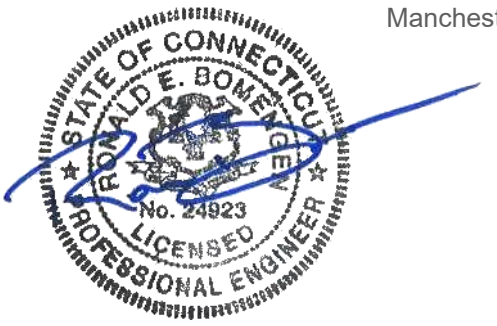
Stormwater Management Report

Westminster School
Recreation Area

995 Hopmeadow Street
Simsbury, Connecticut

April 19, 2024

FUSS & O'NEILL
146 Hartford Road
Manchester, CT 06040



Project No. 01995 057.S70

FUSS & O'NEILL

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1 Executive Summary

Westminster School is a private school located at 995 Hopmeadow Street in Simsbury, Connecticut. The total property is comprised of multiple buildings and parcels covering approximately 181.9 acres with residential developments to the north and west, and Hopmeadow Street (RT. 202) to the south and east. A location map for the project sites can be found in *Figure 1.*

Westminster proposes to re-develop approximately 1.2 acres of their campus, which will include the construction of a new pavilion building addition, new painted sports court, and associated supporting utilities, as well as the construction of a new hillside trail connecting the recreation area to existing uphill campus buildings.

Overall drainage patterns of the site will be unchanged by the project. Stormwater from the re-developed areas will be collected through a series of drywells and yard drains and conveyed through pipe networks that discharge into an existing stormwater network. Runoff from proposed roofs will be captured through gutters and downspouts and conveyed through the stormwater management system. The Recreation Area site will be collected in and conveyed to an at-grade stormwater rain garden and a series of below-grade drywells to mitigate total runoff volumes. In addition, the entirety of the drainage area will ultimately get conveyed to a natural depression located to the northeast of the project area where it will be recharged back into the ground.

Existing and proposed hydrologic conditions for the developed area were evaluated. The evaluation demonstrates a net increase in stormwater peak discharge flow rate and discharge volume from the proposed site for the 2-, 10-, 25-, and 100-year storm events as compared to existing conditions. All stormwater runoff generated by the project area will remain on the Westminster property and be recharged into groundwater after being directed to a large drainage depression, and will not affect a wetland, watercourse, or other property. Water quality for the proposed development will be provided by the drywells and stormwater rain garden.

2 Existing Conditions

The developed portion of the site is in the center of the property and includes existing maintenance sheds, sports courts, and walkways. A majority of the project area consists of a grassed field. The proposed stair connection to the south of the project area is currently wooded. Mild to moderate slopes exist in the developed areas of the site. Moderate to severe slopes are found in the southern hillside portion of the site.

The existing hydrologic evaluation, included as *Appendix A,* determined that the project's 1.2-acre watershed area is comprised of one subcatchment area, which drains to one design point. The design point is as follows:

- **10L** is the existing stormwater conveyance network to the northeast of the project area. The network continues past several maintenance and sports facilities before terminating at an existing wooded depression near the eastern edge of the property.

Existing conditions, drainage characteristics, and discharge locations for the subcatchment are described below. This subcatchment is illustrated on sheet DR-101, which is included in *Appendix A* along with the existing watershed model.

- **Subcatchment 10S** is the entire area of the project, containing paved walkways, lawn, woods, part of an existing drainage network, and existing maintenance and sports buildings. Stormwater runoff is collected by catch basins and conveyed by 15" high density polyethylene pipes (HDPE) and discharged through the culvert end into the continuance of the network serving as design point 10L.
    - To provide a more accurate comparison between existing and proposed conditions, Subcatchment 10S was broken into three catchment areas corresponding to existing stormwater inlets and their surrounding areas.

The Natural Resources Conservation Service (NCRS) characterizes the site with the Hydrological Soil Types presented in *Table 1*. A NRCS soil survey map is included as *Figure 2.*

Table 1 - Hydrological Soil Types

Map Unit Symbol	*Map Unit Name*	*Soil Rating*
38C	Hinckley loamy sand, 3-15% slopes	A
38E	Hinckley loamy sand, 15-45% slopes	A

The site is located within the Farmington Regional Basin of the Connecticut Major Basin, specifically within the Farmington River (4300) sub-basin area as indicated within *Figure 3*.

The site lies outside of the current 500-year flood plain noted as the future 100-year flood plain, denoted as "Zone X" and the current 100-year flood plain, denoted as Zone "A". A portion of the relevant Flood Insurance Rate Map (Map Number 09003C0193F, Effective Date: September 26, 2008) has been included as *Figure 4*.

3 Proposed Conditions

Proposed improvements for the Recreation Area will include the placement of two pre-fabricated outdoor structures and a new sports court. Site improvements associated with this project include new stairways, walkways, supporting site utilities and drainage, and landscaping.

The project area was analyzed to evaluate the proposed hydrologic conditions. The proposed watershed analysis design point label is consistent with the existing watershed analysis. Construction of the proposed improvements will result in an increase of approximately 0.5 acres of impervious areas within the analyzed watersheds. Due to the increase in impervious areas, it will be necessary to detain and attenuate stormwater flow out of the project area. Mitigation of flows and groundwater recharge will be achieved using a stormwater rain garden, a series of drywells, and an existing retention area located near the center of campus to manage flows.

The proposed hydrologic evaluation, included as *Appendix B*, determined that the project area is comprised of four subcatchment areas, which drain to the existing design point (10L).

The evaluated subcatchment areas are illustrated in the Proposed Watershed Analysis Map found in *Appendix B.* The design points are as follows:

- **10L** is unchanged from existing conditions. The design point is the existing stormwater management system leading to a depression located near the eastern property boundary. The land beyond the property line includes wooded areas, consists of steep grades, and includes additional maintenance and sports facilities.
    -

Proposed conditions, drainage characteristics, and discharge locations for the subcatchments are as follows:

- **Subcatchment 20S** is the southern and western area of the Recreation Area. A series of drywells, denoted as 20P in the proposed watershed model, will be constructed at the Recreation Area site to capture runoff from the sports courts, deck area, pavilion, and landscaped areas surrounding the addition. The system will consist of United Concrete 900 Gallon chambers surrounded by crushed stone. Runoff from the proposed improvements and existing courts will drain to the drywells and will be conveyed by high density polyethylene (HDPE) pipe to an existing catch basin that will ultimately discharge into the existing detention system at outfall 10L.
- **Subcatchment 21S** is the southeastern portion of the proposed court and existing hillside, which will drain into an enter existing stormwater inlet. Runoff from this area is conveyed through the existing stormwater conveyance system before ultimately discharging at design point 10L.
- **Subcatchment 22S** is the area along the northwestern edge of the project area adjacent to the existing paved walkway. The area includes an existing slope, the proposed rain garden, and a portion of the proposed sports court area. Runoff will sheet flow into the proposed stormwater rain garden 22P before entering the existing stormwater system.

  The proposed stormwater rain garden 22P captures area from the eastern side area of the project area, which will sheet flow into the rain garden. During large storm events, water will overtop the broad-crested weir separating rain garden 22P from existing stormwater inlets further downstream. Water that overtops rain garden 22P will be directed via existing swale swale towards an existing catch basin located at a natural low point adjacent to the existing paved walkways.
- **Subcatchment 23S** is the small area adjacent to the northern end of the existing building consisting of a section of walkway and grassed area that does not drain towards the proposed stormwater rain garden. Runoff will be collected in an existing yard drain and catch basin and conveyed through the stormwater management pipe network to design point 10L.

Results from modeling of pre- and post-development peak flow rates at the design points are shown in the eight tables that immediately follow this paragraph. These results are taken from the HydroCAD models of existing and proposed conditions found in *Appendices A and B.*

Peak Flow Modeling

2 Year Design Storm				
Design Point	Existing Flow (CFS)	Proposed Flow (CFS)	Net Change (CFS)	Net Change (%)
10L – Existing Catch Basin	1.74	2.33	+0.59	+34%

10 Year Design Storm				
Design Point	Existing Flow (CFS)	Proposed Flow (CFS)	Net Change (CFS)	Net Change (%)
10L – Existing Catch Basin	3.42	4.06	+0.64	+18%

25 Year Design Storm				
Design Point	Existing Flow (CFS)	Proposed Flow (CFS)	Net Change (CFS)	Net Change (%)
10L – Existing Catch Basin	4.83	5.50	+0.67	+13%

100 Year Design Storm				
Design Point	Existing Flow (CFS)	Proposed Flow (CFS)	Net Change (CFS)	Net Change (%)
10L – Existing Catch Basin	7.77	8.38	+0.61	+7%

Runoff Volume Modeling

2 Year Design Storm				
Design Point	Existing Volume (AF)	Proposed Volume (AF)	Net Change (AF)	Net Change (%)
10L – Existing Catch Basin	0.134	0.150	+.016	+12%

10 Year Design Storm				
Design Point	Existing Volume (AF)	Proposed Volume (AF)	Net Change (AF)	Net Change (%)
10L – Existing Catch Basin	0.259	0.290	+0.031	+12%

25 Year Design Storm				
Design Point	Existing Volume (AF)	Proposed Volume (AF)	Net Change (AF)	Net Change (%)
10L – Existing Catch Basin	0.366	0.405	+0.039	+10%

100 Year Design Storm				
Design Point	Existing Volume (AF)	Proposed Volume (AF)	Net Change (AF)	Net Change (%)
10L – Existing Catch Basin	0.593	0.644	+0.051	+8%

The watershed modeling predicts the design to increase peak flow rates and runoff volumes within the work limits of the proposed development for all design storm events. All stormwater entering the existing stormwater conveyance network or sheet flowing off site will be conveyed to an existing drainage depression on site where it will be recharged into groundwater on site. Although there is a minor increase in stormwater flow and volume from the 1-acre project area, it will be entirely contained within the overall property and not cause an increase in peak flow or volume to any abutting properties.

Runoff catchment areas for the site improvements were delineated to evaluate proposed hydraulic conditions. These watersheds are illustrated on sheet DR-201 and calculations for the overall stormwater network are presented in *Appendix B*.

4 Construction Stormwater Management and Soil Erosion and Sedimentation Control

A detailed E&S control plan has been prepared for the site. During construction, measures will be taken to reduce erosion and manage sedimentation from disturbed surfaces. The following Best Management Practices (BMPs) will be deployed:

- Construction entrances will be installed at main point of entry to prevent tracking of sediment into local roads.
- Erosion control matting will be installed on slopes steeper than 3(H):1(V) and within the stormwater rain garden.
- Silt socks will be installed along the existing walkway that runs adjacent to the existing building bordering the project area. The silt socks will help prevent water and sediment from accumulating on the steps and entering the building during construction.

These BMPs will protect downstream stormwater collection systems following construction. Erosion and sedimentation control (E&S) details are provided in the site plans. E&S details and procedures

are consistent with the 2023 Connecticut Guidelines for Soil Erosion and Sediment Control (Effective Date: March 30, 2024), and town requirements.

5 Post-Construction Stormwater Management

The water quality of stormwater runoff from the developed site will be improved using Best Management Practices (BMP's). Deep sumps in catch basins, a rain garden, and drywells will be used to help achieve the removal of 90% of Total Suspended Solids that may be present in the stormwater runoff.

Water quality volume (WQV) will be achieved through the use of the rain garden and the drywells. WQV is equivalent to the first 1.3 inches of rainfall in any storm event that should be captured and treated to remove a majority of the stormwater pollutants on an annual basis. Calculations based on Chapter 4 of the CTSWQM – Water Quality Volume Calculation are provided in *Appendix C*.

To ensure these measures continue to operate adequately over time, the following maintenance procedures should be followed:

- **Inlet Sumps** - Catch basin/ yard drain sumps must be inspected at regular intervals and cleaned when necessary. At a minimum, inspections should be conducted twice per year, once in the spring and again in the fall. More inspections may be required during winter months where heavy sanding operations may lead to rapid sediment accumulation within the structure. Cleaning operations are typically done using a vacuum truck.

- **Stormwater Rain Garden** - The first year following construction, inspections of the stormwater rain garden should be conducted on a weekly basis and within 24 hours of the end of a storm with a rainfall of 0.5 inches or more to determine maintenance needs and excessive sour at the outlets. Trash racks should be cleaned of any garbage or debris. If erosion is severe or of a repetitive nature, the outlet protection should be redesigned. Inspections thereafter can be conducted every 3 months or after a major storm event, whichever comes first. Trash racks should be cleaned as needed and accumulated sediment must be removed when interfered with detention capacity or operation of the outlet control structure. Sediment removal operations can be done using a vacuum truck or by hand. Mechanical removal of sediment is not recommended as it may disturb established plantings.

- **Drywells** - At a minimum, the subsurface detention/infiltration systems should be inspected annually, semi-annually for the first year of operation. For subsequent years, the inspection should be adjusted based upon previous observation of sediment deposition.

The majority of impervious surfaces that are being added to the Westminster Recreation Area are sports courts and deck areas. All surface runoff from proposed improvements will be treated by proposed stormwater BMPs.

These design measures incorporate commonly used Best Management Practices and follows guidelines set forth by the latest CTDEEP Stormwater Quality Manual and the Connecticut and federal stormwater regulations.

6 Methods

The existing and proposed drainage analysis for the development was completed using the HydroCAD Software Solutions computer program. The HydroCAD program runoff method selected for the watershed modeling is based on NRCS TR-20 methods. The methods described in the NRCS TR-55 manual were followed to calculate the curve number and time of concentration input data for this model.

The following curve numbers were used to model the impervious and pervious surfaces, and are acceptable for surfaces over Hydrological Group – 'A' soils per the NRCS TR-55 Drainage Manual:

Cover Type	Hydrologic Soil Type
	A
Paved Parking	98
Roofs	98
<50% Poor Grass Cover	61
Woods, Poor	45

Infiltration rates for calculations package were considered for the stormwater rain garden and drywells based on the soil types identified in *Figure 2* at rated determined in the 2023 Connecticut Stormwater Quality Manual (Effective Date: March 30, 2024), 2.41 inches per hour. This number is significantly lower than the allowable rate provided by the USDA Web Soil Survey, which provides a value of 14 inches per hour for Type 'A' Loamy Sandy soils. The current site improvements show a decrease in stormwater volume leaving the project area when using the 14 inch per hour figure in the HydroCAD model provided.

7 Summary

The proposed development has been designed to effectively convey the total volume of flow as compared to the existing conditions for the 2-, 10-, 25-, 50-, and 100-year design storm event.

Post-construction water quality improvement for the stormwater runoff at the Recreation Area will be achieved by the use of BMPs designed to remove 90% of Total Suspended Solids that may be present in runoff from the site. Water quality for the development will be provided by the stormwater rain garden and drywells.

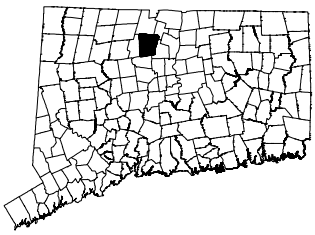
The stormwater management design meets the guidelines of the Connecticut Stormwater Quality Manual (CTSWQM), Connecticut Guidelines for Soil Erosion & Sediment Control, Connecticut General Permit of the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities, as well as the requirements of the Town of Simsbury.

Based on the results of the foregoing analysis, it is the professional opinion of Fuss & O'Neill that the proposed development will not have an adverse impact on receiving watersheds.

Figures

MAP REFERENCE

THIS MAP WAS PREPARED FROM THE FOLLOWING 7.5 MINUTE USGS TOPOGRAPHICAL MAP:
TARRIFFVILLE, CONNECTICUT, MASSACHUSETTS
2021



SCALE:	
HORZ.:	1" = 2000"
VERT.:	
DATUM:	
HORZ.:	
VERT.:	

0 1000 2000
GRAPHIC SCALE

FUSS & O'NEILL
146 HARTFORD ROAD
MANCHESTER, CONNECTICUT 06040
860.646.2469
www.fando.com

WESTMINSTER SCHOOL

SITE LOCATION MAP

WESTMINSTER SCHOOL RECREATION AREA

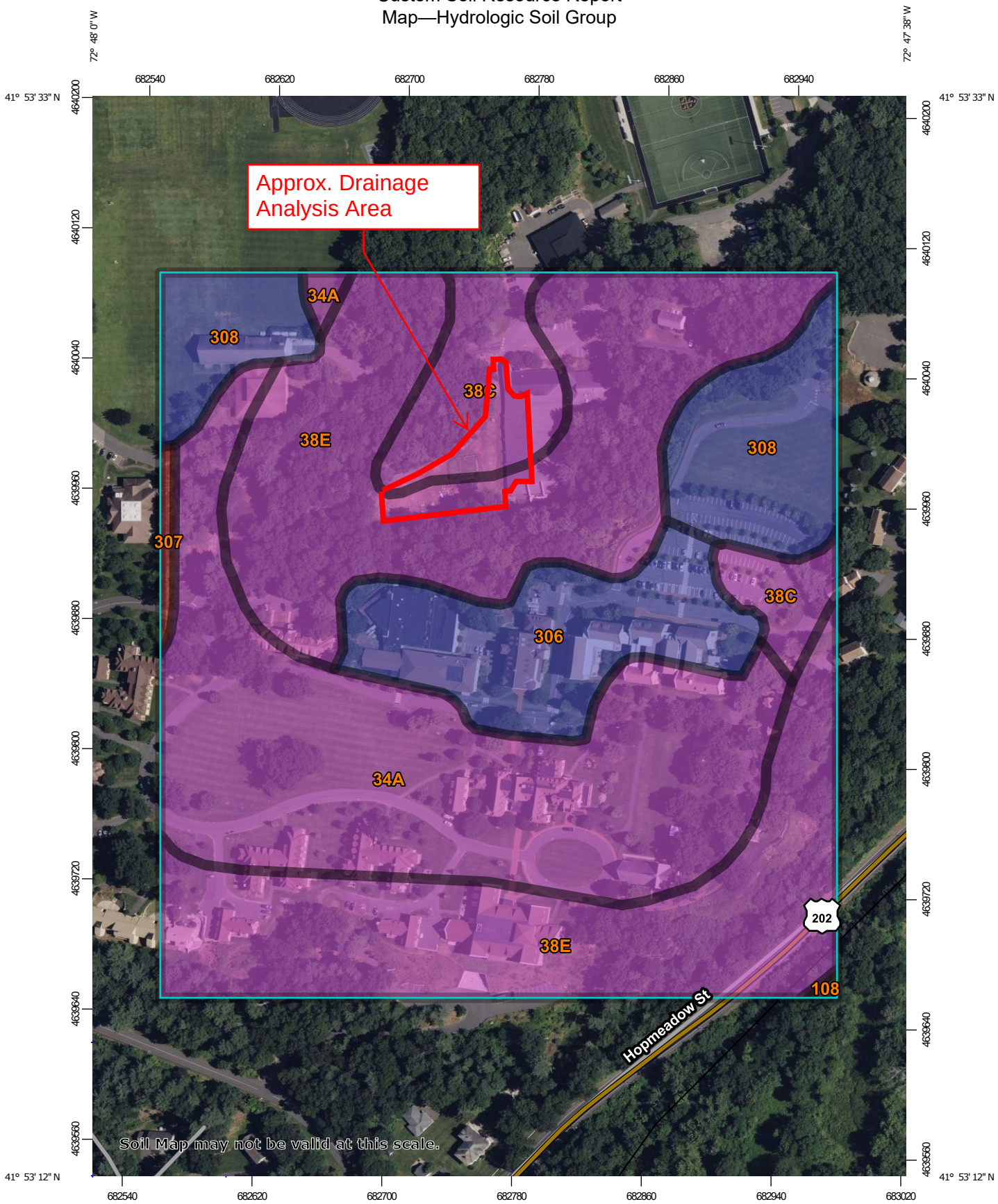
SIMSBURY CONNECTICUT

PROJ. No.: 01995057.S70
DATE: 04/19/2024

FIGURE 1

File Path: J:\DWG\P95\95057\S70\Civil\Plan\01995057S70_LOC01.dwg Layout: LOC01 Plotted: Mon, April 15, 2024 - 4:34 PM User: timothy.davis
Plotter: DWG TO PDF.PC3 CTB File: FO.STB
LAYER STATE:
MS VIEW:

Custom Soil Resource Report
Map—Hydrologic Soil Group



Map Scale: 1:3,230 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 45 90 180 270

Feet: 0 150 300 600 900

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

PROJ. No.: 01995057.S70
DATE: 04/19/2024

Figure 2

MAP LEGEND

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

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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, Western Part
Survey Area Data: Version 1, Sep 15, 2023

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

Date(s) aerial images were photographed: Jun 14, 2022—Oct 6, 2022

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

PROJ. No.: 01995057.S70
DATE: 04/15/2024

Figure 2

Table—Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
34A	Merrimac fine sandy loam, 0 to 3 percent slopes	A	13.0	28.3%
38C	Hinckley loamy sand, 3 to 15 percent slopes	A	3.4	7.4%
38E	Hinckley loamy sand, 15 to 45 percent slopes	A	20.0	43.3%
108	Saco silt loam, frequently ponded, 0 to 2 percent slopes, frequently flooded	B/D	0.0	0.1%
306	Udorthents-Urban land complex	B	4.6	10.1%
307	Urban land	D	0.3	0.6%
308	Udorthents, smoothed	B	4.7	10.3%
Totals for Area of Interest			**46.1**	**100.0%**

Rating Options—Hydrologic Soil Group

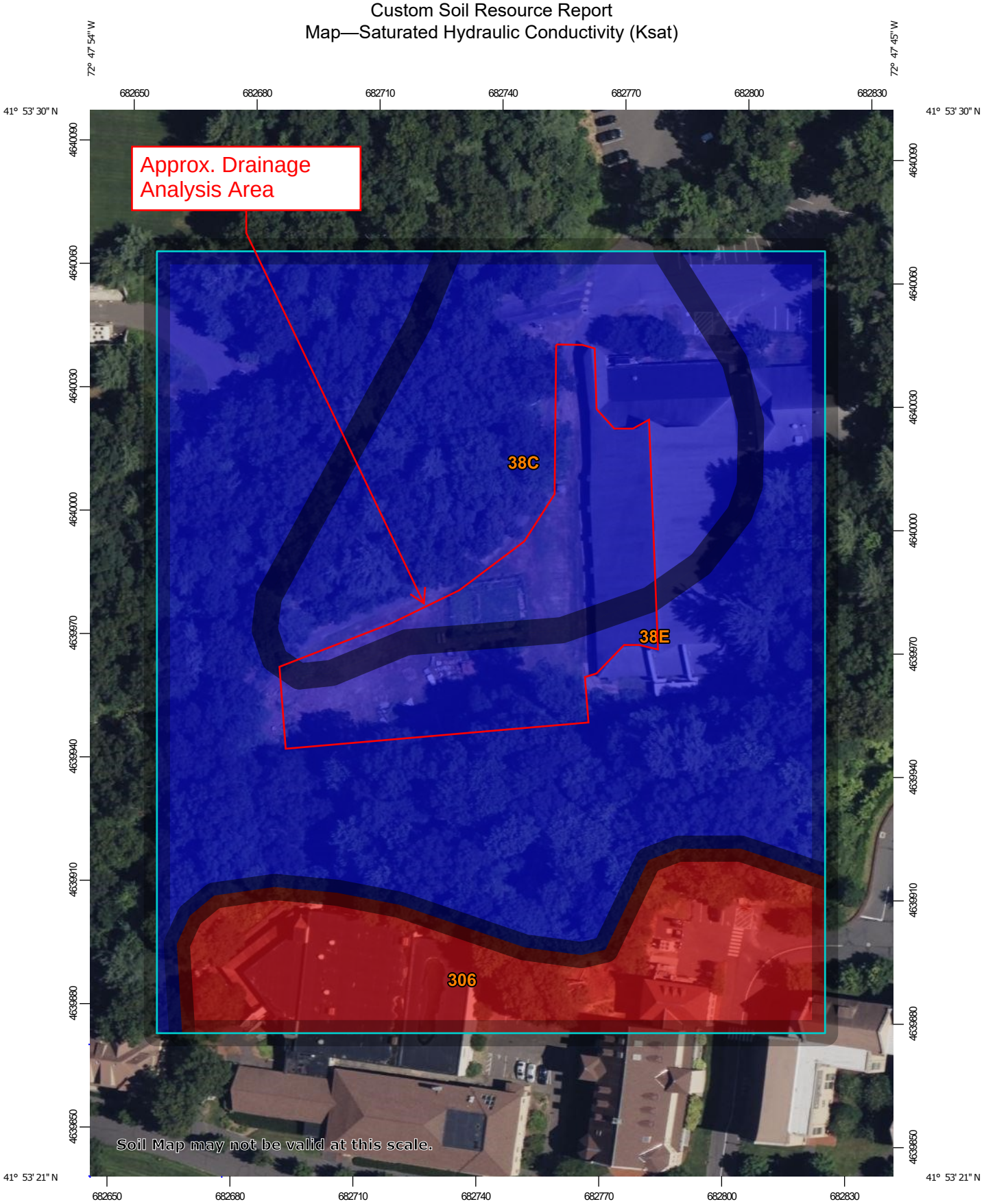
Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

PROJ. No.: 01995057.S70
DATE: 04/15/2024
Figure 2

Custom Soil Resource Report
Map—Saturated Hydraulic Conductivity (Ksat)



Map Scale: 1:1,260 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 15 30 60 90

Feet: 0 50 100 200 300

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

PROJ. No.: 01995057.S70
DATE: 04/15/2024

Figure 2

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- <= 22.9350
- > 22.9350 and <= 100.0000
- Not rated or not available

Soil Rating Lines

- <= 22.9350
- > 22.9350 and <= 100.0000
- Not rated or not available

Soil Rating Points

- <= 22.9350
- > 22.9350 and <= 100.0000
- Not rated or not available

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

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

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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, Western Part
Survey Area Data: Version 1, Sep 15, 2023

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

Date(s) aerial images were photographed: Jun 14, 2022—Oct 6, 2022

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

PROJ. No.: 01995057.S70
DATE: 04/15/2024

Figure 2

Table—Saturated Hydraulic Conductivity (Ksat)

Map unit symbol	Map unit name	Rating (micrometers per second)	Acres in AOI	Percent of AOI
38C	Hinckley loamy sand, 3 to 15 percent slopes	100.0000	2.1	27.0%
38E	Hinckley loamy sand, 15 to 45 percent slopes	100.0000	4.3	56.4%
306	Udorthents-Urban land complex	22.9350	1.3	16.6%
Totals for Area of Interest			**7.7**	**100.0%**

Rating Options—Saturated Hydraulic Conductivity (Ksat)

Units of Measure: micrometers per second

Aggregation Method: Dominant Component

Tie-break Rule: Fastest

Layer Options (Horizon Aggregation Method): All Layers (Weighted Average)

PROJ. No.: 01995057.S70
DATE: 04/15/2024
Figure 2

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

STATE OF CONNECTICUT
HIGHWAY DEPARTMENT

TARIFFVILLE QUADRANGLE
CONNECTICUT—MASSACHUSETTS
7.5 MINUTE SERIES (TOPOGRAPHIC)

Approx. Drainage Analysis Area

Turkey Hill Apts.

Salmon Brook Dist. Water Dept.

Simsbury Housing Authority (Dr. Owen L. Murphy Housing for the Elderly)

Tariffville Fire District

Village Water Company of Simsbury

e Water Company of
ury
ller Reservoir (I)
(A: Simsbury Res.

Mapped, edited, and published by the Geological Survey

Control by USGS, USC&GS, and Connecticut Geodetic Survey

Topography from aerial photographs by multiplex methods
Aerial photographs taken 1941 and 1944. Field check 1948
Revised 1956

Polyconic projection. 1927 North American datum
10,000-foot grid based on Connecticut coordinate system
1000-meter Universal Transverse Mercator grid ticks, zone 18, shown in blue
To place on the predicted North American Datum 1983 move the projection lines 5 meters south and 37 meters west as shown by dashed corner ticks
Fine red dashed lines indicate selected fence and field lines where generally visible on aerial photographs. This information is unchecked

SCALE
1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 0 1 KILOMETER

CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

UTM GRID AND 1970 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

CONNECTICUT
QUADRANGLE LOCATION

ROAD CLASSIFICATION
Heavy-duty — Light-duty
Medium-duty — Unimproved dirt
U.S. Route — State Route

TARIFFVILLE, CONN.—MASS.-21
N4152.5—W7245/7.5

1956
PHOTOREVISED 1970

Notes:

4 Connecticut Major Basin
43 Farmington Regional Basin
4300 Farmington River

Westminster School

Drainage Basin Map

995 Hopmeadow St, Simsbury, CT

PROJ. No.: 01995057.S70
DATE: 04/19/2024

Figure 3

Westminster School

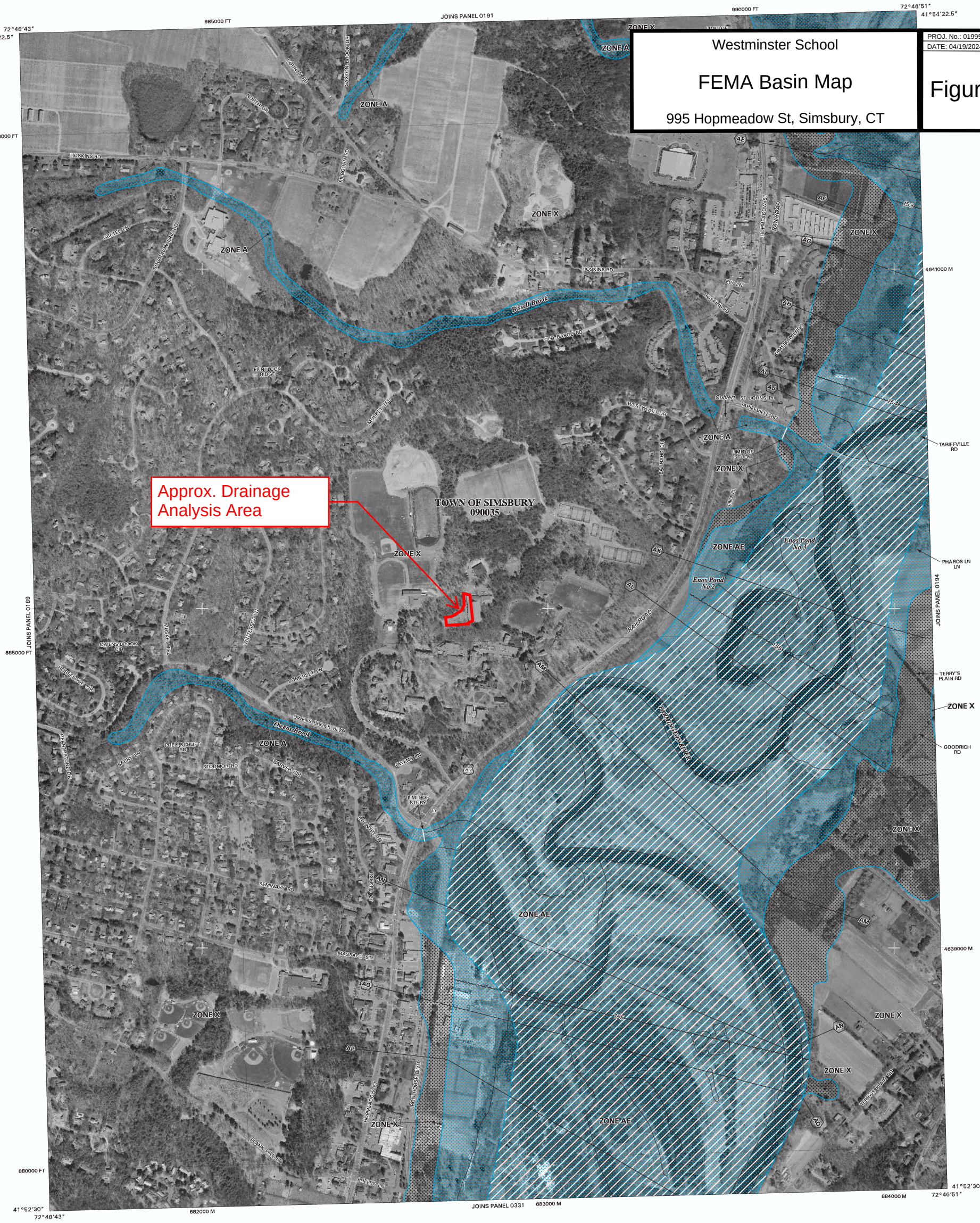
FEMA Basin Map

995 Hopmeadow St, Simsbury, CT

PROJ. No.: 01995057.S70
DATE: 04/19/2024

Figure 4

Approx. Drainage Analysis Area



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD EVENT

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water surface elevation of the 1% annual chance flood.

ZONE A	No base flood elevations determined.
ZONE AE	Base flood elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Area of special flood hazard formerly protected from the 1% annual chance flood event by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood event.
ZONE A99	Area to be protected from 1% annual chance flood event by a Federal flood protection system under construction; no base flood elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no base flood elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	1% annual chance floodplain boundary
	0.2% annual chance floodplain boundary
	Floodway boundary
	Zone D boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or velocities.
513	Base Flood Elevation line and value; elevation in 0*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in 0*

*Referenced to the North American Vertical Datum of 1988

A — A	Cross Section Line
23 — 23	Transect Line
97°07'30", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
4276000M	1000-meter Universal Transverse Mercator grid values, zone 18
600000 FT	5000-foot grid ticks
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel).
• M1.5	River Mile

MAP REPOSITORY
Refer to Repository Listing on Index Map

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
SEPTEMBER 26, 2008

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

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.

MAP SCALE 1" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0193F

FIRM

FLOOD INSURANCE RATE MAP

HARTFORD COUNTY, CONNECTICUT (ALL JURISDICTIONS)

PANEL 193 OF 675

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
SIMSBURY, TOWN OF	090035	0193	F

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER 09003C0193F

EFFECTIVE DATE: SEPTEMBER 26, 2008

Federal Emergency Management Agency

Appendix A

Existing Watershed Analysis

PRELIMINARY: NOT FOR CONSTRUCTION

THIS DRAWING IS FOR INFORMATIONAL PURPOSES ONLY AND IS NOT INTENDED FOR CONSTRUCTION. DO NOT START CONSTRUCTION WITHOUT A SEALED SET OF CONSTRUCTION DOCUMENTS.

