETAILS
MC-4500
DATE: 09/08/17
DRAWN: JLM
PROJECT #
CHECKED:
DESCRIPTION
REV
DRW
CHK
StormTech
4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473
SHEET
1 OF 1
OPTIONAL INSPECTION PORT
MC-4500 END CAP
MC-4500 CHAMBER
TWO LAYERS OF ADS GEOSYNTHETICS 315WTM WOVEN
GEOTEXTILE BETWEEN FOUNDATION STONE AND MEMBERS
10.2 (3.1 m) MIN WIDE CONTINUOUS FABRIC WITHOUT SEAMS
COVER PIPE CONNECTION TO END
CAP WITH ADS GEOSYNTHETICS 601T
NON WOVEN GEOTEXTILE
STORMTECH HIGHLY RECOMMENDS
FLEXSTORM PURE INSERTS IN ANY UPSTREAM
STRUCTURES WITH OPEN GRATES
CATCH BASIN
OR
MANHOLE
24" (600 mm) HDPE ACCESS PIPE REQUIRED
USE ADS CORRUGATED END CAP
PART # NCA600REPZ-06C
SUMP DEPTH TBD BY
SITE DESIGN ENGINEER
(24" [600 mm] MIN RECOMMENDED)
MC-4500 ISOLATOR ROW DETAIL
NTS
16" (450 mm) MIN WIDTH
CONCRETE COLLAR NOT REQUIRED
FOR UNPAVED APPLICATIONS
12" (300 mm) NYLOPLAST IN-LINE
DRAIN BODY W/SOLID HINGED
COVER W/ GRATE
PART# 2712AGBIPK
SOLID COVER: 1298OSC*
GRATE: 1296OGS
6" (150 mm) SDR35 PIPE
MC-4500 CHAMBER
* THE PART# 2712AGBIPKIT CAN BE
USED TO ORDER ALL NECESSARY
COMPONENTS FOR A SOLID LID
INSPECTION PORT INSTALLATION
CONCRETE COLLAR
PAVEMENT
CONCRETE SLAB
8" (2000 mm) MIN THICKNESS
FLEXSTORM CATCH IT
PART# 6012NYFX
WITH USE OF OPEN GRATE
6" (150 mm) INSERTA TEE
PART# 6P25FBSTIP*
INSERTA TEE TO BE CENTERED
IN VALLEY OF CORRUGATIONS
MC-4500 6" INSPECTION PORT DETAIL
NTS
INSPECTION & MAINTENANCE
STEP 1) INSPECT ISOLATOR ROW FOR SEDIMENT
A. INSPECTION PORTS (IF PRESENT)
A.1 REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
A.2 REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW
A.3 USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
A.4 LOWER A CAMERA INTO ISOLATOR ROW FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
A.5 IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
B. ALL ISOLATOR ROWS
B.1 REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW
B.2 USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW THROUGH OUTLET PIPE
i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
ii) ALL ISOLATOR ROWS SHOULD BE INSPECTED FROM OUTLET PIPE IF POSSIBLE
B.3 IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
STEP 2) CLEAN OUT ISOLATOR ROW USING THE JETVAC PROCESS
A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45" (1.1 m) OR MORE IS PREFERRED
B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
C. VACUUM STRUCTURE SUMP AS REQUIRED
STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.
STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.
NOTES
1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS
2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.

StormTech®
Detention • Retention • Water Quality
An ADS company

Isolator® Row O&M Manual

THE MOST ADVANCED NAME IN WATER MANAGEMENT SOLUTIONS™

ADS®

THE ISOLATOR® ROW

INTRODUCTION

An important component of any Stormwater Pollution Prevention Plan is inspection and maintenance. The StormTech Isolator Row is a technique to inexpensively enhance Total Suspended Solids (TSS) removal and provide easy access for inspection and maintenance.

