STORMWATER REPORT

Village At Rock Pond
206 West Main Street
Georgetown, Massachusetts

June 12, 2023

Applicant
Rock Pond Development, LLC
499 East Broadway
Haverhill, MA 01830

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W&S Project Data
GEOR-0058A
SPWestMain#206.dwg
Existing.hcp
Proposed.hcp
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WILLIAMS & SPARAGES
ENGINEERS | SCIENTISTS | SURVEYORS

TABLE OF CONTENTS

COMMONWEALTH OF MASSACHUSETTS
MATTHEW E MOORE
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6.21.2023

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 project located at 206 West Main Street, Georgetown, MA. This is accomplished by analyzing the surface stormwater runoff rates to the limit of watershed analysis as shown on the accompanying watershed maps. The result of this analysis is summarized in the Peak Rate of Runoff tables below, see Section 1.8.

1.2 Introduction

The subject property (Assessors Map 6B, Parcel 53) 206 West Main Street is currently developed with a restaurant that was constructed sometime in the early 1970's with renovations thereafter. The property is located on the west side of West Main Street (Route 97) and is bounded to the north by residential property, to the south by the Commonwealth of Massachusetts Highway Department and to the west by Rock Pond.

The property is occupied by a 1 story building, paved parking with access drives to West Main Street, an existing drainage system, existing septic system, lawn and landscaped areas, Bordering Vegetated Wetlands, various utilities as well as deciduous and coniferous trees.

Bordering Vegetated Wetlands (BVW's) on site were delineated as the A-Series that border on Rock Pond. Bordering Land Subject to Flooding (BLSF) is also located on this parcel that is shown as a Zone AE, Elevation 84.3 (NAVD88), according to FEMA Flood Insurance Rate Map Number 25009C023F with an effective date of July 3, 2012. A filing with the Georgetown Conservation Commissions is required for work within this buffer zone.

The proposal is to raze all existing structures and impervious areas and redevelop the property with 9 single family dwelling units, access driveway, parking, landscaping, utilities and stormwater management devices for the attenuation and treatment of stormwater runoff.

The property is located within the Residential A (RA) zoning district.

The property varies in elevation from approximately 96 (NAVD88) at West Main Street to an approximate elevation of 82 at the rear of the property. The property generally slopes from West Main Street towards Rock Pond at the rear of the property.

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 and 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 within the analyzed drainage area are mapped as 253C Hinckley and 602 Urban Land. Hinckley has an HSG rating of A. Urban Land does not have an assigned HSG, however on-site soil testing by a certified soil evaluator reveals parent material of primarily sand therefore this analysis uses a HSG rating of A for all soil groups.

1.4 Stormwater Modeling Methodology

The mathematical model used in this analysis for post development is computed using the stormwater modeling software HydroCAD, v10.20, 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.

This analysis uses the National Oceanic and Atmospheric Administration's (NOAA) point precipitation frequency estimates (NOAA Atlas 14).

Five design storm events are analyzed and the result is summarized below in the Peak Rate of Runoff tables, see Section 1.8.

1.5 Pre-Development Watershed

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

The selected Comparison Edge 1L represents flow tributary towards Rock Pond. The area tributary to this selected edge of comparison is 61,624 ft^2.

The selected Comparison Edge 2L represents flow tributary towards West Main Street. The area tributary to this selected edge of comparison is 12,520 ft^2.

The total watershed area within the limit of watershed analysis is 74,144 ft^2.

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 result of the calculations for the 2-year, 10-year, 25-year, 50-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 five subcatchments tributary to the selected edge of comparisons.

The selected Comparison Edge 1L represents flow tributary towards Rock Pond. The area tributary to this selected edge of comparison is 64,538 ft^2.

The selected Comparison Edge 2L represents flow tributary towards West Main Street. The area tributary to this selected edge of comparison is 9,606 ft^2.

The total watershed area within the limit of watershed analysis is 74,144 ft^2.

Post-development provides for the construction of deep sump hooded catch basins. These drainage devices will discharge to an existing oil grit separator.

Using the methods described in the stormwater modeling methodology above, runoff curve numbers and times of concentration are generated for the post-development condition. A schematic of the mathematical model and the results of the calculations for the 2-year, 10-year, 25-year, 50-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.

No 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.

Refer to Peak Rate of Runoff tables, see Section 1.8, which demonstrate the post-development peak discharge rates and volumes are less than or equal to the pre-development peak discharge rates.

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 Groups A. Groundwater recharge is provided to the maximum extent practicable through the existing stormwater management area. Groundwater recharge is improved through increased pervious cover.

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, existing oil/grit separators and an existing stormwater management area to treat stormwater runoff to the maximum extent practicable.

Runoff from certain types of roof areas is considered "clean" by DEP and therefore, do not require treatment. We assume the roof types for this project will satisfy this criterion.

Stormwater discharge from this property is not within a Zone II, Interim Wellhead Protection Area of a public water supply or a Critical Area. The property does lie within an area of rapid infiltration and therefore water quality volume/flowrate 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 considered a redevelopment due to a reduction of approximately 20,700 ft^2 of impervious.

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.

Refer to Section 5 Construction Period Pollution Prevention Plan and Erosion and Sediment Control.

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 Appendix D 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.

Signed:____Date:____________________________________
Rock Pond Development, LLC

1.8 Conclusion

The following Peak Rate of Runoff and Basin Performance tables summarize the performance of the stormwater management system within the limit of the watershed analysis for the 2-year, 10-year, 25-year, 50-year and 100-year storm events.

Table 1.8.1: Peak Rate of Runoff | Comparison Location 1L

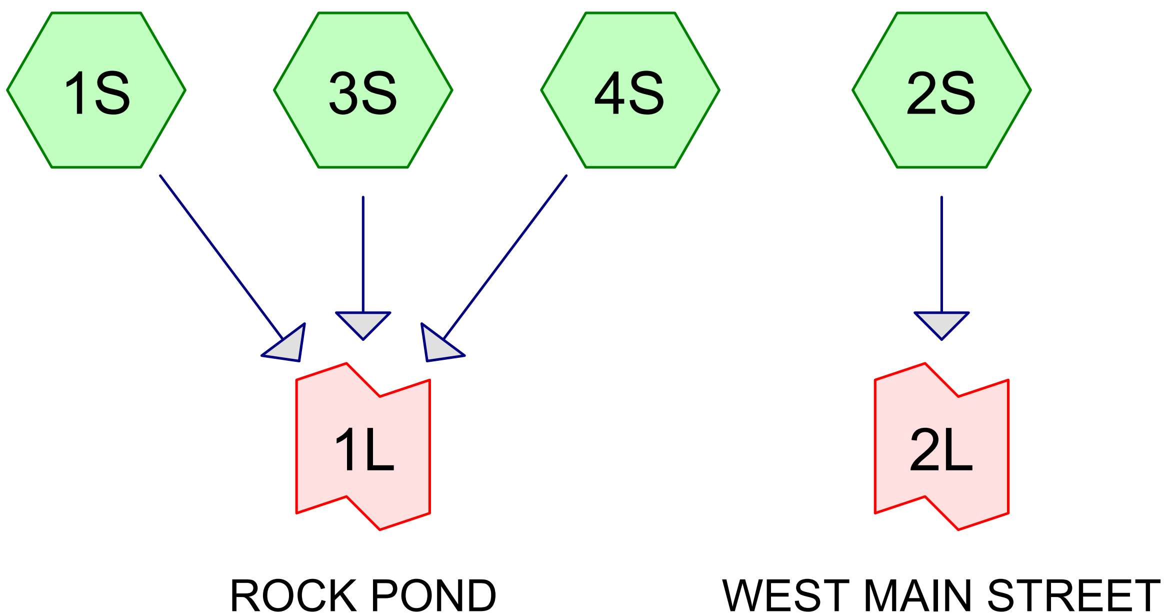
Description	2 Year	10 Year	25 Year	50 Year	100 Year
Existing Peak Rate of Runoff (cfs)	2.99	5.14	6.54	7.58	8.75
Proposed Peak Rate of Runoff (cfs)	1.45	3.09	4.39	5.40	6.58
Difference	**-1.54**	**-2.05**	**-2.15**	**-2.18**	**-2.17**

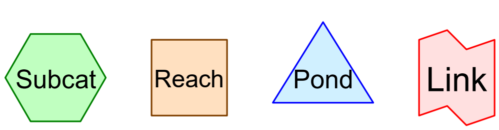
Table 1.8.2: Peak Rate of Runoff | Comparison Location 2L

Description	2 Year	10 Year	25 Year	50 Year	100 Year
Existing Peak Rate of Runoff (cfs)	0.46	0.98	1.31	1.56	1.84
Proposed Peak Rate of Runoff (cfs)	0.24	0.59	0.84	1.02	1.23
Difference	**-0.22**	**-0.39**	**-0.47**	**-0.54**	**-0.61**

1.9 HydroCAD Data

1.9.1 Existing Condition





Routing Diagram for EXISTING
Prepared by Williams & Sparages, Printed 6/21/2023

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2 YEAR	Type III 24-hr		Default	24.00	1	3.22	2
2	10 YEAR	Type III 24-hr		Default	24.00	1	5.08	2
3	25 YEAR	Type III 24-hr		Default	24.00	1	6.25	2
4	50 YEAR	Type III 24-hr		Default	24.00	1	7.10	2
5	100 YEAR	Type III 24-hr		Default	24.00	1	8.05	2

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
11,402	39	>75% Grass cover, Good, HSG A (1S, 2S, 3S, 4S)
46,795	98	Paved parking, HSG A (1S, 2S)
10,170	98	Roofs, HSG A (1S, 2S, 3S)
5,777	30	Woods, Good, HSG A (2S, 3S)
74,144	**84**	**TOTAL AREA**

Summary for Subcatchment 1S:

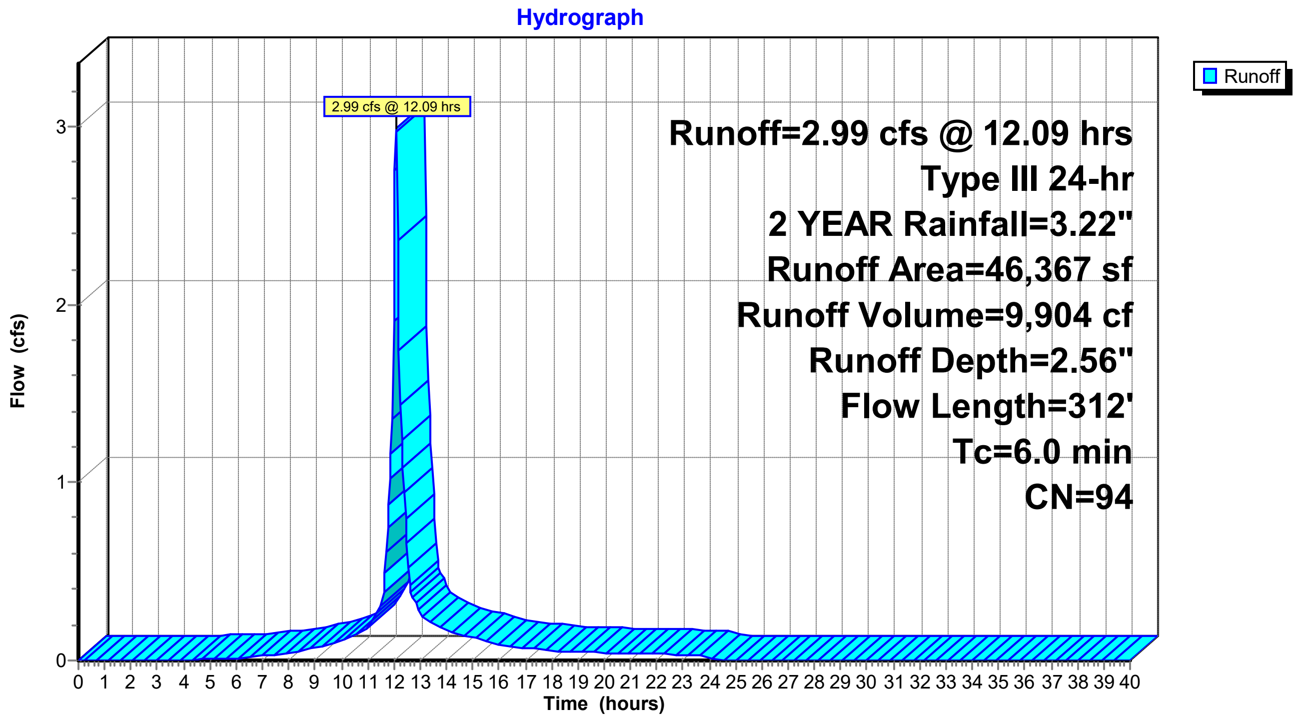
Runoff = 2.99 cfs @ 12.09 hrs, Volume= 9,904 cf, Depth= 2.56"
Routed to Link 1L : ROCK POND

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 YEAR Rainfall=3.22"

Area (sf)	CN	Description
2,919	39	>75% Grass cover, Good, HSG A
39,018	98	Paved parking, HSG A
4,430	98	Roofs, HSG A
46,367	94	Weighted Average
2,919		6.30% Pervious Area
43,448		93.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0510	1.75		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.22"
1.4	262	0.0240	3.14		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.9	312	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 1S:



Summary for Subcatchment 2S:

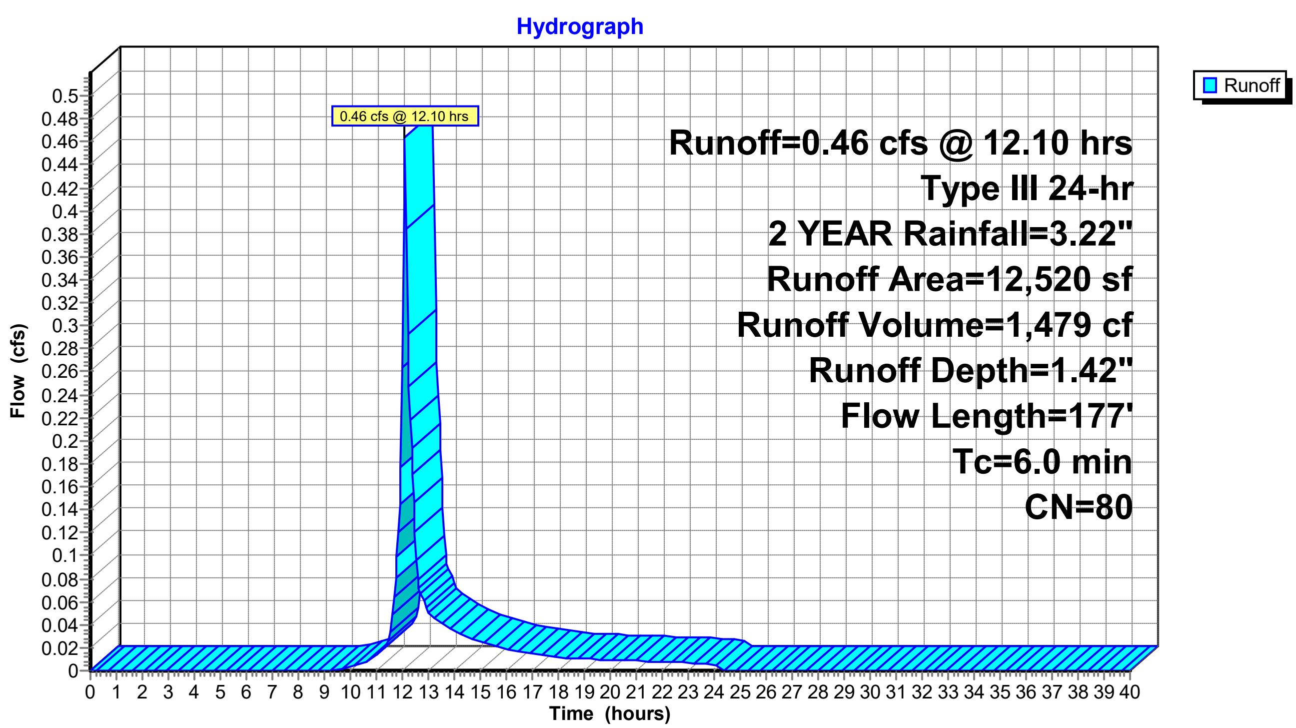
Runoff = 0.46 cfs @ 12.10 hrs, Volume= 1,479 cf, Depth= 1.42"
Routed to Link 2L : WEST MAIN STREET

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 YEAR Rainfall=3.22"

Area (sf)	CN	Description
1,866	39	>75% Grass cover, Good, HSG A
1,664	30	Woods, Good, HSG A
7,777	98	Paved parking, HSG A
1,213	98	Roofs, HSG A
12,520	80	Weighted Average
3,530		28.19% Pervious Area
8,990		71.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0400	1.59		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.22"
0.7	127	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.2	177	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2S:



Summary for Subcatchment 3S:

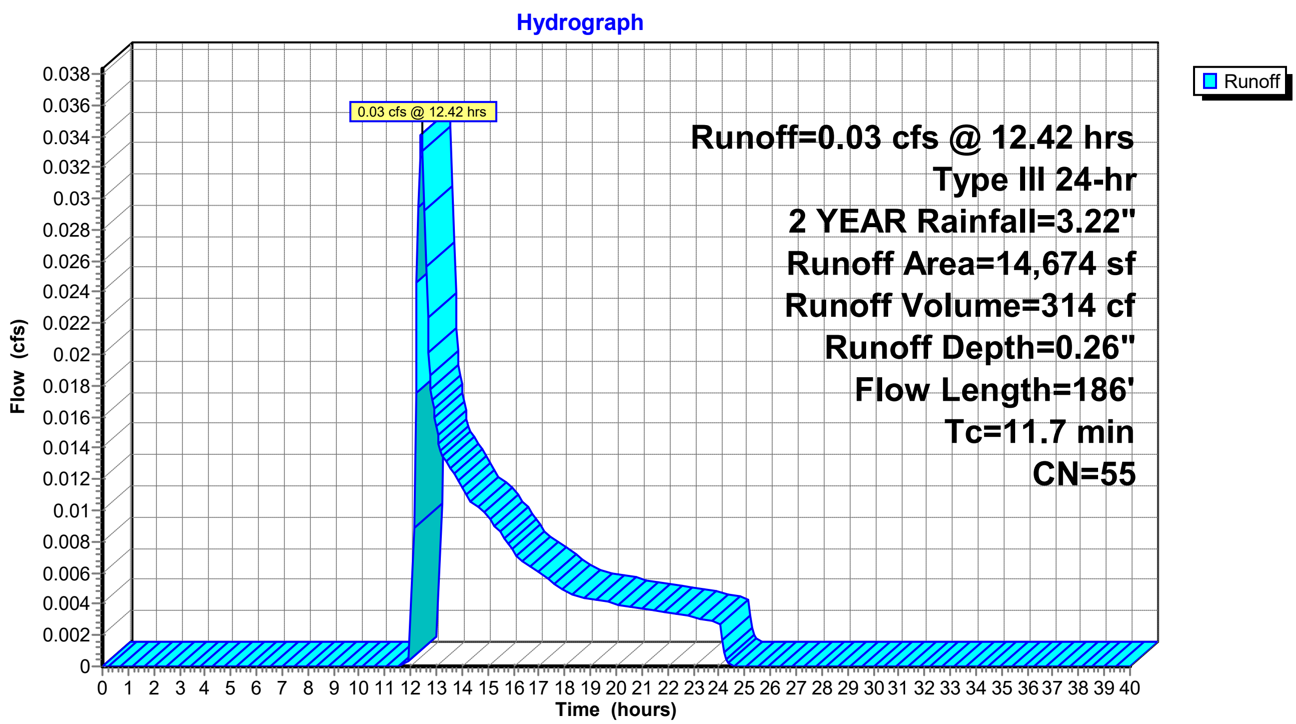
Runoff = 0.03 cfs @ 12.42 hrs, Volume= 314 cf, Depth= 0.26"
Routed to Link 1L : ROCK POND

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 YEAR Rainfall=3.22"

Area (sf)	CN	Description
6,034	39	>75% Grass cover, Good, HSG A
4,113	30	Woods, Good, HSG A
4,527	98	Roofs, HSG A
14,674	55	Weighted Average
10,147		69.15% Pervious Area
4,527		30.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.1	50	0.0260	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.22"
0.6	136	0.0550	3.78		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.7	186	Total			

Subcatchment 3S:



Summary for Subcatchment 4S:

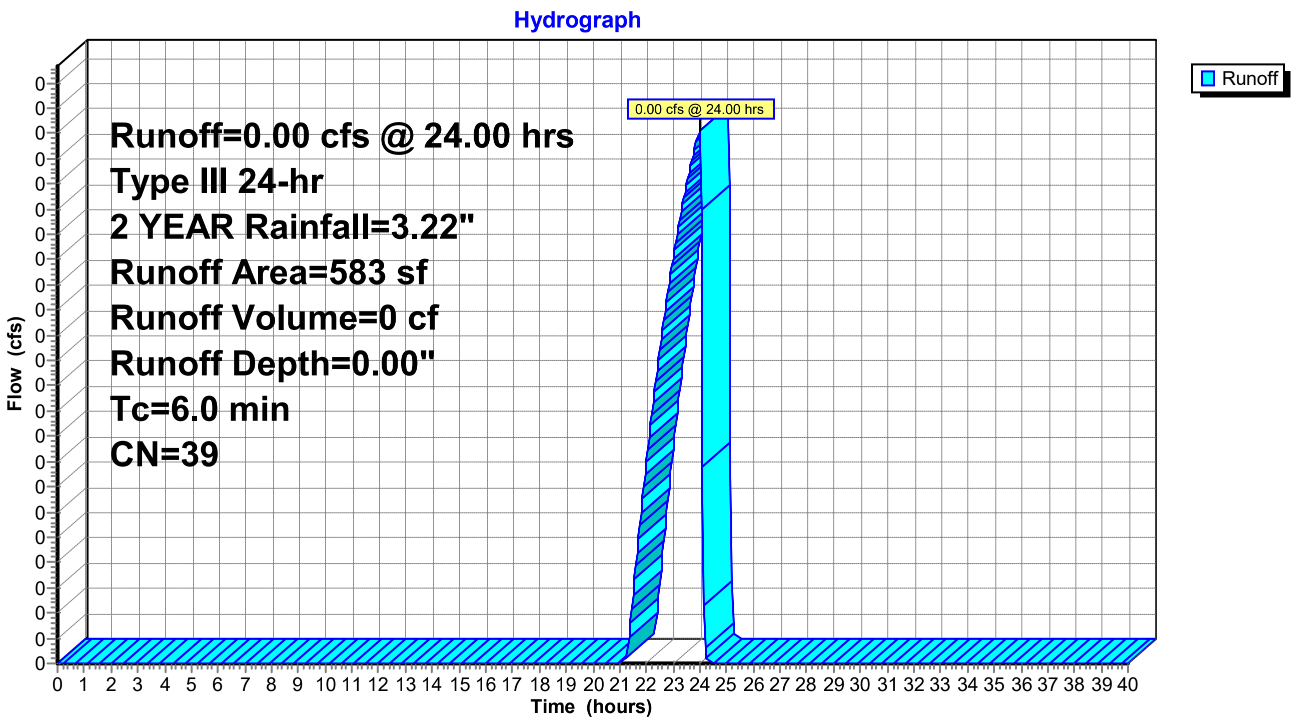
Runoff = 0.00 cfs @ 24.00 hrs, Volume= 0 cf, Depth= 0.00"
Routed to Link 1L : ROCK POND

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 YEAR Rainfall=3.22"

Area (sf)	CN	Description
583	39	>75% Grass cover, Good, HSG A
583		100.00% Pervious Area

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

Subcatchment 4S:

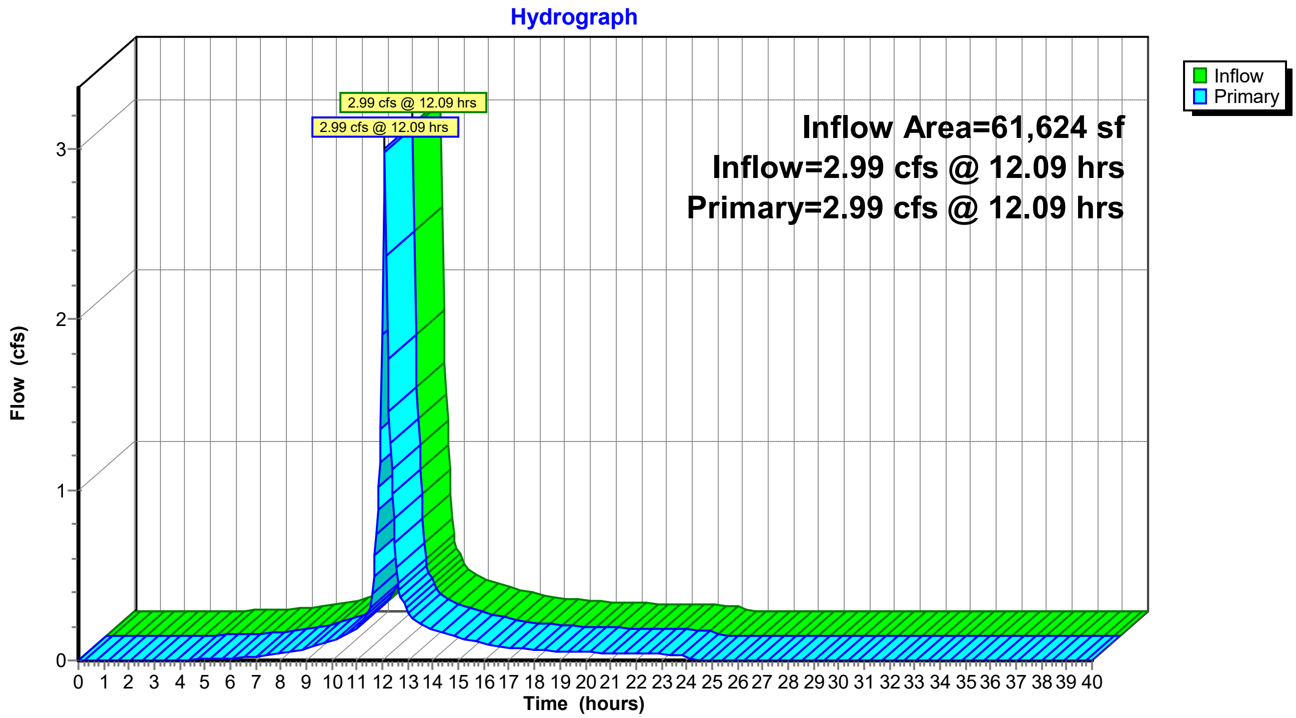


Summary for Link 1L: ROCK POND

Inflow Area = 61,624 sf, 77.85% Impervious, Inflow Depth = 1.99" for 2 YEAR event
Inflow = 2.99 cfs @ 12.09 hrs, Volume= 10,218 cf
Primary = 2.99 cfs @ 12.09 hrs, Volume= 10,218 cf, Atten= 0%, Lag= 0.0 min

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

Link 1L: ROCK POND

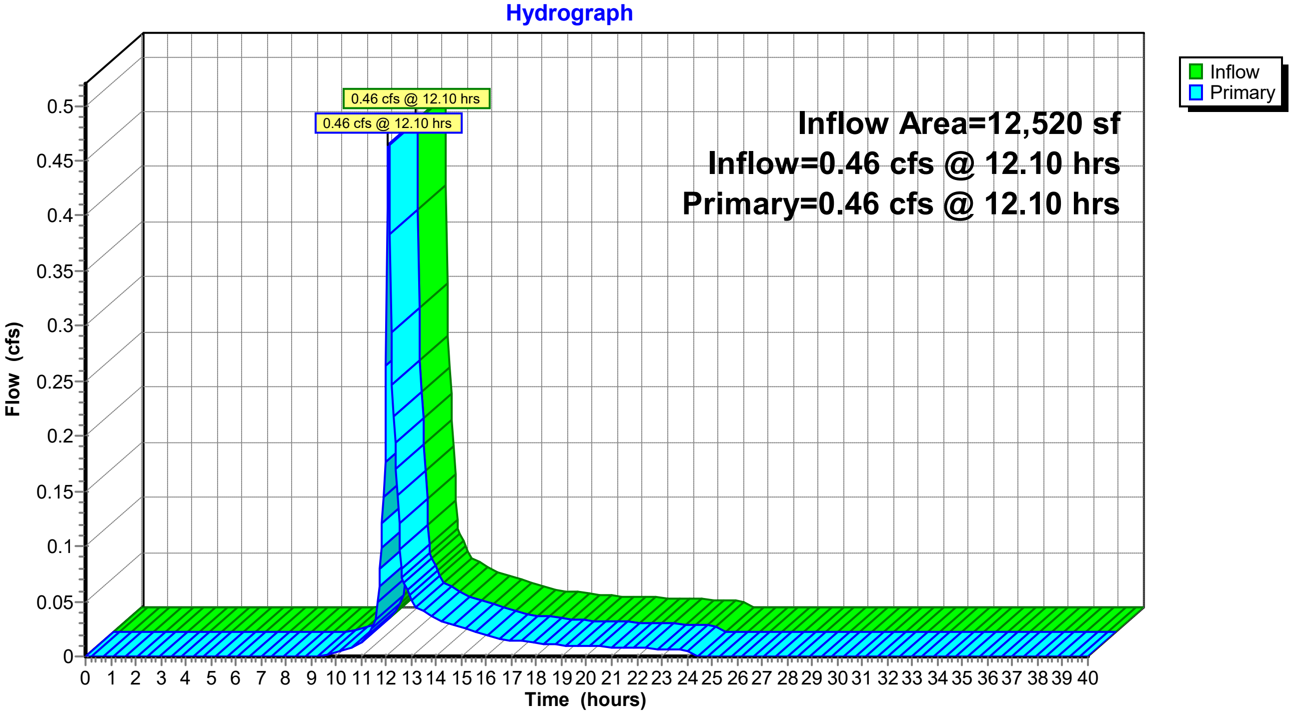


Summary for Link 2L: WEST MAIN STREET

Inflow Area =	12,520 sf, 71.81% Impervious,	Inflow Depth = 1.42"	for 2 YEAR event
Inflow =	0.46 cfs @ 12.10 hrs, Volume=	1,479 cf	
Primary =	0.46 cfs @ 12.10 hrs, Volume=	1,479 cf, Atten= 0%, Lag= 0.0 min	

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

Link 2L: WEST MAIN STREET



Summary for Subcatchment 1S:

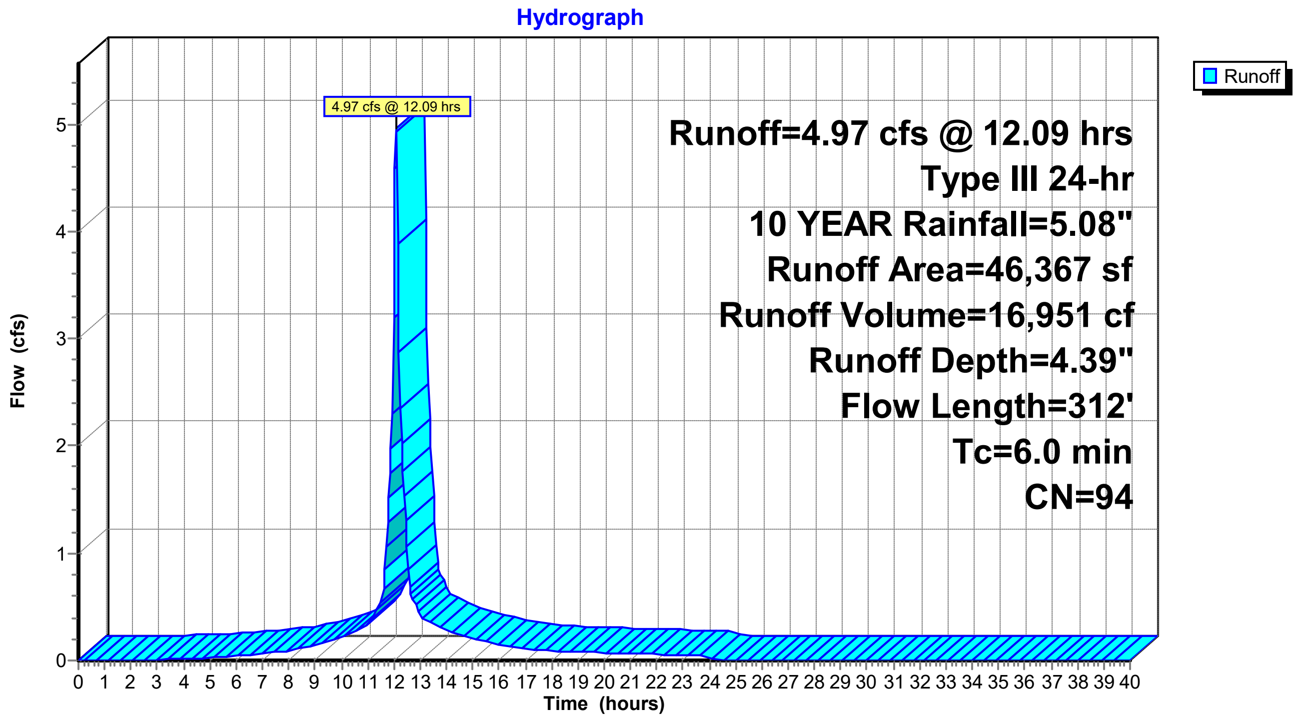
Runoff = 4.97 cfs @ 12.09 hrs, Volume= 16,951 cf, Depth= 4.39"
Routed to Link 1L : ROCK POND

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 YEAR Rainfall=5.08"

Area (sf)	CN	Description
2,919	39	>75% Grass cover, Good, HSG A
39,018	98	Paved parking, HSG A
4,430	98	Roofs, HSG A
46,367	94	Weighted Average
2,919		6.30% Pervious Area
43,448		93.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0510	1.75		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.22"
1.4	262	0.0240	3.14		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.9	312	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 1S:



Summary for Subcatchment 2S:

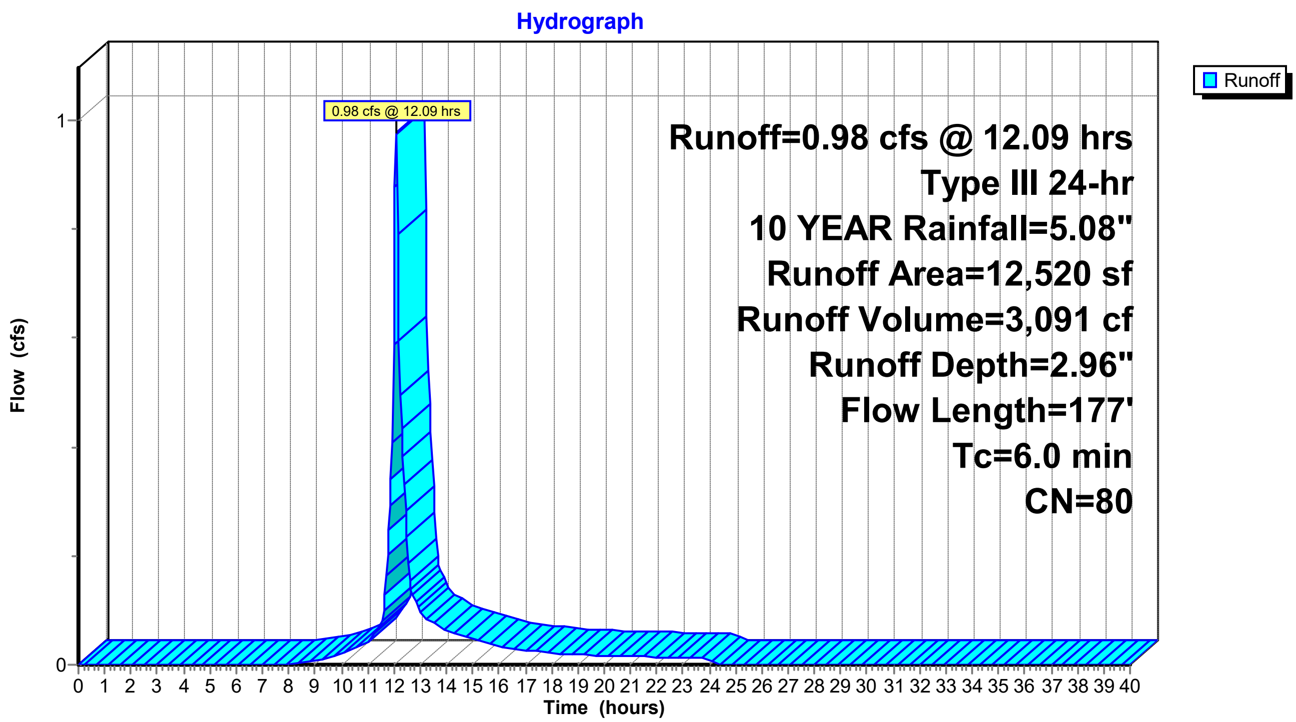
Runoff = 0.98 cfs @ 12.09 hrs, Volume= 3,091 cf, Depth= 2.96"
Routed to Link 2L : WEST MAIN STREET

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 YEAR Rainfall=5.08"

Area (sf)	CN	Description
1,866	39	>75% Grass cover, Good, HSG A
1,664	30	Woods, Good, HSG A
7,777	98	Paved parking, HSG A
1,213	98	Roofs, HSG A
12,520	80	Weighted Average
3,530		28.19% Pervious Area
8,990		71.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0400	1.59		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.22"
0.7	127	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.2	177	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2S:



Summary for Subcatchment 3S:

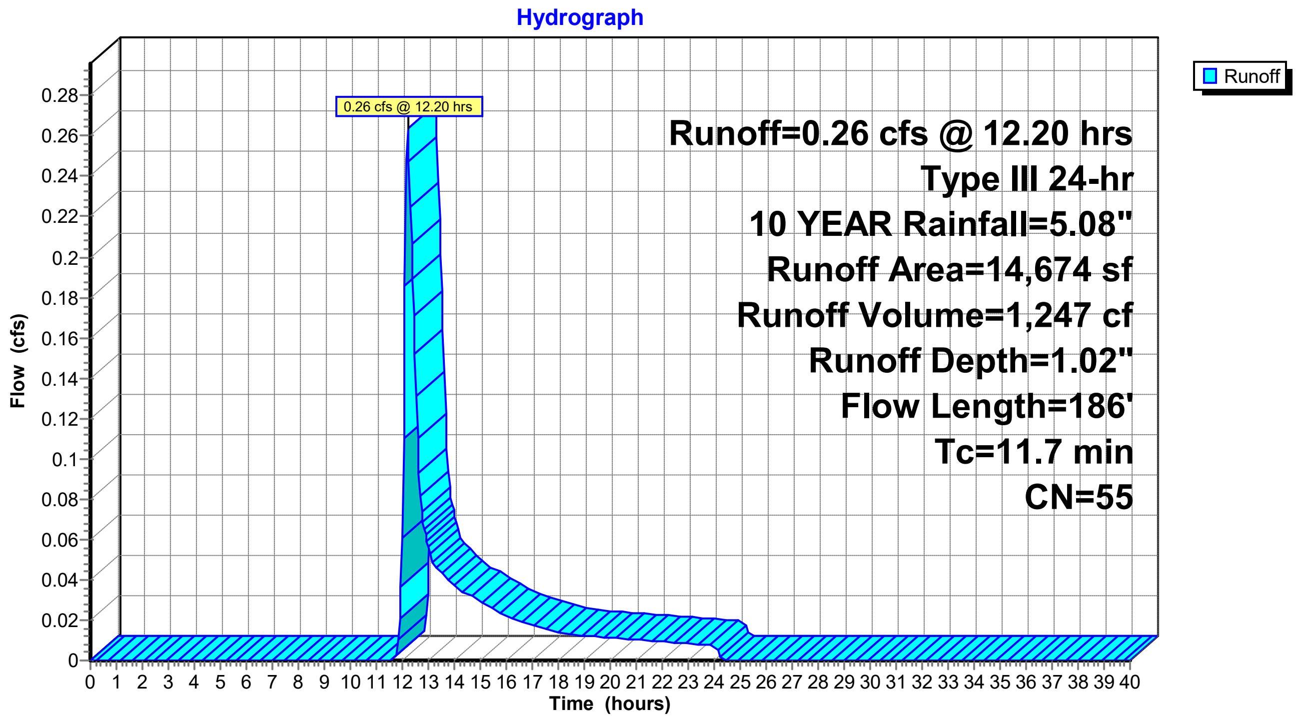
Runoff = 0.26 cfs @ 12.20 hrs, Volume= 1,247 cf, Depth= 1.02"
Routed to Link 1L : ROCK POND

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 YEAR Rainfall=5.08"

Area (sf)	CN	Description
6,034	39	>75% Grass cover, Good, HSG A
4,113	30	Woods, Good, HSG A
4,527	98	Roofs, HSG A
14,674	55	Weighted Average
10,147		69.15% Pervious Area
4,527		30.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.1	50	0.0260	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.22"
0.6	136	0.0550	3.78		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.7	186	Total			

Subcatchment 3S:



Summary for Subcatchment 4S:

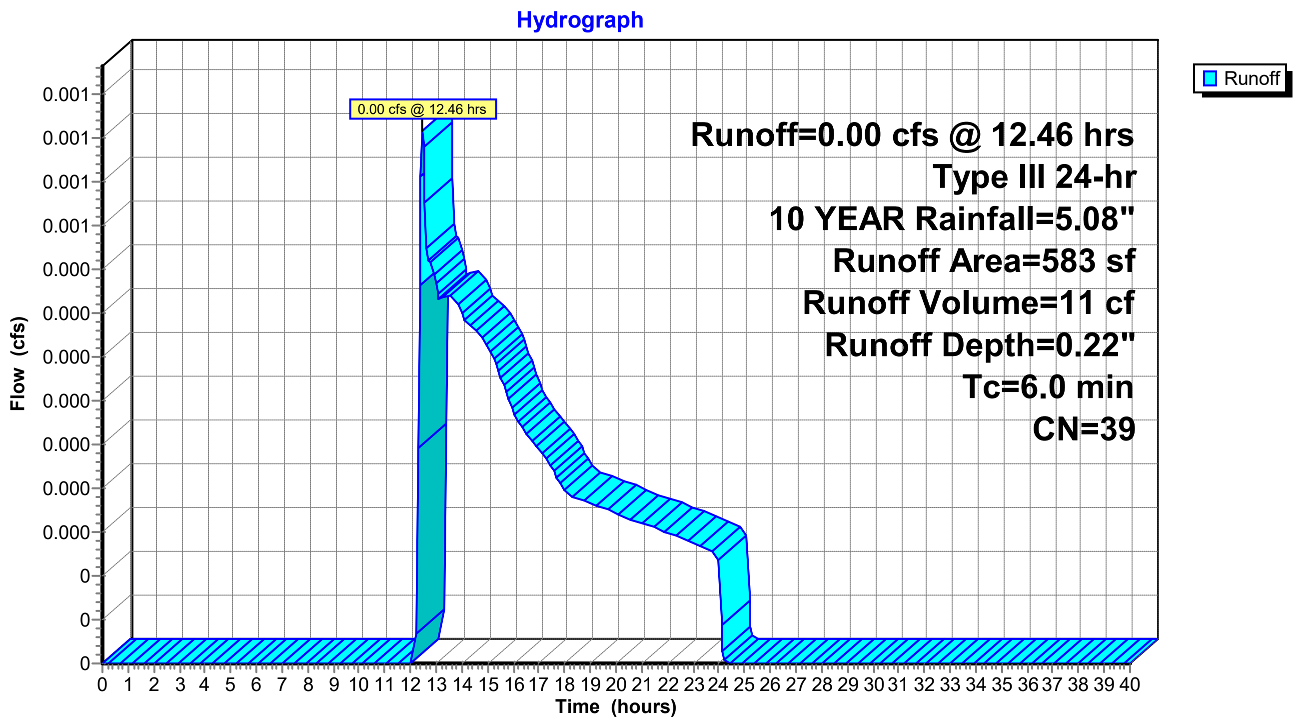
Runoff = 0.00 cfs @ 12.46 hrs, Volume= 11 cf, Depth= 0.22"
Routed to Link 1L : ROCK POND

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 YEAR Rainfall=5.08"

Area (sf)	CN	Description
583	39	>75% Grass cover, Good, HSG A
583		100.00% Pervious Area

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

Subcatchment 4S:

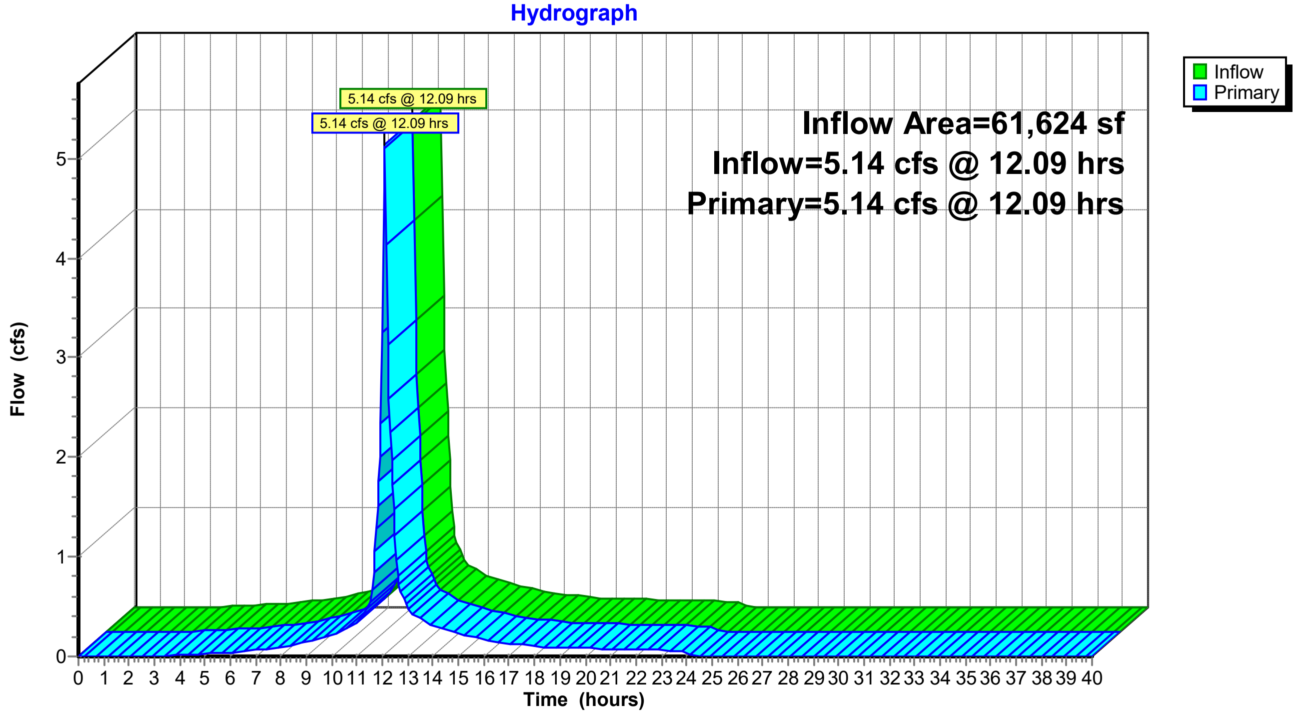


Summary for Link 1L: ROCK POND

Inflow Area =	61,624 sf,	77.85% Impervious,	Inflow Depth = 3.55"	for 10 YEAR event
Inflow =	5.14 cfs @	12.09 hrs, Volume=	18,209 cf	
Primary =	5.14 cfs @	12.09 hrs, Volume=	18,209 cf,	Atten= 0%, Lag= 0.0 min

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

Link 1L: ROCK POND

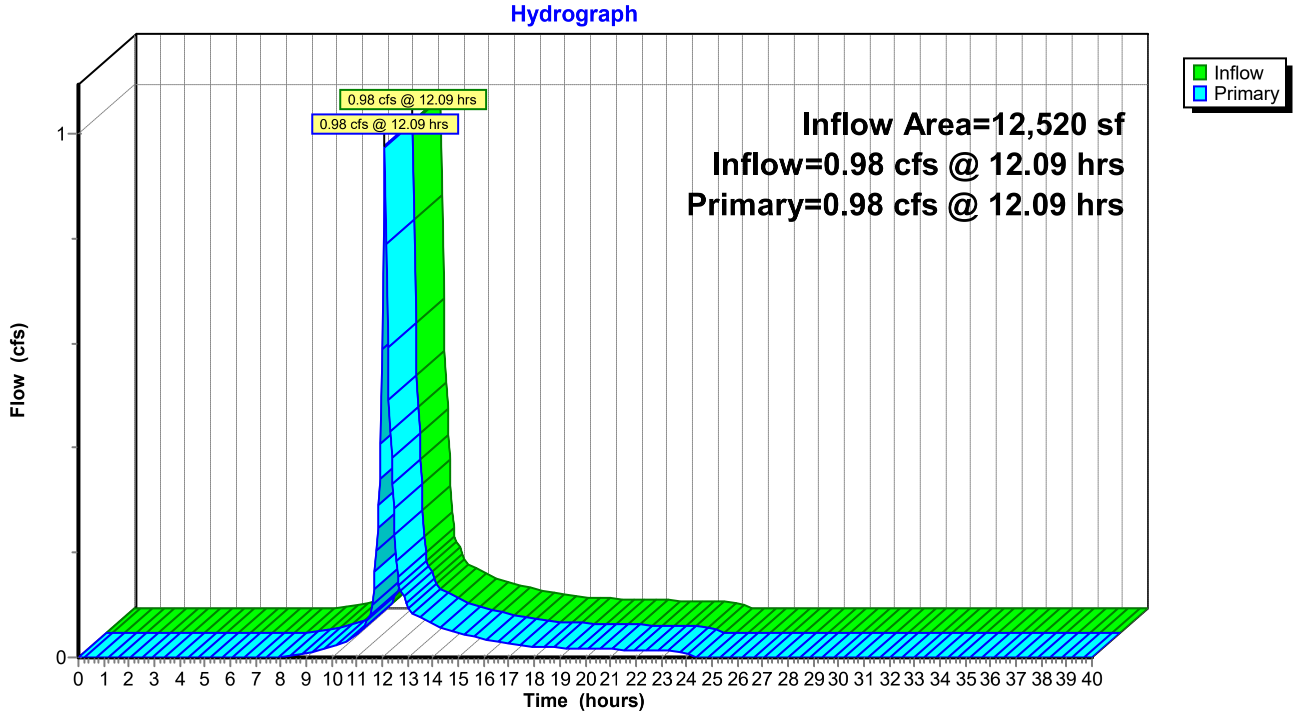


Summary for Link 2L: WEST MAIN STREET

Inflow Area =	12,520 sf,	71.81% Impervious,	Inflow Depth = 2.96"	for 10 YEAR event
Inflow =	0.98 cfs @	12.09 hrs, Volume=	3,091 cf	
Primary =	0.98 cfs @	12.09 hrs, Volume=	3,091 cf, Atten= 0%,	Lag= 0.0 min

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

Link 2L: WEST MAIN STREET



Summary for Subcatchment 1S:

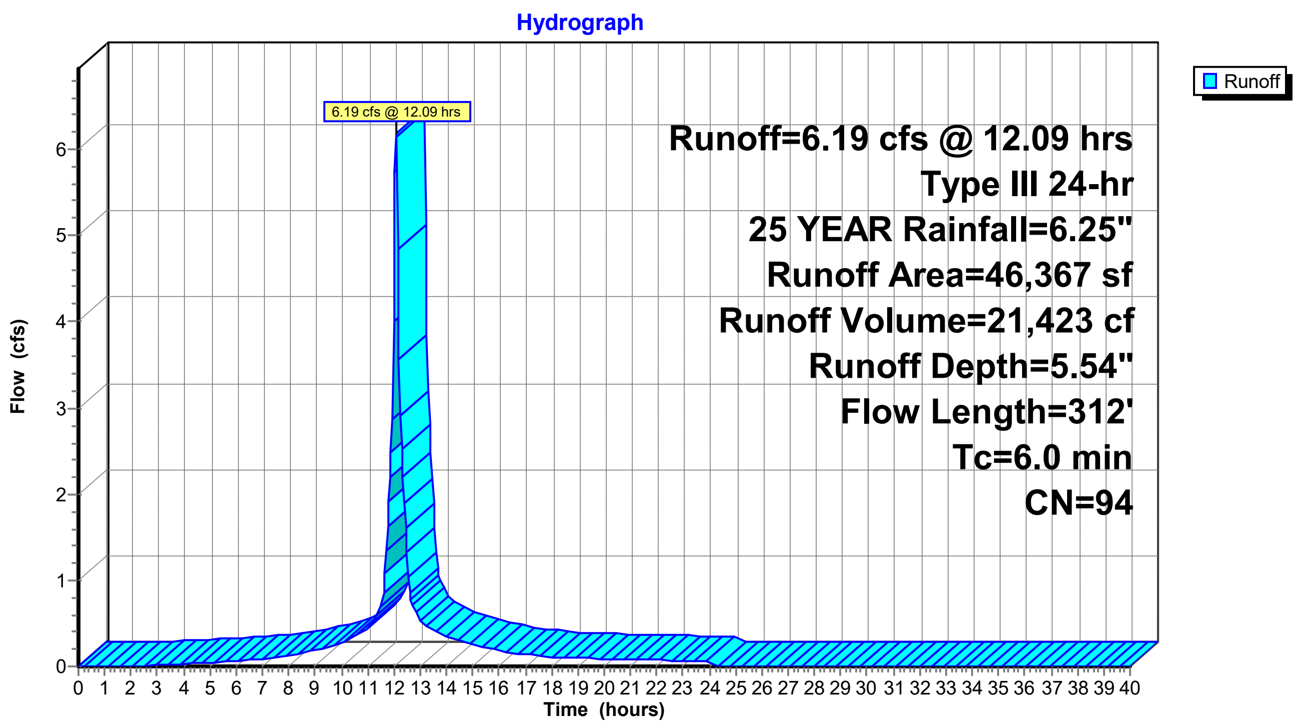
Runoff = 6.19 cfs @ 12.09 hrs, Volume= 21,423 cf, Depth= 5.54"
Routed to Link 1L : ROCK POND

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 YEAR Rainfall=6.25"

Area (sf)	CN	Description
2,919	39	>75% Grass cover, Good, HSG A
39,018	98	Paved parking, HSG A
4,430	98	Roofs, HSG A
46,367	94	Weighted Average
2,919		6.30% Pervious Area
43,448		93.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0510	1.75		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.22"
1.4	262	0.0240	3.14		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.9	312	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 1S:



Summary for Subcatchment 2S:

