U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

The National Map US Topo

COVENTRY QUADRANGLE
CONNECTICUT - TOLLAND COUNTY
7.5-MINUTE SERIES

Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and 1 000-meter grid:Universal Transverse Mercator, Zone 18T

This map is not a legal document. Boundaries may be generalized for this map scale. Private lands within government reservations may not be shown. Obtain permission before entering private lands.

Imagery....NAIP, July 2016 - September 2016
Roads.... U.S. Census Bureau, 2016
Names....GNIS, 1979 - 2017
Hydrography....National Hydrography Dataset, 2003
Contours....National Elevation Dataset, 2012
Boundaries....Multiple sources; see metadata file 2016 - 2017

Wetlands....FWS National Wetlands Inventory 2010

MN GN
14°0′ 249 MILS
1°48′ 32 MILS
UTM GRID AND 2017 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

U.S. National Grid
100,000 - m Square ID
YM
Grid Zone Designation 18T

SCALE 1:24 000
KILOMETERS 1 0.5 0 1 2
METERS 1000 500 0 1000 2000
MILES 1 0.5 0 1
FEET 1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000

CONTOUR INTERVAL 10 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with the National Geospatial Program US Topo Product Standard, 2011.
A metadata file associated with this product is draft version 0.6.18

CONNECTICUT
QUADRANGLE LOCATION

1	2	3
4		5
6	7	8

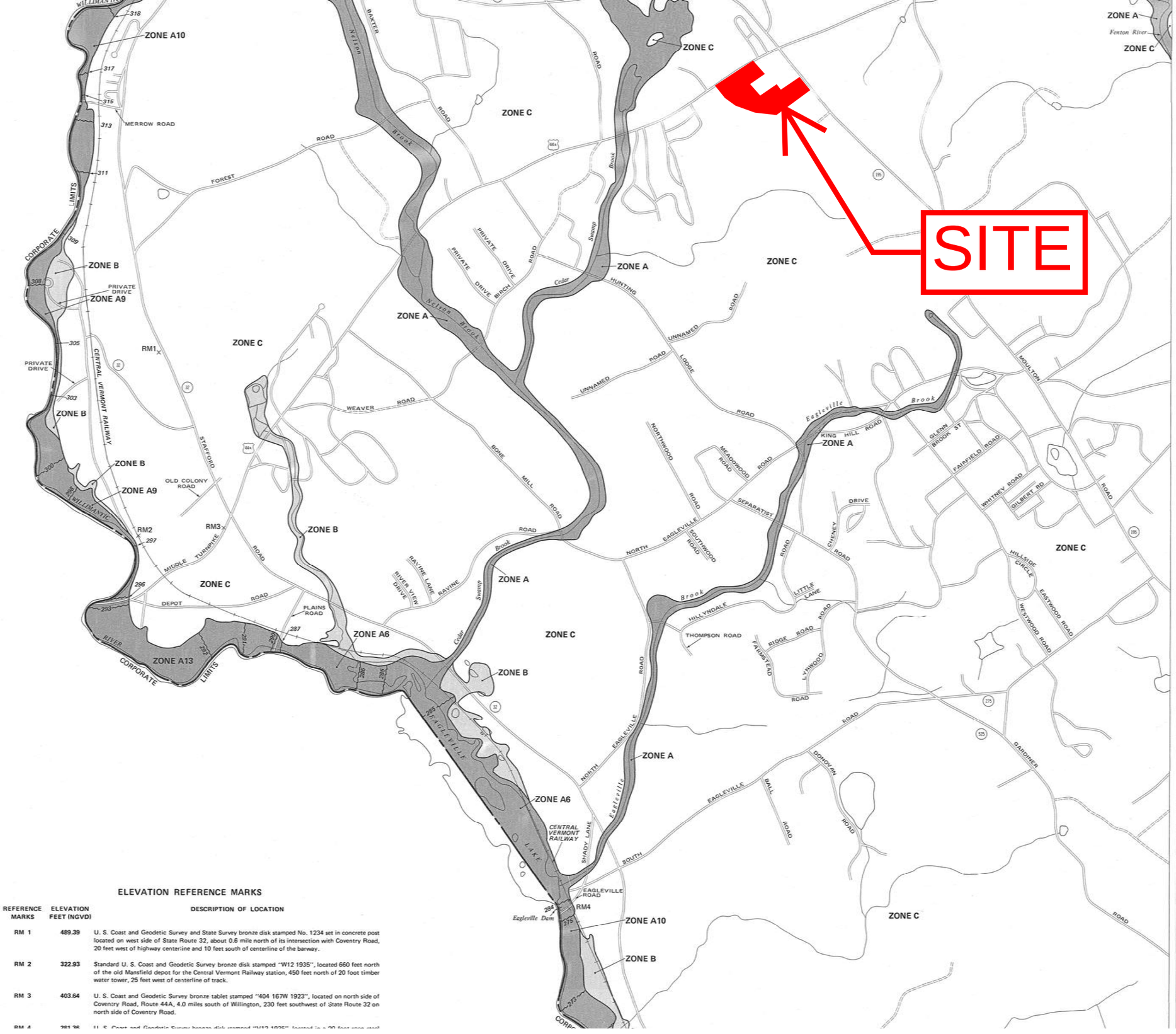
1 Ellington
2 Stafford Springs
3 Westford
4 Rockville
5 Spring Hill
6 Marlborough
7 Columbia
8 Willimantic

ADJOINING QUADRANGLES

ROAD CLASSIFICATION
Expressway
Secondary Hwy
Ramp
Local Connector
Local Road
4WD
Interstate Route
US Route
State Route

COVENTRY, CT
2018

7643016360105
MSN. 7643016360105
USGS REF NO. USGSX24K10393



ELEVATION REFERENCE MARKS

REFERENCE MARKS	ELEVATION FEET (NGVD)	DESCRIPTION OF LOCATION
RM 1	489.39	U. S. Coast and Geodetic Survey and State Survey bronze disk stamped No. 1234 set in concrete post located on west side of State Route 32, about 0.6 mile north of its intersection with Coventry Road, 20 feet west of highway centerline and 10 feet south of centerline of the barway.
RM 2	322.93	Standard U. S. Coast and Geodetic Survey bronze disk stamped "W12 1935", located 660 feet north of the old Mansfield depot for the Central Vermont Railway station, 450 feet north of 20 foot timber water tower, 25 feet west of centerline of track.
RM 3	403.64	U. S. Coast and Geodetic Survey bronze tablet stamped "404 167W 1923", located on north side of Coventry Road, Route 44A, 4.0 miles south of Willington, 230 feet southwest of State Route 32 on north side of Coventry Road.
RM 4	281.36	U. S. Coast and Geodetic Survey bronze disk stamped "W12 1935", located in a 20 foot steep steel

River Mile •M1.5

**Referenced to the National Geodetic Vertical Datum of 1929

*EXPLANATION OF ZONE DESIGNATIONS

ZONE	EXPLANATION
A	Areas of 100-year flood; base flood elevations and flood hazard factors not determined.
A0	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined.
AH	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined.
A1-A30	Areas of 100-year flood; base flood elevations and flood hazard factors determined.
A99	Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined.
B	Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading)
C	Areas of minimal flooding. (No shading)
D	Areas of undetermined, but possible, flood hazards.
V	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.
V1-V30	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

NOTES TO USER

Certain areas not in the special flood hazard areas (zones A and V) may be protected by flood control structures.

This map is for flood insurance purposes only; it does not necessarily show all areas subject to flooding in the community or all planimetric features outside special flood hazard areas.

For adjoining map panels, see separately printed Index To Map Panels.

INITIAL IDENTIFICATION:
JANUARY 9, 1974

FLOOD HAZARD BOUNDARY MAP REVISIONS:
OCTOBER 29, 1976
JUNE 21, 1977

FLOOD INSURANCE RATE MAP EFFECTIVE:
JANUARY 2, 1981

FLOOD INSURANCE RATE MAP REVISIONS:

Refer to the FLOOD INSURANCE RATE MAP EFFECTIVE date shown on this map to determine when actuarial rates apply to structures in the zones where elevations or depths have been established.

To determine if flood insurance is available in this community, contact your insurance agent, or call the National Flood Insurance Program, at (800) 638-6620, or (800) 424-8872.

N

APPROXIMATE SCALE
1000 0 1000 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

TOWN OF
MANSFIELD,
CONNECTICUT
TOLLAND COUNTY

PANEL 5 OF 20

APPENDIX B: SOIL AND WETLAND INFORMATION

- *NCRS CUSTOM SOIL RESOURCE REPORT*
- *REPORT OF GEOTECHNICAL INVESTIGATION*
- *WETLAND/WATERCOURSES REPORT (under separate cover)*
- *PRELIMINARY STORMWATER MANAGEMENT AREA EVALUATION*
- *SUPPLEMENTAL STORMWATER MANAGEMENT AREA EVALUATION*

United States Department of Agriculture

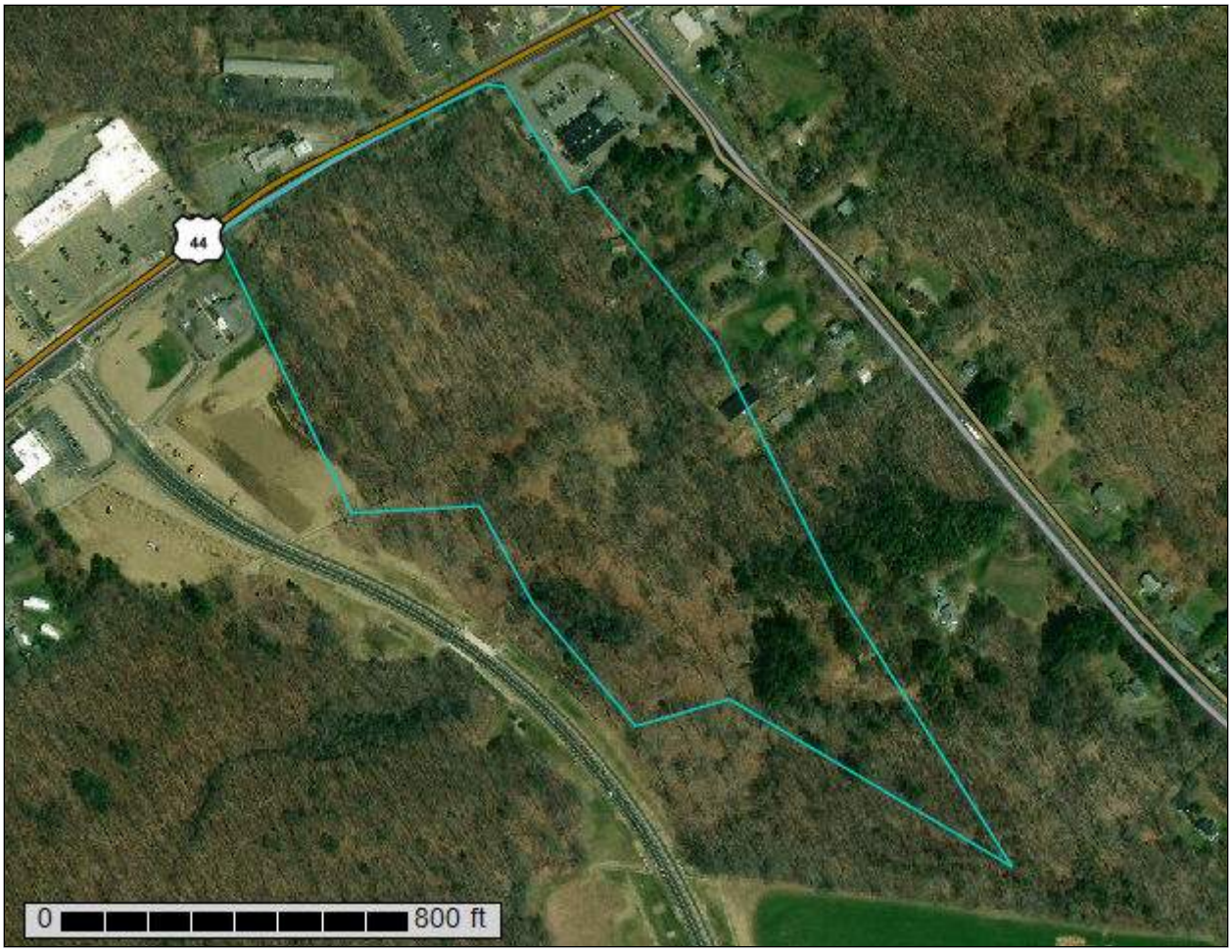
Natural Resources Conservation Service

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

State of Connecticut

Mansfield Soil Survey



Preface

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

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

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

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

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

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

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Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Map Scale: 1:1,360 if printed on D landscape (34" x 22") sheet.

N

0 20 40 80 120 Meters

0 50 100 200 300 Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

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: State of Connecticut
Survey Area Data: Version 19, Sep 13, 2019

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

Date(s) aerial images were photographed: Apr 30, 2013—Sep 23, 2017

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
3	Ridgebury, Leicester, and Whitman soils, 0 to 8 percent slopes, extremely stony	0.5	1.8%
45B	Woodbridge fine sandy loam, 3 to 8 percent slopes	6.7	24.1%
46B	Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony	1.5	5.2%
51B	Sutton fine sandy loam, 0 to 8 percent slopes, very stony	5.6	20.2%
60B	Canton and Charlton fine sandy loams, 3 to 8 percent slopes	11.3	40.6%
61B	Canton and Charlton fine sandy loams, 0 to 8 percent slopes, very stony	2.2	8.0%
306	Udorthents-Urban land complex	0.0	0.1%
Totals for Area of Interest		**27.9**	**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.

State of Connecticut

3—Ridgebury, Leicester, and Whitman soils, 0 to 8 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: 2t2qt
Elevation: 0 to 1,480 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Ridgebury, extremely stony, and similar soils: 40 percent
Leicester, extremely stony, and similar soils: 35 percent
Whitman, extremely stony, and similar soils: 17 percent
Minor components: 8 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ridgebury, Extremely Stony

Setting

Landform: Ground moraines, drumlins, drainageways, depressions, hills
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope, head 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: 0 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

Description of Leicester, Extremely Stony

Setting

Landform: Hills, ground moraines, drainageways, depressions
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave, linear
Across-slope shape: Concave
Parent material: Coarse-loamy melt-out till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 7 inches: fine sandy loam
Bg - 7 to 18 inches: fine sandy loam
BC - 18 to 24 inches: fine sandy loam
C1 - 24 to 39 inches: gravelly fine sandy loam
C2 - 39 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 0 to 8 percent
Percent of area covered with surface fragments: 9.0 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water storage in profile: High (about 9.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B/D
Hydric soil rating: Yes

Description of Whitman, Extremely Stony

Setting

Landform: Hills, ground moraines, drumlins, drainageways, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): 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

Oi - 0 to 1 inches: peat
A - 1 to 10 inches: fine sandy loam
Bg - 10 to 17 inches: gravelly fine sandy loam

Cdg - 17 to 61 inches: fine sandy loam

Properties and qualities

Slope: 0 to 3 percent
Percent of area covered with surface fragments: 9.0 percent
Depth to restrictive feature: 7 to 38 inches to densic material
Natural drainage class: Very poorly drained
Runoff class: Negligible
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: Frequent
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: 6 percent
Landform: Ground moraines, drumlins, hills
Landform position (two-dimensional): Backslope, footslope, summit
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Swansea

Percent of map unit: 2 percent
Landform: Swamps, bogs
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

45B—Woodbridge fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2t2ql
Elevation: 0 to 1,470 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

Woodbridge, fine sandy loam, and similar soils: 82 percent
Minor components: 18 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Woodbridge, Fine Sandy Loam

Setting

Landform: Hills, drumlins, ground moraines
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

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

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 20 to 39 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 18 to 30 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 3.6 inches)

Interpretive groups

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

Minor Components

Paxton

Percent of map unit: 10 percent
Landform: Hills, ground moraines, drumlins
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope, crest, nose slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Ridgebury

Percent of map unit: 8 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

46B—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: Not prime farmland

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: Drumlins, hills, ground moraines
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: Depressions, drainageways, ground moraines, drumlins, 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

51B—Sutton fine sandy loam, 0 to 8 percent slopes, very stony

Map Unit Setting
National map unit symbol: 2xfff
Elevation: 0 to 1,410 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
Sutton, very stony, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sutton, Very Stony

Setting
Landform: Hills, ground moraines
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave

Across-slope shape: Linear
Parent material: Coarse-loamy melt-out till derived from gneiss, granite, and/or schist

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 7 inches: fine sandy loam
Bw1 - 7 to 19 inches: fine sandy loam
Bw2 - 19 to 27 inches: sandy loam
C1 - 27 to 41 inches: gravelly sandy loam
C2 - 41 to 62 inches: gravelly sandy loam

Properties and qualities

Slope: 0 to 8 percent
Percent of area covered with surface fragments: 1.6 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: About 12 to 27 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Moderate (about 8.5 inches)

Interpretive groups

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

Minor Components

Charlton, very stony

Percent of map unit: 7 percent
Landform: Ridges, hills, ground moraines
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Canton, very stony

Percent of map unit: 4 percent
Landform: Moraines, ridges, hills
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Linear, convex
Across-slope shape: Convex
Hydric soil rating: No

Leicester, very stony

Percent of map unit: 3 percent
Landform: Depressions, drainageways, hills, ground moraines
Landform position (two-dimensional): Footslope, toeslope

Landform position (three-dimensional): Base slope
Down-slope shape: Linear, concave
Across-slope shape: Concave
Hydric soil rating: Yes

Whitman, very stony

Percent of map unit: 1 percent
Landform: Drainageways, hills, ground moraines, drumlins, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

60B—Canton and Charlton fine sandy loams, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2w81s
Elevation: 0 to 1,460 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

Canton and similar soils: 50 percent
Charlton and similar soils: 35 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Canton

Setting

Landform: Ridges, hills, moraines
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope, nose slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex
Parent material: Coarse-loamy over sandy melt-out till derived from gneiss, granite, and/or schist

Typical profile

Ap - 0 to 7 inches: fine sandy loam
Bw1 - 7 to 15 inches: fine sandy loam
Bw2 - 15 to 26 inches: gravelly fine sandy loam
2C - 26 to 65 inches: gravelly loamy sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 19 to 39 inches to strongly contrasting textural stratification

Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 2.7 inches)

Interpretive groups

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

Description of Charlton

Setting

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

Typical profile

Ap - 0 to 7 inches: fine sandy loam
Bw - 7 to 22 inches: gravelly fine sandy loam
C - 22 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 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: Moderate (about 6.9 inches)

Interpretive groups

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

Minor Components

Sutton

Percent of map unit: 5 percent
Landform: Ridges, ground moraines, hills
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope

Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Chatfield

Percent of map unit: 5 percent
Landform: Ridges, hills
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Crest, side slope, nose slope
Down-slope shape: Convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Leicester

Percent of map unit: 5 percent
Landform: Depressions, drainageways, hills, ground moraines
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear, concave
Across-slope shape: Concave
Hydric soil rating: Yes

61B—Canton and Charlton fine sandy loams, 0 to 8 percent slopes, very stony

Map Unit Setting

National map unit symbol: 2w81v
Elevation: 0 to 1,480 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Canton, very stony, and similar soils: 50 percent
Charlton, very stony, and similar soils: 35 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Canton, Very Stony

Setting

Landform: Ridges, hills, moraines
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Crest, nose slope, side slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Parent material: Coarse-loamy over sandy melt-out till derived from gneiss, granite, and/or schist

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 5 inches: fine sandy loam
Bw1 - 5 to 16 inches: fine sandy loam
Bw2 - 16 to 22 inches: gravelly fine sandy loam
2C - 22 to 67 inches: gravelly loamy sand

Properties and qualities

Slope: 0 to 8 percent
Percent of area covered with surface fragments: 1.6 percent
Depth to restrictive feature: 19 to 39 inches to strongly contrasting textural stratification
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 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 3.4 inches)

Interpretive groups

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

Description of Charlton, Very Stony

Setting

Landform: Hills, ground moraines, ridges
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 4 inches: fine sandy loam
Bw - 4 to 27 inches: gravelly fine sandy loam
C - 27 to 65 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: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 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: Moderate (about 8.7 inches)

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

Minor Components

Sutton, very stony
Percent of map unit: 5 percent
Landform: Hills, ground moraines
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Leicester, very stony
Percent of map unit: 5 percent
Landform: Hills, depressions, drainageways, ground moraines
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave, linear
Across-slope shape: Concave
Hydric soil rating: Yes

Chatfield, very stony
Percent of map unit: 5 percent
Landform: Ridges, hills
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Crest, side slope, nose slope
Down-slope shape: Convex
Across-slope shape: Linear, convex
Hydric soil rating: No

306—Udorthents-Urban land complex

Map Unit Setting
National map unit symbol: 9lmg
Elevation: 0 to 2,000 feet
Mean annual precipitation: 43 to 56 inches
Mean annual air temperature: 45 to 55 degrees F
Frost-free period: 120 to 185 days
Farmland classification: Not prime farmland

Map Unit Composition
Udorthents and similar soils: 50 percent

Urban land: 35 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udorthents

Setting

Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Drift

Typical profile

A - 0 to 5 inches: loam
C1 - 5 to 21 inches: gravelly loam
C2 - 21 to 80 inches: very gravelly sandy loam

Properties and qualities

Slope: 0 to 25 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to high (0.00 to 1.98 in/hr)
Depth to water table: About 54 to 72 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 6.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Hydric soil rating: No

Description of Urban Land

Typical profile

H - 0 to 6 inches: material

Interpretive groups

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

Minor Components

Unnamed, undisturbed soils

Percent of map unit: 8 percent
Hydric soil rating: No

Udorthents, wet substratum

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

Rock outcrop

Percent of map unit: 2 percent

Hydric soil rating: No

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December 6, 2018

via email

CAPSTONE COLLEGIATE COMMUNITIES, LLC
431 Office Park Drive
Birmingham, Alabama 35223

Attention: Ms. Amanda Wallis
Executive Vice President – Development

Regarding: PRELIMINARY GEOTECHNICAL INVESTIGATION
PROPOSED STUDENT HOUSING DEVELOPMENT
MIDDLE TURNPIKE (U.S. ROUTE 44) & STORRS ROAD (CT ROUTE 195)
MAP 9, BLOCK 23, LOTS 1, 7, & 8
MANSFIELD, TOLLAND COUNTY, CONNECTICUT
WHITESTONE PROJECT NO.: GM1816022.000

Dear Ms. Wallis:

Whitestone Associates, Inc. (Whitestone) has completed a preliminary geotechnical investigation at the above-referenced site. The results of the investigation and recommendations presented below are based on the soil conditions disclosed from a limited number of soil explorations performed during Whitestone's field investigation. The purpose of the investigation was to assess subsurface conditions within proposed building areas accessible to all terrain vehicle (ATV) mounted drilling equipment. Preliminary recommendations for support of the proposed buildings, slabs, and pavement, and anticipated earthwork requirements are included herein.

1.0 PROJECT DESCRIPTION

1.1 Site Location & Existing Conditions

The 24.1-acre site is located at the intersection of Middle Turnpike and Storrs Road in the Town of Mansfield, Tolland County, Connecticut. According to the Town of Mansfield Assessor's Office, the site is identified as Map 9, Block 23, Lots 1, 7, and 8. The site currently is developed with several residential buildings along Storrs Road. The remaining portions of the site are wooded. Wetlands within the subject site reportedly limit the development area to approximately 15.9 acres. Based on a review of available topographic maps, the site slopes down to the northeast from the approximate elevation of 660 feet above North American Vertical Datum of 1988 (NAVD) to approximately 620 feet above NAVD.

1.2 Site Geology

On the *Surficial Materials Map of Connecticut (1992)*, the site is shown underlain by glacial till. The *Bedrock Geologic Map of Connecticut (1985)* indicates that the subject property is underlain by Silurian-aged schist with minor granofels of the upper member of the Bigelow Brook Formation, part of the Eastern Uplands.

1.3 Proposed Construction

The final design has not yet been determined, however, the client anticipates the proposed redevelopment will include approximately 150 residential units, separated into two-story and three-story buildings with associated parking, utilities, and recreational areas. No stormwater management facilities have been identified at this time.

Detailed structural information was not available at the time of this report, however, based on experience with similar facilities, Whitestone anticipates that maximum column, wall, and floor loads will be less than about 50 kips, two kips per lineal foot, and 150 pounds per square foot, respectively.

2.0 FIELD INVESTIGATION

2.1 Fieldwork

Field exploration at the project site consisted of performing five soil borings, completed as groundwater monitoring wells. The locations of the soil borings are shown on the accompanying *Boring Location Plan* included as Figure 1. *Records of Subsurface Exploration* are provided in Appendix A.

The subsurface tests were conducted in the presence of a Whitestone engineer who performed field tests, recorded visual classifications, and collected samples of the various strata encountered. The tests were located in the field using normal taping procedures and estimated right angles. These locations are presumed to be accurate within a few feet.

Soil borings and Standard Penetration Tests (SPTs) were conducted in general accordance with ASTM International (ASTM) designation D1586. The SPT resistance value (N) can be used as an indicator of the consistency of fine-grained soils and the relative density of coarse-grained soils. The N-value for various soil types can be correlated with the engineering behavior of earthworks and foundations.

Groundwater level observations, where encountered, were recorded during and immediately after the completion of field operations, and in the installed groundwater monitoring wells. Seasonal variations, temperature effects, man-made effects, and recent rainfall conditions may influence the levels of the groundwater, and the observed levels will depend on the permeability of the soils. Groundwater elevations derived from sources other than seasonally observed groundwater monitor wells may not be representative of true groundwater levels.

2.2 Laboratory Testing Program

In addition to the field investigation, a laboratory testing program was conducted to assess additional, pertinent engineering characteristics of representative samples of on-site soils. The laboratory testing program was performed in general accordance with applicable ASTM standard test methods and included physical/textural testing.

The results of the laboratory testing program are presented in this section in a general manner and qualitatively interpreted. The results are incorporated into the findings and recommendations discussed throughout this report. Quantitative test results are provided in Appendix B.

Physical and Textural Analysis: Representative samples of the selected stratum encountered were subjected to a laboratory testing program that included moisture content determinations (ASTM D2216) and washed gradation analyses (ASTM D422) in order to perform supplementary engineering soil classifications in general accordance with ASTM D2487. The soil strata tested were classified by the Unified Soil Classification System (USCS) and results of the laboratory testing are summarized in the following table.

PHYSICAL/TEXTURAL ANALYSES SUMMARY					
Boring	**Sample**	**Depth (fbgs)**	**Moisture Content (%)**	**% Passing No. 200 Sieve**	**USCS Classification**
B-1	S-3	5.0 - 7.0	11.2	43.3	SM
B-5	S-2	2.0 - 4.0	15.0	17.9	SM

3.0 SUBSURFACE CONDITIONS

The subsurface soil conditions encountered within the subsurface tests conducted by Whitestone consisted of the following generalized strata in order of increasing depth. *Records of Subsurface Exploration* are provided in Appendix A.

Surface Cover Materials: The borings encountered topsoil, three inch to eight inches in thickness, at the ground surface.

Glacial Till: Beneath the surface cover materials, the borings encountered glacial till, consisting of brown, medium dense to very dense (surficially very loose to loose), silty sand with gravel (USCS: SM). SPT N-values within the glacial till were variable, ranging from two blows per foot (bpf) to greater than 100 bpf.

Apparent Bedrock: The explorations encountered refusal on apparent bedrock at depths ranging from 2.5 fbgs to 12.5 fbgs. Refusal materials were not sampled through rock coring efforts. Rock coring techniques would be required to further characterize the nature and extent of the refusal materials. Bedrock outcrops were noted at various locations throughout the site.

Groundwater: Static groundwater was encountered within the explorations at depths ranging from two fbgs to three fbgs. Groundwater levels should be expected to fluctuate seasonally and following periods of precipitation. Groundwater levels were measured in the monitoring wells at depths ranging from 0.8 fbgs to 4.1 fbgs on December 3, 2018.

4.0 PRELIMINARY CONCLUSIONS & RECOMMENDATIONS

Whitestone's findings indicate that the proposed structures may be supported on conventional shallow foundations bearing on approved natural glacial till and/or properly placed structural fill. Whitestone's findings also indicate that the site is suitable for ground-supported floor slabs deriving support from properly inspected and approved compacted glacial till, and/or compacted structural fill. Additionally, the site conditions support the use of typical pavement sections using standard CTDOT specified materials.

The following recommendations have been developed on the basis of the previously described project characteristics and subsurface conditions encountered within the limited exploration performed. If there are any significant changes to the project characteristics or if significantly different subsurface conditions are encountered during construction, Whitestone should be consulted, so that the recommendations of this report can be reviewed.

4.1 Site Preparation & Earthwork

Surface Preparation: Prior to placing fill to raise or restore grades to the desired subgrade elevations, the existing exposed soils should be compacted to a firm and unyielding surface with several passes in two perpendicular directions of a minimum 10-ton vibratory compactor. Fill and backfill should be placed and compacted in accordance with Section 4.2.

Weather Performance Criteria: Because the natural site soils will soften when exposed to water, every effort should be made to maintain drainage of surface water runoff away from construction areas by grading and limiting the exposure of excavations and prepared subgrades to rainfall. Accordingly, excavation and fill placement procedures should be performed during favorable weather conditions. Overexcavation of saturated soils and replacement with controlled structural fill per Section 4.2 of this report may be required prior to resuming work on disturbed subgrade soils.

Subgrade Protection and Inspection: Every effort should be made to reduce disturbance of the on-site soils by construction traffic and surface runoff. The on-site soils may deteriorate when subjected to repeated construction traffic and/or inclement weather, which would require removal and replacement. These materials also may require discing, drying, and aeration during wet periods. The contractor should be responsible for protection of subgrades and minimization of exposure of the site soils to precipitation by covering stockpiles and subgrades with plastic and preventing ponding of water by sealing subgrades before precipitation events and grading the site to allow proper drainage of surface water. All rutting from construction equipment should be removed prior to any forecasted or actual precipitation. The services of the geotechnical engineer should be retained to observe soils conditions during construction and review the suitability of prepared foundation subgrades for support of design loads.

Groundwater Control: Static groundwater was encountered within the explorations at depths that will impact excavation for foundations or utilities. As such, construction phase dewatering will likely consist of temporarily lowering the static groundwater and removing surface water runoff, infiltrating water, or trapped water at this site. Temporary construction phase dewatering of static and trapped/perched water should be feasible through the use of gravity fed sump pits and pumps.

Since excessive amounts of perched groundwater may accumulate during periods of wet weather, Whitestone recommends that foundation construction occur during periods of relatively dry weather. Every effort must be made to maintain drainage of surface water runoff away from construction areas by grading and limiting the exposure of foundation areas to precipitation.

4.2 Structural Fill & Backfill

Imported Fill Material: Any imported material placed as structural fill or backfill to restore design grades should consist of clean, relatively well graded sand or gravel with a maximum particle size of three inches and five percent to 12 percent of material finer than a #200 sieve. The material should be free of clay lumps, organics, and deleterious material. Any imported structural fill material should be approved by a qualified geotechnical engineer prior to delivery to the site.

Soil Reusability: Portions of the site soils are acceptable for selective reuse as fill/backfill material, provided that soil moisture contents are controlled within two percent of optimum moisture level, particles larger than three inches in diameter are either removed or crushed, and objectionable portions, such as organics or debris, are segregated. Reuse of the site soils will be contingent on careful review in the field by the owner's geotechnical engineer by visual observation during construction as recommended herein. However, portions of the natural silty soils at the site are marginally acceptable for reuse as structural fill and/or backfill because of difficult workability. Reuse of these silty soils will likely require extensive moisture conditioning and/or drying to facilitate reuse, workability, and compaction in fill areas. Immediate re-use of on-site soils for structural fill or backfill should not be anticipated as the majority of the site natural soils are moisture sensitive. On-site natural materials that are or become wet will require extensive handling, such as discing and aerating, which may not be practical during wet seasons or where site area is limited. In order to attempt the re-use of on-site natural soil, the contractor should cover stockpiled soils, seal subgrades each day with a smooth drum roller, and provide proper surface drainage during forecasted wet weather. Alternatively, imported fill materials may be required to expedite earthwork operations. The stripped surface cover materials should not be used as structural fill or backfill.

Compaction and Placement Requirements: Fill and backfill should be placed in maximum eight-inch thick loose lifts and compacted using a vibratory drum roller during mass grading activities or a small hand-held vibratory compactor within excavations. Structural fill and backfill placed within the building pads, including 10 feet outside the exterior walls, should be compacted to at least 95 percent of the maximum dry density within two percent of the optimum moisture content, as determined by ASTM D1557 (Modified Proctor). Structural fill and backfill placed within non-building areas should be compacted to at least 92 percent of the maximum dry density within two percent of the optimum moisture content, as determined by ASTM D1557.

4.3 Preliminary Foundation Design Criteria

Foundations: Whitestone preliminarily recommends supporting the proposed structures on conventional spread foundations designed to bear within the approved natural glacial till and/or on controlled structural fill materials that are properly evaluated, placed and compacted as described herein. Foundations bearing within these materials may preliminarily be designed using a maximum net allowable bearing pressure of 4,000 pounds per square foot subject to review of final design loading, grading, and settlement tolerances.

Foundation subgrades should be compacted in the presence of the geotechnical engineer to densify loose upper soils and disturbed soils. Regardless of loading conditions, proposed foundations should be sized no less than minimum dimensions of 24 inches for spread footings.

Footings subject to lateral loads and/or overturning should be designed so that the maximum toe pressure due to the combined effect of vertical loads and overturning moment does not exceed the recommended maximum allowable net bearing pressure. In addition, positive contact pressure should be maintained throughout the base of the footings such that no uplift or tension exists between the base of the footings and the supporting soil. Uplift loads should be resisted by the weight of the concrete. Side friction should be neglected when proportioning the footings, so that lateral resistance should be provided by friction resistance at the base of the footings. An allowable coefficient of friction against sliding of 0.4 is recommended for use in the design of the foundations bearing within the existing site soils or imported structural fill soils.

Seismic Site Class: Based on a review of the subsurface conditions relevant to the *Connecticut State Building Code*, the subject site has been assigned a Site Class C. The site soils are not susceptible to earthquake induced liquefaction.

Inspection/Overexcavation Criteria: Whitestone recommends that the suitability of the bearing soils at the footing bottoms be reviewed by a geotechnical engineer immediately prior to placing concrete for the footings. In the event that areas of unsuitable materials are encountered, additional overexcavation and replacement of the materials may be necessary to provide a suitable footing subgrade. Any overexcavation to be restored with structural fill will need to extend at least one foot laterally beyond footing edges for each vertical foot of overexcavation. Lateral overexcavation may be eliminated if grades are restored with lean concrete. Compaction of the bottom of overexcavations should be reviewed by the on-site geotechnical engineer.

Frost Coverage: Footings subject to frost action should be placed at least 42 inches below adjacent exterior grades, in accordance with the *Connecticut State Building Code*, to provide protection from frost penetration. Interior footings not subject to frost action may be placed at a minimum depth of 18 inches below the floor slabs.

Settlement: Whitestone estimates post-construction settlements of proposed foundations of less than one inch, if the recommendations outlined in this report are properly implemented. Differential settlement of foundations should be less than one half inch.

4.4 Floor Slabs

Whitestone anticipates that the natural glacial till or controlled structural fill materials will be suitable for support of the proposed floor slabs provided these materials are properly evaluated, placed, and compacted.

4.5 Pavements

Whitestone anticipates that the properly inspected and approved natural glacial till or compacted structural fill and/or backfill placed to raise or restore design elevations will be suitable for support of the proposed pavements, provided these materials are properly evaluated, compacted, and proofrolled during favorable weather conditions.

A California Bearing Ratio value of 8.0 has been assigned to the properly prepared subgrade soils for pavement design purposes. This value was correlated with pertinent soil support values and assumed traffic loads to prepare flexible pavement designs per the AASHTO *Guide for the Design of Pavement Structures*. Design traffic loads were assumed based on typical volumes for similar facilities and correlated with 18-kip equivalent single axle loads (ESAL) for a 20-year life. Estimated maximum pavement loads of 11,000 ESALs and 30,000 ESALs were used for the standard-duty and heavy-duty pavement areas, respectively.

Pavement components should meet material specifications from CTDOT *Standard Specifications* specified below. The recommended flexible pavement sections are tabulated below:

FLEXIBLE PAVEMENT SECTIONS			
Layer	**Material**	**Standard-Duty Thickness (inches)**	**Heavy-Duty Thickness (inches)**
Asphalt Wearing Course	CTDOT HMA S0.375 (Superpave); PG 64S-22	1.5	1.5
Asphalt Binder Course	CTDOT HMA S0.5 (Superpave); PG 64S-22	1.5	2.0
Granular Base	CTDOT M.05.01 Processed Aggregate Base	6.0	6.0
Granular Subbase	CTDOT M.02.02 Subbase; M.02.06 Gradation A	6.0	6.0

The pavement section thickness designs presented in this report are based on the design parameters detailed herein and are contingent on proper construction, inspection, and maintenance. Additional pavement thickness may be required by local code. The designs are contingent on achieving the minimum soil support value in the field. Proper drainage should be provided for the pavement structure, including appropriate grading and surface water control, and interceptor (edge) drains on the higher side(s) of the site. Consideration should also be given to radial drains at catch basins.

The performance of the pavement also will depend on the quality of materials and workmanship. Whitestone recommends that CTDOT standards for materials, workmanship, and maintenance be applied to this site. Project specifications should include verifying that the installed asphaltic concrete material composition is within tolerance for the specified materials and that the percentage of air voids of the installed pavement is within specified ranges for the respective materials.

4.6 Excavations

The site soils encountered during the investigation generally are most consistent with, at least, Type C Soil Conditions as defined by 29 CFR Part 1926 (OSHA) that require a maximum unbraced excavation

angle of 1.5:1 (horizontal:vertical). Actual conditions encountered during construction should be evaluated by a competent person (as defined by OSHA), so that safe excavation methods and/or shoring and bracing requirements are implemented. Competent bedrock may be excavated at an angle of 1:6 (horizontal:vertical). A steeper excavation angle in the bedrock may be feasible, if the exposed bedrock is reviewed by a professional engineer or geologist.

5.0 SUPPLEMENTAL POST INVESTIGATION SERVICES

Construction Inspection and Monitoring: The owner's geotechnical engineer with specific knowledge of the subsurface conditions and design intent should perform inspection, testing, and consultation during construction, as described in previous sections of this report. Monitoring and testing should also be performed to check that the existing surface cover materials are properly stripped and suitable materials, used for controlled fill, are properly placed and compacted over suitable subgrade soils. The proofrolling of all subgrades prior to pavement support should be witnessed and documented by the owner's geotechnical engineer.

6.0 CLOSING

Whitestone geotechnical division appreciates the opportunity to be of service to Capstone Collegiate Communities, LLC. Whitestone has the capability to perform the additional geotechnical engineering services recommended herein. Please contact us at (860) 726-7889 with any questions regarding this report.

Sincerely,

WHITESTONE ASSOCIATES, INC.

Richard W.M. McLaren, P.E.
Senior Consultant

Ryan R. Roy, P.E.
Principal, New England Region

RWM/br N:\Job Folders\2018\1816022GM\Reports and Submittals\GM1816022 Lim GI Mansfield CT.docx
Copy: Laurence W. Keller, P.E., Whitestone Associates, Inc.

FIGURE 1
Boring Location Plan

LEGEND

B-1 BORING LOCATION (APPROX.)

REFERENCE

THIS PLAN IS BASED UPON AN OCTOBER 11, 2018 *CONCEPTUAL DEVELOPMENT PLAN* PREPARED BY NILES BOLTON ASSOCIATES

WHITESTONE ASSOCIATES, INC.
Environmental & Geotechnical Engineers & Consultants
16 OLD FORGE ROAD, SUITE A, ROCKY HILL, CT 06067
860.726.7889 WHITESTONEASSOC.COM

DRAWING TITLE: **BORING LOCATION PLAN**

CLIENT: **CAPSTONE COLLEGIATE COMMUNITIES, LLC**

PROJECT: PROPOSED STUDENT HOUSING DEVELOPMENT
MIDDLE TURNPIKE (U.S. ROUTE 44) & STORRS ROAD (CT ROUTE 195)
MANSFIELD, TOLLAND COUNTY, CONNECTICUT

PROJECT #: GM1816022.000	
DESIGNED BY: JL	PROJ. MGR.: RRR
DATE: 12/05/18	FIGURE: 1
SCALE: 1" = 100'	

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APPENDIX A
Records of Subsurface Exploration

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-1

Project:	Proposed Student Housing Development	**WAI Project No.:**	GM1816022.000
Location:	Middle Turnpike & Storrs Road, Mansfield, Tolland County, Connecticut	**Client:**	Capstone Collegiate Communities, LLC

Surface Elevation:	± NS feet above NAVD88	**Date Started:**	11/19/2018		**Water Depth (feet bgs)**	**Elevation (feet NAVD88)**	**Cave-In Depth (feet bgs)** / **Elevation (feet NAVD88)**
Termination Depth:	9.5 feet bgs	**Date Completed:**	11/19/2018				
Proposed Location:	Building	**Logged By:**	JM	**During:**	3.0	--	
Drill / Test Method:	HSA / SPT	**Contractor:**	OR	**At Completion:**	--	--	**At Completion:** -- / --
		Equipment:	Diedrich D-50	**12/3/2018**	0.8	--	**24 Hours:** -- / --

SAMPLE INFORMATION Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
						0.0			
							TS	8" Topsoil	
0 - 2	S-1	X	W O - 1 - 1 - 2 H	19	2		GLACIAL TILL	Brown, Very Loose, Silty Sand with Gravel (SM)	
2 - 4	S-2	X	4 - 13 - 18 - 22	20	31			As Above, Dense (SM)	
						5.0			
5 - 7	S-3	X	17 - 8 - 15 - 22	24	23			As Above, Medium Dense (SM)	
7 - 9	S-4	X	14 - 21 - 27 - 29	20	48			As Above, Dense (SM)	
						10.0		Boring Log B-1Terminated Upon Auger Refusal on Probable Bedrock at a Depth of 9.5 Feet Below Ground Surface.	Monitoring Well Installed
						15.0			
						20.0			
						25.0			

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-2

Project:	Proposed Student Housing Development	**WAI Project No.:**	GM1816022.000
Location:	Middle Turnpike & Storrs Road, Mansfield, Tolland County, Connecticut	**Client:**	Capstone Collegiate Communities, LLC

Surface Elevation:	± NS feet above NAVD88	**Date Started:**	11/19/2018	**Water Depth | Elevation** (feet bgs) | (feet NAVD88)		**Cave-In Depth | Elevation** (feet bgs) | (feet NAVD88)	
Termination Depth:	2.5 feet bgs	**Date Completed:**	11/19/2018				
Proposed Location:	Building	**Logged By:**	JM	**During:**	-- | --		
Drill / Test Method:	HSA / SPT	**Contractor:**	OR	**At Completion:**	-- | --	**At Completion:**	-- | --
		Equipment:	Diedrich D-50	**12/3/2018**	1.3 | --	**24 Hours:**	-- | --

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						0.0				
0 - .8	S-1	X	28 - 50/3"	8	-		TS		3" Topsoil	
							GLACIAL TILL		Brown, Dense, Silty Sand with Gravel (SM)	Offset Boring, Same Refusal
						5.0			Boring Log B-2 Terminated Upon Auger Refusal on Probable Bedrock at a Depth of 2.5 Feet Below Ground Surface.	Monitoring Well Installed
						10.0				
						15.0				
						20.0				
						25.0				

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-3

Project:	Proposed Student Housing Development	**WAI Project No.:**	GM1816022.000
Location:	Middle Turnpike & Storrs Road, Mansfield, Tolland County, Connecticut	**Client:**	Capstone Collegiate Communities, LLC

Surface Elevation:	± NS feet above NAVD88	**Date Started:**	11/19/2018	**Water Depth | Elevation** (feet bgs) | (feet NAVD88)	**Cave-In Depth | Elevation** (feet bgs) | (feet NAVD88)
Termination Depth:	5.0 feet bgs	**Date Completed:**	11/19/2018		
Proposed Location:	Building	**Logged By:**	JM	**During:** -- | --	
Drill / Test Method:	HSA / SPT	**Contractor:**	OR	**At Completion:** -- | --	**At Completion:** -- | --
		Equipment:	Diedrich D-50	**12/3/2018** 4.1 | --	**24 Hours:** -- | --

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						0.0				
							TS		4" Topsoil	
0 - 2	S-1	X	2 - 2 - 1 - 2	5	3		GLACIAL TILL		Brown, Very Loose, Silty Sand with Gravel (SM)	
2 - 4	S-2	X	2 - 2 - 4 - 4	12	6				As Above, Loose (SM)	
						5.0				
									Boring Log B-3 Terminated Upon Auger Refusal on Probable Bedrock at a Depth of 5.0 Feet Below Ground Surface.	Monitoring Well Installed
						10.0				
						15.0				
						20.0				
						25.0				

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-4

Project:	Proposed Student Housing Development	**WAI Project No.:**	GM1816022.000
Location:	Middle Turnpike & Storrs Road, Mansfield, Tolland County, Connecticut	**Client:**	Capstone Collegiate Communities, LLC

Surface Elevation:	± NS feet above NAVD88	**Date Started:**	11/19/2018	**Water Depth | Elevation** (feet bgs) | (feet NAVD88)		**Cave-In Depth | Elevation** (feet bgs) | (feet NAVD88)	
Termination Depth:	7.5 feet bgs	**Date Completed:**	11/19/2018				
Proposed Location:	Building	**Logged By:**	JM	**During:**	2.0 | --		
Drill / Test Method:	HSA / SPT	**Contractor:**	OR	**At Completion:**	-- | --	**At Completion:**	-- | --
		Equipment:	Diedrich D-50	**12/3/2018**	0.3 | --	**24 Hours:**	-- | --

SAMPLE INFORMATION						DEPTH	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)			
						0.0			
							TS	4" Topsoil	
0 - 2	S-1	X	6 - 3 - 3 - 9	13	6		GLACIAL TILL	Brown, Loose, Silty Sand with Gravel (SM)	
2 - 4	S-2	X	5 - 19 - 21 - 22	13	40			As Above, Dense (SM)	
						5.0			
5 - 7	S-3	X	17 - 17 - 36 - 75	12	53			As Above, Very Dense (SM)	
								Boring Log B-4 Terminated Upon Auger Refusal on Probable Bedrock at a Depth of 7.5 Feet Below Ground Surface.	Monitoring Well Installed
						10.0			
						15.0			
						20.0			
						25.0			

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-5

Project:	Proposed Student Housing Development	**WAI Project No.:**	GM1816022.000
Location:	Middle Turnpike & Storrs Road, Mansfield, Tolland County, Connecticut	**Client:**	Capstone Collegiate Communities, LLC

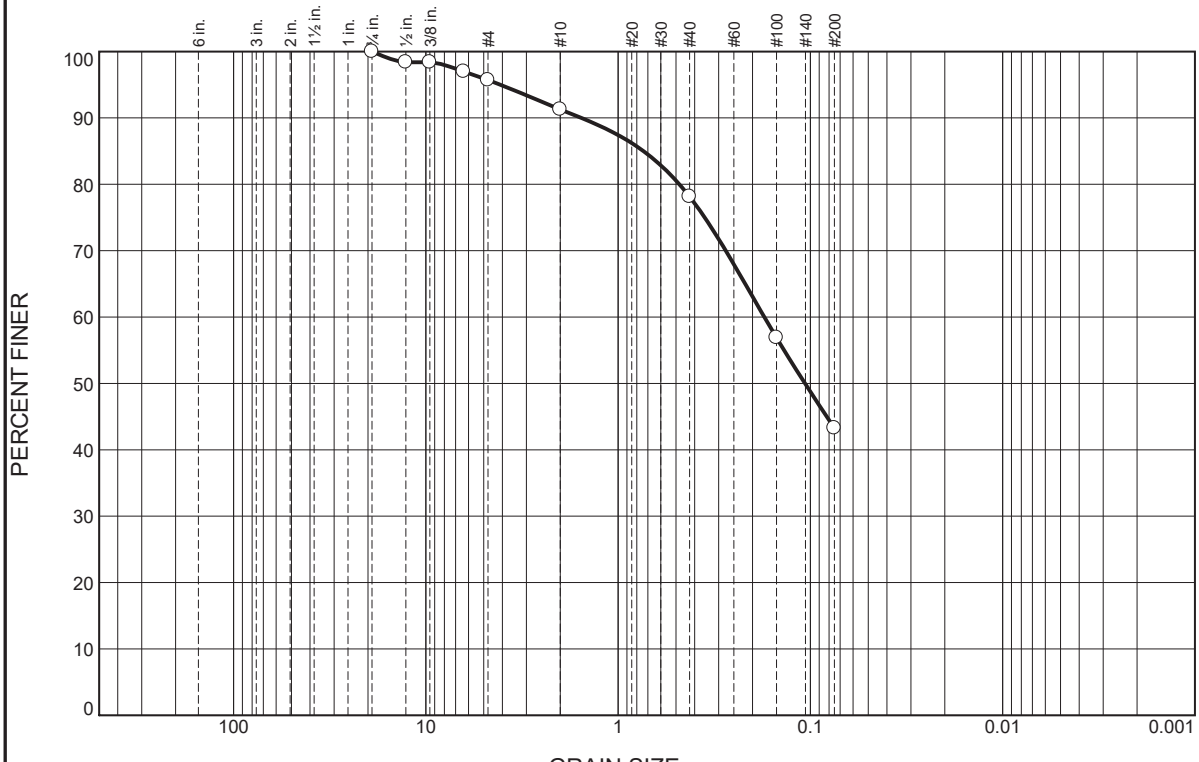
Surface Elevation:	± NS feet above NAVD88	**Date Started:**	11/19/2018	**Water Depth | Elevation** (feet bgs) | (feet NAVD88)		**Cave-In Depth | Elevation** (feet bgs) | (feet NAVD88)	
Termination Depth:	12.5 feet bgs	**Date Completed:**	11/19/2018				
Proposed Location:	Building	**Logged By:**	JM	**During:**	2.0 | --		
Drill / Test Method:	HSA / SPT	**Contractor:**	OR	**At Completion:**	-- | --	**At Completion:**	-- | --
		Equipment:	Diedrich D-50	**12/3/2018**	1.2 | --	**24 Hours:**	-- | --

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						0.0				
							TS		8" Topsoil	
0 - 2	S-1		W O - 2 - 4 - 8 H	10	6				Brown, Loose, Silty Sand with Gravel (SM)	
2 - 4	S-2		15 - 13 - 13 - 14	10	26				As Above, Medium Dense (SM)	
						5.0				
5 - 7	S-3		8 - 50 - 31 - 24	24	81		GLACIAL TILL		As Above, Very Dense (SM)	
7 - 9	S-4		26 - 41 - 37 - 35	24	78				As Above (SM)	
						10.0				
10 - 11.3	S-5		27 - 71 - 50/3"	11	>100				As Above (SM)	
									Boring Log B-5 Terminated Upon Auger Refusal on Probable Bedrock at a Depth of 12.5 Feet Below Ground Surface.	Monitoring Well Installed
						15.0				
						20.0				
						25.0				

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

APPENDIX B
Laboratory Test Results

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	4.3	4.4	13.2	34.8	43.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100.0		
1/2"	98.4		
3/8"	98.4		
1/4"	97.0		
#4	95.7		
#10	91.3		
#40	78.1		
#100	56.9		
#200	43.3		

* (no specification provided)

Soil Description

Silty Sand

Atterberg Limits

PL= NP LL= NV PI=

Coefficients

D_{90}= 1.5546 D_{85}= 0.7382 D_{60}= 0.1736
D_{50}= 0.1066 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-4(0)

Remarks

Moisture Content: 11.2%

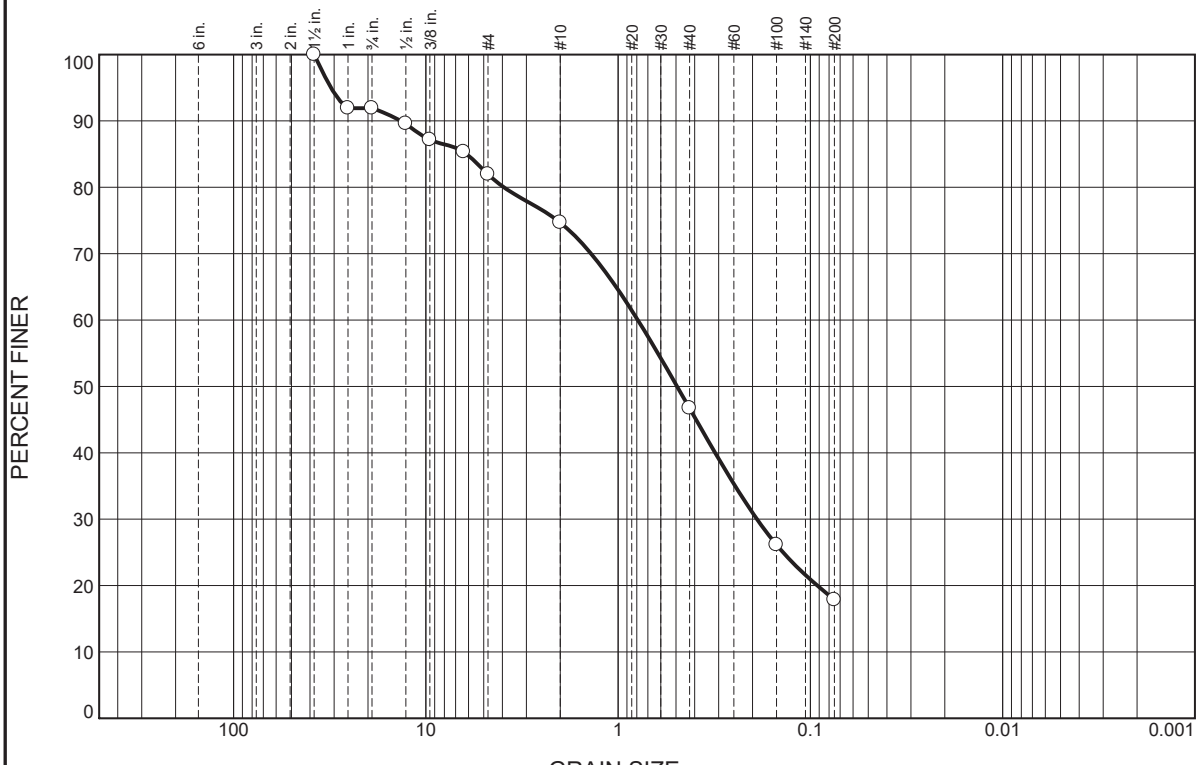
Location: B-1
Sample Number: S-3 **Depth:** 5'-7' **Date:** 11/26/2018

WHITESTONE ASSOCIATES, INC.
Environmental & Geotechnical Engineers & Consultants

Client: Capstone Collegiate Communities, LLC
Project: Proposed Student Housing Development
Middle Turnpike (Route 44) & Storrs Road (Route 195),
Project No: GM1816022.000 **Figure** S-1

Tested By: CN **Checked By:** RWM

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	8.1	10.0	7.2	28.0	28.8	17.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5"	100.0		
1"	91.9		
3/4"	91.9		
1/2"	89.6		
3/8"	87.2		
1/4"	85.3		
#4	81.9		
#10	74.7		
#40	46.7		
#100	26.1		
#200	17.9		

* (no specification provided)

Soil Description

Silty Sand with Gravel

Atterberg Limits

PL= NP LL= NV PI=

Coefficients

D_{90}= 13.4852 D_{85}= 6.1332 D_{60}= 0.7899
D_{50}= 0.4933 D_{30}= 0.1895 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-1-b

Remarks

Moisture Content: 15.0%

Location: B-5
Sample Number: S-2 **Depth:** 2'-4' **Date:** 11/26/18

WHITESTONE ASSOCIATES, INC.
Environmental & Geotechnical Engineers & Consultants

Client: Capstone Collegiate Communities, LLC
Project: Proposed Student Housing Development
Middle Turnpike (Route 44) & Storrs Road (Route 195),
Project No: GM1816022.000 **Figure** S-2

Tested By: CN **Checked By:** RWM

APPENDIX C
Supplemental Information
(USCS, Terms and Symbols)

WHITESTONE ASSOCIATES, INC.
Environmental & Geotechnical Engineers & Consultants

16 OLD FORGE ROAD
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UNIFIED SOIL CLASSIFICATION SYSTEM

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)	GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
			GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
			GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SAND AND SANDY SOILS	CLEAN SAND (LITTLE OR NO FINES)	SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
			SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE	SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)	SM	SILTY SANDS, SAND-SILT MIXTURES
			SC	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMITS LESS THAN 50	ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMITS GREATER THAN 50	MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS FOR SAMPLES WITH 5% TO 12% FINES

GRADATION*

% FINER BY WEIGHT	
TRACE	1% TO 10%
LITTLE	10% TO 20%
SOME	20% TO 35%
AND	35% TO 50%

COMPACTNESS*
Sand and/or Gravel

	RELATIVE DENSITY
LOOSE	0% TO 40%
MEDIUM DENSE	40% TO 70%
DENSE	70% TO 90%
VERY DENSE	90% TO 100%

CONSISTENCY*
Clay and/or Silt

	RANGE OF SHEARING STRENGTH IN POUNDS PER SQUARE FOOT
VERY SOFT	LESS THAN 250
SOFT	250 TO 500
MEDIUM	500 TO 1000
STIFF	1000 TO 2000
VERY STIFF	2000 TO 4000
HARD	GREATER THAN 4000

** VALUES ARE FROM LABORATORY OR FIELD TEST DATA, WHERE APPLICABLE. WHEN NO TESTING WAS PERFORMED, VALUES ARE ESTIMATED.*

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Other Office Locations:

WARREN, NJ 908.668.7777 | CHALFONT, PA 215.712.2700 | SOUTHBOROUGH, MA 508.485.0755 | WALL, NJ 732.592.2101 | STERLING, VA 703.464.5858 | EVERGREEN, CO 303.670.6905

WHITESTONE ASSOCIATES, INC.
Environmental & Geotechnical Engineers & Consultants

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GEOTECHNICAL TERMS AND SYMBOLS

SAMPLE IDENTIFICATION

The Unified Soil Classification System is used to identify the soil unless otherwise noted.

SOIL PROPERTY SYMBOLS

N: Standard Penetration Value: Blows per ft. of a 140 lb. hammer falling 30" on a 2" O.D. split-spoon.
Qu: Unconfined compressive strength, TSF.
Qp: Penetrometer value, unconfined compressive strength, TSF.
Mc: Moisture content, %.
LL: Liquid limit, %.
PI: Plasticity index, %.
δd: Natural dry density, PCF.
▼: Apparent groundwater level at time noted after completion of boring.

DRILLING AND SAMPLING SYMBOLS

NE: Not Encountered (Groundwater was not encountered).
SS: Split-Spoon - 1 ⅜" I.D., 2" O.D., except where noted.
ST: Shelby Tube - 3" O.D., except where noted.
AU: Auger Sample.
OB: Diamond Bit.
CB: Carbide Bit
WS: Washed Sample.

RELATIVE DENSITY AND CONSISTENCY CLASSIFICATION

Term (Non-Cohesive Soils)	Standard Penetration Resistance
Very Loose	0-4
Loose	4-10
Medium Dense	10-30
Dense	30-50
Very Dense	Over 50

Term (Cohesive Soils)	Qu (TSF)
Very Soft	0 - 0.25
Soft	0.25 - 0.50
Firm (Medium)	0.50 - 1.00
Stiff	1.00 - 2.00
Very Stiff	2.00 - 4.00
Hard	4.00+

PARTICLE SIZE

Boulders	8 in.+	Coarse Sand	5mm-0.6mm	Silt	0.074mm-0.005mm
Cobbles	8 in.-3 in.	Medium Sand	0.6mm-0.2mm	Clay	-0.005mm
Gravel	3 in.-5mm	Fine Sand	0.2mm-0.074mm		

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WHITESTONE
ASSOCIATES, INC.
Environmental & Geotechnical Engineers & Consultants

16 OLD FORGE ROAD
SUITE A
ROCKY HILL, CT 06067
860.726.7889
whitestoneassoc.com

January 8, 2019

via email

CAPSTONE COLLEGIATE COMMUNITIES, LLC
431 Office Park Drive
Birmingham, Alabama 35223

Attention: Ms. Amanda Wallis
Executive Vice President – Development

Regarding: SUPPLEMENTAL GEOTECHNICAL INVESTIGATION
ROCK PROBE SUMMARY
PROPOSED STUDENT HOUSING DEVELOPMENT
MIDDLE TURNPIKE (U.S. ROUTE 44) & STORRS ROAD (CT ROUTE 195)
MANSFIELD, TOLLAND COUNTY, CONNECTICUT
PARCEL NOs: 9.23.1, 9.23.7 & 9.23.8
WHITESTONE PROJECT NO.: GM1816022.001

Dear Ms. Wallis:

Whitestone Associates, Inc. (Whitestone) is pleased to submit this rock probe summary letter in support of the proposed student housing development referenced above. Whitestone previously provided a December 6, 2018 *Preliminary Geotechnical Investigation* for the site. Whitestone's supplemental geotechnical services were performed in accordance with our December 12, 2018 proposal.

PROJECT DETAILS

The project site is an approximately 19.2-acre, irregularly-shaped parcel located at the intersection of Middle Turnpike and Storrs Road in the Town of Mansfield, Tolland County, Connecticut currently developed with several residential buildings along Storrs Road. The remaining portions of the site are forested. Wetlands within the subject site reportedly limit the developable area to approximately 15.9 acres. Based on a review of available topographic maps and site reconnaissance, the site slopes down to the northeast from the approximate elevation of 660 feet above mean sea level (msl) to approximately 610 feet above msl.

The final design has not yet been determined, however, the client anticipates the proposed redevelopment will include approximately 200 residential units, separated into three-story to four-story buildings with associated parking, utilities, and recreational areas. It is expected that cuts and fills on the order of five feet to 10 feet and retaining walls or slopes may be required to develop the site. No stormwater management facilities have been identified at this time.

Whitestone's previously completed preliminary geotechnical investigation disclosed probable shallow bedrock at depths ranging from 2.5 feet below ground surface (fbgs) to 12.5 fbgs. Shallow bedrock can have a significant impact on site development costs. Based on the discovery of the shallow bedrock rock probing was requested to document bedrock topography beneath the site. The bedrock topography is intended to assist the design team in producing a cost-effective development plan for the site.

FIELD INVESTIGATION

Field exploration of the project site was conducted by means of 84 bedrock probes, identified as P-2 through P-85 (P-1 was inaccessible). Prior to mobilizing a rock probe drill Whitestone completed a field survey on December 19, 2018 to lay out probe locations and document apparent bedrock outcrops.

On December 26 through 28, 2018 Whitestone mobilized to the site to perform bedrock probes. The bedrock probes were advanced with a Furuwake HCR900 series rock drill to termination depths that ranged from approximately seven feet below ground surface (fbgs) to 23 fbgs. Probes were advanced approximately five feet beyond the apparent bedrock surface to help delineate between boulders and bedrock. Bedrock probe locations and estimated bedrock surface elevations contours are shown on the *Bedrock Surface Contour Plan*, included as Figure 1. Depth to bedrock is shown on the color-coded *Bedrock Depth Plan*, included as Figure 2. A table of probes and estimated bedrock depths is attached as Table 1.

PRELIMINARY FINDINGS

The shallow bedrock generally forms an irregular ridge across the mid-point of the site from west to east. However, there is a relatively large area of shallow bedrock at the south end of the site and a smaller area within the northeast quadrant.

Based on the results of the bedrock probes and the type of bedrock (metamorphosed schist) exposed in outcrops around the site, Whitestone considers that, apart from the upper foot or so, the rock will not be rippable. A portion of the bedrock could be removed with *Ho-Rams* (pneumatic hammers). This procedure would be aided by the soil seams encountered within the upper few feet of bedrock by the probes, which will allow easier removal of portions of the bedrock. However, blasting would likely be required for more extensive excavation.

Special measures should be employed for blasting, including pre- and post-blast surveys of neighboring properties and vibration monitoring during blasting. Blasting should be conducted by an experienced specialty contractor in accordance with applicable Town of Mansfield, State, and federal regulations. Care should be taken to minimize the amount of explosive charge used to reduce the likelihood of over-blast and to provide proper engineering controls during and following blasting operations. Engineering controls will include properly cleaning of loose shot rock from blasted surfaces and allowing the geotechnical engineer to inspect exposed rock conditions.

Rock pieces produced by blasting can be crushed and used on the site for roadway aggregate base and subbase and for crushed stone. Bedrock samples could be tested for L.A. Abrasion (AASHTO T96) and Soundness by Magnesium Sulfate (AASHTO T104) to determine if the bedrock meets the requirements for sale to the Connecticut Department of Transportation as fine and coarse aggregates, but given the bedrock type, its suitability is unlikely. However, regardless of the results of this testing, the crushed excavated rock will be suitable for reuse at the site for the proposed construction.

Whitestone appreciates being of continued service to Capstone Collegiate Communities, LLC. Please do not hesitate to contact us at with any questions regarding this summary letter.

Sincerely,

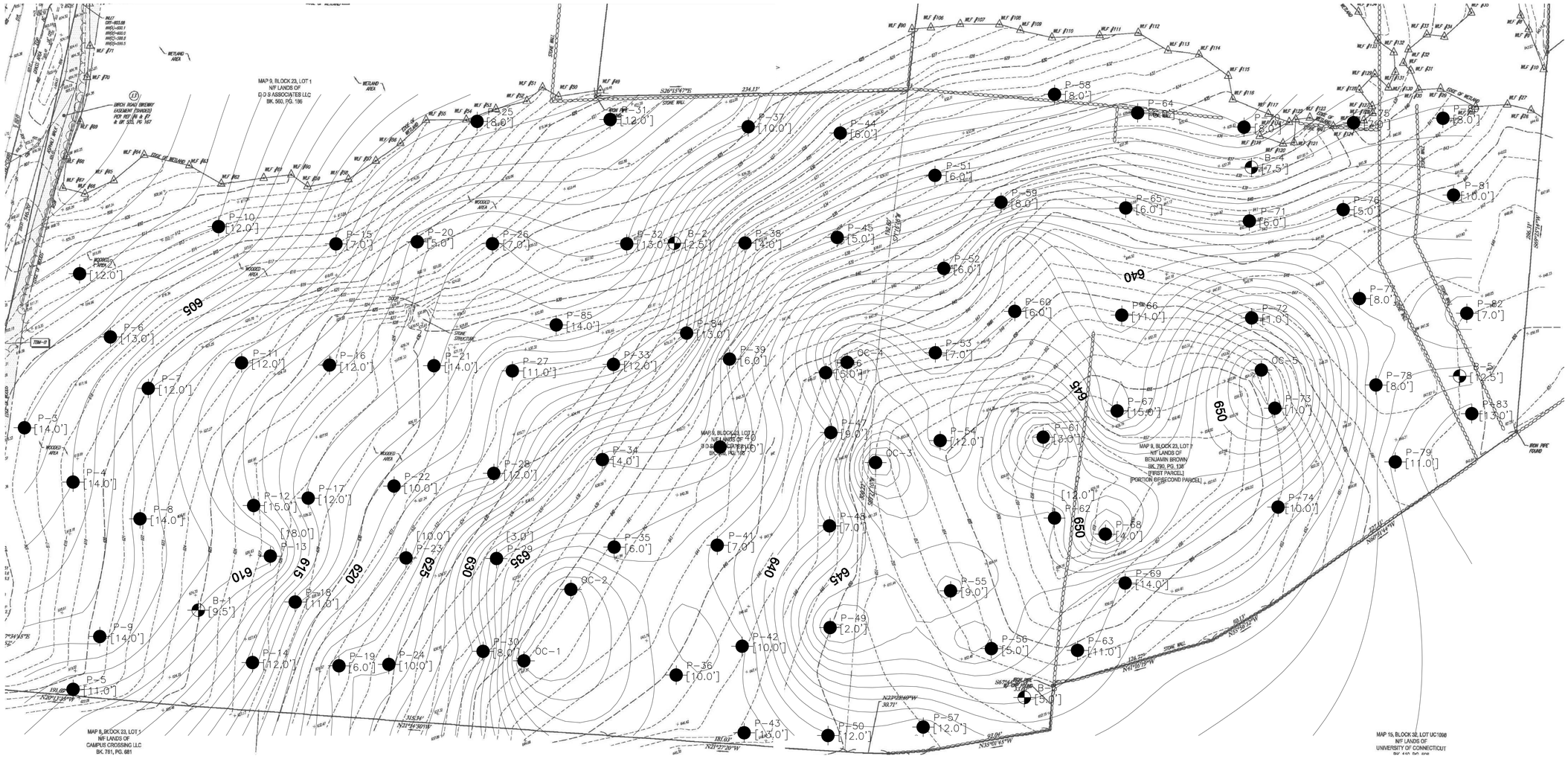
WHITESTONE ASSOCIATES, INC.

Jason R. Landry
Project Manager

Ryan R. Roy, P.E.
Principal, New England Region

JRL/hz N:\Job Folders\2018\1816022GM\Reports and Submittals\GM1816022 SuppGI Rock Probes.docx
Enclosures

FIGURE 1
Bedrock Surface Contour Plan



GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)

1 inch = 40 ft.

GRAPHIC SCALE

30 0 15 30 60 120

(IN FEET)

1 inch = 30 ft.

LEGEND

P-1	ROCK PROBE LOCATION (APPROX.)
[12.0']	APPROXIMATE DEPTH TO BEDROCK
650	APPROXIMATE BEDROCK SURFACE ELEVATION CONTOUR

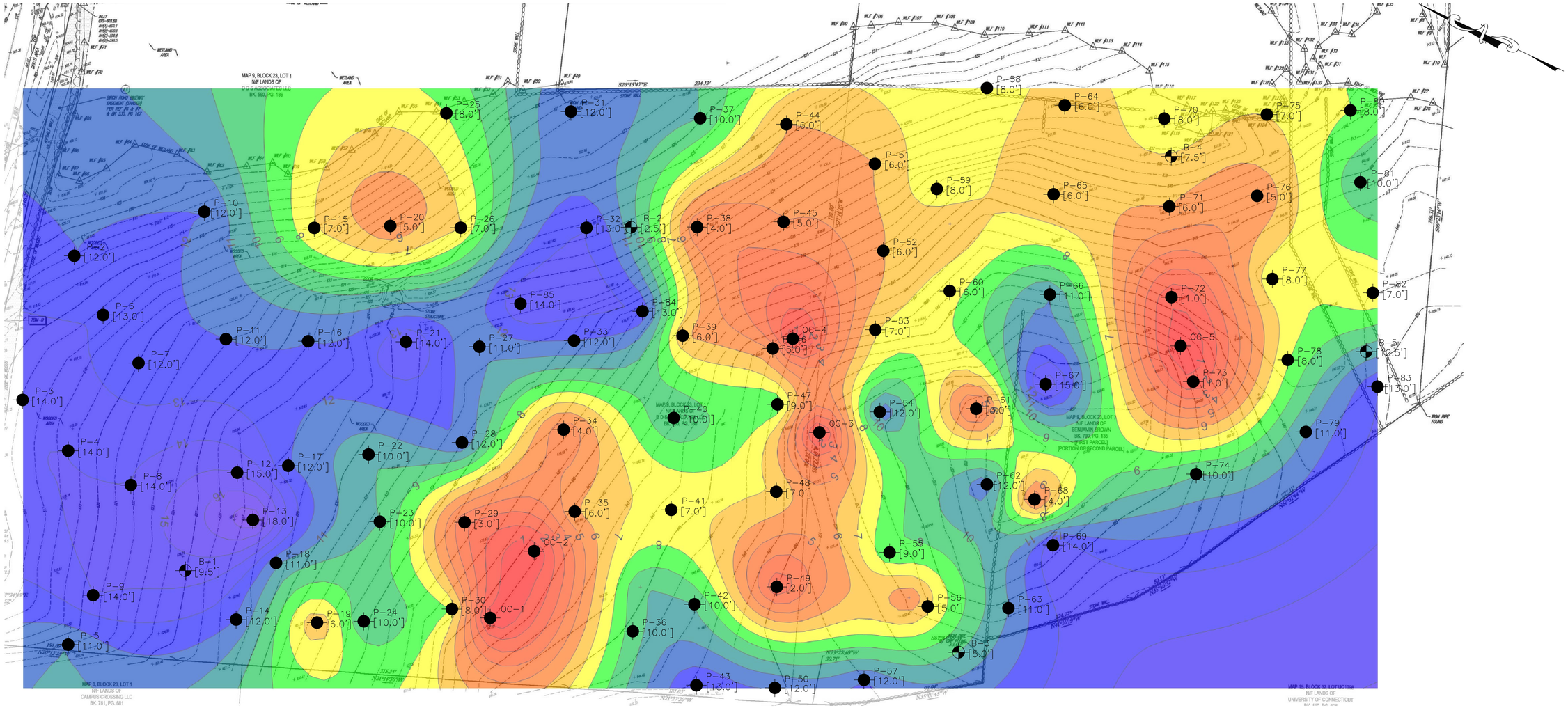
REFERENCE

THIS PLAN IS BASED UPON AN AUGUST 24, 2018 ALTA LAND SURVEY PREPARED BY CONTROL POINT ASSOCIATES, INC.

PROJECT #: GM1816022.001	DRAWING TITLE: BEDROCK SURFACE CONTOUR PLAN
DESIGNED BY: JL / PROJ. MGR.: RR	CLIENT: CAPSTONE COLLEGIATE COMMUNITIES, LLC
DATE: 01/07/19 / FIGURE: 1	PROJECT: PROPOSED STUDENT HOUSING DEVELOPMENT MIDDLE TURNPIKE (U.S. ROUTE 44) & STORRS ROAD (CT ROUTE 195) MANSFIELD, TOLLAND COUNTY, CONNECTICUT
SCALE: 1" = 40'	

WHITESTONE ASSOCIATES, INC.
Environmental & Geotechnical Engineers & Consultants
16 OLD FORGE ROAD, SUITE A, ROCKY HILL, CT 06067
860.726.7889 WHITESTONEASSOC.COM

FIGURE 2
Bedrock Depth Plan



LEGEND

P-1 — ROCK PROBE LOCATION (APPROX.)

[12.0'] — APPROXIMATE DEPTH TO BEDROCK

0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18 — APPROXIMATE DEPTH TO BEDROCK (FEET)

REFERENCE

THIS PLAN IS BASED UPON AN AUGUST 24, 2018 ALTA LAND SURVEY PREPARED BY CONTROL POINT ASSOCIATES, INC.

GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)

1 inch = 40 ft.

PROJECT #: GM1816022.001	DRAWING TITLE: BEDROCK DEPTH PLAN
DESIGNED BY: JL / PROJ. MGR.: RR	CLIENT: CAPSTONE COLLEGIATE COMMUNITIES, LLC
DATE: 01/07/19 / FIGURE: 2	PROJECT: PROPOSED STUDENT HOUSING DEVELOPMENT MIDDLE TURNPIKE (U.S. ROUTE 44) & STORRS ROAD (CT ROUTE 195) MANSFIELD, TOLLAND COUNTY, CONNECTICUT
SCALE: 1" = 40'	

WHITESTONE ASSOCIATES, INC.
Environmental & Geotechnical Engineers & Consultants
16 OLD FORGE ROAD, SUITE A, ROCKY HILL, CT 06067
860.726.7889 WHITESTONEASSOC.COM

Table 1
Estimated Bedrock Depths

ESTIMATED BEDROCK DEPTHS															
Probe No.	**Depth to Bedrock (fbgs)**	**Ground Elev. (ft)**	**Bedrock Elev. (ft)**	**Probe No.**	**Depth to Bedrock (fbgs)**	**Ground Elev. (ft)**	**Bedrock Elev. (ft)**	**Probe No.**	**Depth to Bedrock (fbgs)**	**Ground Elev. (ft)**	**Bedrock Elev. (ft)**	**Probe No.**	**Depth to Bedrock (fbgs)**	**Ground Elev. (ft)**	**Bedrock Elev. (ft)**
P-1	-	-	-	**P-26**	7	623.5	616.5	**P-51**	6	636	630	**P-76**	5	643	638
P-2	12	611.5	599.5	**P-27**	11	632.5	621.5	**P-52**	6	643	637	**P-77**	8	647	639
P-3	14	616	602	**P-28**	12	633.5	621.5	**P-53**	7	648.5	641.5	**P-78**	8	648	640
P-4	14	618	604	**P-29**	3	637	634	**P-54**	12	654.5	642.5	**P-79**	11	648.5	637.5
P-5	11	621	610	**P-30**	8	639	631	**P-55**	9	653	644	**P-80**	8	641.5	633.5
P-6	13	615.5	602.5	**P-31**	12	622	610	**P-56**	5	653	648	**P-81**	10	645.5	635.5
P-7	12	620	608	**P-32**	13	628	615	**P-57**	12	651	639	**P-82**	7	649	642
P-8	14	621.5	607.5	**P-33**	12	634	622	**P-58**	8	633	625	**P-83**	13	649.5	636.5
P-9	14	620.5	606.5	**P-34**	4	637	633	**P-59**	8	641	633	**P-84**	13	637	624
P-10	12	613	601	**P-35**	6	641	635	**P-60**	6	649	643	**P-85**	14	631.5	617.5
P-11	12	622.5	610.5	**P-36**	10	645.5	635.5	**P-61**	3	657.5	654.5	**OC1**	0	6401	641
P-12	15	627	612	**P-37**	10	625	615	**P-62**	12	658.5	646.5	**OC2**	0	640.5	640.5
P-13	18	627	609	**P-38**	4	634	630	**P-63**	11	654.5	643.5	**OC3**	0	652	652
P-14	12	627.5	615.5	**P-39**	6	640.5	634.5	**P-64**	6	635	629	**OC4**	0	646.5	646.5
P-15	7	615	608	**P-40**	10	642.5	632.5	**P-65**	6	643	637	**OC5**	0	653.5	653.5
P-16	12	625.5	613.5	**P-41**	7	644.5	637.5	**P-66**	11	651	640				
P-17	12	628.5	616.5	**P-42**	10	646.5	636.5	**P-67**	15	656	641				
P-18	11	629	618	**P-43**	13	649	636	**P-68**	4	658.5	654.5				
P-19	6	631	625	**P-44**	6	630.5	624.5	**P-69**	14	656.5	642.5				
P-20	5	620	615	**P-45**	5	638	633	**P-70**	8	636	628				
P-21	14	630.5	616.5	**P-46**	5	646.5	641.5	**P-71**	6	642.5	636.5				
P-22	10	630	620	**P-47**	9	648	639	**P-72**	1	649	648				
P-23	10	632.5	622.5	**P-48**	7	648	641	**P-73**	1	654	653				
P-24	10	634.5	624.5	**P-49**	2	650.5	648.5	**P-74**	10	654	644				
P-25	8	616	608	**P-50**	12	651	639	**P-75**	7	639.5	632.5				

WHITESTONE
ASSOCIATES, INC.
Environmental & Geotechnical Engineers & Consultants
Celebrating 25 Years 1994 – 2019

16 OLD FORGE ROAD
SUITE A
ROCKY HILL, CT 06067
860.726.7889
whitestoneassoc.com

November 21, 2019

via email

BOHLER ENGINEERING MA, LLC
16 Old Forge Road
Suite A
Rocky Hill, Connecticut 06067

Attention: Geoffrey Fitzgerald, P.E.
Branch Manager

Regarding: PRELIMINARY STORMWATER MANAGEMENT AREA EVALUATION
PROPOSED STUDENT HOUSING DEVELOPMENT
MIDDLE TURNPIKE (U.S. ROUTE 44) & STORRS ROAD (CT ROUTE 195)
MANSFIELD, TOLLAND COUNTY, CONNECTICUT
PARCEL NOs: 9.23.1, 9.23.7 & 9.23.8
WHITESTONE PROJECT NO.: PRO20194G.M19

Dear Mr. Fitzgerald:

Whitestone Associates, Inc. (Whitestone) is pleased to submit this summary letter regarding a preliminary stormwater management (SWM) area evaluation in support of the proposed student housing development referenced above. This letter is based on information provided in a November 12, 2019 *Grading Plan* provided by Bohler Engineering MA, LLC (Bohler).

SITE DESCRIPTION

The project site is an approximately 19.2-acre, irregularly-shaped parcel located at the intersection of Middle Turnpike and Storrs Road in the Town of Mansfield, Tolland County, Connecticut. The site is developed with several residential buildings along Storrs Road. The remaining portions of the site are forested or covered by wetlands. Approximately 15.9 acres of the site can be developed. The remaining portion of the site is not suitable for development due to wetland impacts. Based on a review of available topographic maps, the site slopes to the northeast from the approximate elevation of 660 feet to approximately 620 feet as compared to the National American Vertical Datum of 1988 (NAVD). Four SWM areas are proposed along the eastern site property line.

FIELD INVESTIGATION & TESTING

On November 14, 2019 Whitestone monitored the excavation of twelve test pits. Test pit locations were determined in the field by a Bohler representative and are shown on the attached plan, a November 22, 2019, *Test Pit Exhibit* prepared by Bohler. Site subsurface conditions at the exploration locations generally consisted of forest mat or topsoil underlain by glacial till. The glacial till consisted of a mixture of silty sand, gravel, cobbles and boulders. *Records of Subsurface Exploration* are attached.

In order to evaluate in-situ infiltration rates a total of nine samples were collected and subjected to falling head infiltration testing in general conformance with Connecticut Department of Energy & Environmental Protection procedures. The results of the laboratory testing are summarized in the following table:

Falling Head Saturated Hydraulic Conductivity Test, K_{SAT} (in/hr)								
TP-1	**TP-2**	**TP-3**	**TP-7**	**TP-8**	**TP-9**	**TP-10**	**TP-11**	**TP-12**
0.02	8.76	1.47	0.06	0.08	9.46	0.10	2.74	0.25

A sample was not collected from test pit TP-4, however, soil conditions within TP-4 were consistent with those observed within TP-2. Infiltration conditions within TP-4 are expected to be similar to TP-2.

Whitestone appreciates the opportunity to be of continued service to Bohler Engineering MA, LLC. Please contact us with any questions regarding this proposal.

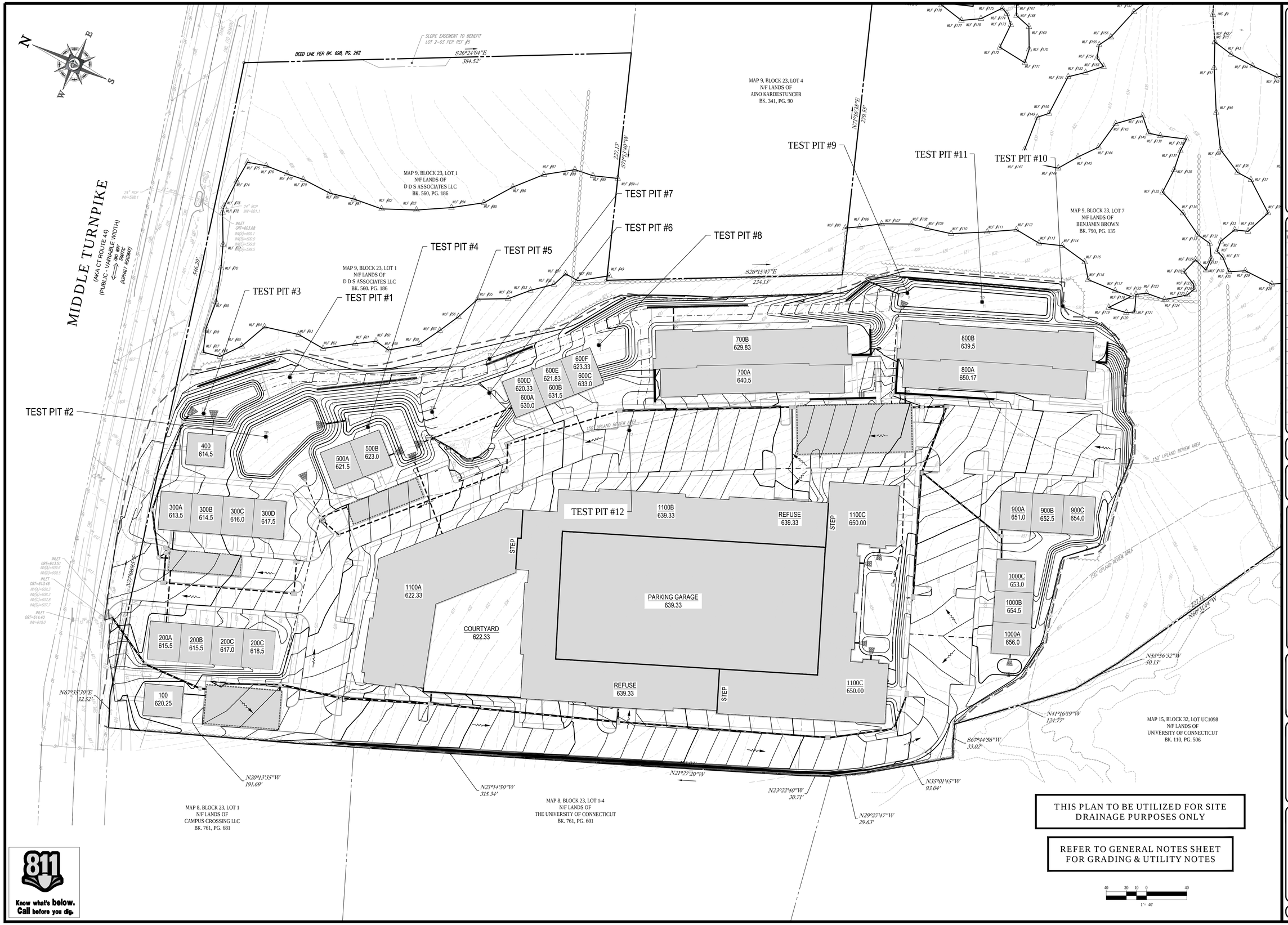
Sincerely,

WHITESTONE ASSOCIATES, INC.

Jason R. Landry
Project Manager

Ryan R. Roy, P.E.
Principal, New England Region

JRL/hz N:\Proposal Folders\2019\PRO20194G.M19\Reports and Submittals\Mansfield CT-SWMA(PRO20194G.M19).docx
Enclosures



Know what's below. Call before you dig.

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SITE CIVIL AND CONSULTING ENGINEERING
LAND SURVEYING · PROGRAM MANAGEMENT · LANDSCAPE ARCHITECTURE
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LOCATIONS:
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THE INFORMATION, DRAWINGS, SPECIFICATIONS AND OTHER DOCUMENTS AND DATA ON THIS SITE ARE THE PROPERTY OF BOHLER ENGINEERING AND MAY BE USED ONLY FOR THE PROJECT AND PURPOSE SPECIFIED BY BOHLER ENGINEERING.

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REVISIONS

REV	DATE	COMMENT	BY
1	09/23/19	DRAINAGE FLOWS	MAA
2	10/18/19	3rd PARTY REVIEW COMMENTS	MAA
3	11/12/19	3rd PARTY REVIEW COMMENTS	MAA
4	11/22/19	3rd PARTY REVIEW COMMENTS	MAA
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			

PERMIT SET

PROJECT No.:	CT181007
DRAWN BY:	MAA
CHECKED BY:	GPF
DATE:	08/22/19
SCALE:	AS NOTED
CAD I.D.:	TB-CT181007ss0

PROJECT:

RESIDENTIAL DEVELOPMENT

FOR

CAPSTONE COLLEGIATE COMMUNITIES, LLC

LOCATION OF SITE

1621 STORRS RD & MIDDLE TPKE
LOTS 1, 7, & 8, BLOCK 23, MAP 9
TOWN OF MANSFIELD
STATE OF CONNECTICUT

BOHLER ENGINEERING
16 OLD FORGE ROAD, SUITE A
ROCKY HILL, CT 06067
Phone: (860) 333-8900
Fax: (508) 480-9080
www.BohlerEngineering.com

SHEET TITLE:

TEST PIT EXHIBIT

SHEET NUMBER:

7
OF 24

REV 3 - 11/12/2019

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-1

Page 1 of 1

Project:	Proposed Student Housing Development	**WAI Project No.:**	PRO20194G.M19
Location:	Middle Turnpike and Storrs Road in the Town of Mansfield, Tolland County, Connecticut	**Client:**	Bohler Engineering MA, LLC

Surface Elevation:	± NS feet above msl	**Date Started:**	11/14/2019		**Water Depth (feet bgs)**	**Elevation (feet msl)**	**Cave-In Depth (feet bgs)** / **Elevation (feet msl)**
Termination Depth:	7.3 feet bgs	**Date Completed:**	11/14/2019				
Proposed Location:		**Logged By:**	DC	**During:**			
Excavating Method:	Test Pit Excavation	**Contractor:**	JS	**At Completion:**	6.8		**At Completion:**
Test Method:	Visual Observation	**Rig Type:**	Kobelco SK55	**24 Hours:**			

SAMPLE INFORMATION Depth (ft.)	Number	Type	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
			0.0			
				TS	10" Forest Mat	
2.3	TS-1	1.25" Tube		GLACIAL TILL	Brown, Silty Sand with Gravel, Cobbles, Boulders (SM)	Roots to 3.5 fbgs
					Orange/Rust Mottling	Seasonal High GWT @ 3.5 fbgs
			5.0			
					Test Pit Log TP-1 Terminated at a Depth of 7.3 Feet Below Ground Surface Upon Refusal on Probable Bedrock.	
			10.0			
			15.0			

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-2

Page 1 of 1

Project:	Proposed Student Housing Development	**WAI Project No.:**	PRO20194G.M19
Location:	Middle Turnpike and Storrs Road in the Town of Mansfield, Tolland County, Connecticut	**Client:**	Bohler Engineering MA, LLC

Surface Elevation:	± NS feet above msl	**Date Started:**	11/14/2019	**Water Depth (feet bgs) | Elevation (feet msl)**	**Cave-In Depth (feet bgs) | Elevation (feet msl)**
Termination Depth:	6.3 feet bgs	**Date Completed:**	11/14/2019		
Proposed Location:		**Logged By:**	DC	**During:**	
Excavating Method:	Test Pit Excavation	**Contractor:**	JS	**At Completion:** 6.3	**At Completion:**
Test Method:	Visual Observation	**Rig Type:**	Kobelco SK55	**24 Hours:**	

SAMPLE INFORMATION Depth (ft.)	Number	Type	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
			0.0			
				TS	10" Forest Mat	
2.5	TS-2	1.25" Tube		GLACIAL TILL	Brown, Silty Sand with Gravel, Cobbles, Boulders (SM) Orange/Rust Mottling Light Brown, Silty Sand with Gravel, Cobbles, Boulders (SM)	Seasonal High GWT @ 2.8 fbgs
			5.0			
			10.0		Test Pit Log TP-2 Terminated at a Depth of 6.3 Feet Below Ground Surface Upon Refusal on Probable Bedrock.	
			15.0			

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-3

Page 1 of 1

Project:	Proposed Student Housing Development	**WAI Project No.:**	PRO20194G.M19
Location:	Middle Turnpike and Storrs Road in the Town of Mansfield, Tolland County, Connecticut	**Client:**	Bohler Engineering MA, LLC

Surface Elevation:	± NS feet above msl	**Date Started:**	11/14/2019		**Water Depth (feet bgs)**	**Elevation (feet msl)**	**Cave-In Depth (feet bgs)** / **Elevation (feet msl)**
Termination Depth:	7.5 feet bgs	**Date Completed:**	11/14/2019				
Proposed Location:		**Logged By:**	DC	**During:**			
Excavating Method:	Test Pit Excavation	**Contractor:**	JS	**At Completion:**	7.0		**At Completion:**
Test Method:	Visual Observation	**Rig Type:**	Kobelco SK55	**24 Hours:**			

SAMPLE INFORMATION Depth (ft.)	Number	Type	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
			0.0			
				TS	11" Forest Mat	
					Brown, Silty Sand with Gravel, Cobbles, Boulders (SM)	
3.0	TS-3	1.25" Tube				Roots to 3 fbgs
				GLACIAL TILL	Orange/Rust Mottling	Seasonal High GWT @3.3 fbgs
			5.0		Gray to Light Brown, Silty Sand (SM)	
					Test Pit Log TP-3 Terminated at a Depth of 7.5 Feet Below Ground Surface Upon Refusal on Probable Bedrock.	
			10.0			
			15.0			

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-4

Page 1 of 1

Project:	Proposed Student Housing Development	**WAI Project No.:**	PRO20194G.M19
Location:	Middle Turnpike and Storrs Road in the Town of Mansfield, Tolland County, Connecticut	**Client:**	Bohler Engineering MA, LLC

Surface Elevation:	± NS feet above msl	**Date Started:**	11/14/2019		**Water Depth (feet bgs)**	**Elevation (feet msl)**	**Cave-In Depth (feet bgs)** / **Elevation (feet msl)**
Termination Depth:	7.5 feet bgs	**Date Completed:**	11/14/2019				
Proposed Location:		**Logged By:**	DC	**During:**			
Excavating Method:	Test Pit Excavation	**Contractor:**	JS	**At Completion:**	7.3		**At Completion:**
Test Method:	Visual Observation	**Rig Type:**	Kobelco SK55	**24 Hours:**			

SAMPLE INFORMATION Depth (ft.)	Number	Type	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
			0.0			
				TS	10" Forest Mat	
				GLACIAL TILL	Brown, Silty Sand with Gravel, Cobbles, Boulders (SM)	
					Orange/Rust Mottling	Seasonal High GWT @ 3 fbgs
						Roots to 3.5 fbgs
					Light Brown, Silty Sand with Gravel, Cobbles, Boulders (SM)	
			5.0			
					Test Pit Log TP-4 Terminated at a Depth of 7.5 Feet Below Ground Surface Upon Refusal on Probable Bedrock.	
			10.0			
			15.0			

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-5

Page 1 of 1

Project:	Proposed Student Housing Development	**WAI Project No.:**	PRO20194G.M19
Location:	Middle Turnpike and Storrs Road in the Town of Mansfield, Tolland County, Connecticut	**Client:**	Bohler Engineering MA, LLC

Surface Elevation:	± NS feet above msl	**Date Started:**	11/14/2019		**Water Depth (feet bgs)**	**Elevation (feet msl)**	**Cave-In Depth (feet bgs)** / **Elevation (feet msl)**
Termination Depth:	5.0 feet bgs	**Date Completed:**	11/14/2019				
Proposed Location:		**Logged By:**	DC	**During:**			
Excavating Method:	Test Pit Excavation	**Contractor:**	JS	**At Completion:**	4.3		**At Completion:**
Test Method:	Visual Observation	**Rig Type:**	Kobelco SK55	**24 Hours:**			

SAMPLE INFORMATION Depth (ft.)	Number	Type	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
			0.0			
				TS	14" Forest Mat	
				GLACIAL TILL	Brown, Silty Sand with Gravel, Cobbles, Boulders (SM)	Roots to 3.0 fbgs
					Orange/Rust Mottling	Seasonal High GWT @ 3.0 fbgs
			5.0			
					Test Pit Log TP-5 Terminated at a Depth of 5.0 Feet Below Ground Surface Upon Refusal on Probable Bedrock.	
			10.0			
			15.0			

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-6

Project:	Proposed Student Housing Development	**WAI Project No.:**	PRO20194G.M19
Location:	Middle Turnpike and Storrs Road in the Town of Mansfield, Tolland County, Connecticut	**Client:**	Bohler Engineering MA, LLC

Surface Elevation:	± NS feet above msl	**Date Started:**	11/14/2019	**Water Depth (feet bgs) | Elevation (feet msl)**	**Cave-In Depth (feet bgs) | Elevation (feet msl)**
Termination Depth:	3.5 feet bgs	**Date Completed:**	11/14/2019		
Proposed Location:		**Logged By:**	DC	**During:**	
Excavating Method:	Test Pit Excavation	**Contractor:**	JS	**At Completion:**	**At Completion:**
Test Method:	Visual Observation	**Rig Type:**	Kobelco SK55	**24 Hours:**	

SAMPLE INFORMATION Depth (ft.)	Number	Type	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
			0.0			
				TS	12" Forest Mat	
				GLACIAL TILL	Brown, Silty Sand with Gravel, Cobbles, Boulders (SM)	No Seasonal High GWT Evidence
			5.0		Test Pit Log TP-6 Terminated at a Depth of 3.5 Feet Below Ground Surface Upon Refusal on Probable Bedrock.	
			10.0			
			15.0			

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-7

Page 1 of 1

Project:	Proposed Student Housing Development	**WAI Project No.:**	PRO20194G.M19
Location:	Middle Turnpike and Storrs Road in the Town of Mansfield, Tolland County, Connecticut	**Client:**	Bohler Engineering MA, LLC

Surface Elevation:	± NS feet above msl	**Date Started:**	11/14/2019		**Water Depth (feet bgs)**	**Elevation (feet msl)**	**Cave-In Depth (feet bgs)** / **Elevation (feet msl)**
Termination Depth:	6.5 feet bgs	**Date Completed:**	11/14/2019				
Proposed Location:		**Logged By:**	DC	**During:**			
Excavating Method:	Test Pit Excavation	**Contractor:**	JS	**At Completion:**	4.3		**At Completion:**
Test Method:	Visual Observation	**Rig Type:**	Kobelco SK55	**24 Hours:**			

SAMPLE INFORMATION Depth (ft.)	Number	Type	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
			0.0			
				TS	11" Forest Mat	
2.5	TS-4	1.25" Tube	5.0	GLACIAL TILL	Brown, Silty Sand with Gravel, Cobbles, Boulders (SM) Orange/Rust Mottling Light Brown, Silty Sand with Gravel, Cobbles, Boulders (SM)	Seasonal High GWT @2.5 fbgs Roots to 2.5 fbgs
			10.0 15.0		Test Pit Log TP-7 Terminated at a Depth of 6.5 Feet Below Ground Surface Upon Refusal on Probable Bedrock.	

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-8

Page 1 of 1

Project:	Proposed Student Housing Development	**WAI Project No.:**	PRO20194G.M19
Location:	Middle Turnpike and Storrs Road in the Town of Mansfield, Tolland County, Connecticut	**Client:**	Bohler Engineering MA, LLC

Surface Elevation:	± NS feet above msl	**Date Started:**	11/14/2019	**Water Depth (feet bgs) | Elevation (feet msl)**	**Cave-In Depth (feet bgs) | Elevation (feet msl)**
Termination Depth:	6.5 feet bgs	**Date Completed:**	11/14/2019		
Proposed Location:		**Logged By:**	DC	**During:**	
Excavating Method:	Test Pit Excavation	**Contractor:**	JS	**At Completion:** 3.8	**At Completion:**
Test Method:	Visual Observation	**Rig Type:**	Kobelco SK55	**24 Hours:**	

SAMPLE INFORMATION Depth (ft.)	Number	Type	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
			0.0			
				TS	12" Forest Mat	
2.3	TS-5	1.25" Tube	5.0	GLACIAL TILL	Brown, Silty Sand with Gravel, Cobbles, Boulders (SM) Orange/Rust Mottling	Roots to 2.8 fbgs Seasonal High GWT @3.0 fbgs
			10.0 15.0		Test Pit Log TP-8 Terminated at a Depth of 6.5 Feet Below Ground Surface Upon Refusal on Probable Bedrock.	

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-9

Page 1 of 1

Project:	Proposed Student Housing Development	**WAI Project No.:**	PRO20194G.M19
Location:	Middle Turnpike and Storrs Road in the Town of Mansfield, Tolland County, Connecticut	**Client:**	Bohler Engineering MA, LLC

Surface Elevation:	± NS feet above msl	**Date Started:**	11/14/2019		**Water Depth (feet bgs)**	**Elevation (feet msl)**	**Cave-In Depth (feet bgs)** / **Elevation (feet msl)**
Termination Depth:	6.5 feet bgs	**Date Completed:**	11/14/2019				
Proposed Location:		**Logged By:**	DC	**During:**	6.3		
Excavating Method:	Test Pit Excavation	**Contractor:**	JS	**At Completion:**			**At Completion:**
Test Method:	Visual Observation	**Rig Type:**	Kobelco SK55	**24 Hours:**			

SAMPLE INFORMATION Depth (ft.)	Number	Type	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
			0.0			
				TS	12" Forest Mat	
3.0	TS-6	1.25" Tube	5.0	GLACIAL TILL	Brown, Silty Sand with Gravel, Cobbles, Boulders (SM) Orange/Rust Mottling	Roots to 4.0 fbgs Seasonal High GWT @ 4.25 fbgs
			10.0 15.0		Test Pit Log TP-9 Terminated at a Depth of 6.5 Feet Below Ground Surface Upon Refusal on Probable Bedrock.	

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-10

Page 1 of 1

Project:	Proposed Student Housing Development	**WAI Project No.:**	PRO20194G.M19
Location:	Middle Turnpike and Storrs Road in the Town of Mansfield, Tolland County, Connecticut	**Client:**	Bohler Engineering MA, LLC

Surface Elevation:	± NS feet above msl	**Date Started:**	11/14/2019		**Water Depth (feet bgs)**	**Elevation (feet msl)**	**Cave-In Depth (feet bgs)** / **Elevation (feet msl)**
Termination Depth:	5.5 feet bgs	**Date Completed:**	11/14/2019				
Proposed Location:		**Logged By:**	DC	**During:**	6.3		
Excavating Method:	Test Pit Excavation	**Contractor:**	JS	**At Completion:**			**At Completion:**
Test Method:	Visual Observation	**Rig Type:**	Kobelco SK55	**24 Hours:**			

SAMPLE INFORMATION Depth (ft.)	Number	Type	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
			0.0			
				TS	15" Topsoil	
2.5	S-1	Grab		GLACIAL TILL	Brown, Silty Sand with Gravel, Cobbles, Boulders (SM)	Roots to 3.0 fbgs
					Gray Silty Sand with Gravel (4.3 fbgs to 4.5 fbgs)	Seasonal High GWT @ 3.3 fbgs
					Brown, Silty Sand with Gravel, Cobbles, Boulders (SM)	
			5.0			Wet at Bottom of TP
					Test Pit Log TP-10 Terminated at a Depth of 5.5 Feet Below Ground Surface Upon Refusal on Probable Bedrock.	
			10.0			
			15.0			

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-11

Page 1 of 1

Project:	Proposed Student Housing Development	**WAI Project No.:**	PRO20194G.M19
Location:	Middle Turnpike and Storrs Road in the Town of Mansfield, Tolland County, Connecticut	**Client:**	Bohler Engineering MA, LLC

Surface Elevation:	± NS feet above msl	**Date Started:**	11/14/2019		**Water Depth (feet bgs)**	**Elevation (feet msl)**	**Cave-In Depth (feet bgs)** / **Elevation (feet msl)**
Termination Depth:	5.5 feet bgs	**Date Completed:**	11/14/2019				
Proposed Location:		**Logged By:**	DC	**During:**	6.3		
Excavating Method:	Test Pit Excavation	**Contractor:**	JS	**At Completion:**			**At Completion:**
Test Method:	Visual Observation	**Rig Type:**	Kobelco SK55	**24 Hours:**			

SAMPLE INFORMATION Depth (ft.)	Number	Type	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
			0.0			
				TS	15" Topsoil	
				GLACIAL TILL	Brown, Silty Sand with Gravel, Cobbles, Boulders (SM)	
4.0	S-2	Grab	5.0		Brown, Silty Sand with Gravel, Cobbles, Boulders (SM)	Seasonal High GWT @ 5.0 fbgs Wet at Bottom of TP
			10.0 15.0		Test Pit Log TP-11 Terminated at a Depth of 5.5 Feet Below Ground Surface Upon Refusal on Probable Bedrock.	

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-12

Page 1 of 1

Project:	Proposed Student Housing Development	**WAI Project No.:**	PRO20194G.M19
Location:	Middle Turnpike and Storrs Road in the Town of Mansfield, Tolland County, Connecticut	**Client:**	Bohler Engineering MA, LLC

Surface Elevation:	± NS feet above msl	**Date Started:**	11/14/2019	**Water Depth (feet bgs) | Elevation (feet msl)**	**Cave-In Depth (feet bgs) | Elevation (feet msl)**
Termination Depth:	6.8 feet bgs	**Date Completed:**	11/14/2019		
Proposed Location:		**Logged By:**	DC	**During:**	
Excavating Method:	Test Pit Excavation	**Contractor:**	JS	**At Completion:**	**At Completion:**
Test Method:	Visual Observation	**Rig Type:**	Kobelco SK55	**24 Hours:**	

SAMPLE INFORMATION Depth (ft.)	Number	Type	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
			0.0			
				TS	10" Topsoil	
				GLACIAL TILL	Brown, Silty Sand with Gravel, Cobbles, Boulders (SM)	
4.5	S-3	Grab	5.0		Gray to Light Brown, Silty Sand with Gravel, Cobbles, Boulders (SM)	Seasonal High GWT @ 5.0 fbgs
			10.0		Test Pit Log TP-12 Terminated at a Depth of 6.8 Feet Below Ground Surface Upon Refusal on Probable Bedrock.	
			15.0			

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE
ASSOCIATES, INC.
Environmental & Geotechnical Engineers & Consultants
Celebrating 25 Years 1994 – 2019

16 OLD FORGE ROAD
SUITE A
ROCKY HILL, CT 06067
860.726.7889
whitestoneassoc.com

December 24, 2019

via email

BOHLER ENGINEERING MA, LLC
16 Old Forge Road
Suite A
Rocky Hill, Connecticut 06067

Attention: Geoffrey Fitzgerald, P.E.
Branch Manager

Regarding: SUPPLEMENTAL STORMWATER MANAGEMENT AREA EVALUATION
PROPOSED STUDENT HOUSING DEVELOPMENT
MIDDLE TURNPIKE (U.S. ROUTE 44) & STORRS ROAD (CT ROUTE 195)
MANSFIELD, TOLLAND COUNTY, CONNECTICUT
PARCEL NOs: 9.23.1, 9.23.7 & 9.23.8
WHITESTONE PROJECT NO.: GM1916845.000

Dear Mr. Fitzgerald:

Whitestone Associates, Inc. (Whitestone) is pleased to submit this summary letter regarding the supplemental stormwater management (SWM) area evaluation in support of the proposed student housing development referenced above. This letter is based on information provided in the November 22, 2019, *Test Pit Exhibit* provided by Bohler Engineering MA, LLC (Bohler). Whitestone previously performed a preliminary SWM evaluation at this site on November 14, 2019.

SITE DESCRIPTION

The project site is an approximately 19.2-acre, irregularly shaped parcel located at the intersection of Middle Turnpike and Storrs Road in the Town of Mansfield, Tolland County, Connecticut. The site is developed with several residential buildings along Storrs Road. The remaining portions of the site are forested or covered by wetlands. Approximately 15.9 acres of the site can be developed. The remaining portion of the site is not suitable for development due to wetland impacts. Based on a review of available topographic maps, the site slopes to the northeast from the approximate elevation of 660 feet to approximately 620 feet as compared to the National American Vertical Datum of 1988 (NAVD).

FIELD INVESTIGATION & TESTING

On December 5, 2019 and December 10, 2019, Whitestone monitored the excavation of 10 test pits. Test pit locations were determined in the field by a Bohler representative and are shown on the attached *Test Pit Exhibit* provided by Bohler. Site subsurface conditions at the exploration locations generally consisted of

forest mat or topsoil underlain by glacial till. The glacial till consisted of a mixture of silty sand, gravel, cobbles and boulders. *Records of Subsurface Exploration* are attached.

In order to evaluate *in-situ* infiltration rates, a total of 10 samples were collected and subjected to falling head infiltration testing in general conformance with Connecticut Department of Energy & Environmental Protection procedures. The results of the laboratory testing are summarized in the following table:

Falling Head Saturated Hydraulic Conductivity Test, K_{SAT} (inches/hour)									
TP-13	**TP-14**	**TP-15**	**TP-16**	**TP-17**	**TP-18**	**TP-19**	**TP-20**	**TP-21**	**TP-22**
8.63	16.81	0.93	4.02	*	0.76	5.75	18.41	7.08	1.16

* infiltration undetectable - considered impermeable

Whitestone appreciates the opportunity to be of continued service to Bohler Engineering MA, LLC. Please contact us with any questions regarding this report.

Sincerely,

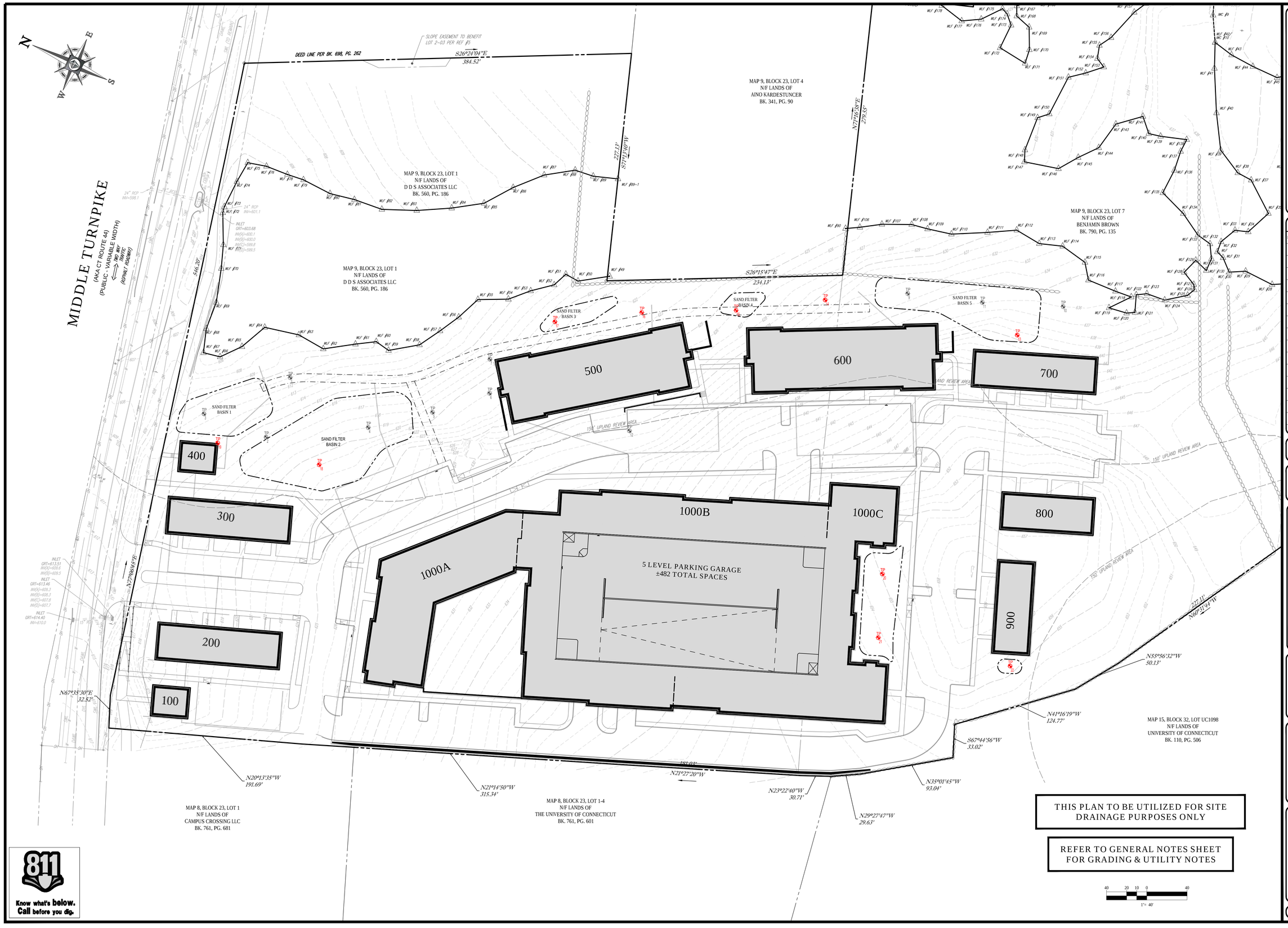
WHITESTONE ASSOCIATES, INC.

Jason R. Landry
Project Manager

Ryan R. Roy, P.E.
Principal, New England Region

JRL/hz N:\Job Folders\2019\1916845GM\Reports and Submittals\Mansfield CT-SWMA(GM1916845.000).docx
Enclosures

FIGURE 1
Test Location Plan



BOHLER ENGINEERING

SITE CIVIL AND CONSULTING ENGINEERING
LAND SURVEYING PROGRAM MANAGEMENT LANDSCAPE ARCHITECTURE
SUSTAINABLE DESIGN PUBLIC OUTREACH TRANSPORTATION SERVICES

◆ UPSTATE NEW YORK
◆ NEW ENGLAND
◆ BOSTON, MA
◆ BUFFALO, NY
◆ NEW YORK METRO
◆ NORTHERN NEW JERSEY
◆ SOUTHERN NEW JERSEY
◆ PHILADELPHIA, PA
◆ PITTSBURGH, PA
◆ HARRISBURG, PA
◆ SOUTHEASTERN, PA
◆ BERKSHIRE BEACH, DE
◆ BALTIMORE, MD
◆ SOUTHERN MARYLAND
◆ NORTHERN VIRGINIA
◆ RICHMOND, VA
◆ RALEIGH, NC
◆ WASHINGTON, DC
◆ CHARLOTTE, NC
◆ ATLANTA, GA
◆ TAMPA, FL
◆ ORLANDO, FLORIDA
◆ DALLAS, TX

THE INFORMATION, DESIGNS, DRAWINGS, SPECIFICATIONS AND REPORTS CONTAINED HEREIN ARE THE PROPERTY OF BOHLER ENGINEERING, AND AS INSTRUMENTS OF SERVICE ARE TO BE RETURNED UPON REQUEST. NO PART THEREOF SHALL BE UTILIZED FOR OTHER PURPOSES OR ADDITIONS OR ALTERATIONS MADE WITHOUT THE WRITTEN CONSENT OF BOHLER ENGINEERING.

REVISIONS

REV	DATE	COMMENT	BY
1	09/23/19	DRAINAGE FLOWS	MAA
2	10/18/19	3rd PARTY REVIEW COMMENTS	MAA
3	11/12/19	3rd PARTY REVIEW COMMENTS	MAA
4	11/22/19	3rd PARTY REVIEW COMMENTS	MAA
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			

PERMIT SET

PROJECT No.:	CT181007
DRAWN BY:	MAA
CHECKED BY:	GPF
DATE:	08/22/19
SCALE:	AS NOTED
CAD I.D.:	TB-CT181007ts50

PROJECT:

RESIDENTIAL DEVELOPMENT

FOR

CAPSTONE COLLEGIATE COMMUNITIES, LLC

LOCATION OF SITE

1621 STORRS RD & MIDDLE TPKE
LOTS 1, 7, & 8, BLOCK 23, MAP 9
TOWN OF MANSFIELD
STATE OF CONNECTICUT

BOHLER ENGINEERING
16 OLD FORGE ROAD, SUITE A
ROCKY HILL, CT 06067
Phone: (860) 333-8900
Fax: (508) 480-9080
www.BohlerEngineering.com

G.P. FITZGERALD

PROFESSIONAL ENGINEER

SHEET TITLE:

TEST PIT EXHIBIT

SHEET NUMBER:

TP

APPENDIX A
Records of Subsurface Exploration

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-13

Page 1 of 1

Project:	Proposed Student Housing Development	**WAI Project No.:**	GM1916845.000
Location:	Middle Turnpike Route 44 & Route 195 Mansfield, Tolland County, CT	**Client:**	Bohler Engineering MA, LLC

Surface Elevation:	± NS feet NAVD88	**Date Started:**	12/5/2019
Termination Depth:	4.0 feet bgs	**Date Completed:**	12/5/2019
Proposed Location:	Sand Filter	**Logged By:**	JM
Excavating Method:	Test Pit Excavation	**Contractor:**	DF
Test Method:	Visual Observation	**Rig Type:**	Takeuchi TB-135

	Water Depth (feet bgs)	Elevation (feet NAVD88)
During:	--	--
At Completion:	--	--
24 Hours:	--	--

	Cave-In Depth (feet bgs)	Elevation (feet msl)
At Completion:	--	--

SAMPLE INFORMATION Depth (ft.)	Number	Type	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
			0.0			
				TS	12" Topsoil	
				GLACIAL TILL	Brown, Silty Sand with Gravel, Cobbles, Boulders (SM)	
					Brown, Silty Sand, Cobbles, Boulders (SM)	
3.5	TS-2	1.25" Tube			Brown, Silty Sand with Gravel, Cobbles, Boulders (SM)	
					Test Pit Log TP-13 Terminated at a Depth of 4.0 Feet Below Ground Surface.	
			5.0			
			10.0			
			15.0			

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-14

Page 1 of 1

Project:	Proposed Student Housing Development	**WAI Project No.:**	GM1916845.000
Location:	Middle Turnpike Route 44 & Route 195 Mansfield, Tolland County, CT	**Client:**	Bohler Engineering MA, LLC

Surface Elevation:	± NS feet NAVD88	**Date Started:**	12/5/2019		**Water Depth (feet bgs)**	**Elevation (feet NAVD88)**	**Cave-In Depth (feet bgs)** / **Elevation (feet NAVD88)**
Termination Depth:	6.5 feet bgs	**Date Completed:**	12/5/2019				
Proposed Location:	--	**Logged By:**	JM	**During:**	6.0	--	
Excavating Method:	Test Pit Excavation	**Contractor:**	DF	**At Completion:**	--	--	**At Completion:** -- / --
Test Method:	Visual Observation	**Rig Type:**	Takeuchi TB-135	**24 Hours:**	--	--	

SAMPLE INFORMATION Depth (ft.)	Number	Type	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
			0.0			
				TS	12" Topsoil	
				GLACIAL TILL	Brown, Silty Sand with Gravel (SM)	
					Brown, Silty Sand with Gravel, Cobbles, Boulders (SM)	
4.5	TS-3	1.25" Tube	5.0		Brown, Silty Sand with Gravel (SM)	
			10.0		Test Pit Log TP-14 Terminated at a Depth of 6.5 Feet Below Ground Surface.	
			15.0			

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-15

Page 1 of 1

Project:	Proposed Student Housing Development	**WAI Project No.:**	GM1916845.000
Location:	Middle Turnpike Route 44 & Route 195 Mansfield, Tolland County, CT	**Client:**	Bohler Engineering MA, LLC

Surface Elevation:	± NS feet NAVD88	**Date Started:**	12/10/2019		**Water Depth (feet bgs)**	**Elevation (feet NAVD88)**	**Cave-In Depth (feet bgs)** / **Elevation (feet NAVD88)**
Termination Depth:	4.0 feet bgs	**Date Completed:**	12/10/2019				
Proposed Location:	Sand Filter	**Logged By:**	JM	**During:**	4.0	--	
Excavating Method:	Test Pit Excavation	**Contractor:**	DF	**At Completion:**	--	--	**At Completion:** -- / --
Test Method:	Visual Observation	**Rig Type:**	Takeuchi TB-135	**24 Hours:**	--	--	

SAMPLE INFORMATION Depth (ft.)	Number	Type	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
			0.0			
				TS	12" Topsoil	
3.0	TS-4	1.25" Tube		GLACIAL TILL	Brown, Silty Sand with Gravel, Cobbles, Boulders (SM)	Increase in Silt Content
					Test Pit Log TP-15 Terminated at a Depth of 4.0 Feet Below Ground Surface	
			5.0			
			10.0			
			15.0			

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-16

Page 1 of 1

Project:	Proposed Student Housing Development	**WAI Project No.:**	GM1916845.000
Location:	Middle Turnpike Route 44 & Route 195 Mansfield, Tolland County, CT	**Client:**	Bohler Engineering MA, LLC

Surface Elevation:	± NS feet NAVD88	**Date Started:**	12/5/2019
Termination Depth:	6.5 feet bgs	**Date Completed:**	12/5/2019
Proposed Location:	--	**Logged By:**	JM
Excavating Method:	Test Pit Excavation	**Contractor:**	DF
Test Method:	Visual Observation	**Rig Type:**	Takeuchi TB-135

	Water Depth (feet bgs)	Elevation (feet NAVD88)
During:	3.0	--
At Completion:	--	--
24 Hours:	--	--

	Cave-In Depth (feet bgs)	Elevation (feet NAVD88)
At Completion:	--	--

SAMPLE INFORMATION Depth (ft.)	Number	Type	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
			0.0			
				TS	12" Topsoil	
2.5	TS-5	1.25" Tube		GLACIAL TILL	Brown, Silty Sand with Gravel (SM) Brown, Silty Sand with Gravel, Cobbles, Boulders (SM)	
			5.0			
			10.0		Test Pit Log TP-16 Terminated at a Depth of 6.5 Feet Below Ground Surface.	
			15.0			

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-17

Page 1 of 1

Project:	Proposed Student Housing Development	**WAI Project No.:**	GM1916845.000
Location:	Middle Turnpike Route 44 & Route 195 Mansfield, Tolland County, CT	**Client:**	Bohler Engineering MA, LLC

Surface Elevation:	± NS feet NAVD88	**Date Started:**	12/5/2019		**Water Depth (feet bgs)**	**Elevation (feet NAVD88)**	**Cave-In Depth (feet bgs)** / **Elevation (feet NAVD88)**
Termination Depth:	7.5 feet bgs	**Date Completed:**	12/5/2019				
Proposed Location:	Sand Filter	**Logged By:**	JM	**During:**	7.0	--	
Excavating Method:	Test Pit Excavation	**Contractor:**	DF	**At Completion:**	--	--	**At Completion:** -- / --
Test Method:	Visual Observation	**Rig Type:**	Takeuchi TB-135	**24 Hours:**	--	--	

SAMPLE INFORMATION Depth (ft.)	Number	Type	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
			0.0			
				TS	12" Topsoil	
3.5	TS-6	1.25" Tube	5.0	GLACIAL TILL	Brown, Silty Sand with Gravel (SM)	Increase in Silt Content
			10.0		Test Pit Log TP-17 Terminated at a Depth of 7.5 Feet Below Ground Surface.	
			15.0			

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-18

Page 1 of 1

Project:	Proposed Student Housing Development	**WAI Project No.:**	GM1916845.000
Location:	Middle Turnpike Route 44 & Route 195 Mansfield, Tolland County, CT	**Client:**	Bohler Engineering MA, LLC

Surface Elevation:	± NS feet NAVD88	**Date Started:**	12/5/2019	**Water Depth (feet bgs) | Elevation (feet NAVD88)**	**Cave-In Depth (feet bgs) | Elevation (feet NAVD88)**
Termination Depth:	7.5 feet bgs	**Date Completed:**	12/5/2019		
Proposed Location:	Sand Filter	**Logged By:**	JM	**During:** -- | --	
Excavating Method:	Test Pit Excavation	**Contractor:**	DF	**At Completion:** -- | --	**At Completion:** -- | --
Test Method:	Visual Observation	**Rig Type:**	Takeuchi TB-135	**24 Hours:** -- | --	

SAMPLE INFORMATION Depth (ft.)	Number	Type	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
			0.0			
				TS	8" Topsoil	
2.5	TS-7	1.25" Tube	5.0	GLACIAL TILL	Brown, Silty Sand (SM) Brown, Silty Sand with Gravel, Cobbles, Boulders (SM)	Increase in Silt Content
			10.0 15.0		Test Pit Log TP-18 Terminated at a Depth of 7.5 Feet Below Ground Surface.	

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-19

Page 1 of 1

Project:	Proposed Student Housing Development	**WAI Project No.:**	GM1916845.000
Location:	Middle Turnpike Route 44 & Route 195 Mansfield, Tolland County, CT	**Client:**	Bohler Engineering MA, LLC

Surface Elevation:	± NS feet NAVD88	**Date Started:**	12/5/2019
Termination Depth:	7.0 feet bgs	**Date Completed:**	12/5/2019
Proposed Location:	Building	**Logged By:**	JM
Excavating Method:	Test Pit Excavation	**Contractor:**	DF
Test Method:	Visual Observation	**Rig Type:**	Takeuchi TB-135

	Water Depth (feet bgs)	Elevation (feet NAVD88)
During:	5.0	--
At Completion:	--	--
24 Hours:	--	--

	Cave-In Depth (feet bgs)	Elevation (feet NAVD88)
At Completion:	--	--

SAMPLE INFORMATION Depth (ft.)	Number	Type	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
			0.0			
				TS	8" Topsoil	
				GLACIAL TILL	Brown, Silty Sand with Gravel, Cobbles, Boulders (SM)	
3.0	TS-8	1.25" Tube			Grey, Silty Sand with Gravel, Cobbles, Boulders (SM)	
			5.0		Brown, Silty Sand with Gravel, Cobbles, Boulders (SM)	Increase in Silt Content
					Test Pit Log TP-19 Terminated at a Depth of 7.0 Feet Below Ground Surface.	
			10.0			
			15.0			

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-20

Page 1 of 1

Project:	Proposed Student Housing Development	**WAI Project No.:**	GM1916845.000
Location:	Middle Turnpike Route 44 & Route 195 Mansfield, Tolland County, CT	**Client:**	Bohler Engineering MA, LLC

Surface Elevation:	± NS feet NAVD88	**Date Started:**	12/5/2019
Termination Depth:	6.0 feet bgs	**Date Completed:**	12/5/2019
Proposed Location:	Sand Filter	**Logged By:**	JM
Excavating Method:	Test Pit Excavation	**Contractor:**	DF
Test Method:	Visual Observation	**Rig Type:**	Takeuchi TB-135

	Water Depth (feet bgs)	Elevation (feet NAVD88)
During:	--	--
At Completion:	--	--
24 Hours:	--	--

	Cave-In Depth (feet bgs)	Elevation (feet NAVD88)
At Completion:	--	--

SAMPLE INFORMATION Depth (ft.)	Number	Type	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
			0.0			
				TS	12" Topsoil	
3.25	TS-9	1.25" Tube	5.0	GLACIAL TILL	Brown, Silty Sand with Gravel (SM)	
			10.0 15.0		Test Pit Log TP-20 Terminated at a Depth of 6.0 Feet Below Ground Surface.	

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-21

Project:	Proposed Student Housing Development	**WAI Project No.:**	GM1916845.000
Location:	Middle Turnpike Route 44 & Route 195 Mansfield, Tolland County, CT	**Client:**	Bohler Engineering MA, LLC

Surface Elevation:	± NS feet NAVD88	**Date Started:**	12/5/2019	**Water Depth (feet bgs) | Elevation (feet NAVD88)**	**Cave-In Depth (feet bgs) | Elevation (feet NAVD88)**
Termination Depth:	6.5 feet bgs	**Date Completed:**	12/5/2019		
Proposed Location:	Sand Filter	**Logged By:**	JM	**During:** -- | --	
Excavating Method:	Test Pit Excavation	**Contractor:**	DF	**At Completion:** -- | --	**At Completion:** -- | --
Test Method:	Visual Observation	**Rig Type:**	Takeuchi TB-135	**24 Hours:** -- | --	

SAMPLE INFORMATION Depth (ft.)	Number	Type	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
			0.0			
				TS	12" Topsoil	
3.5	TS-10	1.25" Tube	5.0	GLACIAL TILL	Brown, Silty Sand with Gravel (SM)	
			10.0 15.0		Test Pit Log TP-21 Terminated at a Depth of 6.5 Feet Below Ground Surface.	

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-22

Project:	Proposed Student Housing Development	**WAI Project No.:**	GM1916845.000
Location:	Middle Turnpike Route 44 & Route 195 Mansfield, Tolland County, CT	**Client:**	Bohler Engineering MA, LLC

Surface Elevation:	± NS feet NAVD88	**Date Started:**	12/5/2019		**Water Depth (feet bgs)**	**Elevation (feet NAVD88)**	**Cave-In Depth (feet bgs)** / **Elevation (feet NAVD88)**
Termination Depth:	6.0 feet bgs	**Date Completed:**	12/5/2019				
Proposed Location:	Sand Filter	**Logged By:**	JM	**During:**	--	--	
Excavating Method:	Test Pit Excavation	**Contractor:**	DF	**At Completion:**	--	--	**At Completion:** -- / --
Test Method:	Visual Observation	**Rig Type:**	Takeuchi TB-135	**24 Hours:**	--	--	

SAMPLE INFORMATION Depth (ft.)	Number	Type	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
			0.0			
				TS	12" Topsoil	
2.25	TS-11	1.25" Tube	2.5	GLACIAL TILL	Brown, Silty Sand with Gravel (SM)	
			5.0			
			10.0		Test Pit Log TP-22 Terminated at a Depth of 6.0 Feet Below Ground Surface.	
			15.0			

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

APPENDIX B
Supplemental Information
(USCS, Terms and Symbols)

WHITESTONE ASSOCIATES, INC.
Environmental & Geotechnical Engineers & Consultants
Celebrating 25 Years 1994 – 2019

16 OLD FORGE ROAD
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UNIFIED SOIL CLASSIFICATION SYSTEM

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)	GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
			GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
			GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SAND AND SANDY SOILS	CLEAN SAND (LITTLE OR NO FINES)	SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
			SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE	SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)	SM	SILTY SANDS, SAND-SILT MIXTURES
			SC	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMITS LESS THAN 50	ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMITS GREATER THAN 50	MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS FOR SAMPLES WITH 5% TO 12% FINES

GRADATION*

% FINER BY WEIGHT

TRACE..... 1% TO 10%
LITTLE..... 10% TO 20%
SOME..... 20% TO 35%
AND..... 35% TO 50%

COMPACTNESS*
Sand and/or Gravel

RELATIVE DENSITY

LOOSE. ..... 0% TO 40%
MEDIUM DENSE.... 40% TO 70%
DENSE..... 70% TO 90%
VERY DENSE..... 90% TO 100%

CONSISTENCY*
Clay and/or Silt

RANGE OF SHEARING STRENGTH IN POUNDS PER SQUARE FOOT

VERY SOFT..... LESS THAN 250
SOFT..... ..... 250 TO 500
MEDIUM..... 500 TO 1000
STIFF..... 1000 TO 2000
VERY STIFF..... 2000 TO 4000
HARD..... GREATER THAN 4000

** VALUES ARE FROM LABORATORY OR FIELD TEST DATA, WHERE APPLICABLE. WHEN NO TESTING WAS PERFORMED, VALUES ARE ESTIMATED.*

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WHITESTONE ASSOCIATES, INC.
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GEOTECHNICAL TERMS AND SYMBOLS

SAMPLE IDENTIFICATION

The Unified Soil Classification System is used to identify the soil unless otherwise noted.

SOIL PROPERTY SYMBOLS

N: Standard Penetration Value: Blows per ft. of a 140 lb. hammer falling 30" on a 2" O.D. split-spoon.
Qu: Unconfined compressive strength, TSF.
Qp: Penetrometer value, unconfined compressive strength, TSF.
Mc: Moisture content, %.
LL: Liquid limit, %.
PI: Plasticity index, %.
δd: Natural dry density, PCF.
▼: Apparent groundwater level at time noted after completion of boring.

DRILLING AND SAMPLING SYMBOLS

NE: Not Encountered (Groundwater was not encountered).
SS: Split-Spoon - 1 ⅜" I.D., 2" O.D., except where noted.
ST: Shelby Tube - 3" O.D., except where noted.
AU: Auger Sample.
OB: Diamond Bit.
CB: Carbide Bit
WS: Washed Sample.

RELATIVE DENSITY AND CONSISTENCY CLASSIFICATION

Term (Non-Cohesive Soils)	Standard Penetration Resistance
Very Loose	0-4
Loose	4-10
Medium Dense	10-30
Dense	30-50
Very Dense	Over 50

Term (Cohesive Soils)	Qu (TSF)
Very Soft	0 - 0.25
Soft	0.25 - 0.50
Firm (Medium)	0.50 - 1.00
Stiff	1.00 - 2.00
Very Stiff	2.00 - 4.00
Hard	4.00+

PARTICLE SIZE

Boulders	8 in.+	Coarse Sand	5mm-0.6mm	Silt	0.074mm-0.005mm
Cobbles	8 in.-3 in.	Medium Sand	0.6mm-0.2mm	Clay	-0.005mm
Gravel	3 in.-5mm	Fine Sand	0.2mm-0.074mm		

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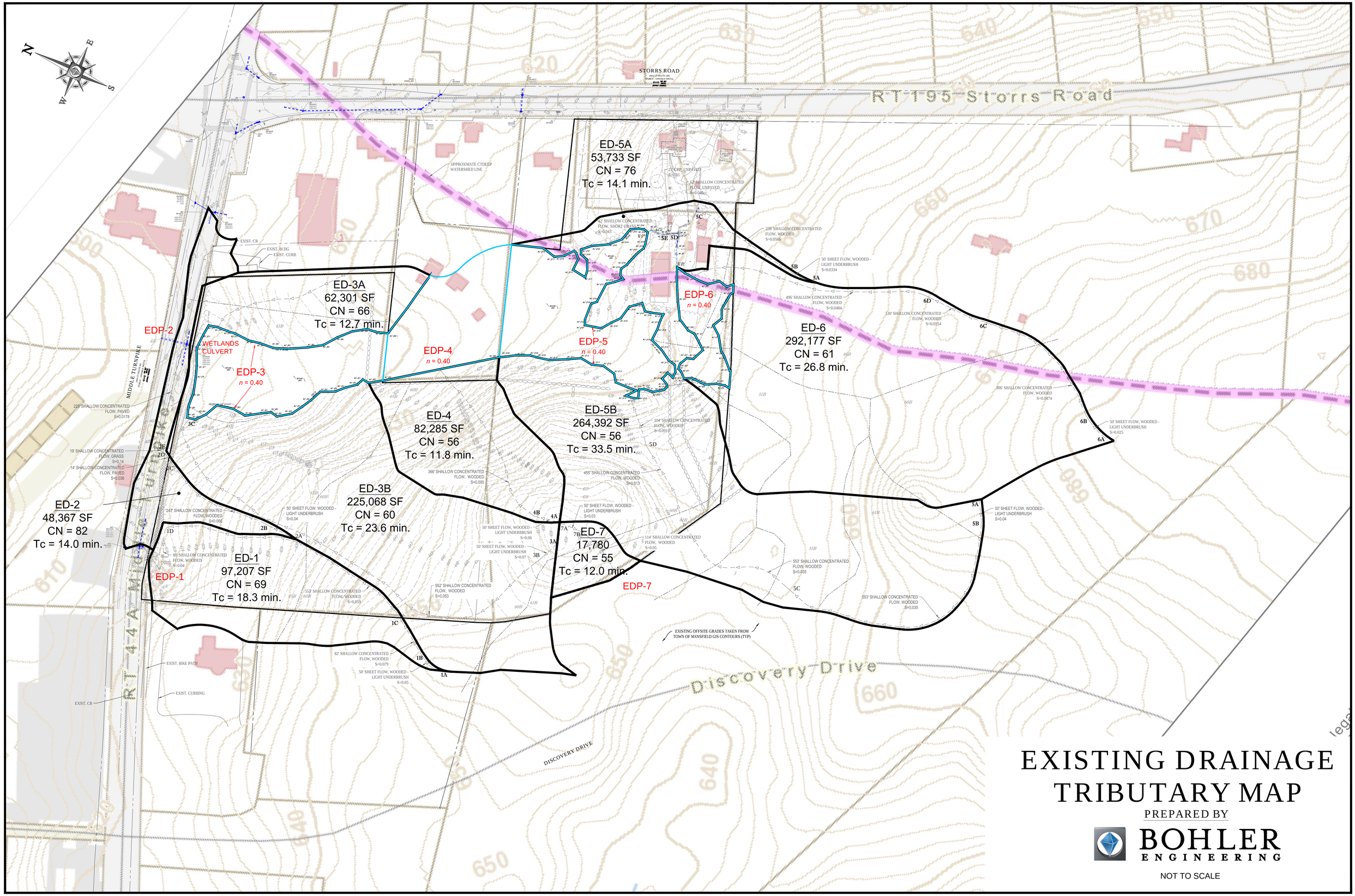
APPENDIX C: EXISTING CONDITIONS HYDROLOGIC ANALYSIS

- *EXISTING CONDITIONS DRAINAGE MAP*
- *EXISTING CONDITIONS HYDROCAD COMPUTATIONS*

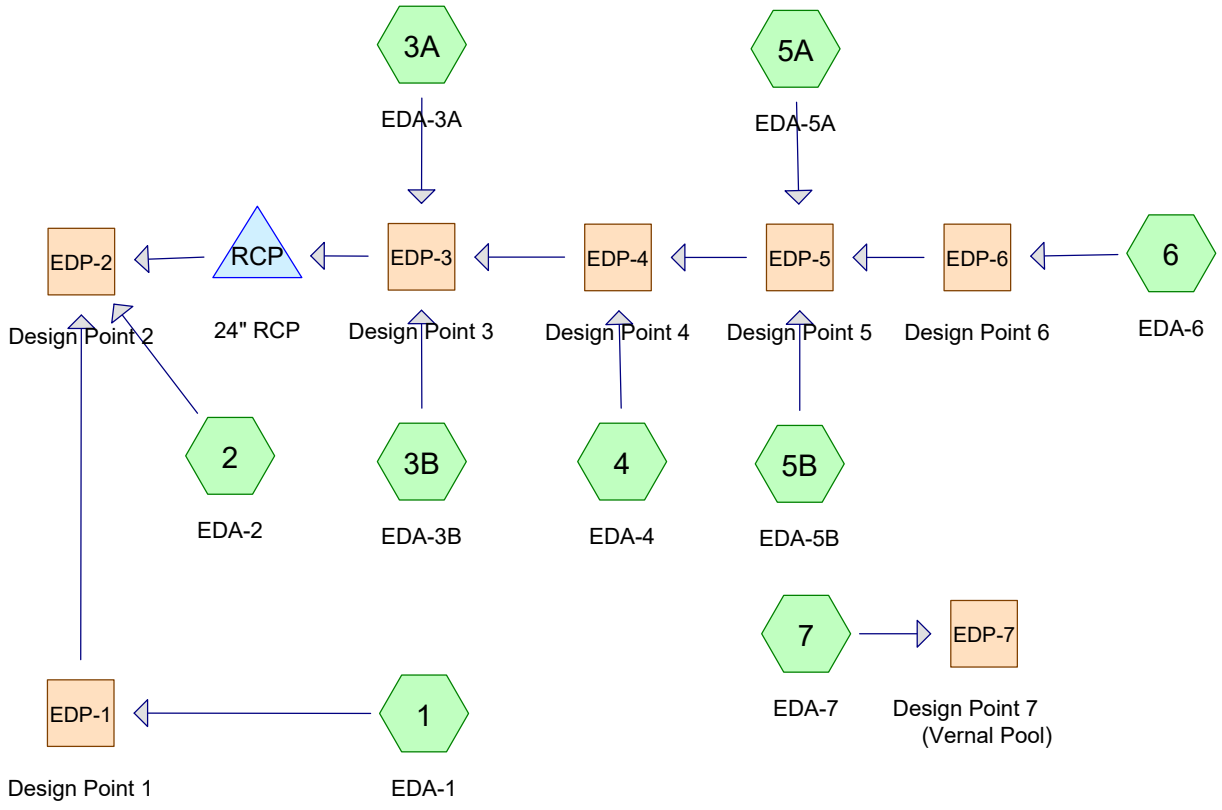


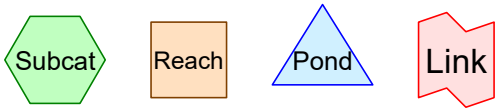
EXISTING DRAINAGE TRIBUTARY MAP

PREPARED BY

BOHLER ENGINEERING

NOT TO SCALE





Routing Diagram for Existing Conditions
Prepared by Bohler Engineering, Printed 12/29/2019
HydroCAD® 10.00-21 s/n 08311 © 2018 HydroCAD Software Solutions LLC

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.439	79	50-75% Grass cover, Fair, HSG C (5A)
0.055	98	Paved parking, HSG B (3A)
0.463	98	Paved parking, HSG C (2)
0.111	98	Unconnected roofs, HSG C (5A)
16.762	55	Woods, Good, HSG B (1, 2, 3A, 3B, 4, 5B, 6, 7)
8.099	70	Woods, Good, HSG C (1, 2, 3A, 3B, 4, 5A, 6)
0.318	77	Woods, Good, HSG D (5B)
26.247	**61**	**TOTAL AREA**

Summary for Subcatchment 1: EDA-1

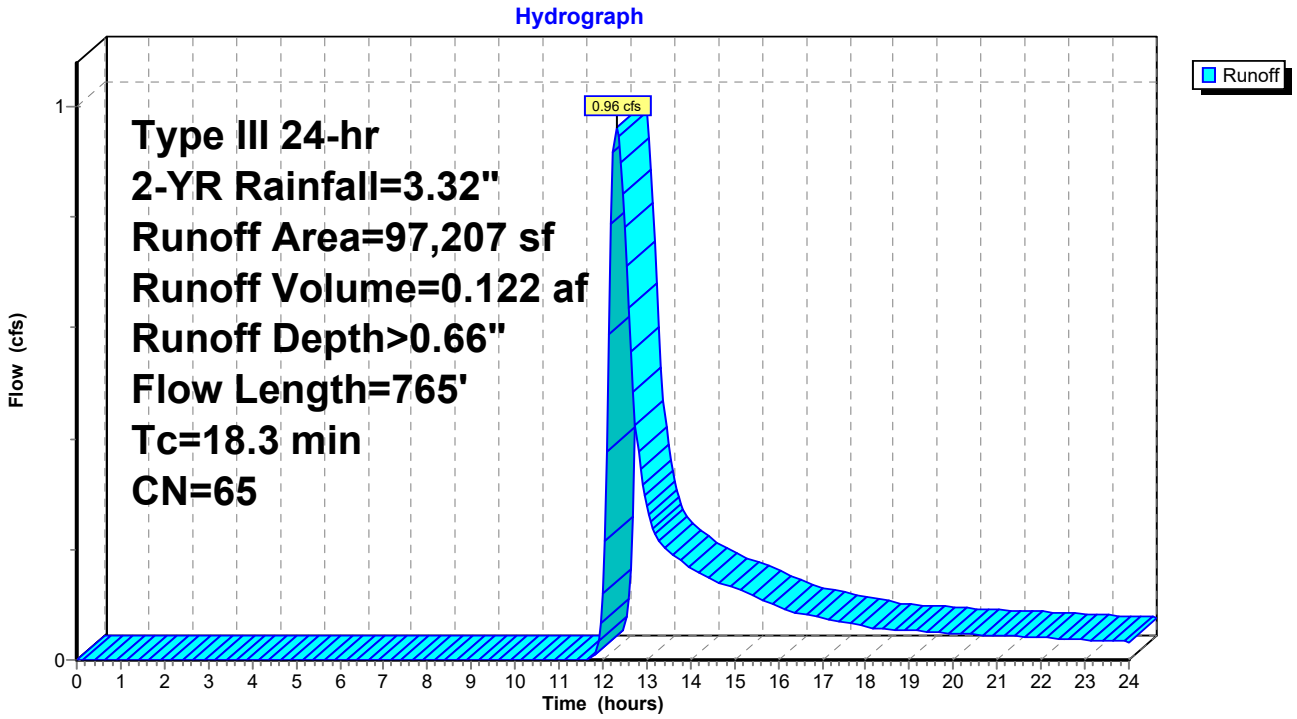
Runoff = 0.96 cfs @ 12.31 hrs, Volume= 0.122 af, Depth> 0.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.32"

Area (sf)	CN	Description
62,786	70	Woods, Good, HSG C
34,421	55	Woods, Good, HSG B
97,207	65	Weighted Average
97,207		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.0500	0.10		**Sheet Flow, 1A-1B** Woods: Light underbrush n= 0.400 P2= 3.32"
1.0	82	0.0790	1.41		**Shallow Concentrated Flow, 1B-1C** Woodland Kv= 5.0 fps
7.6	553	0.0590	1.21		**Shallow Concentrated Flow, 1C-1D** Woodland Kv= 5.0 fps
1.3	80	0.0400	1.00		**Shallow Concentrated Flow, 1D-EDP-1** Woodland Kv= 5.0 fps
18.3	765	Total			

Subcatchment 1: EDA-1



Summary for Subcatchment 2: EDA-2

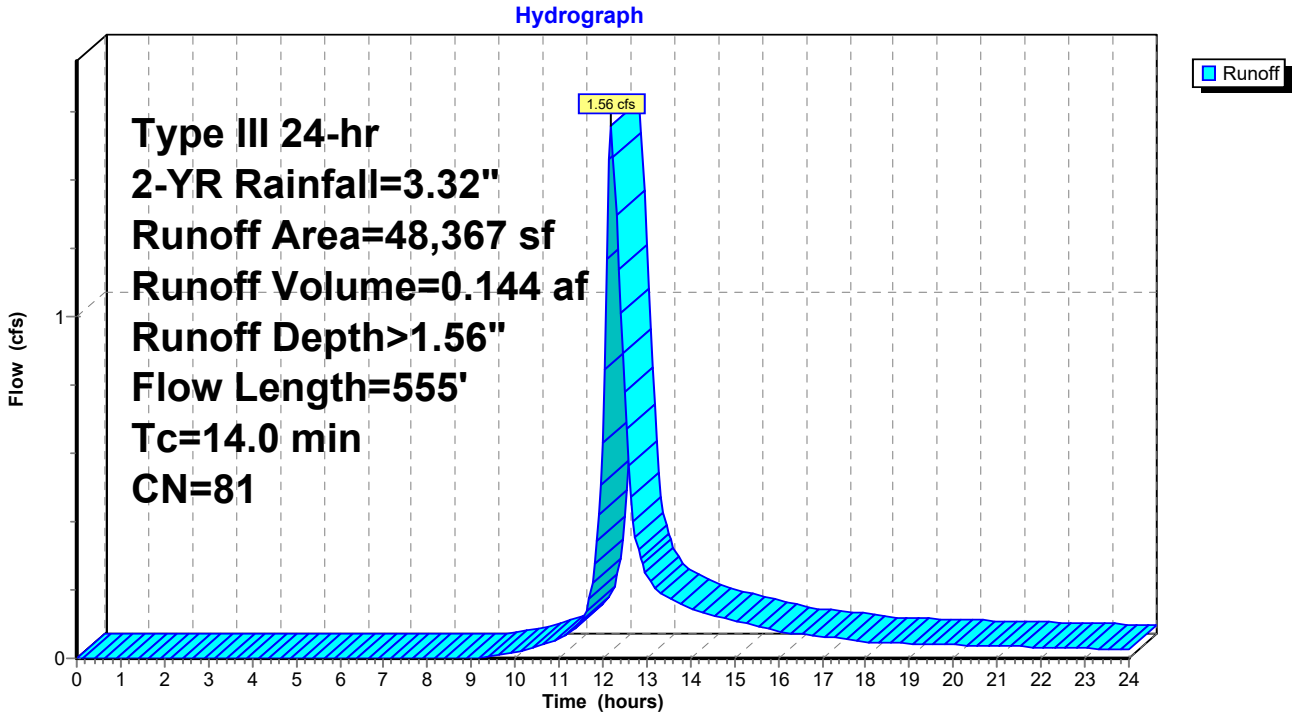
Runoff = 1.56 cfs @ 12.20 hrs, Volume= 0.144 af, Depth> 1.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.32"

Area (sf)	CN	Description
24,861	70	Woods, Good, HSG C
3,336	55	Woods, Good, HSG B
20,170	98	Paved parking, HSG C
48,367	81	Weighted Average
28,197		58.30% Pervious Area
20,170		41.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	50	0.0400	0.09		**Sheet Flow, 2A-2B** Woods: Light underbrush n= 0.400 P2= 3.32"
3.2	247	0.0664	1.29		**Shallow Concentrated Flow, 2B-2C** Woodland Kv= 5.0 fps
0.1	14	0.0360	3.85		**Shallow Concentrated Flow, 2C-2D** Paved Kv= 20.3 fps
0.1	19	0.1400	2.62		**Shallow Concentrated Flow, 2D-2E** Short Grass Pasture Kv= 7.0 fps
1.4	225	0.0178	2.71		**Shallow Concentrated Flow, 2E-EDP-2** Paved Kv= 20.3 fps
14.0	555	Total			

Subcatchment 2: EDA-2



Summary for Subcatchment 3A: EDA-3A

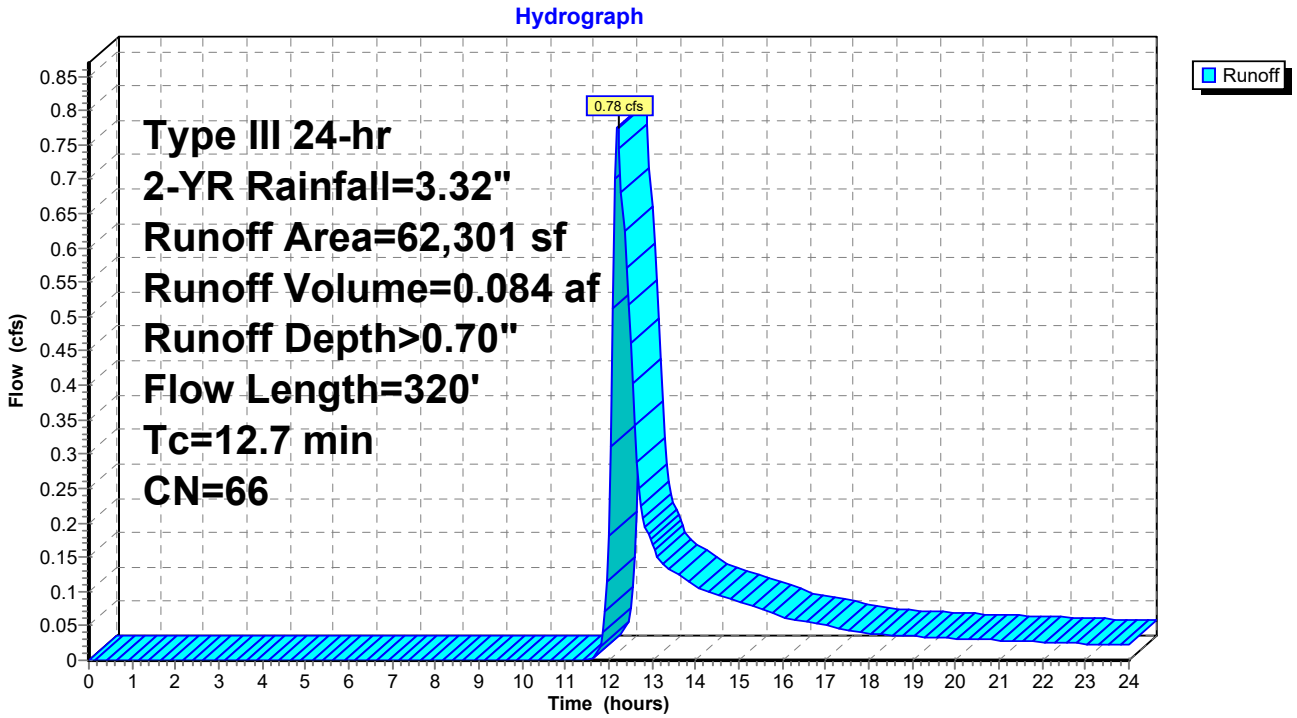
Runoff = 0.78 cfs @ 12.21 hrs, Volume= 0.084 af, Depth> 0.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.32"

Area (sf)	CN	Description
21,831	55	Woods, Good, HSG B
38,070	70	Woods, Good, HSG C
2,400	98	Paved parking, HSG B
62,301	66	Weighted Average
59,901		96.15% Pervious Area
2,400		3.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.0500	0.10		**Sheet Flow, 3A-3B** Woods: Light underbrush n= 0.400 P2= 3.32"
4.3	270	0.0444	1.05		**Shallow Concentrated Flow, 3B-EDP-3** Woodland Kv= 5.0 fps
12.7	320	Total			

Subcatchment 3A: EDA-3A



Summary for Subcatchment 3B: EDA-3B

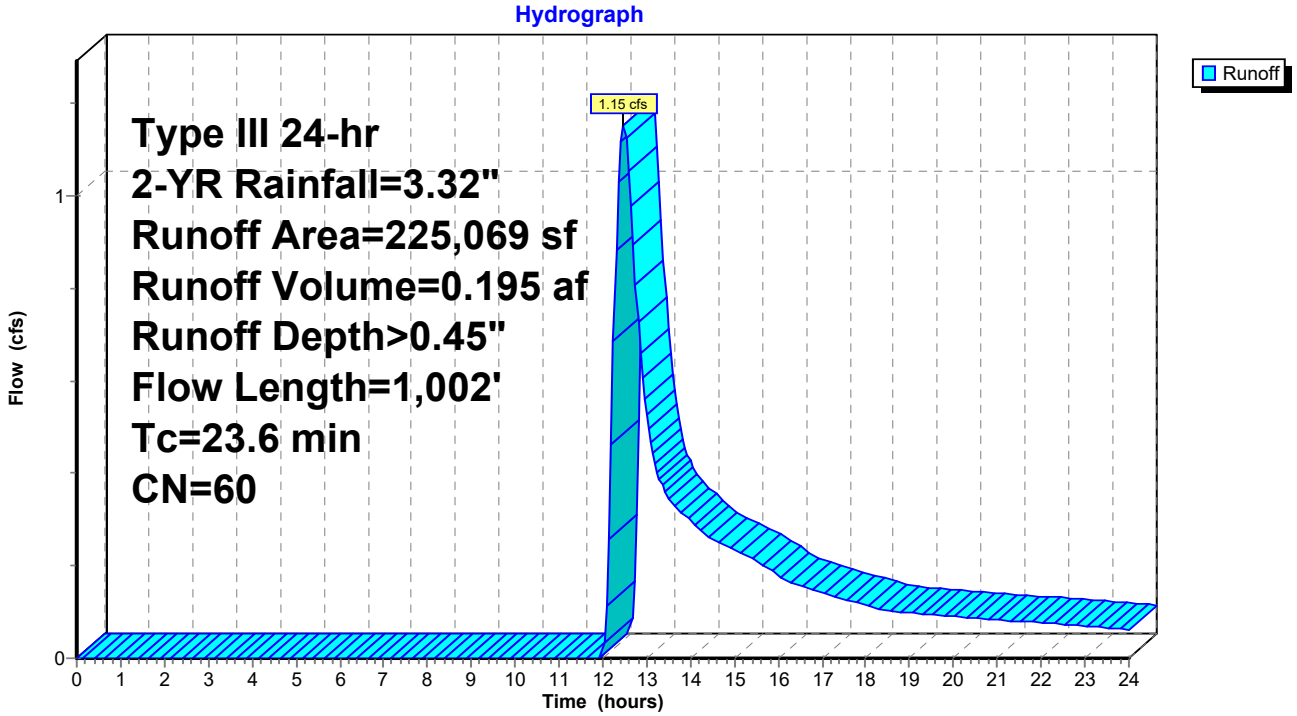
Runoff = 1.15 cfs @ 12.47 hrs, Volume= 0.195 af, Depth> 0.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.32"

Area (sf)	CN	Description
145,447	55	Woods, Good, HSG B
79,622	70	Woods, Good, HSG C
225,069	60	Weighted Average
225,069		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.8	50	0.0343	0.09		**Sheet Flow, 3A-3B** Woods: Light underbrush n= 0.400 P2= 3.32"
13.8	952	0.0530	1.15		**Shallow Concentrated Flow, 3B-EDP-3** Woodland Kv= 5.0 fps
23.6	1,002	Total			

Subcatchment 3B: EDA-3B



Summary for Subcatchment 4: EDA-4

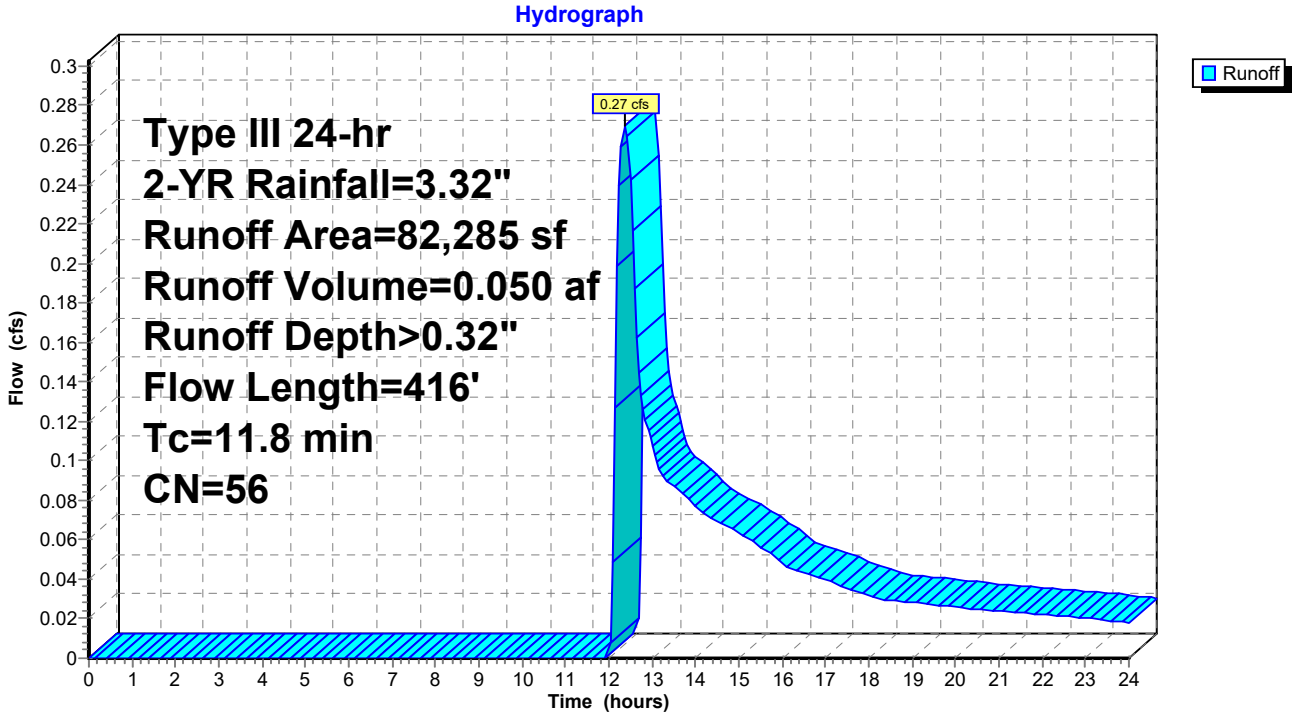
Runoff = 0.27 cfs @ 12.38 hrs, Volume= 0.050 af, Depth> 0.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.32"

Area (sf)	CN	Description
77,691	55	Woods, Good, HSG B
4,594	70	Woods, Good, HSG C
82,285	56	Weighted Average
82,285		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	50	0.0600	0.11		**Sheet Flow, 4A-4B** Woods: Light underbrush n= 0.400 P2= 3.32"
4.0	366	0.0950	1.54		**Shallow Concentrated Flow, 4B-EDP-4** Woodland Kv= 5.0 fps
11.8	416	Total			

Subcatchment 4: EDA-4



Summary for Subcatchment 5A: EDA-5A

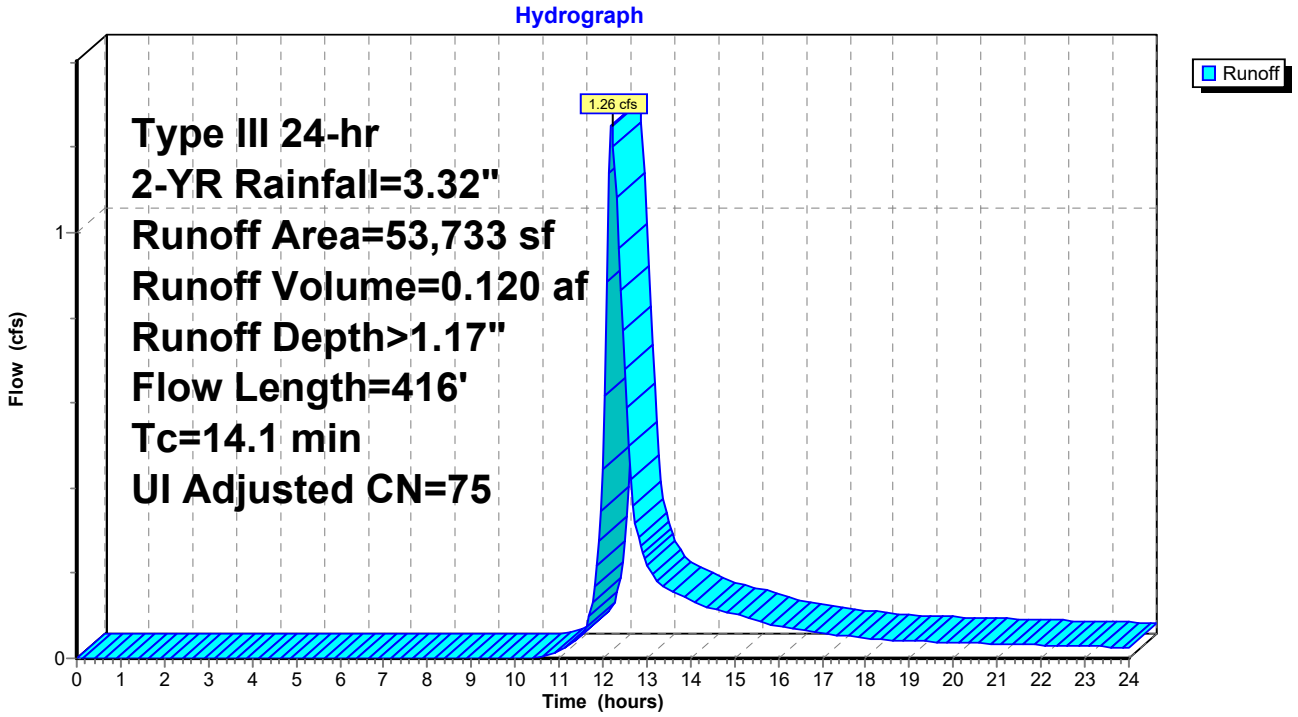
Runoff = 1.26 cfs @ 12.21 hrs, Volume= 0.120 af, Depth> 1.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.32"

Area (sf)	CN	Adj	Description
29,770	70		Woods, Good, HSG C
4,837	98		Unconnected roofs, HSG C
19,126	79		50-75% Grass cover, Fair, HSG C
53,733	76	75	Weighted Average, UI Adjusted
48,896			91.00% Pervious Area
4,837			9.00% Impervious Area
4,837			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.9	50	0.0334	0.08		**Sheet Flow, 5A-5B** Woods: Light underbrush n= 0.400 P2= 3.32"
3.3	239	0.0566	1.19		**Shallow Concentrated Flow, 5B-5C** Woodland Kv= 5.0 fps
0.3	62	0.0450	3.42		**Shallow Concentrated Flow, swale/ditch** Unpaved Kv= 16.1 fps
0.1	23	0.0100	4.91	3.86	**Pipe Channel, 12" CPP** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Corrugated PP, smooth interior
0.5	42	0.0430	1.45		**Shallow Concentrated Flow, 5E-EDP-5** Short Grass Pasture Kv= 7.0 fps
14.1	416	Total			

Subcatchment 5A: EDA-5A



Summary for Subcatchment 5B: EDA-5B

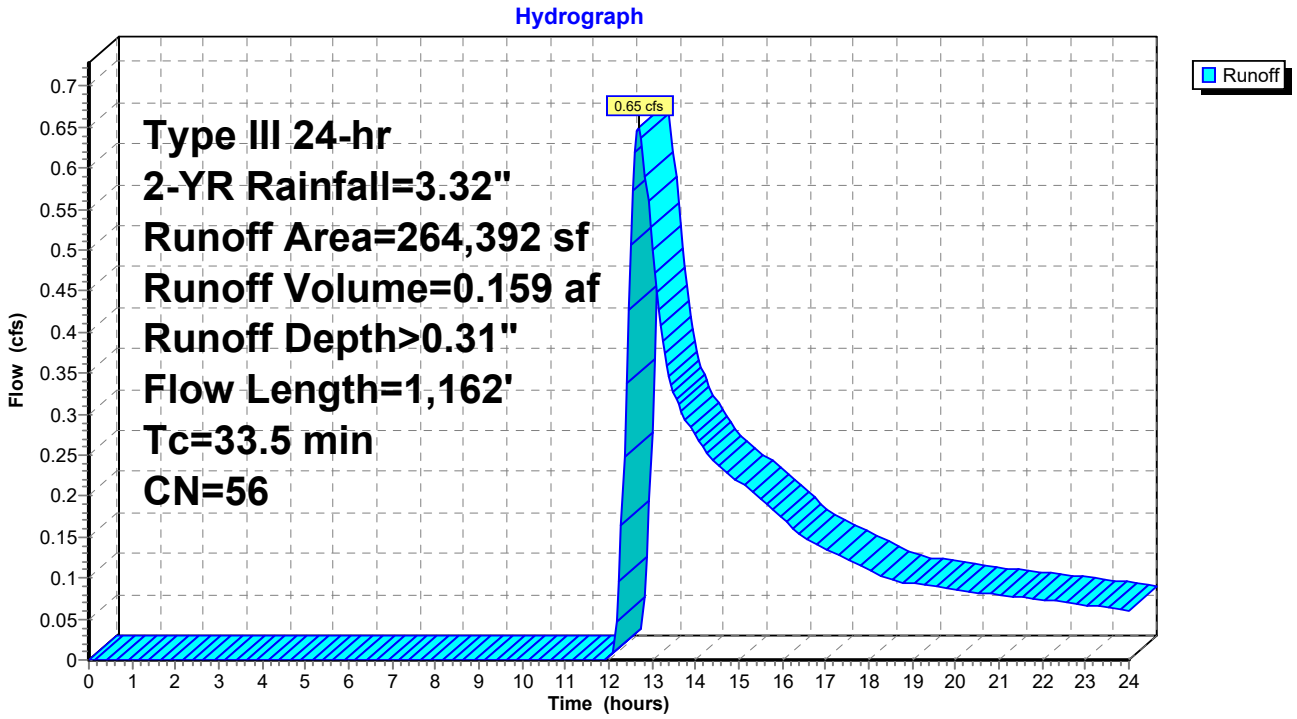
Runoff = 0.65 cfs @ 12.69 hrs, Volume= 0.159 af, Depth> 0.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.32"

Area (sf)	CN	Description
250,540	55	Woods, Good, HSG B
13,852	77	Woods, Good, HSG D
264,392	56	Weighted Average
264,392		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	50	0.0400	0.09		**Sheet Flow, 5A-5B** Woods: Light underbrush n= 0.400 P2= 3.32"
9.9	553	0.0350	0.94		**Shallow Concentrated Flow, 5B-5C** Woodland Kv= 5.0 fps
13.3	455	0.0130	0.57		**Shallow Concentrated Flow, 5C-5D** Woodland Kv= 5.0 fps
1.1	104	0.0913	1.51		**Shallow Concentrated Flow, 5D-EDP-5** Woodland Kv= 5.0 fps
33.5	1,162	Total			

Subcatchment 5B: EDA-5B



Summary for Subcatchment 6: EDA-6

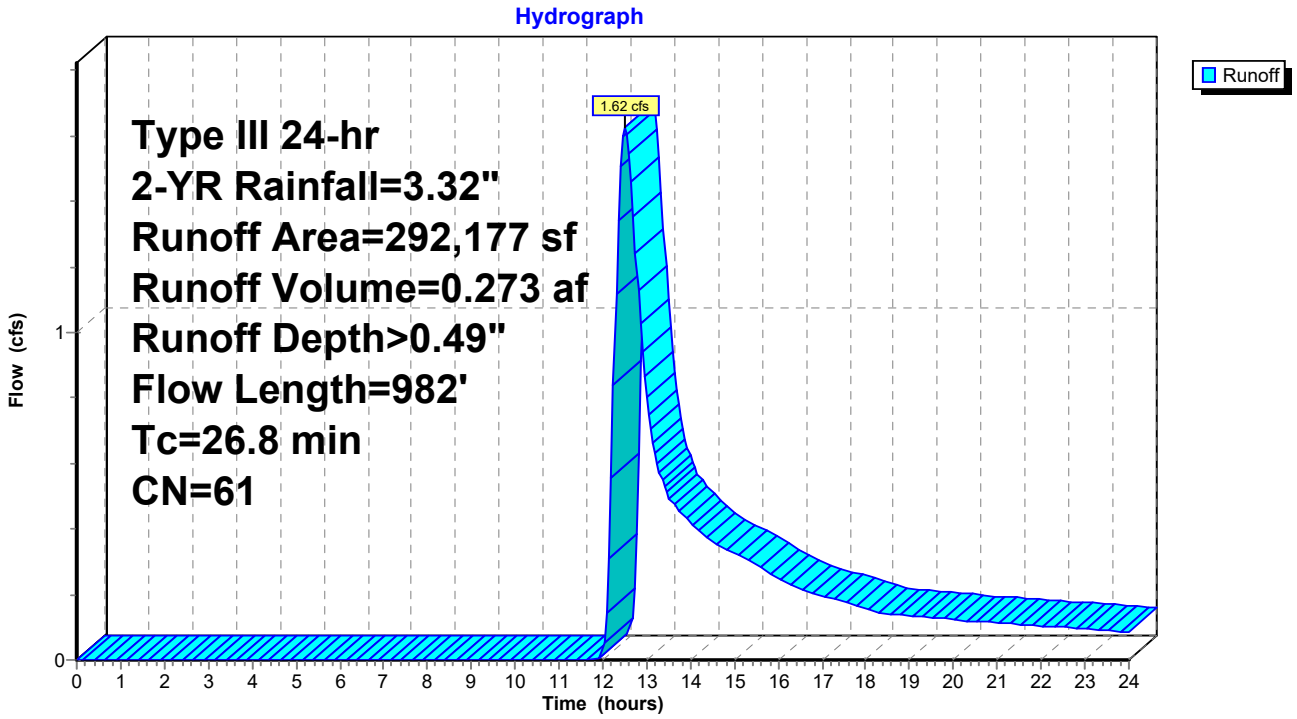
Runoff = 1.62 cfs @ 12.50 hrs, Volume= 0.273 af, Depth> 0.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.32"

Area (sf)	CN	Description
113,079	70	Woods, Good, HSG C
179,098	55	Woods, Good, HSG B
292,177	61	Weighted Average
292,177		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.1	50	0.0250	0.08		**Sheet Flow, 6A-6B** Woods: Light underbrush n= 0.400 P2= 3.32"
4.7	306	0.0474	1.09		**Shallow Concentrated Flow, 6B-6C** Woodland Kv= 5.0 fps
3.5	130	0.0154	0.62		**Shallow Concentrated Flow, 6C-6D** Woodland Kv= 5.0 fps
7.5	496	0.0484	1.10		**Shallow Concentrated Flow, 6D-EDP-6** Woodland Kv= 5.0 fps
26.8	982	Total			

Subcatchment 6: EDA-6



Summary for Subcatchment 7: EDA-7

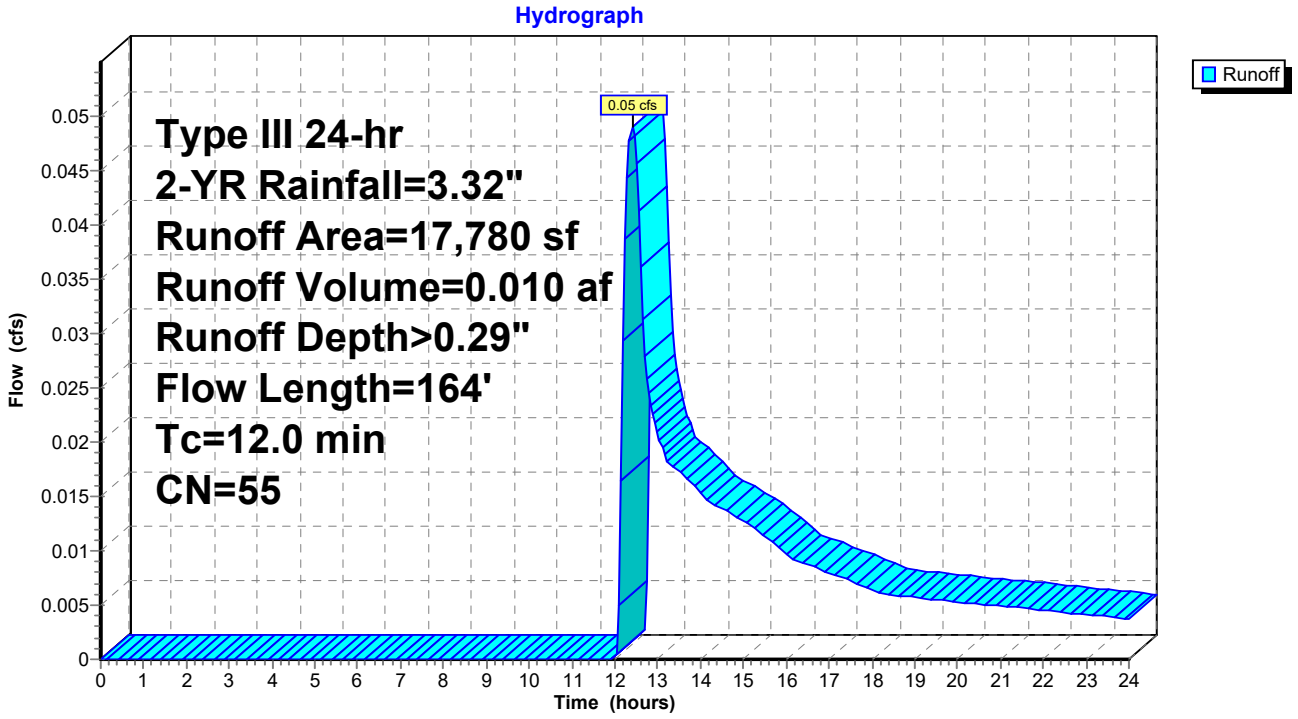
Runoff = 0.05 cfs @ 12.41 hrs, Volume= 0.010 af, Depth> 0.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.32"

Area (sf)	CN	Description
17,780	55	Woods, Good, HSG B
17,780		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.3	50	0.0300	0.08		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.32"
1.7	114	0.0500	1.12		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
12.0	164	Total			

Subcatchment 7: EDA-7

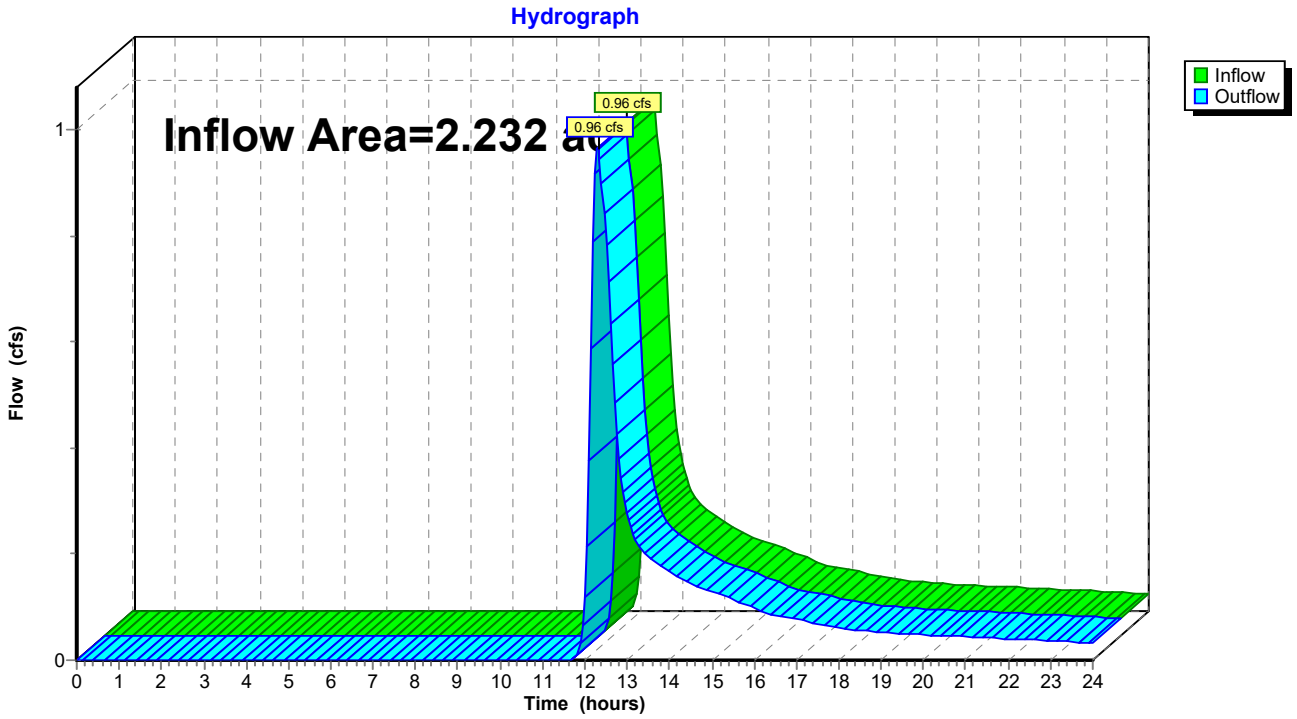


Summary for Reach EDP-1: Design Point 1

Inflow Area = 2.232 ac, 0.00% Impervious, Inflow Depth > 0.66" for 2-YR event
Inflow = 0.96 cfs @ 12.31 hrs, Volume= 0.122 af
Outflow = 0.96 cfs @ 12.31 hrs, Volume= 0.122 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach EDP-1: Design Point 1

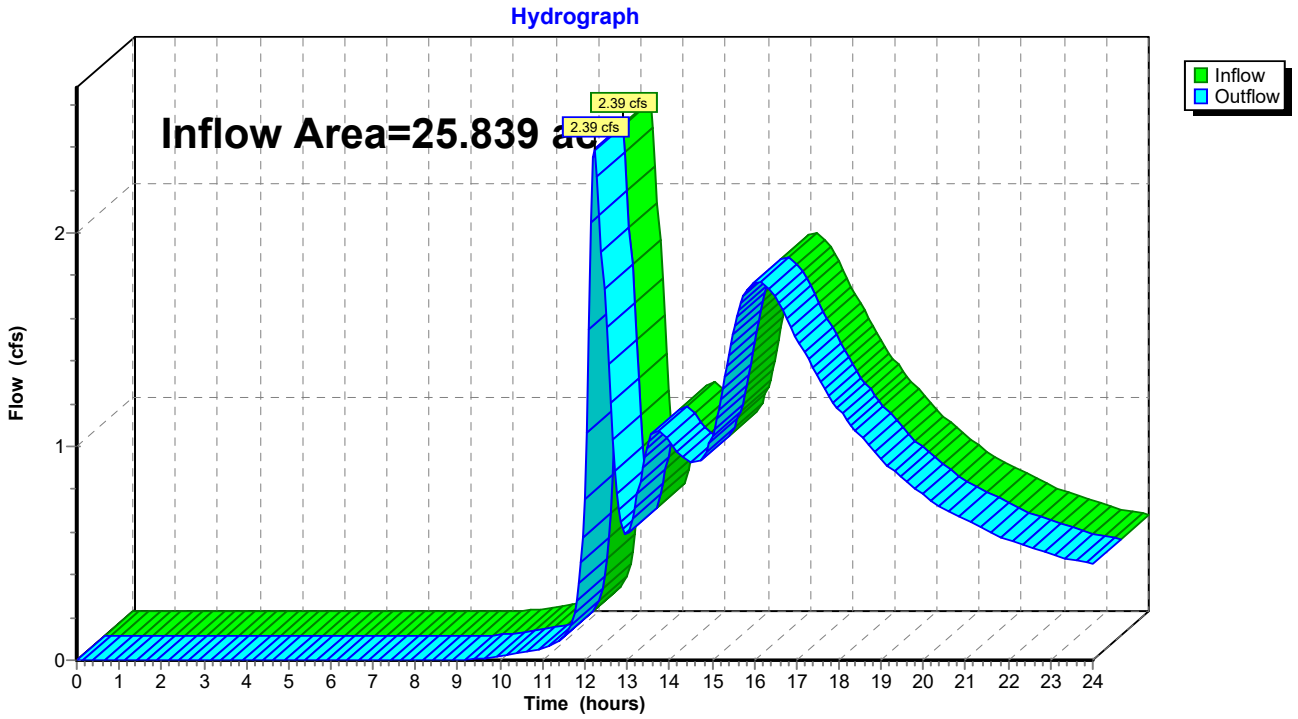


Summary for Reach EDP-2: Design Point 2

Inflow Area = 25.839 ac, 2.44% Impervious, Inflow Depth > 0.47" for 2-YR event
Inflow = 2.39 cfs @ 12.24 hrs, Volume= 1.007 af
Outflow = 2.39 cfs @ 12.24 hrs, Volume= 1.007 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach EDP-2: Design Point 2



Summary for Reach EDP-3: Design Point 3

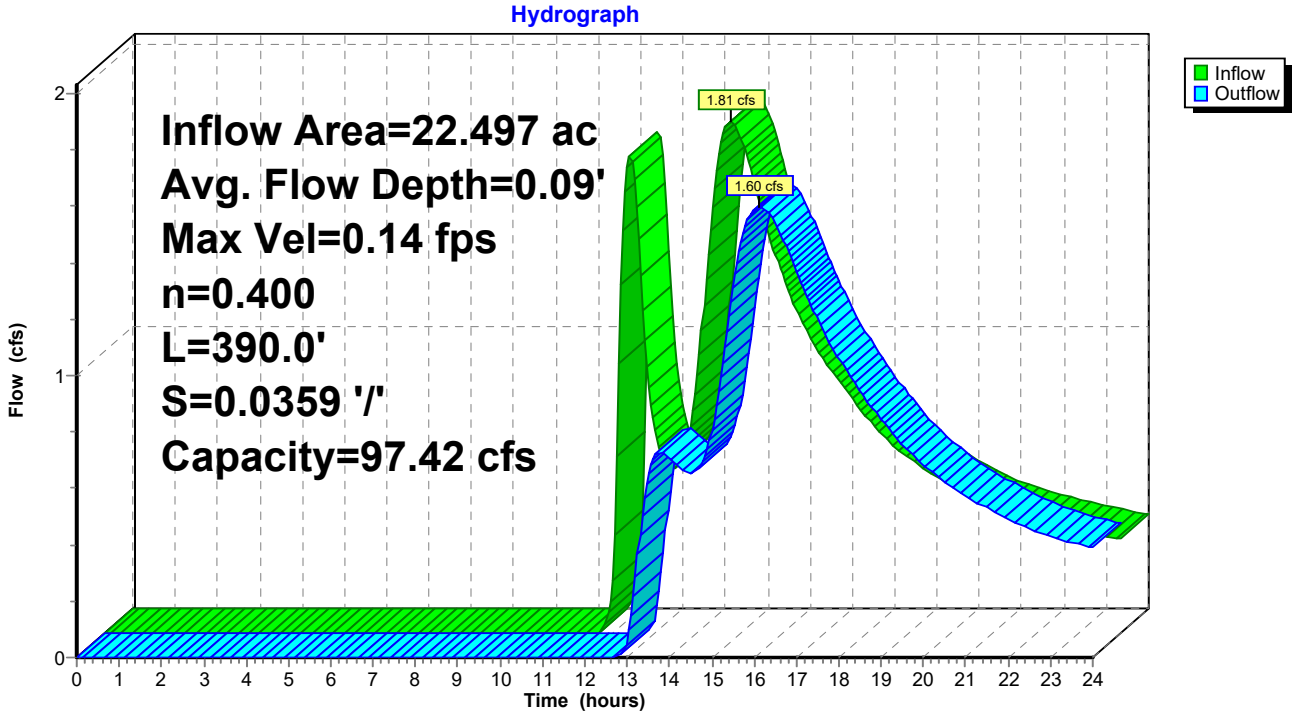
Inflow Area = 22.497 ac, 0.74% Impervious, Inflow Depth > 0.43" for 2-YR event
Inflow = 1.81 cfs @ 14.77 hrs, Volume= 0.807 af
Outflow = 1.60 cfs @ 16.12 hrs, Volume= 0.741 af, Atten= 12%, Lag= 80.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 0.14 fps, Min. Travel Time= 47.1 min
Avg. Velocity = 0.10 fps, Avg. Travel Time= 66.0 min

Peak Storage= 4,521 cf @ 15.33 hrs
Average Depth at Peak Storage= 0.09'
Bank-Full Depth= 1.00' Flow Area= 151.0 sf, Capacity= 97.42 cfs

130.00' x 1.00' deep channel, n= 0.400 Sheet flow: Woods+light brush
Side Slope Z-value= 12.0 30.0 '/' Top Width= 172.00'
Length= 390.0' Slope= 0.0359 '/'
Inlet Invert= 618.00', Outlet Invert= 604.00'

Reach EDP-3: Design Point 3



Summary for Reach EDP-4: Design Point 4

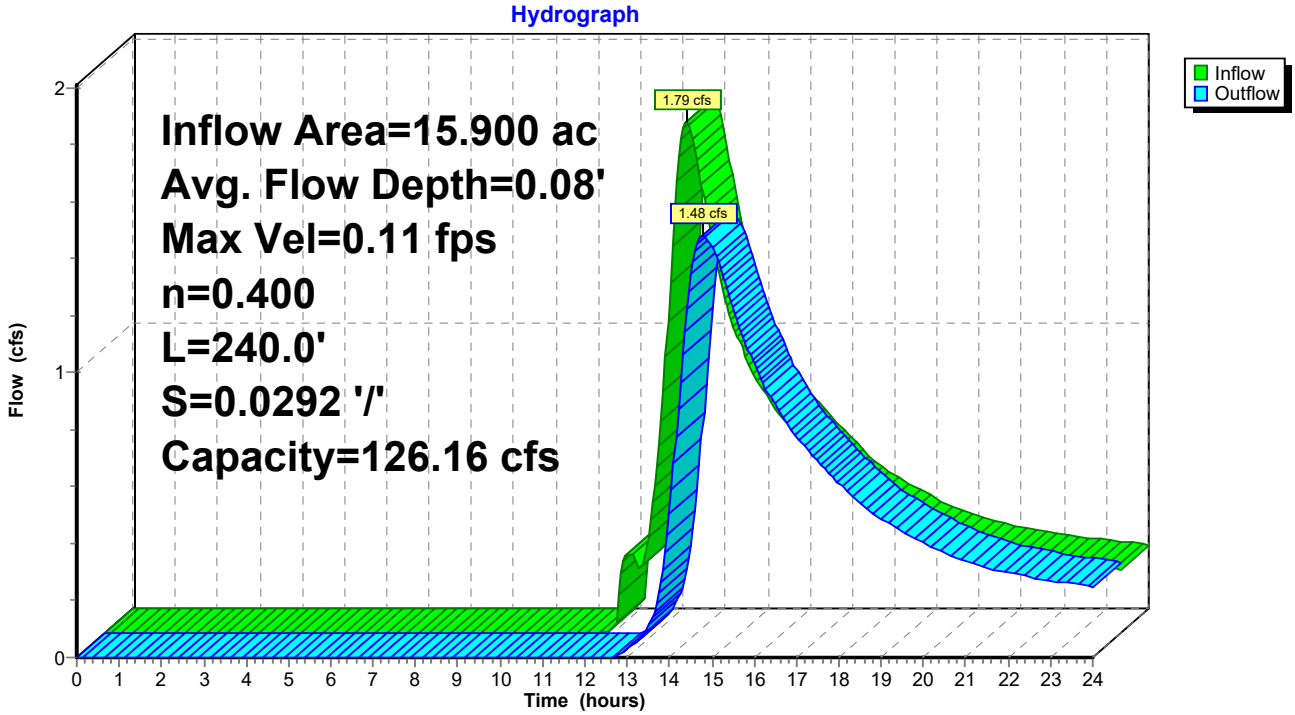
Inflow Area = 15.900 ac, 0.70% Impervious, Inflow Depth > 0.43" for 2-YR event
Inflow = 1.79 cfs @ 13.74 hrs, Volume= 0.564 af
Outflow = 1.48 cfs @ 14.80 hrs, Volume= 0.529 af, Atten= 18%, Lag= 63.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 0.11 fps, Min. Travel Time= 35.5 min
Avg. Velocity = 0.07 fps, Avg. Travel Time= 57.8 min

Peak Storage= 3,154 cf @ 14.21 hrs
Average Depth at Peak Storage= 0.08'
Bank-Full Depth= 1.00' Flow Area= 237.5 sf, Capacity= 126.16 cfs

165.00' x 1.00' deep channel, n= 0.400 Sheet flow: Woods+light brush
Side Slope Z-value= 80.0 65.0 '/' Top Width= 310.00'
Length= 240.0' Slope= 0.0292 '/'
Inlet Invert= 625.00', Outlet Invert= 618.00'

Reach EDP-4: Design Point 4



Summary for Reach EDP-5: Design Point 5

Inflow Area = 14.011 ac, 0.79% Impervious, Inflow Depth > 0.47" for 2-YR event
Inflow = 2.34 cfs @ 12.79 hrs, Volume= 0.547 af
Outflow = 1.71 cfs @ 13.74 hrs, Volume= 0.514 af, Atten= 27%, Lag= 57.1 min

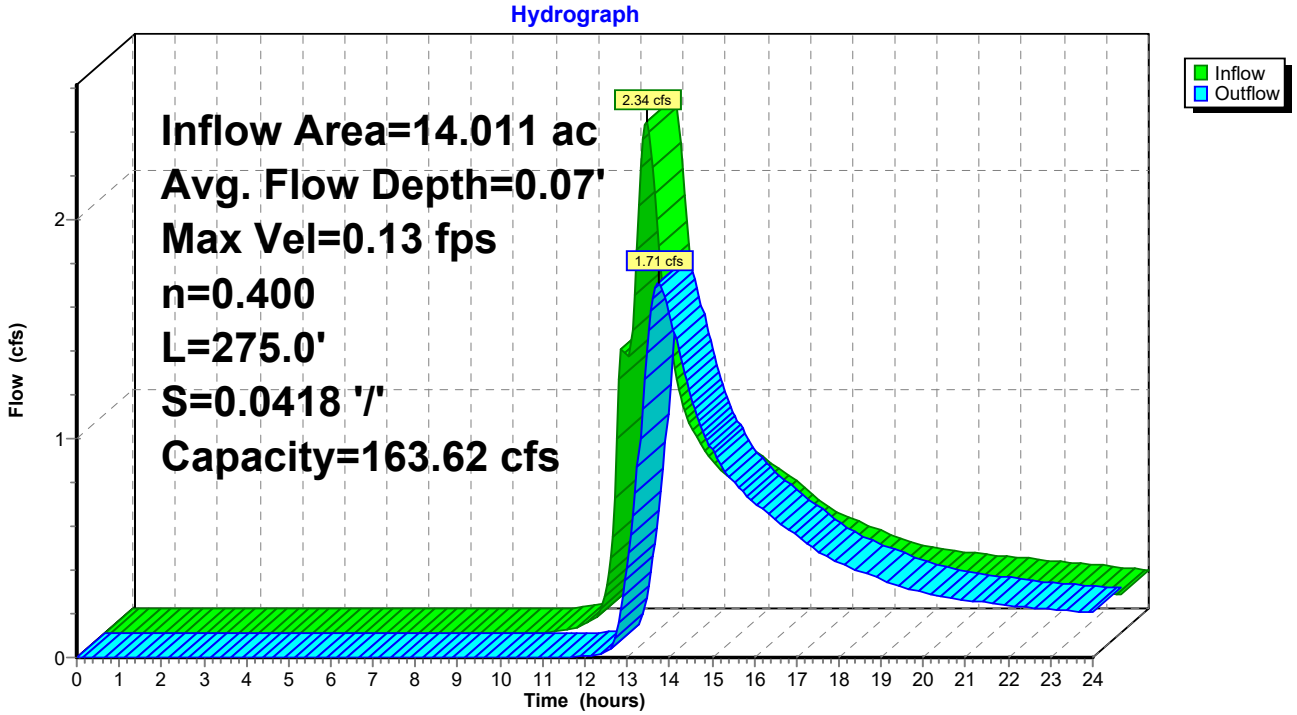
Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 0.13 fps, Min. Travel Time= 36.6 min
Avg. Velocity = 0.07 fps, Avg. Travel Time= 65.7 min

Peak Storage= 3,761 cf @ 13.13 hrs
Average Depth at Peak Storage= 0.07'
Bank-Full Depth= 1.00' Flow Area= 237.5 sf, Capacity= 163.62 cfs

200.00' x 1.00' deep channel, n= 0.400 Sheet flow: Woods+light brush
Side Slope Z-value= 50.0 25.0 '/' Top Width= 275.00'
Length= 275.0' Slope= 0.0418 '/'
Inlet Invert= 636.50', Outlet Invert= 625.00'

‡

Reach EDP-5: Design Point 5



Summary for Reach EDP-6: Design Point 6

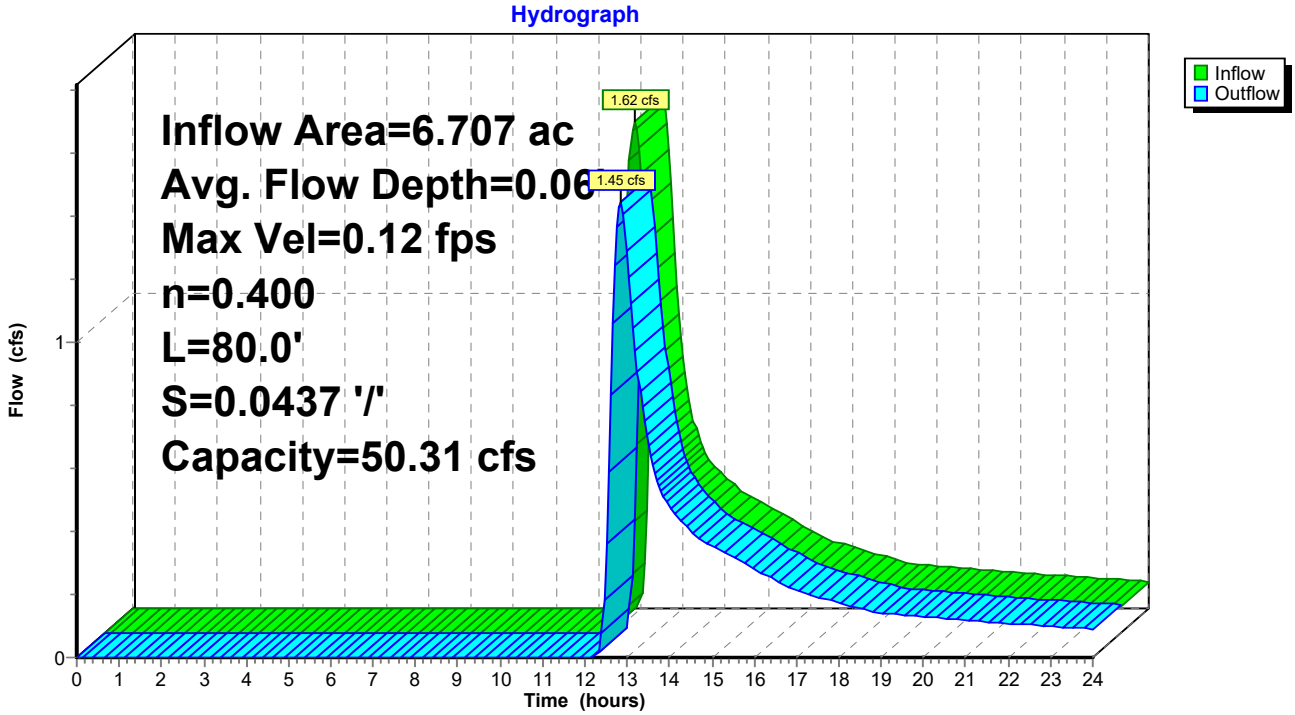
Inflow Area = 6.707 ac, 0.00% Impervious, Inflow Depth > 0.49" for 2-YR event
Inflow = 1.62 cfs @ 12.50 hrs, Volume= 0.273 af
Outflow = 1.45 cfs @ 12.84 hrs, Volume= 0.268 af, Atten= 11%, Lag= 20.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 0.12 fps, Min. Travel Time= 11.2 min
Avg. Velocity = 0.06 fps, Avg. Travel Time= 23.7 min

Peak Storage= 976 cf @ 12.65 hrs
Average Depth at Peak Storage= 0.06'
Bank-Full Depth= 0.50' Flow Area= 107.5 sf, Capacity= 50.31 cfs

200.00' x 0.50' deep channel, n= 0.400 Sheet flow: Woods+light brush
Side Slope Z-value= 30.0 '/' Top Width= 230.00'
Length= 80.0' Slope= 0.0437 '/'
Inlet Invert= 642.50', Outlet Invert= 639.00'

Reach EDP-6: Design Point 6

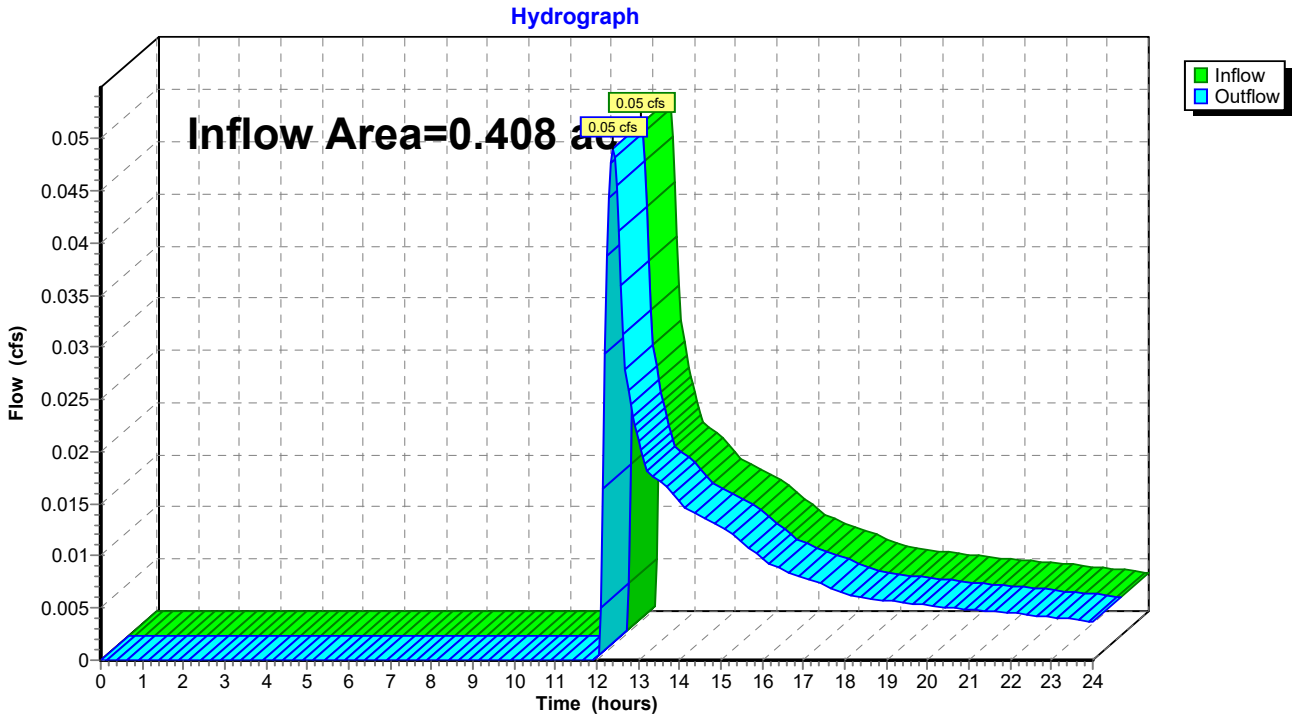


Summary for Reach EDP-7: Design Point 7 (Vernal Pool)

Inflow Area = 0.408 ac, 0.00% Impervious, Inflow Depth > 0.29" for 2-YR event
Inflow = 0.05 cfs @ 12.41 hrs, Volume= 0.010 af
Outflow = 0.05 cfs @ 12.41 hrs, Volume= 0.010 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach EDP-7: Design Point 7 (Vernal Pool)



Summary for Pond RCP: 24" RCP

Inflow Area = 22.497 ac, 0.74% Impervious, Inflow Depth > 0.40" for 2-YR event
Inflow = 1.60 cfs @ 16.12 hrs, Volume= 0.741 af
Outflow = 1.60 cfs @ 16.12 hrs, Volume= 0.741 af, Atten= 0%, Lag= 0.0 min
Primary = 1.60 cfs @ 16.12 hrs, Volume= 0.741 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 601.56' @ 16.12 hrs Surf.Area= 15 sf Storage= 6 cf

Plug-Flow detention time= 0.1 min calculated for 0.739 af (100% of inflow)
Center-of-Mass det. time= 0.0 min (1,070.3 - 1,070.2)

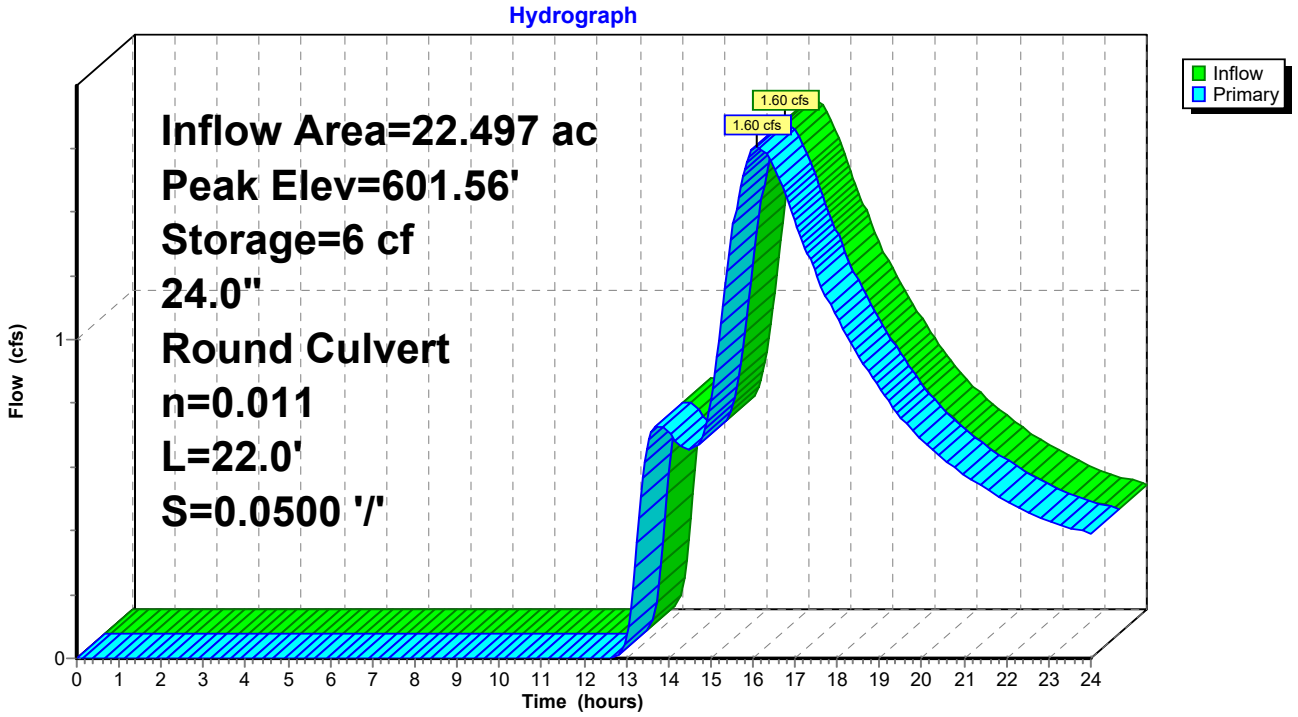
Volume	Invert	Avail.Storage	Storage Description
#1	601.10'	90 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
601.10	10	0	0
602.00	20	13	13
603.00	30	25	38
604.00	40	35	73
604.37	50	17	90

Device	Routing	Invert	Outlet Devices
#1	Primary	601.10'	**24.0" Round RCP_Round 24"** L= 22.0' RCP, groove end w/headwall, Ke= 0.200 Inlet / Outlet Invert= 601.10' / 600.00' S= 0.0500 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf

Primary OutFlow Max=1.60 cfs @ 16.12 hrs HW=601.56' (Free Discharge)
└─**1=RCP_Round 24"** (Inlet Controls 1.60 cfs @ 2.90 fps)

Pond RCP: 24" RCP



Summary for Subcatchment 1: EDA-1

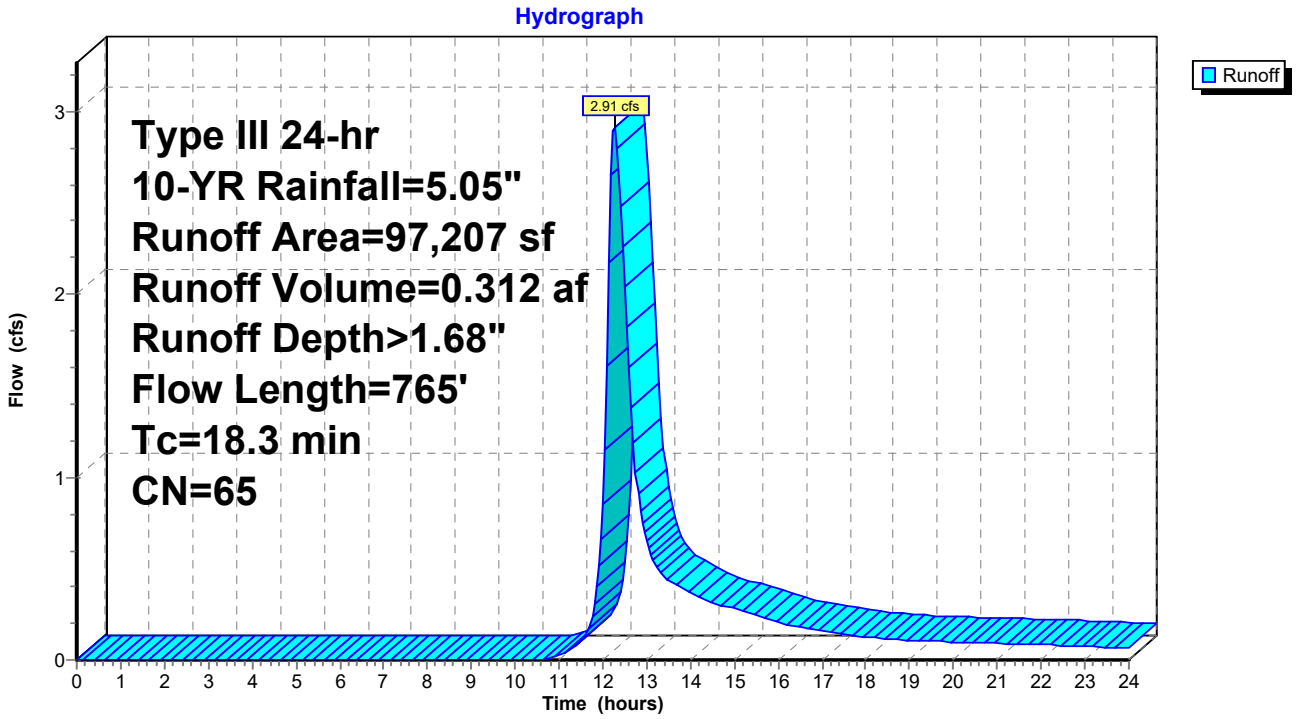
Runoff = 2.91 cfs @ 12.27 hrs, Volume= 0.312 af, Depth> 1.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=5.05"

Area (sf)	CN	Description
62,786	70	Woods, Good, HSG C
34,421	55	Woods, Good, HSG B
97,207	65	Weighted Average
97,207		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.0500	0.10		**Sheet Flow, 1A-1B** Woods: Light underbrush n= 0.400 P2= 3.32"
1.0	82	0.0790	1.41		**Shallow Concentrated Flow, 1B-1C** Woodland Kv= 5.0 fps
7.6	553	0.0590	1.21		**Shallow Concentrated Flow, 1C-1D** Woodland Kv= 5.0 fps
1.3	80	0.0400	1.00		**Shallow Concentrated Flow, 1D-EDP-1** Woodland Kv= 5.0 fps
18.3	765	Total			

Subcatchment 1: EDA-1



Summary for Subcatchment 2: EDA-2

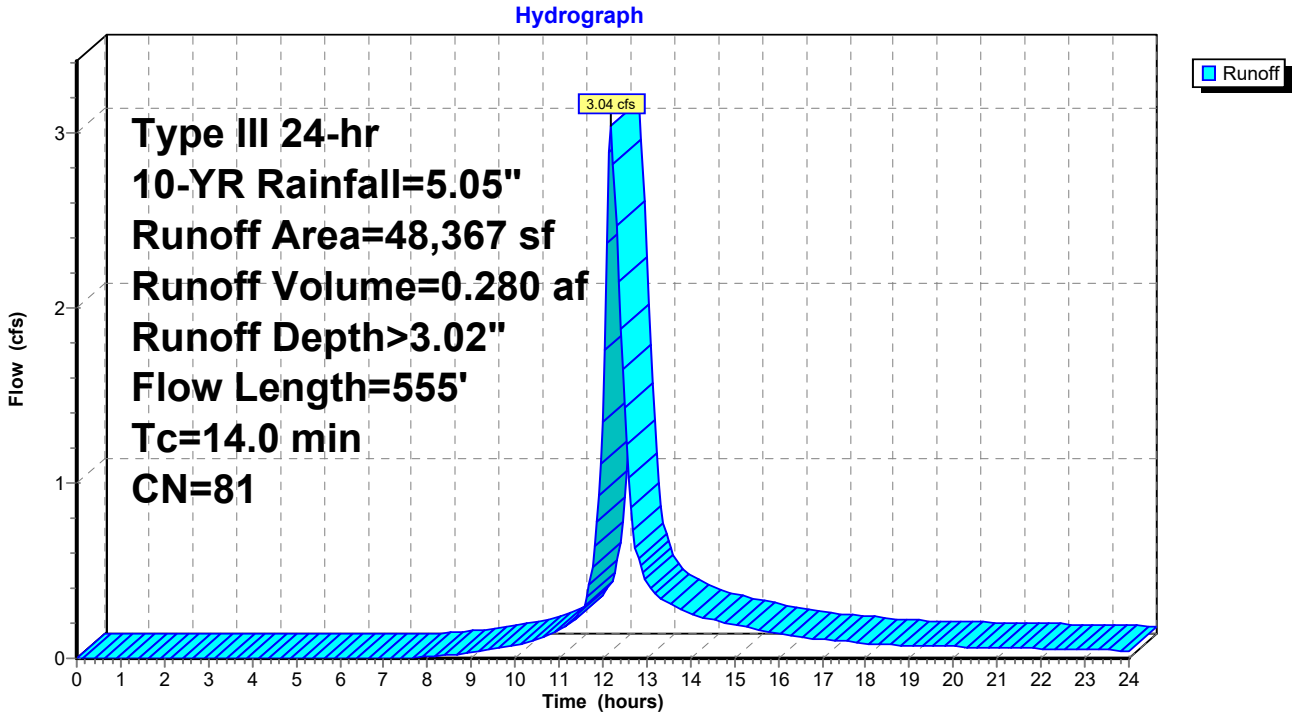
Runoff = 3.04 cfs @ 12.20 hrs, Volume= 0.280 af, Depth> 3.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=5.05"

Area (sf)	CN	Description
24,861	70	Woods, Good, HSG C
3,336	55	Woods, Good, HSG B
20,170	98	Paved parking, HSG C
48,367	81	Weighted Average
28,197		58.30% Pervious Area
20,170		41.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	50	0.0400	0.09		**Sheet Flow, 2A-2B** Woods: Light underbrush n= 0.400 P2= 3.32"
3.2	247	0.0664	1.29		**Shallow Concentrated Flow, 2B-2C** Woodland Kv= 5.0 fps
0.1	14	0.0360	3.85		**Shallow Concentrated Flow, 2C-2D** Paved Kv= 20.3 fps
0.1	19	0.1400	2.62		**Shallow Concentrated Flow, 2D-2E** Short Grass Pasture Kv= 7.0 fps
1.4	225	0.0178	2.71		**Shallow Concentrated Flow, 2E-EDP-2** Paved Kv= 20.3 fps
14.0	555	Total			

Subcatchment 2: EDA-2



Summary for Subcatchment 3A: EDA-3A

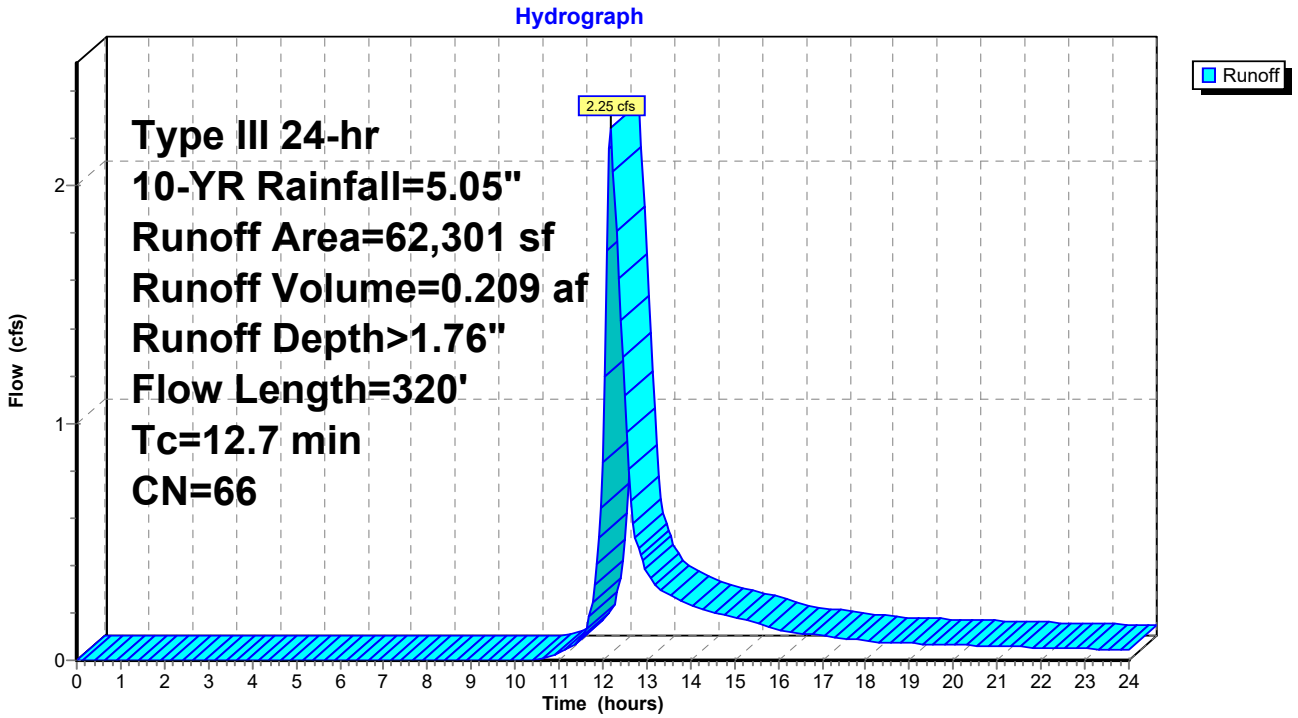
Runoff = 2.25 cfs @ 12.19 hrs, Volume= 0.209 af, Depth> 1.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=5.05"

Area (sf)	CN	Description
21,831	55	Woods, Good, HSG B
38,070	70	Woods, Good, HSG C
2,400	98	Paved parking, HSG B
62,301	66	Weighted Average
59,901		96.15% Pervious Area
2,400		3.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.0500	0.10		**Sheet Flow, 3A-3B** Woods: Light underbrush n= 0.400 P2= 3.32"
4.3	270	0.0444	1.05		**Shallow Concentrated Flow, 3B-EDP-3** Woodland Kv= 5.0 fps
12.7	320	Total			

Subcatchment 3A: EDA-3A



Summary for Subcatchment 3B: EDA-3B

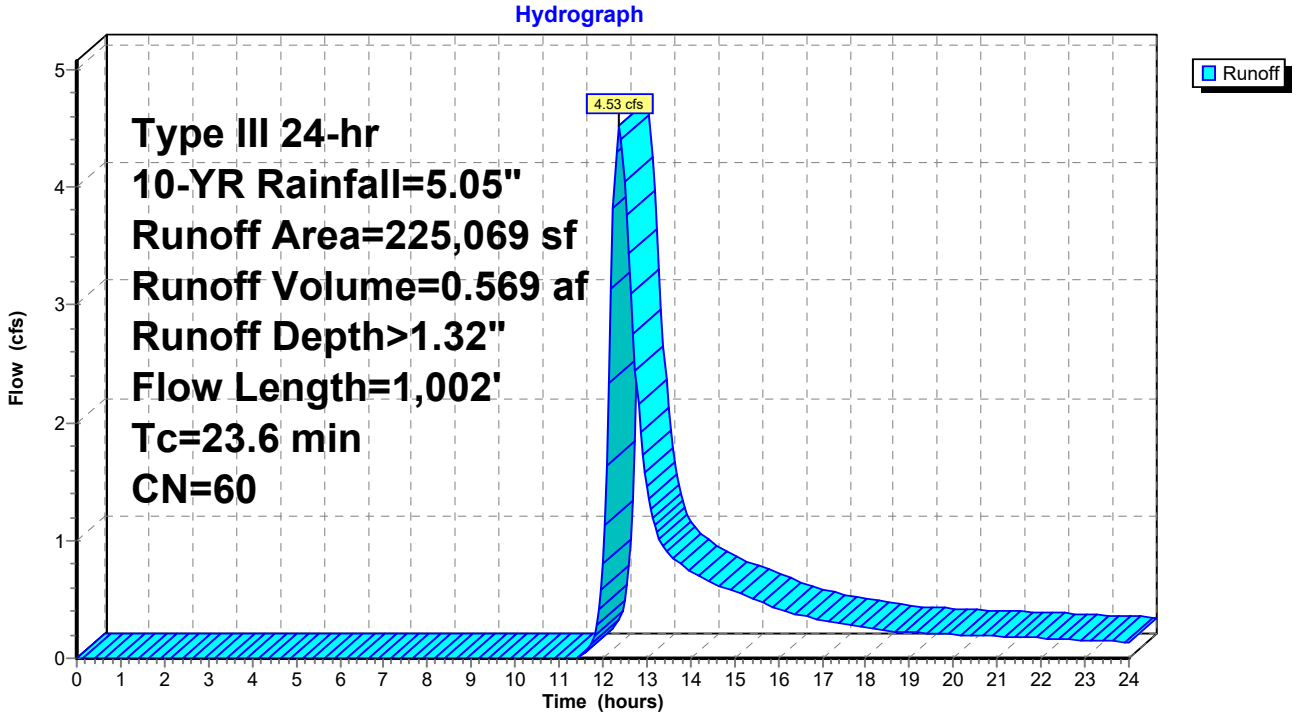
Runoff = 4.53 cfs @ 12.37 hrs, Volume= 0.569 af, Depth> 1.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=5.05"

Area (sf)	CN	Description
145,447	55	Woods, Good, HSG B
79,622	70	Woods, Good, HSG C
225,069	60	Weighted Average
225,069		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.8	50	0.0343	0.09		**Sheet Flow, 3A-3B** Woods: Light underbrush n= 0.400 P2= 3.32"
13.8	952	0.0530	1.15		**Shallow Concentrated Flow, 3B-EDP-3** Woodland Kv= 5.0 fps
23.6	1,002	Total			

Subcatchment 3B: EDA-3B



Summary for Subcatchment 4: EDA-4

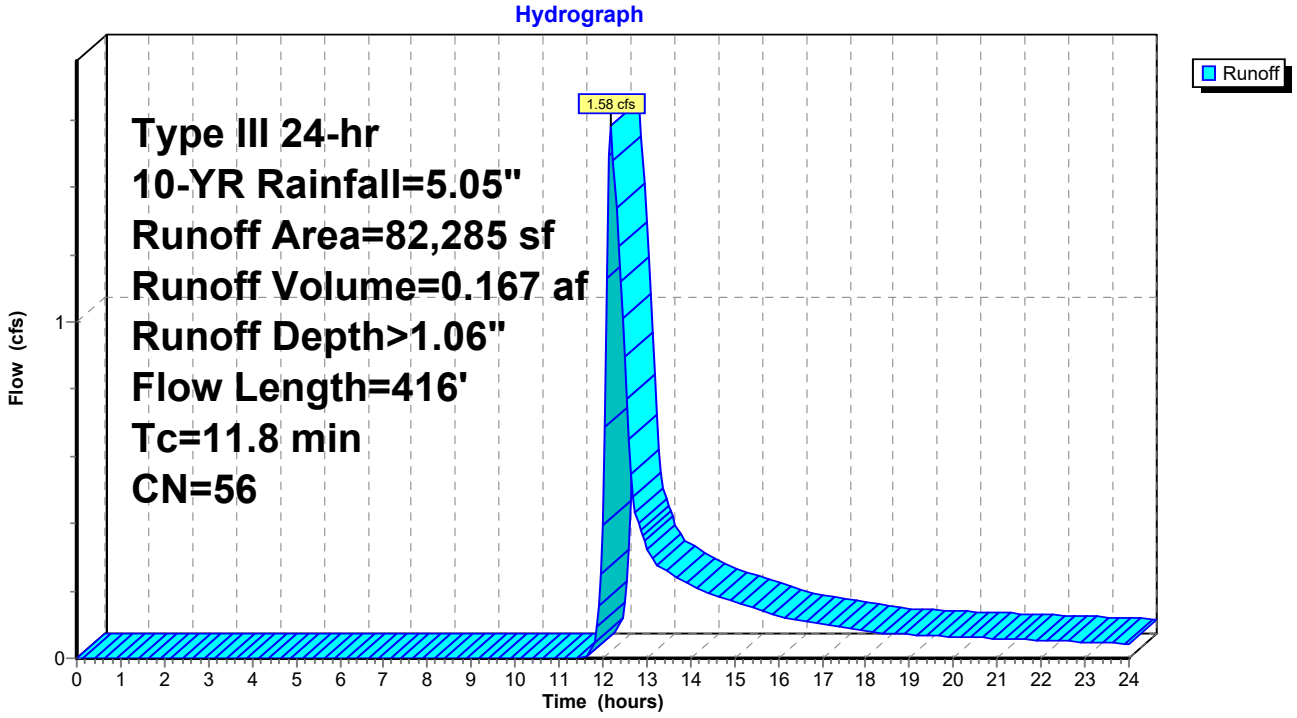
Runoff = 1.58 cfs @ 12.20 hrs, Volume= 0.167 af, Depth> 1.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=5.05"

Area (sf)	CN	Description
77,691	55	Woods, Good, HSG B
4,594	70	Woods, Good, HSG C
82,285	56	Weighted Average
82,285		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	50	0.0600	0.11		**Sheet Flow, 4A-4B** Woods: Light underbrush n= 0.400 P2= 3.32"
4.0	366	0.0950	1.54		**Shallow Concentrated Flow, 4B-EDP-4** Woodland Kv= 5.0 fps
11.8	416	Total			

Subcatchment 4: EDA-4



Summary for Subcatchment 5A: EDA-5A

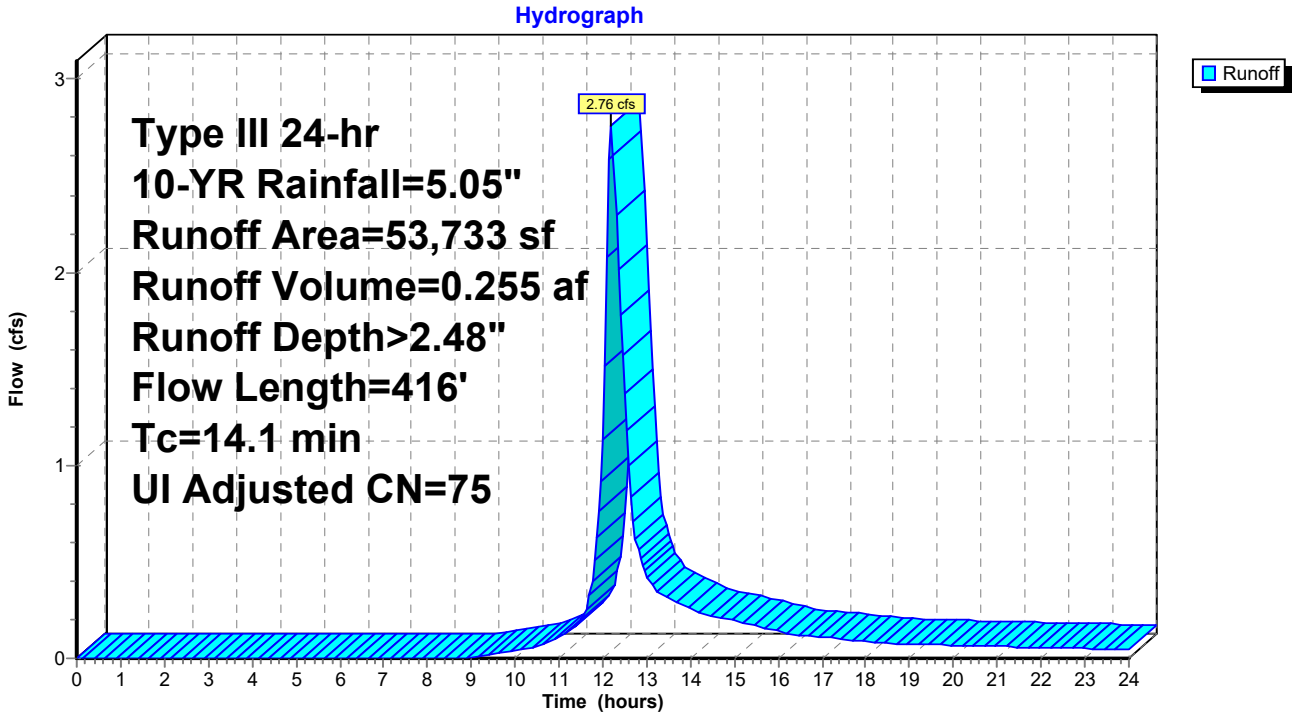
Runoff = 2.76 cfs @ 12.20 hrs, Volume= 0.255 af, Depth> 2.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=5.05"

Area (sf)	CN	Adj	Description
29,770	70		Woods, Good, HSG C
4,837	98		Unconnected roofs, HSG C
19,126	79		50-75% Grass cover, Fair, HSG C
53,733	76	75	Weighted Average, UI Adjusted
48,896			91.00% Pervious Area
4,837			9.00% Impervious Area
4,837			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.9	50	0.0334	0.08		**Sheet Flow, 5A-5B** Woods: Light underbrush n= 0.400 P2= 3.32"
3.3	239	0.0566	1.19		**Shallow Concentrated Flow, 5B-5C** Woodland Kv= 5.0 fps
0.3	62	0.0450	3.42		**Shallow Concentrated Flow, swale/ditch** Unpaved Kv= 16.1 fps
0.1	23	0.0100	4.91	3.86	**Pipe Channel, 12" CPP** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Corrugated PP, smooth interior
0.5	42	0.0430	1.45		**Shallow Concentrated Flow, 5E-EDP-5** Short Grass Pasture Kv= 7.0 fps
14.1	416	Total			

Subcatchment 5A: EDA-5A



Summary for Subcatchment 5B: EDA-5B

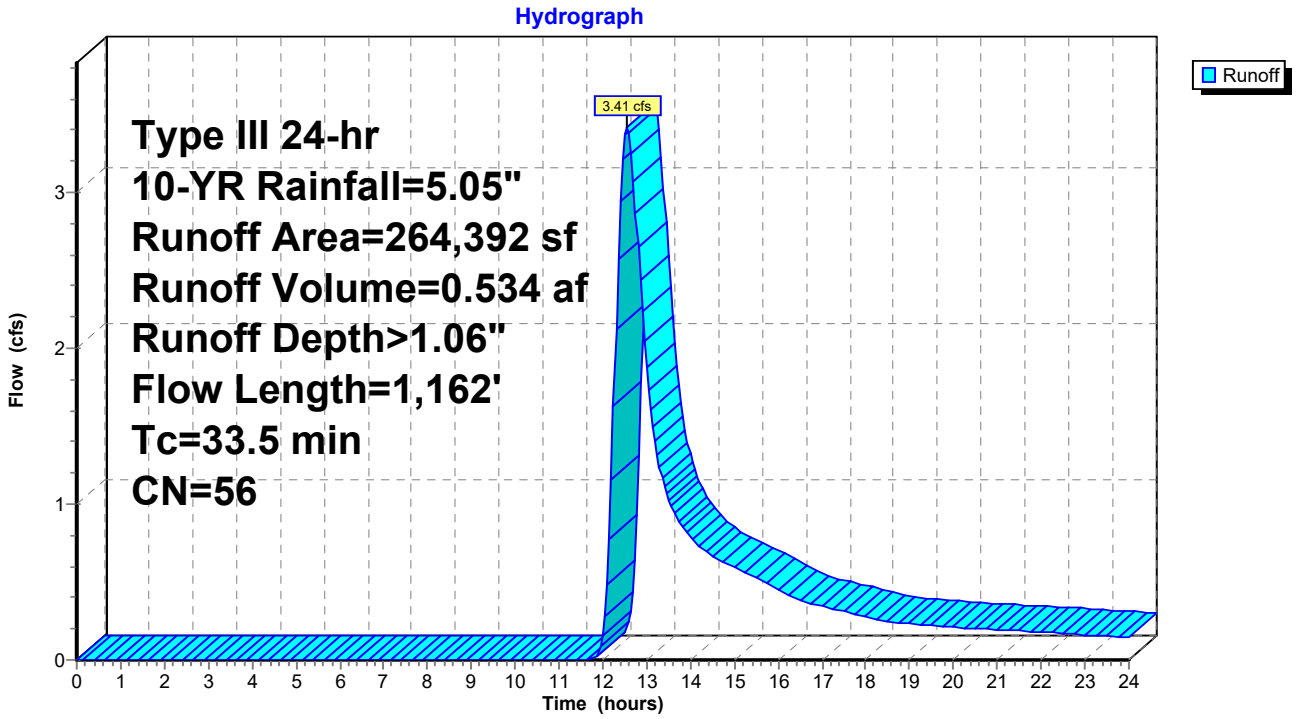
Runoff = 3.41 cfs @ 12.55 hrs, Volume= 0.534 af, Depth> 1.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=5.05"

Area (sf)	CN	Description
250,540	55	Woods, Good, HSG B
13,852	77	Woods, Good, HSG D
264,392	56	Weighted Average
264,392		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	50	0.0400	0.09		**Sheet Flow, 5A-5B** Woods: Light underbrush n= 0.400 P2= 3.32"
9.9	553	0.0350	0.94		**Shallow Concentrated Flow, 5B-5C** Woodland Kv= 5.0 fps
13.3	455	0.0130	0.57		**Shallow Concentrated Flow, 5C-5D** Woodland Kv= 5.0 fps
1.1	104	0.0913	1.51		**Shallow Concentrated Flow, 5D-EDP-5** Woodland Kv= 5.0 fps
33.5	1,162	Total			

Subcatchment 5B: EDA-5B



Summary for Subcatchment 6: EDA-6

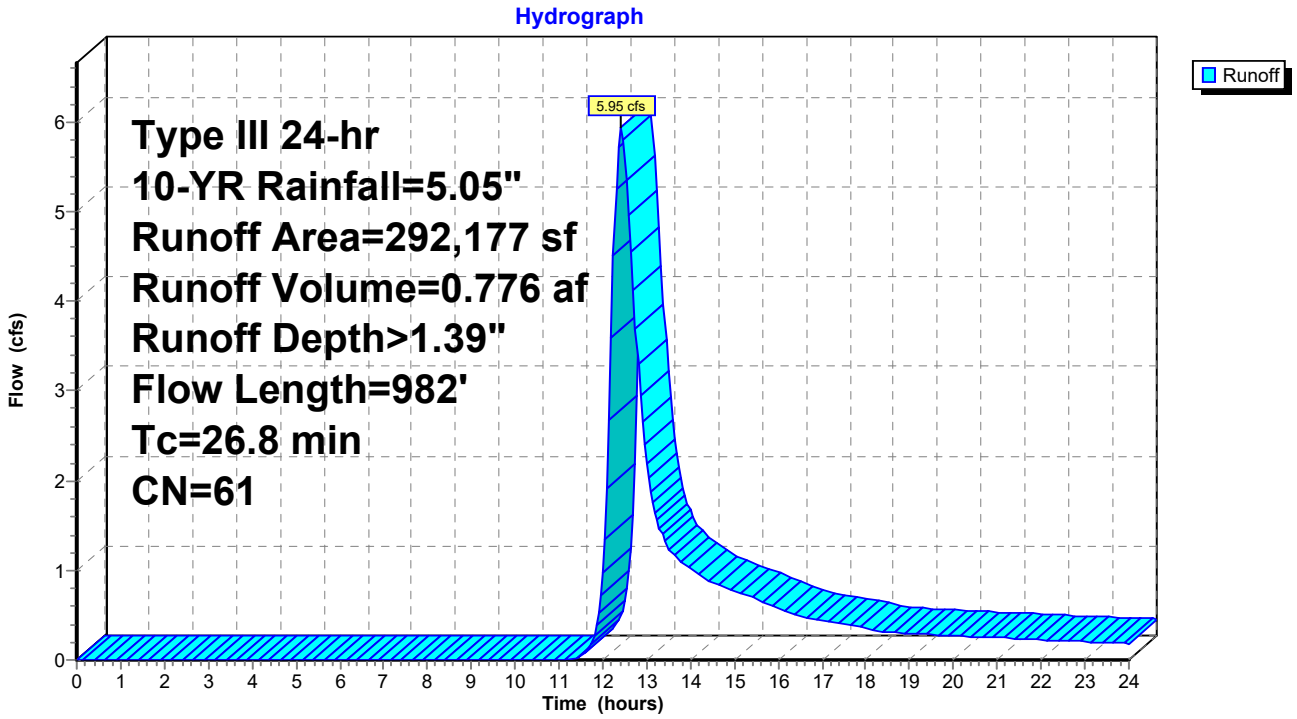
Runoff = 5.95 cfs @ 12.42 hrs, Volume= 0.776 af, Depth> 1.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=5.05"

Area (sf)	CN	Description
113,079	70	Woods, Good, HSG C
179,098	55	Woods, Good, HSG B
292,177	61	Weighted Average
292,177		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.1	50	0.0250	0.08		**Sheet Flow, 6A-6B** Woods: Light underbrush n= 0.400 P2= 3.32"
4.7	306	0.0474	1.09		**Shallow Concentrated Flow, 6B-6C** Woodland Kv= 5.0 fps
3.5	130	0.0154	0.62		**Shallow Concentrated Flow, 6C-6D** Woodland Kv= 5.0 fps
7.5	496	0.0484	1.10		**Shallow Concentrated Flow, 6D-EDP-6** Woodland Kv= 5.0 fps
26.8	982	Total			

Subcatchment 6: EDA-6



Summary for Subcatchment 7: EDA-7

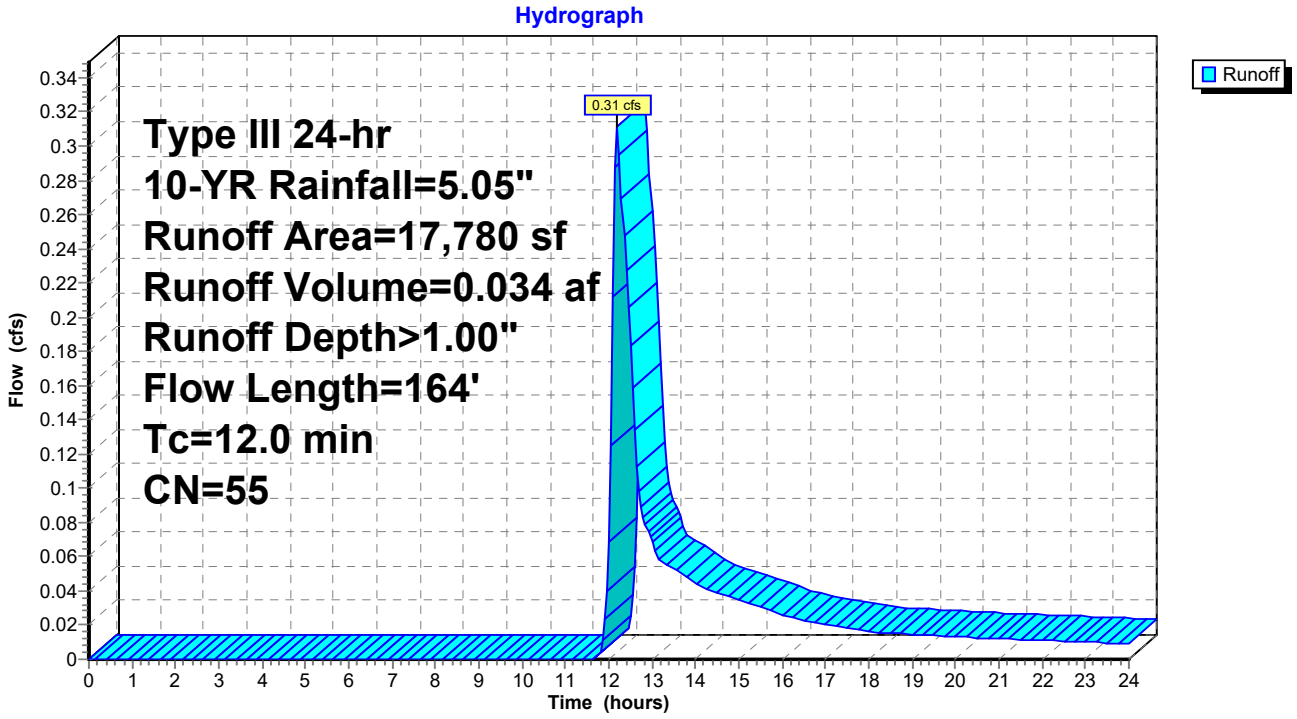
Runoff = 0.31 cfs @ 12.20 hrs, Volume= 0.034 af, Depth> 1.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=5.05"

Area (sf)	CN	Description
17,780	55	Woods, Good, HSG B
17,780		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.3	50	0.0300	0.08		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.32"
1.7	114	0.0500	1.12		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
12.0	164	Total			

Subcatchment 7: EDA-7

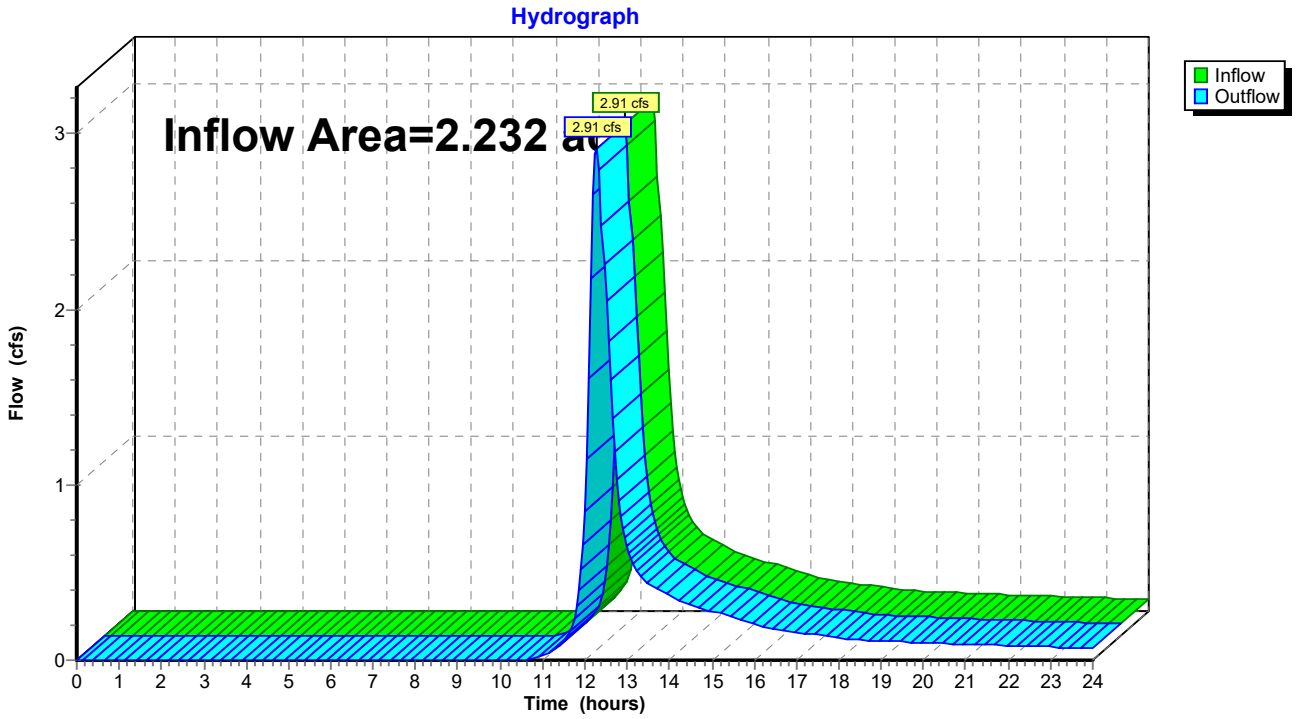


Summary for Reach EDP-1: Design Point 1

Inflow Area = 2.232 ac, 0.00% Impervious, Inflow Depth > 1.68" for 10-YR event
Inflow = 2.91 cfs @ 12.27 hrs, Volume= 0.312 af
Outflow = 2.91 cfs @ 12.27 hrs, Volume= 0.312 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach EDP-1: Design Point 1

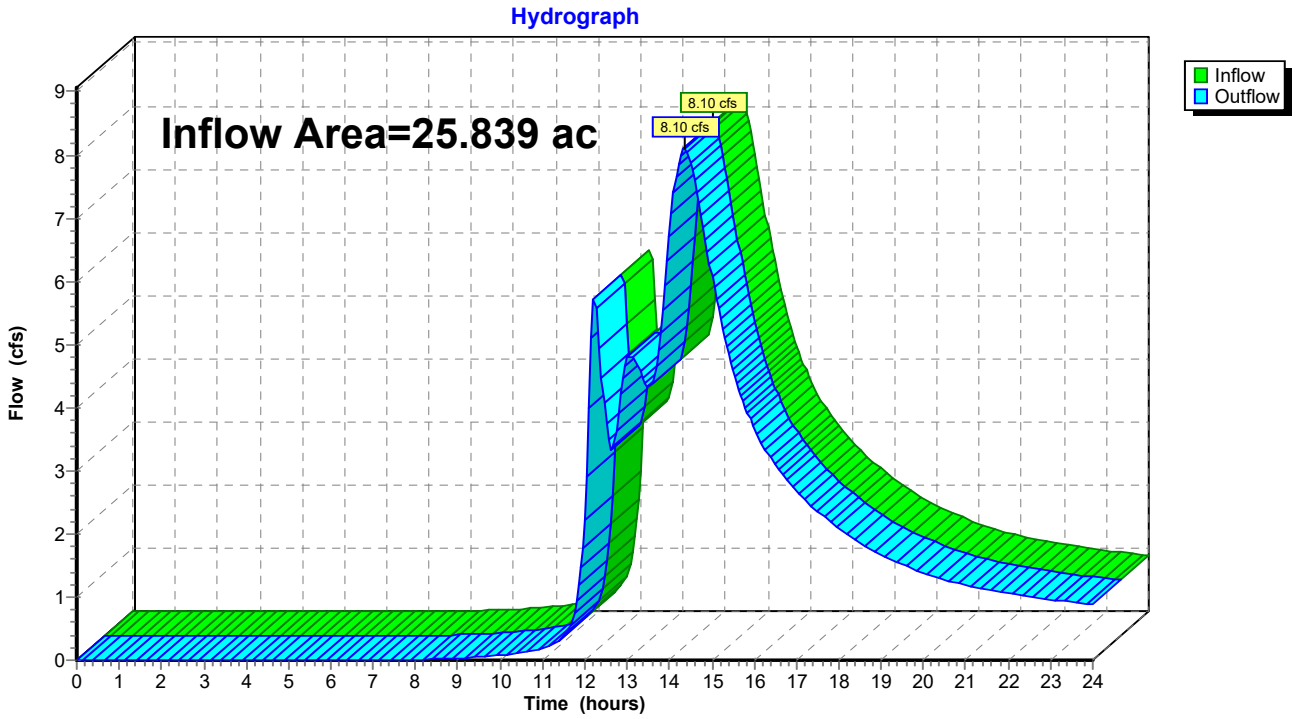


Summary for Reach EDP-2: Design Point 2

Inflow Area = 25.839 ac, 2.44% Impervious, Inflow Depth > 1.35" for 10-YR event
Inflow = 8.10 cfs @ 14.35 hrs, Volume= 2.906 af
Outflow = 8.10 cfs @ 14.35 hrs, Volume= 2.906 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach EDP-2: Design Point 2



Summary for Reach EDP-3: Design Point 3

Inflow Area = 22.497 ac, 0.74% Impervious, Inflow Depth > 1.28" for 10-YR event
Inflow = 8.48 cfs @ 13.65 hrs, Volume= 2.405 af
Outflow = 7.54 cfs @ 14.35 hrs, Volume= 2.314 af, Atten= 11%, Lag= 42.0 min

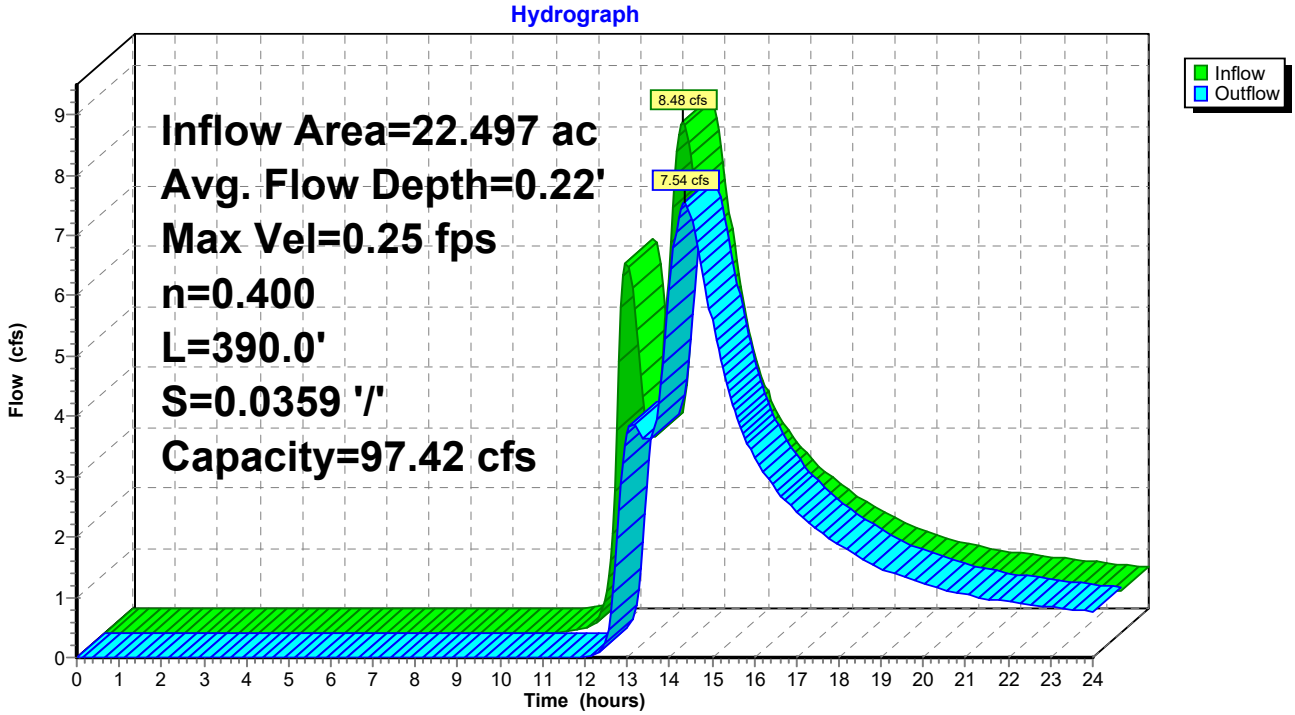
Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 0.25 fps, Min. Travel Time= 25.8 min
Avg. Velocity = 0.13 fps, Avg. Travel Time= 48.7 min

Peak Storage= 11,665 cf @ 13.92 hrs
Average Depth at Peak Storage= 0.22'
Bank-Full Depth= 1.00' Flow Area= 151.0 sf, Capacity= 97.42 cfs

130.00' x 1.00' deep channel, n= 0.400 Sheet flow: Woods+light brush
Side Slope Z-value= 12.0 30.0 '/' Top Width= 172.00'
Length= 390.0' Slope= 0.0359 '/'
Inlet Invert= 618.00', Outlet Invert= 604.00'

‡

Reach EDP-3: Design Point 3



Summary for Reach EDP-4: Design Point 4

Inflow Area = 15.900 ac, 0.70% Impervious, Inflow Depth > 1.27" for 10-YR event
Inflow = 8.54 cfs @ 13.10 hrs, Volume= 1.677 af
Outflow = 7.38 cfs @ 13.66 hrs, Volume= 1.627 af, Atten= 14%, Lag= 33.5 min

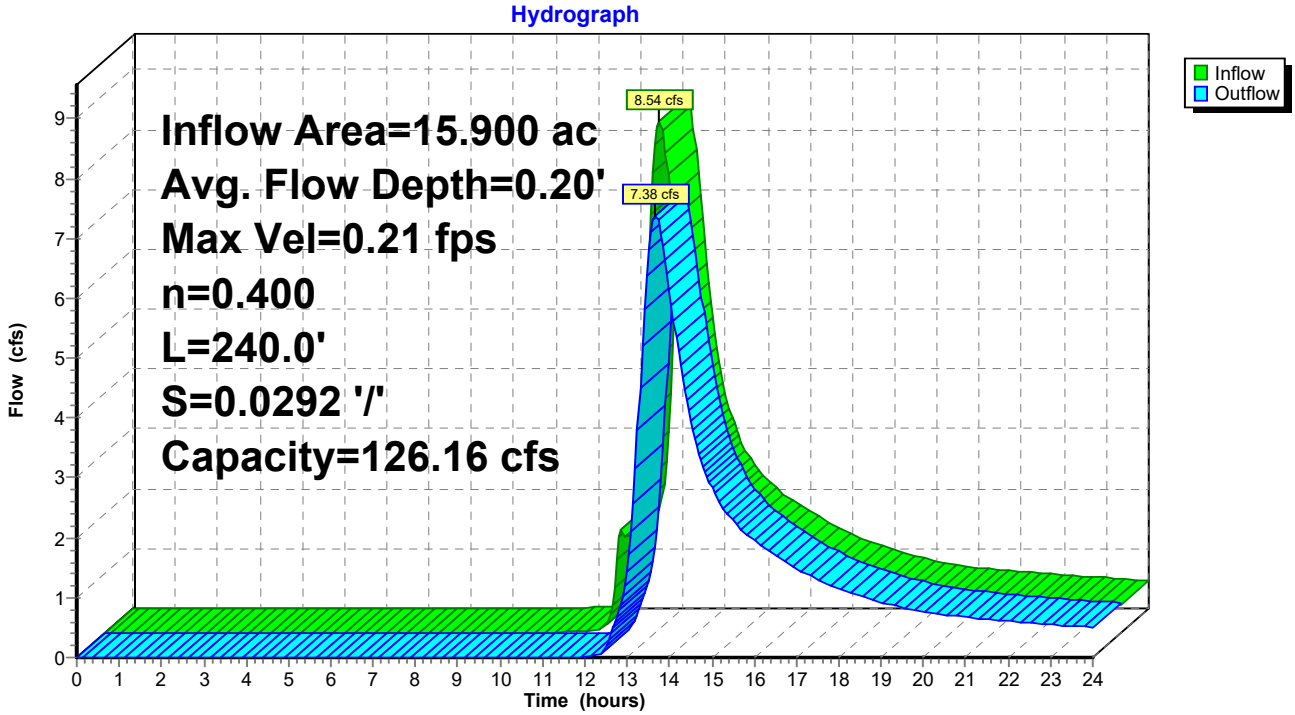
Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 0.21 fps, Min. Travel Time= 19.4 min
Avg. Velocity = 0.09 fps, Avg. Travel Time= 43.1 min

Peak Storage= 8,610 cf @ 13.34 hrs
Average Depth at Peak Storage= 0.20'
Bank-Full Depth= 1.00' Flow Area= 237.5 sf, Capacity= 126.16 cfs

165.00' x 1.00' deep channel, n= 0.400 Sheet flow: Woods+light brush
Side Slope Z-value= 80.0 65.0 '/' Top Width= 310.00'
Length= 240.0' Slope= 0.0292 '/'
Inlet Invert= 625.00', Outlet Invert= 618.00'

‡

Reach EDP-4: Design Point 4



Summary for Reach EDP-5: Design Point 5

Inflow Area = 14.011 ac, 0.79% Impervious, Inflow Depth > 1.33" for 10-YR event
Inflow = 10.15 cfs @ 12.56 hrs, Volume= 1.557 af
Outflow = 8.24 cfs @ 13.11 hrs, Volume= 1.510 af, Atten= 19%, Lag= 32.8 min

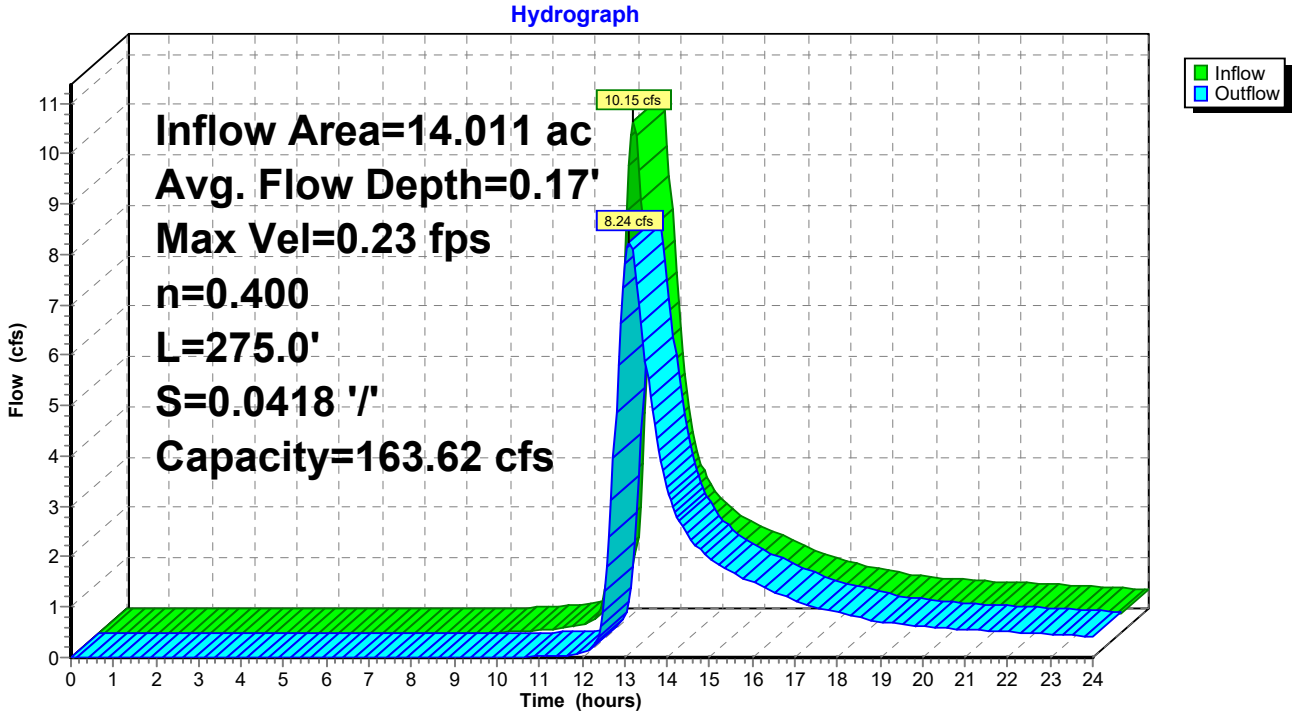
Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 0.23 fps, Min. Travel Time= 19.8 min
Avg. Velocity = 0.09 fps, Avg. Travel Time= 49.3 min

Peak Storage= 9,825 cf @ 12.78 hrs
Average Depth at Peak Storage= 0.17'
Bank-Full Depth= 1.00' Flow Area= 237.5 sf, Capacity= 163.62 cfs

200.00' x 1.00' deep channel, n= 0.400 Sheet flow: Woods+light brush
Side Slope Z-value= 50.0 25.0 '/' Top Width= 275.00'
Length= 275.0' Slope= 0.0418 '/'
Inlet Invert= 636.50', Outlet Invert= 625.00'

‡

Reach EDP-5: Design Point 5



Summary for Reach EDP-6: Design Point 6

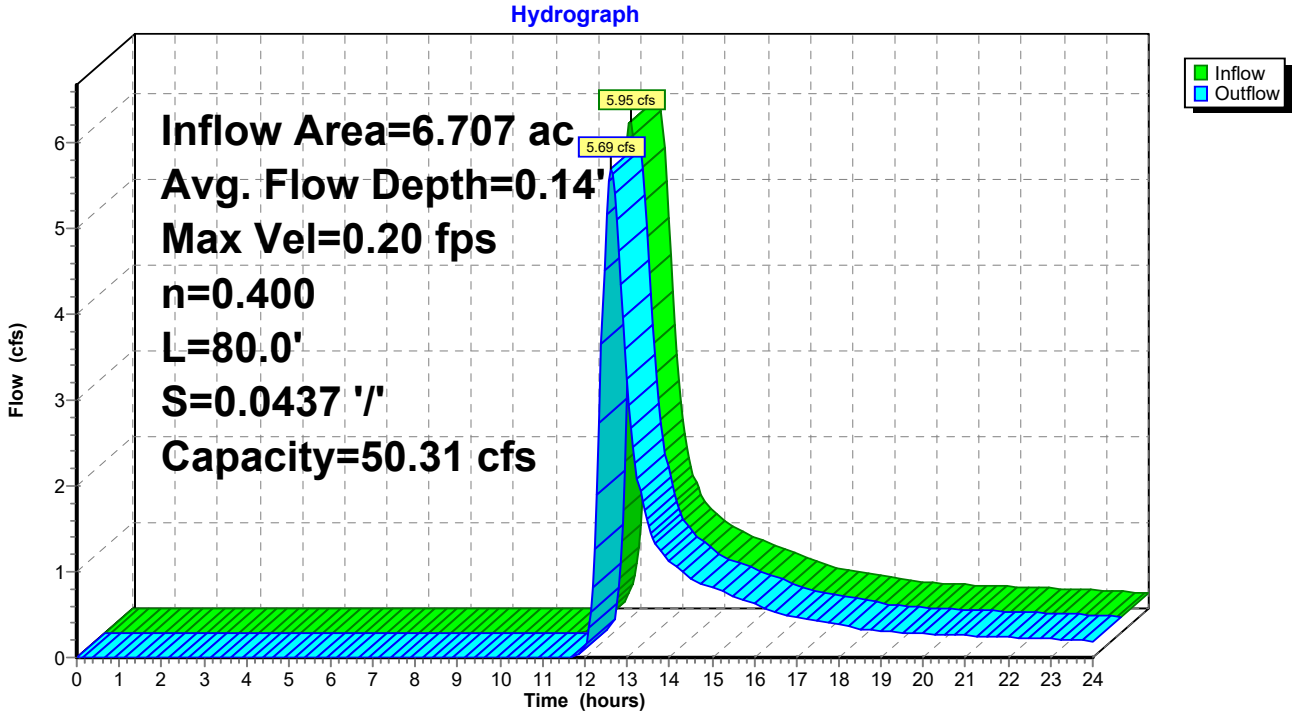
Inflow Area = 6.707 ac, 0.00% Impervious, Inflow Depth > 1.39" for 10-YR event
Inflow = 5.95 cfs @ 12.42 hrs, Volume= 0.776 af
Outflow = 5.69 cfs @ 12.61 hrs, Volume= 0.768 af, Atten= 4%, Lag= 11.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 0.20 fps, Min. Travel Time= 6.5 min
Avg. Velocity = 0.08 fps, Avg. Travel Time= 17.0 min

Peak Storage= 2,238 cf @ 12.50 hrs
Average Depth at Peak Storage= 0.14'
Bank-Full Depth= 0.50' Flow Area= 107.5 sf, Capacity= 50.31 cfs

200.00' x 0.50' deep channel, n= 0.400 Sheet flow: Woods+light brush
Side Slope Z-value= 30.0 '/' Top Width= 230.00'
Length= 80.0' Slope= 0.0437 '/'
Inlet Invert= 642.50', Outlet Invert= 639.00'

Reach EDP-6: Design Point 6

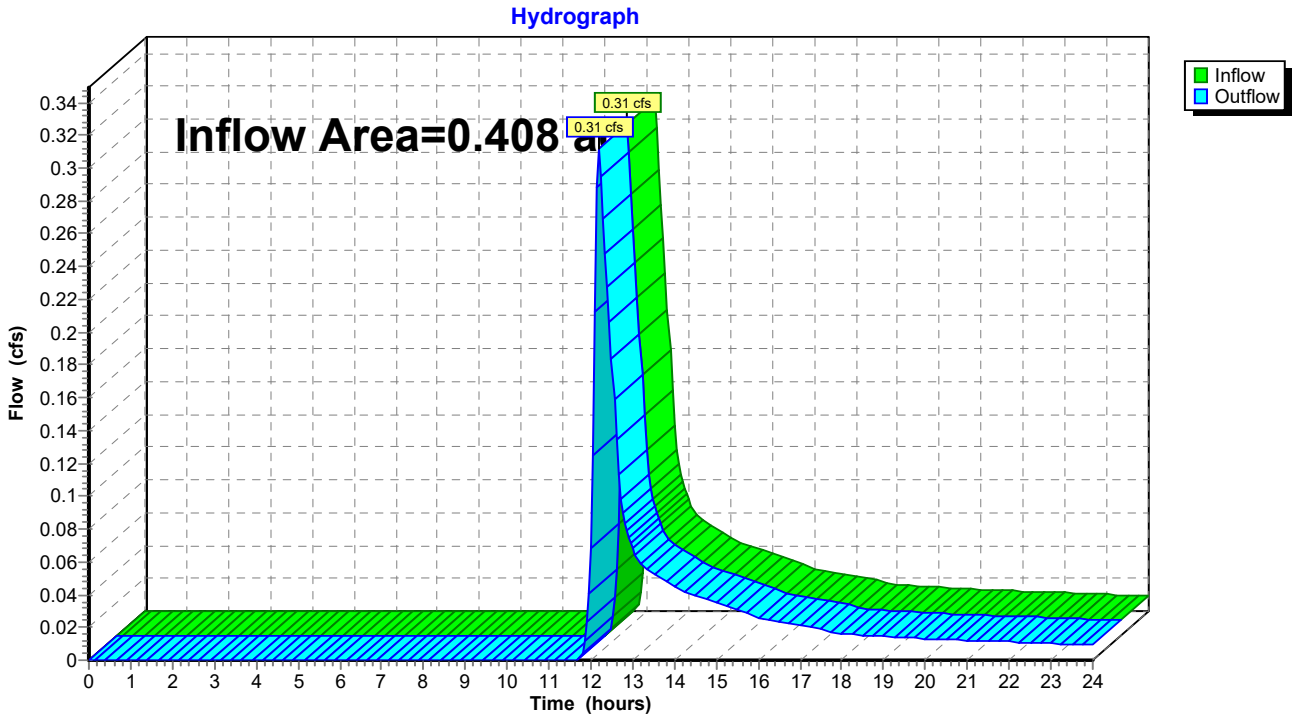


Summary for Reach EDP-7: Design Point 7 (Vernal Pool)

Inflow Area = 0.408 ac, 0.00% Impervious, Inflow Depth > 1.00" for 10-YR event
Inflow = 0.31 cfs @ 12.20 hrs, Volume= 0.034 af
Outflow = 0.31 cfs @ 12.20 hrs, Volume= 0.034 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach EDP-7: Design Point 7 (Vernal Pool)



Summary for Pond RCP: 24" RCP

Inflow Area = 22.497 ac, 0.74% Impervious, Inflow Depth > 1.23" for 10-YR event
Inflow = 7.54 cfs @ 14.35 hrs, Volume= 2.314 af
Outflow = 7.54 cfs @ 14.35 hrs, Volume= 2.314 af, Atten= 0%, Lag= 0.0 min
Primary = 7.54 cfs @ 14.35 hrs, Volume= 2.314 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 602.17' @ 14.35 hrs Surf.Area= 22 sf Storage= 17 cf

Plug-Flow detention time= 0.1 min calculated for 2.310 af (100% of inflow)
Center-of-Mass det. time= 0.0 min (980.3 - 980.2)

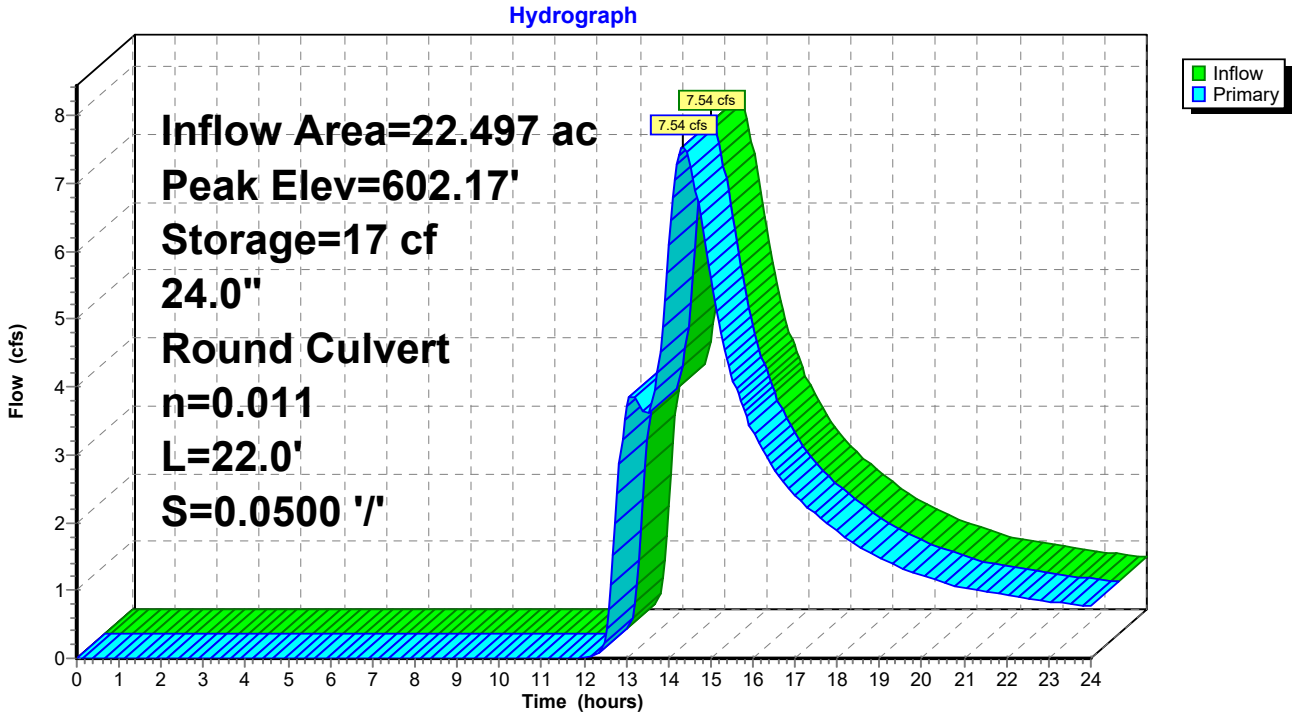
Volume	Invert	Avail.Storage	Storage Description
#1	601.10'	90 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
601.10	10	0	0
602.00	20	13	13
603.00	30	25	38
604.00	40	35	73
604.37	50	17	90

Device	Routing	Invert	Outlet Devices
#1	Primary	601.10'	**24.0" Round RCP_Round 24"** L= 22.0' RCP, groove end w/headwall, Ke= 0.200 Inlet / Outlet Invert= 601.10' / 600.00' S= 0.0500 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf

Primary OutFlow Max=7.54 cfs @ 14.35 hrs HW=602.17' (Free Discharge)
└─**1=RCP_Round 24"** (Inlet Controls 7.54 cfs @ 4.40 fps)

Pond RCP: 24" RCP



Summary for Subcatchment 1: EDA-1

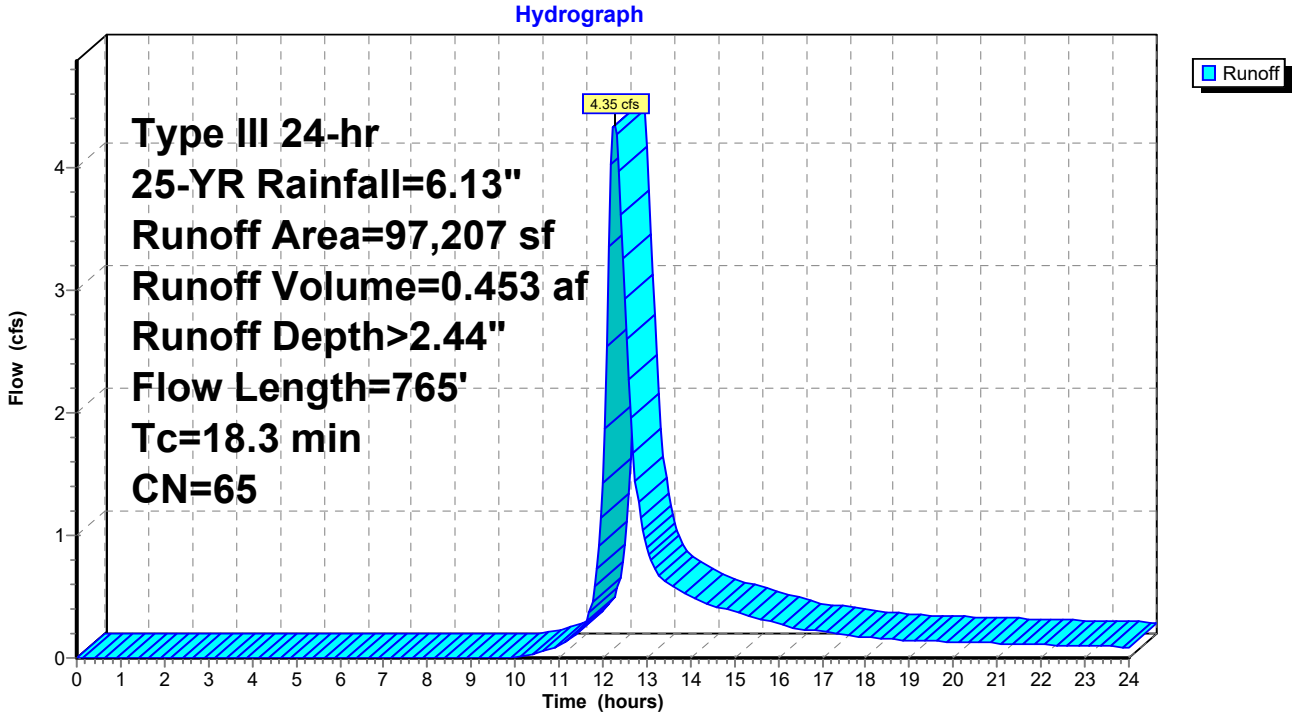
Runoff = 4.35 cfs @ 12.27 hrs, Volume= 0.453 af, Depth> 2.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.13"

Area (sf)	CN	Description
62,786	70	Woods, Good, HSG C
34,421	55	Woods, Good, HSG B
97,207	65	Weighted Average
97,207		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.0500	0.10		**Sheet Flow, 1A-1B** Woods: Light underbrush n= 0.400 P2= 3.32"
1.0	82	0.0790	1.41		**Shallow Concentrated Flow, 1B-1C** Woodland Kv= 5.0 fps
7.6	553	0.0590	1.21		**Shallow Concentrated Flow, 1C-1D** Woodland Kv= 5.0 fps
1.3	80	0.0400	1.00		**Shallow Concentrated Flow, 1D-EDP-1** Woodland Kv= 5.0 fps
18.3	765	Total			

Subcatchment 1: EDA-1



Summary for Subcatchment 2: EDA-2

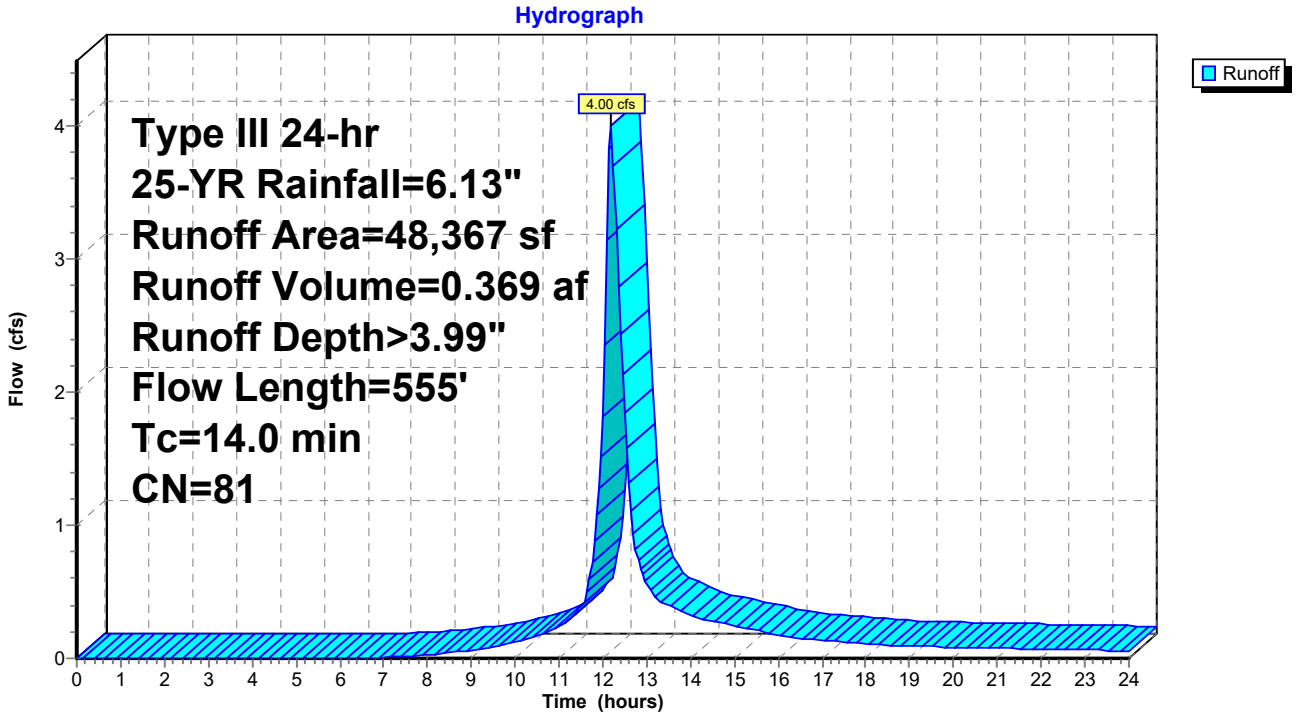
Runoff = 4.00 cfs @ 12.19 hrs, Volume= 0.369 af, Depth> 3.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.13"