THE ISOLATOR ROW

The Isolator Row is a row of StormTech chambers, either SC-160LP, SC-310, SC-310-3, SC-740, DC-780, MC-3500 or MC-4500 models, that is surrounded with filter fabric and connected to a closely located manhole for easy access. The fabric-wrapped chambers provide for settling and filtration of sediment as storm water rises in the Isolator Row and ultimately passes through the filter fabric. The open bottom chambers and perforated sidewalls (SC-310, SC- 310-3 and SC-740 models) allow storm water to flow both vertically and horizontally out of the chambers. Sediments are captured in the Isolator Row protecting the storage areas of the adjacent stone and chambers from sediment accumulation.

Two different fabrics are used for the Isolator Row. A woven geotextile fabric is placed between the stone and the Isolator Row chambers. The tough geotextile provides a media for storm water filtration and provides a durable surface for maintenance operations. It is also designed to prevent scour of the underlying stone and remain intact during high pressure jetting. A non-woven fabric is placed over the chambers to provide a filter media for flows passing through the perforations in the sidewall of the chamber. The non-woven fabric is not required over the SC-160LP, DC-780, MC-3500 or MC-4500 models as these chambers do not have perforated side walls.

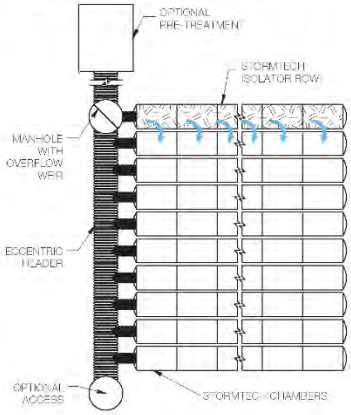
The Isolator Row is typically designed to capture the "first flush" and offers the versatility to be sized on a volume basis or flow rate basis. An upstream manhole not only provides access to the Isolator Row but typically includes a high flow weir such that storm water flowrates or volumes that exceed the capacity of the Isolator Row overtop the over flow weir and discharge through a manifold to the other chambers.

The Isolator Row may also be part of a treatment train. By treating storm water prior to entry into the chamber system, the service life can be extended and pollutants such as hydrocarbons can be captured. Pre-treatment best management practices can be as simple as deep sump catch basins, oil-water separators or can be innovative storm water treatment devices. The design of the treatment train and selection of pretreatment devices by the design engineer is often driven by regulatory requirements. Whether pretreatment is used or not, the Isolator Row is recommended by StormTech as an effective means to minimize maintenance requirements and maintenance costs.

Note: See the StormTech Design Manual for detailed information on designing inlets for a StormTech system, including the Isolator Row.

Looking down the Isolator Row from the manhole opening, woven geotextile is shown between the chamber and stone base.

StormTech Isolator Row with Overflow Spillway (not to scale)



ISOLATOR ROW INSPECTION/MAINTENANCE

INSPECTION

The frequency of inspection and maintenance varies by location. A routine inspection schedule needs to be established for each individual location based upon site specific variables. The type of land use (i.e. industrial, commercial, residential), anticipated pollutant load, percent imperviousness, climate, etc. all play a critical role in determining the actual frequency of inspection and maintenance practices.

At a minimum, StormTech recommends annual inspections. Initially, the Isolator Row should be inspected every 6 months for the first year of operation. For subsequent years, the inspection should be adjusted based upon previous observation of sediment deposition.

The Isolator Row incorporates a combination of standard manhole(s) and strategically located inspection ports (as needed). The inspection ports allow for easy access to the system from the surface, eliminating the need to perform a confined space entry for inspection purposes.

If upon visual inspection it is found that sediment has accumulated, a stadia rod should be inserted to determine the depth of sediment. When the average depth of sediment exceeds 3 inches throughout the length of the Isolator Row, clean-out should be performed.

