

**Stormwater Report
Residential Subdivision
Sconticut Neck Woods
Fairhaven, Massachusetts**

**Submitted to:
Town of Fairhaven**

**Applicant:
Robert Roderiques**



**May 16, 2019
Revised 09/06/19
Revised 12/02/19**

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1.0 Introduction

This drainage analysis was prepared for the project located south of Timothy Street and east of Paul Street in Fairhaven, Massachusetts.

The existing conditions consist of woods and wetlands. Under proposed conditions, the project proposes a residential subdivision with residential houses, driveways, roadways and stormwater management facilities.

2.0 Stormwater Management

2.1 Existing Conditions

The overall hydrologic study area totals 19.90 acres, which includes off-site contributing drainage areas. 4.94 acres is the off-site contributing drainage area on Hiller Avenue that sheet flows toward six (6) existing catch basins (ECB 1 to ECB 6) with 10-inch dia. RCP storm sewer, which outfalls to an existing drainage ditch that ultimately discharges to the wetlands.

Under existing conditions, the site is divided into seven (7) drainage basins: Basin 1, Basin 2, Basin 3, Offsite 1, Offsite 2, Offsite 3 and Timothy Street (refer to *Existing Conditions Basin Map*).

Stormwater runoff from Basin 1, Basin 2, and Basin 3 sheet flow towards the east to existing wetlands.

Stormwater runoff from Offsite 1 and Offsite 2 sheet flow to the east to the western limits of the project site. Offsite 3 is an existing residential cul-de-sac that discharges via an existing 12-inch dia. storm pipe to the western property line of the project site.

Stormwater runoff from Timothy Street sheet flows toward Timothy Street.

2.2 Proposed Conditions

Under proposed conditions, the stormwater management system will consist of two (2) dry detention ponds with wet forebays and infiltration basin: Detention Pond A and Detention Pond B, and grassed swales.

Refer to *Proposed Conditions Basin Map* for the proposed drainage basins.

Stormwater runoff will sheet flow or collected and conveyed via a storm sewer collection system (catch basins and storm sewer pipes) to Detention Pond A and Detention Pond B. Off-site contributing drainage areas will be collected and conveyed via bypass storm sewer systems that will outfall to the wetlands.

3.0 Stormwater Management Compliance

The site design incorporates the Town of Fairhaven Appendix A Stormwater Management Systems.

Stormwater Treatment

As per MADEP Stormwater Management Standards (Page 1-5) rooftop runoff should be considered uncontaminated for the purposes of these standards and therefore can be infiltrated without water quality treatment.

The water quality treatment volume required by the Town of Fairhaven is 1.25" x the impervious area based on TR-55 Residential District by Average Lot Size. Per TR-55, 1/3 acre lots in size are 30% impervious.

Detention Pond A has 1.76 acres of contributing drainage area, while Detention Pond B has 0.45 acres, respectively.

Total first flush volume required to be provided within Detention Pond A and Detention Pond B is 3,209 cf.

MADEP water quality standards of 0.50-inch x total impervious area (1.80 acres) is 3,267 cf.

The total first flush volume provided within Detention Pond A and Detention Pond B between the pond bottom and orifice outlet is 3,828 cf. This exceeds the Town of Fairhaven and MADEP standards.

The proposed sediment forebays within the proposed detention ponds were sized for 0.25-inches per impervious acre of impervious acre of contributing drainage; and will be 4-ft deep.

Peak Discharge Rates

Under existing and proposed conditions, hydrologic/hydraulic analyses were performed utilizing the computer program, HydroCAD[®]. In order to determine the peak rate of discharge for existing and proposed conditions, runoff hydrographs were generated for the 2-, 10-, 25-, and 100-year, 24-

hour storm events using the SCS TR-20 Method (refer to *Appendix A*, HydroCAD Input/Output). Under proposed conditions, the post-development runoff hydrographs were flood routed through the proposed stormwater management facilities. The 100-year, 24-hour storm event must be evaluated to demonstrate that there will not be increased flooding impacts off-site.

Per the Town of Fairhaven, no increase will be allowed in the volume of stormwater runoff up to the 10-year, 24-hour storm event.

The following table summarizes the pre- and post-development discharge rates determined in the hydrologic/hydraulic analyses performed for the project site.

**Table 1 Comparison of Peak Runoff Discharge Rates
(HydroCAD® Reach, WETLANDS)**

Storm Event (24-Hour)	Existing Peak Runoff		Proposed Peak Runoff	
	Rate	Volume	Rate	Volume
	cfs	Ac-ft	cfs	Ac-ft
2-Year	21.62	1.71	19.95	1.64
10-Year	38.25	2.97	35.38	2.90
25-Year	50.46		45.60	
100-Year	70.00		61.26	

cfs – cubic feet per second

As shown in Table 1, under proposed conditions the proposed peak runoff rates are significantly less than the existing peak runoff rates for the 2-, 10-, 25-, and 100-year, 24-hour storm events. The proposed peak runoff volume is less than the existing peak runoff volume for the 2- and 10-year, 24-hour storm events.

The proposed stormwater management systems will drawdown the 100-year storm event within 72 hours. Refer to the drawdown calculations contained within Appendix A.

The emergency spillways within Pond A and Pond B were size to convey the outflow for the 100-year storm event (assuming the 8-inch dia. outfall is clogged). The 100-year outflow from Pond A is 2.05 cfs, while the 5-ft wide spillway is capable of conveying 3.01 cfs. The 100-year outflow from Pond B is 1.40 cfs, while the 5-ft wide spillway is capable of conveying 2.30 cfs.

Groundwater Recharge

The infiltration rate used in this report was based on the *Massachusetts Stormwater Handbook*, Volume 3, Chapter 1, Page 22, Table 2.3.3. 1982 Rawls Rates. There were three (3) test pits performed within Detention Pond A, and two (2) test pits performed in Detention Pond B. Sandy Loam was encountered within the test pits. Sandy Loam has an infiltration rate of 1.02 in/hr and is considered Type 'B' soils for recharge purposes.

Based on MADEP Stormwater Management Standards, page 1-5, the required volume to recharge for Hydrologic Soil Group 'B' and Hydrologic Soil Group 'D' is as follows:

- Hydrologic Soil Group 'B': 0.35 inches of runoff times total impervious area overlying 'B' soils. Impervious area is 1.65 acres. Required volume to recharge is 0.048 acre-feet.
- Hydrologic Soil Group 'D': 0.10 inches of runoff times total impervious area overlying 'D' soils. Impervious area is 0.15 acres. Required volume to recharge is 0.001 acre-feet.

On this basis, impervious area (buildings and pavement) of 1.80 acres will require groundwater recharge volume of 0.049 acre-feet.

Per MADEP Recharge volume requirements, the stormwater management system will provide adequate storage volume to meet the required recharge volume (see *Appendix B*, Stormwater Recharge).

The time to drawdown was calculated to demonstrate that stormwater management system will drawdown the water elevation back to the bottom elevation within 72 hours following a storm event.

TSS Removal

The stormwater management system has been designed to incorporate BMP measures, which include deep sump catch basins (25% TSS removal) and dry infiltration ponds with wet forebay (80% TSS removal).

Stormwater Facilities Reporting to Municipal Agencies

An annual Inspection Report will be prepared by the Facility Manager of the property and submitted to the Town of Fairhaven for the first two (2) years. Records (i.e., condition, cleaning, maintenance/repairs, etc.) of each stormwater facility described above will be maintained throughout the year and compiled in the Report.

4.0 Storm Sewer Sizing

The proposed storm drainage collection system has been designed for a 25-year storm frequency utilizing the Rational Method (refer to *Appendix D, Storm Sewer Sizing Calculations*). The off-site bypass storm sewer system that collects and conveys stormwater runoff (ECB 1 – ECB 6 drainage areas) from Hiller Avenue to the wetland was sized to handle the 100-year storm frequency.

Other design criteria used in the closed pipe system include:

- Time of concentration of 5 minutes.
- Minimum Velocity through pipes of 2.0 feet per second
- Maximum Velocity through pipes of 10.0 feet per second

OPERATION & MAINTENANCE PLAN - DETENTION PONDS

SEDIMENT FOREBAY TO BE INSPECTED MONTHLY AND CLEANED FOUR TIMES PER YEAR

DETENTION POND BOTTOM TO BE INSPECTED TWICE PER YEAR

PONDS TO BE CLEANED OF ANY DEBRIS, LEAVES, PINE NEEDLES AND THE LIKE

EXAMINE THE OUTFALL PIPE & SPILLWAY FOR EVIDENCE OF CLOGGING

CLEAN OUTFALL PIPE AND SPILLWAY

REPAIR ANY AREAS OF EROSION AND REVEGETATE

MOW OR CUT ALL VEGETATION ON THE BOTTOM AND SIDESLOPES

ALL SEDIMENT DEPOSIT SHOULD BE DISPOSED OF IN ACCORDANCE WITH ALL FEDERAL, STATE AND LOCAL REGULATIONS

OPERATION & MAINTENANCE PLAN - GRASS SWALES

GRASS SWALES SHALL BE MOWED TO KEEP GRASS HEIGHT NOT SHORTER THAN 3"-4" AND GRASS HEIGHT SHALL NOT EXCEED 6"

CLEAN SWALES OF ANY SEDIMENT, DEBRIS, LEAVES AND THE LIKE

CLEAN PLUNGE POOLS OF ANY SEDIMENT, DEBRIS, LEAVES AND THE LIKE

CLEAN THE LEVEL SPREADER OF ANY SEDIMENT, DEBRIS, LEAVES AND THE LIKE

REPAIR ANY AREAS OF EROSION AND REVEGETATE

OPERATION & MAINTENANCE PLAN - CATCH BASINS & DRAINAGE MANHOLES

CATCH BASINS TO BE INSPECTED AND CLEANED FOUR TIMES PER YEAR OR DEPTH OR WHEN THE DEPTH OF DEPOSIT IS GREATER OR EQUAL TO 1/2 OF THE SUMP

EXAMINE INLET AND OUTLET OF PIPES AND SEPARATOR TEES

CLEAN STRUCTURES OF ANY DEBRIS, LEAVES, PINE NEEDLES & THE LIKE

INSPECT FOR PROPER PIPE OUTFLOW DURING HEAVY STORM EVENT MIN. ONCE/YEAR

ENGAGE A COMPANY TO CLEAN DRAINAGE PIPES AS NECESSARY

OPERATION & MAINTENANCE PLAN - RESPONSIBLE PARTY

ROBERT RODERIGUES, THE APPLICANT AND DEVELOPER WILL BE THE RESPONSIBLE PARTY

TO IMPLEMENT THE O & M PLAN UNTIL SUCH TIME AS THE ROADWAYS AND ITS DRAINAGE SYSTEM BECOMES AN ACCEPTED PUBLIC WAY BY A FAIRHAVEN TOWN MEETING VOTE.

INSPECTION AND MAINTENANCE REPORT FORM

Inspection Date:

Inspector:

[illegible]

Additional Notes:

ILLCIT DISCHARGE COMPLIANCE STATEMENT

I verify that no illicit discharges exist on the ^{Timothy Street 4} ~~Hiller Ave.~~ property. Through the implementation of Long Term Pollution Prevention Plan and Operation and Maintenance Plan, measures are set forth to prevent illicit discharges from entering the stormwater management drainage system.

Signature

Print Name

Date

Title

Company

Signature

Print Name

Date

Title

Company

Note: This certification must be signed before stormwater is conveyed to the proposed stormwater drainage system in accordance with Standard 10 of the Massachusetts Stormwater Management Standards.

Soil Map—Bristol County, Massachusetts, Southern Part
(1445 - Sconticut Neck Woods)



Soil Map—Bristol County, Massachusetts, Southern Part
(1445 - Sconticut Neck Woods)

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 1:20,000.

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

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

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

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Bristol County, Massachusetts, Southern Part

Survey Area Data: Version 12, Sep 7, 2018

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

Date(s) aerial images were photographed: Dec 31, 2009—Jun 7, 2016

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
71B	Ridgebury fine sandy loam, 3 to 8 percent slopes, extremely stony	2.4	21.7%
305B	Paxton fine sandy loam, 3 to 8 percent slopes	0.9	8.4%
306B	Paxton fine sandy loam, 0 to 8 percent slopes, very stony	6.9	63.6%
311B	Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony	0.0	0.2%
312B	Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony	0.6	5.5%
651	Udorthents, smoothed	0.1	0.5%
Totals for Area of Interest		10.8	100.0%

Bristol County, Massachusetts, Southern Part

71B—Ridgebury fine sandy loam, 3 to 8 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: 2w69c

Elevation: 0 to 1,290 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

Ridgebury, extremely stony, and similar soils: 80 percent

Minor components: 20 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ridgebury, Extremely Stony

Setting

Landform: Ground moraines, depressions, drumlins, drainageways, hills

Landform position (two-dimensional): Toeslope, footslope

Landform position (three-dimensional): Head slope, base slope

Down-slope shape: Concave

Across-slope shape: Concave

Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material

A - 1 to 6 inches: fine sandy loam

Bw - 6 to 10 inches: sandy loam

Bg - 10 to 19 inches: gravelly sandy loam

Cd - 19 to 66 inches: gravelly sandy loam

Properties and qualities

Slope: 3 to 8 percent

Percent of area covered with surface fragments: 9.0 percent

Depth to restrictive feature: 15 to 35 inches to densic material

Natural drainage class: Poorly drained

Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)

Depth to water table: About 0 to 6 inches

Frequency of flooding: None

Frequency of ponding: None

Salinity, maximum in profile: Nonsaline (0.0 to 1.9 mmhos/cm)

Available water storage in profile: Low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7s

Hydrologic Soil Group: D

Hydric soil rating: Yes

Minor Components

Woodbridge, extremely stony

Percent of map unit: 10 percent

Landform: Hills, ground moraines, drumlins

Landform position (two-dimensional): Footslope, summit, backslope

Landform position (three-dimensional): Crest, side slope

Down-slope shape: Convex

Across-slope shape: Linear

Hydric soil rating: No

Whitman, extremely stony

Percent of map unit: 8 percent

Landform: Depressions

Down-slope shape: Concave

Across-slope shape: Concave

Hydric soil rating: Yes

Paxton, extremely stony

Percent of map unit: 2 percent

Landform: Ground moraines, drumlins, hills

Landform position (two-dimensional): Summit, shoulder, backslope

Landform position (three-dimensional): Crest, side slope

Down-slope shape: Linear, convex

Across-slope shape: Convex, linear

Hydric soil rating: No

Data Source Information

Soil Survey Area: Bristol County, Massachusetts, Southern Part

Survey Area Data: Version 12, Sep 7, 2018

Bristol County, Massachusetts, Southern Part

305B—Paxton fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2t2qp

Elevation: 0 to 1,570 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: All areas are prime farmland

Map Unit Composition

Paxton and similar soils: 80 percent

Minor components: 20 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Paxton

Setting

Landform: Ground moraines, hills, drumlins

Landform position (two-dimensional): Backslope, summit, shoulder

Landform position (three-dimensional): Side slope, crest, nose slope

Down-slope shape: Linear, convex

Across-slope shape: Convex

Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Ap - 0 to 8 inches: fine sandy loam

Bw1 - 8 to 15 inches: fine sandy loam

Bw2 - 15 to 26 inches: fine sandy loam

Cd - 26 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 3 to 8 percent

Depth to restrictive feature: 18 to 39 inches to densic material

Natural drainage class: Well drained

Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)

Depth to water table: About 18 to 37 inches

Frequency of flooding: None

Frequency of ponding: None

Salinity, maximum in profile: Nonsaline (0.0 to 1.9 mmhos/cm)

Available water storage in profile: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2s

Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Woodbridge

Percent of map unit: 9 percent
Landform: Drumlins, ground moraines, hills
Landform position (two-dimensional): Backslope, footslope, summit
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Ridgebury

Percent of map unit: 6 percent
Landform: Ground moraines, depressions, drainageways, hills
Landform position (two-dimensional): Toeslope, backslope, footslope
Landform position (three-dimensional): Base slope, head slope, dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Charlton

Percent of map unit: 5 percent
Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Data Source Information

Soil Survey Area: Bristol County, Massachusetts, Southern Part
Survey Area Data: Version 12, Sep 7, 2018

Bristol County, Massachusetts, Southern Part

306B—Paxton fine sandy loam, 0 to 8 percent slopes, very stony

Map Unit Setting

National map unit symbol: 2w673

Elevation: 0 to 1,340 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

Paxton, very stony, and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Paxton, Very Stony

Setting

Landform: Drumlins, hills, ground moraines

Landform position (two-dimensional): Summit, shoulder, backslope

Landform position (three-dimensional): Crest, side slope

Down-slope shape: Linear, convex

Across-slope shape: Convex, linear

Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material

A - 2 to 10 inches: fine sandy loam

Bw1 - 10 to 17 inches: fine sandy loam

Bw2 - 17 to 28 inches: fine sandy loam

Cd - 28 to 67 inches: gravelly fine sandy loam

Properties and qualities

Slope: 0 to 8 percent

Percent of area covered with surface fragments: 1.6 percent

Depth to restrictive feature: 20 to 43 inches to densic material

Natural drainage class: Well drained

Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)

Depth to water table: About 18 to 37 inches

Frequency of flooding: None

Frequency of ponding: None

Salinity, maximum in profile: Nonsaline (0.0 to 1.9 mmhos/cm)

Available water storage in profile: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6s

Hydrologic Soil Group: C

Hydric soil rating: No

Minor Components

Woodbridge, very stony

Percent of map unit: 8 percent

Landform: Hills, ground moraines, drumlins

Landform position (two-dimensional): Summit, backslope,
footslope

Landform position (three-dimensional): Side slope, crest

Down-slope shape: Concave

Across-slope shape: Linear

Hydric soil rating: No

Ridgebury, very stony

Percent of map unit: 4 percent

Landform: Drumlins, ground moraines, hills, depressions,
drainageways

Landform position (two-dimensional): Toeslope, footslope

Landform position (three-dimensional): Base slope, head slope

Down-slope shape: Concave

Across-slope shape: Concave

Hydric soil rating: Yes

Charlton, very stony

Percent of map unit: 3 percent

Landform: Hills

Landform position (two-dimensional): Shoulder, summit, backslope

Landform position (three-dimensional): Crest, side slope

Down-slope shape: Convex

Across-slope shape: Convex

Hydric soil rating: No

Data Source Information

Soil Survey Area: Bristol County, Massachusetts, Southern Part

Survey Area Data: Version 12, Sep 7, 2018

Bristol County, Massachusetts, Southern Part

311B—Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony

Map Unit Setting

National map unit symbol: 2t2qr

Elevation: 0 to 1,440 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

Woodbridge, very stony, and similar soils: 82 percent

Minor components: 18 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Woodbridge, Very Stony

Setting

Landform: Hills, ground moraines, drumlins

Landform position (two-dimensional): Backslope, footslope, summit

Landform position (three-dimensional): Side slope

Down-slope shape: Concave

Across-slope shape: Linear

Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material

A - 2 to 9 inches: fine sandy loam

Bw1 - 9 to 20 inches: fine sandy loam

Bw2 - 20 to 32 inches: fine sandy loam

Cd - 32 to 67 inches: gravelly fine sandy loam

Properties and qualities

Slope: 0 to 8 percent

Percent of area covered with surface fragments: 1.6 percent

Depth to restrictive feature: 20 to 43 inches to densic material

Natural drainage class: Moderately well drained

Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)

Depth to water table: About 19 to 27 inches

Frequency of flooding: None

Frequency of ponding: None

Salinity, maximum in profile: Nonsaline (0.0 to 1.9 mmhos/cm)

Available water storage in profile: Low (about 4.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6s

Hydrologic Soil Group: C/D

Hydric soil rating: No

Minor Components

Paxton, very stony

Percent of map unit: 10 percent

Landform: Ground moraines, drumlins, hills

Landform position (two-dimensional): Shoulder, backslope, summit

Landform position (three-dimensional): Crest, side slope

Down-slope shape: Convex, linear

Across-slope shape: Convex, linear

Hydric soil rating: No

Ridgebury, very stony

Percent of map unit: 8 percent

Landform: Ground moraines, depressions, drumlins,
drainageways, hills

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Head slope, base slope

Down-slope shape: Concave

Across-slope shape: Concave

Hydric soil rating: Yes

Data Source Information

Soil Survey Area: Bristol County, Massachusetts, Southern Part

Survey Area Data: Version 12, Sep 7, 2018



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

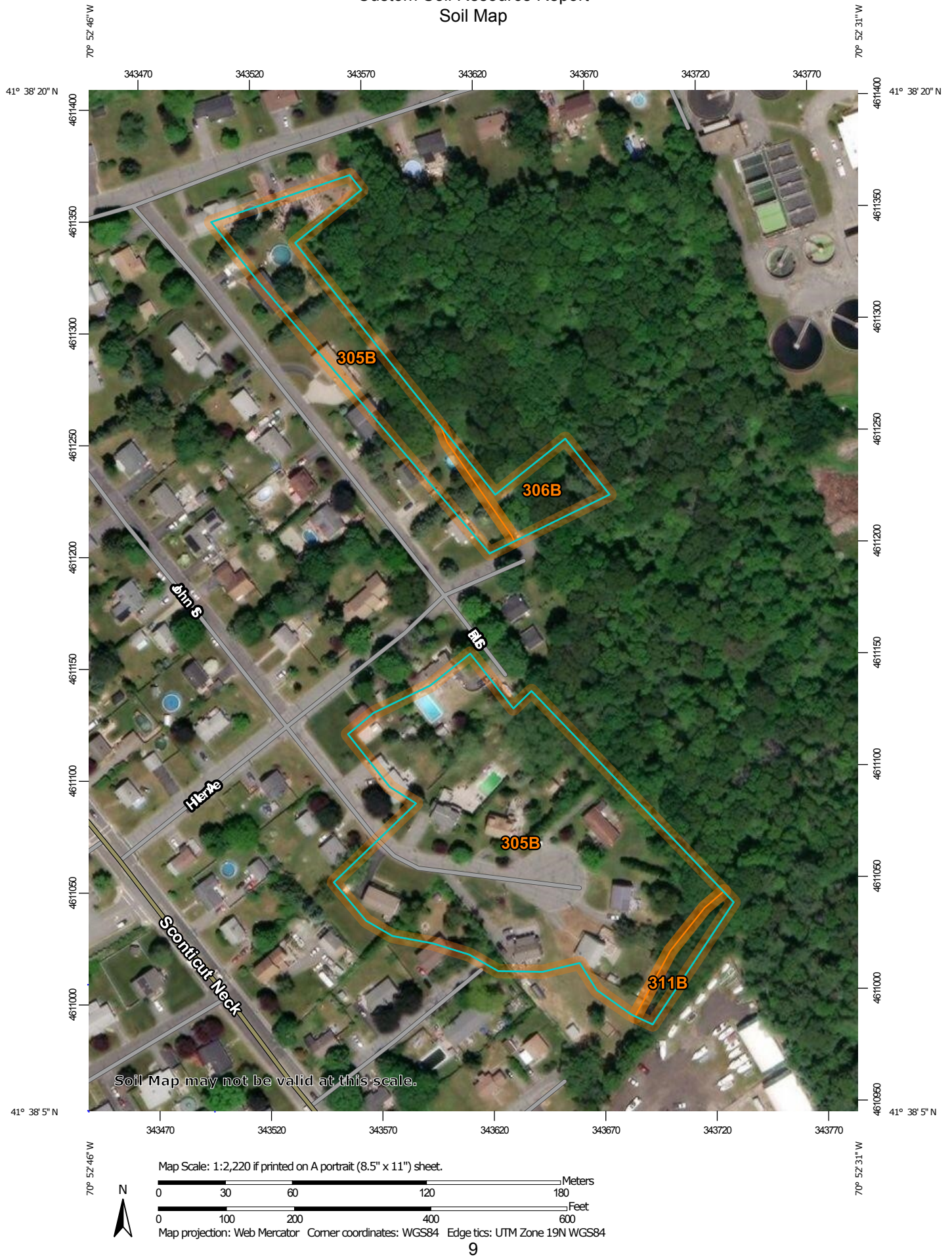
Custom Soil Resource Report for **Bristol County, Massachusetts, Southern Part**

Sconticut Neck Woods - Offsite



January 4, 2019

Custom Soil Resource Report Soil Map



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 1:20,000.

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

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

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Web Soil Survey URL:
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Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
305B	Paxton fine sandy loam, 3 to 8 percent slopes	4.9	90.8%
306B	Paxton fine sandy loam, 0 to 8 percent slopes, very stony	0.3	6.1%
311B	Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony	0.2	3.1%
Totals for Area of Interest		5.4	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.

Bristol County, Massachusetts, Southern Part

305B—Paxton fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2t2qp
Elevation: 0 to 1,570 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: All areas are prime farmland

Map Unit Composition

Paxton and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Paxton

Setting

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

Typical profile

Ap - 0 to 8 inches: fine sandy loam
Bw1 - 8 to 15 inches: fine sandy loam
Bw2 - 15 to 26 inches: fine sandy loam
Cd - 26 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 18 to 39 inches to densic material
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 18 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water storage in profile: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Woodbridge

Percent of map unit: 9 percent
Landform: Drumlins, ground moraines, hills
Landform position (two-dimensional): Backslope, footslope, summit
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Ridgebury

Percent of map unit: 6 percent
Landform: Ground moraines, depressions, drainageways, hills
Landform position (two-dimensional): Toeslope, backslope, footslope
Landform position (three-dimensional): Base slope, head slope, dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Charlton

Percent of map unit: 5 percent
Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

306B—Paxton fine sandy loam, 0 to 8 percent slopes, very stony

Map Unit Setting

National map unit symbol: 2w673
Elevation: 0 to 1,340 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

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

Description of Paxton, Very Stony

Setting

Landform: Drumlins, hills, ground moraines
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear

Custom Soil Resource Report

Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 10 inches: fine sandy loam
Bw1 - 10 to 17 inches: fine sandy loam
Bw2 - 17 to 28 inches: fine sandy loam
Cd - 28 to 67 inches: gravelly fine sandy loam

Properties and qualities

Slope: 0 to 8 percent
Percent of area covered with surface fragments: 1.6 percent
Depth to restrictive feature: 20 to 43 inches to densic material
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 18 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water storage in profile: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Woodbridge, very stony

Percent of map unit: 8 percent
Landform: Hills, ground moraines, drumlins
Landform position (two-dimensional): Summit, backslope, footslope
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Ridgebury, very stony

Percent of map unit: 4 percent
Landform: Drumlins, ground moraines, hills, depressions, drainageways
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope, head slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Charlton, very stony

Percent of map unit: 3 percent
Landform: Hills
Landform position (two-dimensional): Shoulder, summit, backslope
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Convex
Across-slope shape: Convex

Hydric soil rating: No

311B—Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony

Map Unit Setting

National map unit symbol: 2t2qr

Elevation: 0 to 1,440 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

Woodbridge, very stony, and similar soils: 82 percent

Minor components: 18 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Woodbridge, Very Stony

Setting

Landform: Hills, ground moraines, drumlins

Landform position (two-dimensional): Backslope, footslope, summit

Landform position (three-dimensional): Side slope

Down-slope shape: Concave

Across-slope shape: Linear

Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material

A - 2 to 9 inches: fine sandy loam

Bw1 - 9 to 20 inches: fine sandy loam

Bw2 - 20 to 32 inches: fine sandy loam

Cd - 32 to 67 inches: gravelly fine sandy loam

Properties and qualities

Slope: 0 to 8 percent

Percent of area covered with surface fragments: 1.6 percent

Depth to restrictive feature: 20 to 43 inches to densic material

Natural drainage class: Moderately well drained

Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)

Depth to water table: About 19 to 27 inches

Frequency of flooding: None

Frequency of ponding: None

Salinity, maximum in profile: Nonsaline (0.0 to 1.9 mmhos/cm)

Available water storage in profile: Low (about 4.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Custom Soil Resource Report

Land capability classification (nonirrigated): 6s

Hydrologic Soil Group: C/D

Hydric soil rating: No

Minor Components

Paxton, very stony

Percent of map unit: 10 percent

Landform: Ground moraines, drumlins, hills

Landform position (two-dimensional): Shoulder, backslope, summit

Landform position (three-dimensional): Crest, side slope

Down-slope shape: Convex, linear

Across-slope shape: Convex, linear

Hydric soil rating: No

Ridgebury, very stony

Percent of map unit: 8 percent

Landform: Ground moraines, depressions, drumlins, drainageways, hills

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Head slope, base slope

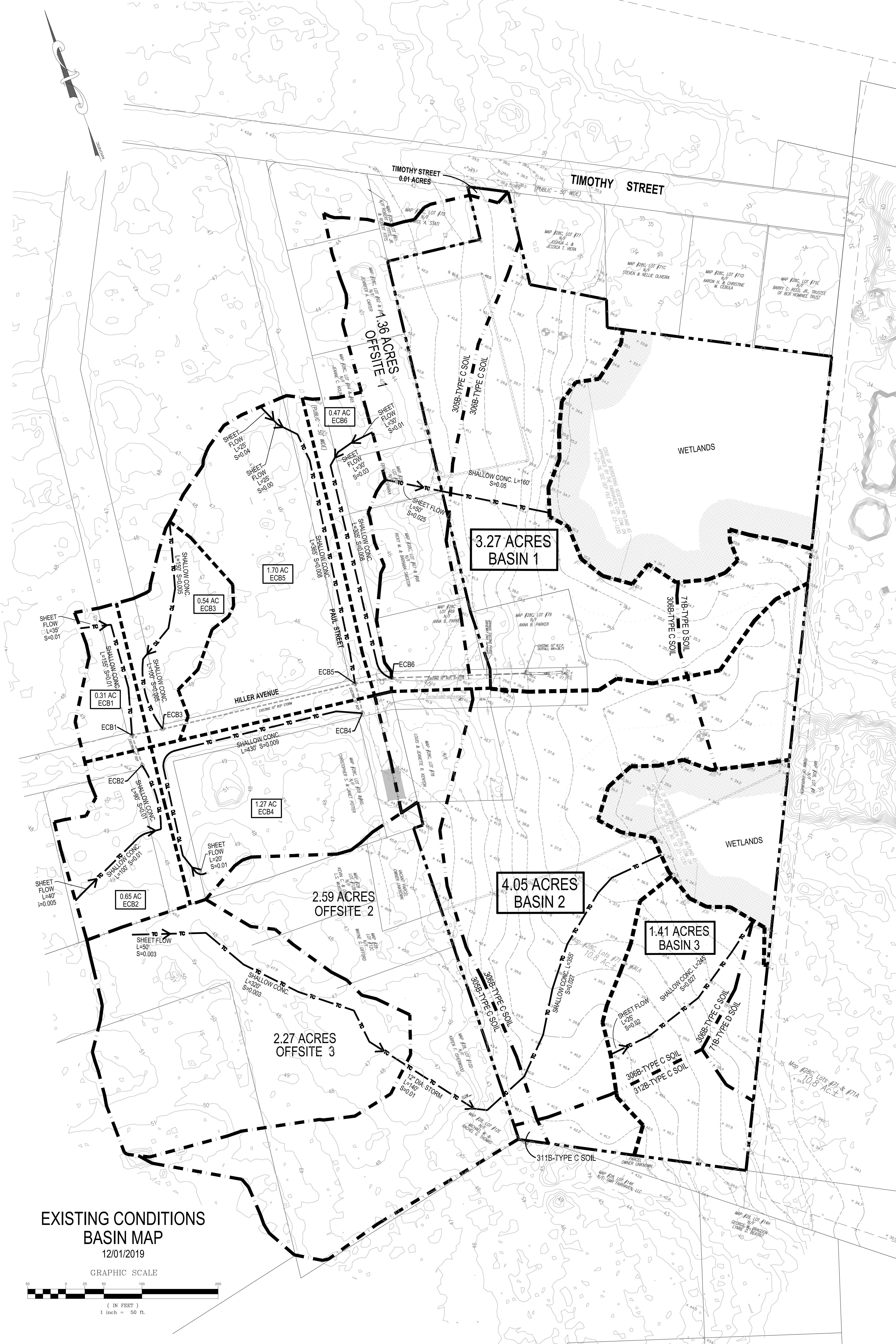
Down-slope shape: Concave

Across-slope shape: Concave

Hydric soil rating: Yes

Appendix A

HydroCAD Input/Output



EXISTING CONDITIONS
BASIN MAP

12/01/2019

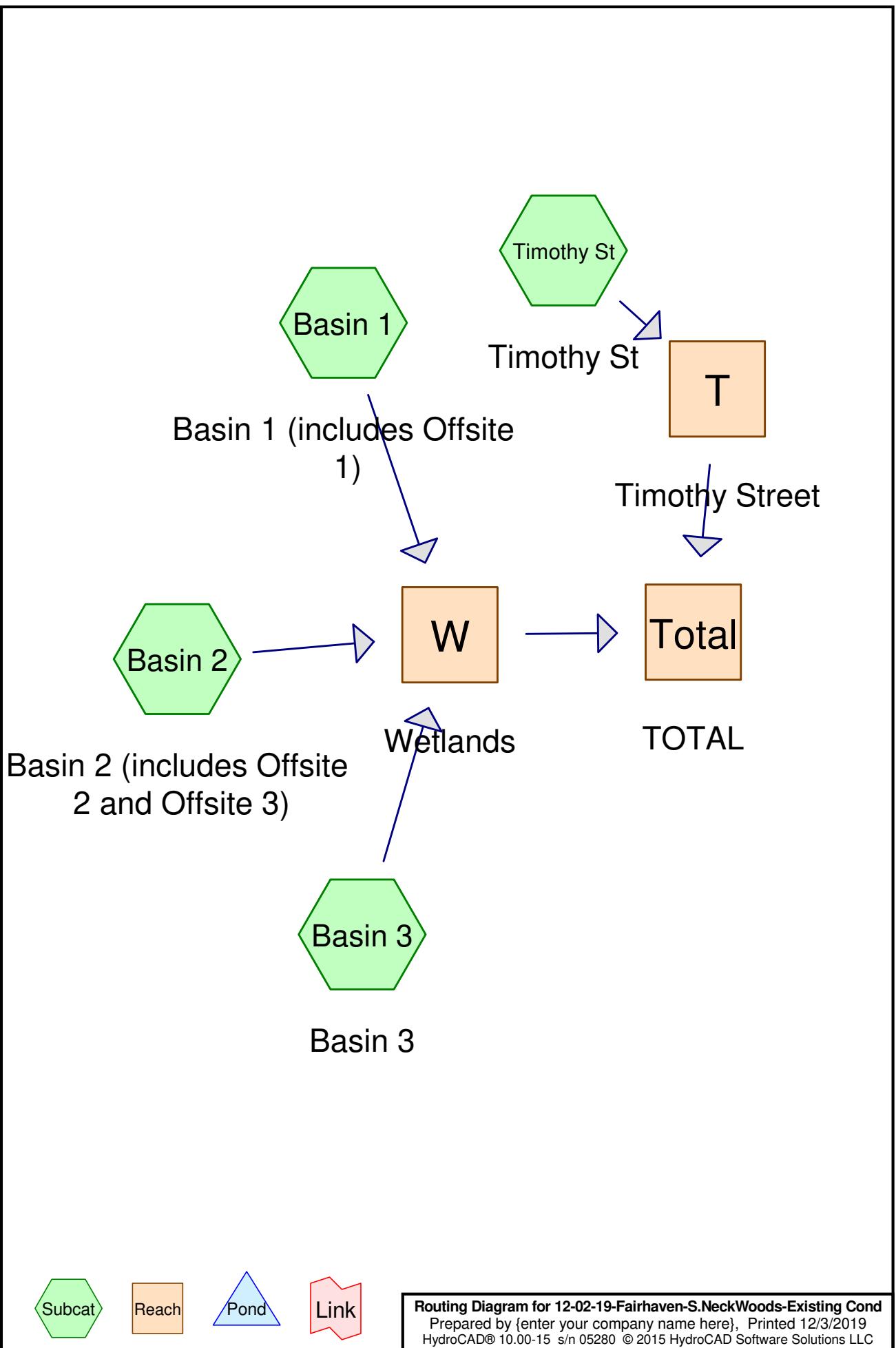
GRAPHIC SCALE



(IN FEET)

1 inch = 50 ft.

(IN FEET)
1 inch = 50 ft.



Time span=0.000-24.000 hrs, dt=0.001 hrs, 24001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment Basin 1: Basin 1 Runoff Area=4.630 ac 2.38% Impervious Runoff Depth>1.24"
Flow Length=210' Tc=7.9 min CN=74 Runoff=6.07 cfs 0.477 af

Subcatchment Basin 2: Basin 2 Runoff Area=8.910 ac 11.99% Impervious Runoff Depth>1.43"
Flow Length=865' Tc=8.8 min CN=77 Runoff=13.32 cfs 1.060 af

Subcatchment Basin 3: Basin 3 Runoff Area=1.410 ac 0.00% Impervious Runoff Depth>1.49"
Flow Length=270' Tc=8.3 min CN=78 Runoff=2.26 cfs 0.176 af

Subcatchment Timothy St: Timothy St Runoff Area=0.010 ac 0.00% Impervious Runoff Depth>1.18"
Tc=6.0 min CN=73 Runoff=0.01 cfs 0.001 af

Reach T: Timothy Street Inflow=0.01 cfs 0.001 af
Outflow=0.01 cfs 0.001 af

Reach Total: TOTAL Inflow=21.62 cfs 1.714 af
Outflow=21.62 cfs 1.714 af

Reach W: Wetlands Inflow=21.60 cfs 1.713 af
Outflow=21.60 cfs 1.713 af

Total Runoff Area = 14.960 ac Runoff Volume = 1.714 af Average Runoff Depth = 1.37"
92.13% Pervious = 13.782 ac 7.87% Impervious = 1.178 ac

Summary for Subcatchment Basin 1: Basin 1 (includes Offsite 1)

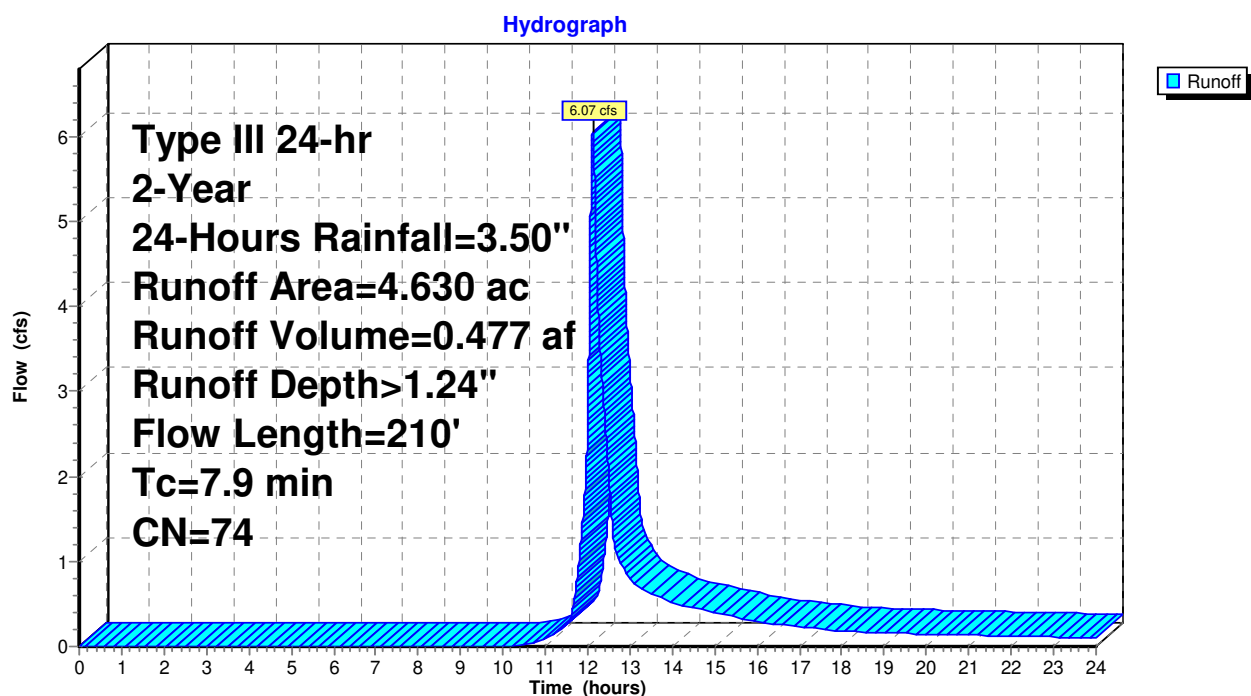
Runoff = 6.07 cfs @ 12.122 hrs, Volume= 0.477 af, Depth> 1.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.001 hrs
 Type III 24-hr 2-Year, 24-Hours Rainfall=3.50"

Area (ac)	CN	Description
2.828	73	Woods, Fair, HSG C
0.410	79	Woods, Fair, HSG D
* 0.325	73	Offsite 1 Woods, Fair, HSG C
* 0.925	74	Offsite 1 >75% Grass cover, Good, HSG C
* 0.110	98	Offsite 1 Buildings
0.032	74	>75% Grass cover, Good, HSG C
4.630	74	Weighted Average
4.520		97.62% Pervious Area
0.110		2.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.2	50	0.0250	0.12		Sheet Flow, Grass: Dense n= 0.240 P2= 3.50"
0.7	160	0.0500	3.60		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
7.9	210	Total			

Subcatchment Basin 1: Basin 1 (includes Offsite 1)



Summary for Subcatchment Basin 2: Basin 2 (includes Offsite 2 and Offsite 3)

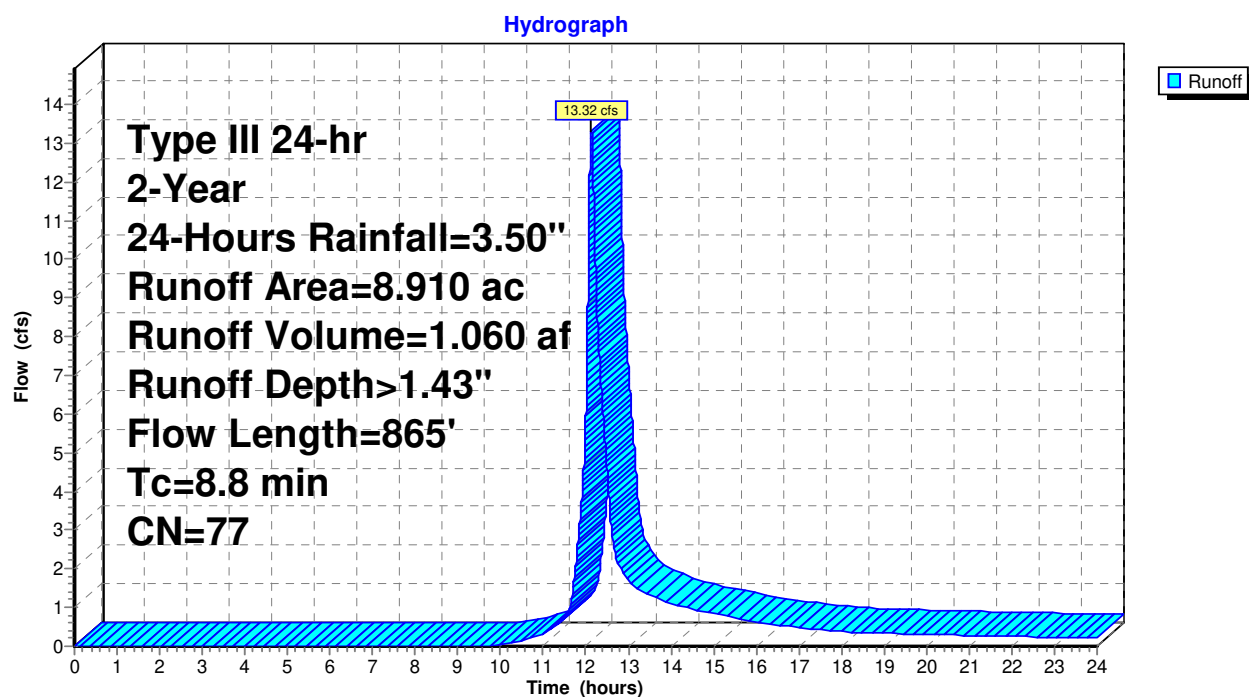
Runoff = 13.32 cfs @ 12.134 hrs, Volume= 1.060 af, Depth> 1.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.001 hrs
 Type III 24-hr 2-Year, 24-Hours Rainfall=3.50"

Area (ac)	CN	Description
3.189	73	Woods, Fair, HSG C
0.520	79	Woods, Fair, HSG D
* 1.560	74	Offsite 3 >75% Grass cover, Good, HSG C
* 0.220	98	Offsite 3 - buildings
* 0.490	98	Offsite 3 - driveway/road
* 1.640	74	Offsite 2 >75% Grass cover, Good, HSG C
* 0.690	73	Offsite 2 Woods, Fair, HSG C
* 0.080	98	Offsite 2 - driveway/road
* 0.180	98	Offsite 2 - buildings
* 0.056	98	Buildings
0.243	74	>75% Grass cover, Good, HSG C
* 0.042	98	Pavement/Driveways
8.910	77	Weighted Average
7.842		88.01% Pervious Area
1.068		11.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	50	0.0030	0.59		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.50"
4.8	320	0.0030	1.11		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.4	140	0.0100	5.36	4.21	Pipe Channel, existing inlet and storm pipe from cul-de-sac 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
2.2	355	0.0270	2.65		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
8.8	865	Total			

Subcatchment Basin 2: Basin 2 (includes Offsite 2 and Offsite 3)



Summary for Subcatchment Basin 3: Basin 3

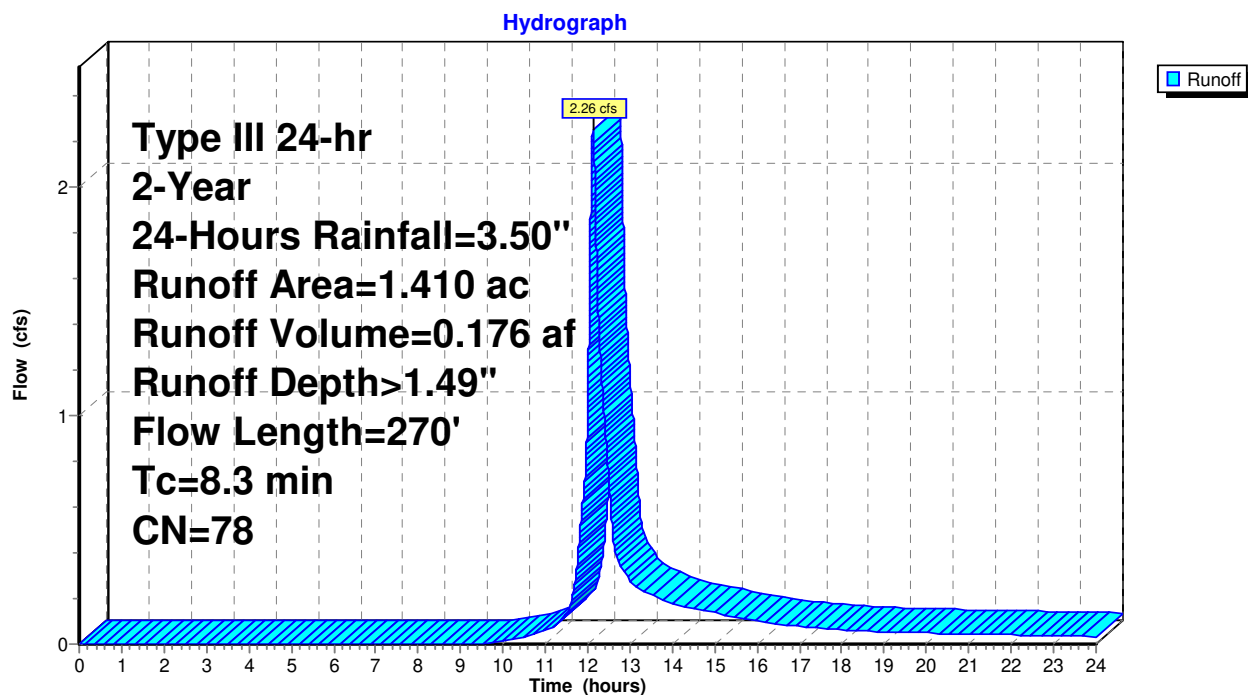
Runoff = 2.26 cfs @ 12.127 hrs, Volume= 0.176 af, Depth> 1.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.001 hrs
 Type III 24-hr 2-Year, 24-Hours Rainfall=3.50"

Area (ac)	CN	Description
0.230	73	Woods, Fair, HSG C
1.180	79	Woods, Fair, HSG D
1.410	78	Weighted Average
1.410		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	25	0.0200	0.06		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
1.5	245	0.0270	2.65		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
8.3	270	Total			

Subcatchment Basin 3: Basin 3



Summary for Subcatchment Timothy St: Timothy St

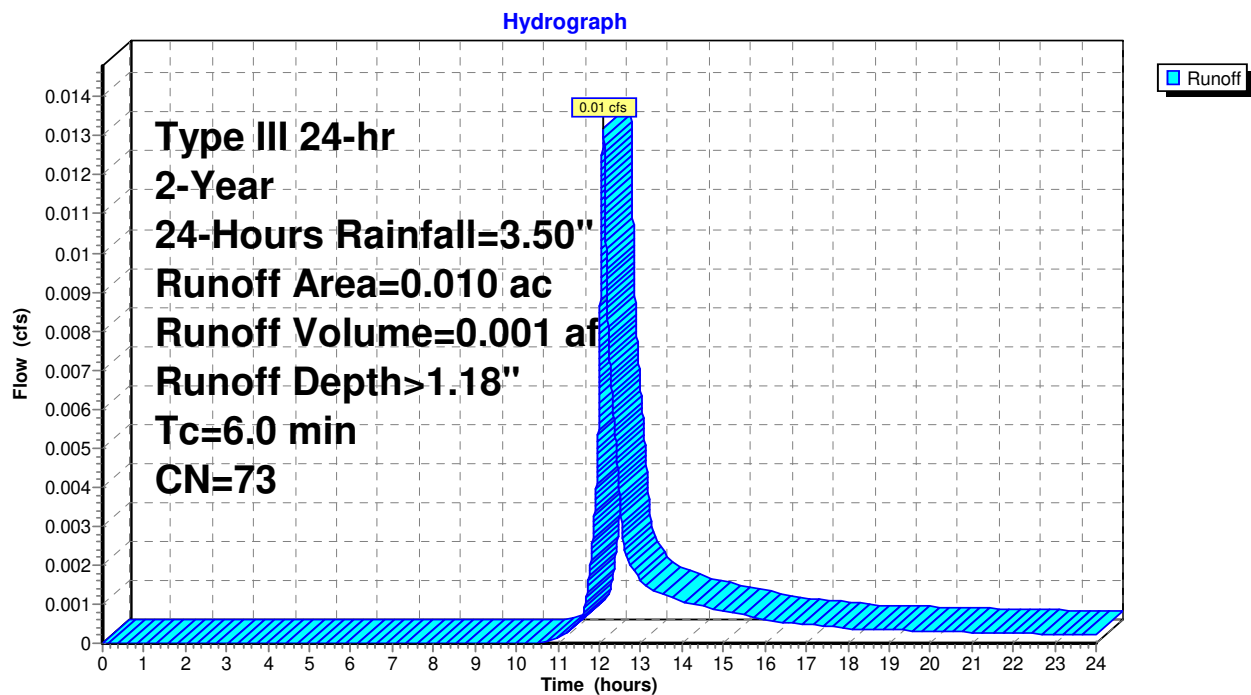
Runoff = 0.01 cfs @ 12.099 hrs, Volume= 0.001 af, Depth> 1.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.001 hrs
 Type III 24-hr 2-Year, 24-Hours Rainfall=3.50"

Area (ac)	CN	Description
0.010	73	Woods, Fair, HSG C
0.010		100.00% Pervious Area

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

Subcatchment Timothy St: Timothy St

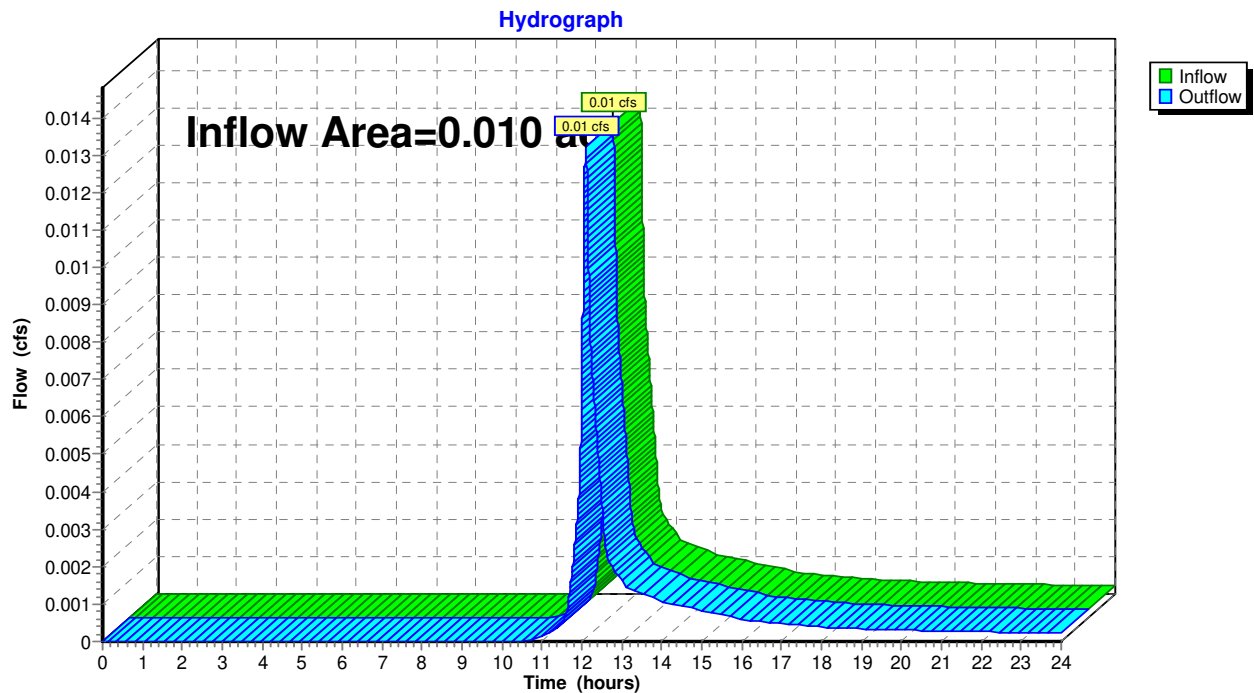


Summary for Reach T: Timothy Street

Inflow Area = 0.010 ac, 0.00% Impervious, Inflow Depth > 1.18" for 2-Year, 24-Hours event
Inflow = 0.01 cfs @ 12.099 hrs, Volume= 0.001 af
Outflow = 0.01 cfs @ 12.099 hrs, Volume= 0.001 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.000-24.000 hrs, dt= 0.001 hrs

Reach T: Timothy Street

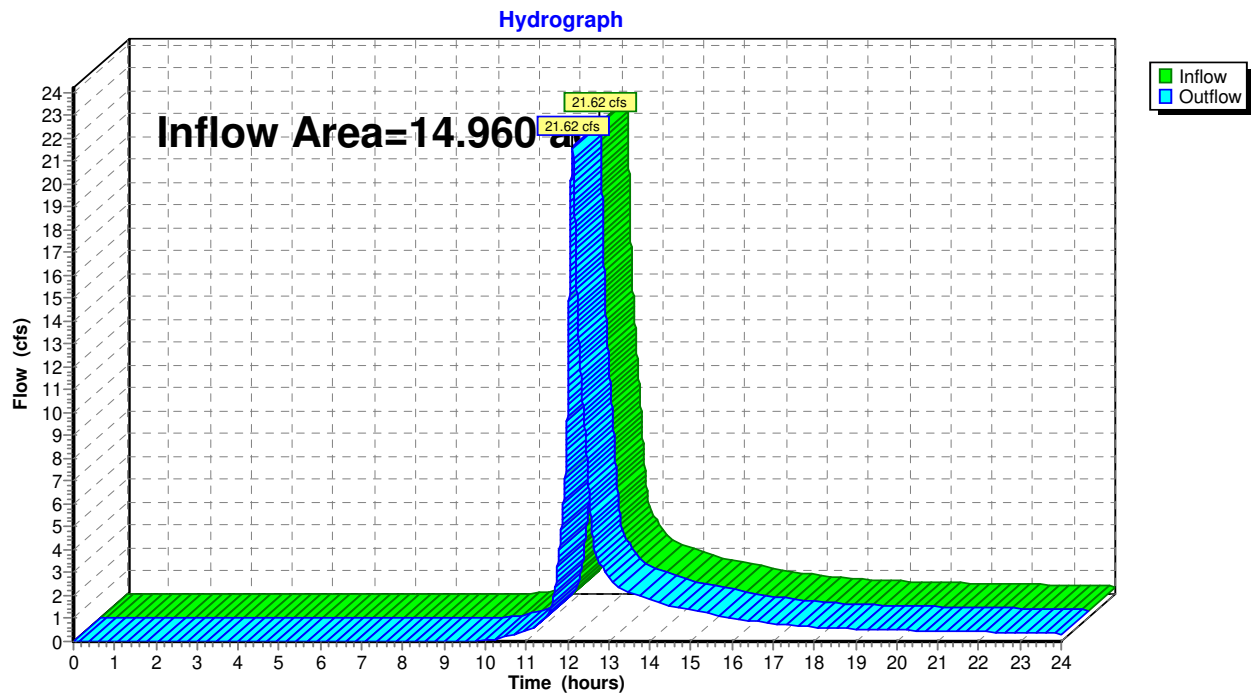


Summary for Reach Total: TOTAL

Inflow Area = 14.960 ac, 7.87% Impervious, Inflow Depth > 1.37" for 2-Year, 24-Hours event
Inflow = 21.62 cfs @ 12.125 hrs, Volume= 1.714 af
Outflow = 21.62 cfs @ 12.125 hrs, Volume= 1.714 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.000-24.000 hrs, dt= 0.001 hrs

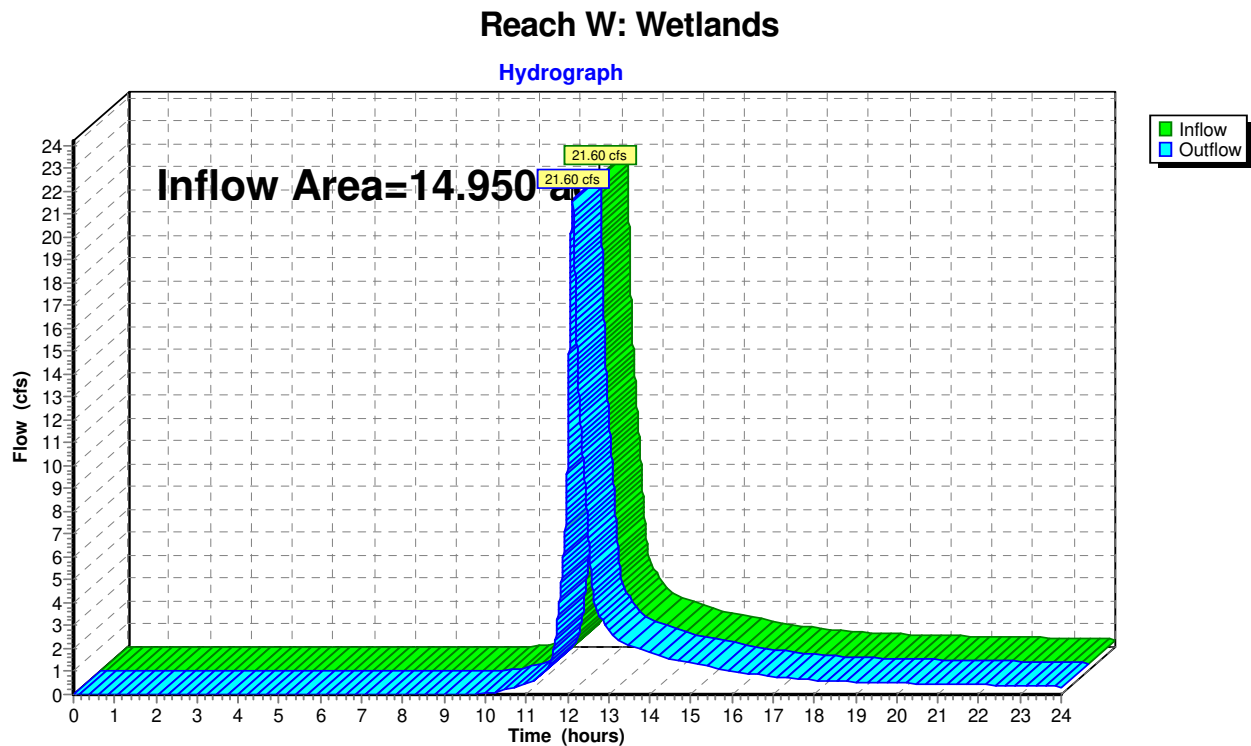
Reach Total: TOTAL



Summary for Reach W: Wetlands

Inflow Area = 14.950 ac, 7.88% Impervious, Inflow Depth > 1.37" for 2-Year, 24-Hours event
Inflow = 21.60 cfs @ 12.125 hrs, Volume= 1.713 af
Outflow = 21.60 cfs @ 12.125 hrs, Volume= 1.713 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.000-24.000 hrs, dt= 0.001 hrs



Time span=0.000-24.000 hrs, dt=0.001 hrs, 24001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment Basin 1: Basin 1 Runoff Area=4.630 ac 2.38% Impervious Runoff Depth>2.20"
Flow Length=210' Tc=7.9 min CN=74 Runoff=11.13 cfs 0.850 af

Subcatchment Basin 2: Basin 2 Runoff Area=8.910 ac 11.99% Impervious Runoff Depth>2.45"
Flow Length=865' Tc=8.8 min CN=77 Runoff=23.28 cfs 1.821 af

Subcatchment Basin 3: Basin 3 Runoff Area=1.410 ac 0.00% Impervious Runoff Depth>2.54"
Flow Length=270' Tc=8.3 min CN=78 Runoff=3.88 cfs 0.298 af

Subcatchment Timothy St: Timothy St Runoff Area=0.010 ac 0.00% Impervious Runoff Depth>2.12"
Tc=6.0 min CN=73 Runoff=0.02 cfs 0.002 af

Reach T: Timothy Street Inflow=0.02 cfs 0.002 af
Outflow=0.02 cfs 0.002 af

Reach Total: TOTAL Inflow=38.28 cfs 2.970 af
Outflow=38.28 cfs 2.970 af

Reach W: Wetlands Inflow=38.25 cfs 2.968 af
Outflow=38.25 cfs 2.968 af

Total Runoff Area = 14.960 ac Runoff Volume = 2.970 af Average Runoff Depth = 2.38"
92.13% Pervious = 13.782 ac 7.87% Impervious = 1.178 ac

Summary for Subcatchment Basin 1: Basin 1 (includes Offsite 1)

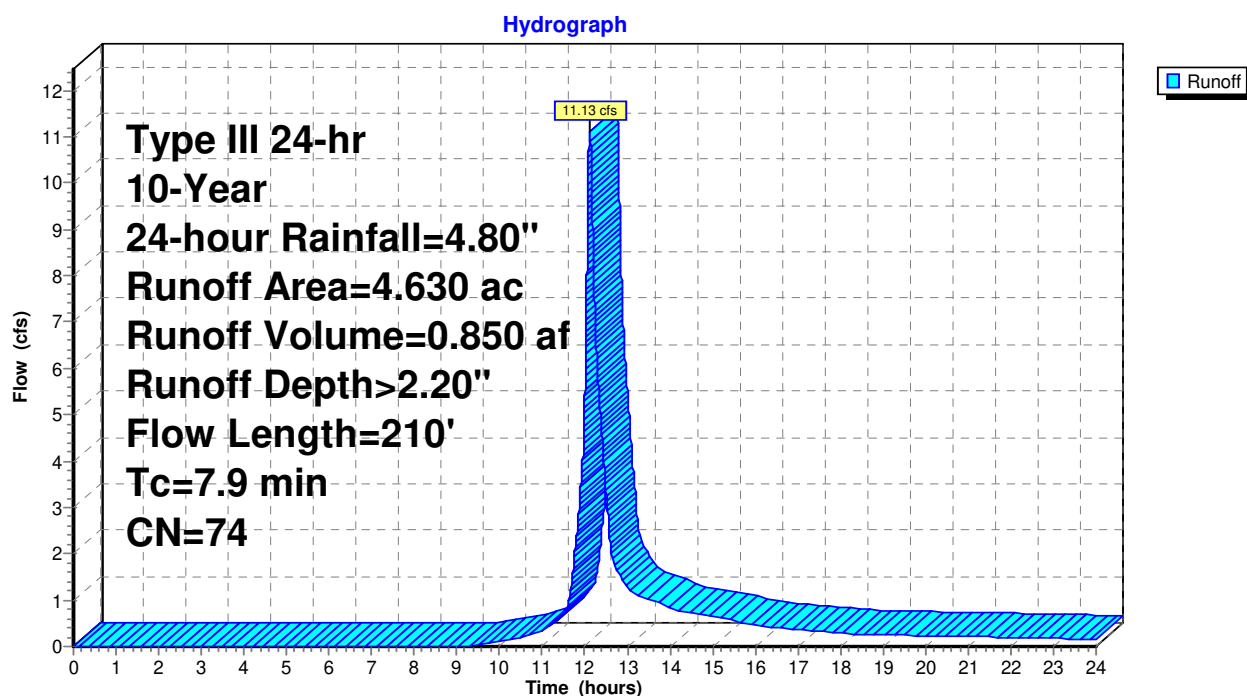
Runoff = 11.13 cfs @ 12.114 hrs, Volume= 0.850 af, Depth> 2.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.001 hrs
 Type III 24-hr 10-Year, 24-hour Rainfall=4.80"

Area (ac)	CN	Description
2.828	73	Woods, Fair, HSG C
0.410	79	Woods, Fair, HSG D
* 0.325	73	Offsite 1 Woods, Fair, HSG C
* 0.925	74	Offsite 1 >75% Grass cover, Good, HSG C
* 0.110	98	Offsite 1 Buildings
0.032	74	>75% Grass cover, Good, HSG C
4.630	74	Weighted Average
4.520		97.62% Pervious Area
0.110		2.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.2	50	0.0250	0.12		Sheet Flow, Grass: Dense n= 0.240 P2= 3.50"
0.7	160	0.0500	3.60		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
7.9	210	Total			

Subcatchment Basin 1: Basin 1 (includes Offsite 1)



Summary for Subcatchment Basin 2: Basin 2 (includes Offsite 2 and Offsite 3)

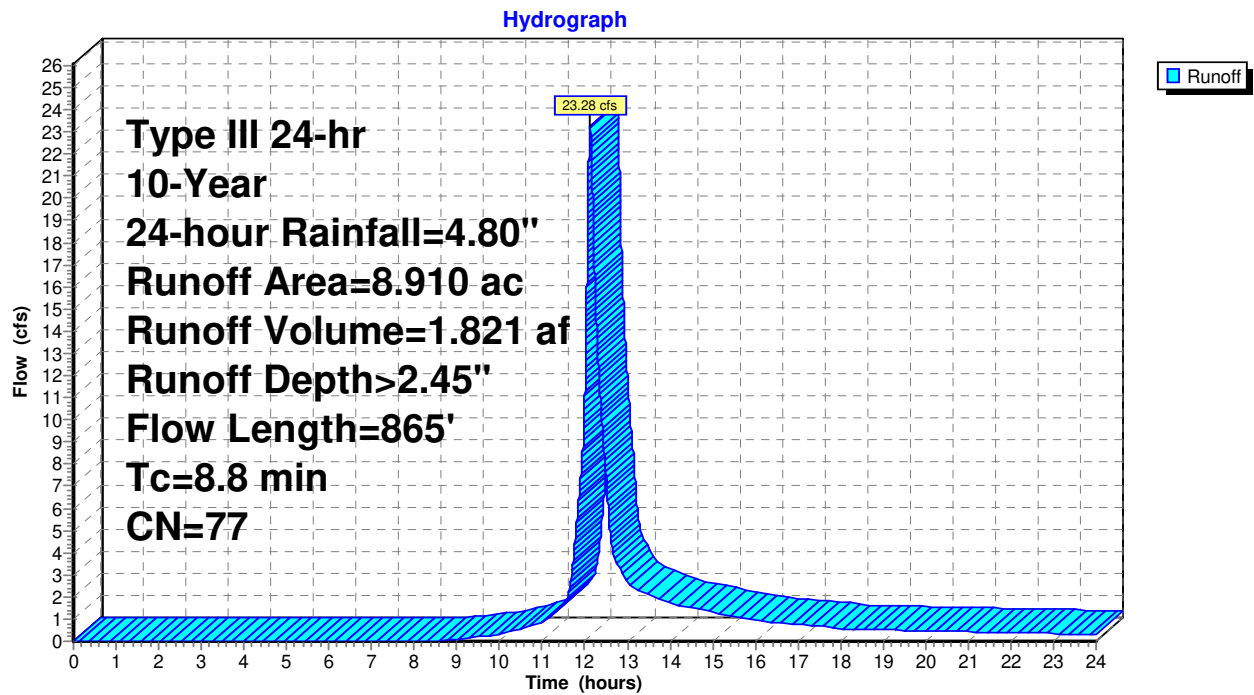
Runoff = 23.28 cfs @ 12.125 hrs, Volume= 1.821 af, Depth> 2.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.001 hrs
 Type III 24-hr 10-Year, 24-hour Rainfall=4.80"

Area (ac)	CN	Description
3.189	73	Woods, Fair, HSG C
0.520	79	Woods, Fair, HSG D
* 1.560	74	Offsite 3 >75% Grass cover, Good, HSG C
* 0.220	98	Offsite 3 - buildings
* 0.490	98	Offsite 3 - driveway/road
* 1.640	74	Offsite 2 >75% Grass cover, Good, HSG C
* 0.690	73	Offsite 2 Woods, Fair, HSG C
* 0.080	98	Offsite 2 - driveway/road
* 0.180	98	Offsite 2 - buildings
* 0.056	98	Buildings
0.243	74	>75% Grass cover, Good, HSG C
* 0.042	98	Pavement/Driveways
8.910	77	Weighted Average
7.842		88.01% Pervious Area
1.068		11.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	50	0.0030	0.59		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.50"
4.8	320	0.0030	1.11		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.4	140	0.0100	5.36	4.21	Pipe Channel, existing inlet and storm pipe from cul-de-sac 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
2.2	355	0.0270	2.65		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
8.8	865	Total			

Subcatchment Basin 2: Basin 2 (includes Offsite 2 and Offsite 3)



Summary for Subcatchment Basin 3: Basin 3

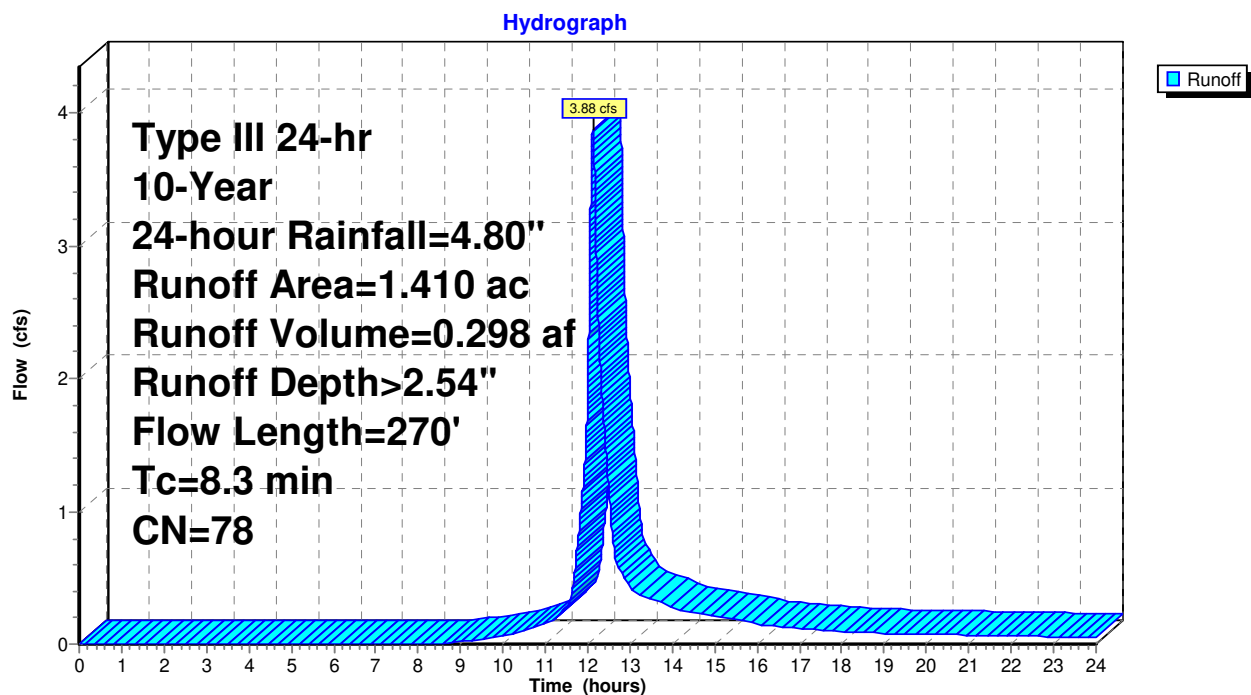
Runoff = 3.88 cfs @ 12.118 hrs, Volume= 0.298 af, Depth> 2.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.001 hrs
 Type III 24-hr 10-Year, 24-hour Rainfall=4.80"

Area (ac)	CN	Description
0.230	73	Woods, Fair, HSG C
1.180	79	Woods, Fair, HSG D
1.410	78	Weighted Average
1.410		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	25	0.0200	0.06		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
1.5	245	0.0270	2.65		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
8.3	270	Total			

Subcatchment Basin 3: Basin 3



Summary for Subcatchment Timothy St: Timothy St

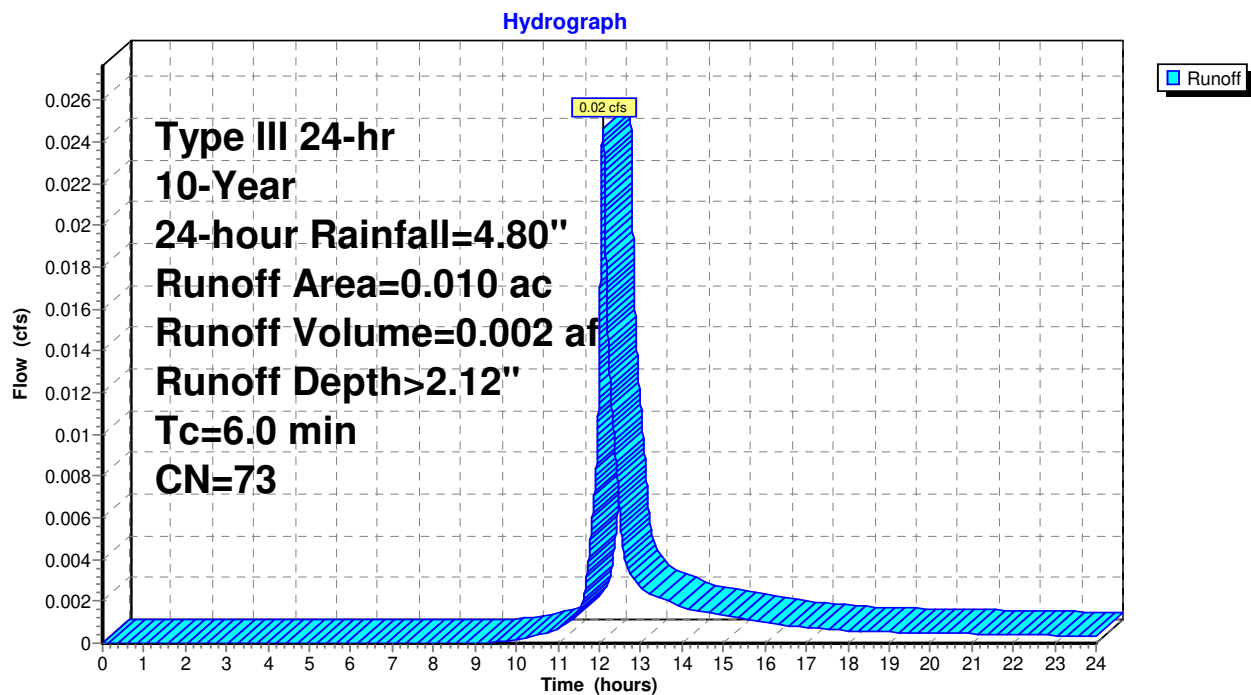
Runoff = 0.02 cfs @ 12.087 hrs, Volume= 0.002 af, Depth> 2.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.001 hrs
 Type III 24-hr 10-Year, 24-hour Rainfall=4.80"

Area (ac)	CN	Description
0.010	73	Woods, Fair, HSG C
0.010		100.00% Pervious Area

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

Subcatchment Timothy St: Timothy St

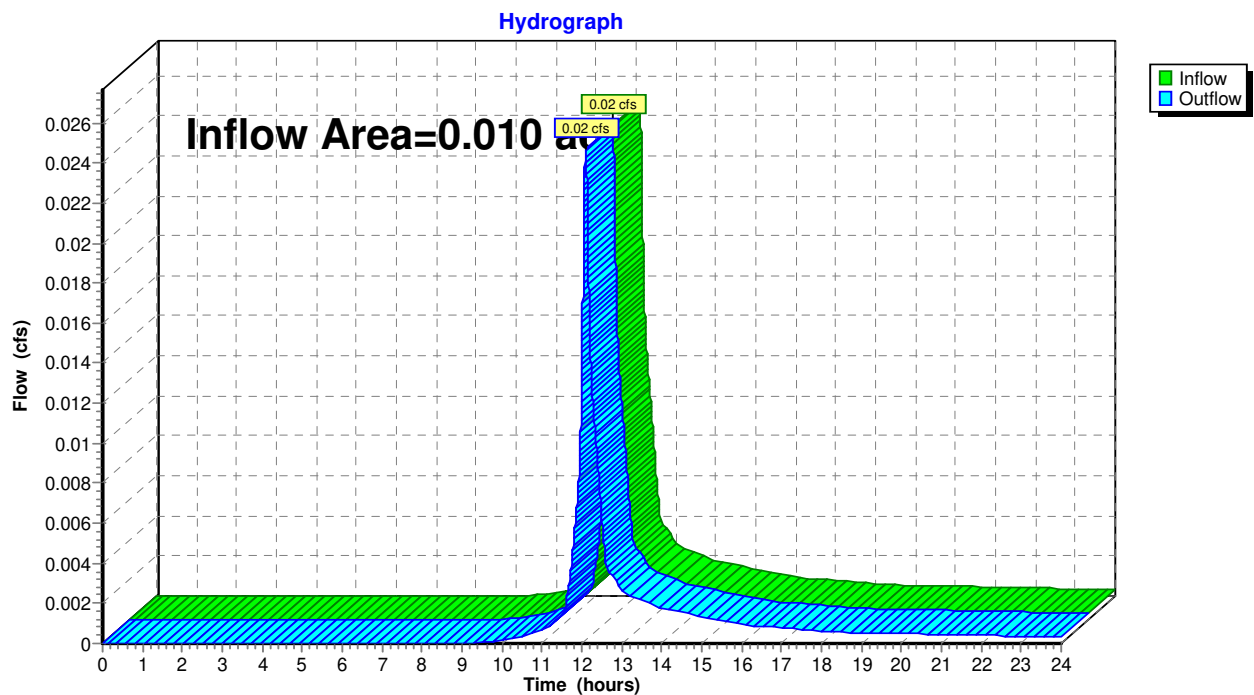


Summary for Reach T: Timothy Street

Inflow Area = 0.010 ac, 0.00% Impervious, Inflow Depth > 2.12" for 10-Year, 24-hour event
Inflow = 0.02 cfs @ 12.087 hrs, Volume= 0.002 af
Outflow = 0.02 cfs @ 12.087 hrs, Volume= 0.002 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.000-24.000 hrs, dt= 0.001 hrs

Reach T: Timothy Street

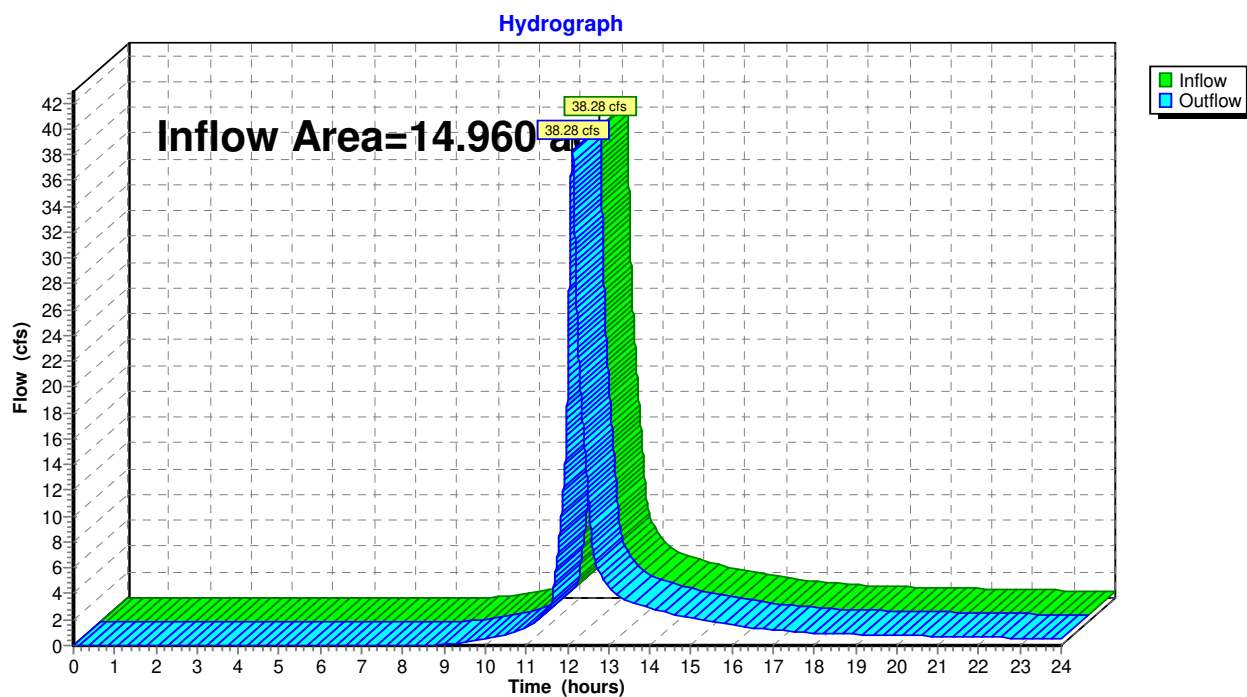


Summary for Reach Total: TOTAL

Inflow Area = 14.960 ac, 7.87% Impervious, Inflow Depth > 2.38" for 10-Year, 24-hour event
Inflow = 38.28 cfs @ 12.122 hrs, Volume= 2.970 af
Outflow = 38.28 cfs @ 12.122 hrs, Volume= 2.970 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.000-24.000 hrs, dt= 0.001 hrs

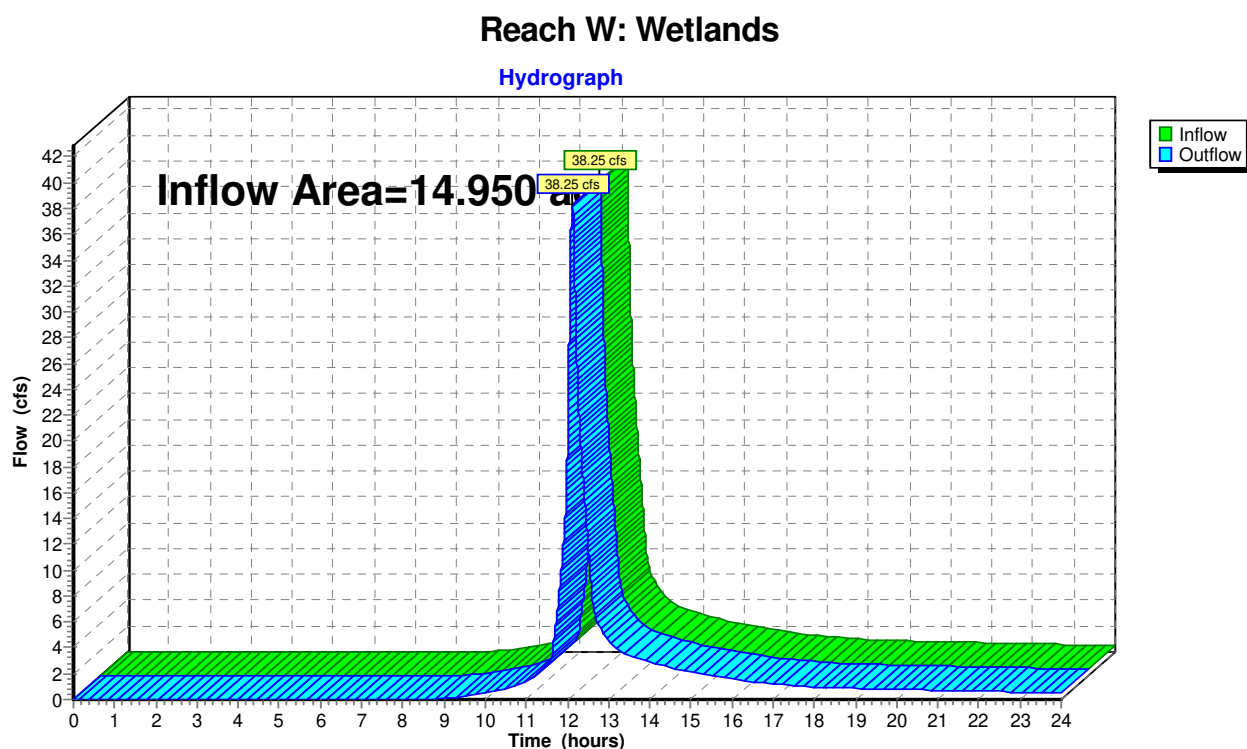
Reach Total: TOTAL



Summary for Reach W: Wetlands

Inflow Area = 14.950 ac, 7.88% Impervious, Inflow Depth > 2.38" for 10-Year, 24-hour event
Inflow = 38.25 cfs @ 12.122 hrs, Volume= 2.968 af
Outflow = 38.25 cfs @ 12.122 hrs, Volume= 2.968 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.000-24.000 hrs, dt= 0.001 hrs



Time span=0.000-24.000 hrs, dt=0.001 hrs, 24001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment Basin 1: Basin 1 Runoff Area=4.630 ac 2.38% Impervious Runoff Depth>2.93"
Flow Length=210' Tc=7.9 min CN=74 Runoff=14.90 cfs 1.130 af

Subcatchment Basin 2: Basin 2 Runoff Area=8.910 ac 11.99% Impervious Runoff Depth>3.21"
Flow Length=865' Tc=8.8 min CN=77 Runoff=30.55 cfs 2.385 af

Subcatchment Basin 3: Basin 3 Runoff Area=1.410 ac 0.00% Impervious Runoff Depth>3.31"
Flow Length=270' Tc=8.3 min CN=78 Runoff=5.06 cfs 0.389 af

Subcatchment Timothy St: Timothy St Runoff Area=0.010 ac 0.00% Impervious Runoff Depth>2.84"
Tc=6.0 min CN=73 Runoff=0.03 cfs 0.002 af

Reach T: Timothy Street Inflow=0.03 cfs 0.002 af
Outflow=0.03 cfs 0.002 af

Reach Total: TOTAL Inflow=50.49 cfs 3.907 af
Outflow=50.49 cfs 3.907 af

Reach W: Wetlands Inflow=50.46 cfs 3.905 af
Outflow=50.46 cfs 3.905 af

Total Runoff Area = 14.960 ac Runoff Volume = 3.907 af Average Runoff Depth = 3.13"
92.13% Pervious = 13.782 ac 7.87% Impervious = 1.178 ac

Summary for Subcatchment Basin 1: Basin 1 (includes Offsite 1)

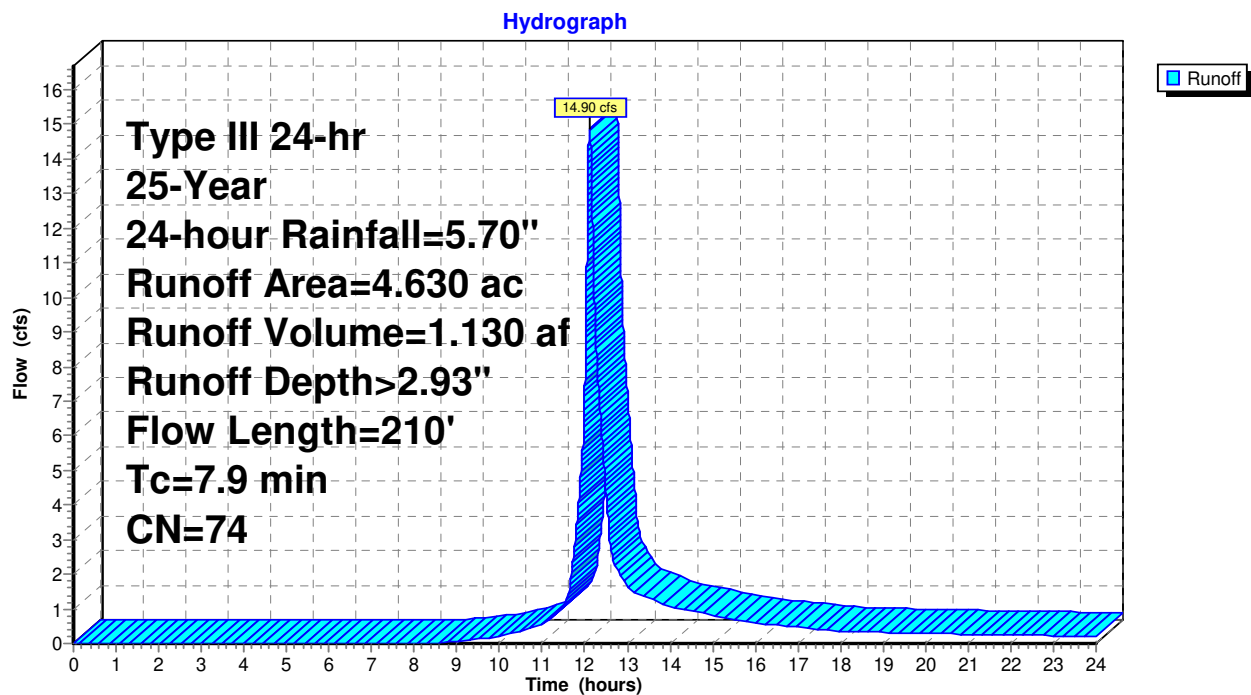
Runoff = 14.90 cfs @ 12.114 hrs, Volume= 1.130 af, Depth> 2.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.001 hrs
 Type III 24-hr 25-Year, 24-hour Rainfall=5.70"

Area (ac)	CN	Description
2.828	73	Woods, Fair, HSG C
0.410	79	Woods, Fair, HSG D
* 0.325	73	Offsite 1 Woods, Fair, HSG C
* 0.925	74	Offsite 1 >75% Grass cover, Good, HSG C
* 0.110	98	Offsite 1 Buildings
0.032	74	>75% Grass cover, Good, HSG C
4.630	74	Weighted Average
4.520		97.62% Pervious Area
0.110		2.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.2	50	0.0250	0.12		Sheet Flow, Grass: Dense n= 0.240 P2= 3.50"
0.7	160	0.0500	3.60		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
7.9	210	Total			

Subcatchment Basin 1: Basin 1 (includes Offsite 1)



Summary for Subcatchment Basin 2: Basin 2 (includes Offsite 2 and Offsite 3)

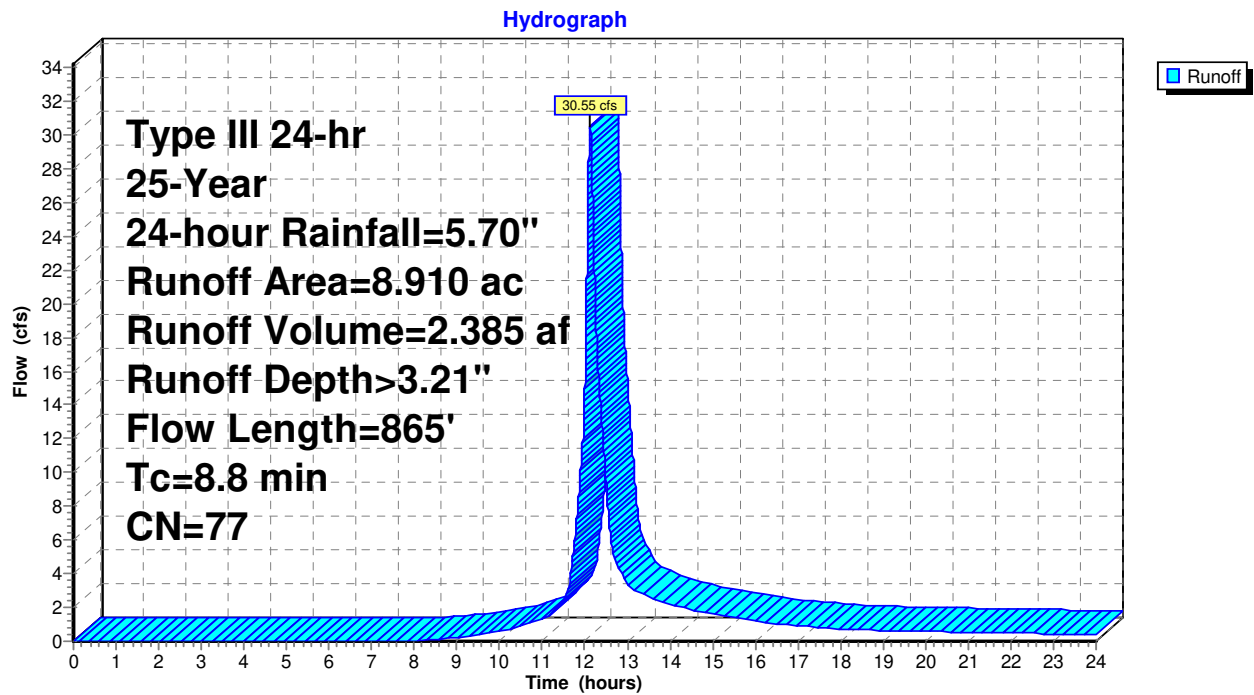
Runoff = 30.55 cfs @ 12.124 hrs, Volume= 2.385 af, Depth> 3.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.001 hrs
 Type III 24-hr 25-Year, 24-hour Rainfall=5.70"

Area (ac)	CN	Description
3.189	73	Woods, Fair, HSG C
0.520	79	Woods, Fair, HSG D
* 1.560	74	Offsite 3 >75% Grass cover, Good, HSG C
* 0.220	98	Offsite 3 - buildings
* 0.490	98	Offsite 3 - driveway/road
* 1.640	74	Offsite 2 >75% Grass cover, Good, HSG C
* 0.690	73	Offsite 2 Woods, Fair, HSG C
* 0.080	98	Offsite 2 - driveway/road
* 0.180	98	Offsite 2 - buildings
* 0.056	98	Buildings
0.243	74	>75% Grass cover, Good, HSG C
* 0.042	98	Pavement/Driveways
8.910	77	Weighted Average
7.842		88.01% Pervious Area
1.068		11.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	50	0.0030	0.59		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.50"
4.8	320	0.0030	1.11		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.4	140	0.0100	5.36	4.21	Pipe Channel, existing inlet and storm pipe from cul-de-sac 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
2.2	355	0.0270	2.65		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
8.8	865	Total			

Subcatchment Basin 2: Basin 2 (includes Offsite 2 and Offsite 3)



Summary for Subcatchment Basin 3: Basin 3

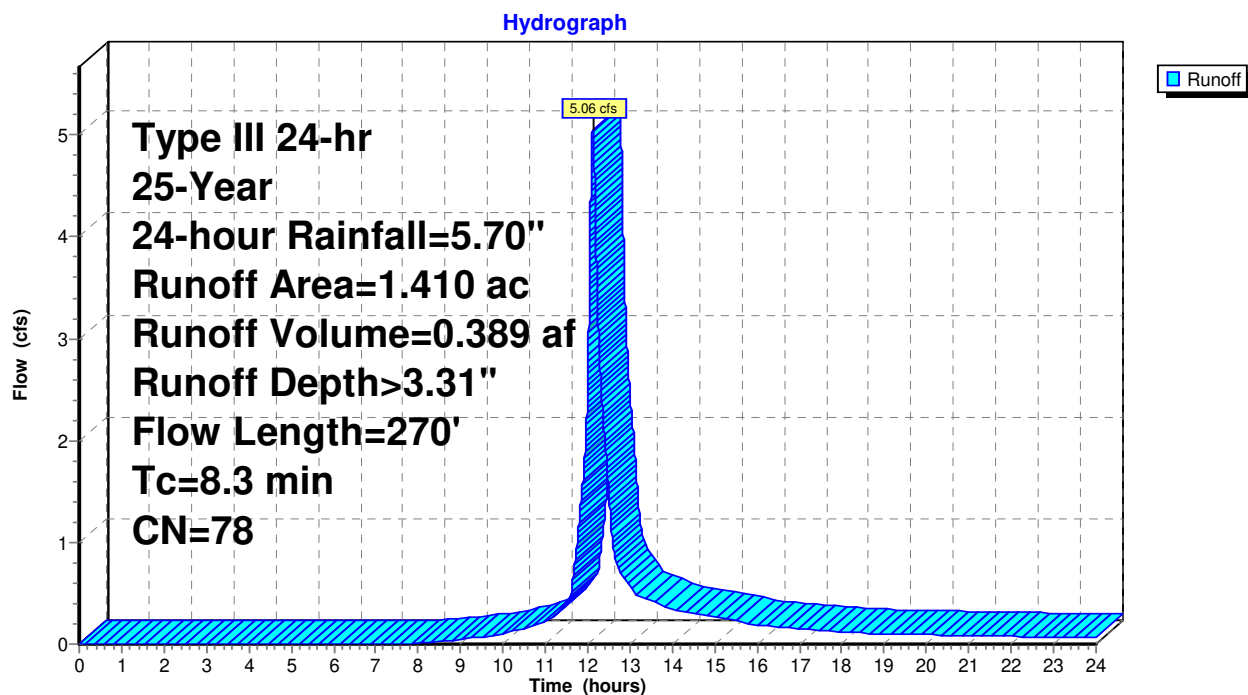
Runoff = 5.06 cfs @ 12.118 hrs, Volume= 0.389 af, Depth> 3.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.001 hrs
 Type III 24-hr 25-Year, 24-hour Rainfall=5.70"