Area (sf)	CN	Description
24,861	70	Woods, Good, HSG C
3,336	55	Woods, Good, HSG B
20,170	98	Paved parking, HSG C
48,367	81	Weighted Average
28,197		58.30% Pervious Area
20,170		41.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	50	0.0400	0.09		**Sheet Flow, 2A-2B** Woods: Light underbrush n= 0.400 P2= 3.32"
3.2	247	0.0664	1.29		**Shallow Concentrated Flow, 2B-2C** Woodland Kv= 5.0 fps
0.1	14	0.0360	3.85		**Shallow Concentrated Flow, 2C-2D** Paved Kv= 20.3 fps
0.1	19	0.1400	2.62		**Shallow Concentrated Flow, 2D-2E** Short Grass Pasture Kv= 7.0 fps
1.4	225	0.0178	2.71		**Shallow Concentrated Flow, 2E-EDP-2** Paved Kv= 20.3 fps
14.0	555	Total			

Subcatchment 2: EDA-2



Summary for Subcatchment 3A: EDA-3A

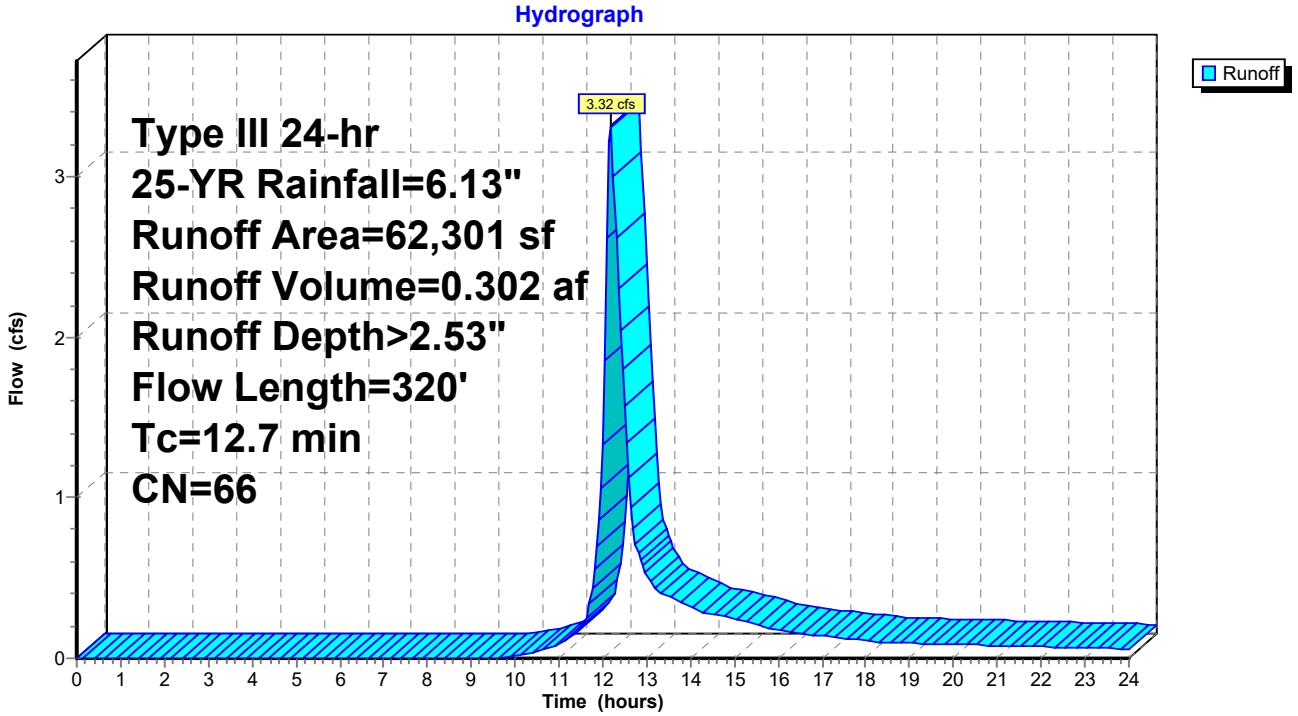
Runoff = 3.32 cfs @ 12.19 hrs, Volume= 0.302 af, Depth> 2.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.13"

Area (sf)	CN	Description
21,831	55	Woods, Good, HSG B
38,070	70	Woods, Good, HSG C
2,400	98	Paved parking, HSG B
62,301	66	Weighted Average
59,901		96.15% Pervious Area
2,400		3.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.0500	0.10		**Sheet Flow, 3A-3B** Woods: Light underbrush n= 0.400 P2= 3.32"
4.3	270	0.0444	1.05		**Shallow Concentrated Flow, 3B-EDP-3** Woodland Kv= 5.0 fps
12.7	320	Total			

Subcatchment 3A: EDA-3A



Summary for Subcatchment 3B: EDA-3B

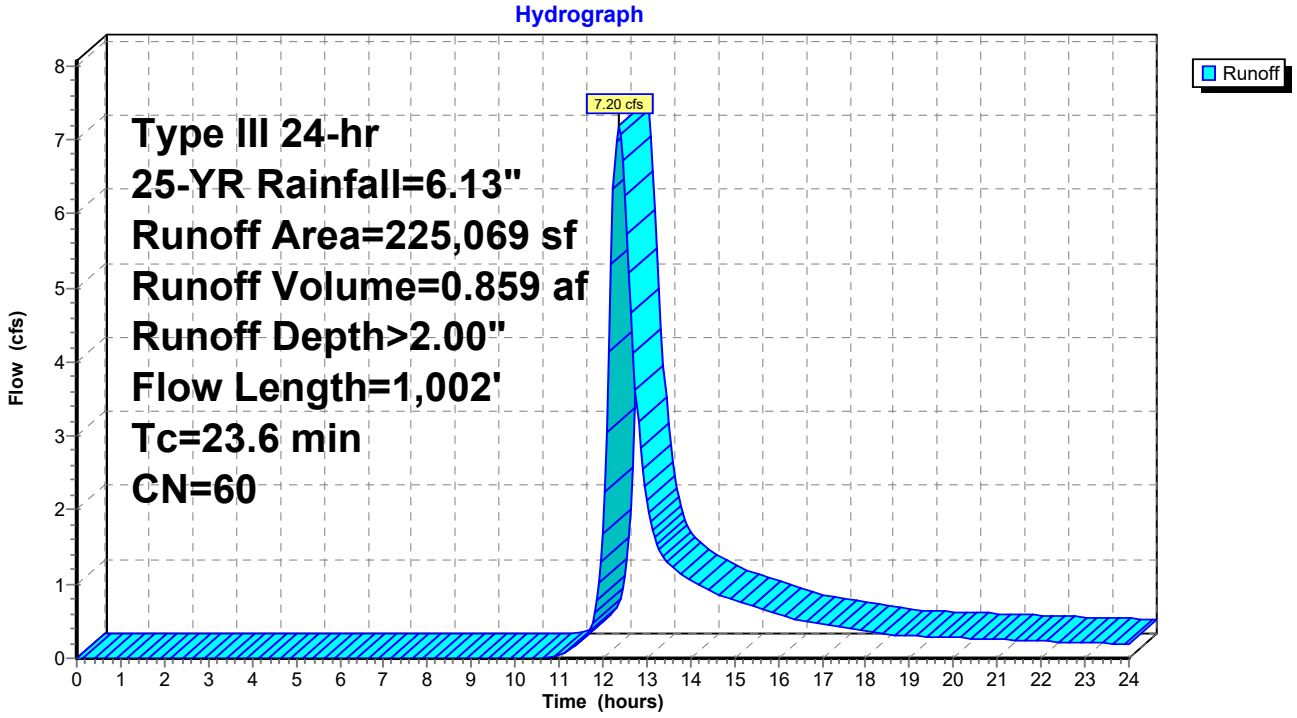
Runoff = 7.20 cfs @ 12.36 hrs, Volume= 0.859 af, Depth> 2.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.13"

Area (sf)	CN	Description
145,447	55	Woods, Good, HSG B
79,622	70	Woods, Good, HSG C
225,069	60	Weighted Average
225,069		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.8	50	0.0343	0.09		**Sheet Flow, 3A-3B** Woods: Light underbrush n= 0.400 P2= 3.32"
13.8	952	0.0530	1.15		**Shallow Concentrated Flow, 3B-EDP-3** Woodland Kv= 5.0 fps
23.6	1,002	Total			

Subcatchment 3B: EDA-3B



Summary for Subcatchment 4: EDA-4

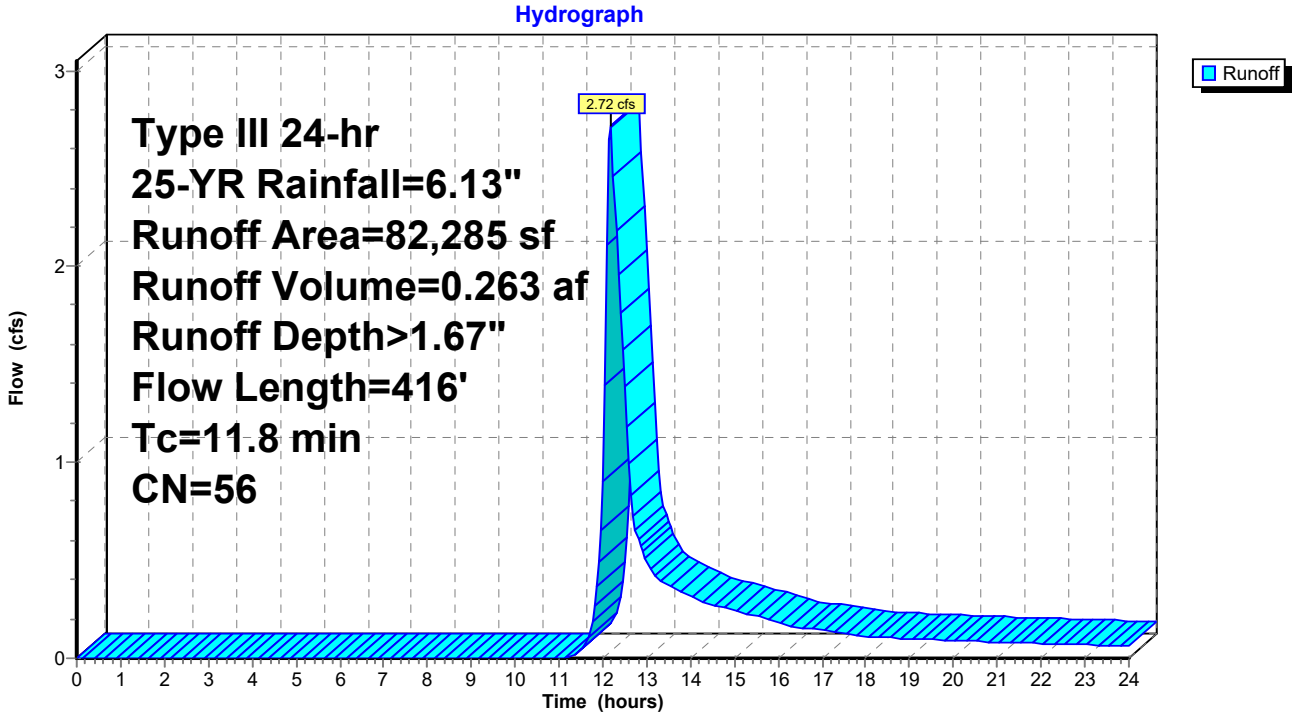
Runoff = 2.72 cfs @ 12.18 hrs, Volume= 0.263 af, Depth> 1.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.13"

Area (sf)	CN	Description
77,691	55	Woods, Good, HSG B
4,594	70	Woods, Good, HSG C
82,285	56	Weighted Average
82,285		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	50	0.0600	0.11		**Sheet Flow, 4A-4B** Woods: Light underbrush n= 0.400 P2= 3.32"
4.0	366	0.0950	1.54		**Shallow Concentrated Flow, 4B-EDP-4** Woodland Kv= 5.0 fps
11.8	416	Total			

Subcatchment 4: EDA-4



Summary for Subcatchment 5A: EDA-5A

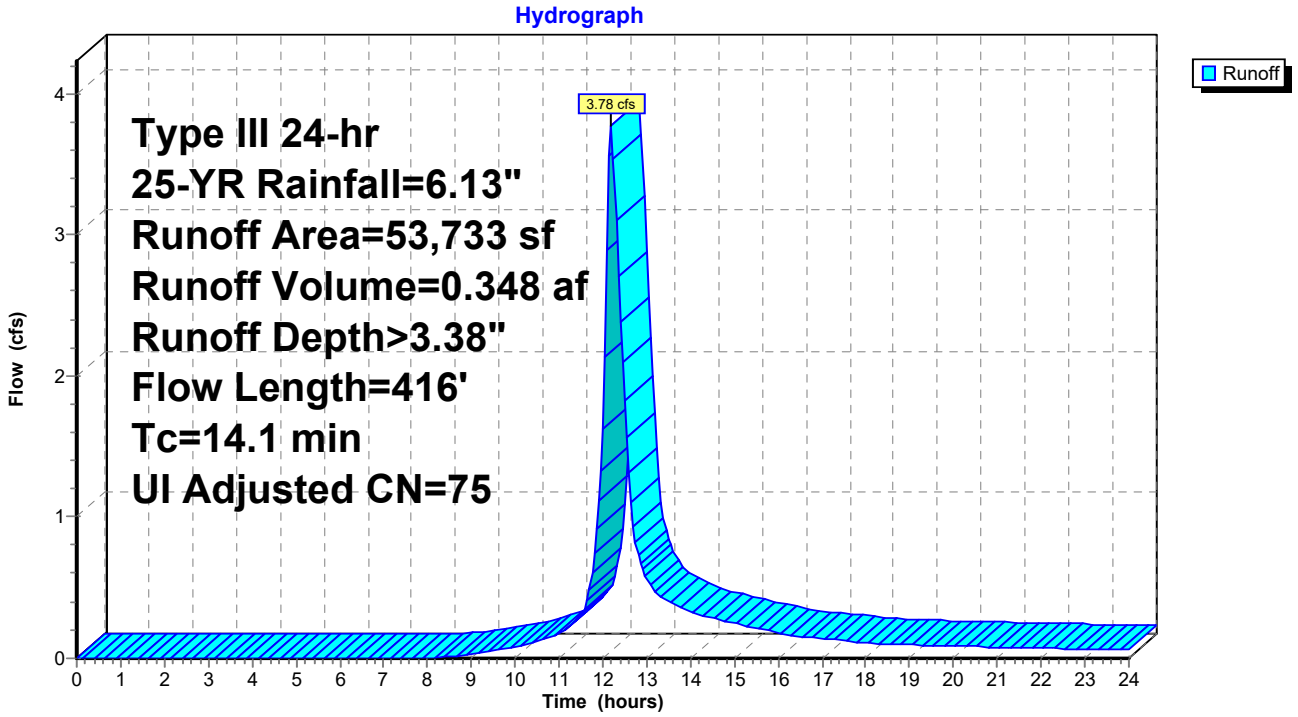
Runoff = 3.78 cfs @ 12.20 hrs, Volume= 0.348 af, Depth> 3.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.13"

Area (sf)	CN	Adj	Description
29,770	70		Woods, Good, HSG C
4,837	98		Unconnected roofs, HSG C
19,126	79		50-75% Grass cover, Fair, HSG C
53,733	76	75	Weighted Average, UI Adjusted
48,896			91.00% Pervious Area
4,837			9.00% Impervious Area
4,837			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.9	50	0.0334	0.08		**Sheet Flow, 5A-5B** Woods: Light underbrush n= 0.400 P2= 3.32"
3.3	239	0.0566	1.19		**Shallow Concentrated Flow, 5B-5C** Woodland Kv= 5.0 fps
0.3	62	0.0450	3.42		**Shallow Concentrated Flow, swale/ditch** Unpaved Kv= 16.1 fps
0.1	23	0.0100	4.91	3.86	**Pipe Channel, 12" CPP** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Corrugated PP, smooth interior
0.5	42	0.0430	1.45		**Shallow Concentrated Flow, 5E-EDP-5** Short Grass Pasture Kv= 7.0 fps
14.1	416	Total			

Subcatchment 5A: EDA-5A



Summary for Subcatchment 5B: EDA-5B

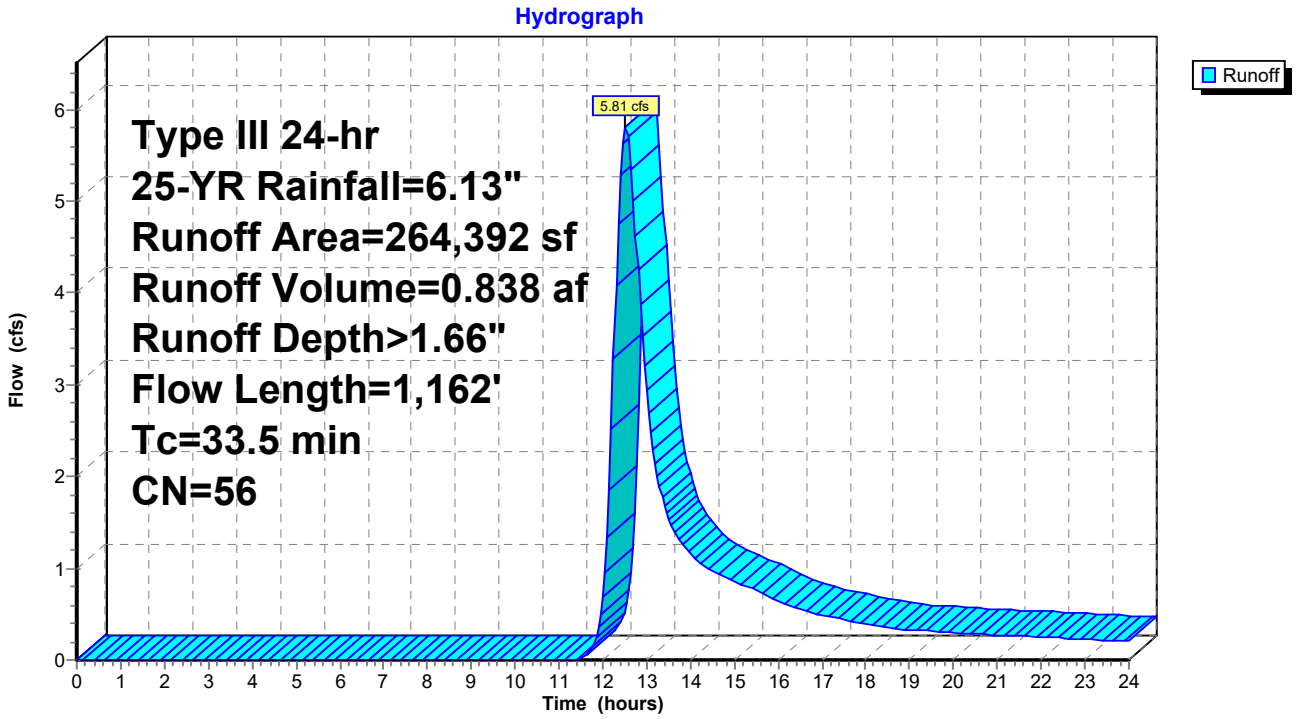
Runoff = 5.81 cfs @ 12.52 hrs, Volume= 0.838 af, Depth> 1.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.13"

Area (sf)	CN	Description
250,540	55	Woods, Good, HSG B
13,852	77	Woods, Good, HSG D
264,392	56	Weighted Average
264,392		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	50	0.0400	0.09		**Sheet Flow, 5A-5B** Woods: Light underbrush n= 0.400 P2= 3.32"
9.9	553	0.0350	0.94		**Shallow Concentrated Flow, 5B-5C** Woodland Kv= 5.0 fps
13.3	455	0.0130	0.57		**Shallow Concentrated Flow, 5C-5D** Woodland Kv= 5.0 fps
1.1	104	0.0913	1.51		**Shallow Concentrated Flow, 5D-EDP-5** Woodland Kv= 5.0 fps
33.5	1,162	Total			

Subcatchment 5B: EDA-5B



Summary for Subcatchment 6: EDA-6

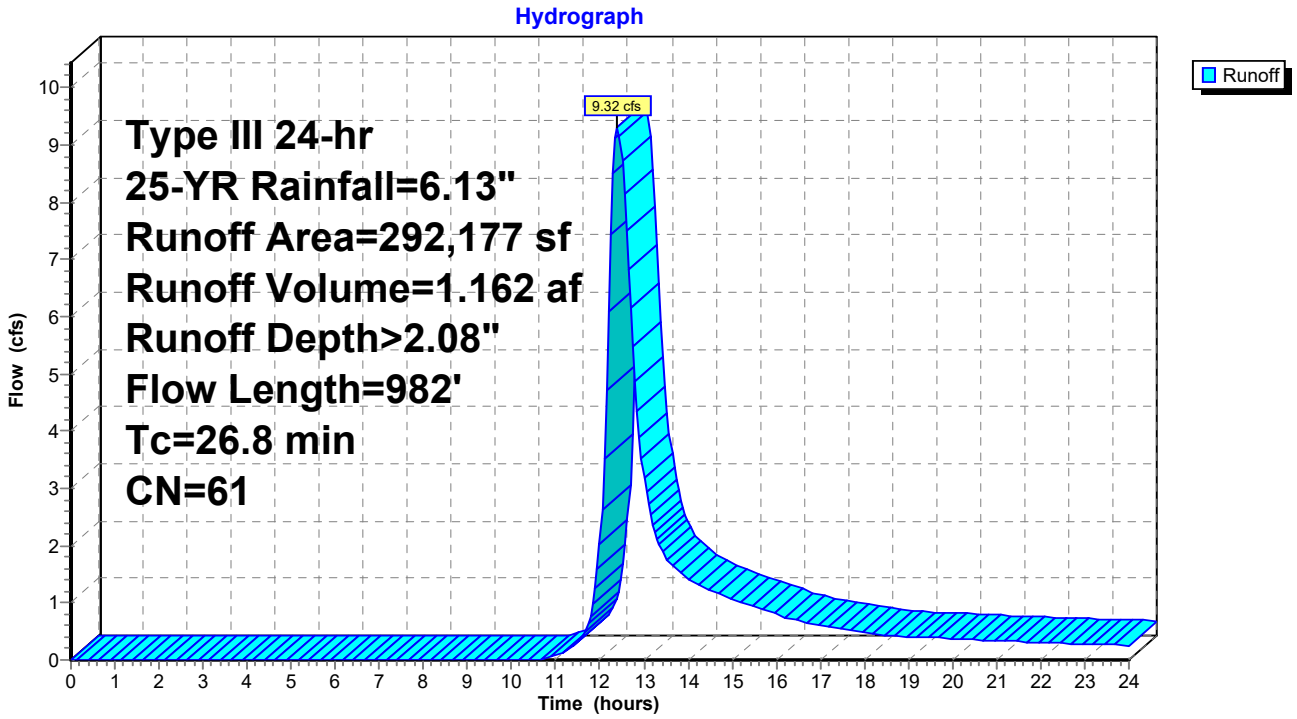
Runoff = 9.32 cfs @ 12.40 hrs, Volume= 1.162 af, Depth> 2.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.13"

Area (sf)	CN	Description
113,079	70	Woods, Good, HSG C
179,098	55	Woods, Good, HSG B
292,177	61	Weighted Average
292,177		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.1	50	0.0250	0.08		**Sheet Flow, 6A-6B** Woods: Light underbrush n= 0.400 P2= 3.32"
4.7	306	0.0474	1.09		**Shallow Concentrated Flow, 6B-6C** Woodland Kv= 5.0 fps
3.5	130	0.0154	0.62		**Shallow Concentrated Flow, 6C-6D** Woodland Kv= 5.0 fps
7.5	496	0.0484	1.10		**Shallow Concentrated Flow, 6D-EDP-6** Woodland Kv= 5.0 fps
26.8	982	Total			

Subcatchment 6: EDA-6



Summary for Subcatchment 7: EDA-7

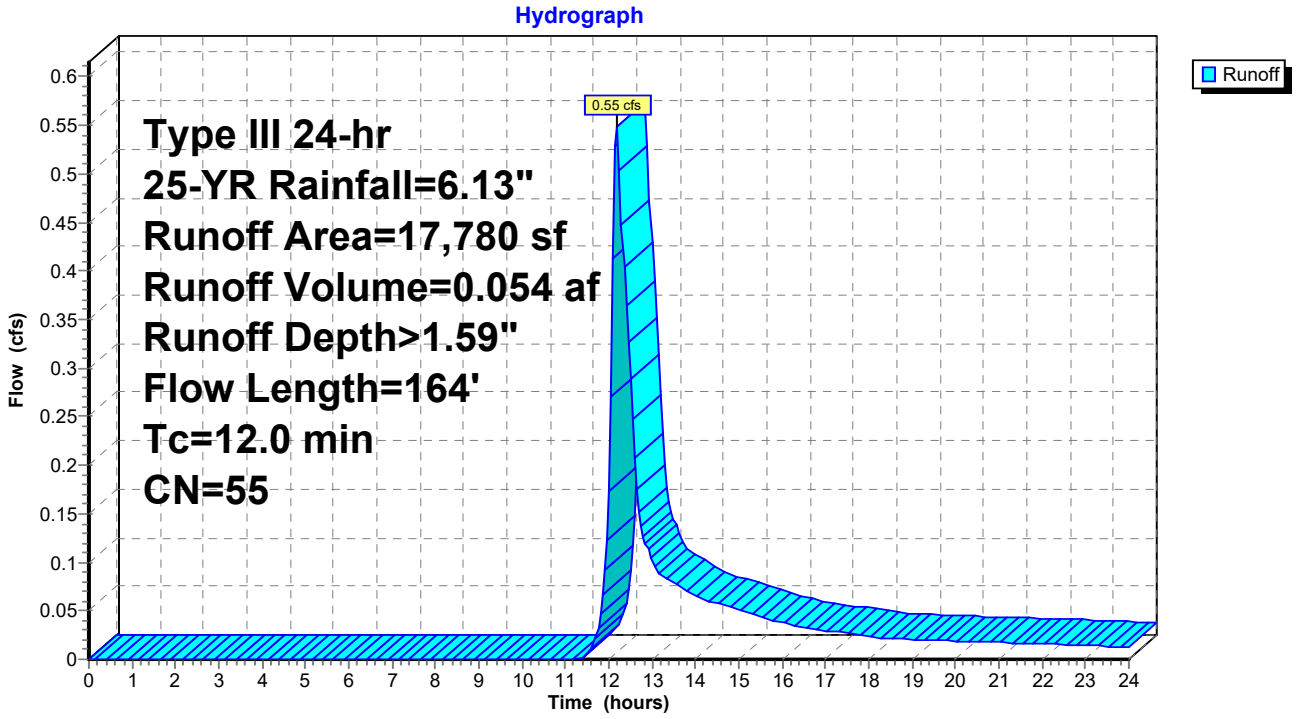
Runoff = 0.55 cfs @ 12.19 hrs, Volume= 0.054 af, Depth> 1.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.13"

Area (sf)	CN	Description
17,780	55	Woods, Good, HSG B
17,780		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.3	50	0.0300	0.08		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.32"
1.7	114	0.0500	1.12		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
12.0	164	Total			

Subcatchment 7: EDA-7

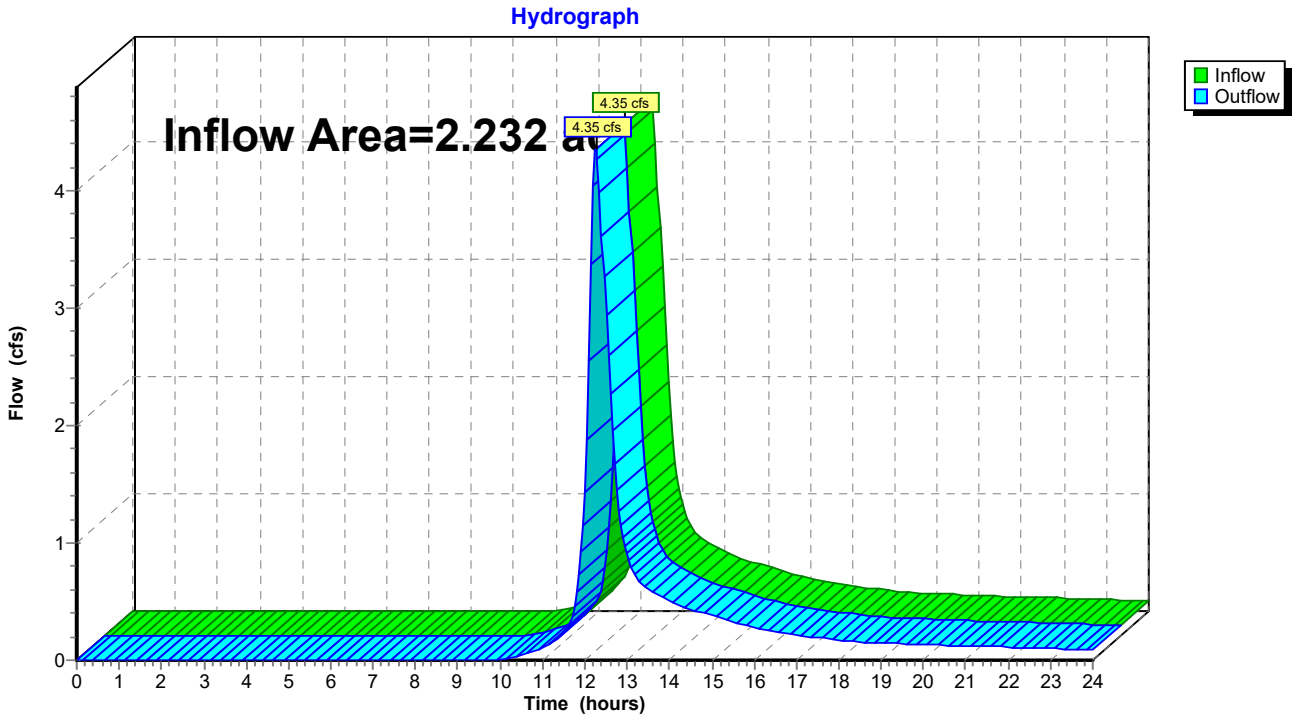


Summary for Reach EDP-1: Design Point 1

Inflow Area = 2.232 ac, 0.00% Impervious, Inflow Depth > 2.44" for 25-YR event
Inflow = 4.35 cfs @ 12.27 hrs, Volume= 0.453 af
Outflow = 4.35 cfs @ 12.27 hrs, Volume= 0.453 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach EDP-1: Design Point 1

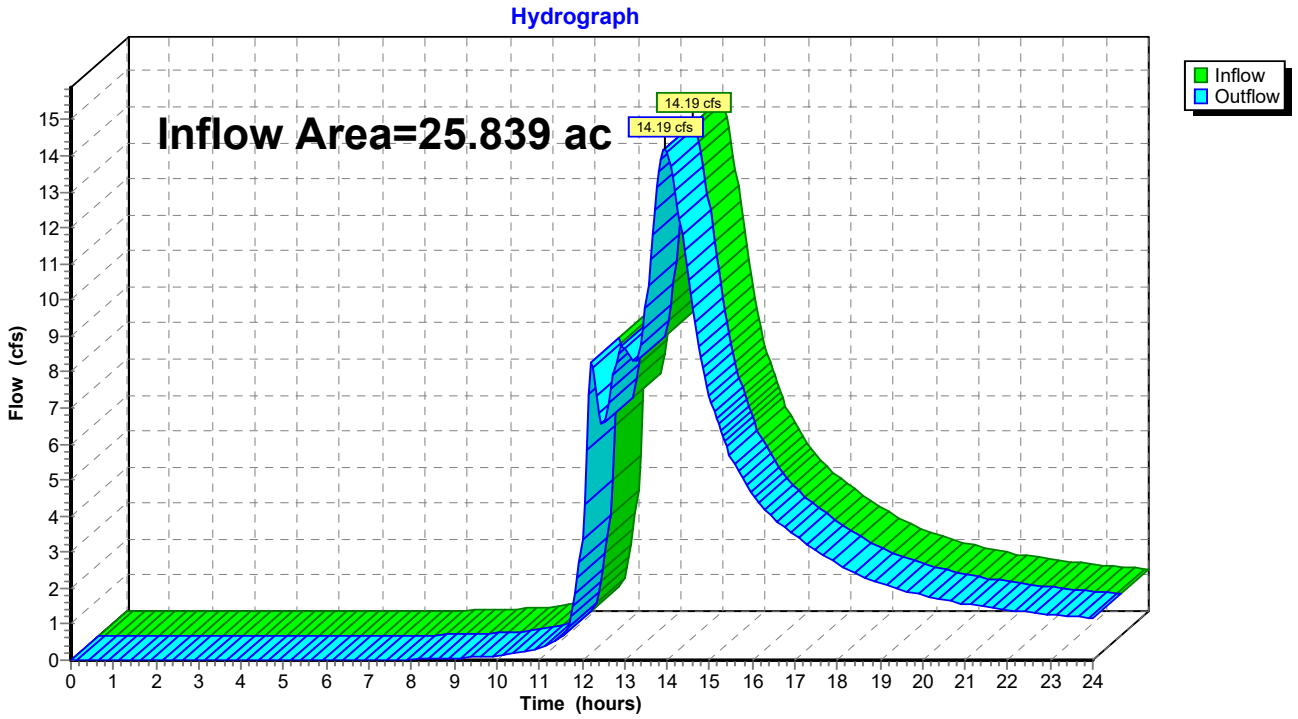


Summary for Reach EDP-2: Design Point 2

Inflow Area = 25.839 ac, 2.44% Impervious, Inflow Depth > 2.03" for 25-YR event
Inflow = 14.19 cfs @ 13.95 hrs, Volume= 4.364 af
Outflow = 14.19 cfs @ 13.95 hrs, Volume= 4.364 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach EDP-2: Design Point 2



Summary for Reach EDP-3: Design Point 3

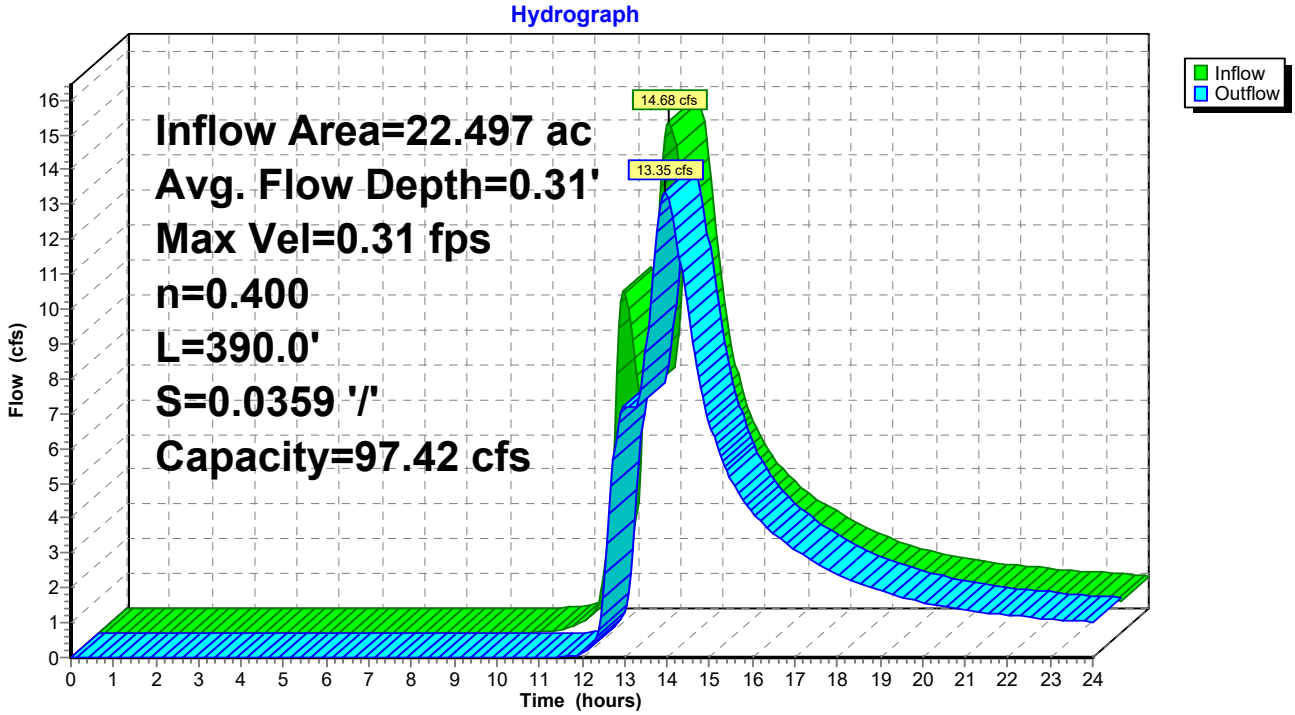
Inflow Area = 22.497 ac, 0.74% Impervious, Inflow Depth > 1.95" for 25-YR event
Inflow = 14.68 cfs @ 13.40 hrs, Volume= 3.647 af
Outflow = 13.35 cfs @ 13.96 hrs, Volume= 3.541 af, Atten= 9%, Lag= 33.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 0.31 fps, Min. Travel Time= 20.7 min
Avg. Velocity = 0.15 fps, Avg. Travel Time= 44.2 min

Peak Storage= 16,600 cf @ 13.61 hrs
Average Depth at Peak Storage= 0.31'
Bank-Full Depth= 1.00' Flow Area= 151.0 sf, Capacity= 97.42 cfs

130.00' x 1.00' deep channel, n= 0.400 Sheet flow: Woods+light brush
Side Slope Z-value= 12.0 30.0 '/' Top Width= 172.00'
Length= 390.0' Slope= 0.0359 '/'
Inlet Invert= 618.00', Outlet Invert= 604.00'

Reach EDP-3: Design Point 3



Summary for Reach EDP-4: Design Point 4

Inflow Area = 15.900 ac, 0.70% Impervious, Inflow Depth > 1.92" for 25-YR event
Inflow = 14.56 cfs @ 12.96 hrs, Volume= 2.545 af
Outflow = 12.94 cfs @ 13.42 hrs, Volume= 2.486 af, Atten= 11%, Lag= 27.2 min

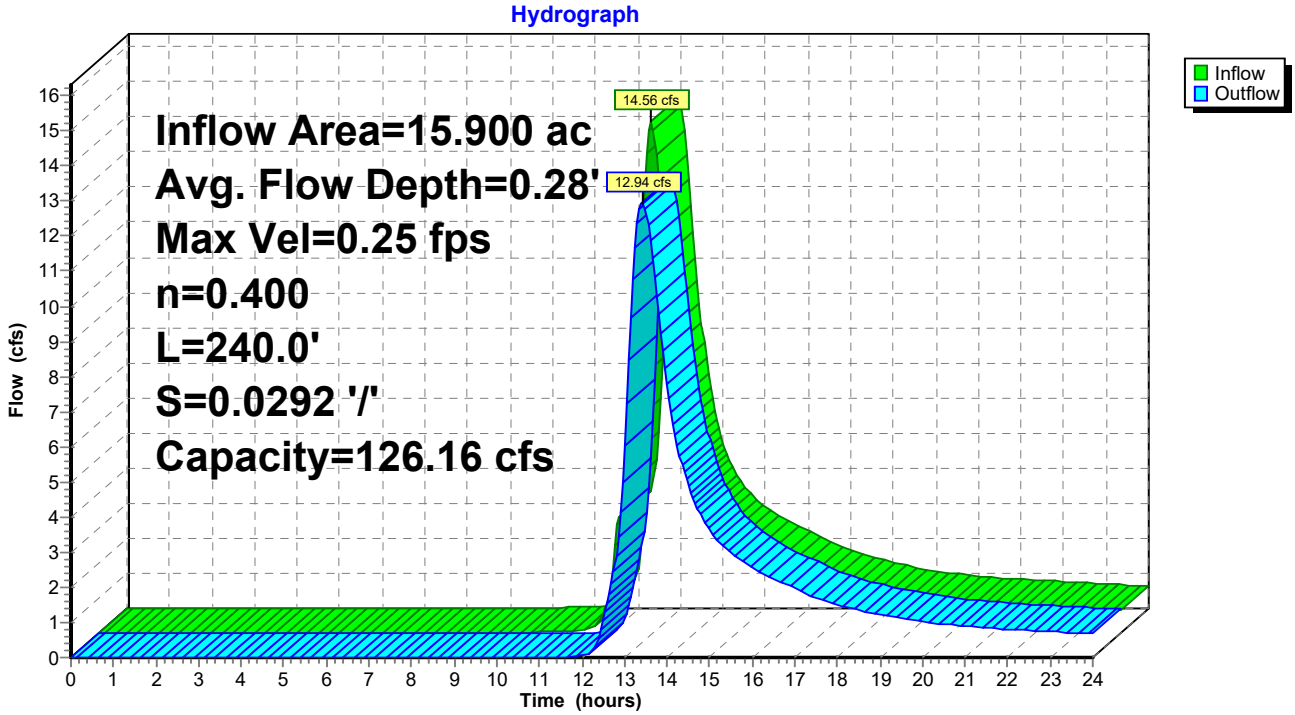
Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 0.25 fps, Min. Travel Time= 15.9 min
Avg. Velocity = 0.10 fps, Avg. Travel Time= 39.1 min

Peak Storage= 12,337 cf @ 13.15 hrs
Average Depth at Peak Storage= 0.28'
Bank-Full Depth= 1.00' Flow Area= 237.5 sf, Capacity= 126.16 cfs

165.00' x 1.00' deep channel, n= 0.400 Sheet flow: Woods+light brush
Side Slope Z-value= 80.0 65.0 '/' Top Width= 310.00'
Length= 240.0' Slope= 0.0292 '/'
Inlet Invert= 625.00', Outlet Invert= 618.00'

‡

Reach EDP-4: Design Point 4



Summary for Reach EDP-5: Design Point 5

Inflow Area = 14.011 ac, 0.79% Impervious, Inflow Depth > 2.00" for 25-YR event
Inflow = 16.45 cfs @ 12.52 hrs, Volume= 2.339 af
Outflow = 14.05 cfs @ 12.97 hrs, Volume= 2.283 af, Atten= 15%, Lag= 26.6 min

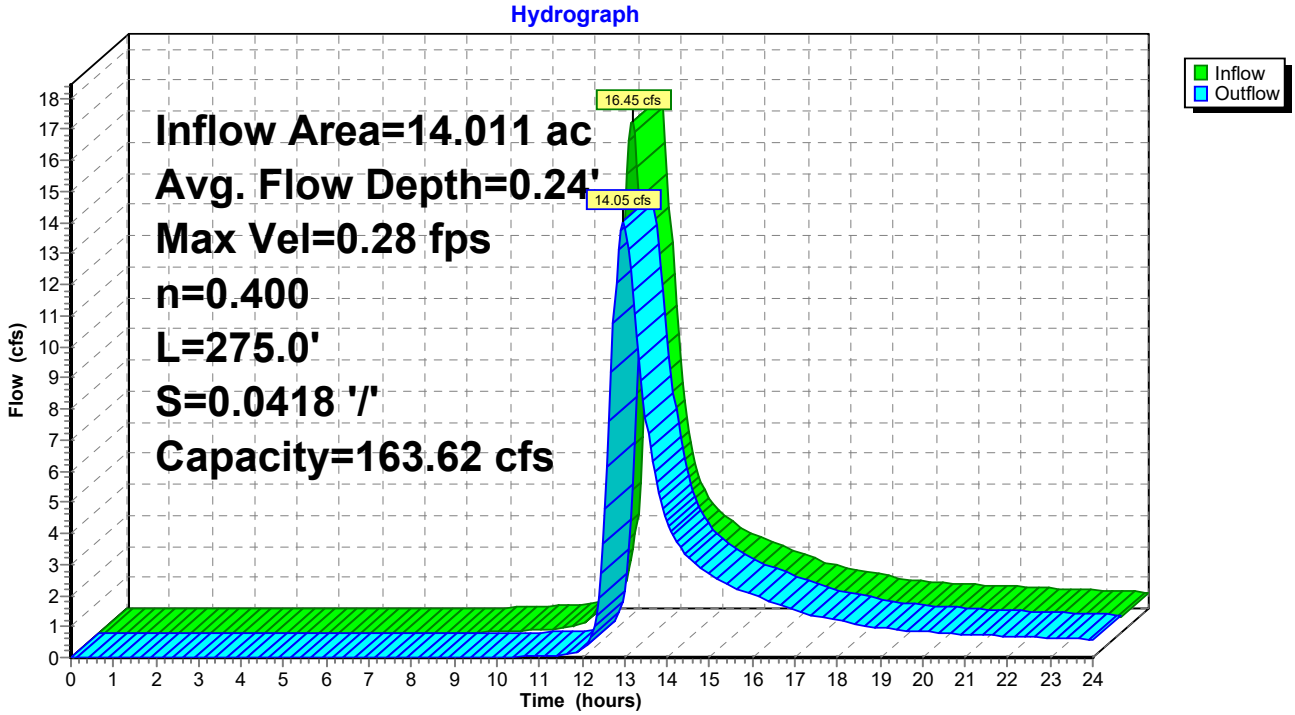
Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 0.28 fps, Min. Travel Time= 16.2 min
Avg. Velocity = 0.10 fps, Avg. Travel Time= 44.5 min

Peak Storage= 13,659 cf @ 12.70 hrs
Average Depth at Peak Storage= 0.24'
Bank-Full Depth= 1.00' Flow Area= 237.5 sf, Capacity= 163.62 cfs

200.00' x 1.00' deep channel, n= 0.400 Sheet flow: Woods+light brush
Side Slope Z-value= 50.0 25.0 '/' Top Width= 275.00'
Length= 275.0' Slope= 0.0418 '/'
Inlet Invert= 636.50', Outlet Invert= 625.00'

‡

Reach EDP-5: Design Point 5



Summary for Reach EDP-6: Design Point 6

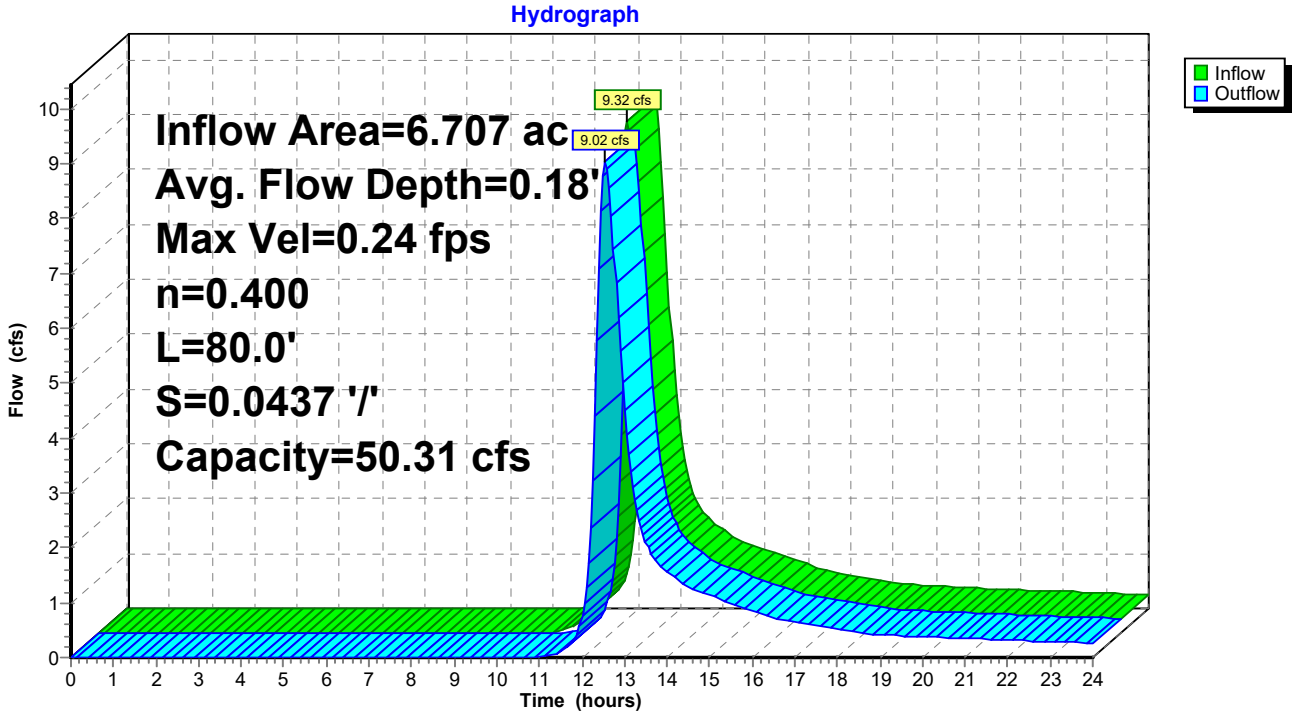
Inflow Area = 6.707 ac, 0.00% Impervious, Inflow Depth > 2.08" for 25-YR event
Inflow = 9.32 cfs @ 12.40 hrs, Volume= 1.162 af
Outflow = 9.02 cfs @ 12.56 hrs, Volume= 1.152 af, Atten= 3%, Lag= 9.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 0.24 fps, Min. Travel Time= 5.5 min
Avg. Velocity = 0.09 fps, Avg. Travel Time= 15.1 min

Peak Storage= 2,966 cf @ 12.47 hrs
Average Depth at Peak Storage= 0.18'
Bank-Full Depth= 0.50' Flow Area= 107.5 sf, Capacity= 50.31 cfs

200.00' x 0.50' deep channel, n= 0.400 Sheet flow: Woods+light brush
Side Slope Z-value= 30.0 '/' Top Width= 230.00'
Length= 80.0' Slope= 0.0437 '/'
Inlet Invert= 642.50', Outlet Invert= 639.00'

Reach EDP-6: Design Point 6

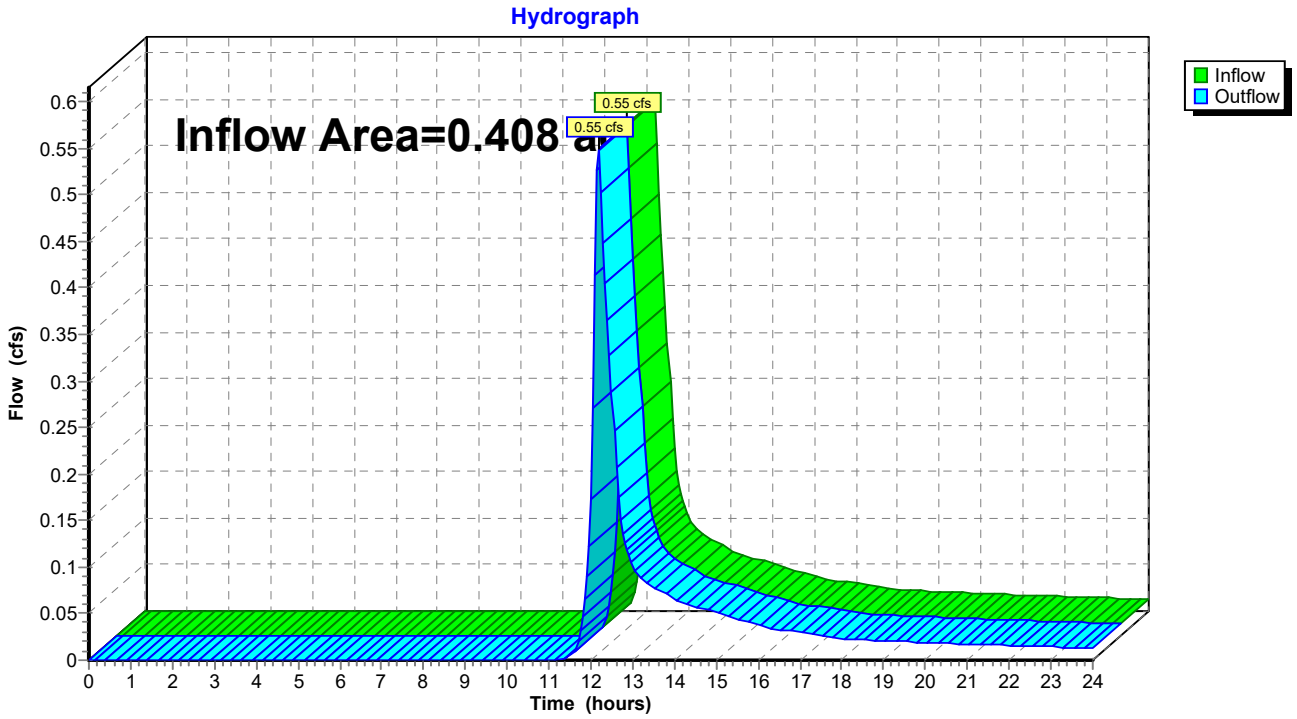


Summary for Reach EDP-7: Design Point 7 (Vernal Pool)

Inflow Area = 0.408 ac, 0.00% Impervious, Inflow Depth > 1.59" for 25-YR event
Inflow = 0.55 cfs @ 12.19 hrs, Volume= 0.054 af
Outflow = 0.55 cfs @ 12.19 hrs, Volume= 0.054 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach EDP-7: Design Point 7 (Vernal Pool)



Summary for Pond RCP: 24" RCP

Inflow Area = 22.497 ac, 0.74% Impervious, Inflow Depth > 1.89" for 25-YR event
Inflow = 13.35 cfs @ 13.96 hrs, Volume= 3.541 af
Outflow = 13.35 cfs @ 13.96 hrs, Volume= 3.541 af, Atten= 0%, Lag= 0.0 min
Primary = 13.35 cfs @ 13.96 hrs, Volume= 3.541 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 602.61' @ 13.96 hrs Surf.Area= 26 sf Storage= 28 cf

Plug-Flow detention time= 0.0 min calculated for 3.534 af (100% of inflow)
Center-of-Mass det. time= 0.0 min (953.6 - 953.6)

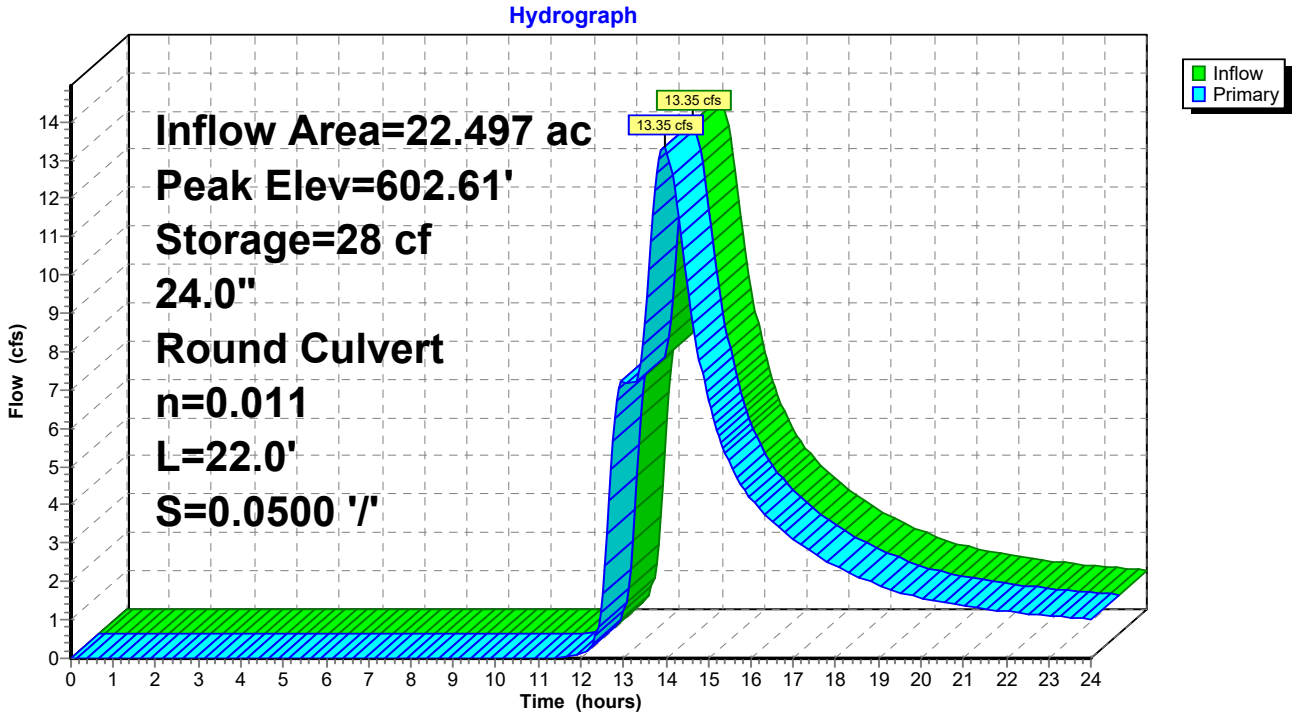
Volume	Invert	Avail.Storage	Storage Description
#1	601.10'	90 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
601.10	10	0	0
602.00	20	13	13
603.00	30	25	38
604.00	40	35	73
604.37	50	17	90

Device	Routing	Invert	Outlet Devices
#1	Primary	601.10'	**24.0" Round RCP_Round 24"** L= 22.0' RCP, groove end w/headwall, Ke= 0.200 Inlet / Outlet Invert= 601.10' / 600.00' S= 0.0500 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf

Primary OutFlow Max=13.34 cfs @ 13.96 hrs HW=602.61' (Free Discharge)
└─**1=RCP_Round 24"** (Inlet Controls 13.34 cfs @ 5.23 fps)

Pond RCP: 24" RCP



Summary for Subcatchment 1: EDA-1

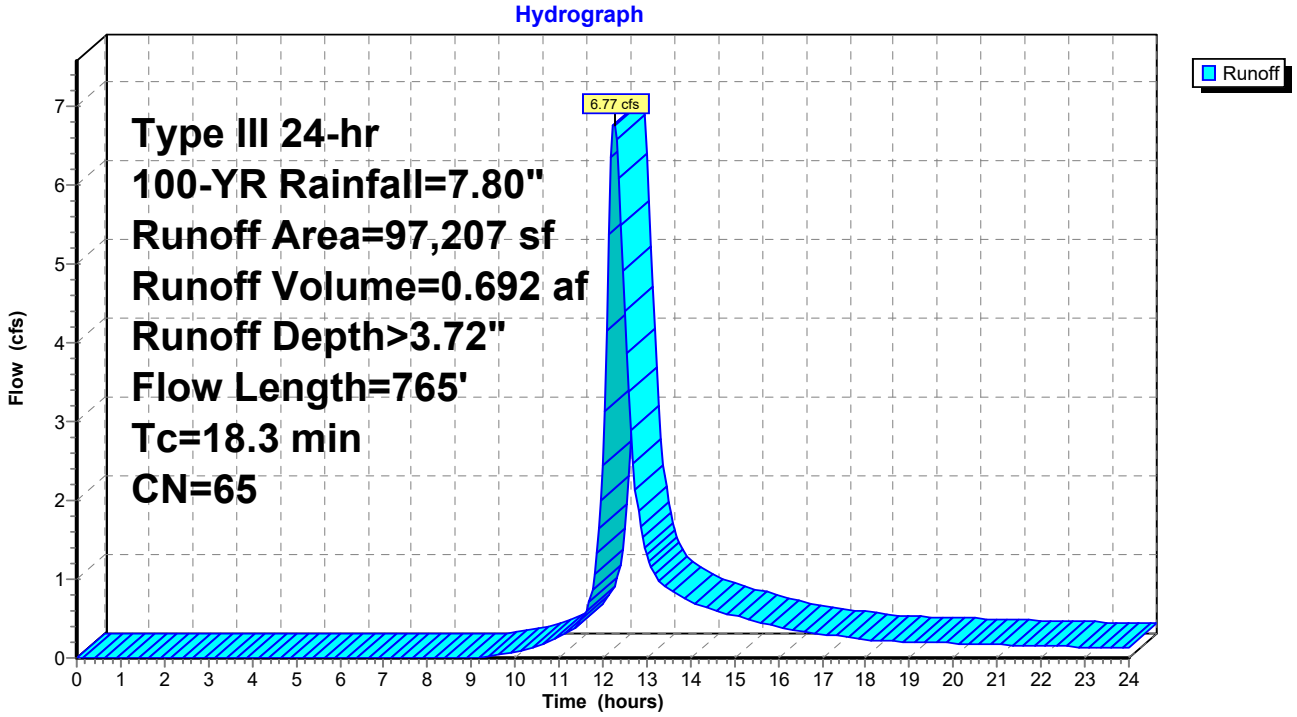
Runoff = 6.77 cfs @ 12.26 hrs, Volume= 0.692 af, Depth> 3.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=7.80"

Area (sf)	CN	Description
62,786	70	Woods, Good, HSG C
34,421	55	Woods, Good, HSG B
97,207	65	Weighted Average
97,207		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.0500	0.10		**Sheet Flow, 1A-1B** Woods: Light underbrush n= 0.400 P2= 3.32"
1.0	82	0.0790	1.41		**Shallow Concentrated Flow, 1B-1C** Woodland Kv= 5.0 fps
7.6	553	0.0590	1.21		**Shallow Concentrated Flow, 1C-1D** Woodland Kv= 5.0 fps
1.3	80	0.0400	1.00		**Shallow Concentrated Flow, 1D-EDP-1** Woodland Kv= 5.0 fps
18.3	765	Total			

Subcatchment 1: EDA-1



Summary for Subcatchment 2: EDA-2

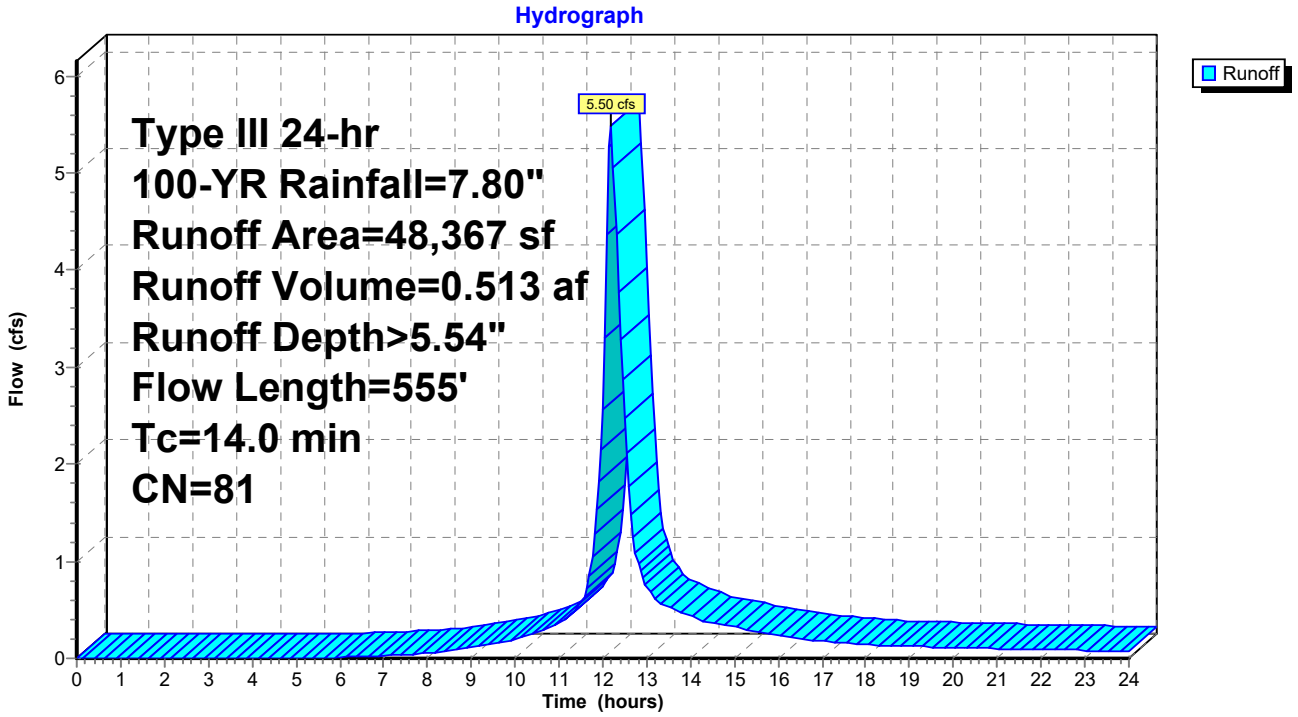
Runoff = 5.50 cfs @ 12.19 hrs, Volume= 0.513 af, Depth> 5.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=7.80"

Area (sf)	CN	Description
24,861	70	Woods, Good, HSG C
3,336	55	Woods, Good, HSG B
20,170	98	Paved parking, HSG C
48,367	81	Weighted Average
28,197		58.30% Pervious Area
20,170		41.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	50	0.0400	0.09		**Sheet Flow, 2A-2B** Woods: Light underbrush n= 0.400 P2= 3.32"
3.2	247	0.0664	1.29		**Shallow Concentrated Flow, 2B-2C** Woodland Kv= 5.0 fps
0.1	14	0.0360	3.85		**Shallow Concentrated Flow, 2C-2D** Paved Kv= 20.3 fps
0.1	19	0.1400	2.62		**Shallow Concentrated Flow, 2D-2E** Short Grass Pasture Kv= 7.0 fps
1.4	225	0.0178	2.71		**Shallow Concentrated Flow, 2E-EDP-2** Paved Kv= 20.3 fps
14.0	555	Total			

Subcatchment 2: EDA-2



Summary for Subcatchment 3A: EDA-3A

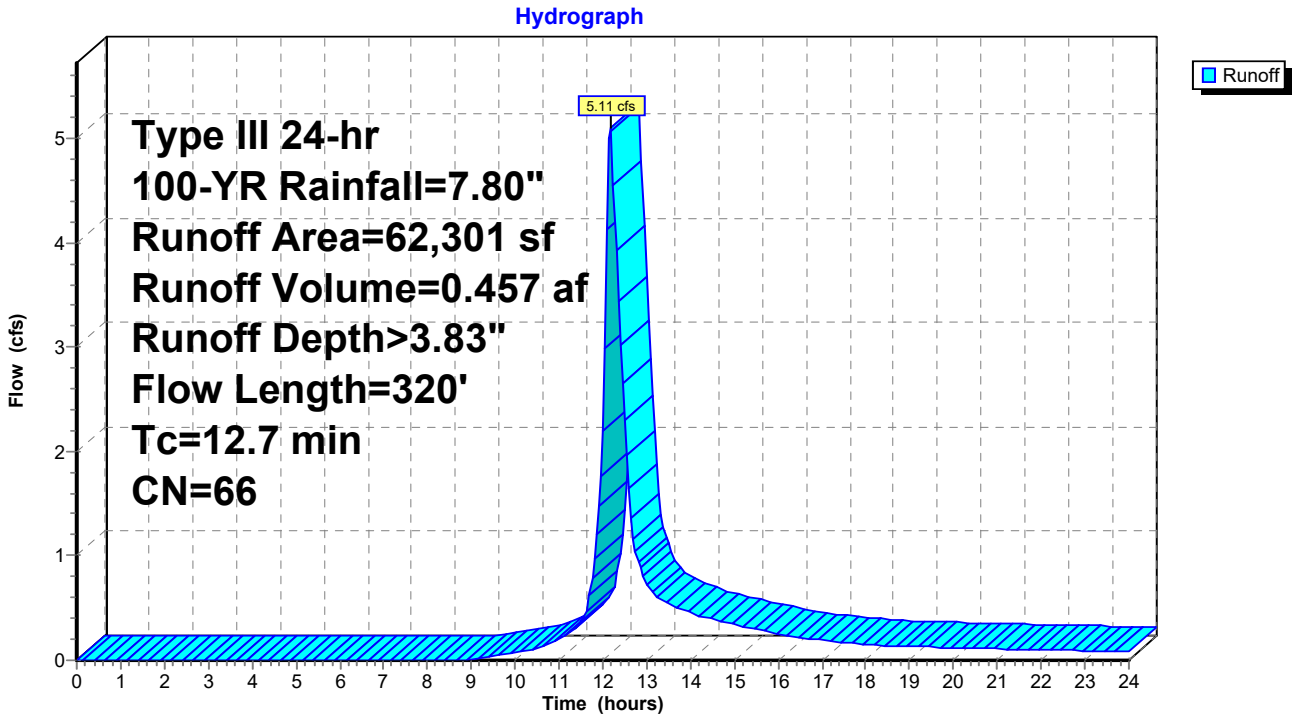
Runoff = 5.11 cfs @ 12.18 hrs, Volume= 0.457 af, Depth> 3.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=7.80"

Area (sf)	CN	Description
21,831	55	Woods, Good, HSG B
38,070	70	Woods, Good, HSG C
2,400	98	Paved parking, HSG B
62,301	66	Weighted Average
59,901		96.15% Pervious Area
2,400		3.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.0500	0.10		**Sheet Flow, 3A-3B** Woods: Light underbrush n= 0.400 P2= 3.32"
4.3	270	0.0444	1.05		**Shallow Concentrated Flow, 3B-EDP-3** Woodland Kv= 5.0 fps
12.7	320	Total			

Subcatchment 3A: EDA-3A



Summary for Subcatchment 3B: EDA-3B

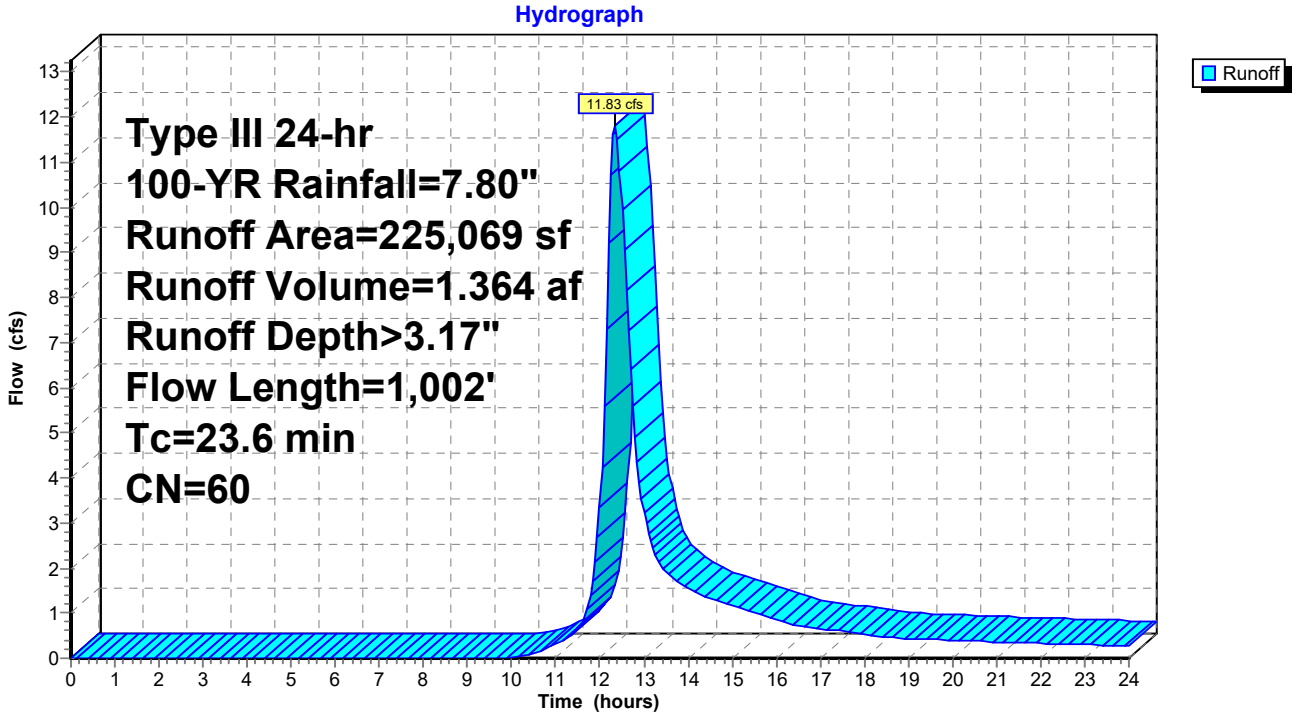
Runoff = 11.83 cfs @ 12.34 hrs, Volume= 1.364 af, Depth> 3.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=7.80"

Area (sf)	CN	Description
145,447	55	Woods, Good, HSG B
79,622	70	Woods, Good, HSG C
225,069	60	Weighted Average
225,069		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.8	50	0.0343	0.09		**Sheet Flow, 3A-3B** Woods: Light underbrush n= 0.400 P2= 3.32"
13.8	952	0.0530	1.15		**Shallow Concentrated Flow, 3B-EDP-3** Woodland Kv= 5.0 fps
23.6	1,002	Total			

Subcatchment 3B: EDA-3B



Summary for Subcatchment 4: EDA-4

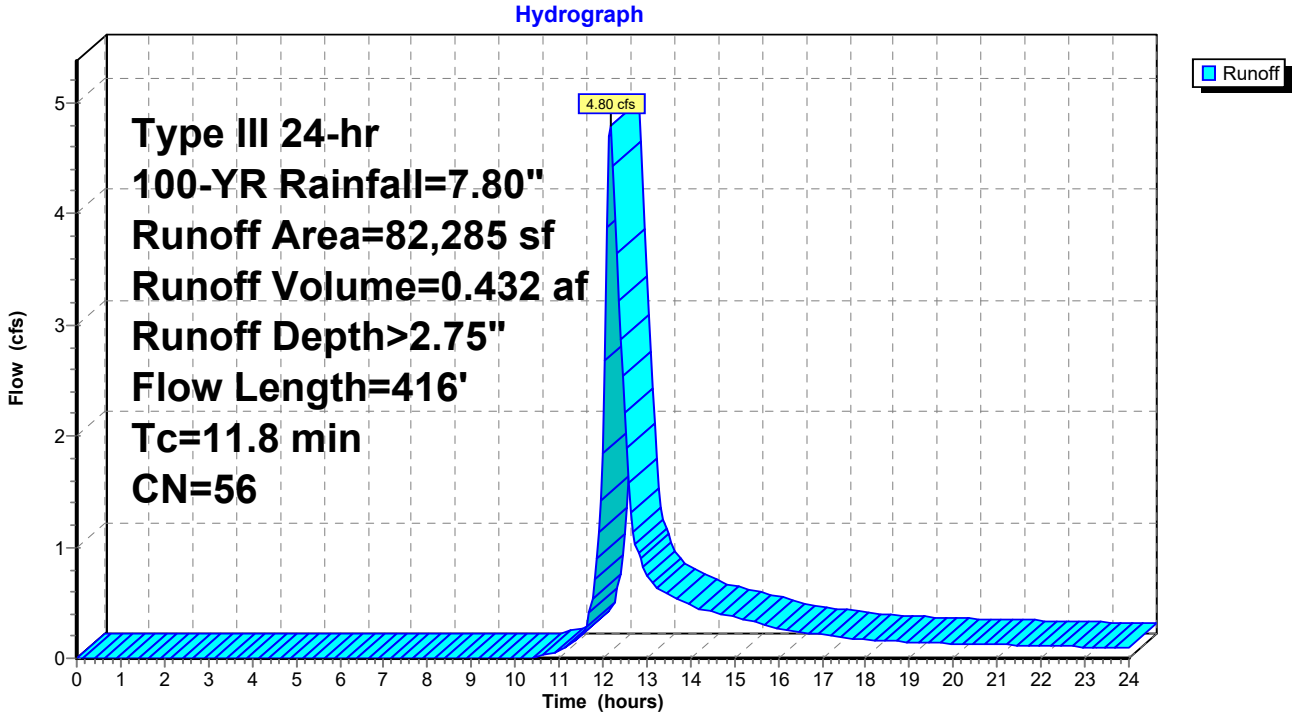
Runoff = 4.80 cfs @ 12.17 hrs, Volume= 0.432 af, Depth> 2.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=7.80"

Area (sf)	CN	Description
77,691	55	Woods, Good, HSG B
4,594	70	Woods, Good, HSG C
82,285	56	Weighted Average
82,285		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	50	0.0600	0.11		**Sheet Flow, 4A-4B** Woods: Light underbrush n= 0.400 P2= 3.32"
4.0	366	0.0950	1.54		**Shallow Concentrated Flow, 4B-EDP-4** Woodland Kv= 5.0 fps
11.8	416	Total			

Subcatchment 4: EDA-4



Summary for Subcatchment 5A: EDA-5A

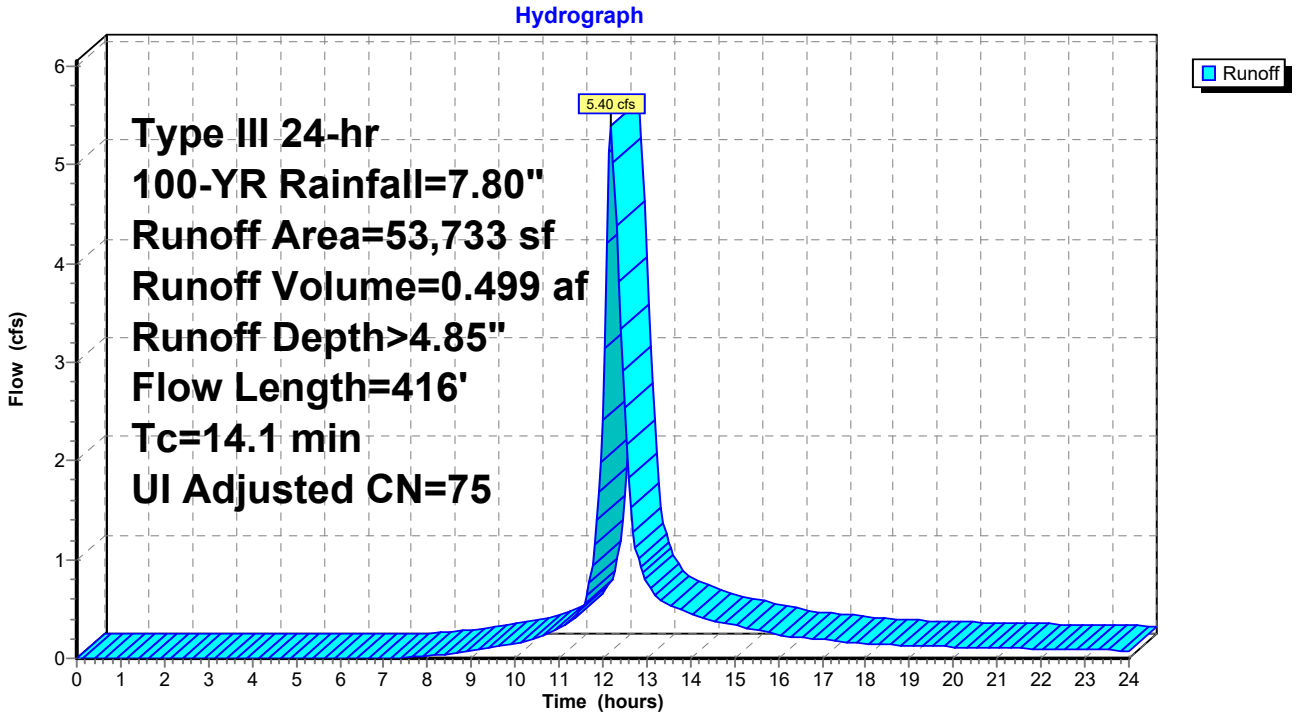
Runoff = 5.40 cfs @ 12.20 hrs, Volume= 0.499 af, Depth> 4.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=7.80"

Area (sf)	CN	Adj	Description
29,770	70		Woods, Good, HSG C
4,837	98		Unconnected roofs, HSG C
19,126	79		50-75% Grass cover, Fair, HSG C
53,733	76	75	Weighted Average, UI Adjusted
48,896			91.00% Pervious Area
4,837			9.00% Impervious Area
4,837			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.9	50	0.0334	0.08		**Sheet Flow, 5A-5B** Woods: Light underbrush n= 0.400 P2= 3.32"
3.3	239	0.0566	1.19		**Shallow Concentrated Flow, 5B-5C** Woodland Kv= 5.0 fps
0.3	62	0.0450	3.42		**Shallow Concentrated Flow, swale/ditch** Unpaved Kv= 16.1 fps
0.1	23	0.0100	4.91	3.86	**Pipe Channel, 12" CPP** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Corrugated PP, smooth interior
0.5	42	0.0430	1.45		**Shallow Concentrated Flow, 5E-EDP-5** Short Grass Pasture Kv= 7.0 fps
14.1	416	Total			

Subcatchment 5A: EDA-5A



Summary for Subcatchment 5B: EDA-5B

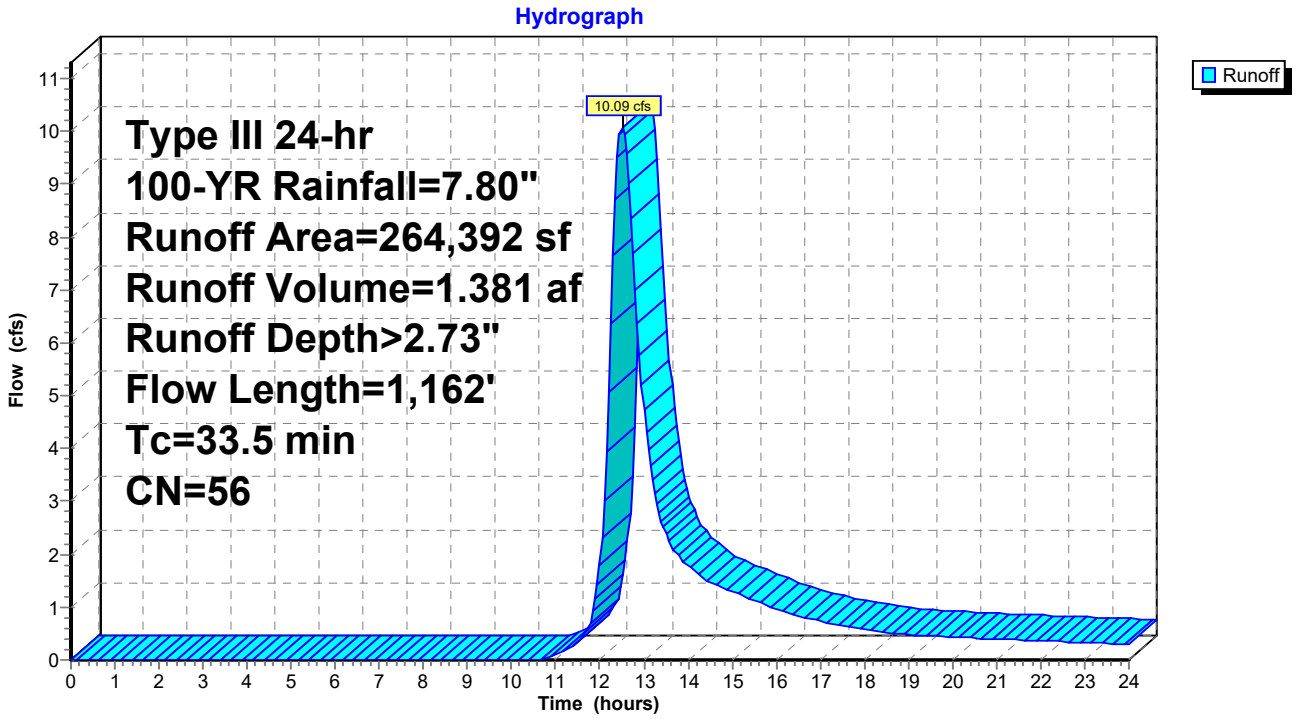
Runoff = 10.09 cfs @ 12.50 hrs, Volume= 1.381 af, Depth> 2.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=7.80"

Area (sf)	CN	Description
250,540	55	Woods, Good, HSG B
13,852	77	Woods, Good, HSG D
264,392	56	Weighted Average
264,392		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	50	0.0400	0.09		**Sheet Flow, 5A-5B** Woods: Light underbrush n= 0.400 P2= 3.32"
9.9	553	0.0350	0.94		**Shallow Concentrated Flow, 5B-5C** Woodland Kv= 5.0 fps
13.3	455	0.0130	0.57		**Shallow Concentrated Flow, 5C-5D** Woodland Kv= 5.0 fps
1.1	104	0.0913	1.51		**Shallow Concentrated Flow, 5D-EDP-5** Woodland Kv= 5.0 fps
33.5	1,162	Total			

Subcatchment 5B: EDA-5B



Summary for Subcatchment 6: EDA-6

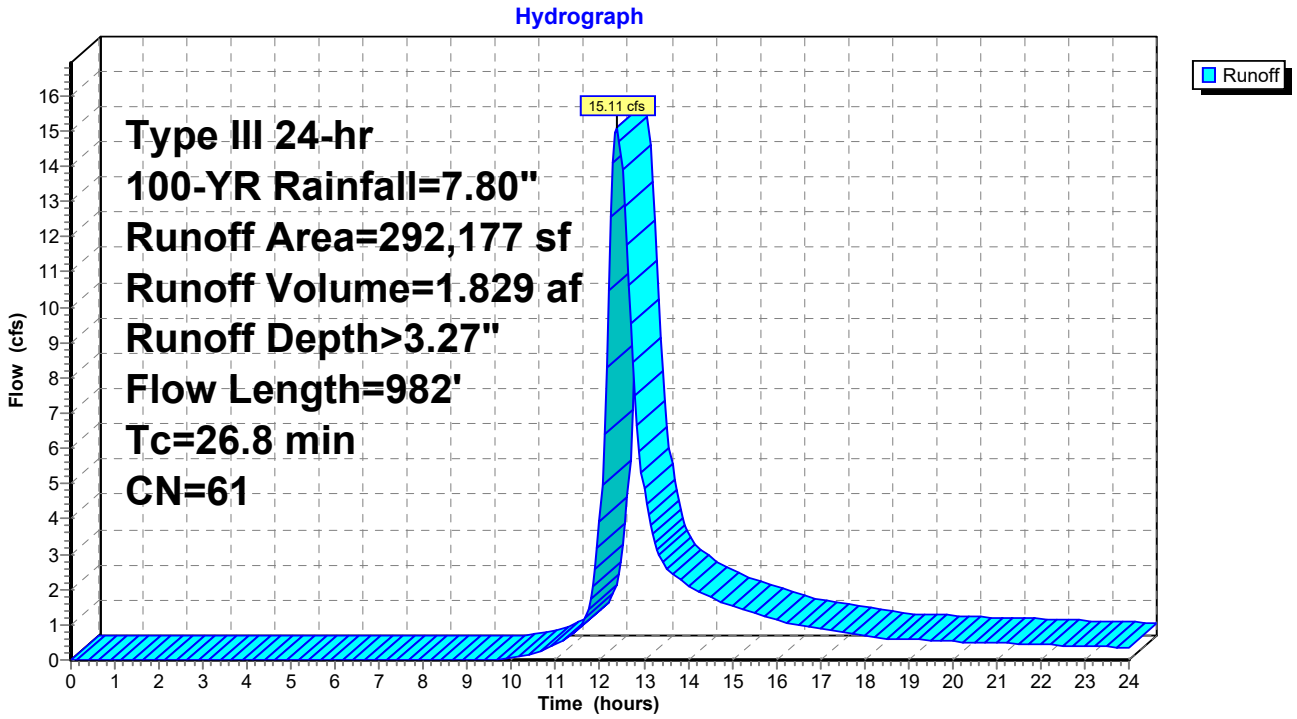
Runoff = 15.11 cfs @ 12.39 hrs, Volume= 1.829 af, Depth> 3.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=7.80"

Area (sf)	CN	Description
113,079	70	Woods, Good, HSG C
179,098	55	Woods, Good, HSG B
292,177	61	Weighted Average
292,177		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.1	50	0.0250	0.08		**Sheet Flow, 6A-6B** Woods: Light underbrush n= 0.400 P2= 3.32"
4.7	306	0.0474	1.09		**Shallow Concentrated Flow, 6B-6C** Woodland Kv= 5.0 fps
3.5	130	0.0154	0.62		**Shallow Concentrated Flow, 6C-6D** Woodland Kv= 5.0 fps
7.5	496	0.0484	1.10		**Shallow Concentrated Flow, 6D-EDP-6** Woodland Kv= 5.0 fps
26.8	982	Total			

Subcatchment 6: EDA-6



Summary for Subcatchment 7: EDA-7

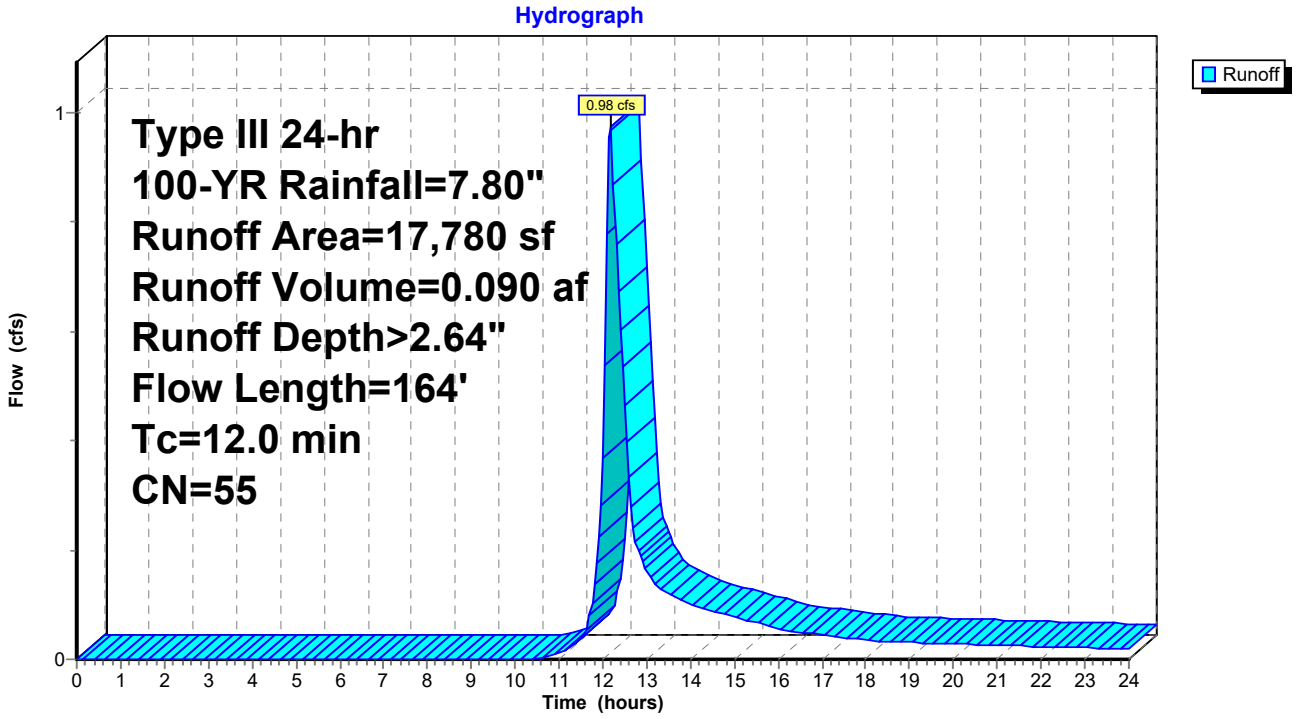
Runoff = 0.98 cfs @ 12.18 hrs, Volume= 0.090 af, Depth> 2.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=7.80"

Area (sf)	CN	Description
17,780	55	Woods, Good, HSG B
17,780		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.3	50	0.0300	0.08		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.32"
1.7	114	0.0500	1.12		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
12.0	164	Total			

Subcatchment 7: EDA-7

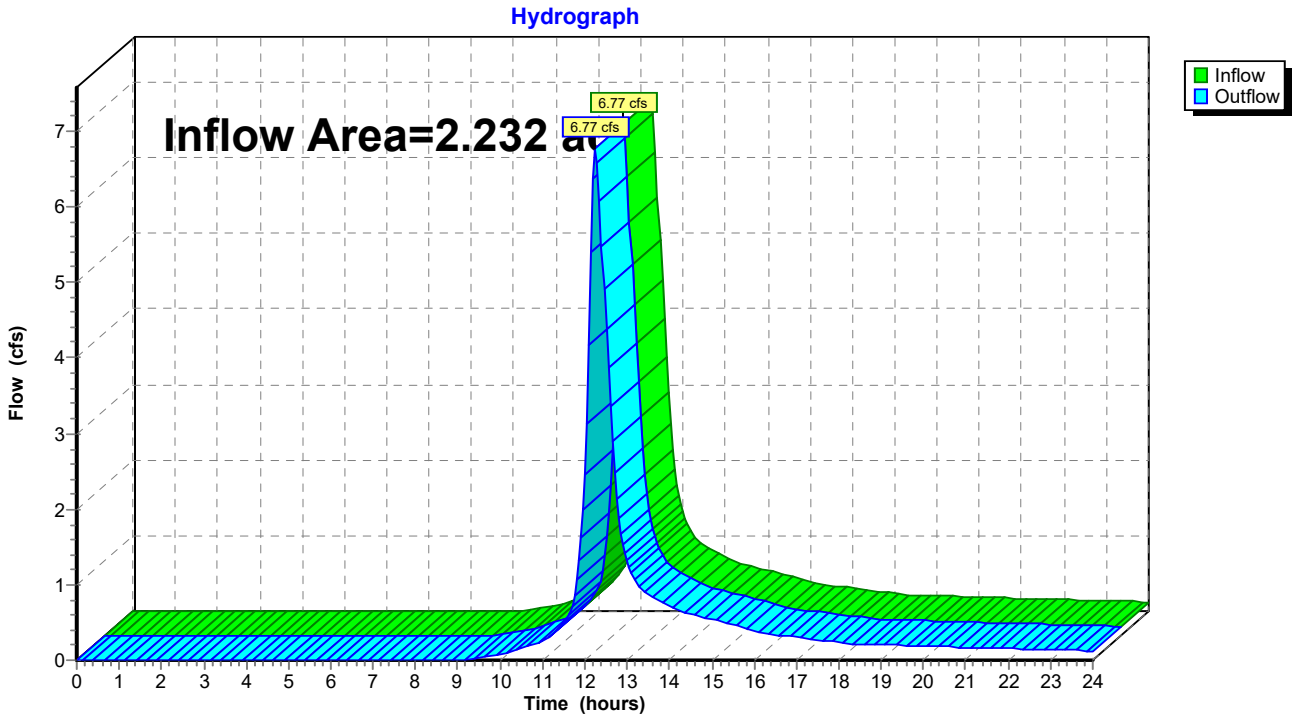


Summary for Reach EDP-1: Design Point 1

Inflow Area = 2.232 ac, 0.00% Impervious, Inflow Depth > 3.72" for 100-YR event
Inflow = 6.77 cfs @ 12.26 hrs, Volume= 0.692 af
Outflow = 6.77 cfs @ 12.26 hrs, Volume= 0.692 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach EDP-1: Design Point 1

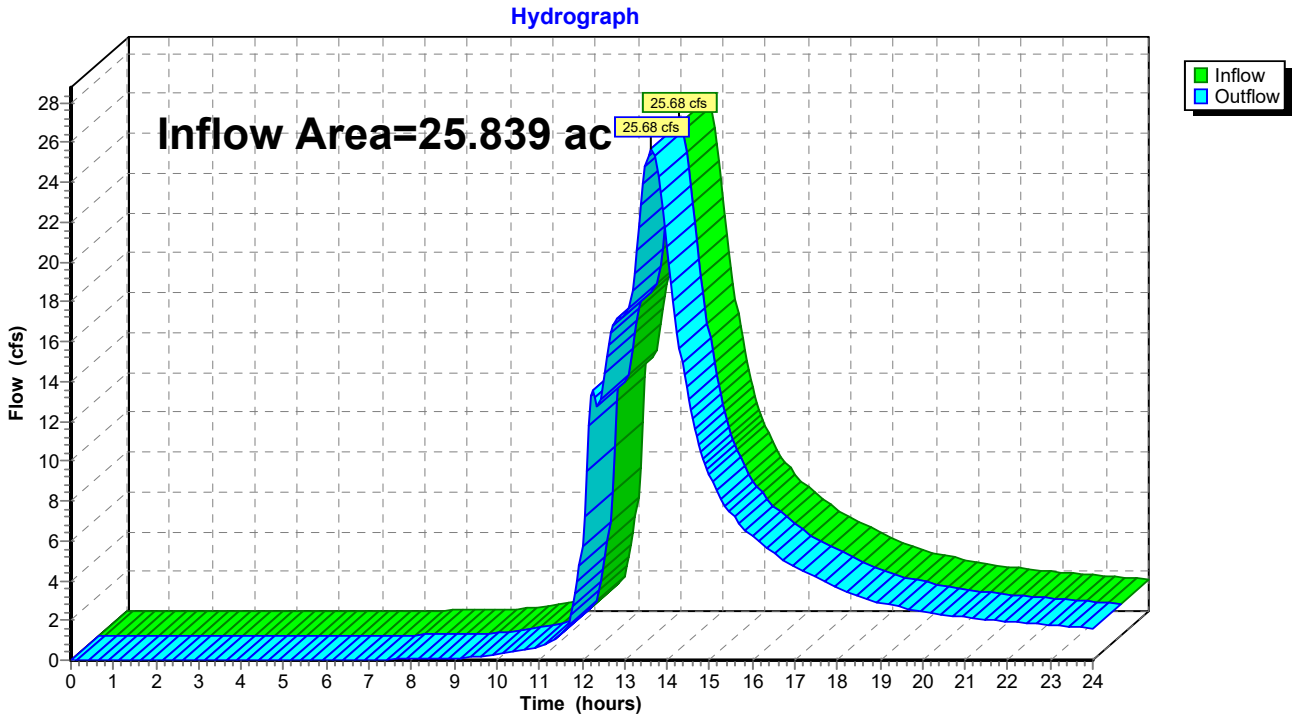


Summary for Reach EDP-2: Design Point 2

Inflow Area = 25.839 ac, 2.44% Impervious, Inflow Depth > 3.20" for 100-YR event
Inflow = 25.68 cfs @ 13.63 hrs, Volume= 6.889 af
Outflow = 25.68 cfs @ 13.63 hrs, Volume= 6.889 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach EDP-2: Design Point 2



Summary for Reach EDP-3: Design Point 3

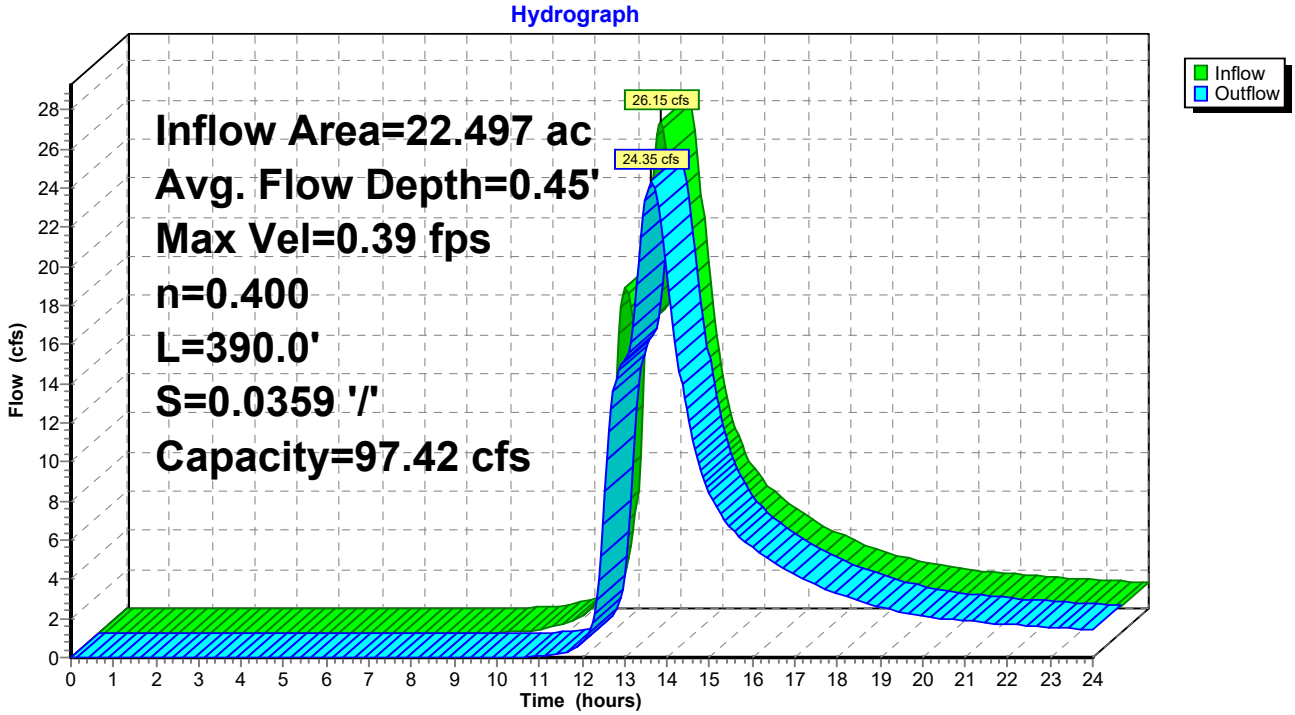
Inflow Area = 22.497 ac, 0.74% Impervious, Inflow Depth > 3.10" for 100-YR event
Inflow = 26.15 cfs @ 13.19 hrs, Volume= 5.811 af
Outflow = 24.35 cfs @ 13.63 hrs, Volume= 5.685 af, Atten= 7%, Lag= 26.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 0.39 fps, Min. Travel Time= 16.5 min
Avg. Velocity = 0.16 fps, Avg. Travel Time= 39.6 min

Peak Storage= 24,197 cf @ 13.35 hrs
Average Depth at Peak Storage= 0.45'
Bank-Full Depth= 1.00' Flow Area= 151.0 sf, Capacity= 97.42 cfs

130.00' x 1.00' deep channel, n= 0.400 Sheet flow: Woods+light brush
Side Slope Z-value= 12.0 30.0 '/' Top Width= 172.00'
Length= 390.0' Slope= 0.0359 '/'
Inlet Invert= 618.00', Outlet Invert= 604.00'

Reach EDP-3: Design Point 3



Summary for Reach EDP-4: Design Point 4

Inflow Area = 15.900 ac, 0.70% Impervious, Inflow Depth > 3.07" for 100-YR event
Inflow = 25.28 cfs @ 12.85 hrs, Volume= 4.062 af
Outflow = 23.10 cfs @ 13.21 hrs, Volume= 3.990 af, Atten= 9%, Lag= 21.9 min

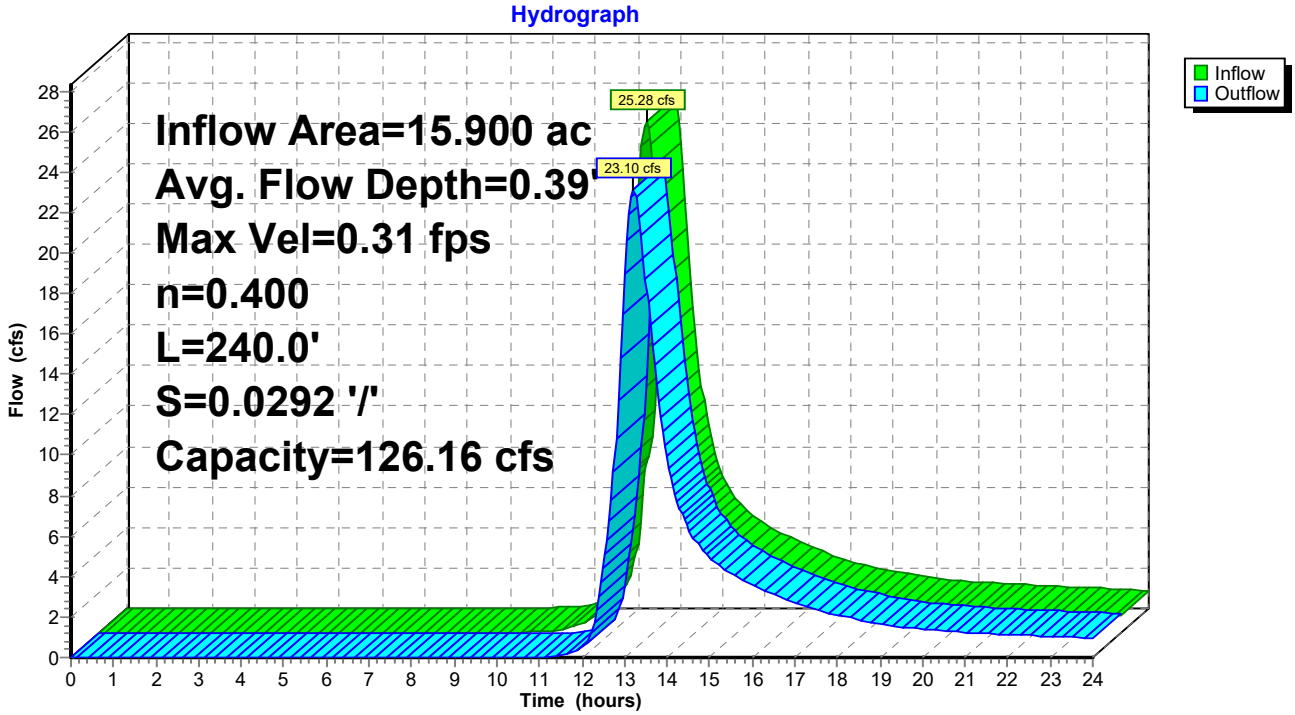
Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 0.31 fps, Min. Travel Time= 13.0 min
Avg. Velocity = 0.11 fps, Avg. Travel Time= 34.9 min

Peak Storage= 18,006 cf @ 13.00 hrs
Average Depth at Peak Storage= 0.39'
Bank-Full Depth= 1.00' Flow Area= 237.5 sf, Capacity= 126.16 cfs

165.00' x 1.00' deep channel, n= 0.400 Sheet flow: Woods+light brush
Side Slope Z-value= 80.0 65.0 '/' Top Width= 310.00'
Length= 240.0' Slope= 0.0292 '/'
Inlet Invert= 625.00', Outlet Invert= 618.00'

‡

Reach EDP-4: Design Point 4



Summary for Reach EDP-5: Design Point 5

Inflow Area = 14.011 ac, 0.79% Impervious, Inflow Depth > 3.17" for 100-YR event
Inflow = 27.33 cfs @ 12.49 hrs, Volume= 3.697 af
Outflow = 24.39 cfs @ 12.85 hrs, Volume= 3.629 af, Atten= 11%, Lag= 21.6 min

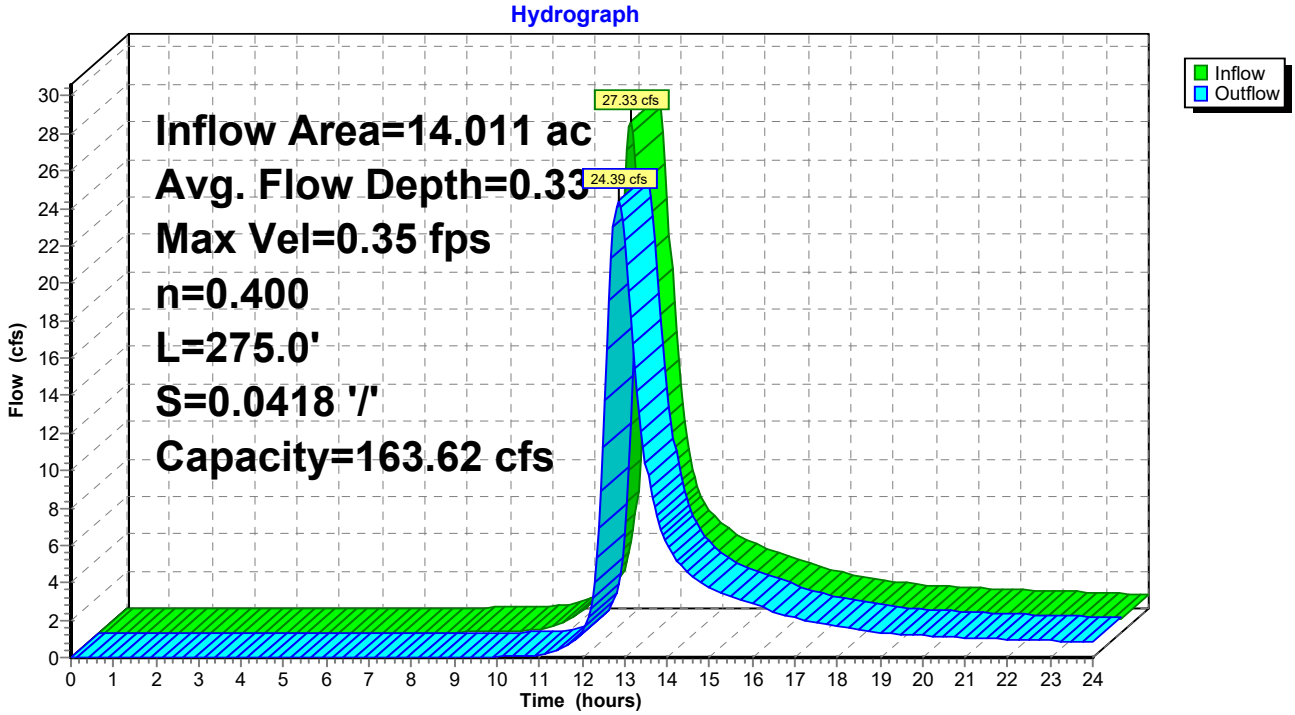
Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 0.35 fps, Min. Travel Time= 13.1 min
Avg. Velocity = 0.12 fps, Avg. Travel Time= 39.2 min

Peak Storage= 19,258 cf @ 12.63 hrs
Average Depth at Peak Storage= 0.33'
Bank-Full Depth= 1.00' Flow Area= 237.5 sf, Capacity= 163.62 cfs

200.00' x 1.00' deep channel, n= 0.400 Sheet flow: Woods+light brush
Side Slope Z-value= 50.0 25.0 '/' Top Width= 275.00'
Length= 275.0' Slope= 0.0418 '/'
Inlet Invert= 636.50', Outlet Invert= 625.00'

‡

Reach EDP-5: Design Point 5



Summary for Reach EDP-6: Design Point 6

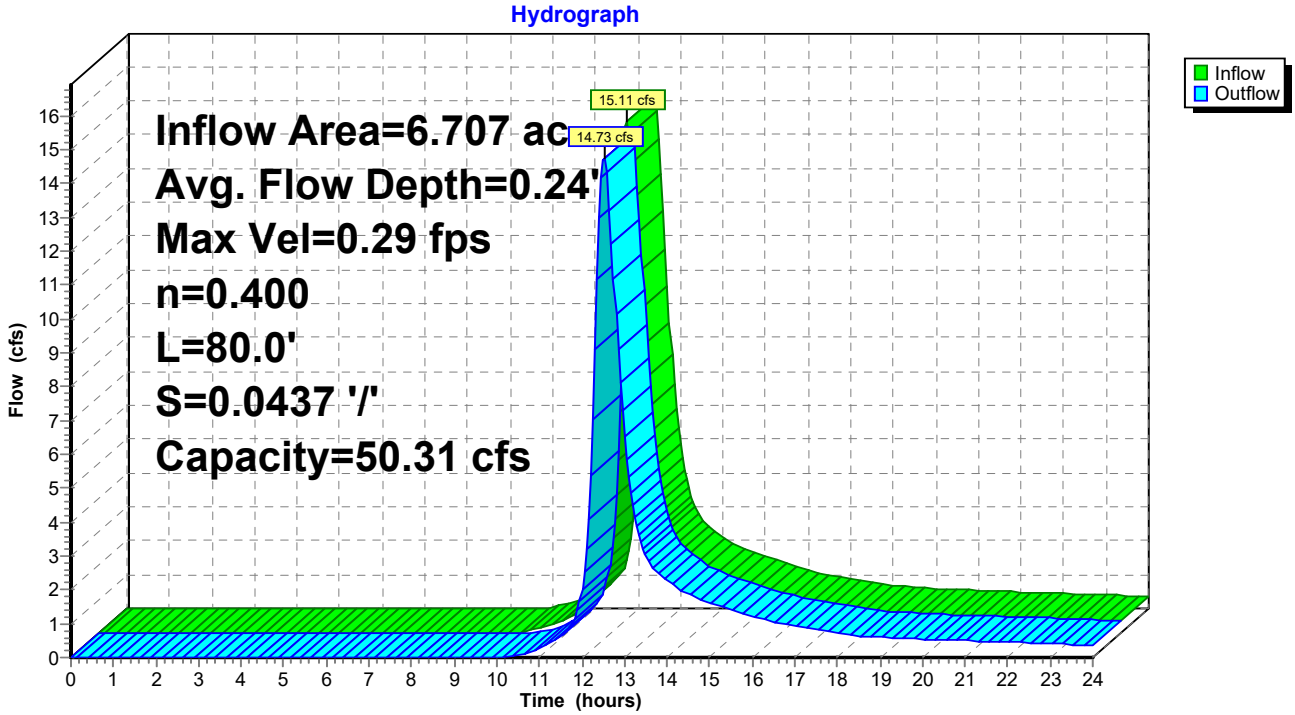
Inflow Area = 6.707 ac, 0.00% Impervious, Inflow Depth > 3.27" for 100-YR event
Inflow = 15.11 cfs @ 12.39 hrs, Volume= 1.829 af
Outflow = 14.73 cfs @ 12.52 hrs, Volume= 1.817 af, Atten= 3%, Lag= 7.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 0.29 fps, Min. Travel Time= 4.5 min
Avg. Velocity = 0.10 fps, Avg. Travel Time= 13.1 min

Peak Storage= 4,012 cf @ 12.44 hrs
Average Depth at Peak Storage= 0.24'
Bank-Full Depth= 0.50' Flow Area= 107.5 sf, Capacity= 50.31 cfs

200.00' x 0.50' deep channel, n= 0.400 Sheet flow: Woods+light brush
Side Slope Z-value= 30.0 '/' Top Width= 230.00'
Length= 80.0' Slope= 0.0437 '/'
Inlet Invert= 642.50', Outlet Invert= 639.00'

Reach EDP-6: Design Point 6

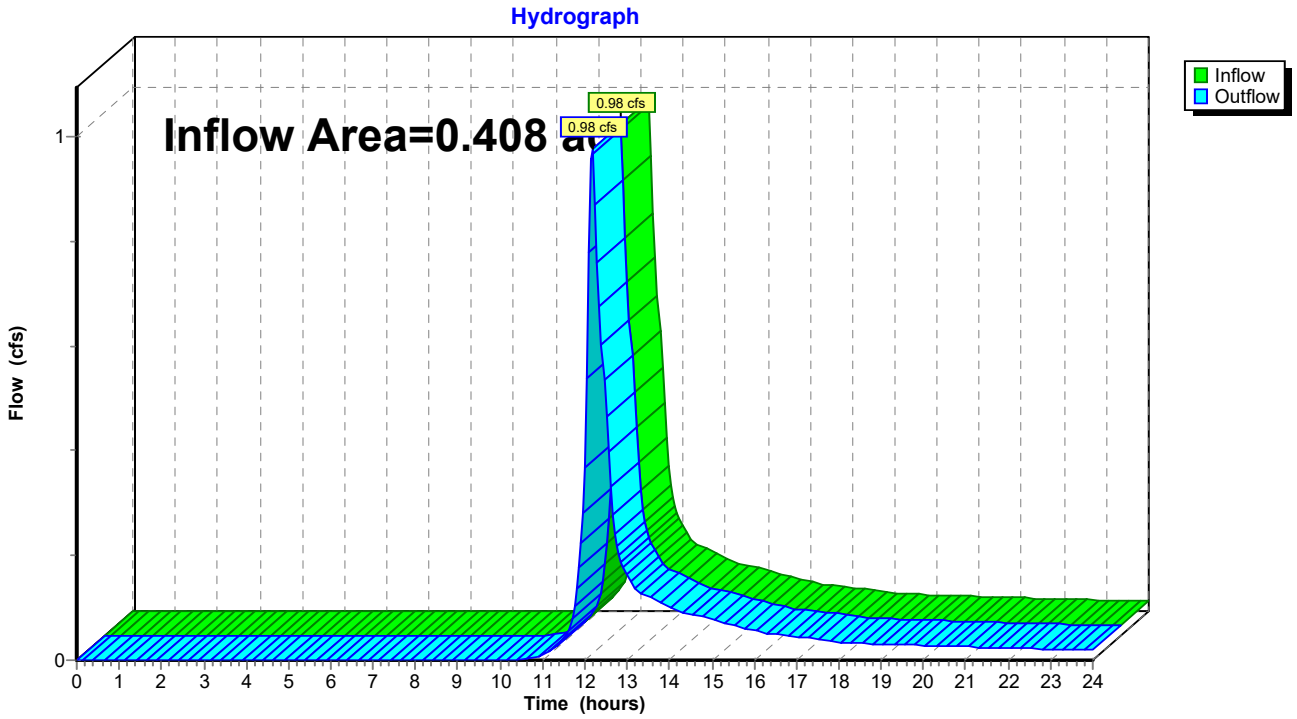


Summary for Reach EDP-7: Design Point 7 (Vernal Pool)

Inflow Area = 0.408 ac, 0.00% Impervious, Inflow Depth > 2.64" for 100-YR event
Inflow = 0.98 cfs @ 12.18 hrs, Volume= 0.090 af
Outflow = 0.98 cfs @ 12.18 hrs, Volume= 0.090 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach EDP-7: Design Point 7 (Vernal Pool)



Summary for Pond RCP: 24" RCP

Inflow Area = 22.497 ac, 0.74% Impervious, Inflow Depth > 3.03" for 100-YR event
Inflow = 24.35 cfs @ 13.63 hrs, Volume= 5.685 af
Outflow = 24.35 cfs @ 13.63 hrs, Volume= 5.685 af, Atten= 0%, Lag= 0.1 min
Primary = 24.35 cfs @ 13.63 hrs, Volume= 5.685 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 603.76' @ 13.63 hrs Surf.Area= 38 sf Storage= 64 cf

Plug-Flow detention time= 0.0 min calculated for 5.685 af (100% of inflow)
Center-of-Mass det. time= 0.0 min (927.9 - 927.8)

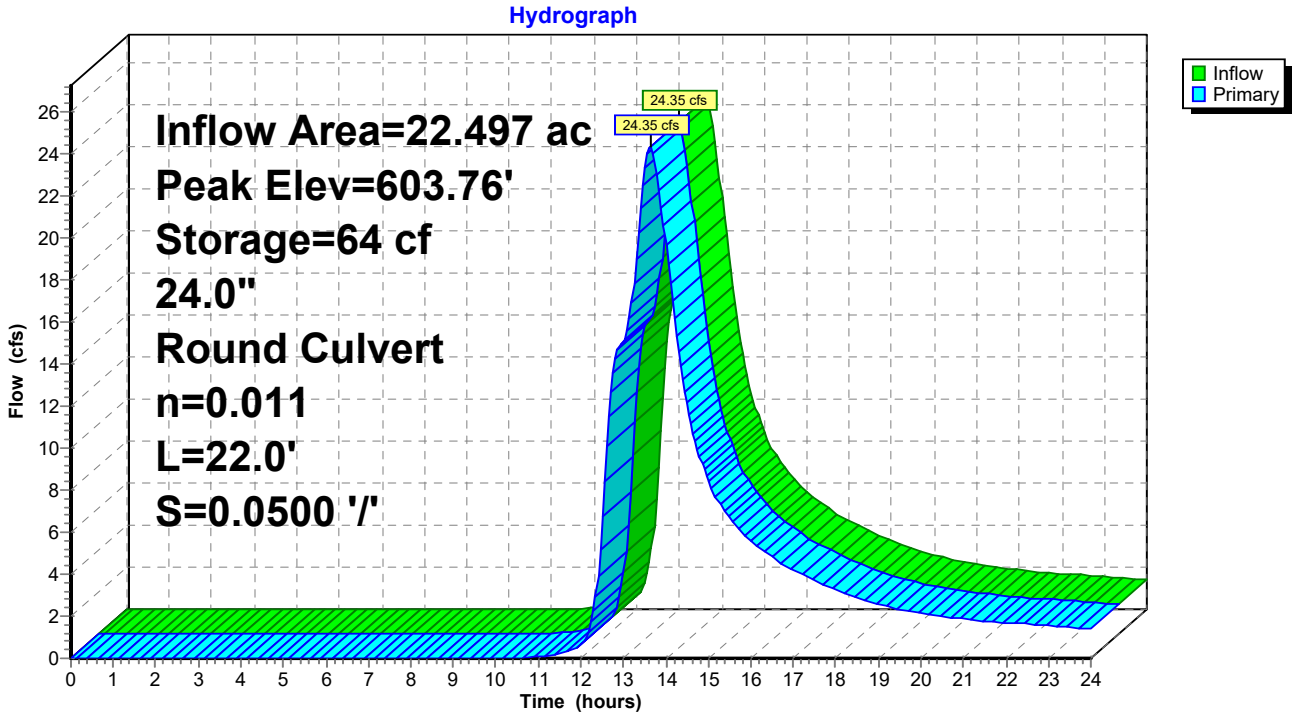
Volume	Invert	Avail.Storage	Storage Description
#1	601.10'	90 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
601.10	10	0	0
602.00	20	13	13
603.00	30	25	38
604.00	40	35	73
604.37	50	17	90

Device	Routing	Invert	Outlet Devices
#1	Primary	601.10'	**24.0" Round RCP_Round 24"** L= 22.0' RCP, groove end w/headwall, Ke= 0.200 Inlet / Outlet Invert= 601.10' / 600.00' S= 0.0500 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf

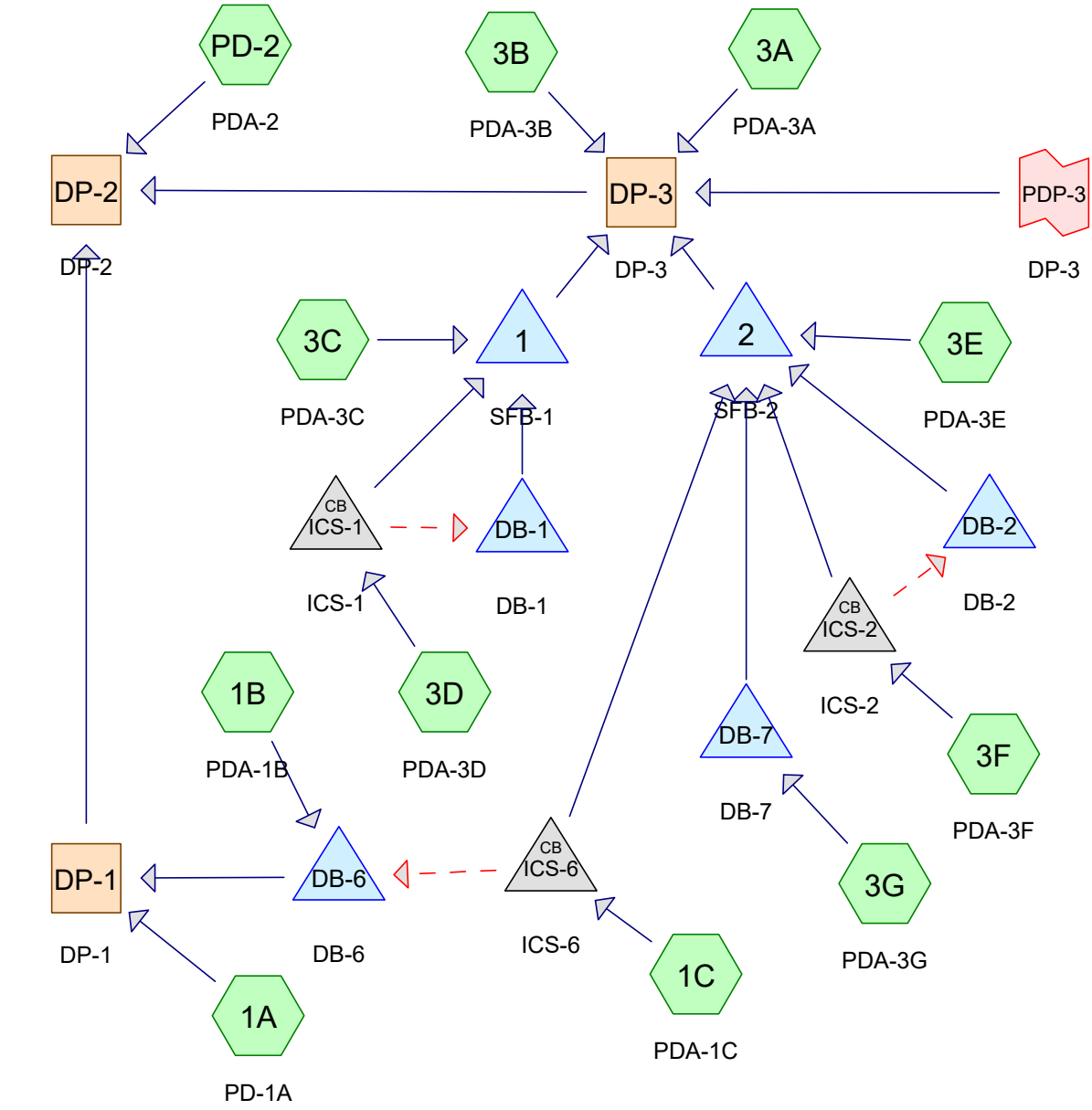
Primary OutFlow Max=24.32 cfs @ 13.63 hrs HW=603.75' (Free Discharge)
└─**1=RCP_Round 24"** (Inlet Controls 24.32 cfs @ 7.74 fps)

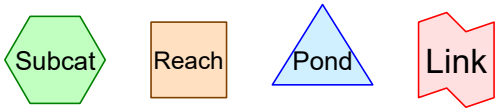
Pond RCP: 24" RCP



APPENDIX D: PROPOSED CONDITIONS HYDROLOGIC ANALYSIS

- *PROPOSED CONDITIONS DRAINAGE MAP*
- *PROPOSED CONDITIONS HYDROCAD CALCULATIONS*
- *SAND FILTER BASIN DRAWDOWN CALCULATIONS*





Routing Diagram for PD_1-3
Prepared by Bohler Engineering, Printed 2/5/2020
HydroCAD® 10.00-21 s/n 08311 © 2018 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.454	61	>75% Grass cover, Good, HSG B (1C, 3D, 3F, 3G)
1.359	74	>75% Grass cover, Good, HSG C (1A, 1C, 3B, 3C, 3D, 3E, 3F, 3G, PD-2)
0.775	98	Paved parking (1C)
0.479	98	Paved parking, HSG B (3A, 3F)
0.035	98	Paved parking, HSG C (1A, 3B)
0.975	98	Paved parking, HSG D (3D, PD-2)
0.570	98	Roofs, HSG B (1C, 3G)
0.133	98	Roofs, HSG C (3C, 3E)
0.115	98	Unconnected pavement, HSG B (3G)
0.019	98	Unconnected pavement, HSG C (3C, 3E)
0.133	98	Unconnected roofs, HSG C (1B)
1.731	55	Woods, Good, HSG B (1C, 3A, 3B, PD-2)
1.656	70	Woods, Good, HSG C (1A, 1C, 3A, 3B, PD-2)
8.437	**78**	**TOTAL AREA**

Summary for Subcatchment 1A: PD-1A

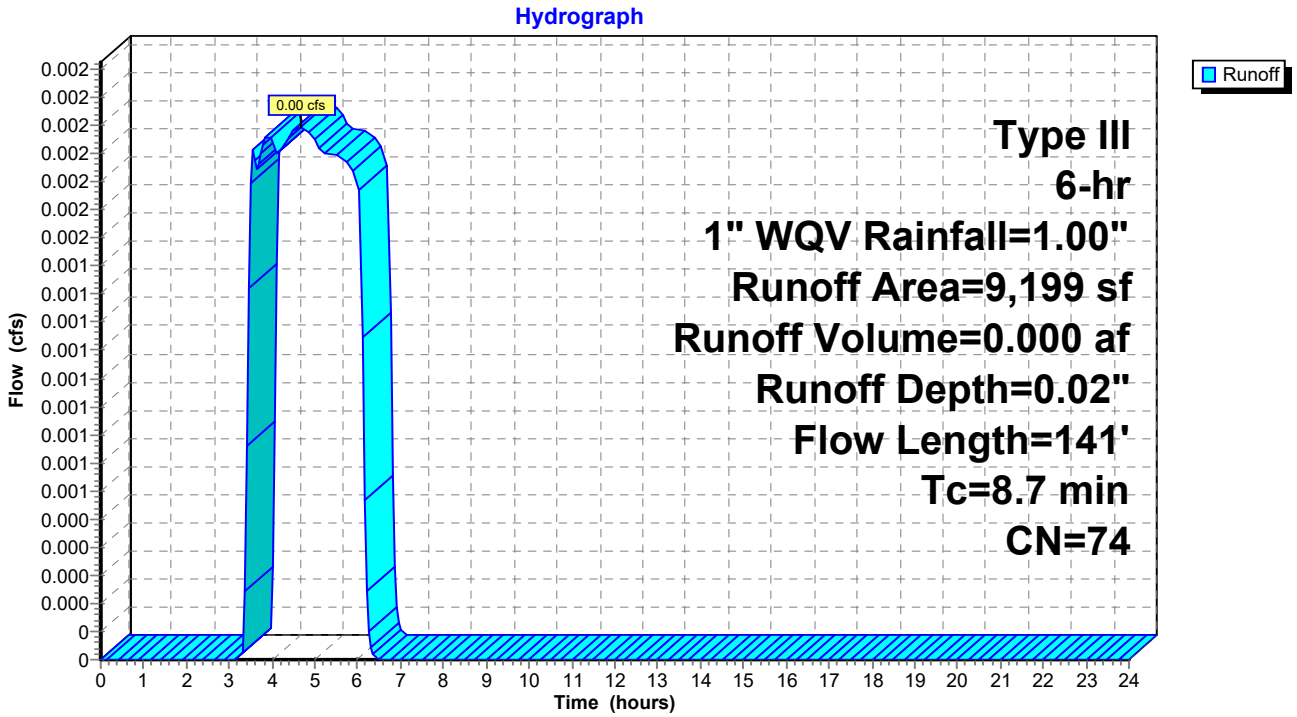
Runoff = 0.00 cfs @ 4.65 hrs, Volume= 0.000 af, Depth= 0.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 6-hr 1" WQV Rainfall=1.00"

Area (sf)	CN	Description
440	98	Paved parking, HSG C
5,095	74	>75% Grass cover, Good, HSG C
3,664	70	Woods, Good, HSG C
9,199	74	Weighted Average
8,759		95.22% Pervious Area
440		4.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	71	0.1100	0.15		**Sheet Flow, 1A-1B** Woods: Light underbrush n= 0.400 P2= 3.32"
0.3	14	0.0100	0.70		**Shallow Concentrated Flow, 1B-1C** Short Grass Pasture Kv= 7.0 fps
0.3	56	0.0050	3.18	1.11	**Pipe Channel, 1C-1D** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010 PVC, smooth interior
8.7	141	Total			

Subcatchment 1A: PD-1A



Summary for Subcatchment 1B: PDA-1B

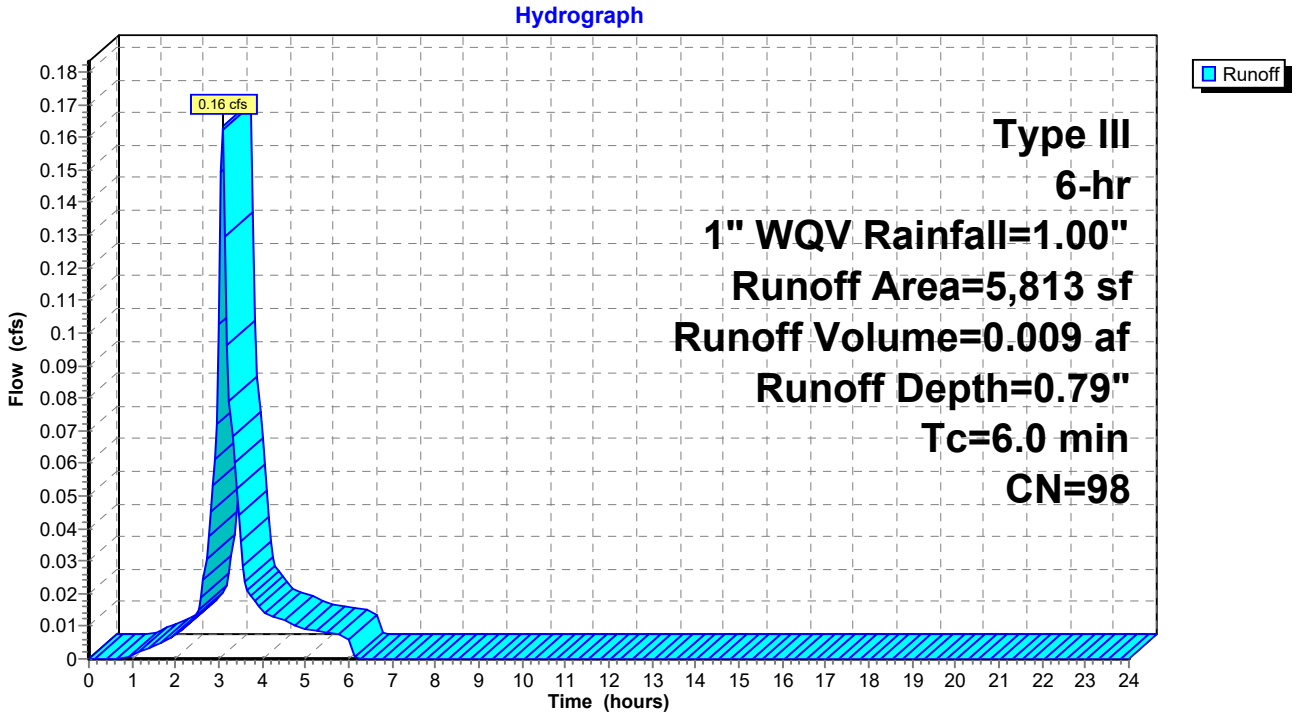
Runoff = 0.16 cfs @ 3.09 hrs, Volume= 0.009 af, Depth= 0.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 6-hr 1" WQV Rainfall=1.00"

Area (sf)	CN	Description
5,813	98	Unconnected roofs, HSG C
5,813		100.00% Impervious Area
5,813		100.00% Unconnected

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

Subcatchment 1B: PDA-1B



Summary for Subcatchment 1C: PDA-1C

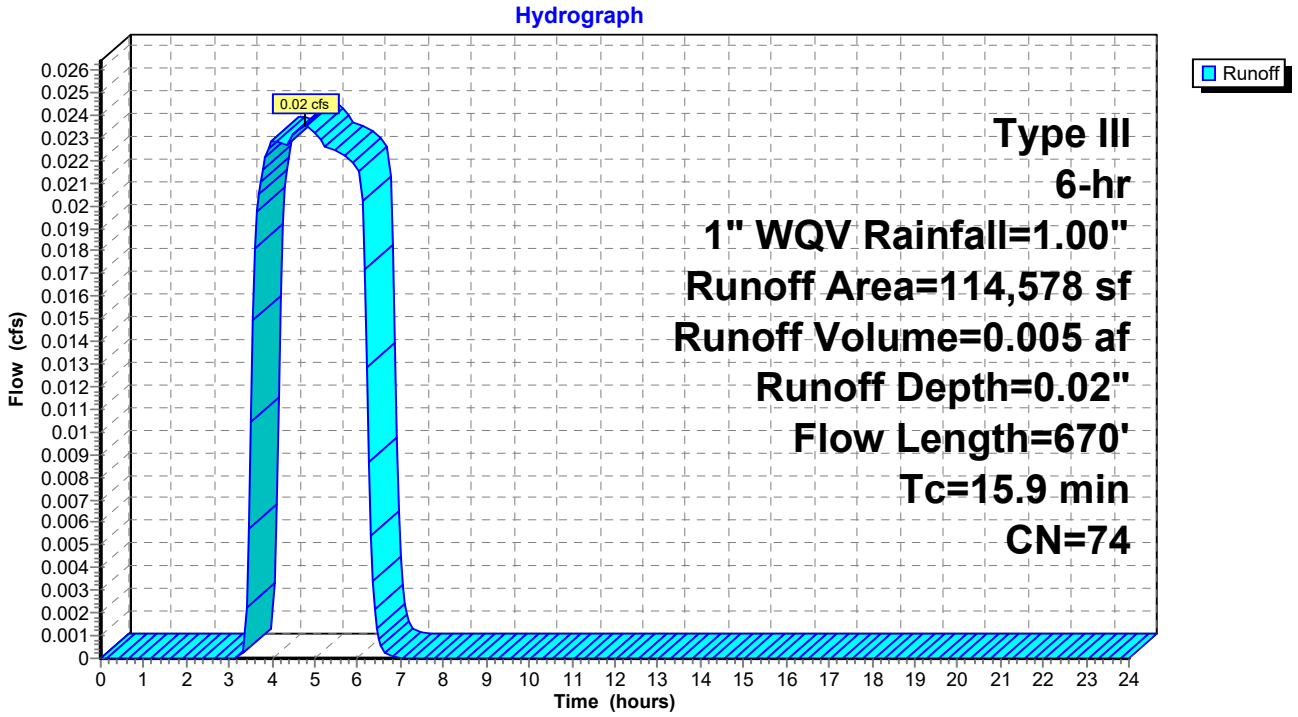
Runoff = 0.02 cfs @ 4.77 hrs, Volume= 0.005 af, Depth= 0.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 6-hr 1" WQV Rainfall=1.00"

	Area (sf)	CN	Description
*	33,778	98	Paved parking
	9,092	61	>75% Grass cover, Good, HSG B
	1,833	74	>75% Grass cover, Good, HSG C
	11,190	98	Roofs, HSG B
	47,970	55	Woods, Good, HSG B
	10,715	70	Woods, Good, HSG C
	114,578	74	Weighted Average
	69,610		60.75% Pervious Area
	44,968		39.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	50	0.0400	0.09		**Sheet Flow, 1A-1B** Woods: Light underbrush n= 0.400 P2= 3.32"
6.0	458	0.0655	1.28		**Shallow Concentrated Flow, 1B-1C** Woodland Kv= 5.0 fps
0.1	10	0.1500	2.71		**Shallow Concentrated Flow, 1C-1D** Short Grass Pasture Kv= 7.0 fps
0.3	78	0.0400	4.06		**Shallow Concentrated Flow, 1D-1E** Paved Kv= 20.3 fps
0.3	74	0.0050	3.79	2.98	**Pipe Channel, 1E-1F** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
15.9	670	Total			

Subcatchment 1C: PDA-1C



Summary for Subcatchment 3A: PDA-3A

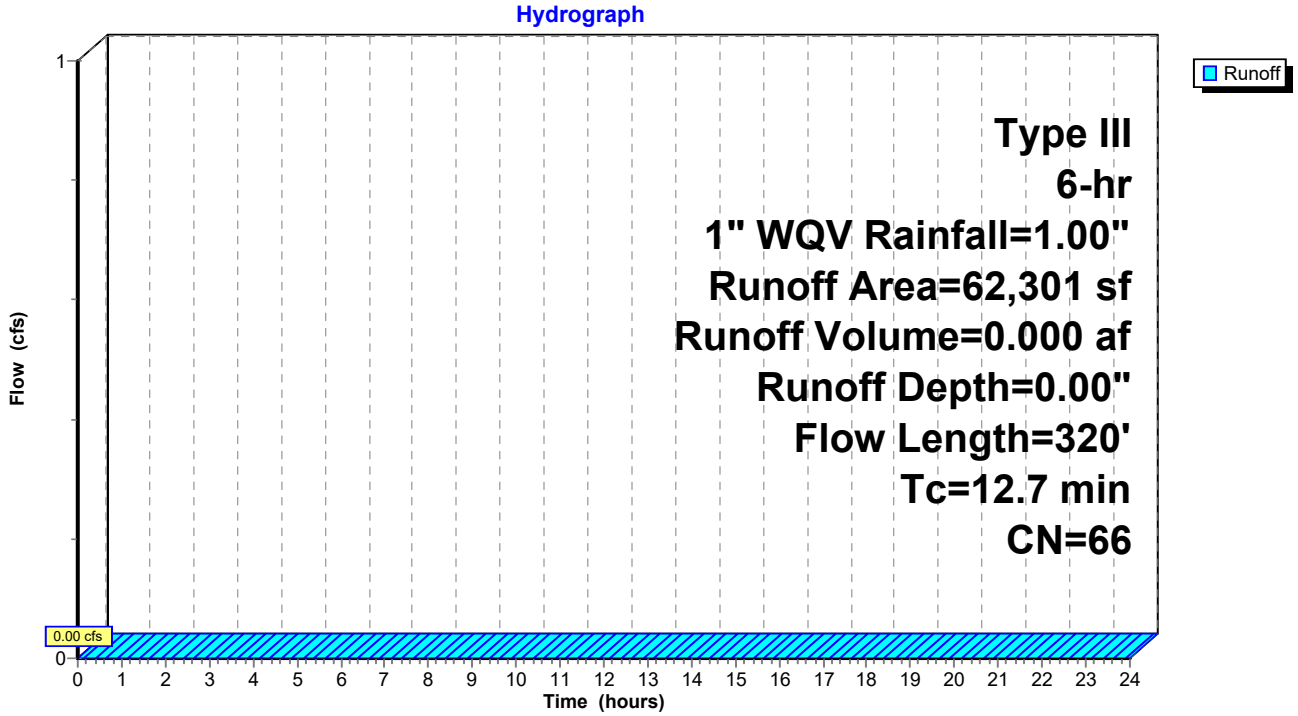
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 6-hr 1" WQV Rainfall=1.00"

Area (sf)	CN	Description
21,831	55	Woods, Good, HSG B
38,070	70	Woods, Good, HSG C
2,400	98	Paved parking, HSG B
62,301	66	Weighted Average
59,901		96.15% Pervious Area
2,400		3.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.0500	0.10		**Sheet Flow, 3A-3B** Woods: Light underbrush n= 0.400 P2= 3.32"
4.3	270	0.0444	1.05		**Shallow Concentrated Flow, 3B-EDP-3** Woodland Kv= 5.0 fps
12.7	320	Total			

Subcatchment 3A: PDA-3A



Summary for Subcatchment 3B: PDA-3B

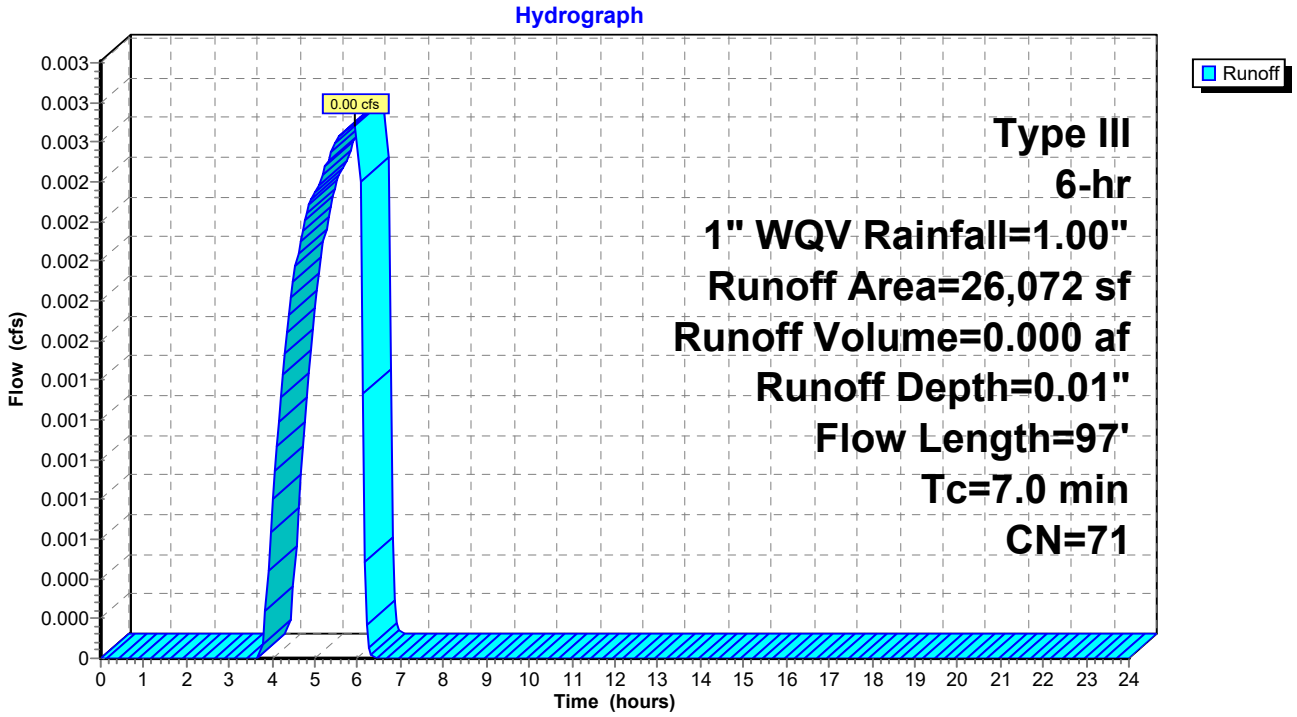
Runoff = 0.00 cfs @ 5.95 hrs, Volume= 0.000 af, Depth= 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 6-hr 1" WQV Rainfall=1.00"

Area (sf)	CN	Description
9,275	74	>75% Grass cover, Good, HSG C
2,286	55	Woods, Good, HSG B
13,438	70	Woods, Good, HSG C
1,073	98	Paved parking, HSG C
26,072	71	Weighted Average
24,999		95.88% Pervious Area
1,073		4.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	51	0.1000	0.13		**Sheet Flow, 3A-3B** Woods: Light underbrush n= 0.400 P2= 3.32"
0.0	6	0.3300	4.02		**Shallow Concentrated Flow, 3B-3C** Short Grass Pasture Kv= 7.0 fps
0.1	8	0.0150	1.97		**Shallow Concentrated Flow, 3C-3D** Unpaved Kv= 16.1 fps
0.0	7	0.2500	3.50		**Shallow Concentrated Flow, 3D-3E** Short Grass Pasture Kv= 7.0 fps
0.4	25	0.0500	1.12		**Shallow Concentrated Flow, 3E-EDP3** Woodland Kv= 5.0 fps
7.0	97	Total			

Subcatchment 3B: PDA-3B



Summary for Subcatchment 3C: PDA-3C

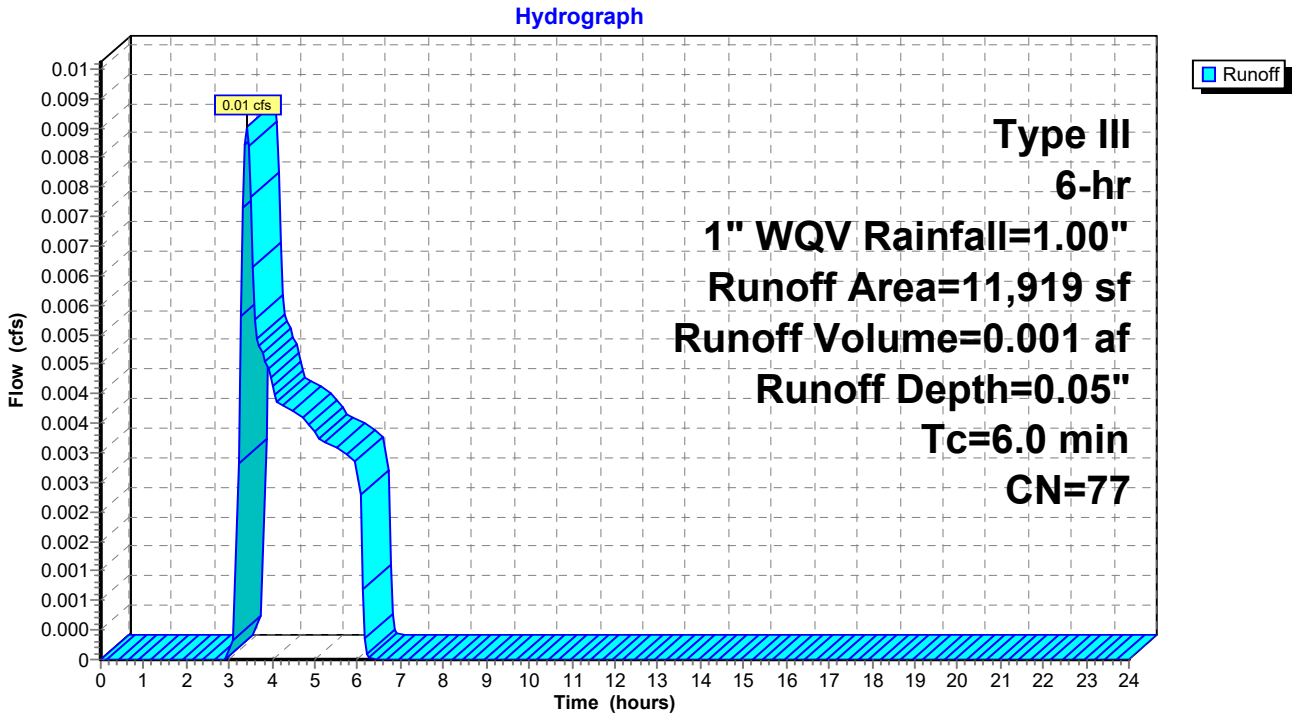
Runoff = 0.01 cfs @ 3.40 hrs, Volume= 0.001 af, Depth= 0.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 6-hr 1" WQV Rainfall=1.00"

Area (sf)	CN	Description
7,718	74	>75% Grass cover, Good, HSG C
336	98	Unconnected pavement, HSG C
2,657	74	>75% Grass cover, Good, HSG C
46	98	Unconnected pavement, HSG C
1,162	98	Roofs, HSG C
11,919	77	Weighted Average
10,375		87.05% Pervious Area
1,544		12.95% Impervious Area
382		24.74% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 MIN**

Subcatchment 3C: PDA-3C



Summary for Subcatchment 3D: PDA-3D

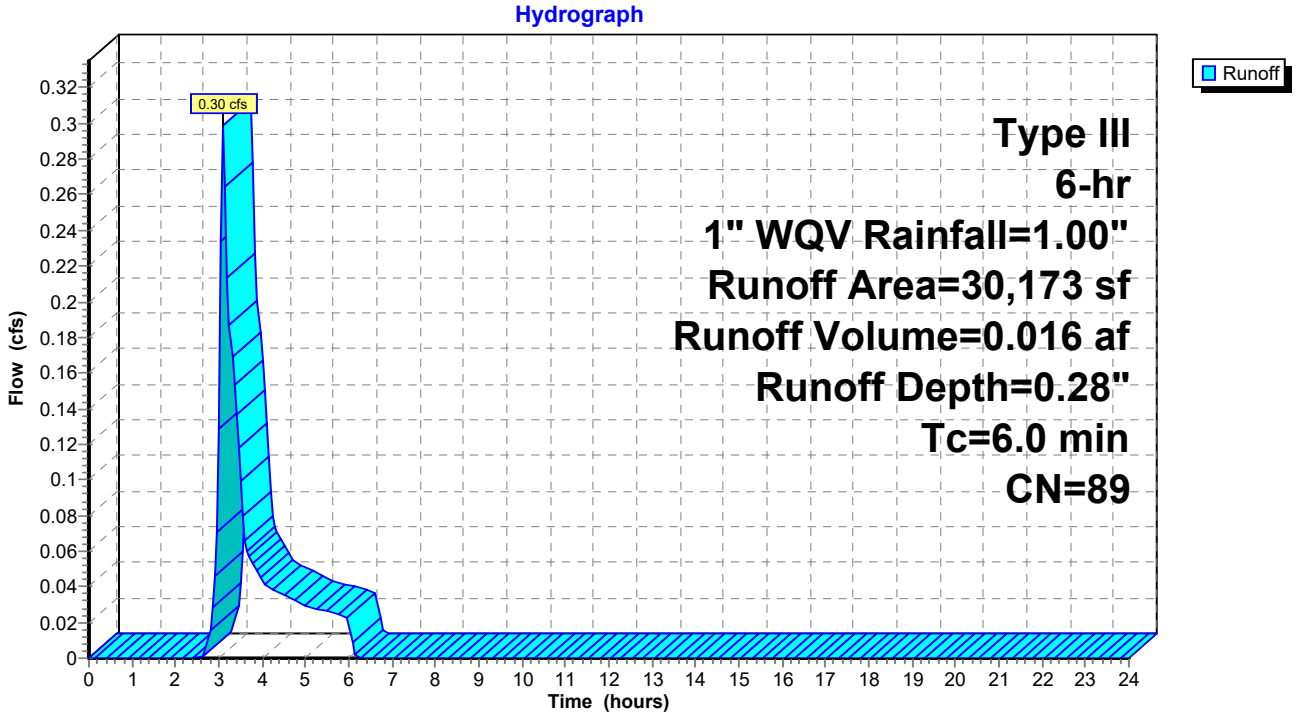
Runoff = 0.30 cfs @ 3.11 hrs, Volume= 0.016 af, Depth= 0.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 6-hr 1" WQV Rainfall=1.00"

Area (sf)	CN	Description
18,935	98	Paved parking, HSG D
11,071	74	>75% Grass cover, Good, HSG C
167	61	>75% Grass cover, Good, HSG B
30,173	89	Weighted Average
11,238		37.25% Pervious Area
18,935		62.75% Impervious Area

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

Subcatchment 3D: PDA-3D



Summary for Subcatchment 3E: PDA-3E

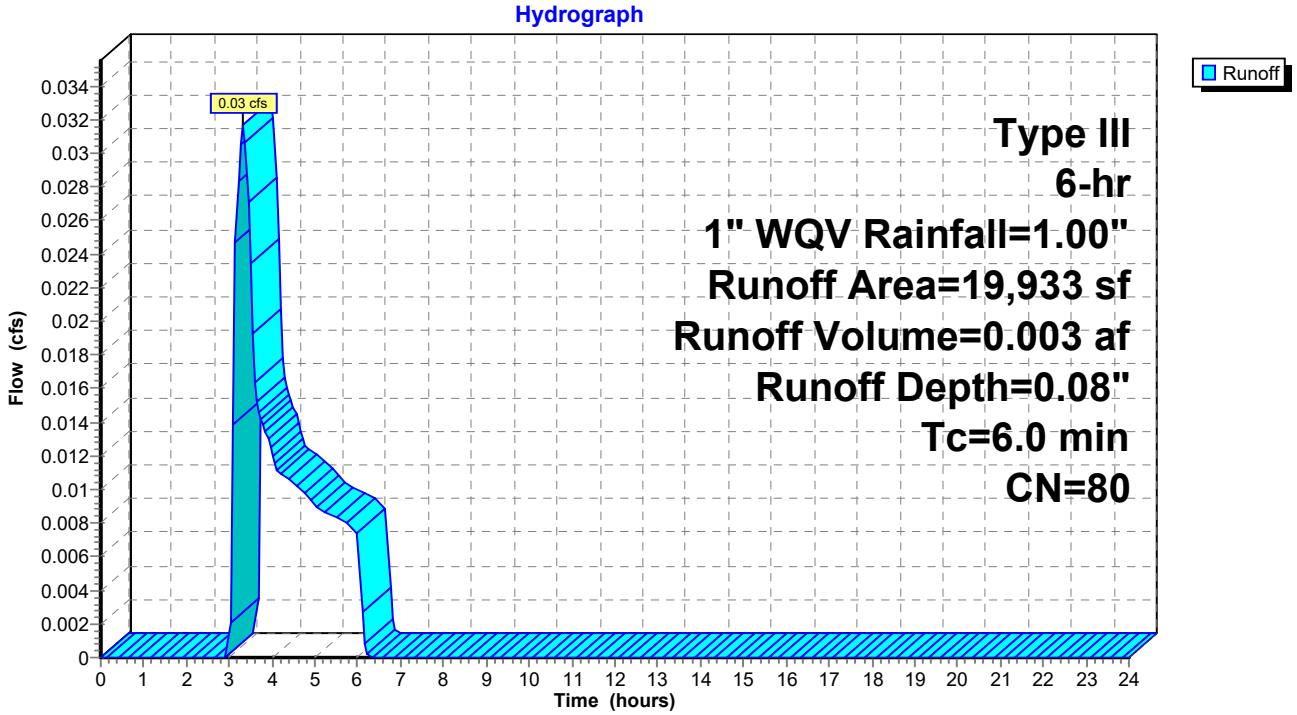
Runoff = 0.03 cfs @ 3.32 hrs, Volume= 0.003 af, Depth= 0.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 6-hr 1" WQV Rainfall=1.00"

Area (sf)	CN	Description
14,823	74	>75% Grass cover, Good, HSG C
460	98	Unconnected pavement, HSG C
4,650	98	Roofs, HSG C
19,933	80	Weighted Average
14,823		74.36% Pervious Area
5,110		25.64% Impervious Area
460		9.00% Unconnected

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

Subcatchment 3E: PDA-3E



Summary for Subcatchment 3F: PDA-3F

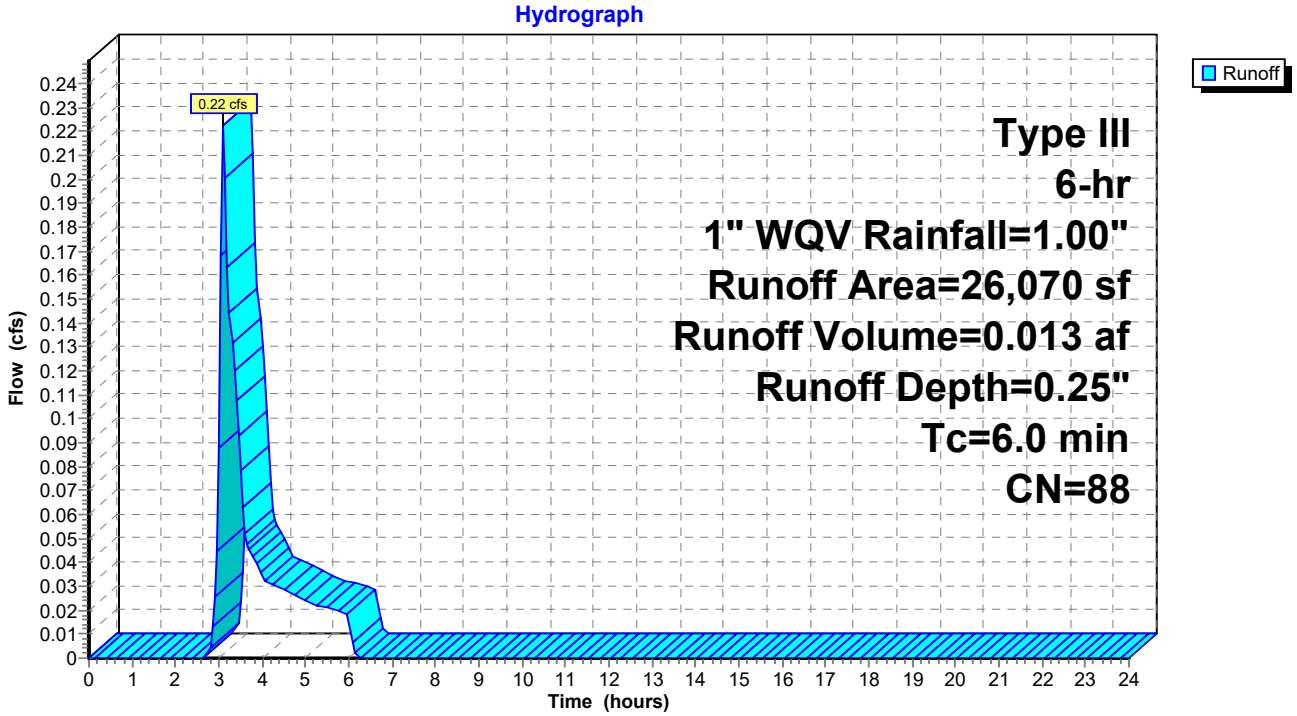
Runoff = 0.22 cfs @ 3.11 hrs, Volume= 0.013 af, Depth= 0.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 6-hr 1" WQV Rainfall=1.00"

Area (sf)	CN	Description
18,472	98	Paved parking, HSG B
1,202	74	>75% Grass cover, Good, HSG C
6,396	61	>75% Grass cover, Good, HSG B
26,070	88	Weighted Average
7,598		29.14% Pervious Area
18,472		70.86% Impervious Area

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

Subcatchment 3F: PDA-3F



Summary for Subcatchment 3G: PDA-3G

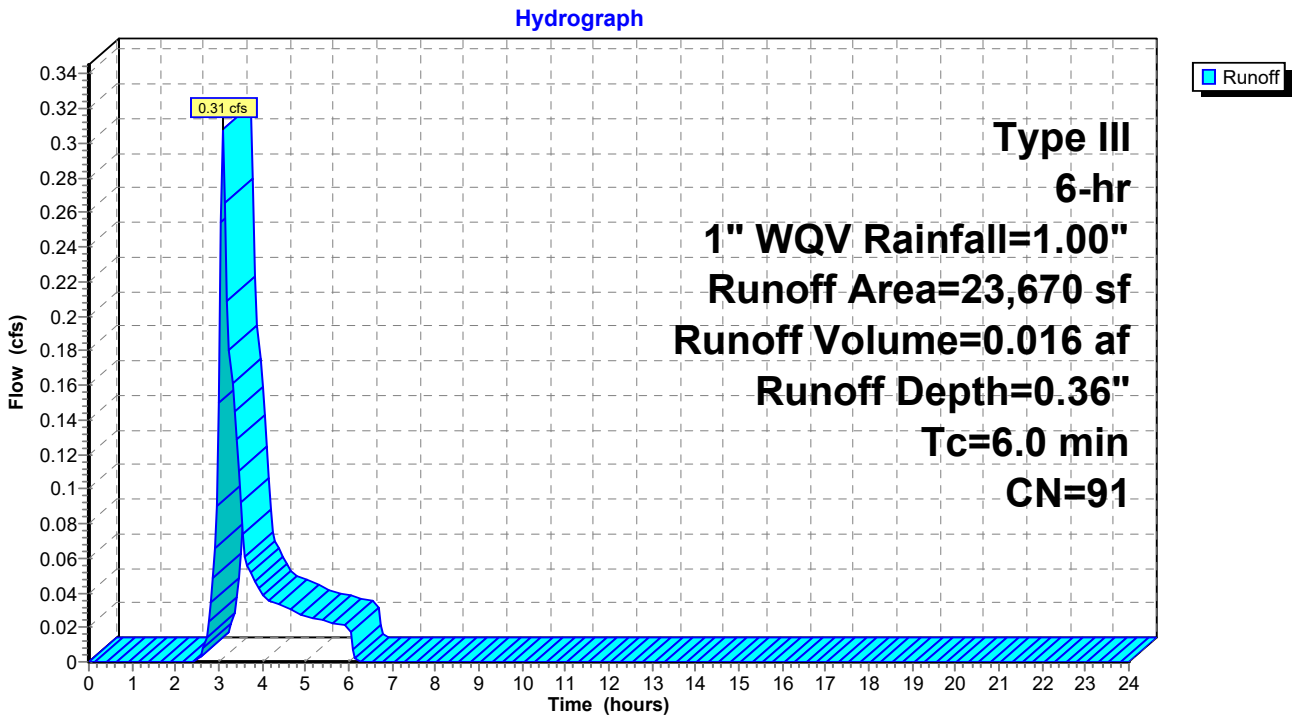
Runoff = 0.31 cfs @ 3.10 hrs, Volume= 0.016 af, Depth= 0.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 6-hr 1" WQV Rainfall=1.00"

Area (sf)	CN	Description
13,660	98	Roofs, HSG B
892	74	>75% Grass cover, Good, HSG C
4,113	61	>75% Grass cover, Good, HSG B
5,005	98	Unconnected pavement, HSG B
23,670	91	Weighted Average
5,005		21.14% Pervious Area
18,665		78.86% Impervious Area
5,005		26.81% Unconnected

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

Subcatchment 3G: PDA-3G



Summary for Subcatchment PD-2: PDA-2

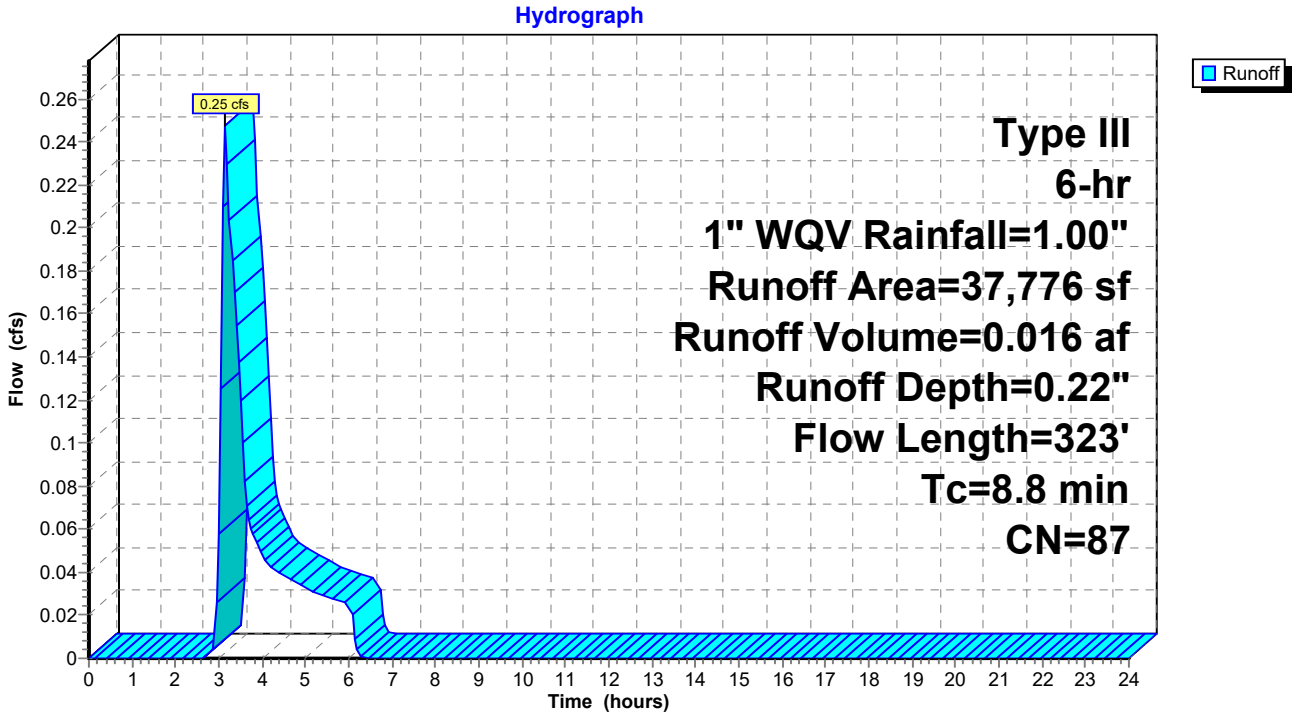
Runoff = 0.25 cfs @ 3.16 hrs, Volume= 0.016 af, Depth= 0.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 6-hr 1" WQV Rainfall=1.00"

Area (sf)	CN	Description
4,628	74	>75% Grass cover, Good, HSG C
23,547	98	Paved parking, HSG D
3,336	55	Woods, Good, HSG B
6,265	70	Woods, Good, HSG C
37,776	87	Weighted Average
14,229		37.67% Pervious Area
23,547		62.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.3	50	0.0100	0.11		**Sheet Flow, 2A-2B** Grass: Short n= 0.150 P2= 3.32"
0.1	34	0.0500	4.54		**Shallow Concentrated Flow, 2B-2C** Paved Kv= 20.3 fps
0.1	19	0.1450	2.67		**Shallow Concentrated Flow, 2C-2D** Short Grass Pasture Kv= 7.0 fps
1.3	220	0.0185	2.76		**Shallow Concentrated Flow, 2D-ED2** Paved Kv= 20.3 fps
8.8	323	Total			

Subcatchment PD-2: PDA-2

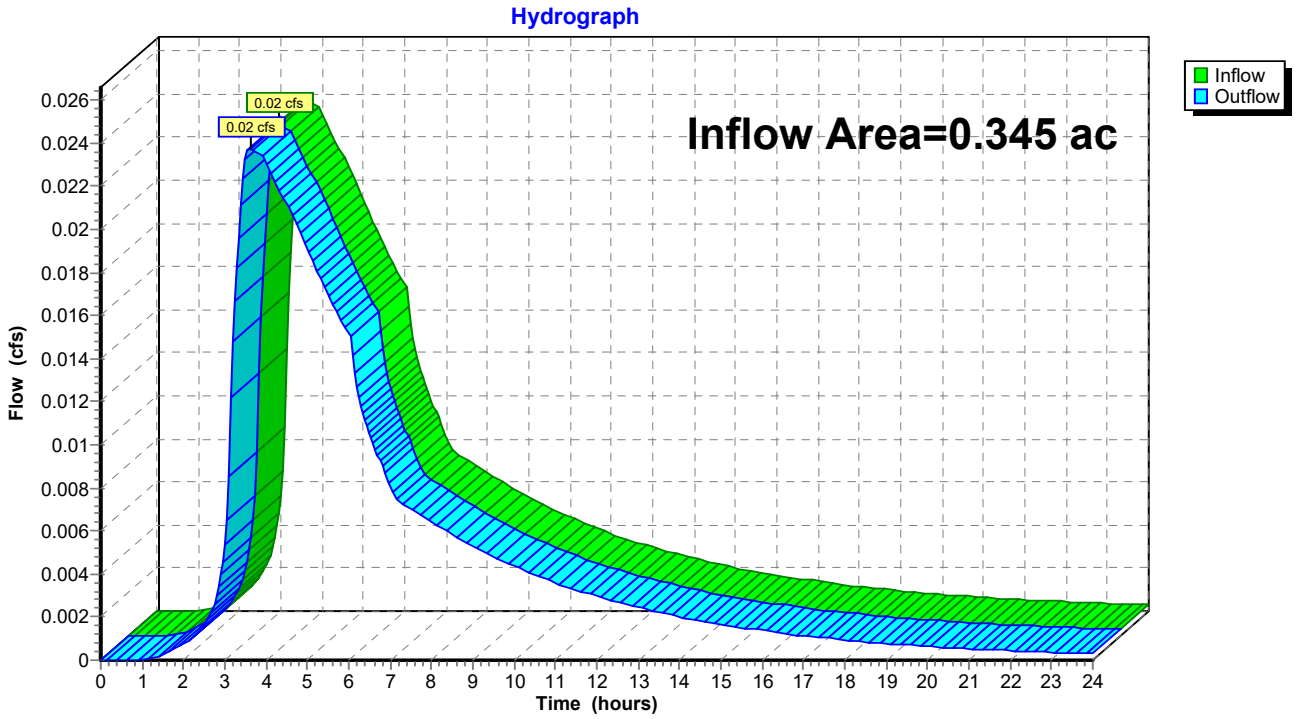


Summary for Reach DP-1: DP-1

Inflow Area = 0.345 ac, 41.65% Impervious, Inflow Depth > 0.32" for 1" WQV event
Inflow = 0.02 cfs @ 3.61 hrs, Volume= 0.009 af
Outflow = 0.02 cfs @ 3.61 hrs, Volume= 0.009 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach DP-1: DP-1

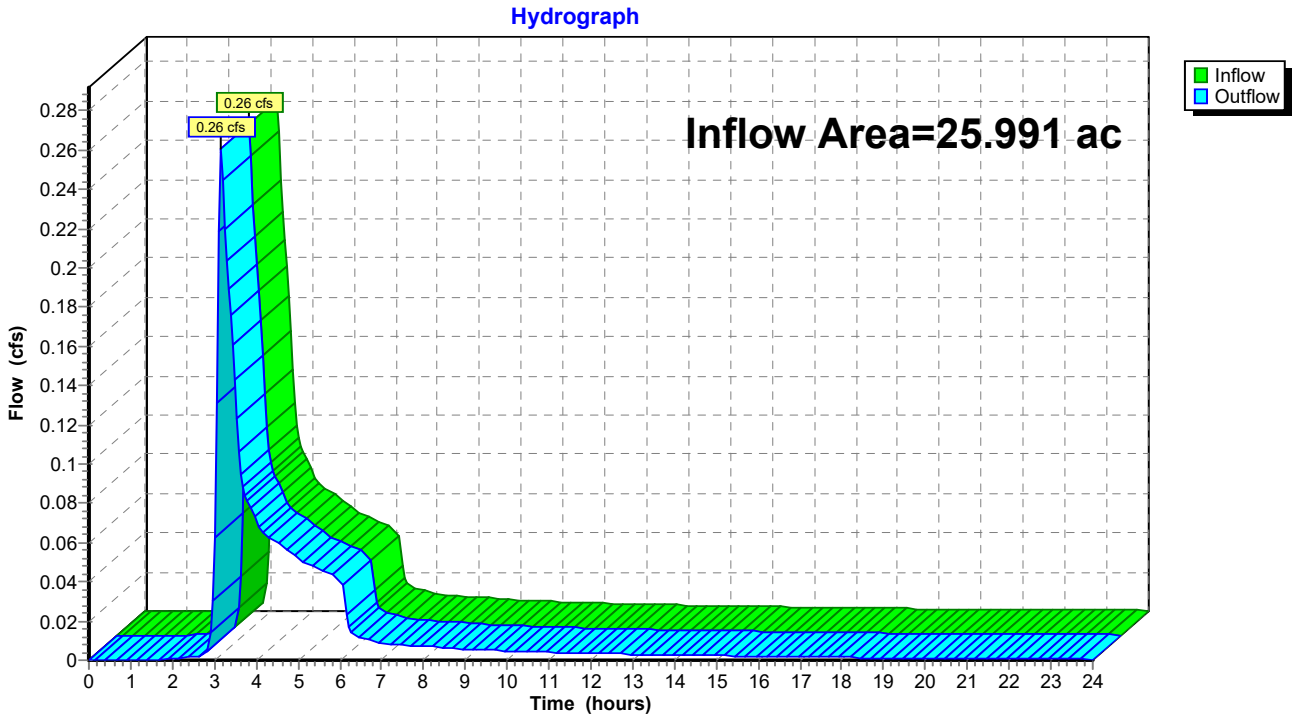


Summary for Reach DP-2: DP-2

Inflow Area = 25.991 ac, 24.71% Impervious, Inflow Depth > 0.01" for 1" WQV event
Inflow = 0.26 cfs @ 3.16 hrs, Volume= 0.026 af
Outflow = 0.26 cfs @ 3.16 hrs, Volume= 0.026 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach DP-2: DP-2



Summary for Reach DP-3: DP-3

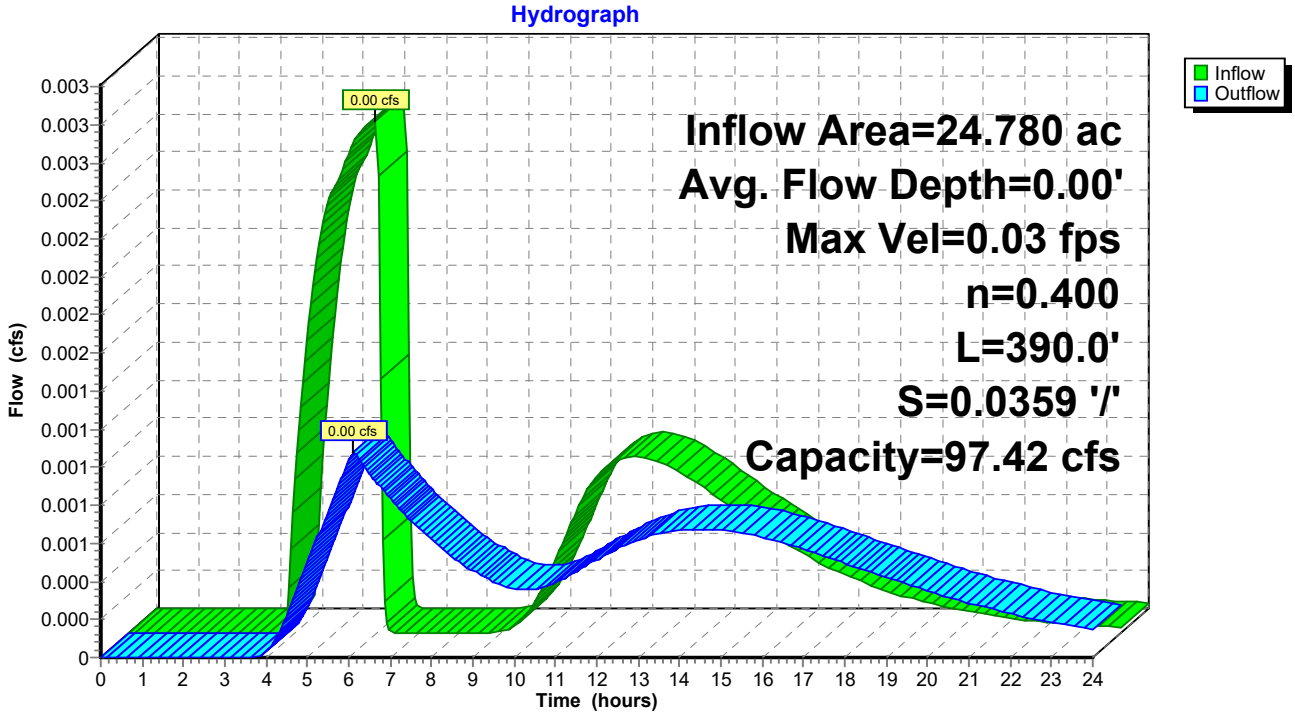
Inflow Area = 24.780 ac, 23.15% Impervious, Inflow Depth > 0.00" for 1" WQV event
Inflow = 0.00 cfs @ 5.95 hrs, Volume= 0.001 af
Outflow = 0.00 cfs @ 6.12 hrs, Volume= 0.001 af, Atten= 60%, Lag= 10.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 0.03 fps, Min. Travel Time= 199.2 min
Avg. Velocity = 0.03 fps, Avg. Travel Time= 199.2 min

Peak Storage= 13 cf @ 6.12 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 1.00' Flow Area= 151.0 sf, Capacity= 97.42 cfs

130.00' x 1.00' deep channel, n= 0.400 Sheet flow: Woods+light brush
Side Slope Z-value= 12.0 30.0 '/' Top Width= 172.00'
Length= 390.0' Slope= 0.0359 '/'
Inlet Invert= 618.00', Outlet Invert= 604.00'

Reach DP-3: DP-3



Stage-Discharge for Reach DP-3: DP-3

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
618.00	0.00	0.00
618.01	0.03	0.04
618.02	0.05	0.13
618.03	0.07	0.27
618.04	0.08	0.43
618.05	0.10	0.62
618.06	0.11	0.84
618.07	0.12	1.09
618.08	0.13	1.37
618.09	0.14	1.66
618.10	0.15	1.98
618.11	0.16	2.32
618.12	0.17	2.69
618.13	0.18	3.07
618.14	0.19	3.48
618.15	0.20	3.91
618.16	0.20	4.35
618.17	0.21	4.82
618.18	0.22	5.30
618.19	0.23	5.81
618.20	0.24	6.33
618.21	0.24	6.87
618.22	0.25	7.43
618.23	0.26	8.00
618.24	0.27	8.60
618.25	0.27	9.21
618.26	0.28	9.84
618.27	0.29	10.48
618.28	0.29	11.14
618.29	0.30	11.82
618.30	0.31	12.51
618.31	0.31	13.23
618.32	0.32	13.95
618.33	0.33	14.70
618.34	0.33	15.45
618.35	0.34	16.23
618.36	0.34	17.02
618.37	0.35	17.83
618.38	0.36	18.65
618.39	0.36	19.48
618.40	0.37	20.34
618.41	0.37	21.20
618.42	0.38	22.09
618.43	0.38	22.99
618.44	0.39	23.90
618.45	0.40	24.83
618.46	0.40	25.77
618.47	0.41	26.72
618.48	0.41	27.70
618.49	0.42	28.68
618.50	0.42	29.68
618.51	0.43	30.70
618.52	0.43	31.73
618.53	0.44	32.77
618.54	0.44	33.83
618.55	0.45	34.91
618.56	0.45	35.99
618.57	0.46	37.09
618.58	0.46	38.21
618.59	0.47	39.34
618.60	0.47	40.48
618.61	0.48	41.64
618.62	0.48	42.81
618.63	0.49	44.00
618.64	0.49	45.20
618.65	0.50	46.41
618.66	0.50	47.64
618.67	0.51	48.88
618.68	0.51	50.14
618.69	0.52	51.40
618.70	0.52	52.69
618.71	0.52	53.98
618.72	0.53	55.29
618.73	0.53	56.62
618.74	0.54	57.95
618.75	0.54	59.30
618.76	0.55	60.67
618.77	0.55	62.05
618.78	0.56	63.44
618.79	0.56	64.84
618.80	0.56	66.26
618.81	0.57	67.69
618.82	0.57	69.14
618.83	0.58	70.59
618.84	0.58	72.07
618.85	0.59	73.55
618.86	0.59	75.05
618.87	0.59	76.56
618.88	0.60	78.09
618.89	0.60	79.63
618.90	0.61	81.18
618.91	0.61	82.74
618.92	0.61	84.32
618.93	0.62	85.91
618.94	0.62	87.52
618.95	0.63	89.14
618.96	0.63	90.77
618.97	0.63	92.41
618.98	0.64	94.07
618.99	0.64	95.74
619.00	**0.65**	**97.42**

Summary for Pond 1: SFB-1

Inflow Area =	0.966 ac, 48.65% Impervious, Inflow Depth = 0.22" for 1" WQV event				
Inflow =	0.30 cfs @	3.11 hrs,	Volume=	0.018 af	
Outflow =	0.05 cfs @	3.00 hrs,	Volume=	0.018 af,	Atten= 84%, Lag= 0.0 min
Discarded =	0.05 cfs @	3.00 hrs,	Volume=	0.018 af	
Primary =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 607.81' @ 3.99 hrs Surf.Area= 1,166 sf Storage= 311 cf
Flood Elev= 611.25' Surf.Area= 3,452 sf Storage= 7,739 cf

Plug-Flow detention time= 72.4 min calculated for 0.018 af (100% of inflow)
Center-of-Mass det. time= 72.4 min (304.2 - 231.8)

Volume	Invert	Avail.Storage	Storage Description
#1	607.00'	7,237 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 8,986 cf Overall - 1,749 cf Embedded = 7,237 cf
#2	607.00'	385 cf	**Sand Media (Prismatic)** Listed below (Recalc) Inside #1 1,166 cf Overall x 33.0% Voids
#3	608.00'	117 cf	**Infiltration Seed Mix (Prismatic)** Listed below (Recalc) Inside #1 583 cf Overall x 20.0% Voids
		7,739 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
607.00	1,166	0	0
608.00	1,166	1,166	1,166
609.00	2,130	1,648	2,814
610.00	2,760	2,445	5,259
611.20	3,452	3,727	8,986

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
607.00	1,166	0	0
608.00	1,166	1,166	1,166

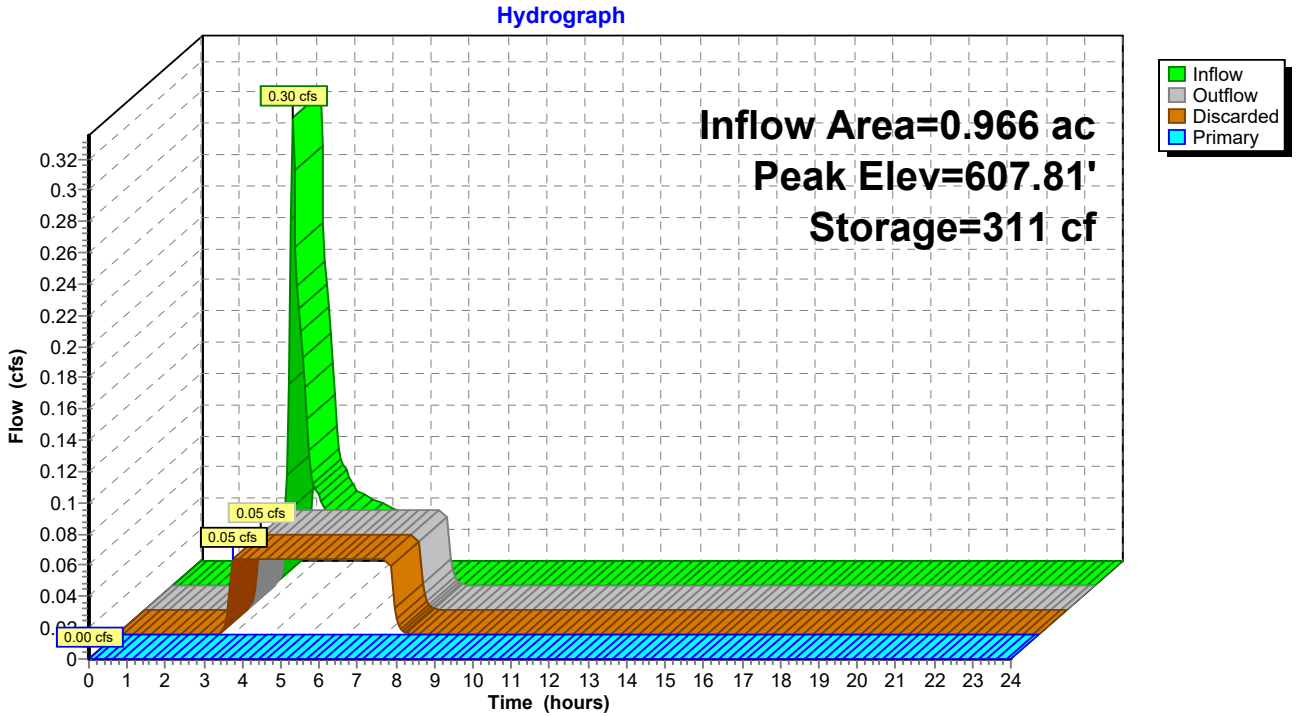
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
608.00	1,166	0	0
608.50	1,166	583	583

Device	Routing	Invert	Outlet Devices
#1	Discarded	607.00'	**1.805 in/hr Exfiltration over Surface area**
#2	Primary	607.50'	**8.0" Round Culvert** L= 20.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 607.50' / 607.00' S= 0.0250 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.35 sf
#3	Device 2	609.00'	**2.0" Vert. Orifice/Grate** C= 0.600
#4	Device 2	609.80'	**8.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.05 cfs @ 3.00 hrs HW=607.06' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=607.00' (Free Discharge)
└─**2=Culvert** (Controls 0.00 cfs)
  ├─**3=Orifice/Grate** (Controls 0.00 cfs)
  └─**4=Orifice/Grate** (Controls 0.00 cfs)

Pond 1: SFB-1



Stage-Discharge for Pond 1: SFB-1

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
607.00	0.00	0.00	0.00
607.05	0.05	0.05	0.00
607.10	0.05	0.05	0.00
607.15	0.05	0.05	0.00
607.20	0.05	0.05	0.00
607.25	0.05	0.05	0.00
607.30	0.05	0.05	0.00
607.35	0.05	0.05	0.00
607.40	0.05	0.05	0.00
607.45	0.05	0.05	0.00
607.50	0.05	0.05	0.00
607.55	0.05	0.05	0.00
607.60	0.05	0.05	0.00
607.65	0.05	0.05	0.00
607.70	0.05	0.05	0.00
607.75	0.05	0.05	0.00
607.80	0.05	0.05	0.00
607.85	0.05	0.05	0.00
607.90	0.05	0.05	0.00
607.95	0.05	0.05	0.00
608.00	0.05	0.05	0.00
608.05	0.05	0.05	0.00
608.10	0.05	0.05	0.00
608.15	0.05	0.05	0.00
608.20	0.06	0.06	0.00
608.25	0.06	0.06	0.00
608.30	0.06	0.06	0.00
608.35	0.06	0.06	0.00
608.40	0.06	0.06	0.00
608.45	0.07	0.07	0.00
608.50	0.07	0.07	0.00
608.55	0.07	0.07	0.00
608.60	0.07	0.07	0.00
608.65	0.07	0.07	0.00
608.70	0.08	0.08	0.00
608.75	0.08	0.08	0.00
608.80	0.08	0.08	0.00
608.85	0.08	0.08	0.00
608.90	0.08	0.08	0.00
608.95	0.09	0.09	0.00
609.00	0.09	0.09	0.00
609.05	0.09	0.09	0.00
609.10	0.11	0.09	0.01
609.15	0.12	0.09	0.03
609.20	0.13	0.09	0.04
609.25	0.14	0.10	0.04
609.30	0.15	0.10	0.05
609.35	0.15	0.10	0.05
609.40	0.16	0.10	0.06
609.45	0.16	0.10	0.06
609.50	0.17	0.10	0.07
609.55	0.18	0.10	0.07
609.60	0.18	0.10	0.08
609.65	0.19	0.11	0.08
609.70	0.19	0.11	0.08
609.75	0.19	0.11	0.09
609.80	0.20	0.11	0.09
609.85	0.28	0.11	0.17
609.90	0.42	0.11	0.31
609.95	0.61	0.11	0.50
610.00	0.83	0.12	0.71
610.05	1.06	0.12	0.94
610.10	1.14	0.12	1.03
610.15	1.22	0.12	1.10
610.20	1.29	0.12	1.17
610.25	1.36	0.12	1.24
610.30	1.43	0.12	1.30
610.35	1.49	0.12	1.36
610.40	1.55	0.12	1.42
610.45	1.60	0.13	1.48
610.50	1.66	0.13	1.53
610.55	1.71	0.13	1.58
610.60	1.76	0.13	1.63
610.65	1.81	0.13	1.68
610.70	1.86	0.13	1.73
610.75	1.91	0.13	1.77
610.80	1.95	0.13	1.82
610.85	2.00	0.14	1.86
610.90	2.04	0.14	1.90
610.95	2.08	0.14	1.95
611.00	2.13	0.14	1.99
611.05	2.17	0.14	2.03
611.10	2.21	0.14	2.07
611.15	2.25	0.14	2.10
611.20	2.29	**0.14**	2.14
611.25	**2.32**	0.14	**2.18**

Summary for Pond 2: SFB-2

Inflow Area = 4.230 ac, 47.33% Impervious, Inflow Depth > 0.10" for 1" WQV event
Inflow = 0.25 cfs @ 3.12 hrs, Volume= 0.036 af
Outflow = 0.21 cfs @ 3.21 hrs, Volume= 0.036 af, Atten= 15%, Lag= 5.5 min
Discarded = 0.21 cfs @ 3.21 hrs, Volume= 0.036 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 613.29' @ 3.21 hrs Surf.Area= 3,944 sf Storage= 53 cf
Flood Elev= 617.40' Surf.Area= 10,100 sf Storage= 21,942 cf

Plug-Flow detention time= 4.1 min calculated for 0.036 af (100% of inflow)
Center-of-Mass det. time= 4.0 min (319.0 - 315.0)

Volume	Invert	Avail.Storage	Storage Description
#1	613.25'	20,246 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 26,162 cf Overall - 5,916 cf Embedded = 20,246 cf
#2	613.25'	1,302 cf	**Sand Media (Prismatic)** Listed below (Recalc) Inside #1 3,944 cf Overall x 33.0% Voids
#3	614.25'	394 cf	**Infiltration Seed Mix (Prismatic)** Listed below (Recalc) Inside #1 1,972 cf Overall x 20.0% Voids
		21,942 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
613.25	3,944	0	0
614.25	3,944	3,944	3,944
615.00	5,539	3,556	7,500
616.00	7,378	6,459	13,959
617.00	9,278	8,328	22,287
617.40	10,100	3,876	26,162

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
613.25	3,944	0	0
614.25	3,944	3,944	3,944

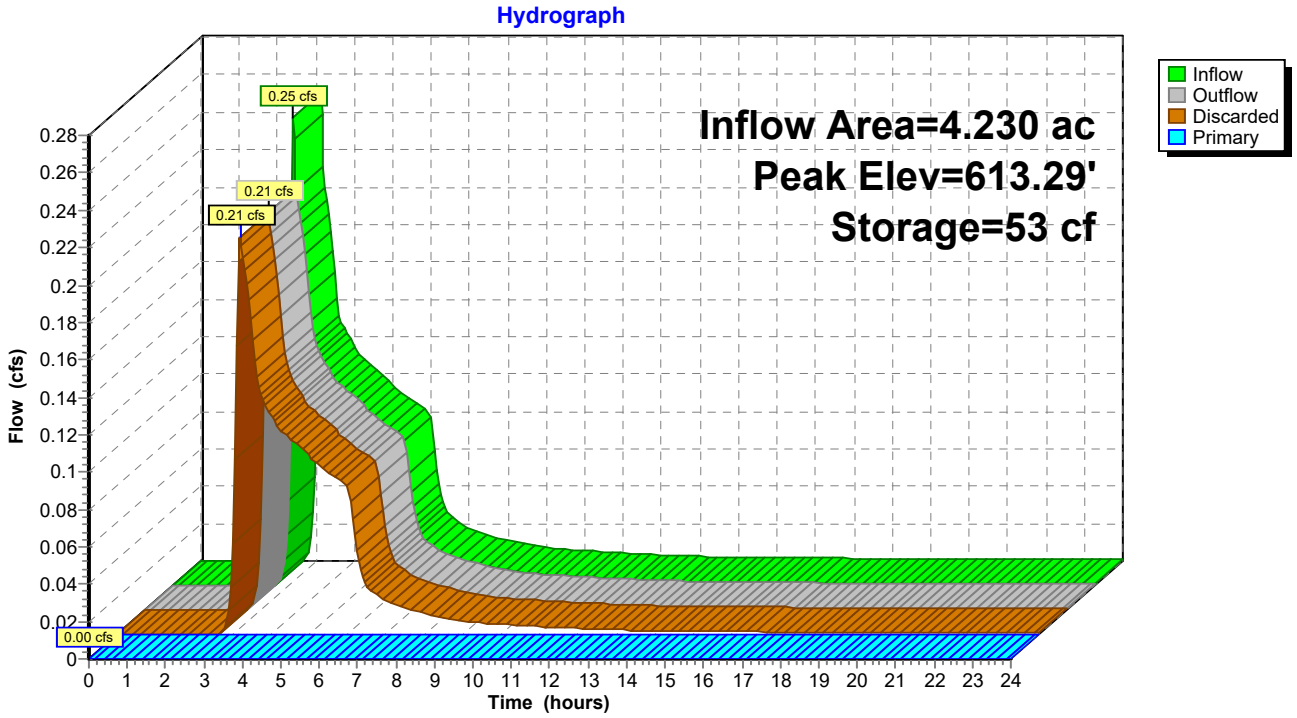
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
614.25	3,944	0	0
614.75	3,944	1,972	1,972

Device	Routing	Invert	Outlet Devices
#1	Discarded	613.25'	**2.380 in/hr Exfiltration over Surface area**
#2	Primary	613.75'	**8.0" Round Culvert** L= 28.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 613.75' / 612.25' S= 0.0536 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.35 sf
#3	Device 2	615.20'	**2.0" Vert. Orifice/Grate** C= 0.600
#4	Device 2	616.00'	**6.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.22 cfs @ 3.21 hrs HW=613.29' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.22 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=613.25' (Free Discharge)
└─**2=Culvert** (Controls 0.00 cfs)
  ├─**3=Orifice/Grate** (Controls 0.00 cfs)
  └─**4=Orifice/Grate** (Controls 0.00 cfs)

Pond 2: SFB-2



Stage-Discharge for Pond 2: SFB-2

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
613.25	0.00	0.00	0.00
613.30	0.22	0.22	0.00
613.35	0.22	0.22	0.00
613.40	0.22	0.22	0.00
613.45	0.22	0.22	0.00
613.50	0.22	0.22	0.00
613.55	0.22	0.22	0.00
613.60	0.22	0.22	0.00
613.65	0.22	0.22	0.00
613.70	0.22	0.22	0.00
613.75	0.22	0.22	0.00
613.80	0.22	0.22	0.00
613.85	0.22	0.22	0.00
613.90	0.22	0.22	0.00
613.95	0.22	0.22	0.00
614.00	0.22	0.22	0.00
614.05	0.22	0.22	0.00
614.10	0.22	0.22	0.00
614.15	0.22	0.22	0.00
614.20	0.22	0.22	0.00
614.25	0.22	0.22	0.00
614.30	0.22	0.22	0.00
614.35	0.23	0.23	0.00
614.40	0.23	0.23	0.00
614.45	0.24	0.24	0.00
614.50	0.25	0.25	0.00
614.55	0.25	0.25	0.00
614.60	0.26	0.26	0.00
614.65	0.26	0.26	0.00
614.70	0.27	0.27	0.00
614.75	0.28	0.28	0.00
614.80	0.28	0.28	0.00
614.85	0.29	0.29	0.00
614.90	0.29	0.29	0.00
614.95	0.30	0.30	0.00
615.00	0.31	0.31	0.00
615.05	0.31	0.31	0.00
615.10	0.32	0.32	0.00
615.15	0.32	0.32	0.00
615.20	0.33	0.33	0.00
615.25	0.33	0.33	0.00
615.30	0.35	0.34	0.01
615.35	0.37	0.34	0.03
615.40	0.38	0.35	0.04
615.45	0.39	0.35	0.04
615.50	0.40	0.36	0.05
615.55	0.42	0.36	0.05
615.60	0.43	0.37	0.06
615.65	0.43	0.37	0.06
615.70	0.44	0.38	0.07
615.75	0.45	0.38	0.07
615.80	0.46	0.39	0.08
615.85	0.47	0.39	0.08
615.90	0.48	0.40	0.08
615.95	0.49	0.40	0.09
616.00	0.50	0.41	0.09
616.05	0.56	0.41	0.15
616.10	0.67	0.42	0.26
616.15	0.82	0.42	0.40
616.20	0.95	0.43	0.52
616.25	1.01	0.43	0.58
616.30	1.06	0.44	0.62
616.35	1.11	0.44	0.67
616.40	1.16	0.45	0.71
616.45	1.20	0.45	0.75
616.50	1.24	0.46	0.78
616.55	1.28	0.46	0.82
616.60	1.32	0.47	0.85
616.65	1.36	0.47	0.89
616.70	1.40	0.48	0.92
616.75	1.43	0.48	0.95
616.80	1.47	0.49	0.97
616.85	1.50	0.50	1.00
616.90	1.53	0.50	1.03
616.95	1.56	0.51	1.06
617.00	1.59	0.51	1.08
617.05	1.63	0.52	1.11
617.10	1.66	0.52	1.13
617.15	1.69	0.53	1.16
617.20	1.71	0.53	1.18
617.25	1.74	0.54	1.20
617.30	1.77	0.55	1.23
617.35	1.80	0.55	1.25
617.40	**1.83**	**0.56**	**1.27**

Summary for Pond DB-1: DB-1

Inflow	=	0.00 cfs @	0.00 hrs,	Volume=	0.000 af
Outflow	=	0.00 cfs @	0.00 hrs,	Volume=	0.000 af, Atten= 0%, Lag= 0.0 min
Primary	=	0.00 cfs @	0.00 hrs,	Volume=	0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 609.25' @ 0.00 hrs Surf.Area= 3,131 sf Storage= 0 cf
Flood Elev= 611.25' Surf.Area= 3,131 sf Storage= 5,328 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1A	609.25'	0 cf	**27.58'W x 113.50'L x 2.67'H Field A** 8,349 cf Overall - 8,349 cf Embedded = 0 cf x 40.0% Voids
#2A	609.25'	5,328 cf	**StormTrap ST1 SingleTrap 2-0** x 32 Inside #1 Inside= 82.7"W x 24.0"H => 11.84 sf x 14.06'L = 166.5 cf Outside= 82.7"W x 32.0"H => 18.39 sf x 14.06'L = 258.6 cf 4 Rows of 8 Chambers 27.58' x 112.50' Core + 0.00' x 0.50' Border = 27.58' x 113.50' System
		5,328 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	609.25'	**6.0" Round Culvert** L= 150.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 609.25' / 608.50' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#2	Device 1	609.25'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	610.25'	**4.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=609.25' (Free Discharge)
└─**1=Culvert** (Controls 0.00 cfs)
  ├─**2=Orifice/Grate** (Controls 0.00 cfs)
  └─**3=Orifice/Grate** (Controls 0.00 cfs)

Pond DB-1: DB-1 - Chamber Wizard Field A

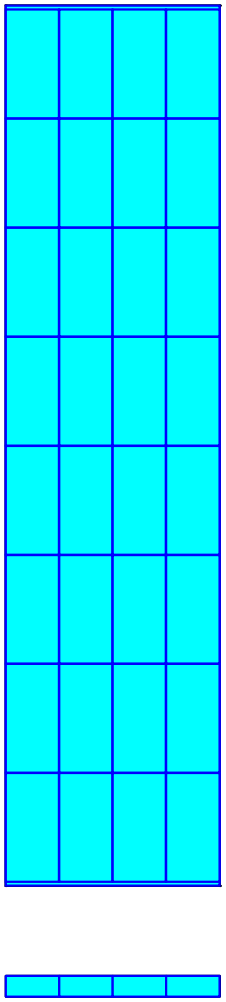
Chamber Model = StormTrap ST1 SingleTrap 2-0 (StormTrap ST1 SingleTrap® Type VI)
Inside= 82.7"W x 24.0"H => 11.84 sf x 14.06'L = 166.5 cf
Outside= 82.7"W x 32.0"H => 18.39 sf x 14.06'L = 258.6 cf

8 Chambers/Row x 14.06' Long = 112.50' Row Length +6.0" Border x 2 = 113.50' Base Length
4 Rows x 82.7" Wide = 27.58' Base Width
32.0" Chamber Height = 2.67' Field Height

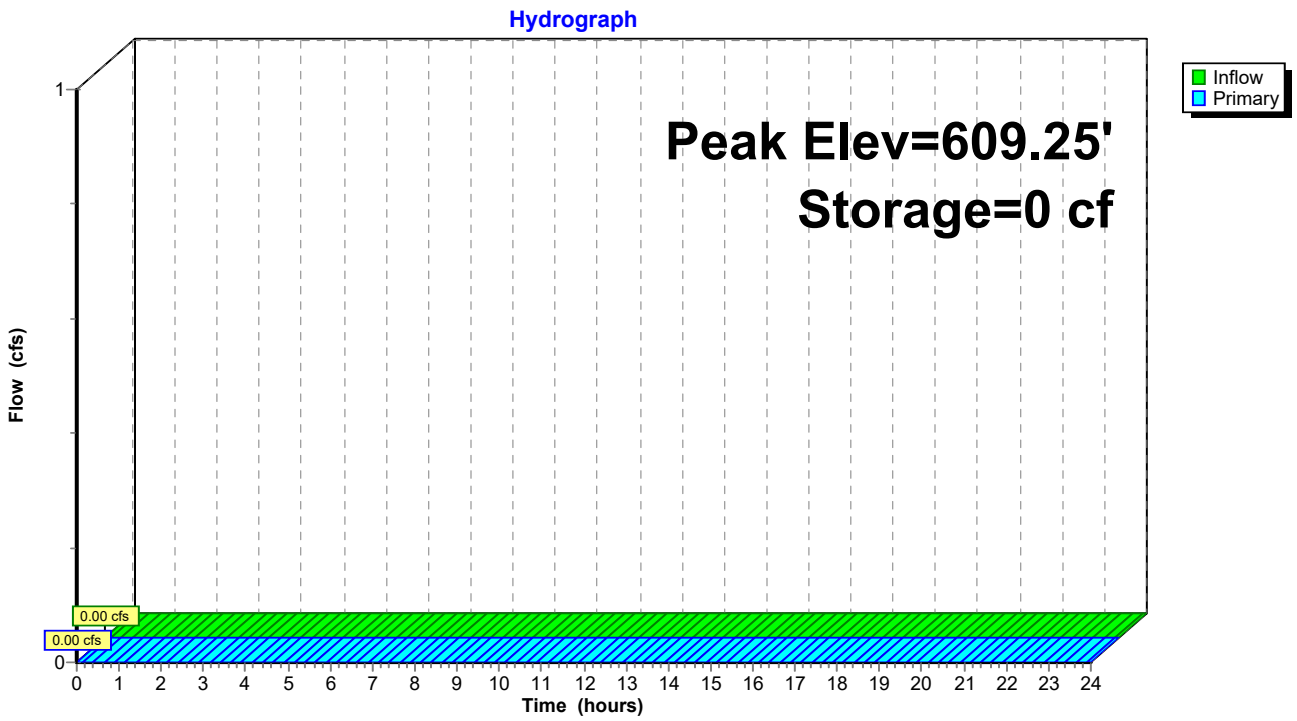
32 Chambers x 166.5 cf = 5,328.0 cf Chamber Storage
32 Chambers x 258.6 cf + 73.6 cf Border = 8,348.6 cf Displacement

Chamber Storage = 5,328.0 cf = 0.122 af
Overall Storage Efficiency = 63.8%
Overall System Size = 113.50' x 27.58' x 2.67'

32 Chambers (plus border)
309.2 cy Field



Pond DB-1: DB-1


Hydrograph
Inflow
Primary
Peak Elev=609.25'
Storage=0 cf
Flow (cfs)
1
0
0.00 cfs
0.00 cfs
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Time (hours)

Stage-Discharge for Pond DB-1: DB-1

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
609.25	0.00	610.29	0.40	611.33	0.65
609.27	0.00	610.31	0.41	611.35	0.65
609.29	0.00	610.33	0.42	611.37	0.65
609.31	0.01	610.35	0.43	611.39	0.66
609.33	0.01	610.37	0.44	611.41	0.66
609.35	0.02	610.39	0.46	611.43	0.66
609.37	0.03	610.41	0.48	611.45	0.66
609.39	0.04	610.43	0.49	611.47	0.67
609.41	0.05	610.45	0.51	611.49	0.67
609.43	0.06	610.47	0.51	611.51	0.67
609.45	0.08	610.49	0.52	611.53	0.68
609.47	0.09	610.51	0.52	611.55	0.68
609.49	0.11	610.53	0.53	611.57	0.68
609.51	0.13	610.55	0.53	611.59	0.68
609.53	0.14	610.57	0.53	611.61	0.69
609.55	0.15	610.59	0.54	611.63	0.69
609.57	0.17	610.61	0.54	611.65	0.69
609.59	0.17	610.63	0.54	611.67	0.69
609.61	0.18	610.65	0.55	611.69	0.70
609.63	0.19	610.67	0.55	611.71	0.70
609.65	0.20	610.69	0.55	611.73	0.70
609.67	0.21	610.71	0.56	611.75	0.70
609.69	0.22	610.73	0.56	611.77	0.71
609.71	0.23	610.75	0.56	611.79	0.71
609.73	0.24	610.77	0.57	611.81	0.71
609.75	0.24	610.79	0.57	611.83	0.71
609.77	0.25	610.81	0.57	611.85	0.72
609.79	0.26	610.83	0.57	611.87	0.72
609.81	0.26	610.85	0.58	611.89	0.72
609.83	0.27	610.87	0.58	611.91	**0.72**
609.85	0.28	610.89	0.58		
609.87	0.28	610.91	0.59		
609.89	0.29	610.93	0.59		
609.91	0.30	610.95	0.59		
609.93	0.30	610.97	0.60		
609.95	0.31	610.99	0.60		
609.97	0.31	611.01	0.60		
609.99	0.32	611.03	0.61		
610.01	0.32	611.05	0.61		
610.03	0.33	611.07	0.61		
610.05	0.33	611.09	0.61		
610.07	0.34	611.11	0.62		
610.09	0.34	611.13	0.62		
610.11	0.35	611.15	0.62		
610.13	0.35	611.17	0.63		
610.15	0.36	611.19	0.63		
610.17	0.36	611.21	0.63		
610.19	0.37	611.23	0.63		
610.21	0.37	611.25	0.64		
610.23	0.38	611.27	0.64		
610.25	0.38	611.29	0.64		
610.27	0.39	611.31	0.65		

Summary for Pond DB-2: DB-2

Inflow	=	0.00 cfs @	0.00 hrs,	Volume=	0.000 af
Outflow	=	0.00 cfs @	0.00 hrs,	Volume=	0.000 af, Atten= 0%, Lag= 0.0 min
Primary	=	0.00 cfs @	0.00 hrs,	Volume=	0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 615.25' @ 0.00 hrs Surf.Area= 3,131 sf Storage= 0 cf
Flood Elev= 617.25' Surf.Area= 3,131 sf Storage= 5,328 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1A	615.25'	0 cf	**27.58'W x 113.50'L x 2.67'H Field A** 8,349 cf Overall - 8,349 cf Embedded = 0 cf x 40.0% Voids
#2A	615.25'	5,328 cf	**StormTrap ST1 SingleTrap 2-0** x 32 Inside #1 Inside= 82.7"W x 24.0"H => 11.84 sf x 14.06'L = 166.5 cf Outside= 82.7"W x 32.0"H => 18.39 sf x 14.06'L = 258.6 cf 4 Rows of 8 Chambers 27.58' x 112.50' Core + 0.00' x 0.50' Border = 27.58' x 113.50' System
		5,328 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	615.25'	**8.0" Round Culvert** L= 44.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 615.25' / 615.00' S= 0.0057 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.35 sf
#2	Device 1	615.25'	**2.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=615.25' (Free Discharge)
└─**1=Culvert** (Controls 0.00 cfs)
  └─**2=Orifice/Grate** (Controls 0.00 cfs)

Pond DB-2: DB-2 - Chamber Wizard Field A

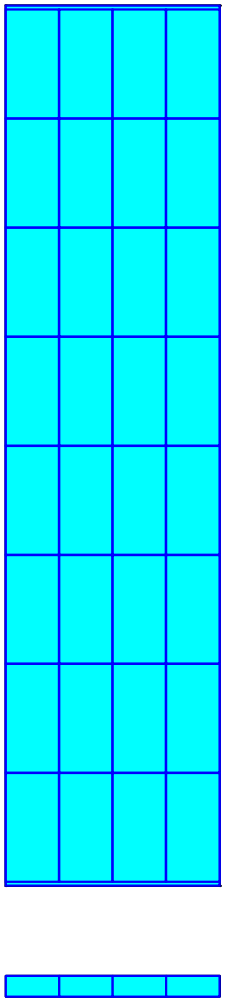
Chamber Model = StormTrap ST1 SingleTrap 2-0 (StormTrap ST1 SingleTrap® Type VI)
Inside= 82.7"W x 24.0"H => 11.84 sf x 14.06'L = 166.5 cf
Outside= 82.7"W x 32.0"H => 18.39 sf x 14.06'L = 258.6 cf

8 Chambers/Row x 14.06' Long = 112.50' Row Length +6.0" Border x 2 = 113.50' Base Length
4 Rows x 82.7" Wide = 27.58' Base Width
32.0" Chamber Height = 2.67' Field Height

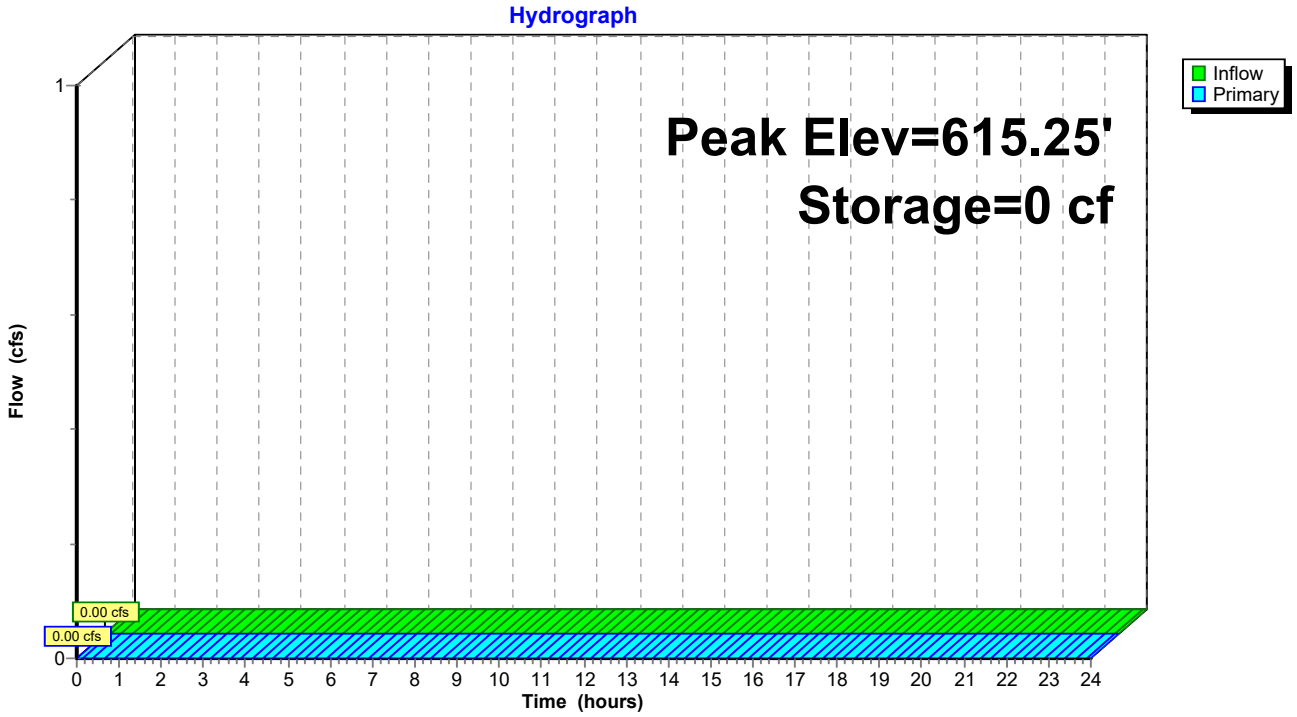
32 Chambers x 166.5 cf = 5,328.0 cf Chamber Storage
32 Chambers x 258.6 cf + 73.6 cf Border = 8,348.6 cf Displacement

Chamber Storage = 5,328.0 cf = 0.122 af
Overall Storage Efficiency = 63.8%
Overall System Size = 113.50' x 27.58' x 2.67'

32 Chambers (plus border)
309.2 cy Field



Pond DB-2: DB-2


Hydrograph
Inflow
Primary
Peak Elev=615.25'
Storage=0 cf
Flow (cfs)
1
0
0.00 cfs
0.00 cfs
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Time (hours)

Stage-Discharge for Pond DB-2: DB-2

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
615.25	0.00	616.29	0.10	617.33	0.15
615.27	0.00	616.31	0.10	617.35	0.15
615.29	0.00	616.33	0.10	617.37	0.15
615.31	0.01	616.35	0.11	617.39	0.15
615.33	0.01	616.37	0.11	617.41	0.15
615.35	0.01	616.39	0.11	617.43	0.15
615.37	0.02	616.41	0.11	617.45	0.15
615.39	0.02	616.43	0.11	617.47	0.15
615.41	0.03	616.45	0.11	617.49	0.15
615.43	0.03	616.47	0.11	617.51	0.15
615.45	0.04	616.49	0.11	617.53	0.16
615.47	0.04	616.51	0.11	617.55	0.16
615.49	0.04	616.53	0.11	617.57	0.16
615.51	0.04	616.55	0.12	617.59	0.16
615.53	0.05	616.57	0.12	617.61	0.16
615.55	0.05	616.59	0.12	617.63	0.16
615.57	0.05	616.61	0.12	617.65	0.16
615.59	0.05	616.63	0.12	617.67	0.16
615.61	0.06	616.65	0.12	617.69	0.16
615.63	0.06	616.67	0.12	617.71	0.16
615.65	0.06	616.69	0.12	617.73	0.16
615.67	0.06	616.71	0.12	617.75	0.16
615.69	0.06	616.73	0.12	617.77	0.16
615.71	0.06	616.75	0.13	617.79	0.16
615.73	0.07	616.77	0.13	617.81	0.17
615.75	0.07	616.79	0.13	617.83	0.17
615.77	0.07	616.81	0.13	617.85	0.17
615.79	0.07	616.83	0.13	617.87	0.17
615.81	0.07	616.85	0.13	617.89	0.17
615.83	0.07	616.87	0.13	617.91	**0.17**
615.85	0.08	616.89	0.13		
615.87	0.08	616.91	0.13		
615.89	0.08	616.93	0.13		
615.91	0.08	616.95	0.13		
615.93	0.08	616.97	0.13		
615.95	0.08	616.99	0.14		
615.97	0.08	617.01	0.14		
615.99	0.09	617.03	0.14		
616.01	0.09	617.05	0.14		
616.03	0.09	617.07	0.14		
616.05	0.09	617.09	0.14		
616.07	0.09	617.11	0.14		
616.09	0.09	617.13	0.14		
616.11	0.09	617.15	0.14		
616.13	0.09	617.17	0.14		
616.15	0.09	617.19	0.14		
616.17	0.10	617.21	0.14		
616.19	0.10	617.23	0.14		
616.21	0.10	617.25	0.15		
616.23	0.10	617.27	0.15		
616.25	0.10	617.29	0.15		
616.27	0.10	617.31	0.15		

Summary for Pond DB-6: DB-6

Inflow Area = 0.133 ac,100.00% Impervious, Inflow Depth = 0.79" for 1" WQV event
Inflow = 0.16 cfs @ 3.09 hrs, Volume= 0.009 af
Outflow = 0.02 cfs @ 3.64 hrs, Volume= 0.009 af, Atten= 87%, Lag= 32.9 min
Primary = 0.02 cfs @ 3.64 hrs, Volume= 0.009 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 612.34' @ 3.64 hrs Surf.Area= 2,902 sf Storage= 240 cf
Flood Elev= 617.25' Surf.Area= 2,902 sf Storage= 12,873 cf

Plug-Flow detention time= 231.5 min calculated for 0.009 af (98% of inflow)
Center-of-Mass det. time= 230.9 min (434.7 - 203.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	612.25'	0 cf	**38.75'W x 74.90'L x 5.50'H Field A** 15,962 cf Overall - 15,962 cf Embedded = 0 cf x 40.0% Voids
#2A	612.25'	12,873 cf	**StormTrap ST2 SingleTrap 5-0**x 12 Inside #1 Inside= 101.7"W x 60.0"H => 38.33 sf x 15.40'L = 590.2 cf Outside= 101.7"W x 66.0"H => 46.64 sf x 15.40'L = 718.0 cf 3 Rows of 4 Chambers 25.44' x 61.58' Core + 6.66' Border = 38.75' x 74.90' System
		12,873 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	612.25'	**12.0" Round Culvert** L= 110.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 612.25' / 609.60' S= 0.0241 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	612.25'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	614.00'	**8.0" Vert. Orifice/Grate** C= 0.600
#4	Device 1	615.25'	**8.0" Vert. Orifice/Grate** C= 0.600
#5	Device 1	616.25'	**12.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.02 cfs @ 3.64 hrs HW=612.34' (Free Discharge)
└─**1=Culvert** (Passes 0.02 cfs of 0.03 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.02 cfs @ 1.04 fps)
  ├─**3=Orifice/Grate** (Controls 0.00 cfs)
  ├─**4=Orifice/Grate** (Controls 0.00 cfs)
  └─**5=Orifice/Grate** (Controls 0.00 cfs)

Pond DB-6: DB-6 - Chamber Wizard Field A

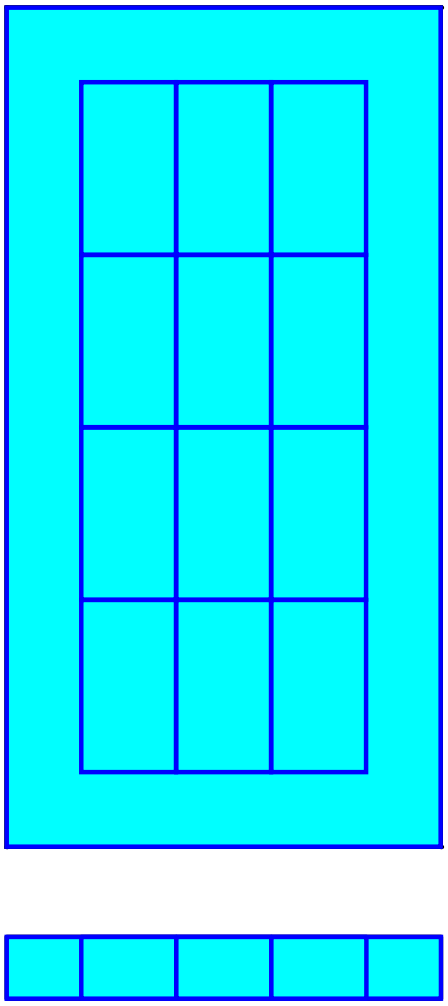
Chamber Model = StormTrap ST2 SingleTrap 5-0 (StormTrap ST2 SingleTrap® Type II+IV)
Inside= 101.7"W x 60.0"H => 38.33 sf x 15.40'L = 590.2 cf
Outside= 101.7"W x 66.0"H => 46.64 sf x 15.40'L = 718.0 cf

4 Chambers/Row x 15.40' Long = 61.58' Row Length +79.9" Border x 2 = 74.90' Base Length
3 Rows x 101.7" Wide + 79.9" Side Border x 2 = 38.75' Base Width
66.0" Chamber Height = 5.50' Field Height

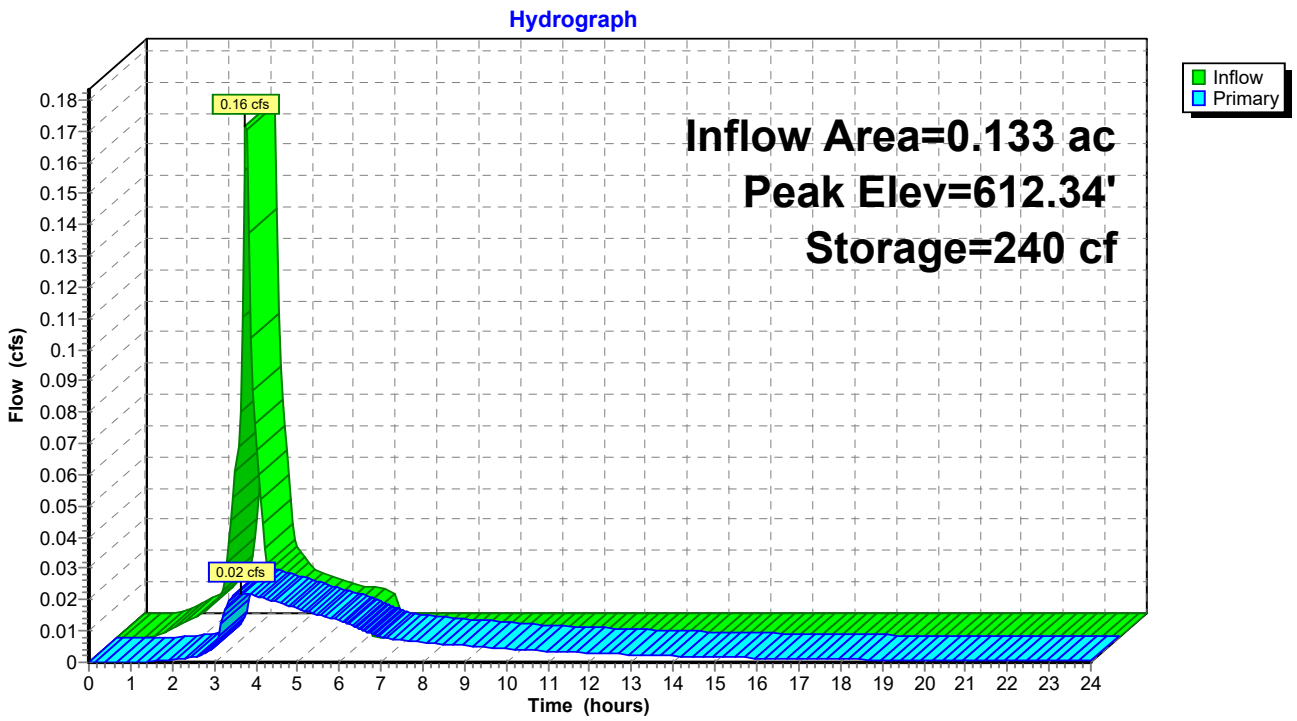
12 Chambers x 590.2 cf + 5,791.0 cf Border = 12,873.2 cf Chamber Storage
12 Chambers x 718.0 cf + 7,346.3 cf Border = 15,962.2 cf Displacement

Chamber Storage = 12,873.2 cf = 0.296 af
Overall Storage Efficiency = 80.6%
Overall System Size = 74.90' x 38.75' x 5.50'

12 Chambers (plus border)
591.2 cy Field



Pond DB-6: DB-6


Hydrograph
Inflow
Primary
0.16 cfs
0.02 cfs
Inflow Area=0.133 ac
Peak Elev=612.34'
Storage=240 cf
Flow (cfs)
Time (hours)

Stage-Discharge for Pond DB-6: DB-6

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
612.25	0.00	614.33	0.92	616.41	4.90
612.29	0.00	614.37	1.00	616.45	5.02
612.33	0.02	614.41	1.08	616.49	5.16
612.37	0.03	614.45	1.17	616.53	5.30
612.41	0.06	614.49	1.26	616.57	5.46
612.45	0.08	614.53	1.35	616.61	5.62
612.49	0.11	614.57	1.43	616.65	5.79
612.53	0.14	614.61	1.51	616.69	5.93
612.57	0.17	614.65	1.58	616.73	5.96
612.61	0.18	614.69	1.64	616.77	5.99
612.65	0.20	614.73	1.70	616.81	6.02
612.69	0.22	614.77	1.76	616.85	6.05
612.73	0.24	614.81	1.81	616.89	6.07
612.77	0.25	614.85	1.86	616.93	6.10
612.81	0.26	614.89	1.91	616.97	6.13
612.85	0.28	614.93	1.96	617.01	6.16
612.89	0.29	614.97	2.01	617.05	6.19
612.93	0.30	615.01	2.06	617.09	6.22
612.97	0.31	615.05	2.10	617.13	6.25
613.01	0.32	615.09	2.15	617.17	6.28
613.05	0.33	615.13	2.19	617.21	6.31
613.09	0.34	615.17	2.23	617.25	6.33
613.13	0.35	615.21	2.28	617.29	6.36
613.17	0.36	615.25	2.32	617.33	6.39
613.21	0.37	615.29	2.36	617.37	6.42
613.25	0.38	615.33	2.42	617.41	6.44
613.29	0.39	615.37	2.48	617.45	6.47
613.33	0.40	615.41	2.56	617.49	6.50
613.37	0.41	615.45	2.64	617.53	6.53
613.41	0.42	615.49	2.73	617.57	6.55
613.45	0.43	615.53	2.83	617.61	6.58
613.49	0.44	615.57	2.93	617.65	6.61
613.53	0.44	615.61	3.04	617.69	6.64
613.57	0.45	615.65	3.16	617.73	**6.66**
613.61	0.46	615.69	3.27		
613.65	0.47	615.73	3.39		
613.69	0.47	615.77	3.50		
613.73	0.48	615.81	3.61		
613.77	0.49	615.85	3.72		
613.81	0.50	615.89	3.82		
613.85	0.50	615.93	3.90		
613.89	0.51	615.97	3.99		
613.93	0.52	616.01	4.07		
613.97	0.52	616.05	4.15		
614.01	0.53	616.09	4.23		
614.05	0.55	616.13	4.31		
614.09	0.57	616.17	4.38		
614.13	0.61	616.21	4.45		
614.17	0.65	616.25	4.52		
614.21	0.71	616.29	4.60		
614.25	0.77	616.33	4.69		
614.29	0.84	616.37	4.79		

Summary for Pond DB-7: DB-7

Inflow Area = 0.543 ac, 78.86% Impervious, Inflow Depth = 0.36" for 1" WQV event
Inflow = 0.31 cfs @ 3.10 hrs, Volume= 0.016 af
Outflow = 0.05 cfs @ 3.85 hrs, Volume= 0.016 af, Atten= 85%, Lag= 45.0 min
Primary = 0.05 cfs @ 3.85 hrs, Volume= 0.016 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 615.94' @ 3.85 hrs Surf.Area= 3,131 sf Storage= 380 cf
Flood Elev= 617.80' Surf.Area= 3,131 sf Storage= 5,328 cf

Plug-Flow detention time= 181.0 min calculated for 0.016 af (96% of inflow)
Center-of-Mass det. time= 177.2 min (402.3 - 225.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	615.80'	0 cf	**27.58'W x 113.50'L x 2.67'H Field A** 8,349 cf Overall - 8,349 cf Embedded = 0 cf x 40.0% Voids
#2A	615.80'	5,328 cf	**StormTrap ST1 SingleTrap 2-0** x 32 Inside #1 Inside= 82.7"W x 24.0"H => 11.84 sf x 14.06'L = 166.5 cf Outside= 82.7"W x 32.0"H => 18.39 sf x 14.06'L = 258.6 cf 4 Rows of 8 Chambers 27.58' x 112.50' Core + 0.00' x 0.50' Border = 27.58' x 113.50' System
		5,328 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	615.80'	**6.0" Round Culvert** L= 124.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 615.80' / 615.00' S= 0.0065 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf
#2	Device 1	615.80'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	617.30'	**4.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.05 cfs @ 3.85 hrs HW=615.94' (Free Discharge)
└─**1=Culvert** (Passes 0.05 cfs of 0.05 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.05 cfs @ 1.29 fps)
  └─**3=Orifice/Grate** (Controls 0.00 cfs)

Pond DB-7: DB-7 - Chamber Wizard Field A

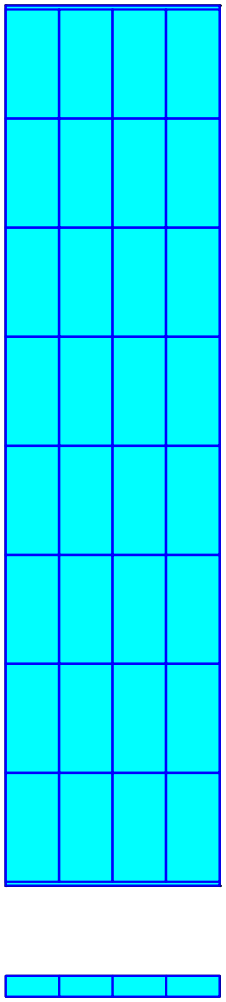
Chamber Model = StormTrap ST1 SingleTrap 2-0 (StormTrap ST1 SingleTrap® Type VI)
Inside= 82.7"W x 24.0"H => 11.84 sf x 14.06'L = 166.5 cf
Outside= 82.7"W x 32.0"H => 18.39 sf x 14.06'L = 258.6 cf

8 Chambers/Row x 14.06' Long = 112.50' Row Length +6.0" Border x 2 = 113.50' Base Length
4 Rows x 82.7" Wide = 27.58' Base Width
32.0" Chamber Height = 2.67' Field Height

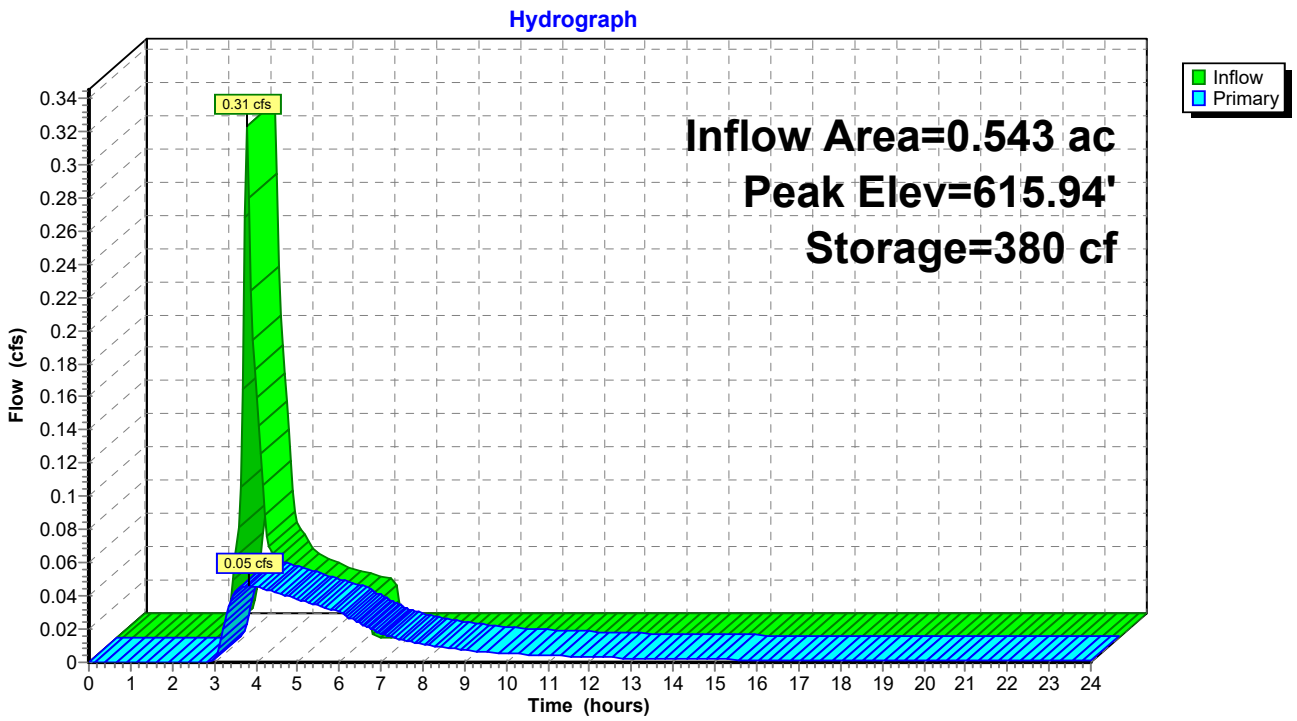
32 Chambers x 166.5 cf = 5,328.0 cf Chamber Storage
32 Chambers x 258.6 cf + 73.6 cf Border = 8,348.6 cf Displacement

Chamber Storage = 5,328.0 cf = 0.122 af
Overall Storage Efficiency = 63.8%
Overall System Size = 113.50' x 27.58' x 2.67'

32 Chambers (plus border)
309.2 cy Field



Pond DB-7: DB-7


Hydrograph
Inflow
Primary
0.31 cfs
0.05 cfs
Inflow Area=0.543 ac
Peak Elev=615.94'
Storage=380 cf
Flow (cfs)
Time (hours)

Stage-Discharge for Pond DB-7: DB-7

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
615.80	0.00	616.84	0.39	617.88	0.85
615.82	0.00	616.86	0.40	617.90	0.86
615.84	0.00	616.88	0.40	617.92	0.87
615.86	0.01	616.90	0.41	617.94	0.88
615.88	0.02	616.92	0.41	617.96	0.89
615.90	0.02	616.94	0.41	617.98	0.89
615.92	0.03	616.96	0.42	618.00	0.90
615.94	0.04	616.98	0.42	618.02	0.90
615.96	0.06	617.00	0.43	618.04	0.90
615.98	0.07	617.02	0.43	618.06	0.91
616.00	0.08	617.04	0.44	618.08	0.91
616.02	0.10	617.06	0.44	618.10	0.92
616.04	0.11	617.08	0.44	618.12	0.92
616.06	0.13	617.10	0.45	618.14	0.92
616.08	0.14	617.12	0.45	618.16	0.93
616.10	0.15	617.14	0.46	618.18	0.93
616.12	0.17	617.16	0.46	618.20	0.93
616.14	0.17	617.18	0.46	618.22	0.94
616.16	0.18	617.20	0.47	618.24	0.94
616.18	0.19	617.22	0.47	618.26	0.94
616.20	0.20	617.24	0.47	618.28	0.95
616.22	0.21	617.26	0.48	618.30	0.95
616.24	0.22	617.28	0.48	618.32	0.95
616.26	0.23	617.30	0.49	618.34	0.96
616.28	0.24	617.32	0.49	618.36	0.96
616.30	0.24	617.34	0.50	618.38	0.96
616.32	0.25	617.36	0.50	618.40	0.97
616.34	0.26	617.38	0.52	618.42	0.97
616.36	0.26	617.40	0.53	618.44	0.97
616.38	0.27	617.42	0.54	618.46	**0.98**
616.40	0.28	617.44	0.55		
616.42	0.28	617.46	0.57		
616.44	0.29	617.48	0.59		
616.46	0.30	617.50	0.60		
616.48	0.30	617.52	0.62		
616.50	0.31	617.54	0.64		
616.52	0.31	617.56	0.66		
616.54	0.32	617.58	0.67		
616.56	0.32	617.60	0.69		
616.58	0.33	617.62	0.71		
616.60	0.33	617.64	0.72		
616.62	0.34	617.66	0.73		
616.64	0.34	617.68	0.74		
616.66	0.35	617.70	0.76		
616.68	0.35	617.72	0.77		
616.70	0.36	617.74	0.78		
616.72	0.36	617.76	0.79		
616.74	0.37	617.78	0.80		
616.76	0.37	617.80	0.81		
616.78	0.38	617.82	0.82		
616.80	0.38	617.84	0.83		
616.82	0.39	617.86	0.84		

Summary for Pond ICS-1: ICS-1

Inflow Area =	0.693 ac, 62.75% Impervious, Inflow Depth = 0.28" for 1" WQV event			
Inflow =	0.30 cfs @	3.11 hrs, Volume=	0.016 af	
Outflow =	0.30 cfs @	3.11 hrs, Volume=	0.016 af, Atten= 0%, Lag= 0.0 min	
Primary =	0.30 cfs @	3.11 hrs, Volume=	0.016 af	
Secondary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af	

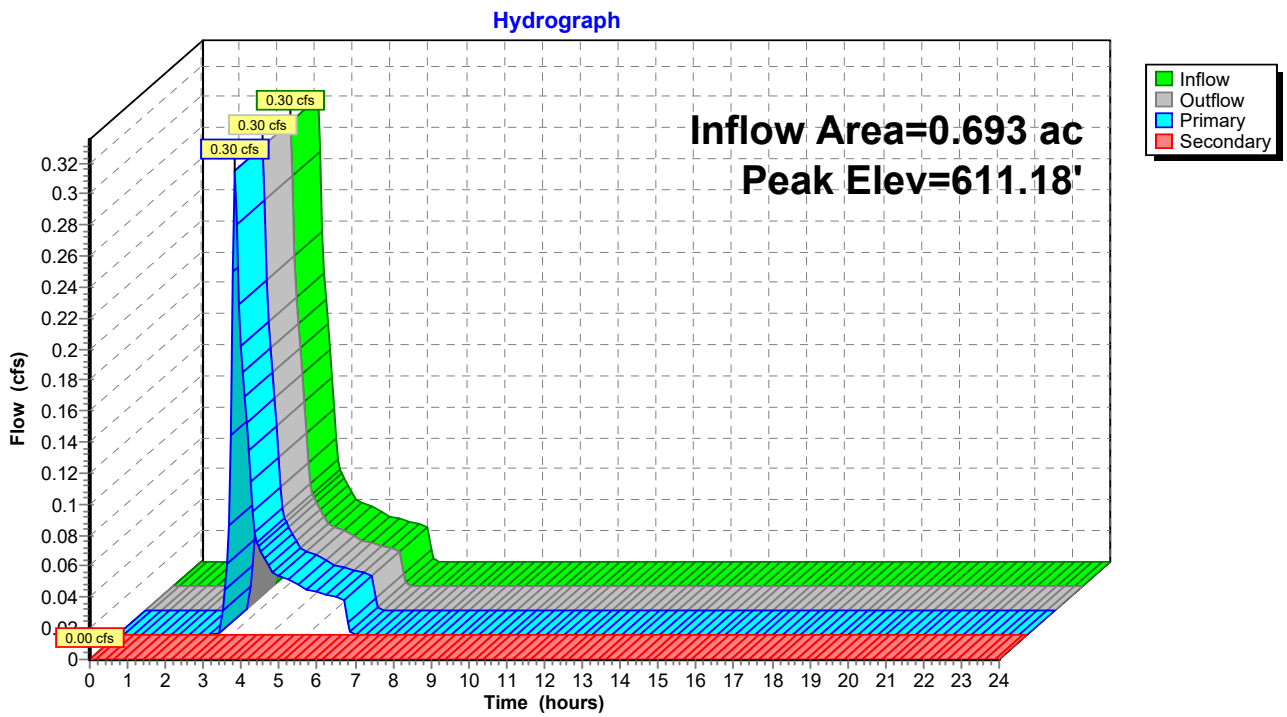
Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 611.18' @ 3.11 hrs
Flood Elev= 613.25'

Device	Routing	Invert	Outlet Devices
#1	Primary	609.25'	**4.0" Round Culvert** L= 145.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 609.25' / 608.50' S= 0.0052 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf
#2	Secondary	611.20'	**12.0" Round Culvert** L= 5.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 611.20' / 610.20' S= 0.2000 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.29 cfs @ 3.11 hrs HW=611.08' (Free Discharge)
└─**1=Culvert** (Barrel Controls 0.29 cfs @ 3.36 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=609.25' (Free Discharge)
└─**2=Culvert** (Controls 0.00 cfs)

Pond ICS-1: ICS-1



Stage-Discharge for Pond ICS-1: ICS-1

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
609.25	0.00	0.00	0.00
609.30	0.00	0.00	0.00
609.35	0.02	0.02	0.00
609.40	0.04	0.04	0.00
609.45	0.07	0.07	0.00
609.50	0.11	0.11	0.00
609.55	0.14	0.14	0.00
609.60	0.17	0.17	0.00
609.65	0.19	0.19	0.00
609.70	0.18	0.18	0.00
609.75	0.19	0.19	0.00
609.80	0.19	0.19	0.00
609.85	0.20	0.20	0.00
609.90	0.20	0.20	0.00
609.95	0.21	0.21	0.00
610.00	0.21	0.21	0.00
610.05	0.22	0.22	0.00
610.10	0.22	0.22	0.00
610.15	0.22	0.22	0.00
610.20	0.23	0.23	0.00
610.25	0.23	0.23	0.00
610.30	0.24	0.24	0.00
610.35	0.24	0.24	0.00
610.40	0.24	0.24	0.00
610.45	0.25	0.25	0.00
610.50	0.25	0.25	0.00
610.55	0.26	0.26	0.00
610.60	0.26	0.26	0.00
610.65	0.26	0.26	0.00
610.70	0.27	0.27	0.00
610.75	0.27	0.27	0.00
610.80	0.27	0.27	0.00
610.85	0.28	0.28	0.00
610.90	0.28	0.28	0.00
610.95	0.28	0.28	0.00
611.00	0.29	0.29	0.00
611.05	0.29	0.29	0.00
611.10	0.29	0.29	0.00
611.15	0.30	0.30	0.00
611.20	0.30	0.30	0.00
611.25	0.32	0.30	0.01
611.30	0.36	0.31	0.06
611.35	0.43	0.31	0.12
611.40	0.53	0.31	0.21
611.45	0.64	0.32	0.33
611.50	0.78	0.32	0.46
611.55	0.94	0.32	0.62
611.60	1.11	0.32	0.79
611.65	1.31	0.33	0.98
611.70	1.51	0.33	1.18
611.75	1.73	0.33	1.40
611.80	1.96	0.34	1.62
611.85	2.19	0.34	1.85
611.90	2.43	0.34	2.09
611.95	2.67	0.34	2.33
612.00	2.91	0.35	2.56
612.05	3.14	0.35	2.79
612.10	3.36	0.35	3.01
612.15	3.55	0.36	3.20
612.20	3.70	0.36	3.34
612.25	3.87	0.36	3.51
612.30	4.03	0.36	3.66
612.35	4.18	0.37	3.81
612.40	4.32	0.37	3.95
612.45	4.47	0.37	4.09
612.50	4.60	0.37	4.23
612.55	4.73	0.38	4.36
612.60	4.86	0.38	4.48
612.65	4.99	0.38	4.61
612.70	5.11	0.38	4.73
612.75	5.23	0.39	4.84
612.80	5.35	0.39	4.96
612.85	5.46	0.39	5.07
612.90	5.57	0.39	5.18
612.95	5.68	0.40	5.29
613.00	5.79	0.40	5.39
613.05	5.89	0.40	5.49
613.10	6.00	0.40	5.59
613.15	6.10	0.41	5.69
613.20	6.20	0.41	5.79
613.25	**6.30**	**0.41**	**5.89**

Summary for Pond ICS-2: ICS-2

Inflow Area =	0.598 ac, 70.86% Impervious, Inflow Depth = 0.25" for 1" WQV event			
Inflow =	0.22 cfs @	3.11 hrs, Volume=	0.013 af	
Outflow =	0.22 cfs @	3.11 hrs, Volume=	0.013 af, Atten= 0%, Lag= 0.0 min	
Primary =	0.22 cfs @	3.11 hrs, Volume=	0.013 af	
Secondary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af	

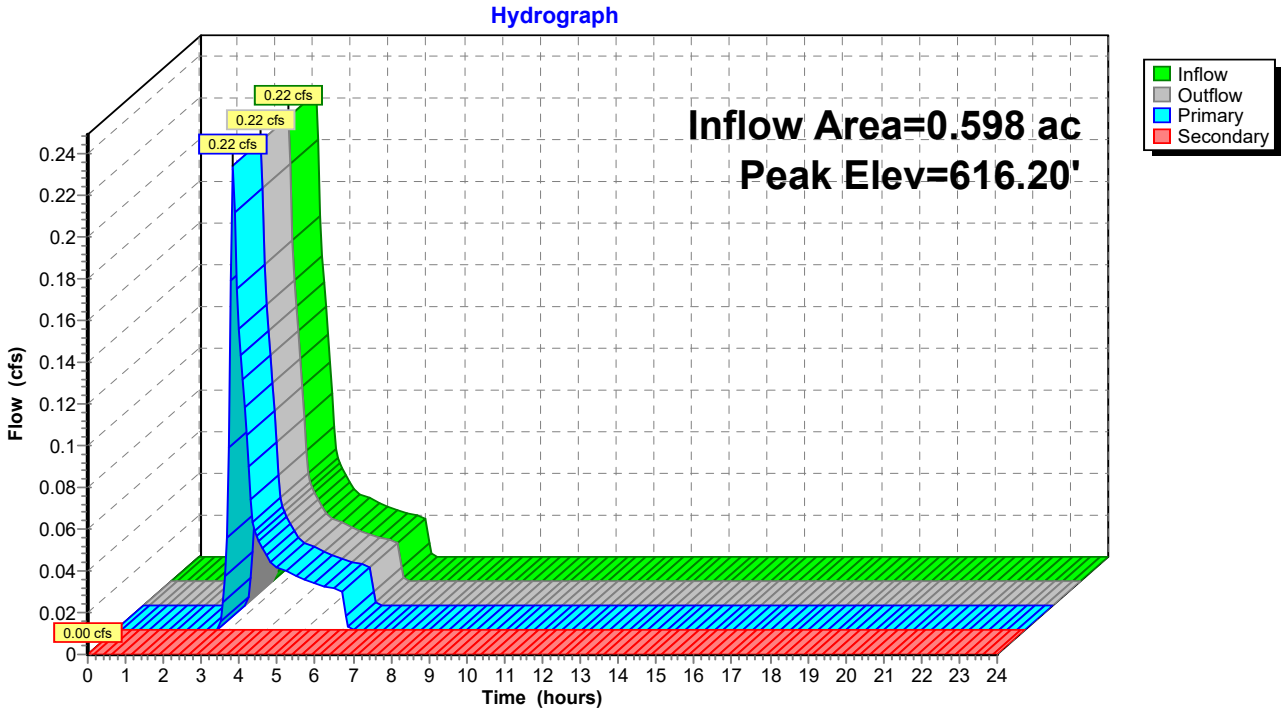
Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 616.20' @ 3.11 hrs
Flood Elev= 617.25'

Device	Routing	Invert	Outlet Devices
#1	Primary	615.85'	**4.0" Round Culvert** L= 34.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 615.85' / 615.00' S= 0.0250 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.09 sf
#2	Secondary	616.21'	**12.0" Round Culvert** L= 12.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 616.21' / 616.15' S= 0.0050 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.22 cfs @ 3.11 hrs HW=616.19' (Free Discharge)
└**1=Culvert** (Inlet Controls 0.22 cfs @ 2.48 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=615.85' (Free Discharge)
└**2=Culvert** (Controls 0.00 cfs)

Pond ICS-2: ICS-2



Stage-Discharge for Pond ICS-2: ICS-2

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
615.85	0.00	0.00	0.00
615.87	0.00	0.00	0.00
615.89	0.01	0.01	0.00
615.91	0.01	0.01	0.00
615.93	0.02	0.02	0.00
615.95	0.03	0.03	0.00
615.97	0.04	0.04	0.00
615.99	0.06	0.06	0.00
616.01	0.07	0.07	0.00
616.03	0.09	0.09	0.00
616.05	0.10	0.10	0.00
616.07	0.12	0.12	0.00
616.09	0.14	0.14	0.00
616.11	0.16	0.16	0.00
616.13	0.18	0.18	0.00
616.15	0.19	0.19	0.00
616.17	0.21	0.21	0.00
616.19	0.22	0.22	0.00
616.21	0.23	0.23	0.00
616.23	0.24	0.24	0.00
616.25	0.26	0.25	0.00
616.27	0.28	0.26	0.01
616.29	0.30	0.27	0.02
616.31	0.32	0.28	0.03
616.33	0.34	0.29	0.05
616.35	0.37	0.30	0.07
616.37	0.40	0.31	0.09
616.39	0.43	0.32	0.11
616.41	0.46	0.33	0.13
616.43	0.50	0.34	0.16
616.45	0.53	0.35	0.19
616.47	0.57	0.35	0.22
616.49	0.61	0.35	0.25
616.51	0.65	0.36	0.29
616.53	0.69	0.36	0.33
616.55	0.73	0.36	0.37
616.57	0.77	0.37	0.41
616.59	0.82	0.37	0.45
616.61	0.87	0.37	0.50
616.63	0.92	0.38	0.54
616.65	0.97	0.38	0.59
616.67	1.02	0.38	0.64
616.69	1.08	0.38	0.69
616.71	1.13	0.39	0.74
616.73	1.19	0.39	0.80
616.75	1.25	0.39	0.86
616.77	1.31	0.40	0.91
616.79	1.37	0.40	0.97
616.81	1.43	0.40	1.03
616.83	1.50	0.40	1.09
616.85	1.56	0.41	1.15
616.87	1.63	0.41	1.22
616.89	1.69	0.41	1.28
616.91	1.76	0.41	1.35
616.93	1.83	0.42	1.41
616.95	1.90	0.42	1.48
616.97	1.97	0.42	1.54
616.99	2.04	0.42	1.61
617.01	2.11	0.43	1.68
617.03	2.18	0.43	1.75
617.05	2.25	0.43	1.82
617.07	2.32	0.43	1.89
617.09	2.40	0.44	1.96
617.11	2.47	0.44	2.03
617.13	2.54	0.44	2.10
617.15	2.61	0.44	2.17
617.17	2.69	0.45	2.24
617.19	2.76	0.45	2.31
617.21	2.83	0.45	2.38
617.23	2.90	0.45	2.45
617.25	**2.97**	**0.46**	**2.51**

Summary for Pond ICS-6: ICS-6

Inflow Area =	2.630 ac, 39.25% Impervious, Inflow Depth = 0.02" for 1" WQV event				
Inflow =	0.02 cfs @	4.77 hrs,	Volume=	0.005 af	
Outflow =	0.02 cfs @	4.77 hrs,	Volume=	0.005 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.02 cfs @	4.77 hrs,	Volume=	0.005 af	
Secondary =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af	

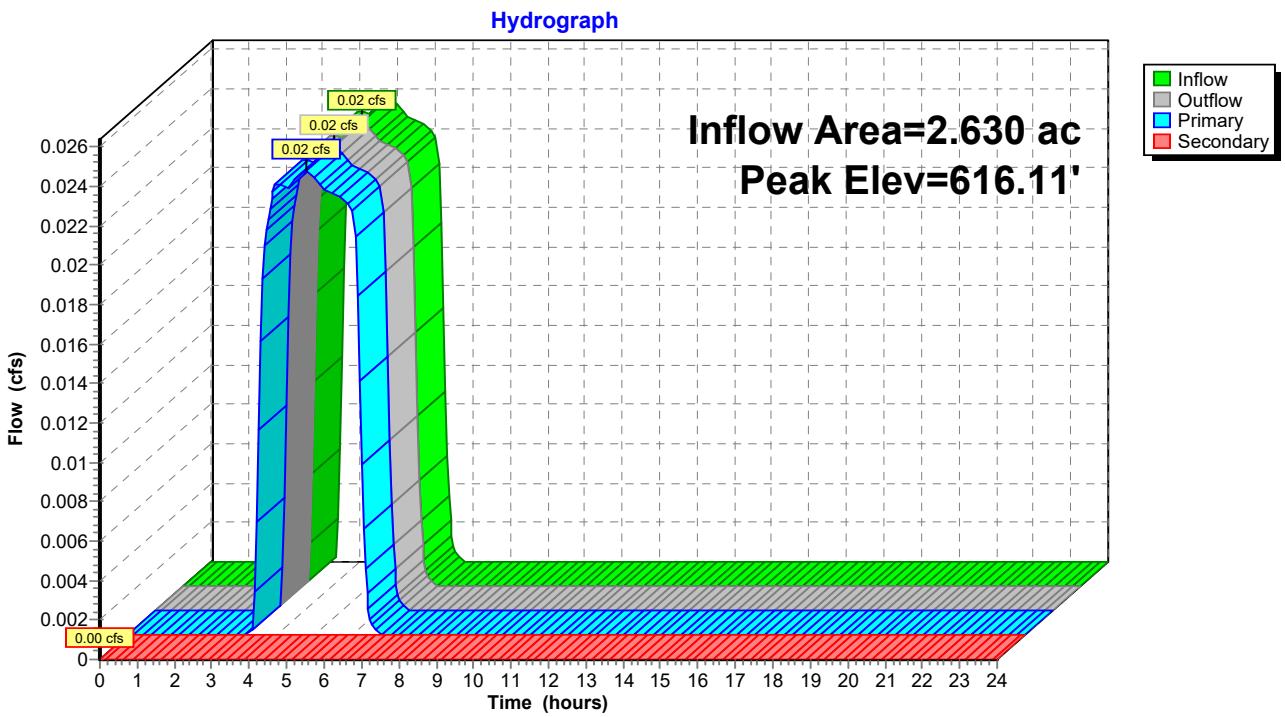
Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 616.11' @ 4.77 hrs
Flood Elev= 621.10'

Device	Routing	Invert	Outlet Devices
#1	Primary	616.00'	**4.0" Round Culvert** L= 202.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 616.00' / 615.00' S= 0.0050 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf
#2	Secondary	616.15'	**15.0" Round Culvert** L= 5.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 616.15' / 616.10' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=0.02 cfs @ 4.77 hrs HW=616.11' (Free Discharge)
└**1=Culvert** (Barrel Controls 0.02 cfs @ 1.38 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=616.00' (Free Discharge)
└**2=Culvert** (Controls 0.00 cfs)

Pond ICS-6: ICS-6



Stage-Discharge for Pond ICS-6: ICS-6

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
616.00	0.00	0.00	0.00
616.10	0.02	0.02	0.00
616.20	0.08	0.07	0.01
616.30	0.24	0.14	0.10
616.40	0.44	0.19	0.26
616.50	0.66	0.18	0.48
616.60	0.94	0.19	0.75
616.70	1.27	0.20	1.08
616.80	1.65	0.20	1.44
616.90	2.06	0.21	1.85
617.00	2.51	0.22	2.30
617.10	2.99	0.22	2.77
617.20	3.49	0.23	3.26
617.30	3.99	0.24	3.76
617.40	4.50	0.24	4.26
617.50	5.00	0.25	4.75
617.60	5.47	0.25	5.22
617.70	5.89	0.26	5.63
617.80	6.21	0.26	5.95
617.90	6.75	0.27	6.48
618.00	7.32	0.27	7.05
618.10	7.85	0.28	7.57
618.20	8.34	0.28	8.06
618.30	8.81	0.29	8.52
618.40	9.25	0.29	8.96
618.50	9.67	0.30	9.38
618.60	10.08	0.30	9.77
618.70	10.47	0.31	10.16
618.80	10.82	0.31	10.51
618.90	11.08	0.32	10.77
619.00	11.34	0.32	11.02
619.10	11.59	0.33	11.26
619.20	11.83	0.33	11.50
619.30	12.07	0.33	11.74
619.40	12.31	0.34	11.97
619.50	12.54	0.34	12.19
619.60	12.76	0.35	12.41
619.70	12.98	0.35	12.63
619.80	13.20	0.35	12.85
619.90	13.42	0.36	13.06
620.00	13.63	0.36	13.26
620.10	13.83	0.37	13.47
620.20	14.04	0.37	13.67
620.30	14.24	0.37	13.87
620.40	14.44	0.38	14.06
620.50	14.64	0.38	14.26
620.60	14.83	0.38	14.45
620.70	15.02	0.39	14.63
620.80	15.21	0.39	14.82
620.90	15.40	0.40	15.00
621.00	15.58	0.40	15.18
621.10	**15.76**	**0.40**	**15.36**

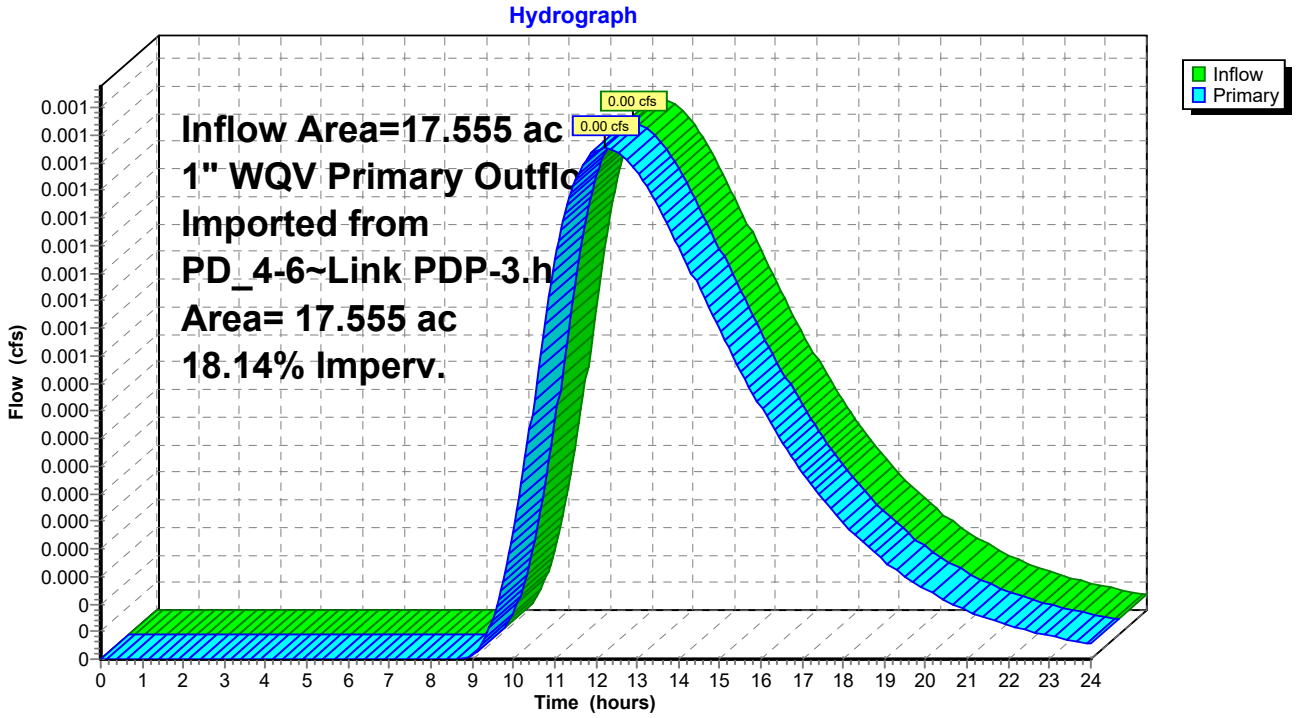
Summary for Link PDP-3: DP-3

Inflow Area = 17.555 ac, 18.14% Impervious, Inflow Depth > 0.00" for 1" WQV event
Inflow = 0.00 cfs @ 12.22 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 12.22 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

1" WQV Primary Outflow Imported from PD_4-6~Link PDP-3.hce

Link PDP-3: DP-3



Summary for Subcatchment 1A: PD-1A

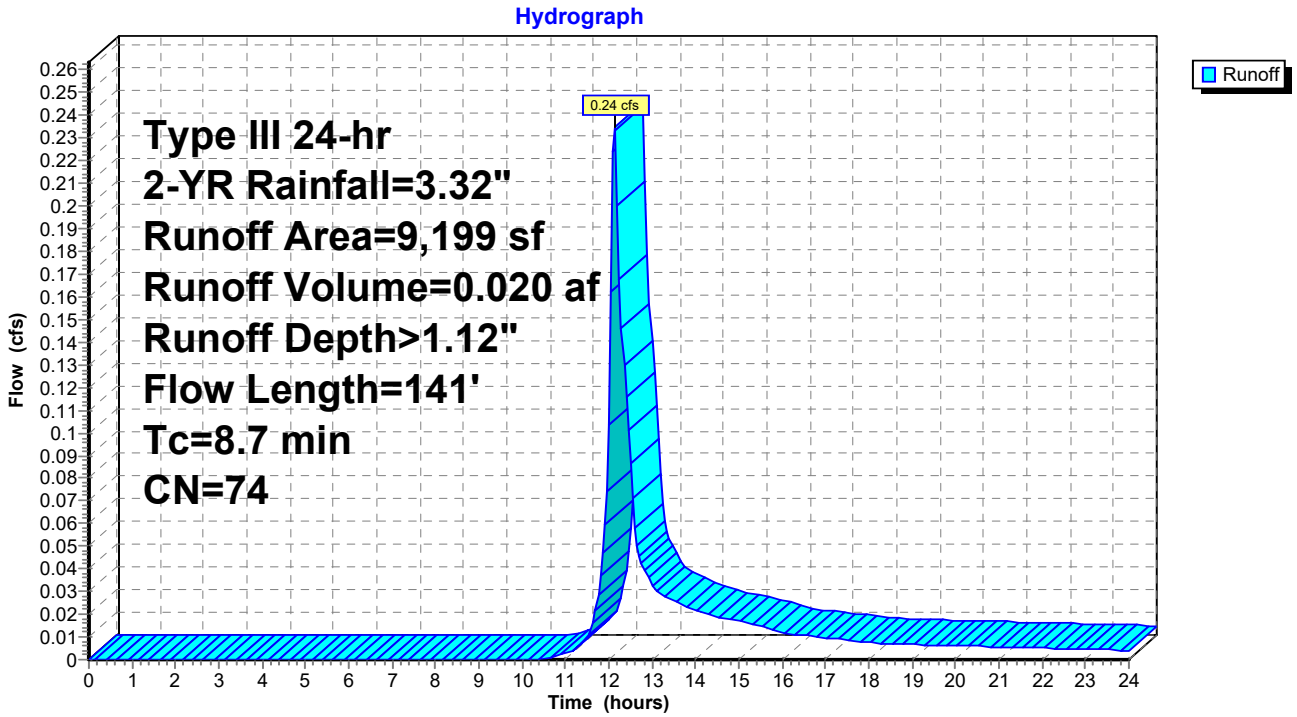
Runoff = 0.24 cfs @ 12.14 hrs, Volume= 0.020 af, Depth> 1.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.32"

Area (sf)	CN	Description
440	98	Paved parking, HSG C
5,095	74	>75% Grass cover, Good, HSG C
3,664	70	Woods, Good, HSG C
9,199	74	Weighted Average
8,759		95.22% Pervious Area
440		4.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	71	0.1100	0.15		**Sheet Flow, 1A-1B** Woods: Light underbrush n= 0.400 P2= 3.32"
0.3	14	0.0100	0.70		**Shallow Concentrated Flow, 1B-1C** Short Grass Pasture Kv= 7.0 fps
0.3	56	0.0050	3.18	1.11	**Pipe Channel, 1C-1D** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010 PVC, smooth interior
8.7	141	Total			

Subcatchment 1A: PD-1A



Summary for Subcatchment 1B: PDA-1B

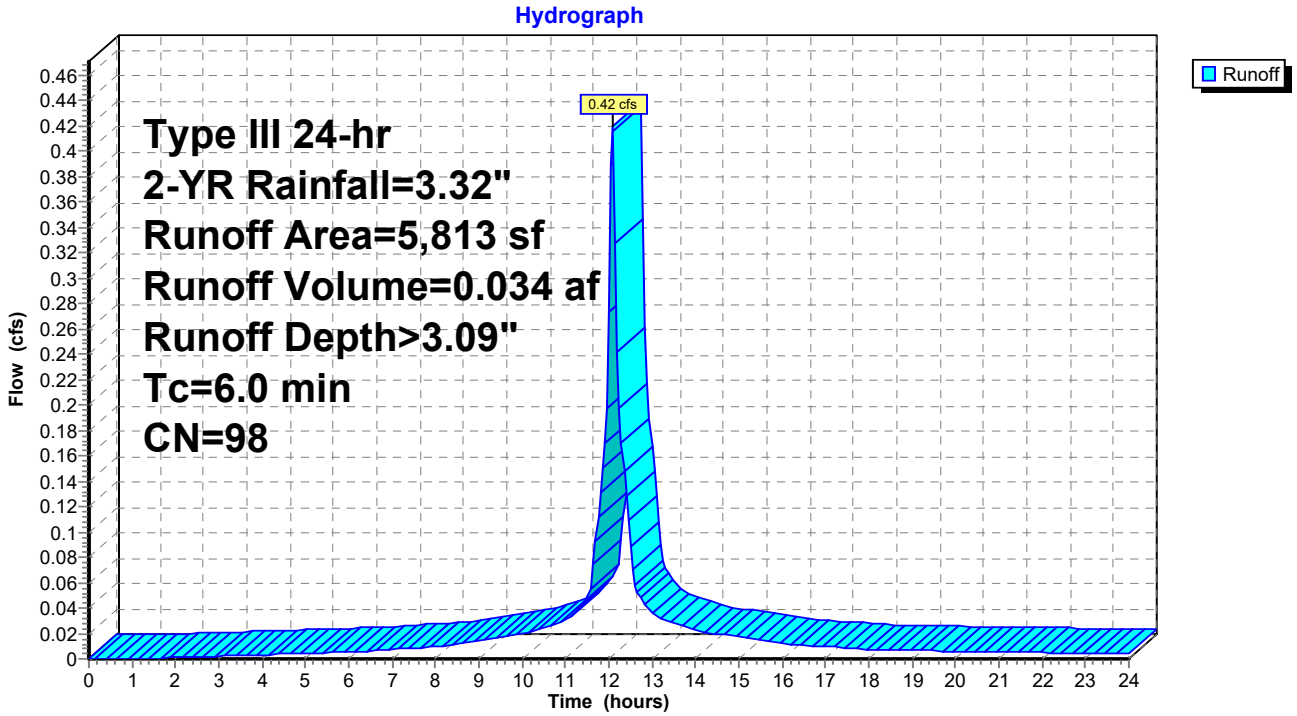
Runoff = 0.42 cfs @ 12.09 hrs, Volume= 0.034 af, Depth> 3.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.32"

Area (sf)	CN	Description
5,813	98	Unconnected roofs, HSG C
5,813		100.00% Impervious Area
5,813		100.00% Unconnected

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

Subcatchment 1B: PDA-1B



Summary for Subcatchment 1C: PDA-1C

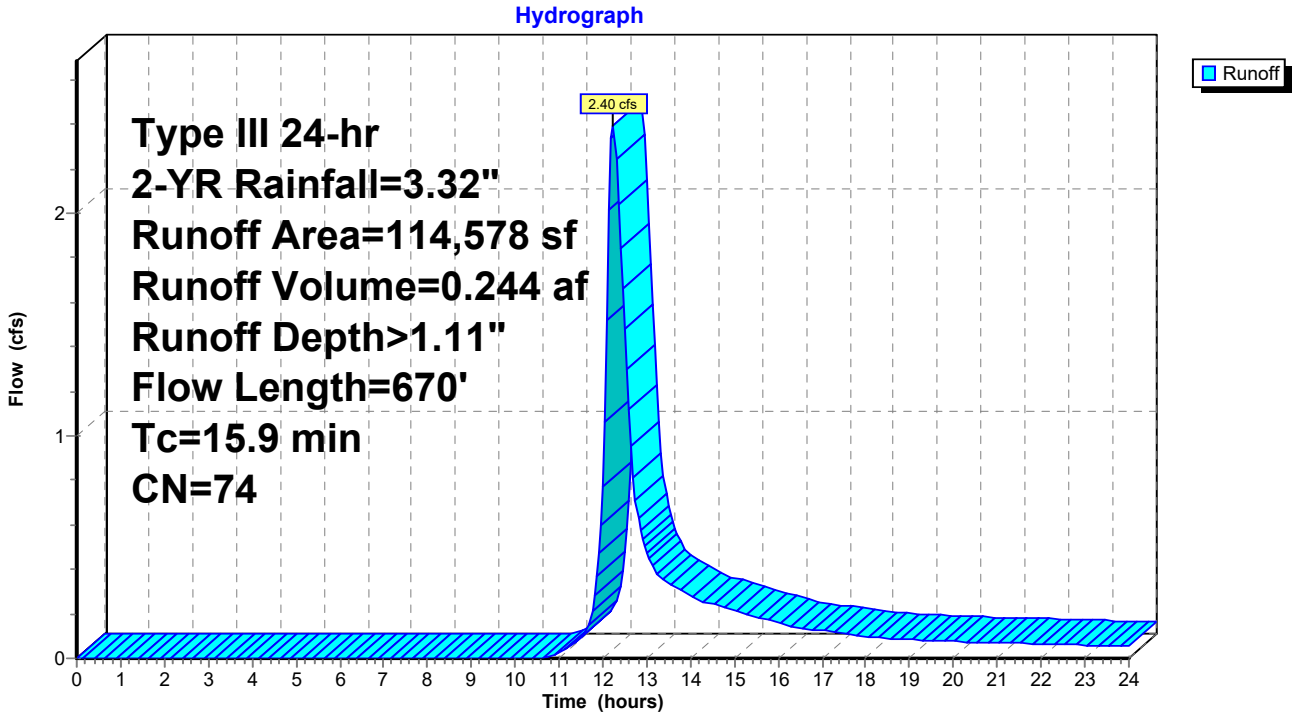
Runoff = 2.40 cfs @ 12.24 hrs, Volume= 0.244 af, Depth> 1.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.32"

	Area (sf)	CN	Description
*	33,778	98	Paved parking
	9,092	61	>75% Grass cover, Good, HSG B
	1,833	74	>75% Grass cover, Good, HSG C
	11,190	98	Roofs, HSG B
	47,970	55	Woods, Good, HSG B
	10,715	70	Woods, Good, HSG C
	114,578	74	Weighted Average
	69,610		60.75% Pervious Area
	44,968		39.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	50	0.0400	0.09		**Sheet Flow, 1A-1B** Woods: Light underbrush n= 0.400 P2= 3.32"
6.0	458	0.0655	1.28		**Shallow Concentrated Flow, 1B-1C** Woodland Kv= 5.0 fps
0.1	10	0.1500	2.71		**Shallow Concentrated Flow, 1C-1D** Short Grass Pasture Kv= 7.0 fps
0.3	78	0.0400	4.06		**Shallow Concentrated Flow, 1D-1E** Paved Kv= 20.3 fps
0.3	74	0.0050	3.79	2.98	**Pipe Channel, 1E-1F** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
15.9	670	Total			

Subcatchment 1C: PDA-1C



Summary for Subcatchment 3A: PDA-3A

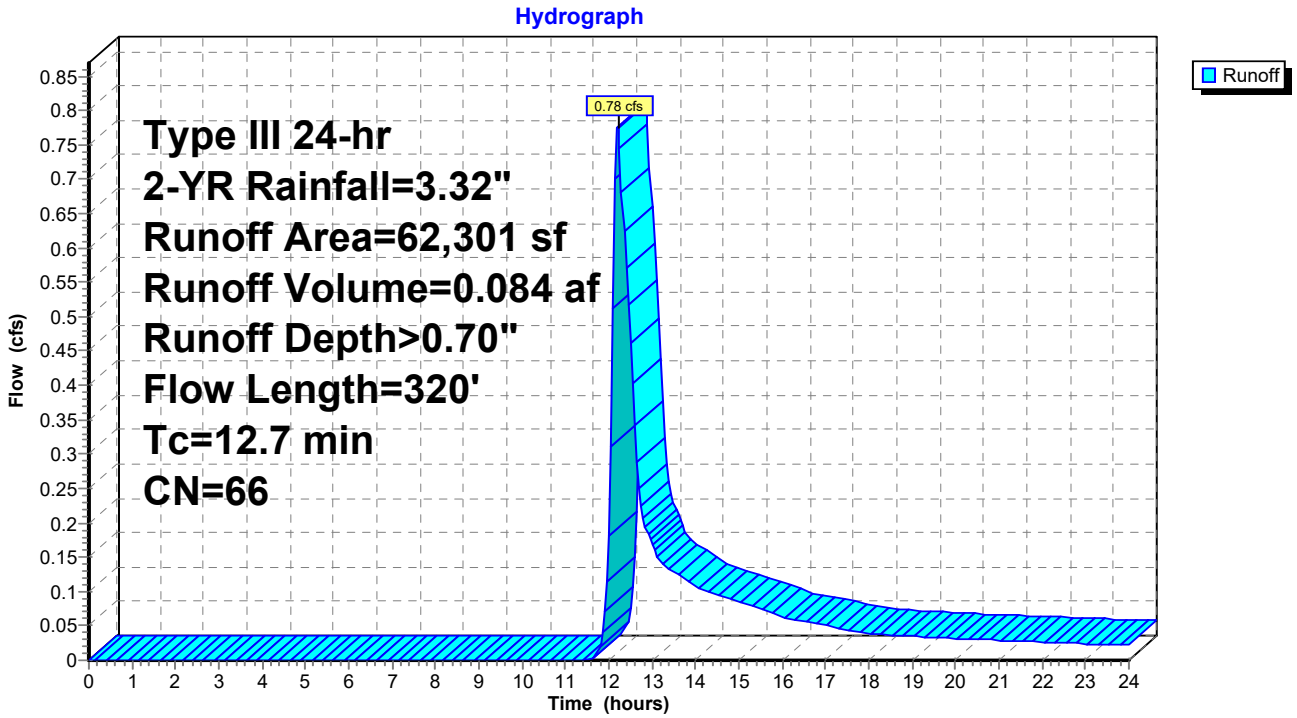
Runoff = 0.78 cfs @ 12.21 hrs, Volume= 0.084 af, Depth> 0.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.32"