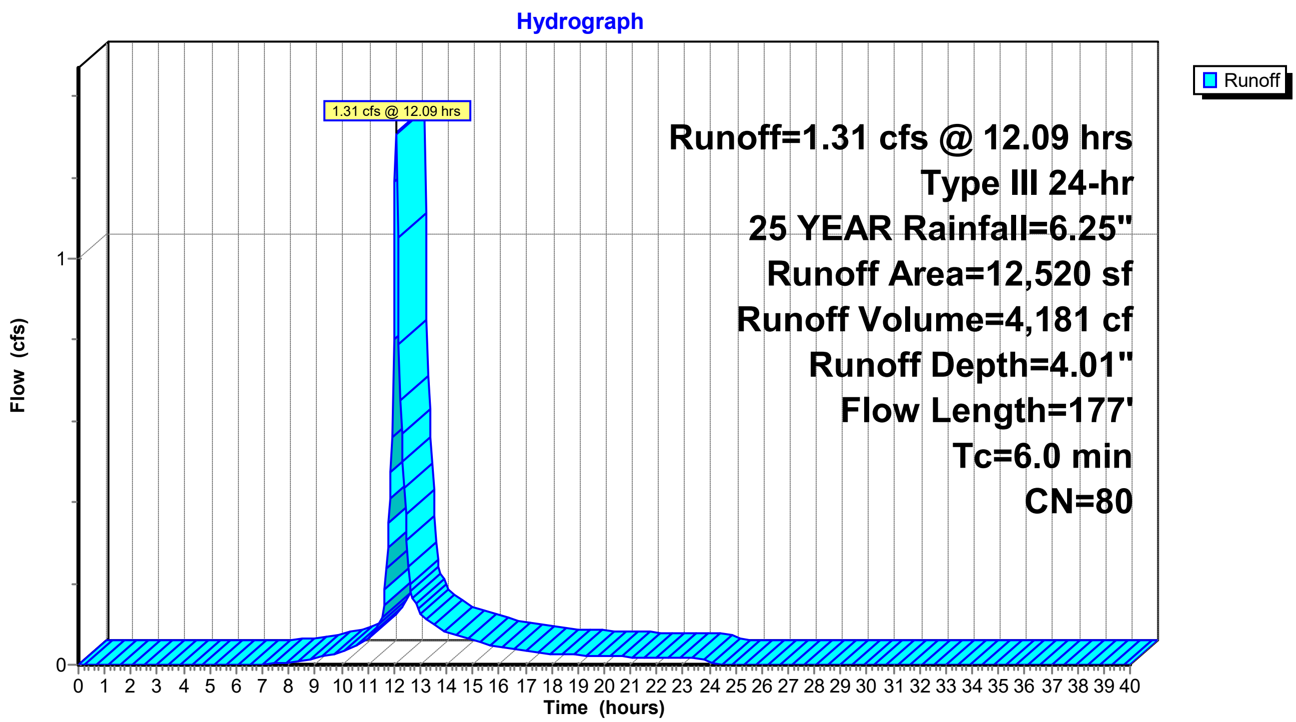
Runoff = 1.31 cfs @ 12.09 hrs, Volume= 4,181 cf, Depth= 4.01"
Routed to Link 2L : WEST MAIN STREET

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 YEAR Rainfall=6.25"

Area (sf)	CN	Description
1,866	39	>75% Grass cover, Good, HSG A
1,664	30	Woods, Good, HSG A
7,777	98	Paved parking, HSG A
1,213	98	Roofs, HSG A
12,520	80	Weighted Average
3,530		28.19% Pervious Area
8,990		71.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0400	1.59		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.22"
0.7	127	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.2	177	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2S:



Summary for Subcatchment 3S:

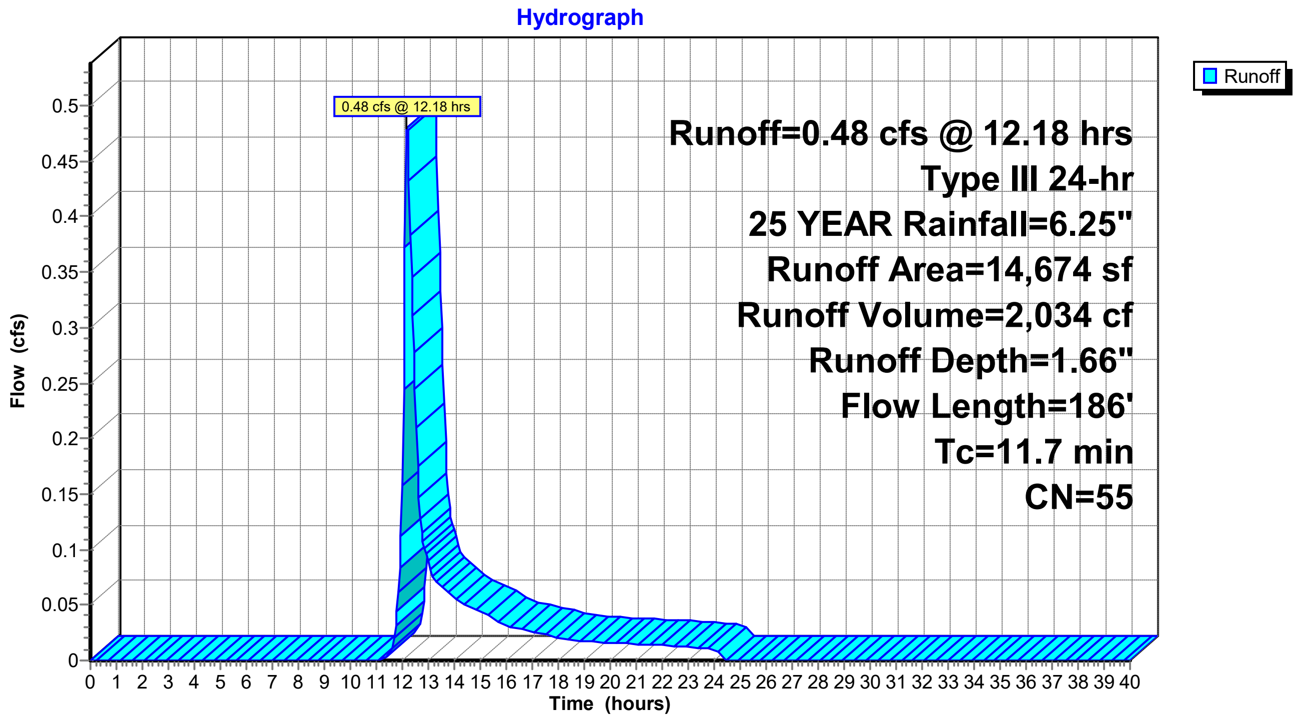
Runoff = 0.48 cfs @ 12.18 hrs, Volume= 2,034 cf, Depth= 1.66"
Routed to Link 1L : ROCK POND

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 YEAR Rainfall=6.25"

Area (sf)	CN	Description
6,034	39	>75% Grass cover, Good, HSG A
4,113	30	Woods, Good, HSG A
4,527	98	Roofs, HSG A
14,674	55	Weighted Average
10,147		69.15% Pervious Area
4,527		30.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.1	50	0.0260	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.22"
0.6	136	0.0550	3.78		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.7	186	Total			

Subcatchment 3S:



Summary for Subcatchment 4S:

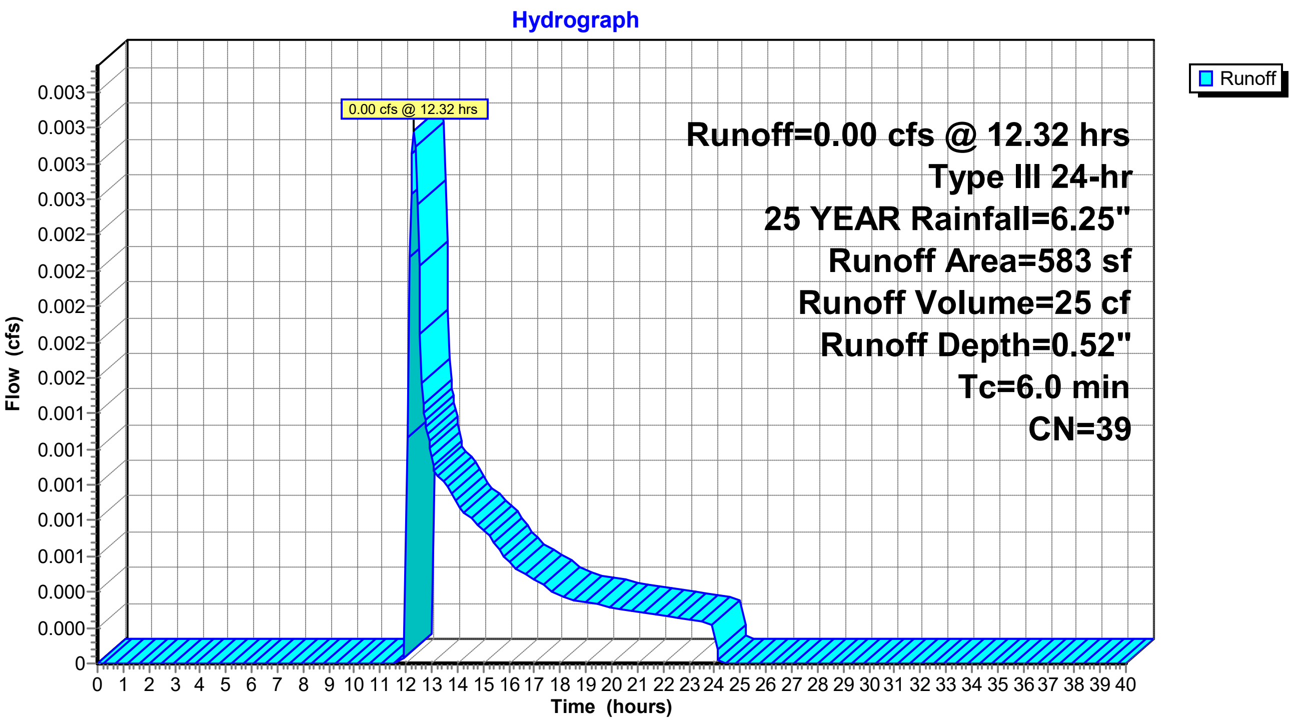
Runoff = 0.00 cfs @ 12.32 hrs, Volume= 25 cf, Depth= 0.52"
Routed to Link 1L : ROCK POND

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 YEAR Rainfall=6.25"

Area (sf)	CN	Description
583	39	>75% Grass cover, Good, HSG A
583		100.00% Pervious Area

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

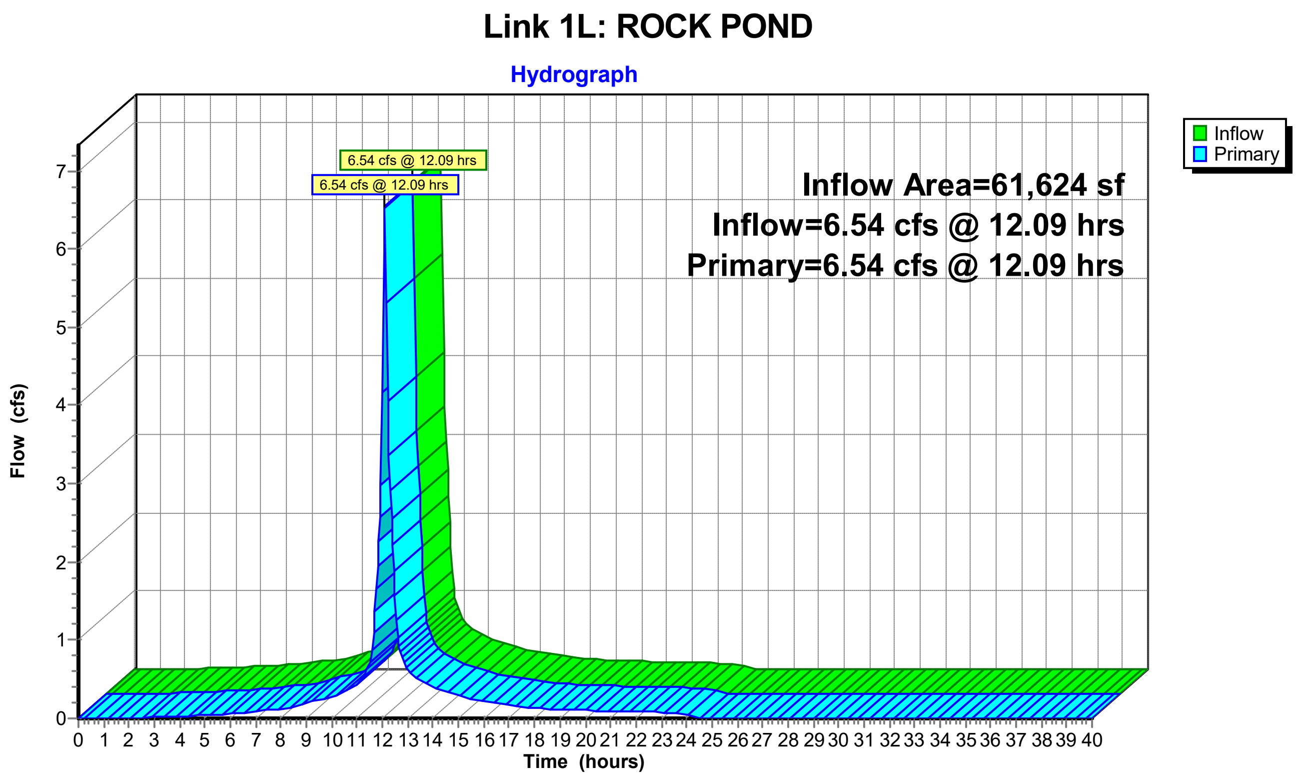
Subcatchment 4S:



Summary for Link 1L: ROCK POND

Inflow Area =	61,624 sf,	77.85% Impervious,	Inflow Depth = 4.57"	for 25 YEAR event
Inflow =	6.54 cfs @	12.09 hrs, Volume=	23,482 cf	
Primary =	6.54 cfs @	12.09 hrs, Volume=	23,482 cf,	Atten= 0%, Lag= 0.0 min

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

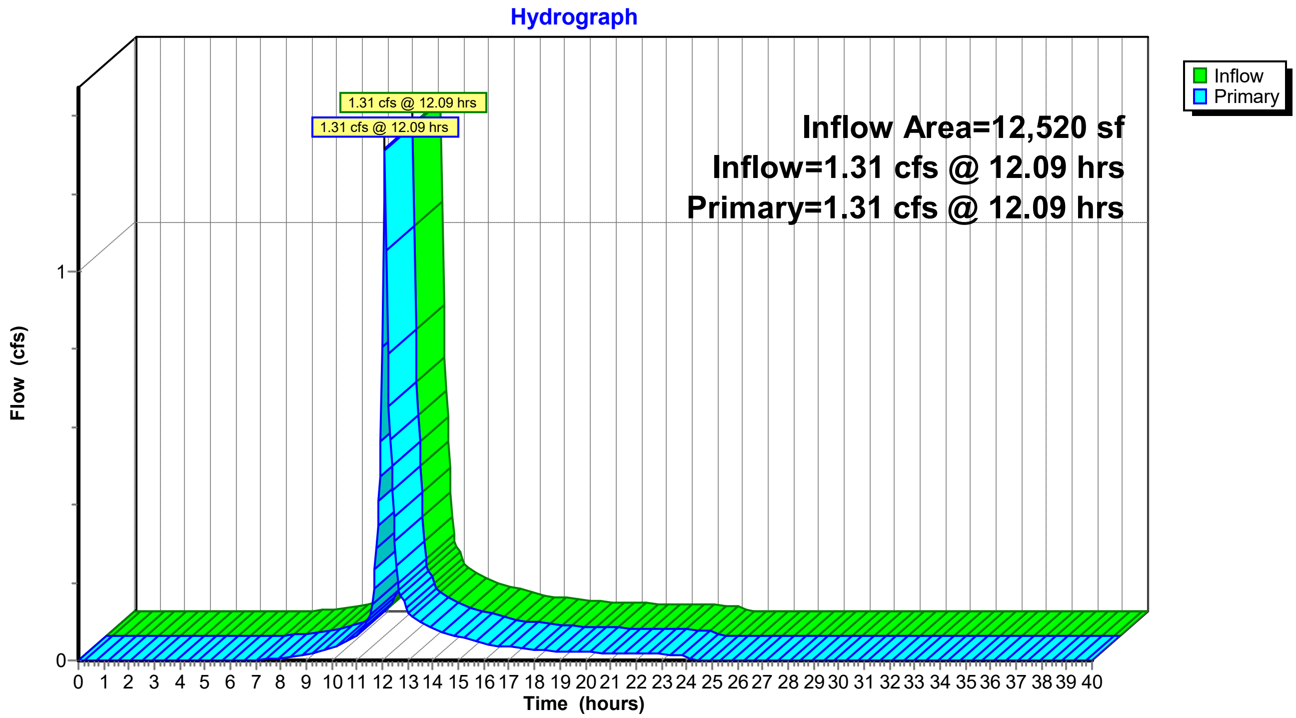


Summary for Link 2L: WEST MAIN STREET

Inflow Area =	12,520 sf,	71.81% Impervious,	Inflow Depth = 4.01"	for 25 YEAR event	
Inflow =	1.31 cfs @	12.09 hrs,	Volume=	4,181 cf	
Primary =	1.31 cfs @	12.09 hrs,	Volume=	4,181 cf,	Atten= 0%, Lag= 0.0 min

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

Link 2L: WEST MAIN STREET



Summary for Subcatchment 1S:

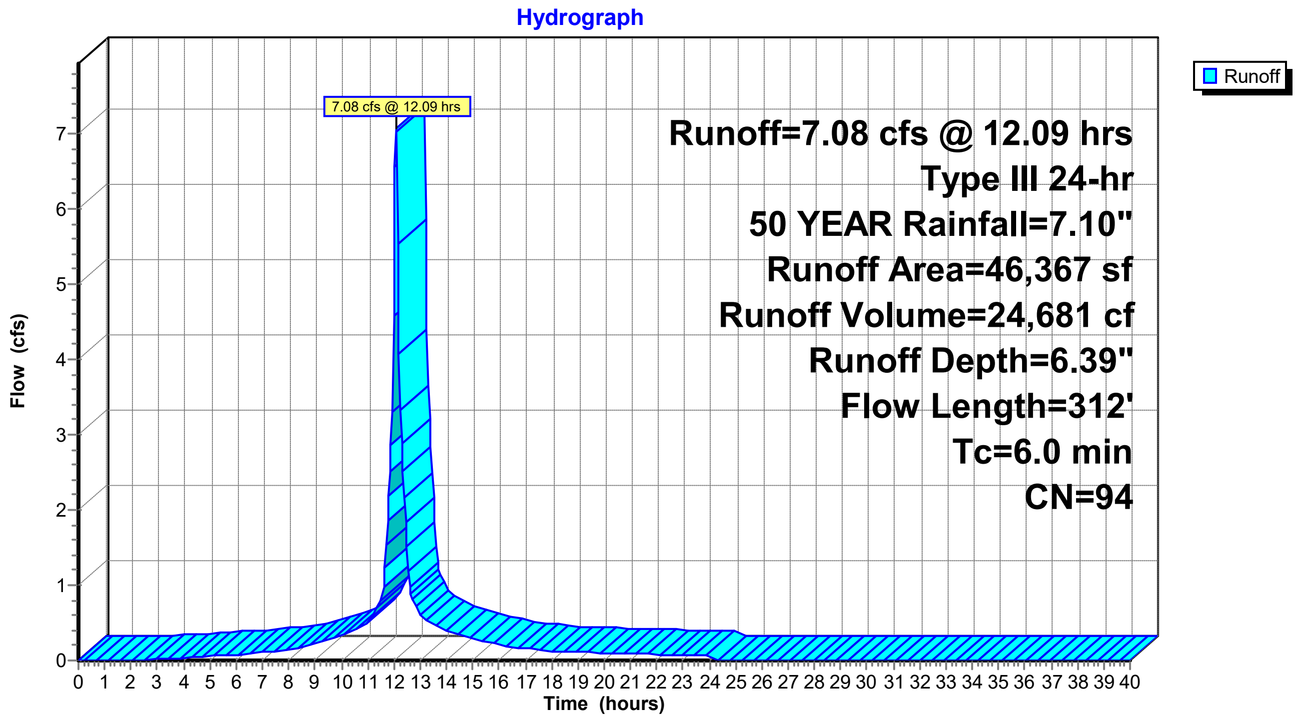
Runoff = 7.08 cfs @ 12.09 hrs, Volume= 24,681 cf, Depth= 6.39"
Routed to Link 1L : ROCK POND

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 50 YEAR Rainfall=7.10"

Area (sf)	CN	Description
2,919	39	>75% Grass cover, Good, HSG A
39,018	98	Paved parking, HSG A
4,430	98	Roofs, HSG A
46,367	94	Weighted Average
2,919		6.30% Pervious Area
43,448		93.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0510	1.75		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.22"
1.4	262	0.0240	3.14		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.9	312	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 1S:



Summary for Subcatchment 2S:

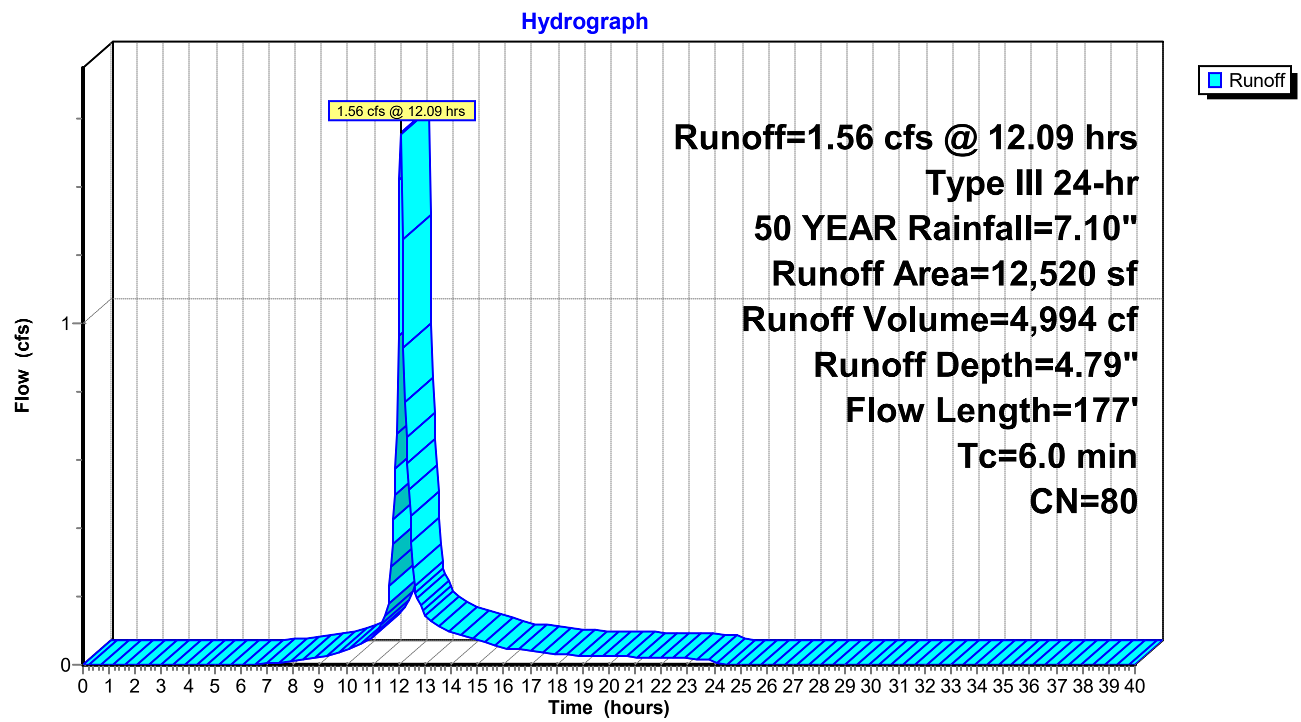
Runoff = 1.56 cfs @ 12.09 hrs, Volume= 4,994 cf, Depth= 4.79"
Routed to Link 2L : WEST MAIN STREET

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 50 YEAR Rainfall=7.10"

Area (sf)	CN	Description
1,866	39	>75% Grass cover, Good, HSG A
1,664	30	Woods, Good, HSG A
7,777	98	Paved parking, HSG A
1,213	98	Roofs, HSG A
12,520	80	Weighted Average
3,530		28.19% Pervious Area
8,990		71.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0400	1.59		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.22"
0.7	127	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.2	177	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2S:



Summary for Subcatchment 3S:

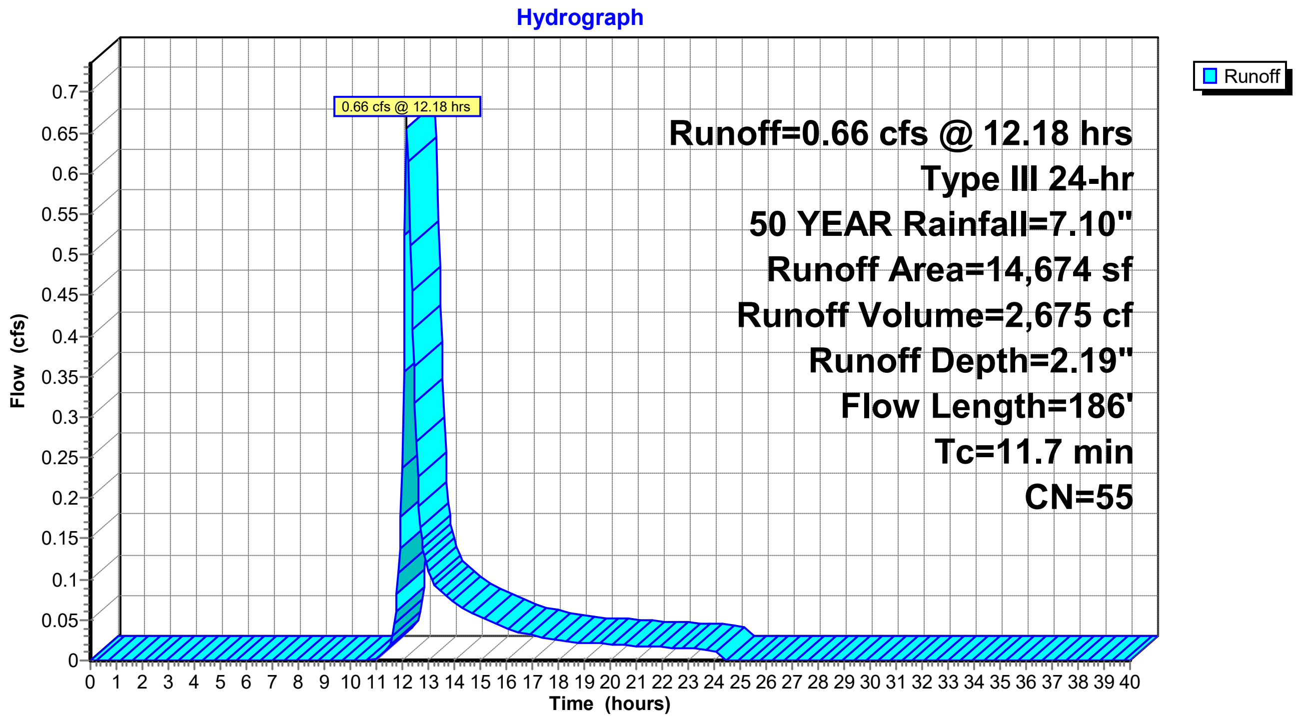
Runoff = 0.66 cfs @ 12.18 hrs, Volume= 2,675 cf, Depth= 2.19"
Routed to Link 1L : ROCK POND

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 50 YEAR Rainfall=7.10"

Area (sf)	CN	Description
6,034	39	>75% Grass cover, Good, HSG A
4,113	30	Woods, Good, HSG A
4,527	98	Roofs, HSG A
14,674	55	Weighted Average
10,147		69.15% Pervious Area
4,527		30.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.1	50	0.0260	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.22"
0.6	136	0.0550	3.78		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.7	186	Total			

Subcatchment 3S:



Summary for Subcatchment 4S:

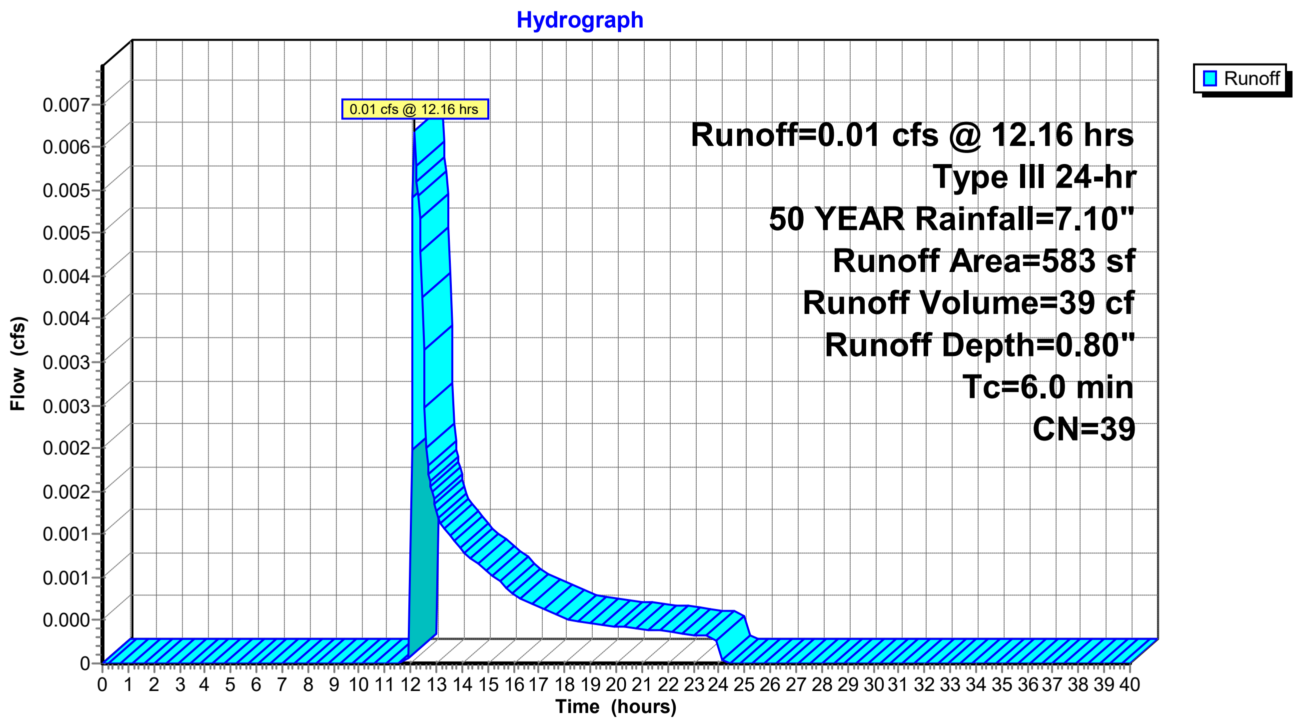
Runoff = 0.01 cfs @ 12.16 hrs, Volume= 39 cf, Depth= 0.80"
Routed to Link 1L : ROCK POND

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 50 YEAR Rainfall=7.10"

Area (sf)	CN	Description
583	39	>75% Grass cover, Good, HSG A
583		100.00% Pervious Area

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

Subcatchment 4S:

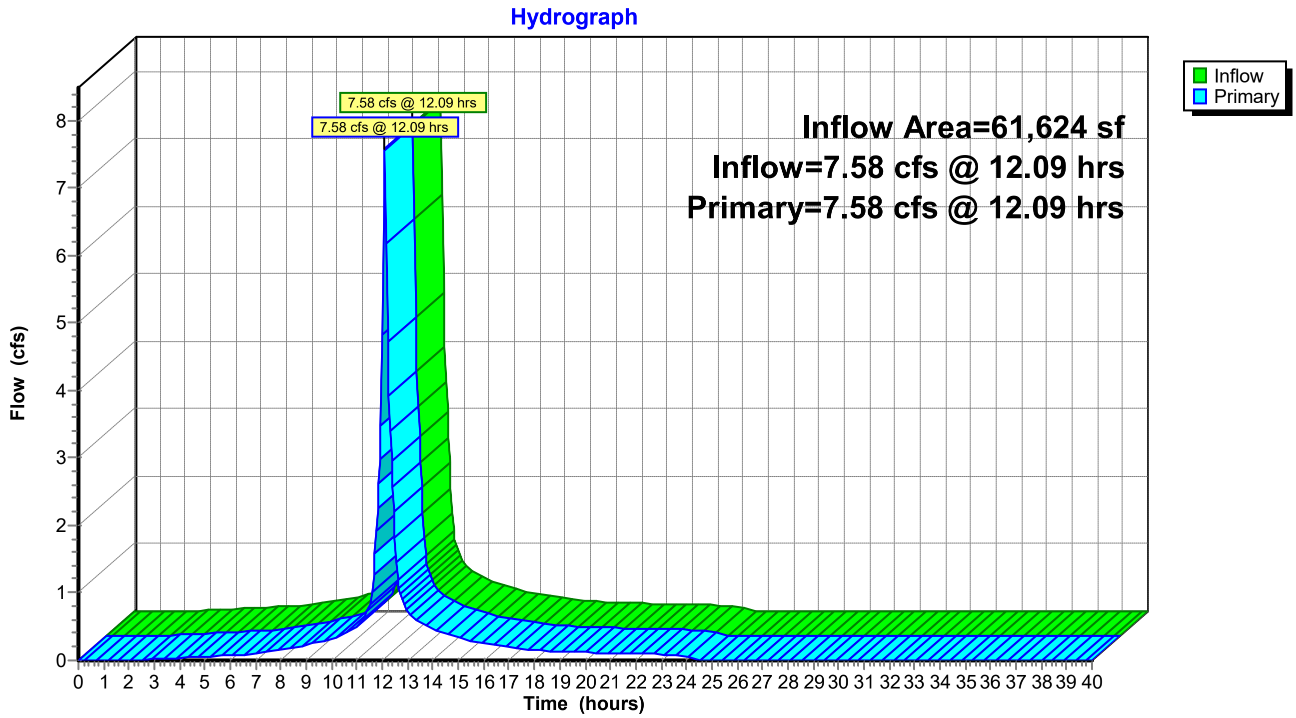


Summary for Link 1L: ROCK POND

Inflow Area =	61,624 sf,	77.85% Impervious,	Inflow Depth = 5.33"	for 50 YEAR event	
Inflow =	7.58 cfs @	12.09 hrs,	Volume=	27,395 cf	
Primary =	7.58 cfs @	12.09 hrs,	Volume=	27,395 cf,	Atten= 0%, Lag= 0.0 min

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

Link 1L: ROCK POND

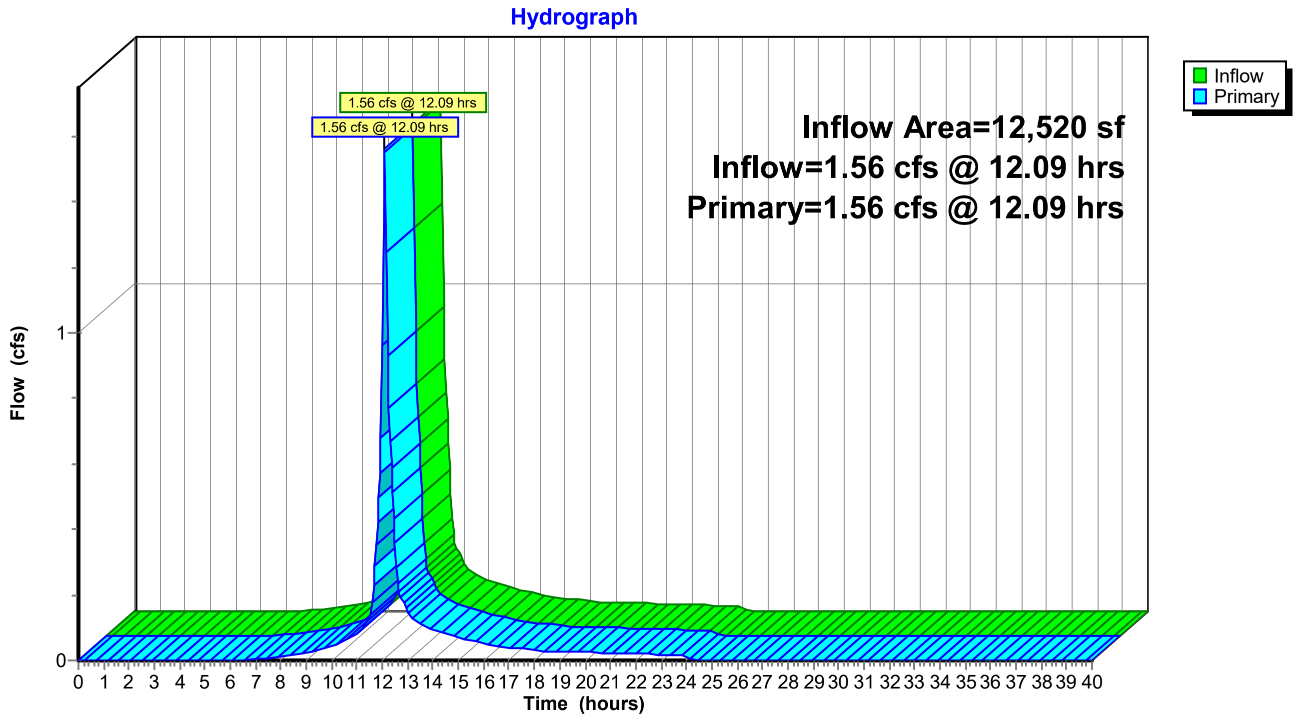


Summary for Link 2L: WEST MAIN STREET

Inflow Area =	12,520 sf,	71.81% Impervious,	Inflow Depth = 4.79"	for 50 YEAR event	
Inflow =	1.56 cfs @	12.09 hrs,	Volume=	4,994 cf	
Primary =	1.56 cfs @	12.09 hrs,	Volume=	4,994 cf,	Atten= 0%, Lag= 0.0 min

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

Link 2L: WEST MAIN STREET



Summary for Subcatchment 1S:

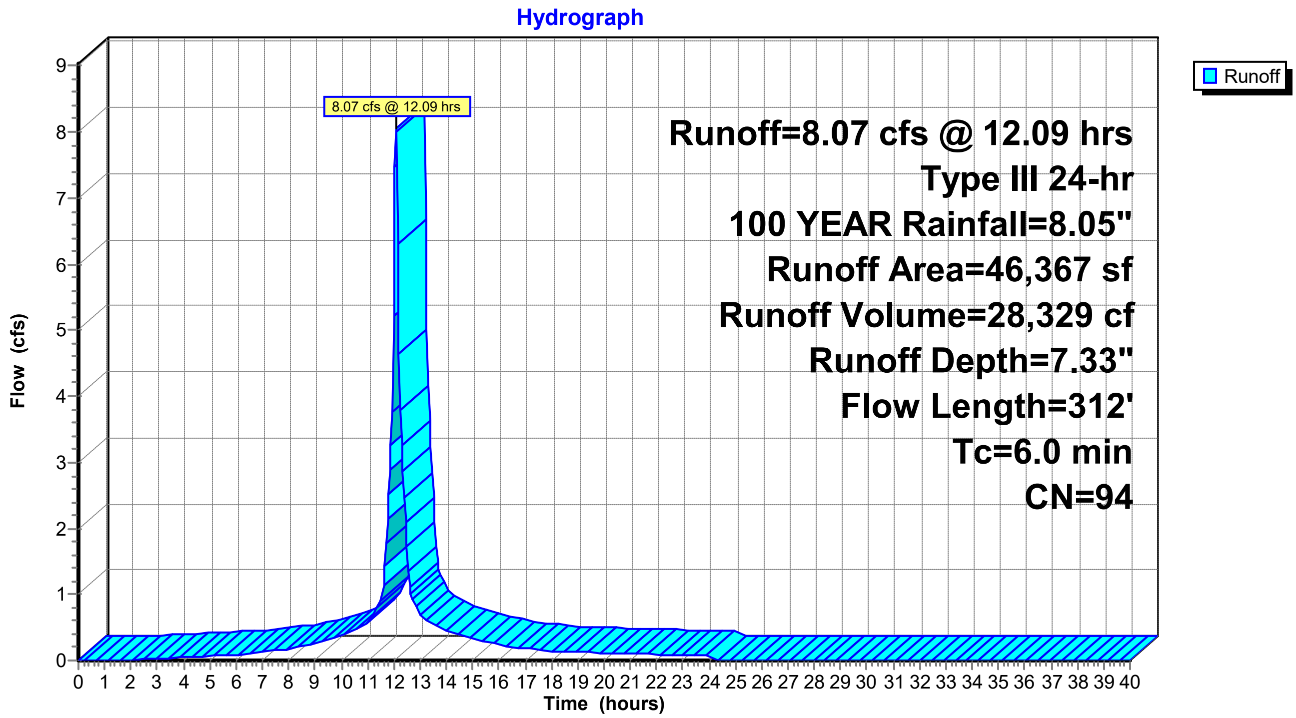
Runoff = 8.07 cfs @ 12.09 hrs, Volume= 28,329 cf, Depth= 7.33"
Routed to Link 1L : ROCK POND

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 YEAR Rainfall=8.05"

Area (sf)	CN	Description
2,919	39	>75% Grass cover, Good, HSG A
39,018	98	Paved parking, HSG A
4,430	98	Roofs, HSG A
46,367	94	Weighted Average
2,919		6.30% Pervious Area
43,448		93.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0510	1.75		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.22"
1.4	262	0.0240	3.14		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.9	312	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 1S:



Summary for Subcatchment 2S:

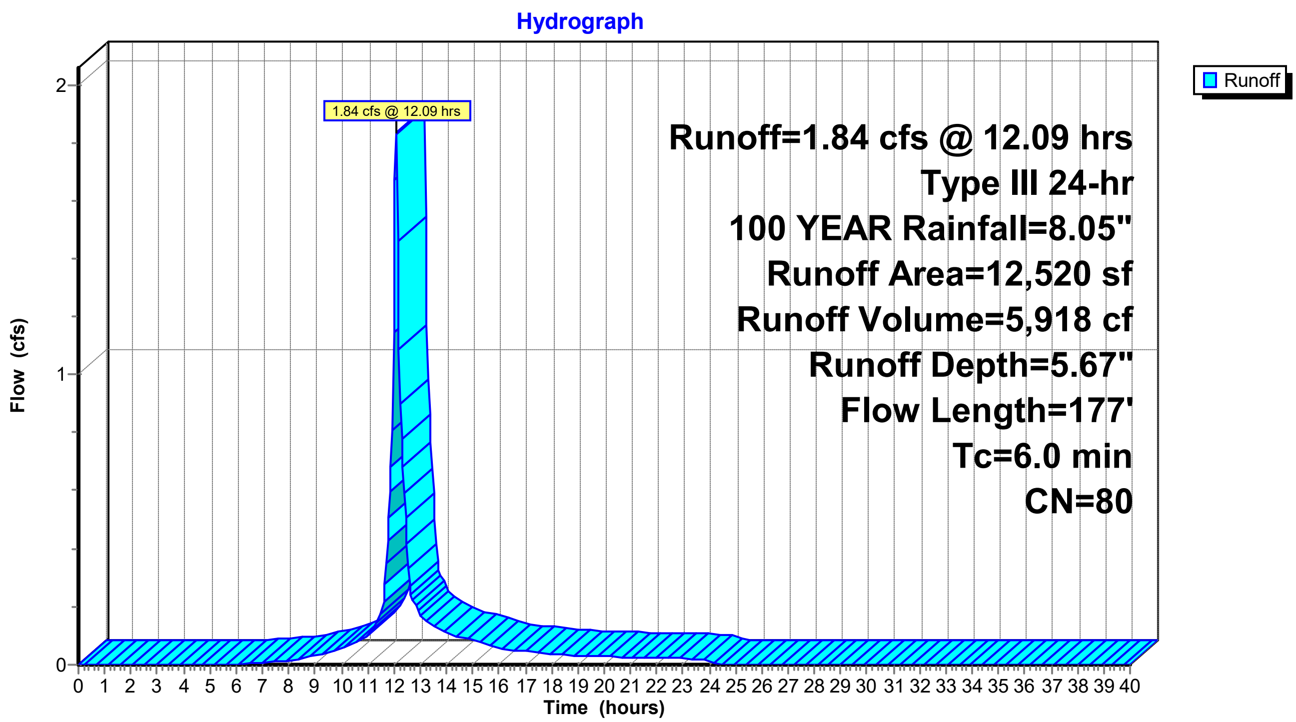
Runoff = 1.84 cfs @ 12.09 hrs, Volume= 5,918 cf, Depth= 5.67"
Routed to Link 2L : WEST MAIN STREET

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 YEAR Rainfall=8.05"

Area (sf)	CN	Description
1,866	39	>75% Grass cover, Good, HSG A
1,664	30	Woods, Good, HSG A
7,777	98	Paved parking, HSG A
1,213	98	Roofs, HSG A
12,520	80	Weighted Average
3,530		28.19% Pervious Area
8,990		71.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0400	1.59		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.22"
0.7	127	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.2	177	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2S:



Summary for Subcatchment 3S:

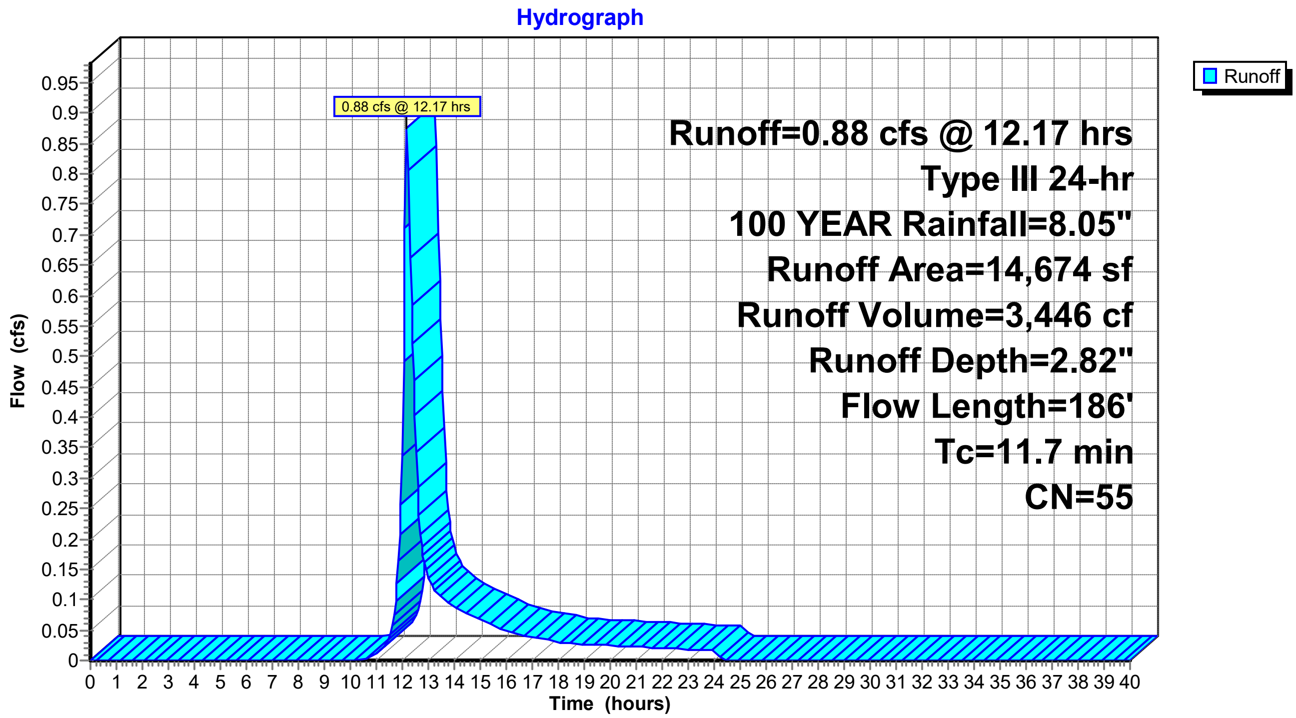
Runoff = 0.88 cfs @ 12.17 hrs, Volume= 3,446 cf, Depth= 2.82"
Routed to Link 1L : ROCK POND

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 YEAR Rainfall=8.05"

Area (sf)	CN	Description
6,034	39	>75% Grass cover, Good, HSG A
4,113	30	Woods, Good, HSG A
4,527	98	Roofs, HSG A
14,674	55	Weighted Average
10,147		69.15% Pervious Area
4,527		30.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.1	50	0.0260	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.22"
0.6	136	0.0550	3.78		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.7	186	Total			

Subcatchment 3S:



Summary for Subcatchment 4S:

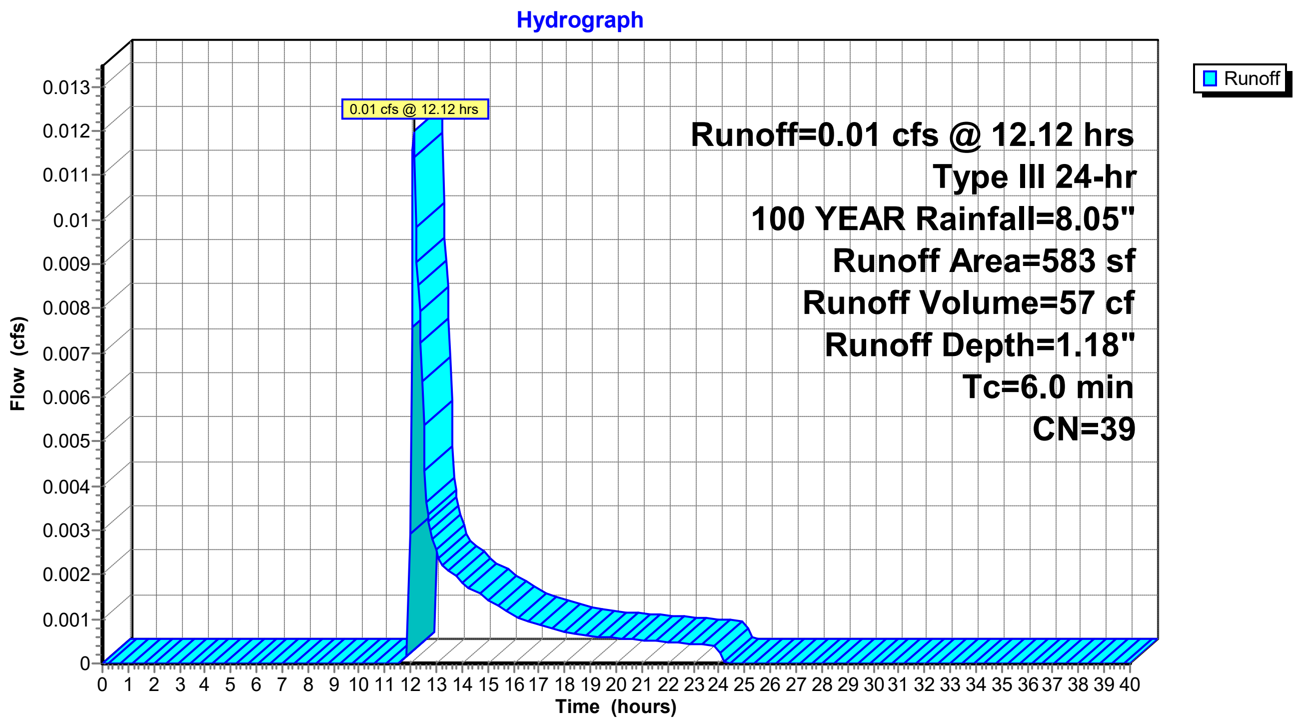
Runoff = 0.01 cfs @ 12.12 hrs, Volume= 57 cf, Depth= 1.18"
Routed to Link 1L : ROCK POND

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 YEAR Rainfall=8.05"

Area (sf)	CN	Description
583	39	>75% Grass cover, Good, HSG A
583		100.00% Pervious Area

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

Subcatchment 4S:

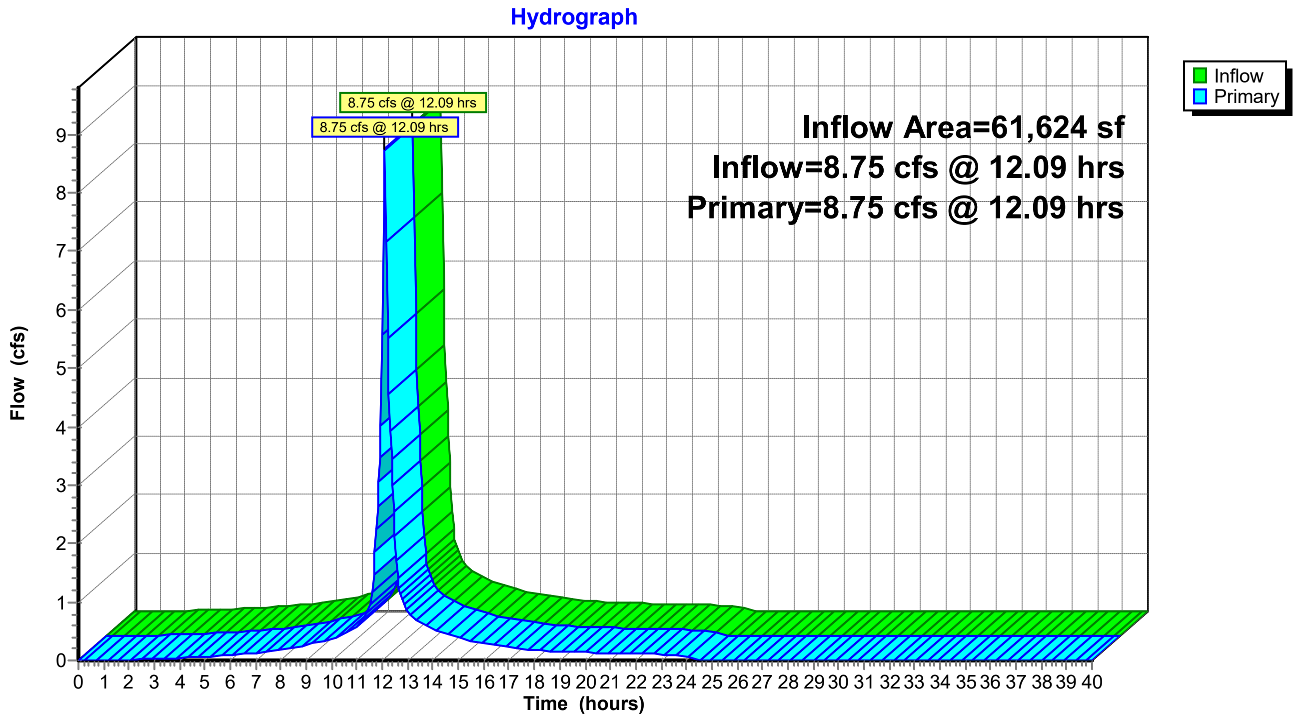


Summary for Link 1L: ROCK POND

Inflow Area =	61,624 sf,	77.85% Impervious,	Inflow Depth = 6.20"	for 100 YEAR event
Inflow =	8.75 cfs @	12.09 hrs, Volume=	31,832 cf	
Primary =	8.75 cfs @	12.09 hrs, Volume=	31,832 cf,	Atten= 0%, Lag= 0.0 min

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

Link 1L: ROCK POND

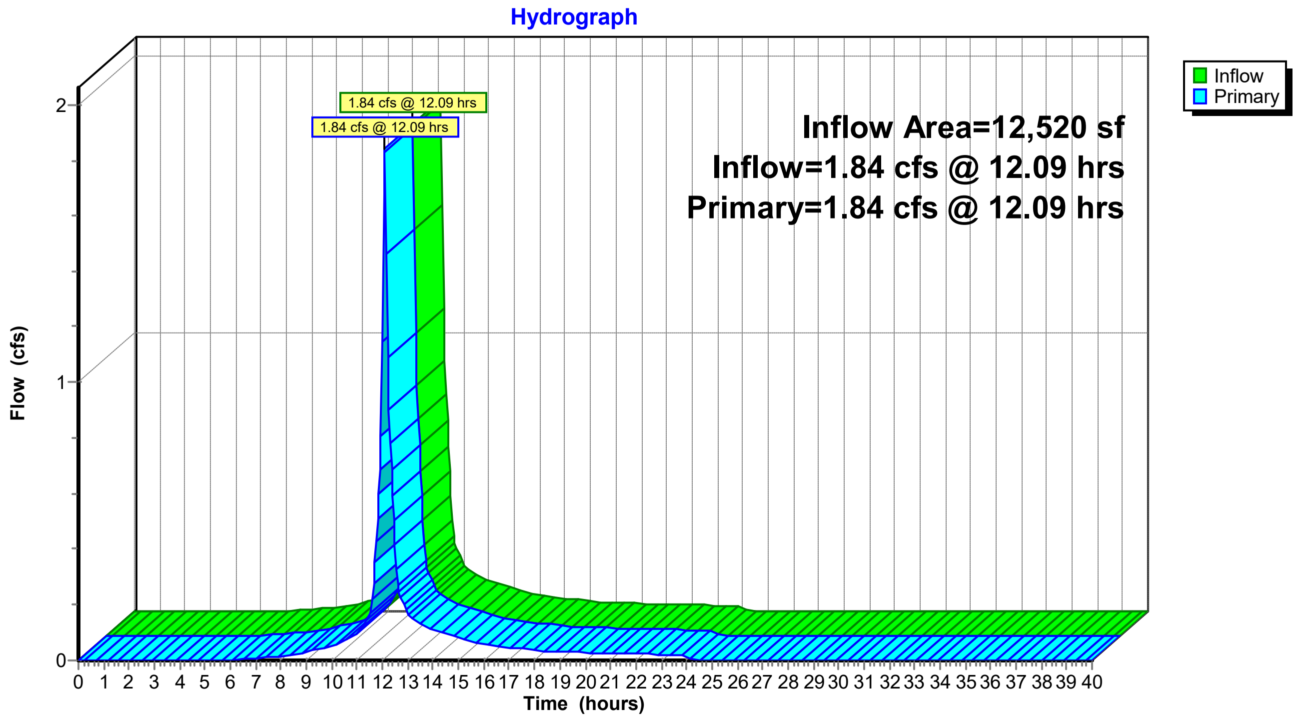


Summary for Link 2L: WEST MAIN STREET

Inflow Area = 12,520 sf, 71.81% Impervious, Inflow Depth = 5.67" for 100 YEAR event
Inflow = 1.84 cfs @ 12.09 hrs, Volume= 5,918 cf
Primary = 1.84 cfs @ 12.09 hrs, Volume= 5,918 cf, Atten= 0%, Lag= 0.0 min