Area (ac)	CN	Description
0.230	73	Woods, Fair, HSG C
1.180	79	Woods, Fair, HSG D
1.410	78	Weighted Average
1.410		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	25	0.0200	0.06		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
1.5	245	0.0270	2.65		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
8.3	270	Total			

Subcatchment Basin 3: Basin 3



Summary for Subcatchment Timothy St: Timothy St

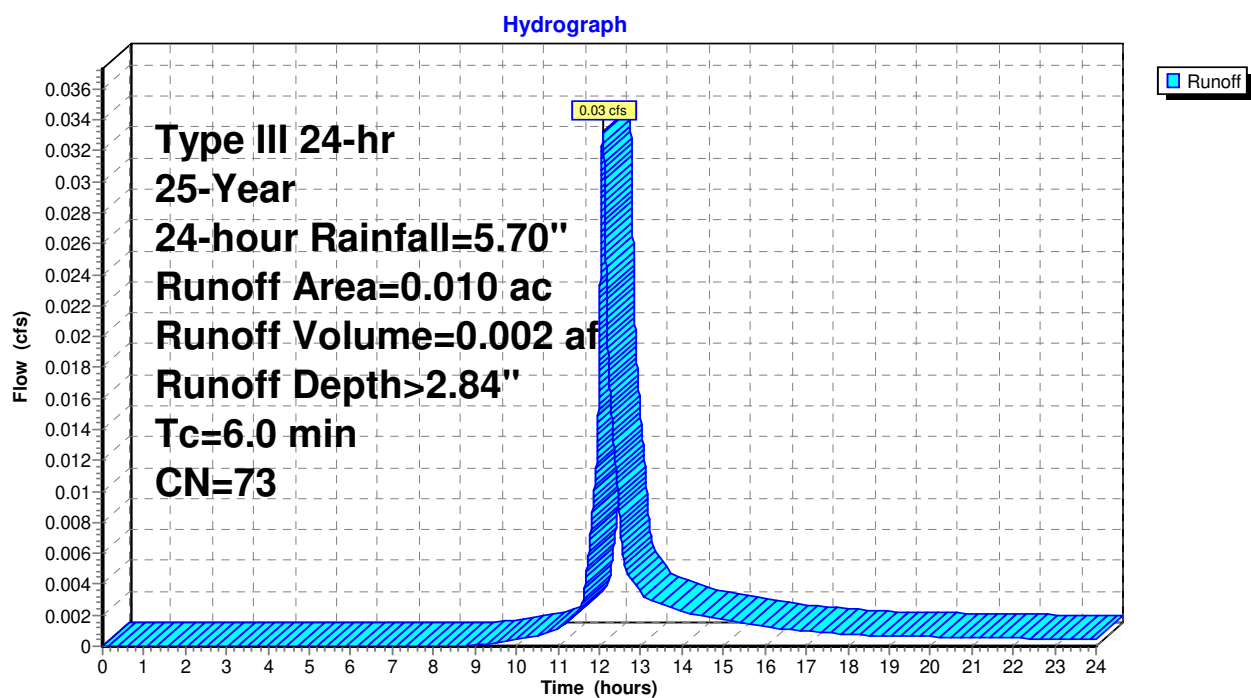
Runoff = 0.03 cfs @ 12.087 hrs, Volume= 0.002 af, Depth> 2.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.001 hrs
 Type III 24-hr 25-Year, 24-hour Rainfall=5.70"

Area (ac)	CN	Description
0.010	73	Woods, Fair, HSG C
0.010		100.00% Pervious Area

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

Subcatchment Timothy St: Timothy St

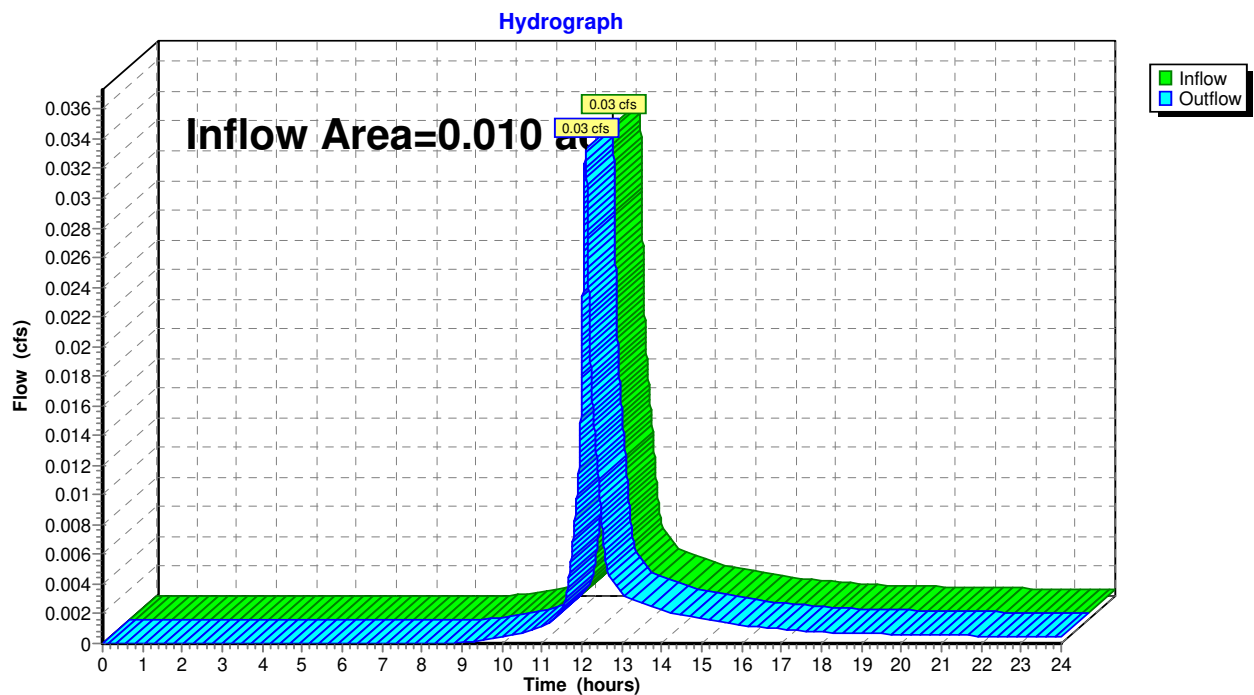


Summary for Reach T: Timothy Street

Inflow Area = 0.010 ac, 0.00% Impervious, Inflow Depth > 2.84" for 25-Year, 24-hour event
Inflow = 0.03 cfs @ 12.087 hrs, Volume= 0.002 af
Outflow = 0.03 cfs @ 12.087 hrs, Volume= 0.002 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.000-24.000 hrs, dt= 0.001 hrs

Reach T: Timothy Street

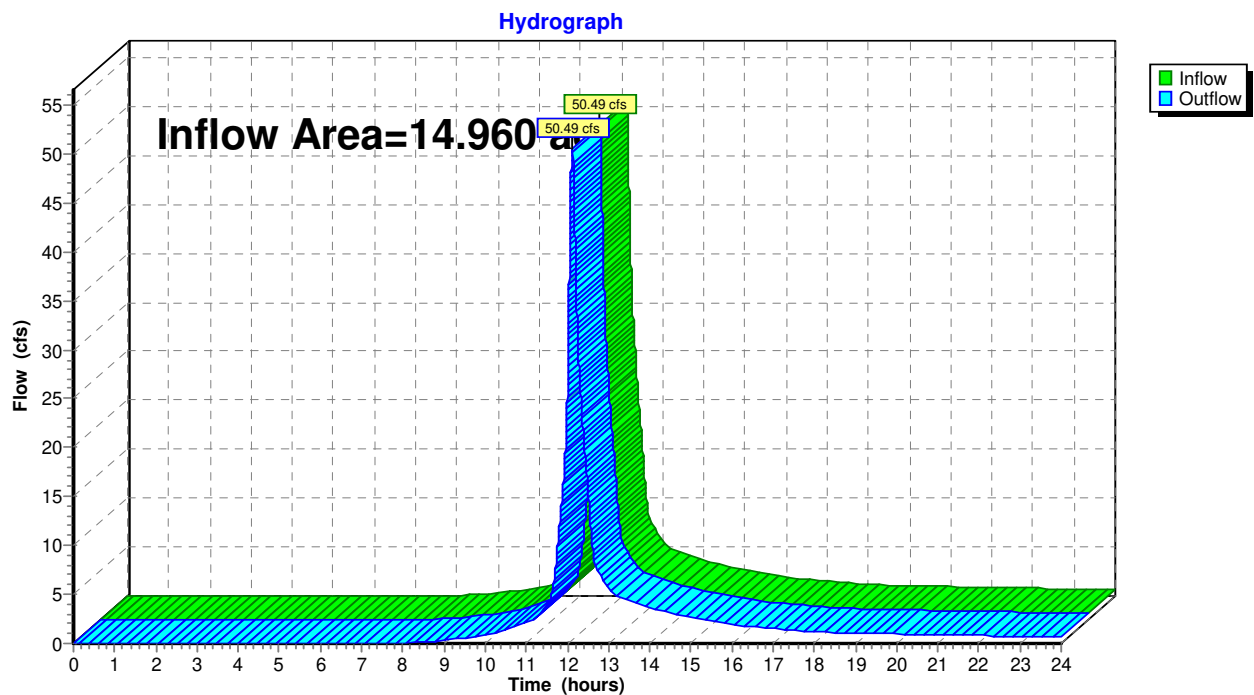


Summary for Reach Total: TOTAL

Inflow Area = 14.960 ac, 7.87% Impervious, Inflow Depth > 3.13" for 25-Year, 24-hour event
Inflow = 50.49 cfs @ 12.122 hrs, Volume= 3.907 af
Outflow = 50.49 cfs @ 12.122 hrs, Volume= 3.907 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.000-24.000 hrs, dt= 0.001 hrs

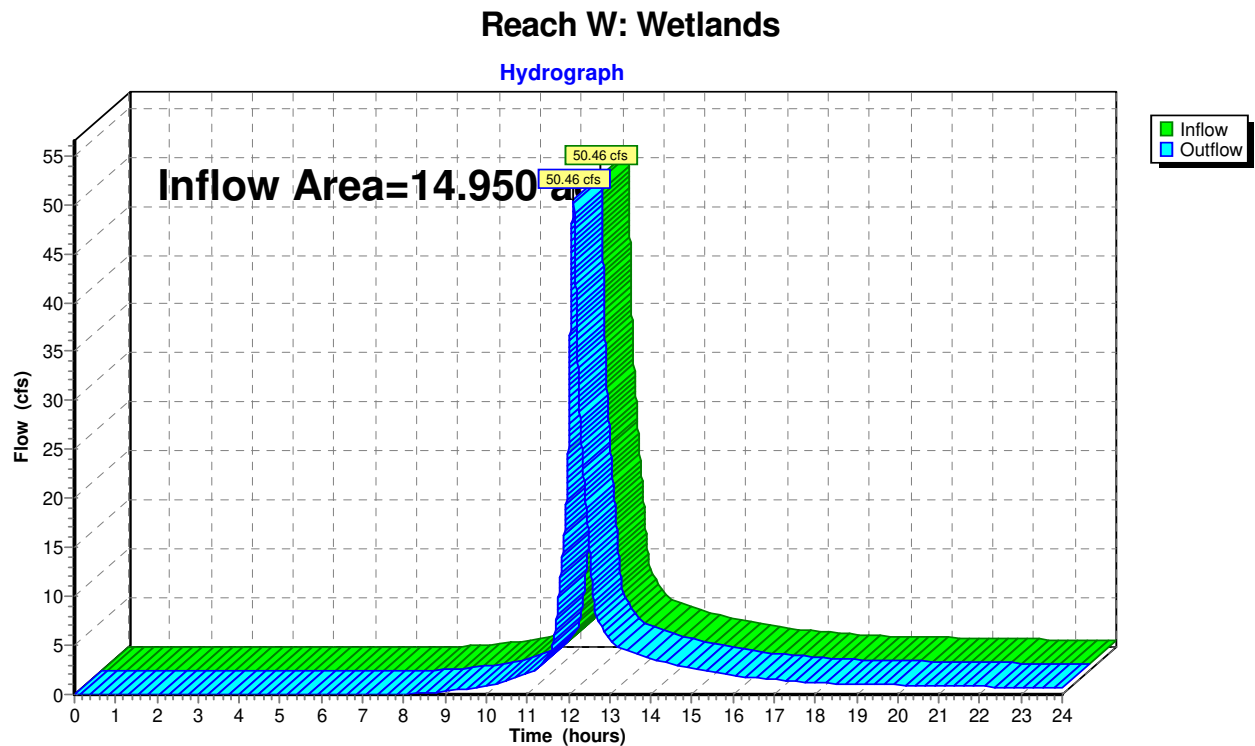
Reach Total: TOTAL



Summary for Reach W: Wetlands

Inflow Area = 14.950 ac, 7.88% Impervious, Inflow Depth > 3.13" for 25-Year, 24-hour event
Inflow = 50.46 cfs @ 12.122 hrs, Volume= 3.905 af
Outflow = 50.46 cfs @ 12.122 hrs, Volume= 3.905 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.000-24.000 hrs, dt= 0.001 hrs



Time span=0.000-24.000 hrs, dt=0.001 hrs, 24001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment Basin 1: Basin 1 Runoff Area=4.630 ac 2.38% Impervious Runoff Depth>4.12"
Flow Length=210' Tc=7.9 min CN=74 Runoff=20.99 cfs 1.591 af

Subcatchment Basin 2: Basin 2 Runoff Area=8.910 ac 11.99% Impervious Runoff Depth>4.45"
Flow Length=865' Tc=8.8 min CN=77 Runoff=42.15 cfs 3.303 af

Subcatchment Basin 3: Basin 3 Runoff Area=1.410 ac 0.00% Impervious Runoff Depth>4.56"
Flow Length=270' Tc=8.3 min CN=78 Runoff=6.94 cfs 0.536 af

Subcatchment Timothy St: Timothy St Runoff Area=0.010 ac 0.00% Impervious Runoff Depth>4.02"
Tc=6.0 min CN=73 Runoff=0.05 cfs 0.003 af

Reach T: Timothy Street Inflow=0.05 cfs 0.003 af
Outflow=0.05 cfs 0.003 af

Reach Total: TOTAL Inflow=70.04 cfs 5.433 af
Outflow=70.04 cfs 5.433 af

Reach W: Wetlands Inflow=70.00 cfs 5.429 af
Outflow=70.00 cfs 5.429 af

Total Runoff Area = 14.960 ac Runoff Volume = 5.433 af Average Runoff Depth = 4.36"
92.13% Pervious = 13.782 ac 7.87% Impervious = 1.178 ac

Summary for Subcatchment Basin 1: Basin 1 (includes Offsite 1)

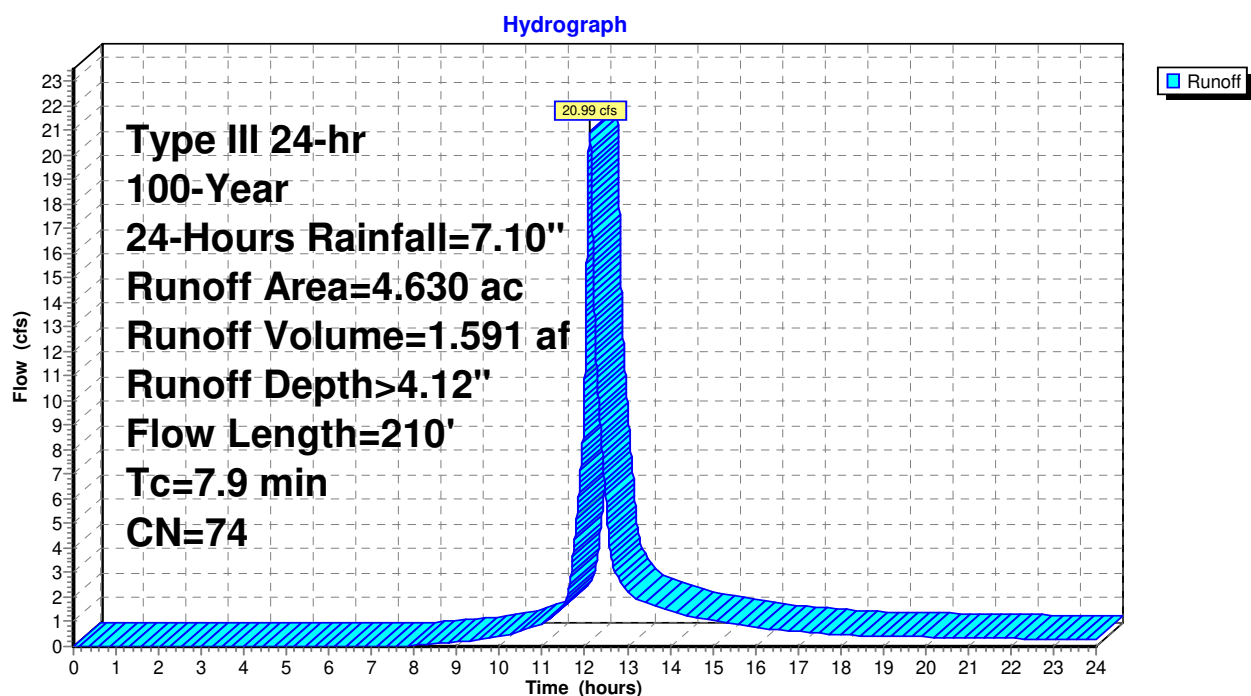
Runoff = 20.99 cfs @ 12.113 hrs, Volume= 1.591 af, Depth> 4.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.001 hrs
 Type III 24-hr 100-Year, 24-Hours Rainfall=7.10"

Area (ac)	CN	Description
2.828	73	Woods, Fair, HSG C
0.410	79	Woods, Fair, HSG D
* 0.325	73	Offsite 1 Woods, Fair, HSG C
* 0.925	74	Offsite 1 >75% Grass cover, Good, HSG C
* 0.110	98	Offsite 1 Buildings
0.032	74	>75% Grass cover, Good, HSG C
4.630	74	Weighted Average
4.520		97.62% Pervious Area
0.110		2.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.2	50	0.0250	0.12		Sheet Flow, Grass: Dense n= 0.240 P2= 3.50"
0.7	160	0.0500	3.60		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
7.9	210	Total			

Subcatchment Basin 1: Basin 1 (includes Offsite 1)



Summary for Subcatchment Basin 2: Basin 2 (includes Offsite 2 and Offsite 3)

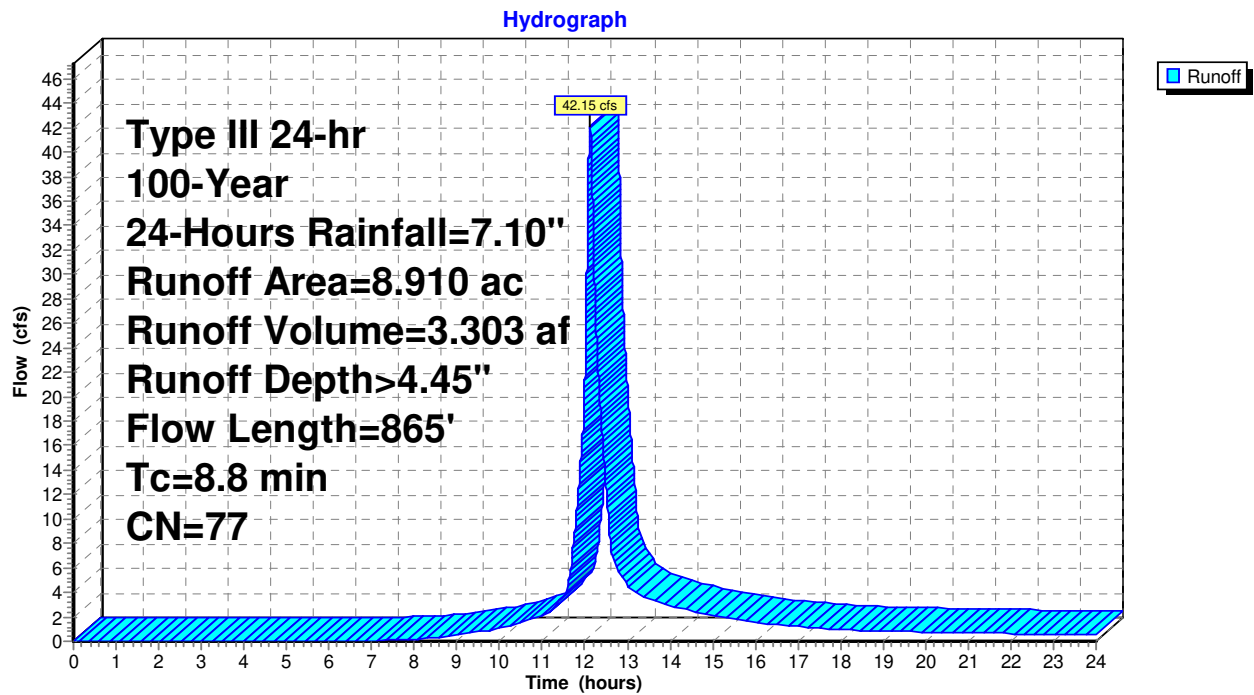
Runoff = 42.15 cfs @ 12.124 hrs, Volume= 3.303 af, Depth> 4.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.001 hrs
 Type III 24-hr 100-Year, 24-Hours Rainfall=7.10"

Area (ac)	CN	Description
3.189	73	Woods, Fair, HSG C
0.520	79	Woods, Fair, HSG D
* 1.560	74	Offsite 3 >75% Grass cover, Good, HSG C
* 0.220	98	Offsite 3 - buildings
* 0.490	98	Offsite 3 - driveway/road
* 1.640	74	Offsite 2 >75% Grass cover, Good, HSG C
* 0.690	73	Offsite 2 Woods, Fair, HSG C
* 0.080	98	Offsite 2 - driveway/road
* 0.180	98	Offsite 2 - buildings
* 0.056	98	Buildings
0.243	74	>75% Grass cover, Good, HSG C
* 0.042	98	Pavement/Driveways
8.910	77	Weighted Average
7.842		88.01% Pervious Area
1.068		11.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	50	0.0030	0.59		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.50"
4.8	320	0.0030	1.11		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.4	140	0.0100	5.36	4.21	Pipe Channel, existing inlet and storm pipe from cul-de-sac 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
2.2	355	0.0270	2.65		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
8.8	865	Total			

Subcatchment Basin 2: Basin 2 (includes Offsite 2 and Offsite 3)



Summary for Subcatchment Basin 3: Basin 3

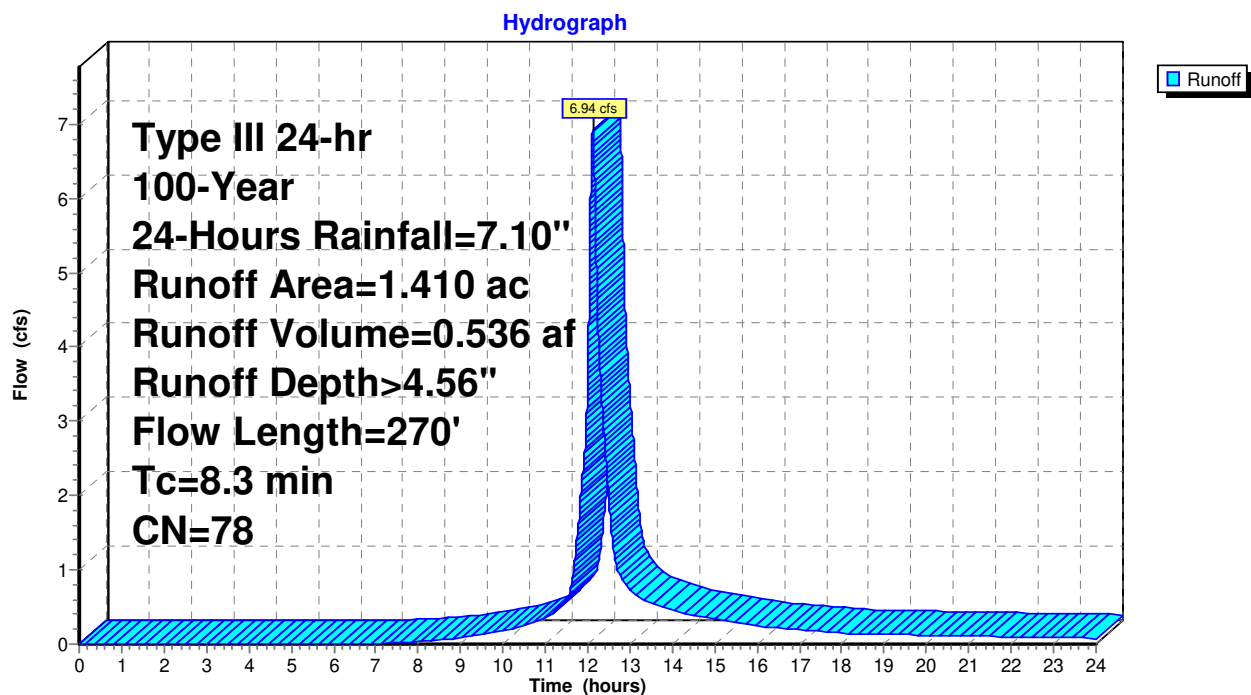
Runoff = 6.94 cfs @ 12.118 hrs, Volume= 0.536 af, Depth> 4.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.001 hrs
 Type III 24-hr 100-Year, 24-Hours Rainfall=7.10"

Area (ac)	CN	Description
0.230	73	Woods, Fair, HSG C
1.180	79	Woods, Fair, HSG D
1.410	78	Weighted Average
1.410		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	25	0.0200	0.06		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
1.5	245	0.0270	2.65		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
8.3	270	Total			

Subcatchment Basin 3: Basin 3



Summary for Subcatchment Timothy St: Timothy St

Runoff = 0.05 cfs @ 12.087 hrs, Volume= 0.003 af, Depth> 4.02"

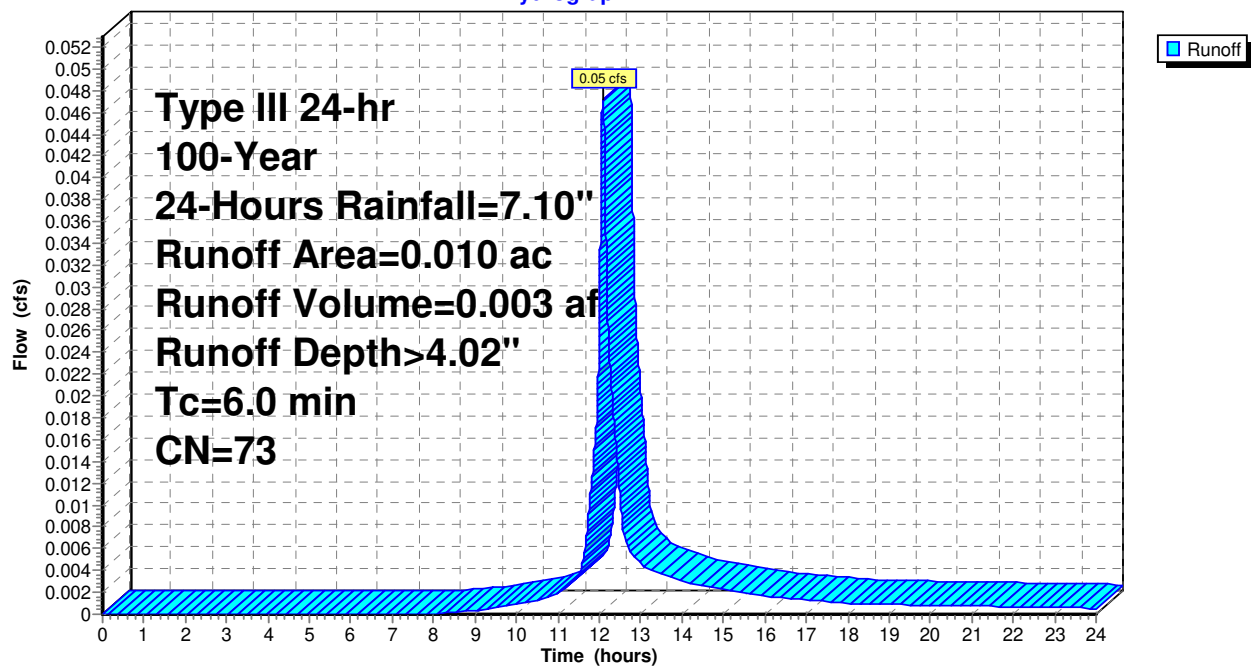
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.001 hrs
 Type III 24-hr 100-Year, 24-Hours Rainfall=7.10"

Area (ac)	CN	Description
0.010	73	Woods, Fair, HSG C
0.010		100.00% Pervious Area

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

Subcatchment Timothy St: Timothy St

Hydrograph

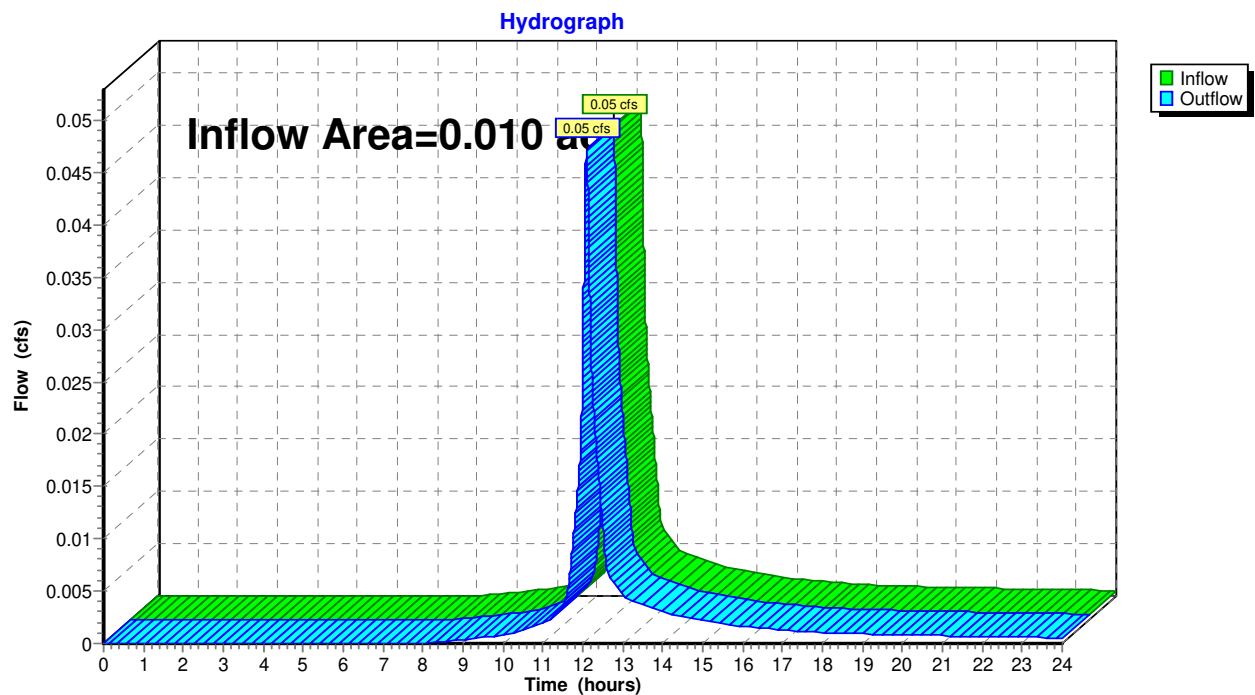


Summary for Reach T: Timothy Street

Inflow Area = 0.010 ac, 0.00% Impervious, Inflow Depth > 4.02" for 100-Year, 24-Hours event
Inflow = 0.05 cfs @ 12.087 hrs, Volume= 0.003 af
Outflow = 0.05 cfs @ 12.087 hrs, Volume= 0.003 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.000-24.000 hrs, dt= 0.001 hrs

Reach T: Timothy Street

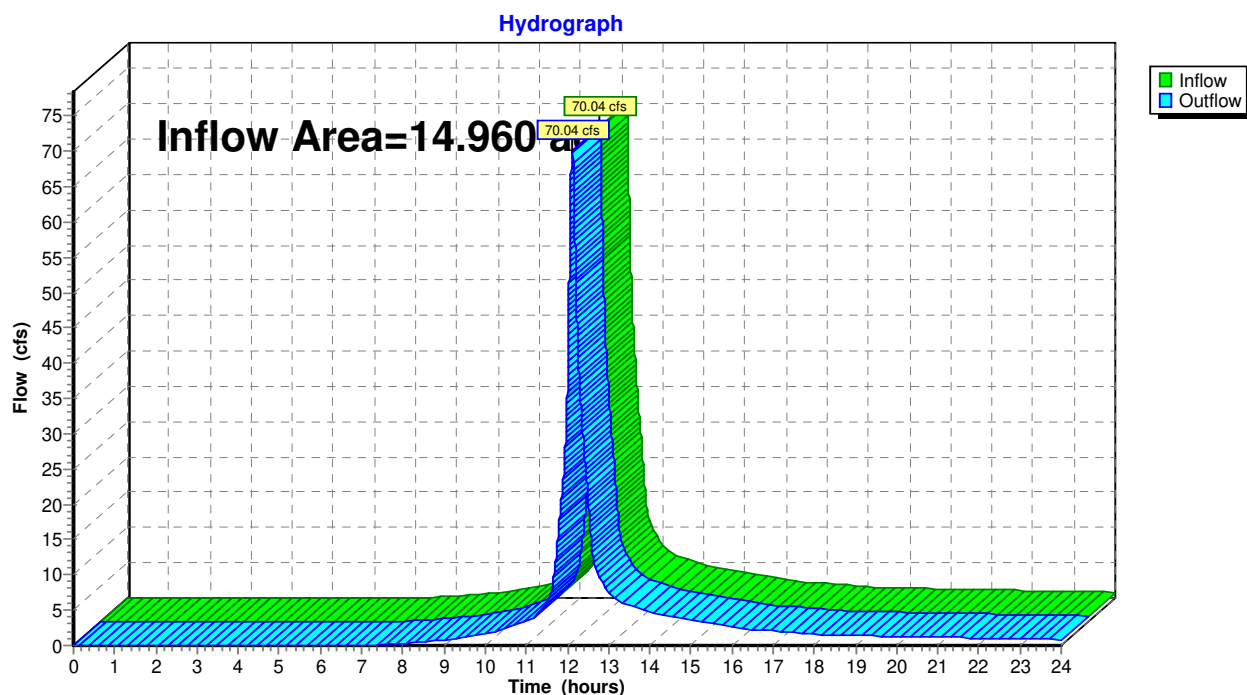


Summary for Reach Total: TOTAL

Inflow Area = 14.960 ac, 7.87% Impervious, Inflow Depth > 4.36" for 100-Year, 24-Hours event
Inflow = 70.04 cfs @ 12.117 hrs, Volume= 5.433 af
Outflow = 70.04 cfs @ 12.117 hrs, Volume= 5.433 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.000-24.000 hrs, dt= 0.001 hrs

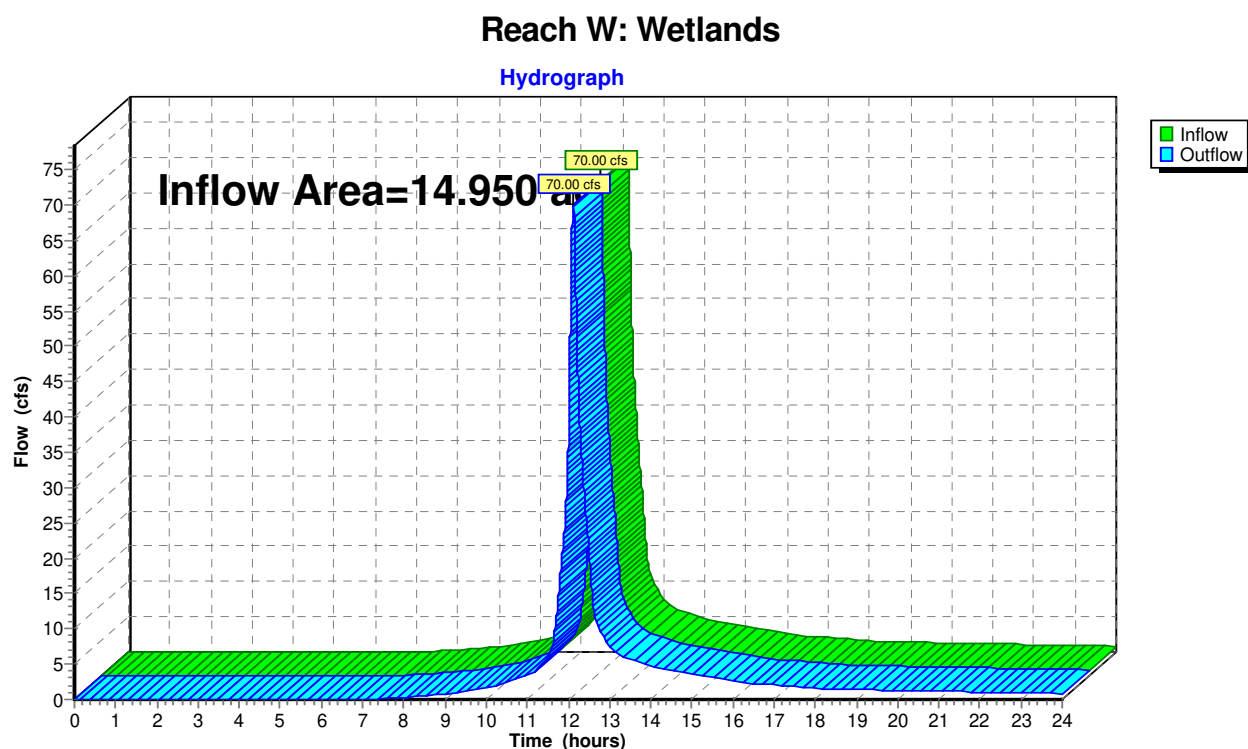
Reach Total: TOTAL

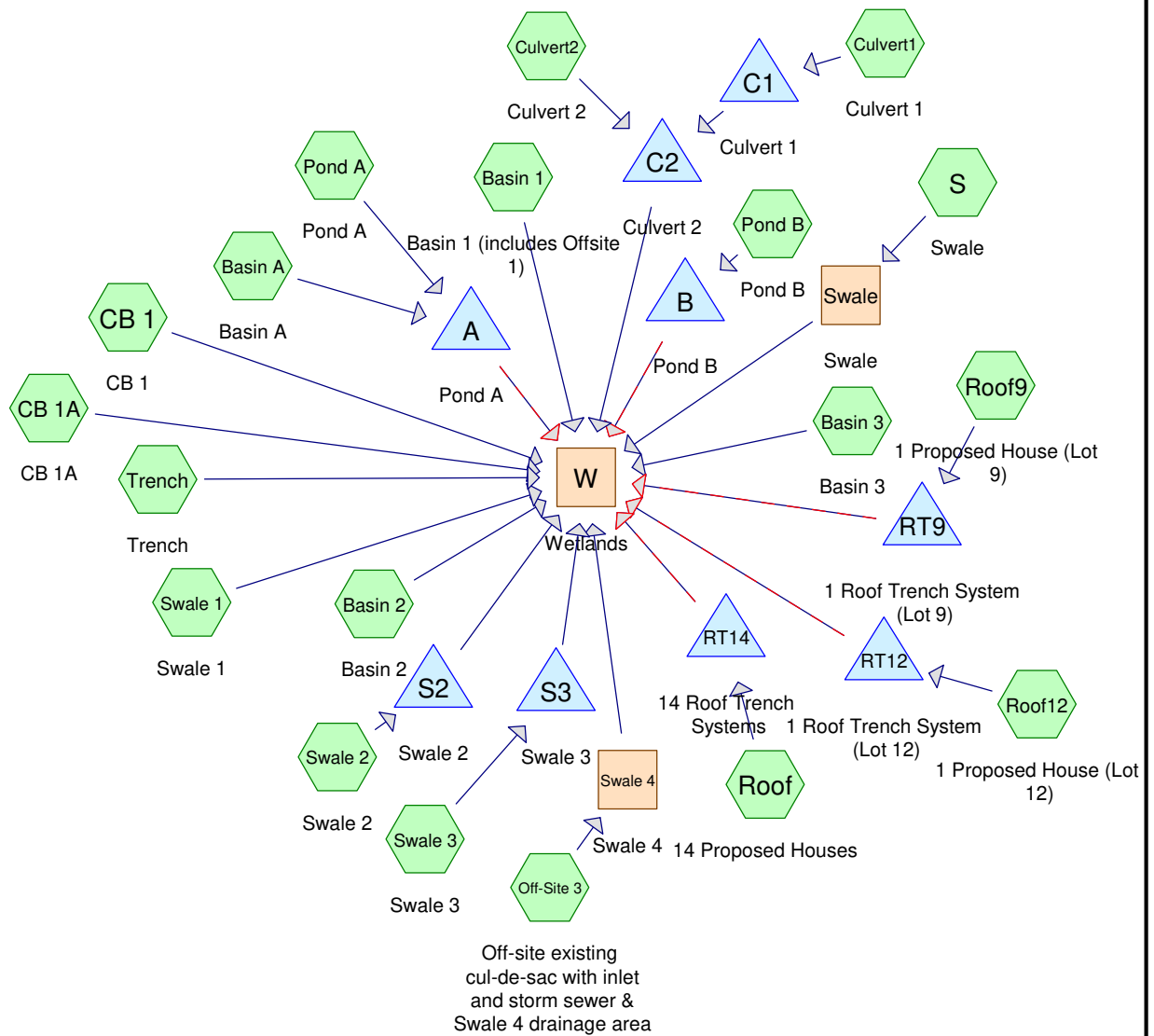


Summary for Reach W: Wetlands

Inflow Area = 14.950 ac, 7.88% Impervious, Inflow Depth > 4.36" for 100-Year, 24-Hours event
Inflow = 70.00 cfs @ 12.117 hrs, Volume= 5.429 af
Outflow = 70.00 cfs @ 12.117 hrs, Volume= 5.429 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.000-24.000 hrs, dt= 0.001 hrs





Time span=0.000-24.000 hrs, dt=0.0001 hrs, 240001 points x 2
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment Basin 1: Basin 1	Runoff Area=2.650 ac 9.81% Impervious Runoff Depth>1.43" Flow Length=210' Tc=7.9 min CN=77 Runoff=4.09 cfs 0.315 af
Subcatchment Basin 2: Basin 2	Runoff Area=0.810 ac 4.94% Impervious Runoff Depth>1.36" Tc=6.0 min CN=76 Runoff=1.27 cfs 0.092 af
Subcatchment Basin 3: Basin 3	Runoff Area=1.030 ac 12.62% Impervious Runoff Depth>1.50" Tc=6.0 min CN=78 Runoff=1.79 cfs 0.128 af
Subcatchment Basin A: Basin A	Runoff Area=1.020 ac 49.02% Impervious Runoff Depth>2.10" Tc=6.0 min CN=86 Runoff=2.51 cfs 0.178 af
Subcatchment CB 1: CB 1	Runoff Area=0.260 ac 23.08% Impervious Runoff Depth>1.63" Tc=6.0 min CN=80 Runoff=0.50 cfs 0.035 af
Subcatchment CB 1A: CB 1A	Runoff Area=0.300 ac 33.33% Impervious Runoff Depth>1.78" Flow Length=160' Tc=7.7 min CN=82 Runoff=0.59 cfs 0.044 af
Subcatchment Culvert1: Culvert 1	Runoff Area=0.530 ac 9.43% Impervious Runoff Depth>1.36" Tc=6.0 min CN=76 Runoff=0.83 cfs 0.060 af
Subcatchment Culvert2: Culvert 2	Runoff Area=0.400 ac 5.00% Impervious Runoff Depth>1.30" Tc=6.0 min CN=75 Runoff=0.59 cfs 0.043 af
Subcatchment Off-Site 3: Off-site	Runoff Area=3.720 ac 19.89% Impervious Runoff Depth>1.56" Flow Length=560' Tc=6.8 min CN=79 Runoff=6.58 cfs 0.485 af
Subcatchment Pond A: Pond A	Runoff Area=0.740 ac 52.70% Impervious Runoff Depth>2.27" Tc=6.0 min CN=88 Runoff=1.96 cfs 0.140 af
Subcatchment Pond B: Pond B	Runoff Area=0.450 ac 53.33% Impervious Runoff Depth>2.18" Tc=6.0 min CN=87 Runoff=1.15 cfs 0.082 af
Subcatchment Roof: 14 Proposed	Runoff Area=0.500 ac 100.00% Impervious Runoff Depth>3.26" Tc=10.0 min CN=98 Runoff=1.49 cfs 0.136 af
Subcatchment Roof12: 1 Proposed	Runoff Area=0.030 ac 100.00% Impervious Runoff Depth>3.26" Tc=10.0 min CN=98 Runoff=0.09 cfs 0.008 af
Subcatchment Roof9: 1 Proposed	Runoff Area=0.030 ac 100.00% Impervious Runoff Depth>3.26" Tc=10.0 min CN=98 Runoff=0.09 cfs 0.008 af
Subcatchment S: Swale	Runoff Area=0.090 ac 33.33% Impervious Runoff Depth>1.78" Tc=6.0 min CN=82 Runoff=0.19 cfs 0.013 af
Subcatchment Swale 1: Swale 1	Runoff Area=0.220 ac 0.00% Impervious Runoff Depth>1.23" Flow Length=706' Tc=17.5 min CN=74 Runoff=0.22 cfs 0.023 af
Subcatchment Swale 2: Swale 2	Runoff Area=1.270 ac 10.24% Impervious Runoff Depth>1.56" Tc=6.0 min CN=79 Runoff=2.31 cfs 0.166 af

Subcatchment Swale 3: Swale 3 Runoff Area=0.670 ac 8.96% Impervious Runoff Depth>1.36"
Tc=6.0 min CN=76 Runoff=1.05 cfs 0.076 af

Subcatchment Trench: Trench Runoff Area=0.240 ac 16.67% Impervious Runoff Depth>1.43"
Flow Length=646' Tc=8.9 min CN=77 Runoff=0.36 cfs 0.029 af

Reach Swale: Swale Avg. Flow Depth=0.07' Max Vel=0.80 fps Inflow=0.19 cfs 0.013 af
n=0.022 L=100.0' S=0.0050 '/' Capacity=2.04 cfs Outflow=0.18 cfs 0.013 af

Reach Swale 4: Swale 4 Avg. Flow Depth=0.41' Max Vel=2.95 fps Inflow=6.58 cfs 0.485 af
n=0.030 L=350.0' S=0.0157 '/' Capacity=33.54 cfs Outflow=6.37 cfs 0.484 af

Reach W: Wetlands Inflow=19.95 cfs 1.644 af
Outflow=19.95 cfs 1.644 af

Pond A: Pond A Peak Elev=38.12' Storage=6,012 cf Inflow=4.47 cfs 0.318 af
Discarded=0.13 cfs 0.118 af Primary=0.91 cfs 0.130 af Secondary=0.00 cfs 0.000 af Outflow=1.04 cfs 0.248 af

Pond B: Pond B Peak Elev=38.96' Storage=1,161 cf Inflow=1.15 cfs 0.082 af
Discarded=0.03 cfs 0.027 af Primary=0.60 cfs 0.040 af Secondary=0.00 cfs 0.000 af Outflow=0.63 cfs 0.067 af

Pond C1: Culvert 1 Peak Elev=39.17' Storage=47 cf Inflow=0.83 cfs 0.060 af
18.0" Round Culvert n=0.013 L=40.0' S=0.0050 '/' Outflow=0.81 cfs 0.060 af

Pond C2: Culvert 2 Peak Elev=38.83' Storage=43 cf Inflow=1.40 cfs 0.104 af
18.0" Round Culvert n=0.013 L=129.0' S=0.0256 '/' Outflow=1.39 cfs 0.103 af

Pond RT12: 1 Roof Trench System (Lot 12) Peak Elev=1.24' Storage=142 cf Inflow=0.09 cfs 0.008 af
Discarded=0.01 cfs 0.008 af Primary=0.00 cfs 0.000 af Outflow=0.01 cfs 0.008 af

Pond RT14: 14 Roof Trench Systems Peak Elev=1.59' Storage=2,585 cf Inflow=1.49 cfs 0.136 af
Discarded=0.09 cfs 0.125 af Primary=0.00 cfs 0.000 af Outflow=0.09 cfs 0.125 af

Pond RT9: 1 Roof Trench System (Lot 9) Peak Elev=3.18' Storage=135 cf Inflow=0.09 cfs 0.008 af
Discarded=0.00 cfs 0.005 af Primary=0.04 cfs 0.001 af Outflow=0.05 cfs 0.006 af

Pond S2: Swale 2 Peak Elev=41.29' Storage=464 cf Inflow=2.31 cfs 0.166 af
Discarded=0.03 cfs 0.023 af Primary=2.01 cfs 0.142 af Outflow=2.04 cfs 0.165 af

Pond S3: Swale 3 Peak Elev=41.99' Storage=186 cf Inflow=1.05 cfs 0.076 af
Discarded=0.02 cfs 0.013 af Primary=0.91 cfs 0.063 af Outflow=0.93 cfs 0.076 af

Total Runoff Area = 14.960 ac Runoff Volume = 2.062 af Average Runoff Depth = 1.65"
77.61% Pervious = 11.610 ac 22.39% Impervious = 3.350 ac

Summary for Subcatchment Basin 1: Basin 1 (includes Offsite 1)

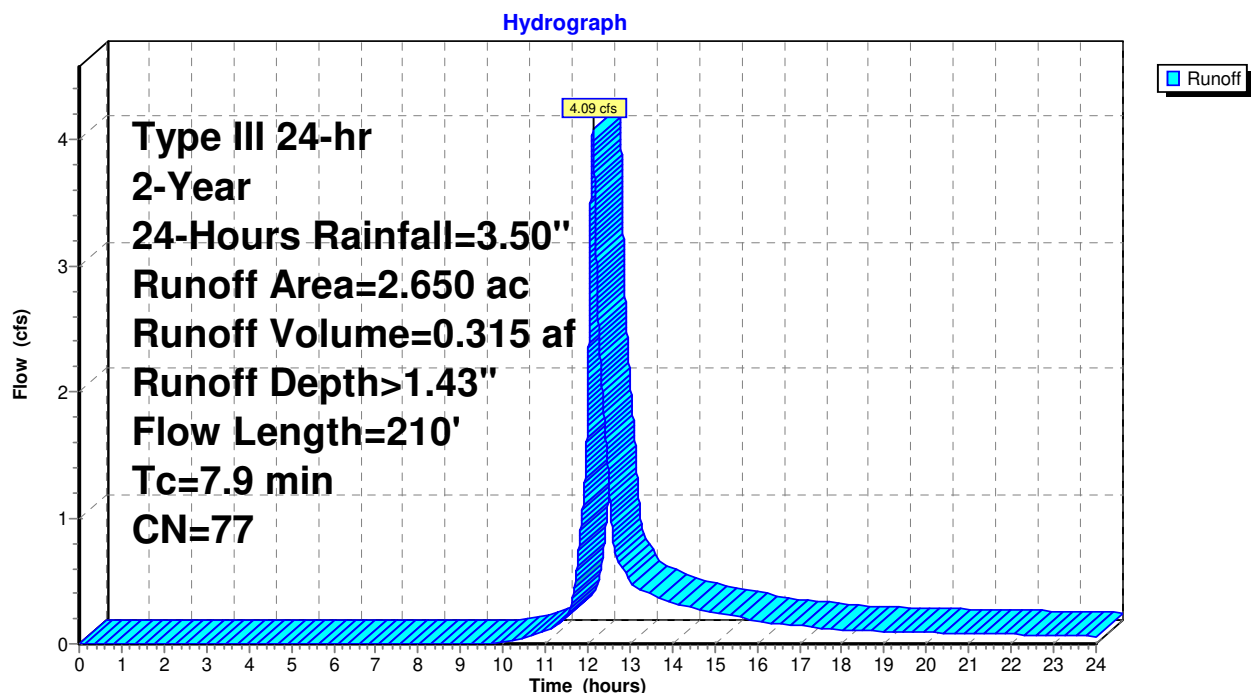
Runoff = 4.09 cfs @ 12.122 hrs, Volume= 0.315 af, Depth> 1.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 2-Year, 24-Hours Rainfall=3.50"

Area (ac)	CN	Description
0.720	73	Woods, Fair, HSG C
0.190	79	Woods, Fair, HSG D
* 0.190	98	Driveway/Road
0.130	80	>75% Grass cover, Good, HSG D
0.730	74	>75% Grass cover, Good, HSG C
* 0.070	73	Offsite 1 Woods, Fair, HSG C
* 0.010	98	Offsite 1 Driveway/Road
* 0.550	74	Offsite 1 >75% Grass cover, Good, HSG C
* 0.060	98	Offsite 1 Buildings
2.650	77	Weighted Average
2.390		90.19% Pervious Area
0.260		9.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.2	50	0.0250	0.12		Sheet Flow, Grass: Dense n= 0.240 P2= 3.50"
0.7	160	0.0500	3.60		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
7.9	210	Total			

Subcatchment Basin 1: Basin 1 (includes Offsite 1)



Summary for Subcatchment Basin 2: Basin 2

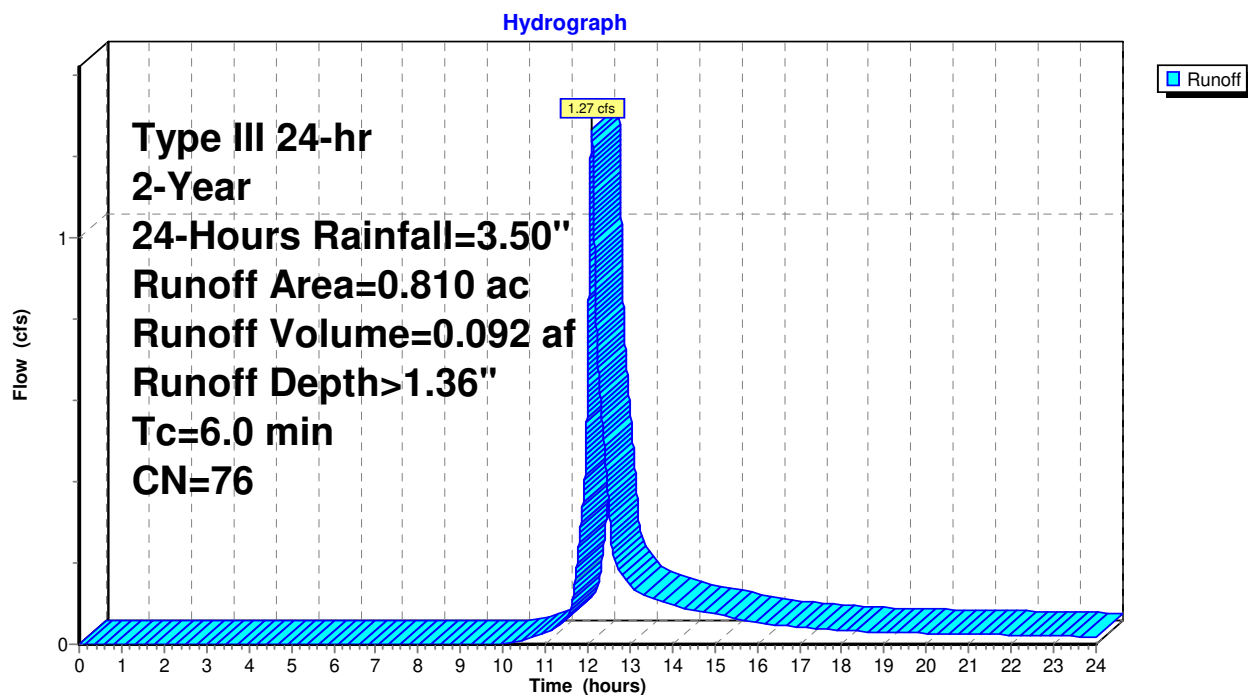
Runoff = 1.27 cfs @ 12.093 hrs, Volume= 0.092 af, Depth> 1.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 2-Year, 24-Hours Rainfall=3.50"

Area (ac)	CN	Description
0.140	73	Woods, Fair, HSG C
0.100	79	Woods, Fair, HSG D
* 0.430	74	>75% Grass cover, Good, HSG C
0.100	80	>75% Grass cover, Good, HSG D
* 0.040	98	driveway/road
0.810	76	Weighted Average
0.770		95.06% Pervious Area
0.040		4.94% Impervious Area

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

Subcatchment Basin 2: Basin 2



Summary for Subcatchment Basin 3: Basin 3

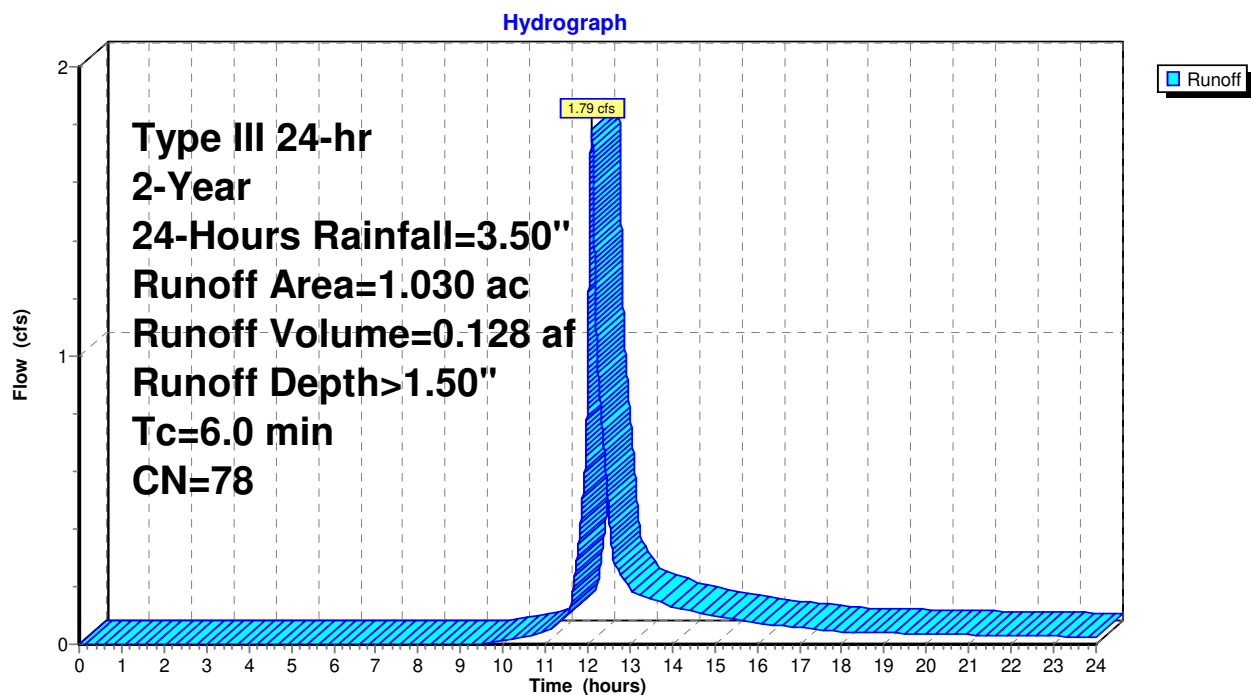
Runoff = 1.79 cfs @ 12.087 hrs, Volume= 0.128 af, Depth> 1.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 2-Year, 24-Hours Rainfall=3.50"

Area (ac)	CN	Description
0.100	73	Woods, Fair, HSG C
0.140	79	Woods, Fair, HSG D
0.580	74	>75% Grass cover, Good, HSG C
0.080	80	>75% Grass cover, Good, HSG D
* 0.130	98	Driveway/road
1.030	78	Weighted Average
0.900		87.38% Pervious Area
0.130		12.62% Impervious Area

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

Subcatchment Basin 3: Basin 3



Summary for Subcatchment Basin A: Basin A

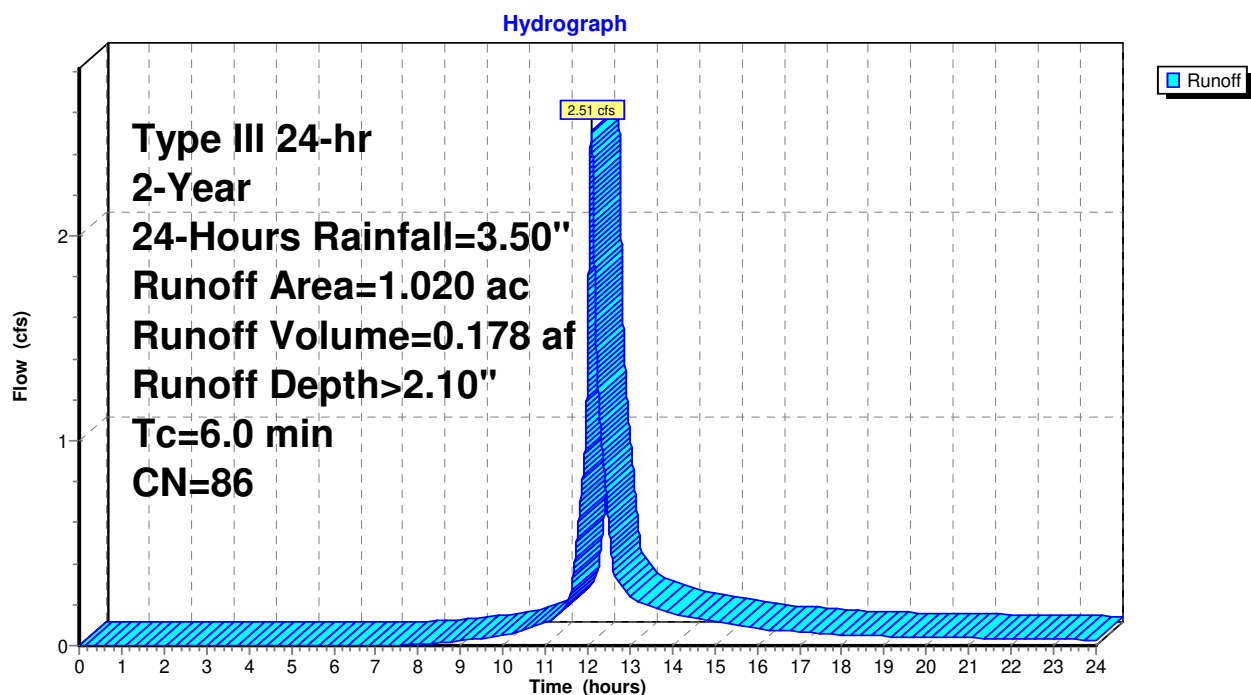
Runoff = 2.51 cfs @ 12.087 hrs, Volume= 0.178 af, Depth> 2.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 2-Year, 24-Hours Rainfall=3.50"

Area (ac)	CN	Description
* 0.500	98	Driveway/Road
0.520	74	>75% Grass cover, Good, HSG C
1.020	86	Weighted Average
0.520		50.98% Pervious Area
0.500		49.02% Impervious Area

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

Subcatchment Basin A: Basin A



Summary for Subcatchment CB 1: CB 1

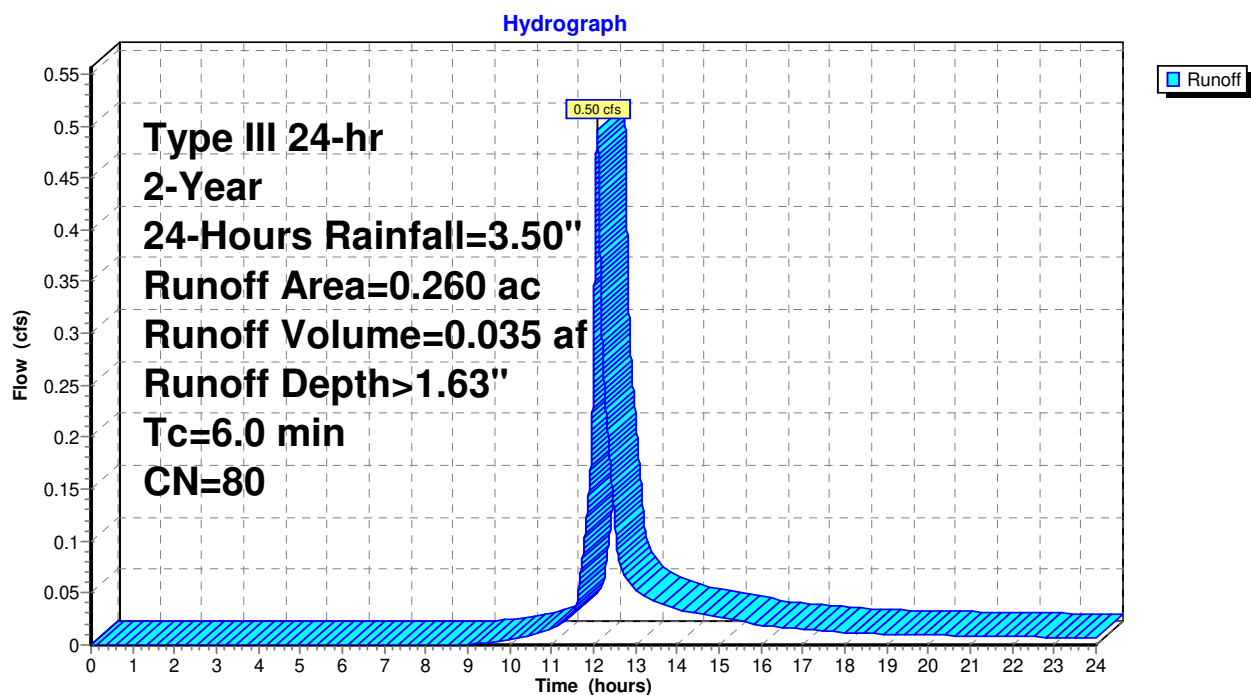
Runoff = 0.50 cfs @ 12.087 hrs, Volume= 0.035 af, Depth> 1.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 2-Year, 24-Hours Rainfall=3.50"

Area (ac)	CN	Description
0.190	74	>75% Grass cover, Good, HSG C
0.010	73	Woods, Fair, HSG C
* 0.060	98	Impervious
0.260	80	Weighted Average
0.200		76.92% Pervious Area
0.060		23.08% Impervious Area

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

Subcatchment CB 1: CB 1



Summary for Subcatchment CB 1A: CB 1A

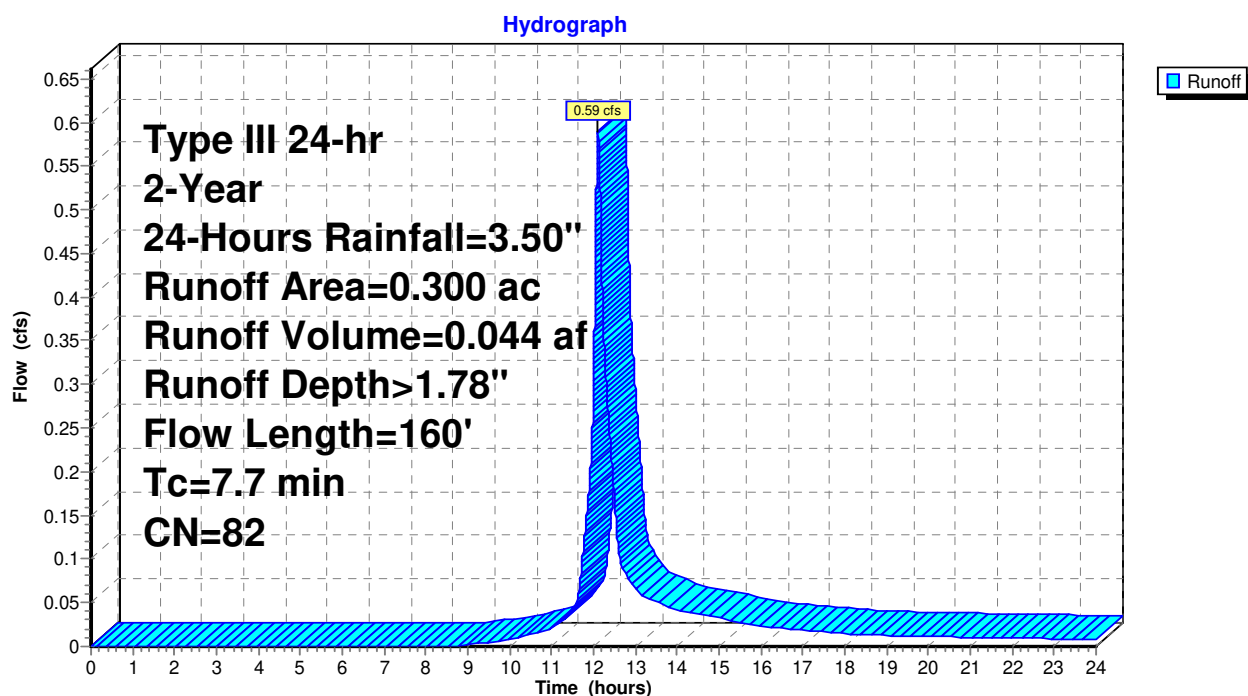
Runoff = 0.59 cfs @ 12.106 hrs, Volume= 0.044 af, Depth> 1.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 2-Year, 24-Hours Rainfall=3.50"

Area (ac)	CN	Description
* 0.100	98	Impervious
0.020	73	Woods, Fair, HSG C
0.180	74	>75% Grass cover, Good, HSG C
0.300	82	Weighted Average
0.200		66.67% Pervious Area
0.100		33.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.2	45	0.0200	0.10		Sheet Flow, Grass: Dense n= 0.240 P2= 3.50"
0.3	75	0.0700	4.26		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.2	40	0.0050	3.21	2.52	Pipe Channel, 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
7.7	160	Total			

Subcatchment CB 1A: CB 1A



Summary for Subcatchment Culvert1: Culvert 1

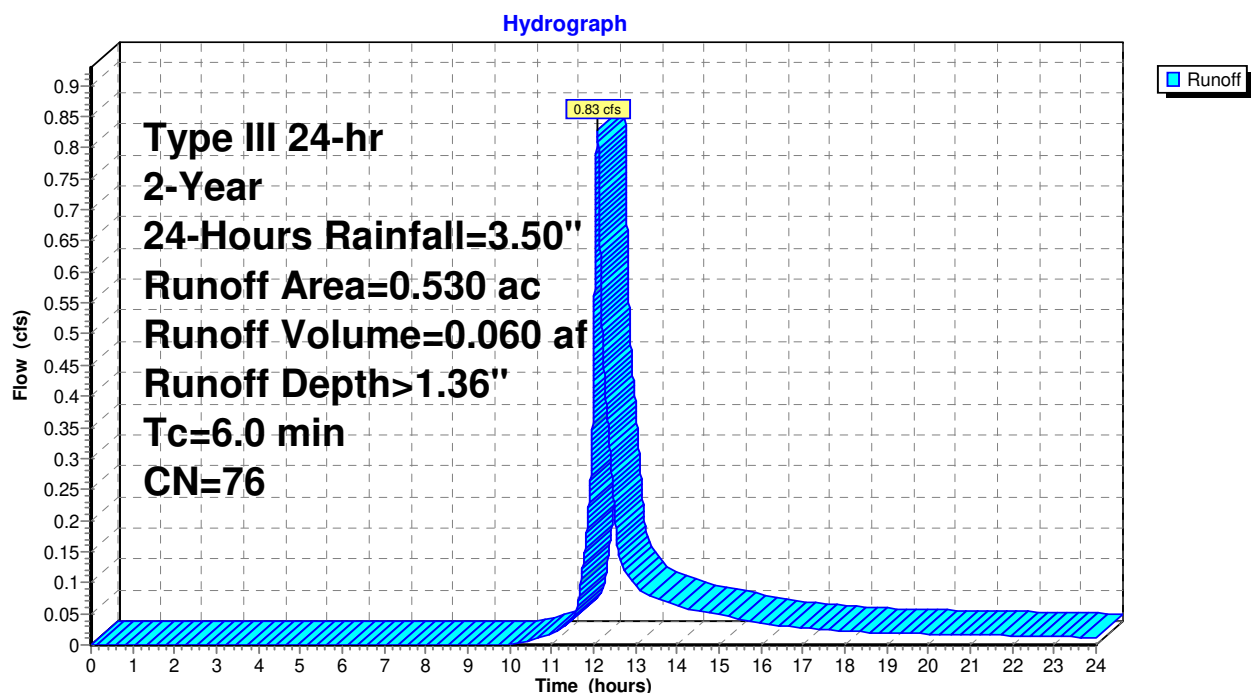
Runoff = 0.83 cfs @ 12.093 hrs, Volume= 0.060 af, Depth> 1.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 2-Year, 24-Hours Rainfall=3.50"

Area (ac)	CN	Description
0.070	73	Woods, Fair, HSG C
* 0.050	98	Impervious
0.410	74	>75% Grass cover, Good, HSG C
0.530	76	Weighted Average
0.480		90.57% Pervious Area
0.050		9.43% Impervious Area

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

Subcatchment Culvert1: Culvert 1



Summary for Subcatchment Culvert2: Culvert 2

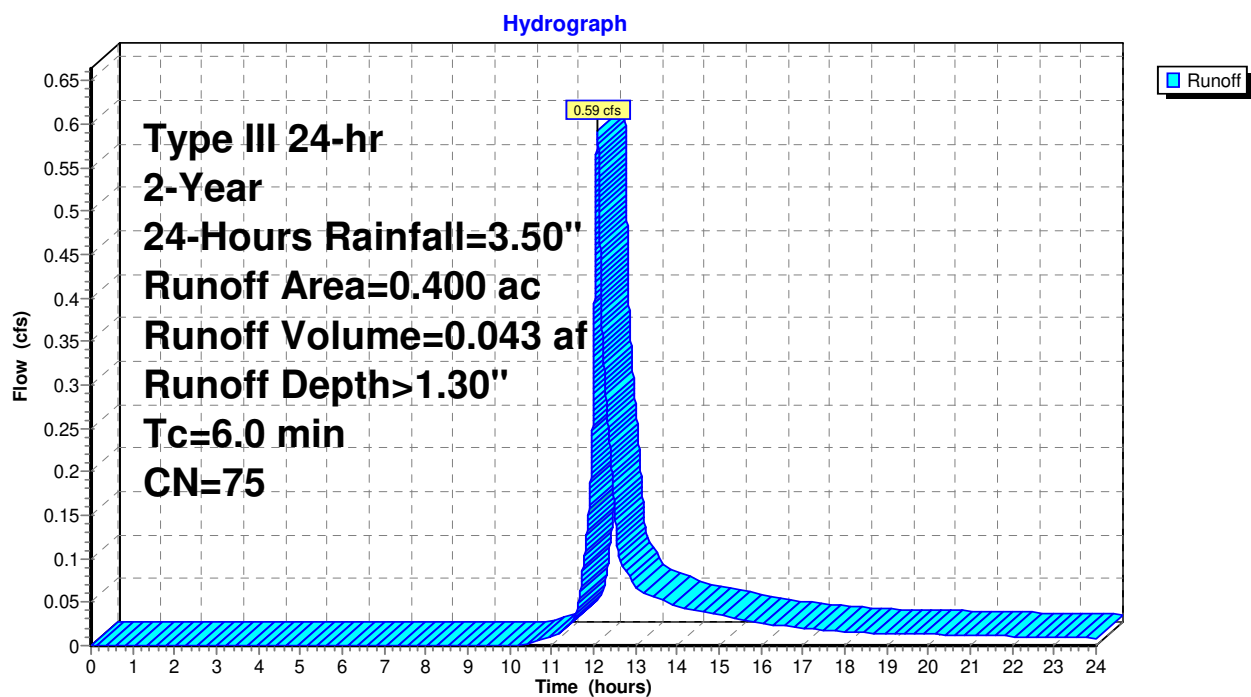
Runoff = 0.59 cfs @ 12.093 hrs, Volume= 0.043 af, Depth> 1.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 2-Year, 24-Hours Rainfall=3.50"

Area (ac)	CN	Description
* 0.020	98	Impervious
0.380	74	>75% Grass cover, Good, HSG C
0.400	75	Weighted Average
0.380		95.00% Pervious Area
0.020		5.00% Impervious Area

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

Subcatchment Culvert2: Culvert 2



Summary for Subcatchment Off-Site 3: Off-site existing cul-de-sac with inlet and storm sewer & Swale 4 drainage area

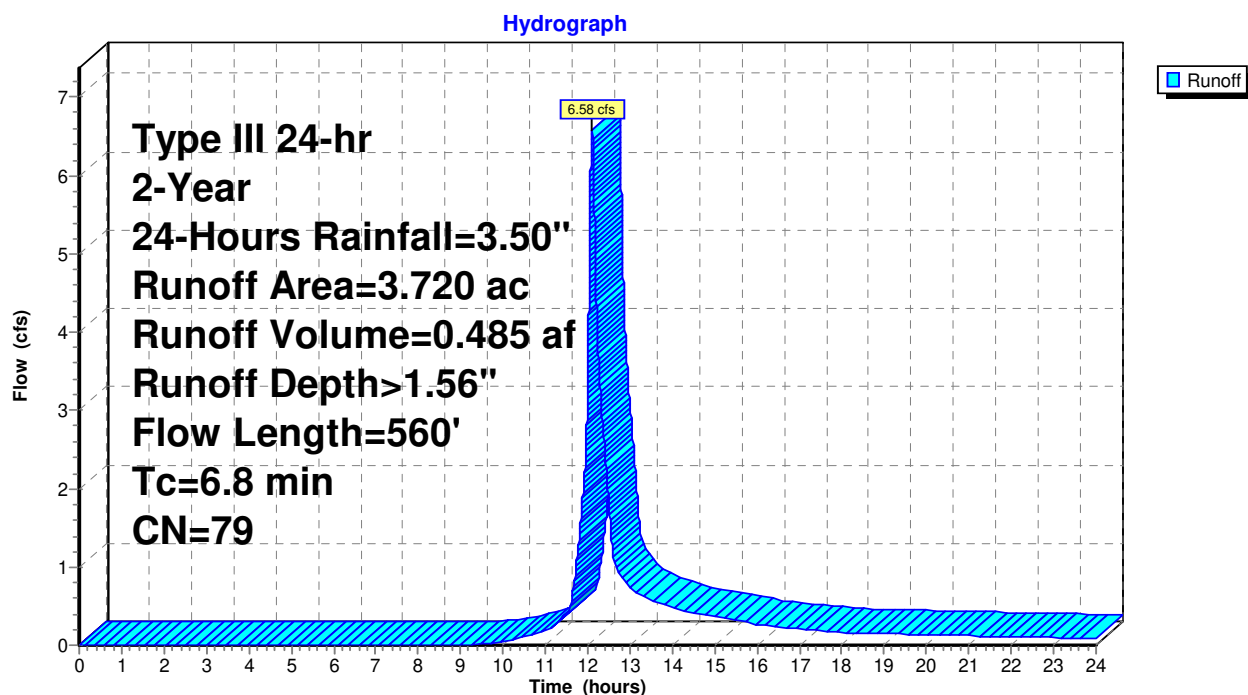
Runoff = 6.58 cfs @ 12.097 hrs, Volume= 0.485 af, Depth> 1.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 2-Year, 24-Hours Rainfall=3.50"

Area (ac)	CN	Description
1.560	74	>75% Grass cover, Good, HSG C
* 0.220	98	Buildings
* 0.490	98	Driveway/Roads
* 0.030	98	Swale 4- Existing Impervious
* 1.230	74	Swale 4 ->75% Grass cover, Good, HSG C
* 0.190	73	Swale 4- Woods, Fair, HSG C
3.720	79	Weighted Average
2.980		80.11% Pervious Area
0.740		19.89% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	50	0.0030	0.59		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.50"
4.8	320	0.0030	1.11		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.4	140	0.0100	5.36	4.21	Pipe Channel, 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
0.2	50	0.0500	3.60		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
6.8	560	Total			

Subcatchment Off-Site 3: Off-site existing cul-de-sac with inlet and storm sewer & Swale 4 drainage area



Summary for Subcatchment Pond A: Pond A

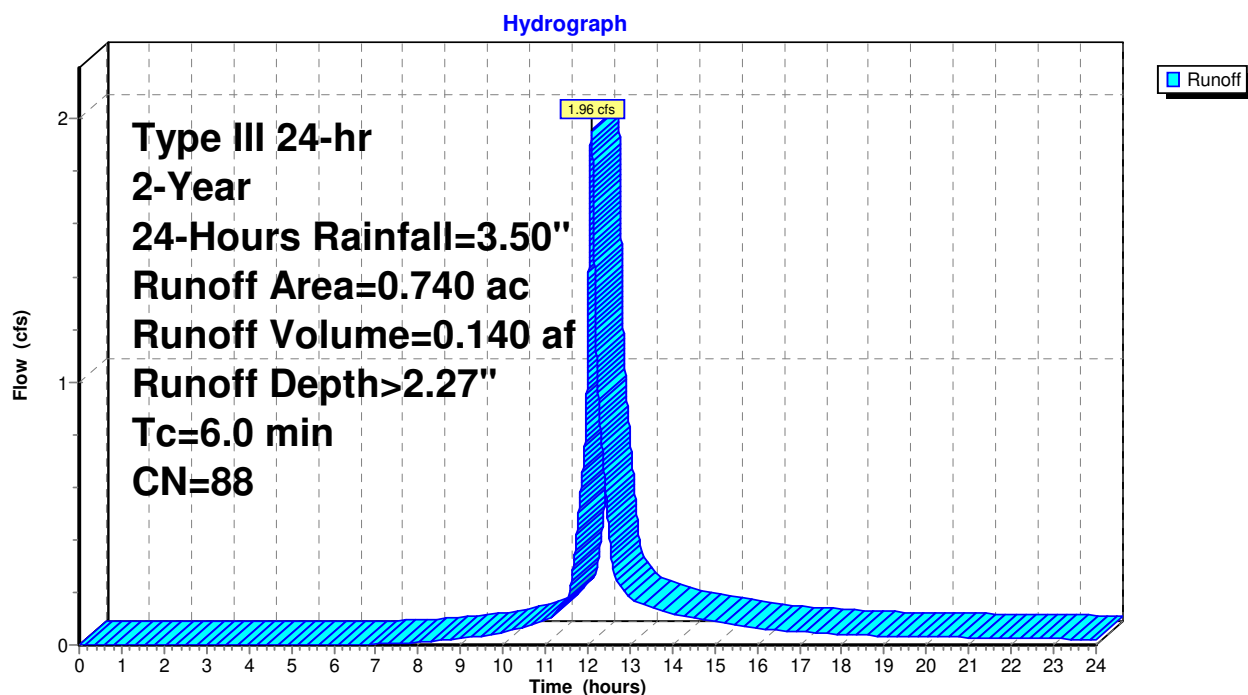
Runoff = 1.96 cfs @ 12.087 hrs, Volume= 0.140 af, Depth> 2.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 2-Year, 24-Hours Rainfall=3.50"

Area (ac)	CN	Description
* 0.180	98	Driveway/Road
0.230	74	>75% Grass cover, Good, HSG C
0.120	80	>75% Grass cover, Good, HSG D
* 0.210	98	Pond
0.740	88	Weighted Average
0.350		47.30% Pervious Area
0.390		52.70% Impervious Area

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

Subcatchment Pond A: Pond A



Summary for Subcatchment Pond B: Pond B

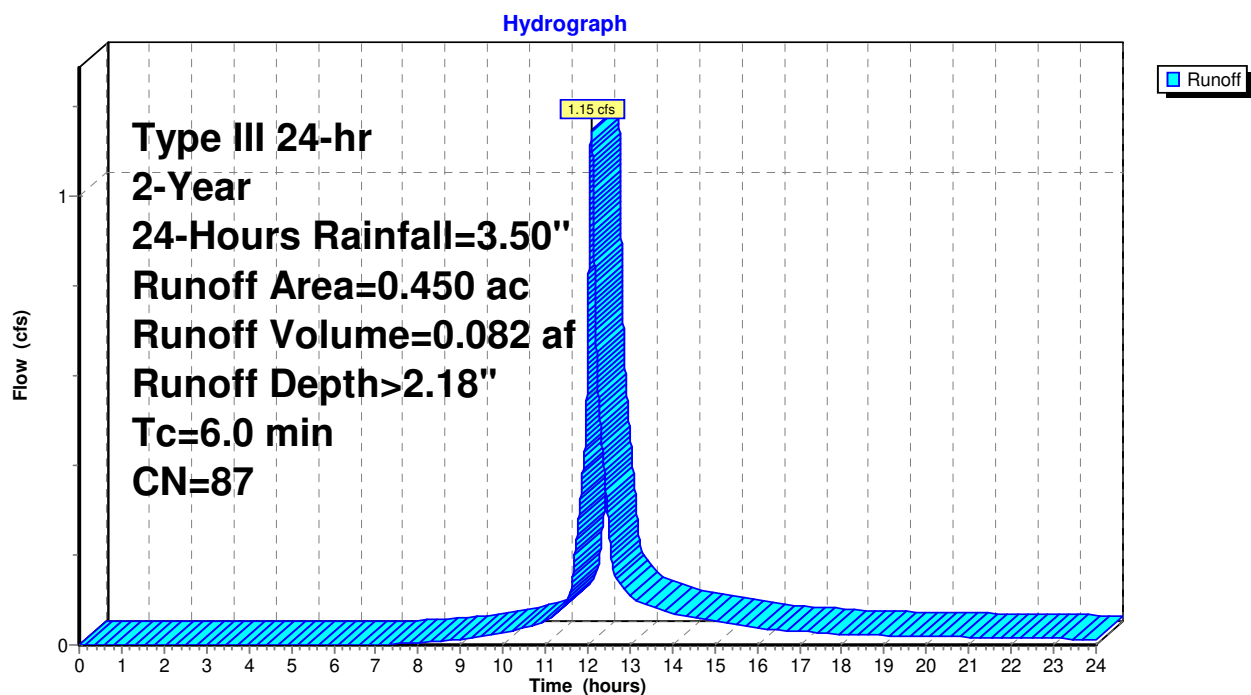
Runoff = 1.15 cfs @ 12.087 hrs, Volume= 0.082 af, Depth> 2.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 2-Year, 24-Hours Rainfall=3.50"

Area (ac)	CN	Description
* 0.190	98	Driveway/Road
0.210	74	>75% Grass cover, Good, HSG C
* 0.050	98	Pond
0.450	87	Weighted Average
0.210		46.67% Pervious Area
0.240		53.33% Impervious Area

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

Subcatchment Pond B: Pond B



Summary for Subcatchment Roof: 14 Proposed Houses

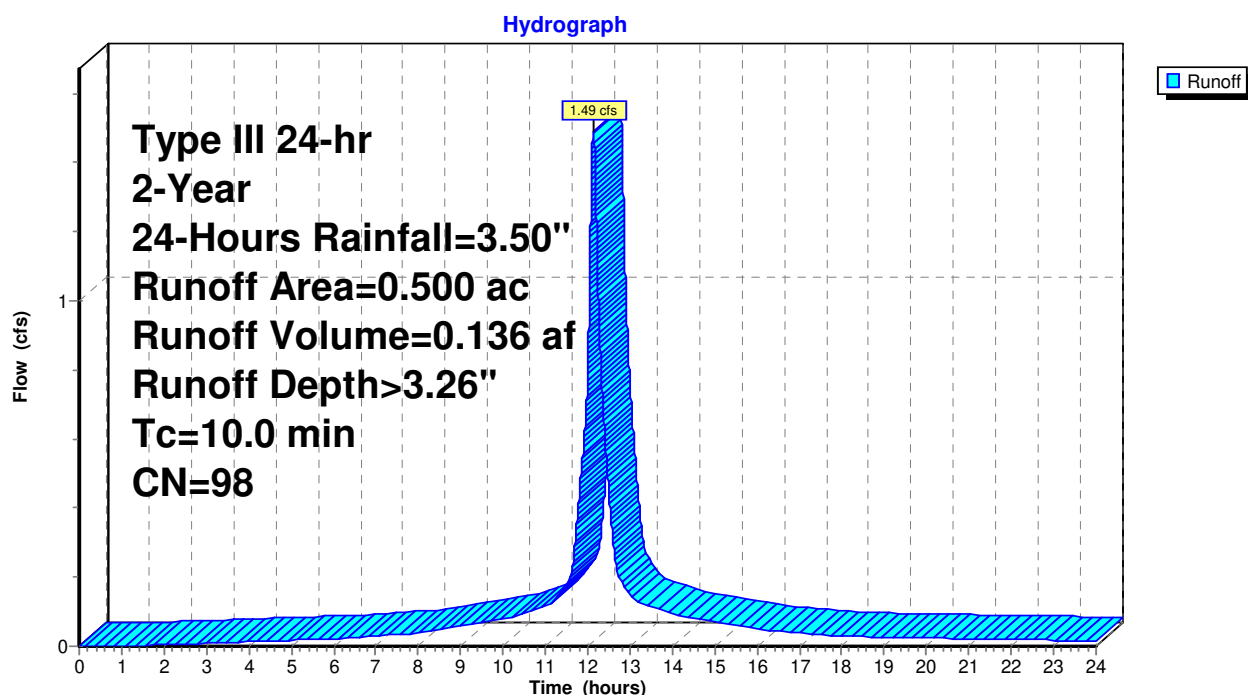
Runoff = 1.49 cfs @ 12.133 hrs, Volume= 0.136 af, Depth> 3.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 2-Year, 24-Hours Rainfall=3.50"

Area (ac)	CN	Description
* 0.500	98	Buildings
0.500		100.00% Impervious Area

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

Subcatchment Roof: 14 Proposed Houses



Summary for Subcatchment Roof12: 1 Proposed House (Lot 12)

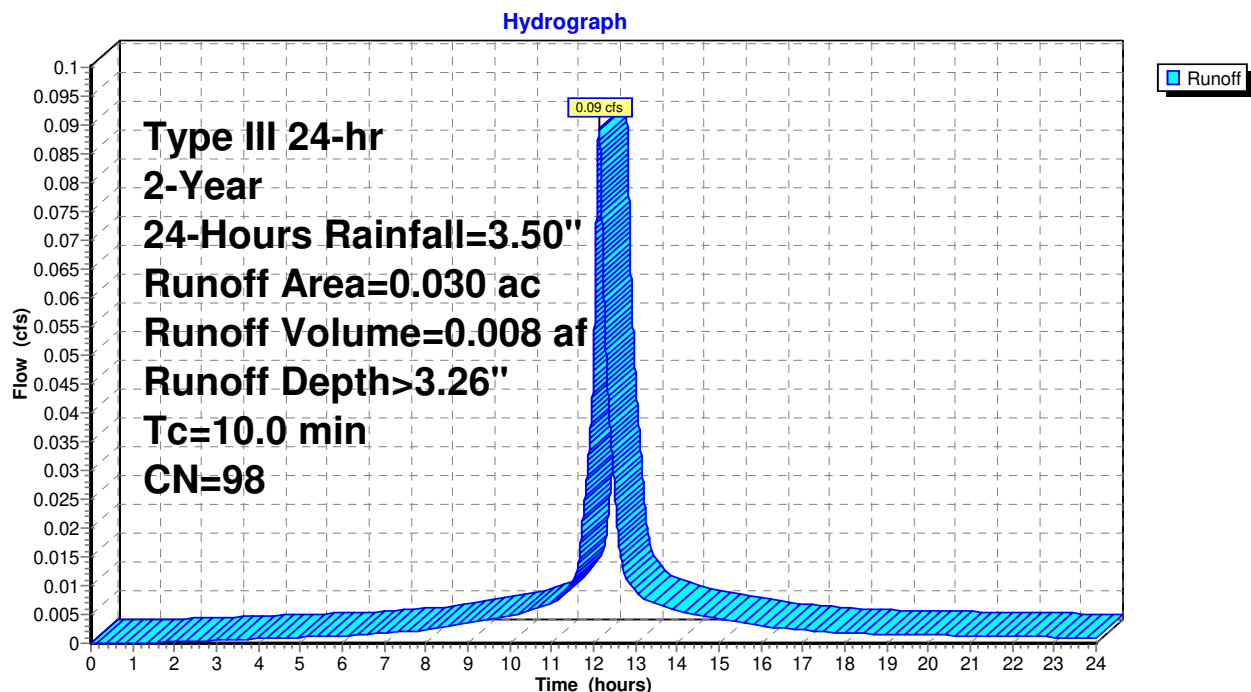
Runoff = 0.09 cfs @ 12.133 hrs, Volume= 0.008 af, Depth> 3.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 2-Year, 24-Hours Rainfall=3.50"

Area (ac)	CN	Description
* 0.030	98	Building
0.030		100.00% Impervious Area

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

Subcatchment Roof12: 1 Proposed House (Lot 12)



Summary for Subcatchment Roof9: 1 Proposed House (Lot 9)

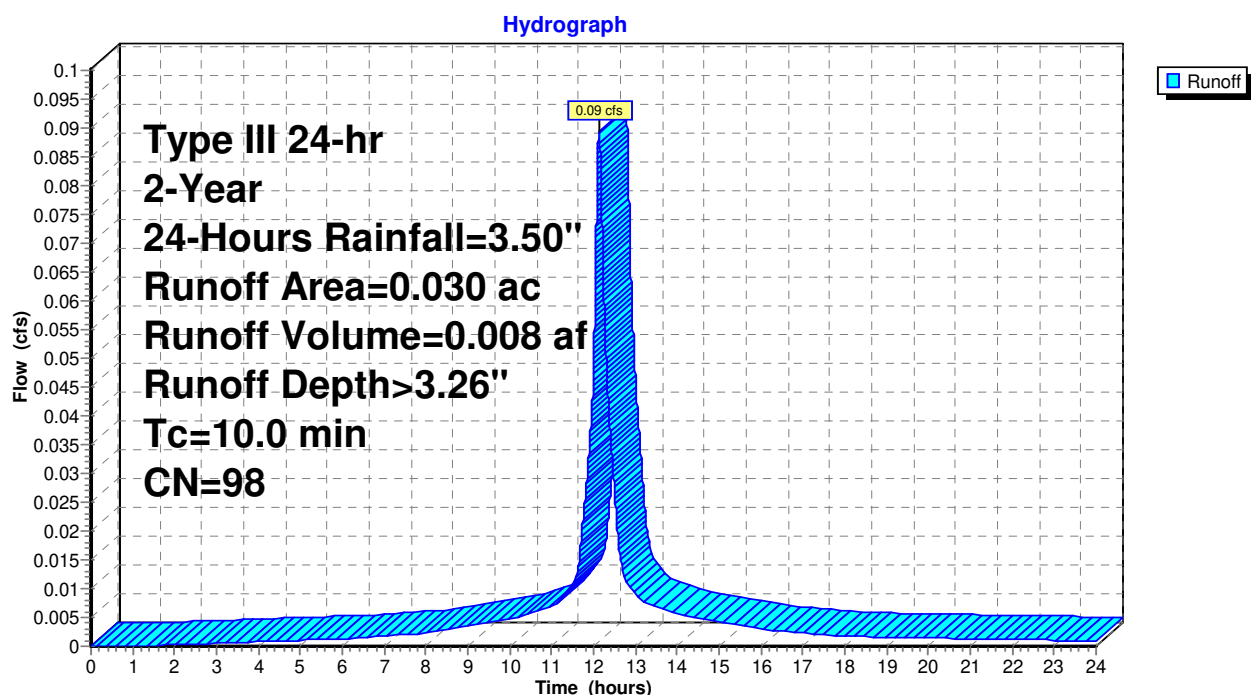
Runoff = 0.09 cfs @ 12.133 hrs, Volume= 0.008 af, Depth> 3.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 2-Year, 24-Hours Rainfall=3.50"

Area (ac)	CN	Description
* 0.030	98	Building
0.030		100.00% Impervious Area

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

Subcatchment Roof9: 1 Proposed House (Lot 9)



Summary for Subcatchment S: Swale

Runoff = 0.19 cfs @ 12.087 hrs, Volume= 0.013 af, Depth> 1.78"