Area (sf)	CN	Description
21,831	55	Woods, Good, HSG B
38,070	70	Woods, Good, HSG C
2,400	98	Paved parking, HSG B
62,301	66	Weighted Average
59,901		96.15% Pervious Area
2,400		3.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.0500	0.10		**Sheet Flow, 3A-3B** Woods: Light underbrush n= 0.400 P2= 3.32"
4.3	270	0.0444	1.05		**Shallow Concentrated Flow, 3B-EDP-3** Woodland Kv= 5.0 fps
12.7	320	Total			

Subcatchment 3A: PDA-3A



Summary for Subcatchment 3B: PDA-3B

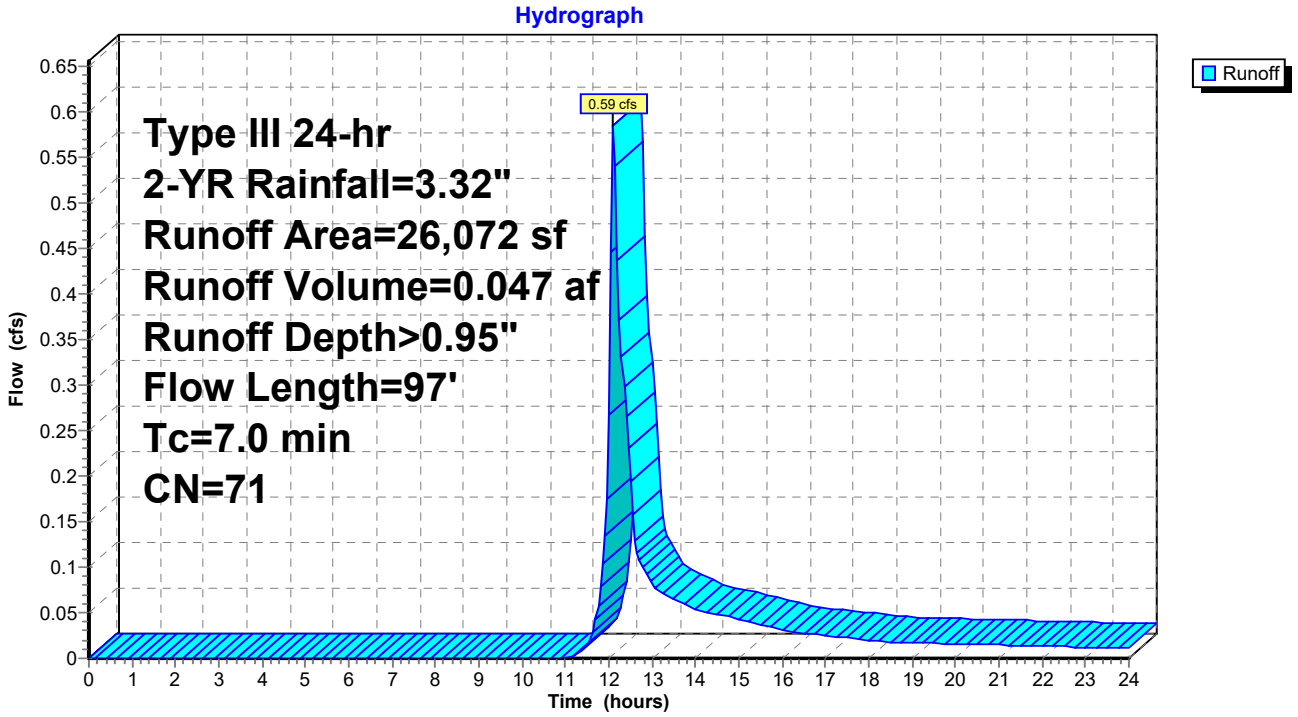
Runoff = 0.59 cfs @ 12.11 hrs, Volume= 0.047 af, Depth> 0.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.32"

Area (sf)	CN	Description
9,275	74	>75% Grass cover, Good, HSG C
2,286	55	Woods, Good, HSG B
13,438	70	Woods, Good, HSG C
1,073	98	Paved parking, HSG C
26,072	71	Weighted Average
24,999		95.88% Pervious Area
1,073		4.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	51	0.1000	0.13		**Sheet Flow, 3A-3B** Woods: Light underbrush n= 0.400 P2= 3.32"
0.0	6	0.3300	4.02		**Shallow Concentrated Flow, 3B-3C** Short Grass Pasture Kv= 7.0 fps
0.1	8	0.0150	1.97		**Shallow Concentrated Flow, 3C-3D** Unpaved Kv= 16.1 fps
0.0	7	0.2500	3.50		**Shallow Concentrated Flow, 3D-3E** Short Grass Pasture Kv= 7.0 fps
0.4	25	0.0500	1.12		**Shallow Concentrated Flow, 3E-EDP3** Woodland Kv= 5.0 fps
7.0	97	Total			

Subcatchment 3B: PDA-3B



Summary for Subcatchment 3C: PDA-3C

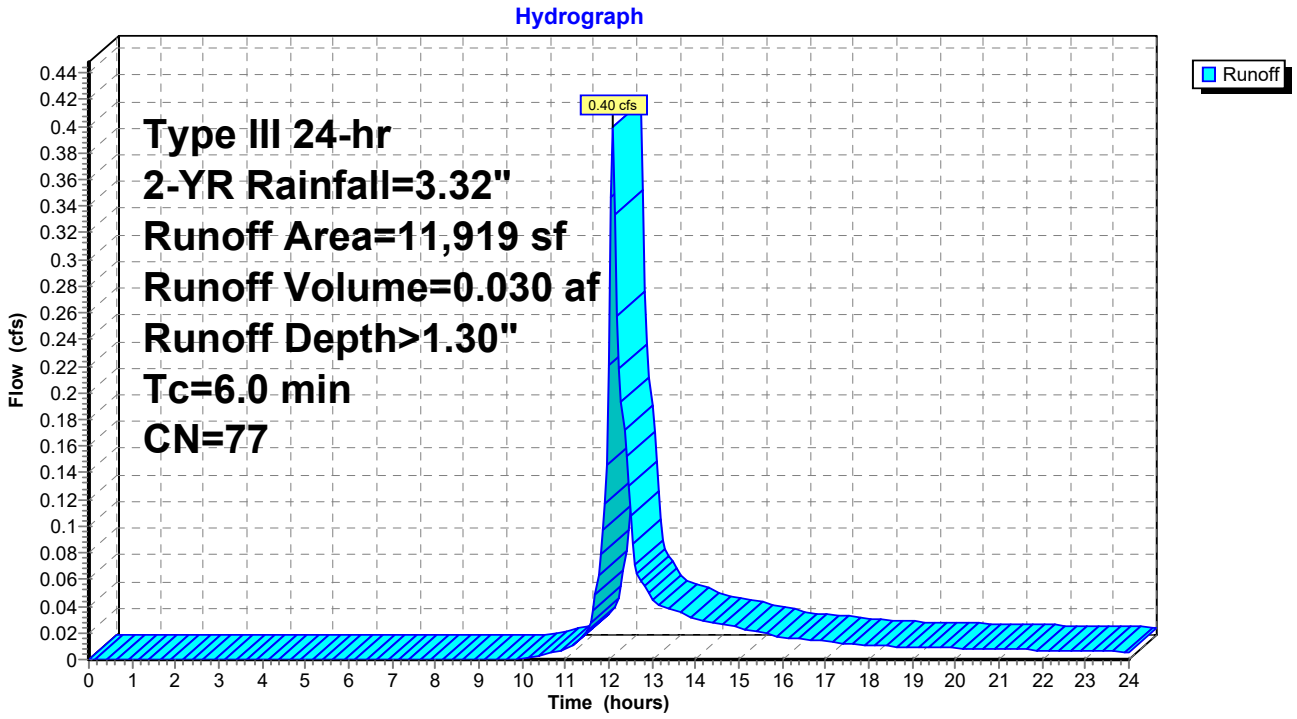
Runoff = 0.40 cfs @ 12.10 hrs, Volume= 0.030 af, Depth> 1.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.32"

Area (sf)	CN	Description
7,718	74	>75% Grass cover, Good, HSG C
336	98	Unconnected pavement, HSG C
2,657	74	>75% Grass cover, Good, HSG C
46	98	Unconnected pavement, HSG C
1,162	98	Roofs, HSG C
11,919	77	Weighted Average
10,375		87.05% Pervious Area
1,544		12.95% Impervious Area
382		24.74% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 MIN**

Subcatchment 3C: PDA-3C



Summary for Subcatchment 3D: PDA-3D

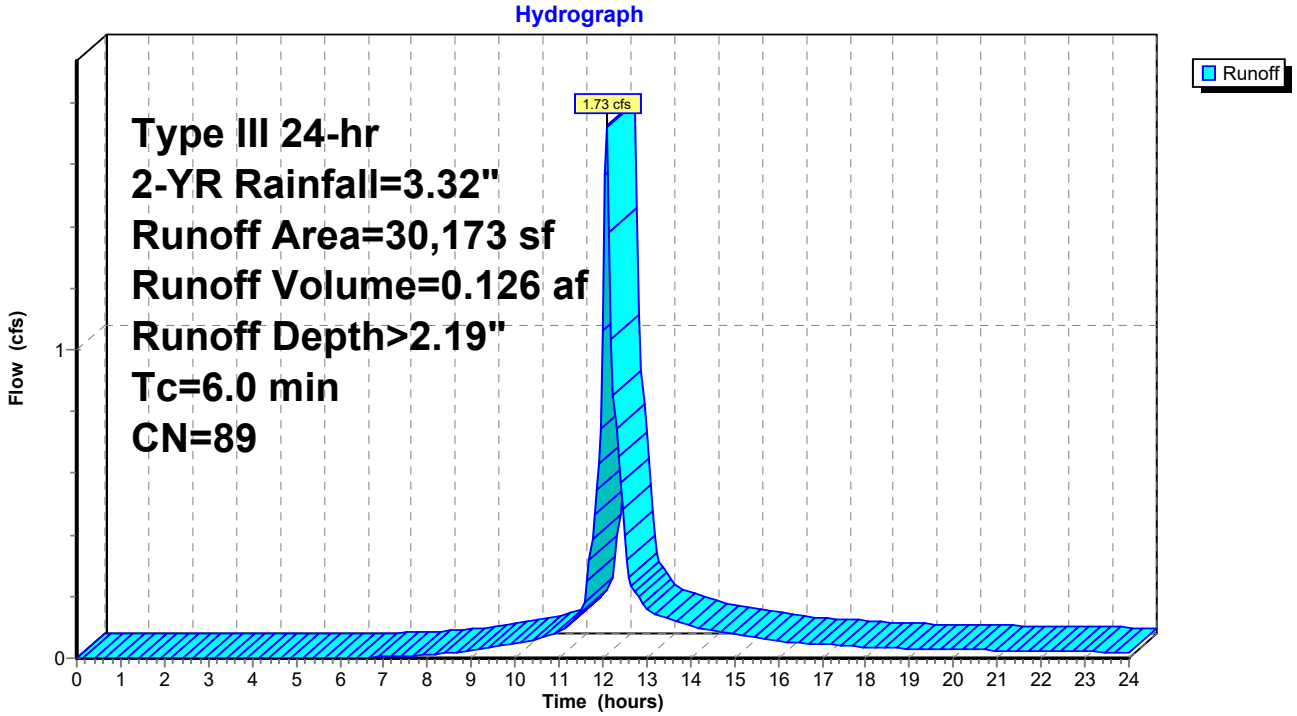
Runoff = 1.73 cfs @ 12.09 hrs, Volume= 0.126 af, Depth> 2.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.32"

Area (sf)	CN	Description
18,935	98	Paved parking, HSG D
11,071	74	>75% Grass cover, Good, HSG C
167	61	>75% Grass cover, Good, HSG B
30,173	89	Weighted Average
11,238		37.25% Pervious Area
18,935		62.75% Impervious Area

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

Subcatchment 3D: PDA-3D



Summary for Subcatchment 3E: PDA-3E

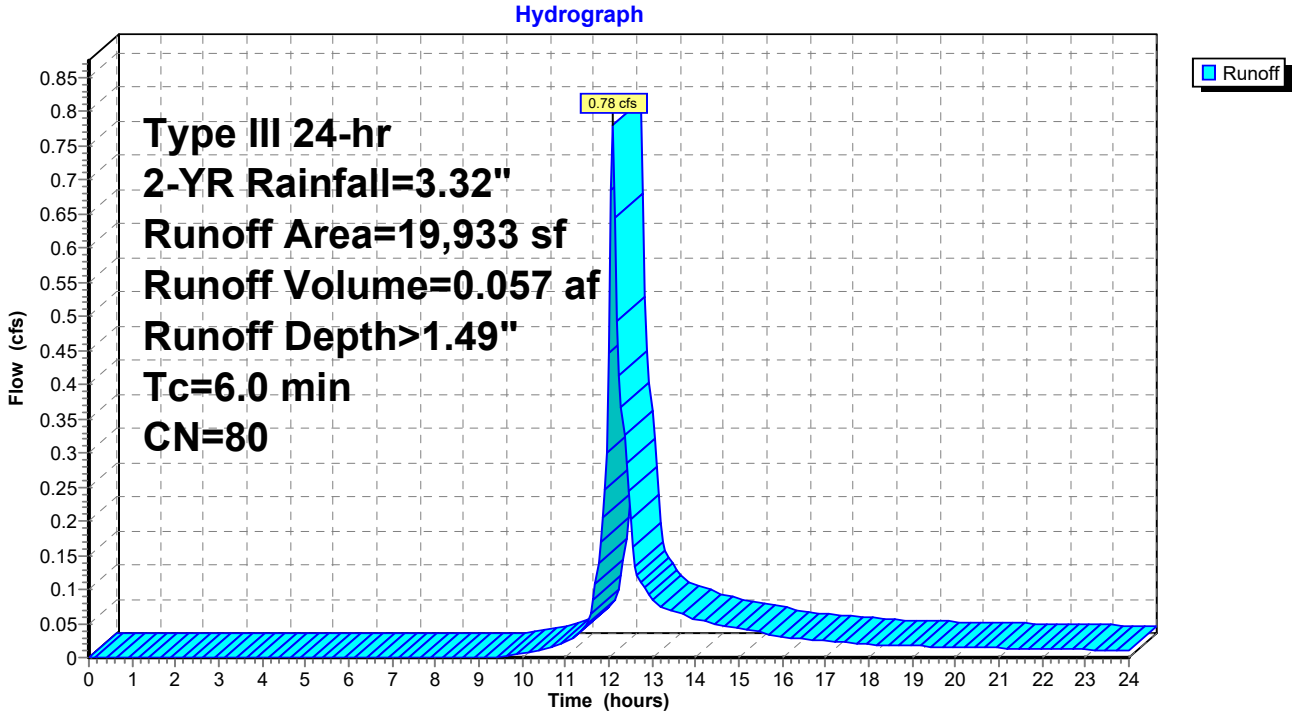
Runoff = 0.78 cfs @ 12.10 hrs, Volume= 0.057 af, Depth> 1.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.32"

Area (sf)	CN	Description
14,823	74	>75% Grass cover, Good, HSG C
460	98	Unconnected pavement, HSG C
4,650	98	Roofs, HSG C
19,933	80	Weighted Average
14,823		74.36% Pervious Area
5,110		25.64% Impervious Area
460		9.00% Unconnected

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

Subcatchment 3E: PDA-3E



Summary for Subcatchment 3F: PDA-3F

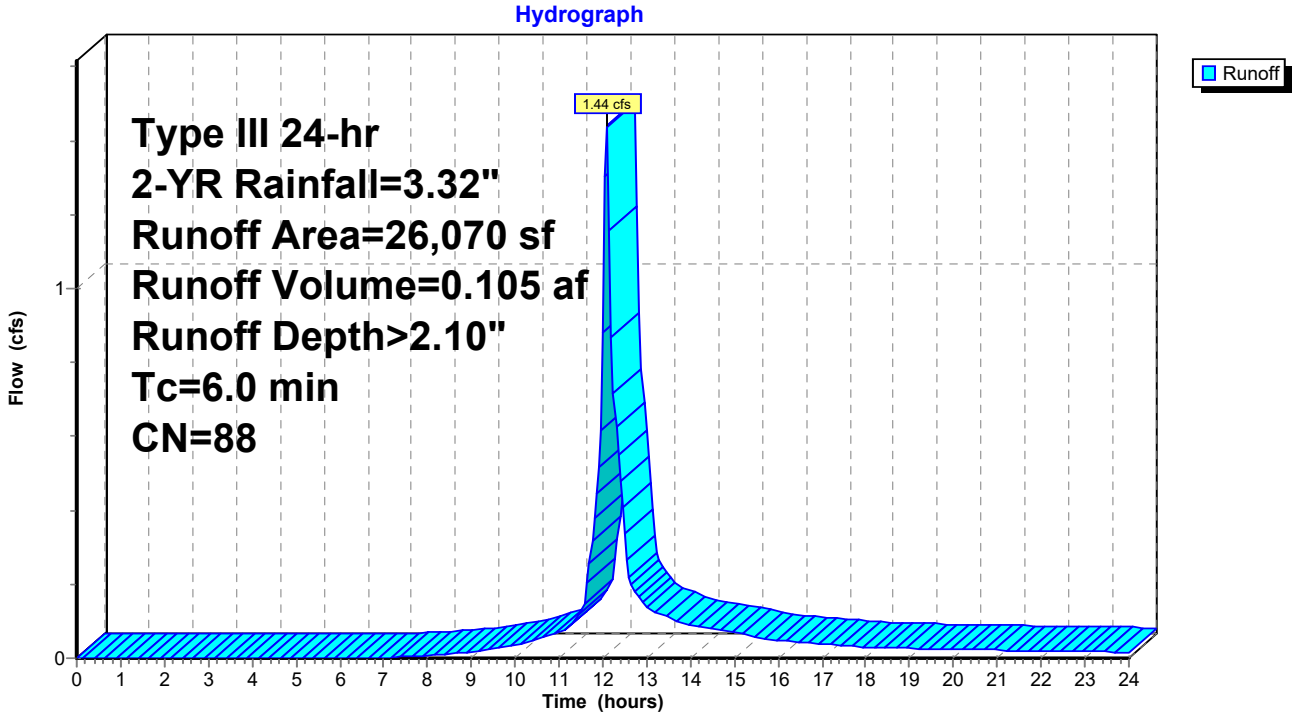
Runoff = 1.44 cfs @ 12.09 hrs, Volume= 0.105 af, Depth> 2.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.32"

Area (sf)	CN	Description
18,472	98	Paved parking, HSG B
1,202	74	>75% Grass cover, Good, HSG C
6,396	61	>75% Grass cover, Good, HSG B
26,070	88	Weighted Average
7,598		29.14% Pervious Area
18,472		70.86% Impervious Area

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

Subcatchment 3F: PDA-3F



Summary for Subcatchment 3G: PDA-3G

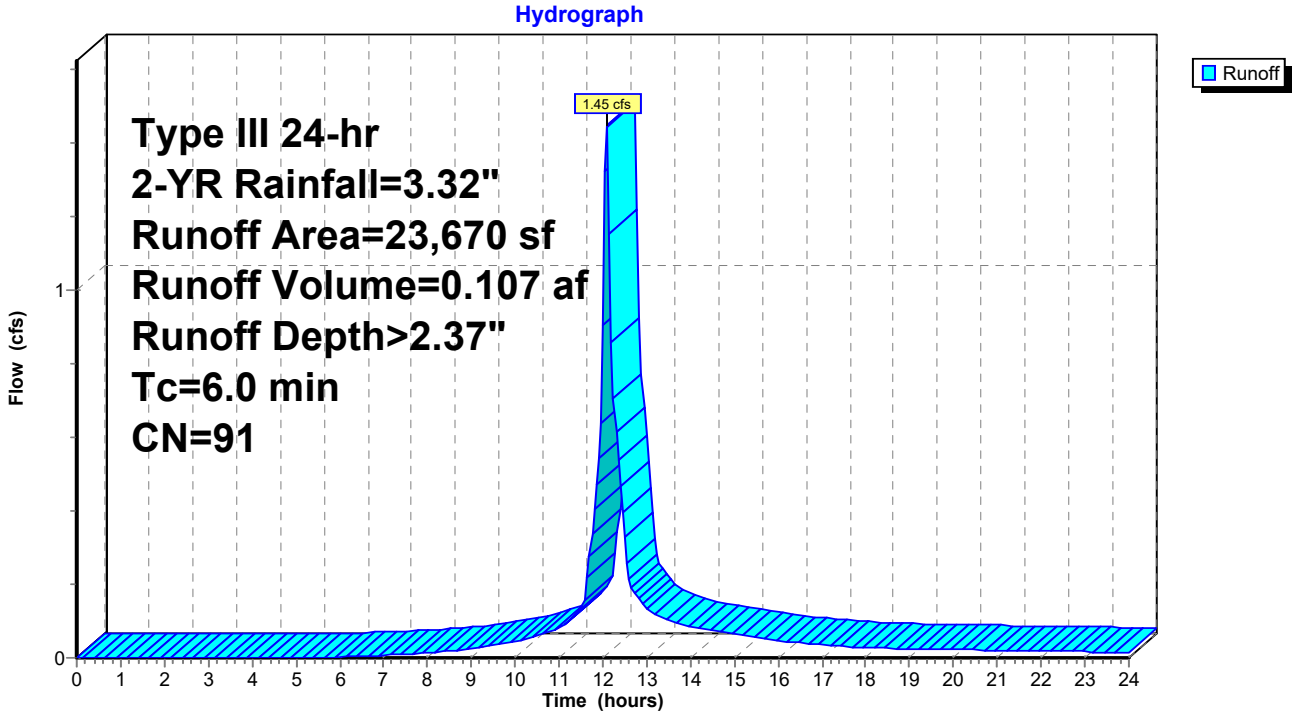
Runoff = 1.45 cfs @ 12.09 hrs, Volume= 0.107 af, Depth> 2.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.32"

Area (sf)	CN	Description
13,660	98	Roofs, HSG B
892	74	>75% Grass cover, Good, HSG C
4,113	61	>75% Grass cover, Good, HSG B
5,005	98	Unconnected pavement, HSG B
23,670	91	Weighted Average
5,005		21.14% Pervious Area
18,665		78.86% Impervious Area
5,005		26.81% Unconnected

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

Subcatchment 3G: PDA-3G



Summary for Subcatchment PD-2: PDA-2

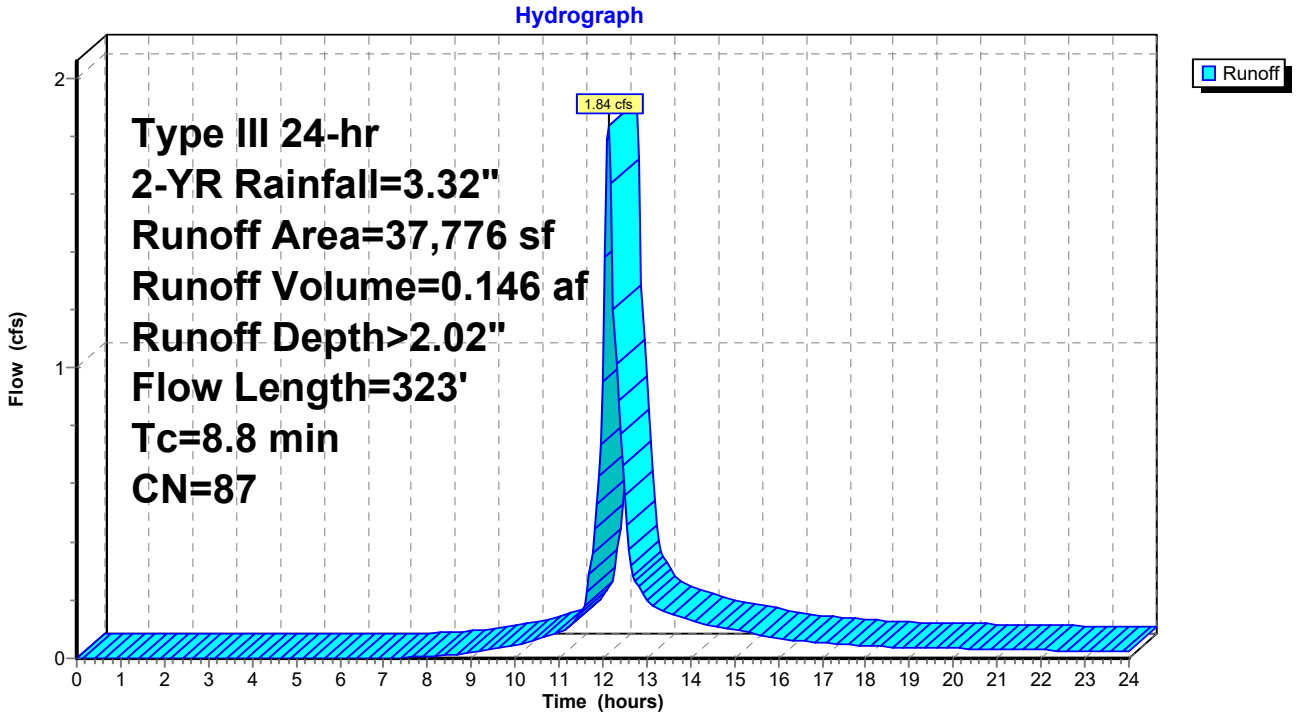
Runoff = 1.84 cfs @ 12.12 hrs, Volume= 0.146 af, Depth> 2.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.32"

Area (sf)	CN	Description
4,628	74	>75% Grass cover, Good, HSG C
23,547	98	Paved parking, HSG D
3,336	55	Woods, Good, HSG B
6,265	70	Woods, Good, HSG C
37,776	87	Weighted Average
14,229		37.67% Pervious Area
23,547		62.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.3	50	0.0100	0.11		**Sheet Flow, 2A-2B** Grass: Short n= 0.150 P2= 3.32"
0.1	34	0.0500	4.54		**Shallow Concentrated Flow, 2B-2C** Paved Kv= 20.3 fps
0.1	19	0.1450	2.67		**Shallow Concentrated Flow, 2C-2D** Short Grass Pasture Kv= 7.0 fps
1.3	220	0.0185	2.76		**Shallow Concentrated Flow, 2D-ED2** Paved Kv= 20.3 fps
8.8	323	Total			

Subcatchment PD-2: PDA-2

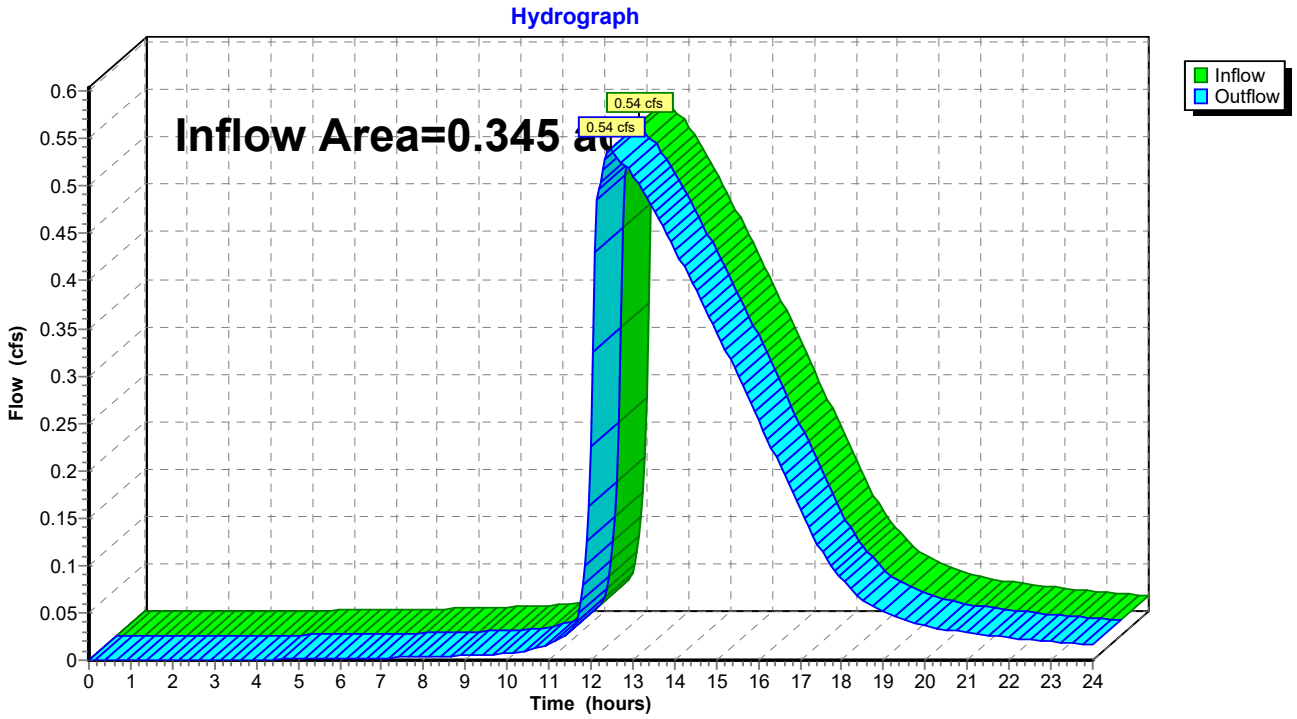


Summary for Reach DP-1: DP-1

Inflow Area = 0.345 ac, 41.65% Impervious, Inflow Depth > 6.57" for 2-YR event
Inflow = 0.54 cfs @ 12.47 hrs, Volume= 0.189 af
Outflow = 0.54 cfs @ 12.47 hrs, Volume= 0.189 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach DP-1: DP-1

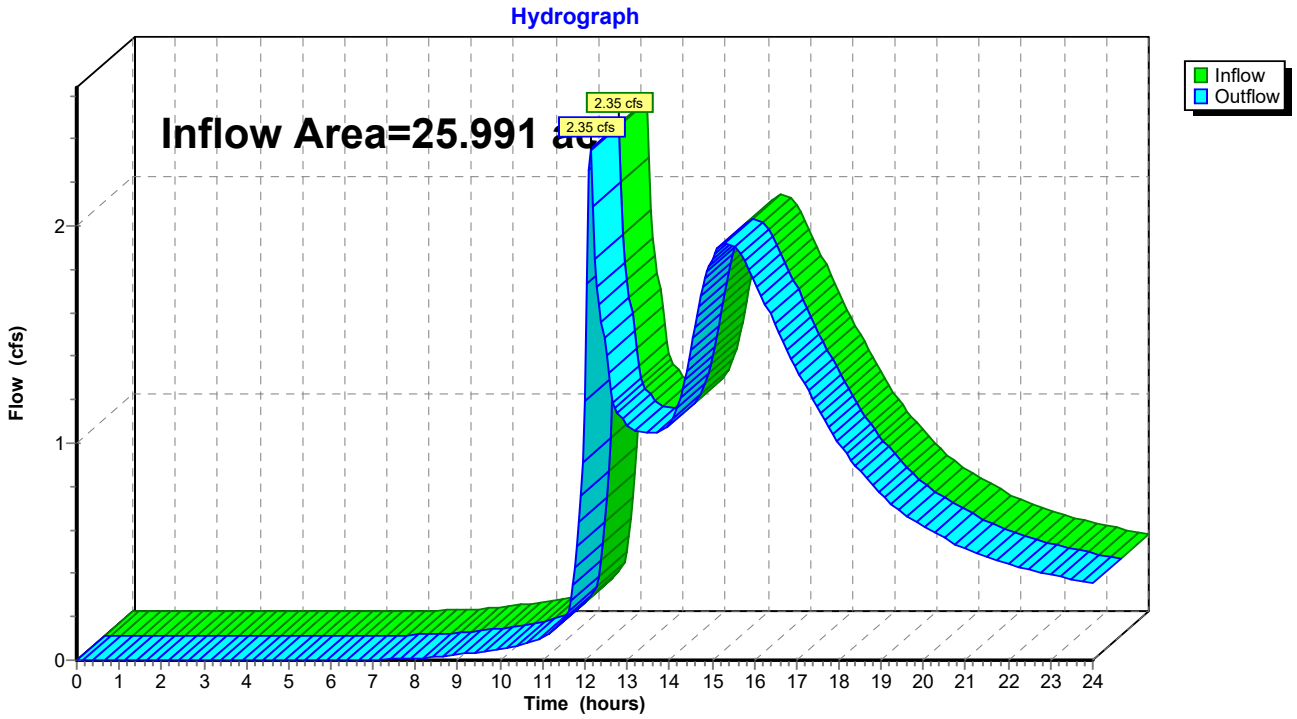


Summary for Reach DP-2: DP-2

Inflow Area = 25.991 ac, 24.71% Impervious, Inflow Depth > 0.47" for 2-YR event
Inflow = 2.35 cfs @ 12.14 hrs, Volume= 1.027 af
Outflow = 2.35 cfs @ 12.14 hrs, Volume= 1.027 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach DP-2: DP-2



Summary for Reach DP-3: DP-3

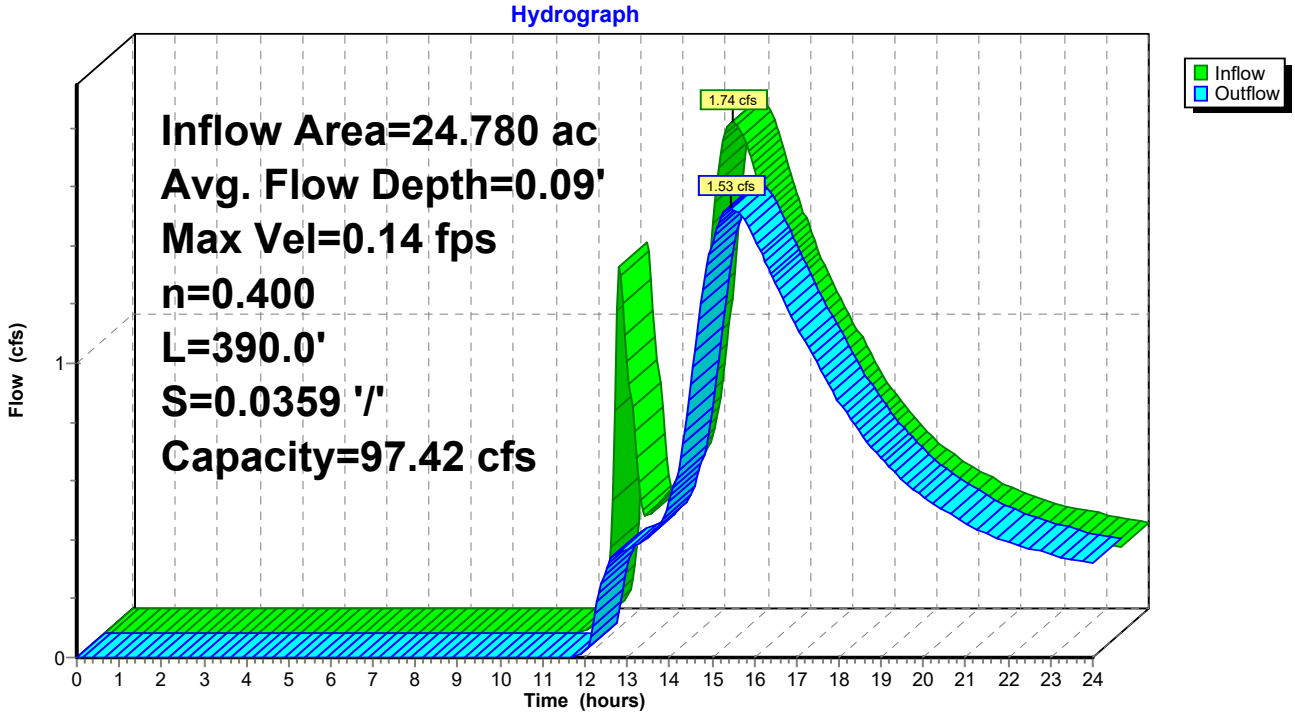
Inflow Area = 24.780 ac, 23.15% Impervious, Inflow Depth > 0.35" for 2-YR event
Inflow = 1.74 cfs @ 14.83 hrs, Volume= 0.731 af
Outflow = 1.53 cfs @ 15.44 hrs, Volume= 0.692 af, Atten= 12%, Lag= 36.9 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 0.14 fps, Min. Travel Time= 48.0 min
Avg. Velocity = 0.09 fps, Avg. Travel Time= 71.2 min

Peak Storage= 4,390 cf @ 15.44 hrs
Average Depth at Peak Storage= 0.09'
Bank-Full Depth= 1.00' Flow Area= 151.0 sf, Capacity= 97.42 cfs

130.00' x 1.00' deep channel, n= 0.400 Sheet flow: Woods+light brush
Side Slope Z-value= 12.0 30.0 '/' Top Width= 172.00'
Length= 390.0' Slope= 0.0359 '/'
Inlet Invert= 618.00', Outlet Invert= 604.00'

Reach DP-3: DP-3



Stage-Discharge for Reach DP-3: DP-3

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
618.00	0.00	0.00
618.01	0.03	0.04
618.02	0.05	0.13
618.03	0.07	0.27
618.04	0.08	0.43
618.05	0.10	0.62
618.06	0.11	0.84
618.07	0.12	1.09
618.08	0.13	1.37
618.09	0.14	1.66
618.10	0.15	1.98
618.11	0.16	2.32
618.12	0.17	2.69
618.13	0.18	3.07
618.14	0.19	3.48
618.15	0.20	3.91
618.16	0.20	4.35
618.17	0.21	4.82
618.18	0.22	5.30
618.19	0.23	5.81
618.20	0.24	6.33
618.21	0.24	6.87
618.22	0.25	7.43
618.23	0.26	8.00
618.24	0.27	8.60
618.25	0.27	9.21
618.26	0.28	9.84
618.27	0.29	10.48
618.28	0.29	11.14
618.29	0.30	11.82
618.30	0.31	12.51
618.31	0.31	13.23
618.32	0.32	13.95
618.33	0.33	14.70
618.34	0.33	15.45
618.35	0.34	16.23
618.36	0.34	17.02
618.37	0.35	17.83
618.38	0.36	18.65
618.39	0.36	19.48
618.40	0.37	20.34
618.41	0.37	21.20
618.42	0.38	22.09
618.43	0.38	22.99
618.44	0.39	23.90
618.45	0.40	24.83
618.46	0.40	25.77
618.47	0.41	26.72
618.48	0.41	27.70
618.49	0.42	28.68
618.50	0.42	29.68
618.51	0.43	30.70
618.52	0.43	31.73
618.53	0.44	32.77
618.54	0.44	33.83
618.55	0.45	34.91
618.56	0.45	35.99
618.57	0.46	37.09
618.58	0.46	38.21
618.59	0.47	39.34
618.60	0.47	40.48
618.61	0.48	41.64
618.62	0.48	42.81
618.63	0.49	44.00
618.64	0.49	45.20
618.65	0.50	46.41
618.66	0.50	47.64
618.67	0.51	48.88
618.68	0.51	50.14
618.69	0.52	51.40
618.70	0.52	52.69
618.71	0.52	53.98
618.72	0.53	55.29
618.73	0.53	56.62
618.74	0.54	57.95
618.75	0.54	59.30
618.76	0.55	60.67
618.77	0.55	62.05
618.78	0.56	63.44
618.79	0.56	64.84
618.80	0.56	66.26
618.81	0.57	67.69
618.82	0.57	69.14
618.83	0.58	70.59
618.84	0.58	72.07
618.85	0.59	73.55
618.86	0.59	75.05
618.87	0.59	76.56
618.88	0.60	78.09
618.89	0.60	79.63
618.90	0.61	81.18
618.91	0.61	82.74
618.92	0.61	84.32
618.93	0.62	85.91
618.94	0.62	87.52
618.95	0.63	89.14
618.96	0.63	90.77
618.97	0.63	92.41
618.98	0.64	94.07
618.99	0.64	95.74
619.00	**0.65**	**97.42**

Summary for Pond 1: SFB-1

Inflow Area =	0.966 ac, 48.65% Impervious, Inflow Depth > 1.91" for 2-YR event				
Inflow =	0.86 cfs @	12.12 hrs,	Volume=	0.154 af	
Outflow =	0.18 cfs @	14.20 hrs,	Volume=	0.134 af,	Atten= 80%, Lag= 124.9 min
Discarded =	0.10 cfs @	14.20 hrs,	Volume=	0.104 af	
Primary =	0.07 cfs @	14.20 hrs,	Volume=	0.030 af	

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 609.56' @ 14.20 hrs Surf.Area= 2,481 sf Storage= 2,849 cf
Flood Elev= 611.25' Surf.Area= 3,452 sf Storage= 7,739 cf

Plug-Flow detention time= 208.5 min calculated for 0.134 af (87% of inflow)
Center-of-Mass det. time= 151.3 min (990.1 - 838.9)

Volume	Invert	Avail.Storage	Storage Description
#1	607.00'	7,237 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 8,986 cf Overall - 1,749 cf Embedded = 7,237 cf
#2	607.00'	385 cf	**Sand Media (Prismatic)** Listed below (Recalc) Inside #1 1,166 cf Overall x 33.0% Voids
#3	608.00'	117 cf	**Infiltration Seed Mix (Prismatic)** Listed below (Recalc) Inside #1 583 cf Overall x 20.0% Voids
		7,739 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
607.00	1,166	0	0
608.00	1,166	1,166	1,166
609.00	2,130	1,648	2,814
610.00	2,760	2,445	5,259
611.20	3,452	3,727	8,986

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
607.00	1,166	0	0
608.00	1,166	1,166	1,166

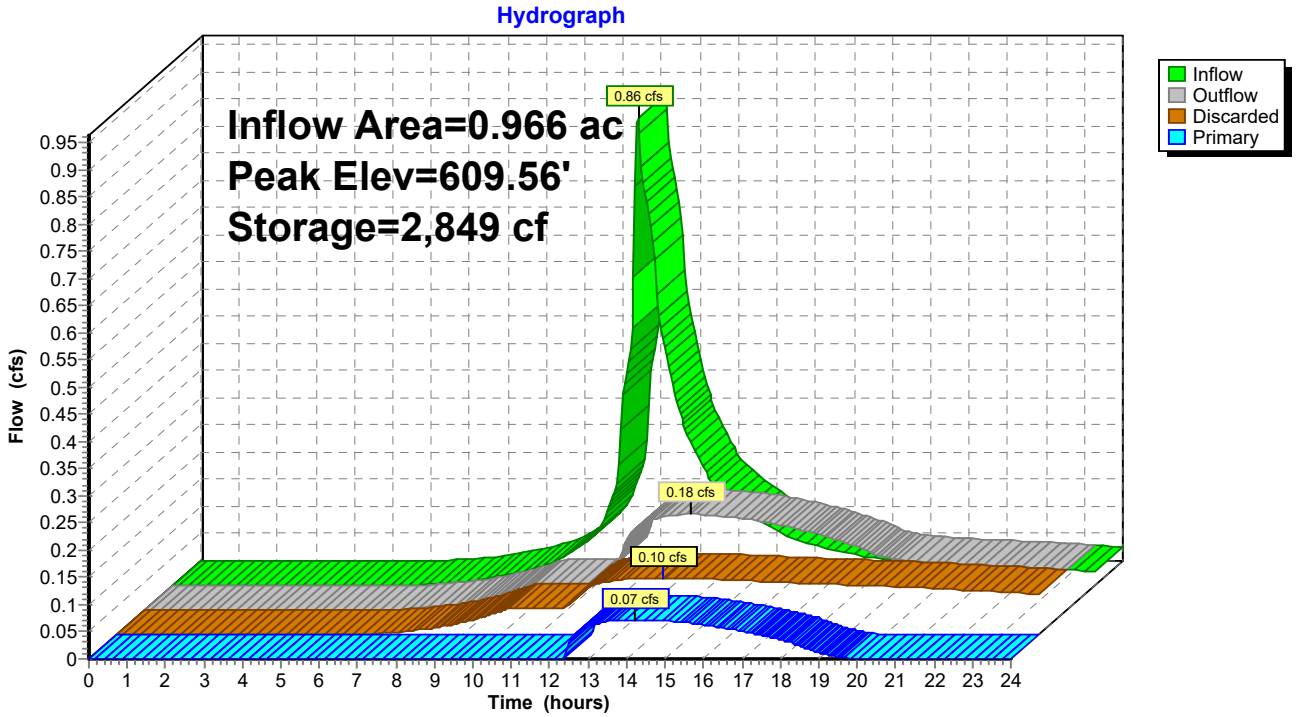
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
608.00	1,166	0	0
608.50	1,166	583	583

Device	Routing	Invert	Outlet Devices
#1	Discarded	607.00'	**1.805 in/hr Exfiltration over Surface area**
#2	Primary	607.50'	**8.0" Round Culvert** L= 20.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 607.50' / 607.00' S= 0.0250 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.35 sf
#3	Device 2	609.00'	**2.0" Vert. Orifice/Grate** C= 0.600
#4	Device 2	609.80'	**8.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.10 cfs @ 14.20 hrs HW=609.56' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.10 cfs)

Primary OutFlow Max=0.07 cfs @ 14.20 hrs HW=609.56' (Free Discharge)
└─**2=Culvert** (Passes 0.07 cfs of 1.74 cfs potential flow)
  ├─**3=Orifice/Grate** (Orifice Controls 0.07 cfs @ 3.31 fps)
  └─**4=Orifice/Grate** (Controls 0.00 cfs)

Pond 1: SFB-1



Stage-Discharge for Pond 1: SFB-1

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
607.00	0.00	0.00	0.00
607.05	0.05	0.05	0.00
607.10	0.05	0.05	0.00
607.15	0.05	0.05	0.00
607.20	0.05	0.05	0.00
607.25	0.05	0.05	0.00
607.30	0.05	0.05	0.00
607.35	0.05	0.05	0.00
607.40	0.05	0.05	0.00
607.45	0.05	0.05	0.00
607.50	0.05	0.05	0.00
607.55	0.05	0.05	0.00
607.60	0.05	0.05	0.00
607.65	0.05	0.05	0.00
607.70	0.05	0.05	0.00
607.75	0.05	0.05	0.00
607.80	0.05	0.05	0.00
607.85	0.05	0.05	0.00
607.90	0.05	0.05	0.00
607.95	0.05	0.05	0.00
608.00	0.05	0.05	0.00
608.05	0.05	0.05	0.00
608.10	0.05	0.05	0.00
608.15	0.05	0.05	0.00
608.20	0.06	0.06	0.00
608.25	0.06	0.06	0.00
608.30	0.06	0.06	0.00
608.35	0.06	0.06	0.00
608.40	0.06	0.06	0.00
608.45	0.07	0.07	0.00
608.50	0.07	0.07	0.00
608.55	0.07	0.07	0.00
608.60	0.07	0.07	0.00
608.65	0.07	0.07	0.00
608.70	0.08	0.08	0.00
608.75	0.08	0.08	0.00
608.80	0.08	0.08	0.00
608.85	0.08	0.08	0.00
608.90	0.08	0.08	0.00
608.95	0.09	0.09	0.00
609.00	0.09	0.09	0.00
609.05	0.09	0.09	0.00
609.10	0.11	0.09	0.01
609.15	0.12	0.09	0.03
609.20	0.13	0.09	0.04
609.25	0.14	0.10	0.04
609.30	0.15	0.10	0.05
609.35	0.15	0.10	0.05
609.40	0.16	0.10	0.06
609.45	0.16	0.10	0.06
609.50	0.17	0.10	0.07
609.55	0.18	0.10	0.07
609.60	0.18	0.10	0.08
609.65	0.19	0.11	0.08
609.70	0.19	0.11	0.08
609.75	0.19	0.11	0.09
609.80	0.20	0.11	0.09
609.85	0.28	0.11	0.17
609.90	0.42	0.11	0.31
609.95	0.61	0.11	0.50
610.00	0.83	0.12	0.71
610.05	1.06	0.12	0.94
610.10	1.14	0.12	1.03
610.15	1.22	0.12	1.10
610.20	1.29	0.12	1.17
610.25	1.36	0.12	1.24
610.30	1.43	0.12	1.30
610.35	1.49	0.12	1.36
610.40	1.55	0.12	1.42
610.45	1.60	0.13	1.48
610.50	1.66	0.13	1.53
610.55	1.71	0.13	1.58
610.60	1.76	0.13	1.63
610.65	1.81	0.13	1.68
610.70	1.86	0.13	1.73
610.75	1.91	0.13	1.77
610.80	1.95	0.13	1.82
610.85	2.00	0.14	1.86
610.90	2.04	0.14	1.90
610.95	2.08	0.14	1.95
611.00	2.13	0.14	1.99
611.05	2.17	0.14	2.03
611.10	2.21	0.14	2.07
611.15	2.25	0.14	2.10
611.20	2.29	**0.14**	2.14
611.25	**2.32**	0.14	**2.18**

Summary for Pond 2: SFB-2

Inflow Area =	4.230 ac, 47.33% Impervious, Inflow Depth > 1.04" for 2-YR event				
Inflow =	1.65 cfs @	12.10 hrs, Volume=	0.367 af		
Outflow =	0.37 cfs @	15.39 hrs, Volume=	0.340 af, Atten= 78%, Lag= 197.3 min		
Discarded =	0.34 cfs @	15.39 hrs, Volume=	0.333 af		
Primary =	0.03 cfs @	15.39 hrs, Volume=	0.007 af		

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 615.36' @ 15.39 hrs Surf.Area= 6,207 sf Storage= 5,413 cf
Flood Elev= 617.40' Surf.Area= 10,100 sf Storage= 21,942 cf

Plug-Flow detention time= 174.3 min calculated for 0.339 af (92% of inflow)
Center-of-Mass det. time= 138.1 min (1,030.1 - 892.1)

Volume	Invert	Avail.Storage	Storage Description
#1	613.25'	20,246 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 26,162 cf Overall - 5,916 cf Embedded = 20,246 cf
#2	613.25'	1,302 cf	**Sand Media (Prismatic)** Listed below (Recalc) Inside #1 3,944 cf Overall x 33.0% Voids
#3	614.25'	394 cf	**Infiltration Seed Mix (Prismatic)** Listed below (Recalc) Inside #1 1,972 cf Overall x 20.0% Voids
		21,942 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
613.25	3,944	0	0
614.25	3,944	3,944	3,944
615.00	5,539	3,556	7,500
616.00	7,378	6,459	13,959
617.00	9,278	8,328	22,287
617.40	10,100	3,876	26,162

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
613.25	3,944	0	0
614.25	3,944	3,944	3,944

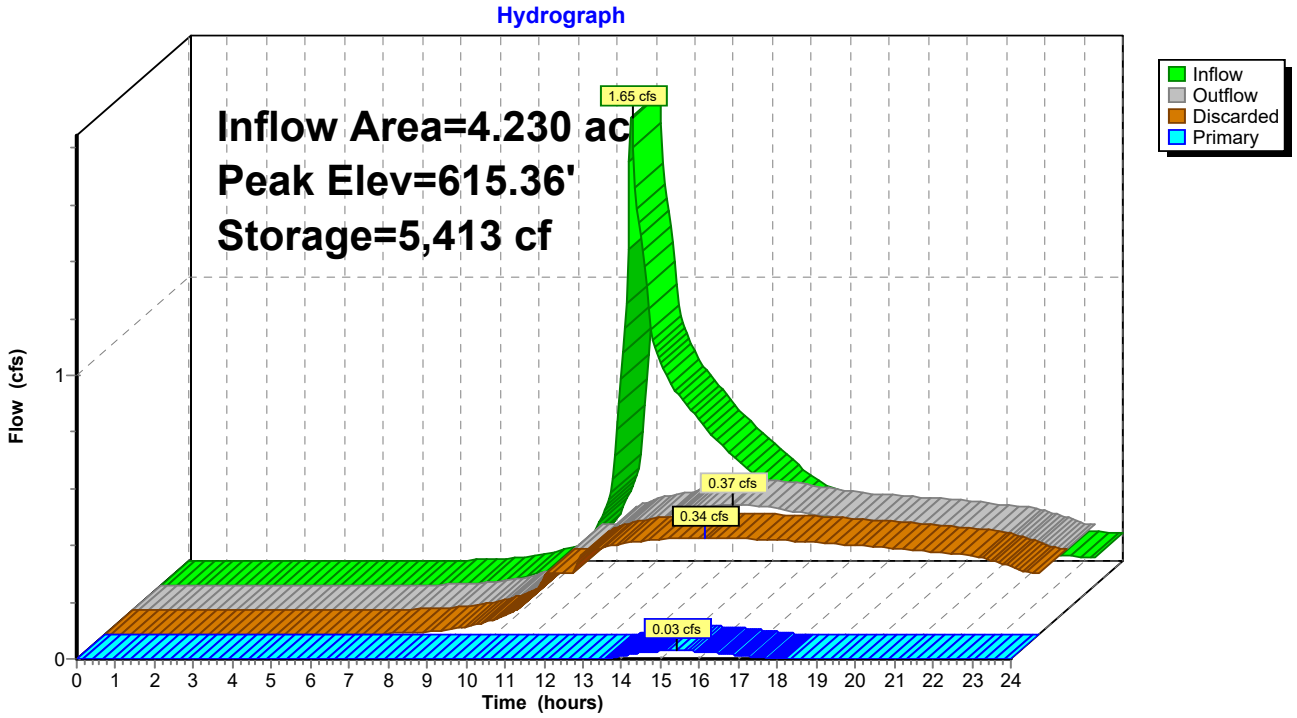
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
614.25	3,944	0	0
614.75	3,944	1,972	1,972

Device	Routing	Invert	Outlet Devices
#1	Discarded	613.25'	**2.380 in/hr Exfiltration over Surface area**
#2	Primary	613.75'	**8.0" Round Culvert** L= 28.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 613.75' / 612.25' S= 0.0536 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.35 sf
#3	Device 2	615.20'	**2.0" Vert. Orifice/Grate** C= 0.600
#4	Device 2	616.00'	**6.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.34 cfs @ 15.39 hrs HW=615.36' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.34 cfs)

Primary OutFlow Max=0.03 cfs @ 15.39 hrs HW=615.36' (Free Discharge)
└─**2=Culvert** (Passes 0.03 cfs of 1.50 cfs potential flow)
  ├─**3=Orifice/Grate** (Orifice Controls 0.03 cfs @ 1.38 fps)
  └─**4=Orifice/Grate** (Controls 0.00 cfs)

Pond 2: SFB-2



Stage-Discharge for Pond 2: SFB-2

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
613.25	0.00	0.00	0.00
613.30	0.22	0.22	0.00
613.35	0.22	0.22	0.00
613.40	0.22	0.22	0.00
613.45	0.22	0.22	0.00
613.50	0.22	0.22	0.00
613.55	0.22	0.22	0.00
613.60	0.22	0.22	0.00
613.65	0.22	0.22	0.00
613.70	0.22	0.22	0.00
613.75	0.22	0.22	0.00
613.80	0.22	0.22	0.00
613.85	0.22	0.22	0.00
613.90	0.22	0.22	0.00
613.95	0.22	0.22	0.00
614.00	0.22	0.22	0.00
614.05	0.22	0.22	0.00
614.10	0.22	0.22	0.00
614.15	0.22	0.22	0.00
614.20	0.22	0.22	0.00
614.25	0.22	0.22	0.00
614.30	0.22	0.22	0.00
614.35	0.23	0.23	0.00
614.40	0.23	0.23	0.00
614.45	0.24	0.24	0.00
614.50	0.25	0.25	0.00
614.55	0.25	0.25	0.00
614.60	0.26	0.26	0.00
614.65	0.26	0.26	0.00
614.70	0.27	0.27	0.00
614.75	0.28	0.28	0.00
614.80	0.28	0.28	0.00
614.85	0.29	0.29	0.00
614.90	0.29	0.29	0.00
614.95	0.30	0.30	0.00
615.00	0.31	0.31	0.00
615.05	0.31	0.31	0.00
615.10	0.32	0.32	0.00
615.15	0.32	0.32	0.00
615.20	0.33	0.33	0.00
615.25	0.33	0.33	0.00
615.30	0.35	0.34	0.01
615.35	0.37	0.34	0.03
615.40	0.38	0.35	0.04
615.45	0.39	0.35	0.04
615.50	0.40	0.36	0.05
615.55	0.42	0.36	0.05
615.60	0.43	0.37	0.06
615.65	0.43	0.37	0.06
615.70	0.44	0.38	0.07
615.75	0.45	0.38	0.07
615.80	0.46	0.39	0.08
615.85	0.47	0.39	0.08
615.90	0.48	0.40	0.08
615.95	0.49	0.40	0.09
616.00	0.50	0.41	0.09
616.05	0.56	0.41	0.15
616.10	0.67	0.42	0.26
616.15	0.82	0.42	0.40
616.20	0.95	0.43	0.52
616.25	1.01	0.43	0.58
616.30	1.06	0.44	0.62
616.35	1.11	0.44	0.67
616.40	1.16	0.45	0.71
616.45	1.20	0.45	0.75
616.50	1.24	0.46	0.78
616.55	1.28	0.46	0.82
616.60	1.32	0.47	0.85
616.65	1.36	0.47	0.89
616.70	1.40	0.48	0.92
616.75	1.43	0.48	0.95
616.80	1.47	0.49	0.97
616.85	1.50	0.50	1.00
616.90	1.53	0.50	1.03
616.95	1.56	0.51	1.06
617.00	1.59	0.51	1.08
617.05	1.63	0.52	1.11
617.10	1.66	0.52	1.13
617.15	1.69	0.53	1.16
617.20	1.71	0.53	1.18
617.25	1.74	0.54	1.20
617.30	1.77	0.55	1.23
617.35	1.80	0.55	1.25
617.40	**1.83**	**0.56**	**1.27**

Summary for Pond DB-1: DB-1

Inflow	=	1.39 cfs @	12.09 hrs,	Volume=	0.034 af
Outflow	=	0.22 cfs @	12.42 hrs,	Volume=	0.032 af, Atten= 84%, Lag= 19.9 min
Primary	=	0.22 cfs @	12.42 hrs,	Volume=	0.032 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 609.69' @ 12.42 hrs Surf.Area= 3,131 sf Storage= 1,163 cf
Flood Elev= 611.25' Surf.Area= 3,131 sf Storage= 5,328 cf

Plug-Flow detention time= 101.4 min calculated for 0.032 af (94% of inflow)
Center-of-Mass det. time= 101.5 min (828.6 - 727.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	609.25'	0 cf	**27.58'W x 113.50'L x 2.67'H Field A** 8,349 cf Overall - 8,349 cf Embedded = 0 cf x 40.0% Voids
#2A	609.25'	5,328 cf	**StormTrap ST1 SingleTrap 2-0** x 32 Inside #1 Inside= 82.7"W x 24.0"H => 11.84 sf x 14.06'L = 166.5 cf Outside= 82.7"W x 32.0"H => 18.39 sf x 14.06'L = 258.6 cf 4 Rows of 8 Chambers 27.58' x 112.50' Core + 0.00' x 0.50' Border = 27.58' x 113.50' System
		5,328 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	609.25'	**6.0" Round Culvert** L= 150.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 609.25' / 608.50' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#2	Device 1	609.25'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	610.25'	**4.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.22 cfs @ 12.42 hrs HW=609.69' (Free Discharge)
└─**1=Culvert** (Passes 0.22 cfs of 0.30 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.22 cfs @ 2.50 fps)
  └─**3=Orifice/Grate** (Controls 0.00 cfs)

Pond DB-1: DB-1 - Chamber Wizard Field A

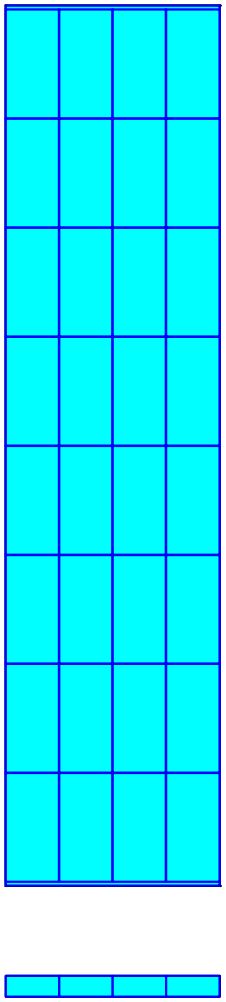
Chamber Model = StormTrap ST1 SingleTrap 2-0 (StormTrap ST1 SingleTrap® Type VI)
Inside= 82.7"W x 24.0"H => 11.84 sf x 14.06'L = 166.5 cf
Outside= 82.7"W x 32.0"H => 18.39 sf x 14.06'L = 258.6 cf

8 Chambers/Row x 14.06' Long = 112.50' Row Length +6.0" Border x 2 = 113.50' Base Length
4 Rows x 82.7" Wide = 27.58' Base Width
32.0" Chamber Height = 2.67' Field Height

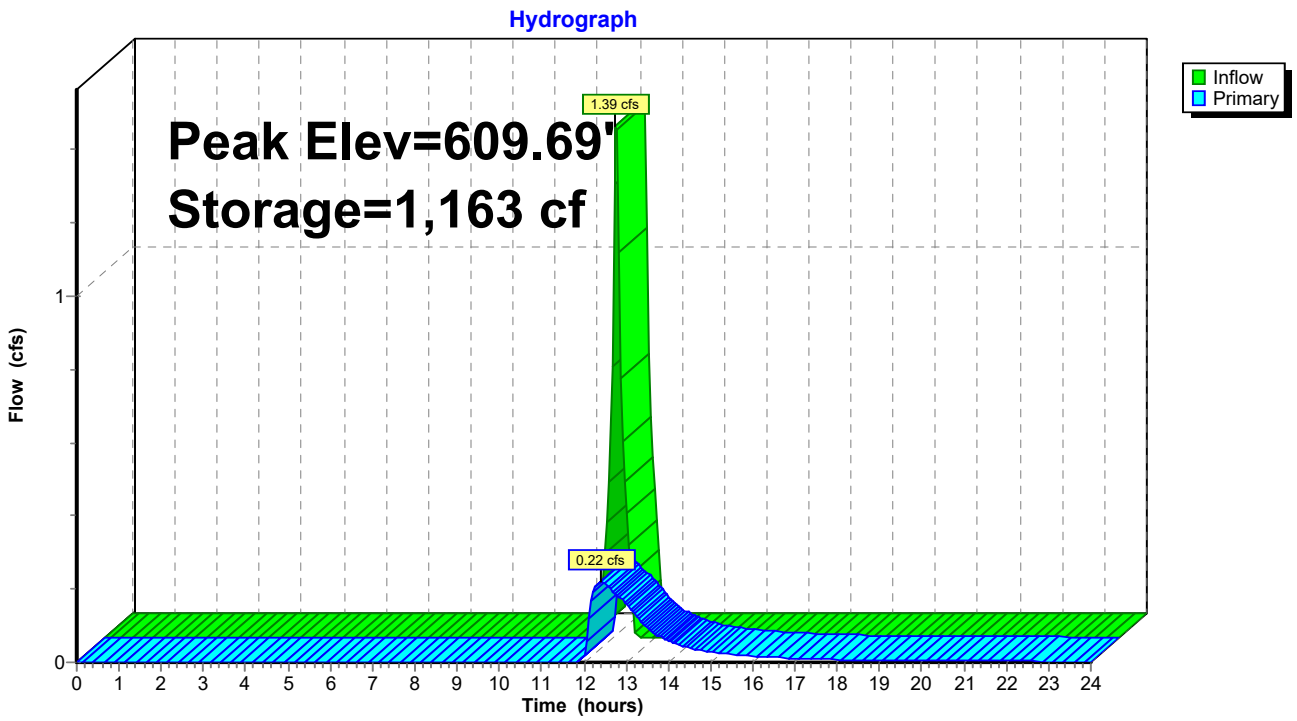
32 Chambers x 166.5 cf = 5,328.0 cf Chamber Storage
32 Chambers x 258.6 cf + 73.6 cf Border = 8,348.6 cf Displacement

Chamber Storage = 5,328.0 cf = 0.122 af
Overall Storage Efficiency = 63.8%
Overall System Size = 113.50' x 27.58' x 2.67'

32 Chambers (plus border)
309.2 cy Field



Pond DB-1: DB-1


Hydrograph
Peak Elev=609.69'
Storage=1,163 cf
1.39 cfs
0.22 cfs
Inflow
Primary
Flow (cfs)
Time (hours)
0
1
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

Stage-Discharge for Pond DB-1: DB-1

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
609.25	0.00	610.29	0.40	611.33	0.65
609.27	0.00	610.31	0.41	611.35	0.65
609.29	0.00	610.33	0.42	611.37	0.65
609.31	0.01	610.35	0.43	611.39	0.66
609.33	0.01	610.37	0.44	611.41	0.66
609.35	0.02	610.39	0.46	611.43	0.66
609.37	0.03	610.41	0.48	611.45	0.66
609.39	0.04	610.43	0.49	611.47	0.67
609.41	0.05	610.45	0.51	611.49	0.67
609.43	0.06	610.47	0.51	611.51	0.67
609.45	0.08	610.49	0.52	611.53	0.68
609.47	0.09	610.51	0.52	611.55	0.68
609.49	0.11	610.53	0.53	611.57	0.68
609.51	0.13	610.55	0.53	611.59	0.68
609.53	0.14	610.57	0.53	611.61	0.69
609.55	0.15	610.59	0.54	611.63	0.69
609.57	0.17	610.61	0.54	611.65	0.69
609.59	0.17	610.63	0.54	611.67	0.69
609.61	0.18	610.65	0.55	611.69	0.70
609.63	0.19	610.67	0.55	611.71	0.70
609.65	0.20	610.69	0.55	611.73	0.70
609.67	0.21	610.71	0.56	611.75	0.70
609.69	0.22	610.73	0.56	611.77	0.71
609.71	0.23	610.75	0.56	611.79	0.71
609.73	0.24	610.77	0.57	611.81	0.71
609.75	0.24	610.79	0.57	611.83	0.71
609.77	0.25	610.81	0.57	611.85	0.72
609.79	0.26	610.83	0.57	611.87	0.72
609.81	0.26	610.85	0.58	611.89	0.72
609.83	0.27	610.87	0.58	611.91	**0.72**
609.85	0.28	610.89	0.58		
609.87	0.28	610.91	0.59		
609.89	0.29	610.93	0.59		
609.91	0.30	610.95	0.59		
609.93	0.30	610.97	0.60		
609.95	0.31	610.99	0.60		
609.97	0.31	611.01	0.60		
609.99	0.32	611.03	0.61		
610.01	0.32	611.05	0.61		
610.03	0.33	611.07	0.61		
610.05	0.33	611.09	0.61		
610.07	0.34	611.11	0.62		
610.09	0.34	611.13	0.62		
610.11	0.35	611.15	0.62		
610.13	0.35	611.17	0.63		
610.15	0.36	611.19	0.63		
610.17	0.36	611.21	0.63		
610.19	0.37	611.23	0.63		
610.21	0.37	611.25	0.64		
610.23	0.38	611.27	0.64		
610.25	0.38	611.29	0.64		
610.27	0.39	611.31	0.65		

Summary for Pond DB-2: DB-2

Inflow	=	1.04 cfs @	12.09 hrs,	Volume=	0.023 af
Outflow	=	0.05 cfs @	12.49 hrs,	Volume=	0.020 af, Atten= 95%, Lag= 24.1 min
Primary	=	0.05 cfs @	12.49 hrs,	Volume=	0.020 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 615.59' @ 12.49 hrs Surf.Area= 3,131 sf Storage= 904 cf
Flood Elev= 617.25' Surf.Area= 3,131 sf Storage= 5,328 cf

Plug-Flow detention time= 199.4 min calculated for 0.020 af (89% of inflow)
Center-of-Mass det. time= 197.4 min (924.6 - 727.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	615.25'	0 cf	**27.58'W x 113.50'L x 2.67'H Field A** 8,349 cf Overall - 8,349 cf Embedded = 0 cf x 40.0% Voids
#2A	615.25'	5,328 cf	**StormTrap ST1 SingleTrap 2-0** x 32 Inside #1 Inside= 82.7"W x 24.0"H => 11.84 sf x 14.06'L = 166.5 cf Outside= 82.7"W x 32.0"H => 18.39 sf x 14.06'L = 258.6 cf 4 Rows of 8 Chambers 27.58' x 112.50' Core + 0.00' x 0.50' Border = 27.58' x 113.50' System
		5,328 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	615.25'	**8.0" Round Culvert** L= 44.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 615.25' / 615.00' S= 0.0057 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.35 sf
#2	Device 1	615.25'	**2.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.05 cfs @ 12.49 hrs HW=615.59' (Free Discharge)
└─**1=Culvert** (Passes 0.05 cfs of 0.28 cfs potential flow)
  └─**2=Orifice/Grate** (Orifice Controls 0.05 cfs @ 2.44 fps)

Pond DB-2: DB-2 - Chamber Wizard Field A

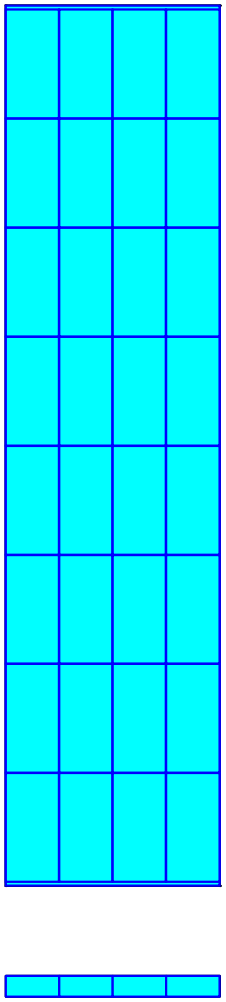
Chamber Model = StormTrap ST1 SingleTrap 2-0 (StormTrap ST1 SingleTrap® Type VI)
Inside= 82.7"W x 24.0"H => 11.84 sf x 14.06'L = 166.5 cf
Outside= 82.7"W x 32.0"H => 18.39 sf x 14.06'L = 258.6 cf

8 Chambers/Row x 14.06' Long = 112.50' Row Length +6.0" Border x 2 = 113.50' Base Length
4 Rows x 82.7" Wide = 27.58' Base Width
32.0" Chamber Height = 2.67' Field Height

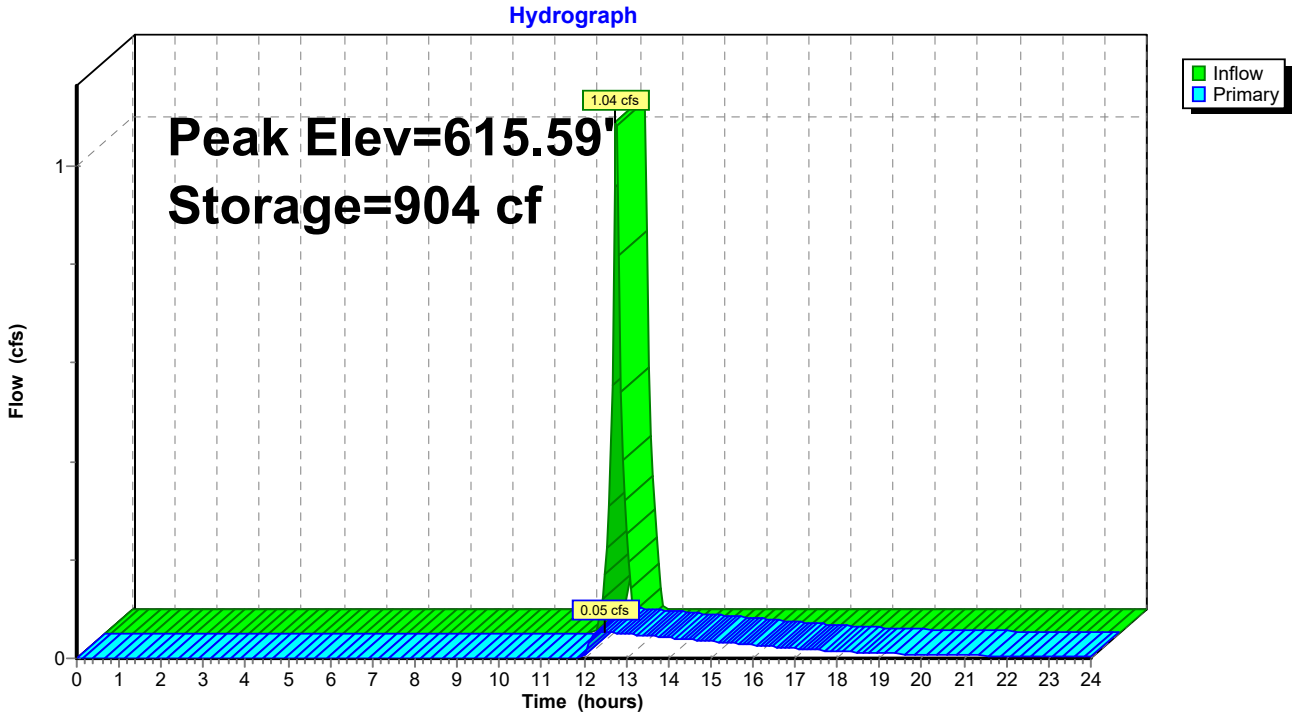
32 Chambers x 166.5 cf = 5,328.0 cf Chamber Storage
32 Chambers x 258.6 cf + 73.6 cf Border = 8,348.6 cf Displacement

Chamber Storage = 5,328.0 cf = 0.122 af
Overall Storage Efficiency = 63.8%
Overall System Size = 113.50' x 27.58' x 2.67'

32 Chambers (plus border)
309.2 cy Field



Pond DB-2: DB-2


Hydrograph
Inflow
Primary
1.04 cfs
0.05 cfs
Peak Elev=615.59'
Storage=904 cf
Flow (cfs)
Time (hours)
0
1
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

Stage-Discharge for Pond DB-2: DB-2

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
615.25	0.00	616.29	0.10	617.33	0.15
615.27	0.00	616.31	0.10	617.35	0.15
615.29	0.00	616.33	0.10	617.37	0.15
615.31	0.01	616.35	0.11	617.39	0.15
615.33	0.01	616.37	0.11	617.41	0.15
615.35	0.01	616.39	0.11	617.43	0.15
615.37	0.02	616.41	0.11	617.45	0.15
615.39	0.02	616.43	0.11	617.47	0.15
615.41	0.03	616.45	0.11	617.49	0.15
615.43	0.03	616.47	0.11	617.51	0.15
615.45	0.04	616.49	0.11	617.53	0.16
615.47	0.04	616.51	0.11	617.55	0.16
615.49	0.04	616.53	0.11	617.57	0.16
615.51	0.04	616.55	0.12	617.59	0.16
615.53	0.05	616.57	0.12	617.61	0.16
615.55	0.05	616.59	0.12	617.63	0.16
615.57	0.05	616.61	0.12	617.65	0.16
615.59	0.05	616.63	0.12	617.67	0.16
615.61	0.06	616.65	0.12	617.69	0.16
615.63	0.06	616.67	0.12	617.71	0.16
615.65	0.06	616.69	0.12	617.73	0.16
615.67	0.06	616.71	0.12	617.75	0.16
615.69	0.06	616.73	0.12	617.77	0.16
615.71	0.06	616.75	0.13	617.79	0.16
615.73	0.07	616.77	0.13	617.81	0.17
615.75	0.07	616.79	0.13	617.83	0.17
615.77	0.07	616.81	0.13	617.85	0.17
615.79	0.07	616.83	0.13	617.87	0.17
615.81	0.07	616.85	0.13	617.89	0.17
615.83	0.07	616.87	0.13	617.91	**0.17**
615.85	0.08	616.89	0.13		
615.87	0.08	616.91	0.13		
615.89	0.08	616.93	0.13		
615.91	0.08	616.95	0.13		
615.93	0.08	616.97	0.13		
615.95	0.08	616.99	0.14		
615.97	0.08	617.01	0.14		
615.99	0.09	617.03	0.14		
616.01	0.09	617.05	0.14		
616.03	0.09	617.07	0.14		
616.05	0.09	617.09	0.14		
616.07	0.09	617.11	0.14		
616.09	0.09	617.13	0.14		
616.11	0.09	617.15	0.14		
616.13	0.09	617.17	0.14		
616.15	0.09	617.19	0.14		
616.17	0.10	617.21	0.14		
616.19	0.10	617.23	0.14		
616.21	0.10	617.25	0.15		
616.23	0.10	617.27	0.15		
616.25	0.10	617.29	0.15		
616.27	0.10	617.31	0.15		

Summary for Pond DB-6: DB-6

Inflow Area = 0.133 ac,100.00% Impervious, Inflow Depth > 15.55" for 2-YR event
Inflow = 2.39 cfs @ 12.23 hrs, Volume= 0.173 af
Outflow = 0.48 cfs @ 12.82 hrs, Volume= 0.169 af, Atten= 80%, Lag= 35.4 min
Primary = 0.48 cfs @ 12.82 hrs, Volume= 0.169 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 613.74' @ 12.82 hrs Surf.Area= 2,902 sf Storage= 3,827 cf
Flood Elev= 617.25' Surf.Area= 2,902 sf Storage= 12,873 cf

Plug-Flow detention time= 113.6 min calculated for 0.169 af (98% of inflow)
Center-of-Mass det. time= 102.0 min (884.3 - 782.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	612.25'	0 cf	**38.75'W x 74.90'L x 5.50'H Field A** 15,962 cf Overall - 15,962 cf Embedded = 0 cf x 40.0% Voids
#2A	612.25'	12,873 cf	**StormTrap ST2 SingleTrap 5-0**x 12 Inside #1 Inside= 101.7"W x 60.0"H => 38.33 sf x 15.40'L = 590.2 cf Outside= 101.7"W x 66.0"H => 46.64 sf x 15.40'L = 718.0 cf 3 Rows of 4 Chambers 25.44' x 61.58' Core + 6.66' Border = 38.75' x 74.90' System
		12,873 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	612.25'	**12.0" Round Culvert** L= 110.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 612.25' / 609.60' S= 0.0241 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	612.25'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	614.00'	**8.0" Vert. Orifice/Grate** C= 0.600
#4	Device 1	615.25'	**8.0" Vert. Orifice/Grate** C= 0.600
#5	Device 1	616.25'	**12.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.48 cfs @ 12.82 hrs HW=613.74' (Free Discharge)
└─**1=Culvert** (Passes 0.48 cfs of 2.96 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.48 cfs @ 5.53 fps)
  ├─**3=Orifice/Grate** (Controls 0.00 cfs)
  ├─**4=Orifice/Grate** (Controls 0.00 cfs)
  └─**5=Orifice/Grate** (Controls 0.00 cfs)

Pond DB-6: DB-6 - Chamber Wizard Field A

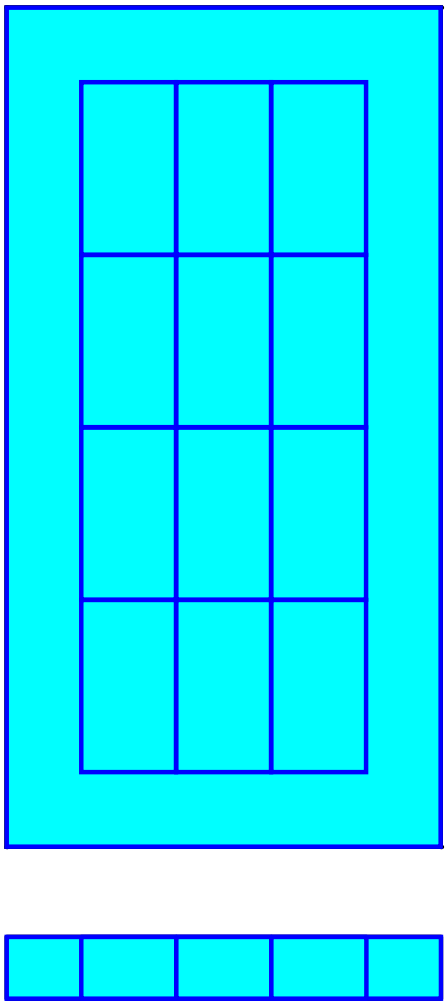
Chamber Model = StormTrap ST2 SingleTrap 5-0 (StormTrap ST2 SingleTrap® Type II+IV)
Inside= 101.7"W x 60.0"H => 38.33 sf x 15.40'L = 590.2 cf
Outside= 101.7"W x 66.0"H => 46.64 sf x 15.40'L = 718.0 cf

4 Chambers/Row x 15.40' Long = 61.58' Row Length +79.9" Border x 2 = 74.90' Base Length
3 Rows x 101.7" Wide + 79.9" Side Border x 2 = 38.75' Base Width
66.0" Chamber Height = 5.50' Field Height

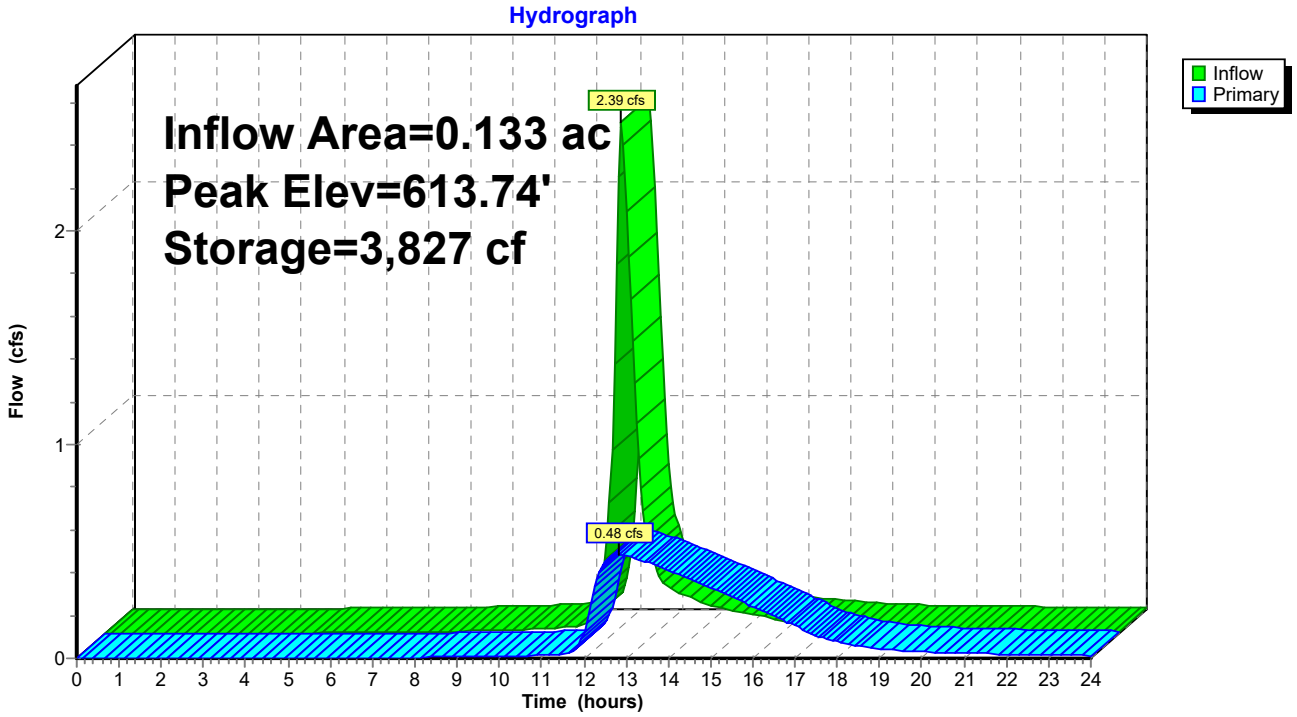
12 Chambers x 590.2 cf + 5,791.0 cf Border = 12,873.2 cf Chamber Storage
12 Chambers x 718.0 cf + 7,346.3 cf Border = 15,962.2 cf Displacement

Chamber Storage = 12,873.2 cf = 0.296 af
Overall Storage Efficiency = 80.6%
Overall System Size = 74.90' x 38.75' x 5.50'

12 Chambers (plus border)
591.2 cy Field



Pond DB-6: DB-6


Hydrograph
Inflow Area=0.133 ac
Peak Elev=613.74'
Storage=3,827 cf
2.39 cfs
0.48 cfs
Inflow
Primary
Flow (cfs)
Time (hours)
0
1
2
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

Stage-Discharge for Pond DB-6: DB-6

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
612.25	0.00	614.33	0.92	616.41	4.90
612.29	0.00	614.37	1.00	616.45	5.02
612.33	0.02	614.41	1.08	616.49	5.16
612.37	0.03	614.45	1.17	616.53	5.30
612.41	0.06	614.49	1.26	616.57	5.46
612.45	0.08	614.53	1.35	616.61	5.62
612.49	0.11	614.57	1.43	616.65	5.79
612.53	0.14	614.61	1.51	616.69	5.93
612.57	0.17	614.65	1.58	616.73	5.96
612.61	0.18	614.69	1.64	616.77	5.99
612.65	0.20	614.73	1.70	616.81	6.02
612.69	0.22	614.77	1.76	616.85	6.05
612.73	0.24	614.81	1.81	616.89	6.07
612.77	0.25	614.85	1.86	616.93	6.10
612.81	0.26	614.89	1.91	616.97	6.13
612.85	0.28	614.93	1.96	617.01	6.16
612.89	0.29	614.97	2.01	617.05	6.19
612.93	0.30	615.01	2.06	617.09	6.22
612.97	0.31	615.05	2.10	617.13	6.25
613.01	0.32	615.09	2.15	617.17	6.28
613.05	0.33	615.13	2.19	617.21	6.31
613.09	0.34	615.17	2.23	617.25	6.33
613.13	0.35	615.21	2.28	617.29	6.36
613.17	0.36	615.25	2.32	617.33	6.39
613.21	0.37	615.29	2.36	617.37	6.42
613.25	0.38	615.33	2.42	617.41	6.44
613.29	0.39	615.37	2.48	617.45	6.47
613.33	0.40	615.41	2.56	617.49	6.50
613.37	0.41	615.45	2.64	617.53	6.53
613.41	0.42	615.49	2.73	617.57	6.55
613.45	0.43	615.53	2.83	617.61	6.58
613.49	0.44	615.57	2.93	617.65	6.61
613.53	0.44	615.61	3.04	617.69	6.64
613.57	0.45	615.65	3.16	617.73	**6.66**
613.61	0.46	615.69	3.27		
613.65	0.47	615.73	3.39		
613.69	0.47	615.77	3.50		
613.73	0.48	615.81	3.61		
613.77	0.49	615.85	3.72		
613.81	0.50	615.89	3.82		
613.85	0.50	615.93	3.90		
613.89	0.51	615.97	3.99		
613.93	0.52	616.01	4.07		
613.97	0.52	616.05	4.15		
614.01	0.53	616.09	4.23		
614.05	0.55	616.13	4.31		
614.09	0.57	616.17	4.38		
614.13	0.61	616.21	4.45		
614.17	0.65	616.25	4.52		
614.21	0.71	616.29	4.60		
614.25	0.77	616.33	4.69		
614.29	0.84	616.37	4.79		

Summary for Pond DB-7: DB-7

Inflow Area = 0.543 ac, 78.86% Impervious, Inflow Depth > 2.37" for 2-YR event
Inflow = 1.45 cfs @ 12.09 hrs, Volume= 0.107 af
Outflow = 0.31 cfs @ 12.51 hrs, Volume= 0.102 af, Atten= 79%, Lag= 25.4 min
Primary = 0.31 cfs @ 12.51 hrs, Volume= 0.102 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 616.51' @ 12.51 hrs Surf.Area= 3,131 sf Storage= 1,895 cf
Flood Elev= 617.80' Surf.Area= 3,131 sf Storage= 5,328 cf

Plug-Flow detention time= 106.4 min calculated for 0.102 af (95% of inflow)
Center-of-Mass det. time= 79.2 min (879.9 - 800.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	615.80'	0 cf	**27.58'W x 113.50'L x 2.67'H Field A** 8,349 cf Overall - 8,349 cf Embedded = 0 cf x 40.0% Voids
#2A	615.80'	5,328 cf	**StormTrap ST1 SingleTrap 2-0** x 32 Inside #1 Inside= 82.7"W x 24.0"H => 11.84 sf x 14.06'L = 166.5 cf Outside= 82.7"W x 32.0"H => 18.39 sf x 14.06'L = 258.6 cf 4 Rows of 8 Chambers 27.58' x 112.50' Core + 0.00' x 0.50' Border = 27.58' x 113.50' System
		5,328 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	615.80'	**6.0" Round Culvert** L= 124.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 615.80' / 615.00' S= 0.0065 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf
#2	Device 1	615.80'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	617.30'	**4.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.31 cfs @ 12.51 hrs HW=616.51' (Free Discharge)
└─**1=Culvert** (Passes 0.31 cfs of 0.51 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.31 cfs @ 3.55 fps)
  └─**3=Orifice/Grate** (Controls 0.00 cfs)

Pond DB-7: DB-7 - Chamber Wizard Field A

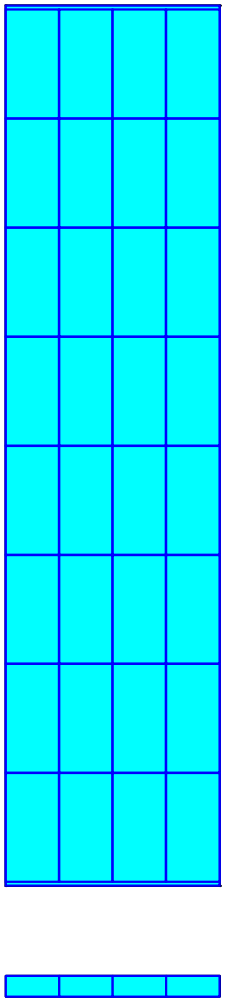
Chamber Model = StormTrap ST1 SingleTrap 2-0 (StormTrap ST1 SingleTrap® Type VI)
Inside= 82.7"W x 24.0"H => 11.84 sf x 14.06'L = 166.5 cf
Outside= 82.7"W x 32.0"H => 18.39 sf x 14.06'L = 258.6 cf

8 Chambers/Row x 14.06' Long = 112.50' Row Length +6.0" Border x 2 = 113.50' Base Length
4 Rows x 82.7" Wide = 27.58' Base Width
32.0" Chamber Height = 2.67' Field Height

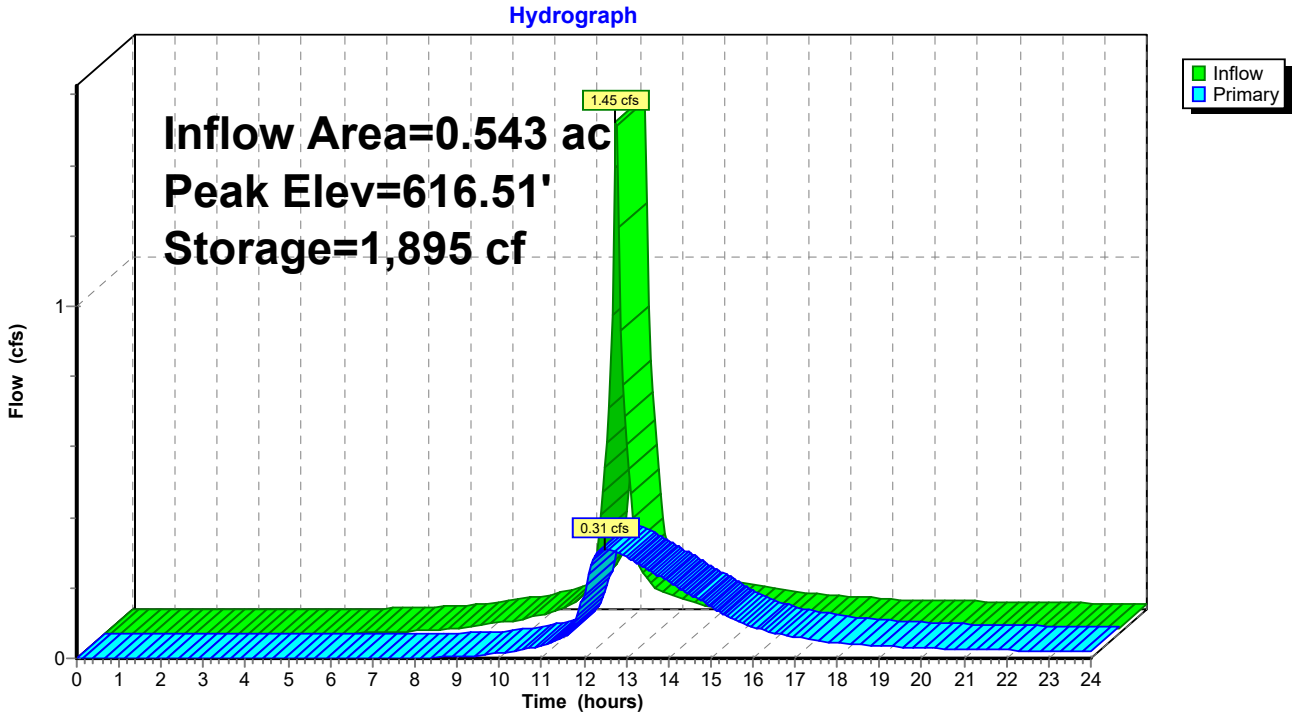
32 Chambers x 166.5 cf = 5,328.0 cf Chamber Storage
32 Chambers x 258.6 cf + 73.6 cf Border = 8,348.6 cf Displacement

Chamber Storage = 5,328.0 cf = 0.122 af
Overall Storage Efficiency = 63.8%
Overall System Size = 113.50' x 27.58' x 2.67'

32 Chambers (plus border)
309.2 cy Field



Pond DB-7: DB-7


Hydrograph
Inflow Area=0.543 ac
Peak Elev=616.51'
Storage=1,895 cf
1.45 cfs
0.31 cfs
Inflow
Primary
Flow (cfs)
Time (hours)
0
1
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

Stage-Discharge for Pond DB-7: DB-7

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
615.80	0.00	616.84	0.39	617.88	0.85
615.82	0.00	616.86	0.40	617.90	0.86
615.84	0.00	616.88	0.40	617.92	0.87
615.86	0.01	616.90	0.41	617.94	0.88
615.88	0.02	616.92	0.41	617.96	0.89
615.90	0.02	616.94	0.41	617.98	0.89
615.92	0.03	616.96	0.42	618.00	0.90
615.94	0.04	616.98	0.42	618.02	0.90
615.96	0.06	617.00	0.43	618.04	0.90
615.98	0.07	617.02	0.43	618.06	0.91
616.00	0.08	617.04	0.44	618.08	0.91
616.02	0.10	617.06	0.44	618.10	0.92
616.04	0.11	617.08	0.44	618.12	0.92
616.06	0.13	617.10	0.45	618.14	0.92
616.08	0.14	617.12	0.45	618.16	0.93
616.10	0.15	617.14	0.46	618.18	0.93
616.12	0.17	617.16	0.46	618.20	0.93
616.14	0.17	617.18	0.46	618.22	0.94
616.16	0.18	617.20	0.47	618.24	0.94
616.18	0.19	617.22	0.47	618.26	0.94
616.20	0.20	617.24	0.47	618.28	0.95
616.22	0.21	617.26	0.48	618.30	0.95
616.24	0.22	617.28	0.48	618.32	0.95
616.26	0.23	617.30	0.49	618.34	0.96
616.28	0.24	617.32	0.49	618.36	0.96
616.30	0.24	617.34	0.50	618.38	0.96
616.32	0.25	617.36	0.50	618.40	0.97
616.34	0.26	617.38	0.52	618.42	0.97
616.36	0.26	617.40	0.53	618.44	0.97
616.38	0.27	617.42	0.54	618.46	**0.98**
616.40	0.28	617.44	0.55		
616.42	0.28	617.46	0.57		
616.44	0.29	617.48	0.59		
616.46	0.30	617.50	0.60		
616.48	0.30	617.52	0.62		
616.50	0.31	617.54	0.64		
616.52	0.31	617.56	0.66		
616.54	0.32	617.58	0.67		
616.56	0.32	617.60	0.69		
616.58	0.33	617.62	0.71		
616.60	0.33	617.64	0.72		
616.62	0.34	617.66	0.73		
616.64	0.34	617.68	0.74		
616.66	0.35	617.70	0.76		
616.68	0.35	617.72	0.77		
616.70	0.36	617.74	0.78		
616.72	0.36	617.76	0.79		
616.74	0.37	617.78	0.80		
616.76	0.37	617.80	0.81		
616.78	0.38	617.82	0.82		
616.80	0.38	617.84	0.83		
616.82	0.39	617.86	0.84		

Summary for Pond ICS-1: ICS-1

Inflow Area =	0.693 ac, 62.75% Impervious, Inflow Depth > 2.19" for 2-YR event				
Inflow =	1.73 cfs @	12.09 hrs,	Volume=	0.126 af	
Outflow =	1.73 cfs @	12.09 hrs,	Volume=	0.126 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.33 cfs @	12.09 hrs,	Volume=	0.093 af	
Secondary =	1.39 cfs @	12.09 hrs,	Volume=	0.034 af	

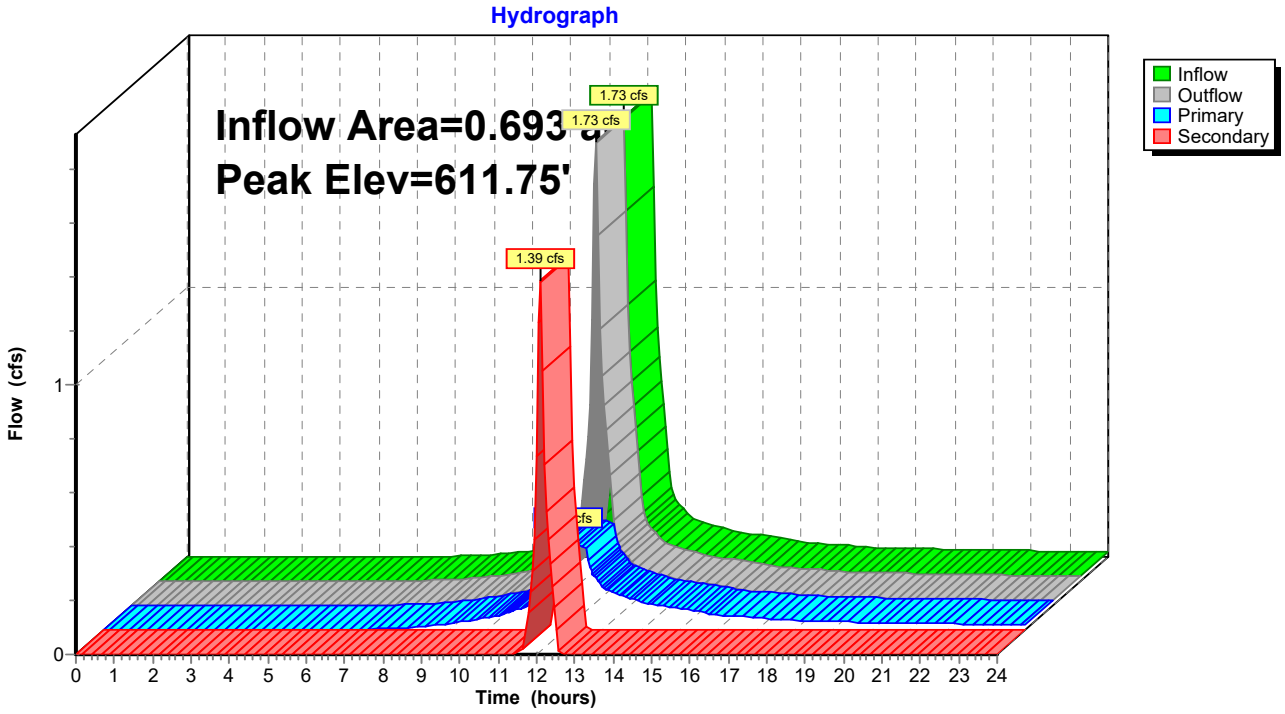
Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 611.75' @ 12.09 hrs
Flood Elev= 613.25'

Device	Routing	Invert	Outlet Devices
#1	Primary	609.25'	**4.0" Round Culvert** L= 145.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 609.25' / 608.50' S= 0.0052 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf
#2	Secondary	611.20'	**12.0" Round Culvert** L= 5.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 611.20' / 610.20' S= 0.2000 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.33 cfs @ 12.09 hrs HW=611.74' (Free Discharge)
└**1=Culvert** (Barrel Controls 0.33 cfs @ 3.82 fps)

Secondary OutFlow Max=1.36 cfs @ 12.09 hrs HW=611.74' (Free Discharge)
└**2=Culvert** (Inlet Controls 1.36 cfs @ 3.13 fps)

Pond ICS-1: ICS-1



Stage-Discharge for Pond ICS-1: ICS-1

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
609.25	0.00	0.00	0.00
609.30	0.00	0.00	0.00
609.35	0.02	0.02	0.00
609.40	0.04	0.04	0.00
609.45	0.07	0.07	0.00
609.50	0.11	0.11	0.00
609.55	0.14	0.14	0.00
609.60	0.17	0.17	0.00
609.65	0.19	0.19	0.00
609.70	0.18	0.18	0.00
609.75	0.19	0.19	0.00
609.80	0.19	0.19	0.00
609.85	0.20	0.20	0.00
609.90	0.20	0.20	0.00
609.95	0.21	0.21	0.00
610.00	0.21	0.21	0.00
610.05	0.22	0.22	0.00
610.10	0.22	0.22	0.00
610.15	0.22	0.22	0.00
610.20	0.23	0.23	0.00
610.25	0.23	0.23	0.00
610.30	0.24	0.24	0.00
610.35	0.24	0.24	0.00
610.40	0.24	0.24	0.00
610.45	0.25	0.25	0.00
610.50	0.25	0.25	0.00
610.55	0.26	0.26	0.00
610.60	0.26	0.26	0.00
610.65	0.26	0.26	0.00
610.70	0.27	0.27	0.00
610.75	0.27	0.27	0.00
610.80	0.27	0.27	0.00
610.85	0.28	0.28	0.00
610.90	0.28	0.28	0.00
610.95	0.28	0.28	0.00
611.00	0.29	0.29	0.00
611.05	0.29	0.29	0.00
611.10	0.29	0.29	0.00
611.15	0.30	0.30	0.00
611.20	0.30	0.30	0.00
611.25	0.32	0.30	0.01
611.30	0.36	0.31	0.06
611.35	0.43	0.31	0.12
611.40	0.53	0.31	0.21
611.45	0.64	0.32	0.33
611.50	0.78	0.32	0.46
611.55	0.94	0.32	0.62
611.60	1.11	0.32	0.79
611.65	1.31	0.33	0.98
611.70	1.51	0.33	1.18
611.75	1.73	0.33	1.40
611.80	1.96	0.34	1.62
611.85	2.19	0.34	1.85
611.90	2.43	0.34	2.09
611.95	2.67	0.34	2.33
612.00	2.91	0.35	2.56
612.05	3.14	0.35	2.79
612.10	3.36	0.35	3.01
612.15	3.55	0.36	3.20
612.20	3.70	0.36	3.34
612.25	3.87	0.36	3.51
612.30	4.03	0.36	3.66
612.35	4.18	0.37	3.81
612.40	4.32	0.37	3.95
612.45	4.47	0.37	4.09
612.50	4.60	0.37	4.23
612.55	4.73	0.38	4.36
612.60	4.86	0.38	4.48
612.65	4.99	0.38	4.61
612.70	5.11	0.38	4.73
612.75	5.23	0.39	4.84
612.80	5.35	0.39	4.96
612.85	5.46	0.39	5.07
612.90	5.57	0.39	5.18
612.95	5.68	0.40	5.29
613.00	5.79	0.40	5.39
613.05	5.89	0.40	5.49
613.10	6.00	0.40	5.59
613.15	6.10	0.41	5.69
613.20	6.20	0.41	5.79
613.25	**6.30**	**0.41**	**5.89**

Summary for Pond ICS-2: ICS-2

Inflow Area = 0.598 ac, 70.86% Impervious, Inflow Depth > 2.10" for 2-YR event
Inflow = 1.44 cfs @ 12.09 hrs, Volume= 0.105 af
Outflow = 1.44 cfs @ 12.09 hrs, Volume= 0.105 af, Atten= 0%, Lag= 0.0 min
Primary = 0.40 cfs @ 12.09 hrs, Volume= 0.082 af
Secondary = 1.04 cfs @ 12.09 hrs, Volume= 0.023 af

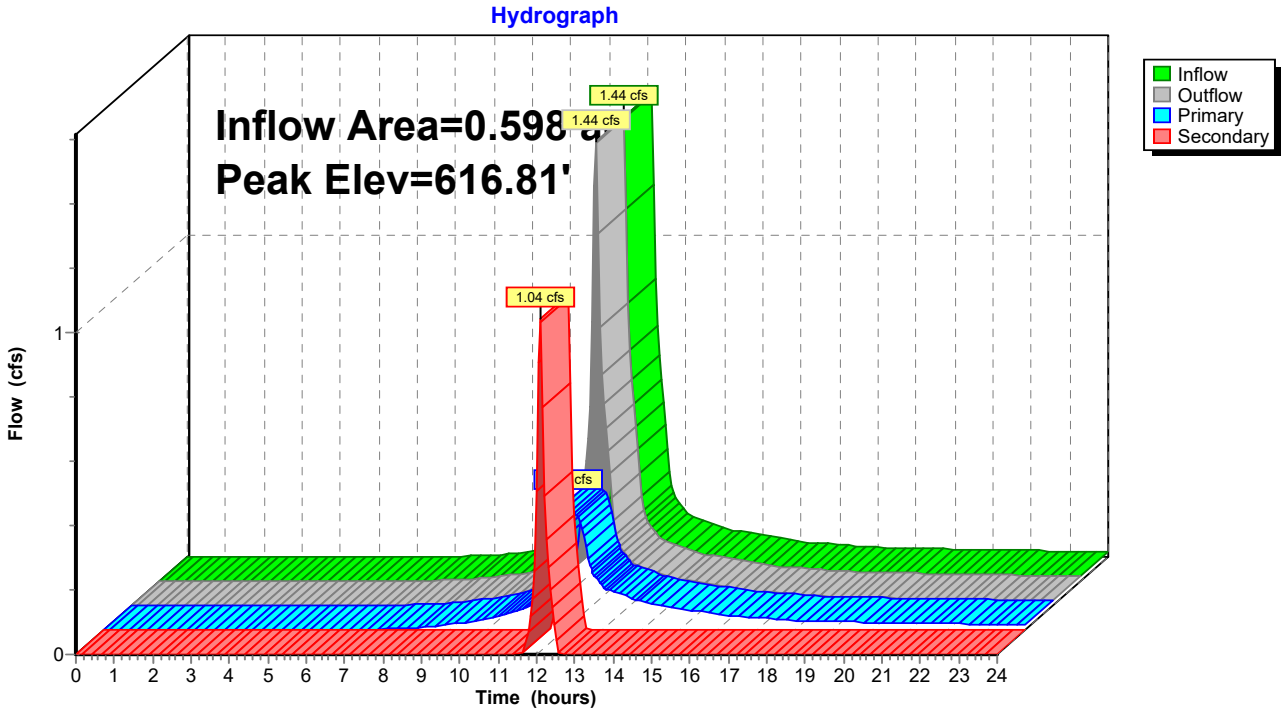
Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 616.81' @ 12.09 hrs
Flood Elev= 617.25'

Device	Routing	Invert	Outlet Devices
#1	Primary	615.85'	**4.0" Round Culvert** L= 34.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 615.85' / 615.00' S= 0.0250 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.09 sf
#2	Secondary	616.21'	**12.0" Round Culvert** L= 12.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 616.21' / 616.15' S= 0.0050 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.40 cfs @ 12.09 hrs HW=616.80' (Free Discharge)
└**1=Culvert** (Barrel Controls 0.40 cfs @ 4.58 fps)

Secondary OutFlow Max=1.01 cfs @ 12.09 hrs HW=616.80' (Free Discharge)
└**2=Culvert** (Barrel Controls 1.01 cfs @ 2.99 fps)

Pond ICS-2: ICS-2



Stage-Discharge for Pond ICS-2: ICS-2

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
615.85	0.00	0.00	0.00
615.87	0.00	0.00	0.00
615.89	0.01	0.01	0.00
615.91	0.01	0.01	0.00
615.93	0.02	0.02	0.00
615.95	0.03	0.03	0.00
615.97	0.04	0.04	0.00
615.99	0.06	0.06	0.00
616.01	0.07	0.07	0.00
616.03	0.09	0.09	0.00
616.05	0.10	0.10	0.00
616.07	0.12	0.12	0.00
616.09	0.14	0.14	0.00
616.11	0.16	0.16	0.00
616.13	0.18	0.18	0.00
616.15	0.19	0.19	0.00
616.17	0.21	0.21	0.00
616.19	0.22	0.22	0.00
616.21	0.23	0.23	0.00
616.23	0.24	0.24	0.00
616.25	0.26	0.25	0.00
616.27	0.28	0.26	0.01
616.29	0.30	0.27	0.02
616.31	0.32	0.28	0.03
616.33	0.34	0.29	0.05
616.35	0.37	0.30	0.07
616.37	0.40	0.31	0.09
616.39	0.43	0.32	0.11
616.41	0.46	0.33	0.13
616.43	0.50	0.34	0.16
616.45	0.53	0.35	0.19
616.47	0.57	0.35	0.22
616.49	0.61	0.35	0.25
616.51	0.65	0.36	0.29
616.53	0.69	0.36	0.33
616.55	0.73	0.36	0.37
616.57	0.77	0.37	0.41
616.59	0.82	0.37	0.45
616.61	0.87	0.37	0.50
616.63	0.92	0.38	0.54
616.65	0.97	0.38	0.59
616.67	1.02	0.38	0.64
616.69	1.08	0.38	0.69
616.71	1.13	0.39	0.74
616.73	1.19	0.39	0.80
616.75	1.25	0.39	0.86
616.77	1.31	0.40	0.91
616.79	1.37	0.40	0.97
616.81	1.43	0.40	1.03
616.83	1.50	0.40	1.09
616.85	1.56	0.41	1.15
616.87	1.63	0.41	1.22
616.89	1.69	0.41	1.28
616.91	1.76	0.41	1.35
616.93	1.83	0.42	1.41
616.95	1.90	0.42	1.48
616.97	1.97	0.42	1.54
616.99	2.04	0.42	1.61
617.01	2.11	0.43	1.68
617.03	2.18	0.43	1.75
617.05	2.25	0.43	1.82
617.07	2.32	0.43	1.89
617.09	2.40	0.44	1.96
617.11	2.47	0.44	2.03
617.13	2.54	0.44	2.10
617.15	2.61	0.44	2.17
617.17	2.69	0.45	2.24
617.19	2.76	0.45	2.31
617.21	2.83	0.45	2.38
617.23	2.90	0.45	2.45
617.25	**2.97**	**0.46**	**2.51**

Summary for Pond ICS-6: ICS-6

Inflow Area = 2.630 ac, 39.25% Impervious, Inflow Depth > 1.11" for 2-YR event
Inflow = 2.40 cfs @ 12.24 hrs, Volume= 0.244 af
Outflow = 2.40 cfs @ 12.24 hrs, Volume= 0.244 af, Atten= 0%, Lag= 0.0 min
Primary = 0.21 cfs @ 12.24 hrs, Volume= 0.105 af
Secondary = 2.18 cfs @ 12.24 hrs, Volume= 0.139 af

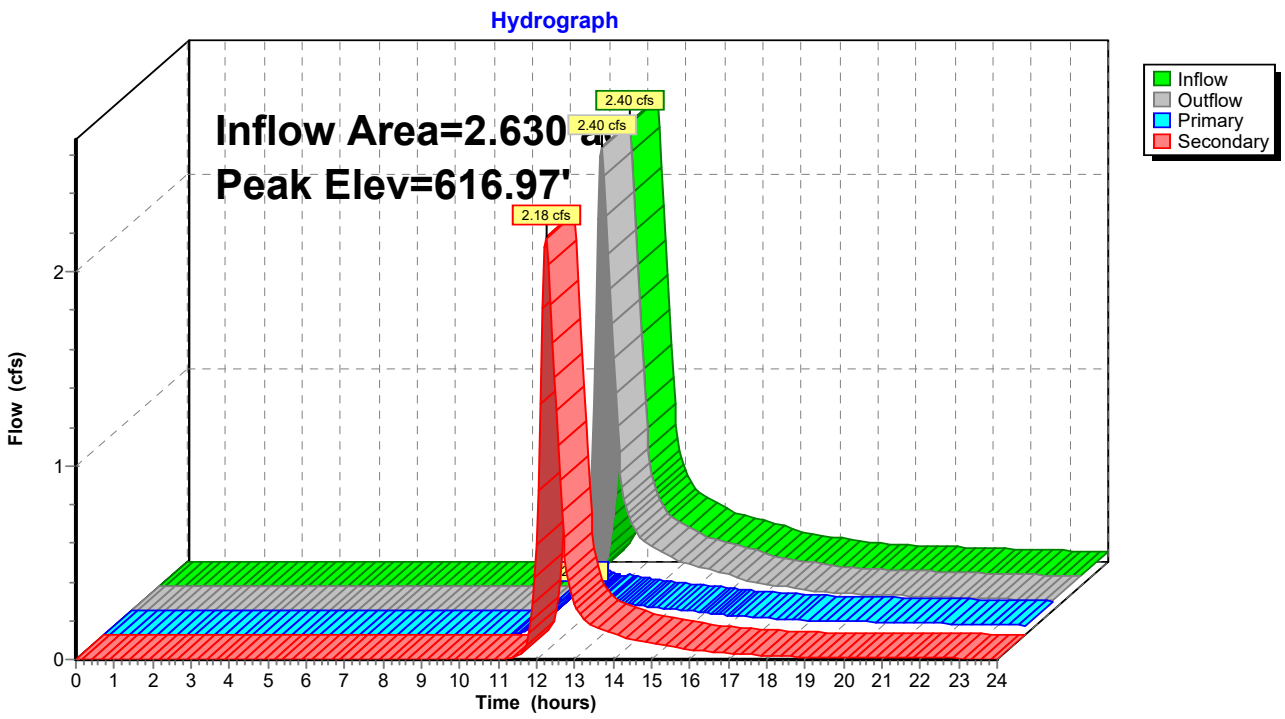
Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 616.97' @ 12.24 hrs
Flood Elev= 621.10'

Device	Routing	Invert	Outlet Devices
#1	Primary	616.00'	**4.0" Round Culvert** L= 202.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 616.00' / 615.00' S= 0.0050 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf
#2	Secondary	616.15'	**15.0" Round Culvert** L= 5.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 616.15' / 616.10' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=0.21 cfs @ 12.24 hrs HW=616.97' (Free Discharge)
└**1=Culvert** (Barrel Controls 0.21 cfs @ 2.46 fps)

Secondary OutFlow Max=2.16 cfs @ 12.24 hrs HW=616.97' (Free Discharge)
└**2=Culvert** (Barrel Controls 2.16 cfs @ 3.60 fps)

Pond ICS-6: ICS-6



Stage-Discharge for Pond ICS-6: ICS-6

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
616.00	0.00	0.00	0.00
616.10	0.02	0.02	0.00
616.20	0.08	0.07	0.01
616.30	0.24	0.14	0.10
616.40	0.44	0.19	0.26
616.50	0.66	0.18	0.48
616.60	0.94	0.19	0.75
616.70	1.27	0.20	1.08
616.80	1.65	0.20	1.44
616.90	2.06	0.21	1.85
617.00	2.51	0.22	2.30
617.10	2.99	0.22	2.77
617.20	3.49	0.23	3.26
617.30	3.99	0.24	3.76
617.40	4.50	0.24	4.26
617.50	5.00	0.25	4.75
617.60	5.47	0.25	5.22
617.70	5.89	0.26	5.63
617.80	6.21	0.26	5.95
617.90	6.75	0.27	6.48
618.00	7.32	0.27	7.05
618.10	7.85	0.28	7.57
618.20	8.34	0.28	8.06
618.30	8.81	0.29	8.52
618.40	9.25	0.29	8.96
618.50	9.67	0.30	9.38
618.60	10.08	0.30	9.77
618.70	10.47	0.31	10.16
618.80	10.82	0.31	10.51
618.90	11.08	0.32	10.77
619.00	11.34	0.32	11.02
619.10	11.59	0.33	11.26
619.20	11.83	0.33	11.50
619.30	12.07	0.33	11.74
619.40	12.31	0.34	11.97
619.50	12.54	0.34	12.19
619.60	12.76	0.35	12.41
619.70	12.98	0.35	12.63
619.80	13.20	0.35	12.85
619.90	13.42	0.36	13.06
620.00	13.63	0.36	13.26
620.10	13.83	0.37	13.47
620.20	14.04	0.37	13.67
620.30	14.24	0.37	13.87
620.40	14.44	0.38	14.06
620.50	14.64	0.38	14.26
620.60	14.83	0.38	14.45
620.70	15.02	0.39	14.63
620.80	15.21	0.39	14.82
620.90	15.40	0.40	15.00
621.00	15.58	0.40	15.18
621.10	**15.76**	**0.40**	**15.36**

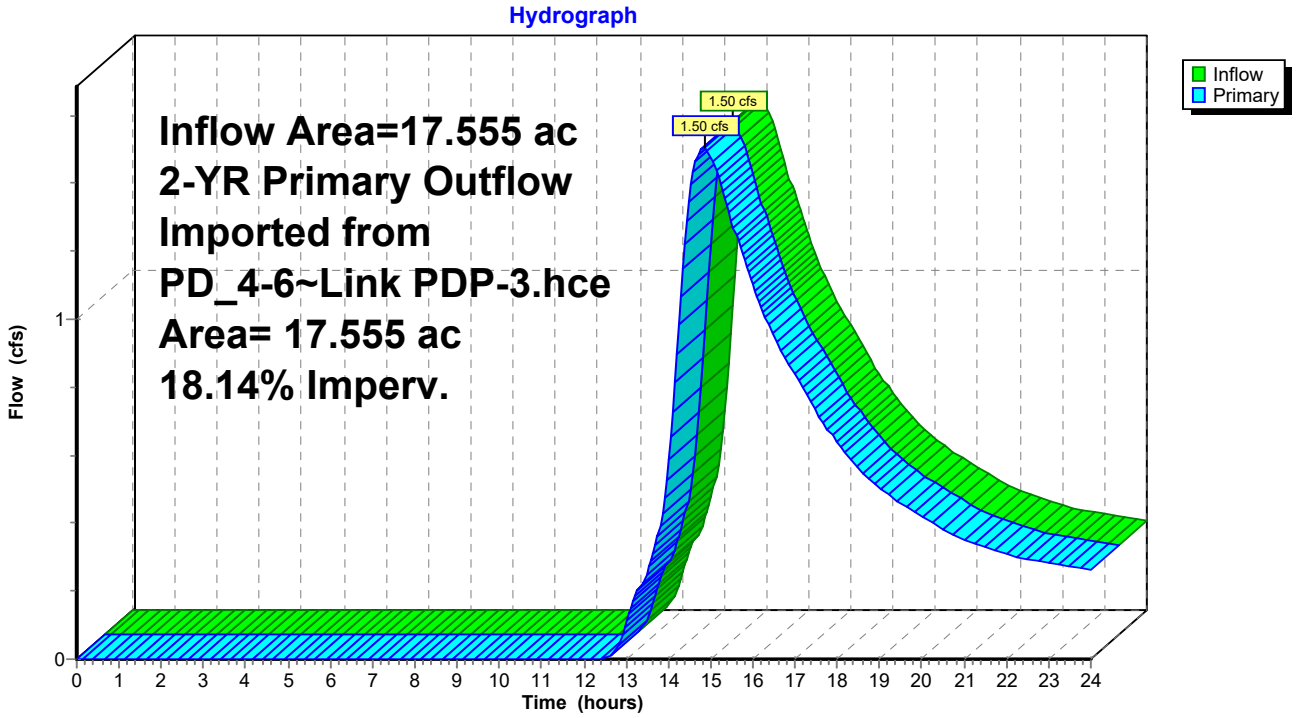
Summary for Link PDP-3: DP-3

Inflow Area = 17.555 ac, 18.14% Impervious, Inflow Depth > 0.39" for 2-YR event
Inflow = 1.50 cfs @ 14.84 hrs, Volume= 0.563 af
Primary = 1.50 cfs @ 14.84 hrs, Volume= 0.563 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

2-YR Primary Outflow Imported from PD_4-6~Link PDP-3.hce

Link PDP-3: DP-3



Summary for Subcatchment 1A: PD-1A

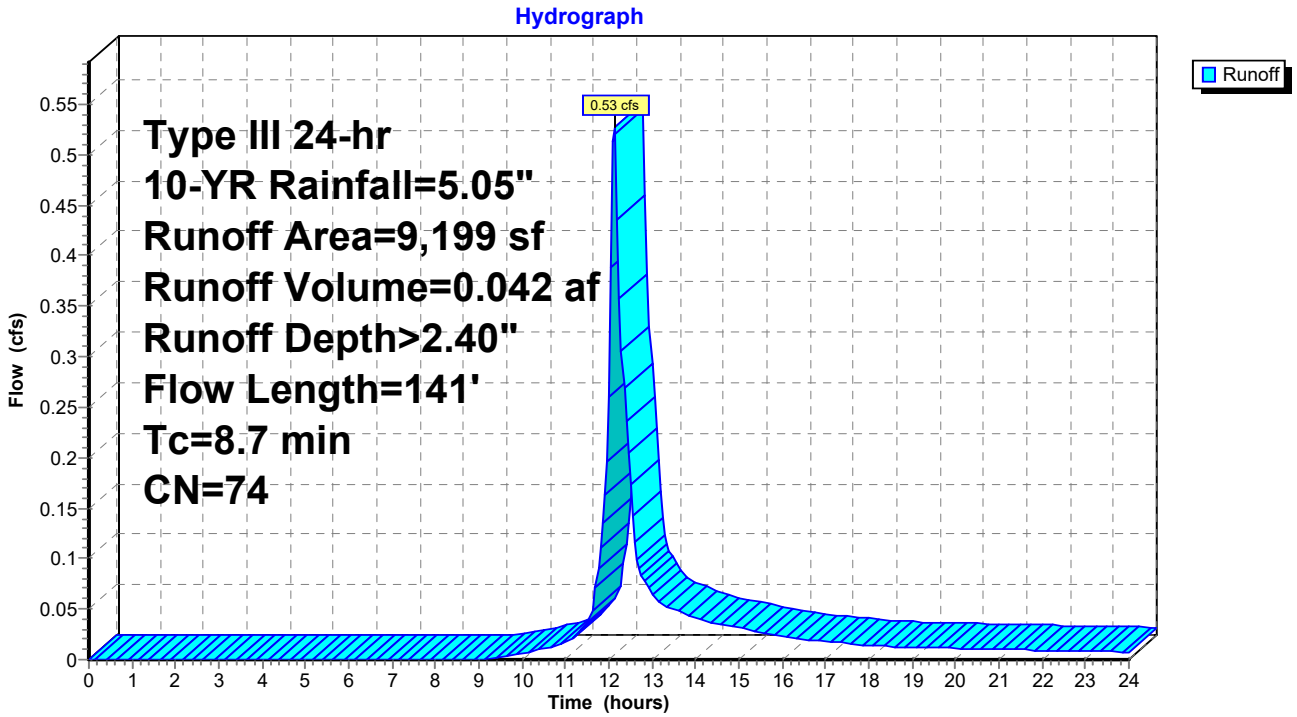
Runoff = 0.53 cfs @ 12.13 hrs, Volume= 0.042 af, Depth> 2.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=5.05"

Area (sf)	CN	Description
440	98	Paved parking, HSG C
5,095	74	>75% Grass cover, Good, HSG C
3,664	70	Woods, Good, HSG C
9,199	74	Weighted Average
8,759		95.22% Pervious Area
440		4.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	71	0.1100	0.15		**Sheet Flow, 1A-1B** Woods: Light underbrush n= 0.400 P2= 3.32"
0.3	14	0.0100	0.70		**Shallow Concentrated Flow, 1B-1C** Short Grass Pasture Kv= 7.0 fps
0.3	56	0.0050	3.18	1.11	**Pipe Channel, 1C-1D** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010 PVC, smooth interior
8.7	141	Total			

Subcatchment 1A: PD-1A



Summary for Subcatchment 1B: PDA-1B

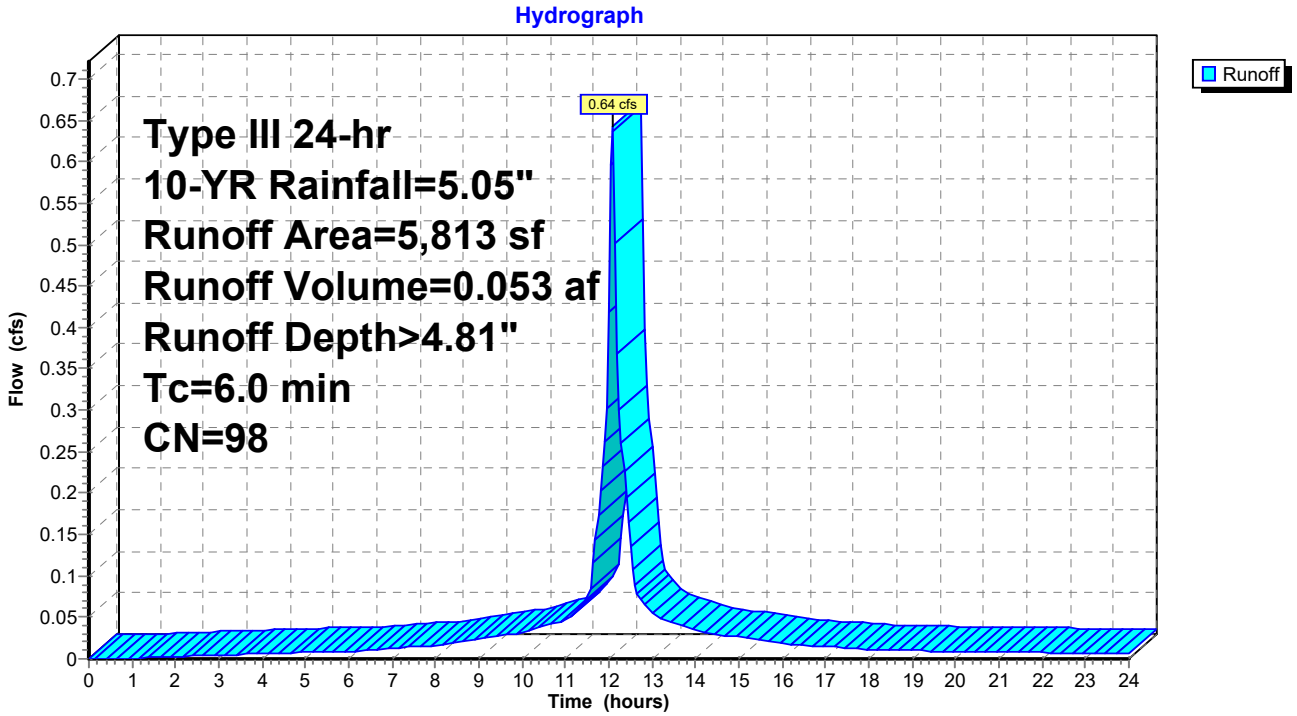
Runoff = 0.64 cfs @ 12.09 hrs, Volume= 0.053 af, Depth> 4.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=5.05"

Area (sf)	CN	Description
5,813	98	Unconnected roofs, HSG C
5,813		100.00% Impervious Area
5,813		100.00% Unconnected

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

Subcatchment 1B: PDA-1B



Summary for Subcatchment 1C: PDA-1C

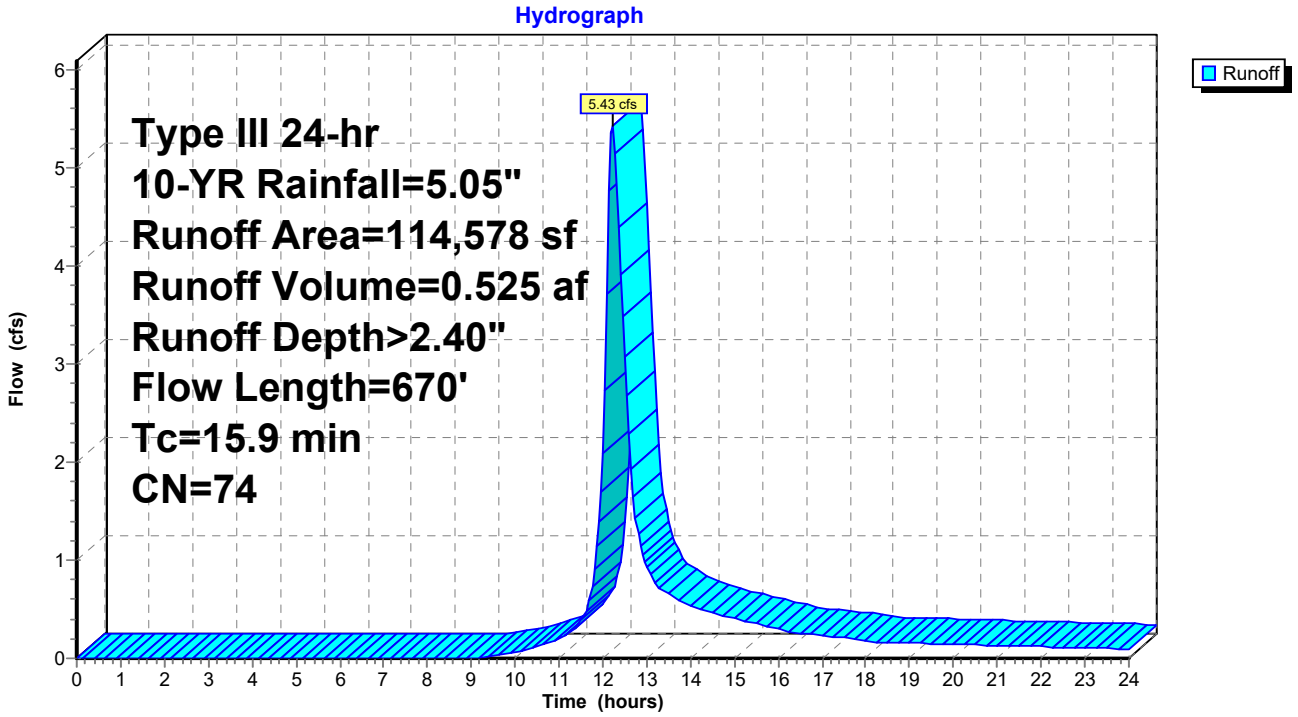
Runoff = 5.43 cfs @ 12.22 hrs, Volume= 0.525 af, Depth> 2.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=5.05"

	Area (sf)	CN	Description
*	33,778	98	Paved parking
	9,092	61	>75% Grass cover, Good, HSG B
	1,833	74	>75% Grass cover, Good, HSG C
	11,190	98	Roofs, HSG B
	47,970	55	Woods, Good, HSG B
	10,715	70	Woods, Good, HSG C
	114,578	74	Weighted Average
	69,610		60.75% Pervious Area
	44,968		39.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	50	0.0400	0.09		**Sheet Flow, 1A-1B** Woods: Light underbrush n= 0.400 P2= 3.32"
6.0	458	0.0655	1.28		**Shallow Concentrated Flow, 1B-1C** Woodland Kv= 5.0 fps
0.1	10	0.1500	2.71		**Shallow Concentrated Flow, 1C-1D** Short Grass Pasture Kv= 7.0 fps
0.3	78	0.0400	4.06		**Shallow Concentrated Flow, 1D-1E** Paved Kv= 20.3 fps
0.3	74	0.0050	3.79	2.98	**Pipe Channel, 1E-1F** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
15.9	670	Total			

Subcatchment 1C: PDA-1C



Summary for Subcatchment 3A: PDA-3A

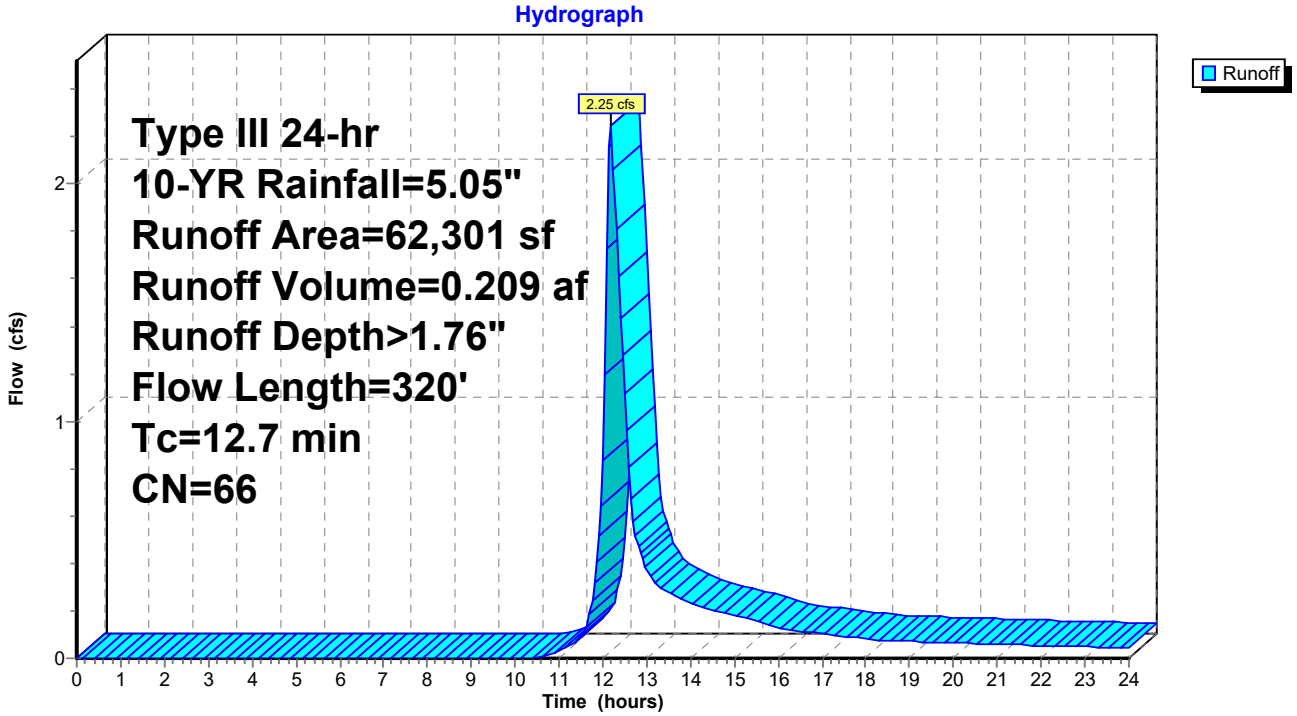
Runoff = 2.25 cfs @ 12.19 hrs, Volume= 0.209 af, Depth> 1.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=5.05"

Area (sf)	CN	Description
21,831	55	Woods, Good, HSG B
38,070	70	Woods, Good, HSG C
2,400	98	Paved parking, HSG B
62,301	66	Weighted Average
59,901		96.15% Pervious Area
2,400		3.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.0500	0.10		**Sheet Flow, 3A-3B** Woods: Light underbrush n= 0.400 P2= 3.32"
4.3	270	0.0444	1.05		**Shallow Concentrated Flow, 3B-EDP-3** Woodland Kv= 5.0 fps
12.7	320	Total			

Subcatchment 3A: PDA-3A



Summary for Subcatchment 3B: PDA-3B

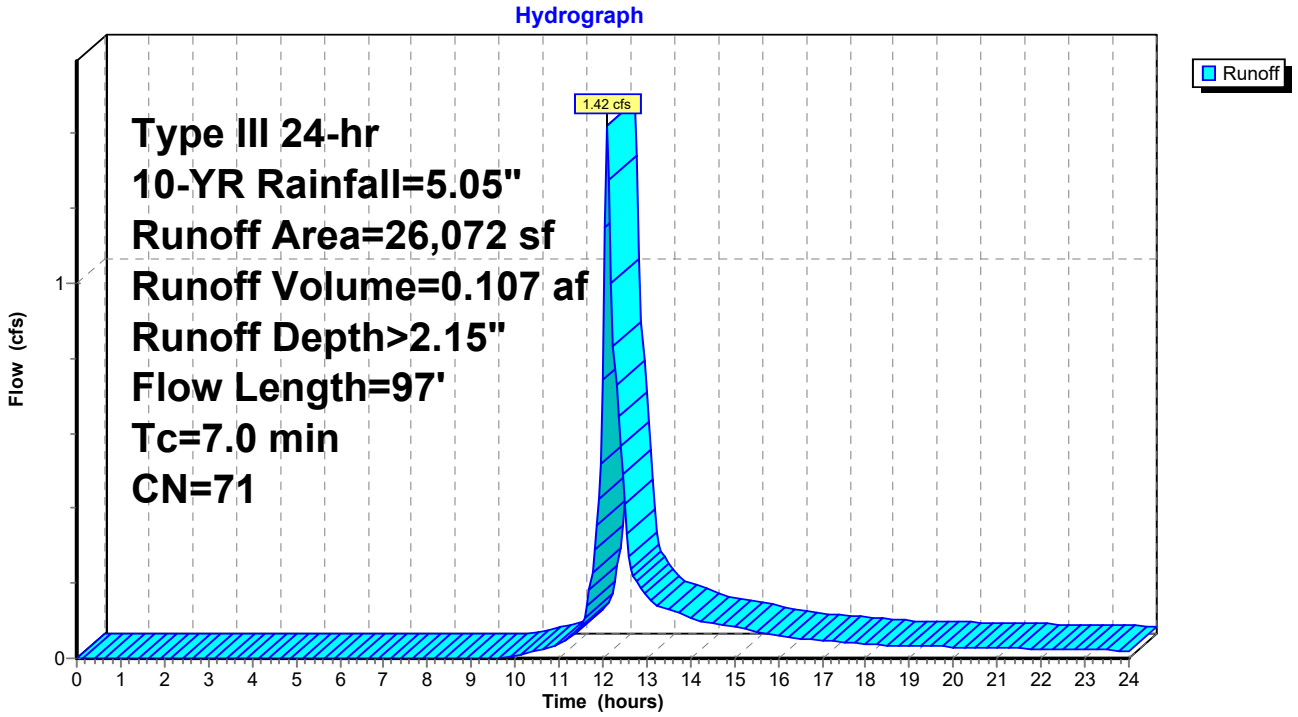
Runoff = 1.42 cfs @ 12.11 hrs, Volume= 0.107 af, Depth> 2.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=5.05"

Area (sf)	CN	Description
9,275	74	>75% Grass cover, Good, HSG C
2,286	55	Woods, Good, HSG B
13,438	70	Woods, Good, HSG C
1,073	98	Paved parking, HSG C
26,072	71	Weighted Average
24,999		95.88% Pervious Area
1,073		4.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	51	0.1000	0.13		**Sheet Flow, 3A-3B** Woods: Light underbrush n= 0.400 P2= 3.32"
0.0	6	0.3300	4.02		**Shallow Concentrated Flow, 3B-3C** Short Grass Pasture Kv= 7.0 fps
0.1	8	0.0150	1.97		**Shallow Concentrated Flow, 3C-3D** Unpaved Kv= 16.1 fps
0.0	7	0.2500	3.50		**Shallow Concentrated Flow, 3D-3E** Short Grass Pasture Kv= 7.0 fps
0.4	25	0.0500	1.12		**Shallow Concentrated Flow, 3E-EDP3** Woodland Kv= 5.0 fps
7.0	97	Total			

Subcatchment 3B: PDA-3B



Summary for Subcatchment 3C: PDA-3C

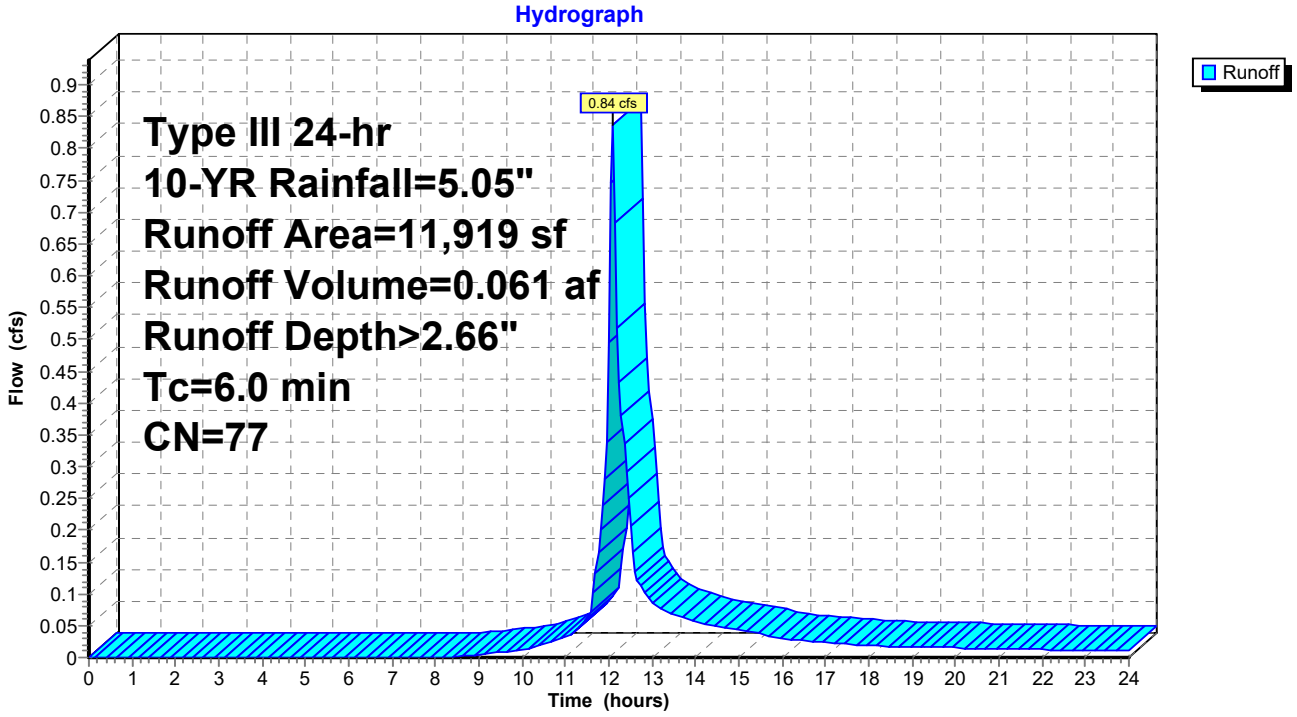
Runoff = 0.84 cfs @ 12.09 hrs, Volume= 0.061 af, Depth> 2.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=5.05"

Area (sf)	CN	Description
7,718	74	>75% Grass cover, Good, HSG C
336	98	Unconnected pavement, HSG C
2,657	74	>75% Grass cover, Good, HSG C
46	98	Unconnected pavement, HSG C
1,162	98	Roofs, HSG C
11,919	77	Weighted Average
10,375		87.05% Pervious Area
1,544		12.95% Impervious Area
382		24.74% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 MIN**

Subcatchment 3C: PDA-3C



Summary for Subcatchment 3D: PDA-3D

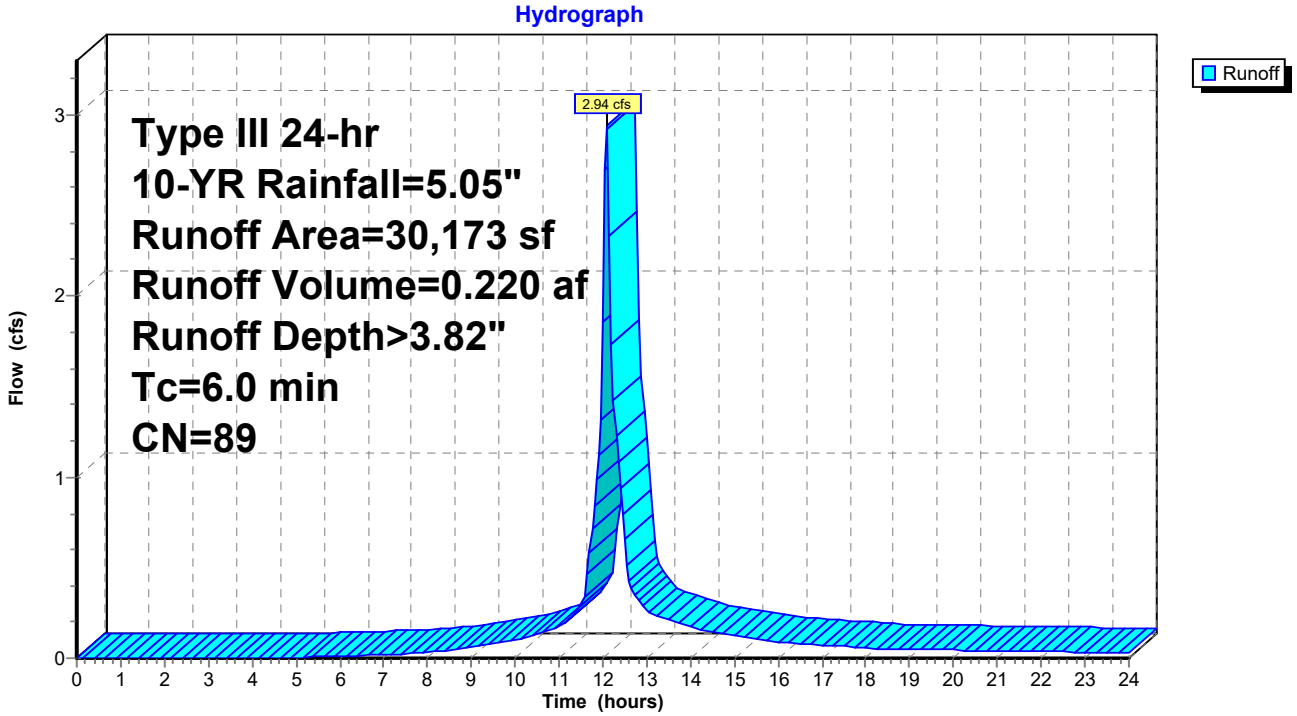
Runoff = 2.94 cfs @ 12.09 hrs, Volume= 0.220 af, Depth> 3.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=5.05"

Area (sf)	CN	Description
18,935	98	Paved parking, HSG D
11,071	74	>75% Grass cover, Good, HSG C
167	61	>75% Grass cover, Good, HSG B
30,173	89	Weighted Average
11,238		37.25% Pervious Area
18,935		62.75% Impervious Area

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

Subcatchment 3D: PDA-3D



Summary for Subcatchment 3E: PDA-3E

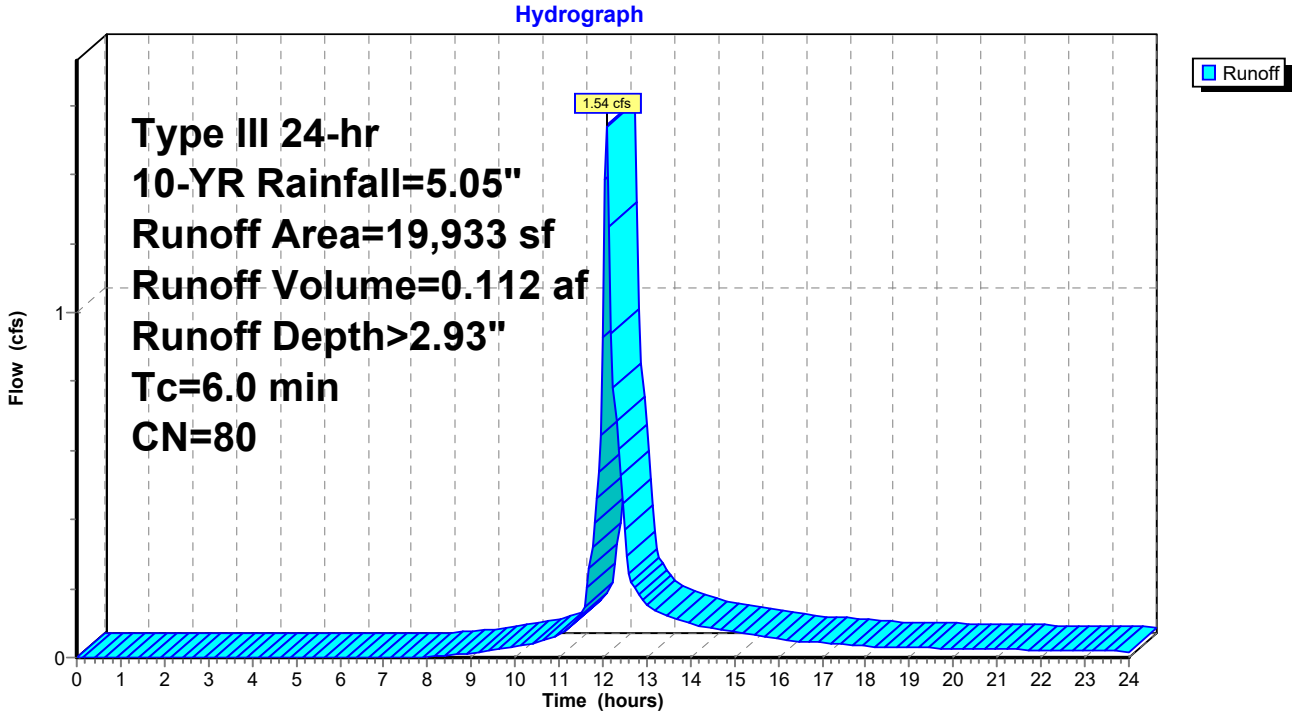
Runoff = 1.54 cfs @ 12.09 hrs, Volume= 0.112 af, Depth> 2.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=5.05"

Area (sf)	CN	Description
14,823	74	>75% Grass cover, Good, HSG C
460	98	Unconnected pavement, HSG C
4,650	98	Roofs, HSG C
19,933	80	Weighted Average
14,823		74.36% Pervious Area
5,110		25.64% Impervious Area
460		9.00% Unconnected

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

Subcatchment 3E: PDA-3E



Summary for Subcatchment 3F: PDA-3F

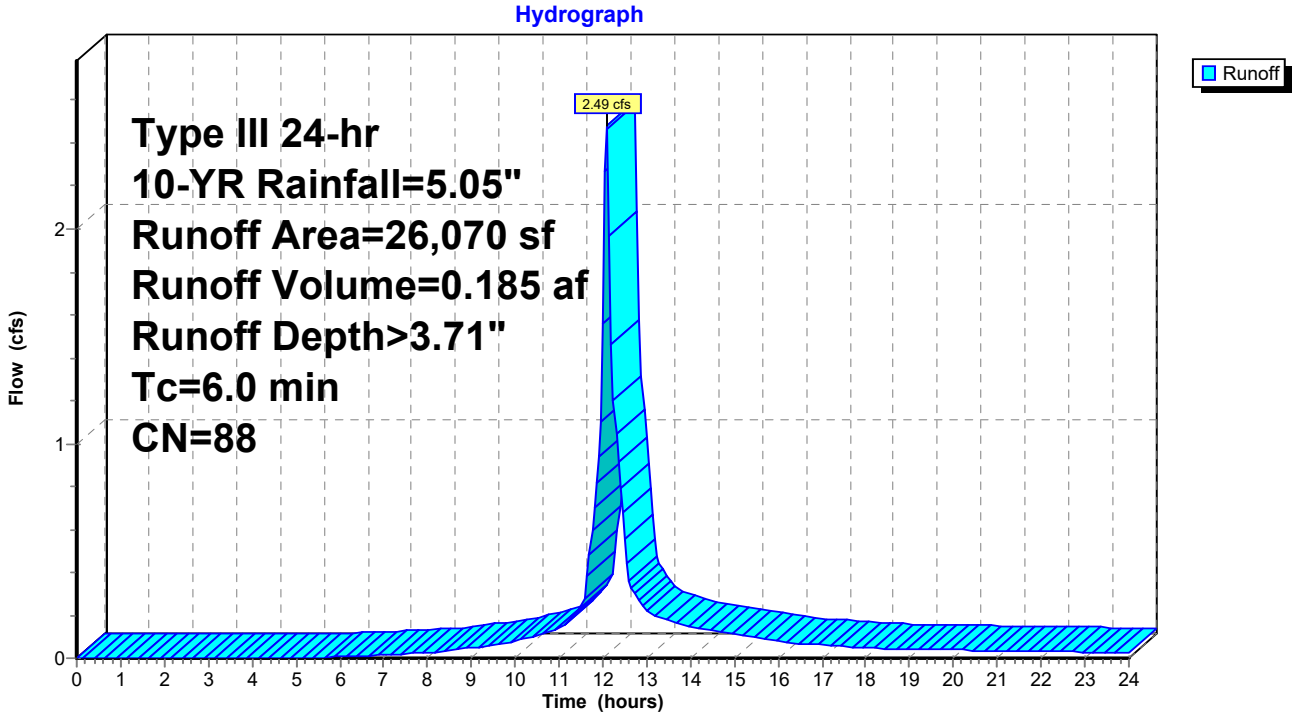
Runoff = 2.49 cfs @ 12.09 hrs, Volume= 0.185 af, Depth> 3.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=5.05"

Area (sf)	CN	Description
18,472	98	Paved parking, HSG B
1,202	74	>75% Grass cover, Good, HSG C
6,396	61	>75% Grass cover, Good, HSG B
26,070	88	Weighted Average
7,598		29.14% Pervious Area
18,472		70.86% Impervious Area

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

Subcatchment 3F: PDA-3F



Summary for Subcatchment 3G: PDA-3G

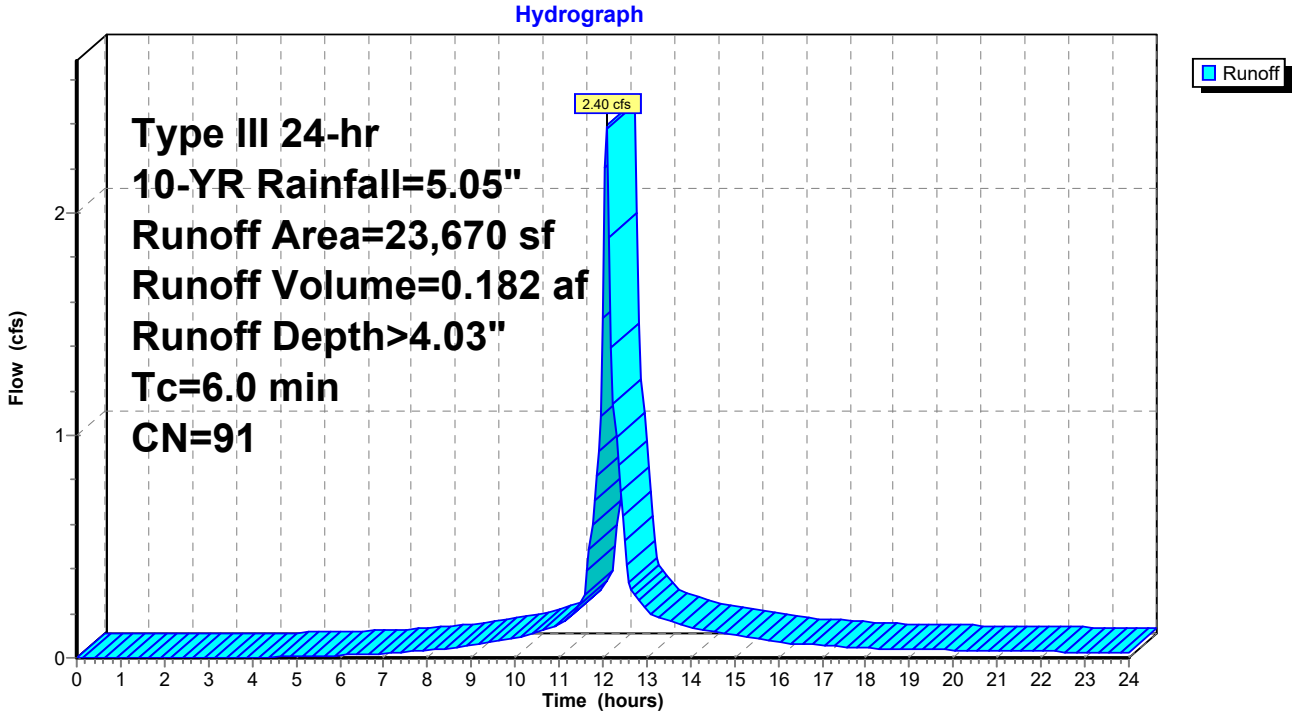
Runoff = 2.40 cfs @ 12.09 hrs, Volume= 0.182 af, Depth> 4.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=5.05"

Area (sf)	CN	Description
13,660	98	Roofs, HSG B
892	74	>75% Grass cover, Good, HSG C
4,113	61	>75% Grass cover, Good, HSG B
5,005	98	Unconnected pavement, HSG B
23,670	91	Weighted Average
5,005		21.14% Pervious Area
18,665		78.86% Impervious Area
5,005		26.81% Unconnected

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

Subcatchment 3G: PDA-3G



Summary for Subcatchment PD-2: PDA-2

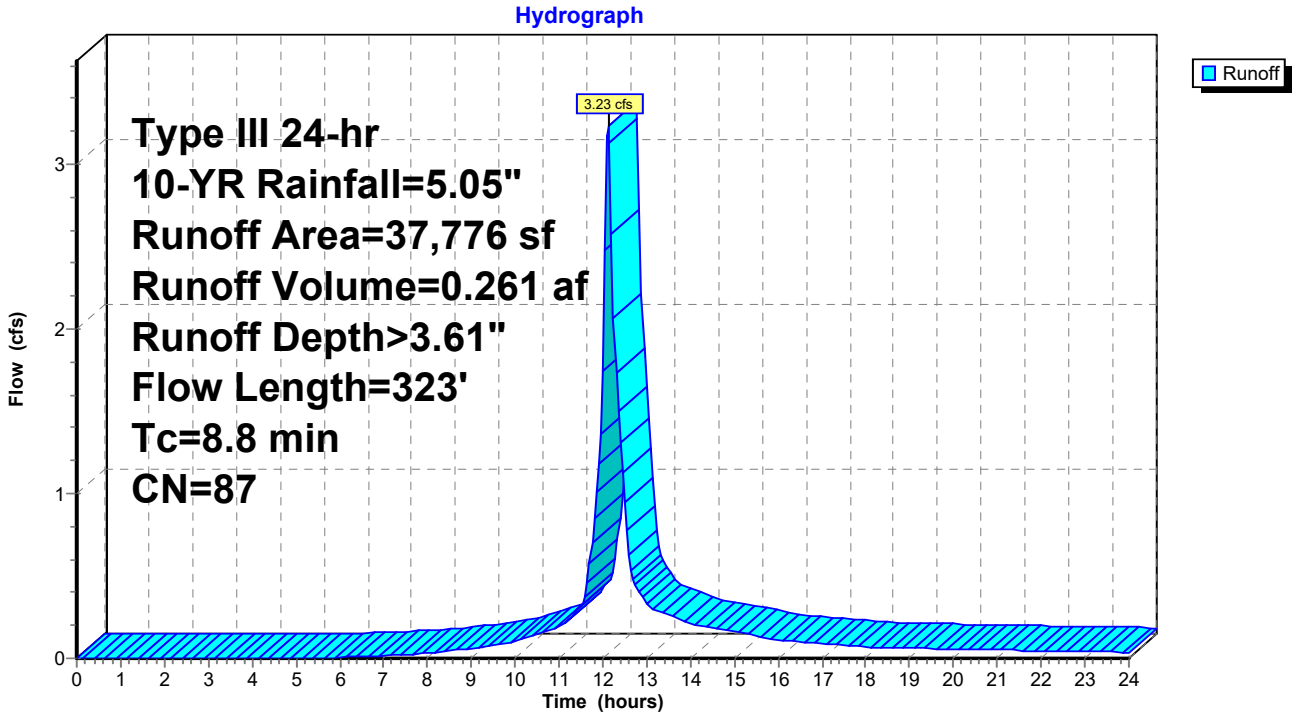
Runoff = 3.23 cfs @ 12.12 hrs, Volume= 0.261 af, Depth> 3.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=5.05"

Area (sf)	CN	Description
4,628	74	>75% Grass cover, Good, HSG C
23,547	98	Paved parking, HSG D
3,336	55	Woods, Good, HSG B
6,265	70	Woods, Good, HSG C
37,776	87	Weighted Average
14,229		37.67% Pervious Area
23,547		62.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.3	50	0.0100	0.11		**Sheet Flow, 2A-2B** Grass: Short n= 0.150 P2= 3.32"
0.1	34	0.0500	4.54		**Shallow Concentrated Flow, 2B-2C** Paved Kv= 20.3 fps
0.1	19	0.1450	2.67		**Shallow Concentrated Flow, 2C-2D** Short Grass Pasture Kv= 7.0 fps
1.3	220	0.0185	2.76		**Shallow Concentrated Flow, 2D-ED2** Paved Kv= 20.3 fps
8.8	323	Total			

Subcatchment PD-2: PDA-2

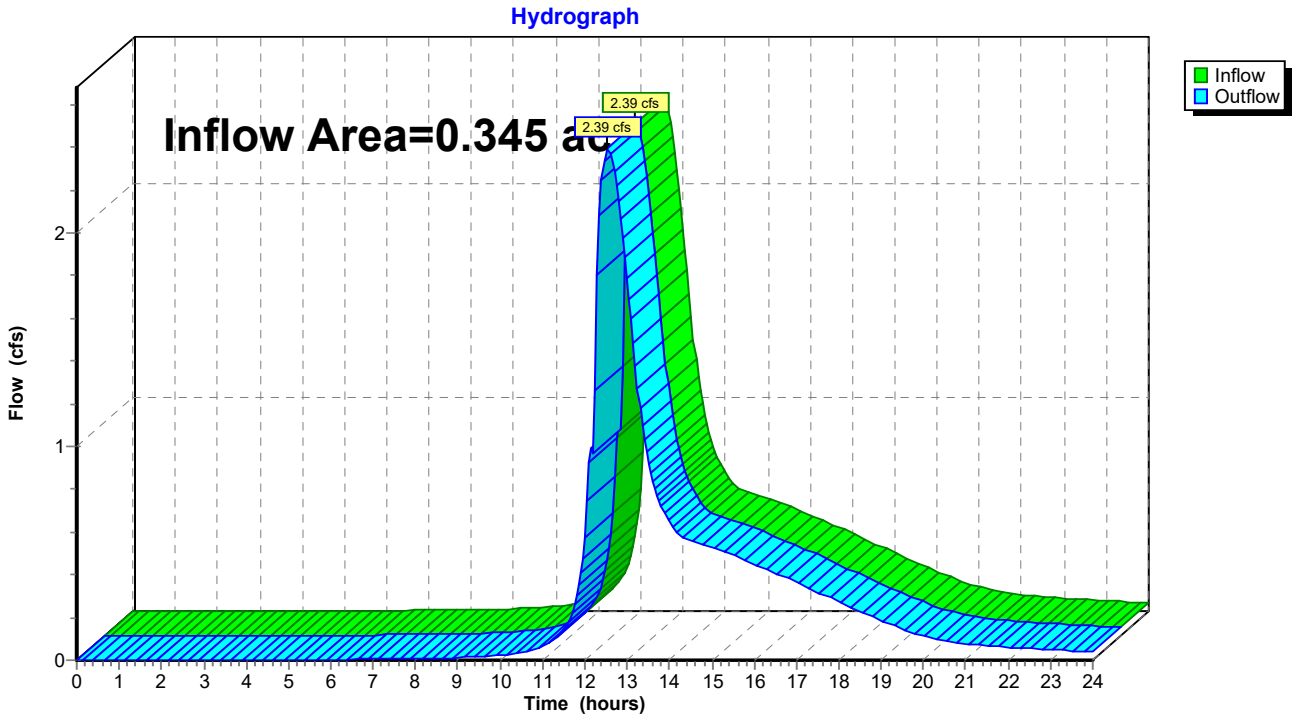


Summary for Reach DP-1: DP-1

Inflow Area = 0.345 ac, 41.65% Impervious, Inflow Depth > 15.99" for 10-YR event
Inflow = 2.39 cfs @ 12.54 hrs, Volume= 0.459 af
Outflow = 2.39 cfs @ 12.54 hrs, Volume= 0.459 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach DP-1: DP-1

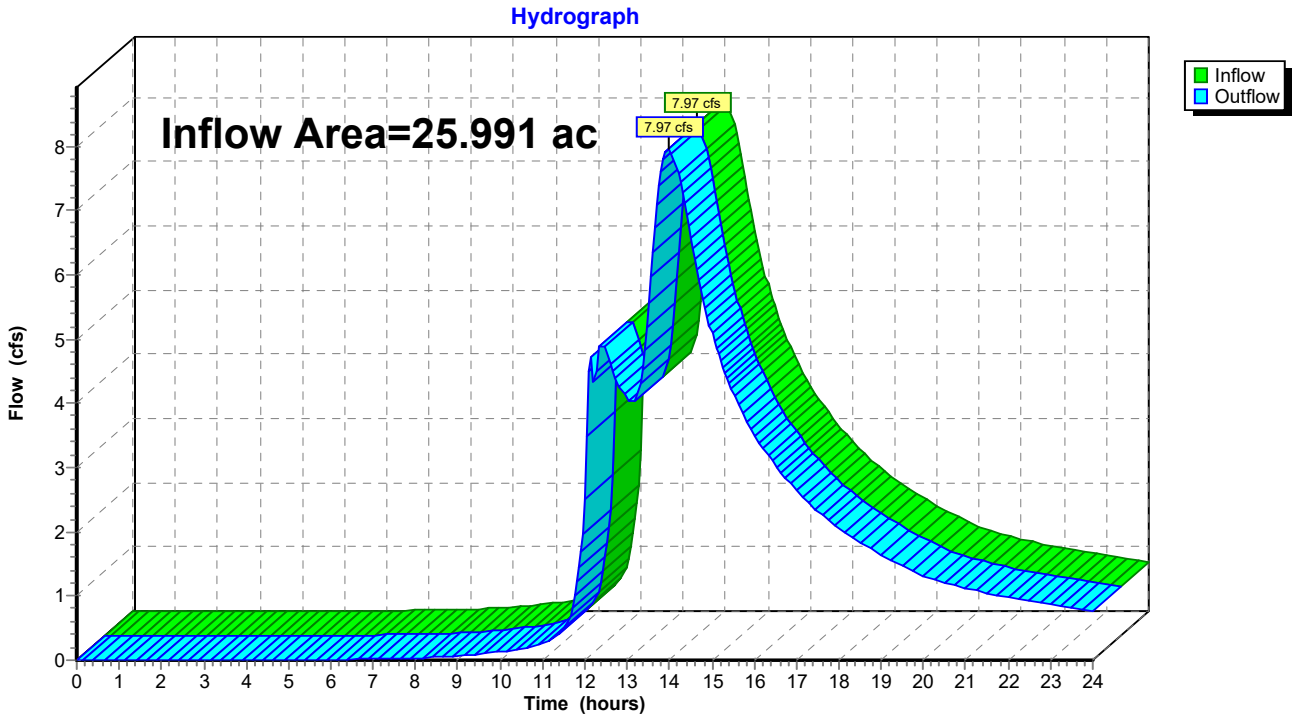


Summary for Reach DP-2: DP-2

Inflow Area = 25.991 ac, 24.71% Impervious, Inflow Depth > 1.33" for 10-YR event
Inflow = 7.97 cfs @ 13.98 hrs, Volume= 2.880 af
Outflow = 7.97 cfs @ 13.98 hrs, Volume= 2.880 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach DP-2: DP-2



Summary for Reach DP-3: DP-3

Inflow Area = 24.780 ac, 23.15% Impervious, Inflow Depth > 1.08" for 10-YR event
Inflow = 8.10 cfs @ 13.70 hrs, Volume= 2.222 af
Outflow = 7.10 cfs @ 14.00 hrs, Volume= 2.160 af, Atten= 12%, Lag= 17.8 min

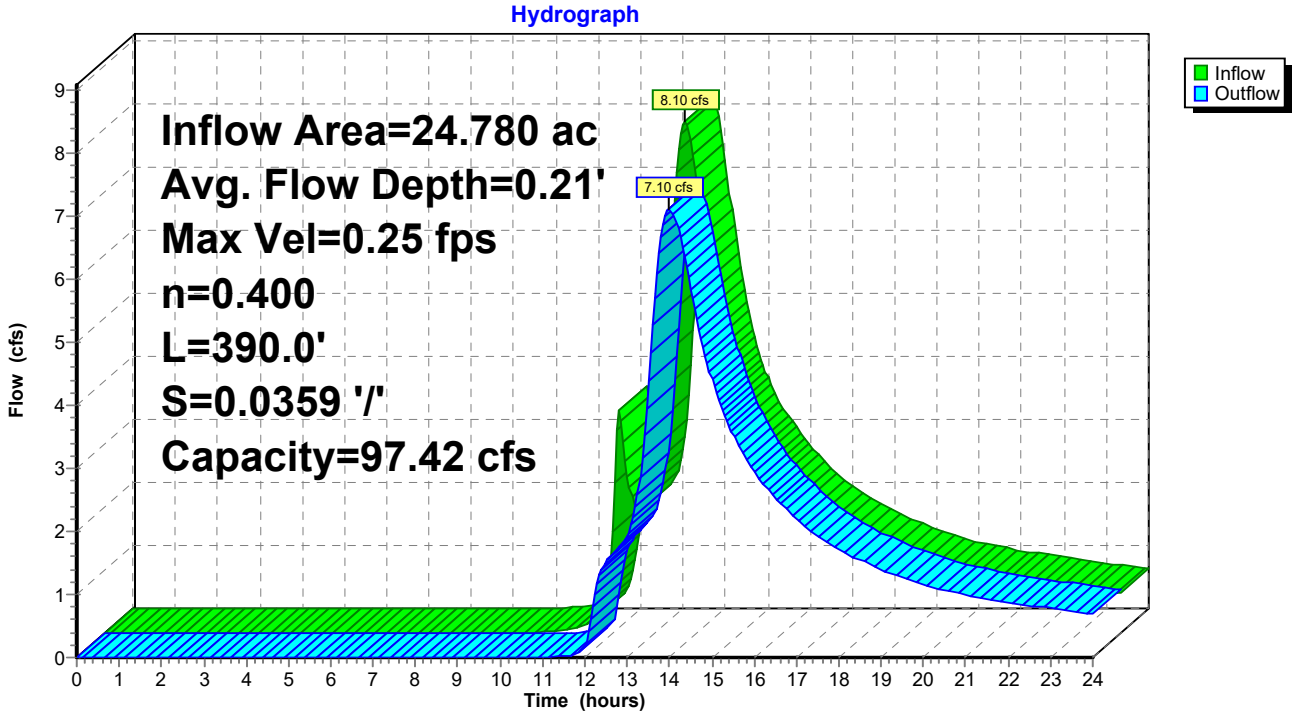
Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 0.25 fps, Min. Travel Time= 26.4 min
Avg. Velocity = 0.13 fps, Avg. Travel Time= 51.1 min

Peak Storage= 11,236 cf @ 14.00 hrs
Average Depth at Peak Storage= 0.21'
Bank-Full Depth= 1.00' Flow Area= 151.0 sf, Capacity= 97.42 cfs

130.00' x 1.00' deep channel, n= 0.400 Sheet flow: Woods+light brush
Side Slope Z-value= 12.0 30.0 '/' Top Width= 172.00'
Length= 390.0' Slope= 0.0359 '/'
Inlet Invert= 618.00', Outlet Invert= 604.00'

‡

Reach DP-3: DP-3



Stage-Discharge for Reach DP-3: DP-3

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
618.00	0.00	0.00
618.01	0.03	0.04
618.02	0.05	0.13
618.03	0.07	0.27
618.04	0.08	0.43
618.05	0.10	0.62
618.06	0.11	0.84
618.07	0.12	1.09
618.08	0.13	1.37
618.09	0.14	1.66
618.10	0.15	1.98
618.11	0.16	2.32
618.12	0.17	2.69
618.13	0.18	3.07
618.14	0.19	3.48
618.15	0.20	3.91
618.16	0.20	4.35
618.17	0.21	4.82
618.18	0.22	5.30
618.19	0.23	5.81
618.20	0.24	6.33
618.21	0.24	6.87
618.22	0.25	7.43
618.23	0.26	8.00
618.24	0.27	8.60
618.25	0.27	9.21
618.26	0.28	9.84
618.27	0.29	10.48
618.28	0.29	11.14
618.29	0.30	11.82
618.30	0.31	12.51
618.31	0.31	13.23
618.32	0.32	13.95
618.33	0.33	14.70
618.34	0.33	15.45
618.35	0.34	16.23
618.36	0.34	17.02
618.37	0.35	17.83
618.38	0.36	18.65
618.39	0.36	19.48
618.40	0.37	20.34
618.41	0.37	21.20
618.42	0.38	22.09
618.43	0.38	22.99
618.44	0.39	23.90
618.45	0.40	24.83
618.46	0.40	25.77
618.47	0.41	26.72
618.48	0.41	27.70
618.49	0.42	28.68
618.50	0.42	29.68
618.51	0.43	30.70
618.52	0.43	31.73
618.53	0.44	32.77
618.54	0.44	33.83
618.55	0.45	34.91
618.56	0.45	35.99
618.57	0.46	37.09
618.58	0.46	38.21
618.59	0.47	39.34
618.60	0.47	40.48
618.61	0.48	41.64
618.62	0.48	42.81
618.63	0.49	44.00
618.64	0.49	45.20
618.65	0.50	46.41
618.66	0.50	47.64
618.67	0.51	48.88
618.68	0.51	50.14
618.69	0.52	51.40
618.70	0.52	52.69
618.71	0.52	53.98
618.72	0.53	55.29
618.73	0.53	56.62
618.74	0.54	57.95
618.75	0.54	59.30
618.76	0.55	60.67
618.77	0.55	62.05
618.78	0.56	63.44
618.79	0.56	64.84
618.80	0.56	66.26
618.81	0.57	67.69
618.82	0.57	69.14
618.83	0.58	70.59
618.84	0.58	72.07
618.85	0.59	73.55
618.86	0.59	75.05
618.87	0.59	76.56
618.88	0.60	78.09
618.89	0.60	79.63
618.90	0.61	81.18
618.91	0.61	82.74
618.92	0.61	84.32
618.93	0.62	85.91
618.94	0.62	87.52
618.95	0.63	89.14
618.96	0.63	90.77
618.97	0.63	92.41
618.98	0.64	94.07
618.99	0.64	95.74
619.00	**0.65**	**97.42**

Summary for Pond 1: SFB-1

Inflow Area =	0.966 ac, 48.65% Impervious, Inflow Depth > 3.46" for 10-YR event				
Inflow =	1.45 cfs @	12.10 hrs,	Volume=	0.279 af	
Outflow =	0.68 cfs @	13.00 hrs,	Volume=	0.246 af,	Atten= 53%, Lag= 53.9 min
Discarded =	0.11 cfs @	13.00 hrs,	Volume=	0.123 af	
Primary =	0.57 cfs @	13.00 hrs,	Volume=	0.122 af	

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 609.97' @ 13.00 hrs Surf.Area= 2,739 sf Storage= 3,920 cf
Flood Elev= 611.25' Surf.Area= 3,452 sf Storage= 7,739 cf

Plug-Flow detention time= 164.7 min calculated for 0.245 af (88% of inflow)
Center-of-Mass det. time= 111.7 min (939.7 - 828.0)

Volume	Invert	Avail.Storage	Storage Description
#1	607.00'	7,237 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 8,986 cf Overall - 1,749 cf Embedded = 7,237 cf
#2	607.00'	385 cf	**Sand Media (Prismatic)** Listed below (Recalc) Inside #1 1,166 cf Overall x 33.0% Voids
#3	608.00'	117 cf	**Infiltration Seed Mix (Prismatic)** Listed below (Recalc) Inside #1 583 cf Overall x 20.0% Voids
		7,739 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
607.00	1,166	0	0
608.00	1,166	1,166	1,166
609.00	2,130	1,648	2,814
610.00	2,760	2,445	5,259
611.20	3,452	3,727	8,986

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
607.00	1,166	0	0
608.00	1,166	1,166	1,166

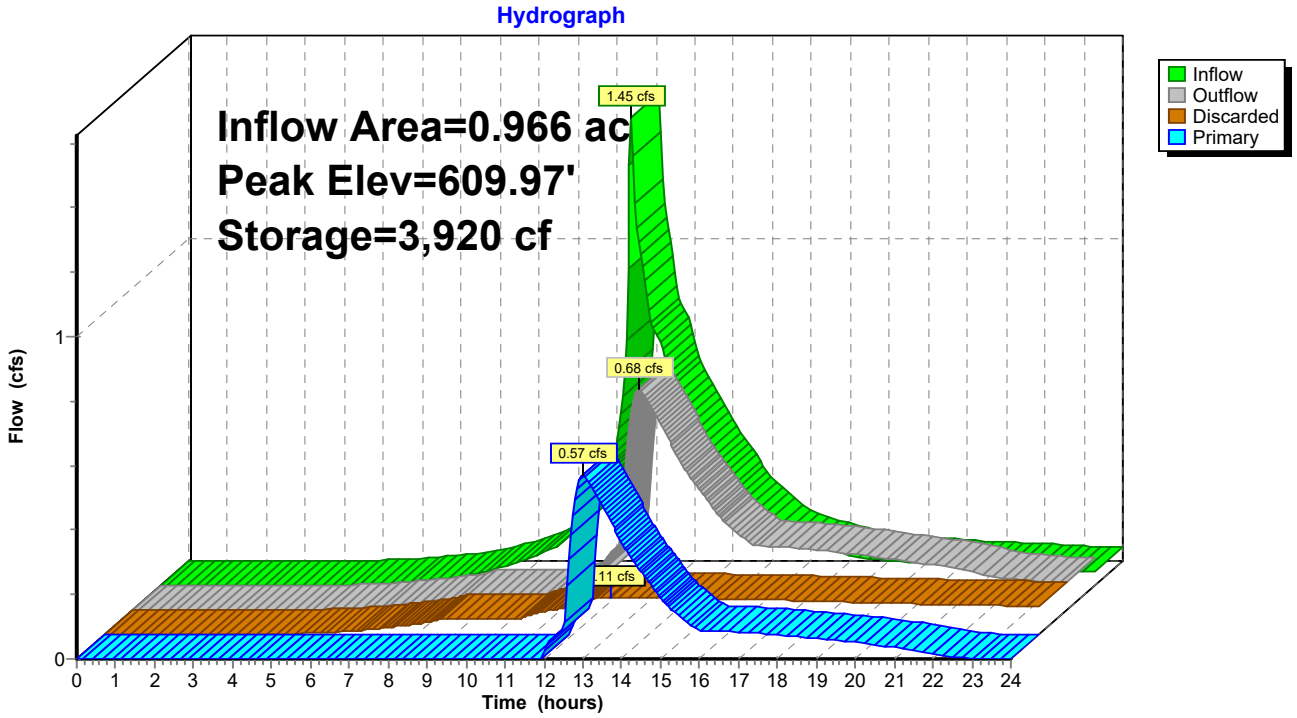
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
608.00	1,166	0	0
608.50	1,166	583	583

Device	Routing	Invert	Outlet Devices
#1	Discarded	607.00'	**1.805 in/hr Exfiltration over Surface area**
#2	Primary	607.50'	**8.0" Round Culvert** L= 20.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 607.50' / 607.00' S= 0.0250 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.35 sf
#3	Device 2	609.00'	**2.0" Vert. Orifice/Grate** C= 0.600
#4	Device 2	609.80'	**8.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.11 cfs @ 13.00 hrs HW=609.97' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.11 cfs)

Primary OutFlow Max=0.57 cfs @ 13.00 hrs HW=609.97' (Free Discharge)
└─**2=Culvert** (Passes 0.57 cfs of 1.94 cfs potential flow)
  ├─**3=Orifice/Grate** (Orifice Controls 0.10 cfs @ 4.53 fps)
  └─**4=Orifice/Grate** (Weir Controls 0.47 cfs @ 1.34 fps)

Pond 1: SFB-1



Stage-Discharge for Pond 1: SFB-1

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
607.00	0.00	0.00	0.00
607.05	0.05	0.05	0.00
607.10	0.05	0.05	0.00
607.15	0.05	0.05	0.00
607.20	0.05	0.05	0.00
607.25	0.05	0.05	0.00
607.30	0.05	0.05	0.00
607.35	0.05	0.05	0.00
607.40	0.05	0.05	0.00
607.45	0.05	0.05	0.00
607.50	0.05	0.05	0.00
607.55	0.05	0.05	0.00
607.60	0.05	0.05	0.00
607.65	0.05	0.05	0.00
607.70	0.05	0.05	0.00
607.75	0.05	0.05	0.00
607.80	0.05	0.05	0.00
607.85	0.05	0.05	0.00
607.90	0.05	0.05	0.00
607.95	0.05	0.05	0.00
608.00	0.05	0.05	0.00
608.05	0.05	0.05	0.00
608.10	0.05	0.05	0.00
608.15	0.05	0.05	0.00
608.20	0.06	0.06	0.00
608.25	0.06	0.06	0.00
608.30	0.06	0.06	0.00
608.35	0.06	0.06	0.00
608.40	0.06	0.06	0.00
608.45	0.07	0.07	0.00
608.50	0.07	0.07	0.00
608.55	0.07	0.07	0.00
608.60	0.07	0.07	0.00
608.65	0.07	0.07	0.00
608.70	0.08	0.08	0.00
608.75	0.08	0.08	0.00
608.80	0.08	0.08	0.00
608.85	0.08	0.08	0.00
608.90	0.08	0.08	0.00
608.95	0.09	0.09	0.00
609.00	0.09	0.09	0.00
609.05	0.09	0.09	0.00
609.10	0.11	0.09	0.01
609.15	0.12	0.09	0.03
609.20	0.13	0.09	0.04
609.25	0.14	0.10	0.04
609.30	0.15	0.10	0.05
609.35	0.15	0.10	0.05
609.40	0.16	0.10	0.06
609.45	0.16	0.10	0.06
609.50	0.17	0.10	0.07
609.55	0.18	0.10	0.07
609.60	0.18	0.10	0.08
609.65	0.19	0.11	0.08
609.70	0.19	0.11	0.08
609.75	0.19	0.11	0.09
609.80	0.20	0.11	0.09
609.85	0.28	0.11	0.17
609.90	0.42	0.11	0.31
609.95	0.61	0.11	0.50
610.00	0.83	0.12	0.71
610.05	1.06	0.12	0.94
610.10	1.14	0.12	1.03
610.15	1.22	0.12	1.10
610.20	1.29	0.12	1.17
610.25	1.36	0.12	1.24
610.30	1.43	0.12	1.30
610.35	1.49	0.12	1.36
610.40	1.55	0.12	1.42
610.45	1.60	0.13	1.48
610.50	1.66	0.13	1.53
610.55	1.71	0.13	1.58
610.60	1.76	0.13	1.63
610.65	1.81	0.13	1.68
610.70	1.86	0.13	1.73
610.75	1.91	0.13	1.77
610.80	1.95	0.13	1.82
610.85	2.00	0.14	1.86
610.90	2.04	0.14	1.90
610.95	2.08	0.14	1.95
611.00	2.13	0.14	1.99
611.05	2.17	0.14	2.03
611.10	2.21	0.14	2.07
611.15	2.25	0.14	2.10
611.20	2.29	**0.14**	2.14
611.25	**2.32**	0.14	**2.18**

Summary for Pond 2: SFB-2

Inflow Area = 4.230 ac, 47.33% Impervious, Inflow Depth > 1.77" for 10-YR event
Inflow = 2.61 cfs @ 12.10 hrs, Volume= 0.623 af
Outflow = 0.56 cfs @ 15.94 hrs, Volume= 0.508 af, Atten= 79%, Lag= 230.4 min
Discarded = 0.41 cfs @ 15.94 hrs, Volume= 0.434 af
Primary = 0.15 cfs @ 15.94 hrs, Volume= 0.074 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 616.05' @ 15.94 hrs Surf.Area= 7,468 sf Storage= 10,091 cf
Flood Elev= 617.40' Surf.Area= 10,100 sf Storage= 21,942 cf

Plug-Flow detention time= 216.4 min calculated for 0.507 af (81% of inflow)
Center-of-Mass det. time= 137.3 min (1,022.1 - 884.8)

Volume	Invert	Avail.Storage	Storage Description
#1	613.25'	20,246 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 26,162 cf Overall - 5,916 cf Embedded = 20,246 cf
#2	613.25'	1,302 cf	**Sand Media (Prismatic)** Listed below (Recalc) Inside #1 3,944 cf Overall x 33.0% Voids
#3	614.25'	394 cf	**Infiltration Seed Mix (Prismatic)** Listed below (Recalc) Inside #1 1,972 cf Overall x 20.0% Voids
		21,942 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
613.25	3,944	0	0
614.25	3,944	3,944	3,944
615.00	5,539	3,556	7,500
616.00	7,378	6,459	13,959
617.00	9,278	8,328	22,287
617.40	10,100	3,876	26,162

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
613.25	3,944	0	0
614.25	3,944	3,944	3,944

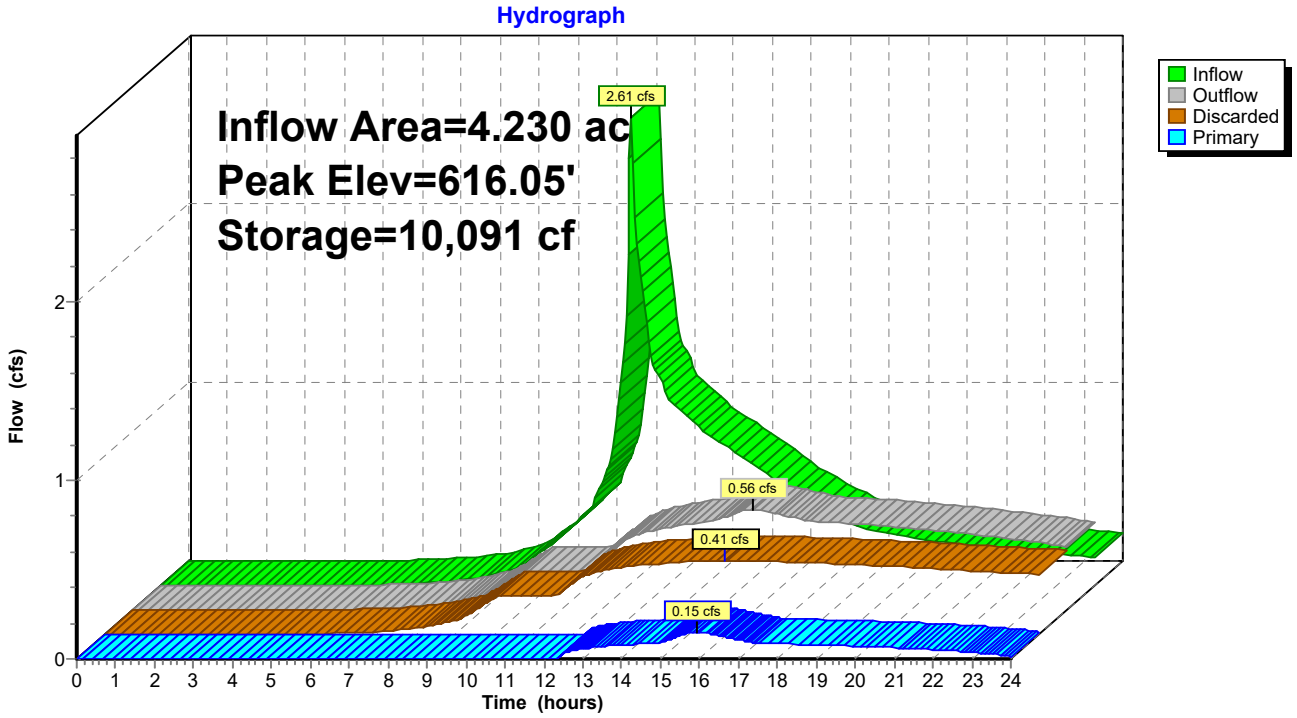
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
614.25	3,944	0	0
614.75	3,944	1,972	1,972

Device	Routing	Invert	Outlet Devices
#1	Discarded	613.25'	**2.380 in/hr Exfiltration over Surface area**
#2	Primary	613.75'	**8.0" Round Culvert** L= 28.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 613.75' / 612.25' S= 0.0536 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.35 sf
#3	Device 2	615.20'	**2.0" Vert. Orifice/Grate** C= 0.600
#4	Device 2	616.00'	**6.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.41 cfs @ 15.94 hrs HW=616.05' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.41 cfs)

Primary OutFlow Max=0.14 cfs @ 15.94 hrs HW=616.05' (Free Discharge)
└─**2=Culvert** (Passes 0.14 cfs of 1.86 cfs potential flow)
  ├─**3=Orifice/Grate** (Orifice Controls 0.09 cfs @ 4.21 fps)
  └─**4=Orifice/Grate** (Weir Controls 0.05 cfs @ 0.71 fps)

Pond 2: SFB-2



Stage-Discharge for Pond 2: SFB-2

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
613.25	0.00	0.00	0.00
613.30	0.22	0.22	0.00
613.35	0.22	0.22	0.00
613.40	0.22	0.22	0.00
613.45	0.22	0.22	0.00
613.50	0.22	0.22	0.00
613.55	0.22	0.22	0.00
613.60	0.22	0.22	0.00
613.65	0.22	0.22	0.00
613.70	0.22	0.22	0.00
613.75	0.22	0.22	0.00
613.80	0.22	0.22	0.00
613.85	0.22	0.22	0.00
613.90	0.22	0.22	0.00
613.95	0.22	0.22	0.00
614.00	0.22	0.22	0.00
614.05	0.22	0.22	0.00
614.10	0.22	0.22	0.00
614.15	0.22	0.22	0.00
614.20	0.22	0.22	0.00
614.25	0.22	0.22	0.00
614.30	0.22	0.22	0.00
614.35	0.23	0.23	0.00
614.40	0.23	0.23	0.00
614.45	0.24	0.24	0.00
614.50	0.25	0.25	0.00
614.55	0.25	0.25	0.00
614.60	0.26	0.26	0.00
614.65	0.26	0.26	0.00
614.70	0.27	0.27	0.00
614.75	0.28	0.28	0.00
614.80	0.28	0.28	0.00
614.85	0.29	0.29	0.00
614.90	0.29	0.29	0.00
614.95	0.30	0.30	0.00
615.00	0.31	0.31	0.00
615.05	0.31	0.31	0.00
615.10	0.32	0.32	0.00
615.15	0.32	0.32	0.00
615.20	0.33	0.33	0.00
615.25	0.33	0.33	0.00
615.30	0.35	0.34	0.01
615.35	0.37	0.34	0.03
615.40	0.38	0.35	0.04
615.45	0.39	0.35	0.04
615.50	0.40	0.36	0.05
615.55	0.42	0.36	0.05
615.60	0.43	0.37	0.06
615.65	0.43	0.37	0.06
615.70	0.44	0.38	0.07
615.75	0.45	0.38	0.07
615.80	0.46	0.39	0.08
615.85	0.47	0.39	0.08
615.90	0.48	0.40	0.08
615.95	0.49	0.40	0.09
616.00	0.50	0.41	0.09
616.05	0.56	0.41	0.15
616.10	0.67	0.42	0.26
616.15	0.82	0.42	0.40
616.20	0.95	0.43	0.52
616.25	1.01	0.43	0.58
616.30	1.06	0.44	0.62
616.35	1.11	0.44	0.67
616.40	1.16	0.45	0.71
616.45	1.20	0.45	0.75
616.50	1.24	0.46	0.78
616.55	1.28	0.46	0.82
616.60	1.32	0.47	0.85
616.65	1.36	0.47	0.89
616.70	1.40	0.48	0.92
616.75	1.43	0.48	0.95
616.80	1.47	0.49	0.97
616.85	1.50	0.50	1.00
616.90	1.53	0.50	1.03
616.95	1.56	0.51	1.06
617.00	1.59	0.51	1.08
617.05	1.63	0.52	1.11
617.10	1.66	0.52	1.13
617.15	1.69	0.53	1.16
617.20	1.71	0.53	1.18
617.25	1.74	0.54	1.20
617.30	1.77	0.55	1.23
617.35	1.80	0.55	1.25
617.40	**1.83**	**0.56**	**1.27**

Summary for Pond DB-1: DB-1

Inflow	=	2.60 cfs @	12.09 hrs,	Volume=	0.076 af
Outflow	=	0.37 cfs @	12.49 hrs,	Volume=	0.074 af, Atten= 86%, Lag= 23.9 min
Primary	=	0.37 cfs @	12.49 hrs,	Volume=	0.074 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 610.21' @ 12.49 hrs Surf.Area= 3,131 sf Storage= 2,563 cf
Flood Elev= 611.25' Surf.Area= 3,131 sf Storage= 5,328 cf

Plug-Flow detention time= 100.4 min calculated for 0.074 af (97% of inflow)
Center-of-Mass det. time= 99.5 min (826.4 - 726.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	609.25'	0 cf	**27.58'W x 113.50'L x 2.67'H Field A** 8,349 cf Overall - 8,349 cf Embedded = 0 cf x 40.0% Voids
#2A	609.25'	5,328 cf	**StormTrap ST1 SingleTrap 2-0** x 32 Inside #1 Inside= 82.7"W x 24.0"H => 11.84 sf x 14.06'L = 166.5 cf Outside= 82.7"W x 32.0"H => 18.39 sf x 14.06'L = 258.6 cf 4 Rows of 8 Chambers 27.58' x 112.50' Core + 0.00' x 0.50' Border = 27.58' x 113.50' System
		5,328 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	609.25'	**6.0" Round Culvert** L= 150.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 609.25' / 608.50' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#2	Device 1	609.25'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	610.25'	**4.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.37 cfs @ 12.49 hrs HW=610.21' (Free Discharge)
└─**1=Culvert** (Passes 0.37 cfs of 0.47 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.37 cfs @ 4.29 fps)
  └─**3=Orifice/Grate** (Controls 0.00 cfs)

Pond DB-1: DB-1 - Chamber Wizard Field A

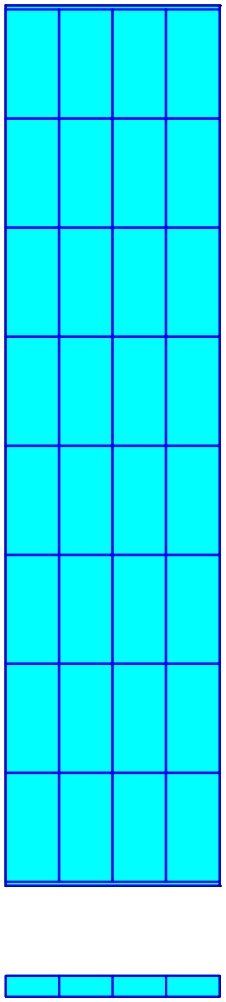
Chamber Model = StormTrap ST1 SingleTrap 2-0 (StormTrap ST1 SingleTrap® Type VI)
Inside= 82.7"W x 24.0"H => 11.84 sf x 14.06'L = 166.5 cf
Outside= 82.7"W x 32.0"H => 18.39 sf x 14.06'L = 258.6 cf

8 Chambers/Row x 14.06' Long = 112.50' Row Length +6.0" Border x 2 = 113.50' Base Length
4 Rows x 82.7" Wide = 27.58' Base Width
32.0" Chamber Height = 2.67' Field Height

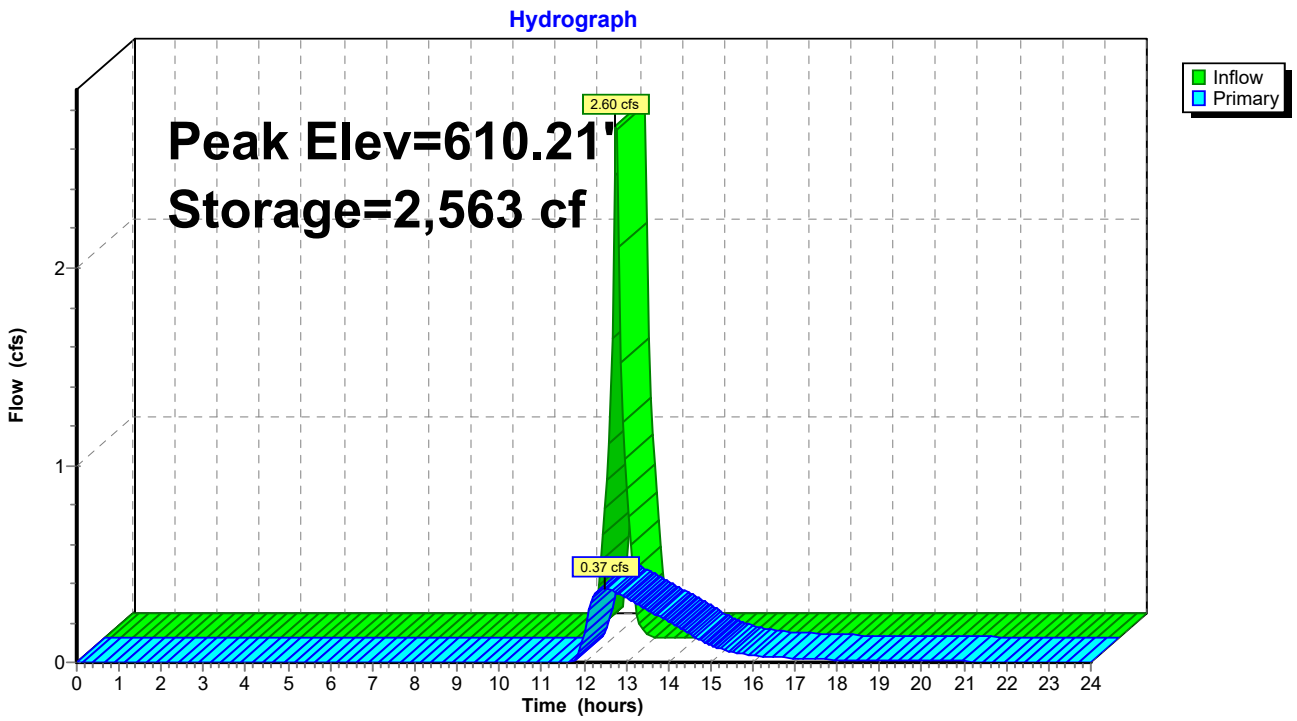
32 Chambers x 166.5 cf = 5,328.0 cf Chamber Storage
32 Chambers x 258.6 cf + 73.6 cf Border = 8,348.6 cf Displacement

Chamber Storage = 5,328.0 cf = 0.122 af
Overall Storage Efficiency = 63.8%
Overall System Size = 113.50' x 27.58' x 2.67'

32 Chambers (plus border)
309.2 cy Field



Pond DB-1: DB-1


Hydrograph
Inflow
Primary
2.60 cfs
0.37 cfs
Peak Elev=610.21'
Storage=2,563 cf
Flow (cfs)
0
1
2
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Time (hours)

Stage-Discharge for Pond DB-1: DB-1

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
609.25	0.00	610.29	0.40	611.33	0.65
609.27	0.00	610.31	0.41	611.35	0.65
609.29	0.00	610.33	0.42	611.37	0.65
609.31	0.01	610.35	0.43	611.39	0.66
609.33	0.01	610.37	0.44	611.41	0.66
609.35	0.02	610.39	0.46	611.43	0.66
609.37	0.03	610.41	0.48	611.45	0.66
609.39	0.04	610.43	0.49	611.47	0.67
609.41	0.05	610.45	0.51	611.49	0.67
609.43	0.06	610.47	0.51	611.51	0.67
609.45	0.08	610.49	0.52	611.53	0.68
609.47	0.09	610.51	0.52	611.55	0.68
609.49	0.11	610.53	0.53	611.57	0.68
609.51	0.13	610.55	0.53	611.59	0.68
609.53	0.14	610.57	0.53	611.61	0.69
609.55	0.15	610.59	0.54	611.63	0.69
609.57	0.17	610.61	0.54	611.65	0.69
609.59	0.17	610.63	0.54	611.67	0.69
609.61	0.18	610.65	0.55	611.69	0.70
609.63	0.19	610.67	0.55	611.71	0.70
609.65	0.20	610.69	0.55	611.73	0.70
609.67	0.21	610.71	0.56	611.75	0.70
609.69	0.22	610.73	0.56	611.77	0.71
609.71	0.23	610.75	0.56	611.79	0.71
609.73	0.24	610.77	0.57	611.81	0.71
609.75	0.24	610.79	0.57	611.83	0.71
609.77	0.25	610.81	0.57	611.85	0.72
609.79	0.26	610.83	0.57	611.87	0.72
609.81	0.26	610.85	0.58	611.89	0.72
609.83	0.27	610.87	0.58	611.91	**0.72**
609.85	0.28	610.89	0.58		
609.87	0.28	610.91	0.59		
609.89	0.29	610.93	0.59		
609.91	0.30	610.95	0.59		
609.93	0.30	610.97	0.60		
609.95	0.31	610.99	0.60		
609.97	0.31	611.01	0.60		
609.99	0.32	611.03	0.61		
610.01	0.32	611.05	0.61		
610.03	0.33	611.07	0.61		
610.05	0.33	611.09	0.61		
610.07	0.34	611.11	0.62		
610.09	0.34	611.13	0.62		
610.11	0.35	611.15	0.62		
610.13	0.35	611.17	0.63		
610.15	0.36	611.19	0.63		
610.17	0.36	611.21	0.63		
610.19	0.37	611.23	0.63		
610.21	0.37	611.25	0.64		
610.23	0.38	611.27	0.64		
610.25	0.38	611.29	0.64		
610.27	0.39	611.31	0.65		

Summary for Pond DB-2: DB-2

Inflow	=	2.05 cfs @	12.09 hrs,	Volume=	0.056 af
Outflow	=	0.09 cfs @	12.57 hrs,	Volume=	0.051 af, Atten= 96%, Lag= 29.1 min
Primary	=	0.09 cfs @	12.57 hrs,	Volume=	0.051 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 616.08' @ 12.57 hrs Surf.Area= 3,131 sf Storage= 2,221 cf
Flood Elev= 617.25' Surf.Area= 3,131 sf Storage= 5,328 cf

Plug-Flow detention time= 253.9 min calculated for 0.051 af (91% of inflow)
Center-of-Mass det. time= 252.7 min (979.6 - 726.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	615.25'	0 cf	**27.58'W x 113.50'L x 2.67'H Field A** 8,349 cf Overall - 8,349 cf Embedded = 0 cf x 40.0% Voids
#2A	615.25'	5,328 cf	**StormTrap ST1 SingleTrap 2-0** x 32 Inside #1 Inside= 82.7"W x 24.0"H => 11.84 sf x 14.06'L = 166.5 cf Outside= 82.7"W x 32.0"H => 18.39 sf x 14.06'L = 258.6 cf 4 Rows of 8 Chambers 27.58' x 112.50' Core + 0.00' x 0.50' Border = 27.58' x 113.50' System
		5,328 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	615.25'	**8.0" Round Culvert** L= 44.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 615.25' / 615.00' S= 0.0057 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.35 sf
#2	Device 1	615.25'	**2.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.09 cfs @ 12.57 hrs HW=616.08' (Free Discharge)
└─**1=Culvert** (Passes 0.09 cfs of 0.94 cfs potential flow)
  └─**2=Orifice/Grate** (Orifice Controls 0.09 cfs @ 4.17 fps)

Pond DB-2: DB-2 - Chamber Wizard Field A

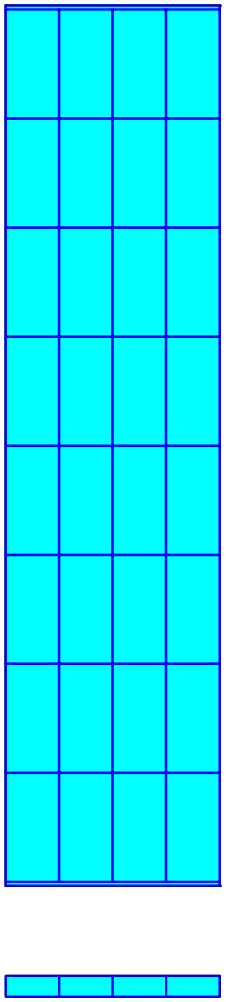
Chamber Model = StormTrap ST1 SingleTrap 2-0 (StormTrap ST1 SingleTrap® Type VI)
Inside= 82.7"W x 24.0"H => 11.84 sf x 14.06'L = 166.5 cf
Outside= 82.7"W x 32.0"H => 18.39 sf x 14.06'L = 258.6 cf

8 Chambers/Row x 14.06' Long = 112.50' Row Length +6.0" Border x 2 = 113.50' Base Length
4 Rows x 82.7" Wide = 27.58' Base Width
32.0" Chamber Height = 2.67' Field Height

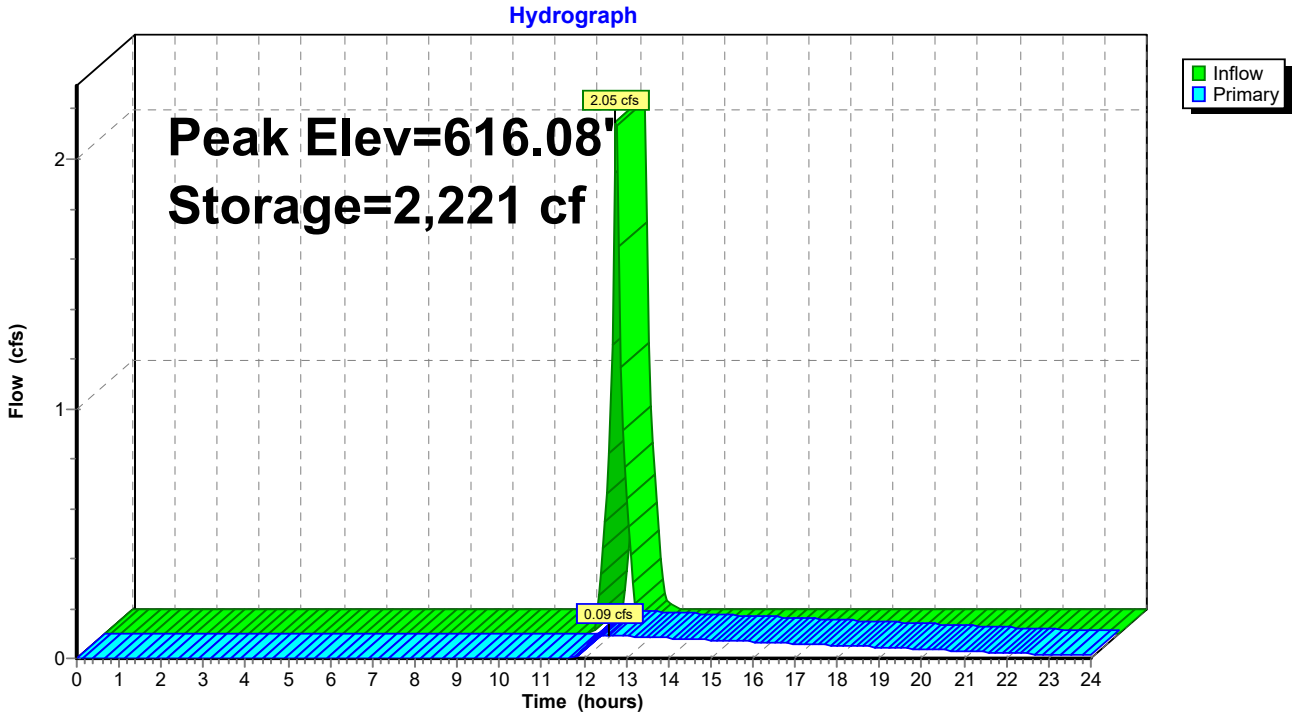
32 Chambers x 166.5 cf = 5,328.0 cf Chamber Storage
32 Chambers x 258.6 cf + 73.6 cf Border = 8,348.6 cf Displacement

Chamber Storage = 5,328.0 cf = 0.122 af
Overall Storage Efficiency = 63.8%
Overall System Size = 113.50' x 27.58' x 2.67'

32 Chambers (plus border)
309.2 cy Field



Pond DB-2: DB-2


Hydrograph
Inflow
Primary
2.05 cfs
0.09 cfs
Peak Elev=616.08'
Storage=2,221 cf
Flow (cfs)
0
1
2
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Time (hours)

Stage-Discharge for Pond DB-2: DB-2

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
615.25	0.00	616.29	0.10	617.33	0.15
615.27	0.00	616.31	0.10	617.35	0.15
615.29	0.00	616.33	0.10	617.37	0.15
615.31	0.01	616.35	0.11	617.39	0.15
615.33	0.01	616.37	0.11	617.41	0.15
615.35	0.01	616.39	0.11	617.43	0.15
615.37	0.02	616.41	0.11	617.45	0.15
615.39	0.02	616.43	0.11	617.47	0.15
615.41	0.03	616.45	0.11	617.49	0.15
615.43	0.03	616.47	0.11	617.51	0.15
615.45	0.04	616.49	0.11	617.53	0.16
615.47	0.04	616.51	0.11	617.55	0.16
615.49	0.04	616.53	0.11	617.57	0.16
615.51	0.04	616.55	0.12	617.59	0.16
615.53	0.05	616.57	0.12	617.61	0.16
615.55	0.05	616.59	0.12	617.63	0.16
615.57	0.05	616.61	0.12	617.65	0.16
615.59	0.05	616.63	0.12	617.67	0.16
615.61	0.06	616.65	0.12	617.69	0.16
615.63	0.06	616.67	0.12	617.71	0.16
615.65	0.06	616.69	0.12	617.73	0.16
615.67	0.06	616.71	0.12	617.75	0.16
615.69	0.06	616.73	0.12	617.77	0.16
615.71	0.06	616.75	0.13	617.79	0.16
615.73	0.07	616.77	0.13	617.81	0.17
615.75	0.07	616.79	0.13	617.83	0.17
615.77	0.07	616.81	0.13	617.85	0.17
615.79	0.07	616.83	0.13	617.87	0.17
615.81	0.07	616.85	0.13	617.89	0.17
615.83	0.07	616.87	0.13	617.91	**0.17**
615.85	0.08	616.89	0.13		
615.87	0.08	616.91	0.13		
615.89	0.08	616.93	0.13		
615.91	0.08	616.95	0.13		
615.93	0.08	616.97	0.13		
615.95	0.08	616.99	0.14		
615.97	0.08	617.01	0.14		
615.99	0.09	617.03	0.14		
616.01	0.09	617.05	0.14		
616.03	0.09	617.07	0.14		
616.05	0.09	617.09	0.14		
616.07	0.09	617.11	0.14		
616.09	0.09	617.13	0.14		
616.11	0.09	617.15	0.14		
616.13	0.09	617.17	0.14		
616.15	0.09	617.19	0.14		
616.17	0.10	617.21	0.14		
616.19	0.10	617.23	0.14		
616.21	0.10	617.25	0.15		
616.23	0.10	617.27	0.15		
616.25	0.10	617.29	0.15		
616.27	0.10	617.31	0.15		

Summary for Pond DB-6: DB-6

Inflow Area = 0.133 ac,100.00% Impervious, Inflow Depth > 38.13" for 10-YR event
Inflow = 5.51 cfs @ 12.22 hrs, Volume= 0.424 af
Outflow = 2.26 cfs @ 12.59 hrs, Volume= 0.417 af, Atten= 59%, Lag= 22.3 min
Primary = 2.26 cfs @ 12.59 hrs, Volume= 0.417 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 615.19' @ 12.59 hrs Surf.Area= 2,902 sf Storage= 7,570 cf
Flood Elev= 617.25' Surf.Area= 2,902 sf Storage= 12,873 cf

Plug-Flow detention time= 94.1 min calculated for 0.416 af (98% of inflow)
Center-of-Mass det. time= 84.9 min (874.6 - 789.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	612.25'	0 cf	**38.75'W x 74.90'L x 5.50'H Field A** 15,962 cf Overall - 15,962 cf Embedded = 0 cf x 40.0% Voids
#2A	612.25'	12,873 cf	**StormTrap ST2 SingleTrap 5-0** x 12 Inside #1 Inside= 101.7"W x 60.0"H => 38.33 sf x 15.40'L = 590.2 cf Outside= 101.7"W x 66.0"H => 46.64 sf x 15.40'L = 718.0 cf 3 Rows of 4 Chambers 25.44' x 61.58' Core + 6.66' Border = 38.75' x 74.90' System
		12,873 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	612.25'	**12.0" Round Culvert** L= 110.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 612.25' / 609.60' S= 0.0241 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	612.25'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	614.00'	**8.0" Vert. Orifice/Grate** C= 0.600
#4	Device 1	615.25'	**8.0" Vert. Orifice/Grate** C= 0.600
#5	Device 1	616.25'	**12.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=2.25 cfs @ 12.59 hrs HW=615.19' (Free Discharge)
└─**1=Culvert** (Passes 2.25 cfs of 4.66 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.70 cfs @ 8.02 fps)
  ├─**3=Orifice/Grate** (Orifice Controls 1.55 cfs @ 4.45 fps)
  ├─**4=Orifice/Grate** (Controls 0.00 cfs)
  └─**5=Orifice/Grate** (Controls 0.00 cfs)

Pond DB-6: DB-6 - Chamber Wizard Field A

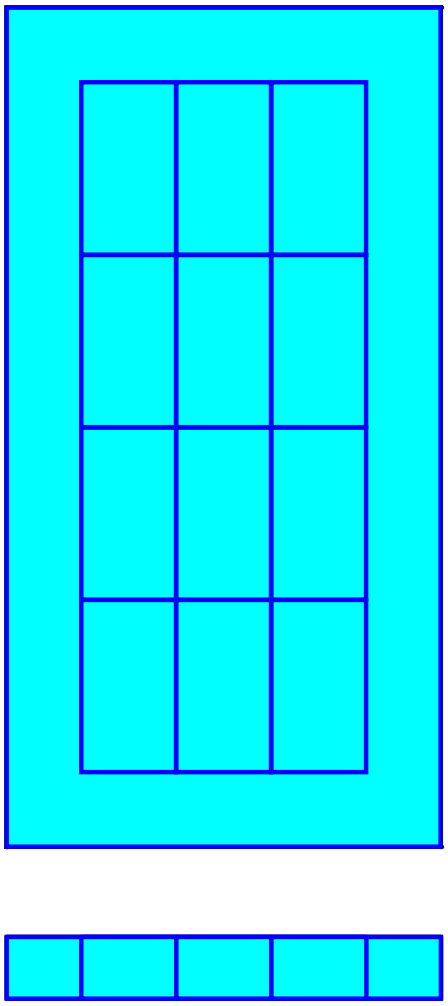
Chamber Model = StormTrap ST2 SingleTrap 5-0 (StormTrap ST2 SingleTrap® Type II+IV)
Inside= 101.7"W x 60.0"H => 38.33 sf x 15.40'L = 590.2 cf
Outside= 101.7"W x 66.0"H => 46.64 sf x 15.40'L = 718.0 cf

4 Chambers/Row x 15.40' Long = 61.58' Row Length +79.9" Border x 2 = 74.90' Base Length
3 Rows x 101.7" Wide + 79.9" Side Border x 2 = 38.75' Base Width
66.0" Chamber Height = 5.50' Field Height

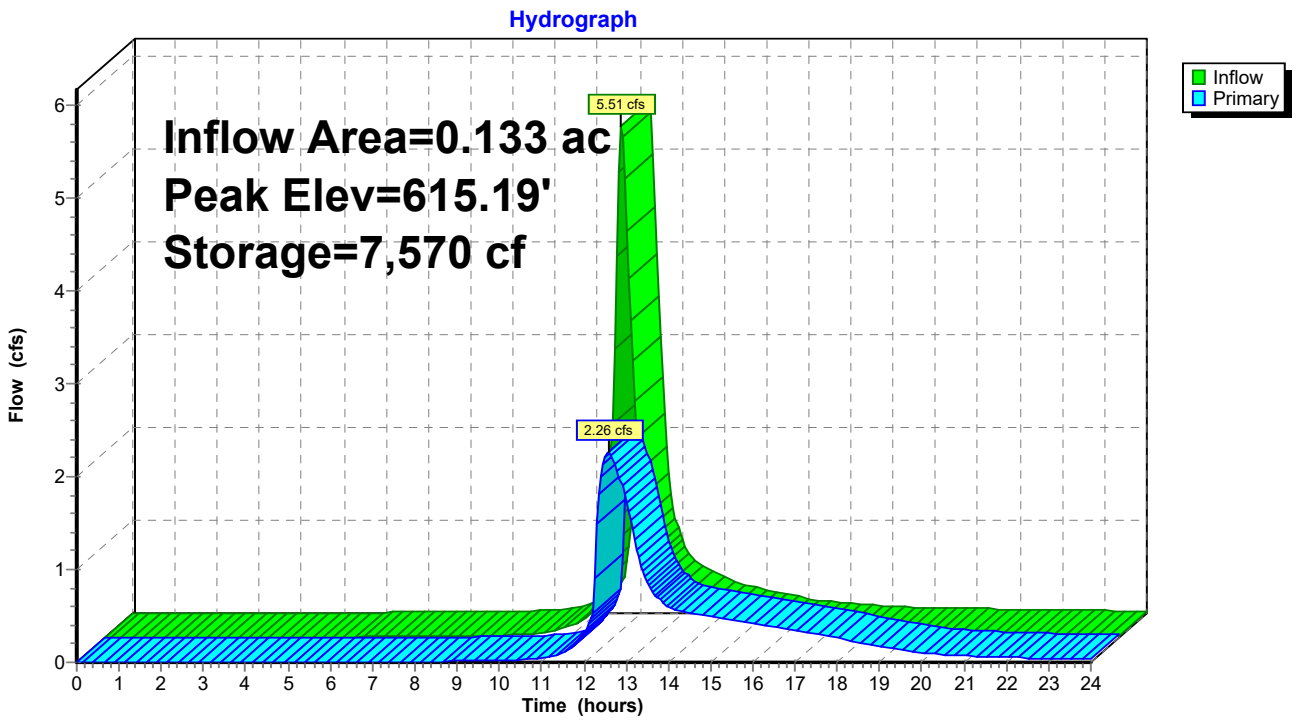
12 Chambers x 590.2 cf + 5,791.0 cf Border = 12,873.2 cf Chamber Storage
12 Chambers x 718.0 cf + 7,346.3 cf Border = 15,962.2 cf Displacement

Chamber Storage = 12,873.2 cf = 0.296 af
Overall Storage Efficiency = 80.6%
Overall System Size = 74.90' x 38.75' x 5.50'

12 Chambers (plus border)
591.2 cy Field



Pond DB-6: DB-6


Hydrograph
Inflow Area=0.133 ac
Peak Elev=615.19'
Storage=7,570 cf
5.51 cfs
2.26 cfs
Inflow
Primary
Flow (cfs)
Time (hours)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24

Stage-Discharge for Pond DB-6: DB-6

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
612.25	0.00	614.33	0.92	616.41	4.90
612.29	0.00	614.37	1.00	616.45	5.02
612.33	0.02	614.41	1.08	616.49	5.16
612.37	0.03	614.45	1.17	616.53	5.30
612.41	0.06	614.49	1.26	616.57	5.46
612.45	0.08	614.53	1.35	616.61	5.62
612.49	0.11	614.57	1.43	616.65	5.79
612.53	0.14	614.61	1.51	616.69	5.93
612.57	0.17	614.65	1.58	616.73	5.96
612.61	0.18	614.69	1.64	616.77	5.99
612.65	0.20	614.73	1.70	616.81	6.02
612.69	0.22	614.77	1.76	616.85	6.05
612.73	0.24	614.81	1.81	616.89	6.07
612.77	0.25	614.85	1.86	616.93	6.10
612.81	0.26	614.89	1.91	616.97	6.13
612.85	0.28	614.93	1.96	617.01	6.16
612.89	0.29	614.97	2.01	617.05	6.19
612.93	0.30	615.01	2.06	617.09	6.22
612.97	0.31	615.05	2.10	617.13	6.25
613.01	0.32	615.09	2.15	617.17	6.28
613.05	0.33	615.13	2.19	617.21	6.31
613.09	0.34	615.17	2.23	617.25	6.33
613.13	0.35	615.21	2.28	617.29	6.36
613.17	0.36	615.25	2.32	617.33	6.39
613.21	0.37	615.29	2.36	617.37	6.42
613.25	0.38	615.33	2.42	617.41	6.44
613.29	0.39	615.37	2.48	617.45	6.47
613.33	0.40	615.41	2.56	617.49	6.50
613.37	0.41	615.45	2.64	617.53	6.53
613.41	0.42	615.49	2.73	617.57	6.55
613.45	0.43	615.53	2.83	617.61	6.58
613.49	0.44	615.57	2.93	617.65	6.61
613.53	0.44	615.61	3.04	617.69	6.64
613.57	0.45	615.65	3.16	617.73	**6.66**
613.61	0.46	615.69	3.27		
613.65	0.47	615.73	3.39		
613.69	0.47	615.77	3.50		
613.73	0.48	615.81	3.61		
613.77	0.49	615.85	3.72		
613.81	0.50	615.89	3.82		
613.85	0.50	615.93	3.90		
613.89	0.51	615.97	3.99		
613.93	0.52	616.01	4.07		
613.97	0.52	616.05	4.15		
614.01	0.53	616.09	4.23		
614.05	0.55	616.13	4.31		
614.09	0.57	616.17	4.38		
614.13	0.61	616.21	4.45		
614.17	0.65	616.25	4.52		
614.21	0.71	616.29	4.60		
614.25	0.77	616.33	4.69		
614.29	0.84	616.37	4.79		

Summary for Pond DB-7: DB-7

Inflow Area = 0.543 ac, 78.86% Impervious, Inflow Depth > 4.03" for 10-YR event
Inflow = 2.40 cfs @ 12.09 hrs, Volume= 0.182 af
Outflow = 0.43 cfs @ 12.55 hrs, Volume= 0.176 af, Atten= 82%, Lag= 27.5 min
Primary = 0.43 cfs @ 12.55 hrs, Volume= 0.176 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 617.02' @ 12.55 hrs Surf.Area= 3,131 sf Storage= 3,259 cf
Flood Elev= 617.80' Surf.Area= 3,131 sf Storage= 5,328 cf

Plug-Flow detention time= 109.4 min calculated for 0.175 af (96% of inflow)
Center-of-Mass det. time= 88.4 min (874.4 - 786.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	615.80'	0 cf	**27.58'W x 113.50'L x 2.67'H Field A** 8,349 cf Overall - 8,349 cf Embedded = 0 cf x 40.0% Voids
#2A	615.80'	5,328 cf	**StormTrap ST1 SingleTrap 2-0** x 32 Inside #1 Inside= 82.7"W x 24.0"H => 11.84 sf x 14.06'L = 166.5 cf Outside= 82.7"W x 32.0"H => 18.39 sf x 14.06'L = 258.6 cf 4 Rows of 8 Chambers 27.58' x 112.50' Core + 0.00' x 0.50' Border = 27.58' x 113.50' System
		5,328 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	615.80'	**6.0" Round Culvert** L= 124.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 615.80' / 615.00' S= 0.0065 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf
#2	Device 1	615.80'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	617.30'	**4.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.43 cfs @ 12.55 hrs HW=617.02' (Free Discharge)
└─**1=Culvert** (Passes 0.43 cfs of 0.70 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.43 cfs @ 4.95 fps)
  └─**3=Orifice/Grate** (Controls 0.00 cfs)

Pond DB-7: DB-7 - Chamber Wizard Field A

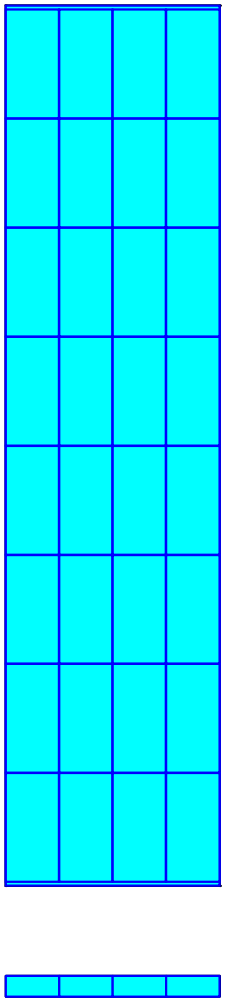
Chamber Model = StormTrap ST1 SingleTrap 2-0 (StormTrap ST1 SingleTrap® Type VI)
Inside= 82.7"W x 24.0"H => 11.84 sf x 14.06'L = 166.5 cf
Outside= 82.7"W x 32.0"H => 18.39 sf x 14.06'L = 258.6 cf

8 Chambers/Row x 14.06' Long = 112.50' Row Length +6.0" Border x 2 = 113.50' Base Length
4 Rows x 82.7" Wide = 27.58' Base Width
32.0" Chamber Height = 2.67' Field Height

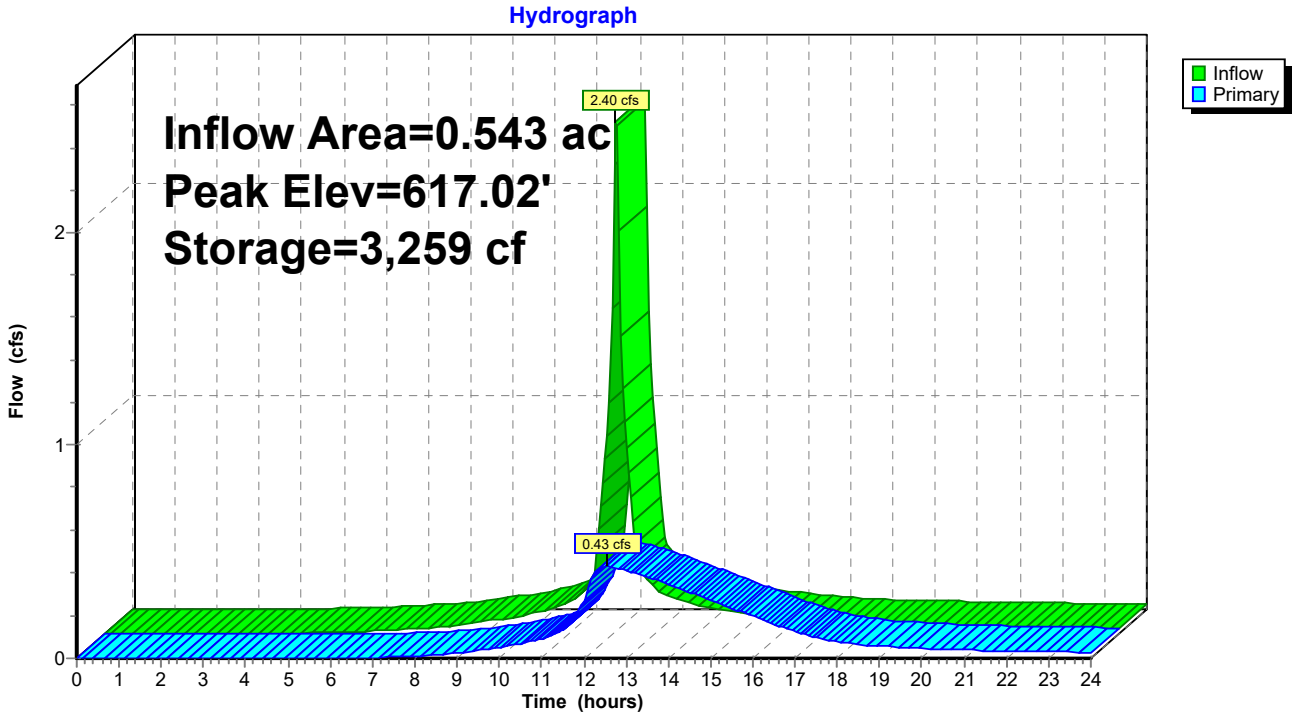
32 Chambers x 166.5 cf = 5,328.0 cf Chamber Storage
32 Chambers x 258.6 cf + 73.6 cf Border = 8,348.6 cf Displacement

Chamber Storage = 5,328.0 cf = 0.122 af
Overall Storage Efficiency = 63.8%
Overall System Size = 113.50' x 27.58' x 2.67'

32 Chambers (plus border)
309.2 cy Field



Pond DB-7: DB-7


Hydrograph
Inflow Area=0.543 ac
Peak Elev=617.02'
Storage=3,259 cf
2.40 cfs
0.43 cfs
Inflow
Primary
Flow (cfs)
Time (hours)
0
1
2
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

Stage-Discharge for Pond DB-7: DB-7

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
615.80	0.00	616.84	0.39	617.88	0.85
615.82	0.00	616.86	0.40	617.90	0.86
615.84	0.00	616.88	0.40	617.92	0.87
615.86	0.01	616.90	0.41	617.94	0.88
615.88	0.02	616.92	0.41	617.96	0.89
615.90	0.02	616.94	0.41	617.98	0.89
615.92	0.03	616.96	0.42	618.00	0.90
615.94	0.04	616.98	0.42	618.02	0.90
615.96	0.06	617.00	0.43	618.04	0.90
615.98	0.07	617.02	0.43	618.06	0.91
616.00	0.08	617.04	0.44	618.08	0.91
616.02	0.10	617.06	0.44	618.10	0.92
616.04	0.11	617.08	0.44	618.12	0.92
616.06	0.13	617.10	0.45	618.14	0.92
616.08	0.14	617.12	0.45	618.16	0.93
616.10	0.15	617.14	0.46	618.18	0.93
616.12	0.17	617.16	0.46	618.20	0.93
616.14	0.17	617.18	0.46	618.22	0.94
616.16	0.18	617.20	0.47	618.24	0.94
616.18	0.19	617.22	0.47	618.26	0.94
616.20	0.20	617.24	0.47	618.28	0.95
616.22	0.21	617.26	0.48	618.30	0.95
616.24	0.22	617.28	0.48	618.32	0.95
616.26	0.23	617.30	0.49	618.34	0.96
616.28	0.24	617.32	0.49	618.36	0.96
616.30	0.24	617.34	0.50	618.38	0.96
616.32	0.25	617.36	0.50	618.40	0.97
616.34	0.26	617.38	0.52	618.42	0.97
616.36	0.26	617.40	0.53	618.44	0.97
616.38	0.27	617.42	0.54	618.46	**0.98**
616.40	0.28	617.44	0.55		
616.42	0.28	617.46	0.57		
616.44	0.29	617.48	0.59		
616.46	0.30	617.50	0.60		
616.48	0.30	617.52	0.62		
616.50	0.31	617.54	0.64		
616.52	0.31	617.56	0.66		
616.54	0.32	617.58	0.67		
616.56	0.32	617.60	0.69		
616.58	0.33	617.62	0.71		
616.60	0.33	617.64	0.72		
616.62	0.34	617.66	0.73		
616.64	0.34	617.68	0.74		
616.66	0.35	617.70	0.76		
616.68	0.35	617.72	0.77		
616.70	0.36	617.74	0.78		
616.72	0.36	617.76	0.79		
616.74	0.37	617.78	0.80		
616.76	0.37	617.80	0.81		
616.78	0.38	617.82	0.82		
616.80	0.38	617.84	0.83		
616.82	0.39	617.86	0.84		

Summary for Pond ICS-1: ICS-1

Inflow Area =	0.693 ac, 62.75% Impervious, Inflow Depth > 3.82" for 10-YR event				
Inflow =	2.94 cfs @	12.09 hrs,	Volume=	0.220 af	
Outflow =	2.94 cfs @	12.09 hrs,	Volume=	0.220 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.35 cfs @	12.09 hrs,	Volume=	0.144 af	
Secondary =	2.60 cfs @	12.09 hrs,	Volume=	0.076 af	

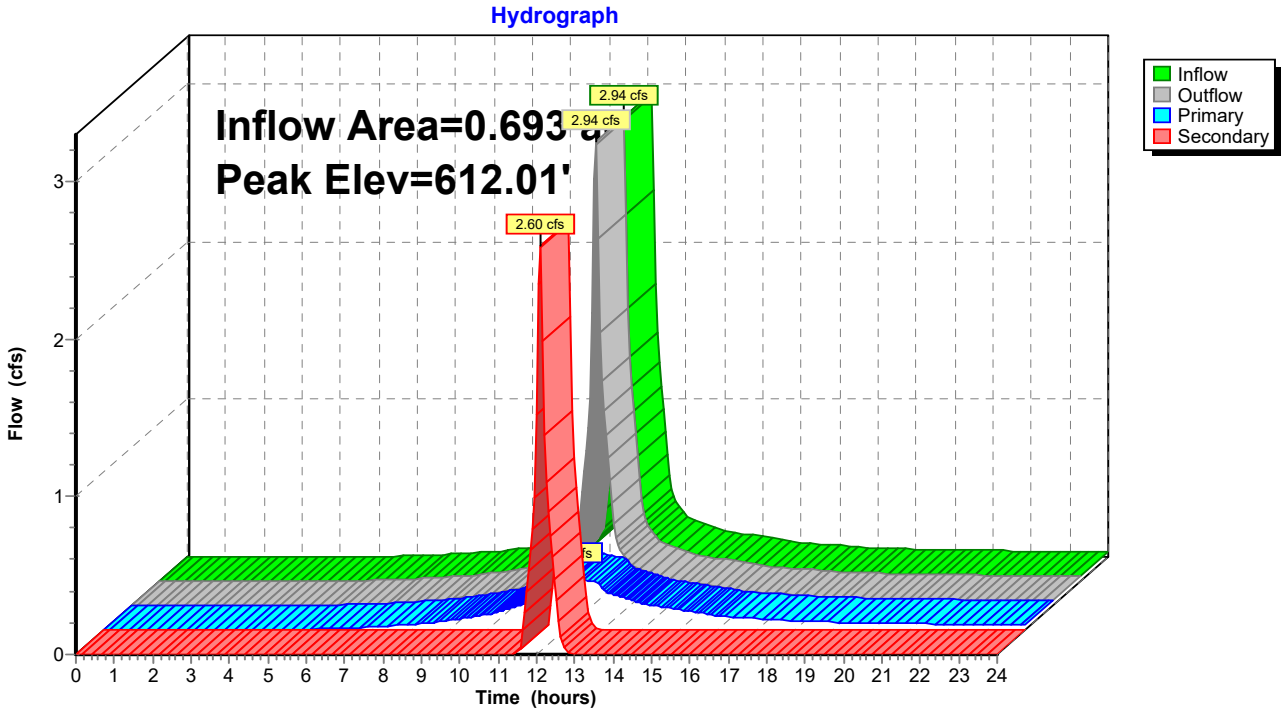
Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 612.01' @ 12.09 hrs
Flood Elev= 613.25'

Device	Routing	Invert	Outlet Devices
#1	Primary	609.25'	**4.0" Round Culvert** L= 145.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 609.25' / 608.50' S= 0.0052 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf
#2	Secondary	611.20'	**12.0" Round Culvert** L= 5.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 611.20' / 610.20' S= 0.2000 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.35 cfs @ 12.09 hrs HW=611.99' (Free Discharge)
└**1=Culvert** (Barrel Controls 0.35 cfs @ 3.98 fps)

Secondary OutFlow Max=2.53 cfs @ 12.09 hrs HW=611.99' (Free Discharge)
└**2=Culvert** (Inlet Controls 2.53 cfs @ 3.79 fps)

Pond ICS-1: ICS-1



Stage-Discharge for Pond ICS-1: ICS-1

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
609.25	0.00	0.00	0.00
609.30	0.00	0.00	0.00
609.35	0.02	0.02	0.00
609.40	0.04	0.04	0.00
609.45	0.07	0.07	0.00
609.50	0.11	0.11	0.00
609.55	0.14	0.14	0.00
609.60	0.17	0.17	0.00
609.65	0.19	0.19	0.00
609.70	0.18	0.18	0.00
609.75	0.19	0.19	0.00
609.80	0.19	0.19	0.00
609.85	0.20	0.20	0.00
609.90	0.20	0.20	0.00
609.95	0.21	0.21	0.00
610.00	0.21	0.21	0.00
610.05	0.22	0.22	0.00
610.10	0.22	0.22	0.00
610.15	0.22	0.22	0.00
610.20	0.23	0.23	0.00
610.25	0.23	0.23	0.00
610.30	0.24	0.24	0.00
610.35	0.24	0.24	0.00
610.40	0.24	0.24	0.00
610.45	0.25	0.25	0.00
610.50	0.25	0.25	0.00
610.55	0.26	0.26	0.00
610.60	0.26	0.26	0.00
610.65	0.26	0.26	0.00
610.70	0.27	0.27	0.00
610.75	0.27	0.27	0.00
610.80	0.27	0.27	0.00
610.85	0.28	0.28	0.00
610.90	0.28	0.28	0.00
610.95	0.28	0.28	0.00
611.00	0.29	0.29	0.00
611.05	0.29	0.29	0.00
611.10	0.29	0.29	0.00
611.15	0.30	0.30	0.00
611.20	0.30	0.30	0.00
611.25	0.32	0.30	0.01
611.30	0.36	0.31	0.06
611.35	0.43	0.31	0.12
611.40	0.53	0.31	0.21
611.45	0.64	0.32	0.33
611.50	0.78	0.32	0.46
611.55	0.94	0.32	0.62
611.60	1.11	0.32	0.79
611.65	1.31	0.33	0.98
611.70	1.51	0.33	1.18
611.75	1.73	0.33	1.40
611.80	1.96	0.34	1.62
611.85	2.19	0.34	1.85
611.90	2.43	0.34	2.09
611.95	2.67	0.34	2.33
612.00	2.91	0.35	2.56
612.05	3.14	0.35	2.79
612.10	3.36	0.35	3.01
612.15	3.55	0.36	3.20
612.20	3.70	0.36	3.34
612.25	3.87	0.36	3.51
612.30	4.03	0.36	3.66
612.35	4.18	0.37	3.81
612.40	4.32	0.37	3.95
612.45	4.47	0.37	4.09
612.50	4.60	0.37	4.23
612.55	4.73	0.38	4.36
612.60	4.86	0.38	4.48
612.65	4.99	0.38	4.61
612.70	5.11	0.38	4.73
612.75	5.23	0.39	4.84
612.80	5.35	0.39	4.96
612.85	5.46	0.39	5.07
612.90	5.57	0.39	5.18
612.95	5.68	0.40	5.29
613.00	5.79	0.40	5.39
613.05	5.89	0.40	5.49
613.10	6.00	0.40	5.59
613.15	6.10	0.41	5.69
613.20	6.20	0.41	5.79
613.25	**6.30**	**0.41**	**5.89**

Summary for Pond ICS-2: ICS-2

Inflow Area =	0.598 ac, 70.86% Impervious, Inflow Depth > 3.71" for 10-YR event				
Inflow =	2.49 cfs @	12.09 hrs,	Volume=	0.185 af	
Outflow =	2.49 cfs @	12.09 hrs,	Volume=	0.185 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.44 cfs @	12.09 hrs,	Volume=	0.129 af	
Secondary =	2.05 cfs @	12.09 hrs,	Volume=	0.056 af	

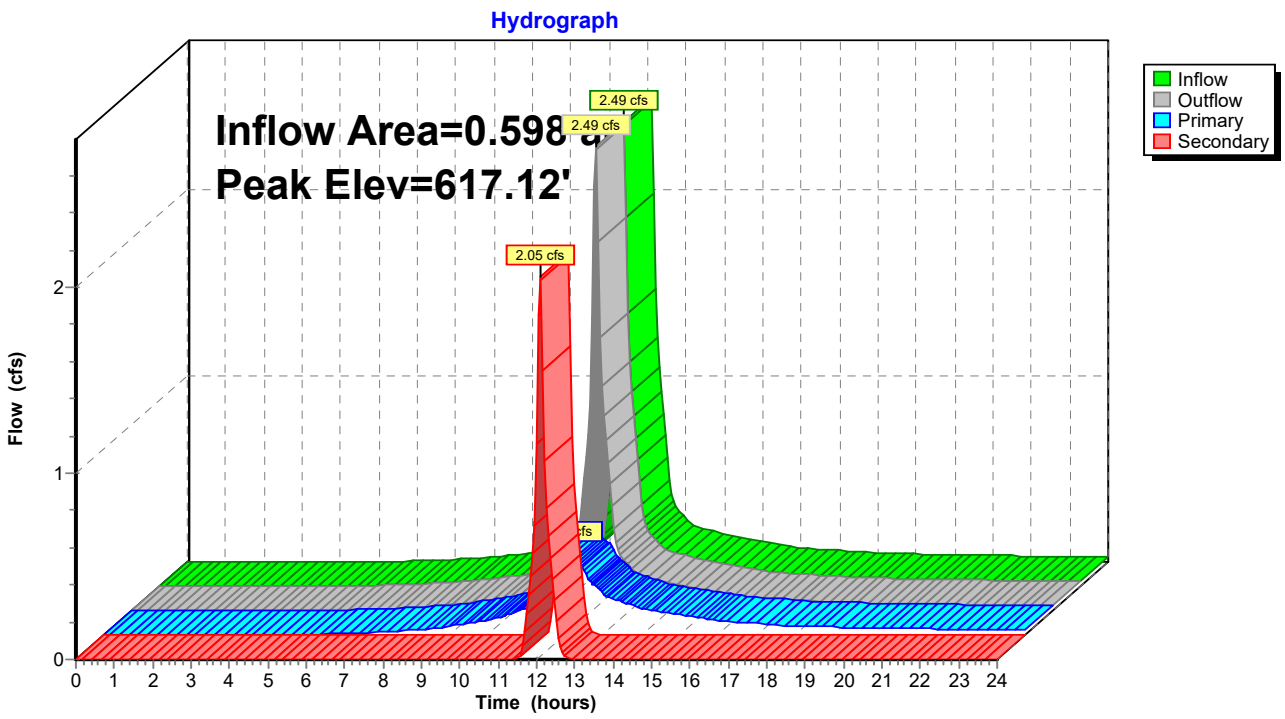
Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 617.12' @ 12.09 hrs
Flood Elev= 617.25'

Device	Routing	Invert	Outlet Devices
#1	Primary	615.85'	**4.0" Round Culvert** L= 34.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 615.85' / 615.00' S= 0.0250 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.09 sf
#2	Secondary	616.21'	**12.0" Round Culvert** L= 12.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 616.21' / 616.15' S= 0.0050 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.44 cfs @ 12.09 hrs HW=617.10' (Free Discharge)
└**1=Culvert** (Barrel Controls 0.44 cfs @ 5.02 fps)

Secondary OutFlow Max=1.99 cfs @ 12.09 hrs HW=617.10' (Free Discharge)
└**2=Culvert** (Barrel Controls 1.99 cfs @ 3.58 fps)

Pond ICS-2: ICS-2



Stage-Discharge for Pond ICS-2: ICS-2

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
615.85	0.00	0.00	0.00
615.87	0.00	0.00	0.00
615.89	0.01	0.01	0.00
615.91	0.01	0.01	0.00
615.93	0.02	0.02	0.00
615.95	0.03	0.03	0.00
615.97	0.04	0.04	0.00
615.99	0.06	0.06	0.00
616.01	0.07	0.07	0.00
616.03	0.09	0.09	0.00
616.05	0.10	0.10	0.00
616.07	0.12	0.12	0.00
616.09	0.14	0.14	0.00
616.11	0.16	0.16	0.00
616.13	0.18	0.18	0.00
616.15	0.19	0.19	0.00
616.17	0.21	0.21	0.00
616.19	0.22	0.22	0.00
616.21	0.23	0.23	0.00
616.23	0.24	0.24	0.00
616.25	0.26	0.25	0.00
616.27	0.28	0.26	0.01
616.29	0.30	0.27	0.02
616.31	0.32	0.28	0.03
616.33	0.34	0.29	0.05
616.35	0.37	0.30	0.07
616.37	0.40	0.31	0.09
616.39	0.43	0.32	0.11
616.41	0.46	0.33	0.13
616.43	0.50	0.34	0.16
616.45	0.53	0.35	0.19
616.47	0.57	0.35	0.22
616.49	0.61	0.35	0.25
616.51	0.65	0.36	0.29
616.53	0.69	0.36	0.33
616.55	0.73	0.36	0.37
616.57	0.77	0.37	0.41
616.59	0.82	0.37	0.45
616.61	0.87	0.37	0.50
616.63	0.92	0.38	0.54
616.65	0.97	0.38	0.59
616.67	1.02	0.38	0.64
616.69	1.08	0.38	0.69
616.71	1.13	0.39	0.74
616.73	1.19	0.39	0.80
616.75	1.25	0.39	0.86
616.77	1.31	0.40	0.91
616.79	1.37	0.40	0.97
616.81	1.43	0.40	1.03
616.83	1.50	0.40	1.09
616.85	1.56	0.41	1.15
616.87	1.63	0.41	1.22
616.89	1.69	0.41	1.28
616.91	1.76	0.41	1.35
616.93	1.83	0.42	1.41
616.95	1.90	0.42	1.48
616.97	1.97	0.42	1.54
616.99	2.04	0.42	1.61
617.01	2.11	0.43	1.68
617.03	2.18	0.43	1.75
617.05	2.25	0.43	1.82
617.07	2.32	0.43	1.89
617.09	2.40	0.44	1.96
617.11	2.47	0.44	2.03
617.13	2.54	0.44	2.10
617.15	2.61	0.44	2.17
617.17	2.69	0.45	2.24
617.19	2.76	0.45	2.31
617.21	2.83	0.45	2.38
617.23	2.90	0.45	2.45
617.25	**2.97**	**0.46**	**2.51**

Summary for Pond ICS-6: ICS-6

Inflow Area =	2.630 ac, 39.25% Impervious, Inflow Depth > 2.40" for 10-YR event				
Inflow =	5.43 cfs @	12.22 hrs,	Volume=	0.525 af	
Outflow =	5.43 cfs @	12.22 hrs,	Volume=	0.525 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.25 cfs @	12.22 hrs,	Volume=	0.155 af	
Secondary =	5.18 cfs @	12.22 hrs,	Volume=	0.371 af	

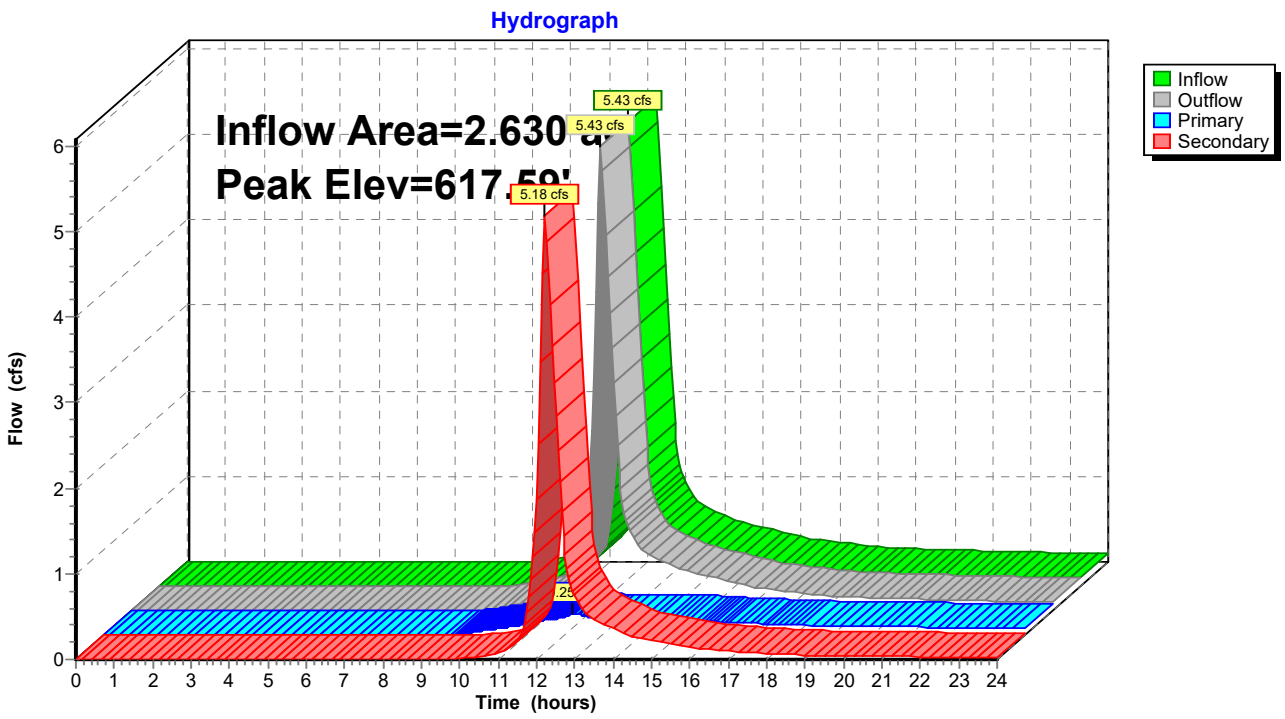
Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 617.59' @ 12.22 hrs
Flood Elev= 621.10'

Device	Routing	Invert	Outlet Devices
#1	Primary	616.00'	**4.0" Round Culvert** L= 202.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 616.00' / 615.00' S= 0.0050 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf
#2	Secondary	616.15'	**15.0" Round Culvert** L= 5.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 616.15' / 616.10' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=0.25 cfs @ 12.22 hrs HW=617.57' (Free Discharge)
└─**1=Culvert** (Barrel Controls 0.25 cfs @ 2.88 fps)

Secondary OutFlow Max=5.10 cfs @ 12.22 hrs HW=617.57' (Free Discharge)
└─**2=Culvert** (Barrel Controls 5.10 cfs @ 4.57 fps)

Pond ICS-6: ICS-6



Stage-Discharge for Pond ICS-6: ICS-6

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
616.00	0.00	0.00	0.00
616.10	0.02	0.02	0.00
616.20	0.08	0.07	0.01
616.30	0.24	0.14	0.10
616.40	0.44	0.19	0.26
616.50	0.66	0.18	0.48
616.60	0.94	0.19	0.75
616.70	1.27	0.20	1.08
616.80	1.65	0.20	1.44
616.90	2.06	0.21	1.85
617.00	2.51	0.22	2.30
617.10	2.99	0.22	2.77
617.20	3.49	0.23	3.26
617.30	3.99	0.24	3.76
617.40	4.50	0.24	4.26
617.50	5.00	0.25	4.75
617.60	5.47	0.25	5.22
617.70	5.89	0.26	5.63
617.80	6.21	0.26	5.95
617.90	6.75	0.27	6.48
618.00	7.32	0.27	7.05
618.10	7.85	0.28	7.57
618.20	8.34	0.28	8.06
618.30	8.81	0.29	8.52
618.40	9.25	0.29	8.96
618.50	9.67	0.30	9.38
618.60	10.08	0.30	9.77
618.70	10.47	0.31	10.16
618.80	10.82	0.31	10.51
618.90	11.08	0.32	10.77
619.00	11.34	0.32	11.02
619.10	11.59	0.33	11.26
619.20	11.83	0.33	11.50
619.30	12.07	0.33	11.74
619.40	12.31	0.34	11.97
619.50	12.54	0.34	12.19
619.60	12.76	0.35	12.41
619.70	12.98	0.35	12.63
619.80	13.20	0.35	12.85
619.90	13.42	0.36	13.06
620.00	13.63	0.36	13.26
620.10	13.83	0.37	13.47
620.20	14.04	0.37	13.67
620.30	14.24	0.37	13.87
620.40	14.44	0.38	14.06
620.50	14.64	0.38	14.26
620.60	14.83	0.38	14.45
620.70	15.02	0.39	14.63
620.80	15.21	0.39	14.82
620.90	15.40	0.40	15.00
621.00	15.58	0.40	15.18
621.10	**15.76**	**0.40**	**15.36**

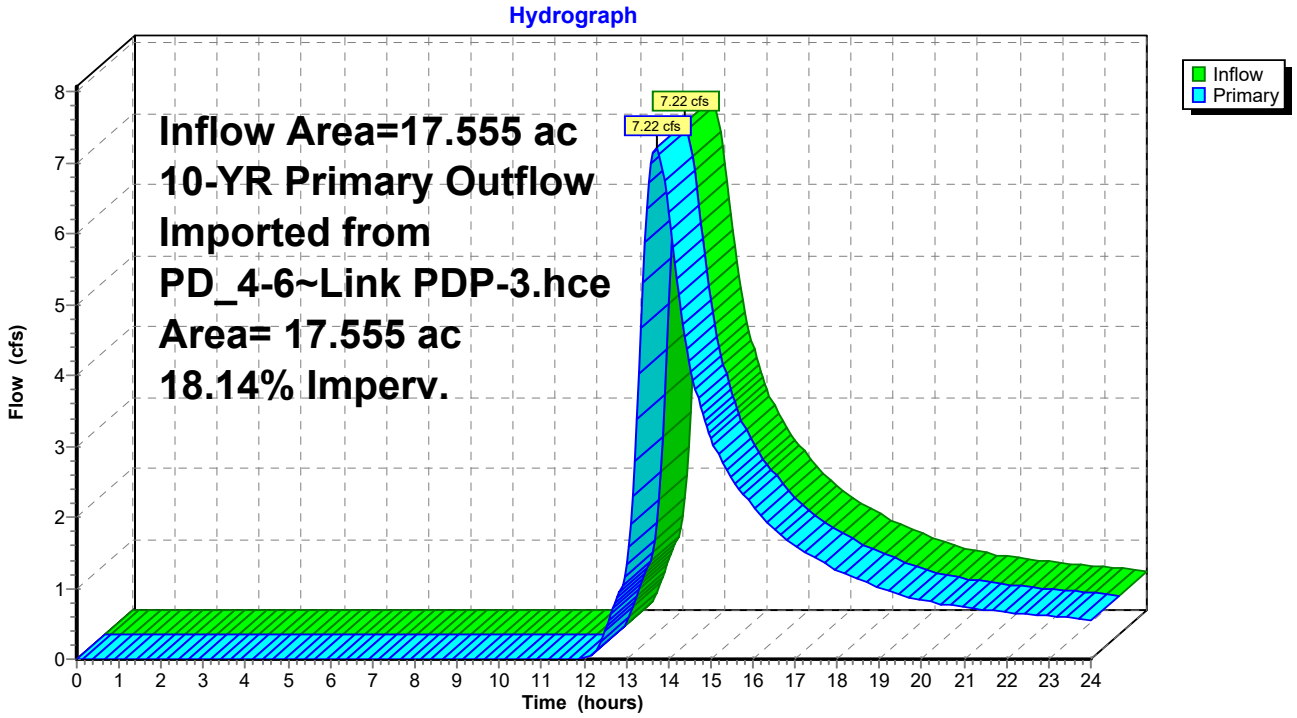
Summary for Link PDP-3: DP-3

Inflow Area = 17.555 ac, 18.14% Impervious, Inflow Depth > 1.17" for 10-YR event
Inflow = 7.22 cfs @ 13.71 hrs, Volume= 1.710 af
Primary = 7.22 cfs @ 13.71 hrs, Volume= 1.710 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

10-YR Primary Outflow Imported from PD_4-6~Link PDP-3.hce

Link PDP-3: DP-3



Summary for Subcatchment 1A: PD-1A

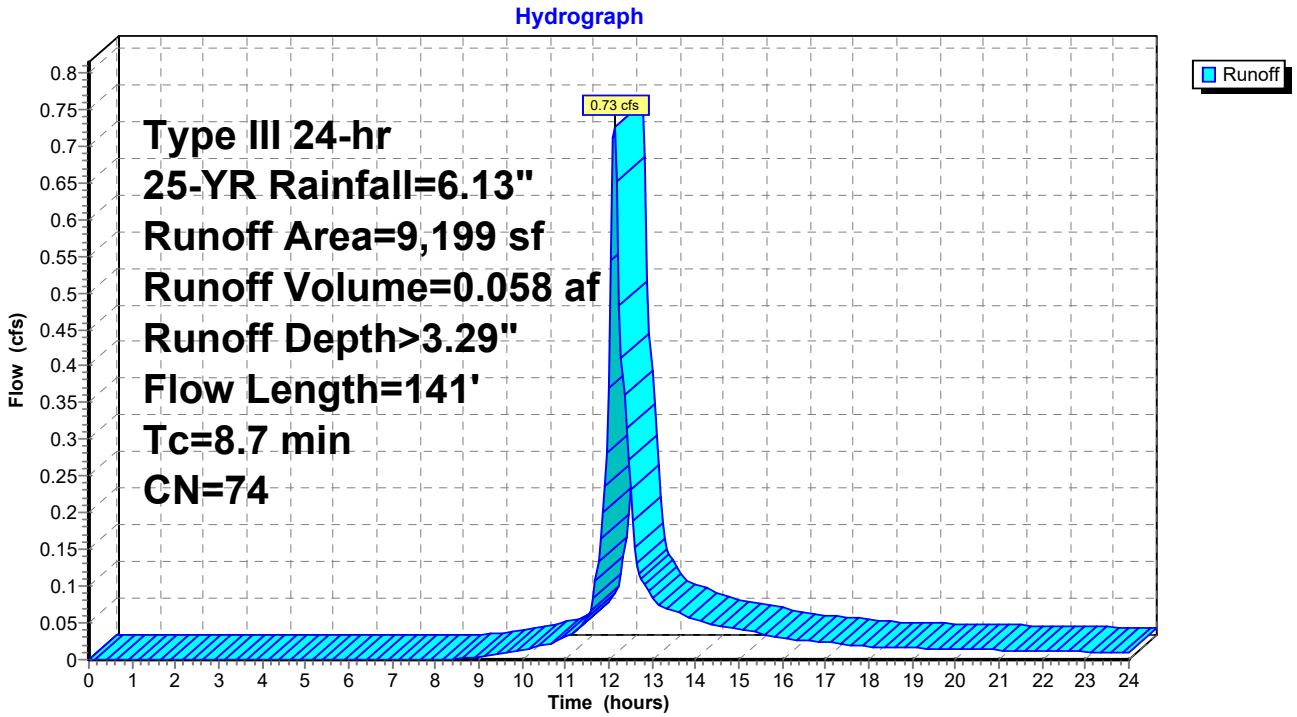
Runoff = 0.73 cfs @ 12.13 hrs, Volume= 0.058 af, Depth> 3.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.13"

Area (sf)	CN	Description
440	98	Paved parking, HSG C
5,095	74	>75% Grass cover, Good, HSG C
3,664	70	Woods, Good, HSG C
9,199	74	Weighted Average
8,759		95.22% Pervious Area
440		4.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	71	0.1100	0.15		**Sheet Flow, 1A-1B** Woods: Light underbrush n= 0.400 P2= 3.32"
0.3	14	0.0100	0.70		**Shallow Concentrated Flow, 1B-1C** Short Grass Pasture Kv= 7.0 fps
0.3	56	0.0050	3.18	1.11	**Pipe Channel, 1C-1D** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010 PVC, smooth interior
8.7	141	Total			

Subcatchment 1A: PD-1A



Summary for Subcatchment 1B: PDA-1B

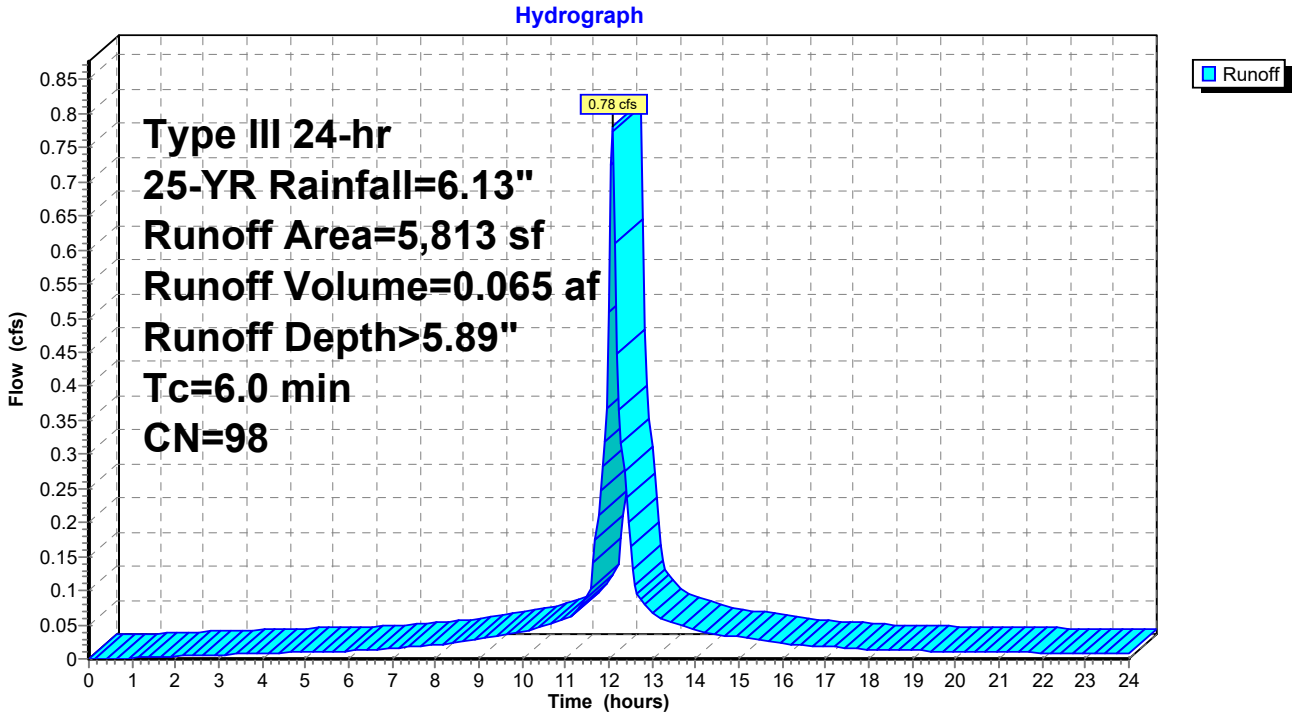
Runoff = 0.78 cfs @ 12.09 hrs, Volume= 0.065 af, Depth> 5.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.13"

Area (sf)	CN	Description
5,813	98	Unconnected roofs, HSG C
5,813		100.00% Impervious Area
5,813		100.00% Unconnected

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

Subcatchment 1B: PDA-1B



Summary for Subcatchment 1C: PDA-1C

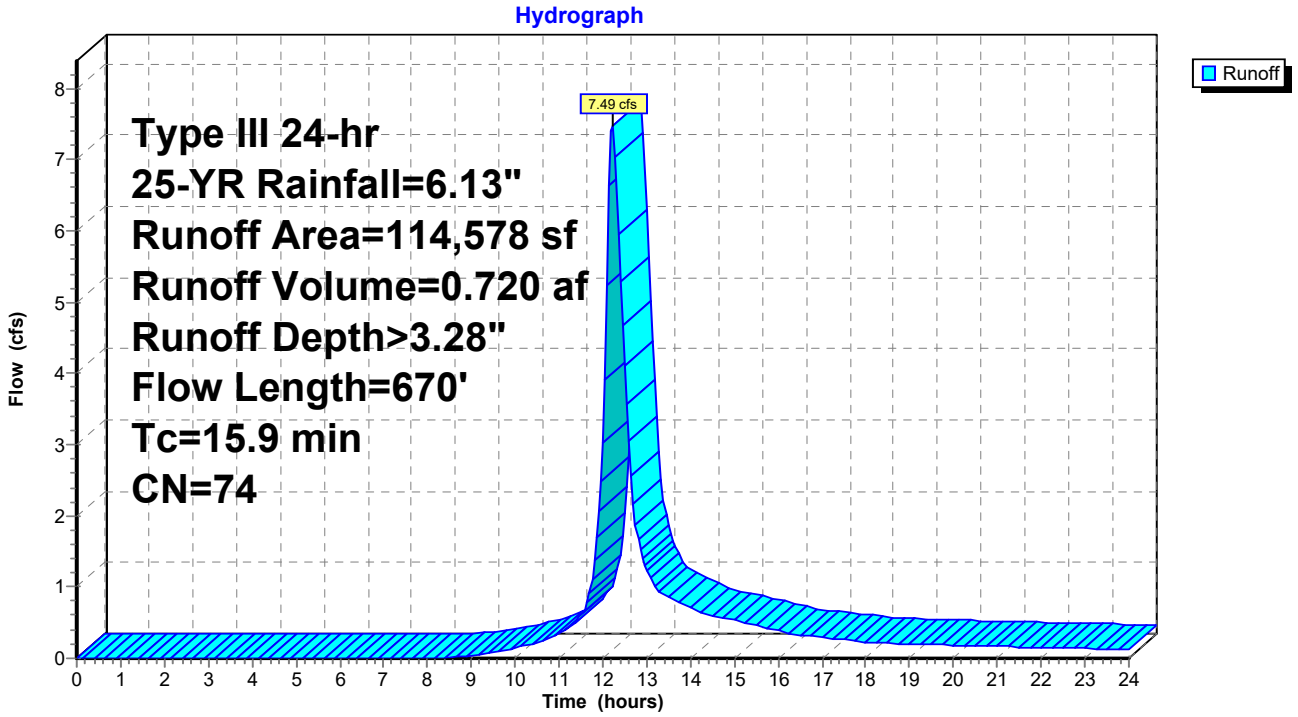
Runoff = 7.49 cfs @ 12.22 hrs, Volume= 0.720 af, Depth> 3.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.13"

	Area (sf)	CN	Description
*	33,778	98	Paved parking
	9,092	61	>75% Grass cover, Good, HSG B
	1,833	74	>75% Grass cover, Good, HSG C
	11,190	98	Roofs, HSG B
	47,970	55	Woods, Good, HSG B
	10,715	70	Woods, Good, HSG C
	114,578	74	Weighted Average
	69,610		60.75% Pervious Area
	44,968		39.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	50	0.0400	0.09		**Sheet Flow, 1A-1B** Woods: Light underbrush n= 0.400 P2= 3.32"
6.0	458	0.0655	1.28		**Shallow Concentrated Flow, 1B-1C** Woodland Kv= 5.0 fps
0.1	10	0.1500	2.71		**Shallow Concentrated Flow, 1C-1D** Short Grass Pasture Kv= 7.0 fps
0.3	78	0.0400	4.06		**Shallow Concentrated Flow, 1D-1E** Paved Kv= 20.3 fps
0.3	74	0.0050	3.79	2.98	**Pipe Channel, 1E-1F** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
15.9	670	Total			

Subcatchment 1C: PDA-1C



Summary for Subcatchment 3A: PDA-3A

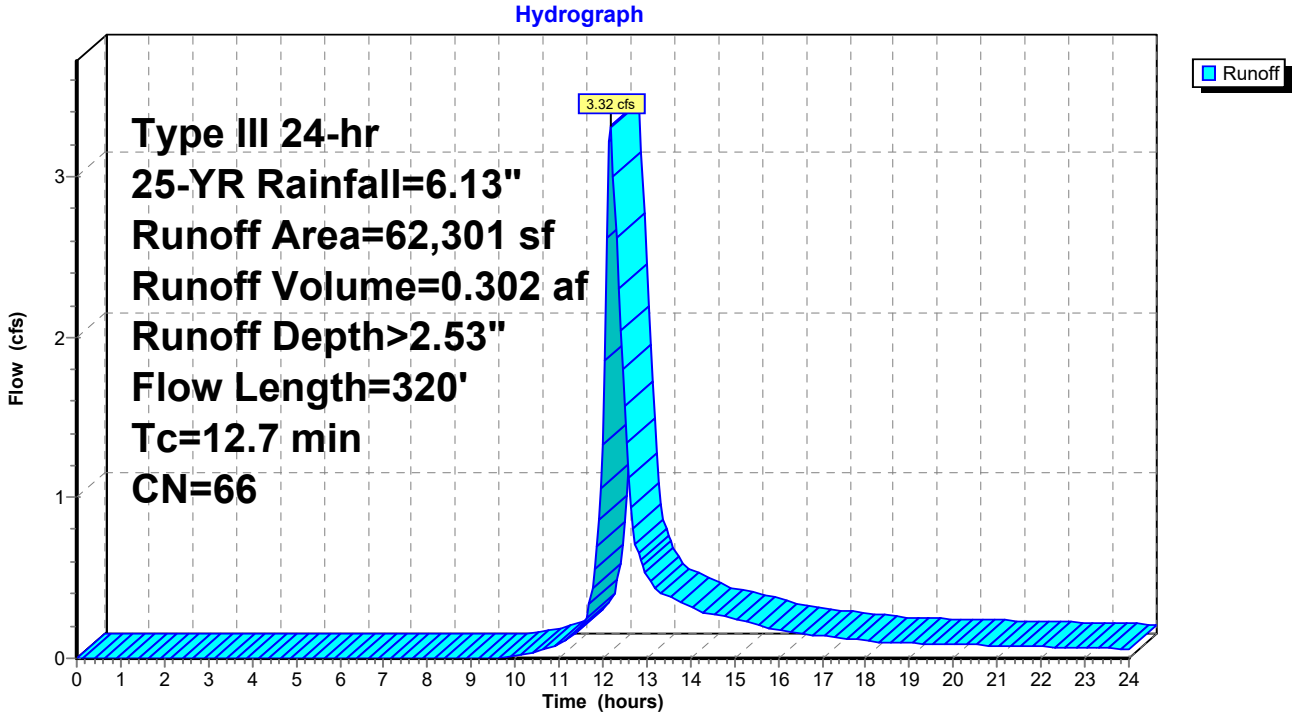
Runoff = 3.32 cfs @ 12.19 hrs, Volume= 0.302 af, Depth> 2.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.13"

Area (sf)	CN	Description
21,831	55	Woods, Good, HSG B
38,070	70	Woods, Good, HSG C
2,400	98	Paved parking, HSG B
62,301	66	Weighted Average
59,901		96.15% Pervious Area
2,400		3.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.0500	0.10		**Sheet Flow, 3A-3B** Woods: Light underbrush n= 0.400 P2= 3.32"
4.3	270	0.0444	1.05		**Shallow Concentrated Flow, 3B-EDP-3** Woodland Kv= 5.0 fps
12.7	320	Total			

Subcatchment 3A: PDA-3A



Summary for Subcatchment 3B: PDA-3B

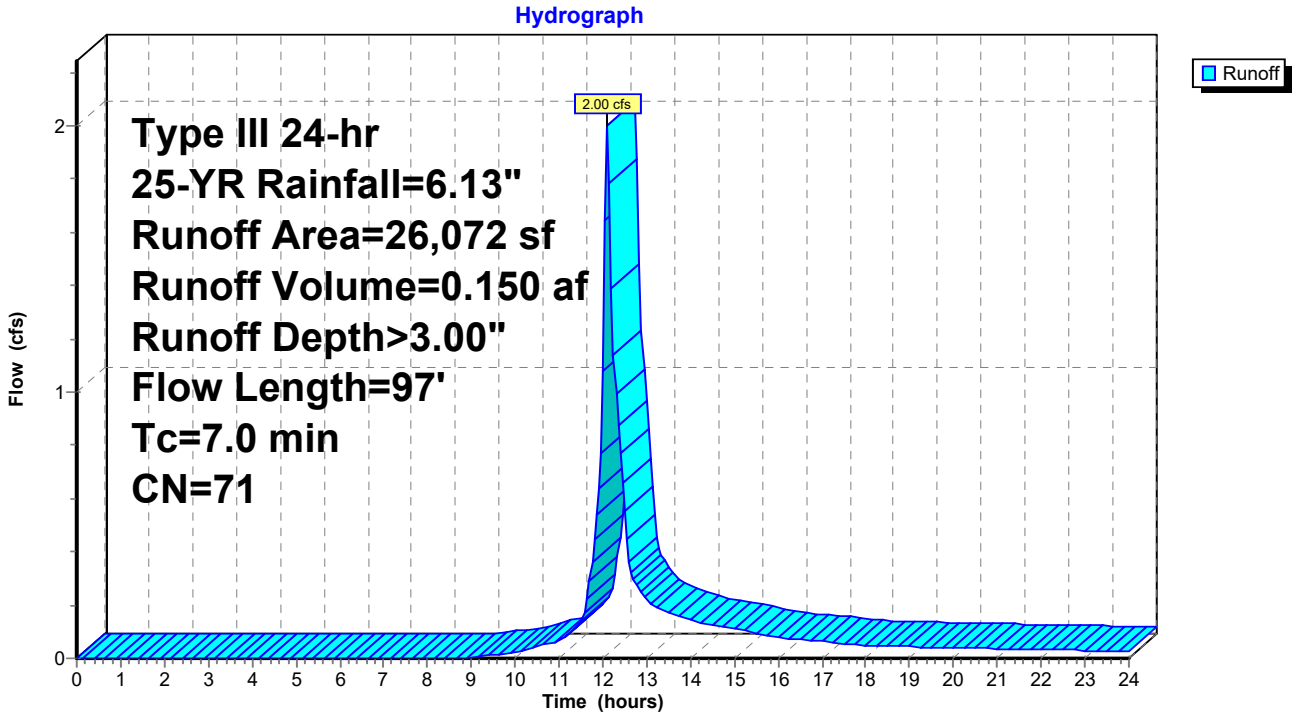
Runoff = 2.00 cfs @ 12.11 hrs, Volume= 0.150 af, Depth> 3.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.13"

Area (sf)	CN	Description
9,275	74	>75% Grass cover, Good, HSG C
2,286	55	Woods, Good, HSG B
13,438	70	Woods, Good, HSG C
1,073	98	Paved parking, HSG C
26,072	71	Weighted Average
24,999		95.88% Pervious Area
1,073		4.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	51	0.1000	0.13		**Sheet Flow, 3A-3B** Woods: Light underbrush n= 0.400 P2= 3.32"
0.0	6	0.3300	4.02		**Shallow Concentrated Flow, 3B-3C** Short Grass Pasture Kv= 7.0 fps
0.1	8	0.0150	1.97		**Shallow Concentrated Flow, 3C-3D** Unpaved Kv= 16.1 fps
0.0	7	0.2500	3.50		**Shallow Concentrated Flow, 3D-3E** Short Grass Pasture Kv= 7.0 fps
0.4	25	0.0500	1.12		**Shallow Concentrated Flow, 3E-EDP3** Woodland Kv= 5.0 fps
7.0	97	Total			