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

Link 2L: WEST MAIN STREET



Events for Subcatchment 1S:

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2 YEAR	3.22	2.99	9,904	2.56
10 YEAR	5.08	4.97	16,951	4.39
25 YEAR	6.25	6.19	21,423	5.54
50 YEAR	7.10	7.08	24,681	6.39
100 YEAR	**8.05**	**8.07**	**28,329**	**7.33**

Events for Subcatchment 2S:

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2 YEAR	3.22	0.46	1,479	1.42
10 YEAR	5.08	0.98	3,091	2.96
25 YEAR	6.25	1.31	4,181	4.01
50 YEAR	7.10	1.56	4,994	4.79
100 YEAR	**8.05**	**1.84**	**5,918**	**5.67**

Events for Subcatchment 3S:

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2 YEAR	3.22	0.03	314	0.26
10 YEAR	5.08	0.26	1,247	1.02
25 YEAR	6.25	0.48	2,034	1.66
50 YEAR	7.10	0.66	2,675	2.19
100 YEAR	**8.05**	**0.88**	**3,446**	**2.82**

Events for Subcatchment 4S:

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2 YEAR	3.22	0.00	0	0.00
10 YEAR	5.08	0.00	11	0.22
25 YEAR	6.25	0.00	25	0.52
50 YEAR	7.10	0.01	39	0.80
100 YEAR	**8.05**	**0.01**	**57**	**1.18**

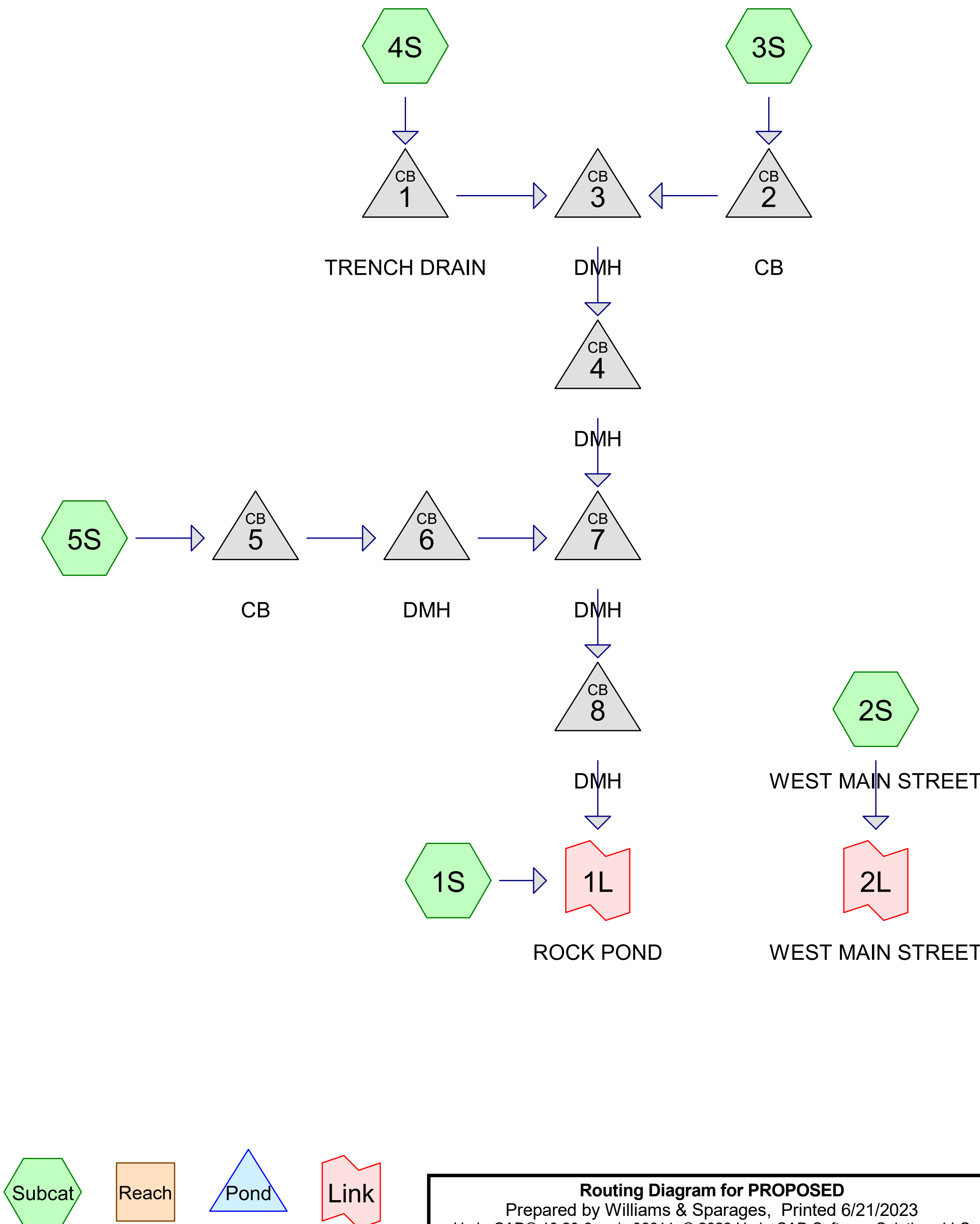
Events for Link 1L: ROCK POND

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)
2 YEAR	2.99	2.99	**0.00**
10 YEAR	5.14	5.14	0.00
25 YEAR	6.54	6.54	0.00
50 YEAR	7.58	7.58	0.00
100 YEAR	**8.75**	**8.75**	0.00

Events for Link 2L: WEST MAIN STREET

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)
2 YEAR	0.46	0.46	**0.00**
10 YEAR	0.98	0.98	0.00
25 YEAR	1.31	1.31	0.00
50 YEAR	1.56	1.56	0.00
100 YEAR	**1.84**	**1.84**	0.00

1.9.2 Proposed Condition



Routing Diagram for PROPOSED
Prepared by Williams & Sparages, Printed 6/21/2023
HydroCAD® 10.20-3c s/n 06611 © 2023 HydroCAD Software Solutions LLC

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2 YEAR	Type III 24-hr		Default	24.00	1	3.22	2
2	10 YEAR	Type III 24-hr		Default	24.00	1	5.08	2
3	25 YEAR	Type III 24-hr		Default	24.00	1	6.25	2
4	50 YEAR	Type III 24-hr		Default	24.00	1	7.10	2
5	100 YEAR	Type III 24-hr		Default	24.00	1	8.05	2

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
33,680	39	>75% Grass cover, Good, HSG A (1S, 2S, 3S, 4S, 5S)
21,109	98	Paved parking, HSG A (1S, 2S, 3S, 4S, 5S)
15,150	98	Roofs, HSG A (1S, 3S, 4S, 5S)
4,205	30	Woods, Good, HSG A (1S, 2S, 5S)
74,144	**67**	**TOTAL AREA**

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)	Node Name
1	1	91.37	89.31	40.0	0.0515	0.010	0.0	8.0	0.0	
2	2	89.00	88.98	2.0	0.0100	0.012	0.0	12.0	0.0	
3	3	88.98	88.49	49.0	0.0100	0.012	0.0	12.0	0.0	
4	4	88.49	88.00	24.0	0.0204	0.012	0.0	12.0	0.0	
5	5	88.73	88.18	55.0	0.0100	0.012	0.0	12.0	0.0	
6	6	88.18	86.28	93.0	0.0204	0.012	0.0	12.0	0.0	
7	7	86.28	84.77	75.0	0.0201	0.012	0.0	12.0	0.0	
8	8	84.77	82.60	109.0	0.0199	0.012	0.0	12.0	0.0	

Summary for Subcatchment 1S:

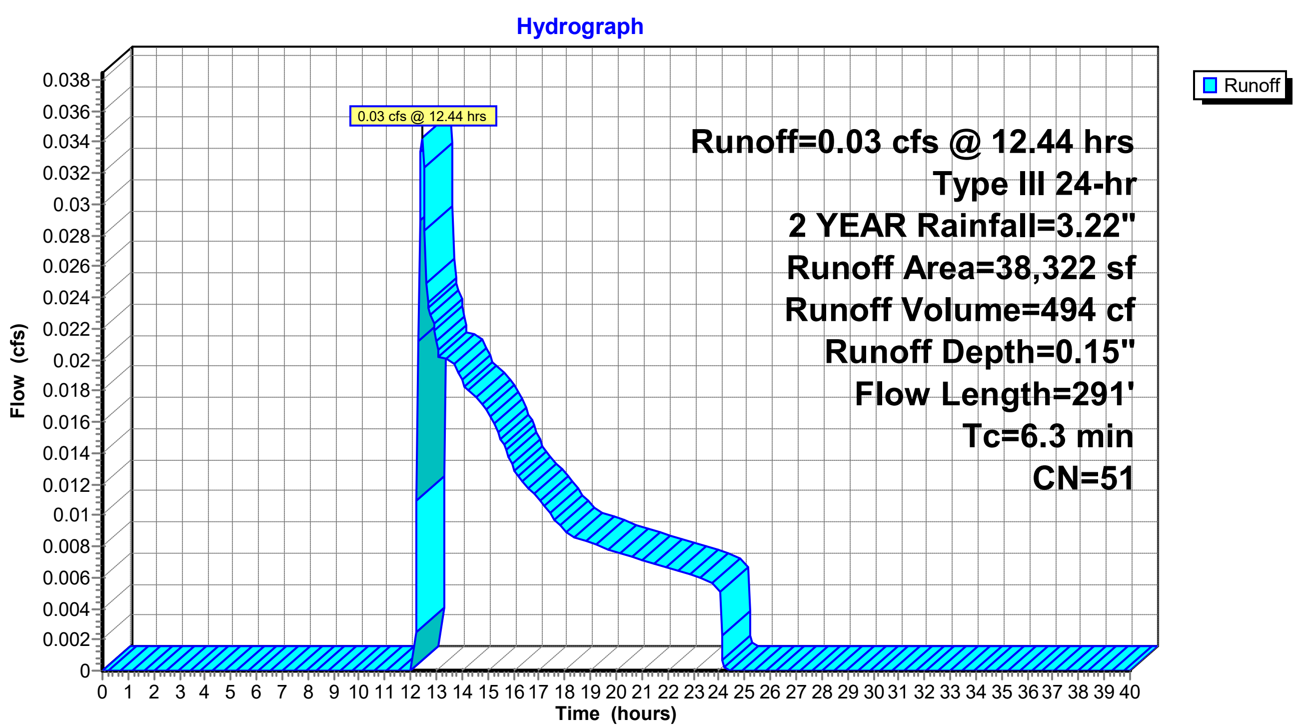
Runoff = 0.03 cfs @ 12.44 hrs, Volume= 494 cf, Depth= 0.15"
Routed to Link 1L : ROCK POND

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 YEAR Rainfall=3.22"

Area (sf)	CN	Description
26,450	39	>75% Grass cover, Good, HSG A
3,425	30	Woods, Good, HSG A
1,094	98	Paved parking, HSG A
7,353	98	Roofs, HSG A
38,322	51	Weighted Average
29,875		77.96% Pervious Area
8,447		22.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	50	0.0720	0.17		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.22"
1.4	241	0.0300	2.79		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
6.3	291	Total			

Subcatchment 1S:



Summary for Subcatchment 2S: WEST MAIN STREET

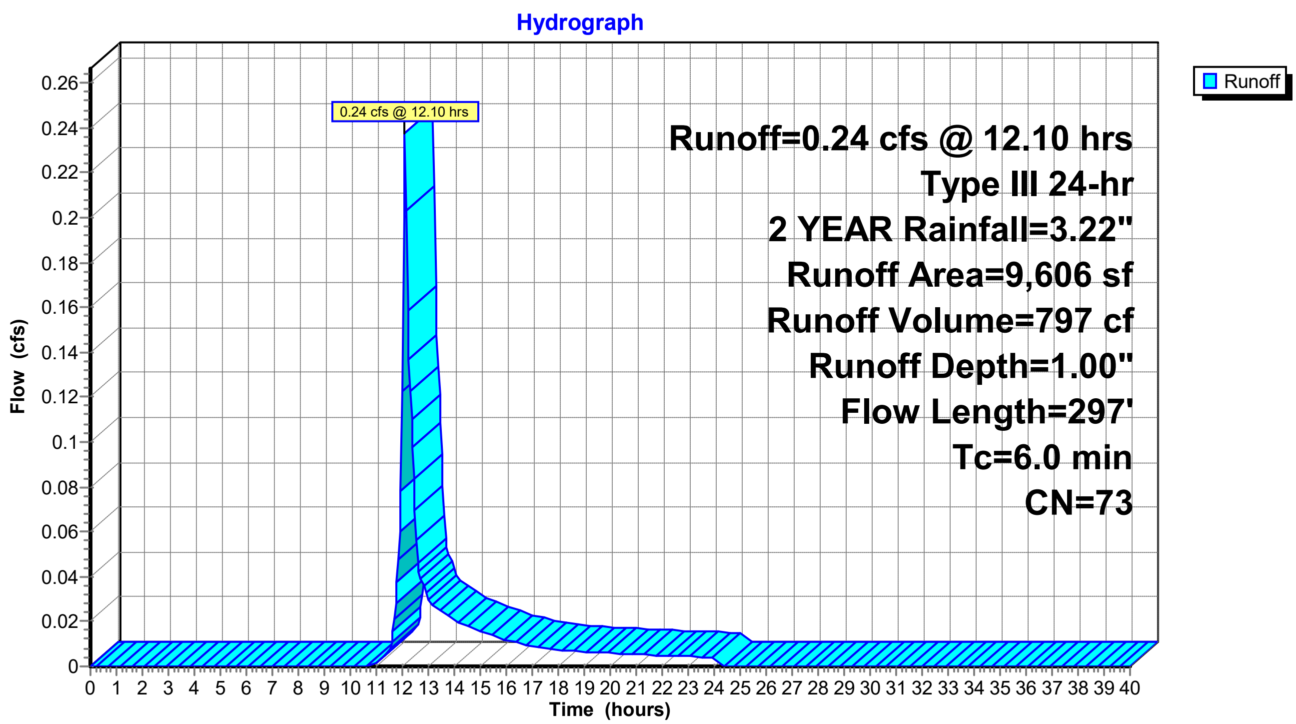
Runoff = 0.24 cfs @ 12.10 hrs, Volume= 797 cf, Depth= 1.00"
Routed to Link 2L : WEST MAIN STREET

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 YEAR Rainfall=3.22"

Area (sf)	CN	Description
3,801	39	>75% Grass cover, Good, HSG A
269	30	Woods, Good, HSG A
5,536	98	Paved parking, HSG A
9,606	73	Weighted Average
4,070		42.37% Pervious Area
5,536		57.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	50	0.5400	4.49		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.22"
1.2	247	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.4	297	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2S: WEST MAIN STREET



Summary for Subcatchment 3S:

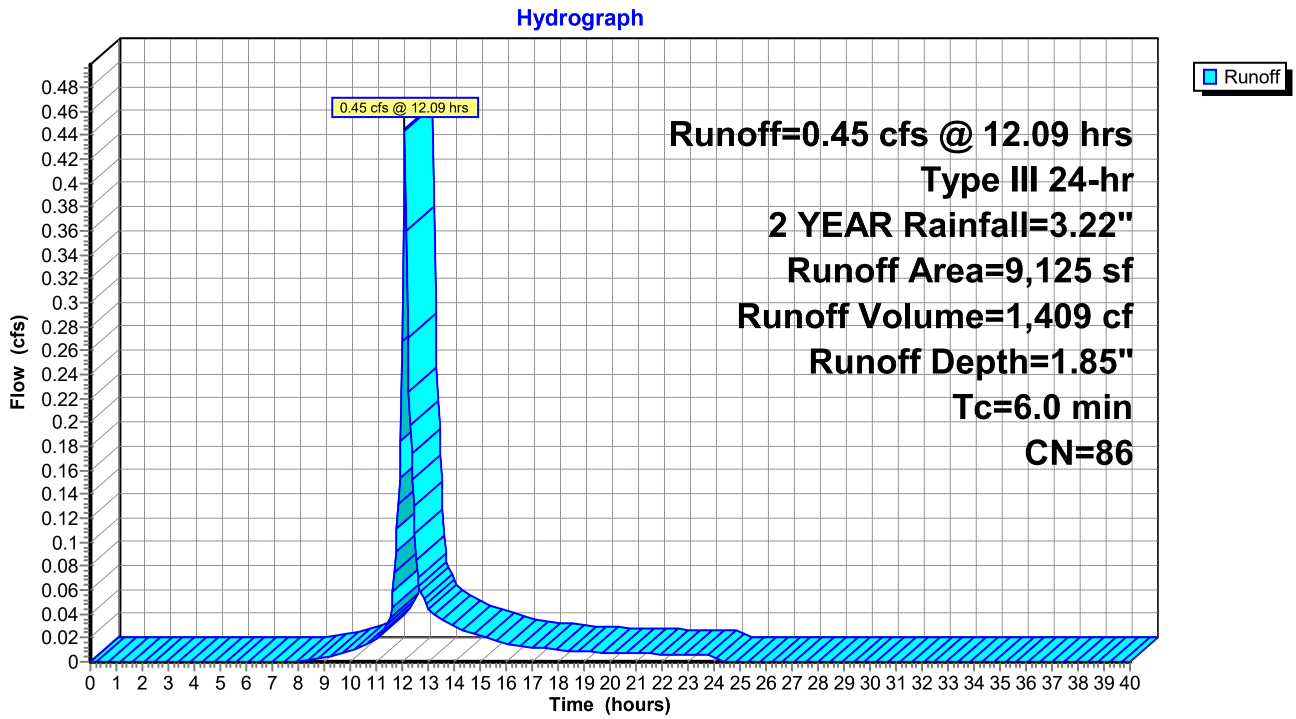
Runoff = 0.45 cfs @ 12.09 hrs, Volume= 1,409 cf, Depth= 1.85"
Routed to Pond 2 : CB

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 YEAR Rainfall=3.22"

Area (sf)	CN	Description
1,914	39	>75% Grass cover, Good, HSG A
4,721	98	Paved parking, HSG A
2,490	98	Roofs, HSG A
9,125	86	Weighted Average
1,914		20.98% Pervious Area
7,211		79.02% Impervious Area

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

Subcatchment 3S:



Summary for Subcatchment 4S:

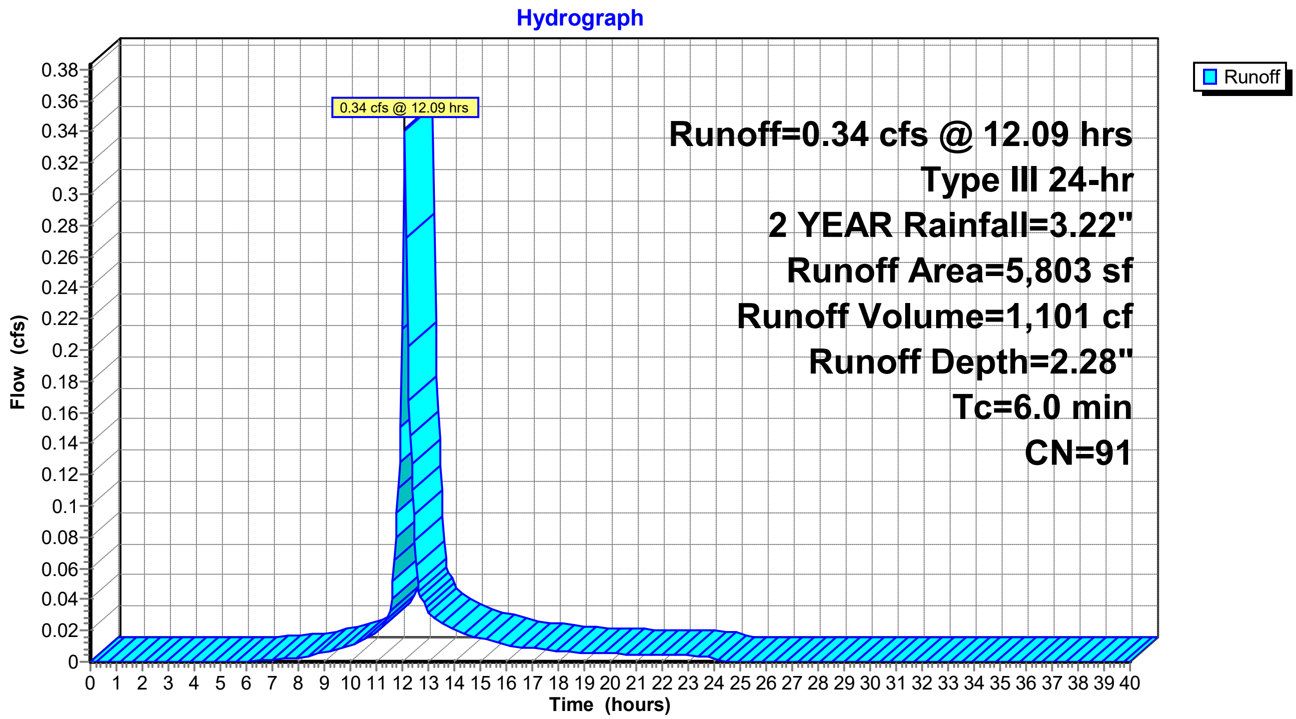
Runoff = 0.34 cfs @ 12.09 hrs, Volume= 1,101 cf, Depth= 2.28"
Routed to Pond 1 : TRENCH DRAIN

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 YEAR Rainfall=3.22"

Area (sf)	CN	Description
737	39	>75% Grass cover, Good, HSG A
3,150	98	Paved parking, HSG A
1,916	98	Roofs, HSG A
5,803	91	Weighted Average
737		12.70% Pervious Area
5,066		87.30% Impervious Area

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

Subcatchment 4S:



Summary for Subcatchment 5S:

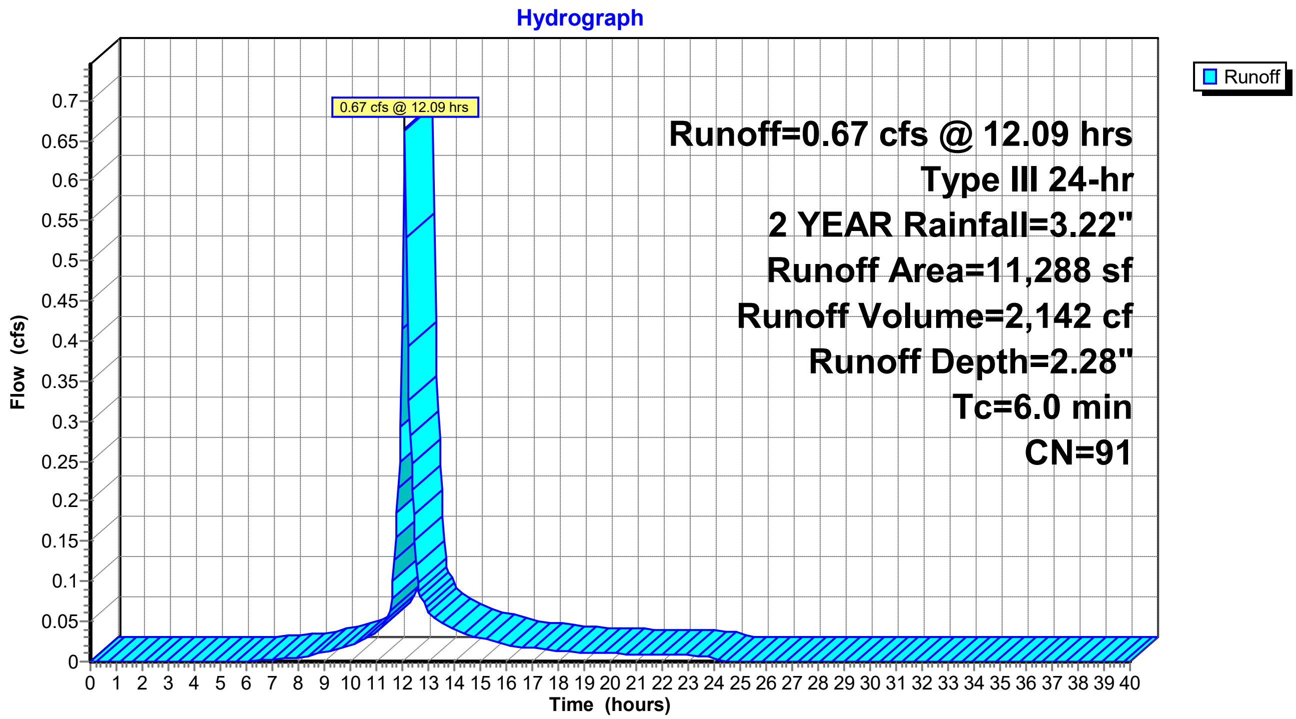
Runoff = 0.67 cfs @ 12.09 hrs, Volume= 2,142 cf, Depth= 2.28"
Routed to Pond 5 : CB

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 YEAR Rainfall=3.22"

Area (sf)	CN	Description
778	39	>75% Grass cover, Good, HSG A
511	30	Woods, Good, HSG A
6,608	98	Paved parking, HSG A
3,391	98	Roofs, HSG A
11,288	91	Weighted Average
1,289		11.42% Pervious Area
9,999		88.58% Impervious Area

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

Subcatchment 5S:



Summary for Pond 1: TRENCH DRAIN

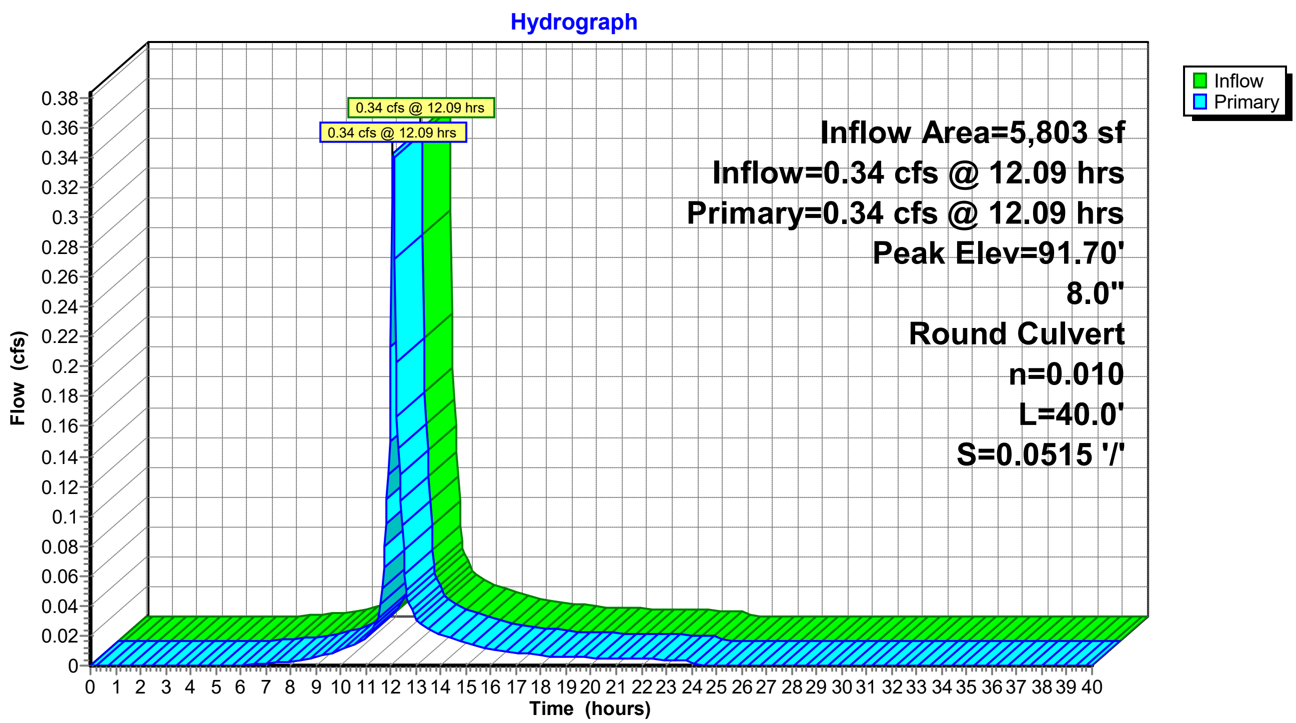
Inflow Area = 5,803 sf, 87.30% Impervious, Inflow Depth = 2.28" for 2 YEAR event
Inflow = 0.34 cfs @ 12.09 hrs, Volume= 1,101 cf
Outflow = 0.34 cfs @ 12.09 hrs, Volume= 1,101 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.34 cfs @ 12.09 hrs, Volume= 1,101 cf
Routed to Pond 3 : DMH

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 91.70' @ 12.09 hrs
Flood Elev= 92.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	91.37'	**8.0" Round Culvert** L= 40.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 91.37' / 89.31' S= 0.0515 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=0.33 cfs @ 12.09 hrs HW=91.70' TW=89.44' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.33 cfs @ 1.95 fps)

Pond 1: TRENCH DRAIN



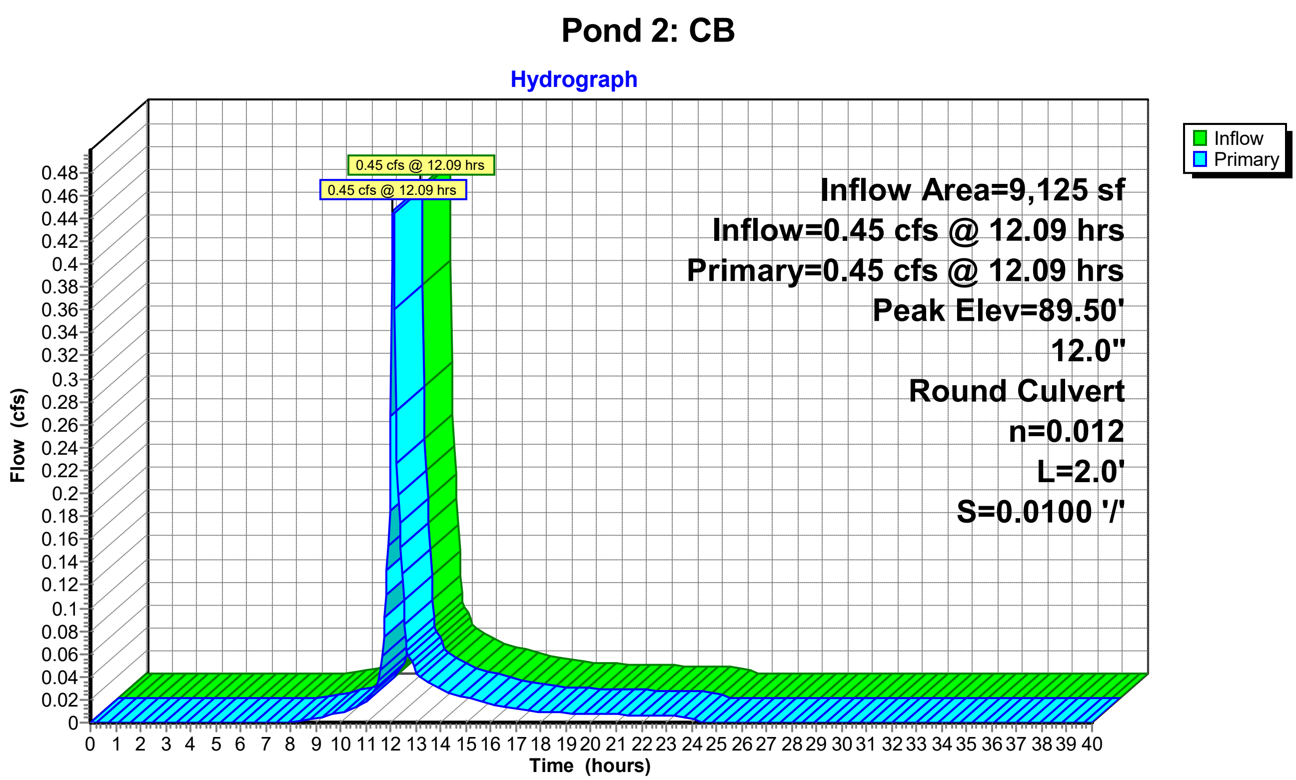
Summary for Pond 2: CB

Inflow Area = 9,125 sf, 79.02% Impervious, Inflow Depth = 1.85" for 2 YEAR event
Inflow = 0.45 cfs @ 12.09 hrs, Volume= 1,409 cf
Outflow = 0.45 cfs @ 12.09 hrs, Volume= 1,409 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.45 cfs @ 12.09 hrs, Volume= 1,409 cf
Routed to Pond 3 : DMH

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 89.50' @ 12.13 hrs
Flood Elev= 93.15'

Device	Routing	Invert	Outlet Devices
#1	Primary	89.00'	**12.0" Round Culvert** L= 2.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 89.00' / 88.98' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.28 cfs @ 12.09 hrs HW=89.47' TW=89.44' (Dynamic Tailwater)
1=Culvert (Outlet Controls 0.28 cfs @ 1.13 fps)



Summary for Pond 3: DMH

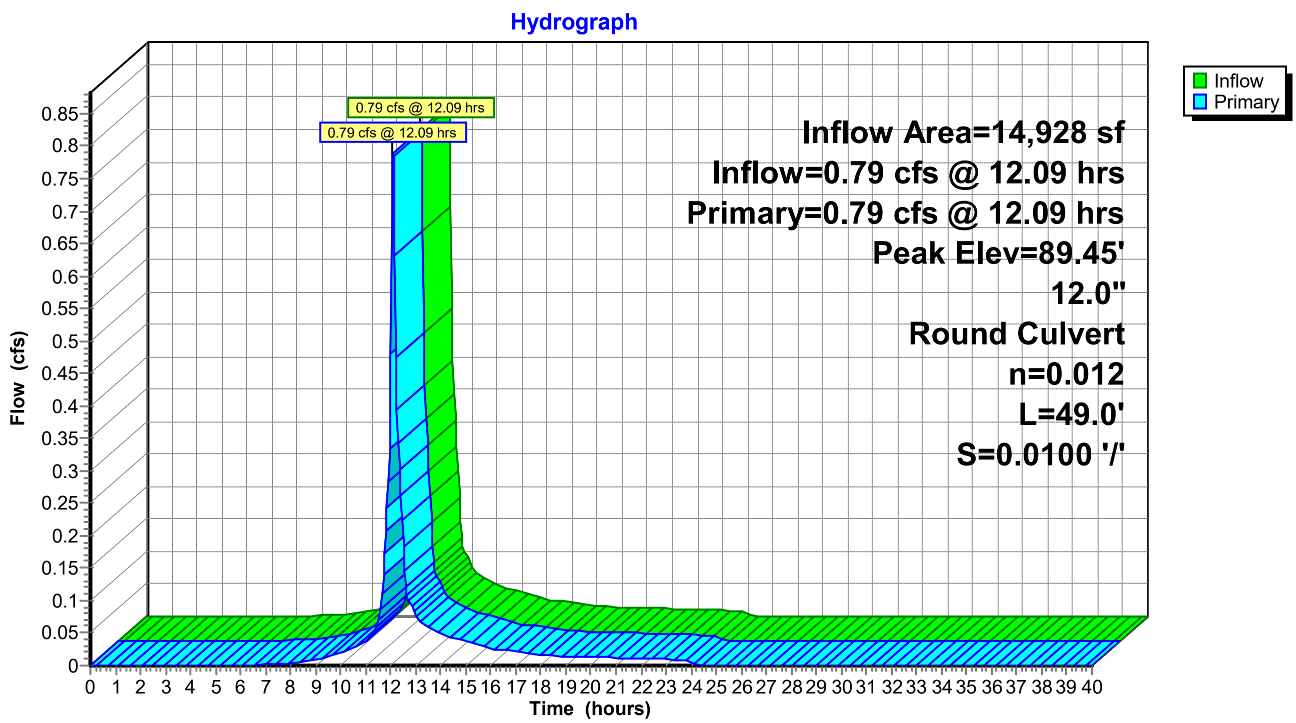
Inflow Area = 14,928 sf, 82.24% Impervious, Inflow Depth = 2.02" for 2 YEAR event
Inflow = 0.79 cfs @ 12.09 hrs, Volume= 2,510 cf
Outflow = 0.79 cfs @ 12.09 hrs, Volume= 2,510 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.79 cfs @ 12.09 hrs, Volume= 2,510 cf
Routed to Pond 4 : DMH

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 89.45' @ 12.10 hrs
Flood Elev= 93.42'

Device	Routing	Invert	Outlet Devices
#1	Primary	88.98'	**12.0" Round Culvert** L= 49.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 88.98' / 88.49' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.75 cfs @ 12.09 hrs HW=89.44' TW=88.94' (Dynamic Tailwater)
1=Culvert (Outlet Controls 0.75 cfs @ 3.10 fps)

Pond 3: DMH



Summary for Pond 4: DMH

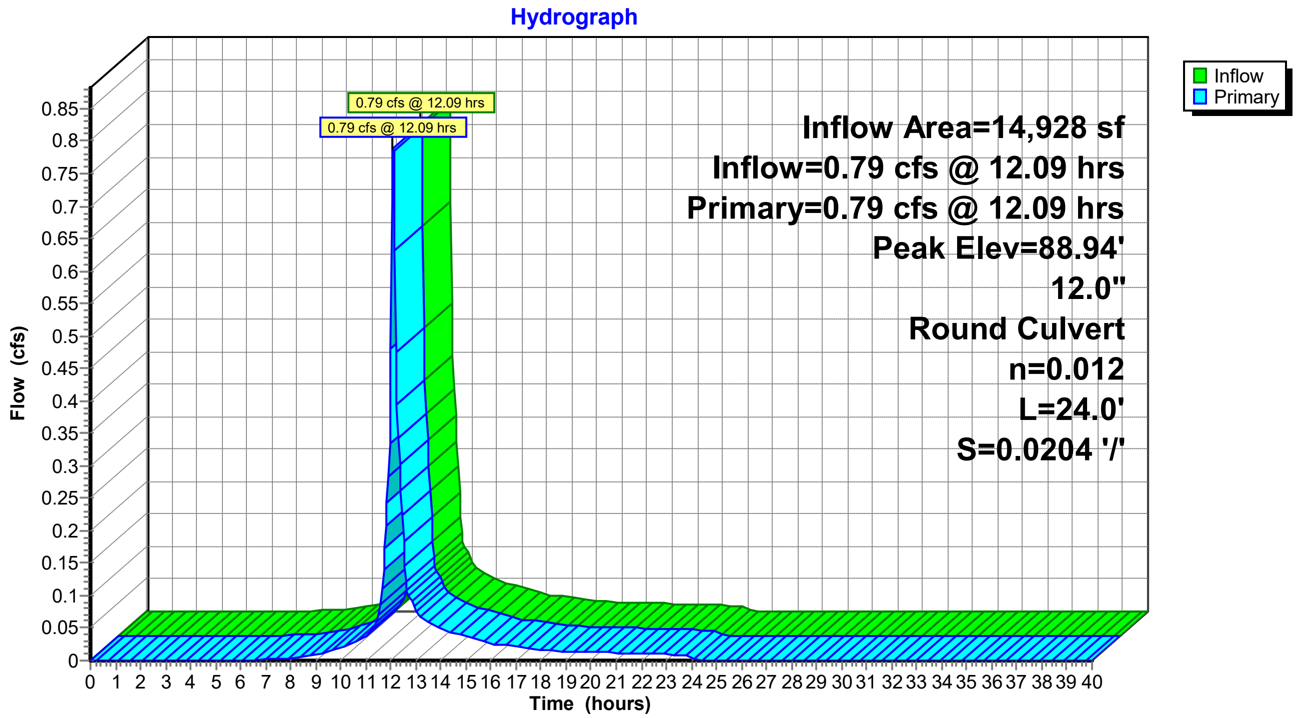
Inflow Area = 14,928 sf, 82.24% Impervious, Inflow Depth = 2.02" for 2 YEAR event
Inflow = 0.79 cfs @ 12.09 hrs, Volume= 2,510 cf
Outflow = 0.79 cfs @ 12.09 hrs, Volume= 2,510 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.79 cfs @ 12.09 hrs, Volume= 2,510 cf
Routed to Pond 7 : DMH

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 88.94' @ 12.09 hrs
Flood Elev= 95.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	88.49'	**12.0" Round Culvert** L= 24.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 88.49' / 88.00' S= 0.0204 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.77 cfs @ 12.09 hrs HW=88.94' TW=86.91' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.77 cfs @ 2.27 fps)

Pond 4: DMH



Summary for Pond 5: CB

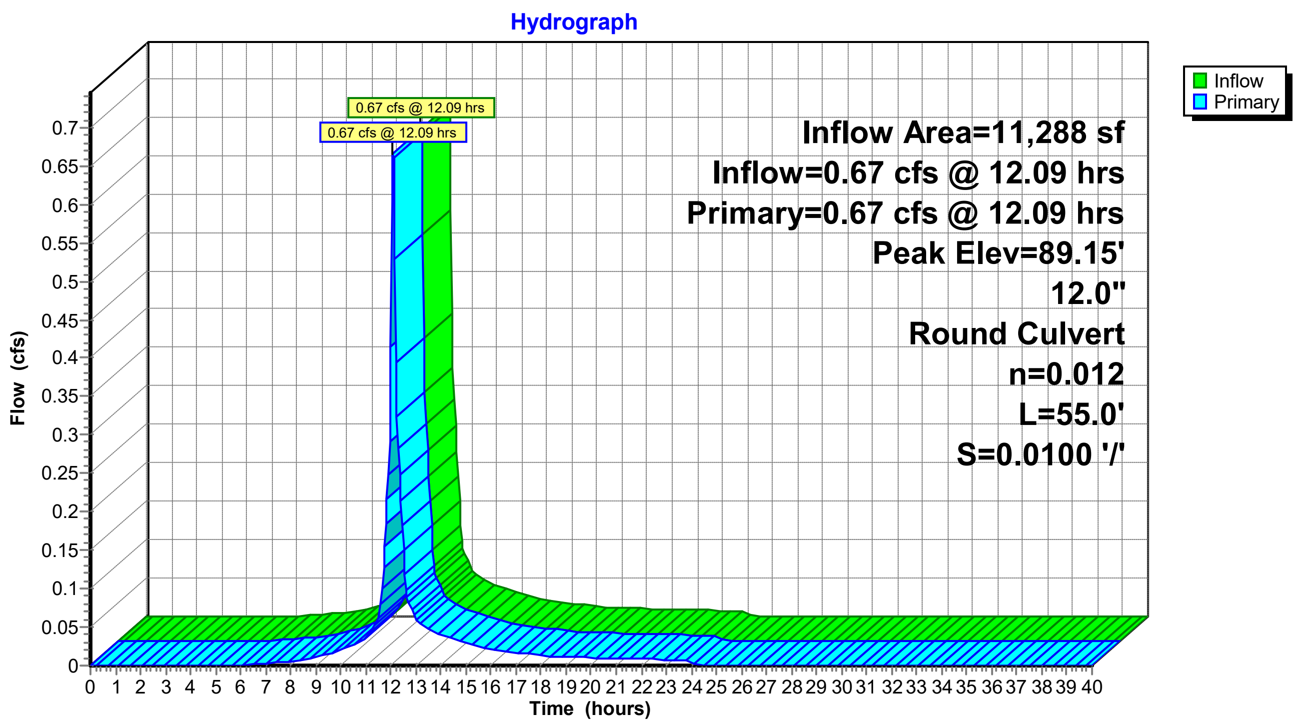
Inflow Area = 11,288 sf, 88.58% Impervious, Inflow Depth = 2.28" for 2 YEAR event
Inflow = 0.67 cfs @ 12.09 hrs, Volume= 2,142 cf
Outflow = 0.67 cfs @ 12.09 hrs, Volume= 2,142 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.67 cfs @ 12.09 hrs, Volume= 2,142 cf
Routed to Pond 6 : DMH

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 89.15' @ 12.10 hrs
Flood Elev= 92.37'

Device	Routing	Invert	Outlet Devices
#1	Primary	88.73'	**12.0" Round Culvert** L= 55.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 88.73' / 88.18' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.63 cfs @ 12.09 hrs HW=89.14' TW=88.59' (Dynamic Tailwater)
└**1=Culvert** (Outlet Controls 0.63 cfs @ 3.05 fps)

Pond 5: CB



Summary for Pond 6: DMH

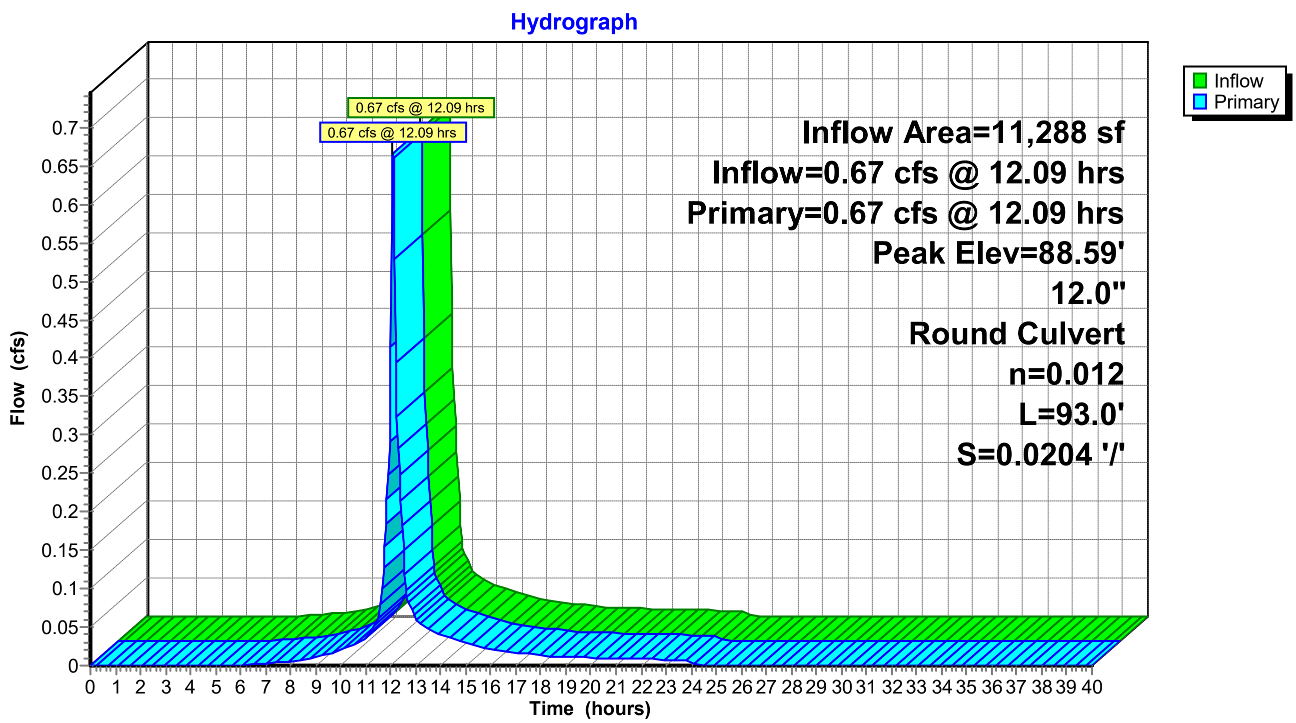
Inflow Area = 11,288 sf, 88.58% Impervious, Inflow Depth = 2.28" for 2 YEAR event
Inflow = 0.67 cfs @ 12.09 hrs, Volume= 2,142 cf
Outflow = 0.67 cfs @ 12.09 hrs, Volume= 2,142 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.67 cfs @ 12.09 hrs, Volume= 2,142 cf
Routed to Pond 7 : DMH

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 88.59' @ 12.09 hrs
Flood Elev= 95.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	88.18'	**12.0" Round Culvert** L= 93.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 88.18' / 86.28' S= 0.0204 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.65 cfs @ 12.09 hrs HW=88.59' TW=86.91' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.65 cfs @ 2.17 fps)

Pond 6: DMH



Summary for Pond 7: DMH

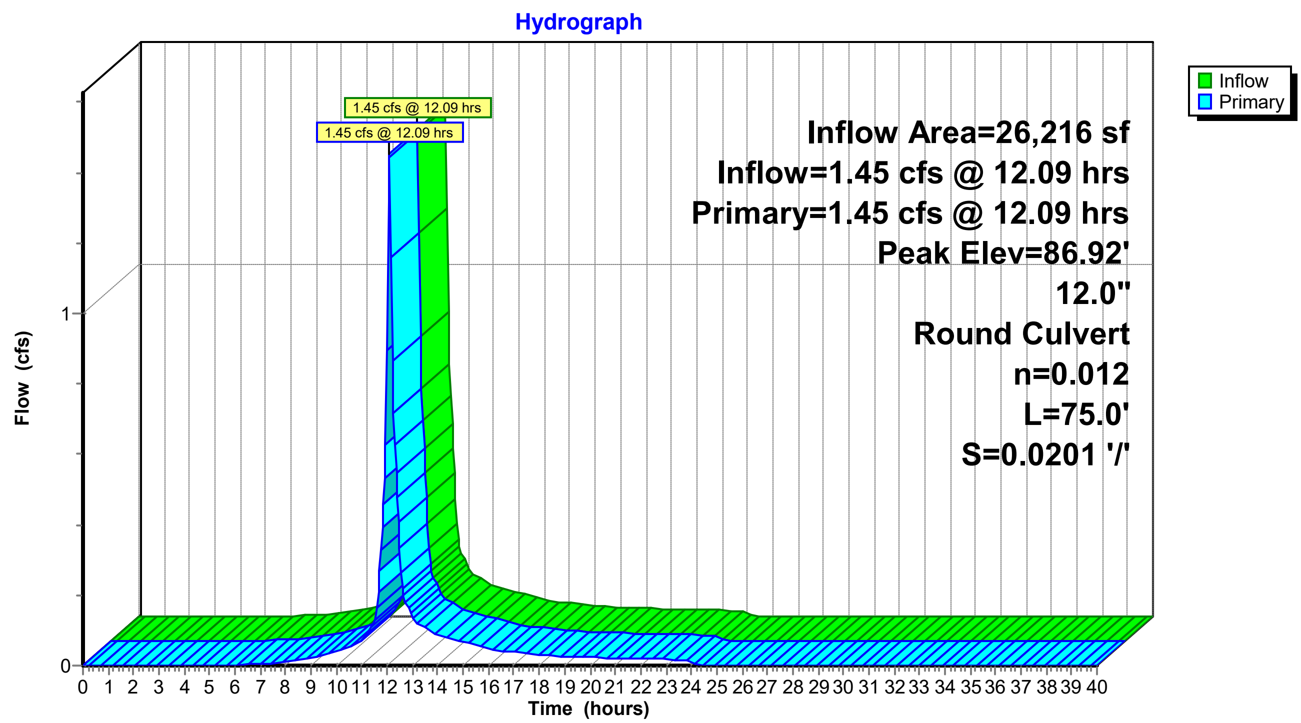
Inflow Area = 26,216 sf, 84.97% Impervious, Inflow Depth = 2.13" for 2 YEAR event
Inflow = 1.45 cfs @ 12.09 hrs, Volume= 4,652 cf
Outflow = 1.45 cfs @ 12.09 hrs, Volume= 4,652 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.45 cfs @ 12.09 hrs, Volume= 4,652 cf
Routed to Pond 8 : DMH

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 86.92' @ 12.09 hrs
Flood Elev= 95.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	86.28'	**12.0" Round Culvert** L= 75.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 86.28' / 84.77' S= 0.0201 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.42 cfs @ 12.09 hrs HW=86.91' TW=85.40' (Dynamic Tailwater)
1=Culvert (Inlet Controls 1.42 cfs @ 2.71 fps)

Pond 7: DMH



Summary for Pond 8: DMH

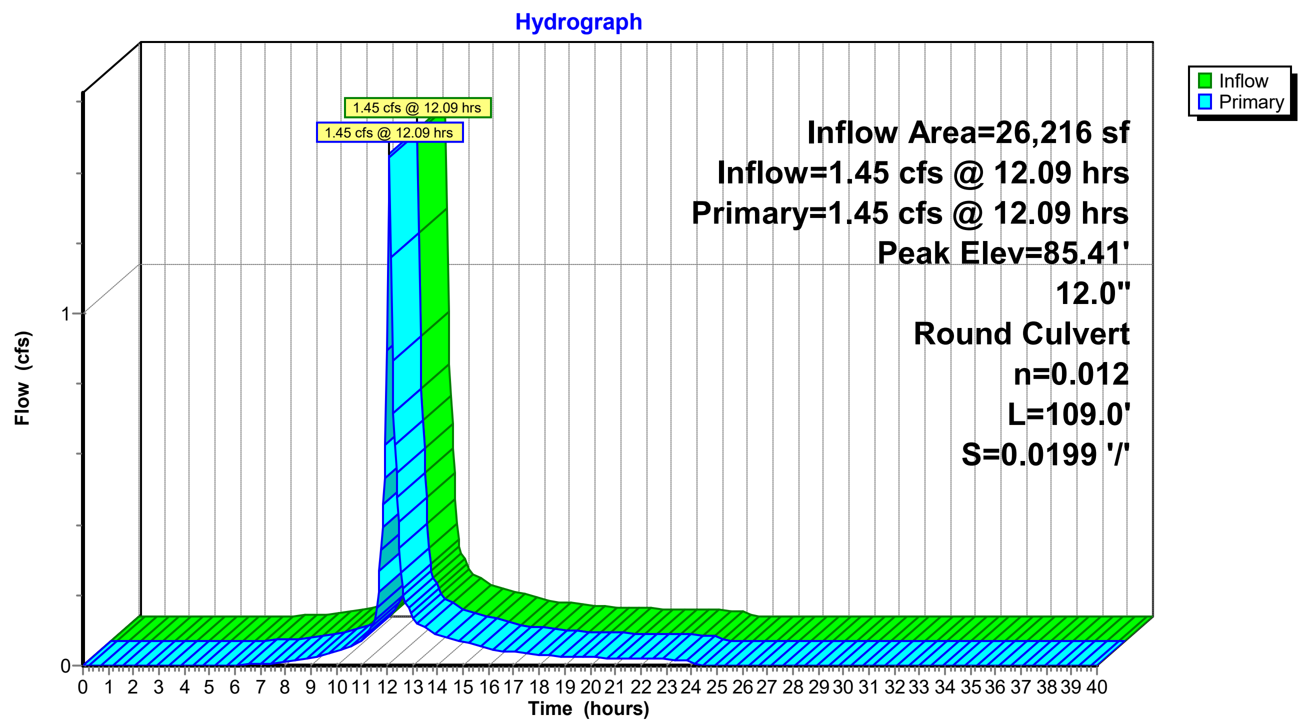
Inflow Area = 26,216 sf, 84.97% Impervious, Inflow Depth = 2.13" for 2 YEAR event
Inflow = 1.45 cfs @ 12.09 hrs, Volume= 4,652 cf
Outflow = 1.45 cfs @ 12.09 hrs, Volume= 4,652 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.45 cfs @ 12.09 hrs, Volume= 4,652 cf
Routed to Link 1L : ROCK POND