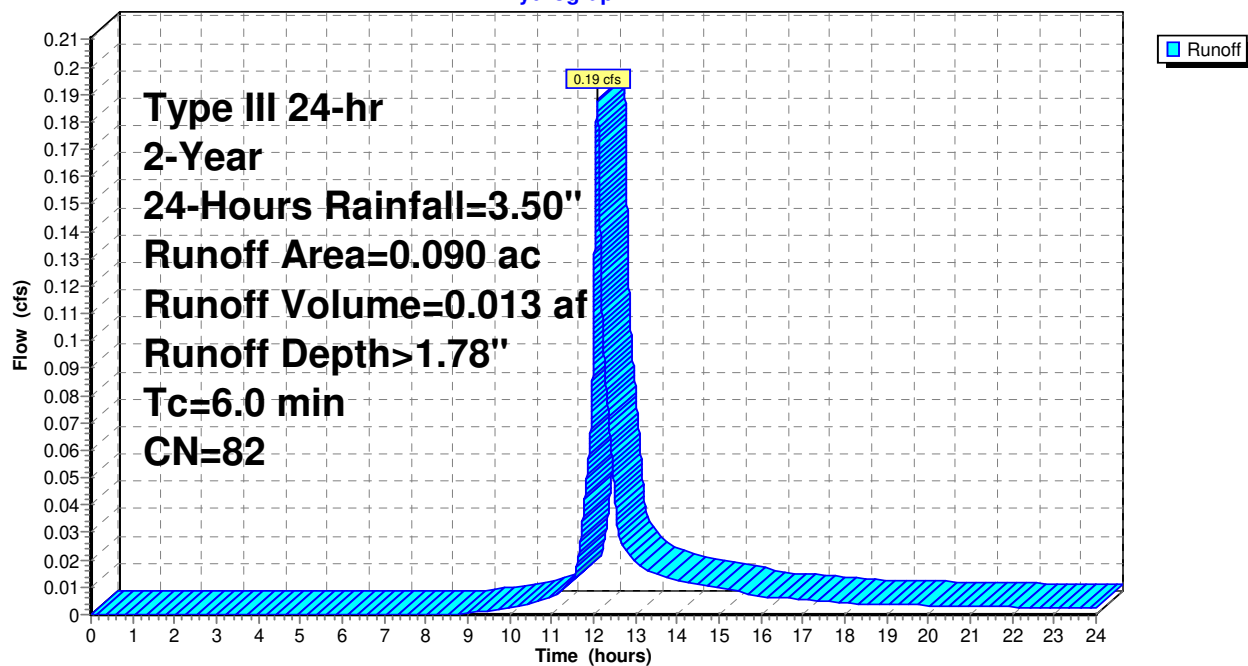
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 2-Year, 24-Hours Rainfall=3.50"

Area (ac)	CN	Description
* 0.030	98	Impervious
0.060	74	>75% Grass cover, Good, HSG C
0.090	82	Weighted Average
0.060		66.67% Pervious Area
0.030		33.33% Impervious Area

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

Subcatchment S: Swale

Hydrograph



Summary for Subcatchment Swale 1: Swale 1

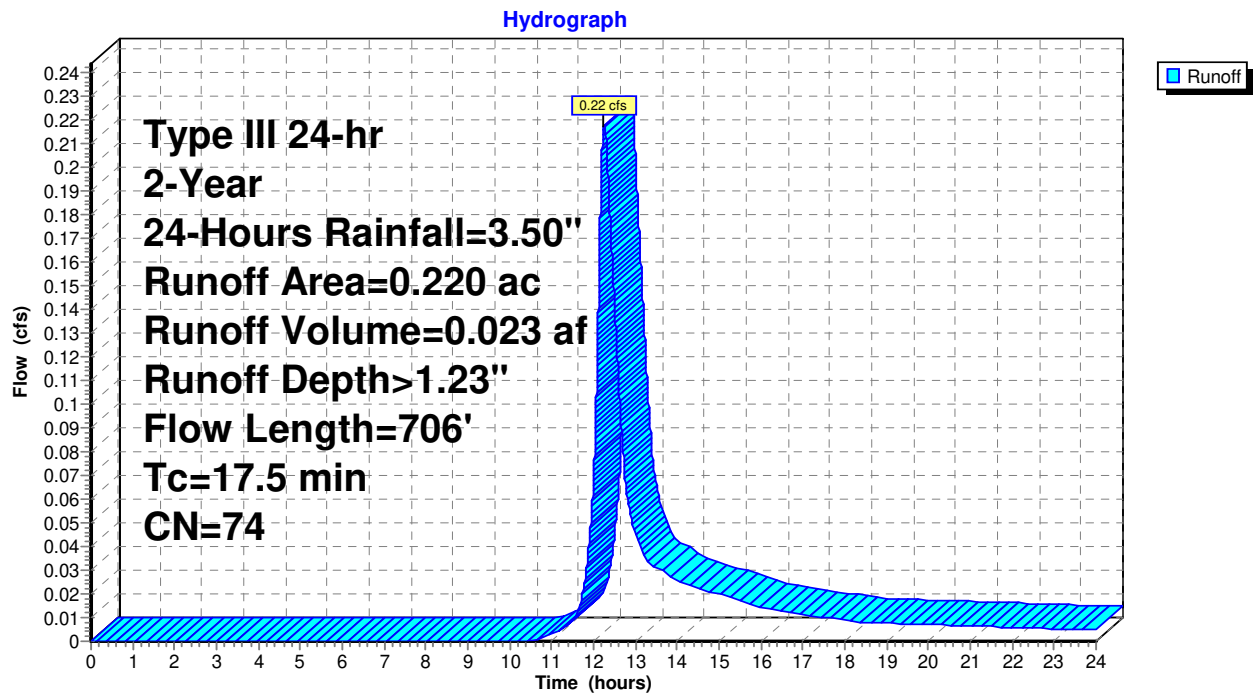
Runoff = 0.22 cfs @ 12.250 hrs, Volume= 0.023 af, Depth> 1.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 2-Year, 24-Hours Rainfall=3.50"

Area (ac)	CN	Description
0.150	74	>75% Grass cover, Good, HSG C
0.070	73	Woods, Fair, HSG C
0.220	74	Weighted Average
0.220		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.8	50	0.0200	0.07		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
0.2	130	0.0400	10.73	64.40	Trap/Vee/Rect Channel Flow, Bot.W=4.00' D=1.00' Z= 2.0 '/' Top.W=8.00' n= 0.022 Earth, clean & straight
4.3	132	0.0001	0.51	0.77	Pipe Channel, 12.0" x 18.0" Box Area= 1.5 sf Perim= 5.0' r= 0.30' n= 0.013
0.0	8	0.0125	3.87	1.35	Pipe Channel, 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.013
0.2	34	0.0060	3.51	2.76	Pipe Channel, 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.0	352	0.0060	6.04	18.98	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
17.5	706	Total			

Subcatchment Swale 1: Swale 1



Summary for Subcatchment Swale 2: Swale 2

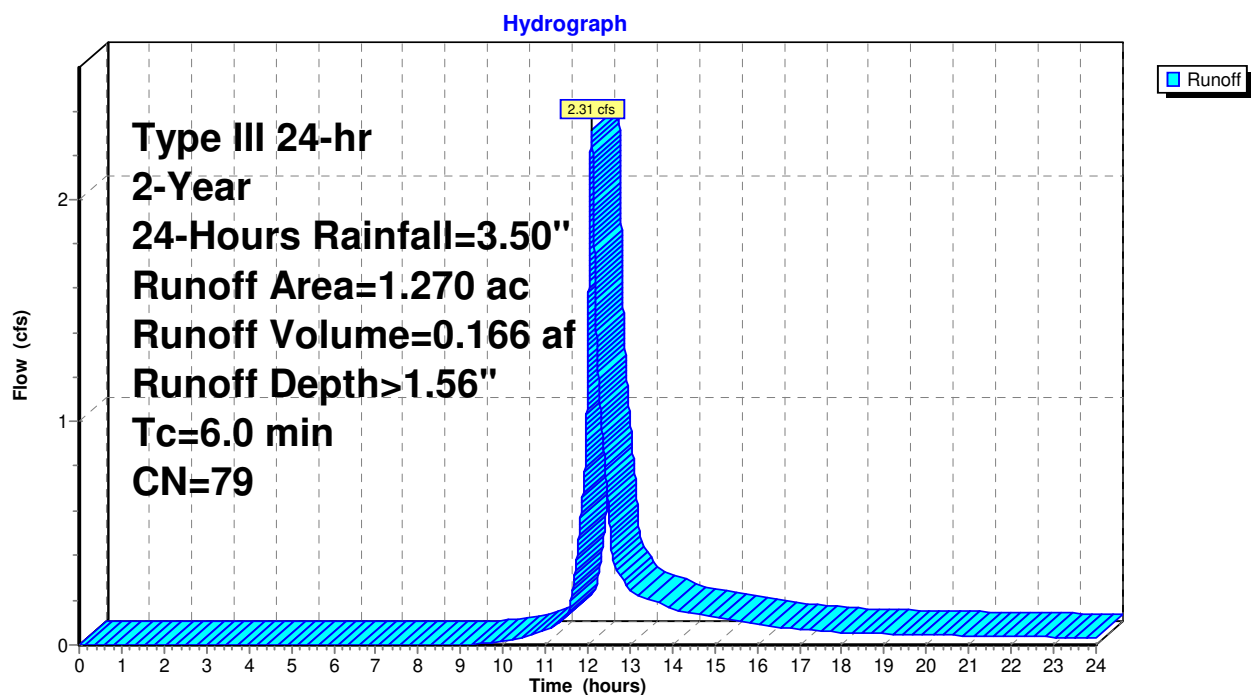
Runoff = 2.31 cfs @ 12.087 hrs, Volume= 0.166 af, Depth> 1.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 2-Year, 24-Hours Rainfall=3.50"

Area (ac)	CN	Description
0.790	79	50-75% Grass cover, Fair, HSG C
0.350	73	Woods, Fair, HSG C
* 0.130	98	Existing Buildings
1.270	79	Weighted Average
1.140		89.76% Pervious Area
0.130		10.24% Impervious Area

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

Subcatchment Swale 2: Swale 2



Summary for Subcatchment Swale 3: Swale 3

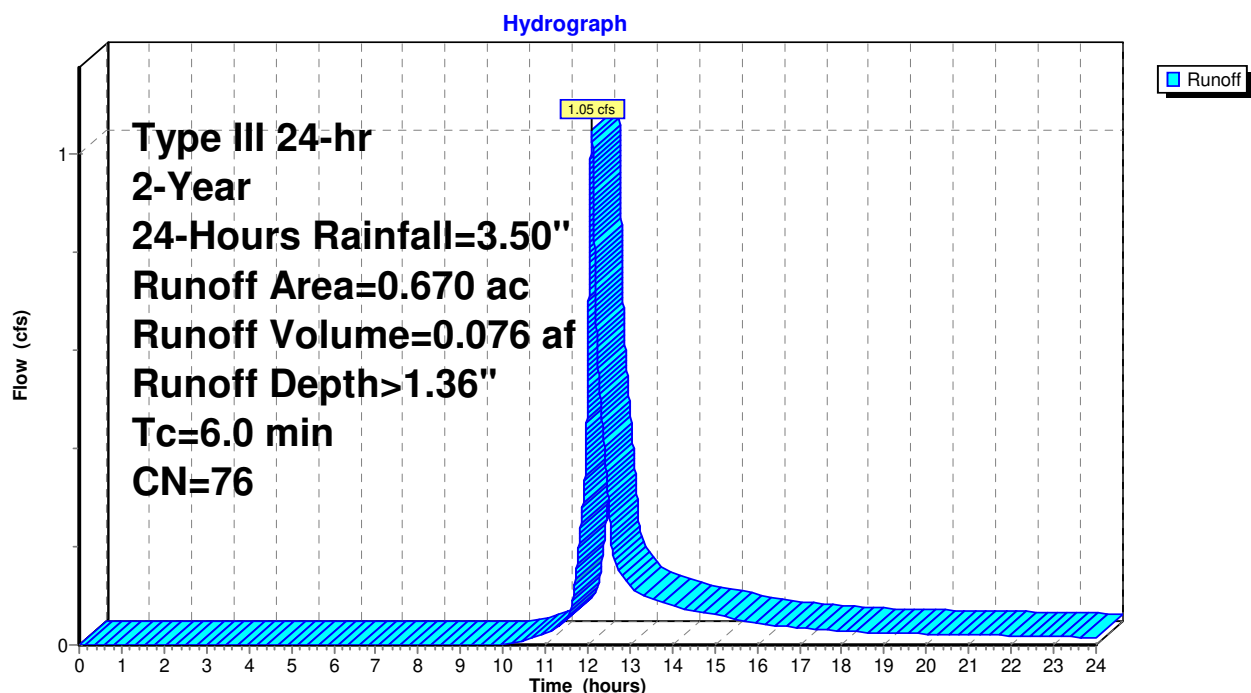
Runoff = 1.05 cfs @ 12.093 hrs, Volume= 0.076 af, Depth> 1.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 2-Year, 24-Hours Rainfall=3.50"

Area (ac)	CN	Description
* 0.060	98	Existing Buildings
0.540	74	>75% Grass cover, Good, HSG C
0.070	73	Woods, Fair, HSG C
0.670	76	Weighted Average
0.610		91.04% Pervious Area
0.060		8.96% Impervious Area

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

Subcatchment Swale 3: Swale 3



Summary for Subcatchment Trench: Trench

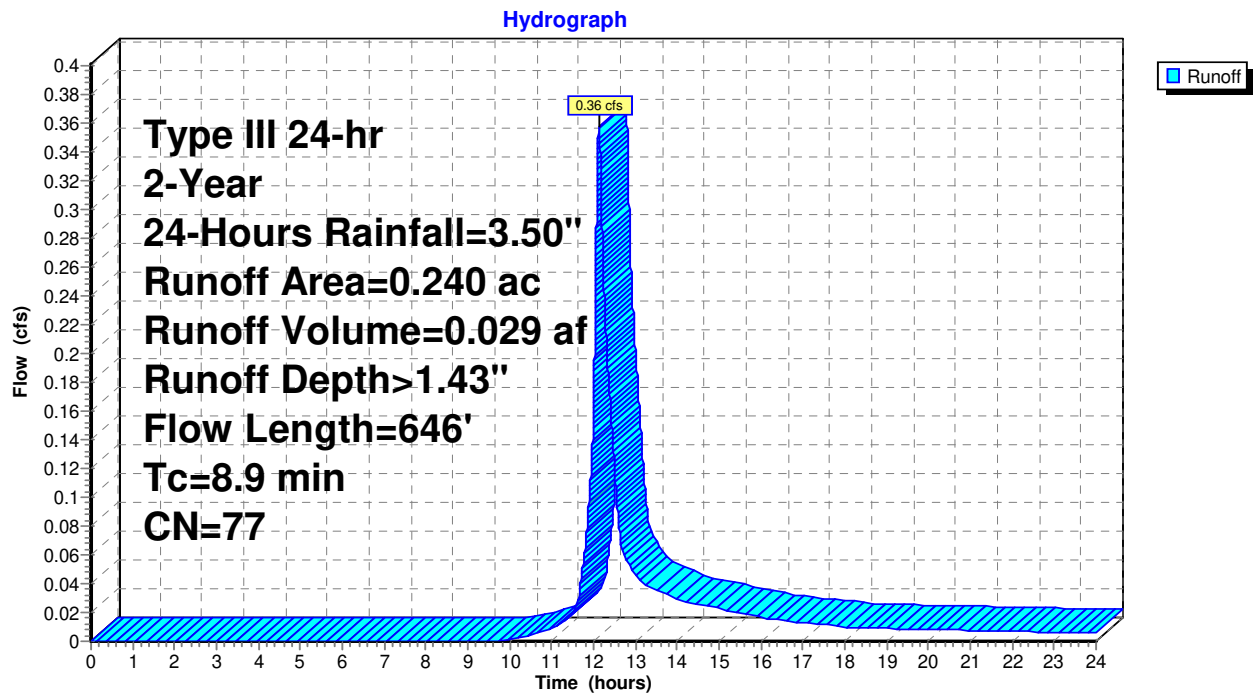
Runoff = 0.36 cfs @ 12.134 hrs, Volume= 0.029 af, Depth> 1.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 2-Year, 24-Hours Rainfall=3.50"

Area (ac)	CN	Description
* 0.040	98	Impervious
0.130	73	Woods, Fair, HSG C
0.070	74	>75% Grass cover, Good, HSG C
0.240	77	Weighted Average
0.200		83.33% Pervious Area
0.040		16.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.9	20	0.0400	0.12		Sheet Flow, Grass: Dense n= 0.240 P2= 3.50"
0.5	100	0.0400	3.22		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
4.3	132	0.0001	0.51	0.77	Pipe Channel, 12.0" x 18.0" Box Area= 1.5 sf Perim= 5.0' r= 0.30' n= 0.013
0.0	8	0.0125	3.87	1.35	Pipe Channel, 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.013
0.2	34	0.0060	3.51	2.76	Pipe Channel, 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.0	352	0.0060	6.04	18.98	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
8.9	646	Total			

Subcatchment Trench: Trench



Summary for Reach Swale: Swale

Inflow Area = 0.090 ac, 33.33% Impervious, Inflow Depth > 1.78" for 2-Year, 24-Hours event
 Inflow = 0.19 cfs @ 12.087 hrs, Volume= 0.013 af
 Outflow = 0.18 cfs @ 12.112 hrs, Volume= 0.013 af, Atten= 4%, Lag= 1.5 min

Routing by Dyn-Stor-Ind method, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs / 2
 Max. Velocity= 0.80 fps, Min. Travel Time= 2.1 min
 Avg. Velocity = 0.22 fps, Avg. Travel Time= 7.5 min

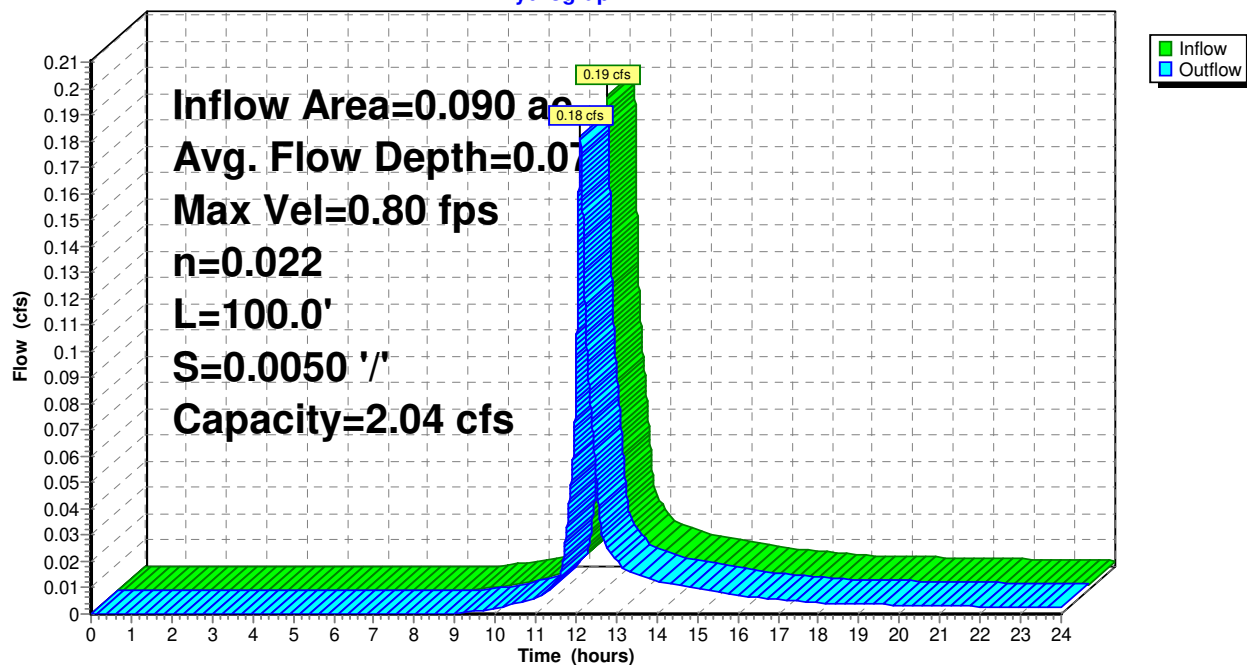
Peak Storage= 23 cf @ 12.112 hrs
 Average Depth at Peak Storage= 0.07'
 Bank-Full Depth= 0.30' Flow Area= 1.1 sf, Capacity= 2.04 cfs

3.00' x 0.30' deep channel, n= 0.022 Earth, clean & straight
 Side Slope Z-value= 2.0 '/' Top Width= 4.20'
 Length= 100.0' Slope= 0.0050 '/'
 Inlet Invert= 38.70', Outlet Invert= 38.20'



Reach Swale: Swale

Hydrograph



Summary for Reach Swale 4: Swale 4

Inflow Area = 3.720 ac, 19.89% Impervious, Inflow Depth > 1.56" for 2-Year, 24-Hours event
 Inflow = 6.58 cfs @ 12.097 hrs, Volume= 0.485 af
 Outflow = 6.37 cfs @ 12.125 hrs, Volume= 0.484 af, Atten= 3%, Lag= 1.7 min

Routing by Dyn-Stor-Ind method, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs / 2
 Max. Velocity= 2.95 fps, Min. Travel Time= 2.0 min
 Avg. Velocity = 0.94 fps, Avg. Travel Time= 6.2 min

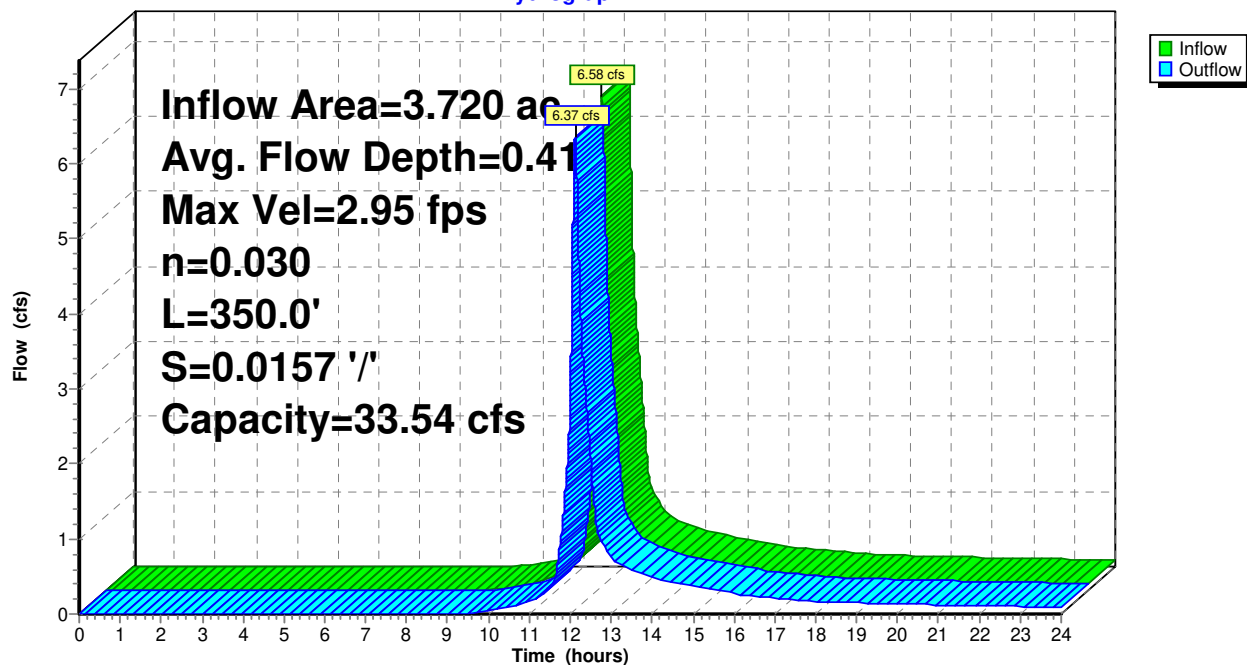
Peak Storage= 756 cf @ 12.125 hrs
 Average Depth at Peak Storage= 0.41'
 Bank-Full Depth= 1.00' Flow Area= 7.0 sf, Capacity= 33.54 cfs

4.00' x 1.00' deep channel, n= 0.030
 Side Slope Z-value= 3.0 '/' Top Width= 10.00'
 Length= 350.0' Slope= 0.0157 '/'
 Inlet Invert= 42.50', Outlet Invert= 37.00'



Reach Swale 4: Swale 4

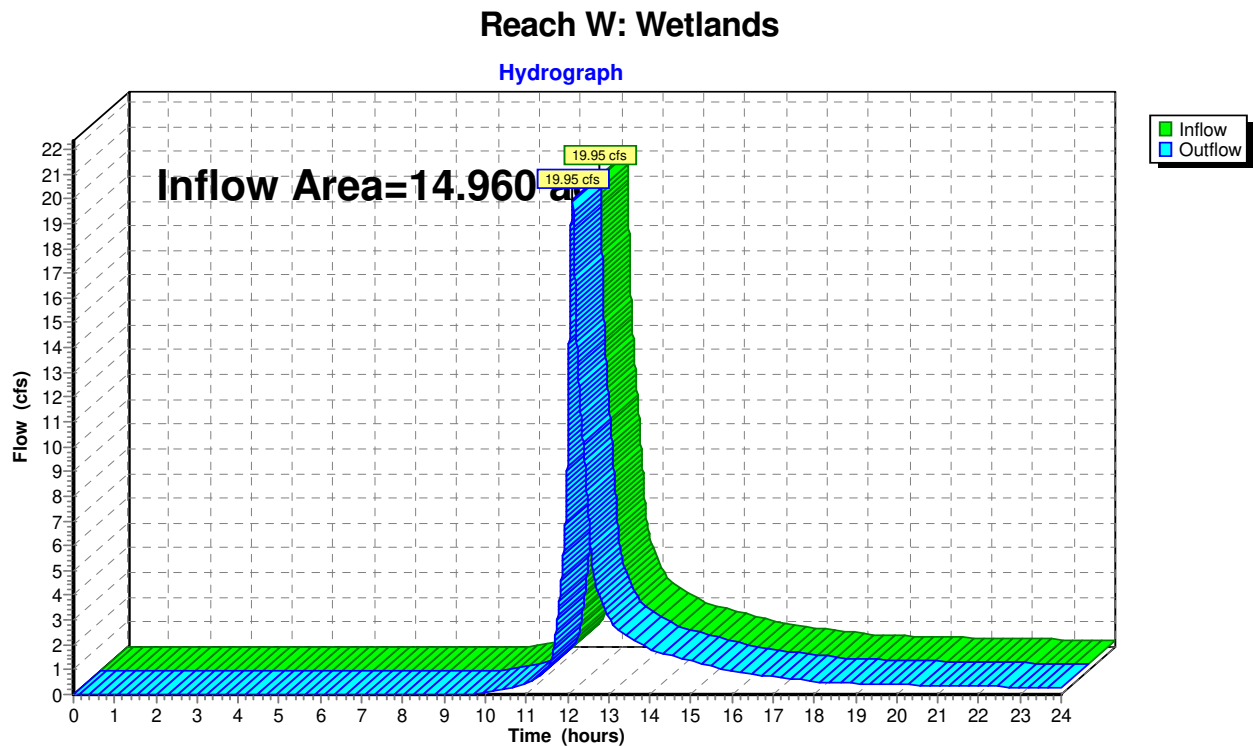
Hydrograph



Summary for Reach W: Wetlands

Inflow Area = 14.960 ac, 22.39% Impervious, Inflow Depth > 1.32" for 2-Year, 24-Hours event
Inflow = 19.95 cfs @ 12.122 hrs, Volume= 1.644 af
Outflow = 19.95 cfs @ 12.122 hrs, Volume= 1.644 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs / 2



Summary for Pond A: Pond A

Inflow Area = 1.760 ac, 50.57% Impervious, Inflow Depth > 2.17" for 2-Year, 24-Hours event
 Inflow = 4.47 cfs @ 12.087 hrs, Volume= 0.318 af
 Outflow = 1.04 cfs @ 12.496 hrs, Volume= 0.248 af, Atten= 77%, Lag= 24.5 min
 Discarded = 0.13 cfs @ 12.496 hrs, Volume= 0.118 af
 Primary = 0.91 cfs @ 12.496 hrs, Volume= 0.130 af
 Secondary = 0.00 cfs @ 0.000 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs / 2
 Peak Elev= 38.12' @ 12.496 hrs Surf.Area= 5,620 sf Storage= 6,012 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 100.4 min (915.2 - 814.8)

Volume	Invert	Avail.Storage	Storage Description
#1	36.50'	21,290 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
#2	34.50'	515 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
			1,472 cf Overall x 35.0% Voids
21,805 cf			Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
36.50	736	0	0
36.51	2,513	16	16
37.00	3,030	1,358	1,374
38.00	4,111	3,571	4,945
38.50	7,261	2,843	7,788
39.00	8,658	3,980	11,768
40.00	10,387	9,523	21,290

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
34.50	736	0	0
36.50	736	1,472	1,472

Device	Routing	Invert	Outlet Devices
#1	Primary	37.50'	8.0" Round Culvert L= 36.0' Ke= 0.500 Inlet / Outlet Invert= 37.50' / 36.28' S= 0.0339 ' ' Cc= 0.900 n= 0.013, Flow Area= 0.35 sf
#2	Discarded	34.50'	1.020 in/hr Exfiltration over Surface area
#3	Secondary	39.35'	5.0' long x 11.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.53 2.59 2.70 2.68 2.67 2.68 2.66 2.64

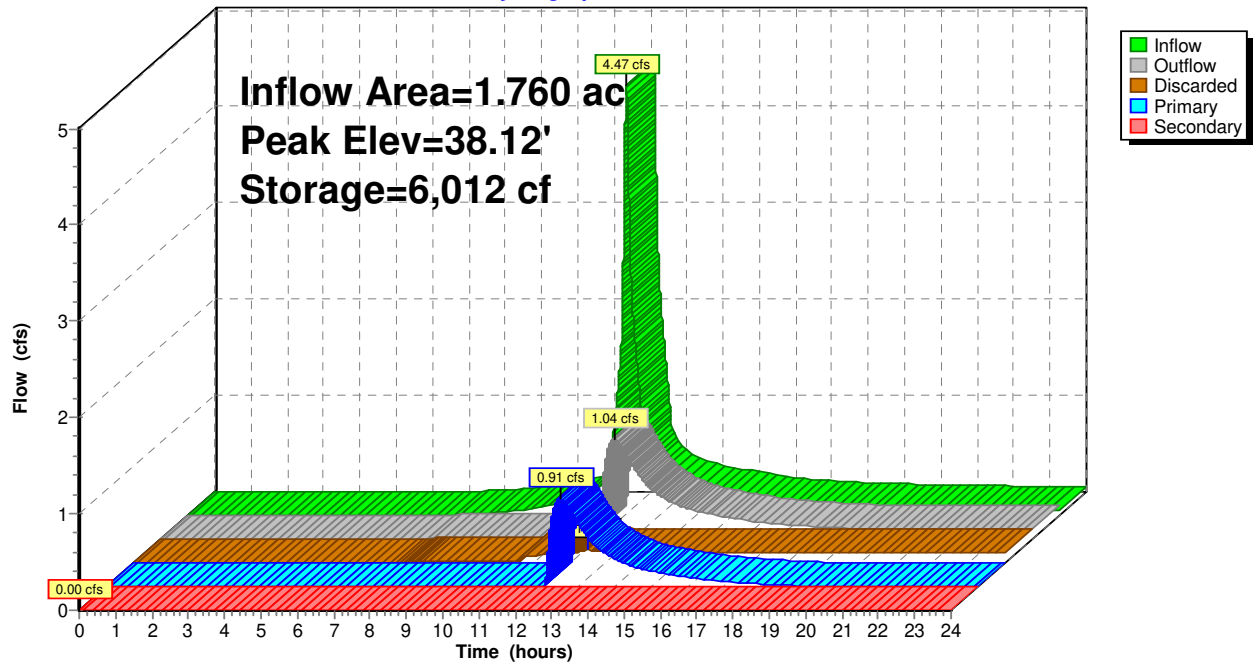
Discarded OutFlow Max=0.13 cfs @ 12.496 hrs HW=38.12' (Free Discharge)
 ↑ **2=Exfiltration** (Exfiltration Controls 0.13 cfs)

Primary OutFlow Max=0.91 cfs @ 12.496 hrs HW=38.12' TW=0.00' (Dynamic Tailwater)
 ↑ **1=Culvert** (Inlet Controls 0.91 cfs @ 2.69 fps)

Secondary OutFlow Max=0.00 cfs @ 0.000 hrs HW=34.50' TW=0.00' (Dynamic Tailwater)
 ↑ **3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond A: Pond A

Hydrograph



Summary for Pond B: Pond B

Inflow Area = 0.450 ac, 53.33% Impervious, Inflow Depth > 2.18" for 2-Year, 24-Hours event
 Inflow = 1.15 cfs @ 12.087 hrs, Volume= 0.082 af
 Outflow = 0.63 cfs @ 12.215 hrs, Volume= 0.067 af, Atten= 45%, Lag= 7.7 min
 Discarded = 0.03 cfs @ 12.215 hrs, Volume= 0.027 af
 Primary = 0.60 cfs @ 12.215 hrs, Volume= 0.040 af
 Secondary = 0.00 cfs @ 0.000 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs / 2
 Peak Elev= 38.96' @ 12.215 hrs Surf.Area= 1,164 sf Storage= 1,161 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 66.5 min (880.9 - 814.4)

Volume	Invert	Avail.Storage	Storage Description
#1	37.50'	4,937 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
#2	35.50'	125 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
		358 cf Overall x 35.0% Voids	
		5,062 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
37.50	450	0	0
38.00	613	266	266
39.00	999	806	1,072
39.50	2,413	853	1,925
40.00	3,062	1,369	3,294
40.50	3,511	1,643	4,937

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
35.50	179	0	0
37.50	179	358	358

Device	Routing	Invert	Outlet Devices
#1	Primary	38.50'	8.0" Round Culvert L= 60.0' Ke= 0.500 Inlet / Outlet Invert= 38.50' / 36.90' S= 0.0267 '/' Cc= 0.900 n= 0.013, Flow Area= 0.35 sf
#2	Discarded	35.50'	1.020 in/hr Exfiltration over Surface area
#3	Secondary	39.55'	5.0' long x 12.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

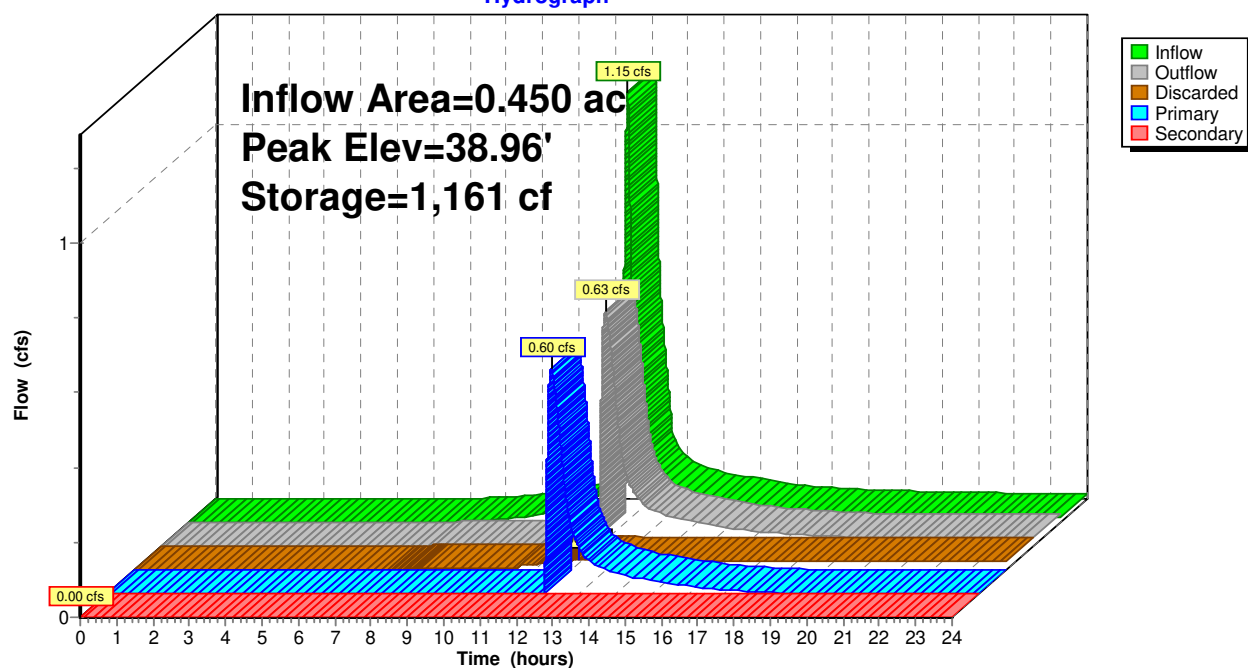
Discarded OutFlow Max=0.03 cfs @ 12.215 hrs HW=38.96' (Free Discharge)
 ↑ **2=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.60 cfs @ 12.215 hrs HW=38.96' TW=0.00' (Dynamic Tailwater)
 ↑ **1=Culvert** (Inlet Controls 0.60 cfs @ 2.32 fps)

Secondary OutFlow Max=0.00 cfs @ 0.000 hrs HW=35.50' TW=0.00' (Dynamic Tailwater)
 ↑ **3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond B: Pond B

Hydrograph



Summary for Pond C1: Culvert 1

Inflow Area = 0.530 ac, 9.43% Impervious, Inflow Depth > 1.36" for 2-Year, 24-Hours event
 Inflow = 0.83 cfs @ 12.093 hrs, Volume= 0.060 af
 Outflow = 0.81 cfs @ 12.108 hrs, Volume= 0.060 af, Atten= 2%, Lag= 0.9 min
 Primary = 0.81 cfs @ 12.108 hrs, Volume= 0.060 af

Routing by Dyn-Stor-Ind method, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs / 2
 Peak Elev= 39.17' @ 12.108 hrs Surf.Area= 187 sf Storage= 47 cf

Plug-Flow detention time= 1.2 min calculated for 0.060 af (100% of inflow)
 Center-of-Mass det. time= 0.9 min (850.5 - 849.6)

Volume	Invert	Avail.Storage	Storage Description
#1	38.70'	324 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

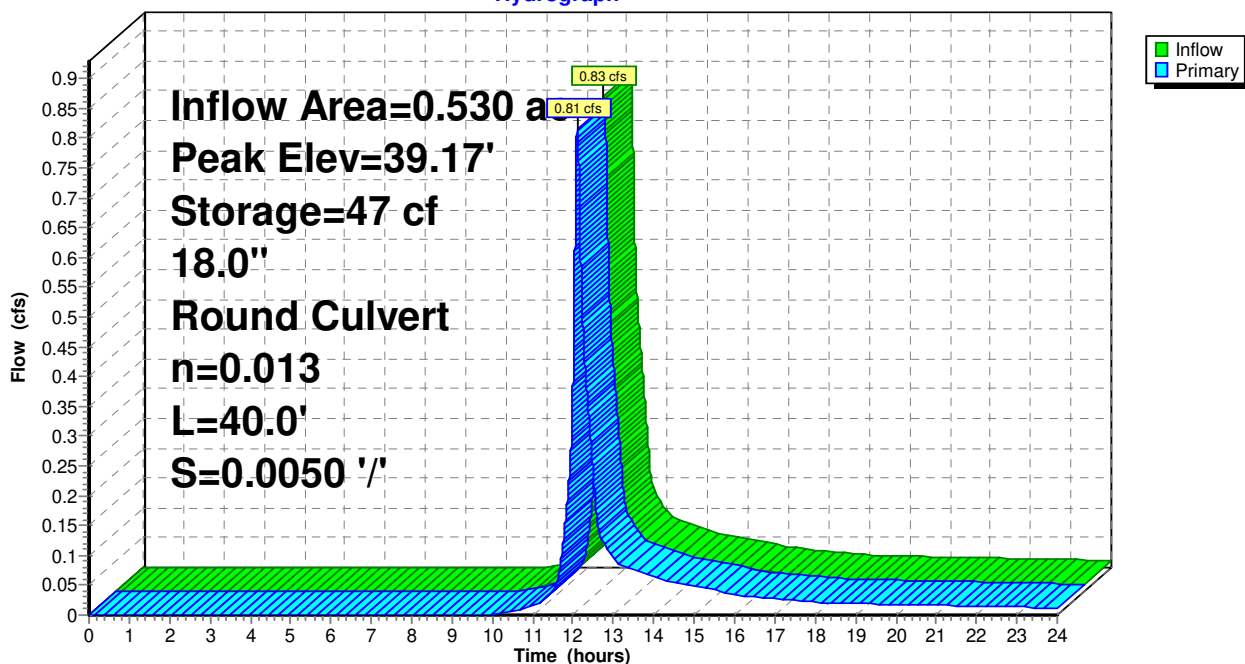
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
38.70	10	0	0
39.00	127	21	21
40.00	480	304	324

Device	Routing	Invert	Outlet Devices
#1	Primary	38.70'	18.0" Round Culvert L= 40.0' Ke= 0.500 Inlet / Outlet Invert= 38.70' / 38.50' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf

Primary OutFlow Max=0.81 cfs @ 12.108 hrs HW=39.17' TW=38.83' (Dynamic Tailwater)
 ↑1=Culvert (Barrel Controls 0.81 cfs @ 2.57 fps)

Pond C1: Culvert 1

Hydrograph



Summary for Pond C2: Culvert 2

Inflow Area = 0.930 ac, 7.53% Impervious, Inflow Depth > 1.34" for 2-Year, 24-Hours event
 Inflow = 1.40 cfs @ 12.101 hrs, Volume= 0.104 af
 Outflow = 1.39 cfs @ 12.111 hrs, Volume= 0.103 af, Atten= 1%, Lag= 0.6 min
 Primary = 1.39 cfs @ 12.111 hrs, Volume= 0.103 af

Routing by Dyn-Stor-Ind method, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs / 2
 Peak Elev= 38.83' @ 12.111 hrs Surf.Area= 150 sf Storage= 43 cf

Plug-Flow detention time= 0.6 min calculated for 0.103 af (100% of inflow)
 Center-of-Mass det. time= 0.5 min (851.9 - 851.4)

Volume	Invert	Avail.Storage	Storage Description
#1	38.30'	922 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

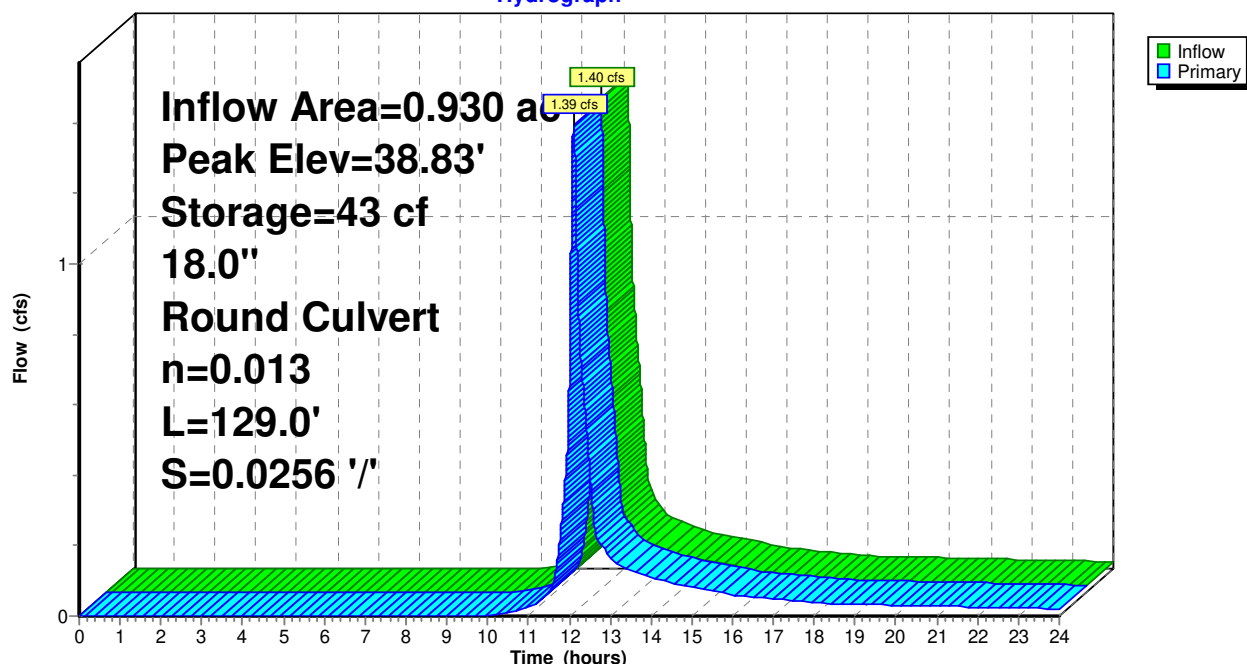
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
38.30	10	0	0
39.00	194	71	71
40.00	418	306	377
41.00	672	545	922

Device	Routing	Invert	Outlet Devices
#1	Primary	38.30'	18.0" Round Culvert L= 129.0' Ke= 0.500 Inlet / Outlet Invert= 38.30' / 35.00' S= 0.0256 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf

Primary OutFlow Max=1.39 cfs @ 12.111 hrs HW=38.83' TW=0.00' (Dynamic Tailwater)
 ↑**1=Culvert** (Inlet Controls 1.39 cfs @ 2.48 fps)

Pond C2: Culvert 2

Hydrograph



Summary for Pond RT12: 1 Roof Trench System (Lot 12)

Inflow Area = 0.030 ac, 100.00% Impervious, Inflow Depth > 3.26" for 2-Year, 24-Hours event
 Inflow = 0.09 cfs @ 12.133 hrs, Volume= 0.008 af
 Outflow = 0.01 cfs @ 11.375 hrs, Volume= 0.008 af, Atten= 92%, Lag= 0.0 min
 Discarded = 0.01 cfs @ 11.375 hrs, Volume= 0.008 af
 Primary = 0.00 cfs @ 0.000 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs / 2

Peak Elev= 1.24' @ 13.506 hrs Surf.Area= 288 sf Storage= 142 cf

Plug-Flow detention time= 161.0 min calculated for 0.008 af (100% of inflow)

Center-of-Mass det. time= 160.5 min (917.8 - 757.3)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	169 cf	8'x36'x24.5" Roof Trench System (Prismatic) Listed below (Recalc) 588 cf Overall - 106 cf Embedded = 482 cf x 35.0% Voids
#2	1.00'	106 cf	Custom Stage Data Listed below Inside #1
#3	2.04'	0 cf	0.50'D x 1.60'H Vertical Cone/Cylinder
		275 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	288	0	0
2.04	288	588	588

Elevation (feet)	Cum.Store (cubic-feet)
1.00	0
2.04	106

Device	Routing	Invert	Outlet Devices
#1	Primary	3.04'	4.0" Vert. Orifice/Grate C= 0.600
#2	Discarded	0.00'	1.020 in/hr Exfiltration over Surface area Phase-In= 0.02'

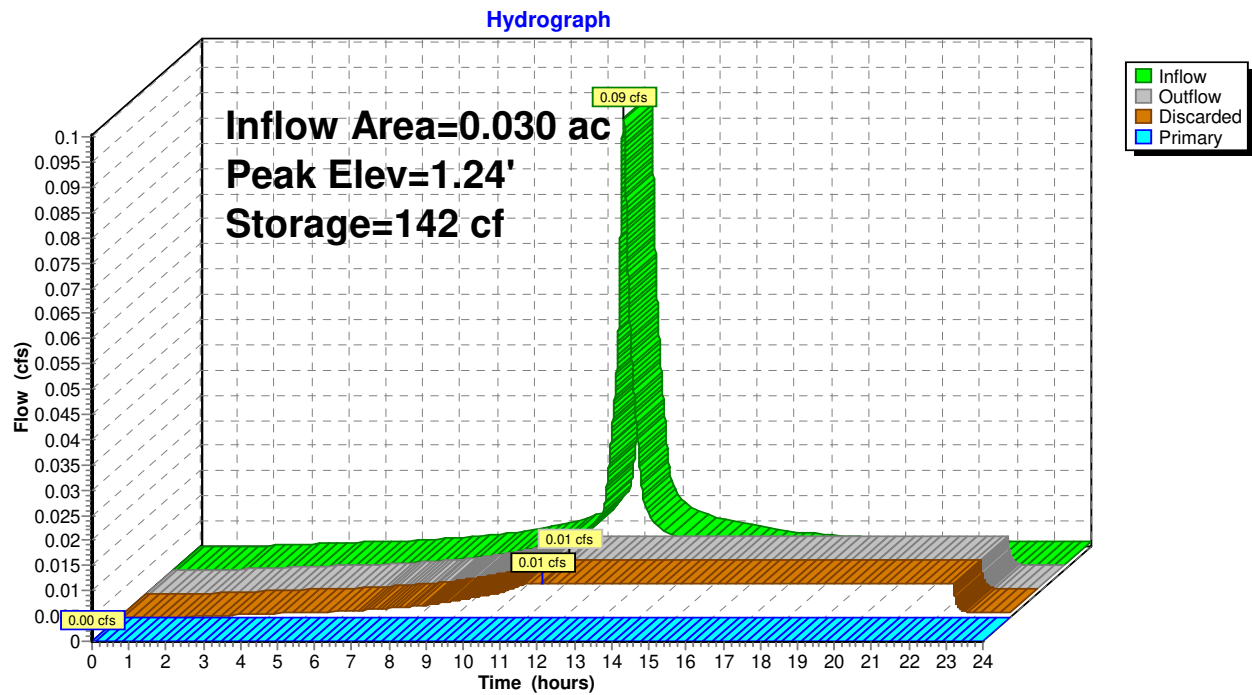
Discarded OutFlow Max=0.01 cfs @ 11.375 hrs HW=0.04' (Free Discharge)

↑ **2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.00 cfs @ 0.000 hrs HW=0.00' TW=0.00' (Dynamic Tailwater)

↑ **1=Orifice/Grate** (Controls 0.00 cfs)

Pond RT12: 1 Roof Trench System (Lot 12)



Summary for Pond RT14: 14 Roof Trench Systems

Inflow Area = 0.500 ac, 100.00% Impervious, Inflow Depth > 3.26" for 2-Year, 24-Hours event
 Inflow = 1.49 cfs @ 12.133 hrs, Volume= 0.136 af
 Outflow = 0.09 cfs @ 10.972 hrs, Volume= 0.125 af, Atten= 94%, Lag= 0.0 min
 Discarded = 0.09 cfs @ 10.972 hrs, Volume= 0.125 af
 Primary = 0.00 cfs @ 0.000 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs / 2

Peak Elev= 1.59' @ 13.999 hrs Surf.Area= 3,920 sf Storage= 2,585 cf

Plug-Flow detention time= 225.2 min calculated for 0.125 af (92% of inflow)

Center-of-Mass det. time= 182.2 min (939.5 - 757.3)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	2,407 cf	10'x28'x24.5" Roof Trench System (Prismatic) Listed below (Recalc) x 1 7,997 cf Overall - 1,120 cf Embedded = 6,877 cf x 35.0% Voids
#2	1.00'	1,120 cf	Custom Stage Data Listed below x 14 Inside #1
#3	2.04'	4 cf	0.50'D x 1.60'H Vertical Cone/Cylinder x 14
		3,531 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	280	0	0
2.04	280	571	571

Elevation (feet)	Cum.Store (cubic-feet)
1.00	0
2.04	80

Device	Routing	Invert	Outlet Devices
#1	Primary	3.04'	4.0" Vert. Orifice/Grate X 14.00 C= 0.600
#2	Discarded	0.00'	1.020 in/hr Exfiltration over Surface area Phase-In= 0.02'

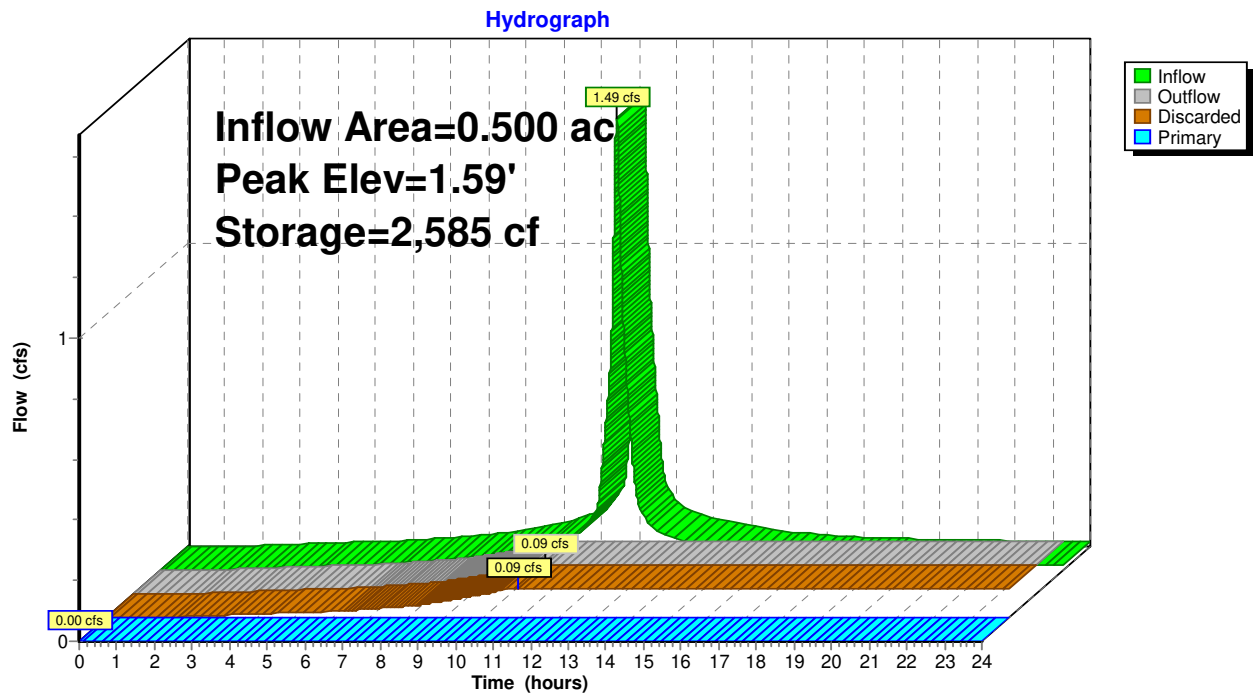
Discarded OutFlow Max=0.09 cfs @ 10.972 hrs HW=0.04' (Free Discharge)

↑ **2=Exfiltration** (Exfiltration Controls 0.09 cfs)

Primary OutFlow Max=0.00 cfs @ 0.000 hrs HW=0.00' TW=0.00' (Dynamic Tailwater)

↑ **1=Orifice/Grate** (Controls 0.00 cfs)

Pond RT14: 14 Roof Trench Systems



Summary for Pond RT9: 1 Roof Trench System (Lot 9)

Inflow Area = 0.030 ac, 100.00% Impervious, Inflow Depth > 3.26" for 2-Year, 24-Hours event
 Inflow = 0.09 cfs @ 12.133 hrs, Volume= 0.008 af
 Outflow = 0.05 cfs @ 12.319 hrs, Volume= 0.006 af, Atten= 47%, Lag= 11.2 min
 Discarded = 0.00 cfs @ 12.317 hrs, Volume= 0.005 af
 Primary = 0.04 cfs @ 12.319 hrs, Volume= 0.001 af

Routing by Dyn-Stor-Ind method, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs / 2

Peak Elev= 3.18' @ 12.319 hrs Surf.Area= 140 sf Storage= 135 cf

Plug-Flow detention time= 196.9 min calculated for 0.006 af (76% of inflow)

Center-of-Mass det. time= 114.2 min (871.4 - 757.3)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	81 cf	7'x20'x24.5" Roof Trench System (Prismatic) Listed below (Recalc) 286 cf Overall - 53 cf Embedded = 233 cf x 35.0% Voids
#2	1.00'	53 cf	Custom Stage Data Listed below Inside #1
#3	2.04'	0 cf	0.50'D x 1.60'H Vertical Cone/Cylinder
		135 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	140	0	0
2.04	140	286	286

Elevation (feet)	Cum.Store (cubic-feet)
1.00	0
2.04	53

Device	Routing	Invert	Outlet Devices
#1	Primary	3.04'	4.0" Vert. Orifice/Grate C= 0.600
#2	Discarded	0.00'	1.020 in/hr Exfiltration over Surface area Phase-In= 0.02'

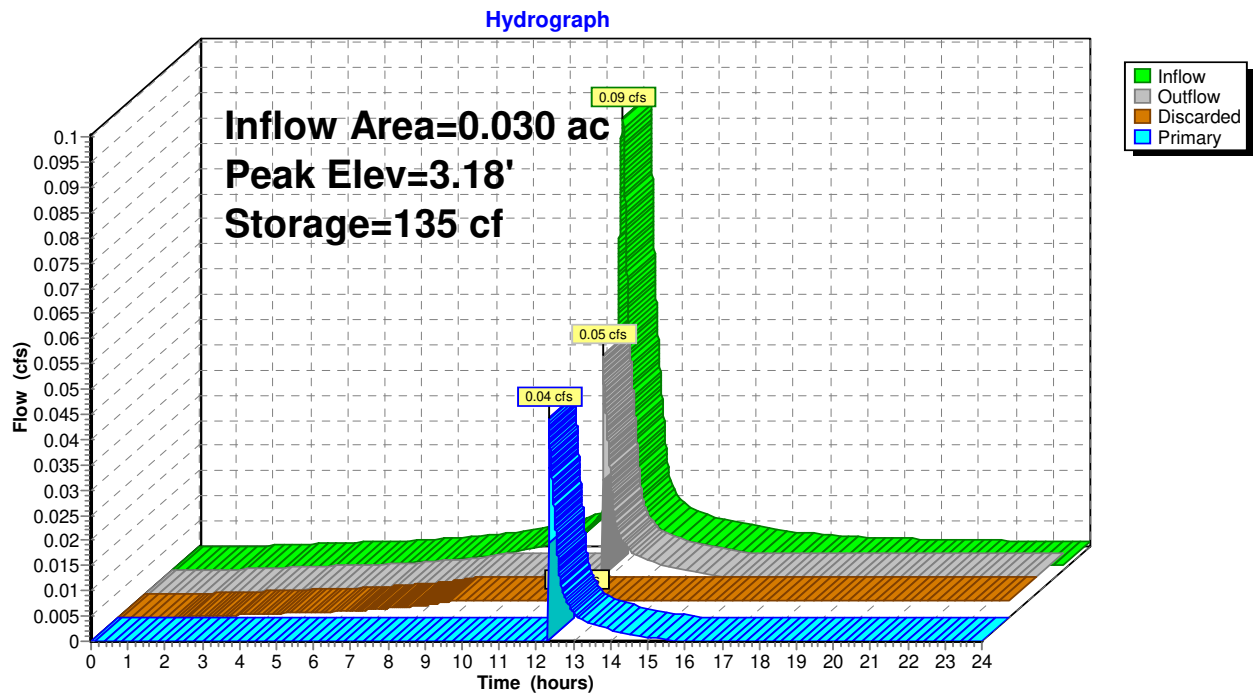
Discarded OutFlow Max=0.00 cfs @ 12.317 hrs HW=2.09' (Free Discharge)

↑**2=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.04 cfs @ 12.319 hrs HW=3.18' TW=0.00' (Dynamic Tailwater)

↑**1=Orifice/Grate** (Orifice Controls 0.04 cfs @ 1.27 fps)

Pond RT9: 1 Roof Trench System (Lot 9)



Summary for Pond S2: Swale 2

Inflow Area = 1.270 ac, 10.24% Impervious, Inflow Depth > 1.56" for 2-Year, 24-Hours event
 Inflow = 2.31 cfs @ 12.087 hrs, Volume= 0.166 af
 Outflow = 2.04 cfs @ 12.134 hrs, Volume= 0.165 af, Atten= 12%, Lag= 2.9 min
 Discarded = 0.03 cfs @ 12.134 hrs, Volume= 0.023 af
 Primary = 2.01 cfs @ 12.134 hrs, Volume= 0.142 af

Routing by Dyn-Stor-Ind method, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs / 2
 Peak Elev= 41.29' @ 12.134 hrs Surf.Area= 1,319 sf Storage= 464 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 5.5 min (846.0 - 840.5)

Volume	Invert	Avail.Storage	Storage Description
#1	40.50'	14,785 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
#2	40.50'	88 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
		250 cf Overall x 35.0% Voids	
		14,873 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
40.50	240	0	0
41.00	500	185	185
42.00	1,600	1,050	1,235
43.00	3,750	2,675	3,910
44.00	4,500	4,125	8,035
45.00	9,000	6,750	14,785

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
40.50	500	0	0
41.00	500	250	250

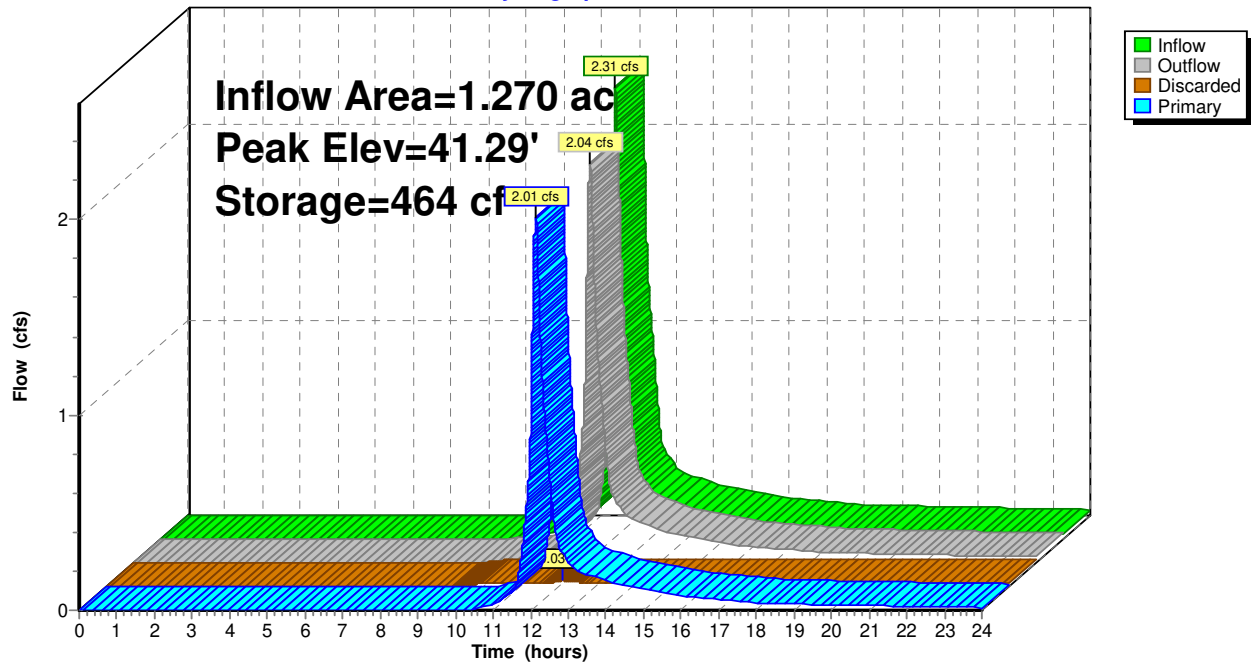
Device	Routing	Invert	Outlet Devices
#1	Primary	40.50'	12.0" Round Culvert L= 162.0' Ke= 0.500 Inlet / Outlet Invert= 40.50' / 36.25' S= 0.0262 '/' Cc= 0.900 n= 0.013 Concrete sewer w/manholes & inlets, Flow Area= 0.79 sf
#2	Discarded	40.50'	1.020 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.03 cfs @ 12.134 hrs HW=41.29' (Free Discharge)
 ↑ **2=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=2.01 cfs @ 12.134 hrs HW=41.29' TW=0.00' (Dynamic Tailwater)
 ↑ **1=Culvert** (Inlet Controls 2.01 cfs @ 3.03 fps)

Pond S2: Swale 2

Hydrograph



Summary for Pond S3: Swale 3

Inflow Area = 0.670 ac, 8.96% Impervious, Inflow Depth > 1.36" for 2-Year, 24-Hours event
 Inflow = 1.05 cfs @ 12.093 hrs, Volume= 0.076 af
 Outflow = 0.93 cfs @ 12.135 hrs, Volume= 0.076 af, Atten= 11%, Lag= 2.5 min
 Discarded = 0.02 cfs @ 12.135 hrs, Volume= 0.013 af
 Primary = 0.91 cfs @ 12.135 hrs, Volume= 0.063 af

Routing by Dyn-Stor-Ind method, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs / 2
 Peak Elev= 41.99' @ 12.135 hrs Surf.Area= 870 sf Storage= 186 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 3.9 min (853.4 - 849.6)

Volume	Invert	Avail.Storage	Storage Description
#1	41.50'	5,613 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
#2	41.50'	70 cf	Custom Stage Data (Prismatic) Listed below
		200 cf Overall x 35.0% Voids	
		5,683 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
41.50	10	0	0
42.00	480	123	123
43.00	1,200	840	963
44.00	1,800	1,500	2,463
45.00	4,500	3,150	5,613

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
41.50	400	0	0
42.00	400	200	200

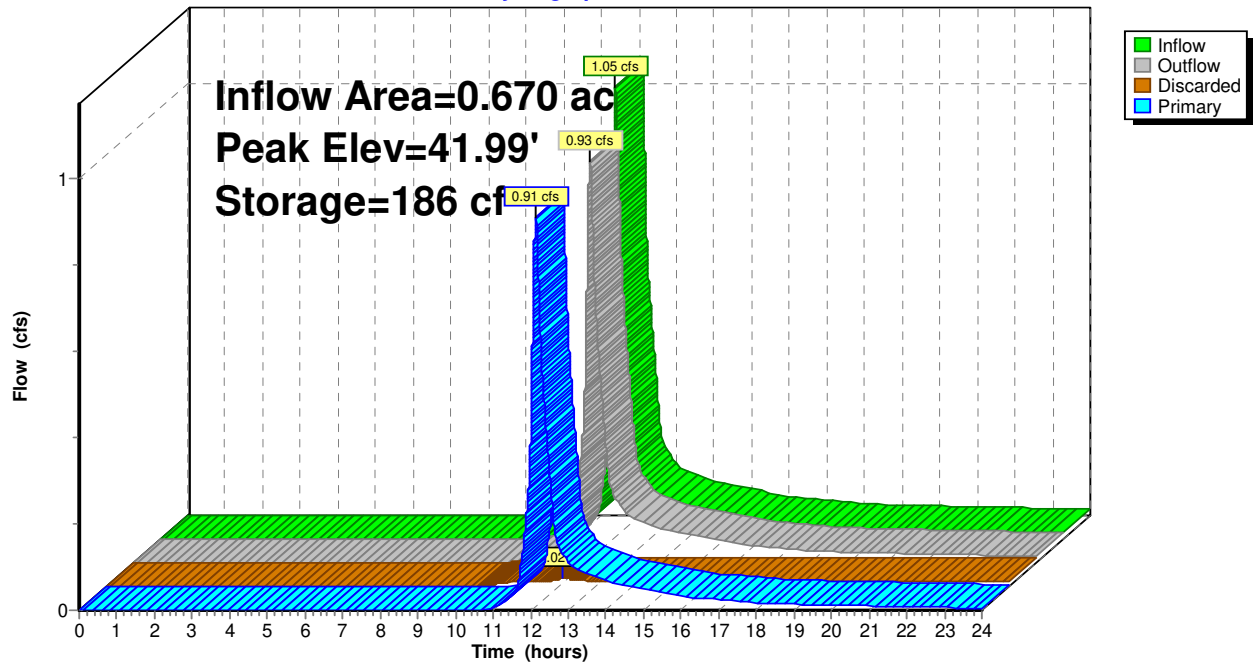
Device	Routing	Invert	Outlet Devices
#1	Primary	41.50'	12.0" Round Culvert L= 292.0' Ke= 0.500 Inlet / Outlet Invert= 41.50' / 36.25' S= 0.0180 '/' Cc= 0.900 n= 0.013 Concrete sewer w/manholes & inlets, Flow Area= 0.79 sf
#2	Discarded	41.50'	1.020 in/hr Exfiltration over Surface area

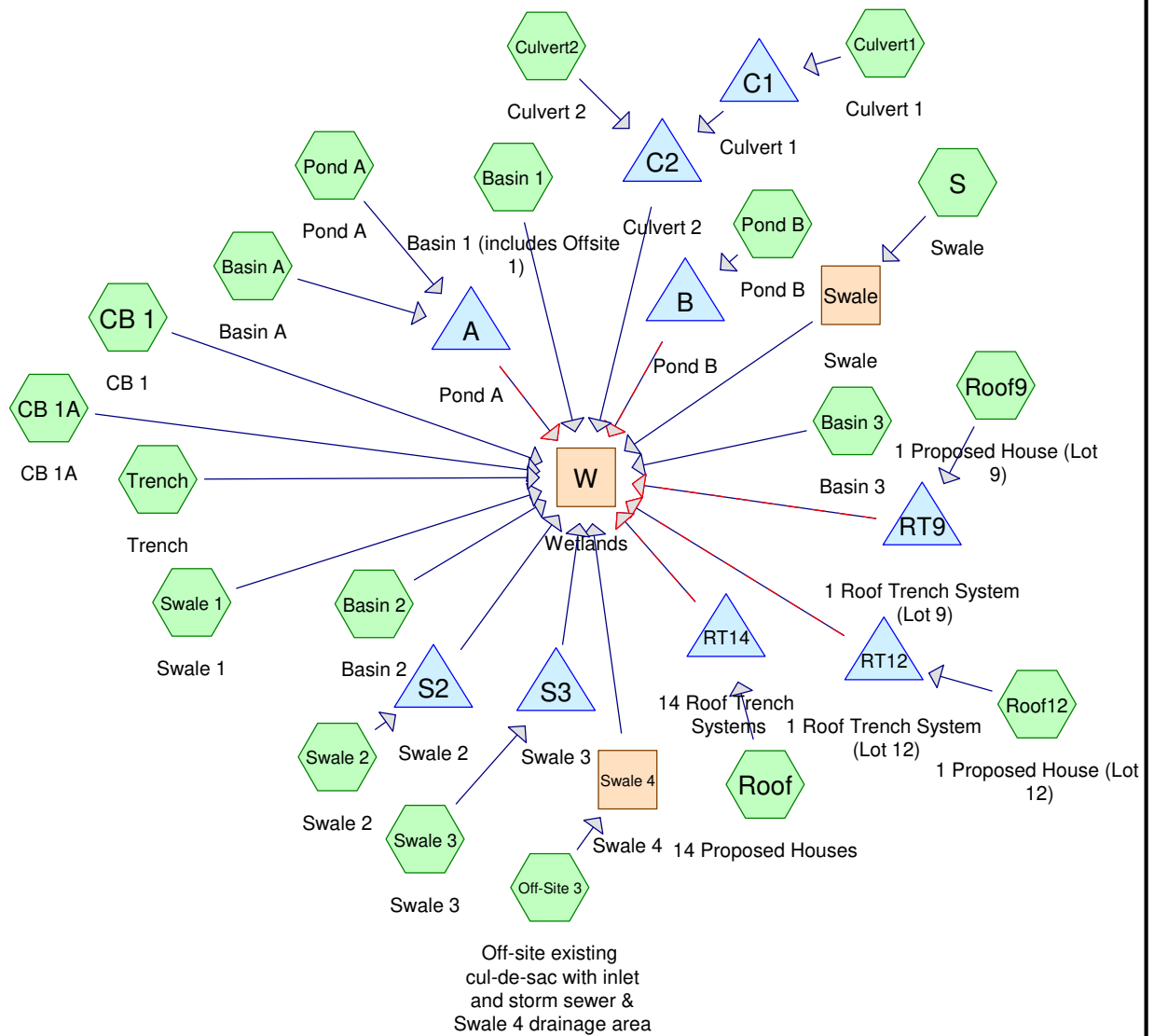
Discarded OutFlow Max=0.02 cfs @ 12.135 hrs HW=41.99' (Free Discharge)
 ↗ **2=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.91 cfs @ 12.135 hrs HW=41.99' TW=0.00' (Dynamic Tailwater)
 ↗ **1=Culvert** (Inlet Controls 0.91 cfs @ 2.38 fps)

Pond S3: Swale 3

Hydrograph





Time span=0.000-24.000 hrs, dt=0.0001 hrs, 240001 points x 2
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment Basin 1: Basin 1	Runoff Area=2.650 ac 9.81% Impervious Runoff Depth>2.45" Flow Length=210' Tc=7.9 min CN=77 Runoff=7.14 cfs 0.542 af
Subcatchment Basin 2: Basin 2	Runoff Area=0.810 ac 4.94% Impervious Runoff Depth>2.37" Tc=6.0 min CN=76 Runoff=2.25 cfs 0.160 af
Subcatchment Basin 3: Basin 3	Runoff Area=1.030 ac 12.62% Impervious Runoff Depth>2.54" Tc=6.0 min CN=78 Runoff=3.08 cfs 0.218 af
Subcatchment Basin A: Basin A	Runoff Area=1.020 ac 49.02% Impervious Runoff Depth>3.28" Tc=6.0 min CN=86 Runoff=3.89 cfs 0.279 af
Subcatchment CB 1: CB 1	Runoff Area=0.260 ac 23.08% Impervious Runoff Depth>2.72" Tc=6.0 min CN=80 Runoff=0.83 cfs 0.059 af
Subcatchment CB 1A: CB 1A	Runoff Area=0.300 ac 33.33% Impervious Runoff Depth>2.90" Flow Length=160' Tc=7.7 min CN=82 Runoff=0.96 cfs 0.072 af
Subcatchment Culvert1: Culvert 1	Runoff Area=0.530 ac 9.43% Impervious Runoff Depth>2.37" Tc=6.0 min CN=76 Runoff=1.47 cfs 0.105 af
Subcatchment Culvert2: Culvert 2	Runoff Area=0.400 ac 5.00% Impervious Runoff Depth>2.29" Tc=6.0 min CN=75 Runoff=1.07 cfs 0.076 af
Subcatchment Off-Site 3: Off-site	Runoff Area=3.720 ac 19.89% Impervious Runoff Depth>2.63" Flow Length=560' Tc=6.8 min CN=79 Runoff=11.18 cfs 0.814 af
Subcatchment Pond A: Pond A	Runoff Area=0.740 ac 52.70% Impervious Runoff Depth>3.48" Tc=6.0 min CN=88 Runoff=2.96 cfs 0.214 af
Subcatchment Pond B: Pond B	Runoff Area=0.450 ac 53.33% Impervious Runoff Depth>3.38" Tc=6.0 min CN=87 Runoff=1.76 cfs 0.127 af
Subcatchment Roof: 14 Proposed	Runoff Area=0.500 ac 100.00% Impervious Runoff Depth>4.56" Tc=10.0 min CN=98 Runoff=2.06 cfs 0.190 af
Subcatchment Roof12: 1 Proposed	Runoff Area=0.030 ac 100.00% Impervious Runoff Depth>4.56" Tc=10.0 min CN=98 Runoff=0.12 cfs 0.011 af
Subcatchment Roof9: 1 Proposed	Runoff Area=0.030 ac 100.00% Impervious Runoff Depth>4.56" Tc=10.0 min CN=98 Runoff=0.12 cfs 0.011 af
Subcatchment S: Swale	Runoff Area=0.090 ac 33.33% Impervious Runoff Depth>2.90" Tc=6.0 min CN=82 Runoff=0.31 cfs 0.022 af
Subcatchment Swale 1: Swale 1	Runoff Area=0.220 ac 0.00% Impervious Runoff Depth>2.20" Flow Length=706' Tc=17.5 min CN=74 Runoff=0.40 cfs 0.040 af
Subcatchment Swale 2: Swale 2	Runoff Area=1.270 ac 10.24% Impervious Runoff Depth>2.63" Tc=6.0 min CN=79 Runoff=3.93 cfs 0.278 af

Subcatchment Swale 3: Swale 3 Runoff Area=0.670 ac 8.96% Impervious Runoff Depth>2.37"
Tc=6.0 min CN=76 Runoff=1.86 cfs 0.132 af

Subcatchment Trench: Trench Runoff Area=0.240 ac 16.67% Impervious Runoff Depth>2.45"
Flow Length=646' Tc=8.9 min CN=77 Runoff=0.62 cfs 0.049 af

Reach Swale: Swale Avg. Flow Depth=0.10' Max Vel=0.96 fps Inflow=0.31 cfs 0.022 af
n=0.022 L=100.0' S=0.0050 '/' Capacity=2.04 cfs Outflow=0.30 cfs 0.022 af

Reach Swale 4: Swale 4 Avg. Flow Depth=0.55' Max Vel=3.47 fps Inflow=11.18 cfs 0.814 af
n=0.030 L=350.0' S=0.0157 '/' Capacity=33.54 cfs Outflow=10.88 cfs 0.813 af

Reach W: Wetlands Inflow=35.38 cfs 2.898 af
Outflow=35.38 cfs 2.898 af

Pond A: Pond A Peak Elev=38.60' Storage=9,076 cf Inflow=6.85 cfs 0.493 af
Discarded=0.20 cfs 0.136 af Primary=1.48 cfs 0.277 af Secondary=0.00 cfs 0.000 af Outflow=1.67 cfs 0.413 af

Pond B: Pond B Peak Elev=39.23' Storage=1,494 cf Inflow=1.76 cfs 0.127 af
Discarded=0.04 cfs 0.029 af Primary=1.05 cfs 0.080 af Secondary=0.00 cfs 0.000 af Outflow=1.10 cfs 0.110 af

Pond C1: Culvert 1 Peak Elev=39.36' Storage=88 cf Inflow=1.47 cfs 0.105 af
18.0" Round Culvert n=0.013 L=40.0' S=0.0050 '/' Outflow=1.43 cfs 0.105 af

Pond C2: Culvert 2 Peak Elev=39.03' Storage=77 cf Inflow=2.49 cfs 0.181 af
18.0" Round Culvert n=0.013 L=129.0' S=0.0256 '/' Outflow=2.47 cfs 0.181 af

Pond RT12: 1 Roof Trench System (Lot 12) Peak Elev=1.75' Storage=226 cf Inflow=0.12 cfs 0.011 af
Discarded=0.01 cfs 0.009 af Primary=0.00 cfs 0.000 af Outflow=0.01 cfs 0.009 af

Pond RT14: 14 Roof Trench Systems Peak Elev=3.15' Storage=3,530 cf Inflow=2.06 cfs 0.190 af
Discarded=0.09 cfs 0.134 af Primary=0.39 cfs 0.014 af Outflow=0.48 cfs 0.148 af

Pond RT9: 1 Roof Trench System (Lot 9) Peak Elev=3.29' Storage=135 cf Inflow=0.12 cfs 0.011 af
Discarded=0.00 cfs 0.005 af Primary=0.12 cfs 0.004 af Outflow=0.12 cfs 0.009 af

Pond S2: Swale 2 Peak Elev=41.66' Storage=838 cf Inflow=3.93 cfs 0.278 af
Discarded=0.04 cfs 0.025 af Primary=3.06 cfs 0.252 af Outflow=3.11 cfs 0.277 af

Pond S3: Swale 3 Peak Elev=42.20' Storage=302 cf Inflow=1.86 cfs 0.132 af
Discarded=0.02 cfs 0.015 af Primary=1.67 cfs 0.117 af Outflow=1.69 cfs 0.132 af

Total Runoff Area = 14.960 ac Runoff Volume = 3.399 af Average Runoff Depth = 2.73"
77.61% Pervious = 11.610 ac 22.39% Impervious = 3.350 ac

Summary for Subcatchment Basin 1: Basin 1 (includes Offsite 1)

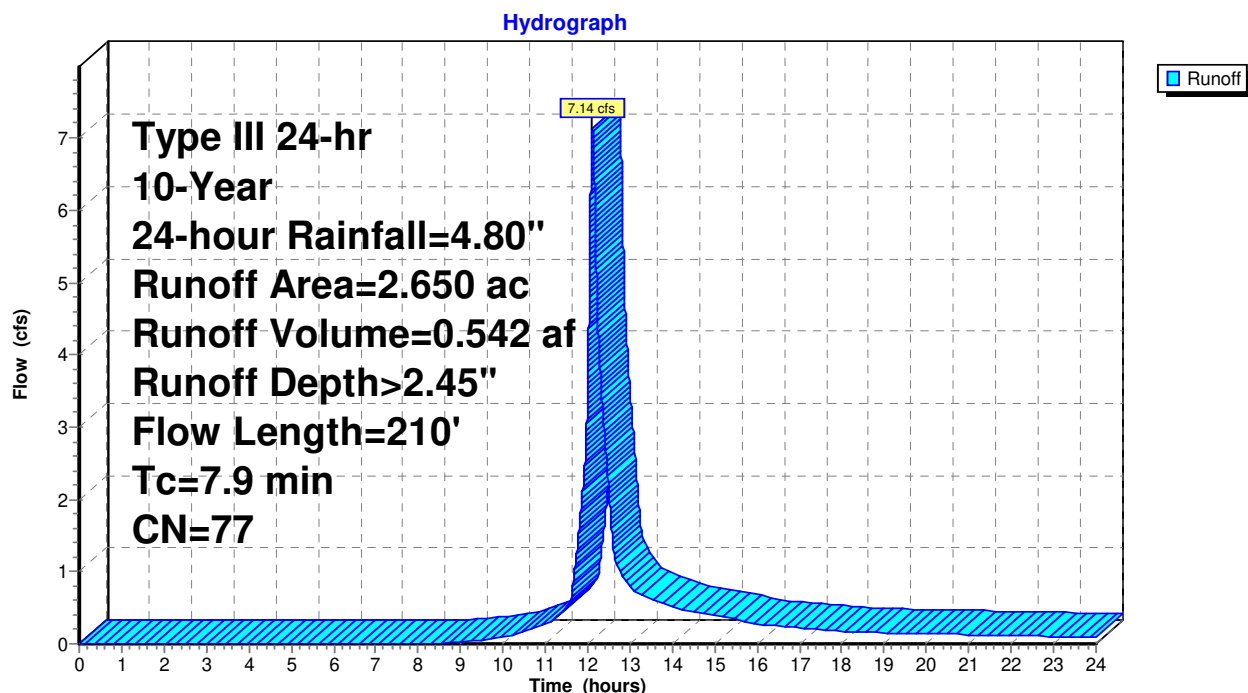
Runoff = 7.14 cfs @ 12.113 hrs, Volume= 0.542 af, Depth> 2.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 10-Year, 24-hour Rainfall=4.80"

Area (ac)	CN	Description
0.720	73	Woods, Fair, HSG C
0.190	79	Woods, Fair, HSG D
* 0.190	98	Driveway/Road
0.130	80	>75% Grass cover, Good, HSG D
0.730	74	>75% Grass cover, Good, HSG C
* 0.070	73	Offsite 1 Woods, Fair, HSG C
* 0.010	98	Offsite 1 Driveway/Road
* 0.550	74	Offsite 1 >75% Grass cover, Good, HSG C
* 0.060	98	Offsite 1 Buildings
2.650	77	Weighted Average
2.390		90.19% Pervious Area
0.260		9.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.2	50	0.0250	0.12		Sheet Flow, Grass: Dense n= 0.240 P2= 3.50"
0.7	160	0.0500	3.60		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
7.9	210	Total			

Subcatchment Basin 1: Basin 1 (includes Offsite 1)



Summary for Subcatchment Basin 2: Basin 2

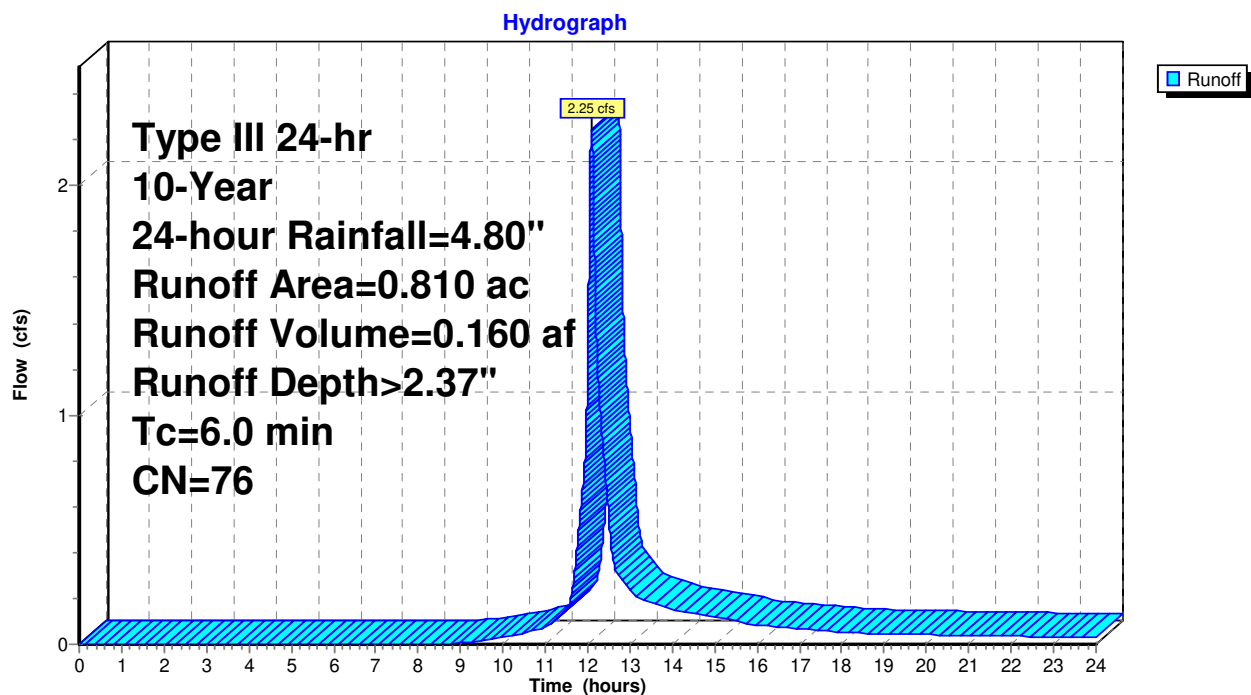
Runoff = 2.25 cfs @ 12.087 hrs, Volume= 0.160 af, Depth> 2.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 10-Year, 24-hour Rainfall=4.80"

Area (ac)	CN	Description
0.140	73	Woods, Fair, HSG C
0.100	79	Woods, Fair, HSG D
* 0.430	74	>75% Grass cover, Good, HSG C
0.100	80	>75% Grass cover, Good, HSG D
* 0.040	98	driveway/road
0.810	76	Weighted Average
0.770		95.06% Pervious Area
0.040		4.94% Impervious Area

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

Subcatchment Basin 2: Basin 2



Summary for Subcatchment Basin 3: Basin 3

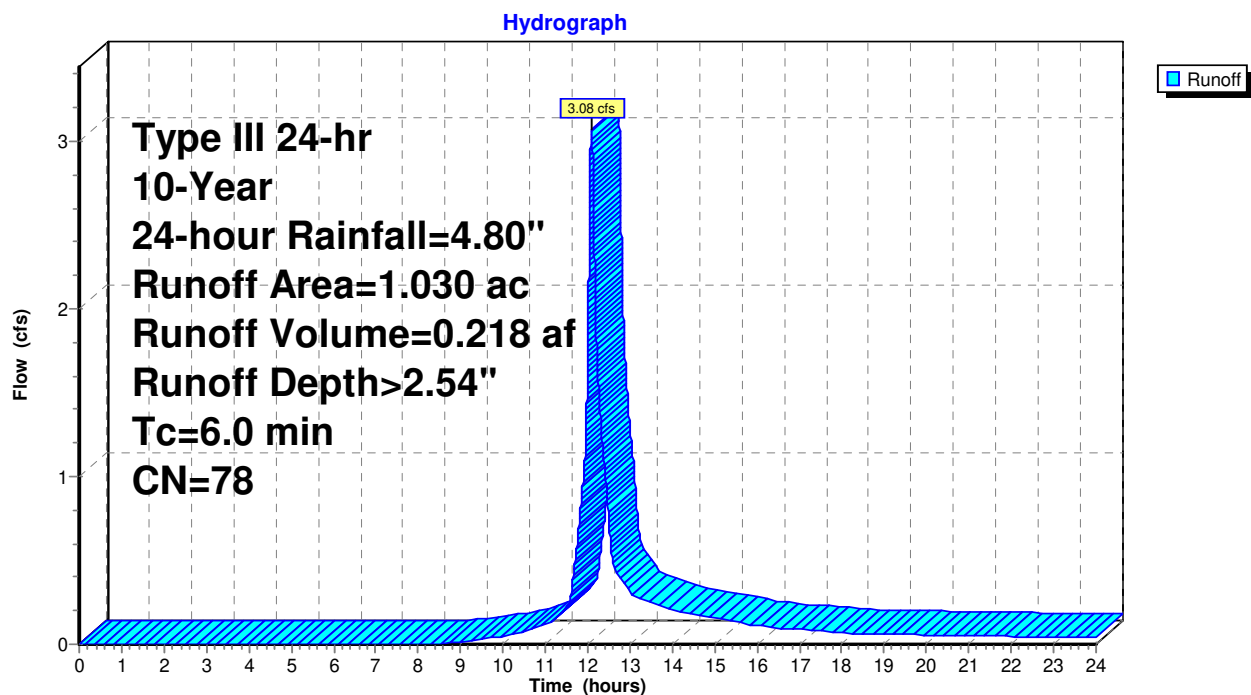
Runoff = 3.08 cfs @ 12.087 hrs, Volume= 0.218 af, Depth> 2.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 10-Year, 24-hour Rainfall=4.80"

Area (ac)	CN	Description
0.100	73	Woods, Fair, HSG C
0.140	79	Woods, Fair, HSG D
0.580	74	>75% Grass cover, Good, HSG C
0.080	80	>75% Grass cover, Good, HSG D
* 0.130	98	Driveway/road
1.030	78	Weighted Average
0.900		87.38% Pervious Area
0.130		12.62% Impervious Area

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

Subcatchment Basin 3: Basin 3



Summary for Subcatchment Basin A: Basin A

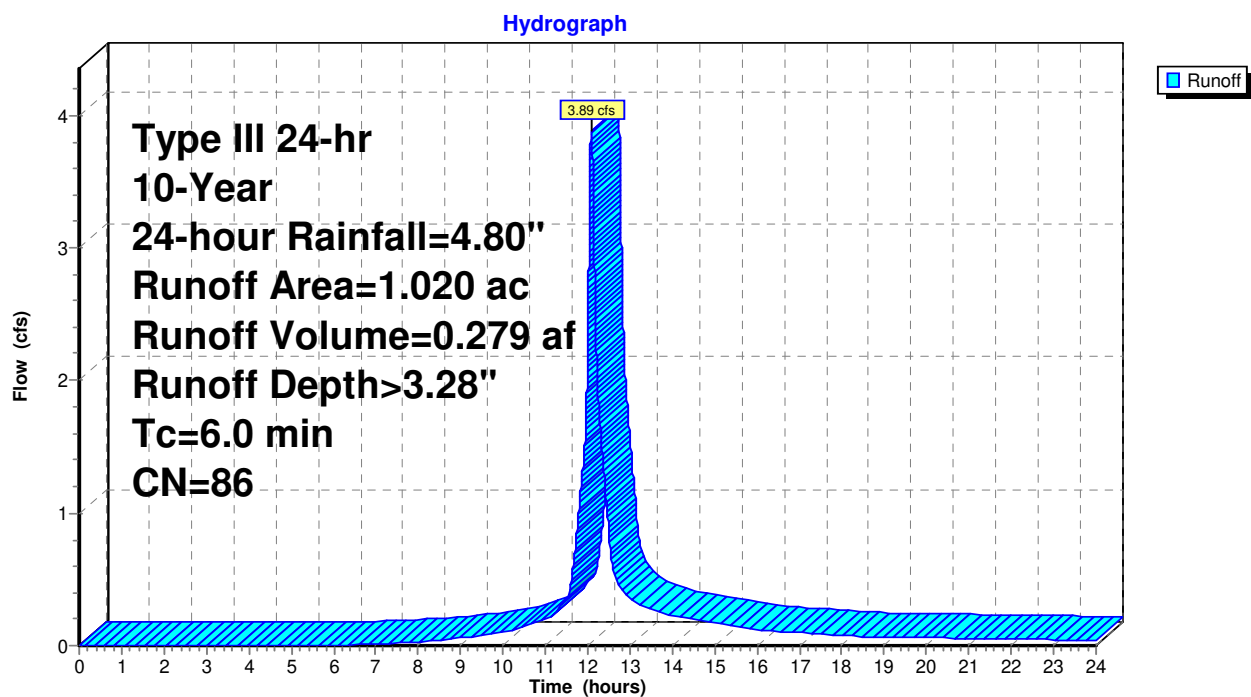
Runoff = 3.89 cfs @ 12.087 hrs, Volume= 0.279 af, Depth> 3.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 10-Year, 24-hour Rainfall=4.80"

Area (ac)	CN	Description
* 0.500	98	Driveway/Road
0.520	74	>75% Grass cover, Good, HSG C
1.020	86	Weighted Average
0.520		50.98% Pervious Area
0.500		49.02% Impervious Area

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

Subcatchment Basin A: Basin A



Summary for Subcatchment CB 1: CB 1

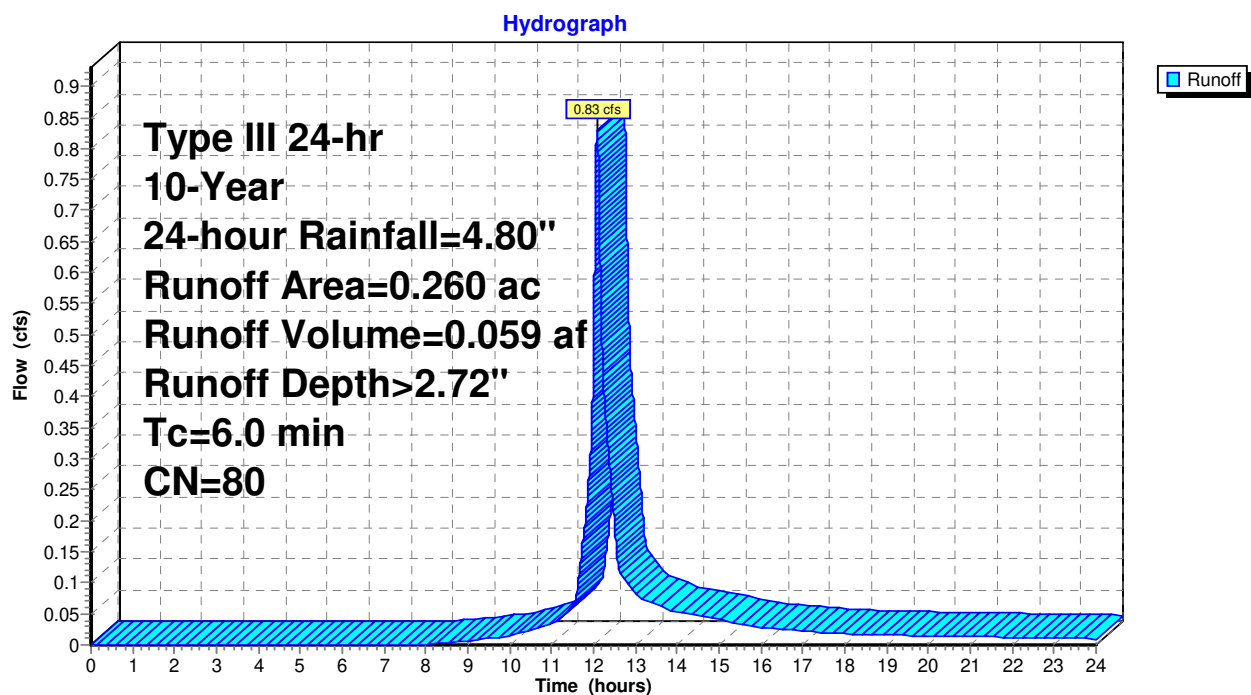
Runoff = 0.83 cfs @ 12.087 hrs, Volume= 0.059 af, Depth> 2.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 10-Year, 24-hour Rainfall=4.80"

Area (ac)	CN	Description
0.190	74	>75% Grass cover, Good, HSG C
0.010	73	Woods, Fair, HSG C
* 0.060	98	Impervious
0.260	80	Weighted Average
0.200		76.92% Pervious Area
0.060		23.08% Impervious Area

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

Subcatchment CB 1: CB 1



Summary for Subcatchment CB 1A: CB 1A

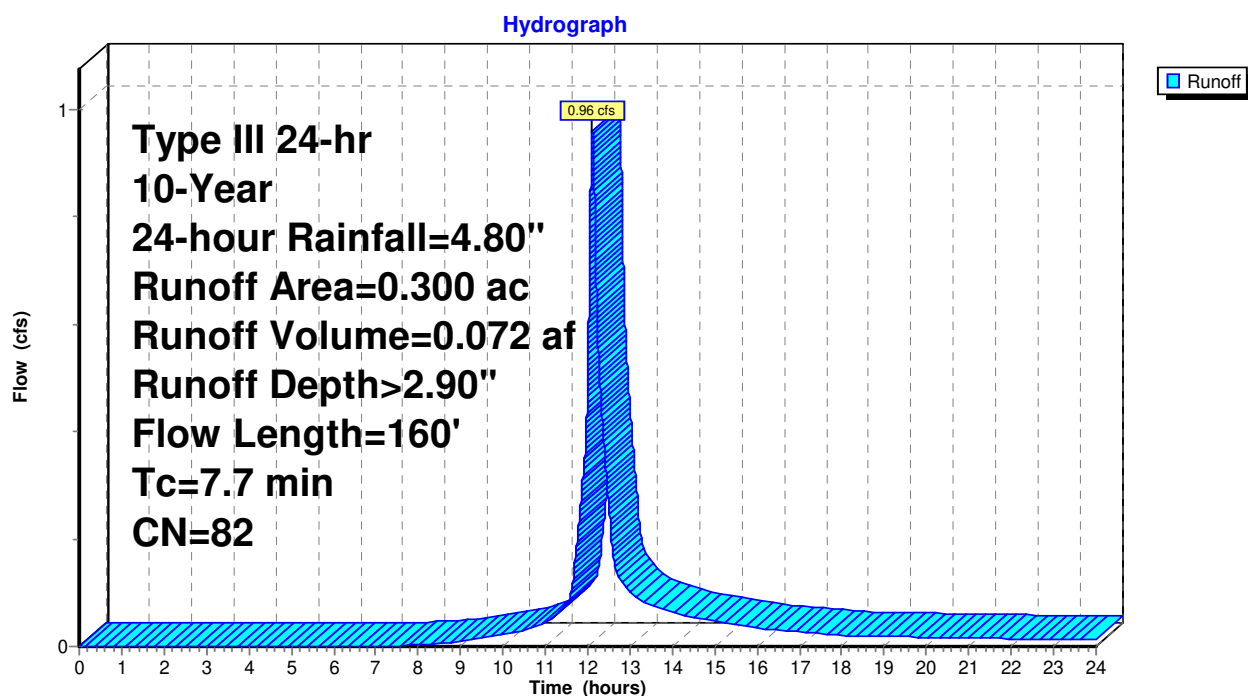
Runoff = 0.96 cfs @ 12.106 hrs, Volume= 0.072 af, Depth> 2.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 10-Year, 24-hour Rainfall=4.80"