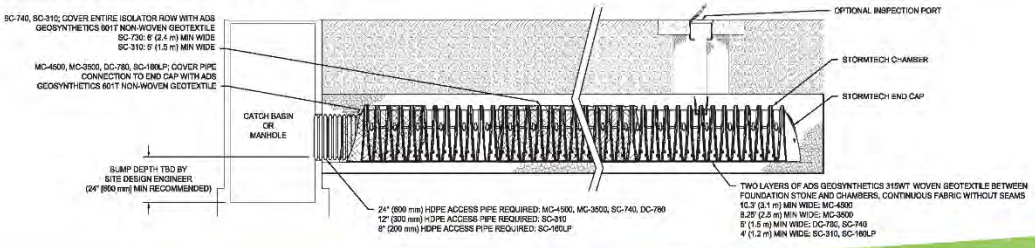
MAINTENANCE

The Isolator Row was designed to reduce the cost of periodic maintenance. By "isolating" sediments to just one row, costs are dramatically reduced by eliminating the need to clean out each row of the entire storage bed. If inspection indicates the potential need for maintenance, access is provided via a manhole(s) located on the end(s) of the row for cleanout. If entry into the manhole is required, please follow local and OSHA rules for a confined space entries.

Maintenance is accomplished with the JetVac process. The JetVac process utilizes a high pressure water nozzle to propel itself down the Isolator Row while scouring and suspending sediments. As the nozzle is retrieved, the captured pollutants are flushed back into the manhole for vacuuming. Most sewer and pipe maintenance companies have vacuum/JetVac combination vehicles. Selection of an appropriate JetVac nozzle will improve maintenance efficiency. Fixed nozzles designed for culverts or large diameter pipe cleaning are preferable. Rear facing jets with an effective spread of at least 45" are best. Most JetVac reels have 400 feet of hose allowing maintenance of an Isolator Row up to 50 chambers long. **The JetVac process shall only be performed on StormTech Isolator Rows that have AASHTO class 1 woven geotextile (as specified by StormTech) over their angular base stone.**

StormTech Isolator Row (not to scale)

Note: Non-woven fabric is only required over the inlet pipe connection into the end cap for SC-160LP, DC-780, MC-3500 and MC-4500 chamber models and is not required over the entire Isolator Row.



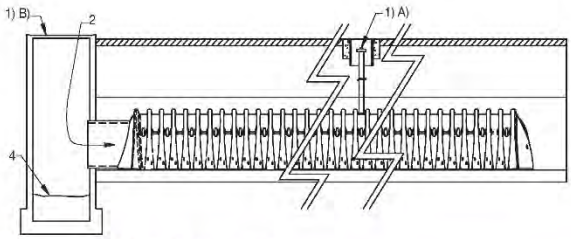
ISOLATOR ROW STEP BY STEP MAINTENANCE PROCEDURES

STEP 1
Inspect Isolator Row for sediment.
- A) Inspection ports (if present)
  - i. Remove lid from floor box frame
  - ii. Remove cap from inspection riser
  - iii. Using a flashlight and stadia rod,measure depth of sediment and record results on maintenance log.
  - iv. If sediment is at or above 3 inch depth, proceed to Step 2. If not, proceed to Step 3.
- B) All Isolator Rows
  - i. Remove cover from manhole at upstream end of Isolator Row
  - ii. Using a flashlight, inspect down Isolator Row through outlet pipe
    1. Mirrors on poles or cameras may be used to avoid a confined space entry
    2. Follow OSHA regulations for confined space entry if entering manhole
  - iii. If sediment is at or above the lower row of sidewall holes (approximately 3 inches), proceed to Step 2. If not, proceed to Step 3.

STEP 2
Clean out Isolator Row using the JetVac process.
- A) A fixed floor cleaning nozzle with rear facing nozzle spread of 45 inches or more is preferable
- B) Apply multiple passes of JetVac until backflush water is clean
- C) Vacuum manhole sump as required

STEP 3
Replace all caps, lids and covers, record observations and actions.

STEP 4
Inspect & clean catch basins and manholes upstream of the StormTech system.



SAMPLE MAINTENANCE LOG

Date	Stadia Rod Readings		Sediment Depth (1)–(2)	Observations/Actions	Inspector
	Fixed point to chamber bottom (1)	Fixed point to top of sediment (2)			
3/15/11	6.3 ft	none		New installation. Fixed point is CI frame at grade	DJM
9/24/11		6.2	0.1 ft	Some grit felt	SM
6/20/13		5.8	0.5 ft	Mucky feel, debris visible in manhole and in Isolator Row, maintenance due	NV
7/7/13	6.3 ft		0	System jetted and vacuumed	DJM

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