CIVIL ENGINEER
FUSS & O'NEILL
146 HARTFORD ROAD
MANCHESTER, CONNECTICUT 06040
860.646.2469
www.fando.com

WESTMINSTER SCHOOL RECREATION AREA

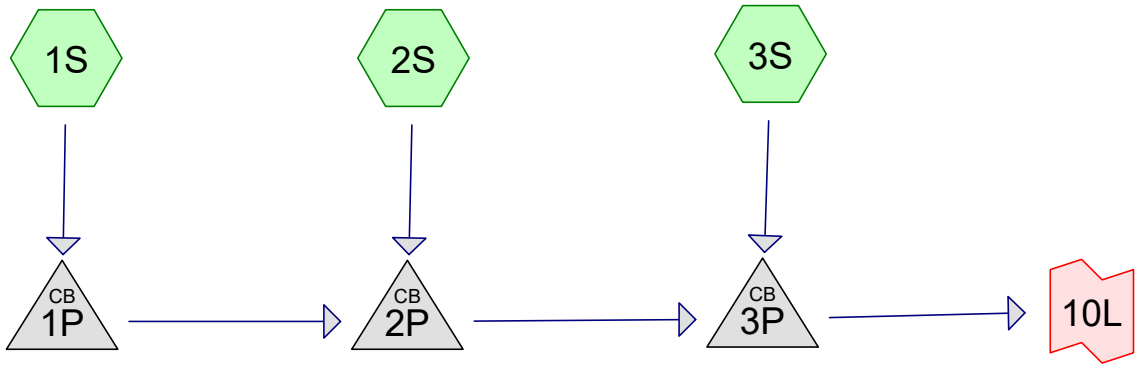
995 HOPMEADOW STREET
SIMSBURY, CT 06070

ISSUE	ISSUE DATE	DESCRIPTION
	0000/00/00	% SD DD CD
	0000/00/00	% SD DD CD
REVISION	REVISION DATE	DESCRIPTION

SCALE
1"=20'-0"
PLOT DATE
2024/04/11
DRAWN BY
TD
REVIEWED BY
RB, KG

EXISTING SITE WATERSHED ANALYSIS

DR-101



Subcat Reach Pond Link

Routing Diagram for 01995057S70_Existing
Prepared by Fuss & O'Neill, Printed 4/17/2024

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.669	68	<50% Grass cover, Poor, HSG A (1S, 2S, 3S)
0.186	98	Paved parking, HSG A (1S, 2S, 3S)
0.260	98	Roofs, HSG A (2S)
0.092	45	Woods, Poor, HSG A (1S)
1.208	**77**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
1.208	HSG A	1S, 2S, 3S
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
0.000	Other	
1.208		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.669	0.000	0.000	0.000	0.000	0.669	<50% Grass cover, Poor	1S, 2S, 3S
0.186	0.000	0.000	0.000	0.000	0.186	Paved parking	1S, 2S, 3S
0.260	0.000	0.000	0.000	0.000	0.260	Roofs	2S
0.092	0.000	0.000	0.000	0.000	0.092	Woods, Poor	1S
1.208	**0.000**	**0.000**	**0.000**	**0.000**	**1.208**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)	Node Name
1	1S	0.00	0.00	284.0	0.0049	0.013	0.0	15.0	0.0	
2	1P	208.30	207.60	106.4	0.0066	0.013	0.0	15.0	0.0	
3	2P	207.30	207.20	108.4	0.0009	0.013	0.0	15.0	0.0	
4	3P	207.20	206.90	61.8	0.0049	0.013	0.0	15.0	0.0	

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Runoff Area=28,359 sf 23.61% Impervious Runoff Depth=0.97"
Flow Length=337' Tc=6.5 min CN=72 Runoff=0.67 cfs 0.052 af

Subcatchment2S: Runoff Area=16,469 sf 71.32% Impervious Runoff Depth=2.14"
Flow Length=155' Tc=6.5 min CN=89 Runoff=0.92 cfs 0.067 af

Subcatchment3S: Runoff Area=7,773 sf 12.93% Impervious Runoff Depth=0.97"
Flow Length=218' Tc=10.1 min CN=72 Runoff=0.16 cfs 0.014 af

Pond 1P: Peak Elev=215.75' Inflow=0.67 cfs 0.052 af
Outflow=0.67 cfs 0.052 af

Pond 2P: Peak Elev=215.88' Inflow=1.59 cfs 0.120 af
Outflow=1.59 cfs 0.120 af

Pond 3P: Peak Elev=208.31' Inflow=1.74 cfs 0.134 af
Outflow=1.74 cfs 0.134 af

Link 10L: Inflow=1.74 cfs 0.134 af
Primary=1.74 cfs 0.134 af

Total Runoff Area = 1.208 ac Runoff Volume = 0.134 af Average Runoff Depth = 1.33"
63.03% Pervious = 0.761 ac 36.97% Impervious = 0.446 ac

Summary for Subcatchment 1S:

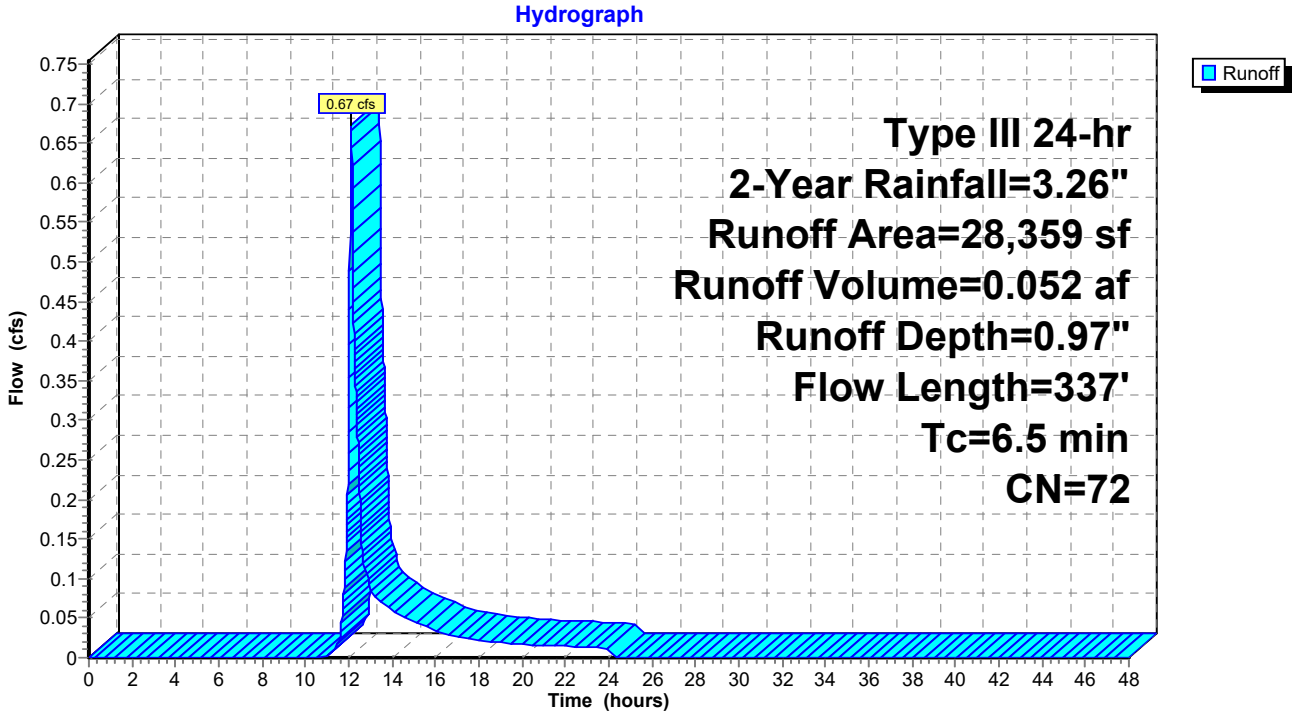
Runoff = 0.67 cfs @ 12.10 hrs, Volume= 0.052 af, Depth= 0.97"
Routed to Pond 1P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.26"

Area (sf)	CN	Description
17,666	68	<50% Grass cover, Poor, HSG A
6,695	98	Paved parking, HSG A
3,998	45	Woods, Poor, HSG A
28,359	72	Weighted Average
21,664		76.39% Pervious Area
6,695		23.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	45	0.1445	0.15		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
0.1	8	0.2400	2.26		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.26"
1.3	284	0.0049	3.68	4.52	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
6.5	337	Total			

Subcatchment 1S:



Summary for Subcatchment 2S:

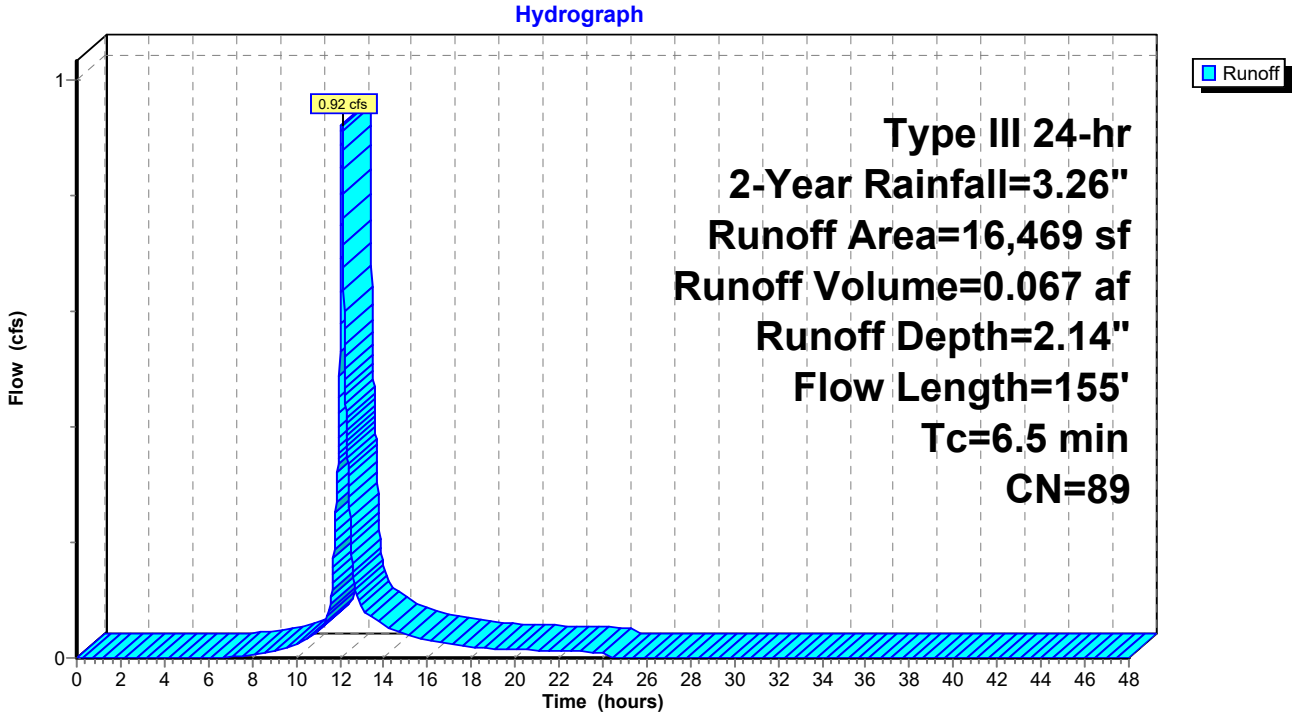
Runoff = 0.92 cfs @ 12.09 hrs, Volume= 0.067 af, Depth= 2.14"
Routed to Pond 2P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.26"

Area (sf)	CN	Description
11,329	98	Roofs, HSG A
4,724	68	<50% Grass cover, Poor, HSG A
416	98	Paved parking, HSG A
16,469	89	Weighted Average
4,724		28.68% Pervious Area
11,745		71.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	100	0.0750	0.29		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.26"
0.8	55	0.0238	1.08		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
6.5	155	Total			

Subcatchment 2S:



Summary for Subcatchment 3S:

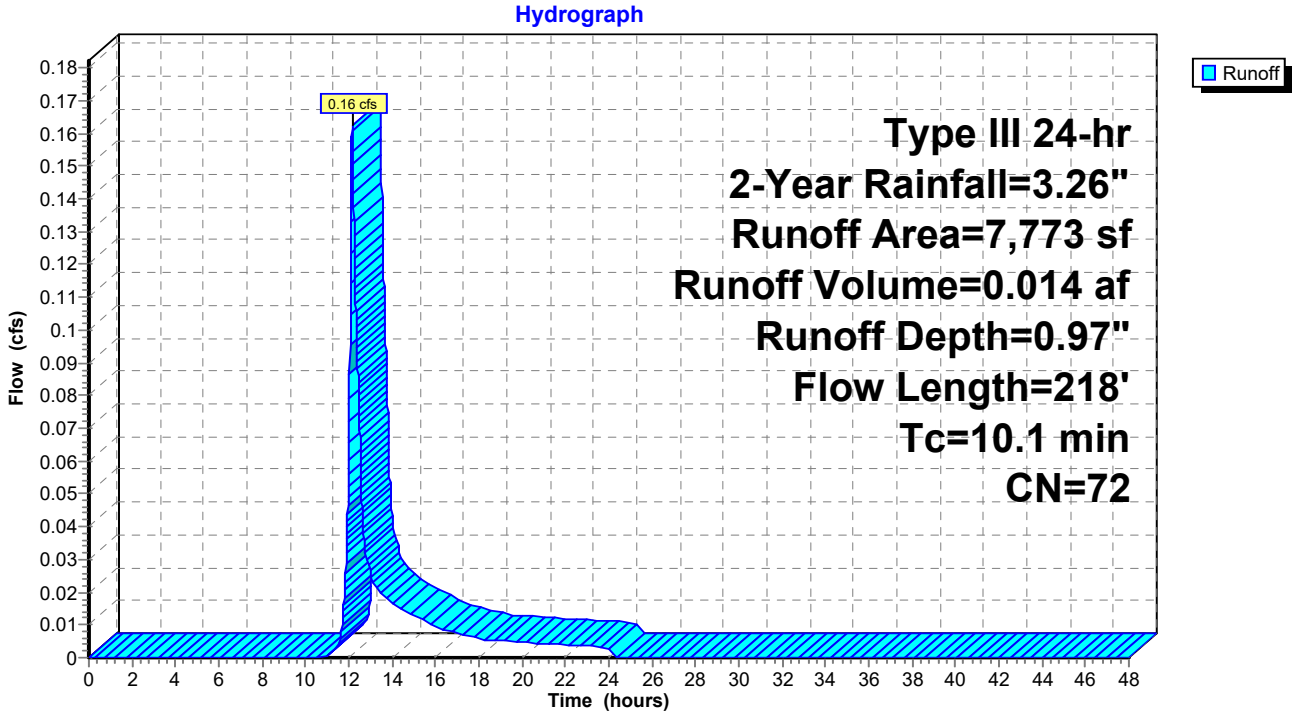
Runoff = 0.16 cfs @ 12.15 hrs, Volume= 0.014 af, Depth= 0.97"
Routed to Pond 3P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.26"

Area (sf)	CN	Description
6,768	68	<50% Grass cover, Poor, HSG A
1,005	98	Paved parking, HSG A
7,773	72	Weighted Average
6,768		87.07% Pervious Area
1,005		12.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	100	0.0240	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.26"
1.1	118	0.0680	1.83		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
10.1	218	Total			

Subcatchment 3S:



Summary for Pond 1P:

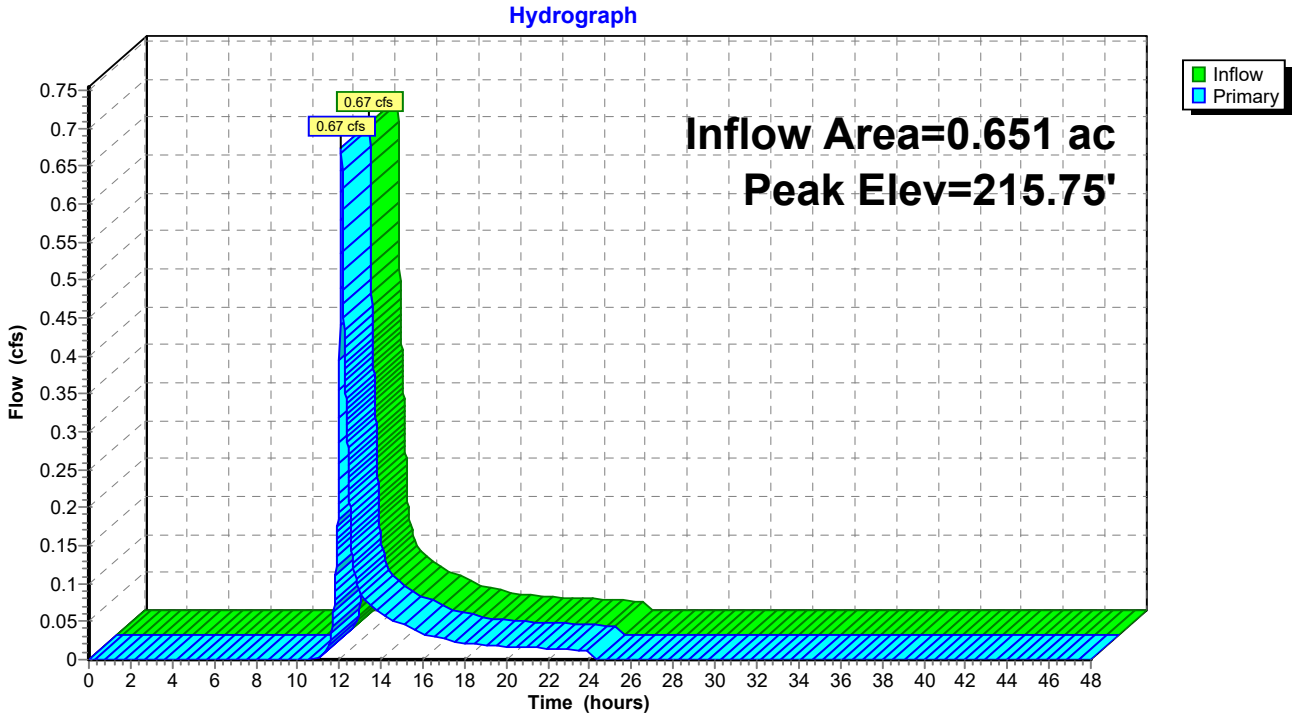
Inflow Area = 0.651 ac, 23.61% Impervious, Inflow Depth = 0.97" for 2-Year event
Inflow = 0.67 cfs @ 12.10 hrs, Volume= 0.052 af
Outflow = 0.67 cfs @ 12.10 hrs, Volume= 0.052 af, Atten= 0%, Lag= 0.0 min
Primary = 0.67 cfs @ 12.10 hrs, Volume= 0.052 af
Routed to Pond 2P :

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 215.75' @ 12.10 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	208.30'	**15.0" Round Culvert** L= 106.4' Ke= 0.500 Inlet / Outlet Invert= 208.30' / 207.60' S= 0.0066 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	215.70'	**19.0" x 76.3" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.54 cfs @ 12.10 hrs HW=215.75' (Free Discharge)
└**1=Culvert** (Passes 0.54 cfs of 12.96 cfs potential flow)
└**2=Orifice/Grate** (Weir Controls 0.54 cfs @ 0.71 fps)

Pond 1P:



Summary for Pond 2P:

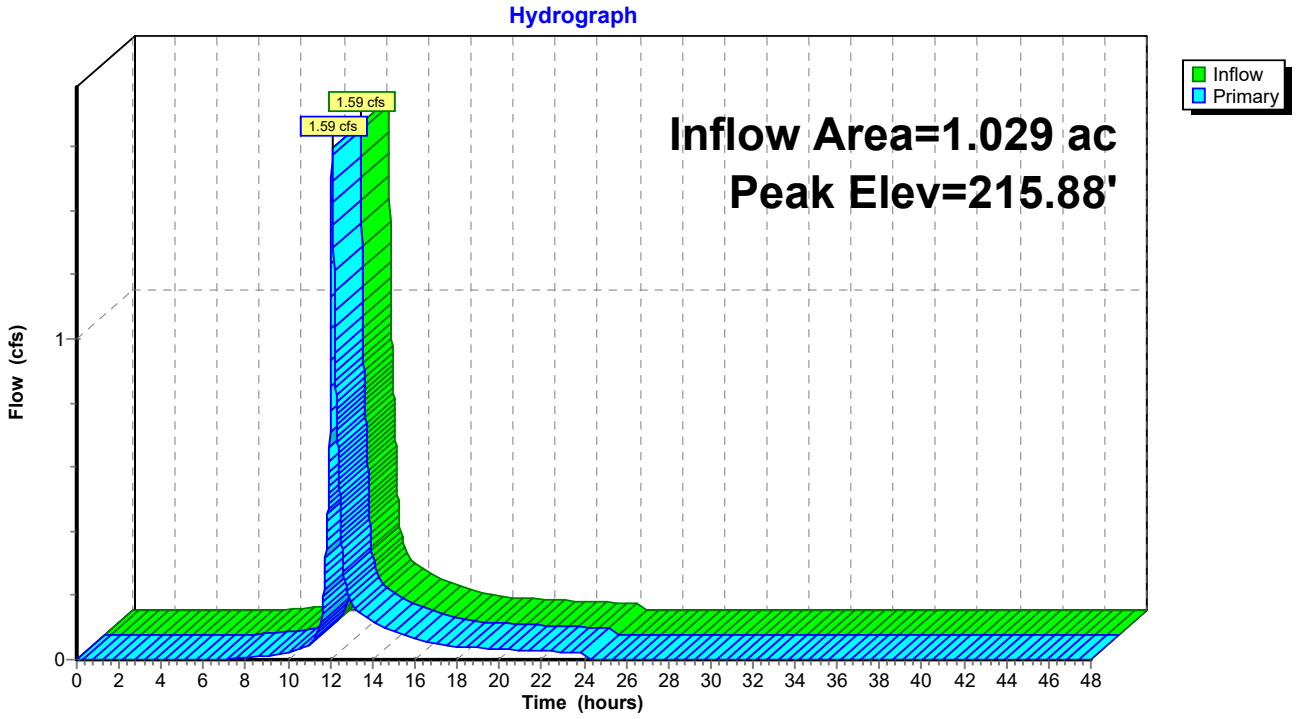
Inflow Area = 1.029 ac, 41.14% Impervious, Inflow Depth = 1.40" for 2-Year event
Inflow = 1.59 cfs @ 12.10 hrs, Volume= 0.120 af
Outflow = 1.59 cfs @ 12.10 hrs, Volume= 0.120 af, Atten= 0%, Lag= 0.0 min
Primary = 1.59 cfs @ 12.10 hrs, Volume= 0.120 af
Routed to Pond 3P :

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 215.88' @ 12.10 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	207.30'	**15.0" Round Culvert** L= 108.4' Ke= 0.500 Inlet / Outlet Invert= 207.30' / 207.20' S= 0.0009 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	215.70'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.58 cfs @ 12.10 hrs HW=215.88' (Free Discharge)
└**1=Culvert** (Passes 1.58 cfs of 13.38 cfs potential flow)
└**2=Orifice/Grate** (Weir Controls 1.58 cfs @ 1.39 fps)

Pond 2P:



Summary for Pond 3P:

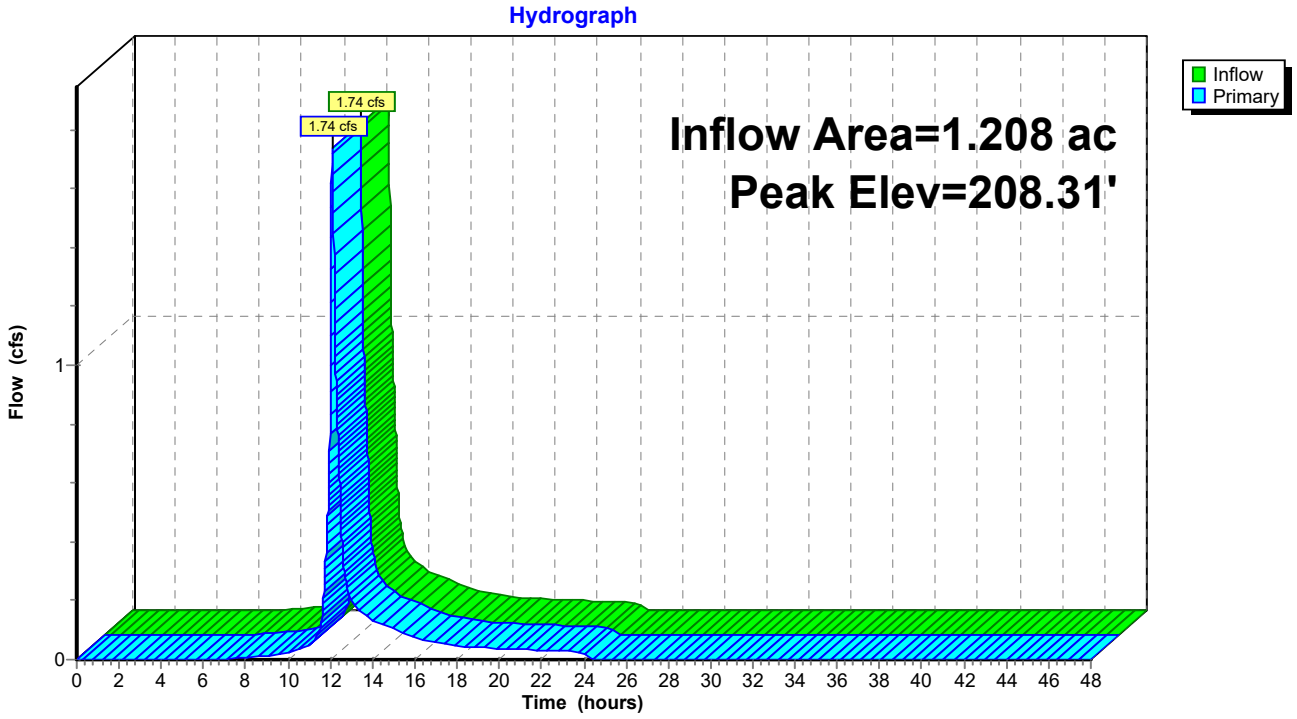
Inflow Area = 1.208 ac, 36.97% Impervious, Inflow Depth = 1.33" for 2-Year event
Inflow = 1.74 cfs @ 12.10 hrs, Volume= 0.134 af
Outflow = 1.74 cfs @ 12.10 hrs, Volume= 0.134 af, Atten= 0%, Lag= 0.0 min
Primary = 1.74 cfs @ 12.10 hrs, Volume= 0.134 af
Routed to Link 10L :

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 208.31' @ 12.10 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	207.20'	**15.0" Round Culvert** L= 61.8' Ke= 0.500 Inlet / Outlet Invert= 207.20' / 206.90' S= 0.0049 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Primary	213.70'	**21.5" x 37.1" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.73 cfs @ 12.10 hrs HW=208.31' TW=208.15' (Fixed TW Elev= 208.15')
1=Culvert (Outlet Controls 1.73 cfs @ 1.99 fps)
2=Orifice/Grate (Controls 0.00 cfs)

Pond 3P:

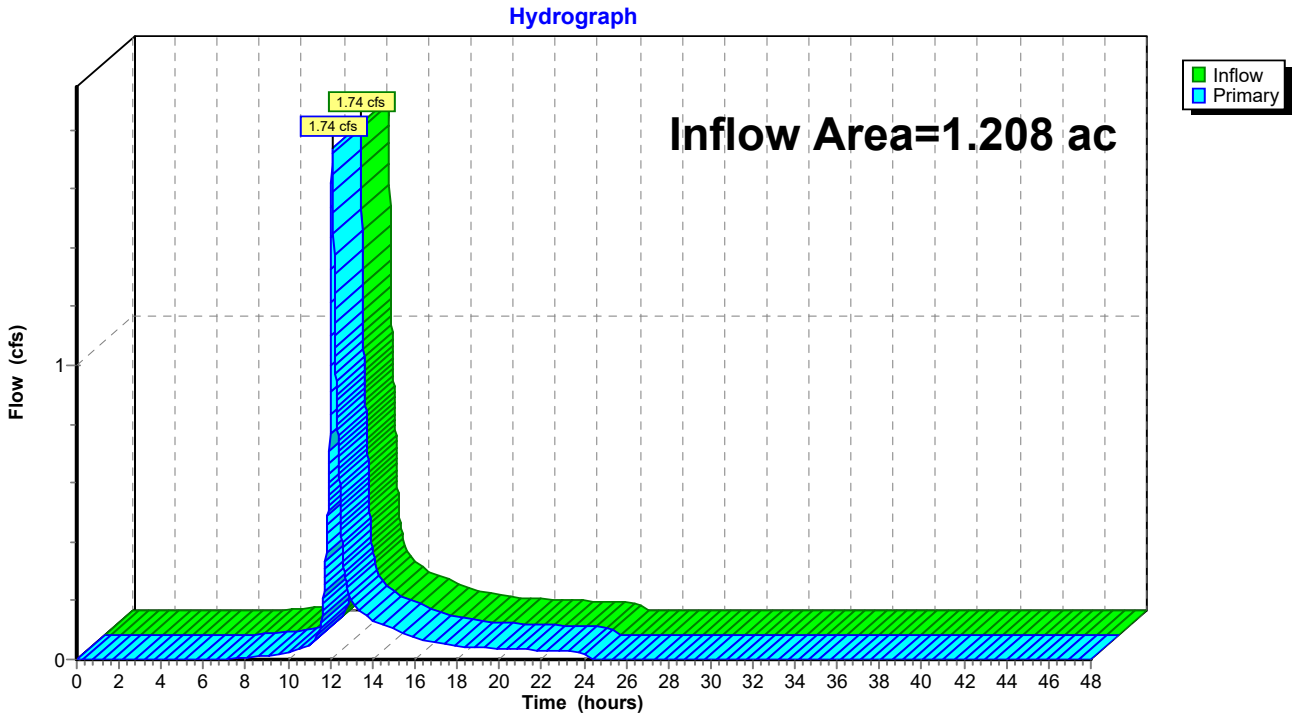


Summary for Link 10L:

Inflow Area = 1.208 ac, 36.97% Impervious, Inflow Depth = 1.33" for 2-Year event
Inflow = 1.74 cfs @ 12.10 hrs, Volume= 0.134 af
Primary = 1.74 cfs @ 12.10 hrs, Volume= 0.134 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link 10L:



Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Runoff Area=28,359 sf 23.61% Impervious Runoff Depth=2.09"
Flow Length=337' Tc=6.5 min CN=72 Runoff=1.55 cfs 0.113 af

Subcatchment2S: Runoff Area=16,469 sf 71.32% Impervious Runoff Depth=3.64"
Flow Length=155' Tc=6.5 min CN=89 Runoff=1.54 cfs 0.115 af

Subcatchment3S: Runoff Area=7,773 sf 12.93% Impervious Runoff Depth=2.09"
Flow Length=218' Tc=10.1 min CN=72 Runoff=0.38 cfs 0.031 af

Pond 1P: Peak Elev=215.79' Inflow=1.55 cfs 0.113 af
Outflow=1.55 cfs 0.113 af

Pond 2P: Peak Elev=215.98' Inflow=3.09 cfs 0.228 af
Outflow=3.09 cfs 0.228 af

Pond 3P: Peak Elev=208.56' Inflow=3.42 cfs 0.259 af
Outflow=3.42 cfs 0.259 af

Link 10L: Inflow=3.42 cfs 0.259 af
Primary=3.42 cfs 0.259 af

Total Runoff Area = 1.208 ac Runoff Volume = 0.259 af Average Runoff Depth = 2.58"
63.03% Pervious = 0.761 ac 36.97% Impervious = 0.446 ac

Summary for Subcatchment 1S:

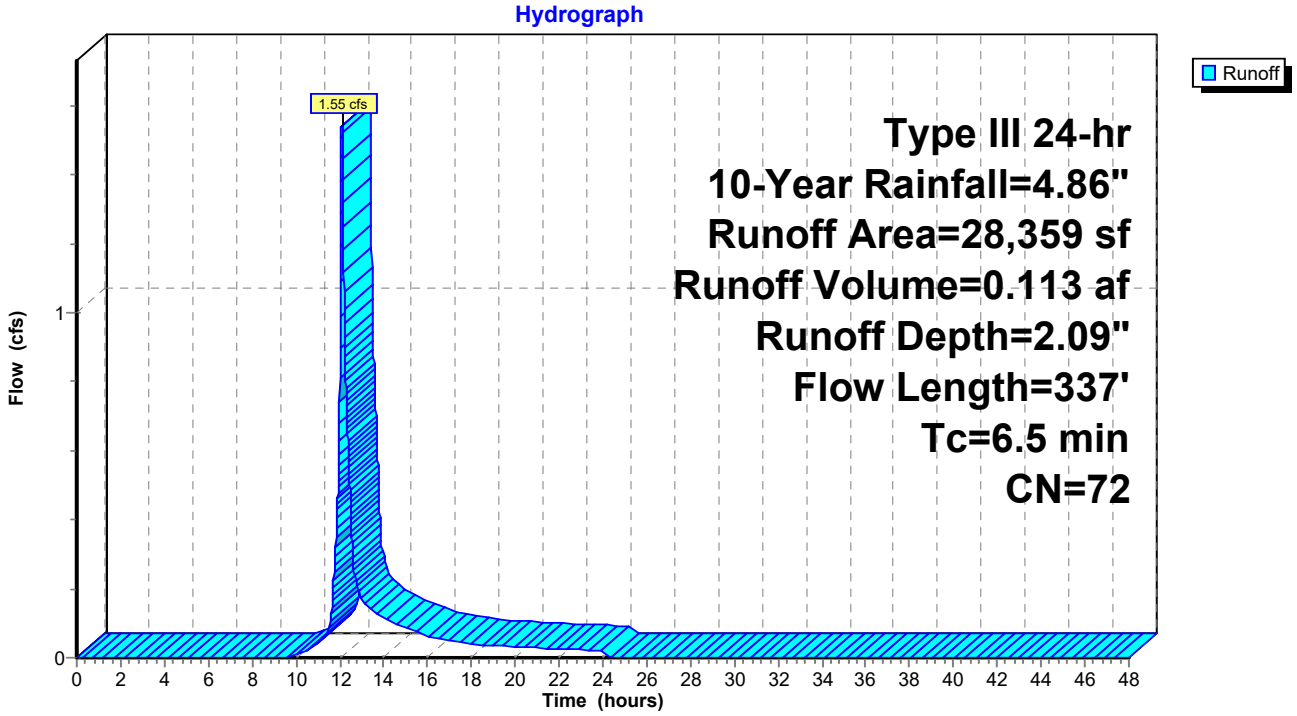
Runoff = 1.55 cfs @ 12.10 hrs, Volume= 0.113 af, Depth= 2.09"
Routed to Pond 1P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.86"

Area (sf)	CN	Description
17,666	68	<50% Grass cover, Poor, HSG A
6,695	98	Paved parking, HSG A
3,998	45	Woods, Poor, HSG A
28,359	72	Weighted Average
21,664		76.39% Pervious Area
6,695		23.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	45	0.1445	0.15		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
0.1	8	0.2400	2.26		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.26"
1.3	284	0.0049	3.68	4.52	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
6.5	337	Total			

Subcatchment 1S:



Summary for Subcatchment 2S:

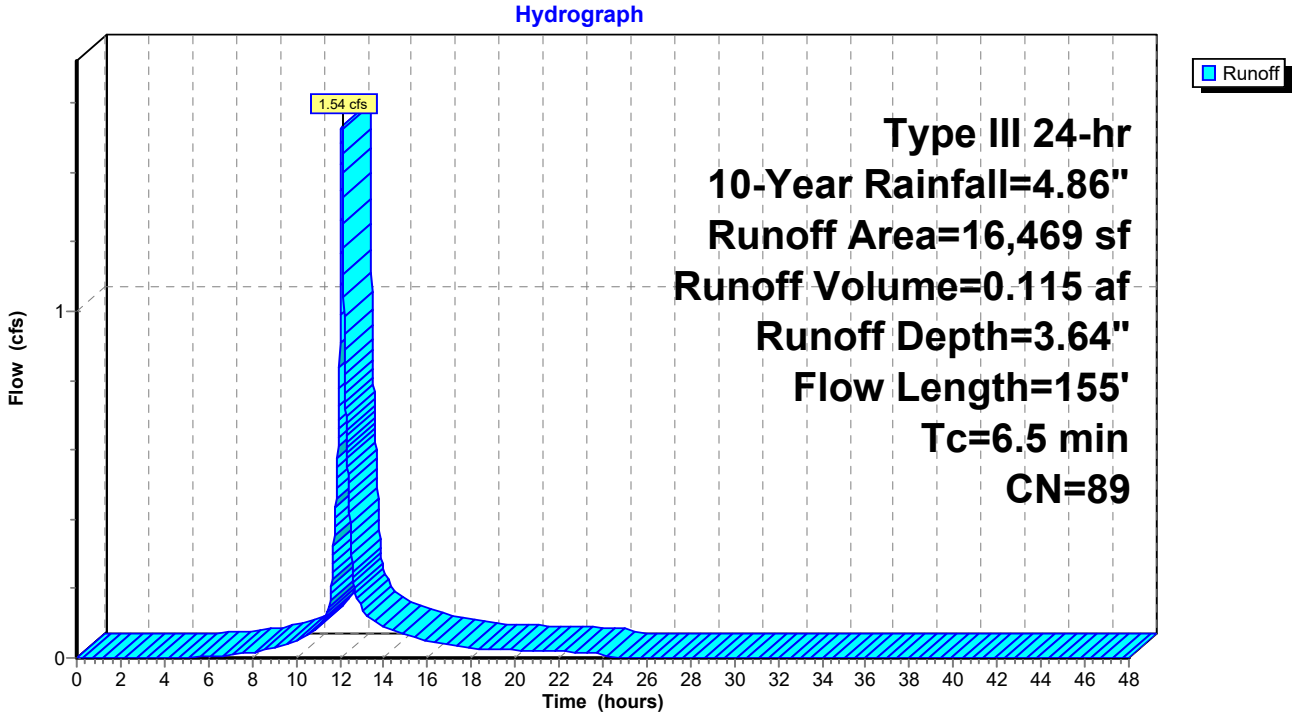
Runoff = 1.54 cfs @ 12.09 hrs, Volume= 0.115 af, Depth= 3.64"
Routed to Pond 2P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.86"