Subcatchment 3B: PDA-3B



Summary for Subcatchment 3C: PDA-3C

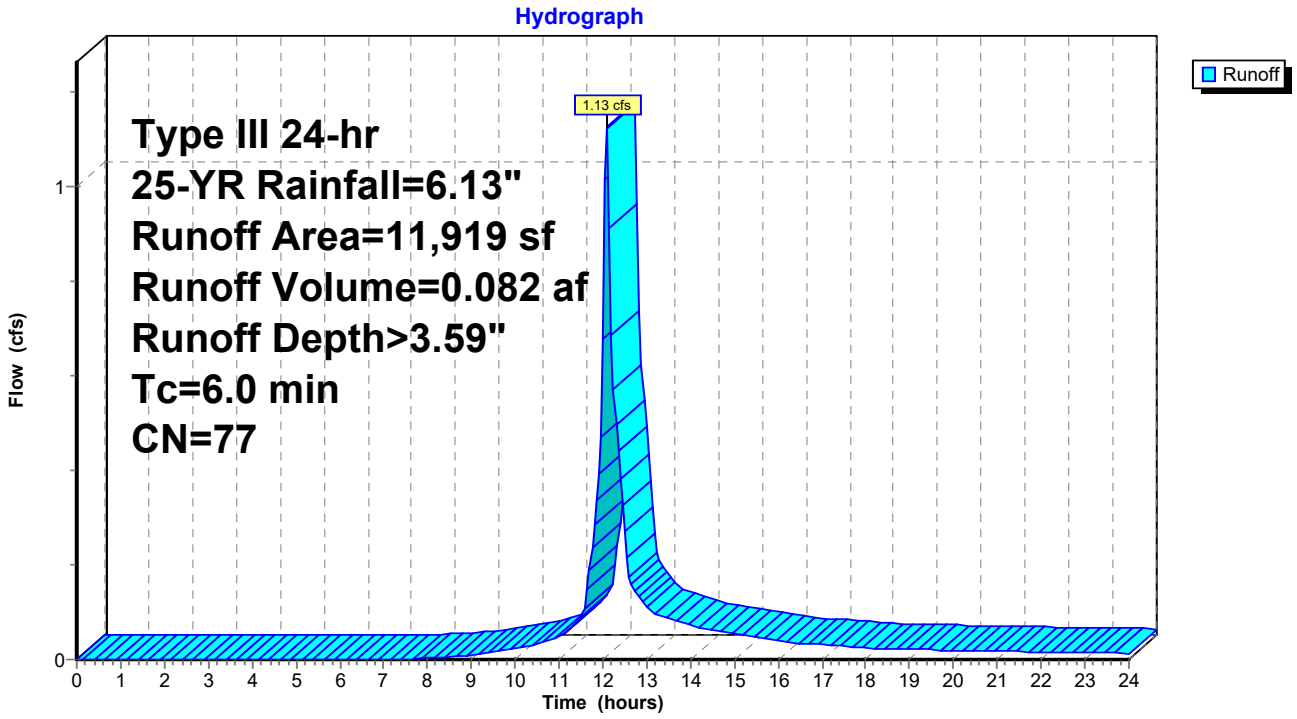
Runoff = 1.13 cfs @ 12.09 hrs, Volume= 0.082 af, Depth> 3.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.13"

Area (sf)	CN	Description
7,718	74	>75% Grass cover, Good, HSG C
336	98	Unconnected pavement, HSG C
2,657	74	>75% Grass cover, Good, HSG C
46	98	Unconnected pavement, HSG C
1,162	98	Roofs, HSG C
11,919	77	Weighted Average
10,375		87.05% Pervious Area
1,544		12.95% Impervious Area
382		24.74% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 MIN**

Subcatchment 3C: PDA-3C



Summary for Subcatchment 3D: PDA-3D

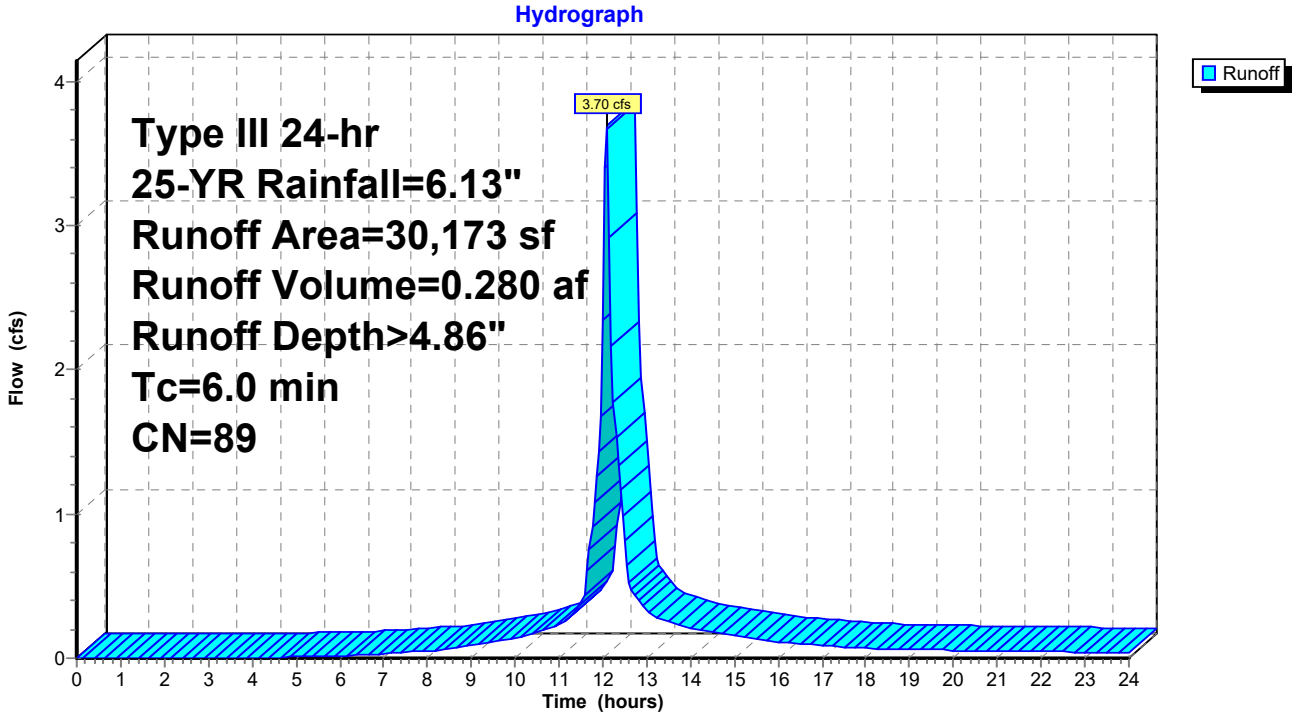
Runoff = 3.70 cfs @ 12.09 hrs, Volume= 0.280 af, Depth> 4.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.13"

Area (sf)	CN	Description
18,935	98	Paved parking, HSG D
11,071	74	>75% Grass cover, Good, HSG C
167	61	>75% Grass cover, Good, HSG B
30,173	89	Weighted Average
11,238		37.25% Pervious Area
18,935		62.75% Impervious Area

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

Subcatchment 3D: PDA-3D



Summary for Subcatchment 3E: PDA-3E

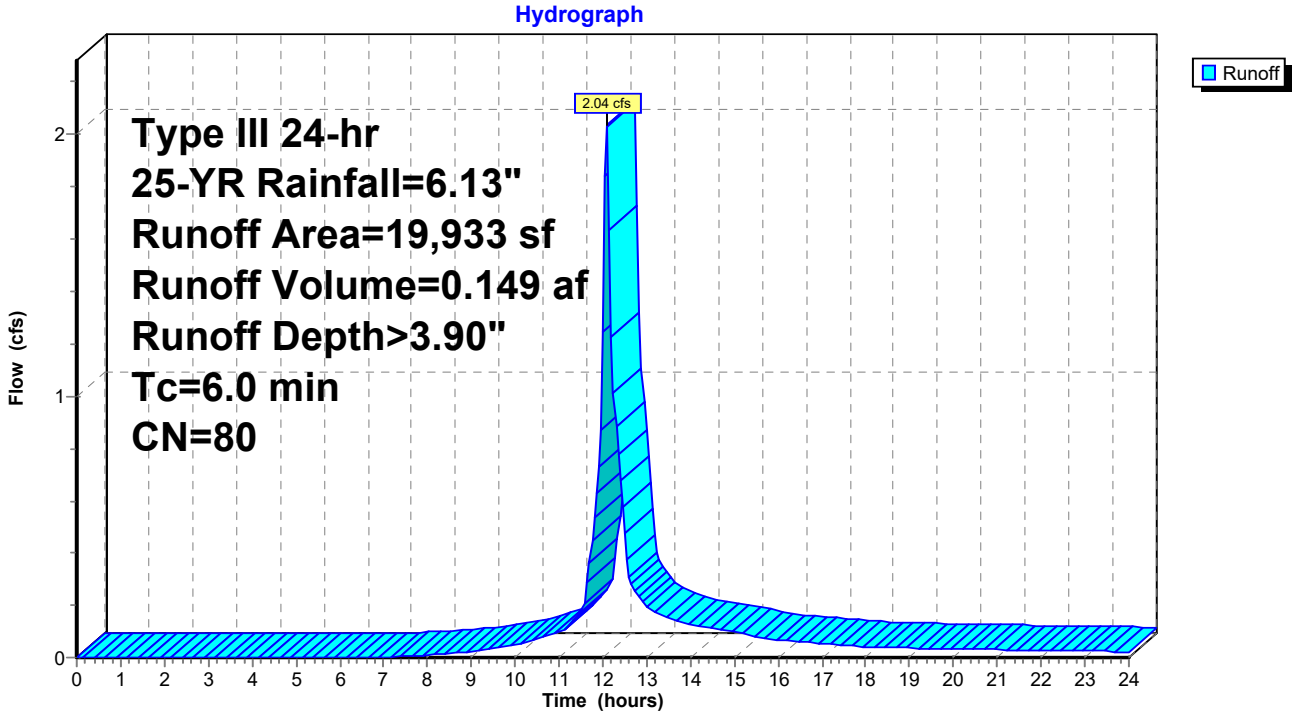
Runoff = 2.04 cfs @ 12.09 hrs, Volume= 0.149 af, Depth> 3.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.13"

Area (sf)	CN	Description
14,823	74	>75% Grass cover, Good, HSG C
460	98	Unconnected pavement, HSG C
4,650	98	Roofs, HSG C
19,933	80	Weighted Average
14,823		74.36% Pervious Area
5,110		25.64% Impervious Area
460		9.00% Unconnected

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

Subcatchment 3E: PDA-3E



Summary for Subcatchment 3F: PDA-3F

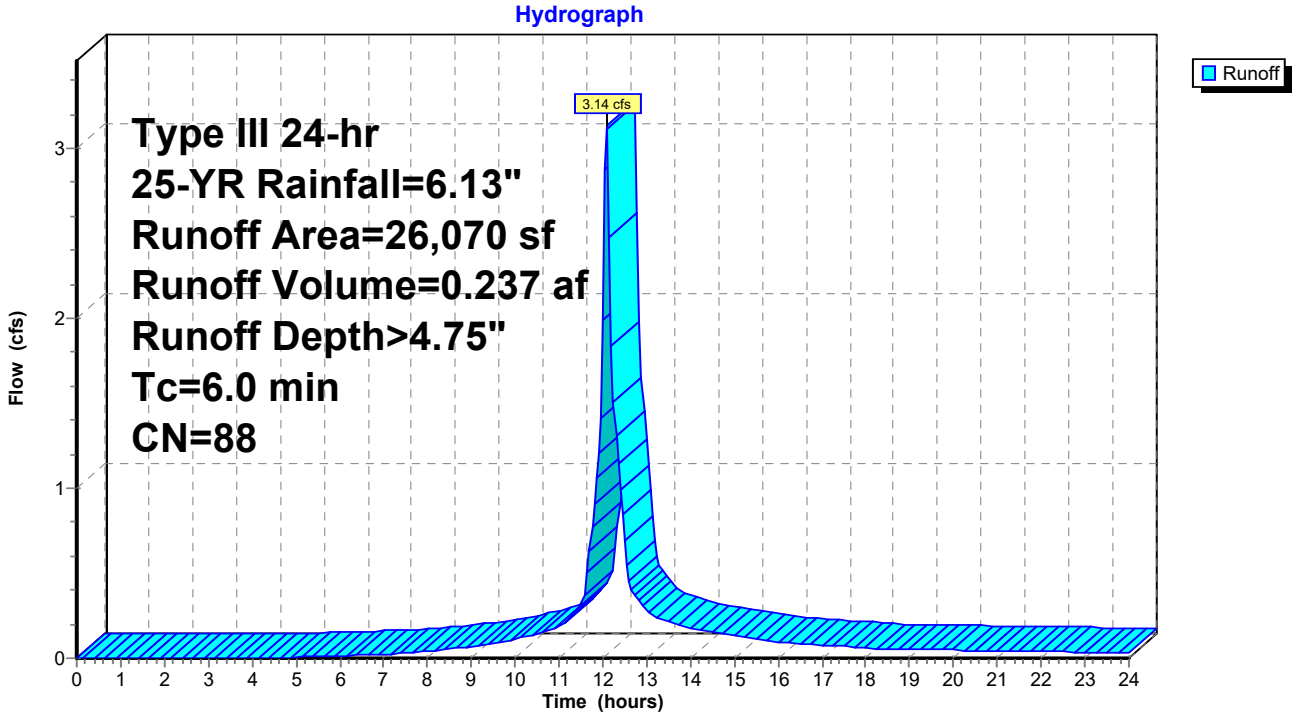
Runoff = 3.14 cfs @ 12.09 hrs, Volume= 0.237 af, Depth> 4.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.13"

Area (sf)	CN	Description
18,472	98	Paved parking, HSG B
1,202	74	>75% Grass cover, Good, HSG C
6,396	61	>75% Grass cover, Good, HSG B
26,070	88	Weighted Average
7,598		29.14% Pervious Area
18,472		70.86% Impervious Area

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

Subcatchment 3F: PDA-3F



Summary for Subcatchment 3G: PDA-3G

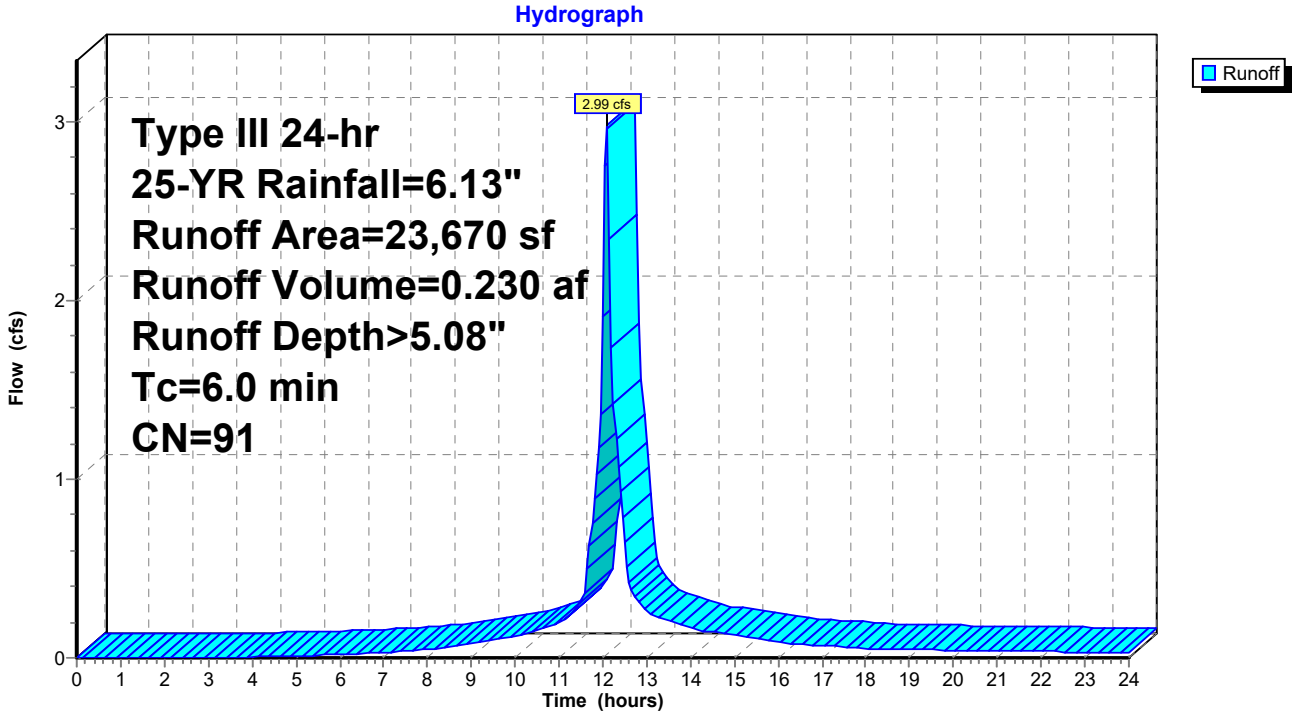
Runoff = 2.99 cfs @ 12.09 hrs, Volume= 0.230 af, Depth> 5.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.13"

Area (sf)	CN	Description
13,660	98	Roofs, HSG B
892	74	>75% Grass cover, Good, HSG C
4,113	61	>75% Grass cover, Good, HSG B
5,005	98	Unconnected pavement, HSG B
23,670	91	Weighted Average
5,005		21.14% Pervious Area
18,665		78.86% Impervious Area
5,005		26.81% Unconnected

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

Subcatchment 3G: PDA-3G



Summary for Subcatchment PD-2: PDA-2

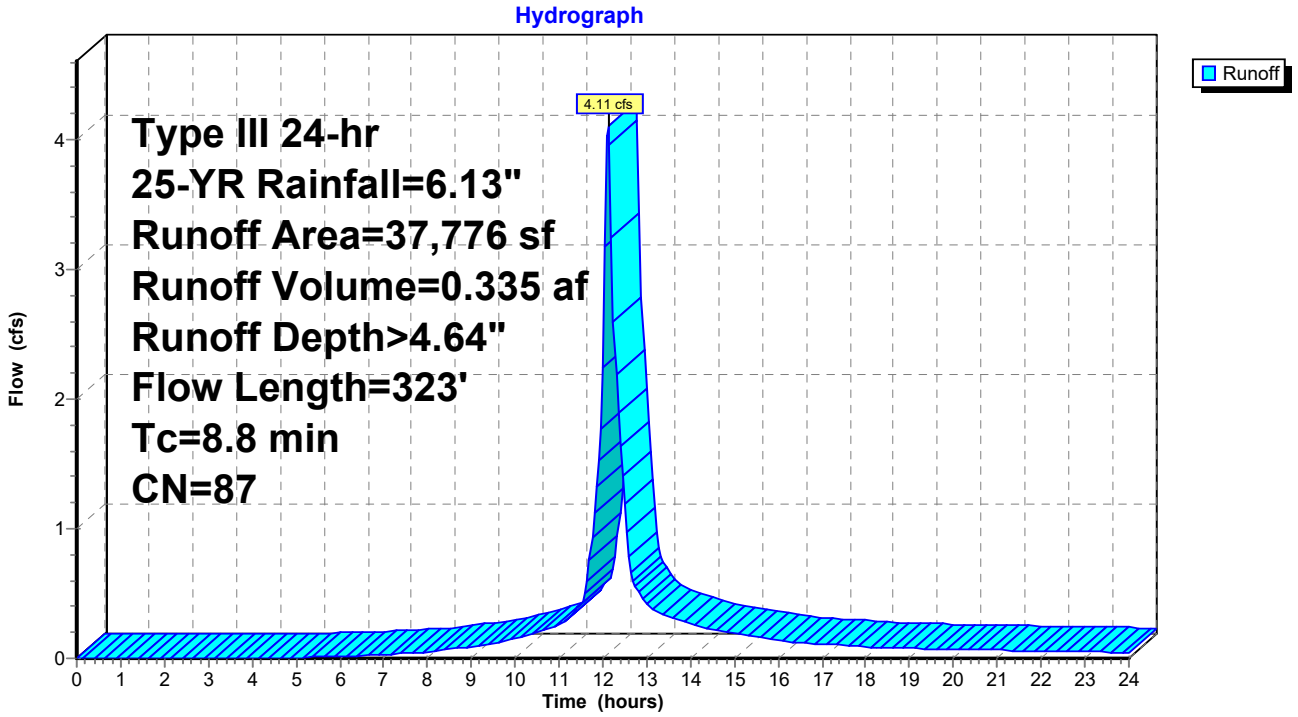
Runoff = 4.11 cfs @ 12.12 hrs, Volume= 0.335 af, Depth> 4.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.13"

Area (sf)	CN	Description
4,628	74	>75% Grass cover, Good, HSG C
23,547	98	Paved parking, HSG D
3,336	55	Woods, Good, HSG B
6,265	70	Woods, Good, HSG C
37,776	87	Weighted Average
14,229		37.67% Pervious Area
23,547		62.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.3	50	0.0100	0.11		**Sheet Flow, 2A-2B** Grass: Short n= 0.150 P2= 3.32"
0.1	34	0.0500	4.54		**Shallow Concentrated Flow, 2B-2C** Paved Kv= 20.3 fps
0.1	19	0.1450	2.67		**Shallow Concentrated Flow, 2C-2D** Short Grass Pasture Kv= 7.0 fps
1.3	220	0.0185	2.76		**Shallow Concentrated Flow, 2D-ED2** Paved Kv= 20.3 fps
8.8	323	Total			

Subcatchment PD-2: PDA-2

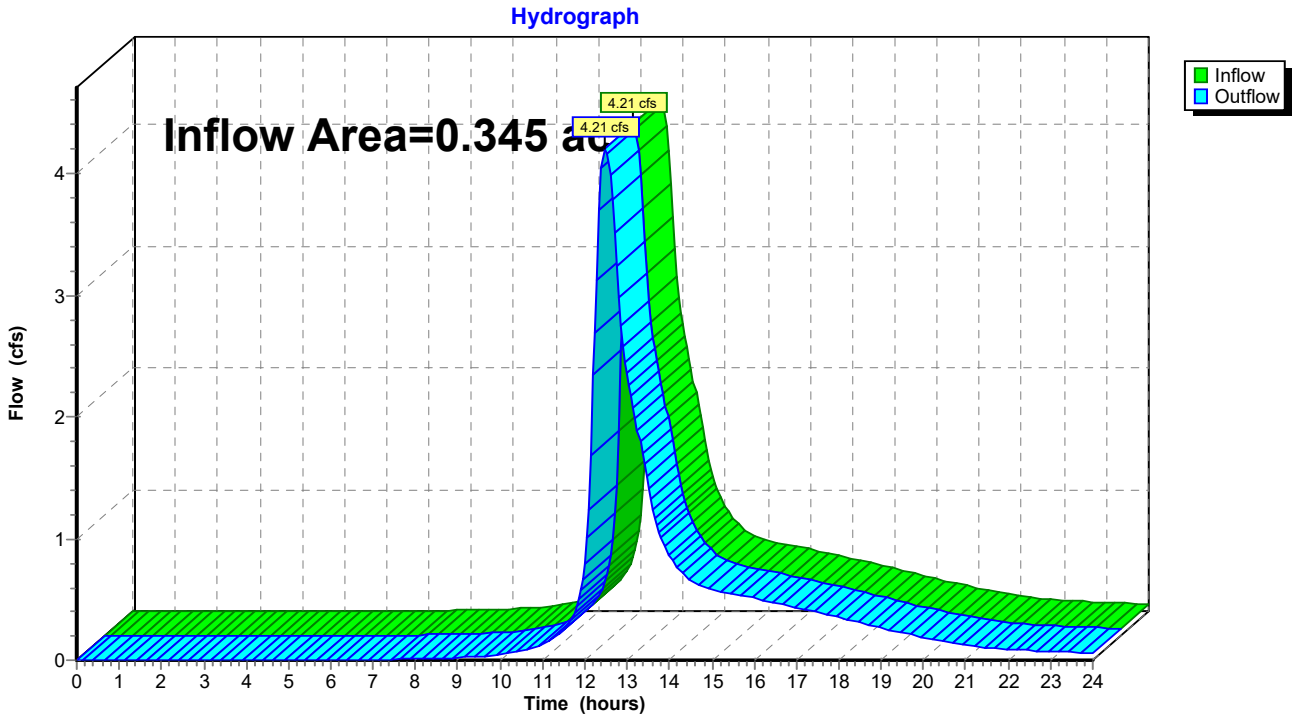


Summary for Reach DP-1: DP-1

Inflow Area = 0.345 ac, 41.65% Impervious, Inflow Depth > 22.84" for 25-YR event
Inflow = 4.21 cfs @ 12.48 hrs, Volume= 0.656 af
Outflow = 4.21 cfs @ 12.48 hrs, Volume= 0.656 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach DP-1: DP-1

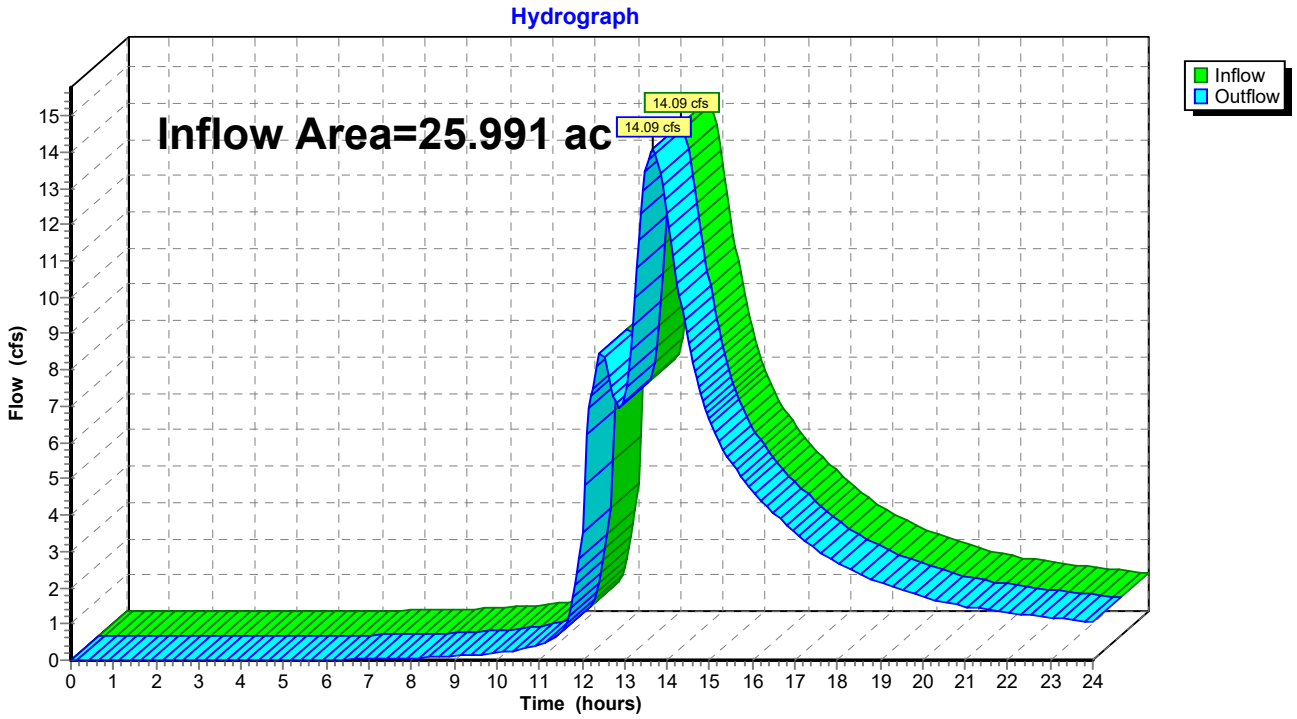


Summary for Reach DP-2: DP-2

Inflow Area = 25.991 ac, 24.71% Impervious, Inflow Depth > 1.99" for 25-YR event
Inflow = 14.09 cfs @ 13.66 hrs, Volume= 4.316 af
Outflow = 14.09 cfs @ 13.66 hrs, Volume= 4.316 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach DP-2: DP-2



Summary for Reach DP-3: DP-3

Inflow Area = 24.780 ac, 23.15% Impervious, Inflow Depth > 1.65" for 25-YR event
Inflow = 14.19 cfs @ 13.45 hrs, Volume= 3.401 af
Outflow = 12.65 cfs @ 13.69 hrs, Volume= 3.325 af, Atten= 11%, Lag= 14.5 min

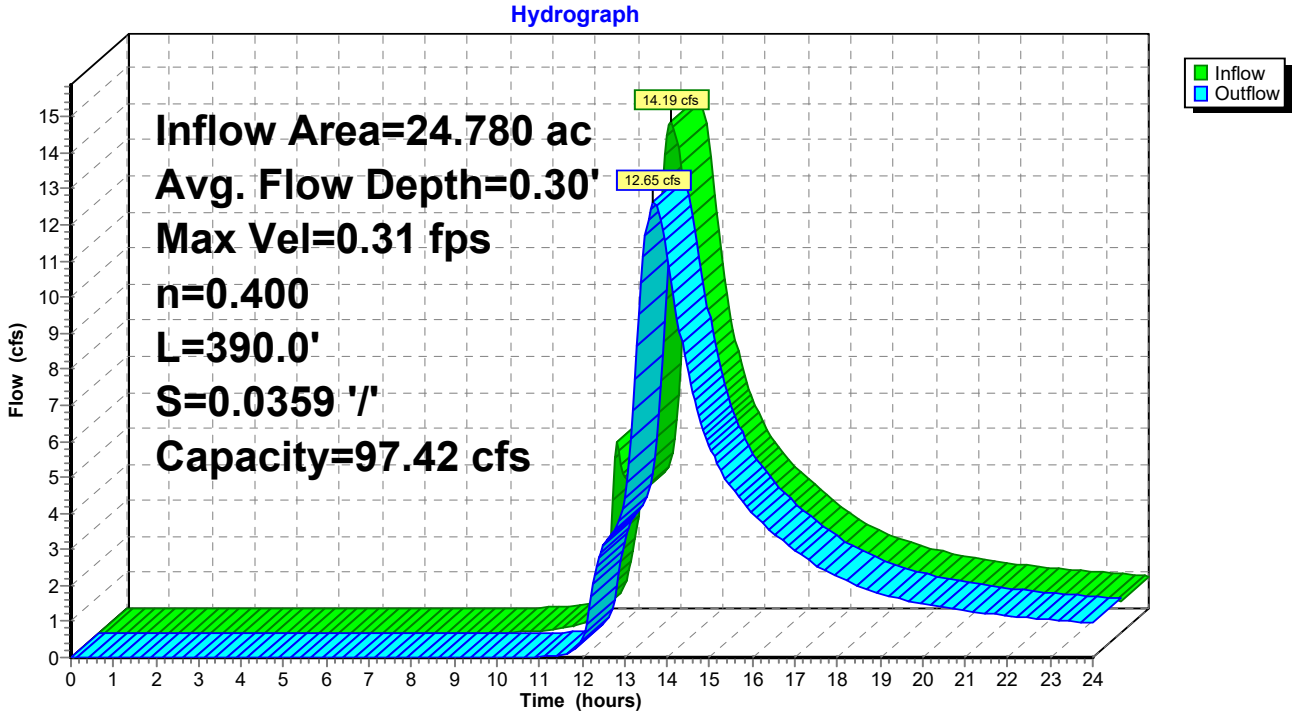
Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 0.31 fps, Min. Travel Time= 21.2 min
Avg. Velocity = 0.14 fps, Avg. Travel Time= 45.7 min

Peak Storage= 16,050 cf @ 13.69 hrs
Average Depth at Peak Storage= 0.30'
Bank-Full Depth= 1.00' Flow Area= 151.0 sf, Capacity= 97.42 cfs

130.00' x 1.00' deep channel, n= 0.400 Sheet flow: Woods+light brush
Side Slope Z-value= 12.0 30.0 '/' Top Width= 172.00'
Length= 390.0' Slope= 0.0359 '/'
Inlet Invert= 618.00', Outlet Invert= 604.00'

‡

Reach DP-3: DP-3



Stage-Discharge for Reach DP-3: DP-3

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
618.00	0.00	0.00
618.01	0.03	0.04
618.02	0.05	0.13
618.03	0.07	0.27
618.04	0.08	0.43
618.05	0.10	0.62
618.06	0.11	0.84
618.07	0.12	1.09
618.08	0.13	1.37
618.09	0.14	1.66
618.10	0.15	1.98
618.11	0.16	2.32
618.12	0.17	2.69
618.13	0.18	3.07
618.14	0.19	3.48
618.15	0.20	3.91
618.16	0.20	4.35
618.17	0.21	4.82
618.18	0.22	5.30
618.19	0.23	5.81
618.20	0.24	6.33
618.21	0.24	6.87
618.22	0.25	7.43
618.23	0.26	8.00
618.24	0.27	8.60
618.25	0.27	9.21
618.26	0.28	9.84
618.27	0.29	10.48
618.28	0.29	11.14
618.29	0.30	11.82
618.30	0.31	12.51
618.31	0.31	13.23
618.32	0.32	13.95
618.33	0.33	14.70
618.34	0.33	15.45
618.35	0.34	16.23
618.36	0.34	17.02
618.37	0.35	17.83
618.38	0.36	18.65
618.39	0.36	19.48
618.40	0.37	20.34
618.41	0.37	21.20
618.42	0.38	22.09
618.43	0.38	22.99
618.44	0.39	23.90
618.45	0.40	24.83
618.46	0.40	25.77
618.47	0.41	26.72
618.48	0.41	27.70
618.49	0.42	28.68
618.50	0.42	29.68
618.51	0.43	30.70
618.52	0.43	31.73
618.53	0.44	32.77
618.54	0.44	33.83
618.55	0.45	34.91
618.56	0.45	35.99
618.57	0.46	37.09
618.58	0.46	38.21
618.59	0.47	39.34
618.60	0.47	40.48
618.61	0.48	41.64
618.62	0.48	42.81
618.63	0.49	44.00
618.64	0.49	45.20
618.65	0.50	46.41
618.66	0.50	47.64
618.67	0.51	48.88
618.68	0.51	50.14
618.69	0.52	51.40
618.70	0.52	52.69
618.71	0.52	53.98
618.72	0.53	55.29
618.73	0.53	56.62
618.74	0.54	57.95
618.75	0.54	59.30
618.76	0.55	60.67
618.77	0.55	62.05
618.78	0.56	63.44
618.79	0.56	64.84
618.80	0.56	66.26
618.81	0.57	67.69
618.82	0.57	69.14
618.83	0.58	70.59
618.84	0.58	72.07
618.85	0.59	73.55
618.86	0.59	75.05
618.87	0.59	76.56
618.88	0.60	78.09
618.89	0.60	79.63
618.90	0.61	81.18
618.91	0.61	82.74
618.92	0.61	84.32
618.93	0.62	85.91
618.94	0.62	87.52
618.95	0.63	89.14
618.96	0.63	90.77
618.97	0.63	92.41
618.98	0.64	94.07
618.99	0.64	95.74
619.00	**0.65**	**97.42**

Summary for Pond 1: SFB-1

Inflow Area = 0.966 ac, 48.65% Impervious, Inflow Depth > 4.47" for 25-YR event
Inflow = 1.81 cfs @ 12.10 hrs, Volume= 0.360 af
Outflow = 1.00 cfs @ 12.62 hrs, Volume= 0.322 af, Atten= 45%, Lag= 31.4 min
Discarded = 0.12 cfs @ 12.62 hrs, Volume= 0.131 af
Primary = 0.89 cfs @ 12.62 hrs, Volume= 0.191 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 610.04' @ 12.62 hrs Surf.Area= 2,784 sf Storage= 4,125 cf
Flood Elev= 611.25' Surf.Area= 3,452 sf Storage= 7,739 cf

Plug-Flow detention time= 139.7 min calculated for 0.322 af (89% of inflow)
Center-of-Mass det. time= 91.7 min (915.6 - 823.8)

Volume	Invert	Avail.Storage	Storage Description
#1	607.00'	7,237 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 8,986 cf Overall - 1,749 cf Embedded = 7,237 cf
#2	607.00'	385 cf	**Sand Media (Prismatic)** Listed below (Recalc) Inside #1 1,166 cf Overall x 33.0% Voids
#3	608.00'	117 cf	**Infiltration Seed Mix (Prismatic)** Listed below (Recalc) Inside #1 583 cf Overall x 20.0% Voids
		7,739 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
607.00	1,166	0	0
608.00	1,166	1,166	1,166
609.00	2,130	1,648	2,814
610.00	2,760	2,445	5,259
611.20	3,452	3,727	8,986

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
607.00	1,166	0	0
608.00	1,166	1,166	1,166

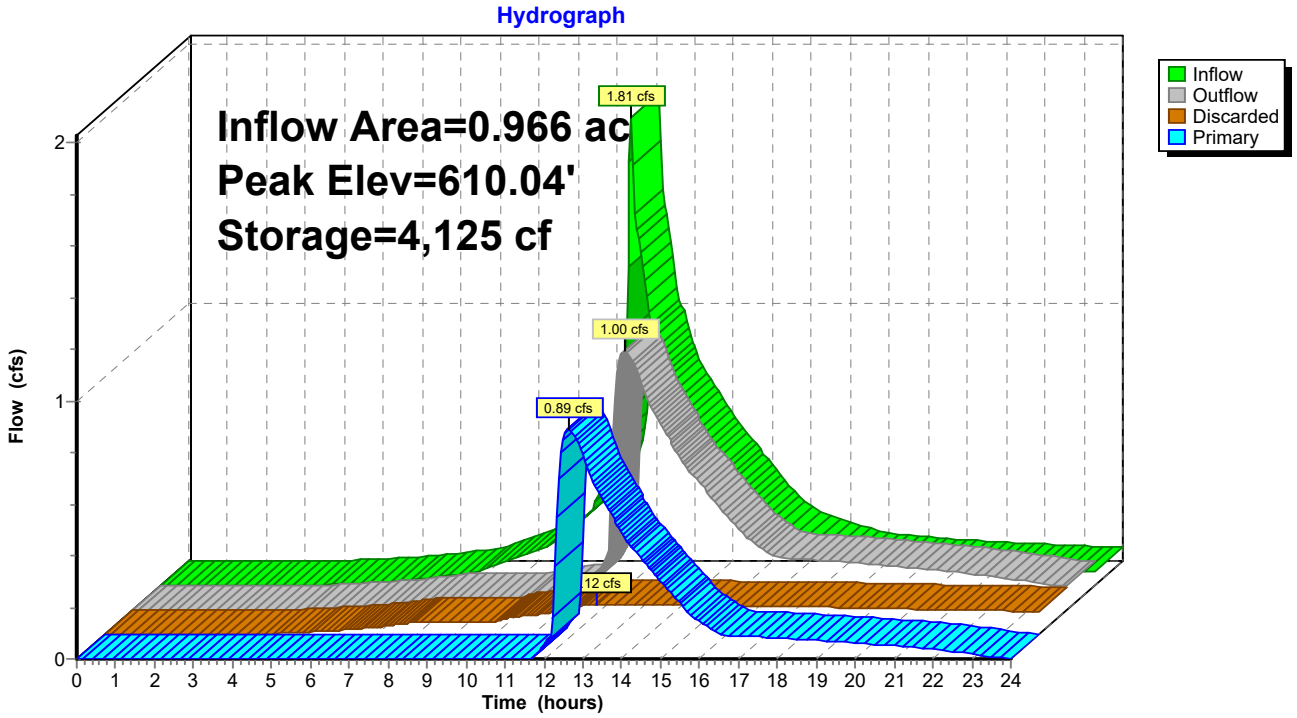
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
608.00	1,166	0	0
608.50	1,166	583	583

Device	Routing	Invert	Outlet Devices
#1	Discarded	607.00'	**1.805 in/hr Exfiltration over Surface area**
#2	Primary	607.50'	**8.0" Round Culvert** L= 20.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 607.50' / 607.00' S= 0.0250 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.35 sf
#3	Device 2	609.00'	**2.0" Vert. Orifice/Grate** C= 0.600
#4	Device 2	609.80'	**8.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.12 cfs @ 12.62 hrs HW=610.04' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.12 cfs)

Primary OutFlow Max=0.91 cfs @ 12.62 hrs HW=610.04' (Free Discharge)
└─**2=Culvert** (Passes 0.91 cfs of 1.97 cfs potential flow)
  ├─**3=Orifice/Grate** (Orifice Controls 0.10 cfs @ 4.71 fps)
  └─**4=Orifice/Grate** (Weir Controls 0.81 cfs @ 1.60 fps)

Pond 1: SFB-1



Stage-Discharge for Pond 1: SFB-1

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
607.00	0.00	0.00	0.00
607.05	0.05	0.05	0.00
607.10	0.05	0.05	0.00
607.15	0.05	0.05	0.00
607.20	0.05	0.05	0.00
607.25	0.05	0.05	0.00
607.30	0.05	0.05	0.00
607.35	0.05	0.05	0.00
607.40	0.05	0.05	0.00
607.45	0.05	0.05	0.00
607.50	0.05	0.05	0.00
607.55	0.05	0.05	0.00
607.60	0.05	0.05	0.00
607.65	0.05	0.05	0.00
607.70	0.05	0.05	0.00
607.75	0.05	0.05	0.00
607.80	0.05	0.05	0.00
607.85	0.05	0.05	0.00
607.90	0.05	0.05	0.00
607.95	0.05	0.05	0.00
608.00	0.05	0.05	0.00
608.05	0.05	0.05	0.00
608.10	0.05	0.05	0.00
608.15	0.05	0.05	0.00
608.20	0.06	0.06	0.00
608.25	0.06	0.06	0.00
608.30	0.06	0.06	0.00
608.35	0.06	0.06	0.00
608.40	0.06	0.06	0.00
608.45	0.07	0.07	0.00
608.50	0.07	0.07	0.00
608.55	0.07	0.07	0.00
608.60	0.07	0.07	0.00
608.65	0.07	0.07	0.00
608.70	0.08	0.08	0.00
608.75	0.08	0.08	0.00
608.80	0.08	0.08	0.00
608.85	0.08	0.08	0.00
608.90	0.08	0.08	0.00
608.95	0.09	0.09	0.00
609.00	0.09	0.09	0.00
609.05	0.09	0.09	0.00
609.10	0.11	0.09	0.01
609.15	0.12	0.09	0.03
609.20	0.13	0.09	0.04
609.25	0.14	0.10	0.04
609.30	0.15	0.10	0.05
609.35	0.15	0.10	0.05
609.40	0.16	0.10	0.06
609.45	0.16	0.10	0.06
609.50	0.17	0.10	0.07
609.55	0.18	0.10	0.07
609.60	0.18	0.10	0.08
609.65	0.19	0.11	0.08
609.70	0.19	0.11	0.08
609.75	0.19	0.11	0.09
609.80	0.20	0.11	0.09
609.85	0.28	0.11	0.17
609.90	0.42	0.11	0.31
609.95	0.61	0.11	0.50
610.00	0.83	0.12	0.71
610.05	1.06	0.12	0.94
610.10	1.14	0.12	1.03
610.15	1.22	0.12	1.10
610.20	1.29	0.12	1.17
610.25	1.36	0.12	1.24
610.30	1.43	0.12	1.30
610.35	1.49	0.12	1.36
610.40	1.55	0.12	1.42
610.45	1.60	0.13	1.48
610.50	1.66	0.13	1.53
610.55	1.71	0.13	1.58
610.60	1.76	0.13	1.63
610.65	1.81	0.13	1.68
610.70	1.86	0.13	1.73
610.75	1.91	0.13	1.77
610.80	1.95	0.13	1.82
610.85	2.00	0.14	1.86
610.90	2.04	0.14	1.90
610.95	2.08	0.14	1.95
611.00	2.13	0.14	1.99
611.05	2.17	0.14	2.03
611.10	2.21	0.14	2.07
611.15	2.25	0.14	2.10
611.20	2.29	**0.14**	2.14
611.25	**2.32**	0.14	**2.18**

Summary for Pond 2: SFB-2

Inflow Area =	4.230 ac, 47.33% Impervious, Inflow Depth > 2.21" for 25-YR event				
Inflow =	3.21 cfs @	12.10 hrs,	Volume=	0.778 af	
Outflow =	0.88 cfs @	14.78 hrs,	Volume=	0.634 af,	Atten= 73%, Lag= 161.0 min
Discarded =	0.42 cfs @	14.78 hrs,	Volume=	0.467 af	
Primary =	0.45 cfs @	14.78 hrs,	Volume=	0.167 af	

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 616.17' @ 14.78 hrs Surf.Area= 7,703 sf Storage= 11,028 cf
Flood Elev= 617.40' Surf.Area= 10,100 sf Storage= 21,942 cf

Plug-Flow detention time= 197.9 min calculated for 0.633 af (81% of inflow)
Center-of-Mass det. time= 117.2 min (999.2 - 882.0)

Volume	Invert	Avail.Storage	Storage Description
#1	613.25'	20,246 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 26,162 cf Overall - 5,916 cf Embedded = 20,246 cf
#2	613.25'	1,302 cf	**Sand Media (Prismatic)** Listed below (Recalc) Inside #1 3,944 cf Overall x 33.0% Voids
#3	614.25'	394 cf	**Infiltration Seed Mix (Prismatic)** Listed below (Recalc) Inside #1 1,972 cf Overall x 20.0% Voids
		21,942 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
613.25	3,944	0	0
614.25	3,944	3,944	3,944
615.00	5,539	3,556	7,500
616.00	7,378	6,459	13,959
617.00	9,278	8,328	22,287
617.40	10,100	3,876	26,162

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
613.25	3,944	0	0
614.25	3,944	3,944	3,944

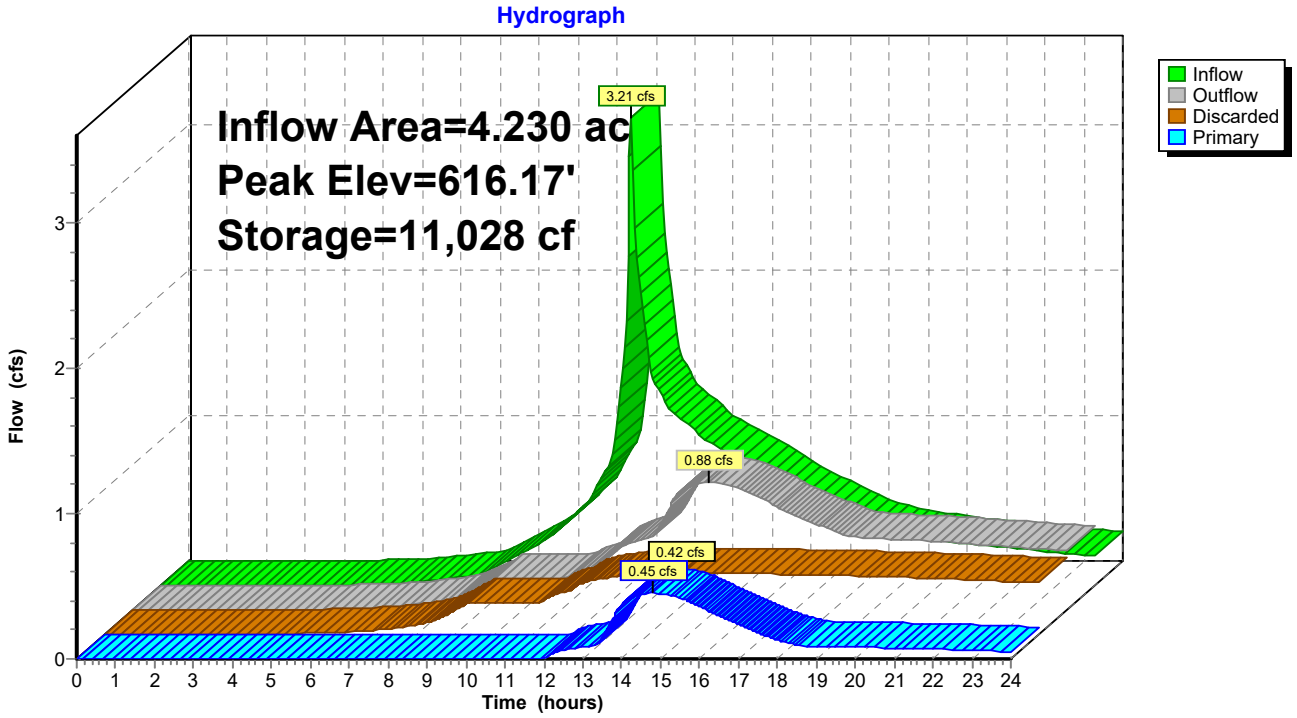
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
614.25	3,944	0	0
614.75	3,944	1,972	1,972

Device	Routing	Invert	Outlet Devices
#1	Discarded	613.25'	**2.380 in/hr Exfiltration over Surface area**
#2	Primary	613.75'	**8.0" Round Culvert** L= 28.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 613.75' / 612.25' S= 0.0536 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.35 sf
#3	Device 2	615.20'	**2.0" Vert. Orifice/Grate** C= 0.600
#4	Device 2	616.00'	**6.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.42 cfs @ 14.78 hrs HW=616.17' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.42 cfs)

Primary OutFlow Max=0.46 cfs @ 14.78 hrs HW=616.17' (Free Discharge)
└─**2=Culvert** (Passes 0.46 cfs of 1.92 cfs potential flow)
  ├─**3=Orifice/Grate** (Orifice Controls 0.10 cfs @ 4.54 fps)
  └─**4=Orifice/Grate** (Weir Controls 0.36 cfs @ 1.35 fps)

Pond 2: SFB-2



Stage-Discharge for Pond 2: SFB-2

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
613.25	0.00	0.00	0.00
613.30	0.22	0.22	0.00
613.35	0.22	0.22	0.00
613.40	0.22	0.22	0.00
613.45	0.22	0.22	0.00
613.50	0.22	0.22	0.00
613.55	0.22	0.22	0.00
613.60	0.22	0.22	0.00
613.65	0.22	0.22	0.00
613.70	0.22	0.22	0.00
613.75	0.22	0.22	0.00
613.80	0.22	0.22	0.00
613.85	0.22	0.22	0.00
613.90	0.22	0.22	0.00
613.95	0.22	0.22	0.00
614.00	0.22	0.22	0.00
614.05	0.22	0.22	0.00
614.10	0.22	0.22	0.00
614.15	0.22	0.22	0.00
614.20	0.22	0.22	0.00
614.25	0.22	0.22	0.00
614.30	0.22	0.22	0.00
614.35	0.23	0.23	0.00
614.40	0.23	0.23	0.00
614.45	0.24	0.24	0.00
614.50	0.25	0.25	0.00
614.55	0.25	0.25	0.00
614.60	0.26	0.26	0.00
614.65	0.26	0.26	0.00
614.70	0.27	0.27	0.00
614.75	0.28	0.28	0.00
614.80	0.28	0.28	0.00
614.85	0.29	0.29	0.00
614.90	0.29	0.29	0.00
614.95	0.30	0.30	0.00
615.00	0.31	0.31	0.00
615.05	0.31	0.31	0.00
615.10	0.32	0.32	0.00
615.15	0.32	0.32	0.00
615.20	0.33	0.33	0.00
615.25	0.33	0.33	0.00
615.30	0.35	0.34	0.01
615.35	0.37	0.34	0.03
615.40	0.38	0.35	0.04
615.45	0.39	0.35	0.04
615.50	0.40	0.36	0.05
615.55	0.42	0.36	0.05
615.60	0.43	0.37	0.06
615.65	0.43	0.37	0.06
615.70	0.44	0.38	0.07
615.75	0.45	0.38	0.07
615.80	0.46	0.39	0.08
615.85	0.47	0.39	0.08
615.90	0.48	0.40	0.08
615.95	0.49	0.40	0.09
616.00	0.50	0.41	0.09
616.05	0.56	0.41	0.15
616.10	0.67	0.42	0.26
616.15	0.82	0.42	0.40
616.20	0.95	0.43	0.52
616.25	1.01	0.43	0.58
616.30	1.06	0.44	0.62
616.35	1.11	0.44	0.67
616.40	1.16	0.45	0.71
616.45	1.20	0.45	0.75
616.50	1.24	0.46	0.78
616.55	1.28	0.46	0.82
616.60	1.32	0.47	0.85
616.65	1.36	0.47	0.89
616.70	1.40	0.48	0.92
616.75	1.43	0.48	0.95
616.80	1.47	0.49	0.97
616.85	1.50	0.50	1.00
616.90	1.53	0.50	1.03
616.95	1.56	0.51	1.06
617.00	1.59	0.51	1.08
617.05	1.63	0.52	1.11
617.10	1.66	0.52	1.13
617.15	1.69	0.53	1.16
617.20	1.71	0.53	1.18
617.25	1.74	0.54	1.20
617.30	1.77	0.55	1.23
617.35	1.80	0.55	1.25
617.40	**1.83**	**0.56**	**1.27**

Summary for Pond DB-1: DB-1

Inflow	=	3.34 cfs @	12.09 hrs,	Volume=	0.106 af
Outflow	=	0.53 cfs @	12.49 hrs,	Volume=	0.103 af, Atten= 84%, Lag= 24.1 min
Primary	=	0.53 cfs @	12.49 hrs,	Volume=	0.103 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 610.55' @ 12.49 hrs Surf.Area= 3,131 sf Storage= 3,454 cf
Flood Elev= 611.25' Surf.Area= 3,131 sf Storage= 5,328 cf

Plug-Flow detention time= 101.6 min calculated for 0.103 af (98% of inflow)
Center-of-Mass det. time= 100.7 min (827.7 - 727.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	609.25'	0 cf	**27.58'W x 113.50'L x 2.67'H Field A** 8,349 cf Overall - 8,349 cf Embedded = 0 cf x 40.0% Voids
#2A	609.25'	5,328 cf	**StormTrap ST1 SingleTrap 2-0** x 32 Inside #1 Inside= 82.7"W x 24.0"H => 11.84 sf x 14.06'L = 166.5 cf Outside= 82.7"W x 32.0"H => 18.39 sf x 14.06'L = 258.6 cf 4 Rows of 8 Chambers 27.58' x 112.50' Core + 0.00' x 0.50' Border = 27.58' x 113.50' System
		5,328 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	609.25'	**6.0" Round Culvert** L= 150.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 609.25' / 608.50' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#2	Device 1	609.25'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	610.25'	**4.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.53 cfs @ 12.49 hrs HW=610.55' (Free Discharge)
└─**1=Culvert** (Barrel Controls 0.53 cfs @ 2.69 fps)
  ├─**2=Orifice/Grate** (Passes < 0.45 cfs potential flow)
  └─**3=Orifice/Grate** (Passes < 0.15 cfs potential flow)

Pond DB-1: DB-1 - Chamber Wizard Field A

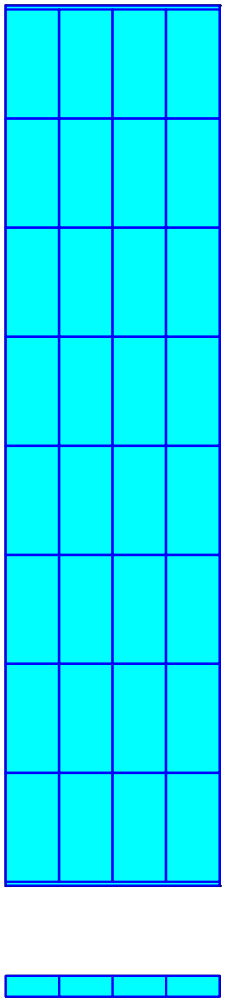
Chamber Model = StormTrap ST1 SingleTrap 2-0 (StormTrap ST1 SingleTrap® Type VI)
Inside= 82.7"W x 24.0"H => 11.84 sf x 14.06'L = 166.5 cf
Outside= 82.7"W x 32.0"H => 18.39 sf x 14.06'L = 258.6 cf

8 Chambers/Row x 14.06' Long = 112.50' Row Length +6.0" Border x 2 = 113.50' Base Length
4 Rows x 82.7" Wide = 27.58' Base Width
32.0" Chamber Height = 2.67' Field Height

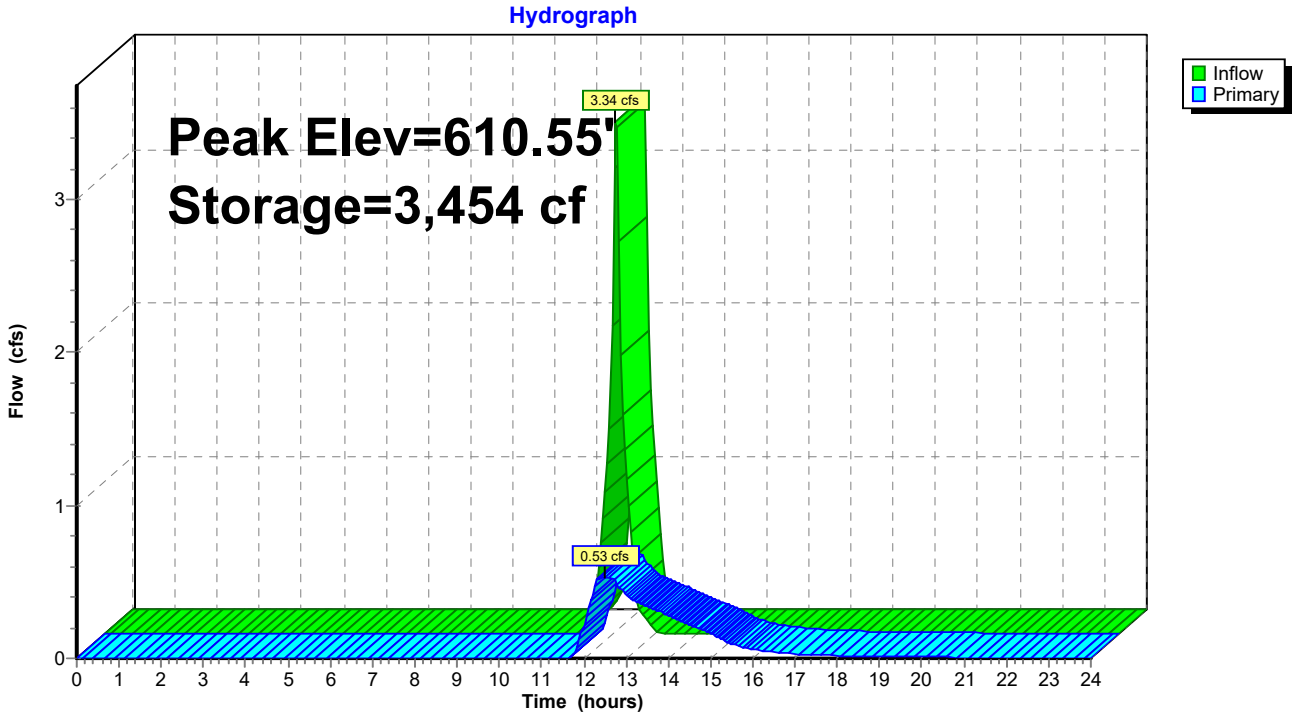
32 Chambers x 166.5 cf = 5,328.0 cf Chamber Storage
32 Chambers x 258.6 cf + 73.6 cf Border = 8,348.6 cf Displacement

Chamber Storage = 5,328.0 cf = 0.122 af
Overall Storage Efficiency = 63.8%
Overall System Size = 113.50' x 27.58' x 2.67'

32 Chambers (plus border)
309.2 cy Field



Pond DB-1: DB-1


Hydrograph
Inflow
Primary
3.34 cfs
0.53 cfs
Peak Elev=610.55'
Storage=3,454 cf
Flow (cfs)
Time (hours)
0
1
2
3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

Stage-Discharge for Pond DB-1: DB-1

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
609.25	0.00	610.29	0.40	611.33	0.65
609.27	0.00	610.31	0.41	611.35	0.65
609.29	0.00	610.33	0.42	611.37	0.65
609.31	0.01	610.35	0.43	611.39	0.66
609.33	0.01	610.37	0.44	611.41	0.66
609.35	0.02	610.39	0.46	611.43	0.66
609.37	0.03	610.41	0.48	611.45	0.66
609.39	0.04	610.43	0.49	611.47	0.67
609.41	0.05	610.45	0.51	611.49	0.67
609.43	0.06	610.47	0.51	611.51	0.67
609.45	0.08	610.49	0.52	611.53	0.68
609.47	0.09	610.51	0.52	611.55	0.68
609.49	0.11	610.53	0.53	611.57	0.68
609.51	0.13	610.55	0.53	611.59	0.68
609.53	0.14	610.57	0.53	611.61	0.69
609.55	0.15	610.59	0.54	611.63	0.69
609.57	0.17	610.61	0.54	611.65	0.69
609.59	0.17	610.63	0.54	611.67	0.69
609.61	0.18	610.65	0.55	611.69	0.70
609.63	0.19	610.67	0.55	611.71	0.70
609.65	0.20	610.69	0.55	611.73	0.70
609.67	0.21	610.71	0.56	611.75	0.70
609.69	0.22	610.73	0.56	611.77	0.71
609.71	0.23	610.75	0.56	611.79	0.71
609.73	0.24	610.77	0.57	611.81	0.71
609.75	0.24	610.79	0.57	611.83	0.71
609.77	0.25	610.81	0.57	611.85	0.72
609.79	0.26	610.83	0.57	611.87	0.72
609.81	0.26	610.85	0.58	611.89	0.72
609.83	0.27	610.87	0.58	611.91	**0.72**
609.85	0.28	610.89	0.58		
609.87	0.28	610.91	0.59		
609.89	0.29	610.93	0.59		
609.91	0.30	610.95	0.59		
609.93	0.30	610.97	0.60		
609.95	0.31	610.99	0.60		
609.97	0.31	611.01	0.60		
609.99	0.32	611.03	0.61		
610.01	0.32	611.05	0.61		
610.03	0.33	611.07	0.61		
610.05	0.33	611.09	0.61		
610.07	0.34	611.11	0.62		
610.09	0.34	611.13	0.62		
610.11	0.35	611.15	0.62		
610.13	0.35	611.17	0.63		
610.15	0.36	611.19	0.63		
610.17	0.36	611.21	0.63		
610.19	0.37	611.23	0.63		
610.21	0.37	611.25	0.64		
610.23	0.38	611.27	0.64		
610.25	0.38	611.29	0.64		
610.27	0.39	611.31	0.65		

Summary for Pond DB-2: DB-2

Inflow	=	2.68 cfs @	12.09 hrs,	Volume=	0.079 af
Outflow	=	0.11 cfs @	12.62 hrs,	Volume=	0.070 af, Atten= 96%, Lag= 32.1 min
Primary	=	0.11 cfs @	12.62 hrs,	Volume=	0.070 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 616.43' @ 12.62 hrs Surf.Area= 3,131 sf Storage= 3,133 cf
Flood Elev= 617.25' Surf.Area= 3,131 sf Storage= 5,328 cf

Plug-Flow detention time= 282.2 min calculated for 0.070 af (89% of inflow)
Center-of-Mass det. time= 279.1 min (1,006.1 - 727.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	615.25'	0 cf	**27.58'W x 113.50'L x 2.67'H Field A** 8,349 cf Overall - 8,349 cf Embedded = 0 cf x 40.0% Voids
#2A	615.25'	5,328 cf	**StormTrap ST1 SingleTrap 2-0** x 32 Inside #1 Inside= 82.7"W x 24.0"H => 11.84 sf x 14.06'L = 166.5 cf Outside= 82.7"W x 32.0"H => 18.39 sf x 14.06'L = 258.6 cf 4 Rows of 8 Chambers 27.58' x 112.50' Core + 0.00' x 0.50' Border = 27.58' x 113.50' System
		5,328 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	615.25'	**8.0" Round Culvert** L= 44.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 615.25' / 615.00' S= 0.0057 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.35 sf
#2	Device 1	615.25'	**2.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.11 cfs @ 12.62 hrs HW=616.43' (Free Discharge)
└─**1=Culvert** (Passes 0.11 cfs of 1.22 cfs potential flow)
└─**2=Orifice/Grate** (Orifice Controls 0.11 cfs @ 5.03 fps)

Pond DB-2: DB-2 - Chamber Wizard Field A

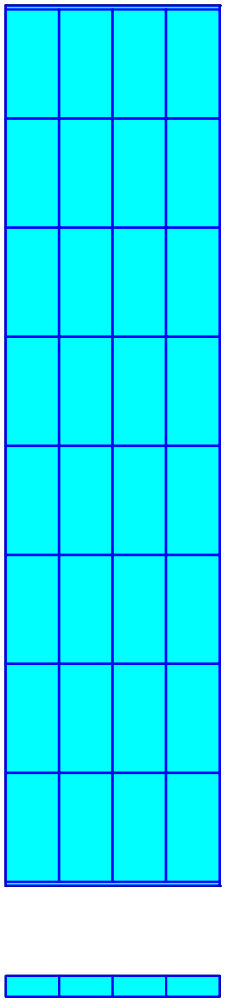
Chamber Model = StormTrap ST1 SingleTrap 2-0 (StormTrap ST1 SingleTrap® Type VI)
Inside= 82.7"W x 24.0"H => 11.84 sf x 14.06'L = 166.5 cf
Outside= 82.7"W x 32.0"H => 18.39 sf x 14.06'L = 258.6 cf

8 Chambers/Row x 14.06' Long = 112.50' Row Length +6.0" Border x 2 = 113.50' Base Length
4 Rows x 82.7" Wide = 27.58' Base Width
32.0" Chamber Height = 2.67' Field Height

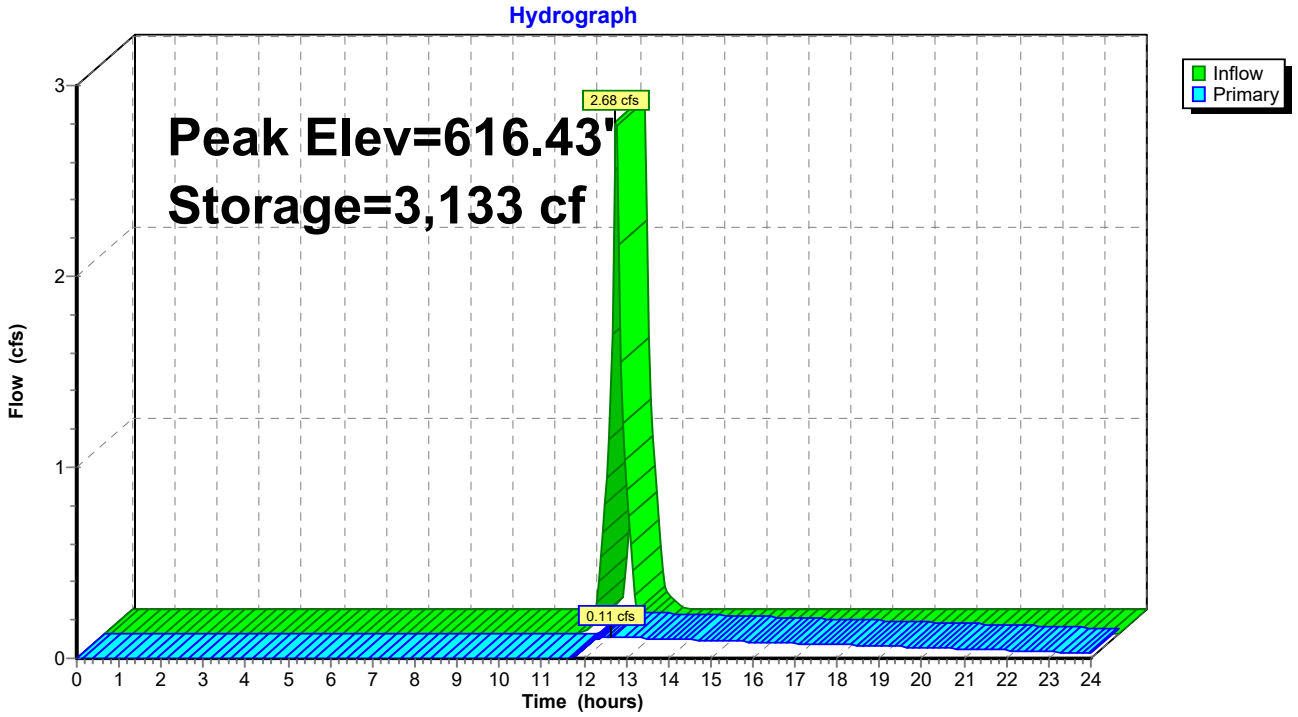
32 Chambers x 166.5 cf = 5,328.0 cf Chamber Storage
32 Chambers x 258.6 cf + 73.6 cf Border = 8,348.6 cf Displacement

Chamber Storage = 5,328.0 cf = 0.122 af
Overall Storage Efficiency = 63.8%
Overall System Size = 113.50' x 27.58' x 2.67'

32 Chambers (plus border)
309.2 cy Field



Pond DB-2: DB-2


Hydrograph
Peak Elev=616.43'
Storage=3,133 cf
2.68 cfs
0.11 cfs
Inflow
Primary
Flow (cfs)
Time (hours)
0
1
2
3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

Stage-Discharge for Pond DB-2: DB-2

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
615.25	0.00	616.29	0.10	617.33	0.15
615.27	0.00	616.31	0.10	617.35	0.15
615.29	0.00	616.33	0.10	617.37	0.15
615.31	0.01	616.35	0.11	617.39	0.15
615.33	0.01	616.37	0.11	617.41	0.15
615.35	0.01	616.39	0.11	617.43	0.15
615.37	0.02	616.41	0.11	617.45	0.15
615.39	0.02	616.43	0.11	617.47	0.15
615.41	0.03	616.45	0.11	617.49	0.15
615.43	0.03	616.47	0.11	617.51	0.15
615.45	0.04	616.49	0.11	617.53	0.16
615.47	0.04	616.51	0.11	617.55	0.16
615.49	0.04	616.53	0.11	617.57	0.16
615.51	0.04	616.55	0.12	617.59	0.16
615.53	0.05	616.57	0.12	617.61	0.16
615.55	0.05	616.59	0.12	617.63	0.16
615.57	0.05	616.61	0.12	617.65	0.16
615.59	0.05	616.63	0.12	617.67	0.16
615.61	0.06	616.65	0.12	617.69	0.16
615.63	0.06	616.67	0.12	617.71	0.16
615.65	0.06	616.69	0.12	617.73	0.16
615.67	0.06	616.71	0.12	617.75	0.16
615.69	0.06	616.73	0.12	617.77	0.16
615.71	0.06	616.75	0.13	617.79	0.16
615.73	0.07	616.77	0.13	617.81	0.17
615.75	0.07	616.79	0.13	617.83	0.17
615.77	0.07	616.81	0.13	617.85	0.17
615.79	0.07	616.83	0.13	617.87	0.17
615.81	0.07	616.85	0.13	617.89	0.17
615.83	0.07	616.87	0.13	617.91	**0.17**
615.85	0.08	616.89	0.13		
615.87	0.08	616.91	0.13		
615.89	0.08	616.93	0.13		
615.91	0.08	616.95	0.13		
615.93	0.08	616.97	0.13		
615.95	0.08	616.99	0.14		
615.97	0.08	617.01	0.14		
615.99	0.09	617.03	0.14		
616.01	0.09	617.05	0.14		
616.03	0.09	617.07	0.14		
616.05	0.09	617.09	0.14		
616.07	0.09	617.11	0.14		
616.09	0.09	617.13	0.14		
616.11	0.09	617.15	0.14		
616.13	0.09	617.17	0.14		
616.15	0.09	617.19	0.14		
616.17	0.10	617.21	0.14		
616.19	0.10	617.23	0.14		
616.21	0.10	617.25	0.15		
616.23	0.10	617.27	0.15		
616.25	0.10	617.29	0.15		
616.27	0.10	617.31	0.15		

Summary for Pond DB-6: DB-6

Inflow Area = 0.133 ac,100.00% Impervious, Inflow Depth > 54.57" for 25-YR event
Inflow = 7.62 cfs @ 12.22 hrs, Volume= 0.607 af
Outflow = 3.97 cfs @ 12.51 hrs, Volume= 0.598 af, Atten= 48%, Lag= 17.5 min
Primary = 3.97 cfs @ 12.51 hrs, Volume= 0.598 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 615.96' @ 12.51 hrs Surf.Area= 2,902 sf Storage= 9,559 cf
Flood Elev= 617.25' Surf.Area= 2,902 sf Storage= 12,873 cf

Plug-Flow detention time= 82.1 min calculated for 0.598 af (99% of inflow)
Center-of-Mass det. time= 73.7 min (864.5 - 790.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	612.25'	0 cf	**38.75'W x 74.90'L x 5.50'H Field A** 15,962 cf Overall - 15,962 cf Embedded = 0 cf x 40.0% Voids
#2A	612.25'	12,873 cf	**StormTrap ST2 SingleTrap 5-0** x 12 Inside #1 Inside= 101.7"W x 60.0"H => 38.33 sf x 15.40'L = 590.2 cf Outside= 101.7"W x 66.0"H => 46.64 sf x 15.40'L = 718.0 cf 3 Rows of 4 Chambers 25.44' x 61.58' Core + 6.66' Border = 38.75' x 74.90' System
		12,873 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	612.25'	**12.0" Round Culvert** L= 110.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 612.25' / 609.60' S= 0.0241 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	612.25'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	614.00'	**8.0" Vert. Orifice/Grate** C= 0.600
#4	Device 1	615.25'	**8.0" Vert. Orifice/Grate** C= 0.600
#5	Device 1	616.25'	**12.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=3.97 cfs @ 12.51 hrs HW=615.96' (Free Discharge)
└─**1=Culvert** (Passes 3.97 cfs of 5.35 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.79 cfs @ 9.06 fps)
  ├─**3=Orifice/Grate** (Orifice Controls 2.14 cfs @ 6.14 fps)
  ├─**4=Orifice/Grate** (Orifice Controls 1.03 cfs @ 2.96 fps)
  └─**5=Orifice/Grate** (Controls 0.00 cfs)

Pond DB-6: DB-6 - Chamber Wizard Field A

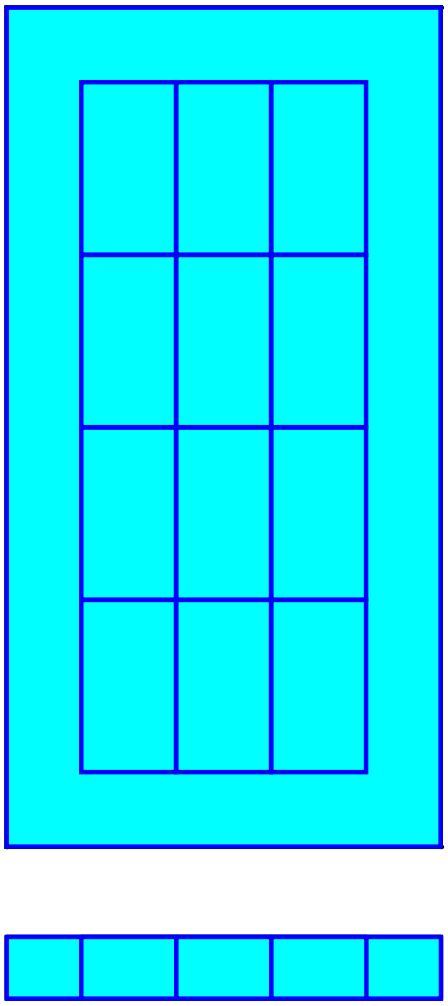
Chamber Model = StormTrap ST2 SingleTrap 5-0 (StormTrap ST2 SingleTrap® Type II+IV)
Inside= 101.7"W x 60.0"H => 38.33 sf x 15.40'L = 590.2 cf
Outside= 101.7"W x 66.0"H => 46.64 sf x 15.40'L = 718.0 cf

4 Chambers/Row x 15.40' Long = 61.58' Row Length +79.9" Border x 2 = 74.90' Base Length
3 Rows x 101.7" Wide + 79.9" Side Border x 2 = 38.75' Base Width
66.0" Chamber Height = 5.50' Field Height

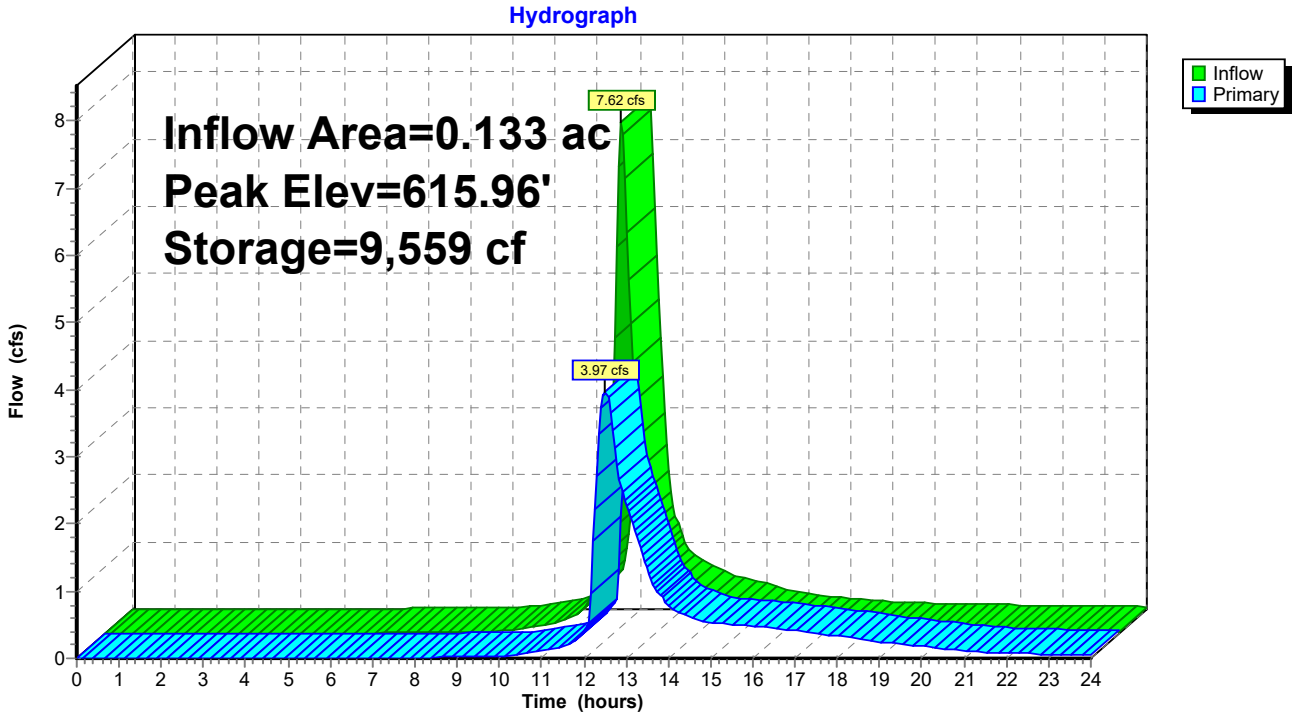
12 Chambers x 590.2 cf + 5,791.0 cf Border = 12,873.2 cf Chamber Storage
12 Chambers x 718.0 cf + 7,346.3 cf Border = 15,962.2 cf Displacement

Chamber Storage = 12,873.2 cf = 0.296 af
Overall Storage Efficiency = 80.6%
Overall System Size = 74.90' x 38.75' x 5.50'

12 Chambers (plus border)
591.2 cy Field



Pond DB-6: DB-6


Hydrograph
Inflow Area=0.133 ac
Peak Elev=615.96'
Storage=9,559 cf
7.62 cfs
3.97 cfs
Inflow
Primary
Flow (cfs)
Time (hours)

Stage-Discharge for Pond DB-6: DB-6

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
612.25	0.00	614.33	0.92	616.41	4.90
612.29	0.00	614.37	1.00	616.45	5.02
612.33	0.02	614.41	1.08	616.49	5.16
612.37	0.03	614.45	1.17	616.53	5.30
612.41	0.06	614.49	1.26	616.57	5.46
612.45	0.08	614.53	1.35	616.61	5.62
612.49	0.11	614.57	1.43	616.65	5.79
612.53	0.14	614.61	1.51	616.69	5.93
612.57	0.17	614.65	1.58	616.73	5.96
612.61	0.18	614.69	1.64	616.77	5.99
612.65	0.20	614.73	1.70	616.81	6.02
612.69	0.22	614.77	1.76	616.85	6.05
612.73	0.24	614.81	1.81	616.89	6.07
612.77	0.25	614.85	1.86	616.93	6.10
612.81	0.26	614.89	1.91	616.97	6.13
612.85	0.28	614.93	1.96	617.01	6.16
612.89	0.29	614.97	2.01	617.05	6.19
612.93	0.30	615.01	2.06	617.09	6.22
612.97	0.31	615.05	2.10	617.13	6.25
613.01	0.32	615.09	2.15	617.17	6.28
613.05	0.33	615.13	2.19	617.21	6.31
613.09	0.34	615.17	2.23	617.25	6.33
613.13	0.35	615.21	2.28	617.29	6.36
613.17	0.36	615.25	2.32	617.33	6.39
613.21	0.37	615.29	2.36	617.37	6.42
613.25	0.38	615.33	2.42	617.41	6.44
613.29	0.39	615.37	2.48	617.45	6.47
613.33	0.40	615.41	2.56	617.49	6.50
613.37	0.41	615.45	2.64	617.53	6.53
613.41	0.42	615.49	2.73	617.57	6.55
613.45	0.43	615.53	2.83	617.61	6.58
613.49	0.44	615.57	2.93	617.65	6.61
613.53	0.44	615.61	3.04	617.69	6.64
613.57	0.45	615.65	3.16	617.73	**6.66**
613.61	0.46	615.69	3.27		
613.65	0.47	615.73	3.39		
613.69	0.47	615.77	3.50		
613.73	0.48	615.81	3.61		
613.77	0.49	615.85	3.72		
613.81	0.50	615.89	3.82		
613.85	0.50	615.93	3.90		
613.89	0.51	615.97	3.99		
613.93	0.52	616.01	4.07		
613.97	0.52	616.05	4.15		
614.01	0.53	616.09	4.23		
614.05	0.55	616.13	4.31		
614.09	0.57	616.17	4.38		
614.13	0.61	616.21	4.45		
614.17	0.65	616.25	4.52		
614.21	0.71	616.29	4.60		
614.25	0.77	616.33	4.69		
614.29	0.84	616.37	4.79		

Summary for Pond DB-7: DB-7

Inflow Area = 0.543 ac, 78.86% Impervious, Inflow Depth > 5.08" for 25-YR event
Inflow = 2.99 cfs @ 12.09 hrs, Volume= 0.230 af
Outflow = 0.50 cfs @ 12.56 hrs, Volume= 0.223 af, Atten= 83%, Lag= 28.3 min
Primary = 0.50 cfs @ 12.56 hrs, Volume= 0.223 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 617.35' @ 12.56 hrs Surf.Area= 3,131 sf Storage= 4,142 cf
Flood Elev= 617.80' Surf.Area= 3,131 sf Storage= 5,328 cf

Plug-Flow detention time= 113.7 min calculated for 0.222 af (97% of inflow)
Center-of-Mass det. time= 94.8 min (874.8 - 779.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	615.80'	0 cf	**27.58'W x 113.50'L x 2.67'H Field A** 8,349 cf Overall - 8,349 cf Embedded = 0 cf x 40.0% Voids
#2A	615.80'	5,328 cf	**StormTrap ST1 SingleTrap 2-0** x 32 Inside #1 Inside= 82.7"W x 24.0"H => 11.84 sf x 14.06'L = 166.5 cf Outside= 82.7"W x 32.0"H => 18.39 sf x 14.06'L = 258.6 cf 4 Rows of 8 Chambers 27.58' x 112.50' Core + 0.00' x 0.50' Border = 27.58' x 113.50' System
		5,328 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	615.80'	**6.0" Round Culvert** L= 124.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 615.80' / 615.00' S= 0.0065 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf
#2	Device 1	615.80'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	617.30'	**4.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.50 cfs @ 12.56 hrs HW=617.35' (Free Discharge)
└─**1=Culvert** (Passes 0.50 cfs of 0.77 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.49 cfs @ 5.67 fps)
  └─**3=Orifice/Grate** (Orifice Controls 0.01 cfs @ 0.79 fps)

Pond DB-7: DB-7 - Chamber Wizard Field A

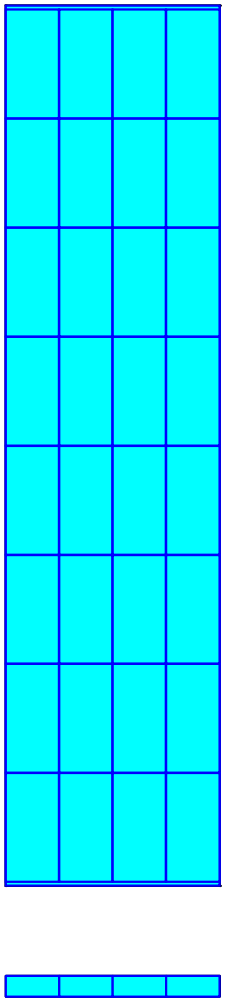
Chamber Model = StormTrap ST1 SingleTrap 2-0 (StormTrap ST1 SingleTrap® Type VI)
Inside= 82.7"W x 24.0"H => 11.84 sf x 14.06'L = 166.5 cf
Outside= 82.7"W x 32.0"H => 18.39 sf x 14.06'L = 258.6 cf

8 Chambers/Row x 14.06' Long = 112.50' Row Length +6.0" Border x 2 = 113.50' Base Length
4 Rows x 82.7" Wide = 27.58' Base Width
32.0" Chamber Height = 2.67' Field Height

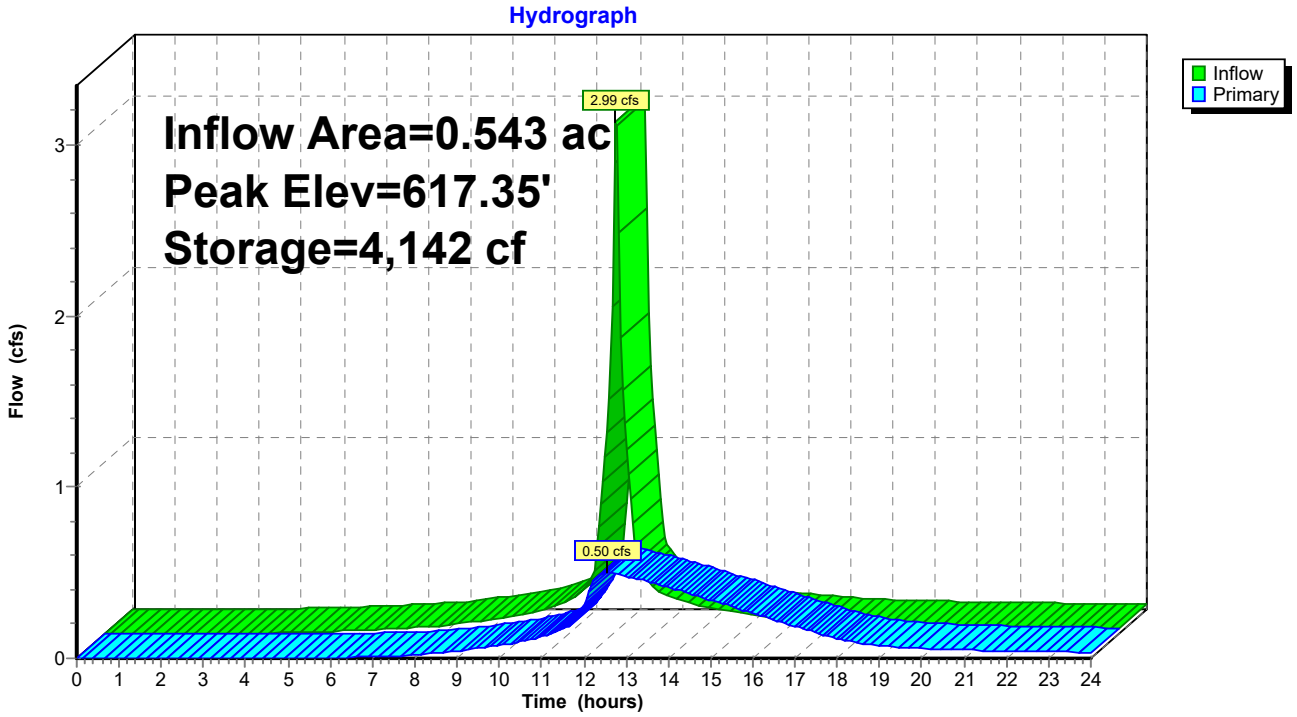
32 Chambers x 166.5 cf = 5,328.0 cf Chamber Storage
32 Chambers x 258.6 cf + 73.6 cf Border = 8,348.6 cf Displacement

Chamber Storage = 5,328.0 cf = 0.122 af
Overall Storage Efficiency = 63.8%
Overall System Size = 113.50' x 27.58' x 2.67'

32 Chambers (plus border)
309.2 cy Field



Pond DB-7: DB-7


Hydrograph
Inflow Area=0.543 ac
Peak Elev=617.35'
Storage=4,142 cf
2.99 cfs
0.50 cfs
Inflow
Primary
Flow (cfs)
Time (hours)
0
1
2
3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

Stage-Discharge for Pond DB-7: DB-7

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
615.80	0.00	616.84	0.39	617.88	0.85
615.82	0.00	616.86	0.40	617.90	0.86
615.84	0.00	616.88	0.40	617.92	0.87
615.86	0.01	616.90	0.41	617.94	0.88
615.88	0.02	616.92	0.41	617.96	0.89
615.90	0.02	616.94	0.41	617.98	0.89
615.92	0.03	616.96	0.42	618.00	0.90
615.94	0.04	616.98	0.42	618.02	0.90
615.96	0.06	617.00	0.43	618.04	0.90
615.98	0.07	617.02	0.43	618.06	0.91
616.00	0.08	617.04	0.44	618.08	0.91
616.02	0.10	617.06	0.44	618.10	0.92
616.04	0.11	617.08	0.44	618.12	0.92
616.06	0.13	617.10	0.45	618.14	0.92
616.08	0.14	617.12	0.45	618.16	0.93
616.10	0.15	617.14	0.46	618.18	0.93
616.12	0.17	617.16	0.46	618.20	0.93
616.14	0.17	617.18	0.46	618.22	0.94
616.16	0.18	617.20	0.47	618.24	0.94
616.18	0.19	617.22	0.47	618.26	0.94
616.20	0.20	617.24	0.47	618.28	0.95
616.22	0.21	617.26	0.48	618.30	0.95
616.24	0.22	617.28	0.48	618.32	0.95
616.26	0.23	617.30	0.49	618.34	0.96
616.28	0.24	617.32	0.49	618.36	0.96
616.30	0.24	617.34	0.50	618.38	0.96
616.32	0.25	617.36	0.50	618.40	0.97
616.34	0.26	617.38	0.52	618.42	0.97
616.36	0.26	617.40	0.53	618.44	0.97
616.38	0.27	617.42	0.54	618.46	**0.98**
616.40	0.28	617.44	0.55		
616.42	0.28	617.46	0.57		
616.44	0.29	617.48	0.59		
616.46	0.30	617.50	0.60		
616.48	0.30	617.52	0.62		
616.50	0.31	617.54	0.64		
616.52	0.31	617.56	0.66		
616.54	0.32	617.58	0.67		
616.56	0.32	617.60	0.69		
616.58	0.33	617.62	0.71		
616.60	0.33	617.64	0.72		
616.62	0.34	617.66	0.73		
616.64	0.34	617.68	0.74		
616.66	0.35	617.70	0.76		
616.68	0.35	617.72	0.77		
616.70	0.36	617.74	0.78		
616.72	0.36	617.76	0.79		
616.74	0.37	617.78	0.80		
616.76	0.37	617.80	0.81		
616.78	0.38	617.82	0.82		
616.80	0.38	617.84	0.83		
616.82	0.39	617.86	0.84		

Summary for Pond ICS-1: ICS-1

Inflow Area =	0.693 ac, 62.75% Impervious, Inflow Depth > 4.86" for 25-YR event				
Inflow =	3.70 cfs @	12.09 hrs,	Volume=	0.280 af	
Outflow =	3.70 cfs @	12.09 hrs,	Volume=	0.280 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.36 cfs @	12.09 hrs,	Volume=	0.175 af	
Secondary =	3.34 cfs @	12.09 hrs,	Volume=	0.106 af	

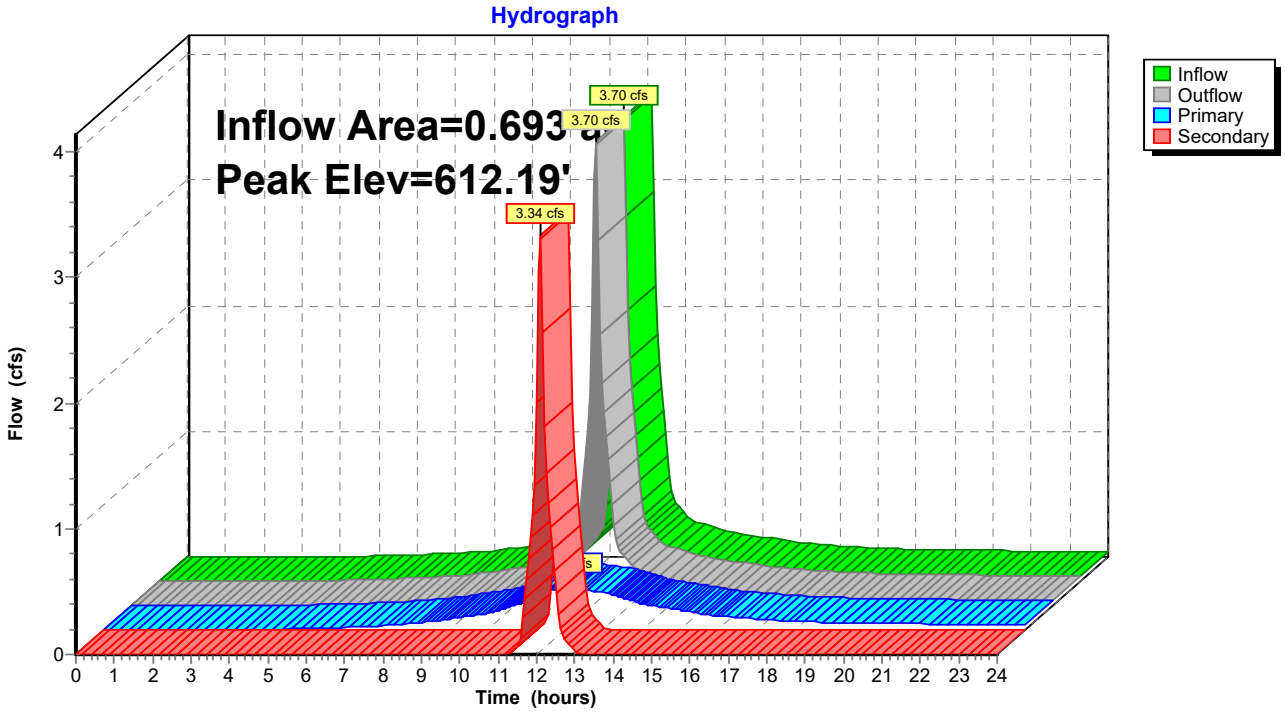
Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 612.19' @ 12.09 hrs
Flood Elev= 613.25'

Device	Routing	Invert	Outlet Devices
#1	Primary	609.25'	**4.0" Round Culvert** L= 145.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 609.25' / 608.50' S= 0.0052 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf
#2	Secondary	611.20'	**12.0" Round Culvert** L= 5.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 611.20' / 610.20' S= 0.2000 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.36 cfs @ 12.09 hrs HW=612.17' (Free Discharge)
└**1=Culvert** (Barrel Controls 0.36 cfs @ 4.09 fps)

Secondary OutFlow Max=3.26 cfs @ 12.09 hrs HW=612.17' (Free Discharge)
└**2=Culvert** (Inlet Controls 3.26 cfs @ 4.19 fps)

Pond ICS-1: ICS-1



Stage-Discharge for Pond ICS-1: ICS-1

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
609.25	0.00	0.00	0.00
609.30	0.00	0.00	0.00
609.35	0.02	0.02	0.00
609.40	0.04	0.04	0.00
609.45	0.07	0.07	0.00
609.50	0.11	0.11	0.00
609.55	0.14	0.14	0.00
609.60	0.17	0.17	0.00
609.65	0.19	0.19	0.00
609.70	0.18	0.18	0.00
609.75	0.19	0.19	0.00
609.80	0.19	0.19	0.00
609.85	0.20	0.20	0.00
609.90	0.20	0.20	0.00
609.95	0.21	0.21	0.00
610.00	0.21	0.21	0.00
610.05	0.22	0.22	0.00
610.10	0.22	0.22	0.00
610.15	0.22	0.22	0.00
610.20	0.23	0.23	0.00
610.25	0.23	0.23	0.00
610.30	0.24	0.24	0.00
610.35	0.24	0.24	0.00
610.40	0.24	0.24	0.00
610.45	0.25	0.25	0.00
610.50	0.25	0.25	0.00
610.55	0.26	0.26	0.00
610.60	0.26	0.26	0.00
610.65	0.26	0.26	0.00
610.70	0.27	0.27	0.00
610.75	0.27	0.27	0.00
610.80	0.27	0.27	0.00
610.85	0.28	0.28	0.00
610.90	0.28	0.28	0.00
610.95	0.28	0.28	0.00
611.00	0.29	0.29	0.00
611.05	0.29	0.29	0.00
611.10	0.29	0.29	0.00
611.15	0.30	0.30	0.00
611.20	0.30	0.30	0.00
611.25	0.32	0.30	0.01
611.30	0.36	0.31	0.06
611.35	0.43	0.31	0.12
611.40	0.53	0.31	0.21
611.45	0.64	0.32	0.33
611.50	0.78	0.32	0.46
611.55	0.94	0.32	0.62
611.60	1.11	0.32	0.79
611.65	1.31	0.33	0.98
611.70	1.51	0.33	1.18
611.75	1.73	0.33	1.40
611.80	1.96	0.34	1.62
611.85	2.19	0.34	1.85
611.90	2.43	0.34	2.09
611.95	2.67	0.34	2.33
612.00	2.91	0.35	2.56
612.05	3.14	0.35	2.79
612.10	3.36	0.35	3.01
612.15	3.55	0.36	3.20
612.20	3.70	0.36	3.34
612.25	3.87	0.36	3.51
612.30	4.03	0.36	3.66
612.35	4.18	0.37	3.81
612.40	4.32	0.37	3.95
612.45	4.47	0.37	4.09
612.50	4.60	0.37	4.23
612.55	4.73	0.38	4.36
612.60	4.86	0.38	4.48
612.65	4.99	0.38	4.61
612.70	5.11	0.38	4.73
612.75	5.23	0.39	4.84
612.80	5.35	0.39	4.96
612.85	5.46	0.39	5.07
612.90	5.57	0.39	5.18
612.95	5.68	0.40	5.29
613.00	5.79	0.40	5.39
613.05	5.89	0.40	5.49
613.10	6.00	0.40	5.59
613.15	6.10	0.41	5.69
613.20	6.20	0.41	5.79
613.25	**6.30**	**0.41**	**5.89**

Summary for Pond ICS-2: ICS-2

Inflow Area =	0.598 ac, 70.86% Impervious, Inflow Depth > 4.75" for 25-YR event				
Inflow =	3.14 cfs @	12.09 hrs,	Volume=	0.237 af	
Outflow =	3.14 cfs @	12.09 hrs,	Volume=	0.237 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.46 cfs @	12.09 hrs,	Volume=	0.158 af	
Secondary =	2.68 cfs @	12.09 hrs,	Volume=	0.079 af	

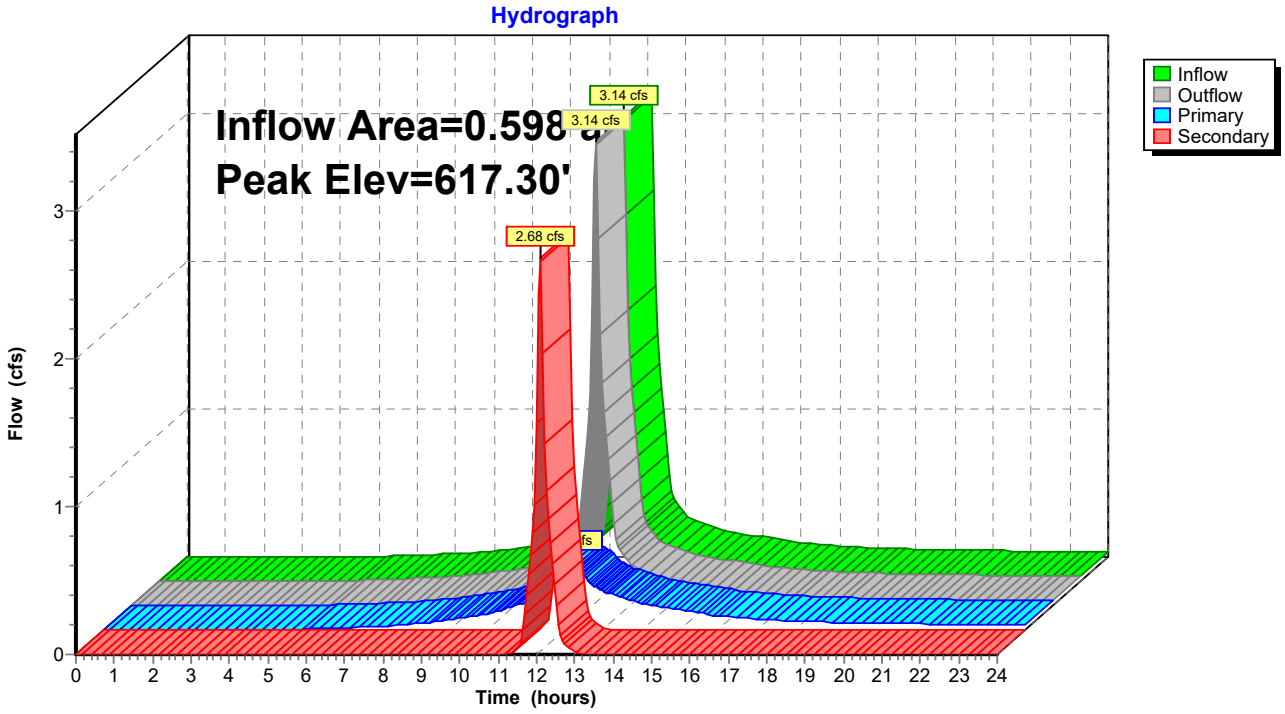
Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 617.30' @ 12.09 hrs
Flood Elev= 617.25'

Device	Routing	Invert	Outlet Devices
#1	Primary	615.85'	**4.0" Round Culvert** L= 34.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 615.85' / 615.00' S= 0.0250 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.09 sf
#2	Secondary	616.21'	**12.0" Round Culvert** L= 12.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 616.21' / 616.15' S= 0.0050 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.46 cfs @ 12.09 hrs HW=617.28' (Free Discharge)
└**1=Culvert** (Barrel Controls 0.46 cfs @ 5.27 fps)

Secondary OutFlow Max=2.61 cfs @ 12.09 hrs HW=617.28' (Free Discharge)
└**2=Culvert** (Barrel Controls 2.61 cfs @ 3.87 fps)

Pond ICS-2: ICS-2



Stage-Discharge for Pond ICS-2: ICS-2

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
615.85	0.00	0.00	0.00
615.87	0.00	0.00	0.00
615.89	0.01	0.01	0.00
615.91	0.01	0.01	0.00
615.93	0.02	0.02	0.00
615.95	0.03	0.03	0.00
615.97	0.04	0.04	0.00
615.99	0.06	0.06	0.00
616.01	0.07	0.07	0.00
616.03	0.09	0.09	0.00
616.05	0.10	0.10	0.00
616.07	0.12	0.12	0.00
616.09	0.14	0.14	0.00
616.11	0.16	0.16	0.00
616.13	0.18	0.18	0.00
616.15	0.19	0.19	0.00
616.17	0.21	0.21	0.00
616.19	0.22	0.22	0.00
616.21	0.23	0.23	0.00
616.23	0.24	0.24	0.00
616.25	0.26	0.25	0.00
616.27	0.28	0.26	0.01
616.29	0.30	0.27	0.02
616.31	0.32	0.28	0.03
616.33	0.34	0.29	0.05
616.35	0.37	0.30	0.07
616.37	0.40	0.31	0.09
616.39	0.43	0.32	0.11
616.41	0.46	0.33	0.13
616.43	0.50	0.34	0.16
616.45	0.53	0.35	0.19
616.47	0.57	0.35	0.22
616.49	0.61	0.35	0.25
616.51	0.65	0.36	0.29
616.53	0.69	0.36	0.33
616.55	0.73	0.36	0.37
616.57	0.77	0.37	0.41
616.59	0.82	0.37	0.45
616.61	0.87	0.37	0.50
616.63	0.92	0.38	0.54
616.65	0.97	0.38	0.59
616.67	1.02	0.38	0.64
616.69	1.08	0.38	0.69
616.71	1.13	0.39	0.74
616.73	1.19	0.39	0.80
616.75	1.25	0.39	0.86
616.77	1.31	0.40	0.91
616.79	1.37	0.40	0.97
616.81	1.43	0.40	1.03
616.83	1.50	0.40	1.09
616.85	1.56	0.41	1.15
616.87	1.63	0.41	1.22
616.89	1.69	0.41	1.28
616.91	1.76	0.41	1.35
616.93	1.83	0.42	1.41
616.95	1.90	0.42	1.48
616.97	1.97	0.42	1.54
616.99	2.04	0.42	1.61
617.01	2.11	0.43	1.68
617.03	2.18	0.43	1.75
617.05	2.25	0.43	1.82
617.07	2.32	0.43	1.89
617.09	2.40	0.44	1.96
617.11	2.47	0.44	2.03
617.13	2.54	0.44	2.10
617.15	2.61	0.44	2.17
617.17	2.69	0.45	2.24
617.19	2.76	0.45	2.31
617.21	2.83	0.45	2.38
617.23	2.90	0.45	2.45
617.25	2.97	0.46	2.51
617.27	3.04	0.46	2.58
617.29	3.11	0.46	2.65
617.31	**3.18**	**0.46**	**2.71**

Summary for Pond ICS-6: ICS-6

Inflow Area = 2.630 ac, 39.25% Impervious, Inflow Depth > 3.28" for 25-YR event
Inflow = 7.49 cfs @ 12.22 hrs, Volume= 0.720 af
Outflow = 7.49 cfs @ 12.22 hrs, Volume= 0.720 af, Atten= 0%, Lag= 0.0 min
Primary = 0.28 cfs @ 12.22 hrs, Volume= 0.179 af
Secondary = 7.21 cfs @ 12.22 hrs, Volume= 0.541 af

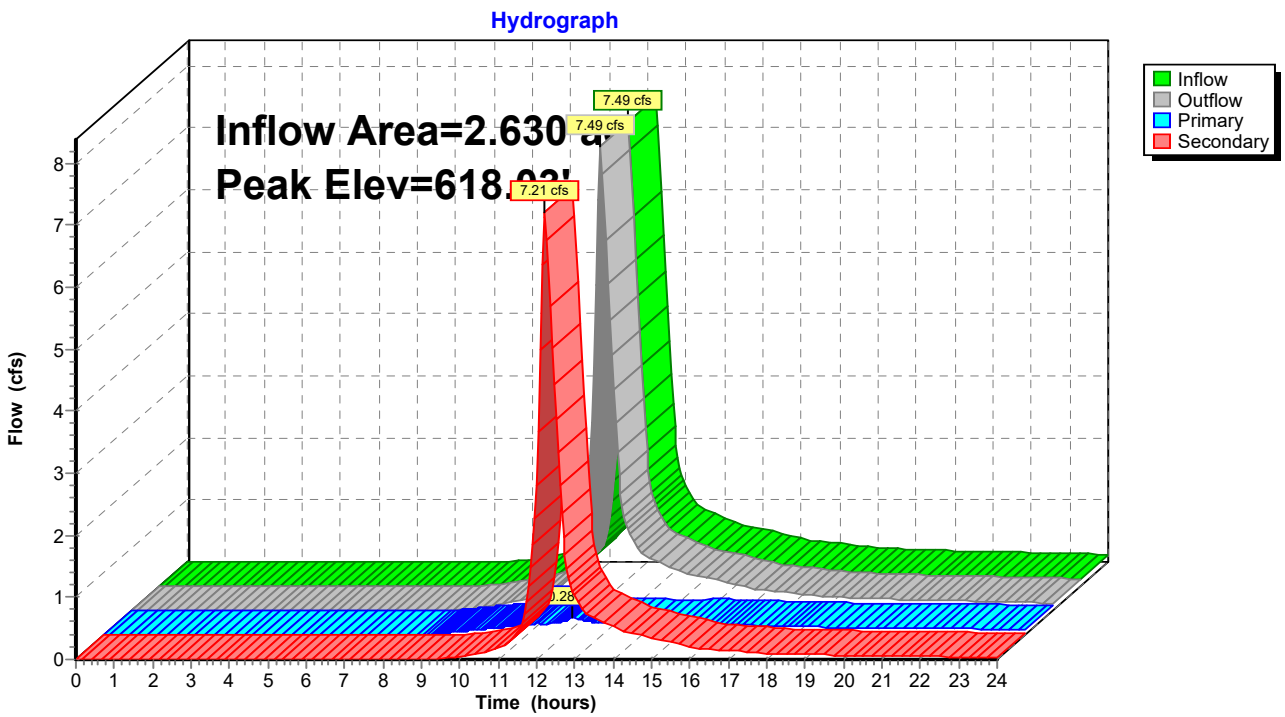
Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 618.03' @ 12.22 hrs
Flood Elev= 621.10'

Device	Routing	Invert	Outlet Devices
#1	Primary	616.00'	**4.0" Round Culvert** L= 202.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 616.00' / 615.00' S= 0.0050 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf
#2	Secondary	616.15'	**15.0" Round Culvert** L= 5.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 616.15' / 616.10' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=0.27 cfs @ 12.22 hrs HW=618.01' (Free Discharge)
└**1=Culvert** (Barrel Controls 0.27 cfs @ 3.15 fps)

Secondary OutFlow Max=7.11 cfs @ 12.22 hrs HW=618.01' (Free Discharge)
└**2=Culvert** (Barrel Controls 7.11 cfs @ 5.79 fps)

Pond ICS-6: ICS-6



Stage-Discharge for Pond ICS-6: ICS-6

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
616.00	0.00	0.00	0.00
616.10	0.02	0.02	0.00
616.20	0.08	0.07	0.01
616.30	0.24	0.14	0.10
616.40	0.44	0.19	0.26
616.50	0.66	0.18	0.48
616.60	0.94	0.19	0.75
616.70	1.27	0.20	1.08
616.80	1.65	0.20	1.44
616.90	2.06	0.21	1.85
617.00	2.51	0.22	2.30
617.10	2.99	0.22	2.77
617.20	3.49	0.23	3.26
617.30	3.99	0.24	3.76
617.40	4.50	0.24	4.26
617.50	5.00	0.25	4.75
617.60	5.47	0.25	5.22
617.70	5.89	0.26	5.63
617.80	6.21	0.26	5.95
617.90	6.75	0.27	6.48
618.00	7.32	0.27	7.05
618.10	7.85	0.28	7.57
618.20	8.34	0.28	8.06
618.30	8.81	0.29	8.52
618.40	9.25	0.29	8.96
618.50	9.67	0.30	9.38
618.60	10.08	0.30	9.77
618.70	10.47	0.31	10.16
618.80	10.82	0.31	10.51
618.90	11.08	0.32	10.77
619.00	11.34	0.32	11.02
619.10	11.59	0.33	11.26
619.20	11.83	0.33	11.50
619.30	12.07	0.33	11.74
619.40	12.31	0.34	11.97
619.50	12.54	0.34	12.19
619.60	12.76	0.35	12.41
619.70	12.98	0.35	12.63
619.80	13.20	0.35	12.85
619.90	13.42	0.36	13.06
620.00	13.63	0.36	13.26
620.10	13.83	0.37	13.47
620.20	14.04	0.37	13.67
620.30	14.24	0.37	13.87
620.40	14.44	0.38	14.06
620.50	14.64	0.38	14.26
620.60	14.83	0.38	14.45
620.70	15.02	0.39	14.63
620.80	15.21	0.39	14.82
620.90	15.40	0.40	15.00
621.00	15.58	0.40	15.18
621.10	**15.76**	**0.40**	**15.36**

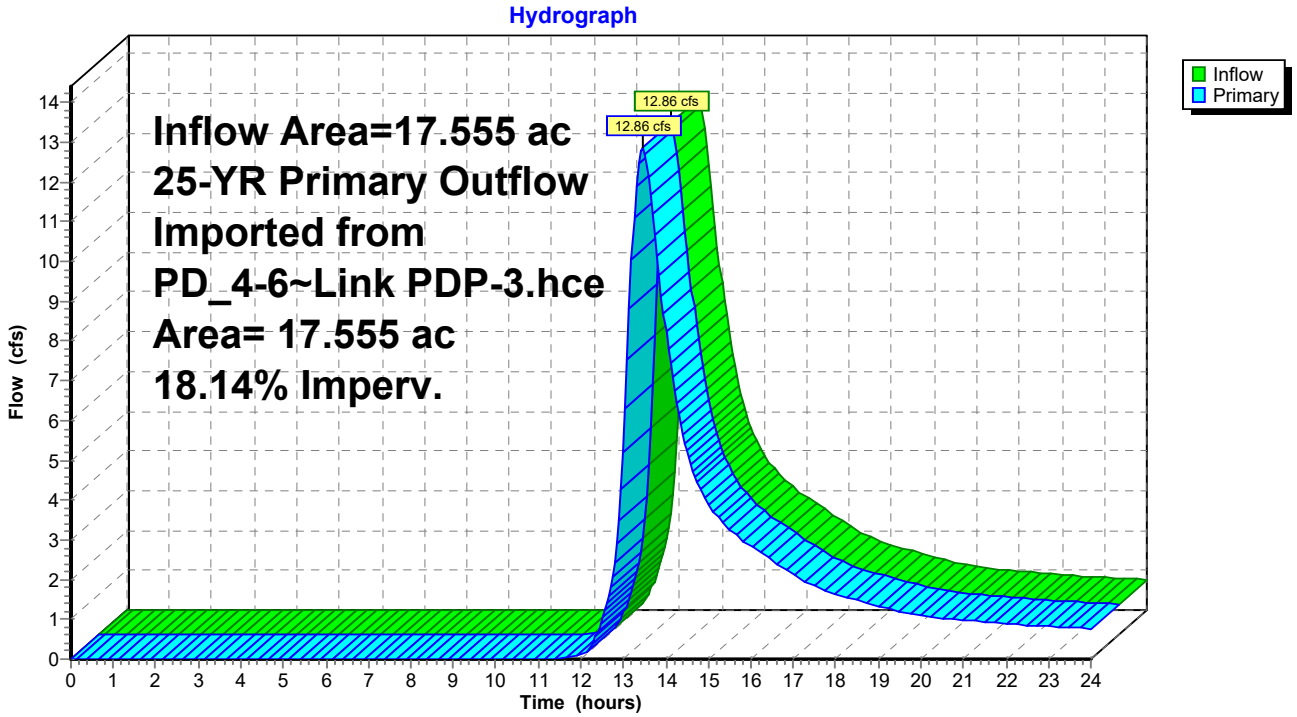
Summary for Link PDP-3: DP-3

Inflow Area = 17.555 ac, 18.14% Impervious, Inflow Depth > 1.77" for 25-YR event
Inflow = 12.86 cfs @ 13.45 hrs, Volume= 2.591 af
Primary = 12.86 cfs @ 13.45 hrs, Volume= 2.591 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

25-YR Primary Outflow Imported from PD_4-6~Link PDP-3.hce

Link PDP-3: DP-3



Summary for Subcatchment 1A: PD-1A

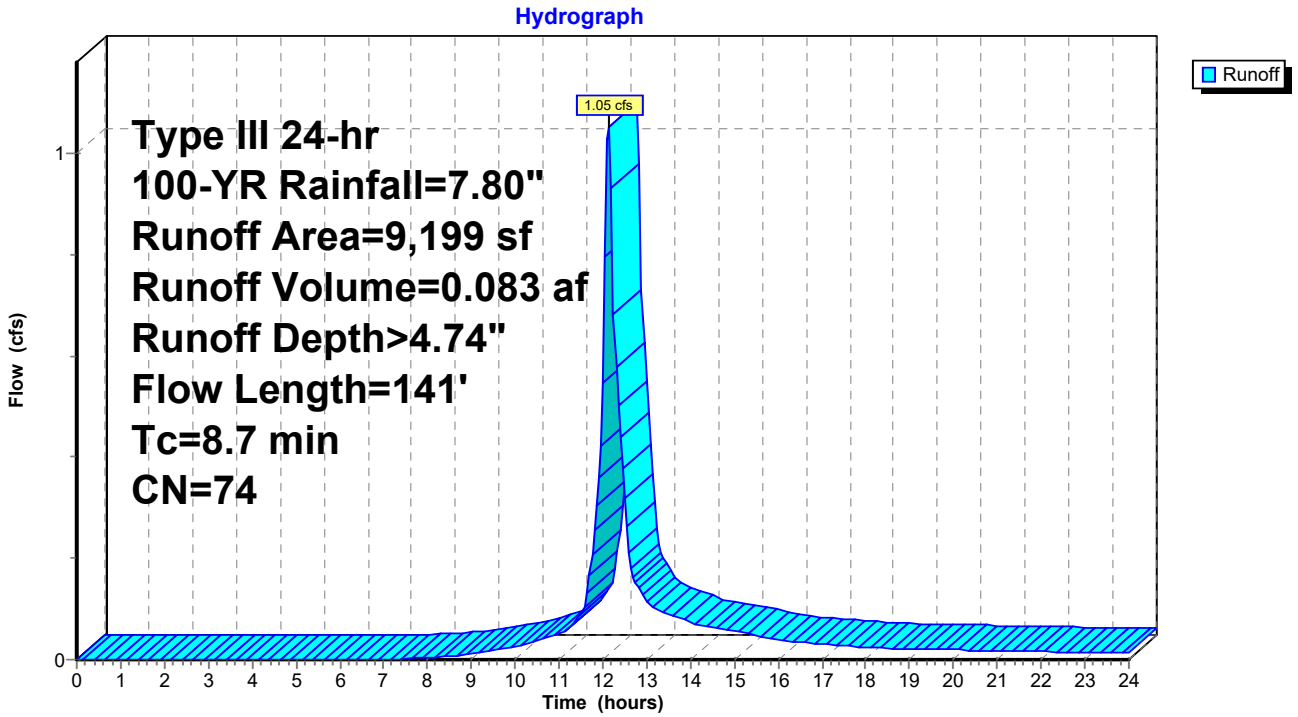
Runoff = 1.05 cfs @ 12.12 hrs, Volume= 0.083 af, Depth> 4.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=7.80"

Area (sf)	CN	Description
440	98	Paved parking, HSG C
5,095	74	>75% Grass cover, Good, HSG C
3,664	70	Woods, Good, HSG C
9,199	74	Weighted Average
8,759		95.22% Pervious Area
440		4.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	71	0.1100	0.15		**Sheet Flow, 1A-1B** Woods: Light underbrush n= 0.400 P2= 3.32"
0.3	14	0.0100	0.70		**Shallow Concentrated Flow, 1B-1C** Short Grass Pasture Kv= 7.0 fps
0.3	56	0.0050	3.18	1.11	**Pipe Channel, 1C-1D** 8.0" Round Area= 0.3 sf Perim= 2.1' r= 0.17' n= 0.010 PVC, smooth interior
8.7	141	Total			

Subcatchment 1A: PD-1A



Summary for Subcatchment 1B: PDA-1B

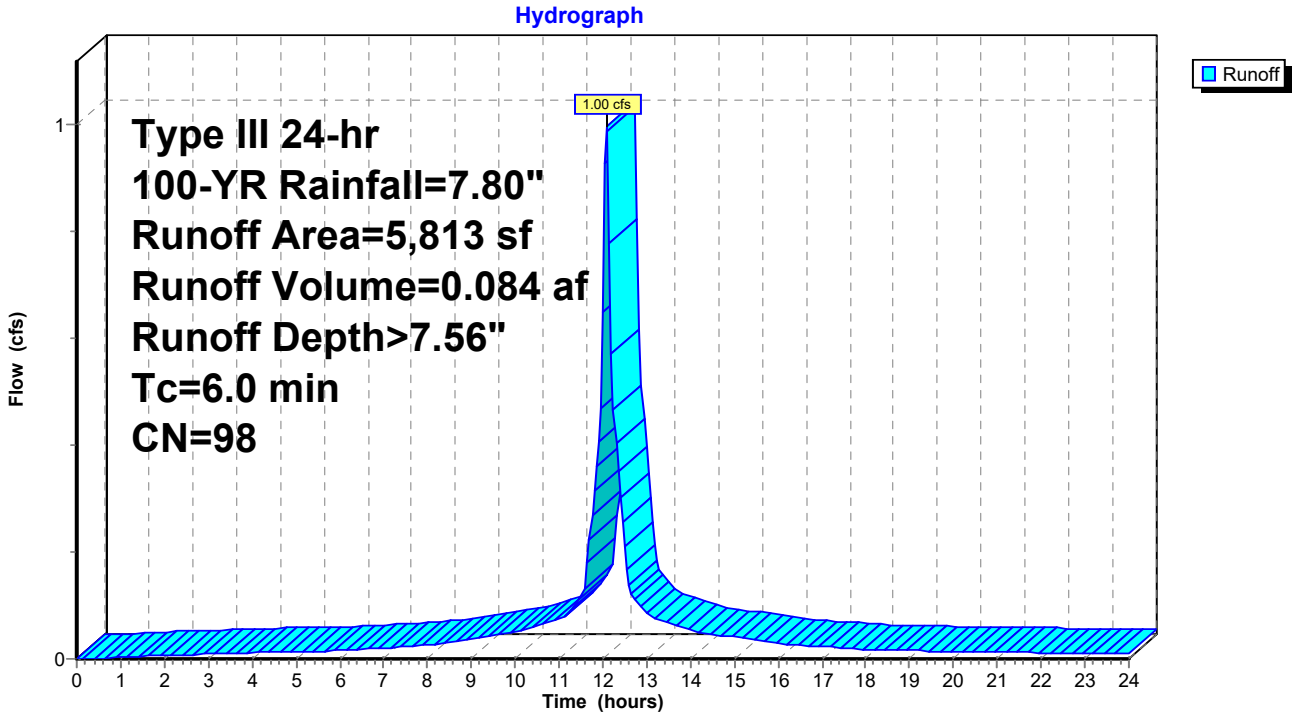
Runoff = 1.00 cfs @ 12.09 hrs, Volume= 0.084 af, Depth> 7.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=7.80"

Area (sf)	CN	Description
5,813	98	Unconnected roofs, HSG C
5,813		100.00% Impervious Area
5,813		100.00% Unconnected

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

Subcatchment 1B: PDA-1B



Summary for Subcatchment 1C: PDA-1C

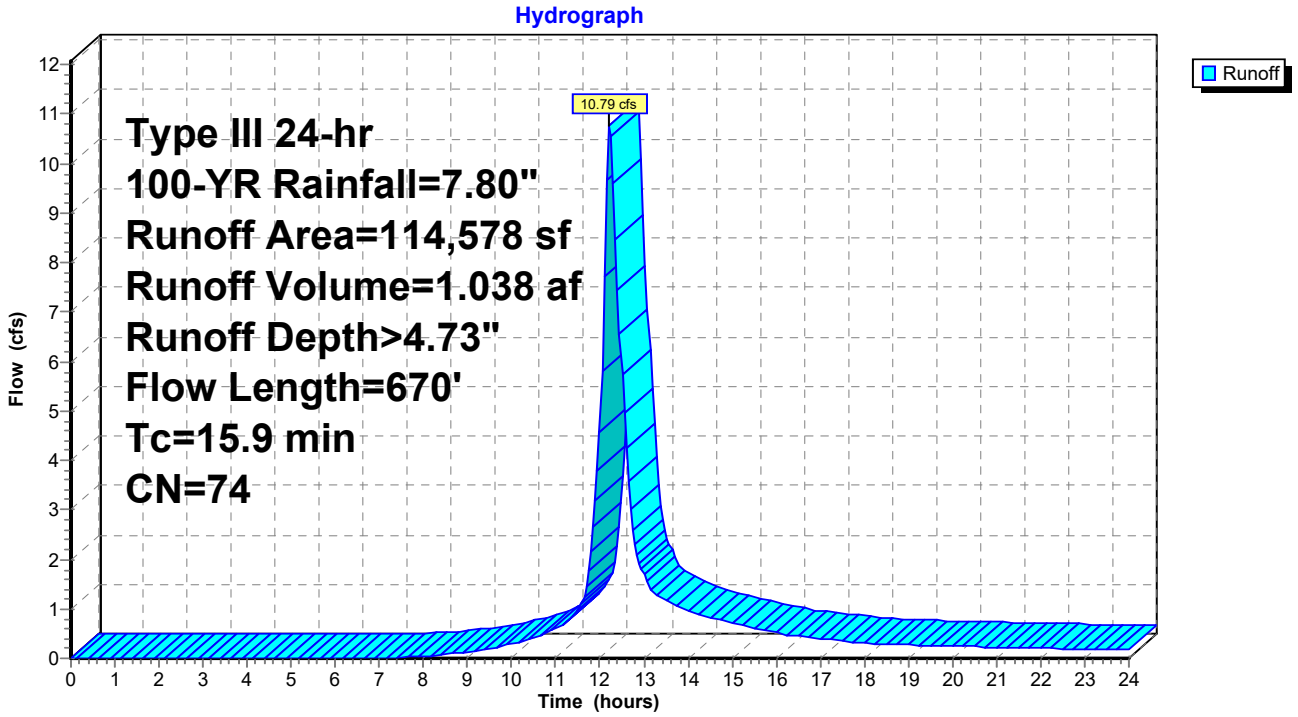
Runoff = 10.79 cfs @ 12.22 hrs, Volume= 1.038 af, Depth> 4.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=7.80"

	Area (sf)	CN	Description
*	33,778	98	Paved parking
	9,092	61	>75% Grass cover, Good, HSG B
	1,833	74	>75% Grass cover, Good, HSG C
	11,190	98	Roofs, HSG B
	47,970	55	Woods, Good, HSG B
	10,715	70	Woods, Good, HSG C
	114,578	74	Weighted Average
	69,610		60.75% Pervious Area
	44,968		39.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	50	0.0400	0.09		**Sheet Flow, 1A-1B** Woods: Light underbrush n= 0.400 P2= 3.32"
6.0	458	0.0655	1.28		**Shallow Concentrated Flow, 1B-1C** Woodland Kv= 5.0 fps
0.1	10	0.1500	2.71		**Shallow Concentrated Flow, 1C-1D** Short Grass Pasture Kv= 7.0 fps
0.3	78	0.0400	4.06		**Shallow Concentrated Flow, 1D-1E** Paved Kv= 20.3 fps
0.3	74	0.0050	3.79	2.98	**Pipe Channel, 1E-1F** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
15.9	670	Total			

Subcatchment 1C: PDA-1C



Summary for Subcatchment 3A: PDA-3A

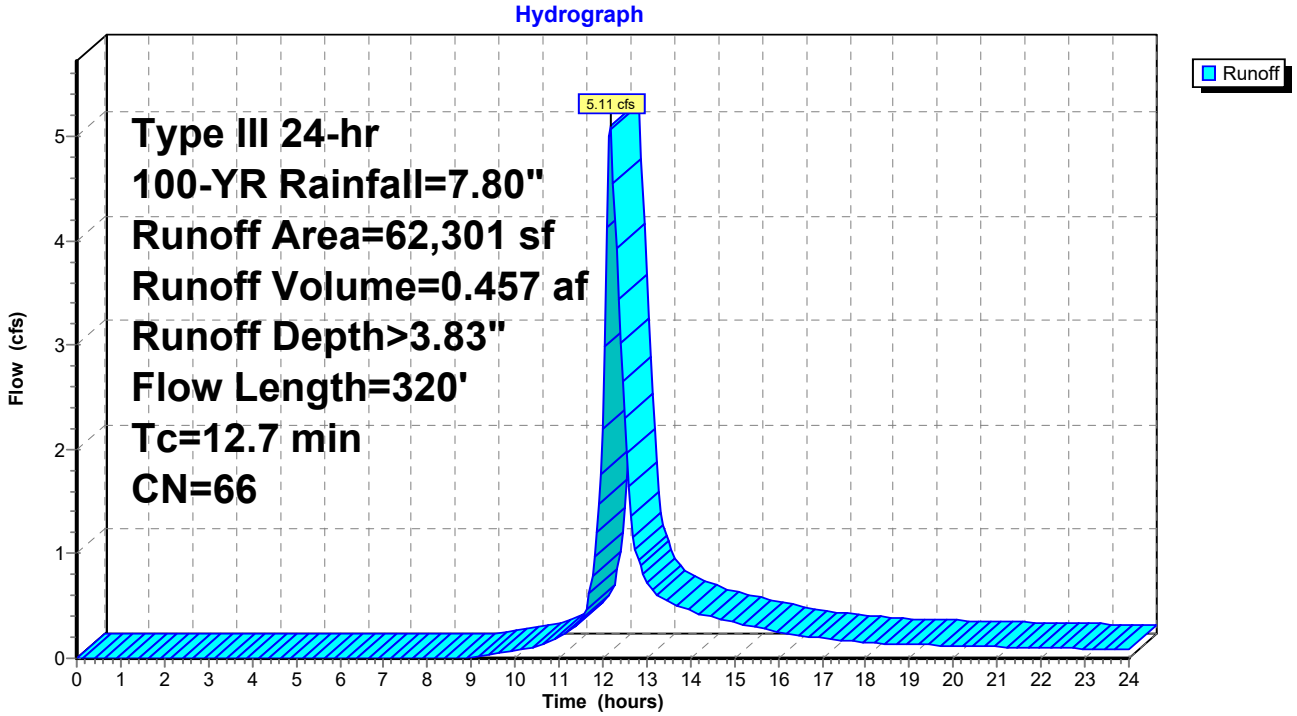
Runoff = 5.11 cfs @ 12.18 hrs, Volume= 0.457 af, Depth> 3.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=7.80"

Area (sf)	CN	Description
21,831	55	Woods, Good, HSG B
38,070	70	Woods, Good, HSG C
2,400	98	Paved parking, HSG B
62,301	66	Weighted Average
59,901		96.15% Pervious Area
2,400		3.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.0500	0.10		**Sheet Flow, 3A-3B** Woods: Light underbrush n= 0.400 P2= 3.32"
4.3	270	0.0444	1.05		**Shallow Concentrated Flow, 3B-EDP-3** Woodland Kv= 5.0 fps
12.7	320	Total			

Subcatchment 3A: PDA-3A



Summary for Subcatchment 3B: PDA-3B

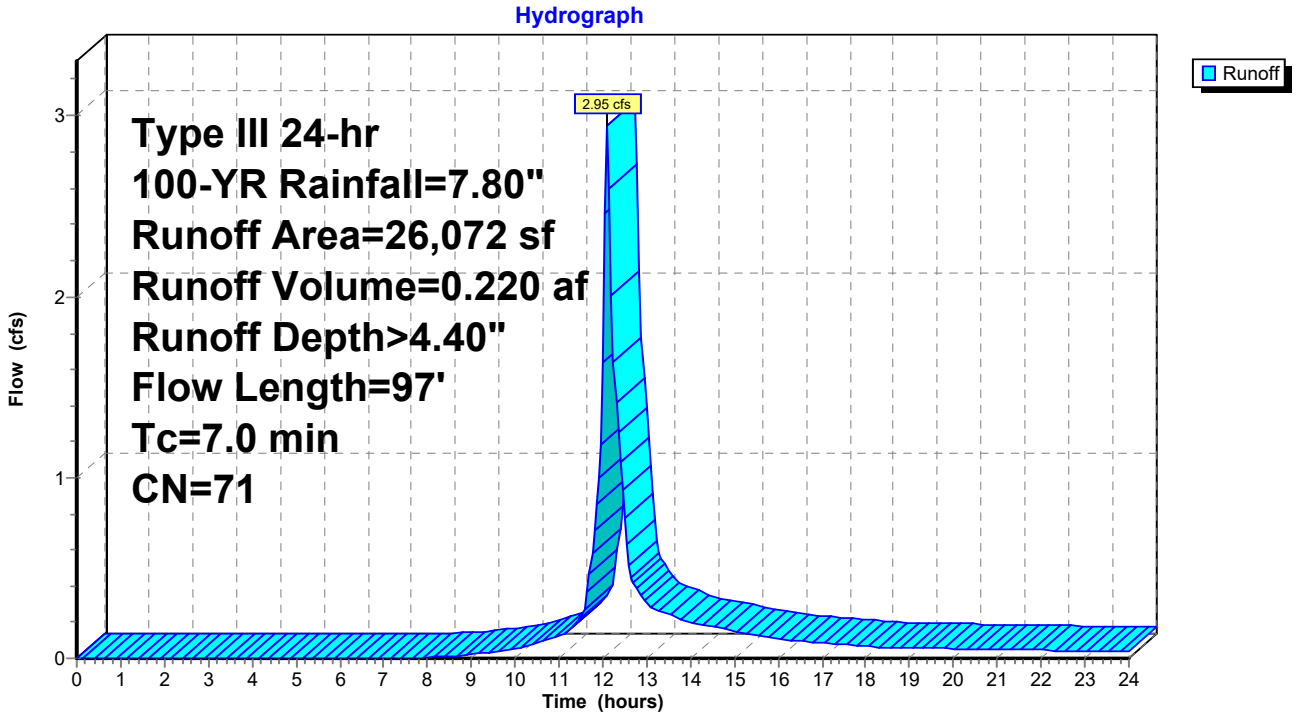
Runoff = 2.95 cfs @ 12.10 hrs, Volume= 0.220 af, Depth> 4.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=7.80"

Area (sf)	CN	Description
9,275	74	>75% Grass cover, Good, HSG C
2,286	55	Woods, Good, HSG B
13,438	70	Woods, Good, HSG C
1,073	98	Paved parking, HSG C
26,072	71	Weighted Average
24,999		95.88% Pervious Area
1,073		4.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	51	0.1000	0.13		**Sheet Flow, 3A-3B** Woods: Light underbrush n= 0.400 P2= 3.32"
0.0	6	0.3300	4.02		**Shallow Concentrated Flow, 3B-3C** Short Grass Pasture Kv= 7.0 fps
0.1	8	0.0150	1.97		**Shallow Concentrated Flow, 3C-3D** Unpaved Kv= 16.1 fps
0.0	7	0.2500	3.50		**Shallow Concentrated Flow, 3D-3E** Short Grass Pasture Kv= 7.0 fps
0.4	25	0.0500	1.12		**Shallow Concentrated Flow, 3E-EDP3** Woodland Kv= 5.0 fps
7.0	97	Total			

Subcatchment 3B: PDA-3B



Summary for Subcatchment 3C: PDA-3C

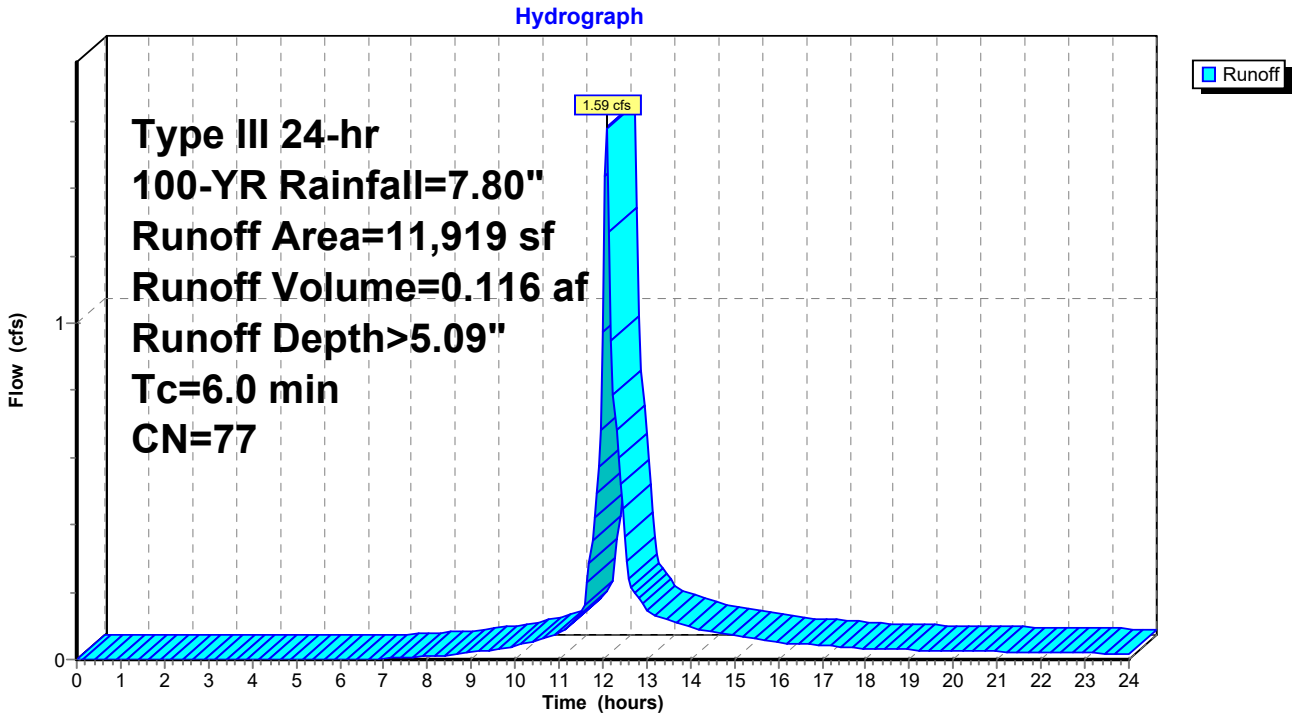
Runoff = 1.59 cfs @ 12.09 hrs, Volume= 0.116 af, Depth> 5.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=7.80"

Area (sf)	CN	Description
7,718	74	>75% Grass cover, Good, HSG C
336	98	Unconnected pavement, HSG C
2,657	74	>75% Grass cover, Good, HSG C
46	98	Unconnected pavement, HSG C
1,162	98	Roofs, HSG C
11,919	77	Weighted Average
10,375		87.05% Pervious Area
1,544		12.95% Impervious Area
382		24.74% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 MIN**

Subcatchment 3C: PDA-3C



Summary for Subcatchment 3D: PDA-3D

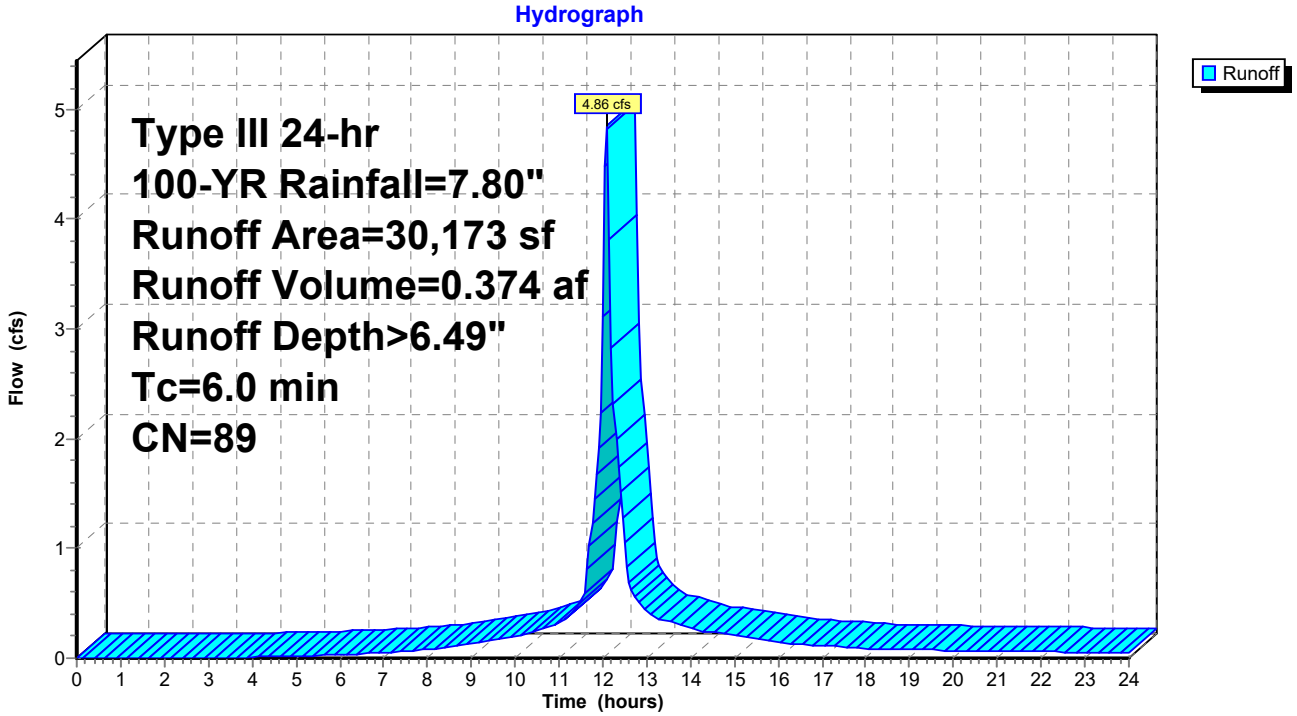
Runoff = 4.86 cfs @ 12.09 hrs, Volume= 0.374 af, Depth> 6.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=7.80"

Area (sf)	CN	Description
18,935	98	Paved parking, HSG D
11,071	74	>75% Grass cover, Good, HSG C
167	61	>75% Grass cover, Good, HSG B
30,173	89	Weighted Average
11,238		37.25% Pervious Area
18,935		62.75% Impervious Area

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

Subcatchment 3D: PDA-3D



Summary for Subcatchment 3E: PDA-3E

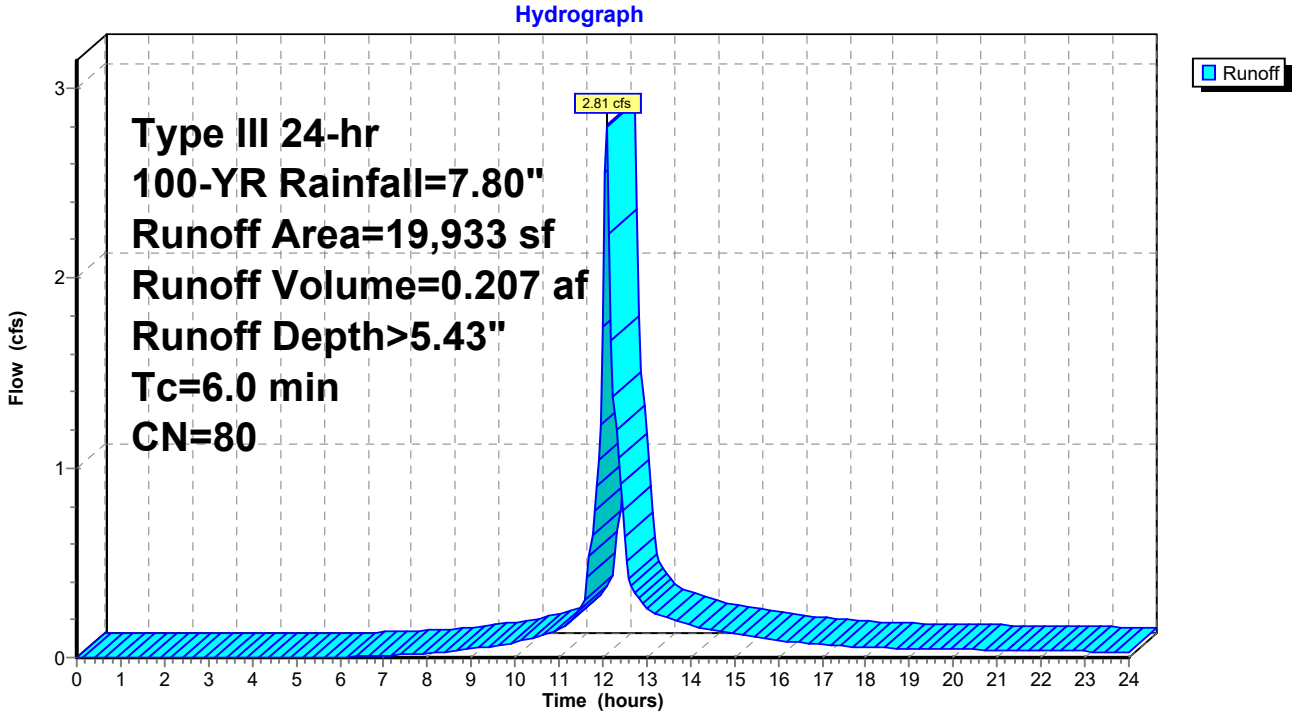
Runoff = 2.81 cfs @ 12.09 hrs, Volume= 0.207 af, Depth> 5.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=7.80"

Area (sf)	CN	Description
14,823	74	>75% Grass cover, Good, HSG C
460	98	Unconnected pavement, HSG C
4,650	98	Roofs, HSG C
19,933	80	Weighted Average
14,823		74.36% Pervious Area
5,110		25.64% Impervious Area
460		9.00% Unconnected

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

Subcatchment 3E: PDA-3E



Summary for Subcatchment 3F: PDA-3F

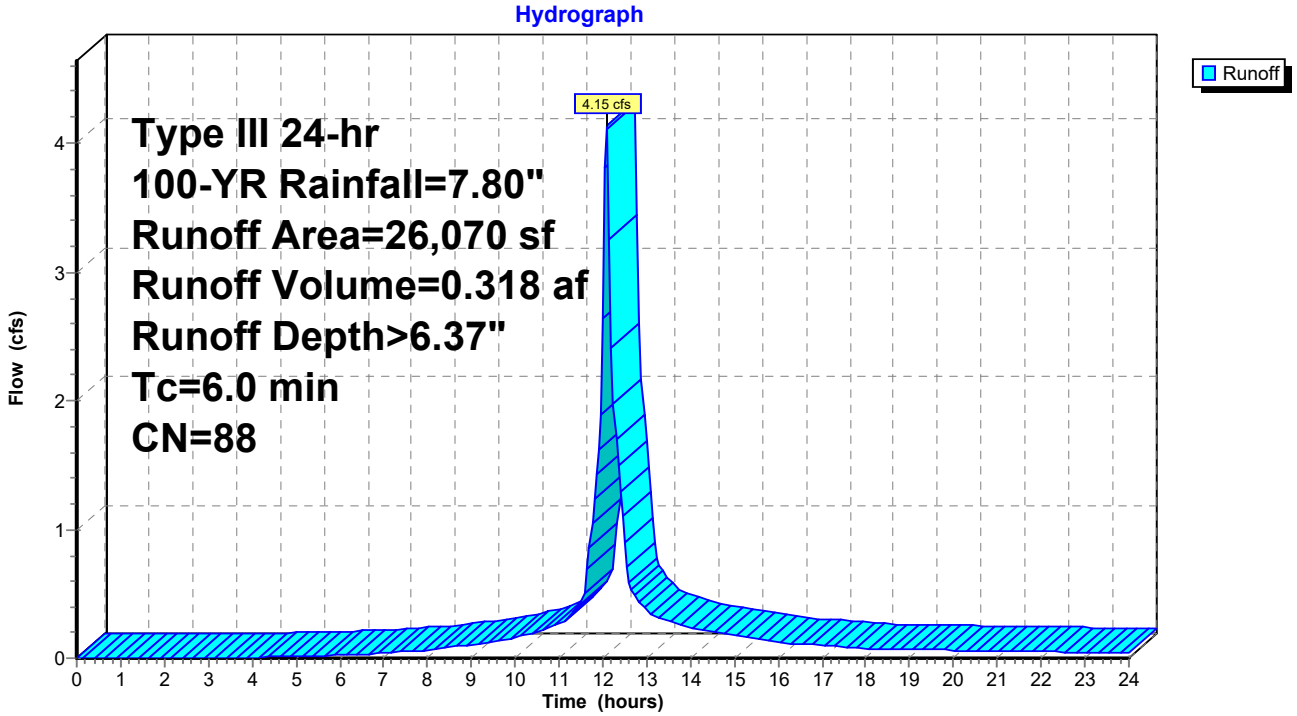
Runoff = 4.15 cfs @ 12.09 hrs, Volume= 0.318 af, Depth> 6.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=7.80"

Area (sf)	CN	Description
18,472	98	Paved parking, HSG B
1,202	74	>75% Grass cover, Good, HSG C
6,396	61	>75% Grass cover, Good, HSG B
26,070	88	Weighted Average
7,598		29.14% Pervious Area
18,472		70.86% Impervious Area

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

Subcatchment 3F: PDA-3F



Summary for Subcatchment 3G: PDA-3G

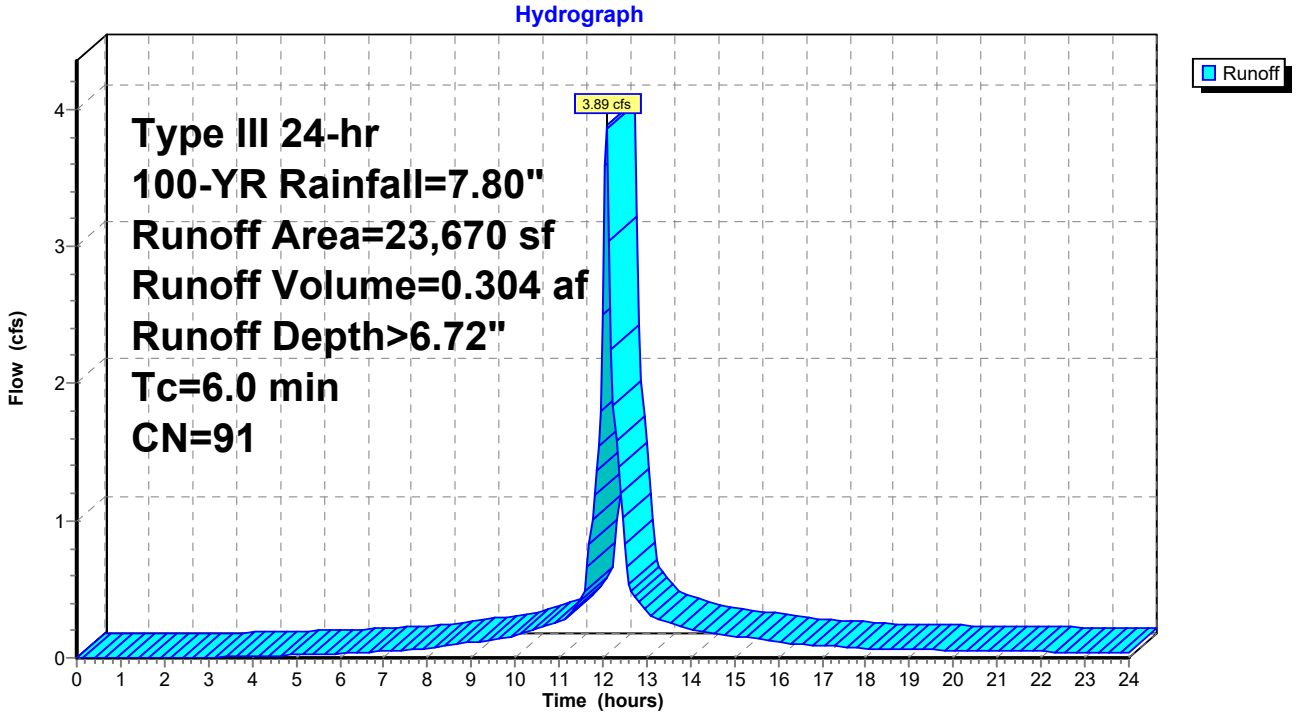
Runoff = 3.89 cfs @ 12.09 hrs, Volume= 0.304 af, Depth> 6.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=7.80"

Area (sf)	CN	Description
13,660	98	Roofs, HSG B
892	74	>75% Grass cover, Good, HSG C
4,113	61	>75% Grass cover, Good, HSG B
5,005	98	Unconnected pavement, HSG B
23,670	91	Weighted Average
5,005		21.14% Pervious Area
18,665		78.86% Impervious Area
5,005		26.81% Unconnected

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

Subcatchment 3G: PDA-3G



Summary for Subcatchment PD-2: PDA-2

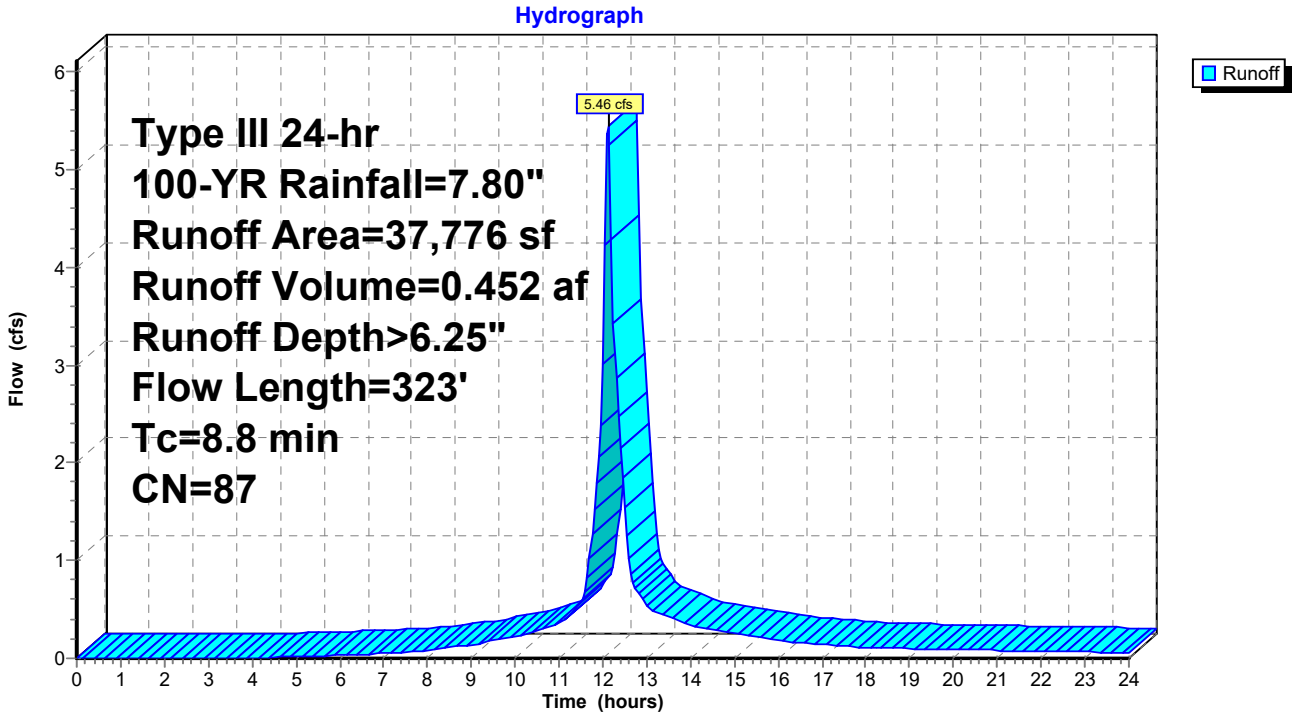
Runoff = 5.46 cfs @ 12.12 hrs, Volume= 0.452 af, Depth> 6.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=7.80"

Area (sf)	CN	Description
4,628	74	>75% Grass cover, Good, HSG C
23,547	98	Paved parking, HSG D
3,336	55	Woods, Good, HSG B
6,265	70	Woods, Good, HSG C
37,776	87	Weighted Average
14,229		37.67% Pervious Area
23,547		62.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.3	50	0.0100	0.11		**Sheet Flow, 2A-2B** Grass: Short n= 0.150 P2= 3.32"
0.1	34	0.0500	4.54		**Shallow Concentrated Flow, 2B-2C** Paved Kv= 20.3 fps
0.1	19	0.1450	2.67		**Shallow Concentrated Flow, 2C-2D** Short Grass Pasture Kv= 7.0 fps
1.3	220	0.0185	2.76		**Shallow Concentrated Flow, 2D-ED2** Paved Kv= 20.3 fps
8.8	323	Total			

Subcatchment PD-2: PDA-2

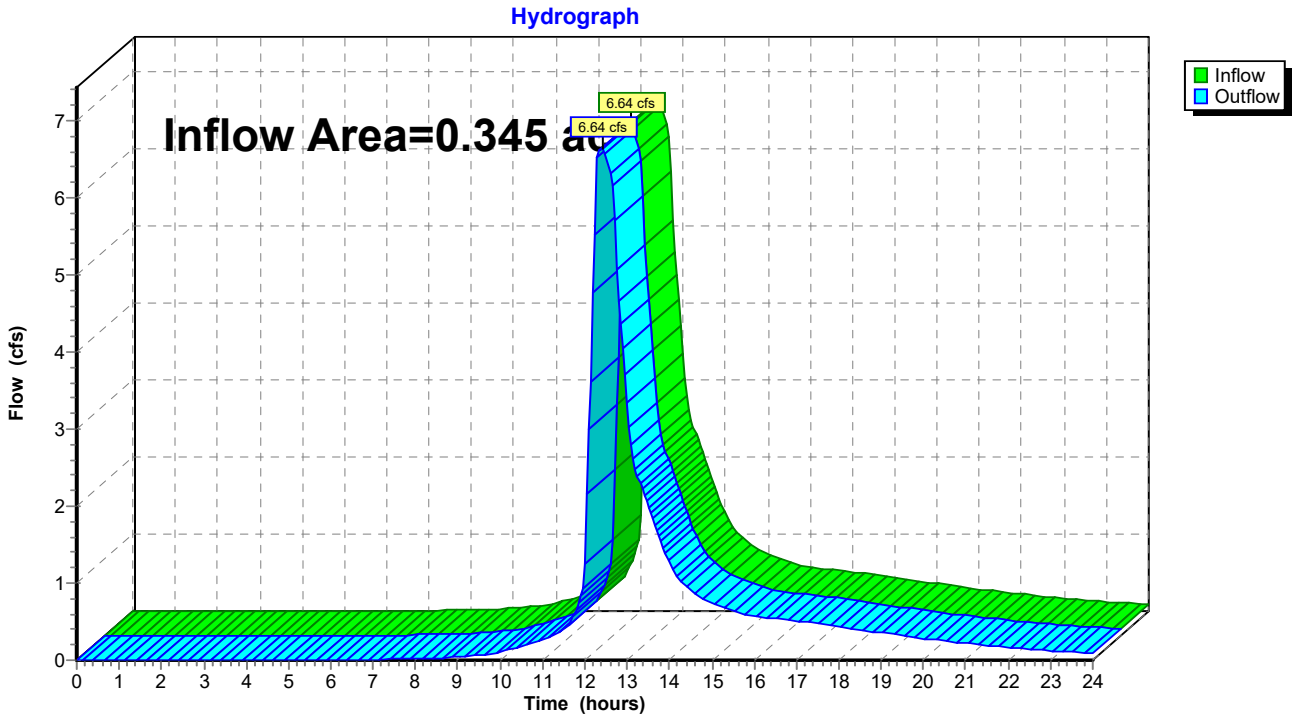


Summary for Reach DP-1: DP-1

Inflow Area = 0.345 ac, 41.65% Impervious, Inflow Depth > 34.26" for 100-YR event
Inflow = 6.64 cfs @ 12.40 hrs, Volume= 0.984 af
Outflow = 6.64 cfs @ 12.40 hrs, Volume= 0.984 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach DP-1: DP-1

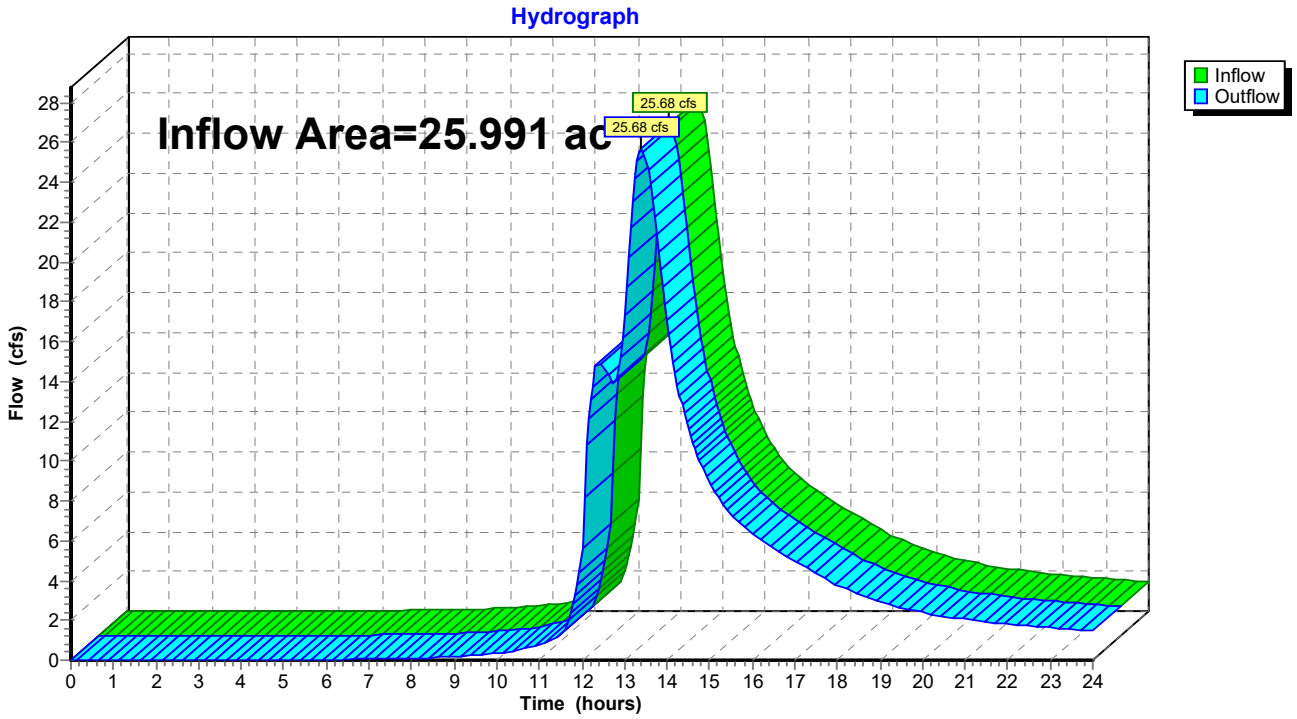


Summary for Reach DP-2: DP-2

Inflow Area = 25.991 ac, 24.71% Impervious, Inflow Depth > 3.12" for 100-YR event
Inflow = 25.68 cfs @ 13.40 hrs, Volume= 6.768 af
Outflow = 25.68 cfs @ 13.40 hrs, Volume= 6.768 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach DP-2: DP-2



Summary for Reach DP-3: DP-3

Inflow Area = 24.780 ac, 23.15% Impervious, Inflow Depth > 2.63" for 100-YR event
Inflow = 25.34 cfs @ 13.23 hrs, Volume= 5.425 af
Outflow = 23.12 cfs @ 13.42 hrs, Volume= 5.332 af, Atten= 9%, Lag= 11.5 min

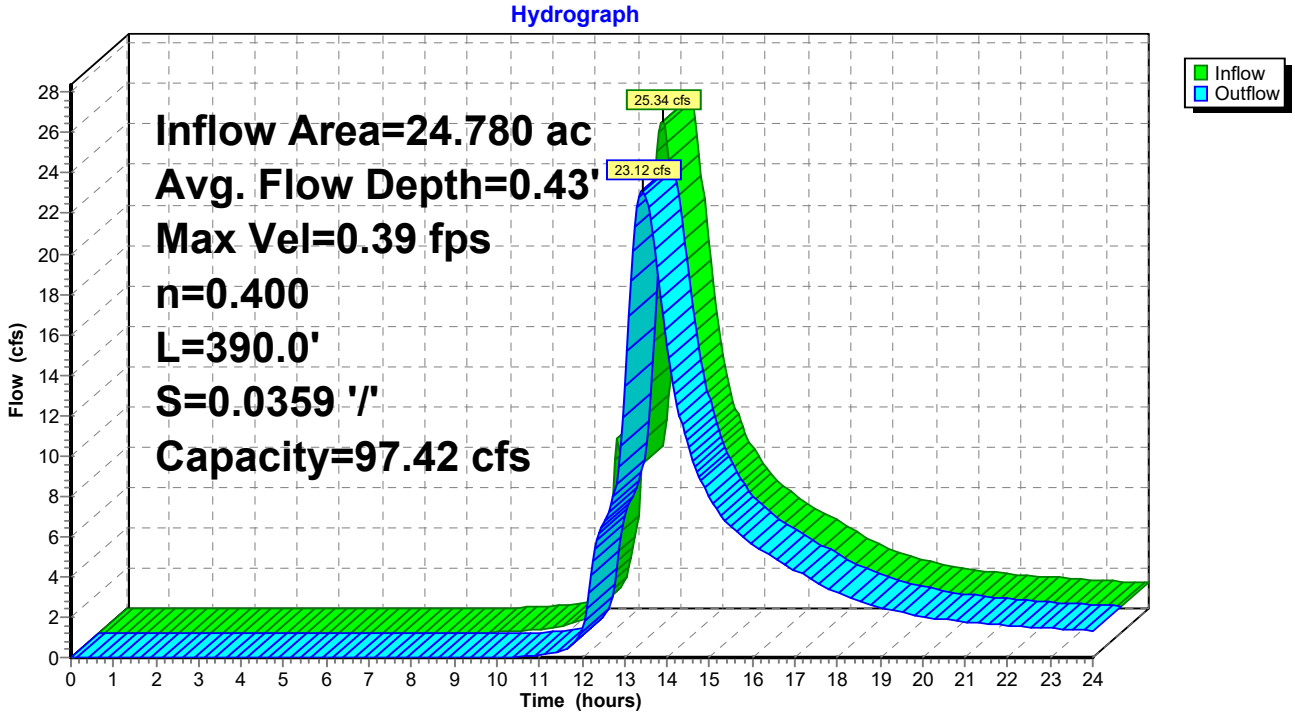
Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 0.39 fps, Min. Travel Time= 16.9 min
Avg. Velocity = 0.16 fps, Avg. Travel Time= 40.6 min

Peak Storage= 23,402 cf @ 13.42 hrs
Average Depth at Peak Storage= 0.43'
Bank-Full Depth= 1.00' Flow Area= 151.0 sf, Capacity= 97.42 cfs

130.00' x 1.00' deep channel, n= 0.400 Sheet flow: Woods+light brush
Side Slope Z-value= 12.0 30.0 '/' Top Width= 172.00'
Length= 390.0' Slope= 0.0359 '/'
Inlet Invert= 618.00', Outlet Invert= 604.00'

‡

Reach DP-3: DP-3



Stage-Discharge for Reach DP-3: DP-3

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
618.00	0.00	0.00
618.01	0.03	0.04
618.02	0.05	0.13
618.03	0.07	0.27
618.04	0.08	0.43
618.05	0.10	0.62
618.06	0.11	0.84
618.07	0.12	1.09
618.08	0.13	1.37
618.09	0.14	1.66
618.10	0.15	1.98
618.11	0.16	2.32
618.12	0.17	2.69
618.13	0.18	3.07
618.14	0.19	3.48
618.15	0.20	3.91
618.16	0.20	4.35
618.17	0.21	4.82
618.18	0.22	5.30
618.19	0.23	5.81
618.20	0.24	6.33
618.21	0.24	6.87
618.22	0.25	7.43
618.23	0.26	8.00
618.24	0.27	8.60
618.25	0.27	9.21
618.26	0.28	9.84
618.27	0.29	10.48
618.28	0.29	11.14
618.29	0.30	11.82
618.30	0.31	12.51
618.31	0.31	13.23
618.32	0.32	13.95
618.33	0.33	14.70
618.34	0.33	15.45
618.35	0.34	16.23
618.36	0.34	17.02
618.37	0.35	17.83
618.38	0.36	18.65
618.39	0.36	19.48
618.40	0.37	20.34
618.41	0.37	21.20
618.42	0.38	22.09
618.43	0.38	22.99
618.44	0.39	23.90
618.45	0.40	24.83
618.46	0.40	25.77
618.47	0.41	26.72
618.48	0.41	27.70
618.49	0.42	28.68
618.50	0.42	29.68
618.51	0.43	30.70
618.52	0.43	31.73
618.53	0.44	32.77
618.54	0.44	33.83
618.55	0.45	34.91
618.56	0.45	35.99
618.57	0.46	37.09
618.58	0.46	38.21
618.59	0.47	39.34
618.60	0.47	40.48
618.61	0.48	41.64
618.62	0.48	42.81
618.63	0.49	44.00
618.64	0.49	45.20
618.65	0.50	46.41
618.66	0.50	47.64
618.67	0.51	48.88
618.68	0.51	50.14
618.69	0.52	51.40
618.70	0.52	52.69
618.71	0.52	53.98
618.72	0.53	55.29
618.73	0.53	56.62
618.74	0.54	57.95
618.75	0.54	59.30
618.76	0.55	60.67
618.77	0.55	62.05
618.78	0.56	63.44
618.79	0.56	64.84
618.80	0.56	66.26
618.81	0.57	67.69
618.82	0.57	69.14
618.83	0.58	70.59
618.84	0.58	72.07
618.85	0.59	73.55
618.86	0.59	75.05
618.87	0.59	76.56
618.88	0.60	78.09
618.89	0.60	79.63
618.90	0.61	81.18
618.91	0.61	82.74
618.92	0.61	84.32
618.93	0.62	85.91
618.94	0.62	87.52
618.95	0.63	89.14
618.96	0.63	90.77
618.97	0.63	92.41
618.98	0.64	94.07
618.99	0.64	95.74
619.00	**0.65**	**97.42**

Summary for Pond 1: SFB-1

Inflow Area = 0.966 ac, 48.65% Impervious, Inflow Depth > 6.06" for 100-YR event
Inflow = 2.42 cfs @ 12.10 hrs, Volume= 0.488 af
Outflow = 1.33 cfs @ 12.49 hrs, Volume= 0.443 af, Atten= 45%, Lag= 23.3 min
Discarded = 0.12 cfs @ 12.49 hrs, Volume= 0.142 af
Primary = 1.21 cfs @ 12.49 hrs, Volume= 0.302 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 610.23' @ 12.49 hrs Surf.Area= 2,891 sf Storage= 4,653 cf
Flood Elev= 611.25' Surf.Area= 3,452 sf Storage= 7,739 cf

Plug-Flow detention time= 116.5 min calculated for 0.443 af (91% of inflow)
Center-of-Mass det. time= 73.9 min (895.4 - 821.4)

Volume	Invert	Avail.Storage	Storage Description
#1	607.00'	7,237 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 8,986 cf Overall - 1,749 cf Embedded = 7,237 cf
#2	607.00'	385 cf	**Sand Media (Prismatic)** Listed below (Recalc) Inside #1 1,166 cf Overall x 33.0% Voids
#3	608.00'	117 cf	**Infiltration Seed Mix (Prismatic)** Listed below (Recalc) Inside #1 583 cf Overall x 20.0% Voids
		7,739 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
607.00	1,166	0	0
608.00	1,166	1,166	1,166
609.00	2,130	1,648	2,814
610.00	2,760	2,445	5,259
611.20	3,452	3,727	8,986

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
607.00	1,166	0	0
608.00	1,166	1,166	1,166

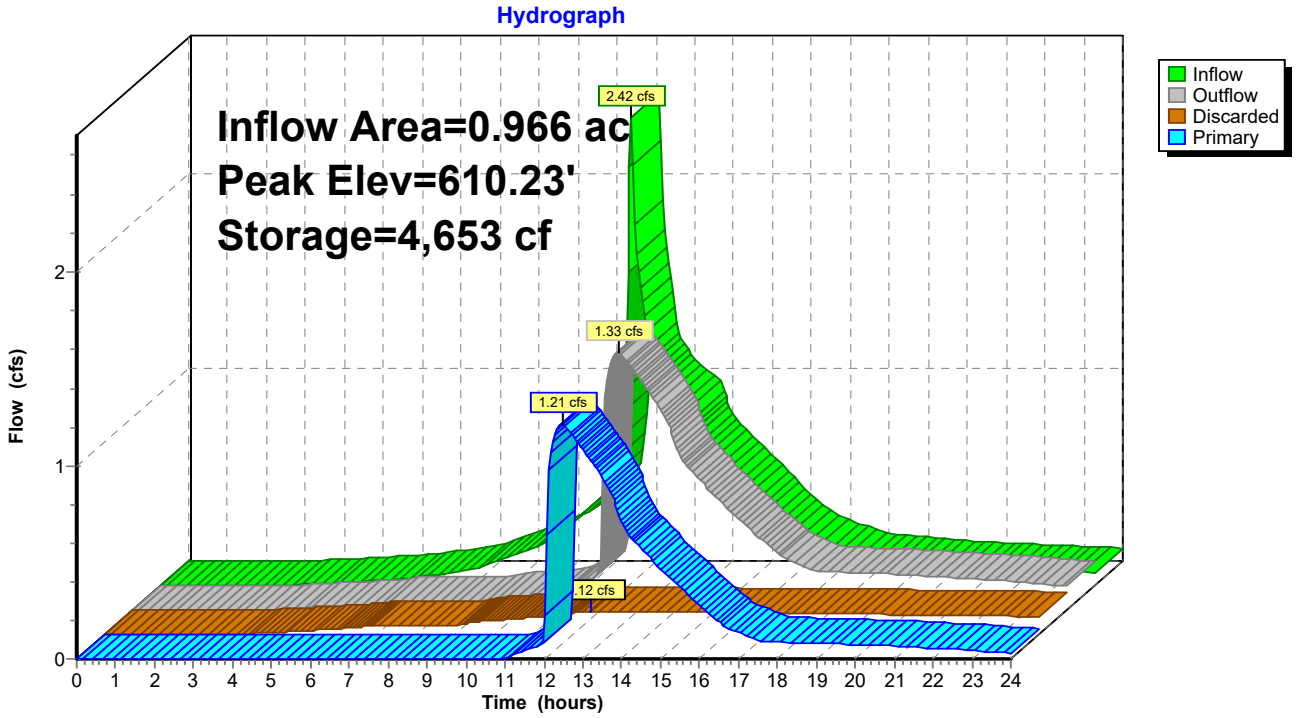
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
608.00	1,166	0	0
608.50	1,166	583	583

Device	Routing	Invert	Outlet Devices
#1	Discarded	607.00'	**1.805 in/hr Exfiltration over Surface area**
#2	Primary	607.50'	**8.0" Round Culvert** L= 20.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 607.50' / 607.00' S= 0.0250 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.35 sf
#3	Device 2	609.00'	**2.0" Vert. Orifice/Grate** C= 0.600
#4	Device 2	609.80'	**8.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.12 cfs @ 12.49 hrs HW=610.23' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.12 cfs)

Primary OutFlow Max=1.21 cfs @ 12.49 hrs HW=610.23' (Free Discharge)
└─**2=Culvert** (Passes 1.21 cfs of 2.05 cfs potential flow)
  ├─**3=Orifice/Grate** (Orifice Controls 0.11 cfs @ 5.15 fps)
  └─**4=Orifice/Grate** (Orifice Controls 1.10 cfs @ 3.15 fps)

Pond 1: SFB-1



Stage-Discharge for Pond 1: SFB-1

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
607.00	0.00	0.00	0.00
607.05	0.05	0.05	0.00
607.10	0.05	0.05	0.00
607.15	0.05	0.05	0.00
607.20	0.05	0.05	0.00
607.25	0.05	0.05	0.00
607.30	0.05	0.05	0.00
607.35	0.05	0.05	0.00
607.40	0.05	0.05	0.00
607.45	0.05	0.05	0.00
607.50	0.05	0.05	0.00
607.55	0.05	0.05	0.00
607.60	0.05	0.05	0.00
607.65	0.05	0.05	0.00
607.70	0.05	0.05	0.00
607.75	0.05	0.05	0.00
607.80	0.05	0.05	0.00
607.85	0.05	0.05	0.00
607.90	0.05	0.05	0.00
607.95	0.05	0.05	0.00
608.00	0.05	0.05	0.00
608.05	0.05	0.05	0.00
608.10	0.05	0.05	0.00
608.15	0.05	0.05	0.00
608.20	0.06	0.06	0.00
608.25	0.06	0.06	0.00
608.30	0.06	0.06	0.00
608.35	0.06	0.06	0.00
608.40	0.06	0.06	0.00
608.45	0.07	0.07	0.00
608.50	0.07	0.07	0.00
608.55	0.07	0.07	0.00
608.60	0.07	0.07	0.00
608.65	0.07	0.07	0.00
608.70	0.08	0.08	0.00
608.75	0.08	0.08	0.00
608.80	0.08	0.08	0.00
608.85	0.08	0.08	0.00
608.90	0.08	0.08	0.00
608.95	0.09	0.09	0.00
609.00	0.09	0.09	0.00
609.05	0.09	0.09	0.00
609.10	0.11	0.09	0.01
609.15	0.12	0.09	0.03
609.20	0.13	0.09	0.04
609.25	0.14	0.10	0.04
609.30	0.15	0.10	0.05
609.35	0.15	0.10	0.05
609.40	0.16	0.10	0.06
609.45	0.16	0.10	0.06
609.50	0.17	0.10	0.07
609.55	0.18	0.10	0.07
609.60	0.18	0.10	0.08
609.65	0.19	0.11	0.08
609.70	0.19	0.11	0.08
609.75	0.19	0.11	0.09
609.80	0.20	0.11	0.09
609.85	0.28	0.11	0.17
609.90	0.42	0.11	0.31
609.95	0.61	0.11	0.50
610.00	0.83	0.12	0.71
610.05	1.06	0.12	0.94
610.10	1.14	0.12	1.03
610.15	1.22	0.12	1.10
610.20	1.29	0.12	1.17
610.25	1.36	0.12	1.24
610.30	1.43	0.12	1.30
610.35	1.49	0.12	1.36
610.40	1.55	0.12	1.42
610.45	1.60	0.13	1.48
610.50	1.66	0.13	1.53
610.55	1.71	0.13	1.58
610.60	1.76	0.13	1.63
610.65	1.81	0.13	1.68
610.70	1.86	0.13	1.73
610.75	1.91	0.13	1.77
610.80	1.95	0.13	1.82
610.85	2.00	0.14	1.86
610.90	2.04	0.14	1.90
610.95	2.08	0.14	1.95
611.00	2.13	0.14	1.99
611.05	2.17	0.14	2.03
611.10	2.21	0.14	2.07
611.15	2.25	0.14	2.10
611.20	2.29	**0.14**	2.14
611.25	**2.32**	0.14	**2.18**

Summary for Pond 2: SFB-2

Inflow Area = 4.230 ac, 47.33% Impervious, Inflow Depth > 2.86" for 100-YR event
Inflow = 4.14 cfs @ 12.09 hrs, Volume= 1.009 af
Outflow = 1.15 cfs @ 14.20 hrs, Volume= 0.831 af, Atten= 72%, Lag= 126.1 min
Discarded = 0.45 cfs @ 14.20 hrs, Volume= 0.509 af
Primary = 0.70 cfs @ 14.20 hrs, Volume= 0.322 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 616.39' @ 14.20 hrs Surf.Area= 8,117 sf Storage= 12,752 cf
Flood Elev= 617.40' Surf.Area= 10,100 sf Storage= 21,942 cf

Plug-Flow detention time= 176.3 min calculated for 0.831 af (82% of inflow)
Center-of-Mass det. time= 95.9 min (970.7 - 874.8)

Volume	Invert	Avail.Storage	Storage Description
#1	613.25'	20,246 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 26,162 cf Overall - 5,916 cf Embedded = 20,246 cf
#2	613.25'	1,302 cf	**Sand Media (Prismatic)** Listed below (Recalc) Inside #1 3,944 cf Overall x 33.0% Voids
#3	614.25'	394 cf	**Infiltration Seed Mix (Prismatic)** Listed below (Recalc) Inside #1 1,972 cf Overall x 20.0% Voids
		21,942 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
613.25	3,944	0	0
614.25	3,944	3,944	3,944
615.00	5,539	3,556	7,500
616.00	7,378	6,459	13,959
617.00	9,278	8,328	22,287
617.40	10,100	3,876	26,162

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
613.25	3,944	0	0
614.25	3,944	3,944	3,944

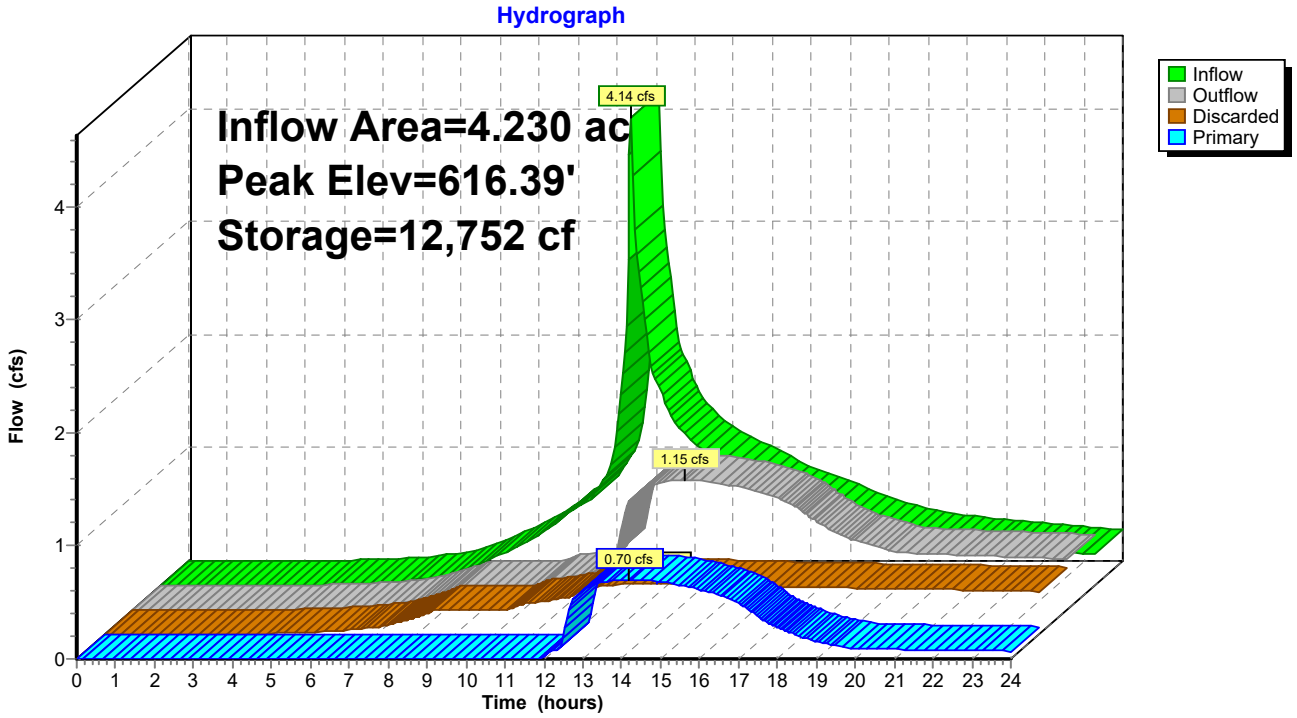
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
614.25	3,944	0	0
614.75	3,944	1,972	1,972

Device	Routing	Invert	Outlet Devices
#1	Discarded	613.25'	**2.380 in/hr Exfiltration over Surface area**
#2	Primary	613.75'	**8.0" Round Culvert** L= 28.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 613.75' / 612.25' S= 0.0536 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.35 sf
#3	Device 2	615.20'	**2.0" Vert. Orifice/Grate** C= 0.600
#4	Device 2	616.00'	**6.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.45 cfs @ 14.20 hrs HW=616.39' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.45 cfs)

Primary OutFlow Max=0.70 cfs @ 14.20 hrs HW=616.39' (Free Discharge)
└─**2=Culvert** (Passes 0.70 cfs of 2.01 cfs potential flow)
  ├─**3=Orifice/Grate** (Orifice Controls 0.11 cfs @ 5.06 fps)
  └─**4=Orifice/Grate** (Orifice Controls 0.59 cfs @ 3.00 fps)

Pond 2: SFB-2



Stage-Discharge for Pond 2: SFB-2

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
613.25	0.00	0.00	0.00
613.30	0.22	0.22	0.00
613.35	0.22	0.22	0.00
613.40	0.22	0.22	0.00
613.45	0.22	0.22	0.00
613.50	0.22	0.22	0.00
613.55	0.22	0.22	0.00
613.60	0.22	0.22	0.00
613.65	0.22	0.22	0.00
613.70	0.22	0.22	0.00
613.75	0.22	0.22	0.00
613.80	0.22	0.22	0.00
613.85	0.22	0.22	0.00
613.90	0.22	0.22	0.00
613.95	0.22	0.22	0.00
614.00	0.22	0.22	0.00
614.05	0.22	0.22	0.00
614.10	0.22	0.22	0.00
614.15	0.22	0.22	0.00
614.20	0.22	0.22	0.00
614.25	0.22	0.22	0.00
614.30	0.22	0.22	0.00
614.35	0.23	0.23	0.00
614.40	0.23	0.23	0.00
614.45	0.24	0.24	0.00
614.50	0.25	0.25	0.00
614.55	0.25	0.25	0.00
614.60	0.26	0.26	0.00
614.65	0.26	0.26	0.00
614.70	0.27	0.27	0.00
614.75	0.28	0.28	0.00
614.80	0.28	0.28	0.00
614.85	0.29	0.29	0.00
614.90	0.29	0.29	0.00
614.95	0.30	0.30	0.00
615.00	0.31	0.31	0.00
615.05	0.31	0.31	0.00
615.10	0.32	0.32	0.00
615.15	0.32	0.32	0.00
615.20	0.33	0.33	0.00
615.25	0.33	0.33	0.00
615.30	0.35	0.34	0.01
615.35	0.37	0.34	0.03
615.40	0.38	0.35	0.04
615.45	0.39	0.35	0.04
615.50	0.40	0.36	0.05
615.55	0.42	0.36	0.05
615.60	0.43	0.37	0.06
615.65	0.43	0.37	0.06
615.70	0.44	0.38	0.07
615.75	0.45	0.38	0.07
615.80	0.46	0.39	0.08
615.85	0.47	0.39	0.08
615.90	0.48	0.40	0.08
615.95	0.49	0.40	0.09
616.00	0.50	0.41	0.09
616.05	0.56	0.41	0.15
616.10	0.67	0.42	0.26
616.15	0.82	0.42	0.40
616.20	0.95	0.43	0.52
616.25	1.01	0.43	0.58
616.30	1.06	0.44	0.62
616.35	1.11	0.44	0.67
616.40	1.16	0.45	0.71
616.45	1.20	0.45	0.75
616.50	1.24	0.46	0.78
616.55	1.28	0.46	0.82
616.60	1.32	0.47	0.85
616.65	1.36	0.47	0.89
616.70	1.40	0.48	0.92
616.75	1.43	0.48	0.95
616.80	1.47	0.49	0.97
616.85	1.50	0.50	1.00
616.90	1.53	0.50	1.03
616.95	1.56	0.51	1.06
617.00	1.59	0.51	1.08
617.05	1.63	0.52	1.11
617.10	1.66	0.52	1.13
617.15	1.69	0.53	1.16
617.20	1.71	0.53	1.18
617.25	1.74	0.54	1.20
617.30	1.77	0.55	1.23
617.35	1.80	0.55	1.25
617.40	**1.83**	**0.56**	**1.27**

Summary for Pond DB-1: DB-1

Inflow	=	4.48 cfs @	12.09 hrs,	Volume=	0.157 af
Outflow	=	0.62 cfs @	12.52 hrs,	Volume=	0.154 af, Atten= 86%, Lag= 26.2 min
Primary	=	0.62 cfs @	12.52 hrs,	Volume=	0.154 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 611.13' @ 12.52 hrs Surf.Area= 3,131 sf Storage= 5,021 cf
Flood Elev= 611.25' Surf.Area= 3,131 sf Storage= 5,328 cf

Plug-Flow detention time= 110.2 min calculated for 0.154 af (98% of inflow)
Center-of-Mass det. time= 109.1 min (836.7 - 727.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	609.25'	0 cf	**27.58'W x 113.50'L x 2.67'H Field A** 8,349 cf Overall - 8,349 cf Embedded = 0 cf x 40.0% Voids
#2A	609.25'	5,328 cf	**StormTrap ST1 SingleTrap 2-0** x 32 Inside #1 Inside= 82.7"W x 24.0"H => 11.84 sf x 14.06'L = 166.5 cf Outside= 82.7"W x 32.0"H => 18.39 sf x 14.06'L = 258.6 cf 4 Rows of 8 Chambers 27.58' x 112.50' Core + 0.00' x 0.50' Border = 27.58' x 113.50' System
		5,328 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	609.25'	**6.0" Round Culvert** L= 150.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 609.25' / 608.50' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#2	Device 1	609.25'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	610.25'	**4.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.62 cfs @ 12.52 hrs HW=611.13' (Free Discharge)
└─**1=Culvert** (Barrel Controls 0.62 cfs @ 3.16 fps)
  ├─**2=Orifice/Grate** (Passes < 0.55 cfs potential flow)
  └─**3=Orifice/Grate** (Passes < 0.36 cfs potential flow)

Pond DB-1: DB-1 - Chamber Wizard Field A

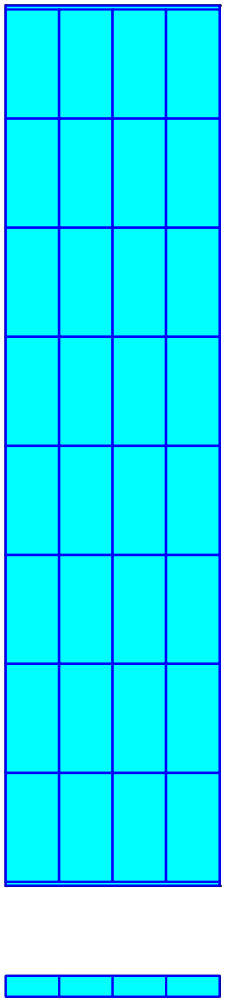
Chamber Model = StormTrap ST1 SingleTrap 2-0 (StormTrap ST1 SingleTrap® Type VI)
Inside= 82.7"W x 24.0"H => 11.84 sf x 14.06'L = 166.5 cf
Outside= 82.7"W x 32.0"H => 18.39 sf x 14.06'L = 258.6 cf

8 Chambers/Row x 14.06' Long = 112.50' Row Length +6.0" Border x 2 = 113.50' Base Length
4 Rows x 82.7" Wide = 27.58' Base Width
32.0" Chamber Height = 2.67' Field Height

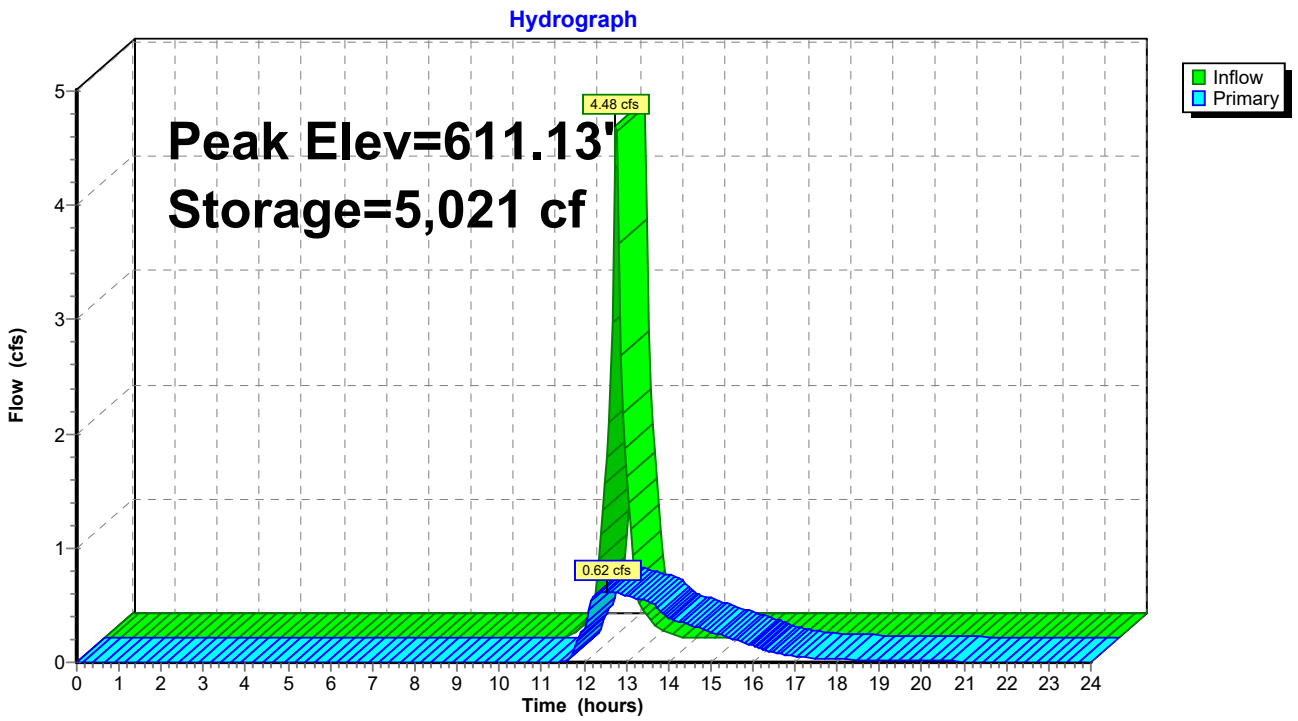
32 Chambers x 166.5 cf = 5,328.0 cf Chamber Storage
32 Chambers x 258.6 cf + 73.6 cf Border = 8,348.6 cf Displacement

Chamber Storage = 5,328.0 cf = 0.122 af
Overall Storage Efficiency = 63.8%
Overall System Size = 113.50' x 27.58' x 2.67'

32 Chambers (plus border)
309.2 cy Field



Pond DB-1: DB-1


Hydrograph
Peak Elev=611.13'
Storage=5,021 cf
4.48 cfs
0.62 cfs
Inflow
Primary
Flow (cfs)
Time (hours)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24

Stage-Discharge for Pond DB-1: DB-1

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
609.25	0.00	610.29	0.40	611.33	0.65
609.27	0.00	610.31	0.41	611.35	0.65
609.29	0.00	610.33	0.42	611.37	0.65
609.31	0.01	610.35	0.43	611.39	0.66
609.33	0.01	610.37	0.44	611.41	0.66
609.35	0.02	610.39	0.46	611.43	0.66
609.37	0.03	610.41	0.48	611.45	0.66
609.39	0.04	610.43	0.49	611.47	0.67
609.41	0.05	610.45	0.51	611.49	0.67
609.43	0.06	610.47	0.51	611.51	0.67
609.45	0.08	610.49	0.52	611.53	0.68
609.47	0.09	610.51	0.52	611.55	0.68
609.49	0.11	610.53	0.53	611.57	0.68
609.51	0.13	610.55	0.53	611.59	0.68
609.53	0.14	610.57	0.53	611.61	0.69
609.55	0.15	610.59	0.54	611.63	0.69
609.57	0.17	610.61	0.54	611.65	0.69
609.59	0.17	610.63	0.54	611.67	0.69
609.61	0.18	610.65	0.55	611.69	0.70
609.63	0.19	610.67	0.55	611.71	0.70
609.65	0.20	610.69	0.55	611.73	0.70
609.67	0.21	610.71	0.56	611.75	0.70
609.69	0.22	610.73	0.56	611.77	0.71
609.71	0.23	610.75	0.56	611.79	0.71
609.73	0.24	610.77	0.57	611.81	0.71
609.75	0.24	610.79	0.57	611.83	0.71
609.77	0.25	610.81	0.57	611.85	0.72
609.79	0.26	610.83	0.57	611.87	0.72
609.81	0.26	610.85	0.58	611.89	0.72
609.83	0.27	610.87	0.58	611.91	**0.72**
609.85	0.28	610.89	0.58		
609.87	0.28	610.91	0.59		
609.89	0.29	610.93	0.59		
609.91	0.30	610.95	0.59		
609.93	0.30	610.97	0.60		
609.95	0.31	610.99	0.60		
609.97	0.31	611.01	0.60		
609.99	0.32	611.03	0.61		
610.01	0.32	611.05	0.61		
610.03	0.33	611.07	0.61		
610.05	0.33	611.09	0.61		
610.07	0.34	611.11	0.62		
610.09	0.34	611.13	0.62		
610.11	0.35	611.15	0.62		
610.13	0.35	611.17	0.63		
610.15	0.36	611.19	0.63		
610.17	0.36	611.21	0.63		
610.19	0.37	611.23	0.63		
610.21	0.37	611.25	0.64		
610.23	0.38	611.27	0.64		
610.25	0.38	611.29	0.64		
610.27	0.39	611.31	0.65		

Summary for Pond DB-2: DB-2

Inflow	=	3.65 cfs @	12.09 hrs,	Volume=	0.119 af
Outflow	=	0.14 cfs @	12.77 hrs,	Volume=	0.098 af, Atten= 96%, Lag= 40.7 min
Primary	=	0.14 cfs @	12.77 hrs,	Volume=	0.098 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 616.99' @ 12.77 hrs Surf.Area= 3,131 sf Storage= 4,645 cf
Flood Elev= 617.25' Surf.Area= 3,131 sf Storage= 5,328 cf

Plug-Flow detention time= 303.6 min calculated for 0.098 af (82% of inflow)
Center-of-Mass det. time= 298.8 min (1,026.2 - 727.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	615.25'	0 cf	**27.58'W x 113.50'L x 2.67'H Field A** 8,349 cf Overall - 8,349 cf Embedded = 0 cf x 40.0% Voids
#2A	615.25'	5,328 cf	**StormTrap ST1 SingleTrap 2-0** x 32 Inside #1 Inside= 82.7"W x 24.0"H => 11.84 sf x 14.06'L = 166.5 cf Outside= 82.7"W x 32.0"H => 18.39 sf x 14.06'L = 258.6 cf 4 Rows of 8 Chambers 27.58' x 112.50' Core + 0.00' x 0.50' Border = 27.58' x 113.50' System
		5,328 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	615.25'	**8.0" Round Culvert** L= 44.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 615.25' / 615.00' S= 0.0057 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.35 sf
#2	Device 1	615.25'	**2.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.14 cfs @ 12.77 hrs HW=616.99' (Free Discharge)
└─**1=Culvert** (Passes 0.14 cfs of 1.58 cfs potential flow)
  └─**2=Orifice/Grate** (Orifice Controls 0.14 cfs @ 6.20 fps)

Pond DB-2: DB-2 - Chamber Wizard Field A

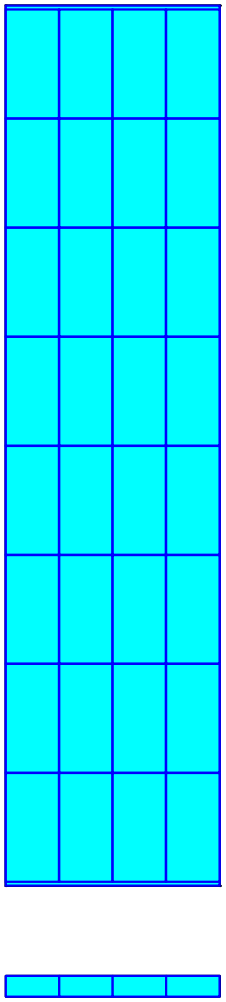
Chamber Model = StormTrap ST1 SingleTrap 2-0 (StormTrap ST1 SingleTrap® Type VI)
Inside= 82.7"W x 24.0"H => 11.84 sf x 14.06'L = 166.5 cf
Outside= 82.7"W x 32.0"H => 18.39 sf x 14.06'L = 258.6 cf

8 Chambers/Row x 14.06' Long = 112.50' Row Length +6.0" Border x 2 = 113.50' Base Length
4 Rows x 82.7" Wide = 27.58' Base Width
32.0" Chamber Height = 2.67' Field Height

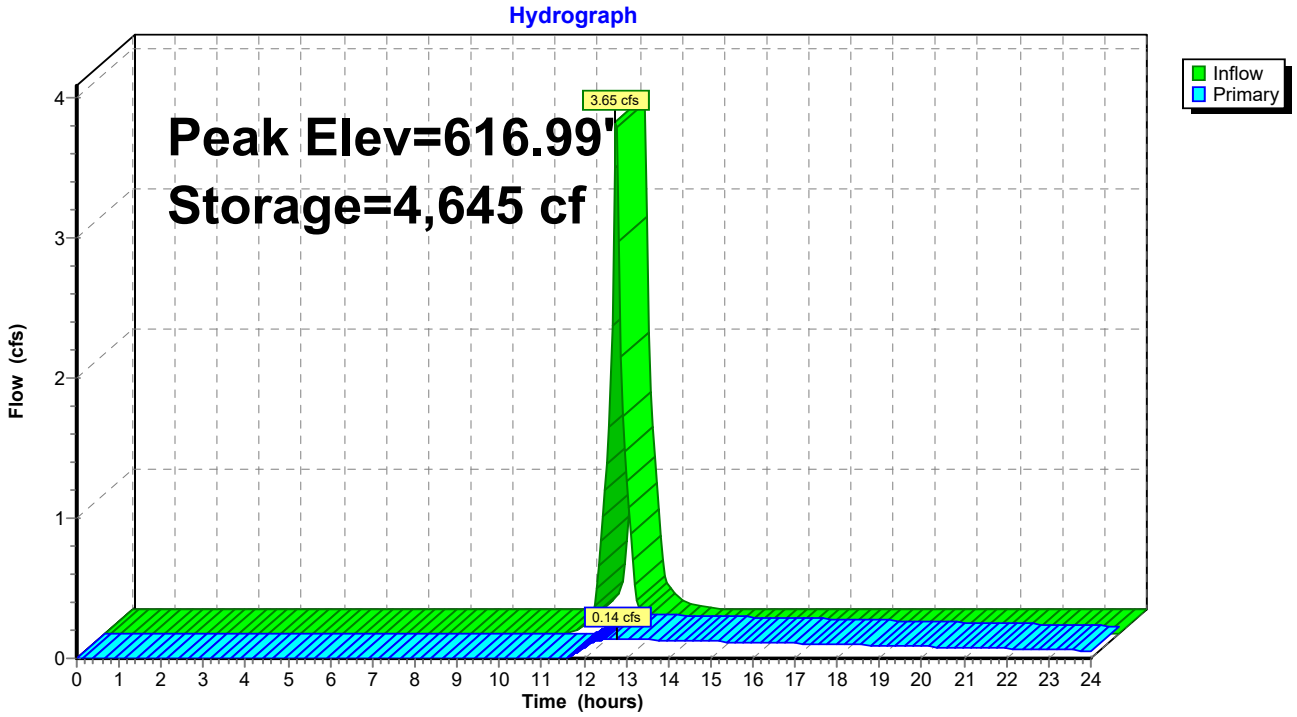
32 Chambers x 166.5 cf = 5,328.0 cf Chamber Storage
32 Chambers x 258.6 cf + 73.6 cf Border = 8,348.6 cf Displacement

Chamber Storage = 5,328.0 cf = 0.122 af
Overall Storage Efficiency = 63.8%
Overall System Size = 113.50' x 27.58' x 2.67'

32 Chambers (plus border)
309.2 cy Field



Pond DB-2: DB-2


Hydrograph
Inflow
Primary
3.65 cfs
0.14 cfs
Peak Elev=616.99'
Storage=4,645 cf
Flow (cfs)
Time (hours)
0
1
2
3
4
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

Stage-Discharge for Pond DB-2: DB-2

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
615.25	0.00	616.29	0.10	617.33	0.15
615.27	0.00	616.31	0.10	617.35	0.15
615.29	0.00	616.33	0.10	617.37	0.15
615.31	0.01	616.35	0.11	617.39	0.15
615.33	0.01	616.37	0.11	617.41	0.15
615.35	0.01	616.39	0.11	617.43	0.15
615.37	0.02	616.41	0.11	617.45	0.15
615.39	0.02	616.43	0.11	617.47	0.15
615.41	0.03	616.45	0.11	617.49	0.15
615.43	0.03	616.47	0.11	617.51	0.15
615.45	0.04	616.49	0.11	617.53	0.16
615.47	0.04	616.51	0.11	617.55	0.16
615.49	0.04	616.53	0.11	617.57	0.16
615.51	0.04	616.55	0.12	617.59	0.16
615.53	0.05	616.57	0.12	617.61	0.16
615.55	0.05	616.59	0.12	617.63	0.16
615.57	0.05	616.61	0.12	617.65	0.16
615.59	0.05	616.63	0.12	617.67	0.16
615.61	0.06	616.65	0.12	617.69	0.16
615.63	0.06	616.67	0.12	617.71	0.16
615.65	0.06	616.69	0.12	617.73	0.16
615.67	0.06	616.71	0.12	617.75	0.16
615.69	0.06	616.73	0.12	617.77	0.16
615.71	0.06	616.75	0.13	617.79	0.16
615.73	0.07	616.77	0.13	617.81	0.17
615.75	0.07	616.79	0.13	617.83	0.17
615.77	0.07	616.81	0.13	617.85	0.17
615.79	0.07	616.83	0.13	617.87	0.17
615.81	0.07	616.85	0.13	617.89	0.17
615.83	0.07	616.87	0.13	617.91	**0.17**
615.85	0.08	616.89	0.13		
615.87	0.08	616.91	0.13		
615.89	0.08	616.93	0.13		
615.91	0.08	616.95	0.13		
615.93	0.08	616.97	0.13		
615.95	0.08	616.99	0.14		
615.97	0.08	617.01	0.14		
615.99	0.09	617.03	0.14		
616.01	0.09	617.05	0.14		
616.03	0.09	617.07	0.14		
616.05	0.09	617.09	0.14		
616.07	0.09	617.11	0.14		
616.09	0.09	617.13	0.14		
616.11	0.09	617.15	0.14		
616.13	0.09	617.17	0.14		
616.15	0.09	617.19	0.14		
616.17	0.10	617.21	0.14		
616.19	0.10	617.23	0.14		
616.21	0.10	617.25	0.15		
616.23	0.10	617.27	0.15		
616.25	0.10	617.29	0.15		
616.27	0.10	617.31	0.15		

Summary for Pond DB-6: DB-6

Inflow Area = 0.133 ac,100.00% Impervious, Inflow Depth > 82.03" for 100-YR event
Inflow = 11.00 cfs @ 12.21 hrs, Volume= 0.912 af
Outflow = 6.25 cfs @ 12.47 hrs, Volume= 0.901 af, Atten= 43%, Lag= 15.4 min
Primary = 6.25 cfs @ 12.47 hrs, Volume= 0.901 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 617.13' @ 12.47 hrs Surf.Area= 2,902 sf Storage= 12,555 cf
Flood Elev= 617.25' Surf.Area= 2,902 sf Storage= 12,873 cf

Plug-Flow detention time= 70.2 min calculated for 0.899 af (99% of inflow)
Center-of-Mass det. time= 62.8 min (853.2 - 790.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	612.25'	0 cf	**38.75'W x 74.90'L x 5.50'H Field A** 15,962 cf Overall - 15,962 cf Embedded = 0 cf x 40.0% Voids
#2A	612.25'	12,873 cf	**StormTrap ST2 SingleTrap 5-0**x 12 Inside #1 Inside= 101.7"W x 60.0"H => 38.33 sf x 15.40'L = 590.2 cf Outside= 101.7"W x 66.0"H => 46.64 sf x 15.40'L = 718.0 cf 3 Rows of 4 Chambers 25.44' x 61.58' Core + 6.66' Border = 38.75' x 74.90' System
		12,873 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	612.25'	**12.0" Round Culvert** L= 110.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 612.25' / 609.60' S= 0.0241 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	612.25'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	614.00'	**8.0" Vert. Orifice/Grate** C= 0.600
#4	Device 1	615.25'	**8.0" Vert. Orifice/Grate** C= 0.600
#5	Device 1	616.25'	**12.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=6.24 cfs @ 12.47 hrs HW=617.12' (Free Discharge)
└─**1=Culvert** (Inlet Controls 6.24 cfs @ 7.95 fps)
  ├─**2=Orifice/Grate** (Passes < 0.91 cfs potential flow)
  ├─**3=Orifice/Grate** (Passes < 2.81 cfs potential flow)
  ├─**4=Orifice/Grate** (Passes < 2.08 cfs potential flow)
  └─**5=Orifice/Grate** (Passes < 2.30 cfs potential flow)

Pond DB-6: DB-6 - Chamber Wizard Field A

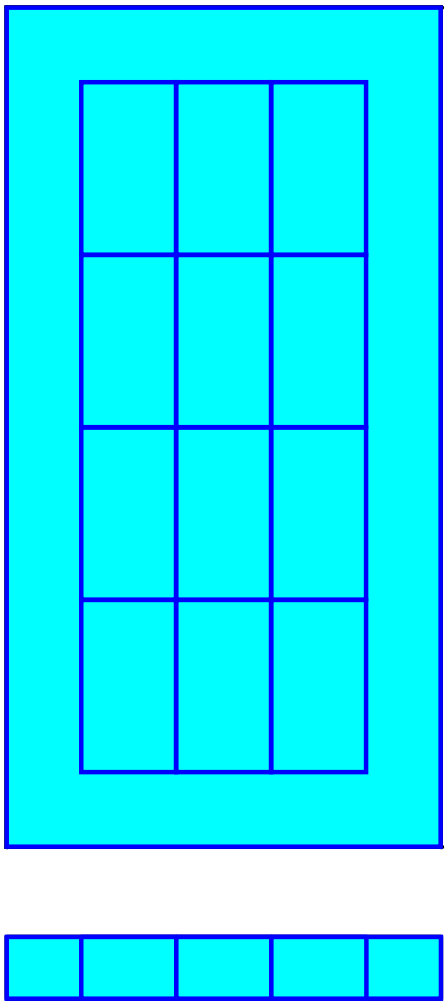
Chamber Model = StormTrap ST2 SingleTrap 5-0 (StormTrap ST2 SingleTrap® Type II+IV)
Inside= 101.7"W x 60.0"H => 38.33 sf x 15.40'L = 590.2 cf
Outside= 101.7"W x 66.0"H => 46.64 sf x 15.40'L = 718.0 cf

4 Chambers/Row x 15.40' Long = 61.58' Row Length +79.9" Border x 2 = 74.90' Base Length
3 Rows x 101.7" Wide + 79.9" Side Border x 2 = 38.75' Base Width
66.0" Chamber Height = 5.50' Field Height

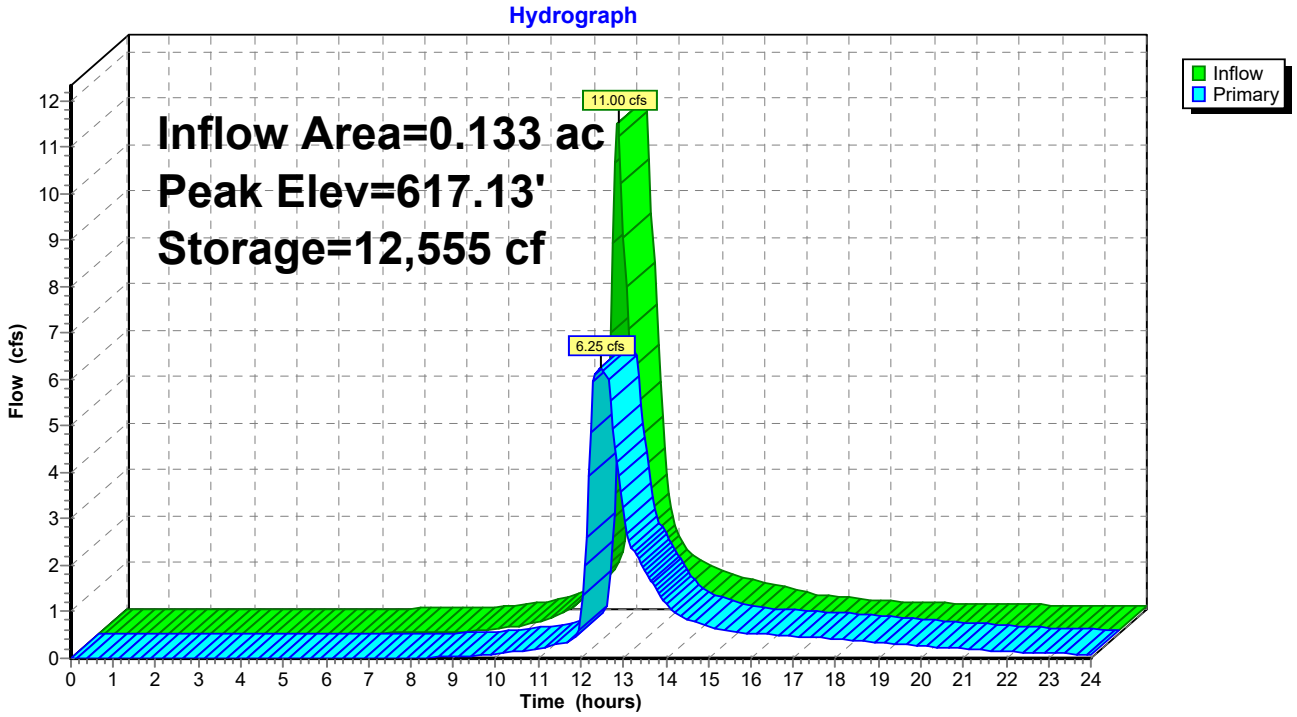
12 Chambers x 590.2 cf + 5,791.0 cf Border = 12,873.2 cf Chamber Storage
12 Chambers x 718.0 cf + 7,346.3 cf Border = 15,962.2 cf Displacement

Chamber Storage = 12,873.2 cf = 0.296 af
Overall Storage Efficiency = 80.6%
Overall System Size = 74.90' x 38.75' x 5.50'

12 Chambers (plus border)
591.2 cy Field



Pond DB-6: DB-6


Hydrograph
Inflow Area=0.133 ac
Peak Elev=617.13'
Storage=12,555 cf
11.00 cfs
6.25 cfs
Inflow
Primary
Flow (cfs)
Time (hours)

Stage-Discharge for Pond DB-6: DB-6

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
612.25	0.00	614.33	0.92	616.41	4.90
612.29	0.00	614.37	1.00	616.45	5.02
612.33	0.02	614.41	1.08	616.49	5.16
612.37	0.03	614.45	1.17	616.53	5.30
612.41	0.06	614.49	1.26	616.57	5.46
612.45	0.08	614.53	1.35	616.61	5.62
612.49	0.11	614.57	1.43	616.65	5.79
612.53	0.14	614.61	1.51	616.69	5.93
612.57	0.17	614.65	1.58	616.73	5.96
612.61	0.18	614.69	1.64	616.77	5.99
612.65	0.20	614.73	1.70	616.81	6.02
612.69	0.22	614.77	1.76	616.85	6.05
612.73	0.24	614.81	1.81	616.89	6.07
612.77	0.25	614.85	1.86	616.93	6.10
612.81	0.26	614.89	1.91	616.97	6.13
612.85	0.28	614.93	1.96	617.01	6.16
612.89	0.29	614.97	2.01	617.05	6.19
612.93	0.30	615.01	2.06	617.09	6.22
612.97	0.31	615.05	2.10	617.13	6.25
613.01	0.32	615.09	2.15	617.17	6.28
613.05	0.33	615.13	2.19	617.21	6.31
613.09	0.34	615.17	2.23	617.25	6.33
613.13	0.35	615.21	2.28	617.29	6.36
613.17	0.36	615.25	2.32	617.33	6.39
613.21	0.37	615.29	2.36	617.37	6.42
613.25	0.38	615.33	2.42	617.41	6.44
613.29	0.39	615.37	2.48	617.45	6.47
613.33	0.40	615.41	2.56	617.49	6.50
613.37	0.41	615.45	2.64	617.53	6.53
613.41	0.42	615.49	2.73	617.57	6.55
613.45	0.43	615.53	2.83	617.61	6.58
613.49	0.44	615.57	2.93	617.65	6.61
613.53	0.44	615.61	3.04	617.69	6.64
613.57	0.45	615.65	3.16	617.73	**6.66**
613.61	0.46	615.69	3.27		
613.65	0.47	615.73	3.39		
613.69	0.47	615.77	3.50		
613.73	0.48	615.81	3.61		
613.77	0.49	615.85	3.72		
613.81	0.50	615.89	3.82		
613.85	0.50	615.93	3.90		
613.89	0.51	615.97	3.99		
613.93	0.52	616.01	4.07		
613.97	0.52	616.05	4.15		
614.01	0.53	616.09	4.23		
614.05	0.55	616.13	4.31		
614.09	0.57	616.17	4.38		
614.13	0.61	616.21	4.45		
614.17	0.65	616.25	4.52		
614.21	0.71	616.29	4.60		
614.25	0.77	616.33	4.69		
614.29	0.84	616.37	4.79		

Summary for Pond DB-7: DB-7

Inflow Area = 0.543 ac, 78.86% Impervious, Inflow Depth > 6.72" for 100-YR event
Inflow = 3.89 cfs @ 12.09 hrs, Volume= 0.304 af
Outflow = 0.81 cfs @ 12.51 hrs, Volume= 0.296 af, Atten= 79%, Lag= 25.3 min
Primary = 0.81 cfs @ 12.51 hrs, Volume= 0.296 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 617.79' @ 12.51 hrs Surf.Area= 3,131 sf Storage= 5,305 cf
Flood Elev= 617.80' Surf.Area= 3,131 sf Storage= 5,328 cf

Plug-Flow detention time= 111.5 min calculated for 0.296 af (97% of inflow)
Center-of-Mass det. time= 94.9 min (867.7 - 772.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	615.80'	0 cf	**27.58'W x 113.50'L x 2.67'H Field A** 8,349 cf Overall - 8,349 cf Embedded = 0 cf x 40.0% Voids
#2A	615.80'	5,328 cf	**StormTrap ST1 SingleTrap 2-0** x 32 Inside #1 Inside= 82.7"W x 24.0"H => 11.84 sf x 14.06'L = 166.5 cf Outside= 82.7"W x 32.0"H => 18.39 sf x 14.06'L = 258.6 cf 4 Rows of 8 Chambers 27.58' x 112.50' Core + 0.00' x 0.50' Border = 27.58' x 113.50' System
		5,328 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	615.80'	**6.0" Round Culvert** L= 124.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 615.80' / 615.00' S= 0.0065 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf
#2	Device 1	615.80'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	617.30'	**4.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.81 cfs @ 12.51 hrs HW=617.79' (Free Discharge)
└─**1=Culvert** (Passes 0.81 cfs of 0.86 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.57 cfs @ 6.50 fps)
  └─**3=Orifice/Grate** (Orifice Controls 0.24 cfs @ 2.74 fps)

Pond DB-7: DB-7 - Chamber Wizard Field A

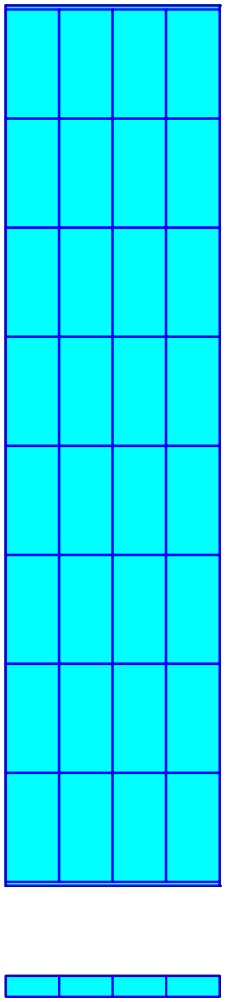
Chamber Model = StormTrap ST1 SingleTrap 2-0 (StormTrap ST1 SingleTrap® Type VI)
Inside= 82.7"W x 24.0"H => 11.84 sf x 14.06'L = 166.5 cf
Outside= 82.7"W x 32.0"H => 18.39 sf x 14.06'L = 258.6 cf

8 Chambers/Row x 14.06' Long = 112.50' Row Length +6.0" Border x 2 = 113.50' Base Length
4 Rows x 82.7" Wide = 27.58' Base Width
32.0" Chamber Height = 2.67' Field Height

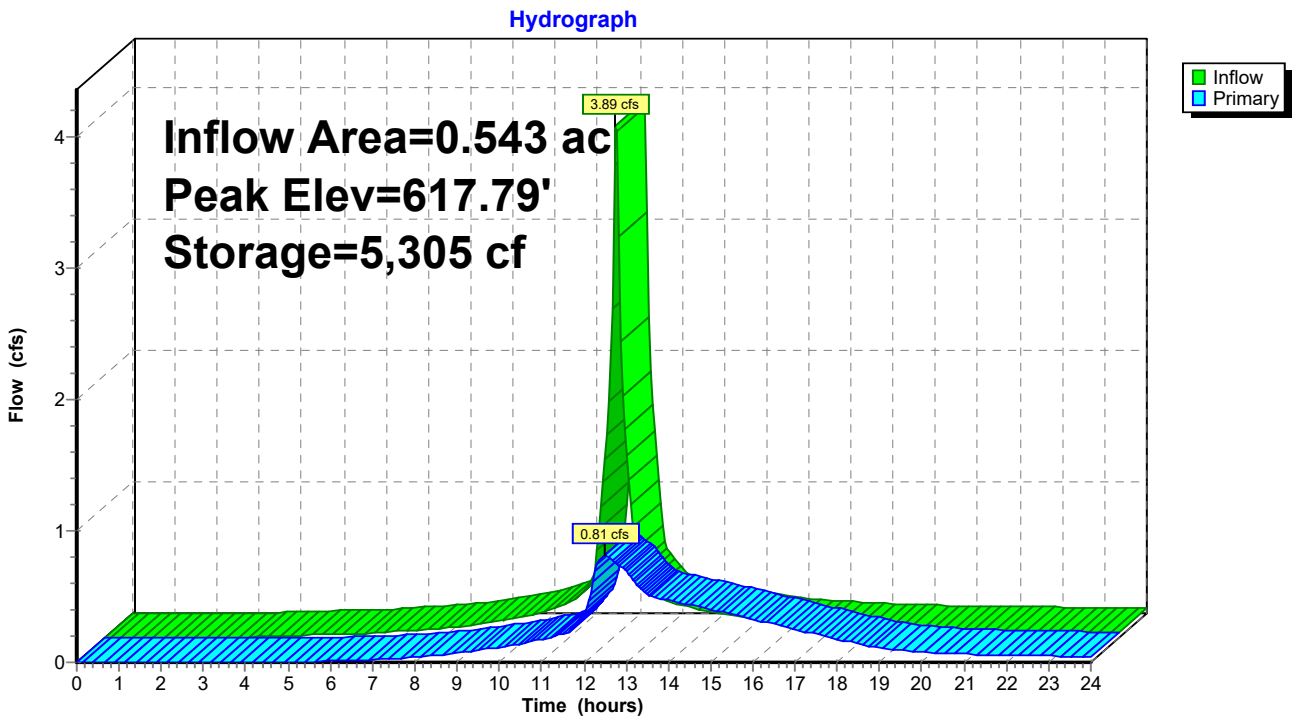
32 Chambers x 166.5 cf = 5,328.0 cf Chamber Storage
32 Chambers x 258.6 cf + 73.6 cf Border = 8,348.6 cf Displacement

Chamber Storage = 5,328.0 cf = 0.122 af
Overall Storage Efficiency = 63.8%
Overall System Size = 113.50' x 27.58' x 2.67'

32 Chambers (plus border)
309.2 cy Field



Pond DB-7: DB-7


Hydrograph
Inflow Area=0.543 ac
Peak Elev=617.79'
Storage=5,305 cf
3.89 cfs
0.81 cfs
Inflow
Primary
Flow (cfs)
Time (hours)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24

Stage-Discharge for Pond DB-7: DB-7

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
615.80	0.00	616.84	0.39	617.88	0.85
615.82	0.00	616.86	0.40	617.90	0.86
615.84	0.00	616.88	0.40	617.92	0.87
615.86	0.01	616.90	0.41	617.94	0.88
615.88	0.02	616.92	0.41	617.96	0.89
615.90	0.02	616.94	0.41	617.98	0.89
615.92	0.03	616.96	0.42	618.00	0.90
615.94	0.04	616.98	0.42	618.02	0.90
615.96	0.06	617.00	0.43	618.04	0.90
615.98	0.07	617.02	0.43	618.06	0.91
616.00	0.08	617.04	0.44	618.08	0.91
616.02	0.10	617.06	0.44	618.10	0.92
616.04	0.11	617.08	0.44	618.12	0.92
616.06	0.13	617.10	0.45	618.14	0.92
616.08	0.14	617.12	0.45	618.16	0.93
616.10	0.15	617.14	0.46	618.18	0.93
616.12	0.17	617.16	0.46	618.20	0.93
616.14	0.17	617.18	0.46	618.22	0.94
616.16	0.18	617.20	0.47	618.24	0.94
616.18	0.19	617.22	0.47	618.26	0.94
616.20	0.20	617.24	0.47	618.28	0.95
616.22	0.21	617.26	0.48	618.30	0.95
616.24	0.22	617.28	0.48	618.32	0.95
616.26	0.23	617.30	0.49	618.34	0.96
616.28	0.24	617.32	0.49	618.36	0.96
616.30	0.24	617.34	0.50	618.38	0.96
616.32	0.25	617.36	0.50	618.40	0.97
616.34	0.26	617.38	0.52	618.42	0.97
616.36	0.26	617.40	0.53	618.44	0.97
616.38	0.27	617.42	0.54	618.46	**0.98**
616.40	0.28	617.44	0.55		
616.42	0.28	617.46	0.57		
616.44	0.29	617.48	0.59		
616.46	0.30	617.50	0.60		
616.48	0.30	617.52	0.62		
616.50	0.31	617.54	0.64		
616.52	0.31	617.56	0.66		
616.54	0.32	617.58	0.67		
616.56	0.32	617.60	0.69		
616.58	0.33	617.62	0.71		
616.60	0.33	617.64	0.72		
616.62	0.34	617.66	0.73		
616.64	0.34	617.68	0.74		
616.66	0.35	617.70	0.76		
616.68	0.35	617.72	0.77		
616.70	0.36	617.74	0.78		
616.72	0.36	617.76	0.79		
616.74	0.37	617.78	0.80		
616.76	0.37	617.80	0.81		
616.78	0.38	617.82	0.82		
616.80	0.38	617.84	0.83		
616.82	0.39	617.86	0.84		

Summary for Pond ICS-1: ICS-1

Inflow Area =	0.693 ac, 62.75% Impervious, Inflow Depth > 6.49" for 100-YR event				
Inflow =	4.86 cfs @	12.09 hrs,	Volume=	0.374 af	
Outflow =	4.86 cfs @	12.09 hrs,	Volume=	0.374 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.38 cfs @	12.09 hrs,	Volume=	0.218 af	
Secondary =	4.48 cfs @	12.09 hrs,	Volume=	0.157 af	

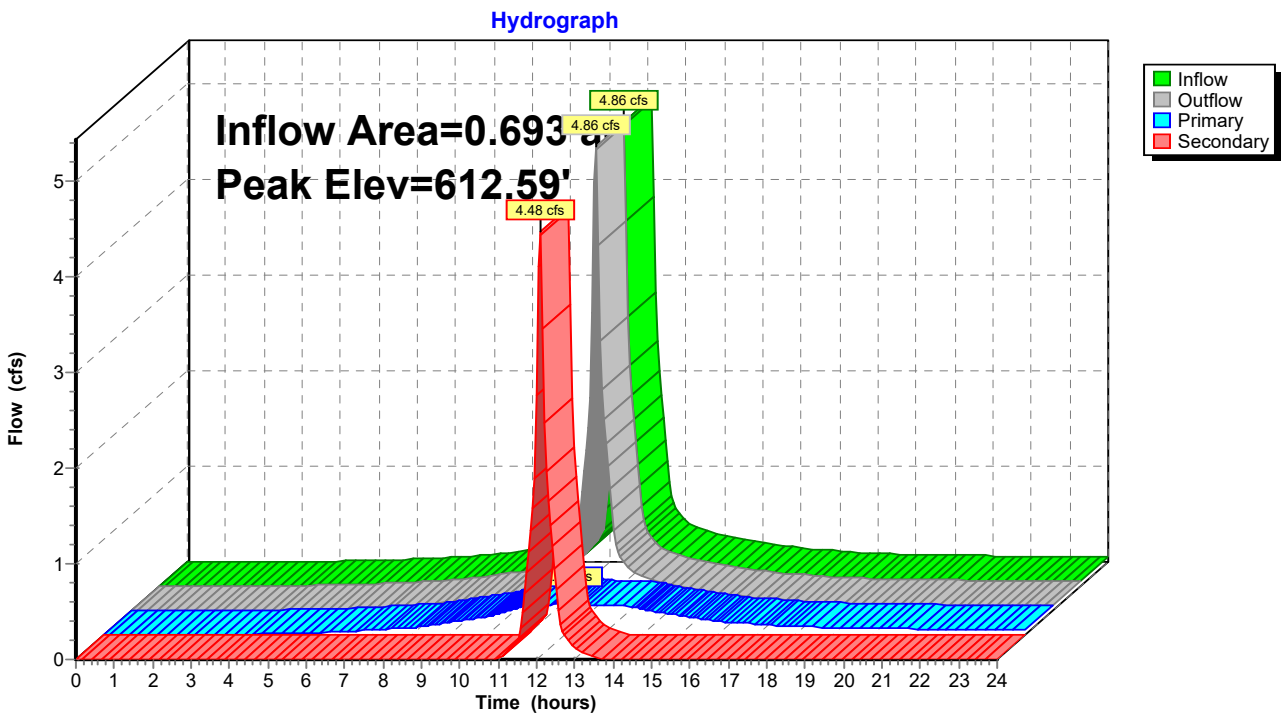
Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 612.59' @ 12.09 hrs
Flood Elev= 613.25'

Device	Routing	Invert	Outlet Devices
#1	Primary	609.25'	**4.0" Round Culvert** L= 145.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 609.25' / 608.50' S= 0.0052 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf
#2	Secondary	611.20'	**12.0" Round Culvert** L= 5.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 611.20' / 610.20' S= 0.2000 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.38 cfs @ 12.09 hrs HW=612.55' (Free Discharge)
└**1=Culvert** (Barrel Controls 0.38 cfs @ 4.32 fps)

Secondary OutFlow Max=4.36 cfs @ 12.09 hrs HW=612.55' (Free Discharge)
└**2=Culvert** (Inlet Controls 4.36 cfs @ 5.55 fps)

Pond ICS-1: ICS-1



Stage-Discharge for Pond ICS-1: ICS-1

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
609.25	0.00	0.00	0.00
609.30	0.00	0.00	0.00
609.35	0.02	0.02	0.00
609.40	0.04	0.04	0.00
609.45	0.07	0.07	0.00
609.50	0.11	0.11	0.00
609.55	0.14	0.14	0.00
609.60	0.17	0.17	0.00
609.65	0.19	0.19	0.00
609.70	0.18	0.18	0.00
609.75	0.19	0.19	0.00
609.80	0.19	0.19	0.00
609.85	0.20	0.20	0.00
609.90	0.20	0.20	0.00
609.95	0.21	0.21	0.00
610.00	0.21	0.21	0.00
610.05	0.22	0.22	0.00
610.10	0.22	0.22	0.00
610.15	0.22	0.22	0.00
610.20	0.23	0.23	0.00
610.25	0.23	0.23	0.00
610.30	0.24	0.24	0.00
610.35	0.24	0.24	0.00
610.40	0.24	0.24	0.00
610.45	0.25	0.25	0.00
610.50	0.25	0.25	0.00
610.55	0.26	0.26	0.00
610.60	0.26	0.26	0.00
610.65	0.26	0.26	0.00
610.70	0.27	0.27	0.00
610.75	0.27	0.27	0.00
610.80	0.27	0.27	0.00
610.85	0.28	0.28	0.00
610.90	0.28	0.28	0.00
610.95	0.28	0.28	0.00
611.00	0.29	0.29	0.00
611.05	0.29	0.29	0.00
611.10	0.29	0.29	0.00
611.15	0.30	0.30	0.00
611.20	0.30	0.30	0.00
611.25	0.32	0.30	0.01
611.30	0.36	0.31	0.06
611.35	0.43	0.31	0.12
611.40	0.53	0.31	0.21
611.45	0.64	0.32	0.33
611.50	0.78	0.32	0.46
611.55	0.94	0.32	0.62
611.60	1.11	0.32	0.79
611.65	1.31	0.33	0.98
611.70	1.51	0.33	1.18
611.75	1.73	0.33	1.40
611.80	1.96	0.34	1.62
611.85	2.19	0.34	1.85
611.90	2.43	0.34	2.09
611.95	2.67	0.34	2.33
612.00	2.91	0.35	2.56
612.05	3.14	0.35	2.79
612.10	3.36	0.35	3.01
612.15	3.55	0.36	3.20
612.20	3.70	0.36	3.34
612.25	3.87	0.36	3.51
612.30	4.03	0.36	3.66
612.35	4.18	0.37	3.81
612.40	4.32	0.37	3.95
612.45	4.47	0.37	4.09
612.50	4.60	0.37	4.23
612.55	4.73	0.38	4.36
612.60	4.86	0.38	4.48
612.65	4.99	0.38	4.61
612.70	5.11	0.38	4.73
612.75	5.23	0.39	4.84
612.80	5.35	0.39	4.96
612.85	5.46	0.39	5.07
612.90	5.57	0.39	5.18
612.95	5.68	0.40	5.29
613.00	5.79	0.40	5.39
613.05	5.89	0.40	5.49
613.10	6.00	0.40	5.59
613.15	6.10	0.41	5.69
613.20	6.20	0.41	5.79
613.25	**6.30**	**0.41**	**5.89**

Summary for Pond ICS-2: ICS-2

Inflow Area =	0.598 ac, 70.86% Impervious, Inflow Depth > 6.37" for 100-YR event				
Inflow =	4.15 cfs @	12.09 hrs,	Volume=	0.318 af	
Outflow =	4.15 cfs @	12.09 hrs,	Volume=	0.318 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.50 cfs @	12.08 hrs,	Volume=	0.199 af	
Secondary =	3.65 cfs @	12.09 hrs,	Volume=	0.119 af	

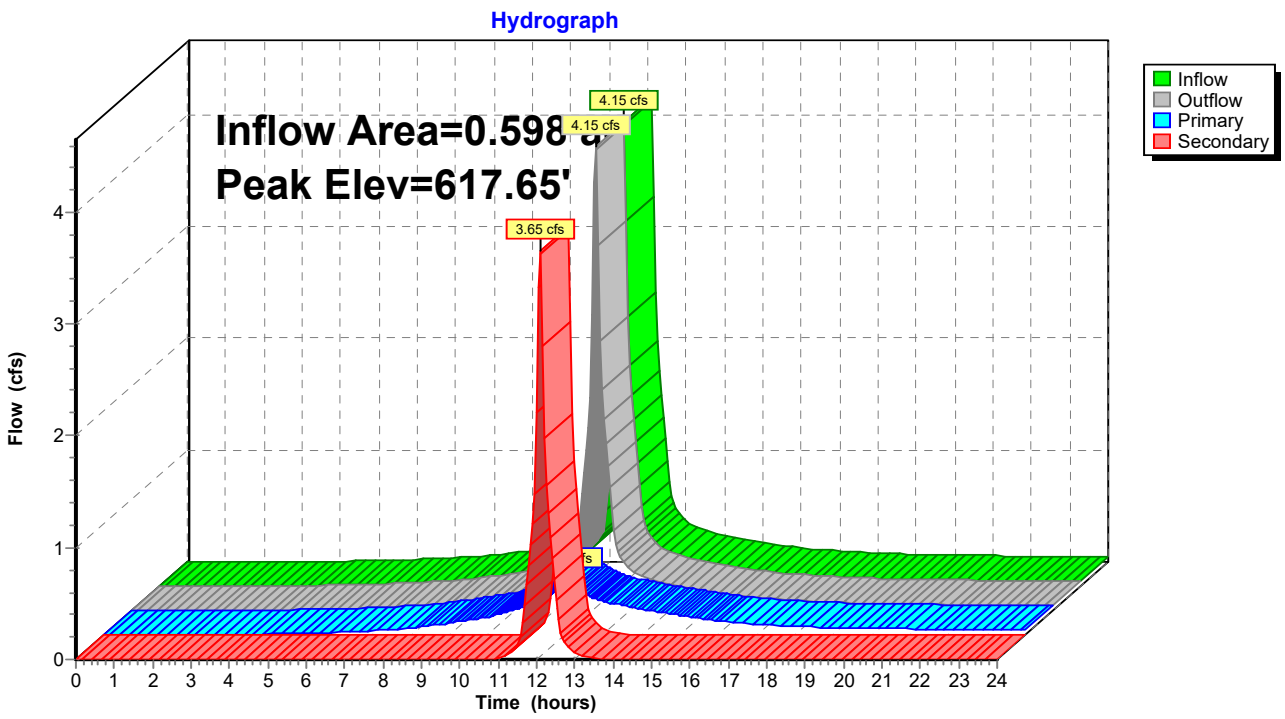
Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 617.65' @ 12.08 hrs
Flood Elev= 617.25'

Device	Routing	Invert	Outlet Devices
#1	Primary	615.85'	**4.0" Round Culvert** L= 34.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 615.85' / 615.00' S= 0.0250 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.09 sf
#2	Secondary	616.21'	**12.0" Round Culvert** L= 12.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 616.21' / 616.15' S= 0.0050 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.50 cfs @ 12.08 hrs HW=617.61' (Free Discharge)
└**1=Culvert** (Barrel Controls 0.50 cfs @ 5.71 fps)

Secondary OutFlow Max=3.55 cfs @ 12.09 hrs HW=617.62' (Free Discharge)
└**2=Culvert** (Barrel Controls 3.55 cfs @ 4.52 fps)

Pond ICS-2: ICS-2



Stage-Discharge for Pond ICS-2: ICS-2

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
615.85	0.00	0.00	0.00
615.87	0.00	0.00	0.00
615.89	0.01	0.01	0.00
615.91	0.01	0.01	0.00
615.93	0.02	0.02	0.00
615.95	0.03	0.03	0.00
615.97	0.04	0.04	0.00
615.99	0.06	0.06	0.00
616.01	0.07	0.07	0.00
616.03	0.09	0.09	0.00
616.05	0.10	0.10	0.00
616.07	0.12	0.12	0.00
616.09	0.14	0.14	0.00
616.11	0.16	0.16	0.00
616.13	0.18	0.18	0.00
616.15	0.19	0.19	0.00
616.17	0.21	0.21	0.00
616.19	0.22	0.22	0.00
616.21	0.23	0.23	0.00
616.23	0.24	0.24	0.00
616.25	0.26	0.25	0.00
616.27	0.28	0.26	0.01
616.29	0.30	0.27	0.02
616.31	0.32	0.28	0.03
616.33	0.34	0.29	0.05
616.35	0.37	0.30	0.07
616.37	0.40	0.31	0.09
616.39	0.43	0.32	0.11
616.41	0.46	0.33	0.13
616.43	0.50	0.34	0.16
616.45	0.53	0.35	0.19
616.47	0.57	0.35	0.22
616.49	0.61	0.35	0.25
616.51	0.65	0.36	0.29
616.53	0.69	0.36	0.33
616.55	0.73	0.36	0.37
616.57	0.77	0.37	0.41
616.59	0.82	0.37	0.45
616.61	0.87	0.37	0.50
616.63	0.92	0.38	0.54
616.65	0.97	0.38	0.59
616.67	1.02	0.38	0.64
616.69	1.08	0.38	0.69
616.71	1.13	0.39	0.74
616.73	1.19	0.39	0.80
616.75	1.25	0.39	0.86
616.77	1.31	0.40	0.91
616.79	1.37	0.40	0.97
616.81	1.43	0.40	1.03
616.83	1.50	0.40	1.09
616.85	1.56	0.41	1.15
616.87	1.63	0.41	1.22
616.89	1.69	0.41	1.28
616.91	1.76	0.41	1.35
616.93	1.83	0.42	1.41
616.95	1.90	0.42	1.48
616.97	1.97	0.42	1.54
616.99	2.04	0.42	1.61
617.01	2.11	0.43	1.68
617.03	2.18	0.43	1.75
617.05	2.25	0.43	1.82
617.07	2.32	0.43	1.89
617.09	2.40	0.44	1.96
617.11	2.47	0.44	2.03
617.13	2.54	0.44	2.10
617.15	2.61	0.44	2.17
617.17	2.69	0.45	2.24
617.19	2.76	0.45	2.31
617.21	2.83	0.45	2.38
617.23	2.90	0.45	2.45
617.25	2.97	0.46	2.51
617.27	3.04	0.46	2.58
617.29	3.11	0.46	2.65
617.31	3.18	0.46	2.71
617.33	3.24	0.47	2.78
617.35	3.31	0.47	2.84
617.37	3.37	0.47	2.90
617.39	3.43	0.47	2.96
617.41	3.49	0.48	3.02
617.43	3.55	0.48	3.07
617.45	3.60	0.48	3.12
617.47	3.65	0.48	3.17
617.49	3.69	0.48	3.21
617.51	3.73	0.49	3.24
617.53	3.75	0.49	3.27
617.55	3.78	0.49	3.29
617.57	3.86	0.49	3.37
617.59	3.94	0.50	3.45
617.61	4.02	0.50	3.53
617.63	**4.10**	**0.50**	**3.60**

Summary for Pond ICS-6: ICS-6

Inflow Area = 2.630 ac, 39.25% Impervious, Inflow Depth > 4.73" for 100-YR event
Inflow = 10.79 cfs @ 12.22 hrs, Volume= 1.038 af
Outflow = 10.79 cfs @ 12.22 hrs, Volume= 1.038 af, Atten= 0%, Lag= 0.0 min
Primary = 0.31 cfs @ 12.22 hrs, Volume= 0.209 af
Secondary = 10.47 cfs @ 12.22 hrs, Volume= 0.828 af

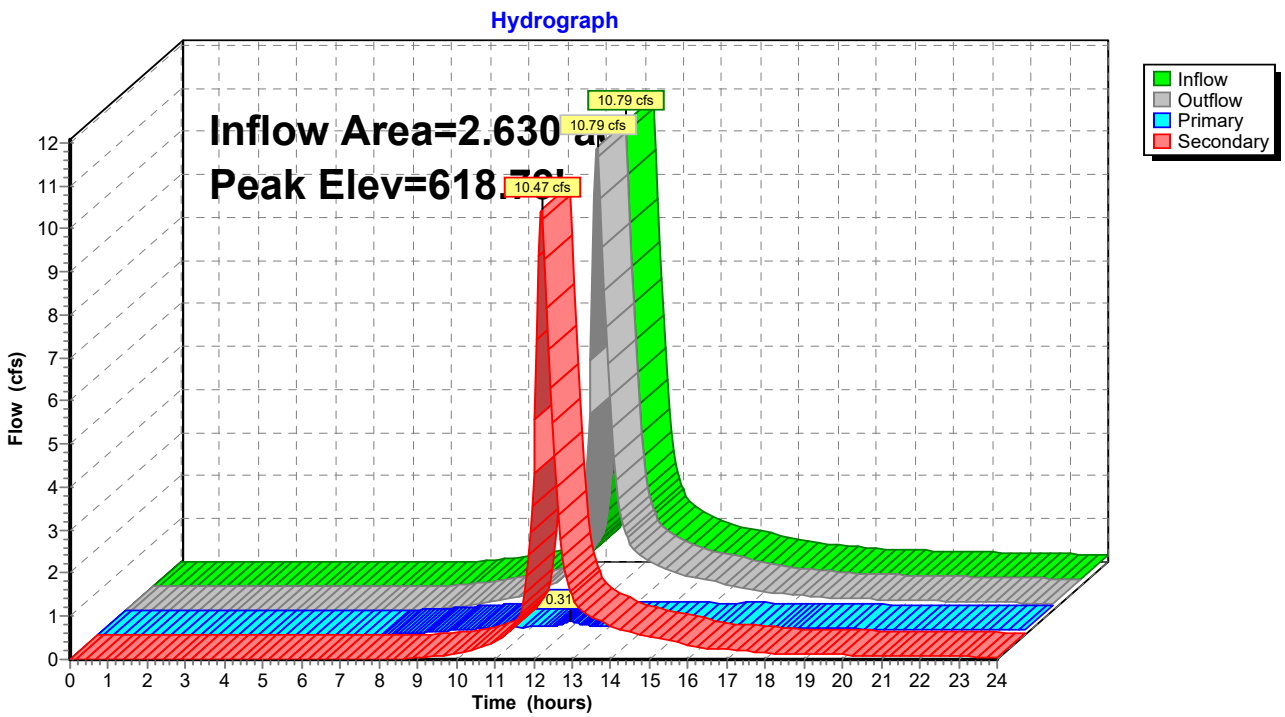
Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 618.79' @ 12.22 hrs
Flood Elev= 621.10'

Device	Routing	Invert	Outlet Devices
#1	Primary	616.00'	**4.0" Round Culvert** L= 202.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 616.00' / 615.00' S= 0.0050 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf
#2	Secondary	616.15'	**15.0" Round Culvert** L= 5.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 616.15' / 616.10' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=0.31 cfs @ 12.22 hrs HW=618.75' (Free Discharge)
└**1=Culvert** (Barrel Controls 0.31 cfs @ 3.55 fps)

Secondary OutFlow Max=10.34 cfs @ 12.22 hrs HW=618.75' (Free Discharge)
└**2=Culvert** (Barrel Controls 10.34 cfs @ 8.43 fps)

Pond ICS-6: ICS-6



Stage-Discharge for Pond ICS-6: ICS-6

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
616.00	0.00	0.00	0.00
616.10	0.02	0.02	0.00
616.20	0.08	0.07	0.01
616.30	0.24	0.14	0.10
616.40	0.44	0.19	0.26
616.50	0.66	0.18	0.48
616.60	0.94	0.19	0.75
616.70	1.27	0.20	1.08
616.80	1.65	0.20	1.44
616.90	2.06	0.21	1.85
617.00	2.51	0.22	2.30
617.10	2.99	0.22	2.77
617.20	3.49	0.23	3.26
617.30	3.99	0.24	3.76
617.40	4.50	0.24	4.26
617.50	5.00	0.25	4.75
617.60	5.47	0.25	5.22
617.70	5.89	0.26	5.63
617.80	6.21	0.26	5.95
617.90	6.75	0.27	6.48
618.00	7.32	0.27	7.05
618.10	7.85	0.28	7.57
618.20	8.34	0.28	8.06
618.30	8.81	0.29	8.52
618.40	9.25	0.29	8.96
618.50	9.67	0.30	9.38
618.60	10.08	0.30	9.77
618.70	10.47	0.31	10.16
618.80	10.82	0.31	10.51
618.90	11.08	0.32	10.77
619.00	11.34	0.32	11.02
619.10	11.59	0.33	11.26
619.20	11.83	0.33	11.50
619.30	12.07	0.33	11.74
619.40	12.31	0.34	11.97
619.50	12.54	0.34	12.19
619.60	12.76	0.35	12.41
619.70	12.98	0.35	12.63
619.80	13.20	0.35	12.85
619.90	13.42	0.36	13.06
620.00	13.63	0.36	13.26
620.10	13.83	0.37	13.47
620.20	14.04	0.37	13.67
620.30	14.24	0.37	13.87
620.40	14.44	0.38	14.06
620.50	14.64	0.38	14.26
620.60	14.83	0.38	14.45
620.70	15.02	0.39	14.63
620.80	15.21	0.39	14.82
620.90	15.40	0.40	15.00
621.00	15.58	0.40	15.18
621.10	**15.76**	**0.40**	**15.36**

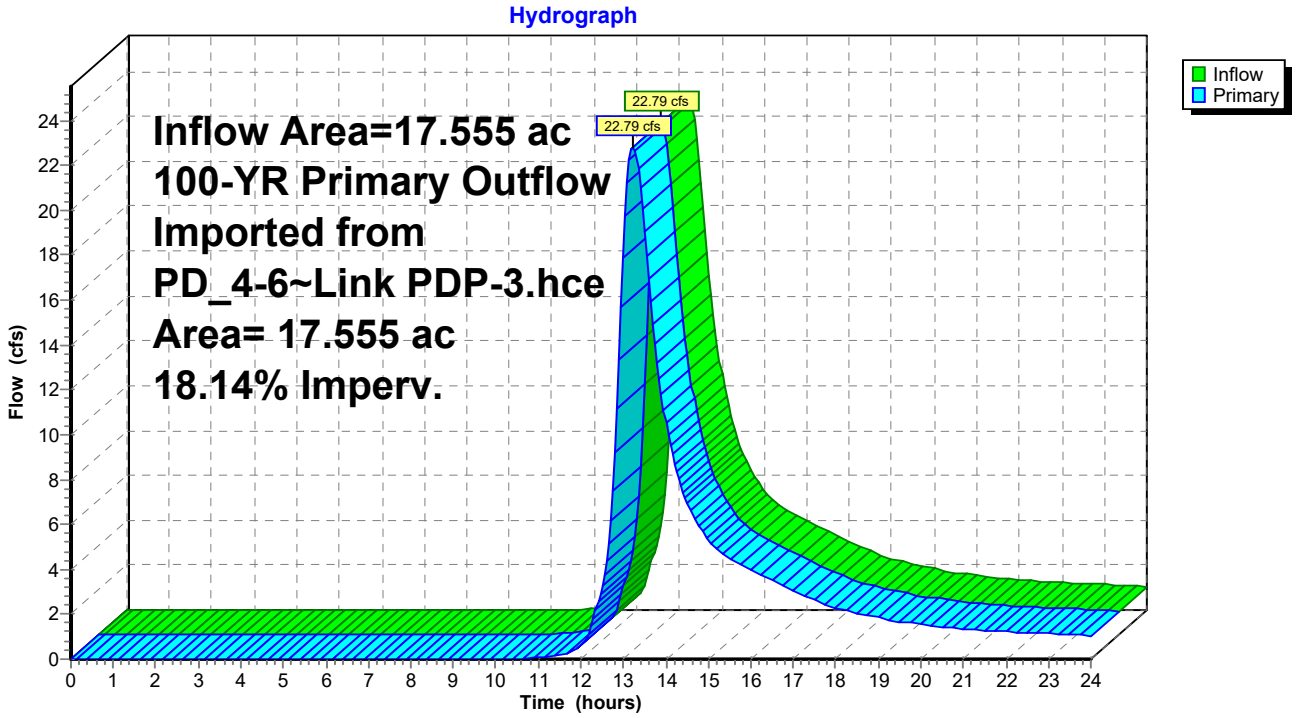
Summary for Link PDP-3: DP-3

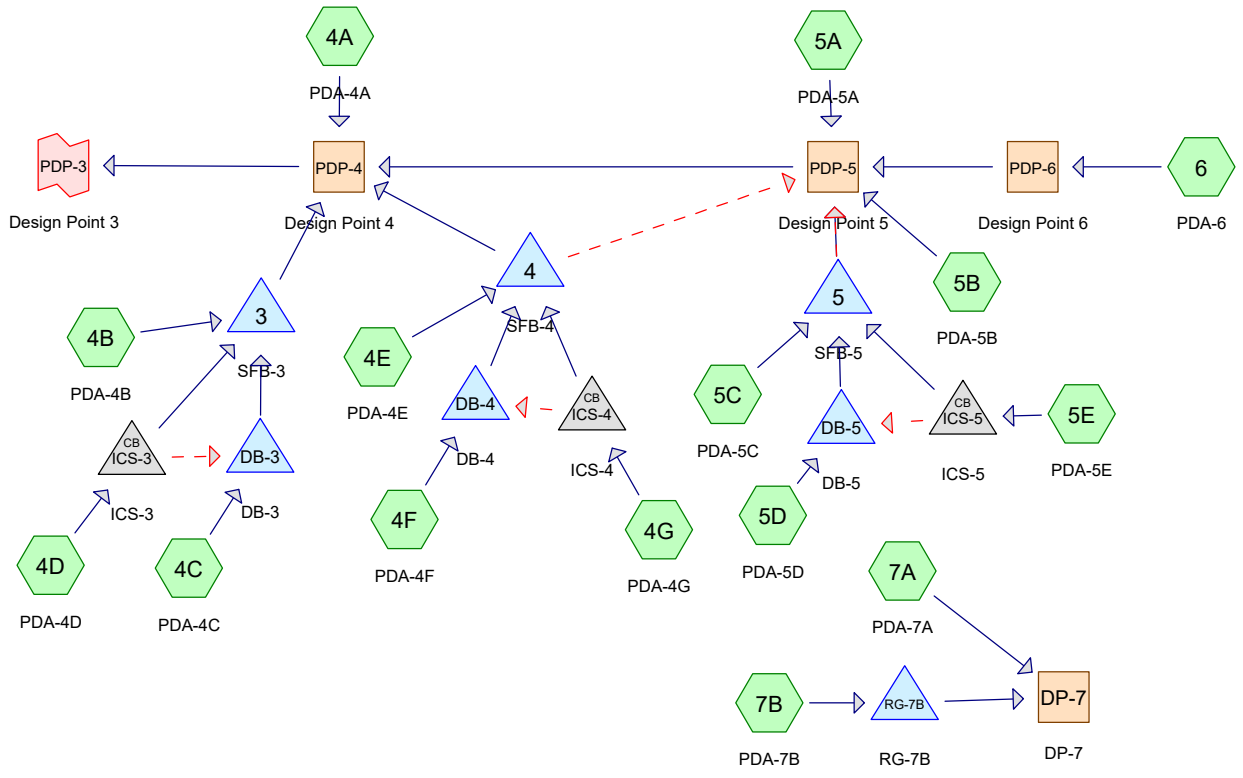
Inflow Area = 17.555 ac, 18.14% Impervious, Inflow Depth > 2.82" for 100-YR event
Inflow = 22.79 cfs @ 13.23 hrs, Volume= 4.124 af
Primary = 22.79 cfs @ 13.23 hrs, Volume= 4.124 af, Atten= 0%, Lag= 0.0 min

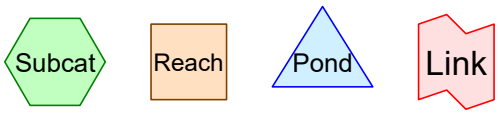
Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

100-YR Primary Outflow Imported from PD_4-6~Link PDP-3.hce

Link PDP-3: DP-3







Routing Diagram for PD_4-7
Prepared by Bohler Engineering, Printed 2/5/2020
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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.223	61	>75% Grass cover, Good, HSG B (4A, 4B, 4D, 4E, 4G, 5B, 5C, 5D, 5E, 7A, 7B)
0.078	74	>75% Grass cover, Good, HSG C (4A, 4B)
0.937	98	Paved parking, HSG B (4D, 4E, 4G, 5E)
2.273	98	Roofs, HSG B (4C, 4F, 4G, 5D, 7B)
0.029	98	Unconnected pavement, HSG B (4B, 5C)
9.068	55	Woods, Good, HSG B (4A, 5B, 6, 7A)
3.909	70	Woods, Good, HSG C (4A, 5A, 6)
0.318	77	Woods, Good, HSG D (5B)
17.835	**67**	**TOTAL AREA**

Summary for Subcatchment 4A: PDA-4A

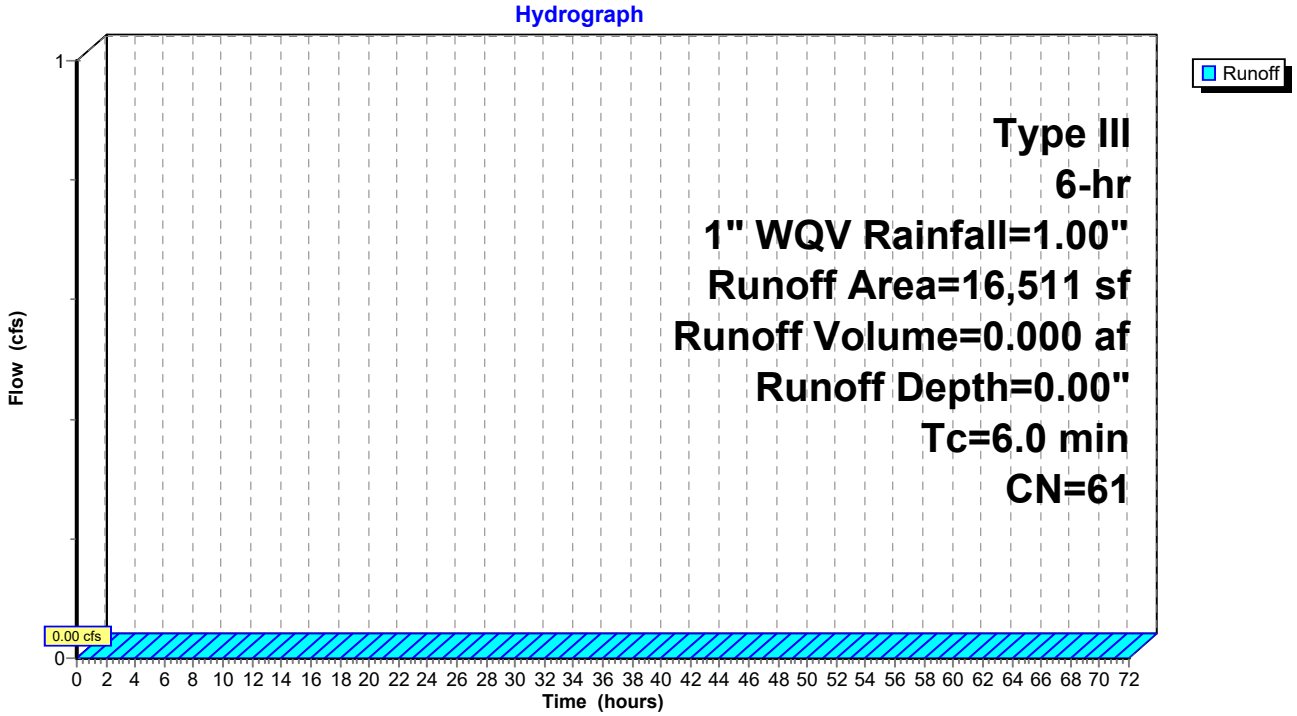
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 6-hr 1" WQV Rainfall=1.00"

	Area (sf)	CN	Description
*	7,284	55	Woods, Good, HSG B
	3,480	70	Woods, Good, HSG C
	1,370	74	>75% Grass cover, Good, HSG C
	4,377	61	>75% Grass cover, Good, HSG B
	16,511	61	Weighted Average
	16,511		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 min.**

Subcatchment 4A: PDA-4A



Summary for Subcatchment 4B: PDA-4B

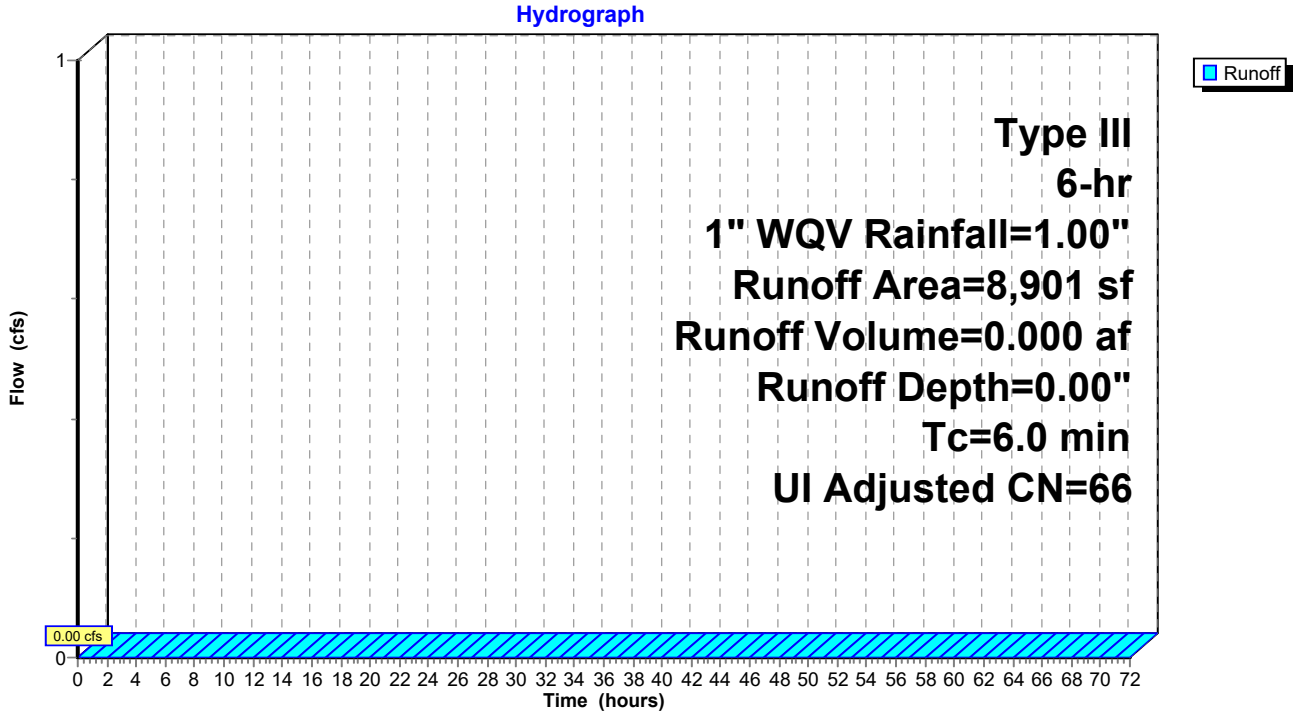
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 6-hr 1" WQV Rainfall=1.00"

Area (sf)	CN	Adj	Description
5,978	61		>75% Grass cover, Good, HSG B
2,026	74		>75% Grass cover, Good, HSG C
897	98		Unconnected pavement, HSG B
8,901	68	66	Weighted Average, UI Adjusted
8,004			89.92% Pervious Area
897			10.08% Impervious Area
897			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 min**

Subcatchment 4B: PDA-4B



Summary for Subcatchment 4C: PDA-4C

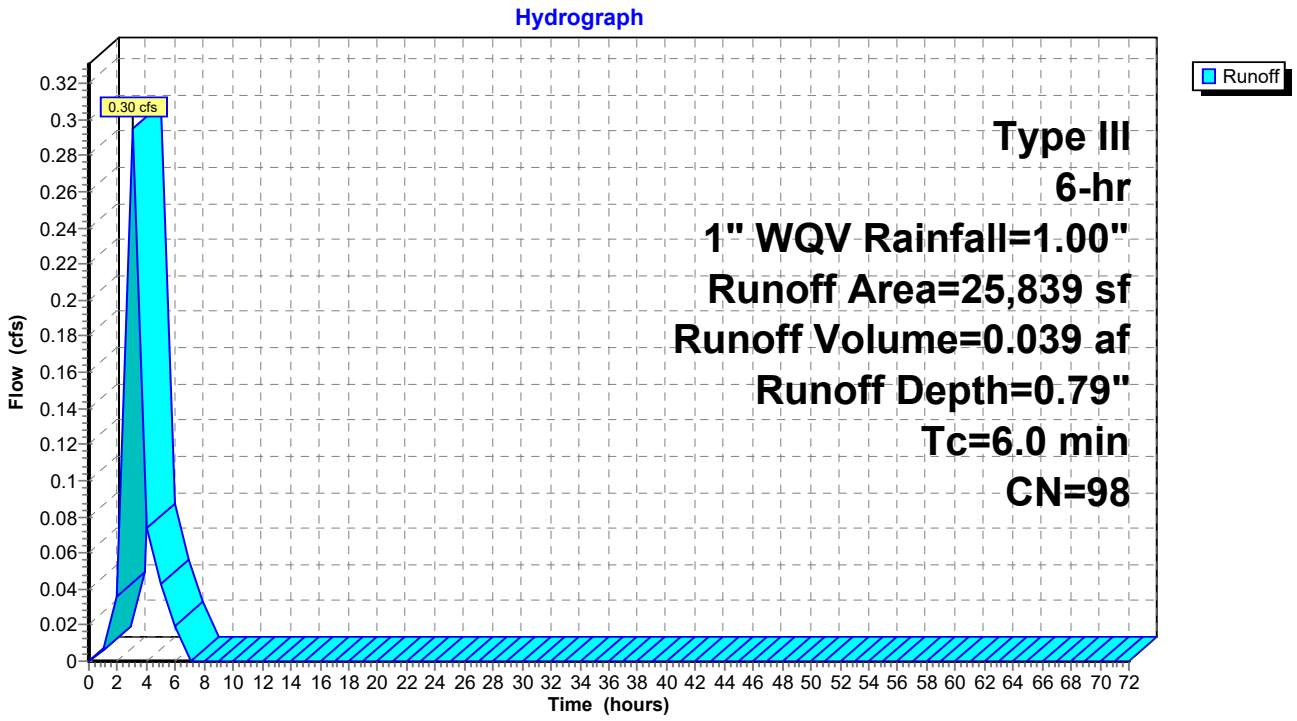
Runoff = 0.30 cfs @ 3.04 hrs, Volume= 0.039 af, Depth= 0.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 6-hr 1" WQV Rainfall=1.00"

Area (sf)	CN	Description
25,839	98	Roofs, HSG B
25,839		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Subcatchment 4C: PDA-4C



Summary for Subcatchment 4D: PDA-4D

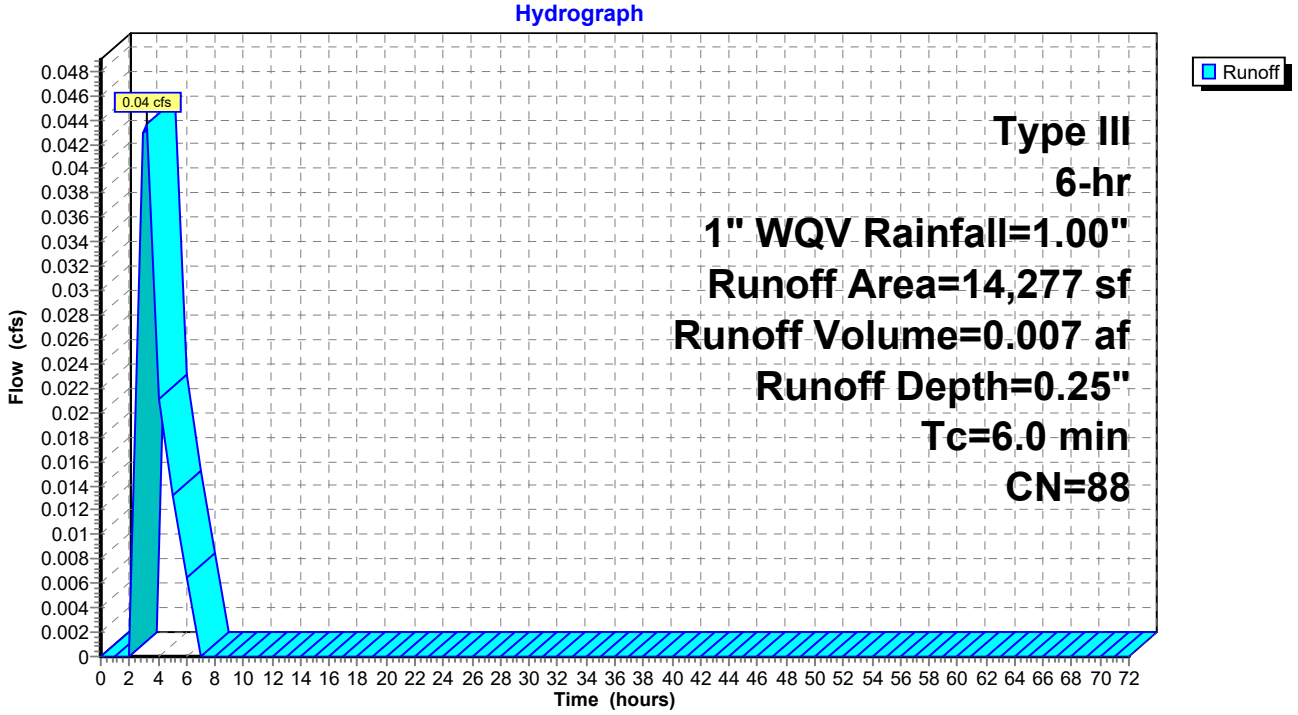
Runoff = 0.04 cfs @ 3.16 hrs, Volume= 0.007 af, Depth= 0.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 6-hr 1" WQV Rainfall=1.00"

Area (sf)	CN	Description
10,311	98	Paved parking, HSG B
3,966	61	>75% Grass cover, Good, HSG B
14,277	88	Weighted Average
3,966		27.78% Pervious Area
10,311		72.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 min**

Subcatchment 4D: PDA-4D



Summary for Subcatchment 4E: PDA-4E

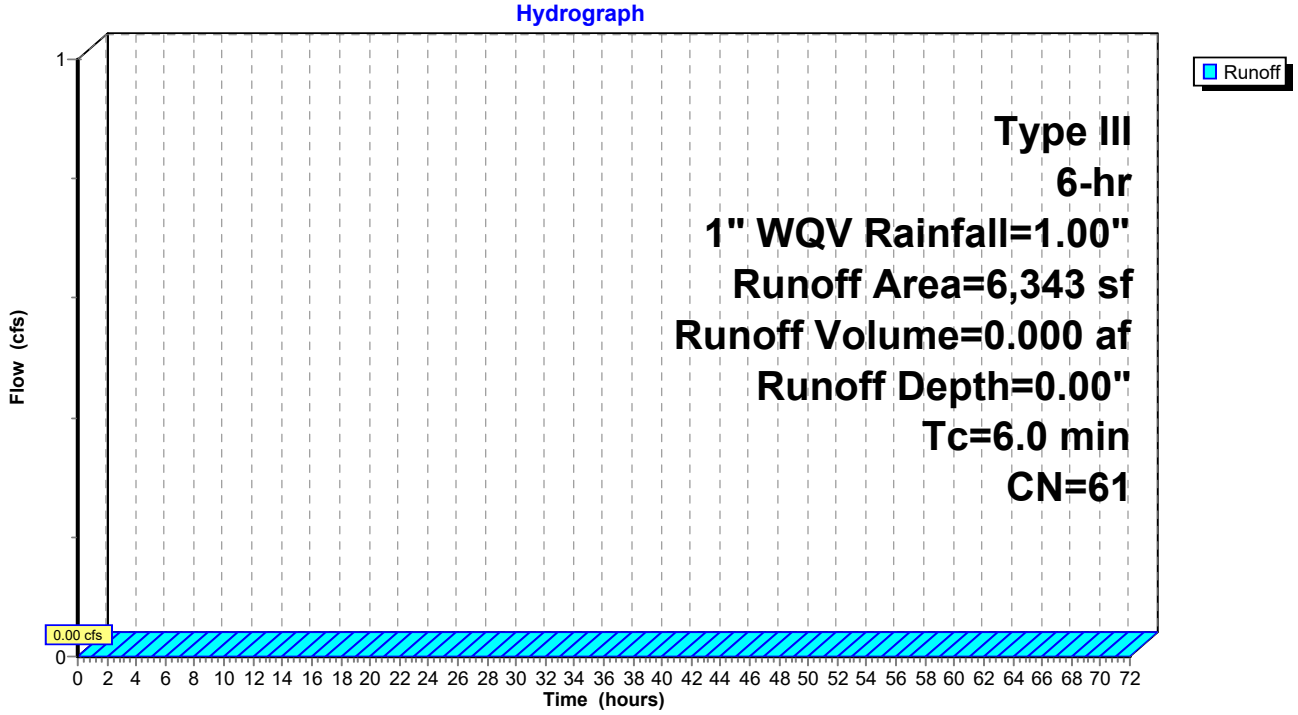
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 6-hr 1" WQV Rainfall=1.00"

Area (sf)	CN	Description
6,331	61	>75% Grass cover, Good, HSG B
12	98	Paved parking, HSG B
6,343	61	Weighted Average
6,331		99.81% Pervious Area
12		0.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 min**

Subcatchment 4E: PDA-4E



Summary for Subcatchment 4F: PDA-4F

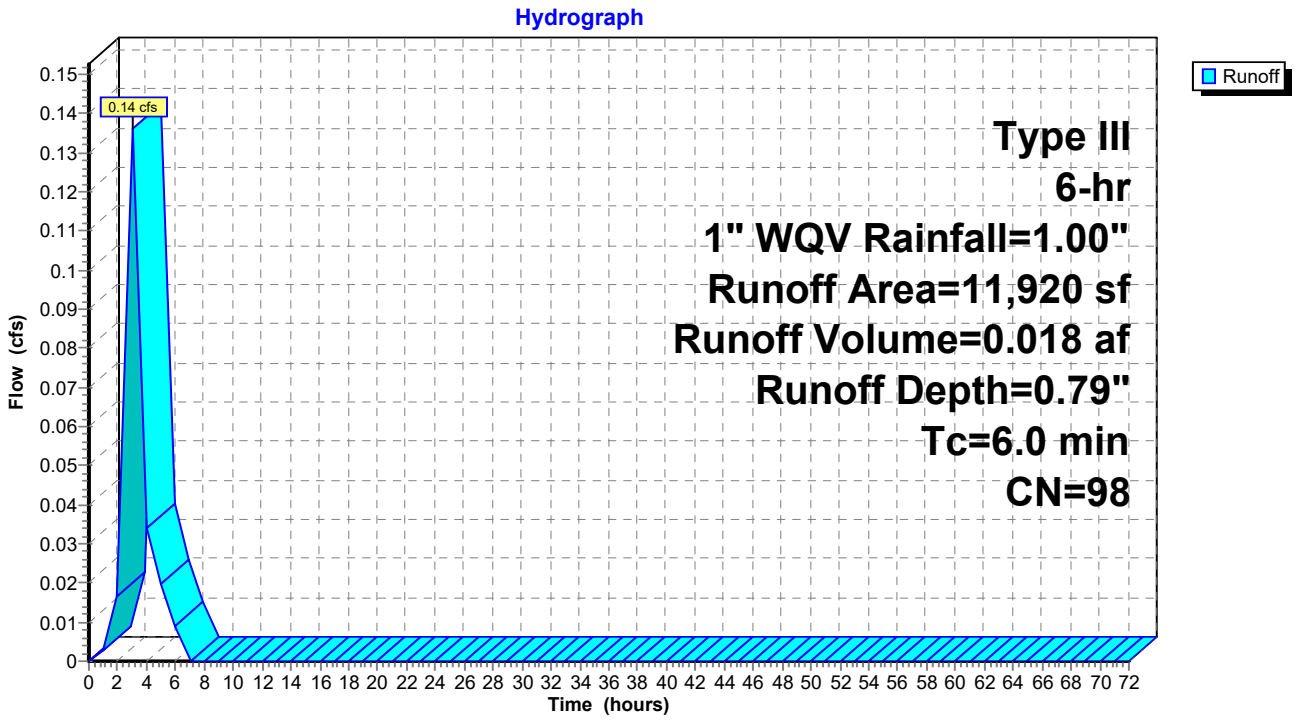
Runoff = 0.14 cfs @ 3.04 hrs, Volume= 0.018 af, Depth= 0.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 6-hr 1" WQV Rainfall=1.00"

Area (sf)	CN	Description
11,920	98	Roofs, HSG B
11,920		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Subcatchment 4F: PDA-4F