Area (ac)	CN	Description
* 0.100	98	Impervious
0.020	73	Woods, Fair, HSG C
0.180	74	>75% Grass cover, Good, HSG C
0.300	82	Weighted Average
0.200		66.67% Pervious Area
0.100		33.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.2	45	0.0200	0.10		Sheet Flow, Grass: Dense n= 0.240 P2= 3.50"
0.3	75	0.0700	4.26		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.2	40	0.0050	3.21	2.52	Pipe Channel, 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
7.7	160	Total			

Subcatchment CB 1A: CB 1A



Summary for Subcatchment Culvert1: Culvert 1

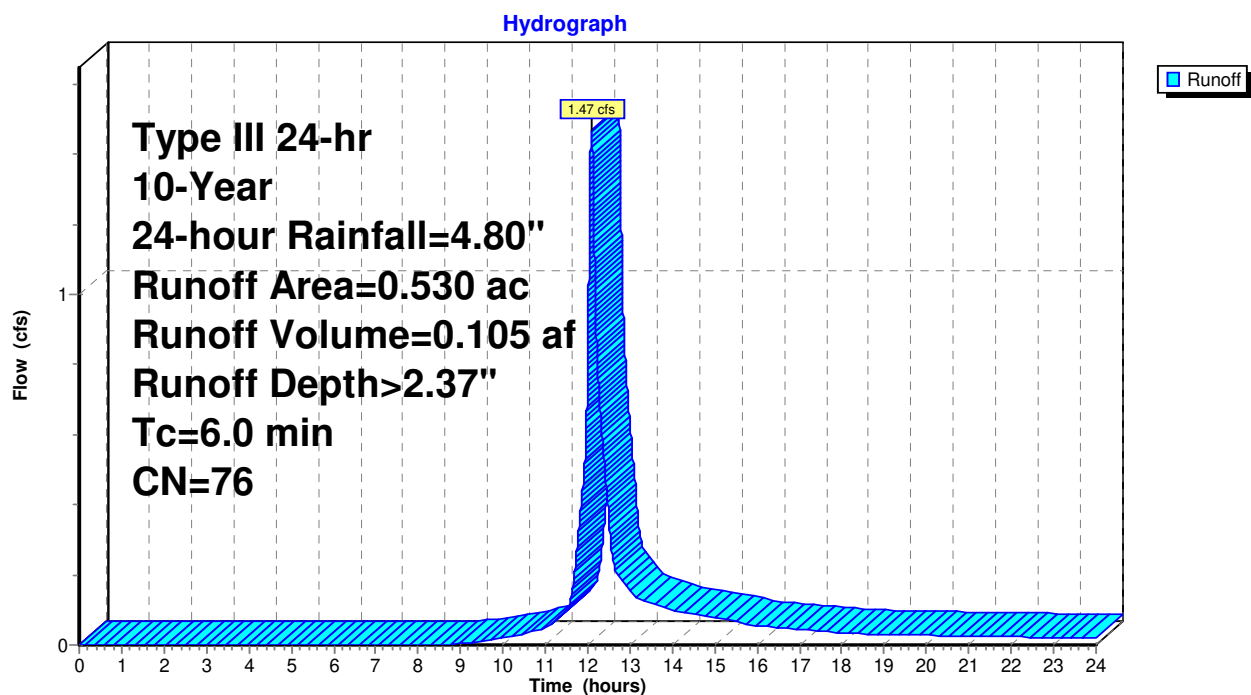
Runoff = 1.47 cfs @ 12.087 hrs, Volume= 0.105 af, Depth> 2.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 10-Year, 24-hour Rainfall=4.80"

Area (ac)	CN	Description
0.070	73	Woods, Fair, HSG C
* 0.050	98	Impervious
0.410	74	>75% Grass cover, Good, HSG C
0.530	76	Weighted Average
0.480		90.57% Pervious Area
0.050		9.43% Impervious Area

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

Subcatchment Culvert1: Culvert 1



Summary for Subcatchment Culvert2: Culvert 2

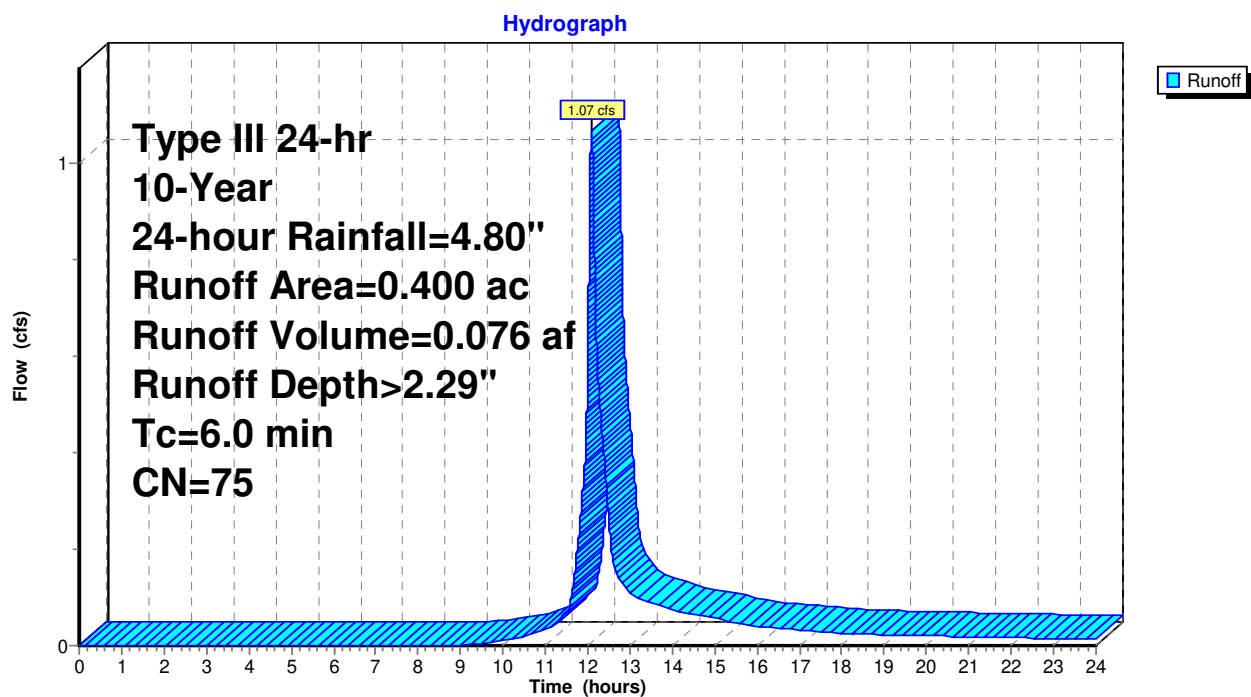
Runoff = 1.07 cfs @ 12.087 hrs, Volume= 0.076 af, Depth> 2.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 10-Year, 24-hour Rainfall=4.80"

Area (ac)	CN	Description
* 0.020	98	Impervious
0.380	74	>75% Grass cover, Good, HSG C
0.400	75	Weighted Average
0.380		95.00% Pervious Area
0.020		5.00% Impervious Area

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

Subcatchment Culvert2: Culvert 2



Summary for Subcatchment Off-Site 3: Off-site existing cul-de-sac with inlet and storm sewer & Swale 4 drainage area

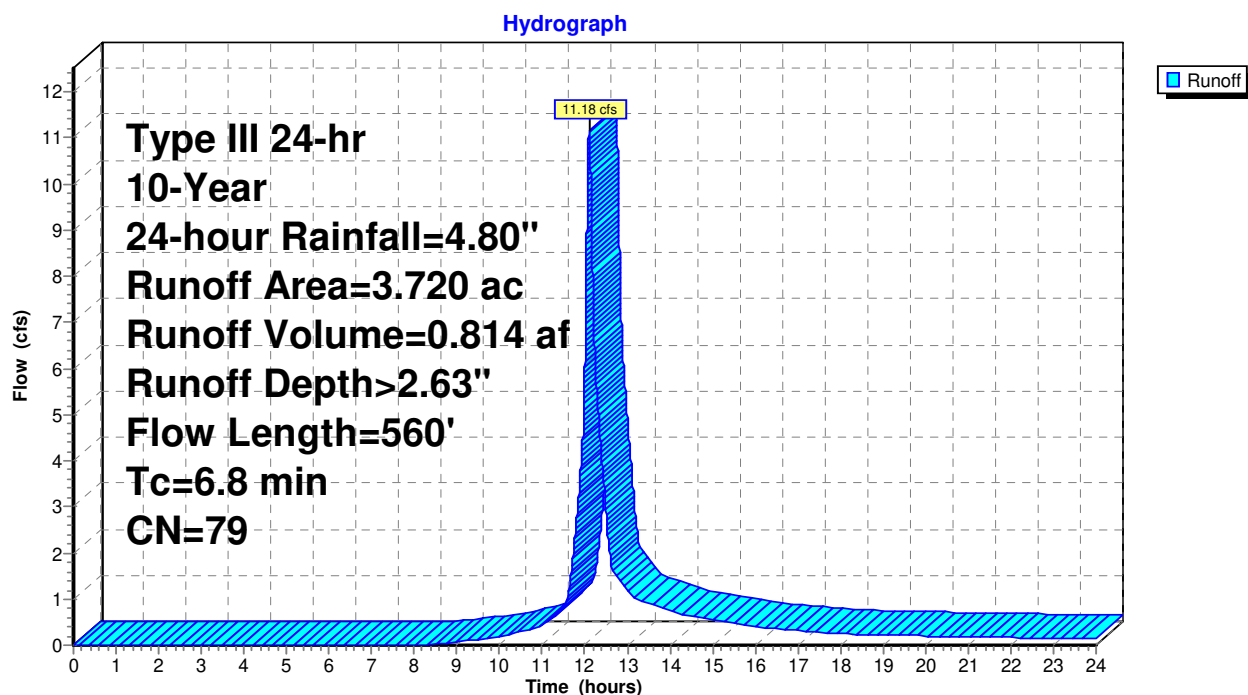
Runoff = 11.18 cfs @ 12.096 hrs, Volume= 0.814 af, Depth> 2.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 10-Year, 24-hour Rainfall=4.80"

Area (ac)	CN	Description
1.560	74	>75% Grass cover, Good, HSG C
* 0.220	98	Buildings
* 0.490	98	Driveway/Roads
* 0.030	98	Swale 4- Existing Impervious
* 1.230	74	Swale 4 ->75% Grass cover, Good, HSG C
* 0.190	73	Swale 4- Woods, Fair, HSG C
3.720	79	Weighted Average
2.980		80.11% Pervious Area
0.740		19.89% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	50	0.0030	0.59		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.50"
4.8	320	0.0030	1.11		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.4	140	0.0100	5.36	4.21	Pipe Channel, 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
0.2	50	0.0500	3.60		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
6.8	560	Total			

Subcatchment Off-Site 3: Off-site existing cul-de-sac with inlet and storm sewer & Swale 4 drainage area



Summary for Subcatchment Pond A: Pond A

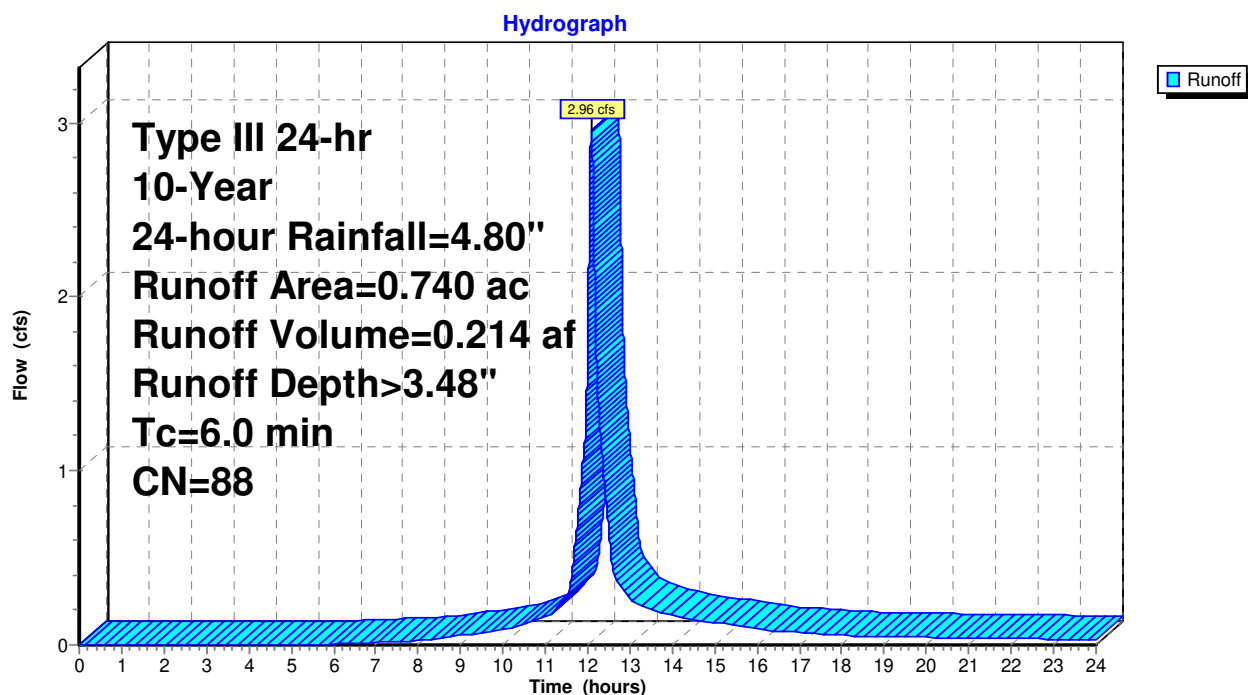
Runoff = 2.96 cfs @ 12.087 hrs, Volume= 0.214 af, Depth> 3.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 10-Year, 24-hour Rainfall=4.80"

Area (ac)	CN	Description
* 0.180	98	Driveway/Road
0.230	74	>75% Grass cover, Good, HSG C
0.120	80	>75% Grass cover, Good, HSG D
* 0.210	98	Pond
0.740	88	Weighted Average
0.350		47.30% Pervious Area
0.390		52.70% Impervious Area

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

Subcatchment Pond A: Pond A



Summary for Subcatchment Pond B: Pond B

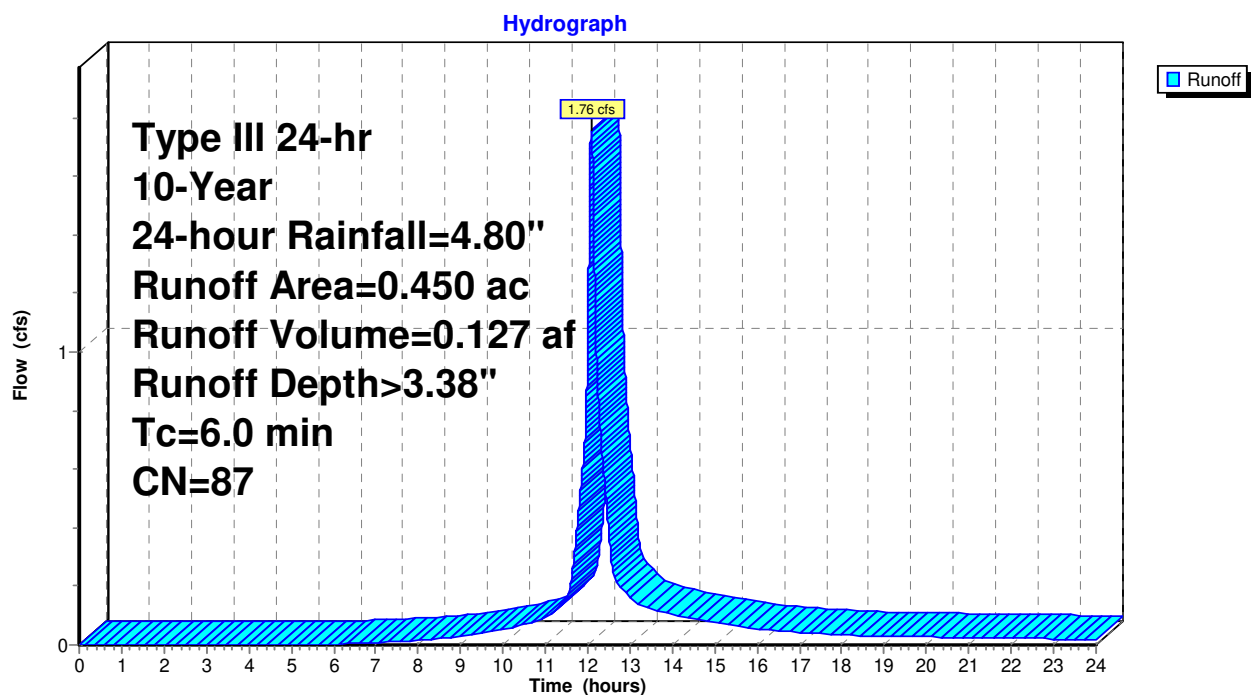
Runoff = 1.76 cfs @ 12.087 hrs, Volume= 0.127 af, Depth> 3.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 10-Year, 24-hour Rainfall=4.80"

Area (ac)	CN	Description
* 0.190	98	Driveway/Road
0.210	74	>75% Grass cover, Good, HSG C
* 0.050	98	Pond
0.450	87	Weighted Average
0.210		46.67% Pervious Area
0.240		53.33% Impervious Area

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

Subcatchment Pond B: Pond B



Summary for Subcatchment Roof: 14 Proposed Houses

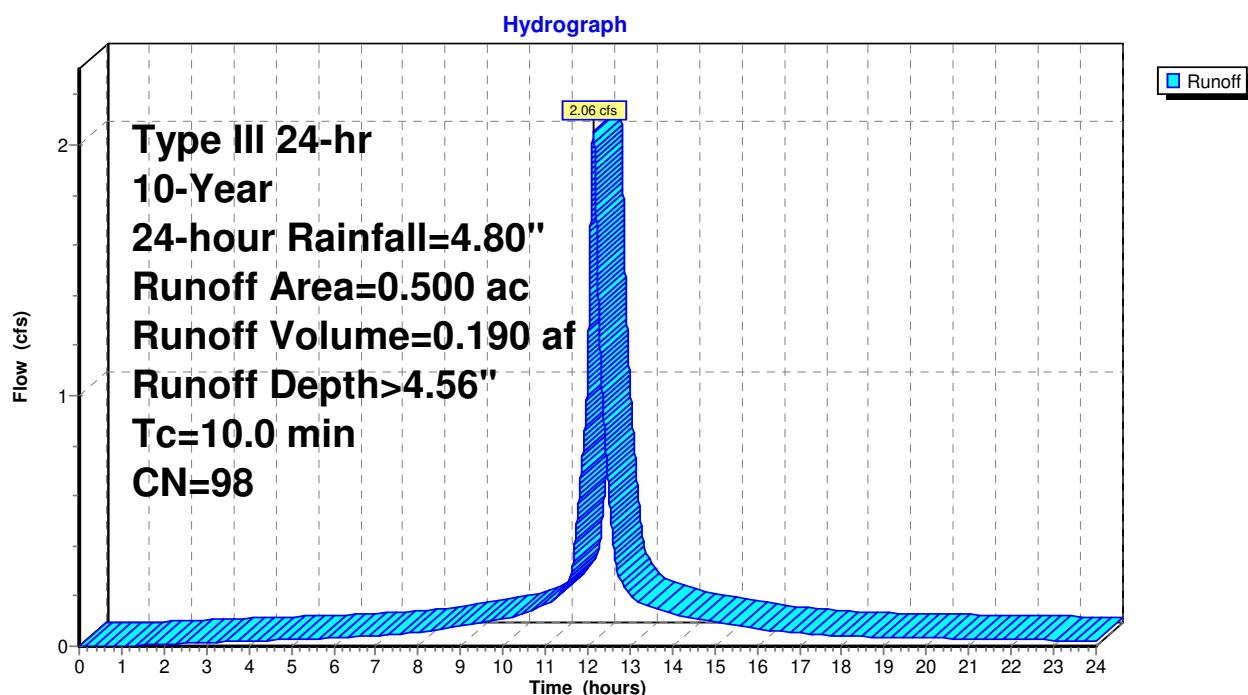
Runoff = 2.06 cfs @ 12.133 hrs, Volume= 0.190 af, Depth> 4.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 10-Year, 24-hour Rainfall=4.80"

Area (ac)	CN	Description
* 0.500	98	Buildings
0.500		100.00% Impervious Area

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

Subcatchment Roof: 14 Proposed Houses



Summary for Subcatchment Roof12: 1 Proposed House (Lot 12)

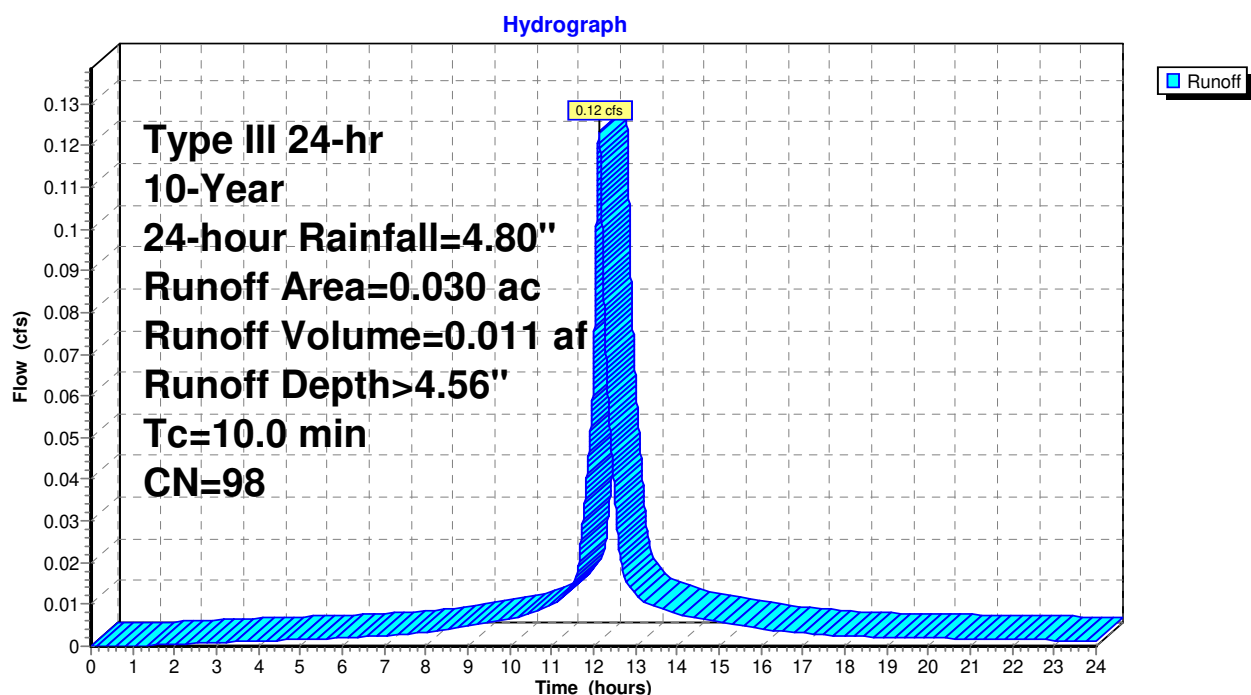
Runoff = 0.12 cfs @ 12.133 hrs, Volume= 0.011 af, Depth> 4.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 10-Year, 24-hour Rainfall=4.80"

Area (ac)	CN	Description
* 0.030	98	Building
0.030		100.00% Impervious Area

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

Subcatchment Roof12: 1 Proposed House (Lot 12)



Summary for Subcatchment Roof9: 1 Proposed House (Lot 9)

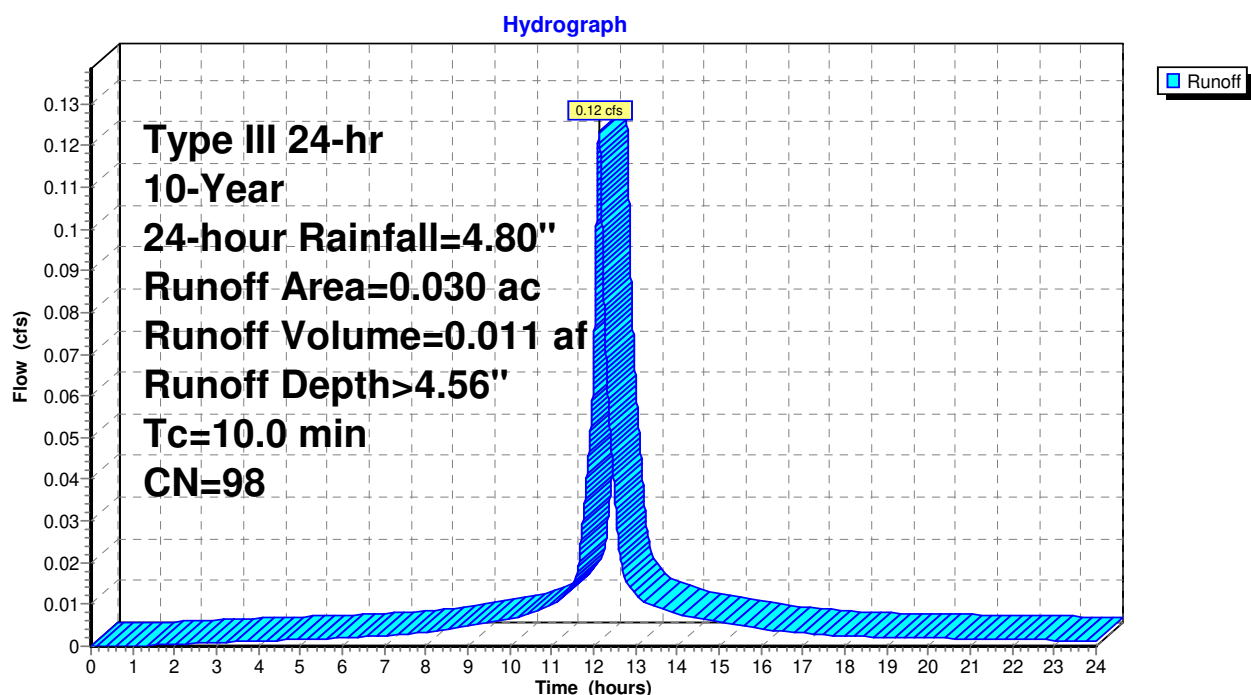
Runoff = 0.12 cfs @ 12.133 hrs, Volume= 0.011 af, Depth> 4.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 10-Year, 24-hour Rainfall=4.80"

Area (ac)	CN	Description
* 0.030	98	Building
0.030		100.00% Impervious Area

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

Subcatchment Roof9: 1 Proposed House (Lot 9)



Summary for Subcatchment S: Swale

Runoff = 0.31 cfs @ 12.087 hrs, Volume= 0.022 af, Depth> 2.90"

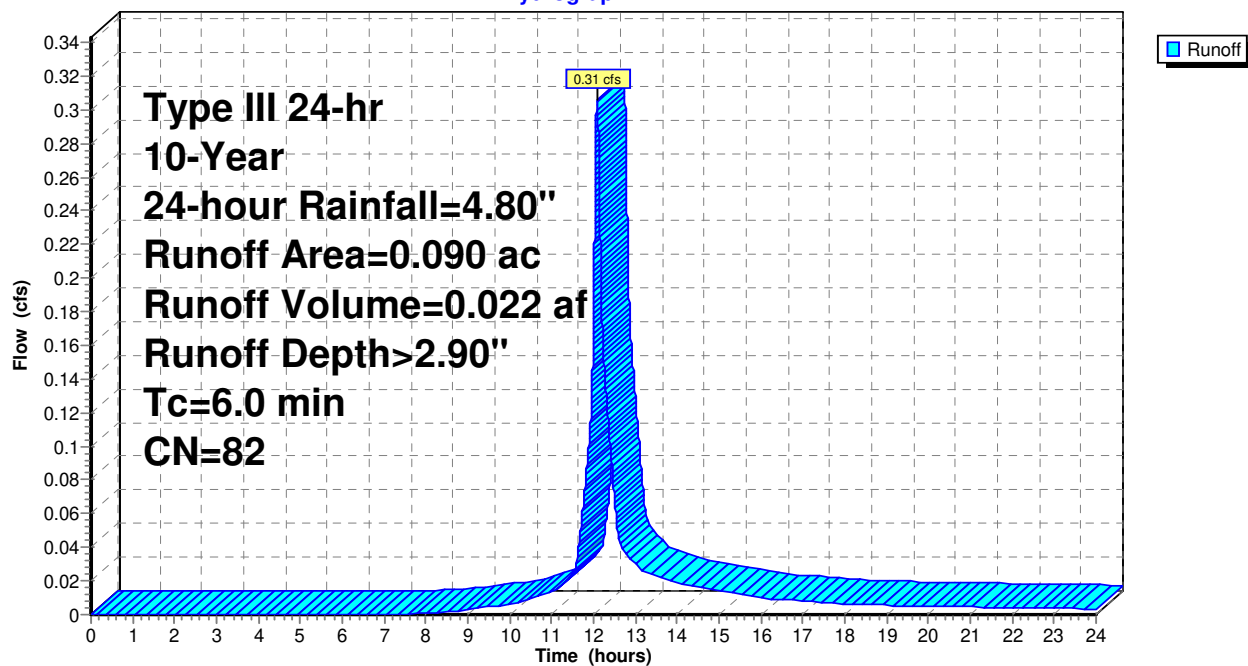
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 10-Year, 24-hour Rainfall=4.80"

Area (ac)	CN	Description
* 0.030	98	Impervious
0.060	74	>75% Grass cover, Good, HSG C
0.090	82	Weighted Average
0.060		66.67% Pervious Area
0.030		33.33% Impervious Area

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

Subcatchment S: Swale

Hydrograph



Summary for Subcatchment Swale 1: Swale 1

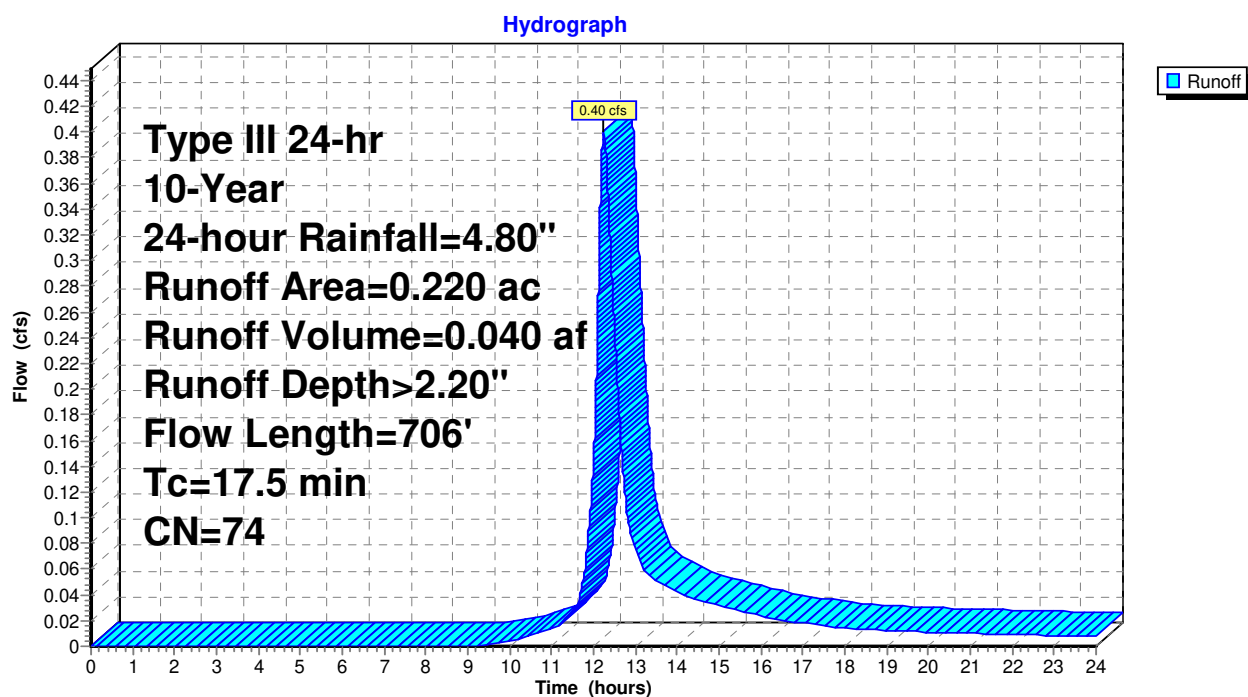
Runoff = 0.40 cfs @ 12.250 hrs, Volume= 0.040 af, Depth> 2.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
Type III 24-hr 10-Year, 24-hour Rainfall=4.80"

Area (ac)	CN	Description
0.150	74	>75% Grass cover, Good, HSG C
0.070	73	Woods, Fair, HSG C
0.220	74	Weighted Average
0.220		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.8	50	0.0200	0.07		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
0.2	130	0.0400	10.73	64.40	Trap/Vee/Rect Channel Flow, Bot.W=4.00' D=1.00' Z= 2.0 '/' Top.W=8.00' n= 0.022 Earth, clean & straight
4.3	132	0.0001	0.51	0.77	Pipe Channel, 12.0" x 18.0" Box Area= 1.5 sf Perim= 5.0' r= 0.30' n= 0.013
0.0	8	0.0125	3.87	1.35	Pipe Channel, 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.013
0.2	34	0.0060	3.51	2.76	Pipe Channel, 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.0	352	0.0060	6.04	18.98	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
17.5	706	Total			

Subcatchment Swale 1: Swale 1



Summary for Subcatchment Swale 2: Swale 2

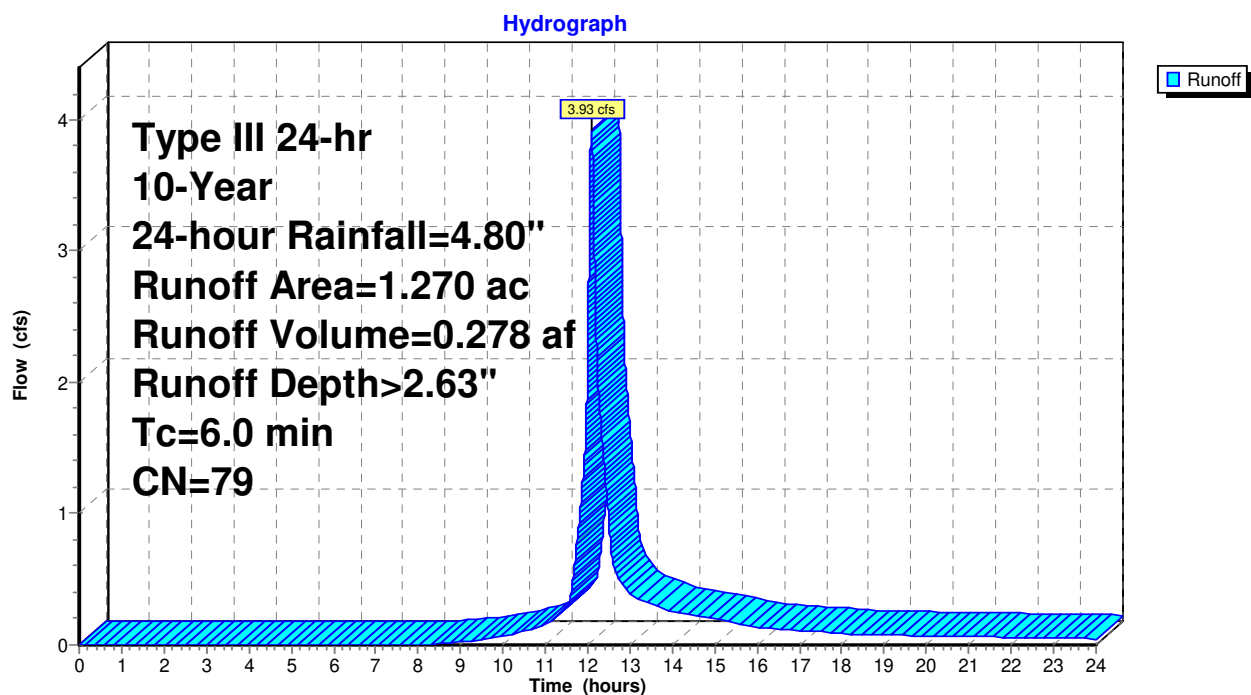
Runoff = 3.93 cfs @ 12.087 hrs, Volume= 0.278 af, Depth> 2.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 10-Year, 24-hour Rainfall=4.80"

Area (ac)	CN	Description
0.790	79	50-75% Grass cover, Fair, HSG C
0.350	73	Woods, Fair, HSG C
* 0.130	98	Existing Buildings
1.270	79	Weighted Average
1.140		89.76% Pervious Area
0.130		10.24% Impervious Area

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

Subcatchment Swale 2: Swale 2



Summary for Subcatchment Swale 3: Swale 3

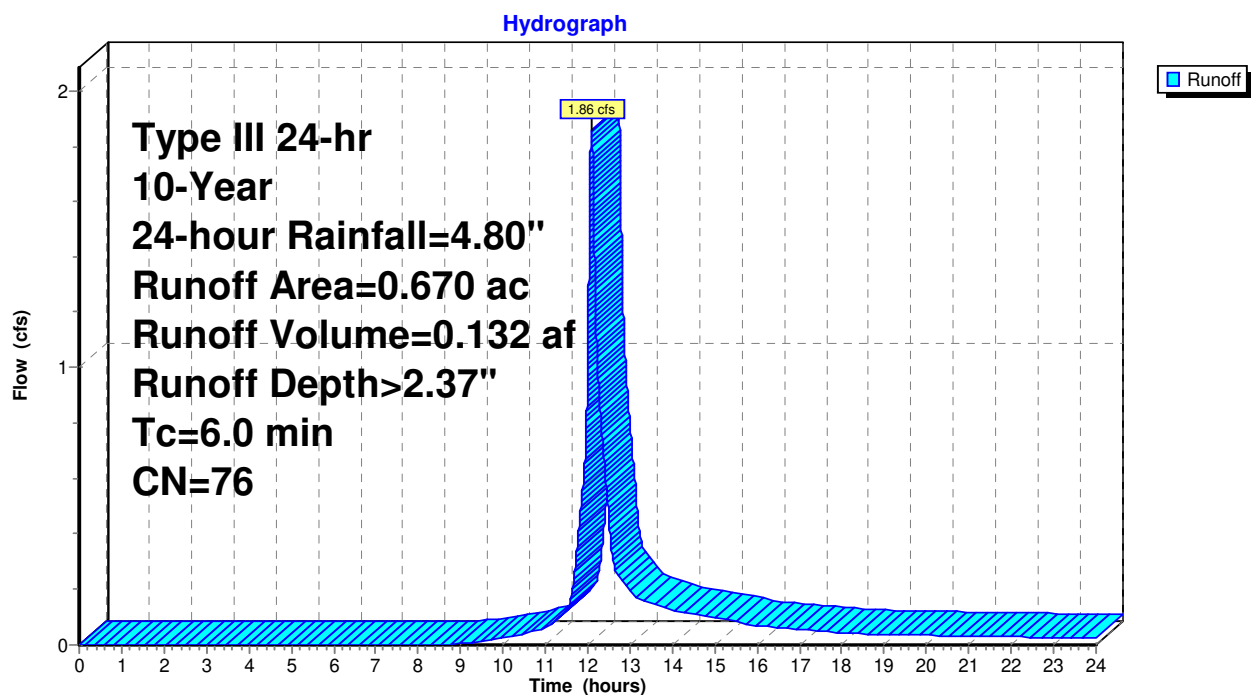
Runoff = 1.86 cfs @ 12.087 hrs, Volume= 0.132 af, Depth> 2.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 10-Year, 24-hour Rainfall=4.80"

Area (ac)	CN	Description
* 0.060	98	Existing Buildings
0.540	74	>75% Grass cover, Good, HSG C
0.070	73	Woods, Fair, HSG C
0.670	76	Weighted Average
0.610		91.04% Pervious Area
0.060		8.96% Impervious Area

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

Subcatchment Swale 3: Swale 3



Summary for Subcatchment Trench: Trench

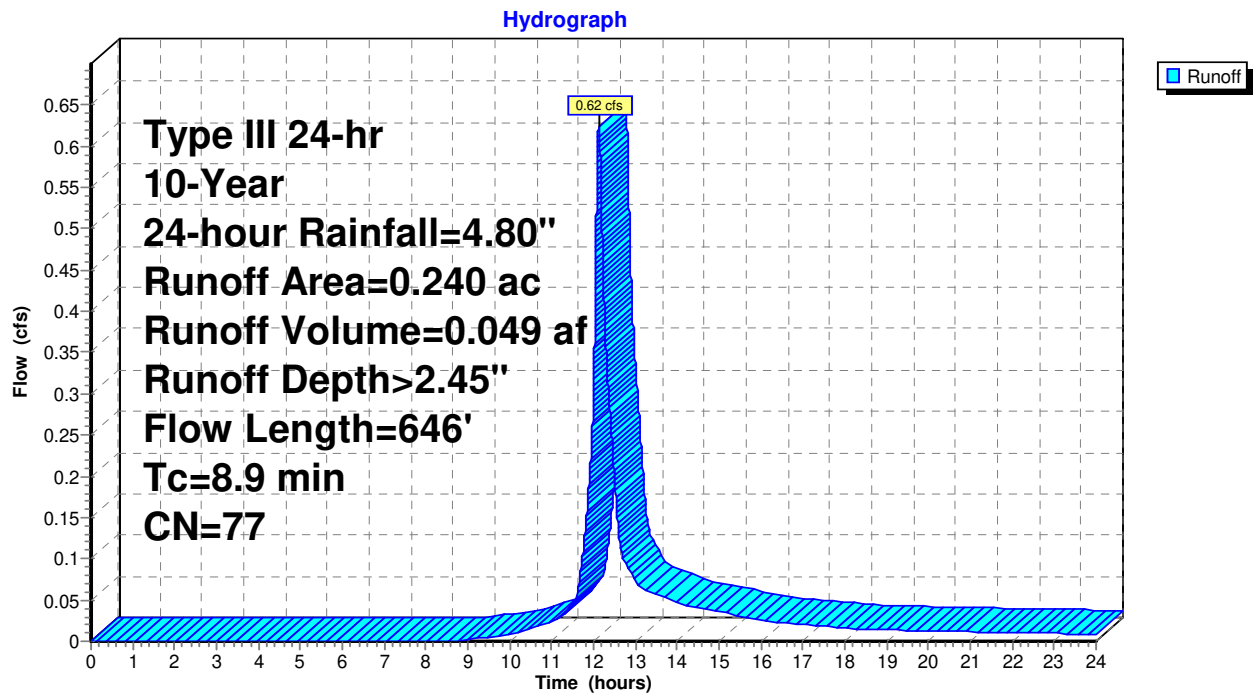
Runoff = 0.62 cfs @ 12.134 hrs, Volume= 0.049 af, Depth> 2.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 10-Year, 24-hour Rainfall=4.80"

Area (ac)	CN	Description
* 0.040	98	Impervious
0.130	73	Woods, Fair, HSG C
0.070	74	>75% Grass cover, Good, HSG C
0.240	77	Weighted Average
0.200		83.33% Pervious Area
0.040		16.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.9	20	0.0400	0.12		Sheet Flow, Grass: Dense n= 0.240 P2= 3.50"
0.5	100	0.0400	3.22		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
4.3	132	0.0001	0.51	0.77	Pipe Channel, 12.0" x 18.0" Box Area= 1.5 sf Perim= 5.0' r= 0.30' n= 0.013
0.0	8	0.0125	3.87	1.35	Pipe Channel, 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.013
0.2	34	0.0060	3.51	2.76	Pipe Channel, 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.0	352	0.0060	6.04	18.98	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
8.9	646	Total			

Subcatchment Trench: Trench



Summary for Reach Swale: Swale

Inflow Area = 0.090 ac, 33.33% Impervious, Inflow Depth > 2.90" for 10-Year, 24-hour event
 Inflow = 0.31 cfs @ 12.087 hrs, Volume= 0.022 af
 Outflow = 0.30 cfs @ 12.106 hrs, Volume= 0.022 af, Atten= 3%, Lag= 1.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs / 2
 Max. Velocity= 0.96 fps, Min. Travel Time= 1.7 min
 Avg. Velocity = 0.25 fps, Avg. Travel Time= 6.5 min

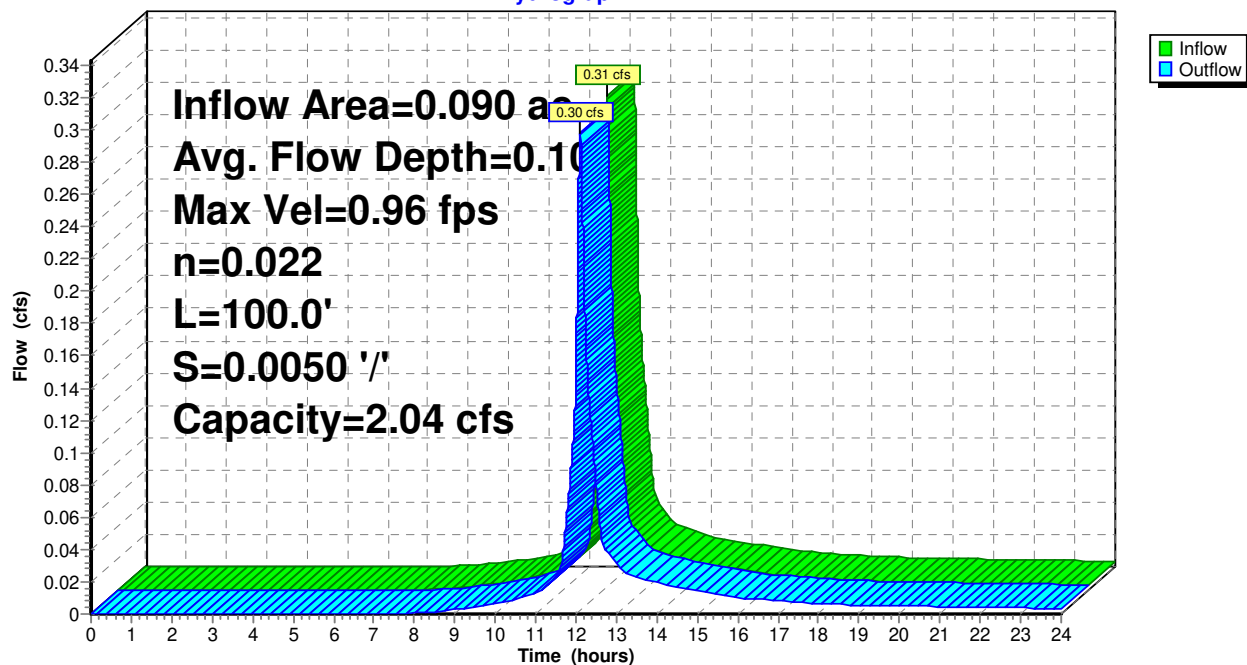
Peak Storage= 31 cf @ 12.106 hrs
 Average Depth at Peak Storage= 0.10'
 Bank-Full Depth= 0.30' Flow Area= 1.1 sf, Capacity= 2.04 cfs

3.00' x 0.30' deep channel, n= 0.022 Earth, clean & straight
 Side Slope Z-value= 2.0 '/' Top Width= 4.20'
 Length= 100.0' Slope= 0.0050 '/'
 Inlet Invert= 38.70', Outlet Invert= 38.20'



Reach Swale: Swale

Hydrograph



Summary for Reach Swale 4: Swale 4

Inflow Area = 3.720 ac, 19.89% Impervious, Inflow Depth > 2.63" for 10-Year, 24-hour event
 Inflow = 11.18 cfs @ 12.096 hrs, Volume= 0.814 af
 Outflow = 10.88 cfs @ 12.119 hrs, Volume= 0.813 af, Atten= 3%, Lag= 1.3 min

Routing by Dyn-Stor-Ind method, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs / 2
 Max. Velocity= 3.47 fps, Min. Travel Time= 1.7 min
 Avg. Velocity = 1.09 fps, Avg. Travel Time= 5.4 min

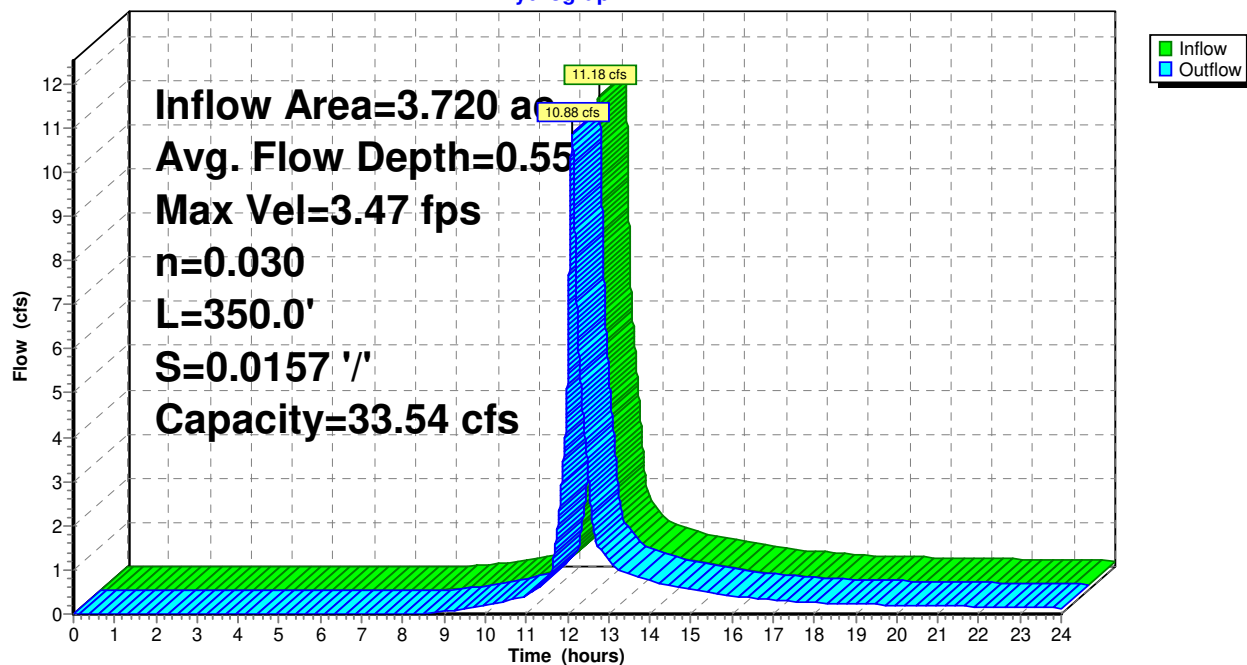
Peak Storage= 1,097 cf @ 12.119 hrs
 Average Depth at Peak Storage= 0.55'
 Bank-Full Depth= 1.00' Flow Area= 7.0 sf, Capacity= 33.54 cfs

4.00' x 1.00' deep channel, n= 0.030
 Side Slope Z-value= 3.0 '/' Top Width= 10.00'
 Length= 350.0' Slope= 0.0157 '/'
 Inlet Invert= 42.50', Outlet Invert= 37.00'



Reach Swale 4: Swale 4

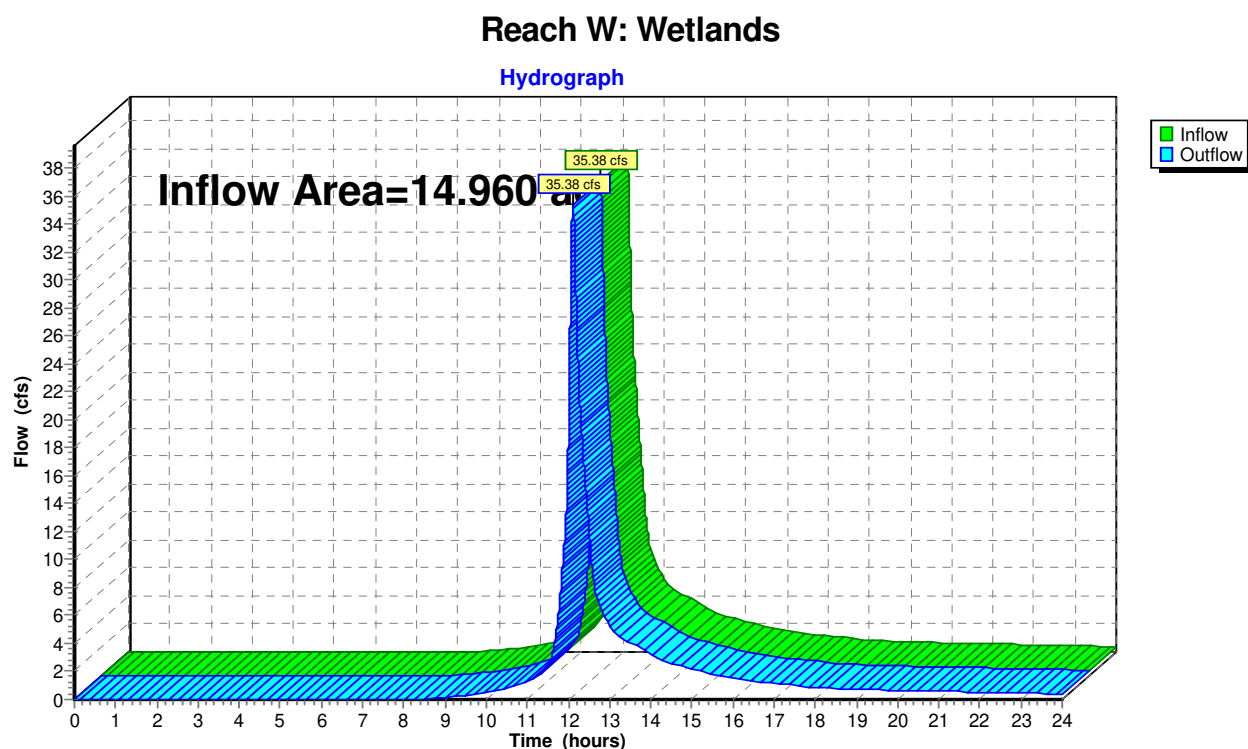
Hydrograph



Summary for Reach W: Wetlands

Inflow Area = 14.960 ac, 22.39% Impervious, Inflow Depth > 2.32" for 10-Year, 24-hour event
Inflow = 35.38 cfs @ 12.113 hrs, Volume= 2.898 af
Outflow = 35.38 cfs @ 12.113 hrs, Volume= 2.898 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs / 2



Summary for Pond A: Pond A

Inflow Area = 1.760 ac, 50.57% Impervious, Inflow Depth > 3.36" for 10-Year, 24-hour event
 Inflow = 6.85 cfs @ 12.087 hrs, Volume= 0.493 af
 Outflow = 1.67 cfs @ 12.476 hrs, Volume= 0.413 af, Atten= 76%, Lag= 23.4 min
 Discarded = 0.20 cfs @ 12.476 hrs, Volume= 0.136 af
 Primary = 1.48 cfs @ 12.476 hrs, Volume= 0.277 af
 Secondary = 0.00 cfs @ 0.000 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs / 2
 Peak Elev= 38.60' @ 12.476 hrs Surf.Area= 8,289 sf Storage= 9,076 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 73.7 min (876.1 - 802.4)

Volume	Invert	Avail.Storage	Storage Description
#1	36.50'	21,290 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
#2	34.50'	515 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
			1,472 cf Overall x 35.0% Voids
		21,805 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
36.50	736	0	0
36.51	2,513	16	16
37.00	3,030	1,358	1,374
38.00	4,111	3,571	4,945
38.50	7,261	2,843	7,788
39.00	8,658	3,980	11,768
40.00	10,387	9,523	21,290

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
34.50	736	0	0
36.50	736	1,472	1,472

Device	Routing	Invert	Outlet Devices
#1	Primary	37.50'	8.0" Round Culvert L= 36.0' Ke= 0.500 Inlet / Outlet Invert= 37.50' / 36.28' S= 0.0339 '/' Cc= 0.900 n= 0.013, Flow Area= 0.35 sf
#2	Discarded	34.50'	1.020 in/hr Exfiltration over Surface area
#3	Secondary	39.35'	5.0' long x 11.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.53 2.59 2.70 2.68 2.67 2.68 2.66 2.64

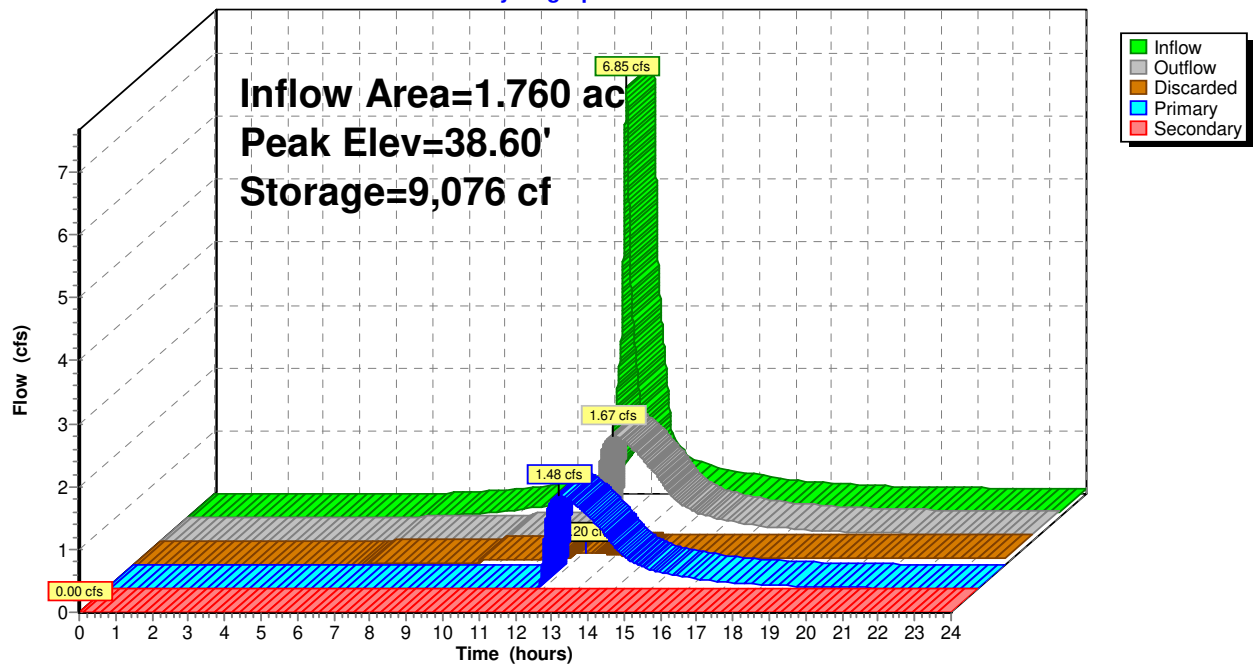
Discarded OutFlow Max=0.20 cfs @ 12.476 hrs HW=38.60' (Free Discharge)
 ↑ **2=Exfiltration** (Exfiltration Controls 0.20 cfs)

Primary OutFlow Max=1.48 cfs @ 12.476 hrs HW=38.60' TW=0.00' (Dynamic Tailwater)
 ↑ **1=Culvert** (Inlet Controls 1.48 cfs @ 4.23 fps)

Secondary OutFlow Max=0.00 cfs @ 0.000 hrs HW=34.50' TW=0.00' (Dynamic Tailwater)
 ↑ **3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond A: Pond A

Hydrograph



Summary for Pond B: Pond B

Inflow Area = 0.450 ac, 53.33% Impervious, Inflow Depth > 3.38" for 10-Year, 24-hour event
 Inflow = 1.76 cfs @ 12.087 hrs, Volume= 0.127 af
 Outflow = 1.10 cfs @ 12.184 hrs, Volume= 0.110 af, Atten= 38%, Lag= 5.9 min
 Discarded = 0.04 cfs @ 12.184 hrs, Volume= 0.029 af
 Primary = 1.05 cfs @ 12.184 hrs, Volume= 0.080 af
 Secondary = 0.00 cfs @ 0.000 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs / 2
 Peak Elev= 39.23' @ 12.184 hrs Surf.Area= 1,816 sf Storage= 1,494 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 41.7 min (843.7 - 802.1)

Volume	Invert	Avail.Storage	Storage Description
#1	37.50'	4,937 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
#2	35.50'	125 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
		358 cf Overall x 35.0% Voids	
		5,062 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
37.50	450	0	0
38.00	613	266	266
39.00	999	806	1,072
39.50	2,413	853	1,925
40.00	3,062	1,369	3,294
40.50	3,511	1,643	4,937

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
35.50	179	0	0
37.50	179	358	358

Device	Routing	Invert	Outlet Devices
#1	Primary	38.50'	8.0" Round Culvert L= 60.0' Ke= 0.500 Inlet / Outlet Invert= 38.50' / 36.90' S= 0.0267 '/' Cc= 0.900 n= 0.013, Flow Area= 0.35 sf
#2	Discarded	35.50'	1.020 in/hr Exfiltration over Surface area
#3	Secondary	39.55'	5.0' long x 12.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

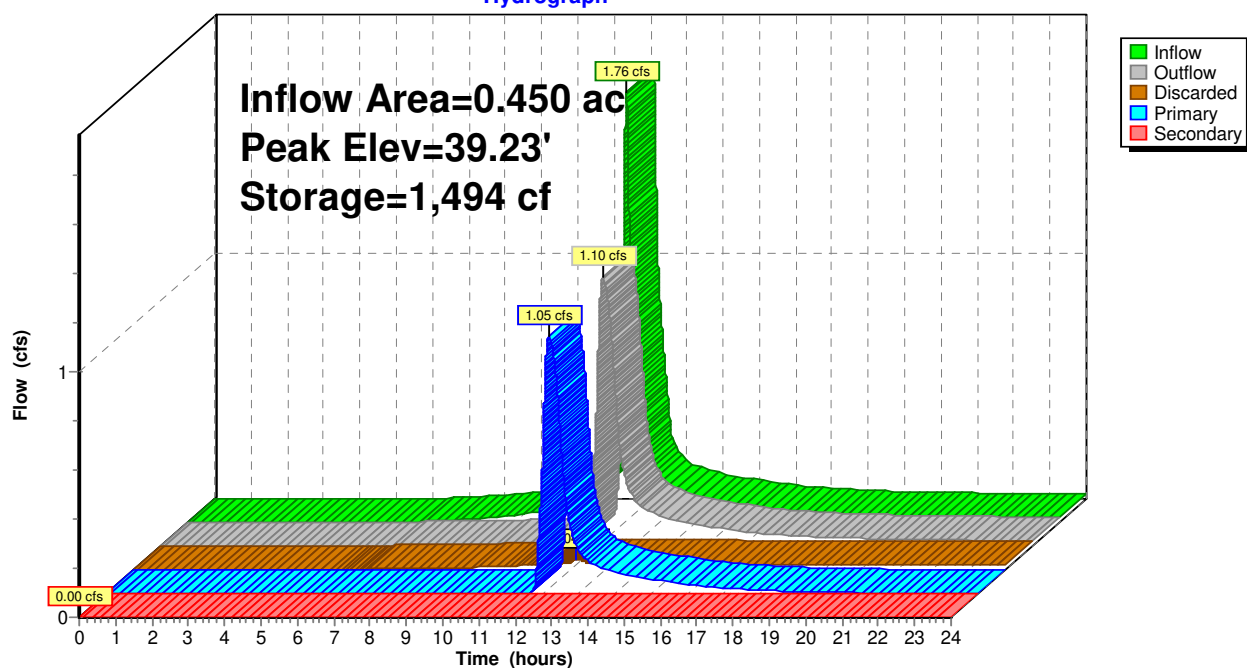
Discarded OutFlow Max=0.04 cfs @ 12.184 hrs HW=39.23' (Free Discharge)
 ↑ **2=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=1.05 cfs @ 12.184 hrs HW=39.23' TW=0.00' (Dynamic Tailwater)
 ↑ **1=Culvert** (Inlet Controls 1.05 cfs @ 3.02 fps)

Secondary OutFlow Max=0.00 cfs @ 0.000 hrs HW=35.50' TW=0.00' (Dynamic Tailwater)
 ↑ **3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond B: Pond B

Hydrograph



Summary for Pond C1: Culvert 1

Inflow Area = 0.530 ac, 9.43% Impervious, Inflow Depth > 2.37" for 10-Year, 24-hour event
 Inflow = 1.47 cfs @ 12.087 hrs, Volume= 0.105 af
 Outflow = 1.43 cfs @ 12.109 hrs, Volume= 0.105 af, Atten= 3%, Lag= 1.3 min
 Primary = 1.43 cfs @ 12.109 hrs, Volume= 0.105 af

Routing by Dyn-Stor-Ind method, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs / 2
 Peak Elev= 39.36' @ 12.109 hrs Surf.Area= 252 sf Storage= 88 cf

Plug-Flow detention time= 1.1 min calculated for 0.105 af (100% of inflow)
 Center-of-Mass det. time= 0.9 min (834.4 - 833.4)

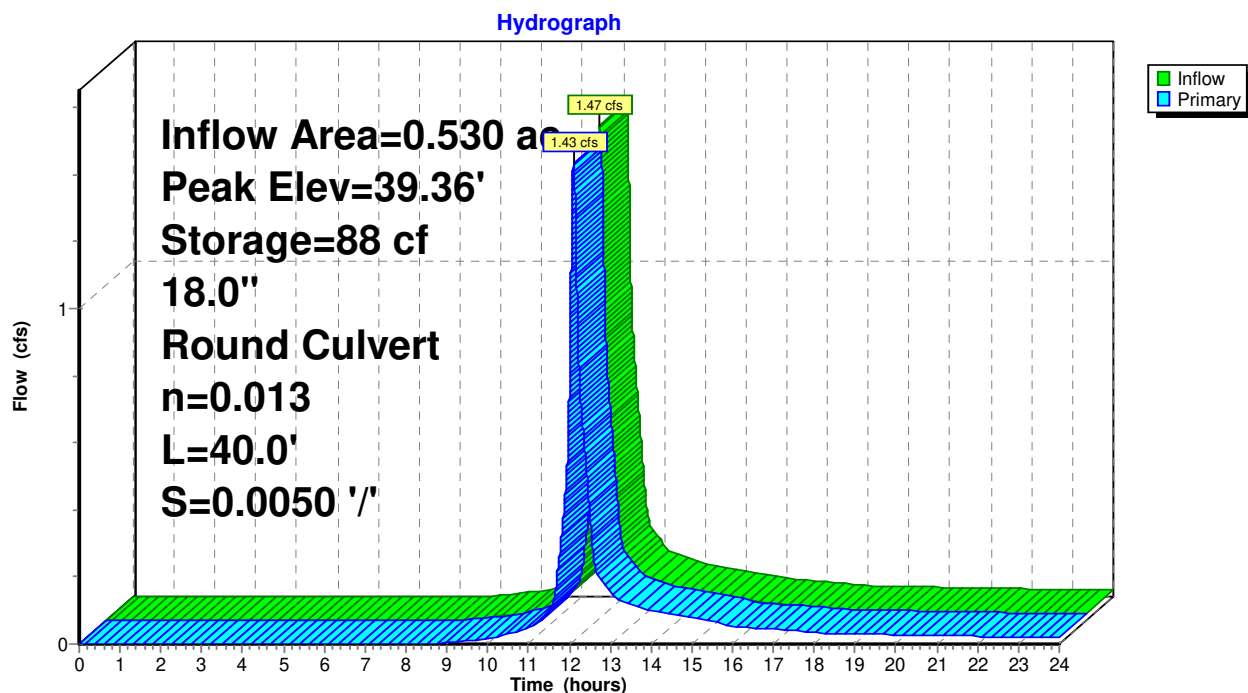
Volume	Invert	Avail.Storage	Storage Description
#1	38.70'	324 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
38.70	10	0	0
39.00	127	21	21
40.00	480	304	324

Device	Routing	Invert	Outlet Devices
#1	Primary	38.70'	18.0" Round Culvert L= 40.0' Ke= 0.500 Inlet / Outlet Invert= 38.70' / 38.50' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf

Primary OutFlow Max=1.43 cfs @ 12.109 hrs HW=39.36' TW=39.03' (Dynamic Tailwater)
 ↑**1=Culvert** (Outlet Controls 1.43 cfs @ 2.84 fps)

Pond C1: Culvert 1



Summary for Pond C2: Culvert 2

Inflow Area = 0.930 ac, 7.53% Impervious, Inflow Depth > 2.33" for 10-Year, 24-hour event
 Inflow = 2.49 cfs @ 12.100 hrs, Volume= 0.181 af
 Outflow = 2.47 cfs @ 12.110 hrs, Volume= 0.181 af, Atten= 1%, Lag= 0.6 min
 Primary = 2.47 cfs @ 12.110 hrs, Volume= 0.181 af

Routing by Dyn-Stor-Ind method, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs / 2
 Peak Elev= 39.03' @ 12.110 hrs Surf.Area= 200 sf Storage= 77 cf

Plug-Flow detention time= 0.6 min calculated for 0.181 af (100% of inflow)
 Center-of-Mass det. time= 0.5 min (835.5 - 835.1)

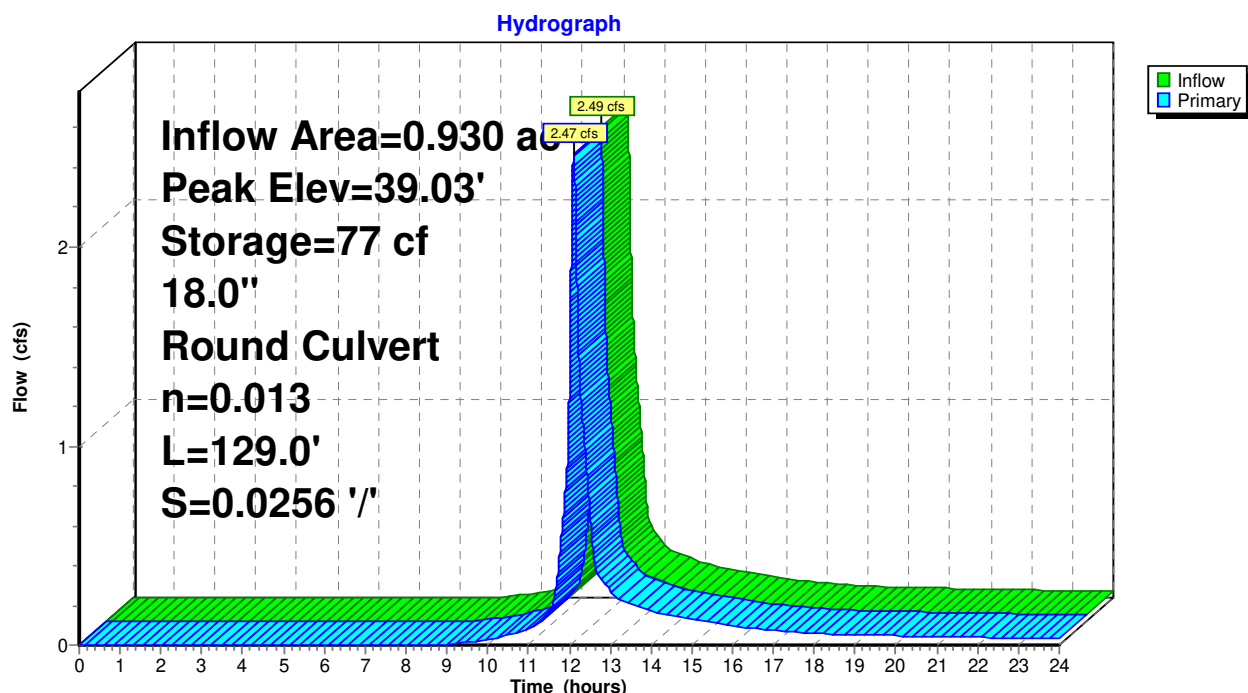
Volume	Invert	Avail.Storage	Storage Description
#1	38.30'	922 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
38.30	10	0	0
39.00	194	71	71
40.00	418	306	377
41.00	672	545	922

Device	Routing	Invert	Outlet Devices
#1	Primary	38.30'	18.0" Round Culvert L= 129.0' Ke= 0.500 Inlet / Outlet Invert= 38.30' / 35.00' S= 0.0256 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf

Primary OutFlow Max=2.47 cfs @ 12.110 hrs HW=39.03' TW=0.00' (Dynamic Tailwater)
 ↑**1=Culvert** (Inlet Controls 2.47 cfs @ 2.91 fps)

Pond C2: Culvert 2



Summary for Pond RT12: 1 Roof Trench System (Lot 12)

Inflow Area = 0.030 ac, 100.00% Impervious, Inflow Depth > 4.56" for 10-Year, 24-hour event
 Inflow = 0.12 cfs @ 12.133 hrs, Volume= 0.011 af
 Outflow = 0.01 cfs @ 10.653 hrs, Volume= 0.009 af, Atten= 95%, Lag= 0.0 min
 Discarded = 0.01 cfs @ 10.653 hrs, Volume= 0.009 af
 Primary = 0.00 cfs @ 0.000 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs / 2

Peak Elev= 1.75' @ 14.332 hrs Surf.Area= 288 sf Storage= 226 cf

Plug-Flow detention time= 238.4 min calculated for 0.009 af (83% of inflow)

Center-of-Mass det. time= 169.5 min (921.0 - 751.4)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	169 cf	8'x36'x24.5" Roof Trench System (Prismatic) Listed below (Recalc) 588 cf Overall - 106 cf Embedded = 482 cf x 35.0% Voids
#2	1.00'	106 cf	Custom Stage Data Listed below Inside #1
#3	2.04'	0 cf	0.50'D x 1.60'H Vertical Cone/Cylinder
		275 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	288	0	0
2.04	288	588	588

Elevation (feet)	Cum.Store (cubic-feet)
1.00	0
2.04	106

Device	Routing	Invert	Outlet Devices
#1	Primary	3.04'	4.0" Vert. Orifice/Grate C= 0.600
#2	Discarded	0.00'	1.020 in/hr Exfiltration over Surface area Phase-In= 0.02'

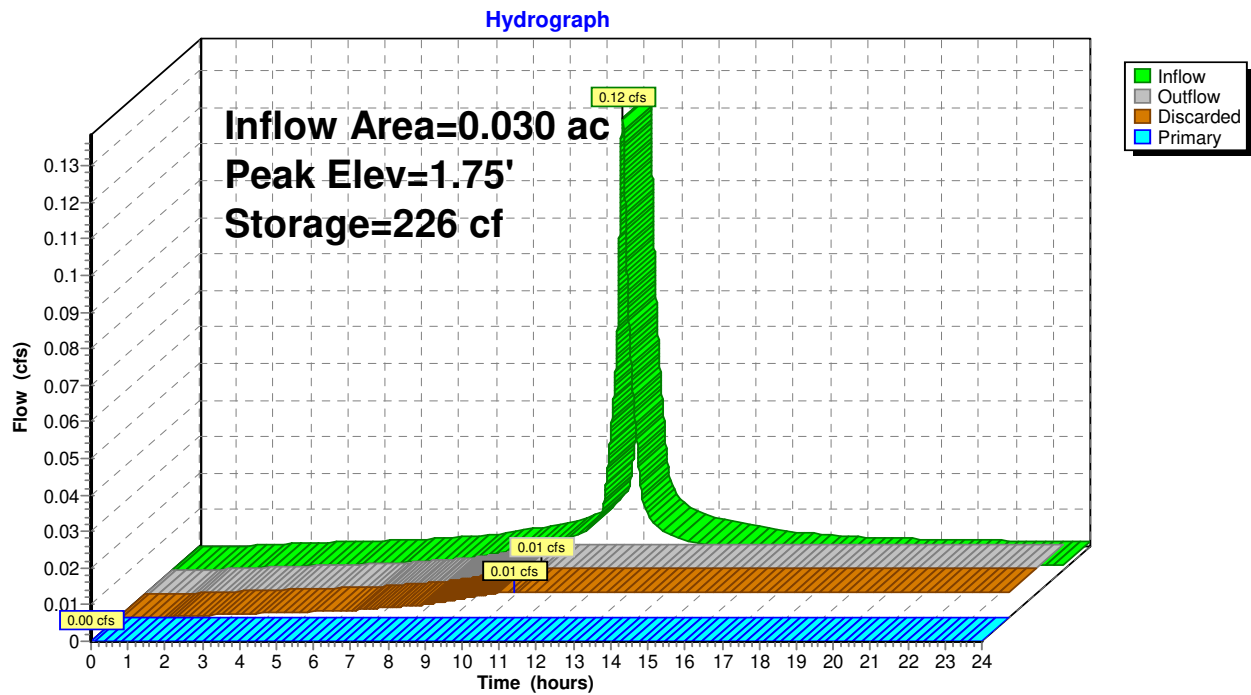
Discarded OutFlow Max=0.01 cfs @ 10.653 hrs HW=0.04' (Free Discharge)

↑ **2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.00 cfs @ 0.000 hrs HW=0.00' TW=0.00' (Dynamic Tailwater)

↑ **1=Orifice/Grate** (Controls 0.00 cfs)

Pond RT12: 1 Roof Trench System (Lot 12)



Summary for Pond RT14: 14 Roof Trench Systems

Inflow Area = 0.500 ac, 100.00% Impervious, Inflow Depth > 4.56" for 10-Year, 24-hour event
 Inflow = 2.06 cfs @ 12.133 hrs, Volume= 0.190 af
 Outflow = 0.48 cfs @ 12.566 hrs, Volume= 0.148 af, Atten= 77%, Lag= 26.0 min
 Discarded = 0.09 cfs @ 12.563 hrs, Volume= 0.134 af
 Primary = 0.39 cfs @ 12.566 hrs, Volume= 0.014 af

Routing by Dyn-Stor-Ind method, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs / 2

Peak Elev= 3.15' @ 12.566 hrs Surf.Area= 3,923 sf Storage= 3,530 cf

Plug-Flow detention time= 222.7 min calculated for 0.148 af (78% of inflow)

Center-of-Mass det. time= 141.8 min (893.2 - 751.4)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	2,407 cf	10'x28'x24.5" Roof Trench System (Prismatic) Listed below (Recalc) x 1 7,997 cf Overall - 1,120 cf Embedded = 6,877 cf x 35.0% Voids
#2	1.00'	1,120 cf	Custom Stage Data Listed below x 14 Inside #1
#3	2.04'	4 cf	0.50'D x 1.60'H Vertical Cone/Cylinder x 14
		3,531 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	280	0	0
2.04	280	571	571

Elevation (feet)	Cum.Store (cubic-feet)
1.00	0
2.04	80

Device	Routing	Invert	Outlet Devices
#1	Primary	3.04'	4.0" Vert. Orifice/Grate X 14.00 C= 0.600
#2	Discarded	0.00'	1.020 in/hr Exfiltration over Surface area Phase-In= 0.02'

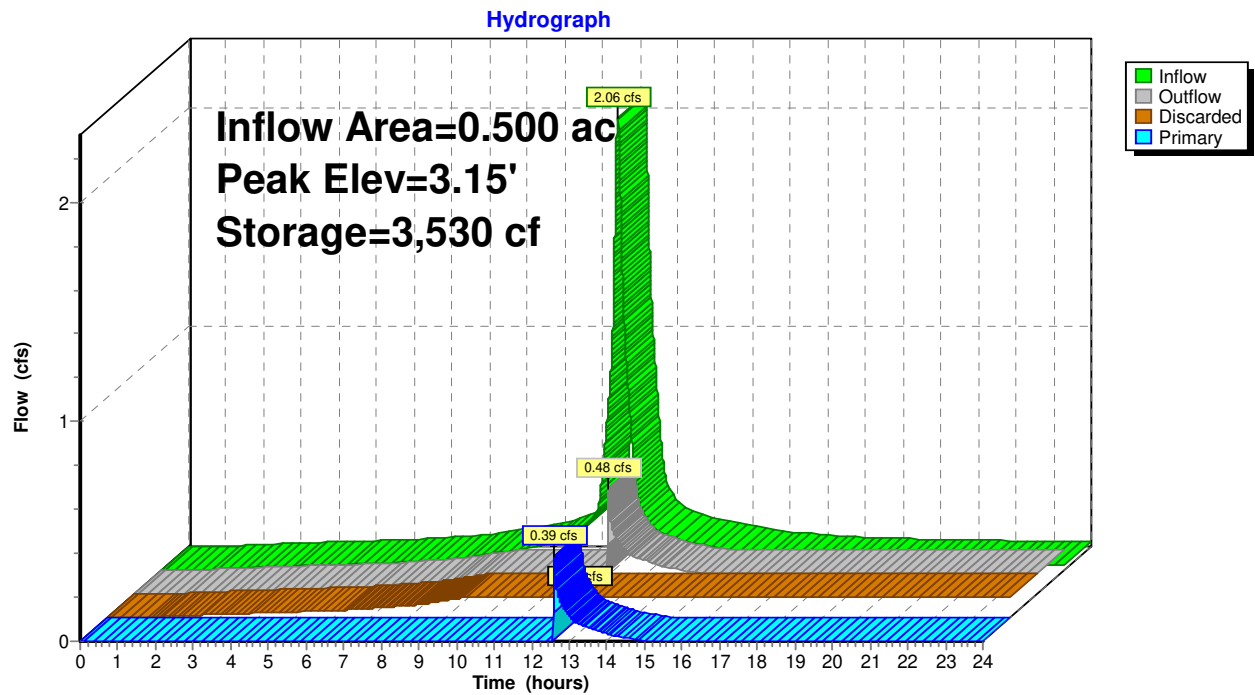
Discarded OutFlow Max=0.09 cfs @ 12.563 hrs HW=2.04' (Free Discharge)

↑ **2=Exfiltration** (Exfiltration Controls 0.09 cfs)

Primary OutFlow Max=0.39 cfs @ 12.566 hrs HW=3.15' TW=0.00' (Dynamic Tailwater)

↑ **1=Orifice/Grate** (Orifice Controls 0.39 cfs @ 1.12 fps)

Pond RT14: 14 Roof Trench Systems



Summary for Pond RT9: 1 Roof Trench System (Lot 9)

Inflow Area = 0.030 ac, 100.00% Impervious, Inflow Depth > 4.56" for 10-Year, 24-hour event
 Inflow = 0.12 cfs @ 12.133 hrs, Volume= 0.011 af
 Outflow = 0.12 cfs @ 12.133 hrs, Volume= 0.009 af, Atten= 0%, Lag= 0.0 min
 Discarded = 0.00 cfs @ 12.112 hrs, Volume= 0.005 af
 Primary = 0.12 cfs @ 12.133 hrs, Volume= 0.004 af

Routing by Dyn-Stor-Ind method, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs / 2

Peak Elev= 3.29' @ 12.133 hrs Surf.Area= 140 sf Storage= 135 cf

Plug-Flow detention time= 145.1 min calculated for 0.009 af (80% of inflow)

Center-of-Mass det. time= 68.6 min (820.0 - 751.4)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	81 cf	7'x20'x24.5" Roof Trench System (Prismatic) Listed below (Recalc) 286 cf Overall - 53 cf Embedded = 233 cf x 35.0% Voids
#2	1.00'	53 cf	Custom Stage Data Listed below Inside #1
#3	2.04'	0 cf	0.50'D x 1.60'H Vertical Cone/Cylinder
		135 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	140	0	0
2.04	140	286	286

Elevation (feet)	Cum.Store (cubic-feet)
1.00	0
2.04	53

Device	Routing	Invert	Outlet Devices
#1	Primary	3.04'	4.0" Vert. Orifice/Grate C= 0.600
#2	Discarded	0.00'	1.020 in/hr Exfiltration over Surface area Phase-In= 0.02'

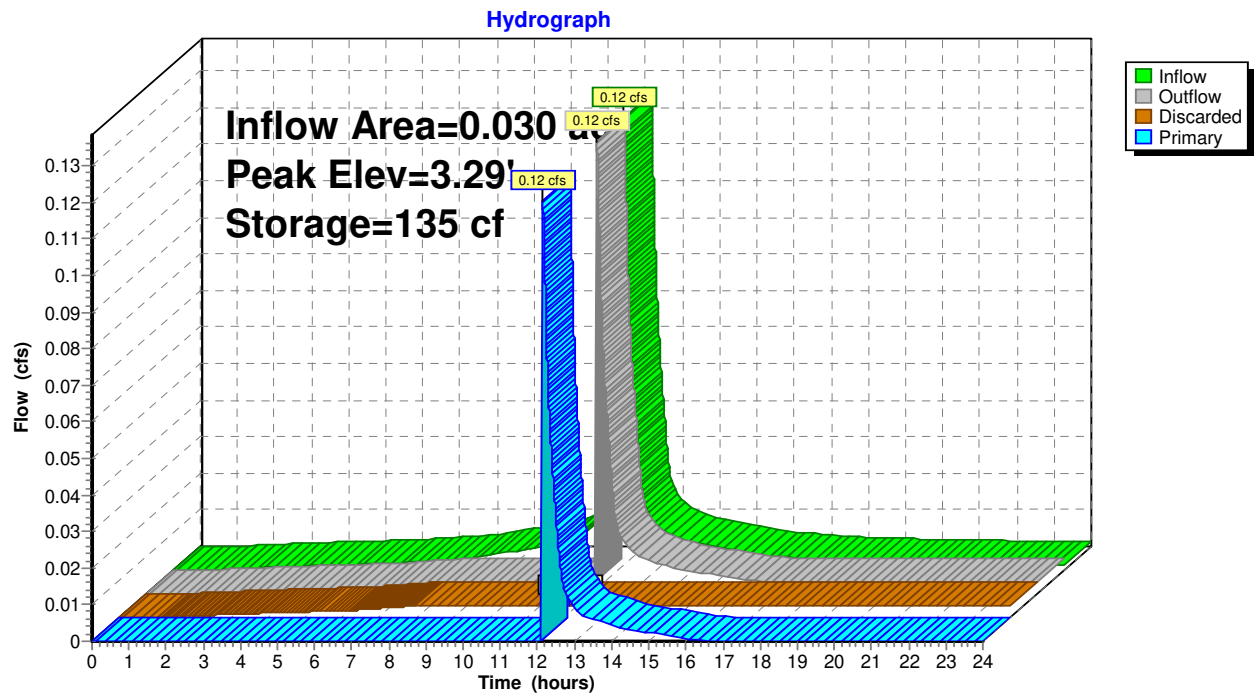
Discarded OutFlow Max=0.00 cfs @ 12.112 hrs HW=2.18' (Free Discharge)

↑ **2=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.12 cfs @ 12.133 hrs HW=3.29' TW=0.00' (Dynamic Tailwater)

↑ **1=Orifice/Grate** (Orifice Controls 0.12 cfs @ 1.71 fps)

Pond RT9: 1 Roof Trench System (Lot 9)



Summary for Pond S2: Swale 2

Inflow Area = 1.270 ac, 10.24% Impervious, Inflow Depth > 2.63" for 10-Year, 24-hour event
 Inflow = 3.93 cfs @ 12.087 hrs, Volume= 0.278 af
 Outflow = 3.11 cfs @ 12.150 hrs, Volume= 0.277 af, Atten= 21%, Lag= 3.8 min
 Discarded = 0.04 cfs @ 12.150 hrs, Volume= 0.025 af
 Primary = 3.06 cfs @ 12.150 hrs, Volume= 0.252 af

Routing by Dyn-Stor-Ind method, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs / 2
 Peak Elev= 41.66' @ 12.150 hrs Surf.Area= 1,723 sf Storage= 838 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 4.9 min (830.4 - 825.5)

Volume	Invert	Avail.Storage	Storage Description
#1	40.50'	14,785 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
#2	40.50'	88 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
		250 cf Overall x 35.0% Voids	
		14,873 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
40.50	240	0	0
41.00	500	185	185
42.00	1,600	1,050	1,235
43.00	3,750	2,675	3,910
44.00	4,500	4,125	8,035
45.00	9,000	6,750	14,785

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
40.50	500	0	0
41.00	500	250	250

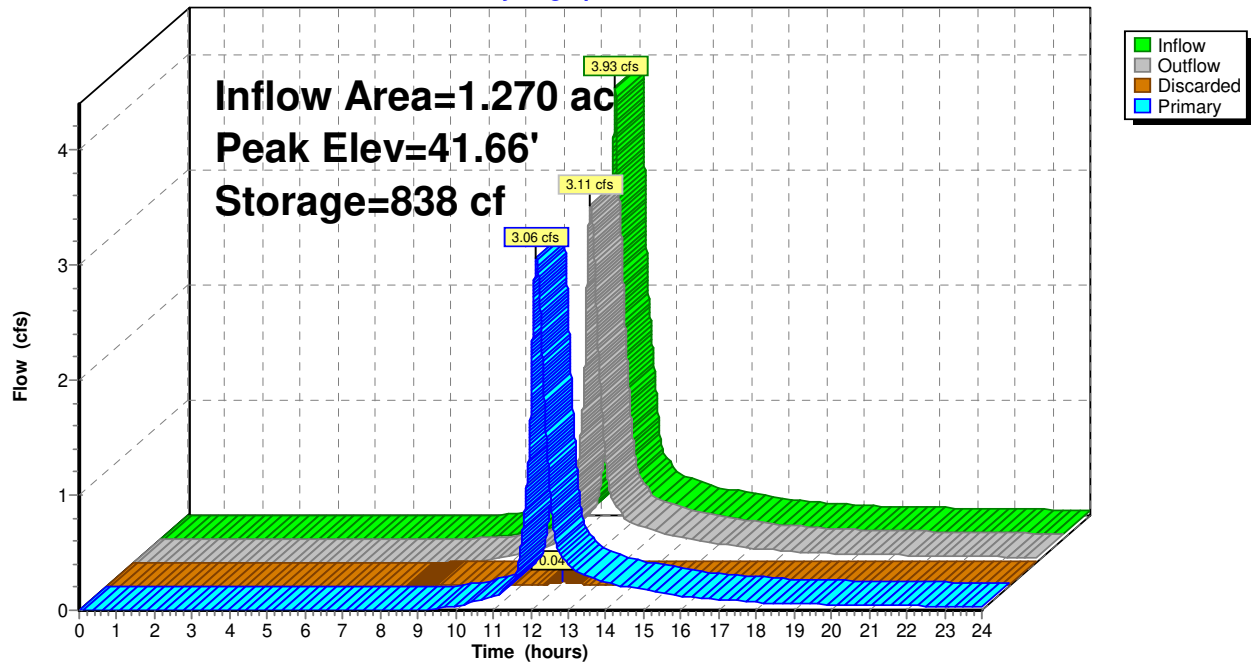
Device	Routing	Invert	Outlet Devices
#1	Primary	40.50'	12.0" Round Culvert L= 162.0' Ke= 0.500 Inlet / Outlet Invert= 40.50' / 36.25' S= 0.0262 '/' Cc= 0.900 n= 0.013 Concrete sewer w/manholes & inlets, Flow Area= 0.79 sf
#2	Discarded	40.50'	1.020 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.04 cfs @ 12.150 hrs HW=41.66' (Free Discharge)
 ↑ **2=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=3.06 cfs @ 12.150 hrs HW=41.66' TW=0.00' (Dynamic Tailwater)
 ↑ **1=Culvert** (Inlet Controls 3.06 cfs @ 3.90 fps)

Pond S2: Swale 2

Hydrograph



Summary for Pond S3: Swale 3

Inflow Area = 0.670 ac, 8.96% Impervious, Inflow Depth > 2.37" for 10-Year, 24-hour event
 Inflow = 1.86 cfs @ 12.087 hrs, Volume= 0.132 af
 Outflow = 1.69 cfs @ 12.127 hrs, Volume= 0.132 af, Atten= 9%, Lag= 2.4 min
 Discarded = 0.02 cfs @ 12.127 hrs, Volume= 0.015 af
 Primary = 1.67 cfs @ 12.127 hrs, Volume= 0.117 af

Routing by Dyn-Stor-Ind method, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs / 2
 Peak Elev= 42.20' @ 12.127 hrs Surf.Area= 1,023 sf Storage= 302 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 3.4 min (836.9 - 833.4)

Volume	Invert	Avail.Storage	Storage Description
#1	41.50'	5,613 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
#2	41.50'	70 cf	Custom Stage Data (Prismatic) Listed below
		200 cf Overall	x 35.0% Voids
		5,683 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
41.50	10	0	0
42.00	480	123	123
43.00	1,200	840	963
44.00	1,800	1,500	2,463
45.00	4,500	3,150	5,613

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
41.50	400	0	0
42.00	400	200	200

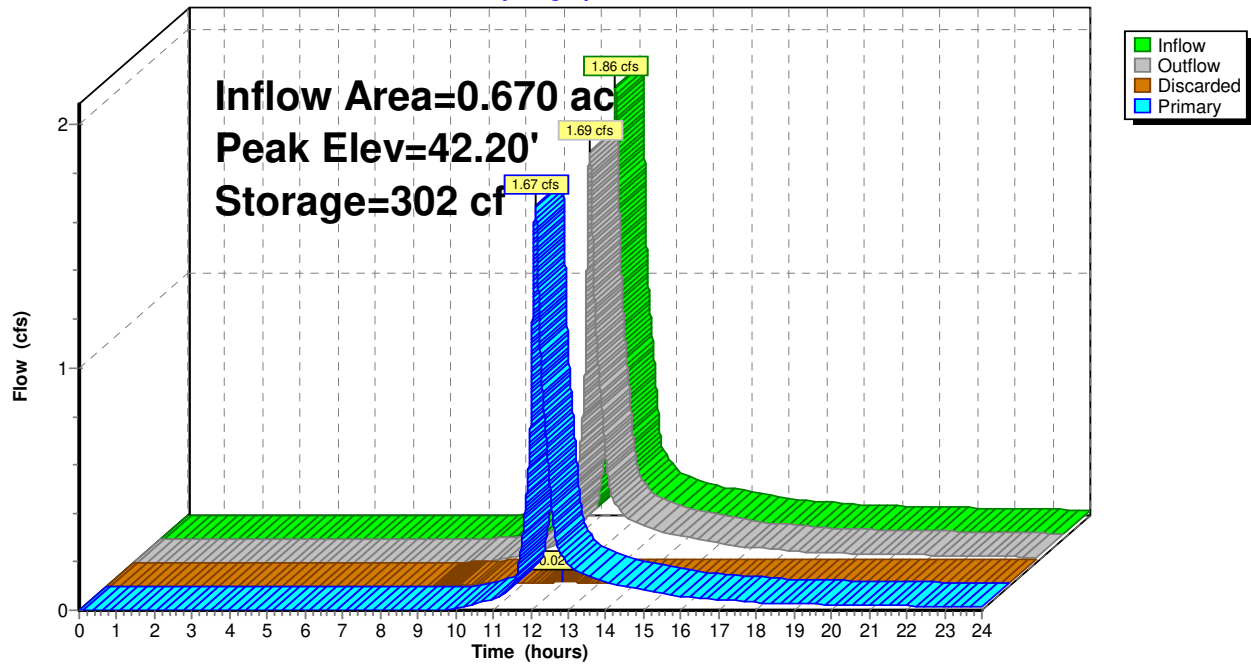
Device	Routing	Invert	Outlet Devices
#1	Primary	41.50'	12.0" Round Culvert L= 292.0' Ke= 0.500 Inlet / Outlet Invert= 41.50' / 36.25' S= 0.0180 '/' Cc= 0.900 n= 0.013 Concrete sewer w/manholes & inlets, Flow Area= 0.79 sf
#2	Discarded	41.50'	1.020 in/hr Exfiltration over Surface area