Area (sf)	CN	Description
11,329	98	Roofs, HSG A
4,724	68	<50% Grass cover, Poor, HSG A
416	98	Paved parking, HSG A
16,469	89	Weighted Average
4,724		28.68% Pervious Area
11,745		71.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	100	0.0750	0.29		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.26"
0.8	55	0.0238	1.08		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
6.5	155	Total			

Subcatchment 2S:



Summary for Subcatchment 3S:

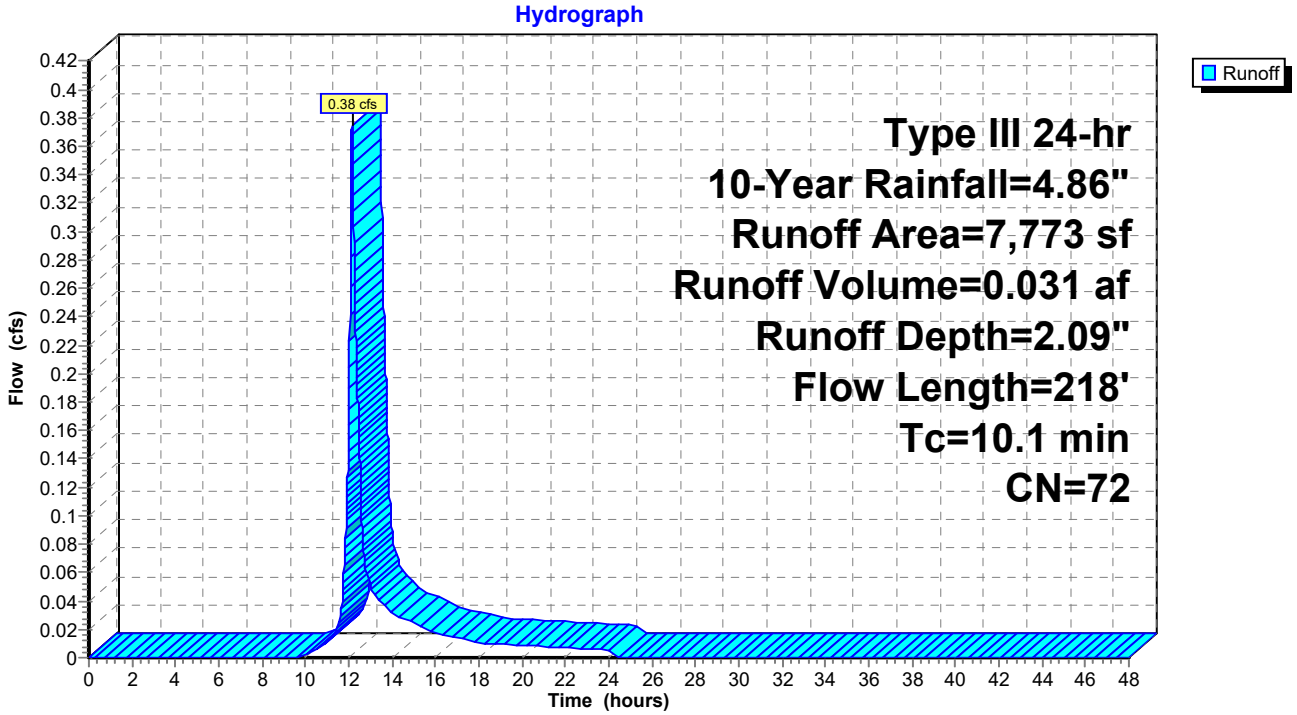
Runoff = 0.38 cfs @ 12.15 hrs, Volume= 0.031 af, Depth= 2.09"
Routed to Pond 3P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.86"

Area (sf)	CN	Description
6,768	68	<50% Grass cover, Poor, HSG A
1,005	98	Paved parking, HSG A
7,773	72	Weighted Average
6,768		87.07% Pervious Area
1,005		12.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	100	0.0240	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.26"
1.1	118	0.0680	1.83		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
10.1	218	Total			

Subcatchment 3S:



Summary for Pond 1P:

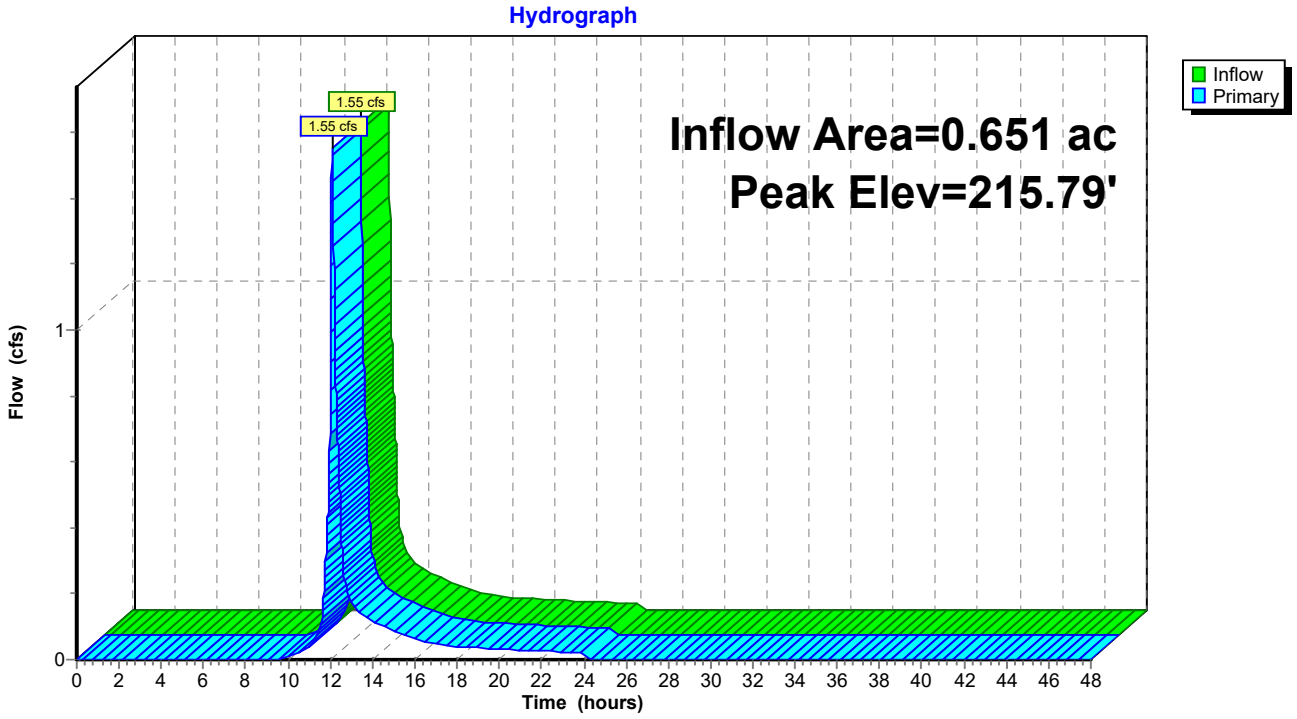
Inflow Area = 0.651 ac, 23.61% Impervious, Inflow Depth = 2.09" for 10-Year event
Inflow = 1.55 cfs @ 12.10 hrs, Volume= 0.113 af
Outflow = 1.55 cfs @ 12.10 hrs, Volume= 0.113 af, Atten= 0%, Lag= 0.0 min
Primary = 1.55 cfs @ 12.10 hrs, Volume= 0.113 af
Routed to Pond 2P :

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 215.79' @ 12.10 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	208.30'	**15.0" Round Culvert** L= 106.4' Ke= 0.500 Inlet / Outlet Invert= 208.30' / 207.60' S= 0.0066 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	215.70'	**19.0" x 76.3" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.48 cfs @ 12.10 hrs HW=215.79' (Free Discharge)
└**1=Culvert** (Passes 1.48 cfs of 13.01 cfs potential flow)
└**2=Orifice/Grate** (Weir Controls 1.48 cfs @ 1.00 fps)

Pond 1P:



Summary for Pond 2P:

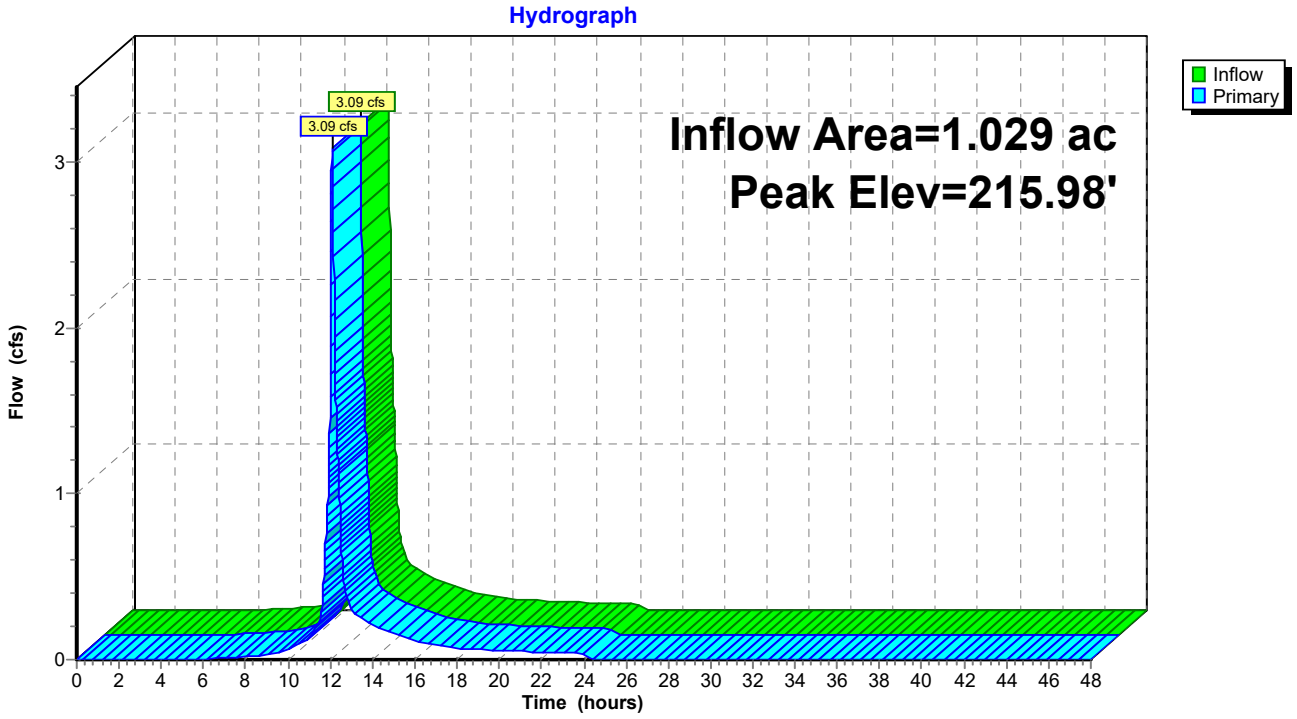
Inflow Area = 1.029 ac, 41.14% Impervious, Inflow Depth = 2.66" for 10-Year event
Inflow = 3.09 cfs @ 12.10 hrs, Volume= 0.228 af
Outflow = 3.09 cfs @ 12.10 hrs, Volume= 0.228 af, Atten= 0%, Lag= 0.0 min
Primary = 3.09 cfs @ 12.10 hrs, Volume= 0.228 af
Routed to Pond 3P :

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 215.98' @ 12.10 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	207.30'	**15.0" Round Culvert** L= 108.4' Ke= 0.500 Inlet / Outlet Invert= 207.30' / 207.20' S= 0.0009 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	215.70'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=3.06 cfs @ 12.10 hrs HW=215.98' (Free Discharge)
└**1=Culvert** (Passes 3.06 cfs of 13.47 cfs potential flow)
└**2=Orifice/Grate** (Weir Controls 3.06 cfs @ 1.73 fps)

Pond 2P:



Summary for Pond 3P:

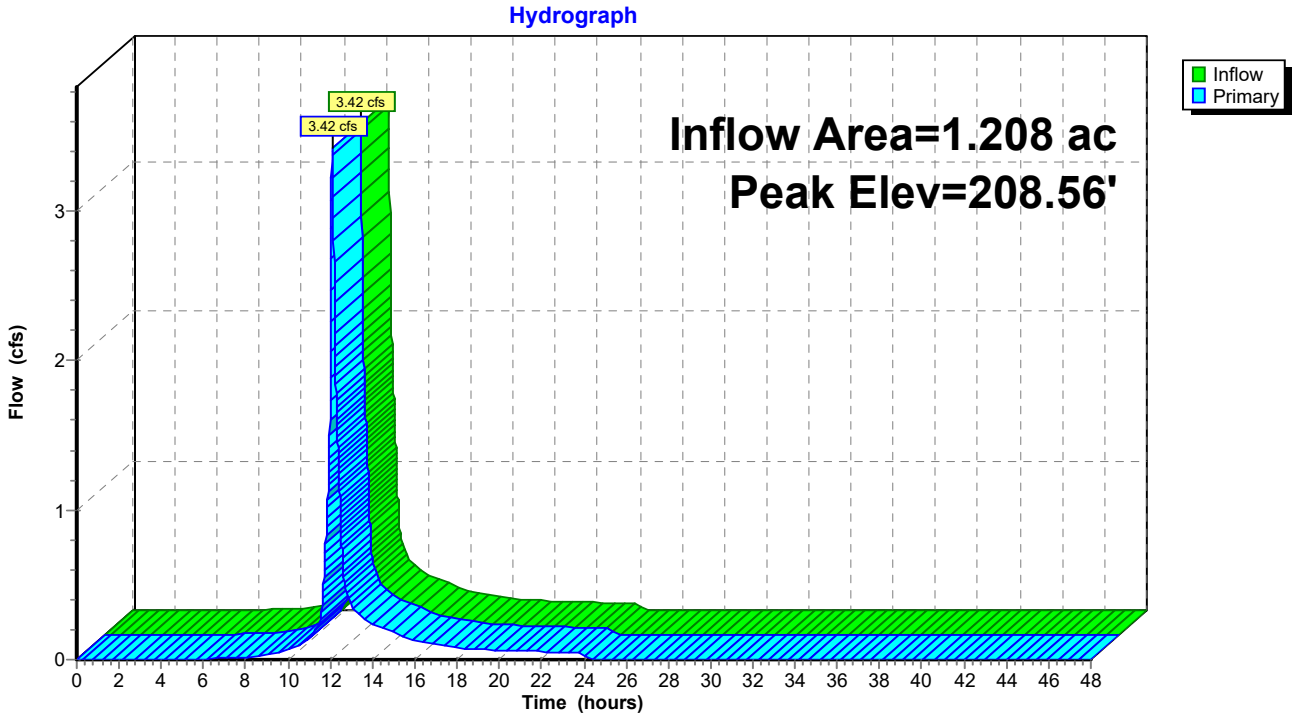
Inflow Area = 1.208 ac, 36.97% Impervious, Inflow Depth = 2.58" for 10-Year event
Inflow = 3.42 cfs @ 12.10 hrs, Volume= 0.259 af
Outflow = 3.42 cfs @ 12.10 hrs, Volume= 0.259 af, Atten= 0%, Lag= 0.0 min
Primary = 3.42 cfs @ 12.10 hrs, Volume= 0.259 af
Routed to Link 10L :

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 208.56' @ 12.10 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	207.20'	**15.0" Round Culvert** L= 61.8' Ke= 0.500 Inlet / Outlet Invert= 207.20' / 206.90' S= 0.0049 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Primary	213.70'	**21.5" x 37.1" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=3.42 cfs @ 12.10 hrs HW=208.56' TW=208.15' (Fixed TW Elev= 208.15')
1=Culvert (Outlet Controls 3.42 cfs @ 3.19 fps)
2=Orifice/Grate (Controls 0.00 cfs)

Pond 3P:

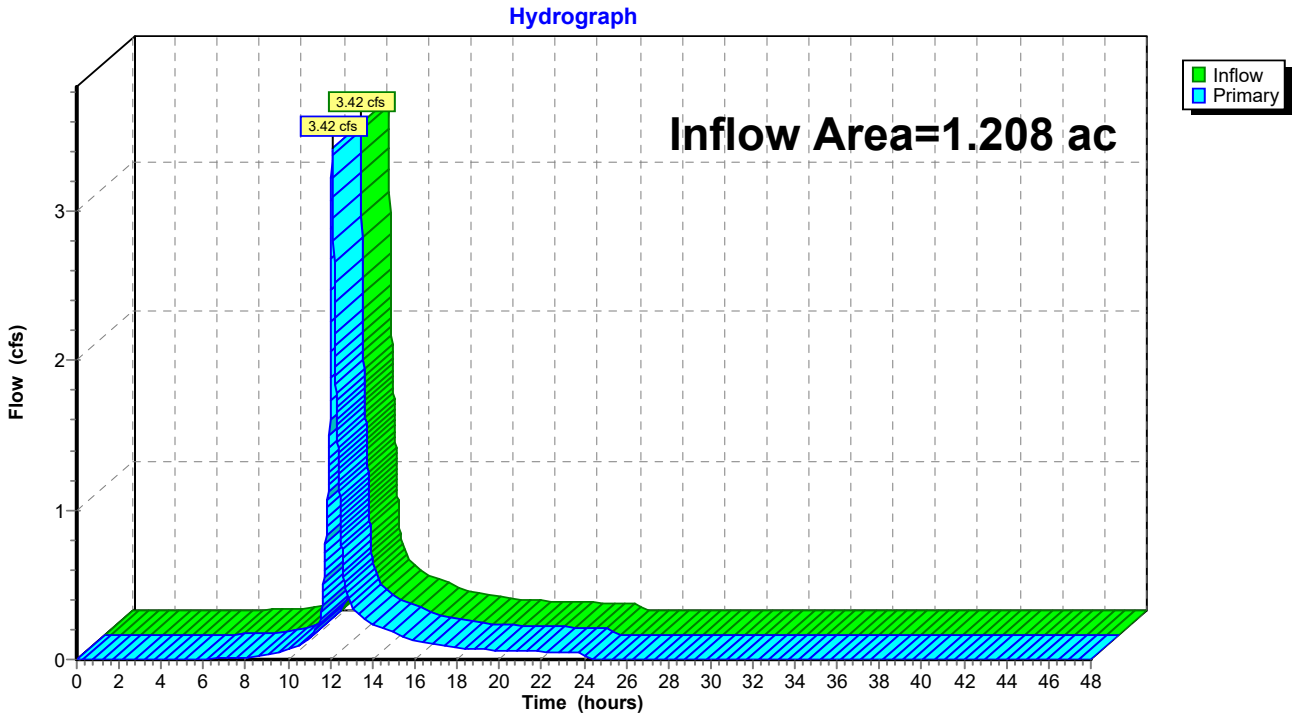


Summary for Link 10L:

Inflow Area = 1.208 ac, 36.97% Impervious, Inflow Depth = 2.58" for 10-Year event
Inflow = 3.42 cfs @ 12.10 hrs, Volume= 0.259 af
Primary = 3.42 cfs @ 12.10 hrs, Volume= 0.259 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link 10L:



Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Runoff Area=28,359 sf 23.61% Impervious Runoff Depth=3.08"
Flow Length=337' Tc=6.5 min CN=72 Runoff=2.31 cfs 0.167 af

Subcatchment2S: Runoff Area=16,469 sf 71.32% Impervious Runoff Depth=4.84"
Flow Length=155' Tc=6.5 min CN=89 Runoff=2.02 cfs 0.153 af

Subcatchment3S: Runoff Area=7,773 sf 12.93% Impervious Runoff Depth=3.08"
Flow Length=218' Tc=10.1 min CN=72 Runoff=0.56 cfs 0.046 af

Pond 1P: Peak Elev=215.82' Inflow=2.31 cfs 0.167 af
Outflow=2.31 cfs 0.167 af

Pond 2P: Peak Elev=216.05' Inflow=4.33 cfs 0.320 af
Outflow=4.33 cfs 0.320 af

Pond 3P: Peak Elev=208.82' Inflow=4.83 cfs 0.366 af
Outflow=4.83 cfs 0.366 af

Link 10L: Inflow=4.83 cfs 0.366 af
Primary=4.83 cfs 0.366 af

Total Runoff Area = 1.208 ac Runoff Volume = 0.366 af Average Runoff Depth = 3.63"
63.03% Pervious = 0.761 ac 36.97% Impervious = 0.446 ac

Summary for Subcatchment 1S:

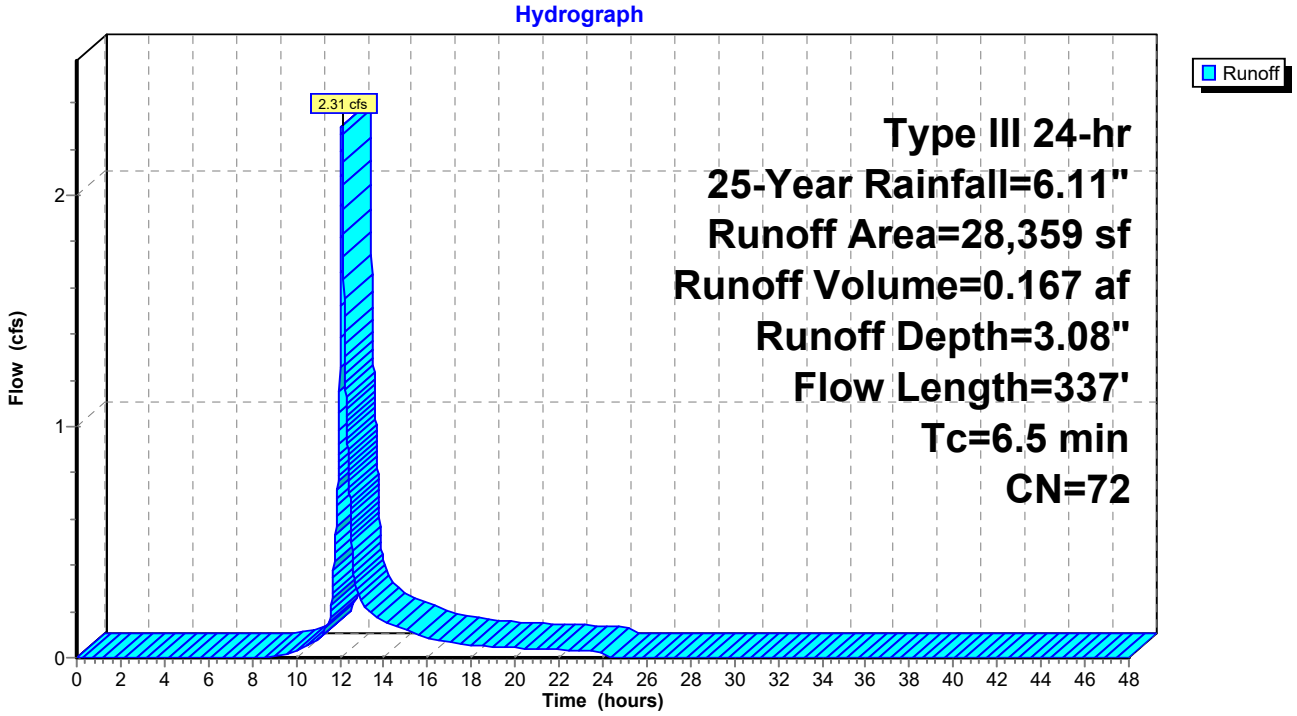
Runoff = 2.31 cfs @ 12.10 hrs, Volume= 0.167 af, Depth= 3.08"
Routed to Pond 1P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.11"

Area (sf)	CN	Description
17,666	68	<50% Grass cover, Poor, HSG A
6,695	98	Paved parking, HSG A
3,998	45	Woods, Poor, HSG A
28,359	72	Weighted Average
21,664		76.39% Pervious Area
6,695		23.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	45	0.1445	0.15		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
0.1	8	0.2400	2.26		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.26"
1.3	284	0.0049	3.68	4.52	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
6.5	337	Total			

Subcatchment 1S:



Summary for Subcatchment 2S:

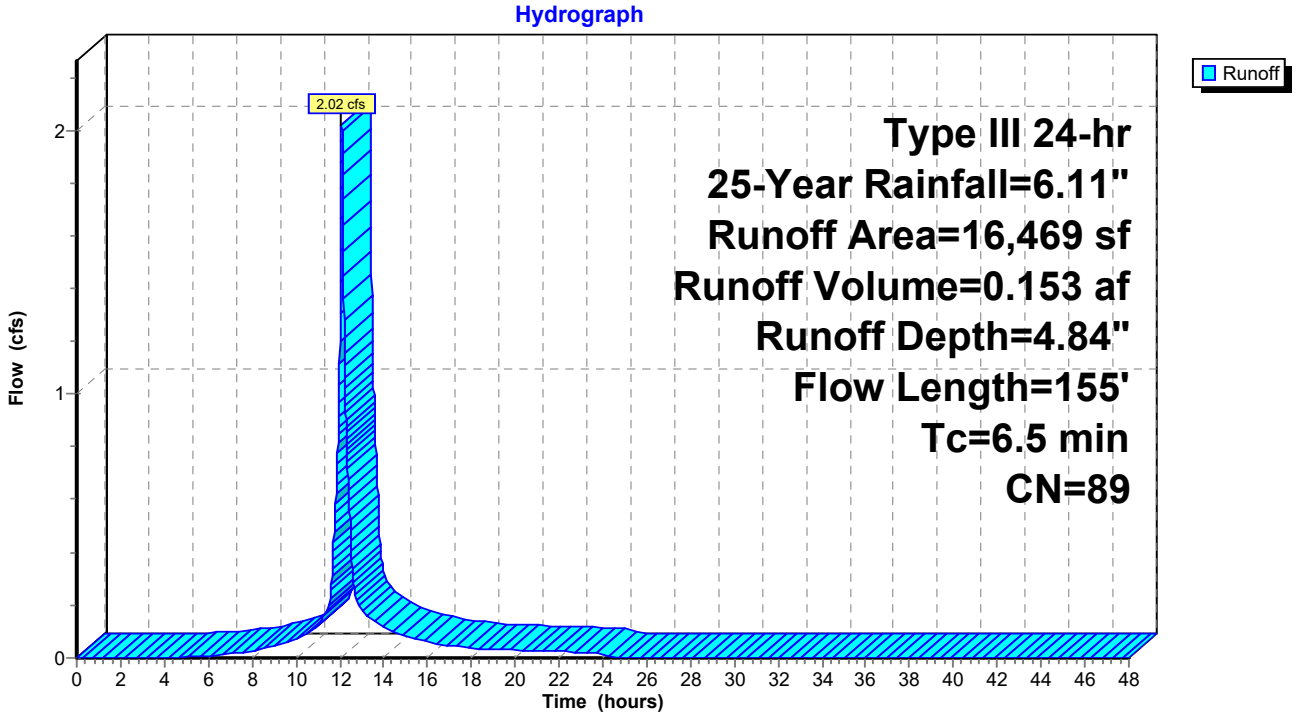
Runoff = 2.02 cfs @ 12.09 hrs, Volume= 0.153 af, Depth= 4.84"
Routed to Pond 2P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.11"

Area (sf)	CN	Description
11,329	98	Roofs, HSG A
4,724	68	<50% Grass cover, Poor, HSG A
416	98	Paved parking, HSG A
16,469	89	Weighted Average
4,724		28.68% Pervious Area
11,745		71.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	100	0.0750	0.29		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.26"
0.8	55	0.0238	1.08		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
6.5	155	Total			

Subcatchment 2S:



Summary for Subcatchment 3S:

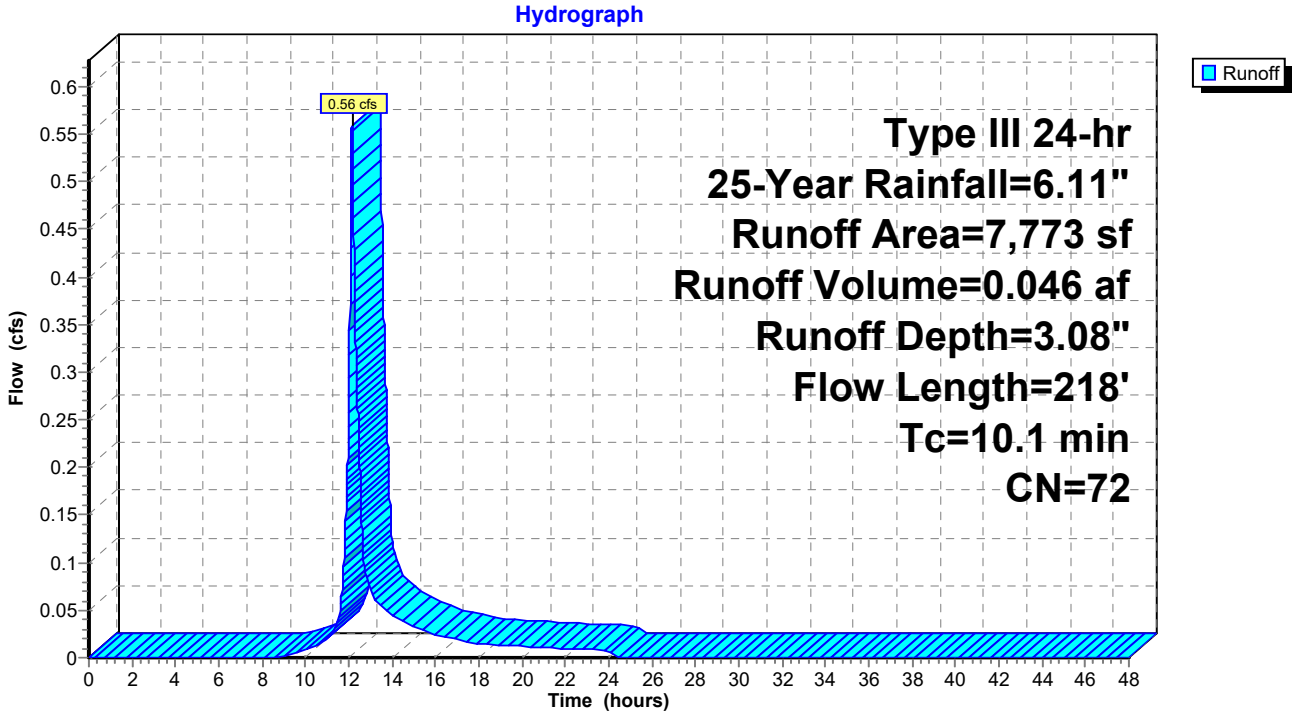
Runoff = 0.56 cfs @ 12.14 hrs, Volume= 0.046 af, Depth= 3.08"
Routed to Pond 3P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.11"

Area (sf)	CN	Description
6,768	68	<50% Grass cover, Poor, HSG A
1,005	98	Paved parking, HSG A
7,773	72	Weighted Average
6,768		87.07% Pervious Area
1,005		12.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	100	0.0240	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.26"
1.1	118	0.0680	1.83		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
10.1	218	Total			

Subcatchment 3S:



Summary for Pond 1P:

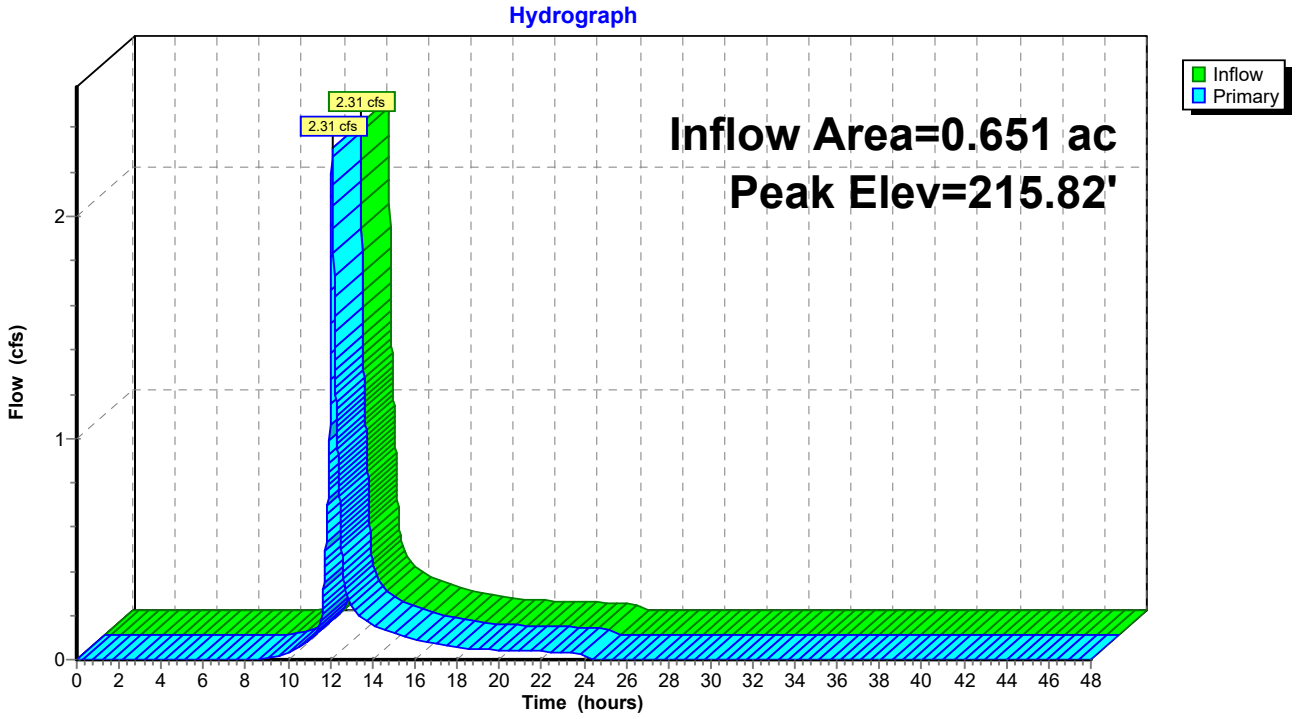
Inflow Area = 0.651 ac, 23.61% Impervious, Inflow Depth = 3.08" for 25-Year event
Inflow = 2.31 cfs @ 12.10 hrs, Volume= 0.167 af
Outflow = 2.31 cfs @ 12.10 hrs, Volume= 0.167 af, Atten= 0%, Lag= 0.0 min
Primary = 2.31 cfs @ 12.10 hrs, Volume= 0.167 af
Routed to Pond 2P :

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 215.82' @ 12.10 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	208.30'	**15.0" Round Culvert** L= 106.4' Ke= 0.500 Inlet / Outlet Invert= 208.30' / 207.60' S= 0.0066 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	215.70'	**19.0" x 76.3" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=2.23 cfs @ 12.10 hrs HW=215.82' (Free Discharge)
└**1=Culvert** (Passes 2.23 cfs of 13.03 cfs potential flow)
└**2=Orifice/Grate** (Weir Controls 2.23 cfs @ 1.15 fps)

Pond 1P:



Summary for Pond 2P:

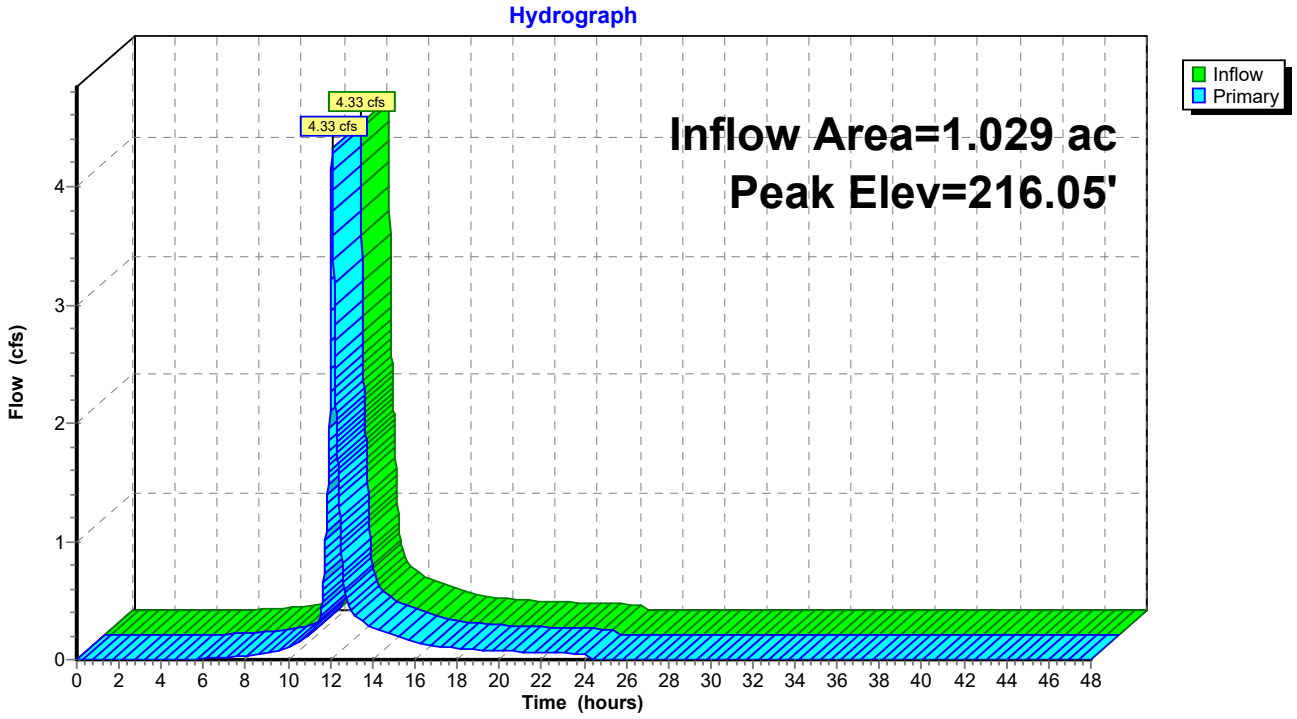
Inflow Area = 1.029 ac, 41.14% Impervious, Inflow Depth = 3.73" for 25-Year event
Inflow = 4.33 cfs @ 12.09 hrs, Volume= 0.320 af
Outflow = 4.33 cfs @ 12.09 hrs, Volume= 0.320 af, Atten= 0%, Lag= 0.0 min
Primary = 4.33 cfs @ 12.09 hrs, Volume= 0.320 af
Routed to Pond 3P :