Summary for Subcatchment 4G: PDA-4G

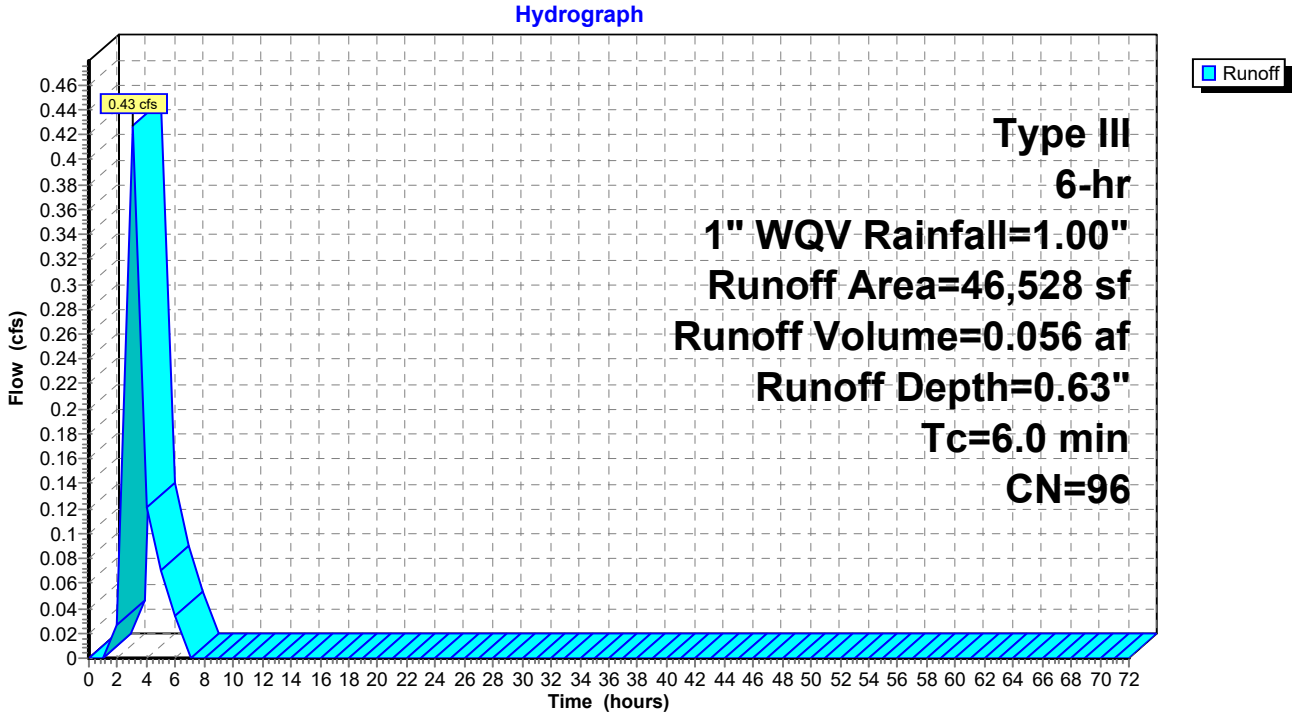
Runoff = 0.43 cfs @ 3.07 hrs, Volume= 0.056 af, Depth= 0.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 6-hr 1" WQV Rainfall=1.00"

Area (sf)	CN	Description
10,383	98	Paved parking, HSG B
3,055	61	>75% Grass cover, Good, HSG B
33,090	98	Roofs, HSG B
46,528	96	Weighted Average
3,055		6.57% Pervious Area
43,473		93.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 min**

Subcatchment 4G: PDA-4G



Summary for Subcatchment 5A: PDA-5A

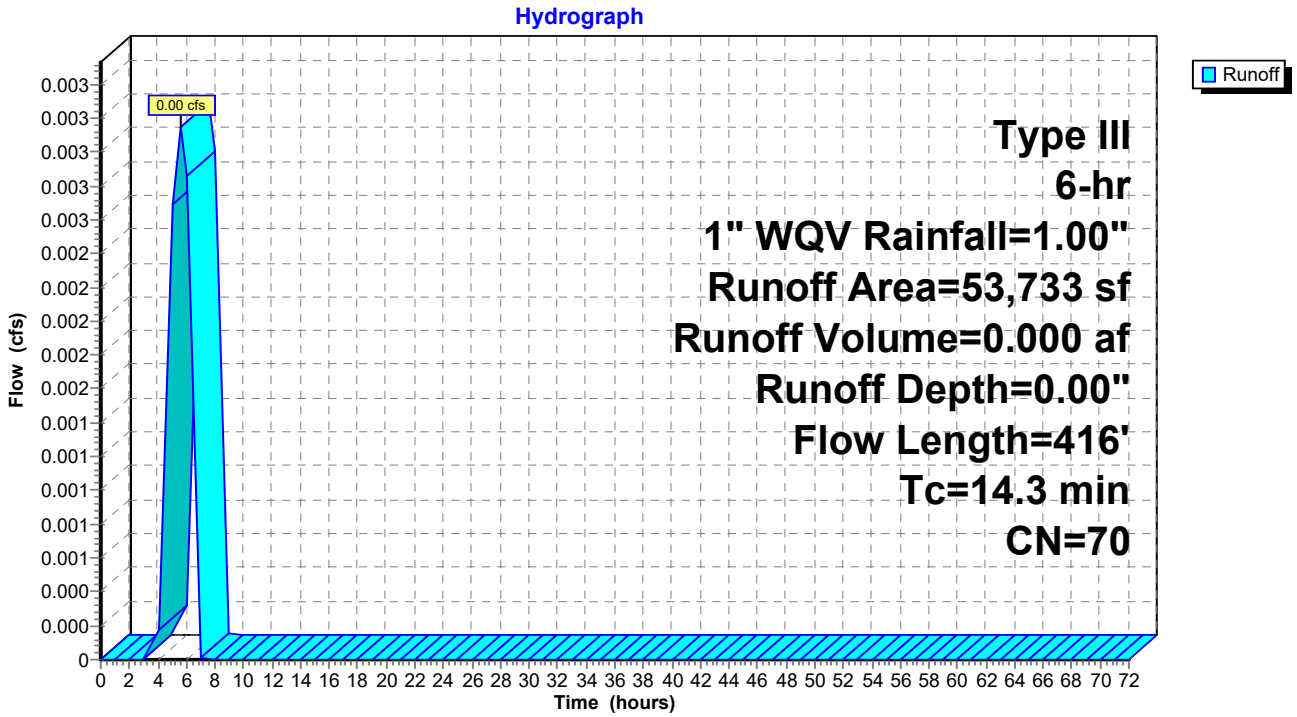
Runoff = 0.00 cfs @ 5.55 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 6-hr 1" WQV Rainfall=1.00"

Area (sf)	CN	Description
53,733	70	Woods, Good, HSG C
53,733		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.9	50	0.0334	0.08		**Sheet Flow, 5A-5B** Woods: Light underbrush n= 0.400 P2= 3.32"
3.3	239	0.0566	1.19		**Shallow Concentrated Flow, 5B-5C** Woodland Kv= 5.0 fps
0.3	62	0.0450	3.42		**Shallow Concentrated Flow, swale/ditch** Unpaved Kv= 16.1 fps
0.1	23	0.0100	4.91	3.86	**Pipe Channel, 12" CPP** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Corrugated PP, smooth interior
0.7	42	0.0430	1.04		**Shallow Concentrated Flow, 5E-EDP-5** Woodland Kv= 5.0 fps
14.3	416	Total			

Subcatchment 5A: PDA-5A



Summary for Subcatchment 5B: PDA-5B

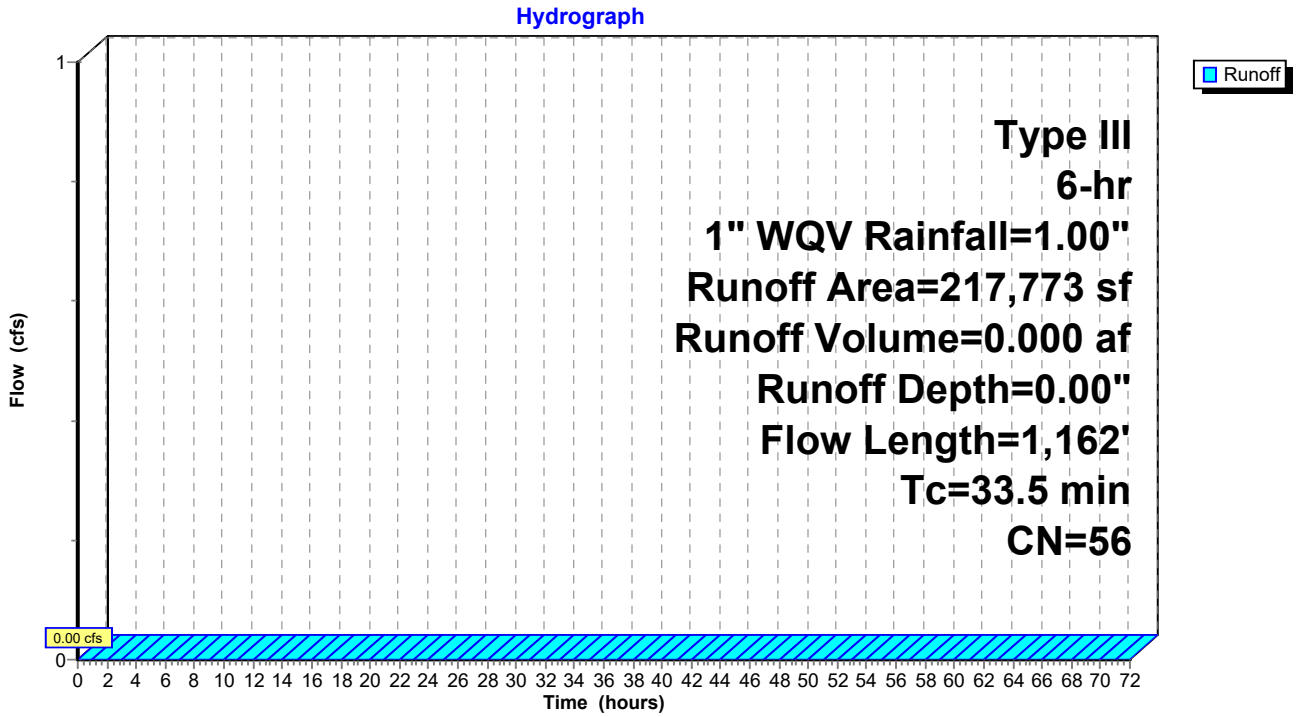
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 6-hr 1" WQV Rainfall=1.00"

Area (sf)	CN	Description
200,443	55	Woods, Good, HSG B
13,852	77	Woods, Good, HSG D
3,478	61	>75% Grass cover, Good, HSG B
217,773	56	Weighted Average
217,773		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	50	0.0400	0.09		**Sheet Flow, 5A-5B** Woods: Light underbrush n= 0.400 P2= 3.32"
9.9	553	0.0350	0.94		**Shallow Concentrated Flow, 5B-5C** Woodland Kv= 5.0 fps
13.3	455	0.0130	0.57		**Shallow Concentrated Flow, 5C-5D** Woodland Kv= 5.0 fps
1.1	104	0.0913	1.51		**Shallow Concentrated Flow, 5D-EDP-5** Woodland Kv= 5.0 fps
33.5	1,162	Total			

Subcatchment 5B: PDA-5B



Summary for Subcatchment 5C: PDA-5C

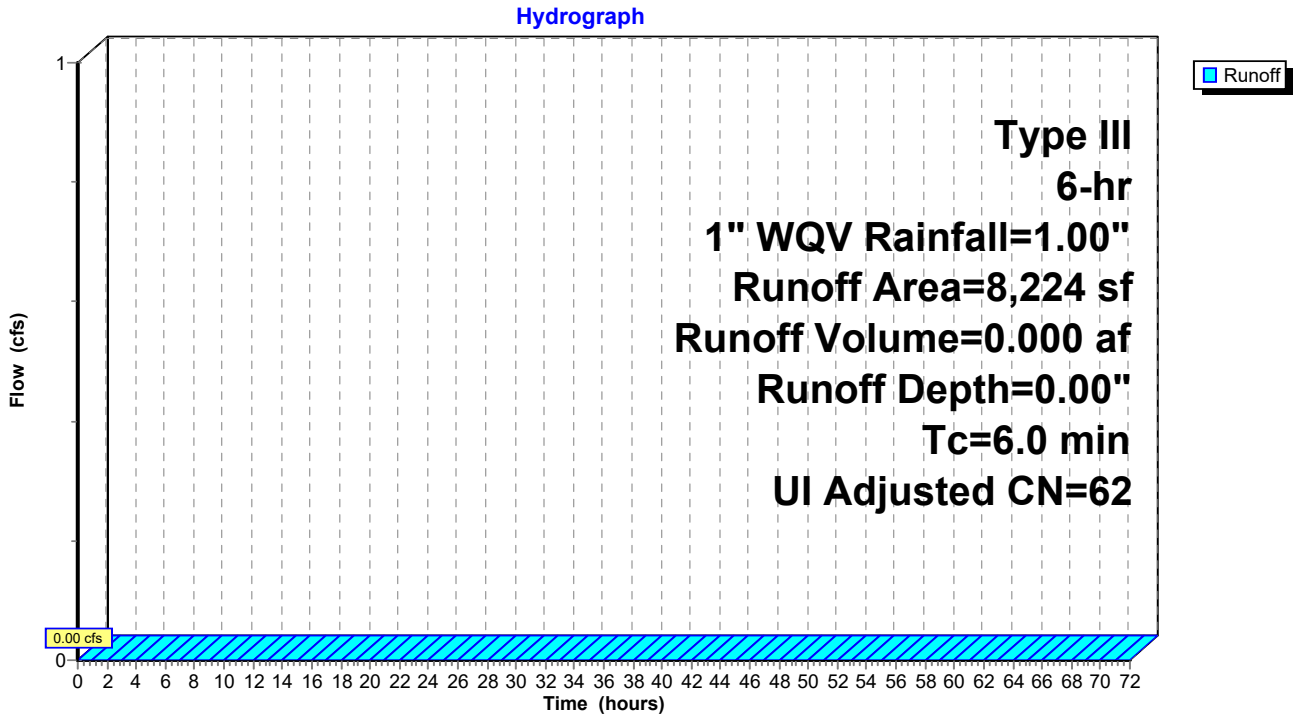
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 6-hr 1" WQV Rainfall=1.00"

Area (sf)	CN	Adj	Description
7,872	61		>75% Grass cover, Good, HSG B
352	98		Unconnected pavement, HSG B
8,224	63	62	Weighted Average, UI Adjusted
7,872			95.72% Pervious Area
352			4.28% Impervious Area
352			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 min**

Subcatchment 5C: PDA-5C



Summary for Subcatchment 5D: PDA-5D

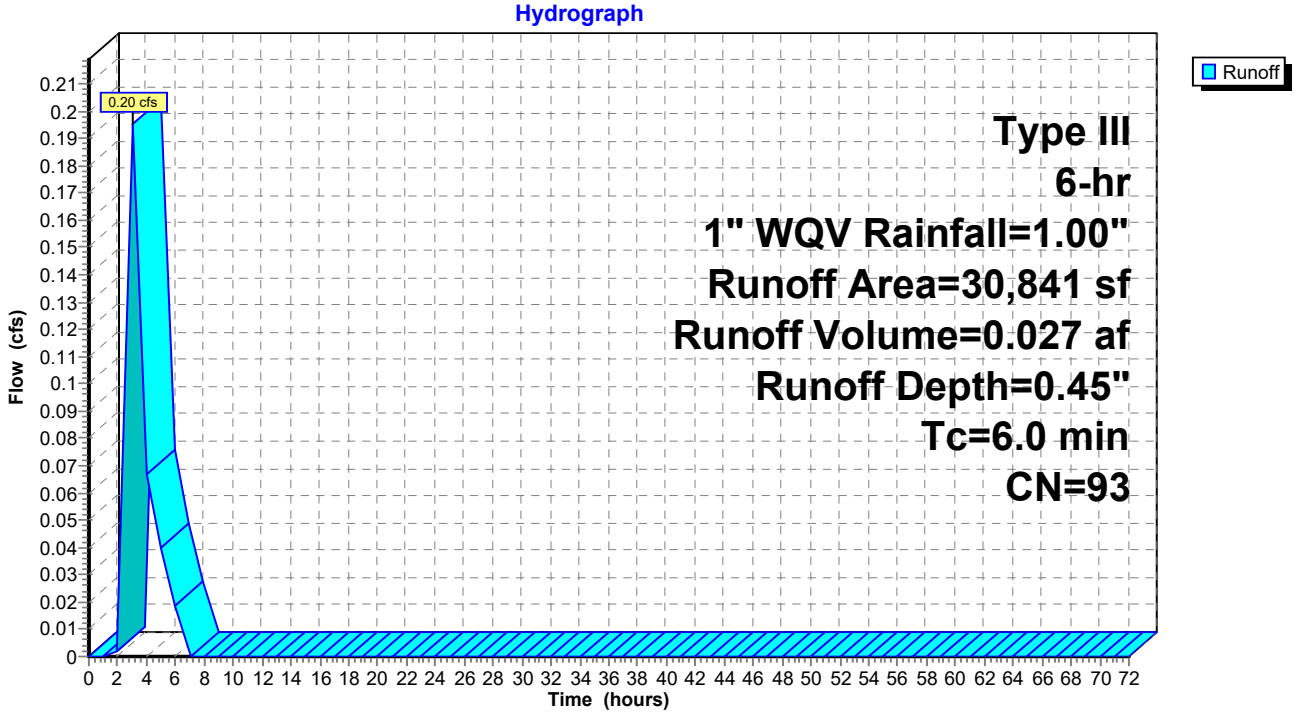
Runoff = 0.20 cfs @ 3.10 hrs, Volume= 0.027 af, Depth= 0.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 6-hr 1" WQV Rainfall=1.00"

Area (sf)	CN	Description
4,408	61	>75% Grass cover, Good, HSG B
26,433	98	Roofs, HSG B
30,841	93	Weighted Average
4,408		14.29% Pervious Area
26,433		85.71% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 min**

Subcatchment 5D: PDA-5D



Summary for Subcatchment 5E: PDA-5E

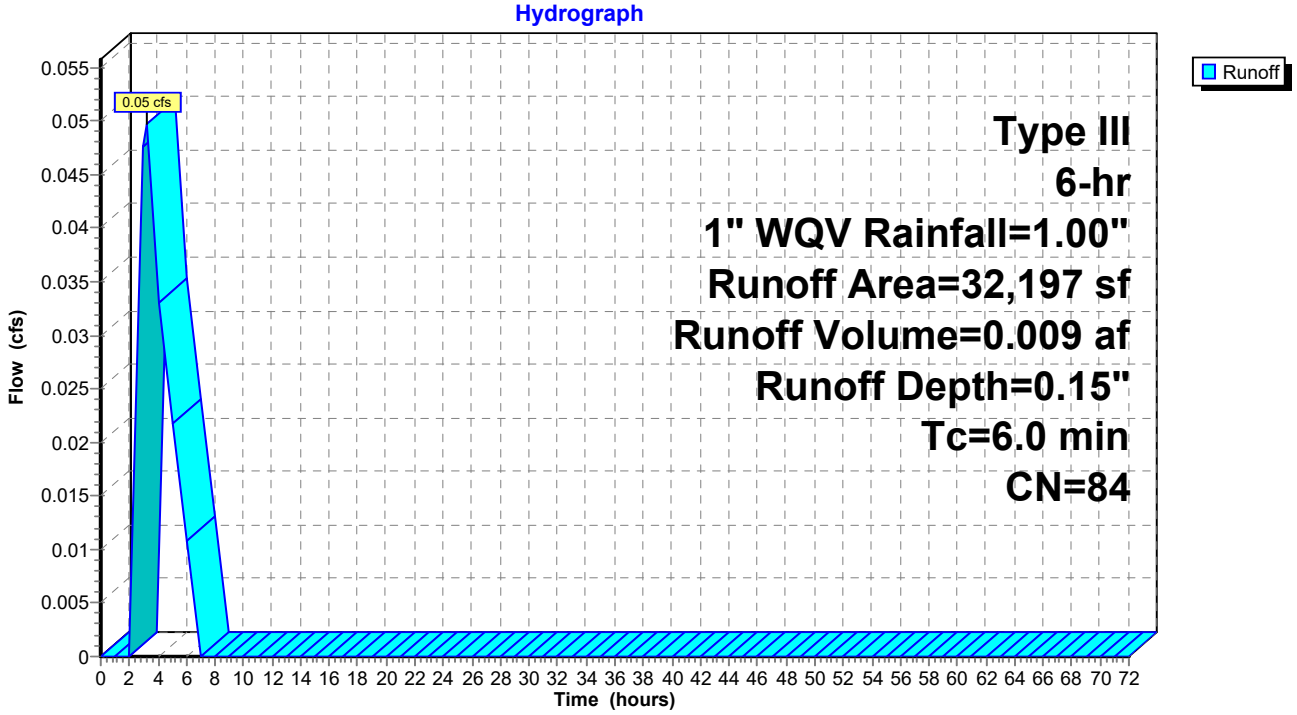
Runoff = 0.05 cfs @ 3.26 hrs, Volume= 0.009 af, Depth= 0.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 6-hr 1" WQV Rainfall=1.00"

Area (sf)	CN	Description
20,092	98	Paved parking, HSG B
12,105	61	>75% Grass cover, Good, HSG B
32,197	84	Weighted Average
12,105		37.60% Pervious Area
20,092		62.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 min**

Subcatchment 5E: PDA-5E



Summary for Subcatchment 6: PDA-6

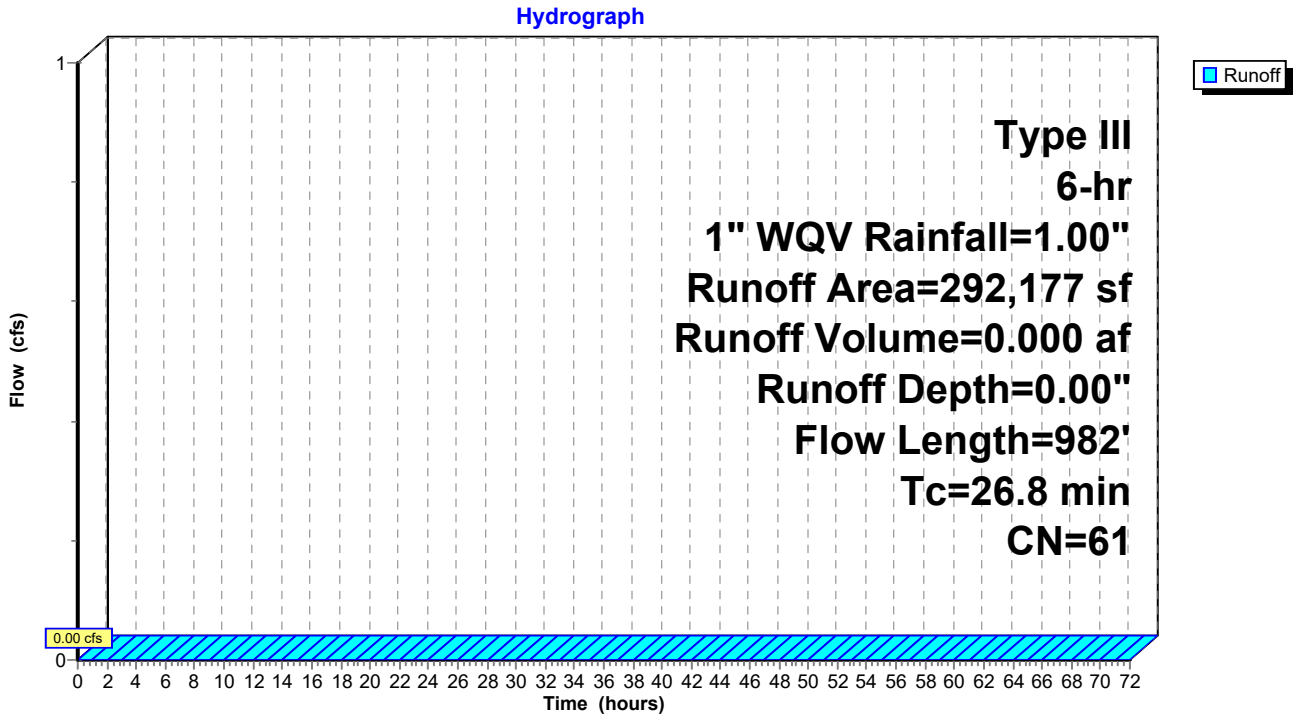
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 6-hr 1" WQV Rainfall=1.00"

Area (sf)	CN	Description
113,079	70	Woods, Good, HSG C
179,098	55	Woods, Good, HSG B
292,177	61	Weighted Average
292,177		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.1	50	0.0250	0.08		**Sheet Flow, 6A-6B** Woods: Light underbrush n= 0.400 P2= 3.32"
4.7	306	0.0474	1.09		**Shallow Concentrated Flow, 6B-6C** Woodland Kv= 5.0 fps
3.5	130	0.0154	0.62		**Shallow Concentrated Flow, 6C-6D** Woodland Kv= 5.0 fps
7.5	496	0.0484	1.10		**Shallow Concentrated Flow, 6D-EDP-6** Woodland Kv= 5.0 fps
26.8	982	Total			

Subcatchment 6: PDA-6



Summary for Subcatchment 7A: PDA-7A

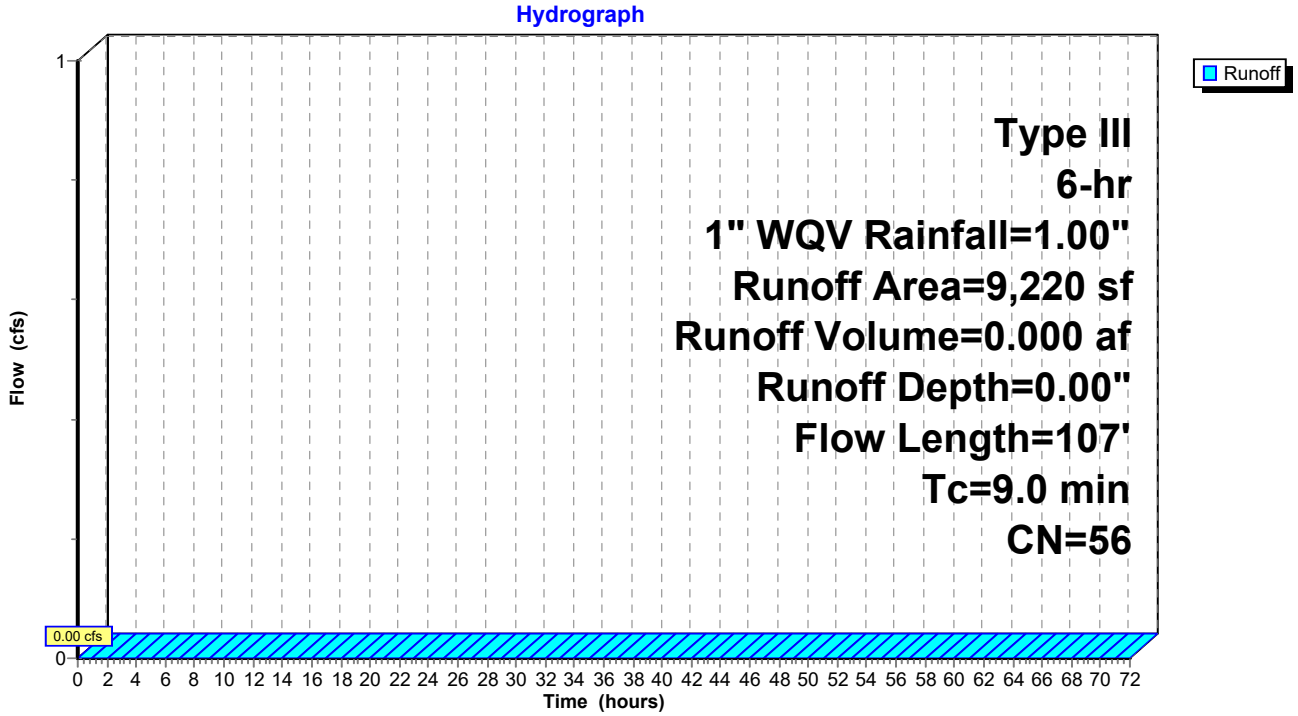
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 6-hr 1" WQV Rainfall=1.00"

Area (sf)	CN	Description
1,048	61	>75% Grass cover, Good, HSG B
8,172	55	Woods, Good, HSG B
9,220	56	Weighted Average
9,220		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	50	0.0550	0.10		**Sheet Flow, 7A-7B** Woods: Light underbrush n= 0.400 P2= 3.32"
0.9	57	0.0480	1.10		**Shallow Concentrated Flow, 7B-7C** Woodland Kv= 5.0 fps
9.0	107	Total			

Subcatchment 7A: PDA-7A



Summary for Subcatchment 7B: PDA-7B

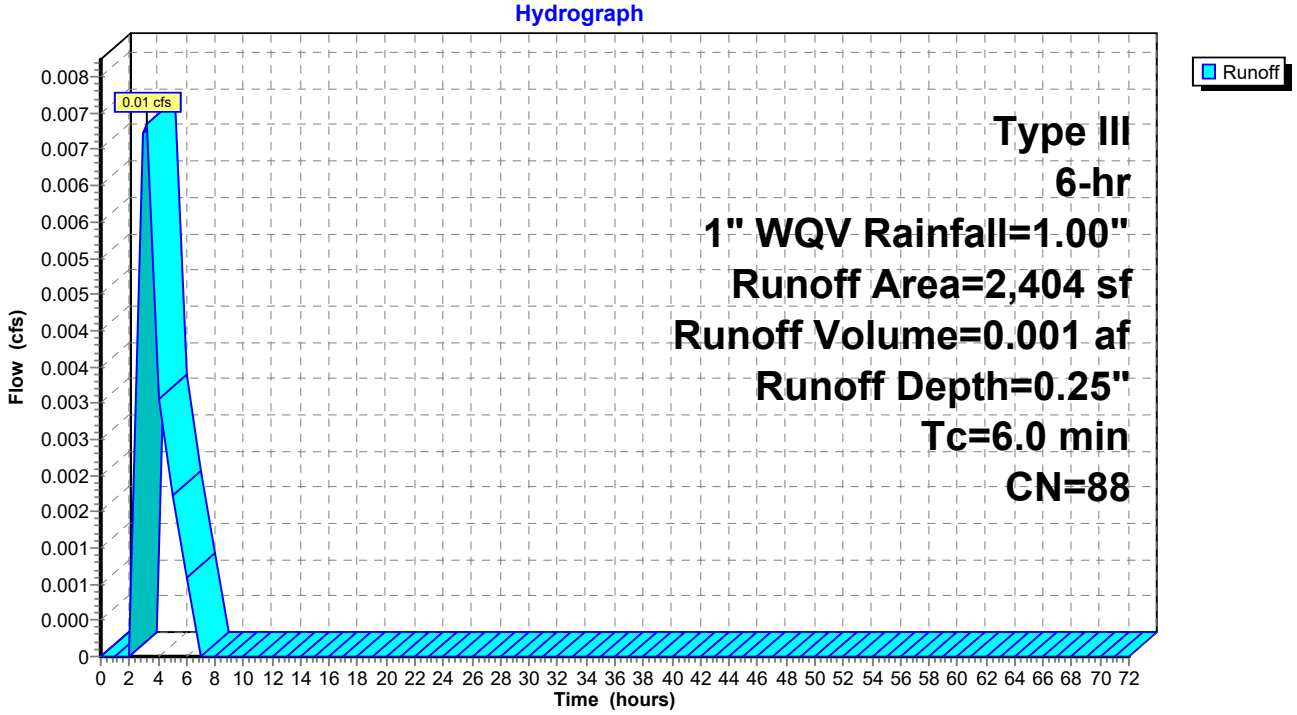
Runoff = 0.01 cfs @ 3.16 hrs, Volume= 0.001 af, Depth= 0.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 6-hr 1" WQV Rainfall=1.00"

Area (sf)	CN	Description
1,743	98	Roofs, HSG B
661	61	>75% Grass cover, Good, HSG B
2,404	88	Weighted Average
661		27.50% Pervious Area
1,743		72.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Subcatchment 7B: PDA-7B

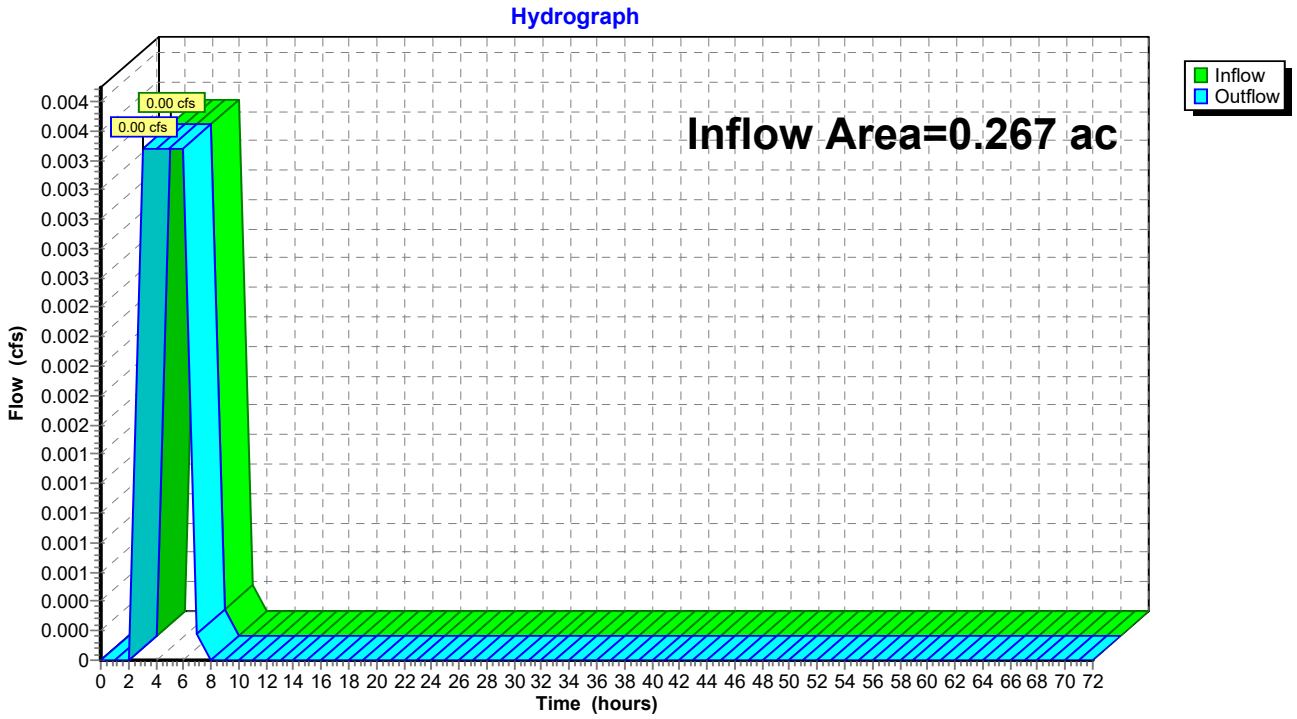


Summary for Reach DP-7: DP-7

Inflow Area = 0.267 ac, 14.99% Impervious, Inflow Depth = 0.05" for 1" WQV event
Inflow = 0.00 cfs @ 3.00 hrs, Volume= 0.001 af
Outflow = 0.00 cfs @ 3.00 hrs, Volume= 0.001 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs

Reach DP-7: DP-7



Summary for Reach PDP-4: Design Point 4

Inflow Area = 17.568 ac, 18.21% Impervious, Inflow Depth = 0.00" for 1" WQV event
Inflow = 0.00 cfs @ 6.48 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 8.13 hrs, Volume= 0.000 af, Atten= 40%, Lag= 98.9 min

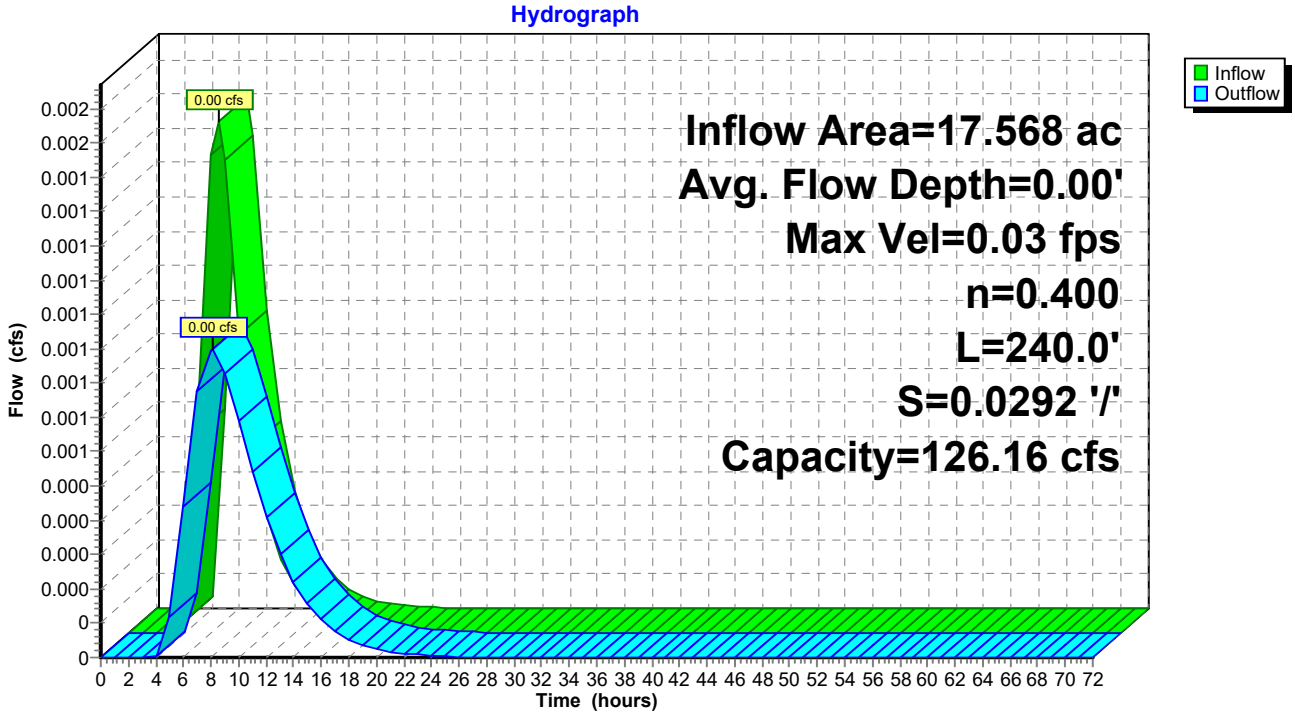
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs / 2
Max. Velocity= 0.03 fps, Min. Travel Time= 136.2 min
Avg. Velocity = 0.03 fps, Avg. Travel Time= 136.2 min

Peak Storage= 7 cf @ 8.13 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 1.00' Flow Area= 237.5 sf, Capacity= 126.16 cfs

165.00' x 1.00' deep channel, n= 0.400 Sheet flow: Woods+light brush
Side Slope Z-value= 80.0 65.0 '/' Top Width= 310.00'
Length= 240.0' Slope= 0.0292 '/'
Inlet Invert= 625.00', Outlet Invert= 618.00'

‡

Reach PDP-4: Design Point 4



Stage-Discharge for Reach PDP-4: Design Point 4

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
625.00	0.00	0.00
625.01	0.03	0.05
625.02	0.05	0.15
625.03	0.06	0.30
625.04	0.07	0.49
625.05	0.08	0.72
625.06	0.10	0.97
625.07	0.11	1.26
625.08	0.12	1.57
625.09	0.12	1.92
625.10	0.13	2.29
625.11	0.14	2.69
625.12	0.15	3.11
625.13	0.16	3.56
625.14	0.16	4.04
625.15	0.17	4.54
625.16	0.18	5.06
625.17	0.19	5.61
625.18	0.19	6.18
625.19	0.20	6.78
625.20	0.21	7.40
625.21	0.21	8.04
625.22	0.22	8.70
625.23	0.22	9.39
625.24	0.23	10.09
625.25	0.24	10.82
625.26	0.24	11.58
625.27	0.25	12.35
625.28	0.25	13.15
625.29	0.26	13.96
625.30	0.26	14.80
625.31	0.27	15.66
625.32	0.27	16.54
625.33	0.28	17.45
625.34	0.28	18.37
625.35	0.29	19.31
625.36	0.29	20.28
625.37	0.30	21.27
625.38	0.30	22.28
625.39	0.31	23.31
625.40	0.31	24.36
625.41	0.32	25.43
625.42	0.32	26.52
625.43	0.33	27.63
625.44	0.33	28.77
625.45	0.34	29.92
625.46	0.34	31.10
625.47	0.35	32.30
625.48	0.35	33.51
625.49	0.35	34.75
625.50	0.36	36.01
625.51	0.36	37.29
625.52	0.37	38.60
625.53	0.37	39.92
625.54	0.37	41.26
625.55	0.38	42.62
625.56	0.38	44.01
625.57	0.39	45.42
625.58	0.39	46.84
625.59	0.39	48.29
625.60	0.40	49.76
625.61	0.40	51.25
625.62	0.41	52.76
625.63	0.41	54.29
625.64	0.41	55.85
625.65	0.42	57.42
625.66	0.42	59.02
625.67	0.42	60.64
625.68	0.43	62.27
625.69	0.43	63.93
625.70	0.43	65.62
625.71	0.44	67.32
625.72	0.44	69.04
625.73	0.44	70.79
625.74	0.45	72.55
625.75	0.45	74.34
625.76	0.46	76.15
625.77	0.46	77.98
625.78	0.46	79.84
625.79	0.47	81.71
625.80	0.47	83.61
625.81	0.47	85.53
625.82	0.48	87.47
625.83	0.48	89.43
625.84	0.48	91.41
625.85	0.48	93.42
625.86	0.49	95.44
625.87	0.49	97.49
625.88	0.49	99.56
625.89	0.50	101.66
625.90	0.50	103.77
625.91	0.50	105.91
625.92	0.51	108.07
625.93	0.51	110.25
625.94	0.51	112.46
625.95	0.52	114.69
625.96	0.52	116.94
625.97	0.52	119.21
625.98	0.53	121.50
625.99	0.53	123.82
626.00	**0.53**	**126.16**

Summary for Reach PDP-5: Design Point 5

Inflow Area = 14.576 ac, 7.38% Impervious, Inflow Depth = 0.00" for 1" WQV event
Inflow = 0.00 cfs @ 5.55 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 6.48 hrs, Volume= 0.000 af, Atten= 53%, Lag= 55.5 min

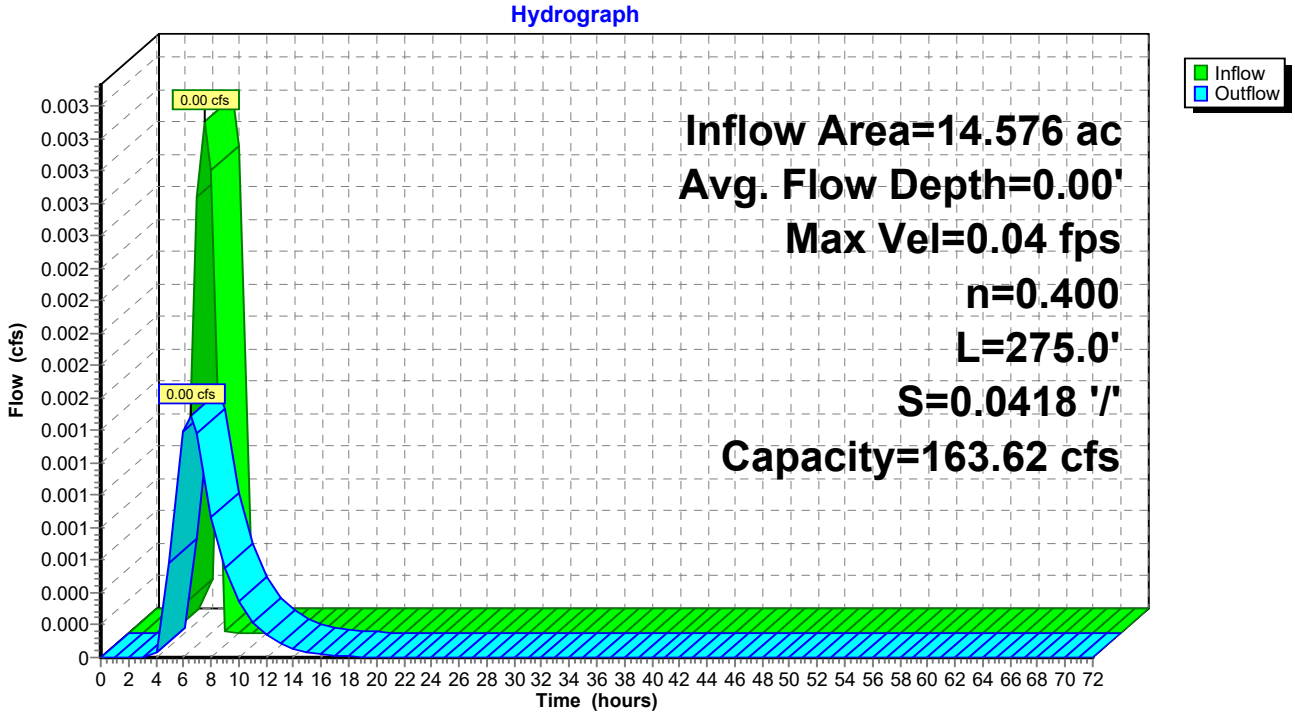
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs / 2
Max. Velocity= 0.04 fps, Min. Travel Time= 130.1 min
Avg. Velocity = 0.04 fps, Avg. Travel Time= 130.1 min

Peak Storage= 12 cf @ 6.48 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 1.00' Flow Area= 237.5 sf, Capacity= 163.62 cfs

200.00' x 1.00' deep channel, n= 0.400 Sheet flow: Woods+light brush
Side Slope Z-value= 50.0 25.0 '/' Top Width= 275.00'
Length= 275.0' Slope= 0.0418 '/'
Inlet Invert= 636.50', Outlet Invert= 625.00'

‡

Reach PDP-5: Design Point 5



Stage-Discharge for Reach PDP-5: Design Point 5

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
636.50	0.00	0.00
636.51	0.04	0.07
636.52	0.06	0.22
636.53	0.07	0.44
636.54	0.09	0.71
636.55	0.10	1.03
636.56	0.12	1.40
636.57	0.13	1.81
636.58	0.14	2.27
636.59	0.15	2.76
636.60	0.16	3.29
636.61	0.17	3.86
636.62	0.18	4.47
636.63	0.19	5.11
636.64	0.20	5.79
636.65	0.21	6.50
636.66	0.22	7.24
636.67	0.23	8.01
636.68	0.24	8.82
636.69	0.25	9.66
636.70	0.25	10.53
636.71	0.26	11.43
636.72	0.27	12.36
636.73	0.28	13.32
636.74	0.29	14.31
636.75	0.29	15.33
636.76	0.30	16.37
636.77	0.31	17.45
636.78	0.31	18.55
636.79	0.32	19.68
636.80	0.33	20.84
636.81	0.34	22.03
636.82	0.34	23.24
636.83	0.35	24.48
636.84	0.36	25.75
636.85	0.36	27.04
636.86	0.37	28.36
636.87	0.38	29.71
636.88	0.38	31.08
636.89	0.39	32.48
636.90	0.39	33.91
636.91	0.40	35.36
636.92	0.41	36.83
636.93	0.41	38.34
636.94	0.42	39.86
636.95	0.42	41.42
636.96	0.43	42.99
636.97	0.44	44.59
636.98	0.44	46.22
636.99	0.45	47.87
637.00	0.45	49.55
637.01	0.46	51.25
637.02	0.46	52.98
637.03	0.47	54.73
637.04	0.48	56.50
637.05	0.48	58.30
637.06	0.49	60.12
637.07	0.49	61.97
637.08	0.50	63.84
637.09	0.50	65.74
637.10	0.51	67.66
637.11	0.51	69.60
637.12	0.52	71.57
637.13	0.52	73.56
637.14	0.53	75.57
637.15	0.53	77.61
637.16	0.54	79.67
637.17	0.54	81.76
637.18	0.55	83.87
637.19	0.55	86.00
637.20	0.56	88.16
637.21	0.56	90.34
637.22	0.57	92.54
637.23	0.57	94.77
637.24	0.58	97.02
637.25	0.58	99.29
637.26	0.58	101.58
637.27	0.59	103.90
637.28	0.59	106.25
637.29	0.60	108.61
637.30	0.60	111.00
637.31	0.61	113.41
637.32	0.61	115.85
637.33	0.62	118.31
637.34	0.62	120.79
637.35	0.63	123.29
637.36	0.63	125.82
637.37	0.63	128.37
637.38	0.64	130.95
637.39	0.64	133.54
637.40	0.65	136.16
637.41	0.65	138.80
637.42	0.66	141.47
637.43	0.66	144.16
637.44	0.66	146.87
637.45	0.67	149.60
637.46	0.67	152.36
637.47	0.68	155.14
637.48	0.68	157.94
637.49	0.68	160.77
637.50	**0.69**	**163.62**

Summary for Reach PDP-6: Design Point 6

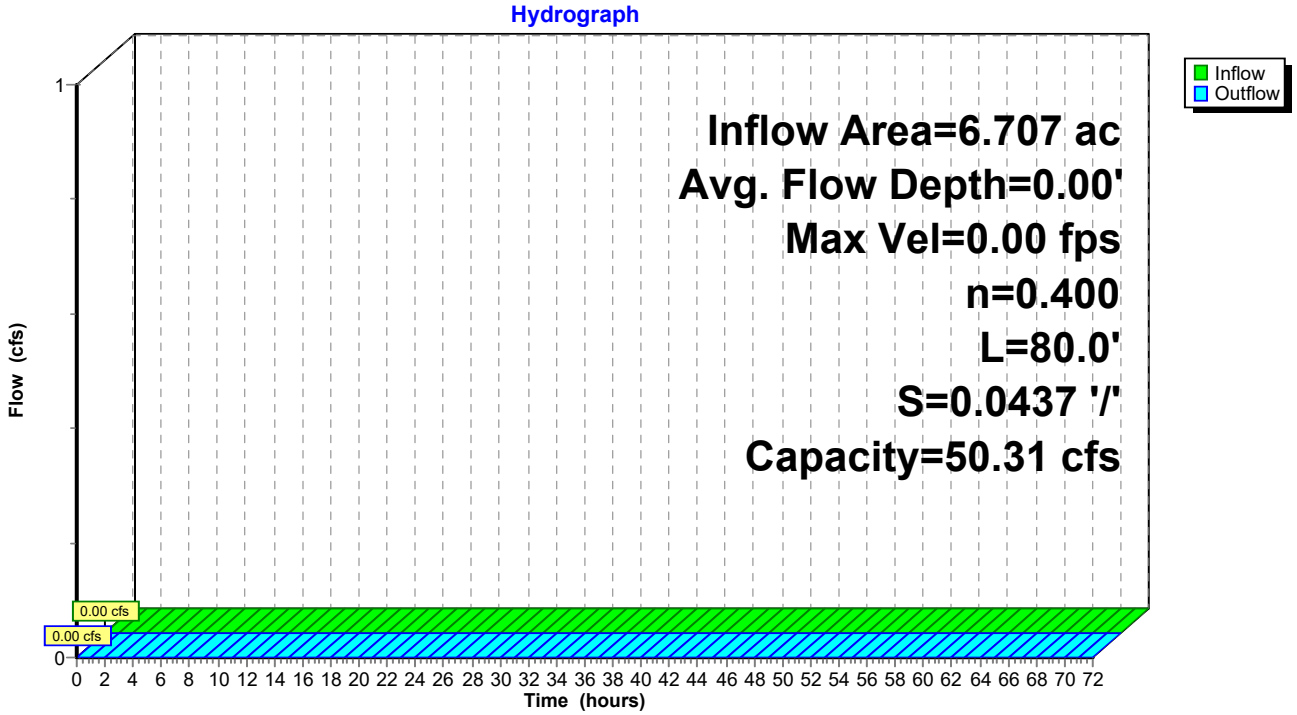
Inflow Area = 6.707 ac, 0.00% Impervious, Inflow Depth = 0.00" for 1" WQV event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs / 2
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 0.50' Flow Area= 107.5 sf, Capacity= 50.31 cfs

200.00' x 0.50' deep channel, n= 0.400 Sheet flow: Woods+light brush
Side Slope Z-value= 30.0 '/' Top Width= 230.00'
Length= 80.0' Slope= 0.0437 '/'
Inlet Invert= 642.50', Outlet Invert= 639.00'

Reach PDP-6: Design Point 6



Stage-Discharge for Reach PDP-6: Design Point 6

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
642.50	0.00	0.00
642.51	0.04	0.07
642.52	0.06	0.23
642.53	0.07	0.45
642.54	0.09	0.73
642.55	0.10	1.06
642.56	0.12	1.43
642.57	0.13	1.85
642.58	0.14	2.32
642.59	0.15	2.82
642.60	0.17	3.37
642.61	0.18	3.95
642.62	0.19	4.57
642.63	0.20	5.22
642.64	0.21	5.91
642.65	0.22	6.63
642.66	0.23	7.39
642.67	0.23	8.18
642.68	0.24	9.00
642.69	0.25	9.86
642.70	0.26	10.74
642.71	0.27	11.66
642.72	0.28	12.60
642.73	0.29	13.58
642.74	0.29	14.59
642.75	0.30	15.62
642.76	0.31	16.69
642.77	0.32	17.78
642.78	0.32	18.90
642.79	0.33	20.05
642.80	0.34	21.23
642.81	0.35	22.43
642.82	0.35	23.67
642.83	0.36	24.92
642.84	0.37	26.21
642.85	0.37	27.52
642.86	0.38	28.86
642.87	0.39	30.23
642.88	0.39	31.62
642.89	0.40	33.04
642.90	0.41	34.48
642.91	0.41	35.95
642.92	0.42	37.45
642.93	0.43	38.97
642.94	0.43	40.51
642.95	0.44	42.08
642.96	0.44	43.68
642.97	0.45	45.30
642.98	0.46	46.94
642.99	0.46	48.61
643.00	**0.47**	**50.31**

Summary for Pond 3: SFB-3

Inflow Area = 1.125 ac, 75.58% Impervious, Inflow Depth > 0.49" for 1" WQV event
Inflow = 0.09 cfs @ 3.48 hrs, Volume= 0.046 af
Outflow = 0.05 cfs @ 7.31 hrs, Volume= 0.046 af, Atten= 47%, Lag= 230.2 min
Discarded = 0.05 cfs @ 7.31 hrs, Volume= 0.046 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs / 3
Peak Elev= 621.61' @ 7.31 hrs Surf.Area= 1,002 sf Storage= 459 cf
Flood Elev= 623.50' Surf.Area= 2,450 sf Storage= 3,580 cf

Plug-Flow detention time= 121.5 min calculated for 0.045 af (99% of inflow)
Center-of-Mass det. time= 118.1 min (616.9 - 498.8)

Volume	Invert	Avail.Storage	Storage Description
#1	620.00'	3,306 cf	**Overall storage (Prismatic)** Listed below (Recalc) 4,263 cf Overall - 957 cf Embedded = 3,306 cf
#2	620.00'	211 cf	**Sand media (Prismatic)** Listed below (Recalc) Inside #1 638 cf Overall x 33.0% Voids
#3	621.00'	64 cf	**Infiltration Seed mix (Prismatic)** Listed below (Recalc) Inside #1 319 cf Overall x 20.0% Voids
		3,580 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
620.00	638	0	0
621.00	638	638	638
622.00	1,230	934	1,572
623.00	1,951	1,591	3,163
623.50	2,450	1,100	4,263

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
620.00	638	0	0
621.00	638	638	638

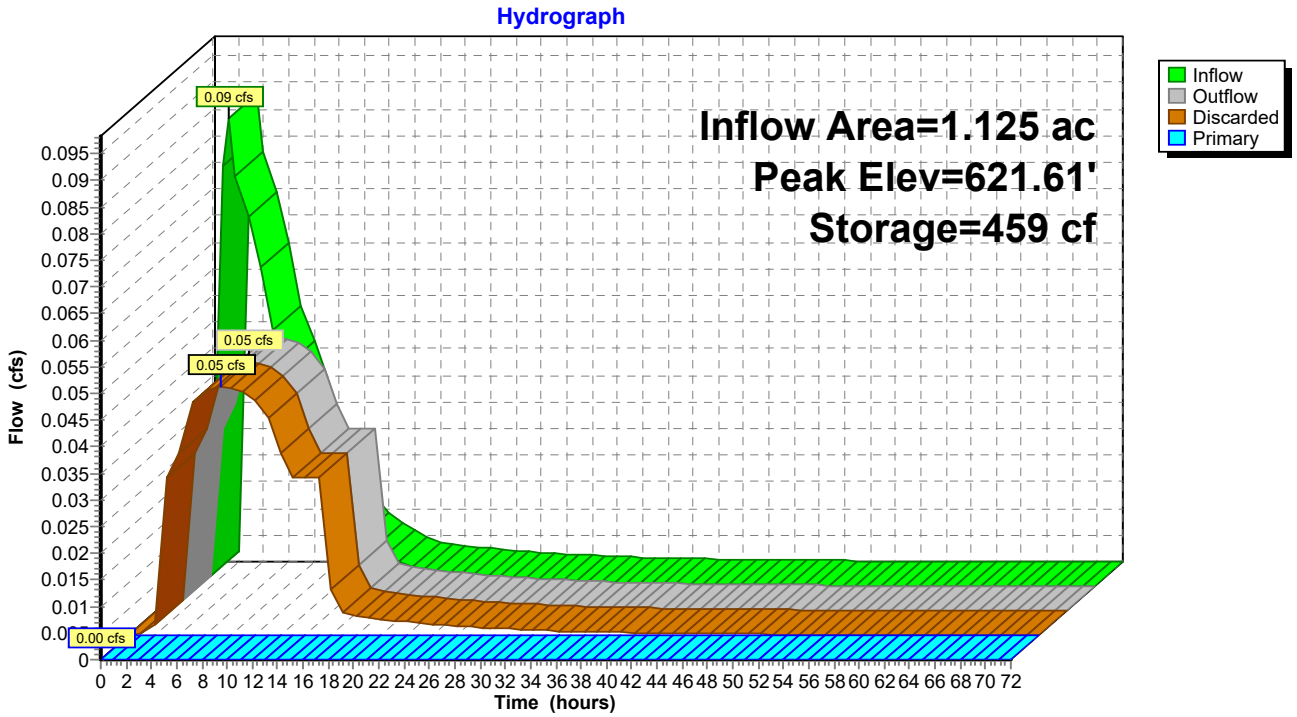
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
621.00	638	0	0
621.50	638	319	319

Device	Routing	Invert	Outlet Devices
#1	Discarded	620.00'	**2.010 in/hr Exfiltration over Surface area**
#2	Primary	620.14'	**8.0" Round Culvert** L= 14.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 620.14' / 620.00' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.35 sf
#3	Device 2	622.00'	**8.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.05 cfs @ 7.31 hrs HW=621.61' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=620.00' (Free Discharge)
└─**2=Culvert** (Controls 0.00 cfs)
└─**3=Orifice/Grate** (Controls 0.00 cfs)

Pond 3: SFB-3



Stage-Discharge for Pond 3: SFB-3

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
620.00	0.00	0.00	0.00
620.05	0.03	0.03	0.00
620.10	0.03	0.03	0.00
620.15	0.03	0.03	0.00
620.20	0.03	0.03	0.00
620.25	0.03	0.03	0.00
620.30	0.03	0.03	0.00
620.35	0.03	0.03	0.00
620.40	0.03	0.03	0.00
620.45	0.03	0.03	0.00
620.50	0.03	0.03	0.00
620.55	0.03	0.03	0.00
620.60	0.03	0.03	0.00
620.65	0.03	0.03	0.00
620.70	0.03	0.03	0.00
620.75	0.03	0.03	0.00
620.80	0.03	0.03	0.00
620.85	0.03	0.03	0.00
620.90	0.03	0.03	0.00
620.95	0.03	0.03	0.00
621.00	0.03	0.03	0.00
621.05	0.03	0.03	0.00
621.10	0.03	0.03	0.00
621.15	0.03	0.03	0.00
621.20	0.04	0.04	0.00
621.25	0.04	0.04	0.00
621.30	0.04	0.04	0.00
621.35	0.04	0.04	0.00
621.40	0.04	0.04	0.00
621.45	0.04	0.04	0.00
621.50	0.04	0.04	0.00
621.55	0.04	0.04	0.00
621.60	0.05	0.05	0.00
621.65	0.05	0.05	0.00
621.70	0.05	0.05	0.00
621.75	0.05	0.05	0.00
621.80	0.05	0.05	0.00
621.85	0.05	0.05	0.00
621.90	0.05	0.05	0.00
621.95	0.06	0.06	0.00
622.00	0.06	0.06	0.00
622.05	0.14	0.06	0.08
622.10	0.28	0.06	0.22
622.15	0.46	0.06	0.40
622.20	0.68	0.06	0.61
622.25	0.91	0.07	0.84
622.30	0.99	0.07	0.92
622.35	1.06	0.07	0.99
622.40	1.13	0.07	1.06
622.45	1.20	0.07	1.13
622.50	1.26	0.07	1.19
622.55	1.32	0.08	1.25
622.60	1.38	0.08	1.30
622.65	1.43	0.08	1.36
622.70	1.49	0.08	1.41
622.75	1.54	0.08	1.46
622.80	1.59	0.08	1.50
622.85	1.64	0.09	1.55
622.90	1.68	0.09	1.59
622.95	1.73	0.09	1.64
623.00	1.77	0.09	1.68
623.05	1.82	0.09	1.72
623.10	1.86	0.10	1.76
623.15	1.90	0.10	1.80
623.20	1.94	0.10	1.84
623.25	1.98	0.10	1.88
623.30	2.02	0.10	1.92
623.35	2.06	0.11	1.95
623.40	2.10	0.11	1.99
623.45	2.14	0.11	2.02
623.50	**2.17**	**0.11**	**2.06**

Summary for Pond 4: SFB-4

Inflow Area =	1.487 ac, 85.51% Impervious, Inflow Depth = 0.60" for 1" WQV event				
Inflow =	0.45 cfs @	3.09 hrs,	Volume=	0.074 af	
Outflow =	0.28 cfs @	3.50 hrs,	Volume=	0.068 af,	Atten= 38%, Lag= 24.6 min
Discarded =	0.28 cfs @	3.50 hrs,	Volume=	0.068 af	
Primary =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af	
Secondary =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs / 3
Peak Elev= 630.72' @ 3.82 hrs Surf.Area= 1,643 sf Storage= 389 cf
Flood Elev= 634.00' Surf.Area= 4,000 sf Storage= 8,373 cf

Plug-Flow detention time= 92.0 min calculated for 0.068 af (92% of inflow)
Center-of-Mass det. time= 20.1 min (307.9 - 287.8)

Volume	Invert	Avail.Storage	Storage Description
#1	630.00'	7,667 cf	**Overall storage (Prismatic)** Listed below (Recalc) 10,132 cf Overall - 2,465 cf Embedded = 7,667 cf
#2	630.00'	542 cf	**Sand media (Prismatic)** Listed below (Recalc) Inside #1 1,643 cf Overall x 33.0% Voids
#3	631.00'	164 cf	**Infiltration Seed mix (Prismatic)** Listed below (Recalc) Inside #1 822 cf Overall x 20.0% Voids
		8,373 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
630.00	1,643	0	0
631.00	1,643	1,643	1,643
632.00	2,443	2,043	3,686
633.00	3,224	2,834	6,520
634.00	4,000	3,612	10,132

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
630.00	1,643	0	0
631.00	1,643	1,643	1,643

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
631.00	1,643	0	0
631.50	1,643	822	822

Device	Routing	Invert	Outlet Devices
#1	Discarded	630.00'	**6.560 in/hr Exfiltration over Surface area**
#2	Primary	630.00'	**8.0" Round Culvert** L= 25.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 630.00' / 629.25' S= 0.0300 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.35 sf
#3	Device 2	632.00'	**2.0" Vert. Orifice/Grate** C= 0.600
#4	Device 2	632.65'	**4.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

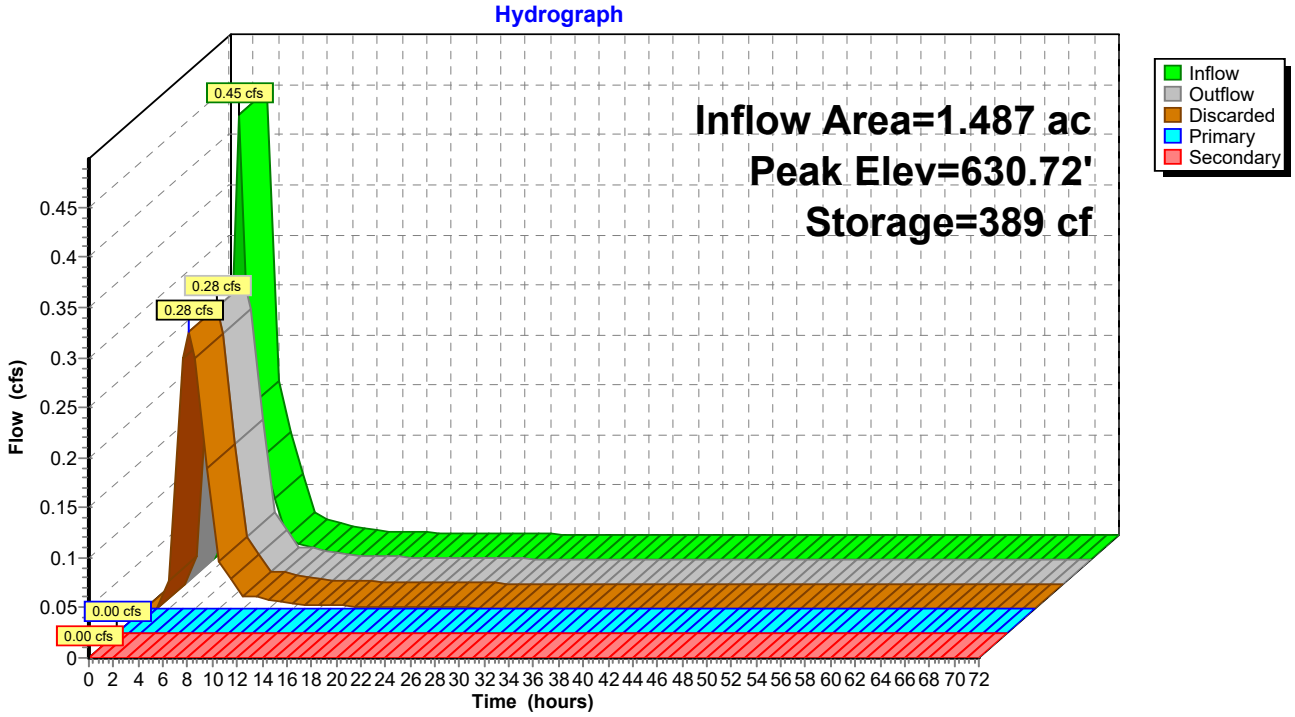
#5 Secondary 633.30' **50.0' long x 1.0' breadth Broad-Crested Rectangular Weir**
Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00
Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Discarded OutFlow Max=0.25 cfs @ 3.50 hrs HW=630.54' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.25 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=630.00' (Free Discharge)
└─**2=Culvert** (Controls 0.00 cfs)
  ├─**3=Orifice/Grate** (Controls 0.00 cfs)
  └─**4=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=630.00' (Free Discharge)
└─**5=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

Pond 4: SFB-4



Stage-Discharge for Pond 4: SFB-4

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)	Secondary (cfs)
630.00	0.00	0.00	0.00	0.00
630.10	0.25	0.25	0.00	0.00
630.20	0.25	0.25	0.00	0.00
630.30	0.25	0.25	0.00	0.00
630.40	0.25	0.25	0.00	0.00
630.50	0.25	0.25	0.00	0.00
630.60	0.25	0.25	0.00	0.00
630.70	0.25	0.25	0.00	0.00
630.80	0.25	0.25	0.00	0.00
630.90	0.25	0.25	0.00	0.00
631.00	0.25	0.25	0.00	0.00
631.10	0.26	0.26	0.00	0.00
631.20	0.27	0.27	0.00	0.00
631.30	0.29	0.29	0.00	0.00
631.40	0.30	0.30	0.00	0.00
631.50	0.31	0.31	0.00	0.00
631.60	0.32	0.32	0.00	0.00
631.70	0.33	0.33	0.00	0.00
631.80	0.35	0.35	0.00	0.00
631.90	0.36	0.36	0.00	0.00
632.00	0.37	0.37	0.00	0.00
632.10	0.40	0.38	0.01	0.00
632.20	0.43	0.39	0.04	0.00
632.30	0.46	0.41	0.05	0.00
632.40	0.48	0.42	0.06	0.00
632.50	0.50	0.43	0.07	0.00
632.60	0.52	0.44	0.08	0.00
632.70	0.57	0.45	0.12	0.00
632.80	0.72	0.47	0.25	0.00
632.90	0.78	0.48	0.31	0.00
633.00	0.84	0.49	0.35	0.00
633.10	0.89	0.50	0.39	0.00
633.20	0.94	0.51	0.42	0.00
633.30	0.98	0.52	0.45	0.00
633.40	5.27	0.54	0.48	4.25
633.50	13.09	0.55	0.51	12.03
633.60	23.32	0.56	0.54	22.22
633.70	35.54	0.57	0.56	34.41
633.80	49.52	0.58	0.59	48.35
633.90	65.11	0.60	0.61	63.90
634.00	**83.23**	**0.61**	**0.63**	**81.99**

Summary for Pond 5: SFB-5

Inflow Area =	1.636 ac, 65.78% Impervious, Inflow Depth = 0.25" for 1" WQV event				
Inflow =	0.13 cfs @	3.42 hrs,	Volume=	0.034 af	
Outflow =	0.10 cfs @	3.00 hrs,	Volume=	0.034 af,	Atten= 24%, Lag= 0.0 min
Discarded =	0.10 cfs @	3.00 hrs,	Volume=	0.034 af	
Primary =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af	
Secondary =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs / 3
Peak Elev= 632.20' @ 4.74 hrs Surf.Area= 1,505 sf Storage= 97 cf
Flood Elev= 636.00' Surf.Area= 4,050 sf Storage= 8,589 cf

Plug-Flow detention time= 12.5 min calculated for 0.034 af (100% of inflow)
Center-of-Mass det. time= 14.2 min (274.2 - 260.0)

Volume	Invert	Avail.Storage	Storage Description
#1	632.00'	7,942 cf	**Overall storage (Prismatic)** Listed below (Recalc) 10,200 cf Overall - 2,258 cf Embedded = 7,942 cf
#2	632.00'	497 cf	**Sand media (Prismatic)** Listed below (Recalc) Inside #1 1,505 cf Overall x 33.0% Voids
#3	633.00'	151 cf	**Infiltration Seed mix (Prismatic)** Listed below (Recalc) Inside #1 753 cf Overall x 20.0% Voids
		8,589 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
632.00	1,505	0	0
633.50	1,505	2,258	2,258
634.00	2,741	1,062	3,319
635.00	3,485	3,113	6,432
636.00	4,050	3,768	10,200

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
632.00	1,505	0	0
633.00	1,505	1,505	1,505

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
633.00	1,505	0	0
633.50	1,505	753	753

Device	Routing	Invert	Outlet Devices
#1	Discarded	632.00'	**2.840 in/hr Exfiltration over Surface area**
#2	Primary	633.80'	**6.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 633.80' / 633.75' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf
#3	Device 2	634.50'	**2.0" Vert. Orifice/Grate** C= 0.600
#4	Secondary	635.00'	**80.0' long x 1.0' breadth Broad-Crested Rectangular Weir**

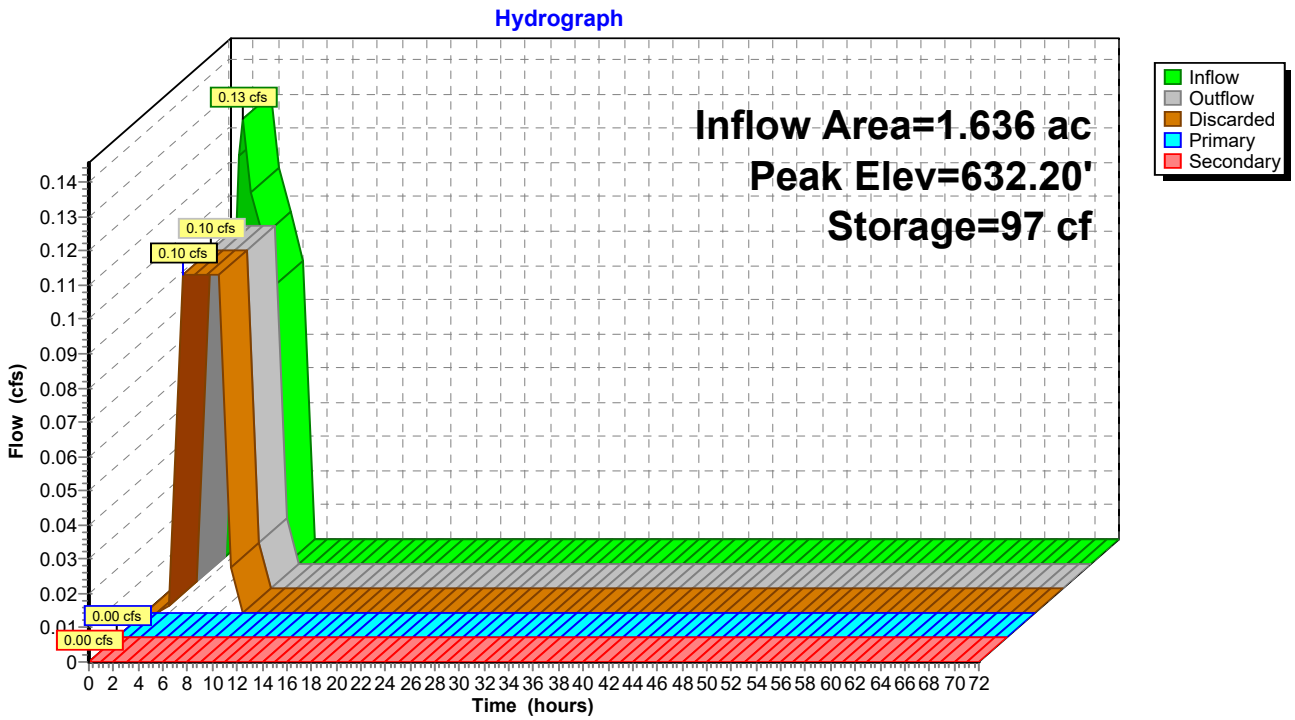
Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00
Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Discarded OutFlow Max=0.10 cfs @ 3.00 hrs HW=632.06' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.10 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=632.00' (Free Discharge)
└─**2=Culvert** (Controls 0.00 cfs)
└─**3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=632.00' (Free Discharge)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 5: SFB-5



Stage-Discharge for Pond 5: SFB-5

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)	Secondary (cfs)
632.00	0.00	0.00	0.00	0.00
632.10	0.10	0.10	0.00	0.00
632.20	0.10	0.10	0.00	0.00
632.30	0.10	0.10	0.00	0.00
632.40	0.10	0.10	0.00	0.00
632.50	0.10	0.10	0.00	0.00
632.60	0.10	0.10	0.00	0.00
632.70	0.10	0.10	0.00	0.00
632.80	0.10	0.10	0.00	0.00
632.90	0.10	0.10	0.00	0.00
633.00	0.10	0.10	0.00	0.00
633.10	0.10	0.10	0.00	0.00
633.20	0.10	0.10	0.00	0.00
633.30	0.10	0.10	0.00	0.00
633.40	0.10	0.10	0.00	0.00
633.50	0.10	0.10	0.00	0.00
633.60	0.12	0.12	0.00	0.00
633.70	0.13	0.13	0.00	0.00
633.80	0.15	0.15	0.00	0.00
633.90	0.16	0.16	0.00	0.00
634.00	0.18	0.18	0.00	0.00
634.10	0.19	0.19	0.00	0.00
634.20	0.19	0.19	0.00	0.00
634.30	0.19	0.19	0.00	0.00
634.40	0.20	0.20	0.00	0.00
634.50	0.20	0.20	0.00	0.00
634.60	0.22	0.21	0.01	0.00
634.70	0.25	0.21	0.04	0.00
634.80	0.27	0.22	0.05	0.00
634.90	0.28	0.22	0.06	0.00
635.00	0.30	0.23	0.07	0.00
635.10	7.11	0.23	0.08	6.81
635.20	19.57	0.24	0.08	19.25
635.30	35.89	0.24	0.09	35.56
635.40	55.39	0.24	0.09	55.05
635.50	77.71	0.25	0.10	77.36
635.60	102.60	0.25	0.11	102.25
635.70	131.55	0.26	0.11	131.19
635.80	163.52	0.26	0.12	163.14
635.90	199.49	0.26	0.12	199.11
636.00	**238.79**	**0.27**	**0.13**	**238.40**

Summary for Pond DB-3: DB-3

Inflow Area = 0.593 ac,100.00% Impervious, Inflow Depth = 0.79" for 1" WQV event
Inflow = 0.30 cfs @ 3.04 hrs, Volume= 0.039 af
Outflow = 0.06 cfs @ 4.58 hrs, Volume= 0.039 af, Atten= 81%, Lag= 92.6 min
Primary = 0.06 cfs @ 4.58 hrs, Volume= 0.039 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Peak Elev= 626.37' @ 4.58 hrs Surf.Area= 0.081 ac Storage= 0.026 af
Flood Elev= 630.00' Surf.Area= 0.081 ac Storage= 0.276 af

Plug-Flow detention time= 352.2 min calculated for 0.039 af (100% of inflow)
Center-of-Mass det. time= 345.0 min (546.6 - 201.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	626.00'	0.000 af	**27.58'W x 127.56'L x 4.67'H Field A** 0.377 af Overall - 0.377 af Embedded = 0.000 af x 0.0% Voids
#2A	626.00'	0.276 af	**StormTrap ST1 SingleTrap 4-0** x 36 Inside #1 Inside= 82.7"W x 48.0"H => 23.79 sf x 14.06'L = 334.5 cf Outside= 82.7"W x 56.0"H => 32.18 sf x 14.06'L = 452.5 cf 4 Rows of 9 Chambers 27.58' x 126.56' Core + 0.00' x 0.50' Border = 27.58' x 127.56' System
		0.276 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	626.00'	**8.0" Round Culvert** L= 240.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 626.00' / 622.00' S= 0.0167 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.35 sf
#2	Device 1	626.00'	**2.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.06 cfs @ 4.58 hrs HW=626.37' (Free Discharge)
└─**1=Culvert** (Passes 0.06 cfs of 0.32 cfs potential flow)
└─**2=Orifice/Grate** (Orifice Controls 0.06 cfs @ 2.57 fps)

Pond DB-3: DB-3 - Chamber Wizard Field A

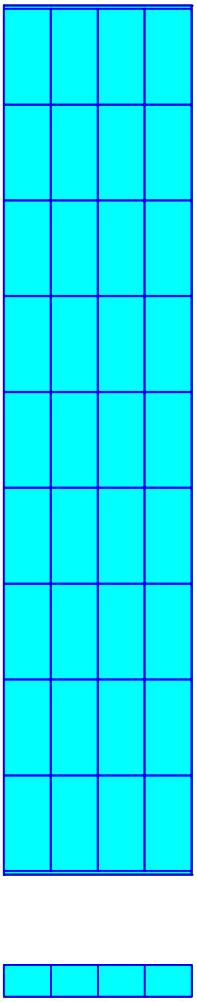
Chamber Model = StormTrap ST1 SingleTrap 4-0 (StormTrap ST1 SingleTrap® Type VI)
Inside= 82.7"W x 48.0"H => 23.79 sf x 14.06'L = 334.5 cf
Outside= 82.7"W x 56.0"H => 32.18 sf x 14.06'L = 452.5 cf

9 Chambers/Row x 14.06' Long = 126.56' Row Length +6.0" Border x 2 = 127.56' Base Length
4 Rows x 82.7" Wide = 27.58' Base Width
56.0" Chamber Height = 4.67' Field Height

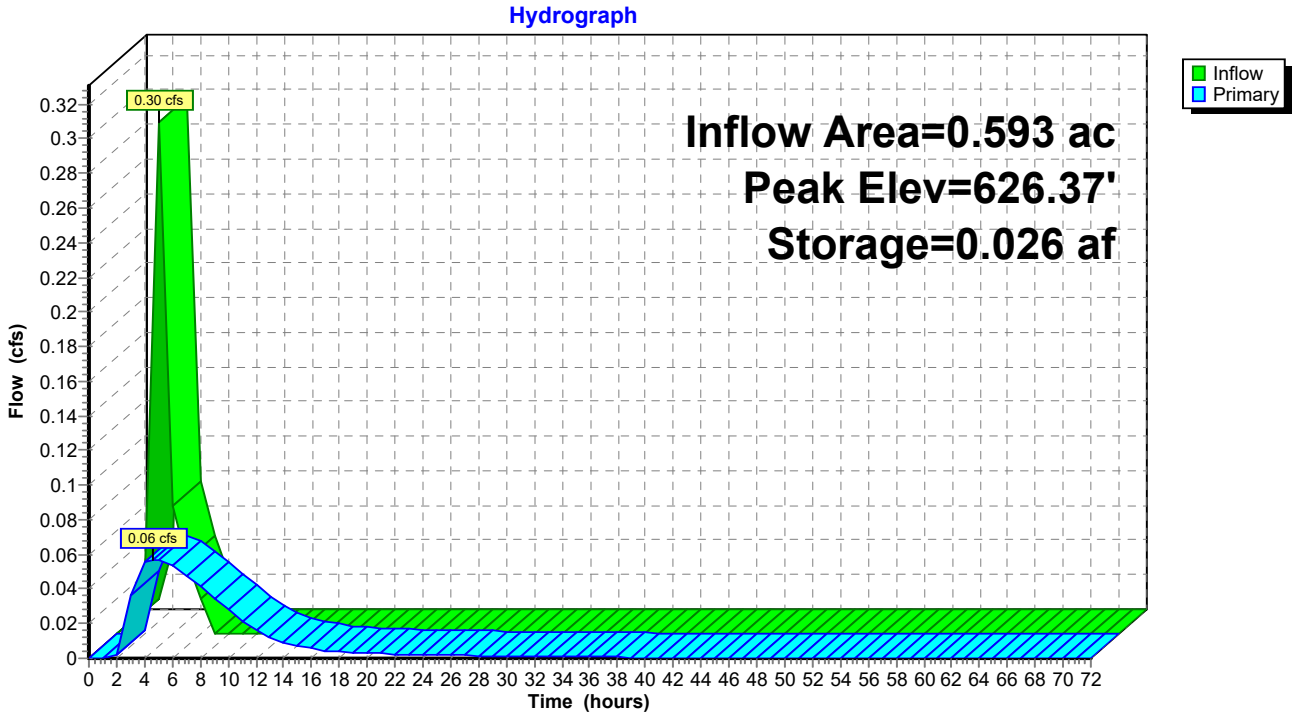
36 Chambers x 334.5 cf = 12,042.0 cf Chamber Storage
36 Chambers x 452.5 cf + 128.7 cf Border = 16,420.1 cf Displacement

Chamber Storage = 12,042.0 cf = 0.276 af
Overall Storage Efficiency = 73.3%
Overall System Size = 127.56' x 27.58' x 4.67'

36 Chambers (plus border)
608.2 cy Field



Pond DB-3: DB-3


Hydrograph
Inflow
Primary
0.30 cfs
0.06 cfs
Inflow Area=0.593 ac
Peak Elev=626.37'
Storage=0.026 af
Flow (cfs)
Time (hours)

Stage-Discharge for Pond DB-3: DB-3

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
626.00	0.00	628.60	0.17
626.05	0.00	628.65	0.17
626.10	0.01	628.70	0.17
626.15	0.03	628.75	0.17
626.20	0.04	628.80	0.17
626.25	0.04	628.85	0.17
626.30	0.05	628.90	0.18
626.35	0.05	628.95	0.18
626.40	0.06	629.00	0.18
626.45	0.06	629.05	0.18
626.50	0.07	629.10	0.18
626.55	0.07	629.15	0.18
626.60	0.08	629.20	0.19
626.65	0.08	629.25	0.19
626.70	0.08	629.30	0.19
626.75	0.09	629.35	0.19
626.80	0.09	629.40	0.19
626.85	0.09	629.45	0.19
626.90	0.09	629.50	0.19
626.95	0.10	629.55	0.20
627.00	0.10	629.60	0.20
627.05	0.10	629.65	0.20
627.10	0.11	629.70	0.20
627.15	0.11	629.75	0.20
627.20	0.11	629.80	0.20
627.25	0.11	629.85	0.20
627.30	0.12	629.90	0.21
627.35	0.12	629.95	0.21
627.40	0.12	630.00	0.21
627.45	0.12	630.05	0.21
627.50	0.13	630.10	0.21
627.55	0.13	630.15	0.21
627.60	0.13	630.20	0.21
627.65	0.13	630.25	0.21
627.70	0.13	630.30	0.22
627.75	0.14	630.35	0.22
627.80	0.14	630.40	0.22
627.85	0.14	630.45	0.22
627.90	0.14	630.50	0.22
627.95	0.14	630.55	0.22
628.00	0.15	630.60	0.22
628.05	0.15	630.65	**0.22**
628.10	0.15		
628.15	0.15		
628.20	0.15		
628.25	0.15		
628.30	0.16		
628.35	0.16		
628.40	0.16		
628.45	0.16		
628.50	0.16		
628.55	0.16		

Summary for Pond DB-4: DB-4

Inflow Area = 0.274 ac,100.00% Impervious, Inflow Depth = 0.79" for 1" WQV event
Inflow = 0.14 cfs @ 3.04 hrs, Volume= 0.018 af
Outflow = 0.04 cfs @ 4.42 hrs, Volume= 0.018 af, Atten= 74%, Lag= 82.8 min
Primary = 0.04 cfs @ 4.42 hrs, Volume= 0.018 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Peak Elev= 634.19' @ 4.41 hrs Surf.Area= 0.072 ac Storage= 0.012 af
Flood Elev= 638.00' Surf.Area= 0.072 ac Storage= 0.246 af

Plug-Flow detention time= 337.4 min calculated for 0.018 af (100% of inflow)
Center-of-Mass det. time= 329.4 min (531.1 - 201.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	634.00'	0.000 af	**27.58'W x 113.50'L x 4.67'H Field A** 0.335 af Overall - 0.335 af Embedded = 0.000 af x 0.0% Voids
#2A	634.00'	0.246 af	**StormTrap ST1 SingleTrap 4-0** x 32 Inside #1 Inside= 82.7"W x 48.0"H => 23.79 sf x 14.06'L = 334.5 cf Outside= 82.7"W x 56.0"H => 32.18 sf x 14.06'L = 452.5 cf 4 Rows of 8 Chambers 27.58' x 112.50' Core + 0.00' x 0.50' Border = 27.58' x 113.50' System
		0.246 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	634.00'	**6.0" Round Culvert** L= 100.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 634.00' / 633.00' S= 0.0100 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.20 sf
#2	Device 1	634.00'	**2.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	636.00'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Device 1	637.00'	**4.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.03 cfs @ 4.42 hrs HW=634.18' (Free Discharge)
└─**1=Culvert** (Passes 0.03 cfs of 0.07 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.03 cfs @ 1.52 fps)
  ├─**3=Orifice/Grate** (Controls 0.00 cfs)
  └─**4=Orifice/Grate** (Controls 0.00 cfs)

Pond DB-4: DB-4 - Chamber Wizard Field A

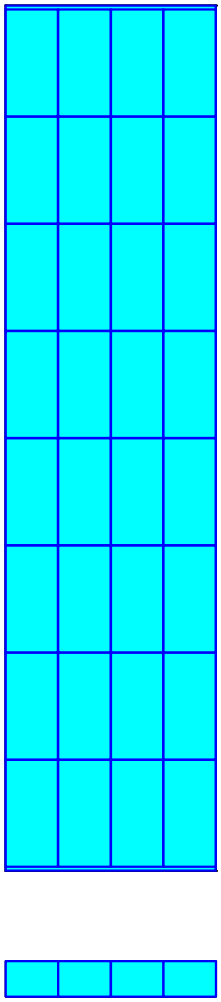
Chamber Model = StormTrap ST1 SingleTrap 4-0 (StormTrap ST1 SingleTrap® Type VI)
Inside= 82.7"W x 48.0"H => 23.79 sf x 14.06'L = 334.5 cf
Outside= 82.7"W x 56.0"H => 32.18 sf x 14.06'L = 452.5 cf

8 Chambers/Row x 14.06' Long = 112.50' Row Length +6.0" Border x 2 = 113.50' Base Length
4 Rows x 82.7" Wide = 27.58' Base Width
56.0" Chamber Height = 4.67' Field Height

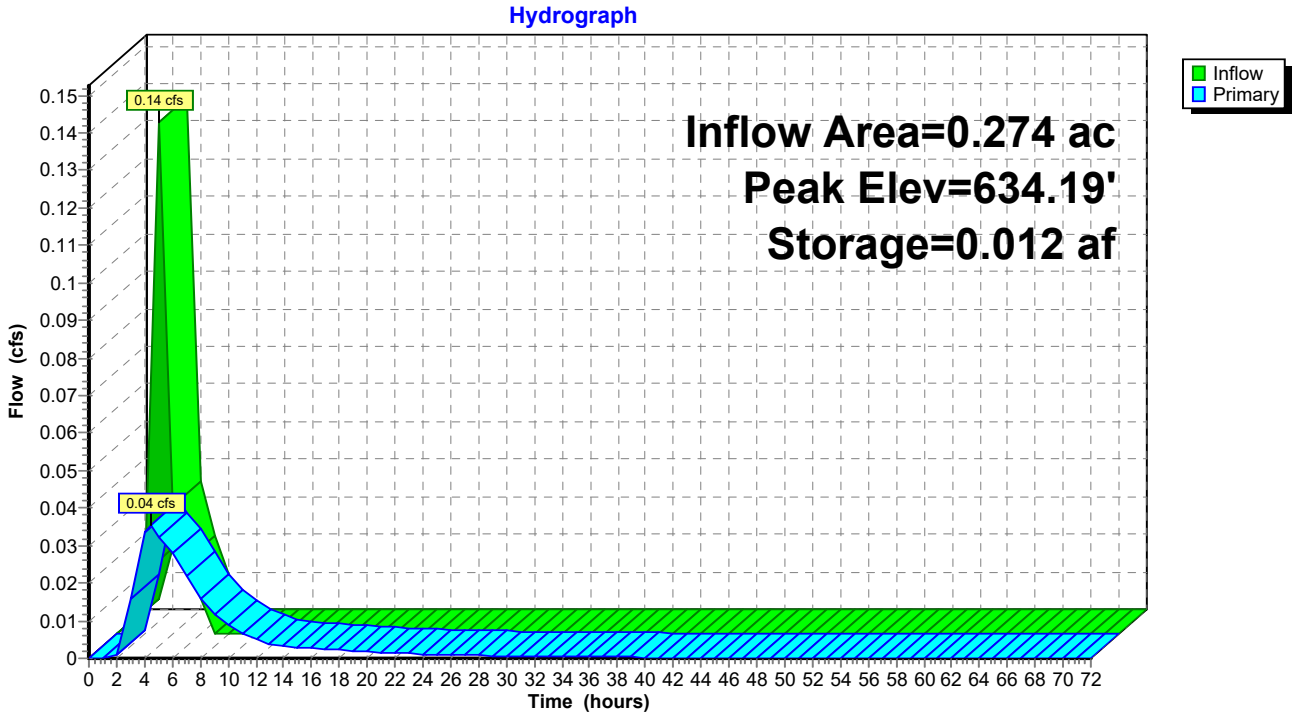
32 Chambers x 334.5 cf = 10,704.0 cf Chamber Storage
32 Chambers x 452.5 cf + 128.7 cf Border = 14,610.0 cf Displacement

Chamber Storage = 10,704.0 cf = 0.246 af
Overall Storage Efficiency = 73.3%
Overall System Size = 113.50' x 27.58' x 4.67'

32 Chambers (plus border)
541.1 cy Field



Pond DB-4: DB-4


Hydrograph
Inflow
Primary
0.14 cfs
0.04 cfs
Inflow Area=0.274 ac
Peak Elev=634.19'
Storage=0.012 af
Flow (cfs)
Time (hours)

Stage-Discharge for Pond DB-4: DB-4

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
634.00	0.00	636.60	0.44
634.05	0.00	636.65	0.46
634.10	0.01	636.70	0.48
634.15	0.03	636.75	0.49
634.20	0.04	636.80	0.51
634.25	0.04	636.85	0.52
634.30	0.05	636.90	0.54
634.35	0.05	636.95	0.55
634.40	0.06	637.00	0.56
634.45	0.06	637.05	0.58
634.50	0.07	637.10	0.61
634.55	0.07	637.15	0.65
634.60	0.08	637.20	0.70
634.65	0.08	637.25	0.74
634.70	0.08	637.30	0.79
634.75	0.09	637.35	0.83
634.80	0.09	637.40	0.86
634.85	0.09	637.45	0.89
634.90	0.09	637.50	0.92
634.95	0.10	637.55	0.95
635.00	0.10	637.60	0.98
635.05	0.10	637.65	1.00
635.10	0.11	637.70	1.03
635.15	0.11	637.75	1.05
635.20	0.11	637.80	1.07
635.25	0.11	637.85	1.10
635.30	0.12	637.90	1.12
635.35	0.12	637.95	1.14
635.40	0.12	638.00	1.16
635.45	0.12	638.05	1.18
635.50	0.13	638.10	1.20
635.55	0.13	638.15	1.22
635.60	0.13	638.20	1.24
635.65	0.13	638.25	1.25
635.70	0.13	638.30	1.26
635.75	0.14	638.35	1.26
635.80	0.14	638.40	1.27
635.85	0.14	638.45	1.27
635.90	0.14	638.50	1.28
635.95	0.14	638.55	1.29
636.00	0.15	638.60	1.29
636.05	0.15	638.65	**1.30**
636.10	0.17		
636.15	0.20		
636.20	0.24		
636.25	0.27		
636.30	0.31		
636.35	0.34		
636.40	0.36		
636.45	0.39		
636.50	0.41		
636.55	0.43		

Summary for Pond DB-5: DB-5

Inflow Area = 0.708 ac, 85.71% Impervious, Inflow Depth = 0.45" for 1" WQV event
Inflow = 0.20 cfs @ 3.10 hrs, Volume= 0.027 af
Outflow = 0.08 cfs @ 4.23 hrs, Volume= 0.024 af, Atten= 61%, Lag= 67.6 min
Primary = 0.08 cfs @ 4.23 hrs, Volume= 0.024 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs / 2
Peak Elev= 638.10' @ 4.22 hrs Surf.Area= 0.090 ac Storage= 0.009 af
Flood Elev= 643.50' Surf.Area= 0.090 ac Storage= 0.449 af

Plug-Flow detention time= 63.3 min calculated for 0.024 af (91% of inflow)
Center-of-Mass det. time= 51.0 min (268.5 - 217.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	637.50'	0.000 af	**34.48'W x 113.83'L x 7.17'H Field A** 0.646 af Overall - 0.646 af Embedded = 0.000 af x 0.0% Voids
#2A	637.50'	0.490 af	**StormTrap ST1 DoubleTrap 6-0**x 40 Inside #1 Inside= 82.7"W x 72.0"H => 37.97 sf x 14.06'L = 534.0 cf Outside= 82.7"W x 86.0"H => 49.42 sf x 14.06'L = 695.0 cf 5 Rows adjusted for 602.1 cf perimeter wall 34.48' x 112.50' Core + 0.00' x 0.67' Border = 34.48' x 113.83' System
		0.490 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	637.50'	**6.0" Round Culvert** L= 80.0' RCP, rounded edge headwall, Ke= 0.100 Inlet / Outlet Invert= 637.50' / 636.00' S= 0.0187 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#2	Device 1	637.50'	**2.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.08 cfs @ 4.23 hrs HW=638.10' (Free Discharge)
└─**1=Culvert** (Passes 0.08 cfs of 0.76 cfs potential flow)
└─**2=Orifice/Grate** (Orifice Controls 0.08 cfs @ 3.45 fps)

Pond DB-5: DB-5 - Chamber Wizard Field A

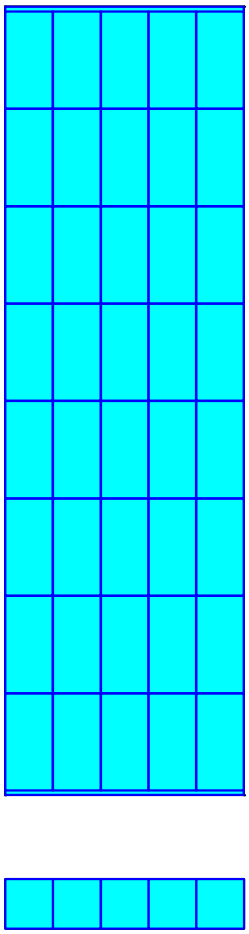
Chamber Model = StormTrap ST1 DoubleTrap 6-0 (StormTrap ST1 DoubleTrap® Type I/III/VI)
Inside= 82.7"W x 72.0"H => 37.97 sf x 14.06'L = 534.0 cf
Outside= 82.7"W x 86.0"H => 49.42 sf x 14.06'L = 695.0 cf
5 Rows adjusted for 602.1 cf perimeter wall

8 Chambers/Row x 14.06' Long = 112.50' Row Length +8.0" Border x 2 = 113.83' Base Length
5 Rows x 82.7" Wide = 34.48' Base Width
86.0" Chamber Height = 7.17' Field Height

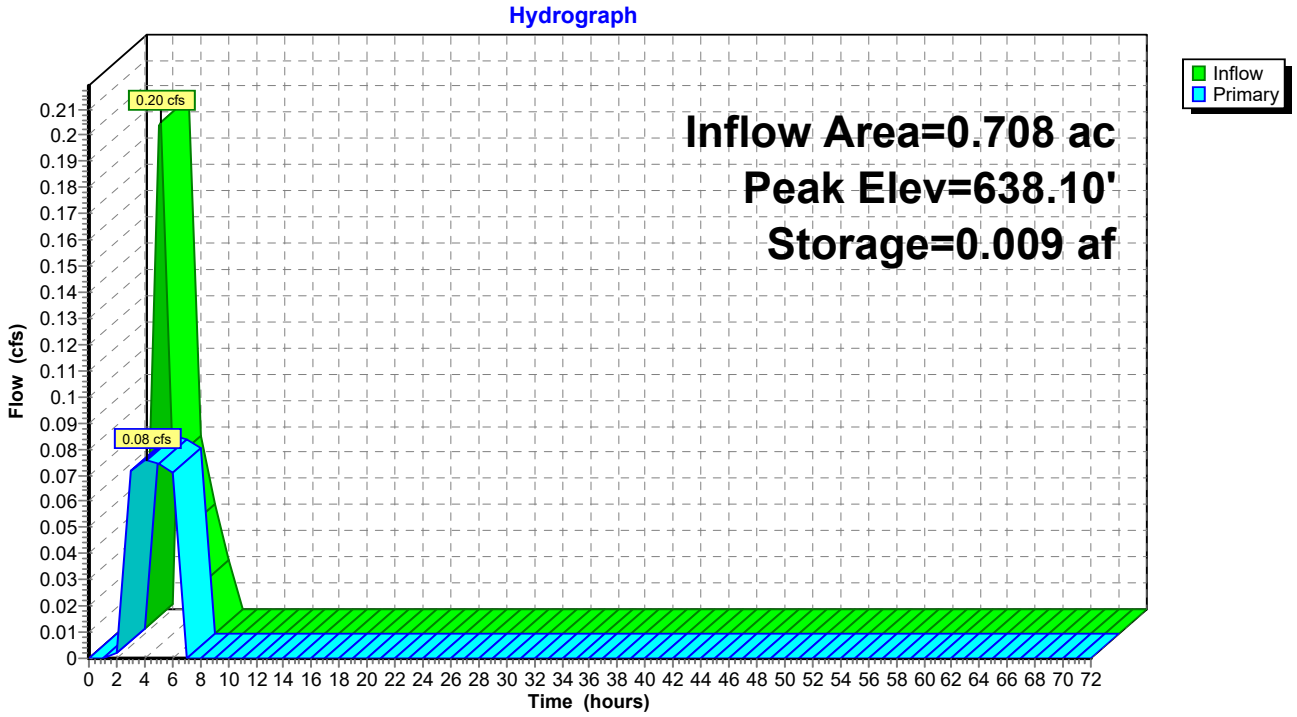
17.0 cf Sidewall x 8 x 2 + 33.0 cf Endwall x 5 x 2 = 602.1 cf Perimeter Wall
40 Chambers x 534.0 cf - 602.1 cf Perimeter wall = 20,757.8 cf Chamber Storage
40 Chambers x 695.0 cf + 329.5 cf Border = 28,128.3 cf Displacement

Chamber Storage = 20,757.8 cf = 0.477 af
Overall Storage Efficiency = 73.8%
Overall System Size = 113.83' x 34.48' x 7.17'

40 Chambers (plus border)
1,041.8 cy Field



Pond DB-5: DB-5


Hydrograph
Inflow
Primary
0.20 cfs
0.08 cfs
Inflow Area=0.708 ac
Peak Elev=638.10'
Storage=0.009 af
Flow (cfs)
Time (hours)

Stage-Discharge for Pond DB-5: DB-5

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
637.50	0.00	639.58	0.15	641.66	0.21	643.74	0.26
637.54	0.00	639.62	0.15	641.70	0.21	643.78	0.26
637.58	0.01	639.66	0.15	641.74	0.21	643.82	0.26
637.62	0.02	639.70	0.15	641.78	0.22	643.86	0.26
637.66	0.03	639.74	0.15	641.82	0.22	643.90	0.26
637.70	0.04	639.78	0.16	641.86	0.22	643.94	0.26
637.74	0.04	639.82	0.16	641.90	0.22	643.98	0.27
637.78	0.05	639.86	0.16	641.94	0.22	644.02	0.27
637.82	0.05	639.90	0.16	641.98	0.22	644.06	0.27
637.86	0.06	639.94	0.16	642.02	0.22	644.10	0.27
637.90	0.06	639.98	0.16	642.06	0.22	644.14	0.27
637.94	0.06	640.02	0.16	642.10	0.22	644.18	0.27
637.98	0.07	640.06	0.17	642.14	0.22	644.22	0.27
638.02	0.07	640.10	0.17	642.18	0.23	644.26	0.27
638.06	0.07	640.14	0.17	642.22	0.23	644.30	0.27
638.10	0.08	640.18	0.17	642.26	0.23	644.34	0.27
638.14	0.08	640.22	0.17	642.30	0.23	644.38	0.27
638.18	0.08	640.26	0.17	642.34	0.23	644.42	0.27
638.22	0.08	640.30	0.17	642.38	0.23	644.46	0.28
638.26	0.09	640.34	0.17	642.42	0.23	644.50	0.28
638.30	0.09	640.38	0.18	642.46	0.23	644.54	0.28
638.34	0.09	640.42	0.18	642.50	0.23	644.58	0.28
638.38	0.09	640.46	0.18	642.54	0.23	644.62	0.28
638.42	0.10	640.50	0.18	642.58	0.23	644.66	**0.28**
638.46	0.10	640.54	0.18	642.62	0.24		
638.50	0.10	640.58	0.18	642.66	0.24		
638.54	0.10	640.62	0.18	642.70	0.24		
638.58	0.10	640.66	0.18	642.74	0.24		
638.62	0.11	640.70	0.19	642.78	0.24		
638.66	0.11	640.74	0.19	642.82	0.24		
638.70	0.11	640.78	0.19	642.86	0.24		
638.74	0.11	640.82	0.19	642.90	0.24		
638.78	0.11	640.86	0.19	642.94	0.24		
638.82	0.12	640.90	0.19	642.98	0.24		
638.86	0.12	640.94	0.19	643.02	0.24		
638.90	0.12	640.98	0.19	643.06	0.25		
638.94	0.12	641.02	0.19	643.10	0.25		
638.98	0.12	641.06	0.20	643.14	0.25		
639.02	0.13	641.10	0.20	643.18	0.25		
639.06	0.13	641.14	0.20	643.22	0.25		
639.10	0.13	641.18	0.20	643.26	0.25		
639.14	0.13	641.22	0.20	643.30	0.25		
639.18	0.13	641.26	0.20	643.34	0.25		
639.22	0.13	641.30	0.20	643.38	0.25		
639.26	0.14	641.34	0.20	643.42	0.25		
639.30	0.14	641.38	0.20	643.46	0.25		
639.34	0.14	641.42	0.21	643.50	0.26		
639.38	0.14	641.46	0.21	643.54	0.26		
639.42	0.14	641.50	0.21	643.58	0.26		
639.46	0.14	641.54	0.21	643.62	0.26		
639.50	0.15	641.58	0.21	643.66	0.26		
639.54	0.15	641.62	0.21	643.70	0.26		

Summary for Pond ICS-3: ICS-3

Inflow Area = 0.328 ac, 72.22% Impervious, Inflow Depth = 0.25" for 1" WQV event
Inflow = 0.04 cfs @ 3.16 hrs, Volume= 0.007 af
Outflow = 0.04 cfs @ 3.16 hrs, Volume= 0.007 af, Atten= 0%, Lag= 0.0 min
Primary = 0.04 cfs @ 3.16 hrs, Volume= 0.007 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

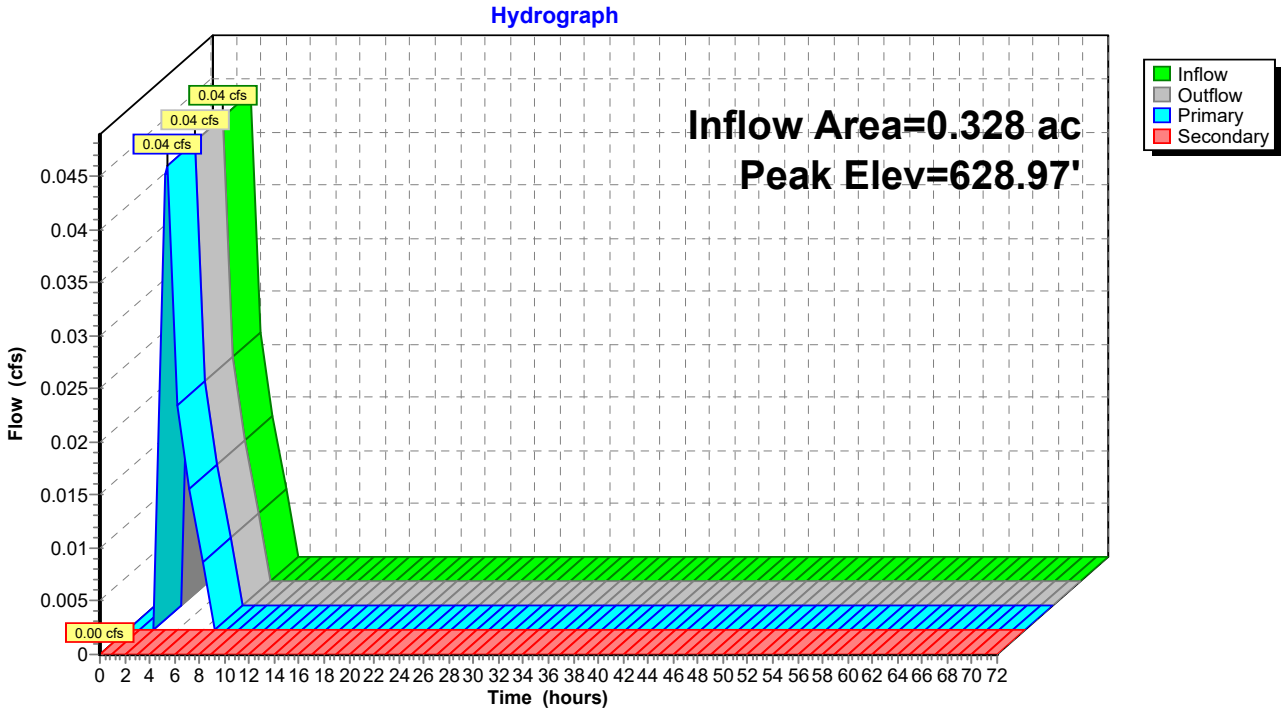
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs / 3
Peak Elev= 628.97' @ 3.26 hrs
Flood Elev= 632.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	628.85'	**5.0" Round Culvert** L= 240.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 628.85' / 622.00' S= 0.0285 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.14 sf
#2	Secondary	629.05'	**12.0" Round Culvert** L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 629.05' / 629.00' S= 0.0050 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.04 cfs @ 3.16 hrs HW=628.96' TW=622.96' (TW follows 6.00' below HW)
└─**1=Culvert** (Inlet Controls 0.04 cfs @ 1.39 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=628.85' (Free Discharge)
└─**2=Culvert** (Controls 0.00 cfs)

Pond ICS-3: ICS-3



Stage-Discharge for Pond ICS-3: ICS-3

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
628.85	0.00	0.00	0.00
628.90	0.01	0.01	0.00
628.95	0.03	0.03	0.00
629.00	0.07	0.07	0.00
629.05	0.12	0.12	0.00
629.10	0.19	0.18	0.01
629.15	0.28	0.24	0.03
629.20	0.38	0.31	0.07
629.25	0.48	0.36	0.12
629.30	0.58	0.40	0.18
629.35	0.69	0.44	0.25
629.40	0.81	0.48	0.33
629.45	0.93	0.51	0.41
629.50	1.06	0.55	0.51
629.55	1.19	0.58	0.62
629.60	1.33	0.60	0.73
629.65	1.48	0.63	0.85
629.70	1.63	0.66	0.97
629.75	1.78	**0.68**	1.10
629.80	1.92	0.68	1.24
629.85	2.06	0.68	1.38
629.90	2.20	0.68	1.52
629.95	2.34	0.68	1.66
630.00	2.48	0.68	1.80
630.05	2.62	0.68	1.94
630.10	2.76	0.68	2.08
630.15	2.90	0.68	2.22
630.20	3.03	0.68	2.35
630.25	3.15	0.68	2.47
630.30	3.26	0.68	2.58
630.35	3.35	0.68	2.67
630.40	3.43	0.68	2.75
630.45	3.51	0.68	2.83
630.50	3.59	0.68	2.91
630.55	3.67	0.68	2.99
630.60	3.74	0.68	3.06
630.65	3.81	0.68	3.13
630.70	3.88	0.68	3.20
630.75	3.95	0.68	3.27
630.80	4.02	0.68	3.34
630.85	4.08	0.68	3.40
630.90	4.15	0.68	3.47
630.95	4.21	0.68	3.53
631.00	4.28	0.68	3.60
631.05	4.34	0.68	3.66
631.10	4.40	0.68	3.72
631.15	4.46	0.68	3.78
631.20	4.52	0.68	3.83
631.25	4.57	0.68	3.89
631.30	4.63	0.68	3.95
631.35	4.69	0.68	4.01
631.40	4.74	0.68	4.06
631.45	4.80	0.68	4.12
631.50	4.85	0.68	4.17
631.55	4.90	0.68	4.22
631.60	4.95	0.68	4.27
631.65	5.01	0.68	4.33
631.70	5.06	0.68	4.38
631.75	5.11	0.68	4.43
631.80	5.16	0.68	4.48
631.85	5.21	0.68	4.53
631.90	5.26	0.68	4.58
631.95	5.31	0.68	4.63
632.00	5.35	0.68	4.67
632.05	5.40	0.68	4.72
632.10	5.45	0.68	4.77
632.15	5.49	0.68	4.81
632.20	5.54	0.68	4.86
632.25	5.59	0.68	4.91
632.30	5.63	0.68	4.95
632.35	5.68	0.68	5.00
632.40	5.72	0.68	5.04
632.45	5.76	0.68	5.08
632.50	**5.81**	0.68	**5.13**

Summary for Pond ICS-4: ICS-4

Inflow Area = 1.068 ac, 93.43% Impervious, Inflow Depth = 0.63" for 1" WQV event
Inflow = 0.43 cfs @ 3.07 hrs, Volume= 0.056 af
Outflow = 0.43 cfs @ 3.07 hrs, Volume= 0.056 af, Atten= 0%, Lag= 0.0 min
Primary = 0.43 cfs @ 3.07 hrs, Volume= 0.056 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

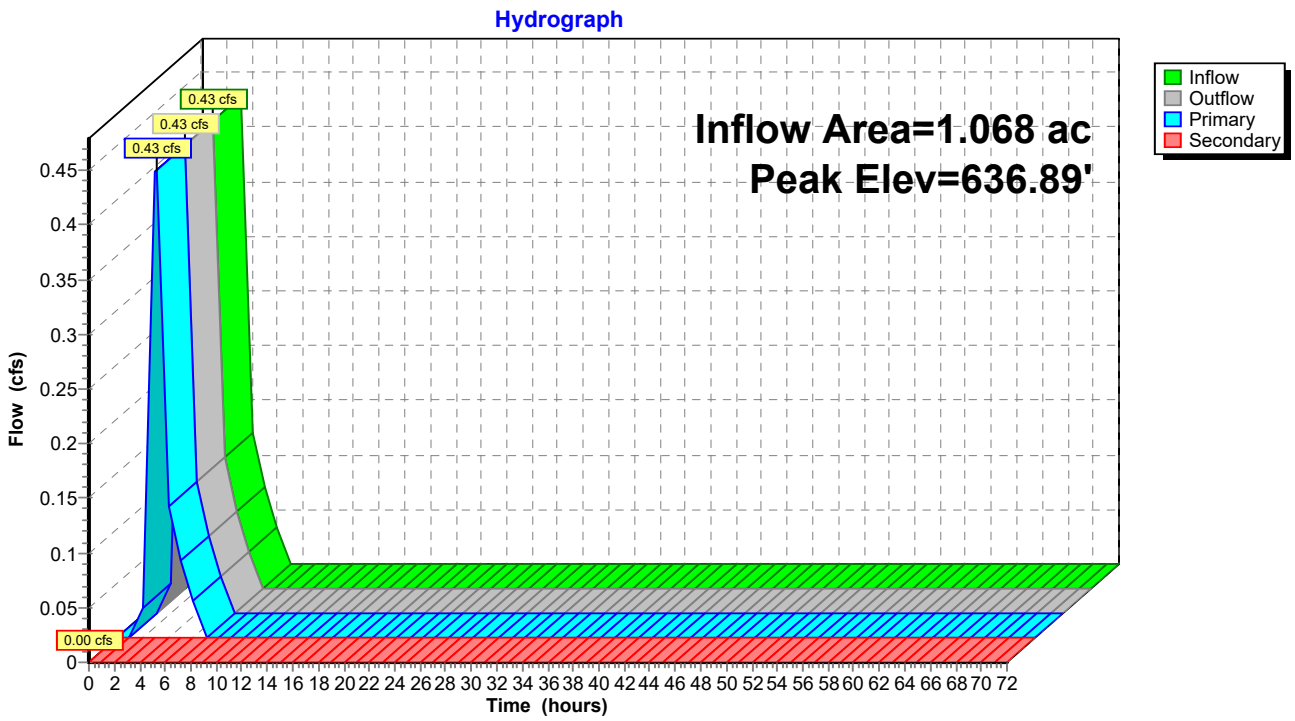
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs / 3
Peak Elev= 636.89' @ 3.10 hrs
Flood Elev= 640.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	636.50'	**6.0" Round Culvert** L= 235.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 636.50' / 633.00' S= 0.0149 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf
#2	Device 3	639.28'	**5.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Secondary	637.00'	**15.0" Round Culvert** L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 637.00' / 636.75' S= 0.0250 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=0.40 cfs @ 3.07 hrs HW=636.87' (Free Discharge)
└─**1=Culvert** (Inlet Controls 0.40 cfs @ 2.59 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=636.50' (Free Discharge)
└─**3=Culvert** (Controls 0.00 cfs)
  └─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond ICS-4: ICS-4



Stage-Discharge for Pond ICS-4: ICS-4

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
636.50	0.00	0.00	0.00
636.55	0.01	0.01	0.00
636.60	0.04	0.04	0.00
636.65	0.08	0.08	0.00
636.70	0.14	0.14	0.00
636.75	0.21	0.21	0.00
636.80	0.29	0.29	0.00
636.85	0.37	0.37	0.00
636.90	0.45	0.45	0.00
636.95	0.53	0.53	0.00
637.00	0.59	0.59	0.00
637.05	0.65	0.65	0.00
637.10	0.70	0.70	0.00
637.15	0.75	0.75	0.00
637.20	0.79	0.79	0.00
637.25	0.84	0.84	0.00
637.30	0.88	0.88	0.00
637.35	0.89	0.89	0.00
637.40	0.89	0.89	0.00
637.45	0.90	0.90	0.00
637.50	0.90	0.90	0.00
637.55	0.91	0.91	0.00
637.60	0.91	0.91	0.00
637.65	0.92	0.92	0.00
637.70	0.92	0.92	0.00
637.75	0.93	0.93	0.00
637.80	0.94	0.94	0.00
637.85	0.94	0.94	0.00
637.90	0.95	0.95	0.00
637.95	0.95	0.95	0.00
638.00	0.96	0.96	0.00
638.05	0.96	0.96	0.00
638.10	0.97	0.97	0.00
638.15	0.97	0.97	0.00
638.20	0.98	0.98	0.00
638.25	0.98	0.98	0.00
638.30	0.99	0.99	0.00
638.35	0.99	0.99	0.00
638.40	1.00	1.00	0.00
638.45	1.00	1.00	0.00
638.50	1.01	1.01	0.00
638.55	1.01	1.01	0.00
638.60	1.02	1.02	0.00
638.65	1.02	1.02	0.00
638.70	1.03	1.03	0.00
638.75	1.03	1.03	0.00
638.80	1.04	1.04	0.00
638.85	1.04	1.04	0.00
638.90	1.05	1.05	0.00
638.95	1.05	1.05	0.00
639.00	1.06	1.06	0.00
639.05	1.06	1.06	0.00
639.10	1.07	1.07	0.00
639.15	1.07	1.07	0.00
639.20	1.08	1.08	0.00
639.25	1.08	1.08	0.00
639.30	1.13	1.09	0.04
639.35	1.35	1.09	0.26
639.40	1.68	1.10	0.58
639.45	2.08	1.10	0.98
639.50	2.56	1.11	1.45
639.55	3.10	1.11	1.99
639.60	3.71	1.11	2.60
639.65	4.38	1.12	3.27
639.70	5.12	1.12	4.00
639.75	5.92	1.13	4.79
639.80	6.79	1.13	5.65
639.85	7.71	1.14	6.58
639.90	8.18	1.14	7.04
639.95	8.26	1.15	7.11
640.00	**8.34**	**1.15**	**7.19**

Summary for Pond ICS-5: ICS-5

Inflow Area =	0.739 ac, 62.40% Impervious, Inflow Depth = 0.15" for 1" WQV event				
Inflow =	0.05 cfs @	3.26 hrs,	Volume=	0.009 af	
Outflow =	0.05 cfs @	3.26 hrs,	Volume=	0.009 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.05 cfs @	3.26 hrs,	Volume=	0.009 af	
Secondary =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af	

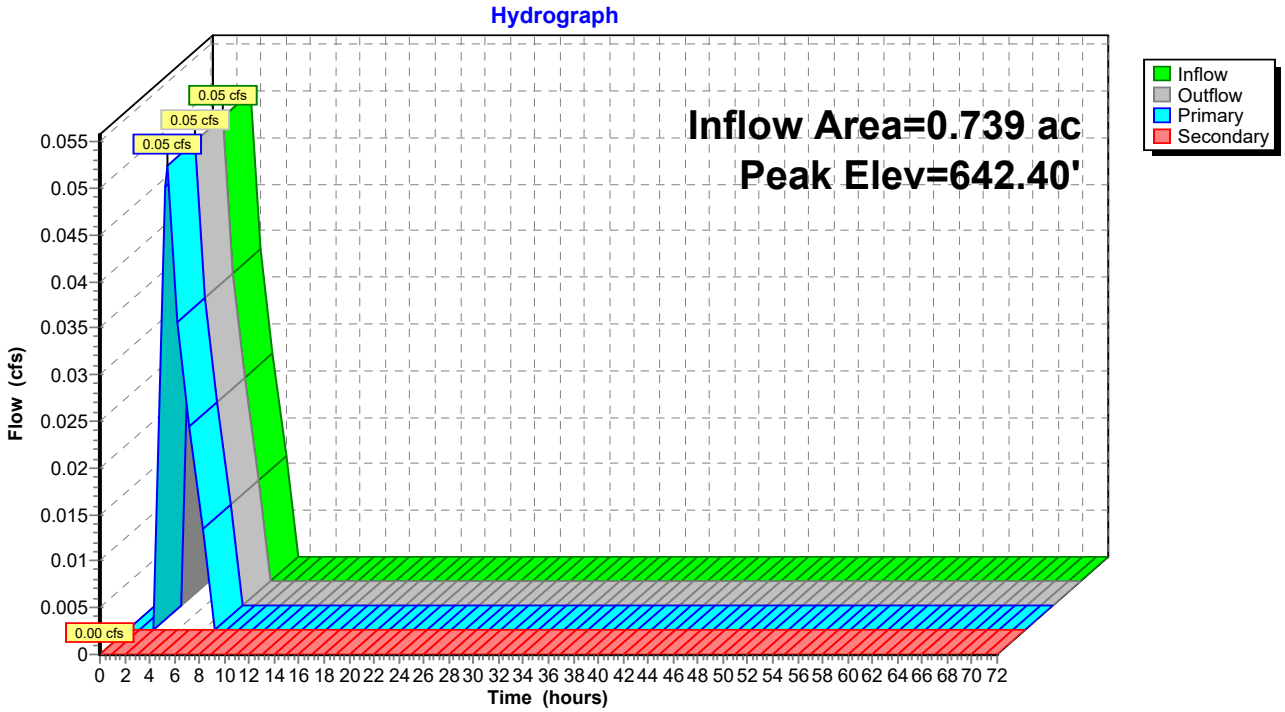
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs / 3
Peak Elev= 642.40' @ 3.34 hrs
Flood Elev= 645.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	642.25'	**3.0" Round Culvert** L= 80.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 642.25' / 636.00' S= 0.0781 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.05 sf
#2	Secondary	642.56'	**12.0" Round Culvert** L= 6.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 642.56' / 642.50' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.04 cfs @ 3.26 hrs HW=642.39' TW=636.39' (TW follows 6.00' below HW)
└─**1=Culvert** (Inlet Controls 0.04 cfs @ 1.57 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=642.25' TW=636.25' (TW follows 6.00' below HW)
└─**2=Culvert** (Controls 0.00 cfs)

Pond ICS-5: ICS-5



Stage-Discharge for Pond ICS-5: ICS-5

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
642.25	0.00	0.00	0.00
642.30	0.01	0.01	0.00
642.35	0.02	0.02	0.00
642.40	0.05	0.05	0.00
642.45	0.08	0.08	0.00
642.50	0.10	0.10	0.00
642.55	0.12	0.12	0.00
642.60	0.15	0.14	0.01
642.65	0.19	0.15	0.03
642.70	0.25	0.17	0.08
642.75	0.32	0.18	0.14
642.80	0.41	0.19	0.22
642.85	0.51	0.20	0.30
642.90	0.62	0.21	0.40
642.95	0.74	0.22	0.52
643.00	0.87	0.23	0.64
643.05	1.02	0.24	0.77
643.10	1.17	0.25	0.91
643.15	1.33	0.26	1.07
643.20	1.49	0.27	1.22
643.25	1.66	0.28	1.39
643.30	1.84	0.28	1.56
643.35	2.02	**0.29**	1.73
643.40	2.21	**0.30**	1.91
643.45	2.39	0.30	2.09
643.50	2.57	0.30	2.27
643.55	2.75	0.30	2.45
643.60	2.93	0.30	2.63
643.65	3.10	0.30	2.80
643.70	3.27	0.30	2.97
643.75	3.42	0.30	3.13
643.80	3.57	0.30	3.27
643.85	3.69	0.30	3.39
643.90	3.78	0.30	3.48
643.95	3.99	0.30	3.69
644.00	4.19	0.30	3.89
644.05	4.38	0.30	4.08
644.10	4.56	0.30	4.26
644.15	4.73	0.30	4.44
644.20	4.90	0.30	4.60
644.25	5.06	0.30	4.77
644.30	5.22	0.30	4.92
644.35	5.37	0.30	5.07
644.40	5.52	0.30	5.22
644.45	5.66	0.30	5.36
644.50	5.80	0.30	5.50
644.55	5.94	0.30	5.64
644.60	6.07	0.30	5.77
644.65	6.20	0.30	5.90
644.70	6.32	0.30	6.03
644.75	6.44	0.30	6.15
644.80	6.53	0.30	6.24
644.85	6.62	0.30	6.32
644.90	6.71	0.30	6.41
644.95	6.79	0.30	6.50
645.00	6.88	0.30	6.58
645.05	6.96	0.30	6.67
645.10	7.05	0.30	6.75
645.15	7.13	0.30	6.83
645.20	7.21	0.30	6.92
645.25	7.29	0.30	7.00
645.30	7.37	0.30	7.07
645.35	7.45	0.30	7.15
645.40	7.53	0.30	7.23
645.45	7.60	0.30	7.31
645.50	**7.68**	0.30	**7.38**

Summary for Pond RG-7B: RG-7B

Inflow Area = 0.055 ac, 72.50% Impervious, Inflow Depth = 0.25" for 1" WQV event
Inflow = 0.01 cfs @ 3.16 hrs, Volume= 0.001 af
Outflow = 0.00 cfs @ 3.00 hrs, Volume= 0.001 af, Atten= 53%, Lag= 0.0 min
Primary = 0.00 cfs @ 3.00 hrs, Volume= 0.001 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs / 3
Peak Elev= 653.12' @ 4.26 hrs Surf.Area= 259 sf Storage= 12 cf

Plug-Flow detention time= 43.9 min calculated for 0.001 af (99% of inflow)
Center-of-Mass det. time= 43.9 min (271.9 - 228.0)

Volume	Invert	Avail.Storage	Storage Description
#1	653.00'	249 cf	**Custom Stage Data (Conic)** Listed below (Recalc) 638 cf Overall - 389 cf Embedded = 249 cf
#2	653.00'	52 cf	**Crushed Stone (Prismatic)** Listed below (Recalc) Inside #1 130 cf Overall x 40.0% Voids
#3	653.50'	58 cf	**Bio Mix Media (Prismatic)** Listed below (Recalc) Inside #1 194 cf Overall x 30.0% Voids
#4	654.25'	13 cf	**Mulch (Prismatic)** Listed below (Recalc) Inside #1 65 cf Overall x 20.0% Voids
		372 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
653.00	259	0	0	259
654.00	259	259	259	316
655.00	513	379	638	579

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
653.00	259	0	0
653.50	259	130	130

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
653.50	259	0	0
654.25	259	194	194

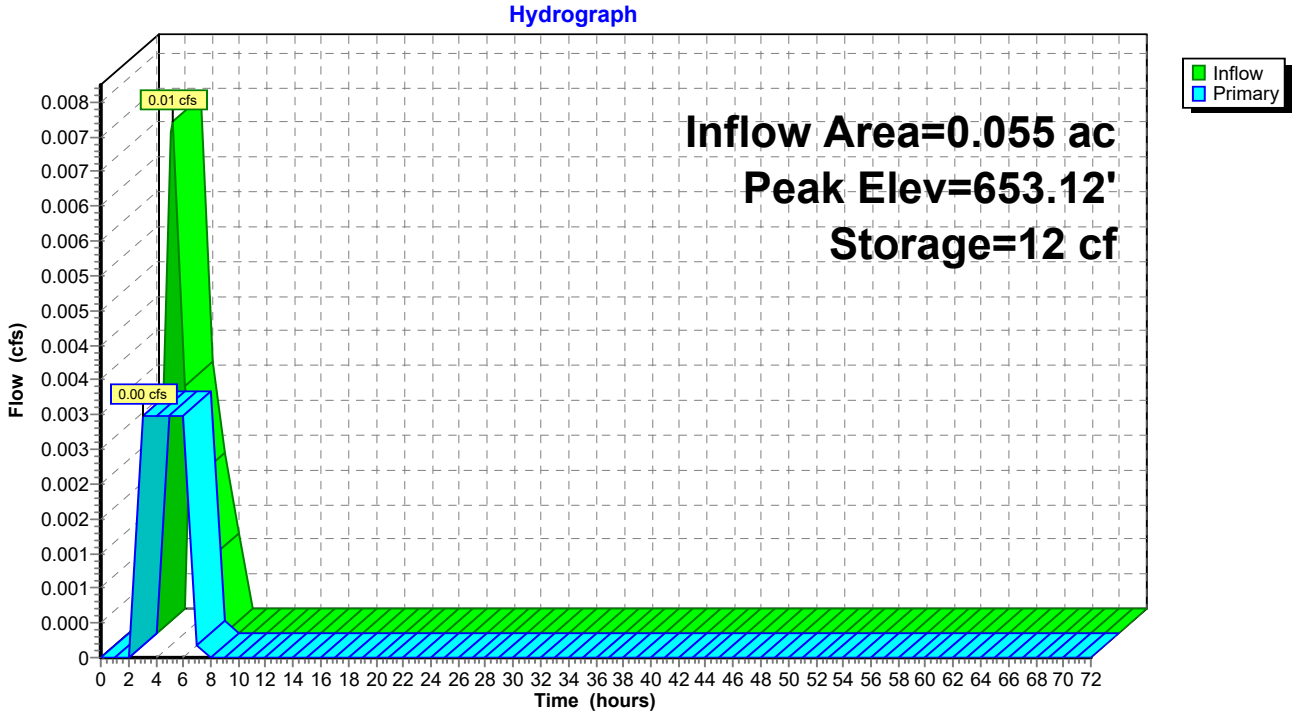
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
654.25	259	0	0
654.50	259	65	65

Device	Routing	Invert	Outlet Devices
#1	Primary	654.90'	**10.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

#2 Primary 653.00' **0.580 in/hr Exfiltration over Surface area**

Primary OutFlow Max=0.00 cfs @ 3.00 hrs HW=653.05' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└─**2=Exfiltration** (Exfiltration Controls 0.00 cfs)

Pond RG-7B: RG-7B



Stage-Discharge for Pond RG-7B: RG-7B

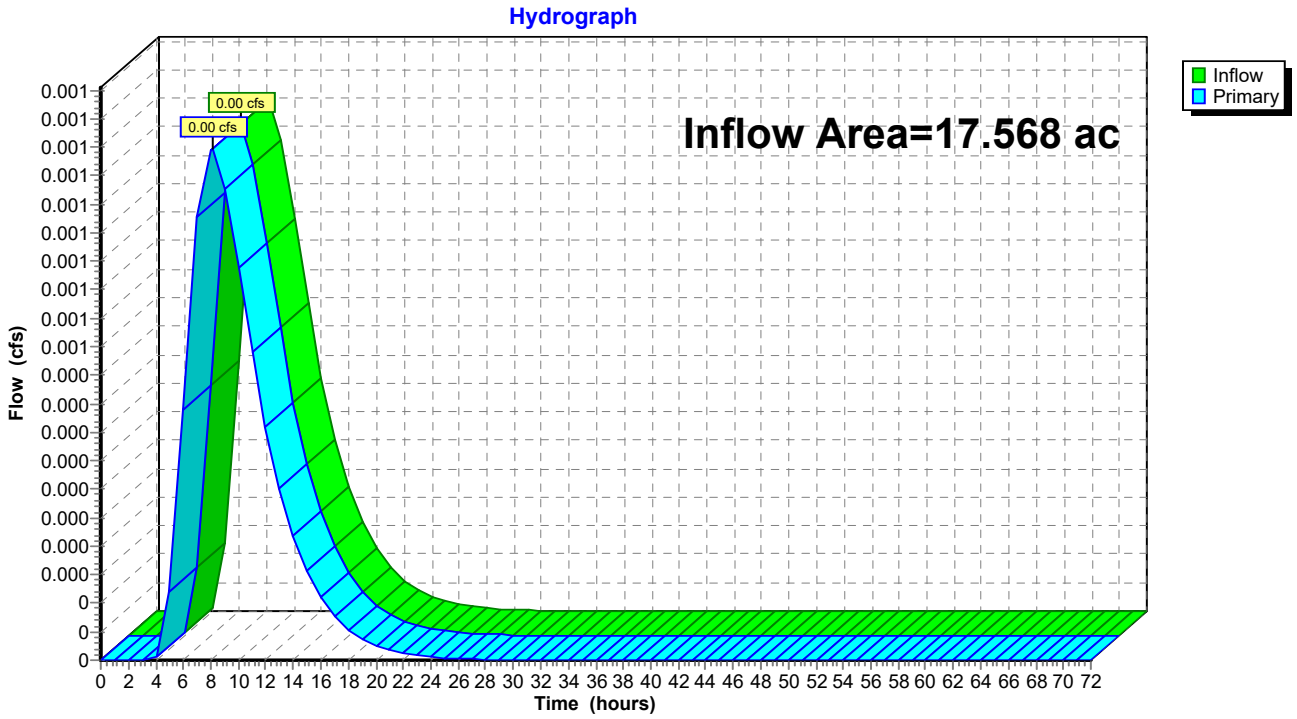
Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
653.00	0.00	653.52	0.00	654.04	0.00	654.56	0.01
653.01	0.00	653.53	0.00	654.05	0.00	654.57	0.01
653.02	0.00	653.54	0.00	654.06	0.00	654.58	0.01
653.03	0.00	653.55	0.00	654.07	0.00	654.59	0.01
653.04	0.00	653.56	0.00	654.08	0.00	654.60	0.01
653.05	0.00	653.57	0.00	654.09	0.00	654.61	0.01
653.06	0.00	653.58	0.00	654.10	0.00	654.62	0.01
653.07	0.00	653.59	0.00	654.11	0.00	654.63	0.01
653.08	0.00	653.60	0.00	654.12	0.00	654.64	0.01
653.09	0.00	653.61	0.00	654.13	0.00	654.65	0.01
653.10	0.00	653.62	0.00	654.14	0.00	654.66	0.01
653.11	0.00	653.63	0.00	654.15	0.00	654.67	0.01
653.12	0.00	653.64	0.00	654.16	0.00	654.68	0.01
653.13	0.00	653.65	0.00	654.17	0.00	654.69	0.01
653.14	0.00	653.66	0.00	654.18	0.00	654.70	0.01
653.15	0.00	653.67	0.00	654.19	0.00	654.71	0.01
653.16	0.00	653.68	0.00	654.20	0.00	654.72	0.01
653.17	0.00	653.69	0.00	654.21	0.00	654.73	0.01
653.18	0.00	653.70	0.00	654.22	0.00	654.74	0.01
653.19	0.00	653.71	0.00	654.23	0.00	654.75	0.01
653.20	0.00	653.72	0.00	654.24	0.00	654.76	0.01
653.21	0.00	653.73	0.00	654.25	0.00	654.77	0.01
653.22	0.00	653.74	0.00	654.26	0.00	654.78	0.01
653.23	0.00	653.75	0.00	654.27	0.00	654.79	0.01
653.24	0.00	653.76	0.00	654.28	0.00	654.80	0.01
653.25	0.00	653.77	0.00	654.29	0.00	654.81	0.01
653.26	0.00	653.78	0.00	654.30	0.00	654.82	0.01
653.27	0.00	653.79	0.00	654.31	0.00	654.83	0.01
653.28	0.00	653.80	0.00	654.32	0.00	654.84	0.01
653.29	0.00	653.81	0.00	654.33	0.00	654.85	0.01
653.30	0.00	653.82	0.00	654.34	0.00	654.86	0.01
653.31	0.00	653.83	0.00	654.35	0.00	654.87	0.01
653.32	0.00	653.84	0.00	654.36	0.00	654.88	0.01
653.33	0.00	653.85	0.00	654.37	0.00	654.89	0.01
653.34	0.00	653.86	0.00	654.38	0.00	654.90	0.01
653.35	0.00	653.87	0.00	654.39	0.00	654.91	0.03
653.36	0.00	653.88	0.00	654.40	0.00	654.92	0.08
653.37	0.00	653.89	0.00	654.41	0.00	654.93	0.14
653.38	0.00	653.90	0.00	654.42	0.00	654.94	0.21
653.39	0.00	653.91	0.00	654.43	0.00	654.95	0.29
653.40	0.00	653.92	0.00	654.44	0.00	654.96	0.38
653.41	0.00	653.93	0.00	654.45	0.00	654.97	0.48
653.42	0.00	653.94	0.00	654.46	0.00	654.98	0.58
653.43	0.00	653.95	0.00	654.47	0.00	654.99	0.69
653.44	0.00	653.96	0.00	654.48	0.00	655.00	**0.81**
653.45	0.00	653.97	0.00	654.49	0.01		
653.46	0.00	653.98	0.00	654.50	0.01		
653.47	0.00	653.99	0.00	654.51	0.01		
653.48	0.00	654.00	0.00	654.52	0.01		
653.49	0.00	654.01	0.00	654.53	0.01		
653.50	0.00	654.02	0.00	654.54	0.01		
653.51	0.00	654.03	0.00	654.55	0.01		

Summary for Link PDP-3: Design Point 3

Inflow Area = 17.568 ac, 18.21% Impervious, Inflow Depth = 0.00" for 1" WQV event
Inflow = 0.00 cfs @ 8.13 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 8.13 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs

Link PDP-3: Design Point 3



Summary for Subcatchment 4A: PDA-4A

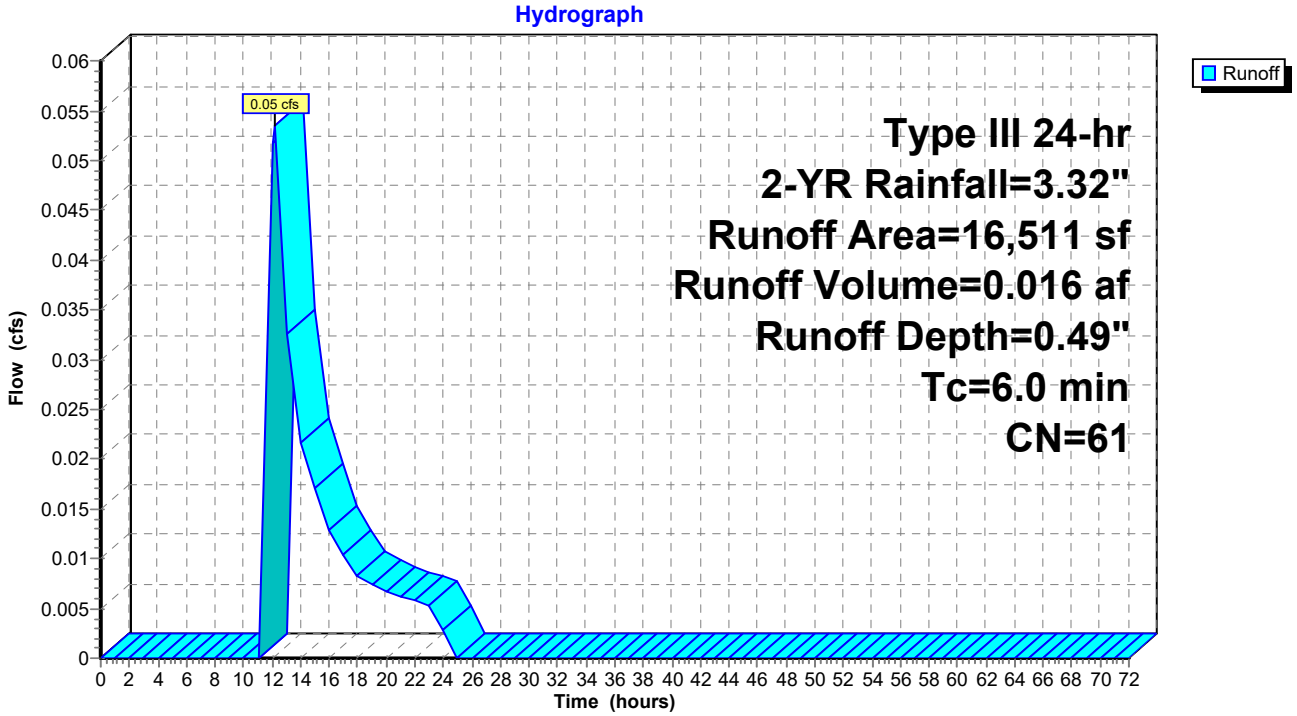
Runoff = 0.05 cfs @ 12.23 hrs, Volume= 0.016 af, Depth= 0.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 2-YR Rainfall=3.32"

	Area (sf)	CN	Description
*	7,284	55	Woods, Good, HSG B
	3,480	70	Woods, Good, HSG C
	1,370	74	>75% Grass cover, Good, HSG C
	4,377	61	>75% Grass cover, Good, HSG B
	16,511	61	Weighted Average
	16,511		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 min.**

Subcatchment 4A: PDA-4A



Summary for Subcatchment 4B: PDA-4B

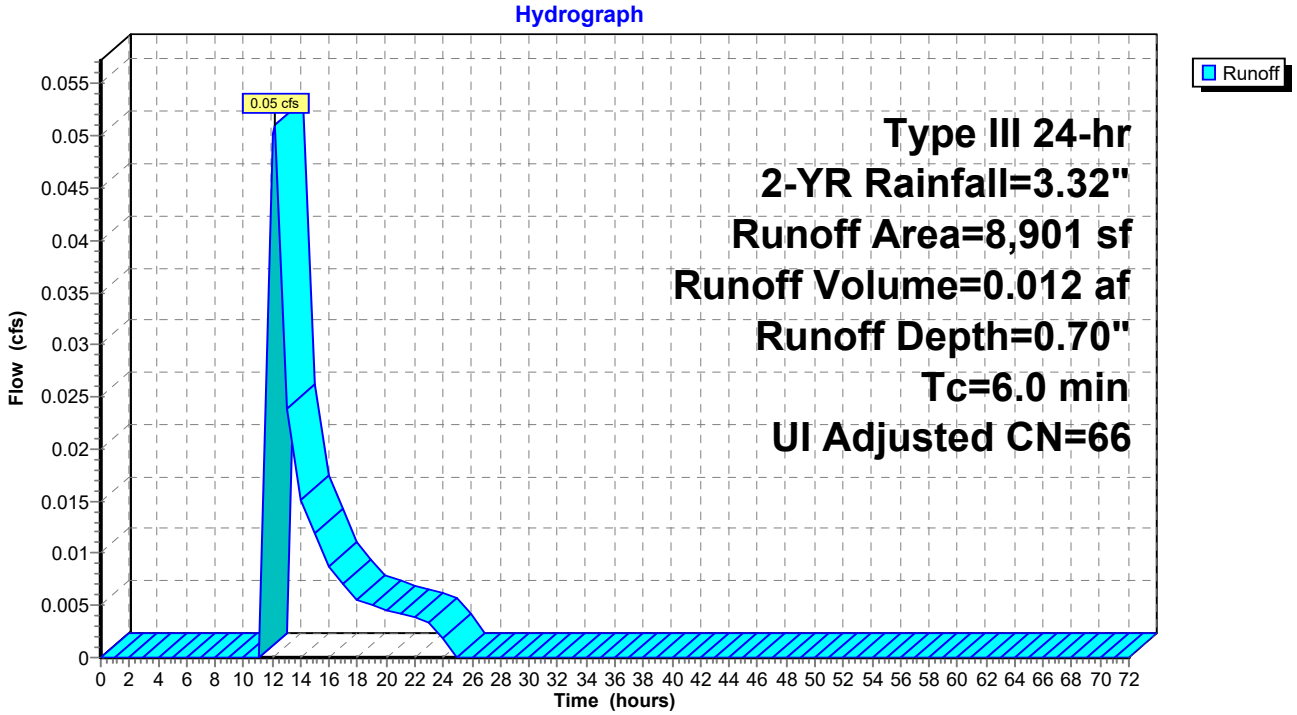
Runoff = 0.05 cfs @ 12.16 hrs, Volume= 0.012 af, Depth= 0.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 2-YR Rainfall=3.32"

Area (sf)	CN	Adj	Description
5,978	61		>75% Grass cover, Good, HSG B
2,026	74		>75% Grass cover, Good, HSG C
897	98		Unconnected pavement, HSG B
8,901	68	66	Weighted Average, UI Adjusted
8,004			89.92% Pervious Area
897			10.08% Impervious Area
897			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 min**

Subcatchment 4B: PDA-4B



Summary for Subcatchment 4C: PDA-4C

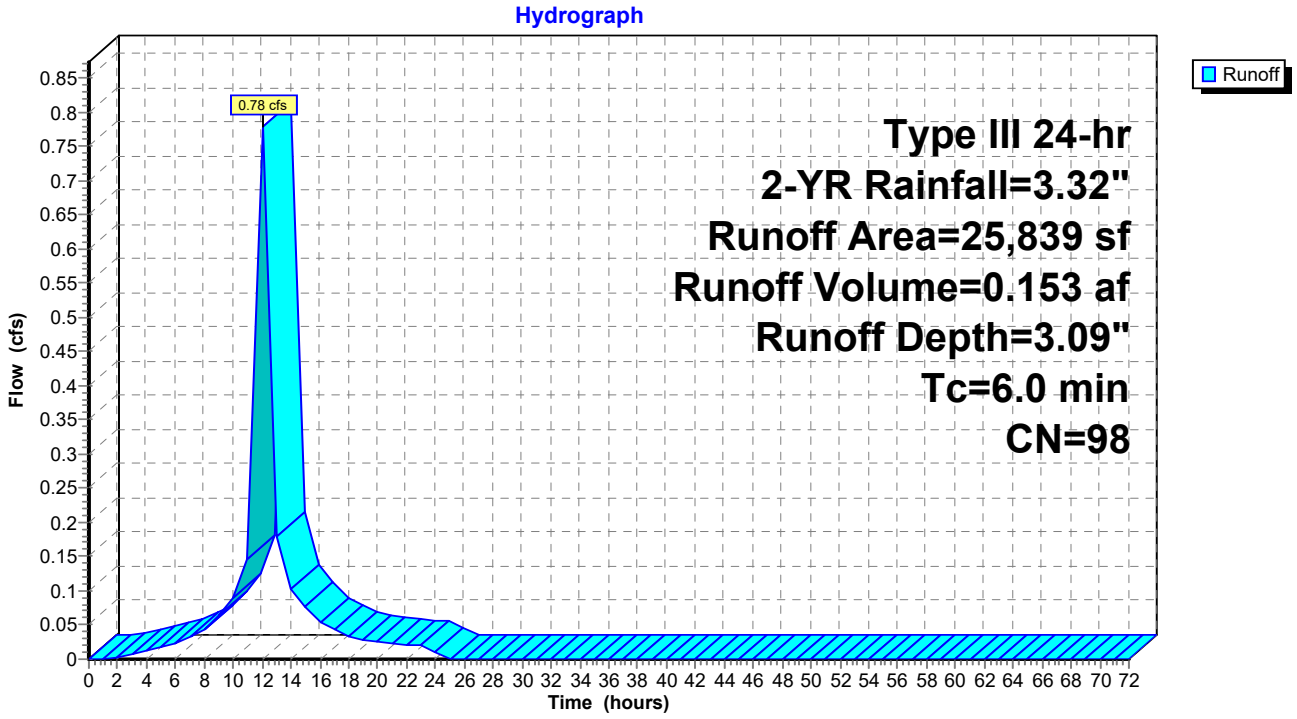
Runoff = 0.78 cfs @ 12.01 hrs, Volume= 0.153 af, Depth= 3.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 2-YR Rainfall=3.32"

Area (sf)	CN	Description
25,839	98	Roofs, HSG B
25,839		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Subcatchment 4C: PDA-4C



Summary for Subcatchment 4D: PDA-4D

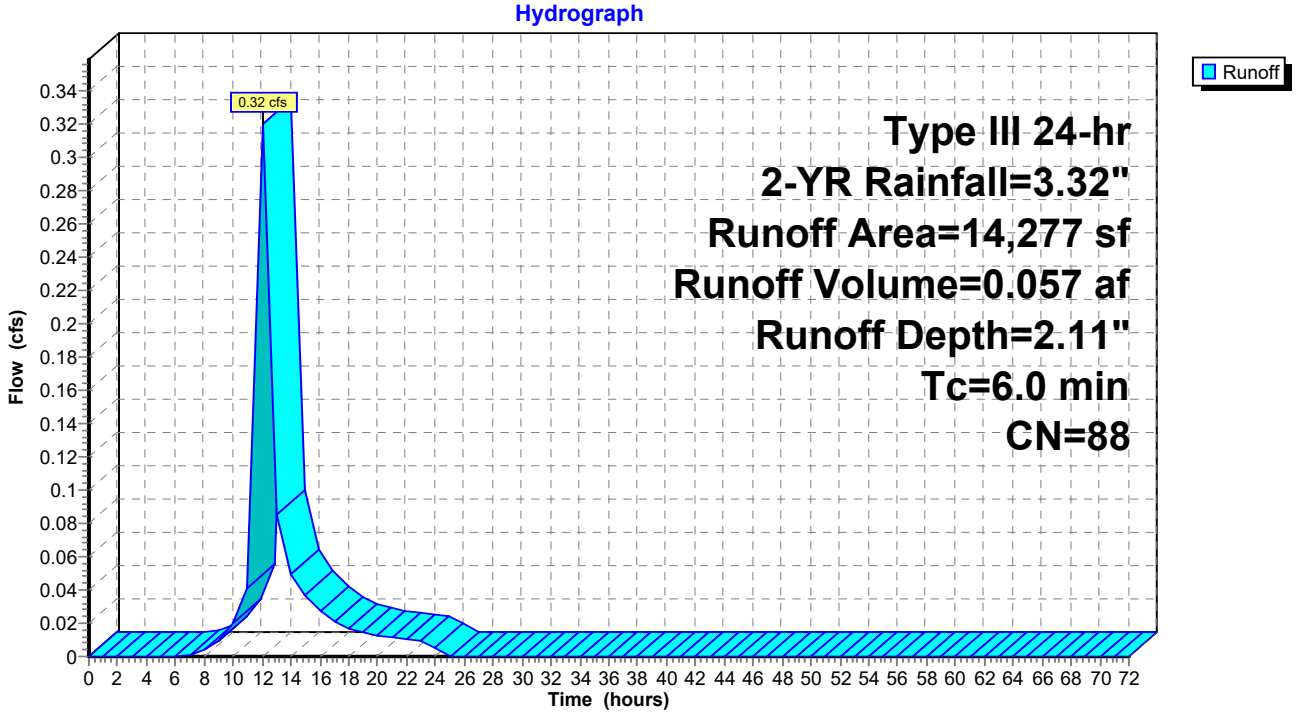
Runoff = 0.32 cfs @ 12.04 hrs, Volume= 0.057 af, Depth= 2.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 2-YR Rainfall=3.32"

Area (sf)	CN	Description
10,311	98	Paved parking, HSG B
3,966	61	>75% Grass cover, Good, HSG B
14,277	88	Weighted Average
3,966		27.78% Pervious Area
10,311		72.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 min**

Subcatchment 4D: PDA-4D



Summary for Subcatchment 4E: PDA-4E

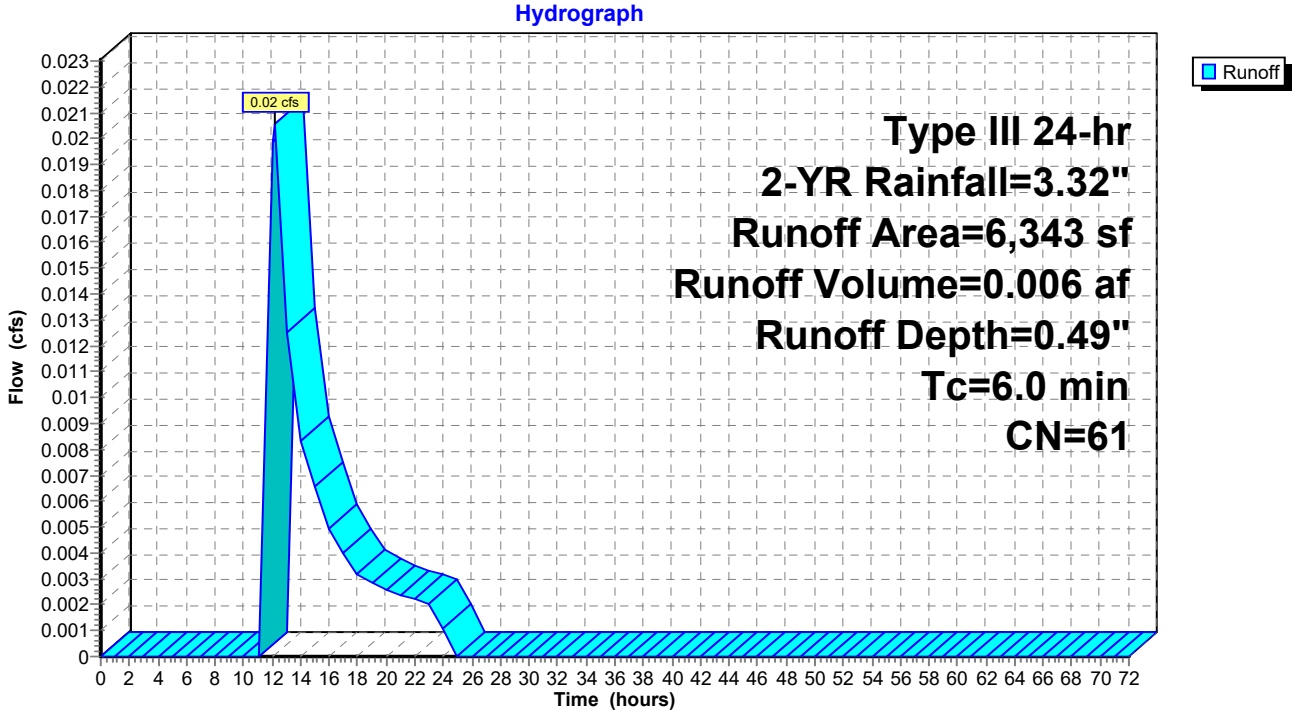
Runoff = 0.02 cfs @ 12.23 hrs, Volume= 0.006 af, Depth= 0.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 2-YR Rainfall=3.32"

Area (sf)	CN	Description
6,331	61	>75% Grass cover, Good, HSG B
12	98	Paved parking, HSG B
6,343	61	Weighted Average
6,331		99.81% Pervious Area
12		0.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 min**

Subcatchment 4E: PDA-4E



Summary for Subcatchment 4F: PDA-4F

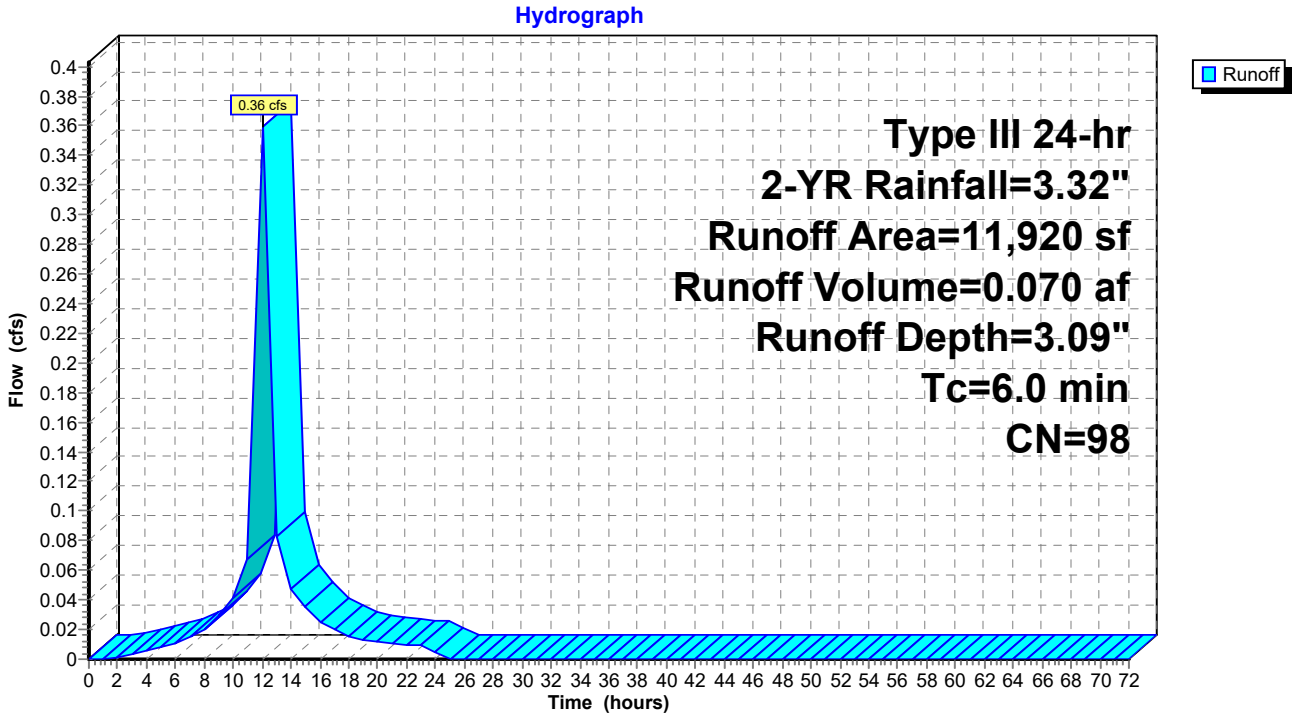
Runoff = 0.36 cfs @ 12.01 hrs, Volume= 0.070 af, Depth= 3.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 2-YR Rainfall=3.32"

Area (sf)	CN	Description
11,920	98	Roofs, HSG B
11,920		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Subcatchment 4F: PDA-4F



Summary for Subcatchment 4G: PDA-4G

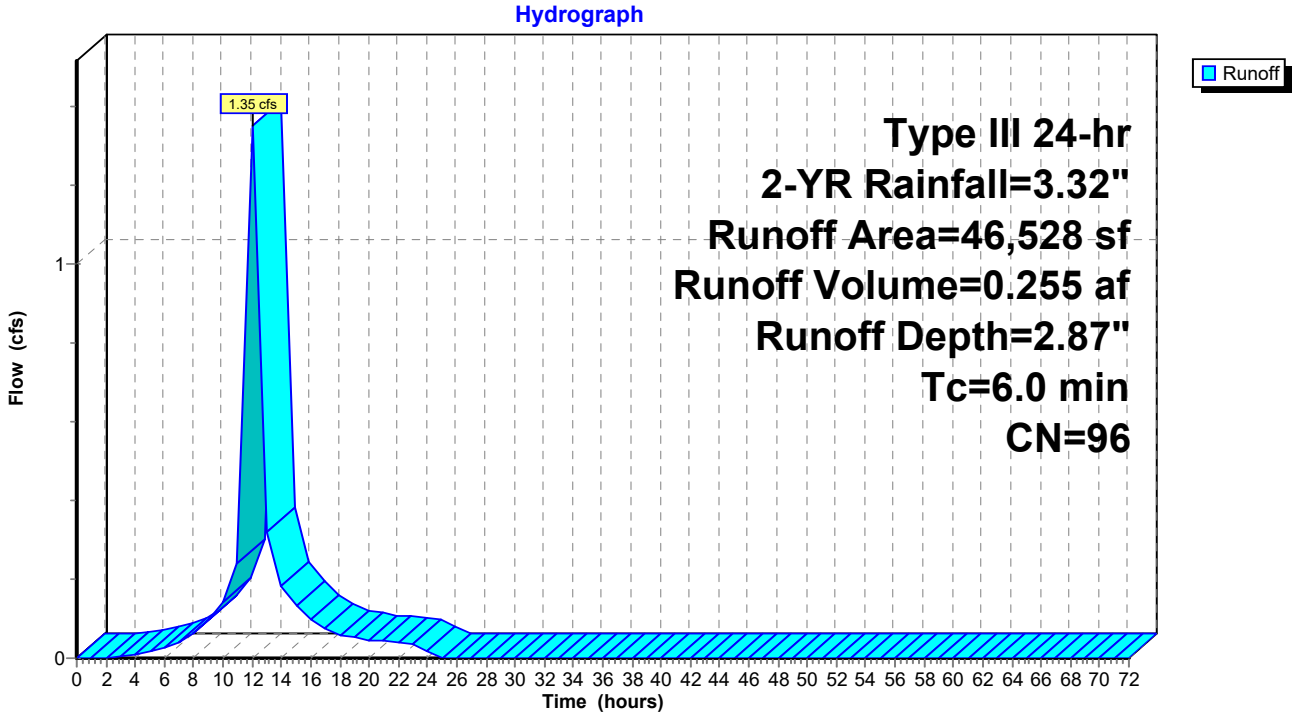
Runoff = 1.35 cfs @ 12.02 hrs, Volume= 0.255 af, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 2-YR Rainfall=3.32"

Area (sf)	CN	Description
10,383	98	Paved parking, HSG B
3,055	61	>75% Grass cover, Good, HSG B
33,090	98	Roofs, HSG B
46,528	96	Weighted Average
3,055		6.57% Pervious Area
43,473		93.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 min**

Subcatchment 4G: PDA-4G



Summary for Subcatchment 5A: PDA-5A

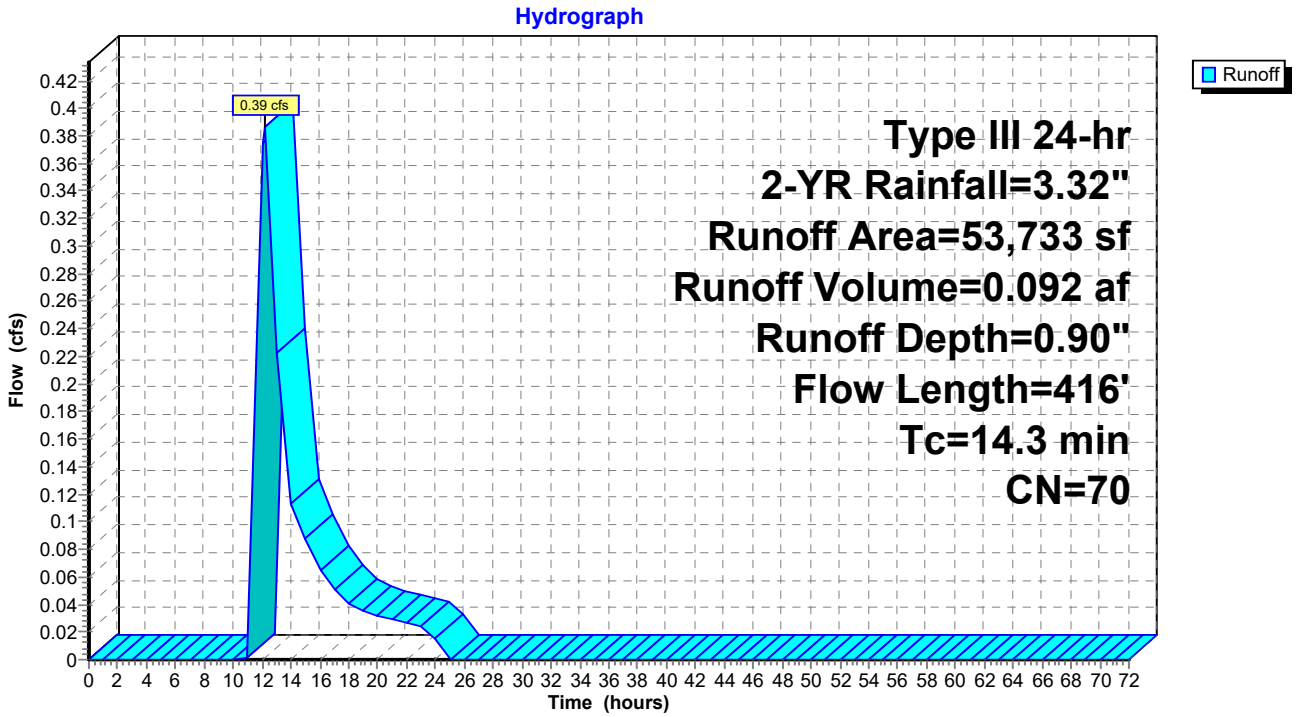
Runoff = 0.39 cfs @ 12.21 hrs, Volume= 0.092 af, Depth= 0.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 2-YR Rainfall=3.32"

Area (sf)	CN	Description
53,733	70	Woods, Good, HSG C
53,733		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.9	50	0.0334	0.08		**Sheet Flow, 5A-5B** Woods: Light underbrush n= 0.400 P2= 3.32"
3.3	239	0.0566	1.19		**Shallow Concentrated Flow, 5B-5C** Woodland Kv= 5.0 fps
0.3	62	0.0450	3.42		**Shallow Concentrated Flow, swale/ditch** Unpaved Kv= 16.1 fps
0.1	23	0.0100	4.91	3.86	**Pipe Channel, 12" CPP** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Corrugated PP, smooth interior
0.7	42	0.0430	1.04		**Shallow Concentrated Flow, 5E-EDP-5** Woodland Kv= 5.0 fps
14.3	416	Total			

Subcatchment 5A: PDA-5A



Summary for Subcatchment 5B: PDA-5B

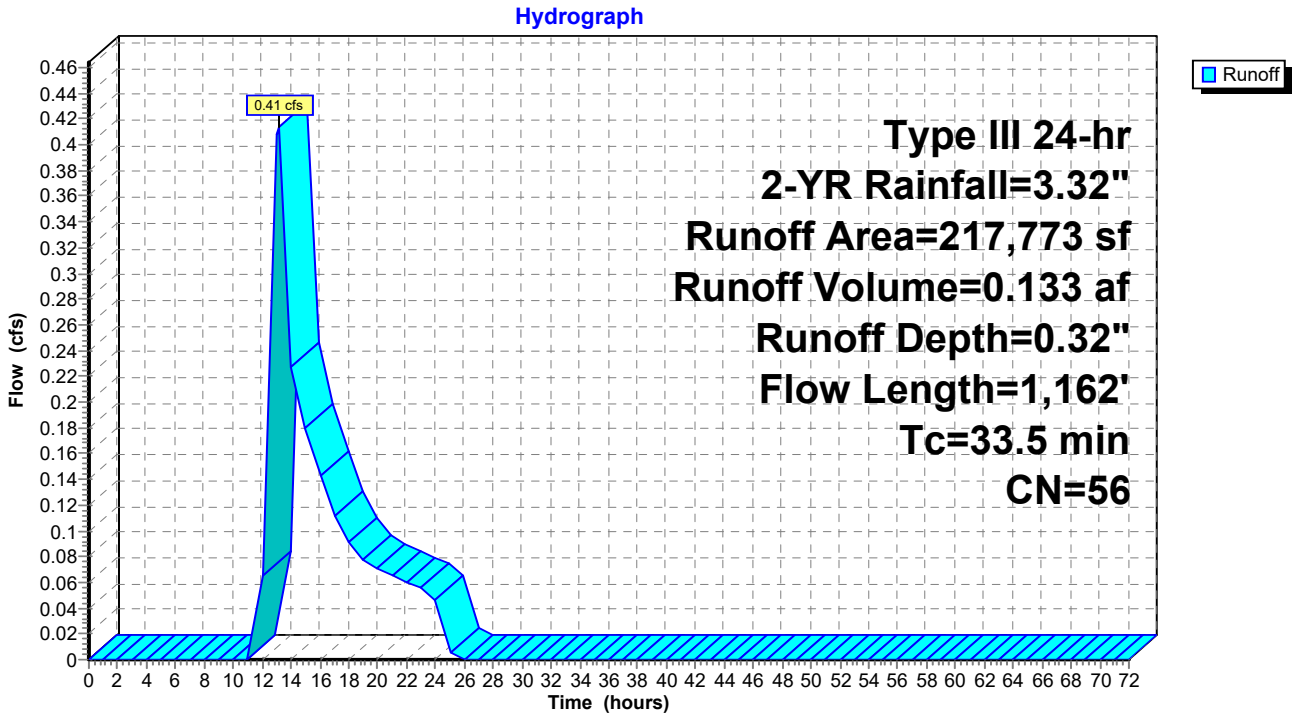
Runoff = 0.41 cfs @ 13.15 hrs, Volume= 0.133 af, Depth= 0.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 2-YR Rainfall=3.32"

Area (sf)	CN	Description
200,443	55	Woods, Good, HSG B
13,852	77	Woods, Good, HSG D
3,478	61	>75% Grass cover, Good, HSG B
217,773	56	Weighted Average
217,773		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	50	0.0400	0.09		**Sheet Flow, 5A-5B** Woods: Light underbrush n= 0.400 P2= 3.32"
9.9	553	0.0350	0.94		**Shallow Concentrated Flow, 5B-5C** Woodland Kv= 5.0 fps
13.3	455	0.0130	0.57		**Shallow Concentrated Flow, 5C-5D** Woodland Kv= 5.0 fps
1.1	104	0.0913	1.51		**Shallow Concentrated Flow, 5D-EDP-5** Woodland Kv= 5.0 fps
33.5	1,162	Total			

Subcatchment 5B: PDA-5B



Summary for Subcatchment 5C: PDA-5C

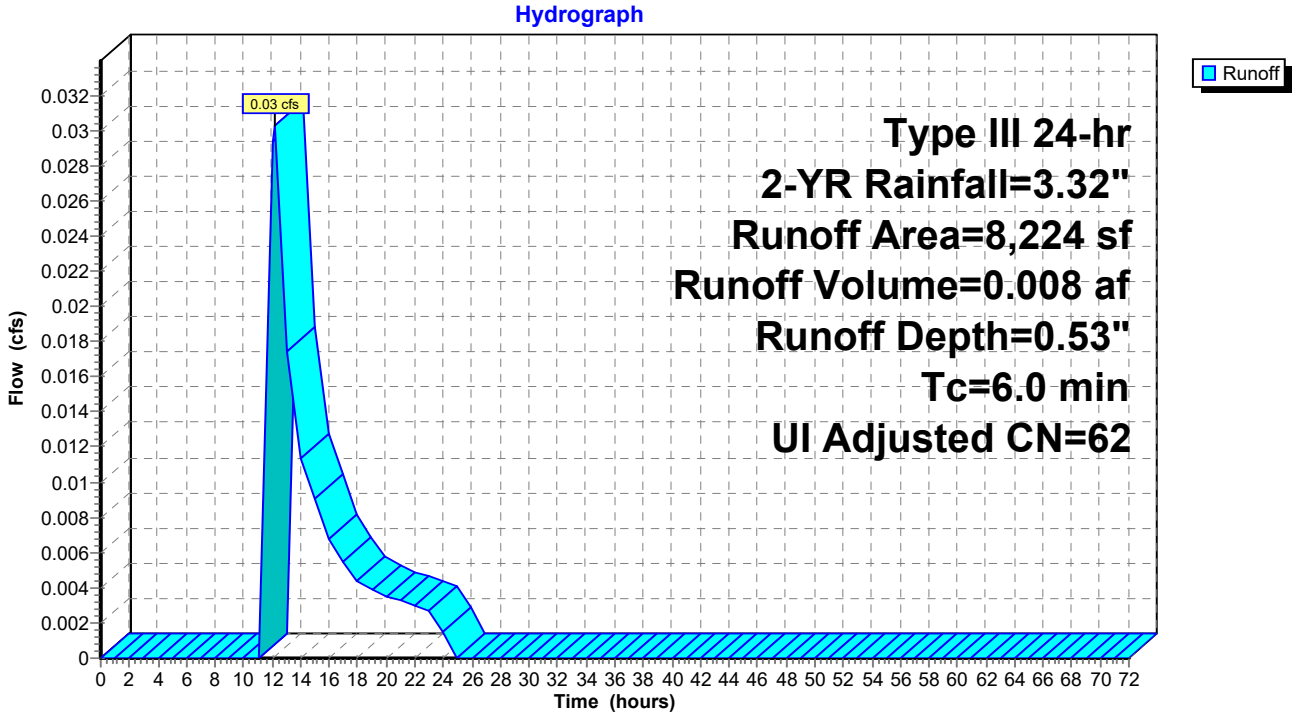
Runoff = 0.03 cfs @ 12.21 hrs, Volume= 0.008 af, Depth= 0.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 2-YR Rainfall=3.32"

Area (sf)	CN	Adj	Description
7,872	61		>75% Grass cover, Good, HSG B
352	98		Unconnected pavement, HSG B
8,224	63	62	Weighted Average, UI Adjusted
7,872			95.72% Pervious Area
352			4.28% Impervious Area
352			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 min**

Subcatchment 5C: PDA-5C



Summary for Subcatchment 5D: PDA-5D

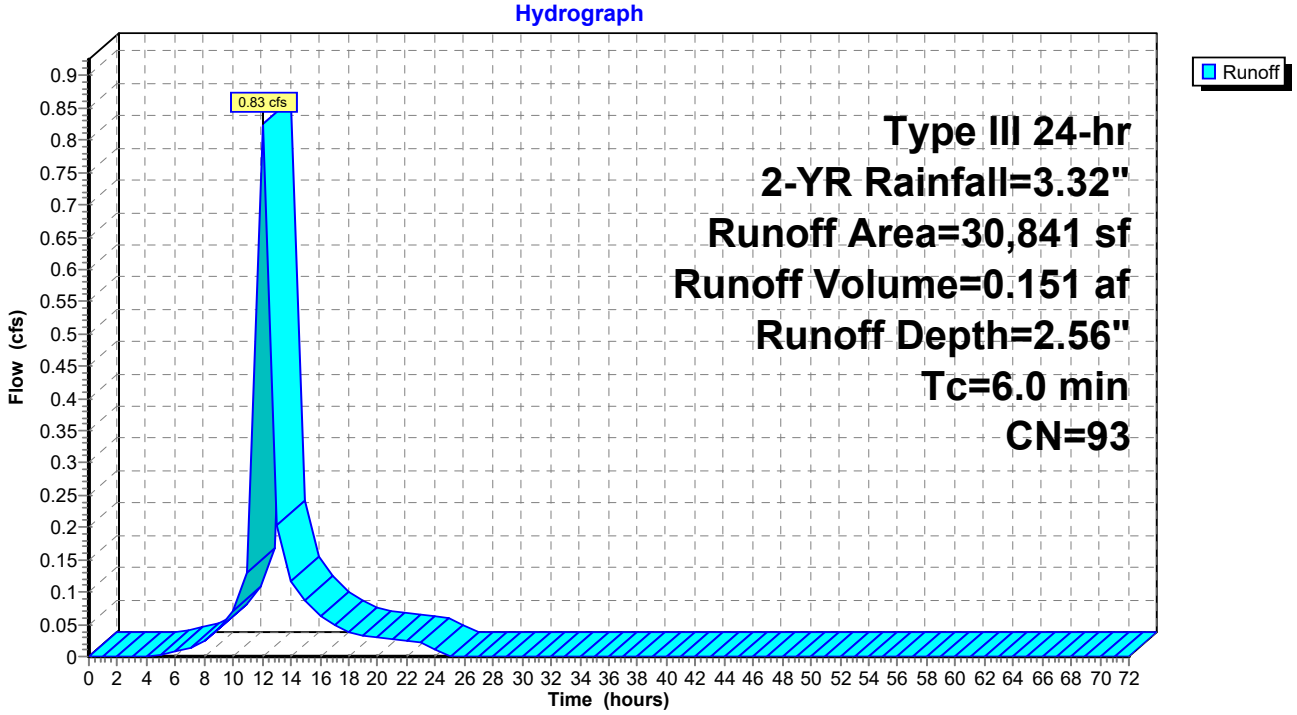
Runoff = 0.83 cfs @ 12.03 hrs, Volume= 0.151 af, Depth= 2.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 2-YR Rainfall=3.32"

Area (sf)	CN	Description
4,408	61	>75% Grass cover, Good, HSG B
26,433	98	Roofs, HSG B
30,841	93	Weighted Average
4,408		14.29% Pervious Area
26,433		85.71% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 min**

Subcatchment 5D: PDA-5D



Summary for Subcatchment 5E: PDA-5E

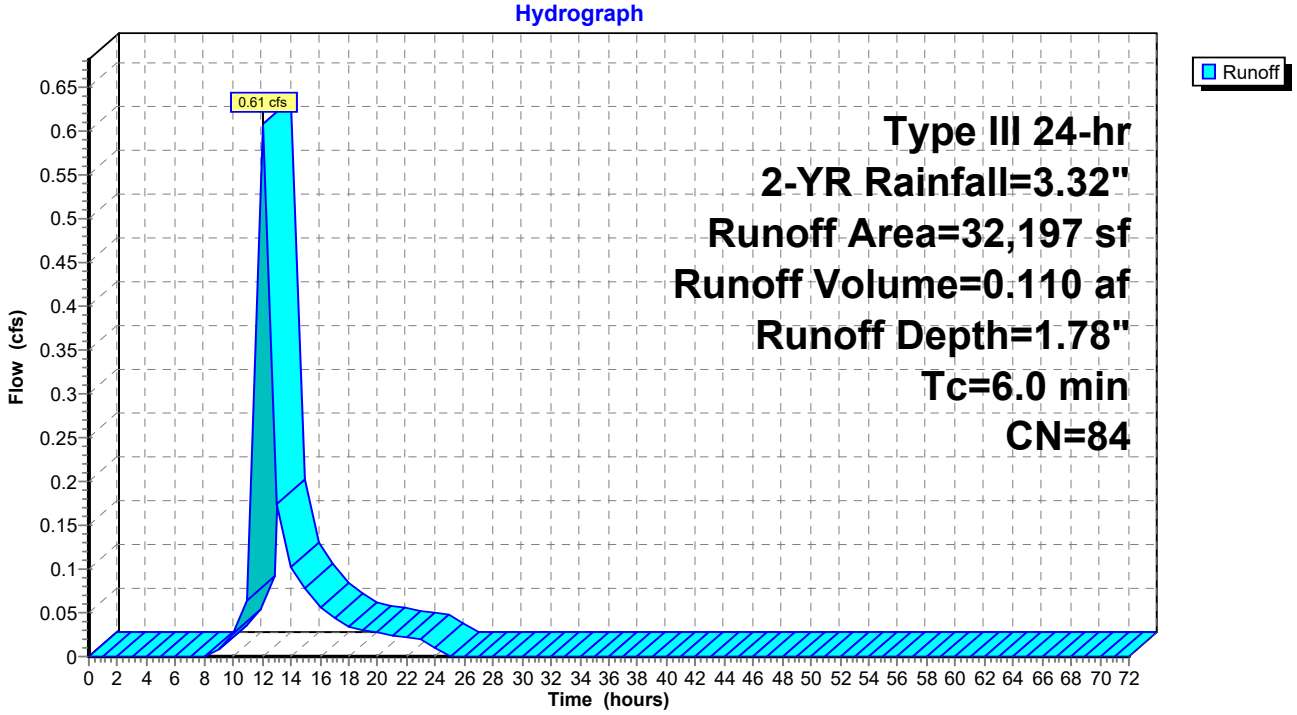
Runoff = 0.61 cfs @ 12.06 hrs, Volume= 0.110 af, Depth= 1.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 2-YR Rainfall=3.32"

Area (sf)	CN	Description
20,092	98	Paved parking, HSG B
12,105	61	>75% Grass cover, Good, HSG B
32,197	84	Weighted Average
12,105		37.60% Pervious Area
20,092		62.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 min**

Subcatchment 5E: PDA-5E



Summary for Subcatchment 6: PDA-6

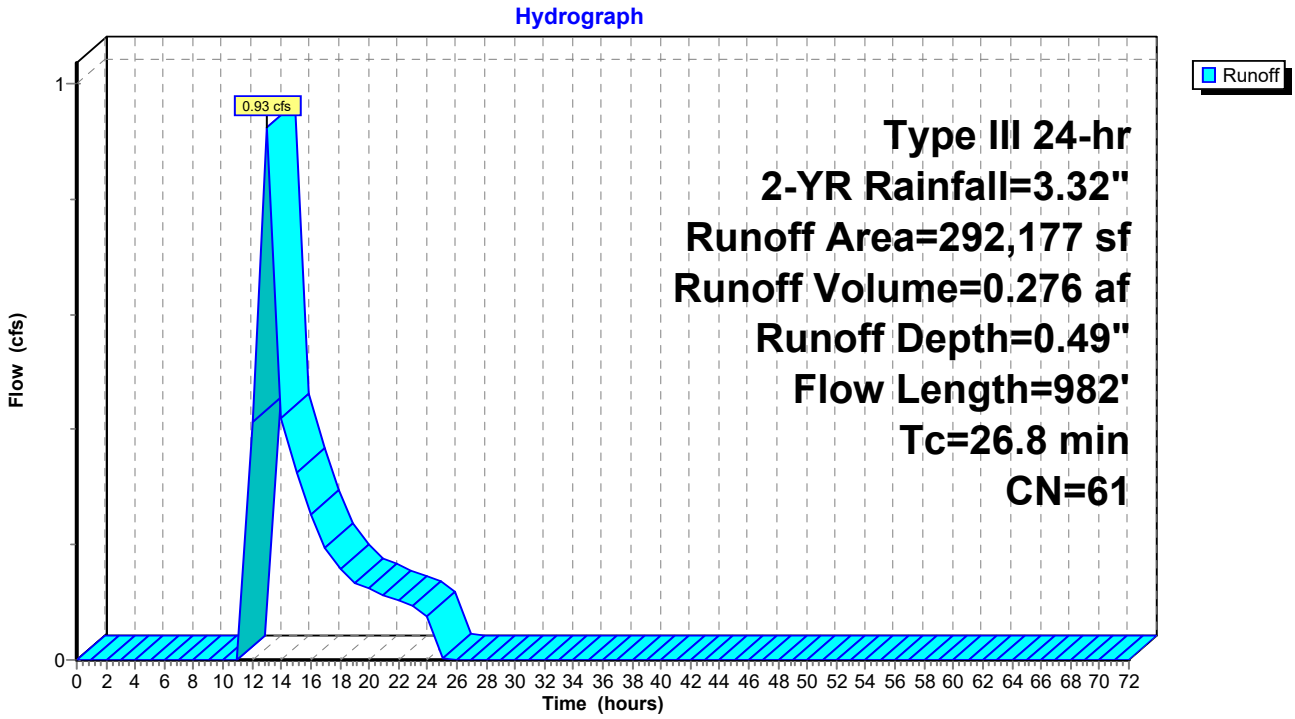
Runoff = 0.93 cfs @ 13.00 hrs, Volume= 0.276 af, Depth= 0.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 2-YR Rainfall=3.32"

Area (sf)	CN	Description
113,079	70	Woods, Good, HSG C
179,098	55	Woods, Good, HSG B
292,177	61	Weighted Average
292,177		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.1	50	0.0250	0.08		**Sheet Flow, 6A-6B** Woods: Light underbrush n= 0.400 P2= 3.32"
4.7	306	0.0474	1.09		**Shallow Concentrated Flow, 6B-6C** Woodland Kv= 5.0 fps
3.5	130	0.0154	0.62		**Shallow Concentrated Flow, 6C-6D** Woodland Kv= 5.0 fps
7.5	496	0.0484	1.10		**Shallow Concentrated Flow, 6D-EDP-6** Woodland Kv= 5.0 fps
26.8	982	Total			

Subcatchment 6: PDA-6



Summary for Subcatchment 7A: PDA-7A

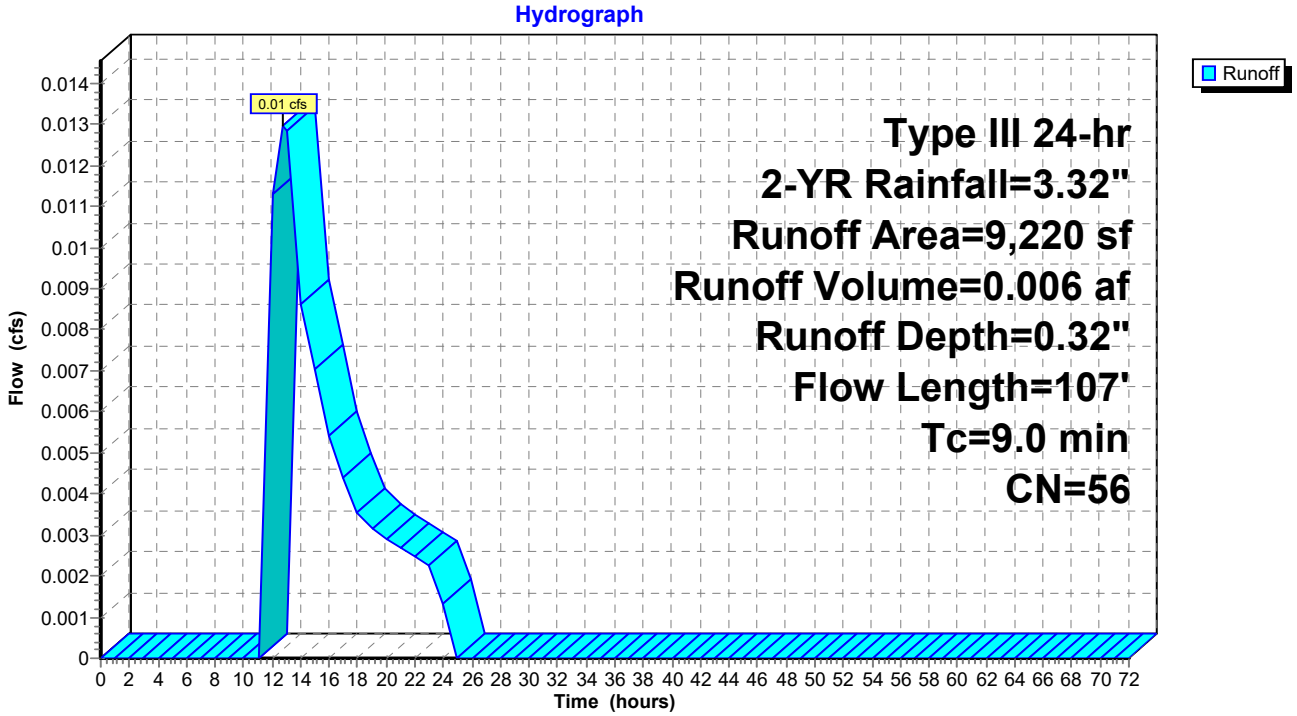
Runoff = 0.01 cfs @ 12.77 hrs, Volume= 0.006 af, Depth= 0.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 2-YR Rainfall=3.32"

Area (sf)	CN	Description
1,048	61	>75% Grass cover, Good, HSG B
8,172	55	Woods, Good, HSG B
9,220	56	Weighted Average
9,220		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	50	0.0550	0.10		**Sheet Flow, 7A-7B** Woods: Light underbrush n= 0.400 P2= 3.32"
0.9	57	0.0480	1.10		**Shallow Concentrated Flow, 7B-7C** Woodland Kv= 5.0 fps
9.0	107	Total			

Subcatchment 7A: PDA-7A



Summary for Subcatchment 7B: PDA-7B

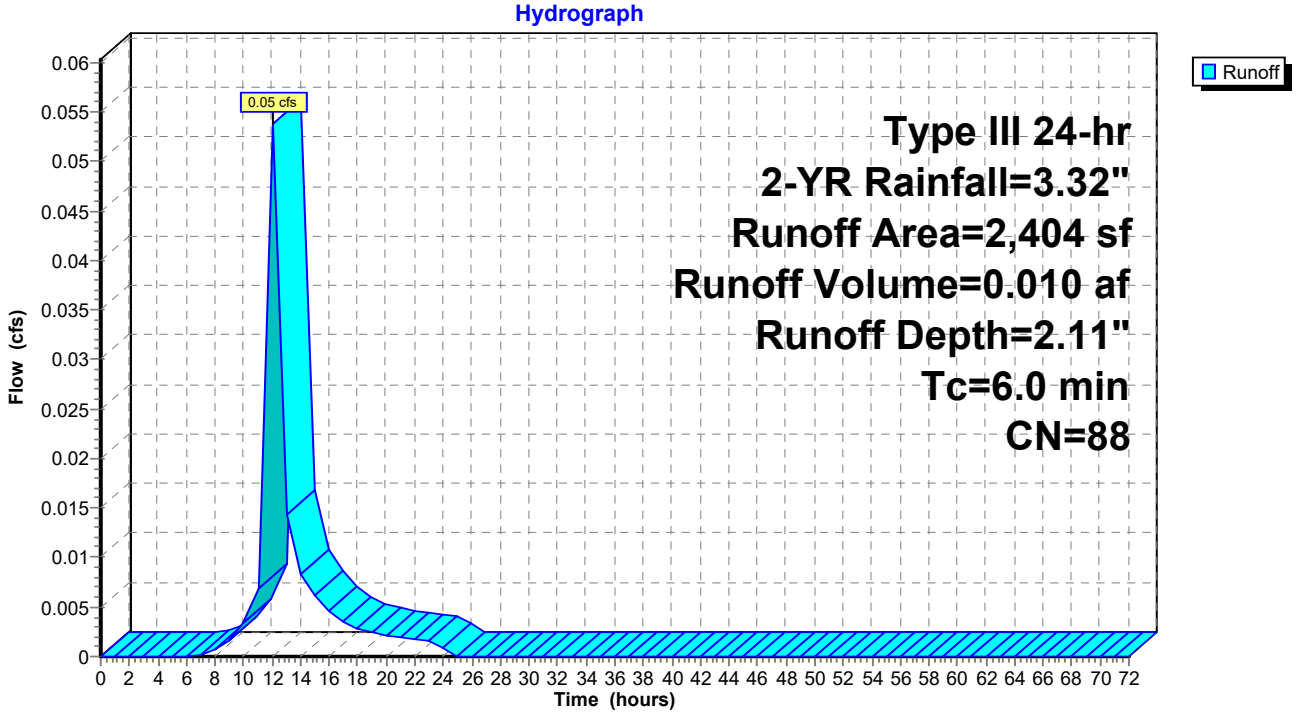
Runoff = 0.05 cfs @ 12.04 hrs, Volume= 0.010 af, Depth= 2.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 2-YR Rainfall=3.32"

Area (sf)	CN	Description
1,743	98	Roofs, HSG B
661	61	>75% Grass cover, Good, HSG B
2,404	88	Weighted Average
661		27.50% Pervious Area
1,743		72.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Subcatchment 7B: PDA-7B

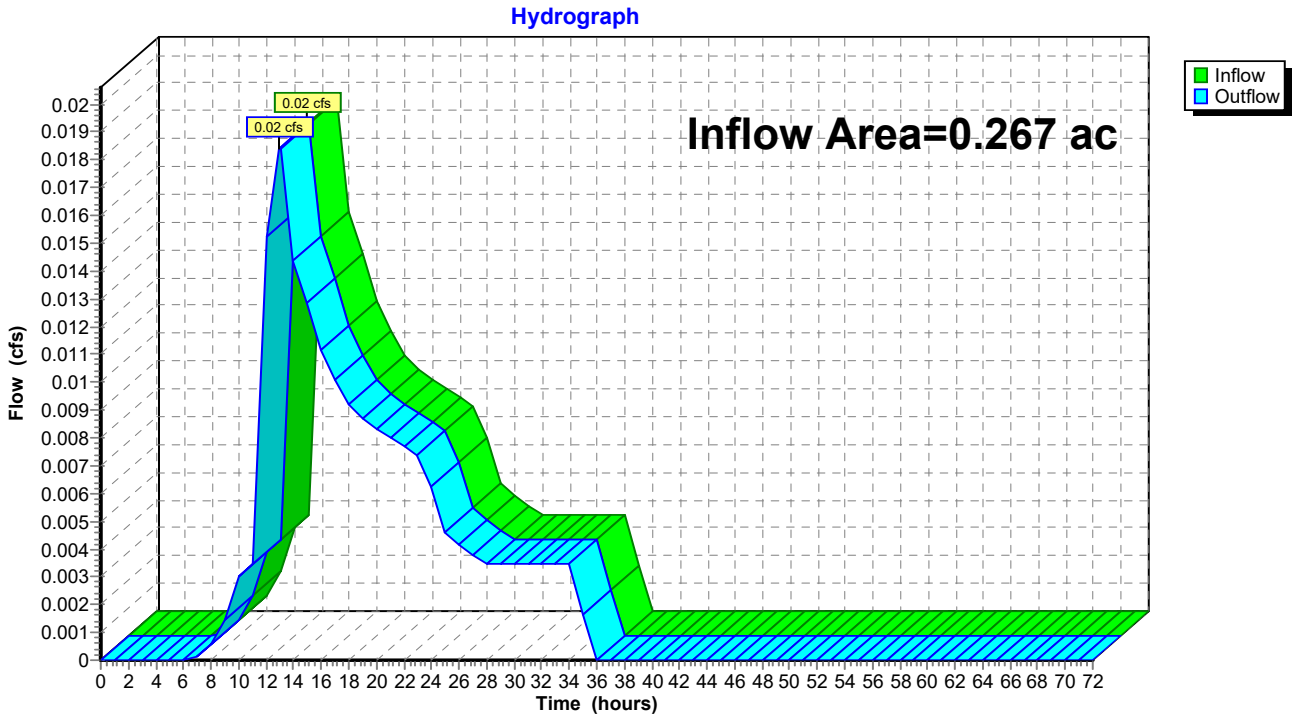


Summary for Reach DP-7: DP-7

Inflow Area = 0.267 ac, 14.99% Impervious, Inflow Depth = 0.69" for 2-YR event
Inflow = 0.02 cfs @ 12.94 hrs, Volume= 0.015 af
Outflow = 0.02 cfs @ 12.94 hrs, Volume= 0.015 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs

Reach DP-7: DP-7



Summary for Reach PDP-4: Design Point 4

Inflow Area = 17.568 ac, 18.21% Impervious, Inflow Depth = 0.41" for 2-YR event
Inflow = 1.44 cfs @ 13.42 hrs, Volume= 0.608 af
Outflow = 1.26 cfs @ 14.15 hrs, Volume= 0.607 af, Atten= 13%, Lag= 44.0 min

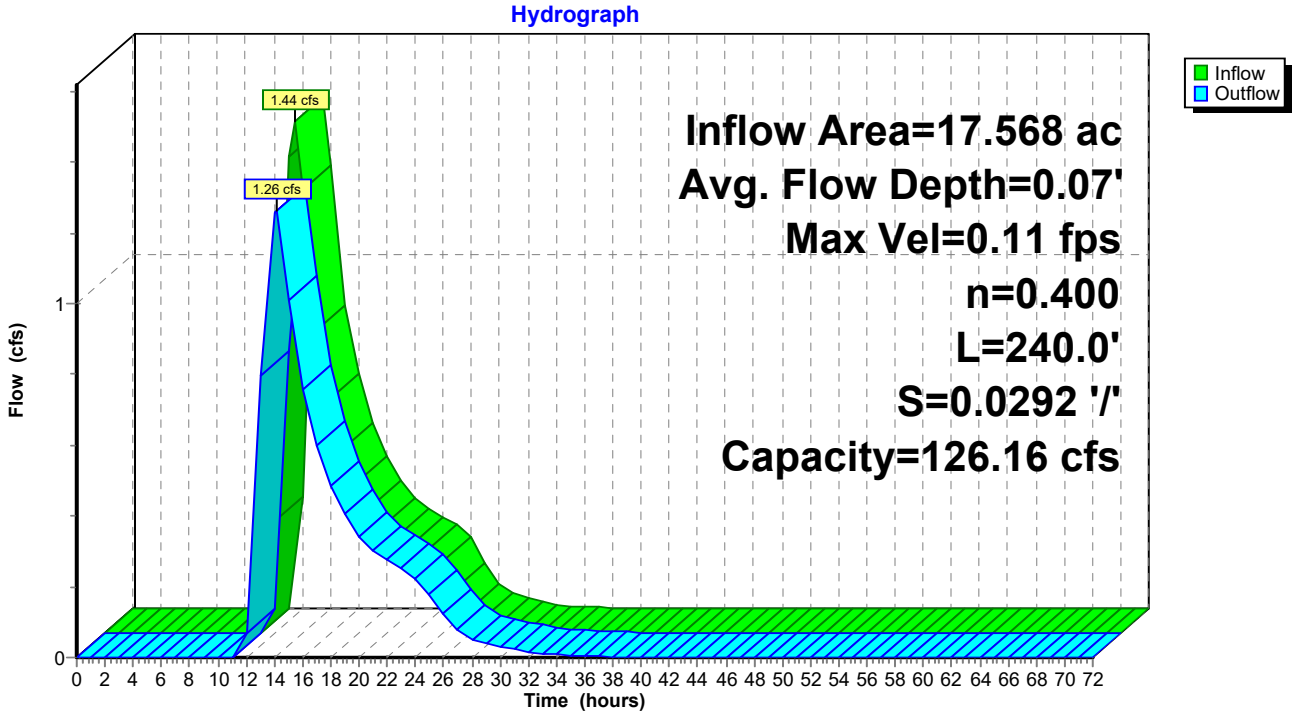
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs / 2
Max. Velocity= 0.11 fps, Min. Travel Time= 37.9 min
Avg. Velocity = 0.04 fps, Avg. Travel Time= 93.5 min

Peak Storage= 2,867 cf @ 14.16 hrs
Average Depth at Peak Storage= 0.07'
Bank-Full Depth= 1.00' Flow Area= 237.5 sf, Capacity= 126.16 cfs

165.00' x 1.00' deep channel, n= 0.400 Sheet flow: Woods+light brush
Side Slope Z-value= 80.0 65.0 '/' Top Width= 310.00'
Length= 240.0' Slope= 0.0292 '/'
Inlet Invert= 625.00', Outlet Invert= 618.00'

‡

Reach PDP-4: Design Point 4



Stage-Discharge for Reach PDP-4: Design Point 4

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
625.00	0.00	0.00
625.01	0.03	0.05
625.02	0.05	0.15
625.03	0.06	0.30
625.04	0.07	0.49
625.05	0.08	0.72
625.06	0.10	0.97
625.07	0.11	1.26
625.08	0.12	1.57
625.09	0.12	1.92
625.10	0.13	2.29
625.11	0.14	2.69
625.12	0.15	3.11
625.13	0.16	3.56
625.14	0.16	4.04
625.15	0.17	4.54
625.16	0.18	5.06
625.17	0.19	5.61
625.18	0.19	6.18
625.19	0.20	6.78
625.20	0.21	7.40
625.21	0.21	8.04
625.22	0.22	8.70
625.23	0.22	9.39
625.24	0.23	10.09
625.25	0.24	10.82
625.26	0.24	11.58
625.27	0.25	12.35
625.28	0.25	13.15
625.29	0.26	13.96
625.30	0.26	14.80
625.31	0.27	15.66
625.32	0.27	16.54
625.33	0.28	17.45
625.34	0.28	18.37
625.35	0.29	19.31
625.36	0.29	20.28
625.37	0.30	21.27
625.38	0.30	22.28
625.39	0.31	23.31
625.40	0.31	24.36
625.41	0.32	25.43
625.42	0.32	26.52
625.43	0.33	27.63
625.44	0.33	28.77
625.45	0.34	29.92
625.46	0.34	31.10
625.47	0.35	32.30
625.48	0.35	33.51
625.49	0.35	34.75
625.50	0.36	36.01
625.51	0.36	37.29
625.52	0.37	38.60
625.53	0.37	39.92
625.54	0.37	41.26
625.55	0.38	42.62
625.56	0.38	44.01
625.57	0.39	45.42
625.58	0.39	46.84
625.59	0.39	48.29
625.60	0.40	49.76
625.61	0.40	51.25
625.62	0.41	52.76
625.63	0.41	54.29
625.64	0.41	55.85
625.65	0.42	57.42
625.66	0.42	59.02
625.67	0.42	60.64
625.68	0.43	62.27
625.69	0.43	63.93
625.70	0.43	65.62
625.71	0.44	67.32
625.72	0.44	69.04
625.73	0.44	70.79
625.74	0.45	72.55
625.75	0.45	74.34
625.76	0.46	76.15
625.77	0.46	77.98
625.78	0.46	79.84
625.79	0.47	81.71
625.80	0.47	83.61
625.81	0.47	85.53
625.82	0.48	87.47
625.83	0.48	89.43
625.84	0.48	91.41
625.85	0.48	93.42
625.86	0.49	95.44
625.87	0.49	97.49
625.88	0.49	99.56
625.89	0.50	101.66
625.90	0.50	103.77
625.91	0.50	105.91
625.92	0.51	108.07
625.93	0.51	110.25
625.94	0.51	112.46
625.95	0.52	114.69
625.96	0.52	116.94
625.97	0.52	119.21
625.98	0.53	121.50
625.99	0.53	123.82
626.00	**0.53**	**126.16**

Summary for Reach PDP-5: Design Point 5

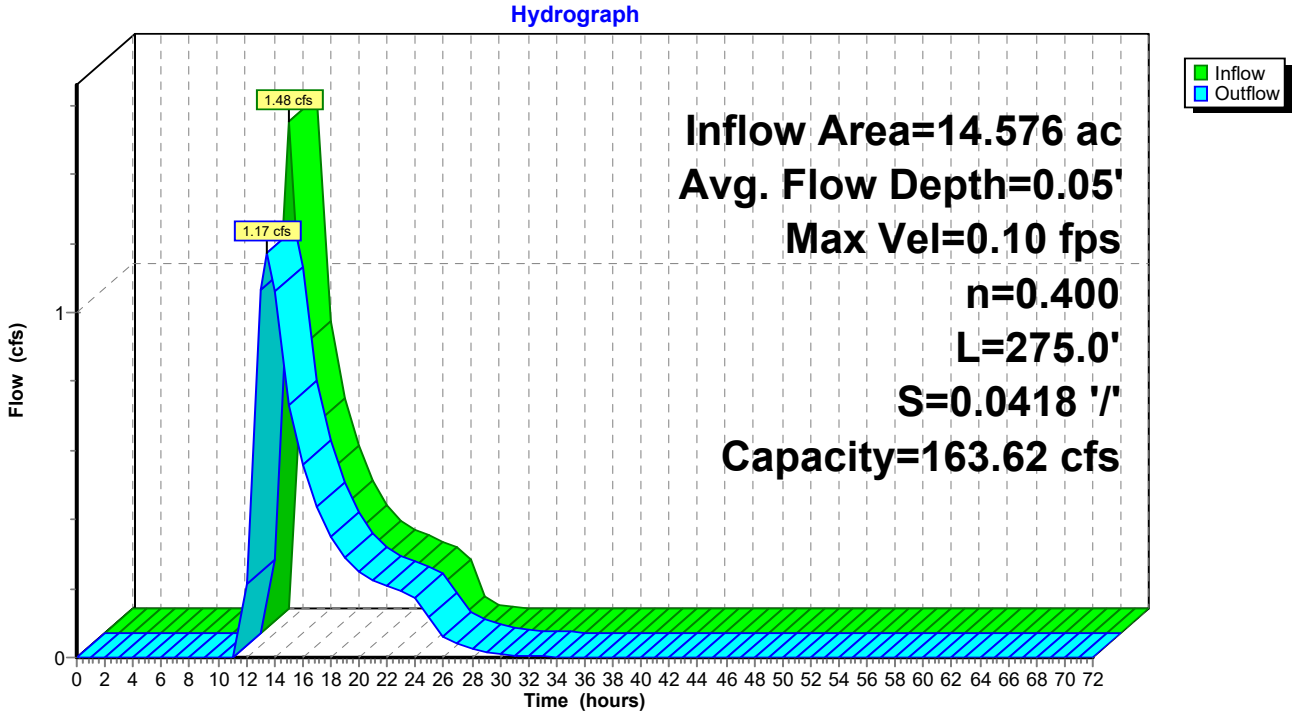
Inflow Area = 14.576 ac, 7.38% Impervious, Inflow Depth = 0.41" for 2-YR event
Inflow = 1.48 cfs @ 13.03 hrs, Volume= 0.502 af
Outflow = 1.17 cfs @ 13.49 hrs, Volume= 0.501 af, Atten= 21%, Lag= 27.6 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs / 2
Max. Velocity= 0.10 fps, Min. Travel Time= 44.1 min
Avg. Velocity = 0.05 fps, Avg. Travel Time= 96.1 min

Peak Storage= 3,043 cf @ 13.50 hrs
Average Depth at Peak Storage= 0.05'
Bank-Full Depth= 1.00' Flow Area= 237.5 sf, Capacity= 163.62 cfs

200.00' x 1.00' deep channel, n= 0.400 Sheet flow: Woods+light brush
Side Slope Z-value= 50.0 25.0 '/' Top Width= 275.00'
Length= 275.0' Slope= 0.0418 '/'
Inlet Invert= 636.50', Outlet Invert= 625.00'

Reach PDP-5: Design Point 5



Stage-Discharge for Reach PDP-5: Design Point 5

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
636.50	0.00	0.00
636.51	0.04	0.07
636.52	0.06	0.22
636.53	0.07	0.44
636.54	0.09	0.71
636.55	0.10	1.03
636.56	0.12	1.40
636.57	0.13	1.81
636.58	0.14	2.27
636.59	0.15	2.76
636.60	0.16	3.29
636.61	0.17	3.86
636.62	0.18	4.47
636.63	0.19	5.11
636.64	0.20	5.79
636.65	0.21	6.50
636.66	0.22	7.24
636.67	0.23	8.01
636.68	0.24	8.82
636.69	0.25	9.66
636.70	0.25	10.53
636.71	0.26	11.43
636.72	0.27	12.36
636.73	0.28	13.32
636.74	0.29	14.31
636.75	0.29	15.33
636.76	0.30	16.37
636.77	0.31	17.45
636.78	0.31	18.55
636.79	0.32	19.68
636.80	0.33	20.84
636.81	0.34	22.03
636.82	0.34	23.24
636.83	0.35	24.48
636.84	0.36	25.75
636.85	0.36	27.04
636.86	0.37	28.36
636.87	0.38	29.71
636.88	0.38	31.08
636.89	0.39	32.48
636.90	0.39	33.91
636.91	0.40	35.36
636.92	0.41	36.83
636.93	0.41	38.34
636.94	0.42	39.86
636.95	0.42	41.42
636.96	0.43	42.99
636.97	0.44	44.59
636.98	0.44	46.22
636.99	0.45	47.87
637.00	0.45	49.55
637.01	0.46	51.25
637.02	0.46	52.98
637.03	0.47	54.73
637.04	0.48	56.50
637.05	0.48	58.30
637.06	0.49	60.12
637.07	0.49	61.97
637.08	0.50	63.84
637.09	0.50	65.74
637.10	0.51	67.66
637.11	0.51	69.60
637.12	0.52	71.57
637.13	0.52	73.56
637.14	0.53	75.57
637.15	0.53	77.61
637.16	0.54	79.67
637.17	0.54	81.76
637.18	0.55	83.87
637.19	0.55	86.00
637.20	0.56	88.16
637.21	0.56	90.34
637.22	0.57	92.54
637.23	0.57	94.77
637.24	0.58	97.02
637.25	0.58	99.29
637.26	0.58	101.58
637.27	0.59	103.90
637.28	0.59	106.25
637.29	0.60	108.61
637.30	0.60	111.00
637.31	0.61	113.41
637.32	0.61	115.85
637.33	0.62	118.31
637.34	0.62	120.79
637.35	0.63	123.29
637.36	0.63	125.82
637.37	0.63	128.37
637.38	0.64	130.95
637.39	0.64	133.54
637.40	0.65	136.16
637.41	0.65	138.80
637.42	0.66	141.47
637.43	0.66	144.16
637.44	0.66	146.87
637.45	0.67	149.60
637.46	0.67	152.36
637.47	0.68	155.14
637.48	0.68	157.94
637.49	0.68	160.77
637.50	**0.69**	**163.62**

Summary for Reach PDP-6: Design Point 6

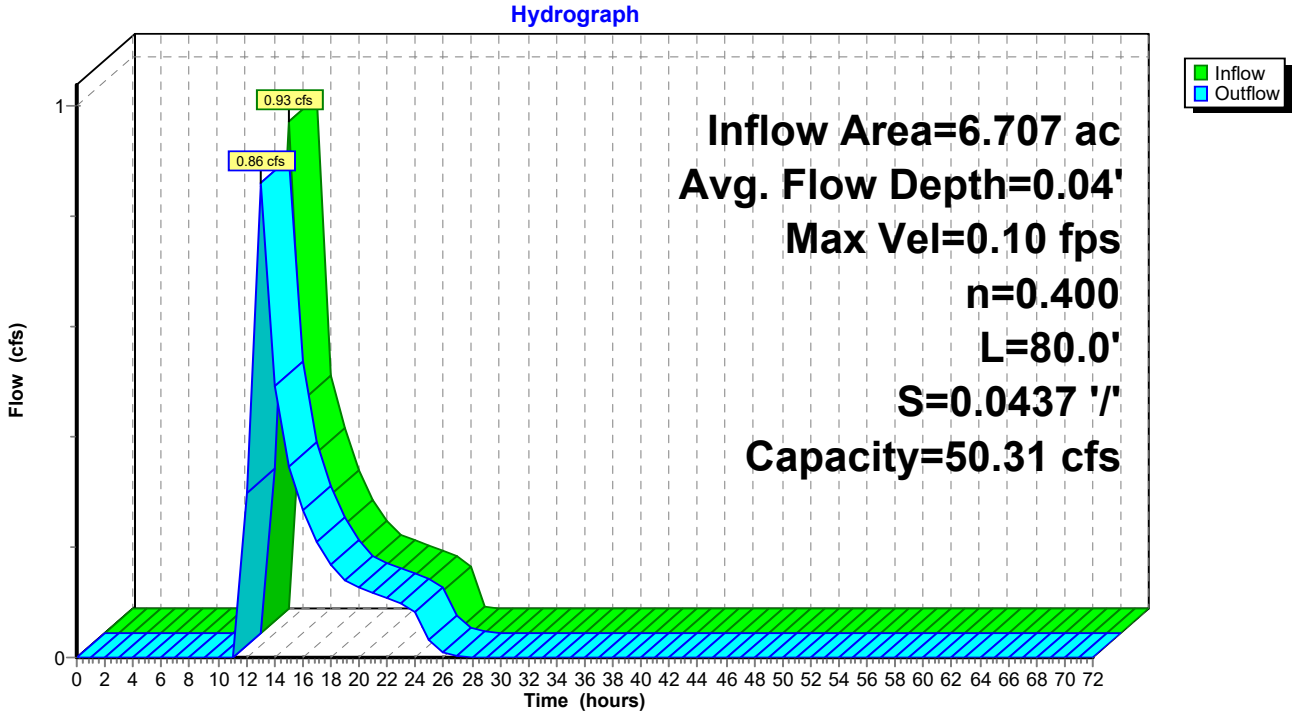
Inflow Area = 6.707 ac, 0.00% Impervious, Inflow Depth = 0.49" for 2-YR event
Inflow = 0.93 cfs @ 13.00 hrs, Volume= 0.276 af
Outflow = 0.86 cfs @ 13.11 hrs, Volume= 0.277 af, Atten= 7%, Lag= 6.2 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs / 2
Max. Velocity= 0.10 fps, Min. Travel Time= 13.8 min
Avg. Velocity = 0.04 fps, Avg. Travel Time= 31.9 min

Peak Storage= 712 cf @ 13.12 hrs
Average Depth at Peak Storage= 0.04'
Bank-Full Depth= 0.50' Flow Area= 107.5 sf, Capacity= 50.31 cfs

200.00' x 0.50' deep channel, n= 0.400 Sheet flow: Woods+light brush
Side Slope Z-value= 30.0 '/' Top Width= 230.00'
Length= 80.0' Slope= 0.0437 '/'
Inlet Invert= 642.50', Outlet Invert= 639.00'

Reach PDP-6: Design Point 6



Stage-Discharge for Reach PDP-6: Design Point 6

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
642.50	0.00	0.00
642.51	0.04	0.07
642.52	0.06	0.23
642.53	0.07	0.45
642.54	0.09	0.73
642.55	0.10	1.06
642.56	0.12	1.43
642.57	0.13	1.85
642.58	0.14	2.32
642.59	0.15	2.82
642.60	0.17	3.37
642.61	0.18	3.95
642.62	0.19	4.57
642.63	0.20	5.22
642.64	0.21	5.91
642.65	0.22	6.63
642.66	0.23	7.39
642.67	0.23	8.18
642.68	0.24	9.00
642.69	0.25	9.86
642.70	0.26	10.74
642.71	0.27	11.66
642.72	0.28	12.60
642.73	0.29	13.58
642.74	0.29	14.59
642.75	0.30	15.62
642.76	0.31	16.69
642.77	0.32	17.78
642.78	0.32	18.90
642.79	0.33	20.05
642.80	0.34	21.23
642.81	0.35	22.43
642.82	0.35	23.67
642.83	0.36	24.92
642.84	0.37	26.21
642.85	0.37	27.52
642.86	0.38	28.86
642.87	0.39	30.23
642.88	0.39	31.62
642.89	0.40	33.04
642.90	0.41	34.48
642.91	0.41	35.95
642.92	0.42	37.45
642.93	0.43	38.97
642.94	0.43	40.51
642.95	0.44	42.08
642.96	0.44	43.68
642.97	0.45	45.30
642.98	0.46	46.94
642.99	0.46	48.61
643.00	**0.47**	**50.31**

Summary for Pond 3: SFB-3

Inflow Area = 1.125 ac, 75.58% Impervious, Inflow Depth > 2.37" for 2-YR event
Inflow = 0.42 cfs @ 12.13 hrs, Volume= 0.222 af
Outflow = 0.25 cfs @ 13.20 hrs, Volume= 0.215 af, Atten= 39%, Lag= 63.9 min
Discarded = 0.06 cfs @ 13.00 hrs, Volume= 0.132 af
Primary = 0.19 cfs @ 13.20 hrs, Volume= 0.083 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs / 3
Peak Elev= 622.09' @ 13.00 hrs Surf.Area= 1,295 sf Storage= 1,003 cf
Flood Elev= 623.50' Surf.Area= 2,450 sf Storage= 3,580 cf

Plug-Flow detention time= 184.1 min calculated for 0.212 af (95% of inflow)
Center-of-Mass det. time= 148.9 min (1,240.6 - 1,091.7)

Volume	Invert	Avail.Storage	Storage Description
#1	620.00'	3,306 cf	**Overall storage (Prismatic)** Listed below (Recalc) 4,263 cf Overall - 957 cf Embedded = 3,306 cf
#2	620.00'	211 cf	**Sand media (Prismatic)** Listed below (Recalc) Inside #1 638 cf Overall x 33.0% Voids
#3	621.00'	64 cf	**Infiltration Seed mix (Prismatic)** Listed below (Recalc) Inside #1 319 cf Overall x 20.0% Voids
		3,580 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
620.00	638	0	0
621.00	638	638	638
622.00	1,230	934	1,572
623.00	1,951	1,591	3,163
623.50	2,450	1,100	4,263

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
620.00	638	0	0
621.00	638	638	638

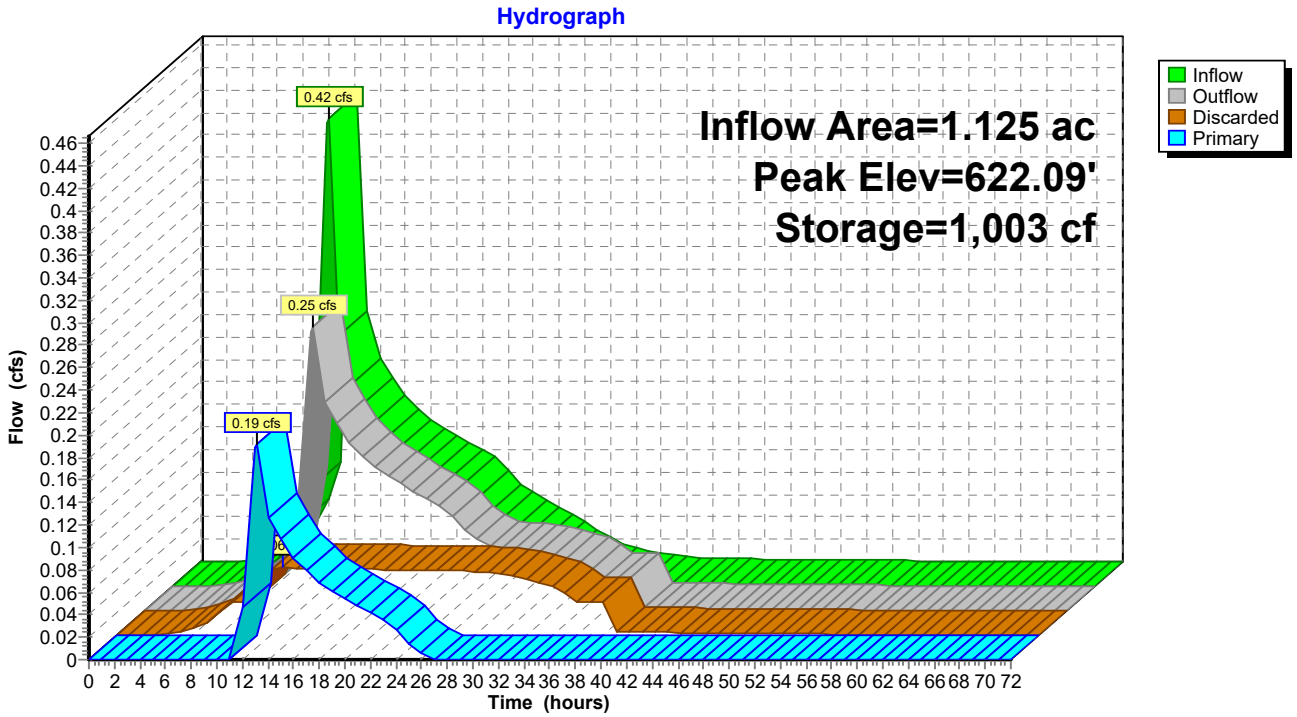
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
621.00	638	0	0
621.50	638	319	319

Device	Routing	Invert	Outlet Devices
#1	Discarded	620.00'	**2.010 in/hr Exfiltration over Surface area**
#2	Primary	620.14'	**8.0" Round Culvert** L= 14.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 620.14' / 620.00' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.35 sf
#3	Device 2	622.00'	**8.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.06 cfs @ 13.00 hrs HW=622.09' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=0.17 cfs @ 13.20 hrs HW=622.09' (Free Discharge)
└─**2=Culvert** (Passes 0.17 cfs of 1.69 cfs potential flow)
└─**3=Orifice/Grate** (Weir Controls 0.17 cfs @ 0.96 fps)

Pond 3: SFB-3



Stage-Discharge for Pond 3: SFB-3

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
620.00	0.00	0.00	0.00
620.05	0.03	0.03	0.00
620.10	0.03	0.03	0.00
620.15	0.03	0.03	0.00
620.20	0.03	0.03	0.00
620.25	0.03	0.03	0.00
620.30	0.03	0.03	0.00
620.35	0.03	0.03	0.00
620.40	0.03	0.03	0.00
620.45	0.03	0.03	0.00
620.50	0.03	0.03	0.00
620.55	0.03	0.03	0.00
620.60	0.03	0.03	0.00
620.65	0.03	0.03	0.00
620.70	0.03	0.03	0.00
620.75	0.03	0.03	0.00
620.80	0.03	0.03	0.00
620.85	0.03	0.03	0.00
620.90	0.03	0.03	0.00
620.95	0.03	0.03	0.00
621.00	0.03	0.03	0.00
621.05	0.03	0.03	0.00
621.10	0.03	0.03	0.00
621.15	0.03	0.03	0.00
621.20	0.04	0.04	0.00
621.25	0.04	0.04	0.00
621.30	0.04	0.04	0.00
621.35	0.04	0.04	0.00
621.40	0.04	0.04	0.00
621.45	0.04	0.04	0.00
621.50	0.04	0.04	0.00
621.55	0.04	0.04	0.00
621.60	0.05	0.05	0.00
621.65	0.05	0.05	0.00
621.70	0.05	0.05	0.00
621.75	0.05	0.05	0.00
621.80	0.05	0.05	0.00
621.85	0.05	0.05	0.00
621.90	0.05	0.05	0.00
621.95	0.06	0.06	0.00
622.00	0.06	0.06	0.00
622.05	0.14	0.06	0.08
622.10	0.28	0.06	0.22
622.15	0.46	0.06	0.40
622.20	0.68	0.06	0.61
622.25	0.91	0.07	0.84
622.30	0.99	0.07	0.92
622.35	1.06	0.07	0.99
622.40	1.13	0.07	1.06
622.45	1.20	0.07	1.13
622.50	1.26	0.07	1.19
622.55	1.32	0.08	1.25
622.60	1.38	0.08	1.30
622.65	1.43	0.08	1.36
622.70	1.49	0.08	1.41
622.75	1.54	0.08	1.46
622.80	1.59	0.08	1.50
622.85	1.64	0.09	1.55
622.90	1.68	0.09	1.59
622.95	1.73	0.09	1.64
623.00	1.77	0.09	1.68
623.05	1.82	0.09	1.72
623.10	1.86	0.10	1.76
623.15	1.90	0.10	1.80
623.20	1.94	0.10	1.84
623.25	1.98	0.10	1.88
623.30	2.02	0.10	1.92
623.35	2.06	0.11	1.95
623.40	2.10	0.11	1.99
623.45	2.14	0.11	2.02
623.50	**2.17**	**0.11**	**2.06**

Summary for Pond 4: SFB-4

Inflow Area =	1.487 ac, 85.51% Impervious, Inflow Depth = 2.68" for 2-YR event				
Inflow =	1.18 cfs @	12.05 hrs,	Volume=	0.332 af	
Outflow =	0.48 cfs @	13.29 hrs,	Volume=	0.331 af,	Atten= 59%, Lag= 74.4 min
Discarded =	0.42 cfs @	13.29 hrs,	Volume=	0.322 af	
Primary =	0.06 cfs @	13.29 hrs,	Volume=	0.008 af	
Secondary =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs / 3
Peak Elev= 632.42' @ 13.29 hrs Surf.Area= 2,768 sf Storage= 3,012 cf
Flood Elev= 634.00' Surf.Area= 4,000 sf Storage= 8,373 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 50.4 min (918.4 - 868.0)

Volume	Invert	Avail.Storage	Storage Description
#1	630.00'	7,667 cf	**Overall storage (Prismatic)** Listed below (Recalc) 10,132 cf Overall - 2,465 cf Embedded = 7,667 cf
#2	630.00'	542 cf	**Sand media (Prismatic)** Listed below (Recalc) Inside #1 1,643 cf Overall x 33.0% Voids
#3	631.00'	164 cf	**Infiltration Seed mix (Prismatic)** Listed below (Recalc) Inside #1 822 cf Overall x 20.0% Voids
		8,373 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
630.00	1,643	0	0
631.00	1,643	1,643	1,643
632.00	2,443	2,043	3,686
633.00	3,224	2,834	6,520
634.00	4,000	3,612	10,132

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
630.00	1,643	0	0
631.00	1,643	1,643	1,643

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
631.00	1,643	0	0
631.50	1,643	822	822

Device	Routing	Invert	Outlet Devices
#1	Discarded	630.00'	**6.560 in/hr Exfiltration over Surface area**
#2	Primary	630.00'	**8.0" Round Culvert** L= 25.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 630.00' / 629.25' S= 0.0300 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.35 sf
#3	Device 2	632.00'	**2.0" Vert. Orifice/Grate** C= 0.600
#4	Device 2	632.65'	**4.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

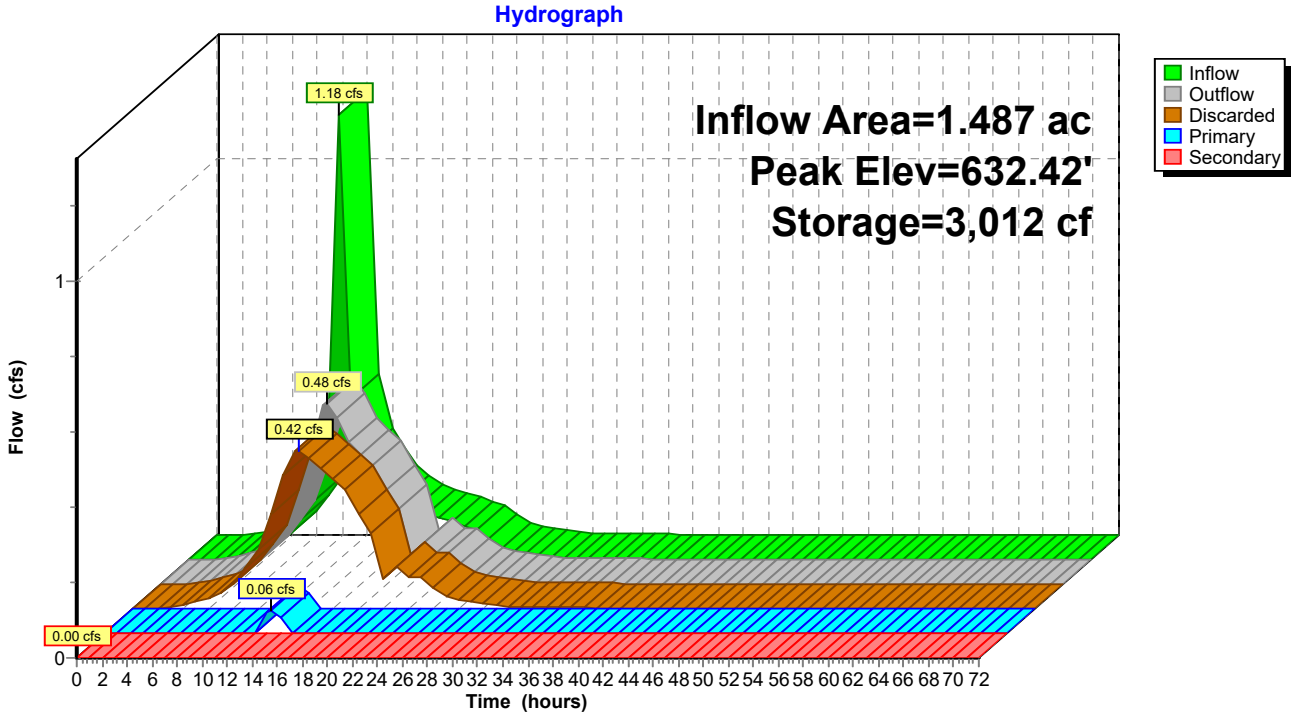
#5 Secondary 633.30' **50.0' long x 1.0' breadth Broad-Crested Rectangular Weir**
Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00
Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Discarded OutFlow Max=0.41 cfs @ 13.29 hrs HW=632.35' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.41 cfs)

Primary OutFlow Max=0.05 cfs @ 13.29 hrs HW=632.35' (Free Discharge)
└─**2=Culvert** (Passes 0.05 cfs of 1.88 cfs potential flow)
  ├─**3=Orifice/Grate** (Orifice Controls 0.05 cfs @ 2.48 fps)
  └─**4=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=630.00' (Free Discharge)
└─**5=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

Pond 4: SFB-4



Stage-Discharge for Pond 4: SFB-4

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)	Secondary (cfs)
630.00	0.00	0.00	0.00	0.00
630.10	0.25	0.25	0.00	0.00
630.20	0.25	0.25	0.00	0.00
630.30	0.25	0.25	0.00	0.00
630.40	0.25	0.25	0.00	0.00
630.50	0.25	0.25	0.00	0.00
630.60	0.25	0.25	0.00	0.00
630.70	0.25	0.25	0.00	0.00
630.80	0.25	0.25	0.00	0.00
630.90	0.25	0.25	0.00	0.00
631.00	0.25	0.25	0.00	0.00
631.10	0.26	0.26	0.00	0.00
631.20	0.27	0.27	0.00	0.00
631.30	0.29	0.29	0.00	0.00
631.40	0.30	0.30	0.00	0.00
631.50	0.31	0.31	0.00	0.00
631.60	0.32	0.32	0.00	0.00
631.70	0.33	0.33	0.00	0.00
631.80	0.35	0.35	0.00	0.00
631.90	0.36	0.36	0.00	0.00
632.00	0.37	0.37	0.00	0.00
632.10	0.40	0.38	0.01	0.00
632.20	0.43	0.39	0.04	0.00
632.30	0.46	0.41	0.05	0.00
632.40	0.48	0.42	0.06	0.00
632.50	0.50	0.43	0.07	0.00
632.60	0.52	0.44	0.08	0.00
632.70	0.57	0.45	0.12	0.00
632.80	0.72	0.47	0.25	0.00
632.90	0.78	0.48	0.31	0.00
633.00	0.84	0.49	0.35	0.00
633.10	0.89	0.50	0.39	0.00
633.20	0.94	0.51	0.42	0.00
633.30	0.98	0.52	0.45	0.00
633.40	5.27	0.54	0.48	4.25
633.50	13.09	0.55	0.51	12.03
633.60	23.32	0.56	0.54	22.22
633.70	35.54	0.57	0.56	34.41
633.80	49.52	0.58	0.59	48.35
633.90	65.11	0.60	0.61	63.90
634.00	**83.23**	**0.61**	**0.63**	**81.99**

Summary for Pond 5: SFB-5

Inflow Area =	1.636 ac, 65.78% Impervious, Inflow Depth = 1.98" for 2-YR event				
Inflow =	0.36 cfs @	12.32 hrs,	Volume=	0.270 af	
Outflow =	0.19 cfs @	16.63 hrs,	Volume=	0.270 af,	Atten= 49%, Lag= 258.5 min
Discarded =	0.19 cfs @	16.63 hrs,	Volume=	0.270 af	
Primary =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af	
Secondary =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs / 3
Peak Elev= 634.10' @ 16.63 hrs Surf.Area= 2,815 sf Storage= 1,985 cf
Flood Elev= 636.00' Surf.Area= 4,050 sf Storage= 8,589 cf

Plug-Flow detention time= 134.2 min calculated for 0.266 af (99% of inflow)
Center-of-Mass det. time= 133.6 min (1,181.8 - 1,048.2)

Volume	Invert	Avail.Storage	Storage Description
#1	632.00'	7,942 cf	**Overall storage (Prismatic)** Listed below (Recalc) 10,200 cf Overall - 2,258 cf Embedded = 7,942 cf
#2	632.00'	497 cf	**Sand media (Prismatic)** Listed below (Recalc) Inside #1 1,505 cf Overall x 33.0% Voids
#3	633.00'	151 cf	**Infiltration Seed mix (Prismatic)** Listed below (Recalc) Inside #1 753 cf Overall x 20.0% Voids
		8,589 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
632.00	1,505	0	0
633.50	1,505	2,258	2,258
634.00	2,741	1,062	3,319
635.00	3,485	3,113	6,432
636.00	4,050	3,768	10,200

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
632.00	1,505	0	0
633.00	1,505	1,505	1,505

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
633.00	1,505	0	0
633.50	1,505	753	753

Device	Routing	Invert	Outlet Devices
#1	Discarded	632.00'	**2.840 in/hr Exfiltration over Surface area**
#2	Primary	633.80'	**6.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 633.80' / 633.75' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf
#3	Device 2	634.50'	**2.0" Vert. Orifice/Grate** C= 0.600
#4	Secondary	635.00'	**80.0' long x 1.0' breadth Broad-Crested Rectangular Weir**

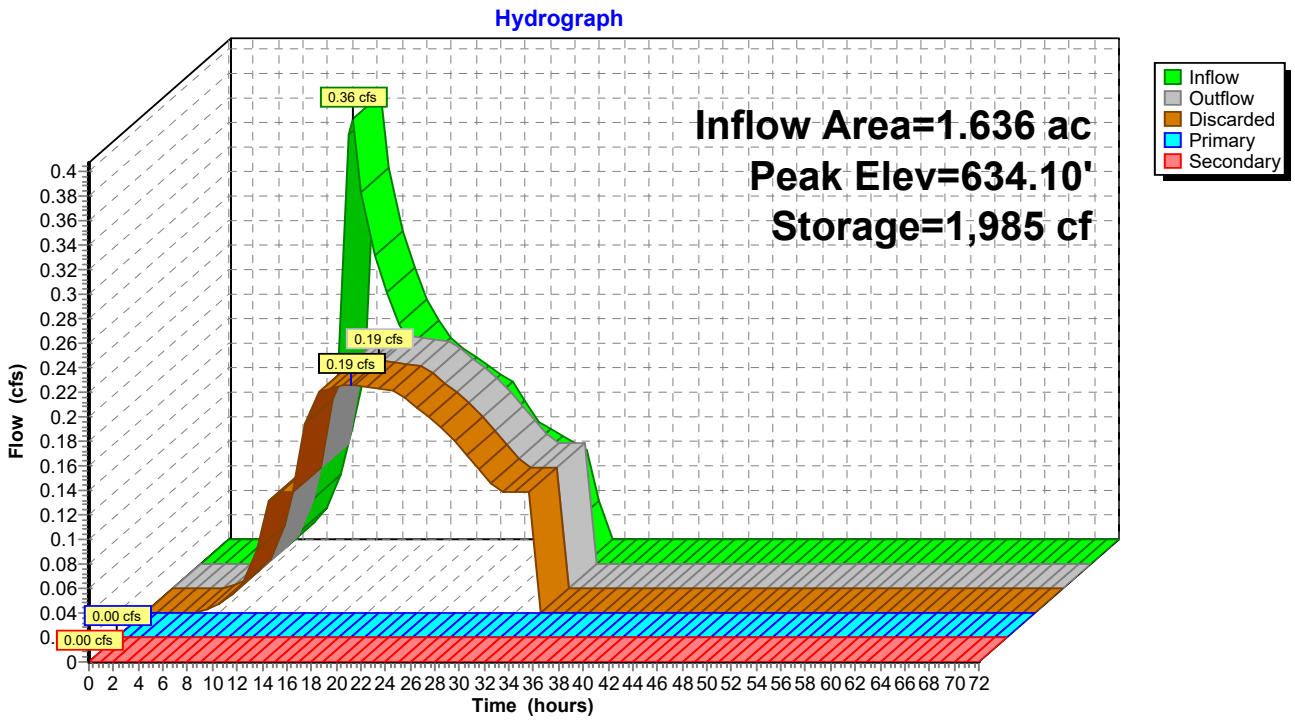
Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00
Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Discarded OutFlow Max=0.18 cfs @ 16.63 hrs HW=634.10' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.18 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=632.00' (Free Discharge)
└─**2=Culvert** (Controls 0.00 cfs)
└─**3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=632.00' (Free Discharge)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 5: SFB-5



Stage-Discharge for Pond 5: SFB-5

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)	Secondary (cfs)
632.00	0.00	0.00	0.00	0.00
632.10	0.10	0.10	0.00	0.00
632.20	0.10	0.10	0.00	0.00
632.30	0.10	0.10	0.00	0.00
632.40	0.10	0.10	0.00	0.00
632.50	0.10	0.10	0.00	0.00
632.60	0.10	0.10	0.00	0.00
632.70	0.10	0.10	0.00	0.00
632.80	0.10	0.10	0.00	0.00
632.90	0.10	0.10	0.00	0.00
633.00	0.10	0.10	0.00	0.00
633.10	0.10	0.10	0.00	0.00
633.20	0.10	0.10	0.00	0.00
633.30	0.10	0.10	0.00	0.00
633.40	0.10	0.10	0.00	0.00
633.50	0.10	0.10	0.00	0.00
633.60	0.12	0.12	0.00	0.00
633.70	0.13	0.13	0.00	0.00
633.80	0.15	0.15	0.00	0.00
633.90	0.16	0.16	0.00	0.00
634.00	0.18	0.18	0.00	0.00
634.10	0.19	0.19	0.00	0.00
634.20	0.19	0.19	0.00	0.00
634.30	0.19	0.19	0.00	0.00
634.40	0.20	0.20	0.00	0.00
634.50	0.20	0.20	0.00	0.00
634.60	0.22	0.21	0.01	0.00
634.70	0.25	0.21	0.04	0.00
634.80	0.27	0.22	0.05	0.00
634.90	0.28	0.22	0.06	0.00
635.00	0.30	0.23	0.07	0.00
635.10	7.11	0.23	0.08	6.81
635.20	19.57	0.24	0.08	19.25
635.30	35.89	0.24	0.09	35.56
635.40	55.39	0.24	0.09	55.05
635.50	77.71	0.25	0.10	77.36
635.60	102.60	0.25	0.11	102.25
635.70	131.55	0.26	0.11	131.19
635.80	163.52	0.26	0.12	163.14
635.90	199.49	0.26	0.12	199.11
636.00	**238.79**	**0.27**	**0.13**	**238.40**

Summary for Pond DB-3: DB-3

Inflow Area = 0.593 ac,100.00% Impervious, Inflow Depth = 3.16" for 2-YR event
Inflow = 0.83 cfs @ 12.01 hrs, Volume= 0.156 af
Outflow = 0.12 cfs @ 14.01 hrs, Volume= 0.156 af, Atten= 86%, Lag= 119.6 min
Primary = 0.12 cfs @ 14.01 hrs, Volume= 0.156 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Peak Elev= 627.31' @ 14.01 hrs Surf.Area= 0.081 ac Storage= 0.090 af
Flood Elev= 630.00' Surf.Area= 0.081 ac Storage= 0.276 af

Plug-Flow detention time= 453.1 min calculated for 0.156 af (100% of inflow)
Center-of-Mass det. time= 447.9 min (1,201.4 - 753.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	626.00'	0.000 af	**27.58'W x 127.56'L x 4.67'H Field A** 0.377 af Overall - 0.377 af Embedded = 0.000 af x 0.0% Voids
#2A	626.00'	0.276 af	**StormTrap ST1 SingleTrap 4-0** x 36 Inside #1 Inside= 82.7"W x 48.0"H => 23.79 sf x 14.06'L = 334.5 cf Outside= 82.7"W x 56.0"H => 32.18 sf x 14.06'L = 452.5 cf 4 Rows of 9 Chambers 27.58' x 126.56' Core + 0.00' x 0.50' Border = 27.58' x 127.56' System
		0.276 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	626.00'	**8.0" Round Culvert** L= 240.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 626.00' / 622.00' S= 0.0167 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.35 sf
#2	Device 1	626.00'	**2.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.12 cfs @ 14.01 hrs HW=627.31' (Free Discharge)
└─**1=Culvert** (Passes 0.12 cfs of 1.31 cfs potential flow)
└─**2=Orifice/Grate** (Orifice Controls 0.12 cfs @ 5.32 fps)

Pond DB-3: DB-3 - Chamber Wizard Field A

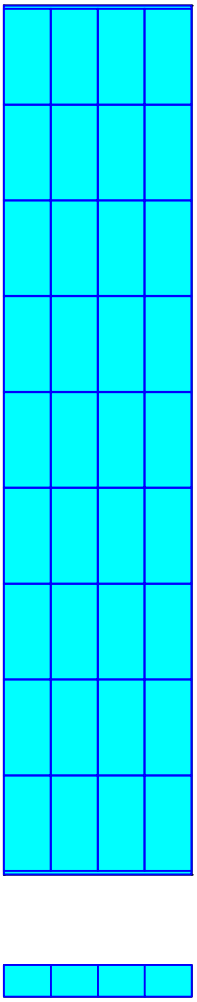
Chamber Model = StormTrap ST1 SingleTrap 4-0 (StormTrap ST1 SingleTrap® Type VI)
Inside= 82.7"W x 48.0"H => 23.79 sf x 14.06'L = 334.5 cf
Outside= 82.7"W x 56.0"H => 32.18 sf x 14.06'L = 452.5 cf

9 Chambers/Row x 14.06' Long = 126.56' Row Length +6.0" Border x 2 = 127.56' Base Length
4 Rows x 82.7" Wide = 27.58' Base Width
56.0" Chamber Height = 4.67' Field Height

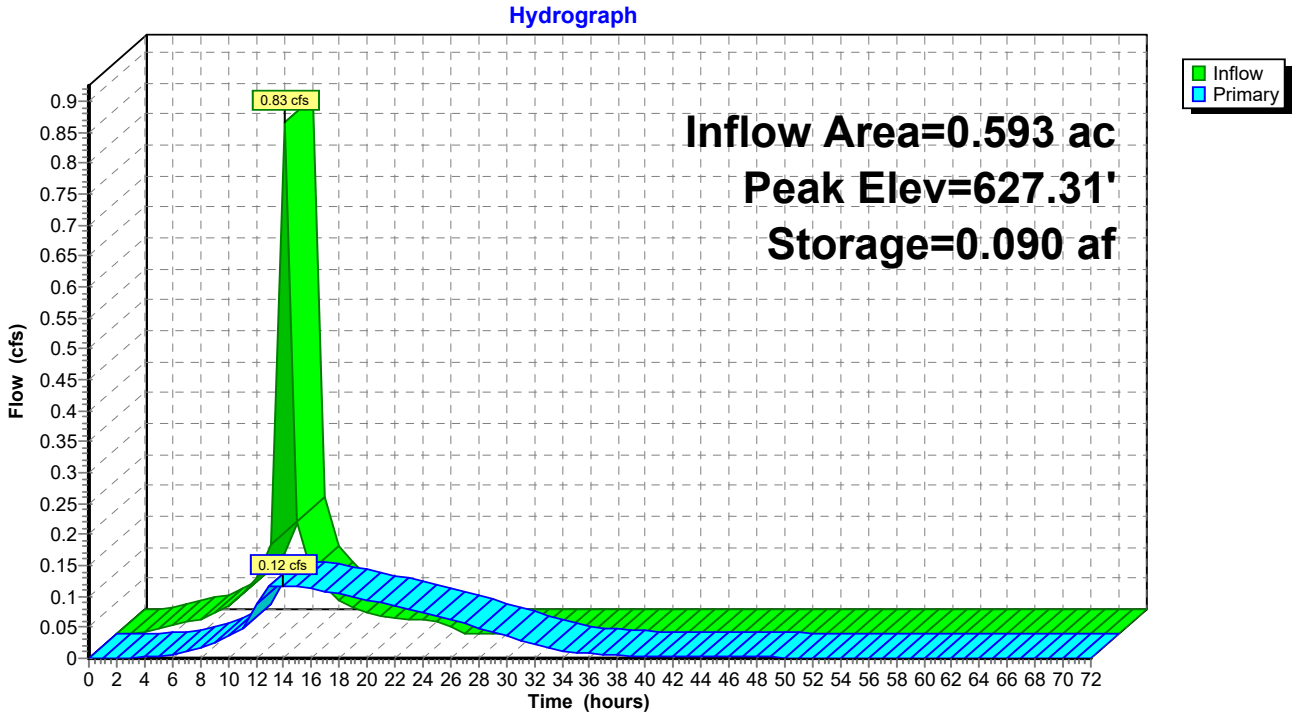
36 Chambers x 334.5 cf = 12,042.0 cf Chamber Storage
36 Chambers x 452.5 cf + 128.7 cf Border = 16,420.1 cf Displacement

Chamber Storage = 12,042.0 cf = 0.276 af
Overall Storage Efficiency = 73.3%
Overall System Size = 127.56' x 27.58' x 4.67'

36 Chambers (plus border)
608.2 cy Field



Pond DB-3: DB-3


Hydrograph
Inflow
Primary
0.83 cfs
0.12 cfs
Inflow Area=0.593 ac
Peak Elev=627.31'
Storage=0.090 af
Flow (cfs)
Time (hours)

Stage-Discharge for Pond DB-3: DB-3

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
626.00	0.00	628.60	0.17
626.05	0.00	628.65	0.17
626.10	0.01	628.70	0.17
626.15	0.03	628.75	0.17
626.20	0.04	628.80	0.17
626.25	0.04	628.85	0.17
626.30	0.05	628.90	0.18
626.35	0.05	628.95	0.18
626.40	0.06	629.00	0.18
626.45	0.06	629.05	0.18
626.50	0.07	629.10	0.18
626.55	0.07	629.15	0.18
626.60	0.08	629.20	0.19
626.65	0.08	629.25	0.19
626.70	0.08	629.30	0.19
626.75	0.09	629.35	0.19
626.80	0.09	629.40	0.19
626.85	0.09	629.45	0.19
626.90	0.09	629.50	0.19
626.95	0.10	629.55	0.20
627.00	0.10	629.60	0.20
627.05	0.10	629.65	0.20
627.10	0.11	629.70	0.20
627.15	0.11	629.75	0.20
627.20	0.11	629.80	0.20
627.25	0.11	629.85	0.20
627.30	0.12	629.90	0.21
627.35	0.12	629.95	0.21
627.40	0.12	630.00	0.21
627.45	0.12	630.05	0.21
627.50	0.13	630.10	0.21
627.55	0.13	630.15	0.21
627.60	0.13	630.20	0.21
627.65	0.13	630.25	0.21
627.70	0.13	630.30	0.22
627.75	0.14	630.35	0.22
627.80	0.14	630.40	0.22
627.85	0.14	630.45	0.22
627.90	0.14	630.50	0.22
627.95	0.14	630.55	0.22
628.00	0.15	630.60	0.22
628.05	0.15	630.65	**0.22**
628.10	0.15		
628.15	0.15		
628.20	0.15		
628.25	0.15		
628.30	0.16		
628.35	0.16		
628.40	0.16		
628.45	0.16		
628.50	0.16		
628.55	0.16		

Summary for Pond DB-4: DB-4

Inflow Area = 0.274 ac,100.00% Impervious, Inflow Depth = 4.03" for 2-YR event
Inflow = 0.62 cfs @ 12.01 hrs, Volume= 0.092 af
Outflow = 0.10 cfs @ 13.41 hrs, Volume= 0.092 af, Atten= 84%, Lag= 84.3 min
Primary = 0.10 cfs @ 13.41 hrs, Volume= 0.092 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Peak Elev= 634.94' @ 13.40 hrs Surf.Area= 0.072 ac Storage= 0.058 af
Flood Elev= 638.00' Surf.Area= 0.072 ac Storage= 0.246 af

Plug-Flow detention time= 358.2 min calculated for 0.092 af (100% of inflow)
Center-of-Mass det. time= 352.0 min (1,098.2 - 746.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	634.00'	0.000 af	**27.58'W x 113.50'L x 4.67'H Field A** 0.335 af Overall - 0.335 af Embedded = 0.000 af x 0.0% Voids
#2A	634.00'	0.246 af	**StormTrap ST1 SingleTrap 4-0** x 32 Inside #1 Inside= 82.7"W x 48.0"H => 23.79 sf x 14.06'L = 334.5 cf Outside= 82.7"W x 56.0"H => 32.18 sf x 14.06'L = 452.5 cf 4 Rows of 8 Chambers 27.58' x 112.50' Core + 0.00' x 0.50' Border = 27.58' x 113.50' System
		0.246 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	634.00'	**6.0" Round Culvert** L= 100.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 634.00' / 633.00' S= 0.0100 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.20 sf
#2	Device 1	634.00'	**2.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	636.00'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Device 1	637.00'	**4.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.09 cfs @ 13.41 hrs HW=634.90' (Free Discharge)
└─**1=Culvert** (Passes 0.09 cfs of 0.60 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.09 cfs @ 4.34 fps)
  ├─**3=Orifice/Grate** (Controls 0.00 cfs)
  └─**4=Orifice/Grate** (Controls 0.00 cfs)

Pond DB-4: DB-4 - Chamber Wizard Field A

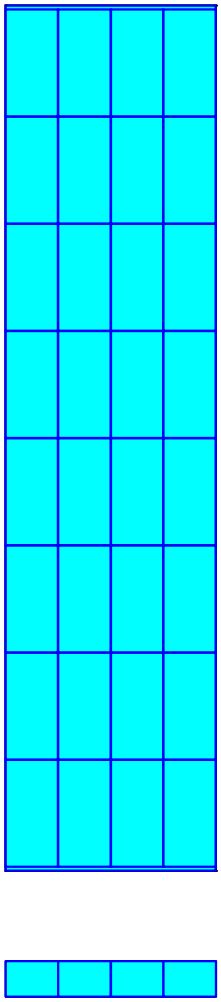
Chamber Model = StormTrap ST1 SingleTrap 4-0 (StormTrap ST1 SingleTrap® Type VI)
Inside= 82.7"W x 48.0"H => 23.79 sf x 14.06'L = 334.5 cf
Outside= 82.7"W x 56.0"H => 32.18 sf x 14.06'L = 452.5 cf

8 Chambers/Row x 14.06' Long = 112.50' Row Length +6.0" Border x 2 = 113.50' Base Length
4 Rows x 82.7" Wide = 27.58' Base Width
56.0" Chamber Height = 4.67' Field Height

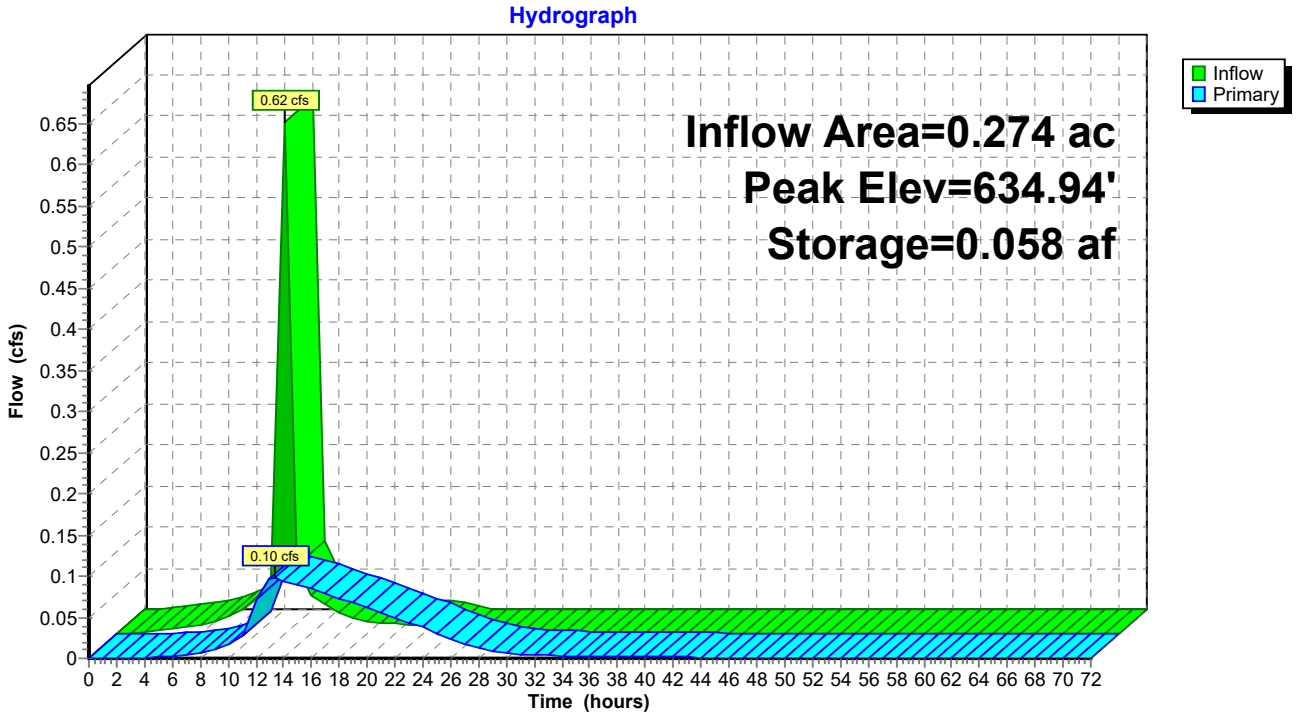
32 Chambers x 334.5 cf = 10,704.0 cf Chamber Storage
32 Chambers x 452.5 cf + 128.7 cf Border = 14,610.0 cf Displacement

Chamber Storage = 10,704.0 cf = 0.246 af
Overall Storage Efficiency = 73.3%
Overall System Size = 113.50' x 27.58' x 4.67'

32 Chambers (plus border)
541.1 cy Field



Pond DB-4: DB-4


Hydrograph
Inflow
Primary
0.62 cfs
0.10 cfs
Inflow Area=0.274 ac
Peak Elev=634.94'
Storage=0.058 af
Flow (cfs)
Time (hours)

Stage-Discharge for Pond DB-4: DB-4

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
634.00	0.00	636.60	0.44
634.05	0.00	636.65	0.46
634.10	0.01	636.70	0.48
634.15	0.03	636.75	0.49
634.20	0.04	636.80	0.51
634.25	0.04	636.85	0.52
634.30	0.05	636.90	0.54
634.35	0.05	636.95	0.55
634.40	0.06	637.00	0.56
634.45	0.06	637.05	0.58
634.50	0.07	637.10	0.61
634.55	0.07	637.15	0.65
634.60	0.08	637.20	0.70
634.65	0.08	637.25	0.74
634.70	0.08	637.30	0.79
634.75	0.09	637.35	0.83
634.80	0.09	637.40	0.86
634.85	0.09	637.45	0.89
634.90	0.09	637.50	0.92
634.95	0.10	637.55	0.95
635.00	0.10	637.60	0.98
635.05	0.10	637.65	1.00
635.10	0.11	637.70	1.03
635.15	0.11	637.75	1.05
635.20	0.11	637.80	1.07
635.25	0.11	637.85	1.10
635.30	0.12	637.90	1.12
635.35	0.12	637.95	1.14
635.40	0.12	638.00	1.16
635.45	0.12	638.05	1.18
635.50	0.13	638.10	1.20
635.55	0.13	638.15	1.22
635.60	0.13	638.20	1.24
635.65	0.13	638.25	1.25
635.70	0.13	638.30	1.26
635.75	0.14	638.35	1.26
635.80	0.14	638.40	1.27
635.85	0.14	638.45	1.27
635.90	0.14	638.50	1.28
635.95	0.14	638.55	1.29
636.00	0.15	638.60	1.29
636.05	0.15	638.65	**1.30**
636.10	0.17		
636.15	0.20		
636.20	0.24		
636.25	0.27		
636.30	0.31		
636.35	0.34		
636.40	0.36		
636.45	0.39		
636.50	0.41		
636.55	0.43		

Summary for Pond DB-5: DB-5

Inflow Area = 0.708 ac, 85.71% Impervious, Inflow Depth = 3.15" for 2-YR event
Inflow = 1.22 cfs @ 12.02 hrs, Volume= 0.186 af
Outflow = 0.14 cfs @ 14.02 hrs, Volume= 0.186 af, Atten= 89%, Lag= 119.6 min
Primary = 0.14 cfs @ 14.02 hrs, Volume= 0.186 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs / 2
Peak Elev= 639.27' @ 14.02 hrs Surf.Area= 0.090 ac Storage= 0.104 af
Flood Elev= 643.50' Surf.Area= 0.090 ac Storage= 0.449 af

Plug-Flow detention time= 346.0 min calculated for 0.184 af (99% of inflow)
Center-of-Mass det. time= 348.2 min (1,125.7 - 777.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	637.50'	0.000 af	**34.48'W x 113.83'L x 7.17'H Field A** 0.646 af Overall - 0.646 af Embedded = 0.000 af x 0.0% Voids
#2A	637.50'	0.490 af	**StormTrap ST1 DoubleTrap 6-0**x 40 Inside #1 Inside= 82.7"W x 72.0"H => 37.97 sf x 14.06'L = 534.0 cf Outside= 82.7"W x 86.0"H => 49.42 sf x 14.06'L = 695.0 cf 5 Rows adjusted for 602.1 cf perimeter wall 34.48' x 112.50' Core + 0.00' x 0.67' Border = 34.48' x 113.83' System
		0.490 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	637.50'	**6.0" Round Culvert** L= 80.0' RCP, rounded edge headwall, Ke= 0.100 Inlet / Outlet Invert= 637.50' / 636.00' S= 0.0187 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#2	Device 1	637.50'	**2.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.14 cfs @ 14.02 hrs HW=639.27' (Free Discharge)
└─**1=Culvert** (Passes 0.14 cfs of 0.96 cfs potential flow)
└─**2=Orifice/Grate** (Orifice Controls 0.14 cfs @ 6.26 fps)

Pond DB-5: DB-5 - Chamber Wizard Field A

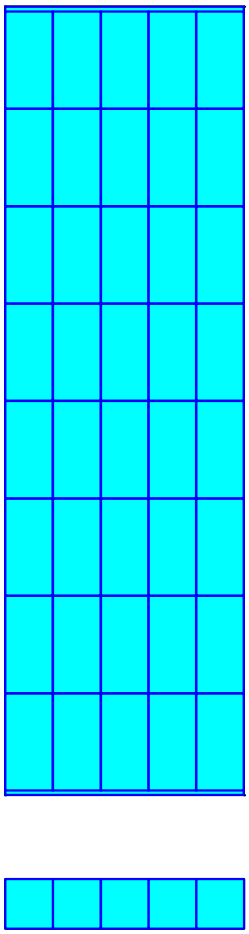
Chamber Model = StormTrap ST1 DoubleTrap 6-0 (StormTrap ST1 DoubleTrap® Type I/III/VI)
Inside= 82.7"W x 72.0"H => 37.97 sf x 14.06'L = 534.0 cf
Outside= 82.7"W x 86.0"H => 49.42 sf x 14.06'L = 695.0 cf
5 Rows adjusted for 602.1 cf perimeter wall

8 Chambers/Row x 14.06' Long = 112.50' Row Length +8.0" Border x 2 = 113.83' Base Length
5 Rows x 82.7" Wide = 34.48' Base Width
86.0" Chamber Height = 7.17' Field Height

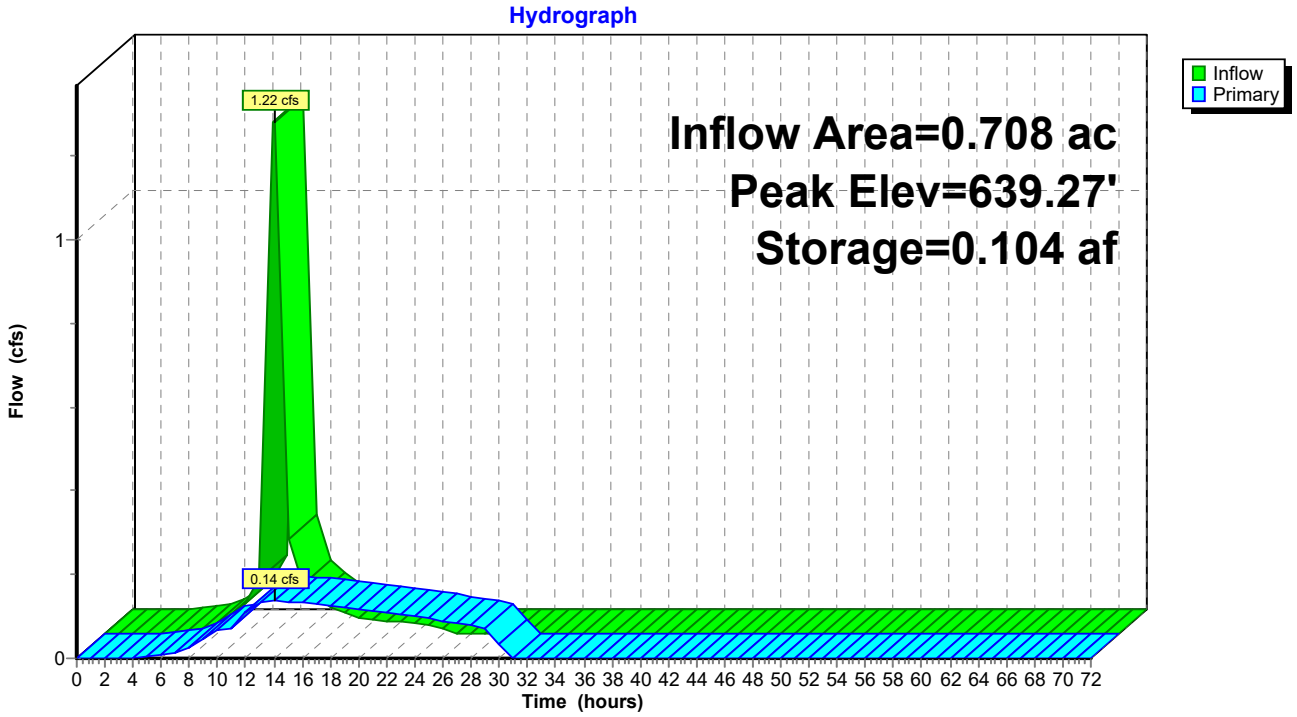
17.0 cf Sidewall x 8 x 2 + 33.0 cf Endwall x 5 x 2 = 602.1 cf Perimeter Wall
40 Chambers x 534.0 cf - 602.1 cf Perimeter wall = 20,757.8 cf Chamber Storage
40 Chambers x 695.0 cf + 329.5 cf Border = 28,128.3 cf Displacement

Chamber Storage = 20,757.8 cf = 0.477 af
Overall Storage Efficiency = 73.8%
Overall System Size = 113.83' x 34.48' x 7.17'

40 Chambers (plus border)
1,041.8 cy Field



Pond DB-5: DB-5


Hydrograph
Inflow
Primary
1.22 cfs
0.14 cfs
Inflow Area=0.708 ac
Peak Elev=639.27'
Storage=0.104 af
Flow (cfs)
1
0
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72
Time (hours)

Stage-Discharge for Pond DB-5: DB-5

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
637.50	0.00	639.58	0.15	641.66	0.21	643.74	0.26
637.54	0.00	639.62	0.15	641.70	0.21	643.78	0.26
637.58	0.01	639.66	0.15	641.74	0.21	643.82	0.26
637.62	0.02	639.70	0.15	641.78	0.22	643.86	0.26
637.66	0.03	639.74	0.15	641.82	0.22	643.90	0.26
637.70	0.04	639.78	0.16	641.86	0.22	643.94	0.26
637.74	0.04	639.82	0.16	641.90	0.22	643.98	0.27
637.78	0.05	639.86	0.16	641.94	0.22	644.02	0.27
637.82	0.05	639.90	0.16	641.98	0.22	644.06	0.27
637.86	0.06	639.94	0.16	642.02	0.22	644.10	0.27
637.90	0.06	639.98	0.16	642.06	0.22	644.14	0.27
637.94	0.06	640.02	0.16	642.10	0.22	644.18	0.27
637.98	0.07	640.06	0.17	642.14	0.22	644.22	0.27
638.02	0.07	640.10	0.17	642.18	0.23	644.26	0.27
638.06	0.07	640.14	0.17	642.22	0.23	644.30	0.27
638.10	0.08	640.18	0.17	642.26	0.23	644.34	0.27
638.14	0.08	640.22	0.17	642.30	0.23	644.38	0.27
638.18	0.08	640.26	0.17	642.34	0.23	644.42	0.27
638.22	0.08	640.30	0.17	642.38	0.23	644.46	0.28
638.26	0.09	640.34	0.17	642.42	0.23	644.50	0.28
638.30	0.09	640.38	0.18	642.46	0.23	644.54	0.28
638.34	0.09	640.42	0.18	642.50	0.23	644.58	0.28
638.38	0.09	640.46	0.18	642.54	0.23	644.62	0.28
638.42	0.10	640.50	0.18	642.58	0.23	644.66	**0.28**
638.46	0.10	640.54	0.18	642.62	0.24		
638.50	0.10	640.58	0.18	642.66	0.24		
638.54	0.10	640.62	0.18	642.70	0.24		
638.58	0.10	640.66	0.18	642.74	0.24		
638.62	0.11	640.70	0.19	642.78	0.24		
638.66	0.11	640.74	0.19	642.82	0.24		
638.70	0.11	640.78	0.19	642.86	0.24		
638.74	0.11	640.82	0.19	642.90	0.24		
638.78	0.11	640.86	0.19	642.94	0.24		
638.82	0.12	640.90	0.19	642.98	0.24		
638.86	0.12	640.94	0.19	643.02	0.24		
638.90	0.12	640.98	0.19	643.06	0.25		
638.94	0.12	641.02	0.19	643.10	0.25		
638.98	0.12	641.06	0.20	643.14	0.25		
639.02	0.13	641.10	0.20	643.18	0.25		
639.06	0.13	641.14	0.20	643.22	0.25		
639.10	0.13	641.18	0.20	643.26	0.25		
639.14	0.13	641.22	0.20	643.30	0.25		
639.18	0.13	641.26	0.20	643.34	0.25		
639.22	0.13	641.30	0.20	643.38	0.25		
639.26	0.14	641.34	0.20	643.42	0.25		
639.30	0.14	641.38	0.20	643.46	0.25		
639.34	0.14	641.42	0.21	643.50	0.26		
639.38	0.14	641.46	0.21	643.54	0.26		
639.42	0.14	641.50	0.21	643.58	0.26		
639.46	0.14	641.54	0.21	643.62	0.26		
639.50	0.15	641.58	0.21	643.66	0.26		
639.54	0.15	641.62	0.21	643.70	0.26		

Summary for Pond ICS-3: ICS-3

Inflow Area = 0.328 ac, 72.22% Impervious, Inflow Depth = 2.11" for 2-YR event
Inflow = 0.32 cfs @ 12.04 hrs, Volume= 0.057 af
Outflow = 0.32 cfs @ 12.04 hrs, Volume= 0.057 af, Atten= 0%, Lag= 0.0 min
Primary = 0.27 cfs @ 12.05 hrs, Volume= 0.054 af
Secondary = 0.05 cfs @ 12.00 hrs, Volume= 0.004 af

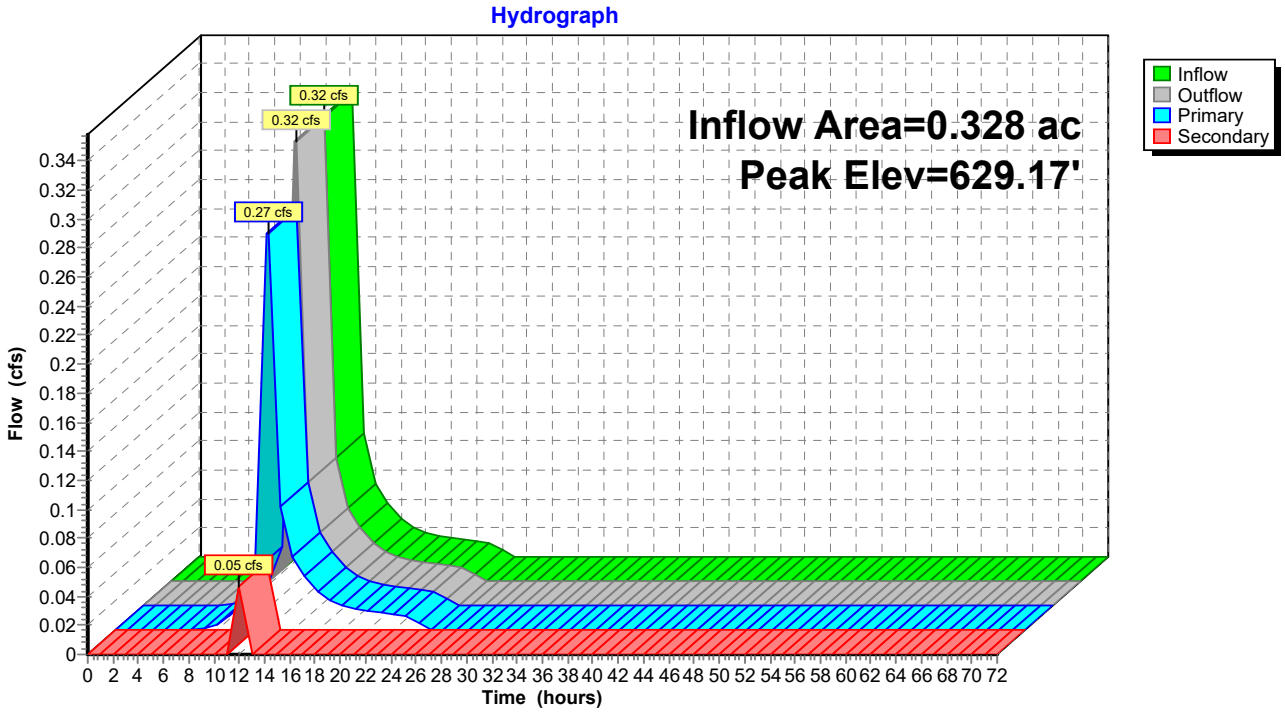
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs / 3
Peak Elev= 629.17' @ 12.07 hrs
Flood Elev= 632.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	628.85'	**5.0" Round Culvert** L= 240.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 628.85' / 622.00' S= 0.0285 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.14 sf
#2	Secondary	629.05'	**12.0" Round Culvert** L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 629.05' / 629.00' S= 0.0050 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.26 cfs @ 12.05 hrs HW=629.16' TW=623.16' (TW follows 6.00' below HW)
└─**1=Culvert** (Inlet Controls 0.26 cfs @ 2.38 fps)

Secondary OutFlow Max=0.05 cfs @ 12.00 hrs HW=629.17' (Free Discharge)
└─**2=Culvert** (Barrel Controls 0.05 cfs @ 1.28 fps)

Pond ICS-3: ICS-3



Stage-Discharge for Pond ICS-3: ICS-3

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
628.85	0.00	0.00	0.00
628.90	0.01	0.01	0.00
628.95	0.03	0.03	0.00
629.00	0.07	0.07	0.00
629.05	0.12	0.12	0.00
629.10	0.19	0.18	0.01
629.15	0.28	0.24	0.03
629.20	0.38	0.31	0.07
629.25	0.48	0.36	0.12
629.30	0.58	0.40	0.18
629.35	0.69	0.44	0.25
629.40	0.81	0.48	0.33
629.45	0.93	0.51	0.41
629.50	1.06	0.55	0.51
629.55	1.19	0.58	0.62
629.60	1.33	0.60	0.73
629.65	1.48	0.63	0.85
629.70	1.63	0.66	0.97
629.75	1.78	**0.68**	1.10
629.80	1.92	0.68	1.24
629.85	2.06	0.68	1.38
629.90	2.20	0.68	1.52
629.95	2.34	0.68	1.66
630.00	2.48	0.68	1.80
630.05	2.62	0.68	1.94
630.10	2.76	0.68	2.08
630.15	2.90	0.68	2.22
630.20	3.03	0.68	2.35
630.25	3.15	0.68	2.47
630.30	3.26	0.68	2.58
630.35	3.35	0.68	2.67
630.40	3.43	0.68	2.75
630.45	3.51	0.68	2.83
630.50	3.59	0.68	2.91
630.55	3.67	0.68	2.99
630.60	3.74	0.68	3.06
630.65	3.81	0.68	3.13
630.70	3.88	0.68	3.20
630.75	3.95	0.68	3.27
630.80	4.02	0.68	3.34
630.85	4.08	0.68	3.40
630.90	4.15	0.68	3.47
630.95	4.21	0.68	3.53
631.00	4.28	0.68	3.60
631.05	4.34	0.68	3.66
631.10	4.40	0.68	3.72
631.15	4.46	0.68	3.78
631.20	4.52	0.68	3.83
631.25	4.57	0.68	3.89
631.30	4.63	0.68	3.95
631.35	4.69	0.68	4.01
631.40	4.74	0.68	4.06
631.45	4.80	0.68	4.12
631.50	4.85	0.68	4.17
631.55	4.90	0.68	4.22
631.60	4.95	0.68	4.27
631.65	5.01	0.68	4.33
631.70	5.06	0.68	4.38
631.75	5.11	0.68	4.43
631.80	5.16	0.68	4.48
631.85	5.21	0.68	4.53
631.90	5.26	0.68	4.58
631.95	5.31	0.68	4.63
632.00	5.35	0.68	4.67
632.05	5.40	0.68	4.72
632.10	5.45	0.68	4.77
632.15	5.49	0.68	4.81
632.20	5.54	0.68	4.86
632.25	5.59	0.68	4.91
632.30	5.63	0.68	4.95
632.35	5.68	0.68	5.00
632.40	5.72	0.68	5.04
632.45	5.76	0.68	5.08
632.50	**5.81**	0.68	**5.13**

Summary for Pond ICS-4: ICS-4

Inflow Area = 1.068 ac, 93.43% Impervious, Inflow Depth = 2.87" for 2-YR event
Inflow = 1.35 cfs @ 12.02 hrs, Volume= 0.255 af
Outflow = 1.35 cfs @ 12.02 hrs, Volume= 0.255 af, Atten= 0%, Lag= 0.0 min
Primary = 1.09 cfs @ 12.03 hrs, Volume= 0.234 af
Secondary = 0.26 cfs @ 12.00 hrs, Volume= 0.022 af

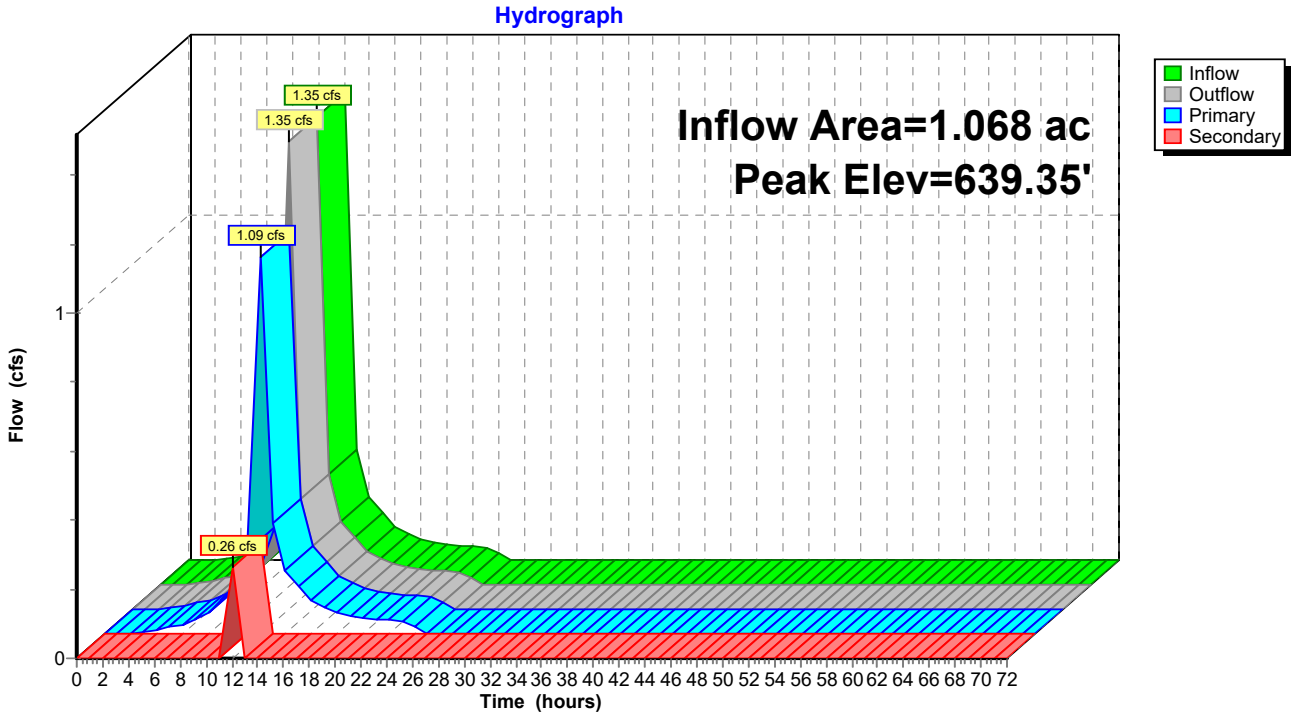
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs / 3
Peak Elev= 639.35' @ 12.00 hrs
Flood Elev= 640.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	636.50'	**6.0" Round Culvert** L= 235.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 636.50' / 633.00' S= 0.0149 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf
#2	Device 3	639.28'	**5.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Secondary	637.00'	**15.0" Round Culvert** L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 637.00' / 636.75' S= 0.0250 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=1.09 cfs @ 12.03 hrs HW=639.29' (Free Discharge)
└─**1=Culvert** (Barrel Controls 1.09 cfs @ 5.53 fps)