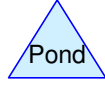
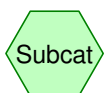
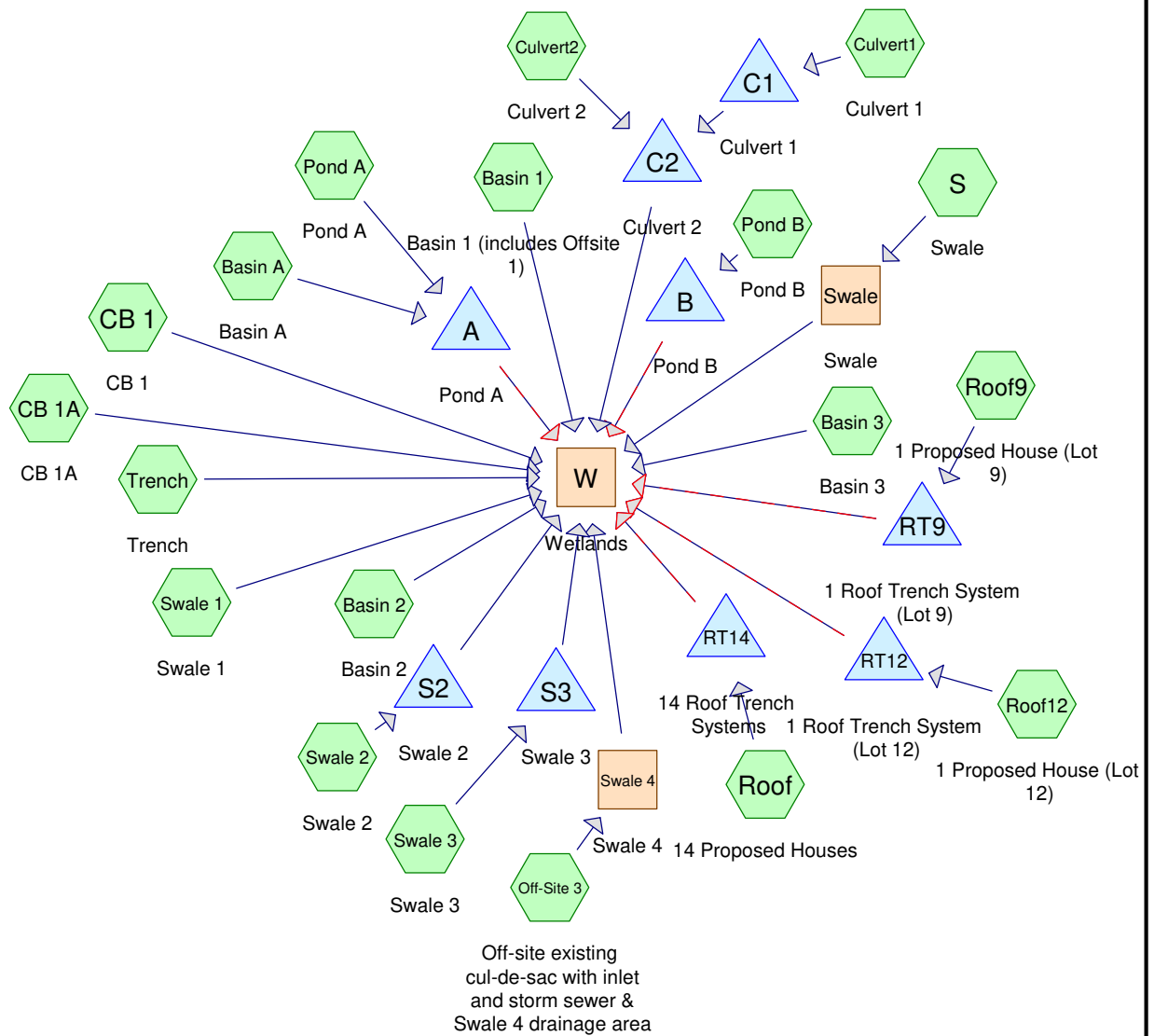
Discarded OutFlow Max=0.02 cfs @ 12.127 hrs HW=42.20' (Free Discharge)
 ↑ **2=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=1.67 cfs @ 12.127 hrs HW=42.20' TW=0.00' (Dynamic Tailwater)
 ↑ **1=Culvert** (Inlet Controls 1.67 cfs @ 2.85 fps)

Pond S3: Swale 3

Hydrograph





Routing Diagram for 12-02-19-Fairhaven-S.NeckWoods-Proposed Cond
 Prepared by {enter your company name here}, Printed 12/5/2019
 HydroCAD® 10.00-15 s/n 05280 © 2015 HydroCAD Software Solutions LLC

Time span=0.000-24.000 hrs, dt=0.0001 hrs, 240001 points x 2
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment Basin 1: Basin 1	Runoff Area=2.650 ac 9.81% Impervious Runoff Depth>3.21" Flow Length=210' Tc=7.9 min CN=77 Runoff=9.37 cfs 0.710 af
Subcatchment Basin 2: Basin 2	Runoff Area=0.810 ac 4.94% Impervious Runoff Depth>3.12" Tc=6.0 min CN=76 Runoff=2.97 cfs 0.211 af
Subcatchment Basin 3: Basin 3	Runoff Area=1.030 ac 12.62% Impervious Runoff Depth>3.31" Tc=6.0 min CN=78 Runoff=4.01 cfs 0.284 af
Subcatchment Basin A: Basin A	Runoff Area=1.020 ac 49.02% Impervious Runoff Depth>4.12" Tc=6.0 min CN=86 Runoff=4.84 cfs 0.350 af
Subcatchment CB 1: CB 1	Runoff Area=0.260 ac 23.08% Impervious Runoff Depth>3.51" Tc=6.0 min CN=80 Runoff=1.07 cfs 0.076 af
Subcatchment CB 1A: CB 1A	Runoff Area=0.300 ac 33.33% Impervious Runoff Depth>3.71" Flow Length=160' Tc=7.7 min CN=82 Runoff=1.23 cfs 0.093 af
Subcatchment Culvert1: Culvert 1	Runoff Area=0.530 ac 9.43% Impervious Runoff Depth>3.12" Tc=6.0 min CN=76 Runoff=1.95 cfs 0.138 af
Subcatchment Culvert2: Culvert 2	Runoff Area=0.400 ac 5.00% Impervious Runoff Depth>3.02" Tc=6.0 min CN=75 Runoff=1.42 cfs 0.101 af
Subcatchment Off-Site 3: Off-site	Runoff Area=3.720 ac 19.89% Impervious Runoff Depth>3.41" Flow Length=560' Tc=6.8 min CN=79 Runoff=14.49 cfs 1.057 af
Subcatchment Pond A: Pond A	Runoff Area=0.740 ac 52.70% Impervious Runoff Depth>4.33" Tc=6.0 min CN=88 Runoff=3.65 cfs 0.267 af
Subcatchment Pond B: Pond B	Runoff Area=0.450 ac 53.33% Impervious Runoff Depth>4.23" Tc=6.0 min CN=87 Runoff=2.18 cfs 0.158 af
Subcatchment Roof: 14 Proposed	Runoff Area=0.500 ac 100.00% Impervious Runoff Depth>5.45" Tc=10.0 min CN=98 Runoff=2.45 cfs 0.227 af
Subcatchment Roof12: 1 Proposed	Runoff Area=0.030 ac 100.00% Impervious Runoff Depth>5.45" Tc=10.0 min CN=98 Runoff=0.15 cfs 0.014 af
Subcatchment Roof9: 1 Proposed	Runoff Area=0.030 ac 100.00% Impervious Runoff Depth>5.45" Tc=10.0 min CN=98 Runoff=0.15 cfs 0.014 af
Subcatchment S: Swale	Runoff Area=0.090 ac 33.33% Impervious Runoff Depth>3.71" Tc=6.0 min CN=82 Runoff=0.39 cfs 0.028 af
Subcatchment Swale 1: Swale 1	Runoff Area=0.220 ac 0.00% Impervious Runoff Depth>2.92" Flow Length=706' Tc=17.5 min CN=74 Runoff=0.54 cfs 0.054 af
Subcatchment Swale 2: Swale 2	Runoff Area=1.270 ac 10.24% Impervious Runoff Depth>3.41" Tc=6.0 min CN=79 Runoff=5.09 cfs 0.361 af

Subcatchment Swale 3: Swale 3 Runoff Area=0.670 ac 8.96% Impervious Runoff Depth>3.12"
Tc=6.0 min CN=76 Runoff=2.46 cfs 0.174 af

Subcatchment Trench: Trench Runoff Area=0.240 ac 16.67% Impervious Runoff Depth>3.21"
Flow Length=646' Tc=8.9 min CN=77 Runoff=0.82 cfs 0.064 af

Reach Swale: Swale Avg. Flow Depth=0.11' Max Vel=1.05 fps Inflow=0.39 cfs 0.028 af
n=0.022 L=100.0' S=0.0050 '/' Capacity=2.04 cfs Outflow=0.38 cfs 0.028 af

Reach Swale 4: Swale 4 Avg. Flow Depth=0.64' Max Vel=3.75 fps Inflow=14.49 cfs 1.057 af
n=0.030 L=350.0' S=0.0157 '/' Capacity=33.54 cfs Outflow=14.14 cfs 1.055 af

Reach W: Wetlands Inflow=45.60 cfs 3.844 af
Outflow=45.60 cfs 3.844 af

Pond A: Pond A Peak Elev=38.90' Storage=11,453 cf Inflow=8.50 cfs 0.617 af
Discarded=0.22 cfs 0.148 af Primary=1.74 cfs 0.385 af Secondary=0.00 cfs 0.000 af Outflow=1.95 cfs 0.534 af

Pond B: Pond B Peak Elev=39.35' Storage=1,729 cf Inflow=2.18 cfs 0.158 af
Discarded=0.05 cfs 0.031 af Primary=1.21 cfs 0.110 af Secondary=0.00 cfs 0.000 af Outflow=1.26 cfs 0.141 af

Pond C1: Culvert 1 Peak Elev=39.48' Storage=122 cf Inflow=1.95 cfs 0.138 af
18.0" Round Culvert n=0.013 L=40.0' S=0.0050 '/' Outflow=1.88 cfs 0.138 af

Pond C2: Culvert 2 Peak Elev=39.15' Storage=104 cf Inflow=3.28 cfs 0.239 af
18.0" Round Culvert n=0.013 L=129.0' S=0.0256 '/' Outflow=3.26 cfs 0.238 af

Pond RT12: 1 Roof Trench System (Lot 12) Peak Elev=3.09' Storage=275 cf Inflow=0.15 cfs 0.014 af
Discarded=0.01 cfs 0.010 af Primary=0.01 cfs 0.000 af Outflow=0.01 cfs 0.010 af

Pond RT14: 14 Roof Trench Systems Peak Elev=3.26' Storage=3,530 cf Inflow=2.45 cfs 0.227 af
Discarded=0.09 cfs 0.139 af Primary=1.37 cfs 0.041 af Outflow=1.47 cfs 0.180 af

Pond RT9: 1 Roof Trench System (Lot 9) Peak Elev=3.32' Storage=135 cf Inflow=0.15 cfs 0.014 af
Discarded=0.00 cfs 0.005 af Primary=0.14 cfs 0.006 af Outflow=0.15 cfs 0.011 af

Pond S2: Swale 2 Peak Elev=41.93' Storage=1,218 cf Inflow=5.09 cfs 0.361 af
Discarded=0.05 cfs 0.027 af Primary=3.65 cfs 0.333 af Outflow=3.70 cfs 0.360 af

Pond S3: Swale 3 Peak Elev=42.33' Storage=393 cf Inflow=2.46 cfs 0.174 af
Discarded=0.03 cfs 0.016 af Primary=2.18 cfs 0.158 af Outflow=2.20 cfs 0.174 af

Total Runoff Area = 14.960 ac Runoff Volume = 4.379 af Average Runoff Depth = 3.51"
77.61% Pervious = 11.610 ac 22.39% Impervious = 3.350 ac

Summary for Subcatchment Basin 1: Basin 1 (includes Offsite 1)

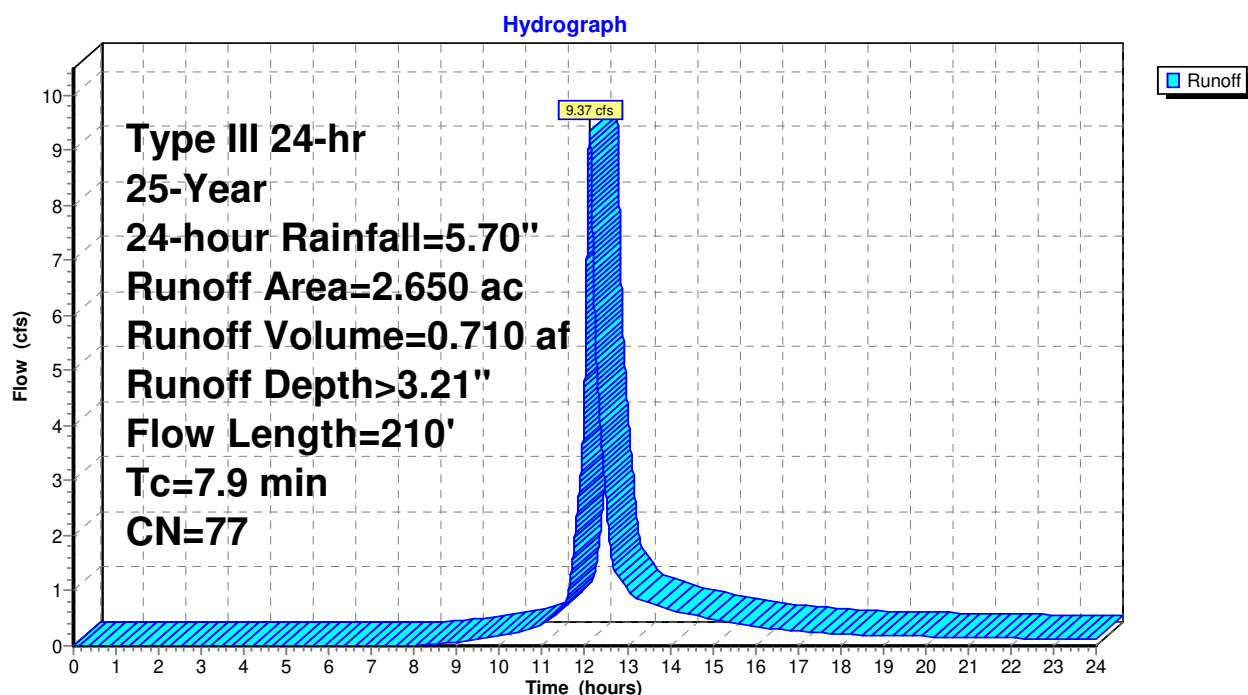
Runoff = 9.37 cfs @ 12.113 hrs, Volume= 0.710 af, Depth> 3.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 25-Year, 24-hour Rainfall=5.70"

Area (ac)	CN	Description
0.720	73	Woods, Fair, HSG C
0.190	79	Woods, Fair, HSG D
* 0.190	98	Driveway/Road
0.130	80	>75% Grass cover, Good, HSG D
0.730	74	>75% Grass cover, Good, HSG C
* 0.070	73	Offsite 1 Woods, Fair, HSG C
* 0.010	98	Offsite 1 Driveway/Road
* 0.550	74	Offsite 1 >75% Grass cover, Good, HSG C
* 0.060	98	Offsite 1 Buildings
2.650	77	Weighted Average
2.390		90.19% Pervious Area
0.260		9.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.2	50	0.0250	0.12		Sheet Flow, Grass: Dense n= 0.240 P2= 3.50"
0.7	160	0.0500	3.60		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
7.9	210	Total			

Subcatchment Basin 1: Basin 1 (includes Offsite 1)



Summary for Subcatchment Basin 2: Basin 2

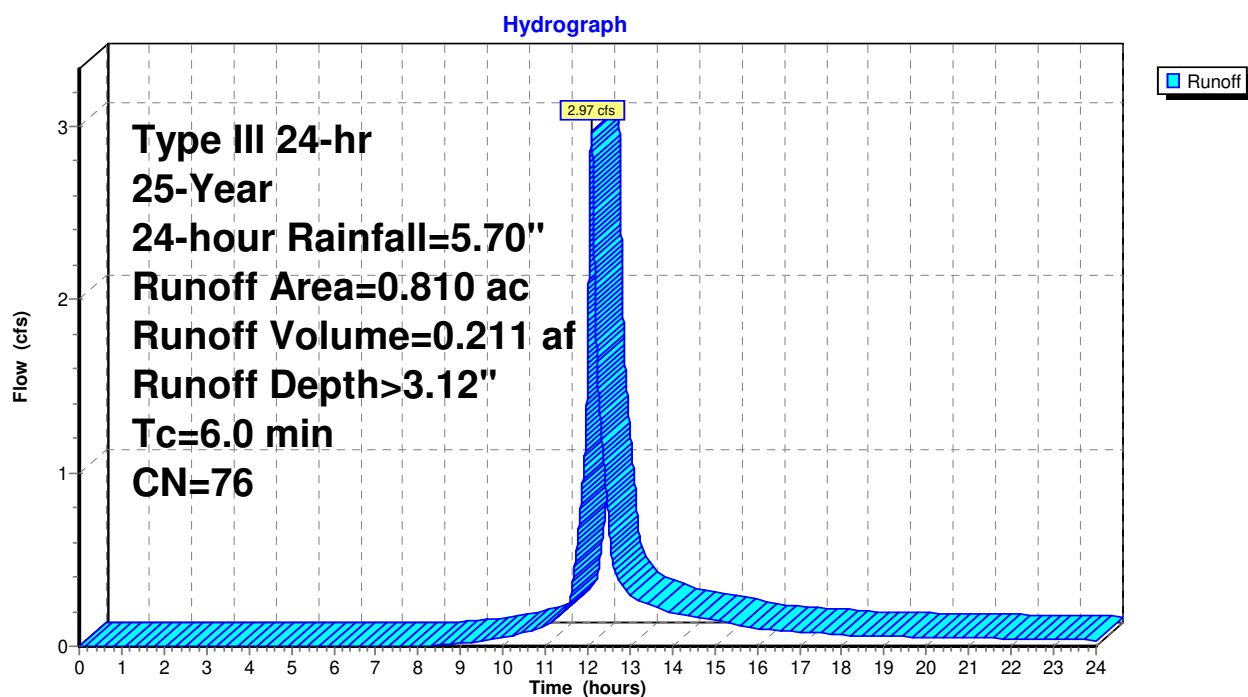
Runoff = 2.97 cfs @ 12.087 hrs, Volume= 0.211 af, Depth> 3.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 25-Year, 24-hour Rainfall=5.70"

Area (ac)	CN	Description
0.140	73	Woods, Fair, HSG C
0.100	79	Woods, Fair, HSG D
* 0.430	74	>75% Grass cover, Good, HSG C
0.100	80	>75% Grass cover, Good, HSG D
* 0.040	98	driveway/road
0.810	76	Weighted Average
0.770		95.06% Pervious Area
0.040		4.94% Impervious Area

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

Subcatchment Basin 2: Basin 2



Summary for Subcatchment Basin 3: Basin 3

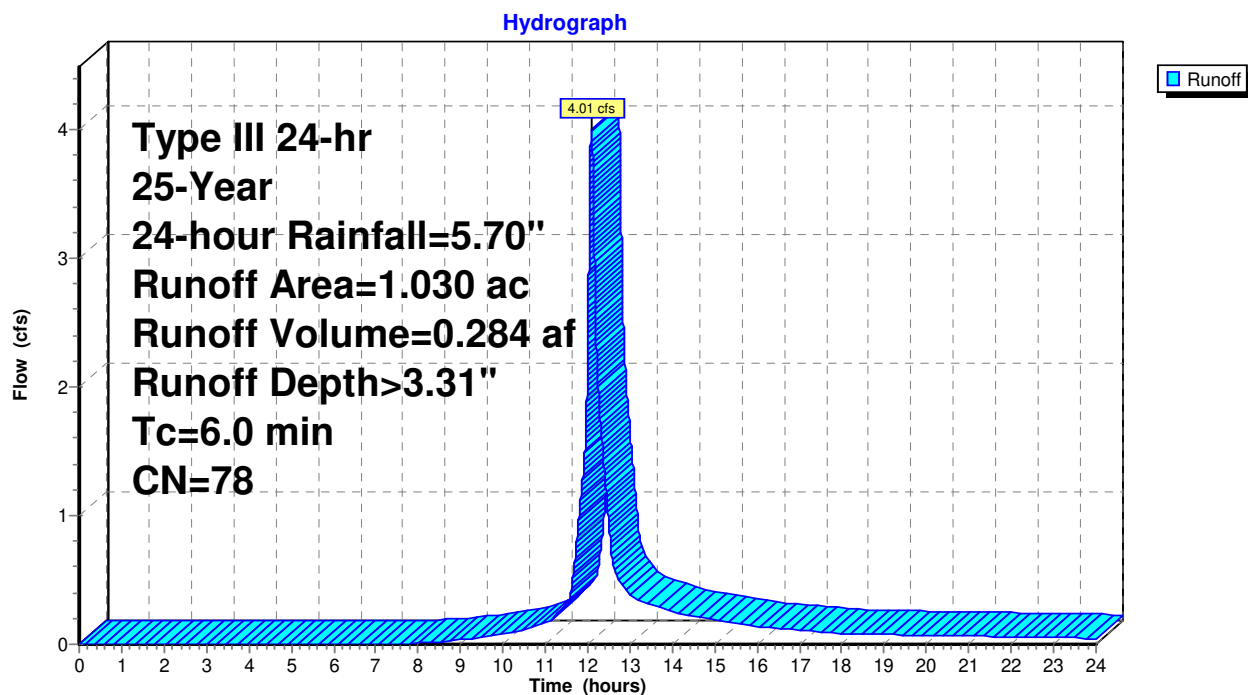
Runoff = 4.01 cfs @ 12.087 hrs, Volume= 0.284 af, Depth> 3.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 25-Year, 24-hour Rainfall=5.70"

Area (ac)	CN	Description
0.100	73	Woods, Fair, HSG C
0.140	79	Woods, Fair, HSG D
0.580	74	>75% Grass cover, Good, HSG C
0.080	80	>75% Grass cover, Good, HSG D
* 0.130	98	Driveway/road
1.030	78	Weighted Average
0.900		87.38% Pervious Area
0.130		12.62% Impervious Area

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

Subcatchment Basin 3: Basin 3



Summary for Subcatchment Basin A: Basin A

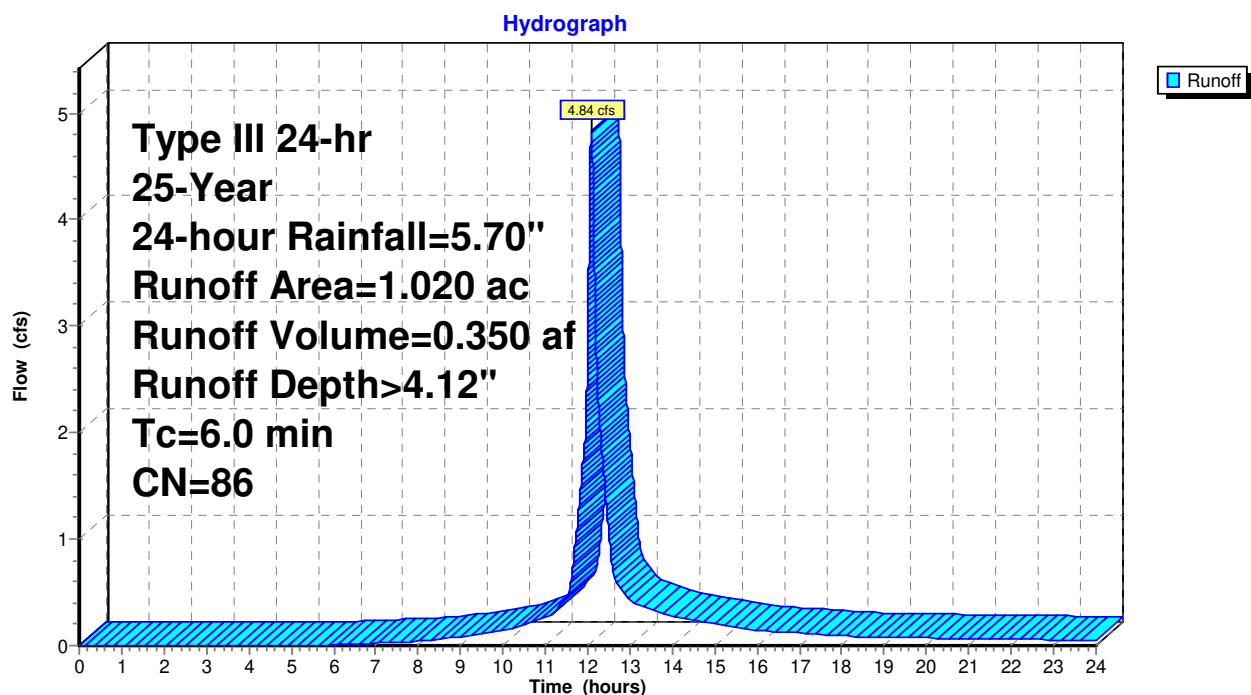
Runoff = 4.84 cfs @ 12.087 hrs, Volume= 0.350 af, Depth> 4.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 25-Year, 24-hour Rainfall=5.70"

Area (ac)	CN	Description
* 0.500	98	Driveway/Road
0.520	74	>75% Grass cover, Good, HSG C
1.020	86	Weighted Average
0.520		50.98% Pervious Area
0.500		49.02% Impervious Area

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

Subcatchment Basin A: Basin A



Summary for Subcatchment CB 1: CB 1

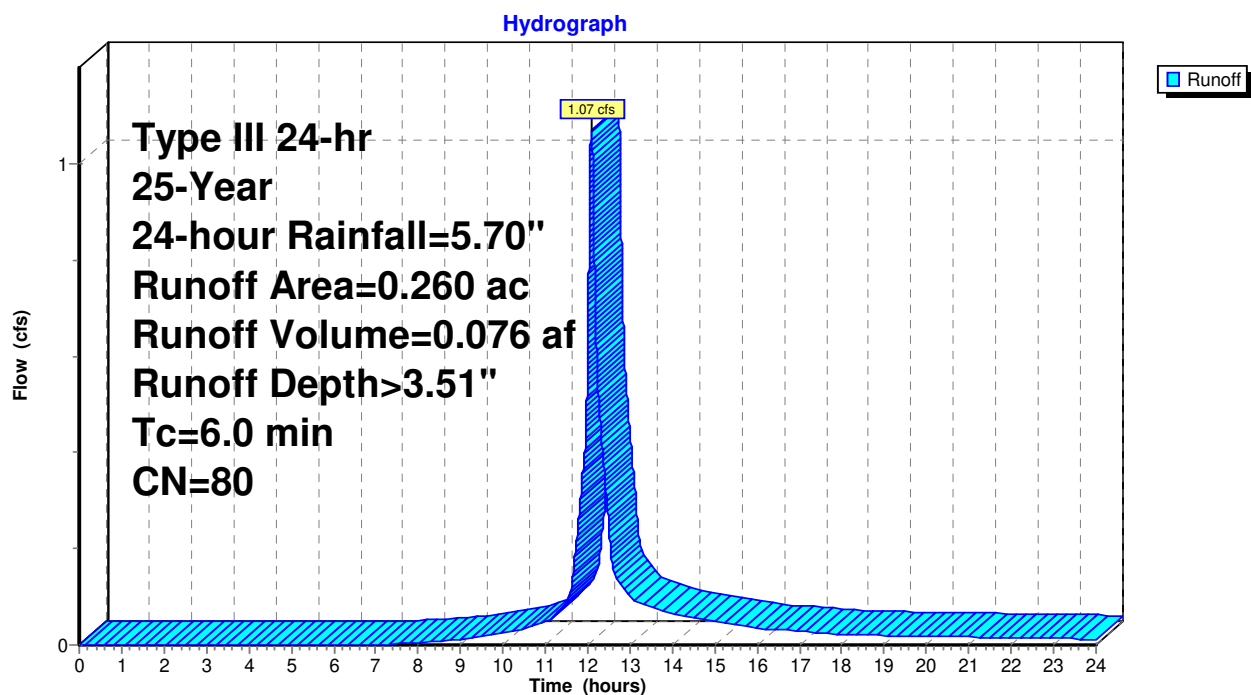
Runoff = 1.07 cfs @ 12.087 hrs, Volume= 0.076 af, Depth> 3.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 25-Year, 24-hour Rainfall=5.70"

Area (ac)	CN	Description
0.190	74	>75% Grass cover, Good, HSG C
0.010	73	Woods, Fair, HSG C
* 0.060	98	Impervious
0.260	80	Weighted Average
0.200		76.92% Pervious Area
0.060		23.08% Impervious Area

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

Subcatchment CB 1: CB 1



Summary for Subcatchment CB 1A: CB 1A

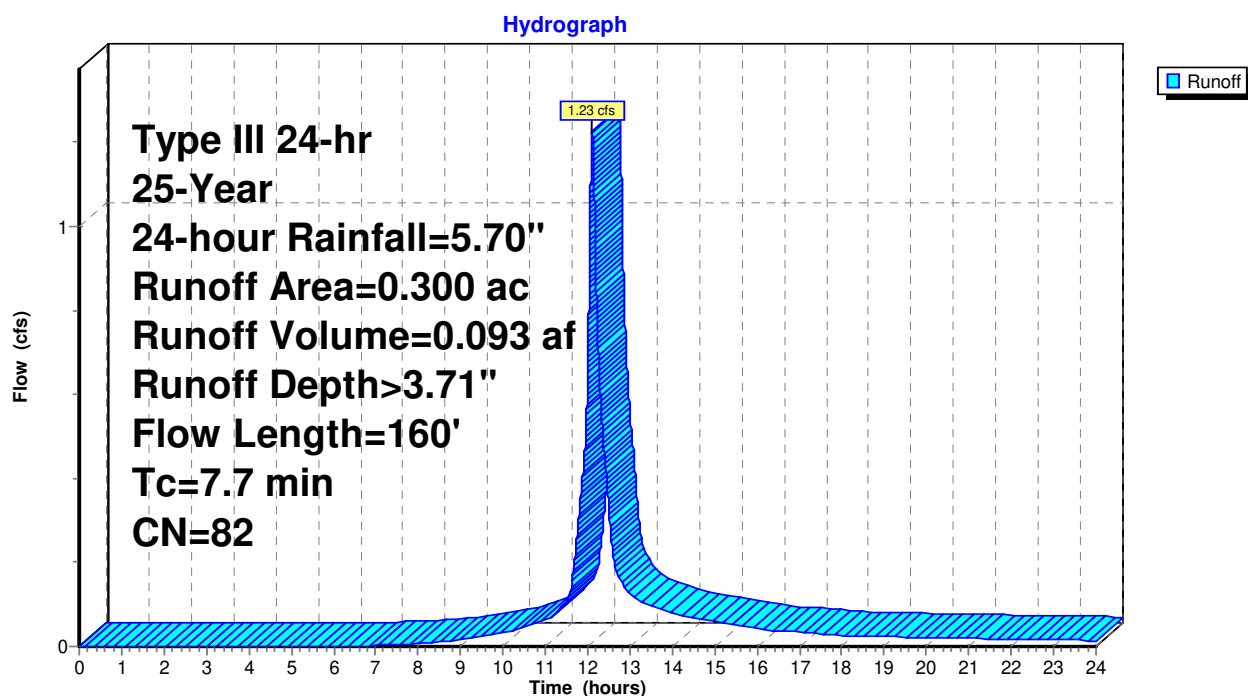
Runoff = 1.23 cfs @ 12.106 hrs, Volume= 0.093 af, Depth> 3.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 25-Year, 24-hour Rainfall=5.70"

Area (ac)	CN	Description
* 0.100	98	Impervious
0.020	73	Woods, Fair, HSG C
0.180	74	>75% Grass cover, Good, HSG C
0.300	82	Weighted Average
0.200		66.67% Pervious Area
0.100		33.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.2	45	0.0200	0.10		Sheet Flow, Grass: Dense n= 0.240 P2= 3.50"
0.3	75	0.0700	4.26		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.2	40	0.0050	3.21	2.52	Pipe Channel, 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
7.7	160	Total			

Subcatchment CB 1A: CB 1A



Summary for Subcatchment Culvert1: Culvert 1

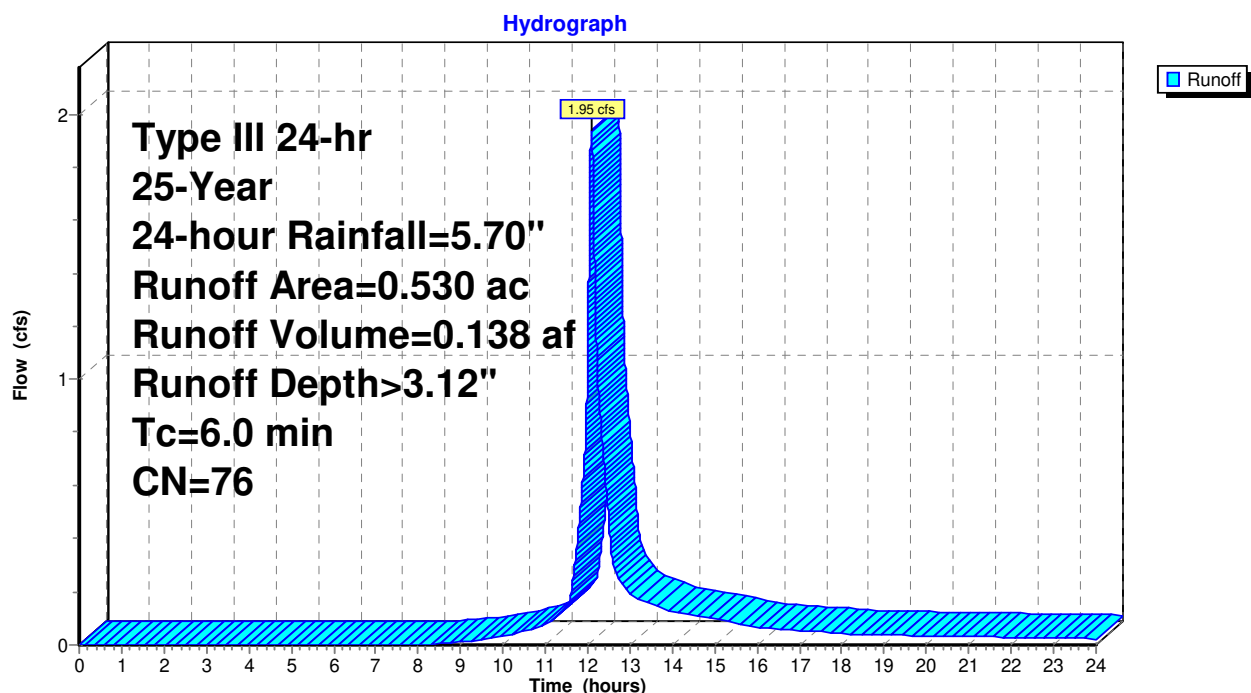
Runoff = 1.95 cfs @ 12.087 hrs, Volume= 0.138 af, Depth> 3.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 25-Year, 24-hour Rainfall=5.70"

Area (ac)	CN	Description
0.070	73	Woods, Fair, HSG C
* 0.050	98	Impervious
0.410	74	>75% Grass cover, Good, HSG C
0.530	76	Weighted Average
0.480		90.57% Pervious Area
0.050		9.43% Impervious Area

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

Subcatchment Culvert1: Culvert 1



Summary for Subcatchment Culvert2: Culvert 2

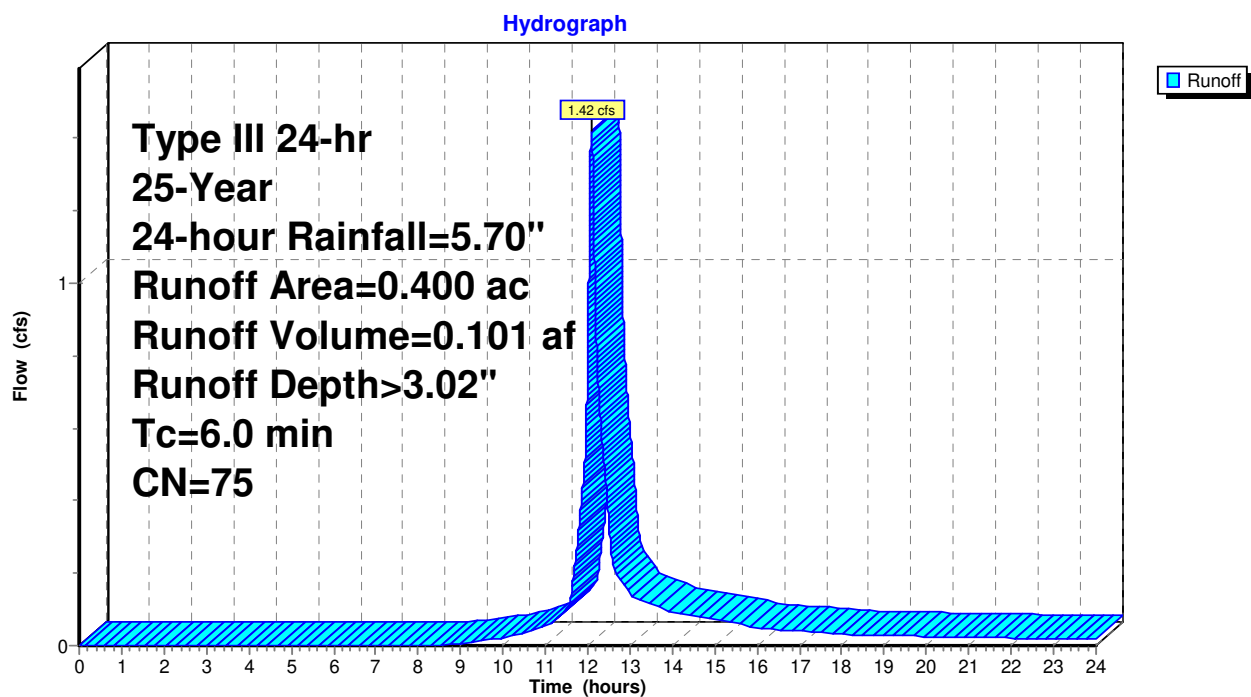
Runoff = 1.42 cfs @ 12.087 hrs, Volume= 0.101 af, Depth> 3.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 25-Year, 24-hour Rainfall=5.70"

Area (ac)	CN	Description
* 0.020	98	Impervious
0.380	74	>75% Grass cover, Good, HSG C
0.400	75	Weighted Average
0.380		95.00% Pervious Area
0.020		5.00% Impervious Area

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

Subcatchment Culvert2: Culvert 2



Summary for Subcatchment Off-Site 3: Off-site existing cul-de-sac with inlet and storm sewer & Swale 4 drainage area

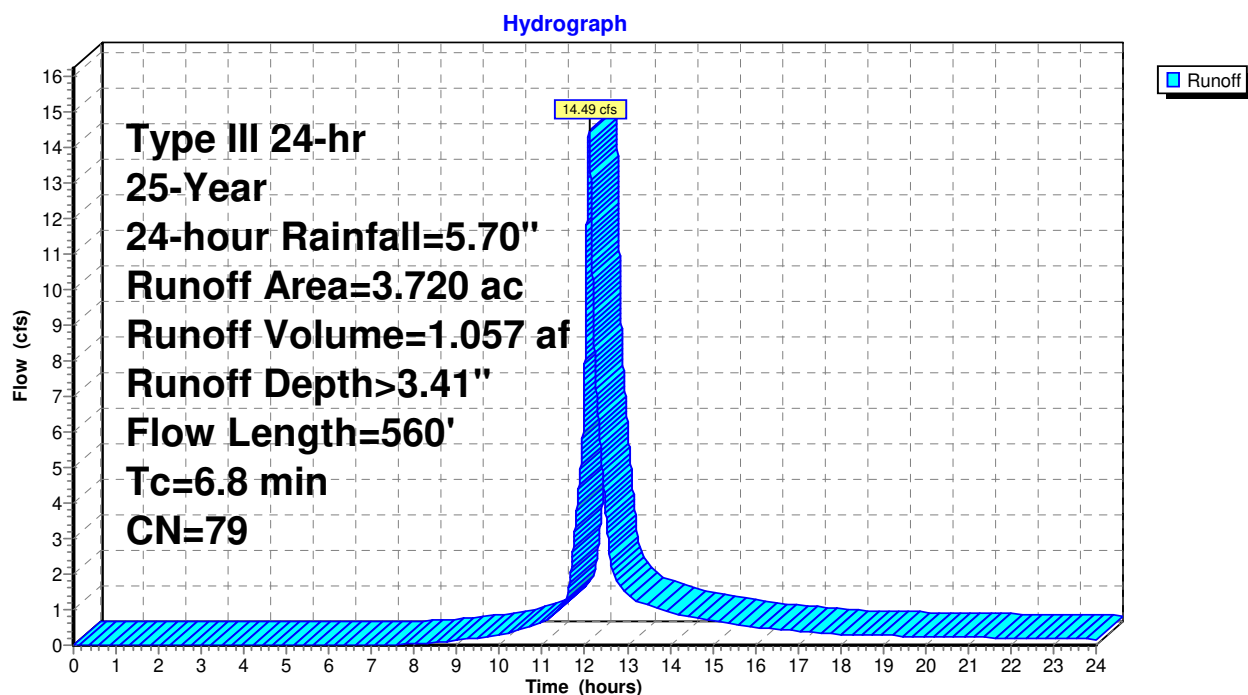
Runoff = 14.49 cfs @ 12.096 hrs, Volume= 1.057 af, Depth> 3.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 25-Year, 24-hour Rainfall=5.70"

Area (ac)	CN	Description
1.560	74	>75% Grass cover, Good, HSG C
* 0.220	98	Buildings
* 0.490	98	Driveway/Roads
* 0.030	98	Swale 4- Existing Impervious
* 1.230	74	Swale 4 ->75% Grass cover, Good, HSG C
* 0.190	73	Swale 4- Woods, Fair, HSG C
3.720	79	Weighted Average
2.980		80.11% Pervious Area
0.740		19.89% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	50	0.0030	0.59		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.50"
4.8	320	0.0030	1.11		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.4	140	0.0100	5.36	4.21	Pipe Channel, 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
0.2	50	0.0500	3.60		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
6.8	560	Total			

Subcatchment Off-Site 3: Off-site existing cul-de-sac with inlet and storm sewer & Swale 4 drainage area



Summary for Subcatchment Pond A: Pond A

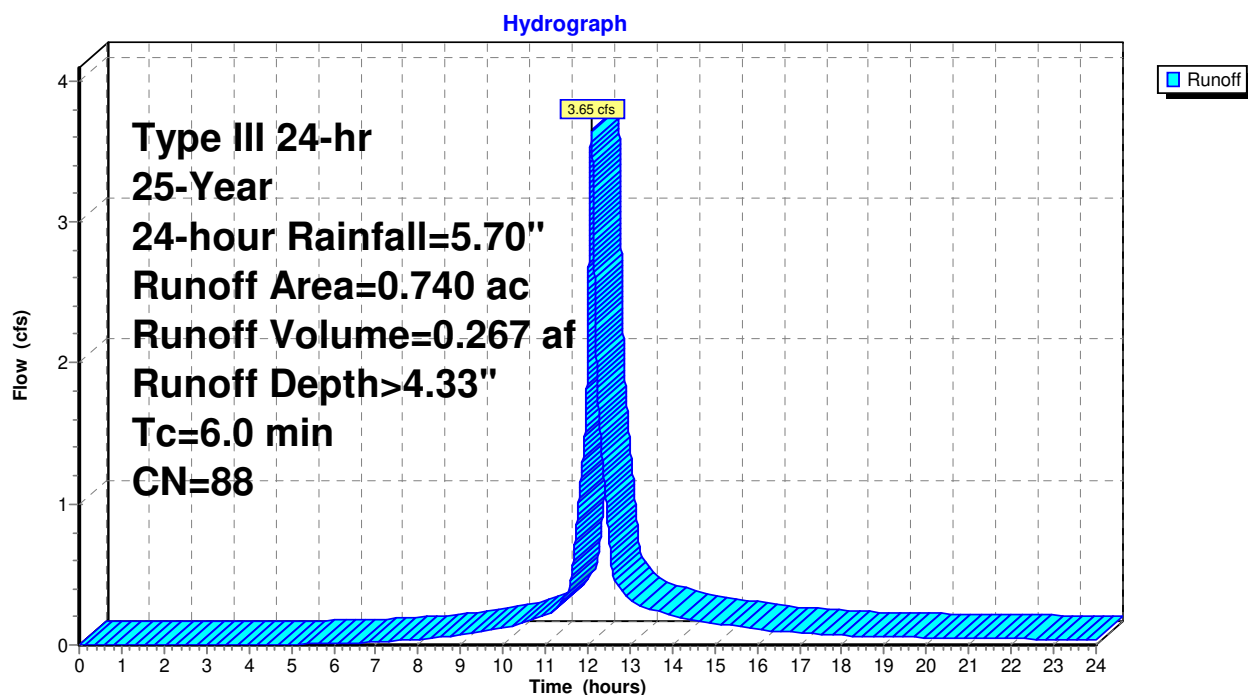
Runoff = 3.65 cfs @ 12.087 hrs, Volume= 0.267 af, Depth> 4.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 25-Year, 24-hour Rainfall=5.70"

Area (ac)	CN	Description
* 0.180	98	Driveway/Road
0.230	74	>75% Grass cover, Good, HSG C
0.120	80	>75% Grass cover, Good, HSG D
* 0.210	98	Pond
0.740	88	Weighted Average
0.350		47.30% Pervious Area
0.390		52.70% Impervious Area

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

Subcatchment Pond A: Pond A



Summary for Subcatchment Pond B: Pond B

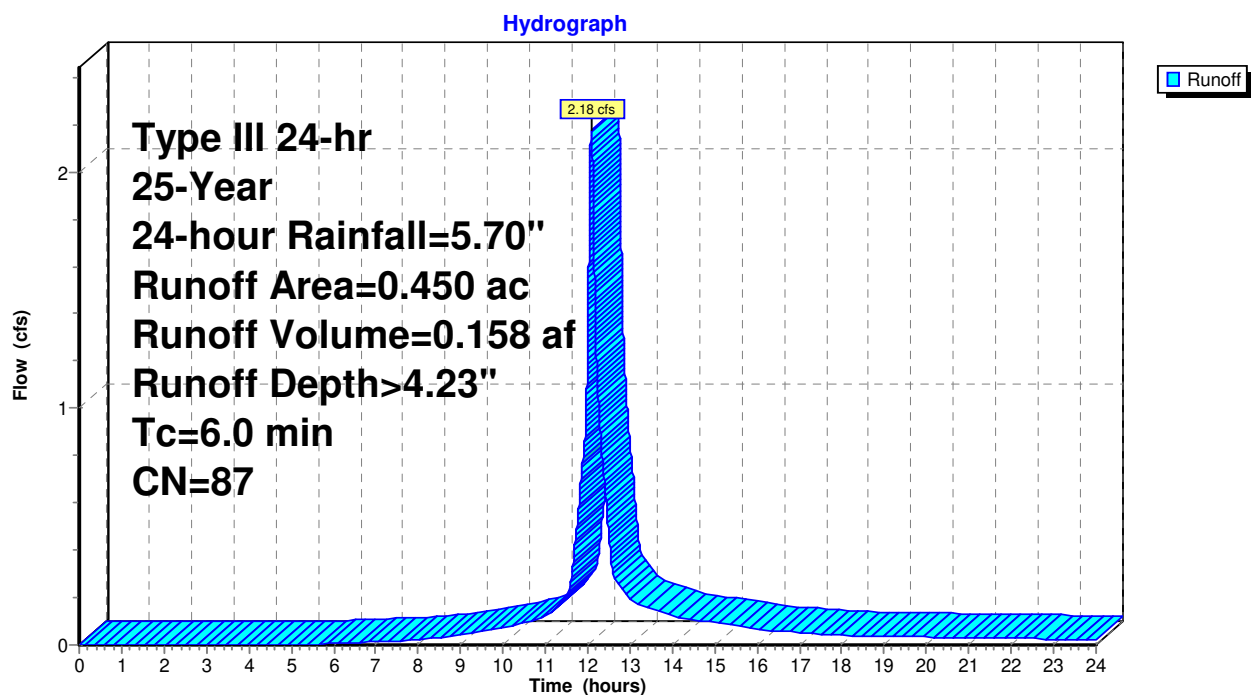
Runoff = 2.18 cfs @ 12.087 hrs, Volume= 0.158 af, Depth> 4.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 25-Year, 24-hour Rainfall=5.70"

Area (ac)	CN	Description
* 0.190	98	Driveway/Road
0.210	74	>75% Grass cover, Good, HSG C
* 0.050	98	Pond
0.450	87	Weighted Average
0.210		46.67% Pervious Area
0.240		53.33% Impervious Area

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

Subcatchment Pond B: Pond B



Summary for Subcatchment Roof: 14 Proposed Houses

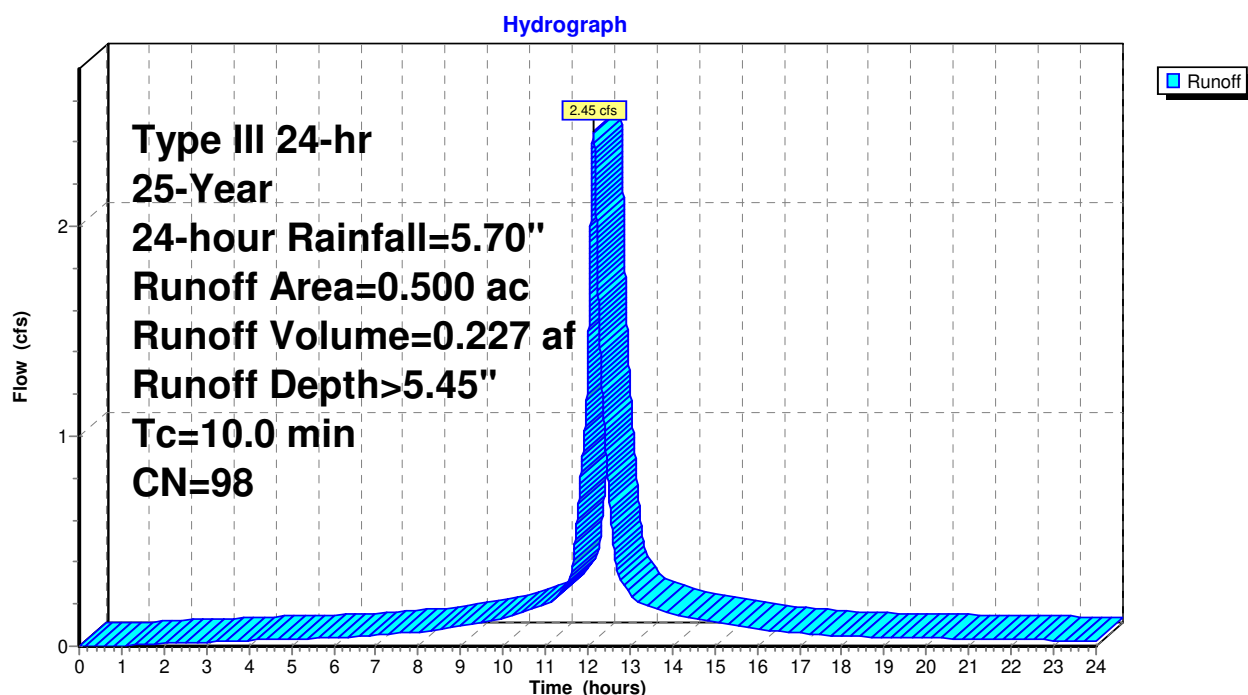
Runoff = 2.45 cfs @ 12.133 hrs, Volume= 0.227 af, Depth> 5.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 25-Year, 24-hour Rainfall=5.70"

Area (ac)	CN	Description
* 0.500	98	Buildings
0.500		100.00% Impervious Area

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

Subcatchment Roof: 14 Proposed Houses



Summary for Subcatchment Roof12: 1 Proposed House (Lot 12)

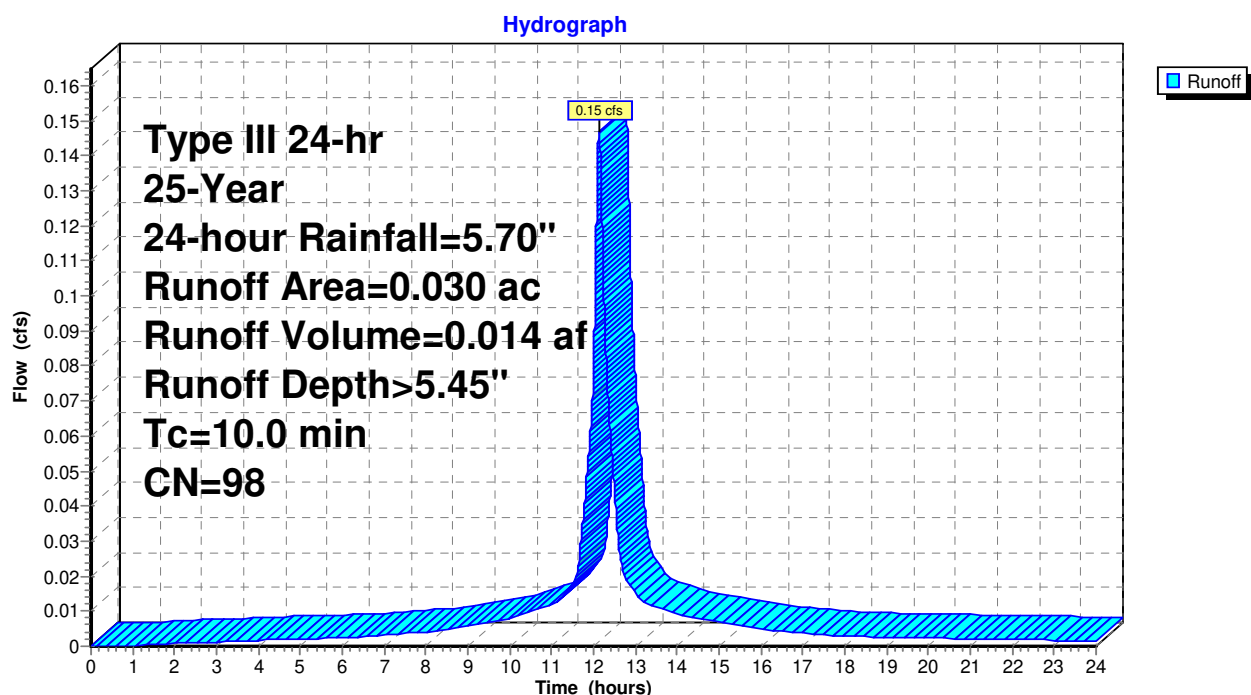
Runoff = 0.15 cfs @ 12.133 hrs, Volume= 0.014 af, Depth> 5.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 25-Year, 24-hour Rainfall=5.70"

Area (ac)	CN	Description
* 0.030	98	Building
0.030		100.00% Impervious Area

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

Subcatchment Roof12: 1 Proposed House (Lot 12)



Summary for Subcatchment Roof9: 1 Proposed House (Lot 9)

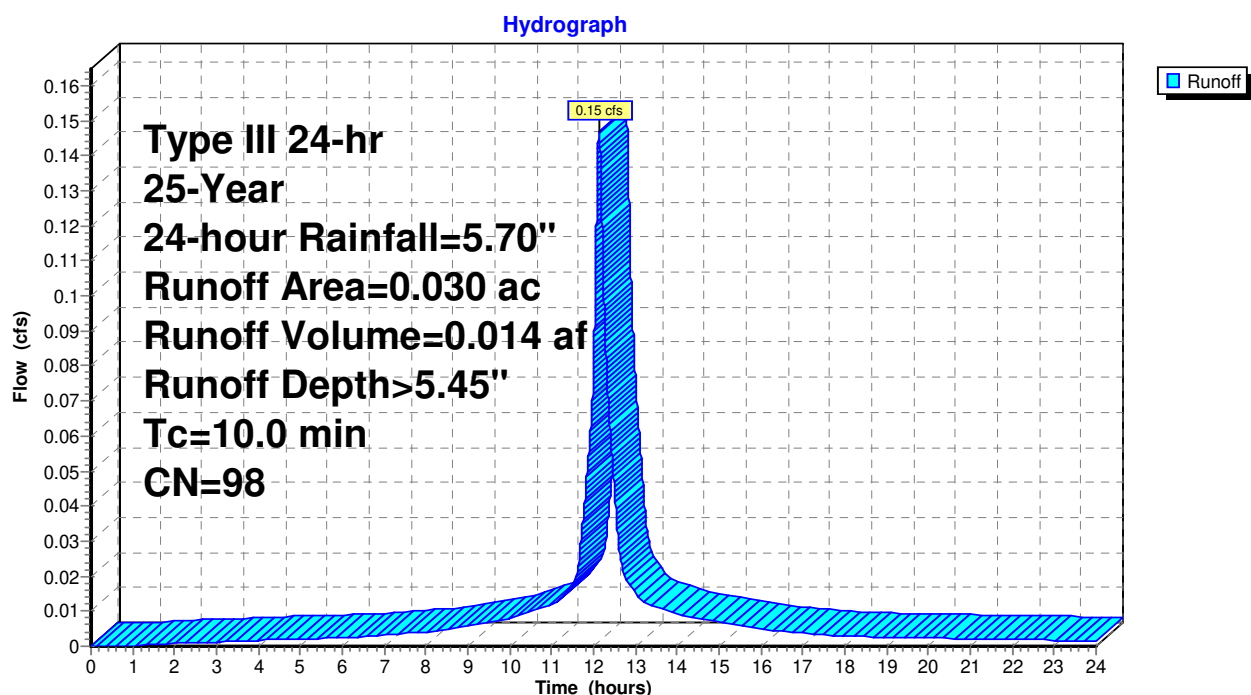
Runoff = 0.15 cfs @ 12.133 hrs, Volume= 0.014 af, Depth> 5.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 25-Year, 24-hour Rainfall=5.70"

Area (ac)	CN	Description
* 0.030	98	Building
0.030		100.00% Impervious Area

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

Subcatchment Roof9: 1 Proposed House (Lot 9)



Summary for Subcatchment S: Swale

Runoff = 0.39 cfs @ 12.087 hrs, Volume= 0.028 af, Depth> 3.71"

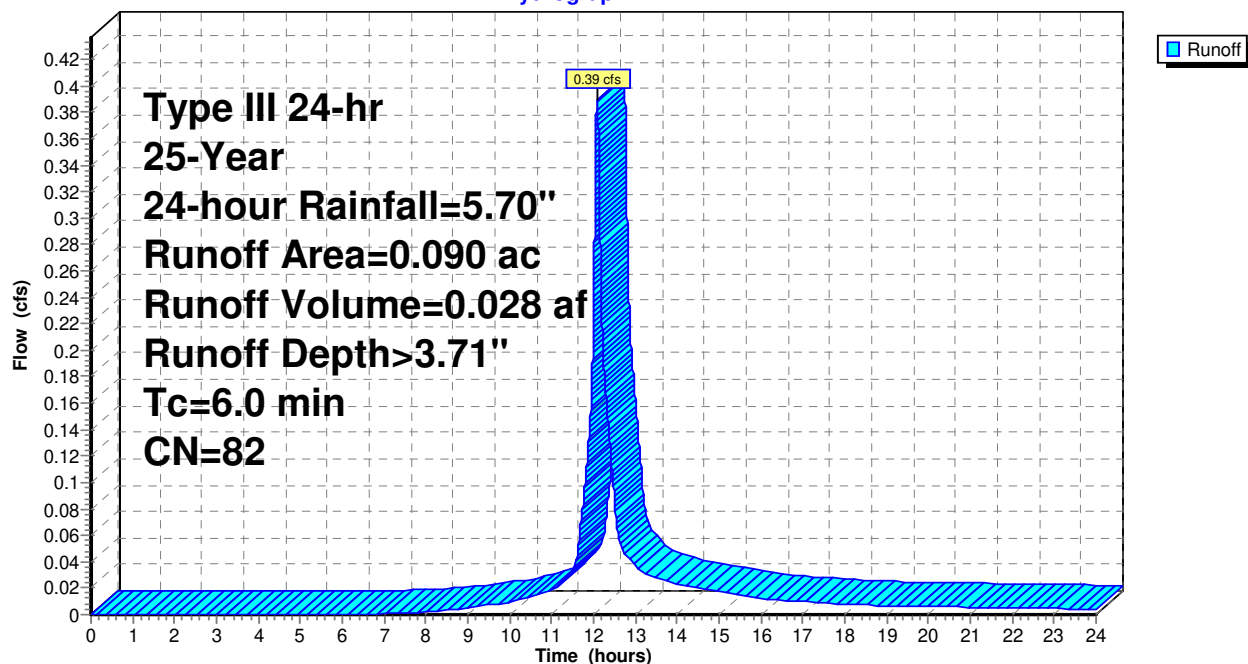
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 25-Year, 24-hour Rainfall=5.70"

Area (ac)	CN	Description
* 0.030	98	Impervious
0.060	74	>75% Grass cover, Good, HSG C
0.090	82	Weighted Average
0.060		66.67% Pervious Area
0.030		33.33% Impervious Area

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

Subcatchment S: Swale

Hydrograph



Summary for Subcatchment Swale 1: Swale 1

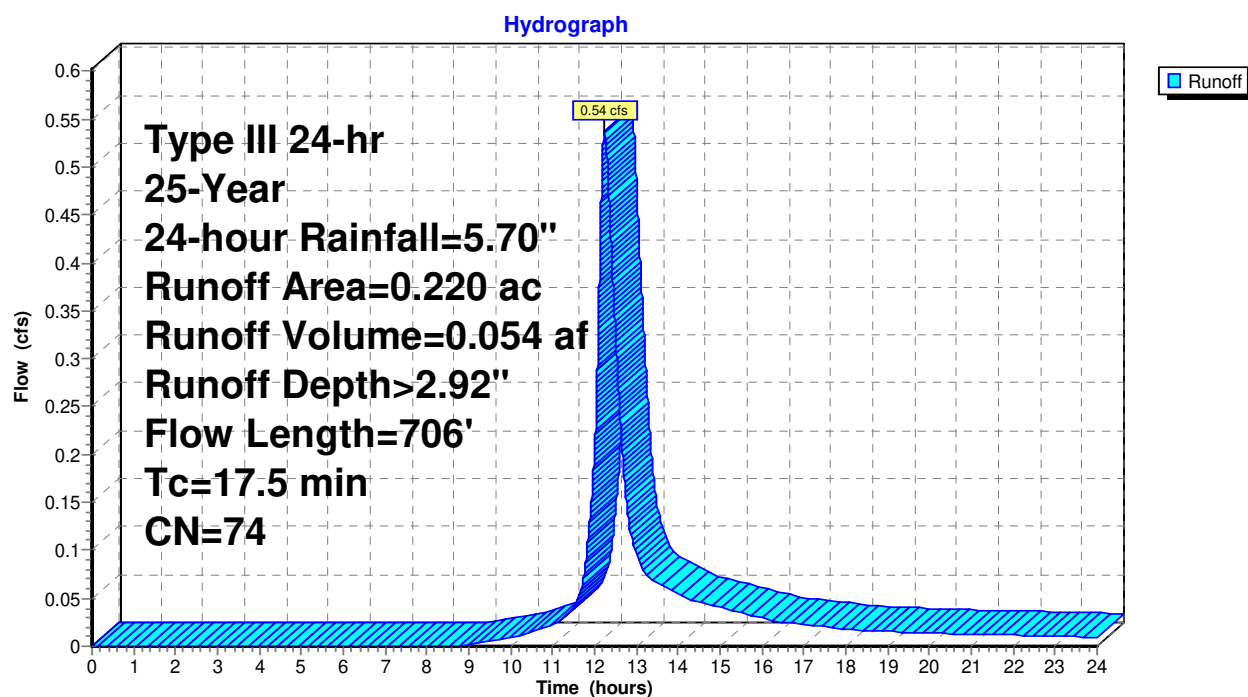
Runoff = 0.54 cfs @ 12.231 hrs, Volume= 0.054 af, Depth> 2.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 25-Year, 24-hour Rainfall=5.70"

Area (ac)	CN	Description
0.150	74	>75% Grass cover, Good, HSG C
0.070	73	Woods, Fair, HSG C
0.220	74	Weighted Average
0.220		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.8	50	0.0200	0.07		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
0.2	130	0.0400	10.73	64.40	Trap/Vee/Rect Channel Flow, Bot.W=4.00' D=1.00' Z= 2.0 '/' Top.W=8.00' n= 0.022 Earth, clean & straight
4.3	132	0.0001	0.51	0.77	Pipe Channel, 12.0" x 18.0" Box Area= 1.5 sf Perim= 5.0' r= 0.30' n= 0.013
0.0	8	0.0125	3.87	1.35	Pipe Channel, 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.013
0.2	34	0.0060	3.51	2.76	Pipe Channel, 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.0	352	0.0060	6.04	18.98	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
17.5	706	Total			

Subcatchment Swale 1: Swale 1



Summary for Subcatchment Swale 2: Swale 2

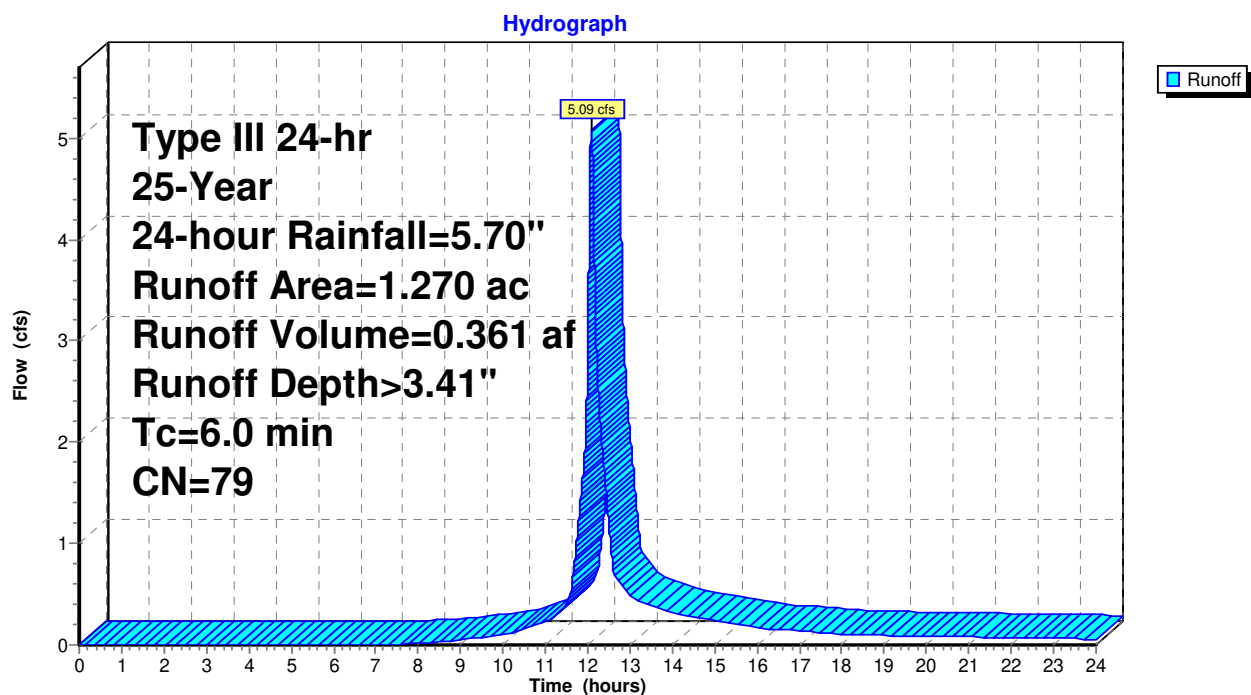
Runoff = 5.09 cfs @ 12.087 hrs, Volume= 0.361 af, Depth> 3.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 25-Year, 24-hour Rainfall=5.70"

Area (ac)	CN	Description
0.790	79	50-75% Grass cover, Fair, HSG C
0.350	73	Woods, Fair, HSG C
* 0.130	98	Existing Buildings
1.270	79	Weighted Average
1.140		89.76% Pervious Area
0.130		10.24% Impervious Area

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

Subcatchment Swale 2: Swale 2



Summary for Subcatchment Swale 3: Swale 3

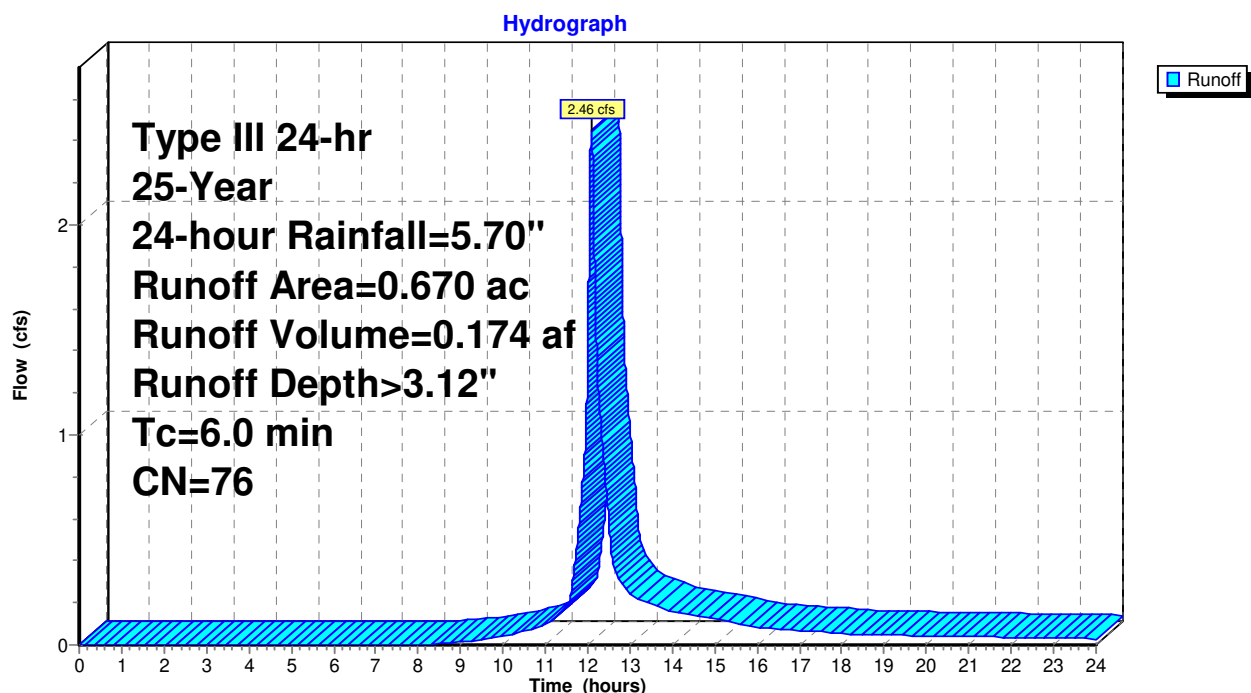
Runoff = 2.46 cfs @ 12.087 hrs, Volume= 0.174 af, Depth> 3.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 25-Year, 24-hour Rainfall=5.70"

Area (ac)	CN	Description
* 0.060	98	Existing Buildings
0.540	74	>75% Grass cover, Good, HSG C
0.070	73	Woods, Fair, HSG C
0.670	76	Weighted Average
0.610		91.04% Pervious Area
0.060		8.96% Impervious Area

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

Subcatchment Swale 3: Swale 3



Summary for Subcatchment Trench: Trench

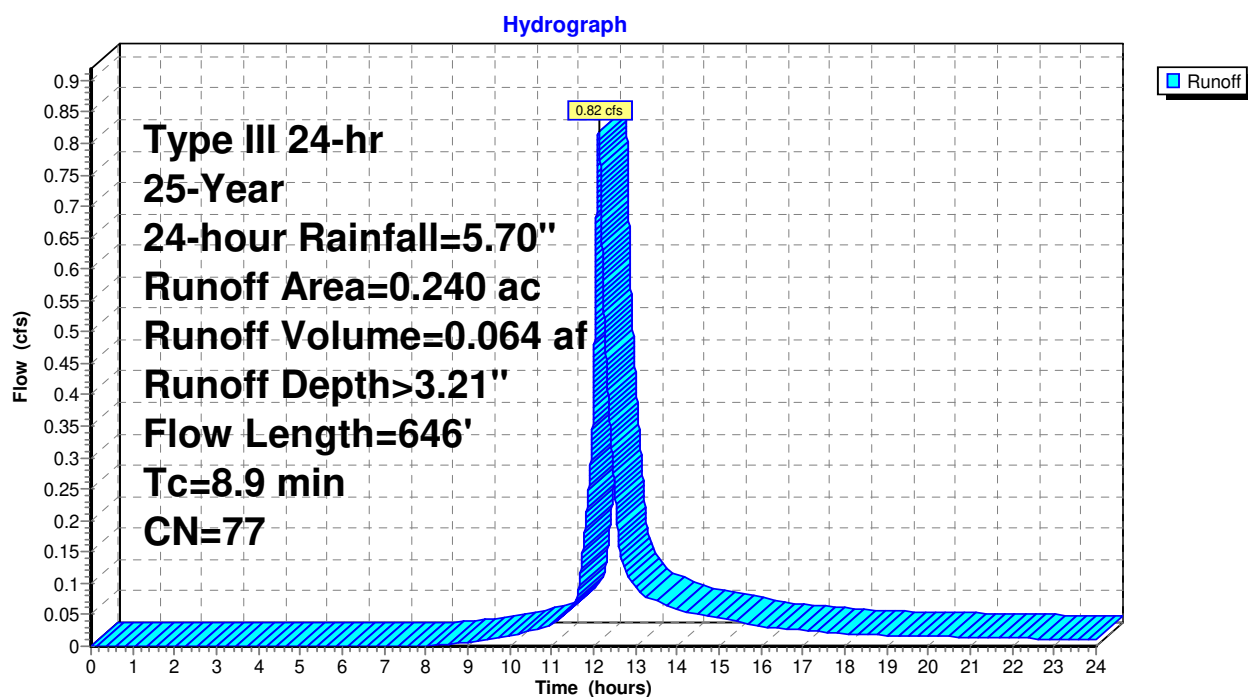
Runoff = 0.82 cfs @ 12.124 hrs, Volume= 0.064 af, Depth> 3.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
Type III 24-hr 25-Year, 24-hour Rainfall=5.70"

Area (ac)	CN	Description
* 0.040	98	Impervious
0.130	73	Woods, Fair, HSG C
0.070	74	>75% Grass cover, Good, HSG C
0.240	77	Weighted Average
0.200		83.33% Pervious Area
0.040		16.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.9	20	0.0400	0.12		Sheet Flow, Grass: Dense n= 0.240 P2= 3.50"
0.5	100	0.0400	3.22		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
4.3	132	0.0001	0.51	0.77	Pipe Channel, 12.0" x 18.0" Box Area= 1.5 sf Perim= 5.0' r= 0.30' n= 0.013
0.0	8	0.0125	3.87	1.35	Pipe Channel, 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.013
0.2	34	0.0060	3.51	2.76	Pipe Channel, 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.0	352	0.0060	6.04	18.98	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
8.9	646	Total			

Subcatchment Trench: Trench



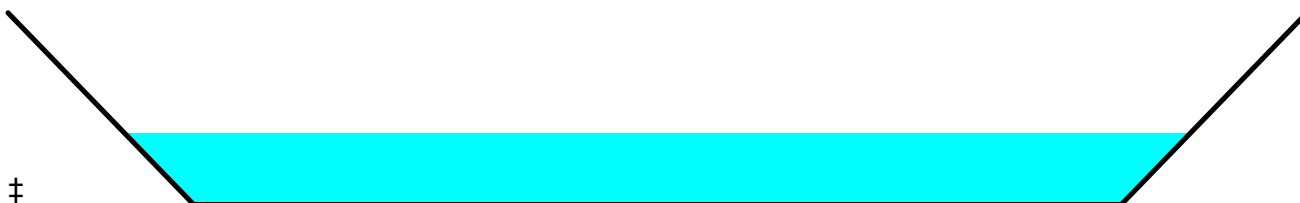
Summary for Reach Swale: Swale

Inflow Area = 0.090 ac, 33.33% Impervious, Inflow Depth > 3.71" for 25-Year, 24-hour event
 Inflow = 0.39 cfs @ 12.087 hrs, Volume= 0.028 af
 Outflow = 0.38 cfs @ 12.103 hrs, Volume= 0.028 af, Atten= 2%, Lag= 1.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs / 2
 Max. Velocity= 1.05 fps, Min. Travel Time= 1.6 min
 Avg. Velocity = 0.27 fps, Avg. Travel Time= 6.1 min

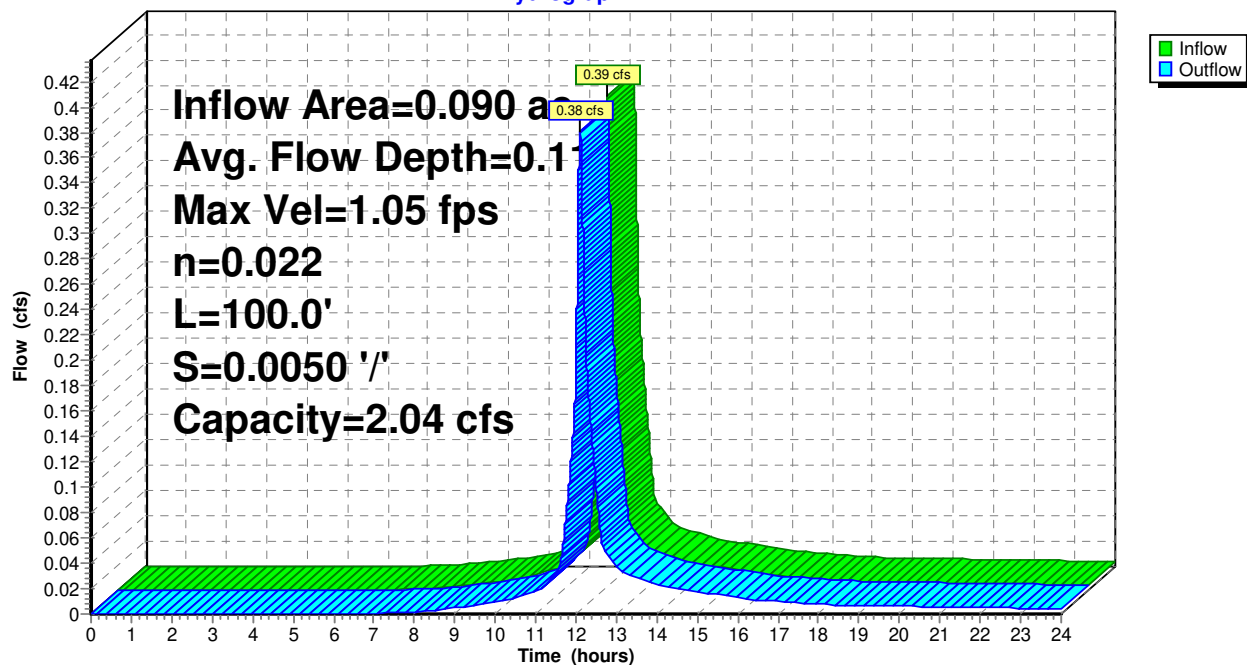
Peak Storage= 36 cf @ 12.103 hrs
 Average Depth at Peak Storage= 0.11'
 Bank-Full Depth= 0.30' Flow Area= 1.1 sf, Capacity= 2.04 cfs

3.00' x 0.30' deep channel, n= 0.022 Earth, clean & straight
 Side Slope Z-value= 2.0 '/' Top Width= 4.20'
 Length= 100.0' Slope= 0.0050 '/'
 Inlet Invert= 38.70', Outlet Invert= 38.20'



Reach Swale: Swale

Hydrograph



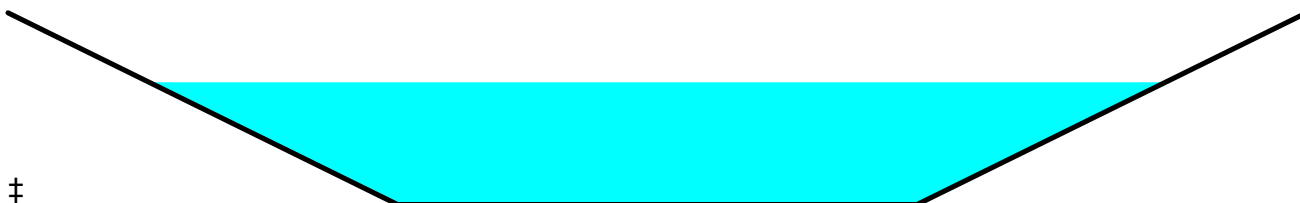
Summary for Reach Swale 4: Swale 4

Inflow Area = 3.720 ac, 19.89% Impervious, Inflow Depth > 3.41" for 25-Year, 24-hour event
 Inflow = 14.49 cfs @ 12.096 hrs, Volume= 1.057 af
 Outflow = 14.14 cfs @ 12.116 hrs, Volume= 1.055 af, Atten= 2%, Lag= 1.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs / 2
 Max. Velocity= 3.75 fps, Min. Travel Time= 1.6 min
 Avg. Velocity = 1.17 fps, Avg. Travel Time= 5.0 min

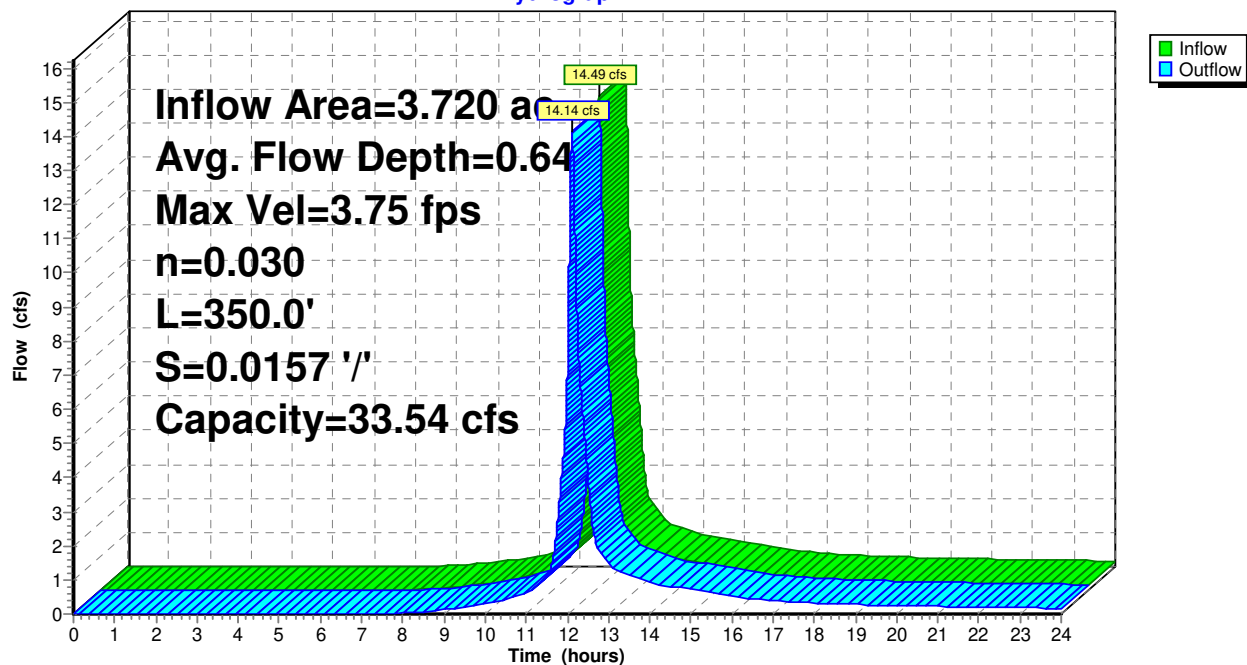
Peak Storage= 1,320 cf @ 12.116 hrs
 Average Depth at Peak Storage= 0.64'
 Bank-Full Depth= 1.00' Flow Area= 7.0 sf, Capacity= 33.54 cfs

4.00' x 1.00' deep channel, n= 0.030
 Side Slope Z-value= 3.0 '/' Top Width= 10.00'
 Length= 350.0' Slope= 0.0157 '/'
 Inlet Invert= 42.50', Outlet Invert= 37.00'



Reach Swale 4: Swale 4

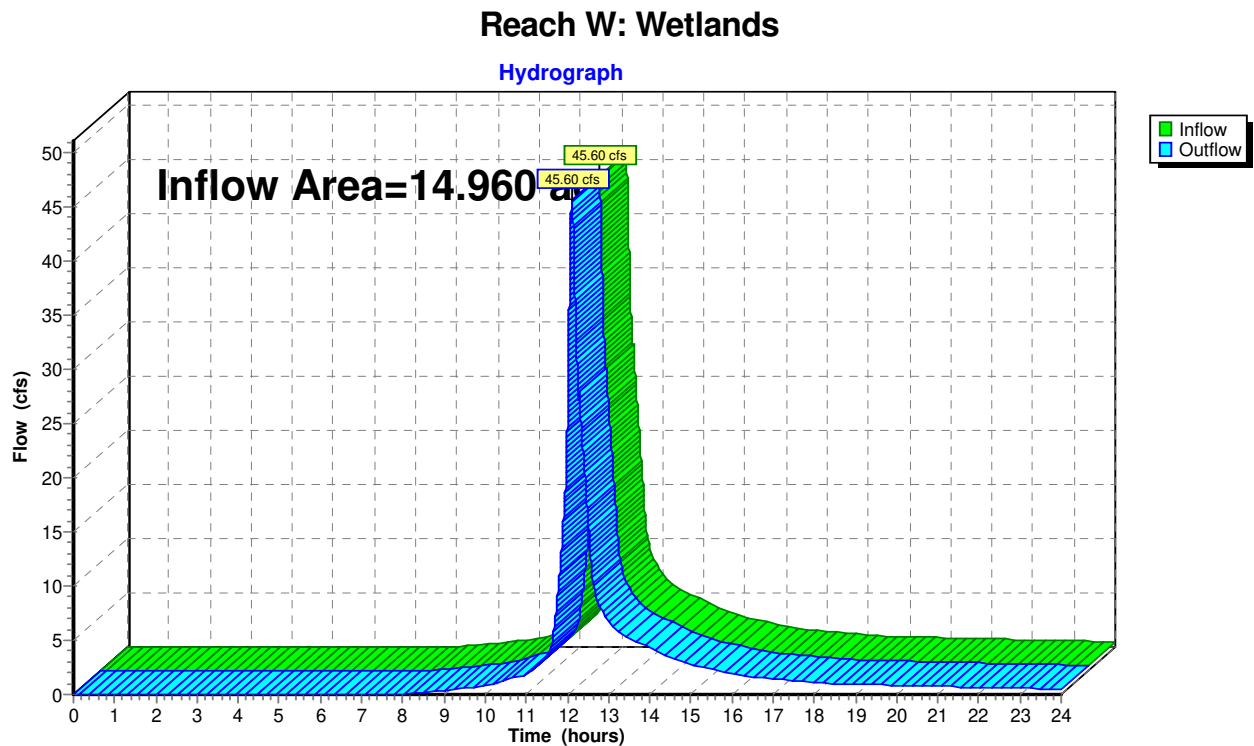
Hydrograph



Summary for Reach W: Wetlands

Inflow Area = 14.960 ac, 22.39% Impervious, Inflow Depth > 3.08" for 25-Year, 24-hour event
Inflow = 45.60 cfs @ 12.113 hrs, Volume= 3.844 af
Outflow = 45.60 cfs @ 12.113 hrs, Volume= 3.844 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs / 2



Summary for Pond A: Pond A

Inflow Area = 1.760 ac, 50.57% Impervious, Inflow Depth > 4.21" for 25-Year, 24-hour event
 Inflow = 8.50 cfs @ 12.087 hrs, Volume= 0.617 af
 Outflow = 1.95 cfs @ 12.487 hrs, Volume= 0.534 af, Atten= 77%, Lag= 24.0 min
 Discarded = 0.22 cfs @ 12.487 hrs, Volume= 0.148 af
 Primary = 1.74 cfs @ 12.487 hrs, Volume= 0.385 af
 Secondary = 0.00 cfs @ 0.000 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs / 2
 Peak Elev= 38.90' @ 12.487 hrs Surf.Area= 9,122 sf Storage= 11,453 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 71.7 min (867.9 - 796.2)

Volume	Invert	Avail.Storage	Storage Description
#1	36.50'	21,290 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
#2	34.50'	515 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
			1,472 cf Overall x 35.0% Voids
21,805 cf			Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
36.50	736	0	0
36.51	2,513	16	16
37.00	3,030	1,358	1,374
38.00	4,111	3,571	4,945
38.50	7,261	2,843	7,788
39.00	8,658	3,980	11,768
40.00	10,387	9,523	21,290

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
34.50	736	0	0
36.50	736	1,472	1,472

Device	Routing	Invert	Outlet Devices
#1	Primary	37.50'	8.0" Round Culvert L= 36.0' Ke= 0.500 Inlet / Outlet Invert= 37.50' / 36.28' S= 0.0339 ' ' Cc= 0.900 n= 0.013, Flow Area= 0.35 sf
#2	Discarded	34.50'	1.020 in/hr Exfiltration over Surface area
#3	Secondary	39.35'	5.0' long x 11.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.53 2.59 2.70 2.68 2.67 2.68 2.66 2.64

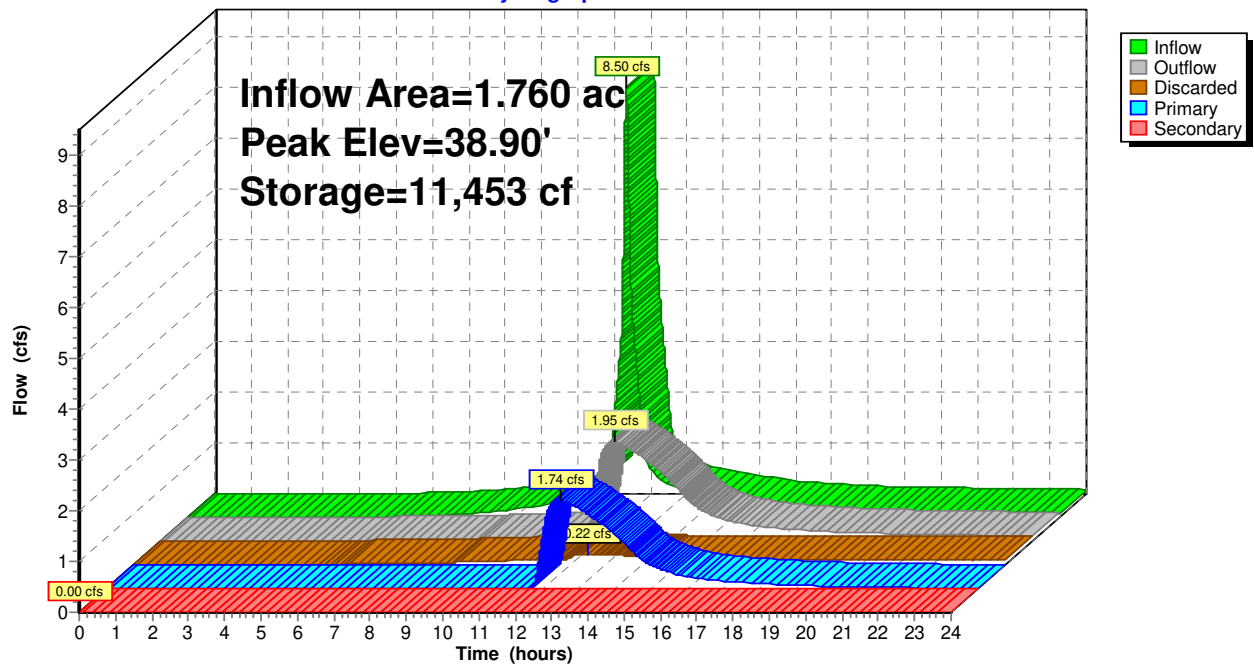
Discarded OutFlow Max=0.22 cfs @ 12.487 hrs HW=38.90' (Free Discharge)
 ↑ **2=Exfiltration** (Exfiltration Controls 0.22 cfs)

Primary OutFlow Max=1.74 cfs @ 12.487 hrs HW=38.90' TW=0.00' (Dynamic Tailwater)
 ↑ **1=Culvert** (Inlet Controls 1.74 cfs @ 4.98 fps)

Secondary OutFlow Max=0.00 cfs @ 0.000 hrs HW=34.50' TW=0.00' (Dynamic Tailwater)
 ↑ **3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond A: Pond A

Hydrograph



Summary for Pond B: Pond B

Inflow Area = 0.450 ac, 53.33% Impervious, Inflow Depth > 4.23" for 25-Year, 24-hour event
 Inflow = 2.18 cfs @ 12.087 hrs, Volume= 0.158 af
 Outflow = 1.26 cfs @ 12.196 hrs, Volume= 0.141 af, Atten= 42%, Lag= 6.6 min
 Discarded = 0.05 cfs @ 12.196 hrs, Volume= 0.031 af
 Primary = 1.21 cfs @ 12.196 hrs, Volume= 0.110 af
 Secondary = 0.00 cfs @ 0.000 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs / 2
 Peak Elev= 39.35' @ 12.196 hrs Surf.Area= 2,180 sf Storage= 1,729 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 36.9 min (832.7 - 795.8)

Volume	Invert	Avail.Storage	Storage Description
#1	37.50'	4,937 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
#2	35.50'	125 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
		358 cf Overall x 35.0% Voids	
		5,062 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
37.50	450	0	0
38.00	613	266	266
39.00	999	806	1,072
39.50	2,413	853	1,925
40.00	3,062	1,369	3,294
40.50	3,511	1,643	4,937

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
35.50	179	0	0
37.50	179	358	358

Device	Routing	Invert	Outlet Devices
#1	Primary	38.50'	8.0" Round Culvert L= 60.0' Ke= 0.500 Inlet / Outlet Invert= 38.50' / 36.90' S= 0.0267 '/' Cc= 0.900 n= 0.013, Flow Area= 0.35 sf
#2	Discarded	35.50'	1.020 in/hr Exfiltration over Surface area
#3	Secondary	39.55'	5.0' long x 12.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

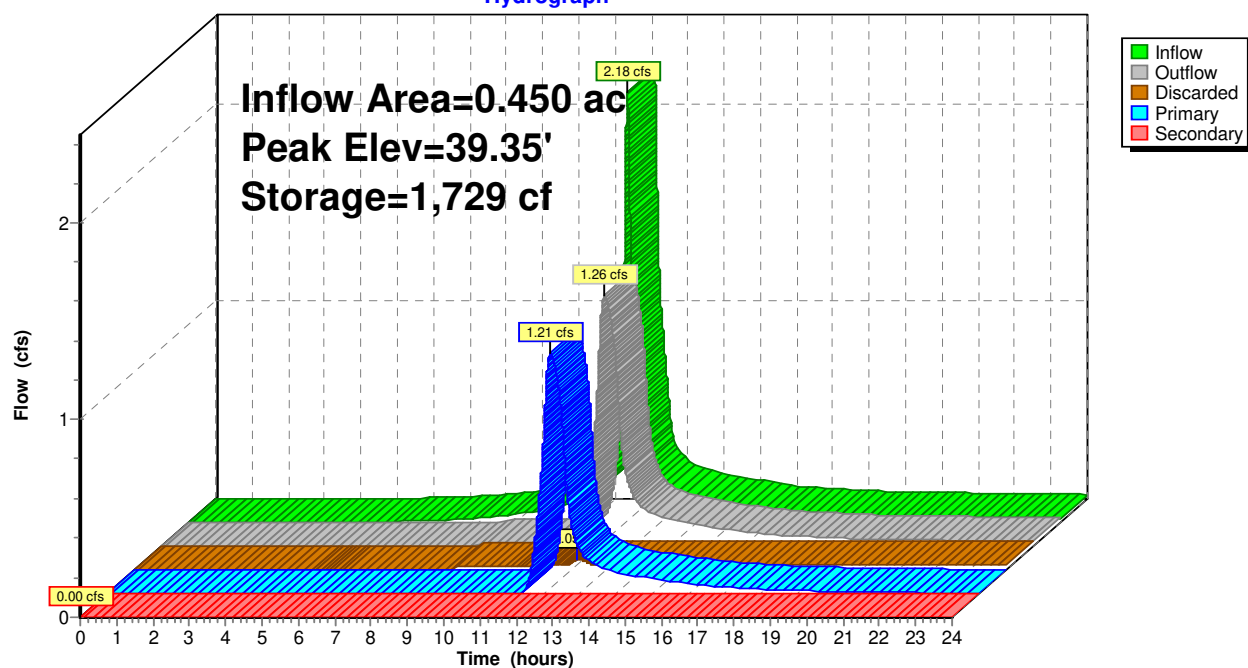
Discarded OutFlow Max=0.05 cfs @ 12.196 hrs HW=39.35' (Free Discharge)
 ↑ **2=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=1.21 cfs @ 12.196 hrs HW=39.35' TW=0.00' (Dynamic Tailwater)
 ↑ **1=Culvert** (Inlet Controls 1.21 cfs @ 3.48 fps)

Secondary OutFlow Max=0.00 cfs @ 0.000 hrs HW=35.50' TW=0.00' (Dynamic Tailwater)
 ↑ **3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond B: Pond B

Hydrograph



Summary for Pond C1: Culvert 1

Inflow Area = 0.530 ac, 9.43% Impervious, Inflow Depth > 3.12" for 25-Year, 24-hour event
 Inflow = 1.95 cfs @ 12.087 hrs, Volume= 0.138 af
 Outflow = 1.88 cfs @ 12.109 hrs, Volume= 0.138 af, Atten= 3%, Lag= 1.3 min
 Primary = 1.88 cfs @ 12.109 hrs, Volume= 0.138 af

Routing by Dyn-Stor-Ind method, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs / 2
 Peak Elev= 39.48' @ 12.109 hrs Surf.Area= 296 sf Storage= 122 cf

Plug-Flow detention time= 1.1 min calculated for 0.138 af (100% of inflow)
 Center-of-Mass det. time= 0.9 min (826.4 - 825.5)