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 216.05' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	207.30'	**15.0" Round Culvert** L= 108.4' Ke= 0.500 Inlet / Outlet Invert= 207.30' / 207.20' S= 0.0009 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	215.70'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=4.31 cfs @ 12.09 hrs HW=216.05' (Free Discharge)
└**1=Culvert** (Passes 4.31 cfs of 13.53 cfs potential flow)
└**2=Orifice/Grate** (Weir Controls 4.31 cfs @ 1.94 fps)

Pond 2P:



Summary for Pond 3P:

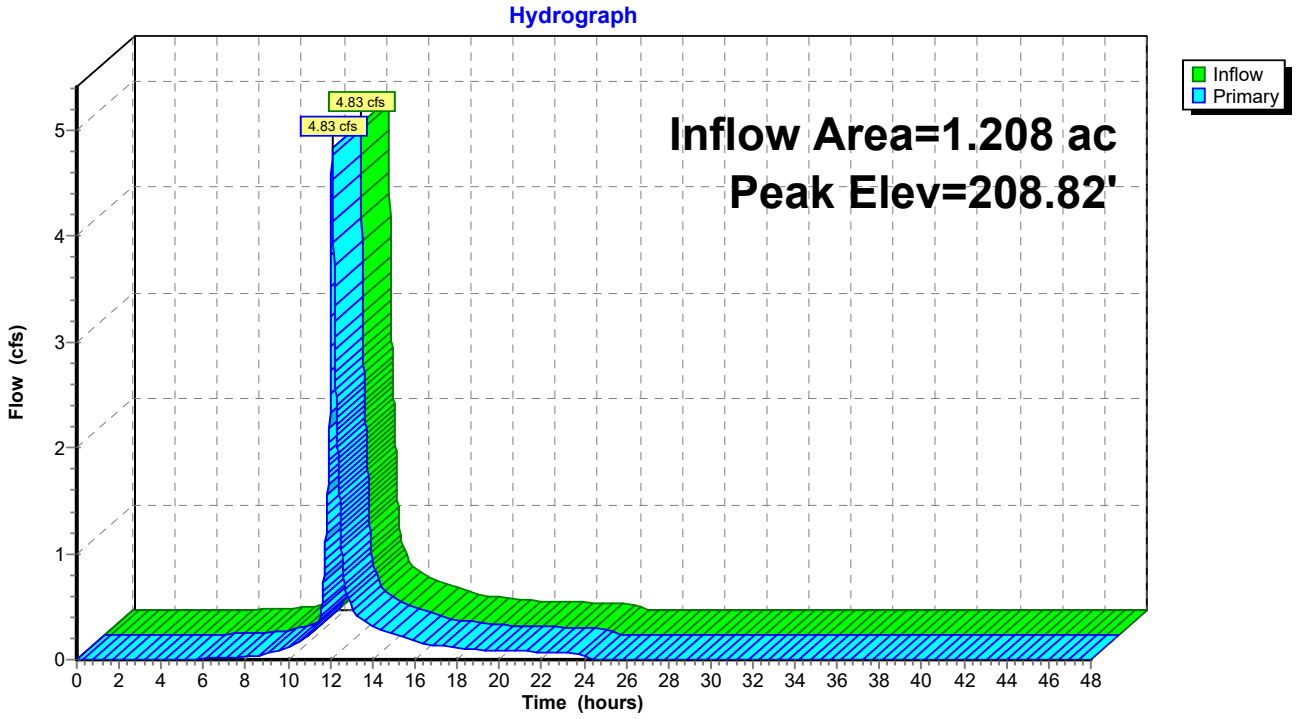
Inflow Area = 1.208 ac, 36.97% Impervious, Inflow Depth = 3.63" for 25-Year event
Inflow = 4.83 cfs @ 12.10 hrs, Volume= 0.366 af
Outflow = 4.83 cfs @ 12.10 hrs, Volume= 0.366 af, Atten= 0%, Lag= 0.0 min
Primary = 4.83 cfs @ 12.10 hrs, Volume= 0.366 af
Routed to Link 10L :

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 208.82' @ 12.10 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	207.20'	**15.0" Round Culvert** L= 61.8' Ke= 0.500 Inlet / Outlet Invert= 207.20' / 206.90' S= 0.0049 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Primary	213.70'	**21.5" x 37.1" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=4.83 cfs @ 12.10 hrs HW=208.82' TW=208.15' (Fixed TW Elev= 208.15')
1=Culvert (Outlet Controls 4.83 cfs @ 3.96 fps)
2=Orifice/Grate (Controls 0.00 cfs)

Pond 3P:

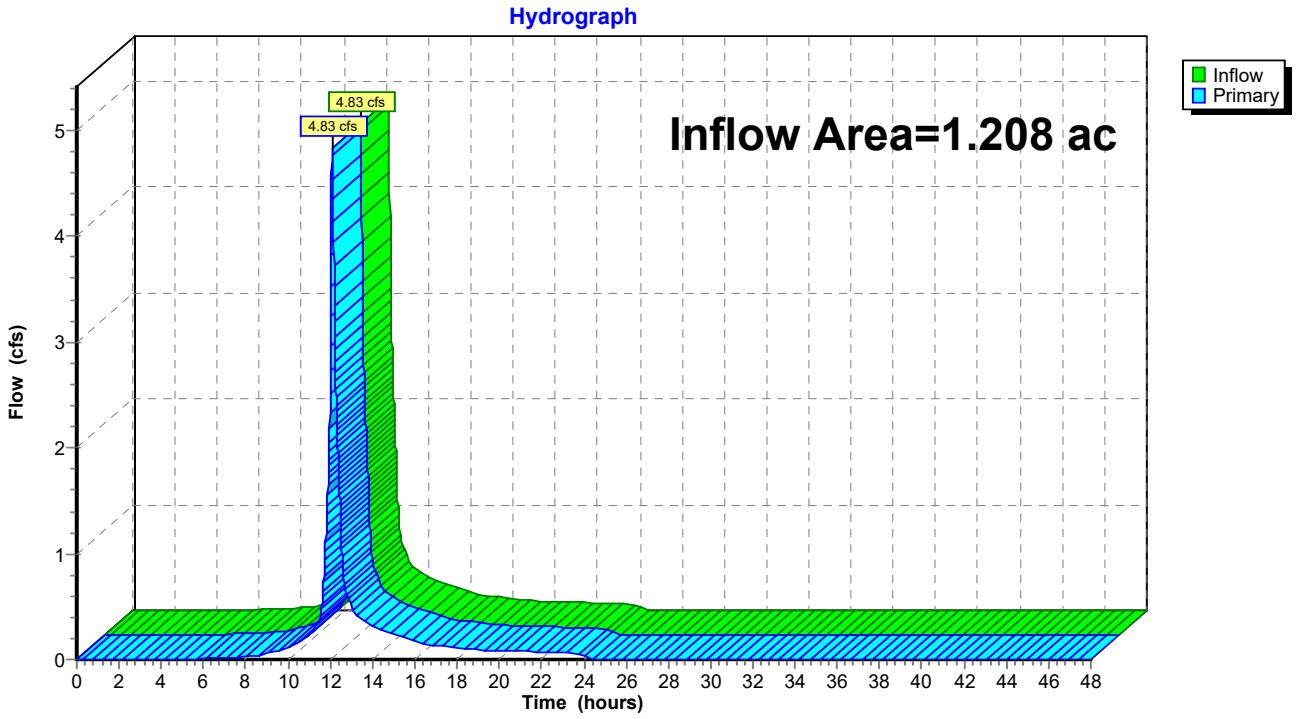


Summary for Link 10L:

Inflow Area = 1.208 ac, 36.97% Impervious, Inflow Depth = 3.63" for 25-Year event
Inflow = 4.83 cfs @ 12.10 hrs, Volume= 0.366 af
Primary = 4.83 cfs @ 12.10 hrs, Volume= 0.366 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link 10L:



Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Runoff Area=28,359 sf 23.61% Impervious Runoff Depth=5.25"
Flow Length=337' Tc=6.5 min CN=72 Runoff=3.93 cfs 0.285 af

Subcatchment2S: Runoff Area=16,469 sf 71.32% Impervious Runoff Depth=7.31"
Flow Length=155' Tc=6.5 min CN=89 Runoff=2.98 cfs 0.230 af

Subcatchment3S: Runoff Area=7,773 sf 12.93% Impervious Runoff Depth=5.25"
Flow Length=218' Tc=10.1 min CN=72 Runoff=0.96 cfs 0.078 af

Pond 1P: Peak Elev=215.88' Inflow=3.93 cfs 0.285 af
Outflow=3.93 cfs 0.285 af

Pond 2P: Peak Elev=216.18' Inflow=6.91 cfs 0.515 af
Outflow=6.91 cfs 0.515 af

Pond 3P: Peak Elev=209.98' Inflow=7.77 cfs 0.593 af
Outflow=7.77 cfs 0.593 af

Link 10L: Inflow=7.77 cfs 0.593 af
Primary=7.77 cfs 0.593 af

Total Runoff Area = 1.208 ac Runoff Volume = 0.593 af Average Runoff Depth = 5.89"
63.03% Pervious = 0.761 ac 36.97% Impervious = 0.446 ac

Summary for Subcatchment 1S:

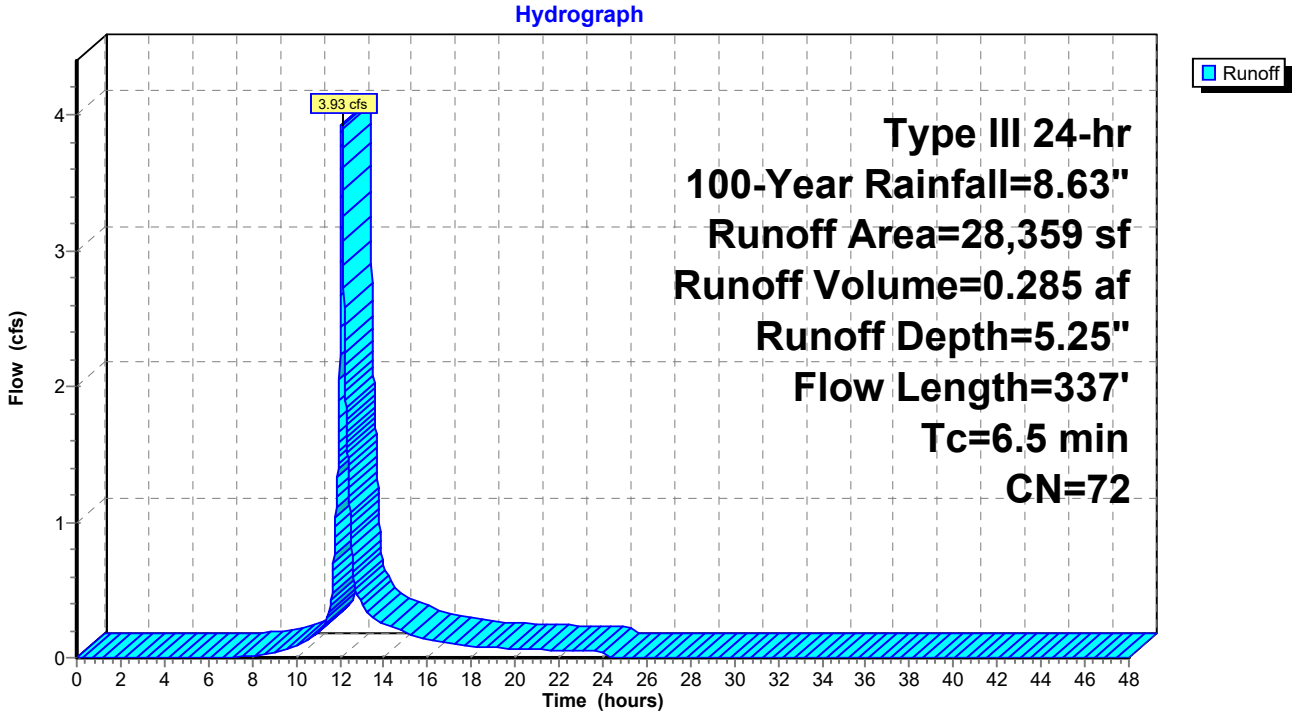
Runoff = 3.93 cfs @ 12.09 hrs, Volume= 0.285 af, Depth= 5.25"
Routed to Pond 1P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.63"

Area (sf)	CN	Description
17,666	68	<50% Grass cover, Poor, HSG A
6,695	98	Paved parking, HSG A
3,998	45	Woods, Poor, HSG A
28,359	72	Weighted Average
21,664		76.39% Pervious Area
6,695		23.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	45	0.1445	0.15		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
0.1	8	0.2400	2.26		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.26"
1.3	284	0.0049	3.68	4.52	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
6.5	337	Total			

Subcatchment 1S:



Summary for Subcatchment 2S:

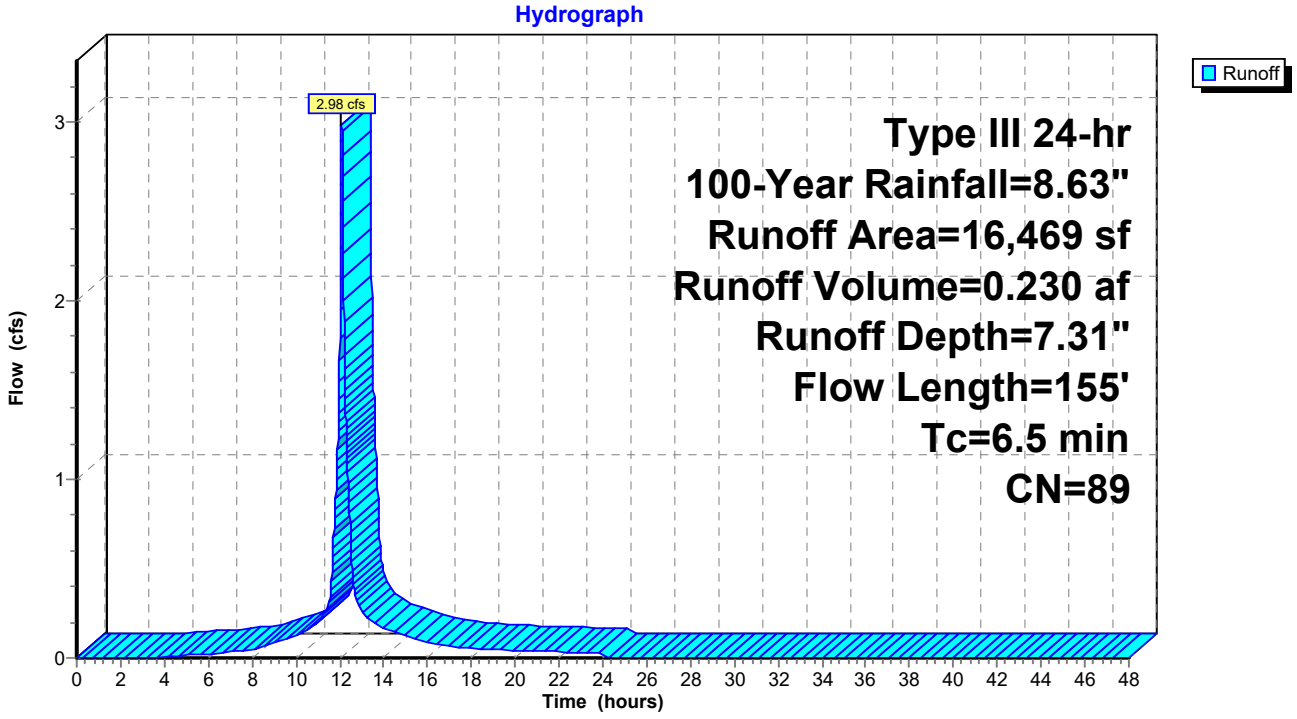
Runoff = 2.98 cfs @ 12.09 hrs, Volume= 0.230 af, Depth= 7.31"
Routed to Pond 2P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.63"

Area (sf)	CN	Description
11,329	98	Roofs, HSG A
4,724	68	<50% Grass cover, Poor, HSG A
416	98	Paved parking, HSG A
16,469	89	Weighted Average
4,724		28.68% Pervious Area
11,745		71.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	100	0.0750	0.29		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.26"
0.8	55	0.0238	1.08		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
6.5	155	Total			

Subcatchment 2S:



Summary for Subcatchment 3S:

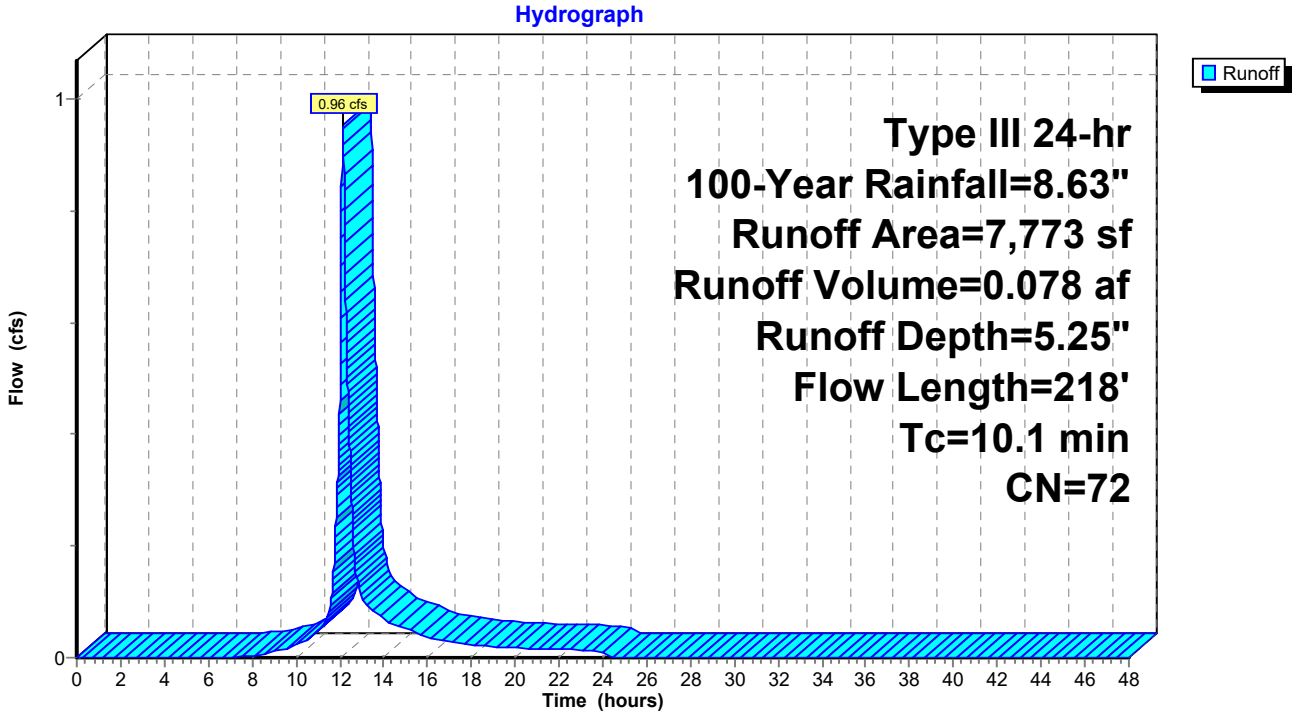
Runoff = 0.96 cfs @ 12.14 hrs, Volume= 0.078 af, Depth= 5.25"
Routed to Pond 3P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.63"

Area (sf)	CN	Description
6,768	68	<50% Grass cover, Poor, HSG A
1,005	98	Paved parking, HSG A
7,773	72	Weighted Average
6,768		87.07% Pervious Area
1,005		12.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	100	0.0240	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.26"
1.1	118	0.0680	1.83		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
10.1	218	Total			

Subcatchment 3S:



Summary for Pond 1P:

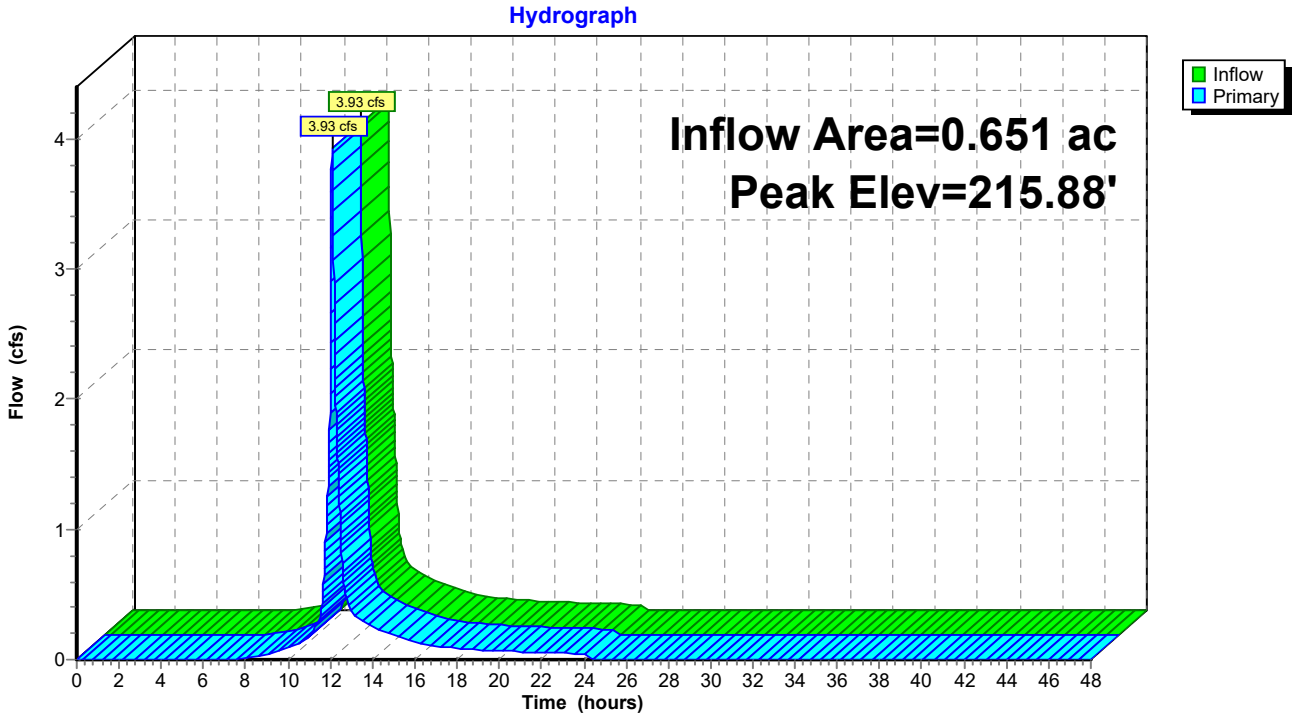
Inflow Area = 0.651 ac, 23.61% Impervious, Inflow Depth = 5.25" for 100-Year event
Inflow = 3.93 cfs @ 12.09 hrs, Volume= 0.285 af
Outflow = 3.93 cfs @ 12.09 hrs, Volume= 0.285 af, Atten= 0%, Lag= 0.0 min
Primary = 3.93 cfs @ 12.09 hrs, Volume= 0.285 af
Routed to Pond 2P :

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 215.88' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	208.30'	**15.0" Round Culvert** L= 106.4' Ke= 0.500 Inlet / Outlet Invert= 208.30' / 207.60' S= 0.0066 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	215.70'	**19.0" x 76.3" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=3.86 cfs @ 12.09 hrs HW=215.88' (Free Discharge)
└**1=Culvert** (Passes 3.86 cfs of 13.08 cfs potential flow)
└**2=Orifice/Grate** (Weir Controls 3.86 cfs @ 1.38 fps)

Pond 1P:



Summary for Pond 2P:

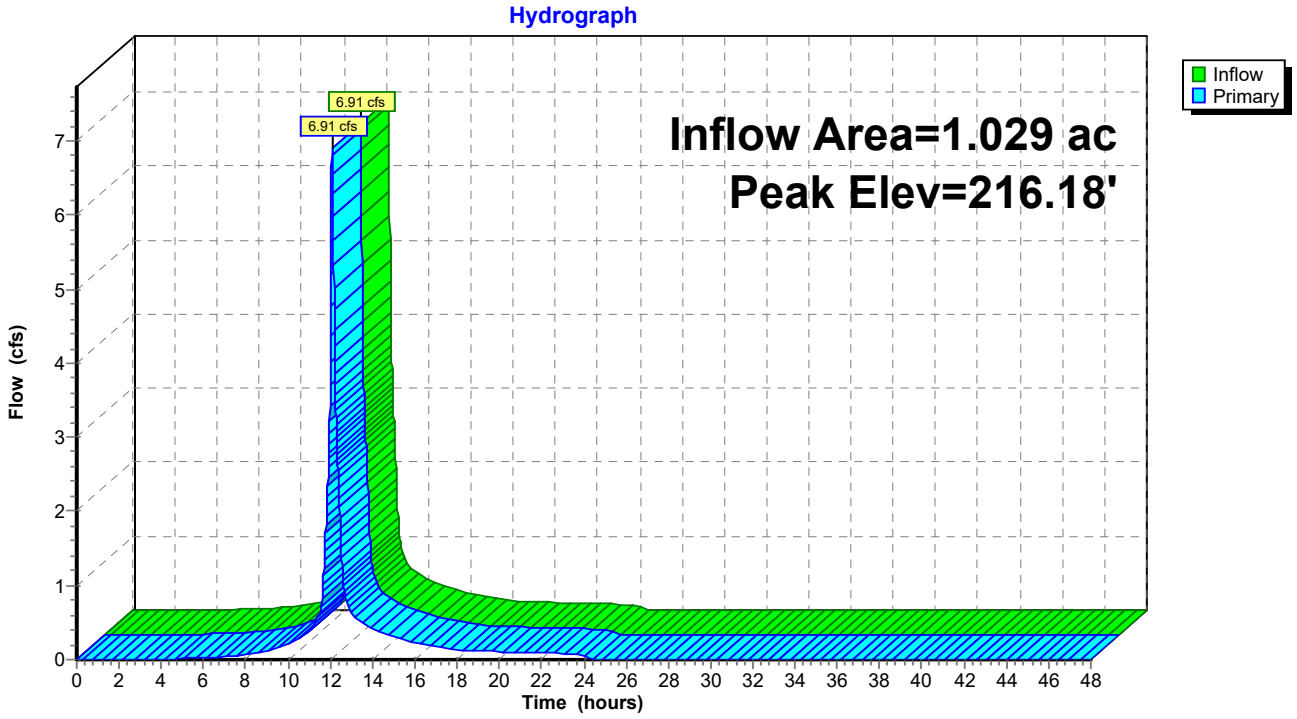
Inflow Area = 1.029 ac, 41.14% Impervious, Inflow Depth = 6.01" for 100-Year event
Inflow = 6.91 cfs @ 12.09 hrs, Volume= 0.515 af
Outflow = 6.91 cfs @ 12.09 hrs, Volume= 0.515 af, Atten= 0%, Lag= 0.0 min
Primary = 6.91 cfs @ 12.09 hrs, Volume= 0.515 af
Routed to Pond 3P :

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 216.18' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	207.30'	**15.0" Round Culvert** L= 108.4' Ke= 0.500 Inlet / Outlet Invert= 207.30' / 207.20' S= 0.0009 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	215.70'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=6.89 cfs @ 12.09 hrs HW=216.18' (Free Discharge)
└**1=Culvert** (Passes 6.89 cfs of 13.65 cfs potential flow)
└**2=Orifice/Grate** (Weir Controls 6.89 cfs @ 2.27 fps)

Pond 2P:



Summary for Pond 3P:

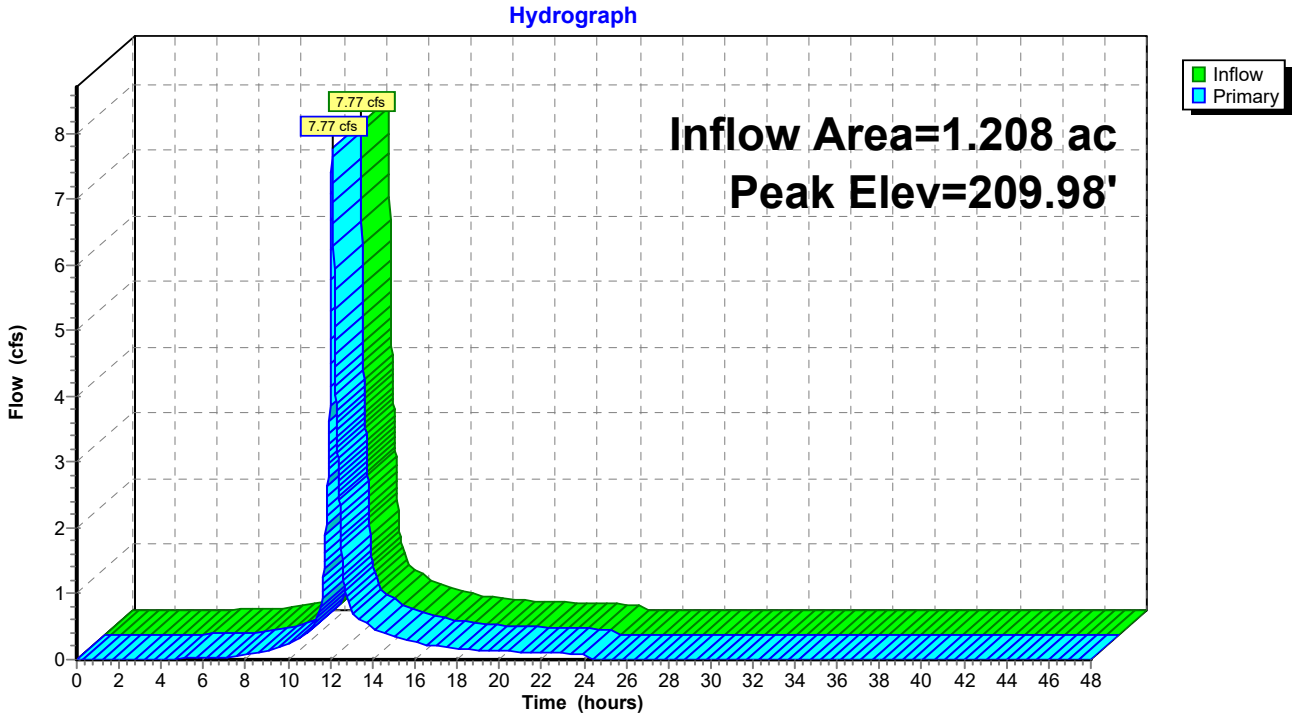
Inflow Area = 1.208 ac, 36.97% Impervious, Inflow Depth = 5.89" for 100-Year event
Inflow = 7.77 cfs @ 12.10 hrs, Volume= 0.593 af
Outflow = 7.77 cfs @ 12.10 hrs, Volume= 0.593 af, Atten= 0%, Lag= 0.0 min
Primary = 7.77 cfs @ 12.10 hrs, Volume= 0.593 af
Routed to Link 10L :

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 209.98' @ 12.10 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	207.20'	**15.0" Round Culvert** L= 61.8' Ke= 0.500 Inlet / Outlet Invert= 207.20' / 206.90' S= 0.0049 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Primary	213.70'	**21.5" x 37.1" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=7.76 cfs @ 12.10 hrs HW=209.98' TW=208.15' (Fixed TW Elev= 208.15')
1=Culvert (Barrel Controls 7.76 cfs @ 6.33 fps)
2=Orifice/Grate (Controls 0.00 cfs)

Pond 3P:

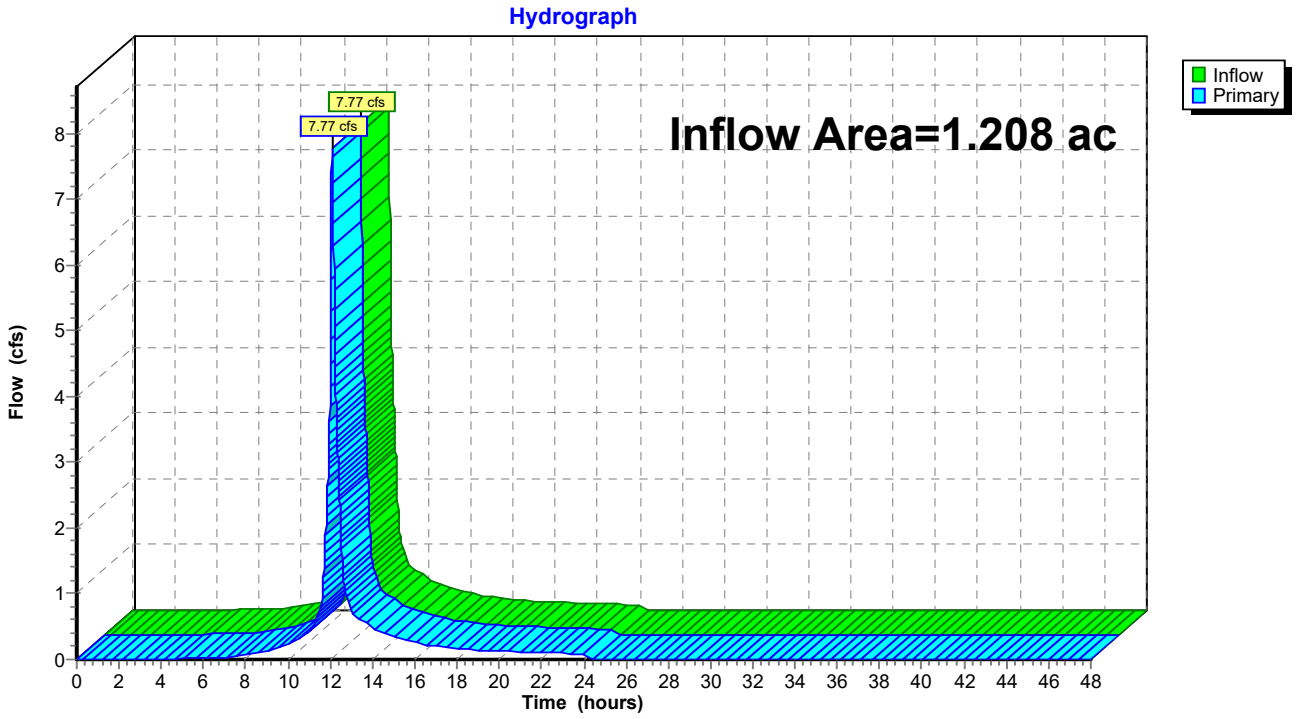


Summary for Link 10L:

Inflow Area = 1.208 ac, 36.97% Impervious, Inflow Depth = 5.89" for 100-Year event
Inflow = 7.77 cfs @ 12.10 hrs, Volume= 0.593 af
Primary = 7.77 cfs @ 12.10 hrs, Volume= 0.593 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link 10L:



Appendix B

Proposed Watershed Analysis

LEGEND:

- OVERALL DRAINAGE AREA
- PROPOSED WATERSHED BOUNDARY
- TIME OF CONCENTRATION PATH
- FLOW DIRECTION
- 00S — SUBCATCHMENT AREA
- 00P — POND
- 00L — DESIGN POINT
- IMPERVIOUS SURFACE – PAVEMENT/CONCRETE
- IMPERVIOUS SURFACE – ROOF
- PERVIOUS SURFACE – WOODED
- PERVIOUS SURFACE – GRASS
- B — NRCS SOIL CLASSIFICATIONS & BOUNDARIES

0 10 20 40 ft

N

PRELIMINARY: NOT FOR CONSTRUCTION

THIS DRAWING IS FOR INFORMATIONAL PURPOSES ONLY AND IS NOT INTENDED FOR CONSTRUCTION. DO NOT START CONSTRUCTION WITHOUT A SEALED SET OF CONSTRUCTION DOCUMENTS.