Secondary OutFlow Max=0.26 cfs @ 12.00 hrs HW=639.35' (Free Discharge)
└─**3=Culvert** (Passes 0.26 cfs of 6.13 cfs potential flow)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 0.26 cfs @ 0.74 fps)

Pond ICS-4: ICS-4



Stage-Discharge for Pond ICS-4: ICS-4

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
636.50	0.00	0.00	0.00
636.55	0.01	0.01	0.00
636.60	0.04	0.04	0.00
636.65	0.08	0.08	0.00
636.70	0.14	0.14	0.00
636.75	0.21	0.21	0.00
636.80	0.29	0.29	0.00
636.85	0.37	0.37	0.00
636.90	0.45	0.45	0.00
636.95	0.53	0.53	0.00
637.00	0.59	0.59	0.00
637.05	0.65	0.65	0.00
637.10	0.70	0.70	0.00
637.15	0.75	0.75	0.00
637.20	0.79	0.79	0.00
637.25	0.84	0.84	0.00
637.30	0.88	0.88	0.00
637.35	0.89	0.89	0.00
637.40	0.89	0.89	0.00
637.45	0.90	0.90	0.00
637.50	0.90	0.90	0.00
637.55	0.91	0.91	0.00
637.60	0.91	0.91	0.00
637.65	0.92	0.92	0.00
637.70	0.92	0.92	0.00
637.75	0.93	0.93	0.00
637.80	0.94	0.94	0.00
637.85	0.94	0.94	0.00
637.90	0.95	0.95	0.00
637.95	0.95	0.95	0.00
638.00	0.96	0.96	0.00
638.05	0.96	0.96	0.00
638.10	0.97	0.97	0.00
638.15	0.97	0.97	0.00
638.20	0.98	0.98	0.00
638.25	0.98	0.98	0.00
638.30	0.99	0.99	0.00
638.35	0.99	0.99	0.00
638.40	1.00	1.00	0.00
638.45	1.00	1.00	0.00
638.50	1.01	1.01	0.00
638.55	1.01	1.01	0.00
638.60	1.02	1.02	0.00
638.65	1.02	1.02	0.00
638.70	1.03	1.03	0.00
638.75	1.03	1.03	0.00
638.80	1.04	1.04	0.00
638.85	1.04	1.04	0.00
638.90	1.05	1.05	0.00
638.95	1.05	1.05	0.00
639.00	1.06	1.06	0.00
639.05	1.06	1.06	0.00
639.10	1.07	1.07	0.00
639.15	1.07	1.07	0.00
639.20	1.08	1.08	0.00
639.25	1.08	1.08	0.00
639.30	1.13	1.09	0.04
639.35	1.35	1.09	0.26
639.40	1.68	1.10	0.58
639.45	2.08	1.10	0.98
639.50	2.56	1.11	1.45
639.55	3.10	1.11	1.99
639.60	3.71	1.11	2.60
639.65	4.38	1.12	3.27
639.70	5.12	1.12	4.00
639.75	5.92	1.13	4.79
639.80	6.79	1.13	5.65
639.85	7.71	1.14	6.58
639.90	8.18	1.14	7.04
639.95	8.26	1.15	7.11
640.00	**8.34**	**1.15**	**7.19**

Summary for Pond ICS-5: ICS-5

Inflow Area = 0.739 ac, 62.40% Impervious, Inflow Depth = 1.78" for 2-YR event
Inflow = 0.61 cfs @ 12.06 hrs, Volume= 0.110 af
Outflow = 0.61 cfs @ 12.06 hrs, Volume= 0.110 af, Atten= 0%, Lag= 0.0 min
Primary = 0.22 cfs @ 12.20 hrs, Volume= 0.075 af
Secondary = 0.39 cfs @ 12.02 hrs, Volume= 0.035 af

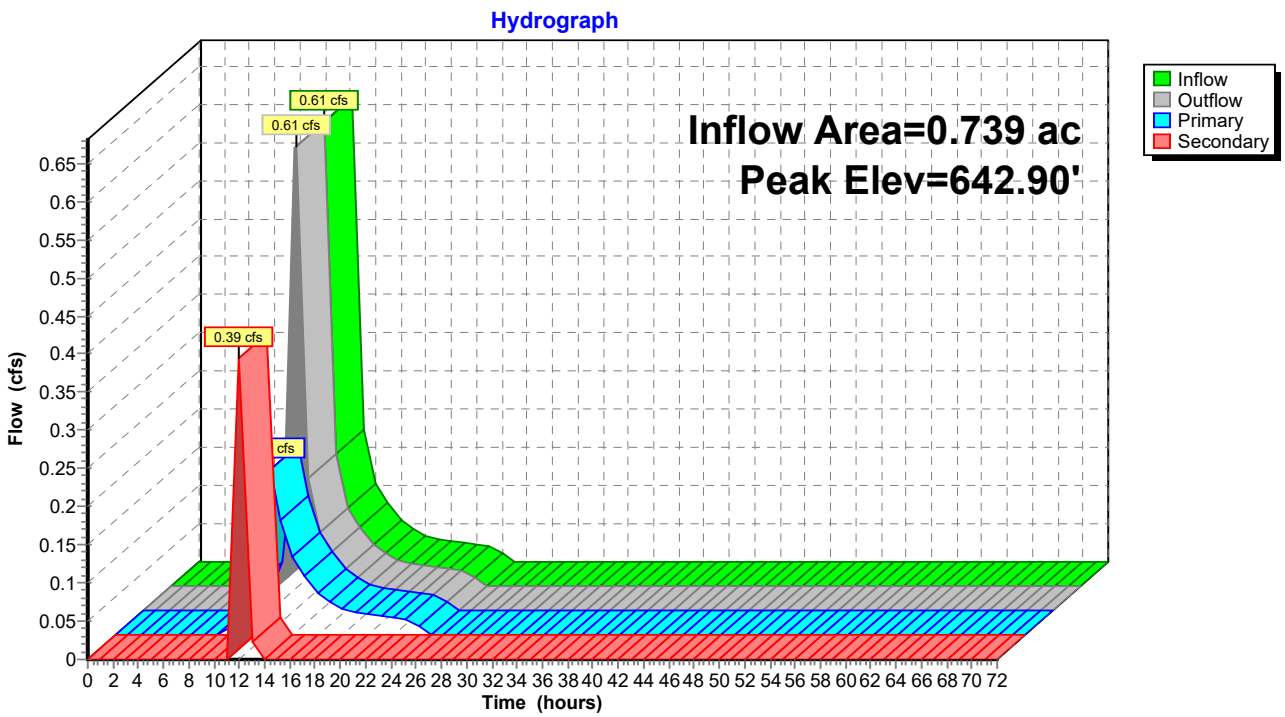
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs / 3
Peak Elev= 642.90' @ 12.14 hrs
Flood Elev= 645.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	642.25'	**3.0" Round Culvert** L= 80.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 642.25' / 636.00' S= 0.0781 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.05 sf
#2	Secondary	642.56'	**12.0" Round Culvert** L= 6.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 642.56' / 642.50' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.20 cfs @ 12.20 hrs HW=642.84' TW=636.84' (TW follows 6.00' below HW)
└─**1=Culvert** (Inlet Controls 0.20 cfs @ 4.11 fps)

Secondary OutFlow Max=0.39 cfs @ 12.02 hrs HW=642.89' TW=636.89' (TW follows 6.00' below HW)
└─**2=Culvert** (Barrel Controls 0.39 cfs @ 2.54 fps)

Pond ICS-5: ICS-5



Stage-Discharge for Pond ICS-5: ICS-5

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
642.25	0.00	0.00	0.00
642.30	0.01	0.01	0.00
642.35	0.02	0.02	0.00
642.40	0.05	0.05	0.00
642.45	0.08	0.08	0.00
642.50	0.10	0.10	0.00
642.55	0.12	0.12	0.00
642.60	0.15	0.14	0.01
642.65	0.19	0.15	0.03
642.70	0.25	0.17	0.08
642.75	0.32	0.18	0.14
642.80	0.41	0.19	0.22
642.85	0.51	0.20	0.30
642.90	0.62	0.21	0.40
642.95	0.74	0.22	0.52
643.00	0.87	0.23	0.64
643.05	1.02	0.24	0.77
643.10	1.17	0.25	0.91
643.15	1.33	0.26	1.07
643.20	1.49	0.27	1.22
643.25	1.66	0.28	1.39
643.30	1.84	0.28	1.56
643.35	2.02	**0.29**	1.73
643.40	2.21	**0.30**	1.91
643.45	2.39	0.30	2.09
643.50	2.57	0.30	2.27
643.55	2.75	0.30	2.45
643.60	2.93	0.30	2.63
643.65	3.10	0.30	2.80
643.70	3.27	0.30	2.97
643.75	3.42	0.30	3.13
643.80	3.57	0.30	3.27
643.85	3.69	0.30	3.39
643.90	3.78	0.30	3.48
643.95	3.99	0.30	3.69
644.00	4.19	0.30	3.89
644.05	4.38	0.30	4.08
644.10	4.56	0.30	4.26
644.15	4.73	0.30	4.44
644.20	4.90	0.30	4.60
644.25	5.06	0.30	4.77
644.30	5.22	0.30	4.92
644.35	5.37	0.30	5.07
644.40	5.52	0.30	5.22
644.45	5.66	0.30	5.36
644.50	5.80	0.30	5.50
644.55	5.94	0.30	5.64
644.60	6.07	0.30	5.77
644.65	6.20	0.30	5.90
644.70	6.32	0.30	6.03
644.75	6.44	0.30	6.15
644.80	6.53	0.30	6.24
644.85	6.62	0.30	6.32
644.90	6.71	0.30	6.41
644.95	6.79	0.30	6.50
645.00	6.88	0.30	6.58
645.05	6.96	0.30	6.67
645.10	7.05	0.30	6.75
645.15	7.13	0.30	6.83
645.20	7.21	0.30	6.92
645.25	7.29	0.30	7.00
645.30	7.37	0.30	7.07
645.35	7.45	0.30	7.15
645.40	7.53	0.30	7.23
645.45	7.60	0.30	7.31
645.50	**7.68**	0.30	**7.38**

Summary for Pond RG-7B: RG-7B

Inflow Area = 0.055 ac, 72.50% Impervious, Inflow Depth = 2.11" for 2-YR event
Inflow = 0.05 cfs @ 12.04 hrs, Volume= 0.010 af
Outflow = 0.01 cfs @ 15.30 hrs, Volume= 0.010 af, Atten= 89%, Lag= 195.6 min
Primary = 0.01 cfs @ 15.30 hrs, Volume= 0.010 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs / 3
Peak Elev= 654.71' @ 15.30 hrs Surf.Area= 430 sf Storage= 236 cf

Plug-Flow detention time= 462.6 min calculated for 0.010 af (100% of inflow)
Center-of-Mass det. time= 460.8 min (1,272.7 - 811.8)

Volume	Invert	Avail.Storage	Storage Description
#1	653.00'	249 cf	**Custom Stage Data (Conic)** Listed below (Recalc) 638 cf Overall - 389 cf Embedded = 249 cf
#2	653.00'	52 cf	**Crushed Stone (Prismatic)** Listed below (Recalc) Inside #1 130 cf Overall x 40.0% Voids
#3	653.50'	58 cf	**Bio Mix Media (Prismatic)** Listed below (Recalc) Inside #1 194 cf Overall x 30.0% Voids
#4	654.25'	13 cf	**Mulch (Prismatic)** Listed below (Recalc) Inside #1 65 cf Overall x 20.0% Voids
		372 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
653.00	259	0	0	259
654.00	259	259	259	316
655.00	513	379	638	579

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
653.00	259	0	0
653.50	259	130	130

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
653.50	259	0	0
654.25	259	194	194

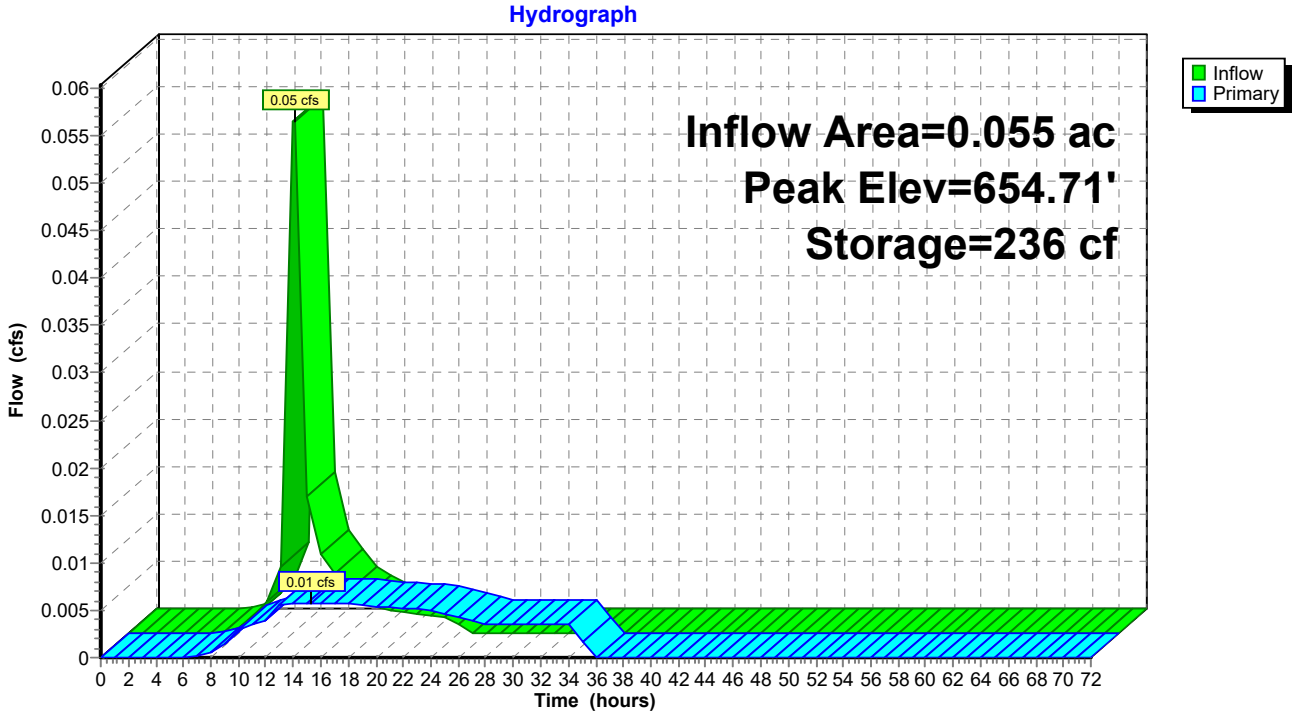
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
654.25	259	0	0
654.50	259	65	65

Device	Routing	Invert	Outlet Devices
#1	Primary	654.90'	**10.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

#2 Primary 653.00' **0.580 in/hr Exfiltration over Surface area**

Primary OutFlow Max=0.01 cfs @ 15.30 hrs HW=654.71' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└─**2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Pond RG-7B: RG-7B



Stage-Discharge for Pond RG-7B: RG-7B

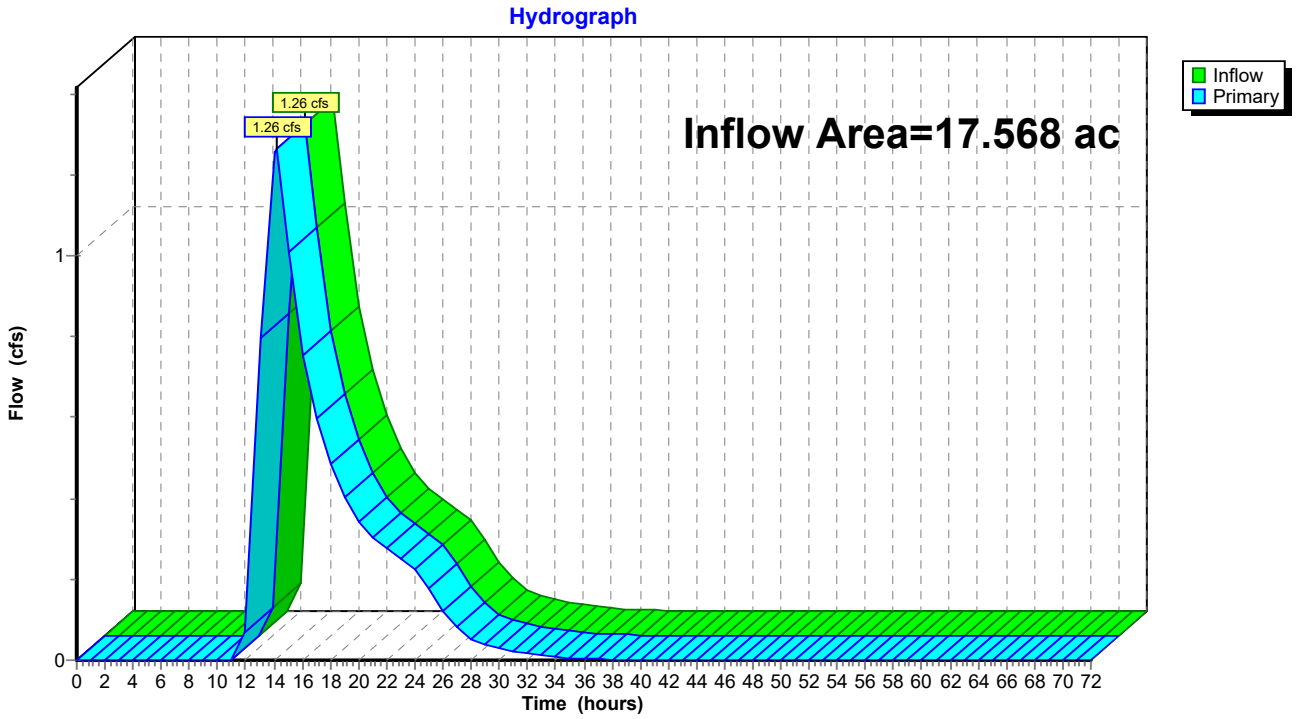
Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
653.00	0.00	653.52	0.00	654.04	0.00	654.56	0.01
653.01	0.00	653.53	0.00	654.05	0.00	654.57	0.01
653.02	0.00	653.54	0.00	654.06	0.00	654.58	0.01
653.03	0.00	653.55	0.00	654.07	0.00	654.59	0.01
653.04	0.00	653.56	0.00	654.08	0.00	654.60	0.01
653.05	0.00	653.57	0.00	654.09	0.00	654.61	0.01
653.06	0.00	653.58	0.00	654.10	0.00	654.62	0.01
653.07	0.00	653.59	0.00	654.11	0.00	654.63	0.01
653.08	0.00	653.60	0.00	654.12	0.00	654.64	0.01
653.09	0.00	653.61	0.00	654.13	0.00	654.65	0.01
653.10	0.00	653.62	0.00	654.14	0.00	654.66	0.01
653.11	0.00	653.63	0.00	654.15	0.00	654.67	0.01
653.12	0.00	653.64	0.00	654.16	0.00	654.68	0.01
653.13	0.00	653.65	0.00	654.17	0.00	654.69	0.01
653.14	0.00	653.66	0.00	654.18	0.00	654.70	0.01
653.15	0.00	653.67	0.00	654.19	0.00	654.71	0.01
653.16	0.00	653.68	0.00	654.20	0.00	654.72	0.01
653.17	0.00	653.69	0.00	654.21	0.00	654.73	0.01
653.18	0.00	653.70	0.00	654.22	0.00	654.74	0.01
653.19	0.00	653.71	0.00	654.23	0.00	654.75	0.01
653.20	0.00	653.72	0.00	654.24	0.00	654.76	0.01
653.21	0.00	653.73	0.00	654.25	0.00	654.77	0.01
653.22	0.00	653.74	0.00	654.26	0.00	654.78	0.01
653.23	0.00	653.75	0.00	654.27	0.00	654.79	0.01
653.24	0.00	653.76	0.00	654.28	0.00	654.80	0.01
653.25	0.00	653.77	0.00	654.29	0.00	654.81	0.01
653.26	0.00	653.78	0.00	654.30	0.00	654.82	0.01
653.27	0.00	653.79	0.00	654.31	0.00	654.83	0.01
653.28	0.00	653.80	0.00	654.32	0.00	654.84	0.01
653.29	0.00	653.81	0.00	654.33	0.00	654.85	0.01
653.30	0.00	653.82	0.00	654.34	0.00	654.86	0.01
653.31	0.00	653.83	0.00	654.35	0.00	654.87	0.01
653.32	0.00	653.84	0.00	654.36	0.00	654.88	0.01
653.33	0.00	653.85	0.00	654.37	0.00	654.89	0.01
653.34	0.00	653.86	0.00	654.38	0.00	654.90	0.01
653.35	0.00	653.87	0.00	654.39	0.00	654.91	0.03
653.36	0.00	653.88	0.00	654.40	0.00	654.92	0.08
653.37	0.00	653.89	0.00	654.41	0.00	654.93	0.14
653.38	0.00	653.90	0.00	654.42	0.00	654.94	0.21
653.39	0.00	653.91	0.00	654.43	0.00	654.95	0.29
653.40	0.00	653.92	0.00	654.44	0.00	654.96	0.38
653.41	0.00	653.93	0.00	654.45	0.00	654.97	0.48
653.42	0.00	653.94	0.00	654.46	0.00	654.98	0.58
653.43	0.00	653.95	0.00	654.47	0.00	654.99	0.69
653.44	0.00	653.96	0.00	654.48	0.00	655.00	**0.81**
653.45	0.00	653.97	0.00	654.49	0.01		
653.46	0.00	653.98	0.00	654.50	0.01		
653.47	0.00	653.99	0.00	654.51	0.01		
653.48	0.00	654.00	0.00	654.52	0.01		
653.49	0.00	654.01	0.00	654.53	0.01		
653.50	0.00	654.02	0.00	654.54	0.01		
653.51	0.00	654.03	0.00	654.55	0.01		

Summary for Link PDP-3: Design Point 3

Inflow Area = 17.568 ac, 18.21% Impervious, Inflow Depth = 0.41" for 2-YR event
Inflow = 1.26 cfs @ 14.15 hrs, Volume= 0.607 af
Primary = 1.26 cfs @ 14.15 hrs, Volume= 0.607 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs

Link PDP-3: Design Point 3



Summary for Subcatchment 4A: PDA-4A

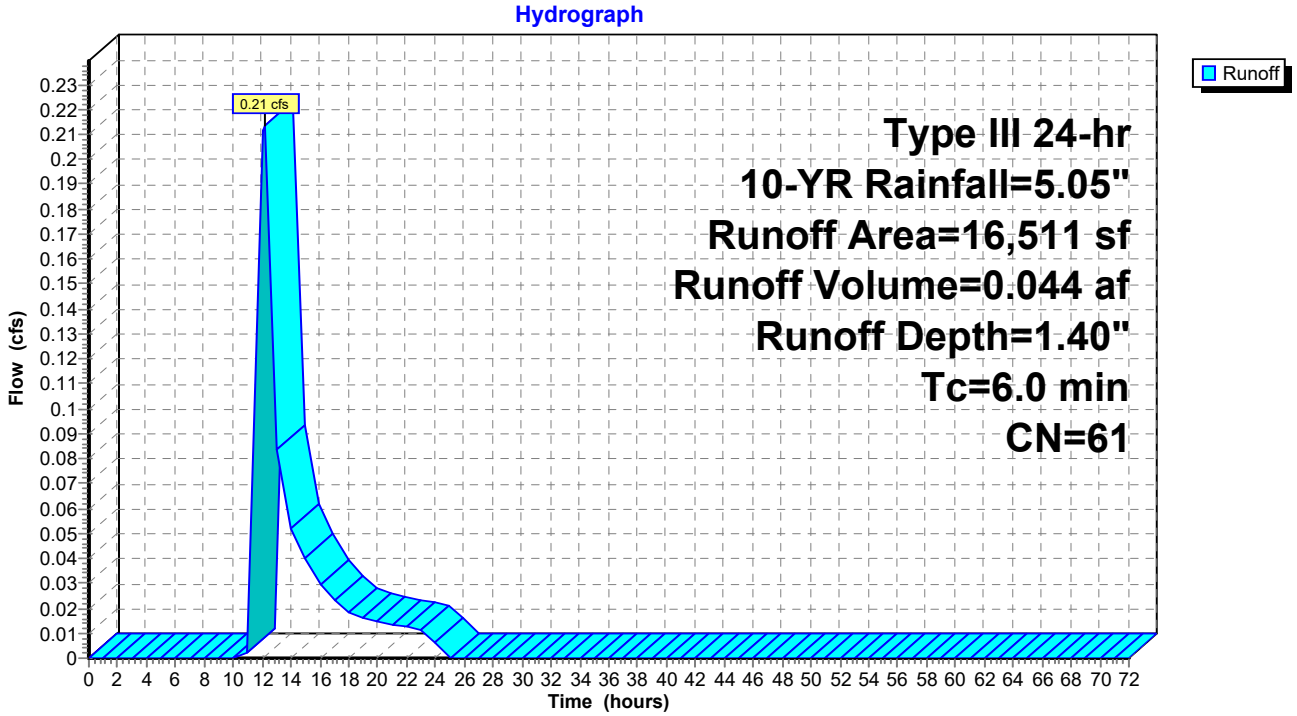
Runoff = 0.21 cfs @ 12.12 hrs, Volume= 0.044 af, Depth= 1.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 10-YR Rainfall=5.05"

	Area (sf)	CN	Description
*	7,284	55	Woods, Good, HSG B
	3,480	70	Woods, Good, HSG C
	1,370	74	>75% Grass cover, Good, HSG C
	4,377	61	>75% Grass cover, Good, HSG B
	16,511	61	Weighted Average
	16,511		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 min.**

Subcatchment 4A: PDA-4A



Summary for Subcatchment 4B: PDA-4B

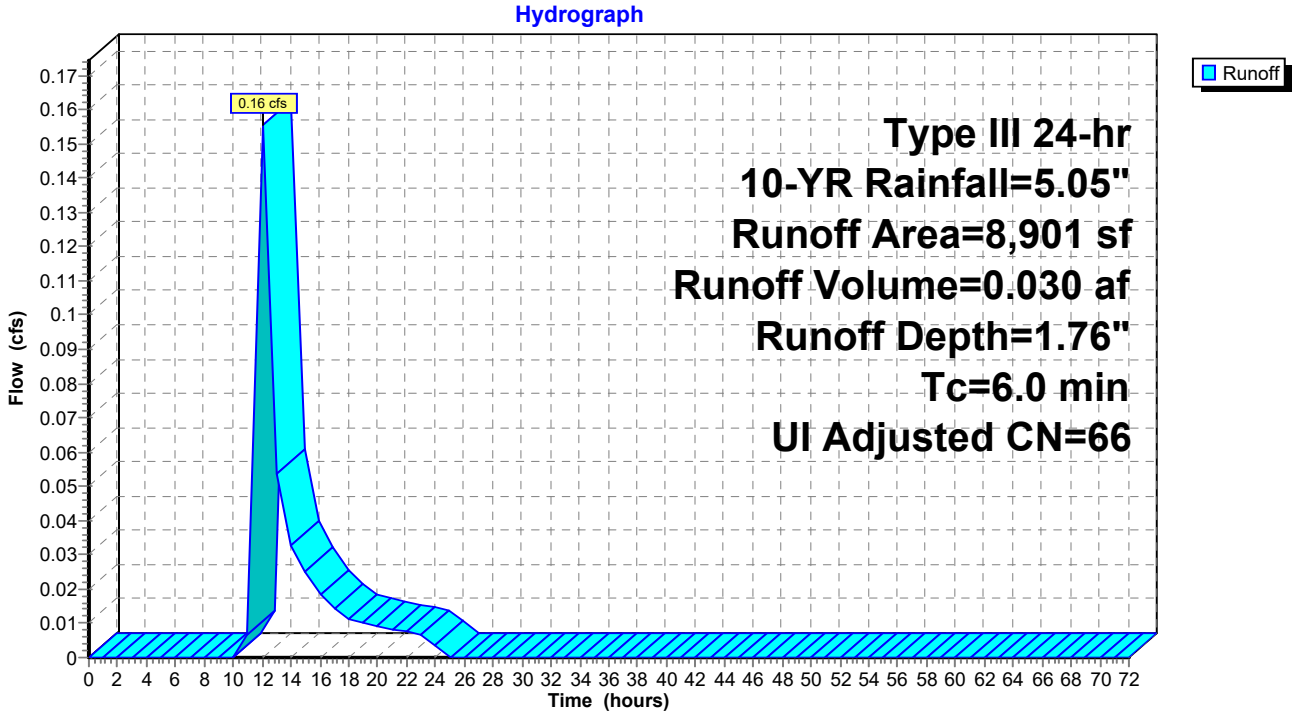
Runoff = 0.16 cfs @ 12.09 hrs, Volume= 0.030 af, Depth= 1.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 10-YR Rainfall=5.05"

Area (sf)	CN	Adj	Description
5,978	61		>75% Grass cover, Good, HSG B
2,026	74		>75% Grass cover, Good, HSG C
897	98		Unconnected pavement, HSG B
8,901	68	66	Weighted Average, UI Adjusted
8,004			89.92% Pervious Area
897			10.08% Impervious Area
897			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 min**

Subcatchment 4B: PDA-4B



Summary for Subcatchment 4C: PDA-4C

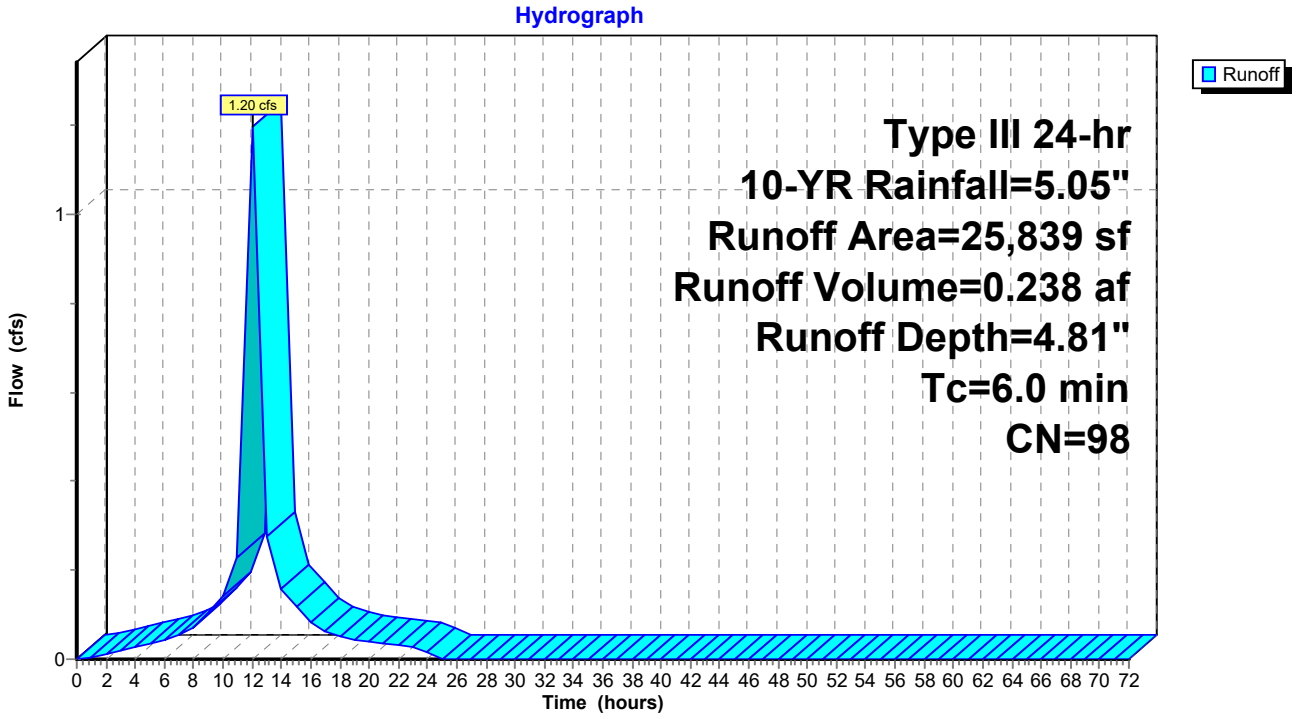
Runoff = 1.20 cfs @ 12.01 hrs, Volume= 0.238 af, Depth= 4.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 10-YR Rainfall=5.05"

Area (sf)	CN	Description
25,839	98	Roofs, HSG B
25,839		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Subcatchment 4C: PDA-4C



Summary for Subcatchment 4D: PDA-4D

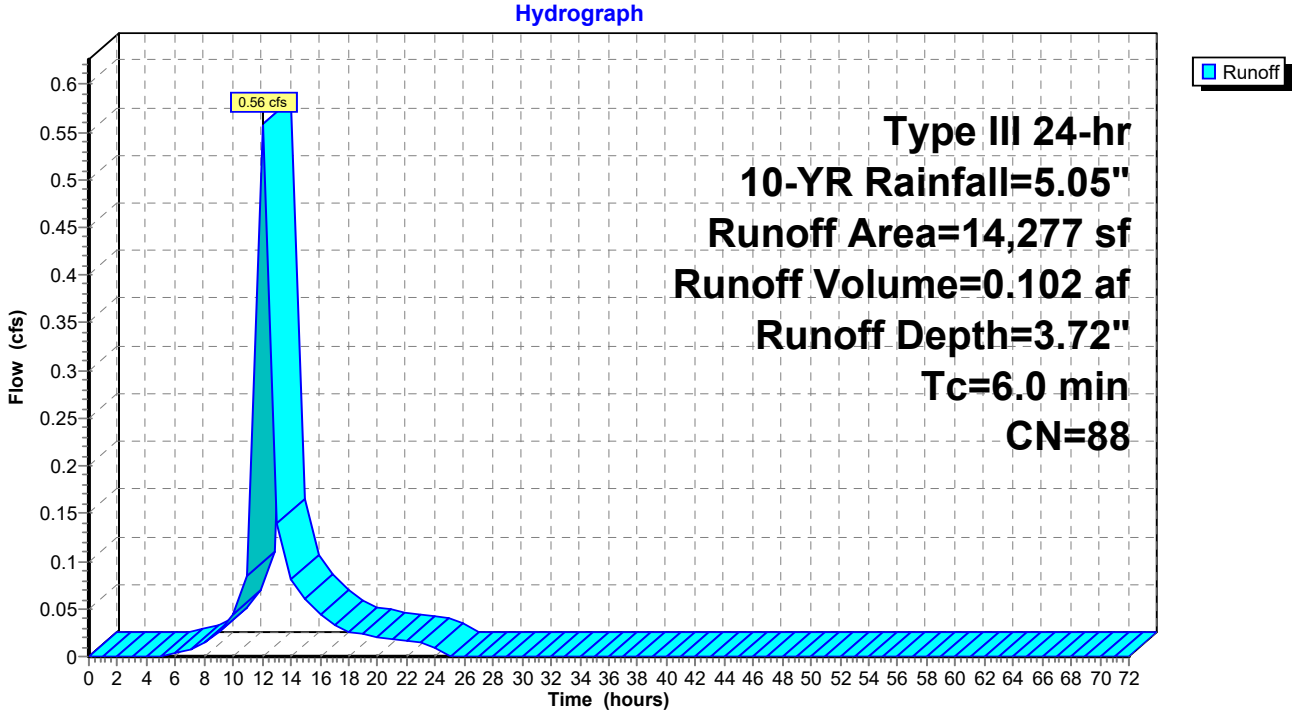
Runoff = 0.56 cfs @ 12.03 hrs, Volume= 0.102 af, Depth= 3.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 10-YR Rainfall=5.05"

Area (sf)	CN	Description
10,311	98	Paved parking, HSG B
3,966	61	>75% Grass cover, Good, HSG B
14,277	88	Weighted Average
3,966		27.78% Pervious Area
10,311		72.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 min**

Subcatchment 4D: PDA-4D



Summary for Subcatchment 4E: PDA-4E

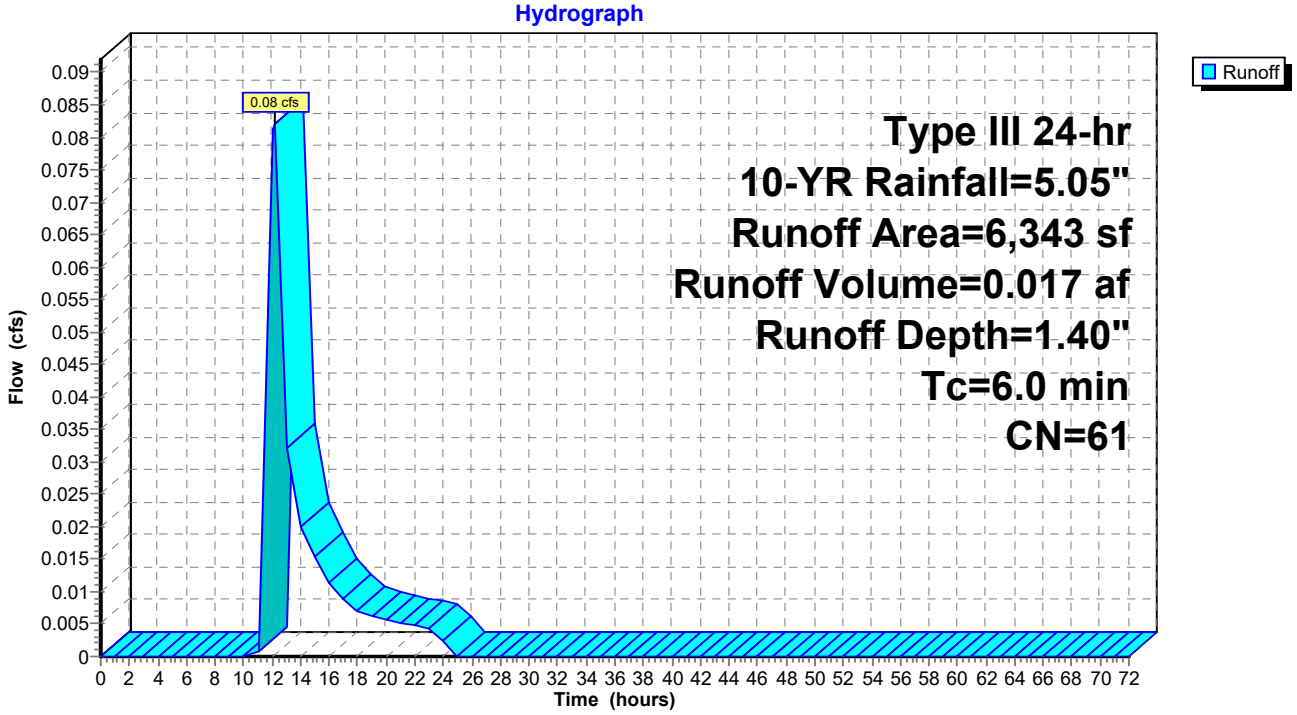
Runoff = 0.08 cfs @ 12.12 hrs, Volume= 0.017 af, Depth= 1.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 10-YR Rainfall=5.05"

Area (sf)	CN	Description
6,331	61	>75% Grass cover, Good, HSG B
12	98	Paved parking, HSG B
6,343	61	Weighted Average
6,331		99.81% Pervious Area
12		0.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 min**

Subcatchment 4E: PDA-4E



Summary for Subcatchment 4F: PDA-4F

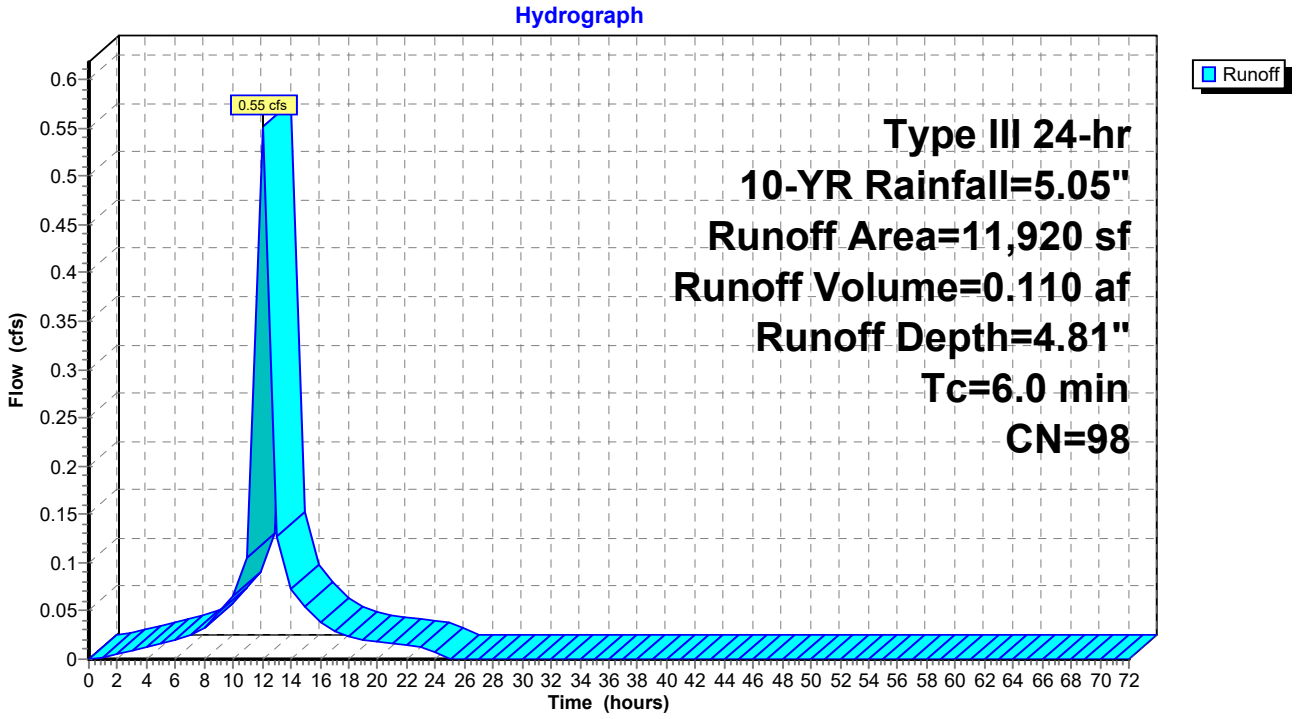
Runoff = 0.55 cfs @ 12.01 hrs, Volume= 0.110 af, Depth= 4.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 10-YR Rainfall=5.05"

Area (sf)	CN	Description
11,920	98	Roofs, HSG B
11,920		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Subcatchment 4F: PDA-4F



Summary for Subcatchment 4G: PDA-4G

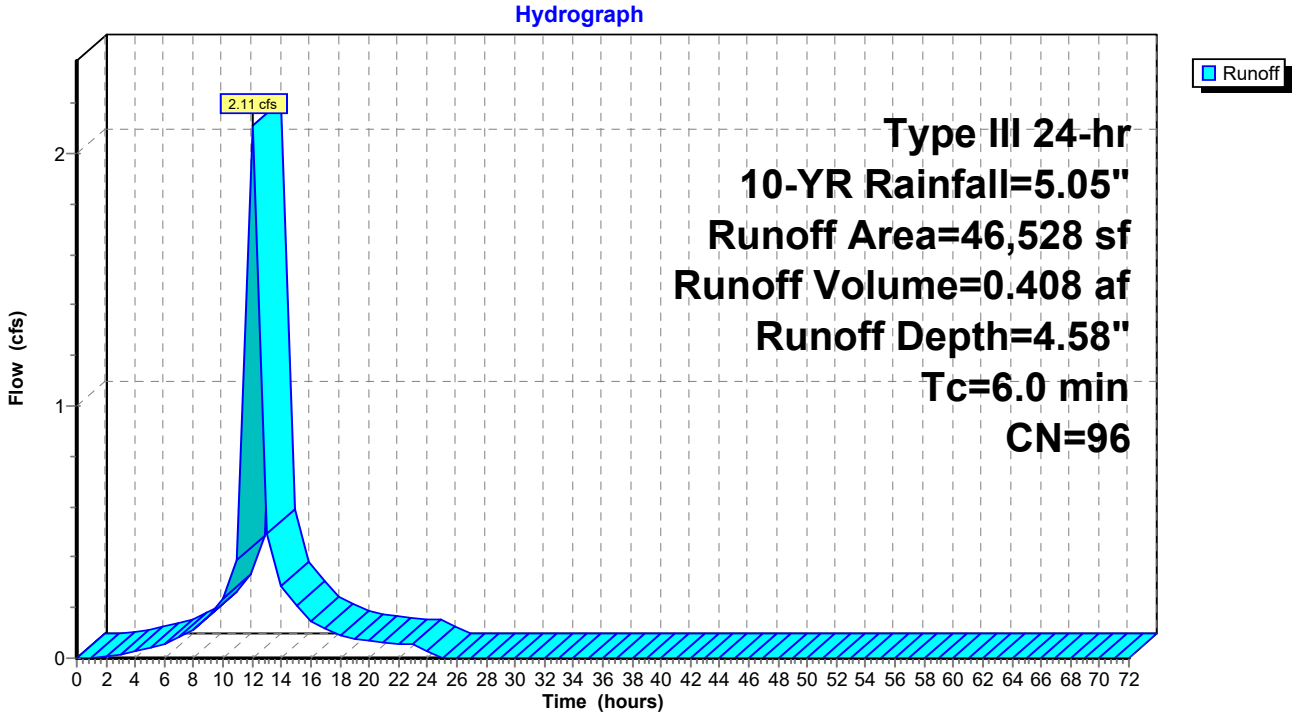
Runoff = 2.11 cfs @ 12.02 hrs, Volume= 0.408 af, Depth= 4.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 10-YR Rainfall=5.05"

Area (sf)	CN	Description
10,383	98	Paved parking, HSG B
3,055	61	>75% Grass cover, Good, HSG B
33,090	98	Roofs, HSG B
46,528	96	Weighted Average
3,055		6.57% Pervious Area
43,473		93.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 min**

Subcatchment 4G: PDA-4G



Summary for Subcatchment 5A: PDA-5A

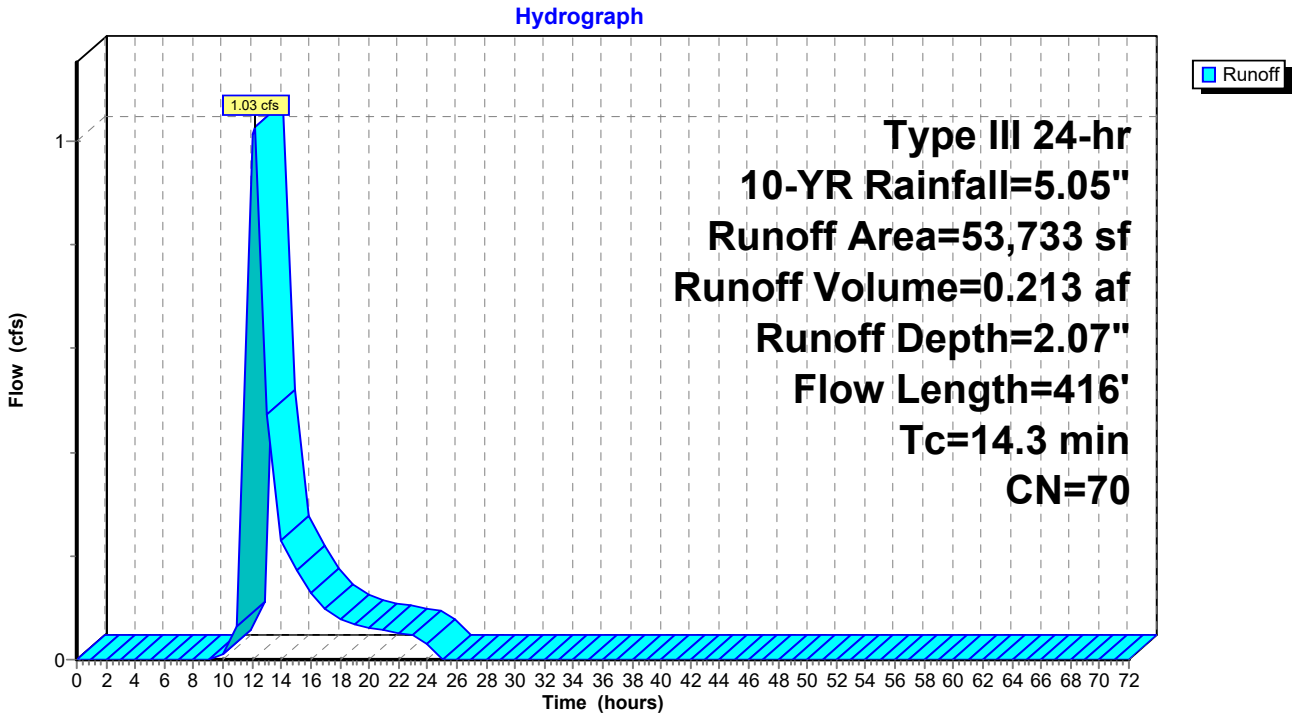
Runoff = 1.03 cfs @ 12.14 hrs, Volume= 0.213 af, Depth= 2.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 10-YR Rainfall=5.05"

Area (sf)	CN	Description
53,733	70	Woods, Good, HSG C
53,733		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.9	50	0.0334	0.08		**Sheet Flow, 5A-5B** Woods: Light underbrush n= 0.400 P2= 3.32"
3.3	239	0.0566	1.19		**Shallow Concentrated Flow, 5B-5C** Woodland Kv= 5.0 fps
0.3	62	0.0450	3.42		**Shallow Concentrated Flow, swale/ditch** Unpaved Kv= 16.1 fps
0.1	23	0.0100	4.91	3.86	**Pipe Channel, 12" CPP** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Corrugated PP, smooth interior
0.7	42	0.0430	1.04		**Shallow Concentrated Flow, 5E-EDP-5** Woodland Kv= 5.0 fps
14.3	416	Total			

Subcatchment 5A: PDA-5A



Summary for Subcatchment 5B: PDA-5B

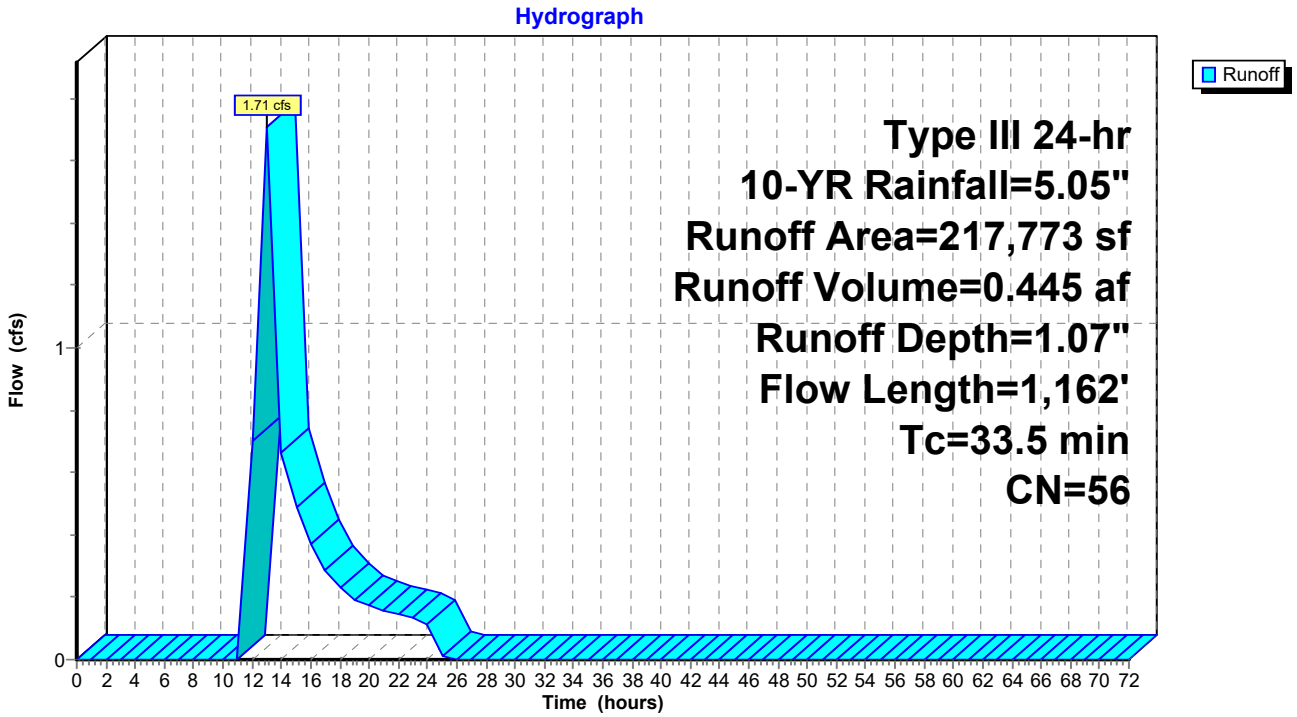
Runoff = 1.71 cfs @ 12.99 hrs, Volume= 0.445 af, Depth= 1.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 10-YR Rainfall=5.05"

Area (sf)	CN	Description
200,443	55	Woods, Good, HSG B
13,852	77	Woods, Good, HSG D
3,478	61	>75% Grass cover, Good, HSG B
217,773	56	Weighted Average
217,773		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	50	0.0400	0.09		**Sheet Flow, 5A-5B** Woods: Light underbrush n= 0.400 P2= 3.32"
9.9	553	0.0350	0.94		**Shallow Concentrated Flow, 5B-5C** Woodland Kv= 5.0 fps
13.3	455	0.0130	0.57		**Shallow Concentrated Flow, 5C-5D** Woodland Kv= 5.0 fps
1.1	104	0.0913	1.51		**Shallow Concentrated Flow, 5D-EDP-5** Woodland Kv= 5.0 fps
33.5	1,162	Total			

Subcatchment 5B: PDA-5B



Summary for Subcatchment 5C: PDA-5C

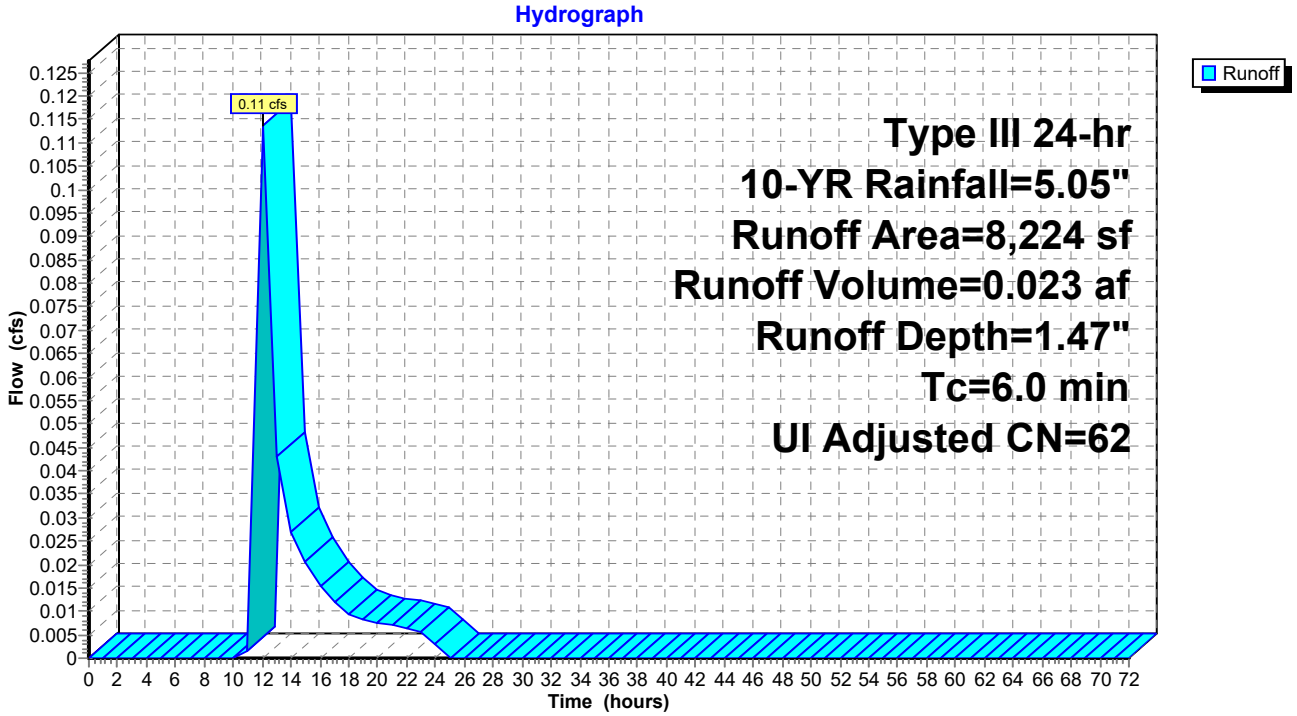
Runoff = 0.11 cfs @ 12.12 hrs, Volume= 0.023 af, Depth= 1.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 10-YR Rainfall=5.05"

Area (sf)	CN	Adj	Description
7,872	61		>75% Grass cover, Good, HSG B
352	98		Unconnected pavement, HSG B
8,224	63	62	Weighted Average, UI Adjusted
7,872			95.72% Pervious Area
352			4.28% Impervious Area
352			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 min**

Subcatchment 5C: PDA-5C



Summary for Subcatchment 5D: PDA-5D

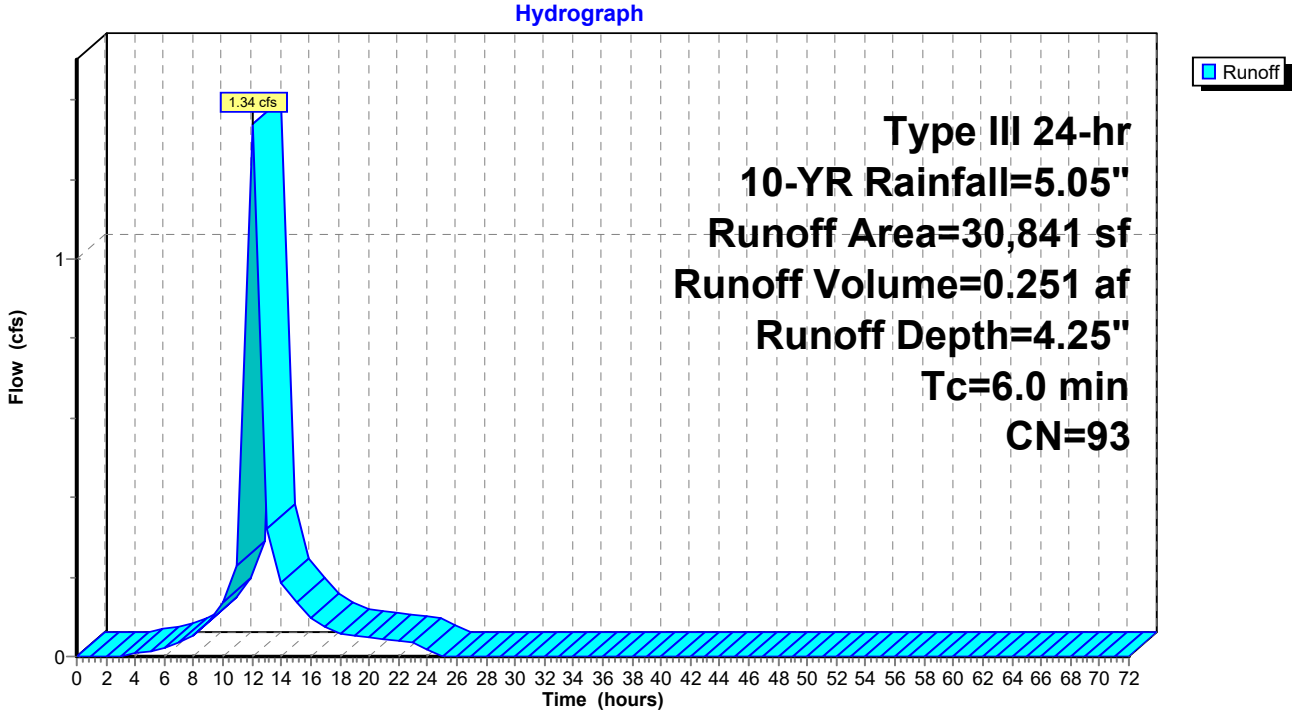
Runoff = 1.34 cfs @ 12.02 hrs, Volume= 0.251 af, Depth= 4.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 10-YR Rainfall=5.05"

Area (sf)	CN	Description
4,408	61	>75% Grass cover, Good, HSG B
26,433	98	Roofs, HSG B
30,841	93	Weighted Average
4,408		14.29% Pervious Area
26,433		85.71% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 min**

Subcatchment 5D: PDA-5D



Summary for Subcatchment 5E: PDA-5E

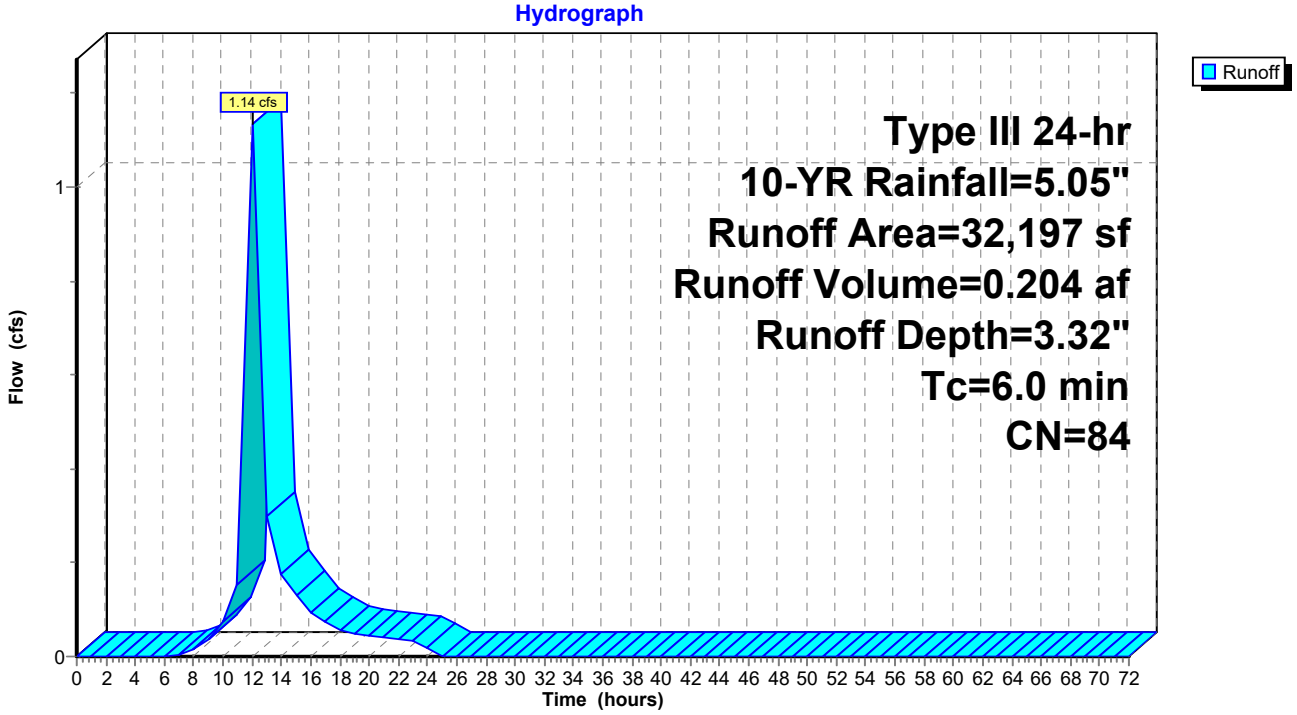
Runoff = 1.14 cfs @ 12.04 hrs, Volume= 0.204 af, Depth= 3.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 10-YR Rainfall=5.05"

Area (sf)	CN	Description
20,092	98	Paved parking, HSG B
12,105	61	>75% Grass cover, Good, HSG B
32,197	84	Weighted Average
12,105		37.60% Pervious Area
20,092		62.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 min**

Subcatchment 5E: PDA-5E



Summary for Subcatchment 6: PDA-6

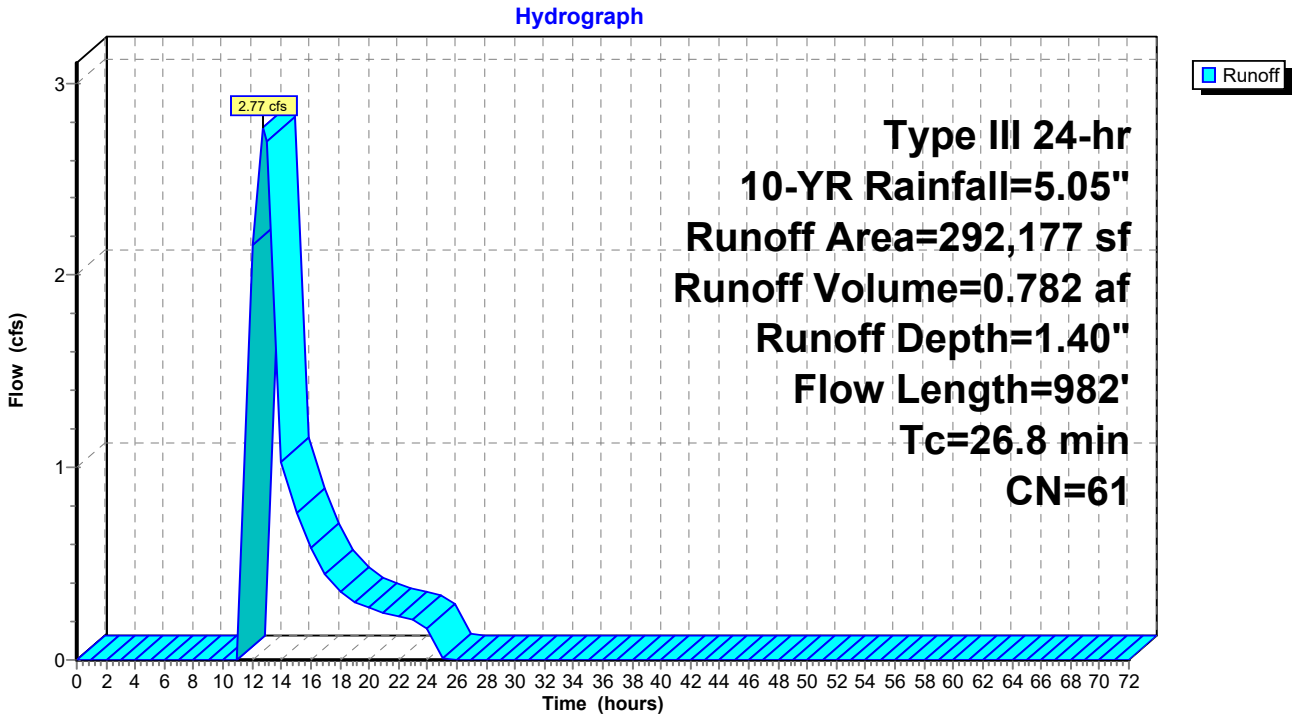
Runoff = 2.77 cfs @ 12.74 hrs, Volume= 0.782 af, Depth= 1.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 10-YR Rainfall=5.05"

Area (sf)	CN	Description
113,079	70	Woods, Good, HSG C
179,098	55	Woods, Good, HSG B
292,177	61	Weighted Average
292,177		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.1	50	0.0250	0.08		**Sheet Flow, 6A-6B** Woods: Light underbrush n= 0.400 P2= 3.32"
4.7	306	0.0474	1.09		**Shallow Concentrated Flow, 6B-6C** Woodland Kv= 5.0 fps
3.5	130	0.0154	0.62		**Shallow Concentrated Flow, 6C-6D** Woodland Kv= 5.0 fps
7.5	496	0.0484	1.10		**Shallow Concentrated Flow, 6D-EDP-6** Woodland Kv= 5.0 fps
26.8	982	Total			

Subcatchment 6: PDA-6



Summary for Subcatchment 7A: PDA-7A

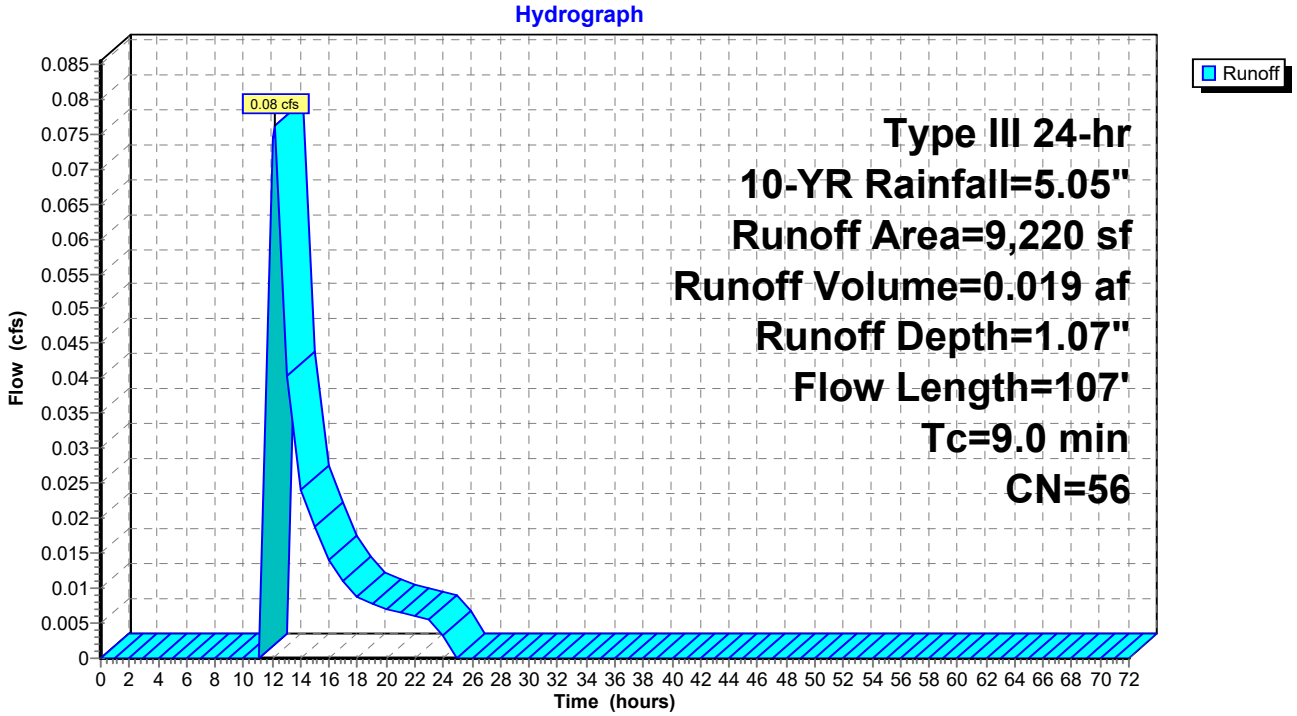
Runoff = 0.08 cfs @ 12.19 hrs, Volume= 0.019 af, Depth= 1.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 10-YR Rainfall=5.05"

Area (sf)	CN	Description
1,048	61	>75% Grass cover, Good, HSG B
8,172	55	Woods, Good, HSG B
9,220	56	Weighted Average
9,220		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	50	0.0550	0.10		**Sheet Flow, 7A-7B** Woods: Light underbrush n= 0.400 P2= 3.32"
0.9	57	0.0480	1.10		**Shallow Concentrated Flow, 7B-7C** Woodland Kv= 5.0 fps
9.0	107	Total			

Subcatchment 7A: PDA-7A



Summary for Subcatchment 7B: PDA-7B

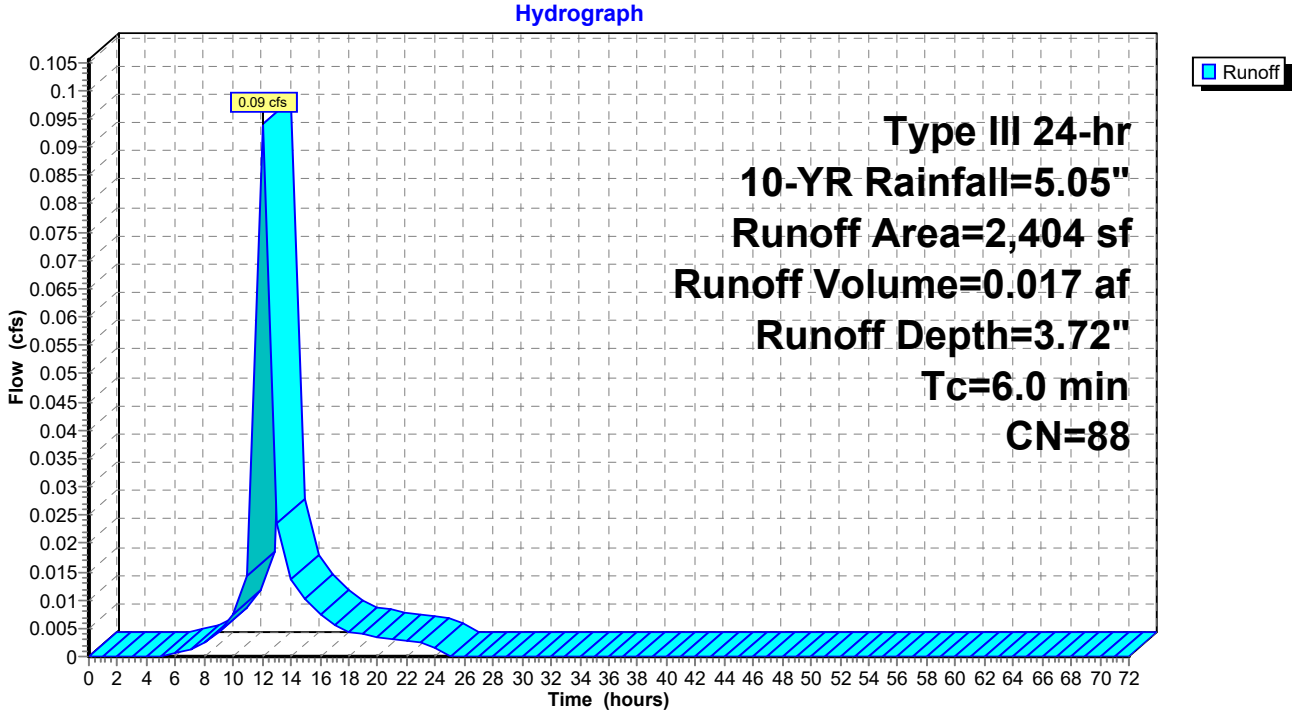
Runoff = 0.09 cfs @ 12.03 hrs, Volume= 0.017 af, Depth= 3.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 10-YR Rainfall=5.05"

Area (sf)	CN	Description
1,743	98	Roofs, HSG B
661	61	>75% Grass cover, Good, HSG B
2,404	88	Weighted Average
661		27.50% Pervious Area
1,743		72.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Subcatchment 7B: PDA-7B

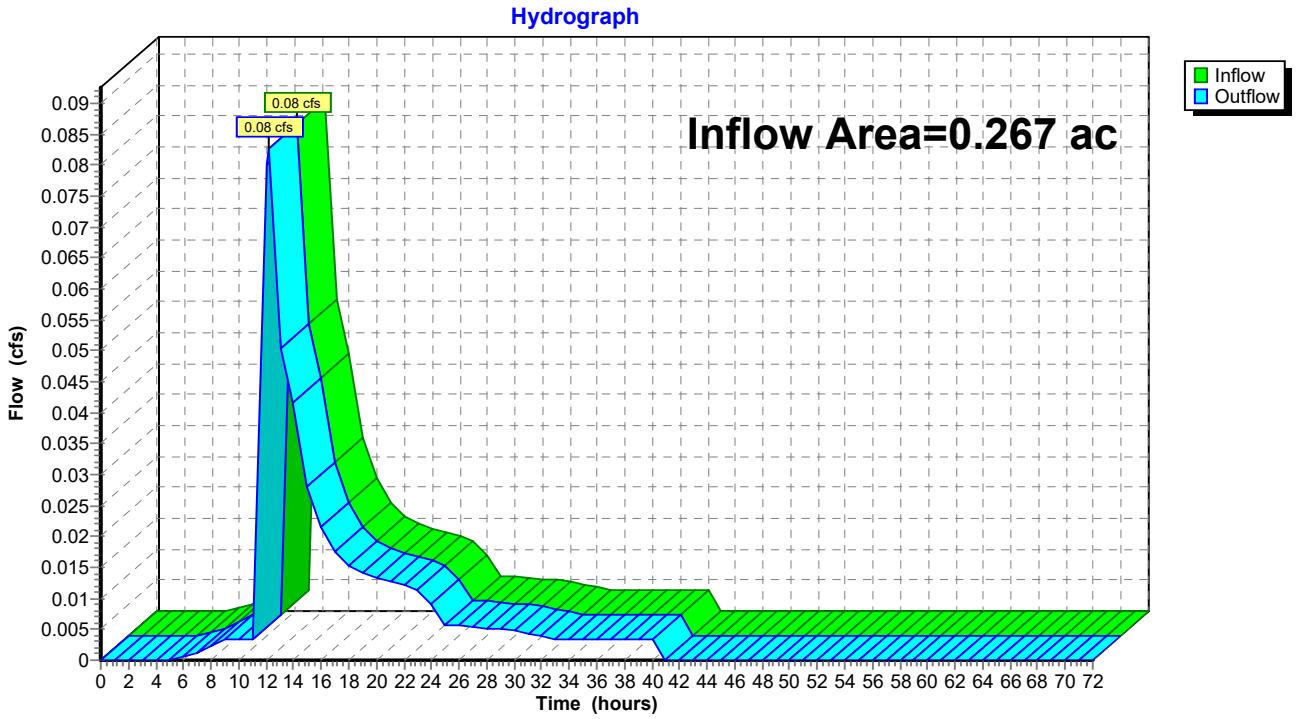


Summary for Reach DP-7: DP-7

Inflow Area = 0.267 ac, 14.99% Impervious, Inflow Depth = 1.52" for 10-YR event
Inflow = 0.08 cfs @ 12.22 hrs, Volume= 0.034 af
Outflow = 0.08 cfs @ 12.22 hrs, Volume= 0.034 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs

Reach DP-7: DP-7



Summary for Reach PDP-4: Design Point 4

Inflow Area = 17.568 ac, 18.21% Impervious, Inflow Depth = 1.21" for 10-YR event
Inflow = 5.14 cfs @ 13.03 hrs, Volume= 1.768 af
Outflow = 4.72 cfs @ 13.27 hrs, Volume= 1.770 af, Atten= 8%, Lag= 14.2 min

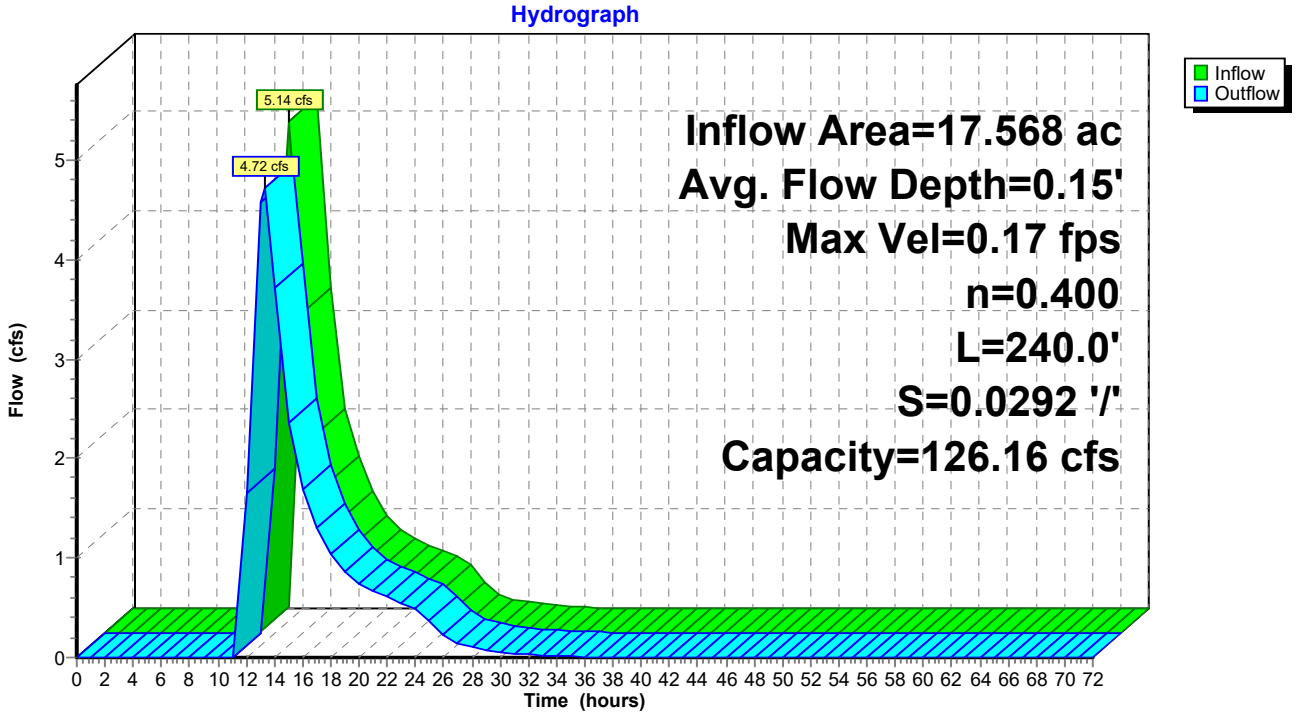
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs / 2
Max. Velocity= 0.17 fps, Min. Travel Time= 23.2 min
Avg. Velocity = 0.05 fps, Avg. Travel Time= 74.5 min

Peak Storage= 6,524 cf @ 13.29 hrs
Average Depth at Peak Storage= 0.15'
Bank-Full Depth= 1.00' Flow Area= 237.5 sf, Capacity= 126.16 cfs

165.00' x 1.00' deep channel, n= 0.400 Sheet flow: Woods+light brush
Side Slope Z-value= 80.0 65.0 '/' Top Width= 310.00'
Length= 240.0' Slope= 0.0292 '/'
Inlet Invert= 625.00', Outlet Invert= 618.00'

‡

Reach PDP-4: Design Point 4



Stage-Discharge for Reach PDP-4: Design Point 4

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
625.00	0.00	0.00
625.01	0.03	0.05
625.02	0.05	0.15
625.03	0.06	0.30
625.04	0.07	0.49
625.05	0.08	0.72
625.06	0.10	0.97
625.07	0.11	1.26
625.08	0.12	1.57
625.09	0.12	1.92
625.10	0.13	2.29
625.11	0.14	2.69
625.12	0.15	3.11
625.13	0.16	3.56
625.14	0.16	4.04
625.15	0.17	4.54
625.16	0.18	5.06
625.17	0.19	5.61
625.18	0.19	6.18
625.19	0.20	6.78
625.20	0.21	7.40
625.21	0.21	8.04
625.22	0.22	8.70
625.23	0.22	9.39
625.24	0.23	10.09
625.25	0.24	10.82
625.26	0.24	11.58
625.27	0.25	12.35
625.28	0.25	13.15
625.29	0.26	13.96
625.30	0.26	14.80
625.31	0.27	15.66
625.32	0.27	16.54
625.33	0.28	17.45
625.34	0.28	18.37
625.35	0.29	19.31
625.36	0.29	20.28
625.37	0.30	21.27
625.38	0.30	22.28
625.39	0.31	23.31
625.40	0.31	24.36
625.41	0.32	25.43
625.42	0.32	26.52
625.43	0.33	27.63
625.44	0.33	28.77
625.45	0.34	29.92
625.46	0.34	31.10
625.47	0.35	32.30
625.48	0.35	33.51
625.49	0.35	34.75
625.50	0.36	36.01
625.51	0.36	37.29
625.52	0.37	38.60
625.53	0.37	39.92
625.54	0.37	41.26
625.55	0.38	42.62
625.56	0.38	44.01
625.57	0.39	45.42
625.58	0.39	46.84
625.59	0.39	48.29
625.60	0.40	49.76
625.61	0.40	51.25
625.62	0.41	52.76
625.63	0.41	54.29
625.64	0.41	55.85
625.65	0.42	57.42
625.66	0.42	59.02
625.67	0.42	60.64
625.68	0.43	62.27
625.69	0.43	63.93
625.70	0.43	65.62
625.71	0.44	67.32
625.72	0.44	69.04
625.73	0.44	70.79
625.74	0.45	72.55
625.75	0.45	74.34
625.76	0.46	76.15
625.77	0.46	77.98
625.78	0.46	79.84
625.79	0.47	81.71
625.80	0.47	83.61
625.81	0.47	85.53
625.82	0.48	87.47
625.83	0.48	89.43
625.84	0.48	91.41
625.85	0.48	93.42
625.86	0.49	95.44
625.87	0.49	97.49
625.88	0.49	99.56
625.89	0.50	101.66
625.90	0.50	103.77
625.91	0.50	105.91
625.92	0.51	108.07
625.93	0.51	110.25
625.94	0.51	112.46
625.95	0.52	114.69
625.96	0.52	116.94
625.97	0.52	119.21
625.98	0.53	121.50
625.99	0.53	123.82
626.00	**0.53**	**126.16**

Summary for Reach PDP-5: Design Point 5

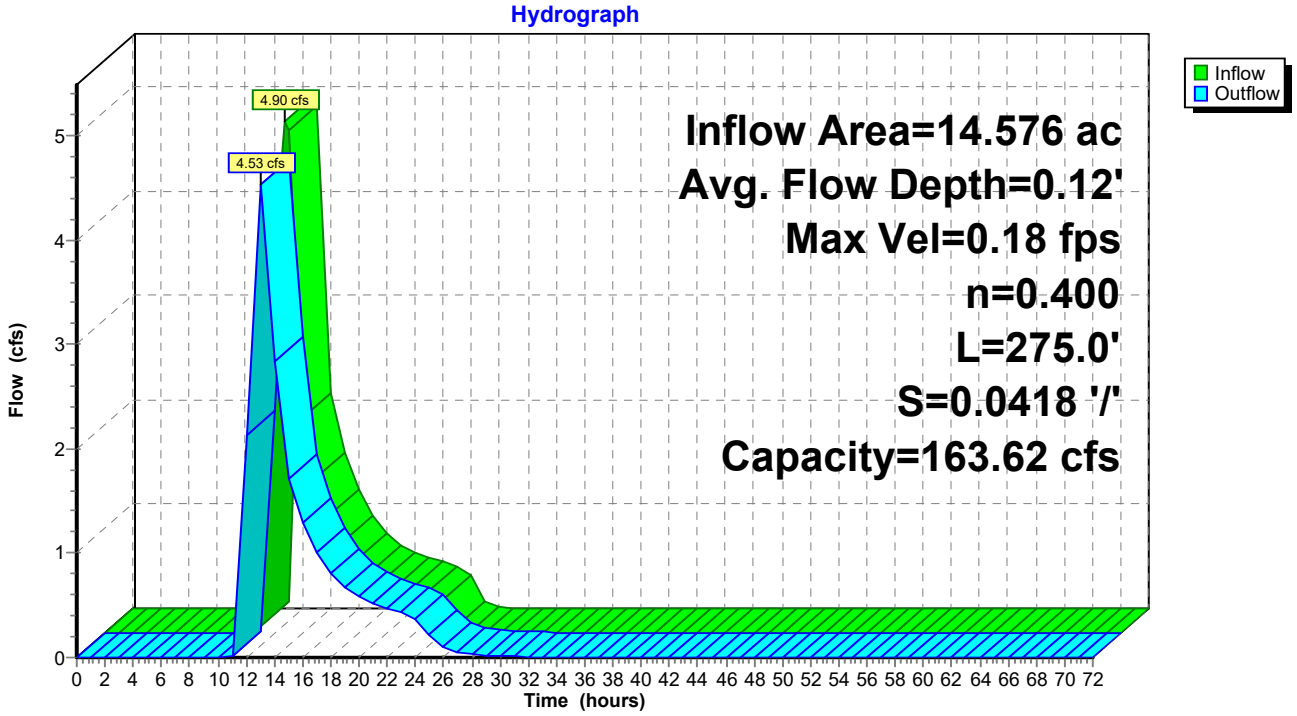
Inflow Area = 14.576 ac, 7.38% Impervious, Inflow Depth = 1.21" for 10-YR event
Inflow = 4.90 cfs @ 12.79 hrs, Volume= 1.472 af
Outflow = 4.53 cfs @ 13.09 hrs, Volume= 1.473 af, Atten= 7%, Lag= 18.1 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs / 2
Max. Velocity= 0.18 fps, Min. Travel Time= 25.1 min
Avg. Velocity = 0.06 fps, Avg. Travel Time= 77.4 min

Peak Storage= 6,813 cf @ 13.10 hrs
Average Depth at Peak Storage= 0.12'
Bank-Full Depth= 1.00' Flow Area= 237.5 sf, Capacity= 163.62 cfs

200.00' x 1.00' deep channel, n= 0.400 Sheet flow: Woods+light brush
Side Slope Z-value= 50.0 25.0 '/' Top Width= 275.00'
Length= 275.0' Slope= 0.0418 '/'
Inlet Invert= 636.50', Outlet Invert= 625.00'

Reach PDP-5: Design Point 5



Stage-Discharge for Reach PDP-5: Design Point 5

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
636.50	0.00	0.00
636.51	0.04	0.07
636.52	0.06	0.22
636.53	0.07	0.44
636.54	0.09	0.71
636.55	0.10	1.03
636.56	0.12	1.40
636.57	0.13	1.81
636.58	0.14	2.27
636.59	0.15	2.76
636.60	0.16	3.29
636.61	0.17	3.86
636.62	0.18	4.47
636.63	0.19	5.11
636.64	0.20	5.79
636.65	0.21	6.50
636.66	0.22	7.24
636.67	0.23	8.01
636.68	0.24	8.82
636.69	0.25	9.66
636.70	0.25	10.53
636.71	0.26	11.43
636.72	0.27	12.36
636.73	0.28	13.32
636.74	0.29	14.31
636.75	0.29	15.33
636.76	0.30	16.37
636.77	0.31	17.45
636.78	0.31	18.55
636.79	0.32	19.68
636.80	0.33	20.84
636.81	0.34	22.03
636.82	0.34	23.24
636.83	0.35	24.48
636.84	0.36	25.75
636.85	0.36	27.04
636.86	0.37	28.36
636.87	0.38	29.71
636.88	0.38	31.08
636.89	0.39	32.48
636.90	0.39	33.91
636.91	0.40	35.36
636.92	0.41	36.83
636.93	0.41	38.34
636.94	0.42	39.86
636.95	0.42	41.42
636.96	0.43	42.99
636.97	0.44	44.59
636.98	0.44	46.22
636.99	0.45	47.87
637.00	0.45	49.55
637.01	0.46	51.25
637.02	0.46	52.98
637.03	0.47	54.73
637.04	0.48	56.50
637.05	0.48	58.30
637.06	0.49	60.12
637.07	0.49	61.97
637.08	0.50	63.84
637.09	0.50	65.74
637.10	0.51	67.66
637.11	0.51	69.60
637.12	0.52	71.57
637.13	0.52	73.56
637.14	0.53	75.57
637.15	0.53	77.61
637.16	0.54	79.67
637.17	0.54	81.76
637.18	0.55	83.87
637.19	0.55	86.00
637.20	0.56	88.16
637.21	0.56	90.34
637.22	0.57	92.54
637.23	0.57	94.77
637.24	0.58	97.02
637.25	0.58	99.29
637.26	0.58	101.58
637.27	0.59	103.90
637.28	0.59	106.25
637.29	0.60	108.61
637.30	0.60	111.00
637.31	0.61	113.41
637.32	0.61	115.85
637.33	0.62	118.31
637.34	0.62	120.79
637.35	0.63	123.29
637.36	0.63	125.82
637.37	0.63	128.37
637.38	0.64	130.95
637.39	0.64	133.54
637.40	0.65	136.16
637.41	0.65	138.80
637.42	0.66	141.47
637.43	0.66	144.16
637.44	0.66	146.87
637.45	0.67	149.60
637.46	0.67	152.36
637.47	0.68	155.14
637.48	0.68	157.94
637.49	0.68	160.77
637.50	**0.69**	**163.62**

Summary for Reach PDP-6: Design Point 6

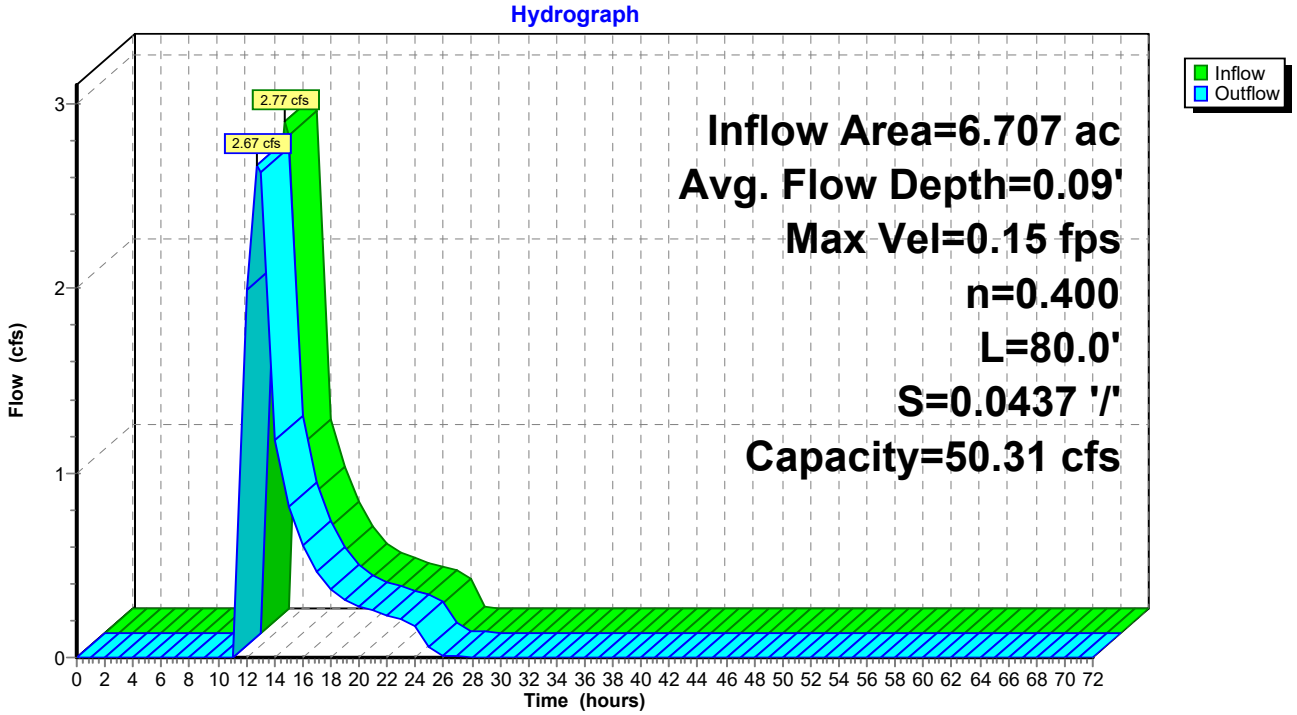
Inflow Area = 6.707 ac, 0.00% Impervious, Inflow Depth = 1.40" for 10-YR event
Inflow = 2.77 cfs @ 12.74 hrs, Volume= 0.782 af
Outflow = 2.67 cfs @ 12.80 hrs, Volume= 0.794 af, Atten= 4%, Lag= 3.6 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs / 2
Max. Velocity= 0.15 fps, Min. Travel Time= 8.9 min
Avg. Velocity = 0.06 fps, Avg. Travel Time= 24.0 min

Peak Storage= 1,415 cf @ 12.79 hrs
Average Depth at Peak Storage= 0.09'
Bank-Full Depth= 0.50' Flow Area= 107.5 sf, Capacity= 50.31 cfs

200.00' x 0.50' deep channel, n= 0.400 Sheet flow: Woods+light brush
Side Slope Z-value= 30.0 '/' Top Width= 230.00'
Length= 80.0' Slope= 0.0437 '/'
Inlet Invert= 642.50', Outlet Invert= 639.00'

Reach PDP-6: Design Point 6



Stage-Discharge for Reach PDP-6: Design Point 6

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
642.50	0.00	0.00
642.51	0.04	0.07
642.52	0.06	0.23
642.53	0.07	0.45
642.54	0.09	0.73
642.55	0.10	1.06
642.56	0.12	1.43
642.57	0.13	1.85
642.58	0.14	2.32
642.59	0.15	2.82
642.60	0.17	3.37
642.61	0.18	3.95
642.62	0.19	4.57
642.63	0.20	5.22
642.64	0.21	5.91
642.65	0.22	6.63
642.66	0.23	7.39
642.67	0.23	8.18
642.68	0.24	9.00
642.69	0.25	9.86
642.70	0.26	10.74
642.71	0.27	11.66
642.72	0.28	12.60
642.73	0.29	13.58
642.74	0.29	14.59
642.75	0.30	15.62
642.76	0.31	16.69
642.77	0.32	17.78
642.78	0.32	18.90
642.79	0.33	20.05
642.80	0.34	21.23
642.81	0.35	22.43
642.82	0.35	23.67
642.83	0.36	24.92
642.84	0.37	26.21
642.85	0.37	27.52
642.86	0.38	28.86
642.87	0.39	30.23
642.88	0.39	31.62
642.89	0.40	33.04
642.90	0.41	34.48
642.91	0.41	35.95
642.92	0.42	37.45
642.93	0.43	38.97
642.94	0.43	40.51
642.95	0.44	42.08
642.96	0.44	43.68
642.97	0.45	45.30
642.98	0.46	46.94
642.99	0.46	48.61
643.00	**0.47**	**50.31**

Summary for Pond 3: SFB-3

Inflow Area = 1.125 ac, 75.58% Impervious, Inflow Depth > 3.94" for 10-YR event
Inflow = 0.67 cfs @ 12.11 hrs, Volume= 0.369 af
Outflow = 0.65 cfs @ 12.19 hrs, Volume= 0.376 af, Atten= 3%, Lag= 4.8 min
Discarded = 0.06 cfs @ 12.36 hrs, Volume= 0.169 af
Primary = 0.59 cfs @ 12.19 hrs, Volume= 0.206 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs / 3
Peak Elev= 622.22' @ 12.37 hrs Surf.Area= 1,392 sf Storage= 1,184 cf
Flood Elev= 623.50' Surf.Area= 2,450 sf Storage= 3,580 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 97.1 min (1,239.0 - 1,141.8)

Volume	Invert	Avail.Storage	Storage Description
#1	620.00'	3,306 cf	**Overall storage (Prismatic)** Listed below (Recalc) 4,263 cf Overall - 957 cf Embedded = 3,306 cf
#2	620.00'	211 cf	**Sand media (Prismatic)** Listed below (Recalc) Inside #1 638 cf Overall x 33.0% Voids
#3	621.00'	64 cf	**Infiltration Seed mix (Prismatic)** Listed below (Recalc) Inside #1 319 cf Overall x 20.0% Voids
		3,580 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
620.00	638	0	0
621.00	638	638	638
622.00	1,230	934	1,572
623.00	1,951	1,591	3,163
623.50	2,450	1,100	4,263

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
620.00	638	0	0
621.00	638	638	638

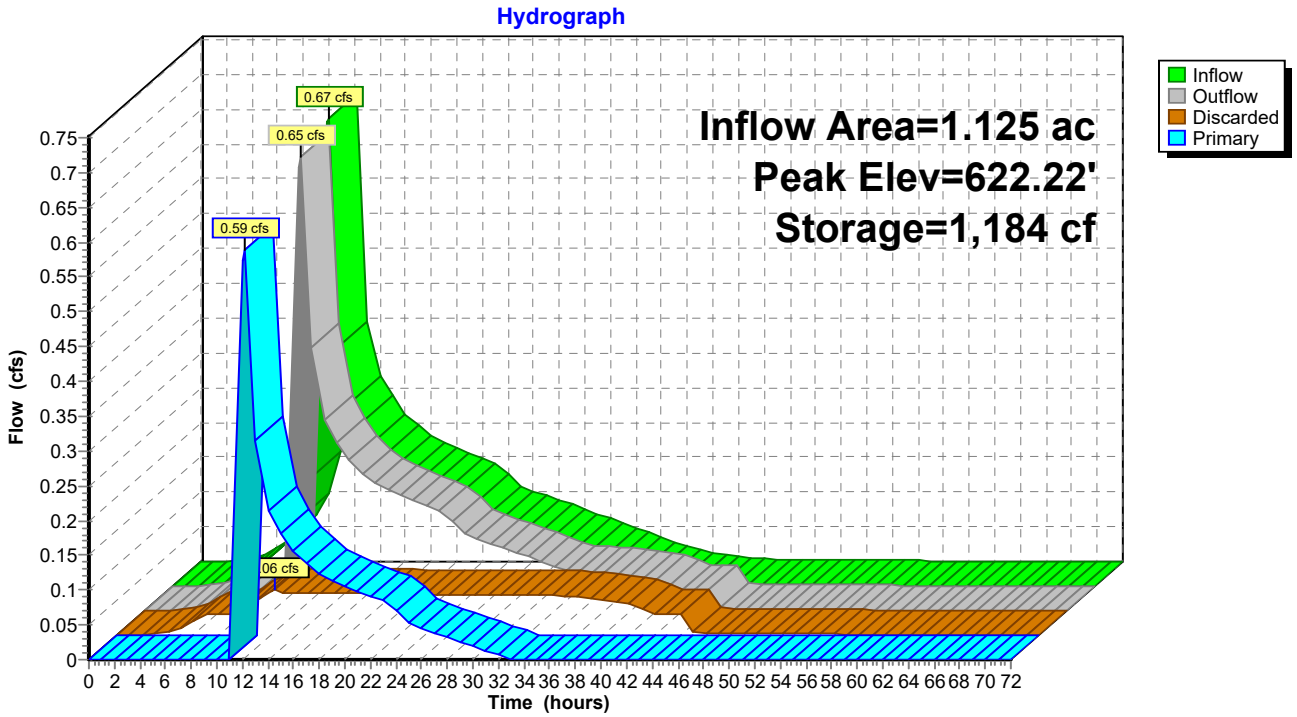
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
621.00	638	0	0
621.50	638	319	319

Device	Routing	Invert	Outlet Devices
#1	Discarded	620.00'	**2.010 in/hr Exfiltration over Surface area**
#2	Primary	620.14'	**8.0" Round Culvert** L= 14.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 620.14' / 620.00' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.35 sf
#3	Device 2	622.00'	**8.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.06 cfs @ 12.36 hrs HW=622.17' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=0.52 cfs @ 12.19 hrs HW=622.18' (Free Discharge)
└─**2=Culvert** (Passes 0.52 cfs of 1.73 cfs potential flow)
└─**3=Orifice/Grate** (Weir Controls 0.52 cfs @ 1.38 fps)

Pond 3: SFB-3



Stage-Discharge for Pond 3: SFB-3

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
620.00	0.00	0.00	0.00
620.05	0.03	0.03	0.00
620.10	0.03	0.03	0.00
620.15	0.03	0.03	0.00
620.20	0.03	0.03	0.00
620.25	0.03	0.03	0.00
620.30	0.03	0.03	0.00
620.35	0.03	0.03	0.00
620.40	0.03	0.03	0.00
620.45	0.03	0.03	0.00
620.50	0.03	0.03	0.00
620.55	0.03	0.03	0.00
620.60	0.03	0.03	0.00
620.65	0.03	0.03	0.00
620.70	0.03	0.03	0.00
620.75	0.03	0.03	0.00
620.80	0.03	0.03	0.00
620.85	0.03	0.03	0.00
620.90	0.03	0.03	0.00
620.95	0.03	0.03	0.00
621.00	0.03	0.03	0.00
621.05	0.03	0.03	0.00
621.10	0.03	0.03	0.00
621.15	0.03	0.03	0.00
621.20	0.04	0.04	0.00
621.25	0.04	0.04	0.00
621.30	0.04	0.04	0.00
621.35	0.04	0.04	0.00
621.40	0.04	0.04	0.00
621.45	0.04	0.04	0.00
621.50	0.04	0.04	0.00
621.55	0.04	0.04	0.00
621.60	0.05	0.05	0.00
621.65	0.05	0.05	0.00
621.70	0.05	0.05	0.00
621.75	0.05	0.05	0.00
621.80	0.05	0.05	0.00
621.85	0.05	0.05	0.00
621.90	0.05	0.05	0.00
621.95	0.06	0.06	0.00
622.00	0.06	0.06	0.00
622.05	0.14	0.06	0.08
622.10	0.28	0.06	0.22
622.15	0.46	0.06	0.40
622.20	0.68	0.06	0.61
622.25	0.91	0.07	0.84
622.30	0.99	0.07	0.92
622.35	1.06	0.07	0.99
622.40	1.13	0.07	1.06
622.45	1.20	0.07	1.13
622.50	1.26	0.07	1.19
622.55	1.32	0.08	1.25
622.60	1.38	0.08	1.30
622.65	1.43	0.08	1.36
622.70	1.49	0.08	1.41
622.75	1.54	0.08	1.46
622.80	1.59	0.08	1.50
622.85	1.64	0.09	1.55
622.90	1.68	0.09	1.59
622.95	1.73	0.09	1.64
623.00	1.77	0.09	1.68
623.05	1.82	0.09	1.72
623.10	1.86	0.10	1.76
623.15	1.90	0.10	1.80
623.20	1.94	0.10	1.84
623.25	1.98	0.10	1.88
623.30	2.02	0.10	1.92
623.35	2.06	0.11	1.95
623.40	2.10	0.11	1.99
623.45	2.14	0.11	2.02
623.50	**2.17**	**0.11**	**2.06**

Summary for Pond 4: SFB-4

Inflow Area =	1.487 ac, 85.51% Impervious, Inflow Depth > 4.31" for 10-YR event				
Inflow =	1.30 cfs @	12.11 hrs,	Volume=	0.535 af	
Outflow =	0.70 cfs @	13.22 hrs,	Volume=	0.532 af,	Atten= 47%, Lag= 66.4 min
Discarded =	0.47 cfs @	13.40 hrs,	Volume=	0.488 af	
Primary =	0.23 cfs @	13.17 hrs,	Volume=	0.044 af	
Secondary =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs / 3
Peak Elev= 632.83' @ 13.40 hrs Surf.Area= 3,089 sf Storage= 4,216 cf
Flood Elev= 634.00' Surf.Area= 4,000 sf Storage= 8,373 cf

Plug-Flow detention time= 64.6 min calculated for 0.525 af (98% of inflow)
Center-of-Mass det. time= 59.0 min (985.0 - 926.0)

Volume	Invert	Avail.Storage	Storage Description
#1	630.00'	7,667 cf	**Overall storage (Prismatic)** Listed below (Recalc) 10,132 cf Overall - 2,465 cf Embedded = 7,667 cf
#2	630.00'	542 cf	**Sand media (Prismatic)** Listed below (Recalc) Inside #1 1,643 cf Overall x 33.0% Voids
#3	631.00'	164 cf	**Infiltration Seed mix (Prismatic)** Listed below (Recalc) Inside #1 822 cf Overall x 20.0% Voids
		8,373 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
630.00	1,643	0	0
631.00	1,643	1,643	1,643
632.00	2,443	2,043	3,686
633.00	3,224	2,834	6,520
634.00	4,000	3,612	10,132

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
630.00	1,643	0	0
631.00	1,643	1,643	1,643

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
631.00	1,643	0	0
631.50	1,643	822	822

Device	Routing	Invert	Outlet Devices
#1	Discarded	630.00'	**6.560 in/hr Exfiltration over Surface area**
#2	Primary	630.00'	**8.0" Round Culvert** L= 25.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 630.00' / 629.25' S= 0.0300 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.35 sf
#3	Device 2	632.00'	**2.0" Vert. Orifice/Grate** C= 0.600
#4	Device 2	632.65'	**4.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

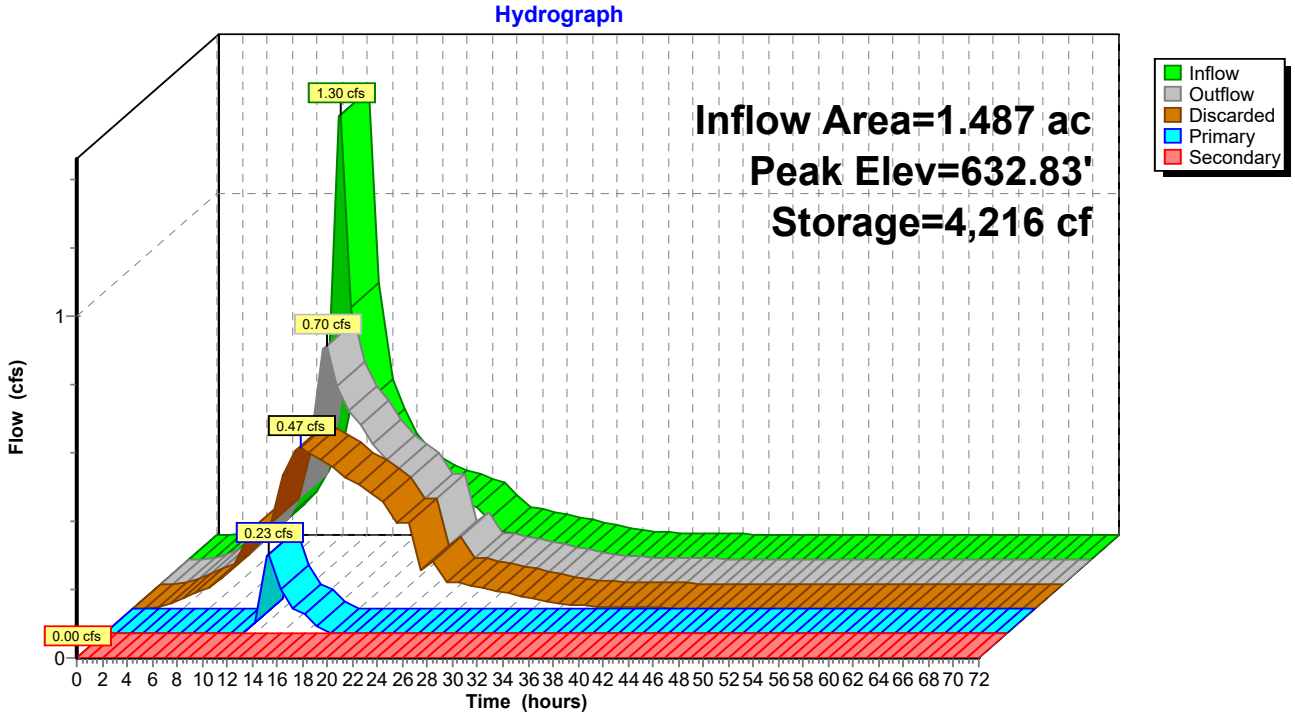
#5 Secondary 633.30' **50.0' long x 1.0' breadth Broad-Crested Rectangular Weir**
Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00
Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Discarded OutFlow Max=0.46 cfs @ 13.40 hrs HW=632.75' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.46 cfs)

Primary OutFlow Max=0.21 cfs @ 13.17 hrs HW=632.76' (Free Discharge)
└─**2=Culvert** (Passes 0.21 cfs of 2.07 cfs potential flow)
  ├─**3=Orifice/Grate** (Orifice Controls 0.09 cfs @ 3.96 fps)
  └─**4=Orifice/Grate** (Weir Controls 0.13 cfs @ 1.09 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=630.00' (Free Discharge)
└─**5=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

Pond 4: SFB-4



Stage-Discharge for Pond 4: SFB-4

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)	Secondary (cfs)
630.00	0.00	0.00	0.00	0.00
630.10	0.25	0.25	0.00	0.00
630.20	0.25	0.25	0.00	0.00
630.30	0.25	0.25	0.00	0.00
630.40	0.25	0.25	0.00	0.00
630.50	0.25	0.25	0.00	0.00
630.60	0.25	0.25	0.00	0.00
630.70	0.25	0.25	0.00	0.00
630.80	0.25	0.25	0.00	0.00
630.90	0.25	0.25	0.00	0.00
631.00	0.25	0.25	0.00	0.00
631.10	0.26	0.26	0.00	0.00
631.20	0.27	0.27	0.00	0.00
631.30	0.29	0.29	0.00	0.00
631.40	0.30	0.30	0.00	0.00
631.50	0.31	0.31	0.00	0.00
631.60	0.32	0.32	0.00	0.00
631.70	0.33	0.33	0.00	0.00
631.80	0.35	0.35	0.00	0.00
631.90	0.36	0.36	0.00	0.00
632.00	0.37	0.37	0.00	0.00
632.10	0.40	0.38	0.01	0.00
632.20	0.43	0.39	0.04	0.00
632.30	0.46	0.41	0.05	0.00
632.40	0.48	0.42	0.06	0.00
632.50	0.50	0.43	0.07	0.00
632.60	0.52	0.44	0.08	0.00
632.70	0.57	0.45	0.12	0.00
632.80	0.72	0.47	0.25	0.00
632.90	0.78	0.48	0.31	0.00
633.00	0.84	0.49	0.35	0.00
633.10	0.89	0.50	0.39	0.00
633.20	0.94	0.51	0.42	0.00
633.30	0.98	0.52	0.45	0.00
633.40	5.27	0.54	0.48	4.25
633.50	13.09	0.55	0.51	12.03
633.60	23.32	0.56	0.54	22.22
633.70	35.54	0.57	0.56	34.41
633.80	49.52	0.58	0.59	48.35
633.90	65.11	0.60	0.61	63.90
634.00	**83.23**	**0.61**	**0.63**	**81.99**

Summary for Pond 5: SFB-5

Inflow Area =	1.636 ac, 65.78% Impervious, Inflow Depth = 3.49" for 10-YR event				
Inflow =	0.51 cfs @	12.23 hrs,	Volume=	0.476 af	
Outflow =	0.25 cfs @	17.55 hrs,	Volume=	0.480 af,	Atten= 51%, Lag= 318.9 min
Discarded =	0.21 cfs @	17.55 hrs,	Volume=	0.460 af	
Primary =	0.04 cfs @	17.55 hrs,	Volume=	0.020 af	
Secondary =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs / 3
Peak Elev= 634.71' @ 17.55 hrs Surf.Area= 3,267 sf Storage= 3,831 cf
Flood Elev= 636.00' Surf.Area= 4,050 sf Storage= 8,589 cf

Plug-Flow detention time= 196.6 min calculated for 0.473 af (99% of inflow)
Center-of-Mass det. time= 203.3 min (1,383.4 - 1,180.1)

Volume	Invert	Avail.Storage	Storage Description
#1	632.00'	7,942 cf	**Overall storage (Prismatic)** Listed below (Recalc) 10,200 cf Overall - 2,258 cf Embedded = 7,942 cf
#2	632.00'	497 cf	**Sand media (Prismatic)** Listed below (Recalc) Inside #1 1,505 cf Overall x 33.0% Voids
#3	633.00'	151 cf	**Infiltration Seed mix (Prismatic)** Listed below (Recalc) Inside #1 753 cf Overall x 20.0% Voids
		8,589 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
632.00	1,505	0	0
633.50	1,505	2,258	2,258
634.00	2,741	1,062	3,319
635.00	3,485	3,113	6,432
636.00	4,050	3,768	10,200

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
632.00	1,505	0	0
633.00	1,505	1,505	1,505

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
633.00	1,505	0	0
633.50	1,505	753	753

Device	Routing	Invert	Outlet Devices
#1	Discarded	632.00'	**2.840 in/hr Exfiltration over Surface area**
#2	Primary	633.80'	**6.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 633.80' / 633.75' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf
#3	Device 2	634.50'	**2.0" Vert. Orifice/Grate** C= 0.600
#4	Secondary	635.00'	**80.0' long x 1.0' breadth Broad-Crested Rectangular Weir**

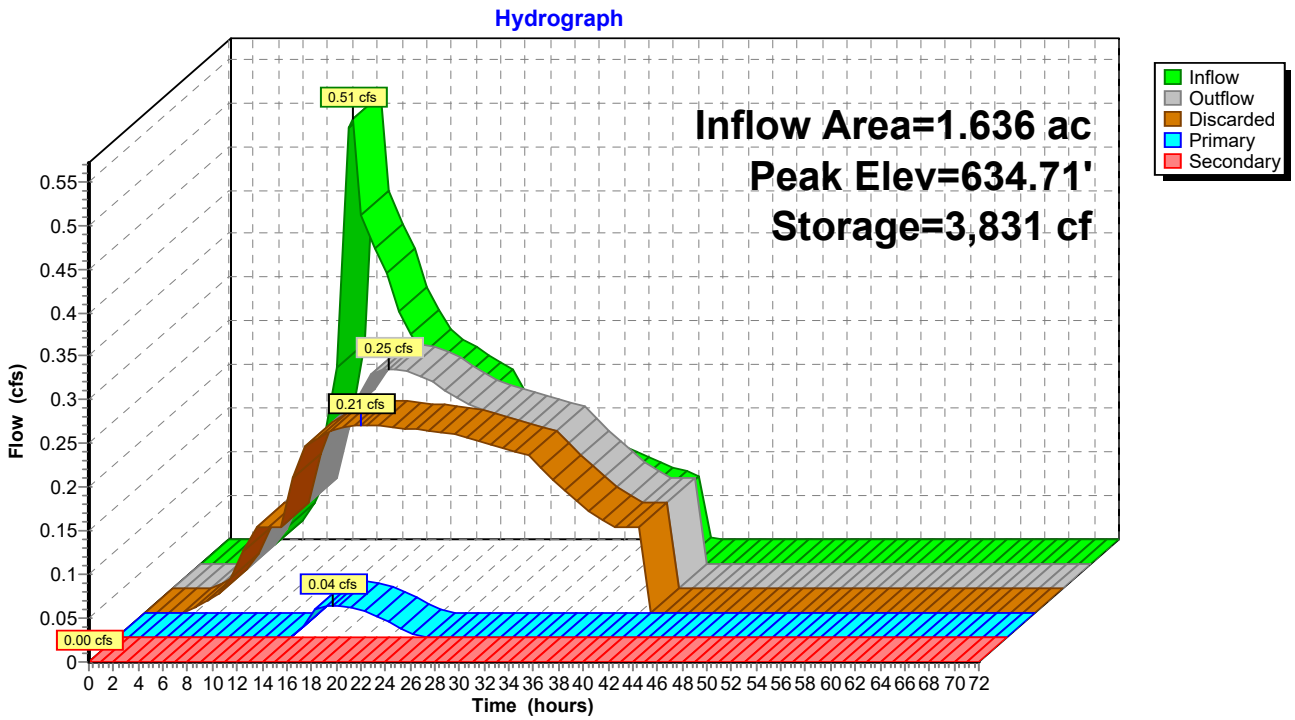
Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00
Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Discarded OutFlow Max=0.21 cfs @ 17.55 hrs HW=634.70' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.21 cfs)

Primary OutFlow Max=0.04 cfs @ 17.55 hrs HW=634.70' (Free Discharge)
└─**2=Culvert** (Passes 0.04 cfs of 0.60 cfs potential flow)
└─**3=Orifice/Grate** (Orifice Controls 0.04 cfs @ 1.68 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=632.00' (Free Discharge)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 5: SFB-5



Stage-Discharge for Pond 5: SFB-5

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)	Secondary (cfs)
632.00	0.00	0.00	0.00	0.00
632.10	0.10	0.10	0.00	0.00
632.20	0.10	0.10	0.00	0.00
632.30	0.10	0.10	0.00	0.00
632.40	0.10	0.10	0.00	0.00
632.50	0.10	0.10	0.00	0.00
632.60	0.10	0.10	0.00	0.00
632.70	0.10	0.10	0.00	0.00
632.80	0.10	0.10	0.00	0.00
632.90	0.10	0.10	0.00	0.00
633.00	0.10	0.10	0.00	0.00
633.10	0.10	0.10	0.00	0.00
633.20	0.10	0.10	0.00	0.00
633.30	0.10	0.10	0.00	0.00
633.40	0.10	0.10	0.00	0.00
633.50	0.10	0.10	0.00	0.00
633.60	0.12	0.12	0.00	0.00
633.70	0.13	0.13	0.00	0.00
633.80	0.15	0.15	0.00	0.00
633.90	0.16	0.16	0.00	0.00
634.00	0.18	0.18	0.00	0.00
634.10	0.19	0.19	0.00	0.00
634.20	0.19	0.19	0.00	0.00
634.30	0.19	0.19	0.00	0.00
634.40	0.20	0.20	0.00	0.00
634.50	0.20	0.20	0.00	0.00
634.60	0.22	0.21	0.01	0.00
634.70	0.25	0.21	0.04	0.00
634.80	0.27	0.22	0.05	0.00
634.90	0.28	0.22	0.06	0.00
635.00	0.30	0.23	0.07	0.00
635.10	7.11	0.23	0.08	6.81
635.20	19.57	0.24	0.08	19.25
635.30	35.89	0.24	0.09	35.56
635.40	55.39	0.24	0.09	55.05
635.50	77.71	0.25	0.10	77.36
635.60	102.60	0.25	0.11	102.25
635.70	131.55	0.26	0.11	131.19
635.80	163.52	0.26	0.12	163.14
635.90	199.49	0.26	0.12	199.11
636.00	**238.79**	**0.27**	**0.13**	**238.40**

Summary for Pond DB-3: DB-3

Inflow Area = 0.593 ac,100.00% Impervious, Inflow Depth = 5.09" for 10-YR event
Inflow = 1.36 cfs @ 12.01 hrs, Volume= 0.252 af
Outflow = 0.15 cfs @ 14.30 hrs, Volume= 0.251 af, Atten= 89%, Lag= 137.4 min
Primary = 0.15 cfs @ 14.30 hrs, Volume= 0.251 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Peak Elev= 628.22' @ 14.30 hrs Surf.Area= 0.081 ac Storage= 0.154 af
Flood Elev= 630.00' Surf.Area= 0.081 ac Storage= 0.276 af

Plug-Flow detention time= 552.7 min calculated for 0.251 af (100% of inflow)
Center-of-Mass det. time= 547.8 min (1,292.9 - 745.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	626.00'	0.000 af	**27.58'W x 127.56'L x 4.67'H Field A** 0.377 af Overall - 0.377 af Embedded = 0.000 af x 0.0% Voids
#2A	626.00'	0.276 af	**StormTrap ST1 SingleTrap 4-0** x 36 Inside #1 Inside= 82.7"W x 48.0"H => 23.79 sf x 14.06'L = 334.5 cf Outside= 82.7"W x 56.0"H => 32.18 sf x 14.06'L = 452.5 cf 4 Rows of 9 Chambers 27.58' x 126.56' Core + 0.00' x 0.50' Border = 27.58' x 127.56' System
		0.276 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	626.00'	**8.0" Round Culvert** L= 240.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 626.00' / 622.00' S= 0.0167 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.35 sf
#2	Device 1	626.00'	**2.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.15 cfs @ 14.30 hrs HW=628.21' (Free Discharge)
└─**1=Culvert** (Passes 0.15 cfs of 1.82 cfs potential flow)
└─**2=Orifice/Grate** (Orifice Controls 0.15 cfs @ 7.03 fps)

Pond DB-3: DB-3 - Chamber Wizard Field A

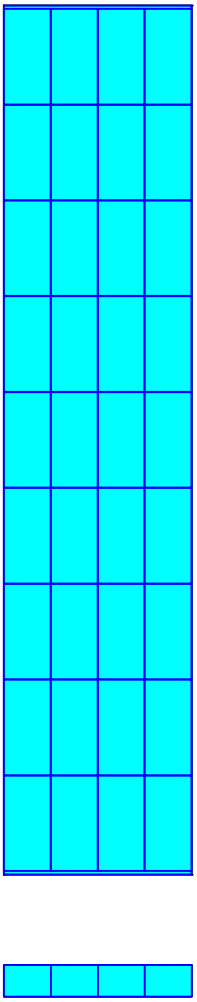
Chamber Model = StormTrap ST1 SingleTrap 4-0 (StormTrap ST1 SingleTrap® Type VI)
Inside= 82.7"W x 48.0"H => 23.79 sf x 14.06'L = 334.5 cf
Outside= 82.7"W x 56.0"H => 32.18 sf x 14.06'L = 452.5 cf

9 Chambers/Row x 14.06' Long = 126.56' Row Length +6.0" Border x 2 = 127.56' Base Length
4 Rows x 82.7" Wide = 27.58' Base Width
56.0" Chamber Height = 4.67' Field Height

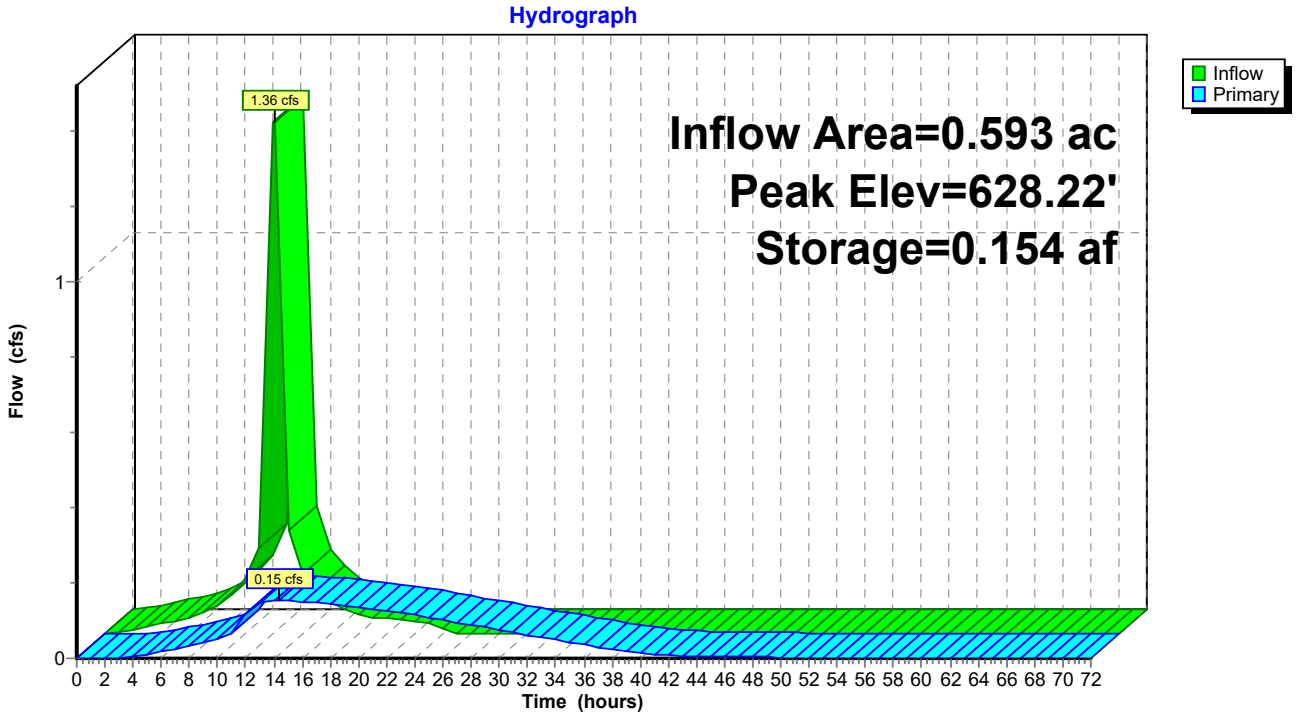
36 Chambers x 334.5 cf = 12,042.0 cf Chamber Storage
36 Chambers x 452.5 cf + 128.7 cf Border = 16,420.1 cf Displacement

Chamber Storage = 12,042.0 cf = 0.276 af
Overall Storage Efficiency = 73.3%
Overall System Size = 127.56' x 27.58' x 4.67'

36 Chambers (plus border)
608.2 cy Field



Pond DB-3: DB-3


Hydrograph
Inflow
Primary
1.36 cfs
0.15 cfs
Inflow Area=0.593 ac
Peak Elev=628.22'
Storage=0.154 af
Flow (cfs)
1
0
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72
Time (hours)

Stage-Discharge for Pond DB-3: DB-3

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
626.00	0.00	628.60	0.17
626.05	0.00	628.65	0.17
626.10	0.01	628.70	0.17
626.15	0.03	628.75	0.17
626.20	0.04	628.80	0.17
626.25	0.04	628.85	0.17
626.30	0.05	628.90	0.18
626.35	0.05	628.95	0.18
626.40	0.06	629.00	0.18
626.45	0.06	629.05	0.18
626.50	0.07	629.10	0.18
626.55	0.07	629.15	0.18
626.60	0.08	629.20	0.19
626.65	0.08	629.25	0.19
626.70	0.08	629.30	0.19
626.75	0.09	629.35	0.19
626.80	0.09	629.40	0.19
626.85	0.09	629.45	0.19
626.90	0.09	629.50	0.19
626.95	0.10	629.55	0.20
627.00	0.10	629.60	0.20
627.05	0.10	629.65	0.20
627.10	0.11	629.70	0.20
627.15	0.11	629.75	0.20
627.20	0.11	629.80	0.20
627.25	0.11	629.85	0.20
627.30	0.12	629.90	0.21
627.35	0.12	629.95	0.21
627.40	0.12	630.00	0.21
627.45	0.12	630.05	0.21
627.50	0.13	630.10	0.21
627.55	0.13	630.15	0.21
627.60	0.13	630.20	0.21
627.65	0.13	630.25	0.21
627.70	0.13	630.30	0.22
627.75	0.14	630.35	0.22
627.80	0.14	630.40	0.22
627.85	0.14	630.45	0.22
627.90	0.14	630.50	0.22
627.95	0.14	630.55	0.22
628.00	0.15	630.60	0.22
628.05	0.15	630.65	**0.22**
628.10	0.15		
628.15	0.15		
628.20	0.15		
628.25	0.15		
628.30	0.16		
628.35	0.16		
628.40	0.16		
628.45	0.16		
628.50	0.16		
628.55	0.16		

Summary for Pond DB-4: DB-4

Inflow Area = 0.274 ac,100.00% Impervious, Inflow Depth = 8.48" for 10-YR event
Inflow = 1.56 cfs @ 12.00 hrs, Volume= 0.193 af
Outflow = 0.22 cfs @ 13.13 hrs, Volume= 0.193 af, Atten= 86%, Lag= 67.4 min
Primary = 0.22 cfs @ 13.13 hrs, Volume= 0.193 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Peak Elev= 636.25' @ 13.39 hrs Surf.Area= 0.072 ac Storage= 0.138 af
Flood Elev= 638.00' Surf.Area= 0.072 ac Storage= 0.246 af

Plug-Flow detention time= 461.1 min calculated for 0.193 af (100% of inflow)
Center-of-Mass det. time= 455.1 min (1,190.2 - 735.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	634.00'	0.000 af	**27.58'W x 113.50'L x 4.67'H Field A** 0.335 af Overall - 0.335 af Embedded = 0.000 af x 0.0% Voids
#2A	634.00'	0.246 af	**StormTrap ST1 SingleTrap 4-0** x 32 Inside #1 Inside= 82.7"W x 48.0"H => 23.79 sf x 14.06'L = 334.5 cf Outside= 82.7"W x 56.0"H => 32.18 sf x 14.06'L = 452.5 cf 4 Rows of 8 Chambers 27.58' x 112.50' Core + 0.00' x 0.50' Border = 27.58' x 113.50' System
		0.246 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	634.00'	**6.0" Round Culvert** L= 100.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 634.00' / 633.00' S= 0.0100 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.20 sf
#2	Device 1	634.00'	**2.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	636.00'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Device 1	637.00'	**4.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.21 cfs @ 13.13 hrs HW=636.16' (Free Discharge)
└─**1=Culvert** (Passes 0.21 cfs of 0.93 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.15 cfs @ 6.93 fps)
  ├─**3=Orifice/Grate** (Orifice Controls 0.05 cfs @ 1.35 fps)
  └─**4=Orifice/Grate** (Controls 0.00 cfs)

Pond DB-4: DB-4 - Chamber Wizard Field A

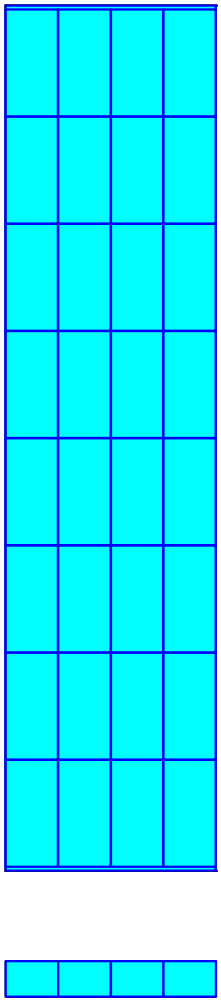
Chamber Model = StormTrap ST1 SingleTrap 4-0 (StormTrap ST1 SingleTrap® Type VI)
Inside= 82.7"W x 48.0"H => 23.79 sf x 14.06'L = 334.5 cf
Outside= 82.7"W x 56.0"H => 32.18 sf x 14.06'L = 452.5 cf

8 Chambers/Row x 14.06' Long = 112.50' Row Length +6.0" Border x 2 = 113.50' Base Length
4 Rows x 82.7" Wide = 27.58' Base Width
56.0" Chamber Height = 4.67' Field Height

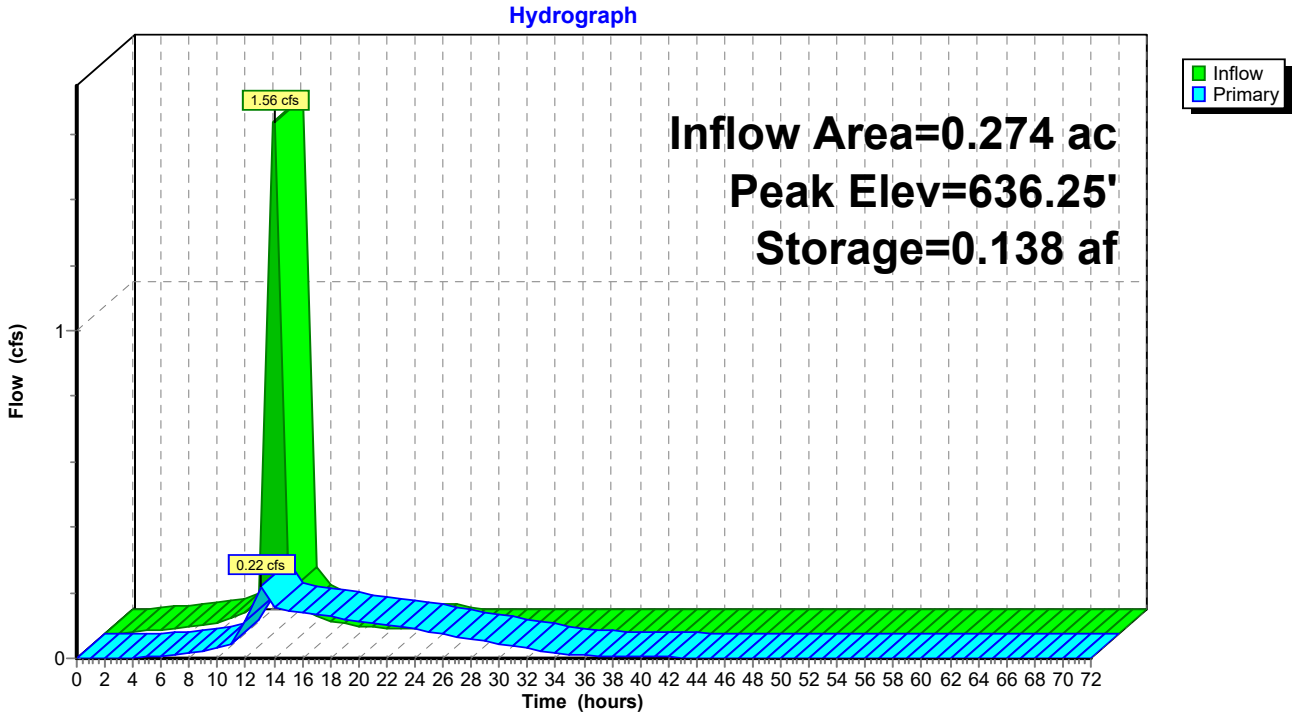
32 Chambers x 334.5 cf = 10,704.0 cf Chamber Storage
32 Chambers x 452.5 cf + 128.7 cf Border = 14,610.0 cf Displacement

Chamber Storage = 10,704.0 cf = 0.246 af
Overall Storage Efficiency = 73.3%
Overall System Size = 113.50' x 27.58' x 4.67'

32 Chambers (plus border)
541.1 cy Field



Pond DB-4: DB-4


Hydrograph
Inflow
Primary
1.56 cfs
0.22 cfs
Inflow Area=0.274 ac
Peak Elev=636.25'
Storage=0.138 af
Flow (cfs)
1
0
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72
Time (hours)

Stage-Discharge for Pond DB-4: DB-4

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
634.00	0.00	636.60	0.44
634.05	0.00	636.65	0.46
634.10	0.01	636.70	0.48
634.15	0.03	636.75	0.49
634.20	0.04	636.80	0.51
634.25	0.04	636.85	0.52
634.30	0.05	636.90	0.54
634.35	0.05	636.95	0.55
634.40	0.06	637.00	0.56
634.45	0.06	637.05	0.58
634.50	0.07	637.10	0.61
634.55	0.07	637.15	0.65
634.60	0.08	637.20	0.70
634.65	0.08	637.25	0.74
634.70	0.08	637.30	0.79
634.75	0.09	637.35	0.83
634.80	0.09	637.40	0.86
634.85	0.09	637.45	0.89
634.90	0.09	637.50	0.92
634.95	0.10	637.55	0.95
635.00	0.10	637.60	0.98
635.05	0.10	637.65	1.00
635.10	0.11	637.70	1.03
635.15	0.11	637.75	1.05
635.20	0.11	637.80	1.07
635.25	0.11	637.85	1.10
635.30	0.12	637.90	1.12
635.35	0.12	637.95	1.14
635.40	0.12	638.00	1.16
635.45	0.12	638.05	1.18
635.50	0.13	638.10	1.20
635.55	0.13	638.15	1.22
635.60	0.13	638.20	1.24
635.65	0.13	638.25	1.25
635.70	0.13	638.30	1.26
635.75	0.14	638.35	1.26
635.80	0.14	638.40	1.27
635.85	0.14	638.45	1.27
635.90	0.14	638.50	1.28
635.95	0.14	638.55	1.29
636.00	0.15	638.60	1.29
636.05	0.15	638.65	**1.30**
636.10	0.17		
636.15	0.20		
636.20	0.24		
636.25	0.27		
636.30	0.31		
636.35	0.34		
636.40	0.36		
636.45	0.39		
636.50	0.41		
636.55	0.43		

Summary for Pond DB-5: DB-5

Inflow Area = 0.708 ac, 85.71% Impervious, Inflow Depth = 5.70" for 10-YR event
Inflow = 2.23 cfs @ 12.03 hrs, Volume= 0.336 af
Outflow = 0.18 cfs @ 14.43 hrs, Volume= 0.335 af, Atten= 92%, Lag= 143.9 min
Primary = 0.18 cfs @ 14.43 hrs, Volume= 0.335 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs / 2
Peak Elev= 640.64' @ 14.42 hrs Surf.Area= 0.090 ac Storage= 0.216 af
Flood Elev= 643.50' Surf.Area= 0.090 ac Storage= 0.449 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 548.3 min (1,312.7 - 764.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	637.50'	0.000 af	**34.48'W x 113.83'L x 7.17'H Field A** 0.646 af Overall - 0.646 af Embedded = 0.000 af x 0.0% Voids
#2A	637.50'	0.490 af	**StormTrap ST1 DoubleTrap 6-0**x 40 Inside #1 Inside= 82.7"W x 72.0"H => 37.97 sf x 14.06'L = 534.0 cf Outside= 82.7"W x 86.0"H => 49.42 sf x 14.06'L = 695.0 cf 5 Rows adjusted for 602.1 cf perimeter wall 34.48' x 112.50' Core + 0.00' x 0.67' Border = 34.48' x 113.83' System
		0.490 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	637.50'	**6.0" Round Culvert** L= 80.0' RCP, rounded edge headwall, Ke= 0.100 Inlet / Outlet Invert= 637.50' / 636.00' S= 0.0187 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#2	Device 1	637.50'	**2.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.18 cfs @ 14.43 hrs HW=640.63' (Free Discharge)
└─**1=Culvert** (Passes 0.18 cfs of 1.17 cfs potential flow)
└─**2=Orifice/Grate** (Orifice Controls 0.18 cfs @ 8.40 fps)

Pond DB-5: DB-5 - Chamber Wizard Field A

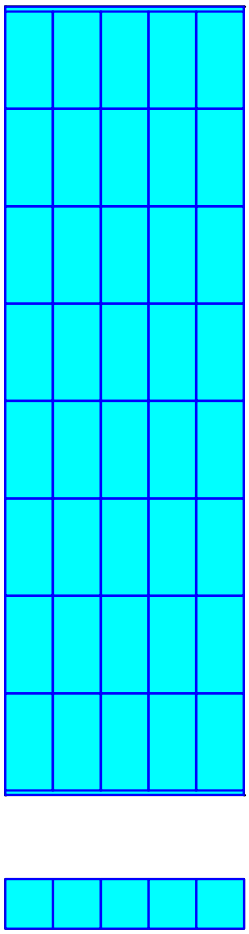
Chamber Model = StormTrap ST1 DoubleTrap 6-0 (StormTrap ST1 DoubleTrap® Type I/III/VI)
Inside= 82.7"W x 72.0"H => 37.97 sf x 14.06'L = 534.0 cf
Outside= 82.7"W x 86.0"H => 49.42 sf x 14.06'L = 695.0 cf
5 Rows adjusted for 602.1 cf perimeter wall

8 Chambers/Row x 14.06' Long = 112.50' Row Length +8.0" Border x 2 = 113.83' Base Length
5 Rows x 82.7" Wide = 34.48' Base Width
86.0" Chamber Height = 7.17' Field Height

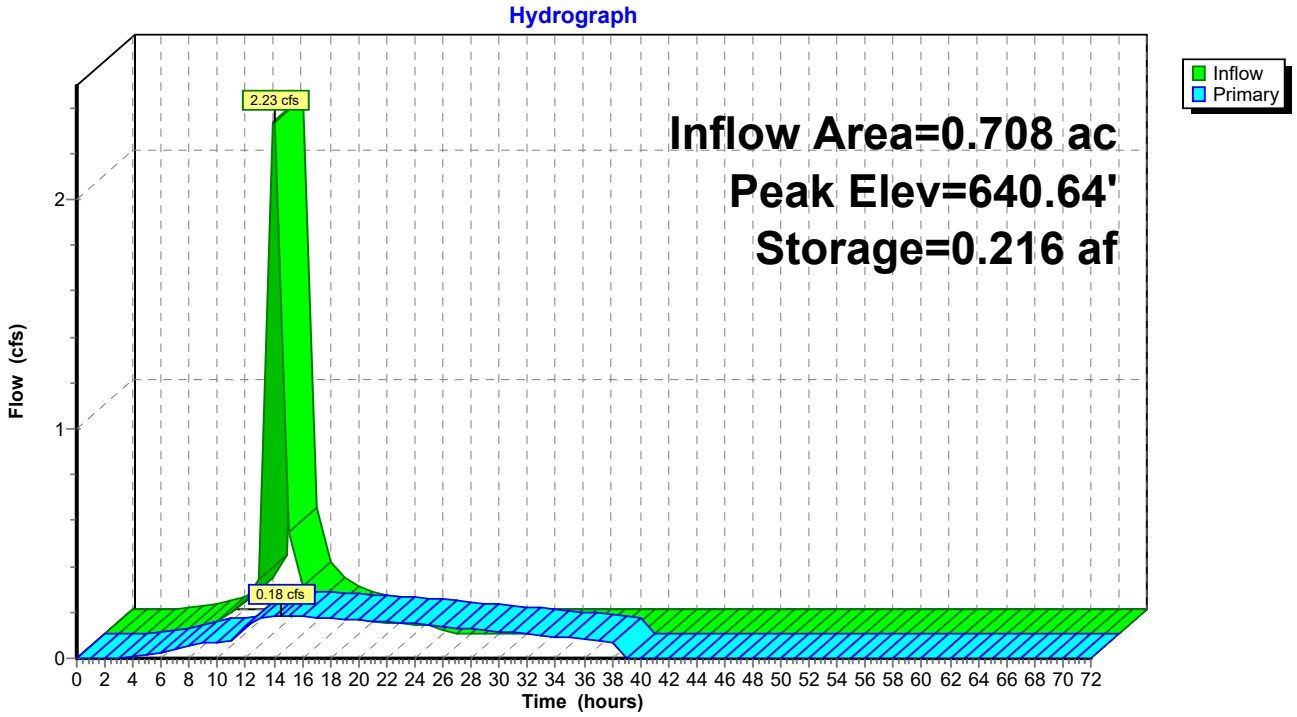
17.0 cf Sidewall x 8 x 2 + 33.0 cf Endwall x 5 x 2 = 602.1 cf Perimeter Wall
40 Chambers x 534.0 cf - 602.1 cf Perimeter wall = 20,757.8 cf Chamber Storage
40 Chambers x 695.0 cf + 329.5 cf Border = 28,128.3 cf Displacement

Chamber Storage = 20,757.8 cf = 0.477 af
Overall Storage Efficiency = 73.8%
Overall System Size = 113.83' x 34.48' x 7.17'

40 Chambers (plus border)
1,041.8 cy Field



Pond DB-5: DB-5


Hydrograph
Inflow
Primary
2.23 cfs
0.18 cfs
Inflow Area=0.708 ac
Peak Elev=640.64'
Storage=0.216 af
Flow (cfs)
0
1
2
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72
Time (hours)

Stage-Discharge for Pond DB-5: DB-5

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
637.50	0.00	639.58	0.15	641.66	0.21	643.74	0.26
637.54	0.00	639.62	0.15	641.70	0.21	643.78	0.26
637.58	0.01	639.66	0.15	641.74	0.21	643.82	0.26
637.62	0.02	639.70	0.15	641.78	0.22	643.86	0.26
637.66	0.03	639.74	0.15	641.82	0.22	643.90	0.26
637.70	0.04	639.78	0.16	641.86	0.22	643.94	0.26
637.74	0.04	639.82	0.16	641.90	0.22	643.98	0.27
637.78	0.05	639.86	0.16	641.94	0.22	644.02	0.27
637.82	0.05	639.90	0.16	641.98	0.22	644.06	0.27
637.86	0.06	639.94	0.16	642.02	0.22	644.10	0.27
637.90	0.06	639.98	0.16	642.06	0.22	644.14	0.27
637.94	0.06	640.02	0.16	642.10	0.22	644.18	0.27
637.98	0.07	640.06	0.17	642.14	0.22	644.22	0.27
638.02	0.07	640.10	0.17	642.18	0.23	644.26	0.27
638.06	0.07	640.14	0.17	642.22	0.23	644.30	0.27
638.10	0.08	640.18	0.17	642.26	0.23	644.34	0.27
638.14	0.08	640.22	0.17	642.30	0.23	644.38	0.27
638.18	0.08	640.26	0.17	642.34	0.23	644.42	0.27
638.22	0.08	640.30	0.17	642.38	0.23	644.46	0.28
638.26	0.09	640.34	0.17	642.42	0.23	644.50	0.28
638.30	0.09	640.38	0.18	642.46	0.23	644.54	0.28
638.34	0.09	640.42	0.18	642.50	0.23	644.58	0.28
638.38	0.09	640.46	0.18	642.54	0.23	644.62	0.28
638.42	0.10	640.50	0.18	642.58	0.23	644.66	**0.28**
638.46	0.10	640.54	0.18	642.62	0.24		
638.50	0.10	640.58	0.18	642.66	0.24		
638.54	0.10	640.62	0.18	642.70	0.24		
638.58	0.10	640.66	0.18	642.74	0.24		
638.62	0.11	640.70	0.19	642.78	0.24		
638.66	0.11	640.74	0.19	642.82	0.24		
638.70	0.11	640.78	0.19	642.86	0.24		
638.74	0.11	640.82	0.19	642.90	0.24		
638.78	0.11	640.86	0.19	642.94	0.24		
638.82	0.12	640.90	0.19	642.98	0.24		
638.86	0.12	640.94	0.19	643.02	0.24		
638.90	0.12	640.98	0.19	643.06	0.25		
638.94	0.12	641.02	0.19	643.10	0.25		
638.98	0.12	641.06	0.20	643.14	0.25		
639.02	0.13	641.10	0.20	643.18	0.25		
639.06	0.13	641.14	0.20	643.22	0.25		
639.10	0.13	641.18	0.20	643.26	0.25		
639.14	0.13	641.22	0.20	643.30	0.25		
639.18	0.13	641.26	0.20	643.34	0.25		
639.22	0.13	641.30	0.20	643.38	0.25		
639.26	0.14	641.34	0.20	643.42	0.25		
639.30	0.14	641.38	0.20	643.46	0.25		
639.34	0.14	641.42	0.21	643.50	0.26		
639.38	0.14	641.46	0.21	643.54	0.26		
639.42	0.14	641.50	0.21	643.58	0.26		
639.46	0.14	641.54	0.21	643.62	0.26		
639.50	0.15	641.58	0.21	643.66	0.26		
639.54	0.15	641.62	0.21	643.70	0.26		

Summary for Pond ICS-3: ICS-3

Inflow Area = 0.328 ac, 72.22% Impervious, Inflow Depth = 3.72" for 10-YR event
Inflow = 0.56 cfs @ 12.03 hrs, Volume= 0.102 af
Outflow = 0.56 cfs @ 12.03 hrs, Volume= 0.102 af, Atten= 0%, Lag= 0.0 min
Primary = 0.40 cfs @ 12.05 hrs, Volume= 0.088 af
Secondary = 0.16 cfs @ 12.00 hrs, Volume= 0.014 af

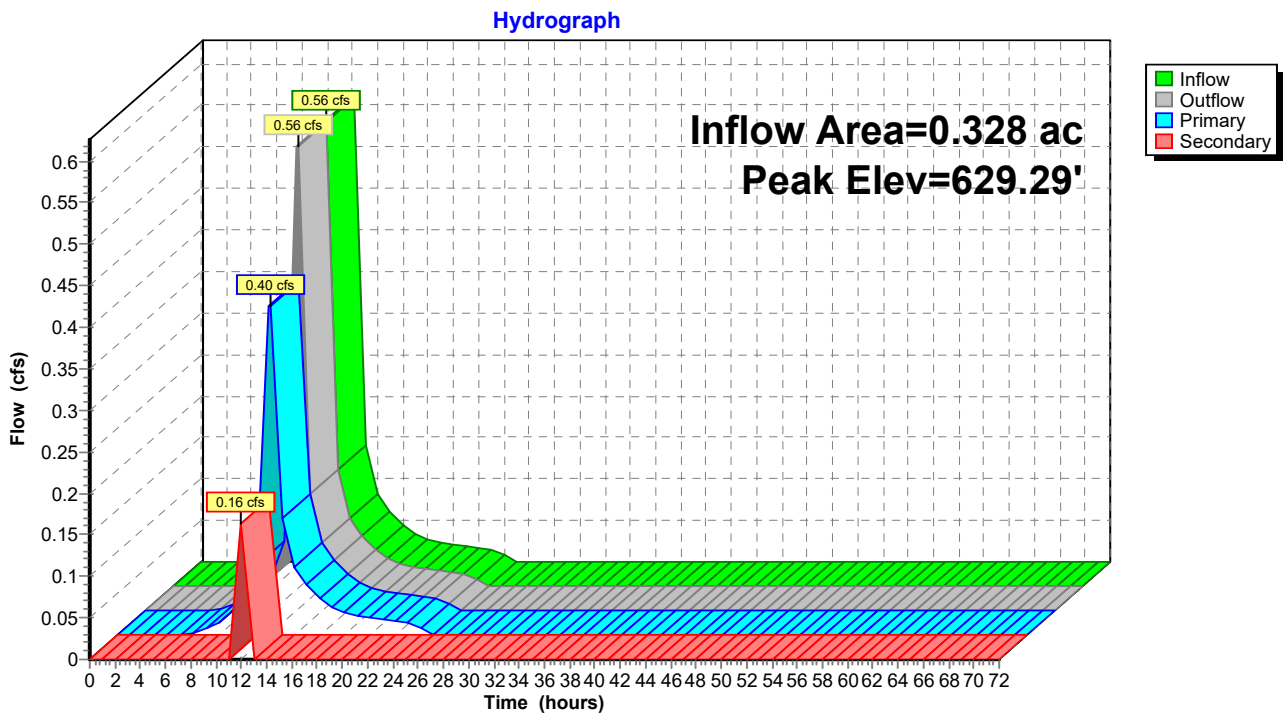
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs / 3
Peak Elev= 629.29' @ 12.05 hrs
Flood Elev= 632.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	628.85'	**5.0" Round Culvert** L= 240.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 628.85' / 622.00' S= 0.0285 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.14 sf
#2	Secondary	629.05'	**12.0" Round Culvert** L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 629.05' / 629.00' S= 0.0050 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.39 cfs @ 12.05 hrs HW=629.28' TW=623.28' (TW follows 6.00' below HW)
└─**1=Culvert** (Inlet Controls 0.39 cfs @ 2.83 fps)

Secondary OutFlow Max=0.16 cfs @ 12.00 hrs HW=629.29' (Free Discharge)
└─**2=Culvert** (Barrel Controls 0.16 cfs @ 1.70 fps)

Pond ICS-3: ICS-3



Stage-Discharge for Pond ICS-3: ICS-3

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
628.85	0.00	0.00	0.00
628.90	0.01	0.01	0.00
628.95	0.03	0.03	0.00
629.00	0.07	0.07	0.00
629.05	0.12	0.12	0.00
629.10	0.19	0.18	0.01
629.15	0.28	0.24	0.03
629.20	0.38	0.31	0.07
629.25	0.48	0.36	0.12
629.30	0.58	0.40	0.18
629.35	0.69	0.44	0.25
629.40	0.81	0.48	0.33
629.45	0.93	0.51	0.41
629.50	1.06	0.55	0.51
629.55	1.19	0.58	0.62
629.60	1.33	0.60	0.73
629.65	1.48	0.63	0.85
629.70	1.63	0.66	0.97
629.75	1.78	**0.68**	1.10
629.80	1.92	0.68	1.24
629.85	2.06	0.68	1.38
629.90	2.20	0.68	1.52
629.95	2.34	0.68	1.66
630.00	2.48	0.68	1.80
630.05	2.62	0.68	1.94
630.10	2.76	0.68	2.08
630.15	2.90	0.68	2.22
630.20	3.03	0.68	2.35
630.25	3.15	0.68	2.47
630.30	3.26	0.68	2.58
630.35	3.35	0.68	2.67
630.40	3.43	0.68	2.75
630.45	3.51	0.68	2.83
630.50	3.59	0.68	2.91
630.55	3.67	0.68	2.99
630.60	3.74	0.68	3.06
630.65	3.81	0.68	3.13
630.70	3.88	0.68	3.20
630.75	3.95	0.68	3.27
630.80	4.02	0.68	3.34
630.85	4.08	0.68	3.40
630.90	4.15	0.68	3.47
630.95	4.21	0.68	3.53
631.00	4.28	0.68	3.60
631.05	4.34	0.68	3.66
631.10	4.40	0.68	3.72
631.15	4.46	0.68	3.78
631.20	4.52	0.68	3.83
631.25	4.57	0.68	3.89
631.30	4.63	0.68	3.95
631.35	4.69	0.68	4.01
631.40	4.74	0.68	4.06
631.45	4.80	0.68	4.12
631.50	4.85	0.68	4.17
631.55	4.90	0.68	4.22
631.60	4.95	0.68	4.27
631.65	5.01	0.68	4.33
631.70	5.06	0.68	4.38
631.75	5.11	0.68	4.43
631.80	5.16	0.68	4.48
631.85	5.21	0.68	4.53
631.90	5.26	0.68	4.58
631.95	5.31	0.68	4.63
632.00	5.35	0.68	4.67
632.05	5.40	0.68	4.72
632.10	5.45	0.68	4.77
632.15	5.49	0.68	4.81
632.20	5.54	0.68	4.86
632.25	5.59	0.68	4.91
632.30	5.63	0.68	4.95
632.35	5.68	0.68	5.00
632.40	5.72	0.68	5.04
632.45	5.76	0.68	5.08
632.50	**5.81**	0.68	**5.13**

Summary for Pond ICS-4: ICS-4

Inflow Area = 1.068 ac, 93.43% Impervious, Inflow Depth = 4.58" for 10-YR event
Inflow = 2.11 cfs @ 12.02 hrs, Volume= 0.408 af
Outflow = 2.11 cfs @ 12.02 hrs, Volume= 0.408 af, Atten= 0%, Lag= 0.0 min
Primary = 1.10 cfs @ 12.04 hrs, Volume= 0.324 af
Secondary = 1.01 cfs @ 12.00 hrs, Volume= 0.084 af

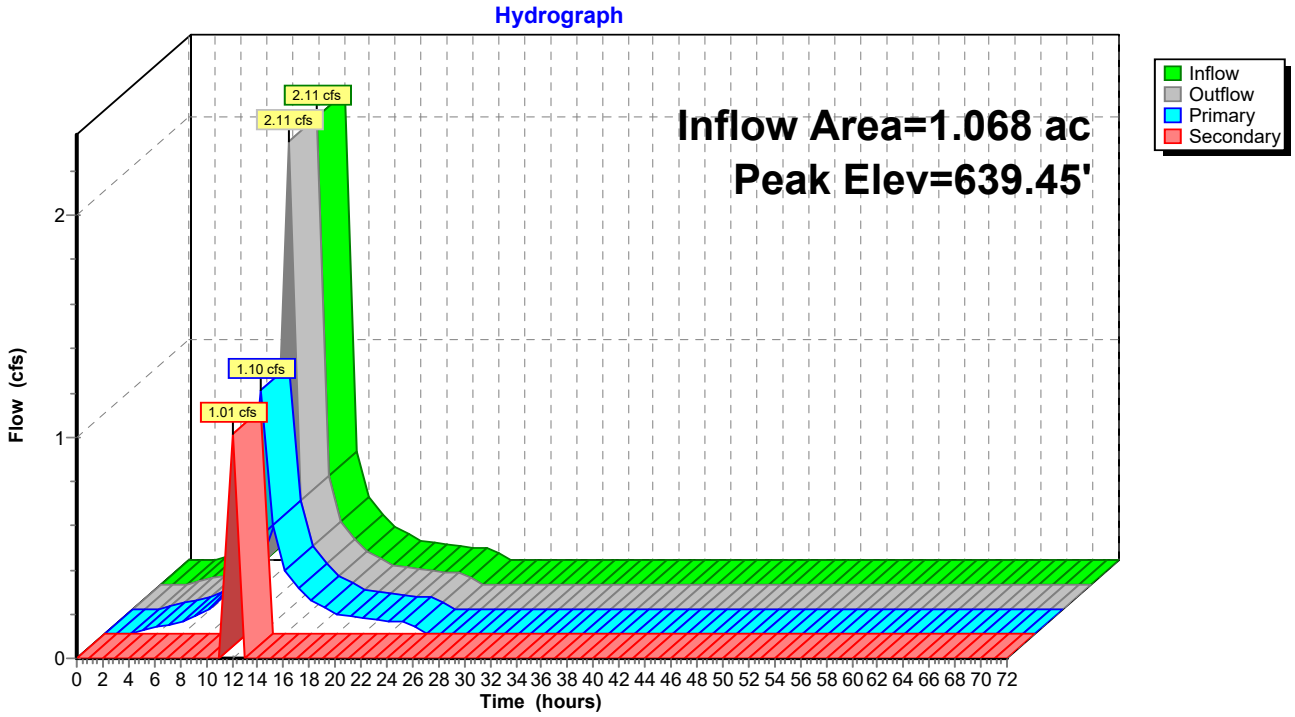
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs / 3
Peak Elev= 639.45' @ 12.01 hrs
Flood Elev= 640.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	636.50'	**6.0" Round Culvert** L= 235.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 636.50' / 633.00' S= 0.0149 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf
#2	Device 3	639.28'	**5.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Secondary	637.00'	**15.0" Round Culvert** L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 637.00' / 636.75' S= 0.0250 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=1.09 cfs @ 12.04 hrs HW=639.35' (Free Discharge)
└─**1=Culvert** (Barrel Controls 1.09 cfs @ 5.56 fps)

Secondary OutFlow Max=1.01 cfs @ 12.00 hrs HW=639.45' (Free Discharge)
└─**3=Culvert** (Passes 1.01 cfs of 6.31 cfs potential flow)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 1.01 cfs @ 1.17 fps)

Pond ICS-4: ICS-4



Stage-Discharge for Pond ICS-4: ICS-4

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
636.50	0.00	0.00	0.00
636.55	0.01	0.01	0.00
636.60	0.04	0.04	0.00
636.65	0.08	0.08	0.00
636.70	0.14	0.14	0.00
636.75	0.21	0.21	0.00
636.80	0.29	0.29	0.00
636.85	0.37	0.37	0.00
636.90	0.45	0.45	0.00
636.95	0.53	0.53	0.00
637.00	0.59	0.59	0.00
637.05	0.65	0.65	0.00
637.10	0.70	0.70	0.00
637.15	0.75	0.75	0.00
637.20	0.79	0.79	0.00
637.25	0.84	0.84	0.00
637.30	0.88	0.88	0.00
637.35	0.89	0.89	0.00
637.40	0.89	0.89	0.00
637.45	0.90	0.90	0.00
637.50	0.90	0.90	0.00
637.55	0.91	0.91	0.00
637.60	0.91	0.91	0.00
637.65	0.92	0.92	0.00
637.70	0.92	0.92	0.00
637.75	0.93	0.93	0.00
637.80	0.94	0.94	0.00
637.85	0.94	0.94	0.00
637.90	0.95	0.95	0.00
637.95	0.95	0.95	0.00
638.00	0.96	0.96	0.00
638.05	0.96	0.96	0.00
638.10	0.97	0.97	0.00
638.15	0.97	0.97	0.00
638.20	0.98	0.98	0.00
638.25	0.98	0.98	0.00
638.30	0.99	0.99	0.00
638.35	0.99	0.99	0.00
638.40	1.00	1.00	0.00
638.45	1.00	1.00	0.00
638.50	1.01	1.01	0.00
638.55	1.01	1.01	0.00
638.60	1.02	1.02	0.00
638.65	1.02	1.02	0.00
638.70	1.03	1.03	0.00
638.75	1.03	1.03	0.00
638.80	1.04	1.04	0.00
638.85	1.04	1.04	0.00
638.90	1.05	1.05	0.00
638.95	1.05	1.05	0.00
639.00	1.06	1.06	0.00
639.05	1.06	1.06	0.00
639.10	1.07	1.07	0.00
639.15	1.07	1.07	0.00
639.20	1.08	1.08	0.00
639.25	1.08	1.08	0.00
639.30	1.13	1.09	0.04
639.35	1.35	1.09	0.26
639.40	1.68	1.10	0.58
639.45	2.08	1.10	0.98
639.50	2.56	1.11	1.45
639.55	3.10	1.11	1.99
639.60	3.71	1.11	2.60
639.65	4.38	1.12	3.27
639.70	5.12	1.12	4.00
639.75	5.92	1.13	4.79
639.80	6.79	1.13	5.65
639.85	7.71	1.14	6.58
639.90	8.18	1.14	7.04
639.95	8.26	1.15	7.11
640.00	**8.34**	**1.15**	**7.19**

Summary for Pond ICS-5: ICS-5

Inflow Area =	0.739 ac, 62.40% Impervious, Inflow Depth = 3.32" for 10-YR event				
Inflow =	1.14 cfs @	12.04 hrs,	Volume=	0.204 af	
Outflow =	1.14 cfs @	12.04 hrs,	Volume=	0.204 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.25 cfs @	12.10 hrs,	Volume=	0.118 af	
Secondary =	0.89 cfs @	12.03 hrs,	Volume=	0.086 af	

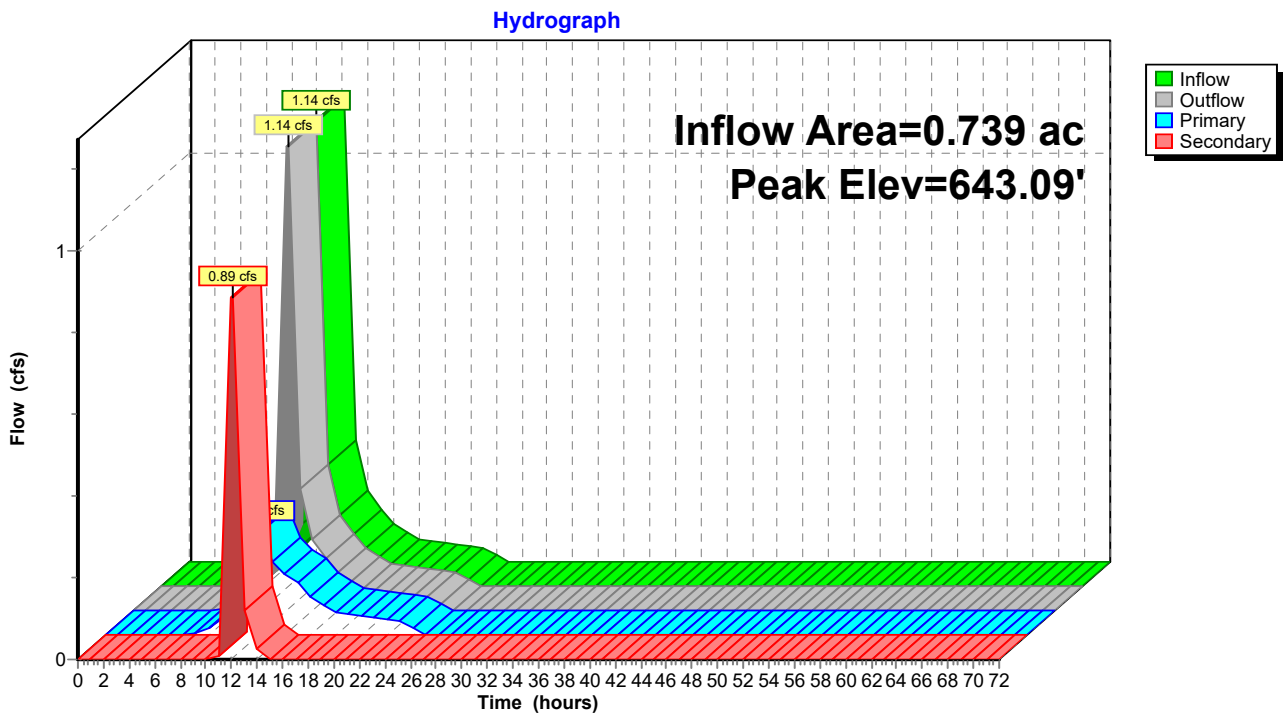
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs / 3
Peak Elev= 643.09' @ 12.08 hrs
Flood Elev= 645.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	642.25'	**3.0" Round Culvert** L= 80.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 642.25' / 636.00' S= 0.0781 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.05 sf
#2	Secondary	642.56'	**12.0" Round Culvert** L= 6.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 642.56' / 642.50' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.24 cfs @ 12.10 hrs HW=643.06' TW=637.06' (TW follows 6.00' below HW)
└─**1=Culvert** (Inlet Controls 0.24 cfs @ 4.96 fps)

Secondary OutFlow Max=0.85 cfs @ 12.03 hrs HW=643.08' TW=637.08' (TW follows 6.00' below HW)
└─**2=Culvert** (Barrel Controls 0.85 cfs @ 3.02 fps)

Pond ICS-5: ICS-5



Stage-Discharge for Pond ICS-5: ICS-5

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
642.25	0.00	0.00	0.00
642.30	0.01	0.01	0.00
642.35	0.02	0.02	0.00
642.40	0.05	0.05	0.00
642.45	0.08	0.08	0.00
642.50	0.10	0.10	0.00
642.55	0.12	0.12	0.00
642.60	0.15	0.14	0.01
642.65	0.19	0.15	0.03
642.70	0.25	0.17	0.08
642.75	0.32	0.18	0.14
642.80	0.41	0.19	0.22
642.85	0.51	0.20	0.30
642.90	0.62	0.21	0.40
642.95	0.74	0.22	0.52
643.00	0.87	0.23	0.64
643.05	1.02	0.24	0.77
643.10	1.17	0.25	0.91
643.15	1.33	0.26	1.07
643.20	1.49	0.27	1.22
643.25	1.66	0.28	1.39
643.30	1.84	0.28	1.56
643.35	2.02	**0.29**	1.73
643.40	2.21	**0.30**	1.91
643.45	2.39	0.30	2.09
643.50	2.57	0.30	2.27
643.55	2.75	0.30	2.45
643.60	2.93	0.30	2.63
643.65	3.10	0.30	2.80
643.70	3.27	0.30	2.97
643.75	3.42	0.30	3.13
643.80	3.57	0.30	3.27
643.85	3.69	0.30	3.39
643.90	3.78	0.30	3.48
643.95	3.99	0.30	3.69
644.00	4.19	0.30	3.89
644.05	4.38	0.30	4.08
644.10	4.56	0.30	4.26
644.15	4.73	0.30	4.44
644.20	4.90	0.30	4.60
644.25	5.06	0.30	4.77
644.30	5.22	0.30	4.92
644.35	5.37	0.30	5.07
644.40	5.52	0.30	5.22
644.45	5.66	0.30	5.36
644.50	5.80	0.30	5.50
644.55	5.94	0.30	5.64
644.60	6.07	0.30	5.77
644.65	6.20	0.30	5.90
644.70	6.32	0.30	6.03
644.75	6.44	0.30	6.15
644.80	6.53	0.30	6.24
644.85	6.62	0.30	6.32
644.90	6.71	0.30	6.41
644.95	6.79	0.30	6.50
645.00	6.88	0.30	6.58
645.05	6.96	0.30	6.67
645.10	7.05	0.30	6.75
645.15	7.13	0.30	6.83
645.20	7.21	0.30	6.92
645.25	7.29	0.30	7.00
645.30	7.37	0.30	7.07
645.35	7.45	0.30	7.15
645.40	7.53	0.30	7.23
645.45	7.60	0.30	7.31
645.50	**7.68**	0.30	**7.38**

Summary for Pond RG-7B: RG-7B

Inflow Area = 0.055 ac, 72.50% Impervious, Inflow Depth = 3.72" for 10-YR event
Inflow = 0.09 cfs @ 12.03 hrs, Volume= 0.017 af
Outflow = 0.02 cfs @ 13.97 hrs, Volume= 0.015 af, Atten= 81%, Lag= 116.3 min
Primary = 0.02 cfs @ 13.97 hrs, Volume= 0.015 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs / 3
Peak Elev= 654.90' @ 14.00 hrs Surf.Area= 485 sf Storage= 324 cf

Plug-Flow detention time= 565.8 min calculated for 0.015 af (87% of inflow)
Center-of-Mass det. time= 522.3 min (1,318.3 - 796.0)

Volume	Invert	Avail.Storage	Storage Description
#1	653.00'	249 cf	**Custom Stage Data (Conic)** Listed below (Recalc) 638 cf Overall - 389 cf Embedded = 249 cf
#2	653.00'	52 cf	**Crushed Stone (Prismatic)** Listed below (Recalc) Inside #1 130 cf Overall x 40.0% Voids
#3	653.50'	58 cf	**Bio Mix Media (Prismatic)** Listed below (Recalc) Inside #1 194 cf Overall x 30.0% Voids
#4	654.25'	13 cf	**Mulch (Prismatic)** Listed below (Recalc) Inside #1 65 cf Overall x 20.0% Voids
		372 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
653.00	259	0	0	259
654.00	259	259	259	316
655.00	513	379	638	579

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
653.00	259	0	0
653.50	259	130	130

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
653.50	259	0	0
654.25	259	194	194

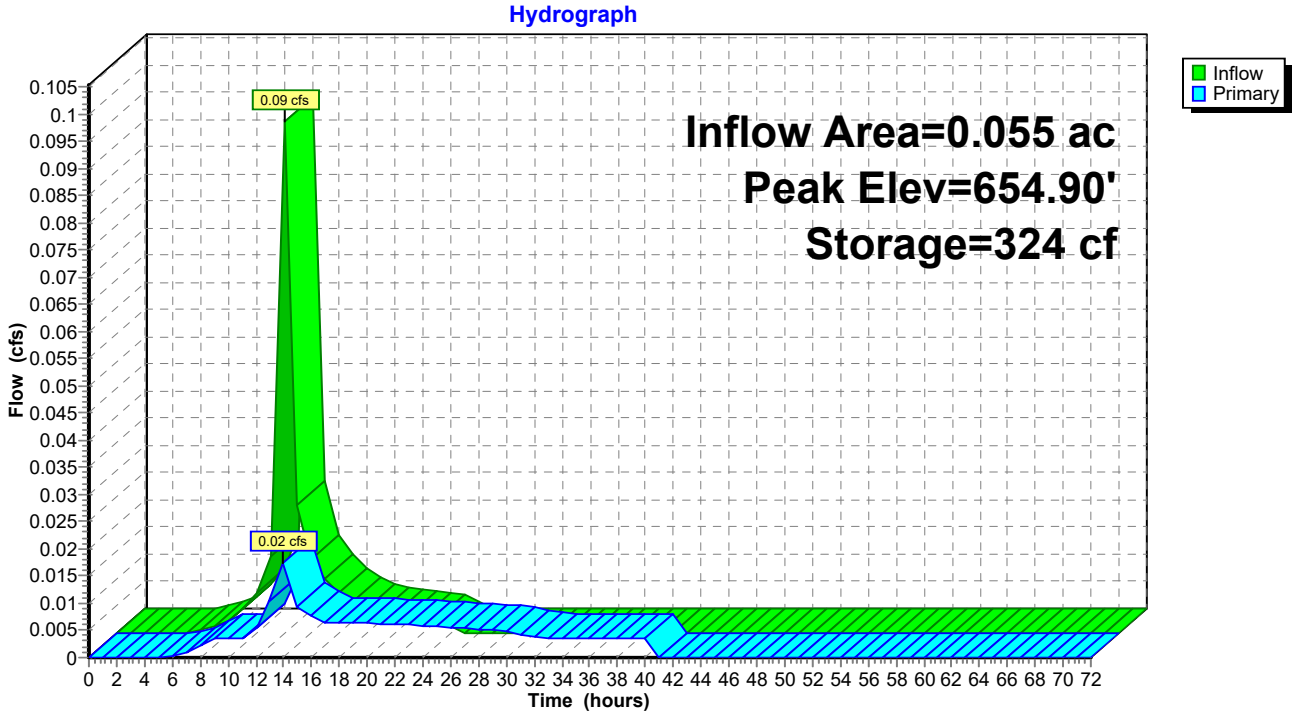
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
654.25	259	0	0
654.50	259	65	65

Device	Routing	Invert	Outlet Devices
#1	Primary	654.90'	**10.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

#2 Primary 653.00' **0.580 in/hr Exfiltration over Surface area**

Primary OutFlow Max=0.01 cfs @ 13.97 hrs HW=654.90' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 0.00 cfs @ 0.14 fps)
└─**2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Pond RG-7B: RG-7B



Stage-Discharge for Pond RG-7B: RG-7B

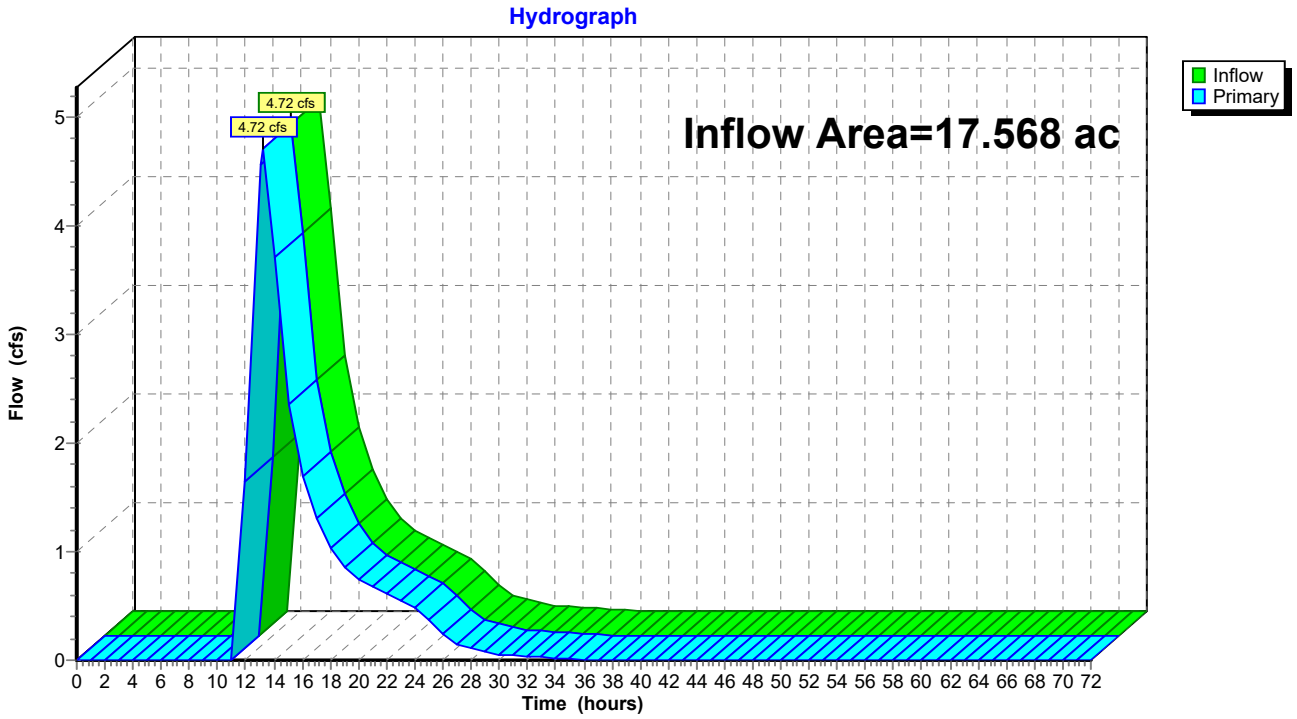
Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
653.00	0.00	653.52	0.00	654.04	0.00	654.56	0.01
653.01	0.00	653.53	0.00	654.05	0.00	654.57	0.01
653.02	0.00	653.54	0.00	654.06	0.00	654.58	0.01
653.03	0.00	653.55	0.00	654.07	0.00	654.59	0.01
653.04	0.00	653.56	0.00	654.08	0.00	654.60	0.01
653.05	0.00	653.57	0.00	654.09	0.00	654.61	0.01
653.06	0.00	653.58	0.00	654.10	0.00	654.62	0.01
653.07	0.00	653.59	0.00	654.11	0.00	654.63	0.01
653.08	0.00	653.60	0.00	654.12	0.00	654.64	0.01
653.09	0.00	653.61	0.00	654.13	0.00	654.65	0.01
653.10	0.00	653.62	0.00	654.14	0.00	654.66	0.01
653.11	0.00	653.63	0.00	654.15	0.00	654.67	0.01
653.12	0.00	653.64	0.00	654.16	0.00	654.68	0.01
653.13	0.00	653.65	0.00	654.17	0.00	654.69	0.01
653.14	0.00	653.66	0.00	654.18	0.00	654.70	0.01
653.15	0.00	653.67	0.00	654.19	0.00	654.71	0.01
653.16	0.00	653.68	0.00	654.20	0.00	654.72	0.01
653.17	0.00	653.69	0.00	654.21	0.00	654.73	0.01
653.18	0.00	653.70	0.00	654.22	0.00	654.74	0.01
653.19	0.00	653.71	0.00	654.23	0.00	654.75	0.01
653.20	0.00	653.72	0.00	654.24	0.00	654.76	0.01
653.21	0.00	653.73	0.00	654.25	0.00	654.77	0.01
653.22	0.00	653.74	0.00	654.26	0.00	654.78	0.01
653.23	0.00	653.75	0.00	654.27	0.00	654.79	0.01
653.24	0.00	653.76	0.00	654.28	0.00	654.80	0.01
653.25	0.00	653.77	0.00	654.29	0.00	654.81	0.01
653.26	0.00	653.78	0.00	654.30	0.00	654.82	0.01
653.27	0.00	653.79	0.00	654.31	0.00	654.83	0.01
653.28	0.00	653.80	0.00	654.32	0.00	654.84	0.01
653.29	0.00	653.81	0.00	654.33	0.00	654.85	0.01
653.30	0.00	653.82	0.00	654.34	0.00	654.86	0.01
653.31	0.00	653.83	0.00	654.35	0.00	654.87	0.01
653.32	0.00	653.84	0.00	654.36	0.00	654.88	0.01
653.33	0.00	653.85	0.00	654.37	0.00	654.89	0.01
653.34	0.00	653.86	0.00	654.38	0.00	654.90	0.01
653.35	0.00	653.87	0.00	654.39	0.00	654.91	0.03
653.36	0.00	653.88	0.00	654.40	0.00	654.92	0.08
653.37	0.00	653.89	0.00	654.41	0.00	654.93	0.14
653.38	0.00	653.90	0.00	654.42	0.00	654.94	0.21
653.39	0.00	653.91	0.00	654.43	0.00	654.95	0.29
653.40	0.00	653.92	0.00	654.44	0.00	654.96	0.38
653.41	0.00	653.93	0.00	654.45	0.00	654.97	0.48
653.42	0.00	653.94	0.00	654.46	0.00	654.98	0.58
653.43	0.00	653.95	0.00	654.47	0.00	654.99	0.69
653.44	0.00	653.96	0.00	654.48	0.00	655.00	**0.81**
653.45	0.00	653.97	0.00	654.49	0.01		
653.46	0.00	653.98	0.00	654.50	0.01		
653.47	0.00	653.99	0.00	654.51	0.01		
653.48	0.00	654.00	0.00	654.52	0.01		
653.49	0.00	654.01	0.00	654.53	0.01		
653.50	0.00	654.02	0.00	654.54	0.01		
653.51	0.00	654.03	0.00	654.55	0.01		

Summary for Link PDP-3: Design Point 3

Inflow Area = 17.568 ac, 18.21% Impervious, Inflow Depth = 1.21" for 10-YR event
Inflow = 4.72 cfs @ 13.27 hrs, Volume= 1.770 af
Primary = 4.72 cfs @ 13.27 hrs, Volume= 1.770 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs

Link PDP-3: Design Point 3



Summary for Subcatchment 4A: PDA-4A

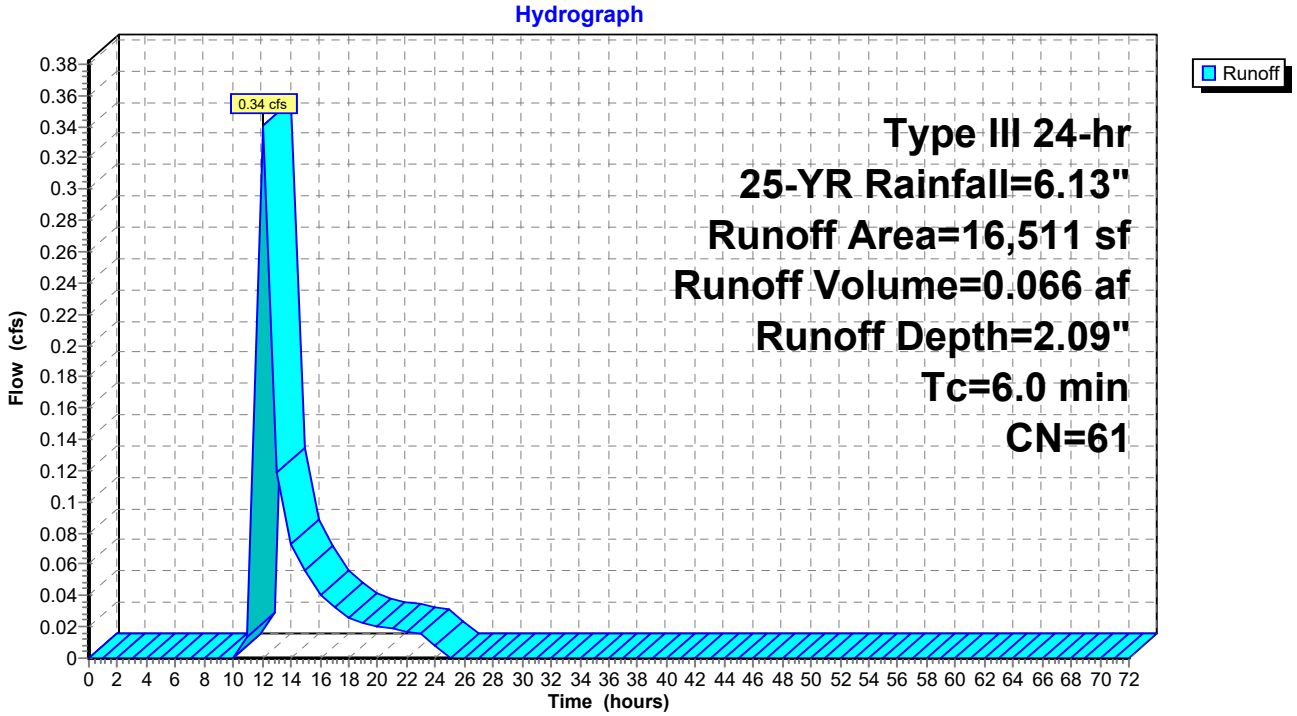
Runoff = 0.34 cfs @ 12.10 hrs, Volume= 0.066 af, Depth= 2.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 25-YR Rainfall=6.13"

	Area (sf)	CN	Description
*	7,284	55	Woods, Good, HSG B
	3,480	70	Woods, Good, HSG C
	1,370	74	>75% Grass cover, Good, HSG C
	4,377	61	>75% Grass cover, Good, HSG B
	16,511	61	Weighted Average
	16,511		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 min.**

Subcatchment 4A: PDA-4A



Summary for Subcatchment 4B: PDA-4B

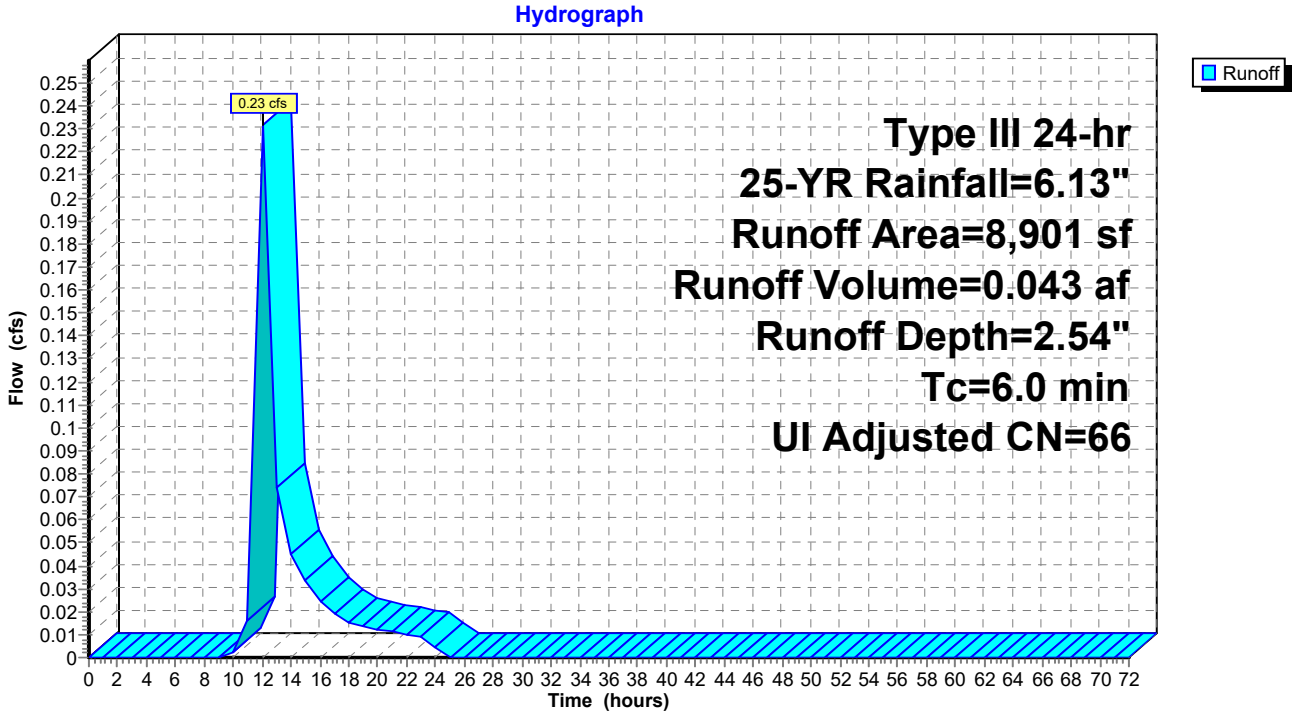
Runoff = 0.23 cfs @ 12.08 hrs, Volume= 0.043 af, Depth= 2.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 25-YR Rainfall=6.13"

Area (sf)	CN	Adj	Description
5,978	61		>75% Grass cover, Good, HSG B
2,026	74		>75% Grass cover, Good, HSG C
897	98		Unconnected pavement, HSG B
8,901	68	66	Weighted Average, UI Adjusted
8,004			89.92% Pervious Area
897			10.08% Impervious Area
897			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 min**

Subcatchment 4B: PDA-4B



Summary for Subcatchment 4C: PDA-4C

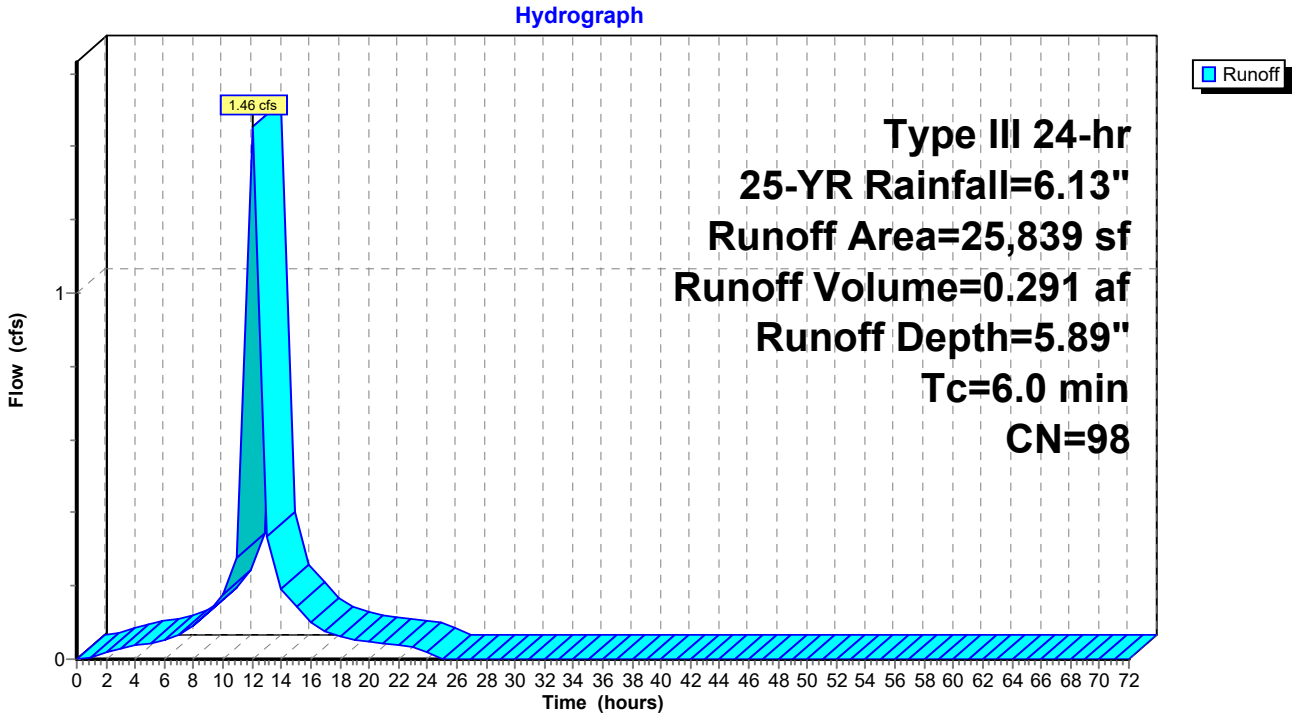
Runoff = 1.46 cfs @ 12.01 hrs, Volume= 0.291 af, Depth= 5.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 25-YR Rainfall=6.13"

Area (sf)	CN	Description
25,839	98	Roofs, HSG B
25,839		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Subcatchment 4C: PDA-4C



Summary for Subcatchment 4D: PDA-4D

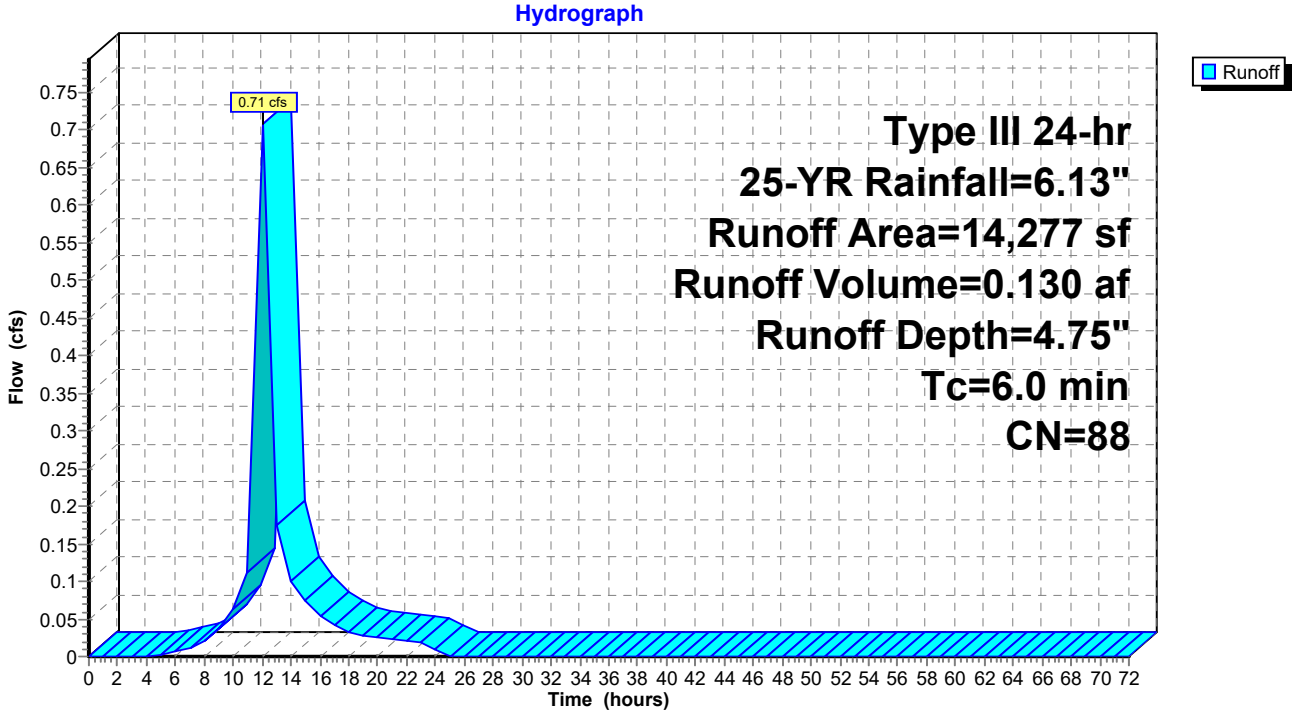
Runoff = 0.71 cfs @ 12.03 hrs, Volume= 0.130 af, Depth= 4.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 25-YR Rainfall=6.13"

Area (sf)	CN	Description
10,311	98	Paved parking, HSG B
3,966	61	>75% Grass cover, Good, HSG B
14,277	88	Weighted Average
3,966		27.78% Pervious Area
10,311		72.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 min**

Subcatchment 4D: PDA-4D



Summary for Subcatchment 4E: PDA-4E

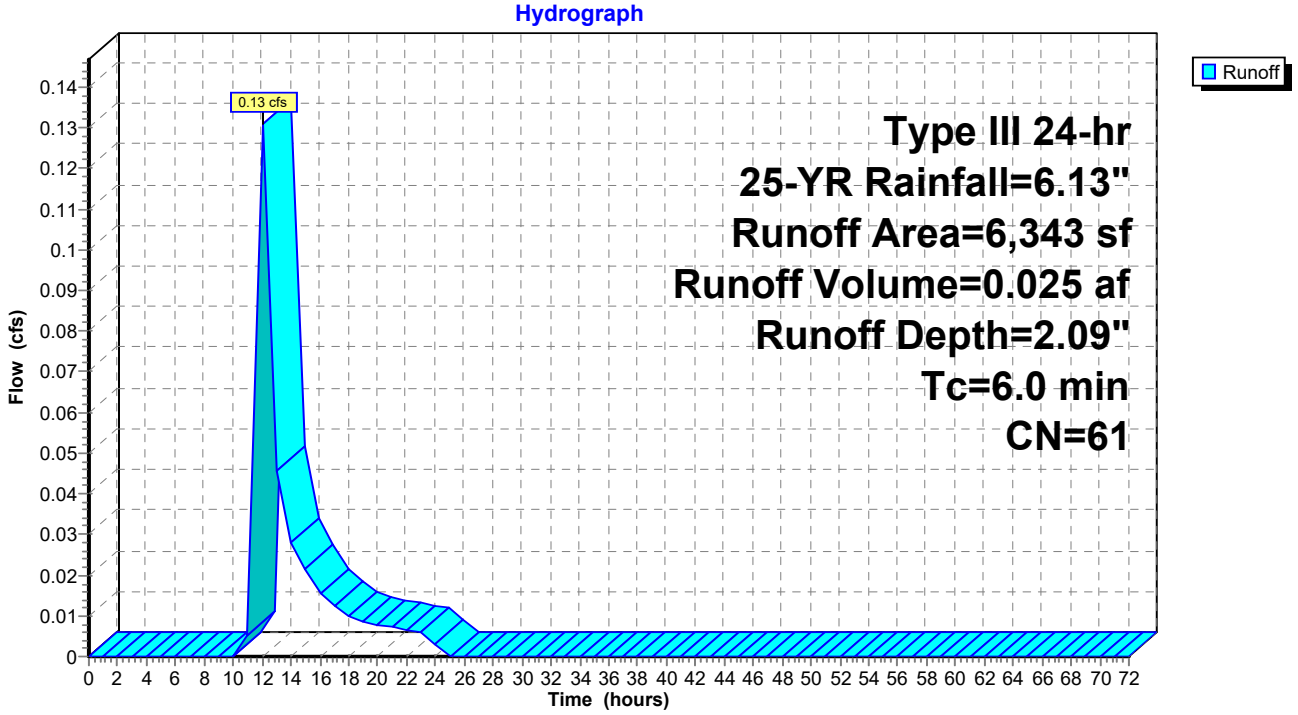
Runoff = 0.13 cfs @ 12.10 hrs, Volume= 0.025 af, Depth= 2.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 25-YR Rainfall=6.13"

Area (sf)	CN	Description
6,331	61	>75% Grass cover, Good, HSG B
12	98	Paved parking, HSG B
6,343	61	Weighted Average
6,331		99.81% Pervious Area
12		0.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 min**

Subcatchment 4E: PDA-4E



Summary for Subcatchment 4F: PDA-4F

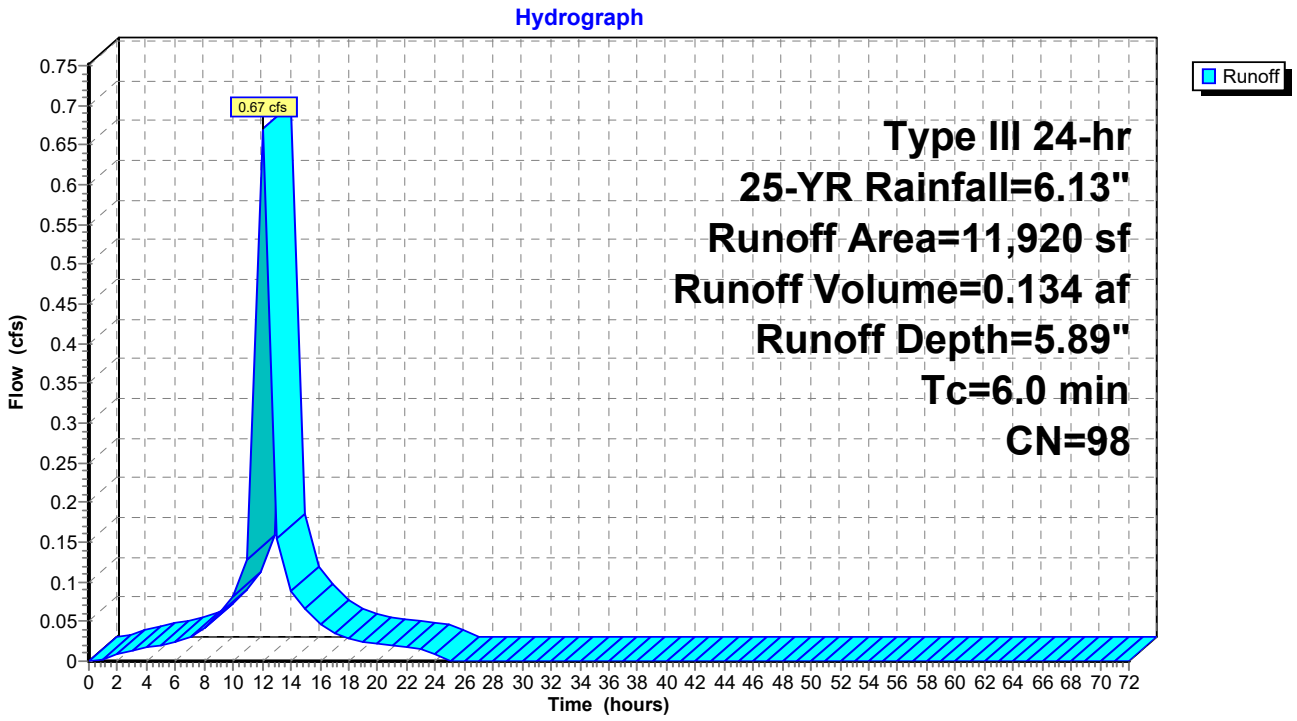
Runoff = 0.67 cfs @ 12.01 hrs, Volume= 0.134 af, Depth= 5.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 25-YR Rainfall=6.13"

Area (sf)	CN	Description
11,920	98	Roofs, HSG B
11,920		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Subcatchment 4F: PDA-4F



Summary for Subcatchment 4G: PDA-4G

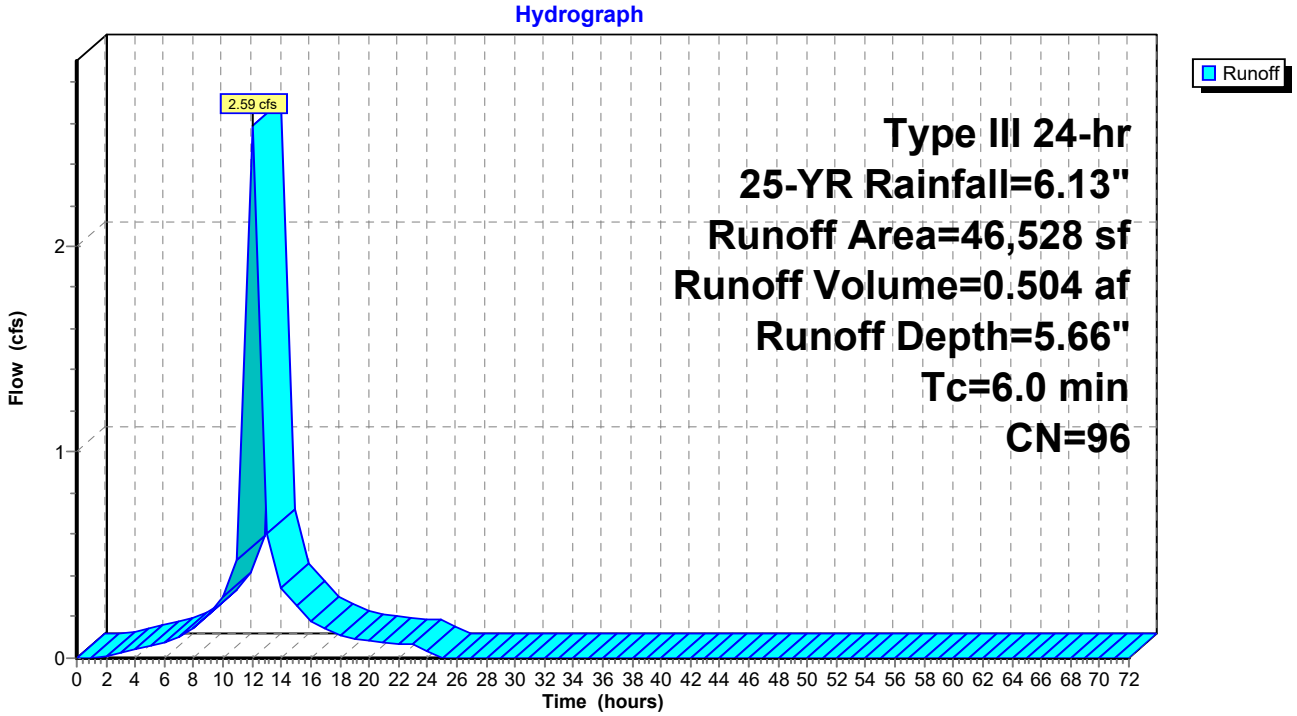
Runoff = 2.59 cfs @ 12.01 hrs, Volume= 0.504 af, Depth= 5.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 25-YR Rainfall=6.13"

Area (sf)	CN	Description
10,383	98	Paved parking, HSG B
3,055	61	>75% Grass cover, Good, HSG B
33,090	98	Roofs, HSG B
46,528	96	Weighted Average
3,055		6.57% Pervious Area
43,473		93.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 min**

Subcatchment 4G: PDA-4G



Summary for Subcatchment 5A: PDA-5A

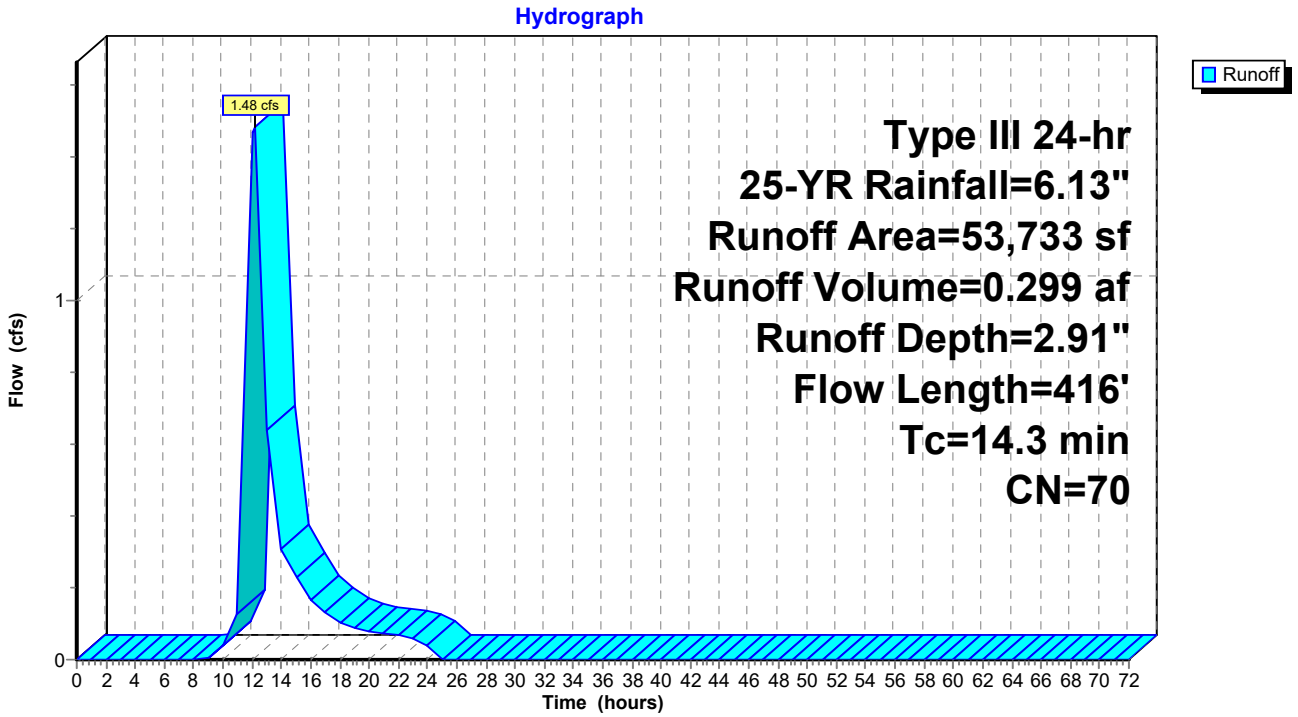
Runoff = 1.48 cfs @ 12.12 hrs, Volume= 0.299 af, Depth= 2.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 25-YR Rainfall=6.13"

Area (sf)	CN	Description
53,733	70	Woods, Good, HSG C
53,733		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.9	50	0.0334	0.08		**Sheet Flow, 5A-5B** Woods: Light underbrush n= 0.400 P2= 3.32"
3.3	239	0.0566	1.19		**Shallow Concentrated Flow, 5B-5C** Woodland Kv= 5.0 fps
0.3	62	0.0450	3.42		**Shallow Concentrated Flow, swale/ditch** Unpaved Kv= 16.1 fps
0.1	23	0.0100	4.91	3.86	**Pipe Channel, 12" CPP** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Corrugated PP, smooth interior
0.7	42	0.0430	1.04		**Shallow Concentrated Flow, 5E-EDP-5** Woodland Kv= 5.0 fps
14.3	416	Total			

Subcatchment 5A: PDA-5A



Summary for Subcatchment 5B: PDA-5B

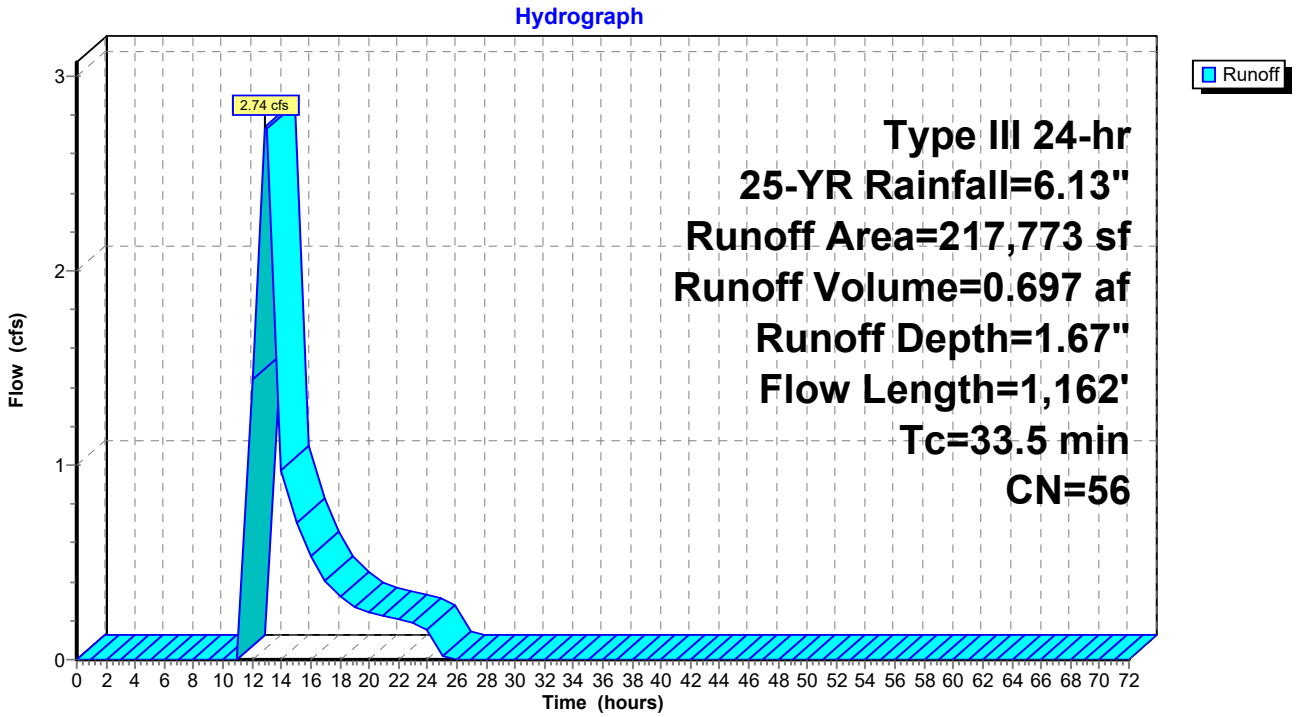
Runoff = 2.74 cfs @ 12.92 hrs, Volume= 0.697 af, Depth= 1.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 25-YR Rainfall=6.13"

Area (sf)	CN	Description
200,443	55	Woods, Good, HSG B
13,852	77	Woods, Good, HSG D
3,478	61	>75% Grass cover, Good, HSG B
217,773	56	Weighted Average
217,773		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	50	0.0400	0.09		**Sheet Flow, 5A-5B** Woods: Light underbrush n= 0.400 P2= 3.32"
9.9	553	0.0350	0.94		**Shallow Concentrated Flow, 5B-5C** Woodland Kv= 5.0 fps
13.3	455	0.0130	0.57		**Shallow Concentrated Flow, 5C-5D** Woodland Kv= 5.0 fps
1.1	104	0.0913	1.51		**Shallow Concentrated Flow, 5D-EDP-5** Woodland Kv= 5.0 fps
33.5	1,162	Total			

Subcatchment 5B: PDA-5B



Summary for Subcatchment 5C: PDA-5C

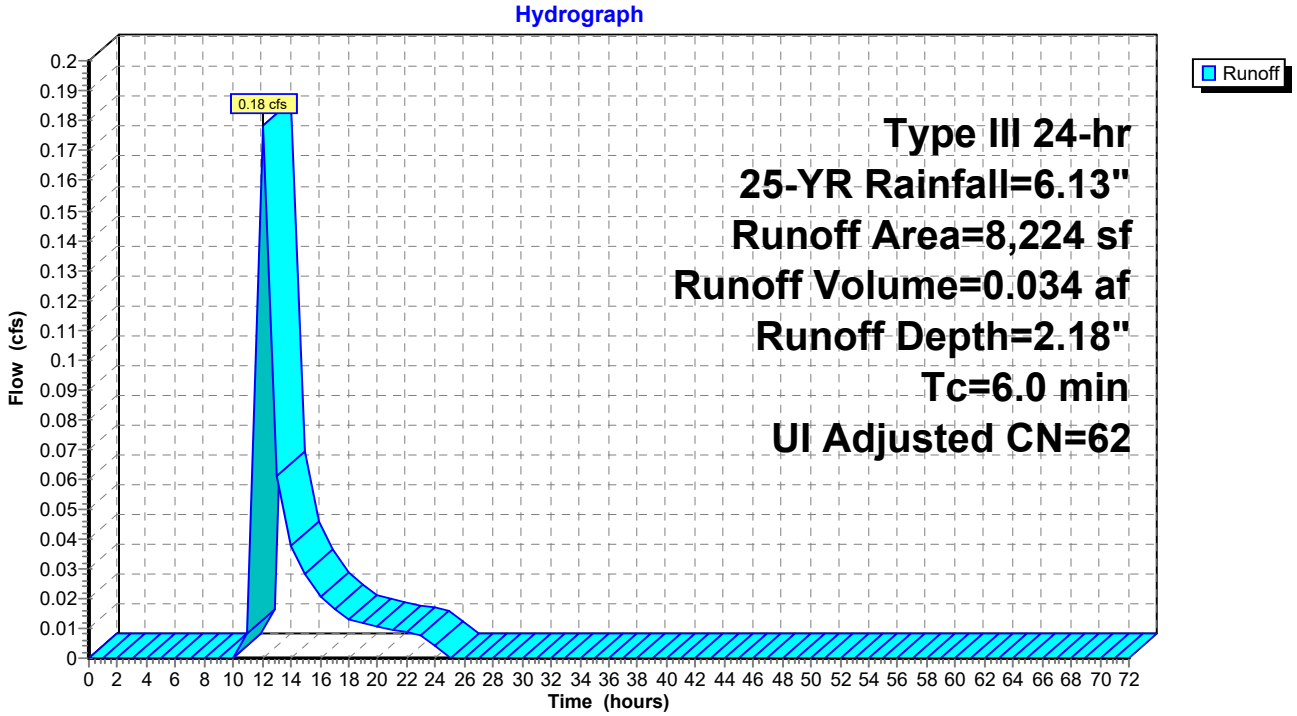
Runoff = 0.18 cfs @ 12.09 hrs, Volume= 0.034 af, Depth= 2.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 25-YR Rainfall=6.13"

Area (sf)	CN	Adj	Description
7,872	61		>75% Grass cover, Good, HSG B
352	98		Unconnected pavement, HSG B
8,224	63	62	Weighted Average, UI Adjusted
7,872			95.72% Pervious Area
352			4.28% Impervious Area
352			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 min**

Subcatchment 5C: PDA-5C



Summary for Subcatchment 5D: PDA-5D

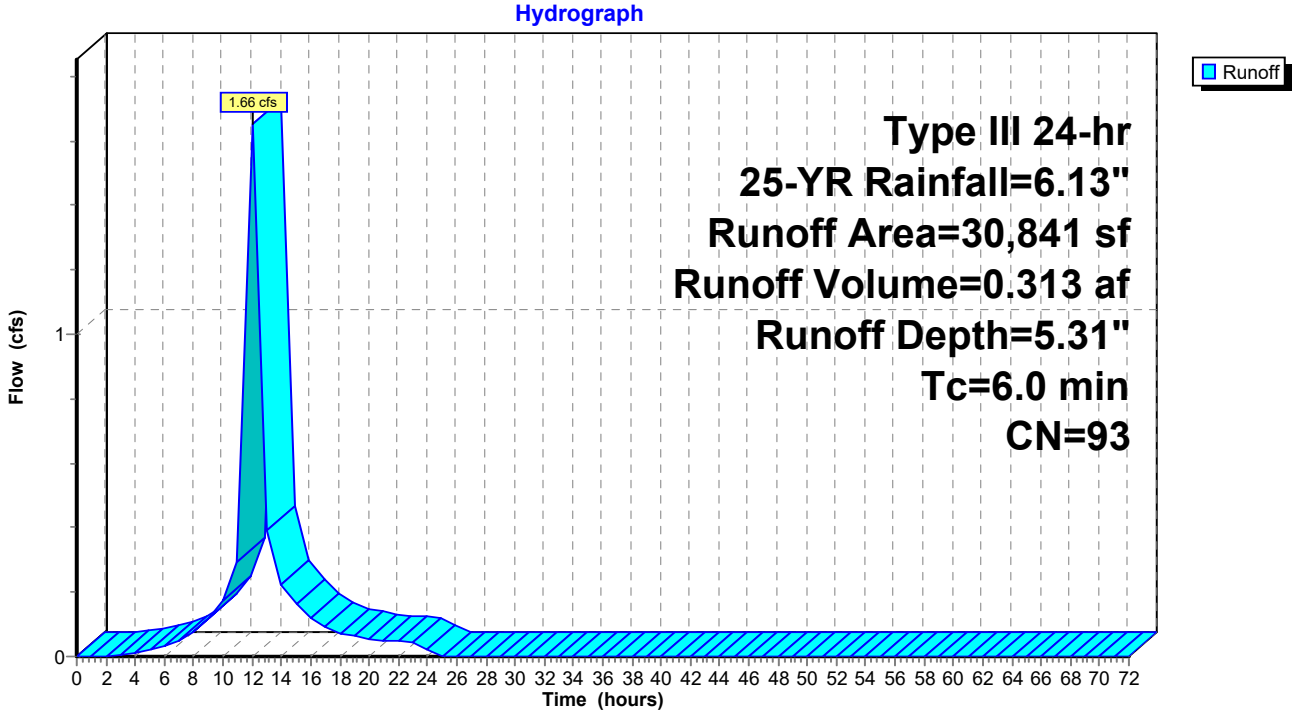
Runoff = 1.66 cfs @ 12.02 hrs, Volume= 0.313 af, Depth= 5.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 25-YR Rainfall=6.13"

Area (sf)	CN	Description
4,408	61	>75% Grass cover, Good, HSG B
26,433	98	Roofs, HSG B
30,841	93	Weighted Average
4,408		14.29% Pervious Area
26,433		85.71% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 min**

Subcatchment 5D: PDA-5D



Summary for Subcatchment 5E: PDA-5E

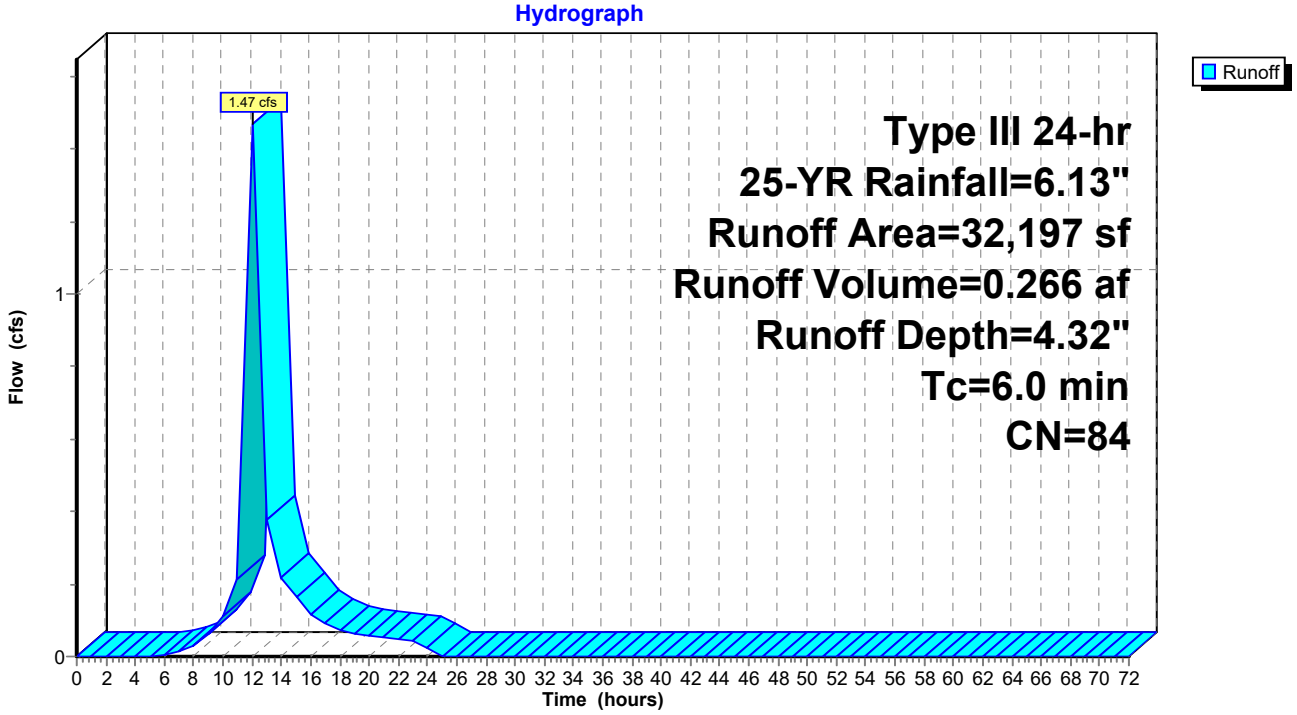
Runoff = 1.47 cfs @ 12.03 hrs, Volume= 0.266 af, Depth= 4.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 25-YR Rainfall=6.13"

Area (sf)	CN	Description
20,092	98	Paved parking, HSG B
12,105	61	>75% Grass cover, Good, HSG B
32,197	84	Weighted Average
12,105		37.60% Pervious Area
20,092		62.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 min**

Subcatchment 5E: PDA-5E



Summary for Subcatchment 6: PDA-6

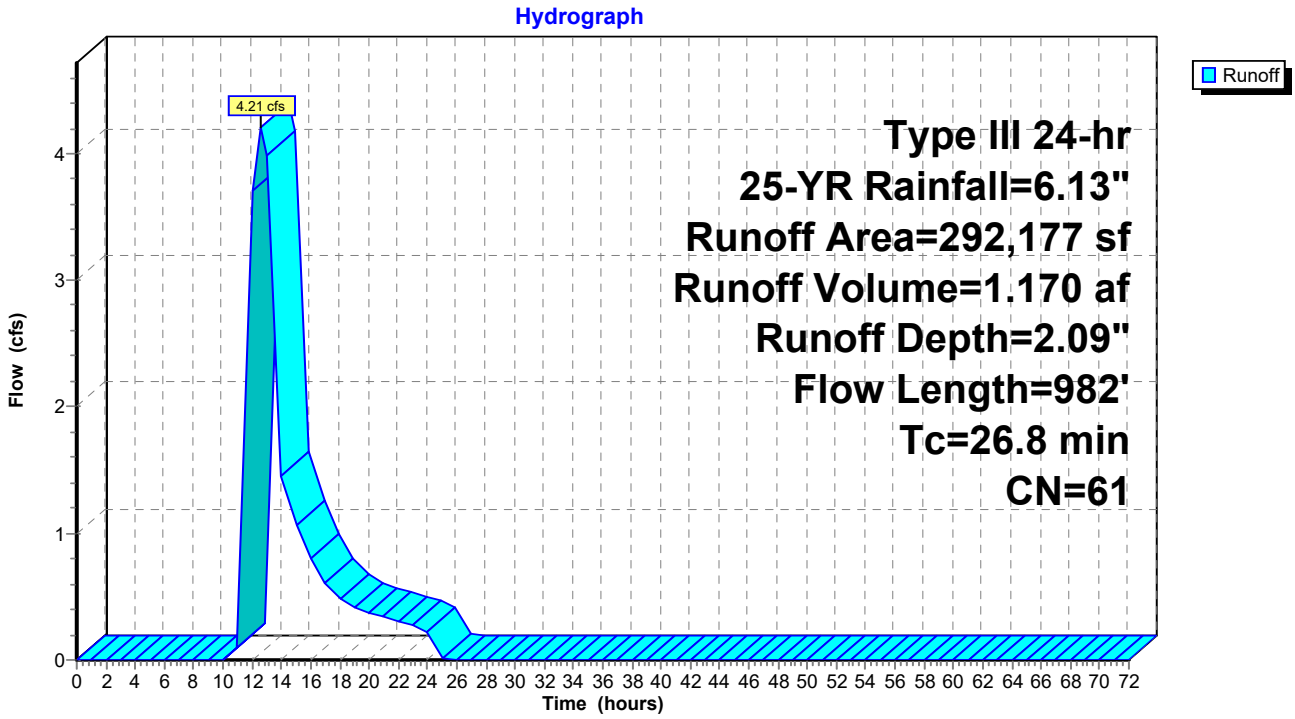
Runoff = 4.21 cfs @ 12.60 hrs, Volume= 1.170 af, Depth= 2.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 25-YR Rainfall=6.13"

Area (sf)	CN	Description
113,079	70	Woods, Good, HSG C
179,098	55	Woods, Good, HSG B
292,177	61	Weighted Average
292,177		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.1	50	0.0250	0.08		**Sheet Flow, 6A-6B** Woods: Light underbrush n= 0.400 P2= 3.32"
4.7	306	0.0474	1.09		**Shallow Concentrated Flow, 6B-6C** Woodland Kv= 5.0 fps
3.5	130	0.0154	0.62		**Shallow Concentrated Flow, 6C-6D** Woodland Kv= 5.0 fps
7.5	496	0.0484	1.10		**Shallow Concentrated Flow, 6D-EDP-6** Woodland Kv= 5.0 fps
26.8	982	Total			

Subcatchment 6: PDA-6



Summary for Subcatchment 7A: PDA-7A

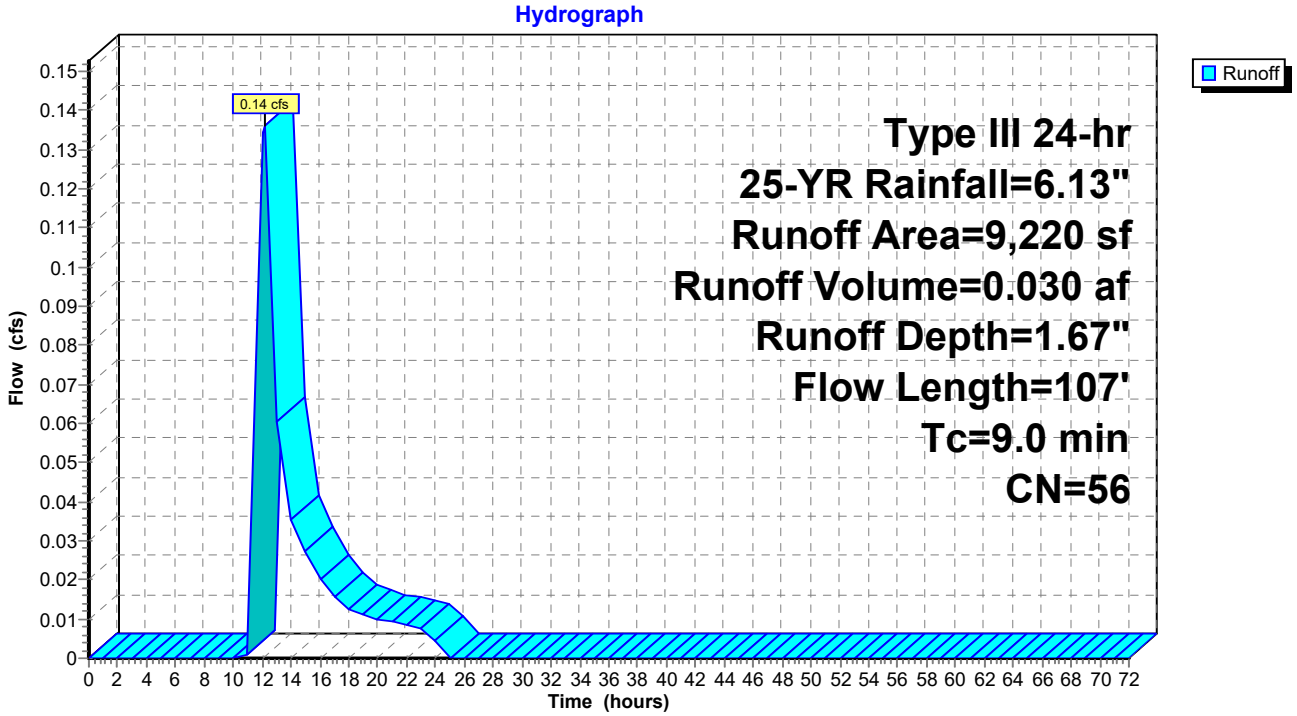
Runoff = 0.14 cfs @ 12.14 hrs, Volume= 0.030 af, Depth= 1.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 25-YR Rainfall=6.13"

Area (sf)	CN	Description
1,048	61	>75% Grass cover, Good, HSG B
8,172	55	Woods, Good, HSG B
9,220	56	Weighted Average
9,220		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	50	0.0550	0.10		**Sheet Flow, 7A-7B** Woods: Light underbrush n= 0.400 P2= 3.32"
0.9	57	0.0480	1.10		**Shallow Concentrated Flow, 7B-7C** Woodland Kv= 5.0 fps
9.0	107	Total			

Subcatchment 7A: PDA-7A



Summary for Subcatchment 7B: PDA-7B

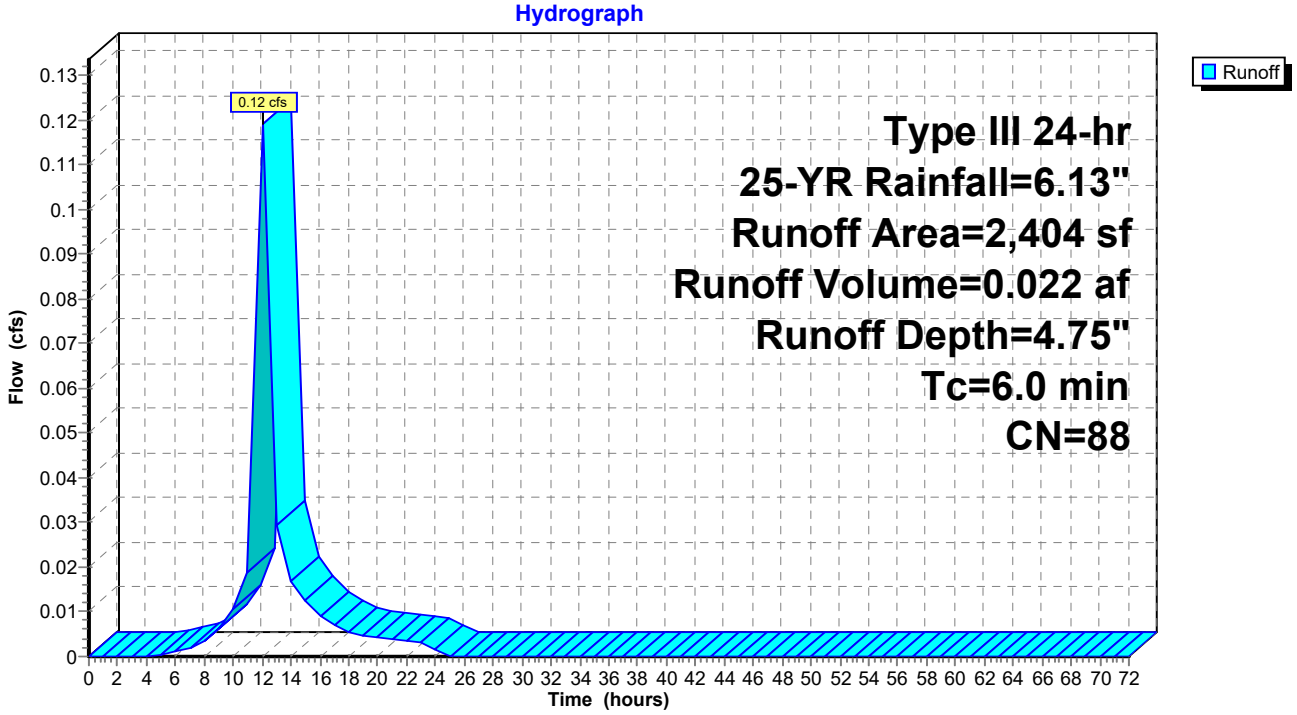
Runoff = 0.12 cfs @ 12.03 hrs, Volume= 0.022 af, Depth= 4.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 25-YR Rainfall=6.13"

Area (sf)	CN	Description
1,743	98	Roofs, HSG B
661	61	>75% Grass cover, Good, HSG B
2,404	88	Weighted Average
661		27.50% Pervious Area
1,743		72.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Subcatchment 7B: PDA-7B

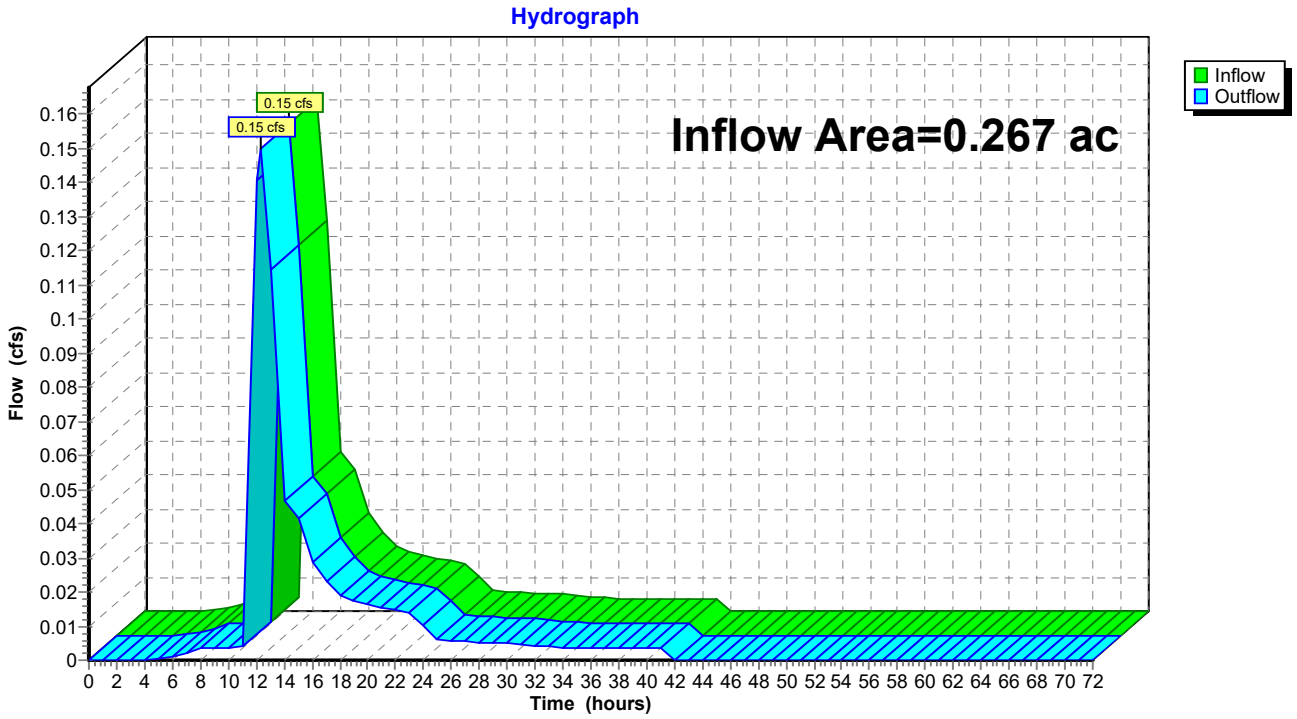


Summary for Reach DP-7: DP-7

Inflow Area = 0.267 ac, 14.99% Impervious, Inflow Depth = 2.21" for 25-YR event
Inflow = 0.15 cfs @ 12.34 hrs, Volume= 0.049 af
Outflow = 0.15 cfs @ 12.34 hrs, Volume= 0.049 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs

Reach DP-7: DP-7



Summary for Reach PDP-4: Design Point 4

Inflow Area = 17.568 ac, 18.21% Impervious, Inflow Depth = 1.84" for 25-YR event
Inflow = 8.01 cfs @ 12.94 hrs, Volume= 2.689 af
Outflow = 7.53 cfs @ 13.16 hrs, Volume= 2.696 af, Atten= 6%, Lag= 13.0 min

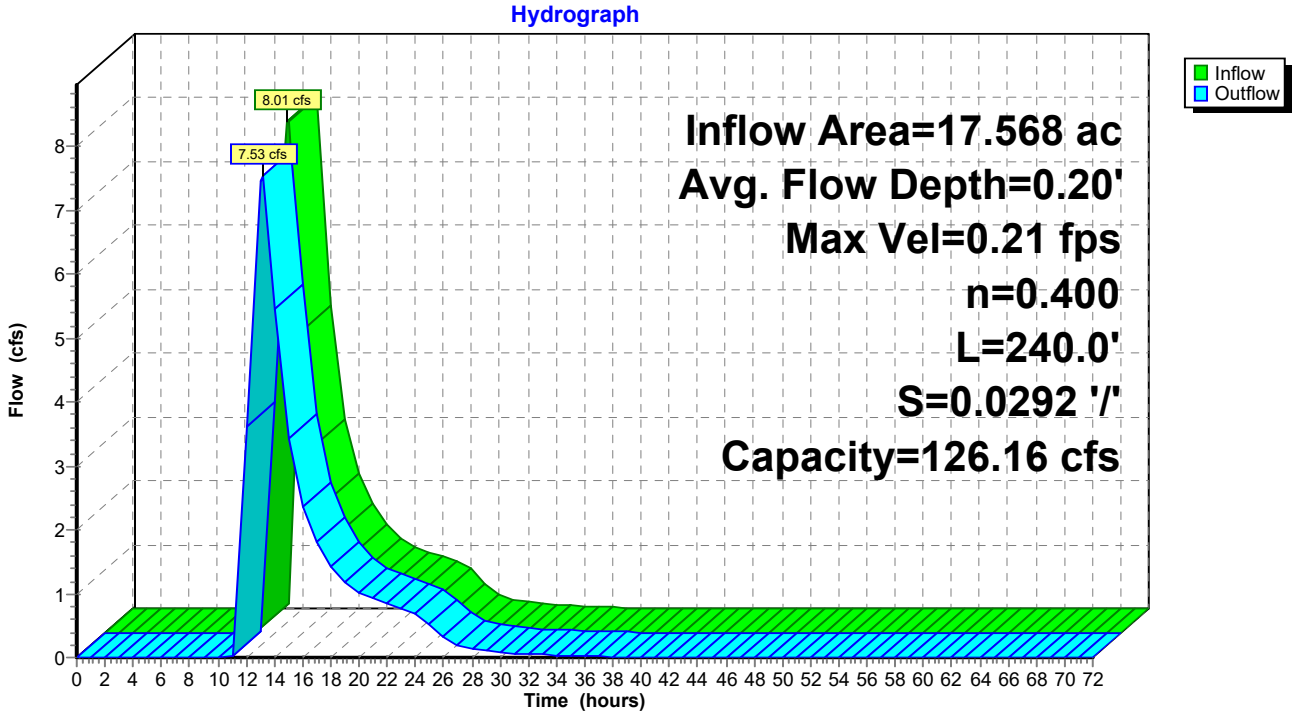
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs / 2
Max. Velocity= 0.21 fps, Min. Travel Time= 19.4 min
Avg. Velocity = 0.06 fps, Avg. Travel Time= 68.6 min

Peak Storage= 8,729 cf @ 13.17 hrs
Average Depth at Peak Storage= 0.20'
Bank-Full Depth= 1.00' Flow Area= 237.5 sf, Capacity= 126.16 cfs

165.00' x 1.00' deep channel, n= 0.400 Sheet flow: Woods+light brush
Side Slope Z-value= 80.0 65.0 '/' Top Width= 310.00'
Length= 240.0' Slope= 0.0292 '/'
Inlet Invert= 625.00', Outlet Invert= 618.00'

‡

Reach PDP-4: Design Point 4



Stage-Discharge for Reach PDP-4: Design Point 4

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
625.00	0.00	0.00
625.01	0.03	0.05
625.02	0.05	0.15
625.03	0.06	0.30
625.04	0.07	0.49
625.05	0.08	0.72
625.06	0.10	0.97
625.07	0.11	1.26
625.08	0.12	1.57
625.09	0.12	1.92
625.10	0.13	2.29
625.11	0.14	2.69
625.12	0.15	3.11
625.13	0.16	3.56
625.14	0.16	4.04
625.15	0.17	4.54
625.16	0.18	5.06
625.17	0.19	5.61
625.18	0.19	6.18
625.19	0.20	6.78
625.20	0.21	7.40
625.21	0.21	8.04
625.22	0.22	8.70
625.23	0.22	9.39
625.24	0.23	10.09
625.25	0.24	10.82
625.26	0.24	11.58
625.27	0.25	12.35
625.28	0.25	13.15
625.29	0.26	13.96
625.30	0.26	14.80
625.31	0.27	15.66
625.32	0.27	16.54
625.33	0.28	17.45
625.34	0.28	18.37
625.35	0.29	19.31
625.36	0.29	20.28
625.37	0.30	21.27
625.38	0.30	22.28
625.39	0.31	23.31
625.40	0.31	24.36
625.41	0.32	25.43
625.42	0.32	26.52
625.43	0.33	27.63
625.44	0.33	28.77
625.45	0.34	29.92
625.46	0.34	31.10
625.47	0.35	32.30
625.48	0.35	33.51
625.49	0.35	34.75
625.50	0.36	36.01
625.51	0.36	37.29
625.52	0.37	38.60
625.53	0.37	39.92
625.54	0.37	41.26
625.55	0.38	42.62
625.56	0.38	44.01
625.57	0.39	45.42
625.58	0.39	46.84
625.59	0.39	48.29
625.60	0.40	49.76
625.61	0.40	51.25
625.62	0.41	52.76
625.63	0.41	54.29
625.64	0.41	55.85
625.65	0.42	57.42
625.66	0.42	59.02
625.67	0.42	60.64
625.68	0.43	62.27
625.69	0.43	63.93
625.70	0.43	65.62
625.71	0.44	67.32
625.72	0.44	69.04
625.73	0.44	70.79
625.74	0.45	72.55
625.75	0.45	74.34
625.76	0.46	76.15
625.77	0.46	77.98
625.78	0.46	79.84
625.79	0.47	81.71
625.80	0.47	83.61
625.81	0.47	85.53
625.82	0.48	87.47
625.83	0.48	89.43
625.84	0.48	91.41
625.85	0.48	93.42
625.86	0.49	95.44
625.87	0.49	97.49
625.88	0.49	99.56
625.89	0.50	101.66
625.90	0.50	103.77
625.91	0.50	105.91
625.92	0.51	108.07
625.93	0.51	110.25
625.94	0.51	112.46
625.95	0.52	114.69
625.96	0.52	116.94
625.97	0.52	119.21
625.98	0.53	121.50
625.99	0.53	123.82
626.00	**0.53**	**126.16**

Summary for Reach PDP-5: Design Point 5

Inflow Area = 14.576 ac, 7.38% Impervious, Inflow Depth = 1.84" for 25-YR event
Inflow = 7.59 cfs @ 12.66 hrs, Volume= 2.239 af
Outflow = 7.11 cfs @ 12.97 hrs, Volume= 2.246 af, Atten= 6%, Lag= 18.5 min

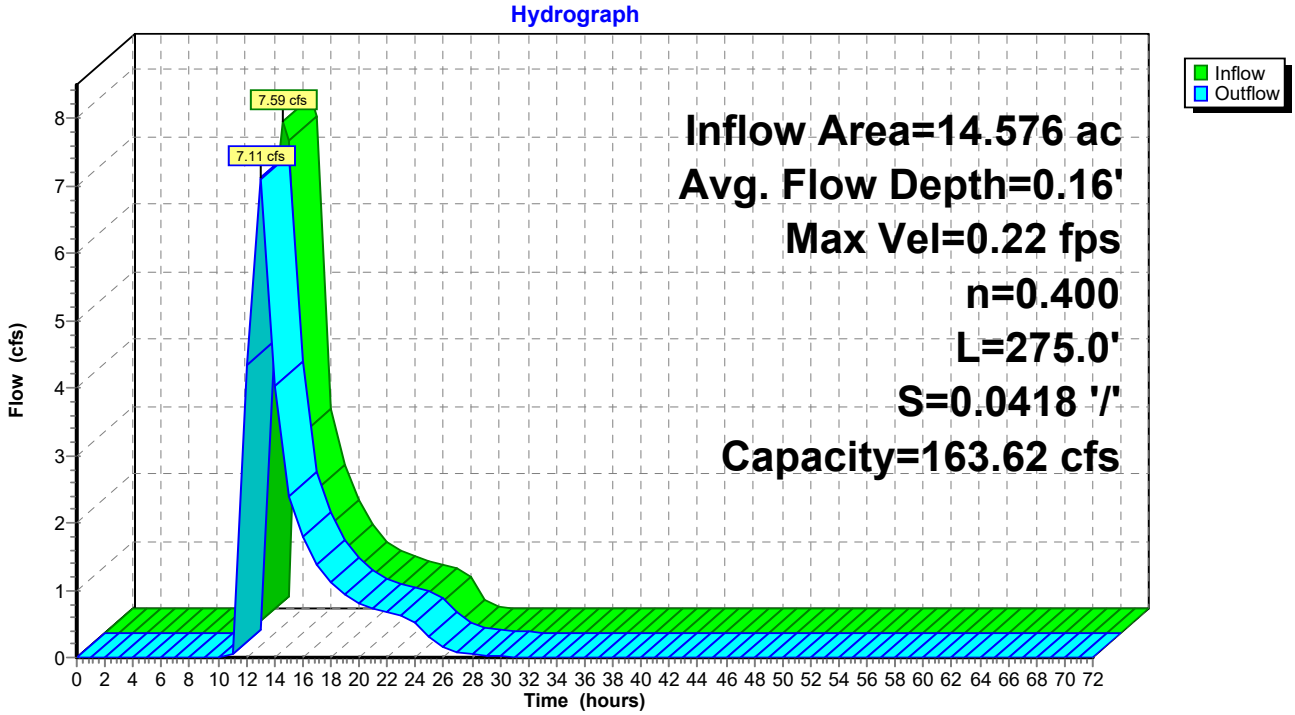
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs / 2
Max. Velocity= 0.22 fps, Min. Travel Time= 21.0 min
Avg. Velocity = 0.06 fps, Avg. Travel Time= 70.8 min

Peak Storage= 8,966 cf @ 12.97 hrs
Average Depth at Peak Storage= 0.16'
Bank-Full Depth= 1.00' Flow Area= 237.5 sf, Capacity= 163.62 cfs

200.00' x 1.00' deep channel, n= 0.400 Sheet flow: Woods+light brush
Side Slope Z-value= 50.0 25.0 '/' Top Width= 275.00'
Length= 275.0' Slope= 0.0418 '/'
Inlet Invert= 636.50', Outlet Invert= 625.00'

‡

Reach PDP-5: Design Point 5



Stage-Discharge for Reach PDP-5: Design Point 5

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
636.50	0.00	0.00
636.51	0.04	0.07
636.52	0.06	0.22
636.53	0.07	0.44
636.54	0.09	0.71
636.55	0.10	1.03
636.56	0.12	1.40
636.57	0.13	1.81
636.58	0.14	2.27
636.59	0.15	2.76
636.60	0.16	3.29
636.61	0.17	3.86
636.62	0.18	4.47
636.63	0.19	5.11
636.64	0.20	5.79
636.65	0.21	6.50
636.66	0.22	7.24
636.67	0.23	8.01
636.68	0.24	8.82
636.69	0.25	9.66
636.70	0.25	10.53
636.71	0.26	11.43
636.72	0.27	12.36
636.73	0.28	13.32
636.74	0.29	14.31
636.75	0.29	15.33
636.76	0.30	16.37
636.77	0.31	17.45
636.78	0.31	18.55
636.79	0.32	19.68
636.80	0.33	20.84
636.81	0.34	22.03
636.82	0.34	23.24
636.83	0.35	24.48
636.84	0.36	25.75
636.85	0.36	27.04
636.86	0.37	28.36
636.87	0.38	29.71
636.88	0.38	31.08
636.89	0.39	32.48
636.90	0.39	33.91
636.91	0.40	35.36
636.92	0.41	36.83
636.93	0.41	38.34
636.94	0.42	39.86
636.95	0.42	41.42
636.96	0.43	42.99
636.97	0.44	44.59
636.98	0.44	46.22
636.99	0.45	47.87
637.00	0.45	49.55
637.01	0.46	51.25
637.02	0.46	52.98
637.03	0.47	54.73
637.04	0.48	56.50
637.05	0.48	58.30
637.06	0.49	60.12
637.07	0.49	61.97
637.08	0.50	63.84
637.09	0.50	65.74
637.10	0.51	67.66
637.11	0.51	69.60
637.12	0.52	71.57
637.13	0.52	73.56
637.14	0.53	75.57
637.15	0.53	77.61
637.16	0.54	79.67
637.17	0.54	81.76
637.18	0.55	83.87
637.19	0.55	86.00
637.20	0.56	88.16
637.21	0.56	90.34
637.22	0.57	92.54
637.23	0.57	94.77
637.24	0.58	97.02
637.25	0.58	99.29
637.26	0.58	101.58
637.27	0.59	103.90
637.28	0.59	106.25
637.29	0.60	108.61
637.30	0.60	111.00
637.31	0.61	113.41
637.32	0.61	115.85
637.33	0.62	118.31
637.34	0.62	120.79
637.35	0.63	123.29
637.36	0.63	125.82
637.37	0.63	128.37
637.38	0.64	130.95
637.39	0.64	133.54
637.40	0.65	136.16
637.41	0.65	138.80
637.42	0.66	141.47
637.43	0.66	144.16
637.44	0.66	146.87
637.45	0.67	149.60
637.46	0.67	152.36
637.47	0.68	155.14
637.48	0.68	157.94
637.49	0.68	160.77
637.50	**0.69**	**163.62**

Summary for Reach PDP-6: Design Point 6

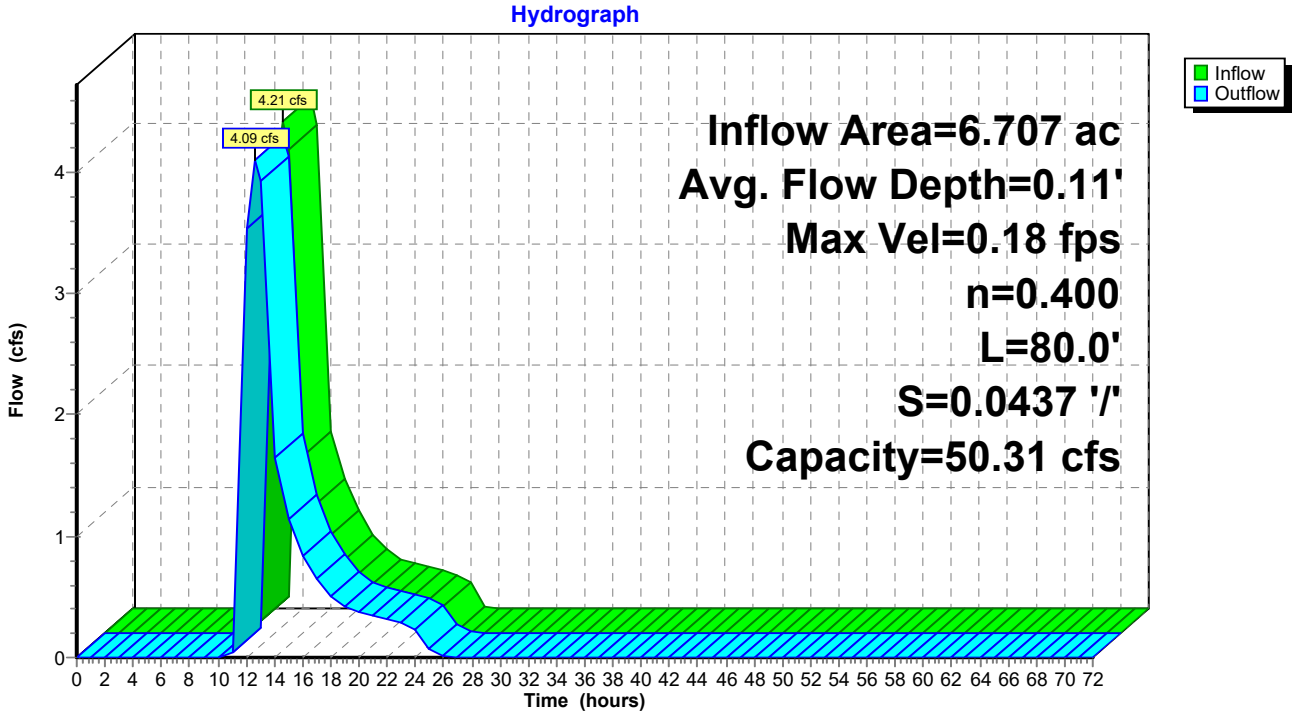
Inflow Area = 6.707 ac, 0.00% Impervious, Inflow Depth = 2.09" for 25-YR event
Inflow = 4.21 cfs @ 12.60 hrs, Volume= 1.170 af
Outflow = 4.09 cfs @ 12.65 hrs, Volume= 1.188 af, Atten= 3%, Lag= 2.7 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs / 2
Max. Velocity= 0.18 fps, Min. Travel Time= 7.6 min
Avg. Velocity = 0.06 fps, Avg. Travel Time= 21.2 min

Peak Storage= 1,841 cf @ 12.63 hrs
Average Depth at Peak Storage= 0.11'
Bank-Full Depth= 0.50' Flow Area= 107.5 sf, Capacity= 50.31 cfs

200.00' x 0.50' deep channel, n= 0.400 Sheet flow: Woods+light brush
Side Slope Z-value= 30.0 '/' Top Width= 230.00'
Length= 80.0' Slope= 0.0437 '/'
Inlet Invert= 642.50', Outlet Invert= 639.00'

Reach PDP-6: Design Point 6



Stage-Discharge for Reach PDP-6: Design Point 6

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
642.50	0.00	0.00
642.51	0.04	0.07
642.52	0.06	0.23
642.53	0.07	0.45
642.54	0.09	0.73
642.55	0.10	1.06
642.56	0.12	1.43
642.57	0.13	1.85
642.58	0.14	2.32
642.59	0.15	2.82
642.60	0.17	3.37
642.61	0.18	3.95
642.62	0.19	4.57
642.63	0.20	5.22
642.64	0.21	5.91
642.65	0.22	6.63
642.66	0.23	7.39
642.67	0.23	8.18
642.68	0.24	9.00
642.69	0.25	9.86
642.70	0.26	10.74
642.71	0.27	11.66
642.72	0.28	12.60
642.73	0.29	13.58
642.74	0.29	14.59
642.75	0.30	15.62
642.76	0.31	16.69
642.77	0.32	17.78
642.78	0.32	18.90
642.79	0.33	20.05
642.80	0.34	21.23
642.81	0.35	22.43
642.82	0.35	23.67
642.83	0.36	24.92
642.84	0.37	26.21
642.85	0.37	27.52
642.86	0.38	28.86
642.87	0.39	30.23
642.88	0.39	31.62
642.89	0.40	33.04
642.90	0.41	34.48
642.91	0.41	35.95
642.92	0.42	37.45
642.93	0.43	38.97
642.94	0.43	40.51
642.95	0.44	42.08
642.96	0.44	43.68
642.97	0.45	45.30
642.98	0.46	46.94
642.99	0.46	48.61
643.00	**0.47**	**50.31**

Summary for Pond 3: SFB-3

Inflow Area = 1.125 ac, 75.58% Impervious, Inflow Depth > 4.95" for 25-YR event
Inflow = 0.82 cfs @ 12.10 hrs, Volume= 0.464 af
Outflow = 0.78 cfs @ 12.19 hrs, Volume= 0.461 af, Atten= 5%, Lag= 5.3 min
Discarded = 0.06 cfs @ 12.25 hrs, Volume= 0.189 af
Primary = 0.72 cfs @ 12.19 hrs, Volume= 0.273 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs / 3
Peak Elev= 622.23' @ 12.25 hrs Surf.Area= 1,393 sf Storage= 1,186 cf
Flood Elev= 623.50' Surf.Area= 2,450 sf Storage= 3,580 cf

Plug-Flow detention time= 113.5 min calculated for 0.461 af (99% of inflow)
Center-of-Mass det. time= 96.1 min (1,271.0 - 1,174.9)

Volume	Invert	Avail.Storage	Storage Description
#1	620.00'	3,306 cf	**Overall storage (Prismatic)** Listed below (Recalc) 4,263 cf Overall - 957 cf Embedded = 3,306 cf
#2	620.00'	211 cf	**Sand media (Prismatic)** Listed below (Recalc) Inside #1 638 cf Overall x 33.0% Voids
#3	621.00'	64 cf	**Infiltration Seed mix (Prismatic)** Listed below (Recalc) Inside #1 319 cf Overall x 20.0% Voids
		3,580 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
620.00	638	0	0
621.00	638	638	638
622.00	1,230	934	1,572
623.00	1,951	1,591	3,163
623.50	2,450	1,100	4,263

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
620.00	638	0	0
621.00	638	638	638

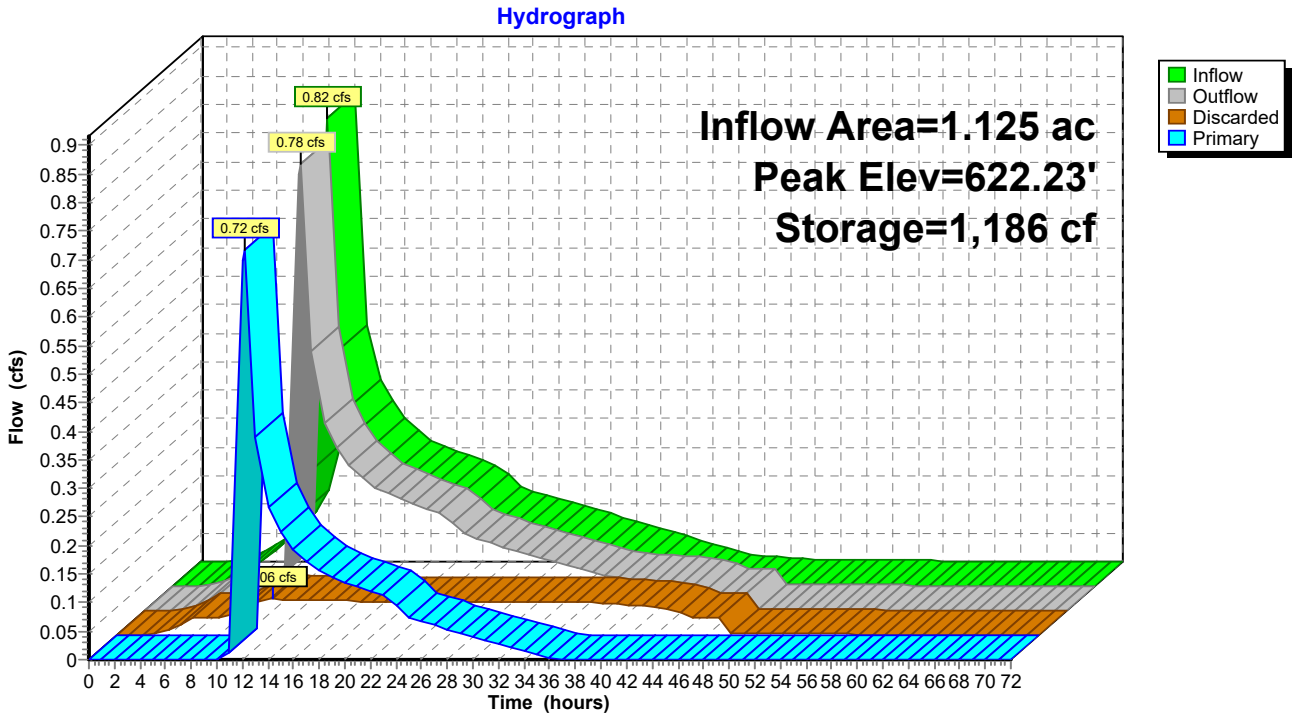
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
621.00	638	0	0
621.50	638	319	319

Device	Routing	Invert	Outlet Devices
#1	Discarded	620.00'	**2.010 in/hr Exfiltration over Surface area**
#2	Primary	620.14'	**8.0" Round Culvert** L= 14.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 620.14' / 620.00' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.35 sf
#3	Device 2	622.00'	**8.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.06 cfs @ 12.25 hrs HW=622.20' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=0.63 cfs @ 12.19 hrs HW=622.20' (Free Discharge)
└─**2=Culvert** (Passes 0.63 cfs of 1.75 cfs potential flow)
└─**3=Orifice/Grate** (Weir Controls 0.63 cfs @ 1.48 fps)

Pond 3: SFB-3



Stage-Discharge for Pond 3: SFB-3

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
620.00	0.00	0.00	0.00
620.05	0.03	0.03	0.00
620.10	0.03	0.03	0.00
620.15	0.03	0.03	0.00
620.20	0.03	0.03	0.00
620.25	0.03	0.03	0.00
620.30	0.03	0.03	0.00
620.35	0.03	0.03	0.00
620.40	0.03	0.03	0.00
620.45	0.03	0.03	0.00
620.50	0.03	0.03	0.00
620.55	0.03	0.03	0.00
620.60	0.03	0.03	0.00
620.65	0.03	0.03	0.00
620.70	0.03	0.03	0.00
620.75	0.03	0.03	0.00
620.80	0.03	0.03	0.00
620.85	0.03	0.03	0.00
620.90	0.03	0.03	0.00
620.95	0.03	0.03	0.00
621.00	0.03	0.03	0.00
621.05	0.03	0.03	0.00
621.10	0.03	0.03	0.00
621.15	0.03	0.03	0.00
621.20	0.04	0.04	0.00
621.25	0.04	0.04	0.00
621.30	0.04	0.04	0.00
621.35	0.04	0.04	0.00
621.40	0.04	0.04	0.00
621.45	0.04	0.04	0.00
621.50	0.04	0.04	0.00
621.55	0.04	0.04	0.00
621.60	0.05	0.05	0.00
621.65	0.05	0.05	0.00
621.70	0.05	0.05	0.00
621.75	0.05	0.05	0.00
621.80	0.05	0.05	0.00
621.85	0.05	0.05	0.00
621.90	0.05	0.05	0.00
621.95	0.06	0.06	0.00
622.00	0.06	0.06	0.00
622.05	0.14	0.06	0.08
622.10	0.28	0.06	0.22
622.15	0.46	0.06	0.40
622.20	0.68	0.06	0.61
622.25	0.91	0.07	0.84
622.30	0.99	0.07	0.92
622.35	1.06	0.07	0.99
622.40	1.13	0.07	1.06
622.45	1.20	0.07	1.13
622.50	1.26	0.07	1.19
622.55	1.32	0.08	1.25
622.60	1.38	0.08	1.30
622.65	1.43	0.08	1.36
622.70	1.49	0.08	1.41
622.75	1.54	0.08	1.46
622.80	1.59	0.08	1.50
622.85	1.64	0.09	1.55
622.90	1.68	0.09	1.59
622.95	1.73	0.09	1.64
623.00	1.77	0.09	1.68
623.05	1.82	0.09	1.72
623.10	1.86	0.10	1.76
623.15	1.90	0.10	1.80
623.20	1.94	0.10	1.84
623.25	1.98	0.10	1.88
623.30	2.02	0.10	1.92
623.35	2.06	0.11	1.95
623.40	2.10	0.11	1.99
623.45	2.14	0.11	2.02
623.50	**2.17**	**0.11**	**2.06**

Summary for Pond 4: SFB-4

Inflow Area =	1.487 ac, 85.51% Impervious, Inflow Depth > 5.35" for 25-YR event				
Inflow =	1.42 cfs @	12.30 hrs,	Volume=	0.663 af	
Outflow =	0.91 cfs @	13.64 hrs,	Volume=	0.663 af,	Atten= 36%, Lag= 80.5 min
Discarded =	0.50 cfs @	13.65 hrs,	Volume=	0.559 af	
Primary =	0.40 cfs @	13.64 hrs,	Volume=	0.104 af	
Secondary =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs / 3
Peak Elev= 633.13' @ 13.65 hrs Surf.Area= 3,325 sf Storage= 5,189 cf
Flood Elev= 634.00' Surf.Area= 4,000 sf Storage= 8,373 cf

Plug-Flow detention time= 69.2 min calculated for 0.663 af (100% of inflow)
Center-of-Mass det. time= 64.2 min (977.3 - 913.1)

Volume	Invert	Avail.Storage	Storage Description
#1	630.00'	7,667 cf	**Overall storage (Prismatic)** Listed below (Recalc) 10,132 cf Overall - 2,465 cf Embedded = 7,667 cf
#2	630.00'	542 cf	**Sand media (Prismatic)** Listed below (Recalc) Inside #1 1,643 cf Overall x 33.0% Voids
#3	631.00'	164 cf	**Infiltration Seed mix (Prismatic)** Listed below (Recalc) Inside #1 822 cf Overall x 20.0% Voids
		8,373 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
630.00	1,643	0	0
631.00	1,643	1,643	1,643
632.00	2,443	2,043	3,686
633.00	3,224	2,834	6,520
634.00	4,000	3,612	10,132

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
630.00	1,643	0	0
631.00	1,643	1,643	1,643

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
631.00	1,643	0	0
631.50	1,643	822	822

Device	Routing	Invert	Outlet Devices
#1	Discarded	630.00'	**6.560 in/hr Exfiltration over Surface area**
#2	Primary	630.00'	**8.0" Round Culvert** L= 25.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 630.00' / 629.25' S= 0.0300 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.35 sf
#3	Device 2	632.00'	**2.0" Vert. Orifice/Grate** C= 0.600
#4	Device 2	632.65'	**4.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

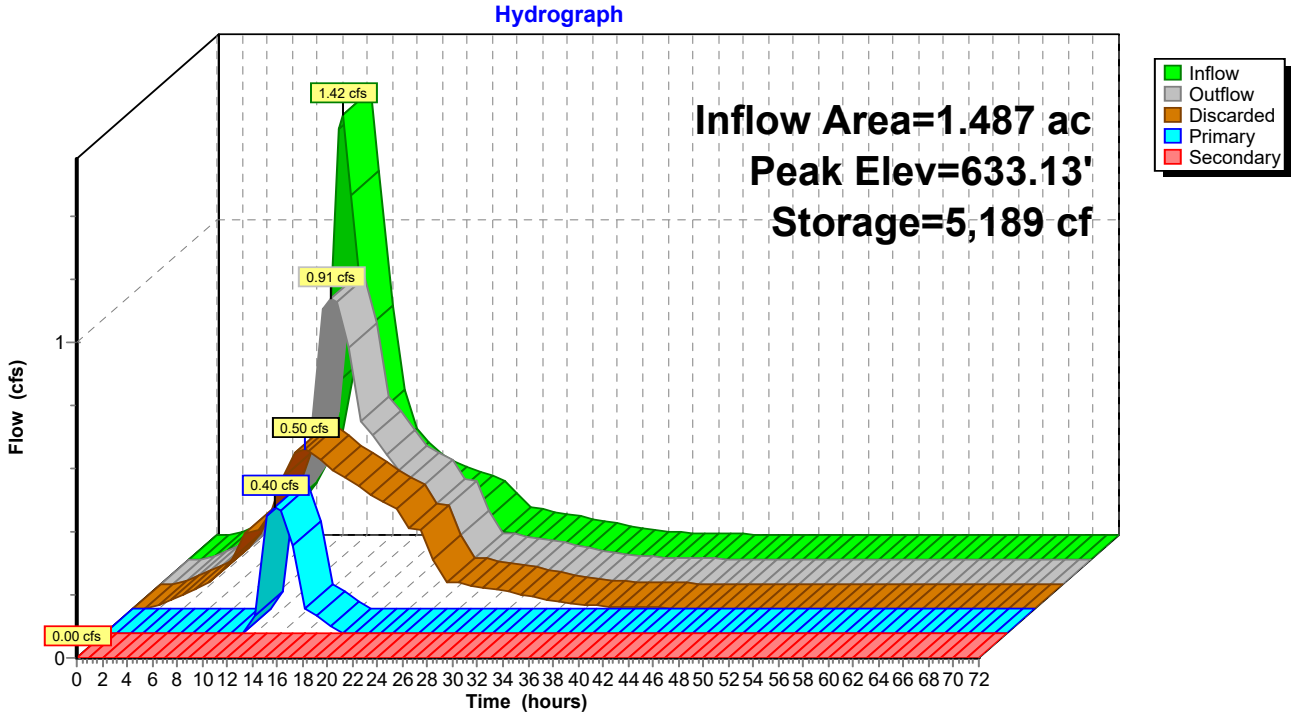
#5 Secondary 633.30' **50.0' long x 1.0' breadth Broad-Crested Rectangular Weir**
Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00
Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Discarded OutFlow Max=0.50 cfs @ 13.65 hrs HW=633.10' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.50 cfs)

Primary OutFlow Max=0.39 cfs @ 13.64 hrs HW=633.09' (Free Discharge)
└─**2=Culvert** (Passes 0.39 cfs of 2.20 cfs potential flow)
  ├─**3=Orifice/Grate** (Orifice Controls 0.11 cfs @ 4.84 fps)
  └─**4=Orifice/Grate** (Orifice Controls 0.28 cfs @ 3.21 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=630.00' (Free Discharge)
└─**5=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

Pond 4: SFB-4



Stage-Discharge for Pond 4: SFB-4

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)	Secondary (cfs)
630.00	0.00	0.00	0.00	0.00
630.10	0.25	0.25	0.00	0.00
630.20	0.25	0.25	0.00	0.00
630.30	0.25	0.25	0.00	0.00
630.40	0.25	0.25	0.00	0.00
630.50	0.25	0.25	0.00	0.00
630.60	0.25	0.25	0.00	0.00
630.70	0.25	0.25	0.00	0.00
630.80	0.25	0.25	0.00	0.00
630.90	0.25	0.25	0.00	0.00
631.00	0.25	0.25	0.00	0.00
631.10	0.26	0.26	0.00	0.00
631.20	0.27	0.27	0.00	0.00
631.30	0.29	0.29	0.00	0.00
631.40	0.30	0.30	0.00	0.00
631.50	0.31	0.31	0.00	0.00
631.60	0.32	0.32	0.00	0.00
631.70	0.33	0.33	0.00	0.00
631.80	0.35	0.35	0.00	0.00
631.90	0.36	0.36	0.00	0.00
632.00	0.37	0.37	0.00	0.00
632.10	0.40	0.38	0.01	0.00
632.20	0.43	0.39	0.04	0.00
632.30	0.46	0.41	0.05	0.00
632.40	0.48	0.42	0.06	0.00
632.50	0.50	0.43	0.07	0.00
632.60	0.52	0.44	0.08	0.00
632.70	0.57	0.45	0.12	0.00
632.80	0.72	0.47	0.25	0.00
632.90	0.78	0.48	0.31	0.00
633.00	0.84	0.49	0.35	0.00
633.10	0.89	0.50	0.39	0.00
633.20	0.94	0.51	0.42	0.00
633.30	0.98	0.52	0.45	0.00
633.40	5.27	0.54	0.48	4.25
633.50	13.09	0.55	0.51	12.03
633.60	23.32	0.56	0.54	22.22
633.70	35.54	0.57	0.56	34.41
633.80	49.52	0.58	0.59	48.35
633.90	65.11	0.60	0.61	63.90
634.00	**83.23**	**0.61**	**0.63**	**81.99**

Summary for Pond 5: SFB-5

Inflow Area =	1.636 ac, 65.78% Impervious, Inflow Depth = 4.50" for 25-YR event				
Inflow =	0.61 cfs @	12.20 hrs,	Volume=	0.613 af	
Outflow =	0.29 cfs @	17.89 hrs,	Volume=	0.616 af,	Atten= 52%, Lag= 341.4 min
Discarded =	0.23 cfs @	17.89 hrs,	Volume=	0.561 af	
Primary =	0.06 cfs @	17.89 hrs,	Volume=	0.055 af	
Secondary =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs / 3
Peak Elev= 634.97' @ 17.89 hrs Surf.Area= 3,460 sf Storage= 4,705 cf
Flood Elev= 636.00' Surf.Area= 4,050 sf Storage= 8,589 cf

Plug-Flow detention time= 208.7 min calculated for 0.608 af (99% of inflow)
Center-of-Mass det. time= 213.4 min (1,476.3 - 1,262.9)