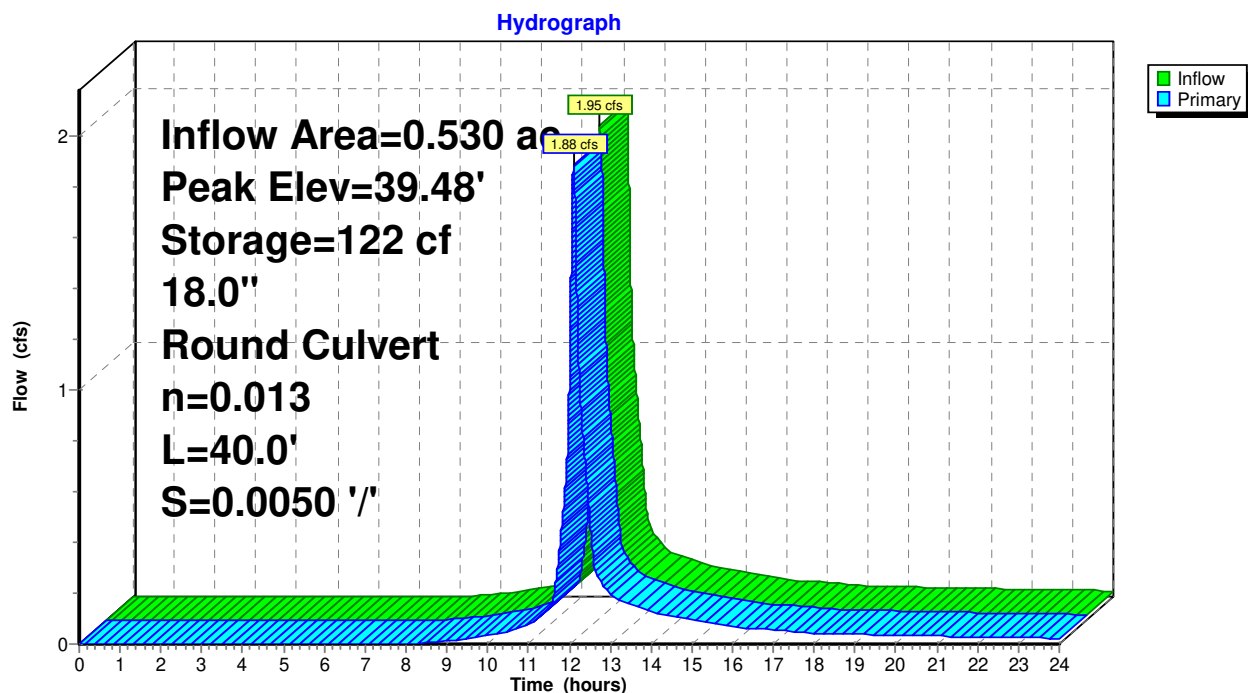
Volume	Invert	Avail.Storage	Storage Description
#1	38.70'	324 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
38.70	10	0	0
39.00	127	21	21
40.00	480	304	324

Device	Routing	Invert	Outlet Devices
#1	Primary	38.70'	18.0" Round Culvert L= 40.0' Ke= 0.500 Inlet / Outlet Invert= 38.70' / 38.50' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf

Primary OutFlow Max=1.88 cfs @ 12.109 hrs HW=39.48' TW=39.15' (Dynamic Tailwater)
 ↑**1=Culvert** (Outlet Controls 1.88 cfs @ 2.95 fps)

Pond C1: Culvert 1



Summary for Pond C2: Culvert 2

Inflow Area = 0.930 ac, 7.53% Impervious, Inflow Depth > 3.08" for 25-Year, 24-hour event
 Inflow = 3.28 cfs @ 12.100 hrs, Volume= 0.239 af
 Outflow = 3.26 cfs @ 12.110 hrs, Volume= 0.238 af, Atten= 1%, Lag= 0.6 min
 Primary = 3.26 cfs @ 12.110 hrs, Volume= 0.238 af

Routing by Dyn-Stor-Ind method, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs / 2
 Peak Elev= 39.15' @ 12.110 hrs Surf.Area= 228 sf Storage= 104 cf

Plug-Flow detention time= 0.6 min calculated for 0.238 af (100% of inflow)
 Center-of-Mass det. time= 0.5 min (827.6 - 827.1)

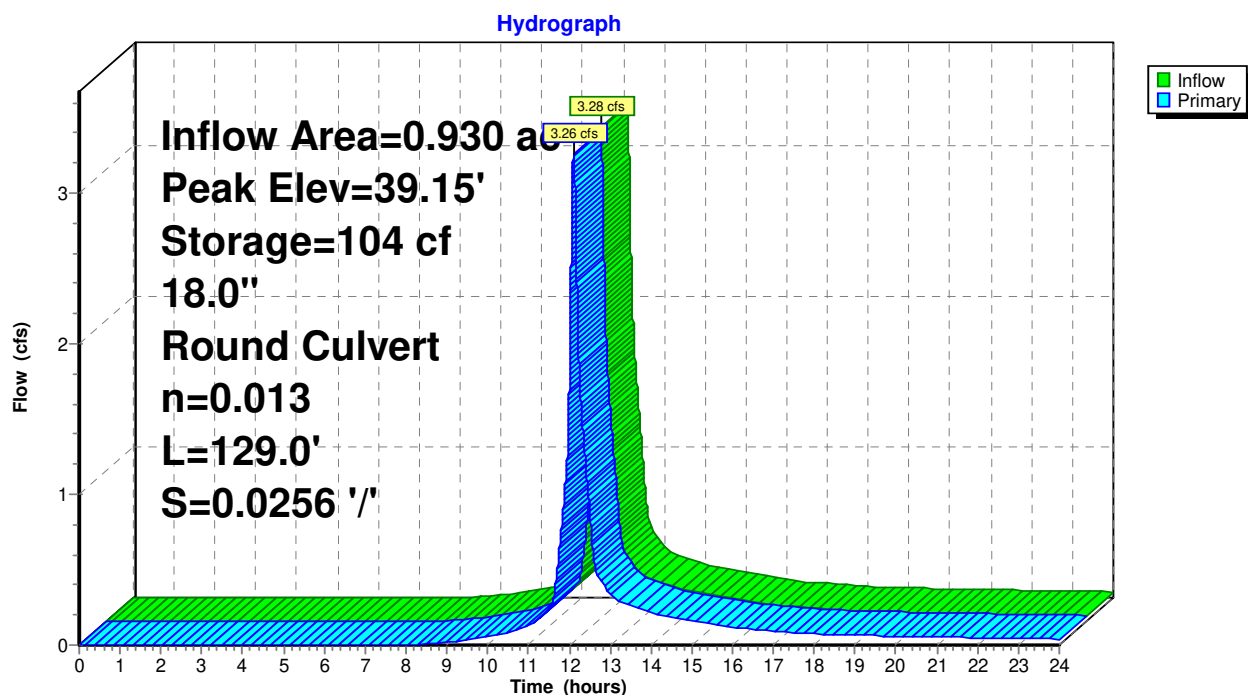
Volume	Invert	Avail.Storage	Storage Description
#1	38.30'	922 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
38.30	10	0	0
39.00	194	71	71
40.00	418	306	377
41.00	672	545	922

Device	Routing	Invert	Outlet Devices
#1	Primary	38.30'	18.0" Round Culvert L= 129.0' Ke= 0.500 Inlet / Outlet Invert= 38.30' / 35.00' S= 0.0256 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf

Primary OutFlow Max=3.26 cfs @ 12.110 hrs HW=39.15' TW=0.00' (Dynamic Tailwater)
 ↑**1=Culvert** (Inlet Controls 3.26 cfs @ 3.14 fps)

Pond C2: Culvert 2



Summary for Pond RT12: 1 Roof Trench System (Lot 12)

Inflow Area = 0.030 ac, 100.00% Impervious, Inflow Depth > 5.45" for 25-Year, 24-hour event
 Inflow = 0.15 cfs @ 12.133 hrs, Volume= 0.014 af
 Outflow = 0.01 cfs @ 13.111 hrs, Volume= 0.010 af, Atten= 91%, Lag= 58.7 min
 Discarded = 0.01 cfs @ 13.099 hrs, Volume= 0.010 af
 Primary = 0.01 cfs @ 13.111 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs / 2
 Peak Elev= 3.09' @ 13.111 hrs Surf.Area= 288 sf Storage= 275 cf

Plug-Flow detention time= 236.1 min calculated for 0.010 af (75% of inflow)
 Center-of-Mass det. time= 149.8 min (898.5 - 748.7)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	169 cf	8'x36'x24.5" Roof Trench System (Prismatic) Listed below (Recalc) 588 cf Overall - 106 cf Embedded = 482 cf x 35.0% Voids
#2	1.00'	106 cf	Custom Stage Data Listed below Inside #1
#3	2.04'	0 cf	0.50'D x 1.60'H Vertical Cone/Cylinder
		275 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	288	0	0
2.04	288	588	588

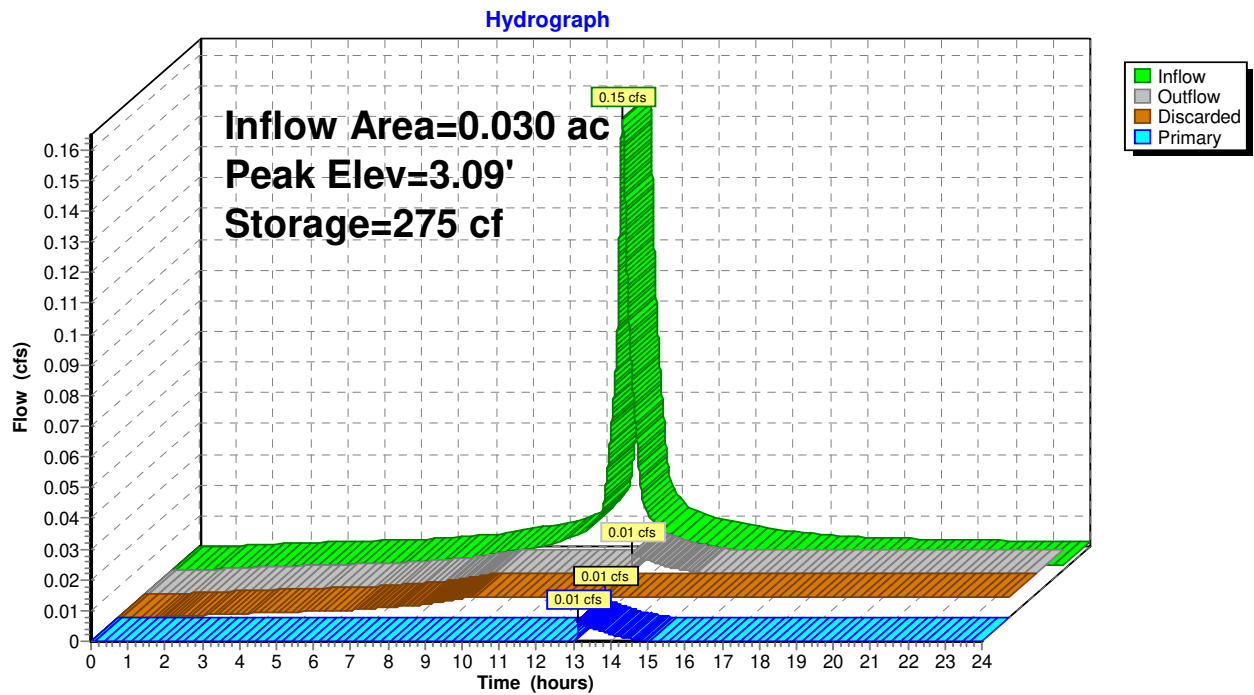
Elevation (feet)	Cum.Store (cubic-feet)
1.00	0
2.04	106

Device	Routing	Invert	Outlet Devices
#1	Primary	3.04'	4.0" Vert. Orifice/Grate C= 0.600
#2	Discarded	0.00'	1.020 in/hr Exfiltration over Surface area Phase-In= 0.02'

Discarded OutFlow Max=0.01 cfs @ 13.099 hrs HW=2.05' (Free Discharge)
 ↑ **2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.01 cfs @ 13.111 hrs HW=3.09' TW=0.00' (Dynamic Tailwater)
 ↑ **1=Orifice/Grate** (Orifice Controls 0.01 cfs @ 0.76 fps)

Pond RT12: 1 Roof Trench System (Lot 12)



Summary for Pond RT14: 14 Roof Trench Systems

Inflow Area = 0.500 ac, 100.00% Impervious, Inflow Depth > 5.45" for 25-Year, 24-hour event
 Inflow = 2.45 cfs @ 12.133 hrs, Volume= 0.227 af
 Outflow = 1.47 cfs @ 12.283 hrs, Volume= 0.180 af, Atten= 40%, Lag= 9.0 min
 Discarded = 0.09 cfs @ 12.282 hrs, Volume= 0.139 af
 Primary = 1.37 cfs @ 12.283 hrs, Volume= 0.041 af

Routing by Dyn-Stor-Ind method, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs / 2
 Peak Elev= 3.26' @ 12.283 hrs Surf.Area= 3,923 sf Storage= 3,530 cf

Plug-Flow detention time= 188.4 min calculated for 0.180 af (79% of inflow)
 Center-of-Mass det. time= 109.9 min (858.6 - 748.7)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	2,407 cf	10'x28'x24.5" Roof Trench System (Prismatic) Listed below (Recalc) x 1 7,997 cf Overall - 1,120 cf Embedded = 6,877 cf x 35.0% Voids
#2	1.00'	1,120 cf	Custom Stage Data Listed below x 14 Inside #1
#3	2.04'	4 cf	0.50'D x 1.60'H Vertical Cone/Cylinder x 14
		3,531 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	280	0	0
2.04	280	571	571

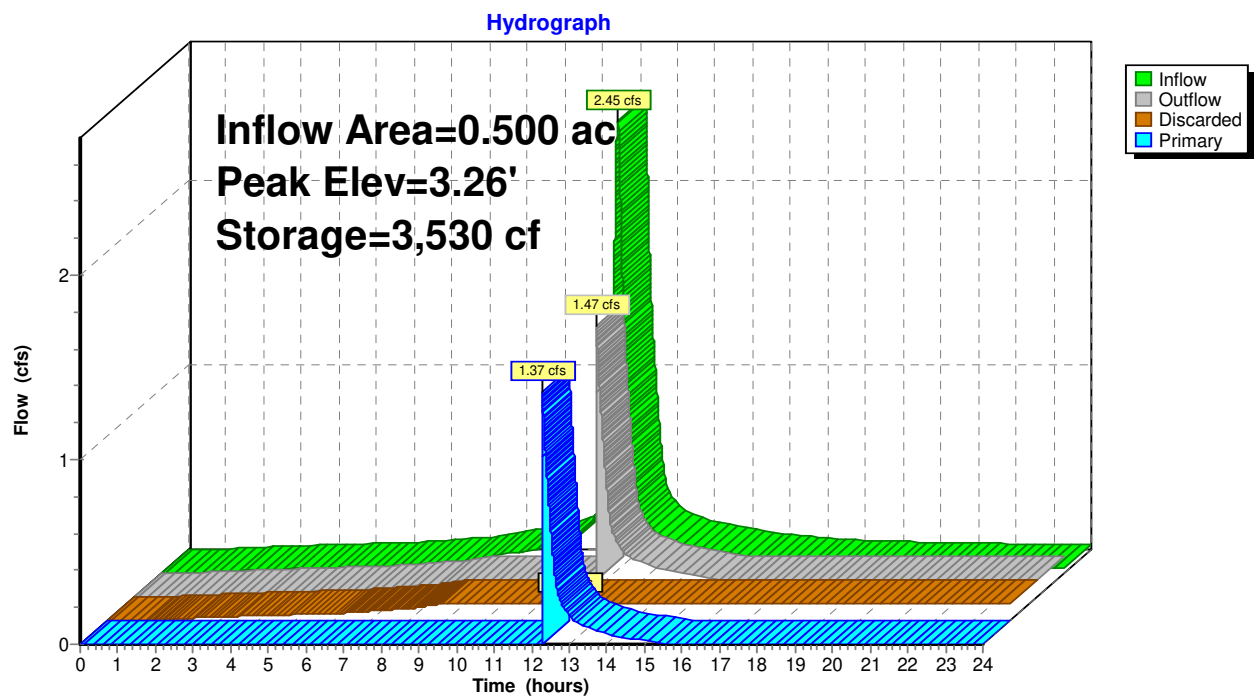
Elevation (feet)	Cum.Store (cubic-feet)
1.00	0
2.04	80

Device	Routing	Invert	Outlet Devices
#1	Primary	3.04'	4.0" Vert. Orifice/Grate X 14.00 C= 0.600
#2	Discarded	0.00'	1.020 in/hr Exfiltration over Surface area Phase-In= 0.02'

Discarded OutFlow Max=0.09 cfs @ 12.282 hrs HW=2.06' (Free Discharge)
 ↑ **2=Exfiltration** (Exfiltration Controls 0.09 cfs)

Primary OutFlow Max=1.37 cfs @ 12.283 hrs HW=3.26' TW=0.00' (Dynamic Tailwater)
 ↑ **1=Orifice/Grate** (Orifice Controls 1.37 cfs @ 1.60 fps)

Pond RT14: 14 Roof Trench Systems



Summary for Pond RT9: 1 Roof Trench System (Lot 9)

Inflow Area = 0.030 ac, 100.00% Impervious, Inflow Depth > 5.45" for 25-Year, 24-hour event
 Inflow = 0.15 cfs @ 12.133 hrs, Volume= 0.014 af
 Outflow = 0.15 cfs @ 12.133 hrs, Volume= 0.011 af, Atten= 0%, Lag= 0.0 min
 Discarded = 0.00 cfs @ 12.024 hrs, Volume= 0.005 af
 Primary = 0.14 cfs @ 12.133 hrs, Volume= 0.006 af

Routing by Dyn-Stor-Ind method, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs / 2

Peak Elev= 3.32' @ 12.133 hrs Surf.Area= 140 sf Storage= 135 cf

Plug-Flow detention time= 125.1 min calculated for 0.011 af (82% of inflow)

Center-of-Mass det. time= 52.4 min (801.1 - 748.7)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	81 cf	7'x20'x24.5" Roof Trench System (Prismatic) Listed below (Recalc) 286 cf Overall - 53 cf Embedded = 233 cf x 35.0% Voids
#2	1.00'	53 cf	Custom Stage Data Listed below Inside #1
#3	2.04'	0 cf	0.50'D x 1.60'H Vertical Cone/Cylinder
		135 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	140	0	0
2.04	140	286	286

Elevation (feet)	Cum.Store (cubic-feet)
1.00	0
2.04	53

Device	Routing	Invert	Outlet Devices
#1	Primary	3.04'	4.0" Vert. Orifice/Grate C= 0.600
#2	Discarded	0.00'	1.020 in/hr Exfiltration over Surface area Phase-In= 0.02'

Discarded OutFlow Max=0.00 cfs @ 12.024 hrs HW=2.15' (Free Discharge)

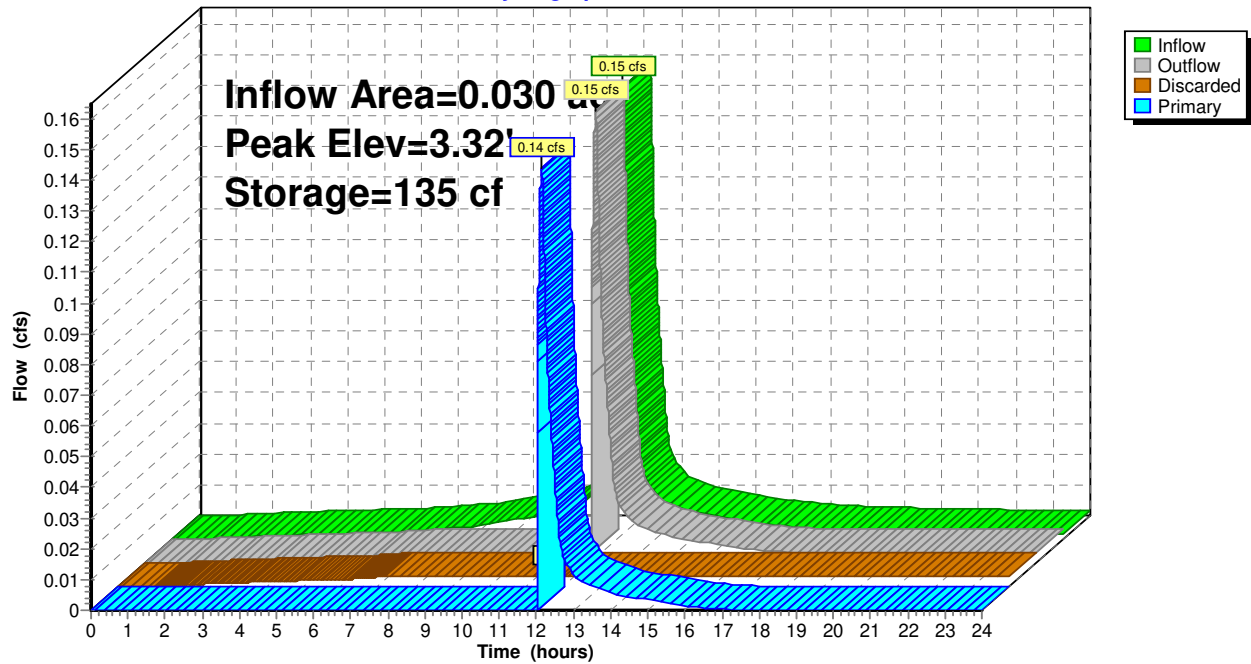
↑ **2=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.14 cfs @ 12.133 hrs HW=3.32' TW=0.00' (Dynamic Tailwater)

↑ **1=Orifice/Grate** (Orifice Controls 0.14 cfs @ 1.81 fps)

Pond RT9: 1 Roof Trench System (Lot 9)

Hydrograph



Summary for Pond S2: Swale 2

Inflow Area = 1.270 ac, 10.24% Impervious, Inflow Depth > 3.41" for 25-Year, 24-hour event
 Inflow = 5.09 cfs @ 12.087 hrs, Volume= 0.361 af
 Outflow = 3.70 cfs @ 12.162 hrs, Volume= 0.360 af, Atten= 27%, Lag= 4.5 min
 Discarded = 0.05 cfs @ 12.162 hrs, Volume= 0.027 af
 Primary = 3.65 cfs @ 12.162 hrs, Volume= 0.333 af

Routing by Dyn-Stor-Ind method, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs / 2

Peak Elev= 41.93' @ 12.162 hrs Surf.Area= 2,026 sf Storage= 1,218 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)

Center-of-Mass det. time= 4.8 min (822.9 - 818.1)

Volume	Invert	Avail.Storage	Storage Description
#1	40.50'	14,785 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
#2	40.50'	88 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
		250 cf Overall	x 35.0% Voids
		14,873 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
40.50	240	0	0
41.00	500	185	185
42.00	1,600	1,050	1,235
43.00	3,750	2,675	3,910
44.00	4,500	4,125	8,035
45.00	9,000	6,750	14,785

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
40.50	500	0	0
41.00	500	250	250

Device	Routing	Invert	Outlet Devices
#1	Primary	40.50'	12.0" Round Culvert L= 162.0' Ke= 0.500 Inlet / Outlet Invert= 40.50' / 36.25' S= 0.0262 '/' Cc= 0.900 n= 0.013 Concrete sewer w/manholes & inlets, Flow Area= 0.79 sf
#2	Discarded	40.50'	1.020 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.05 cfs @ 12.162 hrs HW=41.93' (Free Discharge)

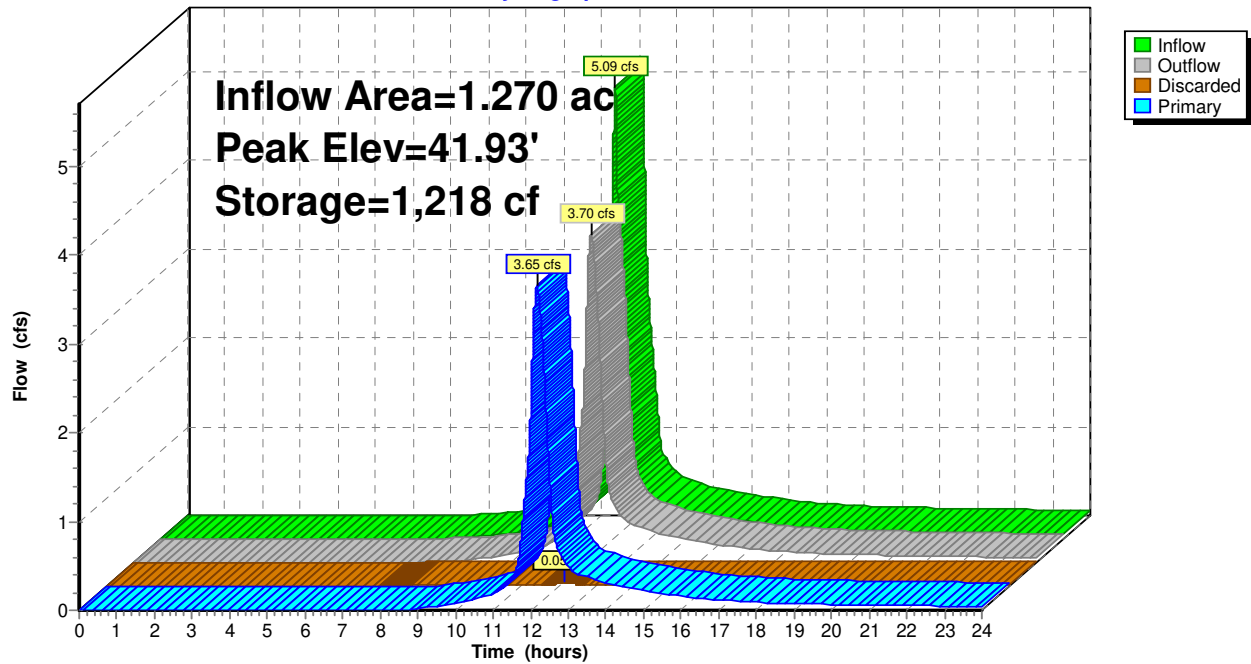
↑ **2=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=3.65 cfs @ 12.162 hrs HW=41.93' TW=0.00' (Dynamic Tailwater)

↑ **1=Culvert** (Inlet Controls 3.65 cfs @ 4.65 fps)

Pond S2: Swale 2

Hydrograph



Summary for Pond S3: Swale 3

Inflow Area = 0.670 ac, 8.96% Impervious, Inflow Depth > 3.12" for 25-Year, 24-hour event
 Inflow = 2.46 cfs @ 12.087 hrs, Volume= 0.174 af
 Outflow = 2.20 cfs @ 12.129 hrs, Volume= 0.174 af, Atten= 10%, Lag= 2.5 min
 Discarded = 0.03 cfs @ 12.129 hrs, Volume= 0.016 af
 Primary = 2.18 cfs @ 12.129 hrs, Volume= 0.158 af

Routing by Dyn-Stor-Ind method, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs / 2
 Peak Elev= 42.33' @ 12.129 hrs Surf.Area= 1,121 sf Storage= 393 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 3.3 min (828.8 - 825.5)

Volume	Invert	Avail.Storage	Storage Description
#1	41.50'	5,613 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
#2	41.50'	70 cf	Custom Stage Data (Prismatic) Listed below
		200 cf Overall	x 35.0% Voids
		5,683 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
41.50	10	0	0
42.00	480	123	123
43.00	1,200	840	963
44.00	1,800	1,500	2,463
45.00	4,500	3,150	5,613

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
41.50	400	0	0
42.00	400	200	200

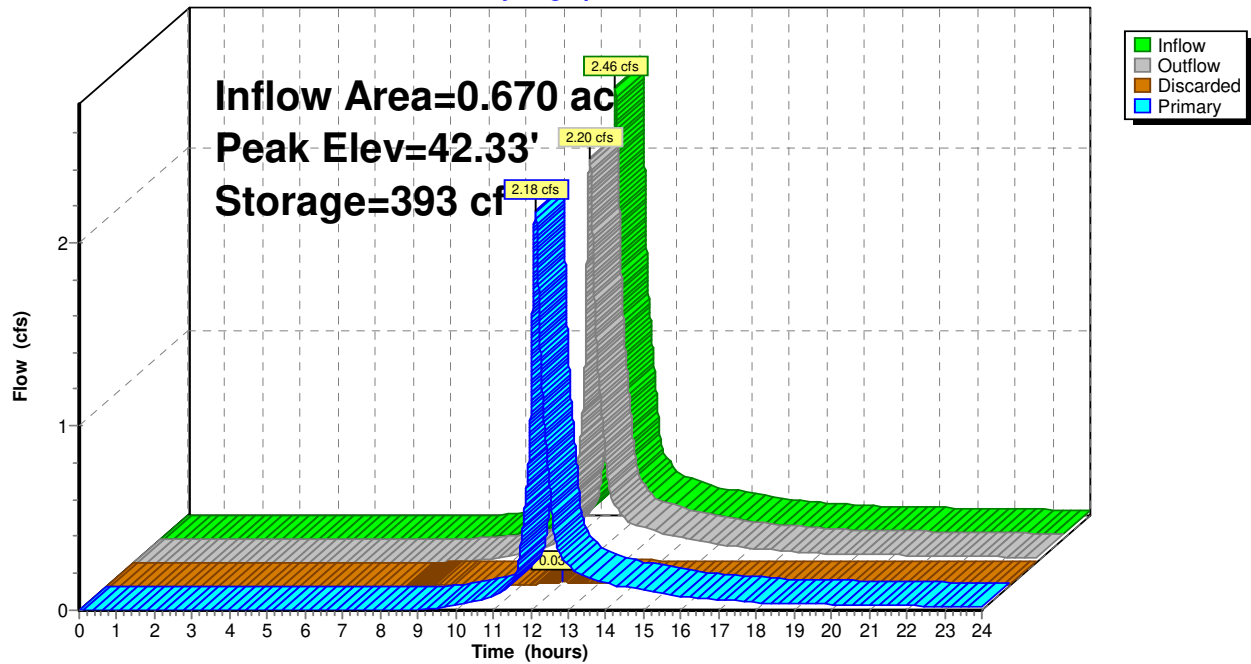
Device	Routing	Invert	Outlet Devices
#1	Primary	41.50'	12.0" Round Culvert L= 292.0' Ke= 0.500 Inlet / Outlet Invert= 41.50' / 36.25' S= 0.0180 '/' Cc= 0.900 n= 0.013 Concrete sewer w/manholes & inlets, Flow Area= 0.79 sf
#2	Discarded	41.50'	1.020 in/hr Exfiltration over Surface area

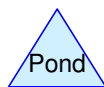
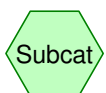
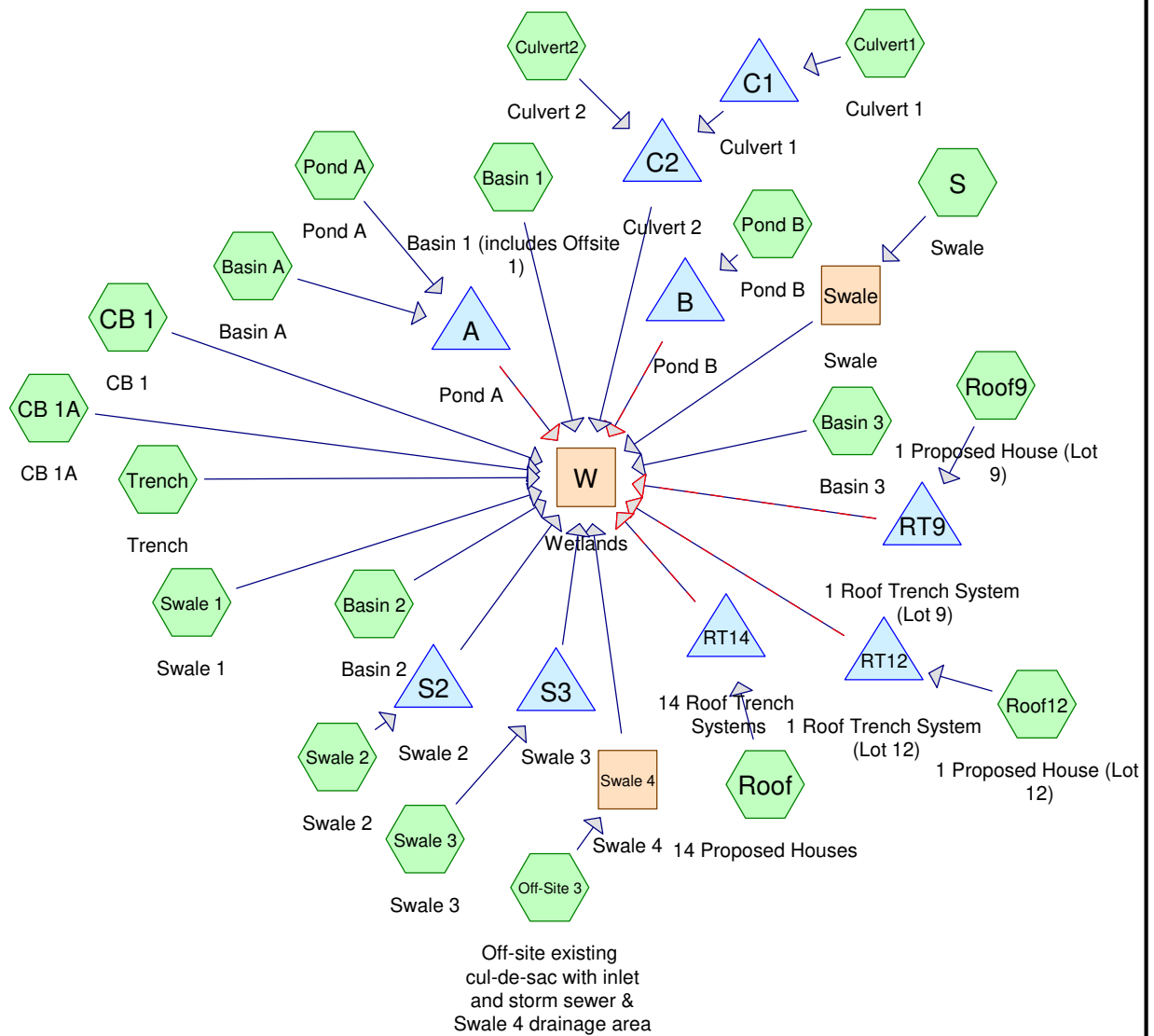
Discarded OutFlow Max=0.03 cfs @ 12.129 hrs HW=42.33' (Free Discharge)
 ↑ **2=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=2.18 cfs @ 12.129 hrs HW=42.33' TW=0.00' (Dynamic Tailwater)
 ↑ **1=Culvert** (Inlet Controls 2.18 cfs @ 3.11 fps)

Pond S3: Swale 3

Hydrograph





Routing Diagram for 12-02-19-Fairhaven-S.NeckWoods-Proposed Cond
 Prepared by {enter your company name here}, Printed 12/5/2019
 HydroCAD® 10.00-15 s/n 05280 © 2015 HydroCAD Software Solutions LLC

Time span=0.000-24.000 hrs, dt=0.0001 hrs, 240001 points x 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment Basin 1: Basin 1	Runoff Area=2.650 ac 9.81% Impervious Runoff Depth>4.45" Flow Length=210' Tc=7.9 min CN=77 Runoff=12.92 cfs 0.983 af
Subcatchment Basin 2: Basin 2	Runoff Area=0.810 ac 4.94% Impervious Runoff Depth>4.34" Tc=6.0 min CN=76 Runoff=4.13 cfs 0.293 af
Subcatchment Basin 3: Basin 3	Runoff Area=1.030 ac 12.62% Impervious Runoff Depth>4.56" Tc=6.0 min CN=78 Runoff=5.50 cfs 0.391 af
Subcatchment Basin A: Basin A	Runoff Area=1.020 ac 49.02% Impervious Runoff Depth>5.46" Tc=6.0 min CN=86 Runoff=6.33 cfs 0.464 af
Subcatchment CB 1: CB 1	Runoff Area=0.260 ac 23.08% Impervious Runoff Depth>4.78" Tc=6.0 min CN=80 Runoff=1.45 cfs 0.104 af
Subcatchment CB 1A: CB 1A	Runoff Area=0.300 ac 33.33% Impervious Runoff Depth>5.00" Flow Length=160' Tc=7.7 min CN=82 Runoff=1.64 cfs 0.125 af
Subcatchment Culvert1: Culvert 1	Runoff Area=0.530 ac 9.43% Impervious Runoff Depth>4.34" Tc=6.0 min CN=76 Runoff=2.70 cfs 0.192 af
Subcatchment Culvert2: Culvert 2	Runoff Area=0.400 ac 5.00% Impervious Runoff Depth>4.23" Tc=6.0 min CN=75 Runoff=1.99 cfs 0.141 af
Subcatchment Off-Site 3: Off-site	Runoff Area=3.720 ac 19.89% Impervious Runoff Depth>4.67" Flow Length=560' Tc=6.8 min CN=79 Runoff=19.73 cfs 1.448 af
Subcatchment Pond A: Pond A	Runoff Area=0.740 ac 52.70% Impervious Runoff Depth>5.69" Tc=6.0 min CN=88 Runoff=4.73 cfs 0.351 af
Subcatchment Pond B: Pond B	Runoff Area=0.450 ac 53.33% Impervious Runoff Depth>5.57" Tc=6.0 min CN=87 Runoff=2.83 cfs 0.209 af
Subcatchment Roof: 14 Proposed	Runoff Area=0.500 ac 100.00% Impervious Runoff Depth>6.85" Tc=10.0 min CN=98 Runoff=3.06 cfs 0.285 af
Subcatchment Roof12: 1 Proposed	Runoff Area=0.030 ac 100.00% Impervious Runoff Depth>6.85" Tc=10.0 min CN=98 Runoff=0.18 cfs 0.017 af
Subcatchment Roof9: 1 Proposed	Runoff Area=0.030 ac 100.00% Impervious Runoff Depth>6.85" Tc=10.0 min CN=98 Runoff=0.18 cfs 0.017 af
Subcatchment S: Swale	Runoff Area=0.090 ac 33.33% Impervious Runoff Depth>5.00" Tc=6.0 min CN=82 Runoff=0.52 cfs 0.038 af
Subcatchment Swale 1: Swale 1	Runoff Area=0.220 ac 0.00% Impervious Runoff Depth>4.11" Flow Length=706' Tc=17.5 min CN=74 Runoff=0.76 cfs 0.075 af
Subcatchment Swale 2: Swale 2	Runoff Area=1.270 ac 10.24% Impervious Runoff Depth>4.67" Tc=6.0 min CN=79 Runoff=6.92 cfs 0.494 af

Subcatchment Swale 3: Swale 3 Runoff Area=0.670 ac 8.96% Impervious Runoff Depth>4.34"
 Tc=6.0 min CN=76 Runoff=3.41 cfs 0.242 af

Subcatchment Trench: Trench Runoff Area=0.240 ac 16.67% Impervious Runoff Depth>4.45"
 Flow Length=646' Tc=8.9 min CN=77 Runoff=1.13 cfs 0.089 af

Reach Swale: Swale Avg. Flow Depth=0.13' Max Vel=1.17 fps Inflow=0.52 cfs 0.038 af
 n=0.022 L=100.0' S=0.0050 '/' Capacity=2.04 cfs Outflow=0.51 cfs 0.037 af

Reach Swale 4: Swale 4 Avg. Flow Depth=0.75' Max Vel=4.10 fps Inflow=19.73 cfs 1.448 af
 n=0.030 L=350.0' S=0.0157 '/' Capacity=33.54 cfs Outflow=19.32 cfs 1.446 af

Reach W: Wetlands Inflow=61.26 cfs 5.378 af
 Outflow=61.26 cfs 5.378 af

Pond A: Pond A Peak Elev=39.32' Storage=15,188 cf Inflow=11.05 cfs 0.814 af
 Discarded=0.24 cfs 0.167 af Primary=2.05 cfs 0.560 af Secondary=0.00 cfs 0.000 af Outflow=2.29 cfs 0.727 af

Pond B: Pond B Peak Elev=39.53' Storage=2,124 cf Inflow=2.83 cfs 0.209 af
 Discarded=0.06 cfs 0.034 af Primary=1.40 cfs 0.157 af Secondary=0.00 cfs 0.000 af Outflow=1.47 cfs 0.191 af

Pond C1: Culvert 1 Peak Elev=39.67' Storage=183 cf Inflow=2.70 cfs 0.192 af
 18.0" Round Culvert n=0.013 L=40.0' S=0.0050 '/' Outflow=2.60 cfs 0.192 af

Pond C2: Culvert 2 Peak Elev=39.34' Storage=149 cf Inflow=4.55 cfs 0.333 af
 18.0" Round Culvert n=0.013 L=129.0' S=0.0256 '/' Outflow=4.51 cfs 0.333 af

Pond RT12: 1 Roof Trench System (Lot 12) Peak Elev=3.26' Storage=275 cf Inflow=0.18 cfs 0.017 af
 Discarded=0.01 cfs 0.010 af Primary=0.09 cfs 0.003 af Outflow=0.10 cfs 0.013 af

Pond RT14: 14 Roof Trench Systems Peak Elev=3.46' Storage=3,531 cf Inflow=3.06 cfs 0.285 af
 Discarded=0.09 cfs 0.146 af Primary=2.96 cfs 0.085 af Outflow=3.05 cfs 0.231 af

Pond RT9: 1 Roof Trench System (Lot 9) Peak Elev=3.39' Storage=135 cf Inflow=0.18 cfs 0.017 af
 Discarded=0.00 cfs 0.006 af Primary=0.18 cfs 0.009 af Outflow=0.18 cfs 0.014 af

Pond S2: Swale 2 Peak Elev=42.34' Storage=1,981 cf Inflow=6.92 cfs 0.494 af
 Discarded=0.07 cfs 0.030 af Primary=4.37 cfs 0.463 af Outflow=4.44 cfs 0.493 af

Pond S3: Swale 3 Peak Elev=42.57' Storage=582 cf Inflow=3.41 cfs 0.242 af
 Discarded=0.03 cfs 0.018 af Primary=2.85 cfs 0.224 af Outflow=2.88 cfs 0.242 af

Total Runoff Area = 14.960 ac Runoff Volume = 5.958 af Average Runoff Depth = 4.78"
77.61% Pervious = 11.610 ac 22.39% Impervious = 3.350 ac

Summary for Subcatchment Basin 1: Basin 1 (includes Offsite 1)

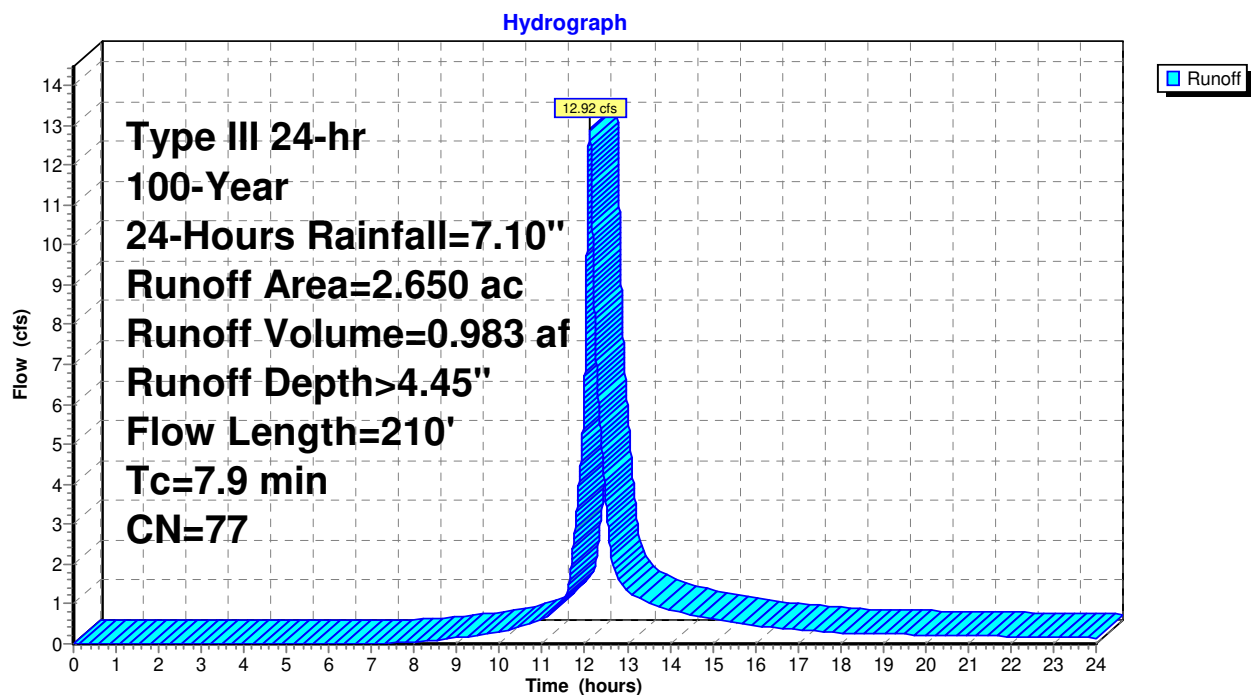
Runoff = 12.92 cfs @ 12.113 hrs, Volume= 0.983 af, Depth> 4.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 100-Year, 24-Hours Rainfall=7.10"

Area (ac)	CN	Description
0.720	73	Woods, Fair, HSG C
0.190	79	Woods, Fair, HSG D
* 0.190	98	Driveway/Road
0.130	80	>75% Grass cover, Good, HSG D
0.730	74	>75% Grass cover, Good, HSG C
* 0.070	73	Offsite 1 Woods, Fair, HSG C
* 0.010	98	Offsite 1 Driveway/Road
* 0.550	74	Offsite 1 >75% Grass cover, Good, HSG C
* 0.060	98	Offsite 1 Buildings
2.650	77	Weighted Average
2.390		90.19% Pervious Area
0.260		9.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.2	50	0.0250	0.12		Sheet Flow, Grass: Dense n= 0.240 P2= 3.50"
0.7	160	0.0500	3.60		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
7.9	210	Total			

Subcatchment Basin 1: Basin 1 (includes Offsite 1)



Summary for Subcatchment Basin 2: Basin 2

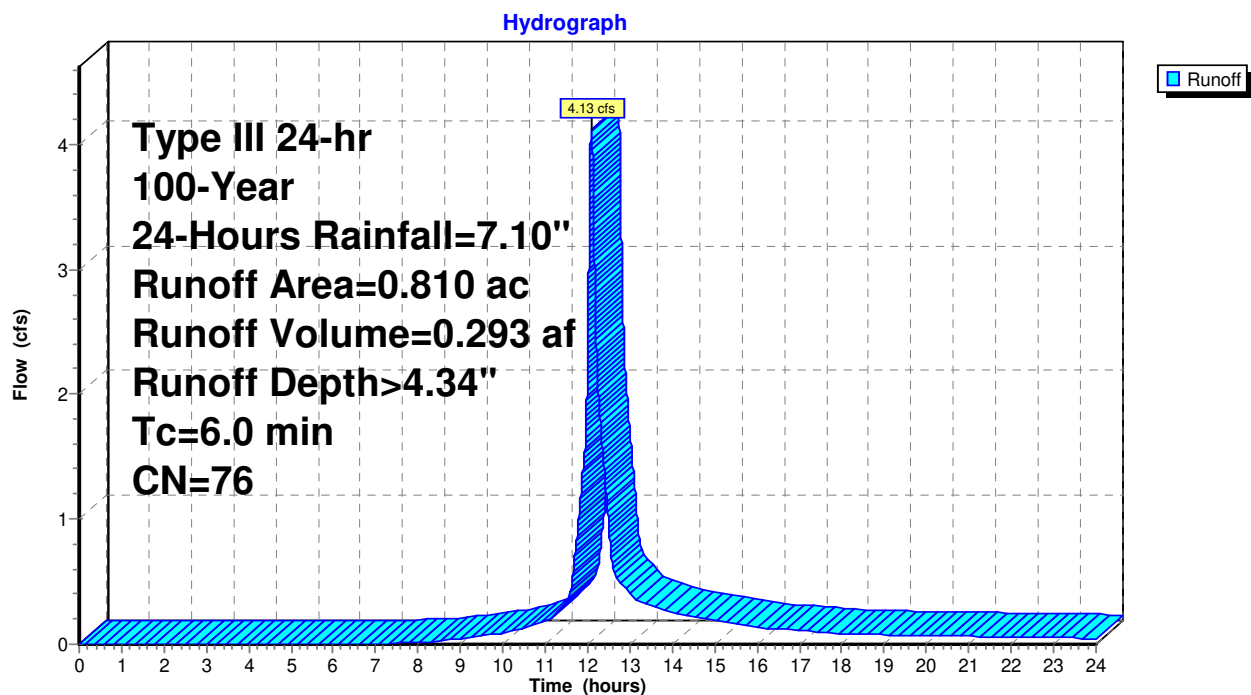
Runoff = 4.13 cfs @ 12.087 hrs, Volume= 0.293 af, Depth> 4.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 100-Year, 24-Hours Rainfall=7.10"

Area (ac)	CN	Description
0.140	73	Woods, Fair, HSG C
0.100	79	Woods, Fair, HSG D
* 0.430	74	>75% Grass cover, Good, HSG C
0.100	80	>75% Grass cover, Good, HSG D
* 0.040	98	driveway/road
0.810	76	Weighted Average
0.770		95.06% Pervious Area
0.040		4.94% Impervious Area

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

Subcatchment Basin 2: Basin 2



Summary for Subcatchment Basin 3: Basin 3

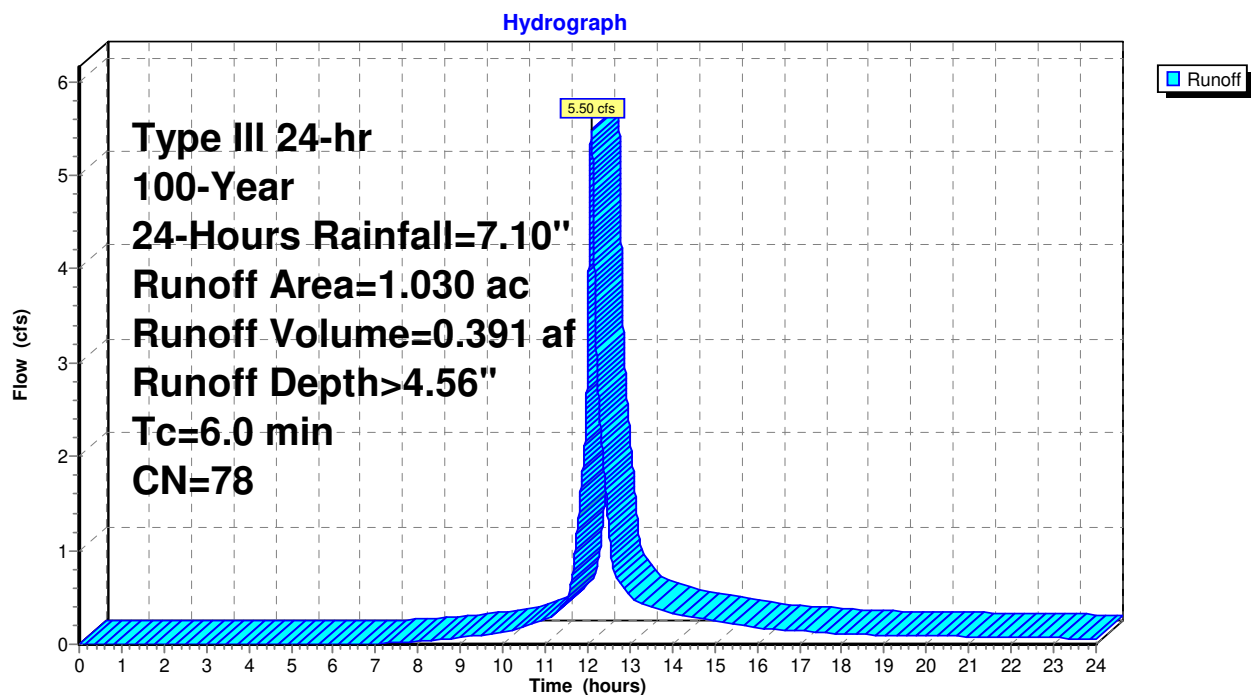
Runoff = 5.50 cfs @ 12.087 hrs, Volume= 0.391 af, Depth> 4.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 100-Year, 24-Hours Rainfall=7.10"

Area (ac)	CN	Description
0.100	73	Woods, Fair, HSG C
0.140	79	Woods, Fair, HSG D
0.580	74	>75% Grass cover, Good, HSG C
0.080	80	>75% Grass cover, Good, HSG D
* 0.130	98	Driveway/road
1.030	78	Weighted Average
0.900		87.38% Pervious Area
0.130		12.62% Impervious Area

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

Subcatchment Basin 3: Basin 3



Summary for Subcatchment Basin A: Basin A

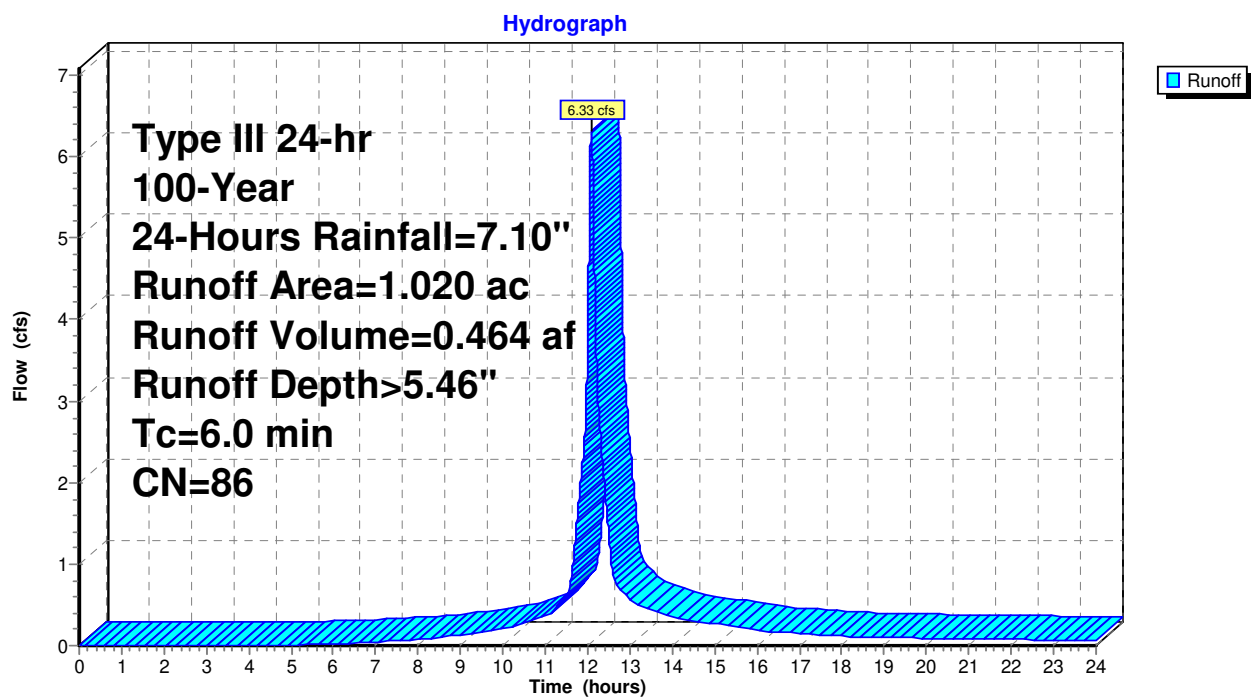
Runoff = 6.33 cfs @ 12.087 hrs, Volume= 0.464 af, Depth> 5.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 100-Year, 24-Hours Rainfall=7.10"

Area (ac)	CN	Description
* 0.500	98	Driveway/Road
0.520	74	>75% Grass cover, Good, HSG C
1.020	86	Weighted Average
0.520		50.98% Pervious Area
0.500		49.02% Impervious Area

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

Subcatchment Basin A: Basin A



Summary for Subcatchment CB 1: CB 1

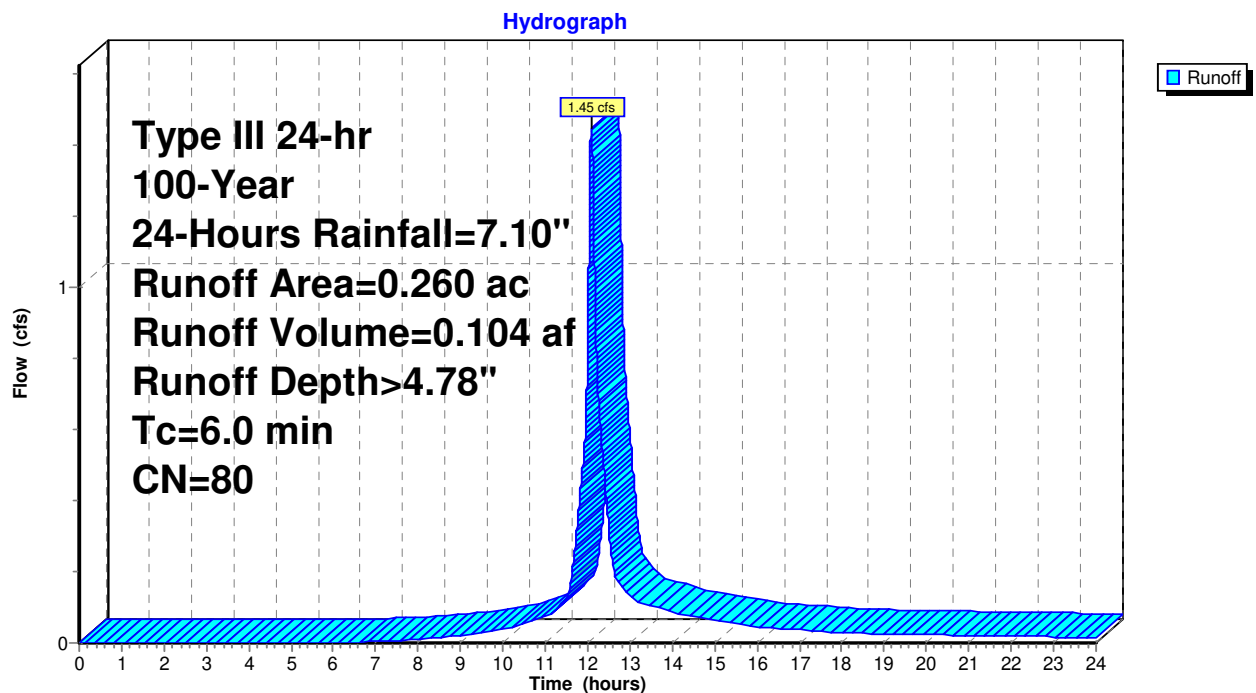
Runoff = 1.45 cfs @ 12.087 hrs, Volume= 0.104 af, Depth> 4.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 100-Year, 24-Hours Rainfall=7.10"

Area (ac)	CN	Description
0.190	74	>75% Grass cover, Good, HSG C
0.010	73	Woods, Fair, HSG C
* 0.060	98	Impervious
0.260	80	Weighted Average
0.200		76.92% Pervious Area
0.060		23.08% Impervious Area

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

Subcatchment CB 1: CB 1



Summary for Subcatchment CB 1A: CB 1A

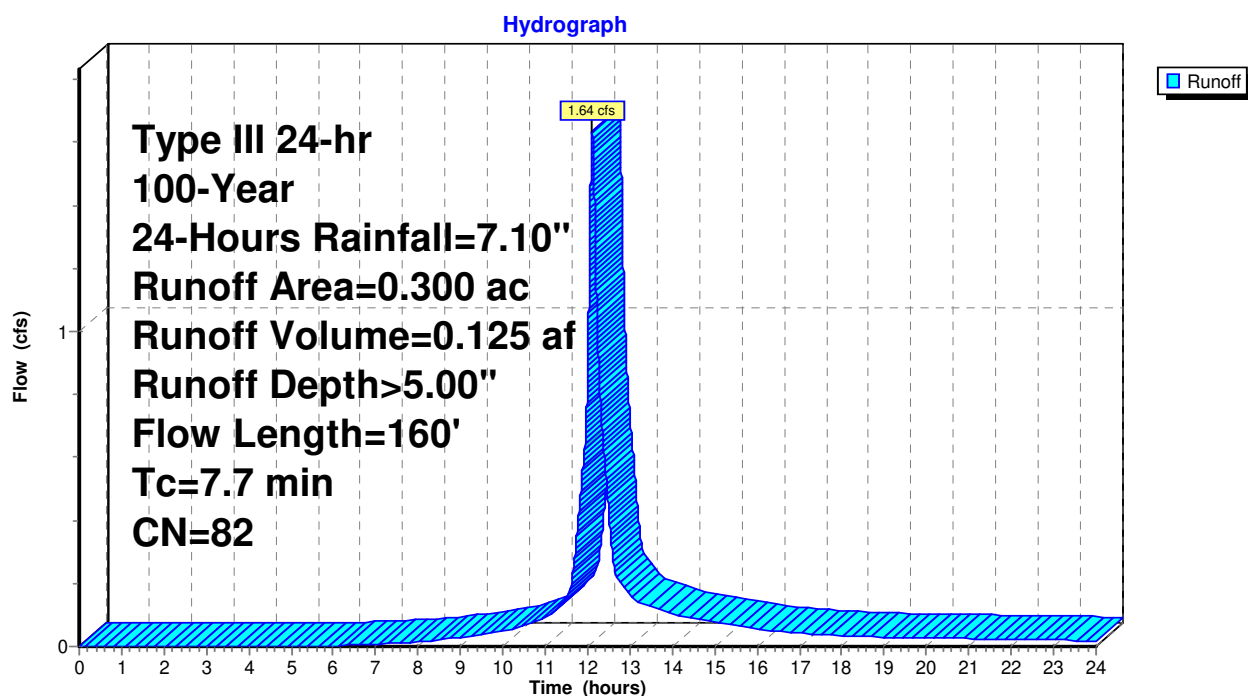
Runoff = 1.64 cfs @ 12.106 hrs, Volume= 0.125 af, Depth> 5.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 100-Year, 24-Hours Rainfall=7.10"

Area (ac)	CN	Description
* 0.100	98	Impervious
0.020	73	Woods, Fair, HSG C
0.180	74	>75% Grass cover, Good, HSG C
0.300	82	Weighted Average
0.200		66.67% Pervious Area
0.100		33.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.2	45	0.0200	0.10		Sheet Flow, Grass: Dense n= 0.240 P2= 3.50"
0.3	75	0.0700	4.26		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.2	40	0.0050	3.21	2.52	Pipe Channel, 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
7.7	160	Total			

Subcatchment CB 1A: CB 1A



Summary for Subcatchment Culvert1: Culvert 1

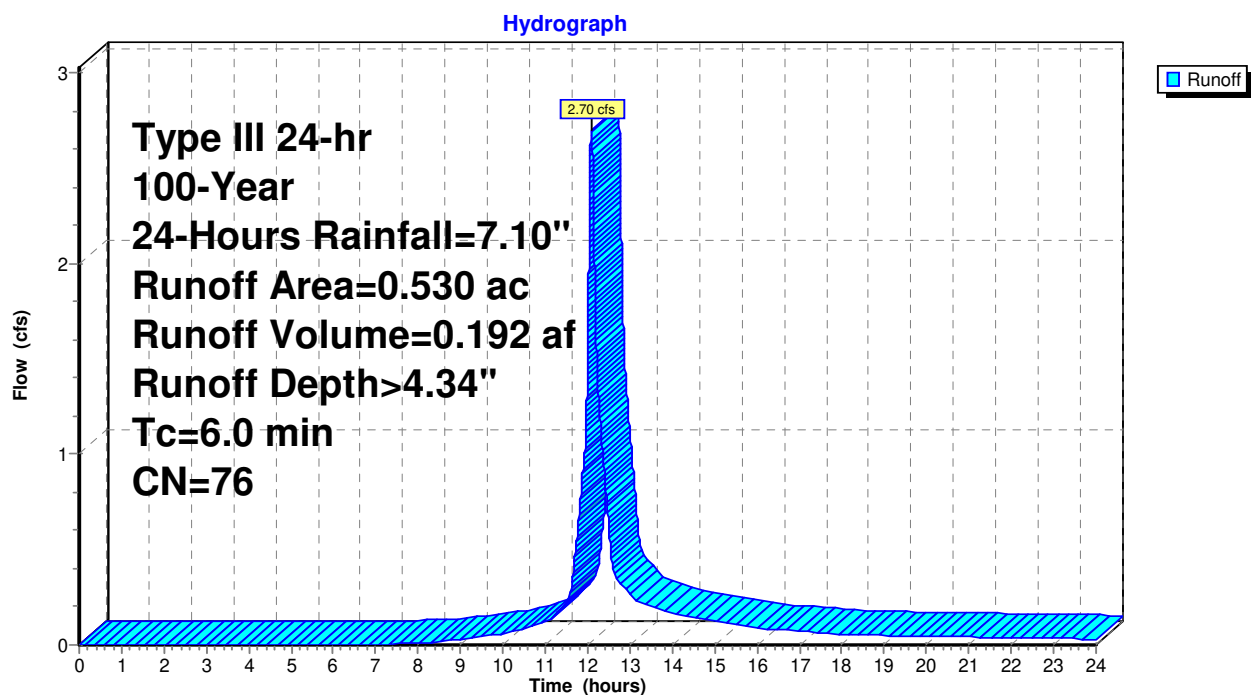
Runoff = 2.70 cfs @ 12.087 hrs, Volume= 0.192 af, Depth> 4.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 100-Year, 24-Hours Rainfall=7.10"

Area (ac)	CN	Description
0.070	73	Woods, Fair, HSG C
* 0.050	98	Impervious
0.410	74	>75% Grass cover, Good, HSG C
0.530	76	Weighted Average
0.480		90.57% Pervious Area
0.050		9.43% Impervious Area

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

Subcatchment Culvert1: Culvert 1



Summary for Subcatchment Culvert2: Culvert 2

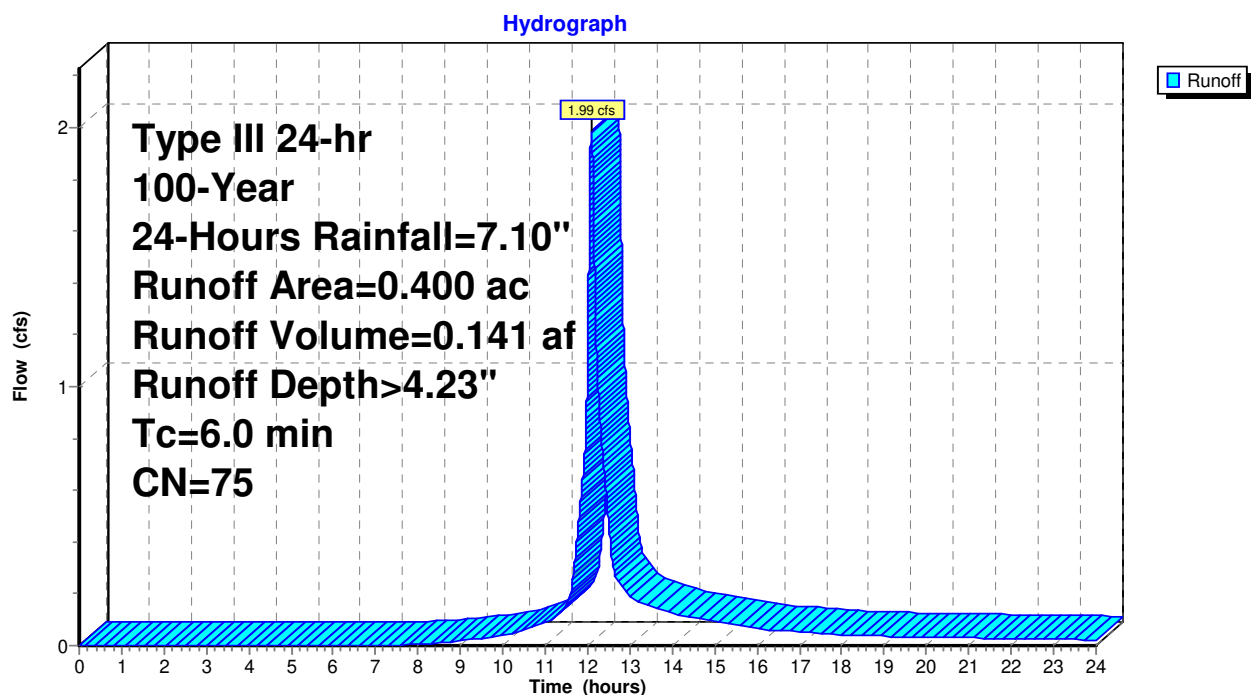
Runoff = 1.99 cfs @ 12.087 hrs, Volume= 0.141 af, Depth> 4.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 100-Year, 24-Hours Rainfall=7.10"

Area (ac)	CN	Description
* 0.020	98	Impervious
0.380	74	>75% Grass cover, Good, HSG C
0.400	75	Weighted Average
0.380		95.00% Pervious Area
0.020		5.00% Impervious Area

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

Subcatchment Culvert2: Culvert 2



Summary for Subcatchment Off-Site 3: Off-site existing cul-de-sac with inlet and storm sewer & Swale 4 drainage area

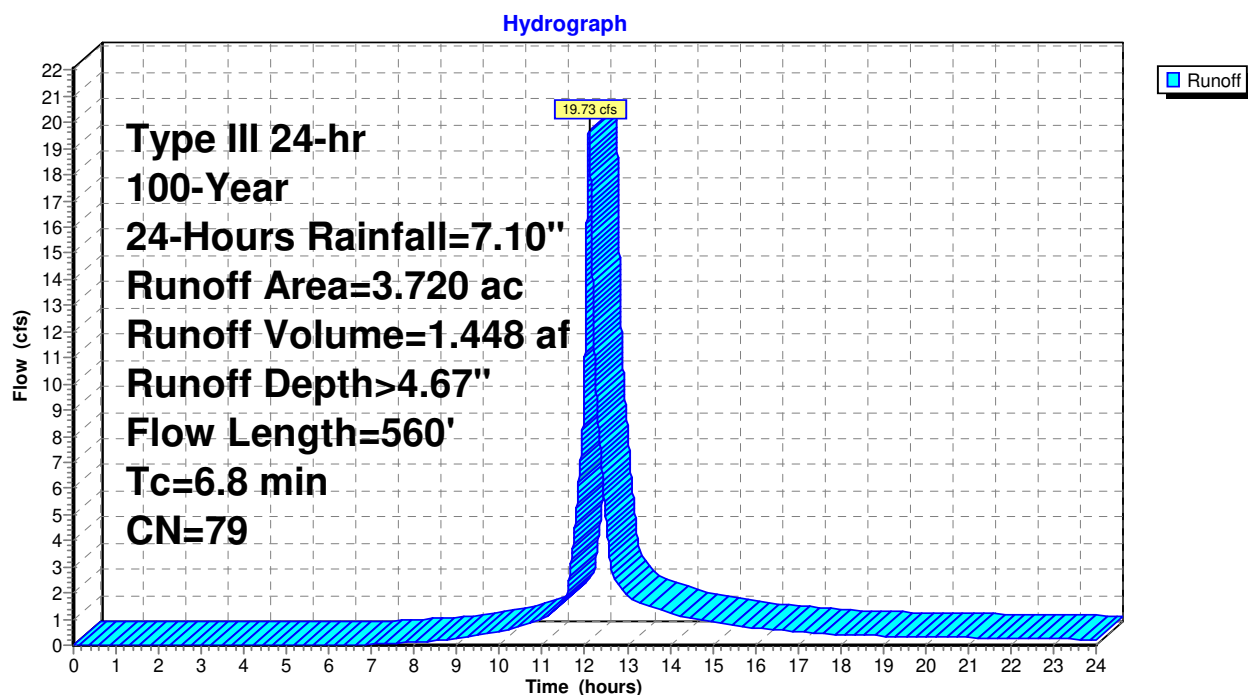
Runoff = 19.73 cfs @ 12.096 hrs, Volume= 1.448 af, Depth> 4.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 100-Year, 24-Hours Rainfall=7.10"

Area (ac)	CN	Description
1.560	74	>75% Grass cover, Good, HSG C
* 0.220	98	Buildings
* 0.490	98	Driveway/Roads
* 0.030	98	Swale 4- Existing Impervious
* 1.230	74	Swale 4 ->75% Grass cover, Good, HSG C
* 0.190	73	Swale 4- Woods, Fair, HSG C
3.720	79	Weighted Average
2.980		80.11% Pervious Area
0.740		19.89% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	50	0.0030	0.59		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.50"
4.8	320	0.0030	1.11		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.4	140	0.0100	5.36	4.21	Pipe Channel, 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
0.2	50	0.0500	3.60		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
6.8	560	Total			

Subcatchment Off-Site 3: Off-site existing cul-de-sac with inlet and storm sewer & Swale 4 drainage area



Summary for Subcatchment Pond A: Pond A

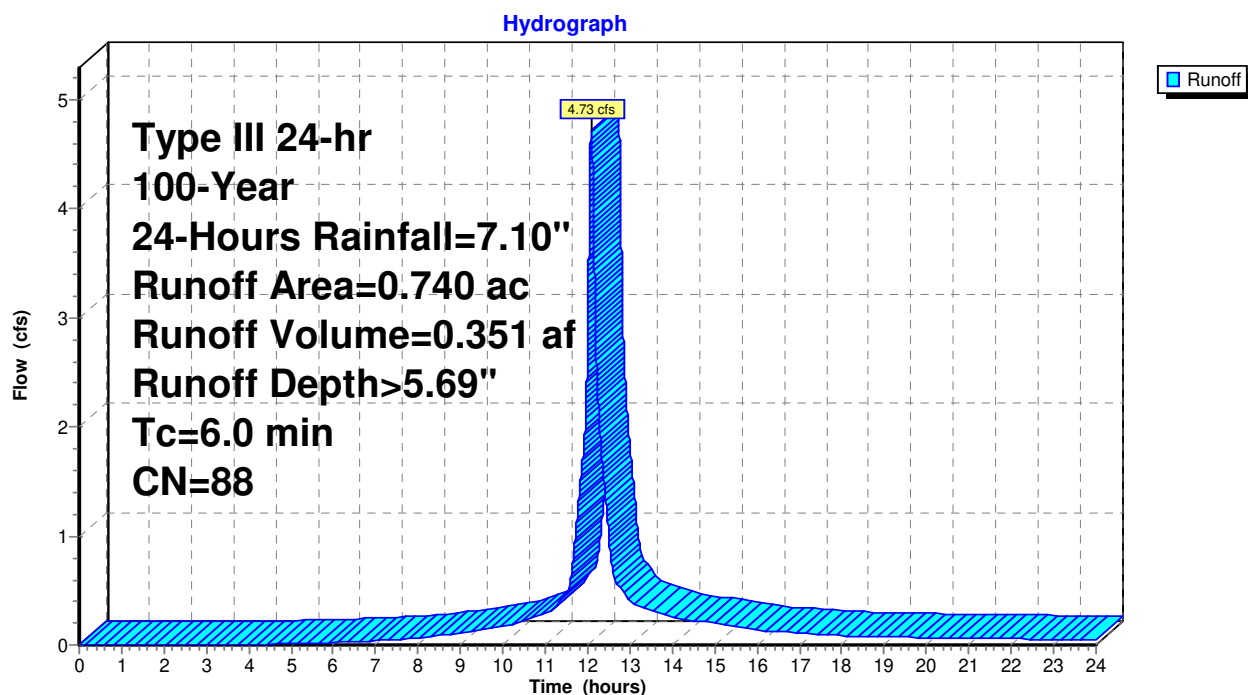
Runoff = 4.73 cfs @ 12.087 hrs, Volume= 0.351 af, Depth> 5.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 100-Year, 24-Hours Rainfall=7.10"

Area (ac)	CN	Description
* 0.180	98	Driveway/Road
0.230	74	>75% Grass cover, Good, HSG C
0.120	80	>75% Grass cover, Good, HSG D
* 0.210	98	Pond
0.740	88	Weighted Average
0.350		47.30% Pervious Area
0.390		52.70% Impervious Area

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

Subcatchment Pond A: Pond A



Summary for Subcatchment Pond B: Pond B

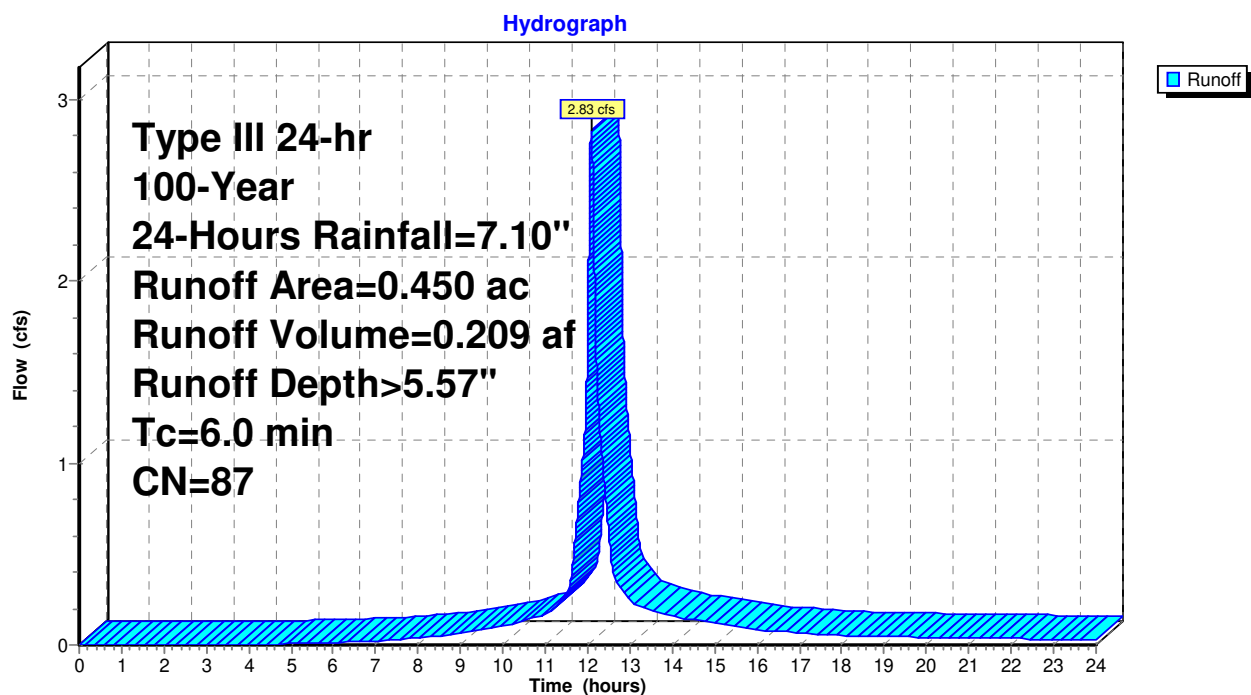
Runoff = 2.83 cfs @ 12.087 hrs, Volume= 0.209 af, Depth> 5.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 100-Year, 24-Hours Rainfall=7.10"

Area (ac)	CN	Description
* 0.190	98	Driveway/Road
0.210	74	>75% Grass cover, Good, HSG C
* 0.050	98	Pond
0.450	87	Weighted Average
0.210		46.67% Pervious Area
0.240		53.33% Impervious Area

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

Subcatchment Pond B: Pond B



Summary for Subcatchment Roof: 14 Proposed Houses

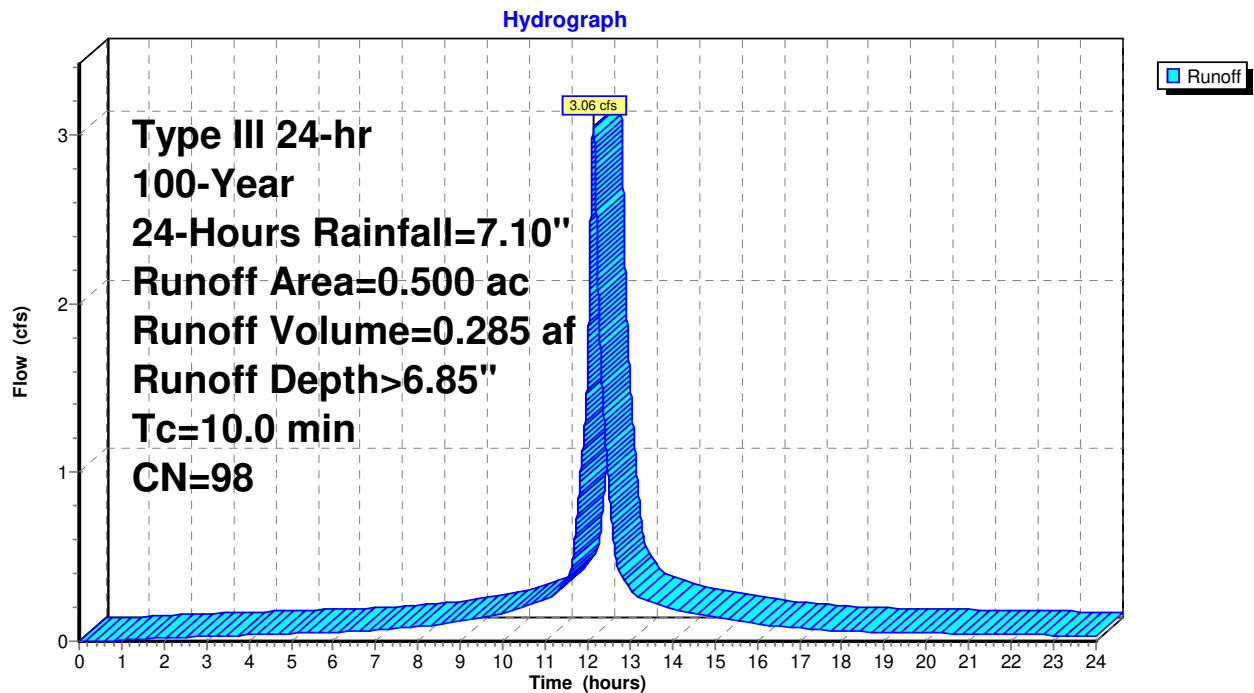
Runoff = 3.06 cfs @ 12.133 hrs, Volume= 0.285 af, Depth> 6.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 100-Year, 24-Hours Rainfall=7.10"

Area (ac)	CN	Description
* 0.500	98	Buildings
0.500		100.00% Impervious Area

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

Subcatchment Roof: 14 Proposed Houses



Summary for Subcatchment Roof12: 1 Proposed House (Lot 12)

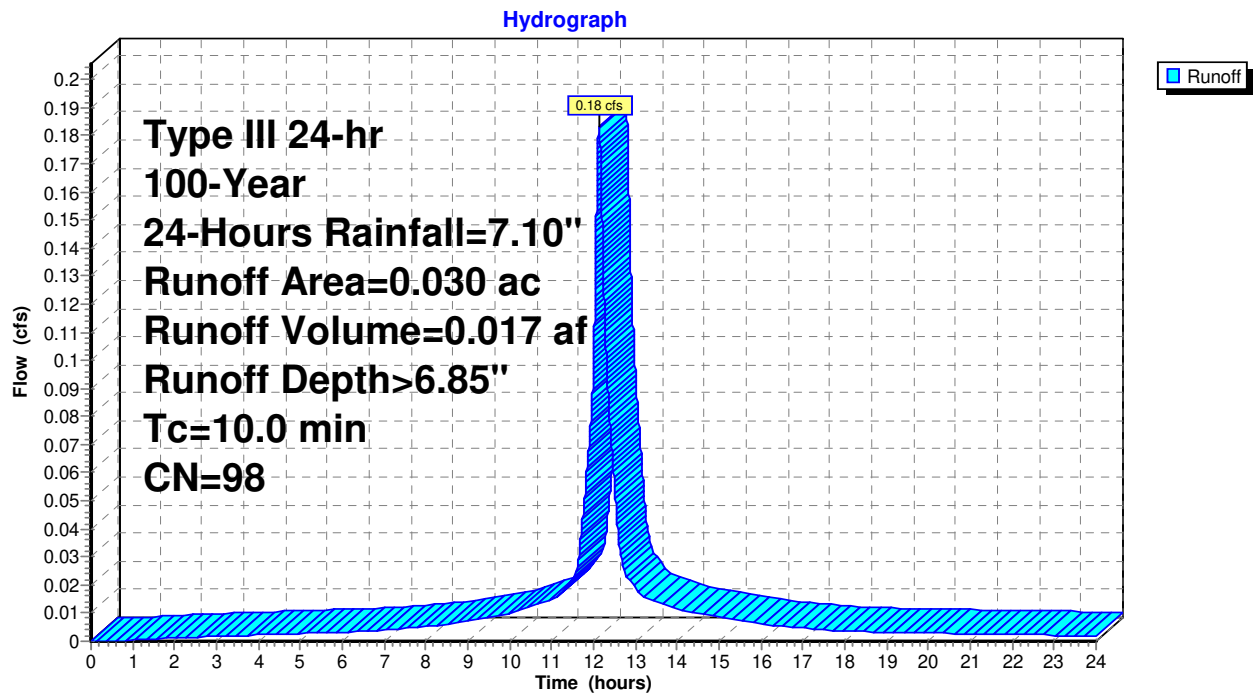
Runoff = 0.18 cfs @ 12.133 hrs, Volume= 0.017 af, Depth> 6.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 100-Year, 24-Hours Rainfall=7.10"

Area (ac)	CN	Description
* 0.030	98	Building
0.030		100.00% Impervious Area

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

Subcatchment Roof12: 1 Proposed House (Lot 12)



Summary for Subcatchment Roof9: 1 Proposed House (Lot 9)

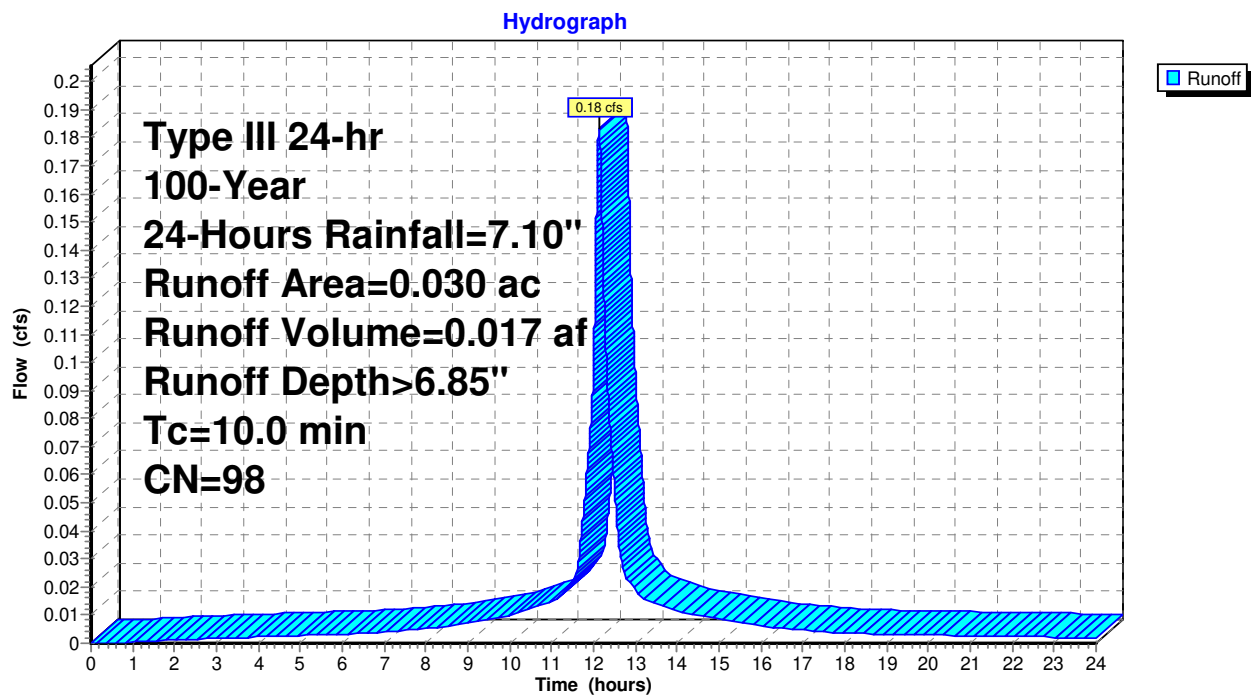
Runoff = 0.18 cfs @ 12.133 hrs, Volume= 0.017 af, Depth> 6.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 100-Year, 24-Hours Rainfall=7.10"

Area (ac)	CN	Description
* 0.030	98	Building
0.030		100.00% Impervious Area

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

Subcatchment Roof9: 1 Proposed House (Lot 9)



Summary for Subcatchment S: Swale

Runoff = 0.52 cfs @ 12.087 hrs, Volume= 0.038 af, Depth> 5.00"

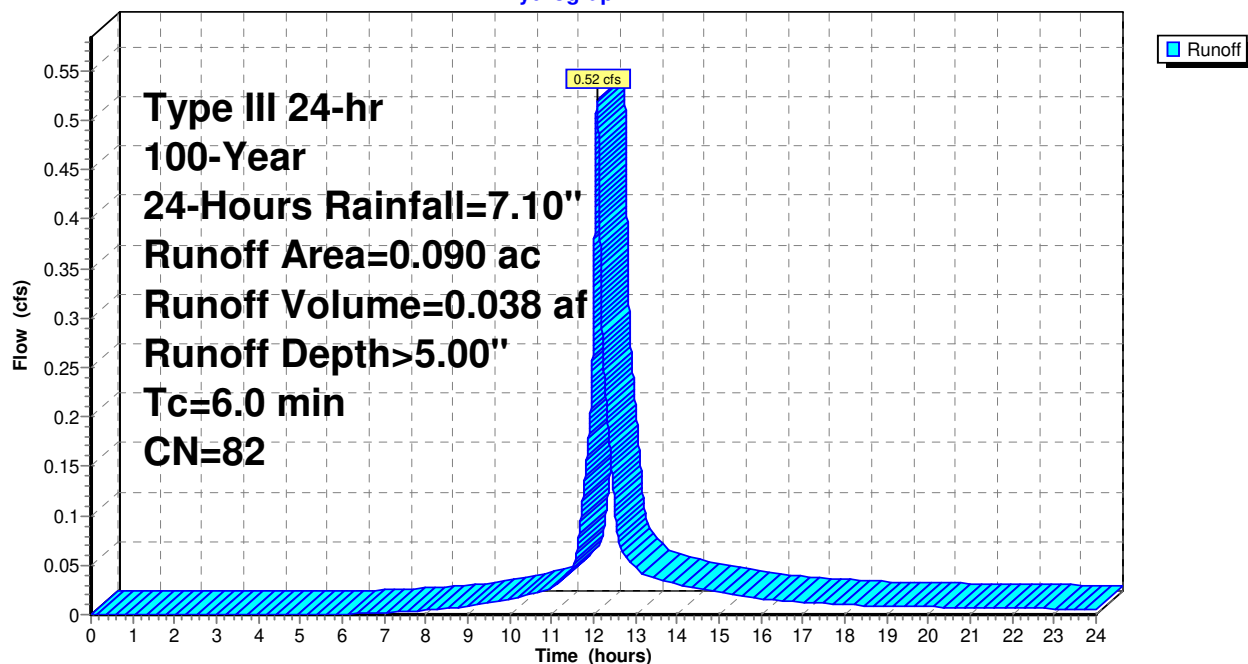
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 100-Year, 24-Hours Rainfall=7.10"

Area (ac)	CN	Description
* 0.030	98	Impervious
0.060	74	>75% Grass cover, Good, HSG C
0.090	82	Weighted Average
0.060		66.67% Pervious Area
0.030		33.33% Impervious Area

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

Subcatchment S: Swale

Hydrograph



Summary for Subcatchment Swale 1: Swale 1

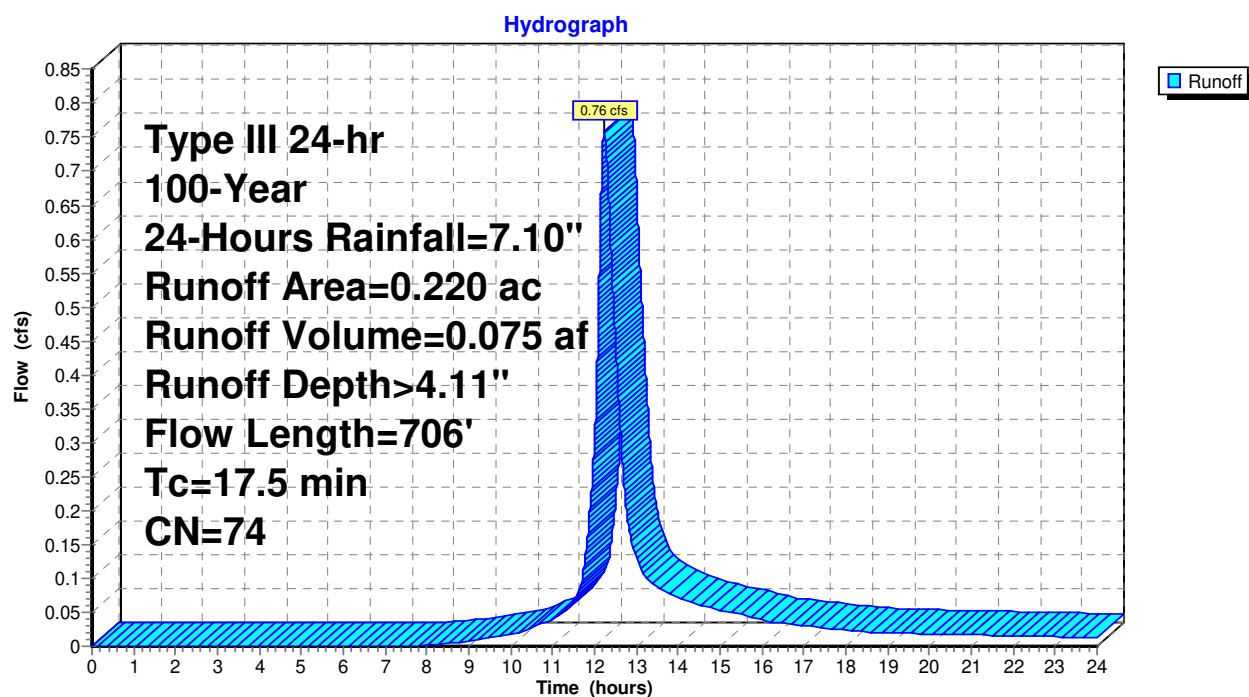
Runoff = 0.76 cfs @ 12.231 hrs, Volume= 0.075 af, Depth> 4.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 100-Year, 24-Hours Rainfall=7.10"

Area (ac)	CN	Description
0.150	74	>75% Grass cover, Good, HSG C
0.070	73	Woods, Fair, HSG C
0.220	74	Weighted Average
0.220		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.8	50	0.0200	0.07		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.50"
0.2	130	0.0400	10.73	64.40	Trap/Vee/Rect Channel Flow, Bot.W=4.00' D=1.00' Z= 2.0 '/' Top.W=8.00' n= 0.022 Earth, clean & straight
4.3	132	0.0001	0.51	0.77	Pipe Channel, 12.0" x 18.0" Box Area= 1.5 sf Perim= 5.0' r= 0.30' n= 0.013
0.0	8	0.0125	3.87	1.35	Pipe Channel, 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.013
0.2	34	0.0060	3.51	2.76	Pipe Channel, 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.0	352	0.0060	6.04	18.98	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
17.5	706	Total			

Subcatchment Swale 1: Swale 1



Summary for Subcatchment Swale 2: Swale 2

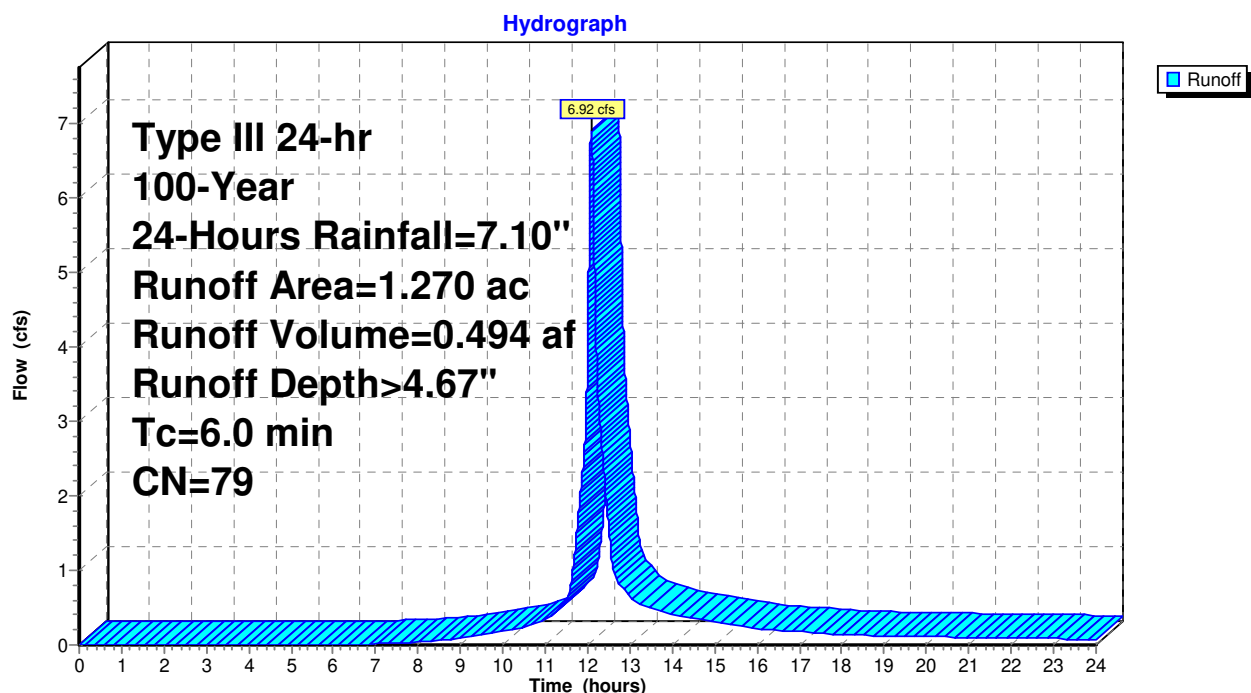
Runoff = 6.92 cfs @ 12.087 hrs, Volume= 0.494 af, Depth> 4.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 100-Year, 24-Hours Rainfall=7.10"

Area (ac)	CN	Description
0.790	79	50-75% Grass cover, Fair, HSG C
0.350	73	Woods, Fair, HSG C
* 0.130	98	Existing Buildings
1.270	79	Weighted Average
1.140		89.76% Pervious Area
0.130		10.24% Impervious Area