CIVIL ENGINEER
FUSS & O'NEILL
146 HARTFORD ROAD
MANCHESTER, CONNECTICUT 06040
860.646.2469
www.fando.com

WESTMINSTER SCHOOL RECREATION AREA

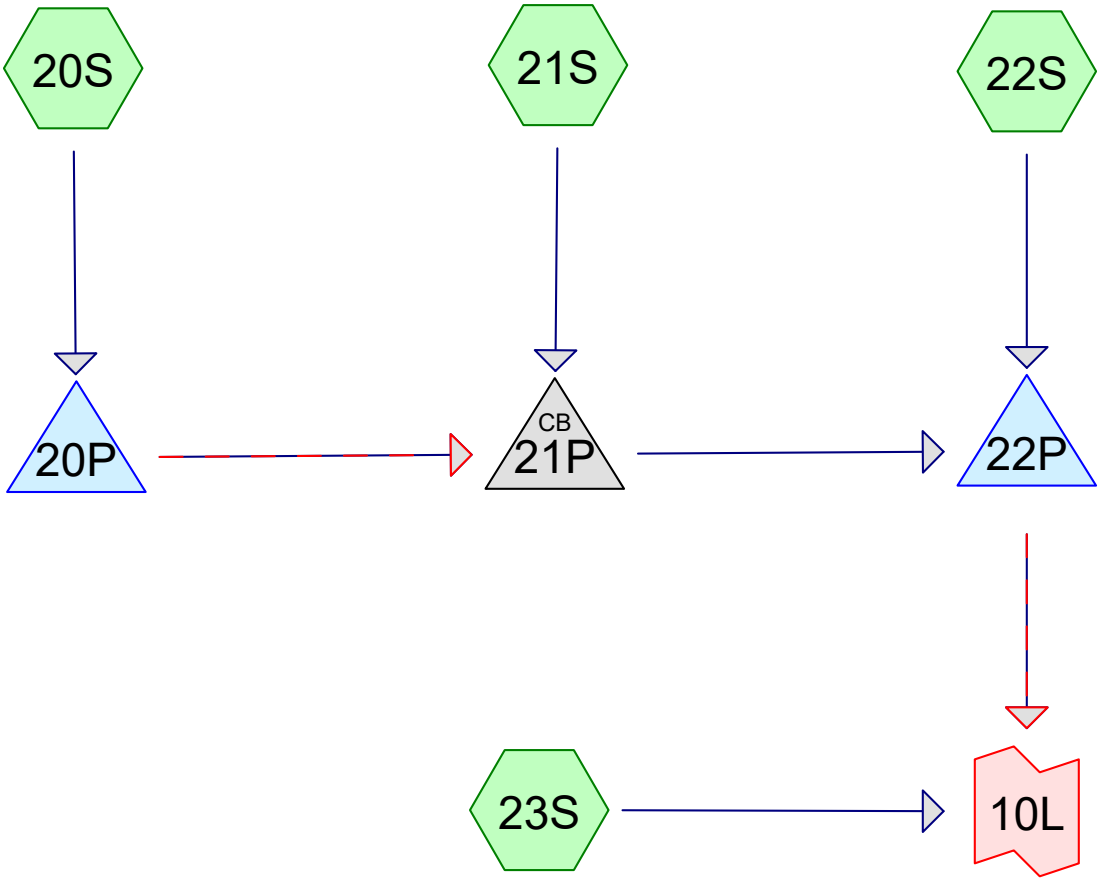
995 HOPMEADOW STREET
SIMSBURY, CT 06070

ISSUE	ISSUE DATE	DESCRIPTION
	0000/00/00	% SD DD CD
	0000/00/00	% SD DD CD
REVISION	REVISION DATE	DESCRIPTION

SCALE 1"=20'-0"
PLOT DATE 2024/04/11
DRAWN BY TD
REVIEWED BY RB, KB

PROPOSED SITE WATERSHED ANALYSIS

---- | DR-201



Subcat Reach Pond Link

Routing Diagram for 01995057S70_Proposed
Prepared by Fuss & O'Neill, Printed 5/14/2024

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year	Type III 24-hr		Default	24.00	1	3.26	2
2	10-Year	Type III 24-hr		Default	24.00	1	4.86	2
3	25-Year	Type III 24-hr		Default	24.00	1	6.11	2
4	100-Year	Type III 24-hr		Default	24.00	1	8.63	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.427	68	<50% Grass cover, Poor, HSG A (20S, 21S, 22S, 23S)
0.439	98	Paved parking, HSG A (20S, 21S, 22S)
0.260	98	Roofs, HSG A (22S)
0.007	98	Unconnected pavement, HSG A (23S)
0.073	45	Woods, Poor, HSG A (20S, 21S)
1.206	**84**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
1.206	HSG A	20S, 21S, 22S, 23S
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
0.000	Other	
1.206		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.427	0.000	0.000	0.000	0.000	0.427	<50% Grass cover, Poor	20S, 21S, 22S, 23S
0.439	0.000	0.000	0.000	0.000	0.439	Paved parking	20S, 21S, 22S
0.260	0.000	0.000	0.000	0.000	0.260	Roofs	22S
0.007	0.000	0.000	0.000	0.000	0.007	Unconnected pavement	23S
0.073	0.000	0.000	0.000	0.000	0.073	Woods, Poor	20S, 21S
1.206	**0.000**	**0.000**	**0.000**	**0.000**	**1.206**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)	Node Name
1	20S	0.00	0.00	333.0	0.0291	0.013	0.0	12.0	0.0	
2	21S	0.00	0.00	283.0	0.0049	0.013	0.0	15.0	0.0	
3	22S	0.00	0.00	175.0	0.0023	0.013	0.0	15.0	0.0	
4	23S	0.00	0.00	62.0	0.0042	0.013	0.0	15.0	0.0	
5	20P	218.00	212.70	66.0	0.0803	0.013	0.0	12.0	0.0	
6	21P	208.30	207.60	112.0	0.0063	0.013	0.0	15.0	0.0	
7	22P	207.30	206.90	109.0	0.0037	0.013	0.0	15.0	0.0	

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 20S: Runoff Area=23,207 sf 59.24% Impervious Runoff Depth=1.73"
Flow Length=408' Tc=9.0 min CN=84 Runoff=0.98 cfs 0.077 af

Subcatchment 21S: Runoff Area=4,210 sf 46.27% Impervious Runoff Depth=1.02"
Flow Length=350' Tc=8.1 min CN=73 Runoff=0.10 cfs 0.008 af

Subcatchment 22S: Runoff Area=23,616 sf 62.41% Impervious Runoff Depth=1.97"
Flow Length=326' Tc=7.8 min CN=87 Runoff=1.17 cfs 0.089 af

Subcatchment 23S: Runoff Area=1,490 sf 19.80% Impervious Runoff Depth=0.91"
Flow Length=153' Tc=6.3 min UI Adjusted CN=71 Runoff=0.03 cfs 0.003 af

Pond 20P: Peak Elev=222.87' Storage=604 cf Inflow=0.98 cfs 0.077 af
Discarded=0.01 cfs 0.027 af Primary=1.15 cfs 0.050 af Secondary=0.04 cfs 0.000 af Outflow=1.20 cfs 0.077 af

Pond 21P: Peak Elev=215.79' Inflow=1.29 cfs 0.058 af
Outflow=1.29 cfs 0.058 af

Pond 22P: Peak Elev=208.23' Storage=5 cf Inflow=2.46 cfs 0.147 af
Discarded=0.00 cfs 0.000 af Primary=2.30 cfs 0.147 af Secondary=0.00 cfs 0.000 af Outflow=2.30 cfs 0.147 af

Link 10L: Inflow=2.33 cfs 0.150 af
Primary=2.33 cfs 0.150 af

Total Runoff Area = 1.206 ac Runoff Volume = 0.177 af Average Runoff Depth = 1.76"
41.49% Pervious = 0.500 ac 58.51% Impervious = 0.705 ac

Summary for Subcatchment 20S:

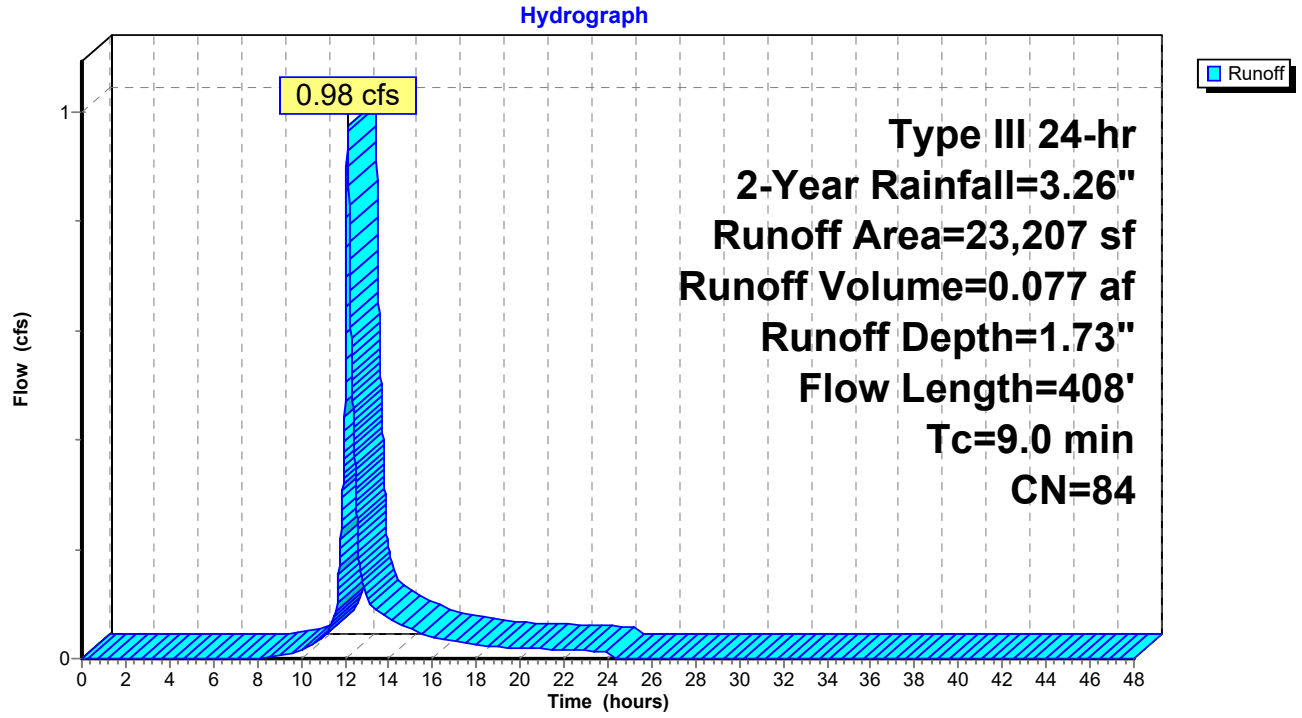
Runoff = 0.98 cfs @ 12.13 hrs, Volume= 0.077 af, Depth= 1.73"
Routed to Pond 20P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.26"

Area (sf)	CN	Description
13,748	98	Paved parking, HSG A
7,842	68	<50% Grass cover, Poor, HSG A
1,617	45	Woods, Poor, HSG A
23,207	84	Weighted Average
9,459		40.76% Pervious Area
13,748		59.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.3	75	0.0166	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.26"
0.7	333	0.0291	7.74	6.08	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
9.0	408	Total			

Subcatchment 20S:



Summary for Subcatchment 21S:

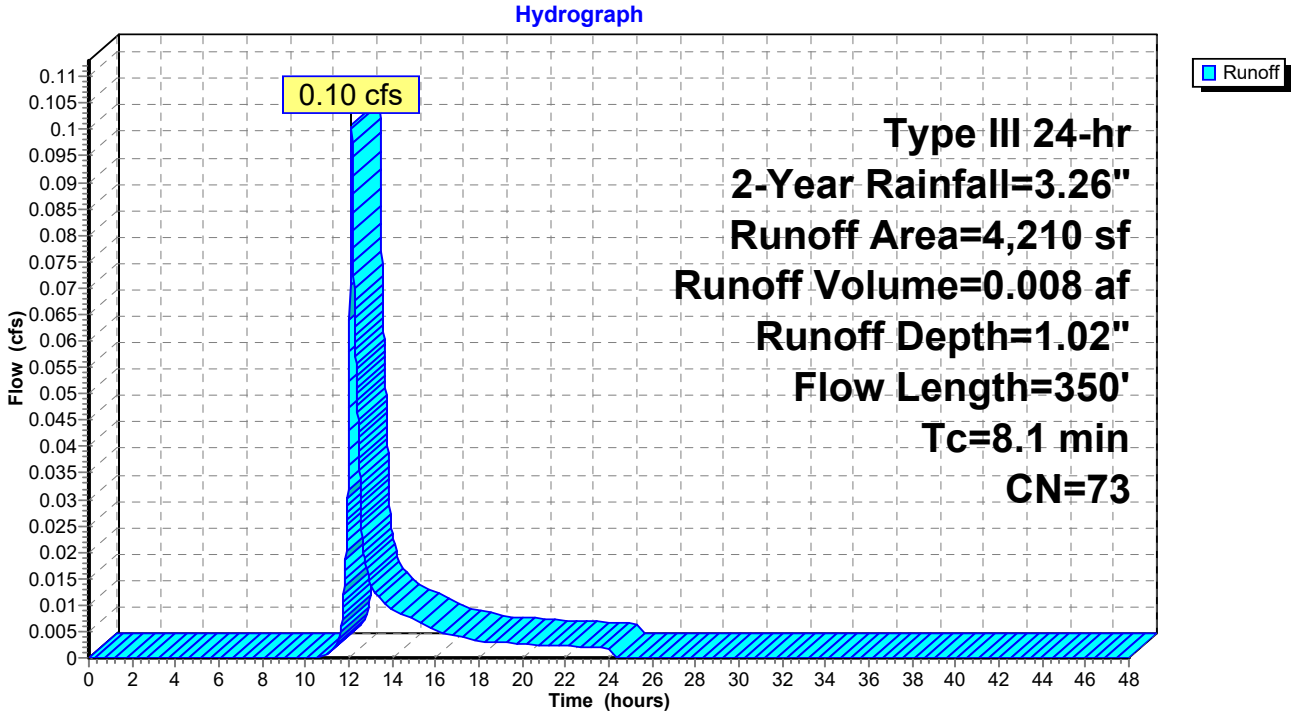
Runoff = 0.10 cfs @ 12.12 hrs, Volume= 0.008 af, Depth= 1.02"
Routed to Pond 21P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.26"

Area (sf)	CN	Description
682	68	<50% Grass cover, Poor, HSG A
1,948	98	Paved parking, HSG A
1,580	45	Woods, Poor, HSG A
4,210	73	Weighted Average
2,262		53.73% Pervious Area
1,948		46.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	58	0.1197	0.14		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
0.1	9	0.1917	2.12		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.26"
1.3	283	0.0049	3.68	4.52	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
8.1	350	Total			

Subcatchment 21S:



Summary for Subcatchment 22S:

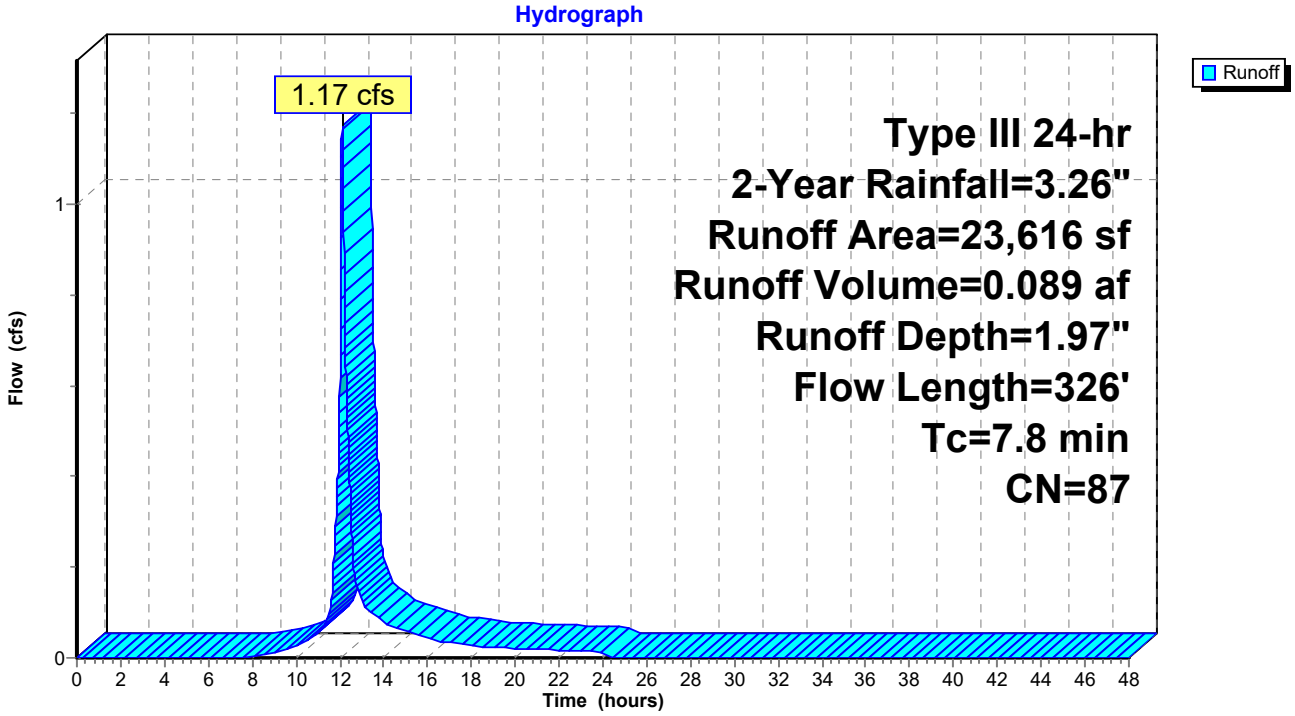
Runoff = 1.17 cfs @ 12.11 hrs, Volume= 0.089 af, Depth= 1.97"
Routed to Pond 22P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.26"

Area (sf)	CN	Description
8,877	68	<50% Grass cover, Poor, HSG A
3,410	98	Paved parking, HSG A
11,329	98	Roofs, HSG A
23,616	87	Weighted Average
8,877		37.59% Pervious Area
14,739		62.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.9	100	0.0680	0.28		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.26"
0.7	51	0.0268	1.15		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.2	175	0.0023	2.52	3.10	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
7.8	326	Total			

Subcatchment 22S:



Summary for Subcatchment 23S:

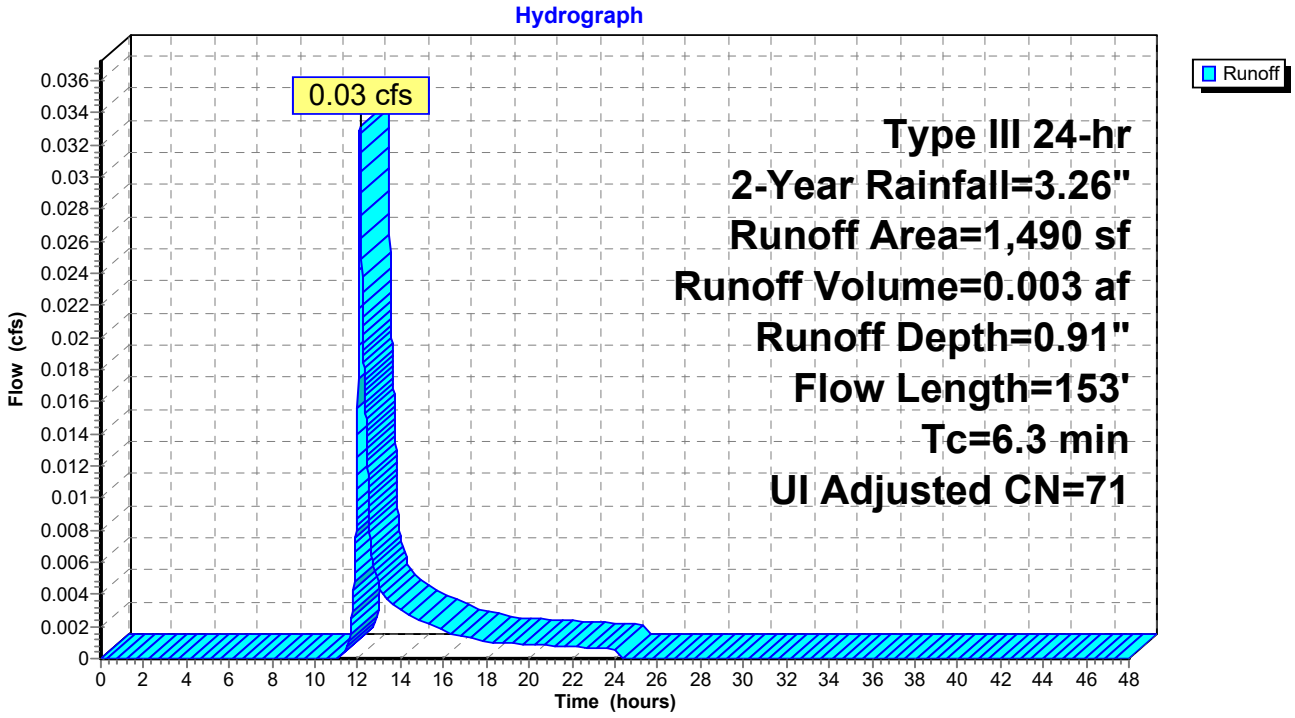
Runoff = 0.03 cfs @ 12.10 hrs, Volume= 0.003 af, Depth= 0.91"
Routed to Link 10L :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.26"

Area (sf)	CN	Adj	Description
295	98		Unconnected pavement, HSG A
1,195	68		<50% Grass cover, Poor, HSG A
1,490	74	71	Weighted Average, UI Adjusted
1,195			80.20% Pervious Area
295			19.80% Impervious Area
295			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	91	0.0549	0.25		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.26"
0.3	62	0.0042	3.41	4.19	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
6.3	153	Total			

Subcatchment 23S:



Summary for Pond 20P:

Inflow Area = 0.533 ac, 59.24% Impervious, Inflow Depth = 1.73" for 2-Year event
Inflow = 0.98 cfs @ 12.13 hrs, Volume= 0.077 af
Outflow = 1.20 cfs @ 12.12 hrs, Volume= 0.077 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.01 cfs @ 12.12 hrs, Volume= 0.027 af
Primary = 1.15 cfs @ 12.12 hrs, Volume= 0.050 af
Routed to Pond 21P :
Secondary = 0.04 cfs @ 12.12 hrs, Volume= 0.000 af
Routed to Pond 21P :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 222.87' @ 12.12 hrs Surf.Area= 108 sf Storage= 604 cf

Plug-Flow detention time= 228.2 min calculated for 0.077 af (100% of inflow)
Center-of-Mass det. time= 228.4 min (1,059.9 - 831.5)

Volume	Invert	Avail.Storage	Storage Description
#1	218.00'	604 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
218.00	150	112.2	0	0	150
222.70	108	95.4	604	604	711

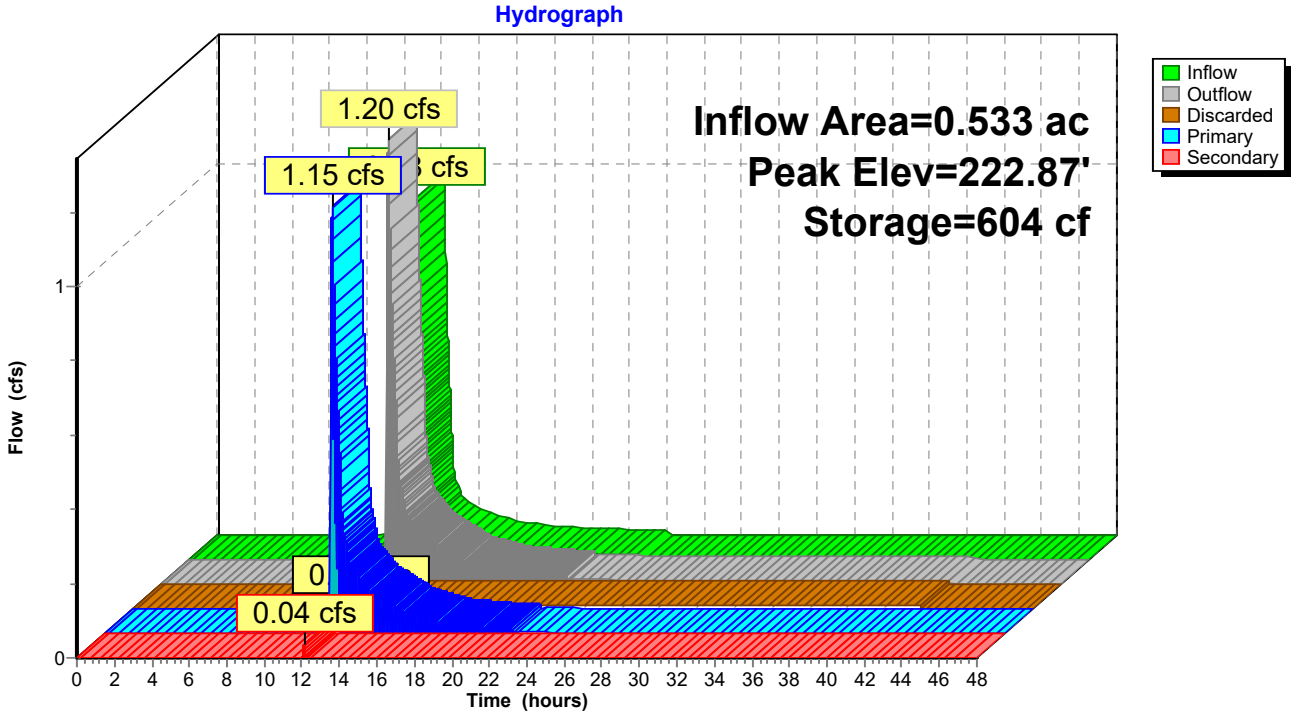
Device	Routing	Invert	Outlet Devices
#1	Primary	218.00'	**12.0" Round Culvert** L= 66.0' Ke= 0.500 Inlet / Outlet Invert= 218.00' / 212.70' S= 0.0803 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	222.75'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Discarded	218.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 200.00'
#4	Secondary	222.85'	**3.5' long (Profile 5) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 2.79 2.93 3.06

Discarded OutFlow Max=0.01 cfs @ 12.12 hrs HW=222.87' (Free Discharge)
└**3=Exfiltration** (Controls 0.01 cfs)

Primary OutFlow Max=1.15 cfs @ 12.12 hrs HW=222.87' TW=215.79' (Dynamic Tailwater)
└**1=Culvert** (Passes 1.15 cfs of 7.91 cfs potential flow)
└**2=Orifice/Grate** (Weir Controls 1.15 cfs @ 1.15 fps)

Secondary OutFlow Max=0.04 cfs @ 12.12 hrs HW=222.87' TW=215.79' (Dynamic Tailwater)
└**4=Broad-Crested Rectangular Weir** (Weir Controls 0.04 cfs @ 0.44 fps)

Pond 20P:


Hydrograph
Inflow Area=0.533 ac
Peak Elev=222.87'
Storage=604 cf
1.20 cfs
1.15 cfs
0.04 cfs
Inflow
Outflow
Discarded
Primary
Secondary
Flow (cfs)
Time (hours)
0
1
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

Summary for Pond 21P:

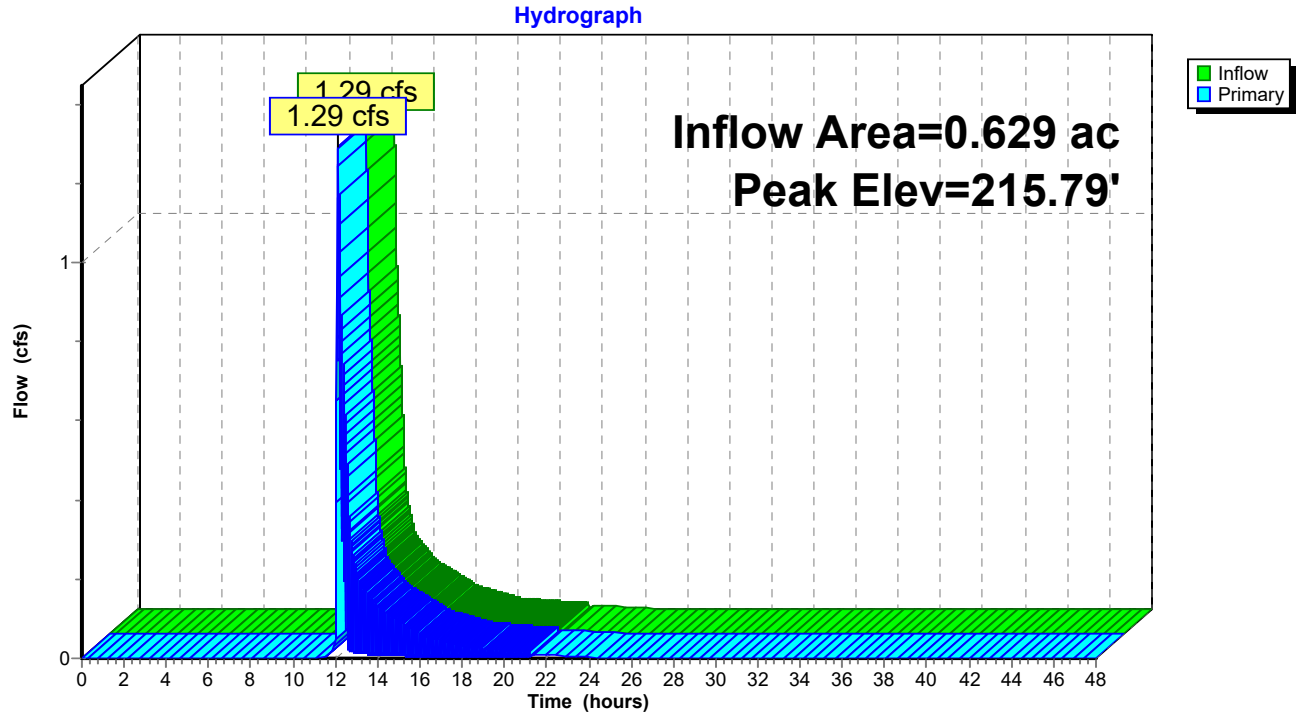
Inflow Area = 0.629 ac, 57.25% Impervious, Inflow Depth = 1.11" for 2-Year event
Inflow = 1.29 cfs @ 12.12 hrs, Volume= 0.058 af
Outflow = 1.29 cfs @ 12.12 hrs, Volume= 0.058 af, Atten= 0%, Lag= 0.0 min
Primary = 1.29 cfs @ 12.12 hrs, Volume= 0.058 af
Routed to Pond 22P :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 215.79' @ 12.12 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	208.30'	**15.0" Round Culvert** L= 112.0' Ke= 0.500 Inlet / Outlet Invert= 208.30' / 207.60' S= 0.0063 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	215.70'	**19.0" x 76.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.29 cfs @ 12.12 hrs HW=215.79' TW=208.23' (Dynamic Tailwater)
└─**1=Culvert** (Passes 1.29 cfs of 12.79 cfs potential flow)
└─**2=Orifice/Grate** (Weir Controls 1.29 cfs @ 0.95 fps)

Pond 21P:



Summary for Pond 22P:

Inflow Area = 1.172 ac, 59.64% Impervious, Inflow Depth = 1.51" for 2-Year event
Inflow = 2.46 cfs @ 12.12 hrs, Volume= 0.147 af
Outflow = 2.30 cfs @ 12.12 hrs, Volume= 0.147 af, Atten= 6%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 2.30 cfs @ 12.12 hrs, Volume= 0.147 af
Routed to Link 10L :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link 10L :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 208.23' @ 12.12 hrs Surf.Area= 5 sf Storage= 5 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.1 min (823.8 - 823.7)

Volume	Invert	Avail.Storage	Storage Description
#1	207.30'	1,489 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
207.30	5	7.8	0	0	5
214.40	5	7.8	35	35	60
214.50	186	374.5	7	43	11,216
215.00	755	383.9	219	262	11,814
216.00	1,769	370.6	1,227	1,489	12,698

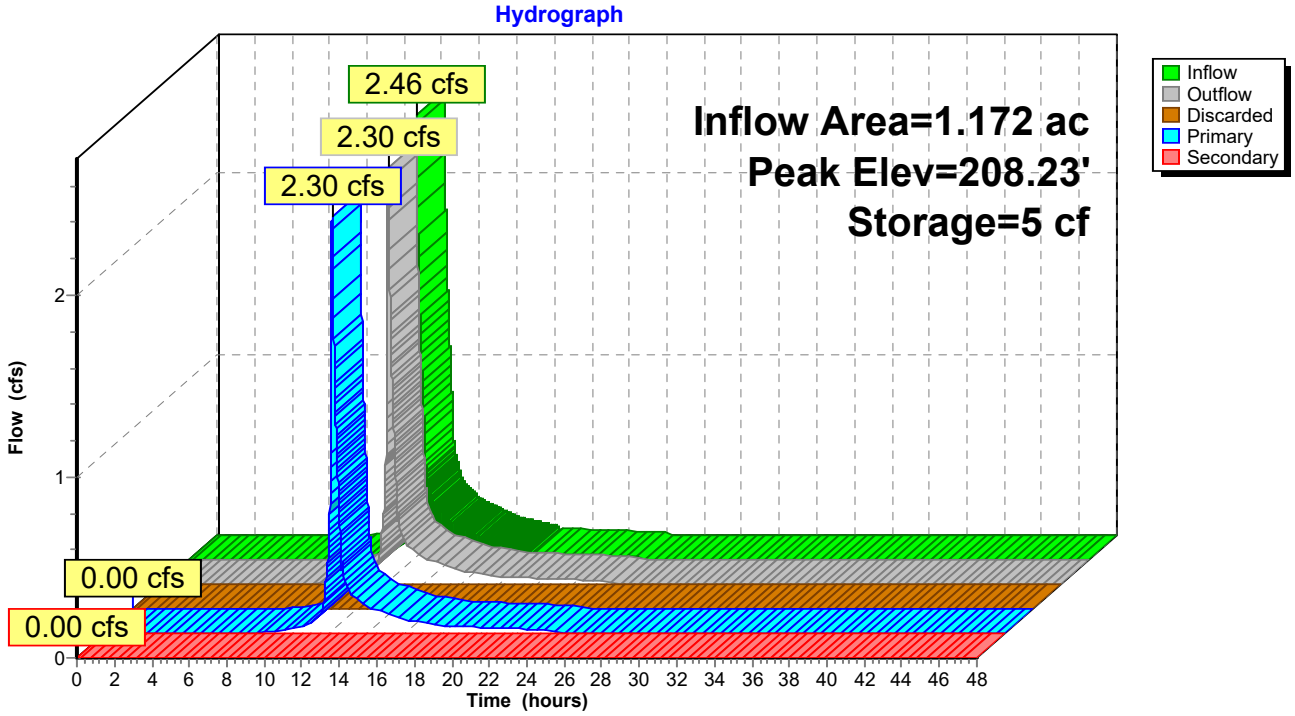
Device	Routing	Invert	Outlet Devices
#1	Discarded	207.30'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 200.00'
#2	Secondary	215.00'	**25.0' long (Profile 5) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 2.79 2.93 3.06
#3	Primary	207.30'	**15.0" Round Culvert** L= 109.0' Ke= 0.500 Inlet / Outlet Invert= 207.30' / 206.90' S= 0.0037 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#4	Device 1	215.70'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=207.30' (Free Discharge)
↑—**1=Exfiltration** (Passes 0.00 cfs of 0.00 cfs potential flow)
↑—**4=Orifice/Grate** (Controls 0.00 cfs)