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 85.41' @ 12.09 hrs
Flood Elev= 88.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	84.77'	**12.0" Round Culvert** L= 109.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 84.77' / 82.60' S= 0.0199 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.42 cfs @ 12.09 hrs HW=85.40' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 1.42 cfs @ 2.71 fps)

Pond 8: DMH

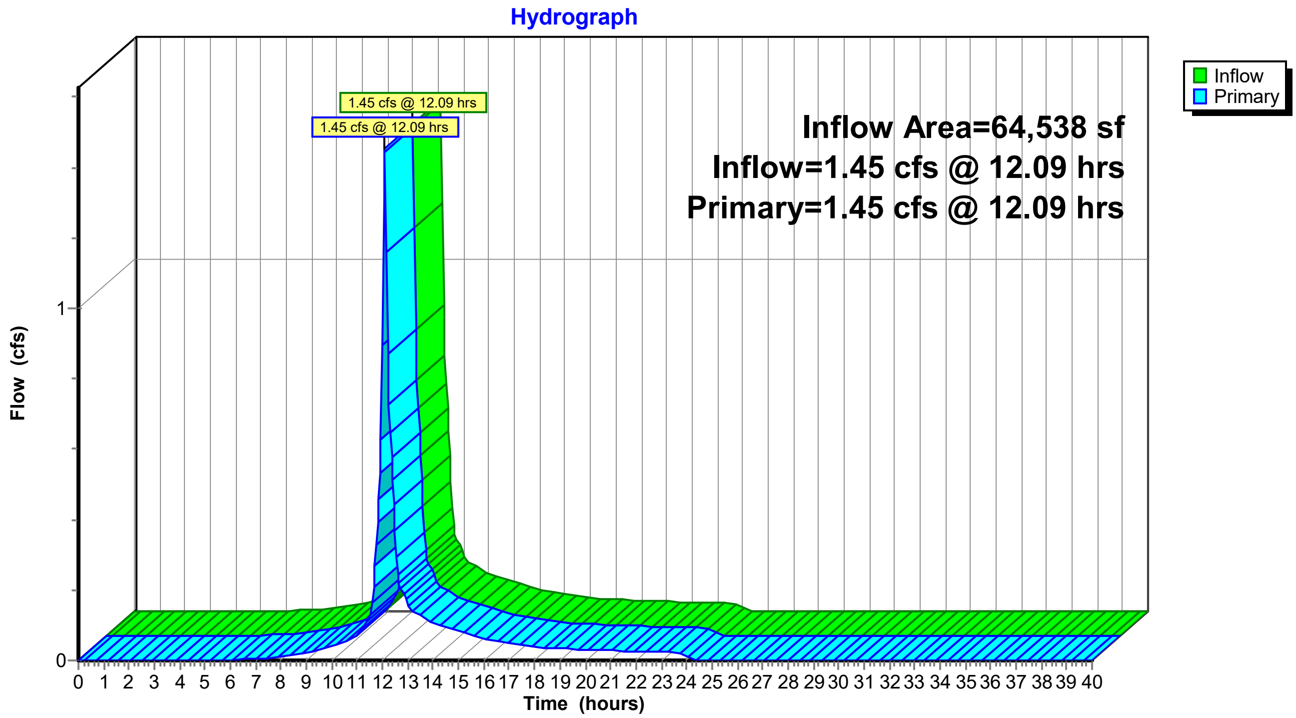


Summary for Link 1L: ROCK POND

Inflow Area =	64,538 sf,	47.60% Impervious,	Inflow Depth = 0.96"	for 2 YEAR event
Inflow =	1.45 cfs @	12.09 hrs, Volume=	5,145 cf	
Primary =	1.45 cfs @	12.09 hrs, Volume=	5,145 cf,	Atten= 0%, Lag= 0.0 min

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

Link 1L: ROCK POND

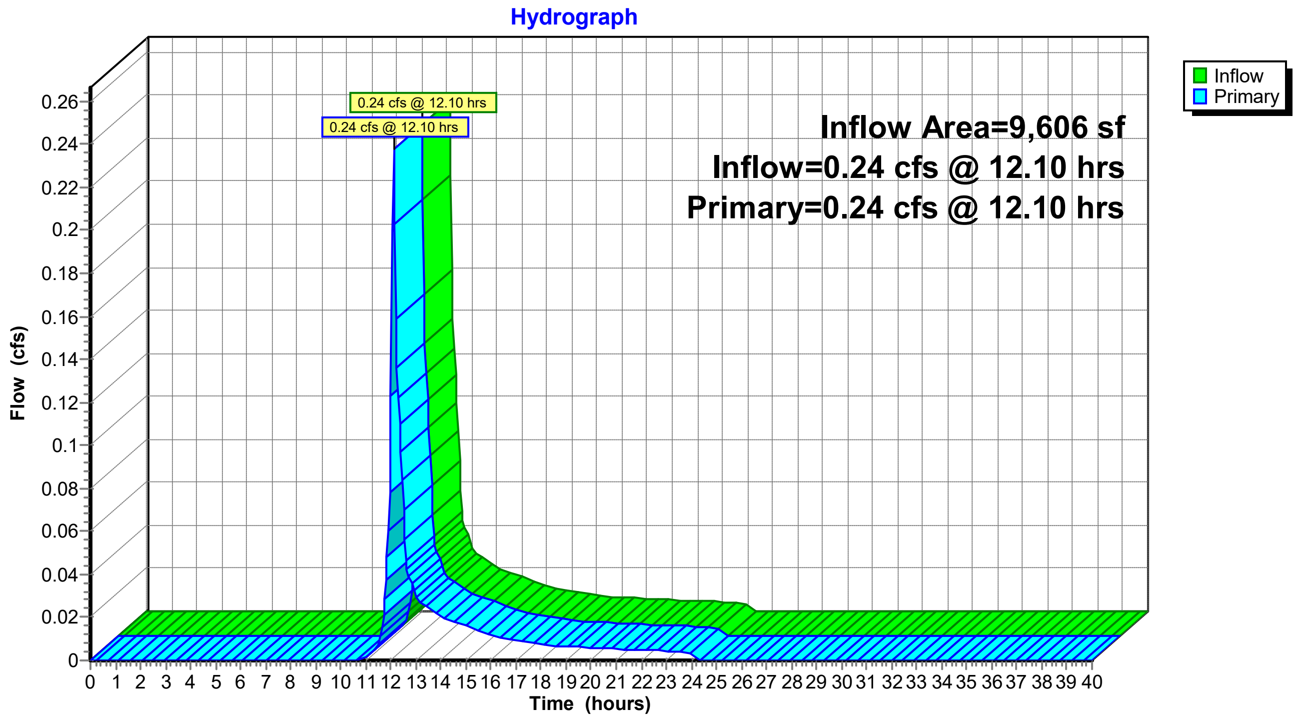


Summary for Link 2L: WEST MAIN STREET

Inflow Area = 9,606 sf, 57.63% Impervious, Inflow Depth = 1.00" for 2 YEAR event
Inflow = 0.24 cfs @ 12.10 hrs, Volume= 797 cf
Primary = 0.24 cfs @ 12.10 hrs, Volume= 797 cf, Atten= 0%, Lag= 0.0 min

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

Link 2L: WEST MAIN STREET



Summary for Subcatchment 1S:

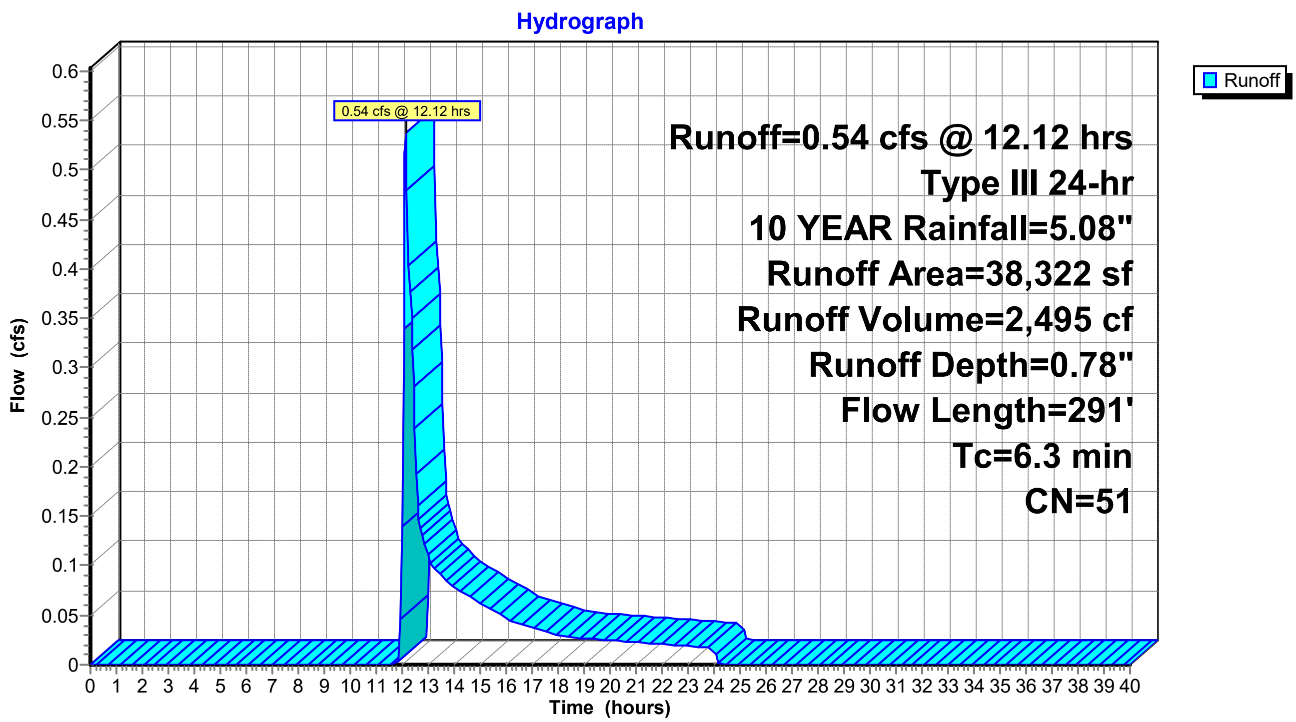
Runoff = 0.54 cfs @ 12.12 hrs, Volume= 2,495 cf, Depth= 0.78"
Routed to Link 1L : ROCK POND

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 YEAR Rainfall=5.08"

Area (sf)	CN	Description
26,450	39	>75% Grass cover, Good, HSG A
3,425	30	Woods, Good, HSG A
1,094	98	Paved parking, HSG A
7,353	98	Roofs, HSG A
38,322	51	Weighted Average
29,875		77.96% Pervious Area
8,447		22.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	50	0.0720	0.17		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.22"
1.4	241	0.0300	2.79		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
6.3	291	Total			

Subcatchment 1S:



Summary for Subcatchment 2S: WEST MAIN STREET

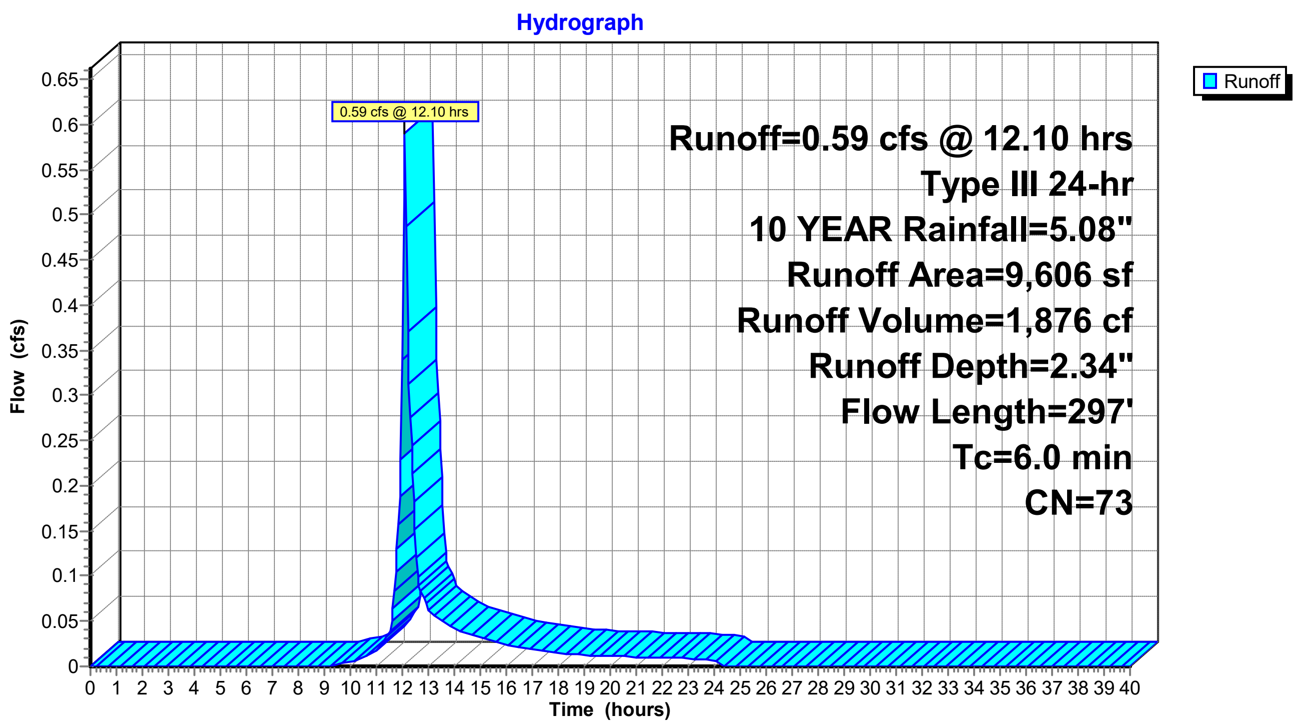
Runoff = 0.59 cfs @ 12.10 hrs, Volume= 1,876 cf, Depth= 2.34"
Routed to Link 2L : WEST MAIN STREET

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 YEAR Rainfall=5.08"

Area (sf)	CN	Description
3,801	39	>75% Grass cover, Good, HSG A
269	30	Woods, Good, HSG A
5,536	98	Paved parking, HSG A
9,606	73	Weighted Average
4,070		42.37% Pervious Area
5,536		57.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	50	0.5400	4.49		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.22"
1.2	247	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.4	297	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2S: WEST MAIN STREET



Summary for Subcatchment 3S:

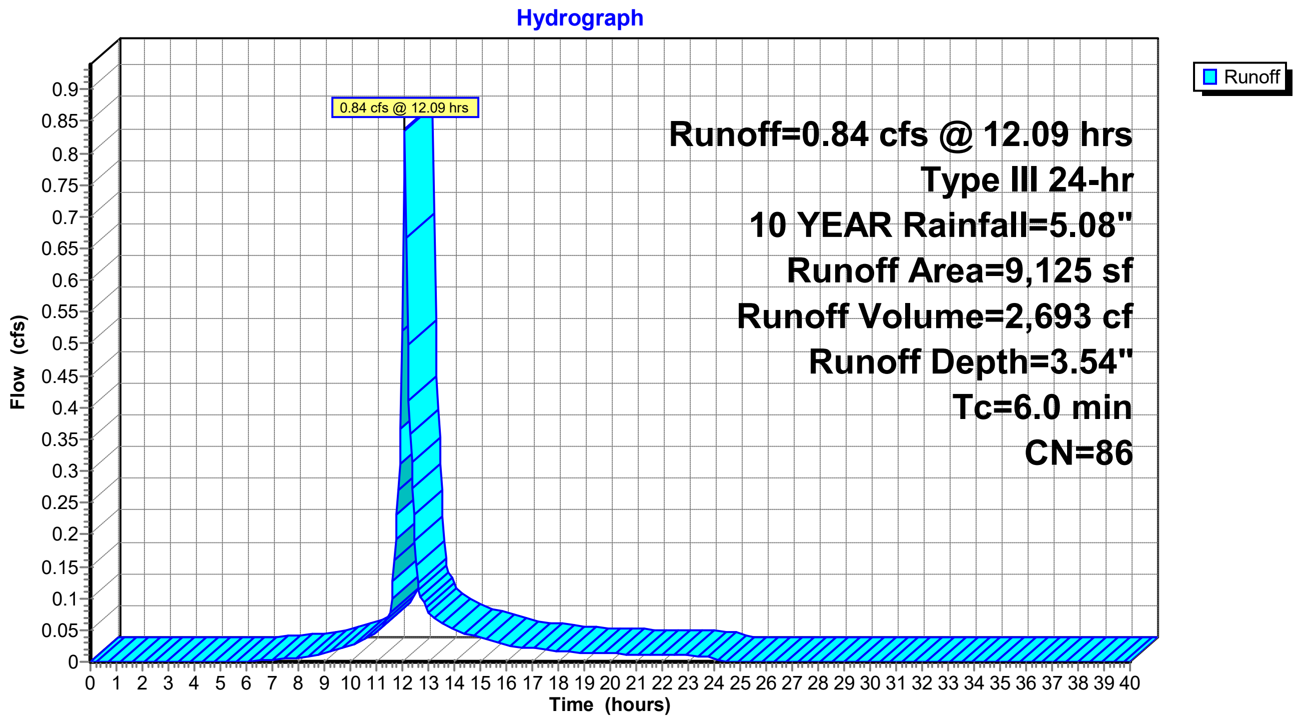
Runoff = 0.84 cfs @ 12.09 hrs, Volume= 2,693 cf, Depth= 3.54"
Routed to Pond 2 : CB

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 YEAR Rainfall=5.08"

Area (sf)	CN	Description
1,914	39	>75% Grass cover, Good, HSG A
4,721	98	Paved parking, HSG A
2,490	98	Roofs, HSG A
9,125	86	Weighted Average
1,914		20.98% Pervious Area
7,211		79.02% Impervious Area

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

Subcatchment 3S:



Summary for Subcatchment 4S:

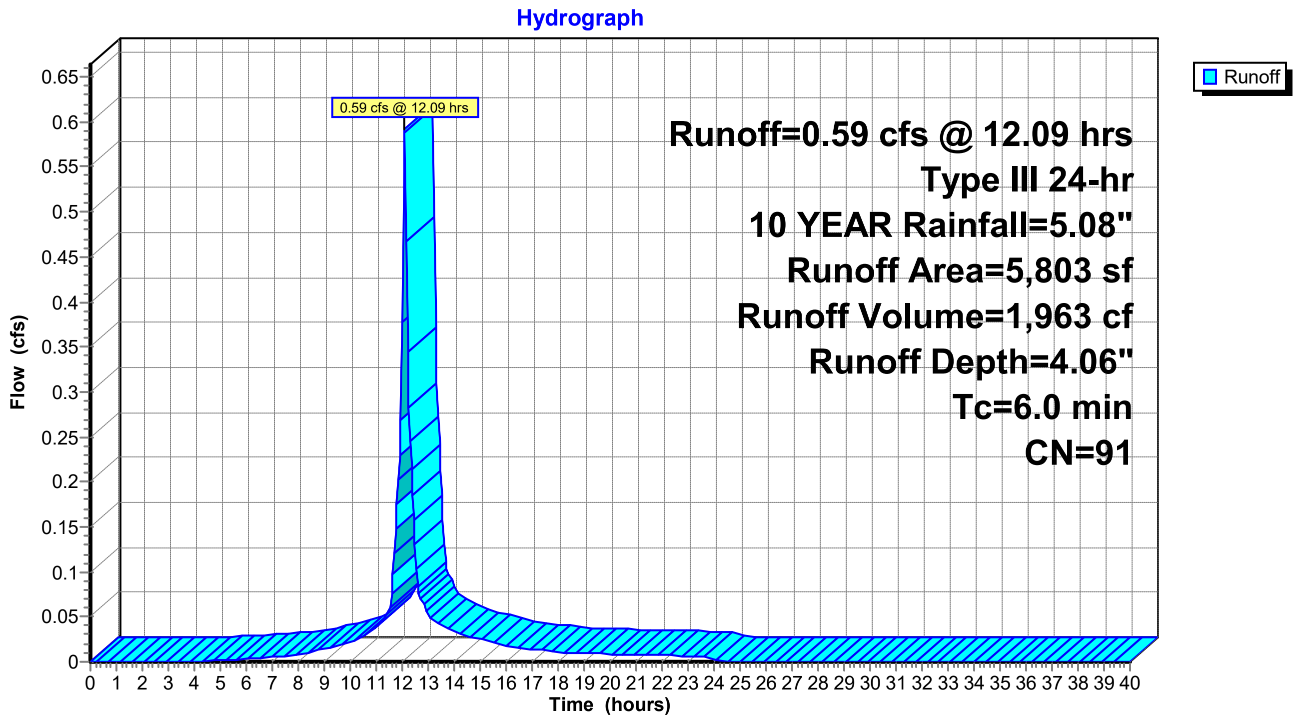
Runoff = 0.59 cfs @ 12.09 hrs, Volume= 1,963 cf, Depth= 4.06"
Routed to Pond 1 : TRENCH DRAIN

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 YEAR Rainfall=5.08"

Area (sf)	CN	Description
737	39	>75% Grass cover, Good, HSG A
3,150	98	Paved parking, HSG A
1,916	98	Roofs, HSG A
5,803	91	Weighted Average
737		12.70% Pervious Area
5,066		87.30% Impervious Area

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

Subcatchment 4S:



Summary for Subcatchment 5S:

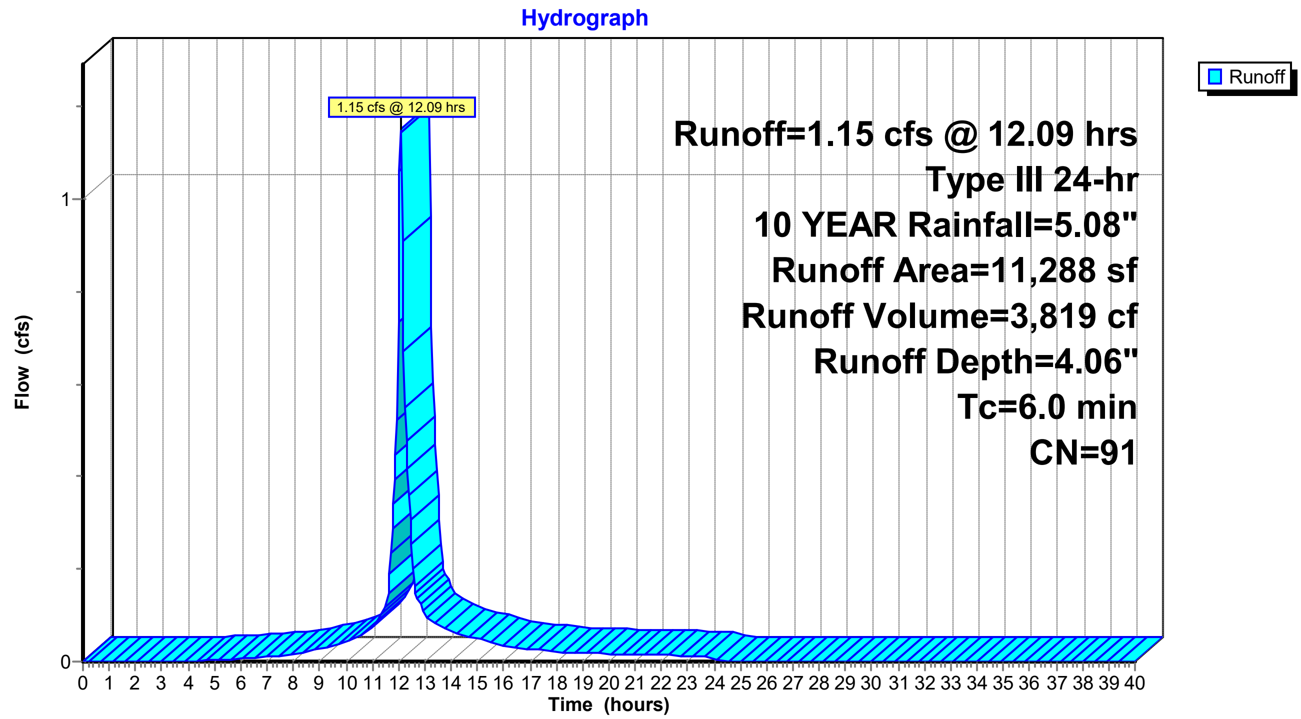
Runoff = 1.15 cfs @ 12.09 hrs, Volume= 3,819 cf, Depth= 4.06"
Routed to Pond 5 : CB

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 YEAR Rainfall=5.08"

Area (sf)	CN	Description
778	39	>75% Grass cover, Good, HSG A
511	30	Woods, Good, HSG A
6,608	98	Paved parking, HSG A
3,391	98	Roofs, HSG A
11,288	91	Weighted Average
1,289		11.42% Pervious Area
9,999		88.58% Impervious Area

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

Subcatchment 5S:



Summary for Pond 1: TRENCH DRAIN

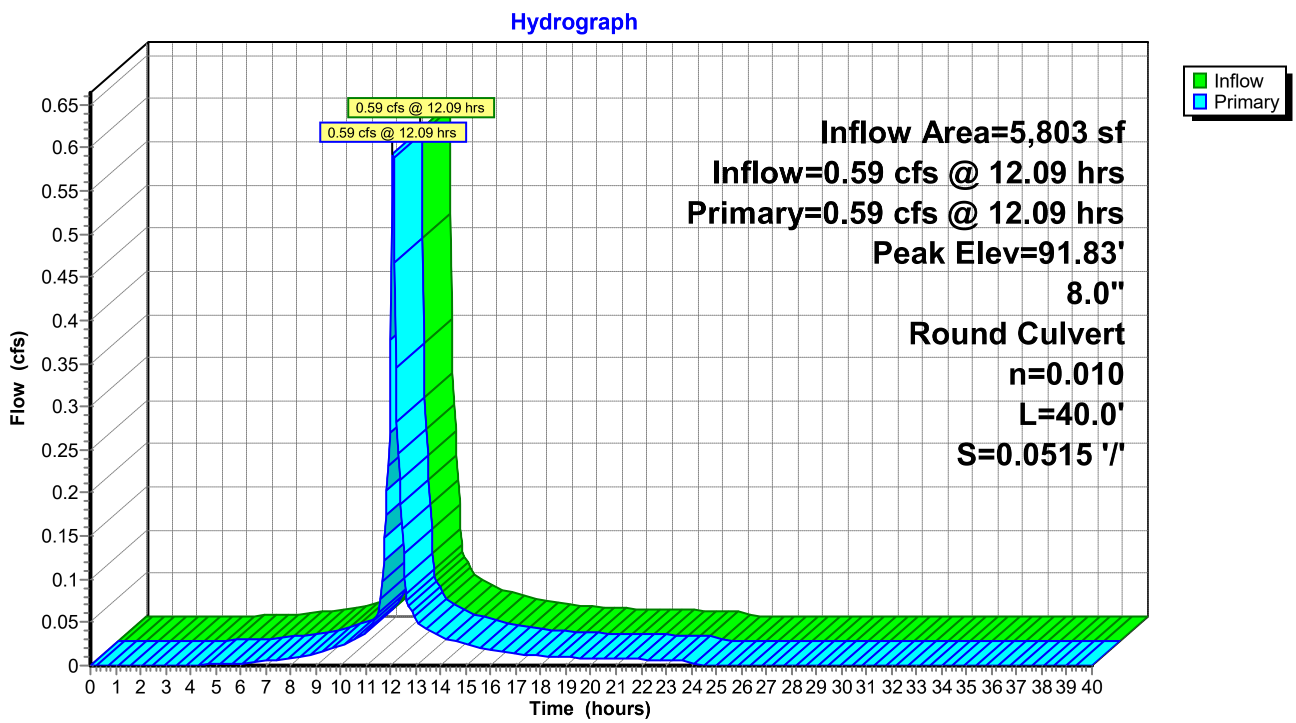
Inflow Area = 5,803 sf, 87.30% Impervious, Inflow Depth = 4.06" for 10 YEAR event
Inflow = 0.59 cfs @ 12.09 hrs, Volume= 1,963 cf
Outflow = 0.59 cfs @ 12.09 hrs, Volume= 1,963 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.59 cfs @ 12.09 hrs, Volume= 1,963 cf
Routed to Pond 3 : DMH

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 91.83' @ 12.09 hrs
Flood Elev= 92.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	91.37'	**8.0" Round Culvert** L= 40.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 91.37' / 89.31' S= 0.0515 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=0.58 cfs @ 12.09 hrs HW=91.82' TW=89.64' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.58 cfs @ 2.29 fps)

Pond 1: TRENCH DRAIN



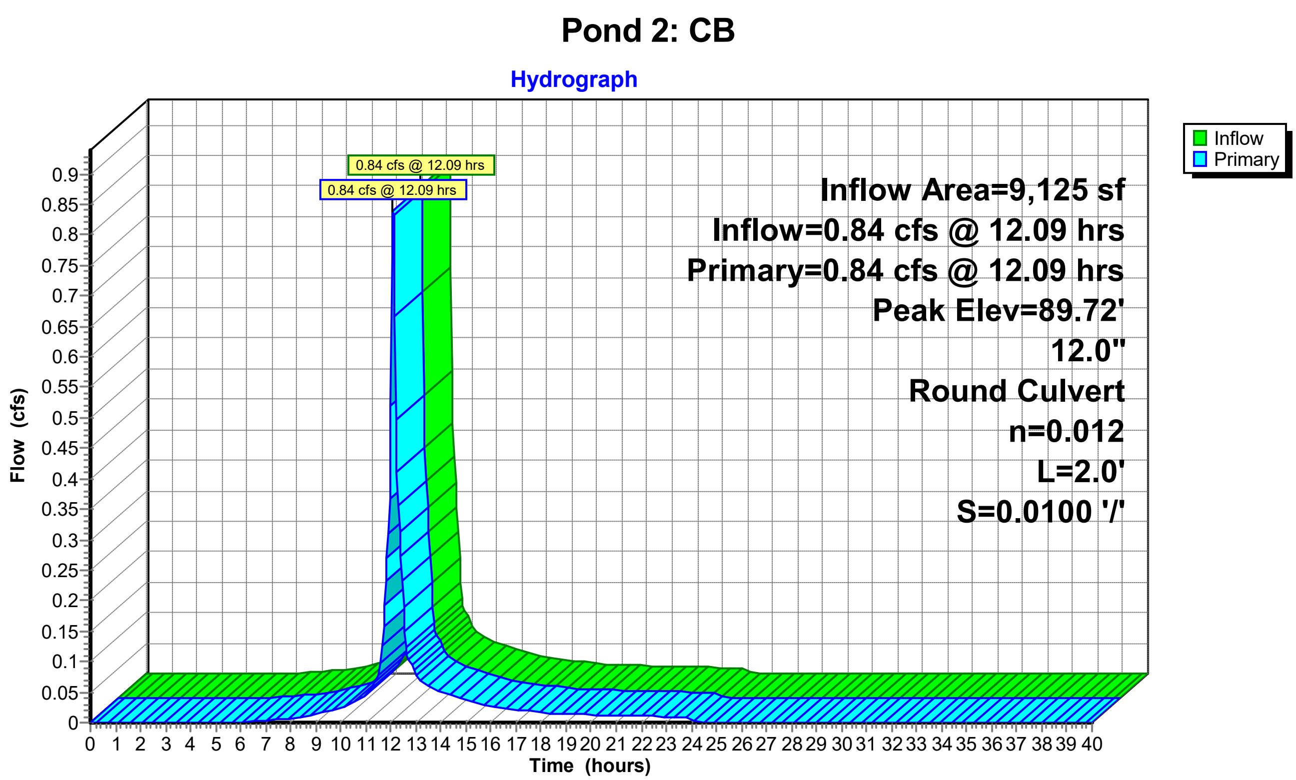
Summary for Pond 2: CB

Inflow Area = 9,125 sf, 79.02% Impervious, Inflow Depth = 3.54" for 10 YEAR event
Inflow = 0.84 cfs @ 12.09 hrs, Volume= 2,693 cf
Outflow = 0.84 cfs @ 12.09 hrs, Volume= 2,693 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.84 cfs @ 12.09 hrs, Volume= 2,693 cf
Routed to Pond 3 : DMH

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 89.72' @ 12.13 hrs
Flood Elev= 93.15'

Device	Routing	Invert	Outlet Devices
#1	Primary	89.00'	**12.0" Round Culvert** L= 2.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 89.00' / 88.98' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.46 cfs @ 12.09 hrs HW=89.67' TW=89.64' (Dynamic Tailwater)
1=Culvert (Outlet Controls 0.46 cfs @ 1.17 fps)



Summary for Pond 3: DMH

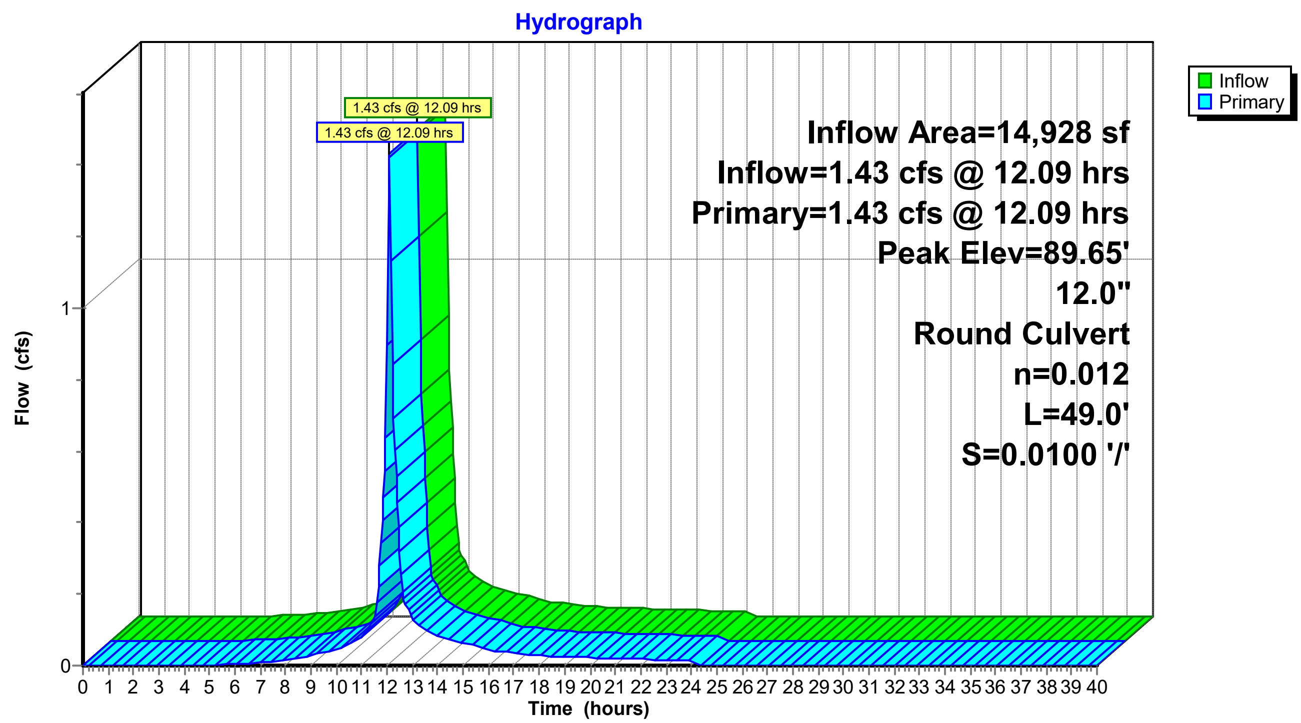
Inflow Area = 14,928 sf, 82.24% Impervious, Inflow Depth = 3.74" for 10 YEAR event
Inflow = 1.43 cfs @ 12.09 hrs, Volume= 4,656 cf
Outflow = 1.43 cfs @ 12.09 hrs, Volume= 4,656 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.43 cfs @ 12.09 hrs, Volume= 4,656 cf
Routed to Pond 4 : DMH

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 89.65' @ 12.10 hrs
Flood Elev= 93.42'

Device	Routing	Invert	Outlet Devices
#1	Primary	88.98'	**12.0" Round Culvert** L= 49.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 88.98' / 88.49' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.34 cfs @ 12.09 hrs HW=89.64' TW=89.12' (Dynamic Tailwater)
└**1=Culvert** (Outlet Controls 1.34 cfs @ 3.45 fps)

Pond 3: DMH



Summary for Pond 4: DMH

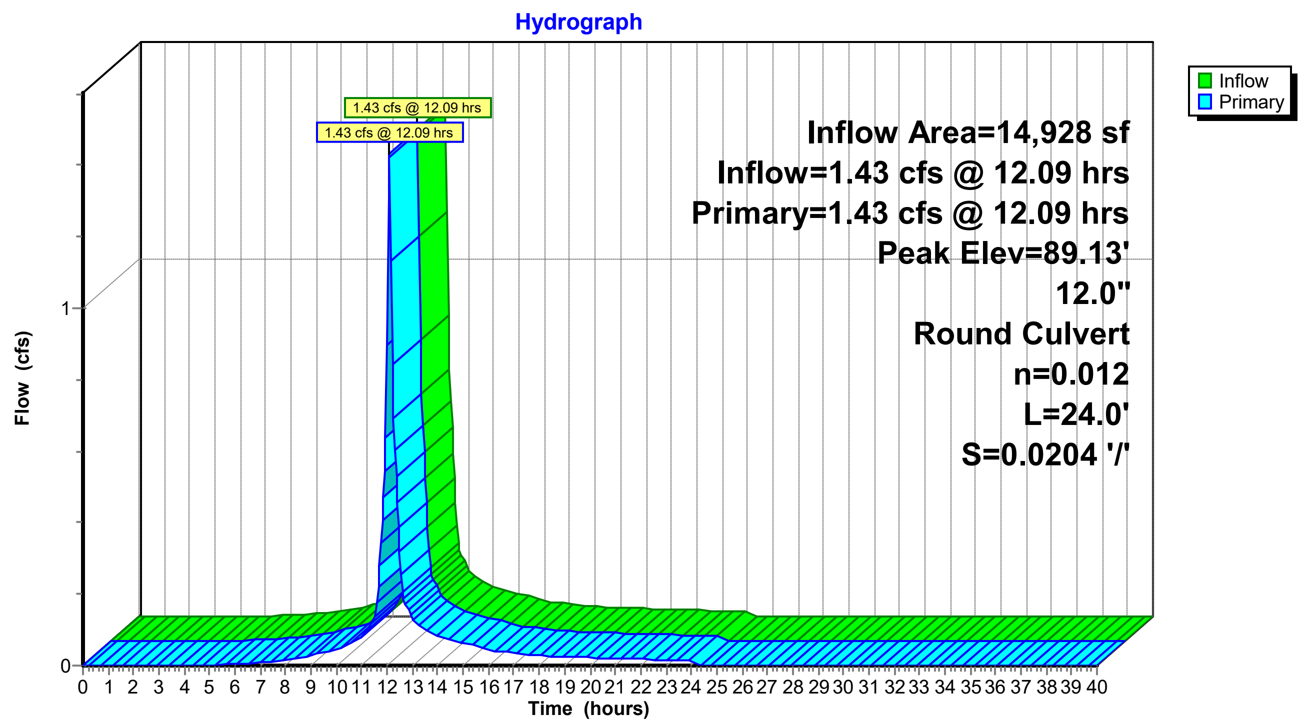
Inflow Area = 14,928 sf, 82.24% Impervious, Inflow Depth = 3.74" for 10 YEAR event
Inflow = 1.43 cfs @ 12.09 hrs, Volume= 4,656 cf
Outflow = 1.43 cfs @ 12.09 hrs, Volume= 4,656 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.43 cfs @ 12.09 hrs, Volume= 4,656 cf
Routed to Pond 7 : DMH

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 89.13' @ 12.09 hrs
Flood Elev= 95.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	88.49'	**12.0" Round Culvert** L= 24.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 88.49' / 88.00' S= 0.0204 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.40 cfs @ 12.09 hrs HW=89.12' TW=87.22' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 1.40 cfs @ 2.70 fps)

Pond 4: DMH



Summary for Pond 5: CB

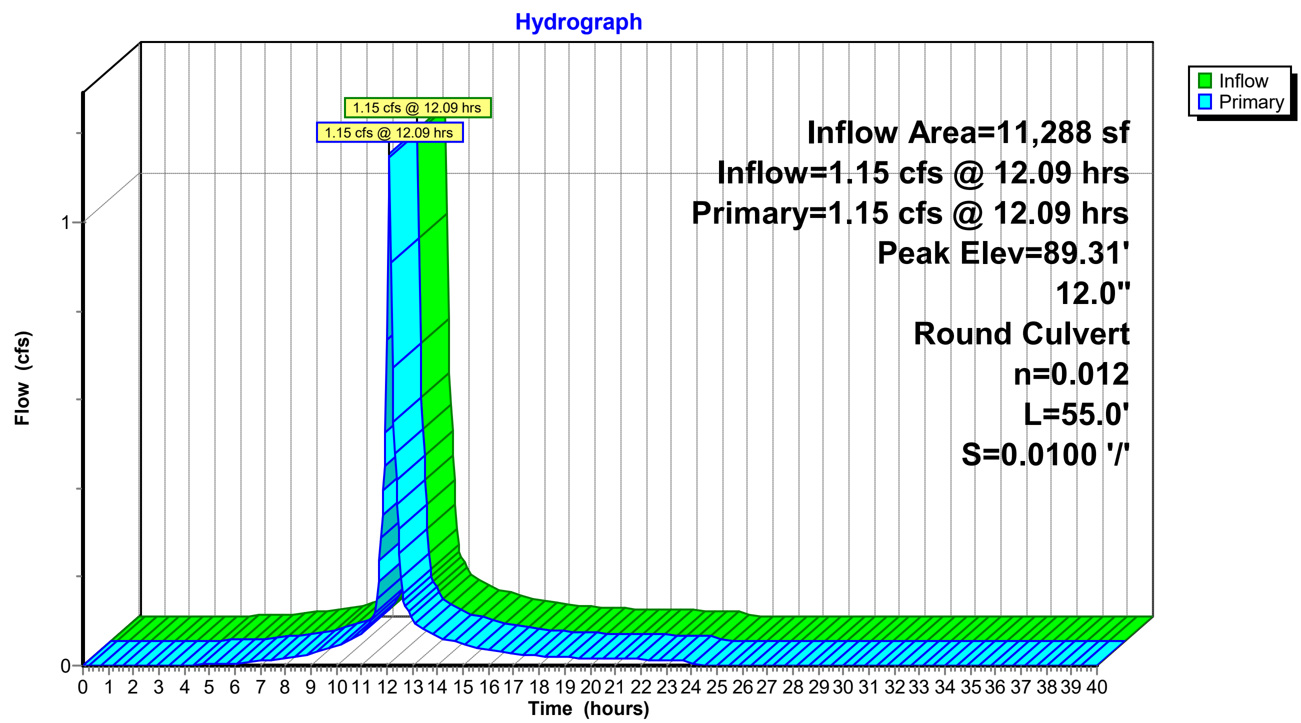
Inflow Area = 11,288 sf, 88.58% Impervious, Inflow Depth = 4.06" for 10 YEAR event
Inflow = 1.15 cfs @ 12.09 hrs, Volume= 3,819 cf
Outflow = 1.15 cfs @ 12.09 hrs, Volume= 3,819 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.15 cfs @ 12.09 hrs, Volume= 3,819 cf
Routed to Pond 6 : DMH

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 89.31' @ 12.10 hrs
Flood Elev= 92.37'

Device	Routing	Invert	Outlet Devices
#1	Primary	88.73'	**12.0" Round Culvert** L= 55.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 88.73' / 88.18' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.09 cfs @ 12.09 hrs HW=89.30' TW=88.73' (Dynamic Tailwater)
1=Culvert (Outlet Controls 1.09 cfs @ 3.39 fps)

Pond 5: CB



Summary for Pond 6: DMH

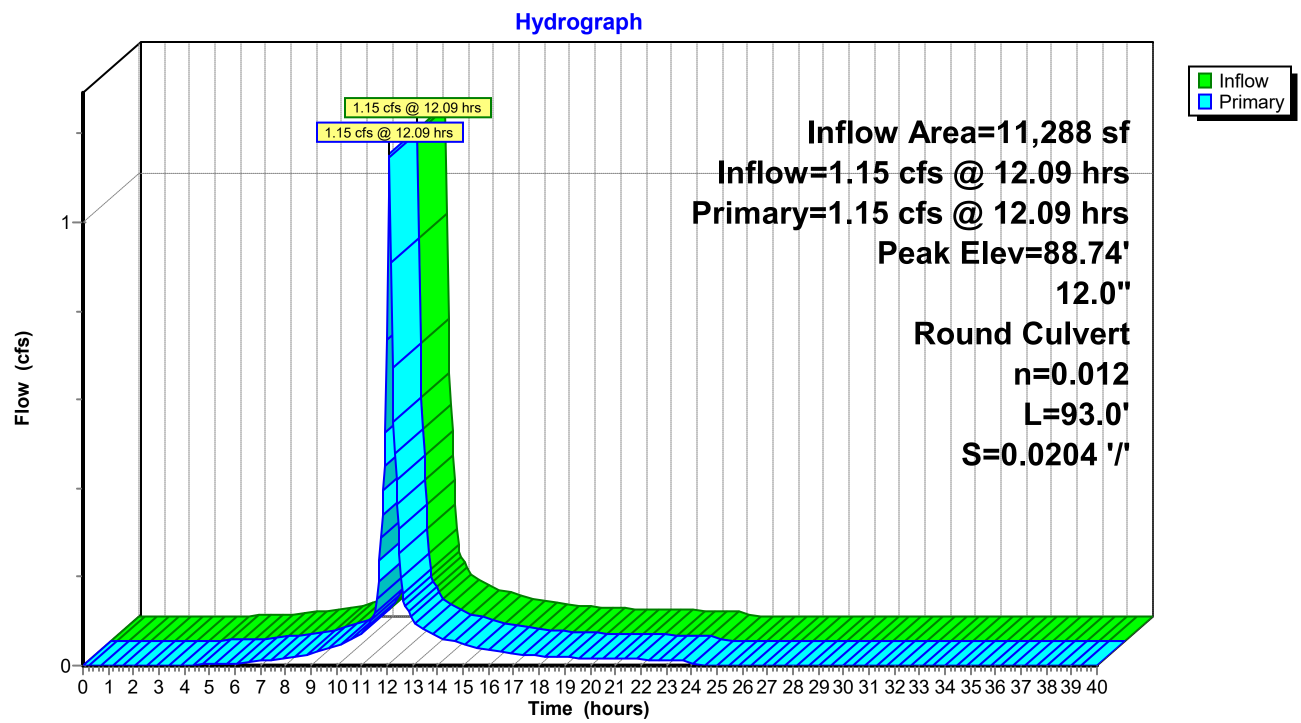
Inflow Area = 11,288 sf, 88.58% Impervious, Inflow Depth = 4.06" for 10 YEAR event
Inflow = 1.15 cfs @ 12.09 hrs, Volume= 3,819 cf
Outflow = 1.15 cfs @ 12.09 hrs, Volume= 3,819 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.15 cfs @ 12.09 hrs, Volume= 3,819 cf
Routed to Pond 7 : DMH

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 88.74' @ 12.09 hrs
Flood Elev= 95.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	88.18'	**12.0" Round Culvert** L= 93.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 88.18' / 86.28' S= 0.0204 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.12 cfs @ 12.09 hrs HW=88.73' TW=87.22' (Dynamic Tailwater)
1=Culvert (Inlet Controls 1.12 cfs @ 2.53 fps)

Pond 6: DMH



Summary for Pond 7: DMH

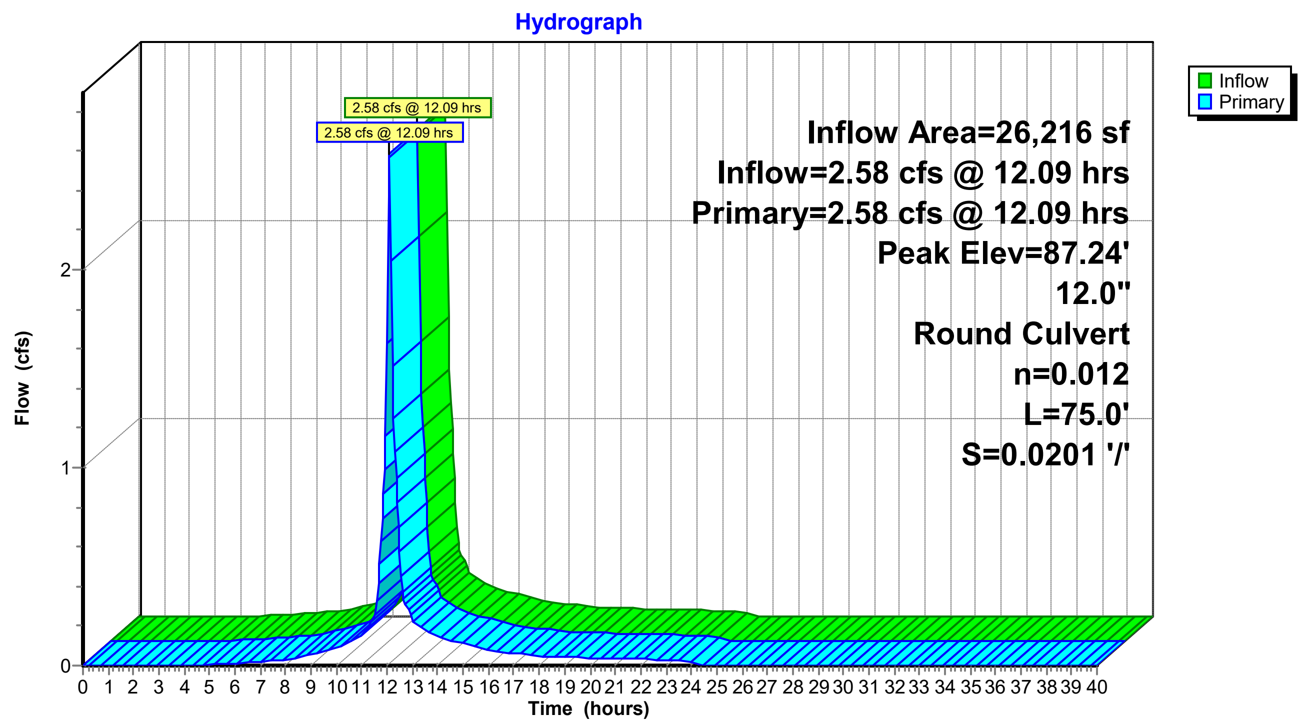
Inflow Area = 26,216 sf, 84.97% Impervious, Inflow Depth = 3.88" for 10 YEAR event
Inflow = 2.58 cfs @ 12.09 hrs, Volume= 8,475 cf
Outflow = 2.58 cfs @ 12.09 hrs, Volume= 8,475 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.58 cfs @ 12.09 hrs, Volume= 8,475 cf
Routed to Pond 8 : DMH

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 87.24' @ 12.09 hrs
Flood Elev= 95.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	86.28'	**12.0" Round Culvert** L= 75.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 86.28' / 84.77' S= 0.0201 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=2.52 cfs @ 12.09 hrs HW=87.22' TW=85.71' (Dynamic Tailwater)
1=Culvert (Inlet Controls 2.52 cfs @ 3.30 fps)

Pond 7: DMH



Summary for Pond 8: DMH

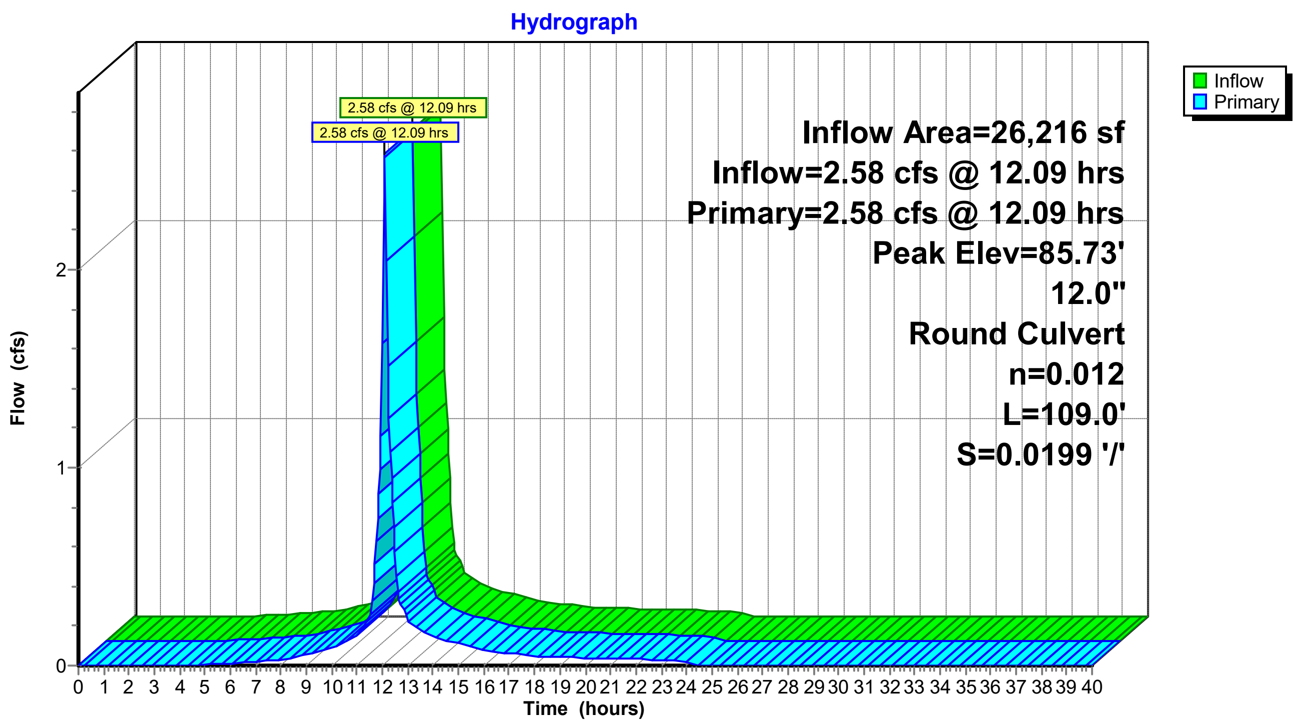
Inflow Area = 26,216 sf, 84.97% Impervious, Inflow Depth = 3.88" for 10 YEAR event
Inflow = 2.58 cfs @ 12.09 hrs, Volume= 8,475 cf
Outflow = 2.58 cfs @ 12.09 hrs, Volume= 8,475 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.58 cfs @ 12.09 hrs, Volume= 8,475 cf
Routed to Link 1L : ROCK POND

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 85.73' @ 12.09 hrs
Flood Elev= 88.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	84.77'	**12.0" Round Culvert** L= 109.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 84.77' / 82.60' S= 0.0199 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=2.52 cfs @ 12.09 hrs HW=85.71' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 2.52 cfs @ 3.30 fps)