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

Subcatchment Swale 2: Swale 2



Summary for Subcatchment Swale 3: Swale 3

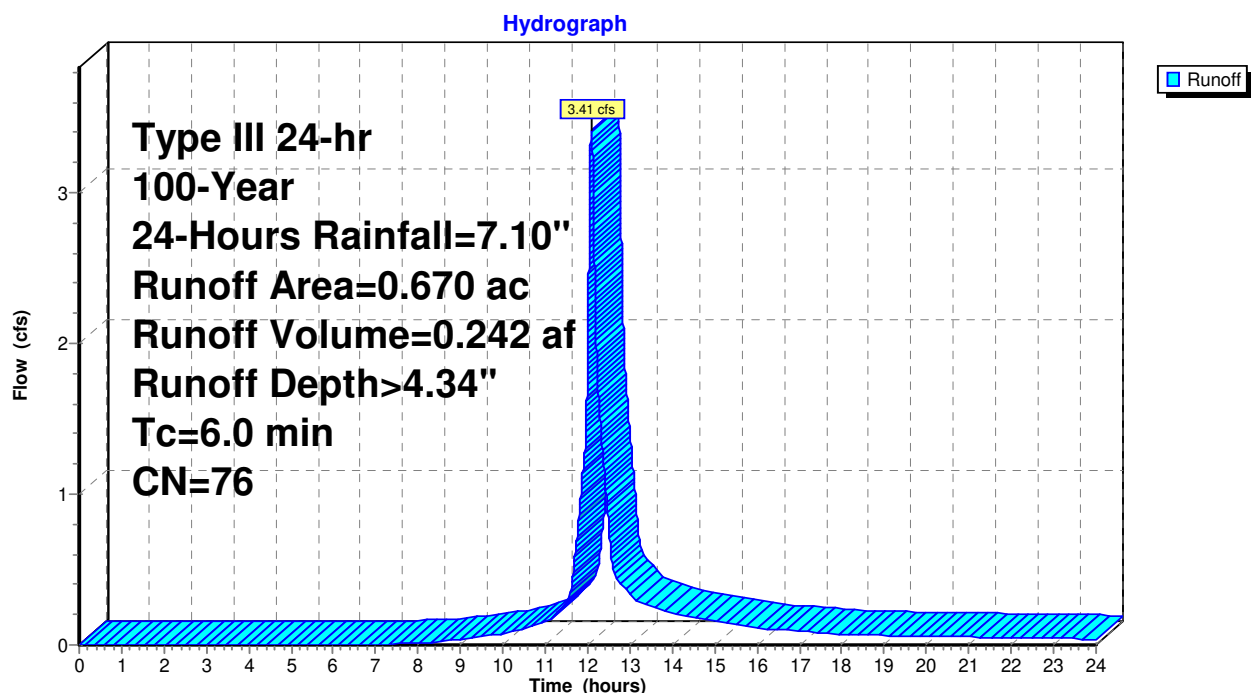
Runoff = 3.41 cfs @ 12.087 hrs, Volume= 0.242 af, Depth> 4.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 100-Year, 24-Hours Rainfall=7.10"

Area (ac)	CN	Description
* 0.060	98	Existing Buildings
0.540	74	>75% Grass cover, Good, HSG C
0.070	73	Woods, Fair, HSG C
0.670	76	Weighted Average
0.610		91.04% Pervious Area
0.060		8.96% Impervious Area

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

Subcatchment Swale 3: Swale 3



Summary for Subcatchment Trench: Trench

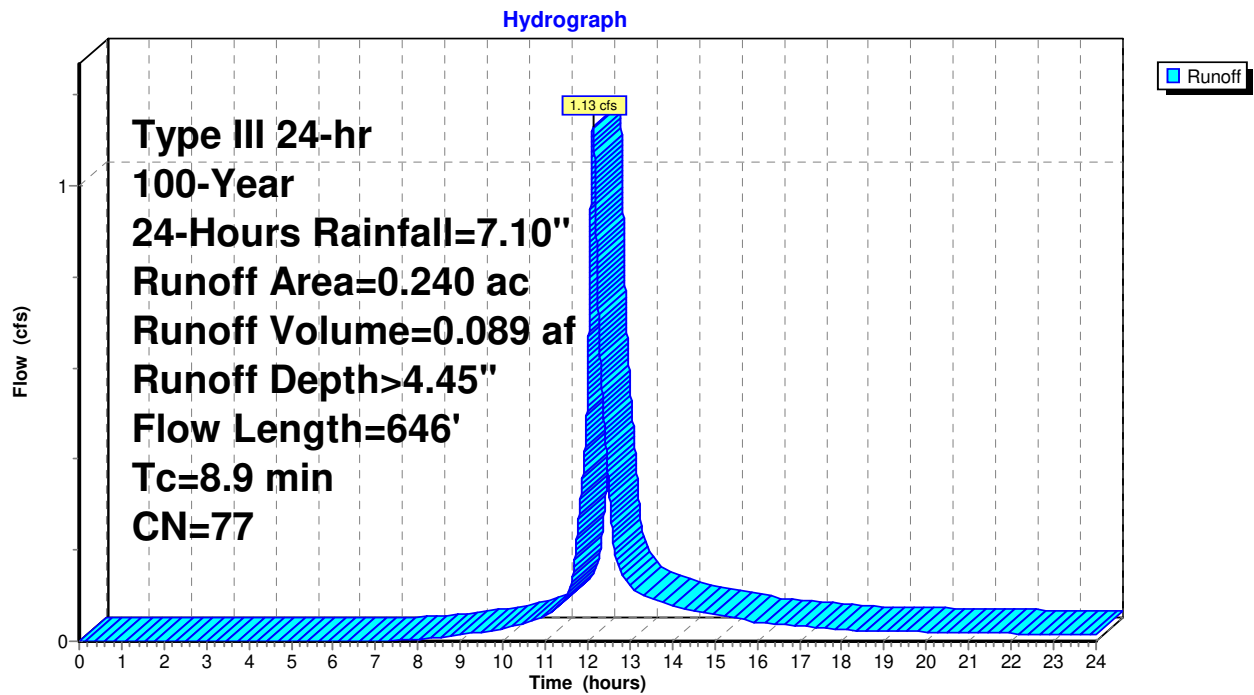
Runoff = 1.13 cfs @ 12.124 hrs, Volume= 0.089 af, Depth> 4.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
 Type III 24-hr 100-Year, 24-Hours Rainfall=7.10"

Area (ac)	CN	Description
* 0.040	98	Impervious
0.130	73	Woods, Fair, HSG C
0.070	74	>75% Grass cover, Good, HSG C
0.240	77	Weighted Average
0.200		83.33% Pervious Area
0.040		16.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.9	20	0.0400	0.12		Sheet Flow, Grass: Dense n= 0.240 P2= 3.50"
0.5	100	0.0400	3.22		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
4.3	132	0.0001	0.51	0.77	Pipe Channel, 12.0" x 18.0" Box Area= 1.5 sf Perim= 5.0' r= 0.30' n= 0.013
0.0	8	0.0125	3.87	1.35	Pipe Channel, 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.013
0.2	34	0.0060	3.51	2.76	Pipe Channel, 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
1.0	352	0.0060	6.04	18.98	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
8.9	646	Total			

Subcatchment Trench: Trench



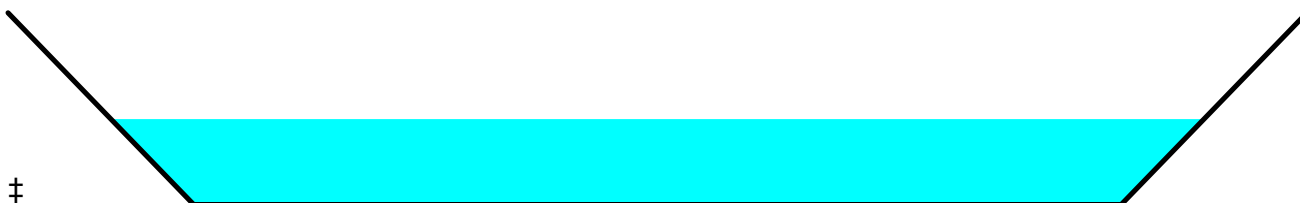
Summary for Reach Swale: Swale

Inflow Area = 0.090 ac, 33.33% Impervious, Inflow Depth > 5.00" for 100-Year, 24-Hours event
 Inflow = 0.52 cfs @ 12.087 hrs, Volume= 0.038 af
 Outflow = 0.51 cfs @ 12.101 hrs, Volume= 0.037 af, Atten= 2%, Lag= 0.9 min

Routing by Dyn-Stor-Ind method, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs / 2
 Max. Velocity= 1.17 fps, Min. Travel Time= 1.4 min
 Avg. Velocity = 0.30 fps, Avg. Travel Time= 5.6 min

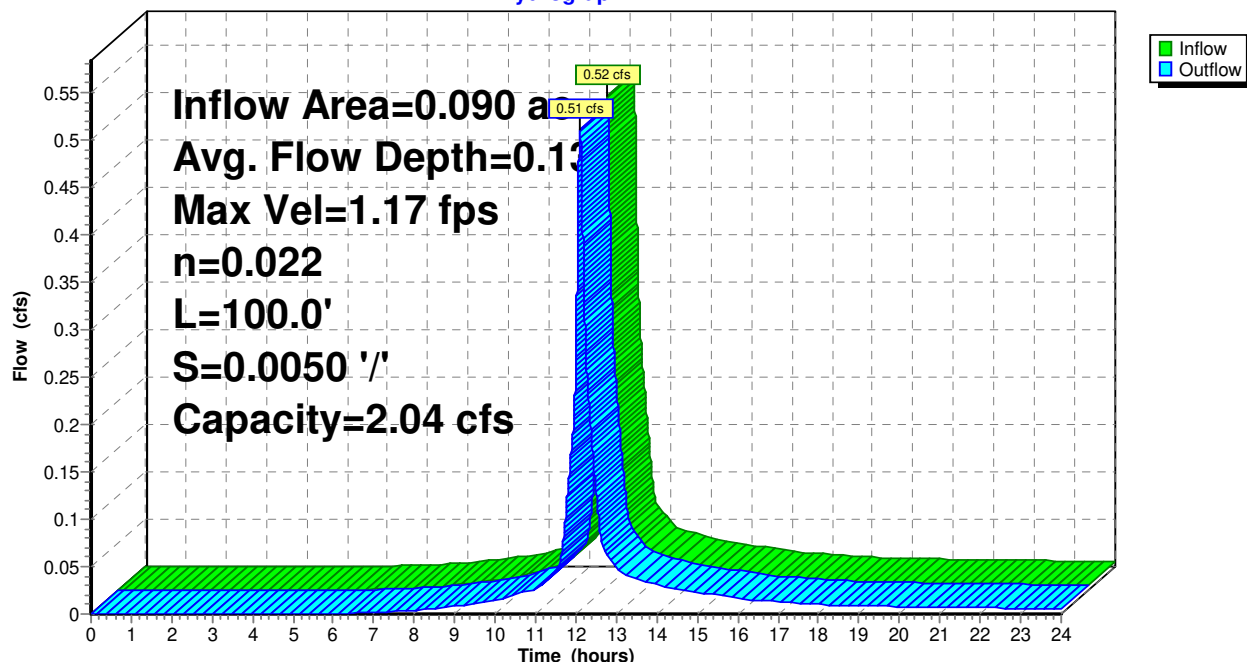
Peak Storage= 44 cf @ 12.101 hrs
 Average Depth at Peak Storage= 0.13'
 Bank-Full Depth= 0.30' Flow Area= 1.1 sf, Capacity= 2.04 cfs

3.00' x 0.30' deep channel, n= 0.022 Earth, clean & straight
 Side Slope Z-value= 2.0 '/' Top Width= 4.20'
 Length= 100.0' Slope= 0.0050 '/'
 Inlet Invert= 38.70', Outlet Invert= 38.20'



Reach Swale: Swale

Hydrograph



Summary for Reach Swale 4: Swale 4

Inflow Area = 3.720 ac, 19.89% Impervious, Inflow Depth > 4.67" for 100-Year, 24-Hours event
 Inflow = 19.73 cfs @ 12.096 hrs, Volume= 1.448 af
 Outflow = 19.32 cfs @ 12.114 hrs, Volume= 1.446 af, Atten= 2%, Lag= 1.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs / 2
 Max. Velocity= 4.10 fps, Min. Travel Time= 1.4 min
 Avg. Velocity = 1.27 fps, Avg. Travel Time= 4.6 min

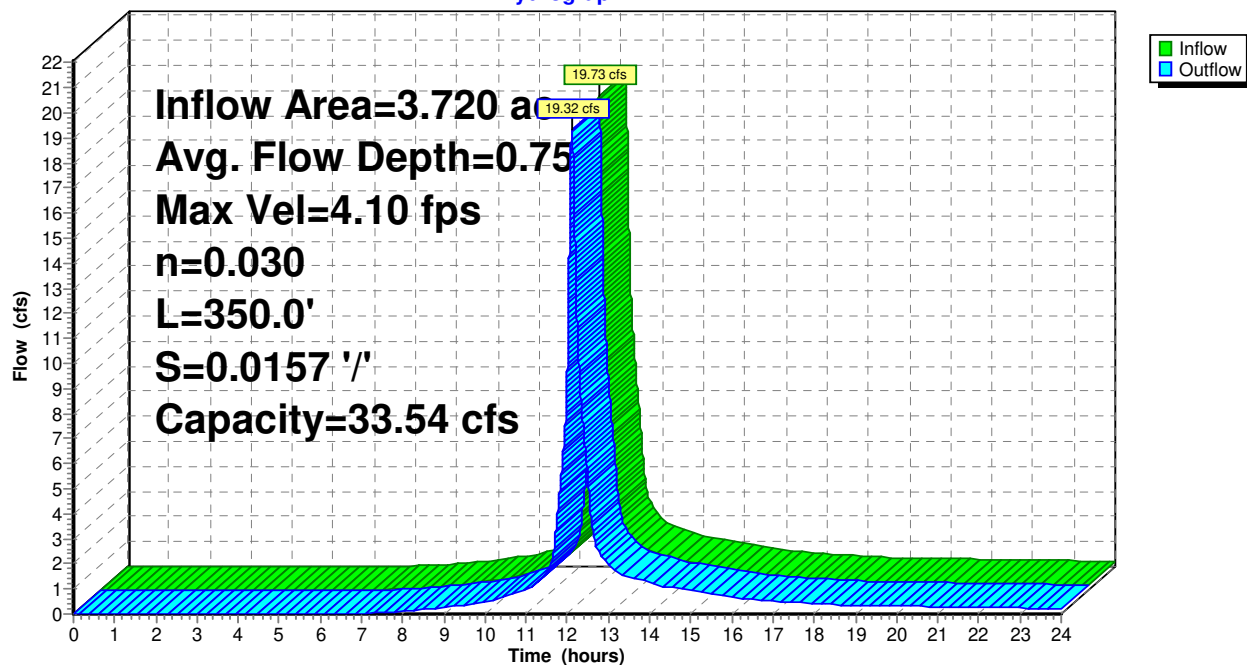
Peak Storage= 1,647 cf @ 12.114 hrs
 Average Depth at Peak Storage= 0.75'
 Bank-Full Depth= 1.00' Flow Area= 7.0 sf, Capacity= 33.54 cfs

4.00' x 1.00' deep channel, n= 0.030
 Side Slope Z-value= 3.0 '/' Top Width= 10.00'
 Length= 350.0' Slope= 0.0157 '/'
 Inlet Invert= 42.50', Outlet Invert= 37.00'



Reach Swale 4: Swale 4

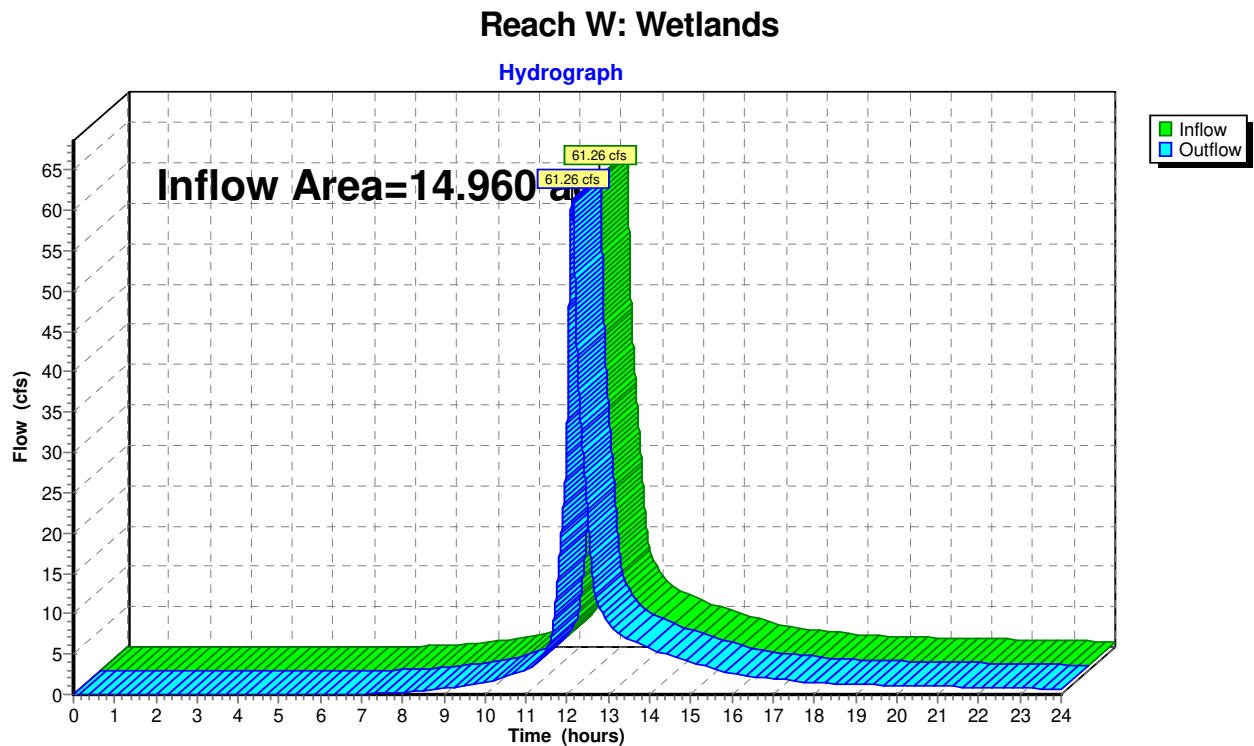
Hydrograph



Summary for Reach W: Wetlands

Inflow Area = 14.960 ac, 22.39% Impervious, Inflow Depth > 4.31" for 100-Year, 24-Hours event
Inflow = 61.26 cfs @ 12.111 hrs, Volume= 5.378 af
Outflow = 61.26 cfs @ 12.111 hrs, Volume= 5.378 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs / 2



Summary for Pond A: Pond A

Inflow Area = 1.760 ac, 50.57% Impervious, Inflow Depth > 5.55" for 100-Year, 24-Hours event
 Inflow = 11.05 cfs @ 12.087 hrs, Volume= 0.814 af
 Outflow = 2.29 cfs @ 12.508 hrs, Volume= 0.727 af, Atten= 79%, Lag= 25.3 min
 Discarded = 0.24 cfs @ 12.508 hrs, Volume= 0.167 af
 Primary = 2.05 cfs @ 12.508 hrs, Volume= 0.560 af
 Secondary = 0.00 cfs @ 0.000 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs / 2
 Peak Elev= 39.32' @ 12.508 hrs Surf.Area= 9,956 sf Storage= 15,188 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 75.2 min (863.8 - 788.6)

Volume	Invert	Avail.Storage	Storage Description
#1	36.50'	21,290 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
#2	34.50'	515 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
			1,472 cf Overall x 35.0% Voids
		21,805 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
36.50	736	0	0
36.51	2,513	16	16
37.00	3,030	1,358	1,374
38.00	4,111	3,571	4,945
38.50	7,261	2,843	7,788
39.00	8,658	3,980	11,768
40.00	10,387	9,523	21,290

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
34.50	736	0	0
36.50	736	1,472	1,472

Device	Routing	Invert	Outlet Devices
#1	Primary	37.50'	8.0" Round Culvert L= 36.0' Ke= 0.500 Inlet / Outlet Invert= 37.50' / 36.28' S= 0.0339 '/' Cc= 0.900 n= 0.013, Flow Area= 0.35 sf
#2	Discarded	34.50'	1.020 in/hr Exfiltration over Surface area
#3	Secondary	39.35'	5.0' long x 11.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.53 2.59 2.70 2.68 2.67 2.68 2.66 2.64

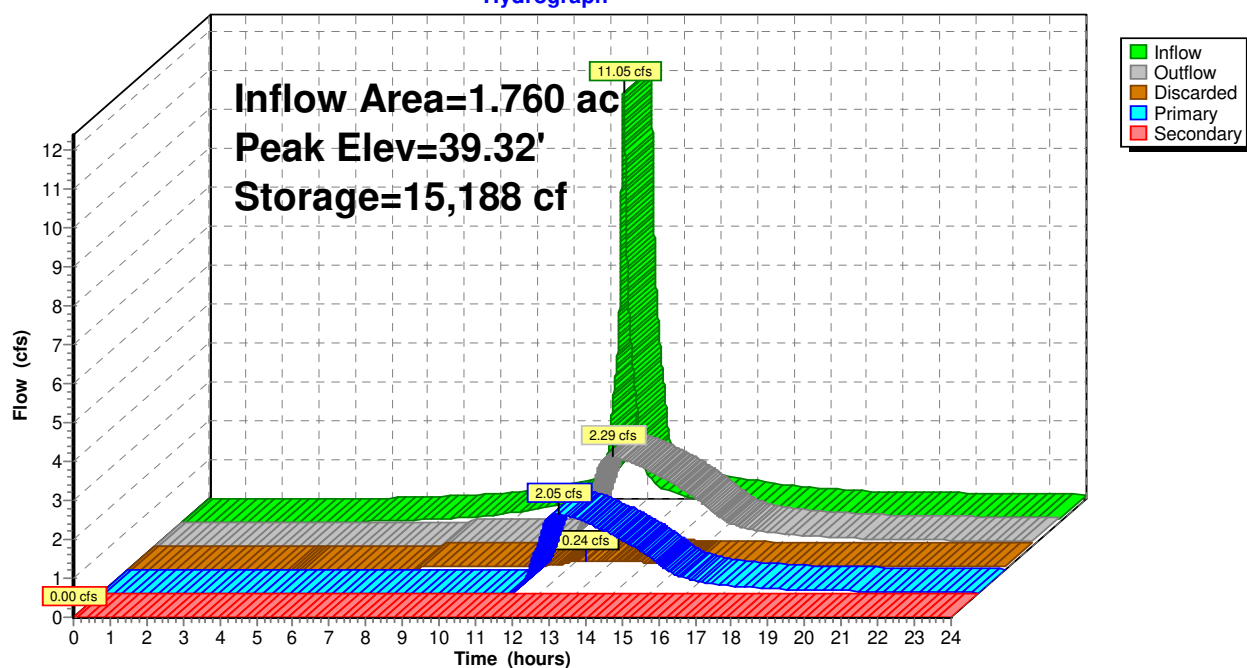
Discarded OutFlow Max=0.24 cfs @ 12.508 hrs HW=39.32' (Free Discharge)
 ↑ **2=Exfiltration** (Exfiltration Controls 0.24 cfs)

Primary OutFlow Max=2.05 cfs @ 12.508 hrs HW=39.32' TW=0.00' (Dynamic Tailwater)
 ↑ **1=Culvert** (Inlet Controls 2.05 cfs @ 5.88 fps)

Secondary OutFlow Max=0.00 cfs @ 0.000 hrs HW=34.50' TW=0.00' (Dynamic Tailwater)
 ↑ **3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond A: Pond A

Hydrograph



Summary for Pond B: Pond B

Inflow Area = 0.450 ac, 53.33% Impervious, Inflow Depth > 5.57" for 100-Year, 24-Hours event
 Inflow = 2.83 cfs @ 12.087 hrs, Volume= 0.209 af
 Outflow = 1.47 cfs @ 12.220 hrs, Volume= 0.191 af, Atten= 48%, Lag= 8.0 min
 Discarded = 0.06 cfs @ 12.220 hrs, Volume= 0.034 af
 Primary = 1.40 cfs @ 12.220 hrs, Volume= 0.157 af
 Secondary = 0.00 cfs @ 0.000 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs / 2
 Peak Elev= 39.53' @ 12.220 hrs Surf.Area= 2,632 sf Storage= 2,124 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 33.9 min (822.1 - 788.3)

Volume	Invert	Avail.Storage	Storage Description
#1	37.50'	4,937 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
#2	35.50'	125 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
		358 cf Overall x 35.0% Voids	
		5,062 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
37.50	450	0	0
38.00	613	266	266
39.00	999	806	1,072
39.50	2,413	853	1,925
40.00	3,062	1,369	3,294
40.50	3,511	1,643	4,937

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
35.50	179	0	0
37.50	179	358	358

Device	Routing	Invert	Outlet Devices
#1	Primary	38.50'	8.0" Round Culvert L= 60.0' Ke= 0.500 Inlet / Outlet Invert= 38.50' / 36.90' S= 0.0267 '/' Cc= 0.900 n= 0.013, Flow Area= 0.35 sf
#2	Discarded	35.50'	1.020 in/hr Exfiltration over Surface area
#3	Secondary	39.55'	5.0' long x 12.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

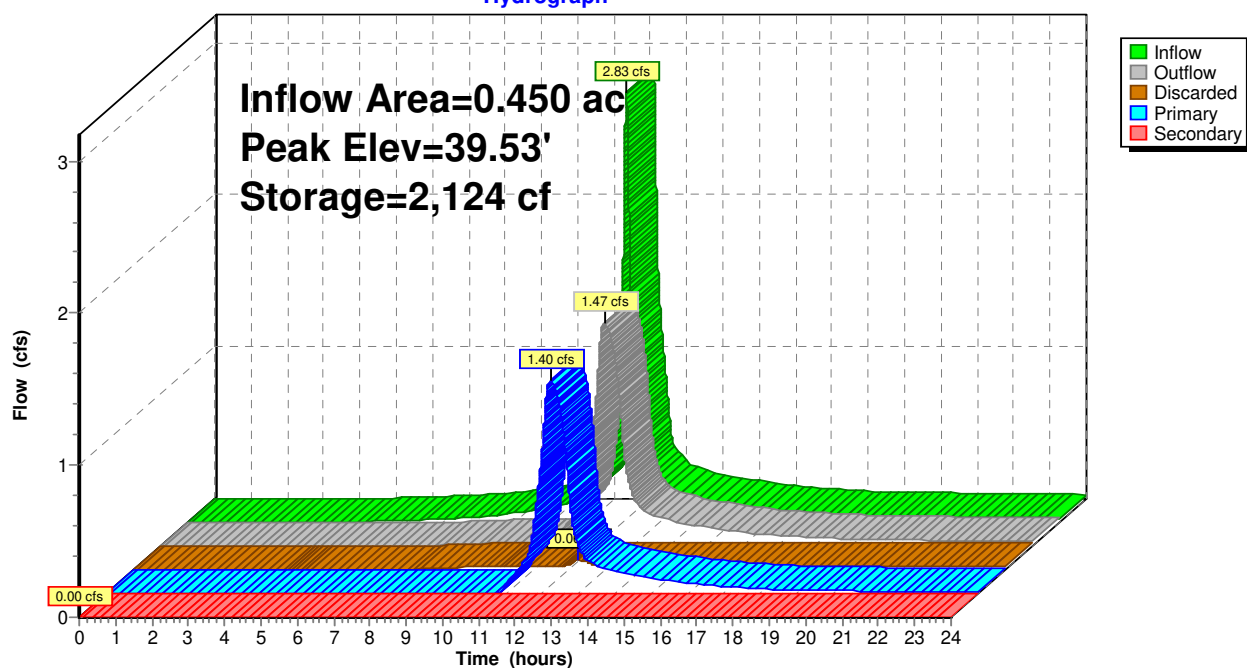
Discarded OutFlow Max=0.06 cfs @ 12.220 hrs HW=39.53' (Free Discharge)
 ↑ **2=Exfiltration** (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=1.40 cfs @ 12.220 hrs HW=39.53' TW=0.00' (Dynamic Tailwater)
 ↑ **1=Culvert** (Inlet Controls 1.40 cfs @ 4.02 fps)

Secondary OutFlow Max=0.00 cfs @ 0.000 hrs HW=35.50' TW=0.00' (Dynamic Tailwater)
 ↑ **3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond B: Pond B

Hydrograph



Summary for Pond C1: Culvert 1

Inflow Area = 0.530 ac, 9.43% Impervious, Inflow Depth > 4.34" for 100-Year, 24-Hours event
 Inflow = 2.70 cfs @ 12.087 hrs, Volume= 0.192 af
 Outflow = 2.60 cfs @ 12.110 hrs, Volume= 0.192 af, Atten= 4%, Lag= 1.4 min
 Primary = 2.60 cfs @ 12.110 hrs, Volume= 0.192 af

Routing by Dyn-Stor-Ind method, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs / 2
 Peak Elev= 39.67' @ 12.110 hrs Surf.Area= 362 sf Storage= 183 cf

Plug-Flow detention time= 1.1 min calculated for 0.192 af (100% of inflow)
 Center-of-Mass det. time= 0.9 min (817.0 - 816.1)

Volume	Invert	Avail.Storage	Storage Description
#1	38.70'	324 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

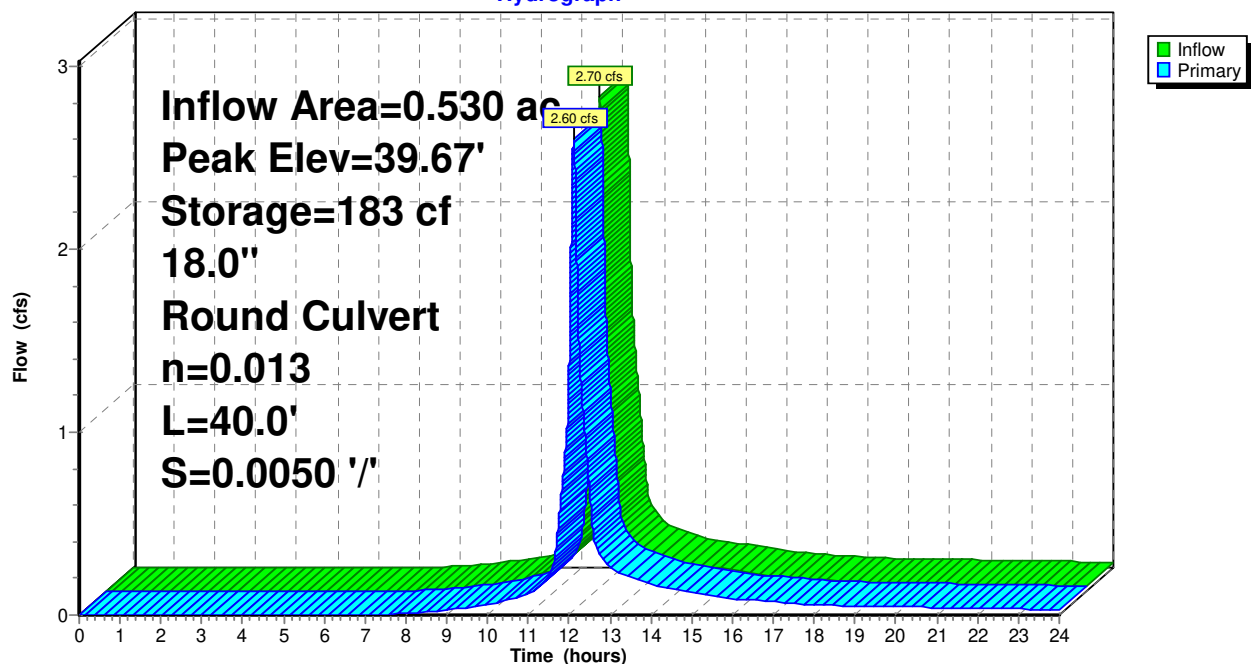
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
38.70	10	0	0
39.00	127	21	21
40.00	480	304	324

Device	Routing	Invert	Outlet Devices
#1	Primary	38.70'	18.0" Round Culvert L= 40.0' Ke= 0.500 Inlet / Outlet Invert= 38.70' / 38.50' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf

Primary OutFlow Max=2.60 cfs @ 12.110 hrs HW=39.67' TW=39.34' (Dynamic Tailwater)
 ↑1=Culvert (Outlet Controls 2.60 cfs @ 3.07 fps)

Pond C1: Culvert 1

Hydrograph



Summary for Pond C2: Culvert 2

Inflow Area = 0.930 ac, 7.53% Impervious, Inflow Depth > 4.29" for 100-Year, 24-Hours event
 Inflow = 4.55 cfs @ 12.100 hrs, Volume= 0.333 af
 Outflow = 4.51 cfs @ 12.110 hrs, Volume= 0.333 af, Atten= 1%, Lag= 0.6 min
 Primary = 4.51 cfs @ 12.110 hrs, Volume= 0.333 af

Routing by Dyn-Stor-Ind method, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs / 2
 Peak Elev= 39.34' @ 12.110 hrs Surf.Area= 269 sf Storage= 149 cf

Plug-Flow detention time= 0.6 min calculated for 0.333 af (100% of inflow)
 Center-of-Mass det. time= 0.5 min (818.1 - 817.6)

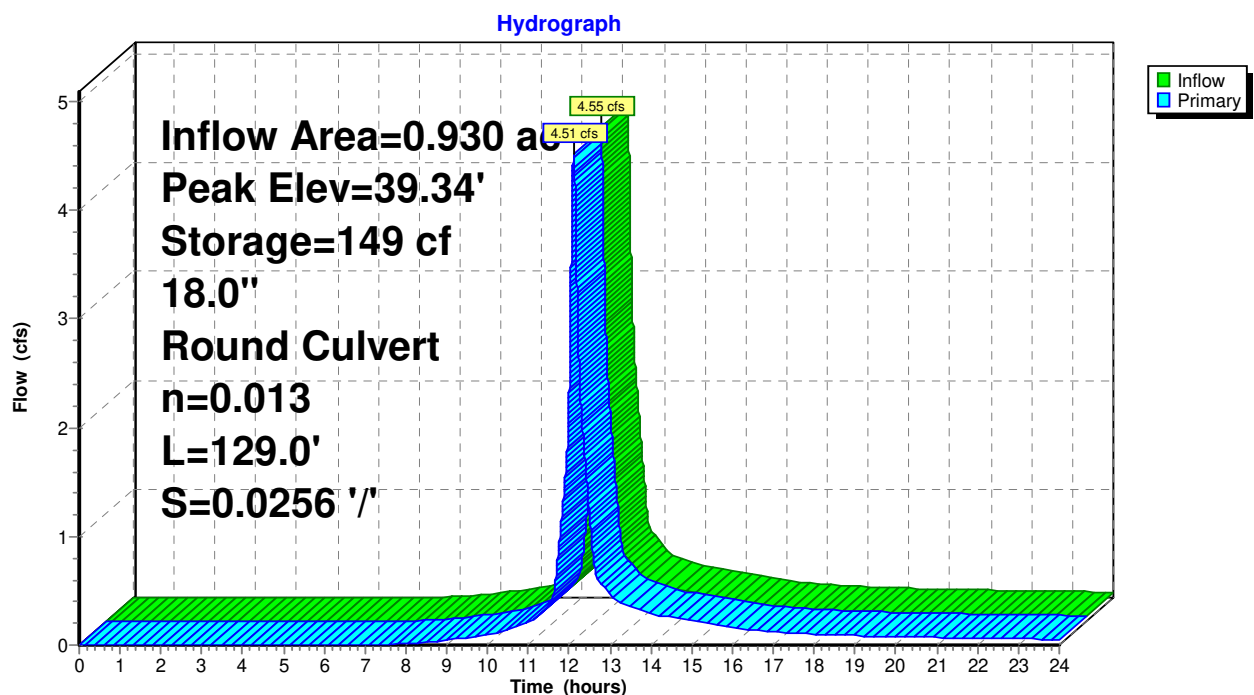
Volume	Invert	Avail.Storage	Storage Description
#1	38.30'	922 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
38.30	10	0	0
39.00	194	71	71
40.00	418	306	377
41.00	672	545	922

Device	Routing	Invert	Outlet Devices
#1	Primary	38.30'	18.0" Round Culvert L= 129.0' Ke= 0.500 Inlet / Outlet Invert= 38.30' / 35.00' S= 0.0256 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf

Primary OutFlow Max=4.51 cfs @ 12.110 hrs HW=39.34' TW=0.00' (Dynamic Tailwater)
 ↑**1=Culvert** (Inlet Controls 4.51 cfs @ 3.47 fps)

Pond C2: Culvert 2



Summary for Pond RT12: 1 Roof Trench System (Lot 12)

Inflow Area = 0.030 ac, 100.00% Impervious, Inflow Depth > 6.85" for 100-Year, 24-Hours event
 Inflow = 0.18 cfs @ 12.133 hrs, Volume= 0.017 af
 Outflow = 0.10 cfs @ 12.305 hrs, Volume= 0.013 af, Atten= 45%, Lag= 10.3 min
 Discarded = 0.01 cfs @ 12.304 hrs, Volume= 0.010 af
 Primary = 0.09 cfs @ 12.305 hrs, Volume= 0.003 af

Routing by Dyn-Stor-Ind method, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs / 2
 Peak Elev= 3.26' @ 12.305 hrs Surf.Area= 288 sf Storage= 275 cf

Plug-Flow detention time= 191.1 min calculated for 0.013 af (77% of inflow)
 Center-of-Mass det. time= 108.6 min (854.1 - 745.5)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	169 cf	8'x36'x24.5" Roof Trench System (Prismatic) Listed below (Recalc) 588 cf Overall - 106 cf Embedded = 482 cf x 35.0% Voids
#2	1.00'	106 cf	Custom Stage Data Listed below Inside #1
#3	2.04'	0 cf	0.50'D x 1.60'H Vertical Cone/Cylinder
		275 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	288	0	0
2.04	288	588	588

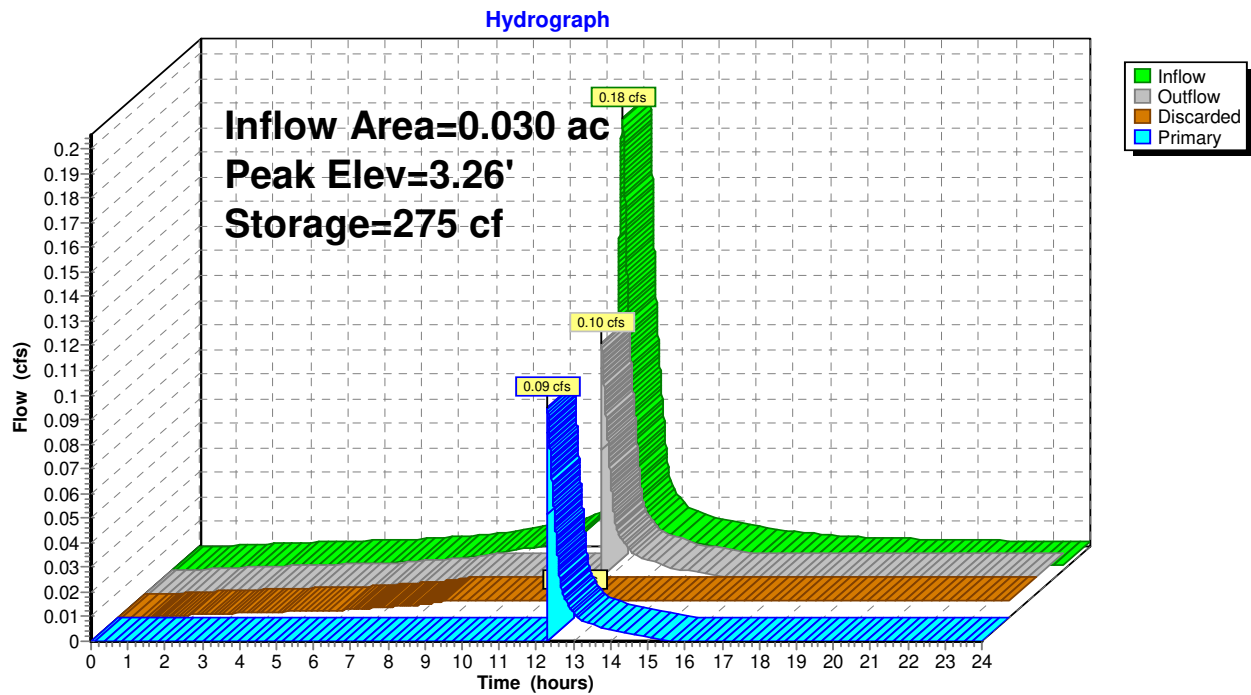
Elevation (feet)	Cum.Store (cubic-feet)
1.00	0
2.04	106

Device	Routing	Invert	Outlet Devices
#1	Primary	3.04'	4.0" Vert. Orifice/Grate C= 0.600
#2	Discarded	0.00'	1.020 in/hr Exfiltration over Surface area Phase-In= 0.02'

Discarded OutFlow Max=0.01 cfs @ 12.304 hrs HW=2.20' (Free Discharge)
 ↑ **2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.09 cfs @ 12.305 hrs HW=3.26' TW=0.00' (Dynamic Tailwater)
 ↑ **1=Orifice/Grate** (Orifice Controls 0.09 cfs @ 1.58 fps)

Pond RT12: 1 Roof Trench System (Lot 12)



Summary for Pond RT14: 14 Roof Trench Systems

Inflow Area = 0.500 ac, 100.00% Impervious, Inflow Depth > 6.85" for 100-Year, 24-Hours event
 Inflow = 3.06 cfs @ 12.133 hrs, Volume= 0.285 af
 Outflow = 3.05 cfs @ 12.143 hrs, Volume= 0.231 af, Atten= 0%, Lag= 0.6 min
 Discarded = 0.09 cfs @ 12.142 hrs, Volume= 0.146 af
 Primary = 2.96 cfs @ 12.143 hrs, Volume= 0.085 af

Routing by Dyn-Stor-Ind method, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs / 2
 Peak Elev= 3.46' @ 12.143 hrs Surf.Area= 3,923 sf Storage= 3,531 cf

Plug-Flow detention time= 153.2 min calculated for 0.231 af (81% of inflow)
 Center-of-Mass det. time= 78.3 min (823.8 - 745.5)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	2,407 cf	10'x28'x24.5" Roof Trench System (Prismatic) Listed below (Recalc) x 1 7,997 cf Overall - 1,120 cf Embedded = 6,877 cf x 35.0% Voids
#2	1.00'	1,120 cf	Custom Stage Data Listed below x 14 Inside #1
#3	2.04'	4 cf	0.50'D x 1.60'H Vertical Cone/Cylinder x 14
		3,531 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	280	0	0
2.04	280	571	571

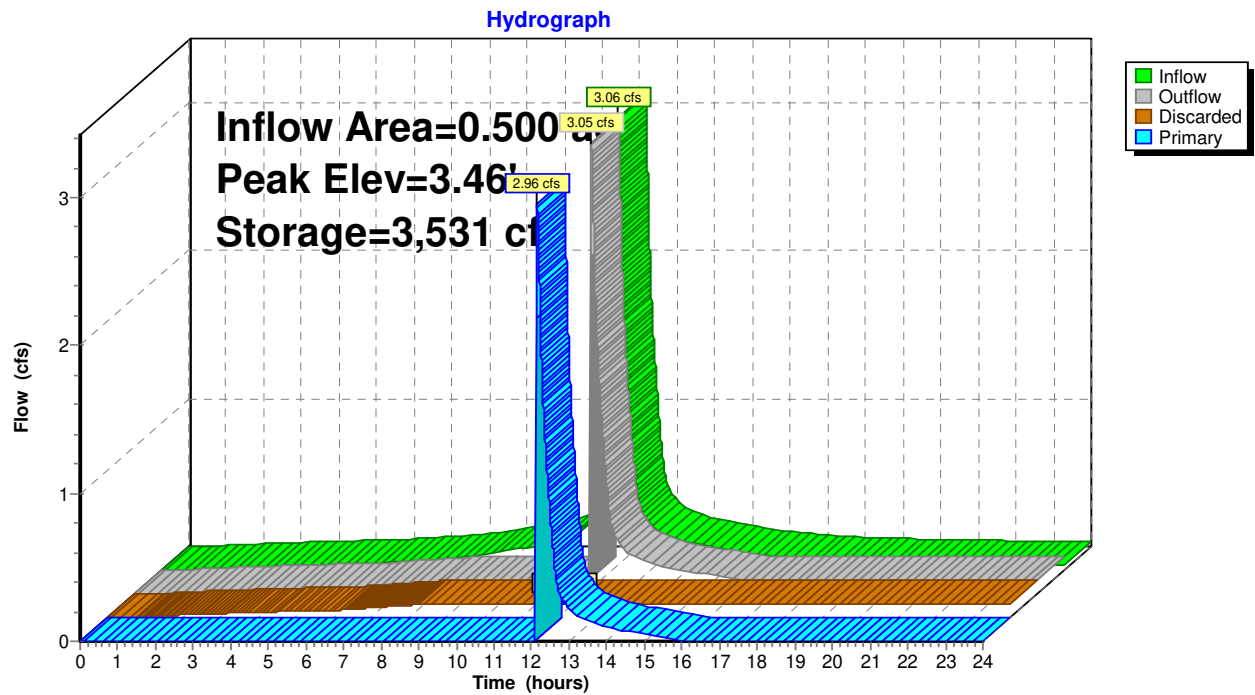
Elevation (feet)	Cum.Store (cubic-feet)
1.00	0
2.04	80

Device	Routing	Invert	Outlet Devices
#1	Primary	3.04'	4.0" Vert. Orifice/Grate X 14.00 C= 0.600
#2	Discarded	0.00'	1.020 in/hr Exfiltration over Surface area Phase-In= 0.02'

Discarded OutFlow Max=0.09 cfs @ 12.142 hrs HW=2.35' (Free Discharge)
 ↑ **2=Exfiltration** (Exfiltration Controls 0.09 cfs)

Primary OutFlow Max=2.96 cfs @ 12.143 hrs HW=3.46' TW=0.00' (Dynamic Tailwater)
 ↑ **1=Orifice/Grate** (Orifice Controls 2.96 cfs @ 2.42 fps)

Pond RT14: 14 Roof Trench Systems



Summary for Pond RT9: 1 Roof Trench System (Lot 9)

Inflow Area = 0.030 ac, 100.00% Impervious, Inflow Depth > 6.85" for 100-Year, 24-Hours event
 Inflow = 0.18 cfs @ 12.133 hrs, Volume= 0.017 af
 Outflow = 0.18 cfs @ 12.133 hrs, Volume= 0.014 af, Atten= 0%, Lag= 0.0 min
 Discarded = 0.00 cfs @ 11.843 hrs, Volume= 0.006 af
 Primary = 0.18 cfs @ 12.133 hrs, Volume= 0.009 af

Routing by Dyn-Stor-Ind method, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs / 2
 Peak Elev= 3.39' @ 12.133 hrs Surf.Area= 140 sf Storage= 135 cf

Plug-Flow detention time= 105.8 min calculated for 0.014 af (84% of inflow)
 Center-of-Mass det. time= 38.1 min (783.6 - 745.5)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	81 cf	7'x20'x24.5" Roof Trench System (Prismatic) Listed below (Recalc) 286 cf Overall - 53 cf Embedded = 233 cf x 35.0% Voids
#2	1.00'	53 cf	Custom Stage Data Listed below Inside #1
#3	2.04'	0 cf	0.50'D x 1.60'H Vertical Cone/Cylinder
		135 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	140	0	0
2.04	140	286	286

Elevation (feet)	Cum.Store (cubic-feet)
1.00	0
2.04	53

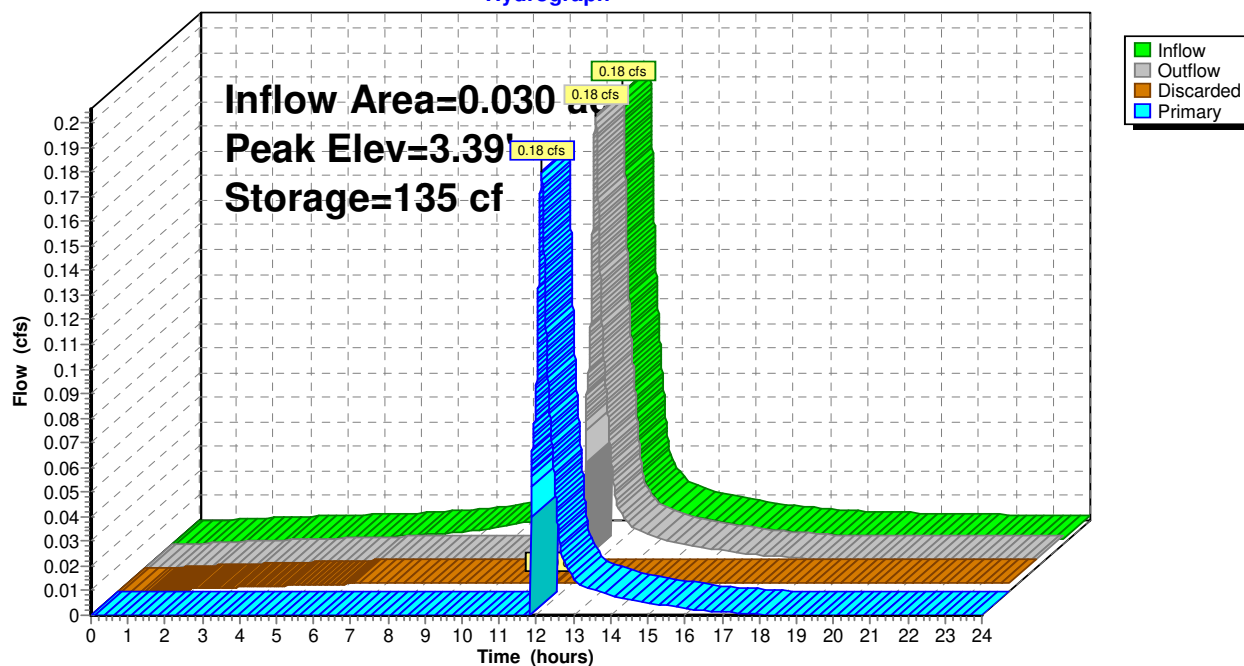
Device	Routing	Invert	Outlet Devices
#1	Primary	3.04'	4.0" Vert. Orifice/Grate C= 0.600
#2	Discarded	0.00'	1.020 in/hr Exfiltration over Surface area Phase-In= 0.02'

Discarded OutFlow Max=0.00 cfs @ 11.843 hrs HW=2.07' (Free Discharge)
 ↑ **2=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.18 cfs @ 12.133 hrs HW=3.39' TW=0.00' (Dynamic Tailwater)
 ↑ **1=Orifice/Grate** (Orifice Controls 0.18 cfs @ 2.07 fps)

Pond RT9: 1 Roof Trench System (Lot 9)

Hydrograph



Summary for Pond S2: Swale 2

Inflow Area = 1.270 ac, 10.24% Impervious, Inflow Depth > 4.67" for 100-Year, 24-Hours event
 Inflow = 6.92 cfs @ 12.087 hrs, Volume= 0.494 af
 Outflow = 4.44 cfs @ 12.181 hrs, Volume= 0.493 af, Atten= 36%, Lag= 5.7 min
 Discarded = 0.07 cfs @ 12.181 hrs, Volume= 0.030 af
 Primary = 4.37 cfs @ 12.181 hrs, Volume= 0.463 af

Routing by Dyn-Stor-Ind method, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs / 2
 Peak Elev= 42.34' @ 12.181 hrs Surf.Area= 2,822 sf Storage= 1,981 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 5.0 min (814.2 - 809.1)

Volume	Invert	Avail.Storage	Storage Description
#1	40.50'	14,785 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
#2	40.50'	88 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
		250 cf Overall x 35.0% Voids	
		14,873 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
40.50	240	0	0
41.00	500	185	185
42.00	1,600	1,050	1,235
43.00	3,750	2,675	3,910
44.00	4,500	4,125	8,035
45.00	9,000	6,750	14,785

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
40.50	500	0	0
41.00	500	250	250

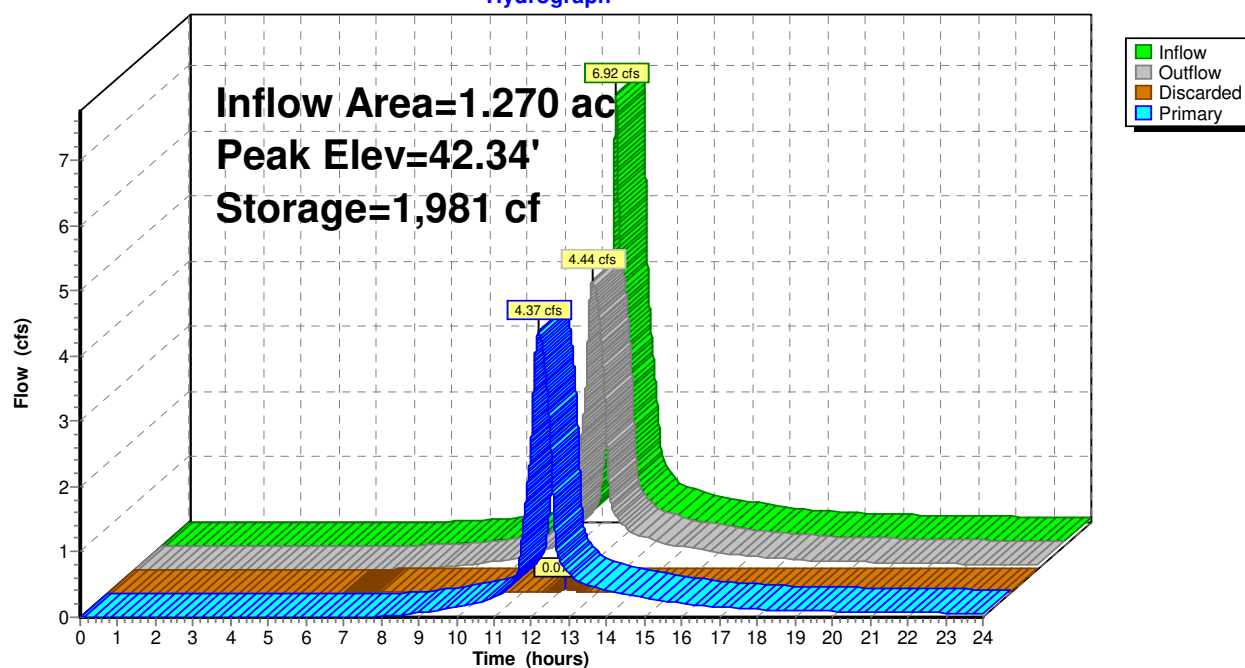
Device	Routing	Invert	Outlet Devices
#1	Primary	40.50'	12.0" Round Culvert L= 162.0' Ke= 0.500 Inlet / Outlet Invert= 40.50' / 36.25' S= 0.0262 '/' Cc= 0.900 n= 0.013 Concrete sewer w/manholes & inlets, Flow Area= 0.79 sf
#2	Discarded	40.50'	1.020 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.07 cfs @ 12.181 hrs HW=42.34' (Free Discharge)
 ↑ **2=Exfiltration** (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=4.37 cfs @ 12.181 hrs HW=42.34' TW=0.00' (Dynamic Tailwater)
 ↑ **1=Culvert** (Inlet Controls 4.37 cfs @ 5.57 fps)

Pond S2: Swale 2

Hydrograph



Summary for Pond S3: Swale 3

Inflow Area = 0.670 ac, 8.96% Impervious, Inflow Depth > 4.34" for 100-Year, 24-Hours event
 Inflow = 3.41 cfs @ 12.087 hrs, Volume= 0.242 af
 Outflow = 2.88 cfs @ 12.138 hrs, Volume= 0.242 af, Atten= 16%, Lag= 3.1 min
 Discarded = 0.03 cfs @ 12.138 hrs, Volume= 0.018 af
 Primary = 2.85 cfs @ 12.138 hrs, Volume= 0.224 af

Routing by Dyn-Stor-Ind method, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs / 2
 Peak Elev= 42.57' @ 12.138 hrs Surf.Area= 1,290 sf Storage= 582 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 3.2 min (819.3 - 816.1)

Volume	Invert	Avail.Storage	Storage Description
#1	41.50'	5,613 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
#2	41.50'	70 cf	Custom Stage Data (Prismatic) Listed below
		200 cf Overall x 35.0% Voids	
		5,683 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
41.50	10	0	0
42.00	480	123	123
43.00	1,200	840	963
44.00	1,800	1,500	2,463
45.00	4,500	3,150	5,613

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
41.50	400	0	0
42.00	400	200	200

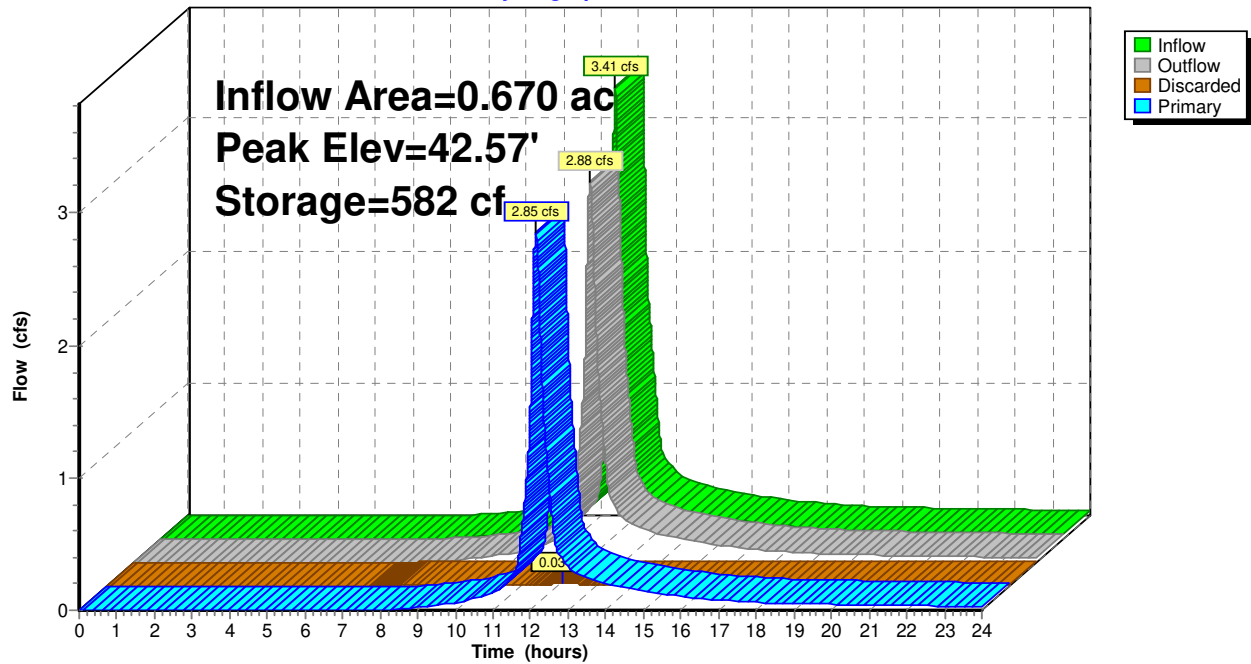
Device	Routing	Invert	Outlet Devices
#1	Primary	41.50'	12.0" Round Culvert L= 292.0' Ke= 0.500 Inlet / Outlet Invert= 41.50' / 36.25' S= 0.0180 '/' Cc= 0.900 n= 0.013 Concrete sewer w/manholes & inlets, Flow Area= 0.79 sf
#2	Discarded	41.50'	1.020 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.03 cfs @ 12.138 hrs HW=42.57' (Free Discharge)
 ↑ **2=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=2.85 cfs @ 12.138 hrs HW=42.57' TW=0.00' (Dynamic Tailwater)
 ↑ **1=Culvert** (Inlet Controls 2.85 cfs @ 3.63 fps)

Pond S3: Swale 3

Hydrograph



SEDIMENT FOREBAY SIZING

Project : Fairhaven, MA

By : Keri Williams, PE

Date : 9/6/2019 (Revised 11/15/19)

Pond A - 2 Sediment Forebays STAGE-STORAGE RELATIONSHIP						
Stage (feet)	Depth (feet)	Surface Area (sq. ft.)	Surface Area (acres)	Average Area (acres)	Incremental Volume (ac-ft)	Total Volume (ac-ft)
34.50	0.00	340	0.01	0.00	0.00	0.00
35.00	0.50	340	0.01	0.008	0.004	0.004
36.00	1.50	340	0.01	0.008	0.008	0.012
37.00	2.50	1,484	0.03	0.021	0.021	0.033
38.00	3.50	2,196	0.05	0.042	0.042	0.075
38.50	4.00	2,610	0.06	0.055	0.028	0.102

Pond A has 0.68 acres of impervious contributing drainage area = 0.25" x 0.68 acres = 0.014 ac-ft required volume

Pond B Sediment Forebay STAGE-STORAGE RELATIONSHIP						
Stage (feet)	Depth (feet)	Surface Area (sq. ft.)	Surface Area (acres)	Average Area (acres)	Incremental Volume (ac-ft)	Total Volume (ac-ft)
35.50	0.00	170	0.00	0.00	0.00	0.00
36.00	0.50	170	0.004	0.004	0.002	0.002
37.00	1.50	170	0.004	0.004	0.004	0.006
37.50	2.00	465	0.011	0.007	0.004	0.009
38.00	2.50	624	0.014	0.013	0.006	0.016
39.00	3.50	1,003	0.023	0.019	0.019	0.034
39.50	4.00	1,222	0.028	0.026	0.013	0.047

Pond B has 0.19 acres of impervious contributing drainage area = 0.25" x 0.19 acres = 0.004 ac-ft required volume

9/6/2019 (revised 12/02/19)

Water Quality Volume Calculations

The first flush treatment volume in cubic feet (V) is determined by the following formula:

$$V = (1.25/12 \text{ inches}) (R) (\text{Contributing Drainage Area in Square Feet})$$

Where $R = 0.05 + 0.009(I)$ and I = the % impervious area based on TR-55 Residential lot impervious

1/3 lot = 30 % impervious per TR-55

$$R = 0.05 + 0.009 (30) = 0.32$$

Total drainage acreage to Pond A = 1.76 acres = 76,665.6 sf

$$V = (1.25/12 \text{ inches}) (R) (\text{Contributing Drainage Area in Square Feet})$$

$$V = (1.25/12 \text{ inches})(0.32)(76,665.6 \text{ sf})$$

$$V = 2,556 \text{ cf}$$

Total drainage acreage to Pond B = 0.45 acres = 19,602 sf

$$V = (1.25/12 \text{ inches}) (R) (\text{Contributing Drainage Area in Square Feet})$$

$$V = (1.25/12 \text{ inches})(0.32)(19,602 \text{ sf})$$

$$V = 653 \text{ cf}$$

Total first flush treatment volume required = 2,556 cf + 653 cf = 3,209 cf

MADEP Water Quality Standards:

$$V = 0.50\text{-inch} \times \text{Total Impervious Area}$$

$$V = 0.50 \text{ inch}/12 \text{ inches} \times 1.80 \text{ acres} = 0.075 \text{ ac-ft}$$

$$\mathbf{V = 3,267 \text{ cf}}$$

Pond A volume = 3,159.5 cf (from bottom elevation to orifice outlet)

Pond B volume = 669 cf (from bottom elevation to orifice outlet)

Total first flush treatment volume provided = 3,828 cf

Hydrograph for Pond A: Pond A

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)	Secondary (cfs)
24.000	0.08	0	34.50	0.02	0.02	0.00	0.00
25.000	0.00	0	34.50	0.00	0.00	0.00	0.00
26.000	0.00	0	34.50	0.00	0.00	0.00	0.00
27.000	0.00	0	34.50	0.00	0.00	0.00	0.00
28.000	0.00	0	34.50	0.00	0.00	0.00	0.00
29.000	0.00	0	34.50	0.00	0.00	0.00	0.00
30.000	0.00	0	34.50	0.00	0.00	0.00	0.00
31.000	0.00	0	34.50	0.00	0.00	0.00	0.00
32.000	0.00	0	34.50	0.00	0.00	0.00	0.00
33.000	0.00	0	34.50	0.00	0.00	0.00	0.00
34.000	0.00	0	34.50	0.00	0.00	0.00	0.00
35.000	0.00	0	34.50	0.00	0.00	0.00	0.00
36.000	0.00	0	34.50	0.00	0.00	0.00	0.00
37.000	0.00	0	34.50	0.00	0.00	0.00	0.00
38.000	0.00	0	34.50	0.00	0.00	0.00	0.00
39.000	0.00	0	34.50	0.00	0.00	0.00	0.00
40.000	0.00	0	34.50	0.00	0.00	0.00	0.00
41.000	0.00	0	34.50	0.00	0.00	0.00	0.00
42.000	0.00	0	34.50	0.00	0.00	0.00	0.00
43.000	0.00	0	34.50	0.00	0.00	0.00	0.00
44.000	0.00	0	34.50	0.00	0.00	0.00	0.00
45.000	0.00	0	34.50	0.00	0.00	0.00	0.00
46.000	0.00	0	34.50	0.00	0.00	0.00	0.00
47.000	0.00	0	34.50	0.00	0.00	0.00	0.00
48.000	0.00	0	34.50	0.00	0.00	0.00	0.00
49.000	0.00	0	34.50	0.00	0.00	0.00	0.00
50.000	0.00	0	34.50	0.00	0.00	0.00	0.00
51.000	0.00	0	34.50	0.00	0.00	0.00	0.00
52.000	0.00	0	34.50	0.00	0.00	0.00	0.00
53.000	0.00	0	34.50	0.00	0.00	0.00	0.00
54.000	0.00	0	34.50	0.00	0.00	0.00	0.00
55.000	0.00	0	34.50	0.00	0.00	0.00	0.00
56.000	0.00	0	34.50	0.00	0.00	0.00	0.00
57.000	0.00	0	34.50	0.00	0.00	0.00	0.00
58.000	0.00	0	34.50	0.00	0.00	0.00	0.00
59.000	0.00	0	34.50	0.00	0.00	0.00	0.00
60.000	0.00	0	34.50	0.00	0.00	0.00	0.00
61.000	0.00	0	34.50	0.00	0.00	0.00	0.00
62.000	0.00	0	34.50	0.00	0.00	0.00	0.00
63.000	0.00	0	34.50	0.00	0.00	0.00	0.00
64.000	0.00	0	34.50	0.00	0.00	0.00	0.00
65.000	0.00	0	34.50	0.00	0.00	0.00	0.00
66.000	0.00	0	34.50	0.00	0.00	0.00	0.00
67.000	0.00	0	34.50	0.00	0.00	0.00	0.00
68.000	0.00	0	34.50	0.00	0.00	0.00	0.00
69.000	0.00	0	34.50	0.00	0.00	0.00	0.00
70.000	0.00	0	34.50	0.00	0.00	0.00	0.00
71.000	0.00	0	34.50	0.00	0.00	0.00	0.00
72.000	0.00	0	34.50	0.00	0.00	0.00	0.00

Hydrograph for Pond B: Pond B

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)	Secondary (cfs)
24.000	0.02	0	35.50	0.00	0.00	0.00	0.00
25.000	0.00	0	35.50	0.00	0.00	0.00	0.00
26.000	0.00	0	35.50	0.00	0.00	0.00	0.00
27.000	0.00	0	35.50	0.00	0.00	0.00	0.00
28.000	0.00	0	35.50	0.00	0.00	0.00	0.00
29.000	0.00	0	35.50	0.00	0.00	0.00	0.00
30.000	0.00	0	35.50	0.00	0.00	0.00	0.00
31.000	0.00	0	35.50	0.00	0.00	0.00	0.00
32.000	0.00	0	35.50	0.00	0.00	0.00	0.00
33.000	0.00	0	35.50	0.00	0.00	0.00	0.00
34.000	0.00	0	35.50	0.00	0.00	0.00	0.00
35.000	0.00	0	35.50	0.00	0.00	0.00	0.00
36.000	0.00	0	35.50	0.00	0.00	0.00	0.00
37.000	0.00	0	35.50	0.00	0.00	0.00	0.00
38.000	0.00	0	35.50	0.00	0.00	0.00	0.00
39.000	0.00	0	35.50	0.00	0.00	0.00	0.00
40.000	0.00	0	35.50	0.00	0.00	0.00	0.00
41.000	0.00	0	35.50	0.00	0.00	0.00	0.00
42.000	0.00	0	35.50	0.00	0.00	0.00	0.00
43.000	0.00	0	35.50	0.00	0.00	0.00	0.00
44.000	0.00	0	35.50	0.00	0.00	0.00	0.00
45.000	0.00	0	35.50	0.00	0.00	0.00	0.00
46.000	0.00	0	35.50	0.00	0.00	0.00	0.00
47.000	0.00	0	35.50	0.00	0.00	0.00	0.00
48.000	0.00	0	35.50	0.00	0.00	0.00	0.00
49.000	0.00	0	35.50	0.00	0.00	0.00	0.00
50.000	0.00	0	35.50	0.00	0.00	0.00	0.00
51.000	0.00	0	35.50	0.00	0.00	0.00	0.00
52.000	0.00	0	35.50	0.00	0.00	0.00	0.00
53.000	0.00	0	35.50	0.00	0.00	0.00	0.00
54.000	0.00	0	35.50	0.00	0.00	0.00	0.00
55.000	0.00	0	35.50	0.00	0.00	0.00	0.00
56.000	0.00	0	35.50	0.00	0.00	0.00	0.00
57.000	0.00	0	35.50	0.00	0.00	0.00	0.00
58.000	0.00	0	35.50	0.00	0.00	0.00	0.00
59.000	0.00	0	35.50	0.00	0.00	0.00	0.00
60.000	0.00	0	35.50	0.00	0.00	0.00	0.00
61.000	0.00	0	35.50	0.00	0.00	0.00	0.00
62.000	0.00	0	35.50	0.00	0.00	0.00	0.00
63.000	0.00	0	35.50	0.00	0.00	0.00	0.00
64.000	0.00	0	35.50	0.00	0.00	0.00	0.00
65.000	0.00	0	35.50	0.00	0.00	0.00	0.00
66.000	0.00	0	35.50	0.00	0.00	0.00	0.00
67.000	0.00	0	35.50	0.00	0.00	0.00	0.00
68.000	0.00	0	35.50	0.00	0.00	0.00	0.00
69.000	0.00	0	35.50	0.00	0.00	0.00	0.00
70.000	0.00	0	35.50	0.00	0.00	0.00	0.00
71.000	0.00	0	35.50	0.00	0.00	0.00	0.00
72.000	0.00	0	35.50	0.00	0.00	0.00	0.00

Hydrograph for Pond RT9: 1 Roof Trench System (Lot 9)

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
24.000	0.00	0	0.00	0.00	0.00	0.00
25.000	0.00	0	0.00	0.00	0.00	0.00
26.000	0.00	0	0.00	0.00	0.00	0.00
27.000	0.00	0	0.00	0.00	0.00	0.00
28.000	0.00	0	0.00	0.00	0.00	0.00
29.000	0.00	0	0.00	0.00	0.00	0.00
30.000	0.00	0	0.00	0.00	0.00	0.00
31.000	0.00	0	0.00	0.00	0.00	0.00
32.000	0.00	0	0.00	0.00	0.00	0.00
33.000	0.00	0	0.00	0.00	0.00	0.00
34.000	0.00	0	0.00	0.00	0.00	0.00
35.000	0.00	0	0.00	0.00	0.00	0.00
36.000	0.00	0	0.00	0.00	0.00	0.00
37.000	0.00	0	0.00	0.00	0.00	0.00
38.000	0.00	0	0.00	0.00	0.00	0.00
39.000	0.00	0	0.00	0.00	0.00	0.00
40.000	0.00	0	0.00	0.00	0.00	0.00
41.000	0.00	0	0.00	0.00	0.00	0.00
42.000	0.00	0	0.00	0.00	0.00	0.00
43.000	0.00	0	0.00	0.00	0.00	0.00
44.000	0.00	0	0.00	0.00	0.00	0.00
45.000	0.00	0	0.00	0.00	0.00	0.00
46.000	0.00	0	0.00	0.00	0.00	0.00
47.000	0.00	0	0.00	0.00	0.00	0.00
48.000	0.00	0	0.00	0.00	0.00	0.00
49.000	0.00	0	0.00	0.00	0.00	0.00
50.000	0.00	0	0.00	0.00	0.00	0.00
51.000	0.00	0	0.00	0.00	0.00	0.00
52.000	0.00	0	0.00	0.00	0.00	0.00
53.000	0.00	0	0.00	0.00	0.00	0.00
54.000	0.00	0	0.00	0.00	0.00	0.00
55.000	0.00	0	0.00	0.00	0.00	0.00
56.000	0.00	0	0.00	0.00	0.00	0.00
57.000	0.00	0	0.00	0.00	0.00	0.00
58.000	0.00	0	0.00	0.00	0.00	0.00
59.000	0.00	0	0.00	0.00	0.00	0.00
60.000	0.00	0	0.00	0.00	0.00	0.00
61.000	0.00	0	0.00	0.00	0.00	0.00
62.000	0.00	0	0.00	0.00	0.00	0.00
63.000	0.00	0	0.00	0.00	0.00	0.00
64.000	0.00	0	0.00	0.00	0.00	0.00
65.000	0.00	0	0.00	0.00	0.00	0.00
66.000	0.00	0	0.00	0.00	0.00	0.00
67.000	0.00	0	0.00	0.00	0.00	0.00
68.000	0.00	0	0.00	0.00	0.00	0.00
69.000	0.00	0	0.00	0.00	0.00	0.00
70.000	0.00	0	0.00	0.00	0.00	0.00
71.000	0.00	0	0.00	0.00	0.00	0.00
72.000	0.00	0	0.00	0.00	0.00	0.00

Hydrograph for Pond RT12: 1 Roof Trench System (Lot 12)

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
24.000	0.00	0	0.00	0.00	0.00	0.00
25.000	0.00	0	0.00	0.00	0.00	0.00
26.000	0.00	0	0.00	0.00	0.00	0.00
27.000	0.00	0	0.00	0.00	0.00	0.00
28.000	0.00	0	0.00	0.00	0.00	0.00
29.000	0.00	0	0.00	0.00	0.00	0.00
30.000	0.00	0	0.00	0.00	0.00	0.00
31.000	0.00	0	0.00	0.00	0.00	0.00
32.000	0.00	0	0.00	0.00	0.00	0.00
33.000	0.00	0	0.00	0.00	0.00	0.00
34.000	0.00	0	0.00	0.00	0.00	0.00
35.000	0.00	0	0.00	0.00	0.00	0.00
36.000	0.00	0	0.00	0.00	0.00	0.00
37.000	0.00	0	0.00	0.00	0.00	0.00
38.000	0.00	0	0.00	0.00	0.00	0.00
39.000	0.00	0	0.00	0.00	0.00	0.00
40.000	0.00	0	0.00	0.00	0.00	0.00
41.000	0.00	0	0.00	0.00	0.00	0.00
42.000	0.00	0	0.00	0.00	0.00	0.00
43.000	0.00	0	0.00	0.00	0.00	0.00
44.000	0.00	0	0.00	0.00	0.00	0.00
45.000	0.00	0	0.00	0.00	0.00	0.00
46.000	0.00	0	0.00	0.00	0.00	0.00
47.000	0.00	0	0.00	0.00	0.00	0.00
48.000	0.00	0	0.00	0.00	0.00	0.00
49.000	0.00	0	0.00	0.00	0.00	0.00
50.000	0.00	0	0.00	0.00	0.00	0.00
51.000	0.00	0	0.00	0.00	0.00	0.00
52.000	0.00	0	0.00	0.00	0.00	0.00
53.000	0.00	0	0.00	0.00	0.00	0.00
54.000	0.00	0	0.00	0.00	0.00	0.00
55.000	0.00	0	0.00	0.00	0.00	0.00
56.000	0.00	0	0.00	0.00	0.00	0.00
57.000	0.00	0	0.00	0.00	0.00	0.00
58.000	0.00	0	0.00	0.00	0.00	0.00
59.000	0.00	0	0.00	0.00	0.00	0.00
60.000	0.00	0	0.00	0.00	0.00	0.00
61.000	0.00	0	0.00	0.00	0.00	0.00
62.000	0.00	0	0.00	0.00	0.00	0.00
63.000	0.00	0	0.00	0.00	0.00	0.00
64.000	0.00	0	0.00	0.00	0.00	0.00
65.000	0.00	0	0.00	0.00	0.00	0.00
66.000	0.00	0	0.00	0.00	0.00	0.00
67.000	0.00	0	0.00	0.00	0.00	0.00
68.000	0.00	0	0.00	0.00	0.00	0.00
69.000	0.00	0	0.00	0.00	0.00	0.00
70.000	0.00	0	0.00	0.00	0.00	0.00
71.000	0.00	0	0.00	0.00	0.00	0.00
72.000	0.00	0	0.00	0.00	0.00	0.00

Hydrograph for Pond RT14: 14 Roof Trench Systems

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
24.000	0.02	0	0.00	0.00	0.00	0.00
25.000	0.00	0	0.00	0.00	0.00	0.00
26.000	0.00	0	0.00	0.00	0.00	0.00
27.000	0.00	0	0.00	0.00	0.00	0.00
28.000	0.00	0	0.00	0.00	0.00	0.00
29.000	0.00	0	0.00	0.00	0.00	0.00
30.000	0.00	0	0.00	0.00	0.00	0.00
31.000	0.00	0	0.00	0.00	0.00	0.00
32.000	0.00	0	0.00	0.00	0.00	0.00
33.000	0.00	0	0.00	0.00	0.00	0.00
34.000	0.00	0	0.00	0.00	0.00	0.00
35.000	0.00	0	0.00	0.00	0.00	0.00
36.000	0.00	0	0.00	0.00	0.00	0.00
37.000	0.00	0	0.00	0.00	0.00	0.00
38.000	0.00	0	0.00	0.00	0.00	0.00
39.000	0.00	0	0.00	0.00	0.00	0.00
40.000	0.00	0	0.00	0.00	0.00	0.00
41.000	0.00	0	0.00	0.00	0.00	0.00
42.000	0.00	0	0.00	0.00	0.00	0.00
43.000	0.00	0	0.00	0.00	0.00	0.00
44.000	0.00	0	0.00	0.00	0.00	0.00
45.000	0.00	0	0.00	0.00	0.00	0.00
46.000	0.00	0	0.00	0.00	0.00	0.00
47.000	0.00	0	0.00	0.00	0.00	0.00
48.000	0.00	0	0.00	0.00	0.00	0.00
49.000	0.00	0	0.00	0.00	0.00	0.00
50.000	0.00	0	0.00	0.00	0.00	0.00
51.000	0.00	0	0.00	0.00	0.00	0.00
52.000	0.00	0	0.00	0.00	0.00	0.00
53.000	0.00	0	0.00	0.00	0.00	0.00
54.000	0.00	0	0.00	0.00	0.00	0.00
55.000	0.00	0	0.00	0.00	0.00	0.00
56.000	0.00	0	0.00	0.00	0.00	0.00
57.000	0.00	0	0.00	0.00	0.00	0.00
58.000	0.00	0	0.00	0.00	0.00	0.00
59.000	0.00	0	0.00	0.00	0.00	0.00
60.000	0.00	0	0.00	0.00	0.00	0.00
61.000	0.00	0	0.00	0.00	0.00	0.00
62.000	0.00	0	0.00	0.00	0.00	0.00
63.000	0.00	0	0.00	0.00	0.00	0.00
64.000	0.00	0	0.00	0.00	0.00	0.00
65.000	0.00	0	0.00	0.00	0.00	0.00
66.000	0.00	0	0.00	0.00	0.00	0.00
67.000	0.00	0	0.00	0.00	0.00	0.00
68.000	0.00	0	0.00	0.00	0.00	0.00
69.000	0.00	0	0.00	0.00	0.00	0.00
70.000	0.00	0	0.00	0.00	0.00	0.00
71.000	0.00	0	0.00	0.00	0.00	0.00
72.000	0.00	0	0.00	0.00	0.00	0.00

Hydrograph for Pond S3: Swale 3

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
24.000	0.03	0	41.50	0.01	0.01	0.00
25.000	0.00	0	41.50	0.00	0.00	0.00
26.000	0.00	0	41.50	0.00	0.00	0.00
27.000	0.00	0	41.50	0.00	0.00	0.00
28.000	0.00	0	41.50	0.00	0.00	0.00
29.000	0.00	0	41.50	0.00	0.00	0.00
30.000	0.00	0	41.50	0.00	0.00	0.00
31.000	0.00	0	41.50	0.00	0.00	0.00
32.000	0.00	0	41.50	0.00	0.00	0.00
33.000	0.00	0	41.50	0.00	0.00	0.00
34.000	0.00	0	41.50	0.00	0.00	0.00
35.000	0.00	0	41.50	0.00	0.00	0.00
36.000	0.00	0	41.50	0.00	0.00	0.00
37.000	0.00	0	41.50	0.00	0.00	0.00
38.000	0.00	0	41.50	0.00	0.00	0.00
39.000	0.00	0	41.50	0.00	0.00	0.00
40.000	0.00	0	41.50	0.00	0.00	0.00
41.000	0.00	0	41.50	0.00	0.00	0.00
42.000	0.00	0	41.50	0.00	0.00	0.00
43.000	0.00	0	41.50	0.00	0.00	0.00
44.000	0.00	0	41.50	0.00	0.00	0.00
45.000	0.00	0	41.50	0.00	0.00	0.00
46.000	0.00	0	41.50	0.00	0.00	0.00
47.000	0.00	0	41.50	0.00	0.00	0.00
48.000	0.00	0	41.50	0.00	0.00	0.00
49.000	0.00	0	41.50	0.00	0.00	0.00
50.000	0.00	0	41.50	0.00	0.00	0.00
51.000	0.00	0	41.50	0.00	0.00	0.00
52.000	0.00	0	41.50	0.00	0.00	0.00
53.000	0.00	0	41.50	0.00	0.00	0.00
54.000	0.00	0	41.50	0.00	0.00	0.00
55.000	0.00	0	41.50	0.00	0.00	0.00
56.000	0.00	0	41.50	0.00	0.00	0.00
57.000	0.00	0	41.50	0.00	0.00	0.00
58.000	0.00	0	41.50	0.00	0.00	0.00
59.000	0.00	0	41.50	0.00	0.00	0.00
60.000	0.00	0	41.50	0.00	0.00	0.00
61.000	0.00	0	41.50	0.00	0.00	0.00
62.000	0.00	0	41.50	0.00	0.00	0.00
63.000	0.00	0	41.50	0.00	0.00	0.00
64.000	0.00	0	41.50	0.00	0.00	0.00
65.000	0.00	0	41.50	0.00	0.00	0.00
66.000	0.00	0	41.50	0.00	0.00	0.00
67.000	0.00	0	41.50	0.00	0.00	0.00
68.000	0.00	0	41.50	0.00	0.00	0.00
69.000	0.00	0	41.50	0.00	0.00	0.00
70.000	0.00	0	41.50	0.00	0.00	0.00
71.000	0.00	0	41.50	0.00	0.00	0.00
72.000	0.00	0	41.50	0.00	0.00	0.00

Hydrograph for Pond S2: Swale 2

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
24.000	0.06	0	40.50	0.02	0.02	0.00
25.000	0.00	0	40.50	0.00	0.00	0.00
26.000	0.00	0	40.50	0.00	0.00	0.00
27.000	0.00	0	40.50	0.00	0.00	0.00
28.000	0.00	0	40.50	0.00	0.00	0.00
29.000	0.00	0	40.50	0.00	0.00	0.00
30.000	0.00	0	40.50	0.00	0.00	0.00
31.000	0.00	0	40.50	0.00	0.00	0.00
32.000	0.00	0	40.50	0.00	0.00	0.00
33.000	0.00	0	40.50	0.00	0.00	0.00
34.000	0.00	0	40.50	0.00	0.00	0.00
35.000	0.00	0	40.50	0.00	0.00	0.00
36.000	0.00	0	40.50	0.00	0.00	0.00
37.000	0.00	0	40.50	0.00	0.00	0.00
38.000	0.00	0	40.50	0.00	0.00	0.00
39.000	0.00	0	40.50	0.00	0.00	0.00
40.000	0.00	0	40.50	0.00	0.00	0.00
41.000	0.00	0	40.50	0.00	0.00	0.00
42.000	0.00	0	40.50	0.00	0.00	0.00
43.000	0.00	0	40.50	0.00	0.00	0.00
44.000	0.00	0	40.50	0.00	0.00	0.00
45.000	0.00	0	40.50	0.00	0.00	0.00
46.000	0.00	0	40.50	0.00	0.00	0.00
47.000	0.00	0	40.50	0.00	0.00	0.00
48.000	0.00	0	40.50	0.00	0.00	0.00
49.000	0.00	0	40.50	0.00	0.00	0.00
50.000	0.00	0	40.50	0.00	0.00	0.00
51.000	0.00	0	40.50	0.00	0.00	0.00
52.000	0.00	0	40.50	0.00	0.00	0.00
53.000	0.00	0	40.50	0.00	0.00	0.00
54.000	0.00	0	40.50	0.00	0.00	0.00
55.000	0.00	0	40.50	0.00	0.00	0.00
56.000	0.00	0	40.50	0.00	0.00	0.00
57.000	0.00	0	40.50	0.00	0.00	0.00
58.000	0.00	0	40.50	0.00	0.00	0.00
59.000	0.00	0	40.50	0.00	0.00	0.00
60.000	0.00	0	40.50	0.00	0.00	0.00
61.000	0.00	0	40.50	0.00	0.00	0.00
62.000	0.00	0	40.50	0.00	0.00	0.00
63.000	0.00	0	40.50	0.00	0.00	0.00
64.000	0.00	0	40.50	0.00	0.00	0.00
65.000	0.00	0	40.50	0.00	0.00	0.00
66.000	0.00	0	40.50	0.00	0.00	0.00
67.000	0.00	0	40.50	0.00	0.00	0.00
68.000	0.00	0	40.50	0.00	0.00	0.00
69.000	0.00	0	40.50	0.00	0.00	0.00
70.000	0.00	0	40.50	0.00	0.00	0.00
71.000	0.00	0	40.50	0.00	0.00	0.00
72.000	0.00	0	40.50	0.00	0.00	0.00

Hydrograph for Pond A: Pond A

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)	Secondary (cfs)
24.000	0.10	0	34.50	0.02	0.02	0.00	0.00
26.000	0.00	0	34.50	0.00	0.00	0.00	0.00
28.000	0.00	0	34.50	0.00	0.00	0.00	0.00
30.000	0.00	0	34.50	0.00	0.00	0.00	0.00
32.000	0.00	0	34.50	0.00	0.00	0.00	0.00
34.000	0.00	0	34.50	0.00	0.00	0.00	0.00
36.000	0.00	0	34.50	0.00	0.00	0.00	0.00
38.000	0.00	0	34.50	0.00	0.00	0.00	0.00
40.000	0.00	0	34.50	0.00	0.00	0.00	0.00
42.000	0.00	0	34.50	0.00	0.00	0.00	0.00
44.000	0.00	0	34.50	0.00	0.00	0.00	0.00
46.000	0.00	0	34.50	0.00	0.00	0.00	0.00
48.000	0.00	0	34.50	0.00	0.00	0.00	0.00
50.000	0.00	0	34.50	0.00	0.00	0.00	0.00
52.000	0.00	0	34.50	0.00	0.00	0.00	0.00
54.000	0.00	0	34.50	0.00	0.00	0.00	0.00
56.000	0.00	0	34.50	0.00	0.00	0.00	0.00
58.000	0.00	0	34.50	0.00	0.00	0.00	0.00
60.000	0.00	0	34.50	0.00	0.00	0.00	0.00
62.000	0.00	0	34.50	0.00	0.00	0.00	0.00
64.000	0.00	0	34.50	0.00	0.00	0.00	0.00
66.000	0.00	0	34.50	0.00	0.00	0.00	0.00
68.000	0.00	0	34.50	0.00	0.00	0.00	0.00
70.000	0.00	0	34.50	0.00	0.00	0.00	0.00
72.000	0.00	0	34.50	0.00	0.00	0.00	0.00
74.000	0.00	0	34.50	0.00	0.00	0.00	0.00
76.000	0.00	0	34.50	0.00	0.00	0.00	0.00
78.000	0.00	0	34.50	0.00	0.00	0.00	0.00
80.000	0.00	0	34.50	0.00	0.00	0.00	0.00
82.000	0.00	0	34.50	0.00	0.00	0.00	0.00
84.000	0.00	0	34.50	0.00	0.00	0.00	0.00
86.000	0.00	0	34.50	0.00	0.00	0.00	0.00
88.000	0.00	0	34.50	0.00	0.00	0.00	0.00
90.000	0.00	0	34.50	0.00	0.00	0.00	0.00
92.000	0.00	0	34.50	0.00	0.00	0.00	0.00
94.000	0.00	0	34.50	0.00	0.00	0.00	0.00
96.000	0.00	0	34.50	0.00	0.00	0.00	0.00

Hydrograph for Pond B: Pond B

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)	Secondary (cfs)
24.000	0.03	0	35.50	0.00	0.00	0.00	0.00
26.000	0.00	0	35.50	0.00	0.00	0.00	0.00
28.000	0.00	0	35.50	0.00	0.00	0.00	0.00
30.000	0.00	0	35.50	0.00	0.00	0.00	0.00
32.000	0.00	0	35.50	0.00	0.00	0.00	0.00
34.000	0.00	0	35.50	0.00	0.00	0.00	0.00
36.000	0.00	0	35.50	0.00	0.00	0.00	0.00
38.000	0.00	0	35.50	0.00	0.00	0.00	0.00
40.000	0.00	0	35.50	0.00	0.00	0.00	0.00
42.000	0.00	0	35.50	0.00	0.00	0.00	0.00
44.000	0.00	0	35.50	0.00	0.00	0.00	0.00
46.000	0.00	0	35.50	0.00	0.00	0.00	0.00
48.000	0.00	0	35.50	0.00	0.00	0.00	0.00
50.000	0.00	0	35.50	0.00	0.00	0.00	0.00
52.000	0.00	0	35.50	0.00	0.00	0.00	0.00
54.000	0.00	0	35.50	0.00	0.00	0.00	0.00
56.000	0.00	0	35.50	0.00	0.00	0.00	0.00
58.000	0.00	0	35.50	0.00	0.00	0.00	0.00
60.000	0.00	0	35.50	0.00	0.00	0.00	0.00
62.000	0.00	0	35.50	0.00	0.00	0.00	0.00
64.000	0.00	0	35.50	0.00	0.00	0.00	0.00
66.000	0.00	0	35.50	0.00	0.00	0.00	0.00
68.000	0.00	0	35.50	0.00	0.00	0.00	0.00
70.000	0.00	0	35.50	0.00	0.00	0.00	0.00
72.000	0.00	0	35.50	0.00	0.00	0.00	0.00
74.000	0.00	0	35.50	0.00	0.00	0.00	0.00
76.000	0.00	0	35.50	0.00	0.00	0.00	0.00
78.000	0.00	0	35.50	0.00	0.00	0.00	0.00
80.000	0.00	0	35.50	0.00	0.00	0.00	0.00
82.000	0.00	0	35.50	0.00	0.00	0.00	0.00
84.000	0.00	0	35.50	0.00	0.00	0.00	0.00
86.000	0.00	0	35.50	0.00	0.00	0.00	0.00
88.000	0.00	0	35.50	0.00	0.00	0.00	0.00
90.000	0.00	0	35.50	0.00	0.00	0.00	0.00
92.000	0.00	0	35.50	0.00	0.00	0.00	0.00
94.000	0.00	0	35.50	0.00	0.00	0.00	0.00
96.000	0.00	0	35.50	0.00	0.00	0.00	0.00

Hydrograph for Pond RT9: 1 Roof Trench System (Lot 9)

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
24.000	0.00	0	0.00	0.00	0.00	0.00
26.000	0.00	0	0.00	0.00	0.00	0.00
28.000	0.00	0	0.00	0.00	0.00	0.00
30.000	0.00	0	0.00	0.00	0.00	0.00
32.000	0.00	0	0.00	0.00	0.00	0.00
34.000	0.00	0	0.00	0.00	0.00	0.00
36.000	0.00	0	0.00	0.00	0.00	0.00
38.000	0.00	0	0.00	0.00	0.00	0.00
40.000	0.00	0	0.00	0.00	0.00	0.00
42.000	0.00	0	0.00	0.00	0.00	0.00
44.000	0.00	0	0.00	0.00	0.00	0.00
46.000	0.00	0	0.00	0.00	0.00	0.00
48.000	0.00	0	0.00	0.00	0.00	0.00
50.000	0.00	0	0.00	0.00	0.00	0.00
52.000	0.00	0	0.00	0.00	0.00	0.00
54.000	0.00	0	0.00	0.00	0.00	0.00
56.000	0.00	0	0.00	0.00	0.00	0.00
58.000	0.00	0	0.00	0.00	0.00	0.00
60.000	0.00	0	0.00	0.00	0.00	0.00
62.000	0.00	0	0.00	0.00	0.00	0.00
64.000	0.00	0	0.00	0.00	0.00	0.00
66.000	0.00	0	0.00	0.00	0.00	0.00
68.000	0.00	0	0.00	0.00	0.00	0.00
70.000	0.00	0	0.00	0.00	0.00	0.00
72.000	0.00	0	0.00	0.00	0.00	0.00
74.000	0.00	0	0.00	0.00	0.00	0.00
76.000	0.00	0	0.00	0.00	0.00	0.00
78.000	0.00	0	0.00	0.00	0.00	0.00
80.000	0.00	0	0.00	0.00	0.00	0.00
82.000	0.00	0	0.00	0.00	0.00	0.00
84.000	0.00	0	0.00	0.00	0.00	0.00
86.000	0.00	0	0.00	0.00	0.00	0.00
88.000	0.00	0	0.00	0.00	0.00	0.00
90.000	0.00	0	0.00	0.00	0.00	0.00
92.000	0.00	0	0.00	0.00	0.00	0.00
94.000	0.00	0	0.00	0.00	0.00	0.00
96.000	0.00	0	0.00	0.00	0.00	0.00

Hydrograph for Pond RT12: 1 Roof Trench System (Lot 12)

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
24.000	0.00	0	0.00	0.00	0.00	0.00
26.000	0.00	0	0.00	0.00	0.00	0.00
28.000	0.00	0	0.00	0.00	0.00	0.00
30.000	0.00	0	0.00	0.00	0.00	0.00
32.000	0.00	0	0.00	0.00	0.00	0.00
34.000	0.00	0	0.00	0.00	0.00	0.00
36.000	0.00	0	0.00	0.00	0.00	0.00
38.000	0.00	0	0.00	0.00	0.00	0.00
40.000	0.00	0	0.00	0.00	0.00	0.00
42.000	0.00	0	0.00	0.00	0.00	0.00
44.000	0.00	0	0.00	0.00	0.00	0.00
46.000	0.00	0	0.00	0.00	0.00	0.00
48.000	0.00	0	0.00	0.00	0.00	0.00
50.000	0.00	0	0.00	0.00	0.00	0.00
52.000	0.00	0	0.00	0.00	0.00	0.00
54.000	0.00	0	0.00	0.00	0.00	0.00
56.000	0.00	0	0.00	0.00	0.00	0.00
58.000	0.00	0	0.00	0.00	0.00	0.00
60.000	0.00	0	0.00	0.00	0.00	0.00
62.000	0.00	0	0.00	0.00	0.00	0.00
64.000	0.00	0	0.00	0.00	0.00	0.00
66.000	0.00	0	0.00	0.00	0.00	0.00
68.000	0.00	0	0.00	0.00	0.00	0.00
70.000	0.00	0	0.00	0.00	0.00	0.00
72.000	0.00	0	0.00	0.00	0.00	0.00
74.000	0.00	0	0.00	0.00	0.00	0.00
76.000	0.00	0	0.00	0.00	0.00	0.00
78.000	0.00	0	0.00	0.00	0.00	0.00
80.000	0.00	0	0.00	0.00	0.00	0.00
82.000	0.00	0	0.00	0.00	0.00	0.00
84.000	0.00	0	0.00	0.00	0.00	0.00
86.000	0.00	0	0.00	0.00	0.00	0.00
88.000	0.00	0	0.00	0.00	0.00	0.00
90.000	0.00	0	0.00	0.00	0.00	0.00
92.000	0.00	0	0.00	0.00	0.00	0.00
94.000	0.00	0	0.00	0.00	0.00	0.00
96.000	0.00	0	0.00	0.00	0.00	0.00

Hydrograph for Pond RT14: 14 Roof Trench Systems

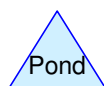
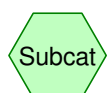
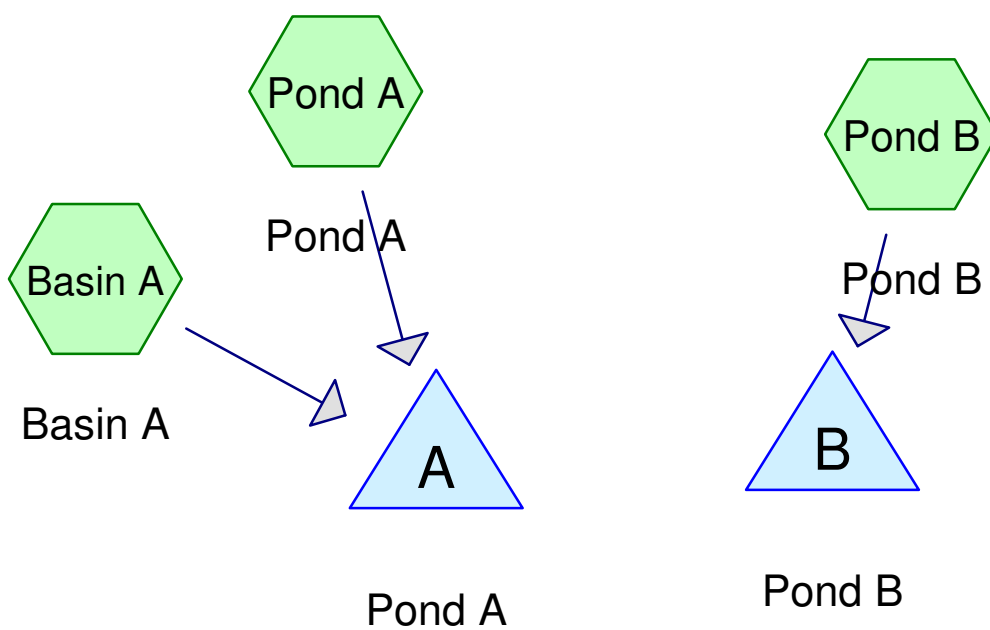
Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
24.000	0.03	0	0.00	0.00	0.00	0.00
26.000	0.00	0	0.00	0.00	0.00	0.00
28.000	0.00	0	0.00	0.00	0.00	0.00
30.000	0.00	0	0.00	0.00	0.00	0.00
32.000	0.00	0	0.00	0.00	0.00	0.00
34.000	0.00	0	0.00	0.00	0.00	0.00
36.000	0.00	0	0.00	0.00	0.00	0.00
38.000	0.00	0	0.00	0.00	0.00	0.00
40.000	0.00	0	0.00	0.00	0.00	0.00
42.000	0.00	0	0.00	0.00	0.00	0.00
44.000	0.00	0	0.00	0.00	0.00	0.00
46.000	0.00	0	0.00	0.00	0.00	0.00
48.000	0.00	0	0.00	0.00	0.00	0.00
50.000	0.00	0	0.00	0.00	0.00	0.00
52.000	0.00	0	0.00	0.00	0.00	0.00
54.000	0.00	0	0.00	0.00	0.00	0.00
56.000	0.00	0	0.00	0.00	0.00	0.00
58.000	0.00	0	0.00	0.00	0.00	0.00
60.000	0.00	0	0.00	0.00	0.00	0.00
62.000	0.00	0	0.00	0.00	0.00	0.00
64.000	0.00	0	0.00	0.00	0.00	0.00
66.000	0.00	0	0.00	0.00	0.00	0.00
68.000	0.00	0	0.00	0.00	0.00	0.00
70.000	0.00	0	0.00	0.00	0.00	0.00
72.000	0.00	0	0.00	0.00	0.00	0.00
74.000	0.00	0	0.00	0.00	0.00	0.00
76.000	0.00	0	0.00	0.00	0.00	0.00
78.000	0.00	0	0.00	0.00	0.00	0.00
80.000	0.00	0	0.00	0.00	0.00	0.00
82.000	0.00	0	0.00	0.00	0.00	0.00
84.000	0.00	0	0.00	0.00	0.00	0.00
86.000	0.00	0	0.00	0.00	0.00	0.00
88.000	0.00	0	0.00	0.00	0.00	0.00
90.000	0.00	0	0.00	0.00	0.00	0.00
92.000	0.00	0	0.00	0.00	0.00	0.00
94.000	0.00	0	0.00	0.00	0.00	0.00
96.000	0.00	0	0.00	0.00	0.00	0.00

Hydrograph for Pond S3: Swale 3

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
24.000	0.04	0	41.50	0.01	0.01	0.00
26.000	0.00	0	41.50	0.00	0.00	0.00
28.000	0.00	0	41.50	0.00	0.00	0.00
30.000	0.00	0	41.50	0.00	0.00	0.00
32.000	0.00	0	41.50	0.00	0.00	0.00
34.000	0.00	0	41.50	0.00	0.00	0.00
36.000	0.00	0	41.50	0.00	0.00	0.00
38.000	0.00	0	41.50	0.00	0.00	0.00
40.000	0.00	0	41.50	0.00	0.00	0.00
42.000	0.00	0	41.50	0.00	0.00	0.00
44.000	0.00	0	41.50	0.00	0.00	0.00
46.000	0.00	0	41.50	0.00	0.00	0.00
48.000	0.00	0	41.50	0.00	0.00	0.00
50.000	0.00	0	41.50	0.00	0.00	0.00
52.000	0.00	0	41.50	0.00	0.00	0.00
54.000	0.00	0	41.50	0.00	0.00	0.00
56.000	0.00	0	41.50	0.00	0.00	0.00
58.000	0.00	0	41.50	0.00	0.00	0.00
60.000	0.00	0	41.50	0.00	0.00	0.00
62.000	0.00	0	41.50	0.00	0.00	0.00
64.000	0.00	0	41.50	0.00	0.00	0.00
66.000	0.00	0	41.50	0.00	0.00	0.00
68.000	0.00	0	41.50	0.00	0.00	0.00
70.000	0.00	0	41.50	0.00	0.00	0.00
72.000	0.00	0	41.50	0.00	0.00	0.00
74.000	0.00	0	41.50	0.00	0.00	0.00
76.000	0.00	0	41.50	0.00	0.00	0.00
78.000	0.00	0	41.50	0.00	0.00	0.00
80.000	0.00	0	41.50	0.00	0.00	0.00
82.000	0.00	0	41.50	0.00	0.00	0.00
84.000	0.00	0	41.50	0.00	0.00	0.00
86.000	0.00	0	41.50	0.00	0.00	0.00
88.000	0.00	0	41.50	0.00	0.00	0.00
90.000	0.00	0	41.50	0.00	0.00	0.00
92.000	0.00	0	41.50	0.00	0.00	0.00
94.000	0.00	0	41.50	0.00	0.00	0.00
96.000	0.00	0	41.50	0.00	0.00	0.00

Hydrograph for Pond S2: Swale 2

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
24.000	0.07	0	40.50	0.02	0.02	0.00
26.000	0.00	0	40.50	0.00	0.00	0.00
28.000	0.00	0	40.50	0.00	0.00	0.00
30.000	0.00	0	40.50	0.00	0.00	0.00
32.000	0.00	0	40.50	0.00	0.00	0.00
34.000	0.00	0	40.50	0.00	0.00	0.00
36.000	0.00	0	40.50	0.00	0.00	0.00
38.000	0.00	0	40.50	0.00	0.00	0.00
40.000	0.00	0	40.50	0.00	0.00	0.00
42.000	0.00	0	40.50	0.00	0.00	0.00
44.000	0.00	0	40.50	0.00	0.00	0.00
46.000	0.00	0	40.50	0.00	0.00	0.00
48.000	0.00	0	40.50	0.00	0.00	0.00
50.000	0.00	0	40.50	0.00	0.00	0.00
52.000	0.00	0	40.50	0.00	0.00	0.00
54.000	0.00	0	40.50	0.00	0.00	0.00
56.000	0.00	0	40.50	0.00	0.00	0.00
58.000	0.00	0	40.50	0.00	0.00	0.00
60.000	0.00	0	40.50	0.00	0.00	0.00
62.000	0.00	0	40.50	0.00	0.00	0.00
64.000	0.00	0	40.50	0.00	0.00	0.00
66.000	0.00	0	40.50	0.00	0.00	0.00
68.000	0.00	0	40.50	0.00	0.00	0.00
70.000	0.00	0	40.50	0.00	0.00	0.00
72.000	0.00	0	40.50	0.00	0.00	0.00
74.000	0.00	0	40.50	0.00	0.00	0.00
76.000	0.00	0	40.50	0.00	0.00	0.00
78.000	0.00	0	40.50	0.00	0.00	0.00
80.000	0.00	0	40.50	0.00	0.00	0.00
82.000	0.00	0	40.50	0.00	0.00	0.00
84.000	0.00	0	40.50	0.00	0.00	0.00
86.000	0.00	0	40.50	0.00	0.00	0.00
88.000	0.00	0	40.50	0.00	0.00	0.00
90.000	0.00	0	40.50	0.00	0.00	0.00
92.000	0.00	0	40.50	0.00	0.00	0.00
94.000	0.00	0	40.50	0.00	0.00	0.00
96.000	0.00	0	40.50	0.00	0.00	0.00



12-02-19-Fairhaven-S.Neck-Spillway*Type III 24-hr 100-Year, 24-Hours Rainfall=7.10"*

Prepared by {enter your company name here}

Printed 12/4/2019

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Page 2

Time span=0.000-24.000 hrs, dt=0.0001 hrs, 240001 points x 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment Basin A: Basin ARunoff Area=1.020 ac 49.02% Impervious Runoff Depth>5.46"
Tc=6.0 min CN=86 Runoff=6.33 cfs 0.464 af**Subcatchment Pond A: Pond A**Runoff Area=0.740 ac 52.70% Impervious Runoff Depth>5.69"
Tc=6.0 min CN=88 Runoff=4.73 cfs 0.351 af**Subcatchment Pond B: Pond B**Runoff Area=0.450 ac 53.33% Impervious Runoff Depth>5.57"
Tc=6.0 min CN=87 Runoff=2.83 cfs 0.209 af**Pond A: Pond A**Peak Elev=39.73' Storage=19,054 cf Inflow=11.05 cfs 0.814 af
Outflow=3.01 cfs 0.451 af**Pond B: Pond B**Peak Elev=39.86' Storage=3,017 cf Inflow=2.83 cfs 0.209 af
Outflow=2.30 cfs 0.158 af**Total Runoff Area = 2.210 ac Runoff Volume = 1.023 af Average Runoff Depth = 5.56"**
48.87% Pervious = 1.080 ac 51.13% Impervious = 1.130 ac

Summary for Subcatchment Basin A: Basin A

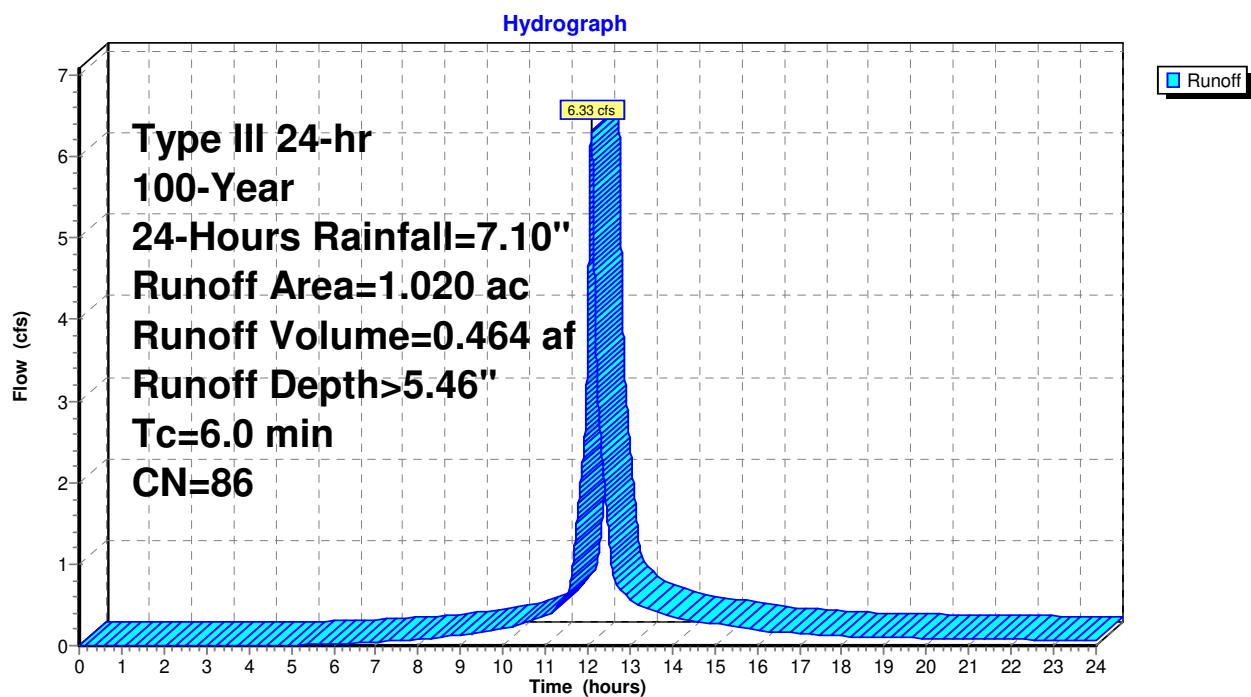
Runoff = 6.33 cfs @ 12.087 hrs, Volume= 0.464 af, Depth> 5.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
Type III 24-hr 100-Year, 24-Hours Rainfall=7.10"

Area (ac)	CN	Description
* 0.500	98	Driveway/Road
0.520	74	>75% Grass cover, Good, HSG C
1.020	86	Weighted Average
0.520		50.98% Pervious Area
0.500		49.02% Impervious Area

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

Subcatchment Basin A: Basin A



Summary for Subcatchment Pond A: Pond A

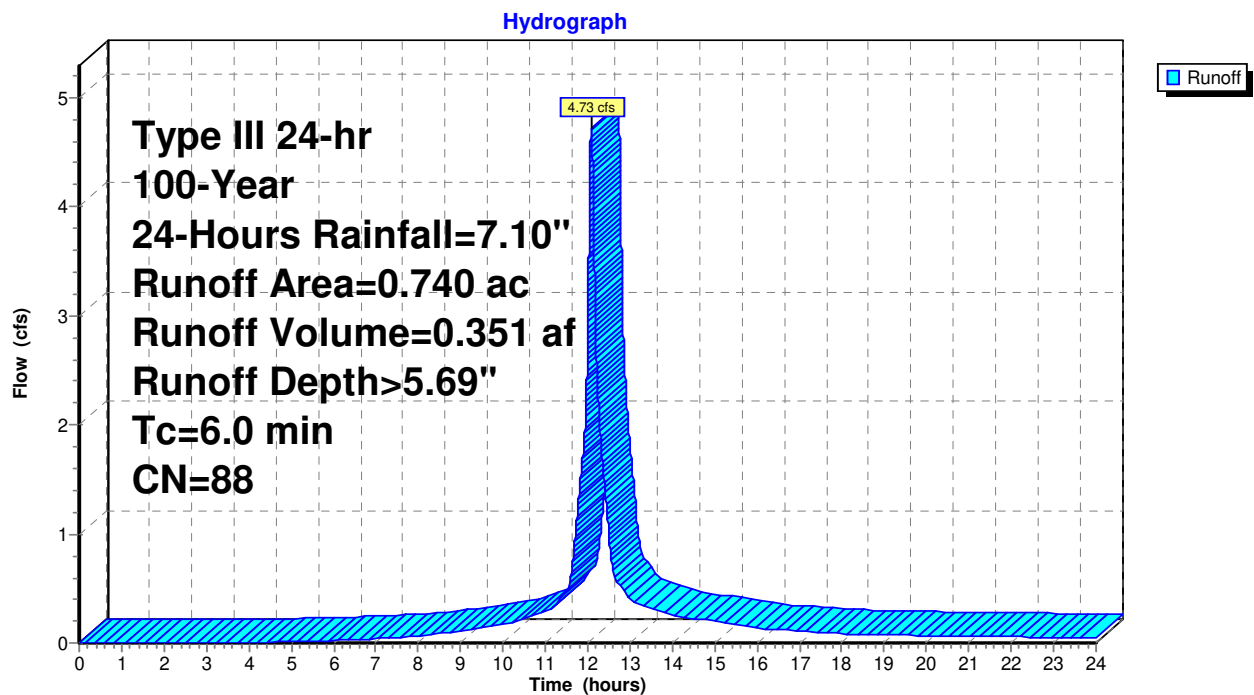
Runoff = 4.73 cfs @ 12.087 hrs, Volume= 0.351 af, Depth> 5.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
Type III 24-hr 100-Year, 24-Hours Rainfall=7.10"

Area (ac)	CN	Description
* 0.180	98	Driveway/Road
0.230	74	>75% Grass cover, Good, HSG C
0.120	80	>75% Grass cover, Good, HSG D
* 0.210	98	Pond
0.740	88	Weighted Average
0.350		47.30% Pervious Area
0.390		52.70% Impervious Area

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

Subcatchment Pond A: Pond A



Summary for Subcatchment Pond B: Pond B

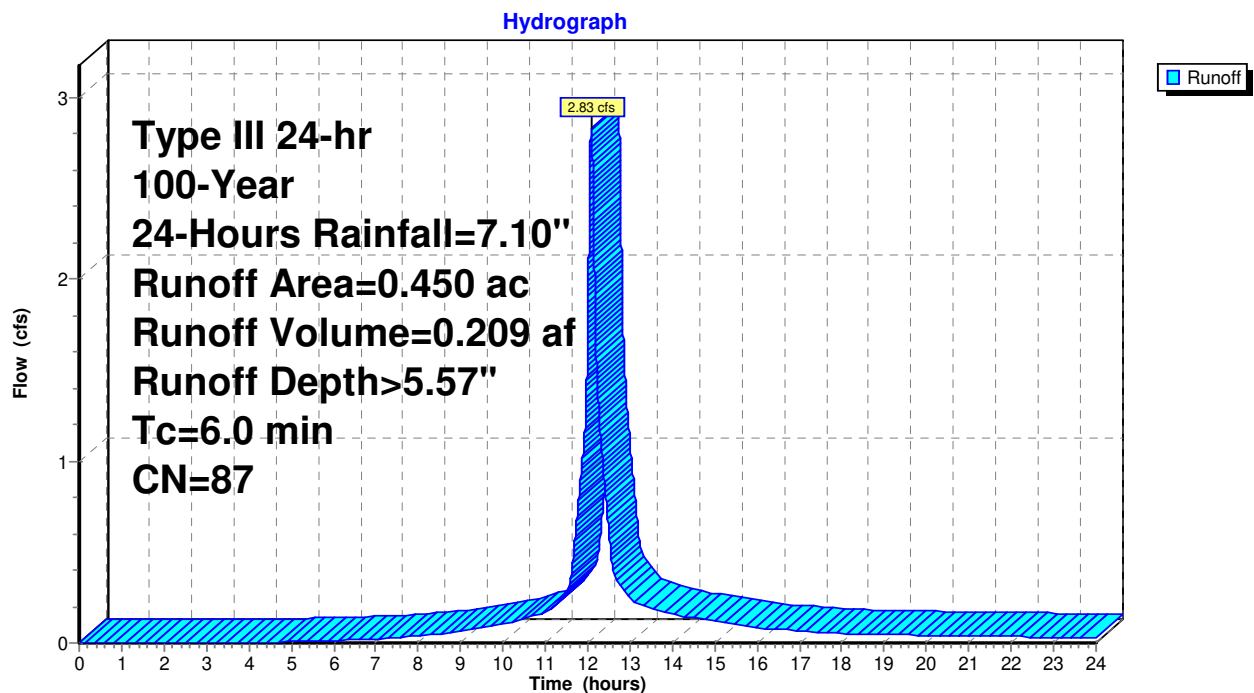
Runoff = 2.83 cfs @ 12.087 hrs, Volume= 0.209 af, Depth> 5.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs
Type III 24-hr 100-Year, 24-Hours Rainfall=7.10"

Area (ac)	CN	Description
* 0.190	98	Driveway/Road
0.210	74	>75% Grass cover, Good, HSG C
* 0.050	98	Pond
0.450	87	Weighted Average
0.210		46.67% Pervious Area
0.240		53.33% Impervious Area

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

Subcatchment Pond B: Pond B



Summary for Pond A: Pond A

Inflow Area = 1.760 ac, 50.57% Impervious, Inflow Depth > 5.55" for 100-Year, 24-Hours event
 Inflow = 11.05 cfs @ 12.087 hrs, Volume= 0.814 af
 Outflow = 3.01 cfs @ 12.437 hrs, Volume= 0.451 af, Atten= 73%, Lag= 21.0 min
 Secondary = 3.01 cfs @ 12.437 hrs, Volume= 0.451 af

Routing by Dyn-Stor-Ind method, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs / 2
 Peak Elev= 39.73' @ 12.437 hrs Surf.Area= 10,655 sf Storage= 19,054 cf

Plug-Flow detention time= 222.6 min calculated for 0.451 af (55% of inflow)
 Center-of-Mass det. time= 115.3 min (903.9 - 788.6)

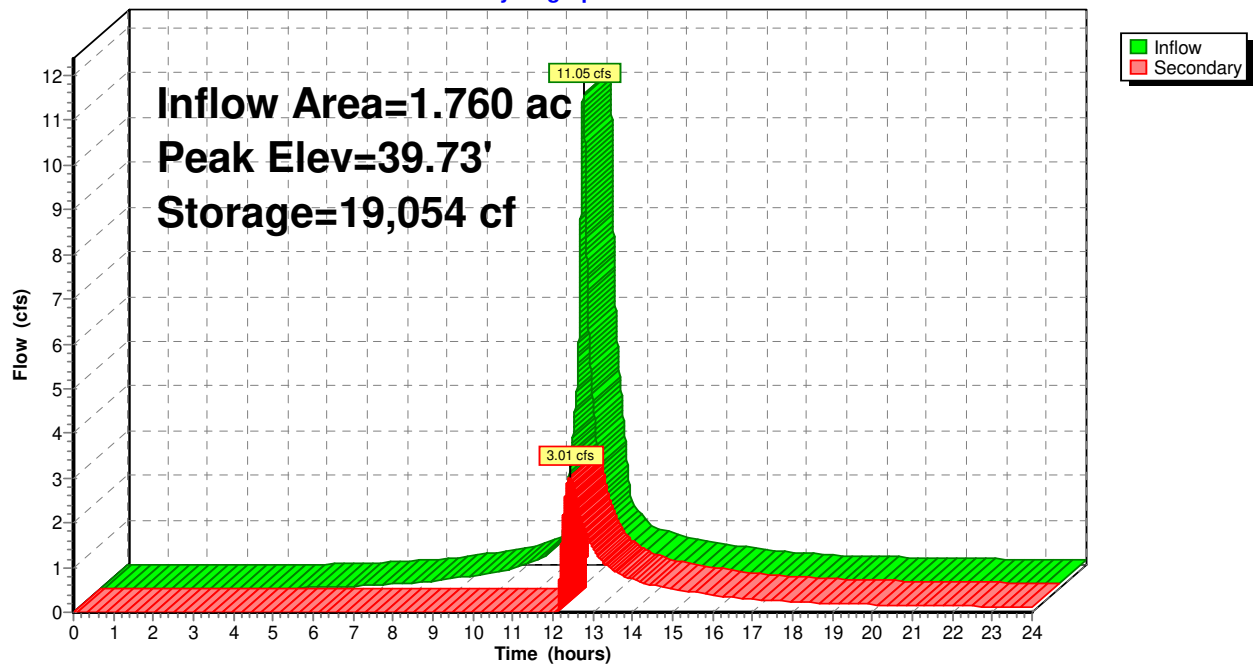
Volume	Invert	Avail.Storage	Storage Description
#1	36.50'	21,290 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
#2	34.50'	515 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
			1,472 cf Overall x 35.0% Voids
21,805 cf			Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
36.50	736	0	0
36.51	2,513	16	16
37.00	3,030	1,358	1,374
38.00	4,111	3,571	4,945
38.50	7,261	2,843	7,788
39.00	8,658	3,980	11,768
40.00	10,387	9,523	21,290

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
34.50	736	0	0
36.50	736	1,472	1,472

Device	Routing	Invert	Outlet Devices
#1	Secondary	39.35'	5.0' long x 11.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.53 2.59 2.70 2.68 2.67 2.68 2.66 2.64

Secondary OutFlow Max=3.01 cfs @ 12.437 hrs HW=39.73' (Free Discharge)
 ↳1=Broad-Crested Rectangular Weir (Weir Controls 3.01 cfs @ 1.59 fps)

Pond A: Pond A**Hydrograph**

Summary for Pond B: Pond B

Inflow Area = 0.450 ac, 53.33% Impervious, Inflow Depth > 5.57" for 100-Year, 24-Hours event
 Inflow = 2.83 cfs @ 12.087 hrs, Volume= 0.209 af
 Outflow = 2.30 cfs @ 12.142 hrs, Volume= 0.158 af, Atten= 19%, Lag= 3.3 min
 Secondary = 2.30 cfs @ 12.142 hrs, Volume= 0.158 af

Routing by Dyn-Stor-Ind method, Time Span= 0.000-24.000 hrs, dt= 0.0001 hrs / 2
 Peak Elev= 39.86' @ 12.142 hrs Surf.Area= 3,066 sf Storage= 3,017 cf

Plug-Flow detention time= 143.1 min calculated for 0.158 af (76% of inflow)
 Center-of-Mass det. time= 60.1 min (848.3 - 788.3)

Volume	Invert	Avail.Storage	Storage Description
#1	37.50'	4,937 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
#2	35.50'	125 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
		358 cf Overall x 35.0% Voids	
		5,062 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
37.50	450	0	0
38.00	613	266	266
39.00	999	806	1,072
39.50	2,413	853	1,925
40.00	3,062	1,369	3,294
40.50	3,511	1,643	4,937

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
35.50	179	0	0
37.50	179	358	358

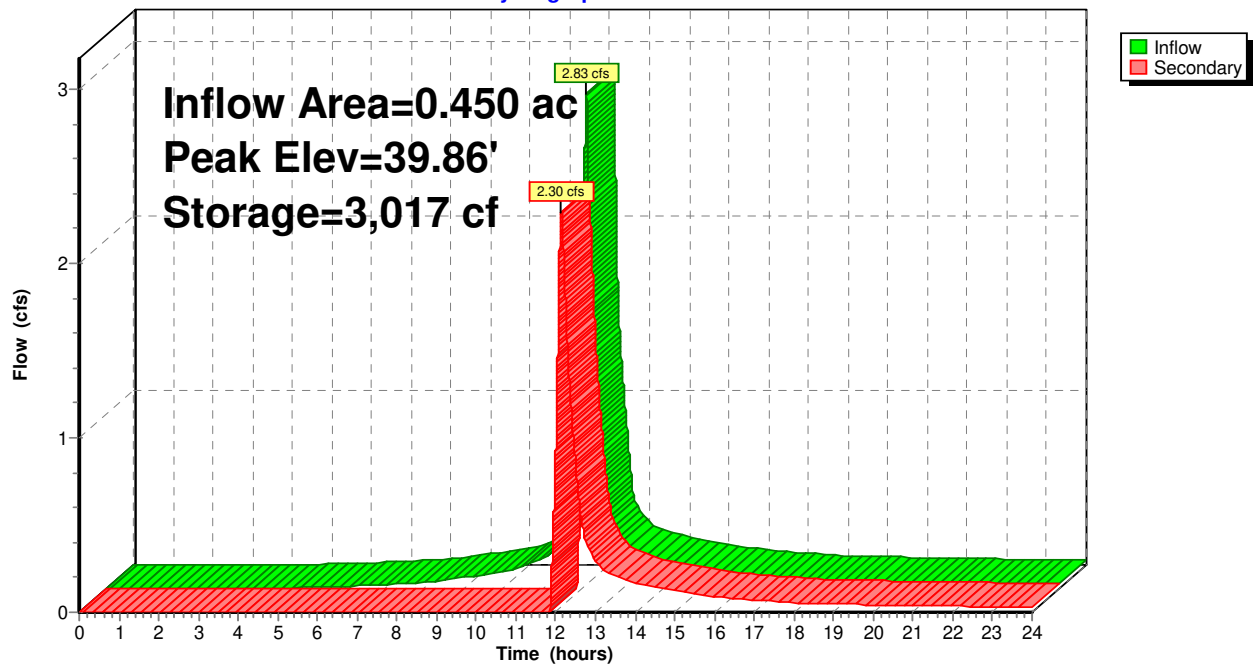
Device	Routing	Invert	Outlet Devices
#1	Secondary	39.55'	5.0' long x 12.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Secondary OutFlow Max=2.30 cfs @ 12.142 hrs HW=39.86' (Free Discharge)

↑1=Broad-Crested Rectangular Weir (Weir Controls 2.30 cfs @ 1.46 fps)

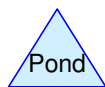
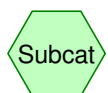
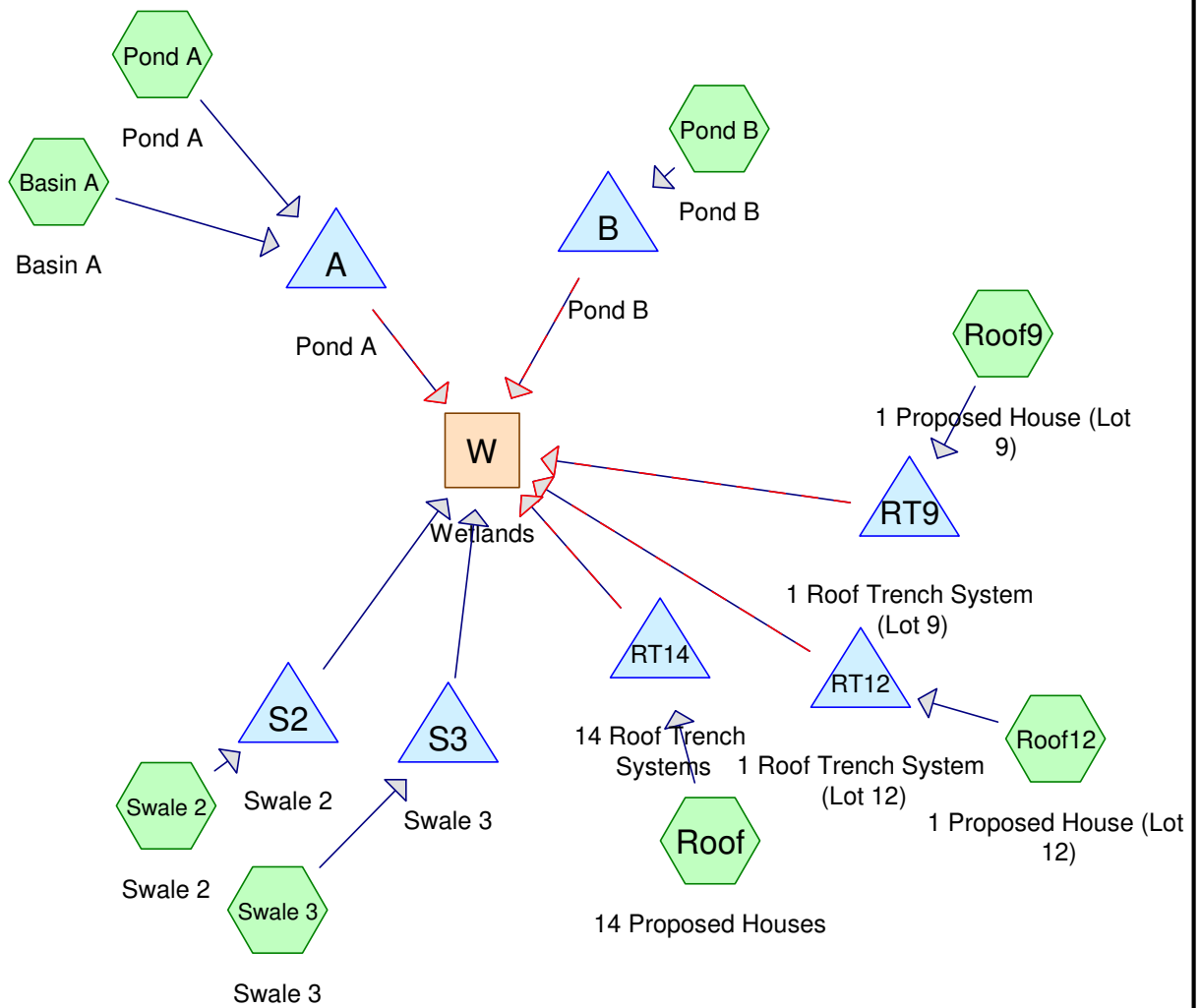
Pond B: Pond B

Hydrograph



Appendix B

Stormwater Recharge / Mounding Calculations



12-02-19-Fairhaven-S.NeckWoods-Recharge

Type III 24-hr Rainfall=4.68"

Prepared by {enter your company name here}

Printed 12/4/2019

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Time span=11.000-13.000 hrs, dt=0.0001 hrs, 20001 points x 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment Basin A: Basin A Runoff Area=1.020 ac 49.02% Impervious Runoff Depth>1.81"
Tc=6.0 min CN=86 Runoff=3.76 cfs 0.154 af

Subcatchment Pond A: Pond A Runoff Area=0.740 ac 52.70% Impervious Runoff Depth>1.91"
Tc=6.0 min CN=88 Runoff=2.87 cfs 0.118 af

Subcatchment Pond B: Pond B Runoff Area=0.450 ac 53.33% Impervious Runoff Depth>1.86"
Tc=6.0 min CN=87 Runoff=1.70 cfs 0.070 af

Subcatchment Roof: 14 Proposed Runoff Area=0.500 ac 100.00% Impervious Runoff Depth>2.31"
Tc=10.0 min CN=98 Runoff=2.01 cfs 0.096 af

Subcatchment Roof12: 1 Proposed Runoff Area=0.030 ac 100.00% Impervious Runoff Depth>2.31"
Tc=10.0 min CN=98 Runoff=0.12 cfs 0.006 af

Subcatchment Roof9: 1 Proposed Runoff Area=0.030 ac 100.00% Impervious Runoff Depth>2.31"
Tc=10.0 min CN=98 Runoff=0.12 cfs 0.006 af

Subcatchment Swale 2: Swale 2 Runoff Area=1.270 ac 10.24% Impervious Runoff Depth>1.43"
Tc=6.0 min CN=79 Runoff=3.77 cfs 0.152 af

Subcatchment Swale 3: Swale 3 Runoff Area=0.670 ac 8.96% Impervious Runoff Depth>1.28"
Tc=6.0 min CN=76 Runoff=1.78 cfs 0.071 af

Reach W: Wetlands Inflow=6.48 cfs 0.352 af
Outflow=6.48 cfs 0.352 af

Pond A: Pond A Peak Elev=38.46' Storage=8,014 cf Inflow=6.63 cfs 0.271 af
Discarded=0.18 cfs 0.019 af Primary=1.33 cfs 0.093 af Secondary=0.00 cfs 0.000 af Outflow=1.51 cfs 0.112 af

Pond B: Pond B Peak Elev=39.16' Storage=1,394 cf Inflow=1.70 cfs 0.070 af
Discarded=0.04 cfs 0.004 af Primary=0.96 cfs 0.045 af Secondary=0.00 cfs 0.000 af Outflow=1.00 cfs 0.048 af

Pond RT12: 1 Roof Trench System (Lot 12) Peak Elev=1.62' Storage=204 cf Inflow=0.12 cfs 0.006 af
Discarded=0.01 cfs 0.001 af Primary=0.00 cfs 0.000 af Outflow=0.01 cfs 0.001 af

Pond RT14: 14 Roof Trench Systems Peak Elev=3.10' Storage=3,530 cf Inflow=2.01 cfs 0.096 af
Discarded=0.09 cfs 0.015 af Primary=0.12 cfs 0.000 af Outflow=0.21 cfs 0.015 af

Pond RT9: 1 Roof Trench System (Lot 9) Peak Elev=3.27' Storage=135 cf Inflow=0.12 cfs 0.006 af
Discarded=0.00 cfs 0.001 af Primary=0.10 cfs 0.002 af Outflow=0.10 cfs 0.003 af

Pond S2: Swale 2 Peak Elev=41.62' Storage=795 cf Inflow=3.77 cfs 0.152 af
Discarded=0.04 cfs 0.004 af Primary=2.98 cfs 0.144 af Outflow=3.02 cfs 0.148 af

Pond S3: Swale 3 Peak Elev=42.18' Storage=291 cf Inflow=1.78 cfs 0.071 af
Discarded=0.02 cfs 0.003 af Primary=1.60 cfs 0.068 af Outflow=1.62 cfs 0.070 af

Total Runoff Area = 4.710 ac Runoff Volume = 0.672 af Average Runoff Depth = 1.71"
60.08% Pervious = 2.830 ac 39.92% Impervious = 1.880 ac

Summary for Subcatchment Basin A: Basin A

Runoff = 3.76 cfs @ 12.087 hrs, Volume= 0.154 af, Depth> 1.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 11.000-13.000 hrs, dt= 0.0001 hrs
Type III 24-hr Rainfall=4.68"

Area (ac)	CN	Description
* 0.500	98	Driveway/Road
0.520	74	>75% Grass cover, Good, HSG C
1.020	86	Weighted Average
0.520		50.98% Pervious Area
0.500		49.02% Impervious Area

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

Summary for Subcatchment Pond A: Pond A

Runoff = 2.87 cfs @ 12.087 hrs, Volume= 0.118 af, Depth> 1.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 11.000-13.000 hrs, dt= 0.0001 hrs
Type III 24-hr Rainfall=4.68"

Area (ac)	CN	Description
* 0.180	98	Driveway/Road
0.230	74	>75% Grass cover, Good, HSG C
0.120	80	>75% Grass cover, Good, HSG D
* 0.210	98	Pond
0.740	88	Weighted Average
0.350		47.30% Pervious Area
0.390		52.70% Impervious Area

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

Summary for Subcatchment Pond B: Pond B

Runoff = 1.70 cfs @ 12.087 hrs, Volume= 0.070 af, Depth> 1.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 11.000-13.000 hrs, dt= 0.0001 hrs
Type III 24-hr Rainfall=4.68"

Area (ac)	CN	Description
* 0.190	98	Driveway/Road
0.210	74	>75% Grass cover, Good, HSG C
* 0.050	98	Pond
0.450	87	Weighted Average
0.210		46.67% Pervious Area
0.240		53.33% Impervious Area

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Type III 24-hr Rainfall=4.68"

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

Summary for Subcatchment Roof: 14 Proposed Houses

Runoff = 2.01 cfs @ 12.133 hrs, Volume= 0.096 af, Depth> 2.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 11.000-13.000 hrs, dt= 0.0001 hrs
Type III 24-hr Rainfall=4.68"

Area (ac)	CN	Description
* 0.500	98	Buildings
0.500		100.00% Impervious Area

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

Summary for Subcatchment Roof12: 1 Proposed House (Lot 12)

Runoff = 0.12 cfs @ 12.133 hrs, Volume= 0.006 af, Depth> 2.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 11.000-13.000 hrs, dt= 0.0001 hrs
Type III 24-hr Rainfall=4.68"

Area (ac)	CN	Description
* 0.030	98	Building
0.030		100.00% Impervious Area

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

Summary for Subcatchment Roof9: 1 Proposed House (Lot 9)

Runoff = 0.12 cfs @ 12.133 hrs, Volume= 0.006 af, Depth> 2.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 11.000-13.000 hrs, dt= 0.0001 hrs
Type III 24-hr Rainfall=4.68"

Area (ac)	CN	Description
* 0.030	98	Building
0.030		100.00% Impervious Area

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

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Type III 24-hr Rainfall=4.68"

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Summary for Subcatchment Swale 2: Swale 2

Runoff = 3.77 cfs @ 12.087 hrs, Volume= 0.152 af, Depth> 1.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 11.000-13.000 hrs, dt= 0.0001 hrs
Type III 24-hr Rainfall=4.68"

Area (ac)	CN	Description
0.790	79	50-75% Grass cover, Fair, HSG C
0.350	73	Woods, Fair, HSG C
* 0.130	98	Existing Buildings
1.270	79	Weighted Average
1.140		89.76% Pervious Area
0.130		10.24% Impervious Area

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

Summary for Subcatchment Swale 3: Swale 3

Runoff = 1.78 cfs @ 12.087 hrs, Volume= 0.071 af, Depth> 1.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 11.000-13.000 hrs, dt= 0.0001 hrs
Type III 24-hr Rainfall=4.68"

Area (ac)	CN	Description
* 0.060	98	Existing Buildings
0.540	74	>75% Grass cover, Good, HSG C
0.070	73	Woods, Fair, HSG C
0.670	76	Weighted Average
0.610		91.04% Pervious Area
0.060		8.96% Impervious Area

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

Summary for Reach W: Wetlands

Inflow Area = 4.710 ac, 39.92% Impervious, Inflow Depth > 0.90"

Inflow = 6.48 cfs @ 12.154 hrs, Volume= 0.352 af

Outflow = 6.48 cfs @ 12.154 hrs, Volume= 0.352 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 11.000-13.000 hrs, dt= 0.0001 hrs / 2

Summary for Pond A: Pond A

Inflow Area = 1.760 ac, 50.57% Impervious, Inflow Depth > 1.85"

Inflow = 6.63 cfs @ 12.087 hrs, Volume= 0.271 af

Outflow = 1.51 cfs @ 12.493 hrs, Volume= 0.112 af, Atten= 77%, Lag= 24.4 min

Discarded = 0.18 cfs @ 12.493 hrs, Volume= 0.019 af

Primary = 1.33 cfs @ 12.493 hrs, Volume= 0.093 af

Secondary = 0.00 cfs @ 11.000 hrs, Volume= 0.000 af

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Type III 24-hr Rainfall=4.68"

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Routing by Dyn-Stor-Ind method, Time Span= 11.000-13.000 hrs, dt= 0.0001 hrs / 2

Peak Elev= 38.46' @ 12.493 hrs Surf.Area= 7,742 sf Storage= 8,014 cf

Plug-Flow detention time= 43.4 min calculated for 0.112 af (41% of inflow)

Center-of-Mass det. time= 24.0 min (750.2 - 726.2)

Volume	Invert	Avail.Storage	Storage Description
#1	36.50'	21,290 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
#2	34.50'	515 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
			1,472 cf Overall x 35.0% Voids
		21,805 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
36.50	736	0	0
36.51	2,513	16	16
37.00	3,030	1,358	1,374
38.00	4,111	3,571	4,945
38.50	7,261	2,843	7,788
39.00	8,658	3,980	11,768
40.00	10,387	9,523	21,290

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
34.50	736	0	0
36.50	736	1,472	1,472

Device	Routing	Invert	Outlet Devices
#1	Primary	37.50'	8.0" Round Culvert L= 36.0' Ke= 0.500 Inlet / Outlet Invert= 37.50' / 36.28' S= 0.0339 '/' Cc= 0.900 n= 0.013, Flow Area= 0.35 sf
#2	Discarded	34.50'	1.020 in/hr Exfiltration over Surface area
#3	Secondary	39.35'	5.0' long x 11.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.53 2.59 2.70 2.68 2.67 2.68 2.66 2.64

Discarded OutFlow Max=0.18 cfs @ 12.493 hrs HW=38.46' (Free Discharge)↑**2=Exfiltration** (Exfiltration Controls 0.18 cfs)**Primary OutFlow** Max=1.33 cfs @ 12.493 hrs HW=38.46' TW=0.00' (Dynamic Tailwater)↑**1=Culvert** (Inlet Controls 1.33 cfs @ 3.81 fps)**Secondary OutFlow** Max=0.00 cfs @ 11.000 hrs HW=34.50' TW=0.00' (Dynamic Tailwater)↑**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)**Summary for Pond B: Pond B**

Inflow Area =	0.450 ac, 53.33% Impervious, Inflow Depth > 1.86"
Inflow =	1.70 cfs @ 12.087 hrs, Volume= 0.070 af
Outflow =	1.00 cfs @ 12.195 hrs, Volume= 0.048 af, Atten= 41%, Lag= 6.5 min
Discarded =	0.04 cfs @ 12.195 hrs, Volume= 0.004 af
Primary =	0.96 cfs @ 12.195 hrs, Volume= 0.045 af
Secondary =	0.00 cfs @ 11.000 hrs, Volume= 0.000 af

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Routing by Dyn-Stor-Ind method, Time Span= 11.000-13.000 hrs, dt= 0.0001 hrs / 2

Peak Elev= 39.16' @ 12.195 hrs Surf.Area= 1,633 sf Storage= 1,394 cf

Plug-Flow detention time= 26.8 min calculated for 0.048 af (69% of inflow)

Center-of-Mass det. time= 16.1 min (742.3 - 726.2)

Volume	Invert	Avail.Storage	Storage Description
#1	37.50'	4,937 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
#2	35.50'	125 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
			358 cf Overall x 35.0% Voids
			5,062 cf Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
37.50	450	0	0
38.00	613	266	266
39.00	999	806	1,072
39.50	2,413	853	1,925
40.00	3,062	1,369	3,294
40.50	3,511	1,643	4,937

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
35.50	179	0	0
37.50	179	358	358

Device	Routing	Invert	Outlet Devices
#1	Primary	38.50'	8.0" Round Culvert L= 60.0' Ke= 0.500 Inlet / Outlet Invert= 38.50' / 36.90' S= 0.0267 '/' Cc= 0.900 n= 0.013, Flow Area= 0.35 sf
#2	Discarded	35.50'	1.020 in/hr Exfiltration over Surface area
#3	Secondary	39.55'	5.0' long x 12.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Discarded OutFlow Max=0.04 cfs @ 12.195 hrs HW=39.16' (Free Discharge)↑**2=Exfiltration** (Exfiltration Controls 0.04 cfs)**Primary OutFlow** Max=0.96 cfs @ 12.195 hrs HW=39.16' TW=0.00' (Dynamic Tailwater)↑**1=Culvert** (Inlet Controls 0.96 cfs @ 2.77 fps)**Secondary OutFlow** Max=0.00 cfs @ 11.000 hrs HW=35.50' TW=0.00' (Dynamic Tailwater)↑**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)**Summary for Pond RT12: 1 Roof Trench System (Lot 12)**

Inflow Area =	0.030 ac, 100.00% Impervious, Inflow Depth > 2.31"
Inflow =	0.12 cfs @ 12.133 hrs, Volume= 0.006 af
Outflow =	0.01 cfs @ 11.224 hrs, Volume= 0.001 af, Atten= 94%, Lag= 0.0 min
Discarded =	0.01 cfs @ 11.224 hrs, Volume= 0.001 af
Primary =	0.00 cfs @ 11.000 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 11.000-13.000 hrs, dt= 0.0001 hrs / 2

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Peak Elev= 1.62' @ 13.000 hrs Surf.Area= 288 sf Storage= 204 cf

Plug-Flow detention time= 30.6 min calculated for 0.001 af (19% of inflow)

Center-of-Mass det. time= (not calculated: outflow precedes inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	169 cf	8'x36'x24.5" Roof Trench System (Prismatic) Listed below (Recalc) 588 cf Overall - 106 cf Embedded = 482 cf x 35.0% Voids
#2	1.00'	106 cf	Custom Stage Data Listed below Inside #1
#3	2.04'	0 cf	0.50'D x 1.60'H Vertical Cone/Cylinder
		275 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	288	0	0
2.04	288	588	588

Elevation (feet)	Cum.Store (cubic-feet)
1.00	0
2.04	106

Device	Routing	Invert	Outlet Devices
#1	Primary	3.04'	4.0" Vert. Orifice/Grate C= 0.600
#2	Discarded	0.00'	1.020 in/hr Exfiltration over Surface area Phase-In= 0.02'

Discarded OutFlow Max=0.01 cfs @ 11.224 hrs HW=0.04' (Free Discharge)↑**2=Exfiltration** (Exfiltration Controls 0.01 cfs)**Primary OutFlow** Max=0.00 cfs @ 11.000 hrs HW=0.00' TW=0.00' (Dynamic Tailwater)↑**1=Orifice/Grate** (Controls 0.00 cfs)**Summary for Pond RT14: 14 Roof Trench Systems**

Inflow Area = 0.500 ac, 100.00% Impervious, Inflow Depth > 2.31"
 Inflow = 2.01 cfs @ 12.133 hrs, Volume= 0.096 af
 Outflow = 0.21 cfs @ 12.981 hrs, Volume= 0.015 af, Atten= 90%, Lag= 50.8 min
 Discarded = 0.09 cfs @ 12.973 hrs, Volume= 0.015 af
 Primary = 0.12 cfs @ 12.981 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 11.000-13.000 hrs, dt= 0.0001 hrs / 2

Peak Elev= 3.10' @ 12.981 hrs Surf.Area= 3,923 sf Storage= 3,530 cf

Plug-Flow detention time= 34.6 min calculated for 0.015 af (16% of inflow)

Center-of-Mass det. time= (not calculated: outflow precedes inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	2,407 cf	10'x28'x24.5" Roof Trench System (Prismatic) Listed below (Recalc) x 14 7,997 cf Overall - 1,120 cf Embedded = 6,877 cf x 35.0% Voids
#2	1.00'	1,120 cf	Custom Stage Data Listed below x 14 Inside #1
#3	2.04'	4 cf	0.50'D x 1.60'H Vertical Cone/Cylinder x 14
		3,531 cf	Total Available Storage

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Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	280	0	0
2.04	280	571	571

Elevation (feet)	Cum.Store (cubic-feet)
1.00	0
2.04	80

Device	Routing	Invert	Outlet Devices
#1	Primary	3.04'	4.0" Vert. Orifice/Grate X 14.00 C= 0.600
#2	Discarded	0.00'	1.020 in/hr Exfiltration over Surface area Phase-In= 0.02'

Discarded OutFlow Max=0.09 cfs @ 12.973 hrs HW=2.05' (Free Discharge)↑**2=Exfiltration** (Exfiltration Controls 0.09 cfs)**Primary OutFlow** Max=0.11 cfs @ 12.981 hrs HW=3.10' TW=0.00' (Dynamic Tailwater)↑**1=Orifice/Grate** (Orifice Controls 0.11 cfs @ 0.81 fps)**Summary for Pond RT9: 1 Roof Trench System (Lot 9)**

Inflow Area = 0.030 ac, 100.00% Impervious, Inflow Depth > 2.31"
 Inflow = 0.12 cfs @ 12.133 hrs, Volume= 0.006 af
 Outflow = 0.10 cfs @ 12.193 hrs, Volume= 0.003 af, Atten= 13%, Lag= 3.6 min
 Discarded = 0.00 cfs @ 12.192 hrs, Volume= 0.001 af
 Primary = 0.10 cfs @ 12.193 hrs, Volume= 0.002 af

Routing by Dyn-Stor-Ind method, Time Span= 11.000-13.000 hrs, dt= 0.0001 hrs / 2
 Peak Elev= 3.27' @ 12.193 hrs Surf.Area= 140 sf Storage= 135 cf

Plug-Flow detention time= 32.7 min calculated for 0.003 af (47% of inflow)
 Center-of-Mass det. time= 14.2 min (740.8 - 726.6)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	81 cf	7'x20'x24.5" Roof Trench System (Prismatic) Listed below (Recalc) 286 cf Overall - 53 cf Embedded = 233 cf x 35.0% Voids
#2	1.00'	53 cf	Custom Stage Data Listed below Inside #1
#3	2.04'	0 cf	0.50'D x 1.60'H Vertical Cone/Cylinder
		135 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	140	0	0
2.04	140	286	286

Elevation (feet)	Cum.Store (cubic-feet)
1.00	0
2.04	53

Device	Routing	Invert	Outlet Devices
#1	Primary	3.04'	4.0" Vert. Orifice/Grate C= 0.600
#2	Discarded	0.00'	1.020 in/hr Exfiltration over Surface area Phase-In= 0.02'

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Discarded OutFlow Max=0.00 cfs @ 12.192 hrs HW=2.10' (Free Discharge)↑**2=Exfiltration** (Exfiltration Controls 0.00 cfs)**Primary OutFlow** Max=0.10 cfs @ 12.193 hrs HW=3.27' TW=0.00' (Dynamic Tailwater)↑**1=Orifice/Grate** (Orifice Controls 0.10 cfs @ 1.62 fps)**Summary for Pond S2: Swale 2**

Inflow Area = 1.270 ac, 10.24% Impervious, Inflow Depth > 1.43"
 Inflow = 3.77 cfs @ 12.087 hrs, Volume= 0.152 af
 Outflow = 3.02 cfs @ 12.149 hrs, Volume= 0.148 af, Atten= 20%, Lag= 3.7 min
 Discarded = 0.04 cfs @ 12.149 hrs, Volume= 0.004 af
 Primary = 2.98 cfs @ 12.149 hrs, Volume= 0.144 af

Routing by Dyn-Stor-Ind method, Time Span= 11.000-13.000 hrs, dt= 0.0001 hrs / 2

Peak Elev= 41.62' @ 12.149 hrs Surf.Area= 1,683 sf Storage= 795 cf

Plug-Flow detention time= 4.6 min calculated for 0.148 af (98% of inflow)

Center-of-Mass det. time= 3.4 min (731.6 - 728.2)

Volume	Invert	Avail.Storage	Storage Description
#1	40.50'	14,785 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
#2	40.50'	88 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
		250 cf Overall	x 35.0% Voids
		14,873 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
40.50	240	0	0
41.00	500	185	185
42.00	1,600	1,050	1,235
43.00	3,750	2,675	3,910
44.00	4,500	4,125	8,035
45.00	9,000	6,750	14,785

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
40.50	500	0	0
41.00	500	250	250

Device	Routing	Invert	Outlet Devices
#1	Primary	40.50'	12.0" Round Culvert L= 162.0' Ke= 0.500 Inlet / Outlet Invert= 40.50' / 36.25' S= 0.0262 '/' Cc= 0.900 n= 0.013 Concrete sewer w/manholes & inlets, Flow Area= 0.79 sf
#2	Discarded	40.50'	1.020 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.04 cfs @ 12.149 hrs HW=41.62' (Free Discharge)↑**2=Exfiltration** (Exfiltration Controls 0.04 cfs)**Primary OutFlow** Max=2.98 cfs @ 12.149 hrs HW=41.62' TW=0.00' (Dynamic Tailwater)↑**1=Culvert** (Inlet Controls 2.98 cfs @ 3.79 fps)

Summary for Pond S3: Swale 3

Inflow Area = 0.670 ac, 8.96% Impervious, Inflow Depth > 1.28"
 Inflow = 1.78 cfs @ 12.087 hrs, Volume= 0.071 af
 Outflow = 1.62 cfs @ 12.127 hrs, Volume= 0.070 af, Atten= 9%, Lag= 2.4 min
 Discarded = 0.02 cfs @ 12.127 hrs, Volume= 0.003 af
 Primary = 1.60 cfs @ 12.127 hrs, Volume= 0.068 af

Routing by Dyn-Stor-Ind method, Time Span= 11.000-13.000 hrs, dt= 0.0001 hrs / 2

Peak Elev= 42.18' @ 12.127 hrs Surf.Area= 1,010 sf Storage= 291 cf

Plug-Flow detention time= 3.5 min calculated for 0.070 af (98% of inflow)

Center-of-Mass det. time= 2.7 min (731.8 - 729.1)

Volume	Invert	Avail.Storage	Storage Description
#1	41.50'	5,613 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
#2	41.50'	70 cf	Custom Stage Data (Prismatic) Listed below
		200 cf Overall	x 35.0% Voids
		5,683 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
41.50	10	0	0
42.00	480	123	123
43.00	1,200	840	963
44.00	1,800	1,500	2,463
45.00	4,500	3,150	5,613

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
41.50	400	0	0
42.00	400	200	200

Device	Routing	Invert	Outlet Devices
#1	Primary	41.50'	12.0" Round Culvert L= 292.0' Ke= 0.500 Inlet / Outlet Invert= 41.50' / 36.25' S= 0.0180 '/' Cc= 0.900 n= 0.013 Concrete sewer w/manholes & inlets, Flow Area= 0.79 sf
#2	Discarded	41.50'	1.020 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.02 cfs @ 12.127 hrs HW=42.18' (Free Discharge)

↑ **2=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=1.60 cfs @ 12.127 hrs HW=42.18' TW=0.00' (Dynamic Tailwater)

↑ **1=Culvert** (Inlet Controls 1.60 cfs @ 2.81 fps)

Type III 24-hr Rainfall=1.29"

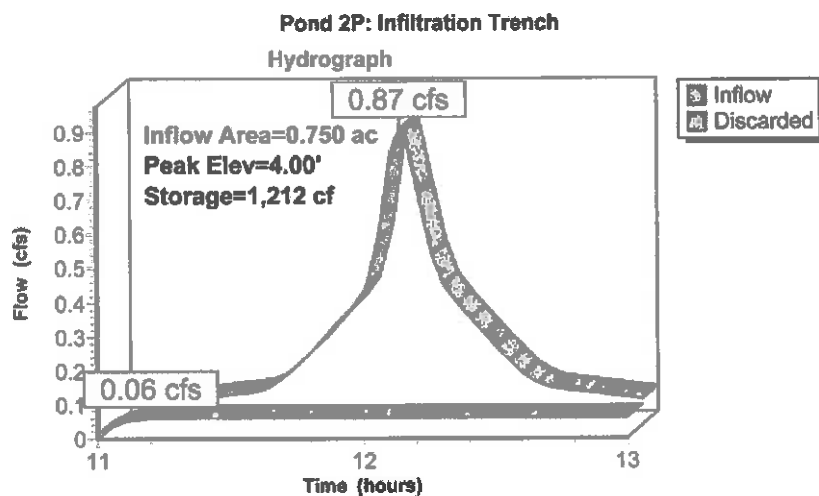


Table 2.3.3. 1982 Rawls Rates¹⁸

Texture Class	NRCS Hydrologic Soil Group (HSG)	Infiltration Rate Inches/Hour
Sand	A	8.27
Loamy Sand	A	2.41
Sandy Loam	B	1.02
Loam	B	0.52
Silt Loam	C	0.27
Sandy Clay Loam	C	0.17
Clay Loam	D	0.09
Silty Clay Loam	D	0.06
Sandy Clay	D	0.05
Silty Clay	D	0.04
Clay	D	0.02

¹⁸ Rawls, Brakensiek and Saxton, 1982

Sconticut Neck Woods, Fairhaven, MA
9/6/2019 (Revised 12/02/19)

Groundwater Recharge Volume and Drawdown Analysis

Detention Pond A

Required Recharge Rv = 0.049 acre-feet
= 2,134 cf

$$\begin{aligned}\text{Time to drawdown} &= \frac{Rv}{(K)(\text{Bottom Area})} \\ &= \frac{2134 \text{ cf}}{(1.02 \text{ in/hr})(1 \text{ ft} / 12 \text{ in})(736 \text{ sf})} \\ &= \frac{2,134 \text{ cf}}{62.56 \text{ cf/hour}} \\ &= 34.11 \text{ hours}\end{aligned}$$

Detention Pond B

Required Recharge Rv = 0.049 acre-feet
= 2,134 cf

$$\begin{aligned}\text{Time to drawdown} &= \frac{Rv}{(K)(\text{Bottom Area})} \\ &= \frac{2,134 \text{ cf}}{(1.02 \text{ in/hr})(1 \text{ ft} / 12 \text{ in})(450 \text{ sf})} \\ &= \frac{2,134 \text{ cf}}{38.25 \text{ cf/hour}} \\ &= 55.79 \text{ hours}\end{aligned}$$

16 Recharge Trenches

Required Recharge Rv = 0.049 acre-feet
= 2,134 cf

$$\begin{aligned}\text{Time to drawdown} &= \frac{Rv}{(K)(\text{Bottom Area})} \\ &= \frac{2134 \text{ cf}}{(1.02 \text{ in/hr})(1 \text{ ft} / 12 \text{ in})(4,348 \text{ sf})} \\ &= \frac{2,134 \text{ cf}}{369.58 \text{ cf/hour}} \\ &= 5.77 \text{ hours}\end{aligned}$$

Swale 2

Required Recharge Rv = 0.049 acre-feet
= 2,134 cf

$$\begin{aligned}\text{Time to drawdown} &= \frac{Rv}{(K)(\text{Bottom Area})} \\ &= \frac{2134 \text{ cf}}{(1.02 \text{ in/hr})(1 \text{ ft} / 12 \text{ in})(500 \text{ sf})} \\ &= \frac{2,134 \text{ cf}}{42.50 \text{ cf/hour}} \\ &= 50.21 \text{ hours}\end{aligned}$$

Swale 3

Required Recharge Rv = 0.049 acre-feet
= 2,134 cf

$$\begin{aligned}\text{Time to drawdown} &= \frac{Rv}{(K)(\text{Bottom Area})} \\ &= \frac{2134 \text{ cf}}{(1.02 \text{ in/hr})(1 \text{ ft} / 12 \text{ in})(400 \text{ sf})} \\ &= \frac{2,134 \text{ cf}}{34 \text{ cf/hour}} \\ &= 62.76 \text{ hours}\end{aligned}$$

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The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.

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Input Values

2.0400	R
0.200	Sy
20.00	K
5.000	x
9.500	y
0.333	t
25.000	hi(0)
25.265	h(max)
0.265	Δh(max)

Ground-water Mounding, in feet

0.265	0
0.101	20
0.037	40
0.022	50
0.013	60
0.008	70
0.005	80
0.003	90
0.002	100
0.001	120

use consistent units (e.g. feet & days **or** inches & hours)

Recharge (infiltration) rate (feet/day)

Specific yield, Sy (dimensionless, between 0 and 1)

Horizontal hydraulic conductivity, Kh (feet/day)*

1/2 length of basin (x direction, in feet)

1/2 width of basin (y direction, in feet)

duration of infiltration period (days)

initial thickness of saturated zone (feet)

Conversion Table

inch/hour	feet/day
0.67	1.33
2.00	4.00
hours	days
36	1.50

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

Re-Calculate Now

Groundwater Mounding, in feet

Distance from center of basin (feet)	Groundwater Mounding (feet)
0	0.265
20	0.101
40	0.037
50	0.022
60	0.013
70	0.008
80	0.005
90	0.003
100	0.002
120	0.001

Disclaimer

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Input Values

2.0400	R
0.200	Sy
20.00	K
5.000	x
38.500	y
0.333	t
25.000	hi(0)
25.540	h(max)
0.540	Δh(max)

Ground-water Mounding, in feet

0.540	0
0.279	20
0.114	40
0.069	50
0.040	60
0.023	70
0.013	80
0.007	90
0.004	100
0.002	120

use consistent units (e.g. feet & days **or** inches & hours)

Recharge (infiltration) rate (feet/day)

Specific yield, Sy (dimensionless, between 0 and 1)

Horizontal hydraulic conductivity, Kh (feet/day)*

1/2 length of basin (x direction, in feet)

1/2 width of basin (y direction, in feet)

duration of infiltration period (days)

initial thickness of saturated zone (feet)

maximum thickness of saturated zone (beneath center of basin at end of infiltration period)

maximum groundwater mounding (beneath center of basin at end of infiltration period)

Conversion Table

inch/hour	feet/day
0.67	1.33
2.00	4.00
hours	days
36	1.50

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

Re-Calculate Now

Groundwater Mounding, in feet

Distance from center of basin (feet)	Groundwater Mounding (feet)
0	0.540
20	0.279
40	0.114
50	0.069
60	0.040
70	0.023
80	0.013
90	0.007
100	0.004
120	0.002

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Input Values

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20.00	K
5.000	x
9.500	y
0.333	t
25.000	hi(0)
25.265	h(max)
0.265	Δh(max)

Ground-water Mounding, in feet

0.265	0
0.101	20
0.037	40
0.022	50
0.013	60
0.008	70
0.005	80
0.003	90
0.002	100
0.001	120

use consistent units (e.g. feet & days **or** inches & hours)

Recharge (infiltration) rate (feet/day)

Specific yield, Sy (dimensionless, between 0 and 1)

Horizontal hydraulic conductivity, Kh (feet/day)*

1/2 length of basin (x direction, in feet)

1/2 width of basin (y direction, in feet)

duration of infiltration period (days)

initial thickness of saturated zone (feet)

maximum thickness of saturated zone (beneath center of basin at end of infiltration period)

maximum groundwater mounding (beneath center of basin at end of infiltration period)

Conversion Table

inch/hour	feet/day
0.67	1.33
2.00	4.00
36	1.50

hours

days

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

Re-Calculate Now

Groundwater Mounding, in feet

Distance from center of basin (feet)	Groundwater Mounding (feet)
0	0.265
20	0.101
40	0.037
50	0.022
60	0.013
70	0.008
80	0.005
90	0.003
100	0.002
120	0.001

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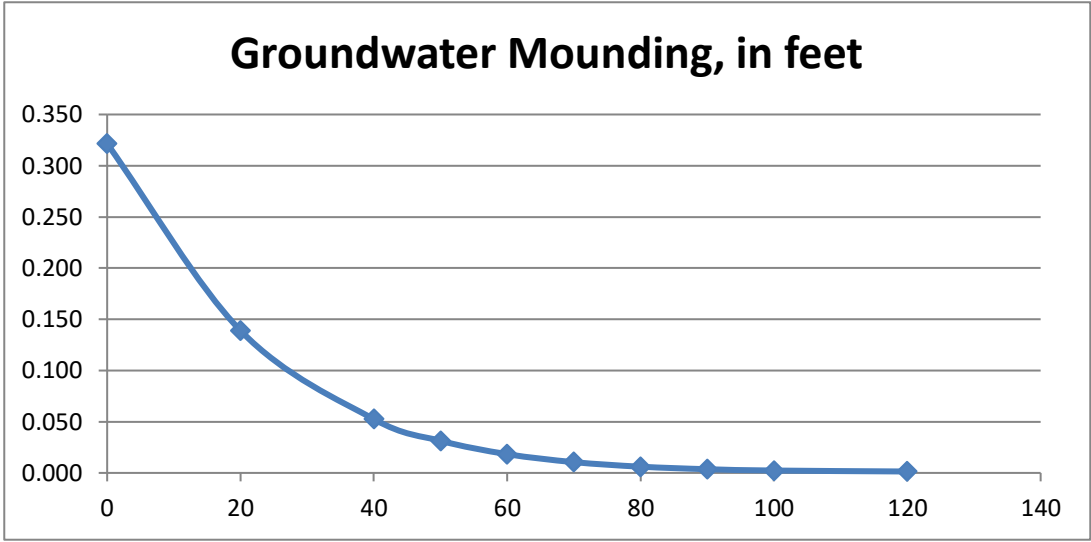
Input Values		use consistent units (e.g. feet & days or inches & hours)		Conversion Table	
				inch/hour	feet/day
2.0400	R	Recharge (infiltration) rate (feet/day)		0.67	1.33
0.200	Sy	Specific yield, Sy (dimensionless, between 0 and 1)			
20.00	K	Horizontal hydraulic conductivity, Kh (feet/day)*		2.00	4.00
4.000	x	1/2 length of basin (x direction, in feet)			
18.000	y	1/2 width of basin (y direction, in feet)	hours	days	
0.333	t	duration of infiltration period (days)		36	1.50
25.000	hi(0)	initial thickness of saturated zone (feet)			
25.321	h(max)	maximum thickness of saturated zone (beneath center of basin at end of infiltration period)			
0.321	Δh(max)	maximum groundwater mounding (beneath center of basin at end of infiltration period)			

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
--------------------------------	---

0.321	0
0.139	20
0.053	40
0.031	50
0.018	60
0.011	70
0.006	80
0.004	90
0.002	100
0.001	120



Re-Calculate Now



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Input Values

2.0400	R
0.200	Sy
20.00	K
5.000	x
14.000	y
0.333	t
25.000	hi(0)
25.340	h(max)
0.340	Δh(max)

Ground-water Mounding, in feet

0.340	0
0.142	20
0.053	40
0.031	50
0.018	60
0.010	70
0.006	80
0.004	90
0.002	100
0.001	120

use consistent units (e.g. feet & days **or** inches & hours)

Recharge (infiltration) rate (feet/day)

Specific yield, Sy (dimensionless, between 0 and 1)

Horizontal hydraulic conductivity, Kh (feet/day)*

1/2 length of basin (x direction, in feet)

1/2 width of basin (y direction, in feet)

duration of infiltration period (days)

initial thickness of saturated zone (feet)

maximum thickness of saturated zone (beneath center of basin at end of infiltration period)

maximum groundwater mounding (beneath center of basin at end of infiltration period)

Conversion Table

inch/hour	feet/day
0.67	1.33
2.00	4.00
36	1.50

hours

days

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

Re-Calculate Now

Groundwater Mounding, in feet

Distance from center of basin (feet)	Groundwater Mounding (feet)
0	0.340
20	0.142
40	0.053
50	0.031
60	0.018
70	0.010
80	0.006
90	0.004
100	0.002
120	0.001

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Input Values

2.0400	R
0.200	Sy
20.00	K
50.000	x
2.000	y
0.333	t
25.000	hi(0)
25.242	h(max)
0.242	Δh(max)

use consistent units (e.g. feet & days **or** inches & hours)

Recharge (infiltration) rate (feet/day)

Specific yield, Sy (dimensionless, between 0 and 1)

Horizontal hydraulic conductivity, Kh (feet/day)*

1/2 length of basin (x direction, in feet)

1/2 width of basin (y direction, in feet)

duration of infiltration period (days)

initial thickness of saturated zone (feet)

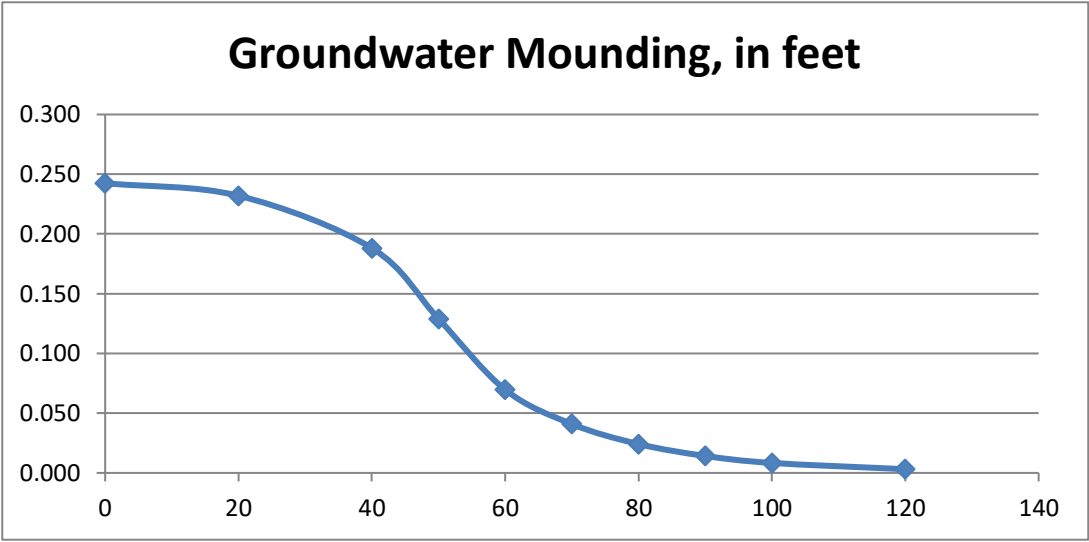
Conversion Table

inch/hour	feet/day
0.67	1.33
2.00	4.00
hours	days
36	1.50

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
0.242	0
0.232	20
0.188	40
0.129	50
0.070	60
0.041	70
0.024	80
0.014	90
0.008	100
0.003	120

 Re-Calculate Now



Distance from center of basin (feet)	Groundwater Mounding (feet)
0	0.242
20	0.232
40	0.188
50	0.129
60	0.070
70	0.041
80	0.024
90	0.014
100	0.008
120	0.003

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Input Values

2.0400	R
0.200	Sy
20.00	K
25.000	x
5.000	y
0.333	t
25.000	hi(0)

use consistent units (e.g. feet & days **or** inches & hours)

Recharge (infiltration) rate (feet/day)

Specific yield, Sy (dimensionless, between 0 and 1)

Horizontal hydraulic conductivity, Kh (feet/day)*

1/2 length of basin (x direction, in feet)

1/2 width of basin (y direction, in feet)

duration of infiltration period (days)

initial thickness of saturated zone (feet)

Conversion Table

inch/hour	feet/day
0.67	1.33
2.00	4.00
hours	days
36	1.50

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25.461

h(max)

0.461

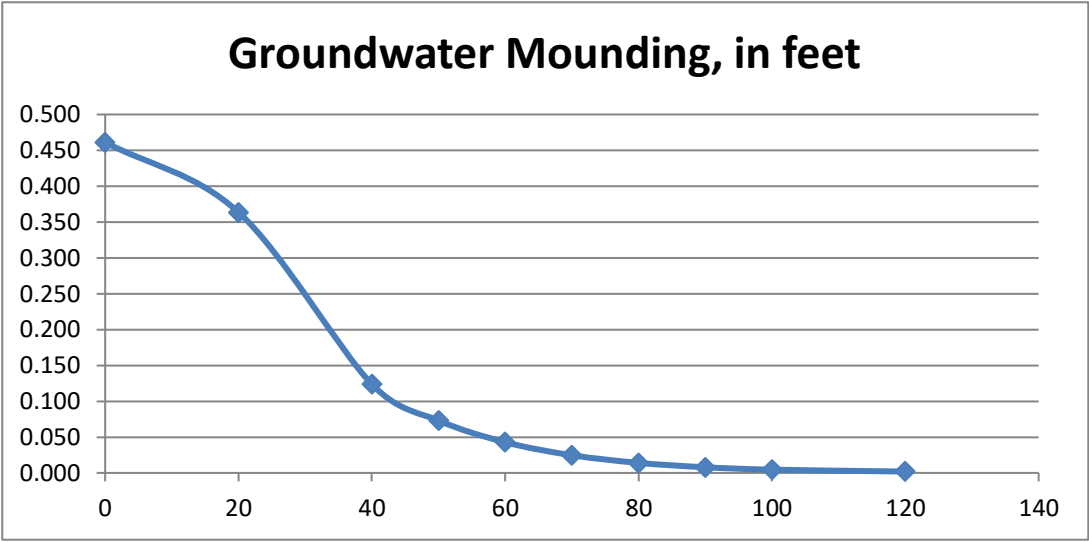
Δh(max)

maximum thickness of saturated zone (beneath center of basin at end of infiltration period)

maximum groundwater mounding (beneath center of basin at end of infiltration period)

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
0.461	0
0.364	20
0.124	40
0.073	50
0.043	60
0.025	70
0.014	80
0.008	90
0.005	100
0.002	120

 **Re-Calculate Now**



Distance from center of basin (feet)	Groundwater Mounding (feet)
0	0.461
20	0.364
40	0.124
50	0.073
60	0.043
70	0.025
80	0.014
90	0.008
100	0.005
120	0.002

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Appendix C

MADEP Stormwater Checklist / TSS Removal



Checklist for Stormwater Report

A. Introduction

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



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

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.¹ This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8²
- 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.



Checklist for Stormwater Report

B. Stormwater Checklist and Certification

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

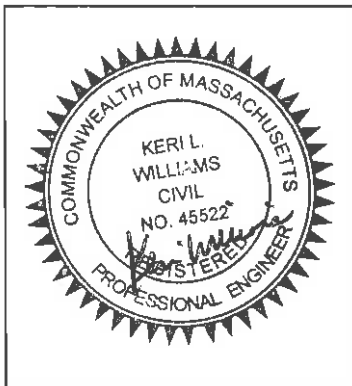
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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

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

Registered Professional Engineer's Certification

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

Registered Professional Engineer Block and Signature



Keri Williams 4/15/19
Signature and Date

Checklist

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

- ☒ New development
- ☐ Redevelopment
- ☐ Mix of New Development and Redevelopment



Checklist for Stormwater Report

Checklist (continued)

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

- ☒ No disturbance to any Wetland Resource Areas
- ☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- ☐ Reduced Impervious Area (Redevelopment Only)
- ☒ Minimizing disturbance to existing trees and shrubs
- ☐ LID Site Design Credit Requested:
 - ☐ Credit 1
 - ☐ Credit 2
 - ☐ Credit 3
- ☐ Use of "country drainage" versus curb and gutter conveyance and pipe
- ☐ Bioretention Cells (includes Rain Gardens)
- ☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
- ☐ Treebox Filter
- ☐ Water Quality Swale
- ☐ Grass Channel
- ☐ Green Roof
- ☒ Other (describe): Detention Ponds (wet forebays and infiltration basin)

Standard 1: No New Untreated Discharges

- ☒ No new untreated discharges
- ☒ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth
- ☒ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.



Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

- ☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.
- ☒ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.
- ☒ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

- ☒ Soil Analysis provided.
- ☒ Required Recharge Volume calculation provided.
- ☐ Required Recharge volume reduced through use of the LID site Design Credits.
- ☒ Sizing the infiltration, BMPs is based on the following method: Check the method used.
 - ☐ Static
 - ☒ Simple Dynamic
 - ☐ Dynamic Field¹
- ☒ Runoff from all impervious areas at the site discharging to the infiltration BMP.
- ☐ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.
- ☒ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.
- ☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:
 - ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
 - ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
 - ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
 - ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.
- ☒ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.
- ☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

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



Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

- ☒ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.
- ☒ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

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

- Good housekeeping practices;
 - Provisions for storing materials and waste products inside or under cover;
 - Vehicle washing controls;
 - Requirements for routine inspections and maintenance of stormwater BMPs;
 - Spill prevention and response plans;
 - Provisions for maintenance of lawns, gardens, and other landscaped areas;
 - Requirements for storage and use of fertilizers, herbicides, and pesticides;
 - Pet waste management provisions;
 - Provisions for operation and management of septic systems;
 - Provisions for solid waste management;
 - Snow disposal and plowing plans relative to Wetland Resource Areas;
 - Winter Road Salt and/or Sand Use and Storage restrictions;
 - Street sweeping schedules;
 - Provisions for prevention of illicit discharges to the stormwater management system;
 - Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
 - Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
 - List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.
- ☐ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.
 - ☐ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:
 - ☐ is within the Zone II or Interim Wellhead Protection Area
 - ☐ is near or to other critical areas
 - ☐ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
 - ☐ involves runoff from land uses with higher potential pollutant loads.
 - ☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.
 - ☒ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.



Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

- ☒ The BMP is sized (and calculations provided) based on:
 - ☒ The ½" or 1" Water Quality Volume or
 - ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.
- ☐ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.
- ☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

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

- ☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.
- ☐ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted *prior* to the discharge of stormwater to the post-construction stormwater BMPs.
- ☐ The NPDES Multi-Sector General Permit does *not* cover the land use.
- ☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.
- ☐ All exposure has been eliminated.
- ☐ All exposure has *not* been eliminated and all BMPs selected are on MassDEP LUHPPL list.
- ☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

- ☐ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.
- ☒ Critical areas and BMPs are identified in the Stormwater Report.



Checklist for Stormwater Report

Checklist (continued)

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

- ☐ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:
 - ☐ Limited Project
 - ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
 - ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
 - ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
 - ☐ Bike Path and/or Foot Path
 - ☐ Redevelopment Project
 - ☐ Redevelopment portion of mix of new and redevelopment.
- ☐ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.
- ☐ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

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

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

- Narrative;
 - Construction Period Operation and Maintenance Plan;
 - Names of Persons or Entity Responsible for Plan Compliance;
 - Construction Period Pollution Prevention Measures;
 - Erosion and Sedimentation Control Plan Drawings;
 - Detail drawings and specifications for erosion control BMPs, including sizing calculations;
 - Vegetation Planning;
 - Site Development Plan;
 - Construction Sequencing Plan;
 - Sequencing of Erosion and Sedimentation Controls;
 - Operation and Maintenance of Erosion and Sedimentation Controls;
 - Inspection Schedule;
 - Maintenance Schedule;
 - Inspection and Maintenance Log Form.
- ☐ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.



Checklist for Stormwater Report

Checklist (continued)

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

- ☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has **not** been included in the Stormwater Report but will be submitted **before** land disturbance begins.
- ☐ The project is **not** covered by a NPDES Construction General Permit.
- ☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.
- ☒ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

- ☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:
 - ☐ Name of the stormwater management system owners;
 - ☒ Party responsible for operation and maintenance;
 - ☒ Schedule for implementation of routine and non-routine maintenance tasks;
 - ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
 - ☐ Description and delineation of public safety features;
 - ☐ Estimated operation and maintenance budget; and
 - ☐ Operation and Maintenance Log Form.
- ☐ The responsible party is **not** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:
 - ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
 - ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

- ☐ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;
- ☐ An Illicit Discharge Compliance Statement is attached;
- ☒ NO Illicit Discharge Compliance Statement is attached but will be submitted **prior to** the discharge of any stormwater to post-construction BMPs.

Project: Sconticut Neck
Woods
Location: Fairhaven, MA

By: KLW
Chkd:

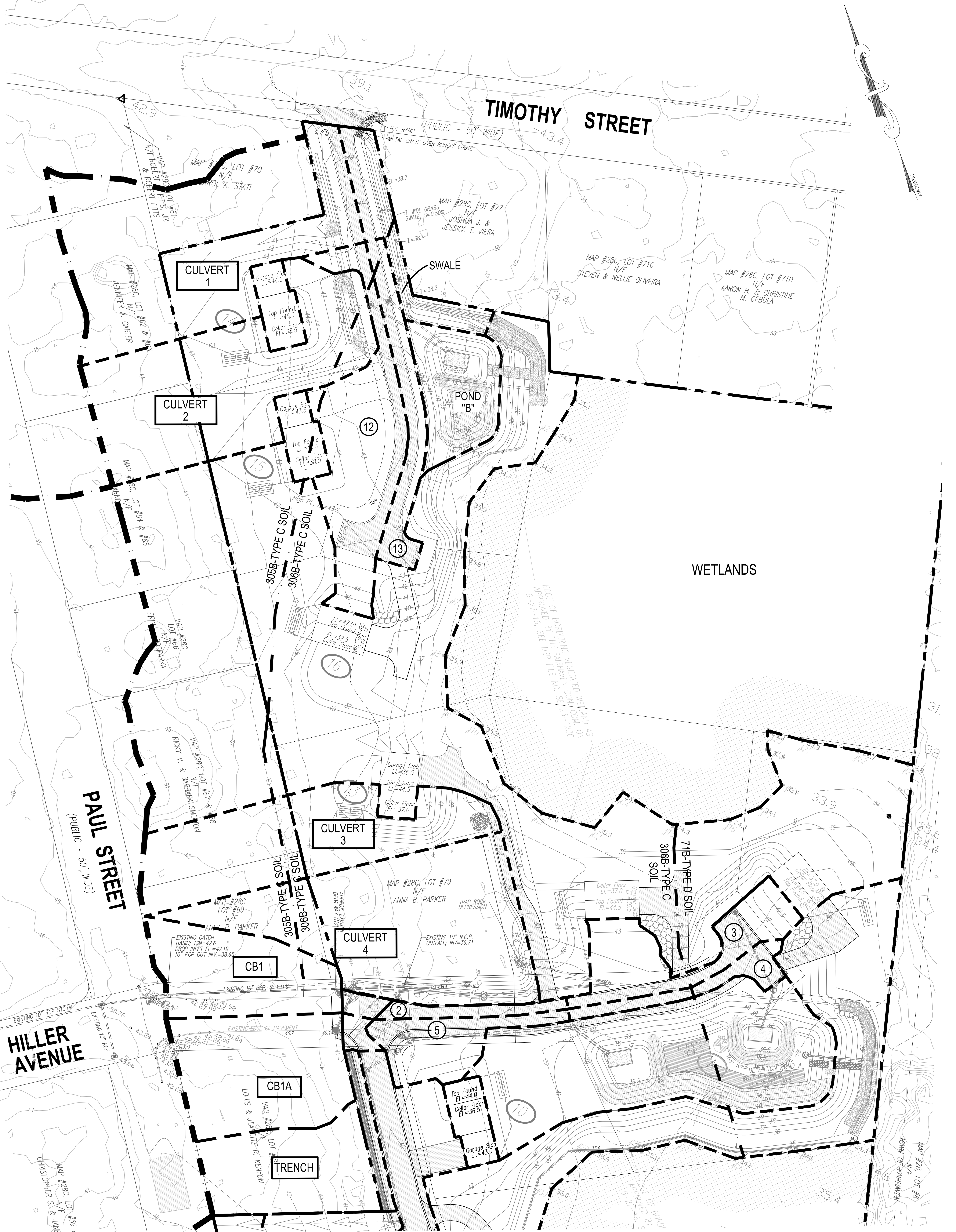
Date: 04/15/19
Date:

Watershed Area: **Proposed Detention Pond A and Detention Pond B**

TSS Removal Calculation Worksheet	A BMP	B TSS Removal Rate	C Starting TSS Load*	D Amount Removed (BxC)	E Remaining Load (C-D)
	Detention Pond (Forebay and Infiltration)	0.80	1.00	0.800	0.20
* Equals remaining load from previous BMP				Total TSS Removal = 80.0%	

Appendix D

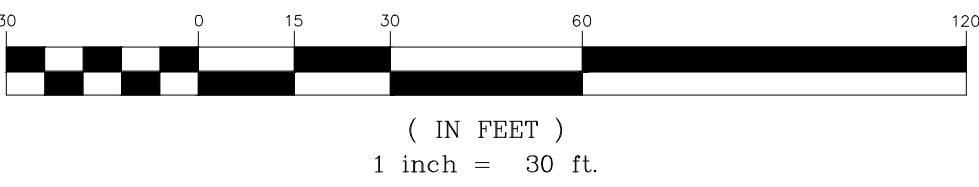
Storm Sewer Sizing Calculations



PROPOSED CONDITIONS
SUB-CATCHMENT MAP

11/20/2019

GRAPHIC SCALE





PROPOSED CONDITIONS
SUB-CATCHMENT MAP

11/18/2019

GRAPHIC SCALE



(IN FEET)
1 inch = 20 ft.

Rational Method Runoff Coefficients Sconticut Neck Woods Fairhaven, MA								
Catchbasin / Culvert ID	Total Area (acres)	Impervious Area (acres)	Pervious Area (acres)	Percent Impervious (%)	Percent Pervious (%)	Total Percent (%)	Weighted Runoff Coefficient (c)	25-Year Peak Discharge Rate (cfs)
CB 11	0.163	0.057	0.106	34.97	65.03	100.00	0.51	0.50
CB 10	0.154	0.073	0.081	47.40	52.60	100.00	0.58	0.54
CB 9	0.150	0.093	0.057	62.00	38.00	100.00	0.67	0.60
CB 8	0.294	0.095	0.199	32.31	67.69	100.00	0.49	0.87
CB 6	0.123	0.089	0.034	72.36	27.64	100.00	0.73	0.54
CB 7	0.150	0.079	0.071	52.67	47.33	100.00	0.62	0.55
CB 12	0.239	0.101	0.138	42.26	57.74	100.00	0.55	0.79
CB 13	0.106	0.106	0.000	100.00	0.00	100.00	0.90	0.57
CB 3	0.130	0.038	0.092	29.23	70.77	100.00	0.48	0.37
CB 4	0.045	0.045	0.000	100.00	0.00	100.00	0.90	0.24
CB 2	0.030	0.030	0.000	99.66	0.34	100.00	0.90	0.16
CB 5	0.092	0.047	0.045	51.09	48.91	100.00	0.61	0.33
Culvert 3	0.320	0.010	0.310	3.13	96.88	100.00	0.32	0.61
Culvert 4	0.450	0.010	0.440	2.22	97.78	100.00	0.31	0.85

NOTE:

1) Weighted runoff coefficients were calculated based on runoff coefficient of 0.90 for impervious areas and runoff coefficient of 0.30 for pervious areas.

2) Rainfall intensity based on a time of concentration of 5 minutes and IDF curves:
Rainfall intensity for the 25-year storm frequency is 6.0 inches/hour

Rational Method Runoff Coefficients Sconticut Neck Woods - Off-site Fairhaven, MA									
Catchbasin / Culvert ID	Total Area (acres)	Impervious Area (acres)	Pervious Area (acres)	Percent Impervious (%)	Percent Pervious (%)	Total Percent (%)	Weighted Runoff Coefficient (c)	25-Year Peak Discharge Rate (cfs)	100-Year Peak Discharge Rate (cfs)
ECB1	0.31	0.13	0.18	41.94	58.06	100.00	0.55	1.03	1.27
ECB2	0.65	0.16	0.49	24.62	75.38	100.00	0.45	1.75	2.15
ECB3	0.54	0.16	0.38	29.63	70.37	100.00	0.48	1.55	1.91
ECB4	1.27	0.32	0.95	25.20	74.80	100.00	0.45	3.44	4.24
ECB5	1.70	0.50	1.20	29.41	70.59	100.00	0.48	4.86	5.99
ECB6	0.47	0.18	0.29	38.30	61.70	100.00	0.53	1.49	1.84
<i>TOTAL</i>	<i>4.94</i>							<i>14.11</i>	<i>17.40</i>
CB 1	0.26	0.06	0.20	23.08	76.92	100.00	0.44	0.68	0.84
CB 1A	0.30	0.10	0.20	33.33	66.67	100.00	0.50	0.90	1.11
TRENCH	0.24	0.04	0.20	16.67	83.33	100.00	0.40	0.58	0.71

NOTE:

1) Weighted runoff coefficients were calculated based on runoff coefficient of 0.90 for impervious areas and runoff coefficient of 0.30 for pervious areas.

2) Rainfall intensity based on a time of concentration of 5 minutes and IDF curves:

Rainfall intensity for the 25-year storm frequency is 6.0 inches/hour

Rainfall intensity for the 100-year storm frequency is 7.4 inches/hour

Project # /Name:

Sconticut Neck Woods, Fairhaven, MA

Calculated By:

KLW

Date:

5/16/2019 (Revised 11/15/19)

25-Year and 100-Year Storm Frequency Storm Drain Design Worksheet

n= 0.012

RCP (24-inch dia.)

n= 0.013

RCP

Structure ID		Q	Qsum	Length	Slope	Dia.	Full-Flow Velocity ¹	Full-Flow Capacity ²	
From	To	(cfs)	(cfs)	(ft.)	(ft./ft.)	(in.)	(fps)	(cfs)	
CB 11	DMH 11	0.50	0.50	10	0.010	12	4.55	3.57	O.K
CB 10	DMH 11	0.54	0.54	4	0.025	12	7.19	5.65	O.K
DMH 11	DMH 10		1.04	217	0.005	12	3.22	2.53	O.K
CB 9	DMH 10	0.60	0.60	10	0.010	12	4.55	3.57	O.K
CB 8	DMH 10	0.87	0.87	4	0.025	12	7.19	5.65	O.K
DMH 10	DMH 9		2.51	96	0.005	12	3.22	2.53	O.K
SWALE 1* (EMERGENCY OVERFLOW)	DMH 9	0.54	0.54	7	0.030	12	7.88	6.19	O.K
DMH 9	DMH 8		3.05	112	0.005	12	3.22	2.53	O.K
CB 7	DMH 8	0.55	0.55	11	0.007	12	3.86	3.03	O.K
DMH 8	DMH 7		3.60	25	0.005	12	3.22	2.53	O.K
CB 6	DMH 7	0.54	0.54	6.5	0.008	12	3.99	3.13	O.K
DMH 7	DMH 6		4.14	9	0.005	15	3.73	4.58	O.K
CB 5	DMH 6	0.33	0.33	6	0.010	12	4.55	3.57	O.K
CB 2	DMH 6	0.16	0.16	31	0.005	12	3.22	2.53	O.K
DMH 6	DMH 5		4.63	118	0.005	24	5.53	17.38	O.K
DMH 5	POND A		4.63	26	0.005	24	5.31	16.67	O.K
CB 3	DMH 4	0.37	0.37	62	0.005	12	3.22	2.53	O.K
CB 4	DMH 4	0.24	0.24	12	0.010	12	4.55	3.57	O.K
DMH 4	POND A		0.61	26	0.005	12	3.22	2.53	O.K
SWALE 1*	TRENCH	0.54	0.54						
TRENCH**	CB 1A	0.71	1.25	8	0.013	8	3.88	1.35	O.K
CB 1A**	DMH 1	1.11	1.11	34	0.006	12	3.49	2.74	O.K
CB 1**	DMH 1	0.84	0.84	6	0.017	12	5.88	4.62	O.K
ECB1 - ECB6**	DMH 1	17.40	17.40	135	0.011	24	7.57	23.79	O.K
DMH 1	DMH 2		20.60	93	0.006	24	5.69	17.86	O.K
DMH 2	DMH 3		20.60	89	0.006	24	5.69	17.86	O.K
CULVERT 4	DMH 3	0.85	0.85	63	0.005	12	3.22	2.53	O.K
DMH 3	BYPASS		21.45	170	0.005	24	5.11	16.04	O.K

Structure ID		Q	Qsum	Length	Slope	Dia.	Full-Flow Velocity ¹	Full-Flow Capacity ²	
From	To	(cfs)	(cfs)	(ft.)	(ft./ft.)	(in.)	(fps)	(cfs)	
SWALE 2*	DMH A	3.65	3.65	6	0.017	12	5.88	4.62	O.K
DMH A	DMH B		3.84	44	0.027	12	7.47	5.87	O.K
SWALE 3*	DMH C	2.18	2.18	18	0.011	12	4.77	3.75	O.K
DMH C	DMH B		2.14	165	0.016	12	5.75	4.52	O.K
DMH B	HEADWALL		5.98	110	0.005	12	3.22	2.53	O.K
CULVERT 1*	CULVERT 2	1.88	1.88	40	0.005	18	4.21	7.45	O.K
CULVERT 2*	DMH	3.26	3.26	49	0.006	18	4.50	7.95	O.K
DMH	OUTFALL		5.14	80	0.005	18	4.21	7.45	O.K
CB 12	POND B	0.79	0.79	63	0.006	12	3.37	2.65	O.K
CB 13	POND B	0.57	0.57	57	0.006	12	3.55	2.79	O.K
CULVERT 3	FES	0.61	0.61	25	0.012	12	4.98	3.91	O.K

Notes:

$$^1 V = 1.49/n \times R^{2/3} \times S^{1/2}$$

*25-year discharge rate based on HydroCAD input/output in Appendix A of Stormwater Report.

*100-year discharge rate based on rational method

Project # /Name:

Sconticut Neck Woods, Fairhaven, MA

Calculated By:

KLW

Date:

5/16/2019 (Revised 11/15/19)

25-Year and 100-Year Storm Frequency Storm Drain Design Worksheet

n= 0.012

RCP (24-inch dia.)

n= 0.013

RCP

Structure ID		Q	Qsum	Length	Slope	Dia.	Full-Flow Velocity ¹	Full-Flow Capacity ²	
From	To	(cfs)	(cfs)	(ft.)	(ft./ft.)	(in.)	(fps)	(cfs)	
CB 11	DMH 11	0.50	0.50	10	0.010	12	4.55	3.57	O.K
CB 10	DMH 11	0.54	0.54	4	0.025	12	7.19	5.65	O.K
DMH 11	DMH 10		1.04	217	0.005	12	3.22	2.53	O.K
CB 9	DMH 10	0.60	0.60	10	0.010	12	4.55	3.57	O.K
CB 8	DMH 10	0.87	0.87	4	0.025	12	7.19	5.65	O.K
DMH 10	DMH 9		2.51	96	0.005	12	3.22	2.53	O.K
SWALE 1* (EMERGENCY OVERFLOW)	DMH 9	0.54	0.54	7	0.030	12	7.88	6.19	O.K
DMH 9	DMH 8		3.05	112	0.005	12	3.22	2.53	O.K
CB 7	DMH 8	0.55	0.55	11	0.007	12	3.86	3.03	O.K
DMH 8	DMH 7		3.60	25	0.005	12	3.22	2.53	O.K
CB 6	DMH 7	0.54	0.54	6.5	0.008	12	3.99	3.13	O.K
DMH 7	DMH 6		4.14	9	0.005	15	3.73	4.58	O.K
CB 5	DMH 6	0.33	0.33	6	0.010	12	4.55	3.57	O.K
CB 2	DMH 6	0.16	0.16	31	0.005	12	3.22	2.53	O.K
DMH 6	DMH 5		4.63	118	0.005	24	5.53	17.38	O.K
DMH 5	POND A		4.63	26	0.005	24	5.31	16.67	O.K
CB 3	DMH 4	0.37	0.37	62	0.005	12	3.22	2.53	O.K
CB 4	DMH 4	0.24	0.24	12	0.010	12	4.55	3.57	O.K
DMH 4	POND A		0.61	26	0.005	12	3.22	2.53	O.K
SWALE 1*	TRENCH	0.54	0.54						
TRENCH**	CB 1A	0.71	1.25	8	0.013	8	3.88	1.35	O.K
CB 1A**	DMH 1	1.11	1.11	34	0.006	12	3.49	2.74	O.K
CB 1**	DMH 1	0.84	0.84	6	0.017	12	5.88	4.62	O.K
ECB1 - ECB6**	DMH 1	17.40	17.40	135	0.011	24	7.57	23.79	O.K
DMH 1	DMH 2		20.60	93	0.006	24	5.69	17.86	O.K
DMH 2	DMH 3		20.60	89	0.006	24	5.69	17.86	O.K
CULVERT 4	DMH 3	0.85	0.85	63	0.005	12	3.22	2.53	O.K
DMH 3	BYPASS		21.45	170	0.005	24	5.11	16.04	O.K

Structure ID		Q	Qsum	Length	Slope	Dia.	Full-Flow Velocity ¹	Full-Flow Capacity ²	
From	To	(cfs)	(cfs)	(ft.)	(ft./ft.)	(in.)	(fps)	(cfs)	
SWALE 2*	DMH A	3.65	3.65	6	0.017	12	5.88	4.62	O.K
DMH A	DMH B		3.84	44	0.027	12	7.47	5.87	O.K
SWALE 3*	DMH C	2.18	2.18	18	0.011	12	4.77	3.75	O.K
DMH C	DMH B		2.14	165	0.016	12	5.75	4.52	O.K
DMH B	HEADWALL		5.98	110	0.005	12	3.22	2.53	O.K
CULVERT 1*	CULVERT 2	1.88	1.88	40	0.005	18	4.21	7.45	O.K
CULVERT 2*	DMH	3.26	3.26	49	0.006	18	4.50	7.95	O.K
DMH	OUTFALL		5.14	80	0.005	18	4.21	7.45	O.K
CB 12	POND B	0.79	0.79	63	0.006	12	3.37	2.65	O.K
CB 13	POND B	0.57	0.57	57	0.006	12	3.55	2.79	O.K
CULVERT 3	FES	0.61	0.61	25	0.012	12	4.98	3.91	O.K

Notes:

$$^1 V = 1.49/n \times R^{2/3} \times S^{1/2}$$

*25-year discharge rate based on HydroCAD input/output in Appendix A of Stormwater Report.

*100-year discharge rate based on rational method