Primary OutFlow Max=2.30 cfs @ 12.12 hrs HW=208.23' TW=0.00' (Dynamic Tailwater)
↑—**3=Culvert** (Barrel Controls 2.30 cfs @ 3.26 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=207.30' TW=0.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 22P:

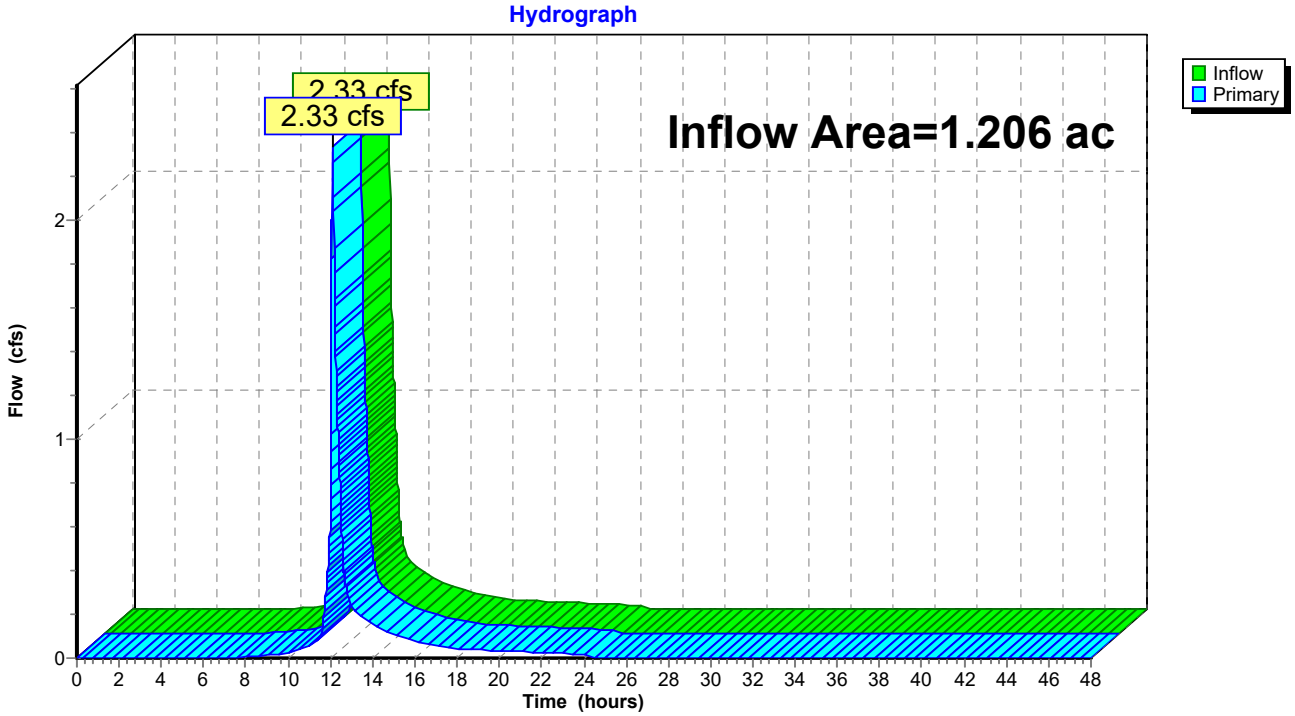

Hydrograph
Inflow Area=1.172 ac
Peak Elev=208.23'
Storage=5 cf
2.46 cfs
2.30 cfs
2.30 cfs
0.00 cfs
0.00 cfs
Inflow
Outflow
Discarded
Primary
Secondary
Flow (cfs)
Time (hours)
0
1
2
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48

Summary for Link 10L:

Inflow Area = 1.206 ac, 58.51% Impervious, Inflow Depth = 1.49" for 2-Year event
Inflow = 2.33 cfs @ 12.12 hrs, Volume= 0.150 af
Primary = 2.33 cfs @ 12.12 hrs, Volume= 0.150 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link 10L:



Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 20S: Runoff Area=23,207 sf 59.24% Impervious Runoff Depth=3.14"
Flow Length=408' Tc=9.0 min CN=84 Runoff=1.76 cfs 0.140 af

Subcatchment 21S: Runoff Area=4,210 sf 46.27% Impervious Runoff Depth=2.17"
Flow Length=350' Tc=8.1 min CN=73 Runoff=0.23 cfs 0.017 af

Subcatchment 22S: Runoff Area=23,616 sf 62.41% Impervious Runoff Depth=3.44"
Flow Length=326' Tc=7.8 min CN=87 Runoff=2.02 cfs 0.155 af

Subcatchment 23S: Runoff Area=1,490 sf 19.80% Impervious Runoff Depth=2.01"
Flow Length=153' Tc=6.3 min UI Adjusted CN=71 Runoff=0.08 cfs 0.006 af

Pond 20P: Peak Elev=222.91' Storage=604 cf Inflow=1.76 cfs 0.140 af
Discarded=0.01 cfs 0.028 af Primary=1.64 cfs 0.110 af Secondary=0.14 cfs 0.002 af Outflow=1.79 cfs 0.140 af

Pond 21P: Peak Elev=215.81' Inflow=2.00 cfs 0.129 af
Outflow=2.00 cfs 0.129 af

Pond 22P: Peak Elev=208.66' Storage=7 cf Inflow=4.01 cfs 0.284 af
Discarded=0.00 cfs 0.000 af Primary=3.98 cfs 0.284 af Secondary=0.00 cfs 0.000 af Outflow=3.98 cfs 0.284 af

Link 10L: Inflow=4.06 cfs 0.290 af
Primary=4.06 cfs 0.290 af

Total Runoff Area = 1.206 ac Runoff Volume = 0.318 af Average Runoff Depth = 3.16"
41.49% Pervious = 0.500 ac 58.51% Impervious = 0.705 ac

Summary for Subcatchment 20S:

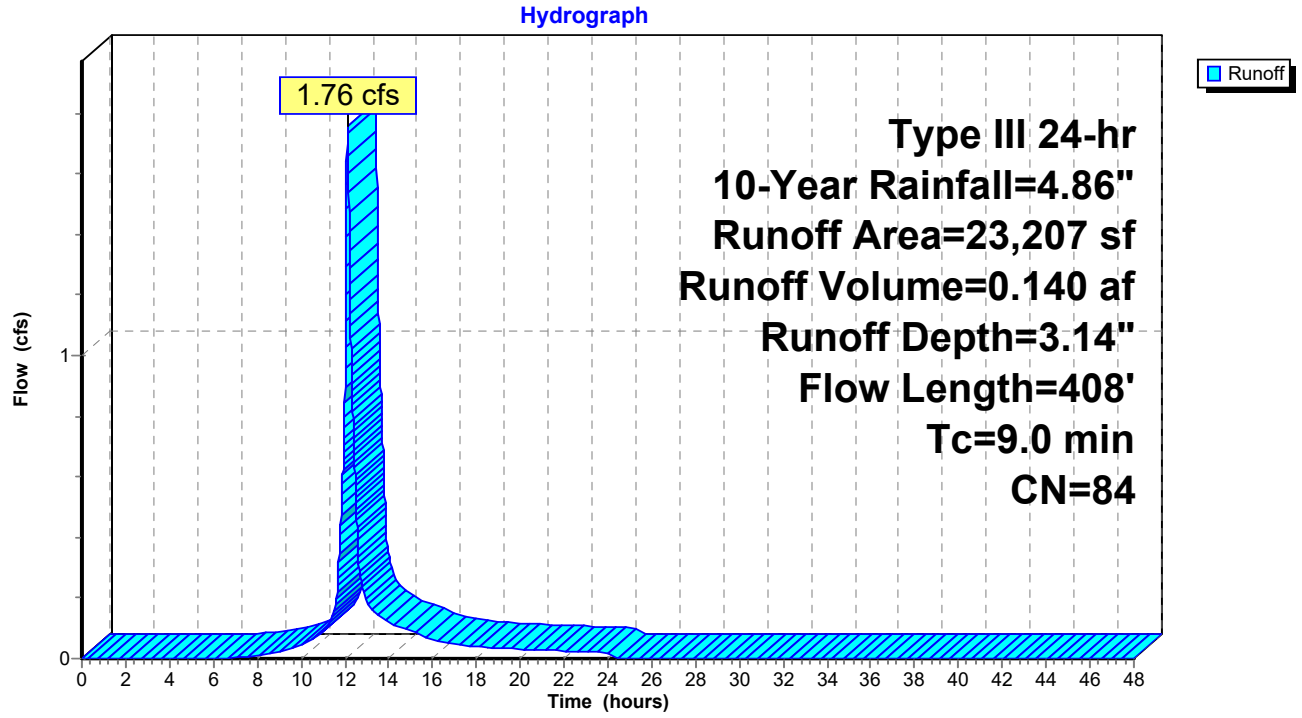
Runoff = 1.76 cfs @ 12.13 hrs, Volume= 0.140 af, Depth= 3.14"
Routed to Pond 20P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.86"

Area (sf)	CN	Description
13,748	98	Paved parking, HSG A
7,842	68	<50% Grass cover, Poor, HSG A
1,617	45	Woods, Poor, HSG A
23,207	84	Weighted Average
9,459		40.76% Pervious Area
13,748		59.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.3	75	0.0166	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.26"
0.7	333	0.0291	7.74	6.08	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
9.0	408	Total			

Subcatchment 20S:



Summary for Subcatchment 21S:

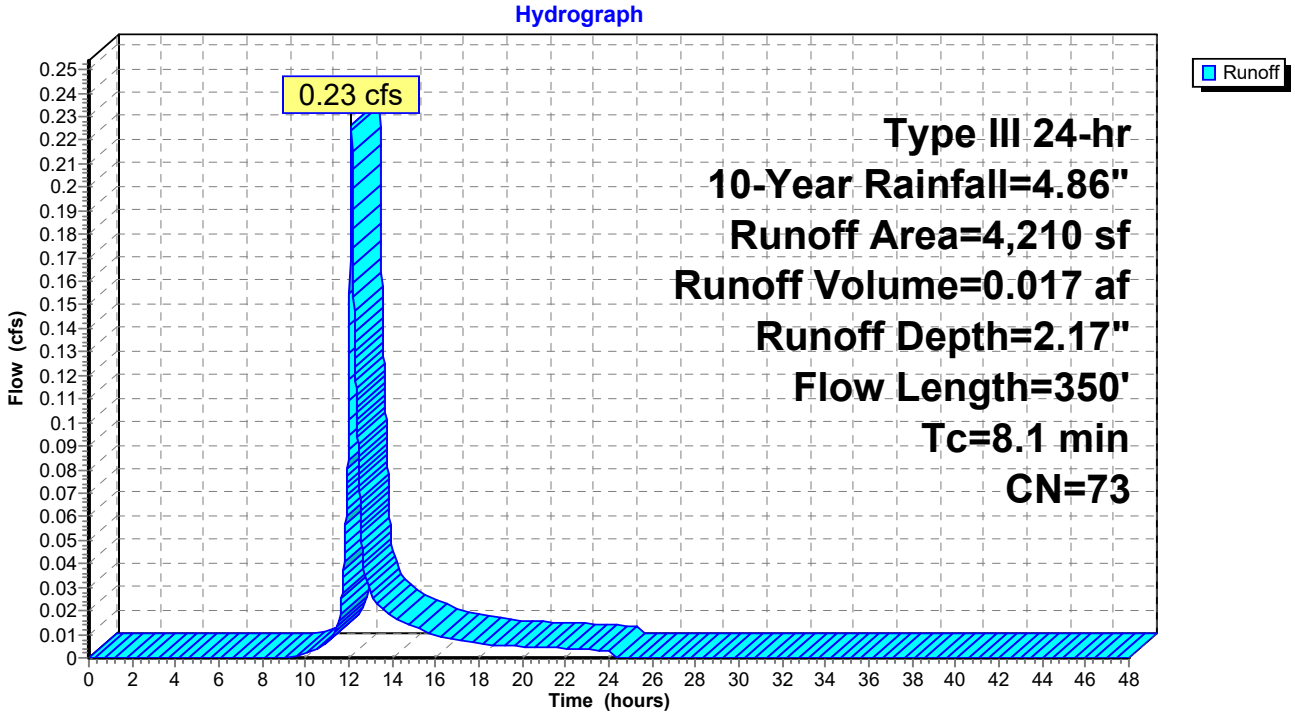
Runoff = 0.23 cfs @ 12.12 hrs, Volume= 0.017 af, Depth= 2.17"
Routed to Pond 21P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.86"

Area (sf)	CN	Description
682	68	<50% Grass cover, Poor, HSG A
1,948	98	Paved parking, HSG A
1,580	45	Woods, Poor, HSG A
4,210	73	Weighted Average
2,262		53.73% Pervious Area
1,948		46.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	58	0.1197	0.14		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
0.1	9	0.1917	2.12		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.26"
1.3	283	0.0049	3.68	4.52	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
8.1	350	Total			

Subcatchment 21S:



Summary for Subcatchment 22S:

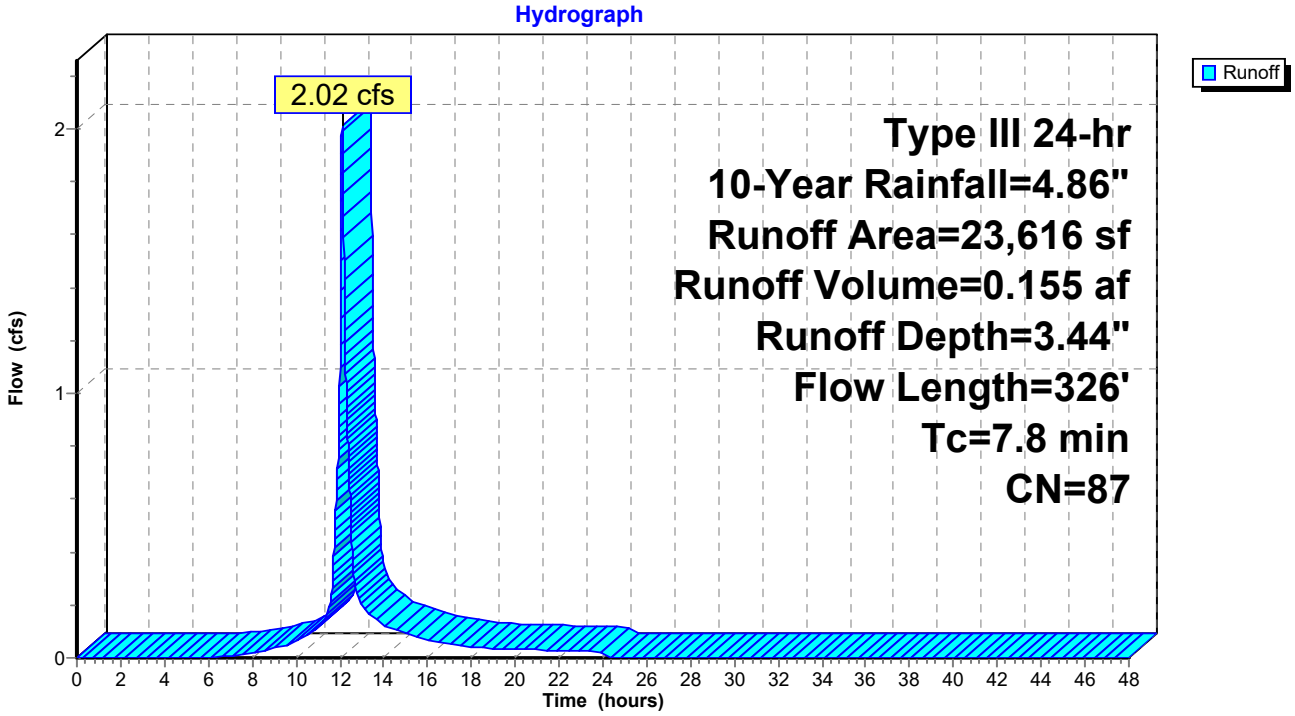
Runoff = 2.02 cfs @ 12.11 hrs, Volume= 0.155 af, Depth= 3.44"
Routed to Pond 22P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.86"

Area (sf)	CN	Description
8,877	68	<50% Grass cover, Poor, HSG A
3,410	98	Paved parking, HSG A
11,329	98	Roofs, HSG A
23,616	87	Weighted Average
8,877		37.59% Pervious Area
14,739		62.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.9	100	0.0680	0.28		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.26"
0.7	51	0.0268	1.15		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.2	175	0.0023	2.52	3.10	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
7.8	326	Total			

Subcatchment 22S:



Summary for Subcatchment 23S:

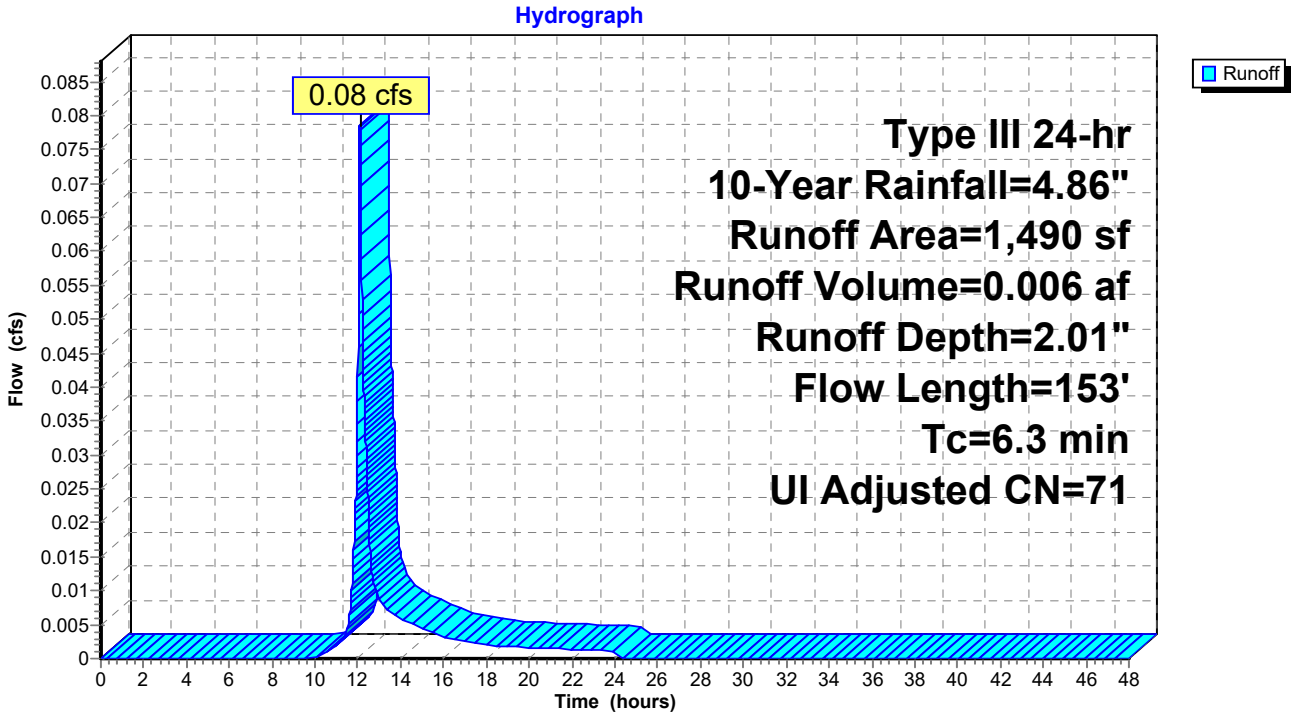
Runoff = 0.08 cfs @ 12.10 hrs, Volume= 0.006 af, Depth= 2.01"
Routed to Link 10L :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.86"

Area (sf)	CN	Adj	Description
295	98		Unconnected pavement, HSG A
1,195	68		<50% Grass cover, Poor, HSG A
1,490	74	71	Weighted Average, UI Adjusted
1,195			80.20% Pervious Area
295			19.80% Impervious Area
295			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	91	0.0549	0.25		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.26"
0.3	62	0.0042	3.41	4.19	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
6.3	153	Total			

Subcatchment 23S:



Summary for Pond 20P:

Inflow Area = 0.533 ac, 59.24% Impervious, Inflow Depth = 3.14" for 10-Year event
Inflow = 1.76 cfs @ 12.13 hrs, Volume= 0.140 af
Outflow = 1.79 cfs @ 12.12 hrs, Volume= 0.140 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.01 cfs @ 12.12 hrs, Volume= 0.028 af
Primary = 1.64 cfs @ 12.12 hrs, Volume= 0.110 af
Routed to Pond 21P :
Secondary = 0.14 cfs @ 12.12 hrs, Volume= 0.002 af
Routed to Pond 21P :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 222.91' @ 12.12 hrs Surf.Area= 108 sf Storage= 604 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 131.8 min (946.2 - 814.4)

Volume	Invert	Avail.Storage	Storage Description
#1	218.00'	604 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
218.00	150	112.2	0	0	150
222.70	108	95.4	604	604	711

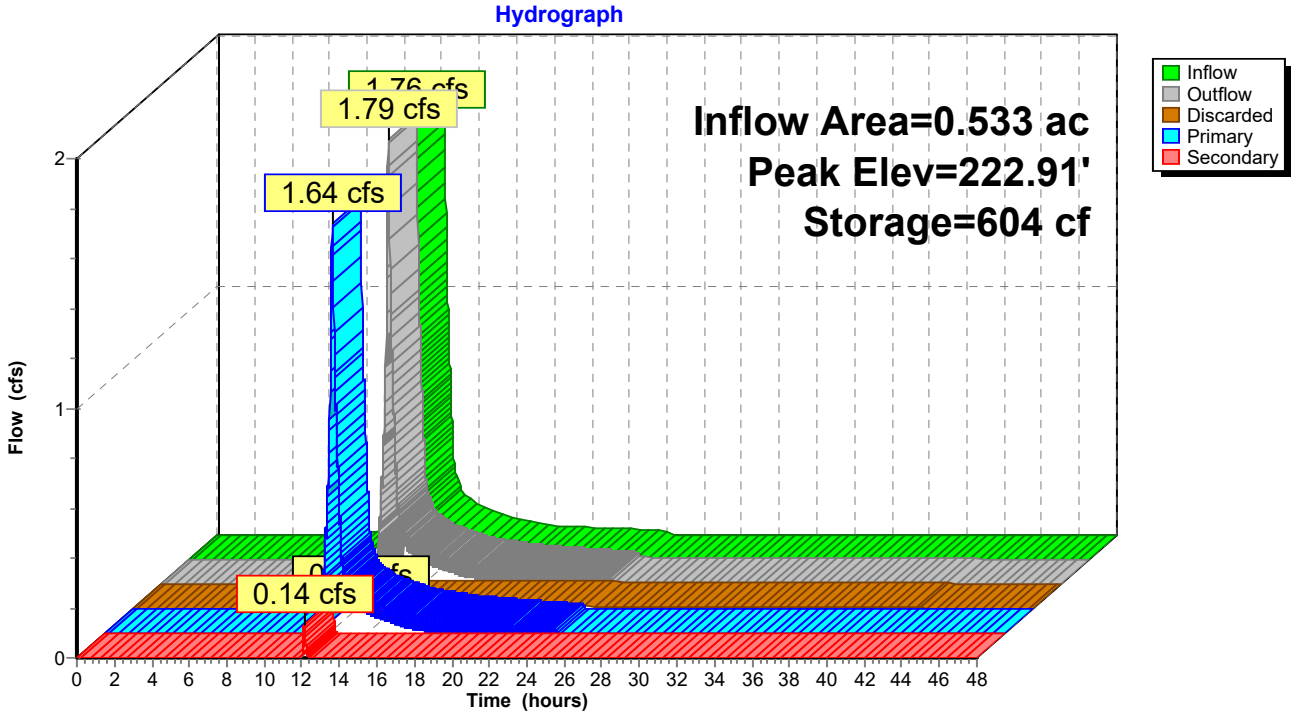
Device	Routing	Invert	Outlet Devices
#1	Primary	218.00'	**12.0" Round Culvert** L= 66.0' Ke= 0.500 Inlet / Outlet Invert= 218.00' / 212.70' S= 0.0803 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	222.75'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Discarded	218.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 200.00'
#4	Secondary	222.85'	**3.5' long (Profile 5) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 2.79 2.93 3.06

Discarded OutFlow Max=0.01 cfs @ 12.12 hrs HW=222.91' (Free Discharge)
└**3=Exfiltration** (Controls 0.01 cfs)

Primary OutFlow Max=1.64 cfs @ 12.12 hrs HW=222.91' TW=215.81' (Dynamic Tailwater)
└**1=Culvert** (Passes 1.64 cfs of 7.94 cfs potential flow)
└**2=Orifice/Grate** (Weir Controls 1.64 cfs @ 1.30 fps)

Secondary OutFlow Max=0.14 cfs @ 12.12 hrs HW=222.91' TW=215.81' (Dynamic Tailwater)
└**4=Broad-Crested Rectangular Weir** (Weir Controls 0.14 cfs @ 0.67 fps)

Pond 20P:


Hydrograph
Inflow Area=0.533 ac
Peak Elev=222.91'
Storage=604 cf
1.79 cfs
1.64 cfs
0.14 cfs
Inflow
Outflow
Discarded
Primary
Secondary
Flow (cfs)
Time (hours)
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

Summary for Pond 21P:

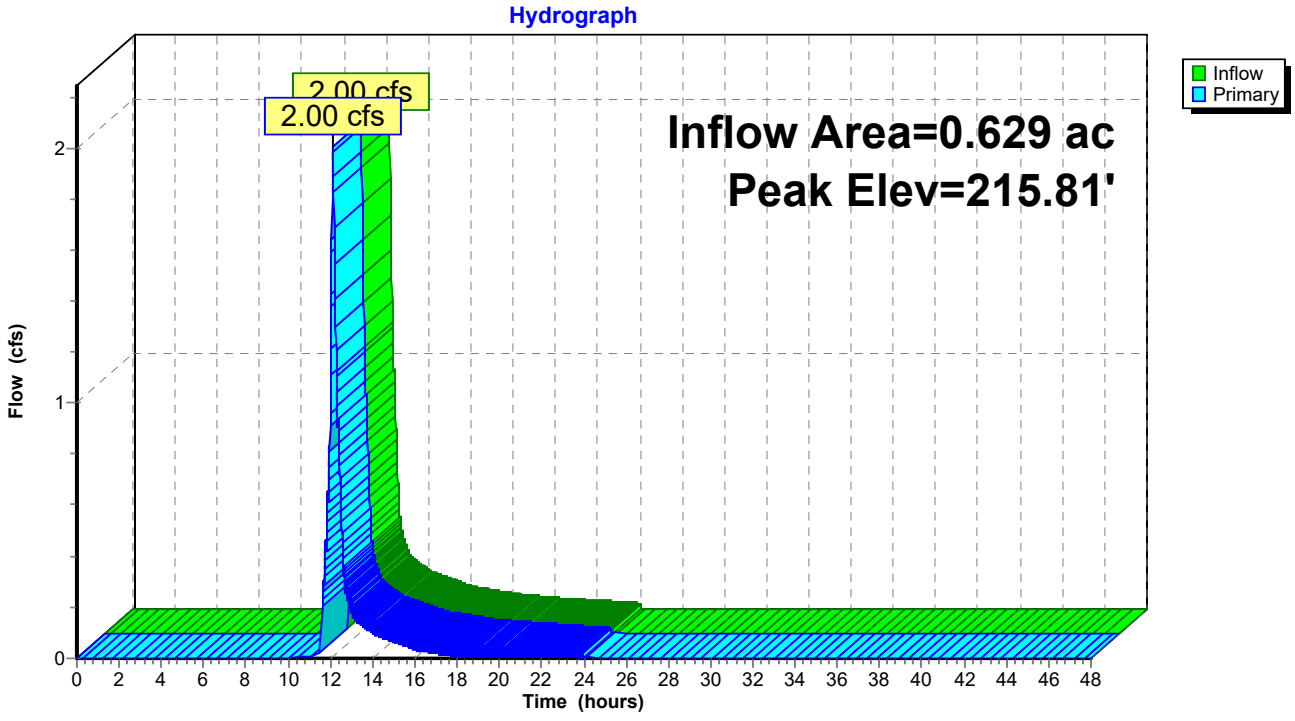
Inflow Area = 0.629 ac, 57.25% Impervious, Inflow Depth = 2.46" for 10-Year event
Inflow = 2.00 cfs @ 12.12 hrs, Volume= 0.129 af
Outflow = 2.00 cfs @ 12.12 hrs, Volume= 0.129 af, Atten= 0%, Lag= 0.0 min
Primary = 2.00 cfs @ 12.12 hrs, Volume= 0.129 af
Routed to Pond 22P :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 215.81' @ 12.12 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	208.30'	**15.0" Round Culvert** L= 112.0' Ke= 0.500 Inlet / Outlet Invert= 208.30' / 207.60' S= 0.0063 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	215.70'	**19.0" x 76.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=2.00 cfs @ 12.12 hrs HW=215.81' TW=208.66' (Dynamic Tailwater)
└─**1=Culvert** (Passes 2.00 cfs of 12.82 cfs potential flow)
└─**2=Orifice/Grate** (Weir Controls 2.00 cfs @ 1.11 fps)

Pond 21P:



Summary for Pond 22P:

Inflow Area = 1.172 ac, 59.64% Impervious, Inflow Depth = 2.91" for 10-Year event
Inflow = 4.01 cfs @ 12.12 hrs, Volume= 0.284 af
Outflow = 3.98 cfs @ 12.12 hrs, Volume= 0.284 af, Atten= 1%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 3.98 cfs @ 12.12 hrs, Volume= 0.284 af
Routed to Link 10L :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link 10L :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 208.66' @ 12.12 hrs Surf.Area= 5 sf Storage= 7 cf

Plug-Flow detention time= 0.2 min calculated for 0.284 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (811.7 - 811.6)

Volume	Invert	Avail.Storage	Storage Description
#1	207.30'	1,489 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
207.30	5	7.8	0	0	5
214.40	5	7.8	35	35	60
214.50	186	374.5	7	43	11,216
215.00	755	383.9	219	262	11,814
216.00	1,769	370.6	1,227	1,489	12,698

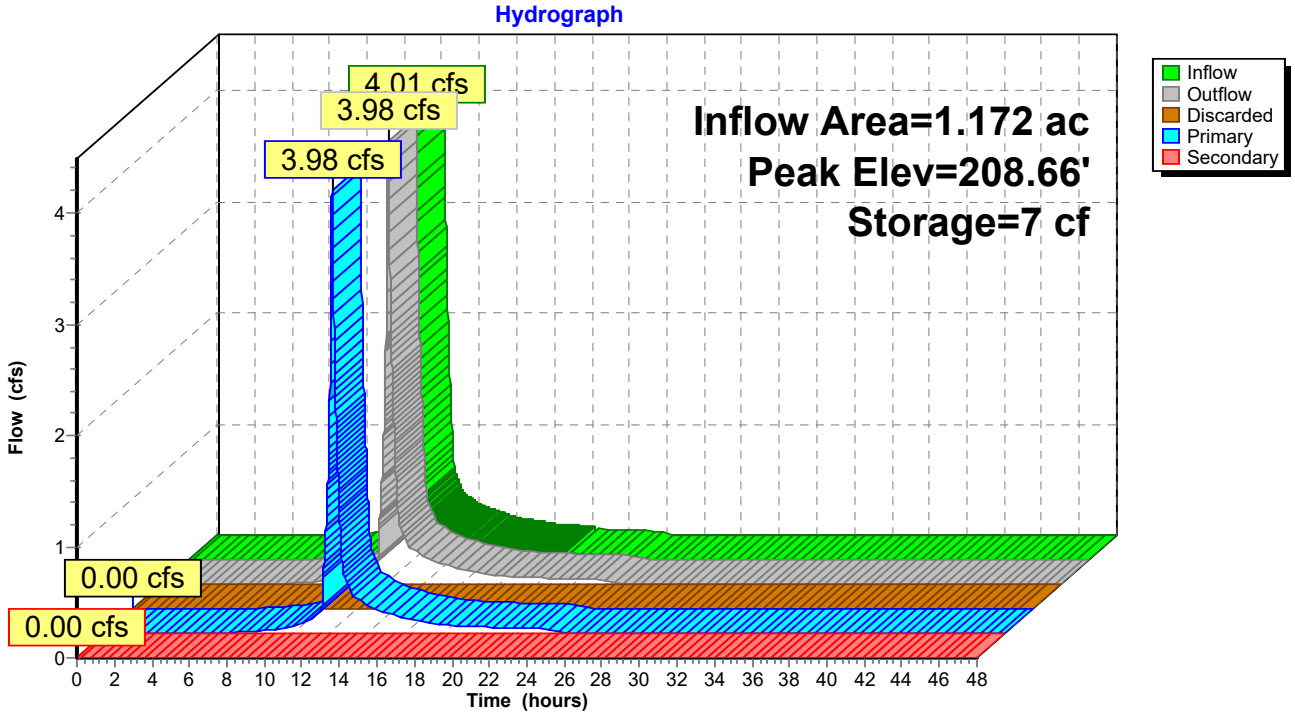
Device	Routing	Invert	Outlet Devices
#1	Discarded	207.30'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 200.00'
#2	Secondary	215.00'	**25.0' long (Profile 5) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 2.79 2.93 3.06
#3	Primary	207.30'	**15.0" Round Culvert** L= 109.0' Ke= 0.500 Inlet / Outlet Invert= 207.30' / 206.90' S= 0.0037 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#4	Device 1	215.70'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=207.30' (Free Discharge)
↑**1=Exfiltration** (Passes 0.00 cfs of 0.00 cfs potential flow)
↑**4=Orifice/Grate** (Controls 0.00 cfs)

Primary OutFlow Max=3.98 cfs @ 12.12 hrs HW=208.66' TW=0.00' (Dynamic Tailwater)
↑**3=Culvert** (Barrel Controls 3.98 cfs @ 3.71 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=207.30' TW=0.00' (Dynamic Tailwater)
↑**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 22P:

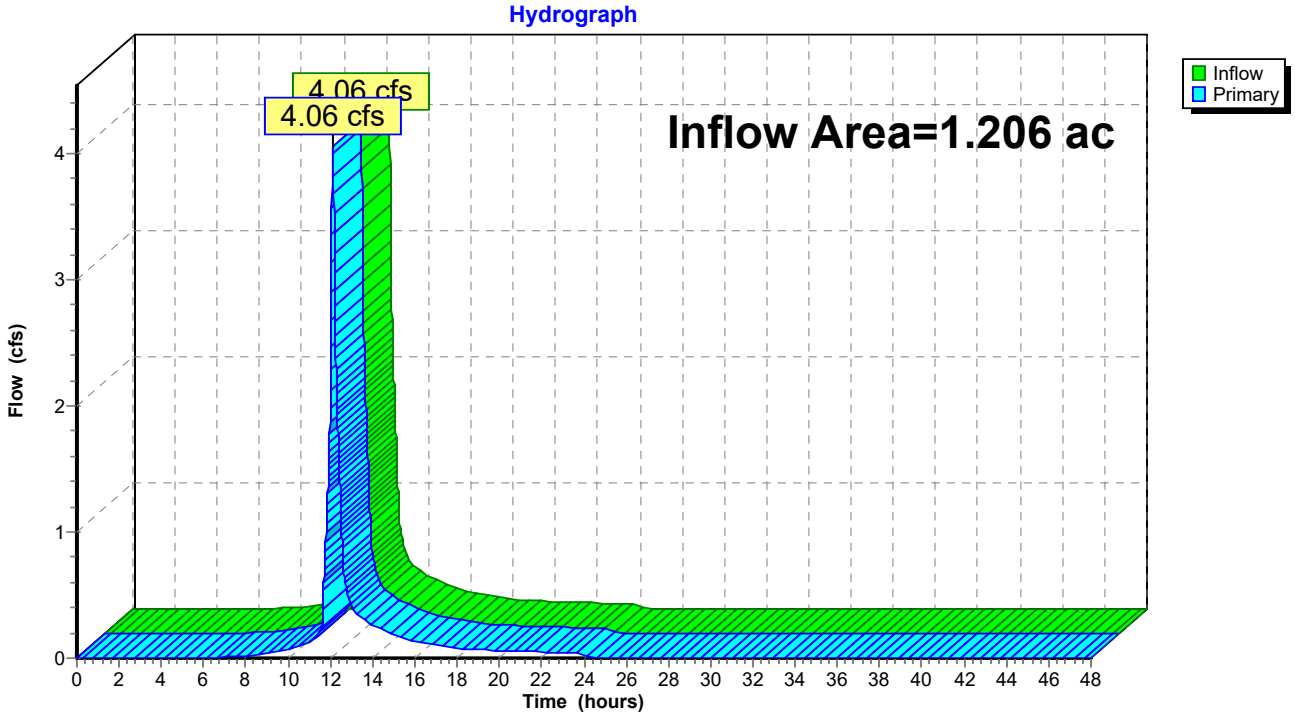

Hydrograph
Inflow Area=1.172 ac
Peak Elev=208.66'
Storage=7 cf
4.01 cfs
3.98 cfs
3.98 cfs
0.00 cfs
0.00 cfs
Inflow
Outflow
Discarded
Primary
Secondary
Flow (cfs)
Time (hours)
0
1
2
3
4
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48