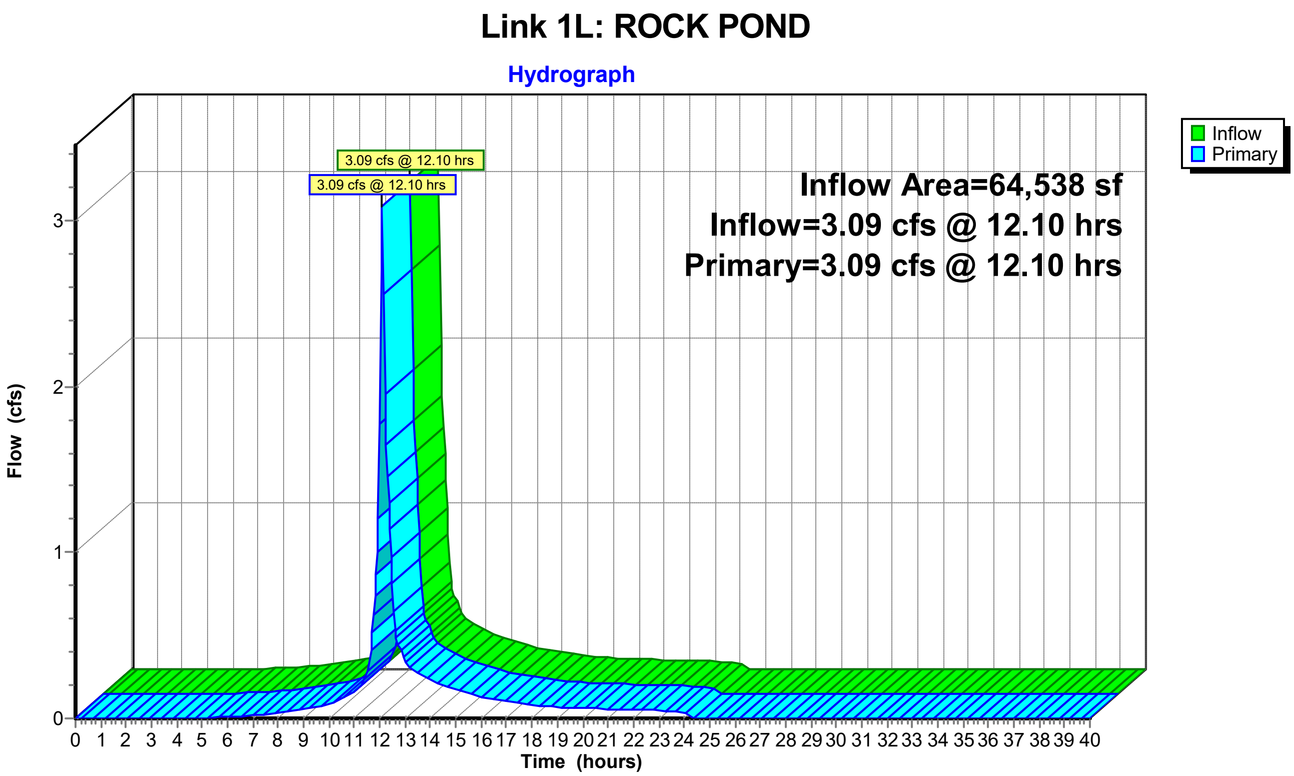
Pond 8: DMH



Summary for Link 1L: ROCK POND

Inflow Area =	64,538 sf,	47.60% Impervious,	Inflow Depth = 2.04"	for 10 YEAR event
Inflow =	3.09 cfs @	12.10 hrs, Volume=	10,971 cf	
Primary =	3.09 cfs @	12.10 hrs, Volume=	10,971 cf,	Atten= 0%, Lag= 0.0 min

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

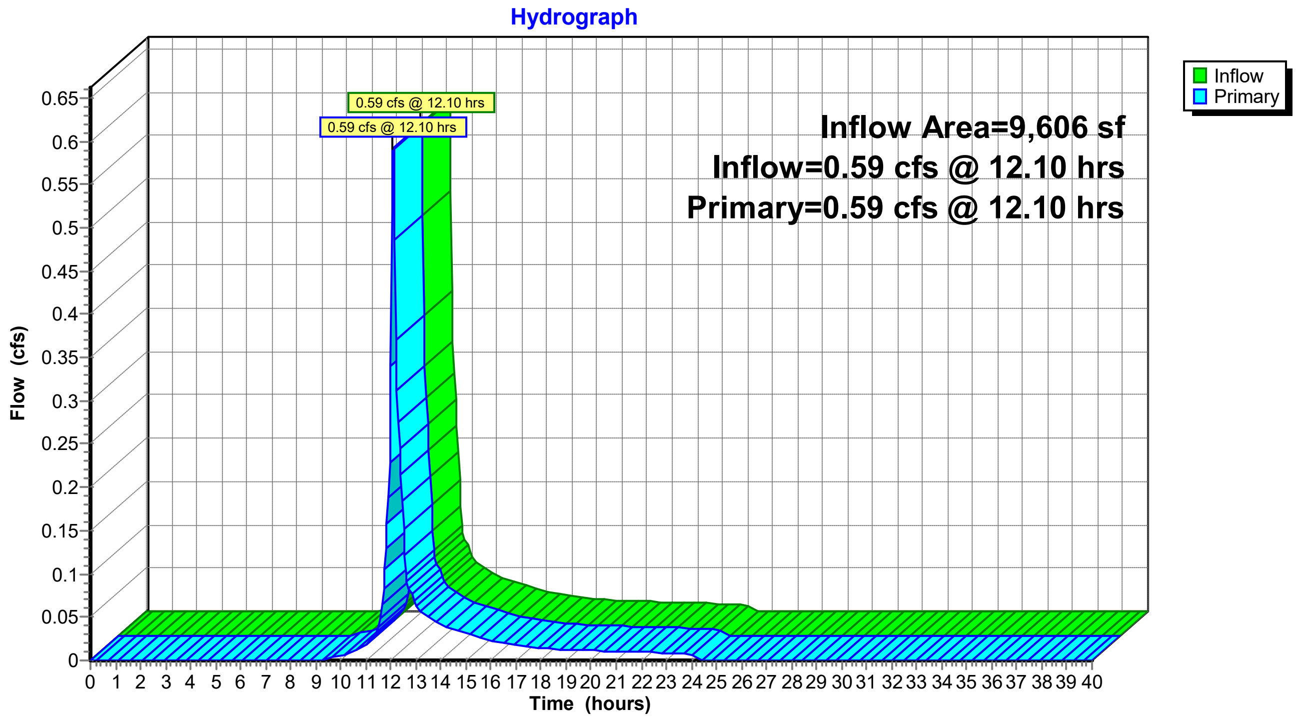


Summary for Link 2L: WEST MAIN STREET

Inflow Area =	9,606 sf,	57.63% Impervious,	Inflow Depth = 2.34"	for 10 YEAR event	
Inflow =	0.59 cfs @	12.10 hrs,	Volume=	1,876 cf	
Primary =	0.59 cfs @	12.10 hrs,	Volume=	1,876 cf,	Atten= 0%, Lag= 0.0 min

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

Link 2L: WEST MAIN STREET



Summary for Subcatchment 1S:

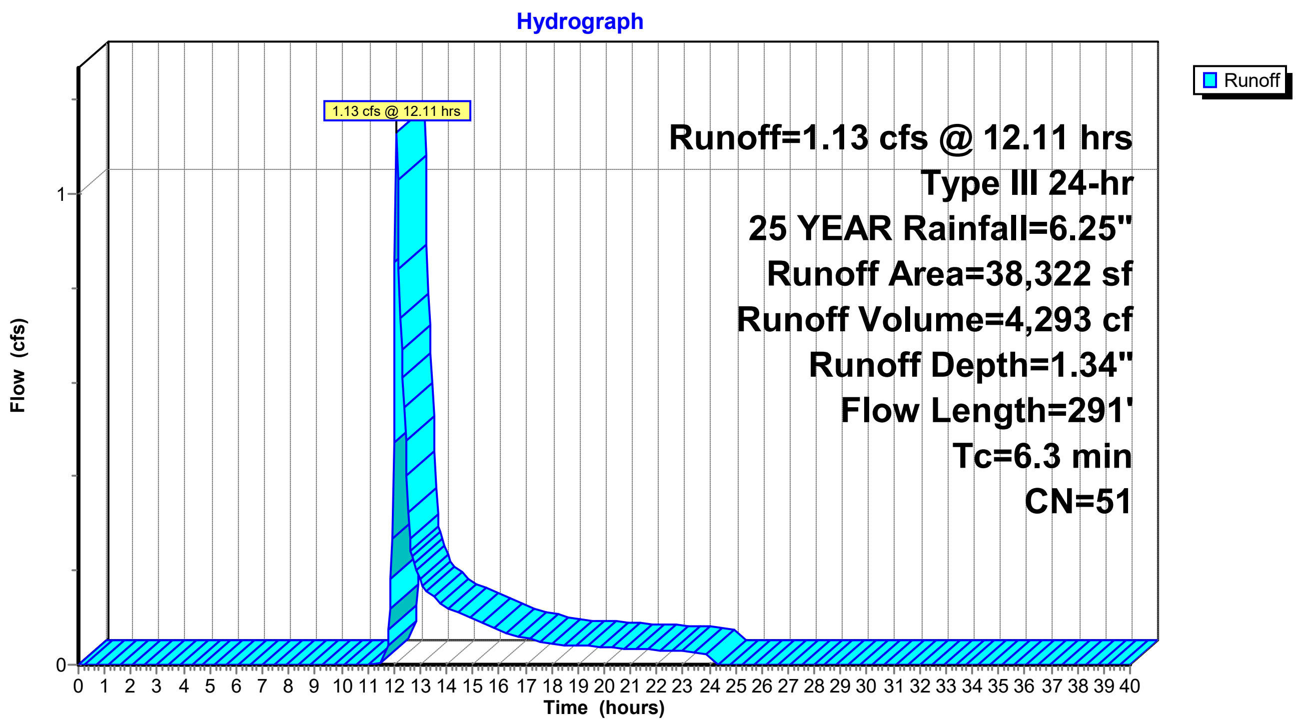
Runoff = 1.13 cfs @ 12.11 hrs, Volume= 4,293 cf, Depth= 1.34"
Routed to Link 1L : ROCK POND

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 YEAR Rainfall=6.25"

Area (sf)	CN	Description
26,450	39	>75% Grass cover, Good, HSG A
3,425	30	Woods, Good, HSG A
1,094	98	Paved parking, HSG A
7,353	98	Roofs, HSG A
38,322	51	Weighted Average
29,875		77.96% Pervious Area
8,447		22.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	50	0.0720	0.17		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.22"
1.4	241	0.0300	2.79		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
6.3	291	Total			

Subcatchment 1S:



Summary for Subcatchment 2S: WEST MAIN STREET

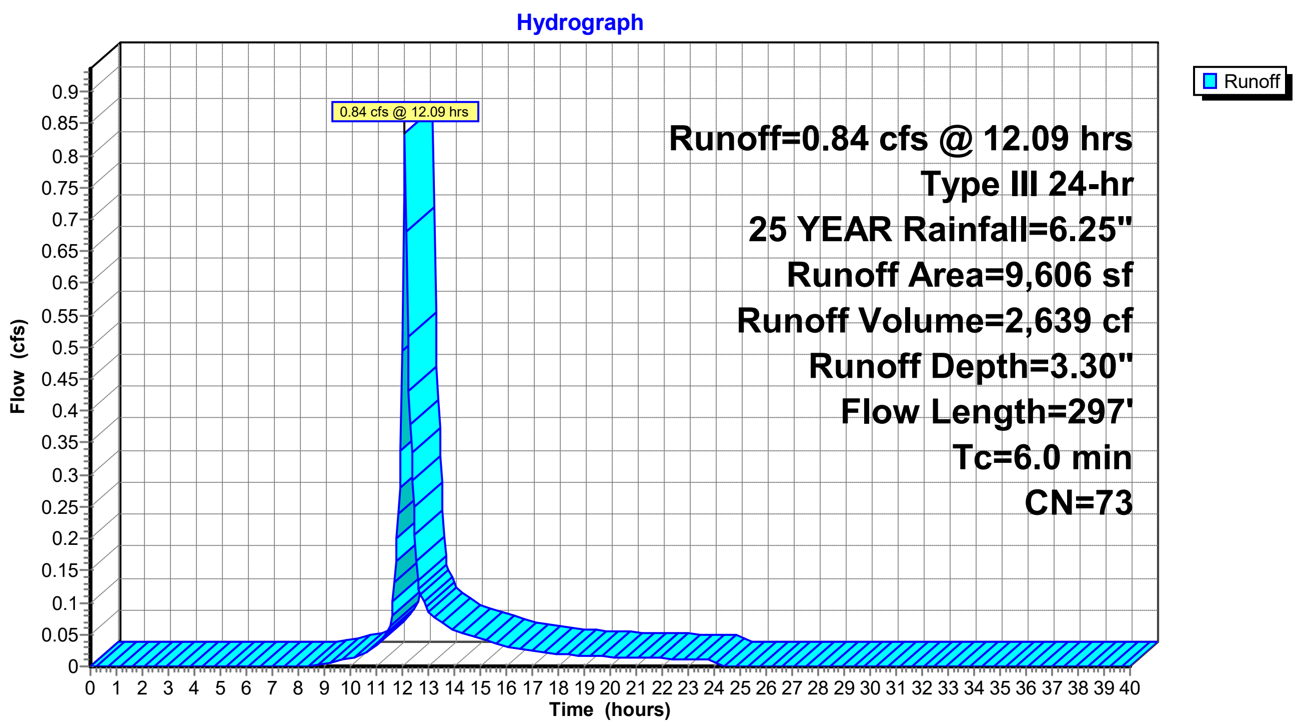
Runoff = 0.84 cfs @ 12.09 hrs, Volume= 2,639 cf, Depth= 3.30"
Routed to Link 2L : WEST MAIN STREET

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 YEAR Rainfall=6.25"

Area (sf)	CN	Description
3,801	39	>75% Grass cover, Good, HSG A
269	30	Woods, Good, HSG A
5,536	98	Paved parking, HSG A
9,606	73	Weighted Average
4,070		42.37% Pervious Area
5,536		57.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	50	0.5400	4.49		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.22"
1.2	247	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.4	297	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2S: WEST MAIN STREET



Summary for Subcatchment 3S:

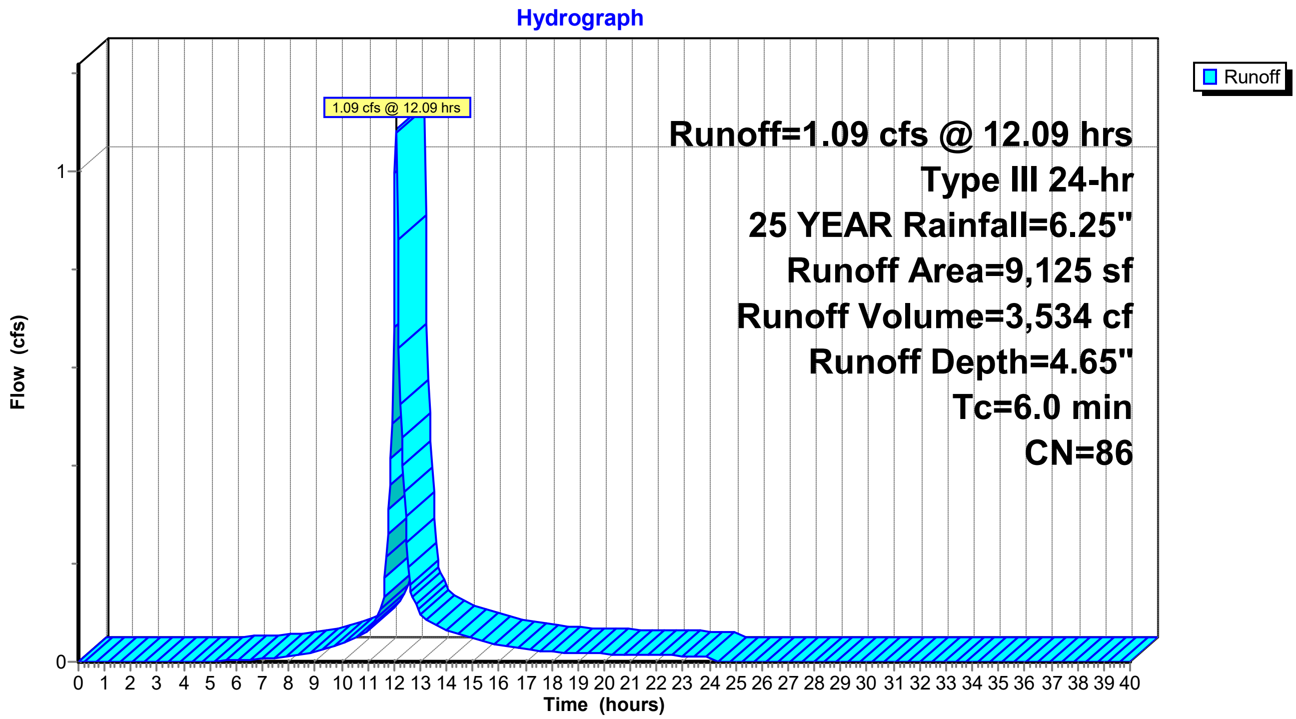
Runoff = 1.09 cfs @ 12.09 hrs, Volume= 3,534 cf, Depth= 4.65"
Routed to Pond 2 : CB

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 YEAR Rainfall=6.25"

Area (sf)	CN	Description
1,914	39	>75% Grass cover, Good, HSG A
4,721	98	Paved parking, HSG A
2,490	98	Roofs, HSG A
9,125	86	Weighted Average
1,914		20.98% Pervious Area
7,211		79.02% Impervious Area

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

Subcatchment 3S:



Summary for Subcatchment 4S:

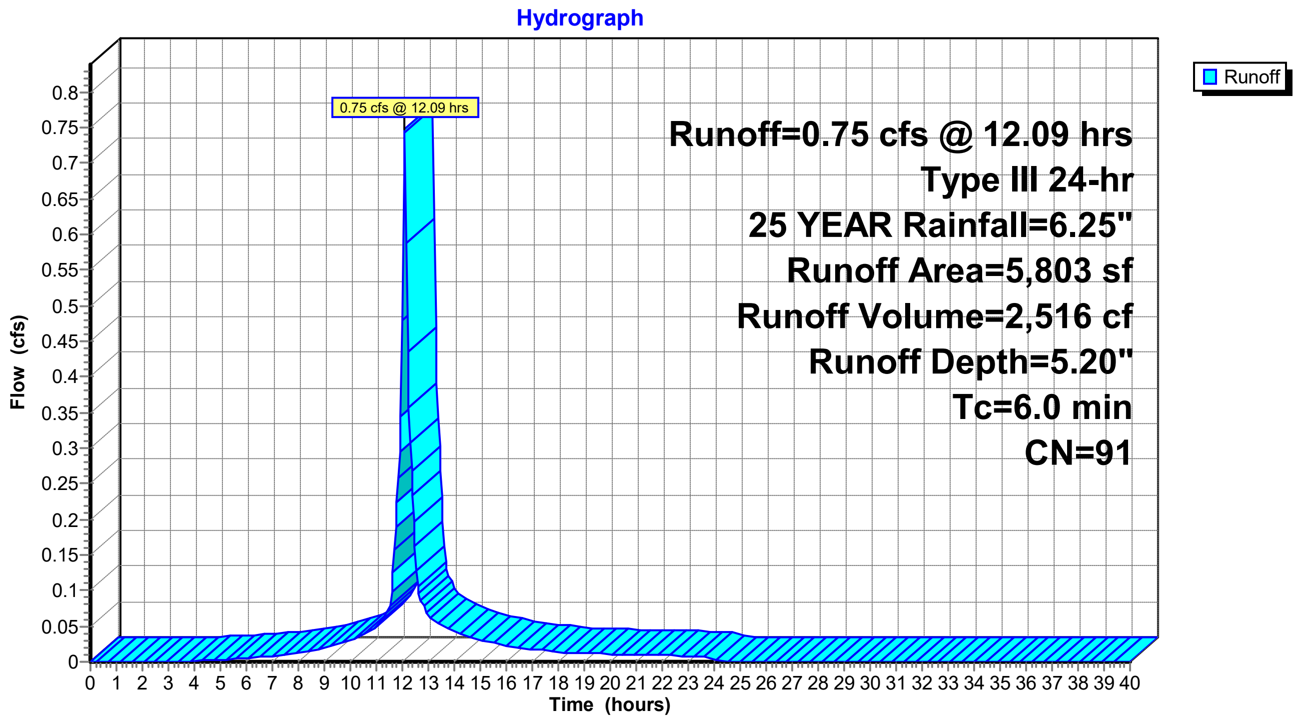
Runoff = 0.75 cfs @ 12.09 hrs, Volume= 2,516 cf, Depth= 5.20"
Routed to Pond 1 : TRENCH DRAIN

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 YEAR Rainfall=6.25"

Area (sf)	CN	Description
737	39	>75% Grass cover, Good, HSG A
3,150	98	Paved parking, HSG A
1,916	98	Roofs, HSG A
5,803	91	Weighted Average
737		12.70% Pervious Area
5,066		87.30% Impervious Area

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

Subcatchment 4S:



Summary for Subcatchment 5S:

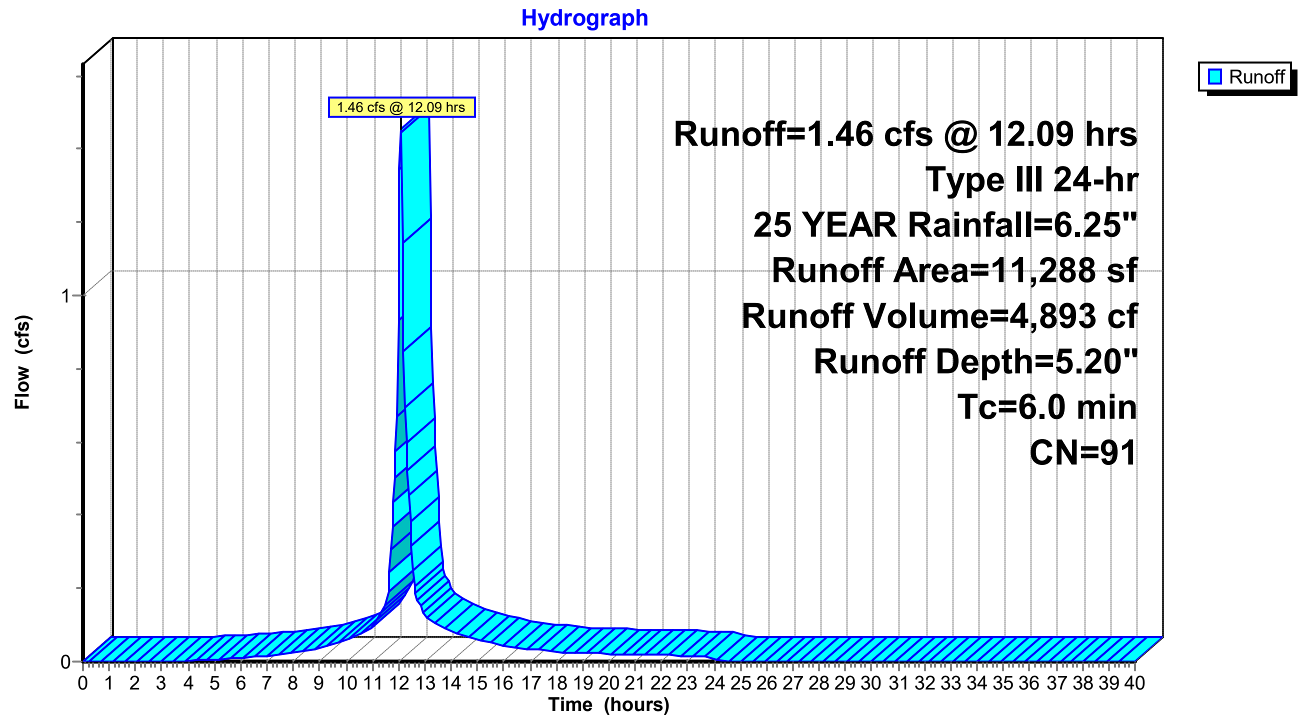
Runoff = 1.46 cfs @ 12.09 hrs, Volume= 4,893 cf, Depth= 5.20"
Routed to Pond 5 : CB

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 YEAR Rainfall=6.25"

Area (sf)	CN	Description
778	39	>75% Grass cover, Good, HSG A
511	30	Woods, Good, HSG A
6,608	98	Paved parking, HSG A
3,391	98	Roofs, HSG A
11,288	91	Weighted Average
1,289		11.42% Pervious Area
9,999		88.58% Impervious Area

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

Subcatchment 5S:



Summary for Pond 1: TRENCH DRAIN

Inflow Area =	5,803 sf,	87.30% Impervious,	Inflow Depth = 5.20"	for 25 YEAR event	
Inflow =	0.75 cfs @	12.09 hrs,	Volume=	2,516 cf	
Outflow =	0.75 cfs @	12.09 hrs,	Volume=	2,516 cf,	Atten= 0%, Lag= 0.0 min
Primary =	0.75 cfs @	12.09 hrs,	Volume=	2,516 cf	

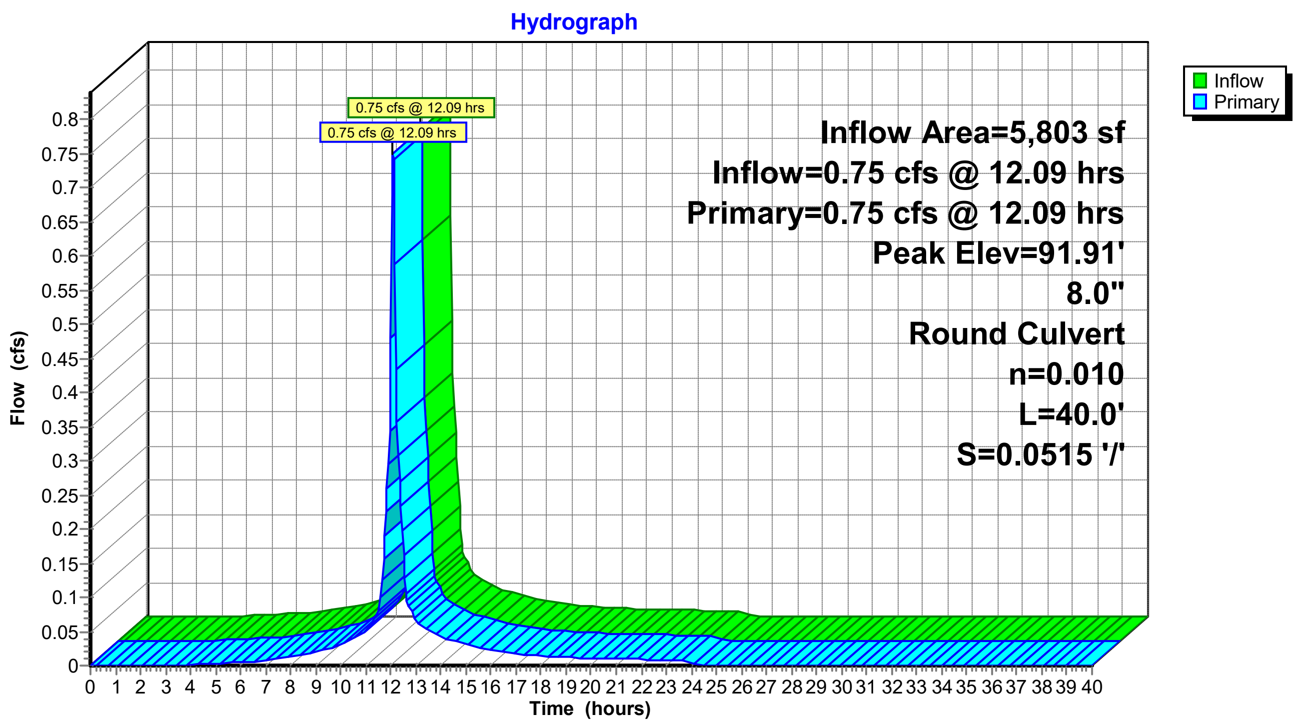
Routed to Pond 3 : DMH

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 91.91' @ 12.09 hrs
Flood Elev= 92.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	91.37'	**8.0" Round Culvert** L= 40.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 91.37' / 89.31' S= 0.0515 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=0.73 cfs @ 12.09 hrs HW=91.90' TW=89.75' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.73 cfs @ 2.47 fps)

Pond 1: TRENCH DRAIN



Summary for Pond 2: CB

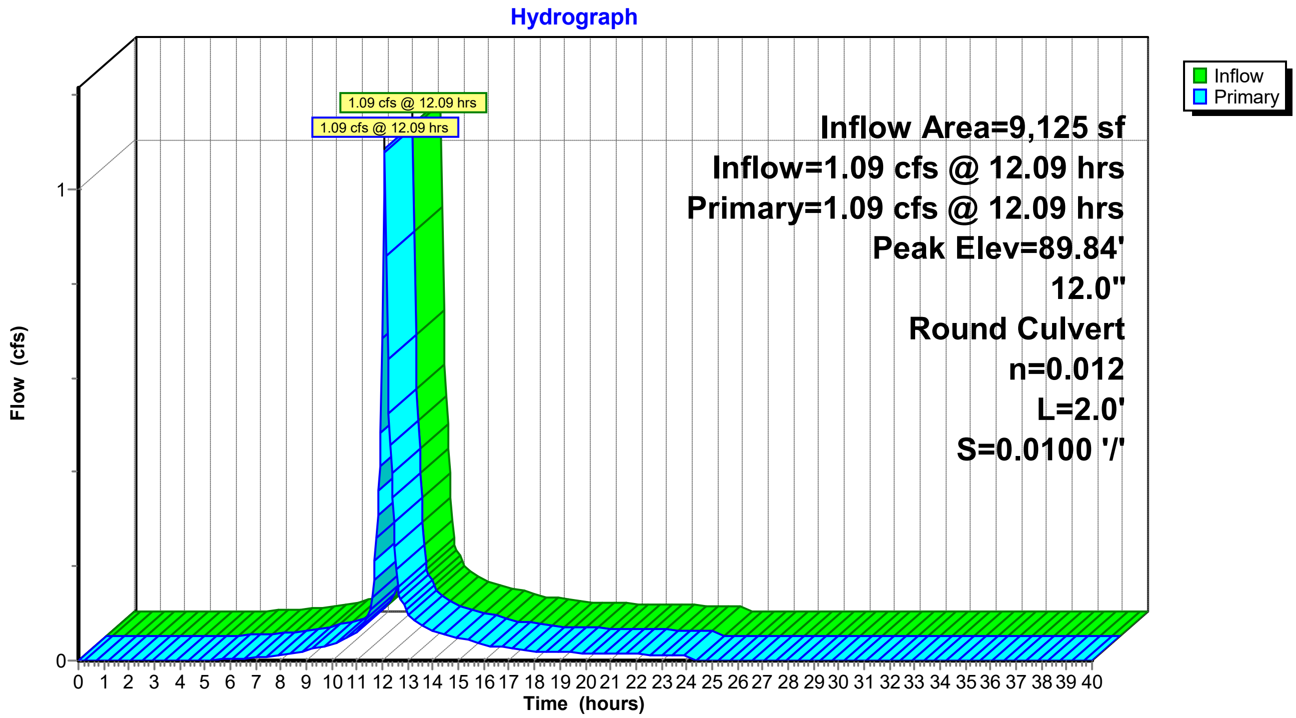
Inflow Area = 9,125 sf, 79.02% Impervious, Inflow Depth = 4.65" for 25 YEAR event
Inflow = 1.09 cfs @ 12.09 hrs, Volume= 3,534 cf
Outflow = 1.09 cfs @ 12.09 hrs, Volume= 3,534 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.09 cfs @ 12.09 hrs, Volume= 3,534 cf
Routed to Pond 3 : DMH

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 89.84' @ 12.14 hrs
Flood Elev= 93.15'

Device	Routing	Invert	Outlet Devices
#1	Primary	89.00'	**12.0" Round Culvert** L= 2.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 89.00' / 88.98' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.53 cfs @ 12.09 hrs HW=89.79' TW=89.76' (Dynamic Tailwater)
└**1=Culvert** (Outlet Controls 0.53 cfs @ 1.11 fps)

Pond 2: CB



Summary for Pond 3: DMH

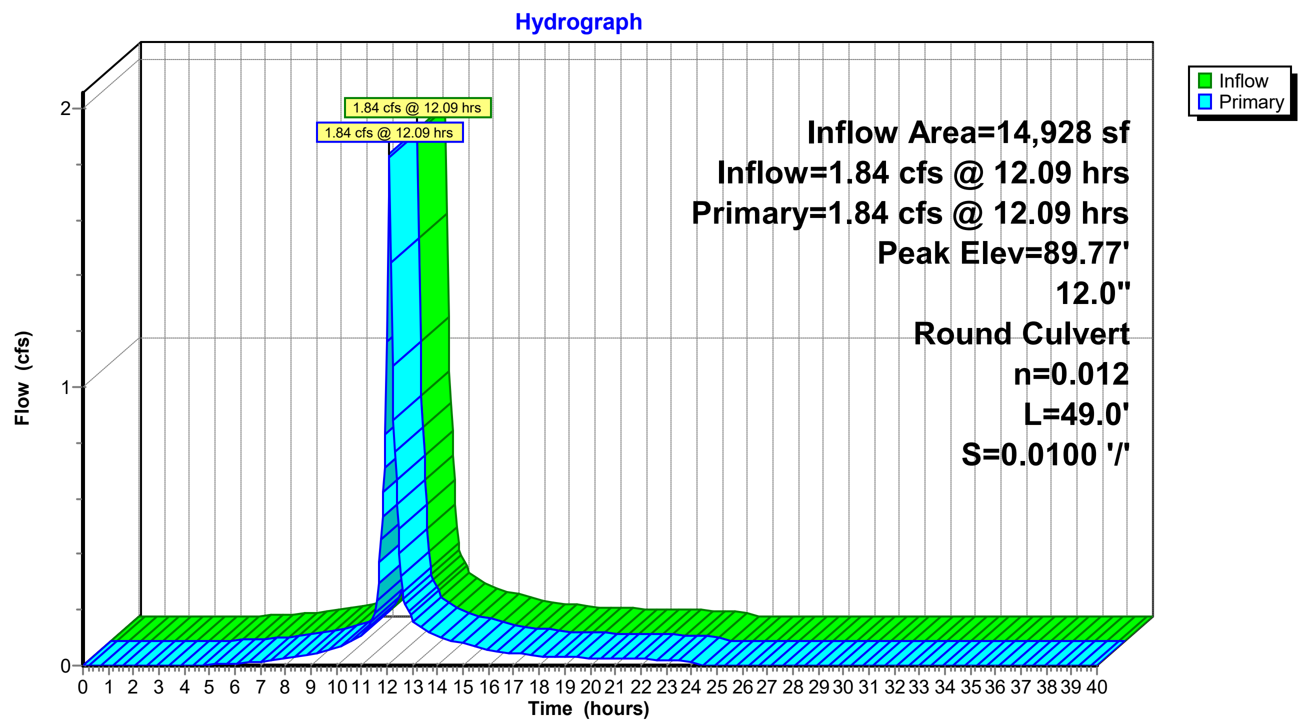
Inflow Area = 14,928 sf, 82.24% Impervious, Inflow Depth = 4.86" for 25 YEAR event
Inflow = 1.84 cfs @ 12.09 hrs, Volume= 6,050 cf
Outflow = 1.84 cfs @ 12.09 hrs, Volume= 6,050 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.84 cfs @ 12.09 hrs, Volume= 6,050 cf
Routed to Pond 4 : DMH

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 89.77' @ 12.10 hrs
Flood Elev= 93.42'

Device	Routing	Invert	Outlet Devices
#1	Primary	88.98'	**12.0" Round Culvert** L= 49.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 88.98' / 88.49' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.70 cfs @ 12.09 hrs HW=89.75' TW=89.22' (Dynamic Tailwater)
1=Culvert (Outlet Controls 1.70 cfs @ 3.59 fps)

Pond 3: DMH



Summary for Pond 4: DMH

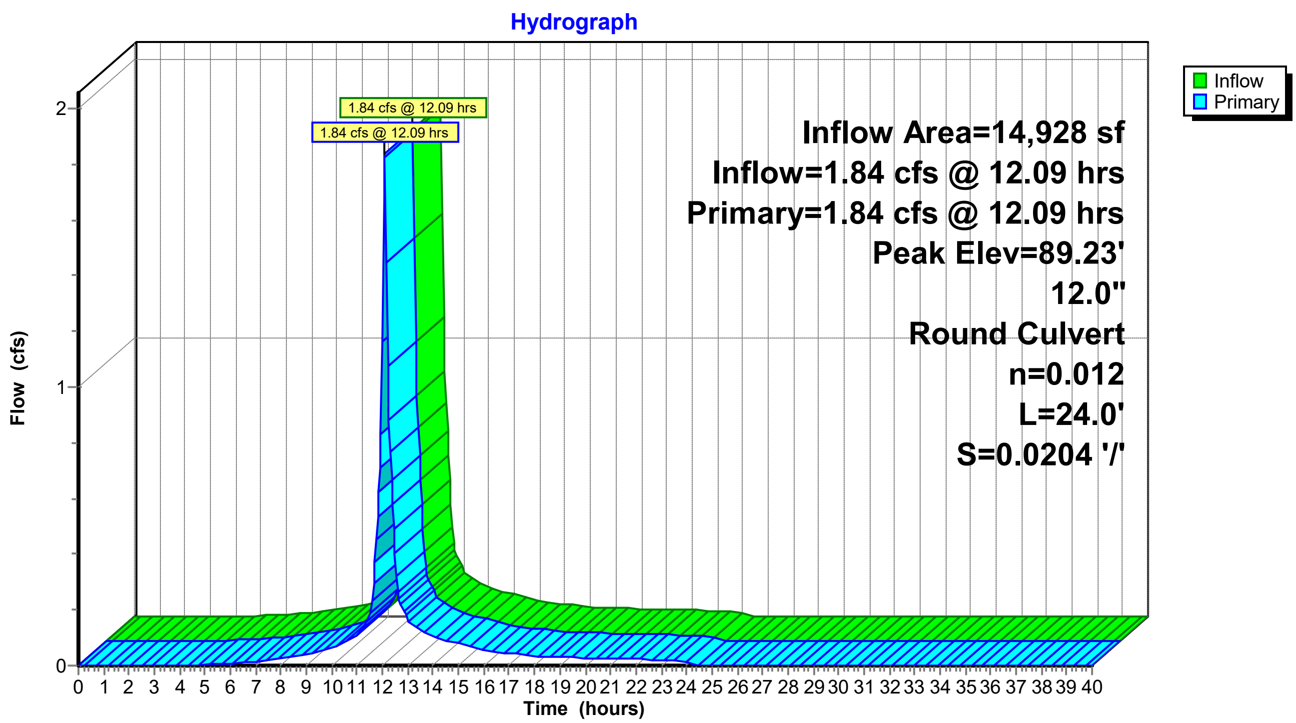
Inflow Area = 14,928 sf, 82.24% Impervious, Inflow Depth = 4.86" for 25 YEAR event
Inflow = 1.84 cfs @ 12.09 hrs, Volume= 6,050 cf
Outflow = 1.84 cfs @ 12.09 hrs, Volume= 6,050 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.84 cfs @ 12.09 hrs, Volume= 6,050 cf
Routed to Pond 7 : DMH

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 89.23' @ 12.09 hrs
Flood Elev= 95.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	88.49'	**12.0" Round Culvert** L= 24.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 88.49' / 88.00' S= 0.0204 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.79 cfs @ 12.09 hrs HW=89.22' TW=87.50' (Dynamic Tailwater)
1=Culvert (Inlet Controls 1.79 cfs @ 2.91 fps)

Pond 4: DMH



Summary for Pond 5: CB

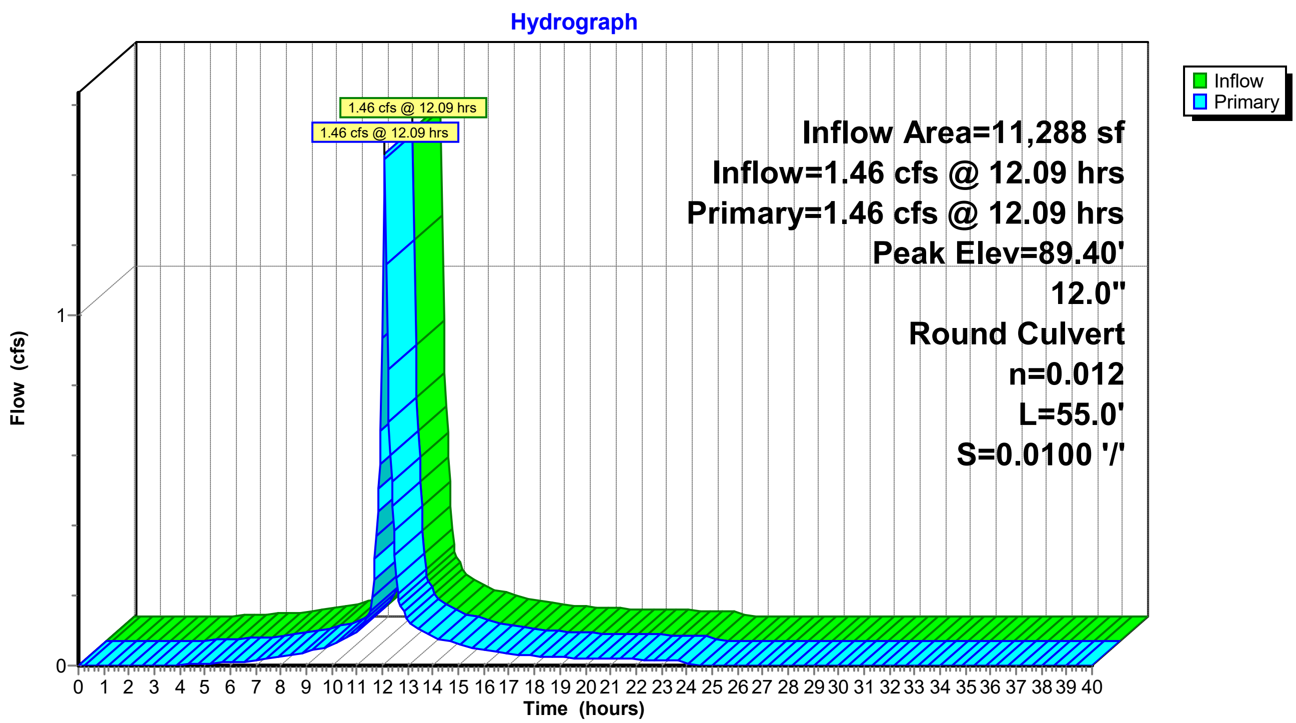
Inflow Area = 11,288 sf, 88.58% Impervious, Inflow Depth = 5.20" for 25 YEAR event
Inflow = 1.46 cfs @ 12.09 hrs, Volume= 4,893 cf
Outflow = 1.46 cfs @ 12.09 hrs, Volume= 4,893 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.46 cfs @ 12.09 hrs, Volume= 4,893 cf
Routed to Pond 6 : DMH

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 89.40' @ 12.10 hrs
Flood Elev= 92.37'

Device	Routing	Invert	Outlet Devices
#1	Primary	88.73'	**12.0" Round Culvert** L= 55.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 88.73' / 88.18' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.36 cfs @ 12.09 hrs HW=89.39' TW=88.81' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 1.36 cfs @ 3.52 fps)

Pond 5: CB



Summary for Pond 6: DMH

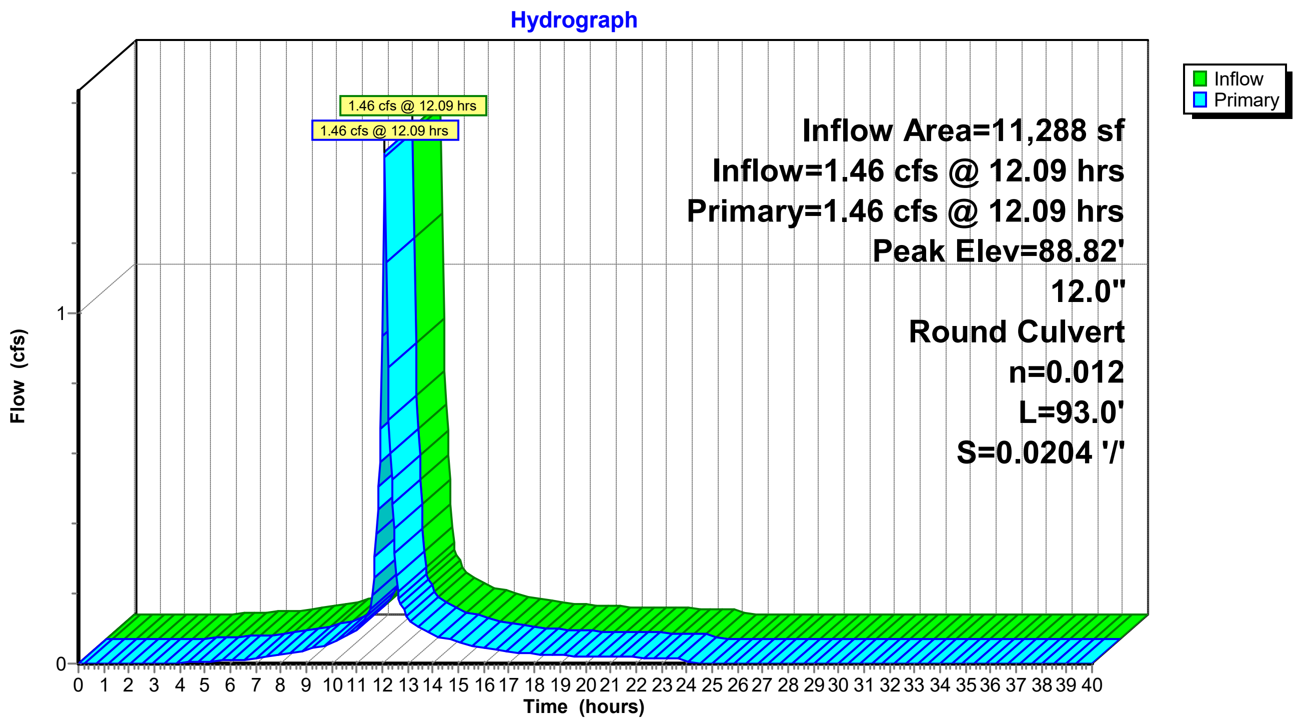
Inflow Area = 11,288 sf, 88.58% Impervious, Inflow Depth = 5.20" for 25 YEAR event
Inflow = 1.46 cfs @ 12.09 hrs, Volume= 4,893 cf
Outflow = 1.46 cfs @ 12.09 hrs, Volume= 4,893 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.46 cfs @ 12.09 hrs, Volume= 4,893 cf
Routed to Pond 7 : DMH

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 88.82' @ 12.09 hrs
Flood Elev= 95.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	88.18'	**12.0" Round Culvert** L= 93.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 88.18' / 86.28' S= 0.0204 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.42 cfs @ 12.09 hrs HW=88.81' TW=87.50' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 1.42 cfs @ 2.71 fps)

Pond 6: DMH



Summary for Pond 7: DMH

Inflow Area =	26,216 sf,	84.97% Impervious,	Inflow Depth = 5.01"	for 25 YEAR event	
Inflow =	3.29 cfs @	12.09 hrs,	Volume=	10,943 cf	
Outflow =	3.29 cfs @	12.09 hrs,	Volume=	10,943 cf,	Atten= 0%, Lag= 0.0 min
Primary =	3.29 cfs @	12.09 hrs,	Volume=	10,943 cf	

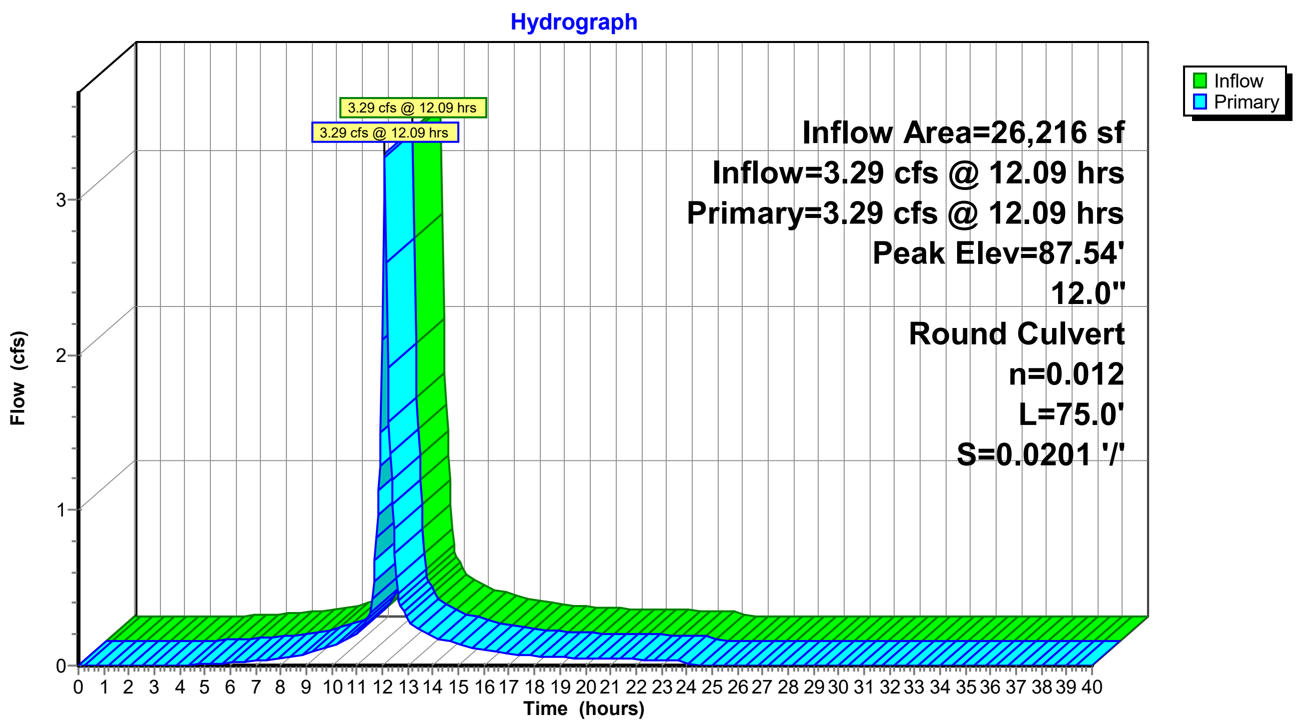
Routed to Pond 8 : DMH

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 87.54' @ 12.09 hrs
Flood Elev= 95.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	86.28'	**12.0" Round Culvert** L= 75.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 86.28' / 84.77' S= 0.0201 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=3.21 cfs @ 12.09 hrs HW=87.50' TW=85.99' (Dynamic Tailwater)
1=Culvert (Inlet Controls 3.21 cfs @ 4.09 fps)

Pond 7: DMH



Summary for Pond 8: DMH

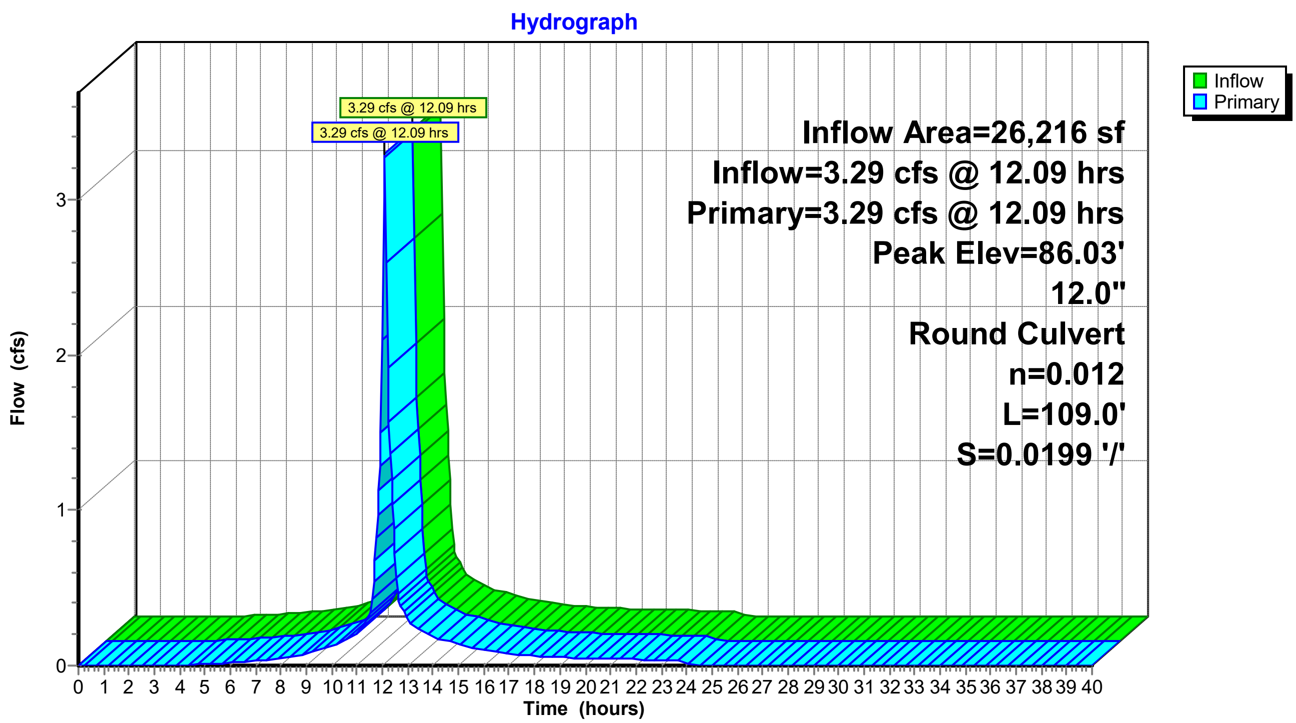
Inflow Area = 26,216 sf, 84.97% Impervious, Inflow Depth = 5.01" for 25 YEAR event
Inflow = 3.29 cfs @ 12.09 hrs, Volume= 10,943 cf
Outflow = 3.29 cfs @ 12.09 hrs, Volume= 10,943 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.29 cfs @ 12.09 hrs, Volume= 10,943 cf
Routed to Link 1L : ROCK POND

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 86.03' @ 12.09 hrs
Flood Elev= 88.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	84.77'	**12.0" Round Culvert** L= 109.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 84.77' / 82.60' S= 0.0199 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=3.21 cfs @ 12.09 hrs HW=85.99' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 3.21 cfs @ 4.09 fps)