Volume	Invert	Avail.Storage	Storage Description
#1	632.00'	7,942 cf	**Overall storage (Prismatic)** Listed below (Recalc) 10,200 cf Overall - 2,258 cf Embedded = 7,942 cf
#2	632.00'	497 cf	**Sand media (Prismatic)** Listed below (Recalc) Inside #1 1,505 cf Overall x 33.0% Voids
#3	633.00'	151 cf	**Infiltration Seed mix (Prismatic)** Listed below (Recalc) Inside #1 753 cf Overall x 20.0% Voids
		8,589 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
632.00	1,505	0	0
633.50	1,505	2,258	2,258
634.00	2,741	1,062	3,319
635.00	3,485	3,113	6,432
636.00	4,050	3,768	10,200

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
632.00	1,505	0	0
633.00	1,505	1,505	1,505

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
633.00	1,505	0	0
633.50	1,505	753	753

Device	Routing	Invert	Outlet Devices
#1	Discarded	632.00'	**2.840 in/hr Exfiltration over Surface area**
#2	Primary	633.80'	**6.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 633.80' / 633.75' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf
#3	Device 2	634.50'	**2.0" Vert. Orifice/Grate** C= 0.600
#4	Secondary	635.00'	**80.0' long x 1.0' breadth Broad-Crested Rectangular Weir**

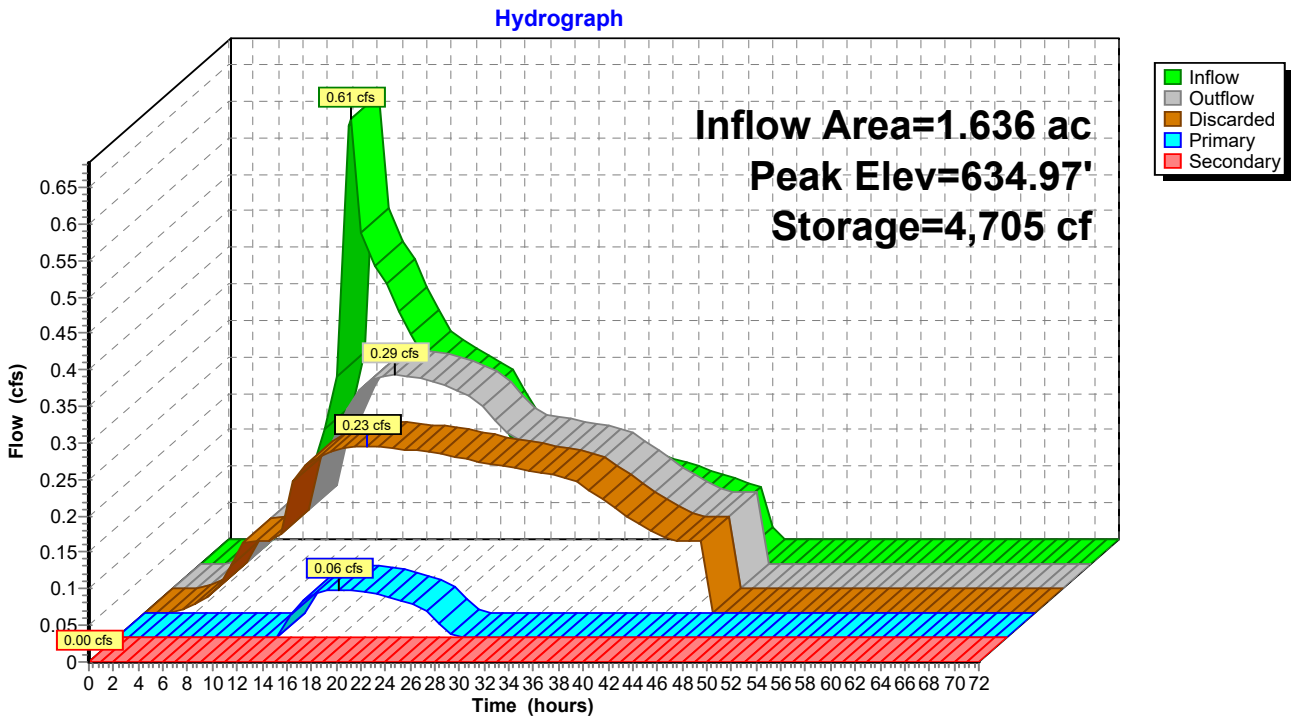
Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00
Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Discarded OutFlow Max=0.23 cfs @ 17.89 hrs HW=634.97' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.23 cfs)

Primary OutFlow Max=0.06 cfs @ 17.89 hrs HW=634.97' (Free Discharge)
└─**2=Culvert** (Passes 0.06 cfs of 0.71 cfs potential flow)
└─**3=Orifice/Grate** (Orifice Controls 0.06 cfs @ 2.98 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=632.00' (Free Discharge)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 5: SFB-5



Stage-Discharge for Pond 5: SFB-5

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)	Secondary (cfs)
632.00	0.00	0.00	0.00	0.00
632.10	0.10	0.10	0.00	0.00
632.20	0.10	0.10	0.00	0.00
632.30	0.10	0.10	0.00	0.00
632.40	0.10	0.10	0.00	0.00
632.50	0.10	0.10	0.00	0.00
632.60	0.10	0.10	0.00	0.00
632.70	0.10	0.10	0.00	0.00
632.80	0.10	0.10	0.00	0.00
632.90	0.10	0.10	0.00	0.00
633.00	0.10	0.10	0.00	0.00
633.10	0.10	0.10	0.00	0.00
633.20	0.10	0.10	0.00	0.00
633.30	0.10	0.10	0.00	0.00
633.40	0.10	0.10	0.00	0.00
633.50	0.10	0.10	0.00	0.00
633.60	0.12	0.12	0.00	0.00
633.70	0.13	0.13	0.00	0.00
633.80	0.15	0.15	0.00	0.00
633.90	0.16	0.16	0.00	0.00
634.00	0.18	0.18	0.00	0.00
634.10	0.19	0.19	0.00	0.00
634.20	0.19	0.19	0.00	0.00
634.30	0.19	0.19	0.00	0.00
634.40	0.20	0.20	0.00	0.00
634.50	0.20	0.20	0.00	0.00
634.60	0.22	0.21	0.01	0.00
634.70	0.25	0.21	0.04	0.00
634.80	0.27	0.22	0.05	0.00
634.90	0.28	0.22	0.06	0.00
635.00	0.30	0.23	0.07	0.00
635.10	7.11	0.23	0.08	6.81
635.20	19.57	0.24	0.08	19.25
635.30	35.89	0.24	0.09	35.56
635.40	55.39	0.24	0.09	55.05
635.50	77.71	0.25	0.10	77.36
635.60	102.60	0.25	0.11	102.25
635.70	131.55	0.26	0.11	131.19
635.80	163.52	0.26	0.12	163.14
635.90	199.49	0.26	0.12	199.11
636.00	**238.79**	**0.27**	**0.13**	**238.40**

Summary for Pond DB-3: DB-3

Inflow Area = 0.593 ac,100.00% Impervious, Inflow Depth = 6.33" for 25-YR event
Inflow = 1.71 cfs @ 12.01 hrs, Volume= 0.313 af
Outflow = 0.17 cfs @ 14.42 hrs, Volume= 0.313 af, Atten= 90%, Lag= 144.7 min
Primary = 0.17 cfs @ 14.42 hrs, Volume= 0.313 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Peak Elev= 628.84' @ 14.42 hrs Surf.Area= 0.081 ac Storage= 0.197 af
Flood Elev= 630.00' Surf.Area= 0.081 ac Storage= 0.276 af

Plug-Flow detention time= 611.6 min calculated for 0.313 af (100% of inflow)
Center-of-Mass det. time= 606.7 min (1,348.8 - 742.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	626.00'	0.000 af	**27.58'W x 127.56'L x 4.67'H Field A** 0.377 af Overall - 0.377 af Embedded = 0.000 af x 0.0% Voids
#2A	626.00'	0.276 af	**StormTrap ST1 SingleTrap 4-0** x 36 Inside #1 Inside= 82.7"W x 48.0"H => 23.79 sf x 14.06'L = 334.5 cf Outside= 82.7"W x 56.0"H => 32.18 sf x 14.06'L = 452.5 cf 4 Rows of 9 Chambers 27.58' x 126.56' Core + 0.00' x 0.50' Border = 27.58' x 127.56' System
		0.276 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	626.00'	**8.0" Round Culvert** L= 240.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 626.00' / 622.00' S= 0.0167 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.35 sf
#2	Device 1	626.00'	**2.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.17 cfs @ 14.42 hrs HW=628.83' (Free Discharge)
└─**1=Culvert** (Passes 0.17 cfs of 2.08 cfs potential flow)
└─**2=Orifice/Grate** (Orifice Controls 0.17 cfs @ 7.98 fps)

Pond DB-3: DB-3 - Chamber Wizard Field A

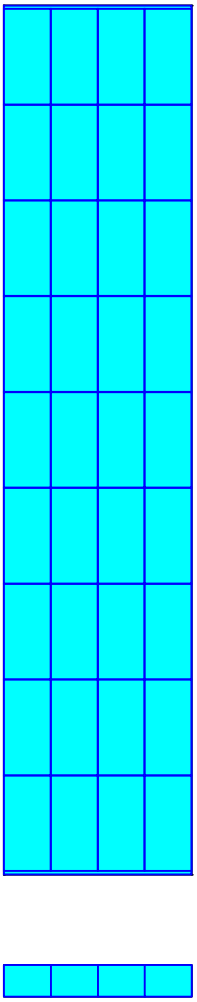
Chamber Model = StormTrap ST1 SingleTrap 4-0 (StormTrap ST1 SingleTrap® Type VI)
Inside= 82.7"W x 48.0"H => 23.79 sf x 14.06'L = 334.5 cf
Outside= 82.7"W x 56.0"H => 32.18 sf x 14.06'L = 452.5 cf

9 Chambers/Row x 14.06' Long = 126.56' Row Length +6.0" Border x 2 = 127.56' Base Length
4 Rows x 82.7" Wide = 27.58' Base Width
56.0" Chamber Height = 4.67' Field Height

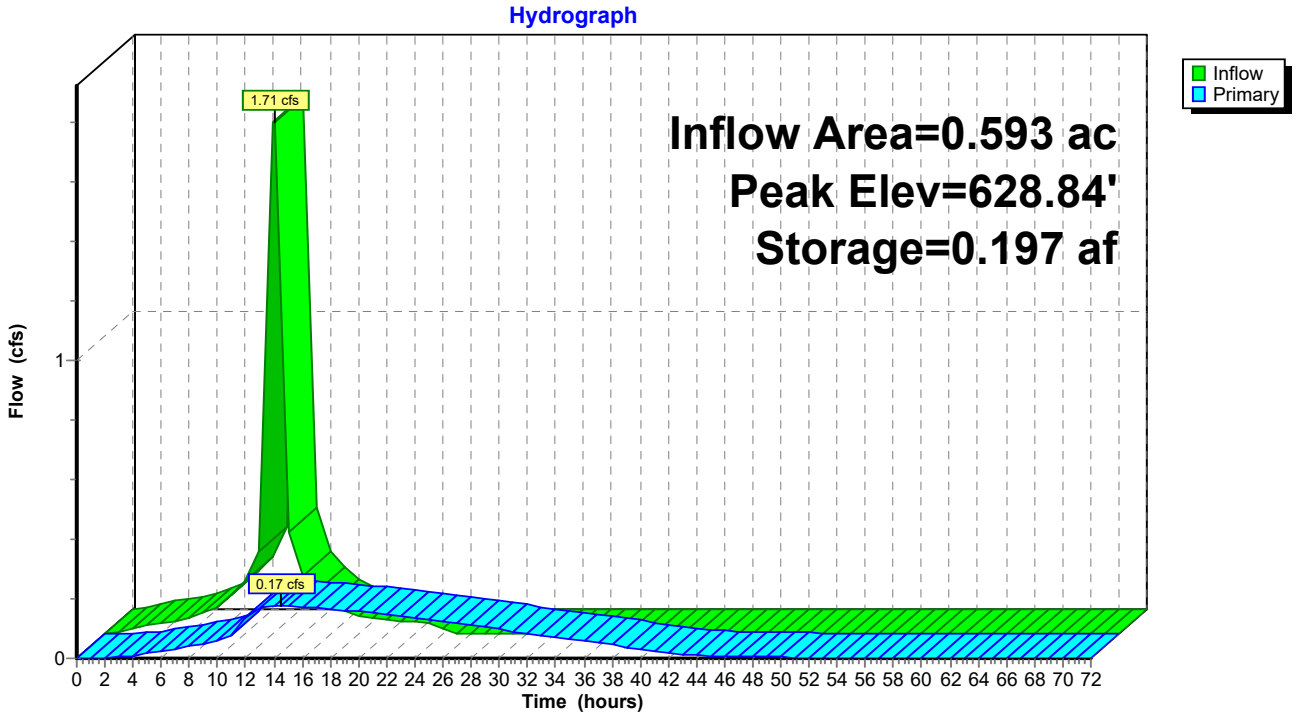
36 Chambers x 334.5 cf = 12,042.0 cf Chamber Storage
36 Chambers x 452.5 cf + 128.7 cf Border = 16,420.1 cf Displacement

Chamber Storage = 12,042.0 cf = 0.276 af
Overall Storage Efficiency = 73.3%
Overall System Size = 127.56' x 27.58' x 4.67'

36 Chambers (plus border)
608.2 cy Field



Pond DB-3: DB-3


Hydrograph
Inflow
Primary
1.71 cfs
0.17 cfs
Inflow Area=0.593 ac
Peak Elev=628.84'
Storage=0.197 af
Flow (cfs)
1
0
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72
Time (hours)

Stage-Discharge for Pond DB-3: DB-3

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
626.00	0.00	628.60	0.17
626.05	0.00	628.65	0.17
626.10	0.01	628.70	0.17
626.15	0.03	628.75	0.17
626.20	0.04	628.80	0.17
626.25	0.04	628.85	0.17
626.30	0.05	628.90	0.18
626.35	0.05	628.95	0.18
626.40	0.06	629.00	0.18
626.45	0.06	629.05	0.18
626.50	0.07	629.10	0.18
626.55	0.07	629.15	0.18
626.60	0.08	629.20	0.19
626.65	0.08	629.25	0.19
626.70	0.08	629.30	0.19
626.75	0.09	629.35	0.19
626.80	0.09	629.40	0.19
626.85	0.09	629.45	0.19
626.90	0.09	629.50	0.19
626.95	0.10	629.55	0.20
627.00	0.10	629.60	0.20
627.05	0.10	629.65	0.20
627.10	0.11	629.70	0.20
627.15	0.11	629.75	0.20
627.20	0.11	629.80	0.20
627.25	0.11	629.85	0.20
627.30	0.12	629.90	0.21
627.35	0.12	629.95	0.21
627.40	0.12	630.00	0.21
627.45	0.12	630.05	0.21
627.50	0.13	630.10	0.21
627.55	0.13	630.15	0.21
627.60	0.13	630.20	0.21
627.65	0.13	630.25	0.21
627.70	0.13	630.30	0.22
627.75	0.14	630.35	0.22
627.80	0.14	630.40	0.22
627.85	0.14	630.45	0.22
627.90	0.14	630.50	0.22
627.95	0.14	630.55	0.22
628.00	0.15	630.60	0.22
628.05	0.15	630.65	**0.22**
628.10	0.15		
628.15	0.15		
628.20	0.15		
628.25	0.15		
628.30	0.16		
628.35	0.16		
628.40	0.16		
628.45	0.16		
628.50	0.16		
628.55	0.16		

Summary for Pond DB-4: DB-4

Inflow Area = 0.274 ac,100.00% Impervious, Inflow Depth = 11.26" for 25-YR event
Inflow = 2.15 cfs @ 12.00 hrs, Volume= 0.257 af
Outflow = 0.52 cfs @ 13.21 hrs, Volume= 0.257 af, Atten= 76%, Lag= 72.6 min
Primary = 0.52 cfs @ 13.21 hrs, Volume= 0.257 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Peak Elev= 636.86' @ 13.22 hrs Surf.Area= 0.072 ac Storage= 0.176 af
Flood Elev= 638.00' Surf.Area= 0.072 ac Storage= 0.246 af

Plug-Flow detention time= 408.3 min calculated for 0.257 af (100% of inflow)
Center-of-Mass det. time= 401.7 min (1,134.1 - 732.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	634.00'	0.000 af	**27.58'W x 113.50'L x 4.67'H Field A** 0.335 af Overall - 0.335 af Embedded = 0.000 af x 0.0% Voids
#2A	634.00'	0.246 af	**StormTrap ST1 SingleTrap 4-0** x 32 Inside #1 Inside= 82.7"W x 48.0"H => 23.79 sf x 14.06'L = 334.5 cf Outside= 82.7"W x 56.0"H => 32.18 sf x 14.06'L = 452.5 cf 4 Rows of 8 Chambers 27.58' x 112.50' Core + 0.00' x 0.50' Border = 27.58' x 113.50' System
		0.246 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	634.00'	**6.0" Round Culvert** L= 100.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 634.00' / 633.00' S= 0.0100 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.20 sf
#2	Device 1	634.00'	**2.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	636.00'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Device 1	637.00'	**4.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.49 cfs @ 13.21 hrs HW=636.73' (Free Discharge)
└─**1=Culvert** (Passes 0.49 cfs of 1.03 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.17 cfs @ 7.83 fps)
  ├─**3=Orifice/Grate** (Orifice Controls 0.31 cfs @ 3.61 fps)
  └─**4=Orifice/Grate** (Controls 0.00 cfs)

Pond DB-4: DB-4 - Chamber Wizard Field A

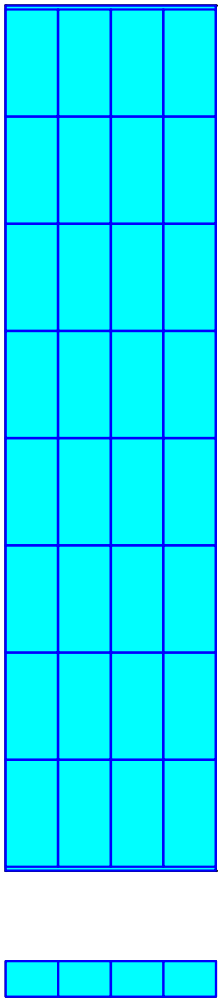
Chamber Model = StormTrap ST1 SingleTrap 4-0 (StormTrap ST1 SingleTrap® Type VI)
Inside= 82.7"W x 48.0"H => 23.79 sf x 14.06'L = 334.5 cf
Outside= 82.7"W x 56.0"H => 32.18 sf x 14.06'L = 452.5 cf

8 Chambers/Row x 14.06' Long = 112.50' Row Length +6.0" Border x 2 = 113.50' Base Length
4 Rows x 82.7" Wide = 27.58' Base Width
56.0" Chamber Height = 4.67' Field Height

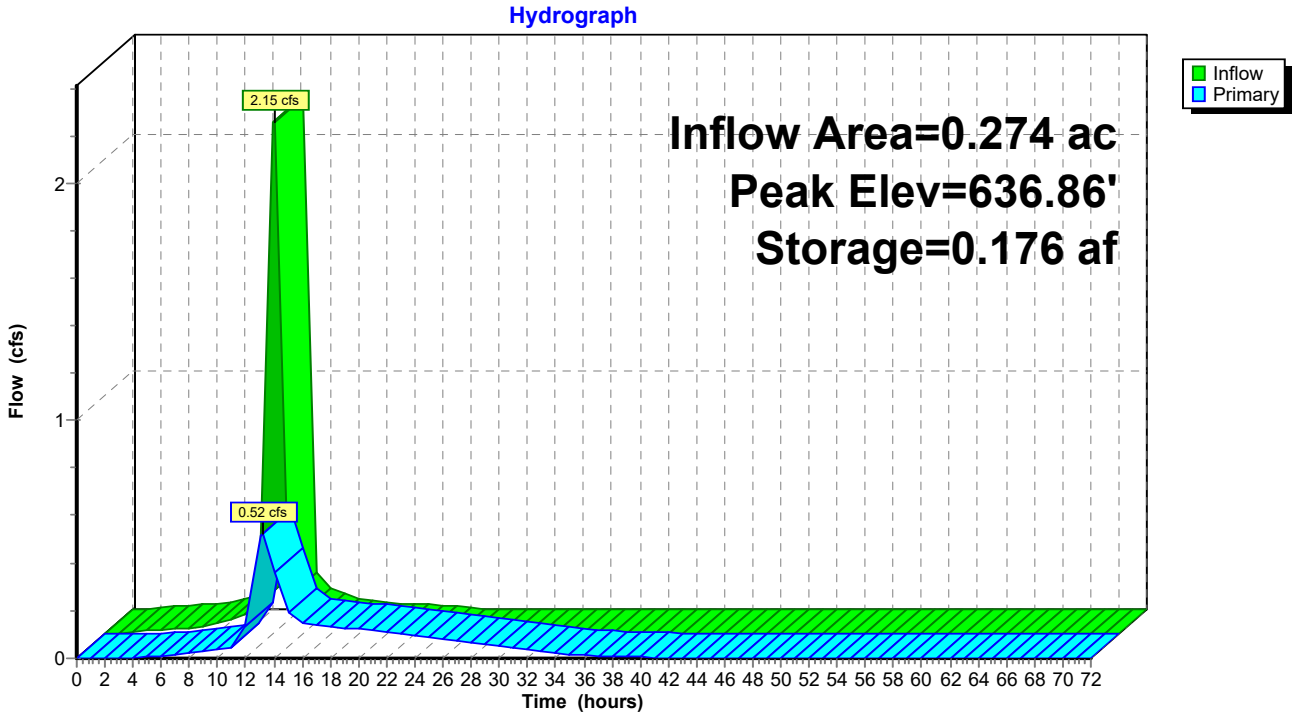
32 Chambers x 334.5 cf = 10,704.0 cf Chamber Storage
32 Chambers x 452.5 cf + 128.7 cf Border = 14,610.0 cf Displacement

Chamber Storage = 10,704.0 cf = 0.246 af
Overall Storage Efficiency = 73.3%
Overall System Size = 113.50' x 27.58' x 4.67'

32 Chambers (plus border)
541.1 cy Field



Pond DB-4: DB-4


Hydrograph
Inflow
Primary
2.15 cfs
0.52 cfs
Inflow Area=0.274 ac
Peak Elev=636.86'
Storage=0.176 af
Flow (cfs)
0
1
2
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72
Time (hours)

Stage-Discharge for Pond DB-4: DB-4

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
634.00	0.00	636.60	0.44
634.05	0.00	636.65	0.46
634.10	0.01	636.70	0.48
634.15	0.03	636.75	0.49
634.20	0.04	636.80	0.51
634.25	0.04	636.85	0.52
634.30	0.05	636.90	0.54
634.35	0.05	636.95	0.55
634.40	0.06	637.00	0.56
634.45	0.06	637.05	0.58
634.50	0.07	637.10	0.61
634.55	0.07	637.15	0.65
634.60	0.08	637.20	0.70
634.65	0.08	637.25	0.74
634.70	0.08	637.30	0.79
634.75	0.09	637.35	0.83
634.80	0.09	637.40	0.86
634.85	0.09	637.45	0.89
634.90	0.09	637.50	0.92
634.95	0.10	637.55	0.95
635.00	0.10	637.60	0.98
635.05	0.10	637.65	1.00
635.10	0.11	637.70	1.03
635.15	0.11	637.75	1.05
635.20	0.11	637.80	1.07
635.25	0.11	637.85	1.10
635.30	0.12	637.90	1.12
635.35	0.12	637.95	1.14
635.40	0.12	638.00	1.16
635.45	0.12	638.05	1.18
635.50	0.13	638.10	1.20
635.55	0.13	638.15	1.22
635.60	0.13	638.20	1.24
635.65	0.13	638.25	1.25
635.70	0.13	638.30	1.26
635.75	0.14	638.35	1.26
635.80	0.14	638.40	1.27
635.85	0.14	638.45	1.27
635.90	0.14	638.50	1.28
635.95	0.14	638.55	1.29
636.00	0.15	638.60	1.29
636.05	0.15	638.65	**1.30**
636.10	0.17		
636.15	0.20		
636.20	0.24		
636.25	0.27		
636.30	0.31		
636.35	0.34		
636.40	0.36		
636.45	0.39		
636.50	0.41		
636.55	0.43		

Summary for Pond DB-5: DB-5

Inflow Area = 0.708 ac, 85.71% Impervious, Inflow Depth = 7.43" for 25-YR event
Inflow = 2.86 cfs @ 12.02 hrs, Volume= 0.439 af
Outflow = 0.21 cfs @ 14.76 hrs, Volume= 0.438 af, Atten= 93%, Lag= 164.4 min
Primary = 0.21 cfs @ 14.76 hrs, Volume= 0.438 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs / 2
Peak Elev= 641.59' @ 14.77 hrs Surf.Area= 0.090 ac Storage= 0.293 af
Flood Elev= 643.50' Surf.Area= 0.090 ac Storage= 0.449 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 663.7 min (1,423.5 - 759.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	637.50'	0.000 af	**34.48'W x 113.83'L x 7.17'H Field A** 0.646 af Overall - 0.646 af Embedded = 0.000 af x 0.0% Voids
#2A	637.50'	0.490 af	**StormTrap ST1 DoubleTrap 6-0**x 40 Inside #1 Inside= 82.7"W x 72.0"H => 37.97 sf x 14.06'L = 534.0 cf Outside= 82.7"W x 86.0"H => 49.42 sf x 14.06'L = 695.0 cf 5 Rows adjusted for 602.1 cf perimeter wall 34.48' x 112.50' Core + 0.00' x 0.67' Border = 34.48' x 113.83' System
		0.490 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	637.50'	**6.0" Round Culvert** L= 80.0' RCP, rounded edge headwall, Ke= 0.100 Inlet / Outlet Invert= 637.50' / 636.00' S= 0.0187 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#2	Device 1	637.50'	**2.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.21 cfs @ 14.76 hrs HW=641.58' (Free Discharge)
└─**1=Culvert** (Passes 0.21 cfs of 1.30 cfs potential flow)
└─**2=Orifice/Grate** (Orifice Controls 0.21 cfs @ 9.63 fps)

Pond DB-5: DB-5 - Chamber Wizard Field A

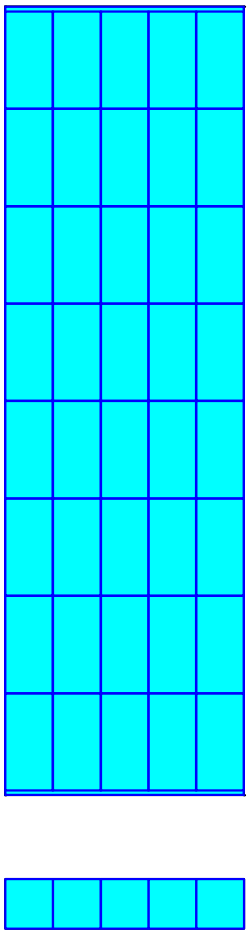
Chamber Model = StormTrap ST1 DoubleTrap 6-0 (StormTrap ST1 DoubleTrap® Type I/III/VI)
Inside= 82.7"W x 72.0"H => 37.97 sf x 14.06'L = 534.0 cf
Outside= 82.7"W x 86.0"H => 49.42 sf x 14.06'L = 695.0 cf
5 Rows adjusted for 602.1 cf perimeter wall

8 Chambers/Row x 14.06' Long = 112.50' Row Length +8.0" Border x 2 = 113.83' Base Length
5 Rows x 82.7" Wide = 34.48' Base Width
86.0" Chamber Height = 7.17' Field Height

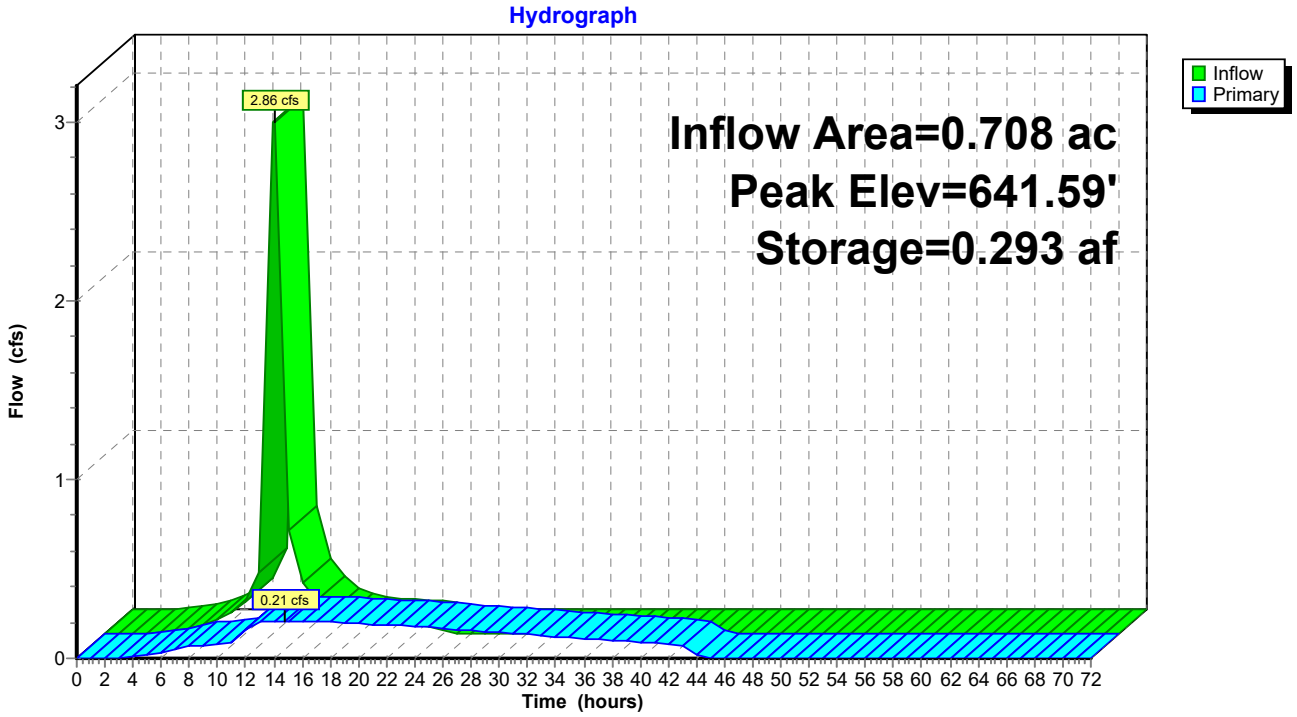
17.0 cf Sidewall x 8 x 2 + 33.0 cf Endwall x 5 x 2 = 602.1 cf Perimeter Wall
40 Chambers x 534.0 cf - 602.1 cf Perimeter wall = 20,757.8 cf Chamber Storage
40 Chambers x 695.0 cf + 329.5 cf Border = 28,128.3 cf Displacement

Chamber Storage = 20,757.8 cf = 0.477 af
Overall Storage Efficiency = 73.8%
Overall System Size = 113.83' x 34.48' x 7.17'

40 Chambers (plus border)
1,041.8 cy Field



Pond DB-5: DB-5


Hydrograph
Inflow
Primary
2.86 cfs
0.21 cfs
Inflow Area=0.708 ac
Peak Elev=641.59'
Storage=0.293 af
Flow (cfs)
Time (hours)

Stage-Discharge for Pond DB-5: DB-5

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
637.50	0.00	639.58	0.15	641.66	0.21	643.74	0.26
637.54	0.00	639.62	0.15	641.70	0.21	643.78	0.26
637.58	0.01	639.66	0.15	641.74	0.21	643.82	0.26
637.62	0.02	639.70	0.15	641.78	0.22	643.86	0.26
637.66	0.03	639.74	0.15	641.82	0.22	643.90	0.26
637.70	0.04	639.78	0.16	641.86	0.22	643.94	0.26
637.74	0.04	639.82	0.16	641.90	0.22	643.98	0.27
637.78	0.05	639.86	0.16	641.94	0.22	644.02	0.27
637.82	0.05	639.90	0.16	641.98	0.22	644.06	0.27
637.86	0.06	639.94	0.16	642.02	0.22	644.10	0.27
637.90	0.06	639.98	0.16	642.06	0.22	644.14	0.27
637.94	0.06	640.02	0.16	642.10	0.22	644.18	0.27
637.98	0.07	640.06	0.17	642.14	0.22	644.22	0.27
638.02	0.07	640.10	0.17	642.18	0.23	644.26	0.27
638.06	0.07	640.14	0.17	642.22	0.23	644.30	0.27
638.10	0.08	640.18	0.17	642.26	0.23	644.34	0.27
638.14	0.08	640.22	0.17	642.30	0.23	644.38	0.27
638.18	0.08	640.26	0.17	642.34	0.23	644.42	0.27
638.22	0.08	640.30	0.17	642.38	0.23	644.46	0.28
638.26	0.09	640.34	0.17	642.42	0.23	644.50	0.28
638.30	0.09	640.38	0.18	642.46	0.23	644.54	0.28
638.34	0.09	640.42	0.18	642.50	0.23	644.58	0.28
638.38	0.09	640.46	0.18	642.54	0.23	644.62	0.28
638.42	0.10	640.50	0.18	642.58	0.23	644.66	**0.28**
638.46	0.10	640.54	0.18	642.62	0.24		
638.50	0.10	640.58	0.18	642.66	0.24		
638.54	0.10	640.62	0.18	642.70	0.24		
638.58	0.10	640.66	0.18	642.74	0.24		
638.62	0.11	640.70	0.19	642.78	0.24		
638.66	0.11	640.74	0.19	642.82	0.24		
638.70	0.11	640.78	0.19	642.86	0.24		
638.74	0.11	640.82	0.19	642.90	0.24		
638.78	0.11	640.86	0.19	642.94	0.24		
638.82	0.12	640.90	0.19	642.98	0.24		
638.86	0.12	640.94	0.19	643.02	0.24		
638.90	0.12	640.98	0.19	643.06	0.25		
638.94	0.12	641.02	0.19	643.10	0.25		
638.98	0.12	641.06	0.20	643.14	0.25		
639.02	0.13	641.10	0.20	643.18	0.25		
639.06	0.13	641.14	0.20	643.22	0.25		
639.10	0.13	641.18	0.20	643.26	0.25		
639.14	0.13	641.22	0.20	643.30	0.25		
639.18	0.13	641.26	0.20	643.34	0.25		
639.22	0.13	641.30	0.20	643.38	0.25		
639.26	0.14	641.34	0.20	643.42	0.25		
639.30	0.14	641.38	0.20	643.46	0.25		
639.34	0.14	641.42	0.21	643.50	0.26		
639.38	0.14	641.46	0.21	643.54	0.26		
639.42	0.14	641.50	0.21	643.58	0.26		
639.46	0.14	641.54	0.21	643.62	0.26		
639.50	0.15	641.58	0.21	643.66	0.26		
639.54	0.15	641.62	0.21	643.70	0.26		

Summary for Pond ICS-3: ICS-3

Inflow Area = 0.328 ac, 72.22% Impervious, Inflow Depth = 4.75" for 25-YR event
Inflow = 0.71 cfs @ 12.03 hrs, Volume= 0.130 af
Outflow = 0.71 cfs @ 12.03 hrs, Volume= 0.130 af, Atten= 0%, Lag= 0.0 min
Primary = 0.45 cfs @ 12.05 hrs, Volume= 0.108 af
Secondary = 0.26 cfs @ 12.01 hrs, Volume= 0.022 af

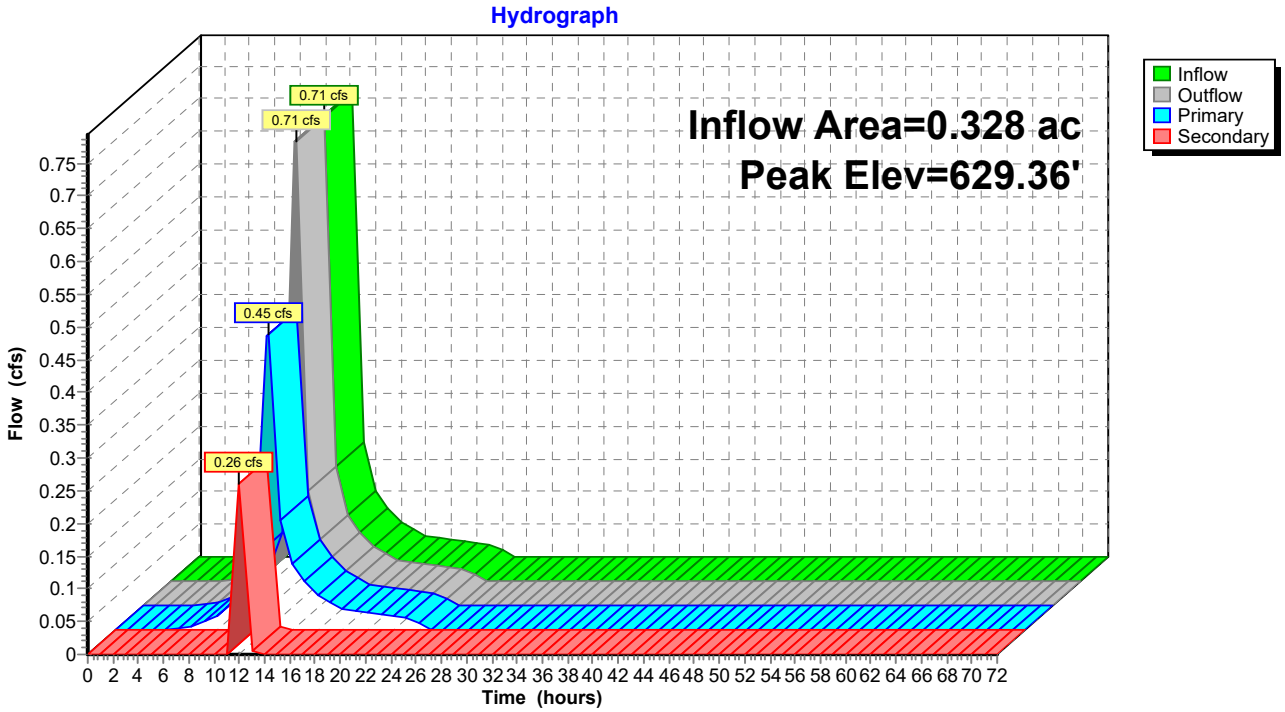
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs / 3
Peak Elev= 629.36' @ 12.04 hrs
Flood Elev= 632.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	628.85'	**5.0" Round Culvert** L= 240.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 628.85' / 622.00' S= 0.0285 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.14 sf
#2	Secondary	629.05'	**12.0" Round Culvert** L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 629.05' / 629.00' S= 0.0050 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.44 cfs @ 12.05 hrs HW=629.35' TW=623.35' (TW follows 6.00' below HW)
└─**1=Culvert** (Inlet Controls 0.44 cfs @ 3.23 fps)

Secondary OutFlow Max=0.26 cfs @ 12.01 hrs HW=629.36' (Free Discharge)
└─**2=Culvert** (Barrel Controls 0.26 cfs @ 1.88 fps)

Pond ICS-3: ICS-3



Stage-Discharge for Pond ICS-3: ICS-3

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
628.85	0.00	0.00	0.00
628.90	0.01	0.01	0.00
628.95	0.03	0.03	0.00
629.00	0.07	0.07	0.00
629.05	0.12	0.12	0.00
629.10	0.19	0.18	0.01
629.15	0.28	0.24	0.03
629.20	0.38	0.31	0.07
629.25	0.48	0.36	0.12
629.30	0.58	0.40	0.18
629.35	0.69	0.44	0.25
629.40	0.81	0.48	0.33
629.45	0.93	0.51	0.41
629.50	1.06	0.55	0.51
629.55	1.19	0.58	0.62
629.60	1.33	0.60	0.73
629.65	1.48	0.63	0.85
629.70	1.63	0.66	0.97
629.75	1.78	**0.68**	1.10
629.80	1.92	0.68	1.24
629.85	2.06	0.68	1.38
629.90	2.20	0.68	1.52
629.95	2.34	0.68	1.66
630.00	2.48	0.68	1.80
630.05	2.62	0.68	1.94
630.10	2.76	0.68	2.08
630.15	2.90	0.68	2.22
630.20	3.03	0.68	2.35
630.25	3.15	0.68	2.47
630.30	3.26	0.68	2.58
630.35	3.35	0.68	2.67
630.40	3.43	0.68	2.75
630.45	3.51	0.68	2.83
630.50	3.59	0.68	2.91
630.55	3.67	0.68	2.99
630.60	3.74	0.68	3.06
630.65	3.81	0.68	3.13
630.70	3.88	0.68	3.20
630.75	3.95	0.68	3.27
630.80	4.02	0.68	3.34
630.85	4.08	0.68	3.40
630.90	4.15	0.68	3.47
630.95	4.21	0.68	3.53
631.00	4.28	0.68	3.60
631.05	4.34	0.68	3.66
631.10	4.40	0.68	3.72
631.15	4.46	0.68	3.78
631.20	4.52	0.68	3.83
631.25	4.57	0.68	3.89
631.30	4.63	0.68	3.95
631.35	4.69	0.68	4.01
631.40	4.74	0.68	4.06
631.45	4.80	0.68	4.12
631.50	4.85	0.68	4.17
631.55	4.90	0.68	4.22
631.60	4.95	0.68	4.27
631.65	5.01	0.68	4.33
631.70	5.06	0.68	4.38
631.75	5.11	0.68	4.43
631.80	5.16	0.68	4.48
631.85	5.21	0.68	4.53
631.90	5.26	0.68	4.58
631.95	5.31	0.68	4.63
632.00	5.35	0.68	4.67
632.05	5.40	0.68	4.72
632.10	5.45	0.68	4.77
632.15	5.49	0.68	4.81
632.20	5.54	0.68	4.86
632.25	5.59	0.68	4.91
632.30	5.63	0.68	4.95
632.35	5.68	0.68	5.00
632.40	5.72	0.68	5.04
632.45	5.76	0.68	5.08
632.50	**5.81**	0.68	**5.13**

Summary for Pond ICS-4: ICS-4

Inflow Area = 1.068 ac, 93.43% Impervious, Inflow Depth = 5.66" for 25-YR event
Inflow = 2.59 cfs @ 12.01 hrs, Volume= 0.504 af
Outflow = 2.59 cfs @ 12.01 hrs, Volume= 0.504 af, Atten= 0%, Lag= 0.0 min
Primary = 1.11 cfs @ 12.05 hrs, Volume= 0.381 af
Secondary = 1.48 cfs @ 12.00 hrs, Volume= 0.122 af

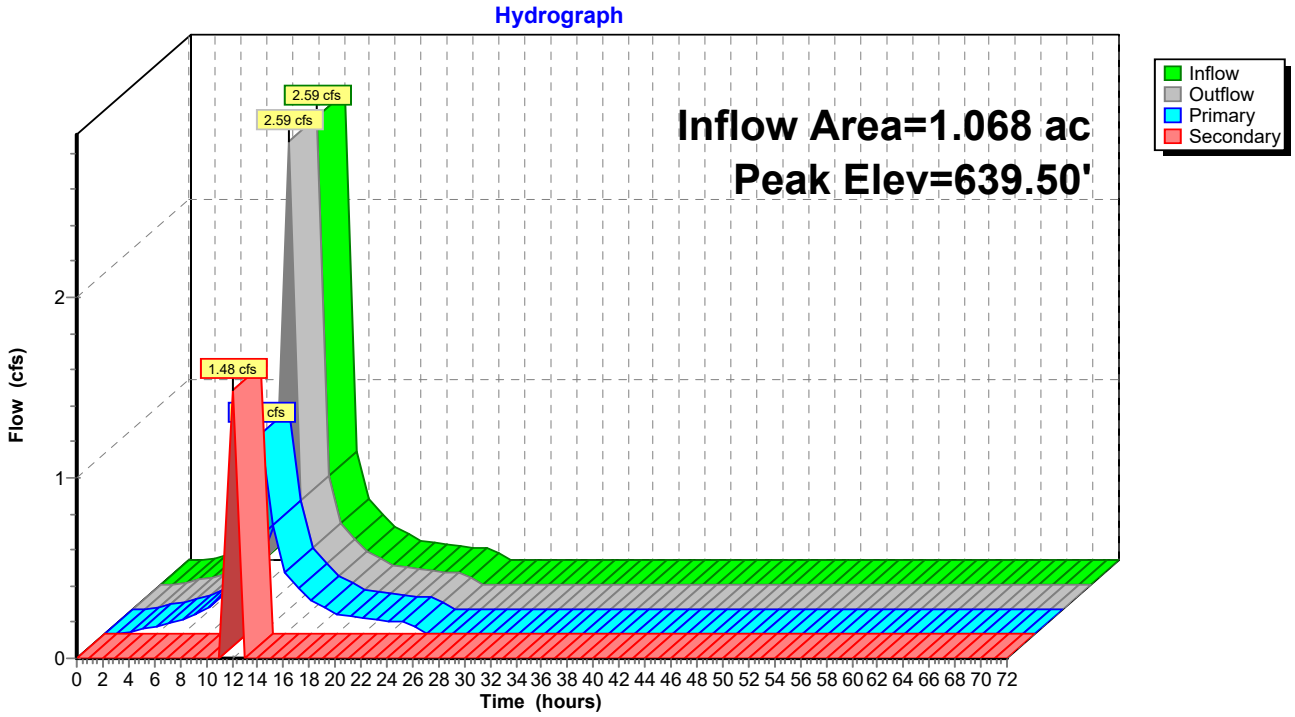
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs / 3
Peak Elev= 639.50' @ 12.01 hrs
Flood Elev= 640.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	636.50'	**6.0" Round Culvert** L= 235.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 636.50' / 633.00' S= 0.0149 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf
#2	Device 3	639.28'	**5.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Secondary	637.00'	**15.0" Round Culvert** L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 637.00' / 636.75' S= 0.0250 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=1.09 cfs @ 12.05 hrs HW=639.37' (Free Discharge)
└─**1=Culvert** (Barrel Controls 1.09 cfs @ 5.57 fps)

Secondary OutFlow Max=1.48 cfs @ 12.00 hrs HW=639.50' (Free Discharge)
└─**3=Culvert** (Passes 1.48 cfs of 6.39 cfs potential flow)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 1.48 cfs @ 1.33 fps)

Pond ICS-4: ICS-4



Stage-Discharge for Pond ICS-4: ICS-4

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
636.50	0.00	0.00	0.00
636.55	0.01	0.01	0.00
636.60	0.04	0.04	0.00
636.65	0.08	0.08	0.00
636.70	0.14	0.14	0.00
636.75	0.21	0.21	0.00
636.80	0.29	0.29	0.00
636.85	0.37	0.37	0.00
636.90	0.45	0.45	0.00
636.95	0.53	0.53	0.00
637.00	0.59	0.59	0.00
637.05	0.65	0.65	0.00
637.10	0.70	0.70	0.00
637.15	0.75	0.75	0.00
637.20	0.79	0.79	0.00
637.25	0.84	0.84	0.00
637.30	0.88	0.88	0.00
637.35	0.89	0.89	0.00
637.40	0.89	0.89	0.00
637.45	0.90	0.90	0.00
637.50	0.90	0.90	0.00
637.55	0.91	0.91	0.00
637.60	0.91	0.91	0.00
637.65	0.92	0.92	0.00
637.70	0.92	0.92	0.00
637.75	0.93	0.93	0.00
637.80	0.94	0.94	0.00
637.85	0.94	0.94	0.00
637.90	0.95	0.95	0.00
637.95	0.95	0.95	0.00
638.00	0.96	0.96	0.00
638.05	0.96	0.96	0.00
638.10	0.97	0.97	0.00
638.15	0.97	0.97	0.00
638.20	0.98	0.98	0.00
638.25	0.98	0.98	0.00
638.30	0.99	0.99	0.00
638.35	0.99	0.99	0.00
638.40	1.00	1.00	0.00
638.45	1.00	1.00	0.00
638.50	1.01	1.01	0.00
638.55	1.01	1.01	0.00
638.60	1.02	1.02	0.00
638.65	1.02	1.02	0.00
638.70	1.03	1.03	0.00
638.75	1.03	1.03	0.00
638.80	1.04	1.04	0.00
638.85	1.04	1.04	0.00
638.90	1.05	1.05	0.00
638.95	1.05	1.05	0.00
639.00	1.06	1.06	0.00
639.05	1.06	1.06	0.00
639.10	1.07	1.07	0.00
639.15	1.07	1.07	0.00
639.20	1.08	1.08	0.00
639.25	1.08	1.08	0.00
639.30	1.13	1.09	0.04
639.35	1.35	1.09	0.26
639.40	1.68	1.10	0.58
639.45	2.08	1.10	0.98
639.50	2.56	1.11	1.45
639.55	3.10	1.11	1.99
639.60	3.71	1.11	2.60
639.65	4.38	1.12	3.27
639.70	5.12	1.12	4.00
639.75	5.92	1.13	4.79
639.80	6.79	1.13	5.65
639.85	7.71	1.14	6.58
639.90	8.18	1.14	7.04
639.95	8.26	1.15	7.11
640.00	**8.34**	**1.15**	**7.19**

Summary for Pond ICS-5: ICS-5

Inflow Area =	0.739 ac, 62.40% Impervious, Inflow Depth = 4.32" for 25-YR event				
Inflow =	1.47 cfs @	12.03 hrs,	Volume=	0.266 af	
Outflow =	1.47 cfs @	12.03 hrs,	Volume=	0.266 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.27 cfs @	12.07 hrs,	Volume=	0.141 af	
Secondary =	1.20 cfs @	12.03 hrs,	Volume=	0.125 af	

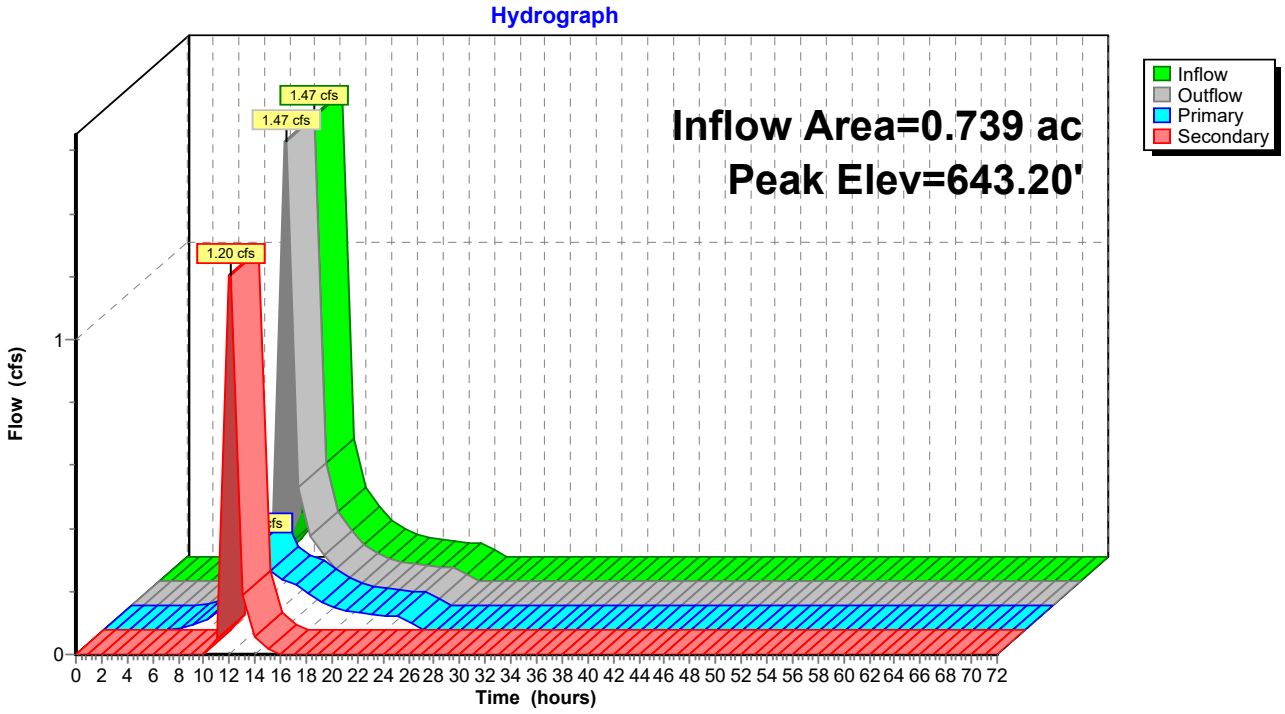
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs / 3
Peak Elev= 643.20' @ 12.06 hrs
Flood Elev= 645.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	642.25'	**3.0" Round Culvert** L= 80.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 642.25' / 636.00' S= 0.0781 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.05 sf
#2	Secondary	642.56'	**12.0" Round Culvert** L= 6.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 642.56' / 642.50' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.26 cfs @ 12.07 hrs HW=643.16' TW=637.16' (TW follows 6.00' below HW)
└─**1=Culvert** (Inlet Controls 0.26 cfs @ 5.34 fps)

Secondary OutFlow Max=1.16 cfs @ 12.03 hrs HW=643.18' TW=637.18' (TW follows 6.00' below HW)
└─**2=Culvert** (Barrel Controls 1.16 cfs @ 3.24 fps)

Pond ICS-5: ICS-5



Stage-Discharge for Pond ICS-5: ICS-5

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
642.25	0.00	0.00	0.00
642.30	0.01	0.01	0.00
642.35	0.02	0.02	0.00
642.40	0.05	0.05	0.00
642.45	0.08	0.08	0.00
642.50	0.10	0.10	0.00
642.55	0.12	0.12	0.00
642.60	0.15	0.14	0.01
642.65	0.19	0.15	0.03
642.70	0.25	0.17	0.08
642.75	0.32	0.18	0.14
642.80	0.41	0.19	0.22
642.85	0.51	0.20	0.30
642.90	0.62	0.21	0.40
642.95	0.74	0.22	0.52
643.00	0.87	0.23	0.64
643.05	1.02	0.24	0.77
643.10	1.17	0.25	0.91
643.15	1.33	0.26	1.07
643.20	1.49	0.27	1.22
643.25	1.66	0.28	1.39
643.30	1.84	0.28	1.56
643.35	2.02	**0.29**	1.73
643.40	2.21	**0.30**	1.91
643.45	2.39	0.30	2.09
643.50	2.57	0.30	2.27
643.55	2.75	0.30	2.45
643.60	2.93	0.30	2.63
643.65	3.10	0.30	2.80
643.70	3.27	0.30	2.97
643.75	3.42	0.30	3.13
643.80	3.57	0.30	3.27
643.85	3.69	0.30	3.39
643.90	3.78	0.30	3.48
643.95	3.99	0.30	3.69
644.00	4.19	0.30	3.89
644.05	4.38	0.30	4.08
644.10	4.56	0.30	4.26
644.15	4.73	0.30	4.44
644.20	4.90	0.30	4.60
644.25	5.06	0.30	4.77
644.30	5.22	0.30	4.92
644.35	5.37	0.30	5.07
644.40	5.52	0.30	5.22
644.45	5.66	0.30	5.36
644.50	5.80	0.30	5.50
644.55	5.94	0.30	5.64
644.60	6.07	0.30	5.77
644.65	6.20	0.30	5.90
644.70	6.32	0.30	6.03
644.75	6.44	0.30	6.15
644.80	6.53	0.30	6.24
644.85	6.62	0.30	6.32
644.90	6.71	0.30	6.41
644.95	6.79	0.30	6.50
645.00	6.88	0.30	6.58
645.05	6.96	0.30	6.67
645.10	7.05	0.30	6.75
645.15	7.13	0.30	6.83
645.20	7.21	0.30	6.92
645.25	7.29	0.30	7.00
645.30	7.37	0.30	7.07
645.35	7.45	0.30	7.15
645.40	7.53	0.30	7.23
645.45	7.60	0.30	7.31
645.50	**7.68**	0.30	**7.38**

Summary for Pond RG-7B: RG-7B

Inflow Area = 0.055 ac, 72.50% Impervious, Inflow Depth = 4.75" for 25-YR event
Inflow = 0.12 cfs @ 12.03 hrs, Volume= 0.022 af
Outflow = 0.05 cfs @ 13.03 hrs, Volume= 0.020 af, Atten= 55%, Lag= 60.0 min
Primary = 0.05 cfs @ 13.03 hrs, Volume= 0.020 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs / 3
Peak Elev= 654.91' @ 13.00 hrs Surf.Area= 488 sf Storage= 329 cf

Plug-Flow detention time= 477.1 min calculated for 0.019 af (88% of inflow)
Center-of-Mass det. time= 439.2 min (1,228.5 - 789.3)

Volume	Invert	Avail.Storage	Storage Description
#1	653.00'	249 cf	**Custom Stage Data (Conic)** Listed below (Recalc) 638 cf Overall - 389 cf Embedded = 249 cf
#2	653.00'	52 cf	**Crushed Stone (Prismatic)** Listed below (Recalc) Inside #1 130 cf Overall x 40.0% Voids
#3	653.50'	58 cf	**Bio Mix Media (Prismatic)** Listed below (Recalc) Inside #1 194 cf Overall x 30.0% Voids
#4	654.25'	13 cf	**Mulch (Prismatic)** Listed below (Recalc) Inside #1 65 cf Overall x 20.0% Voids
		372 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
653.00	259	0	0	259
654.00	259	259	259	316
655.00	513	379	638	579

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
653.00	259	0	0
653.50	259	130	130

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
653.50	259	0	0
654.25	259	194	194

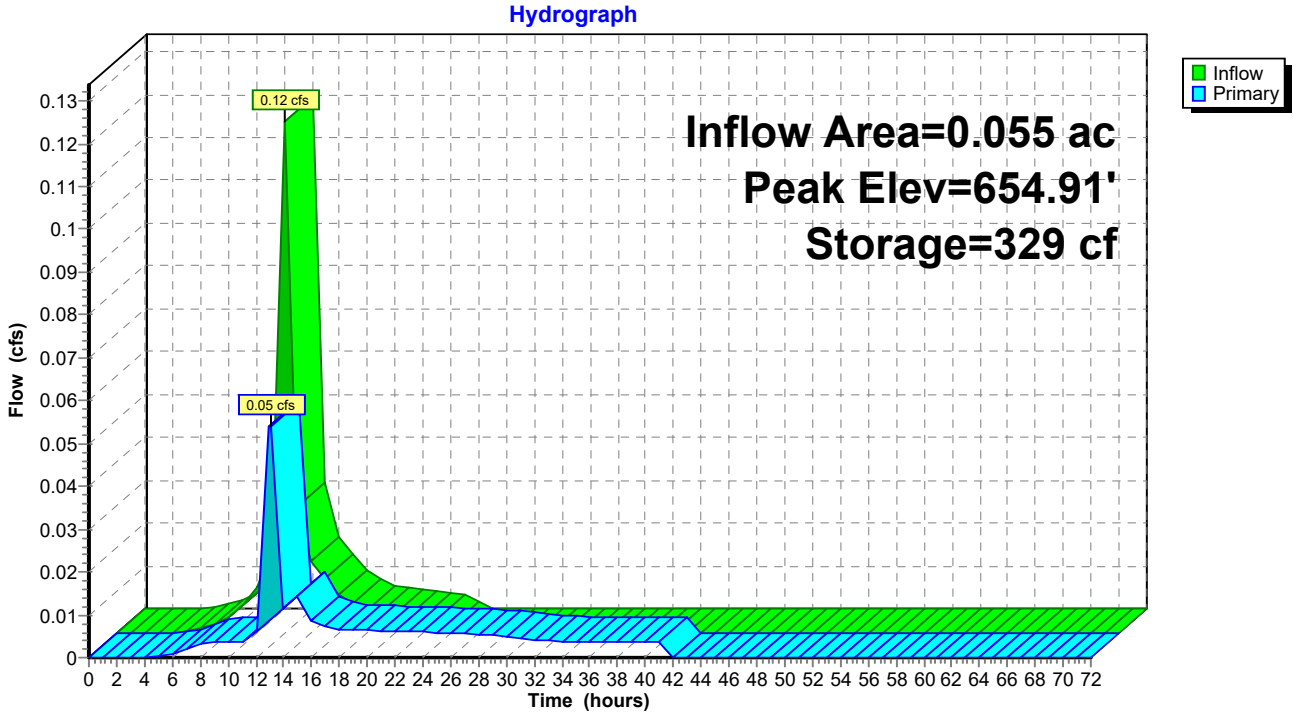
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
654.25	259	0	0
654.50	259	65	65

Device	Routing	Invert	Outlet Devices
#1	Primary	654.90'	**10.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

#2 Primary 653.00' **0.580 in/hr Exfiltration over Surface area**

Primary OutFlow Max=0.04 cfs @ 13.03 hrs HW=654.91' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 0.04 cfs @ 0.29 fps)
└─**2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Pond RG-7B: RG-7B



Stage-Discharge for Pond RG-7B: RG-7B

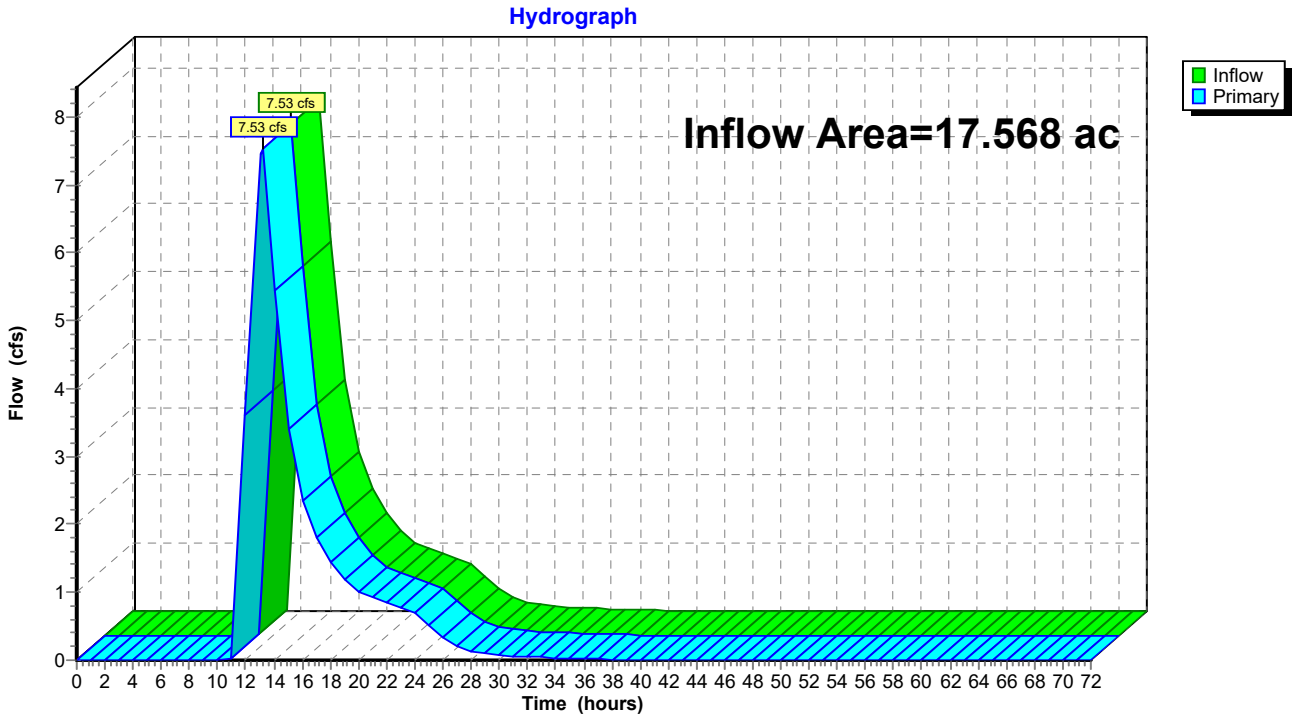
Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
653.00	0.00	653.52	0.00	654.04	0.00	654.56	0.01
653.01	0.00	653.53	0.00	654.05	0.00	654.57	0.01
653.02	0.00	653.54	0.00	654.06	0.00	654.58	0.01
653.03	0.00	653.55	0.00	654.07	0.00	654.59	0.01
653.04	0.00	653.56	0.00	654.08	0.00	654.60	0.01
653.05	0.00	653.57	0.00	654.09	0.00	654.61	0.01
653.06	0.00	653.58	0.00	654.10	0.00	654.62	0.01
653.07	0.00	653.59	0.00	654.11	0.00	654.63	0.01
653.08	0.00	653.60	0.00	654.12	0.00	654.64	0.01
653.09	0.00	653.61	0.00	654.13	0.00	654.65	0.01
653.10	0.00	653.62	0.00	654.14	0.00	654.66	0.01
653.11	0.00	653.63	0.00	654.15	0.00	654.67	0.01
653.12	0.00	653.64	0.00	654.16	0.00	654.68	0.01
653.13	0.00	653.65	0.00	654.17	0.00	654.69	0.01
653.14	0.00	653.66	0.00	654.18	0.00	654.70	0.01
653.15	0.00	653.67	0.00	654.19	0.00	654.71	0.01
653.16	0.00	653.68	0.00	654.20	0.00	654.72	0.01
653.17	0.00	653.69	0.00	654.21	0.00	654.73	0.01
653.18	0.00	653.70	0.00	654.22	0.00	654.74	0.01
653.19	0.00	653.71	0.00	654.23	0.00	654.75	0.01
653.20	0.00	653.72	0.00	654.24	0.00	654.76	0.01
653.21	0.00	653.73	0.00	654.25	0.00	654.77	0.01
653.22	0.00	653.74	0.00	654.26	0.00	654.78	0.01
653.23	0.00	653.75	0.00	654.27	0.00	654.79	0.01
653.24	0.00	653.76	0.00	654.28	0.00	654.80	0.01
653.25	0.00	653.77	0.00	654.29	0.00	654.81	0.01
653.26	0.00	653.78	0.00	654.30	0.00	654.82	0.01
653.27	0.00	653.79	0.00	654.31	0.00	654.83	0.01
653.28	0.00	653.80	0.00	654.32	0.00	654.84	0.01
653.29	0.00	653.81	0.00	654.33	0.00	654.85	0.01
653.30	0.00	653.82	0.00	654.34	0.00	654.86	0.01
653.31	0.00	653.83	0.00	654.35	0.00	654.87	0.01
653.32	0.00	653.84	0.00	654.36	0.00	654.88	0.01
653.33	0.00	653.85	0.00	654.37	0.00	654.89	0.01
653.34	0.00	653.86	0.00	654.38	0.00	654.90	0.01
653.35	0.00	653.87	0.00	654.39	0.00	654.91	0.03
653.36	0.00	653.88	0.00	654.40	0.00	654.92	0.08
653.37	0.00	653.89	0.00	654.41	0.00	654.93	0.14
653.38	0.00	653.90	0.00	654.42	0.00	654.94	0.21
653.39	0.00	653.91	0.00	654.43	0.00	654.95	0.29
653.40	0.00	653.92	0.00	654.44	0.00	654.96	0.38
653.41	0.00	653.93	0.00	654.45	0.00	654.97	0.48
653.42	0.00	653.94	0.00	654.46	0.00	654.98	0.58
653.43	0.00	653.95	0.00	654.47	0.00	654.99	0.69
653.44	0.00	653.96	0.00	654.48	0.00	655.00	**0.81**
653.45	0.00	653.97	0.00	654.49	0.01		
653.46	0.00	653.98	0.00	654.50	0.01		
653.47	0.00	653.99	0.00	654.51	0.01		
653.48	0.00	654.00	0.00	654.52	0.01		
653.49	0.00	654.01	0.00	654.53	0.01		
653.50	0.00	654.02	0.00	654.54	0.01		
653.51	0.00	654.03	0.00	654.55	0.01		

Summary for Link PDP-3: Design Point 3

Inflow Area = 17.568 ac, 18.21% Impervious, Inflow Depth = 1.84" for 25-YR event
Inflow = 7.53 cfs @ 13.16 hrs, Volume= 2.696 af
Primary = 7.53 cfs @ 13.16 hrs, Volume= 2.696 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs

Link PDP-3: Design Point 3



Summary for Subcatchment 4A: PDA-4A

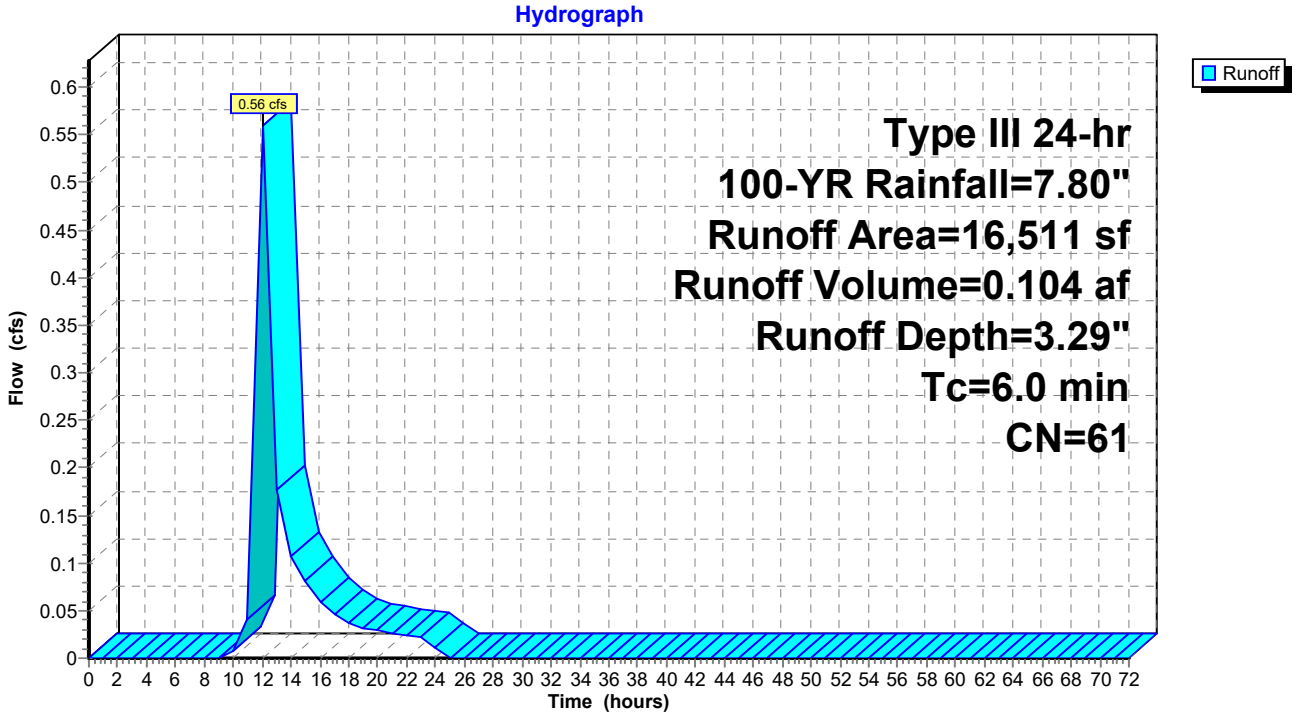
Runoff = 0.56 cfs @ 12.08 hrs, Volume= 0.104 af, Depth= 3.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 100-YR Rainfall=7.80"

	Area (sf)	CN	Description
*	7,284	55	Woods, Good, HSG B
	3,480	70	Woods, Good, HSG C
	1,370	74	>75% Grass cover, Good, HSG C
	4,377	61	>75% Grass cover, Good, HSG B
	16,511	61	Weighted Average
	16,511		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 min.**

Subcatchment 4A: PDA-4A



Summary for Subcatchment 4B: PDA-4B

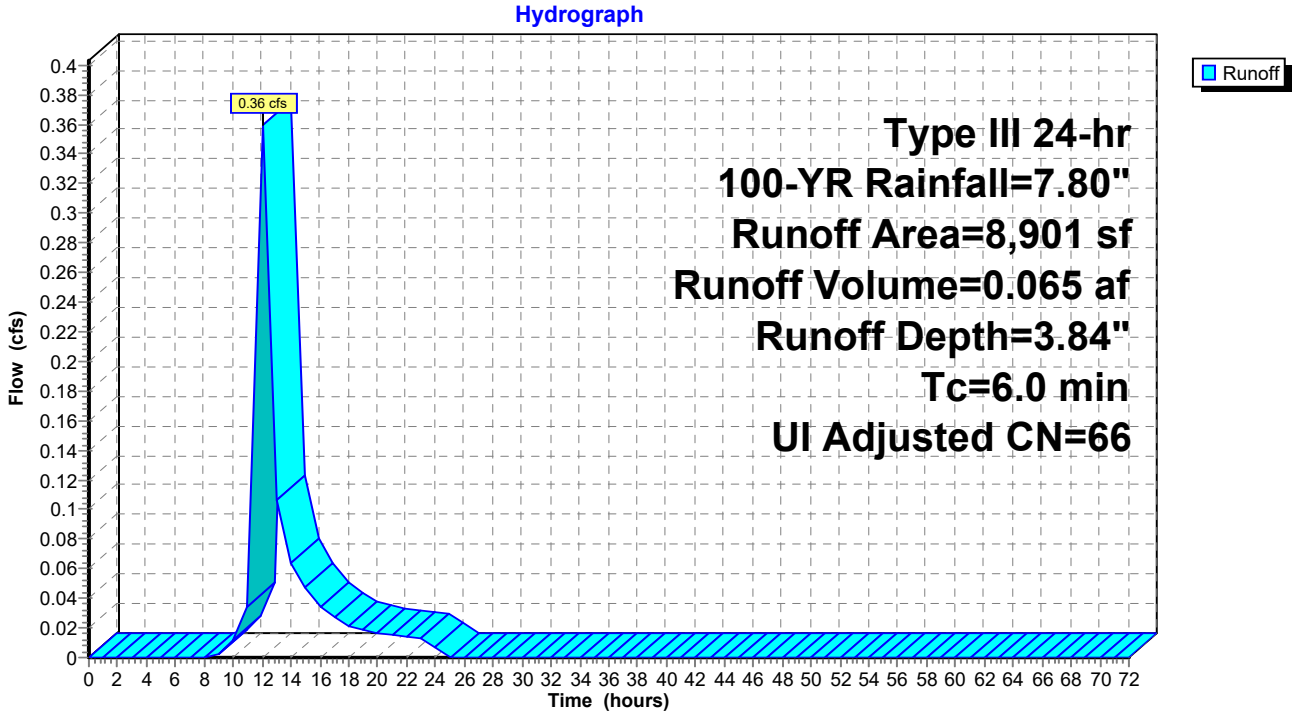
Runoff = 0.36 cfs @ 12.06 hrs, Volume= 0.065 af, Depth= 3.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 100-YR Rainfall=7.80"

Area (sf)	CN	Adj	Description
5,978	61		>75% Grass cover, Good, HSG B
2,026	74		>75% Grass cover, Good, HSG C
897	98		Unconnected pavement, HSG B
8,901	68	66	Weighted Average, UI Adjusted
8,004			89.92% Pervious Area
897			10.08% Impervious Area
897			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 min**

Subcatchment 4B: PDA-4B



Summary for Subcatchment 4C: PDA-4C

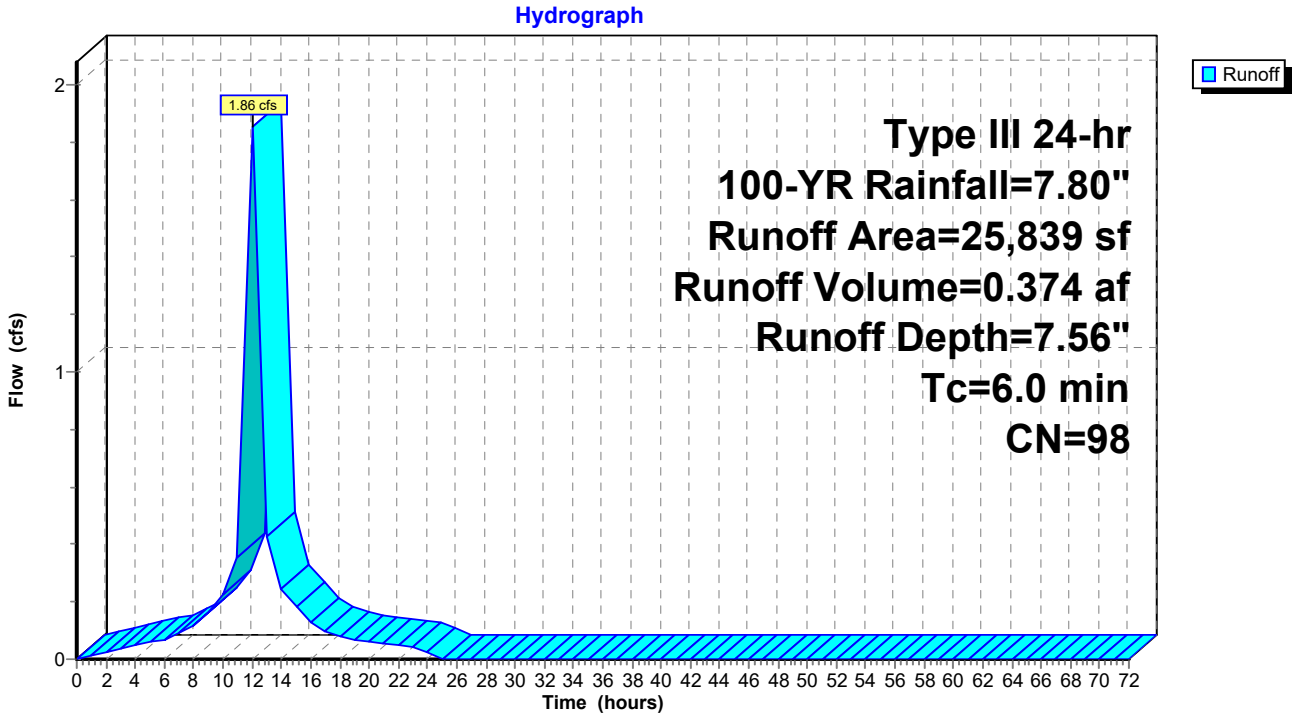
Runoff = 1.86 cfs @ 12.01 hrs, Volume= 0.374 af, Depth= 7.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 100-YR Rainfall=7.80"

Area (sf)	CN	Description
25,839	98	Roofs, HSG B
25,839		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Subcatchment 4C: PDA-4C



Summary for Subcatchment 4D: PDA-4D

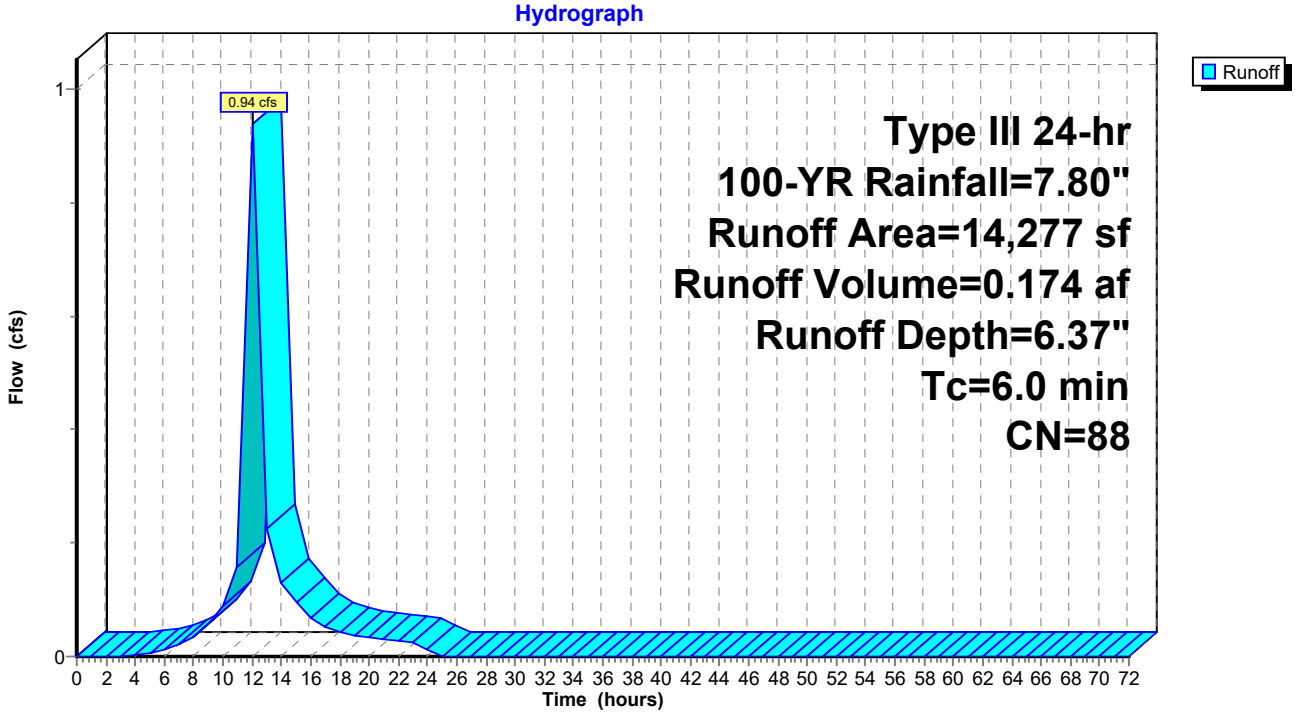
Runoff = 0.94 cfs @ 12.02 hrs, Volume= 0.174 af, Depth= 6.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 100-YR Rainfall=7.80"

Area (sf)	CN	Description
10,311	98	Paved parking, HSG B
3,966	61	>75% Grass cover, Good, HSG B
14,277	88	Weighted Average
3,966		27.78% Pervious Area
10,311		72.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 min**

Subcatchment 4D: PDA-4D



Summary for Subcatchment 4E: PDA-4E

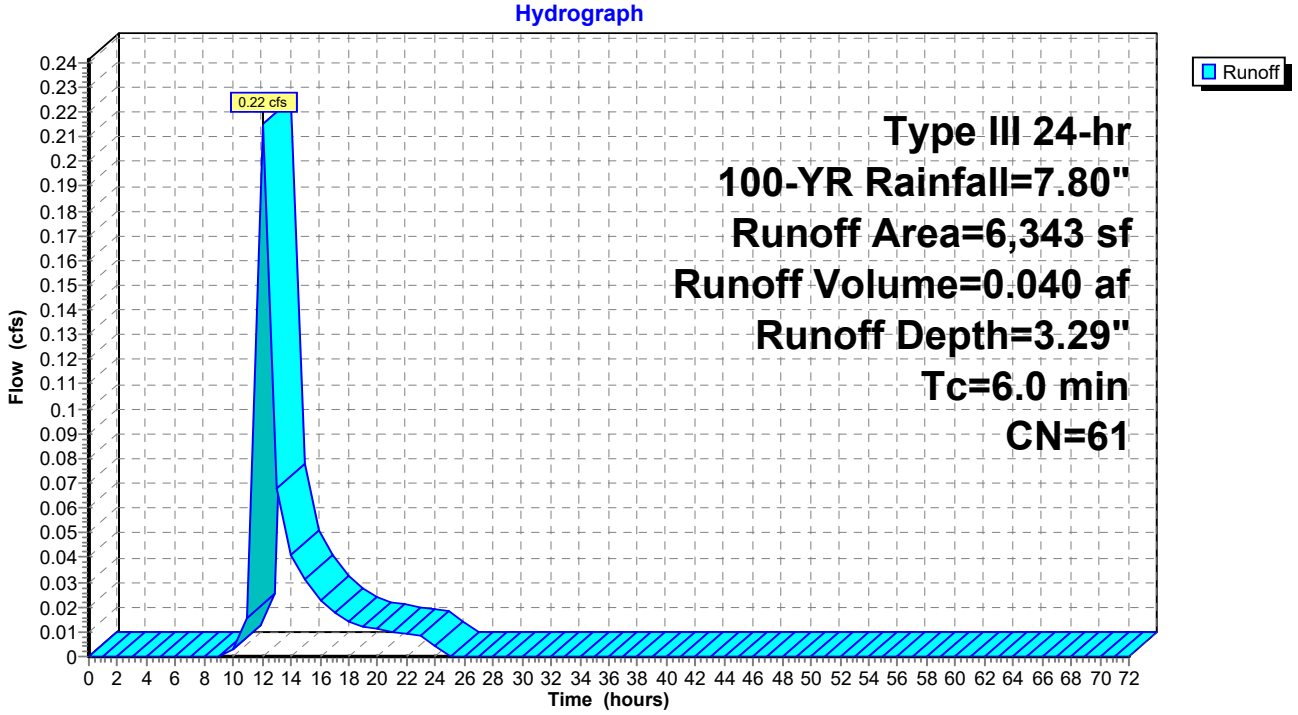
Runoff = 0.22 cfs @ 12.08 hrs, Volume= 0.040 af, Depth= 3.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 100-YR Rainfall=7.80"

Area (sf)	CN	Description
6,331	61	>75% Grass cover, Good, HSG B
12	98	Paved parking, HSG B
6,343	61	Weighted Average
6,331		99.81% Pervious Area
12		0.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 min**

Subcatchment 4E: PDA-4E



Summary for Subcatchment 4F: PDA-4F

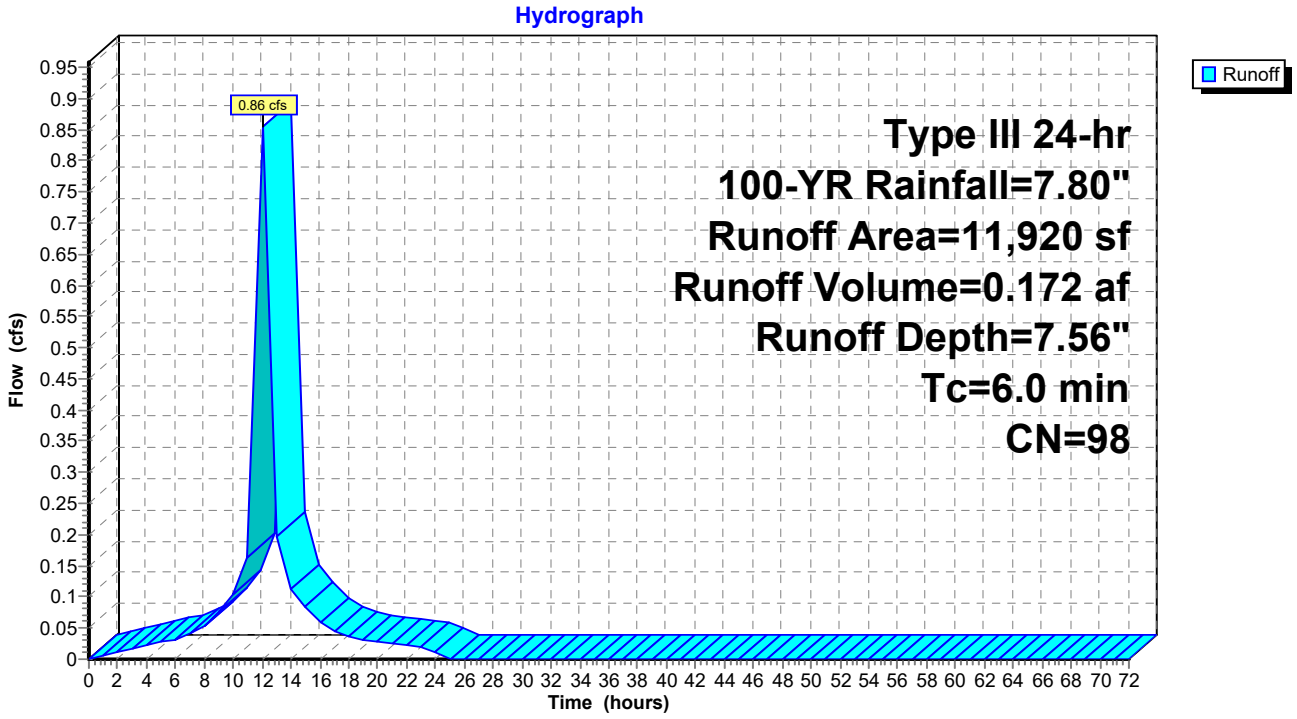
Runoff = 0.86 cfs @ 12.01 hrs, Volume= 0.172 af, Depth= 7.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 100-YR Rainfall=7.80"

Area (sf)	CN	Description
11,920	98	Roofs, HSG B
11,920		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Subcatchment 4F: PDA-4F



Summary for Subcatchment 4G: PDA-4G

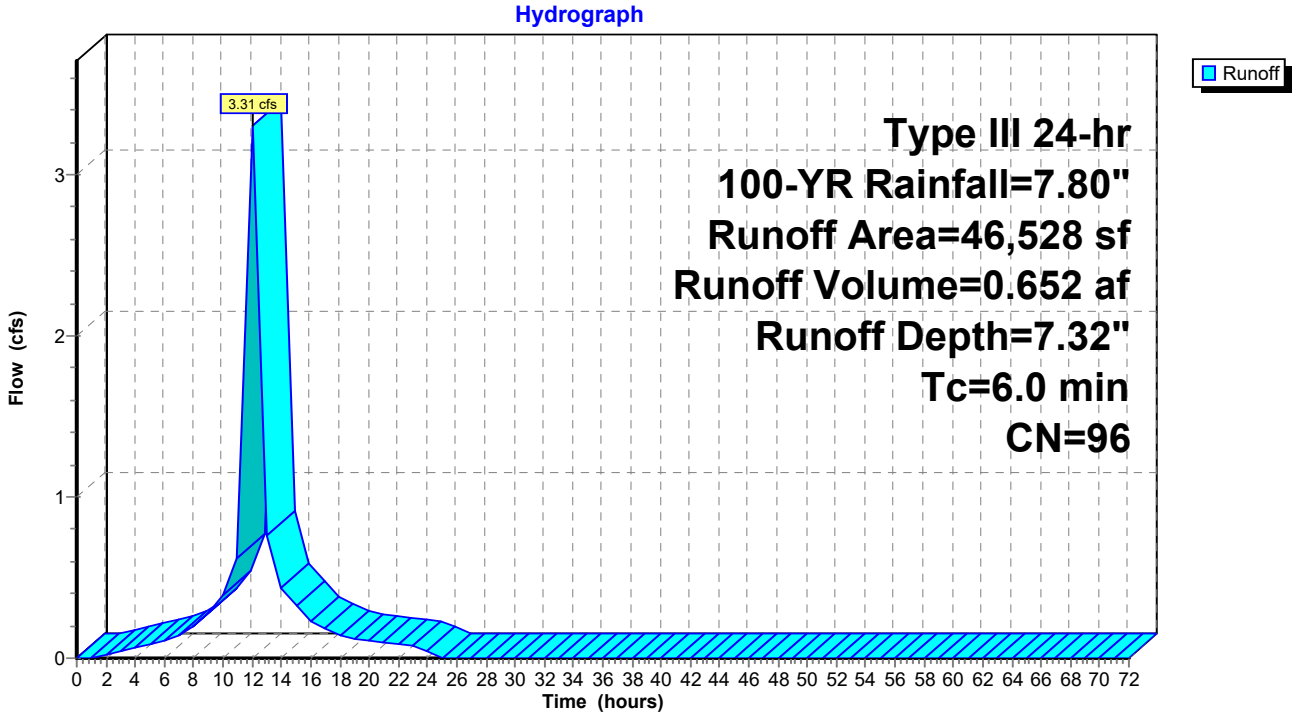
Runoff = 3.31 cfs @ 12.01 hrs, Volume= 0.652 af, Depth= 7.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 100-YR Rainfall=7.80"

Area (sf)	CN	Description
10,383	98	Paved parking, HSG B
3,055	61	>75% Grass cover, Good, HSG B
33,090	98	Roofs, HSG B
46,528	96	Weighted Average
3,055		6.57% Pervious Area
43,473		93.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 min**

Subcatchment 4G: PDA-4G



Summary for Subcatchment 5A: PDA-5A

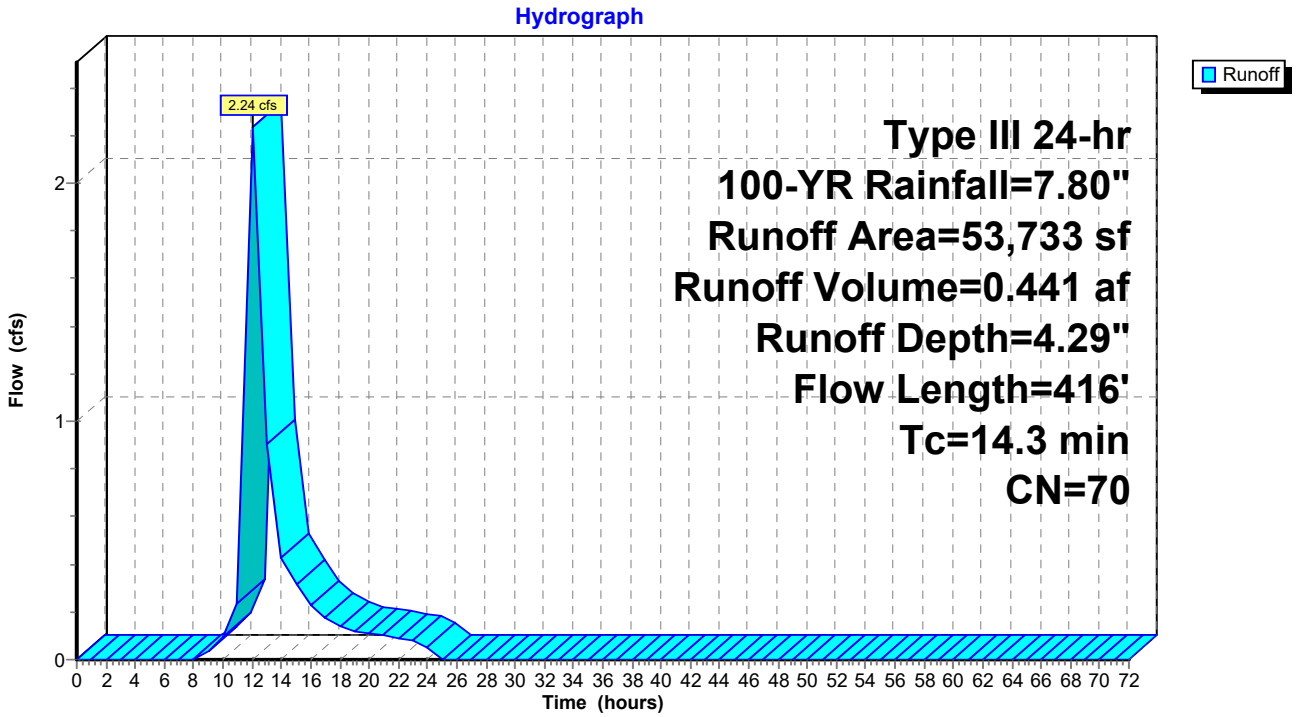
Runoff = 2.24 cfs @ 12.10 hrs, Volume= 0.441 af, Depth= 4.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 100-YR Rainfall=7.80"

Area (sf)	CN	Description
53,733	70	Woods, Good, HSG C
53,733		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.9	50	0.0334	0.08		**Sheet Flow, 5A-5B** Woods: Light underbrush n= 0.400 P2= 3.32"
3.3	239	0.0566	1.19		**Shallow Concentrated Flow, 5B-5C** Woodland Kv= 5.0 fps
0.3	62	0.0450	3.42		**Shallow Concentrated Flow, swale/ditch** Unpaved Kv= 16.1 fps
0.1	23	0.0100	4.91	3.86	**Pipe Channel, 12" CPP** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Corrugated PP, smooth interior
0.7	42	0.0430	1.04		**Shallow Concentrated Flow, 5E-EDP-5** Woodland Kv= 5.0 fps
14.3	416	Total			

Subcatchment 5A: PDA-5A



Summary for Subcatchment 5B: PDA-5B

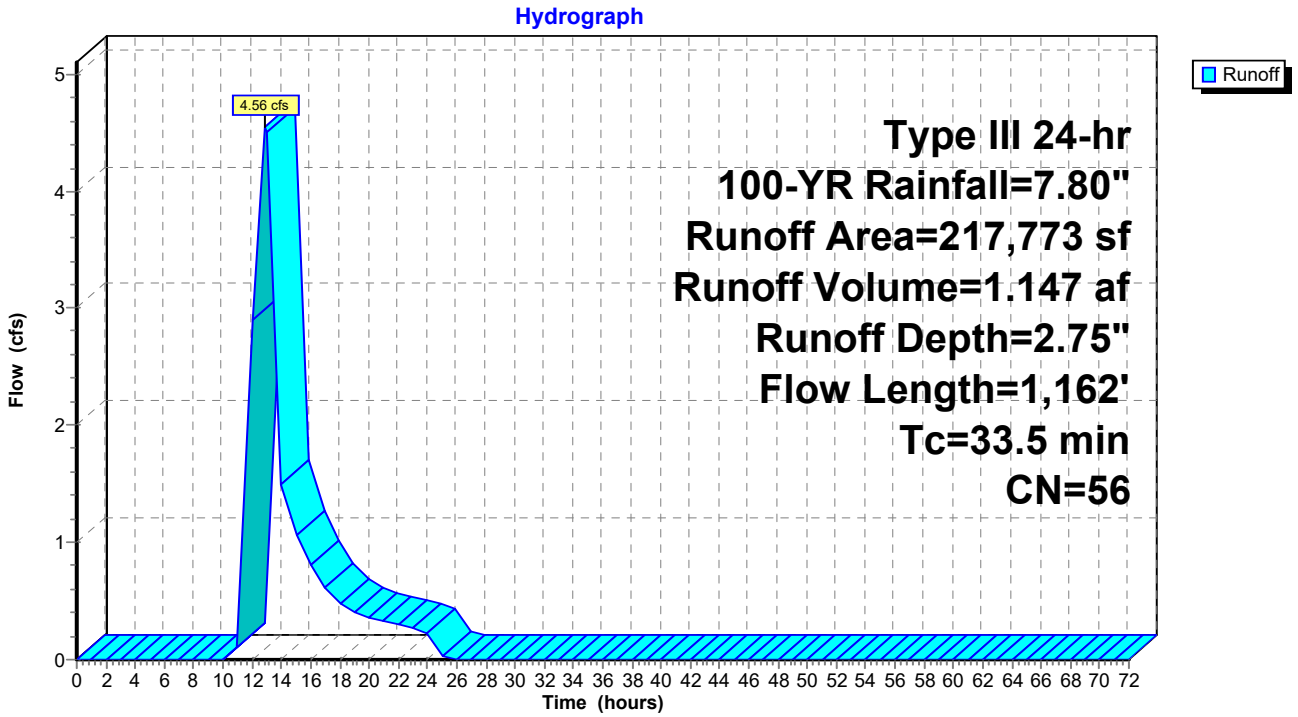
Runoff = 4.56 cfs @ 12.85 hrs, Volume= 1.147 af, Depth= 2.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 100-YR Rainfall=7.80"

Area (sf)	CN	Description
200,443	55	Woods, Good, HSG B
13,852	77	Woods, Good, HSG D
3,478	61	>75% Grass cover, Good, HSG B
217,773	56	Weighted Average
217,773		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	50	0.0400	0.09		**Sheet Flow, 5A-5B** Woods: Light underbrush n= 0.400 P2= 3.32"
9.9	553	0.0350	0.94		**Shallow Concentrated Flow, 5B-5C** Woodland Kv= 5.0 fps
13.3	455	0.0130	0.57		**Shallow Concentrated Flow, 5C-5D** Woodland Kv= 5.0 fps
1.1	104	0.0913	1.51		**Shallow Concentrated Flow, 5D-EDP-5** Woodland Kv= 5.0 fps
33.5	1,162	Total			

Subcatchment 5B: PDA-5B



Summary for Subcatchment 5C: PDA-5C

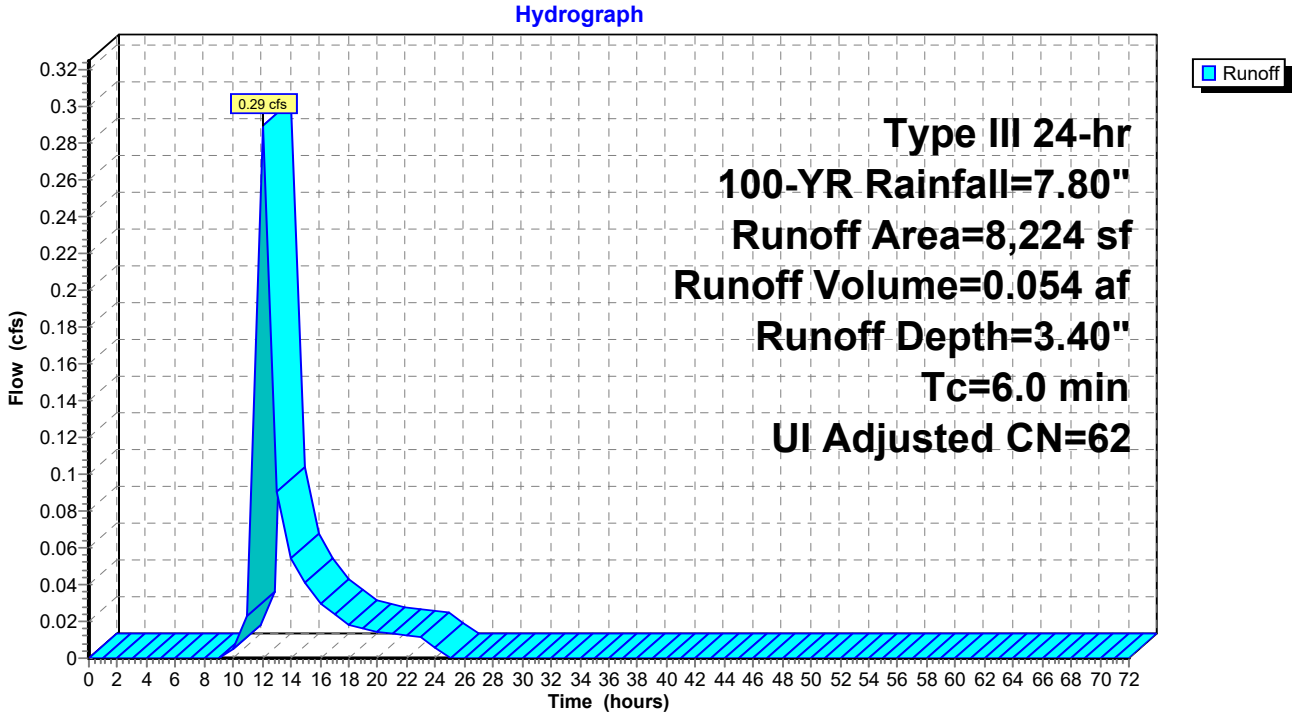
Runoff = 0.29 cfs @ 12.07 hrs, Volume= 0.054 af, Depth= 3.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 100-YR Rainfall=7.80"

Area (sf)	CN	Adj	Description
7,872	61		>75% Grass cover, Good, HSG B
352	98		Unconnected pavement, HSG B
8,224	63	62	Weighted Average, UI Adjusted
7,872			95.72% Pervious Area
352			4.28% Impervious Area
352			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 min**

Subcatchment 5C: PDA-5C



Summary for Subcatchment 5D: PDA-5D

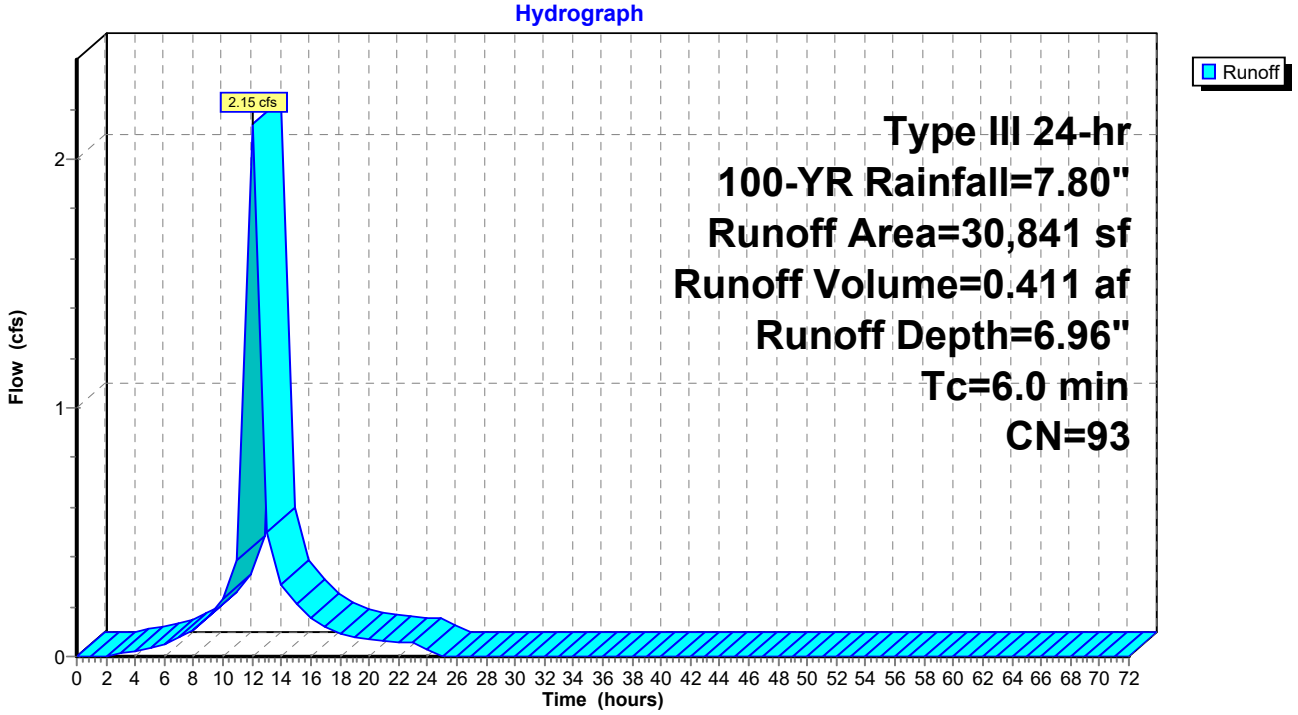
Runoff = 2.15 cfs @ 12.02 hrs, Volume= 0.411 af, Depth= 6.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 100-YR Rainfall=7.80"

Area (sf)	CN	Description
4,408	61	>75% Grass cover, Good, HSG B
26,433	98	Roofs, HSG B
30,841	93	Weighted Average
4,408		14.29% Pervious Area
26,433		85.71% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 min**

Subcatchment 5D: PDA-5D



Summary for Subcatchment 5E: PDA-5E

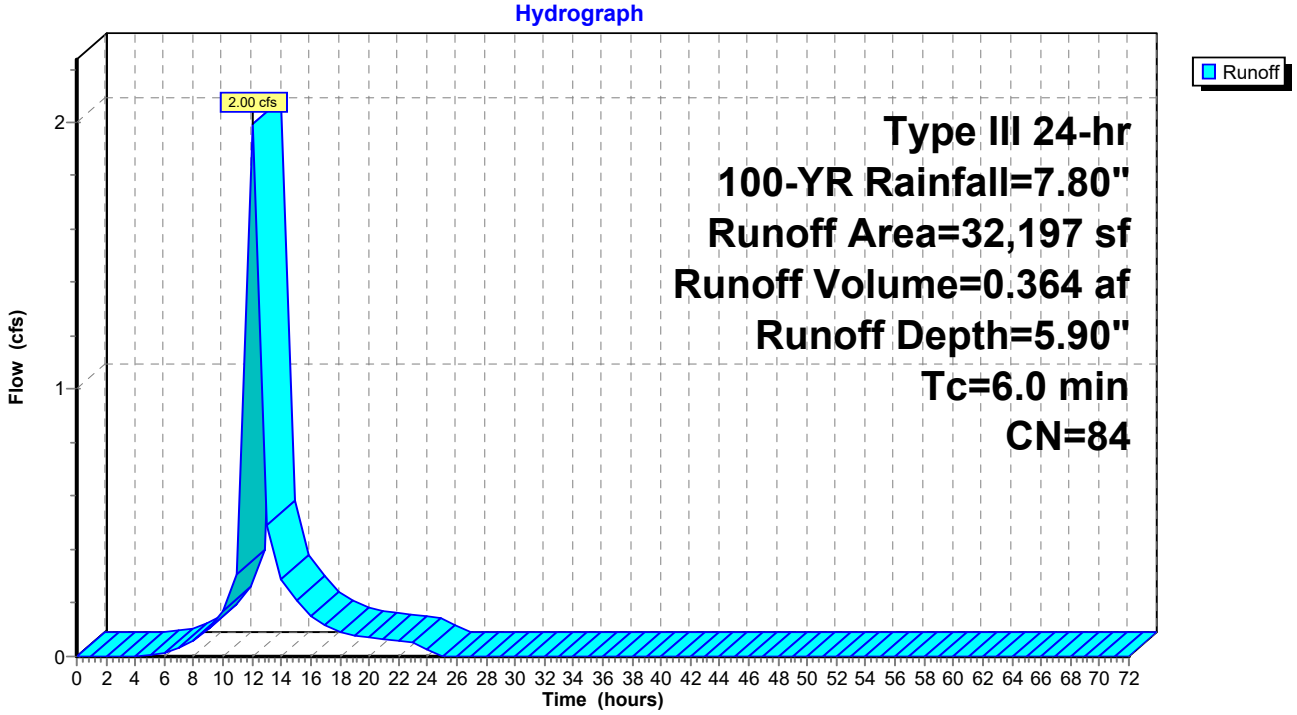
Runoff = 2.00 cfs @ 12.03 hrs, Volume= 0.364 af, Depth= 5.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 100-YR Rainfall=7.80"

Area (sf)	CN	Description
20,092	98	Paved parking, HSG B
12,105	61	>75% Grass cover, Good, HSG B
32,197	84	Weighted Average
12,105		37.60% Pervious Area
20,092		62.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 min**

Subcatchment 5E: PDA-5E



Summary for Subcatchment 6: PDA-6

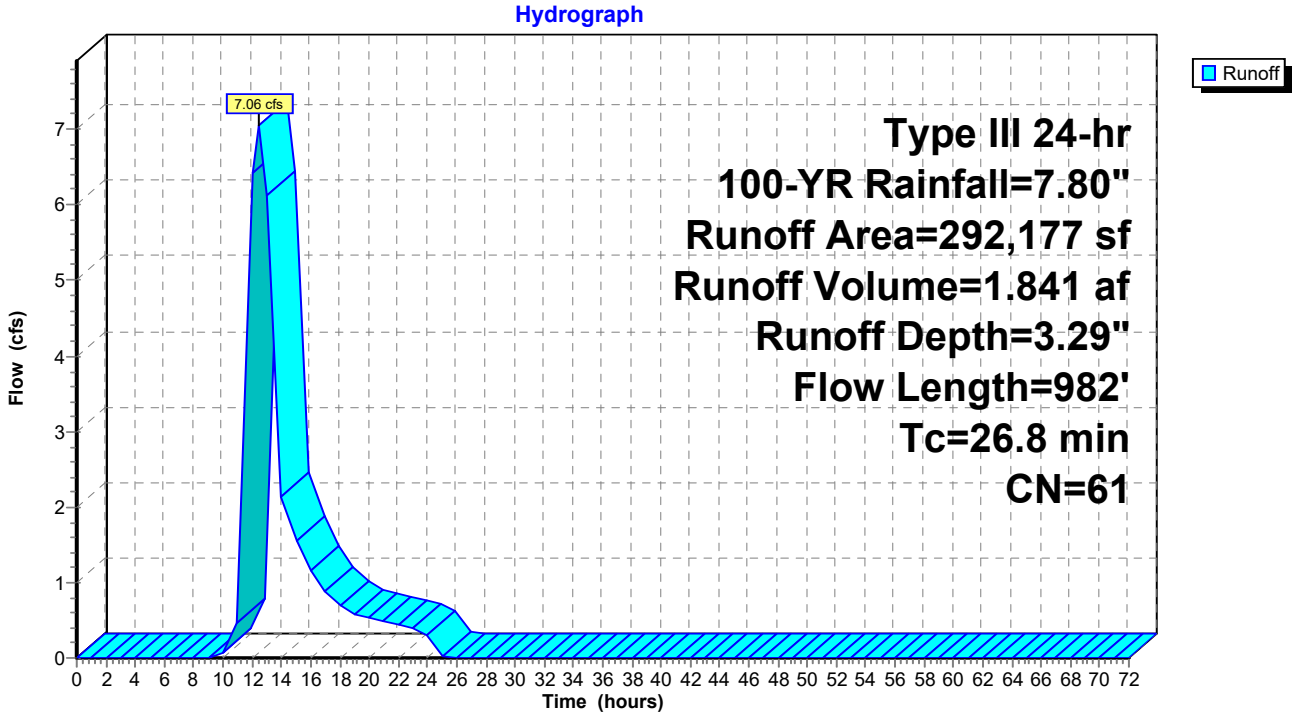
Runoff = 7.06 cfs @ 12.45 hrs, Volume= 1.841 af, Depth= 3.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 100-YR Rainfall=7.80"

Area (sf)	CN	Description
113,079	70	Woods, Good, HSG C
179,098	55	Woods, Good, HSG B
292,177	61	Weighted Average
292,177		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.1	50	0.0250	0.08		**Sheet Flow, 6A-6B** Woods: Light underbrush n= 0.400 P2= 3.32"
4.7	306	0.0474	1.09		**Shallow Concentrated Flow, 6B-6C** Woodland Kv= 5.0 fps
3.5	130	0.0154	0.62		**Shallow Concentrated Flow, 6C-6D** Woodland Kv= 5.0 fps
7.5	496	0.0484	1.10		**Shallow Concentrated Flow, 6D-EDP-6** Woodland Kv= 5.0 fps
26.8	982	Total			

Subcatchment 6: PDA-6



Summary for Subcatchment 7A: PDA-7A

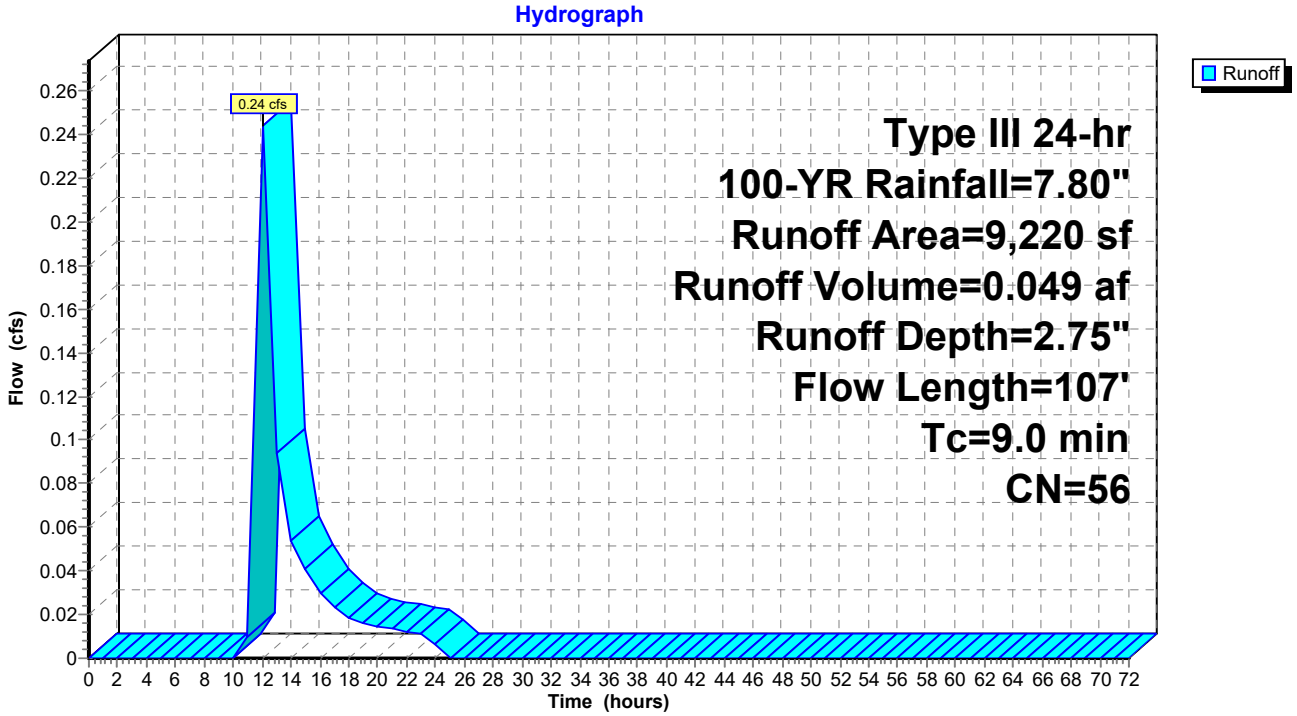
Runoff = 0.24 cfs @ 12.11 hrs, Volume= 0.049 af, Depth= 2.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 100-YR Rainfall=7.80"

Area (sf)	CN	Description
1,048	61	>75% Grass cover, Good, HSG B
8,172	55	Woods, Good, HSG B
9,220	56	Weighted Average
9,220		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	50	0.0550	0.10		**Sheet Flow, 7A-7B** Woods: Light underbrush n= 0.400 P2= 3.32"
0.9	57	0.0480	1.10		**Shallow Concentrated Flow, 7B-7C** Woodland Kv= 5.0 fps
9.0	107	Total			

Subcatchment 7A: PDA-7A



Summary for Subcatchment 7B: PDA-7B

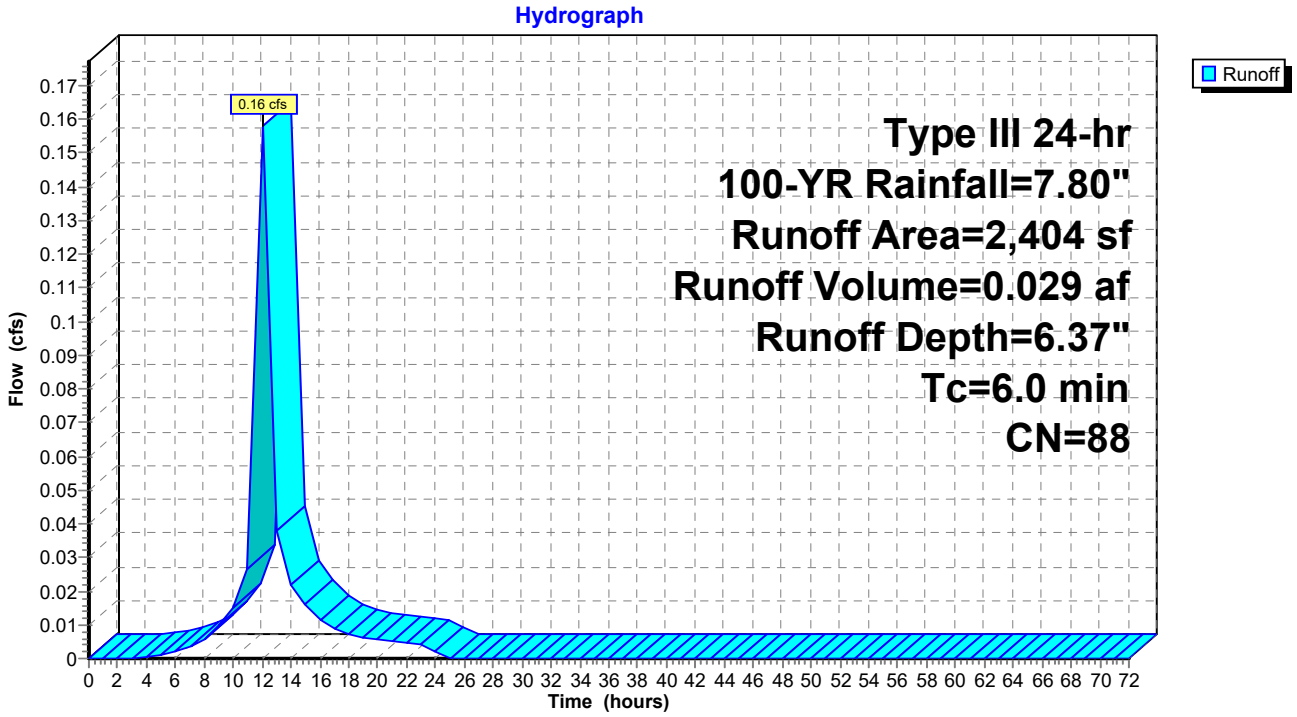
Runoff = 0.16 cfs @ 12.02 hrs, Volume= 0.029 af, Depth= 6.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Type III 24-hr 100-YR Rainfall=7.80"

Area (sf)	CN	Description
1,743	98	Roofs, HSG B
661	61	>75% Grass cover, Good, HSG B
2,404	88	Weighted Average
661		27.50% Pervious Area
1,743		72.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6**

Subcatchment 7B: PDA-7B

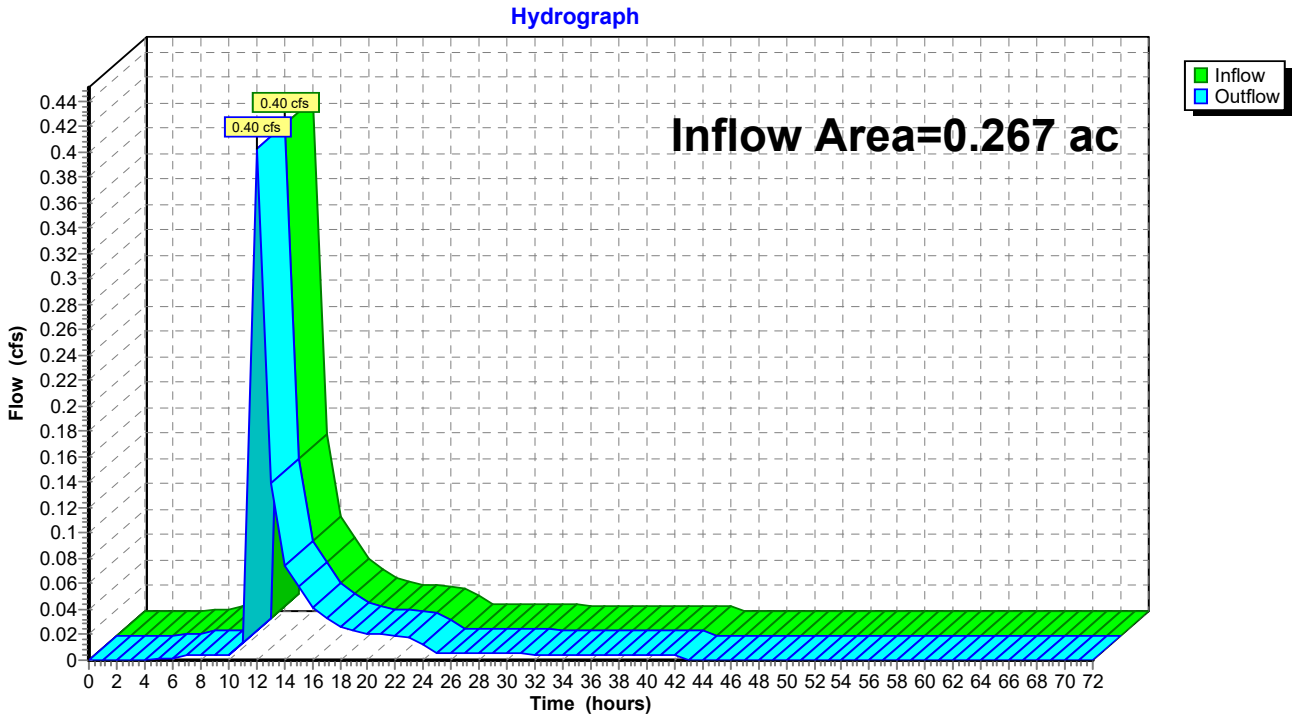


Summary for Reach DP-7: DP-7

Inflow Area = 0.267 ac, 14.99% Impervious, Inflow Depth = 3.70" for 100-YR event
Inflow = 0.40 cfs @ 12.10 hrs, Volume= 0.082 af
Outflow = 0.40 cfs @ 12.10 hrs, Volume= 0.082 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs

Reach DP-7: DP-7



Summary for Reach PDP-4: Design Point 4

Inflow Area = 17.568 ac, 18.21% Impervious, Inflow Depth = 2.97" for 100-YR event
Inflow = 13.66 cfs @ 12.82 hrs, Volume= 4.352 af
Outflow = 12.94 cfs @ 13.00 hrs, Volume= 4.367 af, Atten= 5%, Lag= 11.1 min

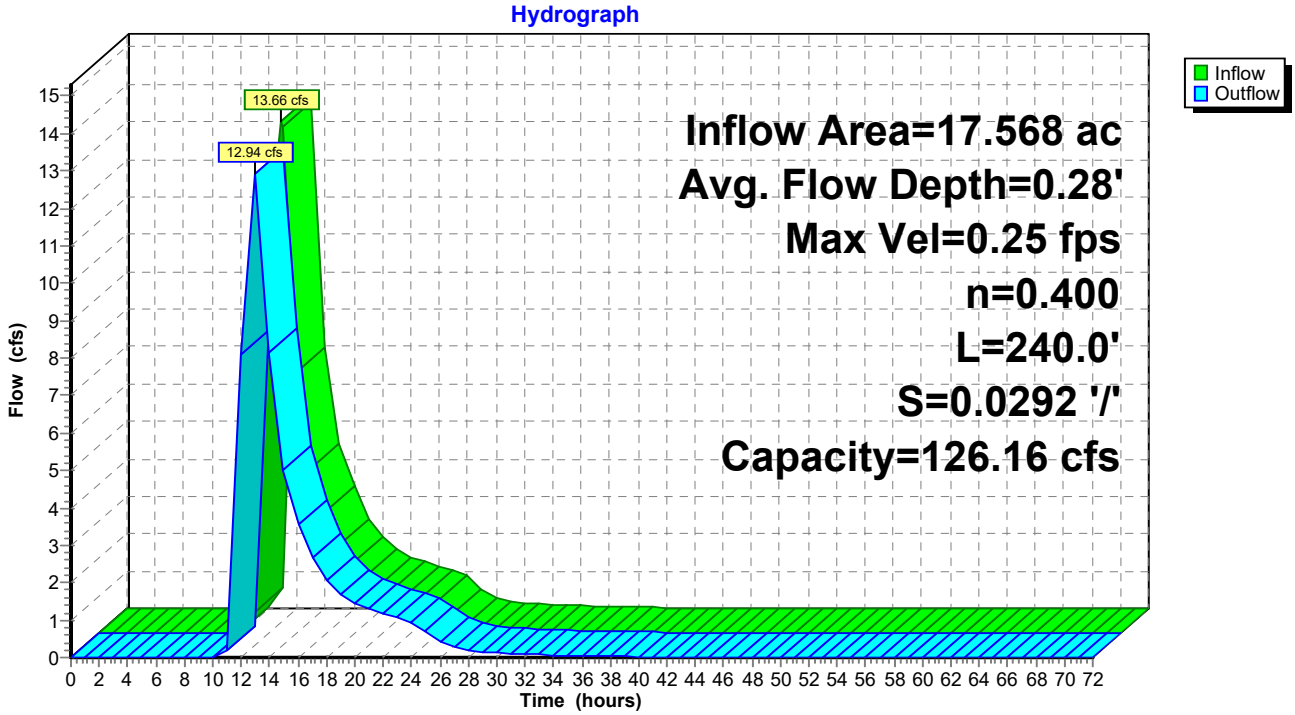
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs / 2
Max. Velocity= 0.25 fps, Min. Travel Time= 15.9 min
Avg. Velocity = 0.06 fps, Avg. Travel Time= 63.6 min

Peak Storage= 12,323 cf @ 13.00 hrs
Average Depth at Peak Storage= 0.28'
Bank-Full Depth= 1.00' Flow Area= 237.5 sf, Capacity= 126.16 cfs

165.00' x 1.00' deep channel, n= 0.400 Sheet flow: Woods+light brush
Side Slope Z-value= 80.0 65.0 '/' Top Width= 310.00'
Length= 240.0' Slope= 0.0292 '/'
Inlet Invert= 625.00', Outlet Invert= 618.00'

‡

Reach PDP-4: Design Point 4



Stage-Discharge for Reach PDP-4: Design Point 4

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
625.00	0.00	0.00
625.01	0.03	0.05
625.02	0.05	0.15
625.03	0.06	0.30
625.04	0.07	0.49
625.05	0.08	0.72
625.06	0.10	0.97
625.07	0.11	1.26
625.08	0.12	1.57
625.09	0.12	1.92
625.10	0.13	2.29
625.11	0.14	2.69
625.12	0.15	3.11
625.13	0.16	3.56
625.14	0.16	4.04
625.15	0.17	4.54
625.16	0.18	5.06
625.17	0.19	5.61
625.18	0.19	6.18
625.19	0.20	6.78
625.20	0.21	7.40
625.21	0.21	8.04
625.22	0.22	8.70
625.23	0.22	9.39
625.24	0.23	10.09
625.25	0.24	10.82
625.26	0.24	11.58
625.27	0.25	12.35
625.28	0.25	13.15
625.29	0.26	13.96
625.30	0.26	14.80
625.31	0.27	15.66
625.32	0.27	16.54
625.33	0.28	17.45
625.34	0.28	18.37
625.35	0.29	19.31
625.36	0.29	20.28
625.37	0.30	21.27
625.38	0.30	22.28
625.39	0.31	23.31
625.40	0.31	24.36
625.41	0.32	25.43
625.42	0.32	26.52
625.43	0.33	27.63
625.44	0.33	28.77
625.45	0.34	29.92
625.46	0.34	31.10
625.47	0.35	32.30
625.48	0.35	33.51
625.49	0.35	34.75
625.50	0.36	36.01
625.51	0.36	37.29
625.52	0.37	38.60
625.53	0.37	39.92
625.54	0.37	41.26
625.55	0.38	42.62
625.56	0.38	44.01
625.57	0.39	45.42
625.58	0.39	46.84
625.59	0.39	48.29
625.60	0.40	49.76
625.61	0.40	51.25
625.62	0.41	52.76
625.63	0.41	54.29
625.64	0.41	55.85
625.65	0.42	57.42
625.66	0.42	59.02
625.67	0.42	60.64
625.68	0.43	62.27
625.69	0.43	63.93
625.70	0.43	65.62
625.71	0.44	67.32
625.72	0.44	69.04
625.73	0.44	70.79
625.74	0.45	72.55
625.75	0.45	74.34
625.76	0.46	76.15
625.77	0.46	77.98
625.78	0.46	79.84
625.79	0.47	81.71
625.80	0.47	83.61
625.81	0.47	85.53
625.82	0.48	87.47
625.83	0.48	89.43
625.84	0.48	91.41
625.85	0.48	93.42
625.86	0.49	95.44
625.87	0.49	97.49
625.88	0.49	99.56
625.89	0.50	101.66
625.90	0.50	103.77
625.91	0.50	105.91
625.92	0.51	108.07
625.93	0.51	110.25
625.94	0.51	112.46
625.95	0.52	114.69
625.96	0.52	116.94
625.97	0.52	119.21
625.98	0.53	121.50
625.99	0.53	123.82
626.00	**0.53**	**126.16**

Summary for Reach PDP-5: Design Point 5

Inflow Area = 14.576 ac, 7.38% Impervious, Inflow Depth = 3.03" for 100-YR event
Inflow = 13.29 cfs @ 12.64 hrs, Volume= 3.677 af
Outflow = 12.47 cfs @ 12.86 hrs, Volume= 3.691 af, Atten= 6%, Lag= 13.6 min

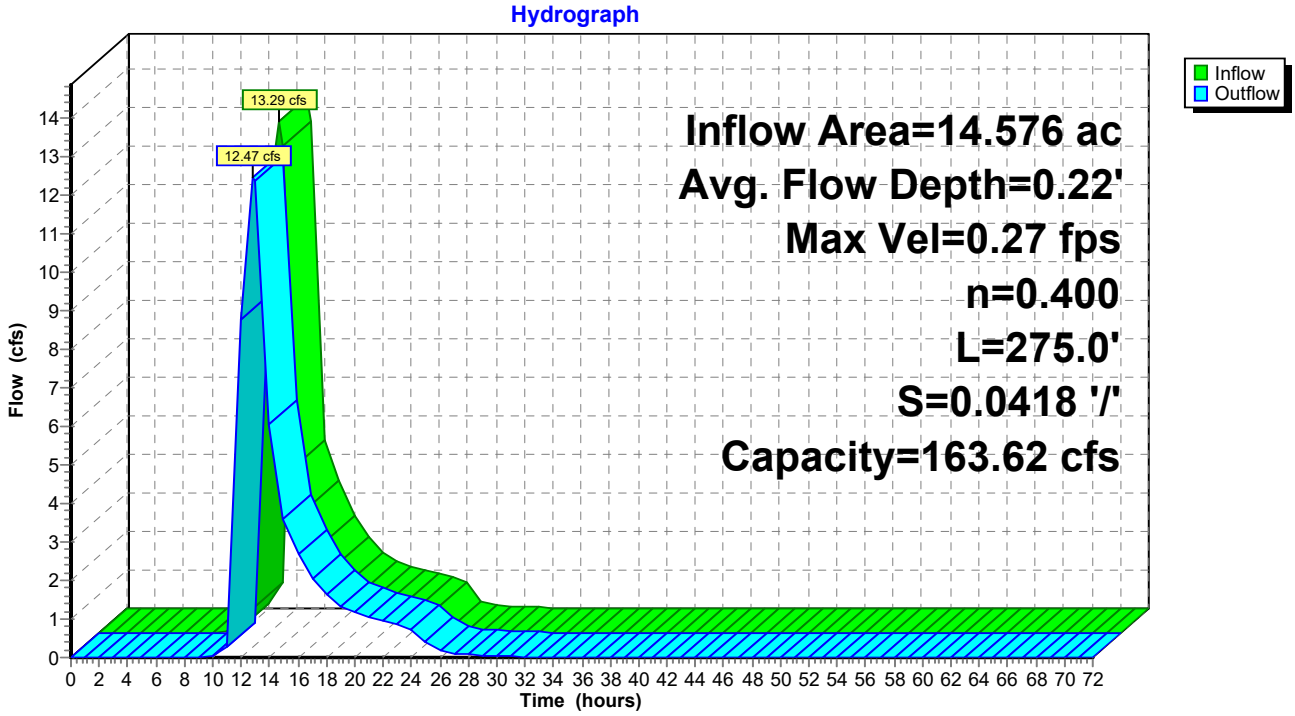
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs / 2
Max. Velocity= 0.27 fps, Min. Travel Time= 17.0 min
Avg. Velocity = 0.07 fps, Avg. Travel Time= 64.7 min

Peak Storage= 12,686 cf @ 12.85 hrs
Average Depth at Peak Storage= 0.22'
Bank-Full Depth= 1.00' Flow Area= 237.5 sf, Capacity= 163.62 cfs

200.00' x 1.00' deep channel, n= 0.400 Sheet flow: Woods+light brush
Side Slope Z-value= 50.0 25.0 '/' Top Width= 275.00'
Length= 275.0' Slope= 0.0418 '/'
Inlet Invert= 636.50', Outlet Invert= 625.00'

‡

Reach PDP-5: Design Point 5



Stage-Discharge for Reach PDP-5: Design Point 5

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
636.50	0.00	0.00
636.51	0.04	0.07
636.52	0.06	0.22
636.53	0.07	0.44
636.54	0.09	0.71
636.55	0.10	1.03
636.56	0.12	1.40
636.57	0.13	1.81
636.58	0.14	2.27
636.59	0.15	2.76
636.60	0.16	3.29
636.61	0.17	3.86
636.62	0.18	4.47
636.63	0.19	5.11
636.64	0.20	5.79
636.65	0.21	6.50
636.66	0.22	7.24
636.67	0.23	8.01
636.68	0.24	8.82
636.69	0.25	9.66
636.70	0.25	10.53
636.71	0.26	11.43
636.72	0.27	12.36
636.73	0.28	13.32
636.74	0.29	14.31
636.75	0.29	15.33
636.76	0.30	16.37
636.77	0.31	17.45
636.78	0.31	18.55
636.79	0.32	19.68
636.80	0.33	20.84
636.81	0.34	22.03
636.82	0.34	23.24
636.83	0.35	24.48
636.84	0.36	25.75
636.85	0.36	27.04
636.86	0.37	28.36
636.87	0.38	29.71
636.88	0.38	31.08
636.89	0.39	32.48
636.90	0.39	33.91
636.91	0.40	35.36
636.92	0.41	36.83
636.93	0.41	38.34
636.94	0.42	39.86
636.95	0.42	41.42
636.96	0.43	42.99
636.97	0.44	44.59
636.98	0.44	46.22
636.99	0.45	47.87
637.00	0.45	49.55
637.01	0.46	51.25
637.02	0.46	52.98
637.03	0.47	54.73
637.04	0.48	56.50
637.05	0.48	58.30
637.06	0.49	60.12
637.07	0.49	61.97
637.08	0.50	63.84
637.09	0.50	65.74
637.10	0.51	67.66
637.11	0.51	69.60
637.12	0.52	71.57
637.13	0.52	73.56
637.14	0.53	75.57
637.15	0.53	77.61
637.16	0.54	79.67
637.17	0.54	81.76
637.18	0.55	83.87
637.19	0.55	86.00
637.20	0.56	88.16
637.21	0.56	90.34
637.22	0.57	92.54
637.23	0.57	94.77
637.24	0.58	97.02
637.25	0.58	99.29
637.26	0.58	101.58
637.27	0.59	103.90
637.28	0.59	106.25
637.29	0.60	108.61
637.30	0.60	111.00
637.31	0.61	113.41
637.32	0.61	115.85
637.33	0.62	118.31
637.34	0.62	120.79
637.35	0.63	123.29
637.36	0.63	125.82
637.37	0.63	128.37
637.38	0.64	130.95
637.39	0.64	133.54
637.40	0.65	136.16
637.41	0.65	138.80
637.42	0.66	141.47
637.43	0.66	144.16
637.44	0.66	146.87
637.45	0.67	149.60
637.46	0.67	152.36
637.47	0.68	155.14
637.48	0.68	157.94
637.49	0.68	160.77
637.50	**0.69**	**163.62**

Summary for Reach PDP-6: Design Point 6

Inflow Area = 6.707 ac, 0.00% Impervious, Inflow Depth = 3.29" for 100-YR event
Inflow = 7.06 cfs @ 12.45 hrs, Volume= 1.841 af
Outflow = 6.91 cfs @ 12.47 hrs, Volume= 1.865 af, Atten= 2%, Lag= 1.2 min

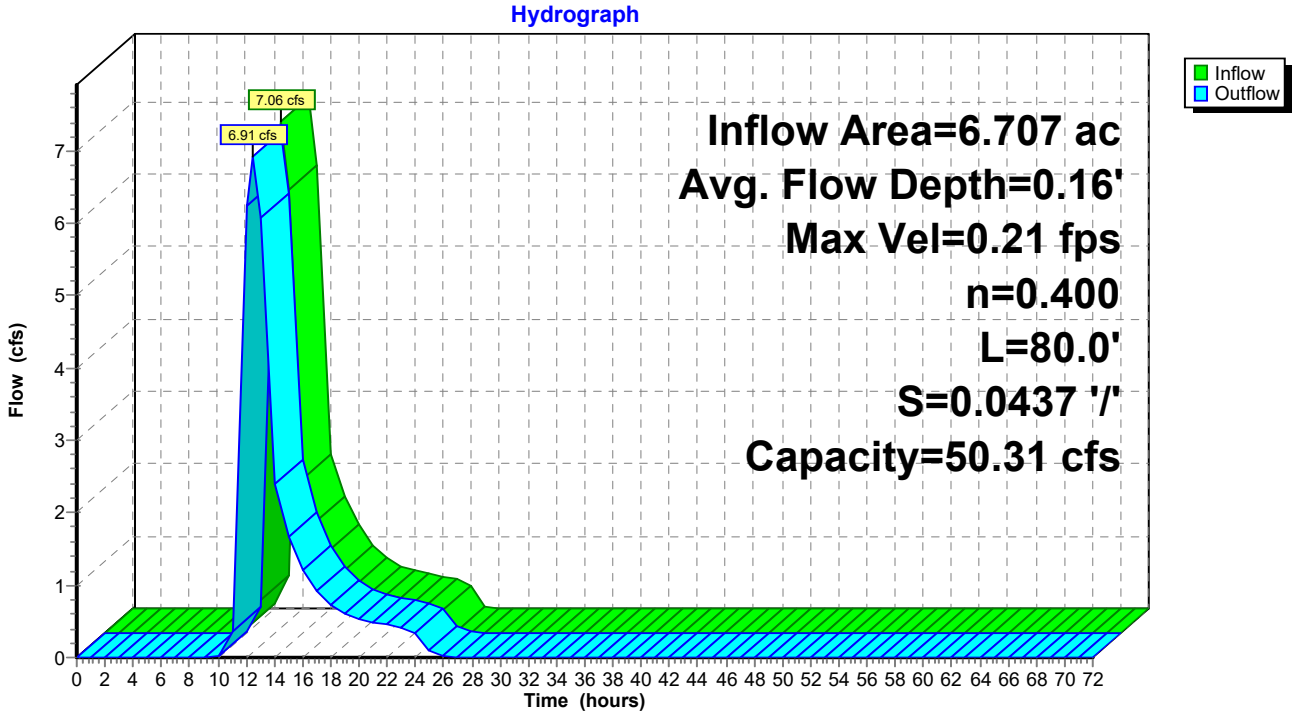
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs / 2
Max. Velocity= 0.21 fps, Min. Travel Time= 6.3 min
Avg. Velocity = 0.07 fps, Avg. Travel Time= 18.7 min

Peak Storage= 2,593 cf @ 12.48 hrs
Average Depth at Peak Storage= 0.16'
Bank-Full Depth= 0.50' Flow Area= 107.5 sf, Capacity= 50.31 cfs

200.00' x 0.50' deep channel, n= 0.400 Sheet flow: Woods+light brush
Side Slope Z-value= 30.0 '/' Top Width= 230.00'
Length= 80.0' Slope= 0.0437 '/'
Inlet Invert= 642.50', Outlet Invert= 639.00'

‡

Reach PDP-6: Design Point 6



Stage-Discharge for Reach PDP-6: Design Point 6

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
642.50	0.00	0.00
642.51	0.04	0.07
642.52	0.06	0.23
642.53	0.07	0.45
642.54	0.09	0.73
642.55	0.10	1.06
642.56	0.12	1.43
642.57	0.13	1.85
642.58	0.14	2.32
642.59	0.15	2.82
642.60	0.17	3.37
642.61	0.18	3.95
642.62	0.19	4.57
642.63	0.20	5.22
642.64	0.21	5.91
642.65	0.22	6.63
642.66	0.23	7.39
642.67	0.23	8.18
642.68	0.24	9.00
642.69	0.25	9.86
642.70	0.26	10.74
642.71	0.27	11.66
642.72	0.28	12.60
642.73	0.29	13.58
642.74	0.29	14.59
642.75	0.30	15.62
642.76	0.31	16.69
642.77	0.32	17.78
642.78	0.32	18.90
642.79	0.33	20.05
642.80	0.34	21.23
642.81	0.35	22.43
642.82	0.35	23.67
642.83	0.36	24.92
642.84	0.37	26.21
642.85	0.37	27.52
642.86	0.38	28.86
642.87	0.39	30.23
642.88	0.39	31.62
642.89	0.40	33.04
642.90	0.41	34.48
642.91	0.41	35.95
642.92	0.42	37.45
642.93	0.43	38.97
642.94	0.43	40.51
642.95	0.44	42.08
642.96	0.44	43.68
642.97	0.45	45.30
642.98	0.46	46.94
642.99	0.46	48.61
643.00	**0.47**	**50.31**

Summary for Pond 3: SFB-3

Inflow Area = 1.125 ac, 75.58% Impervious, Inflow Depth > 6.53" for 100-YR event
Inflow = 1.03 cfs @ 12.09 hrs, Volume= 0.613 af
Outflow = 0.95 cfs @ 12.14 hrs, Volume= 0.609 af, Atten= 8%, Lag= 2.6 min
Discarded = 0.07 cfs @ 12.14 hrs, Volume= 0.218 af
Primary = 0.88 cfs @ 12.14 hrs, Volume= 0.392 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs / 3
Peak Elev= 622.27' @ 12.14 hrs Surf.Area= 1,428 sf Storage= 1,254 cf
Flood Elev= 623.50' Surf.Area= 2,450 sf Storage= 3,580 cf

Plug-Flow detention time= 98.1 min calculated for 0.601 af (98% of inflow)
Center-of-Mass det. time= 90.1 min (1,314.9 - 1,224.8)

Volume	Invert	Avail.Storage	Storage Description
#1	620.00'	3,306 cf	**Overall storage (Prismatic)** Listed below (Recalc) 4,263 cf Overall - 957 cf Embedded = 3,306 cf
#2	620.00'	211 cf	**Sand media (Prismatic)** Listed below (Recalc) Inside #1 638 cf Overall x 33.0% Voids
#3	621.00'	64 cf	**Infiltration Seed mix (Prismatic)** Listed below (Recalc) Inside #1 319 cf Overall x 20.0% Voids
		3,580 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
620.00	638	0	0
621.00	638	638	638
622.00	1,230	934	1,572
623.00	1,951	1,591	3,163
623.50	2,450	1,100	4,263

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
620.00	638	0	0
621.00	638	638	638

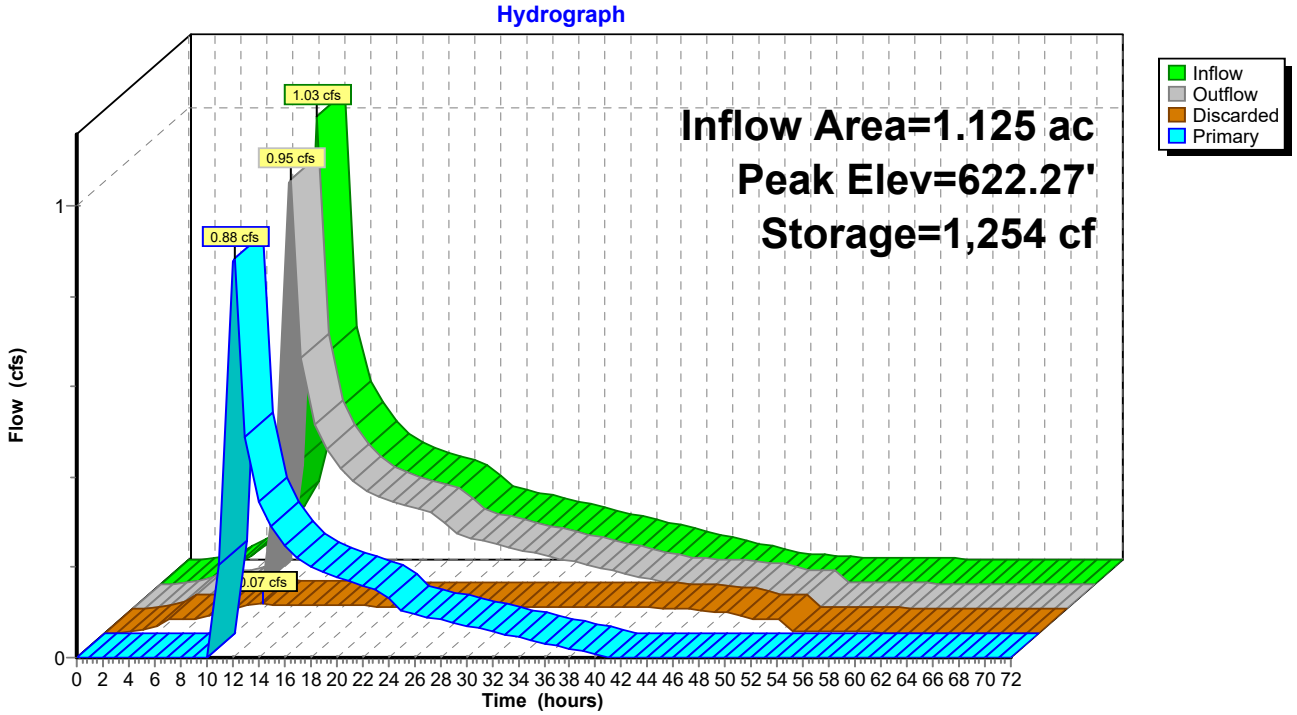
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
621.00	638	0	0
621.50	638	319	319

Device	Routing	Invert	Outlet Devices
#1	Discarded	620.00'	**2.010 in/hr Exfiltration over Surface area**
#2	Primary	620.14'	**8.0" Round Culvert** L= 14.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 620.14' / 620.00' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.35 sf
#3	Device 2	622.00'	**8.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.07 cfs @ 12.14 hrs HW=622.26' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=0.85 cfs @ 12.14 hrs HW=622.26' (Free Discharge)
└─**2=Culvert** (Passes 0.85 cfs of 1.77 cfs potential flow)
└─**3=Orifice/Grate** (Orifice Controls 0.85 cfs @ 2.45 fps)

Pond 3: SFB-3



Stage-Discharge for Pond 3: SFB-3

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
620.00	0.00	0.00	0.00
620.05	0.03	0.03	0.00
620.10	0.03	0.03	0.00
620.15	0.03	0.03	0.00
620.20	0.03	0.03	0.00
620.25	0.03	0.03	0.00
620.30	0.03	0.03	0.00
620.35	0.03	0.03	0.00
620.40	0.03	0.03	0.00
620.45	0.03	0.03	0.00
620.50	0.03	0.03	0.00
620.55	0.03	0.03	0.00
620.60	0.03	0.03	0.00
620.65	0.03	0.03	0.00
620.70	0.03	0.03	0.00
620.75	0.03	0.03	0.00
620.80	0.03	0.03	0.00
620.85	0.03	0.03	0.00
620.90	0.03	0.03	0.00
620.95	0.03	0.03	0.00
621.00	0.03	0.03	0.00
621.05	0.03	0.03	0.00
621.10	0.03	0.03	0.00
621.15	0.03	0.03	0.00
621.20	0.04	0.04	0.00
621.25	0.04	0.04	0.00
621.30	0.04	0.04	0.00
621.35	0.04	0.04	0.00
621.40	0.04	0.04	0.00
621.45	0.04	0.04	0.00
621.50	0.04	0.04	0.00
621.55	0.04	0.04	0.00
621.60	0.05	0.05	0.00
621.65	0.05	0.05	0.00
621.70	0.05	0.05	0.00
621.75	0.05	0.05	0.00
621.80	0.05	0.05	0.00
621.85	0.05	0.05	0.00
621.90	0.05	0.05	0.00
621.95	0.06	0.06	0.00
622.00	0.06	0.06	0.00
622.05	0.14	0.06	0.08
622.10	0.28	0.06	0.22
622.15	0.46	0.06	0.40
622.20	0.68	0.06	0.61
622.25	0.91	0.07	0.84
622.30	0.99	0.07	0.92
622.35	1.06	0.07	0.99
622.40	1.13	0.07	1.06
622.45	1.20	0.07	1.13
622.50	1.26	0.07	1.19
622.55	1.32	0.08	1.25
622.60	1.38	0.08	1.30
622.65	1.43	0.08	1.36
622.70	1.49	0.08	1.41
622.75	1.54	0.08	1.46
622.80	1.59	0.08	1.50
622.85	1.64	0.09	1.55
622.90	1.68	0.09	1.59
622.95	1.73	0.09	1.64
623.00	1.77	0.09	1.68
623.05	1.82	0.09	1.72
623.10	1.86	0.10	1.76
623.15	1.90	0.10	1.80
623.20	1.94	0.10	1.84
623.25	1.98	0.10	1.88
623.30	2.02	0.10	1.92
623.35	2.06	0.11	1.95
623.40	2.10	0.11	1.99
623.45	2.14	0.11	2.02
623.50	**2.17**	**0.11**	**2.06**

Summary for Pond 4: SFB-4

Inflow Area =	1.487 ac, 85.51% Impervious, Inflow Depth = 6.97" for 100-YR event				
Inflow =	1.87 cfs @	12.68 hrs,	Volume=	0.864 af	
Outflow =	2.13 cfs @	13.06 hrs,	Volume=	0.890 af,	Atten= 0%, Lag= 22.6 min
Discarded =	0.54 cfs @	13.43 hrs,	Volume=	0.631 af	
Primary =	0.49 cfs @	13.45 hrs,	Volume=	0.164 af	
Secondary =	1.13 cfs @	13.00 hrs,	Volume=	0.094 af	

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs / 3
Peak Elev= 633.40' @ 13.43 hrs Surf.Area= 3,531 sf Storage= 6,097 cf
Flood Elev= 634.00' Surf.Area= 4,000 sf Storage= 8,373 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 58.4 min (949.9 - 891.5)

Volume	Invert	Avail.Storage	Storage Description
#1	630.00'	7,667 cf	**Overall storage (Prismatic)** Listed below (Recalc) 10,132 cf Overall - 2,465 cf Embedded = 7,667 cf
#2	630.00'	542 cf	**Sand media (Prismatic)** Listed below (Recalc) Inside #1 1,643 cf Overall x 33.0% Voids
#3	631.00'	164 cf	**Infiltration Seed mix (Prismatic)** Listed below (Recalc) Inside #1 822 cf Overall x 20.0% Voids
		8,373 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
630.00	1,643	0	0
631.00	1,643	1,643	1,643
632.00	2,443	2,043	3,686
633.00	3,224	2,834	6,520
634.00	4,000	3,612	10,132

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
630.00	1,643	0	0
631.00	1,643	1,643	1,643

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
631.00	1,643	0	0
631.50	1,643	822	822

Device	Routing	Invert	Outlet Devices
#1	Discarded	630.00'	**6.560 in/hr Exfiltration over Surface area**
#2	Primary	630.00'	**8.0" Round Culvert** L= 25.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 630.00' / 629.25' S= 0.0300 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.35 sf
#3	Device 2	632.00'	**2.0" Vert. Orifice/Grate** C= 0.600
#4	Device 2	632.65'	**4.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

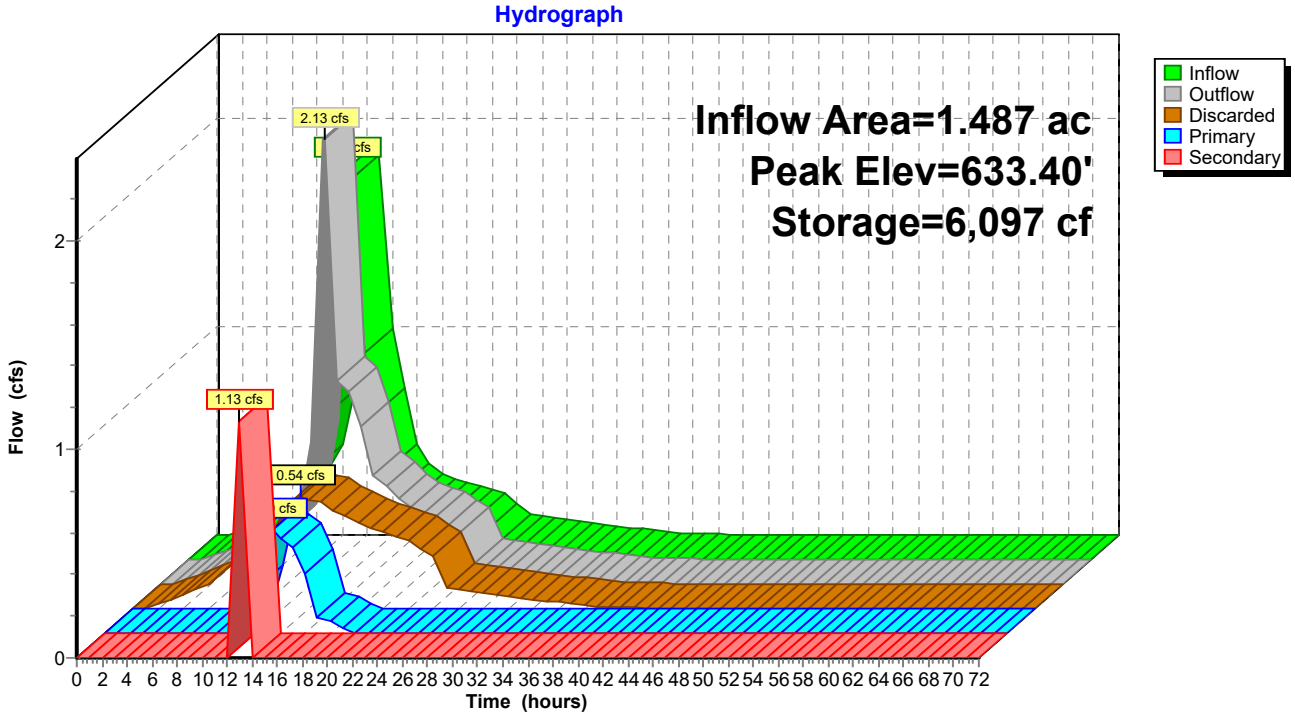
#5 Secondary 633.30' **50.0' long x 1.0' breadth Broad-Crested Rectangular Weir**
Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00
Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Discarded OutFlow Max=0.53 cfs @ 13.43 hrs HW=633.32' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.53 cfs)

Primary OutFlow Max=0.46 cfs @ 13.45 hrs HW=633.32' (Free Discharge)
└─**2=Culvert** (Passes 0.46 cfs of 2.29 cfs potential flow)
  ├─**3=Orifice/Grate** (Orifice Controls 0.12 cfs @ 5.35 fps)
  └─**4=Orifice/Grate** (Orifice Controls 0.34 cfs @ 3.94 fps)

Secondary OutFlow Max=1.03 cfs @ 13.00 hrs HW=633.34' (Free Discharge)
└─**5=Broad-Crested Rectangular Weir** (Weir Controls 1.03 cfs @ 0.53 fps)

Pond 4: SFB-4



Stage-Discharge for Pond 4: SFB-4

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)	Secondary (cfs)
630.00	0.00	0.00	0.00	0.00
630.10	0.25	0.25	0.00	0.00
630.20	0.25	0.25	0.00	0.00
630.30	0.25	0.25	0.00	0.00
630.40	0.25	0.25	0.00	0.00
630.50	0.25	0.25	0.00	0.00
630.60	0.25	0.25	0.00	0.00
630.70	0.25	0.25	0.00	0.00
630.80	0.25	0.25	0.00	0.00
630.90	0.25	0.25	0.00	0.00
631.00	0.25	0.25	0.00	0.00
631.10	0.26	0.26	0.00	0.00
631.20	0.27	0.27	0.00	0.00
631.30	0.29	0.29	0.00	0.00
631.40	0.30	0.30	0.00	0.00
631.50	0.31	0.31	0.00	0.00
631.60	0.32	0.32	0.00	0.00
631.70	0.33	0.33	0.00	0.00
631.80	0.35	0.35	0.00	0.00
631.90	0.36	0.36	0.00	0.00
632.00	0.37	0.37	0.00	0.00
632.10	0.40	0.38	0.01	0.00
632.20	0.43	0.39	0.04	0.00
632.30	0.46	0.41	0.05	0.00
632.40	0.48	0.42	0.06	0.00
632.50	0.50	0.43	0.07	0.00
632.60	0.52	0.44	0.08	0.00
632.70	0.57	0.45	0.12	0.00
632.80	0.72	0.47	0.25	0.00
632.90	0.78	0.48	0.31	0.00
633.00	0.84	0.49	0.35	0.00
633.10	0.89	0.50	0.39	0.00
633.20	0.94	0.51	0.42	0.00
633.30	0.98	0.52	0.45	0.00
633.40	5.27	0.54	0.48	4.25
633.50	13.09	0.55	0.51	12.03
633.60	23.32	0.56	0.54	22.22
633.70	35.54	0.57	0.56	34.41
633.80	49.52	0.58	0.59	48.35
633.90	65.11	0.60	0.61	63.90
634.00	**83.23**	**0.61**	**0.63**	**81.99**

Summary for Pond 5: SFB-5

Inflow Area =	1.636 ac, 65.78% Impervious, Inflow Depth = 6.09" for 100-YR event				
Inflow =	0.77 cfs @	12.17 hrs,	Volume=	0.830 af	
Outflow =	0.51 cfs @	15.15 hrs,	Volume=	0.826 af,	Atten= 33%, Lag= 178.9 min
Discarded =	0.23 cfs @	15.00 hrs,	Volume=	0.696 af	
Primary =	0.07 cfs @	15.00 hrs,	Volume=	0.085 af	
Secondary =	0.22 cfs @	15.15 hrs,	Volume=	0.045 af	

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs / 3
Peak Elev= 635.00' @ 15.00 hrs Surf.Area= 3,488 sf Storage= 4,839 cf
Flood Elev= 636.00' Surf.Area= 4,050 sf Storage= 8,589 cf

Plug-Flow detention time= 214.6 min calculated for 0.826 af (100% of inflow)
Center-of-Mass det. time= 207.7 min (1,589.8 - 1,382.1)

Volume	Invert	Avail.Storage	Storage Description
#1	632.00'	7,942 cf	**Overall storage (Prismatic)** Listed below (Recalc) 10,200 cf Overall - 2,258 cf Embedded = 7,942 cf
#2	632.00'	497 cf	**Sand media (Prismatic)** Listed below (Recalc) Inside #1 1,505 cf Overall x 33.0% Voids
#3	633.00'	151 cf	**Infiltration Seed mix (Prismatic)** Listed below (Recalc) Inside #1 753 cf Overall x 20.0% Voids
		8,589 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
632.00	1,505	0	0
633.50	1,505	2,258	2,258
634.00	2,741	1,062	3,319
635.00	3,485	3,113	6,432
636.00	4,050	3,768	10,200

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
632.00	1,505	0	0
633.00	1,505	1,505	1,505

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
633.00	1,505	0	0
633.50	1,505	753	753

Device	Routing	Invert	Outlet Devices
#1	Discarded	632.00'	**2.840 in/hr Exfiltration over Surface area**
#2	Primary	633.80'	**6.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 633.80' / 633.75' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf
#3	Device 2	634.50'	**2.0" Vert. Orifice/Grate** C= 0.600
#4	Secondary	635.00'	**80.0' long x 1.0' breadth Broad-Crested Rectangular Weir**

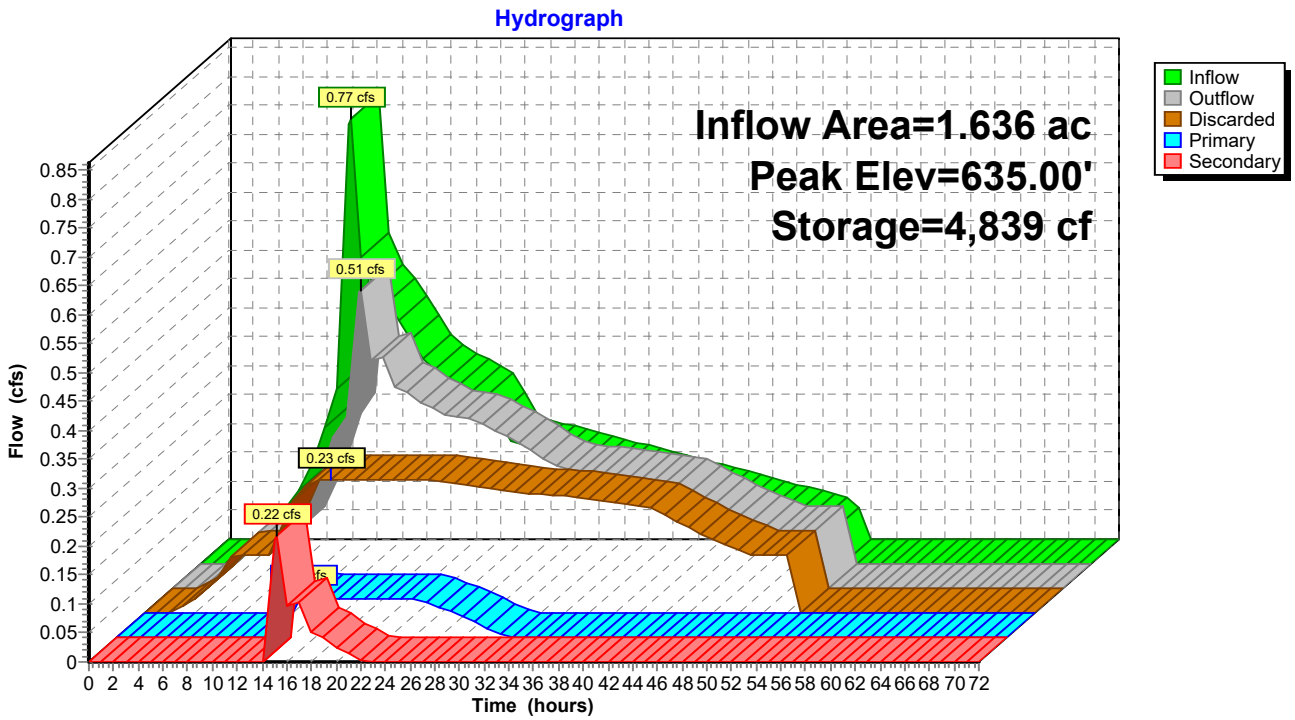
Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00
Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Discarded OutFlow Max=0.23 cfs @ 15.00 hrs HW=635.00' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.23 cfs)

Primary OutFlow Max=0.07 cfs @ 15.00 hrs HW=635.00' (Free Discharge)
└─**2=Culvert** (Passes 0.07 cfs of 0.73 cfs potential flow)
└─**3=Orifice/Grate** (Orifice Controls 0.07 cfs @ 3.13 fps)

Secondary OutFlow Max=0.07 cfs @ 15.15 hrs HW=635.00' (Free Discharge)
└─**4=Broad-Crested Rectangular Weir** (Weir Controls 0.07 cfs @ 0.18 fps)

Pond 5: SFB-5



Stage-Discharge for Pond 5: SFB-5

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)	Secondary (cfs)
632.00	0.00	0.00	0.00	0.00
632.10	0.10	0.10	0.00	0.00
632.20	0.10	0.10	0.00	0.00
632.30	0.10	0.10	0.00	0.00
632.40	0.10	0.10	0.00	0.00
632.50	0.10	0.10	0.00	0.00
632.60	0.10	0.10	0.00	0.00
632.70	0.10	0.10	0.00	0.00
632.80	0.10	0.10	0.00	0.00
632.90	0.10	0.10	0.00	0.00
633.00	0.10	0.10	0.00	0.00
633.10	0.10	0.10	0.00	0.00
633.20	0.10	0.10	0.00	0.00
633.30	0.10	0.10	0.00	0.00
633.40	0.10	0.10	0.00	0.00
633.50	0.10	0.10	0.00	0.00
633.60	0.12	0.12	0.00	0.00
633.70	0.13	0.13	0.00	0.00
633.80	0.15	0.15	0.00	0.00
633.90	0.16	0.16	0.00	0.00
634.00	0.18	0.18	0.00	0.00
634.10	0.19	0.19	0.00	0.00
634.20	0.19	0.19	0.00	0.00
634.30	0.19	0.19	0.00	0.00
634.40	0.20	0.20	0.00	0.00
634.50	0.20	0.20	0.00	0.00
634.60	0.22	0.21	0.01	0.00
634.70	0.25	0.21	0.04	0.00
634.80	0.27	0.22	0.05	0.00
634.90	0.28	0.22	0.06	0.00
635.00	0.30	0.23	0.07	0.00
635.10	7.11	0.23	0.08	6.81
635.20	19.57	0.24	0.08	19.25
635.30	35.89	0.24	0.09	35.56
635.40	55.39	0.24	0.09	55.05
635.50	77.71	0.25	0.10	77.36
635.60	102.60	0.25	0.11	102.25
635.70	131.55	0.26	0.11	131.19
635.80	163.52	0.26	0.12	163.14
635.90	199.49	0.26	0.12	199.11
636.00	**238.79**	**0.27**	**0.13**	**238.40**

Summary for Pond DB-3: DB-3

Inflow Area = 0.593 ac,100.00% Impervious, Inflow Depth = 8.30" for 100-YR event
Inflow = 2.28 cfs @ 12.01 hrs, Volume= 0.410 af
Outflow = 0.20 cfs @ 14.65 hrs, Volume= 0.410 af, Atten= 91%, Lag= 158.2 min
Primary = 0.20 cfs @ 14.65 hrs, Volume= 0.410 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Peak Elev= 629.84' @ 14.65 hrs Surf.Area= 0.081 ac Storage= 0.266 af
Flood Elev= 630.00' Surf.Area= 0.081 ac Storage= 0.276 af

Plug-Flow detention time= 696.7 min calculated for 0.410 af (100% of inflow)
Center-of-Mass det. time= 692.1 min (1,430.8 - 738.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	626.00'	0.000 af	**27.58'W x 127.56'L x 4.67'H Field A** 0.377 af Overall - 0.377 af Embedded = 0.000 af x 0.0% Voids
#2A	626.00'	0.276 af	**StormTrap ST1 SingleTrap 4-0** x 36 Inside #1 Inside= 82.7"W x 48.0"H => 23.79 sf x 14.06'L = 334.5 cf Outside= 82.7"W x 56.0"H => 32.18 sf x 14.06'L = 452.5 cf 4 Rows of 9 Chambers 27.58' x 126.56' Core + 0.00' x 0.50' Border = 27.58' x 127.56' System
		0.276 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	626.00'	**8.0" Round Culvert** L= 240.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 626.00' / 622.00' S= 0.0167 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.35 sf
#2	Device 1	626.00'	**2.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.20 cfs @ 14.65 hrs HW=629.83' (Free Discharge)
└─**1=Culvert** (Passes 0.20 cfs of 2.24 cfs potential flow)
└─**2=Orifice/Grate** (Orifice Controls 0.20 cfs @ 9.33 fps)

Pond DB-3: DB-3 - Chamber Wizard Field A

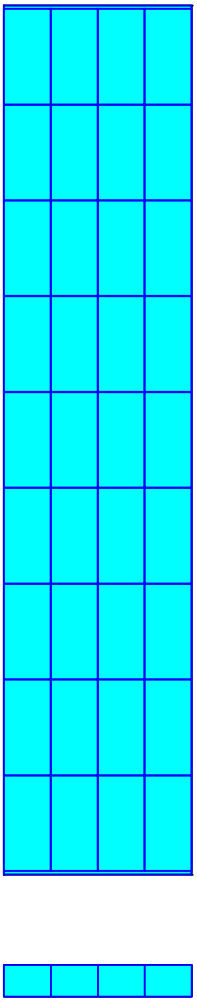
Chamber Model = StormTrap ST1 SingleTrap 4-0 (StormTrap ST1 SingleTrap® Type VI)
Inside= 82.7"W x 48.0"H => 23.79 sf x 14.06'L = 334.5 cf
Outside= 82.7"W x 56.0"H => 32.18 sf x 14.06'L = 452.5 cf

9 Chambers/Row x 14.06' Long = 126.56' Row Length +6.0" Border x 2 = 127.56' Base Length
4 Rows x 82.7" Wide = 27.58' Base Width
56.0" Chamber Height = 4.67' Field Height

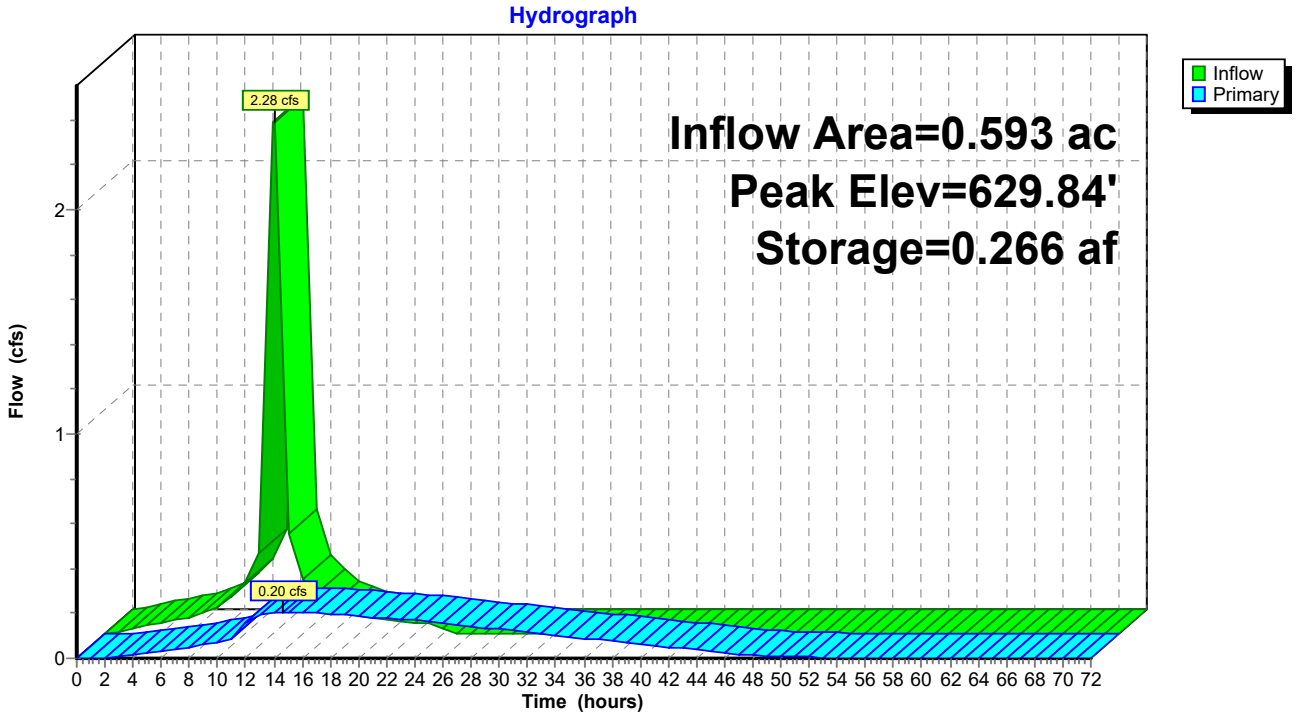
36 Chambers x 334.5 cf = 12,042.0 cf Chamber Storage
36 Chambers x 452.5 cf + 128.7 cf Border = 16,420.1 cf Displacement

Chamber Storage = 12,042.0 cf = 0.276 af
Overall Storage Efficiency = 73.3%
Overall System Size = 127.56' x 27.58' x 4.67'

36 Chambers (plus border)
608.2 cy Field



Pond DB-3: DB-3


Hydrograph
Inflow
Primary
2.28 cfs
0.20 cfs
Inflow Area=0.593 ac
Peak Elev=629.84'
Storage=0.266 af
Flow (cfs)
0
1
2
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72
Time (hours)

Stage-Discharge for Pond DB-3: DB-3

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
626.00	0.00	628.60	0.17
626.05	0.00	628.65	0.17
626.10	0.01	628.70	0.17
626.15	0.03	628.75	0.17
626.20	0.04	628.80	0.17
626.25	0.04	628.85	0.17
626.30	0.05	628.90	0.18
626.35	0.05	628.95	0.18
626.40	0.06	629.00	0.18
626.45	0.06	629.05	0.18
626.50	0.07	629.10	0.18
626.55	0.07	629.15	0.18
626.60	0.08	629.20	0.19
626.65	0.08	629.25	0.19
626.70	0.08	629.30	0.19
626.75	0.09	629.35	0.19
626.80	0.09	629.40	0.19
626.85	0.09	629.45	0.19
626.90	0.09	629.50	0.19
626.95	0.10	629.55	0.20
627.00	0.10	629.60	0.20
627.05	0.10	629.65	0.20
627.10	0.11	629.70	0.20
627.15	0.11	629.75	0.20
627.20	0.11	629.80	0.20
627.25	0.11	629.85	0.20
627.30	0.12	629.90	0.21
627.35	0.12	629.95	0.21
627.40	0.12	630.00	0.21
627.45	0.12	630.05	0.21
627.50	0.13	630.10	0.21
627.55	0.13	630.15	0.21
627.60	0.13	630.20	0.21
627.65	0.13	630.25	0.21
627.70	0.13	630.30	0.22
627.75	0.14	630.35	0.22
627.80	0.14	630.40	0.22
627.85	0.14	630.45	0.22
627.90	0.14	630.50	0.22
627.95	0.14	630.55	0.22
628.00	0.15	630.60	0.22
628.05	0.15	630.65	**0.22**
628.10	0.15		
628.15	0.15		
628.20	0.15		
628.25	0.15		
628.30	0.16		
628.35	0.16		
628.40	0.16		
628.45	0.16		
628.50	0.16		
628.55	0.16		

Summary for Pond DB-4: DB-4

Inflow Area = 0.274 ac,100.00% Impervious, Inflow Depth = 15.53" for 100-YR event
Inflow = 3.06 cfs @ 12.00 hrs, Volume= 0.354 af
Outflow = 0.99 cfs @ 13.09 hrs, Volume= 0.354 af, Atten= 68%, Lag= 65.2 min
Primary = 0.99 cfs @ 13.09 hrs, Volume= 0.354 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs
Peak Elev= 637.63' @ 13.12 hrs Surf.Area= 0.072 ac Storage= 0.223 af
Flood Elev= 638.00' Surf.Area= 0.072 ac Storage= 0.246 af

Plug-Flow detention time= 344.1 min calculated for 0.354 af (100% of inflow)
Center-of-Mass det. time= 336.6 min (1,066.5 - 729.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	634.00'	0.000 af	**27.58'W x 113.50'L x 4.67'H Field A** 0.335 af Overall - 0.335 af Embedded = 0.000 af x 0.0% Voids
#2A	634.00'	0.246 af	**StormTrap ST1 SingleTrap 4-0** x 32 Inside #1 Inside= 82.7"W x 48.0"H => 23.79 sf x 14.06'L = 334.5 cf Outside= 82.7"W x 56.0"H => 32.18 sf x 14.06'L = 452.5 cf 4 Rows of 8 Chambers 27.58' x 112.50' Core + 0.00' x 0.50' Border = 27.58' x 113.50' System
		0.246 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	634.00'	**6.0" Round Culvert** L= 100.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 634.00' / 633.00' S= 0.0100 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.20 sf
#2	Device 1	634.00'	**2.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	636.00'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Device 1	637.00'	**4.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.95 cfs @ 13.09 hrs HW=637.54' (Free Discharge)
└─**1=Culvert** (Passes 0.95 cfs of 1.15 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.20 cfs @ 8.96 fps)
  ├─**3=Orifice/Grate** (Orifice Controls 0.49 cfs @ 5.65 fps)
  └─**4=Orifice/Grate** (Orifice Controls 0.26 cfs @ 2.96 fps)

Pond DB-4: DB-4 - Chamber Wizard Field A

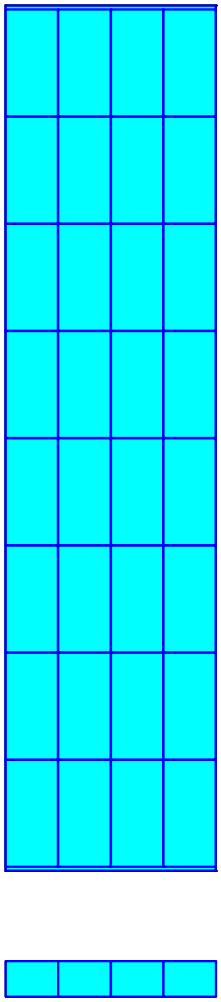
Chamber Model = StormTrap ST1 SingleTrap 4-0 (StormTrap ST1 SingleTrap® Type VI)
Inside= 82.7"W x 48.0"H => 23.79 sf x 14.06'L = 334.5 cf
Outside= 82.7"W x 56.0"H => 32.18 sf x 14.06'L = 452.5 cf

8 Chambers/Row x 14.06' Long = 112.50' Row Length +6.0" Border x 2 = 113.50' Base Length
4 Rows x 82.7" Wide = 27.58' Base Width
56.0" Chamber Height = 4.67' Field Height

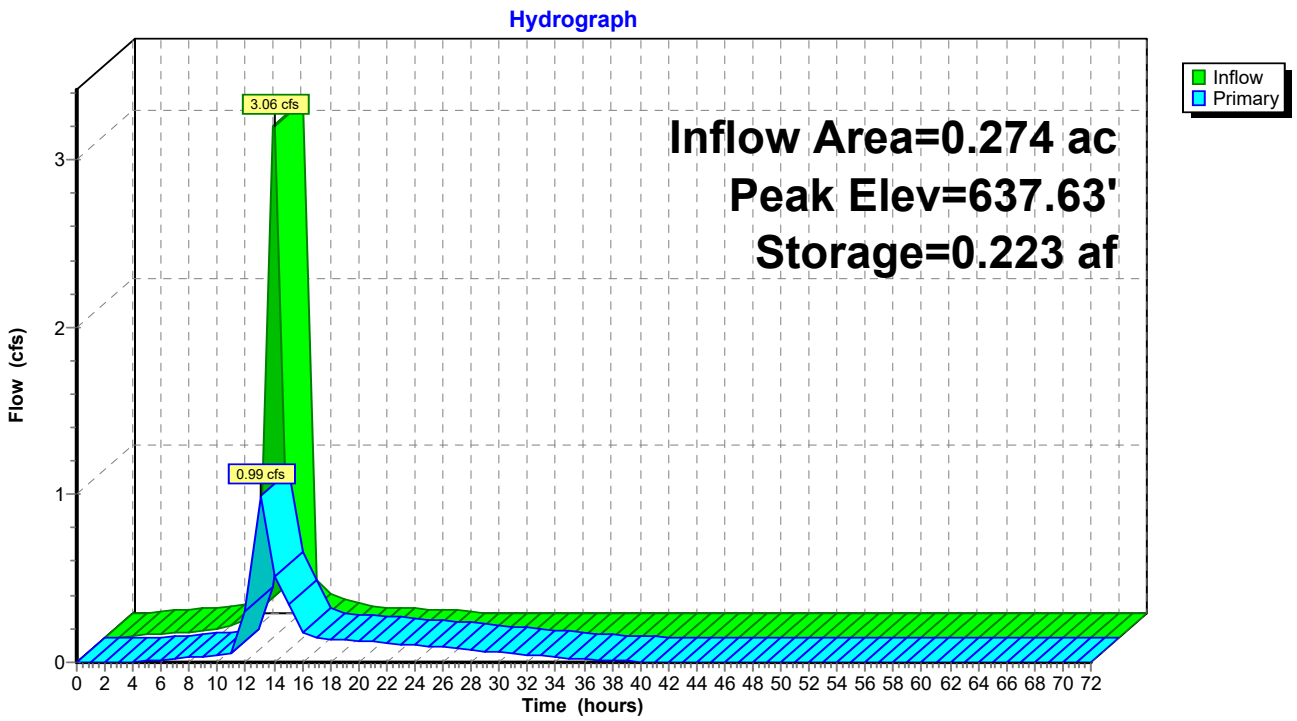
32 Chambers x 334.5 cf = 10,704.0 cf Chamber Storage
32 Chambers x 452.5 cf + 128.7 cf Border = 14,610.0 cf Displacement

Chamber Storage = 10,704.0 cf = 0.246 af
Overall Storage Efficiency = 73.3%
Overall System Size = 113.50' x 27.58' x 4.67'

32 Chambers (plus border)
541.1 cy Field



Pond DB-4: DB-4


Hydrograph
Inflow
Primary
3.06 cfs
0.99 cfs
Inflow Area=0.274 ac
Peak Elev=637.63'
Storage=0.223 af
Flow (cfs)
0
1
2
3
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72
Time (hours)

Stage-Discharge for Pond DB-4: DB-4

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
634.00	0.00	636.60	0.44
634.05	0.00	636.65	0.46
634.10	0.01	636.70	0.48
634.15	0.03	636.75	0.49
634.20	0.04	636.80	0.51
634.25	0.04	636.85	0.52
634.30	0.05	636.90	0.54
634.35	0.05	636.95	0.55
634.40	0.06	637.00	0.56
634.45	0.06	637.05	0.58
634.50	0.07	637.10	0.61
634.55	0.07	637.15	0.65
634.60	0.08	637.20	0.70
634.65	0.08	637.25	0.74
634.70	0.08	637.30	0.79
634.75	0.09	637.35	0.83
634.80	0.09	637.40	0.86
634.85	0.09	637.45	0.89
634.90	0.09	637.50	0.92
634.95	0.10	637.55	0.95
635.00	0.10	637.60	0.98
635.05	0.10	637.65	1.00
635.10	0.11	637.70	1.03
635.15	0.11	637.75	1.05
635.20	0.11	637.80	1.07
635.25	0.11	637.85	1.10
635.30	0.12	637.90	1.12
635.35	0.12	637.95	1.14
635.40	0.12	638.00	1.16
635.45	0.12	638.05	1.18
635.50	0.13	638.10	1.20
635.55	0.13	638.15	1.22
635.60	0.13	638.20	1.24
635.65	0.13	638.25	1.25
635.70	0.13	638.30	1.26
635.75	0.14	638.35	1.26
635.80	0.14	638.40	1.27
635.85	0.14	638.45	1.27
635.90	0.14	638.50	1.28
635.95	0.14	638.55	1.29
636.00	0.15	638.60	1.29
636.05	0.15	638.65	**1.30**
636.10	0.17		
636.15	0.20		
636.20	0.24		
636.25	0.27		
636.30	0.31		
636.35	0.34		
636.40	0.36		
636.45	0.39		
636.50	0.41		
636.55	0.43		

Summary for Pond DB-5: DB-5

Inflow Area = 0.708 ac, 85.71% Impervious, Inflow Depth = 10.21" for 100-YR event
Inflow = 3.85 cfs @ 12.02 hrs, Volume= 0.602 af
Outflow = 0.25 cfs @ 15.21 hrs, Volume= 0.604 af, Atten= 94%, Lag= 191.0 min
Primary = 0.25 cfs @ 15.21 hrs, Volume= 0.604 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs / 2
Peak Elev= 643.17' @ 15.21 hrs Surf.Area= 0.090 ac Storage= 0.422 af
Flood Elev= 643.50' Surf.Area= 0.090 ac Storage= 0.449 af

Plug-Flow detention time= 811.4 min calculated for 0.596 af (99% of inflow)
Center-of-Mass det. time= 824.6 min (1,579.4 - 754.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	637.50'	0.000 af	**34.48'W x 113.83'L x 7.17'H Field A** 0.646 af Overall - 0.646 af Embedded = 0.000 af x 0.0% Voids
#2A	637.50'	0.490 af	**StormTrap ST1 DoubleTrap 6-0**x 40 Inside #1 Inside= 82.7"W x 72.0"H => 37.97 sf x 14.06'L = 534.0 cf Outside= 82.7"W x 86.0"H => 49.42 sf x 14.06'L = 695.0 cf 5 Rows adjusted for 602.1 cf perimeter wall 34.48' x 112.50' Core + 0.00' x 0.67' Border = 34.48' x 113.83' System
		0.490 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	637.50'	**6.0" Round Culvert** L= 80.0' RCP, rounded edge headwall, Ke= 0.100 Inlet / Outlet Invert= 637.50' / 636.00' S= 0.0187 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#2	Device 1	637.50'	**2.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.25 cfs @ 15.21 hrs HW=643.16' (Free Discharge)
└─**1=Culvert** (Passes 0.25 cfs of 1.49 cfs potential flow)
└─**2=Orifice/Grate** (Orifice Controls 0.25 cfs @ 11.37 fps)

Pond DB-5: DB-5 - Chamber Wizard Field A

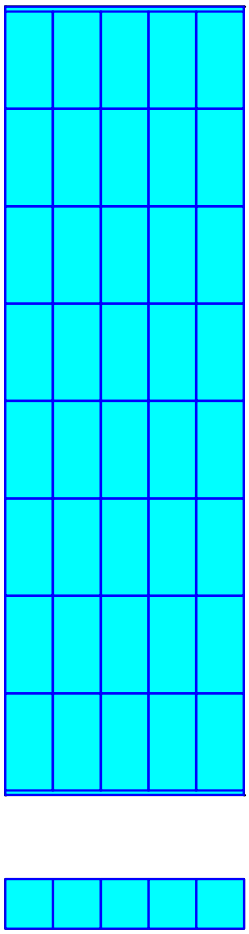
Chamber Model = StormTrap ST1 DoubleTrap 6-0 (StormTrap ST1 DoubleTrap® Type I/III/VI)
Inside= 82.7"W x 72.0"H => 37.97 sf x 14.06'L = 534.0 cf
Outside= 82.7"W x 86.0"H => 49.42 sf x 14.06'L = 695.0 cf
5 Rows adjusted for 602.1 cf perimeter wall

8 Chambers/Row x 14.06' Long = 112.50' Row Length +8.0" Border x 2 = 113.83' Base Length
5 Rows x 82.7" Wide = 34.48' Base Width
86.0" Chamber Height = 7.17' Field Height

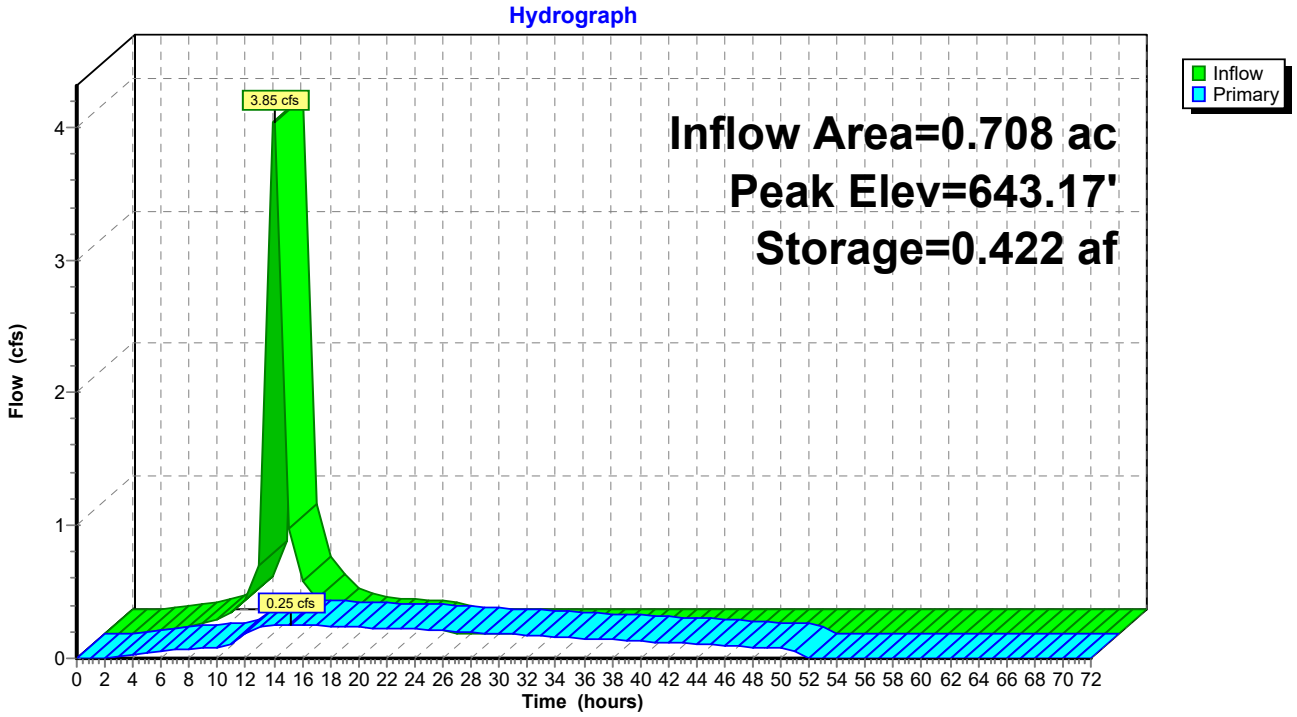
17.0 cf Sidewall x 8 x 2 + 33.0 cf Endwall x 5 x 2 = 602.1 cf Perimeter Wall
40 Chambers x 534.0 cf - 602.1 cf Perimeter wall = 20,757.8 cf Chamber Storage
40 Chambers x 695.0 cf + 329.5 cf Border = 28,128.3 cf Displacement

Chamber Storage = 20,757.8 cf = 0.477 af
Overall Storage Efficiency = 73.8%
Overall System Size = 113.83' x 34.48' x 7.17'

40 Chambers (plus border)
1,041.8 cy Field



Pond DB-5: DB-5


Hydrograph
Inflow
Primary
3.85 cfs
0.25 cfs
Inflow Area=0.708 ac
Peak Elev=643.17'
Storage=0.422 af
Flow (cfs)
Time (hours)

Stage-Discharge for Pond DB-5: DB-5

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
637.50	0.00	639.58	0.15	641.66	0.21	643.74	0.26
637.54	0.00	639.62	0.15	641.70	0.21	643.78	0.26
637.58	0.01	639.66	0.15	641.74	0.21	643.82	0.26
637.62	0.02	639.70	0.15	641.78	0.22	643.86	0.26
637.66	0.03	639.74	0.15	641.82	0.22	643.90	0.26
637.70	0.04	639.78	0.16	641.86	0.22	643.94	0.26
637.74	0.04	639.82	0.16	641.90	0.22	643.98	0.27
637.78	0.05	639.86	0.16	641.94	0.22	644.02	0.27
637.82	0.05	639.90	0.16	641.98	0.22	644.06	0.27
637.86	0.06	639.94	0.16	642.02	0.22	644.10	0.27
637.90	0.06	639.98	0.16	642.06	0.22	644.14	0.27
637.94	0.06	640.02	0.16	642.10	0.22	644.18	0.27
637.98	0.07	640.06	0.17	642.14	0.22	644.22	0.27
638.02	0.07	640.10	0.17	642.18	0.23	644.26	0.27
638.06	0.07	640.14	0.17	642.22	0.23	644.30	0.27
638.10	0.08	640.18	0.17	642.26	0.23	644.34	0.27
638.14	0.08	640.22	0.17	642.30	0.23	644.38	0.27
638.18	0.08	640.26	0.17	642.34	0.23	644.42	0.27
638.22	0.08	640.30	0.17	642.38	0.23	644.46	0.28
638.26	0.09	640.34	0.17	642.42	0.23	644.50	0.28
638.30	0.09	640.38	0.18	642.46	0.23	644.54	0.28
638.34	0.09	640.42	0.18	642.50	0.23	644.58	0.28
638.38	0.09	640.46	0.18	642.54	0.23	644.62	0.28
638.42	0.10	640.50	0.18	642.58	0.23	644.66	**0.28**
638.46	0.10	640.54	0.18	642.62	0.24		
638.50	0.10	640.58	0.18	642.66	0.24		
638.54	0.10	640.62	0.18	642.70	0.24		
638.58	0.10	640.66	0.18	642.74	0.24		
638.62	0.11	640.70	0.19	642.78	0.24		
638.66	0.11	640.74	0.19	642.82	0.24		
638.70	0.11	640.78	0.19	642.86	0.24		
638.74	0.11	640.82	0.19	642.90	0.24		
638.78	0.11	640.86	0.19	642.94	0.24		
638.82	0.12	640.90	0.19	642.98	0.24		
638.86	0.12	640.94	0.19	643.02	0.24		
638.90	0.12	640.98	0.19	643.06	0.25		
638.94	0.12	641.02	0.19	643.10	0.25		
638.98	0.12	641.06	0.20	643.14	0.25		
639.02	0.13	641.10	0.20	643.18	0.25		
639.06	0.13	641.14	0.20	643.22	0.25		
639.10	0.13	641.18	0.20	643.26	0.25		
639.14	0.13	641.22	0.20	643.30	0.25		
639.18	0.13	641.26	0.20	643.34	0.25		
639.22	0.13	641.30	0.20	643.38	0.25		
639.26	0.14	641.34	0.20	643.42	0.25		
639.30	0.14	641.38	0.20	643.46	0.25		
639.34	0.14	641.42	0.21	643.50	0.26		
639.38	0.14	641.46	0.21	643.54	0.26		
639.42	0.14	641.50	0.21	643.58	0.26		
639.46	0.14	641.54	0.21	643.62	0.26		
639.50	0.15	641.58	0.21	643.66	0.26		
639.54	0.15	641.62	0.21	643.70	0.26		

Summary for Pond ICS-3: ICS-3

Inflow Area =	0.328 ac, 72.22% Impervious, Inflow Depth = 6.37" for 100-YR event				
Inflow =	0.94 cfs @	12.02 hrs,	Volume=	0.174 af	
Outflow =	0.94 cfs @	12.02 hrs,	Volume=	0.174 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.52 cfs @	12.04 hrs,	Volume=	0.137 af	
Secondary =	0.42 cfs @	12.01 hrs,	Volume=	0.037 af	

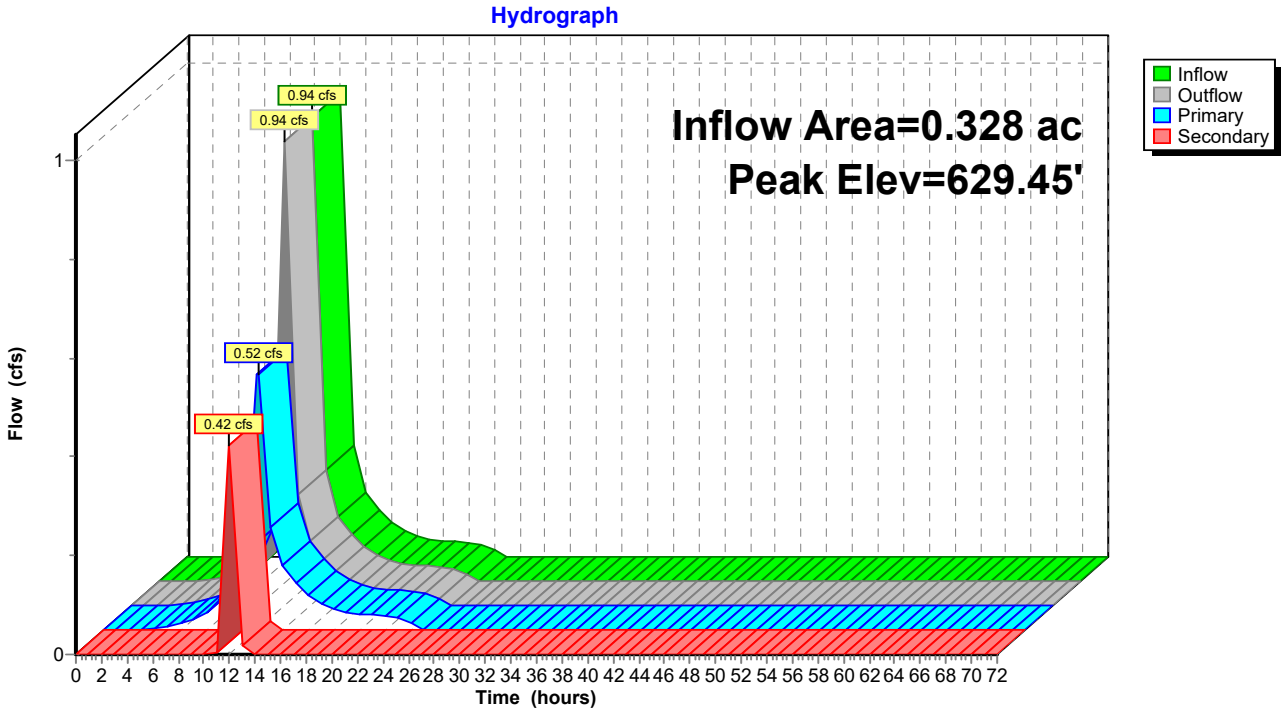
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs / 3
Peak Elev= 629.45' @ 12.03 hrs
Flood Elev= 632.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	628.85'	**5.0" Round Culvert** L= 240.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 628.85' / 622.00' S= 0.0285 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.14 sf
#2	Secondary	629.05'	**12.0" Round Culvert** L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 629.05' / 629.00' S= 0.0050 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.51 cfs @ 12.04 hrs HW=629.44' TW=623.44' (TW follows 6.00' below HW)
└─**1=Culvert** (Inlet Controls 0.51 cfs @ 3.72 fps)

Secondary OutFlow Max=0.42 cfs @ 12.01 hrs HW=629.45' (Free Discharge)
└─**2=Culvert** (Barrel Controls 0.42 cfs @ 2.09 fps)

Pond ICS-3: ICS-3



Stage-Discharge for Pond ICS-3: ICS-3

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
628.85	0.00	0.00	0.00
628.90	0.01	0.01	0.00
628.95	0.03	0.03	0.00
629.00	0.07	0.07	0.00
629.05	0.12	0.12	0.00
629.10	0.19	0.18	0.01
629.15	0.28	0.24	0.03
629.20	0.38	0.31	0.07
629.25	0.48	0.36	0.12
629.30	0.58	0.40	0.18
629.35	0.69	0.44	0.25
629.40	0.81	0.48	0.33
629.45	0.93	0.51	0.41
629.50	1.06	0.55	0.51
629.55	1.19	0.58	0.62
629.60	1.33	0.60	0.73
629.65	1.48	0.63	0.85
629.70	1.63	0.66	0.97
629.75	1.78	**0.68**	1.10
629.80	1.92	0.68	1.24
629.85	2.06	0.68	1.38
629.90	2.20	0.68	1.52
629.95	2.34	0.68	1.66
630.00	2.48	0.68	1.80
630.05	2.62	0.68	1.94
630.10	2.76	0.68	2.08
630.15	2.90	0.68	2.22
630.20	3.03	0.68	2.35
630.25	3.15	0.68	2.47
630.30	3.26	0.68	2.58
630.35	3.35	0.68	2.67
630.40	3.43	0.68	2.75
630.45	3.51	0.68	2.83
630.50	3.59	0.68	2.91
630.55	3.67	0.68	2.99
630.60	3.74	0.68	3.06
630.65	3.81	0.68	3.13
630.70	3.88	0.68	3.20
630.75	3.95	0.68	3.27
630.80	4.02	0.68	3.34
630.85	4.08	0.68	3.40
630.90	4.15	0.68	3.47
630.95	4.21	0.68	3.53
631.00	4.28	0.68	3.60
631.05	4.34	0.68	3.66
631.10	4.40	0.68	3.72
631.15	4.46	0.68	3.78
631.20	4.52	0.68	3.83
631.25	4.57	0.68	3.89
631.30	4.63	0.68	3.95
631.35	4.69	0.68	4.01
631.40	4.74	0.68	4.06
631.45	4.80	0.68	4.12
631.50	4.85	0.68	4.17
631.55	4.90	0.68	4.22
631.60	4.95	0.68	4.27
631.65	5.01	0.68	4.33
631.70	5.06	0.68	4.38
631.75	5.11	0.68	4.43
631.80	5.16	0.68	4.48
631.85	5.21	0.68	4.53
631.90	5.26	0.68	4.58
631.95	5.31	0.68	4.63
632.00	5.35	0.68	4.67
632.05	5.40	0.68	4.72
632.10	5.45	0.68	4.77
632.15	5.49	0.68	4.81
632.20	5.54	0.68	4.86
632.25	5.59	0.68	4.91
632.30	5.63	0.68	4.95
632.35	5.68	0.68	5.00
632.40	5.72	0.68	5.04
632.45	5.76	0.68	5.08
632.50	**5.81**	0.68	**5.13**

Summary for Pond ICS-4: ICS-4

Inflow Area =	1.068 ac, 93.43% Impervious, Inflow Depth = 7.32" for 100-YR event				
Inflow =	3.31 cfs @	12.01 hrs,	Volume=	0.652 af	
Outflow =	3.31 cfs @	12.01 hrs,	Volume=	0.652 af,	Atten= 0%, Lag= 0.0 min
Primary =	1.11 cfs @	12.09 hrs,	Volume=	0.470 af	
Secondary =	2.20 cfs @	12.00 hrs,	Volume=	0.182 af	

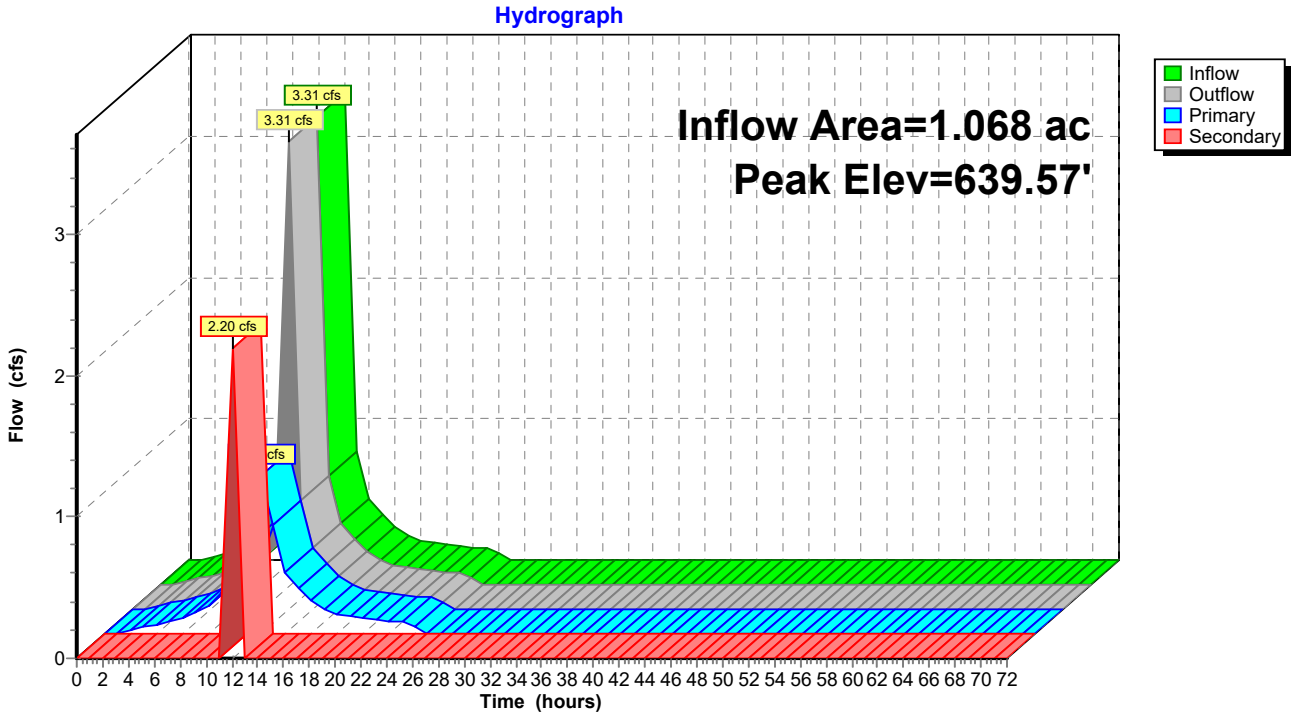
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs / 3
Peak Elev= 639.57' @ 12.01 hrs
Flood Elev= 640.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	636.50'	**6.0" Round Culvert** L= 235.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 636.50' / 633.00' S= 0.0149 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf
#2	Device 3	639.28'	**5.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Secondary	637.00'	**15.0" Round Culvert** L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 637.00' / 636.75' S= 0.0250 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=1.09 cfs @ 12.09 hrs HW=639.36' (Free Discharge)
└─**1=Culvert** (Barrel Controls 1.09 cfs @ 5.56 fps)

Secondary OutFlow Max=2.20 cfs @ 12.00 hrs HW=639.57' (Free Discharge)
└─**3=Culvert** (Passes 2.20 cfs of 6.50 cfs potential flow)
  └─**2=Broad-Crested Rectangular Weir** (Weir Controls 2.20 cfs @ 1.53 fps)

Pond ICS-4: ICS-4



Stage-Discharge for Pond ICS-4: ICS-4

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
636.50	0.00	0.00	0.00
636.55	0.01	0.01	0.00
636.60	0.04	0.04	0.00
636.65	0.08	0.08	0.00
636.70	0.14	0.14	0.00
636.75	0.21	0.21	0.00
636.80	0.29	0.29	0.00
636.85	0.37	0.37	0.00
636.90	0.45	0.45	0.00
636.95	0.53	0.53	0.00
637.00	0.59	0.59	0.00
637.05	0.65	0.65	0.00
637.10	0.70	0.70	0.00
637.15	0.75	0.75	0.00
637.20	0.79	0.79	0.00
637.25	0.84	0.84	0.00
637.30	0.88	0.88	0.00
637.35	0.89	0.89	0.00
637.40	0.89	0.89	0.00
637.45	0.90	0.90	0.00
637.50	0.90	0.90	0.00
637.55	0.91	0.91	0.00
637.60	0.91	0.91	0.00
637.65	0.92	0.92	0.00
637.70	0.92	0.92	0.00
637.75	0.93	0.93	0.00
637.80	0.94	0.94	0.00
637.85	0.94	0.94	0.00
637.90	0.95	0.95	0.00
637.95	0.95	0.95	0.00
638.00	0.96	0.96	0.00
638.05	0.96	0.96	0.00
638.10	0.97	0.97	0.00
638.15	0.97	0.97	0.00
638.20	0.98	0.98	0.00
638.25	0.98	0.98	0.00
638.30	0.99	0.99	0.00
638.35	0.99	0.99	0.00
638.40	1.00	1.00	0.00
638.45	1.00	1.00	0.00
638.50	1.01	1.01	0.00
638.55	1.01	1.01	0.00
638.60	1.02	1.02	0.00
638.65	1.02	1.02	0.00
638.70	1.03	1.03	0.00
638.75	1.03	1.03	0.00
638.80	1.04	1.04	0.00
638.85	1.04	1.04	0.00
638.90	1.05	1.05	0.00
638.95	1.05	1.05	0.00
639.00	1.06	1.06	0.00
639.05	1.06	1.06	0.00
639.10	1.07	1.07	0.00
639.15	1.07	1.07	0.00
639.20	1.08	1.08	0.00
639.25	1.08	1.08	0.00
639.30	1.13	1.09	0.04
639.35	1.35	1.09	0.26
639.40	1.68	1.10	0.58
639.45	2.08	1.10	0.98
639.50	2.56	1.11	1.45
639.55	3.10	1.11	1.99
639.60	3.71	1.11	2.60
639.65	4.38	1.12	3.27
639.70	5.12	1.12	4.00
639.75	5.92	1.13	4.79
639.80	6.79	1.13	5.65
639.85	7.71	1.14	6.58
639.90	8.18	1.14	7.04
639.95	8.26	1.15	7.11
640.00	**8.34**	**1.15**	**7.19**

Summary for Pond ICS-5: ICS-5

Inflow Area =	0.739 ac, 62.40% Impervious, Inflow Depth = 5.90" for 100-YR event				
Inflow =	2.00 cfs @	12.03 hrs,	Volume=	0.364 af	
Outflow =	2.00 cfs @	12.03 hrs,	Volume=	0.364 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.29 cfs @	12.06 hrs,	Volume=	0.172 af	
Secondary =	1.70 cfs @	12.03 hrs,	Volume=	0.192 af	

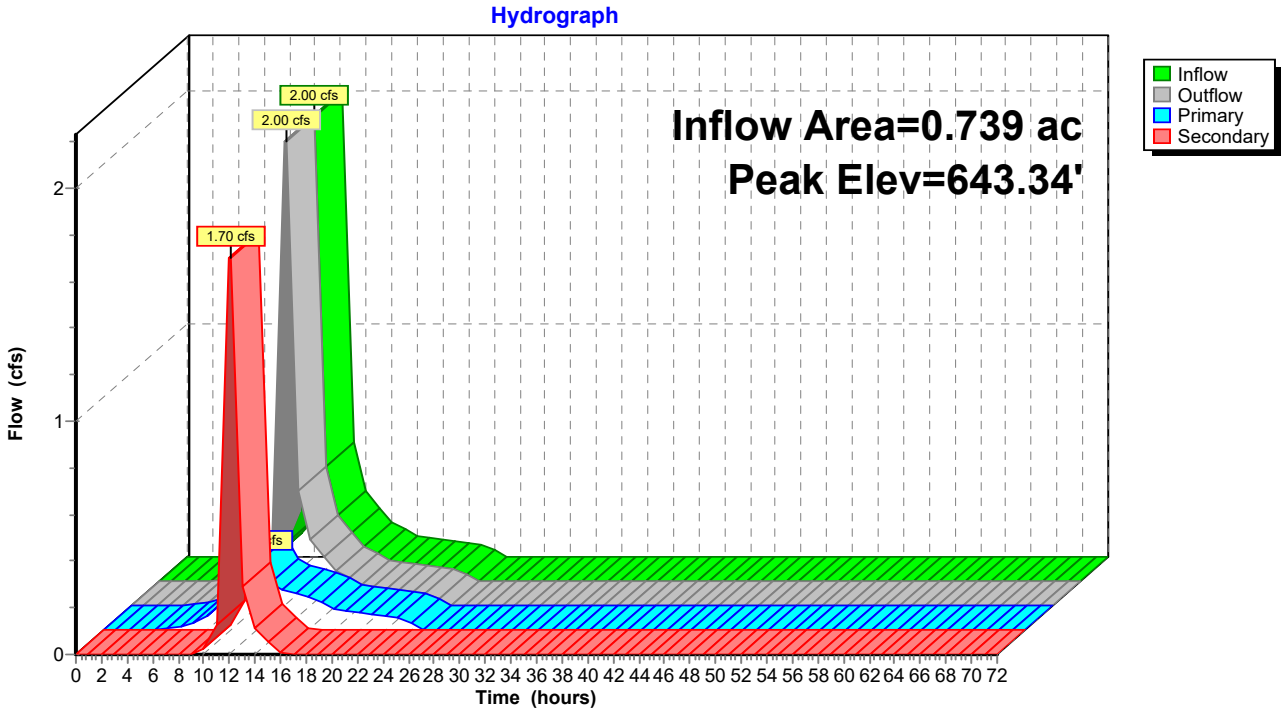
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs / 3
Peak Elev= 643.34' @ 12.05 hrs
Flood Elev= 645.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	642.25'	**3.0" Round Culvert** L= 80.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 642.25' / 636.00' S= 0.0781 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.05 sf
#2	Secondary	642.56'	**12.0" Round Culvert** L= 6.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 642.56' / 642.50' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.29 cfs @ 12.06 hrs HW=643.31' TW=637.31' (TW follows 6.00' below HW)
└─**1=Culvert** (Inlet Controls 0.29 cfs @ 5.83 fps)

Secondary OutFlow Max=1.66 cfs @ 12.03 hrs HW=643.33' TW=637.33' (TW follows 6.00' below HW)
└─**2=Culvert** (Barrel Controls 1.66 cfs @ 3.53 fps)

Pond ICS-5: ICS-5



Stage-Discharge for Pond ICS-5: ICS-5

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
642.25	0.00	0.00	0.00
642.30	0.01	0.01	0.00
642.35	0.02	0.02	0.00
642.40	0.05	0.05	0.00
642.45	0.08	0.08	0.00
642.50	0.10	0.10	0.00
642.55	0.12	0.12	0.00
642.60	0.15	0.14	0.01
642.65	0.19	0.15	0.03
642.70	0.25	0.17	0.08
642.75	0.32	0.18	0.14
642.80	0.41	0.19	0.22
642.85	0.51	0.20	0.30
642.90	0.62	0.21	0.40
642.95	0.74	0.22	0.52
643.00	0.87	0.23	0.64
643.05	1.02	0.24	0.77
643.10	1.17	0.25	0.91
643.15	1.33	0.26	1.07
643.20	1.49	0.27	1.22
643.25	1.66	0.28	1.39
643.30	1.84	0.28	1.56
643.35	2.02	**0.29**	1.73
643.40	2.21	**0.30**	1.91
643.45	2.39	0.30	2.09
643.50	2.57	0.30	2.27
643.55	2.75	0.30	2.45
643.60	2.93	0.30	2.63
643.65	3.10	0.30	2.80
643.70	3.27	0.30	2.97
643.75	3.42	0.30	3.13
643.80	3.57	0.30	3.27
643.85	3.69	0.30	3.39
643.90	3.78	0.30	3.48
643.95	3.99	0.30	3.69
644.00	4.19	0.30	3.89
644.05	4.38	0.30	4.08
644.10	4.56	0.30	4.26
644.15	4.73	0.30	4.44
644.20	4.90	0.30	4.60
644.25	5.06	0.30	4.77
644.30	5.22	0.30	4.92
644.35	5.37	0.30	5.07
644.40	5.52	0.30	5.22
644.45	5.66	0.30	5.36
644.50	5.80	0.30	5.50
644.55	5.94	0.30	5.64
644.60	6.07	0.30	5.77
644.65	6.20	0.30	5.90
644.70	6.32	0.30	6.03
644.75	6.44	0.30	6.15
644.80	6.53	0.30	6.24
644.85	6.62	0.30	6.32
644.90	6.71	0.30	6.41
644.95	6.79	0.30	6.50
645.00	6.88	0.30	6.58
645.05	6.96	0.30	6.67
645.10	7.05	0.30	6.75
645.15	7.13	0.30	6.83
645.20	7.21	0.30	6.92
645.25	7.29	0.30	7.00
645.30	7.37	0.30	7.07
645.35	7.45	0.30	7.15
645.40	7.53	0.30	7.23
645.45	7.60	0.30	7.31
645.50	**7.68**	0.30	**7.38**

Summary for Pond RG-7B: RG-7B

Inflow Area = 0.055 ac, 72.50% Impervious, Inflow Depth = 6.37" for 100-YR event
Inflow = 0.16 cfs @ 12.02 hrs, Volume= 0.029 af
Outflow = 0.16 cfs @ 12.08 hrs, Volume= 0.034 af, Atten= 0%, Lag= 3.2 min
Primary = 0.16 cfs @ 12.08 hrs, Volume= 0.034 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs / 3
Peak Elev= 654.93' @ 12.00 hrs Surf.Area= 493 sf Storage= 338 cf

Plug-Flow detention time= 97.9 min calculated for 0.029 af (99% of inflow)
Center-of-Mass det. time= 260.4 min (1,041.8 - 781.4)

Volume	Invert	Avail.Storage	Storage Description
#1	653.00'	249 cf	**Custom Stage Data (Conic)** Listed below (Recalc) 638 cf Overall - 389 cf Embedded = 249 cf
#2	653.00'	52 cf	**Crushed Stone (Prismatic)** Listed below (Recalc) Inside #1 130 cf Overall x 40.0% Voids
#3	653.50'	58 cf	**Bio Mix Media (Prismatic)** Listed below (Recalc) Inside #1 194 cf Overall x 30.0% Voids
#4	654.25'	13 cf	**Mulch (Prismatic)** Listed below (Recalc) Inside #1 65 cf Overall x 20.0% Voids
		372 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
653.00	259	0	0	259
654.00	259	259	259	316
655.00	513	379	638	579

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
653.00	259	0	0
653.50	259	130	130

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
653.50	259	0	0
654.25	259	194	194

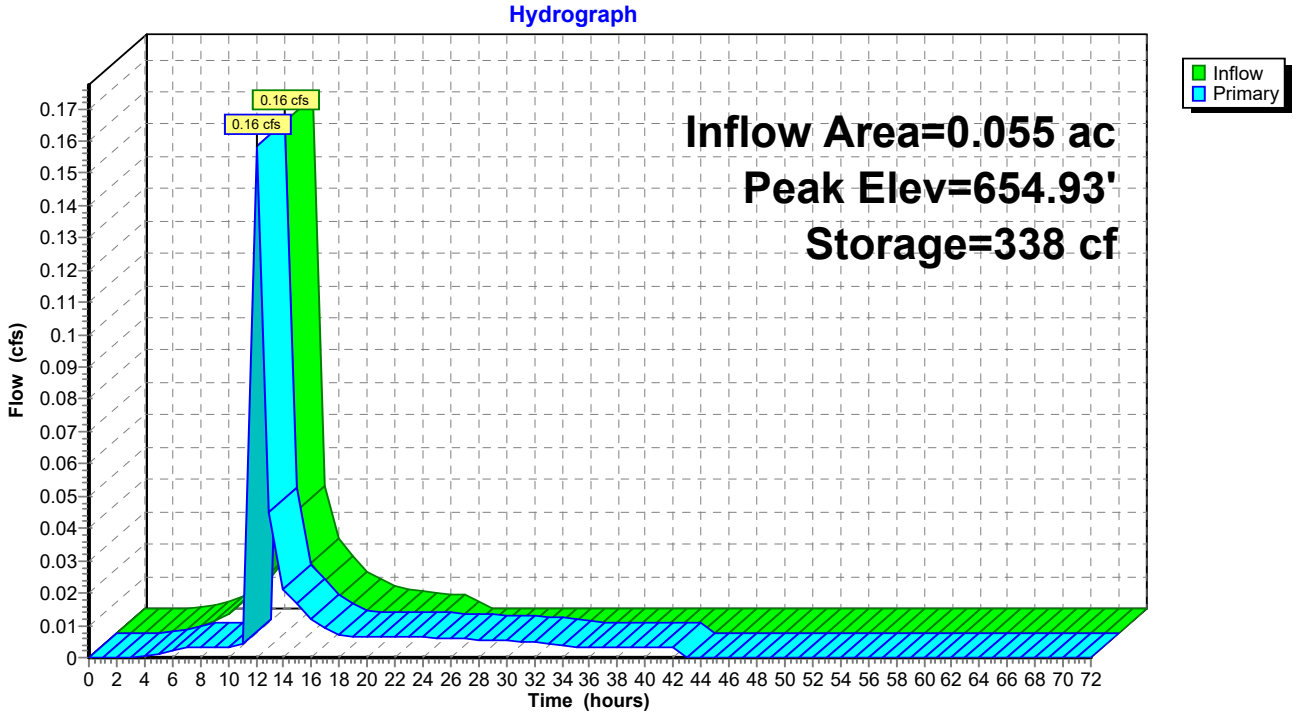
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
654.25	259	0	0
654.50	259	65	65

Device	Routing	Invert	Outlet Devices
#1	Primary	654.90'	**10.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

#2 Primary 653.00' **0.580 in/hr Exfiltration over Surface area**

Primary OutFlow Max=0.14 cfs @ 12.08 hrs HW=654.93' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 0.13 cfs @ 0.44 fps)
└─**2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Pond RG-7B: RG-7B



Stage-Discharge for Pond RG-7B: RG-7B

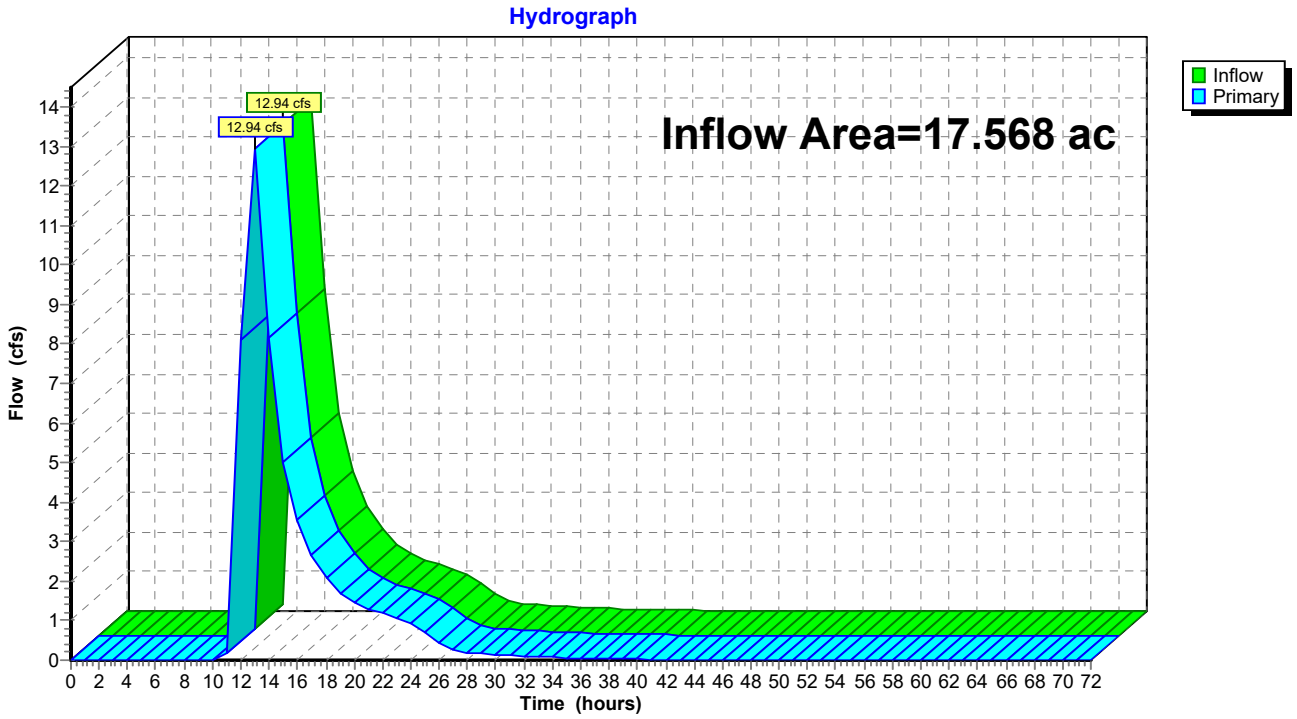
Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
653.00	0.00	653.52	0.00	654.04	0.00	654.56	0.01
653.01	0.00	653.53	0.00	654.05	0.00	654.57	0.01
653.02	0.00	653.54	0.00	654.06	0.00	654.58	0.01
653.03	0.00	653.55	0.00	654.07	0.00	654.59	0.01
653.04	0.00	653.56	0.00	654.08	0.00	654.60	0.01
653.05	0.00	653.57	0.00	654.09	0.00	654.61	0.01
653.06	0.00	653.58	0.00	654.10	0.00	654.62	0.01
653.07	0.00	653.59	0.00	654.11	0.00	654.63	0.01
653.08	0.00	653.60	0.00	654.12	0.00	654.64	0.01
653.09	0.00	653.61	0.00	654.13	0.00	654.65	0.01
653.10	0.00	653.62	0.00	654.14	0.00	654.66	0.01
653.11	0.00	653.63	0.00	654.15	0.00	654.67	0.01
653.12	0.00	653.64	0.00	654.16	0.00	654.68	0.01
653.13	0.00	653.65	0.00	654.17	0.00	654.69	0.01
653.14	0.00	653.66	0.00	654.18	0.00	654.70	0.01
653.15	0.00	653.67	0.00	654.19	0.00	654.71	0.01
653.16	0.00	653.68	0.00	654.20	0.00	654.72	0.01
653.17	0.00	653.69	0.00	654.21	0.00	654.73	0.01
653.18	0.00	653.70	0.00	654.22	0.00	654.74	0.01
653.19	0.00	653.71	0.00	654.23	0.00	654.75	0.01
653.20	0.00	653.72	0.00	654.24	0.00	654.76	0.01
653.21	0.00	653.73	0.00	654.25	0.00	654.77	0.01
653.22	0.00	653.74	0.00	654.26	0.00	654.78	0.01
653.23	0.00	653.75	0.00	654.27	0.00	654.79	0.01
653.24	0.00	653.76	0.00	654.28	0.00	654.80	0.01
653.25	0.00	653.77	0.00	654.29	0.00	654.81	0.01
653.26	0.00	653.78	0.00	654.30	0.00	654.82	0.01
653.27	0.00	653.79	0.00	654.31	0.00	654.83	0.01
653.28	0.00	653.80	0.00	654.32	0.00	654.84	0.01
653.29	0.00	653.81	0.00	654.33	0.00	654.85	0.01
653.30	0.00	653.82	0.00	654.34	0.00	654.86	0.01
653.31	0.00	653.83	0.00	654.35	0.00	654.87	0.01
653.32	0.00	653.84	0.00	654.36	0.00	654.88	0.01
653.33	0.00	653.85	0.00	654.37	0.00	654.89	0.01
653.34	0.00	653.86	0.00	654.38	0.00	654.90	0.01
653.35	0.00	653.87	0.00	654.39	0.00	654.91	0.03
653.36	0.00	653.88	0.00	654.40	0.00	654.92	0.08
653.37	0.00	653.89	0.00	654.41	0.00	654.93	0.14
653.38	0.00	653.90	0.00	654.42	0.00	654.94	0.21
653.39	0.00	653.91	0.00	654.43	0.00	654.95	0.29
653.40	0.00	653.92	0.00	654.44	0.00	654.96	0.38
653.41	0.00	653.93	0.00	654.45	0.00	654.97	0.48
653.42	0.00	653.94	0.00	654.46	0.00	654.98	0.58
653.43	0.00	653.95	0.00	654.47	0.00	654.99	0.69
653.44	0.00	653.96	0.00	654.48	0.00	655.00	**0.81**
653.45	0.00	653.97	0.00	654.49	0.01		
653.46	0.00	653.98	0.00	654.50	0.01		
653.47	0.00	653.99	0.00	654.51	0.01		
653.48	0.00	654.00	0.00	654.52	0.01		
653.49	0.00	654.01	0.00	654.53	0.01		
653.50	0.00	654.02	0.00	654.54	0.01		
653.51	0.00	654.03	0.00	654.55	0.01		

Summary for Link PDP-3: Design Point 3

Inflow Area = 17.568 ac, 18.21% Impervious, Inflow Depth = 2.98" for 100-YR event
Inflow = 12.94 cfs @ 13.00 hrs, Volume= 4.367 af
Primary = 12.94 cfs @ 13.00 hrs, Volume= 4.367 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 1.00 hrs

Link PDP-3: Design Point 3



Hydrograph for Pond 1: SFB-1

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	607.00	0.00	0.00	0.00
2.00	0.00	0	607.00	0.00	0.00	0.00
4.00	0.01	3	607.01	0.01	0.01	0.00
6.00	0.03	10	607.03	0.03	0.03	0.00
8.00	0.09	102	607.26	0.05	0.05	0.00
10.00	0.24	834	608.62	0.07	0.07	0.00
12.00	**1.36**	**3,945**	**609.98**	**0.72**	**0.11**	**0.60**
14.00	0.75	**3,993**	**609.99**	**0.80**	**0.12**	**0.68**
16.00	0.33	3,699	609.89	0.38	0.11	0.27
18.00	0.15	3,421	609.78	0.20	0.11	0.09
20.00	0.11	2,947	609.60	0.18	0.10	0.08
22.00	0.08	2,415	609.38	0.16	0.10	0.06
24.00	0.04	1,901	609.15	0.12	0.09	0.03
26.00	0.00	1,301	608.87	0.08	0.08	0.00
28.00	0.00	753	608.58	0.07	0.07	0.00
30.00	0.00	325	607.84	0.05	0.05	0.00
32.00	0.00	4	607.01	0.01	0.01	0.00
34.00	0.00	0	607.00	0.00	0.00	0.00
36.00	0.00	0	607.00	0.00	0.00	0.00
38.00	0.00	0	607.00	0.00	0.00	0.00
40.00	0.00	0	607.00	0.00	0.00	0.00
42.00	0.00	0	607.00	0.00	0.00	0.00
44.00	0.00	0	607.00	0.00	0.00	0.00
46.00	0.00	0	607.00	0.00	0.00	0.00
48.00	0.00	0	607.00	0.00	0.00	0.00
50.00	0.00	0	607.00	0.00	0.00	0.00
52.00	0.00	0	607.00	0.00	0.00	0.00
54.00	0.00	0	607.00	0.00	0.00	0.00
56.00	0.00	0	607.00	0.00	0.00	0.00
58.00	0.00	0	607.00	0.00	0.00	0.00
60.00	0.00	0	607.00	0.00	0.00	0.00
62.00	0.00	0	607.00	0.00	0.00	0.00
64.00	0.00	0	607.00	0.00	0.00	0.00
66.00	0.00	0	607.00	0.00	0.00	0.00
68.00	0.00	0	607.00	0.00	0.00	0.00
70.00	0.00	0	607.00	0.00	0.00	0.00
72.00	0.00	0	607.00	0.00	0.00	0.00

Hydrograph for Pond 2: SFB-2

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	613.25	0.00	0.00	0.00
2.00	0.00	0	613.25	0.00	0.00	0.00
4.00	0.01	1	613.25	0.00	0.00	0.00
6.00	0.03	8	613.26	0.03	0.03	0.00
8.00	0.17	40	613.28	0.16	0.16	0.00
10.00	0.52	907	613.95	0.22	0.22	0.00
12.00	**2.33**	6,817	615.58	0.42	0.36	0.06
14.00	1.20	**12,826**	**616.40**	**1.16**	**0.45**	**0.71**
16.00	0.84	12,015	616.30	1.06	0.44	0.62
18.00	0.57	10,560	616.11	0.70	0.42	0.28
20.00	0.40	9,786	616.01	0.50	0.41	0.10
22.00	0.33	8,901	615.88	0.48	0.39	0.08
24.00	0.22	7,652	615.71	0.45	0.38	0.07
26.00	0.05	5,419	615.36	0.37	0.34	0.03
28.00	0.03	3,326	615.01	0.31	0.31	0.00
30.00	0.01	1,453	614.41	0.24	0.24	0.00
32.00	0.01	26	613.27	0.10	0.10	0.00
34.00	0.01	1	613.25	0.01	0.01	0.00
36.00	0.00	1	613.25	0.00	0.00	0.00
38.00	0.00	1	613.25	0.00	0.00	0.00
40.00	0.00	1	613.25	0.00	0.00	0.00
42.00	0.00	0	613.25	0.00	0.00	0.00
44.00	0.00	0	613.25	0.00	0.00	0.00
46.00	0.00	0	613.25	0.00	0.00	0.00
48.00	0.00	0	613.25	0.00	0.00	0.00
50.00	0.00	0	613.25	0.00	0.00	0.00
52.00	0.00	0	613.25	0.00	0.00	0.00
54.00	0.00	0	613.25	0.00	0.00	0.00
56.00	0.00	0	613.25	0.00	0.00	0.00
58.00	0.00	0	613.25	0.00	0.00	0.00
60.00	0.00	0	613.25	0.00	0.00	0.00
62.00	0.00	0	613.25	0.00	0.00	0.00
64.00	0.00	0	613.25	0.00	0.00	0.00
66.00	0.00	0	613.25	0.00	0.00	0.00
68.00	0.00	0	613.25	0.00	0.00	0.00
70.00	0.00	0	613.25	0.00	0.00	0.00
72.00	0.00	0	613.25	0.00	0.00	0.00

Hydrograph for Pond 3: SFB-3

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	620.00	0.00	0.00	0.00
2.00	0.00	0	620.00	0.00	0.00	0.00
4.00	0.02	4	620.02	0.02	0.02	0.00
6.00	0.05	44	620.21	0.03	0.03	0.00
8.00	0.08	282	621.32	0.04	0.04	0.00
10.00	0.17	836	621.96	0.06	0.06	0.00
12.00	**1.03**	**1,250**	**622.27**	**0.94**	**0.07**	**0.87**
14.00	0.40	1,064	622.14	0.41	0.06	0.34
16.00	0.31	1,028	622.11	0.31	0.06	0.25
18.00	0.26	1,009	622.09	0.26	0.06	0.20
20.00	0.24	999	622.09	0.24	0.06	0.18
22.00	0.22	991	622.08	0.22	0.06	0.16
24.00	0.19	978	622.07	0.19	0.06	0.13
26.00	0.16	961	622.06	0.16	0.06	0.10
28.00	0.14	954	622.05	0.14	0.06	0.08
30.00	0.13	947	622.05	0.13	0.06	0.07
32.00	0.12	939	622.04	0.12	0.06	0.06
34.00	0.10	932	622.03	0.10	0.06	0.05
36.00	0.09	924	622.03	0.09	0.06	0.03
38.00	0.08	910	622.02	0.08	0.06	0.02
40.00	0.06	897	622.01	0.06	0.06	0.01
42.00	0.05	875	621.99	0.06	0.06	0.00
44.00	0.04	781	621.91	0.05	0.05	0.00
46.00	0.02	614	621.76	0.05	0.05	0.00
48.00	0.01	395	621.55	0.04	0.04	0.00
50.00	0.01	194	620.92	0.03	0.03	0.00
52.00	0.00	25	620.12	0.03	0.03	0.00
54.00	0.00	1	620.00	0.00	0.00	0.00
56.00	0.00	1	620.00	0.00	0.00	0.00
58.00	0.00	1	620.00	0.00	0.00	0.00
60.00	0.00	0	620.00	0.00	0.00	0.00
62.00	0.00	0	620.00	0.00	0.00	0.00
64.00	0.00	0	620.00	0.00	0.00	0.00
66.00	0.00	0	620.00	0.00	0.00	0.00
68.00	0.00	0	620.00	0.00	0.00	0.00
70.00	0.00	0	620.00	0.00	0.00	0.00
72.00	0.00	0	620.00	0.00	0.00	0.00

Hydrograph for Pond 4: SFB-4

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0	630.00	0.00	0.00	0.00	0.00
2.00	0.02	2	630.00	0.02	0.02	0.00	0.00
4.00	0.07	6	630.01	0.07	0.07	0.00	0.00
6.00	0.12	10	630.02	0.12	0.12	0.00	0.00
8.00	0.22	19	630.04	0.22	0.22	0.00	0.00
10.00	0.44	561	631.05	0.26	0.26	0.00	0.00
12.00	**1.63**	**4,018**	**632.76**	**0.68**	**0.46**	**0.21**	**0.00**
14.00	**0.99**	**5,741**	**633.29**	**0.98**	**0.52**	**0.45**	**0.00**
16.00	0.43	4,317	632.86	0.76	0.47	0.28	0.00
18.00	0.29	2,882	632.37	0.47	0.41	0.06	0.00
20.00	0.25	1,838	631.96	0.37	0.37	0.00	0.00
22.00	0.22	1,028	631.61	0.32	0.32	0.00	0.00
24.00	0.15	370	630.68	0.25	0.25	0.00	0.00
26.00	0.09	8	630.01	0.09	0.09	0.00	0.00
28.00	0.07	6	630.01	0.07	0.07	0.00	0.00
30.00	0.06	5	630.01	0.06	0.06	0.00	0.00
32.00	0.04	4	630.01	0.04	0.04	0.00	0.00
34.00	0.03	3	630.00	0.03	0.03	0.00	0.00
36.00	0.02	1	630.00	0.02	0.02	0.00	0.00
38.00	0.01	1	630.00	0.01	0.01	0.00	0.00
40.00	0.01	0	630.00	0.01	0.01	0.00	0.00
42.00	0.00	0	630.00	0.00	0.00	0.00	0.00
44.00	0.00	0	630.00	0.00	0.00	0.00	0.00
46.00	0.00	0	630.00	0.00	0.00	0.00	0.00
48.00	0.00	0	630.00	0.00	0.00	0.00	0.00
50.00	0.00	0	630.00	0.00	0.00	0.00	0.00
52.00	0.00	0	630.00	0.00	0.00	0.00	0.00
54.00	0.00	0	630.00	0.00	0.00	0.00	0.00
56.00	0.00	0	630.00	0.00	0.00	0.00	0.00
58.00	0.00	0	630.00	0.00	0.00	0.00	0.00
60.00	0.00	0	630.00	0.00	0.00	0.00	0.00
62.00	0.00	0	630.00	0.00	0.00	0.00	0.00
64.00	0.00	0	630.00	0.00	0.00	0.00	0.00
66.00	0.00	0	630.00	0.00	0.00	0.00	0.00
68.00	0.00	0	630.00	0.00	0.00	0.00	0.00
70.00	0.00	0	630.00	0.00	0.00	0.00	0.00
72.00	0.00	0	630.00	0.00	0.00	0.00	0.00

Hydrograph for Pond 5: SFB-5

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0	632.00	0.00	0.00	0.00	0.00
2.00	0.00	0	632.00	0.00	0.00	0.00	0.00
4.00	0.02	5	632.01	0.02	0.02	0.00	0.00
6.00	0.07	13	632.03	0.07	0.07	0.00	0.00
8.00	0.13	70	632.14	0.10	0.10	0.00	0.00
10.00	0.24	645	633.49	0.10	0.10	0.00	0.00
12.00	**0.76**	2,472	634.27	0.19	0.19	0.00	0.00
14.00	0.48	**4,799**	**634.99**	**0.30**	**0.23**	**0.07**	**0.00**
16.00	0.42	**4,829**	**635.00**	**0.39**	**0.23**	**0.07**	**0.10**
18.00	0.35	4,826	635.00	0.35	0.23	0.07	0.05
20.00	0.32	4,824	635.00	0.32	0.23	0.07	0.02
22.00	0.30	4,822	635.00	0.30	0.23	0.07	0.00
24.00	0.25	4,719	634.97	0.29	0.23	0.07	0.00
26.00	0.21	4,264	634.84	0.27	0.22	0.05	0.00
28.00	0.20	3,823	634.70	0.25	0.21	0.04	0.00
30.00	0.18	3,481	634.60	0.22	0.21	0.01	0.00
32.00	0.17	3,231	634.52	0.21	0.21	0.00	0.00
34.00	0.16	2,974	634.44	0.20	0.20	0.00	0.00
36.00	0.15	2,669	634.33	0.20	0.20	0.00	0.00
38.00	0.14	2,322	634.22	0.19	0.19	0.00	0.00
40.00	0.13	1,939	634.08	0.18	0.18	0.00	0.00
42.00	0.12	1,538	633.94	0.17	0.17	0.00	0.00
44.00	0.11	1,205	633.80	0.15	0.15	0.00	0.00
46.00	0.10	946	633.67	0.13	0.13	0.00	0.00
48.00	0.08	744	633.56	0.11	0.11	0.00	0.00
50.00	0.07	577	633.27	0.10	0.10	0.00	0.00
52.00	0.00	190	632.38	0.10	0.10	0.00	0.00
54.00	0.00	0	632.00	0.00	0.00	0.00	0.00
56.00	0.00	0	632.00	0.00	0.00	0.00	0.00
58.00	0.00	0	632.00	0.00	0.00	0.00	0.00
60.00	0.00	0	632.00	0.00	0.00	0.00	0.00
62.00	0.00	0	632.00	0.00	0.00	0.00	0.00
64.00	0.00	0	632.00	0.00	0.00	0.00	0.00
66.00	0.00	0	632.00	0.00	0.00	0.00	0.00
68.00	0.00	0	632.00	0.00	0.00	0.00	0.00
70.00	0.00	0	632.00	0.00	0.00	0.00	0.00
72.00	0.00	0	632.00	0.00	0.00	0.00	0.00

APPENDIX E: STORMWATER CALCULATIONS

- *NOAA RAINFALL DATA*
- *WATER QUALITY VOLUME CALCULATIONS*
- *GROUNDWATER RECHARGE VOLUME CALCULATION*
- *TSS REMOVAL*
- *PIPE SIZING CALCULATIONS*
- *RIPRAP SIZING*
- *LEVEL SPREADER CALCULATIONS*

NOAA Atlas 14, Volume 10, Version 3
Location name: Storrs Mansfield, Connecticut, USA*
Latitude: 41.8251°, Longitude: -72.2676°
Elevation: 640.98 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.328 (0.258-0.417)	0.394 (0.310-0.501)	0.502 (0.393-0.641)	0.592 (0.461-0.760)	0.715 (0.538-0.960)	0.808 (0.595-1.11)	0.905 (0.646-1.29)	1.01 (0.684-1.48)	1.17 (0.756-1.77)	1.29 (0.817-2.00)
10-min	0.465 (0.366-0.591)	0.559 (0.439-0.710)	0.712 (0.557-0.908)	0.839 (0.653-1.08)	1.01 (0.762-1.36)	1.15 (0.843-1.57)	1.28 (0.915-1.83)	1.44 (0.969-2.10)	1.65 (1.07-2.51)	1.83 (1.16-2.83)
15-min	0.547 (0.431-0.695)	0.657 (0.517-0.835)	0.837 (0.656-1.07)	0.986 (0.768-1.26)	1.19 (0.897-1.60)	1.35 (0.992-1.85)	1.51 (1.08-2.15)	1.69 (1.14-2.47)	1.94 (1.26-2.95)	2.15 (1.36-3.33)
30-min	0.749 (0.590-0.951)	0.900 (0.707-1.14)	1.15 (0.898-1.46)	1.35 (1.05-1.73)	1.63 (1.23-2.19)	1.84 (1.36-2.53)	2.07 (1.47-2.95)	2.31 (1.56-3.38)	2.66 (1.73-4.04)	2.95 (1.87-4.56)
60-min	0.951 (0.748-1.21)	1.14 (0.898-1.45)	1.46 (1.14-1.86)	1.72 (1.34-2.20)	2.07 (1.56-2.78)	2.34 (1.72-3.22)	2.62 (1.87-3.74)	2.94 (1.98-4.29)	3.38 (2.19-5.13)	3.74 (2.37-5.79)
2-hr	1.23 (0.969-1.55)	1.47 (1.16-1.86)	1.87 (1.47-2.37)	2.20 (1.72-2.80)	2.65 (2.01-3.55)	2.99 (2.22-4.10)	3.36 (2.42-4.80)	3.79 (2.56-5.51)	4.43 (2.88-6.68)	4.97 (3.16-7.66)
3-hr	1.42 (1.13-1.79)	1.70 (1.35-2.14)	2.16 (1.71-2.73)	2.54 (2.00-3.23)	3.07 (2.33-4.10)	3.46 (2.58-4.73)	3.88 (2.81-5.54)	4.39 (2.98-6.36)	5.17 (3.37-7.76)	5.83 (3.71-8.95)
6-hr	1.82 (1.45-2.27)	2.18 (1.74-2.73)	2.77 (2.20-3.48)	3.26 (2.57-4.12)	3.94 (3.01-5.23)	4.44 (3.32-6.05)	4.98 (3.63-7.09)	5.64 (3.84-8.13)	6.66 (4.35-9.95)	7.54 (4.81-11.5)
12-hr	2.29 (1.84-2.85)	2.76 (2.21-3.43)	3.52 (2.81-4.39)	4.15 (3.29-5.21)	5.01 (3.85-6.62)	5.66 (4.25-7.65)	6.35 (4.64-8.96)	7.19 (4.91-10.3)	8.46 (5.55-12.5)	9.54 (6.10-14.4)
24-hr	2.74 (2.20-3.38)	3.32 (2.67-4.10)	4.26 (3.42-5.29)	5.05 (4.02-6.31)	6.13 (4.73-8.05)	6.93 (5.24-9.32)	7.80 (5.73-10.9)	8.84 (6.06-12.6)	10.4 (6.86-15.4)	11.8 (7.56-17.7)
2-day	3.09 (2.50-3.79)	3.78 (3.06-4.65)	4.92 (3.97-6.07)	5.87 (4.70-7.28)	7.17 (5.56-9.37)	8.13 (6.18-10.9)	9.17 (6.79-12.8)	10.5 (7.20-14.8)	12.5 (8.22-18.3)	14.2 (9.13-21.2)
3-day	3.35 (2.72-4.09)	4.11 (3.34-5.04)	5.36 (4.34-6.60)	6.40 (5.14-7.92)	7.83 (6.10-10.2)	8.88 (6.78-11.9)	10.0 (7.45-14.0)	11.5 (7.91-16.2)	13.7 (9.06-20.0)	15.7 (10.1-23.3)
4-day	3.58 (2.91-4.37)	4.40 (3.58-5.38)	5.74 (4.65-7.04)	6.85 (5.51-8.45)	8.38 (6.53-10.9)	9.50 (7.26-12.7)	10.7 (7.99-15.0)	12.3 (8.48-17.3)	14.7 (9.73-21.4)	16.8 (10.8-24.9)
7-day	4.22 (3.45-5.13)	5.15 (4.21-6.27)	6.68 (5.44-8.15)	7.95 (6.43-9.76)	9.69 (7.59-12.5)	11.0 (8.42-14.6)	12.4 (9.25-17.2)	14.1 (9.79-19.8)	16.9 (11.2-24.5)	19.3 (12.5-28.5)
10-day	4.87 (3.99-5.90)	5.86 (4.81-7.11)	7.50 (6.12-9.12)	8.85 (7.18-10.8)	10.7 (8.40-13.8)	12.1 (9.28-15.9)	13.6 (10.1-18.7)	15.4 (10.7-21.5)	18.3 (12.2-26.4)	20.8 (13.5-30.5)
20-day	6.93 (5.72-8.34)	8.00 (6.59-9.64)	9.74 (8.00-11.8)	11.2 (9.13-13.6)	13.2 (10.4-16.8)	14.7 (11.3-19.1)	16.3 (12.1-21.9)	18.1 (12.6-24.9)	20.7 (13.8-29.5)	22.8 (14.8-33.3)
30-day	8.69 (7.19-10.4)	9.78 (8.09-11.7)	11.6 (9.52-13.9)	13.0 (10.7-15.8)	15.1 (11.9-19.0)	16.6 (12.8-21.4)	18.2 (13.4-24.2)	19.9 (13.9-27.3)	22.1 (14.8-31.5)	23.9 (15.6-34.8)
45-day	10.9 (9.05-13.0)	12.0 (9.96-14.4)	13.8 (11.4-16.6)	15.3 (12.6-18.5)	17.4 (13.7-21.7)	19.0 (14.6-24.2)	20.6 (15.1-27.0)	22.1 (15.5-30.2)	24.0 (16.1-34.0)	25.3 (16.5-36.7)
60-day	12.8 (10.6-15.2)	13.9 (11.5-16.6)	15.7 (13.0-18.8)	17.3 (14.2-20.8)	19.4 (15.3-24.1)	21.0 (16.1-26.6)	22.6 (16.6-29.4)	24.0 (16.9-32.6)	25.6 (17.3-36.2)	26.7 (17.5-38.6)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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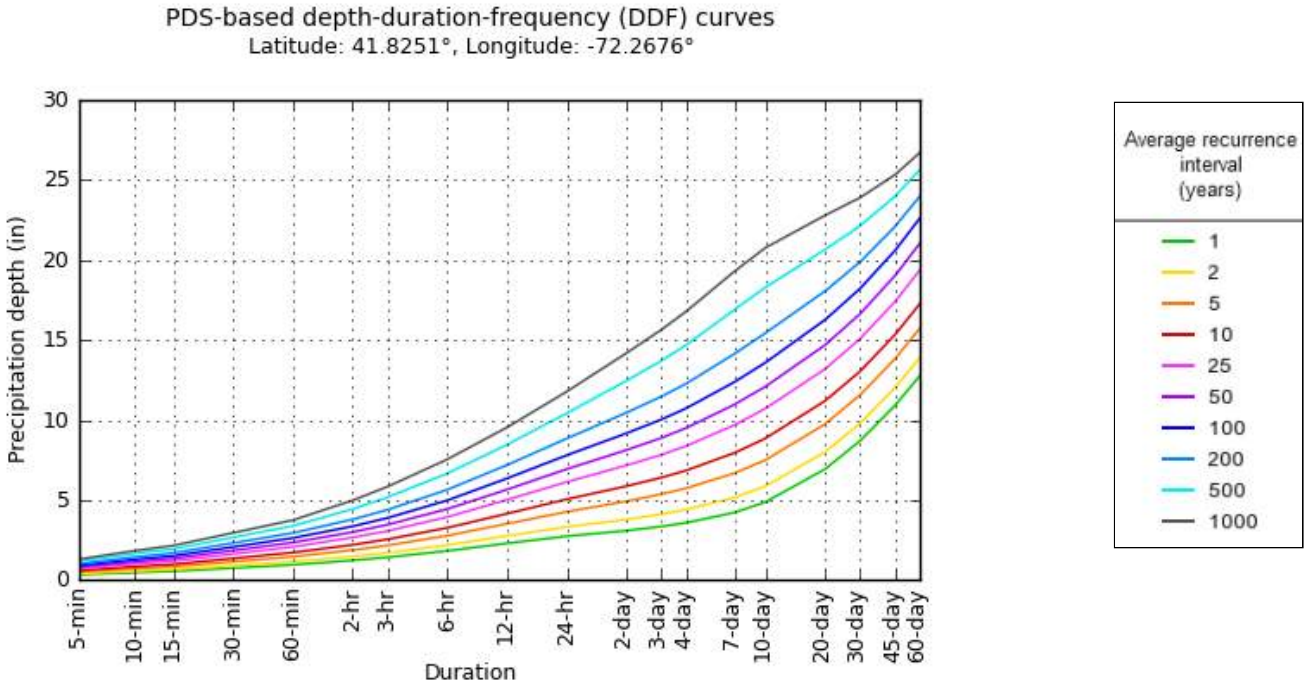
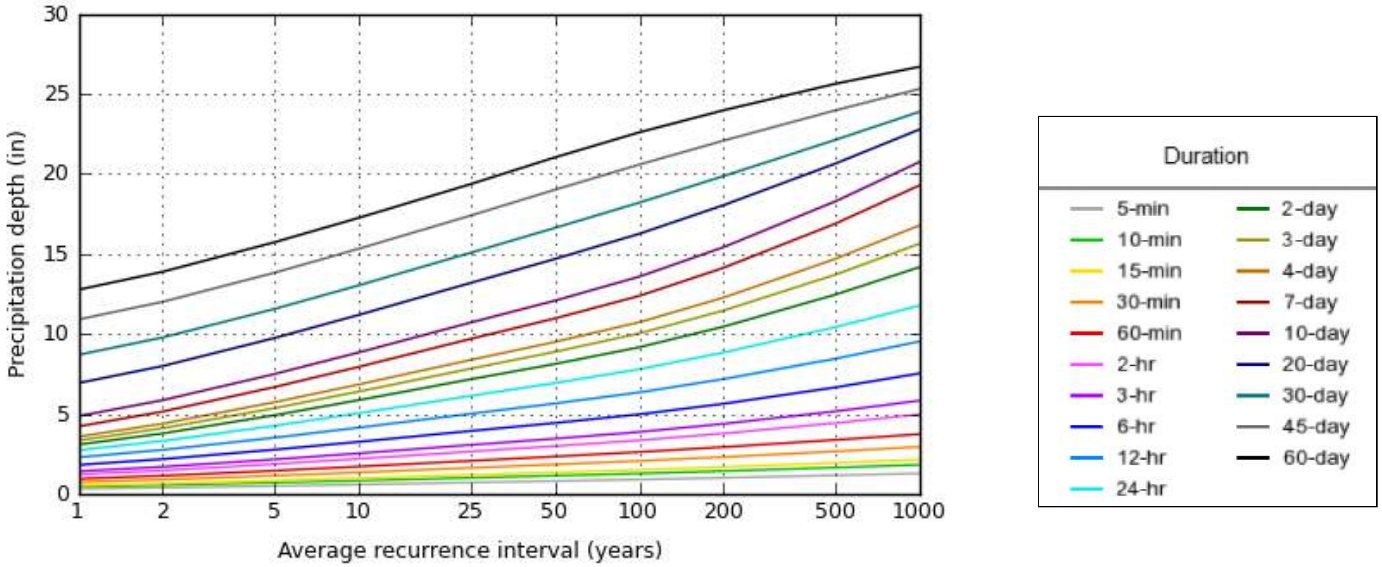
PF graphical





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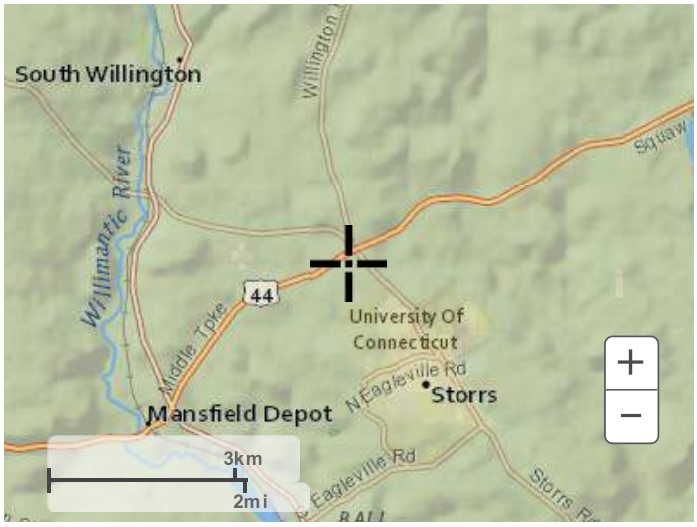
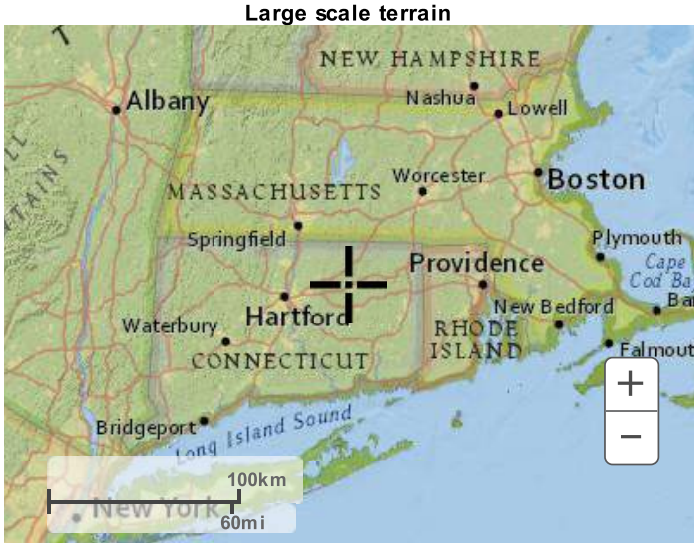
Maps & aerials

Small scale terrain



Large scale terrain



Large scale map

Large scale aerial

Water Quality Calculations

From CT 2004 Stormwater Quality Manual:

$$WQV = \frac{(1'')(R)(A)}{12}$$

$$R = 0.05 + 0.009(I)$$

WQV = water quality volume (ac-ft)
R = volumetric runoff coefficient
I = percent impervious cover (pavement, sidewalks, parking garage)
A = site area in acres

Area	Treatment	Total Area		Impervious Area (not including clean roofs)		Impervious Cover	Volumetric Runoff Coefficient	Water Quality Volume Required (WQV)		WQV Provided
ID	Location	ac	ft^2	ac	ft^2	%	R	acre-feet	ft^3	ft^3
SFB-1	Sand Filter Basin	0.966	42,079	0.443	19,309	45.86	0.463	0.037	1,612	1,566
SFB-2	Sand Filter Basin	4.230	184,259	1.325	57,710	31.32	0.332	0.117	5,097	4,427
SFB-3	Sand Filter Basin	1.125	49,005	0.257	11,199	22.84	0.256	0.024	1,045	889
SFB-4	Sand Filter Basin	1.487	64,773	0.238	10,378	16.01	0.194	0.024	1,045	1,928
SFB-5	Sand Filter Basin	1.636	71,264	0.469	20,445	28.67	0.308	0.042	1,830	3,172
RG-703	Rain Garden	0.055	2,396	0.000	0	0.00	0.050	0.000	0	323
TOTAL		9.499	413,776	2.733	119,040	28.77	0.309	0.244	10,629	12,305

Groundwater Recharge Volume Calculations

Groundwater Recharge Volume

From CT 2004 Stormwater Quality Manual:

$$GVR = \frac{(D)(A)(I)}{12}$$

GRV Groundwater Recharge Volume (ac-ft)
D = Depth of Runoff to be Recharged (table 7-4)
A = site area in acres
I = impervious cover (decimal)

Table 7-4
Groundwater Recharge Depth

NRCS Hydrologic Soil Group	Average Annual Recharge	Groundwater Recharge Depth (D)
A	18 inches/year	0.4 inches
B	12 inches/year	0.25 inches
C	6 inches/year	0.10 inches
D	3 inches/year	0 inches (waived)

Source: MADEP, 1997.
NRCS – Natural Resources Conservation Service

	A									I				
	Total Developed Area (AC)	Site Area by NRCS Hydrologic Soil Group				Impervious Cover by NRCS Hydrologic Soil Group				Site Imperviousness (Decimal) by NRCS Hydrologic Soil Group				GRV Required (cubic-ft)
		A	B	C	D	A	B	C	D	A	B	C	D	
Proposed	9.63	0.00	6.58	3.051	0.00	0.00	4.00	1.84	0.00	0.00	0.61	0.60	0.00	4296

* Groundwater recharge volumes based upon the total developed areage of the site. See PD-Map for full site area delineation.

Location: Drainage System DP 1-4

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Street Sweeping - 5%	**0.05**	**1.00**	**0.05**	**0.95**
Deep Sump and Hooded Catch Basin	**0.25**	**0.95**	**0.24**	**0.71**
Infiltration Basin	**0.80**	**0.71**	**0.57**	**0.14**
	0.00	**0.14**	**0.00**	**0.14**
	0.00	**0.14**	**0.00**	**0.14**

Total TSS Removal = 86%

Project: **Mansfield Res. Development**
Prepared By: **MAA**
Date: **8/22/2019**

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

Capstone Collegiate
1621 Storrs Road
Mansfield, CT
CT181007
December 30, 2019

Rational Pipe Sizing Calculations

Design Period Storm:		10	Year	Design Period Intensity*			5.78	in/hr									
LOCATION		IMPERVIOUS			OTHER												
FROM	TO	A	C	CA	A	C	CA	SUM CA	Tc (min)	I (in/hr)	Q (cfs)	D (in)	S (ft/ft)	Material	n	Q Full (cfs)	V Full (fps)
CB-111	CB-110	0.12	0.95	0.11	0.08	0.30	0.02	0.13	6	5.78	0.77	12	0.050	HDPE	0.012	8.63	10.99
CB-110	CB-109	0.15	0.95	0.14	0.04	0.30	0.01	0.15	6	5.78	0.89	12	0.028	HDPE	0.012	6.46	8.22
CB-109	CDS-108	0.10	0.95	0.09	0.06	0.30	0.02	0.11	6	5.78	1.51	12	0.011	HDPE	0.012	4.05	5.15
CDS-108	ICS-107	0.11	0.95	0.10	0.05	0.30	0.01	0.12	6	5.78	2.19	12	0.017	HDPE	0.012	4.99	6.35
OCS-105	YD-104	0.00	0.95	0.00	0.00	0.30	0.00	0.00	6	5.78	0.72	12	0.005	HDPE	0.012	2.73	3.47
YD-104	MH-103	0.00	0.95	0.00	0.06	0.30	0.02	0.02	6	5.78	0.83	12	0.005	HDPE	0.012	2.73	3.47
ROOF DRAIN	MH-103	0.03	0.95	0.03	0.00	0.30	0.00	0.03	6	5.78	0.15	6	0.005	HDPE	0.012	0.43	2.19
MH-103	FES-102	0.00	0.95	0.00	0.00	0.30	0.00	0.00	6	5.78	0.98	12	0.005	HDPE	0.012	2.73	3.47
CB-210	MH-209	0.22	0.95	0.21	0.08	0.30	0.02	0.23	6	5.78	1.35	12	0.005	HDPE	0.012	2.73	3.47
MH-209	MH-208	0.00	0.95	0.00	0.00	0.30	0.00	0.00	6	5.78	1.35	12	0.043	HDPE	0.012	8.00	10.19
MH-208	CDS-207	0.00	0.95	0.00	0.00	0.30	0.00	0.00	6	5.78	1.35	12	0.005	HDPE	0.012	2.73	3.47
CDS-207	ICS-206	0.20	0.95	0.19	0.10	0.30	0.03	0.22	6	5.78	2.63	12	0.010	HDPE	0.012	3.86	4.91
ROOF DRAIN	MH-203	0.11	0.95	0.10	0.00	0.30	0.00	0.10	6	5.78	0.59	8	0.053	HDPE	0.012	3.01	8.63
ICS-206	MH-203	0.00	0.95	0.00	0.00	0.30	0.00	0.00	6	5.78	0.41	12	0.010	HDPE	0.012	3.86	4.91
ICS-605	MH-211	0.00	0.95	0.00	0.00	0.30	0.00	0.00	6	5.78	0.26	4	0.078	HDPE	0.012	0.58	6.60
MH-211	MH-203	0.00	0.95	0.00	0.00	0.30	0.00	0.00	6	5.78	0.26	12	0.005	HDPE	0.012	2.73	3.47
OCS-204	MH-203	0.00	0.95	0.00	0.00	0.30	0.00	0.00	6	5.78	0.41	6	0.019	HDPE	0.012	0.84	4.27
MH-203	FES-202	0.00	0.95	0.00	0.00	0.30	0.00	0.00	6	5.78	1.67	15	0.005	HDPE	0.012	4.95	4.03
TD-311	MH-310	0.03	0.95	0.03	0.04	0.30	0.01	0.05	6	5.78	0.26	12	0.041	HDPE	0.012	7.82	9.95
MH-310	CDS-309	0.00	0.95	0.00	0.00	0.30	0.00	0.00	6	5.78	0.26	12	0.005	HDPE	0.012	2.73	3.47
CDS-309	ICS-308	0.20	0.95	0.19	0.05	0.30	0.01	0.21	6	5.78	1.46	12	0.013	HDPE	0.012	4.32	5.49
OCS-306	MH-304	0.00	0.95	0.00	0.00	0.30	0.00	0.00	6	5.78	0.93	10	0.005	HDPE	0.012	1.68	3.08
YD-305	MH-304	0.01	0.95	0.01	0.06	0.30	0.02	0.02	6	5.78	0.14	4	0.100	HDPE	0.012	0.65	7.47
MH-304	YD-303	0.00	0.95	0.00	0.00	0.30	0.00	0.00	6	5.78	0.14	6	0.100	HDPE	0.012	1.92	9.79
YD-303	FES-302	0.01	0.95	0.01	0.06	0.30	0.02	0.02	6	5.78	0.29	6	0.005	HDPE	0.012	0.43	2.19
RD-500	MH-312	0.27	0.95	0.26	0.00	0.30	0.00	0.26	6	5.78	1.50	12	0.010	HDPE	0.012	3.86	4.91
RD-1000B1	MH-312	0.32	0.95	0.30	0.00	0.30	0.00	0.30	6	5.78	1.76	12	0.005	HDPE	0.012	2.73	3.47
MH-312	UGB-307	0.00	0.95	0.00	0.00	0.30	0.00	0.00	6	5.78	3.26	12	0.032	HDPE	0.012	6.90	8.79
RD-1000B2	MH-411	0.77	0.95	0.73	0.00	0.30	0.00	0.73	6	5.78	4.21	15	0.005	HDPE	0.012	4.95	4.03
MH-411	CDS-410	0.00	0.95	0.00	0.00	0.30	0.00	0.00	6	5.78	4.21	15	0.005	HDPE	0.012	4.95	4.03
CDS-410	ICS-409	0.24	0.95	0.23	0.00	0.30	0.00	0.23	6	5.78	5.52	15	0.010	HDPE	0.012	7.00	5.70
ICS-409	OCS-407	0.00	0.95	0.00	0.00	0.30	0.00	0.00	6	5.78	1.20	12	0.005	HDPE	0.012	2.73	3.47
OCS-407	MH-405	0.00	0.95	0.00	0.00	0.30	0.00	0.00	6	5.78	1.50	12	0.005	HDPE	0.012	2.73	3.47
YD-406	MH-405	0.00	0.95	0.00	0.01	0.30	0.00	0.00	6	5.78	0.02	8	0.005	HDPE	0.012	0.93	2.65
MH-405	MH-404	0.00	0.95	0.00	0.00	0.30	0.00	0.00	6	5.78	1.52	12	0.010	HDPE	0.012	3.86	4.91
MH-404	FES-403	0.00	0.95	0.00	0.00	0.30	0.00	0.00	6	5.78	1.52	12	0.010	HDPE	0.012	3.86	4.91
YD-511	CB-510	0.11	0.95	0.11	0.01	0.30	0.00	0.11	6	5.78	0.65	8	0.010	HDPE	0.012	1.31	3.75
CB-510	CB-509	0.11	0.95	0.11	0.01	0.30	0.00	0.11	6	5.78	1.29	12	0.017	HDPE	0.012	5.03	6.41
CB-509	CDS-507	0.19	0.95	0.18	0.03	0.30	0.01	0.19	6	5.78	2.39	12	0.021	HDPE	0.012	5.59	7.12
YD-508	CDS-507	0.01	0.95	0.01	0.01	0.30	0.00	0.01	6	5.78	0.05	6	0.005	HDPE	0.012	0.43	2.19
CDS-507	ICS-506	0.00	0.95	0.00	0.00	0.30	0.00	0.00	6	5.78	2.44	12	0.005	HDPE	0.012	2.73	3.47
ICS-506	OCS-504	0.00	0.95	0.00	0.00	0.30	0.00	0.00	6	5.78	0.30	8	0.005	HDPE	0.012	0.93	2.65
OCS-504	FES-503	0.00	0.95	0.00	0.00	0.30	0.00	0.00	6	5.78	0.48	12	0.028	HDPE	0.012	6.46	8.22
CB-612	MH-611	0.09	0.95	0.08	0.01	0.30	0.00	0.08	6	5.78	0.48	12	0.048	HDPE	0.012	8.46	10.77
MH-611	CB-610	0.00	0.95	0.00	0.00	0.30	0.00	0.00	6	5.78	0.48	12	0.054	HDPE	0.012	8.97	11.42
CB-610	CB-609	0.10	0.95	0.09	0.27	0.30	0.08	0.17	6	5.78	1.47	12	0.045	HDPE	0.012	8.19	10.42
CB-609	CB-608	0.19	0.95	0.18	0.07	0.30	0.02	0.20	6	5.78	2.62	12	0.049	HDPE	0.012	8.54	10.88
CB-608	CDS-607	0.18	0.95	0.17	0.04	0.30	0.01	0.19	6	5.78	3.70	12	0.044	HDPE	0.012	8.10	10.31
CDS-607	ICS-605	0.09	0.95	0.09	0.01	0.30	0.00	0.09	6	5.78	4.22	12	0.057	HDPE	0.012	9.21	11.73

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Rip Rap and Apron Sizing Worksheet

Address: Capstone Collegiate Communites
Mansfield CT

Project No.: CT18007
Date: 12/27/2019
Prepared By: BTJ

FES-102

Apron Sizing:

$$La = \frac{1.7Q}{Do^{3/2}} + 8Do$$

$$W\ end = 3Do + 0.4La\ for\ Tailwater\ \geq 0.5Do$$
$$W\ end = 3Do + La\ for\ Tailwater < 0.5Do$$

INPUT	Quantity	Units	Notes
Do	1	ft	Inside diameter of culvert
Q	0.98	cfs	Pipe discharge for conduit design storm or 25 year storm, whichever is greater

OUTPUT	Quantity	Units	Notes
La	9.666	ft	Length of apron (minimum)
For tailwater elevation greater than or equal to the elevation of the center of the pipe:			
W start	3	ft	Width of apron at the culvert (minimum)
W end	6.8664	ft	Width of apron end (minimum)
For tailwater elevation less than the elevation of the center of the pipe:			
W start	3	ft	Width of apron at the culvert (minimum)
W end	12.666	ft	Width of apron end (minimum)

Rip Rap Sizing:

$$d - 50 = \frac{0.02}{TW} * (\frac{Q}{Do})^{4/3}$$

INPUT	Quantity	Units	Notes
TW	0.5	ft	Tailwater depth above the invert of the culvert
Do	1	ft	Inside diameter of culvert (defined in apron sizing)
Q	0.98	cfs	Pipe discharge for conduit design storm or 25 year storm, whichever is greater (defined in apron sizing)

OUTPUT	Quantity	Units	Notes
d-50	0.038937	ft	Median stone diameter in feet
	0.467243	in	Median stone diameter in inches

NOTE: calculations based on 10 Year storm to FES-102

Rip Rap and Apron Sizing Worksheet

Address: Capstone Collegiate Communites
Mansfield CT

Project No.: CT18007
Date: 12/27/2019
Prepared By: BTJ

FES-202

Apron Sizing:

$$La = \frac{1.7Q}{Do^{3/2}} + 8Do$$

$$W\ end = 3Do + 0.4La\ for\ Tailwater\ \geq 0.5Do$$
$$W\ end = 3Do + La\ for\ Tailwater < 0.5Do$$

INPUT	Quantity	Units	Notes
Do	1	ft	Inside diameter of culvert
Q	1.67	cfs	Pipe discharge for conduit design storm or 25 year storm, whichever is greater

OUTPUT	Quantity	Units	Notes
La	10.839	ft	Length of apron (minimum)
For tailwater elevation greater than or equal to the elevation of the center of the pipe:			
W start	3	ft	Width of apron at the culvert (minimum)
W end	7.3356	ft	Width of apron end (minimum)
For tailwater elevation less than the elevation of the center of the pipe:			
W start	3	ft	Width of apron at the culvert (minimum)
W end	13.839	ft	Width of apron end (minimum)

Rip Rap Sizing:

$$d - 50 = \frac{0.02}{TW} * (\frac{Q}{Do})^{4/3}$$

INPUT	Quantity	Units	Notes
TW	0.5	ft	Tailwater depth above the invert of the culvert
Do	1	ft	Inside diameter of culvert (defined in apron sizing)
Q	1.67	cfs	Pipe discharge for conduit design storm or 25 year storm, whichever is greater (defined in apron sizing)

OUTPUT	Quantity	Units	Notes
d-50	0.079253	ft	Median stone diameter in feet
	0.951035	in	Median stone diameter in inches

NOTE: calculations based on 10 Year storm to FES-202

Rip Rap and Apron Sizing Worksheet

Address: Capstone Collegiate Communites
Mansfield CT

Project No.: CT18007
Date: 8/20/2019
Prepared By: DTB

FES-302

Apron Sizing:

$$La = \frac{1.7Q}{Do^{3/2}} + 8Do$$

$$W\ end = 3Do + 0.4La\ for\ Tailwater\ \geq 0.5Do$$
$$W\ end = 3Do + La\ for\ Tailwater < 0.5Do$$

INPUT	Quantity	Units	Notes
Do	0.67	ft	Inside diameter of culvert
Q	0.29	cfs	Pipe discharge for conduit design storm or 25 year storm, whichever is greater

OUTPUT	Quantity	Units	Notes
La	6.258948	ft	Length of apron (minimum)
For tailwater elevation greater than or equal to the elevation of the center of the pipe:			
W start	2.01	ft	Width of apron at the culvert (minimum)
W end	4.513579	ft	Width of apron end (minimum)
For tailwater elevation less than the elevation of the center of the pipe:			
W start	2.01	ft	Width of apron at the culvert (minimum)
W end	8.268948	ft	Width of apron end (minimum)

Rip Rap Sizing:

$$d - 50 = \frac{0.02}{TW} * (\frac{Q}{Do})^{4/3}$$

INPUT	Quantity	Units	Notes
TW	1	ft	Tailwater depth above the invert of the culvert
Do	0.67	ft	Inside diameter of culvert (defined in apron sizing)
Q	0.29	cfs	Pipe discharge for conduit design storm or 25 year storm, whichever is greater (defined in apron sizing)

OUTPUT	Quantity	Units	Notes
d-50	0.006548	ft	Median stone diameter in feet
	0.078579	in	Median stone diameter in inches

NOTE: calculations based on 10 Year storm to FES-302

Rip Rap and Apron Sizing Worksheet

Address: Capstone Collegiate Communites
Mansfield CT

Project No.: CT18007
Date: 8/20/2019
Prepared By: DTB

FES-403

Apron Sizing:

$$La = \frac{1.7Q}{Do^{3/2}} + 8Do$$

$$W\ end = 3Do + 0.4La\ for\ Tailwater\ \geq 0.5Do$$
$$W\ end = 3Do + La\ for\ Tailwater < 0.5Do$$

INPUT	Quantity	Units	Notes
Do	1	ft	Inside diameter of culvert
Q	1.52	cfs	Pipe discharge for conduit design storm or 25 year storm, whichever is greater

OUTPUT	Quantity	Units	Notes
La	10.584	ft	Length of apron (minimum)
For tailwater elevation greater than or equal to the elevation of the center of the pipe:			
W start	3	ft	Width of apron at the culvert (minimum)
W end	7.2336	ft	Width of apron end (minimum)
For tailwater elevation less than the elevation of the center of the pipe:			
W start	3	ft	Width of apron at the culvert (minimum)
W end	13.584	ft	Width of apron end (minimum)

Rip Rap Sizing:

$$d - 50 = \frac{0.02}{TW} * (\frac{Q}{Do})^{4/3}$$

INPUT	Quantity	Units	Notes
TW	0.75	ft	Tailwater depth above the invert of the culvert
Do	1	ft	Inside diameter of culvert (defined in apron sizing)
Q	1.52	cfs	Pipe discharge for conduit design storm or 25 year storm, whichever is greater (defined in apron sizing)

OUTPUT	Quantity	Units	Notes
d-50	0.046604	ft	Median stone diameter in feet
	0.559253	in	Median stone diameter in inches

NOTE: calculations based on 10 Year storm to FES-403

Rip Rap and Apron Sizing Worksheet

Address: Capstone Collegiate Communites
Mansfield CT

Project No.: CT18007
Date: 12/27/2019
Prepared By: BTJ

FES-503

Apron Sizing:

$$La = \frac{1.7Q}{Do^{3/2}} + 8Do$$

$$W\ end = 3Do + 0.4La\ for\ Tailwater\ \geq 0.5Do$$
$$W\ end = 3Do + La\ for\ Tailwater < 0.5Do$$

INPUT	Quantity	Units	Notes
Do	1	ft	Inside diameter of culvert
Q	0.48	cfs	Pipe discharge for conduit design storm or 25 year storm, whichever is greater

OUTPUT	Quantity	Units	Notes
La	8.816	ft	Length of apron (minimum)
For tailwater elevation greater than or equal to the elevation of the center of the pipe:			
W start	3	ft	Width of apron at the culvert (minimum)
W end	6.5264	ft	Width of apron end (minimum)
For tailwater elevation less than the elevation of the center of the pipe:			
W start	3	ft	Width of apron at the culvert (minimum)
W end	11.816	ft	Width of apron end (minimum)

Rip Rap Sizing:

$$d - 50 = \frac{0.02}{TW} * (\frac{Q}{Do})^{4/3}$$

INPUT	Quantity	Units	Notes
TW	0.75	ft	Tailwater depth above the invert of the culvert
Do	1	ft	Inside diameter of culvert (defined in apron sizing)
Q	0.48	cfs	Pipe discharge for conduit design storm or 25 year storm, whichever is greater (defined in apron sizing)

OUTPUT	Quantity	Units	Notes
d-50	0.010022	ft	Median stone diameter in feet
	0.120265	in	Median stone diameter in inches

NOTE: calculations based on 10 Year storm to FES-503

Level Spreader Calculations

Date: 2/5/2020 Calcs By: M.A.A.

Source: PA DEP Stormwater BMP Manual: Chapter 6 - Perforation Discharge

CT SWQM does not address the type of level spreader proposed

Requirements:

10 year/24-hour storm minimum	
Maximum discharge velocity (per down slope covers)	**0.67** *2 fps * 33% (for flow concentrations)*
Minimum Distate between level spreader and down slope property boundary	**15 ft**

Assumptions:

H	0.5	*feet (stone height above perforated pipe)* *Manual's example = 0.418'*
A	0.000767	*ft^2 (0.375-in. diamater perforations / LF of 12" perforated pipe)*
n	36	*(number of perforations/foot)*
G	32.2	*ft/sec^2*
C_d	0.6	*coefficient of discharge*
Q_o	0.0026114	*cfs*
Q_L	0.0940095	*cfs (36 perforations/foot)*
FS	1.1	*(factor of safety from potential clogging)*

L (length of level spreader pipe) = Q / Q_L

Q_L (discharge per linear foot) = Q_O * # of perforations per linear foot of pipe (provided by manufacturer, based on perforation diameter)

Q_O (perforation flow rate) = $C_d * A * (2 * g * H)^{0.5}$

Q_O = the free outfall flow rate through one perforation (ft^3/sec)
C_d = Coefficient of discharge (typically 0.60)
A = Cross sectional area of one perforation (ft^2)
g = 32.2 ft/sec^2
H = head, average height of water above perforation (ft) (provided by manufacturer)

$V = Q_{100}/(A*n*L_{100})$

Table 2. Maximum Velocities of Flow Across Level Spreader

Down Slope Ground Cover	Velocity at Level Spreader V (fps)	Driving Head H (feet)	"Equivalent" Water Height over Level Spreader, H*=2/3H
Grass/Thicket	1.33	0.09	0.058
Gravel	1.50	0.11	0.074
Mulch (Trees, Shrubs)	0.67	0.02	0.015

Source: *Designing Level Spreaders to Treat Stormwater Runoff*

		LS-100	LS-200	LS-300	LS-401		
10-yr storm	**Q_{10}** *(cfs)*	0.57	0.09	0.87	0.26		
	L_{10} *(lf)*	7	2	11	4		
100-yr storm	**Q_{100}** *(cfs)*	1.21	0.69	1.17	0.47		
	L_{100} *(lf)*	15	9	14	6		100-yr storm
	L provided	**65**	**80**	**65**	**40**		
	V_{100} *(f/s)*	0.67	0.31	0.65	0.43	≤ *0.67 fps*	(sandy loam soil, trees, shrubs)

Additional resources for allowable discharge velocities by ground cover:

Table 11-1
Allowable velocity for various soil textures

SOIL TEXTURE	ALLOWABLE VELOCITY ft./sec.
Sand	1.8
Sandy loam	2.5
Silt loam, loam	3.0
Sandy clay loam	3.5
Clay loam	4.0
Clay, fine gravel, graded loam to gravel	5.0
Cobbles	5.5
Shale (non weathered shale)	6.0

Source: STANDARD FOR CHANNEL STABILIZATION; Standards for Soil Erosion and Sediment Control in New Jersey (2014)

TABLE 12-1 ALLOWABLE VELOCITIES FOR VARIOUS SOILS

SOIL TEXTURE	ALLOWABLE VELOCITY (ft./sec.)
Sand	1.8
Sandy loam	2.5
Silt loam (also high lime clay), loam	3.0
Sandy clay loam	3.5
Clay loam	4.0
Clay, fine gravel, graded loam to gravel	5.0
Cobbles	5.5
Shale (non-weathered)	6.0

Source: STANDARD FOR CONDUIT OUTLET PROTECTION; Standards for Soil Erosion and Sediment Control in New Jersey (2014)

Figure OP-1 Allowable Velocities for Various Soils

Soil Texture	Allowable Velocity (ft./sec.)
Sand and sandy loam	2.5
Silt Loam	3.0
Sandy clay loam	3.5
Clay loam	4.0
Clay, fine gravel, graded loam to gravel	5.0
Cobbles	5.5
Shale	6.0

Source: USDA-NRCS

APPENDIX F: OPERATION AND MAINTENANCE

STORMWATER OPERATION AND SITE MAINTENANCE PLAN

For

PROPOSED

Residential Community

1621 Storrs Road, Parcels 9.23.7 and 9.23.1
Town of Mansfield,
Tolland County,
Connecticut

Prepared by:

BOHLER ENGINEERING
16 Old Forge Road
Rocky Hill, CT 06067

December 30, 2019
#CT181007

CONTACT / RESPONSIBLE PARTY:

Ben Walker
Capstone Properties, LLC
431 Office Park Drive
Birmingham, Alabama 35223
Phone: (205) 949-2060

MANAGEMENT COMPANY:

Capstone Properties, LLC
431 Office Park Drive
Birmingham, Alabama 35223
Phone: (205) 949-2060
(Local contact information will be designated before project construction.)

(Note: The contact information for the Contact/ Responsible Party shall be kept current. If ownership changes, the Operation and Maintenance Plan must be transferred to the new party.)

Construction Phase

During the construction phase, all erosion control devices and measures shall be maintained in accordance with the final record plans, local/state approvals and conditions, the CTDEEP Construction General Permit and the Stormwater Pollution Prevention Plan (SWPPP) if applicable. Additionally, the maintenance of all erosion / siltation control measures during construction shall be the responsibility of the general contractor. Contact information of the OWNER and CONTRACTOR shall be listed in the SWPPP for this site. The SWPPP also includes information regarding construction period allowable, housekeeping and emergency response procedures.

Post Development Controls

Once construction is completed, the post development stormwater Best Management Practices (BMP's) are to be operated and maintained in compliance with the following permanent procedures (note that the continued implementation of these procedures shall be the responsibility of the Owner or its assignee):

1. **Litter and Debris Removal:** Litter/Debris to be removed and disposed of weekly.

2. **Parking lots and on-site driveways:** Sweep at least four (4) times per year and on a more frequent basis depending on operations. All resulting sweepings shall be collected and properly disposed of off-site in accordance with CTDEEP and other applicable requirements.

3. **Catch basins, yard drains, trench drains, manholes and piping:** Inspect four (4) times per year and at the end of foliage and snow-removal seasons. These features shall be cleaned four (4) times per year or whenever the depth of deposits is greater than or equal to one half the depth from the bottom of the invert of the lowest pipe in the catch basin or underground system. Accumulated sediment and hydrocarbons present must be removed

and properly disposed of off-site in accordance with CTDEEP and other applicable requirements.

4. **Water Quality Unit (Proprietary Separator):** Twice per year (Spring and Fall), Per manufacturers recommendations (attached).

5. **Water Quality Filtration Basin:** Preventative maintenance after every major storm event during the first three (3) months of operation and at least twice per year thereafter. Inspect structure and pretreatment BMP to ensure proper operation after every major storm event (generally equal or greater to 3.0 inches in 24 hours) for the first three months. Remove trash and debris at inlet riprap stilling pad, mow and remove grass clippings and accumulated organic matter. Any sediment removed shall be disposed of in accordance with CTDEEP and other applicable requirements.

6. **Underground Detention Basins:** Preventative maintenance after every major storm event during the first three (3) months of operation and at least twice per year thereafter. Inspect structure and pretreatment BMP to ensure proper operation after every major storm event (generally equal or greater to 3.0 inches in 24 hours) for the first three months. The outlet of the basin, if any, shall be inspected for erosion and sedimentation, and rip-rap shall be promptly repaired in the case of erosion. Sediment collecting in the bottom of the basin shall be inspected twice annually, and removal shall commence any time the sediment reaches a depth of six inches anywhere in the basin. Any sediment removed shall be disposed of in accordance with CTDEEP and other applicable requirements.

7. **Rain Gardens:** shall be inspected and cleared of trash monthly; mowed 2 to 12 times per year; mulched annually; fertilized annually; dead vegetation removed annually; pruned annually; replace entire media and all vegetation as needed. Any sediment removed shall be disposed of in accordance with CTDEEP and other applicable requirements.

8. **Landscape Replacement/ Restoration of Eroded Areas:** Landscaped areas shall be monitored, maintained and mulched as necessary, but at a minimum of twice annually. Plants shall be replaced as needed.

9. **Maintenance Access Roads:** Maintenance access roads shall be kept clear of debris and litter. Area shall be inspected annually, and woodchips shall be replaced as necessary to maintain a functional pathway.

10. **Trash Removal Procedures:** Exterior waste areas shall be cleaned weekly and waste screening will be inspected quarterly and repair on an as needed basis.

11. **Integrated Pest Management:** Operator will contract with a licensed pest management company to review the proposed site conditions and provide appropriate measures, procedures and controls to minimize potential pest issues.

Overall Site Operation and BMP Maintenance Schedule			
BMP	**Maintenance Protocol**	**Frequency of Maintenance**	**Responsible Party**
General	Litter & Debris Removal	Weekly	Management Company
Parking Lot sweeping	Sweep parking lots, collect and properly dispose	Minimum 4 times annually	3rd Party/ Management Company
General	Inspect and Clean stormwater structures and piping	Minimum 4 times annually	3rd Party/ Management Company
Water Quality Separator	Follow Manufacturer's Recommendations	2 times annually (Spring & Fall)	CDS Engineered Solutions/ Management Company
Water Quality Filter Basin	Inspection and Preventative maintenance. Rake bottom, remove trash and debris, mow and remove glass clippings and accumulated organic matter	After every major storm event for the first 3 months of install, and minimum 2 times annually, thereafter	Management Company
Underground Detention Basins	Outlet of basin to be inspected for erosion and sedimentation. Sediment collecting in the bottom of the basin shall be vacuumed and removed when sediment reaches a depth of six inches.	After every major storm event for the first 3 months of install, and minimum 2 times annually, thereafter	3rd Party/ Management Company
Rain Garden	Shall be inspected and cleared of trash	Monthly	Management Company
	Mowed	2-12 times per year	
	Dead debris removed, mulched, fertilized, pruned	Annually	
General	Landscaped areas to be maintained and mulched as necessary. Plants shall be replaced as needed	Minimum 2 times annually	Management Company
General	Exterior trash enclosure areas shall be inspected and cleaned	Weekly	Management Company

LONG-TERM POLLUTION PREVENTION PLAN

CONTACT / RESPONSIBLE PARTY:

Ben Walker
Capstone Properties, LLC
431 Office Park Drive
Birmingham, Alabama 35223
Phone: (205) 949-2060

MANAGEMENT COMPANY:

Capstone Properties, LLC
431 Office Park Drive
Birmingham, Alabama 35223
Phone: (205) 949-2060

For this site, the Long-Term Pollution Prevention Plan will consist of the following:

- No outdoor maintenance or washing of vehicles allowed.
- The property owner shall be responsible for "good housekeeping" including proper periodic maintenance of building and pavement areas, curbing, landscaping, etc.
- Proper storage and removal of solid waste (dumpsters). Disposal of debris, trash, sediment, and other waste material should be done at a suitable disposal/recycling sites and in compliance with all applicable local, state, and federal waste regulations. Exterior waste areas will be cleaned weekly and waste screen
- Sweeping of driveways, a minimum of four times per year with a commercial cleaning unit. Any sediment removed shall be disposed of in accordance with applicable local and state requirements.
- Regular inspections and maintenance of Stormwater Management System as noted in the "O&M Plan".
- Landscape Plantings shall be monitored a minimum of four times per year and are to be replaced as necessary.
- Snow removal and ice management shall be the responsibility of the property owner. Snow shall not be plowed, dumped and/or placed in forebays, water quality filtration basins, rain gardens or similar stormwater controls. Salting of pavement / walkway areas during winter conditions shall only be done in accordance with all state/local requirements and approvals. Sanding is not recommended due to the use of pervious pavements. Salt storage areas shall be covered or located such that no direct untreated discharges are possible to receiving waters from the storage site. Salt shall be utilized to the minimum extent practical.

OPERATON AND MAINTENANCE TRAINING PROGRAM

The Owner will coordinate an annual in-house and 3rd-Party Management training session to discuss the Operations and Maintenance Plan, the Long-Term Pollution Prevention Plan, and the Storm Water Pollution Prevention Plan (SWPPP). Annual training will include the following:

- Explain the general operations of the stormwater management system and its BMPs
- Identify potential sources of stormwater pollution and measures / methods of reducing or eliminating that pollution
- Emphasize good housekeeping measures
- Explain goals and requirements of Landscaping program:
    - Reseed any bare areas as soon as they occur. Erosion control measures shall be installed in these areas to prevent deposits of sediment from entering the drainage system.
    - Grass shall be maintained at a minimum blade height of two to three inches and only 1/3 of the plant height shall be removed at a time. Clippings shall not be disposed of within stormwater management areas or adjacent resource areas.
    - Plants shall be pruned as necessary.
    - The use of fertilizers will be by licensed professionals and shall be employed only to the extent necessary to maintain healthy landscaping.
    - The use of pesticides will be by licensed professionals and shall be employed only to the extent necessary to maintain healthy landscaping. Where possible mechanical methods (i.e. pest traps) or biological methods (i.e. beneficial insects) of pest control shall be implemented.
- Explain the Snow Removal requirements of the Snow Removal program:
    - Snow piles shall be located adjacent to or on pervious surfaces in upland areas. This will allow snow melt water to filter in to the soil.
    - In no case shall snow be disposed of or stored in resource areas (wetlands, floodplain, streams or other water bodies).
    - In no case shall snow be disposed of or stored in the infiltration basins.
    - If necessary, stockpiled snow will be removed from the Site and disposed of at an off-site location in accordance with all local, state and federal regulations.
    - The amount of deicing chemicals shall be kept at the minimum amount required to provide safe pedestrian and vehicle travel.

STORMWATER MANAGEMENT SYSTEM

POST-CONSTRUCTION INSPECTION REPORT

LOCATION:

1621 Storrs Road, Parcel 9.23.1 & 9.23.7
Mansfield, Connecticut

RESPONSIBLE PARTY:

Capstone Properties, LLC
431 Office Park Drive
Birmingham, Alabama 35223
Phone: (205) 949-2060
(Local contact information will be designated before project construction.)

NAME OF INSPECTOR:	INSPECTION DATE:
Note Condition of the Following (sediment depth, debris, standing water, damage, etc.):	
Litter & Debris removal:	
Parking lots and on-site driveways:	
Catch basins, yard drains, trench drains, manholes and piping:	
Water Quality Unit (Proprietary Separator):	
Water Quality Filtration Basin:	

Underground Detention Basins:
Rain Gardens:
Landscape Replacement/ Restoration of Eroded Areas:
Maintenance Access Roads:
Trash Removal Procedures:
Other
Comments:

STORMWATER INSPECTION AND MAINTENANCE LOG FORM

1621 Storrs Road, Parcel 9.23.1 & 9.23.7
Mansfield, Connecticut

Stormwater Management Practice	Responsible Party	Frequency	Maintenance Activity Performed

February 13, 2020

Jennifer Kaufman, AICP
Senior Planner/Inland Wetlands Agent
Town of Mansfield
4 South Eaglesville Road
Mansfield, CT 06268

RE: Mansfield Inland Wetlands Application Review
Application W1611-1
1621 Storrs Road and Middle Turnpike

Dear Ms. Kaufman:

We have reviewed supplemental application documents recently submitted by the applicant in response to our peer review letter dated January 16, 2020 and in response to a Notice of Intervention by the University of Connecticut.

Reviewed documents include:

- *Site Development Plans* (25 sheets) prepared by Bohler Engineering, dated December 30, 2019 and revised February 6, 2020.
- *Stormwater Management Report*, with Appendices A through F, prepared by Bohler Engineering, dated December 30, 2019 and revised February 6, 2020.
- Letter from Bohler Engineering to Jennifer Kaufman, dated February 6, 2020 regarding *Response to Mansfield Inland Wetlands Application Review, Residential Development, 1621 Storrs Road & Middle Turnpike, Mansfield*.
- Letter from Robinson & Cole to Mr. Paul Aho, dated February 6, 2020 regarding Application for Inland Wetlands Permit W1611-1, The J.E. Shepard Company and Capstone Collegiate Communities, Applications, *1621 Storrs Road and Adjacent Land, and Property on Middle Turnpike, Response to Notice of Intervention by University of Connecticut*.
- Letter from Halloran & Sage, LLP to Jennifer Kaufman dated January 27, 2020 with attached *Notice of Intervention by the University of Connecticut.*

Our comments regarding our review of the current applications documents are provided below.

Stormwater Management

The applicant has addressed our technical comments regarding the stormwater management system. The modifications made will help to ensure that the proposed stormwater management elements will function as designed.

We believe that the client has addressed our comments regarding the proposed footing drain/underdrain system. We believe that the potential effects to groundwater have been minimized to the extent practicable based on the site conditions and the extent of the proposed development.

Soil Erosion and Sediment Control

The applicant has addressed our comments regarding recommended revisions to the proposed soil erosion and sediment controls in the current plan set including the use of additional temporary diversions swales to direct runoff to the temporary sediment traps during construction.

Wetland Impacts and Mitigation Measures

Wetland Hydrologic Impacts

It is our opinion that the applicant has provided the information requested to demonstrate that potential impacts to wetland hydrology have been minimized to the extent practicable. The plans have been revised to enhance the infiltrative capacity of the level spreader outlets by increasing the amount of storage available within the level spreaders to minimize surface discharge and maximize groundwater recharge.

Vernal Pool

As requested, the applicant has agreed to provide a Conservation Easement that includes undeveloped and restored habitat areas within the vernal pool Critical Terrestrial Habitat, as well as all wetland areas on the property and wetland buffers between the wetlands and the proposed development.

It is our opinion that the applicant has demonstrated compliance with the Best Management Practices contained in the Calhoun and Klemens (2002) technical paper cited in previous letters.

Notice of Intervention

The Notice of Intervention contains many of the same concerns that were contained in our peer review of the development proposal including lack of sufficient field data to demonstrate that the stormwater management system would function as proposed, potential wetland hydrologic impacts, and potential impacts to off-site vernal pools and associated breeding amphibians. Based on the comments provided in our Memorandum dated September 27, 2019 and letters dated November, 4, 2019, November 11, 2019, and January 16, 2020, the applicant conducted additional field testing, revised the site plans and provided additional support documentation to address these concerns.

Based on our review of the revised application documents and the applicant's responses to the peer review comments and Notice of Intervention, it is our professional opinion that the applicant has demonstrated that the potential for impacts to wetlands and watercourses have been minimized to the extent practicable and that the development will not have a significant impact on these resources.

If you have any questions or require further assistance, please call us.

Yours truly,
Land-Tech Consultants

Christopher P. Allan
Professional Wetland Scientist
Certified Soil Scientist

Robert Pryor, P.E., L.S.
Director of Site Planning & Engineering

MEMO

To: Inland Wetlands Agency

CC: Conservation Commission

From: Jennifer Kaufman, AICP, Senior Planner/Inland Wetlands Agent

Date: January 2, 2020

Subject: Monthly Business Report

AGENT APPROVALS

A-68- C. Funk- 247 Hanks Hill Road- (Assessor's Parcel ID 17.65.12)-Landing on posts 16 feet from edge of stream.
A-69 –X. Bruder-3 Boulder Lane- (Assessor's Parcel ID 19.70.17). Shed 30 feet from the edge of wetlands**.**

MEMO

To: Inland Wetlands Agency

CC: Conservation Commission

From: Jennifer Kaufman, AICP, Senior Planner/Inland Wetlands Agent

Date: January 2, 2020

Subject: Monthly Business Report

AGENT APPROVALS

None

VIOLATIONS

1. **753 Storrs Road, Nova Properties LLC**-Regulated activity in the Upland Review Area without a permit. See attached Notice of Violation. Staff is following up.

NOTICE OF WETLANDS VIOLATION
Town of Mansfield, Connecticut

Issued pursuant to Section 14.0 of the Mansfield Inland Wetlands and Watercourses Regulations

DATE: January 3, 2020
ISSUED TO: Nova 22 Properties LLC

PROPERTY OWNER OF RECORD: Nova 22 Properties LLC,
156 Wolcott Hill Rd, Wethersfield, CT 06109
LOCATION OF VIOLATION: 753 Storrs Road, Storrs-Mansfield, CT 06268
(Assessor's Parcel ID 23.60.15)

Specific violations: It has been observed there has been disturbance (installation of a deck, clear cutting, etc.) in the area immediately adjacent to the wetland (upland review area) without a permit.

Regulation violated: Section 4.3 of the Mansfield Inland Wetlands and Watercourses Regulations regarding filling, excavating, dredging, clear-cutting, clearing, grading and other alterations within wetlands, watercourses or the 150 foot upland review area.

Required actions: By **January 15, 2020**, you must contact the Inland Wetlands Agent to discuss a plan of action, which shall include, but not be limited to, evaluating the impacts to the wetlands and restoration of the disturbed area.

A copy of this Notice of Violation is being provided to the Mansfield Inland Wetlands Agency. The Agency may request that you appear before them at a future meeting. Failure to carry out the required action(s) identified in this Notice of Violation may result in issuance of the order provided in Section 14.3.A of the Regulations or other enforcement proceedings and penalties as provided by law.

Authority: Connecticut General Statutes, Section 22a-44
Mansfield Inland Wetlands and Watercourses Regulations, Section 14.3
Section 40-6 of the Mansfield Wetlands Ordinance

Jennifer Kaufman, AICP
Senior Planner/Inland Wetlands Agent
(860-429-3335)

cc: Linda Painter, Director of Planning & Development

Sent via regular mail and certified mail

LONG-TERM MONITORING PLAN
FALL 2019 SEMI-ANNUAL SAMPLING ROUND #31
UCONN LANDFILL
STORRS, CONNECTICUT

by

Haley & Aldrich, Inc.
Rocky Hill, Connecticut

for

University of Connecticut
Storrs, Connecticut

File No. 91221-988
January 2020

Haley & Aldrich, Inc.
100 Corporate Place
Suite 105
Rocky Hill, CT 06067
860.282.9400

28 January 2020

Connecticut Department of Energy and Environmental Protection
Remediation Division
Bureau of Water Protection and Land Reuse
79 Elm Street
Hartford, Connecticut 06106-5127

Attention: MaryAnne Danyluk

Subject: Long Term Monitoring Plan
Fall 2019 Semi-Annual Sampling Round #31
UConn Landfill
Storrs, Connecticut

Ladies and Gentlemen:

The following certification is being submitted to the Department of Energy and Environmental Protection in accordance with the terms as delineated in the Consent Order No. SRD-101 issued 26 June 1998 for the document specified below:

- Long Term Monitoring Plan
  Fall 2019 Semi-Annual Sampling Round #31
  UConn Landfill
  Storrs, Connecticut

I have personally examined and am familiar with the information submitted in this document and all attachments and certify that based on reasonable investigation, including my inquiry of those individuals responsible for obtaining the information, the submitted information is true, accurate and complete to the best of my knowledge and belief, and I understand that any false statement made in this document or its attachments may be punishable as a criminal offense.

Agreed and accepted as stated above:

Chris G. Harriman, LEP
Senior Associate
Haley & Aldrich, Inc.

Terri Dominguez
Director
Environmental Health and Safety
University of Connecticut

C: Scott Jordan, Executive Vice President for Administrations & CFO, University of Connecticut

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Table No.	Title
1	Summary of Groundwater Analytical Results

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Figure No.	Title
1	Sampling Locations - Long-Term Monitoring Plan

1. Introduction

This Long Term Monitoring Plan (LTMP) was prepared pursuant to the Consent Order # SRD-101 between the State of Connecticut and the University of Connecticut (UConn) regarding the solid waste disposal area on North Eagleville Road (Landfill and Former Chemical Pits) and the former disposal site in the vicinity of Parking Lot F (F Lot). An Interim Monitoring Program (IMP) was performed in order to monitor shallow groundwater, surface water and bedrock groundwater quality in nearby domestic water supply wells until the LTMP required pursuant to paragraph B.4.e of the Consent Order was implemented. In September 2005, the University transitioned from the IMP to the LTMP. As part of this process, samples were collected from both the IMP and LTMP locations for three sampling quarters. These quarters, referred to as "transition rounds" were conducted in September and December 2005 and May 2006. Beginning with the October and November 2006 monitoring quarter, samples were only collected from the LTMP locations.

The objectives of the LTMP are:

- To assess the effectiveness of the remediation
- To monitor groundwater and surface water quality and trends, and
- To act as sentinel wells to protect human health and the environment.

Groundwater, surface water and soil gas samples are being obtained to verify that the remediation systems are working as planned. The Plan is also designed to protect human health and the environment by evaluating the concentrations of contaminants in groundwater and surface water over time. If increasing concentrations are observed, UConn and the Connecticut Department of Energy and Environmental Protection (CTDEEP) will reassess the remediation system design, expand the monitoring program, and/or take additional measures to protect human health and the environment, if necessary.

The LTMP includes sampling of media at multiple locations as shown on Figure 1:

(1) six surface water locations;
(2) five shallow groundwater monitoring wells;
(3) five deep bedrock monitoring wells;
(4) six active domestic wells on Meadowood Road and Separatist Road; and
(5) four soil gas monitoring locations.

Installation of the landfill cap and leachate interceptor trenches (LITs) was completed in the spring of 2007. To date, slight improvements in groundwater quality have been observed. Analytical results continue to be evaluated and reported to the key parties and to the public.

This report documents the sampling event conducted in November 2019, also referred to as Round #31. In a letter to the University dated 16 April 2010, CTDEEP approved a reduction in the LTMP sampling frequency from quarterly to semi-annually to be conducted in the spring and fall seasons. In April 2018, UConn requested to CTDEEP that the monitoring program be conducted on an annual basis and a reduction in testing locations and parameters where results of laboratory analyses have consistently indicated no detection of target compounds or detection at concentrations well below applicable clean-up criteria. UConn and CTDEEP continue to evaluate the request for reducing sampling but will continue

the LTMP without changes. UConn will resubmit the request to reduce sampling if the analytical data continue to demonstrate no detection of target compounds or detection at concentrations well below applicable clean-up criteria. The next sampling event is planned for March 2020.

2. Scope of Program

The following paragraphs describe the rationale for each sampling location for the LTMP based upon the approved Comprehensive Hydrogeologic Investigation and Remedial Action Plan, Addendum No. 2, dated July 2004.

2.1 SHALLOW GROUNDWATER MONITORING WELLS

Three shallow wells [B401(MW), B403(MW) & B404(MW)] were constructed in the overburden south, southeast and north of the landfill respectively, and downgradient of the LITs in February and March 2007. These wells function to monitor shallow groundwater quality migrating out of the landfill area and to assess the effectiveness of the landfill cover and LITs.

Two previously existing shallow monitoring wells, MW-3 and MW-4, were reinstalled in August 2007 in the same general area in F Lot. However, they were offset several feet from their original locations. They function to monitor shallow groundwater quality downgradient of F Lot.

2.2 DEEP GROUNDWATER MONITORING WELLS

Five bedrock (125 to 300 ft) groundwater monitoring wells are included in the LTMP. Three existing wells, MW-105R, B201R(MW), and B302R(MW) are located south and west of the landfill and former chemical pits. These wells were selected because they are situated in the direction of either suspected historical or known bedrock groundwater flow. Since permanent packer systems for discrete fracture interval sampling are installed in B201R(MW) and MW-105R, two samples are collected from each well. Two former residential water supply wells, located at 156 Hunting Lodge Road and 202 North Eagleville Road, are included in the LTMP because of their locations and construction depths. The University has not received permission to access the well at 156 Hunting Lodge Road, therefore it continues to be excluded from sampling events.

2.3 SURFACE WATER MONITORING LOCATIONS

Six surface water-monitoring locations (SW-A through SW-F) are selected to assess surface water quality migrating from the landfill, former chemical pits, and F Lot areas. SW-A through SW-E are strategically placed at the primary surface waters north (wetland and Cedar Swamp Brook drainage) and south (western tributary of Eagleville Brook drainage) of the landfill and former chemical pits area. SW-F is located downgradient of F Lot on an eastern tributary to Eagleville Brook.

2.4 ACTIVE RESIDENTIAL WATER SUPPLY WELLS

Six active residential water supply wells are included in the LTMP:

38 Meadowood Road
41 Meadowood Road
65 Meadowood Road
202 Separatist Road
206 Separatist Road
211 Separatist Road

These residential wells are the closest active bedrock wells to the landfill and former chemical pits in the direction of suspected historical and known groundwater migration pathways in the fractured bedrock aquifer. In August 2013, 65 Meadowood Road was sold. Although UConn has attempted to obtain permission from the new property owner to continue sampling this location, permission has not been granted to date. In July 2014, 38 Meadowood Road also was sold. UConn received permission from the new property owner to continue sampling this location beginning in October 2015 (Round #23).

During the summer of 2018, 206 and 211 Separatist Road were sold. Permission has not been obtained from the new homeowners to continue monitoring these locations. Therefore, samples were not collected from these wells during this event. UConn will request permission to sample the active wells at 206 and 211 Separatist Road. Past results from these wells have been below the state action level for groundwater protection and found to be potable with regard to the constituents tested.

2.5 SOIL GAS MONITORING LOCATIONS

Four soil gas-monitoring points B501(GW), B502(GW), B503(GW) and B504(GW) were installed in the east, southeast, southwest and northwest quadrants of the landfill immediately outside the cap perimeter to monitor for potential gas migration away from the landfill. The monitoring points are 4-in. diameter PVC wells extending to depths ranging between 7.5 and 9.5 ft bgs with a slotted screen interval from the surface seal (approximately 2.5 ft bgs) to the depth of completion. The locations are lateral to the LITs where the likelihood of soil gas migration is presumed to be greatest.

2.6 SAMPLING PARAMETERS

During the course of the Hydrogeologic Investigation, a comprehensive suite of analytical methods was selected to determine the nature of the contamination in the Study Area. A wide range of methods were used to ensure that any potential contaminant identified during review of historical records or during interviews with knowledgeable personnel would be detected if present. Multiple rounds of groundwater and surface water sampling have shown that the contamination is confined to a few classes of compounds. Monitoring a select number of analytical methods accomplishes the objectives of the LTMP, that is, to assess effectiveness of remediation, monitor groundwater quality and trends and be protective of human health and the environment.

Groundwater and surface water samples were analyzed for the following parameters:

- Volatile Organic Compounds (VOCs) by EPA Method 524.2
- Total metals by EPA Method 200 Series
- Total mercury by EPA Method 7470/E245.1
- Other Inorganic Parameters
  - ammonia, nitrate and nitrite, total phosphorus, total dissolved solids, total suspended solids, alkalinity, hardness, chloride, sulfate, chemical oxygen demand, total organic carbon, biological oxygen demand and cyanide
- Field Screening Data
  - turbidity, conductivity, dissolved oxygen, oxygen reduction potential (ORP), pH, and temperature

Soil gas monitoring points were analyzed for methane and carbon dioxide using a multiple gas detection meter.

2.7 SAMPLING FREQUENCY

As previously mentioned, to date, slight improvements to the groundwater quality have been observed. This round represents the Fall 2019 sampling. The next round of monitoring is planned for March 2020.

3. Sampling Procedures

Sampling procedures and analytical methods for the groundwater monitoring wells and surface water samples were conducted in accordance with the Comprehensive Hydrogeologic Investigation and Remedial Action Plan, Addendum No. 2, dated July 2004.

Sampling procedures for the residential water supply wells were conducted in accordance with procedures previously established by CTDEEP and the Department of Public Health (DPH) for the health consultation study completed in 1999. Samples were collected from the water supply system prior to treatment after running the tap for approximately eight minutes.

Samples from the residential water supply wells were analyzed using EPA drinking water methods as noted on the enclosed Table I.

4. Summary of Results

The analytical results from the October/November LTMP round #31 sampling are summarized in Table I. VOC Concentration and Conductivity vs. Time Plots for selected bedrock wells [MW105R, B201R(MW), and B302R(MW)] and selected overburden wells [B401(MW) and B403(MW)] are included in Appendix A. A discussion of the results below is organized by general sample types and locations.

4.1 SHALLOW GROUNDWATER MONITORING WELLS

Samples from monitoring wells B401(MW), B403(MW), B404(MW), MW-3, and MW-4 were collected and submitted to Phoenix Environmental Laboratories (Phoenix), Manchester, Connecticut for analysis of VOCs, total metals, and nutrients.

Similar to results from previous rounds, chlorobenzene was detected slightly above the reporting limits in B403(MW). No VOCs were detected above laboratory reporting limits in the samples collected from B401(MW) and B404(MW). Metal concentrations in all three samples were below protective criteria. In general, concentrations of selected parameters and compounds appear consistent with previous sampling rounds.

VOCs were not detected in the samples collected from MW-3 or MW-4. Metal concentrations were below protective criteria.

In summary, concentrations of all parameters analyzed were below the applicable RSR criteria in the shallow groundwater monitoring wells.

4.2 DEEP BEDROCK MONITORING WELLS

Samples from these wells were collected and submitted to Phoenix for analysis of VOCs, total metals, and other inorganic parameters. VOCs were detected in discrete samples collected from both fracture zones of MW105R and B201R(MW). Tetrahydrofuran (THF) was detected at concentrations slightly above the recommended GWPC (4 ug/l) in both fracture zones of MW105R and the deeper (60 ft) fracture of B201R(MW). Concentrations of 1,2-dichloroethane, benzene, and trichloroethene (in the duplicate sample) exceeded the GWPC in the sample from the deeper fracture zone in MW105R. Concentrations of 1,2-dichloroethane and benzene exceeded the GWPC in both the upper and deeper fracture zones of B201R(MW). Analytical results of groundwater quality at MW105R and B201R(MW) are consistent with previous sampling events although THF was not detected in project samples prior to October 2015. THF is an industrial solvent for PVC and varnishes and is commonly used in adhesives, PVC cements, to join piping and as a cleaner prior to joining pipes. It has not historically been a compound of concern associated with the landfill. The exact source of the THF is unknown, but it is likely related to either PVC well construction materials or other PVC materials associated with the landfill.

Monitoring wells 202-NERD (unused domestic well at 202 N. Eagleville Road) and B302R-MW were completed at depths of 275 and 300 ft. (grouted to bottom depth of 200 ft.) respectively and do not have discrete sampling systems installed, therefore integrated samples were collected. VOCs were not

detected in the samples collected from 202-NERD or B302R-MW. Metal and nutrient parameters were within typical groundwater ranges in the bedrock well samples.

For quality control purposes, duplicate samples were collected from the deep fracture zone of MW105R and from 202-NERD. Results from the original and duplicate samples were in general agreement.

In summary, a few VOCs continue to be detected at concentrations that exceed the GWPC in two (MW105R and B201R(MW)) of the four bedrock monitoring wells monitored. Results of the other parameters monitored are below applicable RSR criteria.

4.3 SURFACE WATER SAMPLES

During this sampling event, surface water was collected from all six monitoring locations (SW-A, SW-B, SW-C, SW-D, SW-E and SW-F). Samples were submitted to Phoenix for analysis of VOCs, metals and nutrients. VOCs were not detected above laboratory reporting limits at any of the six monitored locations. Metal and nutrient parameters were within typical surface water ranges and consistent with previous sampling rounds for these locations.

In summary, concentrations of all parameters analyzed for in surface water samples are below applicable RSR criteria.

4.4 ACTIVE RESIDENTIAL DOMESTIC WELLS

Three of the six active domestic wells (38 Meadowood Road, 41 Meadowood Road and 202 Separatist Road) were sampled as part of this semiannual event. Permission to sample the domestic well has not been granted by the new owners of 65 Meadowood Road. Additionally, 206 and 211 Separatist Road were sold during the summer of 2018 and UConn will need to request permission to continue sampling at these locations. Results of the domestic well sampling were generally consistent with previous rounds. VOCs were not detected above laboratory reporting limits in any of the domestic wells sampled, and metals and nutrient concentrations at all locations were within acceptable drinking water ranges.

In summary, results of all parameters analyzed for were below applicable RSR criteria.

4.5 SOIL GAS MONITORING

Landfill gas is the natural by-product of the decomposition of solid waste in landfills and is comprised primarily of carbon dioxide and methane. A GEM5000 Landfill Gas Meter was used to sample and analyze methane, carbon dioxide and oxygen content at soil gas monitoring locations B501(GW), B502(GW), B503(GW) and B504(GW). Oxygen concentrations ranged from 17.3% at B504(GW) to 20.7% at B501(GW). Carbon dioxide readings ranged from 0.1% at B501(GW) to 1.7% at B504(GW). Methane gas was detected at 0.4% at B502(GW). These readings are generally consistent with previous monitoring events.

4.6 CONSENT ORDER SRD-101 PROGRESS REPORT

UConn continues to maintain and operate the pumping systems for the North and South Leachate Interceptor Trenches (LIT). The pumps are on a quarterly preventative maintenance schedule and the air supply lines are jetted by a contractor bi-annually.

UConn has pumped from both the North and South LITs. UConn completed maintenance during the summer of 2019 which included line jetting and vacuuming. UConn also performed preventative maintenance on the pumps.

The pumping volumes below represent the period from May 1, 2019 through October 31, 2019. The total gallons pumped from each trench during this timeframe is as follows:

- North LIT: 2,390,833 gallons;
- South LIT: 411,891.

TABLE

TABLE I
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
LONG-TERM MONITORING PLAN
UCONN LANDFILL
STORRS, CONNECTICUT

SAMPLE DESIGNATION	METHOD	RSR GAGPC	RSR SWPC	RSR RVC[4]	MW105R-74	MW105R-111	MW105RP-111	EB-103019	TB-103019	B201R(MW)-38
SAMPLING DATE					10/30/2019	10/30/2019	10/30/2019	10/30/2019	10/30/2019	10/30/2019
COMMENTS					Discrete	Discrete	Duplicate	Field Blank	Trip Blank	Discrete
WELL DEPTH (ft.):										
LOCATION:					MW-105R	MW-105R	MW-105R			B201R-MW
Volatile Organic Compounds (ug/l)	**524.2**	**(ug/l)**	**(ug/l)**	**(ug/l)**						
1,1-Dichloroethane		**70**	**NE**	**34,600**	ND<0.50	1.5	1.6	ND<0.50	ND<0.50	0.57
1,2,4-Trichlorobenzene		**70**	**NE**	**NE**	ND<0.50	6.3	6.6	ND<0.50	ND<0.50	ND<0.50
1,2-Dichlorobenzene		**600**	**170,000**	**30,500**	ND<0.50	2.8	3	ND<0.50	ND<0.50	ND<0.50
1,2-Dichloroethane		**1**	**2,970**	**21**	ND<0.50	**10**	**10**	ND<0.50	ND<0.50	**3.1**
1,4-Dichlorobenzene		**75**	**26,000**	**24,200**	ND<0.50	9.2	9.1	ND<0.50	ND<0.50	0.54
Acetone		**700**	**NE**	**50,000**	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<2.5
Benzene		**1**	**710**	**215**	ND<0.50	**27**	**27**	ND<0.50	ND<0.50	**1.2**
Bromobenzene		**NE**	**NE**	**NE**	ND<0.50	17	20	ND<0.50	ND<0.50	2.2
Carbon disulfide		**700**	**NE**	**NE**	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50
Chlorobenzene		**100**	**420,000**	**1,800**	ND<0.50	29	29	ND<0.50	ND<0.50	4.3
Chloroform		**6**	**14,100**	**287**	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50
cis-1,2-Dichloroethene		**70**	**NE**	**NE**	ND<0.50	8.7	9.6	ND<0.50	ND<0.50	3.4
Tetrachloroethene		**5**	**88**	**1500**	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50
Tetrahydrofuran (THF)		**4**	**9,600**	**250**	**7**	**8.9**	**6.3**	ND<5.0	ND<5.0	ND<5.0
Trichloroethene		**5**	**2,340**	**219**	ND<0.50	5	**5.2**	ND<0.50	ND<0.50	1.6
Trichlorotrifluoroethane		**NE**	**NE**	**NE**	ND<0.50	2.9	2.7	ND<0.50	ND<0.50	ND<0.50
Vinyl chloride		**2**	**15,750**	**2**	ND<0.50	1	0.99	ND<0.50	ND<0.50	ND<0.50
Total Metals (mg/l)										
Aluminum	200.7/6010	**NE**	**NE**	**NE**	0.033	0.022	0.023	ND<0.020	--	0.034
Barium	6010/E200.7	**1**	**NE**	**NE**	0.081	0.078	0.075	ND<0.002	--	0.089
Beryllium	200.7/6010	**0.004**	**0.004**	**NE**	ND<0.001	ND<0.001	ND<0.001	ND<0.001	--	ND<0.001
Calcium	200.7/6010	**NE**	**NE**	**NE**	89.6	46.8	45.3	0.052	--	74.5
Chromium, total	P.E.L.	**50**	**NE**	**NE**	ND<0.001	ND<0.001	ND<0.001	ND<0.001	--	0.002
Chromium, trivalent	200.7/6010	**NE**	**NE**	**NE**	ND<0.001	ND<0.001	ND<0.001	ND<0.001	--	0.002
Copper	6010/E200.7	**1.3**	**0.048**	**NE**	ND<0.005	ND<0.005	ND<0.005	ND<0.005	--	ND<0.005
Iron	6010/E200.7	**NE**	**NE**	**NE**	2.92	0.19	0.183	ND<0.010	--	0.287
Lead	7421/S3113B	**0.015**	**0.013**	**NE**	ND<0.002	ND<0.002	ND<0.002	ND<0.002	--	ND<0.002
Magnesium	200.7/6010	**NE**	**NE**	**NE**	9.67	5.26	5.06	ND<0.010	--	8.26
Manganese	200.7/6010	**NE**	**NE**	**NE**	0.424	0.102	0.099	ND<0.001	--	0.176
Nickel	200.7/6010	**0.1**	**0.88**	**NE**	ND<0.001	ND<0.001	ND<0.001	ND<0.001	--	ND<0.001
Potassium	6010/E200.7	**NE**	**NE**	**NE**	4.1	2.5	2.4	ND<0.1	--	3.3
Sodium	200.7/6010	**NE**	**NE**	**NE**	19.9	18.1	17.7	ND<0.10	--	15.5
Vanadium	200.7/6010	**0.05**	**NE**	**NE**	ND<0.002	ND<0.002	ND<0.002	ND<0.002	--	ND<0.002
Zinc	200.7/6010	**5**	**0.123**	**NE**	ND<0.004	ND<0.004	ND<0.004	ND<0.004	--	ND<0.004

TABLE I
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
LONG-TERM MONITORING PLAN
UCONN LANDFILL
STORRS, CONNECTICUT

SAMPLE DESIGNATION	METHOD	RSR GAGPC	RSR SWPC	RSR RVC[4]	MW105R-74		MW105R-111		MW105RP-111		EB-103019		TB-103019		B201R(MW)-38	
SAMPLING DATE					10/30/2019		10/30/2019		10/30/2019		10/30/2019		10/30/2019		10/30/2019	
COMMENTS					Discrete		Discrete		Duplicate		Field Blank		Trip Blank		Discrete	
WELL DEPTH (ft.):																
LOCATION:					MW-105R		MW-105R		MW-105R						B201R-MW	
Other Analyses (mg/l)																
Alkalinity-CaCO3	SM2320B	--	--	--	272		138		139		ND<20.0		--		204	
Ammonia as Nitrogen	S4500NH3	--	--	--	ND<0.05		ND<0.05		ND<0.05		ND<0.05		--		ND<0.10	
B.O.D./5 day	SM5210B	--	--	--	5		ND<4.0		ND<4.0		ND<4.0		--		4.9	
C.O.D.	SM5220 D	--	--	--	ND<10		ND<10		23	J	ND<10		--		47	
Chloride	300.0/9056	--	--	--	18.7		17.1		17		ND<3.0		--		27.2	
Hardness (CaCO3)	300.0/9056	--	--	--	264		139		134		0.1		--		220	
Nitrate as Nitrogen	300.0/9056	--	--	--	ND<0.05		ND<0.05		ND<0.05		ND<0.05		--		ND<0.05	
Nitrite as Nitrogen	E365.2	--	--	--	ND<0.004		ND<0.004		ND<0.004		ND<0.004		--		ND<0.004	
Phosphorus, as P	9010/335.3	--	--	--	ND<0.010		0.014		0.013		ND<0.010		--		0.013	
Sulfate	300.0/9056	--	--	--	20.4		15.2		15.3		ND<3.0		--		15.7	
Tot. Diss. Solids	SM2540C	--	--	--	340		220		210		ND<10		--		310	
Total Organic Carbon	415.1/SW9060	--	--	--	5		3.7		3.7		ND<1.0		--		16	
Total Suspended Solids	SM2540D	--	--	--	3.3		ND<2.5		ND<2.5		ND<5.0		--		ND<2.5	
Field Screening Data																
Turbidity (NTU)		--	--	--	0		0		--		--		--		0	
Conductivity (uS/cm)		--	--	--	612		175		--		--		--		509	
Dissolved Oxygen (ppm)		--	--	--	0.52		0.49		--		--		--		0.85	
ORP (mV)		--	--	--	-101		45		--		--		--		-147	
pH		--	--	--	6.71		7.04		--		--		--		7.14	
Temperature (° C)		--	--	--	14.78		14.35		--		--		--		13.93	

Notes and Abbreviations:
1. Samples were submitted to Phoenix Environmental Laboratories, Inc., Manchester, CT
2. RSR GA GPC:Connecticut Department of Environmental Protection (CTDEP) Remediation Standard Regulations (RSR) Groundwater Protection Criteria.
3. RSR SWPC: CTDEP RSR Surface Water Protection Criteria
4. RSR RVC: CTDEP RSR Residential Volatilization Criteria (1996).
5. NE: RSR criteria not established
6. ND: compound not detected above laboratory reporting limits.
7. Blank spaces, "--" or "NA" indicate compound not analyzed
8. uS/cm: microsiemens per centimeter.
9. ug/l: micrograms per liter, mg/l: milligrams per liter
10. NTU: Nephelometric Turbidity Units.
11. Methods are EPA unless otherwise specified.
12. Organic qualifier codes: (J): estimated result; (U): not detected above associated value
13. Inorganic qualifier codes: (U): not detected above associated value
14. Bold values exceed one or more of the RSRs

TABLE I
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
LONG-TERM MONITORING PLAN
UCONN LANDFILL
STORRS, CONNECTICUT

SAMPLE DESIGNATION	METHOD	RSR GAGPC	RSR SWPC	RSR RVC[4]	B201R(MW)-60	B401(MW)	EB-102919	TB-102919	B403(MW)	B404(MW)
SAMPLING DATE					10/30/2019	10/29/2019	10/29/2019	10/29/2019	10/29/2019	10/29/2019
COMMENTS					Discrete		Field Blank	Trip Blank		
WELL DEPTH (ft.):						11.01			15.2	11.35
LOCATION:					B201R-MW	B401(MW)			B403(MW)	B404(MW)
Volatile Organic Compounds (ug/l)	**524.2**	**(ug/l)**	**(ug/l)**	**(ug/l)**						
1,1-Dichloroethane		**70**	**NE**	**34,600**	0.95	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50
1,2,4-Trichlorobenzene		**70**	**NE**	**NE**	0.93	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50
1,2-Dichlorobenzene		**600**	**170,000**	**30,500**	0.99	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50
1,2-Dichloroethane		**1**	**2,970**	**21**	**5.6**	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50
1,4-Dichlorobenzene		**75**	**26,000**	**24,200**	2	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50
Acetone		**700**	**NE**	**50,000**	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<2.5
Benzene		**1**	**710**	**215**	**1.7**	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50
Bromobenzene		**NE**	**NE**	**NE**	6.3	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50
Carbon disulfide		**700**	**NE**	**NE**	0.76	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50
Chlorobenzene		**100**	**420,000**	**1,800**	13	ND<0.50	ND<0.50	ND<0.50	0.89	ND<0.50
Chloroform		**6**	**14,100**	**287**	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50
cis-1,2-Dichloroethene		**70**	**NE**	**NE**	5	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50
Tetrachloroethene		**5**	**88**	**1500**	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50
Tetrahydrofuran (THF)		**4**	**9,600**	**250**	**5.5**	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
Trichloroethene		**5**	**2,340**	**219**	3	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50
Trichlorotrifluoroethane		**NE**	**NE**	**NE**	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50
Vinyl chloride		**2**	**15,750**	**2**	0.64	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50
Total Metals (mg/l)										
Aluminum	200.7/6010	**NE**	**NE**	**NE**	0.073	0.151	ND<0.020	--	ND<0.020	0.04
Barium	6010/E200.7	**1**	**NE**	**NE**	0.034	0.078	ND<0.002	--	0.095	0.094
Beryllium	200.7/6010	**0.004**	**0.004**	**NE**	ND<0.001	ND<0.001	ND<0.001	--	ND<0.001	ND<0.001
Calcium	200.7/6010	**NE**	**NE**	**NE**	8.06	32	0.019	--	16.9	74.1
Chromium, total	P.E.L.	**50**	**NE**	**NE**	0.004	ND<0.001	ND<0.001	--	ND<0.001	ND<0.001
Chromium, trivalent	200.7/6010	**NE**	**NE**	**NE**	0.004	ND<0.001	ND<0.001	--	ND<0.001	ND<0.001
Copper	6010/E200.7	**1.3**	**0.048**	**NE**	ND<0.005	ND<0.005	ND<0.005	--	ND<0.005	ND<0.005
Iron	6010/E200.7	**NE**	**NE**	**NE**	0.021	22.3	ND<0.010	--	19.4	0.02
Lead	7421/S3113B	**0.015**	**0.013**	**NE**	ND<0.002	ND<0.002	ND<0.002	--	ND<0.002	ND<0.002
Magnesium	200.7/6010	**NE**	**NE**	**NE**	2.41	3.51	ND<0.010	--	4.05	6.64
Manganese	200.7/6010	**NE**	**NE**	**NE**	0.001	0.554	ND<0.001	--	1.44	0.009
Nickel	200.7/6010	**0.1**	**0.88**	**NE**	0.001	0.003	ND<0.001	--	0.003	0.001
Potassium	6010/E200.7	**NE**	**NE**	**NE**	5.6	7.4	ND<0.1	--	7.5	6.9
Sodium	200.7/6010	**NE**	**NE**	**NE**	35.1	26.7	ND<0.10	--	87	9.86
Vanadium	200.7/6010	**0.05**	**NE**	**NE**	ND<0.002	ND<0.002	ND<0.002	--	ND<0.002	ND<0.002
Zinc	200.7/6010	**5**	**0.123**	**NE**	0.005	0.007	ND<0.004	--	0.005	ND<0.004

TABLE I
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LONG-TERM MONITORING PLAN
UCONN LANDFILL
STORRS, CONNECTICUT

SAMPLE DESIGNATION	METHOD	RSR GAGPC	RSR SWPC	RSR RVC[4]	B201R(MW)-60		B401(MW)		EB-102919		TB-102919		B403(MW)		B404(MW)	
SAMPLING DATE					10/30/2019		10/29/2019		10/29/2019		10/29/2019		10/29/2019		10/29/2019	
COMMENTS					Discrete				Field Blank		Trip Blank					
WELL DEPTH (ft.):							11.01						15.2		11.35	
LOCATION:					B201R-MW		B401(MW)						B403(MW)		B404(MW)	
Other Analyses (mg/l)																
Alkalinity-CaCO3	SM2320B	--	--	--	50		106		ND<20.0		--		84		102	
Ammonia as Nitrogen	S4500NH3	--	--	--	ND<0.10		2.24		ND<0.05		--		0.52		0.05	
B.O.D./5 day	SM5210B	--	--	--	5.3		6.8		ND<4.0		--		ND<4.0		ND<4.0	
C.O.D.	SM5220 D	--	--	--	21		21		ND<10		--		ND<10		ND<10	
Chloride	300.0/9056	--	--	--	14.9		58.4		ND<3.0		--		105		75.7	
Hardness (CaCO3)	300.0/9056	--	--	--	30.1		94.4		ND<0.1		--		58.9		212	
Nitrate as Nitrogen	300.0/9056	--	--	--	ND<0.05		ND<0.05		ND<0.05		--		ND<0.05		ND<0.05	
Nitrite as Nitrogen	E365.2	--	--	--	ND<0.004		ND<0.004		ND<0.004		--		ND<0.004		ND<0.004	
Phosphorus, as P	9010/335.3	--	--	--	0.014		0.06	J	0.016		--		0.02	J	0.064	J
Sulfate	300.0/9056	--	--	--	34.3		18		ND<3.0		--		35.6		37.4	
Tot. Diss. Solids	SM2540C	--	--	--	140		230		ND<10		--		300		530	
Total Organic Carbon	415.1/SW9060	--	--	--	8		7.2		ND<1.0		--		1.2		3.4	
Total Suspended Solids	SM2540D	--	--	--	ND<5.0		4		ND<2.5		--		3.5		ND<2.5	
Field Screening Data																
Turbidity (NTU)		--	--	--	0.0		9.4		--		--		0		0	
Conductivity (uS/cm)		--	--	--	242		243		--		--		722		631	
Dissolved Oxygen (ppm)		--	--	--	1.19		0.33		--		--		0.93		7.46	
ORP (mV)		--	--	--	-105		11		--		--		17		289	
pH		--	--	--	8.55		5.9		--		--		5.95		6.27	
Temperature (° C)		--	--	--	13.56		14.78		--		--		15.86		14.61	

Notes and Abbreviations:
1. Samples were submitted to Phoenix Environmental Laboratories, Inc., Manchester, CT
2. RSR GA GPC:Connecticut Department of Environmental Protection (CTDEP) Remediation Standard Regulations (RSR) Groundwater Protection Criteria.
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4. RSR RVC: CTDEP RSR Residential Volatilization Criteria (1996).
5. NE: RSR criteria not established
6. ND: compound not detected above laboratory reporting limits.
7. Blank spaces, "--" or "NA" indicate compound not analyzed
8. uS/cm: microsiemens per centimeter.
9. ug/l: micrograms per liter, mg/l: milligrams per liter
10. NTU: Nephelometric Turbidity Units.
11. Methods are EPA unless otherwise specified.
12. Organic qualifier codes: (J): estimated result; (U): not detected above associated value
13. Inorganic qualifier codes: (U): not detected above associated value
14. Bold values exceed one or more of the RSRs

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LONG-TERM MONITORING PLAN
UCONN LANDFILL
STORRS, CONNECTICUT

SAMPLE DESIGNATION	METHOD	RSR GAGPC	RSR SWPC	RSR RVC[4]	202-NERD		202P-NERD		B302R-MW		MW-3		MW-4		SW-A
SAMPLING DATE					10/30/2019		10/30/2019		10/30/2019		10/29/2019		10/29/2019		11/1/2019
COMMENTS					Inactive		Duplicate		Open hole						Surface Water
WELL DEPTH (ft.):					320		320		275		18.65		22.95		
LOCATION:					North Eagleville Rd		North Eagleville Rd		B302R-MW		F Lot		F Lot		
Volatile Organic Compounds (ug/l)	**524.2**	**(ug/l)**	**(ug/l)**	**(ug/l)**											
1,1-Dichloroethane		**70**	**NE**	**34,600**	ND<0.50		ND<0.50		ND<0.50		ND<0.50		ND<0.50		ND<0.50
1,2,4-Trichlorobenzene		**70**	**NE**	**NE**	ND<0.50		ND<0.50		ND<0.50		ND<0.50		ND<0.50		ND<0.50
1,2-Dichlorobenzene		**600**	**170,000**	**30,500**	ND<0.50		ND<0.50		ND<0.50		ND<0.50		ND<0.50		ND<0.50
1,2-Dichloroethane		**1**	**2,970**	**21**	ND<0.50		ND<0.50		ND<0.50		ND<0.50		ND<0.50		ND<0.50
1,4-Dichlorobenzene		**75**	**26,000**	**24,200**	ND<0.50		ND<0.50		ND<0.50		ND<0.50		ND<0.50		ND<0.50
Acetone		**700**	**NE**	**50,000**	ND<2.5		ND<2.5		ND<2.5		ND<2.5		ND<2.5		ND<2.5
Benzene		**1**	**710**	**215**	ND<0.50		ND<0.50		ND<0.50		ND<0.50		ND<0.50		ND<0.50
Bromobenzene		**NE**	**NE**	**NE**	ND<0.50		ND<0.50		ND<0.50		ND<0.50		ND<0.50		ND<0.50
Carbon disulfide		**700**	**NE**	**NE**	ND<0.50		ND<0.50		ND<0.50		ND<0.50		ND<0.50		ND<0.50
Chlorobenzene		**100**	**420,000**	**1,800**	ND<0.50		ND<0.50		ND<0.50		ND<0.50		ND<0.50		ND<0.50
Chloroform		**6**	**14,100**	**287**	ND<0.50		ND<0.50		ND<0.50		ND<0.50		ND<0.50		ND<0.50
cis-1,2-Dichloroethene		**70**	**NE**	**NE**	ND<0.50		ND<0.50		ND<0.50		ND<0.50		ND<0.50		ND<0.50
Tetrachloroethene		**5**	**88**	**1500**	ND<0.50		ND<0.50		ND<0.50		ND<0.50		ND<0.50		ND<0.50
Tetrahydrofuran (THF)		**4**	**9,600**	**250**	ND<5.0		ND<5.0		ND<5.0		ND<5.0		ND<5.0		ND<5.0
Trichloroethene		**5**	**2,340**	**219**	ND<0.50		ND<0.50		ND<0.50		ND<0.50		ND<0.50		ND<0.50
Trichlorotrifluoroethane		**NE**	**NE**	**NE**	ND<0.50		ND<0.50		ND<0.50		ND<0.50		ND<0.50		ND<0.50
Vinyl chloride		**2**	**15,750**	**2**	ND<0.50		ND<0.50		ND<0.50		ND<0.50		ND<0.50		ND<0.50
Total Metals (mg/l)															
Aluminum	200.7/6010	**NE**	**NE**	**NE**	0.213	J	0.021	J	0.114		0.033		0.071		ND<0.020
Barium	6010/E200.7	**1**	**NE**	**NE**	ND<0.002		ND<0.002		0.017		0.058		0.016		0.065
Beryllium	200.7/6010	**0.004**	**0.004**	**NE**	ND<0.001		ND<0.001		ND<0.001		ND<0.001		ND<0.001		ND<0.001
Calcium	200.7/6010	**NE**	**NE**	**NE**	14.2		13.9		23.6		14.5		5.18		19.8
Chromium, total	P.E.L.	**50**	**NE**	**NE**	ND<0.001		ND<0.001		0.001		ND<0.001		ND<0.001		ND<0.001
Chromium, trivalent	200.7/6010	**NE**	**NE**	**NE**	ND<0.001		ND<0.001		0.001		ND<0.001		ND<0.001		ND<0.001
Copper	6010/E200.7	**1.3**	**0.048**	**NE**	ND<0.005		ND<0.005		ND<0.005		ND<0.005		ND<0.005		0.031
Iron	6010/E200.7	**NE**	**NE**	**NE**	0.358		0.5		0.122		0.444		0.152		0.023
Lead	7421/S3113B	**0.015**	**0.013**	**NE**	ND<0.002		ND<0.002		ND<0.002		ND<0.002		ND<0.002		ND<0.002
Magnesium	200.7/6010	**NE**	**NE**	**NE**	2.21		2.14		0.648		2.02		0.74		3.6
Manganese	200.7/6010	**NE**	**NE**	**NE**	0.013		0.014		0.003		0.059		0.006		0.004
Nickel	200.7/6010	**0.1**	**0.88**	**NE**	ND<0.001		ND<0.001		ND<0.001		0.002		0.002		0.008
Potassium	6010/E200.7	**NE**	**NE**	**NE**	1.1		1.1		3.5		5.8		3.6		4.6
Sodium	200.7/6010	**NE**	**NE**	**NE**	6.92		6.79		17.5		171		73.8		58.1
Vanadium	200.7/6010	**0.05**	**NE**	**NE**	ND<0.002		ND<0.002		0.005		ND<0.002		ND<0.002		ND<0.002
Zinc	200.7/6010	**5**	**0.123**	**NE**	ND<0.004		ND<0.004		0.006		0.008		ND<0.004		0.11

TABLE I
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
LONG-TERM MONITORING PLAN
UCONN LANDFILL
STORRS, CONNECTICUT

SAMPLE DESIGNATION	METHOD	RSR GAGPC	RSR SWPC	RSR RVC[4]	202-NERD		202P-NERD		B302R-MW		MW-3		MW-4		SW-A	
SAMPLING DATE					10/30/2019		10/30/2019		10/30/2019		10/29/2019		10/29/2019		11/1/2019	
COMMENTS					Inactive		Duplicate		Open hole						Surface Water	
WELL DEPTH (ft.):					320		320		275		18.65		22.95			
LOCATION:					North Eagleville Rd		North Eagleville Rd		B302R-MW		F Lot		F Lot			
Other Analyses (mg/l)																
Alkalinity-CaCO3	SM2320B	--	--	--	46		46		59		98		51		21	
Ammonia as Nitrogen	S4500NH3	--	--	--	0.09		ND<0.05		ND<0.05		ND<0.05		ND<0.05		ND<0.05	
B.O.D./5 day	SM5210B	--	--	--	ND<4.0		ND<4.0		ND<4.0		ND<4.0		ND<4.0		ND<4.0	
C.O.D.	SM5220 D	--	--	--	ND<10		ND<10		ND<10		ND<10		ND<10		11	
Chloride	300.0/9056	--	--	--	ND<3.0		ND<3.0		ND<3.0		186		79.8		77	
Hardness (CaCO3)	300.0/9056	--	--	--	44.6		43.5		61.6		44.5		16		64.3	
Nitrate as Nitrogen	300.0/9056	--	--	--	ND<0.05		ND<0.05		0.09		0.51		4.65		ND<0.05	
Nitrite as Nitrogen	E365.2	--	--	--	ND<0.004		ND<0.004		ND<0.004		ND<0.004		ND<0.004		ND<0.004	
Phosphorus, as P	9010/335.3	--	--	--	0.019		0.014		0.025		ND<0.010		0.025	J	ND<0.010	
Sulfate	300.0/9056	--	--	--	13.9		13.8		44.6		44.9		19.1		32.8	
Tot. Diss. Solids	SM2540C	--	--	--	78		80		140		510		280		180	
Total Organic Carbon	415.1/SW9060	--	--	--	ND<1.0		ND<1.0		ND<1.0		3.3		1.9		4	
Total Suspended Solids	SM2540D	--	--	--	ND<2.5		ND<2.5		ND<2.5		3		ND<1.7		ND<2.5	
Field Screening Data																
Turbidity (NTU)		--	--	--	0		--		0		0.6		0		0	
Conductivity (uS/cm)		--	--	--	135		--		242		844		348		448	
Dissolved Oxygen (ppm)		--	--	--	0		--		0.37		1.76		3.08		10.05	
ORP (mV)		--	--	--	133		--		189		150		166		202	
pH		--	--	--	7.99		--		7.89		5.61		6.06		5.6	
Temperature (° C)		--	--	--	15.27		--		13.94		14.89		14.09		14.58	

Notes and Abbreviations:
1. Samples were submitted to Phoenix Environmental Laboratories, Inc., Manchester, CT
2. RSR GA GPC:Connecticut Department of Environmental Protection (CTDEP) Remediation Standard Regulations (RSR) Groundwater Protection Criteria.
3. RSR SWPC: CTDEP RSR Surface Water Protection Criteria
4. RSR RVC: CTDEP RSR Residential Volatilization Criteria (1996).
5. NE: RSR criteria not established
6. ND: compound not detected above laboratory reporting limits.
7. Blank spaces, "--" or "NA" indicate compound not analyzed
8. uS/cm: microsiemens per centimeter.
9. ug/l: micrograms per liter, mg/l: milligrams per liter
10. NTU: Nephelometric Turbidity Units.
11. Methods are EPA unless otherwise specified.
12. Organic qualifier codes: (J): estimated result; (U): not detected above associated value
13. Inorganic qualifier codes: (U): not detected above associated value
14. Bold values exceed one or more of the RSRs

TABLE I
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LONG-TERM MONITORING PLAN
UCONN LANDFILL
STORRS, CONNECTICUT

SAMPLE DESIGNATION	METHOD	RSR GAGPC	RSR SWPC	RSR RVC[4]	SW-B	SW-C	SW-D	SW-E	SW-F	TB-110119
SAMPLING DATE					11/1/2019	11/1/2019	11/1/2019	11/1/2019	11/1/2019	11/1/2019
COMMENTS					Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Trip Blank
WELL DEPTH (ft.):										
LOCATION:										
Volatile Organic Compounds (ug/l)	**524.2**	**(ug/l)**	**(ug/l)**	**(ug/l)**						
1,1-Dichloroethane		**70**	**NE**	**34,600**	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50
1,2,4-Trichlorobenzene		**70**	**NE**	**NE**	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50
1,2-Dichlorobenzene		**600**	**170,000**	**30,500**	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50
1,2-Dichloroethane		**1**	**2,970**	**21**	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50
1,4-Dichlorobenzene		**75**	**26,000**	**24,200**	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50
Acetone		**700**	**NE**	**50,000**	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<2.5
Benzene		**1**	**710**	**215**	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50
Bromobenzene		**NE**	**NE**	**NE**	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50
Carbon disulfide		**700**	**NE**	**NE**	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50
Chlorobenzene		**100**	**420,000**	**1,800**	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50
Chloroform		**6**	**14,100**	**287**	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50
cis-1,2-Dichloroethene		**70**	**NE**	**NE**	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50
Tetrachloroethene		**5**	**88**	**1500**	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50
Tetrahydrofuran (THF)		**4**	**9,600**	**250**	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
Trichloroethene		**5**	**2,340**	**219**	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50
Trichlorotrifluoroethane		**NE**	**NE**	**NE**	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50
Vinyl chloride		**2**	**15,750**	**2**	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<0.50
Total Metals (mg/l)										
Aluminum	200.7/6010	**NE**	**NE**	**NE**	0.039	0.038	0.051	0.047	0.462	--
Barium	6010/E200.7	**1**	**NE**	**NE**	0.065	0.019	0.025	0.039	0.099	--
Beryllium	200.7/6010	**0.004**	**0.004**	**NE**	ND<0.001	ND<0.001	ND<0.001	ND<0.001	0.001	--
Calcium	200.7/6010	**NE**	**NE**	**NE**	18.6	21.9	23.7	27.7	67.7	--
Chromium, total	P.E.L.	**50**	**NE**	**NE**	0.001	ND<0.001	ND<0.001	ND<0.001	0.001	--
Chromium, trivalent	200.7/6010	**NE**	**NE**	**NE**	0.001	ND<0.001	ND<0.001	ND<0.001	0.001	--
Copper	6010/E200.7	**1.3**	**0.048**	**NE**	ND<0.005	ND<0.005	ND<0.005	ND<0.005	0.006	--
Iron	6010/E200.7	**NE**	**NE**	**NE**	0.469	0.02	0.033	0.364	1.01	--
Lead	7421/S3113B	**0.015**	**0.013**	**NE**	ND<0.002	ND<0.002	ND<0.002	ND<0.002	0.002	--
Magnesium	200.7/6010	**NE**	**NE**	**NE**	6.69	5.9	6.41	7.68	16.7	--
Manganese	200.7/6010	**NE**	**NE**	**NE**	0.1	0.027	0.02	0.107	0.307	--
Nickel	200.7/6010	**0.1**	**0.88**	**NE**	0.004	0.008	0.005	0.003	0.005	--
Potassium	6010/E200.7	**NE**	**NE**	**NE**	7.8	5.2	3.7	3.9	7.4	--
Sodium	200.7/6010	**NE**	**NE**	**NE**	31.4	44.6	38.1	49.6	175	--
Vanadium	200.7/6010	**0.05**	**NE**	**NE**	ND<0.002	ND<0.002	ND<0.002	ND<0.002	ND<0.002	--
Zinc	200.7/6010	**5**	**0.123**	**NE**	0.008	0.008	0.011	0.007	0.015	--

TABLE I
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
LONG-TERM MONITORING PLAN
UCONN LANDFILL
STORRS, CONNECTICUT

SAMPLE DESIGNATION	METHOD	RSR GAGPC	RSR SWPC	RSR RVC[4]	SW-B	SW-C	SW-D	SW-E	SW-F	TB-110119
SAMPLING DATE					11/1/2019	11/1/2019	11/1/2019	11/1/2019	11/1/2019	11/1/2019
COMMENTS					Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Trip Blank
WELL DEPTH (ft.):										
LOCATION:										
Other Analyses (mg/l)										
Alkalinity-CaCO3	SM2320B	--	--	--	ND<20.0	ND<20.0	ND<20.0	ND<20.0	91	--
Ammonia as Nitrogen	S4500NH3	--	--	--	ND<0.05	0.07	ND<0.05	0.09	0.07	--
B.O.D./5 day	SM5210B	--	--	--	ND<4.0	ND<4.0	ND<4.0	ND<4.0	ND<4.0	--
C.O.D.	SM5220 D	--	--	--	19	ND<10	ND<10	15	19	--
Chloride	300.0/9056	--	--	--	75.4	49.1	67.5	99.9	390	--
Hardness (CaCO3)	300.0/9056	--	--	--	74	79	85.6	101	238	--
Nitrate as Nitrogen	300.0/9056	--	--	--	ND<0.05	0.15	ND<0.05	ND<0.05	0.21	--
Nitrite as Nitrogen	E365.2	--	--	--	ND<0.004	ND<0.004	ND<0.004	ND<0.004	ND<0.020	--
Phosphorus, as P	9010/335.3	--	--	--	0.024	0.014	ND<0.010	0.022	0.049	--
Sulfate	300.0/9056	--	--	--	39.5	100	74	47.8	25.6	--
Tot. Diss. Solids	SM2540C	--	--	--	190	220	200	260	920	--
Total Organic Carbon	415.1/SW9060	--	--	--	4.9	1.5	2.5	4.3	4.2	--
Total Suspended Solids	SM2540D	--	--	--	ND<5.0	ND<1.7	ND<2.5	ND<2.5	ND<10	--
Field Screening Data										
Turbidity (NTU)		--	--	--	0	0	0	0	0	--
Conductivity (uS/cm)		--	--	--	412	477	481	678	1580	--
Dissolved Oxygen (ppm)		--	--	--	7.44	5.52	9.72	9.81	8.37	--
ORP (mV)		--	--	--	163	265	273	281	49	--
pH		--	--	--	5.77	5.85	5.42	5.1	6.11	--
Temperature (° C)		--	--	--	15.02	14.44	14.84	14.65	14.36	--

Notes and Abbreviations:
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3. RSR SWPC: CTDEP RSR Surface Water Protection Criteria
4. RSR RVC: CTDEP RSR Residential Volatilization Criteria (1996).
5. NE: RSR criteria not established
6. ND: compound not detected above laboratory reporting limits.
7. Blank spaces, "--" or "NA" indicate compound not analyzed
8. uS/cm: microsiemens per centimeter.
9. ug/l: micrograms per liter, mg/l: milligrams per liter
10. NTU: Nephelometric Turbidity Units.
11. Methods are EPA unless otherwise specified.
12. Organic qualifier codes: (J): estimated result; (U): not detected above associated value
13. Inorganic qualifier codes: (U): not detected above associated value
14. Bold values exceed one or more of the RSRs

TABLE I
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
LONG-TERM MONITORING PLAN
UCONN LANDFILL
STORRS, CONNECTICUT

SAMPLE DESIGNATION	METHOD	RSR GAGPC	RSR SWPC	RSR RVC[4]	38-MWRD	41-MWRD	202-SRD	TB-111819
SAMPLING DATE					11/18/2019	11/18/2019	11/18/2019	11/18/2019
COMMENTS					Active	Active	Active	Trip Blank
WELL DEPTH (ft.):					Unknown	Unknown	Unknown	
LOCATION:					Meadowood Road	Meadowood Road	Separatist Road	
Volatile Organic Compounds (ug/l)	**524.2**	**(ug/l)**	**(ug/l)**	**(ug/l)**				
1,1-Dichloroethane		**70**	**NE**	**34,600**	ND<0.50	ND<0.50	ND<0.50	ND<0.50
1,2,4-Trichlorobenzene		**70**	**NE**	**NE**	ND<0.50	ND<0.50	ND<0.50	ND<0.50
1,2-Dichlorobenzene		**600**	**170,000**	**30,500**	ND<0.50	ND<0.50	ND<0.50	ND<0.50
1,2-Dichloroethane		**1**	**2,970**	**21**	ND<0.50	ND<0.50	ND<0.50	ND<0.50
1,4-Dichlorobenzene		**75**	**26,000**	**24,200**	ND<0.50	ND<0.50	ND<0.50	ND<0.50
Acetone		**700**	**NE**	**50,000**	ND<2.5	ND<2.5	ND<2.5	ND<2.5
Benzene		**1**	**710**	**215**	ND<0.50	ND<0.50	ND<0.50	ND<0.50
Bromobenzene		**NE**	**NE**	**NE**	ND<0.50	ND<0.50	ND<0.50	ND<0.50
Carbon disulfide		**700**	**NE**	**NE**	ND<0.50	ND<0.50	ND<0.50	ND<0.50
Chlorobenzene		**100**	**420,000**	**1,800**	ND<0.50	ND<0.50	ND<0.50	ND<0.50
Chloroform		**6**	**14,100**	**287**	ND<0.50	ND<0.50	ND<0.50	ND<0.50
cis-1,2-Dichloroethene		**70**	**NE**	**NE**	ND<0.50	ND<0.50	ND<0.50	ND<0.50
Tetrachloroethene		**5**	**88**	**1500**	ND<0.50	ND<0.50	ND<0.50	ND<0.50
Tetrahydrofuran (THF)		**4**	**9,600**	**250**	ND<2.5	ND<2.5	ND<2.5	ND<5.0
Trichloroethene		**5**	**2,340**	**219**	ND<0.50	ND<0.50	ND<0.50	ND<0.50
Trichlorotrifluoroethane		**NE**	**NE**	**NE**	ND<0.50	ND<0.50	ND<0.50	ND<0.50
Vinyl chloride		**2**	**15,750**	**2**	ND<0.50	ND<0.50	ND<0.50	ND<0.50
Total Metals (mg/l)								
Aluminum	200.7/6010	**NE**	**NE**	**NE**	0.025	ND<0.020	0.029	--
Barium	6010/E200.7	**1**	**NE**	**NE**	0.014	ND<0.002	0.015	--
Beryllium	200.7/6010	**0.004**	**0.004**	**NE**	ND<0.001	ND<0.001	ND<0.001	--
Calcium	200.7/6010	**NE**	**NE**	**NE**	41.6	17.1	40.4	--
Chromium, total	P.E.L.	**50**	**NE**	**NE**	ND<0.001	ND<0.001	0.001	--
Chromium, trivalent	200.7/6010	**NE**	**NE**	**NE**	ND<0.001	ND<0.001	0.001	--
Copper	6010/E200.7	**1.3**	**0.048**	**NE**	ND<0.005	ND<0.005	0.02	--
Iron	6010/E200.7	**NE**	**NE**	**NE**	0.197	0.246	0.026	--
Lead	7421/S3113B	**0.015**	**0.013**	**NE**	ND<0.002	ND<0.002	ND<0.002	--
Magnesium	200.7/6010	**NE**	**NE**	**NE**	8.22	3.52	10.6	--
Manganese	200.7/6010	**NE**	**NE**	**NE**	0.42	0.119	ND<0.001	--
Nickel	200.7/6010	**0.1**	**0.88**	**NE**	ND<0.001	ND<0.001	ND<0.001	--
Potassium	6010/E200.7	**NE**	**NE**	**NE**	2.2	1.5	3.9	--
Sodium	200.7/6010	**NE**	**NE**	**NE**	8.53	5.91	8.79	--
Vanadium	200.7/6010	**0.05**	**NE**	**NE**	ND<0.002	ND<0.002	ND<0.002	--
Zinc	200.7/6010	**5**	**0.123**	**NE**	ND<0.004	ND<0.004	0.007	--

TABLE I
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LONG-TERM MONITORING PLAN
UCONN LANDFILL
STORRS, CONNECTICUT

SAMPLE DESIGNATION	METHOD	RSR GAGPC	RSR SWPC	RSR RVC[4]	38-MWRD	41-MWRD	202-SRD	TB-111819
SAMPLING DATE					11/18/2019	11/18/2019	11/18/2019	11/18/2019
COMMENTS					Active	Active	Active	Trip Blank
WELL DEPTH (ft.):					Unknown	Unknown	Unknown	
LOCATION:					Meadowood Road	Meadowood Road	Separatist Road	
Other Analyses (mg/l)								
Alkalinity-CaCO3	SM2320B	--	--	--	101	54	64	--
Ammonia as Nitrogen	S4500NH3	--	--	--	0.07	ND<0.05	ND<0.05	--
B.O.D./5 day	SM5210B	--	--	--	ND<4.0	ND<4.0	ND<4.0	--
C.O.D.	SM5220 D	--	--	--	ND<10	ND<10	ND<10	--
Chloride	300.0/9056	--	--	--	26.8	7.9	58.6	--
Hardness (CaCO3)	300.0/9056	--	--	--	138	57.2	145	--
Nitrate as Nitrogen	300.0/9056	--	--	--	ND<0.05	ND<0.05	2.92	--
Nitrite as Nitrogen	E365.2	--	--	--	ND<0.004	ND<0.004	ND<0.004	--
Phosphorus, as P	9010/335.3	--	--	--	0.022	0.014	0.014	--
Sulfate	300.0/9056	--	--	--	19.9	13.3	14.9	--
Tot. Diss. Solids	SM2540C	--	--	--	200	94	270	--
Total Organic Carbon	415.1/SW9060	--	--	--	ND<1.0	ND<1.0	ND<1.0	--
Total Suspended Solids	SM2540D	--	--	--	ND<2.5	ND<1.7	ND<1.7	--
Field Screening Data								
Turbidity (NTU)		--	--	--	0	0	0	--
Conductivity (uS/cm)		--	--	--	368	175	361	--
Dissolved Oxygen (ppm)		--	--	--	6.5	6.2	6.78	--
ORP (mV)		--	--	--	130	83	149	--
pH		--	--	--	5.52	5.97	5.92	--
Temperature (° C)		--	--	--	13.96	13.83	13.54	--

Notes and Abbreviations:
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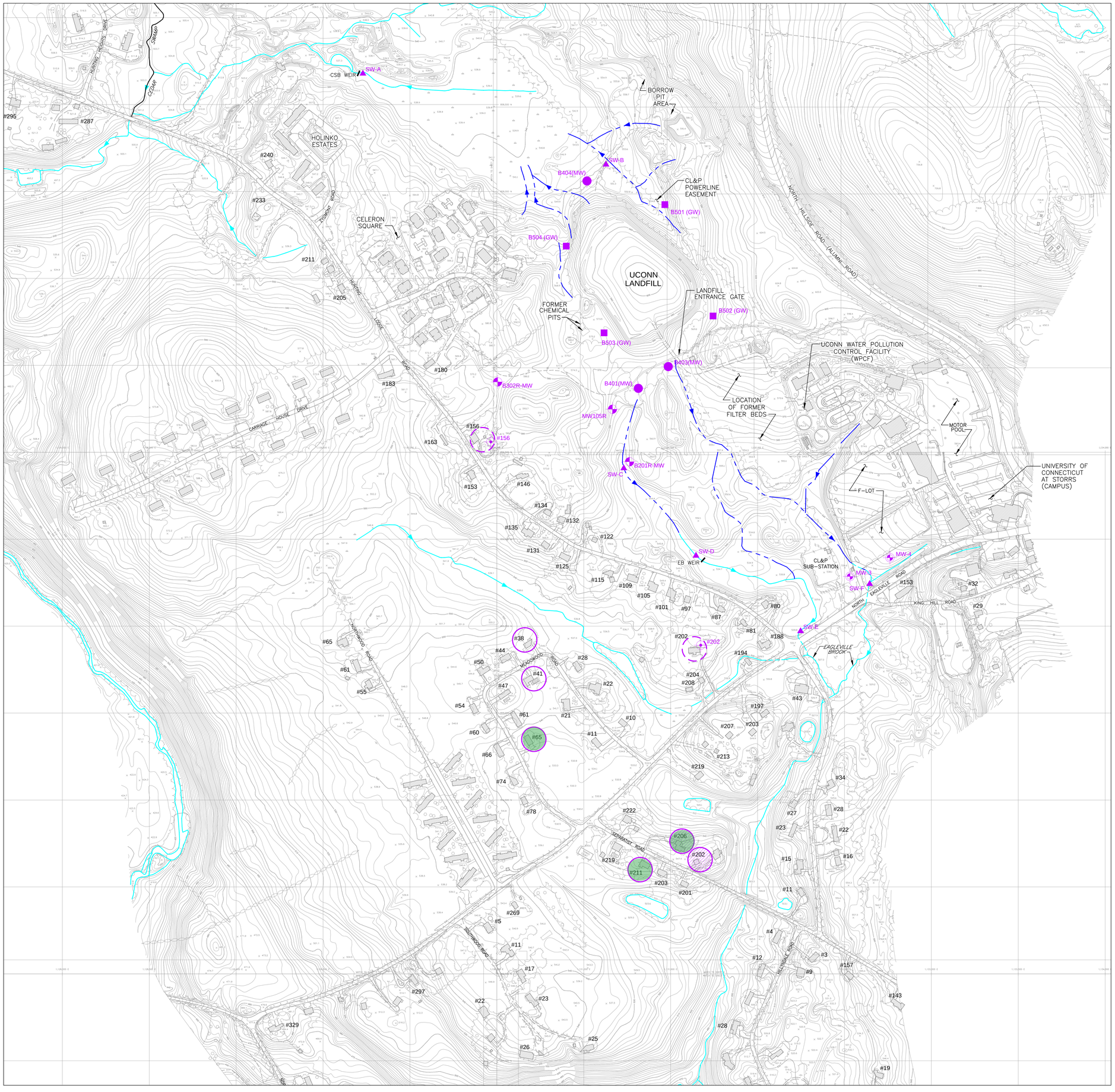
3. RSR SWPC: CTDEP RSR Surface Water Protection Criteria
4. RSR RVC: CTDEP RSR Residential Volatilization Criteria (1996).
5. NE: RSR criteria not established
6. ND: compound not detected above laboratory reporting limits.
7. Blank spaces, "--" or "NA" indicate compound not analyzed
8. uS/cm: microsiemens per centimeter.
9. ug/l: micrograms per liter, mg/l: milligrams per liter
10. NTU: Nephelometric Turbidity Units.
11. Methods are EPA unless otherwise specified.
12. Organic qualifier codes: (J): estimated result; (U): not detected above associated value
13. Inorganic qualifier codes: (U): not detected above associated value
14. Bold values exceed one or more of the RSRs

FIGURE



LEGEND

- #157 — DOMESTIC WELL LOCATION MONITORED AS PART OF BOTH THE INTERIM MONITORING PROGRAM (IMP) AND THE LONG-TERM MONITORING PLAN (LTMP).
- #38 — LOCATION OF ACTIVE DOMESTIC WELL MONITORED AS PART OF THE LTMP.
- #156 — LOCATION OF INACTIVE DOMESTIC WELL MONITORED AS PART OF THE LTMP.
- SW-A — SURFACE WATER SAMPLING LOCATIONS
- MW-105R — LOCATION OF BEDROCK WELL MONITORED AS PART OF THE LTMP. DISCRETE ZONE WELLS WERE INSTALLED IN MW105R AND B201R(MW) IN JUNE 2005.
- B501 (GW) — LOCATION OF GAS MONITORING WELL INSTALLED BY ASSOCIATED BORING CO. IN MARCH 2007 AND MONITORED AS PART OF THE LTMP
- MW-4 — LOCATION OF MONITORING WELL PREVIOUSLY SAMPLED AS PART OF THE IMP. WELL WAS ABANDONED BY NEW ENGLAND BORING CONTRACTORS OF CT, INC. IN SPRING 2005 DUE TO SUBSTAION CONSTRUCTION AND REINSTALLED IN AUGUST 2007 BY ASSOCIATED BORING CO AND WILL BE MONITORED AS PART OF THE LTMP.
- #156 — LOCATION OF UNUSED DOMESTIC WELL TO BE MONITORED AS PART OF THE LTMP.
- B401(MW) — LOCATION OF OVERBURDEN WELL INSTALLED BY ASSOCIATED BORING CO. IN FEBRUARY AND MARCH 2007 AND MONITORED AS PART OF THE LTMP. NOTE: PROPOSED MONITORING WELL B402R(MW) HAS BEEN ELIMINATED.
- INDICATES APPROXIMATE LOCATION OF PERENNIAL STREAM DRAINAGE AND OBSERVED DIRECTION OF FLOW
- INDICATES APPROXIMATE LOCATION OF EPHEMERAL STREAM DRAINAGE AND OBSERVED DIRECTION OF FLOW
- INDICATES GENERAL WETLAND AREA
- POWERLINE POLE
- VEGETATION BOUNDARY
- STONE WALLS
- PERMISSION TO SAMPLE WELL HAS NOT BEEN GRANTED BY THE NEW HOMEOWNER

NOTES

1. BASE PLAN PROVIDED BY EARTH TECH, INC., MIDDLEBOROUGH, MA. AERIAL PHOTOGRAPHY BY ABRAMS SURVEY CORPORATION OF LANSING, MI.
2. ELEVATIONS IN FEET AND REFERENCED TO NORTH AMERICAN VERTICAL DATUM (NAVD) 1988.
3. GENERAL SITE, CULTURAL AND GEOGRAPHIC FEATURES COMPILED FROM THE FOLLOWING SOURCES:

   TOWN OF MANSFIELD, CONNECTICUT PLANNING AND ZONING COMMISSION REPORT ENTITLED "PLAN OF DEVELOPMENT, MANSFIELD, CONNECTICUT," DATED 15 SEPTEMBER 1993.

   MANSFIELD DEPARTMENT OF PUBLIC WORKS - PLAN OF TOWN ROADS, REVISED DATE 21 JANUARY 1998, APPROXIMATE SCALE 1 IN. = 1/2 MILE.

   HALEY & ALDRICH REPORT, ENTITLED "PURCHASING AND CENTRAL WAREHOUSE FACILITY, UNIVERSITY OF CONNECTICUT, STORRS, CONNECTICUT," DATED MAY 1998.

   UNIVERSITY OF CONNECTICUT-OFFICE OF FACILITIES, STORRS CT., "CHEMICAL DISPOSAL PITS PROPOSED SOIL TEST LOCATIONS," PROJECT NO. 260514, DATED NOVEMBER 1985.

   UNIVERSITY OF CONNECTICUT-OFFICE OF FACILITIES, STORRS CT., "CHEMICAL PIT CLOSURE PLAN," PROJECT NO. 700132, DATED MAY 1986.

   CONSULTING ENVIRONMENTAL ENGINEERS, INC. REPORT ENTITLED "FINAL HYDROGEOLOGIC STUDY REPORT, UCONN LANDFILL," DATED JANUARY 1985.

   SITE RECONNAISSANCE CONDUCTED ON 10 AUGUST 1998, AND DURING THE PERIOD 29 APRIL 1999 TO 11 MAY 1999.

   UNITED STATES GEOLOGICAL SURVEY, WATER RESOURCES DIVISION, AND CONNECTICUT DEPARTMENT OF ENVIRONMENTAL PROTECTION FOR LOCATIONS OF DOMESTIC WATER WELLS.

N

0 200 400 600 800
SCALE IN FEET

HALEY ALDRICH

HYDROGEOLOGIC INVESTIGATION
UCONN LANDFILL
STORRS, CONNECTICUT

SAMPLING LOCATIONS
LONG-TERM MONITORING PLAN

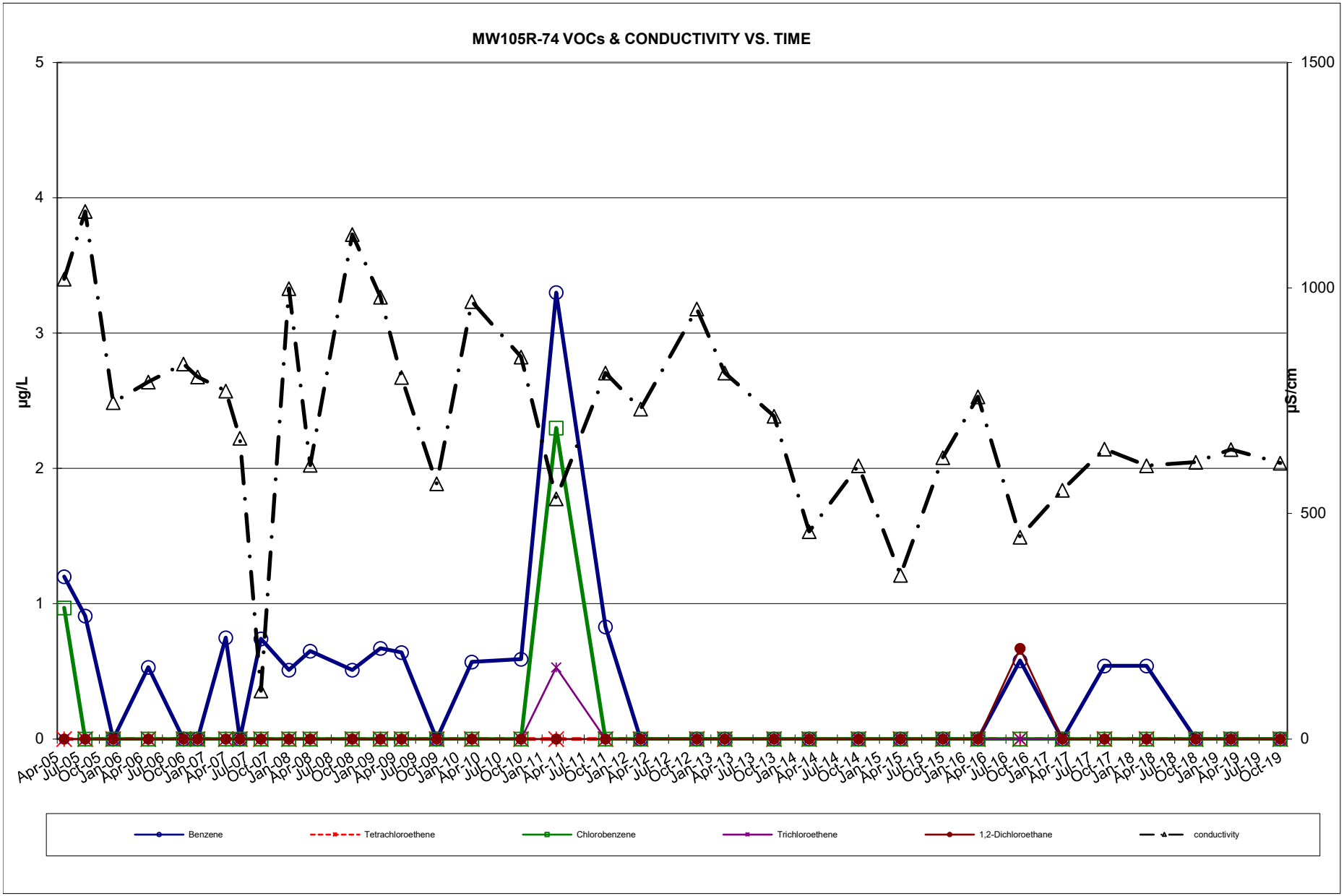
SCALE: AS SHOWN
JANUARY 2020

FIGURE 1

PEREZ MEJIA, KATRINA Printed:5/20/2019 11:57 AM Layout: HA-FIG-E-L
G:\PROJECTS\91221\GLOBAL\CAD\DRAWINGS\91221-689 0025 LTMP.DWG

APPENDIX A

VOC Concentrations & Conductivity vs. Time Plots


MW105R-74 VOCs & CONDUCTIVITY VS. TIME
µg/L
µS/cm
5
4
3
2
1
0
1500
1000
500
0
Apr-05
Jul-05
Oct-05
Jan-06
Apr-06
Jul-06
Oct-06
Jan-07
Apr-07
Jul-07
Oct-07
Jan-08
Apr-08
Jul-08
Oct-08
Jan-09
Apr-09
Jul-09
Oct-09
Jan-10
Apr-10
Jul-10
Oct-10
Jan-11
Apr-11
Jul-11
Oct-11
Jan-12
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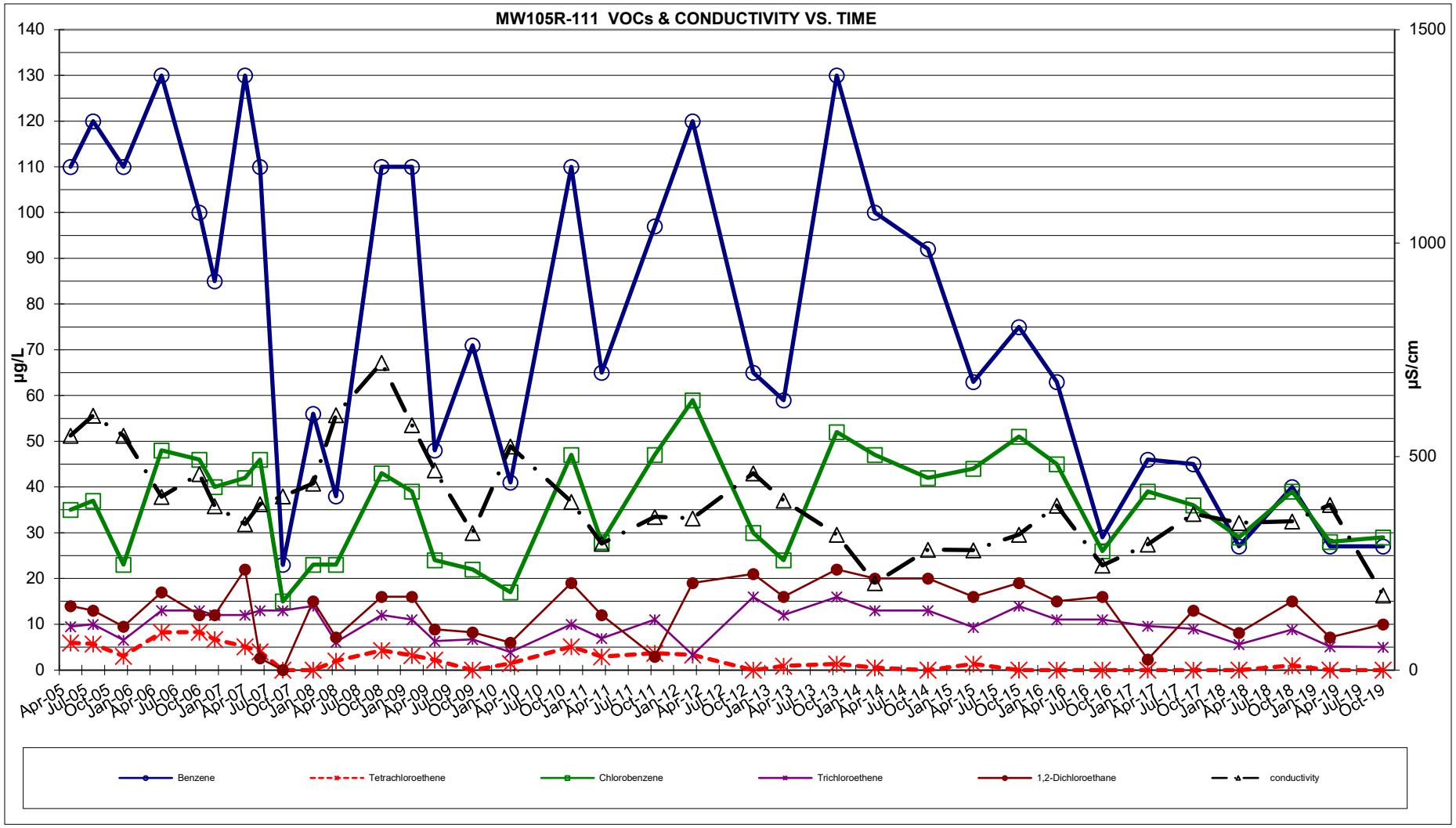
Apr-14
Jul-14
Oct-14
Jan-15
Apr-15
Jul-15
Oct-15
Jan-16
Apr-16
Jul-16
Oct-16
Jan-17
Apr-17
Jul-17
Oct-17
Jan-18
Apr-18
Jul-18
Oct-18
Jan-19
Apr-19
Jul-19
Oct-19
Benzene
Tetrachloroethene
Chlorobenzene
Trichloroethene
1,2-Dichloroethane
conductivity


MW105R-111 VOCs & CONDUCTIVITY VS. TIME
µg/L
µS/cm
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
1500
1000
500
0
Apr-05
Jul-05
Oct-05
Jan-06
Apr-06
Jul-06
Oct-06
Jan-07
Apr-07
Jul-07
Oct-07
Jan-08
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Jul-08
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Jan-18
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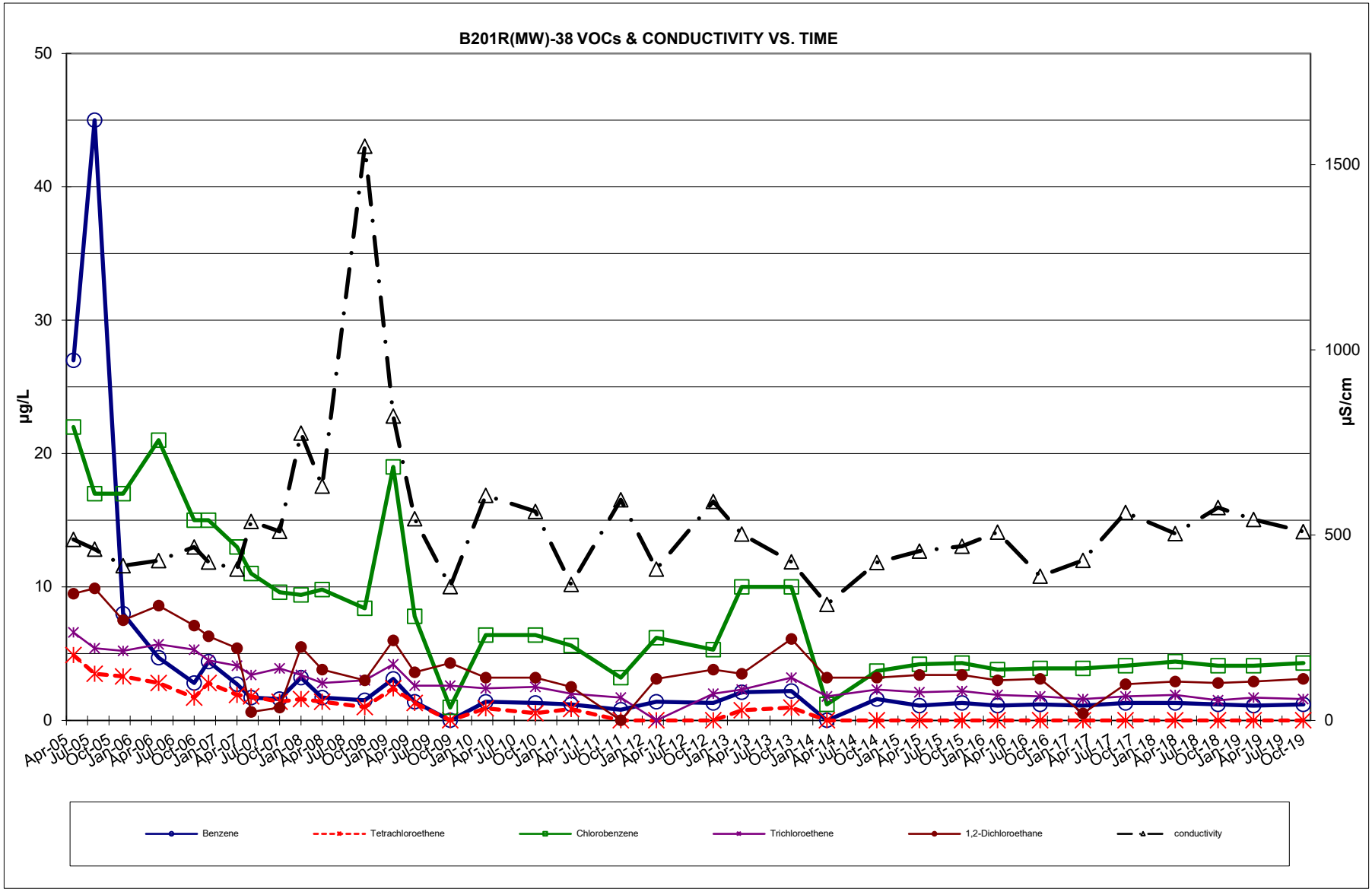
Jul-18
Oct-18
Jan-19
Apr-19
Jul-19
Oct-19
Benzene
Tetrachloroethene
Chlorobenzene
Trichloroethene
1,2-Dichloroethane
conductivity


B201R(MW)-38 VOCs & CONDUCTIVITY VS. TIME
µg/L
µS/cm
50
40
30
20
10
0
1500
1000
500
0
Apr-05
Jul-05
Oct-05
Jan-06
Apr-06
Jul-06
Oct-06
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Oct-18
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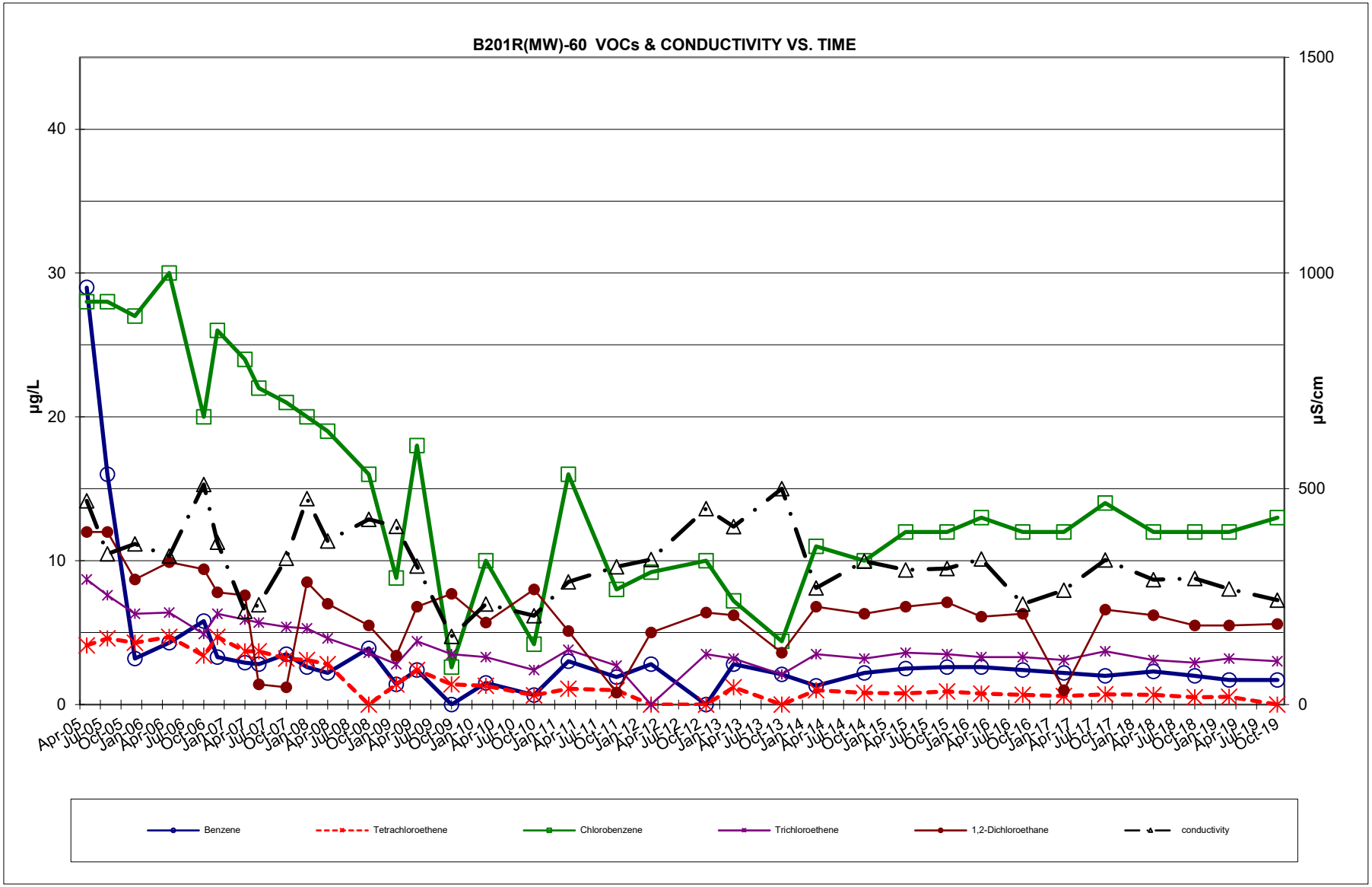
Jul-19
Oct-19
Benzene
Tetrachloroethene
Chlorobenzene
Trichloroethene
1,2-Dichloroethane
conductivity


B201R(MW)-60 VOCs & CONDUCTIVITY VS. TIME
µg/L
µS/cm
0
10
20
30
40
0
500
1000
1500
Apr-05
Jul-05
Oct-05
Jan-06
Apr-06
Jul-06
Oct-06
Jan-07
Apr-07
Jul-07
Oct-07
Jan-08
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Oct-18
Jan-19
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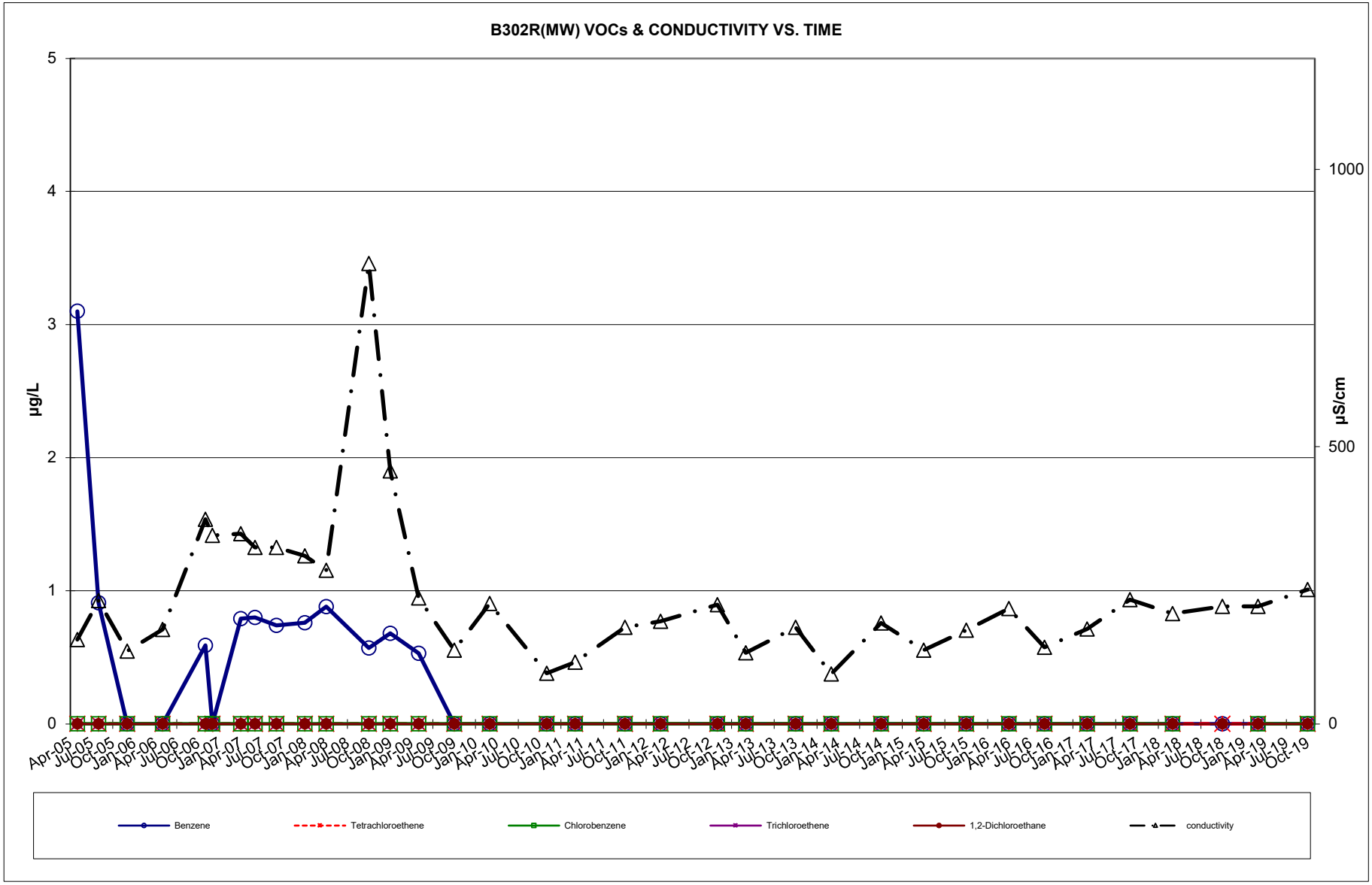
Oct-19
Benzene
Tetrachloroethene
Chlorobenzene
Trichloroethene
1,2-Dichloroethane
conductivity


B302R(MW) VOCs & CONDUCTIVITY VS. TIME
µg/L
µS/cm
5
4
3
2
1
0
1000
500
0
Apr-05
Jul-05
Oct-05
Jan-06
Apr-06
Jul-06
Oct-06
Jan-07
Apr-07
Jul-07
Oct-07
Jan-08
Apr-08
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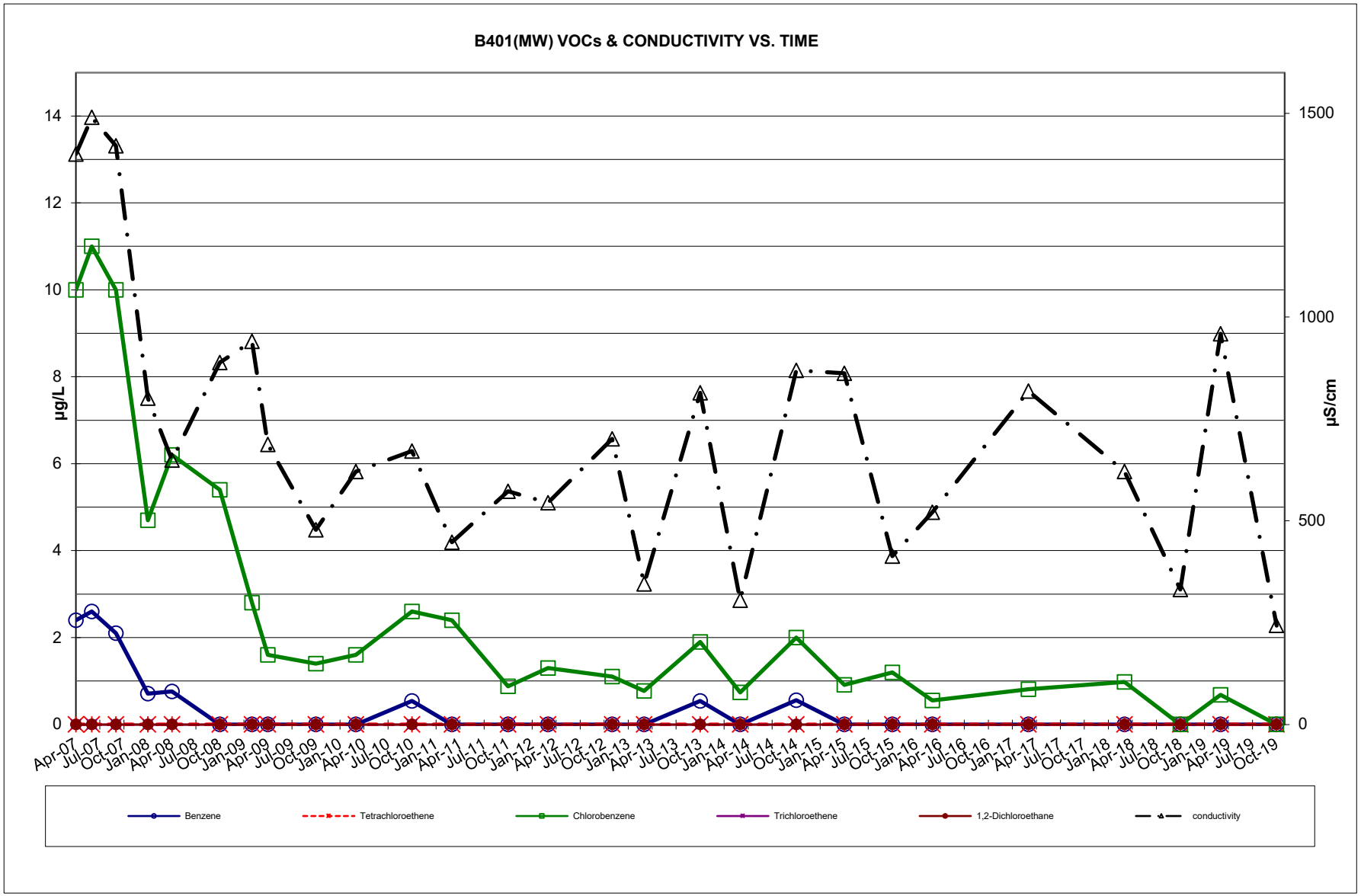
Oct-18
Jan-19
Apr-19
Jul-19
Oct-19
Benzene
Tetrachloroethene
Chlorobenzene
Trichloroethene
1,2-Dichloroethane
conductivity


B401(MW) VOCs & CONDUCTIVITY VS. TIME
µg/L
µS/cm
0
2
4
6
8
10
12
14
0
500
1000
1500
Apr-07
Jul-07
Oct-07
Jan-08
Apr-08
Jul-08
Oct-08
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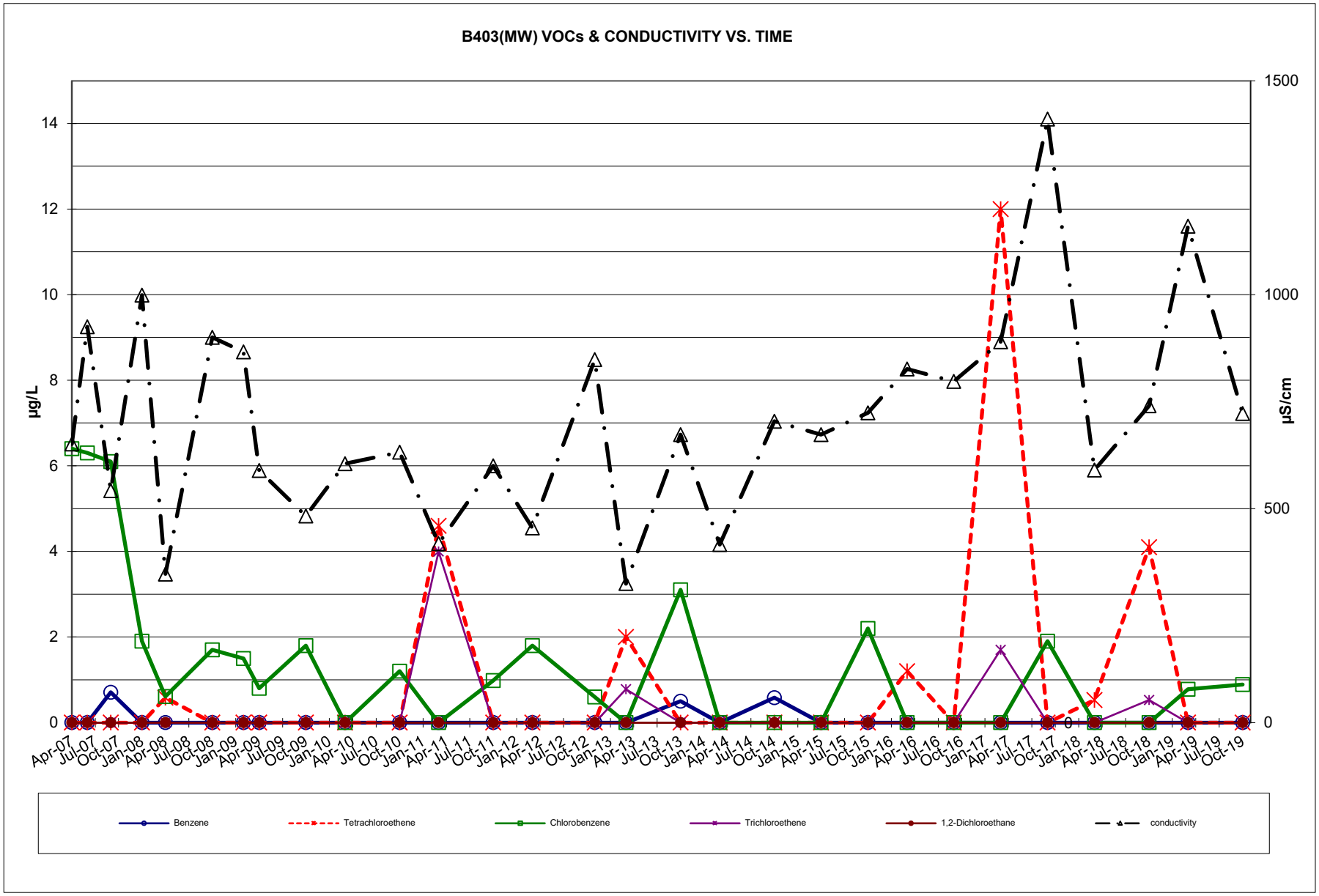
Oct-18
Jan-19
Apr-19
Jul-19
Oct-19
Benzene
Tetrachloroethene
Chlorobenzene
Trichloroethene
1,2-Dichloroethane
conductivity


B403(MW) VOCs & CONDUCTIVITY VS. TIME
µg/L
µS/cm
0
2
4
6
8
10
12
14
0
500
1000
1500
Apr-07
Jul-07
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Jan-19
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Jul-19
Oct-19
Benzene
Tetrachloroethene
Chlorobenzene
Trichloroethene
1,2-Dichloroethane
conductivity

HALEY ALDRICH

Letter of Transmittal

Haley & Aldrich, Inc.
100 Corporate Place
Suite 105
Rocky Hill, CT 06067

Date	12 February 2020
File Number	91221-988
From	Elida S. Danaher

To	State of Connecticut Department of Energy and Environmental Protection Bureau of Water Protection and Land Reuse 79 Elm Street Hartford, Connecticut 06106-5127
Attention	MaryAnne Danyluk
Copy to	B. Toal, CTDPH J. Carrington, Mansfield Interim Town Manager (Electronic Copy) R. Miller, EHHD (Electronic Copy) L. Painter, Mansfield Town Planner (Electronic Copy) S. Jordan, UConn (Certification Letter Only) P. Ferri, UConn (Electronic Copy)
Subject	UConn Landfill Long Term Monitoring Plan Report

Copies	Date	Description
1 each	January 2020	Long Term Monitoring Plan Report Fall Semi-Annual Sampling Event Round #31

Transmitted via ☐ First class mail ☒ Overnight express ☐ Hand delivery ☐ Other

Remarks

Eastern Connecticut Conservation District

238 West Town Street, Norwich, CT. 06360 860-319-8806
139 Wolf Den Road, Brooklyn, CT. 06234 860-774-9600 x13

Board of Directors

William Jorsz, Chair
Anne Roberts-Pierson, Vice-Chair
Warren Swanson, Treasurer
Leonora Szruba, Secretary

Susan Manning
Sherwood Raymond
Charlie Hobbs
Matt Peckham
Cathy Osten
Paul Shaffer
Jimmy Moran

Alternate Directors
Pete Merrill
Walter Tabor
Gwen Haaland

Staff

Dan Mullins, Executive Director
Judy Rondeau, Assistant Director
Kate Johnson, Office Manager
Francine Brodeur, Office Manager
Jean Pillo, Watershed Conservation Project Manager
Maura Robie, Conservation Technician

2018-2019 ANNUAL REPORT

July 1, 2018 – June 30, 2019

Much of ECCD's work begins with the development of watershed plans.

Watershed plans provide a roadmap for the conservation district to follow to improve water quality in local waterbodies by educating the public, and by affecting changes in land-use, practices and habits of residents living within a watershed.

Typically, when ECCD develops a watershed plan, it follows the format established by the US Environmental Protection Agency. From ECCD's perspective, one of the most important elements of the EPA watershed planning process is to build partnerships. ECCD has worked diligently over the years to develop and maintain strong, mutually beneficial, partnerships. Currently, the District is in the process of strengthening existing partnerships while developing additional partnerships to further our mission and the missions of our partners.

An important initiative being undertaken by ECCD staff is to develop sustainable watershed stakeholder groups The Niantic River Watershed Committee (NRWC) serves as a shining example of such a stakeholder group. Having created the NRWC in 2008, ECCD staff have spearheaded the organization to become the premier authority on the Niantic River and its tributaries. Populated by local residents, environmental professionals, industry representatives, members of local shellfish commissions and representatives from all four towns in the watershed, NRWC educates the public about the Niantic River, conducts water quality testing of the Niantic River and its tributaries, raises money to implement projects that prevent stormwater pollution from entering the river and improve the River's water quality as marine habitat for shellfishing, recreation and tourism. It is a model organization that ECCD aspires to emulate, as District staff work to expand our capacity to address environmental issues in Eastern Connecticut.

Local involvement in watershed stakeholder organizations has the potential to initiate a sea-change in environmental awareness and activism, and in our collective impacts on local waterbodies and Long Island Sound. Following the lead of the Niantic River Watershed Committee, ECCD staff has initiated the creation of two more watershed stakeholder groups to implement projects and initiatives from watershed plans. The Little River Healthy Watershed Coalition is working to improve water quality in the Little River, its tributaries and Roseland Lake for the purpose of improving the drinking water supply for the Town of Putnam and making Roseland Lake more hospitable to recreational uses. The Baker Cove Watershed Committee, having formed recently, will work to improve the water quality of Baker Cove for shellfish habitat and recreational enjoyment.

Educate the public, conduct water quality testing, implement projects to reduce stormwater pollution and raise funding, improve water quality for drinking, protect wildlife habitat, and restore and protect waterbodies for recreation, tourism and economic sustainability of our shared natural resources – these are the activities and outcomes in which we hope to involve the residents of Eastern Connecticut. We encourage all of you to become involved, support a local watershed organization and get your hands dirty to help your neighbors clean our waters. Nothing breeds success like success; join us and be part of it.

William A. Jorsz,
Chair

ECCD Provides Technical Assistance to District Towns & Residents

ECCD provided recommendations including a low berm and rubber belt deflector to the Town of Woodstock as erosion control measures at the Town Beach at Muddy Pond.

ECCD initiated a Little River Healthy Watershed Collaborative to focus on implementing the 2018 Roseland Lake Management Plan.

ECCD responded to a wide variety of inquiries from District municipalities and residents, providing technical assistance on topics such as:

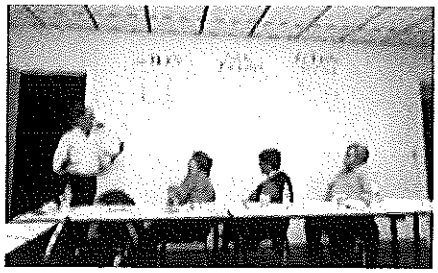
Nonpoint source pollution, farmland restoration, soil health, MS4 permit support, coastal resiliency, stormwater management and retrofits, stormwater sampling, riparian buffers and buffer plants, GIS assistance, agricultural best management practices, low-impact development, green infrastructure, conservation planning, open space planning and management, native plants, pollinator plants, stormwater BMP monitoring & maintenance, erosion and sediment control, pond management, water quality monitoring, funding opportunities, grant writing support, legislative and policy updates, invasive species information, and local, state and federal permitting questions.

We would like to thank the following towns for their 2018-19 contributions to ECCD which help to support regional conservation throughout eastern Connecticut.

Ashford, Brooklyn, Canterbury, Columbia, Eastford, Franklin, Hampton, Ledyard, Lisbon, Mansfield, Pomfret, Preston, Putnam, Sprague, Sterling, Thompson, Voluntown, Waterford and Woodstock.

ECCD Provides Natural Resource Conservation Information & Education

ECCD Strategic Planning



With funding provided by the Community Foundation of Eastern CT, the ECCD Board and staff undertook a series of strategic planning sessions. The Strategic Plan, will guide District activities over the next 10 years.

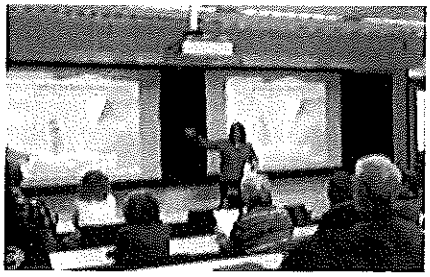
TRBP Floating Workshop XIX

This year's Thames River Basin Partnership Floating Workshop featured the Yantic River and CT DEEP Trout Management Program.The field event included fly fishing lessons by the Thames Valley Chapter of Trout Unlimited.

Rain Barrel/Water Conservation Festival

ECCD, in partnership with Boy Scout Troop 240 of East Lyme and Perennial Harmony, conducted a Rain Barrel and Water Conservation Festival. The event attracted nearly 50 participants and 45 rain barrels were distributed.

Pollinator Workshops

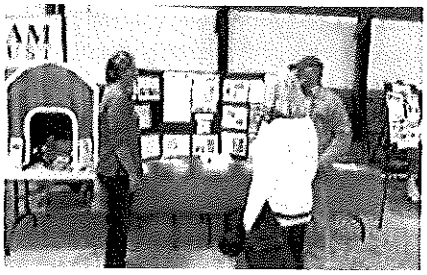


ECCD held two Pollinator Workshops in March. Emily May, of the Xerces Society, taught about native bees and reasons for decline. John LoRusso, Master Gardener Coordinator, gave a valuable overview about pollinator insects and plants.

Mansfield Rain Garden Workshop

ECCD partnered with the Mansfield Recreation Department to conduct a rain garden workshop and install a rain garden at the Town-owned Bicentennial Pond Park.

Celebrating Agriculture!



ECCD tabled a display of our projects at the annual Celebrating Agriculture Day at the Woodstock Fair Grounds.

♥ ♥ ♥ ECCD wishes to express its respectful appreciation for donations ♥ ♥ ♥ fondly made on behalf of others in the name of conservation.

Alexander Lake Conservation & Rentals
In Memory of John L. Leader, Jr.

Donna Ayers-LaPointe
In Memory of James L. Ayers

Nick Brown
In Honor of Mike Chapel

Scott & Denise Gravatt
In Honor of Kate's Last Hurrah

Mr. & Mrs. Donald Hynson
In Memory of Edward P. Storti Senior

Beverly Johnson
In Memory of Richard S. Fito!

Kate Johnson
In Memory of Eddie & Margie Hnatiuk

Chip Lamb
In Honor of Susan Lamb

Lauren Laughlin
In Memory of Anita Guenin

Pete Merrill
In Memory of Pauline S. Merrill

Rhoda Micocci
In Memory of Antonio A. Micocci

Louisa Miner
In Memory of J. Morgan Miner, Jr.

Patricia Peck
In Memory of Howard Peck

John & Elaine Siena
In Memory of Leo Tucker

Ruth Stedman
In Honor of "Great" Grandson Cayden LeBlanc

Gary Sudol
In Memory of Stanley & Jane Sudol

Warren & Karen Swanson
In Memory of Lori Swanson

Agricultural Projects

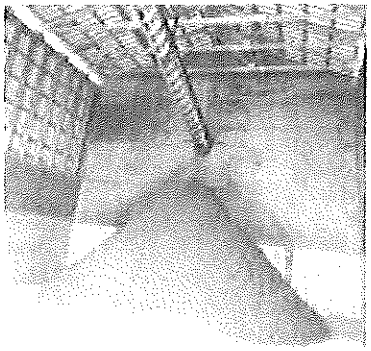
Fairvue Farm Agricultural Waste Management Practices Project [1] - To improve water quality in the Little River, which provides drinking water to Putnam, ECCD and Fairvue Farm have installed a suite of agricultural waste management practices. These practices include subsurface drainage, silage leachate collection, a waste transfer system with concrete receiving tanks and a liquid-solid separator to remove liquids from manure and produce bedding for Fairvue's herd of dairy cows.

Valleyside Farm Bioreactor Monitoring Project [1] - In 2017, ECCD installed a woodchip bioreactor to intercept tile drainage from an agricultural field as a nutrient reduction conservation practice. In 2018, ECCD was awarded funding to monitor the inflow and outflow of the reactor, to assess whether this is a viable practice in the Connecticut climate for nutrient and pathogen reduction. A year of water sampling at the inlet and outlet of the Woodchip Bioreactor was completed in mid-June. The results demonstrated a consistent and significant reduction in nitrogen from the tile drainage system under the farm field.

Conservation Innovation Grant (CIG) - ECCD completed three years of collecting and analyzing runoff from the edge of corn fields using two different runoff collection methods. We concluded that passive stormwater samplers were an effective, if not better, means of collecting edge of field runoff samples compared to the technically complicated and significantly more expensive pump systems required by the standard USDA method, making passive sampling more economically feasible for agricultural producers to monitor nutrient loss from their fields. Using nutrient test strips for analyzing the samples was adequate for nitrogen compounds, but not successful for phosphorus compounds.

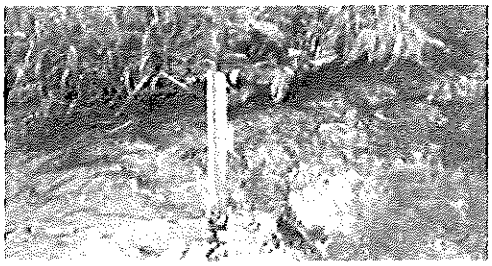
Thames River Basin Regional Conservation Partnership Program [2] – Under the RCPP, ECCD is assisting The Last Green Valley by providing technical assistance to engage agricultural producers in the Thames River Basin and to support them in implementing conservation practices that will improve soil health and water quality. In 2018, ECCD enlisted a Baltic farm to plant 266 acres of a 5-species mixed cover crop. ECCD is in the process of collecting samples at 2 edge-of field stormwater runoff sites located in Baltic and Bozrah which will provide valuable data to the farmer on any losses of nitrate-nitrogen and soluble phosphorous.

PATH to Reduce Pathogens in Agriculture Runoff [3] - Under the Regional Conservation Partnership Program, *PATH to Reduce Pathogens in CT Agricultural Runoff*, spearheaded by The University of CT, ECCD is assisting UConn by providing technical assistance to producers in Eastern CT to reduce the discharge into our waterways of harmful pathogens contained in agricultural runoff. ECCD has been conducting water quality monitoring for the project and assessing potential sites to implement conservation practices to reduce pathogens.



Bedding produced from manure solids by the new liquid-solids separator at Fairvue Farms in Woodstock.

Water samples collected during edge of field monitoring contain varying amounts of sediment transported by stormwater runoff. These samples can contain high levels of nutrients, including phosphorus, which adsorbs to the soil particles.



A passive sampler is used to collect water quality data related to stormwater runoff from a stream in eastern CT.

[1] Funded in part by CT DEEP through a CWA §319 NPS Program grant

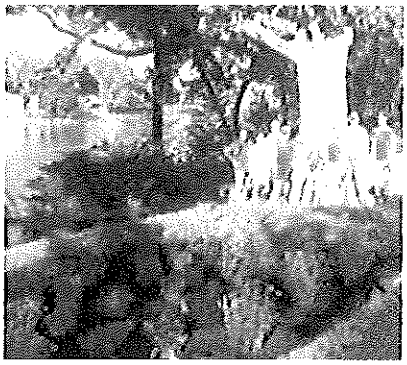
[2] Funded in part by CT NRCS through USDA RCPP grant

[3] Funded in part by a National Fish and Wildlife Foundation Long Island Sound Futures Fund grant with additional funding provided by EPA

[4] Funded by the Community Foundation of Eastern Connecticut

Water Quality & Habitat Improvement Projects

100 Rain Barrels & 100 Rain Gardens [3] – In 2019, ECCD continued to install rain gardens and distribute rain barrels across eastern CT. Over the past year, ECCD installed 33 rain gardens and gave away 140 rain barrels. The Boys Scouts of America, River Network and Coca-Cola Company have been important partners, providing planting assistance, rain barrel conversion kits and syrup drums for the project.



Scouts from East Lyme Boy Scout Troop 240 pose by the newly installed rain garden at Pine Grove, overlooking Smith Cove and the Niantic River.

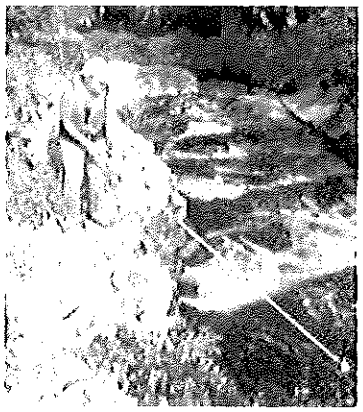
Baker Cove Non-migratory Canada Geese Outreach, Education & Control Project [1] - ECCD and multiple partners are completing a 2-year non-migratory Canada geese management project in Groton. Over the course of multiple stakeholder meetings, project partners conducted public education workshops, identified Canada goose use areas through surveys, and created a management matrix for local areas experiencing non-migratory Canada geese issues. An important outcome of the project is the creation of a Baker Cove watershed committee to spearhead implementation of the Baker Cove Abbreviated Watershed-Based Plan.

Latimer Brook Stormwater Infiltration Project [1] - ECCD, the East Lyme DPW and School Department partnered to install drywells under a parking lot at East Lyme High School. The drywells will infiltrate approximately 1.8 million gallons of stormwater per year. This stormwater, containing a varied assortment of non-point source (NPS) pollution, previously discharged untreated stormwater to Latimer Brook, the primary tributary to the Niantic River.

A section of a drywell is lowered into place at a parking lot at East Lyme High School.

Anguilla Brook Bacteria Trackdown & Watershed Plan [1] – With the assistance of the Town of Stonington and local volunteers, ECCD launched the Anguilla Brook bacteria trackdown during the winter of 2019. ECCD and local volunteers will conduct bacteria sampling and riparian corridor assessments in Anguilla Brook and other tributaries to Wequetequock Cove in order to develop a watershed management plan for the Anguilla Brook watershed.

Eastern Connecticut Stormwater Collaborative [4] – In the fall of 2018, ECCD initiated the Southeastern Connecticut Stormwater Collaborative. The purpose of the Collaborative is to provide support, tools and resources for municipal DPWs and other stormwater managers in order to improve the quality of water in waterbodies that receive discharge from municipal stormdrain systems and comply with the requirements of the NPDES Small Municipal Separate Storm Sewer Systems (MS4) permit.



A water quality monitoring volunteer collects a water sample for bacterial analysis from Anguilla Brook.

Shewville Dam Fishway Design Project [3] - ECCD received funding to design a fishway over the Shewville Dam in Ledyard, CT. Past work in the Poquetanuck Brook system by ECCD, in collaboration with CTDEEP, has restored 3.1 miles of stream habitat through fishway construction and dam breaching. This project will design a steep-pass fishway at the Shewville dam, which will open historic habitat in Avery and Amos Lakes.

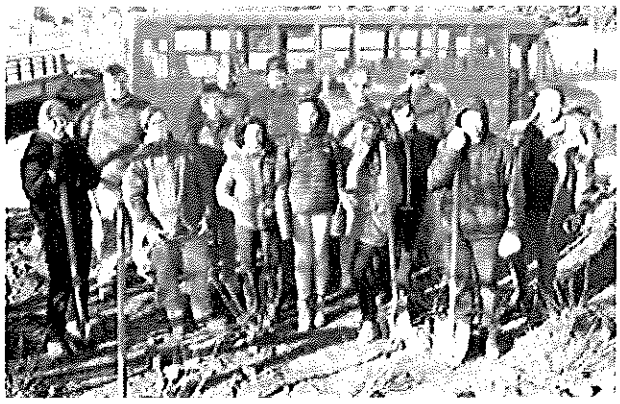
Little River Healthy Watershed Collaborative – Initiated in the fall of 2018, the Little River Healthy Watershed Collaborative will focus on implementation of recommendations in the 2009 Muddy Brook and Little River Water Quality Improvement Plan and the 2018 Roseland Lake Management Plan. The collaborative sponsored a Certified Lake Manager to review all the water quality data and make a recommendation for the best in-lake Phosphorus control method in Roseland Lake. Working with the Collaborative, ECCD is seeking funding to implement this recommendation.

Collaborations/Partnerships

Partnerships with government agencies and other non-profit organizations are important to ECCD to achieve our mission. ECCD is represented on the Board of the Connecticut Resource Conservation and Development Area, the Thames River Basin Partnership, the Celebrating Agriculture! Steering Committee, The Last Green Valley Water Advisory Committee, Connecticut Envirothon, the Niantic River Nitrogen Work Group and Willimantic Whitewater Partnership. We also partner with the USDA Natural Resources Conservation Service, the CT Department of Energy and Environmental Protection, US Environmental Protection Agency, Department of Public Health and local health districts, UConn Extension System, CLEAR, College of Agriculture, Health and Natural Resources (CANR), Connecticut Audubon Society, Boy Scouts of America, Girl Scouts of America and others. Partnering with other conservation organizations provides a positive synergy to meet our conservation goals.

In addition to our many partnerships, ECCD provides support services to other conservation organizations, including administrative and financial management services, and grant application submittal and management.

Ella T. Grasso Technical High School



A 450-sf rain garden was installed at the Groton Human Services Building located next to the Poquonnock River with assistance from students from Ella T. Grasso Regional Vocational Technical High School. Excavation, topsoil, and mulch were donated by the Town of Groton Public Works, Roads & Streets and Parks & Recreation Departments.

H. H. Ellis Technical High School

Students from H.H. Ellis Technical High School installed a rain garden on Main Street in Danielson, CT. This rain garden will infiltrate stormwater from nearby impervious surfaces, including rooftops and roadways, while beautifying this downtown public space.

We extend our thanks to the following supporters of conservation for their generous assistance & outreach!

- ✧ 2018-19 Water Quality Monitoring Volunteers
- ✧ 2019 Plant Sale Volunteers
- ✧ Andrew Tate Memorial Fund
- ✧ The CT Audubon Society
- ✧ CT Dept. of Energy & Environmental Protection
- ✧ Green Team of Frito Lay-Pepsico
- ✧ The Town of Lisbon
- ✧ Ocean State Job Lot
- ✧ Retired Senior Volunteers
- ✧ Plainfield Conservation Commission
- ✧ The Last Green Valley, Inc.
- ✧ UConn Extension System
- ✧ USDA Natural Resources Conservation Service
- ✧ Windham County Agricultural Society

The Eastern Connecticut Conservation District wishes to extend our sincere appreciation to all of our donors listed below during 2018-19. Your generosity and cooperative spirit greatly support our efforts in soil & water conservation throughout eastern Connecticut. Thank you.

Dr. Sultan & Ann Ahamed
Robert Alling
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Derek Andrews
Brunilda Aponte
Donna Ayers-LaPointe
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www.ConserveCT.org/eastern

District Goals

- Provide municipalities, farmers, residents and businesses of the District with technical assistance to promote responsible use of natural resources.
- Conduct projects and provide services to protect and improve natural resource and watershed health.
- Provide natural resource conservation information and education.
- Provide support services to CT DEEP for the Stormwater Construction General Permit.
- Collaborate with and provide support services to other conservation organizations.
- Provide efficient and effective District administration.

Statewide Vision:

Connecticut's five Conservation Districts shall serve as leading environmental organizations in Connecticut.

District Vision:

Provide technical assistance and environmental education to promote sound natural resource management utilizing a watershed approach.

Eastern Connecticut
Conservation District
238 West Town Street
Norwich, CT 06360

Joshua's Trust News

Protecting Land and Preserving Heritage. Forever.

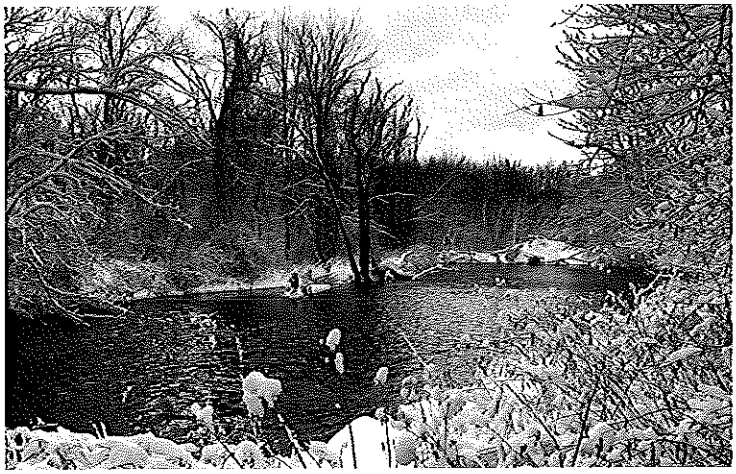
Published quarterly by Joshua's Tract Conservation and Historic Trust ***www.joshuastrust.org***

GOING FOR THE BIG LEAGUES

by Kailyn Murphy

Our newest property, Schmid Overlook, is not just a beautiful property along the Willimantic River, it actually holds a little bit of family history for our board member and stewardship chair, Ann Dunnack and her husband, Scott. The Dunnack family homestead, situated on Route 32 in Mansfield, was lovingly nicknamed "The Ridges." The family consisted of 11 children, three girls and eight boys. The boys loved to play outside and in particular they loved to play baseball, but being just one boy short of a team they recruited a neighbor whom they called "Dope" to join them. These boys played baseball wherever they could. Willimantic, Windham High School, and Twilight Leagues. Their team was of course called "The Ridges."

The boys grew up but kept playing baseball and after World War II, four of the brothers were drafted to play AAA ball. Eventually, all the brothers came back home to the area and started to play again but needed a field. The Coutu family lived across the street and owned what is now Schmid Overlook. They allowed the brothers to build themselves a baseball diamond, which the Dunnack brothers built with nothing but muscle and a desire to play ball. Ann Dunnack's husband, Scott, remembers sitting on the sand dunes with his cousins watching his dad and uncles play.



Scott with his father, Jerry.

Today, the field is gone, but the property will become a place of community activity once again. Joshua's Trust has plans to install a loop trail around the property, complete with a bird blind for birders and a bench for those who like to simply sit and enjoy nature. Additionally, there will be a place to drop in kayaks and canoes and the property will be open for fishing. The Trust is excited to create a place where families can make their own memories just as the Dunnacks did decades ago.

Pictured above: Four of the Dunnack boys from a newspaper clipping. Pictured at left: The current view of the river from Schmid Overlook.

JOSHUA'S TRUST NEWS

JOSHUA'S TRUST

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administration@joshuastrust.org
www.joshuastrust.org

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Office hours: Tues. Thurs. noon- 5 p.m.
Phone: 860-429-9023

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The accreditation seal recognizes land conservation organizations that meet national standards for excellence, uphold the public trust and ensure that conservation efforts are permanent.

THANKFUL THOUGHTS

by Paul Pribula

Invasives at Skungamaug Meadows

We're just past the Thanksgiving Day holiday, but I've found myself still thinking about a lot of the things for which I'm thankful. A fair amount has been said about those who originally founded Joshua's Trust over 50 years ago as well as those who dedicated their time and energy into building our conservation properties portfolio while keeping things running. And of course, there were those who gave generous donations of land, conservation restrictions, and yes, money.

However, I'd like to highlight some of the activities that I've had the privilege to observe over the past few months, that might have gone under the radar to most of our membership. The picture I've included for this season's newsletter is of a morass of invasives that had overwhelmed a dirt access road and several meadows on one of our properties. No, I'm not thankful for invasive species. I'm thankful for the hundreds of UConn students who volunteered to manually clear invasive plants at this and other properties. I'm also thankful for the low profile but major efforts by other volunteers:

- The crew that's replacing the ramp at the Gurleyville Grist Mill
- The individuals who took on the field brush cutting and tree removal projects at the Grist Mill

Continued on page 4

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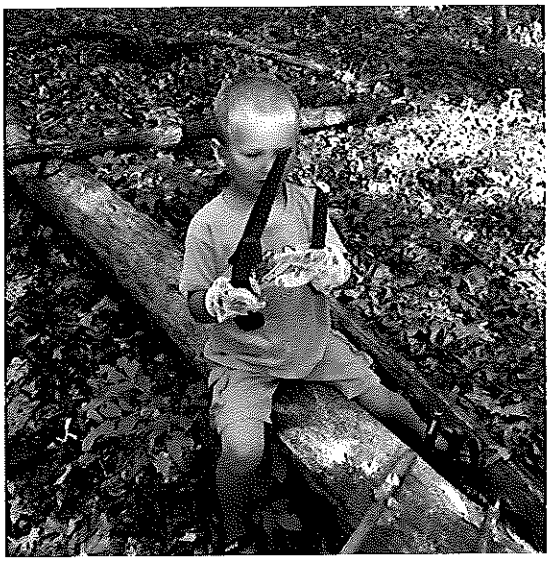
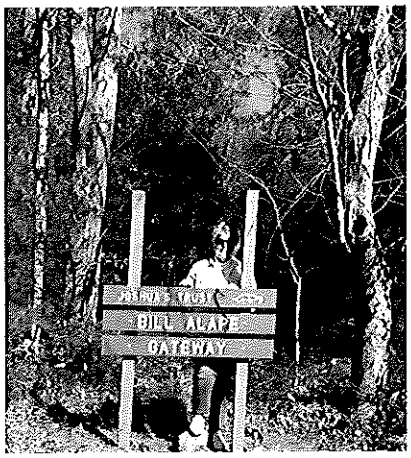


LEO J. AND ROSE PAGEAU TRUST GRANT

by Nancy Silander

Joshua's Trust is the recent recipient, through the Education and Outreach Committee, of a grant from the Leo J. and Rose Pageau Trust. The Pageau Trust annually funds Windham area nonprofits who have projects that specifically benefit area residents. The grant will pay for transportation and materials for students at Sweeney School in Willimantic to explore nature at a Joshua's Trust preserve. Teachers will use the Project Learning Tree curriculum as a resource in conjunction with the science curriculum at the elementary school to create a pilot project that will broaden the children's experience outdoors. We hope to engage university students who are interested in working with children to help facilitate the program. A secondary goal is to encourage parental involvement, through specialized Trust programming such as weekend walks. If the program is successful, we plan to replicate it at other Windham area schools. Keep a look out for an update in the summer newsletter!

HEAVEN ON EARTH



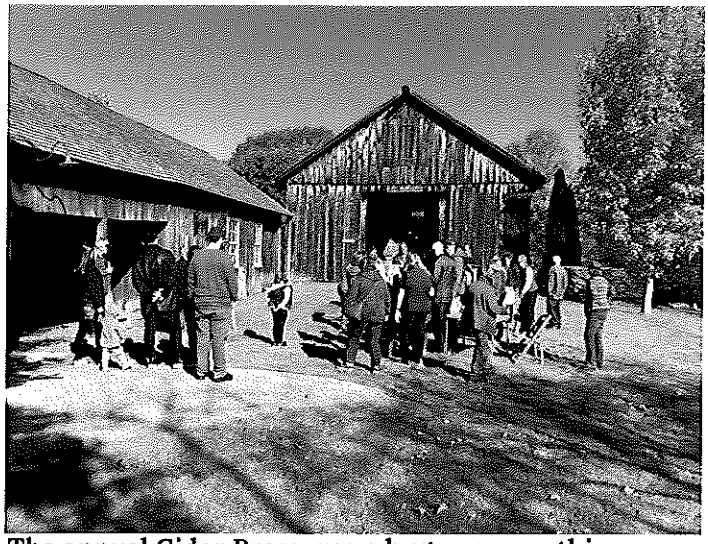
Kathleen with the sign erected on Bill's birthday.

by Kathleen Alape Carpenter

Bill Alape was 6 years old when Robert "Eddie" and Anne Alape moved, along with Bob, 7, from Jersey City, NJ to Ashford, CT. They bought the now-gone chicken farm surrounded by land on Bebbington Road near the intersection of Pumpkin Hill Road. Originally city people, the country life appealed to my parents and older brothers; Billy especially loved being outdoors, roaming the adjacent fields and clearing paths through the woods. Three more siblings - Kathy, Joyce, Philip - were born and we remember "Bill's trails" with great fondness, and as our own gateway to the exploration of pristine nature. Though his working life took him to many places around the globe, Billy Alape was happiest outdoors in his woods. When he returned to Ashford and acquired the house on James Road, he reveled in owning his own expansive tract of land. The Bill Alape Gateway that now belongs to Joshua's Trust is a fitting memorial to Bill's love of the outdoors and his desire to protect and preserve natural resources for future generations. I especially like the thought of school buses full of children passing the gateway sign every day and perhaps being inspired by Bill Alape to get outdoors to explore the woods and fields! Bill used to say "On earth there is no heaven, but there are pieces of it." And now, the Bill Alape Gateway will remain a piece of heaven on earth, *forever*.

JOSHUA'S TRUST NEWS

Pictured above: The trailer that you all made possible through your immense generosity has been put to good use! Here it was used to haul out brush from Hubbard Sanctuary. Pictured on right: Black Sheep Post and Beam have been working to repair and restore a section of the roof at Atwood Farm.



The annual Cider Press was a huge success this year! Over 70 people stopped by and visited to make cider the old-fashioned way. We were thrilled to see so many new faces.

...preserving land in perpetuity is important, because once developed, the value of the land as an open space dissipates, wildlife suffers, and our memory fades. Supporting Joshua's Trust was long overdue. **- PETER BERRIS, DONOR**

THANKFUL THOUGHTS (CONTINUED)

- The individuals who cleared trees at Wolf Rock to restore the scenic view
- All of the stewards who have completed their steward's annual report form

I understand that the last one might seem trivial, but I know I do not enjoy paperwork, so I appreciate those who make it possible for us to maintain our land trust credibility and accreditation.

So, for all of the above, I'm thankful, and I hope that all of those involved in those efforts know they're appreciated.

WANT TO SEE MORE OF JOSHUA'S TRUST?

Follow us on social media!

@joshuastrust @joshuas_trust @JoshuasTrust_ joshuastrust.org

EXPLORING JOSHUA'S TRUST

by Ada Snodgrass

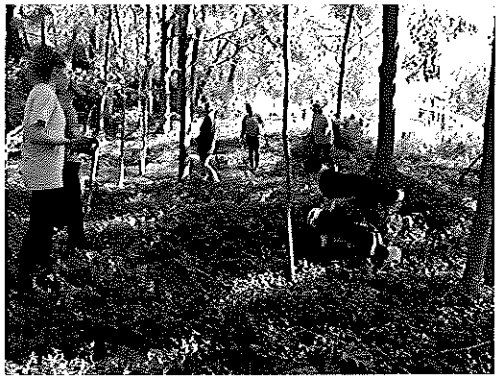
Greetings Readers!

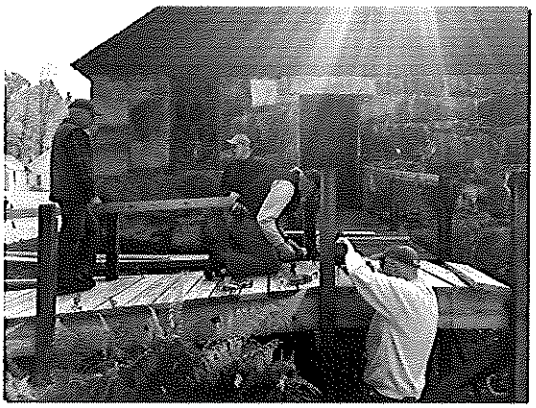
My name is Ada Snodgrass: avid reader, hiker, coffee drinker, and Stewardship Coordinator at Joshua's Trust. During my first six weeks at Joshua's Trust I was given the task of walking all of our beautiful trails. During this time, I was delighted to come across some of the most beautiful views I've ever seen, sometimes only minutes from my own backyard! This is the first in a series for the newsletter, in which I hope to inspire you to discover new Joshua's Trust properties.

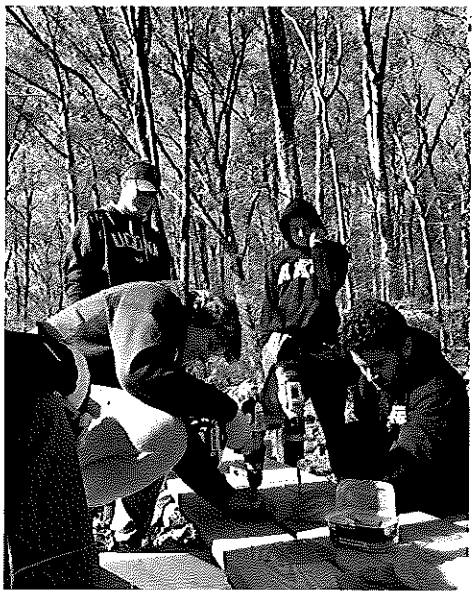
Joshua's Trust has something for everyone. Whether you're looking to take a stroll with your loved one after dinner, or challenge yourself to a strenuous hike, there is a trail for you. I'll be your guide to finding just the right property. Though many of our properties offer a variety of scenic vistas, my personal favorites almost always include a water feature. If you prefer heights, there are plenty of properties to point you to. Some of our trails begin in residential areas, where you may feel at first you are in someone's backyard but don't let that dissuade you.

For example, Iron Mine Valley is tucked between private properties on Sand Hill Road in Ashford, but once you walk down the narrow beginning of the trail, you turn to see a vast forest ahead of you. Along the trail you can see where bog iron was mined from the wetlands during the Revolutionary War. White tail deer gallop through the forest until the loop trail leads you across wetlands and the Mount Hope River. The river ripples softly as birds, beavers and otters prepare for the season ahead. This is just one of many hidden gems the Trust has to offer. I hope through this series you find yourself wanting to uncover many more.

JOSHUA'S TRUST NEWS







IMAGES FROM FALL TRAIL CREWS

Here are a few statistics about this fall's crews:

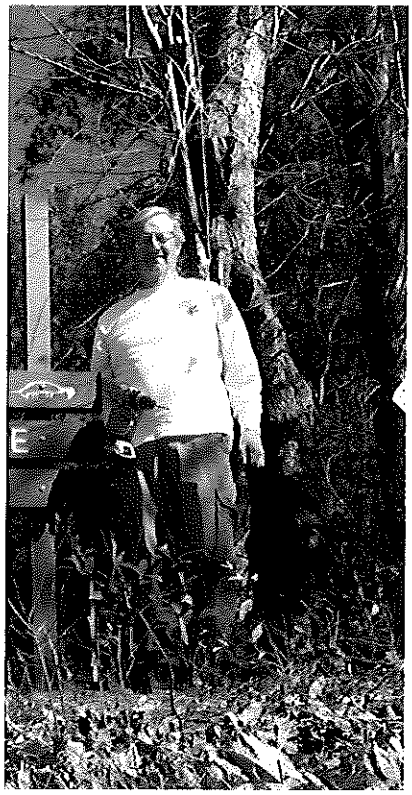
262 Volunteers

17 Work Days

419 Hours of Dedication

TRAIL CREW VOLUNTEERS

by Andy Woodcock



When your obligation is also your joy, you might just be a member of a Joshua's Trust trail crew. We were fortunate this fall to blaze a new trail, clear seven trails, build two bridges, add a non-skid surface to a boardwalk, plant erosion preventive bushes on a slope, and attack some off-trail invasive species.

To call this productive would be telling half the story. We had fun – the kind when the time flies and the project slips into place. So does the laughter. Trail crews are a special breed of JT volunteers – they're tangibly part of something larger than themselves and yet the camaraderie in the moment is unbeatable. It's almost a shame to remind the crew members that we're preparing the property for the hikers coming tomorrow, later in the week, 40 years from now and in perpetuity.

JT is seeing a larger number of volunteers from a wider range of our 14-town community. But we are always looking for more people, of all ages, who want to explore and engage with familiar and new properties. The projects generally don't require experience, and yet people who repeatedly join projects gain confidence and skills.

We also have projects for people who bring skills to the sites – carpentry, design, teaching, group dynamics, are all skills needed for projects anticipated for 2020. Additionally, we are in search of new Regional Coordinators, who oversee and assist our stewards in maintaining our properties.

Volunteering is easy. And we're making it easier. In January, I'll post a calendar on our website of trail crews through May; in June, a summer calendar is planned and in late August, the autumn calendar will be posted. You can contact me anytime at andy.woodcock@joshuastrust.org with questions, comments or to discuss volunteer opportunities.

THANKS TO ALL OUR DONORS!

So many of you have not only given once but several times this year. We truly cannot continue in our mission without your generosity. So we thank you! We look forward to serving the community in new ways in 2020 thanks to your generosity.

REMEMBER

There are many ways to give to Joshua's Trust! We accept gifts of money, land, stock, IRA distributions, volunteer hours and more. If you would like to discuss any of these opportunities with us, please email administration@ joshuastrust.org or call (860) 429-9023.

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JOSHUA'S TRUST UPCOMING EVENTS

Winter Seminar Series

Climate Change Action

Learn what you can do locally to help address climate change.

Dr. Anji Seth
January 12

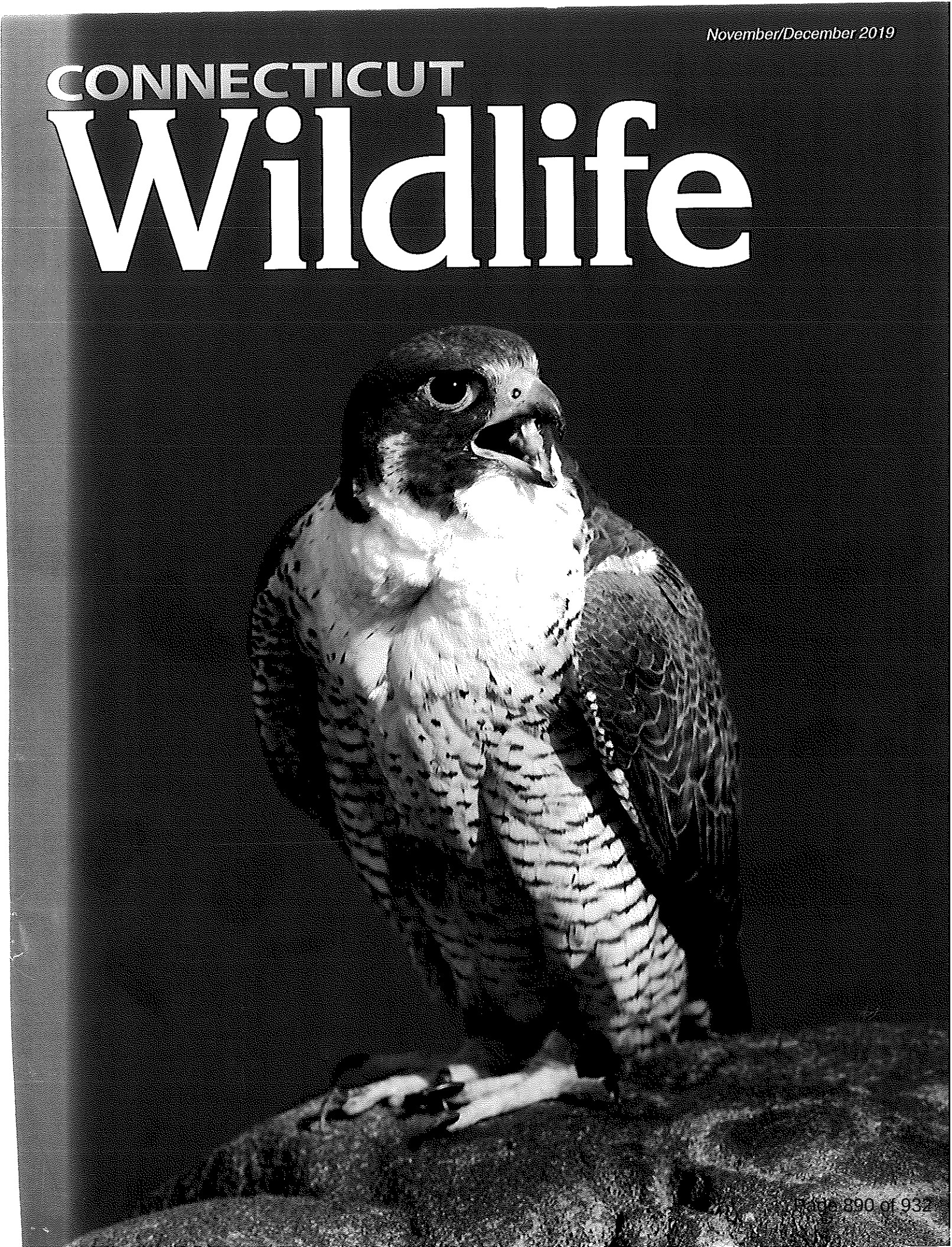
Christine Palm
February 9

Beth Bernard
March 8

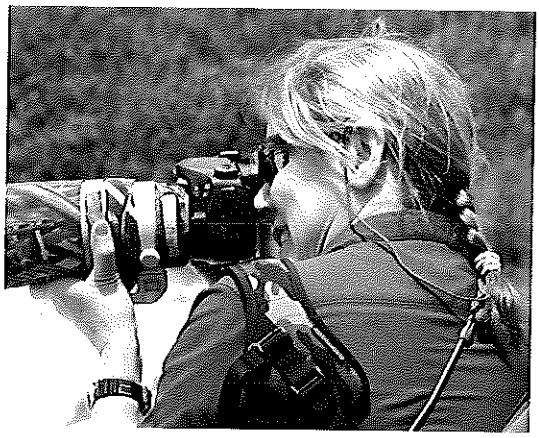
For the full details of each event in our seminar series along with biographies of our presenters, visit joshuastrust.org/events. All events will be held in the Biophysics auditorium on the UConn-Storrs campus at 2 pm.

November/December 2019

CONNECTICUT Wildlife



From The Director



This issue of Connecticut Wildlife *is perfect for the season. It is filled with many things to be thankful for. I am sure both the young falcon learning to fly and the adult bald eagle in need of some help would agree that the many residents of our state who care enough about our wildlife to help when needed would be high on the list. A highly skilled staff of wildlife and fisheries biologists and licensed wildlife rehabilitators are not far behind. The teamwork displayed by these individuals allowed a young falcon to survive and, hopefully, learn to soar through Connecticut skies and helped a veteran bald eagle – one of our first "home-grown" chicks – continue to thrive some 24 years later.*

You will also read about how families were able to enjoy the magic of the outdoors together, whether through teaching kids to ice fish, learning lots of new things at Discover Outdoor Connecticut Day, or by mentoring the conservationists, biologists, and community leaders of the future through the University of Connecticut's Natural Resources Conservation Academy. The stories you will read and the images captured reflect the wonder and curiosity that our natural world brings to all of us, regardless of our age.

There are things to celebrate – a piping plover population that continues to slowly grow after nearly disappearing from our state; a young angler who was able to catch the biggest fish of his young life; the adaptability of a small woodpecker that enables it to thrive in backyards as well as in forests; and yes, that adult eagle. Gone from our state as breeding birds by the mid-1950s and facing extinction largely due to the use of the pesticide DDT that caused their egg shells to weaken, the return of bald eagles to Connecticut as nesting birds in the early 1990s is one of our most poignant success stories. To learn that one of the chicks from that first nesting pair, one that I was fortunate enough to help band all those years ago, is still gracing our state touches me deeply.

While there are still many challenges ahead, as the story on hibernating bats underscores, there are things we can try and ways we can work together to achieve more conservation success stories. As we approach the New Year, I hope this issue inspires you to enjoy all the wonders our natural world has to offer, to celebrate the successes, and to let your curiosity lead you to the adventures waiting outside.

Jenny Dickson, DEEP Wildlife Division Director

Connecticut Wildlife

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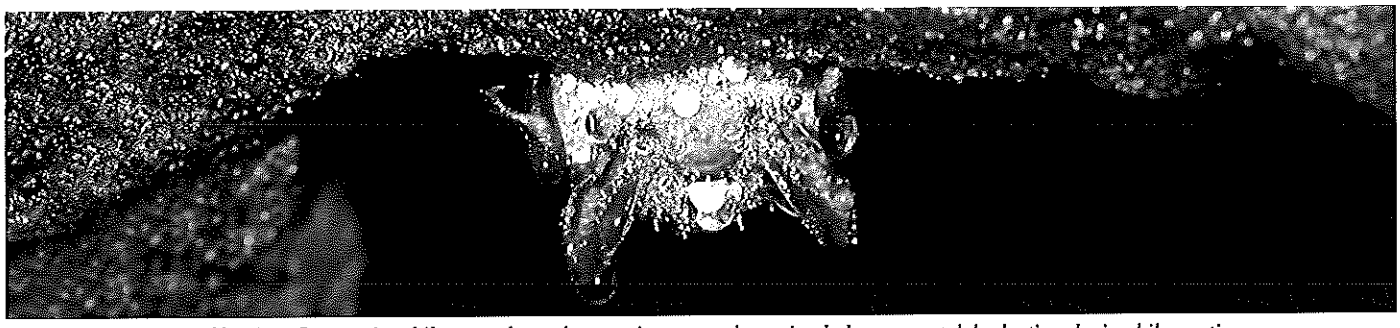

A northern long-eared bat in a Connecticut hibernaculum where moisture condensation helps prevent dehydration during hibernation. PHOTO BY P. J. FUSCO

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An adult female peregrine falcon perches on a Connecticut rock outcrop. Read about peregrine nesting success in the state during 2019 on page 4. Photo courtesy Paul Fusco

Lesson on the River

Peregrine Falcon Takes a Training Flight

Written by Brian Hess, DEEP Wildlife Division

Peregrine falcons are the high performance sports cars of the bird world. Their long pointed wings are adapted to a blend of fast and maneuverable flight and can be tucked in for extremely high speed dives exceeding 240 miles per hour. Peregrines have specialized tubercles inside their nostrils that deflect high speed air that would damage their nasal passages (supersonic jet engines have similar structures that slow air before it reaches the turbines). To protect their eyes from high speeds, they repeatedly flush away debris with special membranes.

From the time young falcons take flight, they have these adaptations to fly fast. But, the process of learning to fly fast is difficult. First flights are awkward adventures for most young birds, but for falcons, their physiology and nesting locations mean that the learning curve can be steep, and the cost of errors can be high.

One fledgling falcon took a risky plunge from the Charter Oak Bridge this past summer. It was an exceptionally windy day on June 11 with afternoon gusts well over 30 mph. That afternoon, a fully-feathered peregrine fledgling that had not yet taken his first flight fell from the substructure under the bridge. The bird landed in the water, and swam to the Hartford shore. There, an angler scooped up the falcon and transported it to the Wildlife Division office at DEEP Headquarters in Hartford.

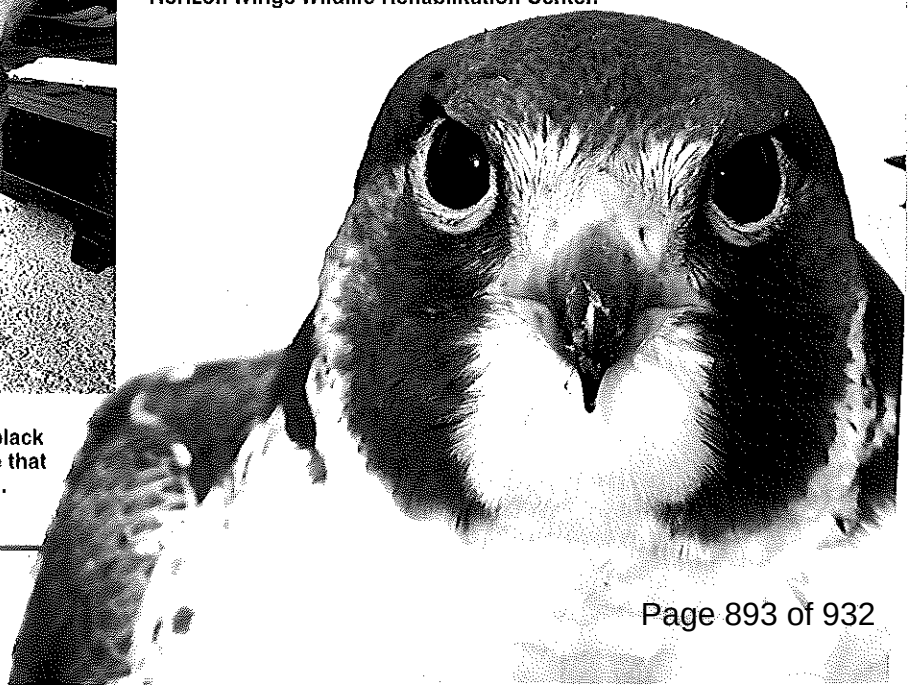
The Wildlife Division Director's office is not a suitable

C. VANN / DEEP WILDLIFE

A damp falcon waits to be transported from DEEP Headquarters to Horizon Wings Wildlife Rehabilitation Center.

C. SAMORAJCZYK / CT DOT

The young bird was fitted with two leg bands – a bare aluminum band with a unique nine-digit number and a black and green colored band with a large alphanumeric code that can be seen with a spotting scope or zoom camera lens.



place to evaluate or rehabilitate a bird, so from there, DEEP staff took the bird to Horizon Wings Raptor Rehabilitation and Education Center in Ashford. Mary-Beth Kaeser, a state-licensed wildlife rehabilitator, fed the falcon and took him to be evaluated by a veterinarian the next morning. Under the dedicated eye of the staff at the center, the bird (with a clean bill of health) spent a few days in the flight pen to determine if he was ready to fly. While he had the necessary feathers, he was unable to jump up from the ground to a perch. Though the bird was not yet capable of strong flight, the staff at DEEP and Horizon Wings agreed that the best scenario was to return the falcon to the bridge as soon as possible. The falcon would be placed back on the bridge pier, where the adult falcons (who had not left the area) would hopefully keep feeding and protecting the young bird.

After marking the bird with aluminum leg bands, staff from CT DOT and DEEP crawled up into the cat-walk under the bridge and walked out over the river, carrying the bird in a cloth bag. Peregrines do not build nest structures. Rather, they lay eggs directly on the concrete or metal of a bridge. When the crew found the spot with plenty of food remnants and guano, they opened the bag and the bird walked away. It was seen on the pier for the rest of the day, but by morning it was gone. A chick was seen in the area later the second day, but it unclear if it was the same bird. The Division has not received any subsequent reports of the young bird, but we hope it is doing well.

Peregrine Falcon Nesting Summary, 2019

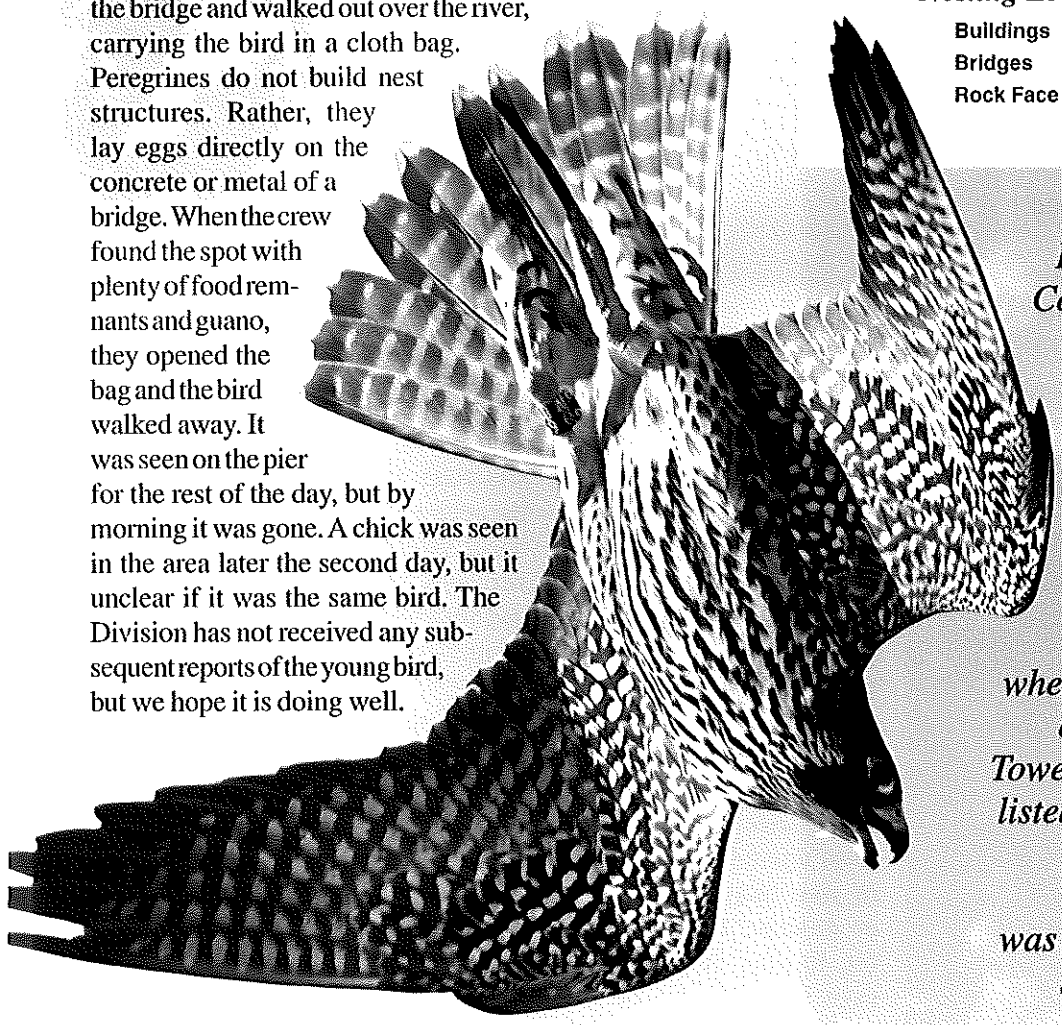
Even with their affinity to human and urban structures, falcons can be very difficult to monitor compared to other birds. The presence of a nest is assumed by the number of adults seen and if they are acting territorially. Despite these monitoring challenges, 2019 was a productive year for peregrine falcons in Connecticut. In particular, New Haven was a hot spot for falcons, with two new nests. At first glance, this may seem odd, but the area is full of pigeons, is along a migratory corridor, and has plenty of tall buildings and natural rock faces.

Productivity

Active Nesting Territories	18
Successful Nests	6
Number of Chicks	11
Unknown Outcome	8
Failed Nests	4

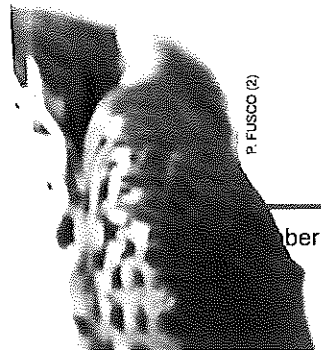
Nesting Locations

Buildings	5
Bridges	8
Rock Face	5



Peregrine nesting activity in Connecticut declined through the 1920s and 1930s, with the last documented nesting occurring on the Travelers Tower in Hartford in the late 1940s. Peregrines remained absent from Connecticut until 1997 when a pair successfully nested once again on the Travelers Tower. The peregrine falcon was listed in 1992 as an endangered species on Connecticut's Endangered Species List. It was reclassified as a threatened species in the state in 2010.

Peregrine falcon populations declined rapidly between 1950 and 1965 throughout the United States and Europe. By 1975, the entire population of peregrines in the eastern United States was considered to be extirpated. This decline is directly attributed to the effect of organochlorine pesticides, such as DDT, on breeding populations.



P. FUSCO (2)

Where Do Bats Go During Winter?

Written by Kyle Testerman, Contractor for the Wildlife Management Institute; photos by Paul J. Fusco

The silhouettes of bats catching insects in the summer evening sky was enjoyed by many around Connecticut in decades past. In recent years, that sight has become more infrequent as the overall bat population in the state has dramatically declined.

While bats can still be seen by a few fortunate onlookers at dusk during the warmer months, winter brings a stillness in the air and an absence of furry flying mammals. So, where do bats go during winter?

For all bats in Connecticut, winter brings about a change to colder temperatures and a lack of insects for food. As a result, bats must leave their summer habitat and move to where they spend the winter. While there is not one simple answer to where bats go, there are some general trends on where different groups of bats end up each winter. The nine species of bats in Connecticut are often categorized into one of two general groups; cave bats or tree-roosting bats.

The red bat is North America's most abundant tree bat. This bat's reddish fur helps it blend in among pine cones and browning leaves in the tree tops. When hibernating, red bats use their furry tail membrane like an insulating blanket to conserve heat.

The silver-haired bat is one of three tree-roosting species found in Connecticut. These bats generally migrate long distances to more southern latitudes during the winter. They face threats from wind turbines along their migration paths.

Cave Bats

Much more is known about cave bats because they tend to live more social and communal lives throughout the year. Cave bats include the big brown bat, which is the species most likely to roost around your home or in your barn in the warmer months. Come winter, big browns and the other cave bats, like tri-colored, northern long-eared, eastern small-footed, little brown, and Indiana bats, migrate regionally to cavernous spaces, usually below ground, where they hibernate through the coldest months of the year. Bats select slightly different types of cave-like structures for hibernation, as long as the environmental conditions suit their needs. Most often, they are found hibernating in abandoned mines, caves, and other underground structures, where temperatures hold steady between 32°F and 49°F. During hibernation, the body temperature of a bat can decline from a normal summer range of 99°-106°F down to as low as 32°F. This drop in body temperature helps slow down a bat's metabolism, reducing its need to eat for several months.

Another important characteristic of suitable hibernating spaces is humidity. Hibernating bats are susceptible to dehydration, so choosing a hibernaculum with higher humidity will reduce evaporative water loss. In some cases, high humidity can cause water droplets to form on the fur of hibernating bats, which bats can drink when they

periodically wake up (photo below, northern long-eared bats). Waking and warming up from hibernation is energetically expensive. In fact, a bat can use 80-90% of its entire stored fat reserves just from waking up for a few minutes each winter. The high energy cost of warming up after waking is part of what makes cave bats so vulnerable to white-nose syndrome (WNS). The disease is caused by an introduced fungus (*Pseudogymnoascus destructans*, or *Pd*) which thrives in the same cold, wet places where cave bats hibernate.

Connecticut Bat Species and their Status

Common Name	Scientific Name	CT Status	Federal Status
Big brown bat	*Eptesicus fuscus*	SGCN	
Little brown bat	*Myotis lucifugus*	E, SGCN	
Northern long-eared bat	*Myotis septentrionalis*	E, SGCN	T
Eastern small-footed bat	*Myotis leibii*	E, SGCN	
Indiana bat	*Myotis sodalis*	E, SGCN	E
Tri-colored bat	*Perimyotis subflavus*	E, SGCN	
Silver-haired bat	*Lasionycteris noctivagans*	SC, SGCN	
Eastern red bat	*Lasiurus borealis*	SC, SGCN	
Hoary bat	*Lasiurus cinereus*	SC, SGCN	

SGCN = Species of Greatest Conservation Need
E= Endangered
T = Threatened
SC = Special Concern

Since the discovery of WNS in North America in 2006, nearly seven million cave bats have perished. The fungus infects a hibernating bat's muzzle and wings, irritating the bat and causing it to wake up frequently and burn through stored fat reserves too soon. Starving bats are forced to leave their hibernacula in search of food, which leads to death in the cold winter months. Deaths from WNS for some species, like the little brown and northern long-eared bats, have resulted in over 90% population declines in the region.

Tree-roosting Bats

Connecticut's three tree-roosting bat species include the eastern red, silver-haired, and hoary bats. These species are mostly solitary throughout the year, and do not hibernate in cave-like environments, making them much more difficult to study. Tree-roosting bats generally migrate long distances to more southern latitudes during winter. Upon arrival to their winter range, many tree bats will still hibernate during periods of cold weather, emerging to feed during periods of warm winter weather.

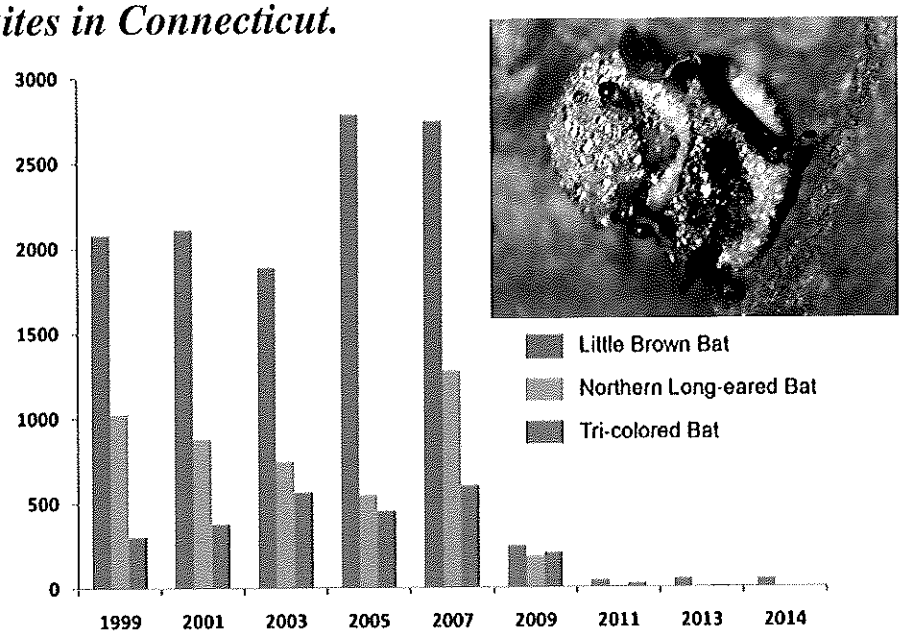
While considered safe from the effects of WNS, migratory tree bats are still facing threats. Habitat loss and mortality associated with wind turbines present other conservation challenges.

While bat populations face a long, uphill battle to recover, there are some things you can do to help:

- Report sightings of live and dead bats seen in late December through mid-March to *deep.batprogram@ct.gov*.
- Let the Wildlife Division know about summer bat colonies. There might be a maternity colony nearby. Report summer colonies to *deep.batprogram@ct.gov*.
- Put up a bat house. You could support a whole colony in your own backyard!
- Educate friends and family about the benefits of bats and the perils they face.

Next summer, if you are fortunate to see a bat flying overhead after sunset, appreciate the journey this amazing animal took to get back to your yard. The sad fact is that when bats leave for winter, many never make it back.

Number of bats counted at three hibernation sites in Connecticut.

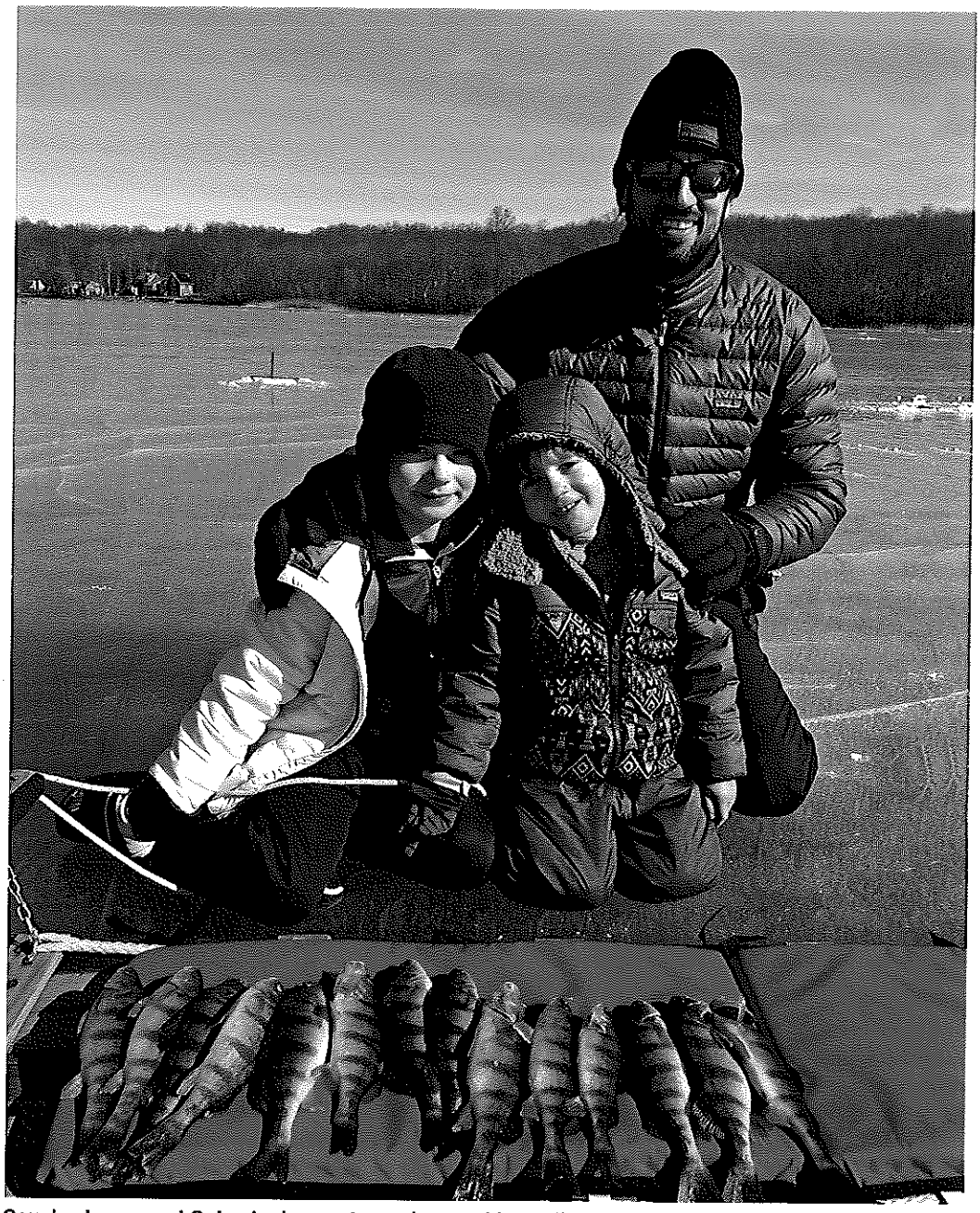


Families that Fish Together, Eat Fish Together!

Written by Justin Wiggins, DEEP Fisheries Division

Connecticut is home to many avid and passionate anglers who take advantage of the fantastic and diverse fresh and saltwater fisheries. What fuels and motivates people to fish will vary greatly depending on who you ask. Relaxation, spending time outdoors, catching lots of fish, catching BIG fish, spending time with family and friends, connecting with nature, and observing wildlife are all valid and genuine responses you could expect.

As far back as I can remember, I have been hooked on fishing. As a kid, fishing was an adventure into the unknown (a feeling that has not yet faded) and every fish and experience was new and exciting. One of the biggest joys in my life now is witnessing this excitement through the eyes of a "newbie" to fishing. Being with someone who is seeing things in the natural world for the first time is truly a remarkable and rewarding experience.



M. CLAVETTE FOR DEEP

Cousins Logan and Quinn had a great morning catching a dinner of fried yellow perch! The boys went back and forth, running from flag to flag. Yellow perch are the saving grace for many ice fishing outings. These beautiful native fish are very active during winter and can be caught on tip-ups or jigging rods. Yellow perch are excellent eating, even more so when pulled from the cold winter water.

These days, there is nothing better than taking my young son and nephews fishing and I am already looking forward to my baby daughter joining in a few years! Like any parent, I love spending time with my kids, especially time spent outdoors. Quinn, my oldest at four years of age, loves digging for worms and using them to catch sunfish at our local town park. His reaction to seeing the first fish pulled up from a frozen pond during an ice fishing trip last winter was priceless – pure, sincere shock and awe (and screaming and running). He is still talking about the catfish he caught last summer and the blue crabs we scooped up and ate with

his cousins. These memories and experiences are imprinted in his young mind as they are mine, which is what I have come to love most about fishing – **sharing the experience.** Kids grow up way too fast, but these memories will last and be cherished forever.

Taking a kid fishing is much more than just fishing. Beyond the good old-fashioned family fun, time spent outdoors with youth has numerous consequential benefits, such as fostering a connection with our natural world and building a foundation of respect, knowledge, and love for the outdoors. Fishing provides the perfect excuse to put the cell phone away, turn the TV off, and connect with nature and each other. Take advantage of the opportunity and integrate positive life lessons into your fishing experience. For instance, I always make it a point to pick up any balloons and discarded fishing line I see. I now have a young boy with a keen eye for garbage, which he insists on picking up and disposing of properly – whether on the water, hiking trail, or in a parking lot.

Fishing with kids undoubtedly takes preparation, patience, and love! Following are some simple tips for making your next trip with kids a success:

- **Keep it simple:** Use live bait. A worm or live minnow under a bobber will catch fish. Kids like to catch fish. Enough said.
- **Be prepared:** Bug spray, sunscreen, first-aid kit, and a change of clothes are all essentials. You will need the change of clothes!
- **Snacks:** Got to have them! Lots of snacks. An absolute must.
- **Life jacket:** When fishing from a boat or on a floating dock, it is critical that a PFD be worn at all times. Even if the kids are good swimmers, this is responsible behavior and offers piece of mind.
- **Expectations:** If you get a few solid hours of fishing in, you did well!
- **Pictures:** Make sure to take lots! You will look back and cherish these memories.

Ice Fishing

Ice fishing is a wonderful way to introduce kids to fishing. It is a family-friendly outdoor activity that provides fresh air and exercise during the doldrums of winter. The fishing can be fast and furious, and the slow times are perfect for dragging the kids around in a sled, throwing a football or Frisbee, cooking hot dogs, and drinking hot chocolate. The Connecticut Aquatic Resources Education (CARE) Program offers free "Introduction to Ice Fishing" classes during winter that will teach you everything you need to know to get started ice fishing!

The winter 2019 ice fishing season yielded some unforgettable times with family, friends, and new ice anglers. The target species while ice fishing is usually anything that will

J. WIGGINS / DEEP FISHERIES

Quietly paddling a canoe through a calm saltwater marsh, it did not take long before we noticed dimpling on the water's surface. The boys eagerly casted their snapper poppers toward the commotion as giant schools of peanut bunker were fleeing from snapper bluefish. The juvenile bluefish were a few months old and tiny, too small to catch, but Quinn and Ryan loved seeing the giant schools of baitfish. As the tide fell, we noticed blue crabs shuffling along the muddy bottom. Over the next hour, a dozen keeper blue crabs were netted for a feast that afternoon. The beauty and life exploding from a saltwater marsh is a must see for any kid!

M. CLAVETTE FOR DEEP

On the afternoon of Super Bowl Sunday, Quinn and I found ourselves in the midst of a perch feeding frenzy! As the sun was sinking, I began to pull tip-ups, thinking this trip could not get any better. One of the last tip-ups left got triggered. "Flag up," I yelled to Quinn. He took it by himself. "Help, it's a monster," he replied. I laughed, assuming a yellow perch was on the line. Instead, I saw a walleye head sticking out of the ice hole and we had caught a 20-inch walleye. My three-year old boy (at the time) had just landed a bigger walleye than I ever have. We hugged, screamed, and smiled ear to ear for a photo.

Cousins Quinn, Logan, and Ryan were eager to spend a day on the boat after a long winter. The first warm day in early April found my brother-in-law and me taking the boys fishing. We watched great blue herons, ospreys, egrets, and bald eagles hunting for fish, just as we were. Casting live shiners under a bobber, we found a school of hungry fish. Over the next few hours, a flurry of sinking bobbers produced a stringer full of beautiful black crappie that made for a fantastic dinner!

bite! Tip-ups baited with live shiners dropped down to one to two feet off the lake bottom is all it takes to produce fish.

Freshwater fishing in lakes, ponds, and rivers offers a variety of options for the kids. From Trout Parks in spring to panfish, bass, and catfish during summer, the opportunities are endless! The "Connecticut Is Fishy" interactive web application, found at *www.ct.gov/deep/fishing*, can help identify family-friendly fishing locations near you. Not many fish can resist the simple, yet effective, presentation of a worm or minnow fished under a bobber.

The go-to quarry are panfish, a group of fish that includes sunfish, yellow perch, and black crappies. Panfish are abundant in our lakes, ponds, and large rivers and usually willing biters. An added bonus is panfish make fantastic table fair and the kids love eating the fish they catch.

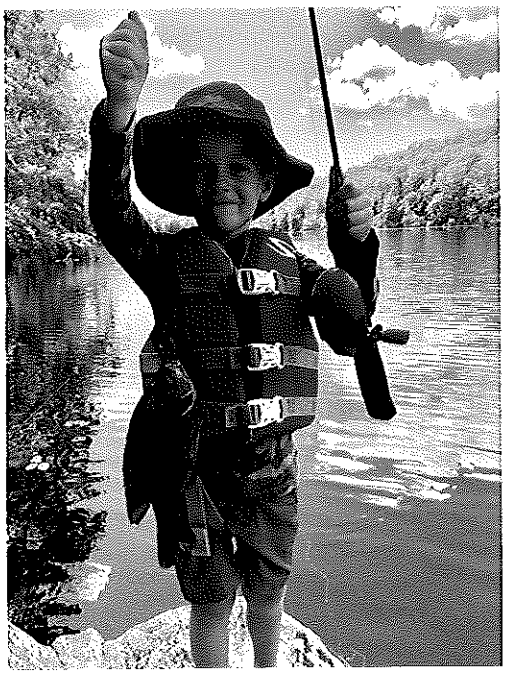
Long Island Sound and her bountiful tidal rivers, streams, and salt water marshes are bursting with great kid-friendly opportunities throughout summer.

Scup (porgy), referred to as the "sunfish of the seas", migrate into Long Island Sound in late spring, taking residence on almost every rock pile, mussel bed, pier, or jetty. A simple bottom rig baited with squid strips or sandworms, whether casted from the shore or drifting from a boat or kayak, is irresistible to scup and many other saltwater species. Drifting on a boat or kayak will allow you to cover ground, which will certainly help you find the fish. If you are shore bound, the DEEP-designated "Enhanced Shore Fishing Sites" have excellent public access and reduced length limits on fluke and scup. Jumping aboard one of the many Charter or Party Boats that cater to families will cost a bit

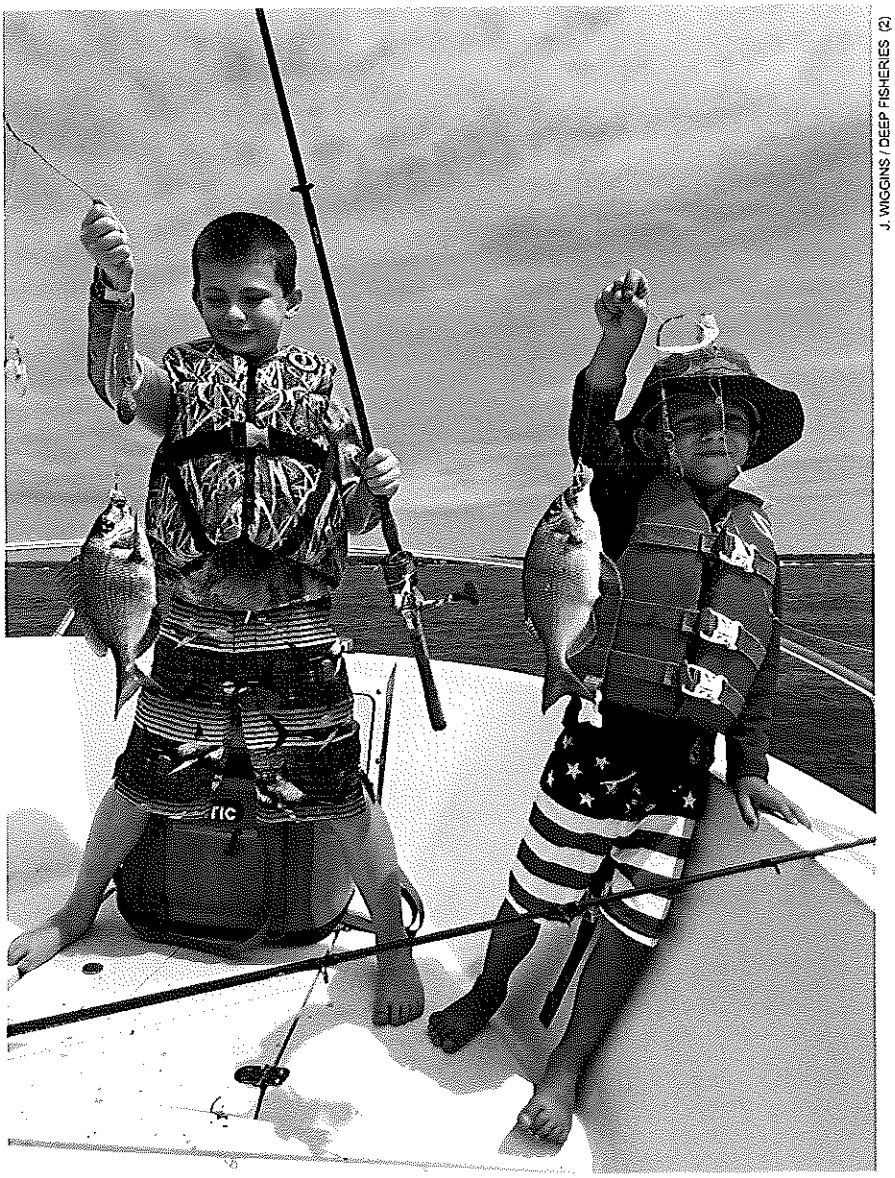
of money but greatly increase your chances of success and having a day you will never forget! Come August, the numerous tidal rivers, creeks, marshes, and beaches along the coast offer fantastic multi-species fishing for snapper bluefish and blue crabs. The "Saltwater Fishing Resource Map" found at *www.ct.gov/deep/fishing* has detailed information on shore fishing sites, boat ramps, and Party/Charter vessels found along the Connecticut shoreline.

Become a Volunteer CARE Fishing Instructor

I am grateful and fortunate to have a career with the DEEP Fisheries Division Connecticut Aquatic Resources Education (CARE) Program. The CARE Program offers "Learn to Fish" classes around the state, affording the opportunity to share my passion and love of fishing with others who are interested in learning. Almost as rewarding is working with the hundreds of volunteer fishing instructors who donate their time to teach fishing to others.



Quinn and I launched my canoe into a small pond on a hot July afternoon. Just the two of us for an afternoon of bluegill fishing. A Spiderman push button rod with a piece of nightcrawler hung 18 inches under a bobber did the trick this day. We paddled around and argued about where we should fish, went for a swim, and caught bluegill after bluegill. A few dozen of these tasty fish made their way into our cooler destined for "Poor Man's Shrimp", an easy and delicious use of bluegill fillets. An afternoon well spent!



J. WIGGINS / DEEP FISHERIES (2)

We set out of Niantic Bay on a beautiful July day with the goal of gathering enough scup for fish tacos that evening. Hi-lo rigs baited with squid were sent to the bottom of Bartlett Reef. Almost instantly, they were hooked up. The boys reeled in scup after scup until their arms hurt! Not the biggest fish in the sea by any means, but what they lack in size scup make up for with their tenacious fight. And, they make for excellent fish tacos!

The CARE Program relies heavily on these volunteer instructors to provide quality first fishing experiences to Connecticut residents. If you are passionate about the outdoors and interested in sharing your knowledge and love with others, call the CARE Center at 860-663-1656 to become a volunteer fishing instructor. You may just find that what you enjoy most about fishing is sharing the experience!

A Backyard Favorite

The Industrious Downy Woodpecker

Article and photography by Paul Fusco, DEEP Wildlife Division

Female downy woodpeckers often have a dainty appearance.

Note the black barring on the tail feathers, which is visible on the top and the underside of the feathers.

One of Connecticut's most familiar backyard birds is the downy woodpecker. This little hammerhead is our smallest member of the woodpecker family. It is a hardy bird with a wide distribution across the continent, and is found virtually statewide in Connecticut. They can be seen in practically any woodlot, regardless of size. Downy woodpeckers are resident birds, but those from the northern part of their range may shift a short distance south.

In winter, downy woodpeckers are common visitors to backyard bird feeders. They are often in the company of other small birds, including chickadees, titmice, and nuthatches, together forming a roving band of activity. By congregating in loose flocks, all of the individuals benefit as they locate food sources and watch for predators, such as hawks and cats.

Downy woodpeckers have a broad white patch on their back and a white underside. The black wings have white spots, giving them a bold checkerboard appearance. The head is striped black and white, and males have a red spot on the back of the head. The outer tail feathers are typically white with a few small black bars. The bill is small, straight, and finely-tipped. The birds also have a noticeable tuft of nasal bristles at the base of the bill.

While downy woodpeckers prefer open deciduous woodlands, they are also at home in orchards, parks, backyards, and young forest habitat with brushy or weedy edges. Because of their small size, these woodpeckers can forage on smaller twigs, branches, and herbaceous stems that would not support larger birds. The majority of the diet consists of insects, especially wood-boring beetles and their larvae. The downy woodpecker is a recognized predator of the invasive pest, the emerald ash borer.

At backyard bird feeders, this little woodpecker is fond of black oil sunflower seed, suet, peanuts, and peanut butter. It will sometimes visit hummingbird feeders for sugar water.

Woodpeckers often communicate by drumming on a resonating surface, such as a hollow

Male downy woodpeckers have a bright red patch on the back of the head.

Downy vs. Hairy

These two very similar black-and-white woodpeckers can be hard to distinguish.

The hairy woodpecker (below), with a length of 7.5 inches, is quite a bit larger than the downy at 5.75 inches. The hairy also has a much larger bill, proportionally, than the little bill of the downy.

The outer tail feathers of both species are white, but those of the downy have a small amount of black barring, while the hairy's are unbarred.

Another difference is the voice. The hairy woodpecker has a loud, sharp "peek" call note, while the downy has a mild but loud "pik" call note. Both have a similar rattling call, but the call of the hairy remains at about the same pitch while the rattle descends in pitch at the end with the downy.

How did they get their names?

The lower white patch on the back of the downy woodpecker has soft feathers, while those feathers on the hairy woodpecker are shaggy and more hair-like.

or dead branch. Drumming is done by both sexes and intensifies in late winter and early spring as males advertise for a mate and begin courtship. Drumming may also be a way for woodpeckers to claim a territory or as response to an intruder.

Drumming patterns can be separated by species. For instance, downy woodpeckers drum at a relatively slow pace, 15 or so taps per second, with a frequency of a few seconds between each set of drums. Compare that to the hairy woodpecker, which has a faster rate of about 25 taps per second, but a slower frequency, which may be over 20 seconds between sets.

Downy woodpeckers nest in dead trees, where they excavate a chamber with a small entrance hole. The cavity is usually up to 12 inches deep. Here, the female lays three to eight white eggs. Incubation takes 12 days and young fledge about 24 days after hatching.

Conservation

Because they are adaptable birds and use such a wide variety of habitats, downy woodpeckers have a relatively stable population. However, the same issues that are affecting many small birds are also a concern for downy woodpeckers. Chief among those concerns is habitat loss, which is the number one concern for all wildlife, downy woodpeckers included. While Connecticut has experienced forest regeneration over the past 100 years, there has been a downtick in the amount of forest habitat in the state in recent years due almost entirely to land clearing for development. Other serious concerns for these birds include predation by cats, collisions, and pesticide poisoning.

Homeowners who wish to help downy woodpeckers can provide safe places for roosting at night. The birds will readily use bird boxes, such as bluebird nest boxes, for roosting on cold winter nights.

Piping Plover Numbers Continue to Grow

Written by Rebecca Foster, DEEP Wildlife Division; photography by Paul Fusco, DEEP Wildlife Division

The piping plover is a small (robin-sized) buff-gray and white shorebird that winters in the southern hemisphere and returns to the Connecticut shoreline to breed each spring. The DEEP Wildlife Division manages this state and federally threatened species consistent with guidelines provided by the U.S. Fish and Wildlife Service (USFWS). This is the Wildlife Division's 33rd year of monitoring and managing this species in Connecticut under the USFWS guidelines, although the Division has been responsible for the management and protection of this small shorebird before it was listed as a threatened species.

Multi-faceted Management

Piping plovers nest on beaches, directly in the sand. Efforts to protect nests begin with using wooden posts and string to construct "fencing" delineating plover nesting habitat. Male piping plovers dig a small depression in the sand, called a "scrape", in which the female plover lays three or four cryptically-colored eggs. Fencing off prime nesting habitat from beach foot traffic minimizes disturbance while the birds are forming nesting territories. Fencing also prevents the eggs, and later small chicks, from being accidentally stepped on. Numerous signs are used in conjunction with the fencing, including yellow "STAY AWAY" (from sensitive nesting areas) signs, "NO DOGS ALLOWED" (during breeding season) signs, and educational signs explaining the life cycle and needs of the breeding plovers.

Once piping plover nests are located, the Wildlife Division may use an exclosure to limit egg predation. An exclosure is essentially a protective metal structure with netting over the top that is buried into the sand (around a nest) and anchored down with large, metal posts. Piping plovers are small enough to easily move in and out of the exclosure, and the exclosure is very effective at preventing large predators, both birds and mammals, from reaching the eggs. Our research has shown that the success rate for exclosed nests is higher than for unexclosed nests.

The final step involves carefully monitoring the fate of piping plover pairs, their nests, and chicks throughout the season (typically April through August). Monitoring is done to collect accurate data, document and minimize disturbances, and educate beachgoers who are interested in learning about piping plovers. The Wildlife Division is very fortunate to have a robust support system of conservationists who assist with monitoring piping plovers, including the Audubon Alliance for Coastal Waterbirds, The Nature Conservancy, DEEP State Parks Division, municipal governments, shoreline property owners, and over 100 dedicated volunteer piping plover monitors.

Piping Plover Nesting Results for 2019

This past season, 57 pairs of piping plovers and two non-breeding

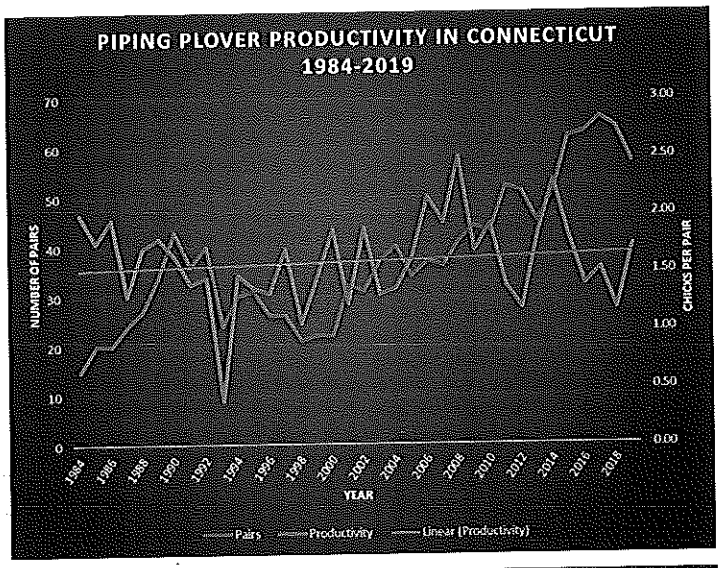
All totalled, 260 plover eggs were produced statewide. Of those, 149 chicks hatched for a hatching success rate of 57%. A total of 98 plover chicks were able to reach flight age.

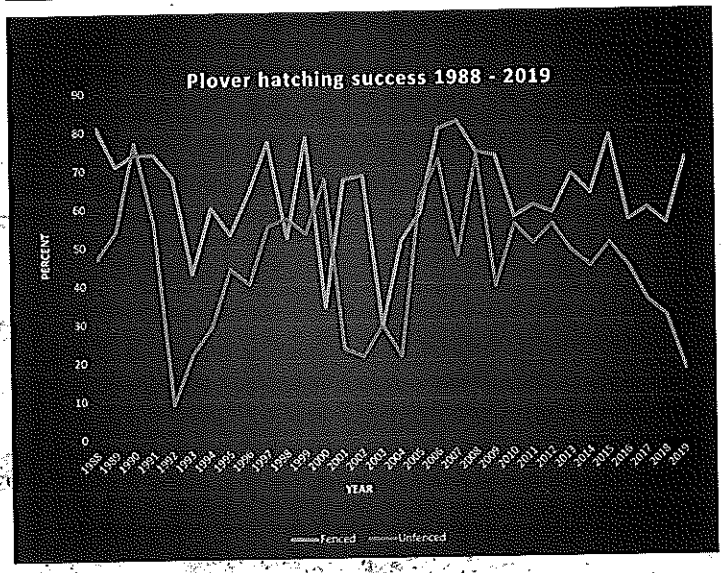
Piping plover eggs and chicks are well camouflaged in their beach habitat.

males were documented on Connecticut beaches. Of the 57 pairs, 53 were able to nest while four pairs did not. Several nests were destroyed and pairs renested. All totalled, 260 plover eggs were produced statewide. Of those, 149 chicks hatched for a hatching success rate of 57%. A total of 98 plover chicks were able to reach flight age, or "fledge," for a fledging success rate of 66%. Piping plover productivity for 2019 was 1.72 chicks produced per pair of plovers. The average productivity in Connecticut over the past 33 years indicates an increasing piping plover population for the state.

Private Property Challenge

Much of Connecticut's shoreline property is privately-owned. Therefore, successful shorebird breeding cannot occur without the cooperation and stewardship of these property owners. The Wildlife Division works diligently to develop and maintain positive relationships with shoreline property owners. The Division recognizes and appreciates that these landowners temporarily modify their activities and use of their beaches to accommodate the nesting birds, as well as allow staff access to their property. Most landowners who "host" nesting piping plovers on their property are enthusiastic about the birds. However, this past season, several landowners declined the protections that have proven to enormously increase plover nesting success. This lack of protection and best management practices created an unfortunate situation where residents and visitors constantly walked through nesting territories, causing the birds to abandon usually productive nesting areas.





Looking Ahead to 2020

The Wildlife Division will continue to work with landowners, municipalities, and beach visitors to implement protections and best management practices to ensure the greatest probability of breeding and nesting success for Connecticut's threatened piping plovers. Those interested in assisting the Division with piping plover monitoring for the 2020 season are encouraged to contact the Audubon Alliance for Coastal Waterbirds at *ctwaterbirds@gmail.com.*

Community Connections Through Conservation

Written by Nicole Freidenfelds, Visiting Assistant Extension Educator, NRCA Program Coordinator, Department of Natural Resources and the Environment, University of Connecticut

The Natural Resources Conservation Academy (NRCA) at the University of Connecticut (UConn) is a unique program that engages Connecticut teens and adult volunteers throughout the state with conservation efforts at the community level. The NRCA includes two different programs students can choose to participate in – the Conservation Ambassador Program (CAP) and the Conservation Training Partnerships (CTP) Program. With the guidance of UConn faculty and students, Academy participants in both programs conduct projects that address local conservation issues, such as creating an inventory of invasive plant species for a specific property, collecting water quality data for stream/wetland protection, using geospatial technology to map resources or features of interest in a given area, along with many others. The products that result from these projects contribute to scientific research and vary from educational presentations and pamphlets to interactive online maps and short videos.

Evelyn, a student in the Conservation Ambassador Program, digs through leaf litter for earthworms and eastern red-backed salamanders with her community partner, Annette Evans, a doctoral student from the Ecology and Evolutionary Biology department at UConn.
PHOTO: A. CABANISS, UCONN NRCA

Popular among NRCA participants are conservation projects that focus on diverse topics related to wildlife. The species and habitats they choose to explore range from insects to bears and backyards to city trails. Here, we highlight a number of wildlife-related projects being conducted by members of the current NRCA class.

Listening for State-listed Bats

All of Connecticut's native bat species are considered of greatest conservation need according to the state's Wildlife Action Plan, and all but one are listed under the state's Endangered Species Act. In addition to habitat loss and disturbance to roosting sites, another major threat to bats is the deadly fungus that causes white-nose syndrome, which has resulted in the death of tens of thousands of bats since it was first discovered in Connecticut in 2008.

Working as Conservation Training Partnerships (CTP) teammates, Laurie and Aiden are using acoustic recording devices to survey for bats throughout northwest Connecticut. Aiden, a high school student, notes that they are not only contributing valuable data to the state's long-term bat monitoring efforts, but also helping "educate the public about bats and their importance in the environment." Bats are often misunderstood, even though they provide important ecosystem services, such as reducing the number of insect pests (e.g., mosquitoes) and pollinating plants in some environments.

As one of Kent Land Trust's Board

Dr. Erin Kuprewicz, Vertebrate Collections Manager in UConn's Biodiversity Research Collections, Department of Ecology and Evolutionary Biology, lends her expertise during a tour of the vertebrate collections for a closer look at the mammals that benefit from beaver-created wetlands.
PHOTO: N. FREIDENFIELDS, UCONN NRCA

of Directors, Laurie particularly wants to focus their survey efforts in the town of Kent, land trust properties, and specific micro-habitats within these areas so that the town and land trusts can better manage habitat for bat species. She also points out the need for well-trained wildlife rehabilitators who can care for abandoned or injured bats to help release them safely back into the wild.

Salamanders vs. Earthworms

Over the past few decades, an increase in human activity and movement has enabled the spread of non-native earthworms into new areas of North American forest ecosystems. These invasive earthworms are driving changes in soil structure, nutrient cycling, and competition with native species for food and/or space.

Evelyn, a member of the NRCA's Conservation Ambassador Program (CAP), notes that "something as small as an earthworm can affect the ecology of a forest." She is partnering with Annette Evans, a doctoral student at UConn, to examine the impacts of non-native earthworms on the abundance of eastern red-backed salamanders (*Plethodon cinereus*) in southwestern Connecticut. It is thought that earthworms reduce the amount of leaf litter and detritus on the forest floor, which in turn reduces the availability of invertebrates that make up the majority of salamander diets.

As Annette points out, "The introduction of non-native species, such as earthworms, can have devastating consequences for native ecosystems, including those in your town! Everyone can help preserve native Connecticut

Aiden is using SonoBat software to analyze bat acoustic recordings as part of his Conservation Training Partnerships project.
PHOTO: L. DOSS, MARVELWOOD SCHOOL

wildlife, such as salamanders, by not dumping unwanted plants or animals outside and never removing rocks or fallen logs from forests (even those next to your backyard!), as they provide important homes to native wildlife."

Birds of a Feather

Michael and Michaela are a father-daughter CTP team whose goal is to combine Michaela's passion for birding and Michael's passion for the Oswegatchie Hills Nature Preserve in East Lyme. According to Michaela, "The Oswegatchie Hills is an astounding place, with countless stories to tell." She and her dad plan to create a series of entertaining and educational videos about the preserve "in hopes that it will bring more interest to the Hills." Michael adds that when people become fascinated by the different things they can see and experience in the woods, they become more passionate about nature and thereby more inclined to preserve it.

Eastern red-backed salamanders (*Plethodon cinereus*) occur throughout Connecticut and are commonly found under leaf litter and woody debris on the forest floor.
PHOTO: N. FREIDENFIELDS, UCONN NRCA

Ovenbirds and Stock Market Models

Ovenbirds are olive-green warblers commonly heard singing throughout Connecticut forests during spring and summer, and the subject of CAP member Allie's project. She is working with Eliza Grames, a UConn doctoral student, to better understand factors that affect ovenbird singing. Using models similar to those in financial market trading and earthquake aftershock analysis, Eliza and Allie are exploring the role of time during the breeding season and forest fragmentation on ovenbird singing behavior.

When asked about the project, Allie said it is "a perfect fit for me because I am passionate about computer science and technology, as well as environmental conservation. I was surprised when I began my project at how easily accessible it was to me. I am not an expert on bird calls or Connecticut bird species, but I was immediately able to start learning more. It's important to understand that environmental conservation can be connected to many other fields (in this case, computer science) and that all forms of research are valuable." Eliza hopes "to help Allie develop programming skills that she can use in her future research and give her an opportunity to combine her interests in computer science and wildlife."

Eager Beavers

Inspired in part by the book *Eager: The Surprising, Secret Life of Beavers and Why They Matter* by Ben Goldfarb, CTP teammates, Christin and Melinda, are creating an online story map featuring a beaver-created wetland at Mendell's Folly preserve, a property of the Bethany Land Trust. Their story map will include information they gained during a recent visit to the UConn Storrs campus. Melinda and Christin were given a tour of the UConn vertebrate collections by Dr. Erin Kuprewicz and met with Anna Puchkoff, a graduate student in the department of Natural Resources and the Environment, to learn more about wetlands, the valuable services they provide, and the organisms that use them.

Melinda's goal with this project is to educate the general public and to encourage more people to participate in citizen science programs like the NRCA or smaller events, such as The Great Backyard Bird Count.

Interested in learning more about the Natural Resources Conservation Academy and conducting a local wildlife-related conservation project? Visit *https://nrca.uconn.edu* or email *nrca@uconn.edu* for more information. Programs are available for teens and adults. The CTP program is funded by a grant from the National Science Foundation; CAP support is provided in part by the Goldring Family Foundation, Inc.

A Rewarding Story of Rescue and Release

Written by Sandra Ruiz, DEEP Wildlife Division

Successful stories about the recovery of injured wildlife are often the result of cooperative work among non-profit organizations, citizens, and DEEP. This year, the cooperative action of Audubon Connecticut's Sharon Audubon Center, volunteers, and DEEP's Fisheries and Wildlife Divisions resulted in the successful rescue and release of an adult male bald eagle. Early this past May, staff from DEEP's Burlington Trout Hatchery found a bald eagle stranded at one of the ponds and immediately contacted the Wildlife Division. The bird was taken to Sharon Audubon's Wildlife Rehabilitation Clinic.

P. J. FUSCO

This 24-year-old bald eagle – the offspring of the first bald eagle pair to nest in Connecticut after almost 40 years of absence – was recently rehabilitated and released back into the wild.

Under the care of wildlife rehabilitation and outreach specialist, Sunny Kellner, along with the assistance of staff and volunteers, the eagle recovered his strength. Adult birds of prey taken in for rehabilitation without obvious injuries often show levels of lead poisoning and accumulation of environmental contaminants that are picked up from the prey and carrion they eat. In this case, medical examination showed no bodily injuries or chemical toxicity. The eagle's condition seemed to have been the result of weakness, possibly related to its remarkable age of 24 years old! Life expectancy in the wild ranges between 15 and 30 years, but for this bird to be free of toxins at that age is remarkable. Fortunately, the eagle only needed a safe place to recover weight and gain strength.

The surprise did not end with the medical results, band reports identified this eagle as a Connecticut native, banded as a chick by DEEP staff on June 8, 1995, in Barkhamsted. It is the offspring of the first pair of bald eagles to nest in Connecticut since the 1950s. This breeding pair was the only one in Connecticut from 1992 to 1995.

On October 1, 2019, after five months of hearty meals (including fish provided by the hatchery) and vigilant care, the eagle was released at the Burlington Trout Hatchery in the presence of those who were involved in his rescue and care.

Discover Outdoor CT 2019

Fun for the Whole Family

Written by Andrew LaBonte, DEEP Wildlife Division; photos by DEEP Wildlife Division staff

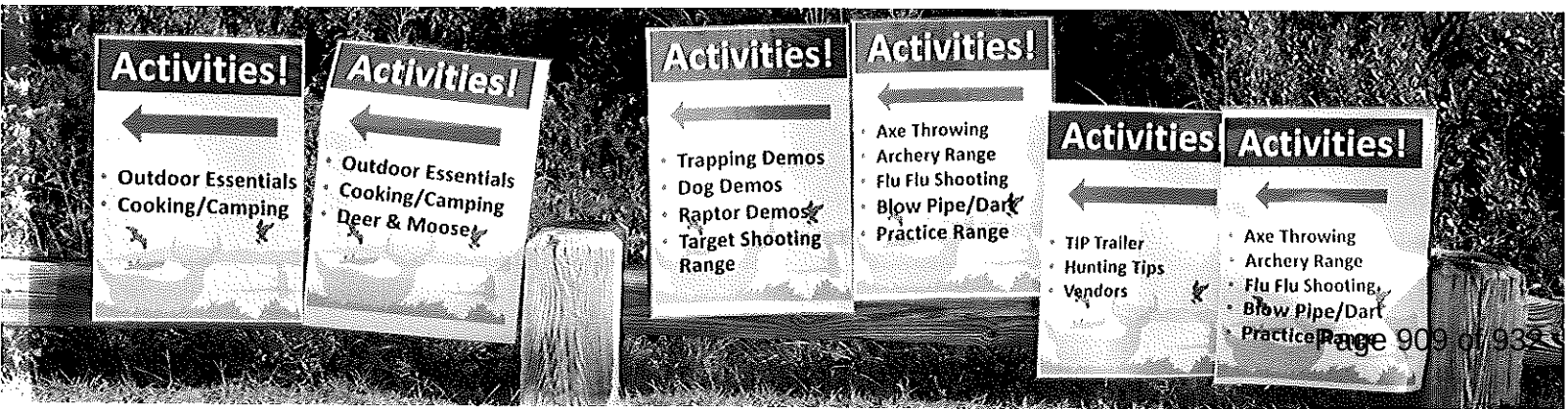
This year's Discover Outdoor Connecticut Day was held in September at Hammonasset Beach State Park in Madison. The Bureau of Natural Resources Wildlife and Fisheries Divisions, along with the Bureau of Outdoor Recreation's Divisions of State Parks, Law Enforcement, and Boating, cooperatively hosted the event with more than 30 other groups, such as private hunting and fishing clubs, environmental education centers, and other conservation organizations.

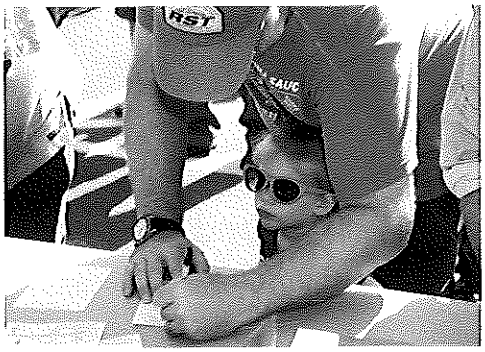
The federal Wildlife and Sportfish Restoration Program, which is funded by special fees on hunting and fishing equipment and helps finance wildlife and fish management, habitat restoration, and other conservation programs in the states, helped make this event possible. Additional support was provided by Bill Embacher Decoys-Avian Taxidermy, East Hartford Cabela's, The Country Butcher, Friends of Sessions Woods, Home Depot, High Rock Shooting Preserve, Quinebaug Kennels, and the Rocky Mountain Elk Foundation. Events like Discover Outdoor Connecticut would not be possible without tremendous support from various conservation and outdoor groups and local volunteers. The ultimate goal of the event is to provide attendees an opportunity to participate in various outdoor-related activities while also raising awareness and appreciation for resource conservation. Management efforts that benefit Connecticut's natural resources not only include fish and wildlife, but the air, water, and habitats in which those animals live. By introducing residents to our state's diverse natural areas and the species that live within, it is hoped they develop an appreciation, a sense of stewardship, and an interest in becoming involved.

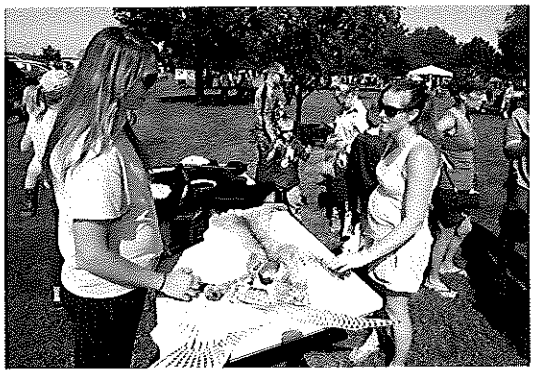
Emma Kowalchuk won third place in the youth category of the photo contest for her photo of a flower.

Participants at this year's Discover Outdoor Connecticut learned from natural resource professionals about ongoing habitat management programs (top) and tried their hand at casting with spinning reels.

The second Discover Outdoor Connecticut Photo Contest was held in conjunction







with the event. Whether a hunter, angler, or general outdoor enthusiast, seeing and capturing a great photo of a raccoon, frog, butterfly, dragonfly, or a beautiful landscape, can be a memorable experience.

The locavore movement is becoming more popular, spurring interest in harvesting and providing local food for one's own table. Thanks to generous venison donations from Josh Weiner and processing efforts from Steven Boyer of The Country Butcher in Tolland, over 300 pounds of local venison (deer) were made into kielbasa, meat sticks, pastrami, salami, and summer sausage for attendees to enjoy. Many left with a full appreciation of how good locally harvested food tastes and, hopefully, left them craving more.

Thanks to all of the DEEP staff, volunteers, and organizations who participated, the event featured a long list of outdoor activities for the whole family. Truly connecting with the outdoors cannot be accomplished through a smart phone or tablet. Nothing can replace a firsthand outdoor experience – such as spending the day on the water in a canoe or kayak, hiking through the woods with a camera, or harvesting one's own food for the table. Events like Discover Outdoor Connecticut not only increase awareness of DEEP's role in managing fish, wildlife, and their habitats, they also help build an understanding of the value and importance of natural resources as a whole.

It is hoped that attendees will continue to enjoy the outdoors and all it has to offer. Next year's event is planned again for Hammonasset Beach State Park, sometime in September. Stay tuned for details by checking the DEEP website at *www.ct.gov/deep/DiscoverOutdoorCT*.

Discover Outdoor Connecticut offers participants a unique opportunity to learn about Connecticut's natural resources and a variety of outdoor activities, including target archery, wildlife demonstrations, exhibits, a photo contest, venison tasting (left), and more!

Discover Outdoor Connecticut will be held in September 2020 at Hammonasset Beach State Park. Stay tuned for details at www.ct.gov/deep/DiscoverOutdoorCT or on Facebook at https://www.facebook.com/CTFishAndWildlife.

Notable Statistics from the 2018 Deer Hunting Season

Harvest Total	**11,345**
Archery Harvest	5,332
Shotgun/Rifle Harvest	4,298
Archery Permits	16,956
Shotgun/Rifle Permits	16,526
Success Rates	
Archery	31.3%
Shotgun/Rifle	24.6%
Muzzleloader	8.4%
Sex Ratio	
Males per Female	1.4:1
Top Harvest Towns	
Lebanon	227
East Haddam	228
Coventry	202
Woodstock	196
Top Archery Harvest Zone	
Zone 11	1,249
Reported Roadkill	608
Crop Damage	569

More specific details are in the 2018 Deer Program Summary at:

https://www.ct.gov/deep/lib/deep/wildlife/pdf_files/game/deersum2018.pdf

A Fun Day of Fishing!

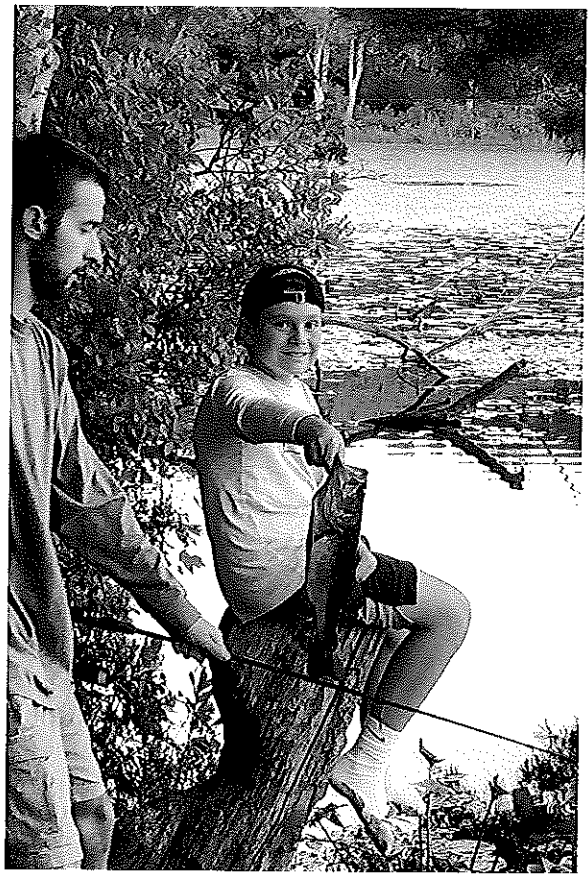


PHOTO COURTESY M. ADAMS

Thirteen-year-old Zack Adams attended DEEP's Discover Outdoor Connecticut Day this past September not knowing it would turn into the largest bass of his life! Zack was the winner of the Kid's Quiz contest at the event, which earned him a fishing prize package and an afternoon of fishing for his family at the Connecticut Aquatic Resources Education (CARE) Center.

Zack has experience trout fishing, but bass fishing was new to him. He and his brother, Jake, were in for a treat that evening and CARE Fishing Instructor Jake Parise was on hand to assist with this new style of fishing. The conditions were calm and perfect for casting topwater frogs. The plastic frogs dragged across lily pads triggered several eruptions, and the boys were rewarded with a few nice largemouth bass. In the meantime, CARE Instructor Jake caught some live bait – small bluegill sunfish that he rigged on a large circle hook under a bobber. Bluegill sunfish are bass candy, and this turned out to be the ticket for Zack's biggest largemouth bass ever. Zack casted one of the live bluegill along a weed line and soon watched the bobber disappear. After a short battle, Zack pulled to shore a largemouth bass that was pushing four pounds. Congratulations to Zack!

Justin Wiggins, DEEP Fisheries Division

Bird Species on the Brink

Using the latest climate change models and known home ranges of 604 North American birds, National Audubon Society scientists were able to predict how each species' range will shift as climate change and other human impacts continue to influence the continent. The results indicate that two-thirds (389 out of 604) of North American bird species will be forced to relocate as the climate warms, and many of those species may not survive. While one might think that certain species would simply shift their home ranges further north, the models emphasize the fundamental climate needs each species requires for survival; not the specifics of habitat. In other words, some species will likely be forced to move their home ranges further north, but there may not be any suitable habitat for them when they get there. So what does this mean for Connecticut birds? A two degrees Celsius warming could mean that over 50 species that call our state home may lose more than half of their current range. This includes the eastern towhee, American woodcock, bobolink, and ovenbird. Reducing our carbon emissions and better absorbing emissions that are produced would greatly help limit our planet's warming trend. To learn more about how climate change will impact birds, visit *www.audubon.org/climate/survivalbydegrees.*

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Conservation Calendar

Dec. - March ..... Observe eagles at the Shepaug Dam Observation Area in Southbury. The viewing area is open Saturdays, Sundays, and Wednesdays from 9:00 AM to 1:00 PM from early December through early March. Visitation to the observation area is by reservation only. To schedule a free visit, go to *https://www.firstlightpower.com/recreation/?location_id=397* or call 1-800-368-8954 (Tuesday through Friday between 9:00 AM and 3:00 PM).

Jan. - April..... Donate to the Endangered Species/Wildlife Income Tax Check-off Fund on your 2019 Connecticut Income Tax form. Learn more at *www.ct.gov/deep/EndangeredSpecies*.

Early 2020 Hunting Season Dates

Jan. 1-31..... Bowhunting season for deer and turkey on private land only in Deer Management Zones 11 and 12.

Jan. 1-Feb. 29..... Hunting continues for pheasant, chukar and Hungarian partridges, gray squirrels, cottontail rabbits, European hares, and red and gray foxes. (See the 2020 Connecticut Hunting and Trapping Guide for additional season dates.)

Jan. 15-Feb. 15..... Canada goose late season in the south zone.

Consult the 2020 Connecticut Hunting and Trapping Guides and 2019-2020 Migratory Bird Hunting Guide for specific season dates and details. Guides are available at DEEP facilities, town halls, and outdoor equipment stores, and also on the DEEP website **(www.ct.gov/deep/hunting; www.ct.gov/deep/fishing)**. *Go to* **www.ct.gov/deep/sportsmenlicensing** *to purchase Connecticut hunting, trapping, and fishing licenses, as well as required permits and stamps. The system accepts payment by VISA or MasterCard.*

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Recovering America's Wildlife Act Advances in the U.S. House of Representatives

ALLIANCE FOR AMERICA'S FISH & WILDLIFE

The U.S. Congress House Committee on Natural Resources recently advanced bills that protect our rivers and restore our wildlife populations, including Recovering America's Wildlife Act (H.R. 3742) which has 157 bipartisan cosponsors toward final passage in the House.

State fish and wildlife agencies have identified over 12,000 species in need of proactive conservation to prevent them from becoming threatened or endangered. The bipartisan Recovering America's Wildlife Act (RAWA), reintroduced by Representatives Debbie Dingell (D-MI) and Jeff Fortenberry (R-NE) in July of this year, is a solution to this critical problem.

The bill will dedicate $1.3 billion annually to state fish and wildlife agencies to implement their science-based wildlife action plans and an additional $97.5 million for tribal fish and wildlife managers to conserve fish and wildlife on tribal lands and waters. This will provide dedicated funding, so state and tribal wildlife managers can proactively conserve fish and wildlife species of greatest conservation need in a voluntary, non-regulatory manner before federal listing under the Endangered Species Act is warranted. All of this can be done without additional taxes. Learn more at *www.ct.gov/deep/AllianceforFishandWildlife* or *http://ournatureusa.com/*. Follow progress on RAWA on Facebook at *https://www.facebook.com/OurNatureUSA*.

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MANSFIELD CONSV/INLD WETLANDS
TOWN HALL
4 S EAGLEVILLE RD
STORRS CT 06268-2574

P. J. FUSCO

A cedar waxwing makes use of ornamental crabapple berries on a cold and icy winter morning.

SATURDAY, MARCH 21

36th Annual Connecticut Land Conservation Conference

Please join the Connecticut Land Conservation Council for the state's largest land conservation gathering and CLCC's premier annual event, featuring a full day of educational workshops and peer-to-peer networking followed by an informal reception with friends and colleagues from across the state.

Learning, sharing, and growing our skills & knowledge!

CONFERENCE AGENDA

7:30 am	Registration & Continental Breakfast
8:30 am	**Plenary Session** • Welcome Address • Awards Ceremony • Keynote Speaker
10:00 am	Break
10:30 am	**Workshop Session A**
12:00 pm	Lunch
1:15 pm	**Workshop Session B**
2:30 pm	Break
2:45 pm	**Workshop Session C**
4:00 pm	Break
4:15 pm	**Workshop Session D**
5:00 pm	Reception

Keynote Speaker

Coping with Green Angst: A Young Kaitiaki's Call to Action

Like all of us struggling to cope with the global climate crisis, twenty-two year old environmentalist and veterinary student, **Anne-Sophie Pagé**, is consumed by angst over the fate of our planet.

Embracing the Kaitiakitanga philosophy (environmental guardianship) of the indigenous Māori people of her native New Zealand, Anne-Sophie will share her hopes for the future through the lens of her global wildlife research—highlighting the importance of land conservation and other natural climate solutions for saving the planet, and inspiring us to take action to fight the climate crisis head-on.

Read more about Anne-Sophie at ctconservation.org

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Choose 4 Workshops (1 from Session A, B, C, and D) Workshop Descriptions at ctconservation.org

Session A: 10:30 am–12:00 pm	Session B: 1:15–2:30 pm	Session C: 2:45–4:00 pm	Session D: 4:15–5:00 pm
TRACK 1 : Conservation Policy, Advocacy & Engagement			
A.1 Waging Peace Through Land Conservation: Resilience in the Face of Climate Crisis	**B.1** Connecticut General Assembly 2020 Session Update	**C.1** Environmental Justice Roundtable	**D.1** A Conversation with Anne-Sophie Pagé and Dahr Jamail
A.2 Land Trust Law School—Tree and Land Law Connecticut Style	**B.2** Survival by Degrees: 389 Bird Species on the Brink	**C.2** Land Trusts Taking Action on Climate Change	**D.2** Update on Farm Bill and NRCS Funding Programs
TRACK 2 : Land Protection – Project Planning, Due Diligence & Model Documents			
A.3 Intro to Revised Model Conservation Easement (101 Series)	**B.3** Revised Model Conservation Easement—Advanced Topics	**C.3** Best Practices in Due Diligence	**D.3** Intro to CT Model Agricultural Easement (101 Series)
	B.4 Doing Deals (101 Series)	**C.4** Doing Deals—Advanced Models	**D.4** Model Forever Wild Easement
	B.5 Farmland Access for New and Beginning Farmers		
TRACK 3 : Stewardship I – Managing Land to Mitigate & respond to Climate Change			
A.4 Film: *Lost Forests of New England*, followed by Q&A	**B.6** Wildlands: Why We Need Them and How to Create and Manage Them	**C.5** Forest Protection and Management for Biodiversity and Climate Mitigation	**D.5** Making the Case for Conservation: 30 Years of Landscape Change in CT
A.5 Forest Management with a Climate Lens	**B.7** Drones for Biodiversity Conservation	**C.6** Working Lands as a Key to Climate Change Mitigation	
A.6 New England Landscape Futures Explorer Tool: Envision/Plan for Resilience			
TRACK 4 : Stewardship II – Habitat Management & Restoration			
A.7 Stewardship Speed Dating (101 Series)	**B.8** Invasive Species Management Calendar	**C.7** Innovative Beaver Control Program	**D.6** Restoring a Coastal Forest in Westport
			D.7 Trail Building Basics (101 Series)
TRACK 5 : Stewardship III – Managing Land for Public Access & Community Engagement			
A.8 Youth-Powered Partnerships: Engaging Next Gen Conservation Leaders	**B.9** Risk Management Strategies	**C.8** Introducing Multi-Use Trails to Your Land Trust Properties (101 Series)	**D.8** Using Conserved Land as Laboratory and Classroom
A.9 Community Forests: The 21st Century New England Town Forest	**B.10** Wander Our Watershed: Connecting Communities & Open Spaces	**C.9** Hidden Landscapes: Native American Stone Ceremonial Sites on Public and Private Lands	**D.9** Landscape Design for Cognitive Development
A.10 A Seat at the Table: Partnerships for Healthier Communities		**C.10** Become a Certified Frogwatch Citizen Scientist (2 hrs)	**D.10** Building Community Engagement with Pollinator Pathways
TRACK 6 : Organizational Strength & Sustainability			
A.11 Looking in the Mirror Towards a More Diverse Organization	**B.11** Building a Stronger Board (101 Series)	**C.11** Connecticut Land Trust Mergers (101 Series)	**D.11** Staffing Up!
	B.12 Record Keeping (101 Series)	**C.12** Boards, Fundraising, Strategic Plans	**D.12** Financial Reports & Accounting
	B.13 Annual Stewardship Workplan	**C.13** Ins & Outs of Restricted Gifts	
		C.14 Accreditation Myth Busters and Unexpected Bonuses	
TRACK 7 : Fundraising & Communications			
A.12 Connecting More Effectively with People from All Walks of Life	**B.14** Using Visual Communications to Connect and Inspire People to Action	**C.15** It's Not What You Save, It's Why You Save It	**D.13** Social Media—You Can Do It!
A.13 Raising Major Gifts from Individuals (101 Series)			

*The **101 Series** is an entry-level workshop for those new to land conservation work, or needing a refresher.*

CUT ALONG LINE

Online Registration is Easy!

Via Credit Card or Check

www.ctconservation.org/2020-conference

(Check One)

☐ $65 CLCC Members

☐ $85 Non-Members

☐ $25 Students

**Add $10 for registrations mailed after March 1.*

Send check payable to:

"CLCC" with memo "2020 Conference" and completed registration form to:

Connecticut Land Conservation Council
deKoven House
27 Washington Street
Middletown, CT 06457

Name _____

Organization _____

Address _____

Town _____

State _____ Zip _____

Phone _____

Email _____

Select 4 Workshops

(1 from Sessions A, B, C, and D)

Session A _____

Session B _____

Session C _____

Session D _____

Visit www.ctconservation.org/2020-conference for full workshop titles and descriptions, conference updates, to download a PDF of this brochure, and more.

Amy Blaymore Paterson
abpaterson@ctconservation.org
(860) 852-5512

MINUTES (DRAFT)

Members Present:	S. Stearns (Chair), C. Keuffner, T. Wollen, E. Hall, D. Dorfer, J. Jeliffe, M. Tindall (alt), N. Rawn (alt)
Members Absent:	J. Lovdal, (recently resigned)
Staff Present:	J. Kaufman, Senior Planner/Inland Wetlands Agent; J. Woodmansee, Planning Specialist;

CALL TO ORDER AND ROLL CALL
Chair Stearns called the meeting to order at 7:00 PM.

APPOINTMENT OF SECRETARY
Nancy Rawn volunteered to be Secretary for this meeting.

OPPORTUNITY FOR PUBLIC COMMENT
No public comment

MINUTES

December 3, 2019 minutes- Diane motioned to approve the minutes and Nancy seconded, the minutes passed unanimously.

NEW BUSINESS

A. INTERPRETATION OF ZONING REGULATIONS: ARTICLE 10, SECTION T, AGRICULTURAL USES

In light of Jillene's presence and the presence of two members of the public, (Mr. Morse and Ms. Peters) for whom this matter was related, new business was conducted first. Jillene introduced the issue of an animal enclosure at 170 Crane Hill Road that had been referred to the Agriculture Committee by the Planning and Zoning Committee. The owner of this property had been issued a violation based on the original interpretation of the enclosure as a "pen". The owners disputed this and called it a "pasture". Pictures of the property and enclosure, and maps of the site were examined and after some discussion, a motion was made by Terry Wollen that "the questionable area is a pen, not a pasture." This was seconded by Ed Hall. Discussion followed. It was generally agreed upon by the committee that an enclosure in which goats are housed permanently, fed, and watered and in which the fencing is not moved for said goats in a regular manner, is a pen. The fact that it is greater than 200 square feet is not relevant in this situation. Public comment by Mr. Morse confirmed that it is not a grassy area and Ed added that this time of year they would have to be fed in such an area, since it lacks potential for grazing. Stacy read definitions of "pen" and "pasture" from UNH Extension that reinforced ideas expressed by Ed.

A vote was taken: The motion passed
In favor: Dorfer, Rawn, Hall, Wollen (Rawn was seated as voting member.) Abstained: Jeliffe, Keuffner

B. 2019-2020 AG LEASE REPORTS

Jennifer asked for confirmation that members of the committee had reviewed the Ag Lease Reports and asked if there were any questions. Chris moved that the Ag Lease Reports were reviewed and Terry seconded. All voted in favor.

OLD BUSINESS

A. Taste of Mansfield Update – Jill Martin, UConn Extension

Tabled to February 2020 meeting.

B. March 9, 2020 Farmers Forum

Jennifer confirmed that it will take place at Buchanan Center at the library. The program was discussed and the following was decided on: Introductions, an update on Ag Committee projects (including the farm to table dinner), an update on Taste of Mansfield. A suggested keynote speaker was Bryan O'Hara, as he has a new book out. An alternate or second speaker suggested was Shuresh Gamire. Diane will explore those two possibilities and get back to Jennifer. Finally, farmers would have an opportunity to sign up as providers for the Farm to Table Dinner.

C. Marketing and Outreach

- **Farm to Table Dinner:** Diane reported that she spoke with Leslie McDonough, of Mansfield Library and that the lawn at the library could be used for this purpose, even on a Sunday. Bathrooms and kitchen area could be used. She reported that tent rental would by @$700. (20ft x 40 ft) and would hold tables for 60 people. Sarah Cook Curtis, owner of Not Only Juice, was interested in catering. Tentative date of July 25th was proposed. It was agreed that draft budget was needed. Sub committee was chosen to meet with Sarah and Leslie. (Nancy and Diane) and will meet before Feb. Ag Comm Meeting. Jenn suggested that Taste of Mansfield could promote it.
- **Radio Appearance** Stacey reported that Ken Rawn (of local CSA) will appear on Wayne Norman show on Feb 19th to talk about the CSA concept, CSA day and local food. It was suggested a second farmer join Ken; Diane, Susan Mitchell, or Jiff Martin.
- **CSA Article in Mansfield Connections**: Stacey reported that this publication would not write such an article due to its policy of not promoting businesses.

D. Membership

Melissa Tindal and Nancy Rawn were approved as alternates, Diane Dorfer was made a full member due to resignation of Jude Lovdal. Jenn confirmed that there is one alternate seat open and that this news should be spread.

REPORTS

A. COMMITTEE MEMBER REPORTS

None

B. STAFF REPORT

Jennifer reported that the following events are happening:

- Community Dinner at the Middle school, January 29th
- A Friends and Farmers event for local CSAs at the library in coordination with morning storytelling on Feb. 22nd.
- There will be a Know Your Farmer Fair in Windham on Feb. 29th
- A member event at the Community Center about CSAs and local food presented by Jiff Martin.4/29 from 6:30-8 pm MCC Community Room
- A member event at the Community Center by Raluca on Pollinator Plants-4/23 from 7-8:30 in the MCC Community Room

All of these events will be on the Taste of Mansfield Website.

Stacey moved to adjourn at 9:04. Chris seconded. The Motion passed unanimously.

Respectfully Submitted:

Nancy Rawn
Acting Secretary

Parks and Natural Resources Committee

Tuesday January 21, 2020 7:00 PM
Mansfield Town Hall Conference Room B
Minutes -- DRAFT

1. **Call to order**
   The meeting was called to order at 7:01 PM
   Roll Call
   Attending: Jim Morrow (Chair), Ken Feathers (secretary), Quentin Kessel (Cons. Com. Rep.), Sue Harrington, Michael Soares, Julianna Barrett (alt.), Vicky Wetherell (by phone)
   Not present but on committee roster: Tom Harrington
   Town Staff Present: Jennifer Kaufman
2. **Brief Review of On-Line Meeting Software**
   Town staff presented an overview of new software to be used for minutes and agenda of our meetings as the town migrates away from paper documents. The goal is to have standardized formats and access. The software will be accessible through mansfield.civicweb.net, and all our documents with have both "public access" and "confidential" versions, with access to the confidential versions regulated by login credentials issued to the committee. Implementation is pending.
3. **Opportunity for Public comment**
   No members of the public were present.
4. **Review of Minutes**
   1. The Minutes of the November 19, 2019 meeting were approved, with modification of the close to read "respectfully submitted" (moved Kessel, second Soares)
   2. The minutes of the November 16, 2019 special meeting were approved, with modification to add that Soares was not present (moved Feathers, seconded S. Harrington)
      A tangent discussion ensued with a question from Soares regarding committee membership; Town staff listed current members and indicated that there is one vacancy for an alternate due to a resignation in the fall.
   3. It was pointed out that the January 10, 2020 meeting did not have a quorum, and should be recharacterized as notes rather than minutes, with no approval therefore necessary.
5. **New Business**
   1. *Mansfield Dog Park – Presentation from Community Members*
      Presentation was tabled to the February meeting because the group was not present
6. **Continuing business**
   1. *Simpson-Wood Preserve Projects.*
      Morrow reported on the January 10 trip that he and Feathers took to go out and mark final trail layout in areas identified as needing work during the November 16 special meeting. Feathers had earlier walked the property with John Hankins, and Morrow and Feathers confirmed and finalized some suggested routing solutions on January 10, with the results summarized for today's meeting.
      Kaufman reported that town staff and Morrow met with Monty Grable, an eagle scout, about the details of a proposed project, and the decision was to refocus the project from a bridge crossing a wet area on the north-east part of the loop trail to instead ensuring that the entry

point and trail beginning had adequate provisions, such as a boardwalk or other low structure, to cross the major wet area near the road. A picture of a metal grid "boardwalk" was shown as a concept. Discussion focused on the need for any structures placed by the project to ensure that they did not impede any emergency vehicle access or future parking development. Wetherell advocated for expecting to need to develop parking at the trail head to address safety concerns with crossing Route 89 from the Mount Hope parking area. Discussion continued to note that any signage also should be installed to not impede emergency access or future parking development, including sightlines. Town staff will plan to meet on-site with town fire safety personnel to ensure that any boardwalk is appropriately placed.

2. *Simpson-Wood Draft Management Plan*
   See note under 3
3. *Moss Sanctuary Management Plan*
   Discussion of both Management Plans considered the need for a semi-generic template, as general as possible, that references an attachment listing priorities specific to the parcel. Soares and Feathers agreed to meet before the next meeting to develop a framework, with town staff needing 24 hours to publish notice of the meeting, tentatively on 4 February.
4. *Winter/Spring Programming*
   Report by S. Harrington:
   The winter tree walk got 12 people.
   The winter birding program was cancelled due to low registration.
   Discussion covered the need to better define the process for cancellation.
   A more general discussion of fees occurred:
   It was pointed out that materials available in print and on the web were inconsistent in listing fees, and town staff agreed that this needed to be improved.
   Harrington pointed out that free programs were well attended (example: tree walk), but programs with fees often were undersubscribed (example: winter birding). Discussion raised a general question of why programs that specifically addressed our committee's educational mission needed a fee, especially if they took place in the parks and did not use the community center facilities. Town staff indicated that the fees stemmed from the fee-based model of the community center, that fees were used to pay instructors, and there was a waiver process for individuals. The committee's suggestion was to look into the potential for a blanket waiver for programs that could be considered as sponsored by PANRC, rather than the community center, especially if there was no facility usage at the community center and/or the instructor was a volunteer not seeking reimbursement for their time.
   (Editorial note: absent from discussion was any consideration of a need for liability coverage.)
   Upcoming programs:
   - A Mother's Day bird walk is planned
   - Trails Day is June 7th, and the plan is to repeat the popular "Unnatural History" activity at Merrow Meadow that was run last year. Timing will be June 7 from 1-3 pm.
   - Also for Trails Day Merrow and Charlotte Pyle will run a guided walk of the Simpson-Wood Preserve trail loop. Timing will be June 6 from 9:30 to 11:30 am

   Discussion of coordination of the two Trails Day events finalized the proposed times noted above for inclusion in the community center brochure.

7. **Communications**
   1. *Other Committee Minutes*
      Consensus of the group was that there were no particular issues concerning our committee in the minutes listed in the agenda
   2. *Member Updates*
      - Morrow continued discussion reporting observations regarding trails at Simpson-Wood Preserve. Some wet areas may be able to be improved with minimal drainage modifications of the old logging roads, after obtaining appropriate wetland permissions.
      - A discussion of mountain bikes occurred, stemming from observation that there did not seem to be current bike activity at Simpson-Wood Preserve. Town policy is that we cannot prohibit them, but won't encourage their use except in specific preserves with appropriately designed trails. Feathers suggested a need for a long term monitoring study of trails, to identify any potential impact, perhaps coordinated with UConn.
   3. *Staff Report*
      - The town is continuing to try for a National Park Service technical assistance grant. An NPS person will meet with the town to discuss an application to consolidate all trails information.
      - There are two large subdivision applications pending, one from Mansfield Housing Authority and one from JE Shepard. The committee will have referral with opportunity to comment on JE Shepard, which has some identified cultural resources to address, but the Housing Authority is exempt because it is under statute 830g for affordable housing.
        Discussion ensued as to why the Housing Authority should not have to address how they conform to Mansfield's goals for conservation and sustainability. Town staff indicated that stormwater and wetlands requirements apply, but for other considerations the burden of proof is on the Town to show a problem, not on the applicant to show it conforms. The committee was referred to the 12/2 PZC packet for additional information on the project.
   4. *Correspondence as noted in package*
8. **Executive session in accordance with CGS section 1200(6)(D)**
   There were no issues requiring an executive session, and none was held
9. **Future Meetings**
10. **Adjournment**
    The meeting was adjourned at 8:29 PM by consensus (moved Kessel, seconded S.Harrington)

Respectfully Submitted
Ken Feathers, Secretary

MINUTES

Members Present:	P. Aho, B. Chandy, L. Cooley, C. Cotton, D. Plante, K. Rawn, V. Ward
Members Absent:	S. Accorsi, R. Hall
Alternates Present:	J. DeVivo, K. Fratoni
Staff Present:	L. Painter, Director of Planning and Development; J. Kaufman, Senior Planner/Inland Wetlands Agent; J. Woodmansee, Planning Specialist; E. Galbraith, Administrative Assistant

CALL TO ORDER AND ROLL CALL

Chair Aho called the meeting to order at 6:32 PM. Members present are Aho, Chandy, Cooley, Cotton, Plante, Rawn and Ward. Alternates DeVivo and Fratoni are seated for absent members.

APPROVAL OF MINUTES

Cooley stated that she watched the video recording of the January 6, 2020 IWA meeting. Chandy MOVED, Plante seconded, to approve the January 6, 2020 meeting minutes as presented. Motion PASSED unanimously.

COMMUNICATIONS

A. The Conservation Committee did not meet in January.

B. Inland Wetlands Agent Kaufman reported that a notice of violation was issued to 753 Storrs Road for tree clearing and deck installation without a wetlands review or permit.

PUBLIC HEARINGS

OLD BUSINESS

A. Application of the Mansfield Non-profit Housing Development Corporation (owner/applicant) for a multifamily development at 113-121 S. Eagleville Road (Parcel ID 16.57.5) (IWA File W-1612)

Rawn MOVED, Ward seconded, to schedule a public hearing on March 2, 2020 at 6:30 pm in the Council Chamber of the Audrey P. Beck Building, 4 South Eagleville Road to hear comments on the application of the Mansfield Nonprofit Housing Development Corporation (owner/applicant) to construct a multifamily development consisting of 7 buildings, 81 parking spaces and associated site improvements on property located at 113-121 S. Eagleville Rd (Parcel ID 16.57.5) pursuant to the Mansfield Inland Wetlands and Watercourses Regulations (File #W1612). Motion PASSED unanimously.

B. Application of J.E. Shepard Company and Capstone Collegiate Communities for construction of a 358-unti multifamily development at 1612 Storrs Road and Middle Turnpike (Assessor Parcel IDs 9.23.1, 9.23.7 and 9.23.8) (W1611-1)

Cooley MOVED, Plante seconded, to schedule a special meeting of the Inland Wetlands Agency and a public hearing on March 4, 2020 at 6:30 pm in the Council Chamber of the Audrey P. Beck Building, 4 South Eagleville Road to hear comment on the revised application submitted by JE Shepard Company and Capstone Collegiate Communities (IWA File 1611-1) under the Inland Wetlands and Watercourses Regulations of the Town of Mansfield for construction of a 358-unit multi-family development in 10 residential buildings on property located at 1621 Storrs Road and Middle Turnpike (Assessor Parcel IDs 9.23.1, 9.23.7 and 9.23.8) as shown on a map dated 8/22/2019, revised through 12/30/2019. Motion PASSED unanimously. Kaufman explained that a special meeting has been scheduled for this public hearing, to avoid holding two potentially lengthy public hearings on the same night.

NEW BUSINESS

Wetlands Citation Ordinance

Plante MOVED, Ward seconded, to authorize the Chair to draft letter to the Town Council in support of modifying section 40-6 of the Town of Mansfield Code of Ordinances to be consistent with state statute. Motion PASSED unanimously.

OTHER COMMUNICATIONS AND BILLS

Noted.

REPORTS FROM OFFICERS AND COMMITTEES

None.

ADJOURNMENT

Aho adjourned the meeting at 6:40 PM.

Respectfully Submitted:

Emmy A. Galbraith
Administrative Assistant

MINUTES

Members Present:	P. Aho, B. Chandy, L. Cooley, C. Cotton, D. Plante, K. Rawn, V. Ward
Members Absent:	S. Accorsi, R. Hall
Alternates Present:	J. DeVivo, K. Fratoni
Staff Present:	L. Painter, Director of Planning and Development; J. Woodmansee, Planning Specialist; E. Galbraith, Administrative Assistant

CALL TO ORDER AND ROLL CALL

Chair Aho called the meeting to order at 6:41 p.m. Members present are Aho, Chandy, Cooley, Cotton, Plante, Rawn, and Ward. Alternates DeVivo and Fratoni are seated for absent members.

APPROVAL OF MINUTES

Cooley stated that she watched the recording of the January 6, 2020 PZC meeting.

Rawn MOVED, Chandy seconded, to approve the January 6, 2020 meeting minutes as presented. Motion PASSED unanimously.

ZONING AGENT REPORT

None.

PUBLIC HEARINGS

A. Application of the Mansfield Nonprofit Housing Development Corporation (owner/applicant) to amend the Zoning Map to change the zoning of property located at 113-121 South Eagleville Road (Parcel ID 16.57.5) from Rural Agriculture Residence 90 (RAR-90) to South Eagleville Road Housing Opportunity Zone (SER-HO) pursuant to Sec. 8-30g, C.G.S. (PZC File 1364-1)

Aho opened the public hearing at 6:43 p.m. Members present are Aho, Chandy, Cooley, Cotton, Plante, Rawn, and Ward. Alternates DeVivo and Fratoni are seated for absent members. Painter read aloud the legal notice advertising the public hearing, which was published in The Chronicle on 1/11/2020 and 1/16/2020.

Ward MOVED, Fratoni seconded, to adjourn the public hearing on the Zoning Map Amendment application (PZC File 1364-1) of the Mansfield Nonprofit Housing Development Corporation to change the zoning of property located at 113-121 South Eagleville Road to Monday, March 2, 2020 at 6:45 p.m. in the Council Chambers of the

A.P. Beck Municipal Building. Motion PASSED unanimously. The public hearing was closed at 6:46 p.m.

B. Site plan application of the Mansfield Nonprofit Housing Development Corporation (owner/applicant) for a 42-unit multifamily residential development at 113-121 South Eagleville Rd (Parcel ID 16.57.5) pursuant to Sec. 8-30g, C.G.S. (PZC File 1364-2)

Aho opened the public hearing at 6:46 p.m. Members present are Aho, Chandy, Cooley, Cotton, Plante, Rawn, and Ward. Alternates DeVivo and Fratoni are seated for absent members. Painter read aloud the legal notice advertising the public hearing, which was published in The Chronicle on 1/11/2020 and 1/16/2020.

Cotton MOVED, Rawn seconded, to adjourn the public hearing on the Site Plan application (PZC File 1364-2) of the Mansfield Nonprofit Housing Development Corporation for a multi-family development at 113-121 South Eagleville Road to Monday, March 2, 2020 at 6:50 p.m. in the Council Chambers of the A.P. Beck Municipal Building. Motion PASSED unanimously. The public hearing was closed at 6:50 p.m.

OLD BUSINESS

A. Modification to Special Permit: Application of Wendy and Dudley Hamlin (owner/applicant) of Holiday Hill Day Camp & Recreation Center, 41 Chaffeeville Road, Mansfield Center to convert existing vacant home on property to Airbnb lodging for wedding and party venue customers. (PZC File 0056)

Painter presented an overview of the requested modification.

Ward MOVED, Plante seconded, to authorize the Zoning Agent and PZC Chair to approve the application of Wendy and Dudley Hamlin to modify the Special Permit for the Holiday Hill Day Camp and Recreation Center at 41 Chaffeeville Road for use of a house on the property as a short term rental as specified in application materials. This approval is granted subject to the condition that the owners obtain and maintain a rental certificate pursuant to Chapter 130 of the Mansfield Code of Ordinances. Motion PASSED unanimously.

B. Interpretation of Zoning Regulations: Articles 10, Section T, Agricultural Uses

Painter updated the Commission on the Agriculture Committee's review of the question as to what constitutes a "pen" as opposed to a "pasture" and read excerpts from the Agriculture Committee minutes as well as a UNH Extension document referenced by the Agriculture Committee.

Cooley MOVED, Fratoni seconded, to direct Zoning Agents to use the following characteristics of an animal pen in determining whether a fenced enclosure is a pen or a pasture pursuant to Article 10, Section T.3.5.a:

- Characteristics of an animal pen: an enclosure where animals are housed permanently, fed, watered and in which the fencing is not moved in a regular manner.

Motion PASSED unanimously.

C. PZC-Initiated Amendments to Articles 7, 8 and 10 of the Mansfield Zoning Regulations related to owner-occupancy requirements for two-family and efficiency dwelling units and setback requirements for parking associated with parks, preserves and playgrounds. (P907-47)

Chandy MOVED, Plante seconded, to change the effective date from January 15, 2020 to February 1, 2020 for the amendments to Articles 7, 8 and 10 of the Mansfield Zoning Regulations related to owner-occupancy requirements for two-family and efficiency dwelling units and setback requirements for parking associated with parks, preserves and playgrounds that were adopted on January 6, 2020. Motion PASSED unanimously.

D. Application of the Mansfield Non-Profit Housing Development Corporation (owner/applicant) to amend the Zoning Map to change the zoning of property located at 113-121 South Eagleville Road (Parcel ID 16.57.5) from Rural Agriculture Residence 90 (RAR-90) to South Eagleville Road Housing Opportunity Zone (SER-HO) pursuant to Sec. 8-30g, C.G.S. (PZC File 1364-1)

Tabled to March 2, 2020 Public Hearing.

E. Site plan application of the Mansfield Nonprofit Housing Development Corporation (owner/applicant) for a 42 unit multi-family residential development at 113-121 So. Eagleville Road (Parcel ID 16.57.5) pursuant to Sec. 8-30g, C.G.S. (PZC File 1364-2)

Tabled to March 2, 2020 Public Hearing.

F. Application for Site and Building Modifications to the Spring Hill Inn on property located at 957 Storrs Road (Parcel ID 23.59.12), Lee Lambert, owner/applicant.

Tabled at the request of the applicant.

G. Application of the Taylor Family Trust (owner/applicant) to amend the Zoning Map to change the zoning of a portion of property located on the north side of Storrs Road, between 9 Timber Drive and 1768 Storrs Road (Parcel ID 2.5.22) from Rural Agriculture Residence 90 (R-90) and Professional Office 1 (PO-1) to Planned Business 3 (PB-3). (PZC File 1365)

Tabled to February 18, 2020 Public Hearing.

NEW BUSINESS

None.

REPORTS FROM OFFICERS AND COMMITTEES

Chairman's Report

None.

Regional Planning Commission

None.

Regulatory Review Committee
Aho noted that the next meeting is scheduled for Friday, February 7, 2020.

Planning and Development Director's Report
Painter noted that the terms of current Design Review Panel members have expired; however, by Town regulation, they continue to serve until they are reappointed or replaced. By consensus, the Commission requested that staff ask current members if they are interested in continuing to serve on the committee. If any members are not interested in continuing, staff will conduct outreach to find a replacement based on the member's field of expertise.

Other Committees
None.

COMMUNICATIONS AND BILLS
None.

ADJOURNMENT
Aho adjourned the meeting at 7:11 p.m.

Respectfully Submitted:

Emmy A. Galbraith
Administrative Assistant

MINUTES (Draft)

Members Present:	P. Aho, B. Chandy, L. Cooley, C. Cotton, D. Plante, K. Rawn, V. Ward
Members Absent:	S. Accorsi, R. Hall
Alternates Present:	J. DeVivo, K. Fratoni
Staff Present:	J. Kaufman, Senior Planner/Inland Wetlands Agent; E. Galbraith, Administrative Assistant

CALL TO ORDER AND ROLL CALL

Chair Aho called the meeting to order at 6:30 p.m. Members present are Aho, Chandy, Cooley, Cotton, Plante, Rawn, and Ward. Alternates DeVivo and Fratoni are seated for absent members.

Kaufman presented members with an Agenda Item to add under New Business.

Ward MOVED, Cooley seconded, to add the Application of the Town of Mansfield Parks and Recreation Department to construct a 50 by 100-foot parking lot at Simpson-Wood Preserve, Rte. 89, Assessor's Parcel ID 19.70.12-1 under New Business. Motion PASSED unanimously.

APPROVAL OF MINUTES

Ward MOVED, Chandy seconded, to approve the January 21, 2020 meeting Minutes as presented. Motion PASSED unanimously.

OLD BUSINESS

A. Application of the Mansfield Non-Profit Housing Development Corporation (owner/applicant) for a multifamily development at 113-121 S. Eagleville Rd (Parcel ID 16.57.5) (IWA File W-1612)

Tabled to March 2, 2020 Public Hearing.

B. W1611-1- Application of J.E. Shepard Company and Capstone Collegiate Communities-Construction of a 358-unit multi-family Development-1621 Storrs Road and Middle Turnpike (Assessor Parcel IDs 9.23.1, 9.23.7 and 9.23.8)

Tabled to March 4, 2020 Public Hearing.

NEW BUSINESS

A. Application of Hull Forest Products for a Jurisdictional Ruling to Conduct a Timber Harvest at 971 and 979 Warrenville Rd and

Adjacent Vacant Parcel to the North-Assessor Parcel IDs 6.51.3, 6.52.5, and 6.51.4 (File # J-16)

Chandy MOVED, Plante seconded, to approve a finding that the proposed timber harvest (IWA File #J-16) on three parcels located at 971 and 979 Warrenville Rd and a vacant adjacent parcel (Assessor Parcel IDs 6.51.3, 6.52.5, and 6.51.4) owned by Bryan and Catherine Salai and Arthur and Jana McCann as shown on a map 1/20/2020 and as described in the associated attachments is permitted as of right pursuant to Section 4.1 of the Mansfield Inland Wetlands and Watercourses Regulations. Motion PASSED unanimously.

B. Application of J. Randazzo for a Jurisdictional Ruling to Conduct a Timber Harvest on a Vacant Parcel located on the North Side of Pleasant Valley Road-Assessor Parcel ID 36.88.90 (File # J-17)

Rawn MOVED, Ward seconded to approve a finding that the proposed timber harvest (IWA File #J-17) located on the north side of Pleasant Valley Road (Assessor's Parcel ID 36.88.90) on land owned by Robert Cardinal, as shown on a map dated 1/28/2020 and as described in the associated attachments is permitted as of right pursuant to Section 4.1 of the Mansfield Inland Wetlands and Watercourses Regulations.

C. Application of J. Randazzo for a Jurisdictional Ruling to Conduct a Timber Harvest at 209 Mansfield City Road-Assessor's Parcel ID 32.88.1 (File # J-18)

Chandy MOVED, Plante seconded, to approve a finding that the proposed timber harvest (IWA File #J-18) located at 209 Mansfield City Road (Assessor's Parcel ID 32.88.1) on land owned by WJ Stearns and Sons, Inc., as shown on a map dated 1/28/2020 and as described in the associated attachments is permitted as of right pursuant to Section 4.1 of the Mansfield Inland Wetlands and Watercourses Regulations. Motion PASSED unanimously.

D. Application of J. Randazzo for a Jurisdictional Ruling to Conduct a Timber Harvest a 488-500 Mansfield Avenue-Assessor's Parcel ID 37.93.4 (File# J-19)

Chandy MOVED, Fratoni seconded, to approve a finding that the proposed timber harvest (IWA File #J-19) located at 488-500 Pleasant Valley Road (Assessor's Parcel ID 37.93.4) on land owned by Bruce Hussey, as shown on a map dated 1/28/2020 and as described in the associated attachments is permitted as of right pursuant to Section 4.1 of the Mansfield Inland Wetlands and Watercourses Regulations. Motion PASSED unanimously.

E. Application of the Town of Mansfield Parks and Recreation Department to construct a 50 by 100-foot parking lot at Simpson-Wood Preserve, Rte. 89 Assessor's Parcel ID Assessor's Parcel ID 19.70.12-1)

Chandy MOVED, Ward seconded, to authorize Mansfield's Inland Wetlands Agent to issue a wetlands license for construction of a 50 by 100 foot parking lot at Simpson-

Wood Preserve Rte. 89 (Assessor's Parcel ID 19.70.12-1) under section 12.0 of Mansfield's Inland Wetlands Regulations. Motion PASSED unanimously.

OTHER COMMUNICATIONS AND BILLS

Noted.

REPORTS FROM OFFICERS AND COMMITTEES

None.

ADJOURNMENT

The meeting was adjourned at 6:40 p.m.

Respectfully Submitted:

Emmy A. Galbraith
Administrative Assistant

MINUTES (NOT YET APPROVED)

Members Present:	P. Aho, B. Chandy, L. Cooley, C. Cotton, D. Plante, K. Rawn, V. Ward
Members Absent:	S. Accorsi, R. Hall
Alternates Present:	J. DeVivo, K. Fratoni
Staff Present:	J. Kaufman, Senior Planner/Inland Wetlands Agent; J. Woodmansee, Planning Specialist; E. Galbraith, Administrative Assistant

CALL TO ORDER AND ROLL CALL

Chair Aho called the meeting to order at 6:41 p.m. Members present are Aho, Chandy, Cooley, Cotton, Plante, Rawn and Ward. Alternates DeVivo and Fratoni are seated for absent members.

APPROVAL OF MINUTES

Ward noted two corrections to the January 21, 2020 meeting Minutes. The first correction is to include the dates that legal notices for the public hearings were published in *The Chronicle*. And the second correction is to adjust the verb tense within the public hearing portion for consistency.

Fratoni MOVED, Cooley seconded, to approve the January 21, 2020 meeting Minutes with the proposed changes. Motion PASSED unanimously.

ZONING AGENT REPORT

Noted.

OLD BUSINESS

A. Application of the Taylor Family Trust (owner/applicant) to amend the Zoning Map to change the zoning of a portion of property located on the north side of Storrs Road, between 9 Timber Drive and 1768 Storrs Road (Parcel ID 2.5.22) from Rural Agriculture Residence 90 (R-90) and Professional Office 1 (PO-1) to Planned Business 3 (PB-3). (PZC File 1365)

Tabled to February 18, 2020 Public Hearing.

B. Application of the Mansfield Non-Profit Housing Development Corporation (owner/applicant) to amend the Zoning Map to change the zoning of property located at 113-121 South Eagleville Road (Parcel ID 16.57.5) from Rural Agriculture Residence 90 (RAR-90) to South Eagleville Road Housing Opportunity Zone (SER-HO) pursuant to Sec. 8-30g, C.G.S. (PZC File 1364-1)

Tabled to March 2, 2020 Public Hearing.

C. Site plan application of the Mansfield Nonprofit Housing Development Corporation (owner/applicant) for a 42 unit multifamily residential development at 113-121 So. Eagleville Road (Parcel ID 16.57.5) pursuant to Sec. 8-30g, C.G.S. (PZC File 1364-2)
Tabled to March 2, 2020 Public Hearing.

NEW BUSINESS

A. Historic Village Review: Proposed Drainage Improvements at the Mansfield Historical Society building, 954 Storrs Road (Spring Hill Historic Village)
Chandy MOVED, Plante seconded, to authorize drainage improvements to the Mansfield Historical Society building as described in the materials provided to the Commission at the February 3, 2020 meeting based on a finding that the improvements meet the Historic Village review criteria established in Article 10, Section J. Motion PASSED unanimously.

REPORTS FROM OFFICERS AND COMMITTEES

Regulatory Review Committee
Staff confirmed the Regulatory Review Committee will meet Friday, February 7, 2020 at 9:00 a.m. in the Mansfield Town Hall.

Other Committees
Ward asked about the status of the Design Review Panel members continuing their current terms. Galbraith confirmed that all current members have requested to continue serving on the Design Review Panel, with the exception of one member yet to reply.

COMMUNICATIONS AND BILLS
Noted.

ADJOURNMENT
The meeting was adjourned at 6:47 p.m.

Respectfully Submitted:

Emmy A. Galbraith

Emmy A. Galbraith
Administrative Assistant

Parks and Natural Resources Committee

Special Meeting
Tuesday February 4, 2020 6:30 PM
Mansfield Town Hall Conference Room A
Notes -- DRAFT

1. **Call to order**
   The attendees for the special meeting working session gathered at 6:35 PM, convening eventually in Conference Room A instead of B. (Email and Agenda had identified different rooms, with one attendee in each at 6:30; the meeting was moved to A because of where electronic resources had been set up.)
   Roll Call
   Attending: Ken Feathers (secretary), Michael Soares
   Not present but on committee roster: Jim Morrow (Chair), Quentin Kessel (Cons. Com. Rep.), Sue Harrington, Julianna Barrett (alt.), Vicky Wetherell, Tom Harrington
2. **Opportunity for Public comment**
   No members of the public were present.
3. **Continuing business**
   1. *Simpson-Wood Draft Management Plan*
      See note under 3
   2. *Moss Sanctuary Management Plan*
      See note under 3
   3. Attendees took, as an example, the Simspon-Wood Draft Management Plan and reviewed how the specific preserve goals related to the Goals, Strategies and Actions listed in the Town's Plan Of Conservation and Development. Discussion centered on identifying elements in the POCD goals and strategies that would be generally applicable to most protected parcels, as appropriate for a 3-7 year horizon for inclusion in the plan, and trying to create inclusive general language. Conceptually the discussion also looked at identifying specific more detailed and parcel specific actions that could be in a supplemental table, for implementing the goals and strategies of the plan, but updated and prioritized by staff and/or the committee on a more frequent basis, without needing to rewrite the management plan itself. One question that arose was what the update cycle frequency for management plans should be, especially considering the effort involved.
4. **Adjournment**
   The working session ended at approximately 8:30 PM

Respectfully Submitted
Ken Feathers, Secretary