Summary for Link 10L:

Inflow Area = 1.206 ac, 58.51% Impervious, Inflow Depth = 2.89" for 10-Year event
Inflow = 4.06 cfs @ 12.12 hrs, Volume= 0.290 af
Primary = 4.06 cfs @ 12.12 hrs, Volume= 0.290 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link 10L:



Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 20S: Runoff Area=23,207 sf 59.24% Impervious Runoff Depth=4.30"
Flow Length=408' Tc=9.0 min CN=84 Runoff=2.39 cfs 0.191 af

Subcatchment 21S: Runoff Area=4,210 sf 46.27% Impervious Runoff Depth=3.18"
Flow Length=350' Tc=8.1 min CN=73 Runoff=0.33 cfs 0.026 af

Subcatchment 22S: Runoff Area=23,616 sf 62.41% Impervious Runoff Depth=4.62"
Flow Length=326' Tc=7.8 min CN=87 Runoff=2.68 cfs 0.209 af

Subcatchment 23S: Runoff Area=1,490 sf 19.80% Impervious Runoff Depth=2.99"
Flow Length=153' Tc=6.3 min UI Adjusted CN=71 Runoff=0.12 cfs 0.009 af

Pond 20P: Peak Elev=222.94' Storage=604 cf Inflow=2.39 cfs 0.191 af
Discarded=0.01 cfs 0.029 af Primary=2.21 cfs 0.158 af Secondary=0.27 cfs 0.004 af Outflow=2.49 cfs 0.191 af

Pond 21P: Peak Elev=215.84' Inflow=2.81 cfs 0.188 af
Outflow=2.81 cfs 0.188 af

Pond 22P: Peak Elev=209.36' Storage=10 cf Inflow=5.48 cfs 0.396 af
Discarded=0.00 cfs 0.000 af Primary=5.38 cfs 0.396 af Secondary=0.00 cfs 0.000 af Outflow=5.38 cfs 0.396 af

Link 10L: Inflow=5.50 cfs 0.405 af
Primary=5.50 cfs 0.405 af

Total Runoff Area = 1.206 ac Runoff Volume = 0.434 af Average Runoff Depth = 4.32"
41.49% Pervious = 0.500 ac 58.51% Impervious = 0.705 ac

Summary for Subcatchment 20S:

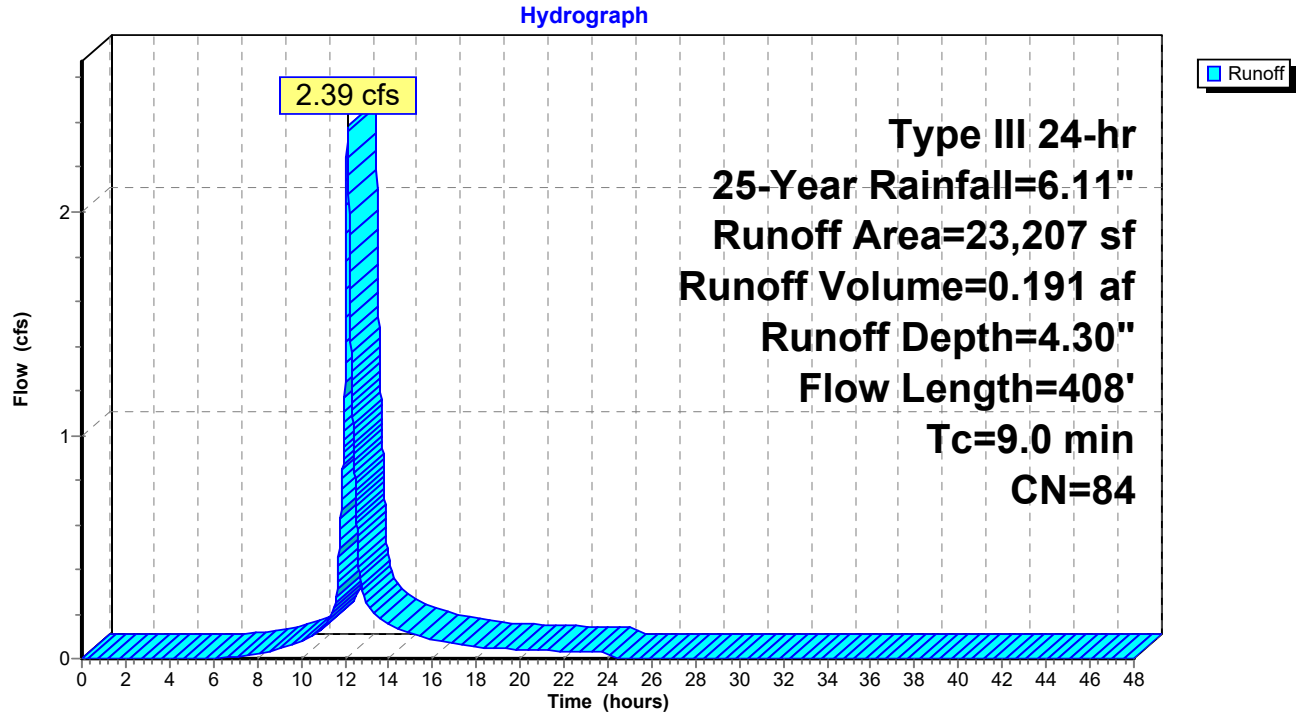
Runoff = 2.39 cfs @ 12.13 hrs, Volume= 0.191 af, Depth= 4.30"
Routed to Pond 20P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.11"

Area (sf)	CN	Description
13,748	98	Paved parking, HSG A
7,842	68	<50% Grass cover, Poor, HSG A
1,617	45	Woods, Poor, HSG A
23,207	84	Weighted Average
9,459		40.76% Pervious Area
13,748		59.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.3	75	0.0166	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.26"
0.7	333	0.0291	7.74	6.08	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
9.0	408	Total			

Subcatchment 20S:



Summary for Subcatchment 21S:

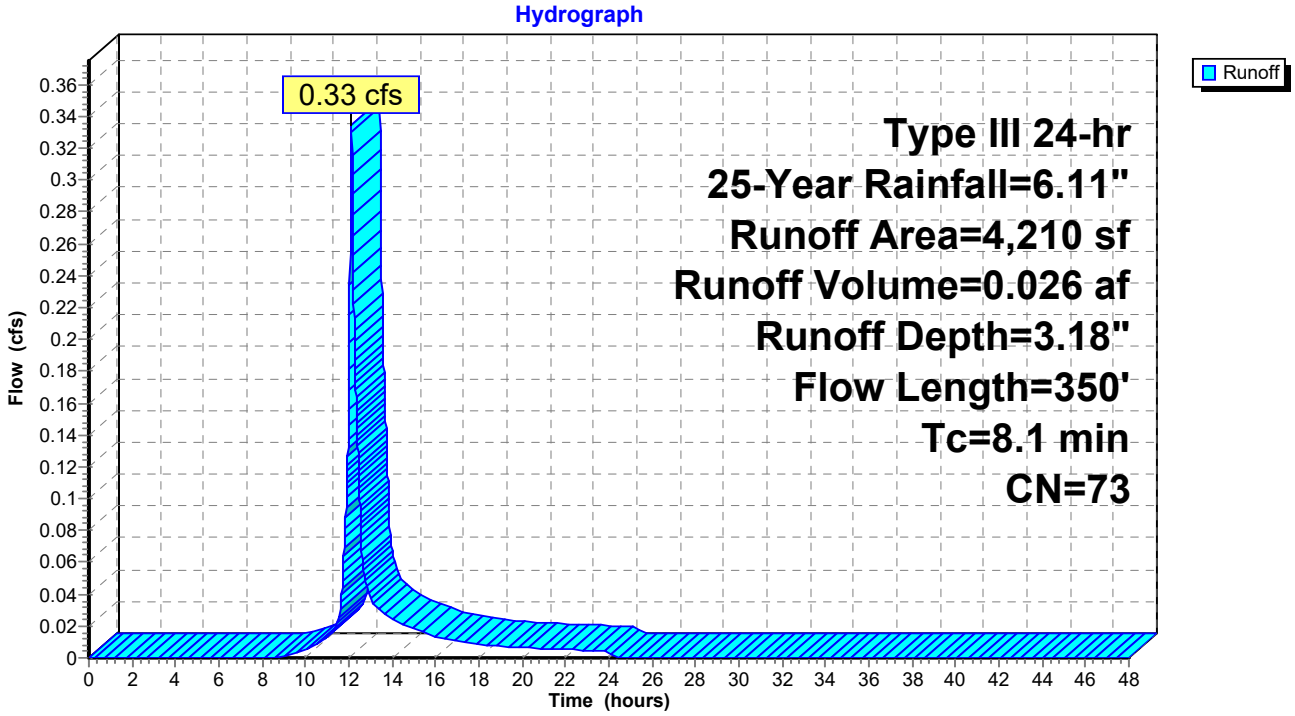
Runoff = 0.33 cfs @ 12.12 hrs, Volume= 0.026 af, Depth= 3.18"
Routed to Pond 21P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.11"

Area (sf)	CN	Description
682	68	<50% Grass cover, Poor, HSG A
1,948	98	Paved parking, HSG A
1,580	45	Woods, Poor, HSG A
4,210	73	Weighted Average
2,262		53.73% Pervious Area
1,948		46.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	58	0.1197	0.14		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
0.1	9	0.1917	2.12		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.26"
1.3	283	0.0049	3.68	4.52	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
8.1	350	Total			

Subcatchment 21S:



Summary for Subcatchment 22S:

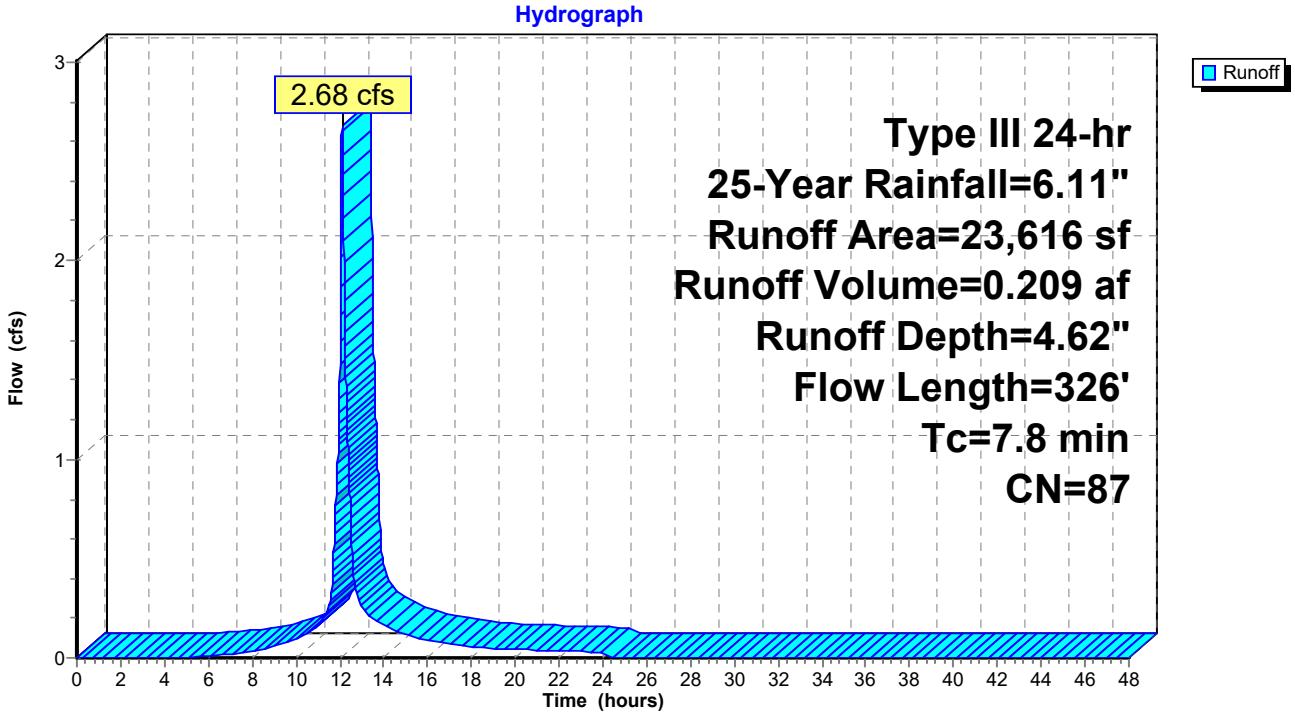
Runoff = 2.68 cfs @ 12.11 hrs, Volume= 0.209 af, Depth= 4.62"
Routed to Pond 22P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.11"

Area (sf)	CN	Description
8,877	68	<50% Grass cover, Poor, HSG A
3,410	98	Paved parking, HSG A
11,329	98	Roofs, HSG A
23,616	87	Weighted Average
8,877		37.59% Pervious Area
14,739		62.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.9	100	0.0680	0.28		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.26"
0.7	51	0.0268	1.15		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.2	175	0.0023	2.52	3.10	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
7.8	326	Total			

Subcatchment 22S:



Summary for Subcatchment 23S:

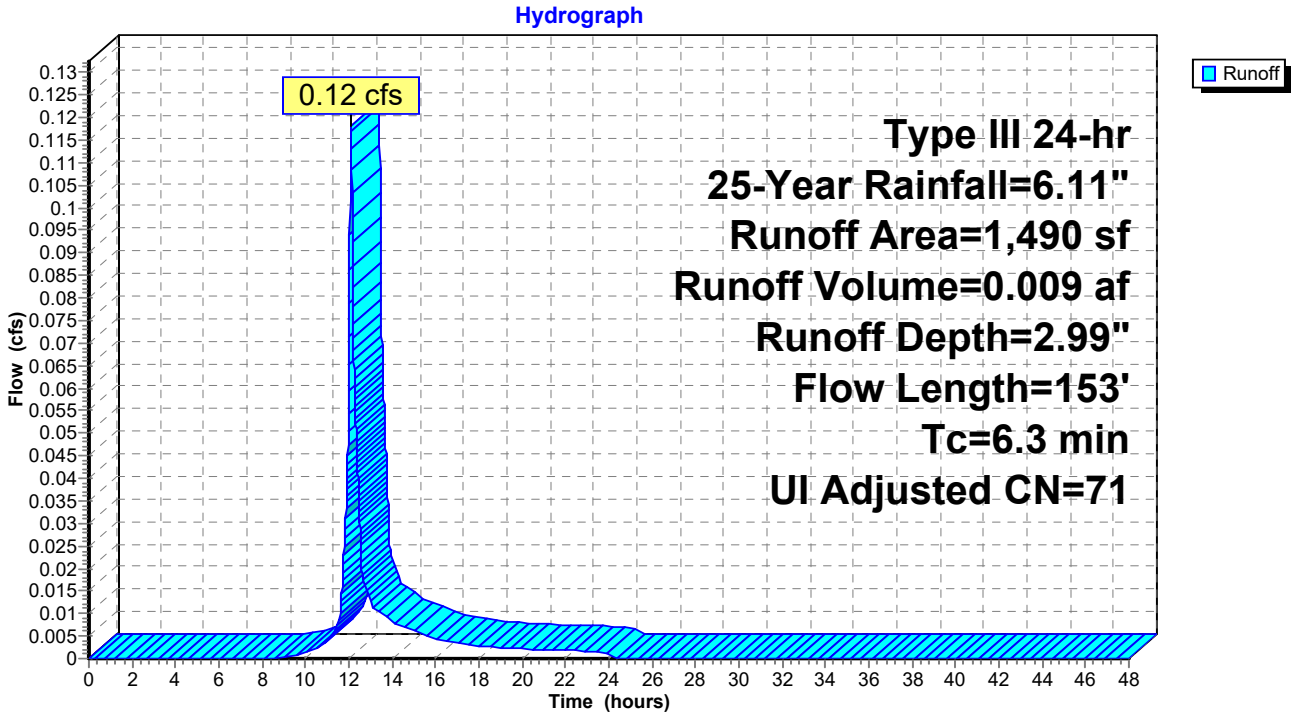
Runoff = 0.12 cfs @ 12.09 hrs, Volume= 0.009 af, Depth= 2.99"
Routed to Link 10L :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.11"

Area (sf)	CN	Adj	Description
295	98		Unconnected pavement, HSG A
1,195	68		<50% Grass cover, Poor, HSG A
1,490	74	71	Weighted Average, UI Adjusted
1,195			80.20% Pervious Area
295			19.80% Impervious Area
295			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	91	0.0549	0.25		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.26"
0.3	62	0.0042	3.41	4.19	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
6.3	153	Total			

Subcatchment 23S:



Summary for Pond 20P:

Inflow Area = 0.533 ac, 59.24% Impervious, Inflow Depth = 4.30" for 25-Year event
Inflow = 2.39 cfs @ 12.13 hrs, Volume= 0.191 af
Outflow = 2.49 cfs @ 12.13 hrs, Volume= 0.191 af, Atten= 0%, Lag= 0.3 min
Discarded = 0.01 cfs @ 12.13 hrs, Volume= 0.029 af
Primary = 2.21 cfs @ 12.13 hrs, Volume= 0.158 af
Routed to Pond 21P :
Secondary = 0.27 cfs @ 12.13 hrs, Volume= 0.004 af
Routed to Pond 21P :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 222.94' @ 12.13 hrs Surf.Area= 108 sf Storage= 604 cf

Plug-Flow detention time= 99.7 min calculated for 0.191 af (100% of inflow)
Center-of-Mass det. time= 99.9 min (905.5 - 805.6)

Volume	Invert	Avail.Storage	Storage Description
#1	218.00'	604 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
218.00	150	112.2	0	0	150
222.70	108	95.4	604	604	711

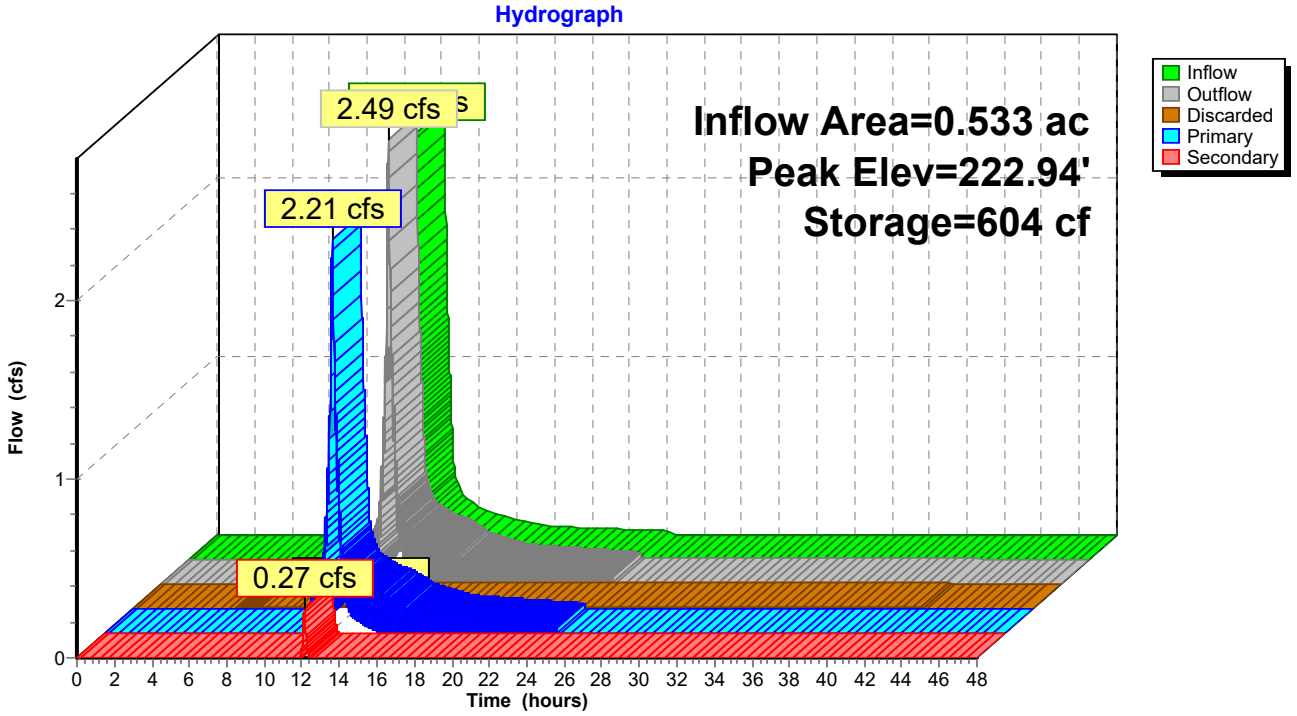
Device	Routing	Invert	Outlet Devices
#1	Primary	218.00'	**12.0" Round Culvert** L= 66.0' Ke= 0.500 Inlet / Outlet Invert= 218.00' / 212.70' S= 0.0803 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	222.75'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Discarded	218.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 200.00'
#4	Secondary	222.85'	**3.5' long (Profile 5) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 2.79 2.93 3.06

Discarded OutFlow Max=0.01 cfs @ 12.13 hrs HW=222.94' (Free Discharge)
└**3=Exfiltration** (Controls 0.01 cfs)

Primary OutFlow Max=2.20 cfs @ 12.13 hrs HW=222.94' TW=215.84' (Dynamic Tailwater)
└**1=Culvert** (Passes 2.20 cfs of 7.97 cfs potential flow)
└**2=Orifice/Grate** (Weir Controls 2.20 cfs @ 1.43 fps)

Secondary OutFlow Max=0.27 cfs @ 12.13 hrs HW=222.94' TW=215.84' (Dynamic Tailwater)
└**4=Broad-Crested Rectangular Weir** (Weir Controls 0.27 cfs @ 0.85 fps)

Pond 20P:


Hydrograph
Inflow Area=0.533 ac
Peak Elev=222.94'
Storage=604 cf
2.49 cfs
2.21 cfs
0.27 cfs
Inflow
Outflow
Discarded
Primary
Secondary
Flow (cfs)
Time (hours)
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

Summary for Pond 21P:

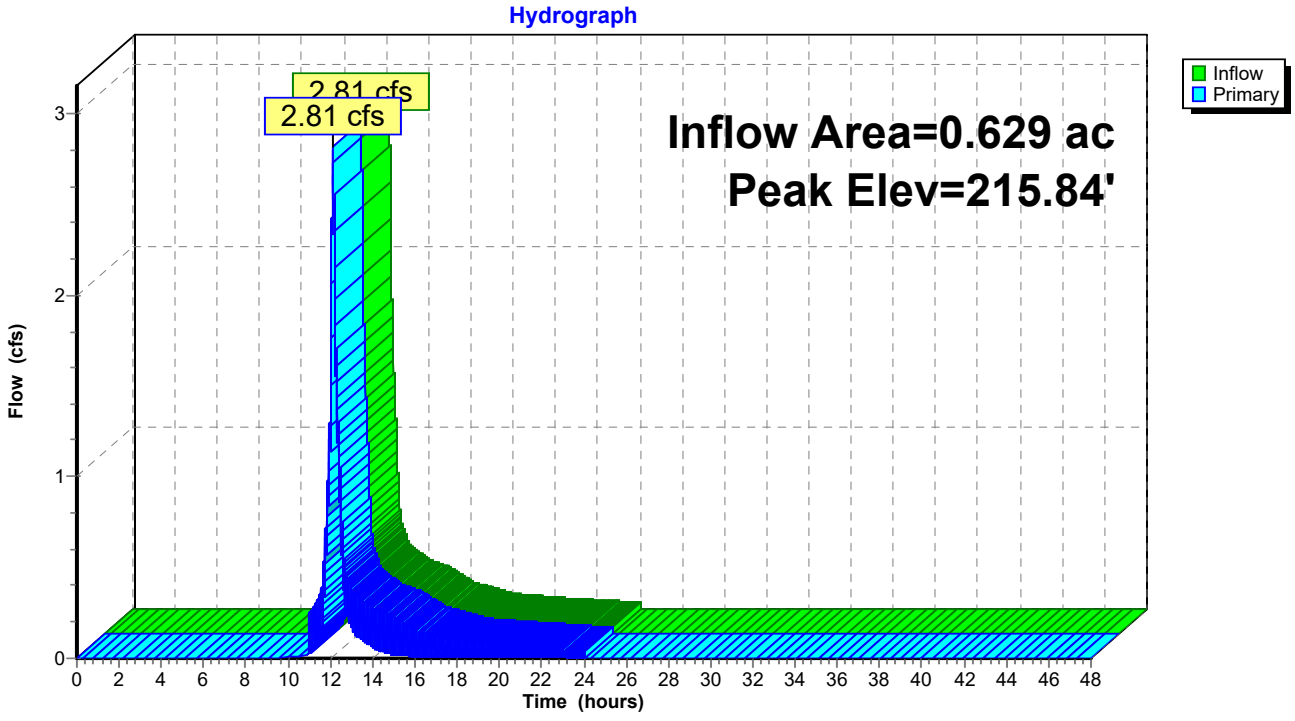
Inflow Area = 0.629 ac, 57.25% Impervious, Inflow Depth = 3.58" for 25-Year event
Inflow = 2.81 cfs @ 12.13 hrs, Volume= 0.188 af
Outflow = 2.81 cfs @ 12.13 hrs, Volume= 0.188 af, Atten= 0%, Lag= 0.0 min
Primary = 2.81 cfs @ 12.13 hrs, Volume= 0.188 af
Routed to Pond 22P :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 215.84' @ 12.13 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	208.30'	**15.0" Round Culvert** L= 112.0' Ke= 0.500 Inlet / Outlet Invert= 208.30' / 207.60' S= 0.0063 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	215.70'	**19.0" x 76.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=2.81 cfs @ 12.13 hrs HW=215.84' TW=209.33' (Dynamic Tailwater)
└─**1=Culvert** (Passes 2.81 cfs of 12.40 cfs potential flow)
└─**2=Orifice/Grate** (Weir Controls 2.81 cfs @ 1.24 fps)

Pond 21P:



Summary for Pond 22P:

Inflow Area = 1.172 ac, 59.64% Impervious, Inflow Depth = 4.06" for 25-Year event
Inflow = 5.48 cfs @ 12.11 hrs, Volume= 0.396 af
Outflow = 5.38 cfs @ 12.12 hrs, Volume= 0.396 af, Atten= 2%, Lag= 0.4 min
Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 5.38 cfs @ 12.12 hrs, Volume= 0.396 af
Routed to Link 10L :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link 10L :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 209.36' @ 12.12 hrs Surf.Area= 5 sf Storage= 10 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.1 min (804.8 - 804.7)

Volume	Invert	Avail.Storage	Storage Description
#1	207.30'	1,489 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
207.30	5	7.8	0	0	5
214.40	5	7.8	35	35	60
214.50	186	374.5	7	43	11,216
215.00	755	383.9	219	262	11,814
216.00	1,769	370.6	1,227	1,489	12,698

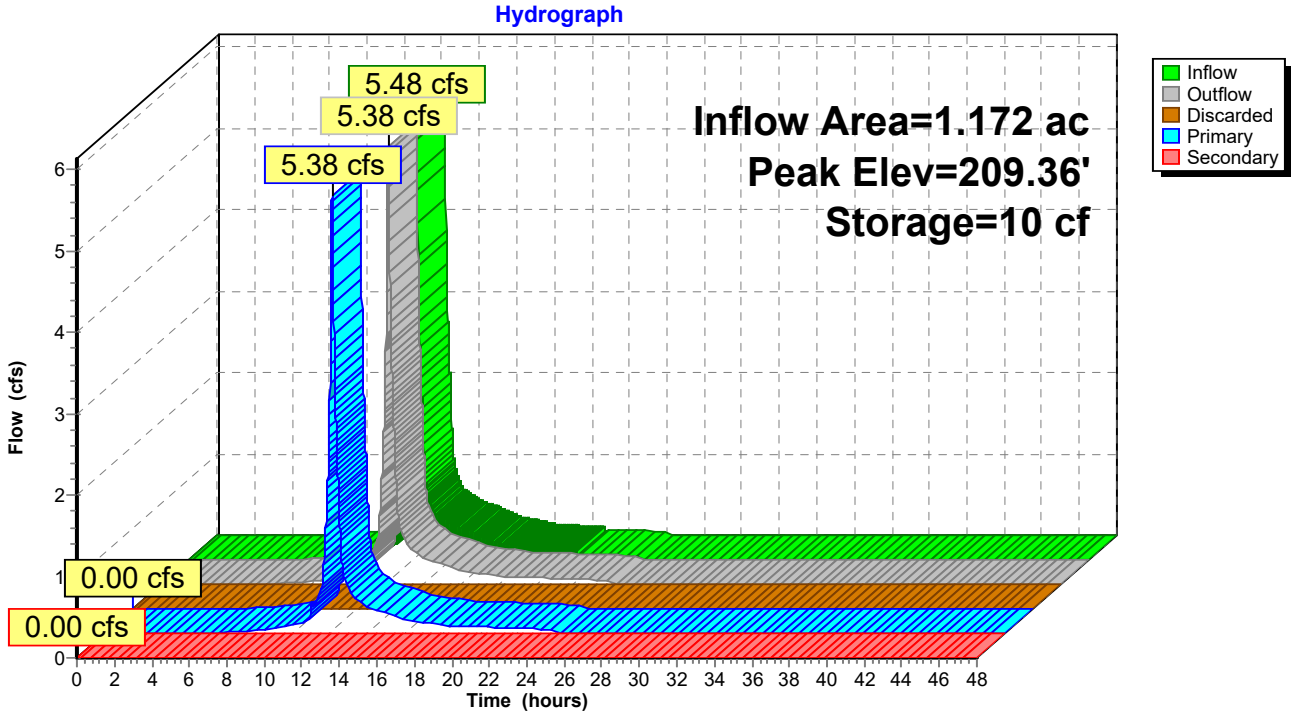
Device	Routing	Invert	Outlet Devices
#1	Discarded	207.30'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 200.00'
#2	Secondary	215.00'	**25.0' long (Profile 5) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 2.79 2.93 3.06
#3	Primary	207.30'	**15.0" Round Culvert** L= 109.0' Ke= 0.500 Inlet / Outlet Invert= 207.30' / 206.90' S= 0.0037 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#4	Device 1	215.70'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=207.30' (Free Discharge)
↑**1=Exfiltration** (Passes 0.00 cfs of 0.00 cfs potential flow)
↑**4=Orifice/Grate** (Controls 0.00 cfs)

Primary OutFlow Max=5.37 cfs @ 12.12 hrs HW=209.35' TW=0.00' (Dynamic Tailwater)
↑**3=Culvert** (Barrel Controls 5.37 cfs @ 4.38 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=207.30' TW=0.00' (Dynamic Tailwater)
↑**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 22P:

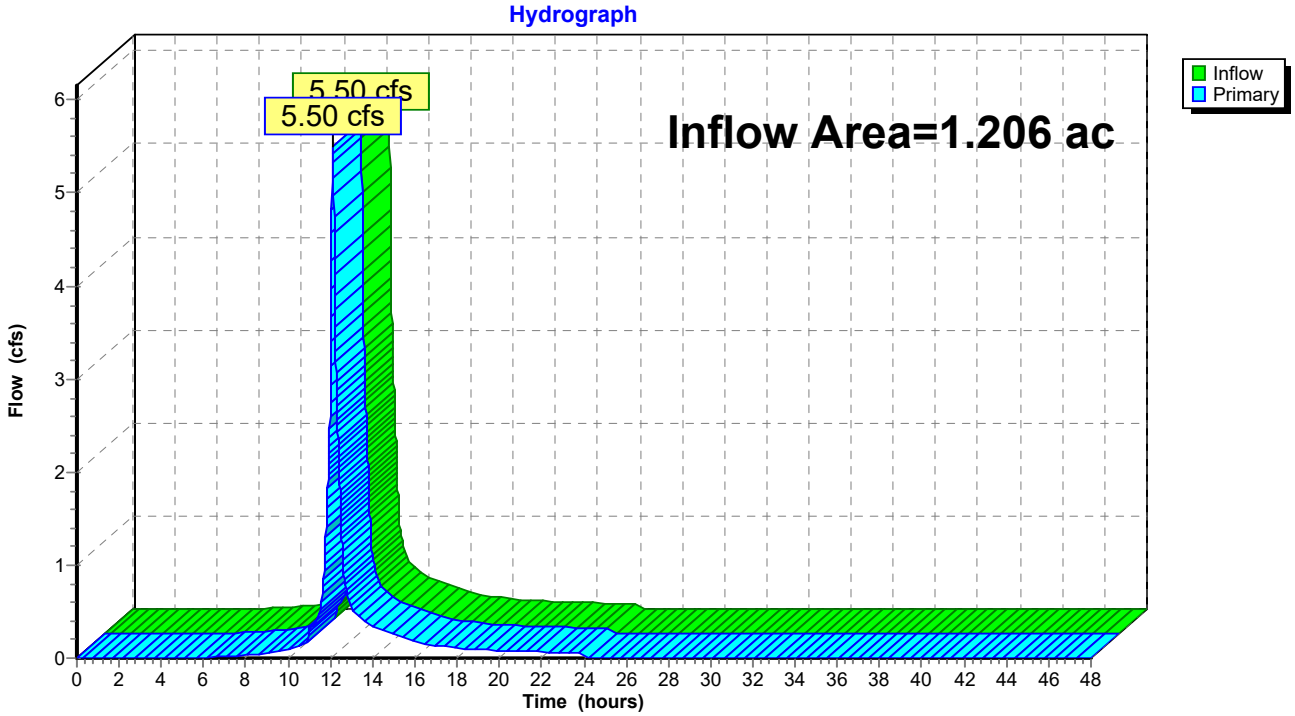

Hydrograph
Inflow Area=1.172 ac
Peak Elev=209.36'
Storage=10 cf
5.48 cfs
5.38 cfs
5.38 cfs
0.00 cfs
0.00 cfs
Inflow
Outflow
Discarded
Primary
Secondary
Flow (cfs)
Time (hours)
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48
0 1 2 3 4 5 6

Summary for Link 10L:

Inflow Area = 1.206 ac, 58.51% Impervious, Inflow Depth = 4.03" for 25-Year event
Inflow = 5.50 cfs @ 12.12 hrs, Volume= 0.405 af
Primary = 5.50 cfs @ 12.12 hrs, Volume= 0.405 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link 10L:



Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 20S: Runoff Area=23,207 sf 59.24% Impervious Runoff Depth=6.70"
Flow Length=408' Tc=9.0 min CN=84 Runoff=3.65 cfs 0.298 af

Subcatchment 21S: Runoff Area=4,210 sf 46.27% Impervious Runoff Depth=5.37"
Flow Length=350' Tc=8.1 min CN=73 Runoff=0.56 cfs 0.043 af

Subcatchment 22S: Runoff Area=23,616 sf 62.41% Impervious Runoff Depth=7.06"
Flow Length=326' Tc=7.8 min CN=87 Runoff=4.01 cfs 0.319 af

Subcatchment 23S: Runoff Area=1,490 sf 19.80% Impervious Runoff Depth=5.13"
Flow Length=153' Tc=6.3 min UI Adjusted CN=71 Runoff=0.20 cfs 0.015 af

Pond 20P: Peak Elev=222.99' Storage=604 cf Inflow=3.65 cfs 0.298 af
Discarded=0.01 cfs 0.030 af Primary=3.17 cfs 0.256 af Secondary=0.54 cfs 0.011 af Outflow=3.72 cfs 0.298 af

Pond 21P: Peak Elev=215.89' Inflow=4.27 cfs 0.311 af
Outflow=4.27 cfs 0.311 af

Pond 22P: Peak Elev=210.94' Storage=18 cf Inflow=8.24 cfs 0.630 af
Discarded=0.00 cfs 0.000 af Primary=8.19 cfs 0.630 af Secondary=0.00 cfs 0.000 af Outflow=8.19 cfs 0.630 af