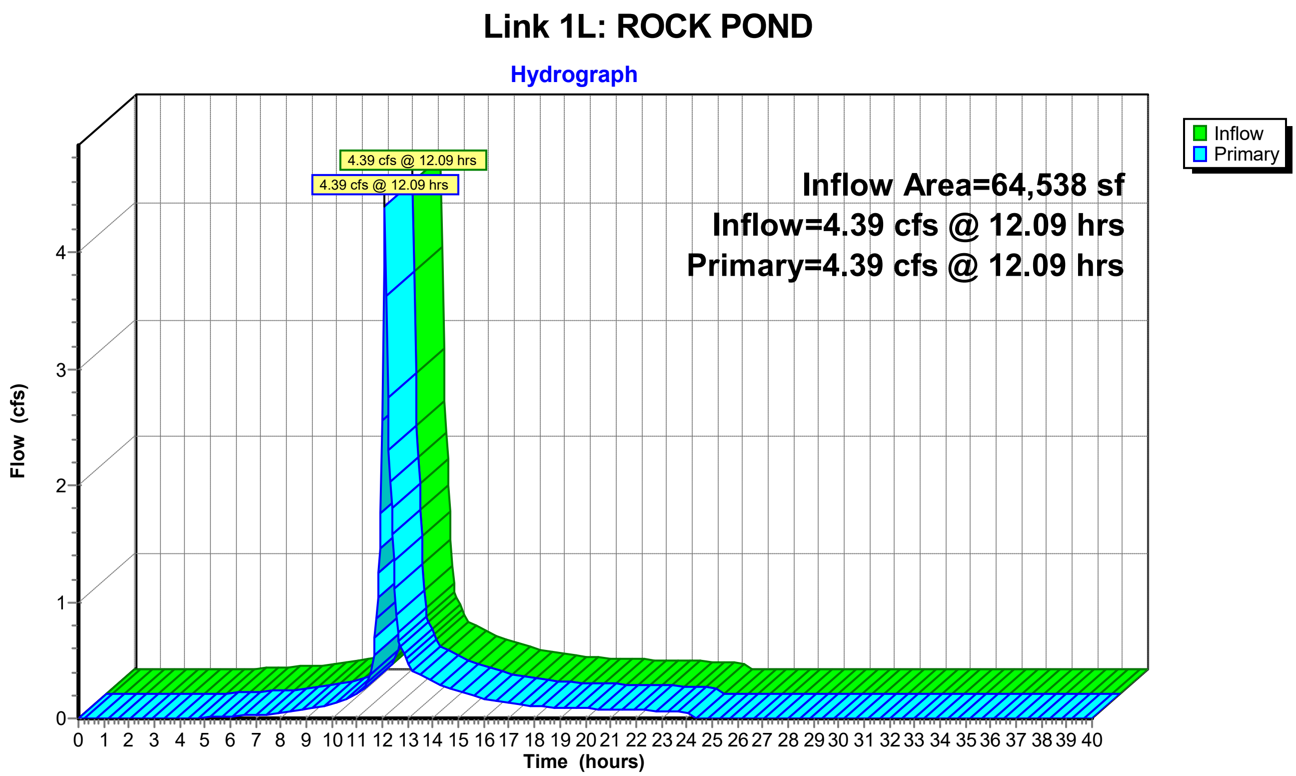
Pond 8: DMH



Summary for Link 1L: ROCK POND

Inflow Area = 64,538 sf, 47.60% Impervious, Inflow Depth = 2.83" for 25 YEAR event
Inflow = 4.39 cfs @ 12.09 hrs, Volume= 15,236 cf
Primary = 4.39 cfs @ 12.09 hrs, Volume= 15,236 cf, Atten= 0%, Lag= 0.0 min

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

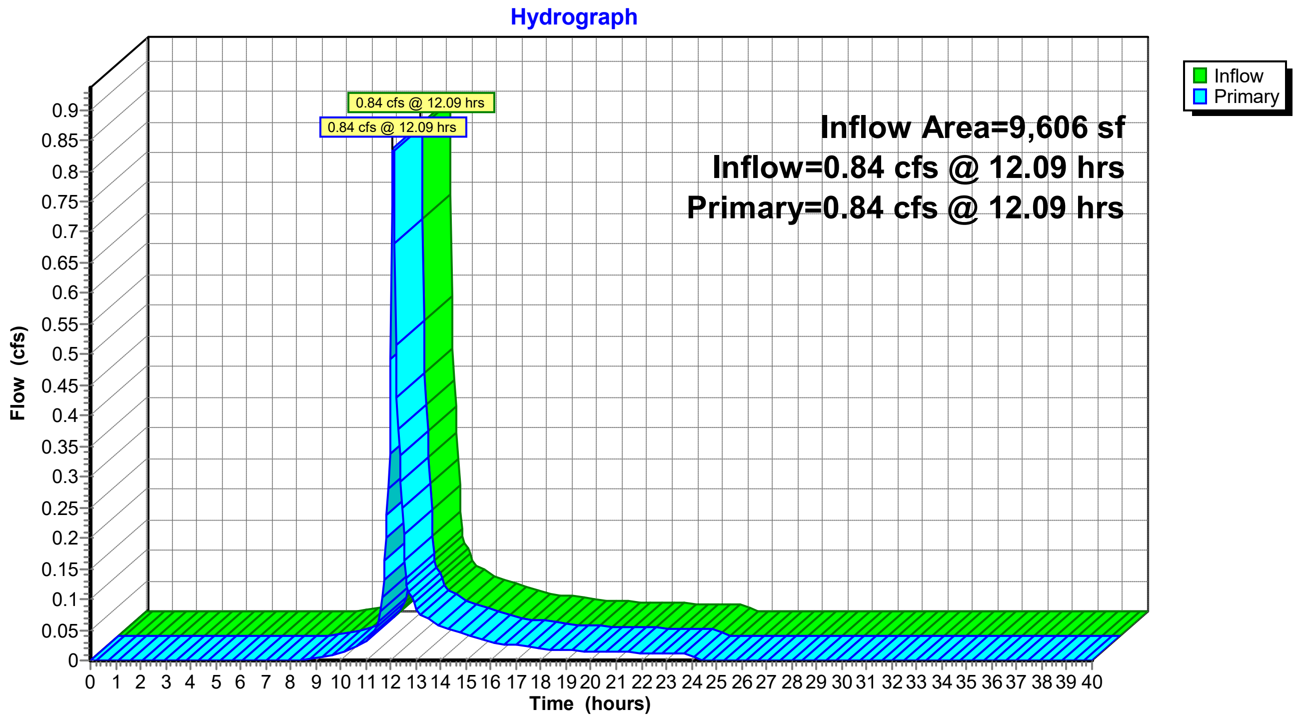


Summary for Link 2L: WEST MAIN STREET

Inflow Area =	9,606 sf,	57.63% Impervious,	Inflow Depth = 3.30"	for 25 YEAR event
Inflow =	0.84 cfs @	12.09 hrs, Volume=	2,639 cf	
Primary =	0.84 cfs @	12.09 hrs, Volume=	2,639 cf,	Atten= 0%, Lag= 0.0 min

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

Link 2L: WEST MAIN STREET



Summary for Subcatchment 1S:

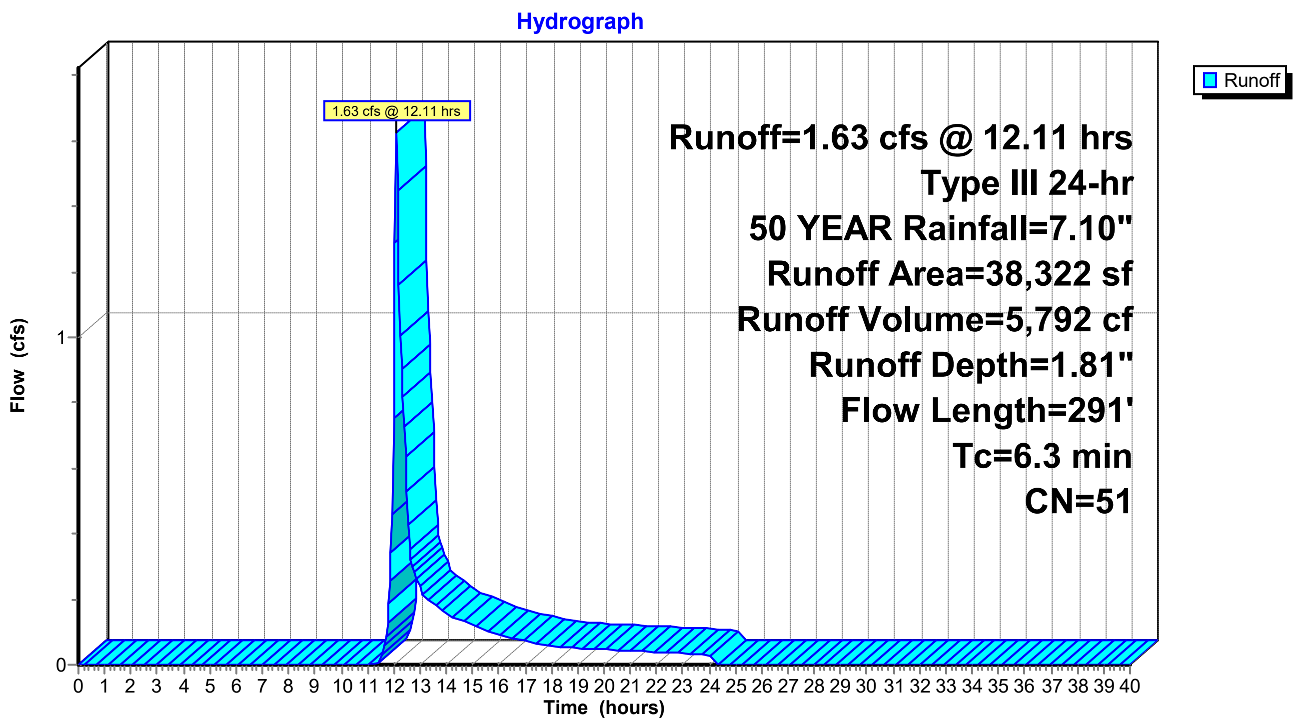
Runoff = 1.63 cfs @ 12.11 hrs, Volume= 5,792 cf, Depth= 1.81"
Routed to Link 1L : ROCK POND

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 50 YEAR Rainfall=7.10"

Area (sf)	CN	Description
26,450	39	>75% Grass cover, Good, HSG A
3,425	30	Woods, Good, HSG A
1,094	98	Paved parking, HSG A
7,353	98	Roofs, HSG A
38,322	51	Weighted Average
29,875		77.96% Pervious Area
8,447		22.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	50	0.0720	0.17		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.22"
1.4	241	0.0300	2.79		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
6.3	291	Total			

Subcatchment 1S:



Summary for Subcatchment 2S: WEST MAIN STREET

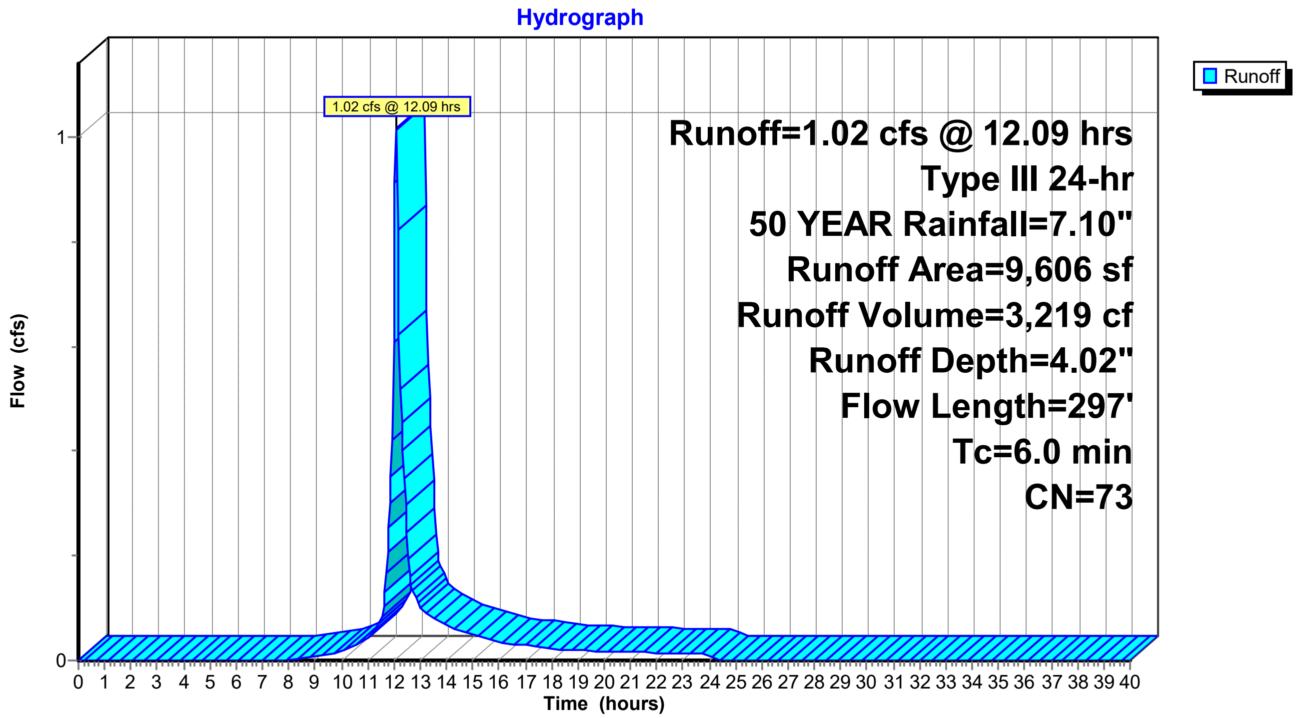
Runoff = 1.02 cfs @ 12.09 hrs, Volume= 3,219 cf, Depth= 4.02"
Routed to Link 2L : WEST MAIN STREET

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 50 YEAR Rainfall=7.10"

Area (sf)	CN	Description
3,801	39	>75% Grass cover, Good, HSG A
269	30	Woods, Good, HSG A
5,536	98	Paved parking, HSG A
9,606	73	Weighted Average
4,070		42.37% Pervious Area
5,536		57.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	50	0.5400	4.49		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.22"
1.2	247	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.4	297	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2S: WEST MAIN STREET



Summary for Subcatchment 3S:

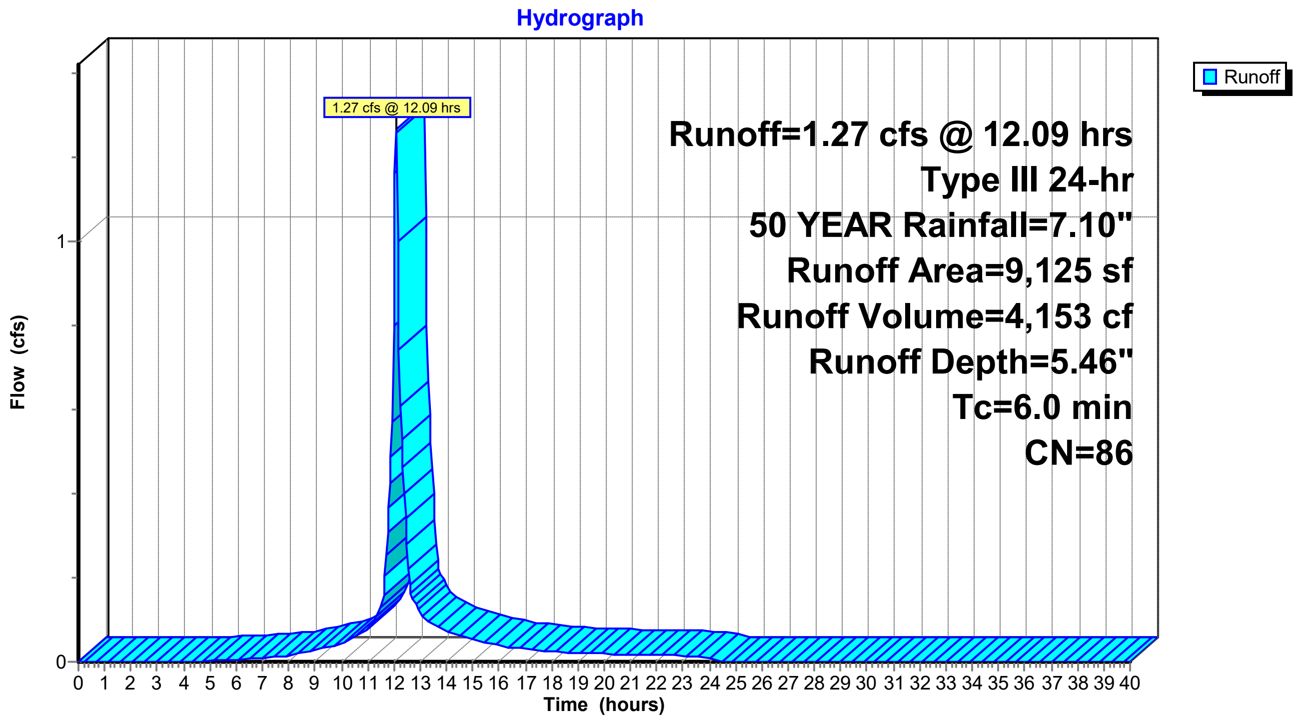
Runoff = 1.27 cfs @ 12.09 hrs, Volume= 4,153 cf, Depth= 5.46"
Routed to Pond 2 : CB

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 50 YEAR Rainfall=7.10"

Area (sf)	CN	Description
1,914	39	>75% Grass cover, Good, HSG A
4,721	98	Paved parking, HSG A
2,490	98	Roofs, HSG A
9,125	86	Weighted Average
1,914		20.98% Pervious Area
7,211		79.02% Impervious Area

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

Subcatchment 3S:



Summary for Subcatchment 4S:

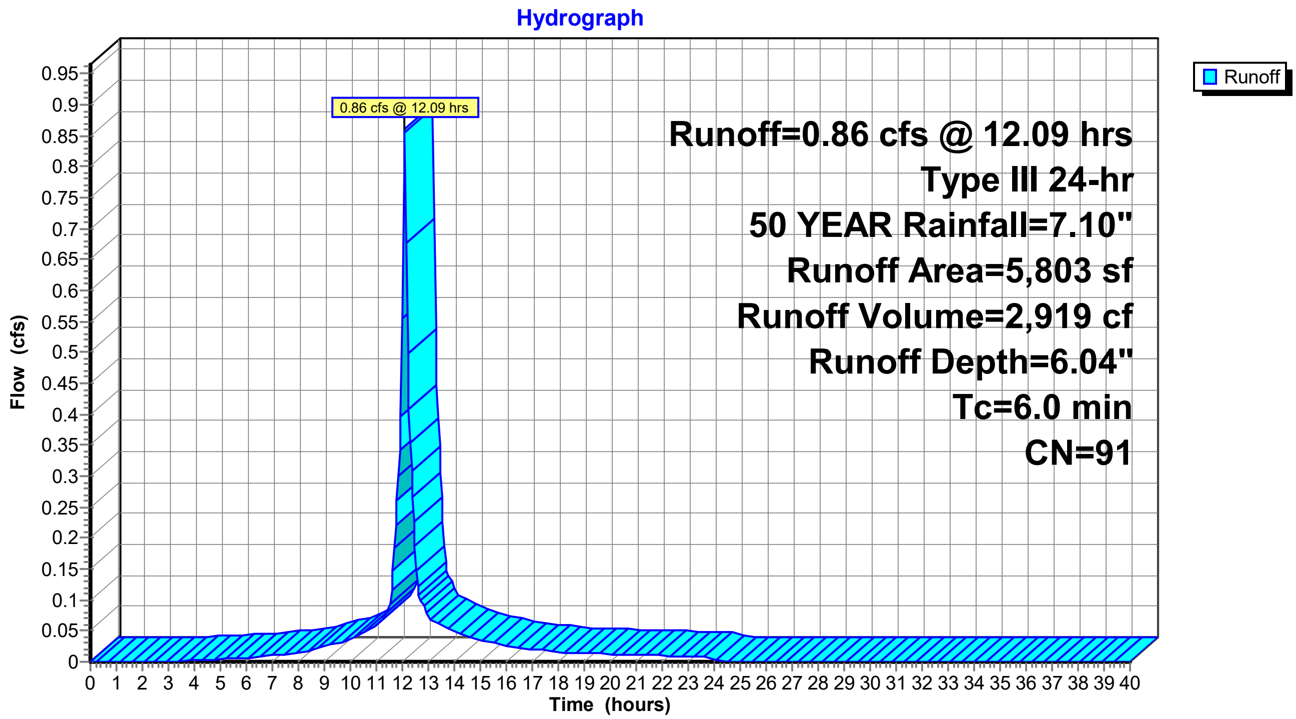
Runoff = 0.86 cfs @ 12.09 hrs, Volume= 2,919 cf, Depth= 6.04"
Routed to Pond 1 : TRENCH DRAIN

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 50 YEAR Rainfall=7.10"

Area (sf)	CN	Description
737	39	>75% Grass cover, Good, HSG A
3,150	98	Paved parking, HSG A
1,916	98	Roofs, HSG A
5,803	91	Weighted Average
737		12.70% Pervious Area
5,066		87.30% Impervious Area

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

Subcatchment 4S:



Summary for Subcatchment 5S:

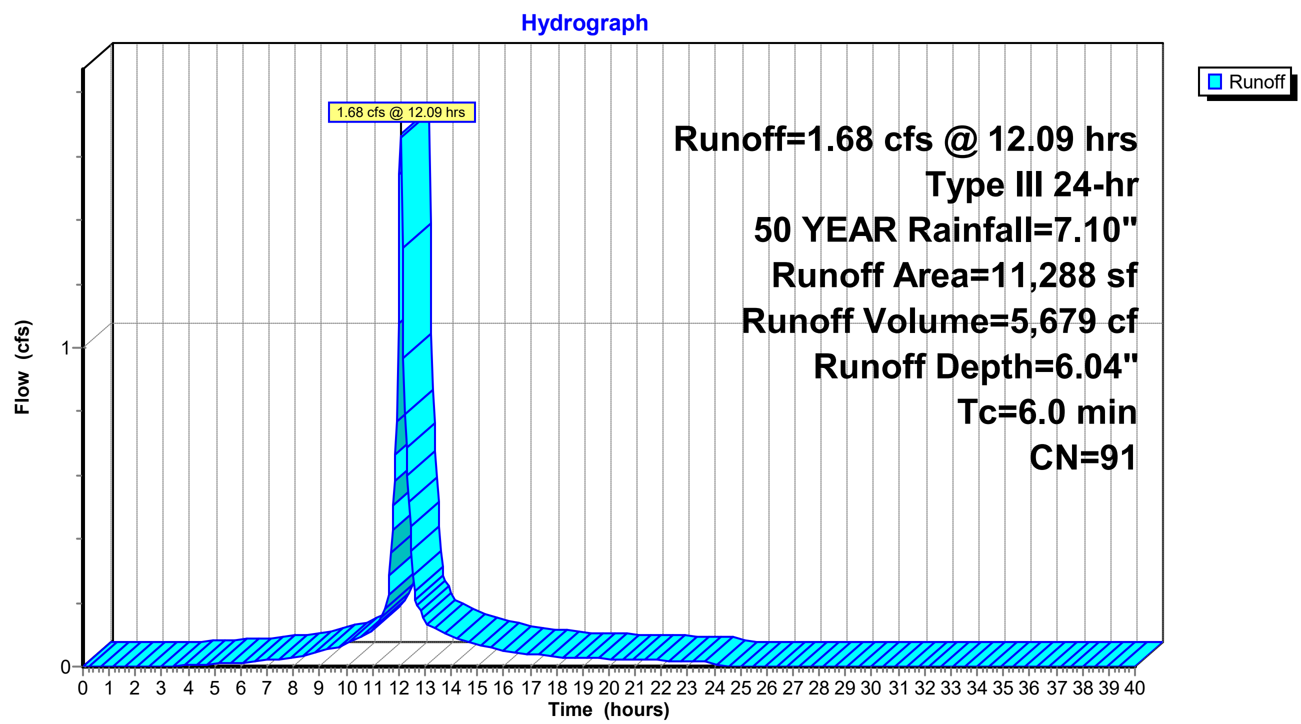
Runoff = 1.68 cfs @ 12.09 hrs, Volume= 5,679 cf, Depth= 6.04"
Routed to Pond 5 : CB

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 50 YEAR Rainfall=7.10"

Area (sf)	CN	Description
778	39	>75% Grass cover, Good, HSG A
511	30	Woods, Good, HSG A
6,608	98	Paved parking, HSG A
3,391	98	Roofs, HSG A
11,288	91	Weighted Average
1,289		11.42% Pervious Area
9,999		88.58% Impervious Area

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

Subcatchment 5S:



Summary for Pond 1: TRENCH DRAIN

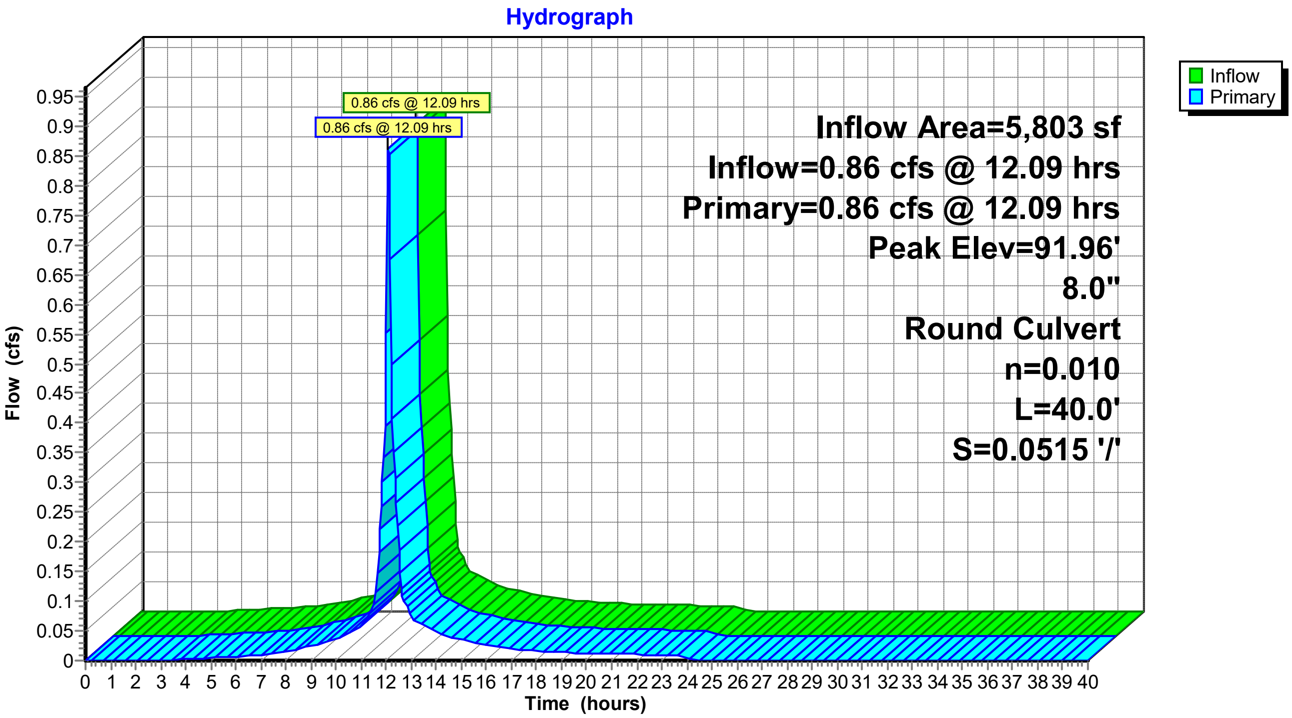
Inflow Area = 5,803 sf, 87.30% Impervious, Inflow Depth = 6.04" for 50 YEAR event
Inflow = 0.86 cfs @ 12.09 hrs, Volume= 2,919 cf
Outflow = 0.86 cfs @ 12.09 hrs, Volume= 2,919 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.86 cfs @ 12.09 hrs, Volume= 2,919 cf
Routed to Pond 3 : DMH

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 91.96' @ 12.09 hrs
Flood Elev= 92.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	91.37'	**8.0" Round Culvert** L= 40.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 91.37' / 89.31' S= 0.0515 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=0.84 cfs @ 12.09 hrs HW=91.95' TW=89.84' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.84 cfs @ 2.60 fps)

Pond 1: TRENCH DRAIN



Summary for Pond 2: CB

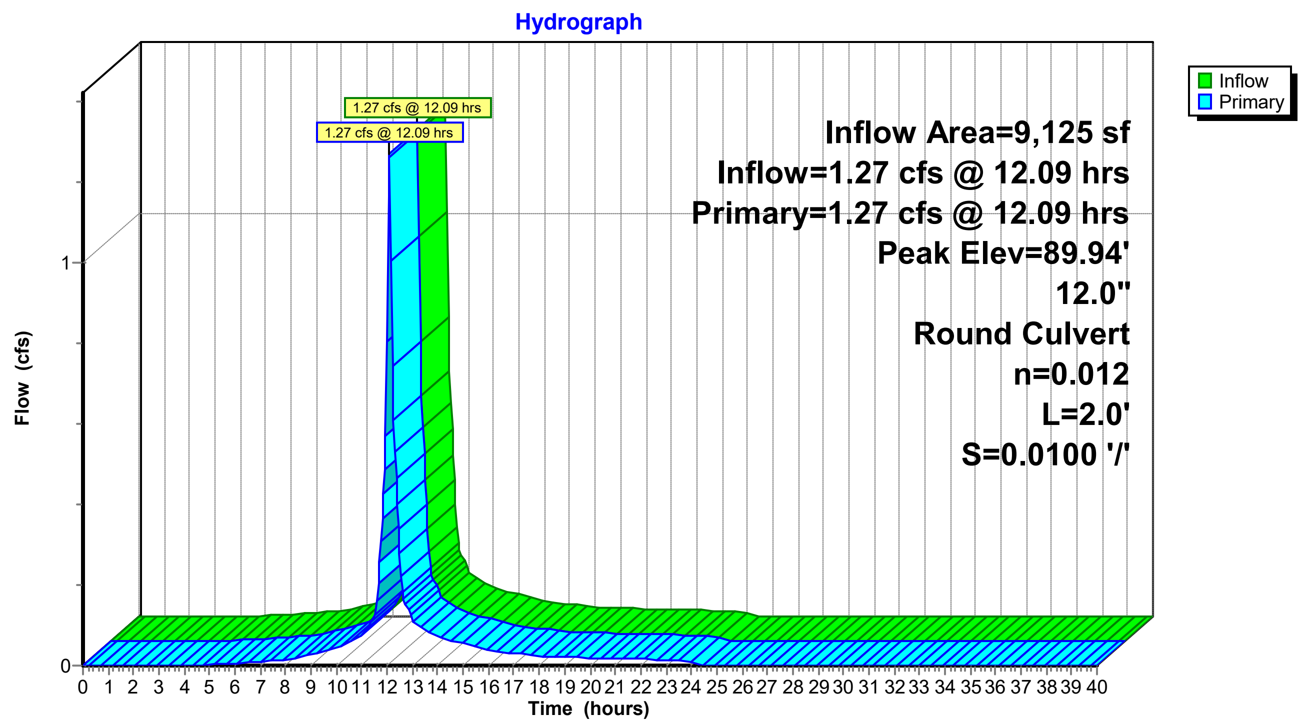
Inflow Area = 9,125 sf, 79.02% Impervious, Inflow Depth = 5.46" for 50 YEAR event
Inflow = 1.27 cfs @ 12.09 hrs, Volume= 4,153 cf
Outflow = 1.27 cfs @ 12.09 hrs, Volume= 4,153 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.27 cfs @ 12.09 hrs, Volume= 4,153 cf
Routed to Pond 3 : DMH

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 89.94' @ 12.14 hrs
Flood Elev= 93.15'

Device	Routing	Invert	Outlet Devices
#1	Primary	89.00'	**12.0" Round Culvert** L= 2.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 89.00' / 88.98' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.57 cfs @ 12.09 hrs HW=89.87' TW=89.84' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 0.57 cfs @ 0.79 fps)

Pond 2: CB



Summary for Pond 3: DMH

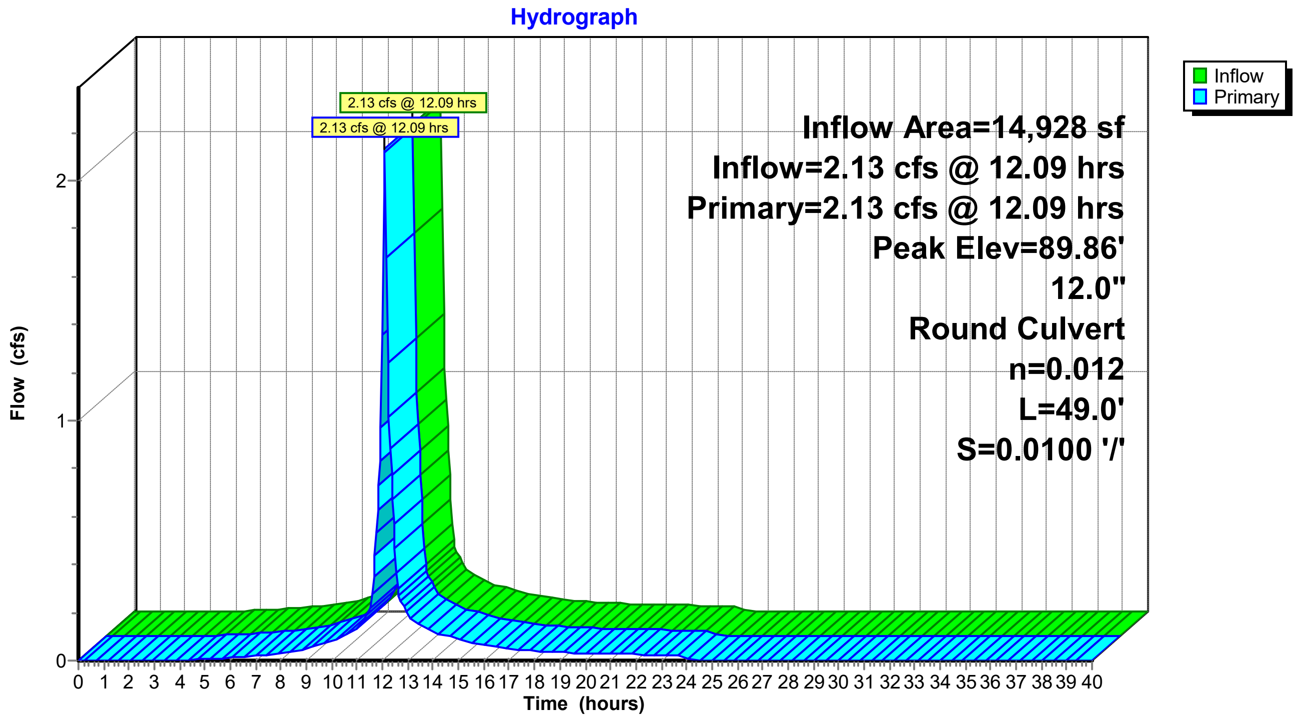
Inflow Area = 14,928 sf, 82.24% Impervious, Inflow Depth = 5.69" for 50 YEAR event
Inflow = 2.13 cfs @ 12.09 hrs, Volume= 7,073 cf
Outflow = 2.13 cfs @ 12.09 hrs, Volume= 7,073 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.13 cfs @ 12.09 hrs, Volume= 7,073 cf
Routed to Pond 4 : DMH

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 89.86' @ 12.10 hrs
Flood Elev= 93.42'

Device	Routing	Invert	Outlet Devices
#1	Primary	88.98'	**12.0" Round Culvert** L= 49.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 88.98' / 88.49' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.96 cfs @ 12.09 hrs HW=89.84' TW=89.30' (Dynamic Tailwater)
1=Culvert (Outlet Controls 1.96 cfs @ 3.67 fps)

Pond 3: DMH



Summary for Pond 4: DMH

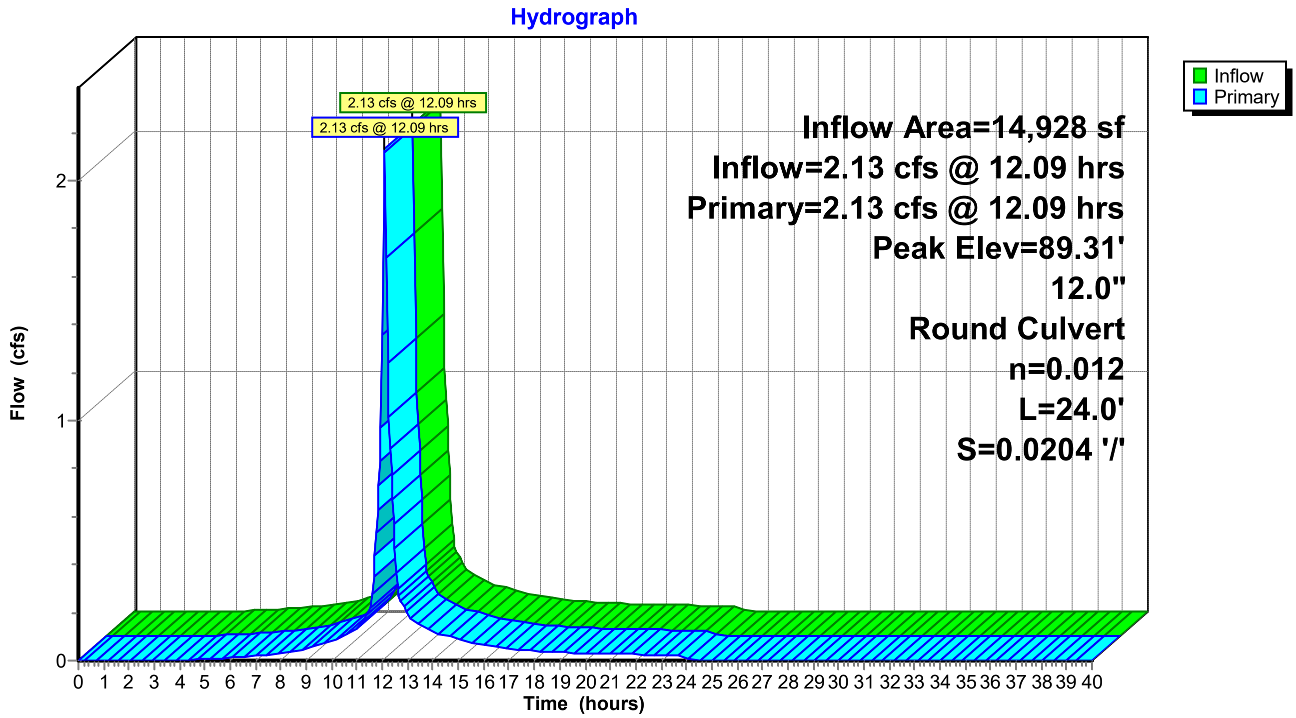
Inflow Area = 14,928 sf, 82.24% Impervious, Inflow Depth = 5.69" for 50 YEAR event
Inflow = 2.13 cfs @ 12.09 hrs, Volume= 7,073 cf
Outflow = 2.13 cfs @ 12.09 hrs, Volume= 7,073 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.13 cfs @ 12.09 hrs, Volume= 7,073 cf
Routed to Pond 7 : DMH

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 89.31' @ 12.09 hrs
Flood Elev= 95.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	88.49'	**12.0" Round Culvert** L= 24.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 88.49' / 88.00' S= 0.0204 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=2.08 cfs @ 12.09 hrs HW=89.30' TW=87.74' (Dynamic Tailwater)
1=Culvert (Inlet Controls 2.08 cfs @ 3.06 fps)

Pond 4: DMH



Summary for Pond 5: CB

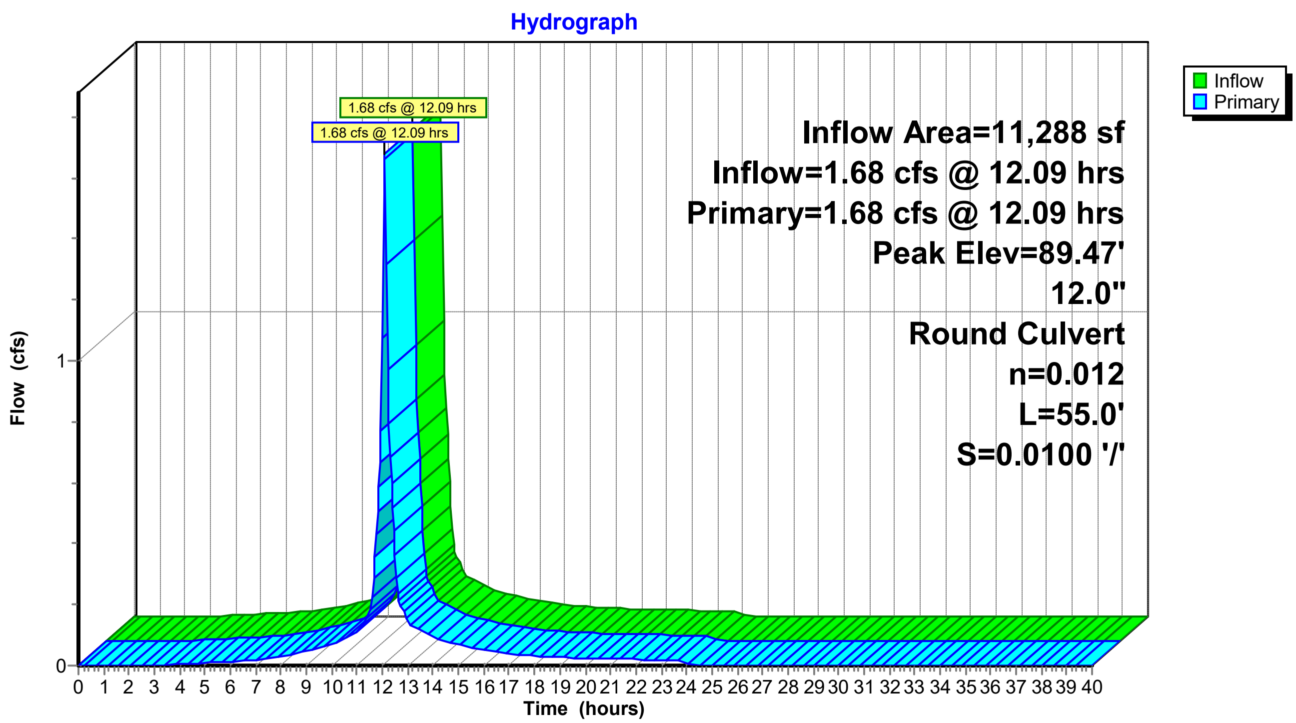
Inflow Area = 11,288 sf, 88.58% Impervious, Inflow Depth = 6.04" for 50 YEAR event
Inflow = 1.68 cfs @ 12.09 hrs, Volume= 5,679 cf
Outflow = 1.68 cfs @ 12.09 hrs, Volume= 5,679 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.68 cfs @ 12.09 hrs, Volume= 5,679 cf
Routed to Pond 6 : DMH

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 89.47' @ 12.10 hrs
Flood Elev= 92.37'

Device	Routing	Invert	Outlet Devices
#1	Primary	88.73'	**12.0" Round Culvert** L= 55.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 88.73' / 88.18' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.56 cfs @ 12.09 hrs HW=89.45' TW=88.87' (Dynamic Tailwater)
1=Culvert (Outlet Controls 1.56 cfs @ 3.61 fps)

Pond 5: CB



Summary for Pond 6: DMH

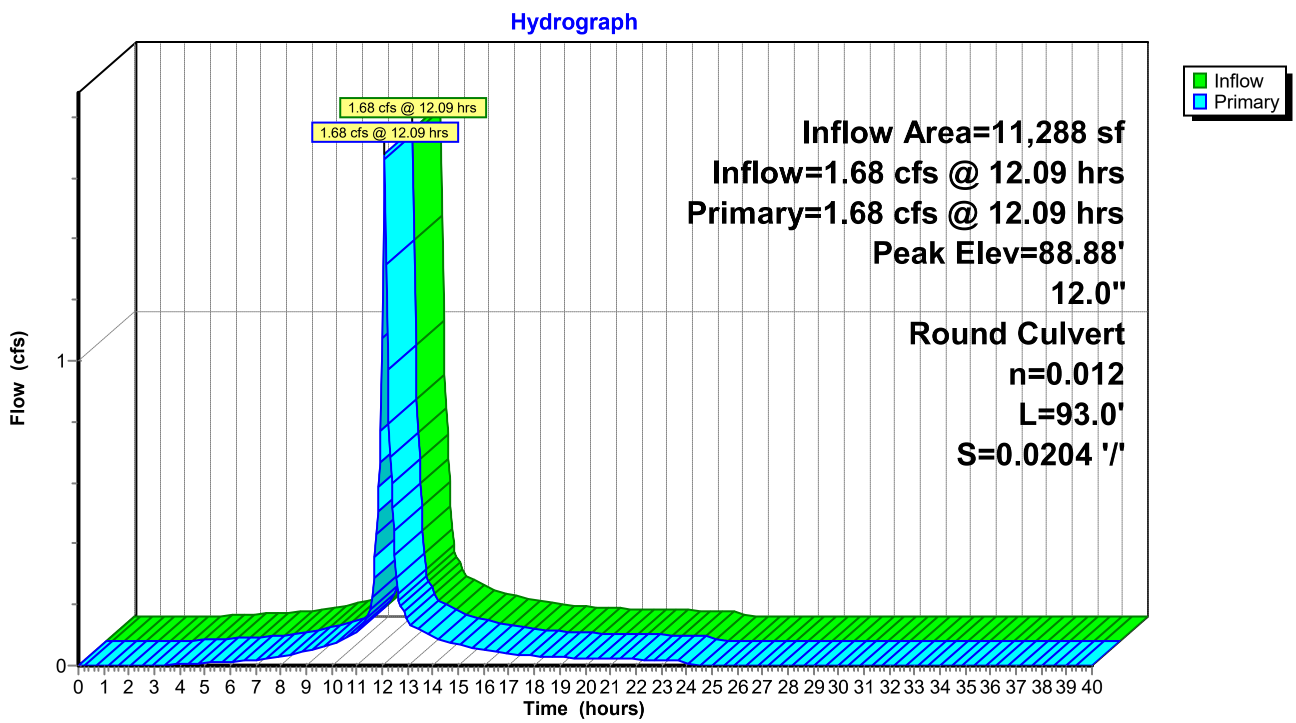
Inflow Area = 11,288 sf, 88.58% Impervious, Inflow Depth = 6.04" for 50 YEAR event
Inflow = 1.68 cfs @ 12.09 hrs, Volume= 5,679 cf
Outflow = 1.68 cfs @ 12.09 hrs, Volume= 5,679 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.68 cfs @ 12.09 hrs, Volume= 5,679 cf
Routed to Pond 7 : DMH

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 88.88' @ 12.09 hrs
Flood Elev= 95.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	88.18'	**12.0" Round Culvert** L= 93.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 88.18' / 86.28' S= 0.0204 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.63 cfs @ 12.09 hrs HW=88.87' TW=87.74' (Dynamic Tailwater)
1=Culvert (Inlet Controls 1.63 cfs @ 2.83 fps)

Pond 6: DMH



Summary for Pond 7: DMH

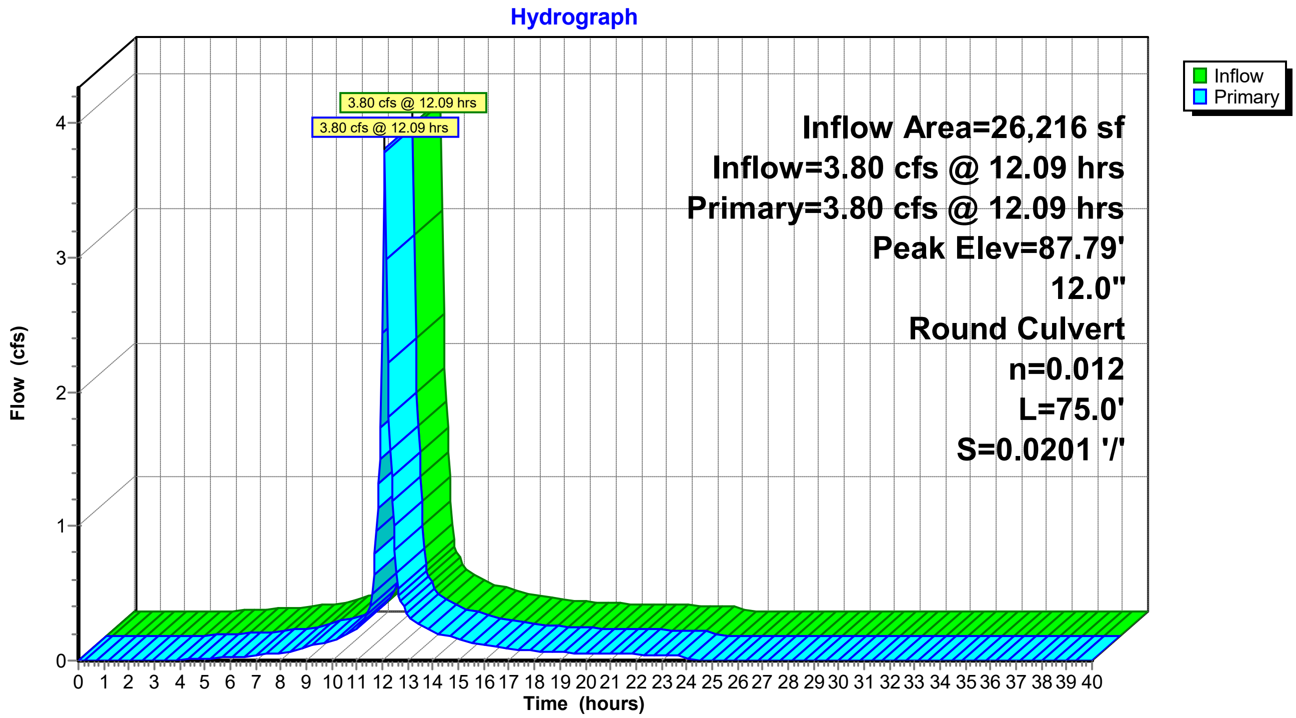
Inflow Area = 26,216 sf, 84.97% Impervious, Inflow Depth = 5.84" for 50 YEAR event
Inflow = 3.80 cfs @ 12.09 hrs, Volume= 12,752 cf
Outflow = 3.80 cfs @ 12.09 hrs, Volume= 12,752 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.80 cfs @ 12.09 hrs, Volume= 12,752 cf
Routed to Pond 8 : DMH

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 87.79' @ 12.09 hrs
Flood Elev= 95.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	86.28'	**12.0" Round Culvert** L= 75.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 86.28' / 84.77' S= 0.0201 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=3.71 cfs @ 12.09 hrs HW=87.74' TW=86.23' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 3.71 cfs @ 4.72 fps)

Pond 7: DMH



Summary for Pond 8: DMH

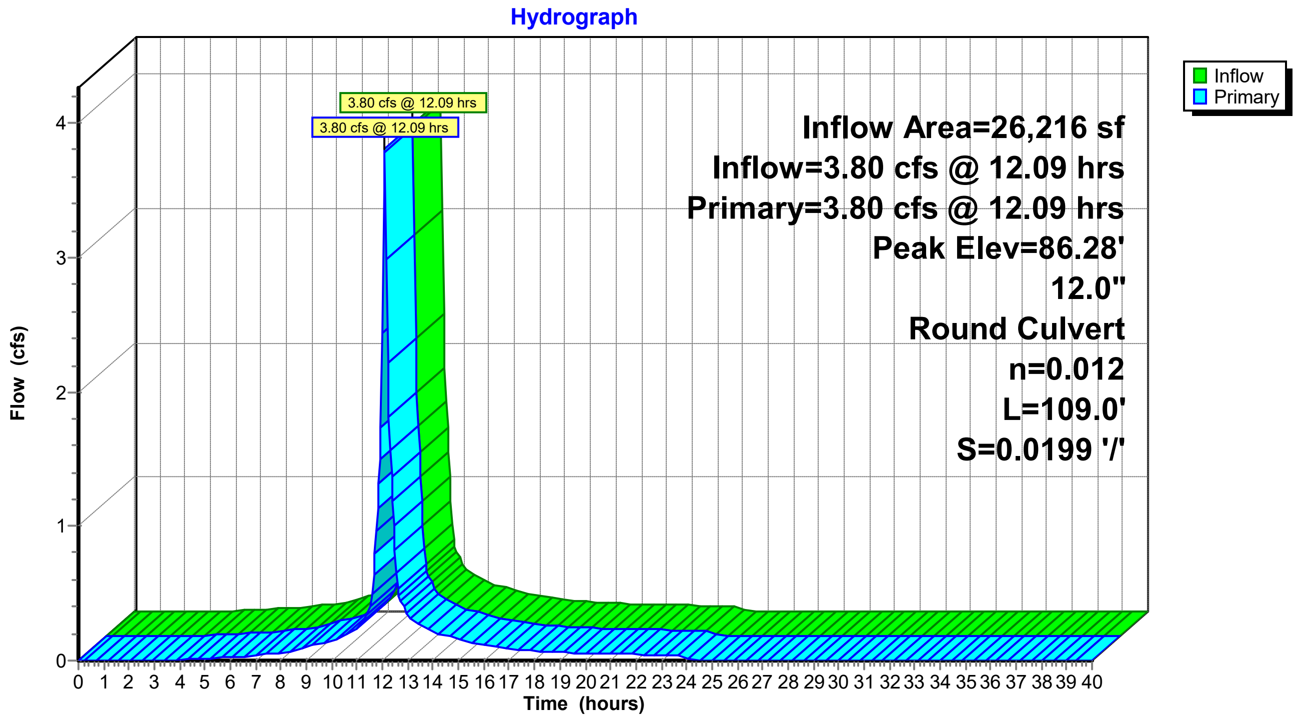
Inflow Area = 26,216 sf, 84.97% Impervious, Inflow Depth = 5.84" for 50 YEAR event
Inflow = 3.80 cfs @ 12.09 hrs, Volume= 12,752 cf
Outflow = 3.80 cfs @ 12.09 hrs, Volume= 12,752 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.80 cfs @ 12.09 hrs, Volume= 12,752 cf
Routed to Link 1L : ROCK POND

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 86.28' @ 12.09 hrs
Flood Elev= 88.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	84.77'	**12.0" Round Culvert** L= 109.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 84.77' / 82.60' S= 0.0199 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=3.71 cfs @ 12.09 hrs HW=86.23' TW=0.00' (Dynamic Tailwater)
1=Culvert (Inlet Controls 3.71 cfs @ 4.72 fps)

Pond 8: DMH

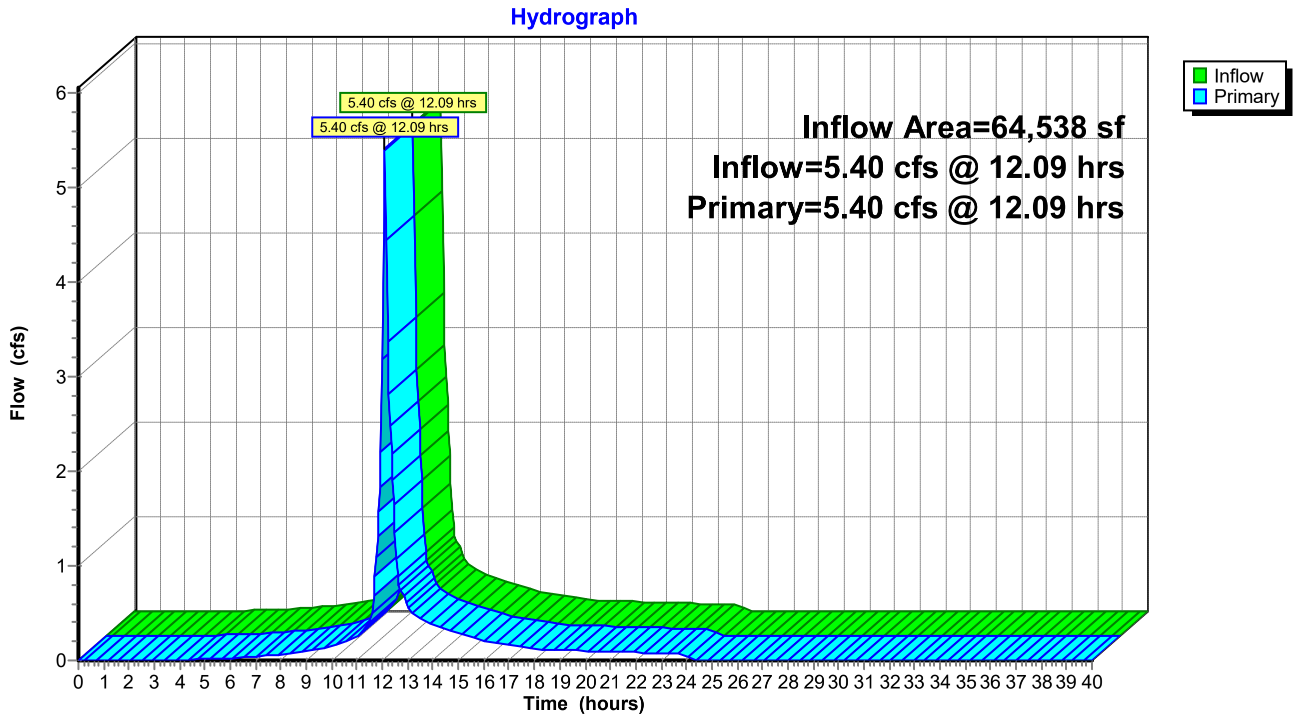


Summary for Link 1L: ROCK POND

Inflow Area =	64,538 sf,	47.60% Impervious,	Inflow Depth = 3.45"	for 50 YEAR event
Inflow =	5.40 cfs @	12.09 hrs, Volume=	18,543 cf	
Primary =	5.40 cfs @	12.09 hrs, Volume=	18,543 cf,	Atten= 0%, Lag= 0.0 min