Link 10L: Inflow=8.38 cfs 0.644 af
Primary=8.38 cfs 0.644 af

Total Runoff Area = 1.206 ac Runoff Volume = 0.675 af Average Runoff Depth = 6.71"
41.49% Pervious = 0.500 ac 58.51% Impervious = 0.705 ac

Summary for Subcatchment 20S:

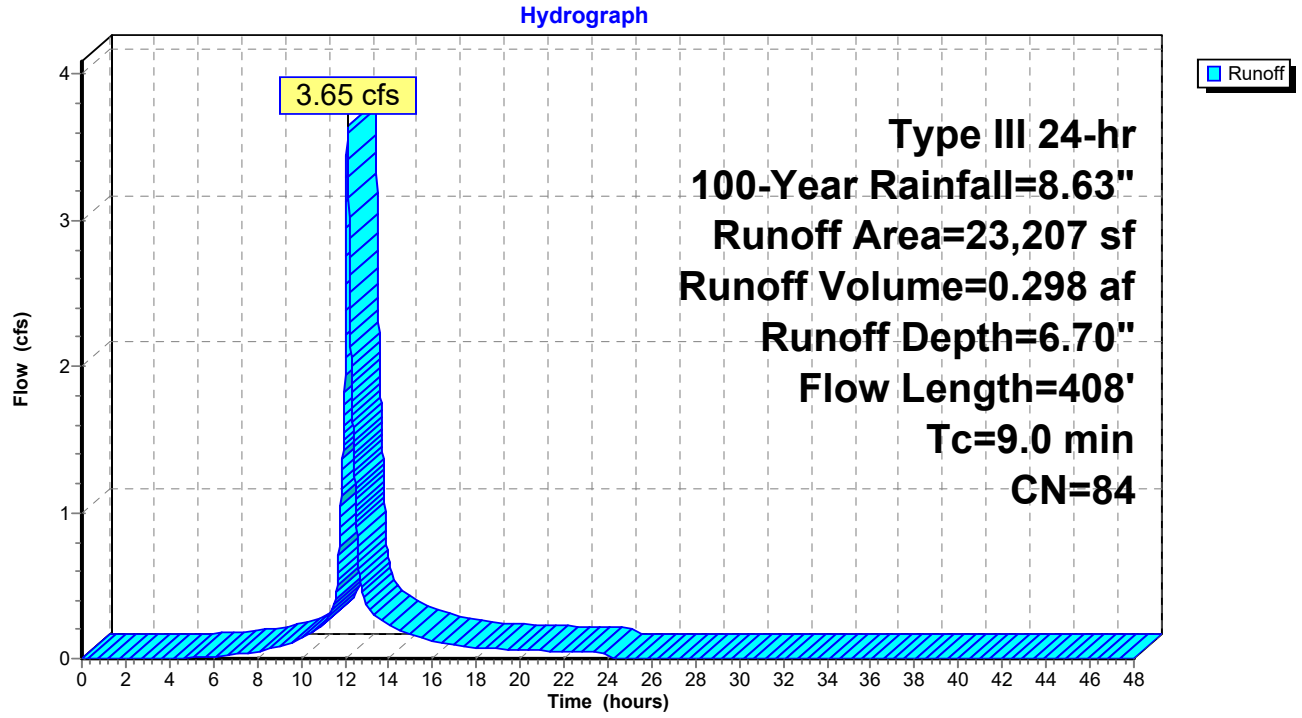
Runoff = 3.65 cfs @ 12.12 hrs, Volume= 0.298 af, Depth= 6.70"
Routed to Pond 20P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.63"

Area (sf)	CN	Description
13,748	98	Paved parking, HSG A
7,842	68	<50% Grass cover, Poor, HSG A
1,617	45	Woods, Poor, HSG A
23,207	84	Weighted Average
9,459		40.76% Pervious Area
13,748		59.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.3	75	0.0166	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.26"
0.7	333	0.0291	7.74	6.08	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
9.0	408	Total			

Subcatchment 20S:



Summary for Subcatchment 21S:

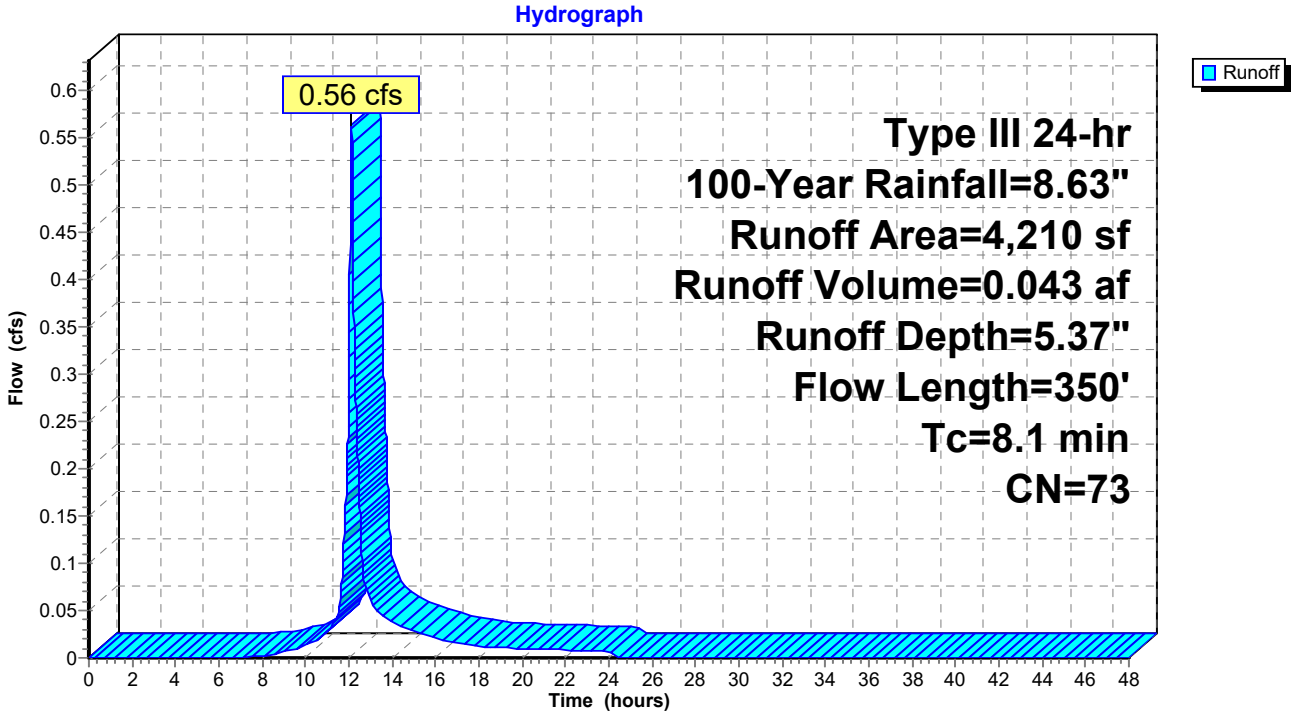
Runoff = 0.56 cfs @ 12.11 hrs, Volume= 0.043 af, Depth= 5.37"
Routed to Pond 21P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.63"

Area (sf)	CN	Description
682	68	<50% Grass cover, Poor, HSG A
1,948	98	Paved parking, HSG A
1,580	45	Woods, Poor, HSG A
4,210	73	Weighted Average
2,262		53.73% Pervious Area
1,948		46.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	58	0.1197	0.14		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
0.1	9	0.1917	2.12		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.26"
1.3	283	0.0049	3.68	4.52	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
8.1	350	Total			

Subcatchment 21S:



Summary for Subcatchment 22S:

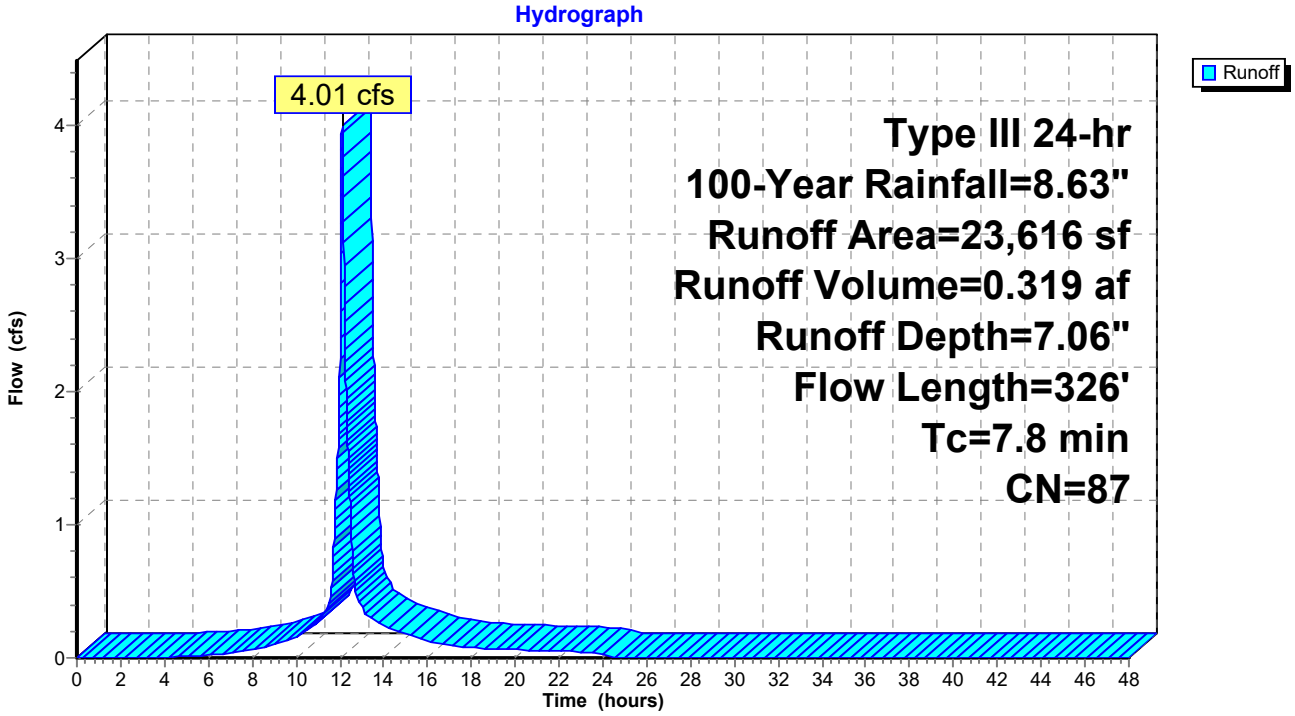
Runoff = 4.01 cfs @ 12.11 hrs, Volume= 0.319 af, Depth= 7.06"
Routed to Pond 22P :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.63"

Area (sf)	CN	Description
8,877	68	<50% Grass cover, Poor, HSG A
3,410	98	Paved parking, HSG A
11,329	98	Roofs, HSG A
23,616	87	Weighted Average
8,877		37.59% Pervious Area
14,739		62.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.9	100	0.0680	0.28		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.26"
0.7	51	0.0268	1.15		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.2	175	0.0023	2.52	3.10	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
7.8	326	Total			

Subcatchment 22S:



Summary for Subcatchment 23S:

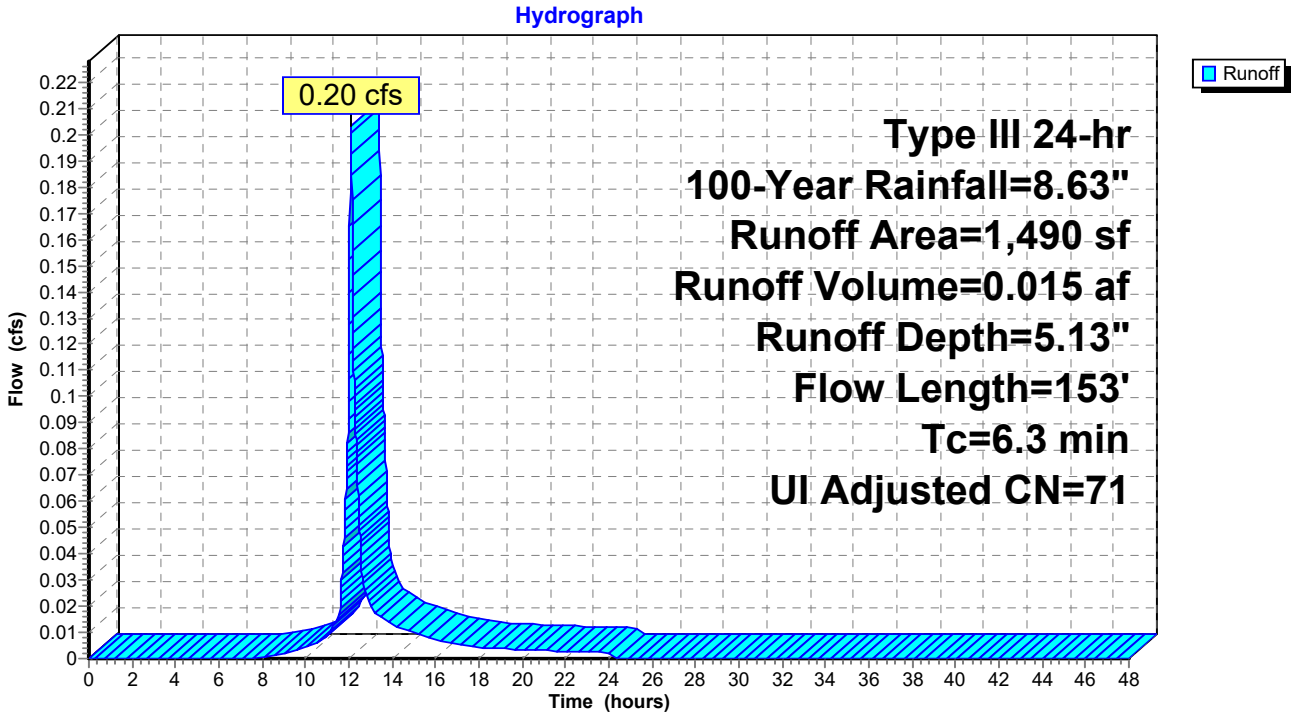
Runoff = 0.20 cfs @ 12.09 hrs, Volume= 0.015 af, Depth= 5.13"
Routed to Link 10L :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.63"

Area (sf)	CN	Adj	Description
295	98		Unconnected pavement, HSG A
1,195	68		<50% Grass cover, Poor, HSG A
1,490	74	71	Weighted Average, UI Adjusted
1,195			80.20% Pervious Area
295			19.80% Impervious Area
295			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	91	0.0549	0.25		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.26"
0.3	62	0.0042	3.41	4.19	**Pipe Channel,** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
6.3	153	Total			

Subcatchment 23S:



Summary for Pond 20P:

Inflow Area = 0.533 ac, 59.24% Impervious, Inflow Depth = 6.70" for 100-Year event
Inflow = 3.65 cfs @ 12.12 hrs, Volume= 0.298 af
Outflow = 3.72 cfs @ 12.12 hrs, Volume= 0.298 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.01 cfs @ 12.12 hrs, Volume= 0.030 af
Primary = 3.17 cfs @ 12.12 hrs, Volume= 0.256 af
Routed to Pond 21P :
Secondary = 0.54 cfs @ 12.12 hrs, Volume= 0.011 af
Routed to Pond 21P :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 222.99' @ 12.12 hrs Surf.Area= 108 sf Storage= 604 cf

Plug-Flow detention time= 67.7 min calculated for 0.297 af (100% of inflow)
Center-of-Mass det. time= 67.9 min (861.2 - 793.3)

Volume	Invert	Avail.Storage	Storage Description
#1	218.00'	604 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
218.00	150	112.2	0	0	150
222.70	108	95.4	604	604	711

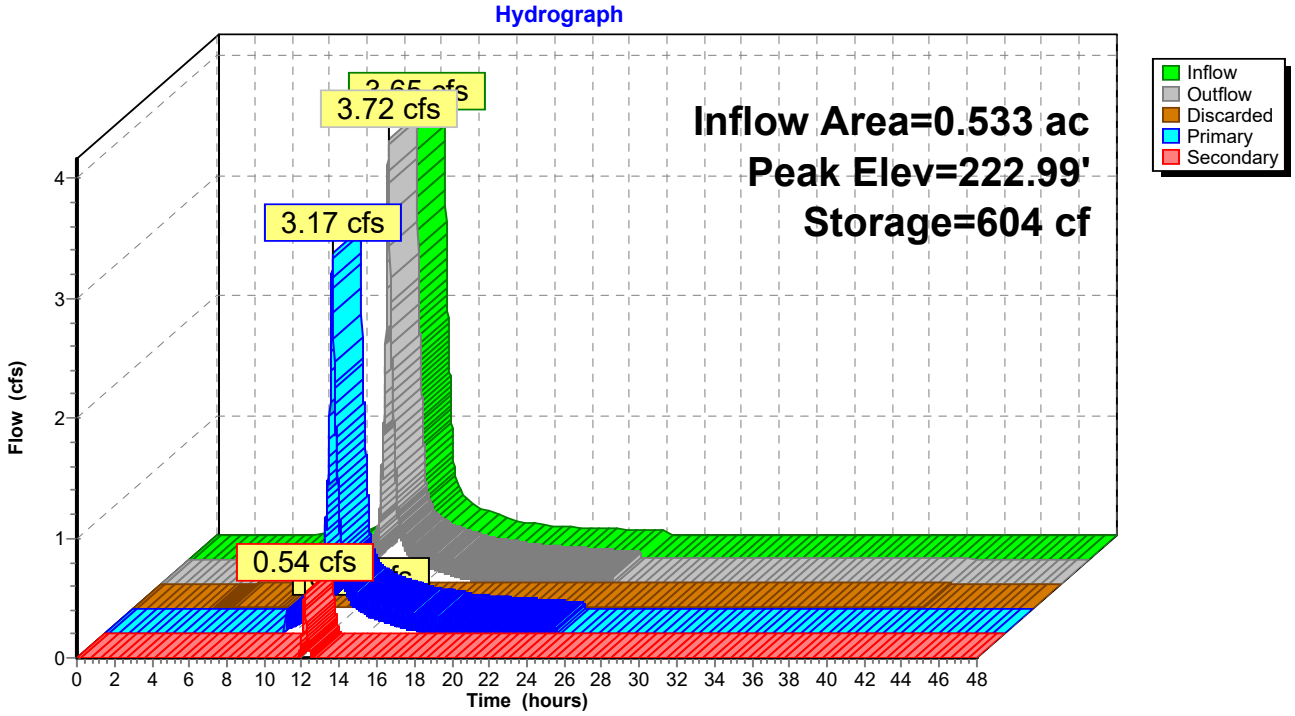
Device	Routing	Invert	Outlet Devices
#1	Primary	218.00'	**12.0" Round Culvert** L= 66.0' Ke= 0.500 Inlet / Outlet Invert= 218.00' / 212.70' S= 0.0803 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	222.75'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Discarded	218.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 200.00'
#4	Secondary	222.85'	**3.5' long (Profile 5) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 2.79 2.93 3.06

Discarded OutFlow Max=0.01 cfs @ 12.12 hrs HW=222.99' (Free Discharge)
└**3=Exfiltration** (Controls 0.01 cfs)

Primary OutFlow Max=3.16 cfs @ 12.12 hrs HW=222.99' TW=215.89' (Dynamic Tailwater)
└**1=Culvert** (Passes 3.16 cfs of 8.02 cfs potential flow)
└**2=Orifice/Grate** (Weir Controls 3.16 cfs @ 1.62 fps)

Secondary OutFlow Max=0.54 cfs @ 12.12 hrs HW=222.99' TW=215.89' (Dynamic Tailwater)
└**4=Broad-Crested Rectangular Weir** (Weir Controls 0.54 cfs @ 1.06 fps)

Pond 20P:


Hydrograph
Inflow Area=0.533 ac
Peak Elev=222.99'
Storage=604 cf
3.72 cfs
3.17 cfs
0.54 cfs
Inflow
Outflow
Discarded
Primary
Secondary
Flow (cfs)
Time (hours)
0
1
2
3
4
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

Summary for Pond 21P:

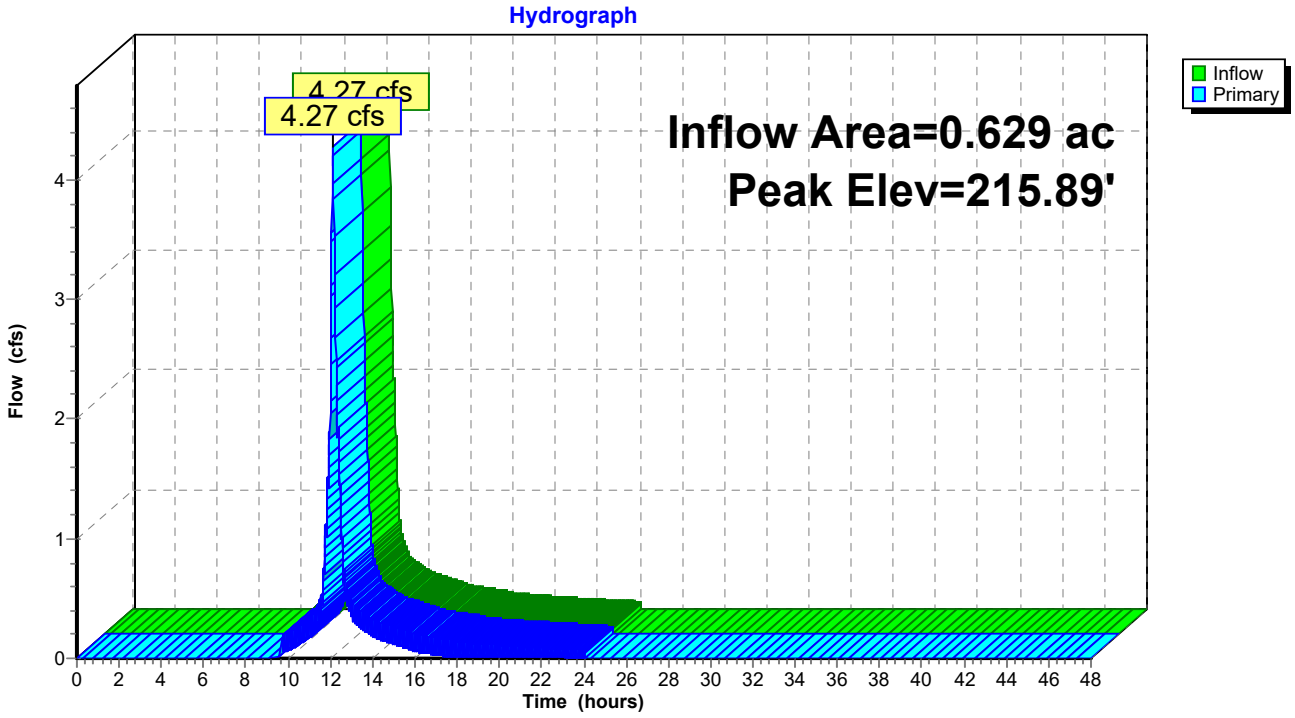
Inflow Area = 0.629 ac, 57.25% Impervious, Inflow Depth = 5.92" for 100-Year event
Inflow = 4.27 cfs @ 12.12 hrs, Volume= 0.311 af
Outflow = 4.27 cfs @ 12.12 hrs, Volume= 0.311 af, Atten= 0%, Lag= 0.0 min
Primary = 4.27 cfs @ 12.12 hrs, Volume= 0.311 af
Routed to Pond 22P :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 215.89' @ 12.12 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	208.30'	**15.0" Round Culvert** L= 112.0' Ke= 0.500 Inlet / Outlet Invert= 208.30' / 207.60' S= 0.0063 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	215.70'	**19.0" x 76.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=4.27 cfs @ 12.12 hrs HW=215.89' TW=210.93' (Dynamic Tailwater)
└─**1=Culvert** (Passes 4.27 cfs of 10.81 cfs potential flow)
└─**2=Orifice/Grate** (Weir Controls 4.27 cfs @ 1.42 fps)

Pond 21P:



Summary for Pond 22P:

Inflow Area = 1.172 ac, 59.64% Impervious, Inflow Depth = 6.45" for 100-Year event
Inflow = 8.24 cfs @ 12.12 hrs, Volume= 0.630 af
Outflow = 8.19 cfs @ 12.12 hrs, Volume= 0.630 af, Atten= 1%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 8.19 cfs @ 12.12 hrs, Volume= 0.630 af
Routed to Link 10L :
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link 10L :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 210.94' @ 12.12 hrs Surf.Area= 5 sf Storage= 18 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.1 min (794.1 - 794.0)

Volume	Invert	Avail.Storage	Storage Description
#1	207.30'	1,489 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
207.30	5	7.8	0	0	5
214.40	5	7.8	35	35	60
214.50	186	374.5	7	43	11,216
215.00	755	383.9	219	262	11,814
216.00	1,769	370.6	1,227	1,489	12,698

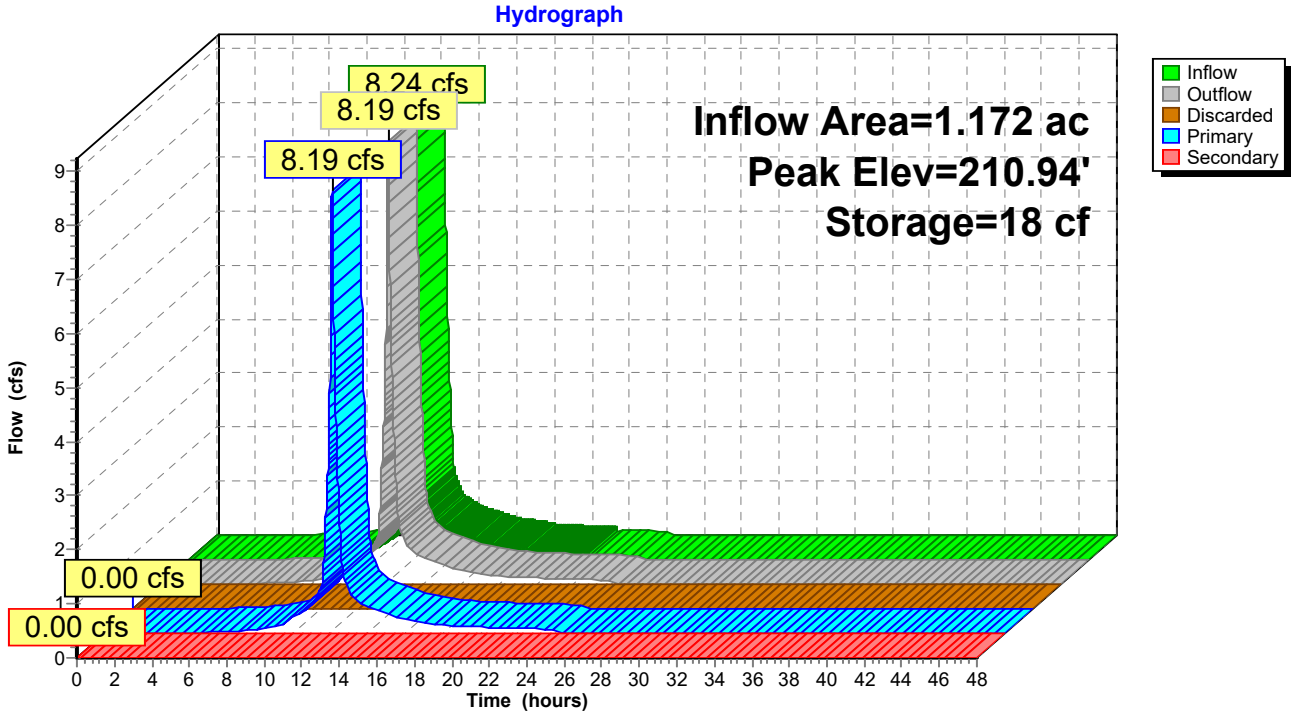
Device	Routing	Invert	Outlet Devices
#1	Discarded	207.30'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 200.00'
#2	Secondary	215.00'	**25.0' long (Profile 5) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 2.79 2.93 3.06
#3	Primary	207.30'	**15.0" Round Culvert** L= 109.0' Ke= 0.500 Inlet / Outlet Invert= 207.30' / 206.90' S= 0.0037 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#4	Device 1	215.70'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=207.30' (Free Discharge)
↑—**1=Exfiltration** (Passes 0.00 cfs of 0.00 cfs potential flow)
↑—**4=Orifice/Grate** (Controls 0.00 cfs)

Primary OutFlow Max=8.17 cfs @ 12.12 hrs HW=210.93' TW=0.00' (Dynamic Tailwater)
↑—**3=Culvert** (Barrel Controls 8.17 cfs @ 6.66 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=207.30' TW=0.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 22P:

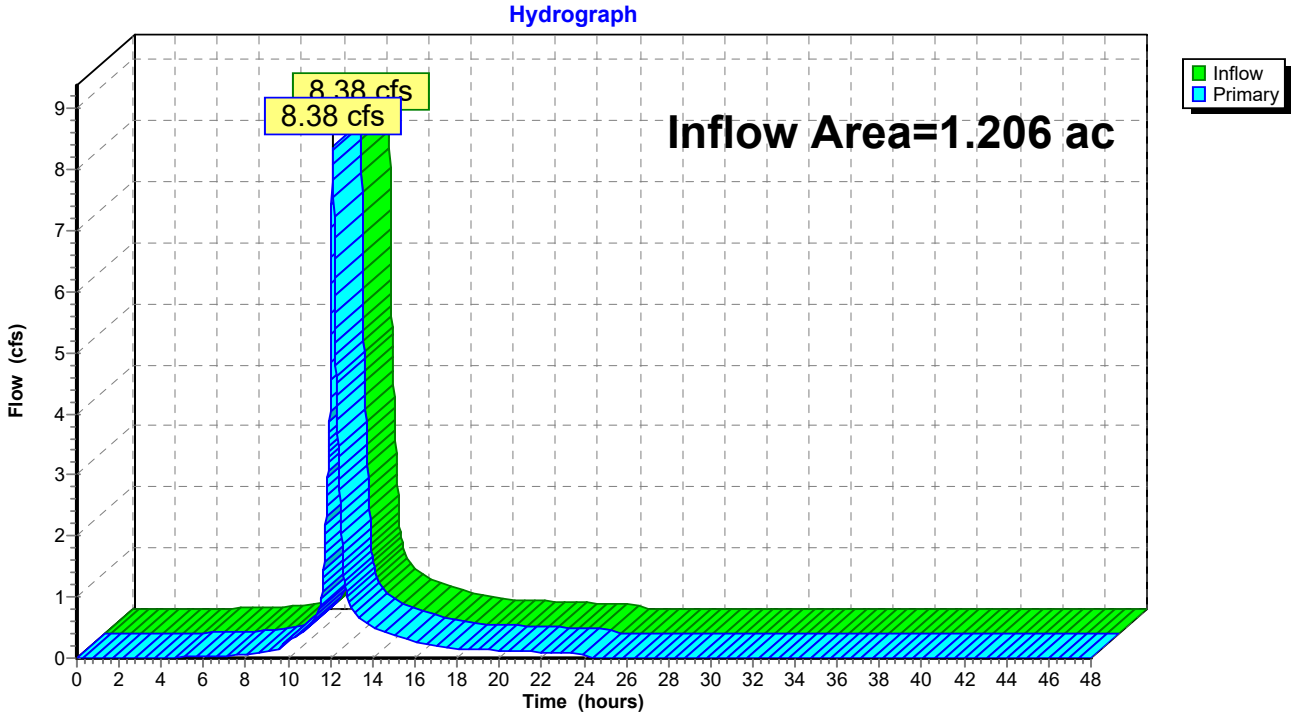

Hydrograph
8.24 cfs
8.19 cfs
8.19 cfs
0.00 cfs
0.00 cfs
Inflow Area=1.172 ac
Peak Elev=210.94'
Storage=18 cf
Inflow
Outflow
Discarded
Primary
Secondary
Flow (cfs)
Time (hours)
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48
0 1 2 3 4 5 6 7 8 9

Summary for Link 10L:

Inflow Area = 1.206 ac, 58.51% Impervious, Inflow Depth = 6.41" for 100-Year event
Inflow = 8.38 cfs @ 12.11 hrs, Volume= 0.644 af
Primary = 8.38 cfs @ 12.11 hrs, Volume= 0.644 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link 10L:



Appendix C

Water Quality Calculations

FUSS & O'NEILL

Water Quality Volume & Flow Calculations
Stormwater Treatment Unit Sizing
995 Hopmeadow Street
Simsbury, Connecticut

	Description	Symbol	Unit of Measure	Quantity
Water Quality Volume (WQV)	**Input**			
	Proposed Project Area	A	AC	1.22
	Percent Impervious Cover	I	%	58%
	Calculations			
	Volumetric Runoff Coefficient	R		0.574
	Water Quality Volume	WQV	ac-ft	**0.076**

Water Quality Flow (WQF)	**Input**			
	Design Precipitation	P	in	1.3
	Calculations			
	Runoff Depth	Q	in	0.746
	Runoff Curve Number	CN		94
	Initial Abstraction (From Table 4-1, Ch 4, TR-55 Manual)	I_A		0.128
	I_A/P (Rounded)		in	0.10
	Time of Concentration (Min. 0.10 Hours)	T_C	hr	0.100
	Unit Peak Discharge (from Exhibit 4-III, Ch 4, TR-55 Manual)	q_u	csm/ (mi^2*in)	650
	Drainage Area	A	mi^2	0.0019
	Water Quality Flow	WQF	cfs	**0.92**
Date: April 2024		Prepared By: TED		

Notes:
1. All water quality calculations based on 2004 Connecticut Stormwater Quality Manual.
2. Shaded cells indicate numbers inputted from other sources.

FUSS & O'NEILL

Water Quality Volume & Flow Calculations
Stormwater Treatment Unit Sizing
Westminster - Simsbury, CT
Recreation Area - Drywells

	Description	Symbol	Unit of Measure	Quantity
Water Quality Volume (WQV)	**Input**			
	Design Precipitation	P	in	1.3
	Proposed Project Area	A	AC	0.53
	Percent Impervious Cover	I	%	49%
	Calculations			
	Volumetric Runoff Coefficient	R		0.491
	Water Quality Volume	WQV	ac-ft	**0.028**

	Description	Symbol	Unit of Measure	Quantity
Water Quality Flow (WQF)	**Calculations**			
	Runoff Depth	Q	in	0.638
	Runoff Curve Number	CN		92
	Initial Abstraction (From Table 4-1, Ch 4, TR-55 Manual)	I_A		0.174
	I_A/P (Rounded)		in	0.13
	Time of Concentration (Min. 0.10 Hours)	T_C	hr	0.150
	Unit Peak Discharge (from Exhibit 4-III, Ch 4, TR-55 Manual)	q_u	csm/ (mi^2*in)	597
	Drainage Area	A	mi^2	0.0008
	Water Quality Flow	WQF	cfs	**0.32**
Date: April 2024		Prepared By: TED		

Notes:
1. All water quality calculations based on 2023 Connecticut Stormwater Quality Manual.
2. Shaded cells indicate numbers inputted from other sources.

FUSS & O'NEILL

Water Quality Volume & Flow Calculations
Stormwater Treatment Unit Sizing
Westminster - Simsbury, CT
Recreation Area - Rain Garden

	Description	Symbol	Unit of Measure	Quantity
Water Quality Volume (WQV)	**Input**			
	Design Precipitation	P	in	1.3
	Proposed Project Area	A	AC	0.54
	Percent Impervious Cover	I	%	62%
	Calculations			
	Volumetric Runoff Coefficient	R		0.608
	Water Quality Volume	WQV	ac-ft	**0.036**
Water Quality Flow (WQF)	**Calculations**			
	Runoff Depth	Q	in	0.790
	Runoff Curve Number	CN		94
	Initial Abstraction (From Table 4-1, Ch 4, TR-55 Manual)	I_A		0.128
	I_A/P (Rounded)		in	0.10
	Time of Concentration (Min. 0.10 Hours)	T_C	hr	0.130
	Unit Peak Discharge (from Exhibit 4-III, Ch 4, TR-55 Manual)	q_u	csm/ (mi^2*in)	629
	Drainage Area	A	mi^2	0.0008
	Water Quality Flow	WQF	cfs	**0.42**
Date: April 2024		Prepared By: TED		

Notes:
1. All water quality calculations based on 2023 Connecticut Stormwater Quality Manual.
2. Shaded cells indicate numbers inputted from other sources.