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

Link 1L: ROCK POND

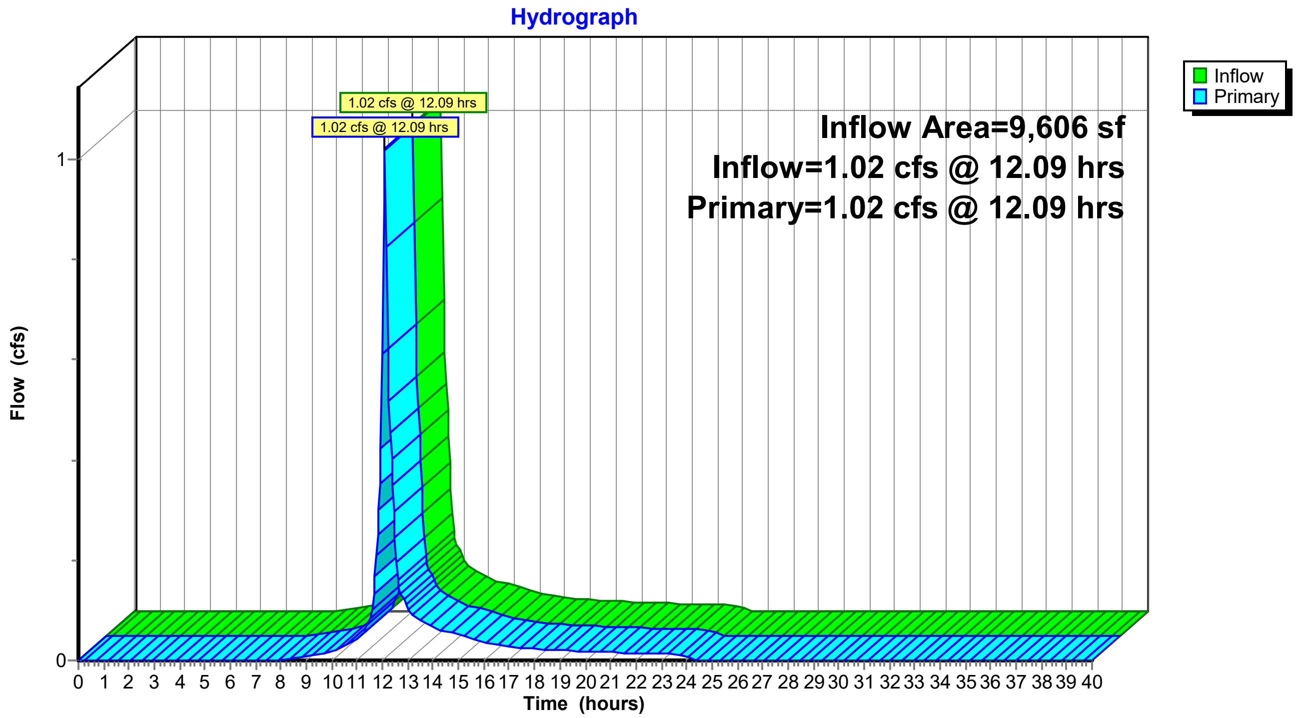


Summary for Link 2L: WEST MAIN STREET

Inflow Area =	9,606 sf,	57.63% Impervious,	Inflow Depth = 4.02"	for 50 YEAR event
Inflow =	1.02 cfs @	12.09 hrs, Volume=	3,219 cf	
Primary =	1.02 cfs @	12.09 hrs, Volume=	3,219 cf, Atten= 0%, Lag= 0.0 min	

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

Link 2L: WEST MAIN STREET



Summary for Subcatchment 1S:

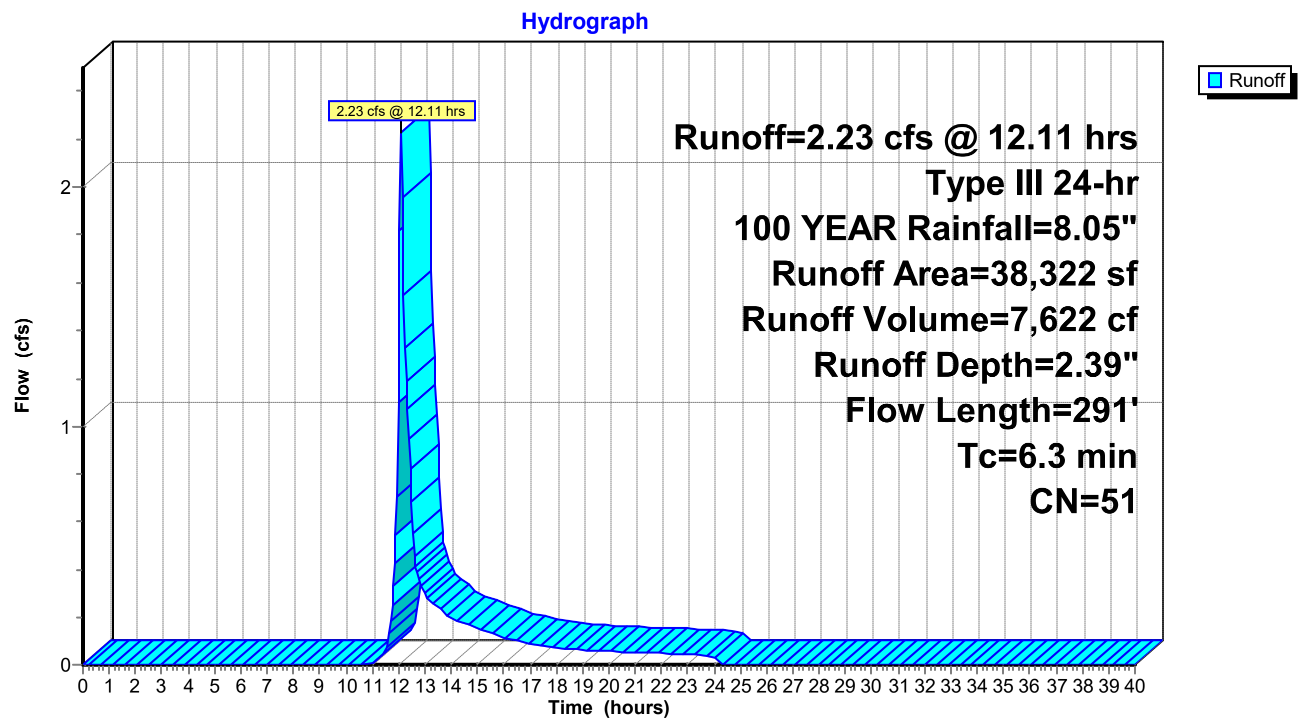
Runoff = 2.23 cfs @ 12.11 hrs, Volume= 7,622 cf, Depth= 2.39"
Routed to Link 1L : ROCK POND

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 YEAR Rainfall=8.05"

Area (sf)	CN	Description
26,450	39	>75% Grass cover, Good, HSG A
3,425	30	Woods, Good, HSG A
1,094	98	Paved parking, HSG A
7,353	98	Roofs, HSG A
38,322	51	Weighted Average
29,875		77.96% Pervious Area
8,447		22.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	50	0.0720	0.17		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.22"
1.4	241	0.0300	2.79		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
6.3	291	Total			

Subcatchment 1S:



Summary for Subcatchment 2S: WEST MAIN STREET

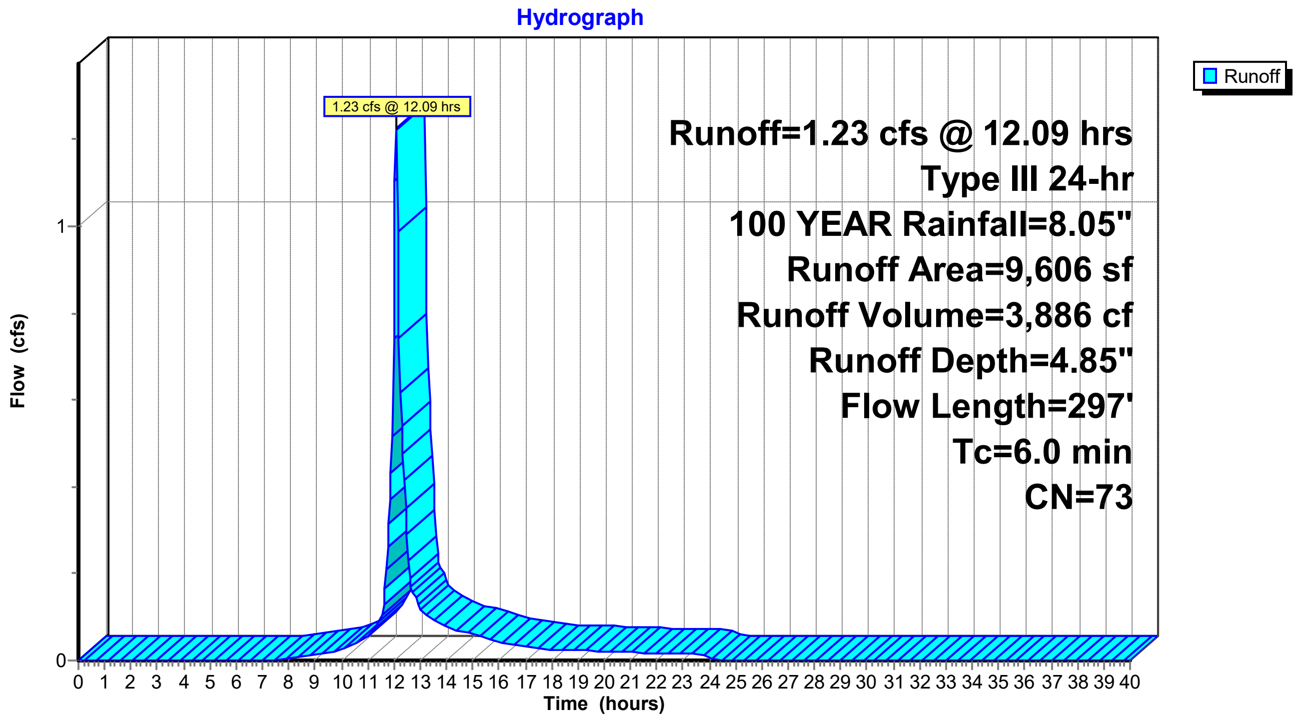
Runoff = 1.23 cfs @ 12.09 hrs, Volume= 3,886 cf, Depth= 4.85"
Routed to Link 2L : WEST MAIN STREET

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 YEAR Rainfall=8.05"

Area (sf)	CN	Description
3,801	39	>75% Grass cover, Good, HSG A
269	30	Woods, Good, HSG A
5,536	98	Paved parking, HSG A
9,606	73	Weighted Average
4,070		42.37% Pervious Area
5,536		57.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	50	0.5400	4.49		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.22"
1.2	247	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.4	297	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2S: WEST MAIN STREET



Summary for Subcatchment 3S:

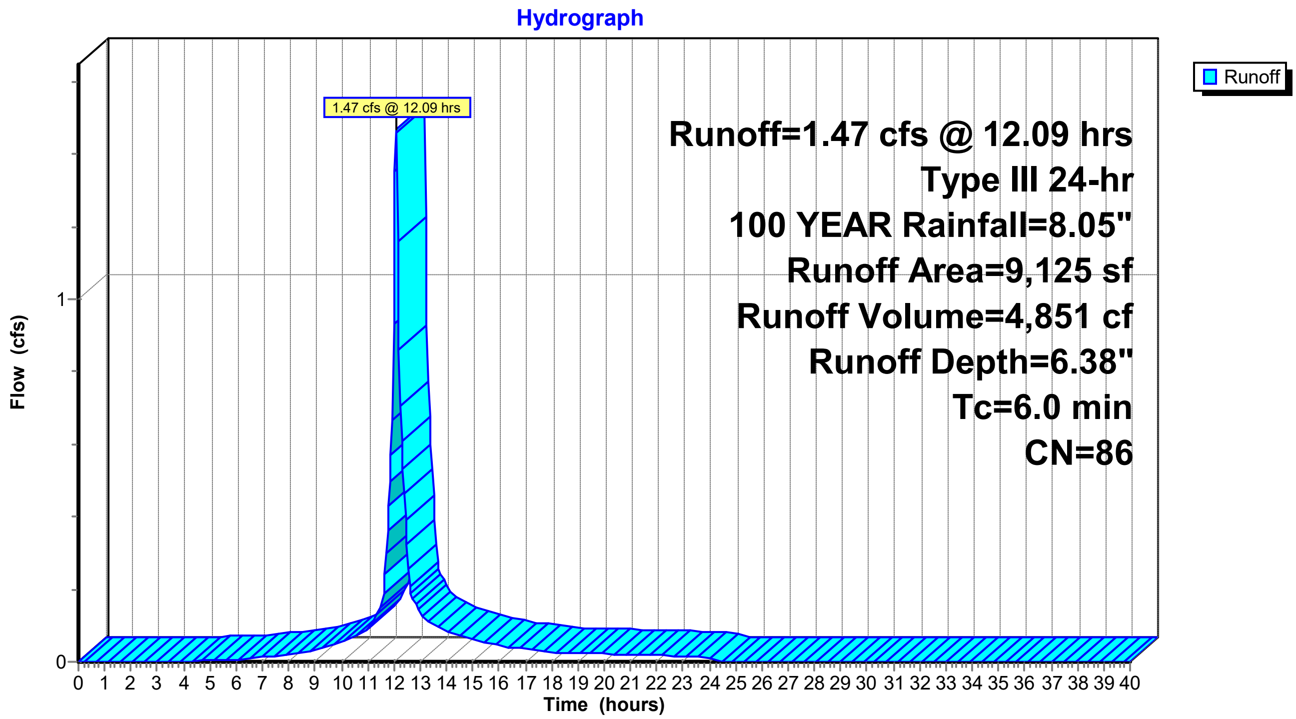
Runoff = 1.47 cfs @ 12.09 hrs, Volume= 4,851 cf, Depth= 6.38"
Routed to Pond 2 : CB

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 YEAR Rainfall=8.05"

Area (sf)	CN	Description
1,914	39	>75% Grass cover, Good, HSG A
4,721	98	Paved parking, HSG A
2,490	98	Roofs, HSG A
9,125	86	Weighted Average
1,914		20.98% Pervious Area
7,211		79.02% Impervious Area

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

Subcatchment 3S:



Summary for Subcatchment 4S:

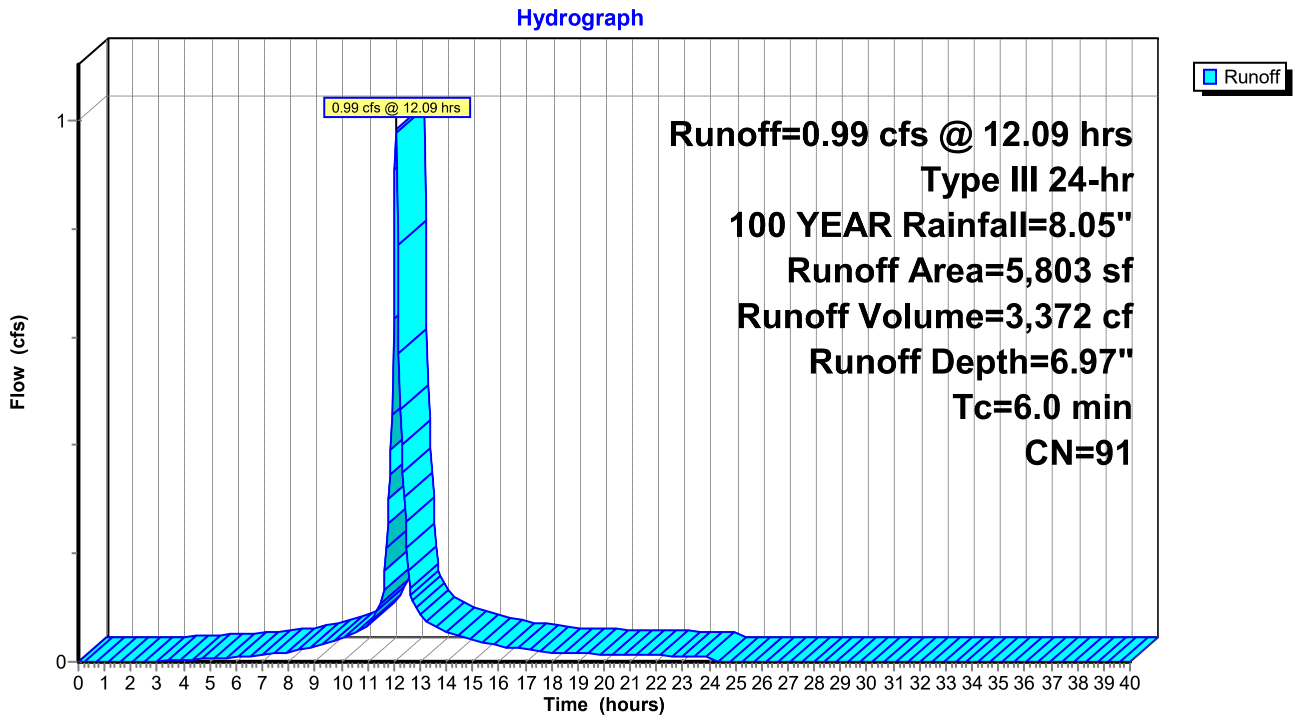
Runoff = 0.99 cfs @ 12.09 hrs, Volume= 3,372 cf, Depth= 6.97"
Routed to Pond 1 : TRENCH DRAIN

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 YEAR Rainfall=8.05"

Area (sf)	CN	Description
737	39	>75% Grass cover, Good, HSG A
3,150	98	Paved parking, HSG A
1,916	98	Roofs, HSG A
5,803	91	Weighted Average
737		12.70% Pervious Area
5,066		87.30% Impervious Area

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

Subcatchment 4S:



Summary for Subcatchment 5S:

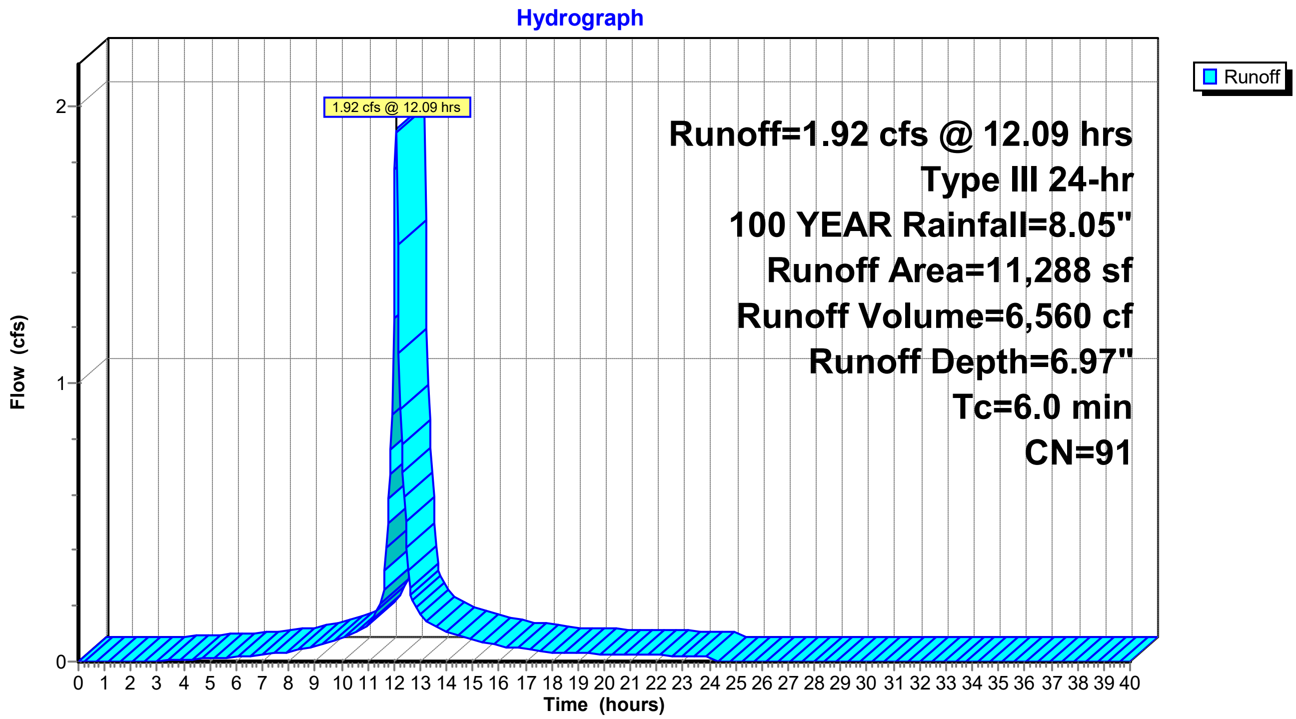
Runoff = 1.92 cfs @ 12.09 hrs, Volume= 6,560 cf, Depth= 6.97"
Routed to Pond 5 : CB

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 YEAR Rainfall=8.05"

Area (sf)	CN	Description
778	39	>75% Grass cover, Good, HSG A
511	30	Woods, Good, HSG A
6,608	98	Paved parking, HSG A
3,391	98	Roofs, HSG A
11,288	91	Weighted Average
1,289		11.42% Pervious Area
9,999		88.58% Impervious Area

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

Subcatchment 5S:



Summary for Pond 1: TRENCH DRAIN

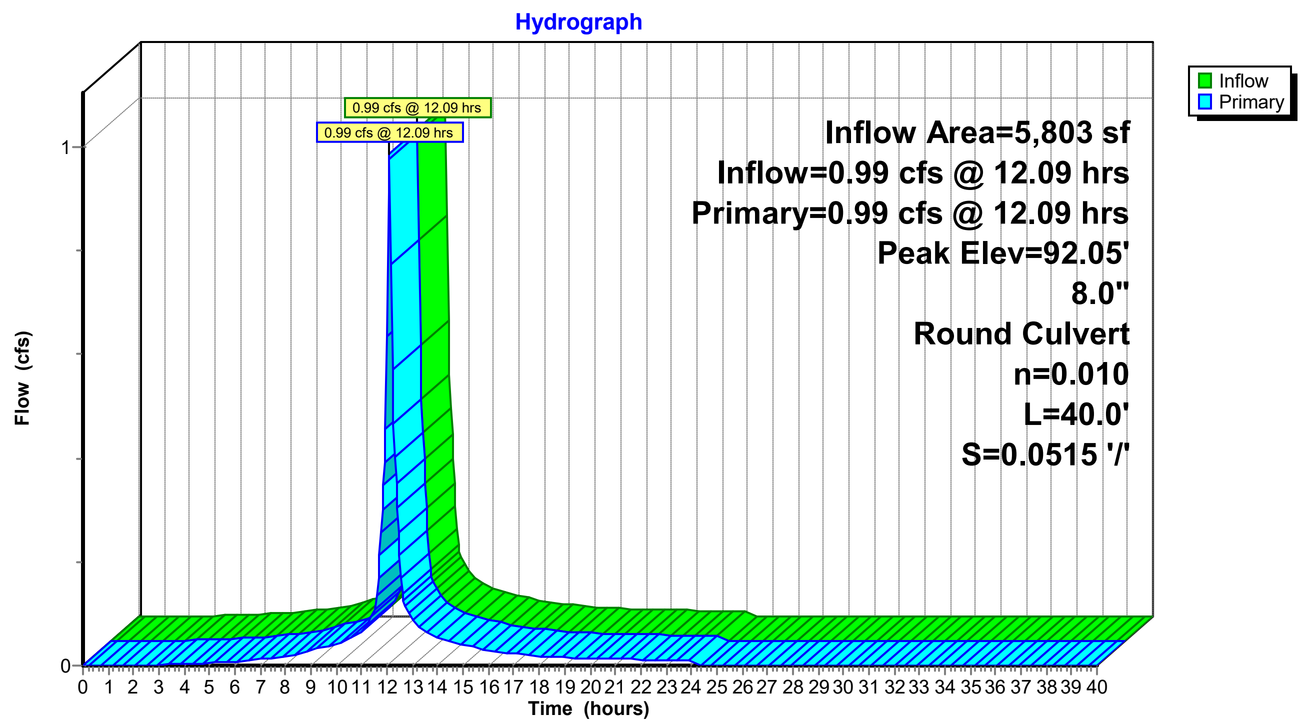
Inflow Area = 5,803 sf, 87.30% Impervious, Inflow Depth = 6.97" for 100 YEAR event
Inflow = 0.99 cfs @ 12.09 hrs, Volume= 3,372 cf
Outflow = 0.99 cfs @ 12.09 hrs, Volume= 3,372 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.99 cfs @ 12.09 hrs, Volume= 3,372 cf
Routed to Pond 3 : DMH

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 92.05' @ 12.09 hrs
Flood Elev= 92.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	91.37'	**8.0" Round Culvert** L= 40.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 91.37' / 89.31' S= 0.0515 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=0.96 cfs @ 12.09 hrs HW=92.03' TW=89.93' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.96 cfs @ 2.76 fps)

Pond 1: TRENCH DRAIN



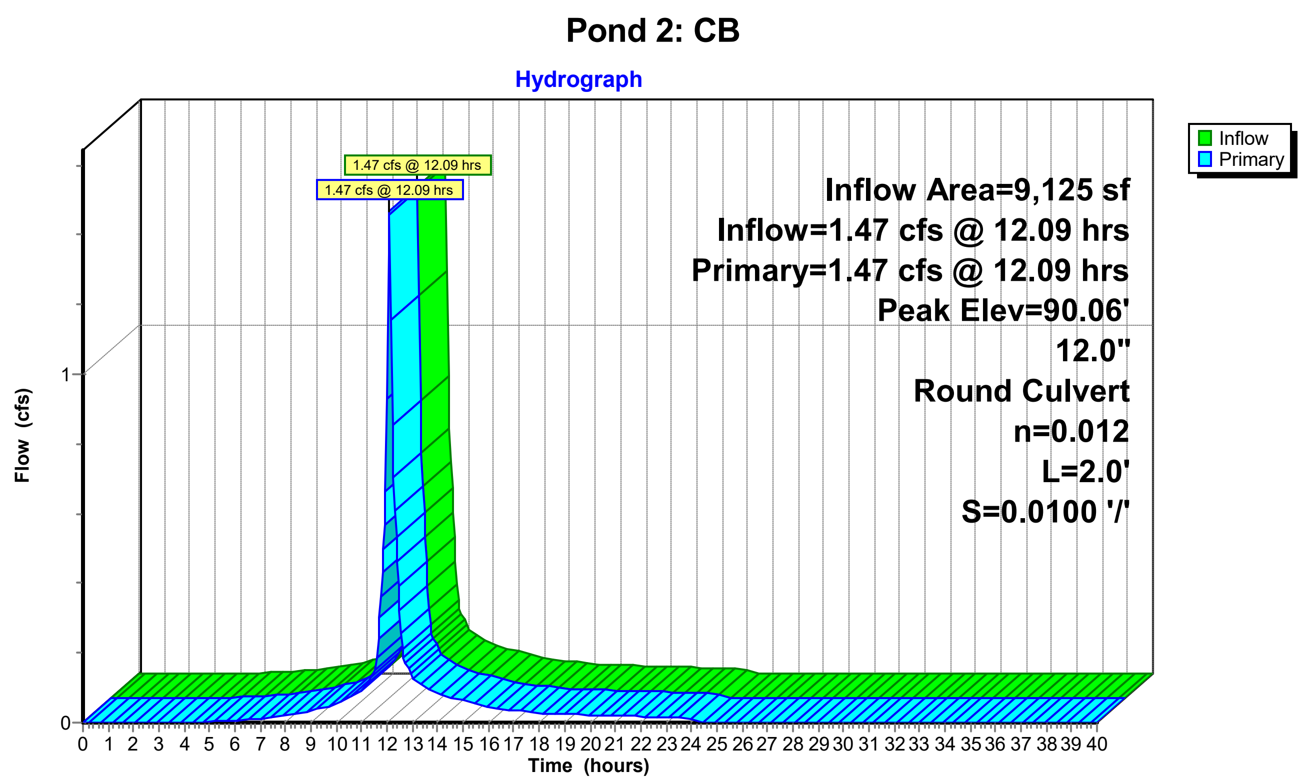
Summary for Pond 2: CB

Inflow Area = 9,125 sf, 79.02% Impervious, Inflow Depth = 6.38" for 100 YEAR event
Inflow = 1.47 cfs @ 12.09 hrs, Volume= 4,851 cf
Outflow = 1.47 cfs @ 12.09 hrs, Volume= 4,851 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.47 cfs @ 12.09 hrs, Volume= 4,851 cf
Routed to Pond 3 : DMH

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 90.06' @ 12.14 hrs
Flood Elev= 93.15'

Device	Routing	Invert	Outlet Devices
#1	Primary	89.00'	**12.0" Round Culvert** L= 2.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 89.00' / 88.98' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.63 cfs @ 12.09 hrs HW=89.96' TW=89.93' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.63 cfs @ 0.81 fps)



Summary for Pond 3: DMH

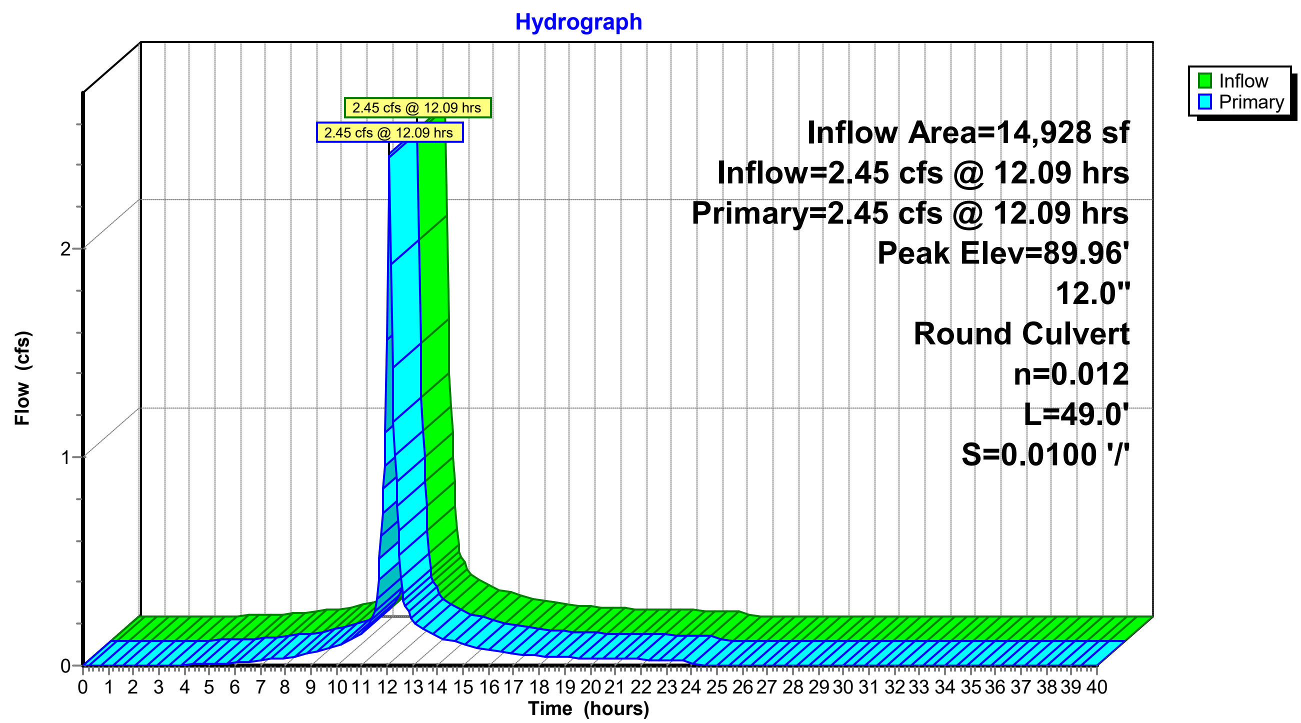
Inflow Area = 14,928 sf, 82.24% Impervious, Inflow Depth = 6.61" for 100 YEAR event
Inflow = 2.45 cfs @ 12.09 hrs, Volume= 8,224 cf
Outflow = 2.45 cfs @ 12.09 hrs, Volume= 8,224 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.45 cfs @ 12.09 hrs, Volume= 8,224 cf
Routed to Pond 4 : DMH

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 89.96' @ 12.10 hrs
Flood Elev= 93.42'

Device	Routing	Invert	Outlet Devices
#1	Primary	88.98'	**12.0" Round Culvert** L= 49.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 88.98' / 88.49' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=2.23 cfs @ 12.09 hrs HW=89.93' TW=89.39' (Dynamic Tailwater)
1=Culvert (Outlet Controls 2.23 cfs @ 3.72 fps)

Pond 3: DMH



Summary for Pond 4: DMH

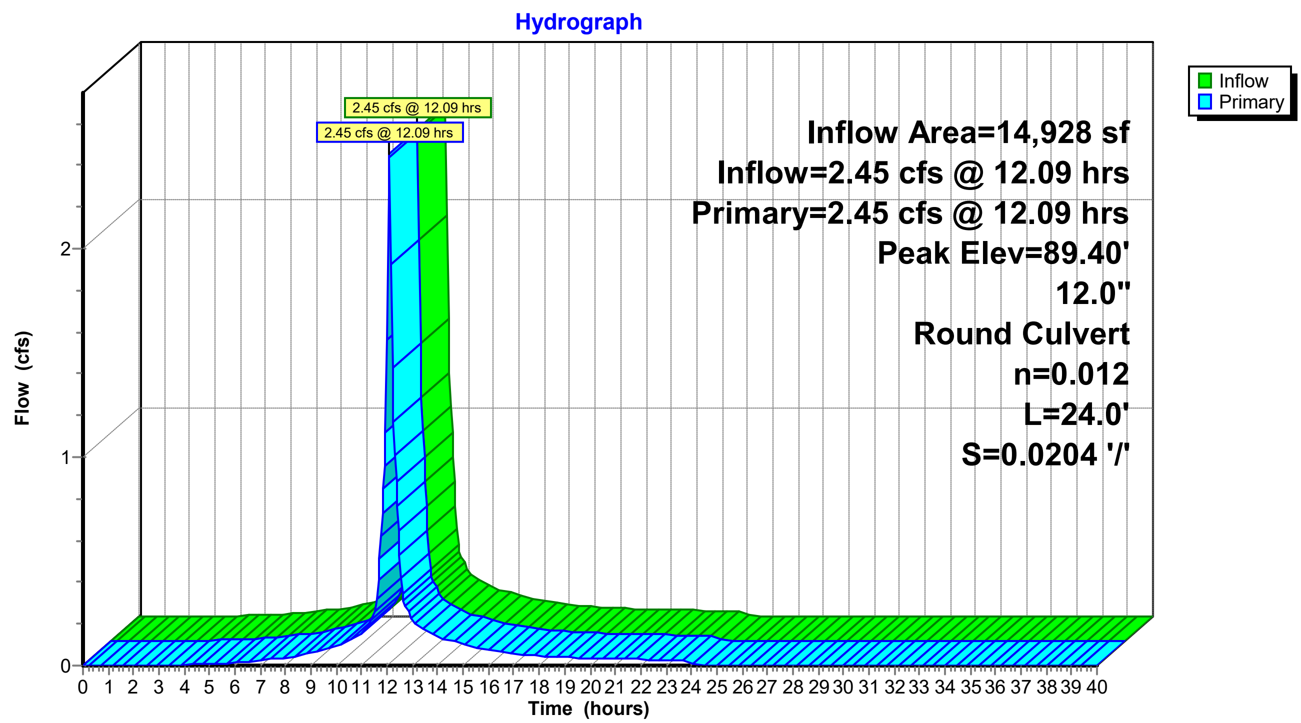
Inflow Area = 14,928 sf, 82.24% Impervious, Inflow Depth = 6.61" for 100 YEAR event
Inflow = 2.45 cfs @ 12.09 hrs, Volume= 8,224 cf
Outflow = 2.45 cfs @ 12.09 hrs, Volume= 8,224 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.45 cfs @ 12.09 hrs, Volume= 8,224 cf
Routed to Pond 7 : DMH

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 89.40' @ 12.09 hrs
Flood Elev= 95.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	88.49'	**12.0" Round Culvert** L= 24.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 88.49' / 88.00' S= 0.0204 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=2.39 cfs @ 12.09 hrs HW=89.39' TW=88.05' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 2.39 cfs @ 3.22 fps)

Pond 4: DMH



Summary for Pond 5: CB

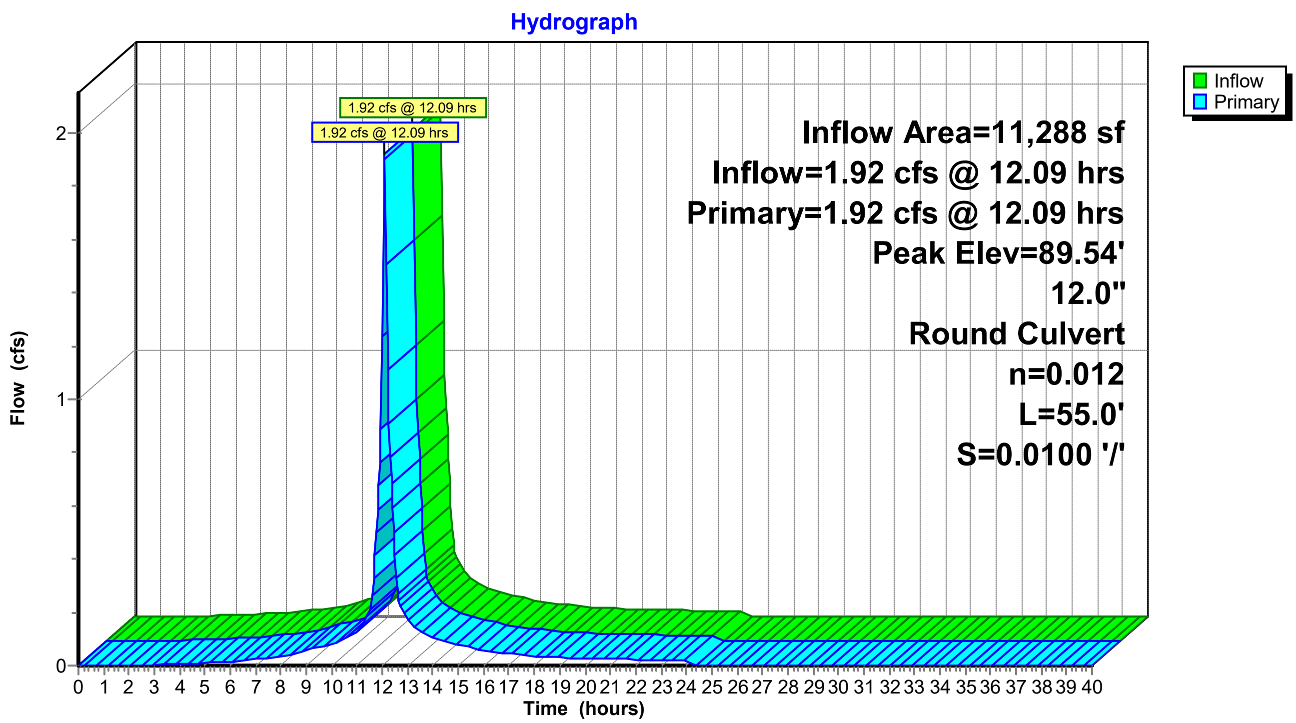
Inflow Area = 11,288 sf, 88.58% Impervious, Inflow Depth = 6.97" for 100 YEAR event
Inflow = 1.92 cfs @ 12.09 hrs, Volume= 6,560 cf
Outflow = 1.92 cfs @ 12.09 hrs, Volume= 6,560 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.92 cfs @ 12.09 hrs, Volume= 6,560 cf
Routed to Pond 6 : DMH

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 89.54' @ 12.10 hrs
Flood Elev= 92.37'

Device	Routing	Invert	Outlet Devices
#1	Primary	88.73'	**12.0" Round Culvert** L= 55.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 88.73' / 88.18' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.78 cfs @ 12.09 hrs HW=89.52' TW=88.93' (Dynamic Tailwater)
1=Culvert (Outlet Controls 1.78 cfs @ 3.68 fps)

Pond 5: CB



Summary for Pond 6: DMH

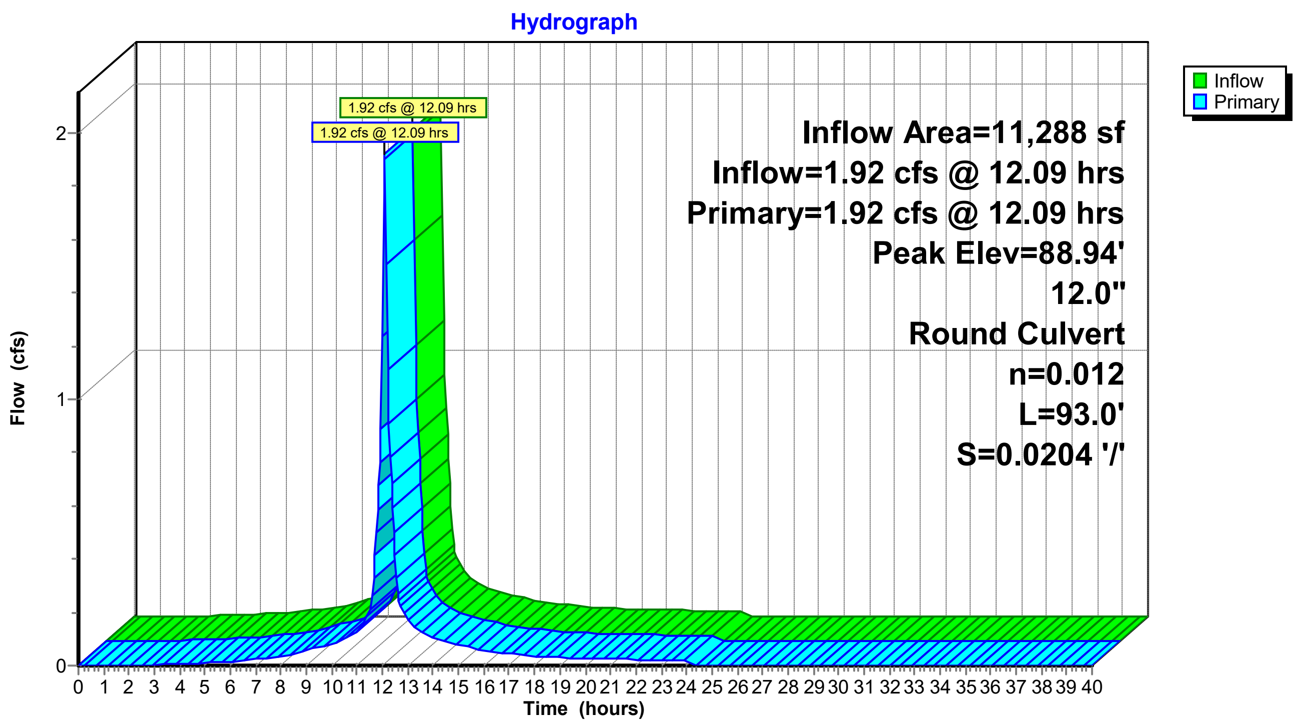
Inflow Area = 11,288 sf, 88.58% Impervious, Inflow Depth = 6.97" for 100 YEAR event
Inflow = 1.92 cfs @ 12.09 hrs, Volume= 6,560 cf
Outflow = 1.92 cfs @ 12.09 hrs, Volume= 6,560 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.92 cfs @ 12.09 hrs, Volume= 6,560 cf
Routed to Pond 7 : DMH

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 88.94' @ 12.09 hrs
Flood Elev= 95.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	88.18'	**12.0" Round Culvert** L= 93.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 88.18' / 86.28' S= 0.0204 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.77 cfs @ 12.09 hrs HW=88.93' TW=88.05' (Dynamic Tailwater)
1=Culvert (Outlet Controls 1.77 cfs @ 3.89 fps)

Pond 6: DMH



Summary for Pond 7: DMH

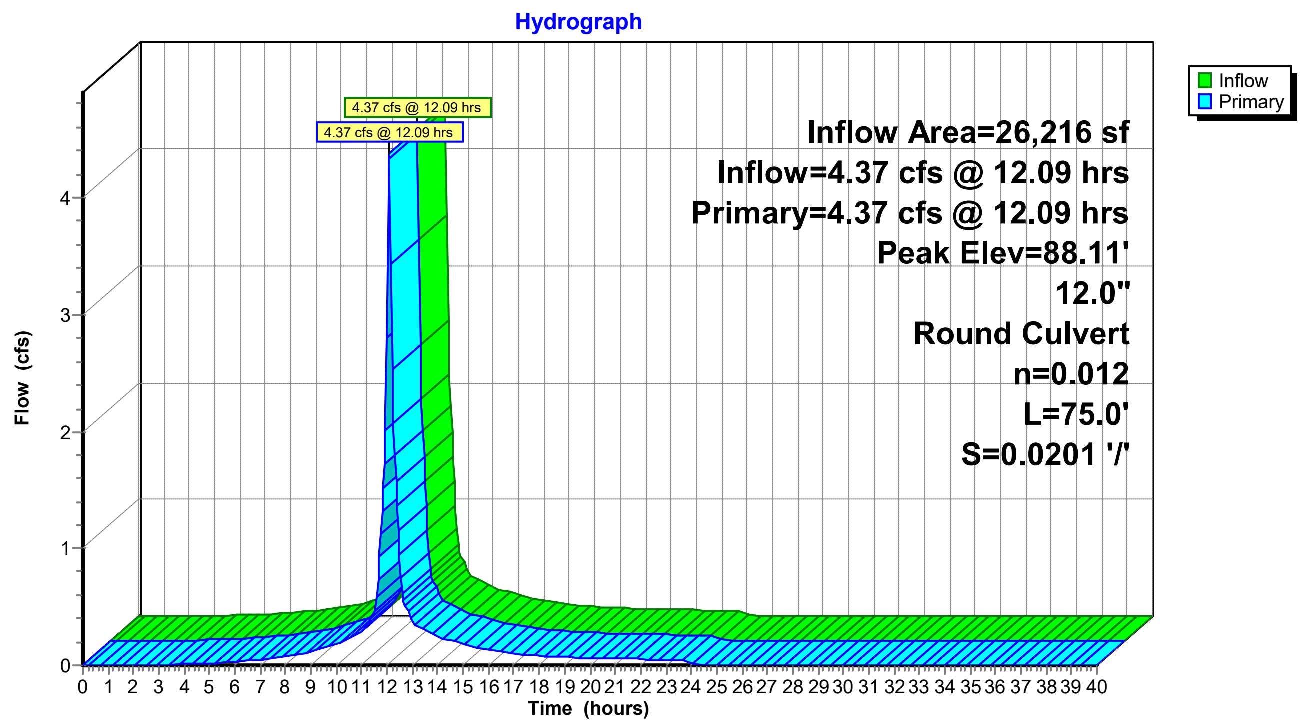
Inflow Area = 26,216 sf, 84.97% Impervious, Inflow Depth = 6.77" for 100 YEAR event
Inflow = 4.37 cfs @ 12.09 hrs, Volume= 14,784 cf
Outflow = 4.37 cfs @ 12.09 hrs, Volume= 14,784 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.37 cfs @ 12.09 hrs, Volume= 14,784 cf
Routed to Pond 8 : DMH

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 88.11' @ 12.09 hrs
Flood Elev= 95.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	86.28'	**12.0" Round Culvert** L= 75.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 86.28' / 84.77' S= 0.0201 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=4.14 cfs @ 12.09 hrs HW=88.05' TW=86.54' (Dynamic Tailwater)
↑**1=Culvert** (Outlet Controls 4.14 cfs @ 5.27 fps)

Pond 7: DMH



Summary for Pond 8: DMH

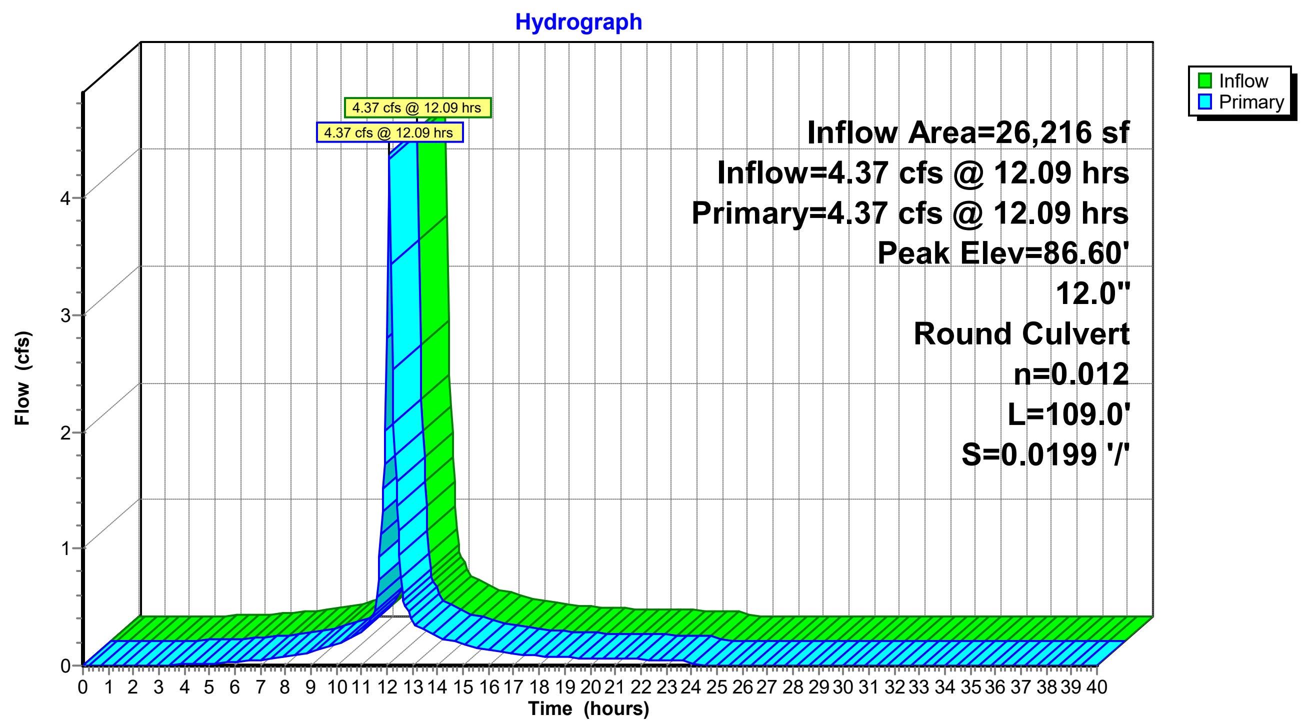
Inflow Area = 26,216 sf, 84.97% Impervious, Inflow Depth = 6.77" for 100 YEAR event
Inflow = 4.37 cfs @ 12.09 hrs, Volume= 14,784 cf
Outflow = 4.37 cfs @ 12.09 hrs, Volume= 14,784 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.37 cfs @ 12.09 hrs, Volume= 14,784 cf
Routed to Link 1L : ROCK POND

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 86.60' @ 12.09 hrs
Flood Elev= 88.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	84.77'	**12.0" Round Culvert** L= 109.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 84.77' / 82.60' S= 0.0199 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=4.26 cfs @ 12.09 hrs HW=86.54' TW=0.00' (Dynamic Tailwater)
1=Culvert (Inlet Controls 4.26 cfs @ 5.43 fps)

Pond 8: DMH

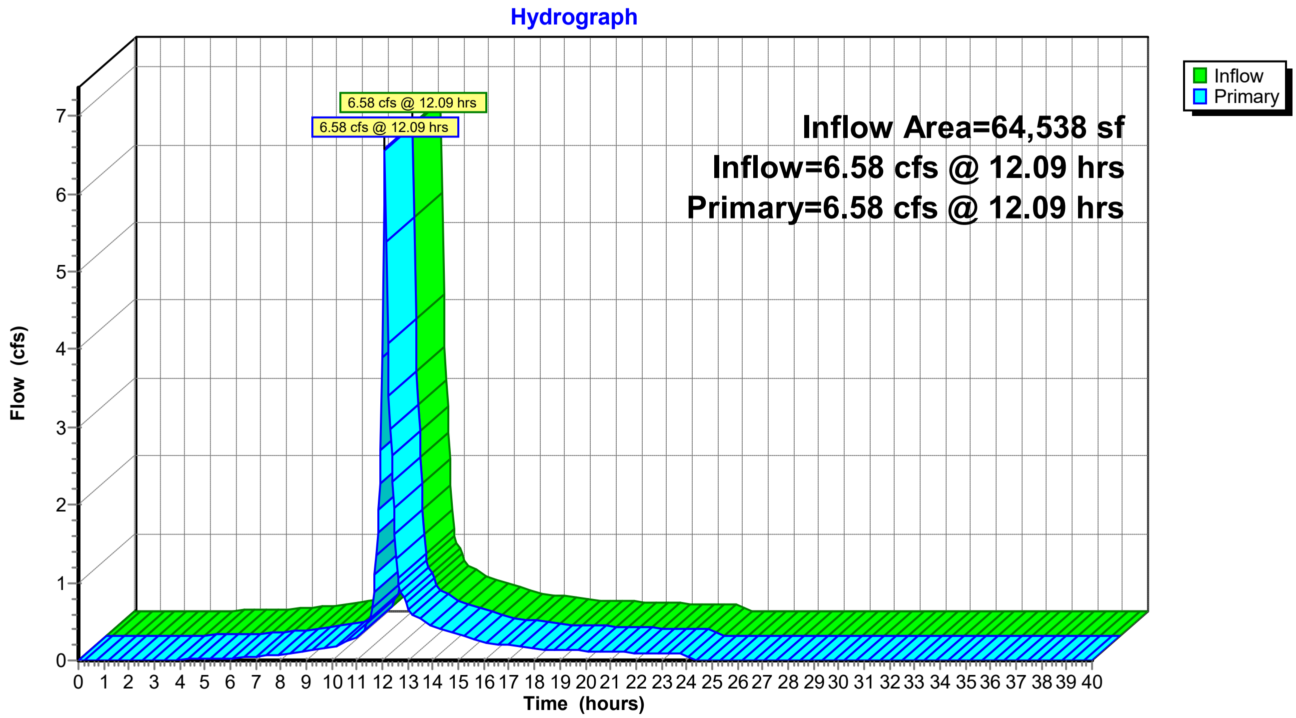


Summary for Link 1L: ROCK POND

Inflow Area = 64,538 sf, 47.60% Impervious, Inflow Depth = 4.17" for 100 YEAR event
Inflow = 6.58 cfs @ 12.09 hrs, Volume= 22,406 cf
Primary = 6.58 cfs @ 12.09 hrs, Volume= 22,406 cf, Atten= 0%, Lag= 0.0 min

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

Link 1L: ROCK POND

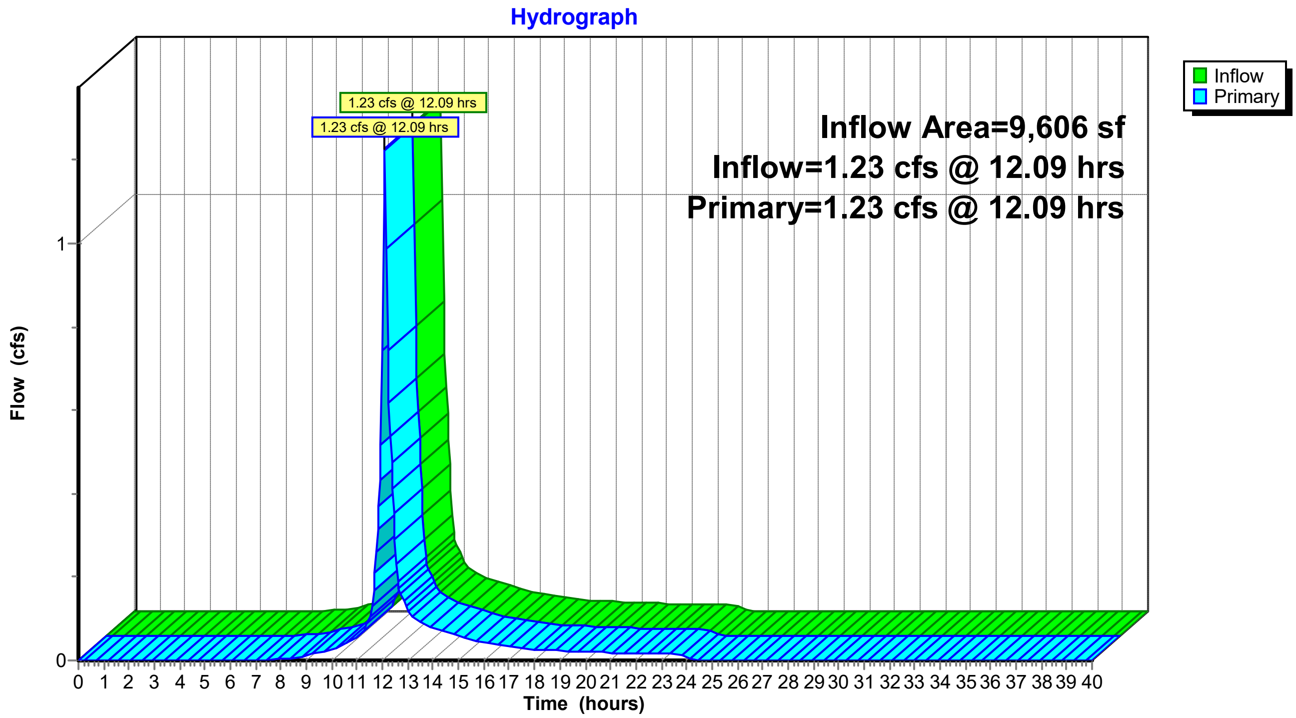


Summary for Link 2L: WEST MAIN STREET

Inflow Area = 9,606 sf, 57.63% Impervious, Inflow Depth = 4.85" for 100 YEAR event
Inflow = 1.23 cfs @ 12.09 hrs, Volume= 3,886 cf
Primary = 1.23 cfs @ 12.09 hrs, Volume= 3,886 cf, Atten= 0%, Lag= 0.0 min

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

Link 2L: WEST MAIN STREET



Events for Subcatchment 1S:

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2 YEAR	3.22	0.03	494	0.15
10 YEAR	5.08	0.54	2,495	0.78
25 YEAR	6.25	1.13	4,293	1.34
50 YEAR	7.10	1.63	5,792	1.81
100 YEAR	**8.05**	**2.23**	**7,622**	**2.39**

Events for Subcatchment 2S: WEST MAIN STREET

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2 YEAR	3.22	0.24	797	1.00
10 YEAR	5.08	0.59	1,876	2.34
25 YEAR	6.25	0.84	2,639	3.30
50 YEAR	7.10	1.02	3,219	4.02
100 YEAR	**8.05**	**1.23**	**3,886**	**4.85**

Events for Subcatchment 3S:

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2 YEAR	3.22	0.45	1,409	1.85
10 YEAR	5.08	0.84	2,693	3.54
25 YEAR	6.25	1.09	3,534	4.65
50 YEAR	7.10	1.27	4,153	5.46
100 YEAR	**8.05**	**1.47**	**4,851**	**6.38**

Events for Subcatchment 4S:

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2 YEAR	3.22	0.34	1,101	2.28
10 YEAR	5.08	0.59	1,963	4.06
25 YEAR	6.25	0.75	2,516	5.20
50 YEAR	7.10	0.86	2,919	6.04
100 YEAR	**8.05**	**0.99**	**3,372**	**6.97**

Events for Subcatchment 5S:

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2 YEAR	3.22	0.67	2,142	2.28
10 YEAR	5.08	1.15	3,819	4.06
25 YEAR	6.25	1.46	4,893	5.20
50 YEAR	7.10	1.68	5,679	6.04
100 YEAR	**8.05**	**1.92**	**6,560**	**6.97**

Events for Pond 1: TRENCH DRAIN

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (cubic-feet)
2 YEAR	0.34	0.34	91.70	**0**
10 YEAR	0.59	0.59	91.83	0
25 YEAR	0.75	0.75	91.91	0
50 YEAR	0.86	0.86	91.96	0
100 YEAR	**0.99**	**0.99**	**92.05**	0

Events for Pond 2: CB

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (cubic-feet)
2 YEAR	0.45	0.45	89.50	**0**
10 YEAR	0.84	0.84	89.72	0
25 YEAR	1.09	1.09	89.84	0
50 YEAR	1.27	1.27	89.94	0
100 YEAR	**1.47**	**1.47**	**90.06**	0

Events for Pond 3: DMH

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (cubic-feet)
2 YEAR	0.79	0.79	89.45	**0**
10 YEAR	1.43	1.43	89.65	0
25 YEAR	1.84	1.84	89.77	0
50 YEAR	2.13	2.13	89.86	0
100 YEAR	**2.45**	**2.45**	**89.96**	0

Events for Pond 4: DMH

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (cubic-feet)
2 YEAR	0.79	0.79	88.94	**0**
10 YEAR	1.43	1.43	89.13	0
25 YEAR	1.84	1.84	89.23	0
50 YEAR	2.13	2.13	89.31	0
100 YEAR	**2.45**	**2.45**	**89.40**	0

Events for Pond 5: CB

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (cubic-feet)
2 YEAR	0.67	0.67	89.15	**0**
10 YEAR	1.15	1.15	89.31	0
25 YEAR	1.46	1.46	89.40	0
50 YEAR	1.68	1.68	89.47	0
100 YEAR	**1.92**	**1.92**	**89.54**	0

Events for Pond 6: DMH

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (cubic-feet)
2 YEAR	0.67	0.67	88.59	**0**
10 YEAR	1.15	1.15	88.74	0
25 YEAR	1.46	1.46	88.82	0
50 YEAR	1.68	1.68	88.88	0
100 YEAR	**1.92**	**1.92**	**88.94**	0

Events for Pond 7: DMH

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (cubic-feet)
2 YEAR	1.45	1.45	86.92	**0**
10 YEAR	2.58	2.58	87.24	0
25 YEAR	3.29	3.29	87.54	0
50 YEAR	3.80	3.80	87.79	0
100 YEAR	**4.37**	**4.37**	**88.11**	0

Events for Pond 8: DMH

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (cubic-feet)
2 YEAR	1.45	1.45	85.41	**0**
10 YEAR	2.58	2.58	85.73	0
25 YEAR	3.29	3.29	86.03	0
50 YEAR	3.80	3.80	86.28	0
100 YEAR	**4.37**	**4.37**	**86.60**	0

Events for Link 1L: ROCK POND

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)
2 YEAR	1.45	1.45	**0.00**
10 YEAR	3.09	3.09	0.00
25 YEAR	4.39	4.39	0.00
50 YEAR	5.40	5.40	0.00
100 YEAR	**6.58**	**6.58**	0.00

Events for Link 2L: WEST MAIN STREET

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)
2 YEAR	0.24	0.24	**0.00**
10 YEAR	0.59	0.59	0.00
25 YEAR	0.84	0.84	0.00
50 YEAR	1.02	1.02	0.00
100 YEAR	**1.23**	**1.23**	0.00

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
No stormwater outfalls are proposed.

2.2 Standard 2 | Peak Rate Attenuation

Refer to Peak Rate of Runoff tables below (see Mitigative Drainage Analysis)

Table 2.2.1: Peak Rate of Runoff | Comparison Location 1L

Description	2 Year	10 Year	25 Year	50 Year	100 Year
Existing Peak Rate of Runoff (cfs)	0.03	0.12	0.19`	0.24	0.31
Proposed Peak Rate of Runoff (cfs)	0.01	0.05	0.08	0.12	0.15
Difference	**-0.02**	**-0.07**	**-0.11**	**-0.12**	**-0.16**

Table 2.2.2: Peak Rate of Runoff | Comparison Location 2L

Description	2 Year	10 Year	25 Year	50 Year	100 Year
Existing Peak Rate of Runoff (cfs)	0.12	0.26	0.34	0.41	0.48
Proposed Peak Rate of Runoff (cfs)	0.00	0.00	0.01	0.02	0.03
Difference	**-0.12**	**-0.26**	**-0.33**	**-0.39**	**-0.45**

2.3 Standard 3 | Stormwater Recharge

The project site is analyzed using Hydrologic Soil Groups A. Groundwater recharge is provided to the maximum extent practicable through the existing stormwater management area. Groundwater recharge is improved through approximately 20,700 ft^2 of additional pervious cover.

2.4 Standard 4 | Water Quality

Water Quality:
Water quality is provided through the following stormwater best management practices.

1. Deep Sump Catch Basins w/hood
2. Existing Oil/Grit Separator
3. Existing Stormwater Management Area

TSS Removal:

Pretreatment Chain 1 SWMA1P = 44%
- Deep Sump Catch Bain = 25%
- Oil Grit Separator = 25%

Treatment Chain 1 SWMA1P = 80%
- Existing Stormwater Management Area = 80%

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 considered a redevelopment due to a reduction of approximately 20,700 ft^2 of impervious.

2.8 Standard 8 | Construction Period Controls

Refer to Section 5 Construction Period Pollution Prevention Plan and Erosion and Sediment Control.

2.9 Standard 9 | Long Term Operation And Maintenance Plan

Refer to Appendix D 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/definitive 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 applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

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

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

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

Signature and Date

Checklist

3.1 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

3.2 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): ______________________________

3.3 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.

3.4 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.

3.5 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.

3.6 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.

3.7 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.

3.8 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.

3.9 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.

3.10 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.

3.11 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 site 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.

3.12 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 Standard 10 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 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.

4.1 Driveway/Parking Lot Sweeping

Driveway and parking lot shall be swept on a monthly average with special attention given to spring (March/April) and late fall (November/December).

4.2 Trash and Litter Cleanup

Property owner(s) shall perform trash and litter cleanup once per month in and around the site. Trash and litter shall be disposed of in on-site dumpsters.

4.3 Ownership and Maintenance Responsibilities

After completion a condominium association (TBD) will assume full responsibility of continuing the operation and maintenance of the stormwater management system. The exception would be if a legal agreement is made with another party to perform such duties for the owner(s).

4.4 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 street sweeping, stabilizing all disturbed areas with vegetative cover and catch basin cleaning.

Provisions for storing materials and waste products inside or under cover
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.

Vehicle washing controls
Vehicle washing and maintenance are prohibited on-site, all vehicle washing must occur off-site. Encourage vehicle owners to wash their vehicles at commercial car washes which recycle water and use approximately 60% on average of the amount of water used in a home wash. All contaminants/hazardous waste 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.

Requirements for routine inspections and maintenance of Stormwater BMP's
Follow the procedures outlined in Appendix D Long Term Operation and Maintenance Plan and the provided Inspection and Maintenance Forms.

Spill prevention and response plans
Spill Prevention: As mentioned previously, 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. 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
Consult the Town of Georgetown Conservation Commission for any questions regarding these materials.

Fertilizers: Fertilizers are to be applied at the minimum amounts recommended by the manufacturer and once applied shall be worked into the soil 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 pet owner(s) to schedule and perform.

Provisions for solid waste management
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.

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 11, 2020. See Section 7 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.

Street Sweeping schedules
Street sweeping should be performed on a monthly average; however, at the very least sweeping must 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).

5 | 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.

5.1 Site Description

Project name and location
Village At Rock Pond
206 West Main Street
Georgetown, Massachusetts 01833

Applicant Name and Address
Rock Pond Development, LLC
499 East Broadway
Haverhill, MA 01830

Description (Purpose and Types of Soil Disturbing Activities)

The proposal is to raze all existing structures and remnants of previous development and redevelop the property with a 32 unit residential building and driveway, parking, landscaping, utilities and stormwater management devices for the attenuation, treatment and groundwater recharge of stormwater runoff.

Soil disturbing activities include: Demolition, installation of erosion and sediment control devices, buildings, stormwater management devices, septic, utilities, pavement, landscape and preparation for final loaming and seeding.

Site Runoff Coefficient
The final composite runoff coefficient for the area of construction is approximately 0.5.

Site Area
The site is 2.1± acres of which 1.4 acres will be disturbed by construction activities.

Sequence of Major Activities
1. Install construction entrance
2. Install erosion control devices
3. Demolition
4. Clearing, cutting and grubbing
5. Rough grading
6. Utility Installation
7. Gravel and pavement base course installation
8. Building site preparation
9. Curbing and sidewalk construction
10. Finished grading and slope stabilization
11. Finished Paving
12. Loam and seed all disturbed areas
13. Final cleanup including inspection and cleanout of all stormwater structures

Name of Receiving Waters
Rock Pond

5.2 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 is proposed as the primary erosion control device for this project (see detail provided on site/definitive 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 compost filter 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 1/4-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."

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	Seed, Pounds per: 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 woody growth)
		Perennial Ryegrass	15	0.35	
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 PLS.
		Perennial Ryegrass	10	0.25	
6	Dry - Moist	Red Fescue	10	0.25	* Use Cool Season planting procedure.
		Canada Bluegrass	10	0.25	* Provides quick cover but is non-aggressive; will tend to allow indigenous plant colonization.
		Perennial Ryegrass	10	0.25	
		Red Top	1	0.10	* General erosion control on variety of sites, including forest roads, skid trails and landings.
7	Moist-Wet	Switchgrass	10	0.25	* Use Warm Season planting procedure.
		Virginia Wild Rye	5	0.10	* Coastal plain/flood plain
		Big Bluestem	15	0.35	* Rates for Bluestem and Switchgrass are for PLS.
		Red Top	1	0.10	

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.

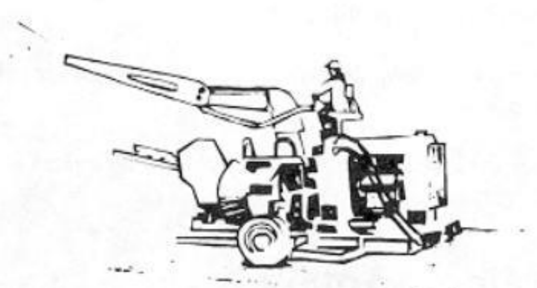
References

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.

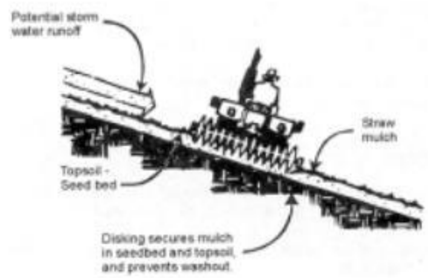


HYDRO-SEEDING

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 or approved equal shall be installed as shown on the approved site/definitive plan to help prevent erosion and sedimentation of the downstream wetland resources identified on the project.

Catch basins appropriately identified on the site/definitive 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:

1. Deep Sump Catch Basins w/hood
2. Existing Oil/Grit Separator
3. Existing Stormwater Management Area

5.3 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 the existing westerly curb cut at West Main Street.

5.4 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.

5.5 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 wetland filling associated with this project, it is strictly a buffer zone project. Note that there are no other applicable State or Federal requirements for sediment and erosion control plans (or permits), or stormwater management plans (or permits) required for this project to the best of our knowledge.

5.6 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 1/4 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. Rock Pond Development, 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 Rock Pond Development, 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.

5.7 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.

5.8 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. Structural Steel
4. Masonry Block
5. Office Building Materials
6. Fiber Glass Insulation

7. Fertilizers
8. Petroleum Based Products
9. Cleaning Solvents
10. Paints (enamel and latex)
11. Tar
12. Waterproofing Materials

5.9 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 clean up measures shall also be included.
8. Rock Pond Development, LLC or their assigned designee shall be the spill prevention and cleanup coordinator. Rock Pond Development, LLC shall designate at least three other site personnel who will be trained in the spill control practices identified above.

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:___________________________________
Rock Pond Development, LLC

Inspection and Maintenance Form

To be completed every 14 days and within 24 hours of a rainfall event of 1/4 inches or greater

Inspector: Date:

Inspector Title:

Days since last rainfall: Amount of last rainfall:

Structural Controls: Silt Fence/Compost Filter 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 1/4 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
TD1	Driveway entrance	Yes ☐ No ☐	Yes ☐ No ☐		Poor ☐ Fair ☐ Good ☐
CB2	Front parking field	Yes ☐ No ☐	Yes ☐ No ☐		Poor ☐ Fair ☐ Good ☐
CB5	Front parking field	Yes ☐ No ☐	Yes ☐ No ☐		Poor ☐ Fair ☐ Good ☐
CB11	Existing SWMA	Yes ☐ No ☐	Yes ☐ No ☐		Poor ☐ Fair ☐ Good ☐
CB12	Existing SWMA	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 1/4 inches or greater

Inspector: Date:

Inspector Title:

Days since last rainfall: Amount of last rainfall:

Structural Controls: Silt Sack / Filter Fabric

Structure Identification	Location	Catch basin at grade	Hood/trap installed	Sediment buildup (in.)	Silt Sack Full
TD1	Driveway entrance	Yes ☐ No ☐	Yes ☐ No ☐		Yes ☐ No ☐
CB2	Front parking field	Yes ☐ No ☐	Yes ☐ No ☐		Yes ☐ No ☐
CB5	Front parking field	Yes ☐ No ☐	Yes ☐ No ☐		Yes ☐ No ☐
CB11	Existing SWMA	Yes ☐ No ☐	Yes ☐ No ☐		Yes ☐ No ☐
CB12	Existing SWMA	Yes ☐ No ☐	Yes ☐ No ☐		Yes ☐ No ☐
		Yes ☐ No ☐	Yes ☐ No ☐		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 1/4 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
OGS9	Existing SWMA			Poor☐ Fair☐ Good☐
OGS10	Existing SWMA			Poor☐ Fair☐ Good☐
				Poor☐ Fair☐ Good☐
				Poor☐ Fair☐ Good☐
				Poor☐ Fair☐ Good☐
				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 1/4 inches or greater

Inspector: Date:

Inspector Title:

Days since last rainfall: Amount of last rainfall:

Structural Controls: Existing Stormwater Management Area

Structure Identification	Location	Condition of side slope % vegetated	Sediment buildup in basin % accumulation	Rilling or gullying
SWMA	Rear property			Minor☐ Moderate☐ Major☐
				Minor☐ Moderate☐ Major☐
				Minor☐ Moderate☐ Major☐
				Minor☐ Moderate☐ Major☐
				Minor☐ Moderate☐ Major☐
				Minor☐ Moderate☐ Major☐

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 1/4 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:

Rock Pond Development, LLC

6 | NRCS Web Soil Survey

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

Essex County, Massachusetts, Northern Part

206 West Main Street Georgetown, MA

June 9, 2023

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

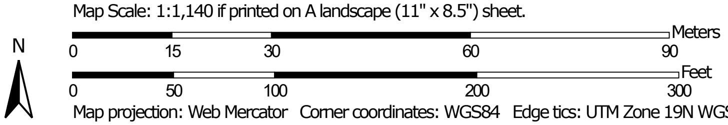
Contents

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.

Soil Map

Map Scale: 1:1,140 if printed on A landscape (11" x 8.5") sheet.



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

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

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

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

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

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: Essex County, Massachusetts, Northern Part
Survey Area Data: Version 18, Sep 9, 2022

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

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

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
1	Water	0.1	3.9%
52A	Freetown muck, 0 to 1 percent slopes	0.5	20.2%
253C	Hinckley loamy sand, 8 to 15 percent slopes	0.3	14.3%
602	Urban land	1.4	61.7%
Totals for Area of Interest		**2.3**	**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 was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Essex County, Massachusetts, Northern Part

1—Water

Map Unit Setting

National map unit symbol: vjx4
Frost-free period: 125 to 165 days
Farmland classification: Not prime farmland

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

52A—Freetown muck, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2t2q9
Elevation: 0 to 1,110 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Freetown and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Freetown

Setting

Landform: Depressions, depressions, swamps, kettles, marshes, bogs
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Highly decomposed organic material

Typical profile

Oe - 0 to 2 inches: mucky peat
Oa - 2 to 79 inches: muck

Properties and qualities

Slope: 0 to 1 percent
Surface area covered with cobbles, stones or boulders: 0.0 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: Rare

Frequency of ponding: Frequent
Available water supply, 0 to 60 inches: Very high (about 19.2 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: B/D
Ecological site: F144AY043MA - Acidic Organic Wetlands
Hydric soil rating: Yes

Minor Components

Whitman
Percent of map unit: 5 percent
Landform: Drainageways, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Swansea
Percent of map unit: 5 percent
Landform: Bogs, swamps, marshes, depressions, depressions, kettles
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Scarboro
Percent of map unit: 5 percent
Landform: Drainageways, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope, tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

253C—Hinckley loamy sand, 8 to 15 percent slopes

Map Unit Setting
National map unit symbol: 2svm9
Elevation: 0 to 1,480 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Hinckley and similar soils: 85 percent

Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hinckley

Setting

Landform: Outwash deltas, outwash terraces, moraines, eskers, kames, outwash plains, kame terraces
Landform position (two-dimensional): Shoulder, backslope, footslope, toeslope
Landform position (three-dimensional): Head slope, nose slope, side slope, crest, riser
Down-slope shape: Concave, convex, linear
Across-slope shape: Convex, linear, concave
Parent material: Sandy and gravelly glaciofluvial deposits derived from gneiss and/or granite and/or schist

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 8 inches: loamy sand
Bw1 - 8 to 11 inches: gravelly loamy sand
Bw2 - 11 to 16 inches: gravelly loamy sand
BC - 16 to 19 inches: very gravelly loamy sand
C - 19 to 65 inches: very gravelly sand

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Ecological site: F144AY022MA - Dry Outwash
Hydric soil rating: No

Minor Components

Merrimac

Percent of map unit: 5 percent
Landform: Kames, outwash plains, outwash terraces, moraines, eskers
Landform position (two-dimensional): Shoulder, backslope, footslope, toeslope
Landform position (three-dimensional): Head slope, nose slope, side slope, crest, riser
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Windsor

Percent of map unit: 5 percent
Landform: Moraines, eskers, kames, outwash deltas, outwash terraces, outwash plains, kame terraces
Landform position (two-dimensional): Shoulder, backslope, footslope, toeslope
Landform position (three-dimensional): Head slope, nose slope, side slope, crest, riser
Down-slope shape: Concave, convex, linear
Across-slope shape: Convex, linear, concave
Hydric soil rating: No

Sudbury

Percent of map unit: 5 percent
Landform: Outwash deltas, moraines, outwash plains, kame terraces, outwash terraces
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Base slope, tread
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: No

602—Urban land

Map Unit Setting

National map unit symbol: vjx3
Frost-free period: 125 to 165 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Setting

Parent material: Excavated and filled land

Minor Components

Udorthents

Percent of map unit: 10 percent
Hydric soil rating: No

Hinckley

Percent of map unit: 2 percent
Hydric soil rating: No

Charlton

Percent of map unit: 2 percent
Hydric soil rating: No

Windsor

Percent of map unit: 2 percent
Hydric soil rating: No

Merrimac

Percent of map unit: 2 percent
Hydric soil rating: No

Paxton

Percent of map unit: 2 percent
Hydric soil rating: No

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Hydrologic Soil Group

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

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

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

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

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

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

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

Map—Hydrologic Soil Group

Map Scale: 1:1,140 if printed on A landscape (11" x 8.5") sheet.

Meters: 0, 15, 30, 60, 90

Feet: 0, 50, 100, 200, 300

N

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

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: Essex County, Massachusetts, Northern Part
Survey Area Data: Version 18, Sep 9, 2022

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

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

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.

Table—Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
1	Water		0.1	3.9%
52A	Freetown muck, 0 to 1 percent slopes	B/D	0.5	20.2%
253C	Hinckley loamy sand, 8 to 15 percent slopes	A	0.3	14.3%
602	Urban land		1.4	61.7%
Totals for Area of Interest			**2.3**	**100.0%**

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

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7 | *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.

Massachusetts Department of Environmental Protection
Bureau of Water Resources Snow Disposal Guidance

Effective Date: December 11, 2020

Applicability: Applies to all federal, state, regional and local agencies, as well as to private businesses.

Supersedes: Bureau of Resource Protection (BRP) Snow Disposal Guideline No. BRPG97-1 issued December 12, 1997 and BRPG01-01 issued March 8, 2001; Bureau of Water Resources (BWR) snow disposal guidance issued December 21, 2015 and December 12, 2018.

Approved by: Kathleen Baskin, Assistant Commissioner, Bureau of Water Resources

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 all federal agencies, state agencies, state authorities, municipal 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 MassDEP is 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 that occurs on the land has the potential to impact the Commonwealth's 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 federal agencies, state agencies, state authorities, 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 away from water resources and drinking water wells. At these locations, the snow meltwater can filter into the soil, leaving behind sand and debris which can be removed in the spring. The following conditions should be followed:

- Within water supply Zone A and Zone II, avoid storage or disposal of snow and ice containing deicing chemicals that has been collected from streets located outside these zones. Municipalities may have a water supply protection land use control that prohibits the disposal of snow and ice containing deicing chemicals from outside the Zone A and Zone II, subject to the Massachusetts Drinking Water Regulations at 310 CMR 22.20C and 310 CMR 22.21(2).

• Avoid storage or disposal of snow or ice in Interim Wellhead Protection Areas (IWPA) of public water supply wells, and within 75 feet of a private well, where road salt may contaminate water supplies.

• Avoid dumping 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 systems including detention basins, swales or ditches. Snow combined with sand and debris may block a stormwater 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:

• 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.

• Identify sites that could potentially be used for snow disposal, such as municipal open space (e.g., parking lots or parks).

• Select sites located in upland locations that are not likely to impact sensitive environmental resources first.

• 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 in identifying possible locations to potentially dispose of snow. MassDEP encourages municipalities to use this tool to identify possible snow disposal options. 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/.

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.

- Wherever possible maintain a 50-foot vegetated buffer between the disposal site and adjacent waterbodies to filter pollutants from the meltwater.

- Clear debris from the site prior to using the site for snow disposal.

- Clear debris from the site and properly dispose of it 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:

- 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 stormwater 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 an entity exhausts all available upland snow disposal sites. The location and mapping of snow disposal sites will help facilitate each entity's routine snow management efforts.

- Emergency Certifications – If an entity demonstrates that there is no remaining capacity at upland snow disposal locations, local conservation commissions may issue an Emergency Certification under the Massachusetts Wetlands Protection regulations to authorize snow disposal in buffer zones to wetlands, certain open water areas, and certain wetland resource areas (i.e. within flood plains). 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. See 310 CMR 10.06(1)-(4). Use the following guidelines in these emergency situations:

    - Dispose of snow in open water with adequate flow and mixing to prevent ice dams from forming.

    - 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.

• Do not dispose of snow where trucks may cause shoreline damage or erosion.

• Consult with the municipal Conservation Commission to ensure that snow disposal in open water complies with local ordinances and bylaws.

• Severe Weather 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 federal agencies, state agencies, state authorities, municipalities, and businesses 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 enable MassDEP and the Massachusetts Emergency Management Agency (MEMA) 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. In these situations, a buffer of at least 50 feet, preferably vegetated, should still be maintained between the site and the waterbody. 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 federal agency, state agency, state authority, municipality or business seeking to dispose of snow in a waterbody should take the following steps:***

• Call the emergency contact phone number [(888) 304-1133)] and notify the MEMA of the municipality's intent.

• MEMA will ask for some information about where the requested disposal will take place.

• MEMA will confirm that the disposal is consistent with MassDEP's Severe Weather 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 [(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, 978-694-3246
Southeast Regional Office, Lakeville, 508-946-2714
Central Regional Office, Worcester, 508-792-7650
Western Regional Office, Springfield, 413-755-2114

8 | 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.

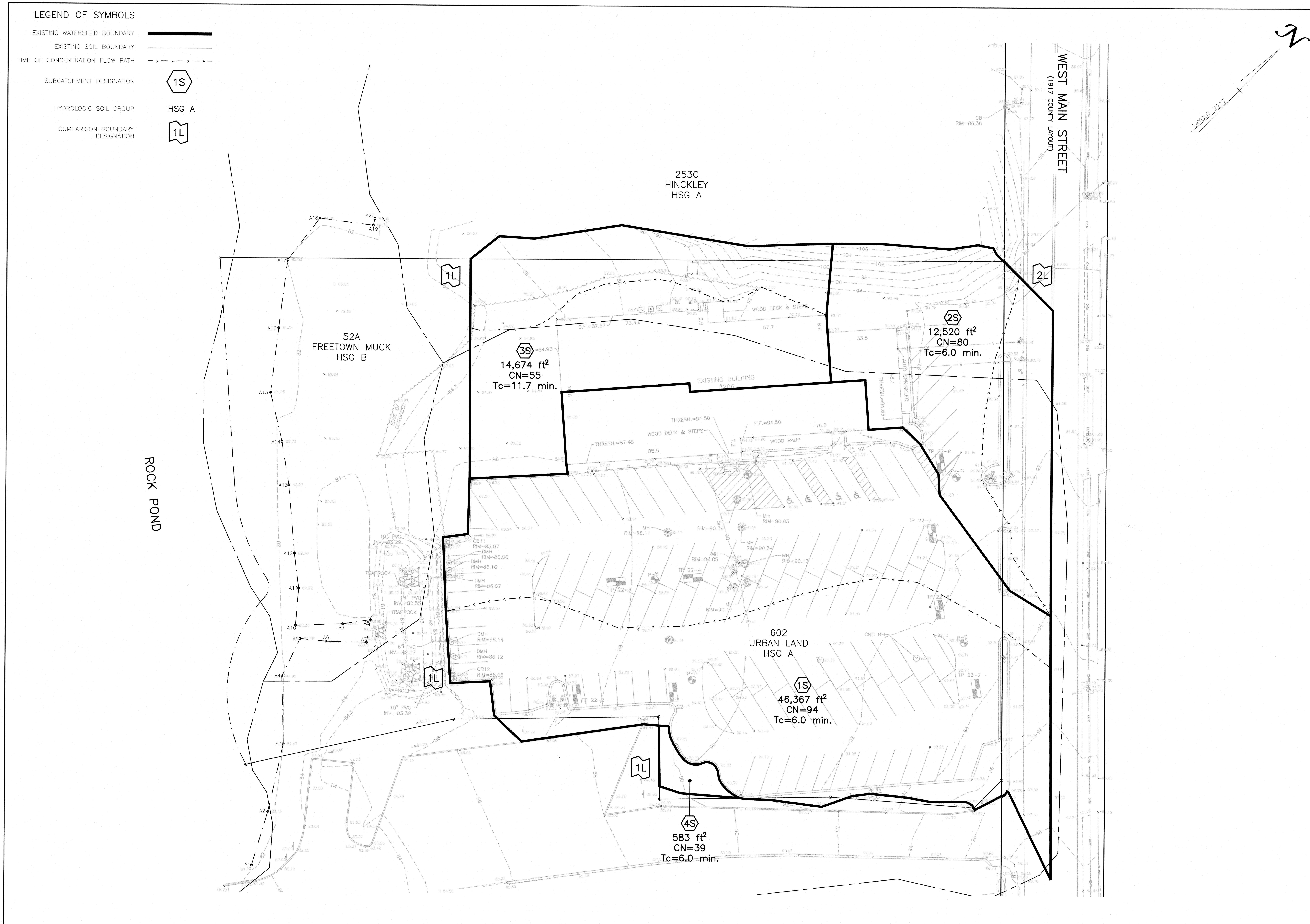
Salt Storage Practices of the Massachusetts Highway Department

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

USGS Locus Map
206 West Main Street, Georgetown, MA
7.5 Minute Topo Quadrangle
Custom Extent
NAVD88

Appendix B – Site Maps



EXISTING CONDITION WATERSHED MAP
VILLAGE AT ROCK POND

206 WEST MAIN STREET, GEORGETOWN, MA

0' 10' 20' 40'

SCALE: 1"=20'

JUNE 12, 2023

DRAWING: W1.1

SHEET 1 OF 1

6		12	
5		11	
4		10	
3		9	
2		8	
1		7	

SEAL

COMMONWEALTH OF MASSACHUSETTS
MATTHEW E MOORE
CIVIL
No 45885
REGISTERED PROFESSIONAL ENGINEER

6.21.2023

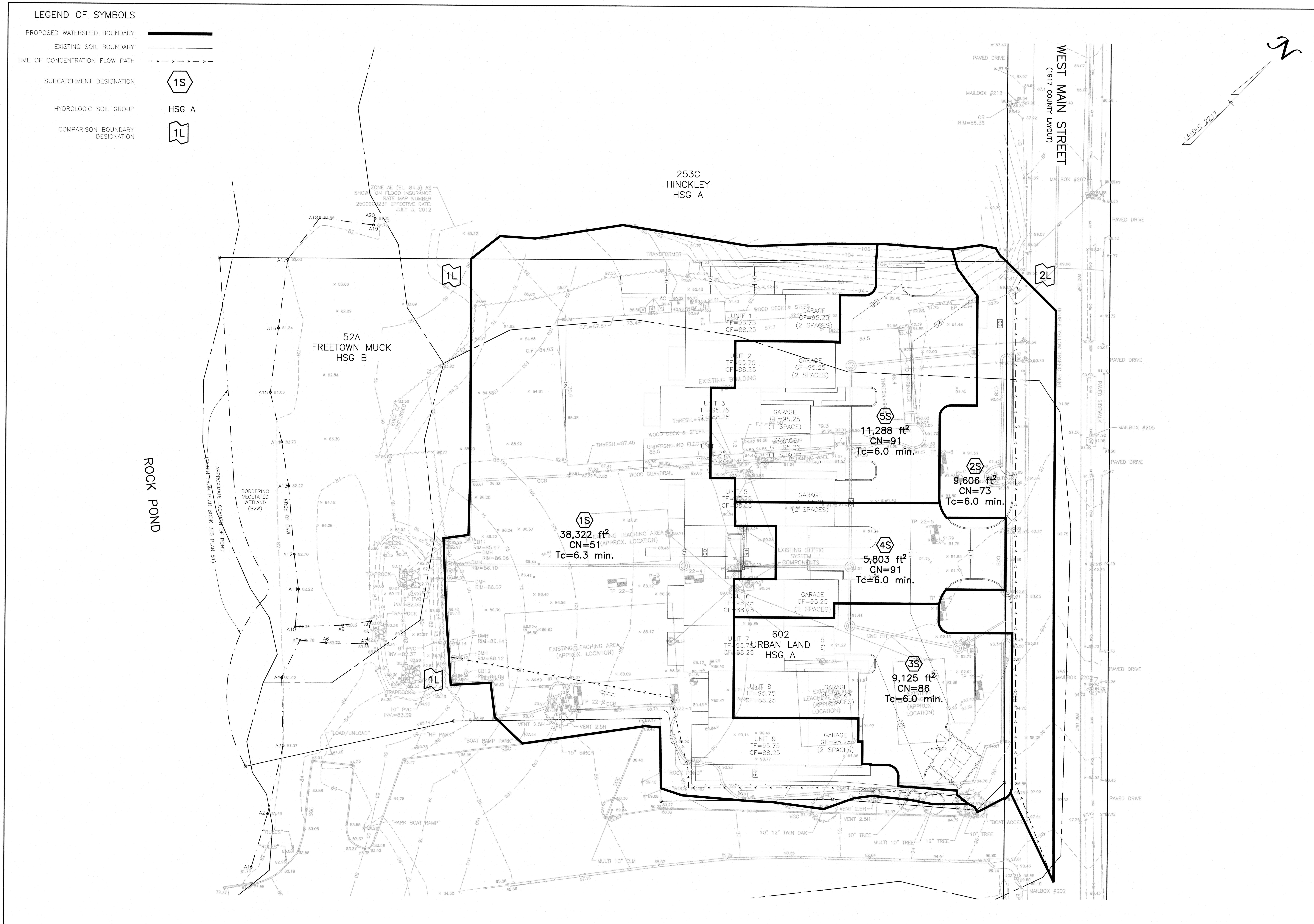
Designed By: MEM
Drawn By: MEM
Reviewed By: RLW
Project Manager: RLW
Job File Number: GEOR-0058A
Drawing File Folder: GEOR58

- [x] Drawing Issued for Review
- [ ] Drawing Issued for Permit
- [ ] Drawing Issued for Construction

Owner:
Rock Pond Development, LLC
499 East Broadway
Haverhill, MA 01830

Applicant:
Rock Pond Development, LLC
499 East Broadway
Haverhill, MA 01830

WILLIAMS & SPARAGES
ENGINEERS | SCIENTISTS | SURVEYORS
189 NORTH MAIN STREET
SUITE 101
MIDDLETON, MA 01949
PHONE: (978) 539-8088
FAX: (978) 539-8200
WSENGINEERS.COM



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WILLIAMS & SPARAGES
ENGINEERS | SCIENTISTS | SURVEYORS
189 NORTH MAIN STREET
SUITE 101
MIDDLETON, MA 01949
PHONE: (978) 539-8088
FAX: (978) 539-8200
WSENGINEERS.COM

Owner:
Rock Pond Development, LLC
499 East Broadway
Haverhill, MA 01830

Applicant:
Rock Pond Development, LLC
499 East Broadway
Haverhill, MA 01830

Designed By: MEM
Drawn By: MEM
Reviewed By: RLW
Project Manager: RLW
Job File Number: GEOR-0058A
Drawing File Folder: GEOR58

- [x] Drawing Issued for Review
- [ ] Drawing Issued for Permit
- [ ] Drawing Issued for Construction

SEAL

COMMONWEALTH OF MASSACHUSETTS
MATTHEW E. MOORE
CIVIL
No. 48885
REGISTERED PROFESSIONAL ENGINEER

6.21.2023

12	6
11	5
10	4
9	3
8	2
7	1

PROPOSED CONDITION WATERSHED MAP
VILLAGE AT ROCK POND
206 WEST MAIN STREET, GEORGETOWN, MA

0' 10' 20' 40'
SCALE: 1"=20'

JUNE 12, 2023

DRAWING: W1.2

SHEET 1 OF 1

Appendix C – Soil Logs

Commonwealth of Massachusetts
City/Town of Georgetown

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

Gary Van Geyte
Owner Name

206 west Main Street
Street Address

Map 6B, Lot 53
Map/Lot #

Georgetown
City

MA
State

01833
Zip Code

B. Site Information

1. (Check one) ☒ New Construction ☐ Upgrade ☒ Repair

2. Soil Survey Available? ☒ Yes ☐ No If yes: NRCS WEB SOIL SURVEY

   602
   Soil Map Unit

   Urban Land
   Soil Name

   Soil Limitations

   Excavated and filled land
   Soil Parent material

   Landform

3. Surficial Geological Report Available? ☒ Yes ☐ No If yes: MassMapper
   Year Published/Source

   Sand and Gravel
   Map Unit

   Glacial stratified deposits, coarse
   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: Shrub Swamp
   Wetland Type

7. Current Water Resource Conditions (USGS): 6/15/2023
   Month/Day/ Year
   Range: ☐ Above Normal ☒ Normal ☐ Below Normal

8. Other references reviewed:

Commonwealth of Massachusetts
City/Town of Georgetown

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: TP 22-1 (Hole #) | 11/28/2022 (Date) | 8:30AM (Time) | Overcast, 50 (Weather) | 42.7321 (Latitude) | -71.008 (Longitude:)

1. Land Use: Vacant Lot – Prior restaurant use (e.g., woodland, agricultural field, vacant lot, etc.) | Grass (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 3-8% (Slope (%))

Description of Location: Parking Lot

2. Soil Parent Material: Sand and Gravel | ______ (Landform) | BS (Position on Landscape (SU, SH, BS, FS, 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 115" 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			
0-80	Fill										
80-86	Ab	fsl	10YR 3/2						m/fr		
86-92	Bw	ls	7.5YR 5/6						m/fr		
92-142	C	md sand	2.5Y 5/4	94"					loose		

ESHGW @ 94"

Commonwealth of Massachusetts
City/Town of Georgetown

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: TP 22-2 (Hole #) 11/28/2022 (Date) 9:00AM (Time) Overcast, 50 (Weather) 42.7321 (Latitude) -71.008 (Longitude:)

1. Land Use: Vacant Lot – Prior restaurant use (e.g., woodland, agricultural field, vacant lot, etc.) Grass (Vegetation) None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) 0-3% (Slope (%))

   Description of Location: Parking Lot

2. Soil Parent Material: Sand and Gravel ______ (Landform) BS (Position on Landscape (SU, SH, BS, FS, 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 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			
0-82	Fill										
82-95	Ab+Bw	fsl	2.5Y 2.5/1								
95-145	C	sand	5Y 5/2	95"							

ESHGW @ 95"

Commonwealth of Massachusetts
City/Town of Georgetown

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: TP 22-3 (Hole #) | 11/28/2022 (Date) | 9:30AM (Time) | Overcast, 50 (Weather) | 42.7321 (Latitude) | -71.008 (Longitude:)

1. Land Use: Vacant Lot – Prior restaurant use (e.g., woodland, agricultural field, vacant lot, etc.) | Grass (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 0-3% (Slope (%))

   Description of Location: Parking Lot

2. Soil Parent Material: Sand and Gravel | ______ (Landform) | TS (Position on Landscape (SU, SH, BS, FS, 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: 126" Depth Weeping from Pit 126" 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			
0-89	Fill										
89-109	Ab+Bw	fsl	2.5Y 2.5/1	94"							
109-159	C	sand	2.5Y 5/4								

ESHGW @ 94"

Commonwealth of Massachusetts
City/Town of Georgetown

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: TP 22-4 (Hole #) 11/28/2022 (Date) 10:00AM (Time) Overcast, 50 (Weather) 42.7321 (Latitude) -71.008 (Longitude:)

1. Land Use Vacant Lot – Prior restaurant use (e.g., woodland, agricultural field, vacant lot, etc.) Grass (Vegetation) None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) 3-8% (Slope (%))

Description of Location: Parking Lot

2. Soil Parent Material: Sand and Gravel ______ (Landform) TS (Position on Landscape (SU, SH, BS, FS, 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: 126" Depth Weeping from Pit 126" 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			
0-101	Fill+Ab			94"							
101-151	C	sand	2.5Y 5/4								

ESHGW @ 94"

Commonwealth of Massachusetts
City/Town of Georgetown

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: TP 22-5 (Hole #) | 11/28/2022 (Date) | 10:30AM (Time) | Overcast, 50 (Weather) | 42.7321 (Latitude) | -71.008 (Longitude:)

1. Land Use: Vacant Lot – Prior restaurant use (e.g., woodland, agricultural field, vacant lot, etc.) | Grass (Vegetation) | None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 0-3% (Slope (%))

   Description of Location: Parking Lot

2. Soil Parent Material: Sand and Gravel | ______ (Landform) | BS (Position on Landscape (SU, SH, BS, FS, 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			
0-74	Fill										
74-84	Ab	fsl	10YR 3/2								
84-90	Bw	ls	10YR 5/6								
90-141+	C	sand	2.5Y 5/6								

Commonwealth of Massachusetts
City/Town of Georgetown

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: TP 22-6 (Hole #) 11/28/2022 (Date) 11:00AM (Time) Overcast, 50 (Weather) 42.7321 (Latitude) -71.008 (Longitude:)

1. Land Use Vacant Lot – Prior restaurant use (e.g., woodland, agricultural field, vacant lot, etc.) Grass (Vegetation) None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) 0-3% (Slope (%))

   Description of Location: Parking Lot

2. Soil Parent Material: Sand and Gravel ______ (Landform) BS (Position on Landscape (SU, SH, BS, FS, 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: 148" 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			
0-70	Fill										
70-84	Ab	fsl	10YR 3/2								
84-90	Bw	ls	10YR 5/6								
90-151+	C	sand	2.5Y 5/6	117"							

ESHGW @ 117"

Commonwealth of Massachusetts
City/Town of Georgetown

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: TP 22-7 (Hole #) 11/28/2022 (Date) 11:30AM (Time) Overcast, 50 (Weather) 42.7321 (Latitude) -71.008 (Longitude:)

1. Land Use Vacant Lot – Prior restaurant use (e.g., woodland, agricultural field, vacant lot, etc.) Grass (Vegetation) None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) 3-8% (Slope (%))

   Description of Location: Parking Lot

2. Soil Parent Material: Sand and Gravel ______ (Landform) BS (Position on Landscape (SU, SH, BS, FS, 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	Fill+Ab										
12-26	Bw	fsl	10YR 5/6								
26-120+	C	Cos/gr	2.5Y 5/6								

Commonwealth of Massachusetts
City/Town of Georgetown

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: TP 22-8 (Hole #) 11/28/2022 (Date) 12:00AM (Time) Overcast, 50 (Weather) 42.7321 (Latitude) -71.008 (Longitude:)

1. Land Use Vacant Lot – Prior restaurant use (e.g., woodland, agricultural field, vacant lot, etc.) Grass (Vegetation) None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) 0-3% (Slope (%))

Description of Location: Parking Lot

2. Soil Parent Material: Sand and Gravel ____ (Landform) BS (Position on Landscape (SU, SH, BS, FS, 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			
0-10	Fill										
10-21	Ab	fsl	10YR 3/2								
21-32	Bw	fsl	10YR 5/6								
32-119	C	ls	2.5Y 5/6								

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 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.

	6/16/2023
Signature of Soil Evaluator	Date
Gregory J. Hochmuth, SE#2825	6/30/2025
Typed or Printed Name of Soil Evaluator / License #	Expiration Date of License
Brian Holt	Georgetown Board of Health
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 Georgetown

Percolation Test

Form 12

Percolation test results must be submitted with the Soil Suitability Assessment for On-site Sewage Disposal. DEP has provided this form for use by local Boards of Health. Other forms may be used, but the information must be substantially the same as that provided here. Before using this form, check with the local Board of Health to determine the form they use.

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

tab

return

A. Site Information

Gary Van Geyte
Owner Name

206 West Main Street
Street Address or Lot #

City/Town	State	Zip Code
Georgetown	MA	01883

Contact Person (if different from Owner)	Telephone Number
Williams & Sparages LLC	978-539-8088

B. Test Results

	Date	Time	Date	Time
	11/28/2022	9:10am	11/28/2022	9:22am
Observation Hole #	P-A w/ TP 22-1		P-B w/ TP 22-3	
Depth of Perc	93"+16"		109"+14"	
Start Pre-Soak	9:10		9:22	
End Pre-Soak				
Time at 12”				
Time at 9”				
Time at 6”				
Time (9”-6”)				
Rate (Min./Inch)	<2 MPI		<2 MPI	
	Test Passed: ☒		Test Passed: ☒	
	Test Failed: ☐		Test Failed: ☐	

Gregory Hochmuth
Test Performed By:

Brian Holt
Board of Health Witness

Comments:

Took 24 gallons during soak

Commonwealth of Massachusetts
City/Town of Georgetown

Percolation Test

Form 12

Percolation test results must be submitted with the Soil Suitability Assessment for On-site Sewage Disposal. DEP has provided this form for use by local Boards of Health. Other forms may be used, but the information must be substantially the same as that provided here. Before using this form, check with the local Board of Health to determine the form they use.

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

A. Site Information

Gary Van Geyte
Owner Name

206 West Main Street
Street Address or Lot #

City/Town	State	Zip Code
Georgetown	MA	01883

Contact Person (if different from Owner)	Telephone Number
Williams & Sparages LLC	978-539-8088

B. Test Results

Date / Time	11/28/2022 / 10:48am	11/28/2022 / 11:08am
Observation Hole #	P-C w/ TP 22-8	P-D w/ TP 22-6
Depth of Perc	34"+18"	92"+18"
Start Pre-Soak	10:48	11:08
End Pre-Soak		
Time at 12”		
Time at 9”		
Time at 6”		
Time (9”-6”)		
Rate (Min./Inch)	<2 MPI	<2 MPI
Test Passed:	☒	☒
Test Failed:	☐	☐

Gregory Hochmuth
Test Performed By:

Brian Holt
Board of Health Witness

Comments:

Took 24 gallons during soak

Appendix D – Long Term Operation & Maintenance Plan

LONG TERM OPERATION & MAINTENANCE PLAN

Village At Rock Pond
206 West Main Street
Georgetown, Massachusetts

June 12, 2023

Applicant
Rock Pond Development, LLC
499 East Broadway
Haverhill, MA 01830

Prepared By
Williams & Sparages, LLC
189 North Main Street, Suite 101
Middleton, MA 01949
Ph: 978-539-8088
Fax: 978-539-8200
www.wsengineers.com

W&S Project Data
GEOR-0058A
SPWestMain#206.dwg
Existing.hcp
Proposed.hcp
p:\geor-0058a(206 west main street)\drainage\stormwater_report.docx

W & WILLIAMS SPARAGES
ENGINEERS | SCIENTISTS | SURVEYORS
S

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 person(s) having legal interest in the property:

Gary Van Geyte, Manager
Cell number: 603 548 5550
Email: edl123@comcast.net

Property tax reference number(s):

Georgetown Assessors: Map 6B Lot 53

The stormwater management system owner and the party responsible for maintenance and finance of the stormwater management system shall be a condominium association (TBD) and its designated employees given below.

, Manager
Cell number:
Email:

, Property Manager
Cell Phone:
Email:

Signed:____Date:_____________________________________
Condominium Association

1.1 The following BMPs provide pollutant removal, groundwater recharge and storage

1. Deep Sump Catch Basins w/hood
2. Existing Oil/Grit Separator
3. Existing Stormwater Management Area

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.

Sediments must also be removed four times per year or whenever the depth of deposits is equal to one half the depth from the bottom of the sump to the invert of the lowest outlet pipe. A minimum sump storage capacity of 50% shall be maintained throughout the year.

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.

Existing Stormwater Management Area
Infiltration basins are prone to clogging and failure so it is imperative to develop and implement aggressive maintenance plans and schedules. If required, installing the required pretreatment BMPs, e.g. deep-sump catch basins and sediment forebays, will significantly reduce the maintenance requirements for the basin.

Inspections and preventative maintenance shall be performed at least twice a year, and after every time drainage discharges through the high outlet orifice or a major storm event which is defined as a storm that is equal to or greater than the 2-year, 24-hour storm (3.1 inches in a 24-hour storm).
After the basin is on line, inspect it after every major storm for the first few months to ensure that it is stabilized and functioning properly. Take corrective action if necessary.

Note the time that water remains standing in the basin after a storm event. Standing water within the basin 48 to 72 hours after a storm indicates that the infiltration capacity of the basin may have been overestimated or the bottom has been clogged.

If the reason is clogging, determine the cause, e.g. erosion, excessive compaction, or low spots and take the necessary corrective action. Thereafter, inspect the infiltration basin at least twice per year.

Important items to check during the inspections include:

1. Signs of differential settlement,
2. Cracking,
3. Erosion,
4. Leakage in the embankments,
5. Tree growth on the embankments,
6. Condition of riprap,
7. Sediment accumulation and,
8. Health of the turf.

At least twice a year the buffer area, side slopes, and basin bottom shall be mowed. Remove the grass clippings and accumulated organic matter to prevent an impervious organic mat from forming. Remove trash and debris at this time as well as using deep tilling to break up any clogged surfaces, revegetate immediately.

Remove sediment from the basin as necessary only when the floor of the basin is completely dry. Use light equipment to remove the top layer to prevent compacting the underlying soil. Deep till the remaining soil and revegetate as soon as possible.

1.2 The following BMPs are utilized to minimize impacts to wetland resource areas

Driveway/Parking Lot Sweeping
Driveway and parking lot sweeping will be conducted on a monthly average. Special attention will be given to the spring (March or April) and late fall (November or December).

Snow Removal
Snow will be removed from parking areas and sidewalks during snow events. Snow will be stockpiled in the designated "Snow Storage" locations shown on the site/definitive plan. Snow disposal/removal shall be in compliance with MassDEP's Bureau of Water Resources guidelines, effective December 11, 2020. See Section 8 Snow Disposal Guidelines. Provisions will be made to remove snow from the site when the designated areas have reached their capacity.

Rip Rap Apron/Spillway/Level Spreader
The rip rap apron, spillway and level spreader will be inspected during and after several storms (e.g. 0.5-inch or greater) and if necessary, maintenance performed during the first year of operation. Thereafter, inspections and preventative maintenance shall be performed at least twice a year, and after every time drainage discharges through the high outlet orifice or a major storm event which is defined as a storm that is equal to or greater than the 2-year, 24-hour storm (3.2 inches in a 24 hour storm). Any detrimental sediment accumulation shall be removed.
If rilling is present downgradient or adjacent to the rip rap apron, spillway and level spreader the cause shall be identified and corrected and damage shall be repaired.

Leaf litter shall be removed from the rip rap apron, spillway and level spreader.

Vegetation in the vicinity of the rip rap apron, spillway and level spreader shall be inspected periodically and if needed, fertilized to maintain healthy, dense growth.

1.3 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. 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 "Massachusetts Erosion and Sediment Control Guidelines for Urban and Suburban Areas, May 2003, prepared by Franklin, Hampden, and Hampshire Conservation Districts."

1.4 Stormwater Management Easements

No stormwater management easements are provided. Stormwater management system will be maintained by the property owner.

1.5 Changes to Long Term Operation and Maintenance Plan

The owner(s) of the stormwater management system must notify the Department of Public Works of changes in ownership or assignment of financial responsibility.

1.6 Planning Board Provisions

Provisions for the Georgetown Planning Board or their designee(s) to enter the property and in a reasonable manner shall be provided for the purpose of inspection during normal construction hours.

A copy of the Stormwater Report shall be kept on-site.

1.7 Recording

The Long Term Operation and Maintenance Plan shall be recorded at the Registry of Deeds along with the decision of the applicable permitting authority and the Post Construction Stormwater Management Plan.

Inspection and Maintenance Form

Refer to Section 1.1 above for frequency of inspection

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
TD1	Driveway entrance	Yes ☐ No ☐	Yes ☐ No ☐		Poor ☐ Fair ☐ Good ☐
CB2	Front parking field	Yes ☐ No ☐	Yes ☐ No ☐		Poor ☐ Fair ☐ Good ☐
CB5	Front parking field	Yes ☐ No ☐	Yes ☐ No ☐		Poor ☐ Fair ☐ Good ☐
CB11	Existing SWMA	Yes ☐ No ☐	Yes ☐ No ☐		Poor ☐ Fair ☐ Good ☐
CB12	Existing SWMA	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

Refer to Section 1.1 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
OGS9	Existing SWMA			Poor☐ Fair☐ Good☐
OGS10	Existing SWMA			Poor☐ Fair☐ Good☐
				Poor☐ Fair☐ Good☐
				Poor☐ Fair☐ Good☐
				Poor☐ Fair☐ Good☐
				Poor☐ Fair☐ Good☐

Maintenance required

To be performed by: On or before:

Inspection and Maintenance Form

Refer to Section 1.1 above for frequency of inspection

Inspector: Date:

Inspector Title:

Days since last rainfall: Amount of last rainfall:

Structural Controls: Existing Stormwater Management Area

Structure Identification	Location	Condition of side slope % vegetated	Sediment buildup in basin % accumulation	Rilling or gullying
SWMA	Rear property			Minor☐ Moderate☐ Major☐
				Minor☐ Moderate☐ Major☐
				Minor☐ Moderate☐ Major☐
				Minor☐ Moderate☐ Major☐
				Minor☐ Moderate☐ Major☐
				Minor☐ Moderate☐ Major☐

Maintenance required

To be performed by: On or before: