

STORMWATER MANAGEMENT REPORT

40 B DEVELOPMENT

at

**55 PEARSON DRIVE
(ASSESSOR'S MAP 20 LOT 75)**

in

BYFIELD, MASSACHUSETTS 01922

November 15, 2017

Prepared for:

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III.

INTRODUCTION

In accordance with the 40B regulations in the Commonwealth of Massachusetts Ranger Engineering & Design, LLC (Ranger) has prepared a comprehensive Stormwater Management Plan for submittal to the Town of Newbury, MA Zoning Board of Appeals on behalf of Byfield Estates, LLC in support of an *Application for a Chapter 40B Subdivision* for the proposed development of a roadway and 24 single family dwelling units at 55 Pearson Drive in Byfield, Massachusetts

IV.

EXISTING CONDITIONS

The project site consists of a 15.08 ± acre parcel of land located at the rear portion of 55 Pearson Drive (Assessors Map 20 Lot 75) in the Byfield section of Newbury, Massachusetts (see Ranger Dwg. CS9201). The site presently is undeveloped and can be characterized as wooded land with rolling topography and some statutory wetland areas. The parcel is bordered by residential properties located along Pearson Drive to the south, residential properties with large areas of wooded land to the east, and primarily undeveloped land associated with the Martin Burns Wildlife Management Area to the west and north. Access to the property is gained through an easement over the front portion of 55 Pearson Drive which is an existing lot containing one single family dwelling.

The majority of the site consists of undeveloped woodlands consisting of a mix of deciduous trees. Generally the topography is rolling and undulating with moderate slopes. The site contains rock (ledge) outcroppings and surface boulders and stones which are visible throughout the site. The site is situated at an elevation which is slightly higher than the properties along Pearson Drive and contains several identified bordering vegetated wetlands (BVW), an isolated land subject to flooding (ILSF), and several vernal pools. The BVW areas are located on the east and west sides of the development and the ILSF is located on the south center of the property. The developed portion of the site is as much as 20 feet higher in elevation than the wetland areas.

V.

PROPOSED CONDITIONS

The Applicant proposes to construct 24 single family homes on a 22' wide access roadway from Pearson Drive. The roadway gains access to Pearson Drive through an easement over the parcel of land fronting Pearson Drive containing the existing dwelling. The roadway will cross a small portion of bordering vegetated wetland to gain access to the higher areas on the site.

The subdivision will include construction of approximately 800± linear feet of paved roadway measuring 22' wide. A 5' wide sidewalk will be constructed along one side of the new roadway and the roadway will be lined with sloped granite curbing.

A closed drainage system will be constructed to collect and convey stormwater runoff to several open detention basins and an underground detention and infiltration structure located onsite. The closed drainage system will consist of deep sump catch basins, manholes, and piping. The underground detention and infiltration system will be located under the cul de sac landscape area and will discharge to one of the open detention basins. Three open detention basins will

be located adjacent to BVW areas on the east and west sides of the site which will discharge runoff to the BVW areas.

The subdivision will be serviced by municipal water and private utilities such as underground electric, gas, cable TV, and telephone. The subdivision's sewer collection system will be connected to three separate common septic systems located on the west side of the site..

VI.

STORMWATER DESIGN

The proposed stormwater system will maintain the same drainage patterns as under the pre-development conditions. Increase to peak rates of flow and stormwater volumes will be mitigated onsite to minimize or eliminate impacts to downstream areas. Stormwater presently flows east, south, and west into the different wetland systems.

Closed Drainage Systems

The proposed closed drainage system consists of deep sump catch basins, drain manholes, and HDPE piping. The system conforms to the Town of Newbury subdivision regulations.

Stormwater Detention System

Three (3) open detention basins and one underground basin are proposed to mitigate peak runoff rates and volumes, promote groundwater recharge, and to provide for water quality. The buried detention basin will be located beneath the landscape area at the center of the cul-de-sac and will be used to treat and infiltrate runoff as well as provide peak flow attenuation. The underground structure will discharge flow to an open detention basin located adjacent to the BVW to the east of the development. Two additional detention basins will be located at the west side of the developed area one of which will provide TSS removal for roadway runoff. The stormwater system is designed to contain and mitigate the 2-year, 10-year, 25-year, 10-year, and 100-year storm events.

System has been sized to provide both water quality treatment and recharge to satisfy the requirements of both Mass DEP Stormwater Management Standards 3 and 4.

Rooftop Runoff Infiltration

Each home will have gutters and downspouts which will be directed into individual roof runoff infiltration structures which consists of a single infiltrator chamber within a bed of crushed stone. The infiltration units are sized to infiltrate the first .35" of runoff from the rooftop impervious areas.

Wetland Resource Areas

The site does contain wetlands resource areas and will require the filing of a Notice of Intent (NOI) with the Town of Newbury Conservation Commission as part of the permitting process.

Flood Zone Classification

According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) for Essex County, Massachusetts, Community Panel 25009C0118G, effective date July 16, 2014, the site and nearby properties are located within Zone X, which is defined as areas outside of the 500-year floodplains (see attached).

Estimated Habitat for Rare Wildlife and Rare Species

According to current *Massachusetts GIS Online Mapping Tool (Oliver)*, the site is not designated as an area for estimated habitat for rare wildlife or rare species and will not require a submittal to the Natural Heritage and Endangered Species Program (NHESP) as part of the permitting process.

The site does contain two vernal pools which will be treated as certified vernal pools, however they are not listed as such by DEP.

Soil Classification

According to the Soil Survey of Essex County, Massachusetts, prepared by the US Department of Agriculture, Soil Conservation Service, underlying soils located within the site consist primarily of Canton and Maybid soils (see Soils Map). The upland areas of the site are primarily Canton soils which are classified within SCS Hydrologic Soil Group B. The Maybid soils are located in and directly adjacent to the wetland resource areas.

Table 1
Hydrologic Soil Group Ratings

Map Unit Symbol	Map Unit Name	Rating
422D	Canton Fine Sandy Loam, 8-15 and 15-25 percent slopes, extremely stony	B
12A	Maybid Silt Loam, 0-3 percent slopes	D
		-

The on-site soils consist of series, described by NRCS, as follows:

Canton Fine Sandy Loam series (SCS Classification "B") consist of sloped terrain (8 to 25 percent), well drained soils on ridges, hills, and ground moraines. Canton Fine Sandy Loam soils consist of approximately 20% Charlton, Hollis, Scituate, and Montauk type soils.

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

Per the soil survey, the general characteristics of the four (4) hydrologic soil groups are as follows:

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

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

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

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

Subsurface Investigation

Test pit investigations were conducted within the site to determine the presence of the Seasonal High Groundwater (SHGW) elevation and depth to bedrock. The soils were found to be consistent with a B soil type as indicated in the USGS soil survey report. Sufficient soils were found beneath the proposed detention/infiltration basin to allow for infiltration at a rate of 1" per hour.

Sieve analysis results can be found under the Appendices section of this report.

Methodology

The comparative hydrologic analysis of pre-development conditions to post-development conditions was performed using the Soil Conservation Service, Technical Release 20 (TR-20). The 2-, 10-, 25-, 50-, and 100-year storm events were modeled for a 24-hour, Type III storm using HydroCAD version 8.5. HydroCAD calculations for pre-and post-development conditions are include in the Appendices.

The following rainfall amounts were utilized for each design storm event.

2-year Frequency Storm:	3.2 inches per 24-hours
10-year Frequency Storm:	4.8 inches per 24-hours
25-year Frequency Storm:	6.0 inches per 24-hours
50-year Frequency Storm:	7.0 inches per 24-hours
100-year Frequency Storm:	8.5 inches per 24-hours

Existing Watershed

The existing site does not contain any drainage systems. Stormwater runoff infiltrates onsite and flows offsite in all directions. The existing catchment areas and drainage runoff flow patterns associated with the site are illustrated on the attached Pre-Development Watershed Plan (Dwg. CS9201). The drainage patterns will be maintained under post-development conditions.

For the purposes of the hydrologic analyses, the existing site has been delineated into three (3) existing catchment areas which flow to three (3) different design points. All of the catchment areas flow offsite and are described as follows. As shown, surface drainage flows to the following site boundaries:

- Design Point #1 (DP1) – West bordering vegetated wetlands
- Design Point #2 (DP2) – South isolated land subject to flooding
- Design Point #3 (DP3) – East bordering vegetated wetland

Catchment EX1

Catchment EX1 includes areas of the site which direct stormwater runoff primarily toward the wetland series D on the west side of the property (DP #1). The area does not include any impervious surfaces and the topography within the catchment includes moderately sloped (approx. 4%-15%) areas and some flatter terrain adjacent to the wetland.

Catchment EX2

Catchment EX2 includes areas of the site which direct stormwater runoff primarily toward the south ILSF which is adjacent to the south property line (DP #2) and abutting developed areas along Pearson Drive. The area does not include any impervious surfaces and the topography within the catchment includes moderately sloped (approx. 4-20%) areas and some flatter terrain.

Catchment EX3

Catchment EX3 includes areas of the site which direct stormwater runoff primarily toward the east bordering vegetated wetland (DP #3). The area does not include any impervious surfaces and the topography within the catchment includes moderately sloped (approx. 4-20%) areas and some flatter terrain.

Proposed Watershed

The proposed subdivision will include a closed drainage system which will collect and convey stormwater runoff into several detention basins. For the purposes of the analyses, the proposed site has been divided into eleven (11) sub-catchment areas. The proposed catchment areas are shown on the Post-Development Watershed Plan (Dwg. CS9301)

Catchment P-1A

Catchment P-1A includes flow from lawn and rooftop areas of the interior properties. Runoff from this catchment flows directly to the west BVW.

Catchment P-1B

Catchment P-1B includes pavement area and overland flow from lawn and rooftop areas of the interior properties. Runoff from this catchment flows toward the gutter line of the subdivision roadway where it is collected within the proposed closed drainage system.

Catchment P-1C

Catchment P-1C includes pavement area and some overland flow from adjacent lawn. Runoff from this catchment flows toward the gutter line of the subdivision roadway where it is collected within the proposed closed drainage system.

Catchment P-1D

Catchment P-1D includes pavement area and overland flow from adjacent lawn along the roadway. Runoff from this catchment flows toward the gutter line of the subdivision roadway where it is collected within the proposed closed drainage system.

Catchment P-1E

Catchment P-1E includes overland flow from lawn areas of the interior properties and contains detention basin 1-1. Runoff from this catchment flows directly into detention basin 1-1

Catchment P-1F

Catchment P-1F includes pavement, roof, and some lawn areas. Runoff from this catchment flows toward the gutter line of the subdivision roadway where it is collected within the proposed closed drainage system.

Catchment P-1G

Catchment P-1G includes pavement, roof, and some lawn areas. Runoff from this catchment flows toward the gutter line of the subdivision roadway where it is collected within the proposed closed drainage system.

Catchment P-1H

Catchment P-1H includes pavement, roof, and some lawn areas. Runoff from this catchment flows toward the gutter line of the subdivision roadway where it is collected within the proposed closed drainage system.

Catchment P-1I

Catchment P-1I includes mostly lawn areas which flow directly to detention basin 1-2. Detention basin 1-2 is part of this catchment

Catchment P-1J

Catchment P-1J includes some grass areas and woodland which will flow directly to the BVW on the west side of the property.

Catchment P-2A

Catchment P-2A includes lawn areas and some rooftop. The area flows directly to the ILSF on the south of the property which is design point 2

Catchment P-3A

Catchment P-3A includes woods and lawn areas which flow directly to the east BVW which is design point 3.

Catchment P-3B

Catchment P-1H includes roof, some lawn areas, and the detention basin 3-2. Runoff from this catchment flows directly to detention basin 3-2.

Catchment P-3C

Catchment P-3C includes pavement, roof, and some lawn areas. Runoff from this catchment flows toward the gutter line of the subdivision roadway where it is collected within the proposed closed drainage system.

Catchment P-3D

Catchment P-3D includes pavement, roof, and some lawn areas. Runoff from this catchment flows toward the gutter line of the subdivision roadway where it is collected within the proposed closed drainage system.

Catchment P-3E

Catchment P-3E includes pavement, roof, and some lawn areas. Runoff from this catchment flows toward the gutter line of the subdivision roadway where it is collected within the proposed closed drainage system.

IX. SUMMARY OF PEAK DISCHARGE RATES

The estimation of flow rates and volumes were calculated utilizing *HydroCad* stormwater modeling software. The methodology is SCS TR-20, Type III, 24-hour rainfalls (2, 10, 25, 50 & 100-year frequency storm events). Supporting calculations are included in the Appendix.

Point of Analysis	Storm	Pre-Development Rate (CFS)	Post-Development Rate (CFS)
DP #1 (West Wetland)	2-year	0.31	0.30
	10-year	1.95	1.71
	25-year	3.81	3.65
	50-year	5.60	5.55
	100-year	8.60	8.23

Point of Analysis	Storm	Pre-Development Rate (CFS)	Post- Development Rate (CFS)
DP#2 (South Isolated Land Subject to Flooding)	2-year	0.22	0.31**
	10-year	1.47	1.23
	25-year	2.95	2.08
	50-year	4.35	2.86
	100-year	6.67	4.12

Point of Analysis	Storm	Pre-Development Rate (CFS)	Post- Development Rate (CFS)
DP#3 (Western property line)	2-year	0.27	0.20
	10-year	1.81	1.23
	25-year	3.65	1.91
	50-year	5.38	2.55
	100-year	8.24	5.83

** Although the peak rate of flow increases slightly the total volume of runoff is decreased from 2018 cubic feet to 1485 cubic feet which will result in less of an impact downstream.

X. STORMWATER MANAGEMENT STANDARDS

The project has been designed to meet the *Mass DEP Stormwater Management Standards* outlined in the *Wetlands Protection Act Regulations, 310 CMR 10.05(6)(k)* to the maximum extent possible. The project's conformance with these standards is described below.

STORMWATER MANAGEMENT PRACTICES

The majority of the stormwater runoff from the developed site is routed through a closed drainage system into detention ponds at the low points on the east and west sides of the property. Detention ponds 1-2 and 3-1 have been designed as dry detention basins to control flow. Detention basin 1-1 is designed with its outlet elevated above the bottom of the pond to provide treatment in a constructed wet pond within the basin.

Additional stormwater storage and treatment is provided in the buried detention basin 3-1 which is comprised of 4' x 4' open bottom concrete structures set in a bed of stone. The bottom portion of the buried basin is retained and infiltrated while several rows of chambers are wrapped in filter fabric to provide stormwater treatment. Additional pre-treatment is provided by deep sump catch basins and sediment forbays.

Additional infiltration is provided by directing roof runoff into individual infiltration structures. The volume of runoff captured in the stormwater structures is sufficient to meet both the standards for infiltration and for treatment. (See calculations below)

CONFORMANCE WITH STANDARDS

Standard 1: No New Untreated Discharges – Met

There will be no new untreated outfalls proposed as part of this project; the stormwater management system is designed to provide a minimal level of water quality treatment for all discharges.

Standard 2: Peak Rate Attenuation – Met

There will be an increase to the impervious area in all watersheds as a result of this project. The drainage collection and conveyance system has been designed to direct stormwater to detention structures to attenuate increases in peak runoff. Pre- and post-development watershed analyses of the drainage systems were performed for the 2, 10, 25, 50 and 100-year storms. The results of the analysis indicate that post-development peak discharge rates will not increase from the pre-development discharge rates for all design points in the analysis.

Standard 3: Recharge Volume– Met

At a minimum, Standard 3 requires that the post-development site provides at least as much recharge volume as the existing conditions. There will be an increase to the impervious areas of 90,195 square feet in the post development condition which is broken down as follows:

Paved Area = 47,955 square feet
Roof Areas = 42,240 square feet

There is a groundwater recharge requirement associated with this project based upon the Type B soil is 0.35" over the area of impervious surface. The total groundwater recharge requirement is 90,195 square feet x 0.35 inches. The equation is as follows:

$$90,195 \text{ sf} \times (0.35"/12") = \mathbf{2,630 \text{ cubic feet}}$$

Infiltration is accomplished by infiltrating individual roofs with individual infiltrators located adjacent to each dwelling unit and through the buried detention basin 3-1.

The area required for infiltration of each roof is calculated as follows:

$$\text{ReV (roof area each unit)} = 1760 \text{ sf} \times (0.35''/12) = \mathbf{54 \text{ cf}}$$

The volume of infiltration available in each roof infiltrator system is **98 cf > 54 CF**

See Hydrocad Calculations for roof infiltrator capacity.

The infiltration area provided in detention basin 3-1 can be calculated as follows:

Volume of storage in crushed stone below bottom of 4' x 4' chambers + volume of storage in chambers below system outlet + volume in stone around chambers below system outlet. The equation is as follows:

$$[(68' \times 58' \times .5) \times .4] + [3.5 \times 3.5 \times .5] + [(68' \times 58' - 3072 \text{ sq. ft.}) \times .4] = \mathbf{2,138 \text{ cubic feet}}$$

68' = length of infiltration area

58' = width of infiltration area

.4 = void space in crushed stone

3.5' x 3.5' = interior dimensions of concrete chambers

3072 sq ft = area of storage in chambers

The lowest outlet invert in the system is 1' above the bottom of the system stone.

The total volume of infiltration available in the roof infiltrators and detention basin 3-1 combined is (24 units x 98 cf./unit) + 2,138cf = **4,490 cubic feet**

The stormwater management act requires that no less than 65% of the impervious area flow to the infiltration systems for the project site.

The proposed project is designed so that all proposed roof areas direct runoff through a gutter and downspout system to the individual roof infiltrator systems. The area of these roofs totals 42,240 square feet.

The roadway surface areas directed to the subsurface detention basin with infiltration are those contained in subcatchments 3C, 3D, and 3E. (see Hydrocad report) The total area = 25,649 square feet.

The total amount of impervious surface directed to the infiltration systems = 42,240 sf + 25,649 sf = 67,889 square feet.

The percentage of impervious area flowing to the infiltration systems is 67,889 sf. / 90,195 sf. = **75% > 65%**

The stormwater management act requires that the amount of infiltration be adjusted to reflect the reduced surface flowing to the infiltration systems. The adjustment equation is proportional to the areas is as follows:

Total site impervious area / impervious area flowing to infiltration systems = adjustment factor. The equation for this site is as follows:

$$90,195 \text{ sf impervious area on site} / 67,889 \text{ sf flowing to infiltration systems} = 1.33$$

The required available infiltration capacity must be adjusted by 1.33 %. The required infiltration can be calculated as $1.33\% \times 2,630 \text{ cu ft.} = \mathbf{3,497 \text{ cu ft.} < 4,490 \text{ cu ft. provided}}$

72-Hour Drawdown Calculations

The drawdown time for the detention basin is determined with the following equation.

$$\text{Time (drawdown)} = \frac{\text{ReV}}{(\text{K}) \times \text{Area}}$$

Where, ReV = recharge Volume Provided
 K = Saturated Hydraulic Conductivity (Rawls Rate for HSG B soils)
 Area = Average Surface area of basin bottom

Six (6) soil samples were taken on site, one of which was beneath the buried infiltration / detention system in the cul de sac or other upland areas which indicate that the underlying soil is a silt loam. The infiltration rate associated with the silt loam is .27 inches per hour and is the rate used in the drawdown calculations below.

Detention Basin

$$\text{Time (drawdown)} = \frac{2138 \text{ cf}}{(.27''/\text{hr})/12 \times 3,944 \text{ sf}} = 24.1 \text{ hours}$$

Roof Infiltrators

$$\text{Time (drawdown)} = \frac{98 \text{ cf}}{(.27''/\text{hr})/12 \times 70 \text{ sf}} = 62.2 \text{ hours}$$

Standard 4: Water Quality – Met

According to Standard 4, the project is subject to an 80% TSS Removal Rate requirement and the one half-inch rule for the water quality volume calculations. The project increases the impervious paved area by 50,746 square feet. Water quality will be provided in two separate treatment trains as detailed below.

Detention Pond P1-1

Roadway and driveway surfaces draining to a detention pond with pocket wetland. This detention pond is associated with design point 1.

Water quality will be provided through the use of deep sump catch basins, sediment forbays, and a constructed pocket wetland within the detention basin. The water quality volume treated within this system would be as follows:

$$\begin{aligned} \text{Impervious pavement area draining to detention basin} &= 20,383 \text{ sf} \\ \text{Required WQV} &= 23,395 \text{ sf} \times (0.50''/12) = 849 \text{ cf} \end{aligned}$$

The detention basin water quality treatment train includes deep sump catch basins, which provide a 25% TSS removal rate, and the pocket wetland with sediment forbays within the detention basin, which provides an 80% TSS removal rate. The total TSS removal rate for this treatment chain is 85%

Buried Detention Basin P3-1

Roadway and driveway surfaces drain to this detention basin which is associated with design point 3.

Water quality will be provided through the use of filter fabric wrapping around the exterior of the chambers. The outlet pipes are positioned so that the rows of chambers which are designed to provide TSS removal are surcharged with runoff prior to the runoff reaching the outlet invert. Once the treatment volume has been reached the remaining flow can slowly drain from the system, The required water quality volume treated within this system would be as follows:

$$\begin{aligned}\text{Impervious pavement area draining to detention basin} &= 25,649 \text{ sf} \\ \text{Required WQV} &= 20,383 \text{ sf} \times (0.50''/12) = 1068 \text{ cf}\end{aligned}$$

The volume of water being treated is the same as is infiltrated which was calculated previously as **2138 cubic feet**

The detention basin water quality treatment train includes deep sump catch basins, which provide a 25% TSS removal rate, and the subsurface structure with filter fabric wrap provides an 80% TSS removal rate. The total TSS removal rate for this treatment chain is 85%

Subcatchments P-1C and P-1D

Flow from the roadway surface at the entrance to the project is captured in two deep sump catch basins, routed to a buried detention system, and discharged to the west side BVW. The treatment provided consists of deep sump catch basins which provide a treatment level of 85%.

Because a portion of the flow from paved surfaces is not treated to a level of 80% a weighted treatment calculation is required to verify that the system provides a minimum overall treatment level of 80%.

The Weighted Average TSS Removal is calculated as follows.

$$\begin{aligned}\text{Area 1 (paved area to detention basin P-1-1)} &= 20,383 \text{ sf} \\ \text{Area 2 (paved area to underground detention basin P-3-1)} &= 25,649 \text{ sf} \\ \text{Area 3 (paved area flowing untreated to Design Point 1)} &= 5,052 \text{ sf}\end{aligned}$$

$$\text{Weighted Average TSS \%} = \frac{(20,383 \text{ sf})(85\%) + (25,649 \text{ sf})(85\%) + (5,192 \text{ sf})(25\%)}{51,224 \text{ sf}} = 80 \%$$

Sediment Forebay Sizing

The sediment forebay has been sized for a volume equal to 0.10 inches multiplied by the impervious pavement area contributing to the detention basin.

Required Size of Detention Basin Forebay	= $(0.10''/12) \times 20,383 = 250 \text{ cf}$
Provided Volume	= 170 cf > 250 cf

Standard 5: LUHPPL's – Not applicable

Standard 6: Critical Areas – Not applicable

Standard 7: Redevelopment Projects – Not applicable

Standard 8: Erosion and Sediment Control – Met

Soil and erosion control shall be provided during construction by means of straw bales or wattles, siltation fence, and/or compost filter tubes. The Stormwater Pollution Prevention Plan (SWPPP) will be the responsibility of the selected Contractor. The Contractor will submit the SWPPP prior to any land disturbance.

Standard 9: Operation and Maintenance Plan – Met

The operation and maintenance plan for the post-construction BMP's on this project will be the responsibility of the Salem Public Works Department. The Operation and Maintenance Plan for the proposed drainage systems will be adopted into the current operation and maintenance plan, and can be found in the Appendix.

Standard 10: Illicit Discharges – Met

There are no known or suspected illicit discharges to the proposed stormwater conveyance system.

In summary, this project meets Standards 1, 2, 3, 4, 8, 9, and 10. Standards 5, 6, and 7 are not applicable to the project.



STORMWATER CHECKLIST:



Checklist for Stormwater Report

A. Introduction

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



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the [Massachusetts Stormwater Handbook](#). The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.¹ This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8²
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

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

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



Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

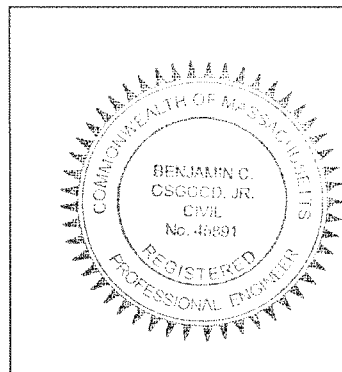
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature



B. C. Osgood, Jr. 11-15-17
Signature and Date

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

- ☒ New development
☐ Redevelopment
☐ Mix of New Development and Redevelopment



Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

- ☐ No disturbance to any Wetland Resource Areas
- ☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- ☐ Reduced Impervious Area (Redevelopment Only)
- ☐ Minimizing disturbance to existing trees and shrubs
- ☐ LID Site Design Credit Requested:
 - ☐ Credit 1
 - ☐ Credit 2
 - ☐ Credit 3
- ☐ Use of "country drainage" versus curb and gutter conveyance and pipe
- ☐ Bioretention Cells (includes Rain Gardens)
- ☒ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
- ☐ Treebox Filter
- ☐ Water Quality Swale
- ☐ Grass Channel
- ☐ Green Roof
- ☐ Other (describe): _____

Standard 1: No New Untreated Discharges

- ☒ No new untreated discharges
- ☒ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth
- ☒ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.



Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

- ☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.
- ☐ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.
- ☒ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

- ☒ Soil Analysis provided.
- ☒ Required Recharge Volume calculation provided.
- ☐ Required Recharge volume reduced through use of the LID site Design Credits.
- ☐ Sizing the infiltration, BMPs is based on the following method: Check the method used.
 - ☒ Static
 - ☐ Simple Dynamic
 - ☐ Dynamic Field¹
- ☐ Runoff from all impervious areas at the site discharging to the infiltration BMP.
- ☒ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.
- ☒ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.
- ☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:
 - ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
 - ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
 - ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
 - ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.
- ☒ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.
- ☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

¹ 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.



Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

- ☐ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.
- ☐ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
 - Provisions for storing materials and waste products inside or under cover;
 - Vehicle washing controls;
 - Requirements for routine inspections and maintenance of stormwater BMPs;
 - Spill prevention and response plans;
 - Provisions for maintenance of lawns, gardens, and other landscaped areas;
 - Requirements for storage and use of fertilizers, herbicides, and pesticides;
 - Pet waste management provisions;
 - Provisions for operation and management of septic systems;
 - Provisions for solid waste management;
 - Snow disposal and plowing plans relative to Wetland Resource Areas;
 - Winter Road Salt and/or Sand Use and Storage restrictions;
 - Street sweeping schedules;
 - Provisions for prevention of illicit discharges to the stormwater management system;
 - Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
 - Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
 - List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.
- ☒ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.
 - ☐ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:
 - ☐ is within the Zone II or Interim Wellhead Protection Area
 - ☐ is near or to other critical areas
 - ☐ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
 - ☐ involves runoff from land uses with higher potential pollutant loads.
 - ☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.
 - ☒ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.



Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

- ☒ The BMP is sized (and calculations provided) based on:
 - ☒ The ½" or 1" Water Quality Volume or
 - ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.
- ☐ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.
- ☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

- ☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.
- ☐ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted **prior to** the discharge of stormwater to the post-construction stormwater BMPs.
- ☐ The NPDES Multi-Sector General Permit does **not** cover the land use.
- ☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.
- ☐ All exposure has been eliminated.
- ☐ All exposure has **not** been eliminated and all BMPs selected are on MassDEP LUHPPL list.
- ☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

- ☐ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.
- ☐ Critical areas and BMPs are identified in the Stormwater Report.



Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

- ☐ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:
 - ☐ Limited Project
 - ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
 - ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
 - ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
 - ☐ Bike Path and/or Foot Path
 - ☐ Redevelopment Project
 - ☐ Redevelopment portion of mix of new and redevelopment.
- ☐ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.
- ☐ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
 - Construction Period Operation and Maintenance Plan;
 - Names of Persons or Entity Responsible for Plan Compliance;
 - Construction Period Pollution Prevention Measures;
 - Erosion and Sedimentation Control Plan Drawings;
 - Detail drawings and specifications for erosion control BMPs, including sizing calculations;
 - Vegetation Planning;
 - Site Development Plan;
 - Construction Sequencing Plan;
 - Sequencing of Erosion and Sedimentation Controls;
 - Operation and Maintenance of Erosion and Sedimentation Controls;
 - Inspection Schedule;
 - Maintenance Schedule;
 - Inspection and Maintenance Log Form.
- ☒ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.



Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

- ☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has **not** been included in the Stormwater Report but will be submitted **before** land disturbance begins.
- ☒ The project is **not** covered by a NPDES Construction General Permit.
- ☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.
- ☐ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

- ☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:
 - ☒ Name of the stormwater management system owners;
 - ☒ Party responsible for operation and maintenance;
 - ☒ Schedule for implementation of routine and non-routine maintenance tasks;
 - ☐ Plan showing the location of all stormwater BMPs maintenance access areas;
 - ☒ Description and delineation of public safety features;
 - ☒ Estimated operation and maintenance budget; and
 - ☒ Operation and Maintenance Log Form.
- ☐ The responsible party is **not** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:
 - ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
 - ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

- ☐ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;
- ☐ An Illicit Discharge Compliance Statement is attached;
- ☒ NO Illicit Discharge Compliance Statement is attached but will be submitted **prior to** the discharge of any stormwater to post-construction BMPs.



TSS REMOVAL CALCULATIONS:

INSTRUCTIONS:

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Version 1, Automated: Mar. 4, 2008

Location: Detention Pond 1-1

TSS Removal Calculation Worksheet	B	C	D	E	F
	BMP ¹	TSS Removal Rate ¹	Starting TSS Load*	Amount Removed (C*D)	Remaining Load (D-E)
	Deep Sump and Hooded Catch Basin	0.25	1.00	0.25	0.75
	Constructed Stormwater Wetland	0.80	0.75	0.60	0.15
				0.00	0.00
		0.00	0.00	0.00	0.00
		0.00	0.00	0.00	0.00

Total TSS Removal =

85%

Separate Form Needs to
be Completed for Each
Outlet or BMP Train

Project: Byfield Estates
Prepared By: BCO, JR
Date: 11/15/2017

*Equals remaining load from previous BMP (E)
which enters the BMP

INSTRUCTIONS:

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Version 1, Automated: Mar. 4, 2008

Location: Detention Structure P1-2

TSS Removal Calculation Worksheet	B	C	D	E	F
	BMP ¹	TSS Removal Rate ¹	Starting TSS Load*	Amount Removed (C*D)	Remaining Load (D-E)
	Deep Sump and Hooded Catch Basin	0.25	1.00	0.25	0.75
				0.00	0.00
				0.00	0.00
		0.00	0.00	0.00	0.00
		0.00	0.00	0.00	0.00

Total TSS Removal =

75%

Separate Form Needs to
be Completed for Each
Outlet or BMP Train

Project: Byfield Estates
Prepared By: BCO, JR
Date: 11/15/2017

*Equals remaining load from previous BMP (E)
which enters the BMP

INSTRUCTIONS:

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Version 1, Automated: Mar. 4, 2008

Location: Detention Structure P3-1

TSS Removal Calculation Worksheet	B	C	D	E	F
	BMP ¹	TSS Removal Rate ¹	Starting TSS Load*	Amount Removed (C*D)	Remaining Load (D-E)
	Deep Sump and Hooded Catch Basin	0.25	1.00	0.25	0.75
	Subsurface Infiltration Structure	0.80	0.75	0.60	0.15
				0.00	0.00
		0.00	0.00	0.00	0.00
		0.00	0.00	0.00	0.00

Total TSS Removal =

85%

Separate Form Needs to
be Completed for Each
Outlet or BMP Train

Project: Byfield Estates
Prepared By: BCO, JR
Date: 11/15/2017

*Equals remaining load from previous BMP (E)
which enters the BMP

Construction Period Erosion and Sedimentation Control Plan:

The BMP's associated with this project will be owned by the Applicant's Contractor, which will be responsible for inspection, operation and maintenance. A more detailed SWPPP – per NPDES Phase 2 requirements – is to be kept on site, along with inspection logs. All details and plans required are included in the Site Plan set attached herewith.

1. The contractor is to install and maintain drainage facilities as shown on site plan prepared by Ranger Engineering & Design, LLC. (Ranger), dated March 22, 2017, revised to November 15, 2017.
2. Prior to construction, all erosion/siltation control devices shown on the above plan are to be installed. If applicable and to prevent silt intrusion into the drainage system during construction, the contractor is to install and maintain inlet protection at all catch basins, and install a silt fence and siltation barrier at all slopes which may erode in the direction of any open drainage facilities. These are to be maintained throughout the construction process.
3. Installation of erosion controls and drainage facilities is to be inspected by Ranger to verify conformance to the design plans.
4. The sequence of drainage construction shall be as follows:
 - a) Install erosion control.
 - b) Clear, grub, and excavate areas for roadway.
 - c) Install drainage systems
5. Erosion controls are to be inspected and maintained on a daily basis by the Contractor.
6. All exposed soils which will remain exposed for more than 30 days shall be immediately stabilized with a layer of mulch straw.
7. During construction of other site features, all drainage facilities shall be inspected on a daily basis and cleaned/repared immediately upon discovery of sediment build-up or damage. Logs of inspections are to be kept on site and available to officials.
8. All hazardous materials are to be handled as described in SWPPP.

Long-Term Pollution Prevention:

The owner/applicant is to be responsible for maintenance of all drainage structures in the project, including drain pipes. The future owner is expected to be the condominium association which will be formed to oversee maintenance in the development, which will be responsible for compliance with the Plan upon completion of the roadway.

Regular maintenance is to include the following:

1. Inspection of all drainage facilities (pipes and infiltration basins) every three months. During these inspections, the inspector (a Registered Professional Engineer qualified in drainage systems as designated by the Applicant) shall look for evidence of the following: structural damage, silt accumulation (near inlet inverts on pipes), and improper function. A report on the system shall be delivered to the Project Association, with a copy delivered to the Town Engineer and Conservation Commission.
2. After inspection, if any of the above conditions exist, the inspector shall notify the Applicant who shall immediately arrange for all necessary repairs and sediment removal.
3. All graded slopes shall be inspected every spring for erosion. Upon discovery of any failure (ie. erosion, sloughing, rutting), loam and seed shall be put in place and nurtured.
4. Catch basins and sediment forebays shall be cleaned out annually or when sediment has accumulated to within 6" of the inlet or outlet inverts.

Inspection Costs

The annual costs of implementing the required inspections and maintenance outlined in the long term pollution prevention plan are expected to be as follows:

- Quarterly inspections by a Registered Professional Engineer \$ 2,000
- Annual roadway sweeping \$ 1,500
- Removal of silt from stormwater treatment systems \$ 2,000
- Annual mowing of side slopes \$ 500
- Annual catch basin cleaning \$ 1,500

Public Safety

The stormwater management system is designed as a passive system and when maintained properly it should not pose any threat to public safety. The systems which are located below grade and are not accessible by the general public.

STORMWATER MANAGEMENT SYSTEM
Post-Development Inspection & Maintenance Log

BMP/System Component	Maintenance Required & Frequency	Date of Inspection	Inspection Inspector	Cleaning/Repair Needed (list items/comments)	Date of Cleaning/ Repair	Cleaning/ Repair Performed by
Pavement Sweeping	<ul style="list-style-type: none"> Swept clean as required (i.e. visual noticeable build-up). A minimum of once per year, preferably just after snow melt. 					
Catch Basin Sumps/Drain Manholes/ Outlet Control Structure	<ul style="list-style-type: none"> Inspect and clean annually for the evidence of structural damage, silt accumulation and improper function. Remove accumulated sediments and debris from sump when sump is more than 25% full, minimum annually just after snow melt. 					
Drain Pipes	<ul style="list-style-type: none"> Inspect annually for the evidence of structural damage, silt accumulation and improper function. Clean pipes when 					

BMP/System Component	Maintenance Required & Frequency	Date of Inspection	Inspection Inspector	Cleaning/Repair Needed (list items/comments)	Date of Cleaning/ Repair	Cleaning/ Repair Performed by
	sediment occupies more than 20% of pipe diameter.					
Buried Chamber Systems	<ul style="list-style-type: none"> Inspect after every major storm during first three months of operation and annually thereafter for evidence of structural damage, silt accumulation and improper function. Clean silt from bottom of chamber system when silt buildup is greater than 2" 					
Detention basins	<ul style="list-style-type: none"> Inspect after every major storm during first three months of operation and annually thereafter for the evidence of structural damage, silt accumulation and improper function. Mow the side slopes 					

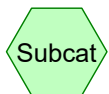
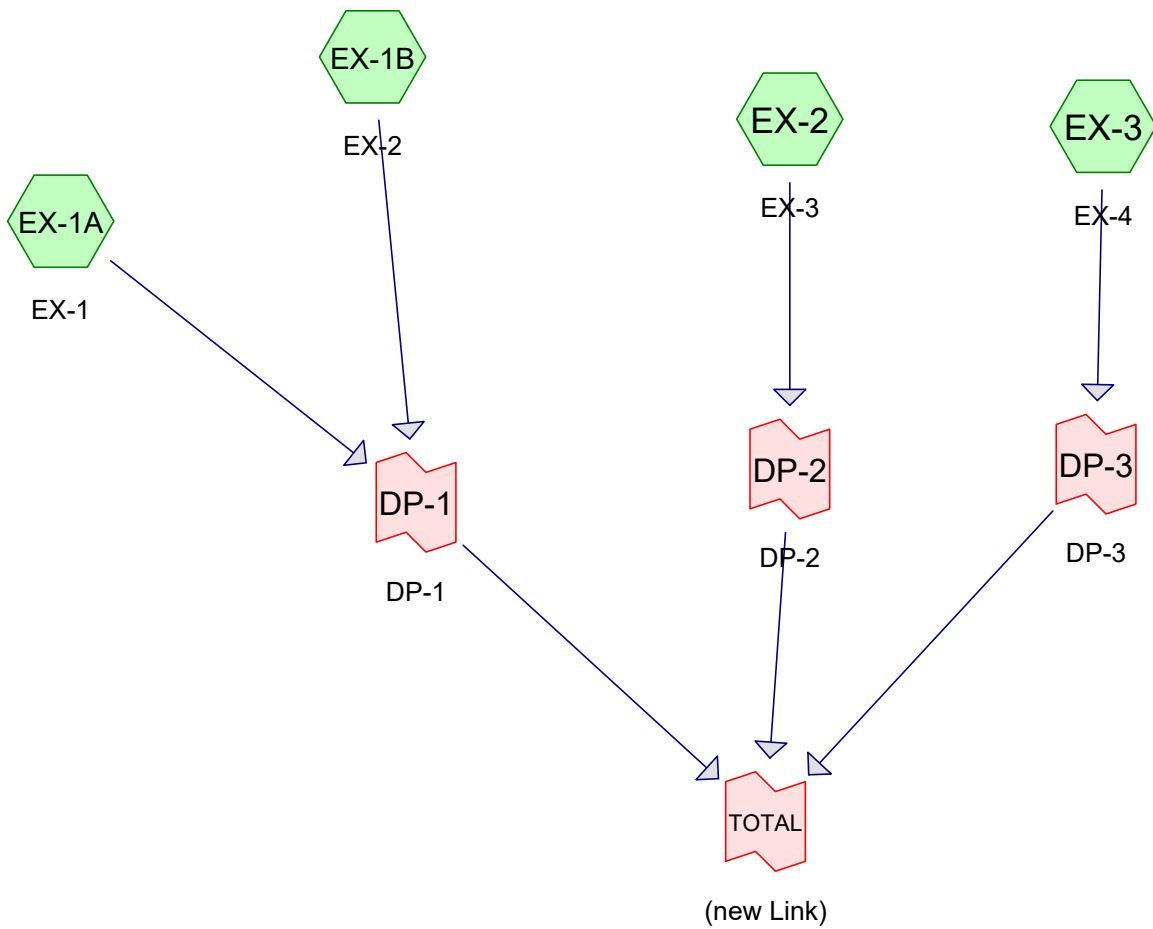
BMP/System Component	Maintenance Required & Frequency	Date of Inspection	Inspection Inspector	Cleaning/Repair Needed (list items/comments)	Date of Cleaning/ Repair	Cleaning/ Repair Performed by
	and basin bottom, remove trash and debris, grass clippings and accumulated organic matter every six months.					
Graded Slopes/ Rip-Rap	<ul style="list-style-type: none"> Inspect every spring for erosion. Repair any erosion by placing rip-rap/ loam and seed in place and nurtured 					



Hydrocad

PRE-DEVELOPMENT

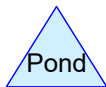
HYDROCAD CALCULATIONS



Subcat



Reach



Pond



Link

Drainage Diagram for Pearson Drive, Newbury, MA PRE DEV-JRA
Prepared by Ranger Engineering & Design, LLC, Printed 11/15/2017
HydroCAD® 8.50 s/n 002248 © 2007 HydroCAD Software Solutions LLC



Hydrocad

PRE-DEVELOPMENT:

2-Year Storm

Pearson Drive, Newbury, MA PRE DEV-JRA

Prepared by Ranger Engineering & Design, LLC

HydroCAD® 8.50 s/n 002248 © 2007 HydroCAD Software Solutions LLC

Printed 11/15/2017

Page 2

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
356,424	55	Woods, Good, HSG B (EX-1A,EX-1B,EX-2,EX-3)
3,186	61	>75% Grass cover, Good, HSG B (EX-1A)
359,610		TOTAL AREA

Pearson Drive, Newbury, MA PRE DEV-JRA

Prepared by Ranger Engineering & Design, LLC

HydroCAD® 8.50 s/n 002248 © 2007 HydroCAD Software Solutions LLC

Printed 11/15/2017

Page 3

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
359,610	HSG B	EX-1A, EX-1B, EX-2, EX-3
0	HSG C	
0	HSG D	
0	Other	
359,610		TOTAL AREA

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EX-1A: EX-1Runoff Area=9,400 sf 0.00% Impervious Runoff Depth>0.31"
Flow Length=117' Tc=5.0 min CN=57 Runoff=0.03 cfs 242 cf**Subcatchment EX-1B: EX-2**Runoff Area=135,246 sf 0.00% Impervious Runoff Depth>0.25"
Flow Length=457' Tc=15.6 min CN=55 Runoff=0.29 cfs 2,808 cf**Subcatchment EX-2: EX-3**Runoff Area=96,945 sf 0.00% Impervious Runoff Depth>0.25"
Flow Length=287' Tc=10.8 min CN=55 Runoff=0.22 cfs 2,018 cf**Subcatchment EX-3: EX-4**Runoff Area=118,019 sf 0.00% Impervious Runoff Depth>0.25"
Flow Length=401' Tc=10.3 min CN=55 Runoff=0.27 cfs 2,457 cf**Link DP-1: DP-1**Inflow=0.31 cfs 3,050 cf
Primary=0.31 cfs 3,050 cf**Link DP-2: DP-2**Inflow=0.22 cfs 2,018 cf
Primary=0.22 cfs 2,018 cf**Link DP-3: DP-3**Inflow=0.27 cfs 2,457 cf
Primary=0.27 cfs 2,457 cf**Link TOTAL: (new Link)**Inflow=0.79 cfs 7,524 cf
Primary=0.79 cfs 7,524 cf**Total Runoff Area = 359,610 sf Runoff Volume = 7,524 cf Average Runoff Depth = 0.25"**
100.00% Pervious = 359,610 sf 0.00% Impervious = 0 sf

Summary for Subcatchment EX-1A: EX-1

Runoff = 0.03 cfs @ 12.15 hrs, Volume= 242 cf, Depth> 0.31"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

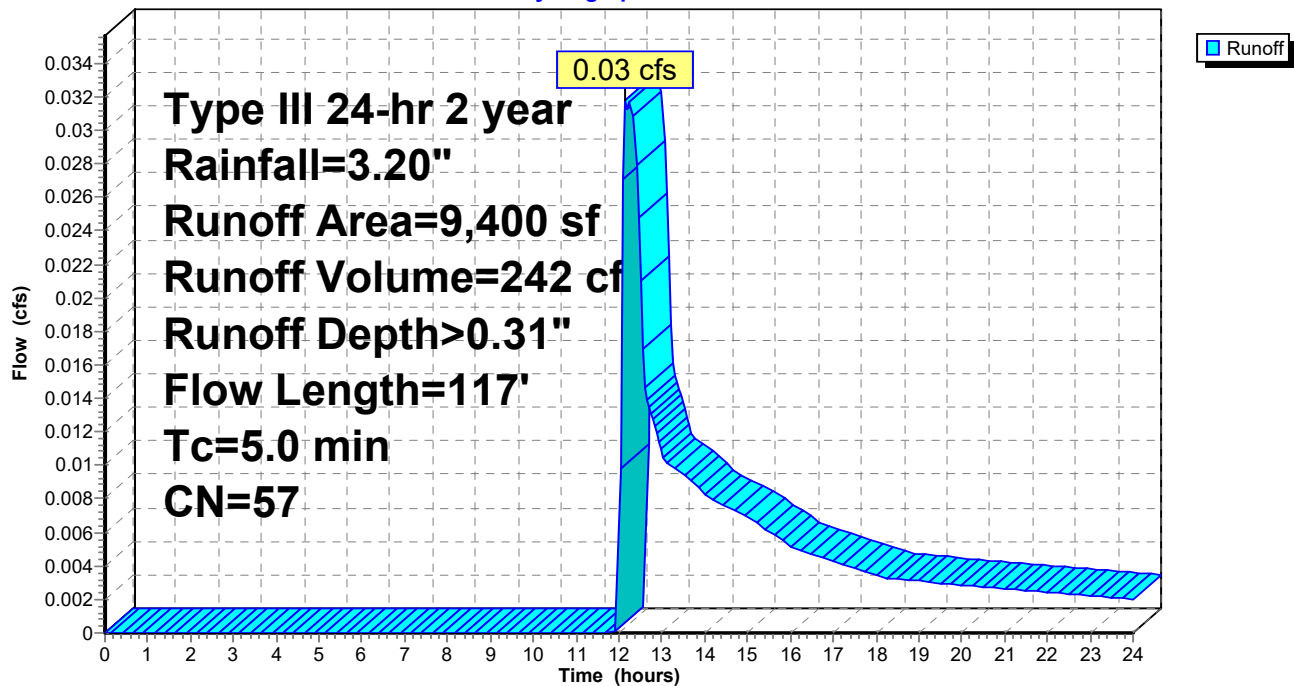
Type III 24-hr 2 year Rainfall=3.20"

Area (sf)	CN	Description
3,186	61	>75% Grass cover, Good, HSG B
6,214	55	Woods, Good, HSG B
0	98	Water Surface, HSG B
0	98	Unconnected pavement, HSG B
9,400	57	Weighted Average
9,400		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	50	0.0760	0.25		Sheet Flow, SHEET FLOW IN GRASS
					Grass: Short n= 0.150 P2= 3.20"
1.1	67	0.0448	1.06		Shallow Concentrated Flow, FLOW THROUGH WOODS
					Woodland Kv= 5.0 fps
0.6					Direct Entry, DIRECT
5.0	117	Total			

Subcatchment EX-1A: EX-1

Hydrograph



Summary for Subcatchment EX-1B: EX-2

Runoff = 0.29 cfs @ 12.48 hrs, Volume= 2,808 cf, Depth> 0.25"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

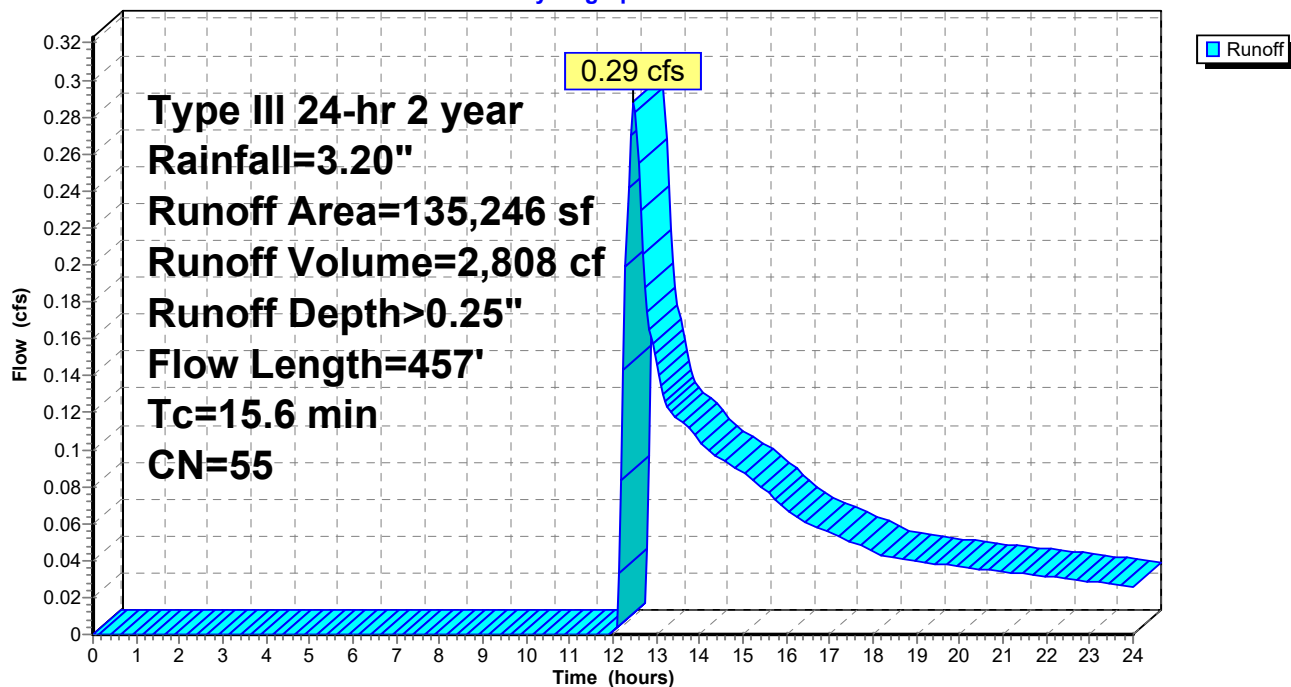
Type III 24-hr 2 year Rainfall=3.20"

Area (sf)	CN	Description
0	61	>75% Grass cover, Good, HSG B
135,246	55	Woods, Good, HSG B
0	98	Water Surface, HSG B
0	98	Unconnected pavement, HSG B
135,246	55	Weighted Average
135,246		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	50	0.0400	0.09		Sheet Flow, SHEET FLOW IN WOODS Woods: Light underbrush n= 0.400 P2= 3.20"
6.3	407	0.0467	1.08		Shallow Concentrated Flow, FLOW THROUGH WOODS Woodland Kv= 5.0 fps
15.6	457	Total			

Subcatchment EX-1B: EX-2

Hydrograph



Summary for Subcatchment EX-2: EX-3

Runoff = 0.22 cfs @ 12.41 hrs, Volume= 2,018 cf, Depth> 0.25"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

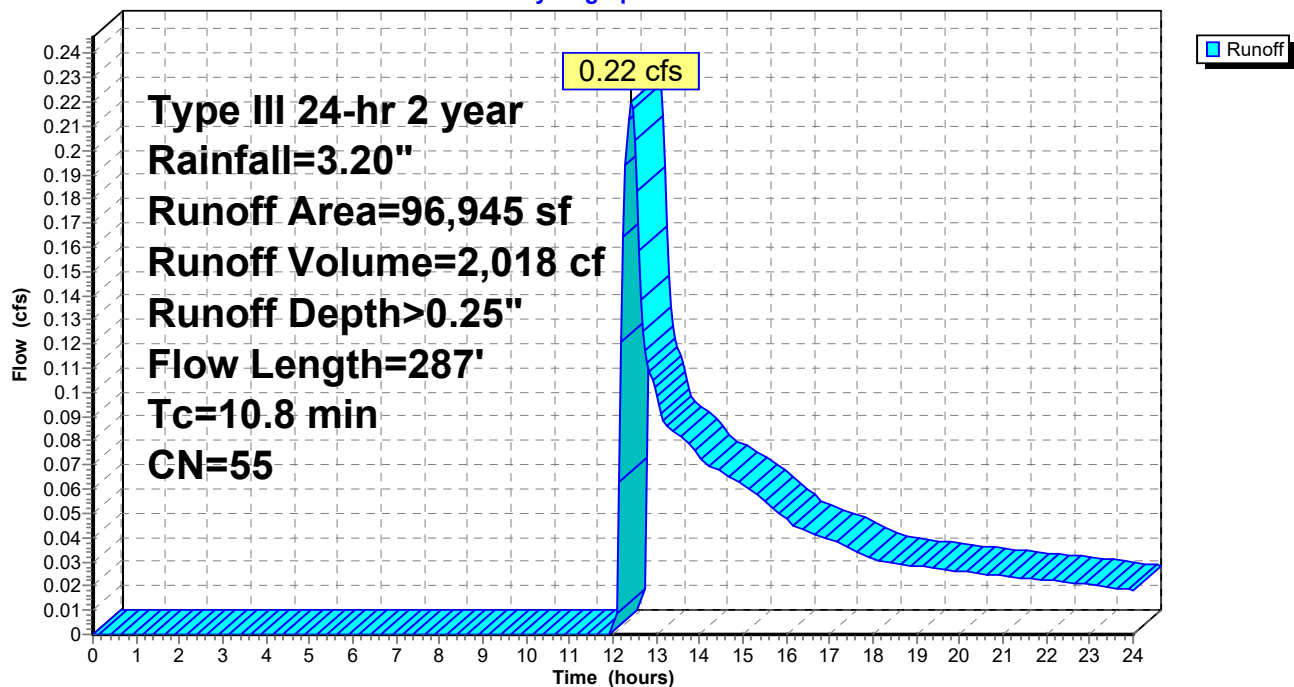
Type III 24-hr 2 year Rainfall=3.20"

Area (sf)	CN	Description
0	61	>75% Grass cover, Good, HSG B
96,945	55	Woods, Good, HSG B
0	98	Water Surface, HSG B
0	98	Unconnected pavement, HSG B
96,945	55	Weighted Average
96,945		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	50	0.0600	0.10		Sheet Flow, SHEET FLOW IN WOODS Woods: Light underbrush n= 0.400 P2= 3.20"
2.9	237	0.0759	1.38		Shallow Concentrated Flow, FLOW THROUGH WOODS Woodland Kv= 5.0 fps
10.8	287	Total			

Subcatchment EX-2: EX-3

Hydrograph



Summary for Subcatchment EX-3: EX-4

Runoff = 0.27 cfs @ 12.40 hrs, Volume= 2,457 cf, Depth> 0.25"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

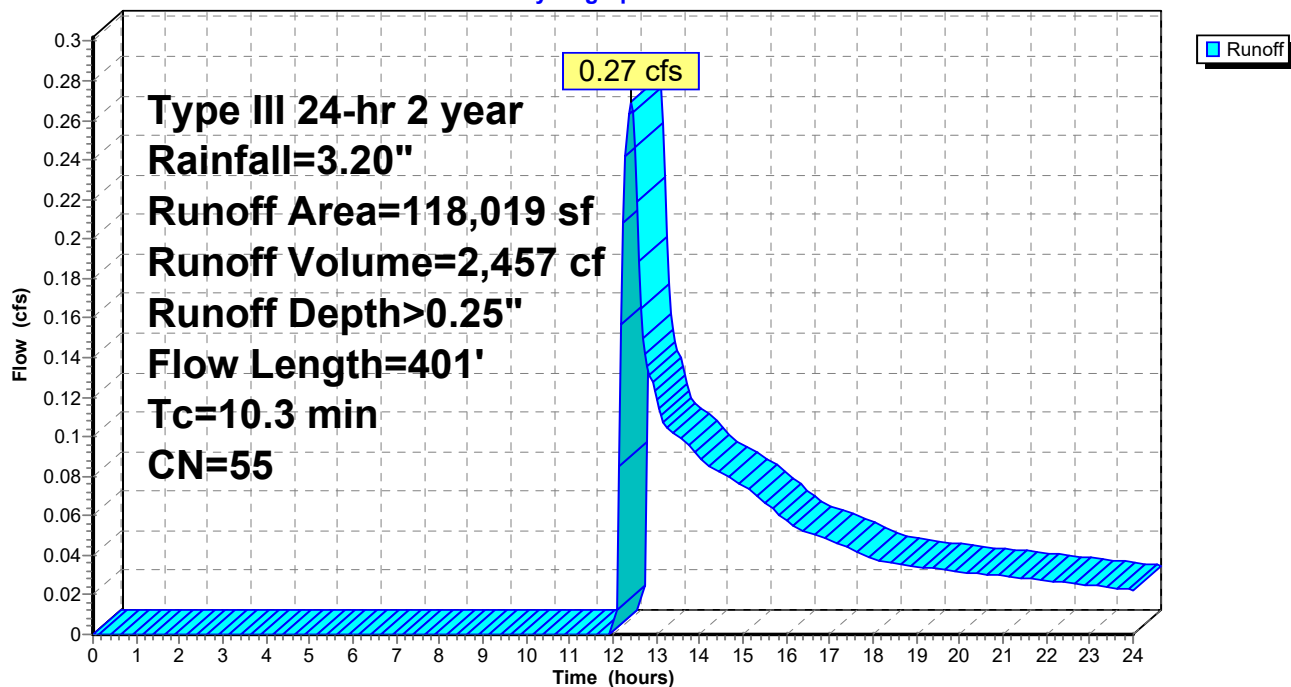
Type III 24-hr 2 year Rainfall=3.20"

Area (sf)	CN	Description
0	61	>75% Grass cover, Good, HSG B
118,019	55	Woods, Good, HSG B
0	98	Water Surface, HSG B
0	98	Unconnected pavement, HSG B
118,019	55	Weighted Average
118,019		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.1460	0.15		Sheet Flow, SHEET FLOW IN WOODS
					Woods: Light underbrush n= 0.400 P2= 3.20"
4.7	351	0.0627	1.25		Shallow Concentrated Flow, FLOW THROUGH WOODS
					Woodland Kv= 5.0 fps
10.3	401	Total			

Subcatchment EX-3: EX-4

Hydrograph



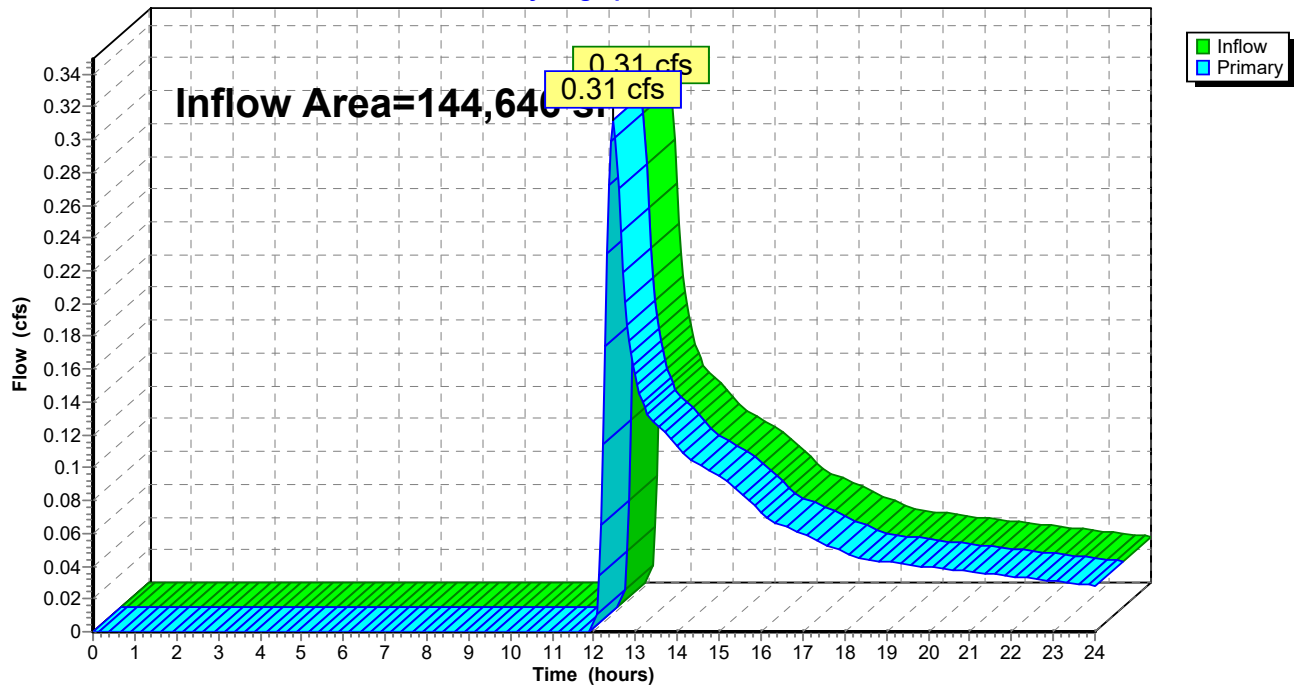
Summary for Link DP-1: DP-1

Inflow Area = 144,646 sf, 0.00% Impervious, Inflow Depth > 0.25" for 2 year event
Inflow = 0.31 cfs @ 12.47 hrs, Volume= 3,050 cf
Primary = 0.31 cfs @ 12.47 hrs, Volume= 3,050 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP-1: DP-1

Hydrograph



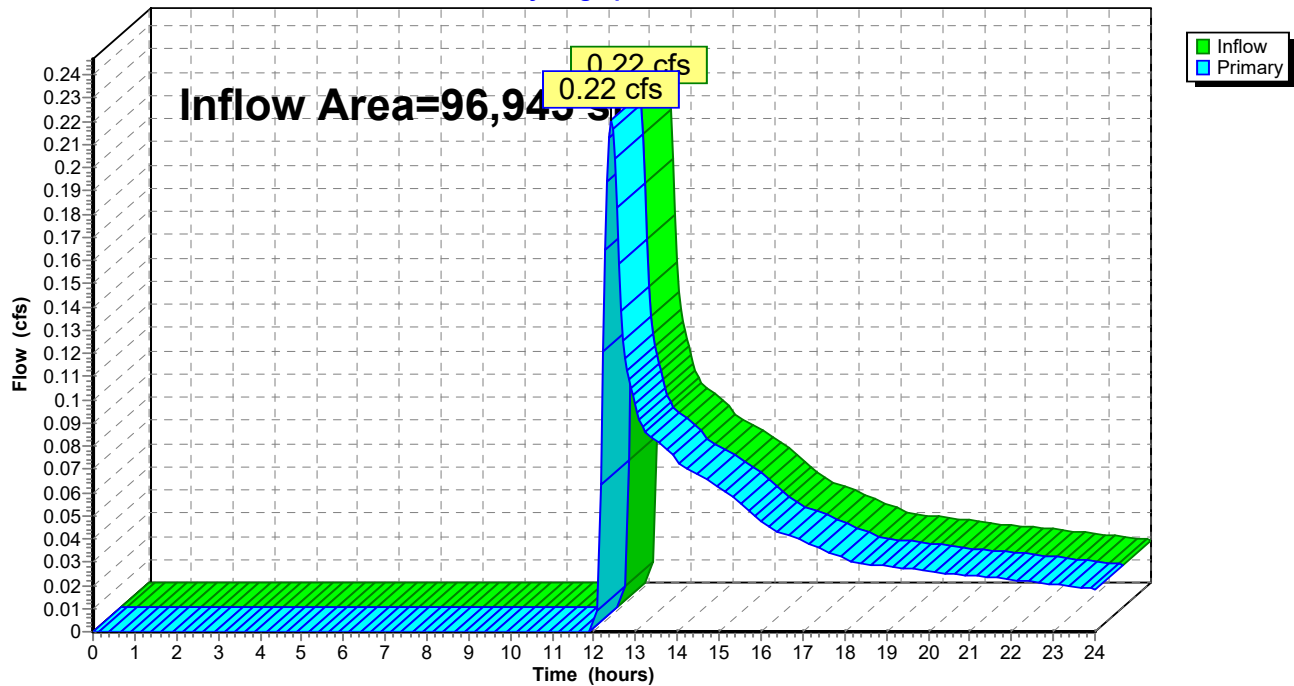
Summary for Link DP-2: DP-2

Inflow Area = 96,945 sf, 0.00% Impervious, Inflow Depth > 0.25" for 2 year event
Inflow = 0.22 cfs @ 12.41 hrs, Volume= 2,018 cf
Primary = 0.22 cfs @ 12.41 hrs, Volume= 2,018 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP-2: DP-2

Hydrograph



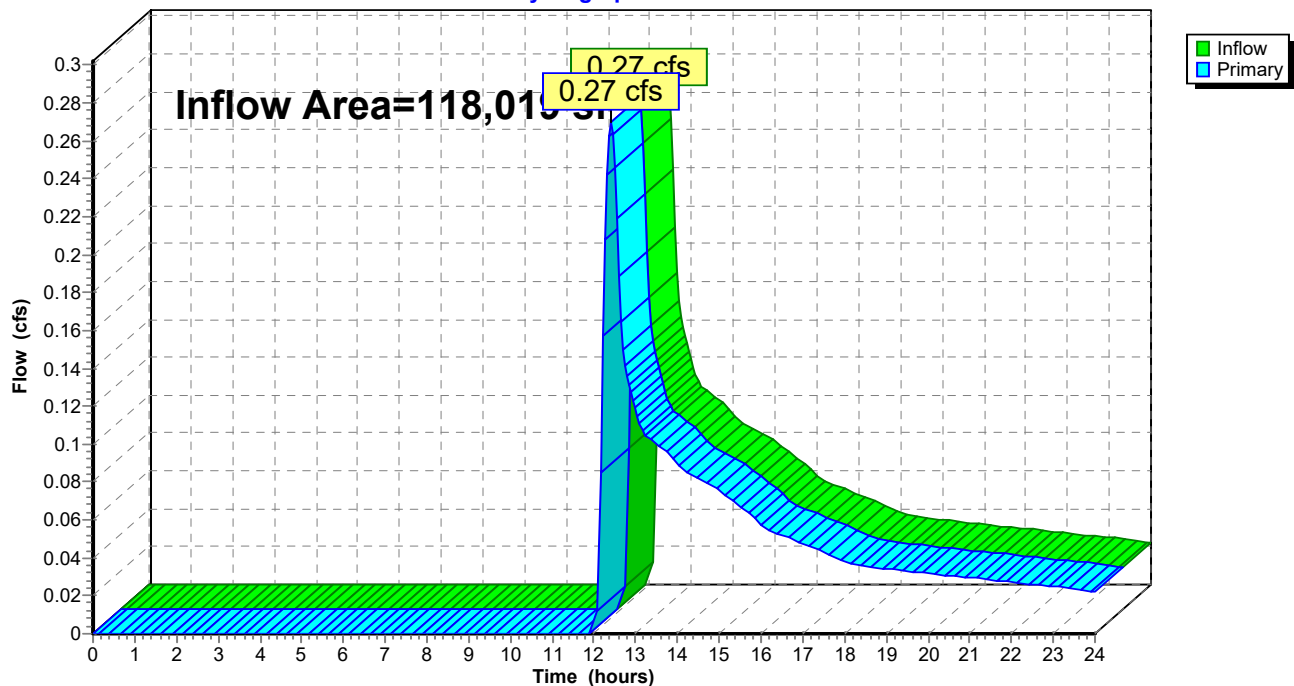
Summary for Link DP-3: DP-3

Inflow Area = 118,019 sf, 0.00% Impervious, Inflow Depth > 0.25" for 2 year event
Inflow = 0.27 cfs @ 12.40 hrs, Volume= 2,457 cf
Primary = 0.27 cfs @ 12.40 hrs, Volume= 2,457 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP-3: DP-3

Hydrograph

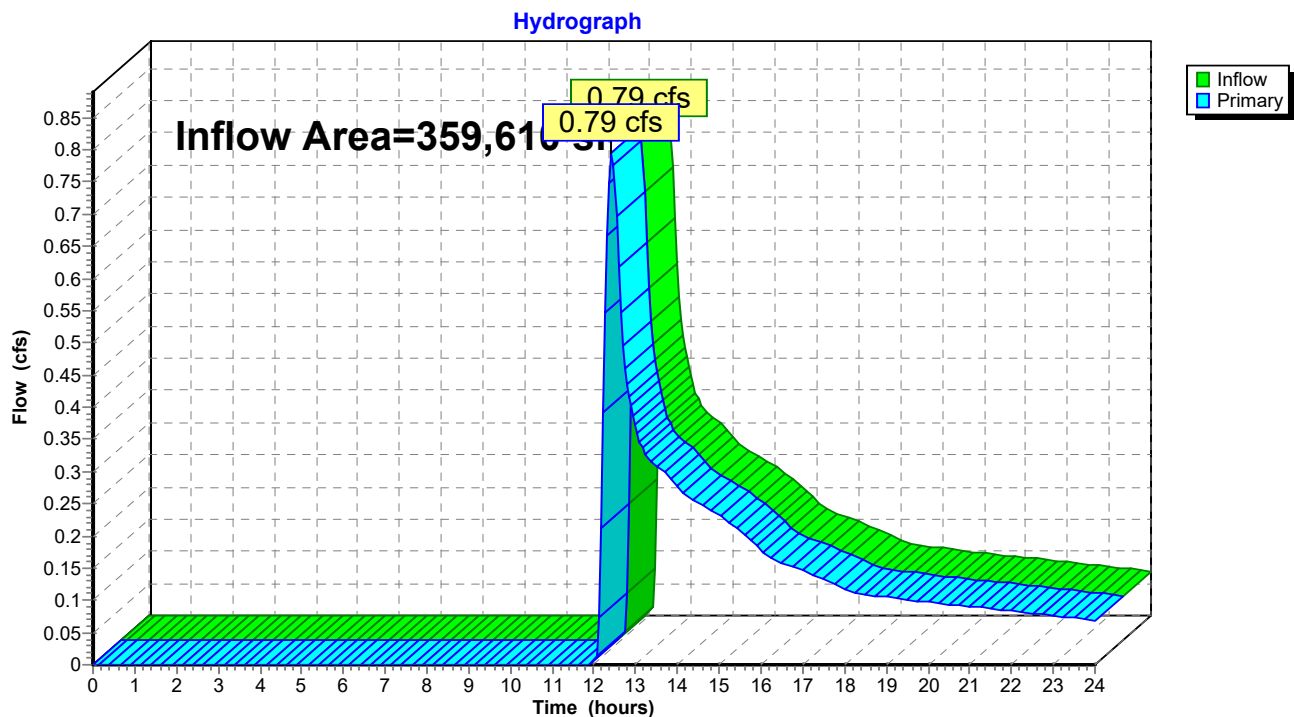


Summary for Link TOTAL: (new Link)

Inflow Area = 359,610 sf, 0.00% Impervious, Inflow Depth > 0.25" for 2 year event
Inflow = 0.79 cfs @ 12.43 hrs, Volume= 7,524 cf
Primary = 0.79 cfs @ 12.43 hrs, Volume= 7,524 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link TOTAL: (new Link)





Hydrocad

PRE-DEVELOPMENT:

10-Year Storm

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EX-1A: EX-1Runoff Area=9,400 sf 0.00% Impervious Runoff Depth>1.00"
Flow Length=117' Tc=5.0 min CN=57 Runoff=0.21 cfs 782 cf**Subcatchment EX-1B: EX-2**Runoff Area=135,246 sf 0.00% Impervious Runoff Depth>0.88"
Flow Length=457' Tc=15.6 min CN=55 Runoff=1.82 cfs 9,894 cf**Subcatchment EX-2: EX-3**Runoff Area=96,945 sf 0.00% Impervious Runoff Depth>0.88"
Flow Length=287' Tc=10.8 min CN=55 Runoff=1.47 cfs 7,104 cf**Subcatchment EX-3: EX-4**Runoff Area=118,019 sf 0.00% Impervious Runoff Depth>0.88"
Flow Length=401' Tc=10.3 min CN=55 Runoff=1.81 cfs 8,650 cf**Link DP-1: DP-1**Inflow=1.95 cfs 10,676 cf
Primary=1.95 cfs 10,676 cf**Link DP-2: DP-2**Inflow=1.47 cfs 7,104 cf
Primary=1.47 cfs 7,104 cf**Link DP-3: DP-3**Inflow=1.81 cfs 8,650 cf
Primary=1.81 cfs 8,650 cf**Link TOTAL: (new Link)**Inflow=5.08 cfs 26,430 cf
Primary=5.08 cfs 26,430 cf**Total Runoff Area = 359,610 sf Runoff Volume = 26,430 cf Average Runoff Depth = 0.88"**
100.00% Pervious = 359,610 sf 0.00% Impervious = 0 sf

Summary for Subcatchment EX-1A: EX-1

Runoff = 0.21 cfs @ 12.10 hrs, Volume= 782 cf, Depth> 1.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

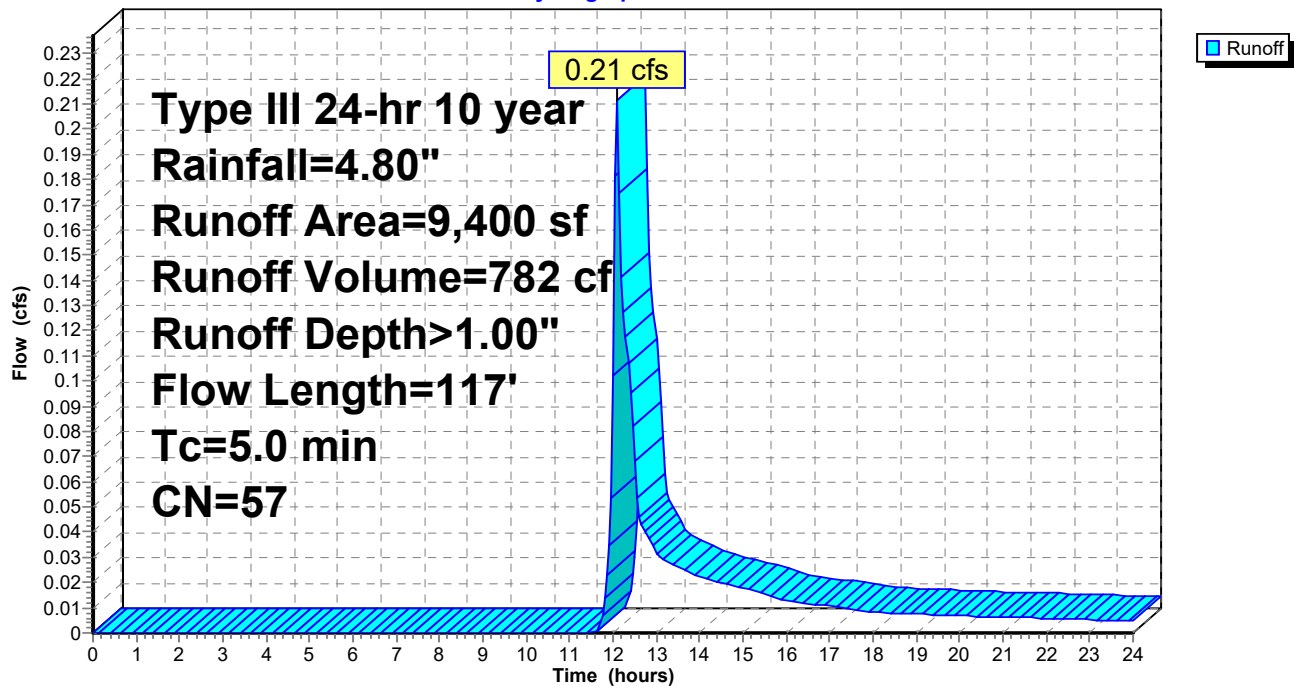
Type III 24-hr 10 year Rainfall=4.80"

Area (sf)	CN	Description
3,186	61	>75% Grass cover, Good, HSG B
6,214	55	Woods, Good, HSG B
0	98	Water Surface, HSG B
0	98	Unconnected pavement, HSG B
9,400	57	Weighted Average
9,400		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	50	0.0760	0.25		Sheet Flow, SHEET FLOW IN GRASS Grass: Short n= 0.150 P2= 3.20"
1.1	67	0.0448	1.06		Shallow Concentrated Flow, FLOW THROUGH WOODS Woodland Kv= 5.0 fps
0.6					Direct Entry, DIRECT
5.0	117	Total			

Subcatchment EX-1A: EX-1

Hydrograph



Summary for Subcatchment EX-1B: EX-2

Runoff = 1.82 cfs @ 12.27 hrs, Volume= 9,894 cf, Depth> 0.88"

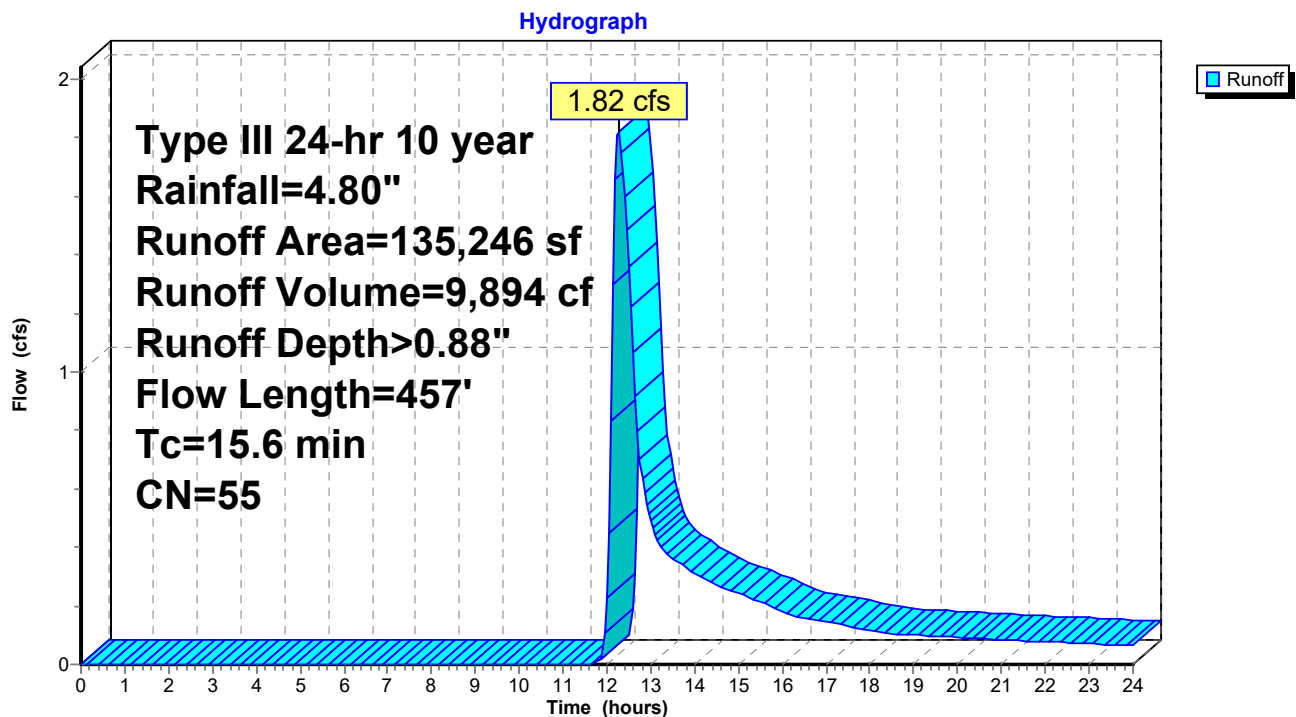
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 10 year Rainfall=4.80"

Area (sf)	CN	Description
0	61	>75% Grass cover, Good, HSG B
135,246	55	Woods, Good, HSG B
0	98	Water Surface, HSG B
0	98	Unconnected pavement, HSG B
135,246	55	Weighted Average
135,246		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	50	0.0400	0.09		Sheet Flow, SHEET FLOW IN WOODS
					Woods: Light underbrush n= 0.400 P2= 3.20"
6.3	407	0.0467	1.08		Shallow Concentrated Flow, FLOW THROUGH WOODS
					Woodland Kv= 5.0 fps
15.6	457	Total			

Subcatchment EX-1B: EX-2



Summary for Subcatchment EX-2: EX-3

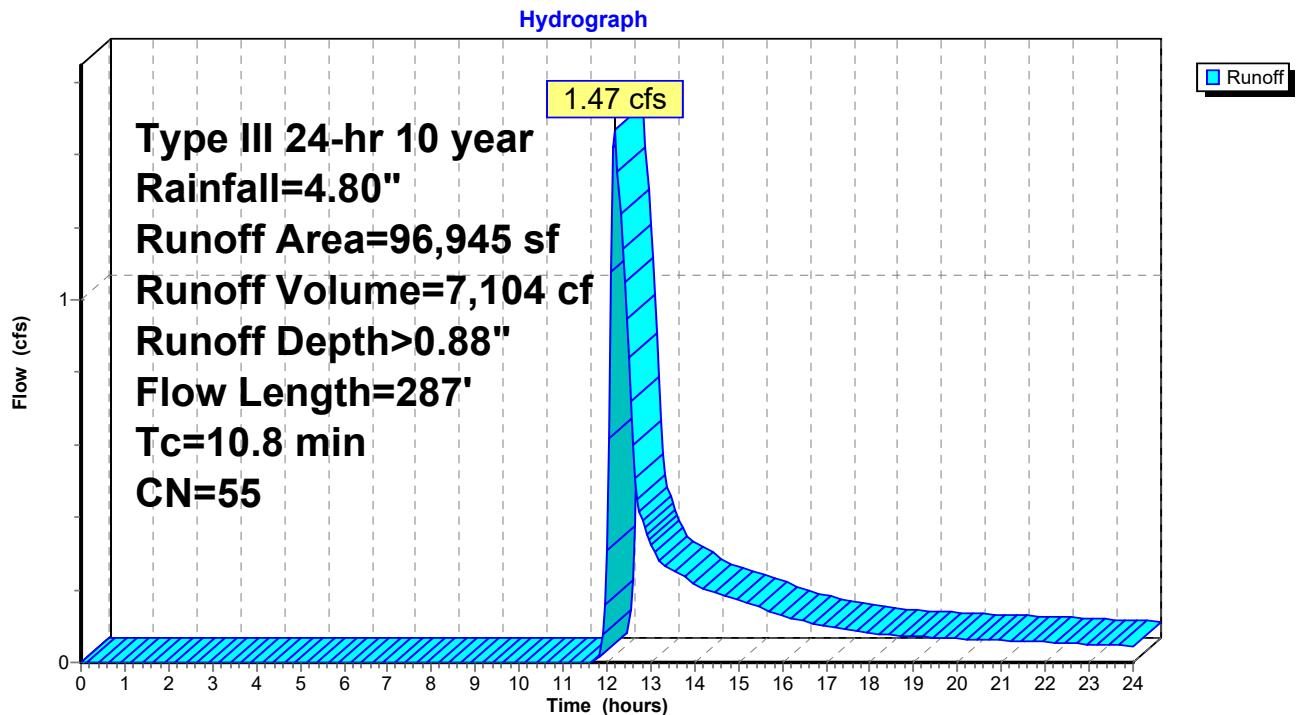
Runoff = 1.47 cfs @ 12.19 hrs, Volume= 7,104 cf, Depth> 0.88"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 10 year Rainfall=4.80"

Area (sf)	CN	Description
0	61	>75% Grass cover, Good, HSG B
96,945	55	Woods, Good, HSG B
0	98	Water Surface, HSG B
0	98	Unconnected pavement, HSG B
96,945	55	Weighted Average
96,945		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	50	0.0600	0.10		Sheet Flow, SHEET FLOW IN WOODS
					Woods: Light underbrush n= 0.400 P2= 3.20"
2.9	237	0.0759	1.38		Shallow Concentrated Flow, FLOW THROUGH WOODS
					Woodland Kv= 5.0 fps
10.8	287	Total			

Subcatchment EX-2: EX-3

Summary for Subcatchment EX-3: EX-4

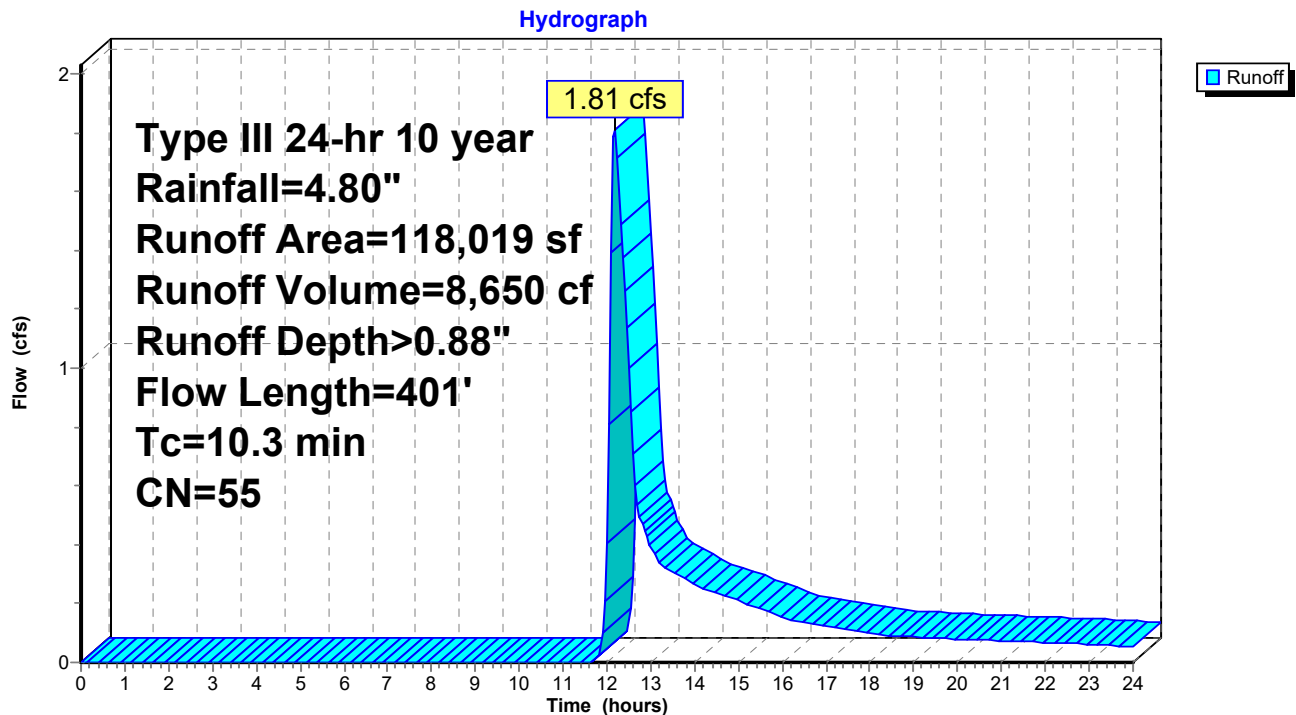
Runoff = 1.81 cfs @ 12.18 hrs, Volume= 8,650 cf, Depth> 0.88"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 10 year Rainfall=4.80"

Area (sf)	CN	Description
0	61	>75% Grass cover, Good, HSG B
118,019	55	Woods, Good, HSG B
0	98	Water Surface, HSG B
0	98	Unconnected pavement, HSG B
118,019	55	Weighted Average
118,019		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.1460	0.15		Sheet Flow, SHEET FLOW IN WOODS
					Woods: Light underbrush n= 0.400 P2= 3.20"
4.7	351	0.0627	1.25		Shallow Concentrated Flow, FLOW THROUGH WOODS
					Woodland Kv= 5.0 fps
10.3	401	Total			

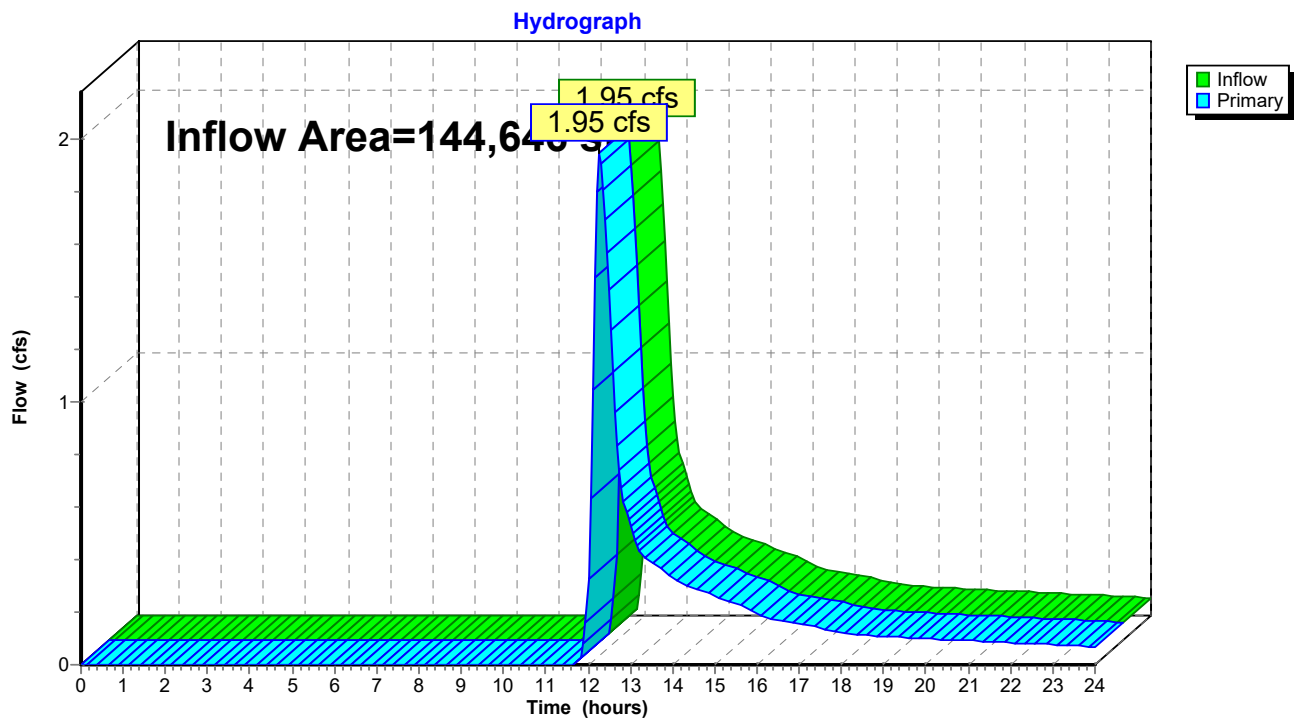
Subcatchment EX-3: EX-4

Summary for Link DP-1: DP-1

Inflow Area = 144,646 sf, 0.00% Impervious, Inflow Depth > 0.89" for 10 year event
Inflow = 1.95 cfs @ 12.27 hrs, Volume= 10,676 cf
Primary = 1.95 cfs @ 12.27 hrs, Volume= 10,676 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP-1: DP-1

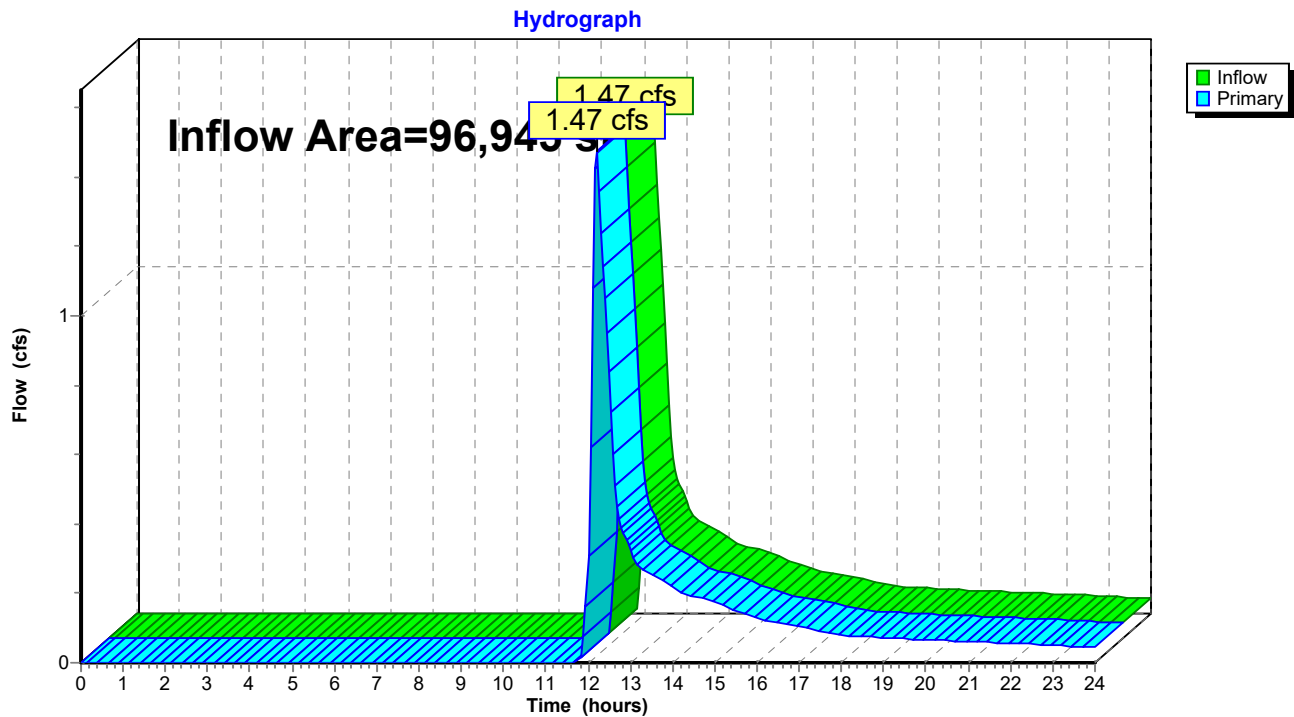


Summary for Link DP-2: DP-2

Inflow Area = 96,945 sf, 0.00% Impervious, Inflow Depth > 0.88" for 10 year event
Inflow = 1.47 cfs @ 12.19 hrs, Volume= 7,104 cf
Primary = 1.47 cfs @ 12.19 hrs, Volume= 7,104 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP-2: DP-2

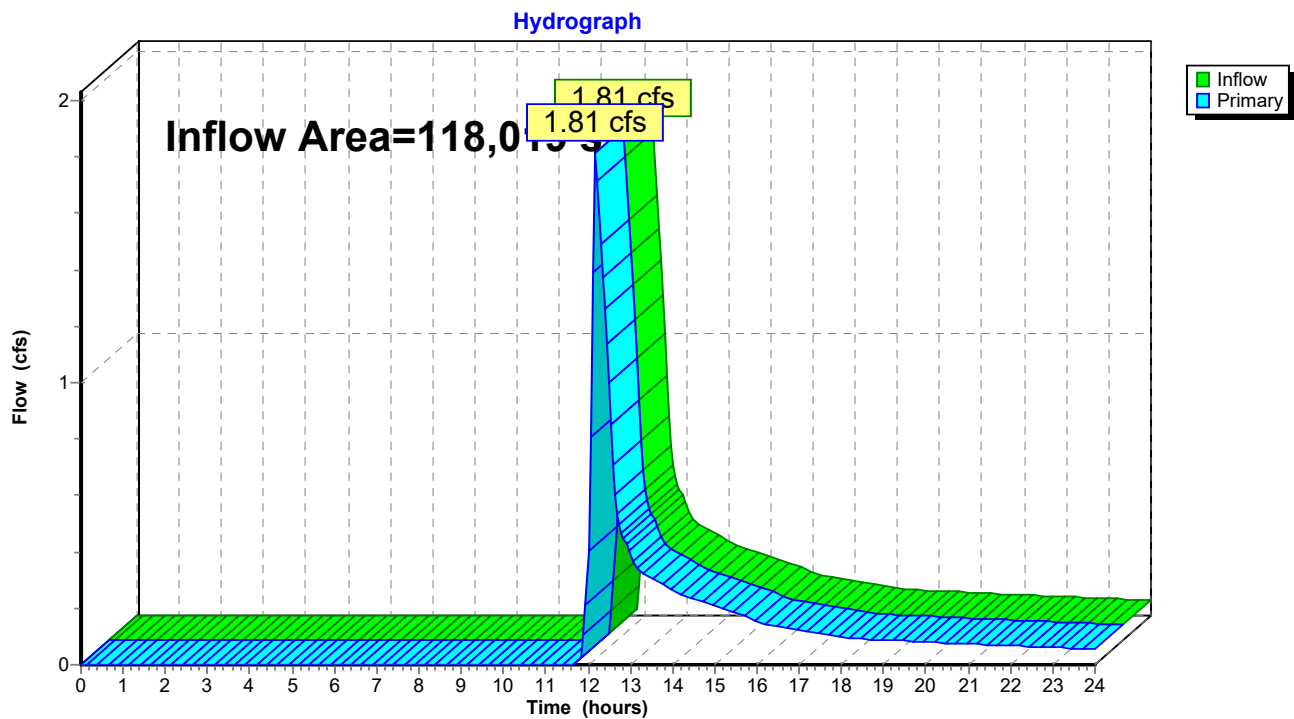


Summary for Link DP-3: DP-3

Inflow Area = 118,019 sf, 0.00% Impervious, Inflow Depth > 0.88" for 10 year event
Inflow = 1.81 cfs @ 12.18 hrs, Volume= 8,650 cf
Primary = 1.81 cfs @ 12.18 hrs, Volume= 8,650 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP-3: DP-3

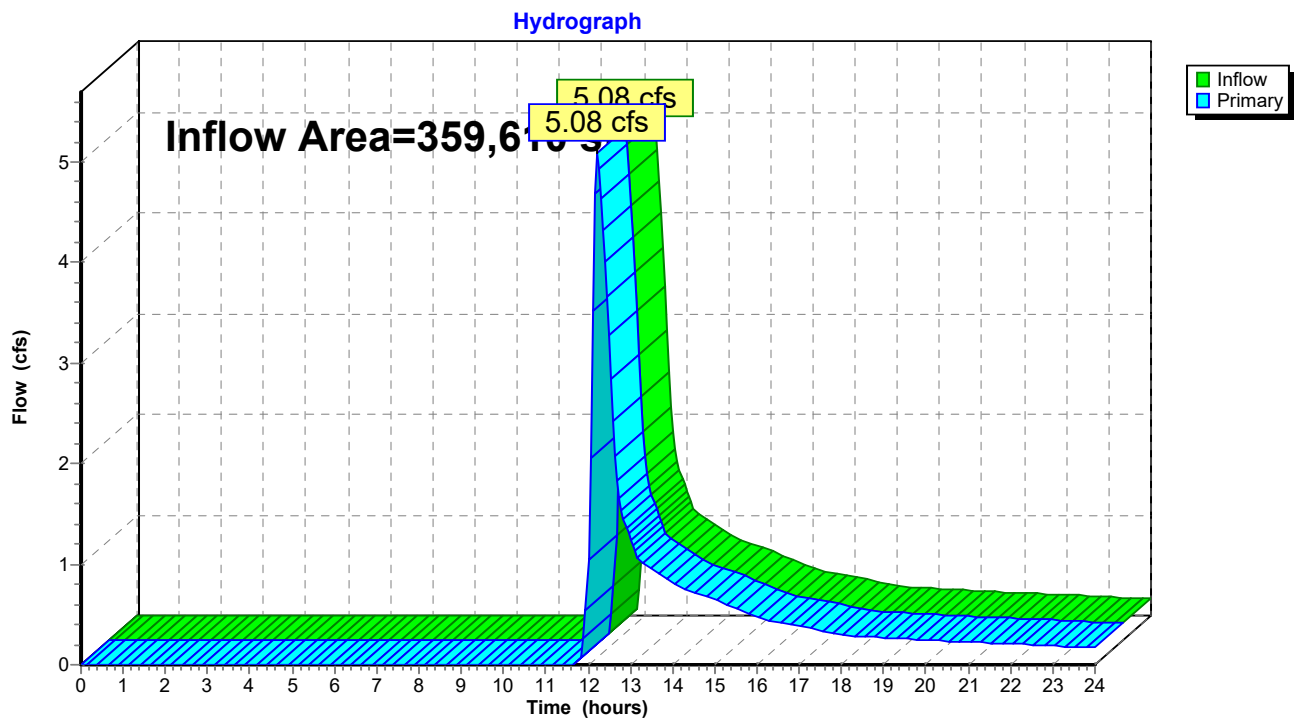


Summary for Link TOTAL: (new Link)

Inflow Area = 359,610 sf, 0.00% Impervious, Inflow Depth > 0.88" for 10 year event
Inflow = 5.08 cfs @ 12.21 hrs, Volume= 26,430 cf
Primary = 5.08 cfs @ 12.21 hrs, Volume= 26,430 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link TOTAL: (new Link)





Hydrocad

PRE-DEVELOPMENT:

25-Year Storm

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EX-1A: EX-1Runoff Area=9,400 sf 0.00% Impervious Runoff Depth>1.67"
Flow Length=117' Tc=5.0 min CN=57 Runoff=0.39 cfs 1,312 cf**Subcatchment EX-1B: EX-2**Runoff Area=135,246 sf 0.00% Impervious Runoff Depth>1.51"
Flow Length=457' Tc=15.6 min CN=55 Runoff=3.60 cfs 17,034 cf**Subcatchment EX-2: EX-3**Runoff Area=96,945 sf 0.00% Impervious Runoff Depth>1.51"
Flow Length=287' Tc=10.8 min CN=55 Runoff=2.95 cfs 12,228 cf**Subcatchment EX-3: EX-4**Runoff Area=118,019 sf 0.00% Impervious Runoff Depth>1.51"
Flow Length=401' Tc=10.3 min CN=55 Runoff=3.65 cfs 14,888 cf**Link DP-1: DP-1**Inflow=3.81 cfs 18,345 cf
Primary=3.81 cfs 18,345 cf**Link DP-2: DP-2**Inflow=2.95 cfs 12,228 cf
Primary=2.95 cfs 12,228 cf**Link DP-3: DP-3**Inflow=3.65 cfs 14,888 cf
Primary=3.65 cfs 14,888 cf**Link TOTAL: (new Link)**Inflow=10.04 cfs 45,461 cf
Primary=10.04 cfs 45,461 cf**Total Runoff Area = 359,610 sf Runoff Volume = 45,461 cf Average Runoff Depth = 1.52"**
100.00% Pervious = 359,610 sf 0.00% Impervious = 0 sf

Summary for Subcatchment EX-1A: EX-1

Runoff = 0.39 cfs @ 12.09 hrs, Volume= 1,312 cf, Depth> 1.67"

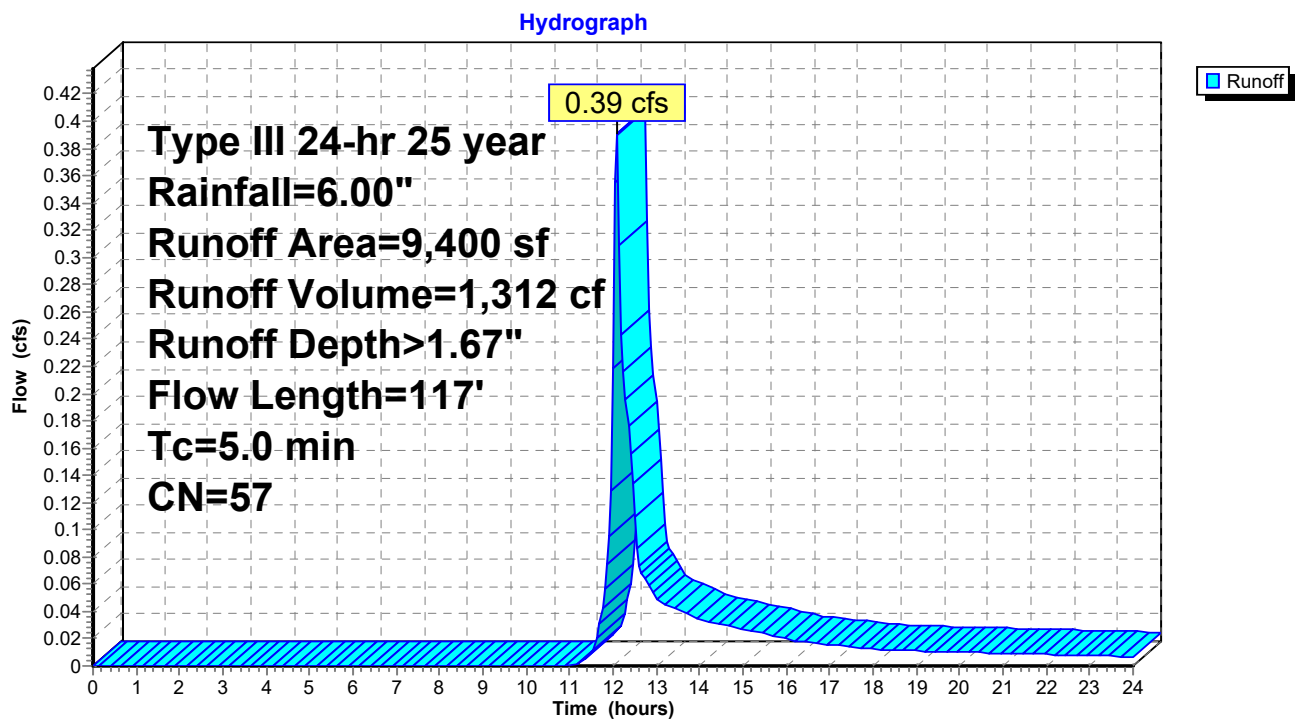
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 25 year Rainfall=6.00"

Area (sf)	CN	Description
3,186	61	>75% Grass cover, Good, HSG B
6,214	55	Woods, Good, HSG B
0	98	Water Surface, HSG B
0	98	Unconnected pavement, HSG B
9,400	57	Weighted Average
9,400		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	50	0.0760	0.25		Sheet Flow, SHEET FLOW IN GRASS
					Grass: Short n= 0.150 P2= 3.20"
1.1	67	0.0448	1.06		Shallow Concentrated Flow, FLOW THROUGH WOODS
					Woodland Kv= 5.0 fps
0.6					Direct Entry, DIRECT
5.0	117	Total			

Subcatchment EX-1A: EX-1



Summary for Subcatchment EX-1B: EX-2

Runoff = 3.60 cfs @ 12.25 hrs, Volume= 17,034 cf, Depth> 1.51"

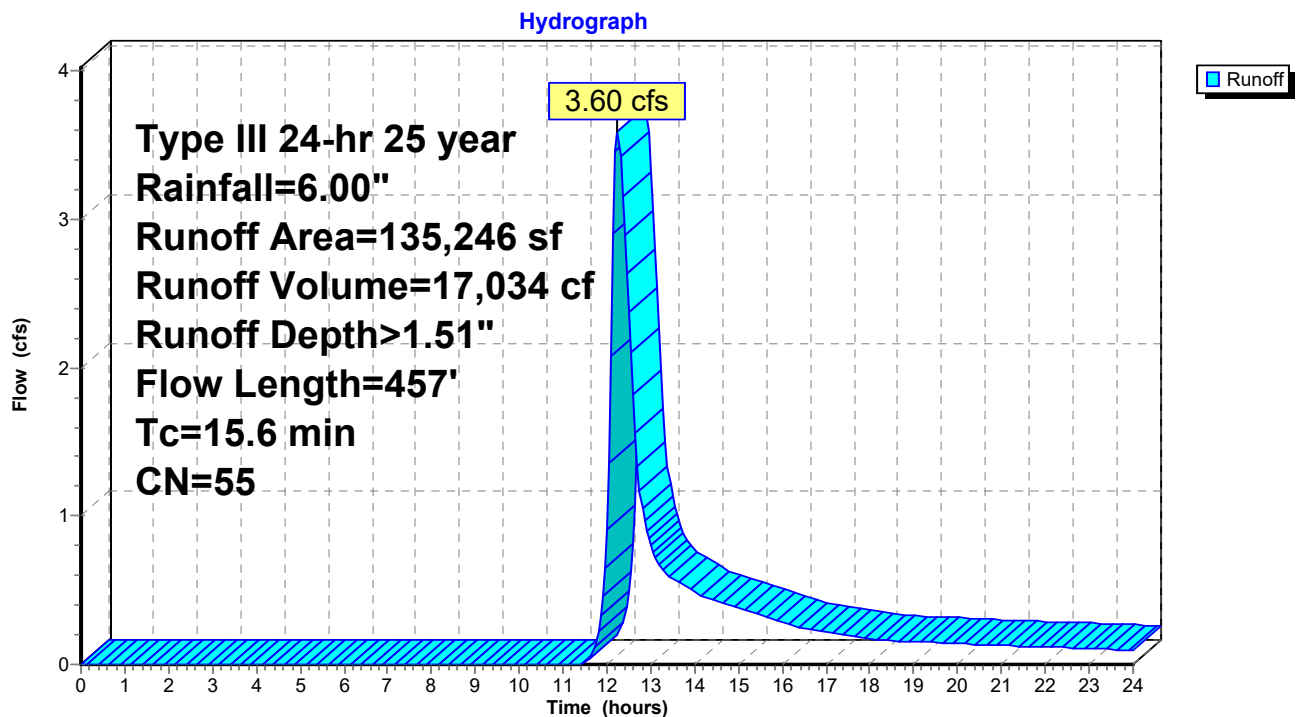
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 25 year Rainfall=6.00"

Area (sf)	CN	Description
0	61	>75% Grass cover, Good, HSG B
135,246	55	Woods, Good, HSG B
0	98	Water Surface, HSG B
0	98	Unconnected pavement, HSG B
135,246	55	Weighted Average
135,246		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	50	0.0400	0.09		Sheet Flow, SHEET FLOW IN WOODS
					Woods: Light underbrush n= 0.400 P2= 3.20"
6.3	407	0.0467	1.08		Shallow Concentrated Flow, FLOW THROUGH WOODS
					Woodland Kv= 5.0 fps
15.6	457	Total			

Subcatchment EX-1B: EX-2



Summary for Subcatchment EX-2: EX-3

Runoff = 2.95 cfs @ 12.17 hrs, Volume= 12,228 cf, Depth> 1.51"

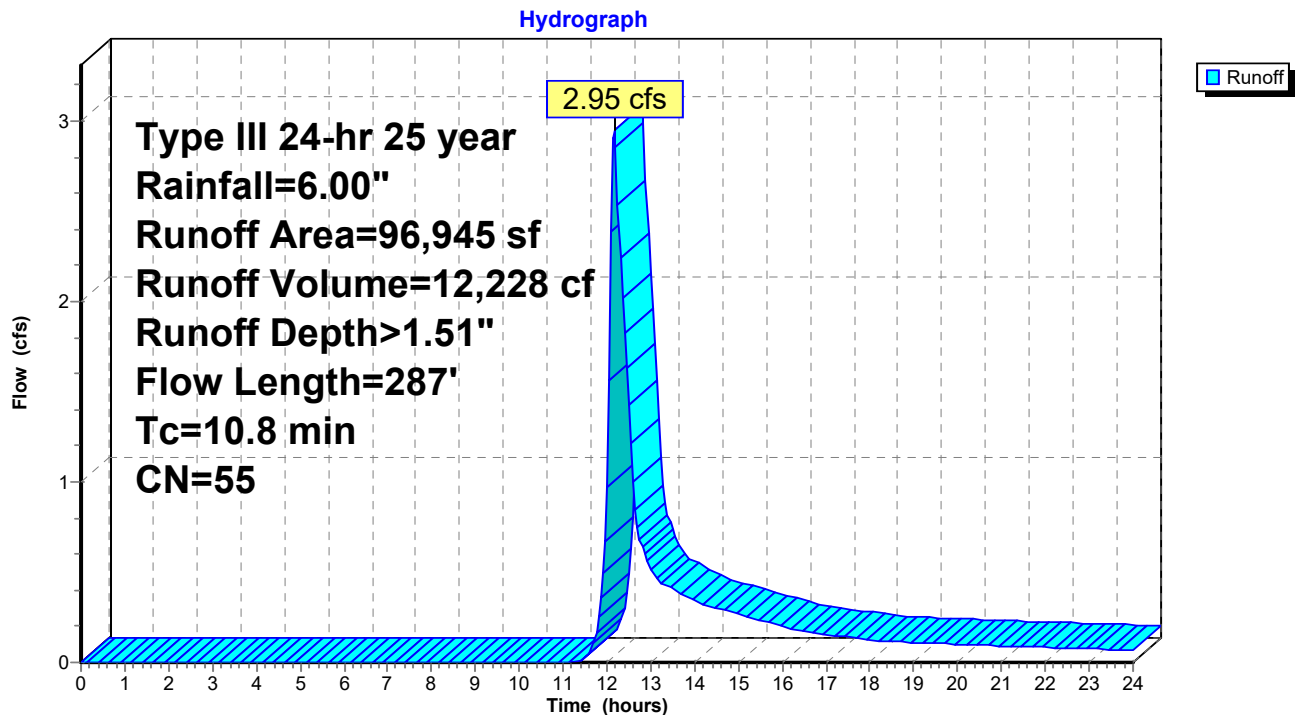
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 25 year Rainfall=6.00"

Area (sf)	CN	Description
0	61	>75% Grass cover, Good, HSG B
96,945	55	Woods, Good, HSG B
0	98	Water Surface, HSG B
0	98	Unconnected pavement, HSG B
96,945	55	Weighted Average
96,945		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	50	0.0600	0.10		Sheet Flow, SHEET FLOW IN WOODS
					Woods: Light underbrush n= 0.400 P2= 3.20"
2.9	237	0.0759	1.38		Shallow Concentrated Flow, FLOW THROUGH WOODS
					Woodland Kv= 5.0 fps
10.8	287	Total			

Subcatchment EX-2: EX-3



Summary for Subcatchment EX-3: EX-4

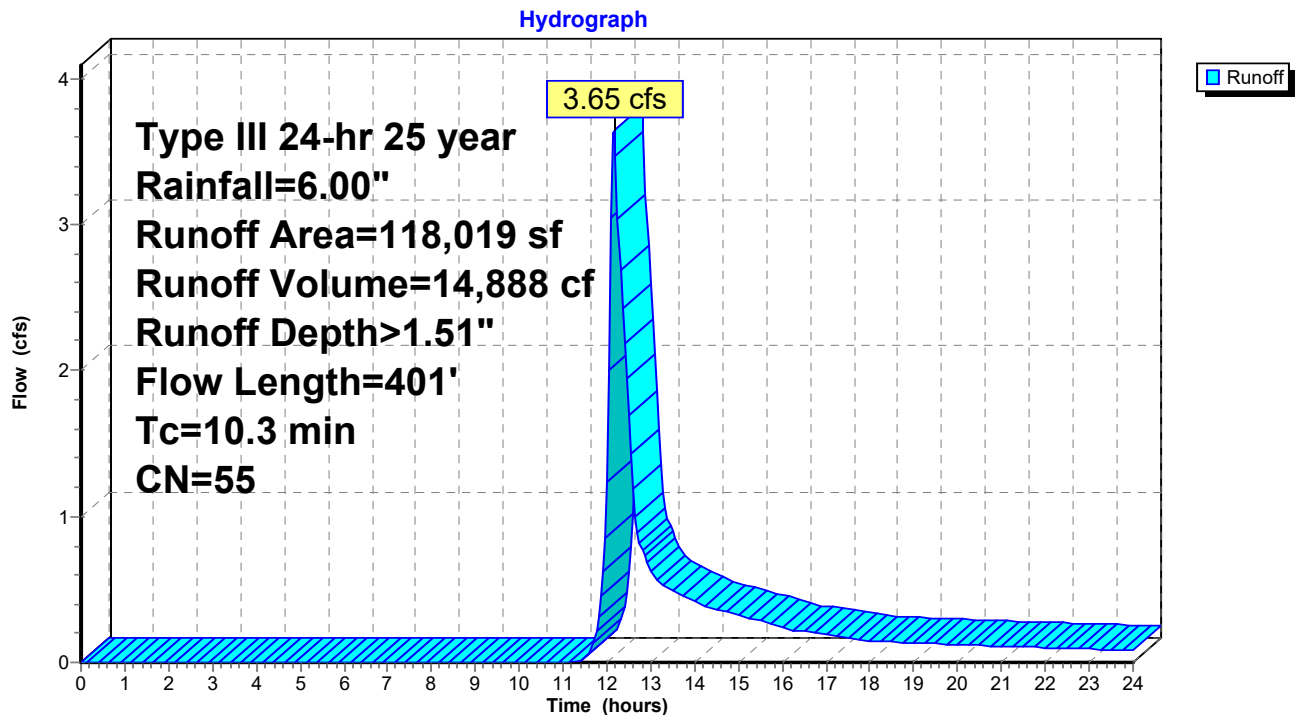
Runoff = 3.65 cfs @ 12.16 hrs, Volume= 14,888 cf, Depth> 1.51"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 25 year Rainfall=6.00"

Area (sf)	CN	Description
0	61	>75% Grass cover, Good, HSG B
118,019	55	Woods, Good, HSG B
0	98	Water Surface, HSG B
0	98	Unconnected pavement, HSG B
118,019	55	Weighted Average
118,019		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.1460	0.15		Sheet Flow, SHEET FLOW IN WOODS
					Woods: Light underbrush n= 0.400 P2= 3.20"
4.7	351	0.0627	1.25		Shallow Concentrated Flow, FLOW THROUGH WOODS
					Woodland Kv= 5.0 fps
10.3	401	Total			

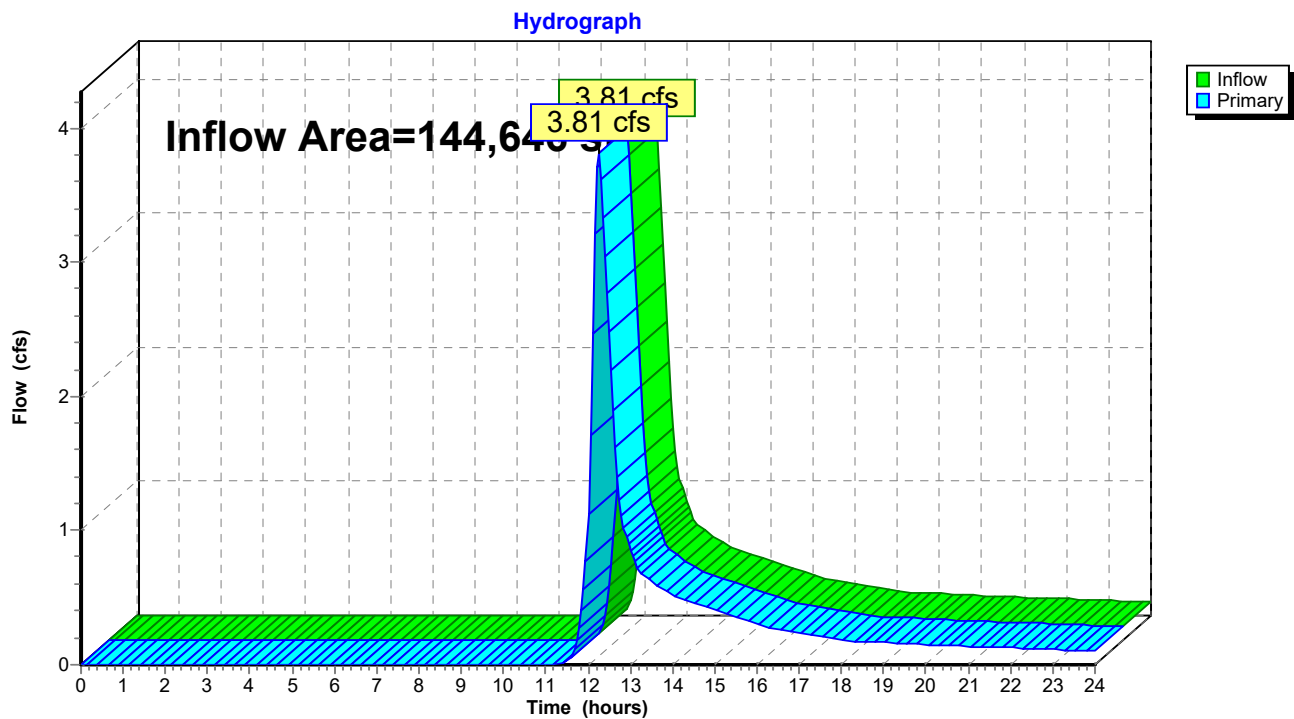
Subcatchment EX-3: EX-4

Summary for Link DP-1: DP-1

Inflow Area = 144,646 sf, 0.00% Impervious, Inflow Depth > 1.52" for 25 year event
Inflow = 3.81 cfs @ 12.24 hrs, Volume= 18,345 cf
Primary = 3.81 cfs @ 12.24 hrs, Volume= 18,345 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP-1: DP-1

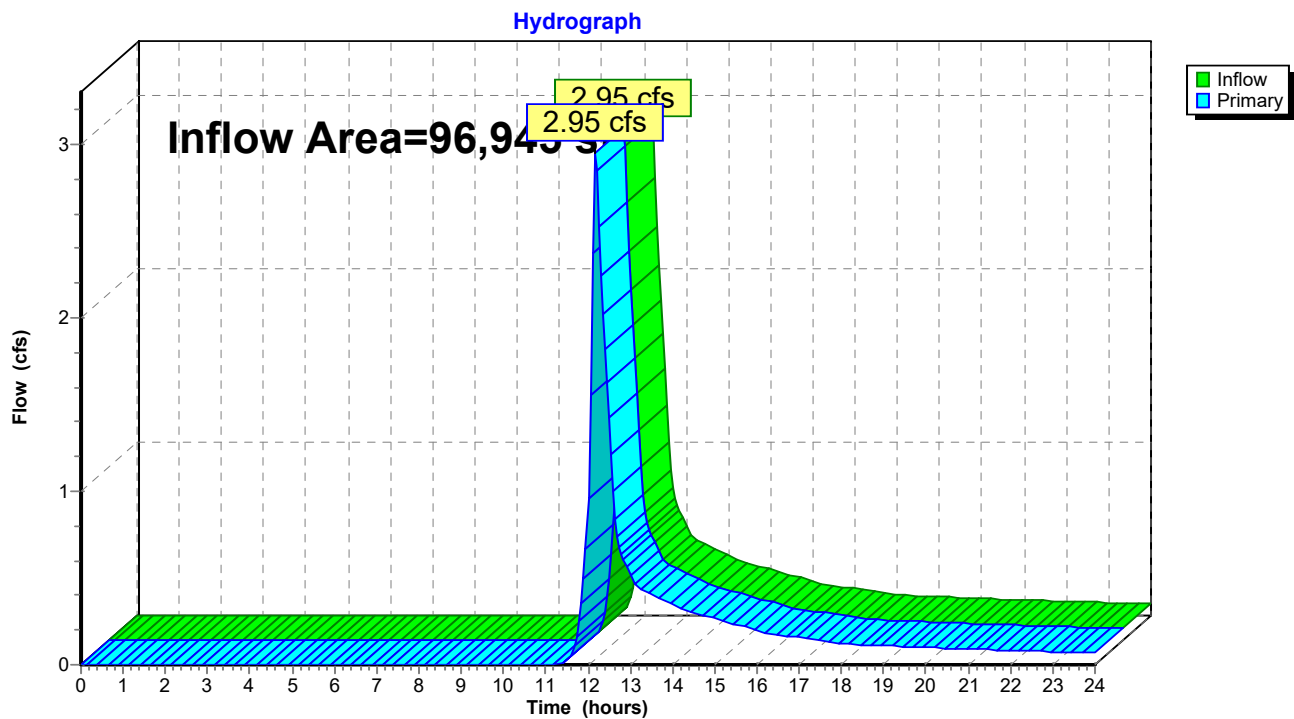


Summary for Link DP-2: DP-2

Inflow Area = 96,945 sf, 0.00% Impervious, Inflow Depth > 1.51" for 25 year event
Inflow = 2.95 cfs @ 12.17 hrs, Volume= 12,228 cf
Primary = 2.95 cfs @ 12.17 hrs, Volume= 12,228 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP-2: DP-2

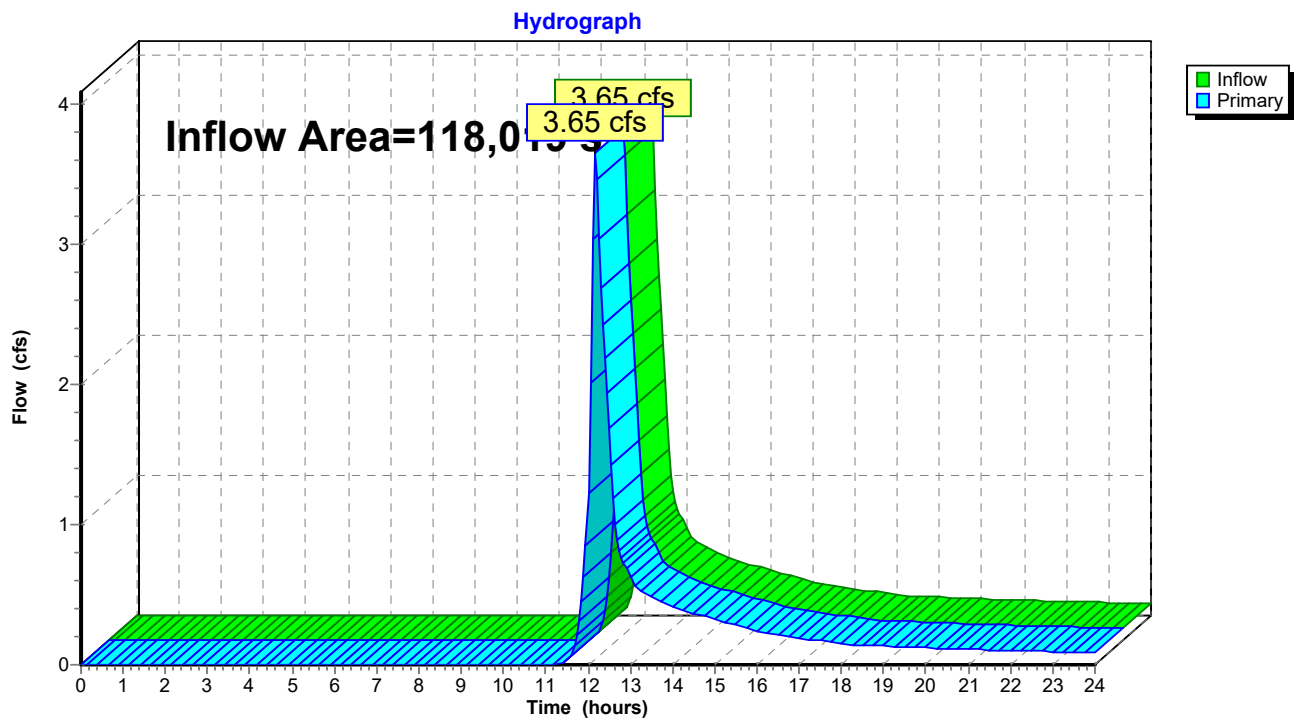


Summary for Link DP-3: DP-3

Inflow Area = 118,019 sf, 0.00% Impervious, Inflow Depth > 1.51" for 25 year event
Inflow = 3.65 cfs @ 12.16 hrs, Volume= 14,888 cf
Primary = 3.65 cfs @ 12.16 hrs, Volume= 14,888 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP-3: DP-3

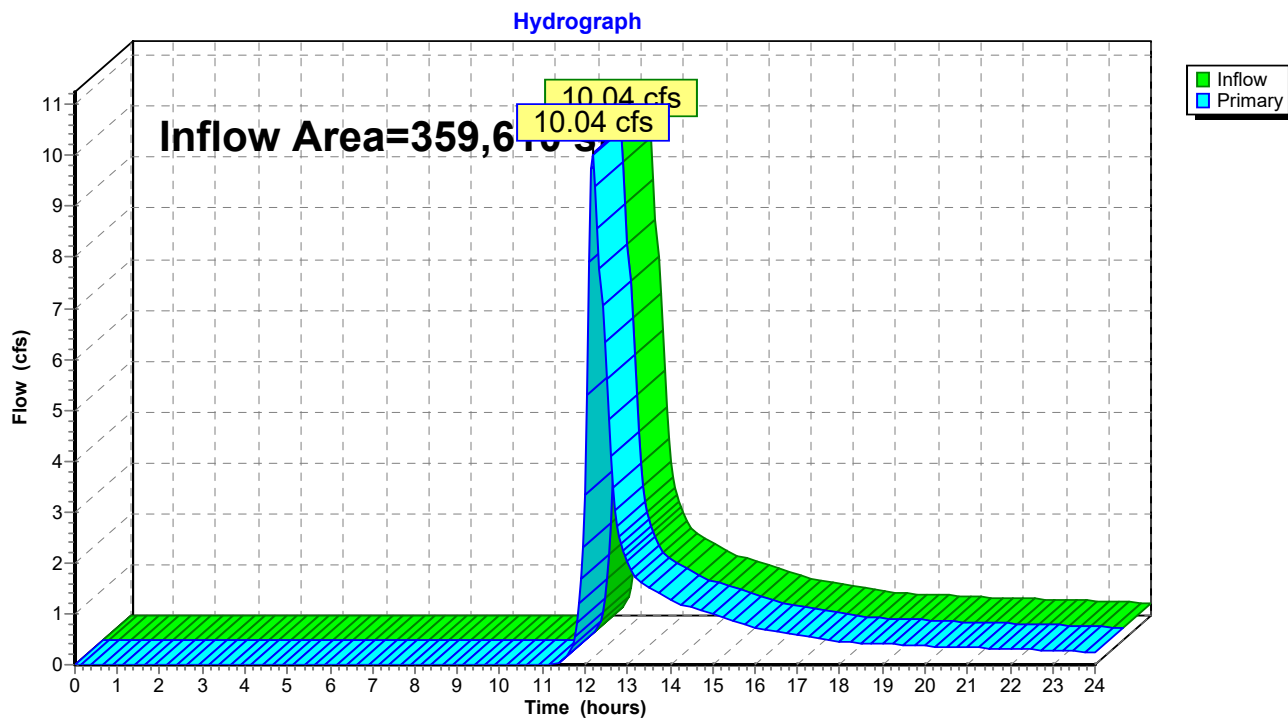


Summary for Link TOTAL: (new Link)

Inflow Area = 359,610 sf, 0.00% Impervious, Inflow Depth > 1.52" for 25 year event
Inflow = 10.04 cfs @ 12.19 hrs, Volume= 45,461 cf
Primary = 10.04 cfs @ 12.19 hrs, Volume= 45,461 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link TOTAL: (new Link)





Hydrocad

PRE-DEVELOPMENT:

50-Year Storm

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EX-1A: EX-1Runoff Area=9,400 sf 0.00% Impervious Runoff Depth>2.31"
Flow Length=117' Tc=5.0 min CN=57 Runoff=0.56 cfs 1,810 cf**Subcatchment EX-1B: EX-2**Runoff Area=135,246 sf 0.00% Impervious Runoff Depth>2.12"
Flow Length=457' Tc=15.6 min CN=55 Runoff=5.30 cfs 23,843 cf**Subcatchment EX-2: EX-3**Runoff Area=96,945 sf 0.00% Impervious Runoff Depth>2.12"
Flow Length=287' Tc=10.8 min CN=55 Runoff=4.35 cfs 17,114 cf**Subcatchment EX-3: EX-4**Runoff Area=118,019 sf 0.00% Impervious Runoff Depth>2.12"
Flow Length=401' Tc=10.3 min CN=55 Runoff=5.38 cfs 20,838 cf**Link DP-1: DP-1**Inflow=5.60 cfs 25,654 cf
Primary=5.60 cfs 25,654 cf**Link DP-2: DP-2**Inflow=4.35 cfs 17,114 cf
Primary=4.35 cfs 17,114 cf**Link DP-3: DP-3**Inflow=5.38 cfs 20,838 cf
Primary=5.38 cfs 20,838 cf**Link TOTAL: (new Link)**Inflow=14.80 cfs 63,605 cf
Primary=14.80 cfs 63,605 cf**Total Runoff Area = 359,610 sf Runoff Volume = 63,605 cf Average Runoff Depth = 2.12"**
100.00% Pervious = 359,610 sf 0.00% Impervious = 0 sf

Summary for Subcatchment EX-1A: EX-1

Runoff = 0.56 cfs @ 12.09 hrs, Volume= 1,810 cf, Depth> 2.31"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

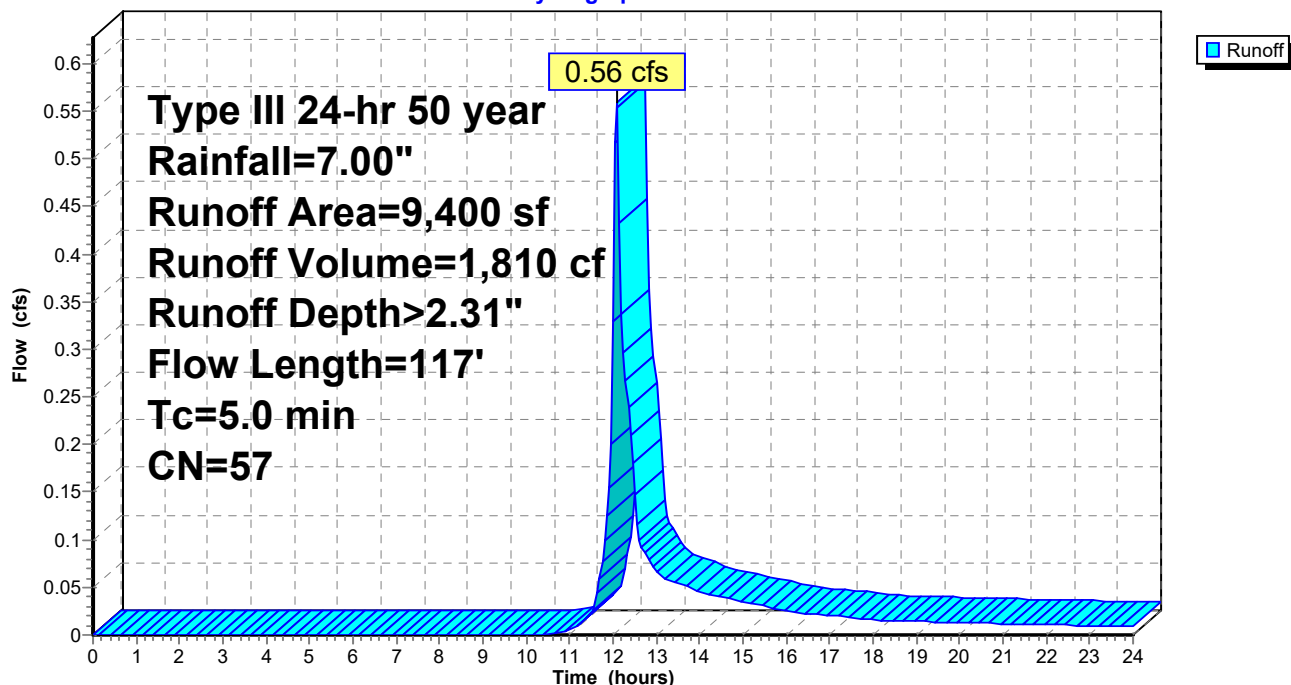
Type III 24-hr 50 year Rainfall=7.00"

Area (sf)	CN	Description
3,186	61	>75% Grass cover, Good, HSG B
6,214	55	Woods, Good, HSG B
0	98	Water Surface, HSG B
0	98	Unconnected pavement, HSG B
9,400	57	Weighted Average
9,400		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	50	0.0760	0.25		Sheet Flow, SHEET FLOW IN GRASS Grass: Short n= 0.150 P2= 3.20"
1.1	67	0.0448	1.06		Shallow Concentrated Flow, FLOW THROUGH WOODS Woodland Kv= 5.0 fps
0.6					Direct Entry, DIRECT
5.0	117	Total			

Subcatchment EX-1A: EX-1

Hydrograph



Summary for Subcatchment EX-1B: EX-2

Runoff = 5.30 cfs @ 12.24 hrs, Volume= 23,843 cf, Depth> 2.12"

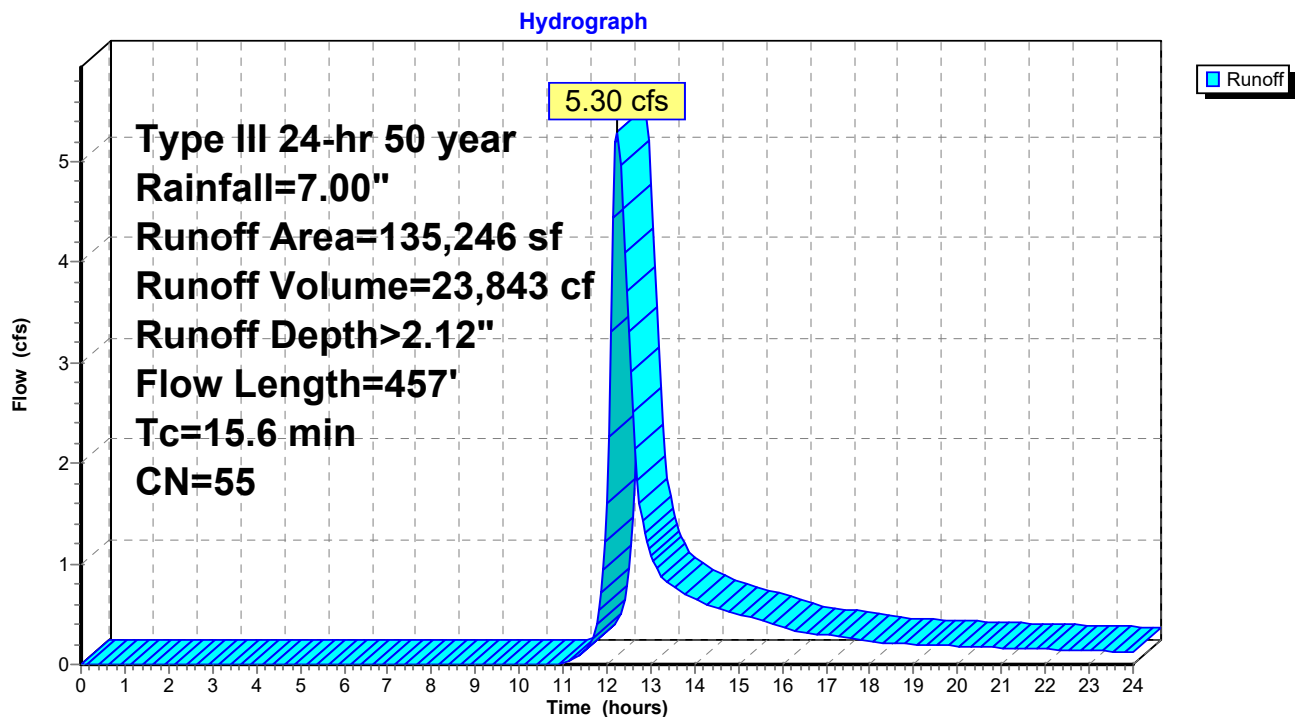
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 50 year Rainfall=7.00"

Area (sf)	CN	Description
0	61	>75% Grass cover, Good, HSG B
135,246	55	Woods, Good, HSG B
0	98	Water Surface, HSG B
0	98	Unconnected pavement, HSG B
135,246	55	Weighted Average
135,246		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	50	0.0400	0.09		Sheet Flow, SHEET FLOW IN WOODS
					Woods: Light underbrush n= 0.400 P2= 3.20"
6.3	407	0.0467	1.08		Shallow Concentrated Flow, FLOW THROUGH WOODS
					Woodland Kv= 5.0 fps
15.6	457	Total			

Subcatchment EX-1B: EX-2



Summary for Subcatchment EX-2: EX-3

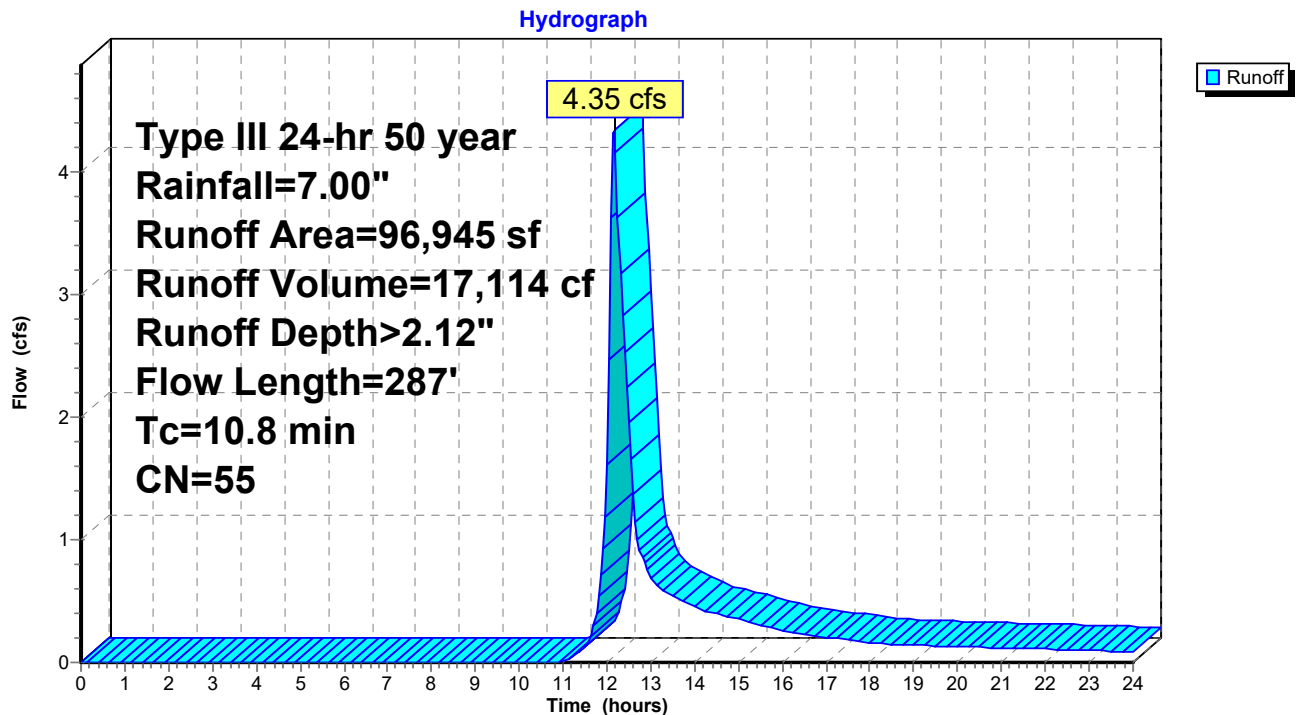
Runoff = 4.35 cfs @ 12.17 hrs, Volume= 17,114 cf, Depth> 2.12"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 50 year Rainfall=7.00"

Area (sf)	CN	Description
0	61	>75% Grass cover, Good, HSG B
96,945	55	Woods, Good, HSG B
0	98	Water Surface, HSG B
0	98	Unconnected pavement, HSG B
96,945	55	Weighted Average
96,945		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	50	0.0600	0.10		Sheet Flow, SHEET FLOW IN WOODS
					Woods: Light underbrush n= 0.400 P2= 3.20"
2.9	237	0.0759	1.38		Shallow Concentrated Flow, FLOW THROUGH WOODS
					Woodland Kv= 5.0 fps
10.8	287	Total			

Subcatchment EX-2: EX-3

Summary for Subcatchment EX-3: EX-4

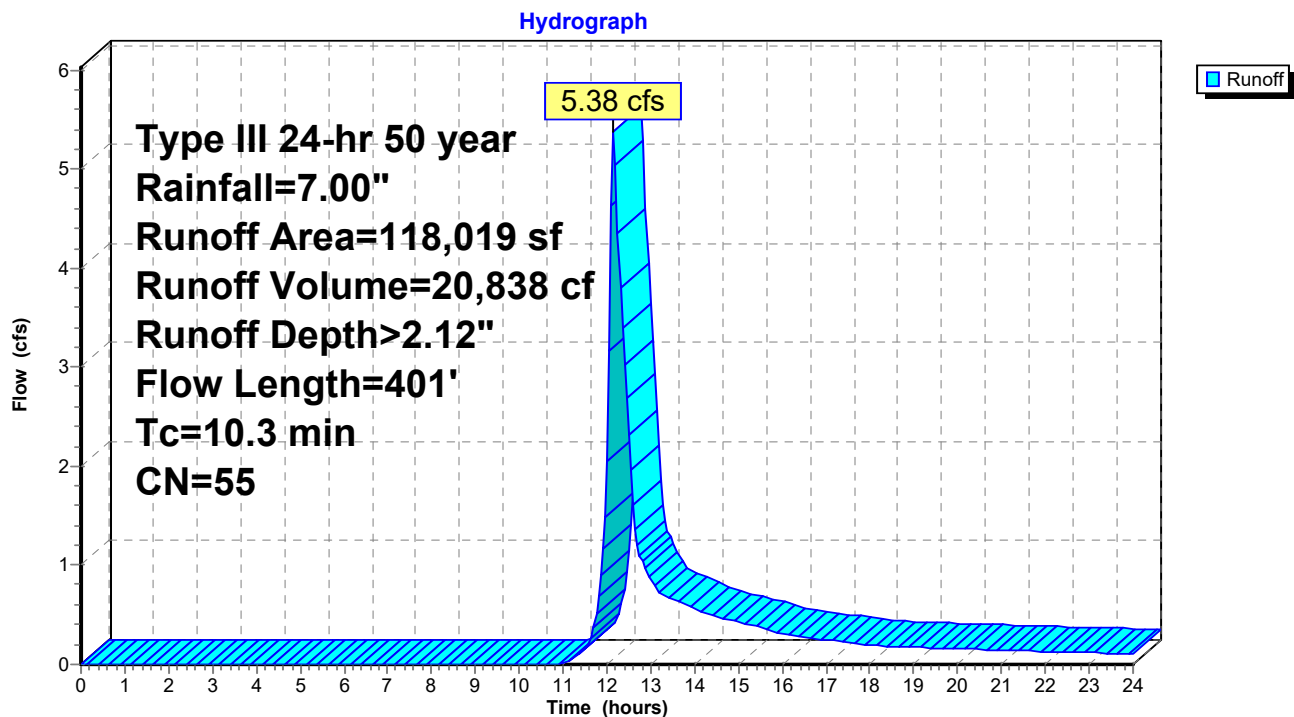
Runoff = 5.38 cfs @ 12.16 hrs, Volume= 20,838 cf, Depth> 2.12"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 50 year Rainfall=7.00"

Area (sf)	CN	Description
0	61	>75% Grass cover, Good, HSG B
118,019	55	Woods, Good, HSG B
0	98	Water Surface, HSG B
0	98	Unconnected pavement, HSG B
118,019	55	Weighted Average
118,019		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.1460	0.15		Sheet Flow, SHEET FLOW IN WOODS
					Woods: Light underbrush n= 0.400 P2= 3.20"
4.7	351	0.0627	1.25		Shallow Concentrated Flow, FLOW THROUGH WOODS
					Woodland Kv= 5.0 fps
10.3	401	Total			

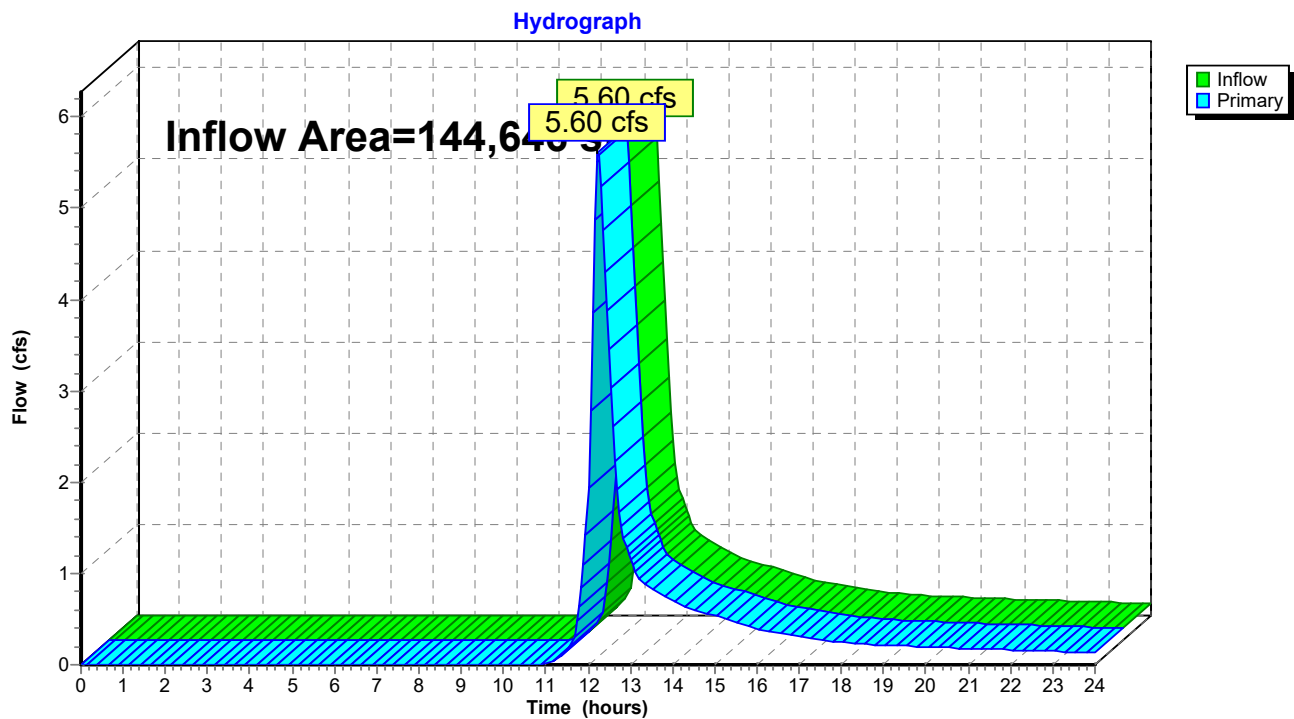
Subcatchment EX-3: EX-4

Summary for Link DP-1: DP-1

Inflow Area = 144,646 sf, 0.00% Impervious, Inflow Depth > 2.13" for 50 year event
Inflow = 5.60 cfs @ 12.23 hrs, Volume= 25,654 cf
Primary = 5.60 cfs @ 12.23 hrs, Volume= 25,654 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP-1: DP-1

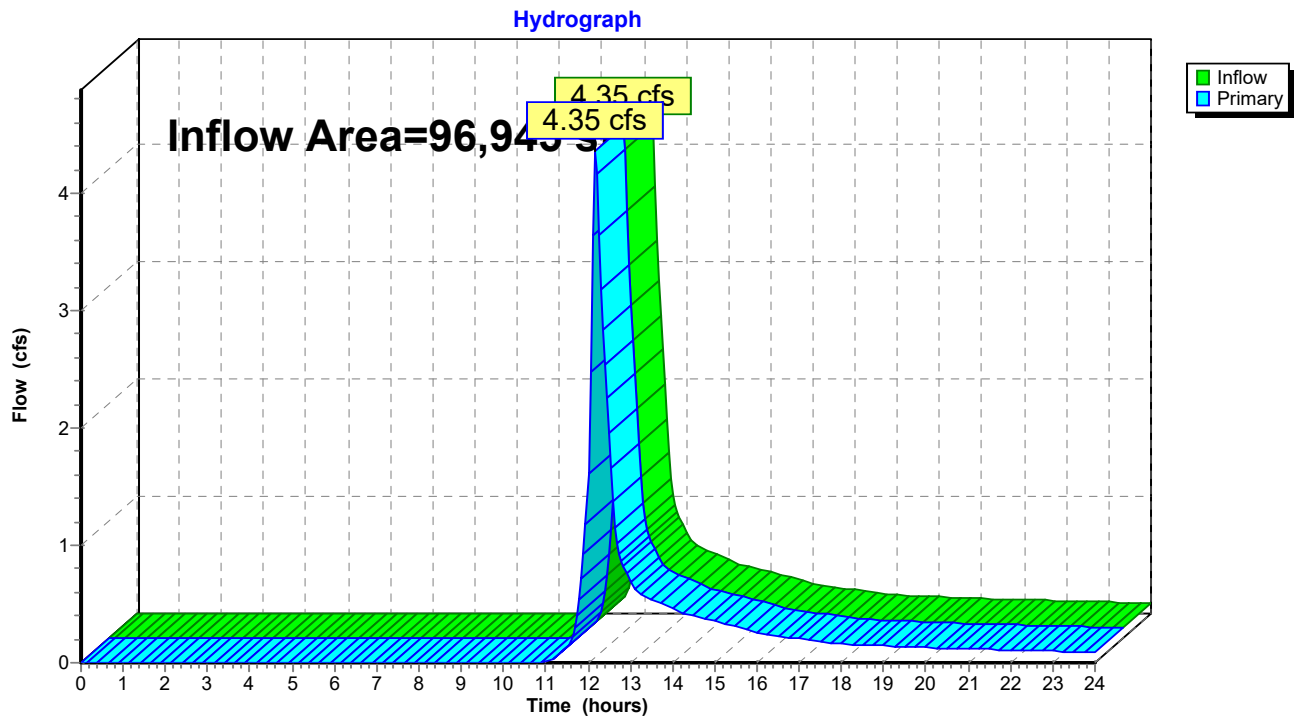


Summary for Link DP-2: DP-2

Inflow Area = 96,945 sf, 0.00% Impervious, Inflow Depth > 2.12" for 50 year event
Inflow = 4.35 cfs @ 12.17 hrs, Volume= 17,114 cf
Primary = 4.35 cfs @ 12.17 hrs, Volume= 17,114 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP-2: DP-2

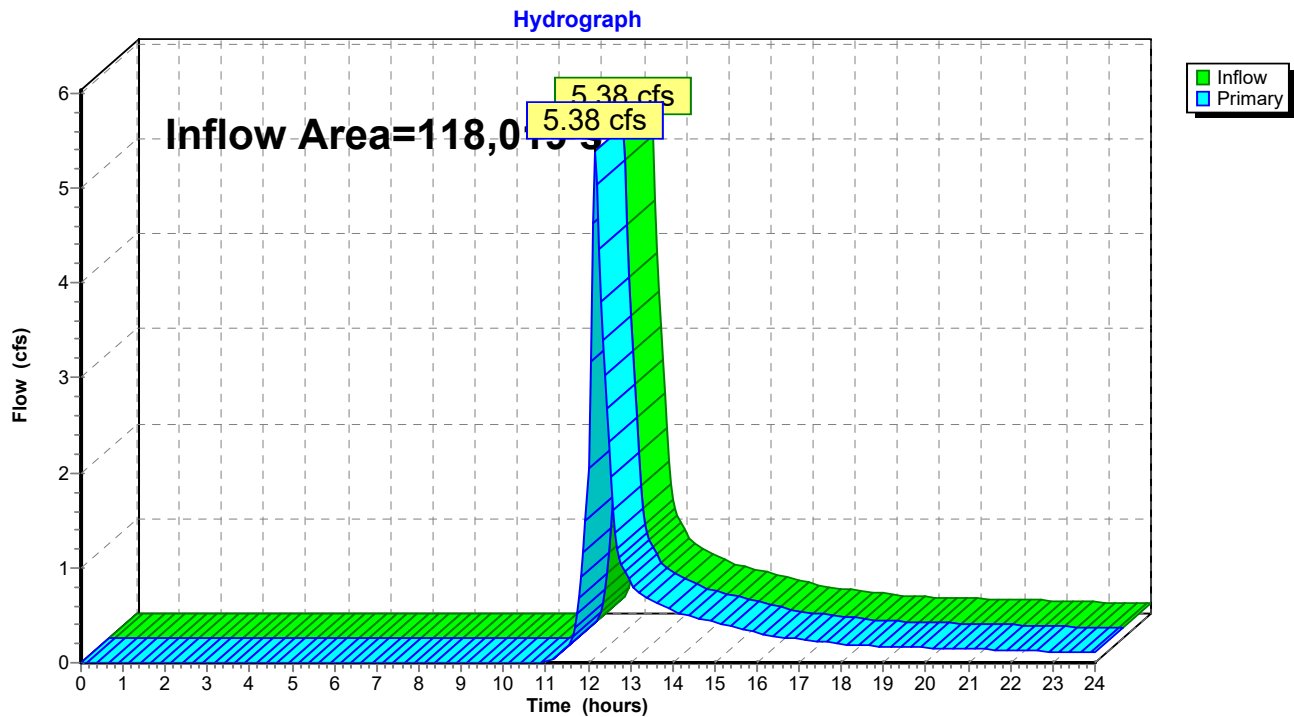


Summary for Link DP-3: DP-3

Inflow Area = 118,019 sf, 0.00% Impervious, Inflow Depth > 2.12" for 50 year event
Inflow = 5.38 cfs @ 12.16 hrs, Volume= 20,838 cf
Primary = 5.38 cfs @ 12.16 hrs, Volume= 20,838 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP-3: DP-3

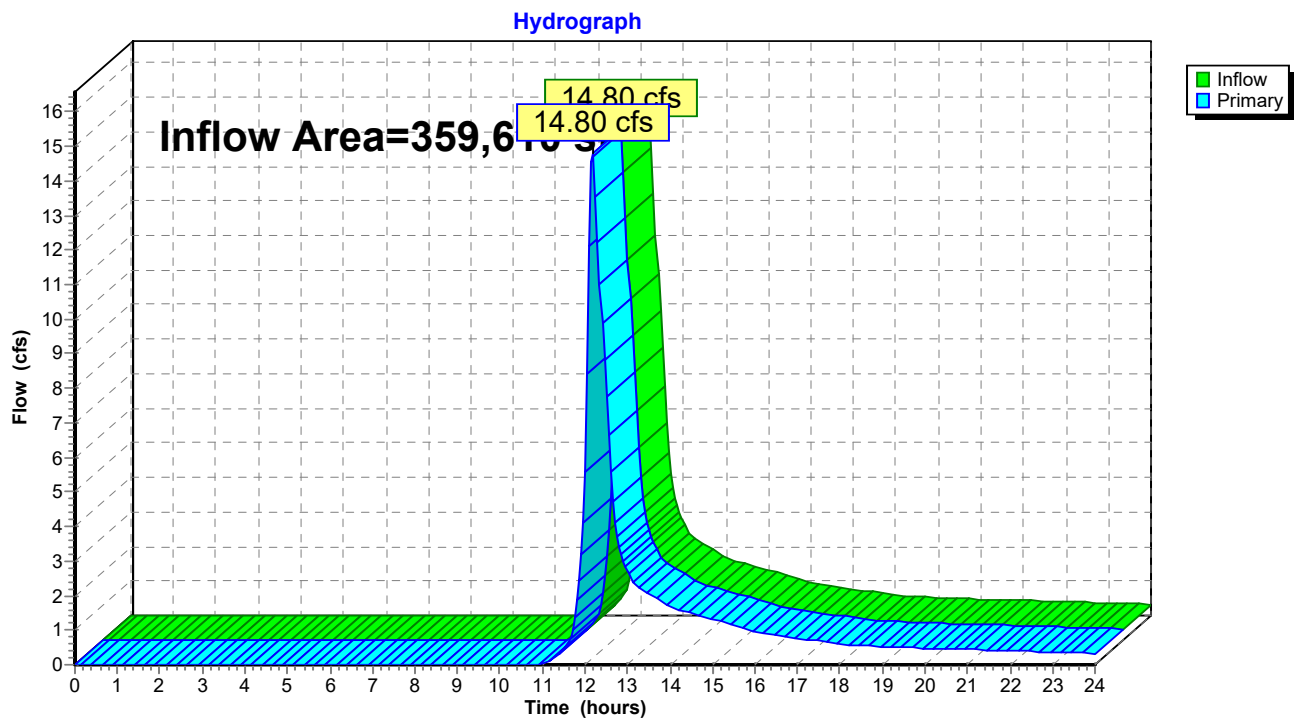


Summary for Link TOTAL: (new Link)

Inflow Area = 359,610 sf, 0.00% Impervious, Inflow Depth > 2.12" for 50 year event
Inflow = 14.80 cfs @ 12.18 hrs, Volume= 63,605 cf
Primary = 14.80 cfs @ 12.18 hrs, Volume= 63,605 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link TOTAL: (new Link)





Hydrocad

PRE-DEVELOPMENT:

100-Year Storm

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EX-1A: EX-1Runoff Area=9,400 sf 0.00% Impervious Runoff Depth>3.36"
Flow Length=117' Tc=5.0 min CN=57 Runoff=0.84 cfs 2,632 cf**Subcatchment EX-1B: EX-2**Runoff Area=135,246 sf 0.00% Impervious Runoff Depth>3.12"
Flow Length=457' Tc=15.6 min CN=55 Runoff=8.11 cfs 35,163 cf**Subcatchment EX-2: EX-3**Runoff Area=96,945 sf 0.00% Impervious Runoff Depth>3.12"
Flow Length=287' Tc=10.8 min CN=55 Runoff=6.67 cfs 25,237 cf**Subcatchment EX-3: EX-4**Runoff Area=118,019 sf 0.00% Impervious Runoff Depth>3.12"
Flow Length=401' Tc=10.3 min CN=55 Runoff=8.24 cfs 30,727 cf**Link DP-1: DP-1**Inflow=8.60 cfs 37,795 cf
Primary=8.60 cfs 37,795 cf**Link DP-2: DP-2**Inflow=6.67 cfs 25,237 cf
Primary=6.67 cfs 25,237 cf**Link DP-3: DP-3**Inflow=8.24 cfs 30,727 cf
Primary=8.24 cfs 30,727 cf**Link TOTAL: (new Link)**Inflow=22.90 cfs 93,759 cf
Primary=22.90 cfs 93,759 cf**Total Runoff Area = 359,610 sf Runoff Volume = 93,759 cf Average Runoff Depth = 3.13"**
100.00% Pervious = 359,610 sf 0.00% Impervious = 0 sf

Summary for Subcatchment EX-1A: EX-1

Runoff = 0.84 cfs @ 12.08 hrs, Volume= 2,632 cf, Depth> 3.36"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

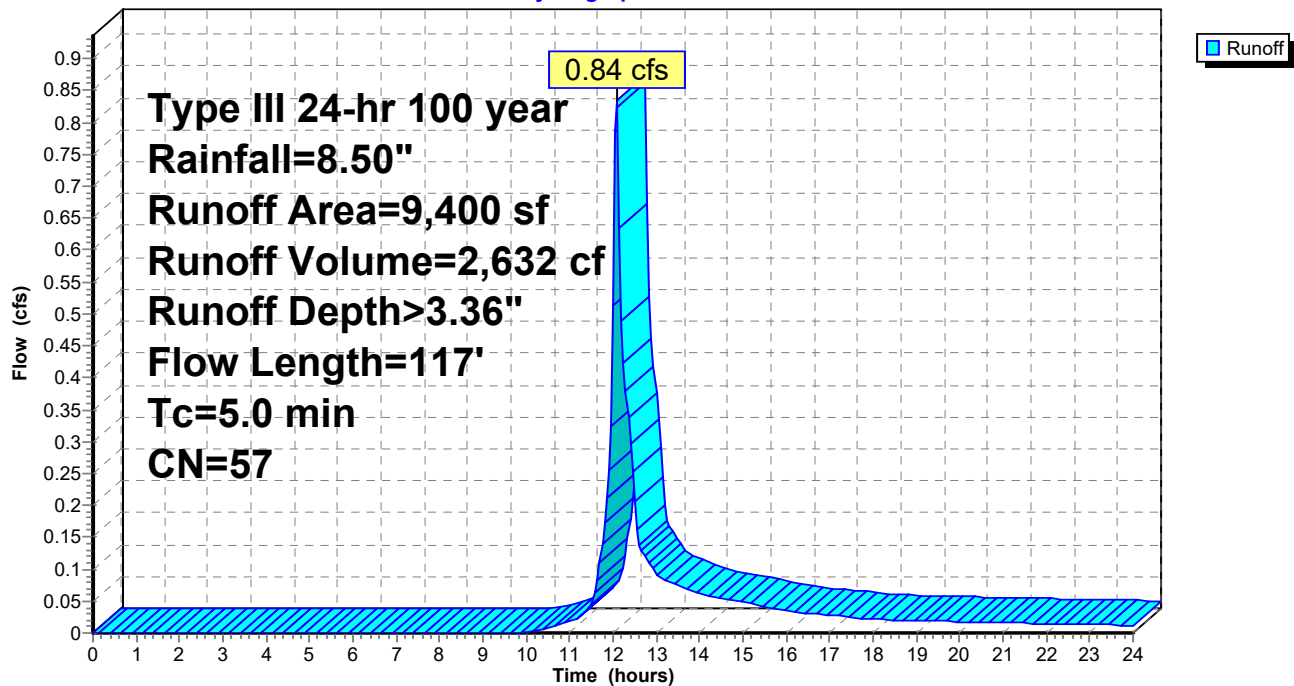
Type III 24-hr 100 year Rainfall=8.50"

Area (sf)	CN	Description
3,186	61	>75% Grass cover, Good, HSG B
6,214	55	Woods, Good, HSG B
0	98	Water Surface, HSG B
0	98	Unconnected pavement, HSG B
9,400	57	Weighted Average
9,400		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	50	0.0760	0.25		Sheet Flow, SHEET FLOW IN GRASS
					Grass: Short n= 0.150 P2= 3.20"
1.1	67	0.0448	1.06		Shallow Concentrated Flow, FLOW THROUGH WOODS
					Woodland Kv= 5.0 fps
0.6					Direct Entry, DIRECT
5.0	117	Total			

Subcatchment EX-1A: EX-1

Hydrograph



Summary for Subcatchment EX-1B: EX-2

Runoff = 8.11 cfs @ 12.23 hrs, Volume= 35,163 cf, Depth> 3.12"

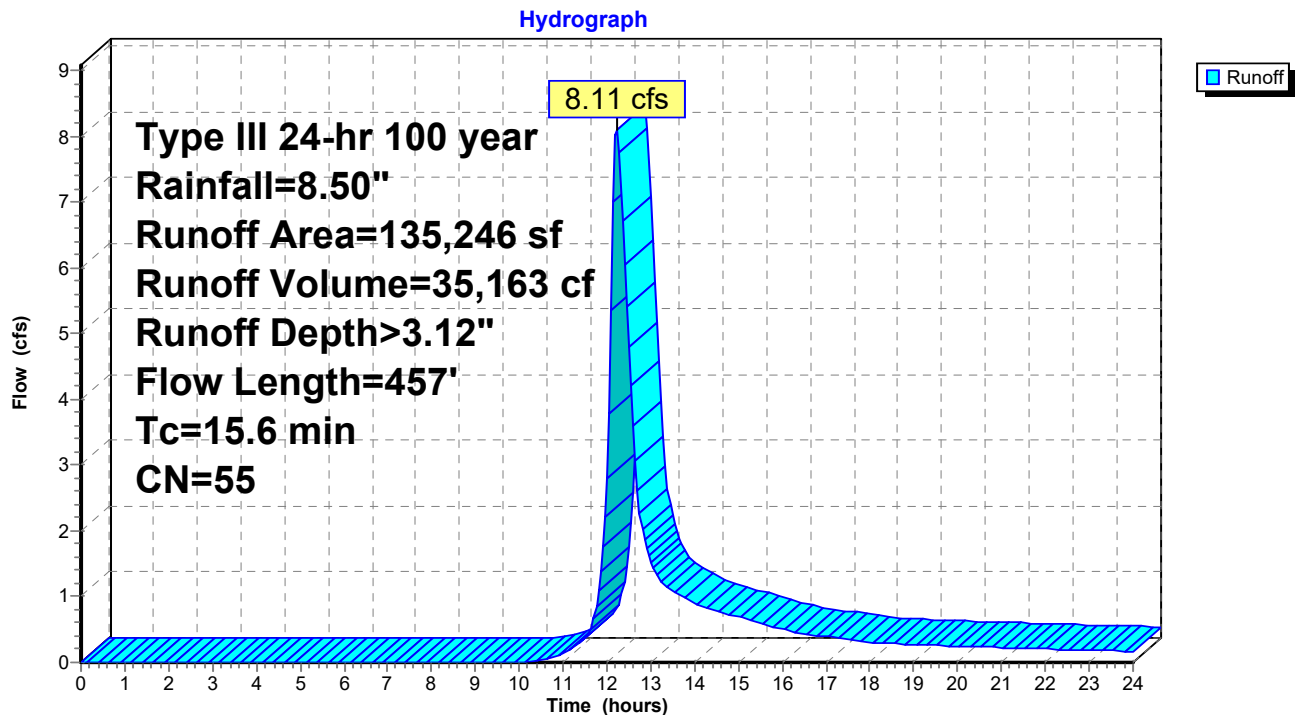
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 100 year Rainfall=8.50"

Area (sf)	CN	Description
0	61	>75% Grass cover, Good, HSG B
135,246	55	Woods, Good, HSG B
0	98	Water Surface, HSG B
0	98	Unconnected pavement, HSG B
135,246	55	Weighted Average
135,246		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	50	0.0400	0.09		Sheet Flow, SHEET FLOW IN WOODS
					Woods: Light underbrush n= 0.400 P2= 3.20"
6.3	407	0.0467	1.08		Shallow Concentrated Flow, FLOW THROUGH WOODS
					Woodland Kv= 5.0 fps
15.6	457	Total			

Subcatchment EX-1B: EX-2



Summary for Subcatchment EX-2: EX-3

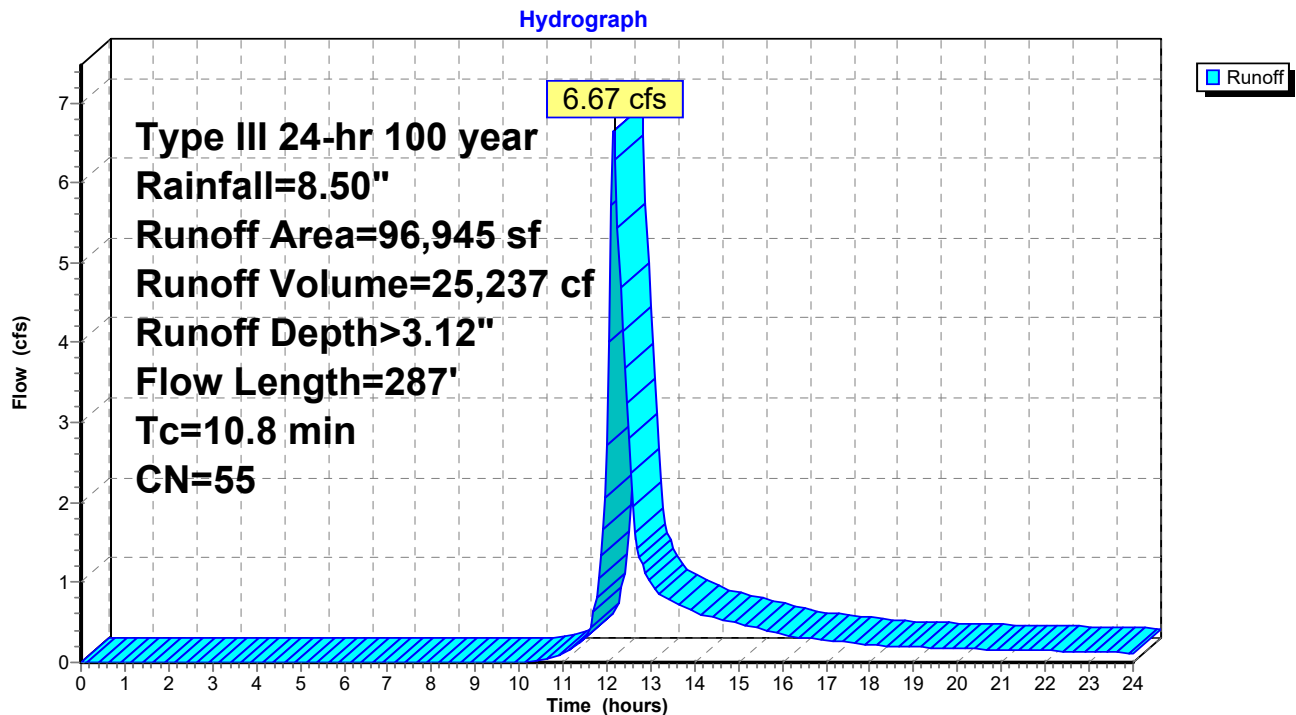
Runoff = 6.67 cfs @ 12.16 hrs, Volume= 25,237 cf, Depth> 3.12"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 100 year Rainfall=8.50"

Area (sf)	CN	Description
0	61	>75% Grass cover, Good, HSG B
96,945	55	Woods, Good, HSG B
0	98	Water Surface, HSG B
0	98	Unconnected pavement, HSG B
96,945	55	Weighted Average
96,945		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	50	0.0600	0.10		Sheet Flow, SHEET FLOW IN WOODS
					Woods: Light underbrush n= 0.400 P2= 3.20"
2.9	237	0.0759	1.38		Shallow Concentrated Flow, FLOW THROUGH WOODS
					Woodland Kv= 5.0 fps
10.8	287	Total			

Subcatchment EX-2: EX-3

Summary for Subcatchment EX-3: EX-4

Runoff = 8.24 cfs @ 12.16 hrs, Volume= 30,727 cf, Depth> 3.12"

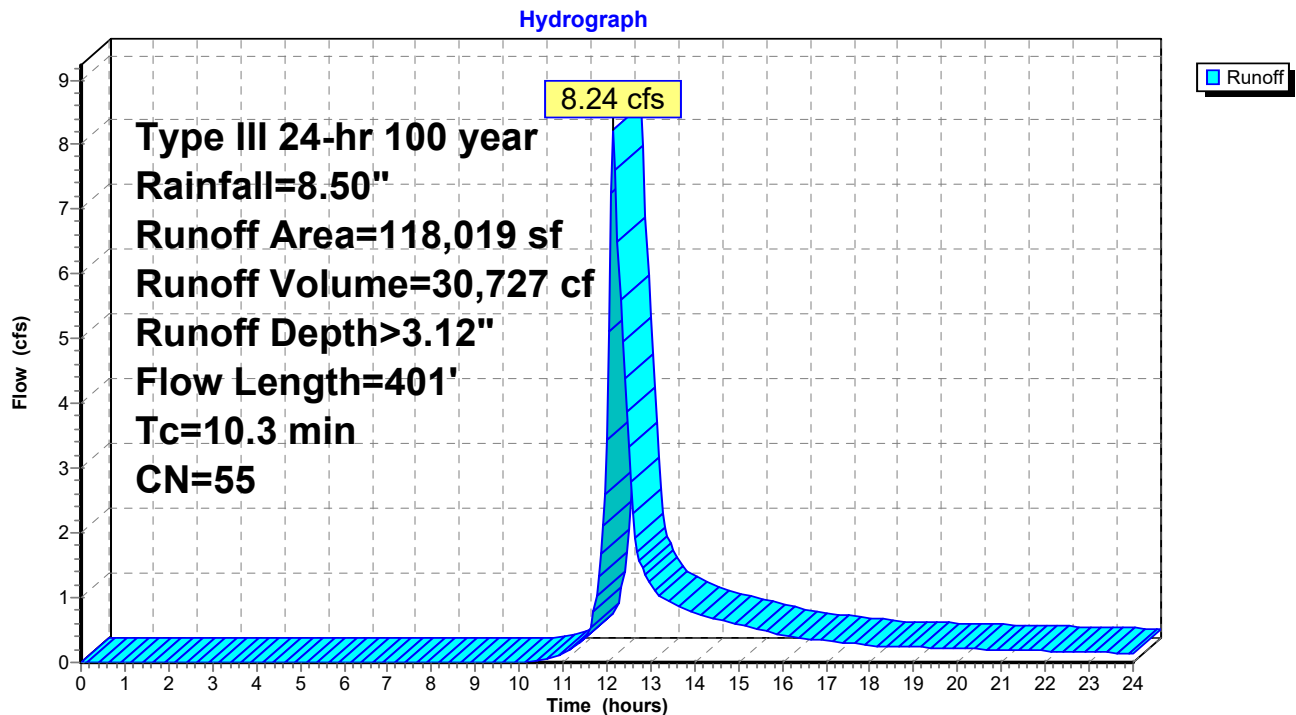
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 100 year Rainfall=8.50"

Area (sf)	CN	Description
0	61	>75% Grass cover, Good, HSG B
118,019	55	Woods, Good, HSG B
0	98	Water Surface, HSG B
0	98	Unconnected pavement, HSG B
118,019	55	Weighted Average
118,019		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.1460	0.15		Sheet Flow, SHEET FLOW IN WOODS
					Woods: Light underbrush n= 0.400 P2= 3.20"
4.7	351	0.0627	1.25		Shallow Concentrated Flow, FLOW THROUGH WOODS
					Woodland Kv= 5.0 fps
10.3	401	Total			

Subcatchment EX-3: EX-4

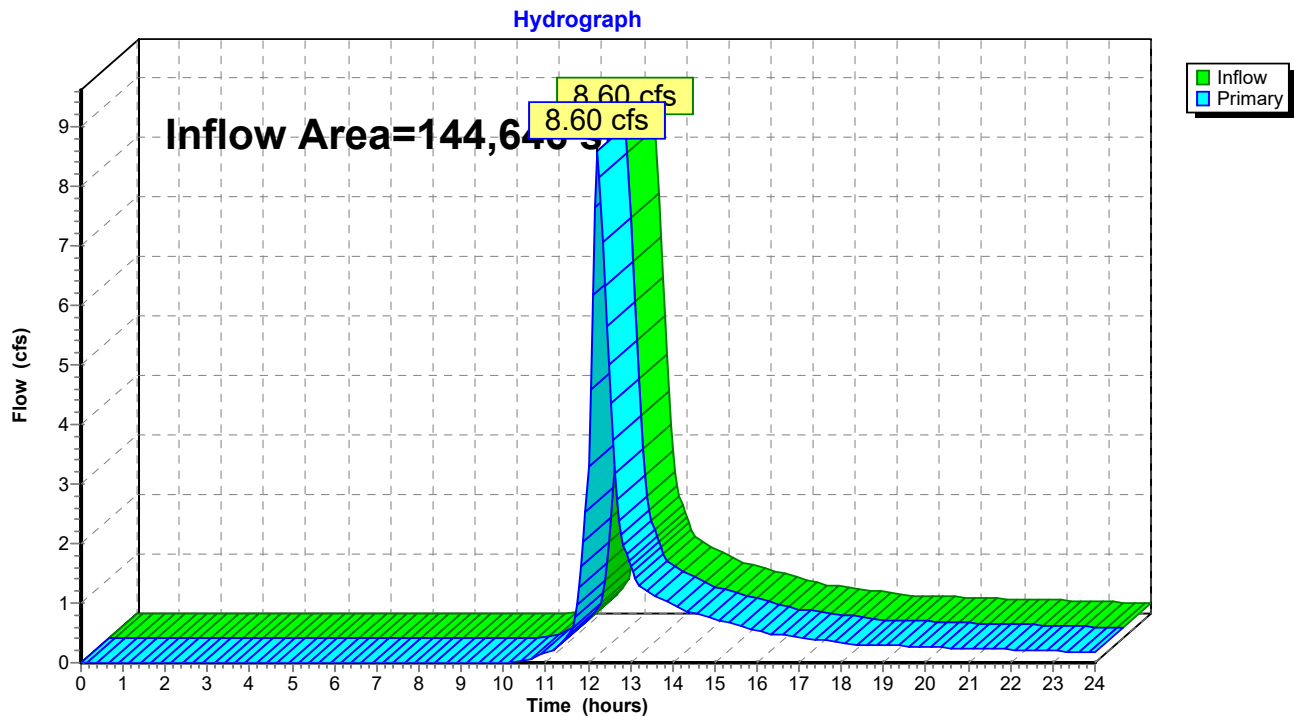


Summary for Link DP-1: DP-1

Inflow Area = 144,646 sf, 0.00% Impervious, Inflow Depth > 3.14" for 100 year event
Inflow = 8.60 cfs @ 12.22 hrs, Volume= 37,795 cf
Primary = 8.60 cfs @ 12.22 hrs, Volume= 37,795 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP-1: DP-1

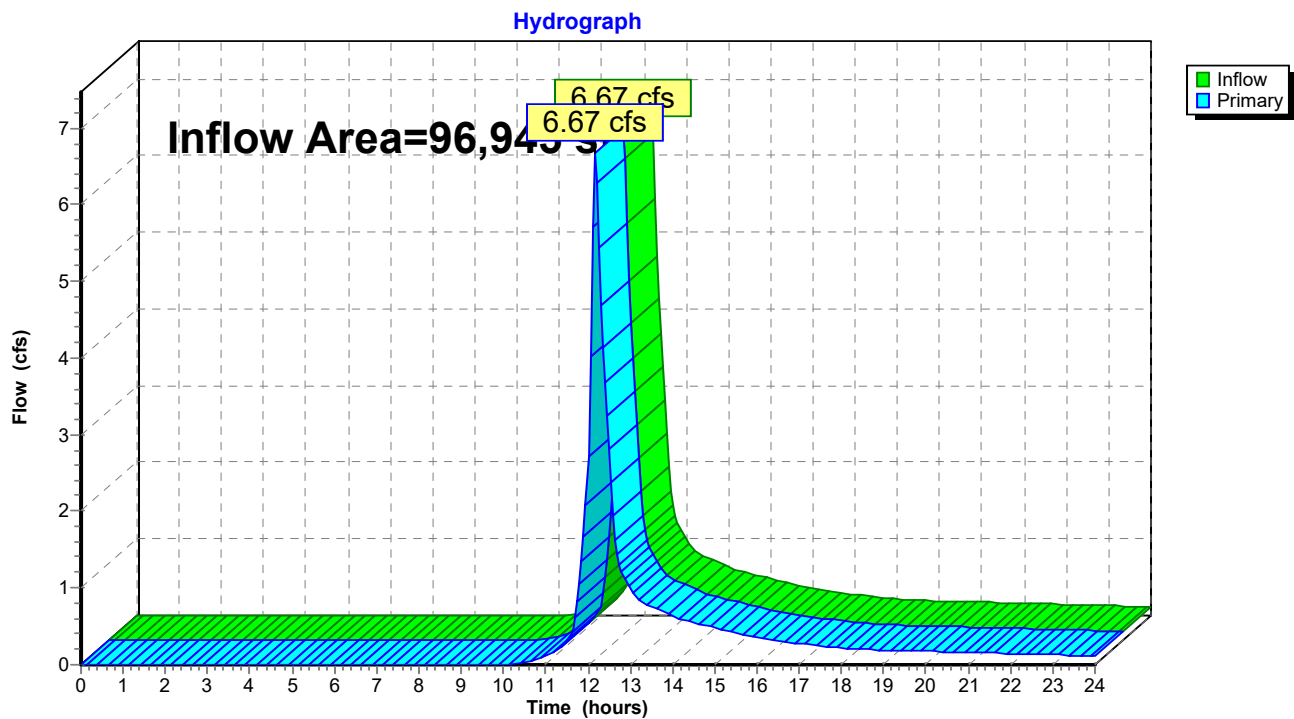


Summary for Link DP-2: DP-2

Inflow Area = 96,945 sf, 0.00% Impervious, Inflow Depth > 3.12" for 100 year event
Inflow = 6.67 cfs @ 12.16 hrs, Volume= 25,237 cf
Primary = 6.67 cfs @ 12.16 hrs, Volume= 25,237 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP-2: DP-2

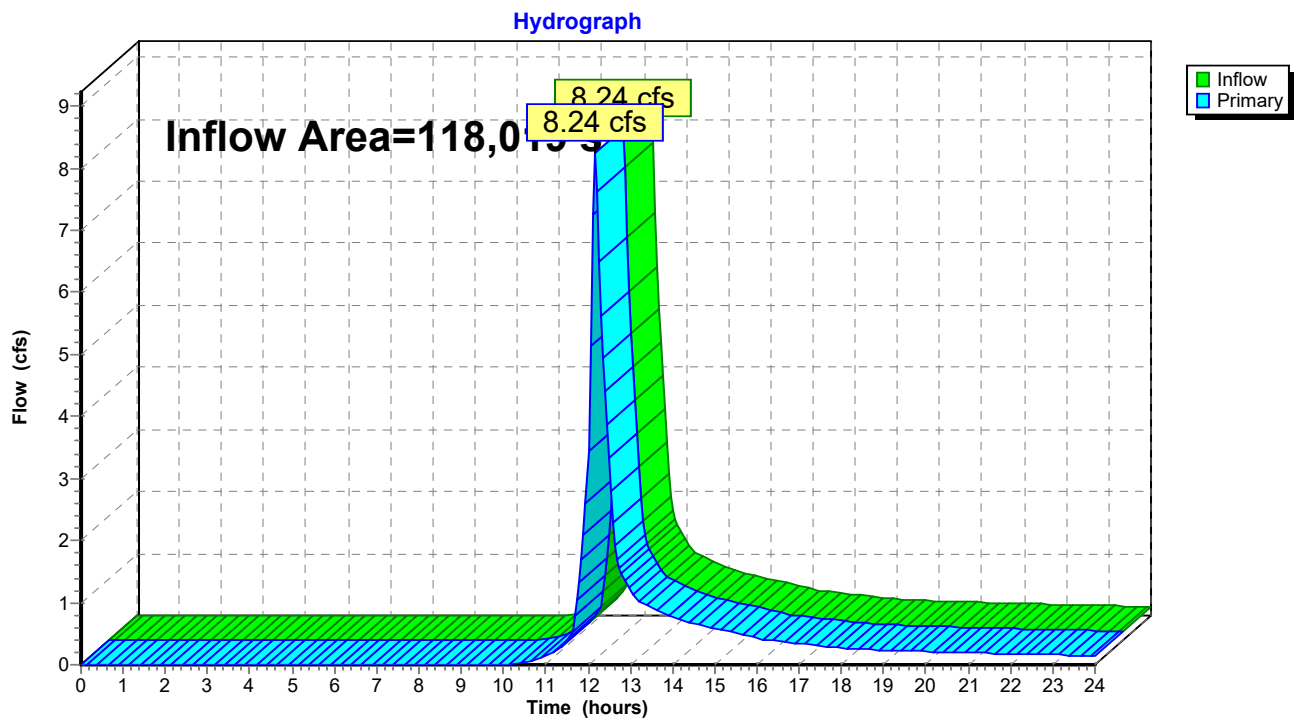


Summary for Link DP-3: DP-3

Inflow Area = 118,019 sf, 0.00% Impervious, Inflow Depth > 3.12" for 100 year event
Inflow = 8.24 cfs @ 12.16 hrs, Volume= 30,727 cf
Primary = 8.24 cfs @ 12.16 hrs, Volume= 30,727 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP-3: DP-3



Summary for Link TOTAL: (new Link)

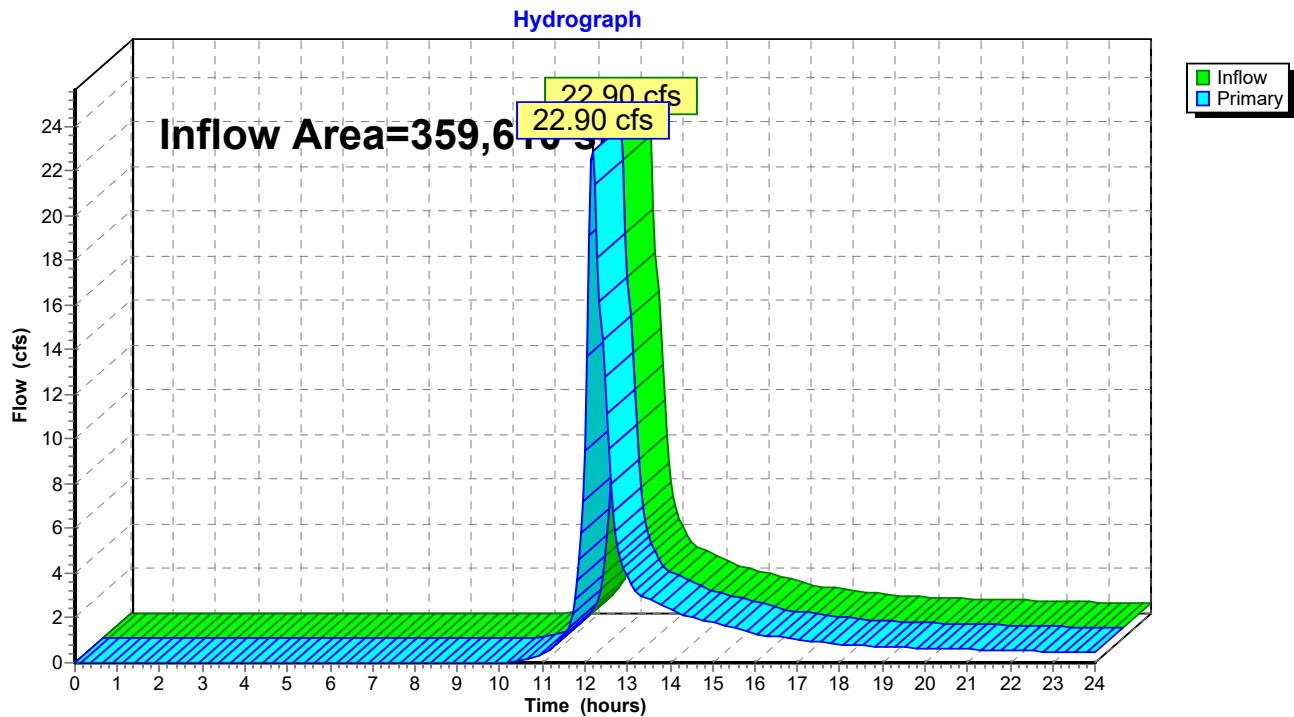
Inflow Area = 359,610 sf, 0.00% Impervious, Inflow Depth > 3.13" for 100 year event

Inflow = 22.90 cfs @ 12.17 hrs, Volume= 93,759 cf

Primary = 22.90 cfs @ 12.17 hrs, Volume= 93,759 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

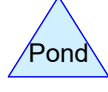
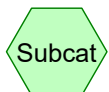
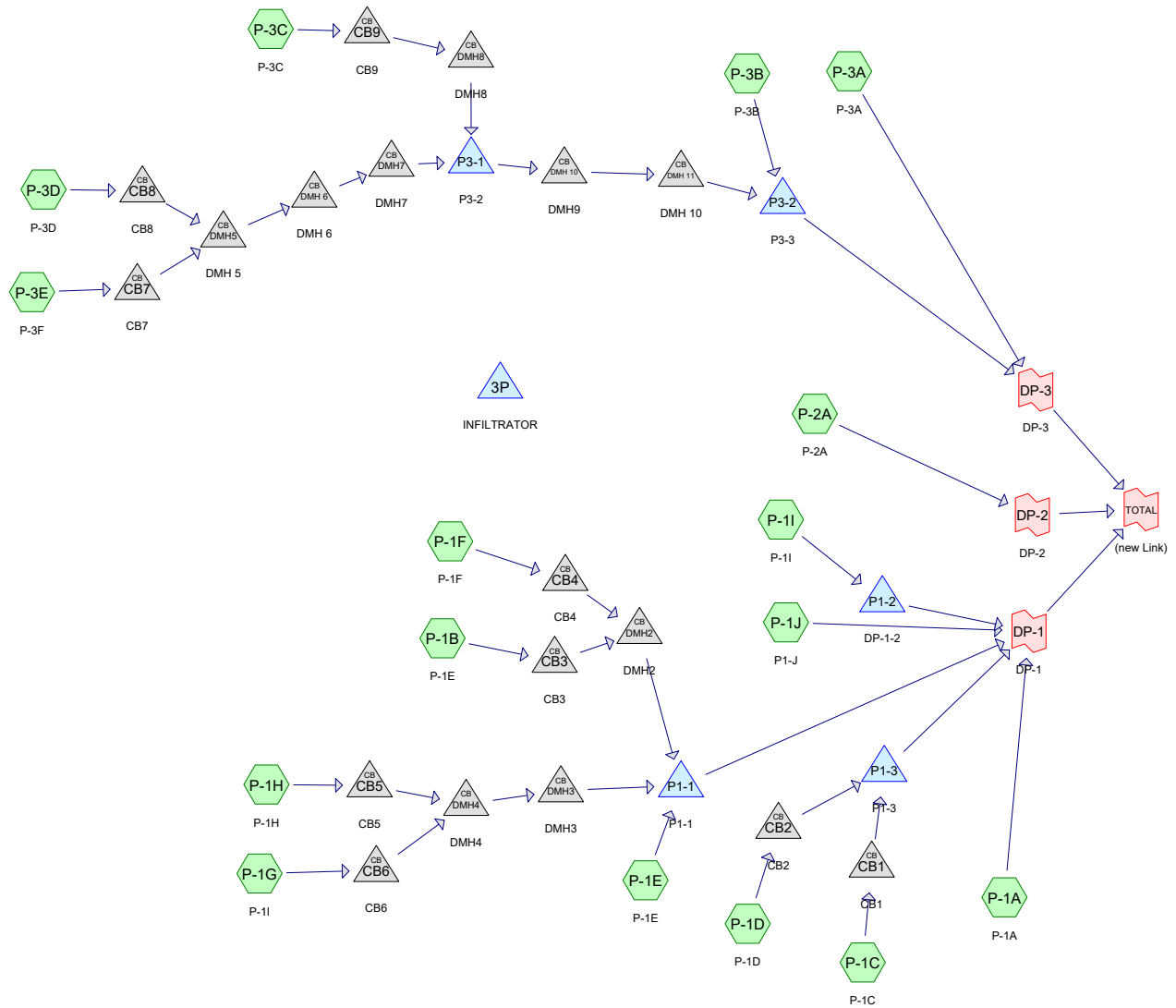
Link TOTAL: (new Link)





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**POST-DEVELOPMENT
HYDROCAD CALCULATIONS**



Drainage Diagram for Pearson Drive, Newbury, MA POST DEV
 Prepared by Ranger Engineering & Design, LLC, Printed 11/15/2017
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POST-DEVELOPMENT

2-Year Storm

Pearson Drive, Newbury, MA POST DEV

Prepared by Ranger Engineering & Design, LLC

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Printed 11/15/2017

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Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
65,816	55	Woods, Good, HSG B (P-1A,P-1E,P-1J,P-2A,P-3A)
181,177	61	>75% Grass cover, Good, HSG B (P-1A,P-1B,P-1C,P-1D,P-1E,P-1F,P-1G,P-1H,P-1I,P-1J,P-2A,P-2B,P-2C,P-2D,P-2E,P-2F,P-2G,P-2H,P-2I,P-2J,P-3A,P-3B,P-3C,P-3D,P-3E,P-3F,P-3G,P-3H,P-3I,P-3J)
51,224	98	Paved roads w/curbs & sewers, HSG B (P-1B,P-1C,P-1D,P-1F,P-1G,P-1H,P-1J,P-3C,P-3D,P-3E,P-3F,P-3G,P-3H,P-3I,P-3J)
42,240	98	Roofs, HSG B (P-1E,P-1F,P-1G,P-1H,P-1I,P-2A,P-3B,P-3C,P-3D,P-3E)
19,153	98	Water Surface, HSG B (P-1E,P-1I,P-3B)
359,610		TOTAL AREA

Pearson Drive, Newbury, MA POST DEV

Prepared by Ranger Engineering & Design, LLC

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Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
359,610	HSG B	P-1A, P-1B, P-1C, P-1D, P-1E, P-1F, P-1G, P-1H, P-1I, P-1J, P-2A, P-3A, P-3B, P-3C, P-3D
0	HSG C	
0	HSG D	
0	Other	
359,610		TOTAL AREA

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment P-1A: P-1A	Runoff Area=2,325 sf 0.00% Impervious Runoff Depth>0.28" Flow Length=106' Tc=5.0 min CN=56 Runoff=0.01 cfs 54 cf
Subcatchment P-1B: P-1E	Runoff Area=12,786 sf 39.18% Impervious Runoff Depth>1.09" Tc=5.0 min CN=75 Runoff=0.36 cfs 1,165 cf
Subcatchment P-1C: P-1C	Runoff Area=3,632 sf 56.17% Impervious Runoff Depth>1.54" Flow Length=301' Tc=1.8 min CN=82 Runoff=0.16 cfs 465 cf
Subcatchment P-1D: P-1D	Runoff Area=3,713 sf 81.12% Impervious Runoff Depth>2.26" Flow Length=235' Tc=1.4 min CN=91 Runoff=0.24 cfs 699 cf
Subcatchment P-1E: P-1E	Runoff Area=15,652 sf 37.11% Impervious Runoff Depth>1.04" Flow Length=108' Tc=5.0 min CN=74 Runoff=0.42 cfs 1,352 cf
Subcatchment P-1F: P-1F	Runoff Area=20,654 sf 69.31% Impervious Runoff Depth>1.91" Flow Length=272' Tc=5.0 min CN=87 Runoff=1.06 cfs 3,294 cf
Subcatchment P-1G: P-1I	Runoff Area=5,773 sf 64.25% Impervious Runoff Depth>1.76" Flow Length=177' Tc=5.0 min CN=85 Runoff=0.27 cfs 845 cf
Subcatchment P-1H: P-1H	Runoff Area=19,745 sf 42.54% Impervious Runoff Depth>1.21" Flow Length=158' Tc=5.0 min CN=77 Runoff=0.63 cfs 1,992 cf
Subcatchment P-1I: P-1I	Runoff Area=35,138 sf 15.99% Impervious Runoff Depth>0.69" Flow Length=170' Tc=8.2 min CN=67 Runoff=0.49 cfs 2,008 cf
Subcatchment P-1J: P-1J	Runoff Area=28,788 sf 0.31% Impervious Runoff Depth>0.31" Flow Length=280' Tc=6.1 min CN=57 Runoff=0.10 cfs 741 cf
Subcatchment P-2A: P-2A	Runoff Area=40,190 sf 10.95% Impervious Runoff Depth>0.44" Flow Length=156' Tc=5.0 min CN=61 Runoff=0.31 cfs 1,485 cf
Subcatchment P-3A: P-3A	Runoff Area=30,736 sf 0.00% Impervious Runoff Depth>0.34" Flow Length=260' Tc=5.0 min CN=58 Runoff=0.13 cfs 873 cf
Subcatchment P-3B: P-3B	Runoff Area=71,810 sf 34.04% Impervious Runoff Depth>1.04" Flow Length=128' Tc=5.0 min CN=74 Runoff=1.91 cfs 6,203 cf
Subcatchment P-3C: P-3C	Runoff Area=41,660 sf 48.12% Impervious Runoff Depth>1.34" Flow Length=153' Tc=5.0 min CN=79 Runoff=1.48 cfs 4,637 cf
Subcatchment P-3D: P-3D	Runoff Area=22,478 sf 56.13% Impervious Runoff Depth>1.54" Flow Length=240' Tc=5.0 min CN=82 Runoff=0.93 cfs 2,879 cf
Subcatchment P-3E: P-3F	Runoff Area=4,530 sf 68.52% Impervious Runoff Depth>1.83" Flow Length=245' Tc=5.0 min CN=86 Runoff=0.22 cfs 692 cf

Pond 3P: INFILTRATOR

Peak Elev=0.00' Storage=0 cf

Pond CB1: CB1Peak Elev=50.84' Inflow=0.16 cfs 465 cf
8.0" x 9.0' Culvert Outflow=0.16 cfs 465 cf**Pond CB2: CB2**Peak Elev=50.89' Inflow=0.24 cfs 699 cf
8.0" x 9.0' Culvert Outflow=0.24 cfs 699 cf**Pond CB3: CB3**Peak Elev=52.95' Inflow=0.36 cfs 1,165 cf
12.0" x 12.0' Culvert Outflow=0.36 cfs 1,165 cf**Pond CB4: CB4**Peak Elev=53.06' Inflow=1.06 cfs 3,294 cf
12.0" x 11.0' Culvert Outflow=1.06 cfs 3,294 cf**Pond CB5: CB5**Peak Elev=61.43' Inflow=0.63 cfs 1,992 cf
12.0" x 13.0' Culvert Outflow=0.63 cfs 1,992 cf**Pond CB6: CB6**Peak Elev=61.28' Inflow=0.27 cfs 845 cf
12.0" x 13.0' Culvert Outflow=0.27 cfs 845 cf**Pond CB7: CB7**Peak Elev=66.35' Inflow=0.22 cfs 692 cf
12.0" x 20.0' Culvert Outflow=0.22 cfs 692 cf**Pond CB8: CB8**Peak Elev=66.52' Inflow=0.93 cfs 2,879 cf
12.0" x 20.0' Culvert Outflow=0.93 cfs 2,879 cf**Pond CB9: CB9**Peak Elev=66.01' Inflow=1.48 cfs 4,637 cf
12.0" x 22.0' Culvert Outflow=1.48 cfs 4,637 cf**Pond DMH 10: DMH9**Peak Elev=61.37' Inflow=0.64 cfs 5,770 cf
15.0" x 100.0' Culvert Outflow=0.64 cfs 5,770 cf**Pond DMH 11: DMH 10**Peak Elev=55.61' Inflow=0.64 cfs 5,770 cf
15.0" x 33.0' Culvert Outflow=0.64 cfs 5,770 cf**Pond DMH 6: DMH 6**Peak Elev=65.80' Inflow=1.15 cfs 3,571 cf
15.0" x 55.0' Culvert Outflow=1.15 cfs 3,571 cf**Pond DMH2: DMH2**Peak Elev=52.92' Inflow=1.42 cfs 4,458 cf
12.0" x 39.0' Culvert Outflow=1.42 cfs 4,458 cf**Pond DMH3: DMH3**Peak Elev=55.75' Inflow=0.90 cfs 2,837 cf
12.0" x 35.0' Culvert Outflow=0.90 cfs 2,837 cf**Pond DMH4: DMH4**Peak Elev=58.74' Inflow=0.90 cfs 2,837 cf
12.0" x 119.0' Culvert Outflow=0.90 cfs 2,837 cf**Pond DMH5: DMH 5**Peak Elev=66.32' Inflow=1.15 cfs 3,571 cf
15.0" x 94.0' Culvert Outflow=1.15 cfs 3,571 cf**Pond DMH7: DMH7**Peak Elev=65.49' Inflow=1.15 cfs 3,571 cf
Outflow=1.15 cfs 3,571 cf

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Type III 24-hr 2 year Rainfall=3.20"

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Pond DMH8: DMH8Peak Elev=65.82' Inflow=1.48 cfs 4,637 cf
12.0" x 1.0' Culvert Outflow=1.48 cfs 4,637 cf**Pond P1-1: P1-1**Peak Elev=52.74' Storage=4,947 cf Inflow=2.74 cfs 8,647 cf
Outflow=0.14 cfs 5,637 cf**Pond P1-2: DP-1-2**Peak Elev=57.38' Storage=1,405 cf Inflow=0.49 cfs 2,008 cf
Outflow=0.02 cfs 619 cf**Pond P1-3: P1-3**Peak Elev=50.83' Storage=502 cf Inflow=0.40 cfs 1,164 cf
Outflow=0.08 cfs 1,023 cf**Pond P3-1: P3-2**Peak Elev=65.48' Storage=3,501 cf Inflow=2.63 cfs 8,208 cf
Outflow=0.64 cfs 5,770 cf**Pond P3-2: P3-3**Peak Elev=51.88' Storage=7,133 cf Inflow=1.91 cfs 11,973 cf
Outflow=0.14 cfs 5,783 cf**Link DP-1: DP-1**Inflow=0.30 cfs 8,075 cf
Primary=0.30 cfs 8,075 cf**Link DP-2: DP-2**Inflow=0.31 cfs 1,485 cf
Primary=0.31 cfs 1,485 cf**Link DP-3: DP-3**Inflow=0.20 cfs 6,656 cf
Primary=0.20 cfs 6,656 cf**Link TOTAL: (new Link)**Inflow=0.76 cfs 16,216 cf
Primary=0.76 cfs 16,216 cf**Total Runoff Area = 359,610 sf Runoff Volume = 29,384 cf Average Runoff Depth = 0.98"**
68.68% Pervious = 246,993 sf 31.32% Impervious = 112,617 sf

Summary for Subcatchment P-1A: P-1A

Runoff = 0.01 cfs @ 12.29 hrs, Volume= 54 cf, Depth> 0.28"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

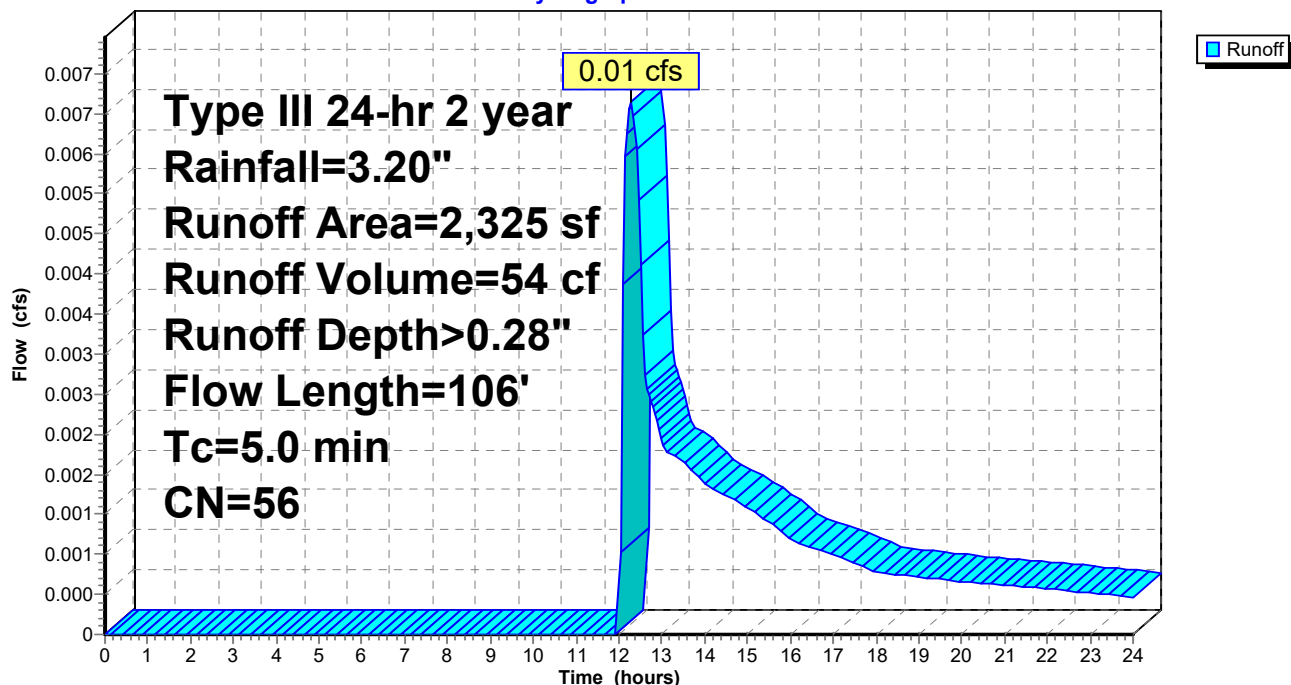
Type III 24-hr 2 year Rainfall=3.20"

Area (sf)	CN	Description
1,780	55	Woods, Good, HSG B
545	61	>75% Grass cover, Good, HSG B
0	98	Roofs, HSG B
0	98	Paved parking, HSG B
0	98	Paved roads w/curbs & sewers, HSG B
2,325	56	Weighted Average
2,325		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1					Direct Entry, DIRECT
3.2	50	0.0800	0.26		Sheet Flow, SHEET FLOW
					Grass: Short n= 0.150 P2= 3.20"
0.7	56	0.0357	1.32		Shallow Concentrated Flow, GRASS
					Short Grass Pasture Kv= 7.0 fps
5.0	106	Total			

Subcatchment P-1A: P-1A

Hydrograph



Summary for Subcatchment P-1B: P-1E

Runoff = 0.36 cfs @ 12.09 hrs, Volume= 1,165 cf, Depth> 1.09"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

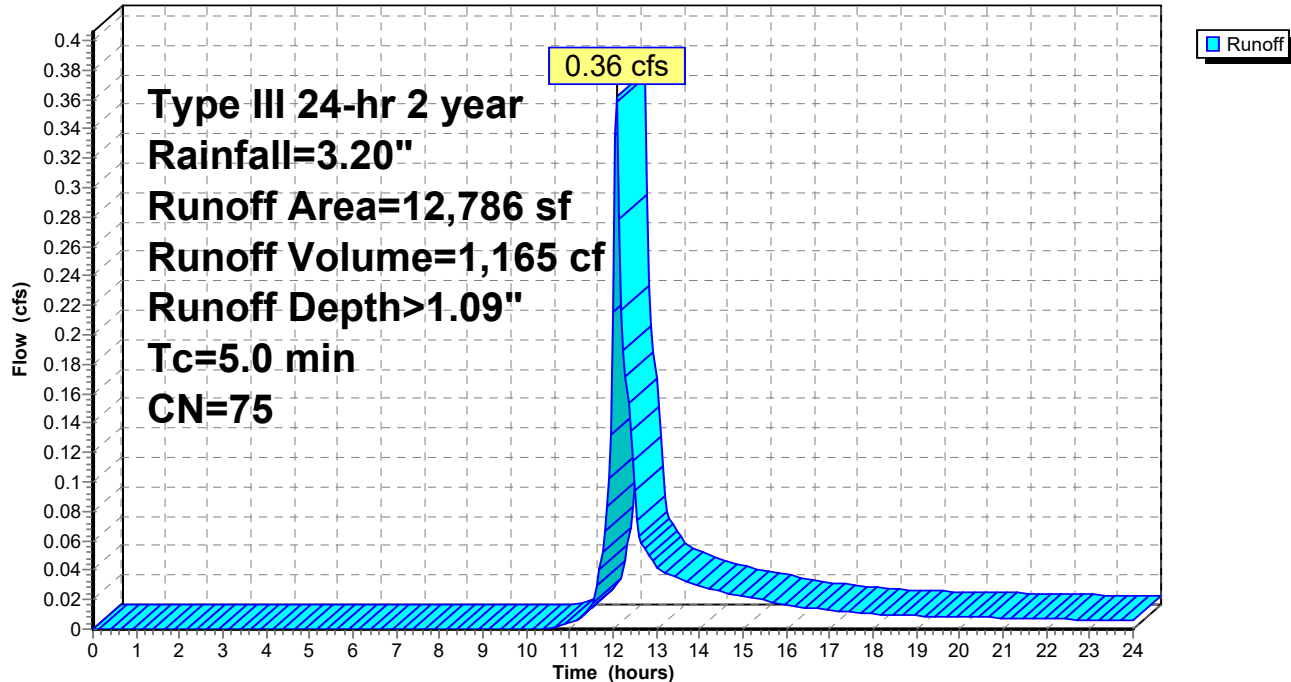
Type III 24-hr 2 year Rainfall=3.20"

Area (sf)	CN	Description
0	98	Roofs, HSG B
5,009	98	Paved roads w/curbs & sewers, HSG B
7,777	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
0	98	Water Surface, HSG B
12,786	75	Weighted Average
7,777		Pervious Area
5,009		Impervious Area

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

Subcatchment P-1B: P-1E

Hydrograph



Summary for Subcatchment P-1C: P-1C

Runoff = 0.16 cfs @ 12.04 hrs, Volume= 465 cf, Depth> 1.54"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

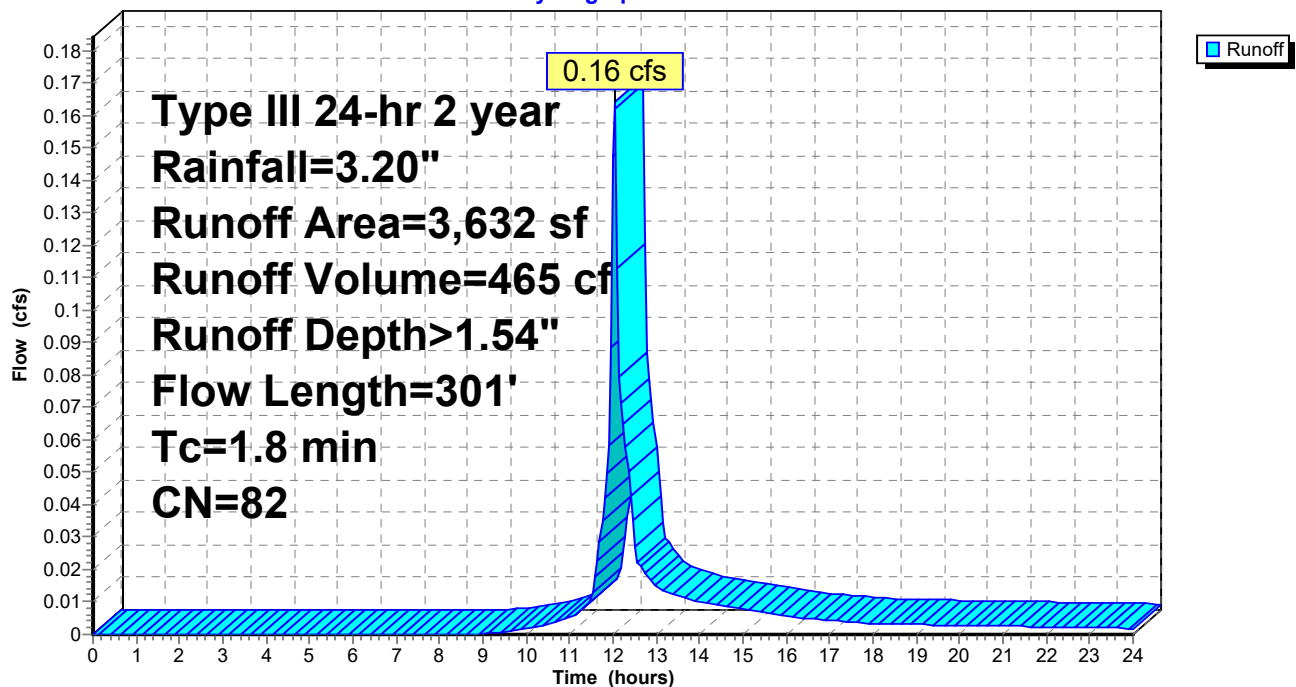
Type III 24-hr 2 year Rainfall=3.20"

Area (sf)	CN	Description
0	98	Roofs, HSG B
0	98	Paved parking, HSG B
2,040	98	Paved roads w/curbs & sewers, HSG B
1,592	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
3,632	82	Weighted Average
1,592		Pervious Area
2,040		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	50	0.0300	1.41		Sheet Flow, SHEET
					Smooth surfaces n= 0.011 P2= 3.20"
1.2	251	0.0287	3.44		Shallow Concentrated Flow, PAVEMENT
					Paved Kv= 20.3 fps
1.8	301	Total			

Subcatchment P-1C: P-1C

Hydrograph



Summary for Subcatchment P-1D: P-1D

Runoff = 0.24 cfs @ 12.02 hrs, Volume= 699 cf, Depth> 2.26"

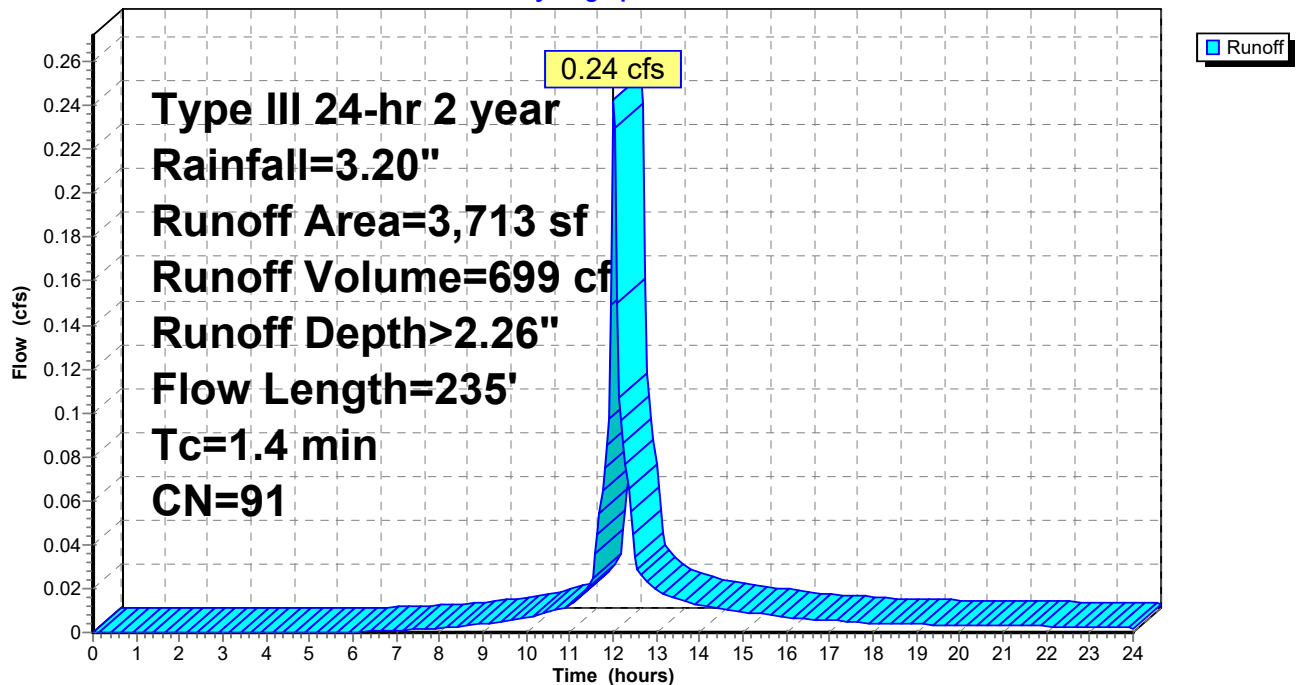
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 year Rainfall=3.20"

Area (sf)	CN	Description
0	98	Roofs, HSG B
0	98	Paved parking, HSG B
3,012	98	Paved roads w/curbs & sewers, HSG B
701	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
3,713	91	Weighted Average
701		Pervious Area
3,012		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0400	1.58		Sheet Flow, SHEET
					Smooth surfaces n= 0.011 P2= 3.20"
0.9	185	0.0282	3.41		Shallow Concentrated Flow, PAVEMENT
					Paved Kv= 20.3 fps
1.4	235	Total			

Subcatchment P-1D: P-1D

Hydrograph



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Type III 24-hr 2 year Rainfall=3.20"

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Summary for Subcatchment P-1E: P-1E

Runoff = 0.42 cfs @ 12.09 hrs, Volume= 1,352 cf, Depth> 1.04"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

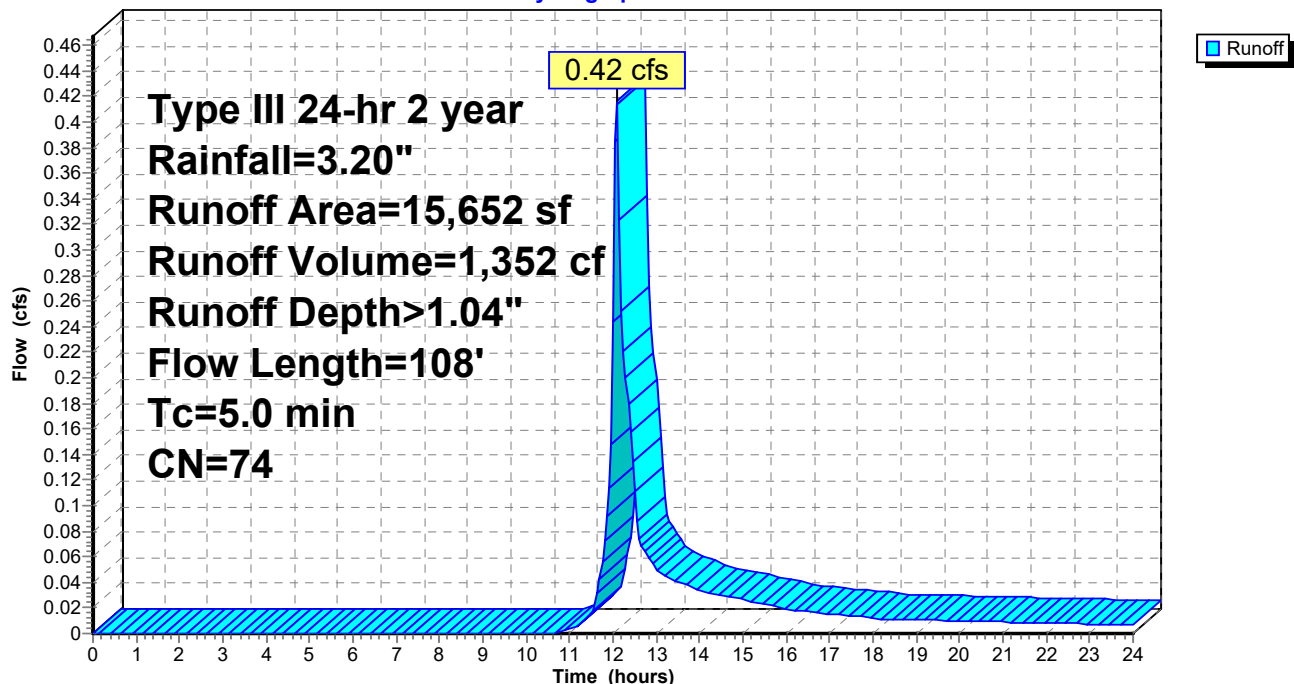
Type III 24-hr 2 year Rainfall=3.20"

Area (sf)	CN	Description
880	98	Roofs, HSG B
0	98	Paved parking, HSG B
0	98	Paved roads w/curbs & sewers, HSG B
8,844	61	>75% Grass cover, Good, HSG B
4,928	98	Water Surface, HSG B
1,000	55	Woods, Good, HSG B
15,652	74	Weighted Average
9,844		Pervious Area
5,808		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4					Direct Entry, DIRECT
3.3	50	0.0760	0.25		Sheet Flow, SHEET
					Grass: Short n= 0.150 P2= 3.20"
0.3	58	0.1897	3.05		Shallow Concentrated Flow, GRASS
					Short Grass Pasture Kv= 7.0 fps
5.0	108	Total			

Subcatchment P-1E: P-1E

Hydrograph



Summary for Subcatchment P-1F: P-1F

Runoff = 1.06 cfs @ 12.08 hrs, Volume= 3,294 cf, Depth> 1.91"

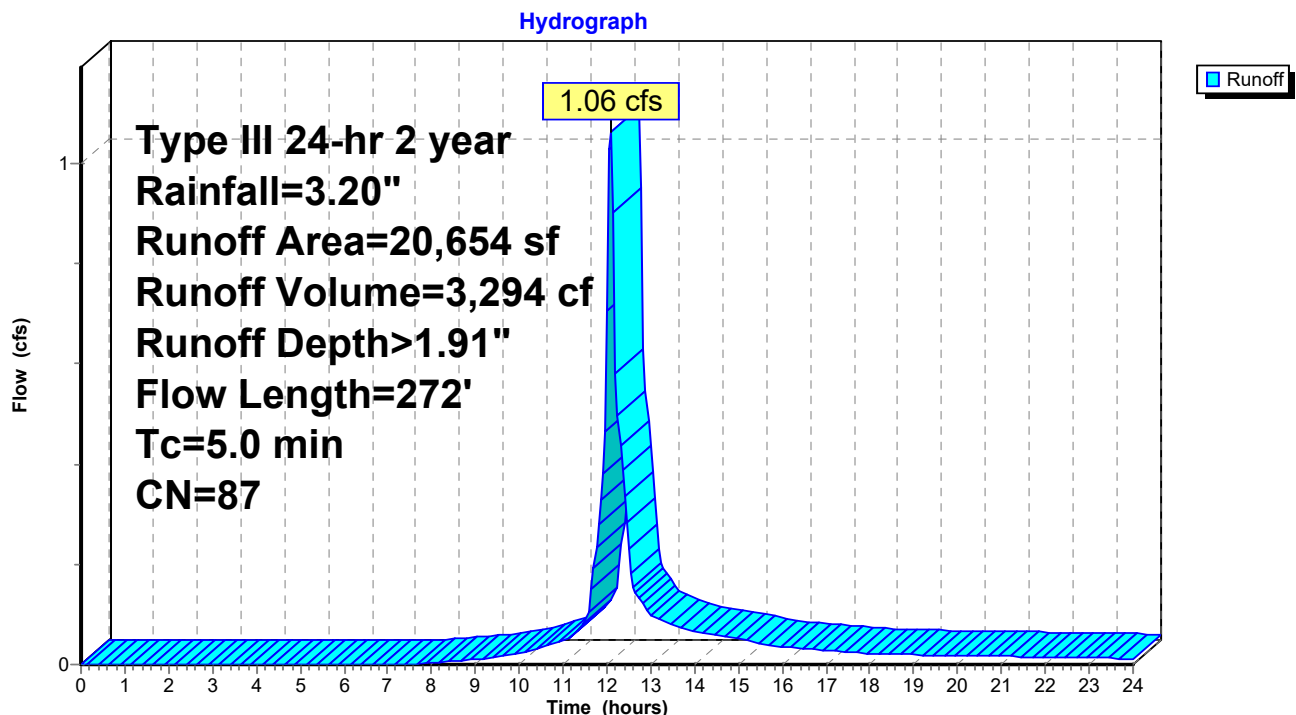
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 2 year Rainfall=3.20"

Area (sf)	CN	Description
4,840	98	Roofs, HSG B
0	98	Paved parking, HSG B
9,476	98	Paved roads w/curbs & sewers, HSG B
6,338	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
0	98	Water Surface, HSG B
20,654	87	Weighted Average
6,338		Pervious Area
14,316		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0					Direct Entry, DIRECT
3.0	50	0.1000	0.28		Sheet Flow, SHEET
					Grass: Short n= 0.150 P2= 3.20"
2.0	222	0.0676	1.82		Shallow Concentrated Flow, GRASS
					Short Grass Pasture Kv= 7.0 fps
5.0	272	Total			

Subcatchment P-1F: P-1F



Summary for Subcatchment P-1G: P-1I

Runoff = 0.27 cfs @ 12.08 hrs, Volume= 845 cf, Depth> 1.76"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

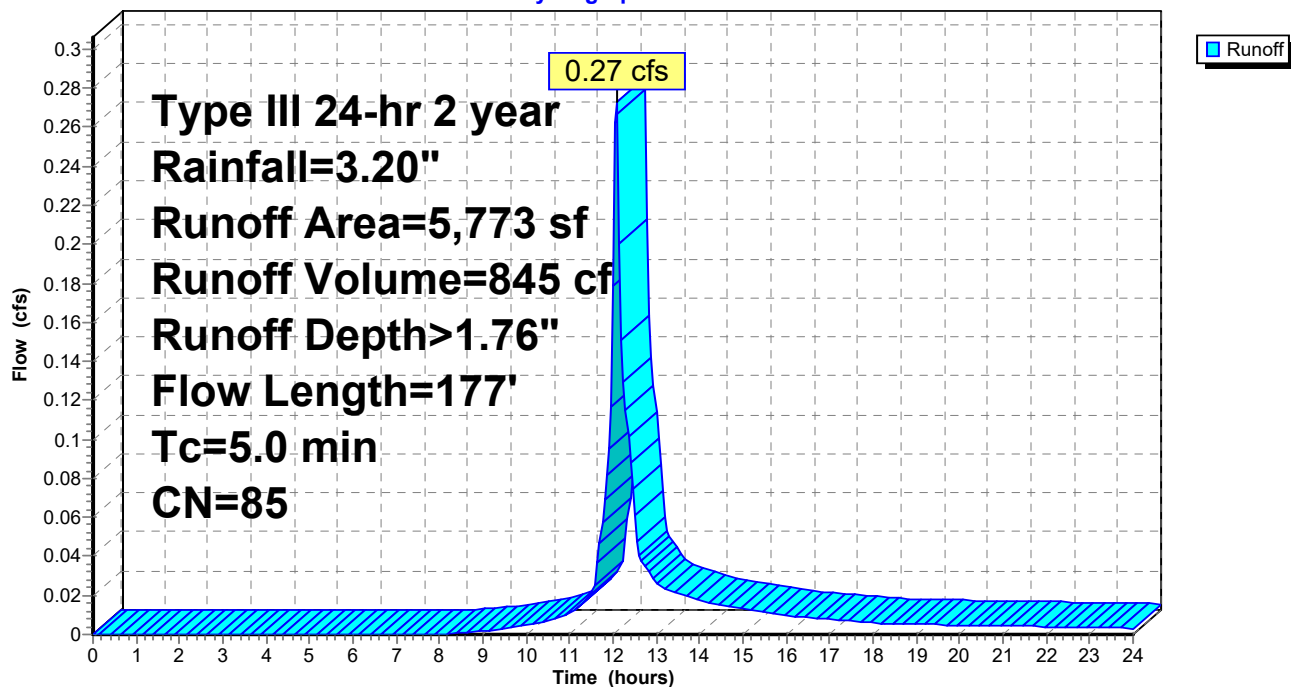
Type III 24-hr 2 year Rainfall=3.20"

Area (sf)	CN	Description
0	55	Woods, Good, HSG B
2,064	61	>75% Grass cover, Good, HSG B
440	98	Roofs, HSG B
3,269	98	Paved roads w/curbs & sewers, HSG B
5,773	85	Weighted Average
2,064		Pervious Area
3,709		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7					Direct Entry, DIRECT
0.6	50	0.0300	1.41		Sheet Flow, SHEET FLOW
					Smooth surfaces n= 0.011 P2= 3.20"
0.7	127	0.0197	2.85		Shallow Concentrated Flow, PAVED
					Paved Kv= 20.3 fps
5.0	177	Total			

Subcatchment P-1G: P-1I

Hydrograph



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Type III 24-hr 2 year Rainfall=3.20"

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Summary for Subcatchment P-1H: P-1H

Runoff = 0.63 cfs @ 12.08 hrs, Volume= 1,992 cf, Depth> 1.21"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

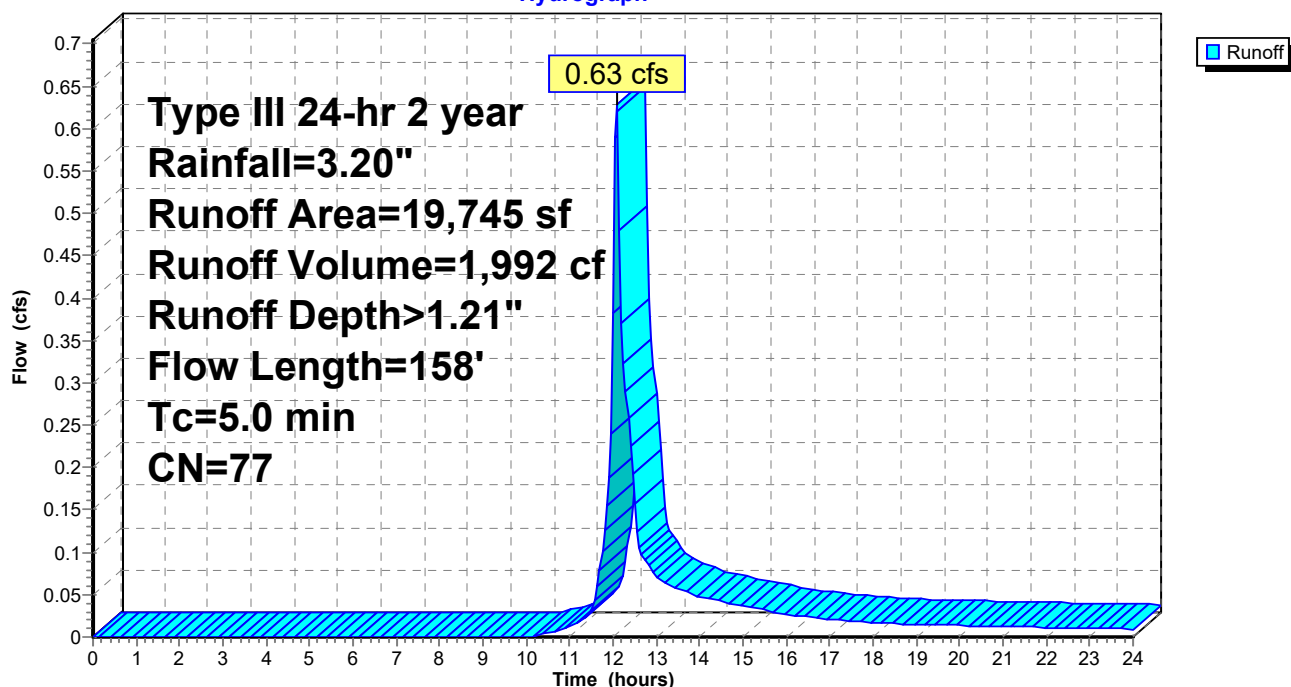
Type III 24-hr 2 year Rainfall=3.20"

Area (sf)	CN	Description
5,720	98	Roofs, HSG B
0	98	Paved parking, HSG B
2,679	98	Paved roads w/curbs & sewers, HSG B
11,346	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
19,745	77	Weighted Average
11,346		Pervious Area
8,399		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.8					Direct Entry, DIRECT
0.6	50	0.0300	1.41		Sheet Flow, SHEET
					Smooth surfaces n= 0.011 P2= 3.20"
0.6	108	0.0231	3.09		Shallow Concentrated Flow, PAVEMENT
					Paved Kv= 20.3 fps
5.0	158	Total			

Subcatchment P-1H: P-1H

Hydrograph



Summary for Subcatchment P-1I: P-1I

Runoff = 0.49 cfs @ 12.14 hrs, Volume= 2,008 cf, Depth> 0.69"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

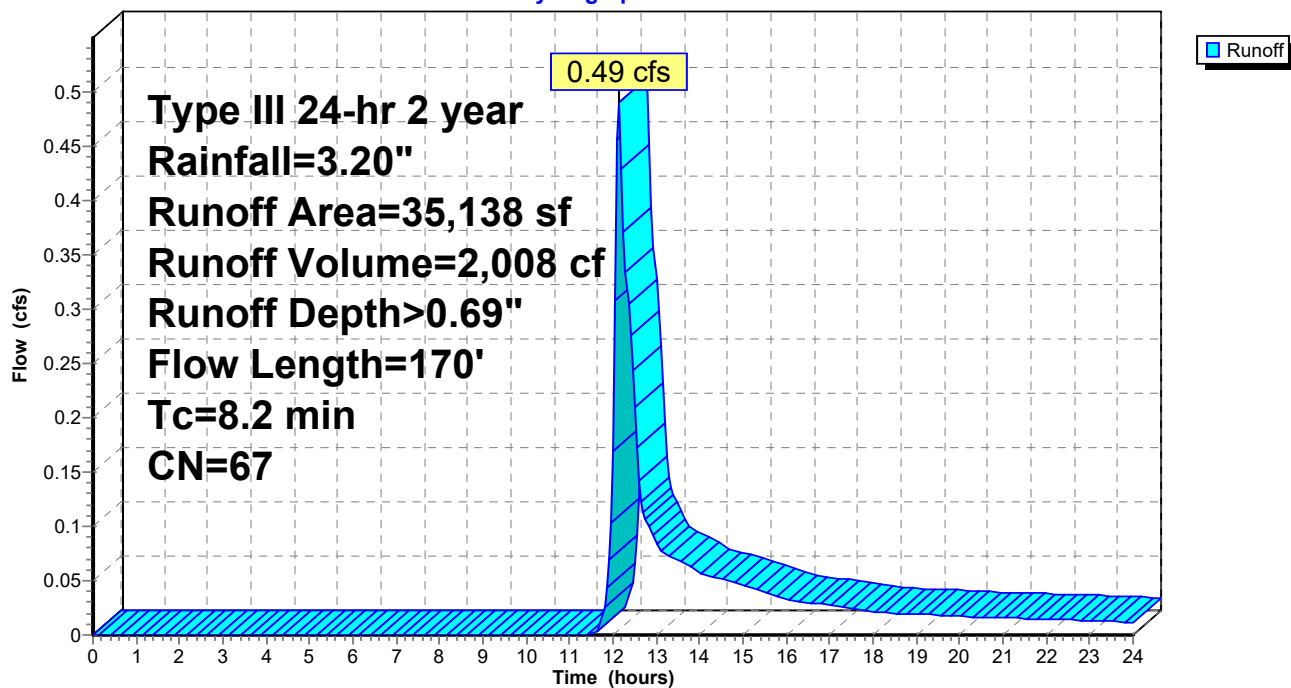
Type III 24-hr 2 year Rainfall=3.20"

Area (sf)	CN	Description
440	98	Roofs, HSG B
0	98	Paved parking, HSG B
0	98	Paved roads w/curbs & sewers, HSG B
29,518	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
5,180	98	Water Surface, HSG B
35,138	67	Weighted Average
29,518		Pervious Area
5,620		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.1000	0.13		Sheet Flow, SHEET
					Woods: Light underbrush n= 0.400 P2= 3.20"
1.7	120	0.0580	1.20		Shallow Concentrated Flow, GRASS
					Woodland Kv= 5.0 fps
8.2	170	Total			

Subcatchment P-1I: P-1I

Hydrograph



Summary for Subcatchment P-1J: P1-J

Runoff = 0.10 cfs @ 12.28 hrs, Volume= 741 cf, Depth> 0.31"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

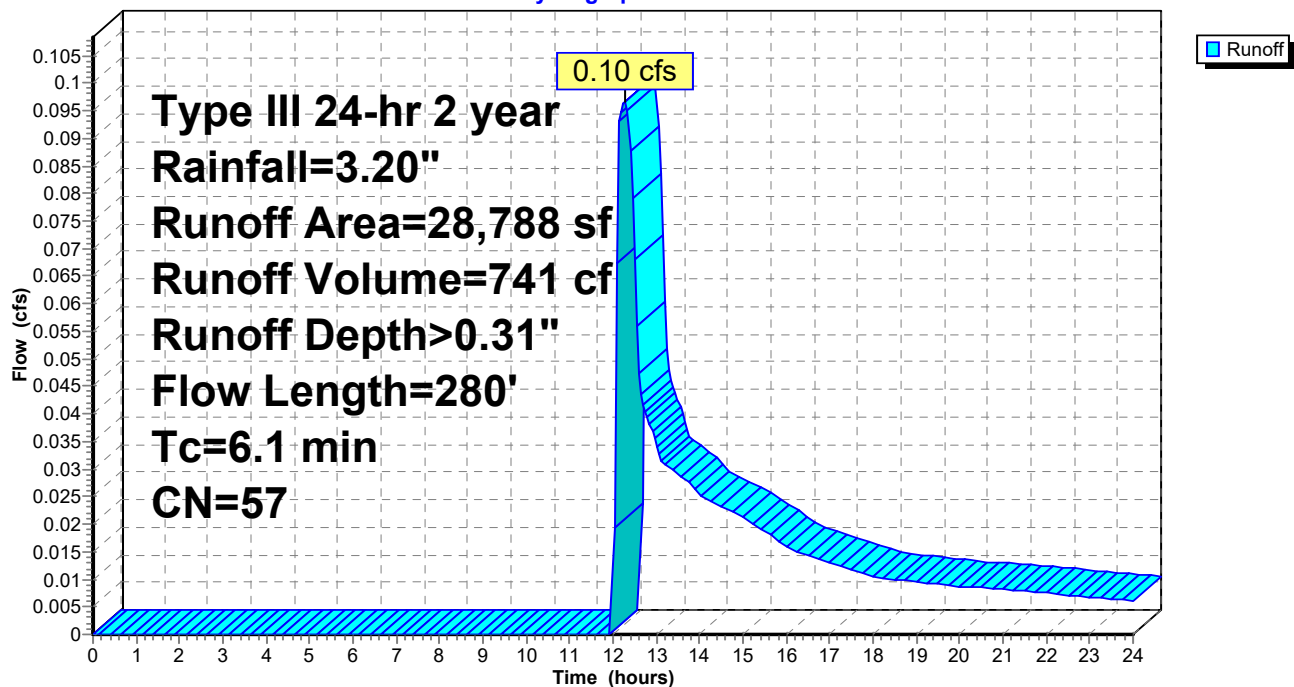
Type III 24-hr 2 year Rainfall=3.20"

Area (sf)	CN	Description
21,119	55	Woods, Good, HSG B
7,579	61	>75% Grass cover, Good, HSG B
* 90	98	Paved roads w/curbs & sewers, HSG B
28,788	57	Weighted Average
28,698		Pervious Area
90		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.2	50	0.0800	0.26		Sheet Flow, Flow over grass Grass: Short n= 0.150 P2= 3.20"
2.9	230	0.0690	1.31		Shallow Concentrated Flow, Flow in woods Woodland Kv= 5.0 fps
6.1	280	Total			

Subcatchment P-1J: P1-J

Hydrograph



Summary for Subcatchment P-2A: P-2A

Runoff = 0.31 cfs @ 12.11 hrs, Volume= 1,485 cf, Depth> 0.44"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

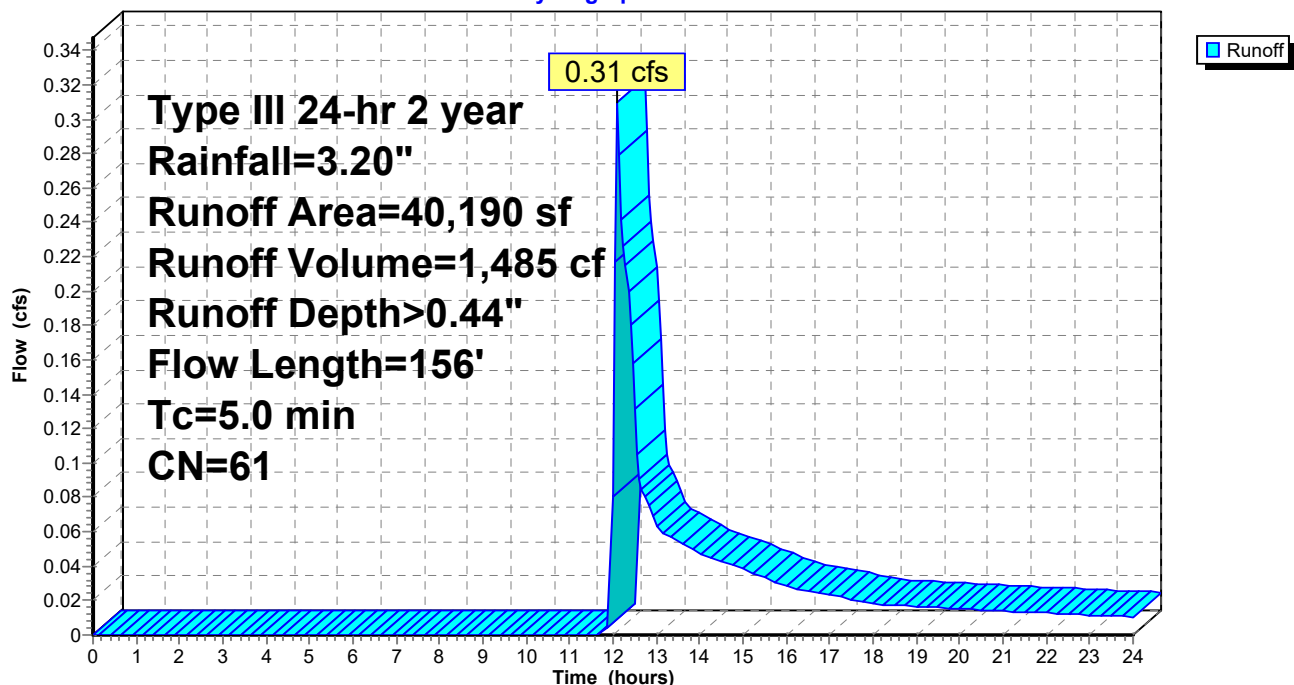
Type III 24-hr 2 year Rainfall=3.20"

Area (sf)	CN	Description
4,400	98	Roofs, HSG B
0	98	Paved parking, HSG B
0	98	Paved roads w/curbs & sewers, HSG B
10,645	61	>75% Grass cover, Good, HSG B
25,145	55	Woods, Good, HSG B
40,190	61	Weighted Average
35,790		Pervious Area
4,400		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3					Direct Entry, DIRECT
3.9	50	0.0500	0.21		Sheet Flow, SHEET GRASS Grass: Short n= 0.150 P2= 3.20"
0.8	106	0.1085	2.31		Shallow Concentrated Flow, GRASS SHALLOW Short Grass Pasture Kv= 7.0 fps
5.0	156	Total			

Subcatchment P-2A: P-2A

Hydrograph



Summary for Subcatchment P-3A: P-3A

Runoff = 0.13 cfs @ 12.15 hrs, Volume= 873 cf, Depth> 0.34"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

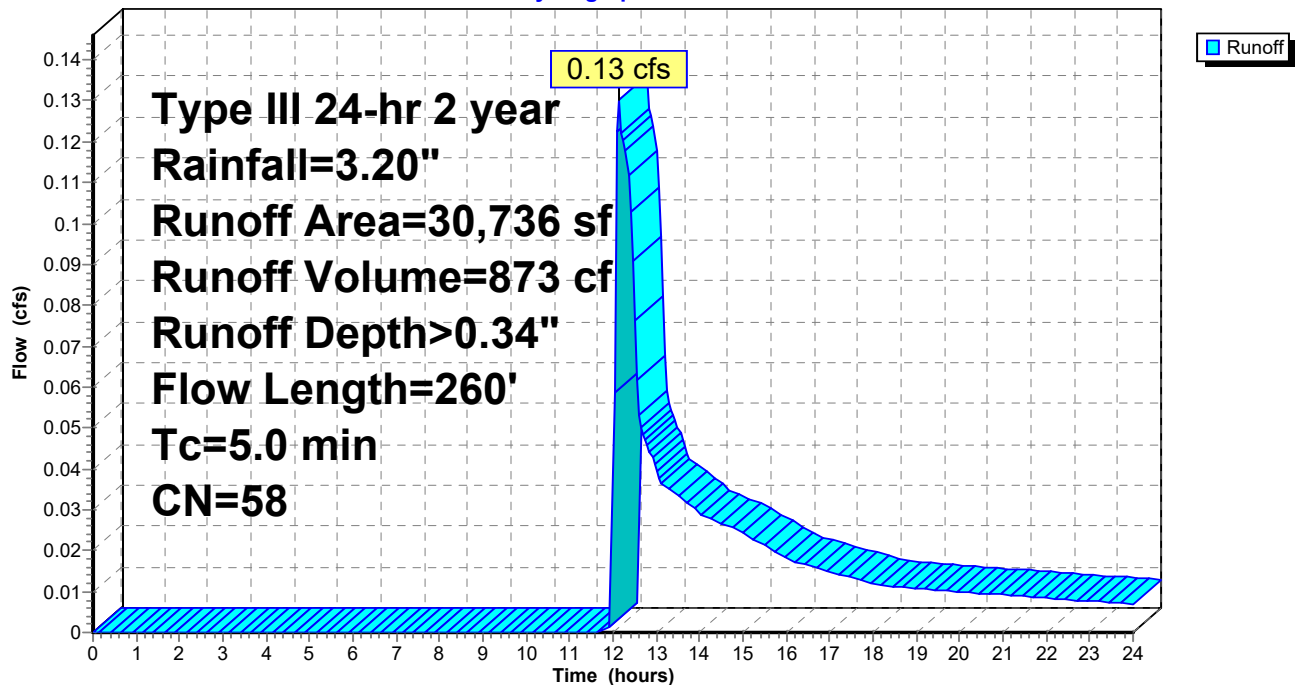
Type III 24-hr 2 year Rainfall=3.20"

Area (sf)	CN	Description
0	98	Roofs, HSG B
0	98	Unconnected pavement, HSG B
0	98	Paved roads w/curbs & sewers, HSG B
13,964	61	>75% Grass cover, Good, HSG B
16,772	55	Woods, Good, HSG B
30,736	58	Weighted Average
30,736		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0					Direct Entry, DIRECT
2.0	50	0.2700	0.42		Sheet Flow, SHEET GRASS
					Grass: Short n= 0.150 P2= 3.20"
2.0	210	0.0595	1.71		Shallow Concentrated Flow, SHALLOW GRASS
					Short Grass Pasture Kv= 7.0 fps
5.0	260	Total			

Subcatchment P-3A: P-3A

Hydrograph



Summary for Subcatchment P-3B: P-3B

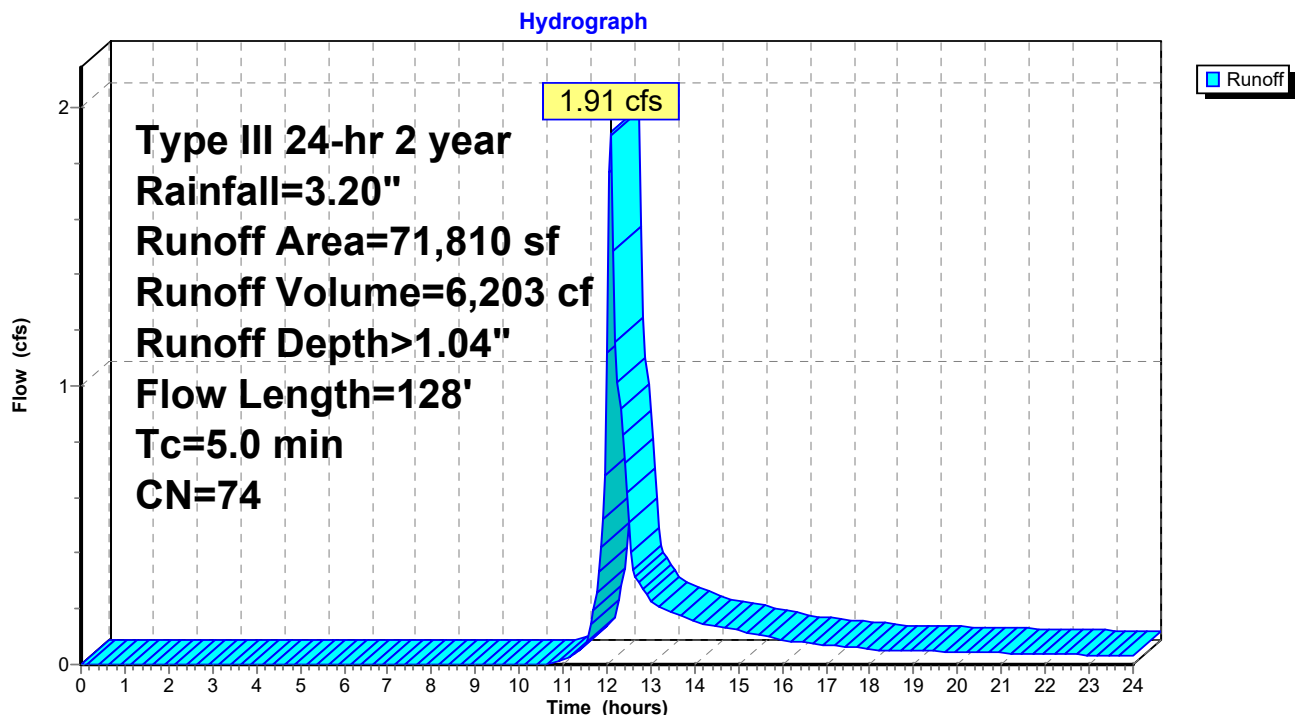
Runoff = 1.91 cfs @ 12.09 hrs, Volume= 6,203 cf, Depth> 1.04"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 year Rainfall=3.20"

Area (sf)	CN	Description
15,400	98	Roofs, HSG B
0	98	Paved parking, HSG B
0	98	Paved roads w/curbs & sewers, HSG B
47,365	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
9,045	98	Water Surface, HSG B
71,810	74	Weighted Average
47,365		Pervious Area
24,445		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8					Direct Entry, DIRECT
2.7	50	0.1300	0.31		Sheet Flow, SHEET GRASS
					Grass: Short n= 0.150 P2= 3.20"
0.5	78	0.1218	2.44		Shallow Concentrated Flow, SHALLOW GRASS
					Short Grass Pasture Kv= 7.0 fps
5.0	128	Total			

Subcatchment P-3B: P-3B



Summary for Subcatchment P-3C: P-3C

Runoff = 1.48 cfs @ 12.08 hrs, Volume= 4,637 cf, Depth> 1.34"

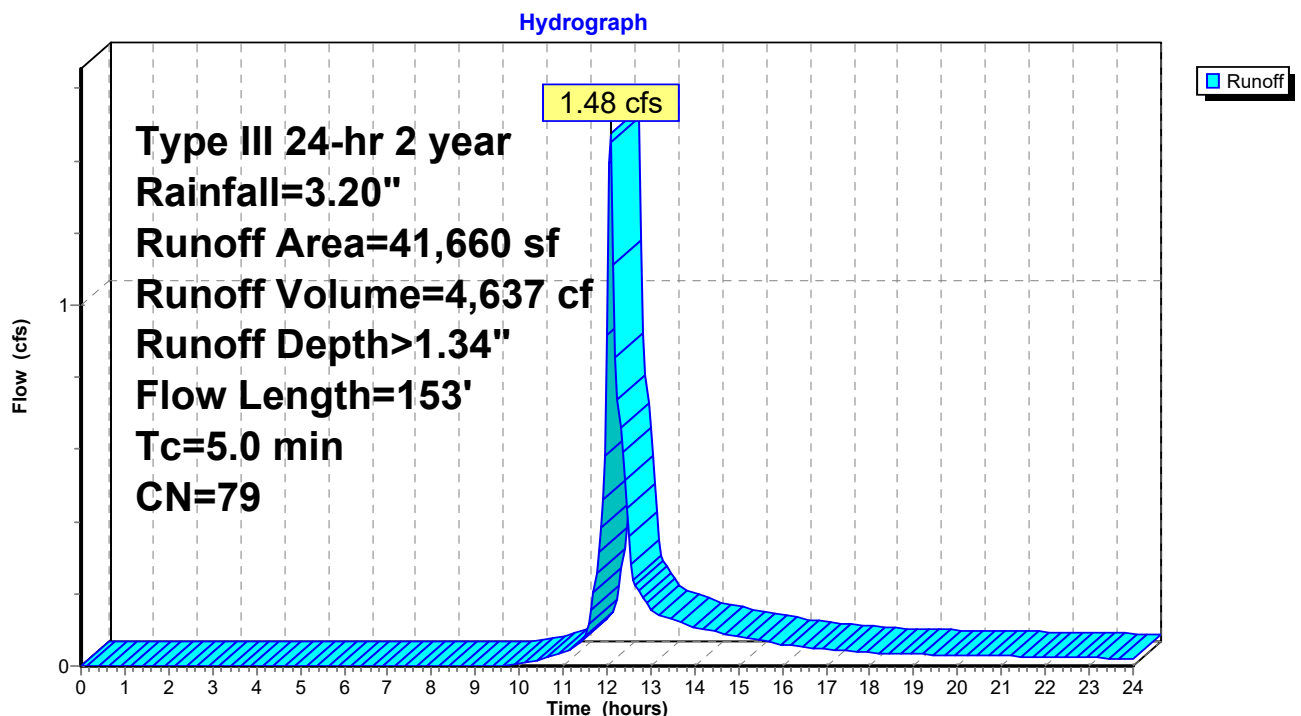
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 2 year Rainfall=3.20"

Area (sf)	CN	Description
3,520	98	Roofs, HSG B
0	98	Paved parking, HSG B
16,527	98	Paved roads w/curbs & sewers, HSG B
21,613	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
41,660	79	Weighted Average
21,613		Pervious Area
20,047		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3					Direct Entry, DIRECT
0.9	50	0.0096	0.89		Sheet Flow, SHEET PAVEMENT
					Smooth surfaces n= 0.011 P2= 3.20"
0.8	103	0.0116	2.19		Shallow Concentrated Flow, SHALLOW PAVEMENT
					Paved Kv= 20.3 fps
5.0	153	Total			

Subcatchment P-3C: P-3C



Summary for Subcatchment P-3D: P-3D

Runoff = 0.93 cfs @ 12.08 hrs, Volume= 2,879 cf, Depth> 1.54"

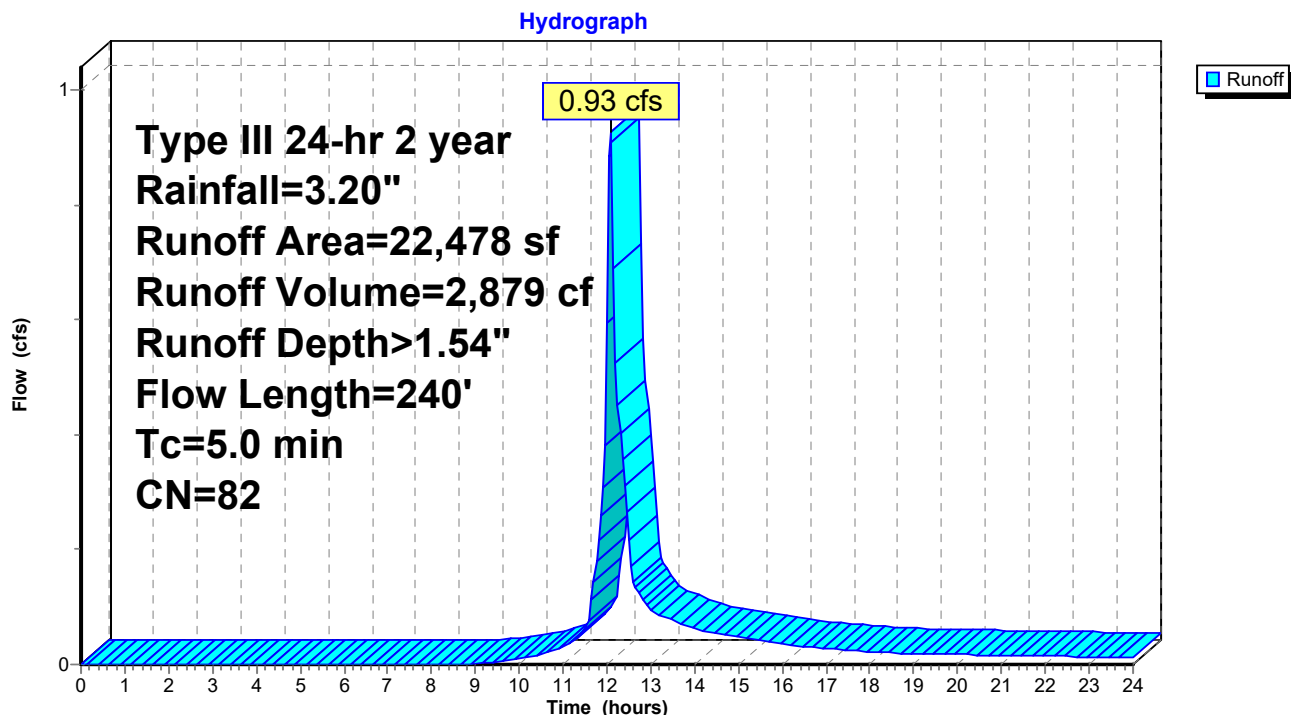
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 2 year Rainfall=3.20"

Area (sf)	CN	Description
6,160	98	Roofs, HSG B
6,458	98	Paved roads w/curbs & sewers, HSG B
9,860	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
22,478	82	Weighted Average
9,860		Pervious Area
12,618		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1					Direct Entry, DIRECT
1.3	50	0.0040	0.63		Sheet Flow, SHEET PAVEMENT
					Smooth surfaces n= 0.011 P2= 3.20"
1.6	190	0.0095	1.98		Shallow Concentrated Flow, SHALLOW PAVEMENT
					Paved Kv= 20.3 fps
5.0	240	Total			

Subcatchment P-3D: P-3D



Summary for Subcatchment P-3E: P-3F

Runoff = 0.22 cfs @ 12.08 hrs, Volume= 692 cf, Depth> 1.83"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

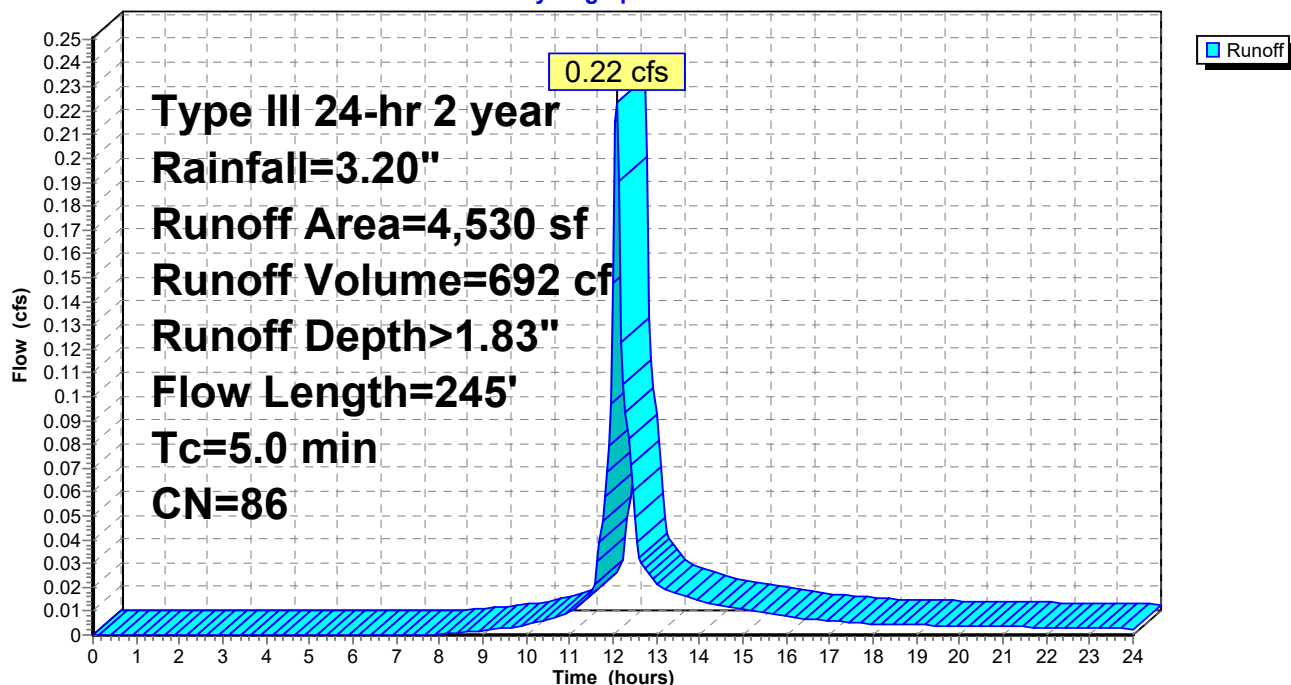
Type III 24-hr 2 year Rainfall=3.20"

Area (sf)	CN	Description
440	98	Roofs, HSG B
0	98	Paved parking, HSG B
2,664	98	Paved roads w/curbs & sewers, HSG B
1,426	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
4,530	86	Weighted Average
1,426		Pervious Area
3,104		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0					Direct Entry, DIRECT
1.3	50	0.0040	0.63		Sheet Flow, SHEET PAVEMENT
					Smooth surfaces n= 0.011 P2= 3.20"
1.7	195	0.0092	1.95		Shallow Concentrated Flow, SHALLOW PAVEMENT
					Paved Kv= 20.3 fps
5.0	245	Total			

Subcatchment P-3E: P-3F

Hydrograph



Summary for Pond 3P: INFILTRATOR

Routing by Dyn-Stor-Ind method

Peak Elev= 0.00' @ 0.00 hrs Surf.Area= 50 sf Storage= 0 cf

Plug-Flow detention time= (not calculated)

Center-of-Mass det. time= (not calculated)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	52 cf	5.00'W x 10.00'L x 3.50'H Prismatoid 175 cf Overall - 46 cf Embedded = 129 cf x 40.0% Voids
#2	0.00'	46 cf	44.6"W x 30.0"H x 7.12'L StormTech SC-740 Inside #1
		98 cf	Total Available Storage

Summary for Pond CB1: CB1

Inflow Area = 3,632 sf, 56.17% Impervious, Inflow Depth > 1.54" for 2 year event
 Inflow = 0.16 cfs @ 12.04 hrs, Volume= 465 cf
 Outflow = 0.16 cfs @ 12.04 hrs, Volume= 465 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.16 cfs @ 12.04 hrs, Volume= 465 cf

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

Peak Elev= 50.84' @ 12.48 hrs

Flood Elev= 53.86'

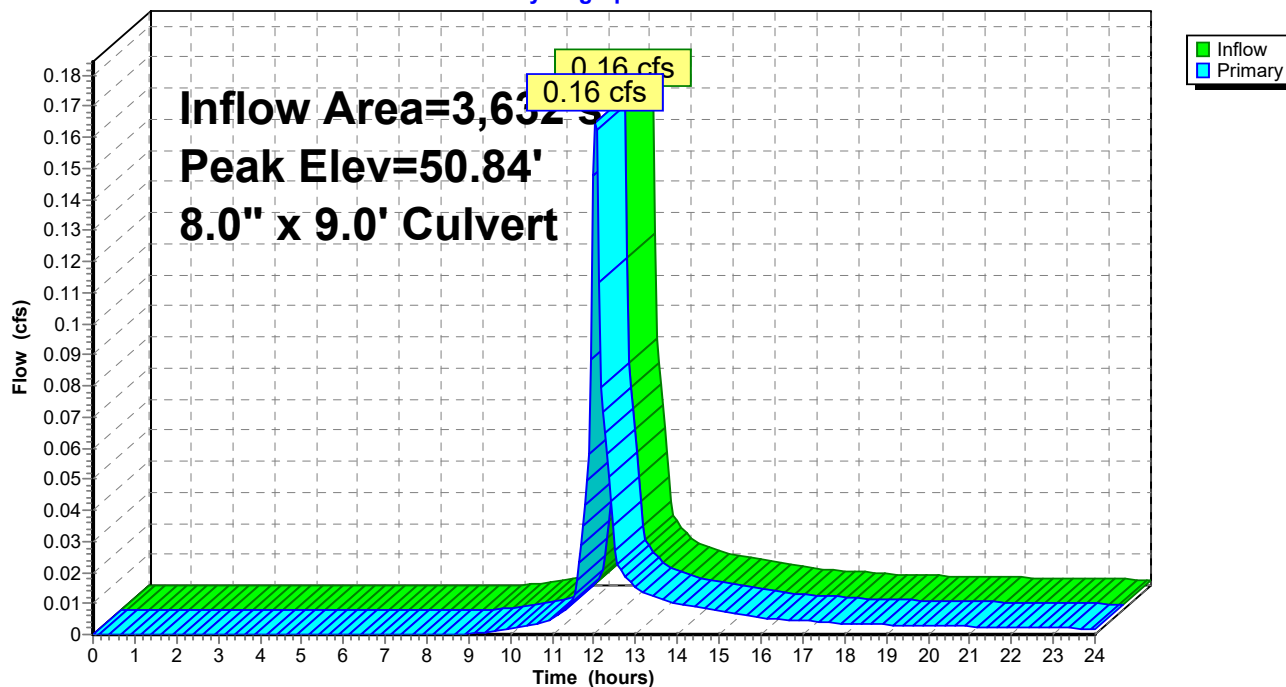
Device	Routing	Invert	Outlet Devices
#1	Primary	50.60'	8.0" x 9.0' long Culvert RCP, groove end projecting, Ke= 0.200 Outlet Invert= 50.50' S= 0.0111 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.16 cfs @ 12.04 hrs HW=50.83' TW=50.60' (Dynamic Tailwater)

1=Culvert (Barrel Controls 0.16 cfs @ 2.18 fps)

Pond CB1: CB1

Hydrograph



Summary for Pond CB2: CB2

Inflow Area = 3,713 sf, 81.12% Impervious, Inflow Depth > 2.26" for 2 year event
 Inflow = 0.24 cfs @ 12.02 hrs, Volume= 699 cf
 Outflow = 0.24 cfs @ 12.02 hrs, Volume= 699 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.24 cfs @ 12.02 hrs, Volume= 699 cf

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

Peak Elev= 50.89' @ 12.02 hrs

Flood Elev= 53.86'

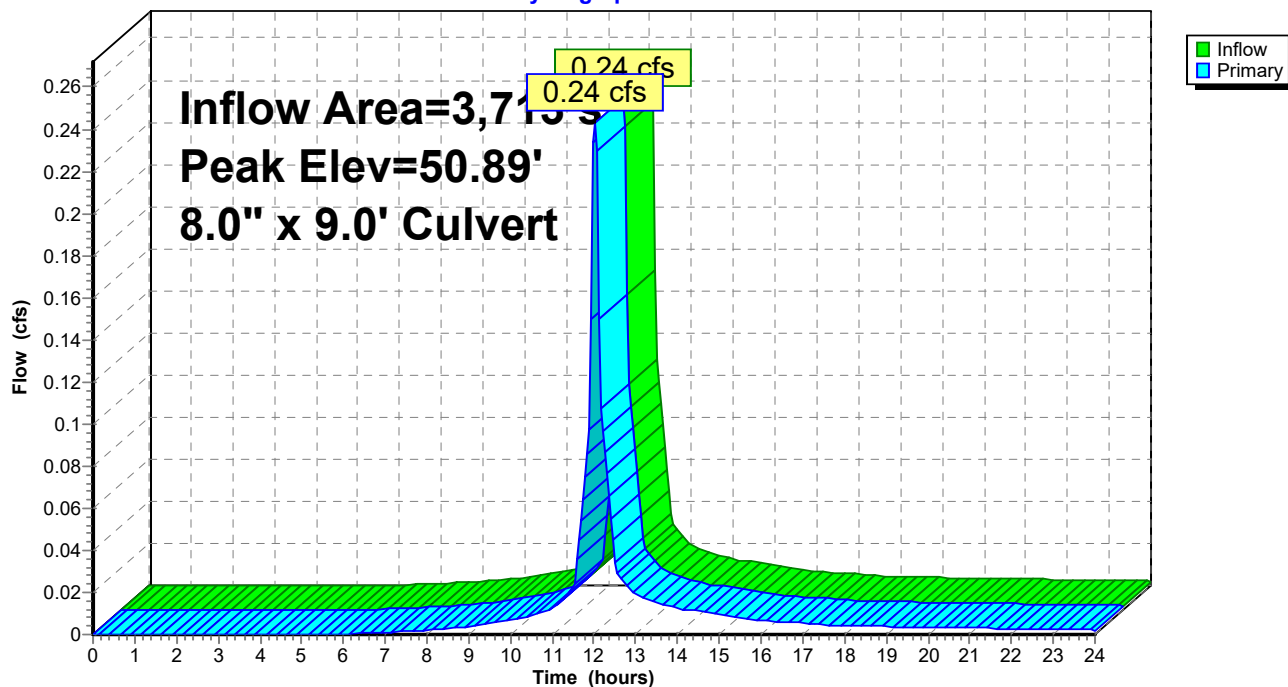
Device	Routing	Invert	Outlet Devices
#1	Primary	50.60'	8.0" x 9.0' long Culvert RCP, groove end projecting, Ke= 0.200 Outlet Invert= 50.50' S= 0.0111 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.23 cfs @ 12.02 hrs HW=50.89' TW=50.58' (Dynamic Tailwater)

1=Culvert (Barrel Controls 0.23 cfs @ 2.38 fps)

Pond CB2: CB2

Hydrograph



Summary for Pond CB3: CB3

Inflow Area = 12,786 sf, 39.18% Impervious, Inflow Depth > 1.09" for 2 year event
 Inflow = 0.36 cfs @ 12.09 hrs, Volume= 1,165 cf
 Outflow = 0.36 cfs @ 12.09 hrs, Volume= 1,165 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.36 cfs @ 12.09 hrs, Volume= 1,165 cf

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

Peak Elev= 52.95' @ 12.12 hrs

Flood Elev= 54.77'

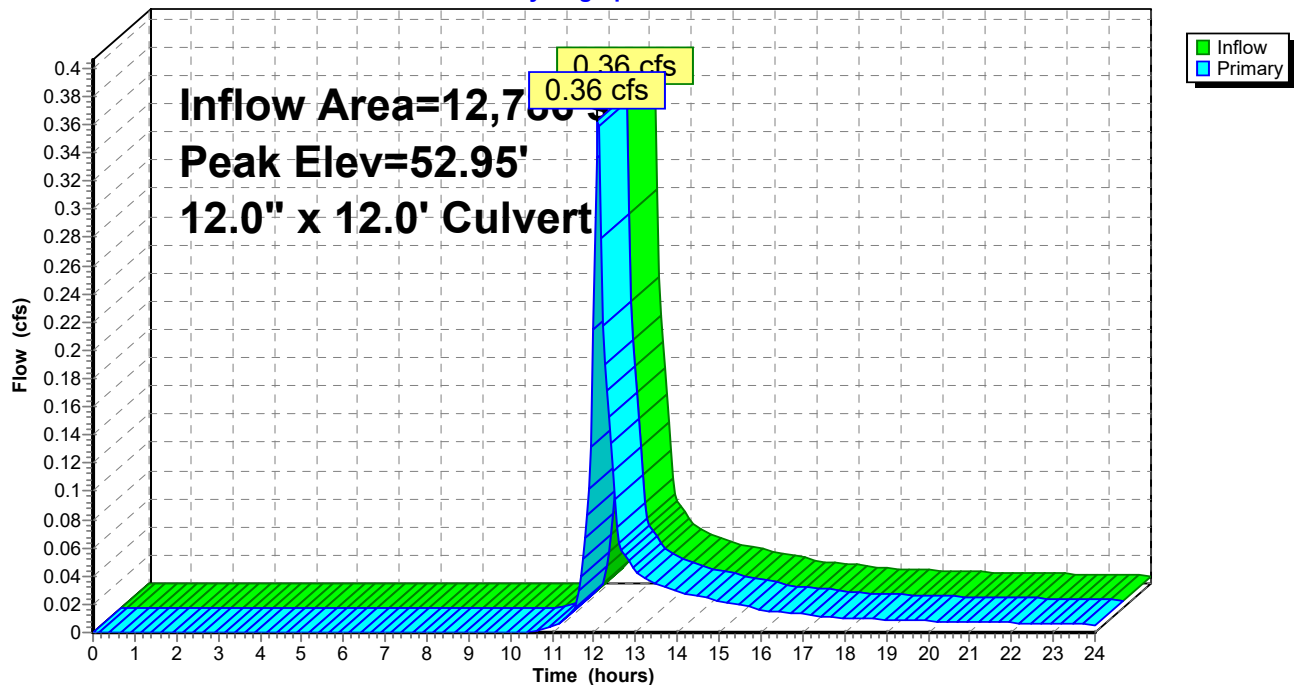
Device	Routing	Invert	Outlet Devices
#1	Primary	52.34'	12.0" x 12.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 52.28' S= 0.0050 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean

Primary OutFlow Max=0.00 cfs @ 12.09 hrs HW=52.90' TW=52.91' (Dynamic Tailwater)

↑1=Culvert (Controls 0.00 cfs)

Pond CB3: CB3

Hydrograph



Summary for Pond CB4: CB4

Inflow Area = 20,654 sf, 69.31% Impervious, Inflow Depth > 1.91" for 2 year event
 Inflow = 1.06 cfs @ 12.08 hrs, Volume= 3,294 cf
 Outflow = 1.06 cfs @ 12.08 hrs, Volume= 3,294 cf, Atten= 0%, Lag= 0.0 min
 Primary = 1.06 cfs @ 12.08 hrs, Volume= 3,294 cf

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

Peak Elev= 53.06' @ 12.11 hrs

Flood Elev= 54.77'

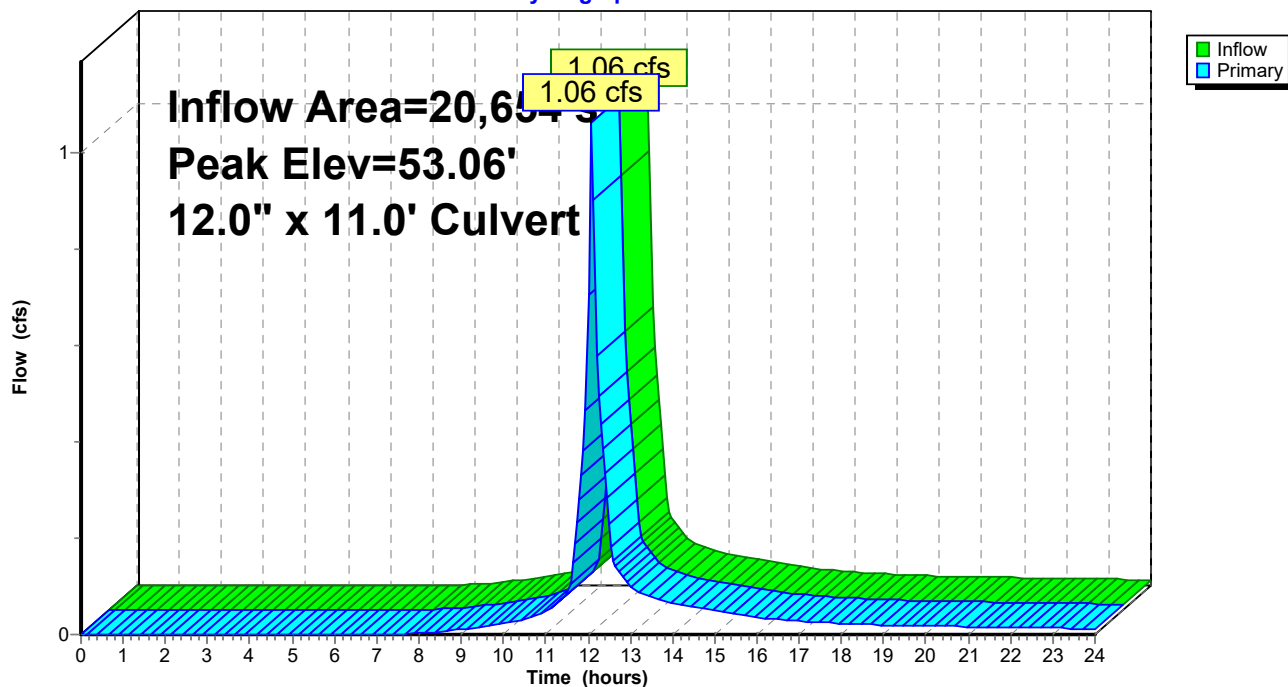
Device	Routing	Invert	Outlet Devices
#1	Primary	52.34'	12.0" x 11.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 52.28' S= 0.0055 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean

Primary OutFlow Max=0.80 cfs @ 12.08 hrs HW=53.01' TW=52.90' (Dynamic Tailwater)

↑1=Culvert (Outlet Controls 0.80 cfs @ 2.02 fps)

Pond CB4: CB4

Hydrograph



Summary for Pond CB5: CB5

Inflow Area = 19,745 sf, 42.54% Impervious, Inflow Depth > 1.21" for 2 year event
 Inflow = 0.63 cfs @ 12.08 hrs, Volume= 1,992 cf
 Outflow = 0.63 cfs @ 12.08 hrs, Volume= 1,992 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.63 cfs @ 12.08 hrs, Volume= 1,992 cf

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

Peak Elev= 61.43' @ 12.08 hrs

Flood Elev= 65.00'

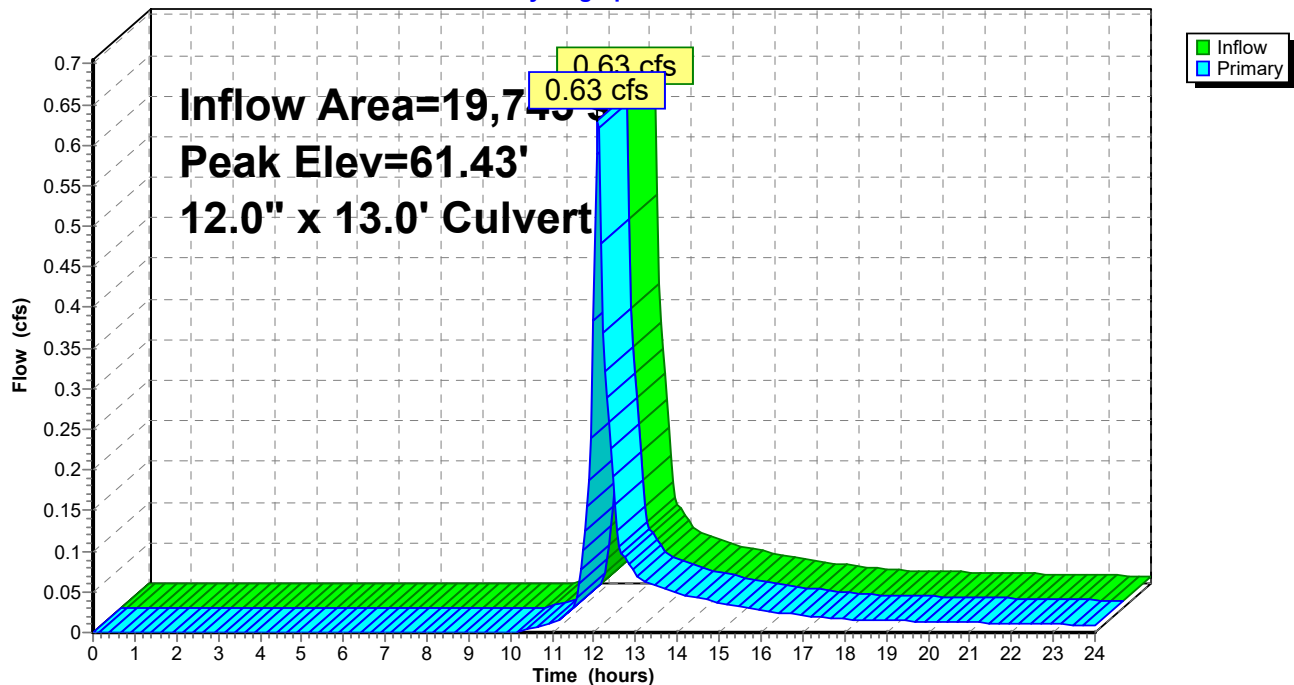
Device	Routing	Invert	Outlet Devices
#1	Primary	61.00'	12.0" x 13.0' long Culvert RCP, groove end projecting, Ke= 0.200 Outlet Invert= 60.87' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.61 cfs @ 12.08 hrs HW=61.42' TW=58.73' (Dynamic Tailwater)

1=Culvert (Barrel Controls 0.61 cfs @ 2.87 fps)

Pond CB5: CB5

Hydrograph



Summary for Pond CB6: CB6

Inflow Area = 5,773 sf, 64.25% Impervious, Inflow Depth > 1.76" for 2 year event
 Inflow = 0.27 cfs @ 12.08 hrs, Volume= 845 cf
 Outflow = 0.27 cfs @ 12.08 hrs, Volume= 845 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.27 cfs @ 12.08 hrs, Volume= 845 cf

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

Peak Elev= 61.28' @ 12.08 hrs

Flood Elev= 65.00'

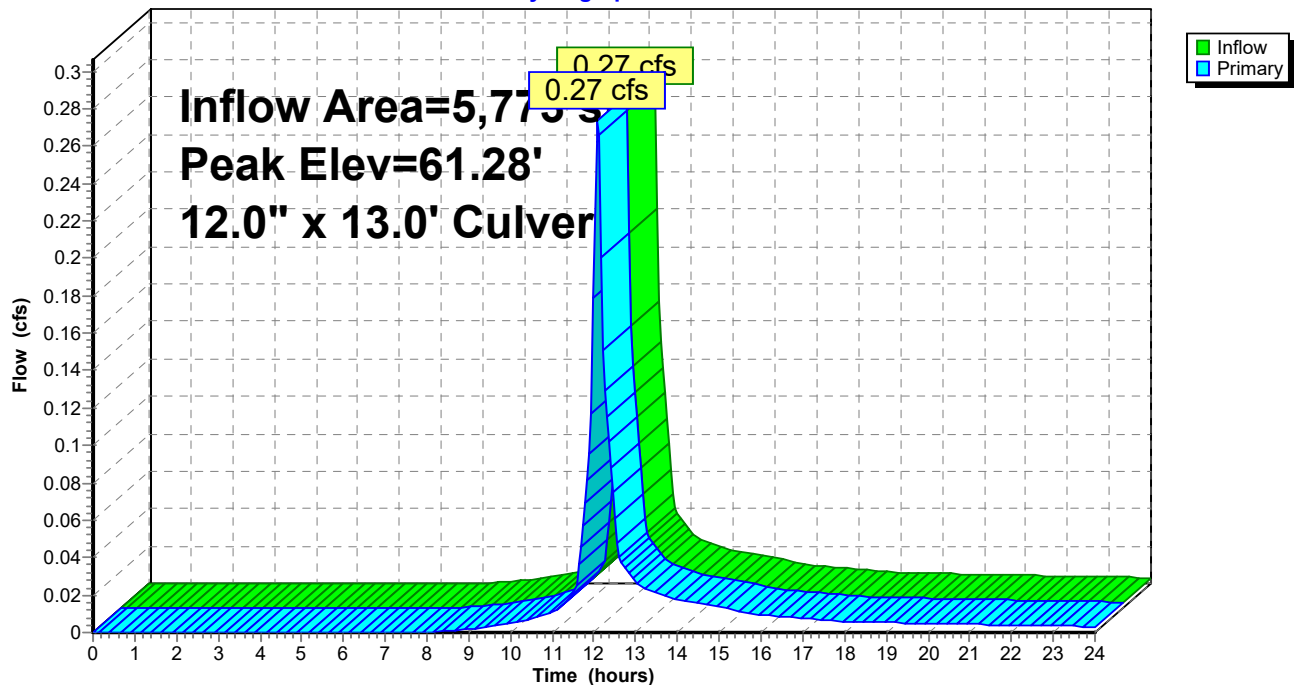
Device	Routing	Invert	Outlet Devices
#1	Primary	61.00'	12.0" x 13.0' long Culvert CPP, square edge headwall, Ke= 0.500 Outlet Invert= 60.87' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.26 cfs @ 12.08 hrs HW=61.28' TW=58.73' (Dynamic Tailwater)

↑1=Culvert (Barrel Controls 0.26 cfs @ 2.25 fps)

Pond CB6: CB6

Hydrograph



Summary for Pond CB7: CB7

Inflow Area = 4,530 sf, 68.52% Impervious, Inflow Depth > 1.83" for 2 year event
 Inflow = 0.22 cfs @ 12.08 hrs, Volume= 692 cf
 Outflow = 0.22 cfs @ 12.08 hrs, Volume= 692 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.22 cfs @ 12.08 hrs, Volume= 692 cf

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

Peak Elev= 66.35' @ 12.13 hrs

Flood Elev= 69.00'

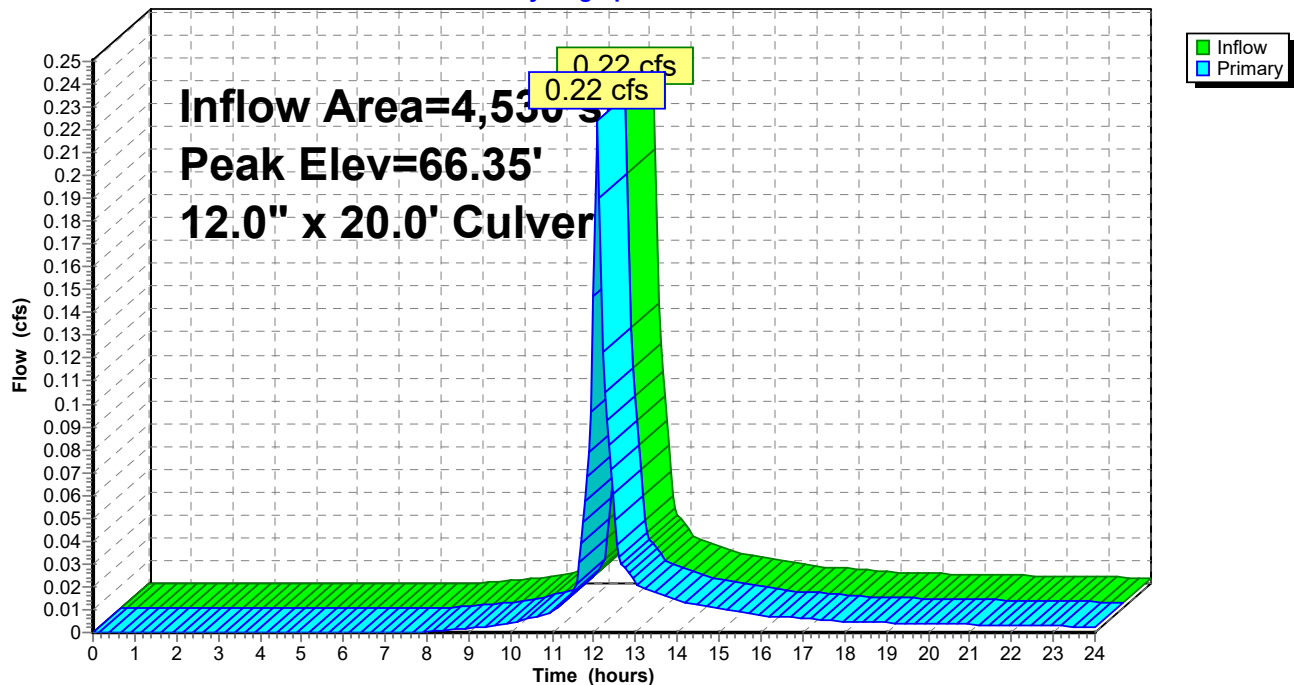
Device	Routing	Invert	Outlet Devices
#1	Primary	65.91'	12.0" x 20.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 65.81' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.00 cfs @ 12.08 hrs HW=66.29' TW=66.30' (Dynamic Tailwater)

↑1=Culvert (Controls 0.00 cfs)

Pond CB7: CB7

Hydrograph



Summary for Pond CB8: CB8

Inflow Area = 22,478 sf, 56.13% Impervious, Inflow Depth > 1.54" for 2 year event
 Inflow = 0.93 cfs @ 12.08 hrs, Volume= 2,879 cf
 Outflow = 0.93 cfs @ 12.08 hrs, Volume= 2,879 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.93 cfs @ 12.08 hrs, Volume= 2,879 cf

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

Peak Elev= 66.52' @ 12.09 hrs

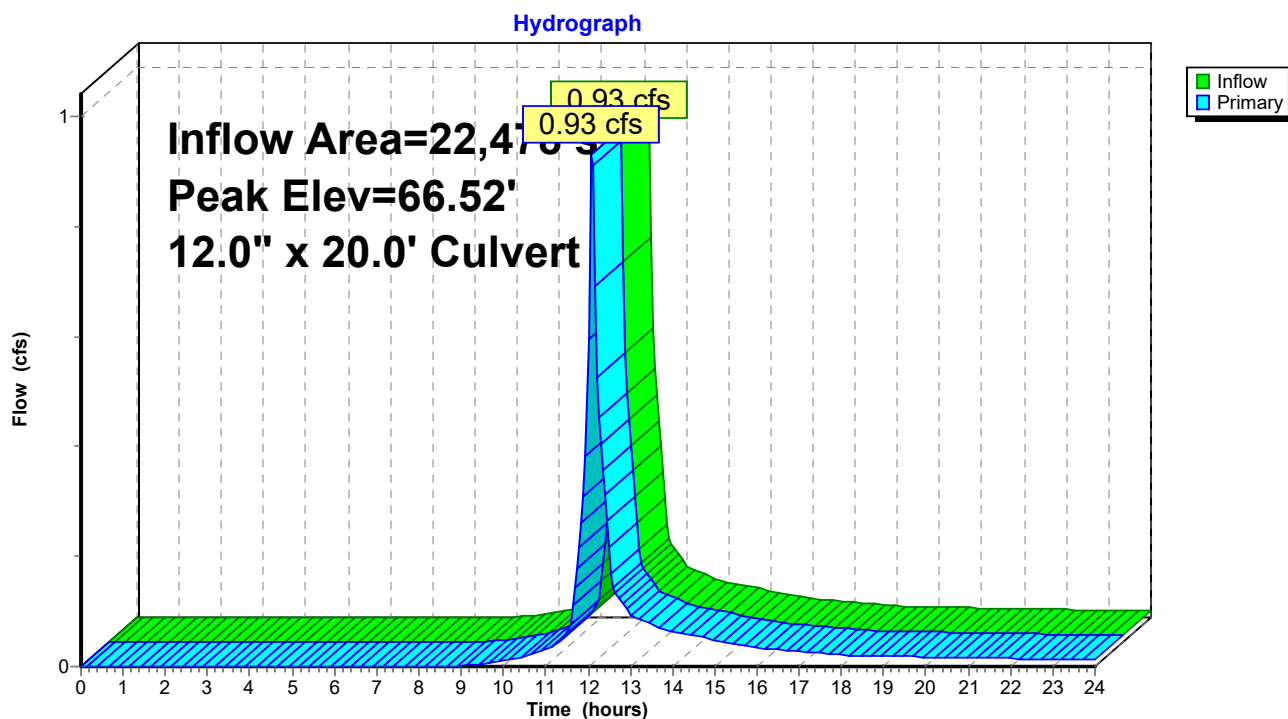
Flood Elev= 69.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	65.91'	12.0" x 20.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 65.81' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.83 cfs @ 12.08 hrs HW=66.51' TW=66.31' (Dynamic Tailwater)

↑1=Culvert (Outlet Controls 0.83 cfs @ 2.43 fps)

Pond CB8: CB8



Summary for Pond CB9: CB9

Inflow Area = 41,660 sf, 48.12% Impervious, Inflow Depth > 1.34" for 2 year event
 Inflow = 1.48 cfs @ 12.08 hrs, Volume= 4,637 cf
 Outflow = 1.48 cfs @ 12.08 hrs, Volume= 4,637 cf, Atten= 0%, Lag= 0.0 min
 Primary = 1.48 cfs @ 12.08 hrs, Volume= 4,637 cf

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

Peak Elev= 66.01' @ 12.11 hrs

Flood Elev= 69.40'

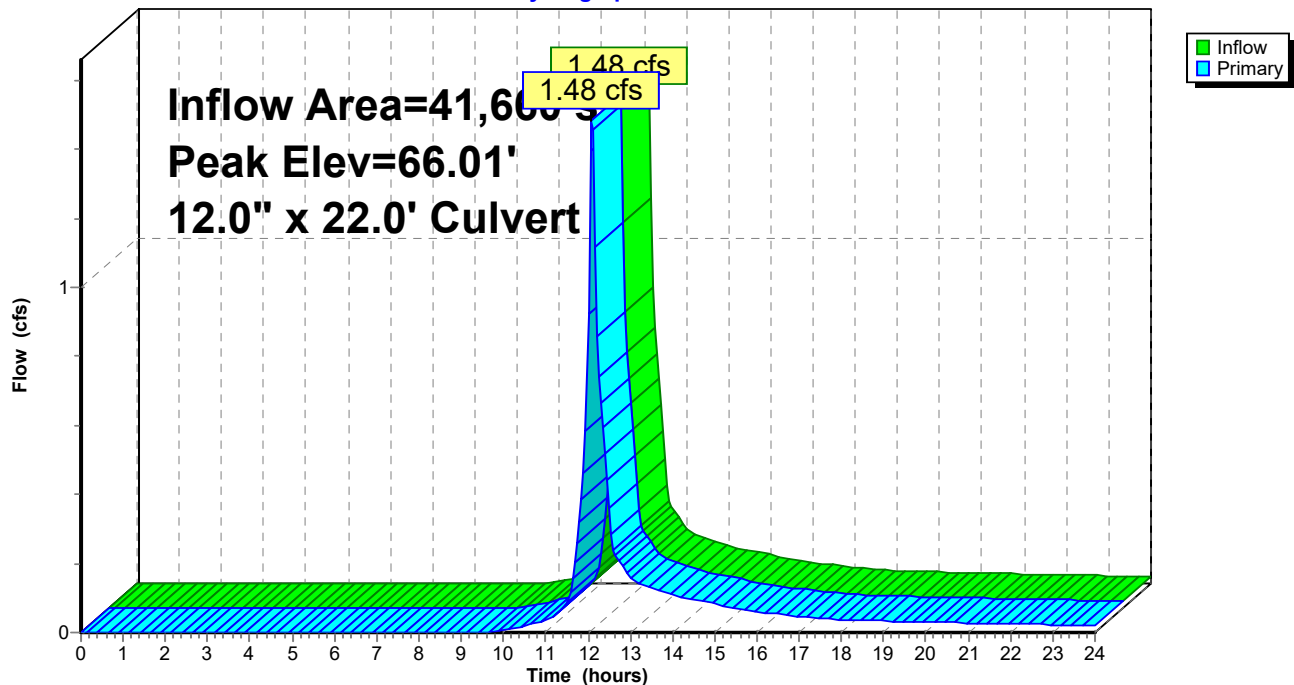
Device	Routing	Invert	Outlet Devices
#1	Primary	65.11'	12.0" x 22.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 65.00' S= 0.0050 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=1.21 cfs @ 12.08 hrs HW=65.97' TW=65.80' (Dynamic Tailwater)

↑1=Culvert (Outlet Controls 1.21 cfs @ 2.26 fps)

Pond CB9: CB9

Hydrograph



Summary for Pond DMH 10: DMH9

Inflow Area = 68,668 sf, 52.09% Impervious, Inflow Depth > 1.01" for 2 year event
 Inflow = 0.64 cfs @ 12.50 hrs, Volume= 5,770 cf
 Outflow = 0.64 cfs @ 12.50 hrs, Volume= 5,770 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.64 cfs @ 12.50 hrs, Volume= 5,770 cf

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

Peak Elev= 61.37' @ 12.50 hrs

Flood Elev= 69.78'

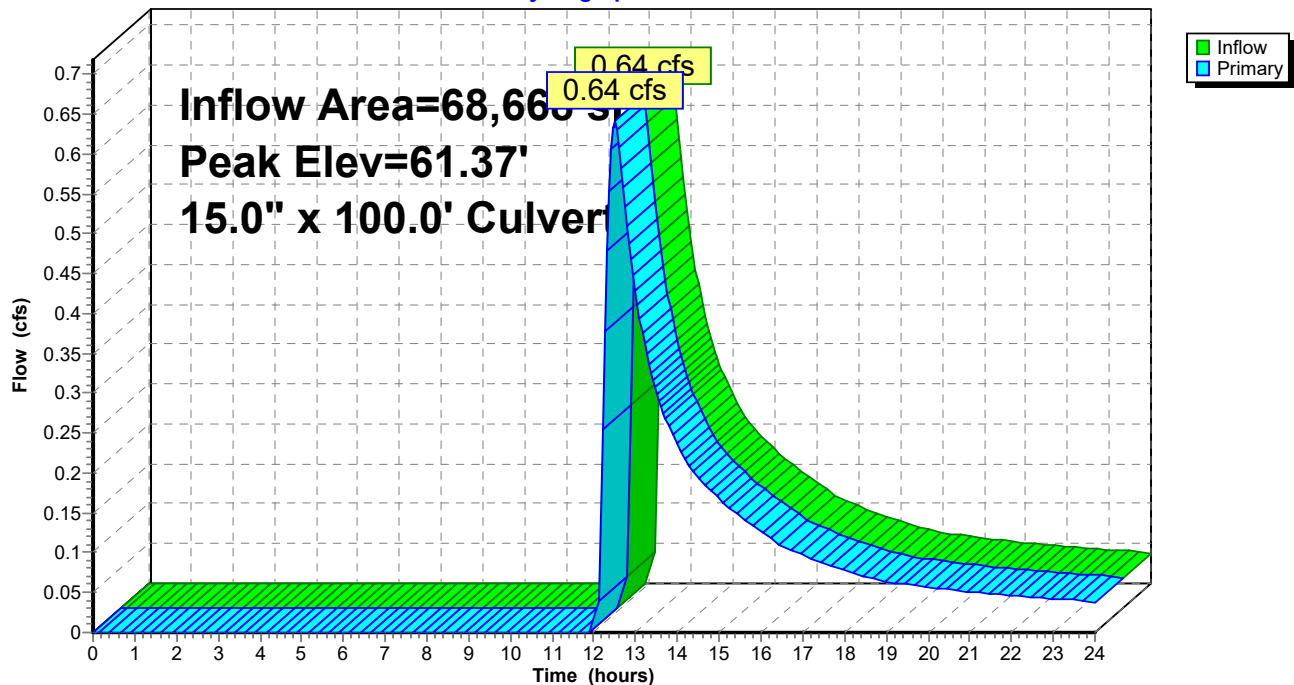
Device	Routing	Invert	Outlet Devices
#1	Primary	61.00'	15.0" x 100.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 56.00' S= 0.0500 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.64 cfs @ 12.50 hrs HW=61.37' TW=55.61' (Dynamic Tailwater)

↑ **1=Culvert** (Inlet Controls 0.64 cfs @ 2.08 fps)

Pond DMH 10: DMH9

Hydrograph



Summary for Pond DMH 11: DMH 10

Inflow Area = 68,668 sf, 52.09% Impervious, Inflow Depth > 1.01" for 2 year event
 Inflow = 0.64 cfs @ 12.50 hrs, Volume= 5,770 cf
 Outflow = 0.64 cfs @ 12.50 hrs, Volume= 5,770 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.64 cfs @ 12.50 hrs, Volume= 5,770 cf

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

Peak Elev= 55.61' @ 12.50 hrs

Flood Elev= 58.00'

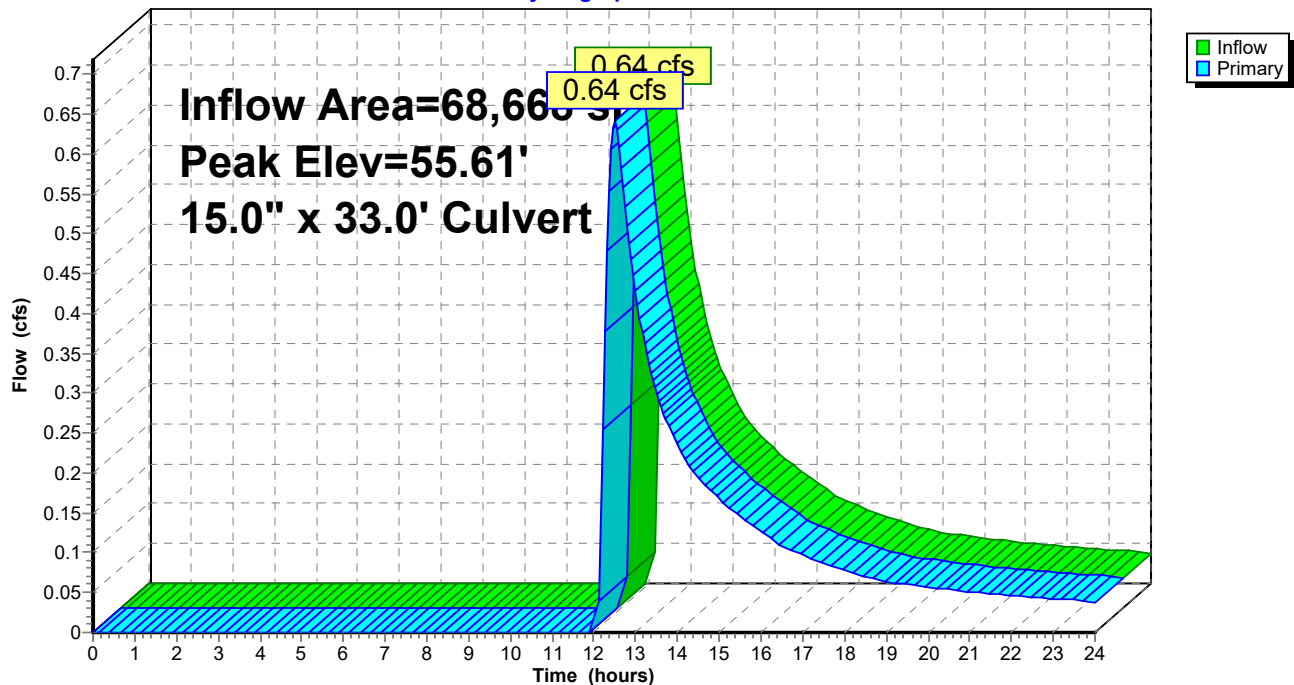
Device	Routing	Invert	Outlet Devices
#1	Primary	55.17'	15.0" x 33.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 55.00' S= 0.0052 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.64 cfs @ 12.50 hrs HW=55.61' TW=50.99' (Dynamic Tailwater)

1=Culvert (Barrel Controls 0.64 cfs @ 2.47 fps)

Pond DMH 11: DMH 10

Hydrograph



Summary for Pond DMH 6: DMH 6

Inflow Area = 27,008 sf, 58.21% Impervious, Inflow Depth > 1.59" for 2 year event
 Inflow = 1.15 cfs @ 12.08 hrs, Volume= 3,571 cf
 Outflow = 1.15 cfs @ 12.08 hrs, Volume= 3,571 cf, Atten= 0%, Lag= 0.0 min
 Primary = 1.15 cfs @ 12.08 hrs, Volume= 3,571 cf

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

Peak Elev= 65.80' @ 12.08 hrs

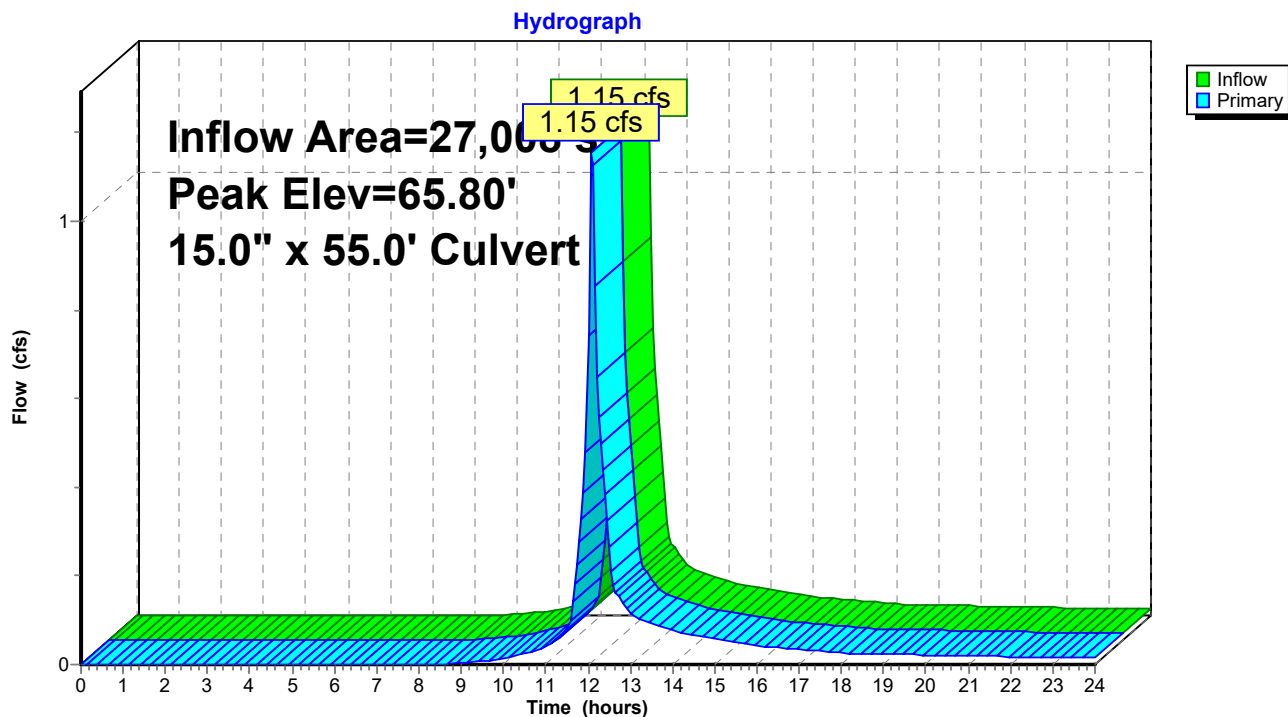
Flood Elev= 71.33'

Device	Routing	Invert	Outlet Devices
#1	Primary	65.14'	15.0" x 55.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 65.00' S= 0.0025 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=1.12 cfs @ 12.08 hrs HW=65.79' TW=65.42' (Dynamic Tailwater)

↑1=Culvert (Barrel Controls 1.12 cfs @ 2.51 fps)

Pond DMH 6: DMH 6



Summary for Pond DMH2: DMH2

Inflow Area = 33,440 sf, 57.79% Impervious, Inflow Depth > 1.60" for 2 year event
 Inflow = 1.42 cfs @ 12.08 hrs, Volume= 4,458 cf
 Outflow = 1.42 cfs @ 12.08 hrs, Volume= 4,458 cf, Atten= 0%, Lag= 0.0 min
 Primary = 1.42 cfs @ 12.08 hrs, Volume= 4,458 cf

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

Peak Elev= 52.92' @ 12.08 hrs

Flood Elev= 55.00'

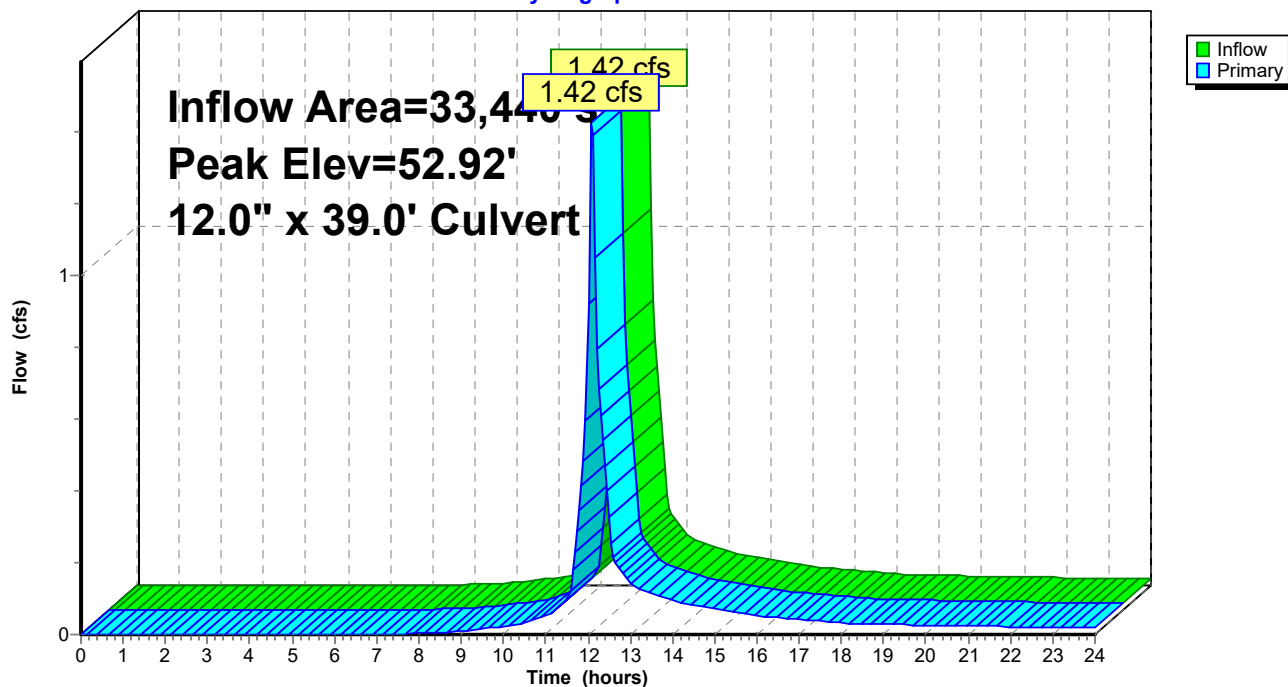
Device	Routing	Invert	Outlet Devices
#1	Primary	52.18'	12.0" x 39.0' long Culvert RCP, square edge headwall, Ke= 0.500 Outlet Invert= 52.00' S= 0.0046 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean

Primary OutFlow Max=1.38 cfs @ 12.08 hrs HW=52.90' TW=51.84' (Dynamic Tailwater)

↑1=Culvert (Barrel Controls 1.38 cfs @ 3.17 fps)

Pond DMH2: DMH2

Hydrograph



Summary for Pond DMH3: DMH3

Inflow Area = 25,518 sf, 47.45% Impervious, Inflow Depth > 1.33" for 2 year event
 Inflow = 0.90 cfs @ 12.08 hrs, Volume= 2,837 cf
 Outflow = 0.90 cfs @ 12.08 hrs, Volume= 2,837 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.90 cfs @ 12.08 hrs, Volume= 2,837 cf

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

Peak Elev= 55.75' @ 12.08 hrs

Flood Elev= 61.00'

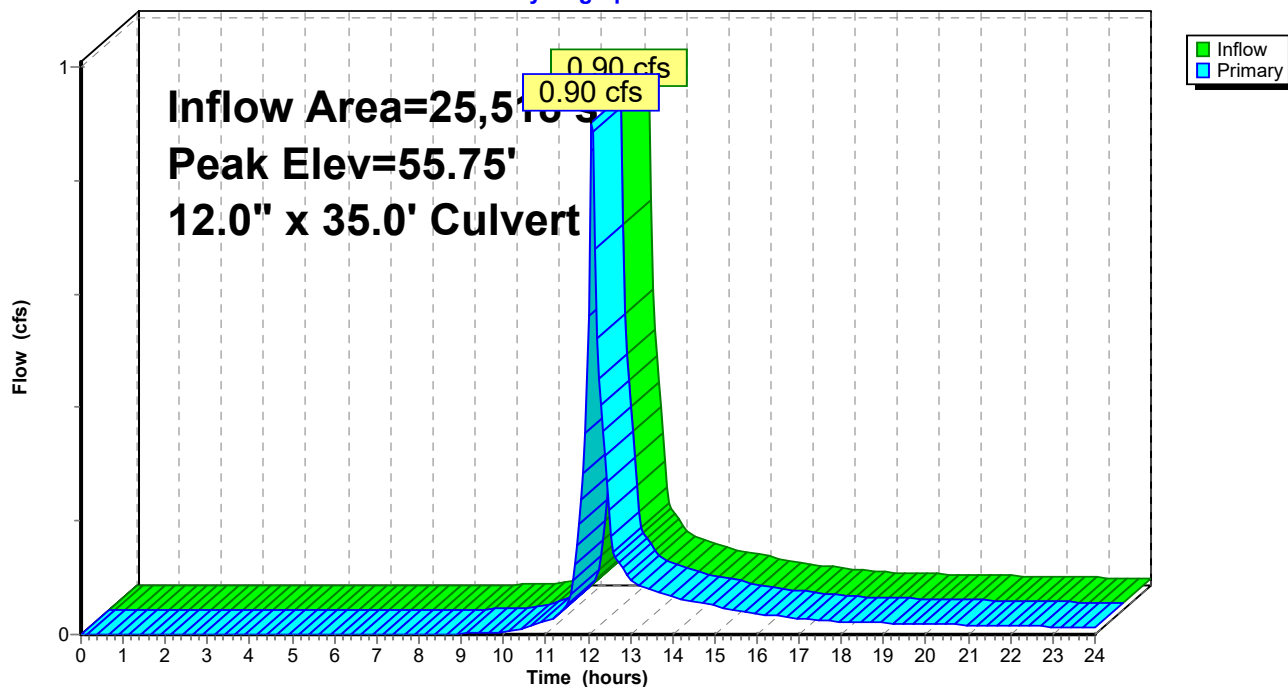
Device	Routing	Invert	Outlet Devices
#1	Primary	55.17'	12.0" x 35.0' long Culvert CPP, square edge headwall, Ke= 0.500 Outlet Invert= 55.00' S= 0.0049 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.87 cfs @ 12.08 hrs HW=55.74' TW=51.85' (Dynamic Tailwater)

1=Culvert (Barrel Controls 0.87 cfs @ 2.71 fps)

Pond DMH3: DMH3

Hydrograph



Summary for Pond DMH4: DMH4

Inflow Area = 25,518 sf, 47.45% Impervious, Inflow Depth > 1.33" for 2 year event
 Inflow = 0.90 cfs @ 12.08 hrs, Volume= 2,837 cf
 Outflow = 0.90 cfs @ 12.08 hrs, Volume= 2,837 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.90 cfs @ 12.08 hrs, Volume= 2,837 cf

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

Peak Elev= 58.74' @ 12.08 hrs

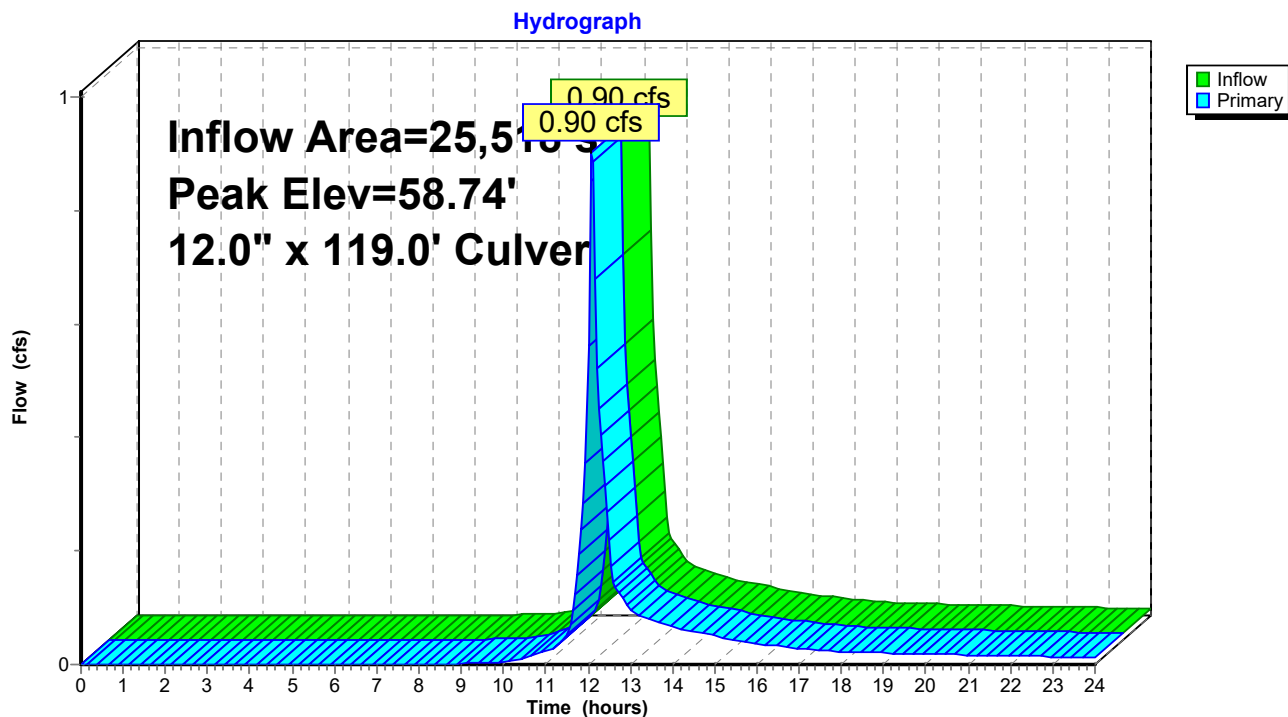
Flood Elev= 65.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	58.25'	12.0" x 119.0' long Culvert CPP, square edge headwall, Ke= 0.500 Outlet Invert= 55.28' S= 0.0250 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.87 cfs @ 12.08 hrs HW=58.73' TW=55.74' (Dynamic Tailwater)

↑1=Culvert (Inlet Controls 0.87 cfs @ 2.36 fps)

Pond DMH4: DMH4



Summary for Pond DMH5: DMH 5

Inflow Area = 27,008 sf, 58.21% Impervious, Inflow Depth > 1.59" for 2 year event
 Inflow = 1.15 cfs @ 12.08 hrs, Volume= 3,571 cf
 Outflow = 1.15 cfs @ 12.08 hrs, Volume= 3,571 cf, Atten= 0%, Lag= 0.0 min
 Primary = 1.15 cfs @ 12.08 hrs, Volume= 3,571 cf

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

Peak Elev= 66.32' @ 12.09 hrs

Flood Elev= 69.53'

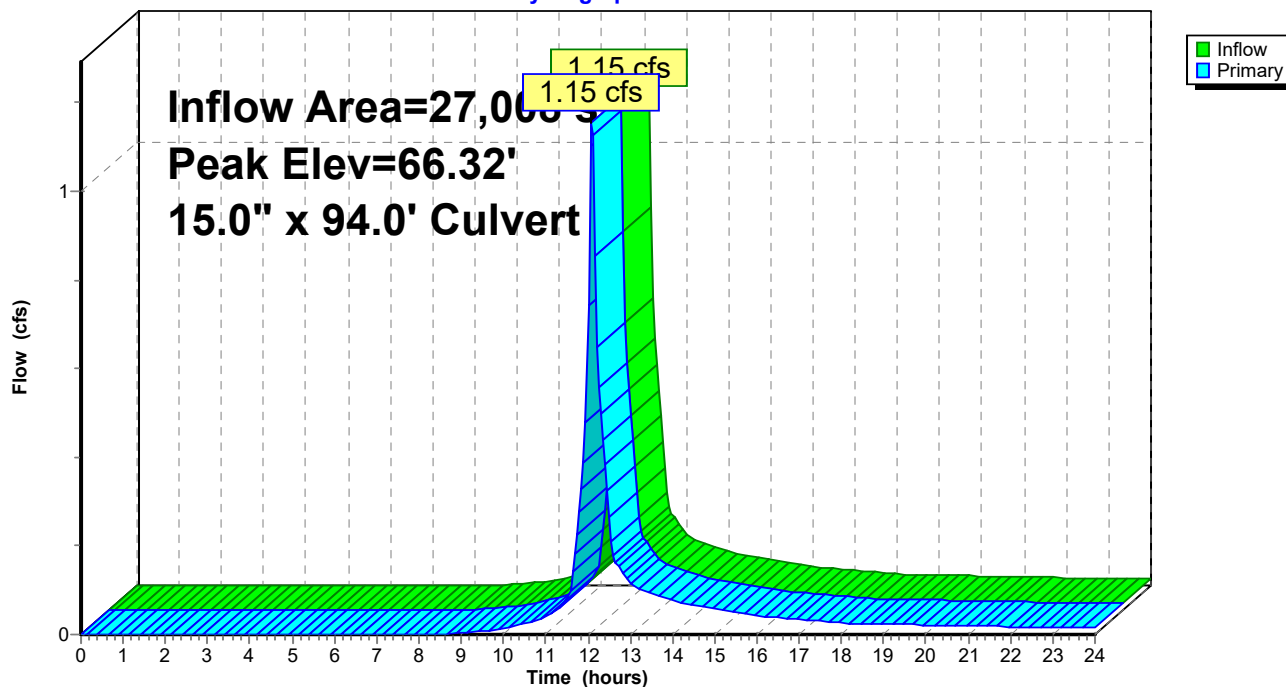
Device	Routing	Invert	Outlet Devices
#1	Primary	65.71'	15.0" x 94.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 65.24' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=1.07 cfs @ 12.08 hrs HW=66.31' TW=65.79' (Dynamic Tailwater)

1=Culvert (Outlet Controls 1.07 cfs @ 2.70 fps)

Pond DMH5: DMH 5

Hydrograph



Summary for Pond DMH7: DMH7

Inflow Area = 27,008 sf, 58.21% Impervious, Inflow Depth > 1.59" for 2 year event
 Inflow = 1.15 cfs @ 12.08 hrs, Volume= 3,571 cf
 Outflow = 1.15 cfs @ 12.08 hrs, Volume= 3,571 cf, Atten= 0%, Lag= 0.0 min
 Primary = 1.15 cfs @ 12.08 hrs, Volume= 3,571 cf

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

Peak Elev= 65.49' @ 12.54 hrs

Flood Elev= 70.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	65.00'	12.0" x 1.0' long Culvert CPP, square edge headwall, Ke= 0.500 Outlet Invert= 65.00' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Primary	64.90'	12.0" x 1.0' long Culvert CPP, square edge headwall, Ke= 0.500 Outlet Invert= 64.90' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

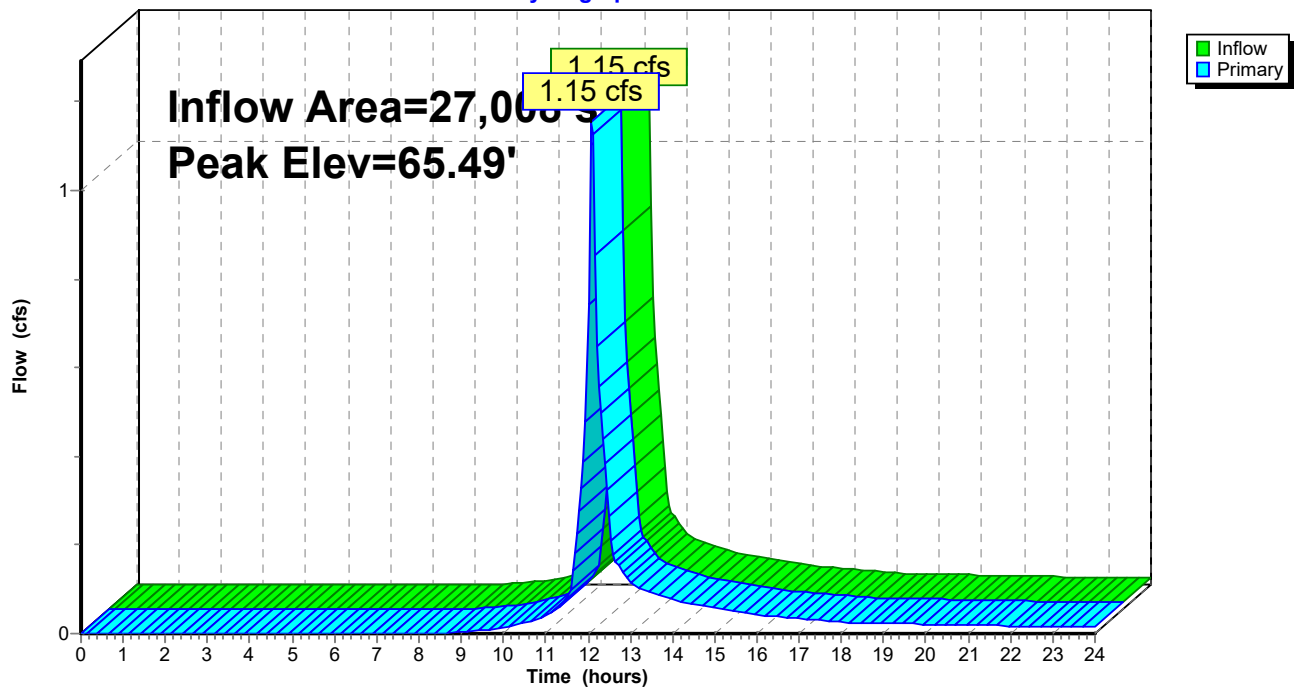
Primary OutFlow Max=1.12 cfs @ 12.08 hrs HW=65.42' TW=64.97' (Dynamic Tailwater)

1=Culvert (Barrel Controls 0.45 cfs @ 2.10 fps)

2=Culvert (Barrel Controls 0.67 cfs @ 2.34 fps)

Pond DMH7: DMH7

Hydrograph



Summary for Pond DMH8: DMH8

Inflow Area = 41,660 sf, 48.12% Impervious, Inflow Depth > 1.34" for 2 year event
 Inflow = 1.48 cfs @ 12.08 hrs, Volume= 4,637 cf
 Outflow = 1.48 cfs @ 12.08 hrs, Volume= 4,637 cf, Atten= 0%, Lag= 0.0 min
 Primary = 1.48 cfs @ 12.08 hrs, Volume= 4,637 cf

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

Peak Elev= 65.82' @ 12.08 hrs

Flood Elev= 70.00'

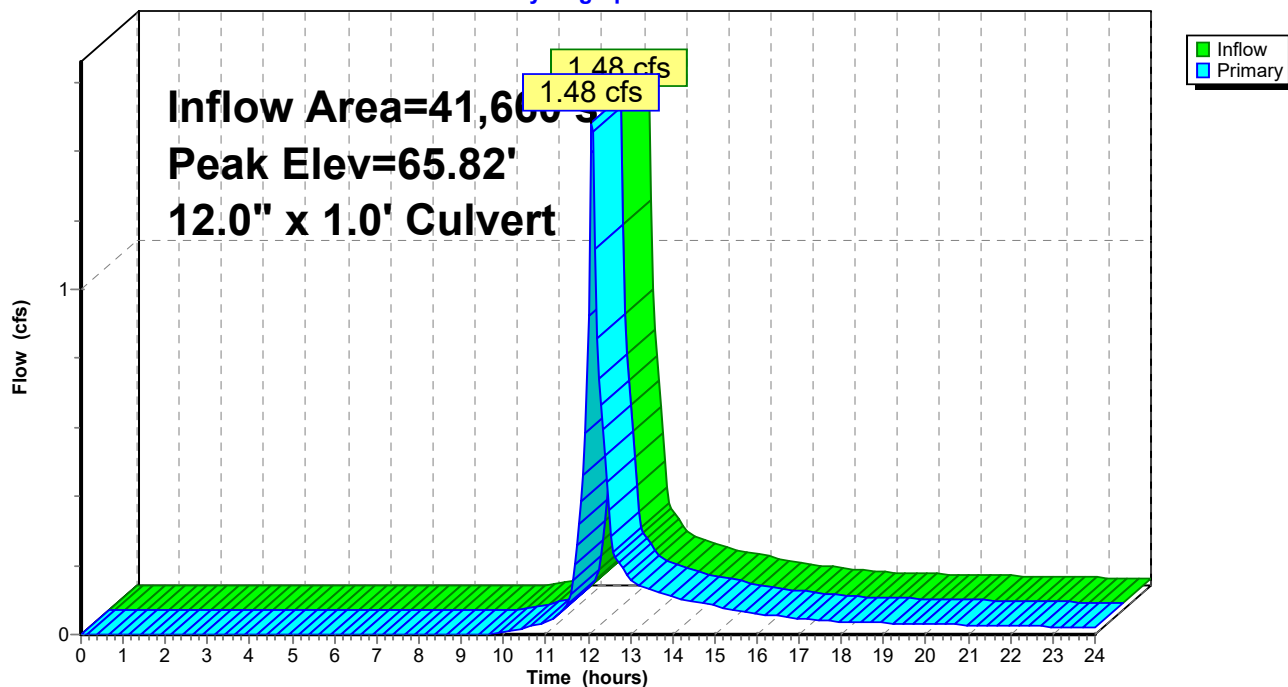
Device	Routing	Invert	Outlet Devices
#1	Primary	65.00'	12.0" x 1.0' long Culvert CPP, square edge headwall, Ke= 0.500 Outlet Invert= 65.00' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=1.44 cfs @ 12.08 hrs HW=65.80' TW=64.98' (Dynamic Tailwater)

↑1=Culvert (Barrel Controls 1.44 cfs @ 2.91 fps)

Pond DMH8: DMH8

Hydrograph



Summary for Pond P1-1: P1-1

Inflow Area = 74,610 sf, 49.91% Impervious, Inflow Depth > 1.39" for 2 year event
 Inflow = 2.74 cfs @ 12.08 hrs, Volume= 8,647 cf
 Outflow = 0.14 cfs @ 15.34 hrs, Volume= 5,637 cf, Atten= 95%, Lag= 195.6 min
 Primary = 0.14 cfs @ 15.34 hrs, Volume= 5,637 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 52.74' @ 15.34 hrs Surf.Area= 3,766 sf Storage= 4,947 cf
 Flood Elev= 55.50' Surf.Area= 5,973 sf Storage= 18,004 cf

Plug-Flow detention time= 329.9 min calculated for 5,625 cf (65% of inflow)
 Center-of-Mass det. time= 223.5 min (1,061.5 - 838.0)

Volume	Invert	Avail.Storage	Storage Description
#1	51.00'	18,004 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
51.00	2,080	0	0
52.00	2,814	2,447	2,447
52.50	3,624	1,610	4,057
54.00	4,509	6,100	10,156
55.00	5,467	4,988	15,144
55.50	5,973	2,860	18,004

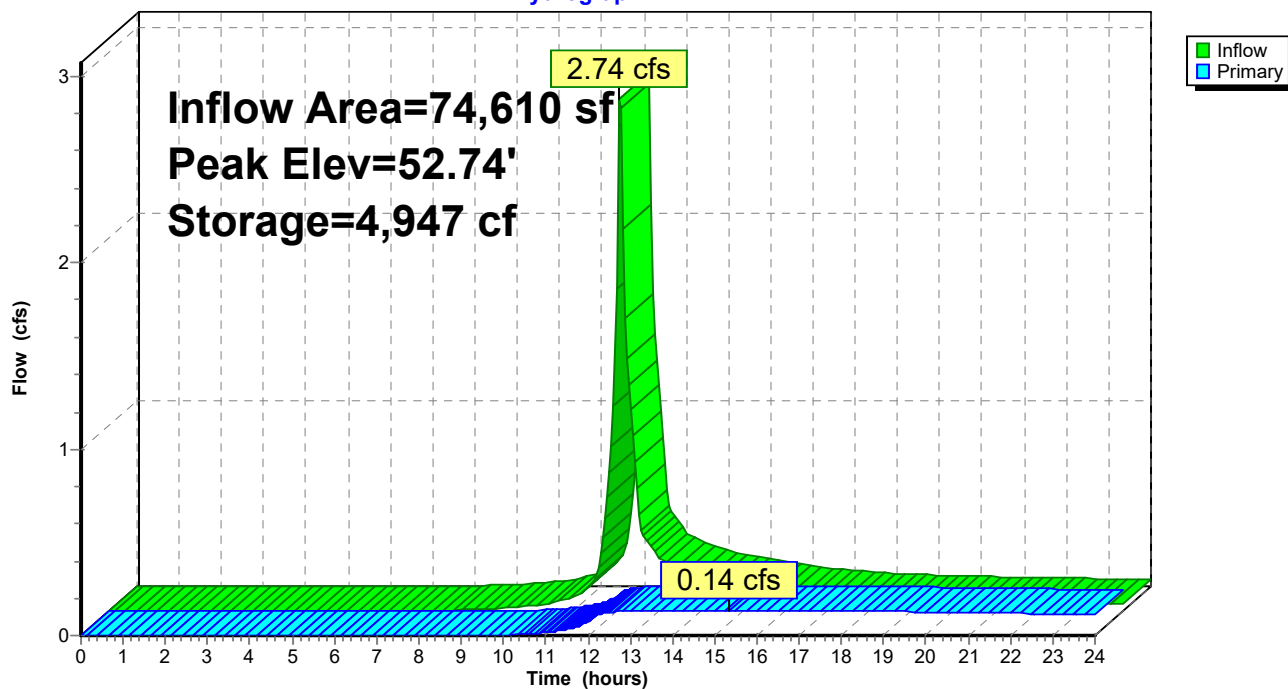
Device	Routing	Invert	Outlet Devices
#1	Primary	51.00'	12.0" x 80.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 50.00' S= 0.0125 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Device 1	51.00'	2.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	52.75'	10.0" Vert. Orifice/Grate C= 0.600
#4	Device 1	53.25'	10.0" Vert. Orifice/Grate C= 0.600
#5	Device 1	54.25'	2.00' x 2.00' Horiz. Orifice/Grate Limited to weir flow C= 0.600

Primary OutFlow Max=0.14 cfs @ 15.34 hrs HW=52.74' TW=0.00' (Dynamic Tailwater)

1=Culvert (Passes 0.14 cfs of 4.15 cfs potential flow)
 2=Orifice/Grate (Orifice Controls 0.14 cfs @ 6.20 fps)
 3=Orifice/Grate (Controls 0.00 cfs)
 4=Orifice/Grate (Controls 0.00 cfs)
 5=Orifice/Grate (Controls 0.00 cfs)

Pond P1-1: P1-1

Hydrograph



Summary for Pond P1-2: DP-1-2

Inflow Area = 35,138 sf, 15.99% Impervious, Inflow Depth > 0.69" for 2 year event
 Inflow = 0.49 cfs @ 12.14 hrs, Volume= 2,008 cf
 Outflow = 0.02 cfs @ 21.43 hrs, Volume= 619 cf, Atten= 97%, Lag= 557.1 min
 Primary = 0.02 cfs @ 21.43 hrs, Volume= 619 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 57.38' @ 21.43 hrs Surf.Area= 4,014 sf Storage= 1,405 cf
 Flood Elev= 59.75' Surf.Area= 7,130 sf Storage= 10,384 cf

Plug-Flow detention time= 369.7 min calculated for 618 cf (31% of inflow)
 Center-of-Mass det. time= 213.3 min (1,101.2 - 887.9)

Volume	Invert	Avail.Storage	Storage Description
#1	57.00'	10,384 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
57.00	3,285	0	0
58.00	5,180	4,233	4,233
58.50	6,148	2,832	7,065
59.00	7,130	3,320	10,384

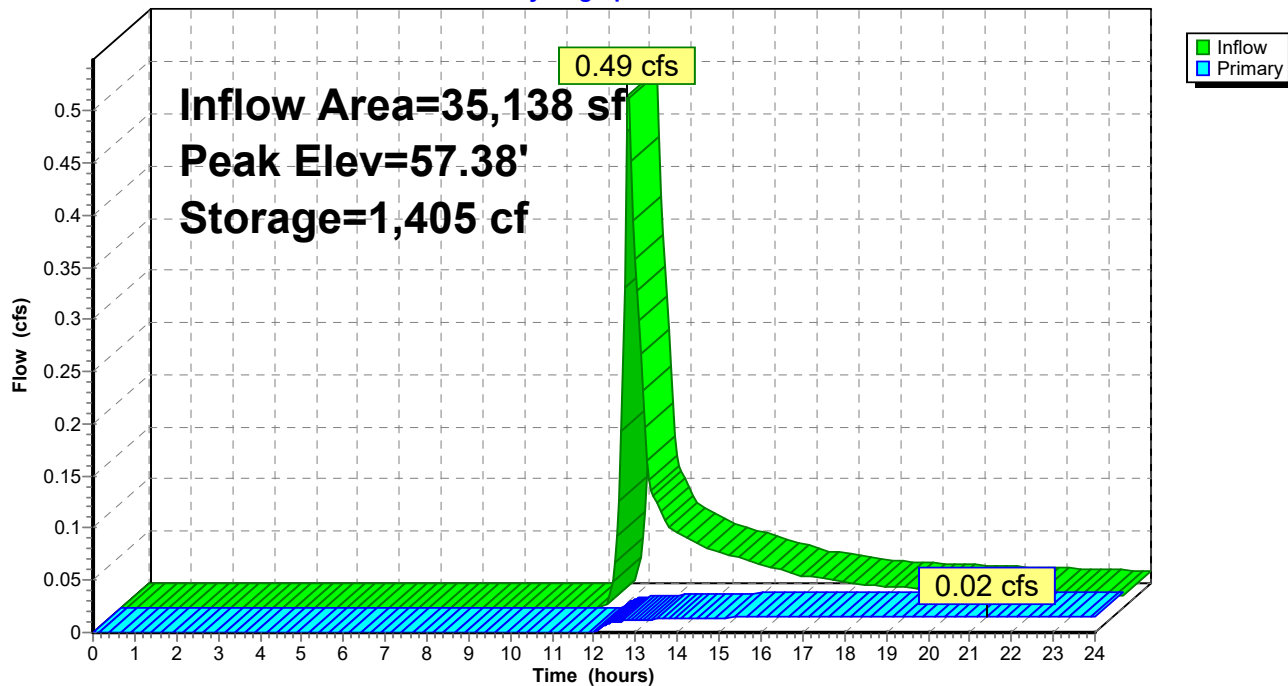
Device	Routing	Invert	Outlet Devices
#1	Primary	57.00'	12.0" x 25.0' long Culvert RCP, square edge headwall, Ke= 0.500 Outlet Invert= 56.50' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Device 1	57.00'	1.0" Vert. Orifice/Grate C= 0.600
#3	Primary	58.75'	3.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.02 cfs @ 21.43 hrs HW=57.38' TW=0.00' (Dynamic Tailwater)

1=Culvert (Passes 0.02 cfs of 0.59 cfs potential flow)
 2=Orifice/Grate (Orifice Controls 0.02 cfs @ 2.82 fps)
 3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond P1-2: DP-1-2

Hydrograph



Summary for Pond P1-3: P1-3

Inflow Area = 7,345 sf, 68.78% Impervious, Inflow Depth > 1.90" for 2 year event
 Inflow = 0.40 cfs @ 12.03 hrs, Volume= 1,164 cf
 Outflow = 0.08 cfs @ 12.45 hrs, Volume= 1,023 cf, Atten= 81%, Lag= 25.6 min
 Primary = 0.08 cfs @ 12.45 hrs, Volume= 1,023 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 50.83' @ 12.45 hrs Surf.Area= 1,505 sf Storage= 502 cf
 Flood Elev= 54.27' Surf.Area= 1,400 sf Storage= 1,861 cf

Plug-Flow detention time= 131.2 min calculated for 1,023 cf (88% of inflow)
 Center-of-Mass det. time= 75.4 min (887.3 - 811.8)

Volume	Invert	Avail.Storage	Storage Description
#1	50.00'	1,680 cf	10.00'W x 35.00'L x 3.00'H Prismatic x 4 4,200 cf Overall x 40.0% Voids
#2	50.50'	181 cf	48.0"W x 24.0"H x 8.00'L Galley 4x8x2 x 4
		1,861 cf	Total Available Storage

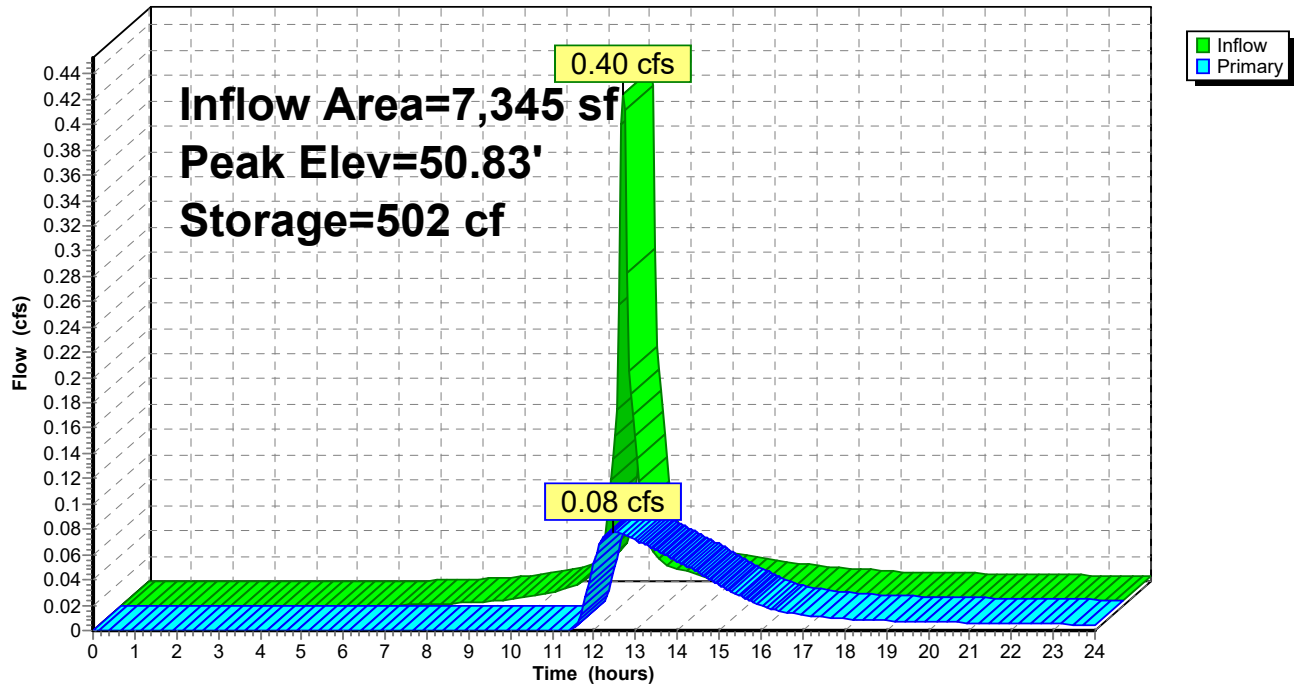
Device	Routing	Invert	Outlet Devices
#1	Primary	50.20'	12.0" x 16.0' long Culvert CPP, square edge headwall, Ke= 0.500 Outlet Invert= 50.00' S= 0.0125 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Device 1	50.20'	2.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	53.00'	12.0" Horiz. Orifice/Grate Limited to weir flow C= 0.600

Primary OutFlow Max=0.08 cfs @ 12.45 hrs HW=50.83' TW=0.00' (Dynamic Tailwater)

1=Culvert (Passes 0.08 cfs of 1.24 cfs potential flow)
 2=Orifice/Grate (Orifice Controls 0.08 cfs @ 3.57 fps)
 3=Orifice/Grate (Controls 0.00 cfs)

Pond P1-3: P1-3

Hydrograph



Summary for Pond P3-1: P3-2

Inflow Area = 68,668 sf, 52.09% Impervious, Inflow Depth > 1.43" for 2 year event
 Inflow = 2.63 cfs @ 12.08 hrs, Volume= 8,208 cf
 Outflow = 0.64 cfs @ 12.50 hrs, Volume= 5,770 cf, Atten= 76%, Lag= 24.9 min
 Primary = 0.64 cfs @ 12.50 hrs, Volume= 5,770 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 65.48' @ 12.50 hrs Surf.Area= 3,825 sf Storage= 3,501 cf
 Flood Elev= 70.00' Surf.Area= 3,825 sf Storage= 10,877 cf

Plug-Flow detention time= 183.0 min calculated for 5,770 cf (70% of inflow)
 Center-of-Mass det. time= 84.4 min (923.6 - 839.2)

Volume	Invert	Avail.Storage	Storage Description
#1	64.00'	2,363 cf	Custom Stage Data (Prismatic) Listed below (Recalc) 17,213 cf Overall - 11,304 cf Embedded = 5,908 cf x 40.0% Voids
#2	64.50'	8,514 cf	52.8"W x 48.0"H x 4.00'L Galley 4x4x4 x 192 Inside #1
		10,877 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
64.00	3,825	0	0
68.50	3,825	17,213	17,213

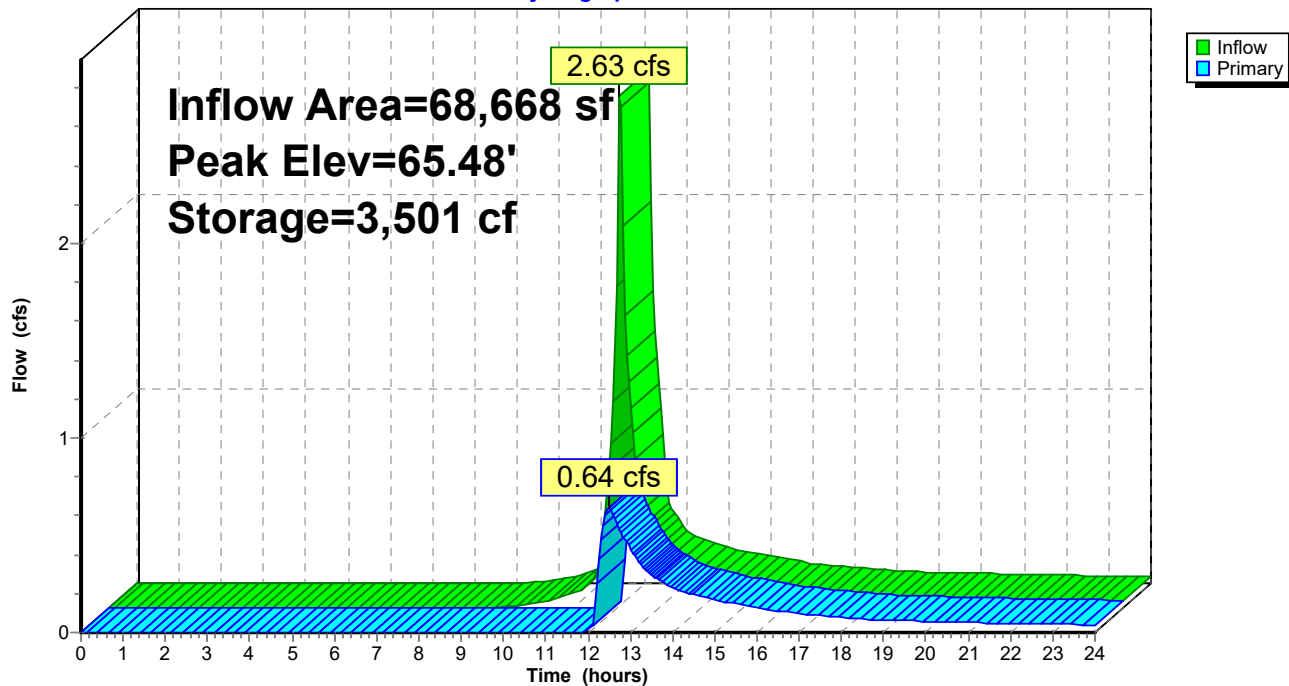
Device	Routing	Invert	Outlet Devices
#1	Primary	64.00'	15.0" x 41.0' long Culvert CPP, square edge headwall, Ke= 0.500 Outlet Invert= 62.00' S= 0.0488 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Device 1	65.00'	8.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	67.50'	15.0" Horiz. Orifice/Grate Limited to weir flow C= 0.600

Primary OutFlow Max=0.64 cfs @ 12.50 hrs HW=65.48' TW=61.37' (Dynamic Tailwater)

1=Culvert (Passes 0.64 cfs of 5.47 cfs potential flow)
 2=Orifice/Grate (Orifice Controls 0.64 cfs @ 2.37 fps)
 3=Orifice/Grate (Controls 0.00 cfs)

Pond P3-1: P3-2

Hydrograph



Summary for Pond P3-2: P3-3

Inflow Area = 140,478 sf, 42.86% Impervious, Inflow Depth > 1.02" for 2 year event
 Inflow = 1.91 cfs @ 12.09 hrs, Volume= 11,973 cf
 Outflow = 0.14 cfs @ 17.76 hrs, Volume= 5,783 cf, Atten= 93%, Lag= 339.9 min
 Primary = 0.14 cfs @ 17.76 hrs, Volume= 5,783 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 51.88' @ 17.76 hrs Surf.Area= 5,174 sf Storage= 7,133 cf
 Flood Elev= 55.50' Surf.Area= 12,548 sf Storage= 38,610 cf

Plug-Flow detention time= 340.8 min calculated for 5,771 cf (48% of inflow)
 Center-of-Mass det. time= 199.2 min (1,090.1 - 891.0)

Volume	Invert	Avail.Storage	Storage Description
#1	50.00'	38,610 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
50.00	2,426	0	0
52.00	5,354	7,780	7,780
54.00	9,180	14,534	22,314
55.50	12,548	16,296	38,610

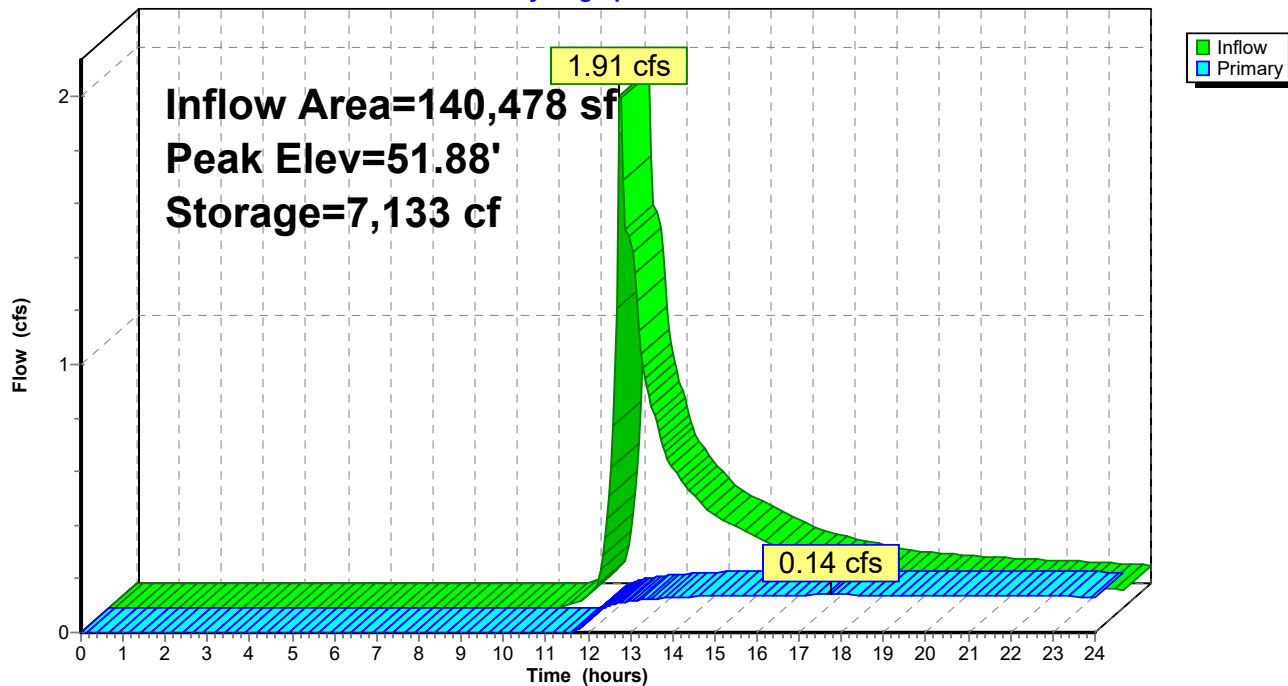
Device	Routing	Invert	Outlet Devices
#1	Primary	50.00'	12.0" x 29.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 49.00' S= 0.0345 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Device 1	50.00'	2.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	52.00'	8.0" Vert. Orifice/Grate C= 0.600
#4	Device 1	54.00'	2.00' x 2.00' Horiz. Orifice/Grate Limited to weir flow C= 0.600
#5	Primary	54.55'	10.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.14 cfs @ 17.76 hrs HW=51.88' TW=0.00' (Dynamic Tailwater)

1=Culvert (Passes 0.14 cfs of 4.44 cfs potential flow)
 2=Orifice/Grate (Orifice Controls 0.14 cfs @ 6.45 fps)
 3=Orifice/Grate (Controls 0.00 cfs)
 4=Orifice/Grate (Controls 0.00 cfs)
 5=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond P3-2: P3-3

Hydrograph



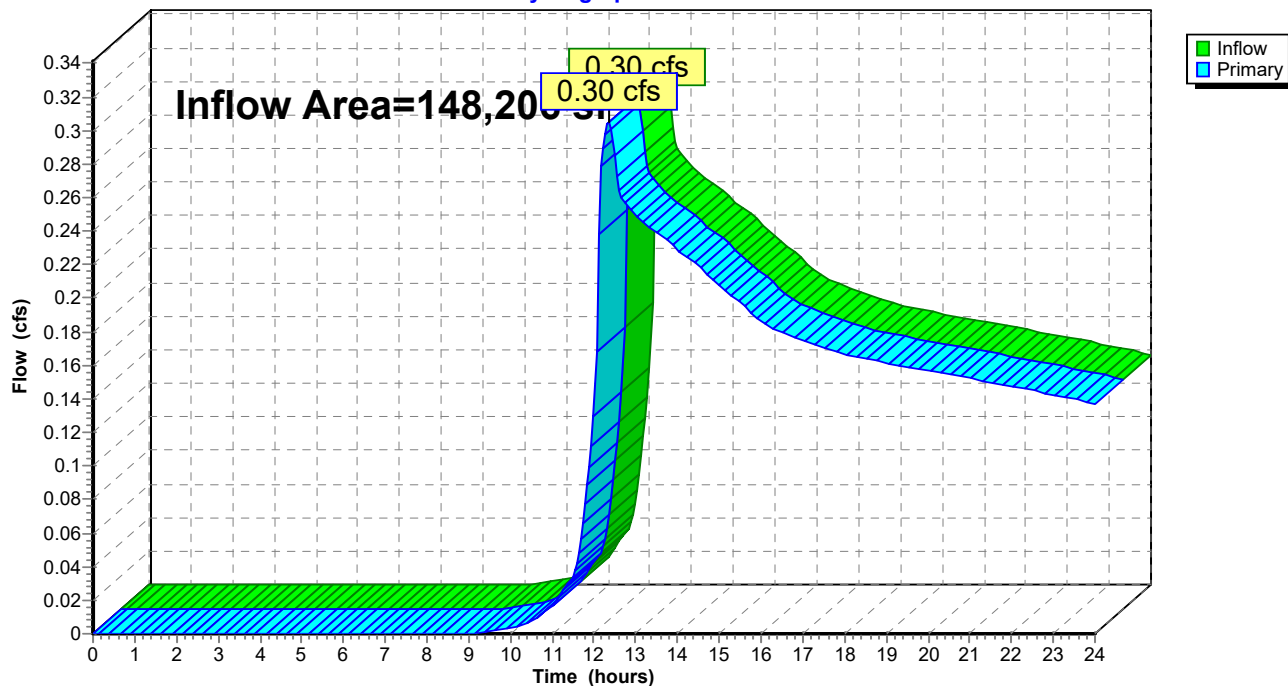
Summary for Link DP-1: DP-1

Inflow Area = 148,206 sf, 32.39% Impervious, Inflow Depth > 0.65" for 2 year event
Inflow = 0.30 cfs @ 12.34 hrs, Volume= 8,075 cf
Primary = 0.30 cfs @ 12.34 hrs, Volume= 8,075 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP-1: DP-1

Hydrograph



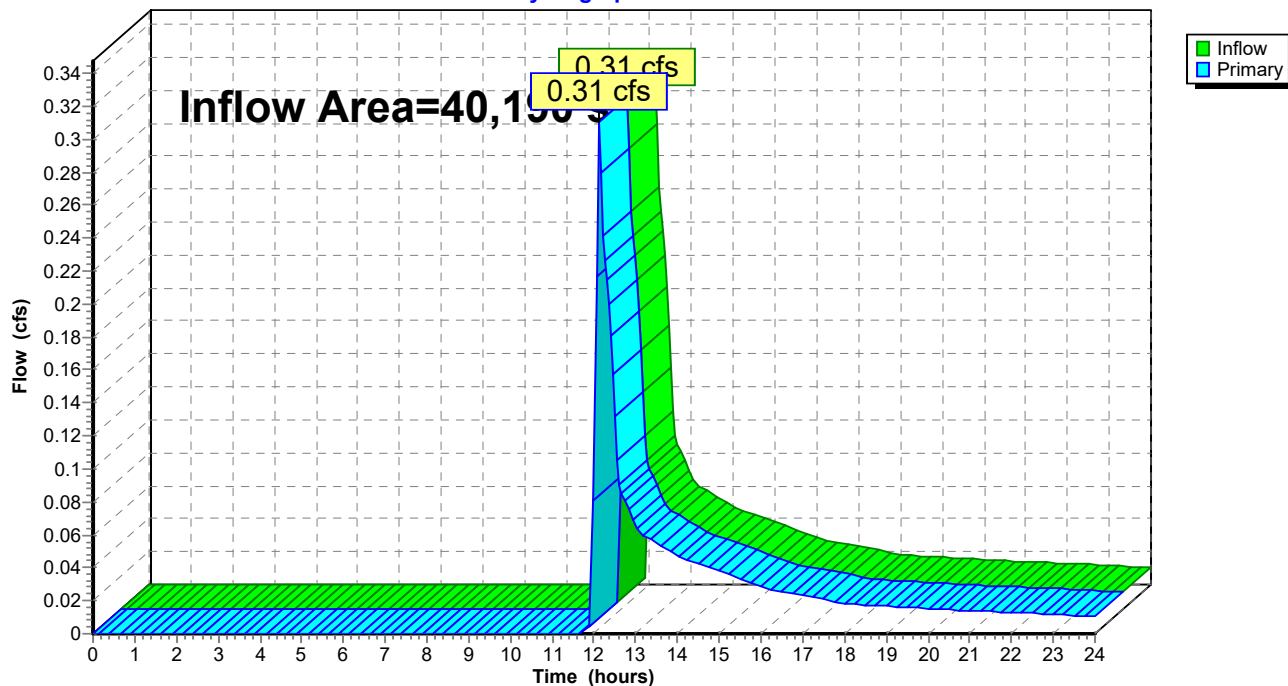
Summary for Link DP-2: DP-2

Inflow Area = 40,190 sf, 10.95% Impervious, Inflow Depth > 0.44" for 2 year event
Inflow = 0.31 cfs @ 12.11 hrs, Volume= 1,485 cf
Primary = 0.31 cfs @ 12.11 hrs, Volume= 1,485 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP-2: DP-2

Hydrograph



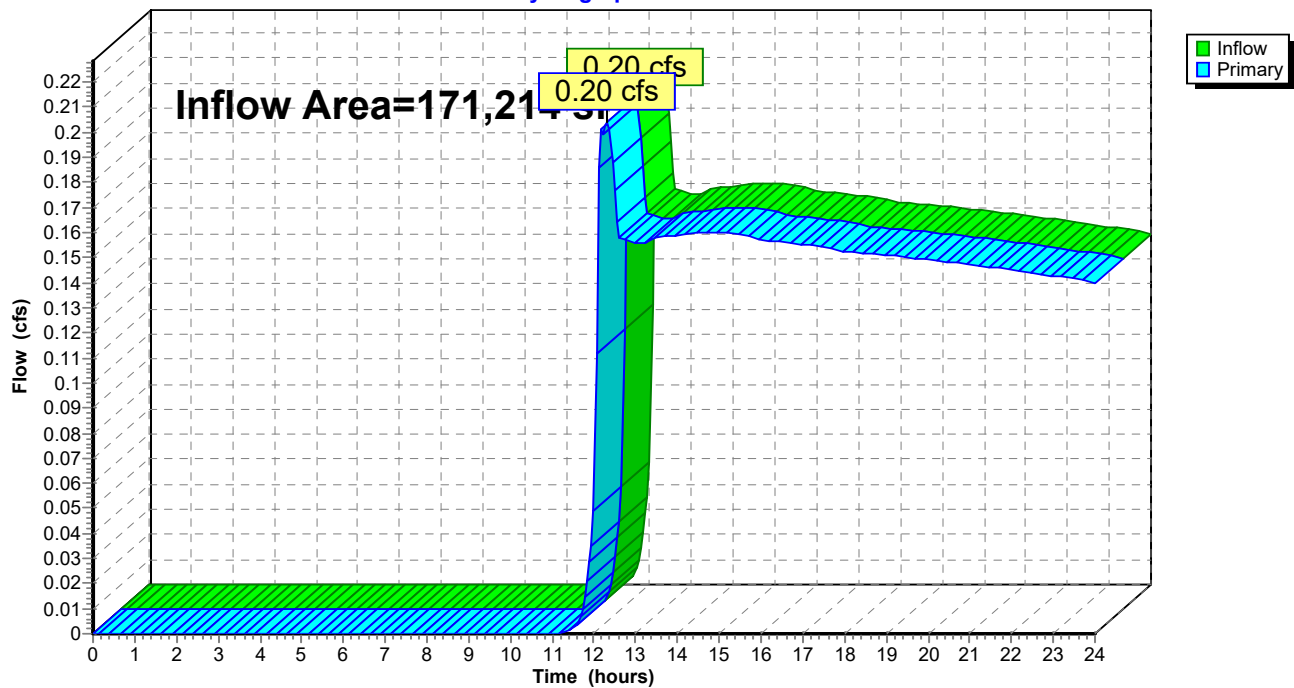
Summary for Link DP-3: DP-3

Inflow Area = 171,214 sf, 35.17% Impervious, Inflow Depth > 0.47" for 2 year event
Inflow = 0.20 cfs @ 12.30 hrs, Volume= 6,656 cf
Primary = 0.20 cfs @ 12.30 hrs, Volume= 6,656 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP-3: DP-3

Hydrograph

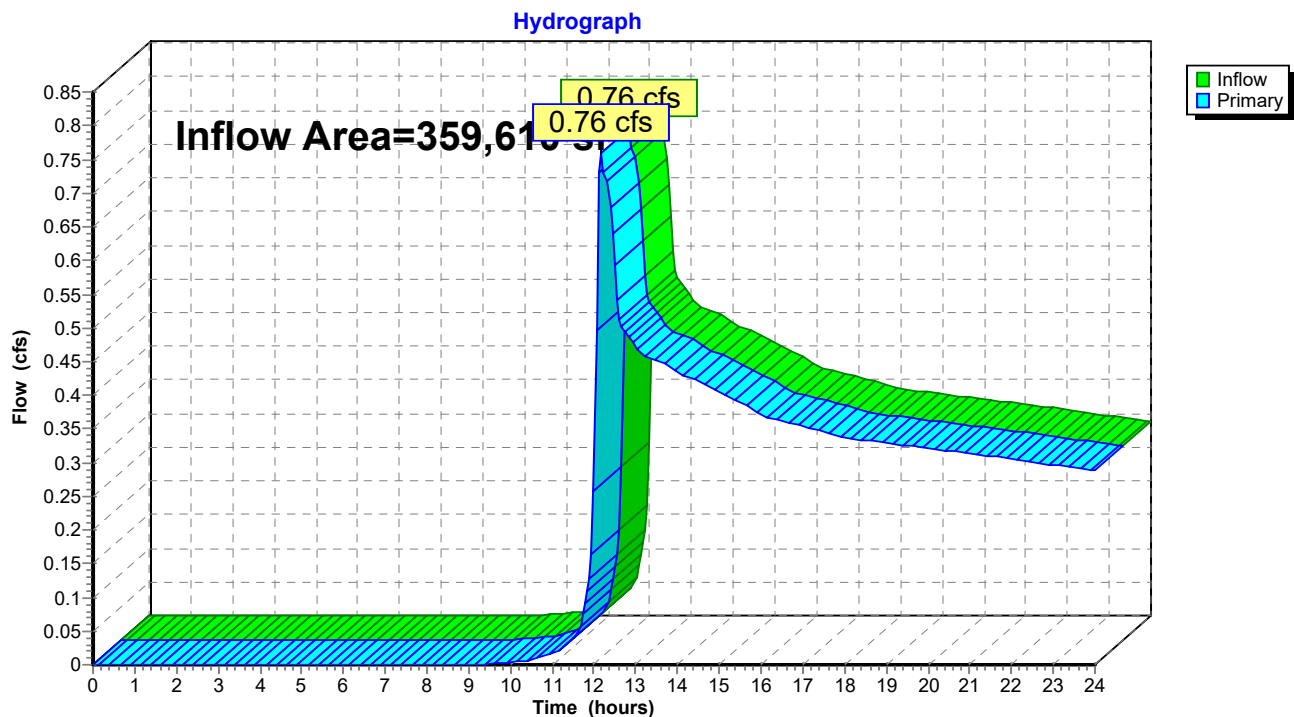


Summary for Link TOTAL: (new Link)

Inflow Area = 359,610 sf, 31.32% Impervious, Inflow Depth > 0.54" for 2 year event
Inflow = 0.76 cfs @ 12.15 hrs, Volume= 16,216 cf
Primary = 0.76 cfs @ 12.15 hrs, Volume= 16,216 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link TOTAL: (new Link)





Hydrocad

POST-DEVELOPMENT

10-Year Storm

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment P-1A: P-1A	Runoff Area=2,325 sf 0.00% Impervious Runoff Depth>0.94" Flow Length=106' Tc=5.0 min CN=56 Runoff=0.05 cfs 182 cf
Subcatchment P-1B: P-1E	Runoff Area=12,786 sf 39.18% Impervious Runoff Depth>2.29" Tc=5.0 min CN=75 Runoff=0.79 cfs 2,436 cf
Subcatchment P-1C: P-1C	Runoff Area=3,632 sf 56.17% Impervious Runoff Depth>2.90" Flow Length=301' Tc=1.8 min CN=82 Runoff=0.31 cfs 878 cf
Subcatchment P-1D: P-1D	Runoff Area=3,713 sf 81.12% Impervious Runoff Depth>3.79" Flow Length=235' Tc=1.4 min CN=91 Runoff=0.40 cfs 1,172 cf
Subcatchment P-1E: P-1E	Runoff Area=15,652 sf 37.11% Impervious Runoff Depth>2.20" Flow Length=108' Tc=5.0 min CN=74 Runoff=0.93 cfs 2,875 cf
Subcatchment P-1F: P-1F	Runoff Area=20,654 sf 69.31% Impervious Runoff Depth>3.38" Flow Length=272' Tc=5.0 min CN=87 Runoff=1.86 cfs 5,813 cf
Subcatchment P-1G: P-1I	Runoff Area=5,773 sf 64.25% Impervious Runoff Depth>3.18" Flow Length=177' Tc=5.0 min CN=85 Runoff=0.49 cfs 1,531 cf
Subcatchment P-1H: P-1H	Runoff Area=19,745 sf 42.54% Impervious Runoff Depth>2.45" Flow Length=158' Tc=5.0 min CN=77 Runoff=1.31 cfs 4,039 cf
Subcatchment P-1I: P-1I	Runoff Area=35,138 sf 15.99% Impervious Runoff Depth>1.66" Flow Length=170' Tc=8.2 min CN=67 Runoff=1.36 cfs 4,867 cf
Subcatchment P-1J: P-1J	Runoff Area=28,788 sf 0.31% Impervious Runoff Depth>1.00" Flow Length=280' Tc=6.1 min CN=57 Runoff=0.63 cfs 2,395 cf
Subcatchment P-2A: P-2A	Runoff Area=40,190 sf 10.95% Impervious Runoff Depth>1.25" Flow Length=156' Tc=5.0 min CN=61 Runoff=1.23 cfs 4,184 cf
Subcatchment P-3A: P-3A	Runoff Area=30,736 sf 0.00% Impervious Runoff Depth>1.06" Flow Length=260' Tc=5.0 min CN=58 Runoff=0.75 cfs 2,713 cf
Subcatchment P-3B: P-3B	Runoff Area=71,810 sf 34.04% Impervious Runoff Depth>2.20" Flow Length=128' Tc=5.0 min CN=74 Runoff=4.25 cfs 13,190 cf
Subcatchment P-3C: P-3C	Runoff Area=41,660 sf 48.12% Impervious Runoff Depth>2.63" Flow Length=153' Tc=5.0 min CN=79 Runoff=2.95 cfs 9,125 cf
Subcatchment P-3D: P-3D	Runoff Area=22,478 sf 56.13% Impervious Runoff Depth>2.90" Flow Length=240' Tc=5.0 min CN=82 Runoff=1.75 cfs 5,430 cf
Subcatchment P-3E: P-3F	Runoff Area=4,530 sf 68.52% Impervious Runoff Depth>3.28" Flow Length=245' Tc=5.0 min CN=86 Runoff=0.40 cfs 1,238 cf

Pond 3P: INFILTRATOR

Peak Elev=0.00' Storage=0 cf

Pond CB1: CB1Peak Elev=51.41' Inflow=0.31 cfs 878 cf
8.0" x 9.0' Culvert Outflow=0.31 cfs 878 cf**Pond CB2: CB2**Peak Elev=51.41' Inflow=0.40 cfs 1,172 cf
8.0" x 9.0' Culvert Outflow=0.40 cfs 1,172 cf**Pond CB3: CB3**Peak Elev=53.37' Inflow=0.79 cfs 2,436 cf
12.0" x 12.0' Culvert Outflow=0.79 cfs 2,436 cf**Pond CB4: CB4**Peak Elev=53.51' Inflow=1.86 cfs 5,813 cf
12.0" x 11.0' Culvert Outflow=1.86 cfs 5,813 cf**Pond CB5: CB5**Peak Elev=61.65' Inflow=1.31 cfs 4,039 cf
12.0" x 13.0' Culvert Outflow=1.31 cfs 4,039 cf**Pond CB6: CB6**Peak Elev=61.39' Inflow=0.49 cfs 1,531 cf
12.0" x 13.0' Culvert Outflow=0.49 cfs 1,531 cf**Pond CB7: CB7**Peak Elev=66.62' Inflow=0.40 cfs 1,238 cf
12.0" x 20.0' Culvert Outflow=0.40 cfs 1,238 cf**Pond CB8: CB8**Peak Elev=66.82' Inflow=1.75 cfs 5,430 cf
12.0" x 20.0' Culvert Outflow=1.75 cfs 5,430 cf**Pond CB9: CB9**Peak Elev=66.86' Inflow=2.95 cfs 9,125 cf
12.0" x 22.0' Culvert Outflow=2.95 cfs 9,125 cf**Pond DMH 10: DMH9**Peak Elev=61.64' Inflow=1.71 cfs 13,269 cf
15.0" x 100.0' Culvert Outflow=1.71 cfs 13,269 cf**Pond DMH 11: DMH 10**Peak Elev=55.93' Inflow=1.71 cfs 13,269 cf
15.0" x 33.0' Culvert Outflow=1.71 cfs 13,269 cf**Pond DMH 6: DMH 6**Peak Elev=66.38' Inflow=2.15 cfs 6,668 cf
15.0" x 55.0' Culvert Outflow=2.15 cfs 6,668 cf**Pond DMH2: DMH2**Peak Elev=53.37' Inflow=2.63 cfs 8,249 cf
12.0" x 39.0' Culvert Outflow=2.63 cfs 8,249 cf**Pond DMH3: DMH3**Peak Elev=56.06' Inflow=1.80 cfs 5,570 cf
12.0" x 35.0' Culvert Outflow=1.80 cfs 5,570 cf**Pond DMH4: DMH4**Peak Elev=58.98' Inflow=1.80 cfs 5,570 cf
12.0" x 119.0' Culvert Outflow=1.80 cfs 5,570 cf**Pond DMH5: DMH 5**Peak Elev=66.60' Inflow=2.15 cfs 6,668 cf
15.0" x 94.0' Culvert Outflow=2.15 cfs 6,668 cf**Pond DMH7: DMH7**Peak Elev=66.37' Inflow=2.15 cfs 6,668 cf
Outflow=2.15 cfs 6,668 cf

Pearson Drive, Newbury, MA POST DEV

Prepared by Ranger Engineering & Design, LLC

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Type III 24-hr 10 year Rainfall=4.80"

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Pond DMH8: DMH8Peak Elev=66.43' Inflow=2.95 cfs 9,125 cf
12.0" x 1.0' Culvert Outflow=2.95 cfs 9,125 cf**Pond P1-1: P1-1**Peak Elev=53.35' Storage=7,345 cf Inflow=5.35 cfs 16,694 cf
Outflow=1.30 cfs 12,536 cf**Pond P1-2: DP-1-2**Peak Elev=57.93' Storage=3,854 cf Inflow=1.36 cfs 4,867 cf
Outflow=0.02 cfs 1,015 cf**Pond P1-3: P1-3**Peak Elev=51.41' Storage=886 cf Inflow=0.70 cfs 2,050 cf
Outflow=0.11 cfs 1,901 cf**Pond P3-1: P3-2**Peak Elev=66.36' Storage=5,954 cf Inflow=5.10 cfs 15,793 cf
Outflow=1.71 cfs 13,269 cf**Pond P3-2: P3-3**Peak Elev=52.66' Storage=11,729 cf Inflow=5.48 cfs 26,459 cf
Outflow=1.13 cfs 18,435 cf**Link DP-1: DP-1**Inflow=1.71 cfs 18,029 cf
Primary=1.71 cfs 18,029 cf**Link DP-2: DP-2**Inflow=1.23 cfs 4,184 cf
Primary=1.23 cfs 4,184 cf**Link DP-3: DP-3**Inflow=1.23 cfs 21,148 cf
Primary=1.23 cfs 21,148 cf**Link TOTAL: (new Link)**Inflow=3.01 cfs 43,362 cf
Primary=3.01 cfs 43,362 cf**Total Runoff Area = 359,610 sf Runoff Volume = 62,068 cf Average Runoff Depth = 2.07"**
68.68% Pervious = 246,993 sf 31.32% Impervious = 112,617 sf

Summary for Subcatchment P-1A: P-1A

Runoff = 0.05 cfs @ 12.10 hrs, Volume= 182 cf, Depth> 0.94"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

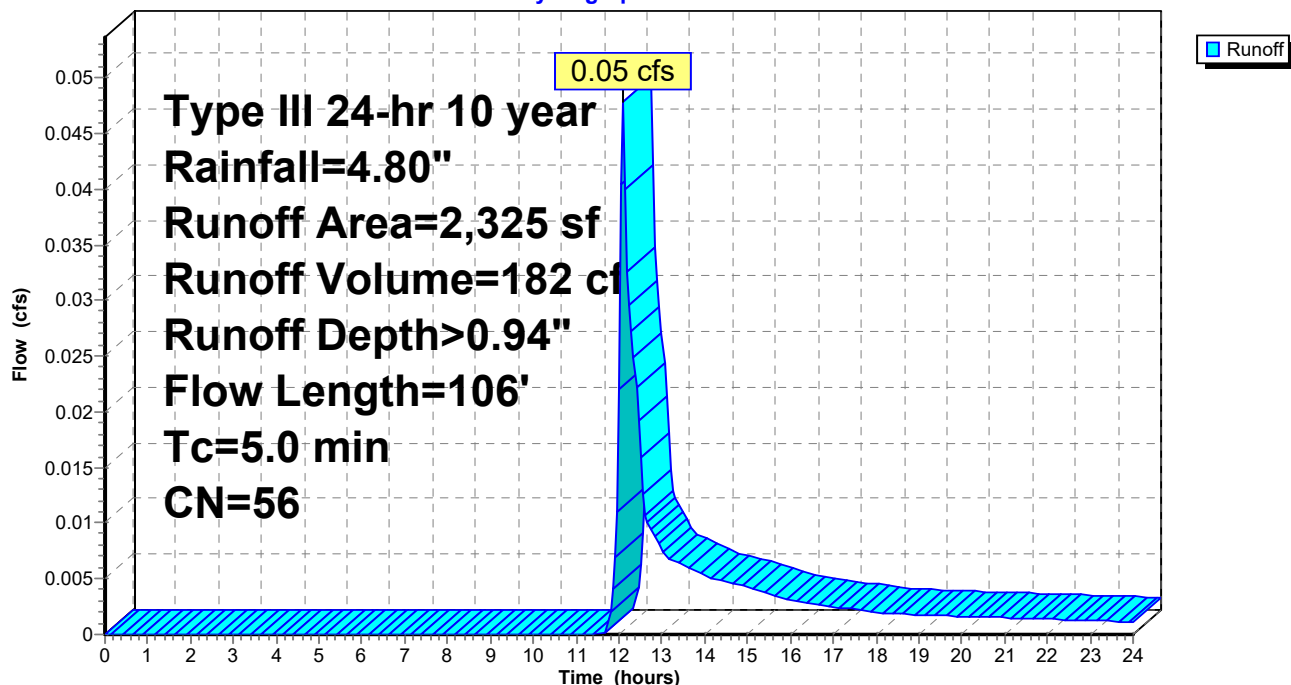
Type III 24-hr 10 year Rainfall=4.80"

Area (sf)	CN	Description
1,780	55	Woods, Good, HSG B
545	61	>75% Grass cover, Good, HSG B
0	98	Roofs, HSG B
0	98	Paved parking, HSG B
0	98	Paved roads w/curbs & sewers, HSG B
2,325	56	Weighted Average
2,325		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1					Direct Entry, DIRECT
3.2	50	0.0800	0.26		Sheet Flow, SHEET FLOW
					Grass: Short n= 0.150 P2= 3.20"
0.7	56	0.0357	1.32		Shallow Concentrated Flow, GRASS
					Short Grass Pasture Kv= 7.0 fps
5.0	106	Total			

Subcatchment P-1A: P-1A

Hydrograph



Summary for Subcatchment P-1B: P-1E

Runoff = 0.79 cfs @ 12.08 hrs, Volume= 2,436 cf, Depth> 2.29"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

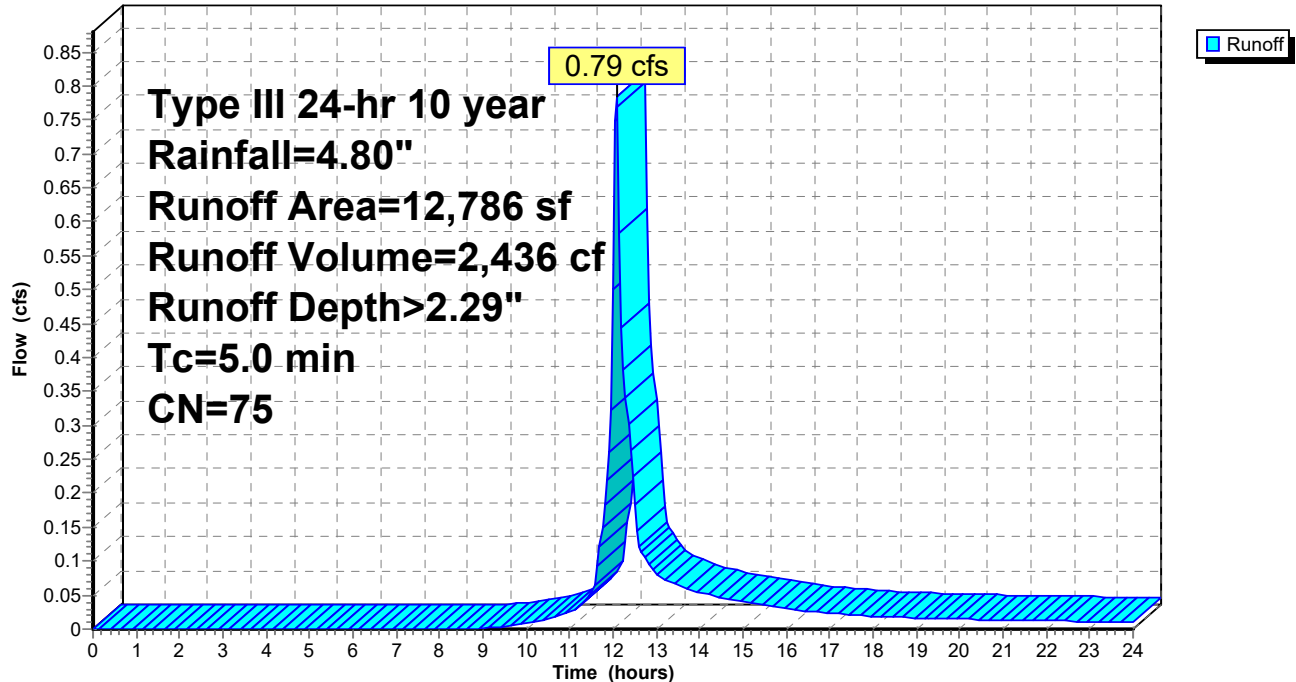
Type III 24-hr 10 year Rainfall=4.80"

Area (sf)	CN	Description
0	98	Roofs, HSG B
5,009	98	Paved roads w/curbs & sewers, HSG B
7,777	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
0	98	Water Surface, HSG B
12,786	75	Weighted Average
7,777		Pervious Area
5,009		Impervious Area

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

Subcatchment P-1B: P-1E

Hydrograph



Summary for Subcatchment P-1C: P-1C

Runoff = 0.31 cfs @ 12.03 hrs, Volume= 878 cf, Depth> 2.90"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 10 year Rainfall=4.80"

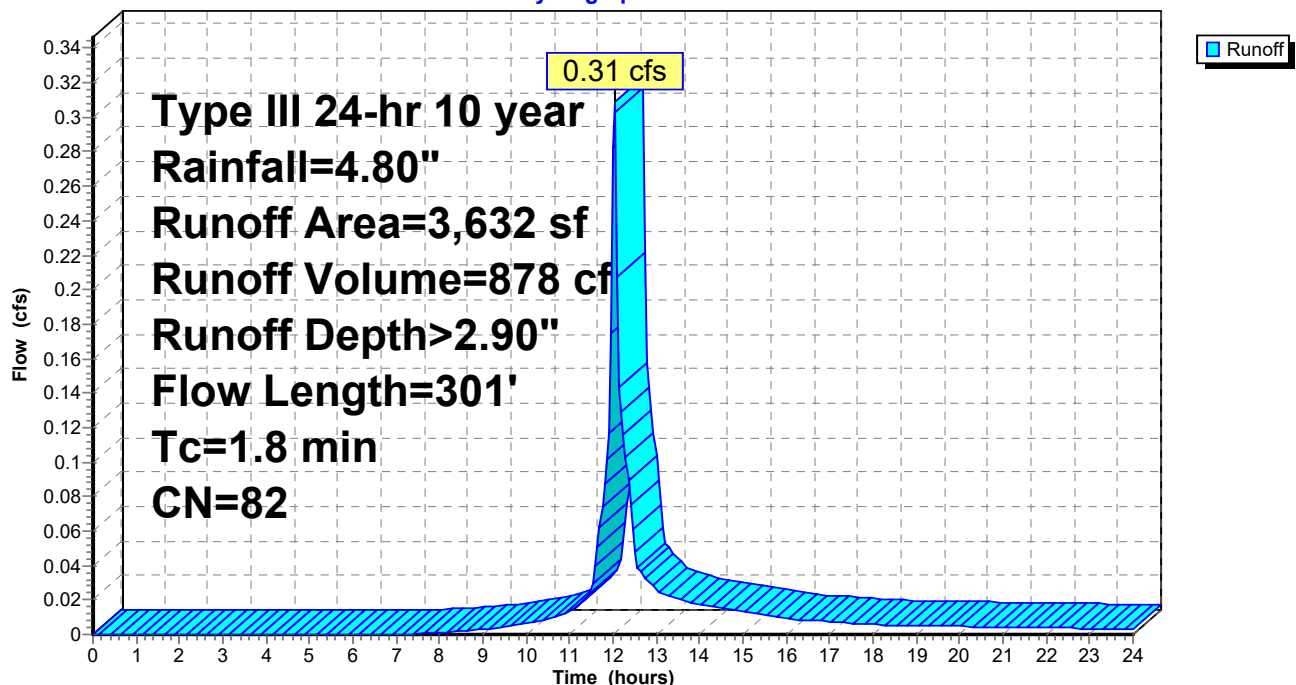
Area (sf)	CN	Description
0	98	Roofs, HSG B
0	98	Paved parking, HSG B
2,040	98	Paved roads w/curbs & sewers, HSG B
1,592	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B

3,632	82	Weighted Average
1,592		Pervious Area
2,040		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	50	0.0300	1.41		Sheet Flow, SHEET
					Smooth surfaces n= 0.011 P2= 3.20"
1.2	251	0.0287	3.44		Shallow Concentrated Flow, PAVEMENT
					Paved Kv= 20.3 fps
1.8	301	Total			

Subcatchment P-1C: P-1C

Hydrograph



Summary for Subcatchment P-1D: P-1D

Runoff = 0.40 cfs @ 12.02 hrs, Volume= 1,172 cf, Depth> 3.79"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 10 year Rainfall=4.80"

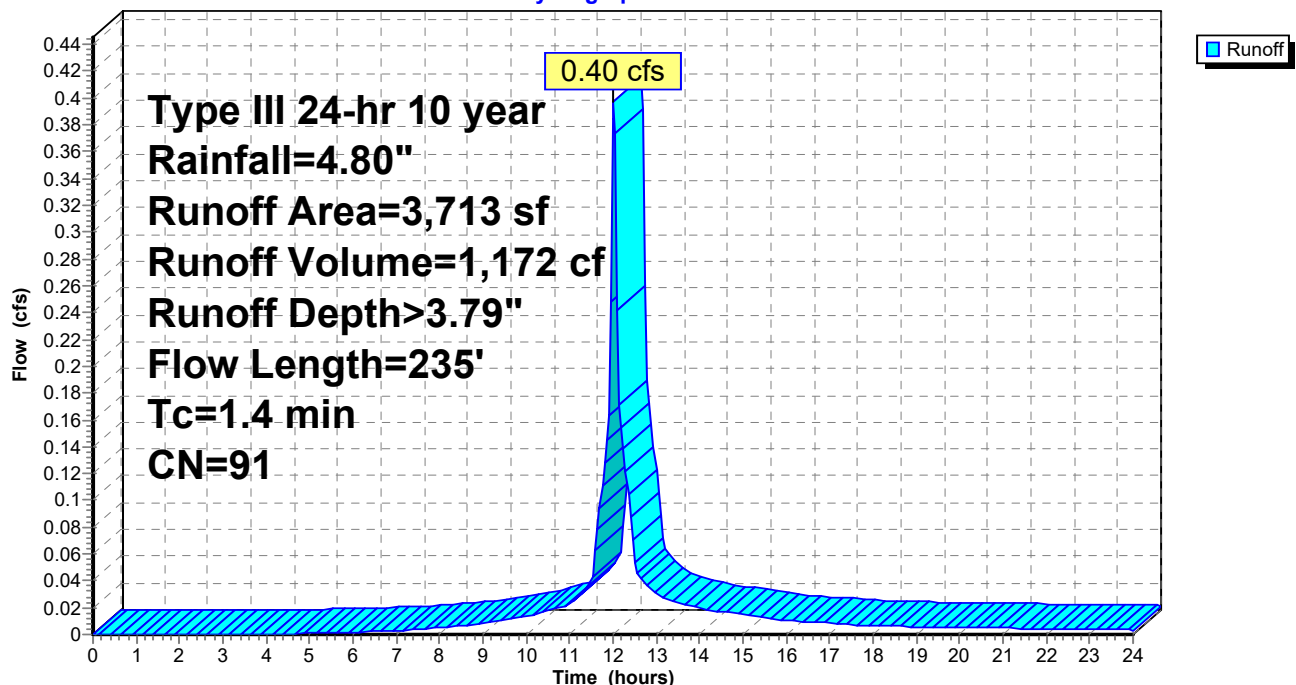
Area (sf)	CN	Description
0	98	Roofs, HSG B
0	98	Paved parking, HSG B
3,012	98	Paved roads w/curbs & sewers, HSG B
701	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B

3,713	91	Weighted Average
701		Pervious Area
3,012		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0400	1.58		Sheet Flow, SHEET
					Smooth surfaces n= 0.011 P2= 3.20"
0.9	185	0.0282	3.41		Shallow Concentrated Flow, PAVEMENT
					Paved Kv= 20.3 fps
1.4	235	Total			

Subcatchment P-1D: P-1D

Hydrograph



Summary for Subcatchment P-1E: P-1E

Runoff = 0.93 cfs @ 12.08 hrs, Volume= 2,875 cf, Depth> 2.20"

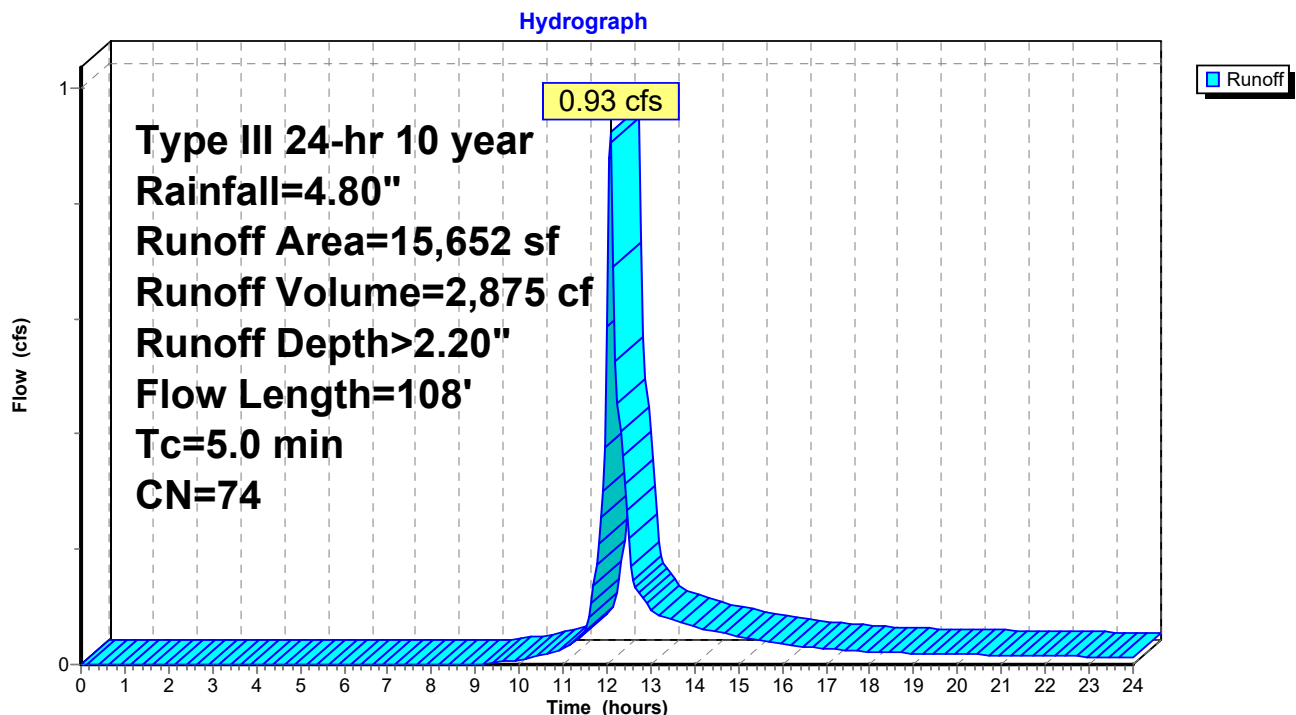
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 10 year Rainfall=4.80"

Area (sf)	CN	Description
880	98	Roofs, HSG B
0	98	Paved parking, HSG B
0	98	Paved roads w/curbs & sewers, HSG B
8,844	61	>75% Grass cover, Good, HSG B
4,928	98	Water Surface, HSG B
1,000	55	Woods, Good, HSG B
15,652	74	Weighted Average
9,844		Pervious Area
5,808		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4					Direct Entry, DIRECT
3.3	50	0.0760	0.25		Sheet Flow, SHEET
					Grass: Short n= 0.150 P2= 3.20"
0.3	58	0.1897	3.05		Shallow Concentrated Flow, GRASS
					Short Grass Pasture Kv= 7.0 fps
5.0	108	Total			

Subcatchment P-1E: P-1E



Summary for Subcatchment P-1F: P-1F

Runoff = 1.86 cfs @ 12.07 hrs, Volume= 5,813 cf, Depth> 3.38"

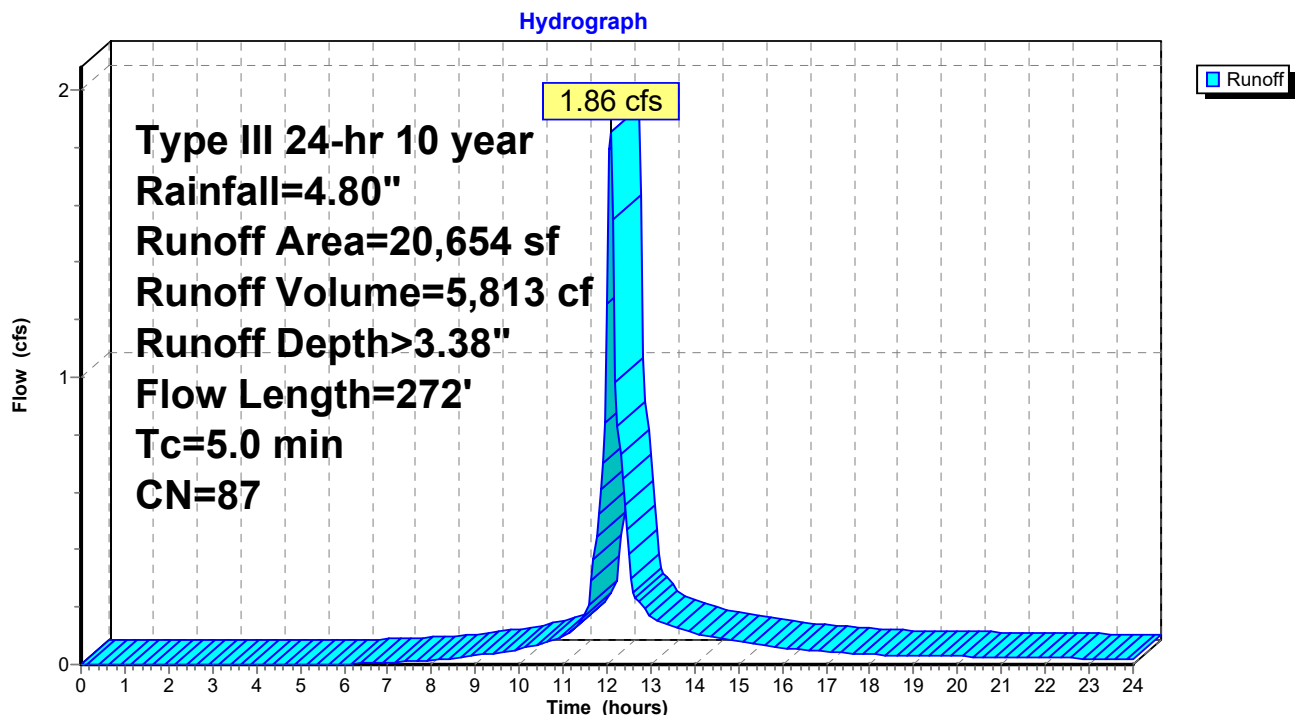
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 10 year Rainfall=4.80"

Area (sf)	CN	Description
4,840	98	Roofs, HSG B
0	98	Paved parking, HSG B
9,476	98	Paved roads w/curbs & sewers, HSG B
6,338	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
0	98	Water Surface, HSG B
20,654	87	Weighted Average
6,338		Pervious Area
14,316		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0					Direct Entry, DIRECT
3.0	50	0.1000	0.28		Sheet Flow, SHEET
					Grass: Short n= 0.150 P2= 3.20"
2.0	222	0.0676	1.82		Shallow Concentrated Flow, GRASS
					Short Grass Pasture Kv= 7.0 fps
5.0	272	Total			

Subcatchment P-1F: P-1F



Summary for Subcatchment P-1G: P-1I

Runoff = 0.49 cfs @ 12.07 hrs, Volume= 1,531 cf, Depth> 3.18"

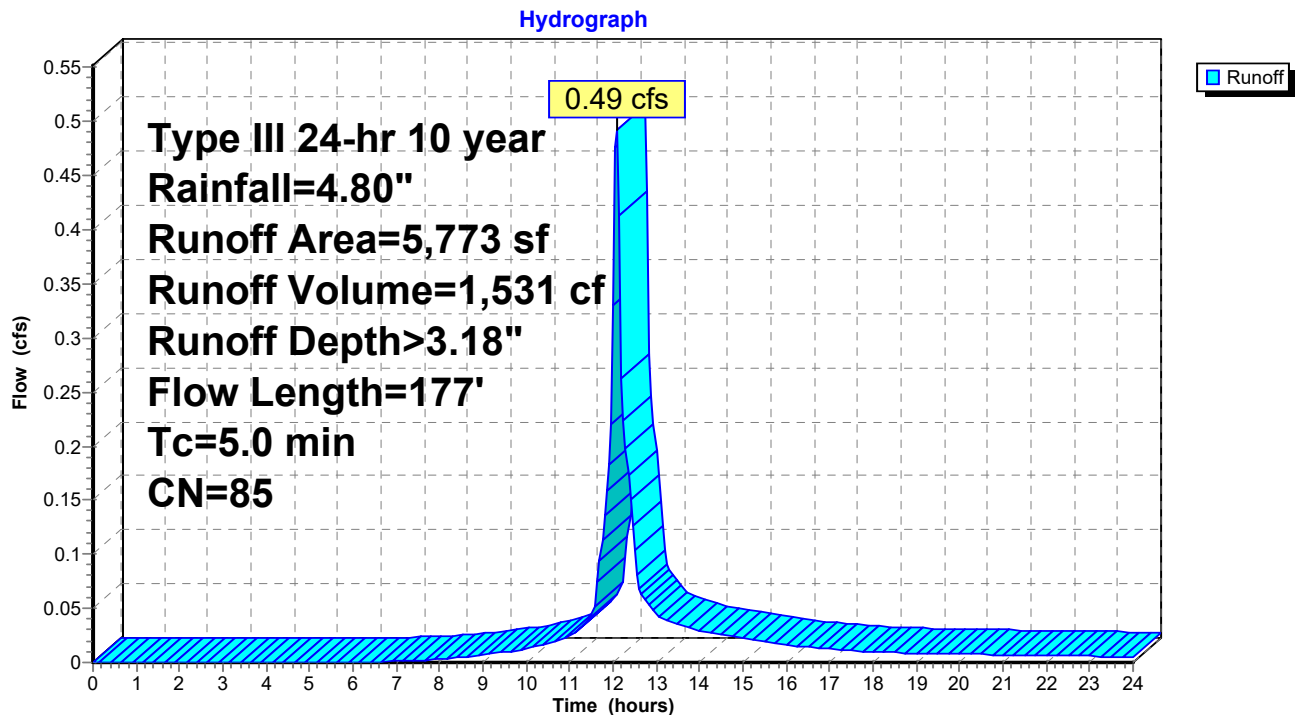
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 10 year Rainfall=4.80"

Area (sf)	CN	Description
0	55	Woods, Good, HSG B
2,064	61	>75% Grass cover, Good, HSG B
440	98	Roofs, HSG B
3,269	98	Paved roads w/curbs & sewers, HSG B
5,773	85	Weighted Average
2,064		Pervious Area
3,709		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7					Direct Entry, DIRECT
0.6	50	0.0300	1.41		Sheet Flow, SHEET FLOW
					Smooth surfaces n= 0.011 P2= 3.20"
0.7	127	0.0197	2.85		Shallow Concentrated Flow, PAVED
					Paved Kv= 20.3 fps
5.0	177	Total			

Subcatchment P-1G: P-1I



Summary for Subcatchment P-1H: P-1H

Runoff = 1.31 cfs @ 12.08 hrs, Volume= 4,039 cf, Depth> 2.45"

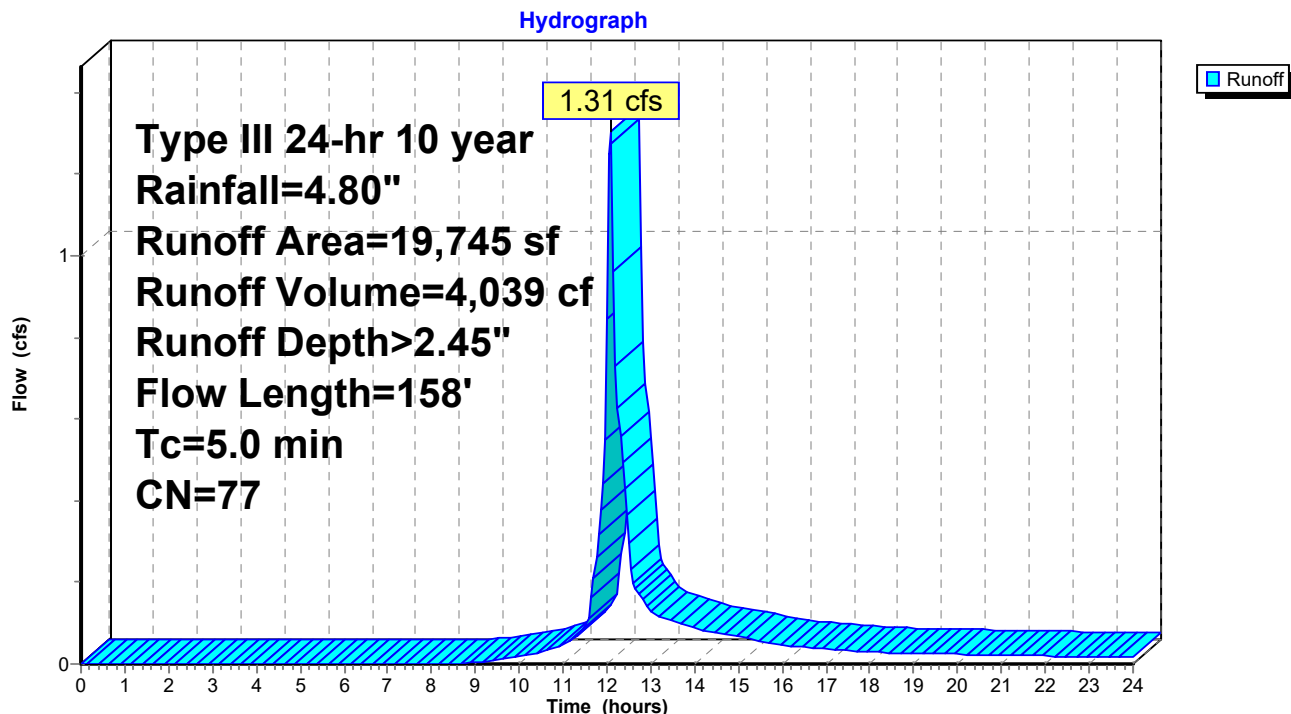
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 10 year Rainfall=4.80"

Area (sf)	CN	Description
5,720	98	Roofs, HSG B
0	98	Paved parking, HSG B
2,679	98	Paved roads w/curbs & sewers, HSG B
11,346	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
19,745	77	Weighted Average
11,346		Pervious Area
8,399		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.8					Direct Entry, DIRECT
0.6	50	0.0300	1.41		Sheet Flow, SHEET
					Smooth surfaces n= 0.011 P2= 3.20"
0.6	108	0.0231	3.09		Shallow Concentrated Flow, PAVEMENT
					Paved Kv= 20.3 fps
5.0	158	Total			

Subcatchment P-1H: P-1H



Summary for Subcatchment P-1I: P-1I

Runoff = 1.36 cfs @ 12.13 hrs, Volume= 4,867 cf, Depth> 1.66"

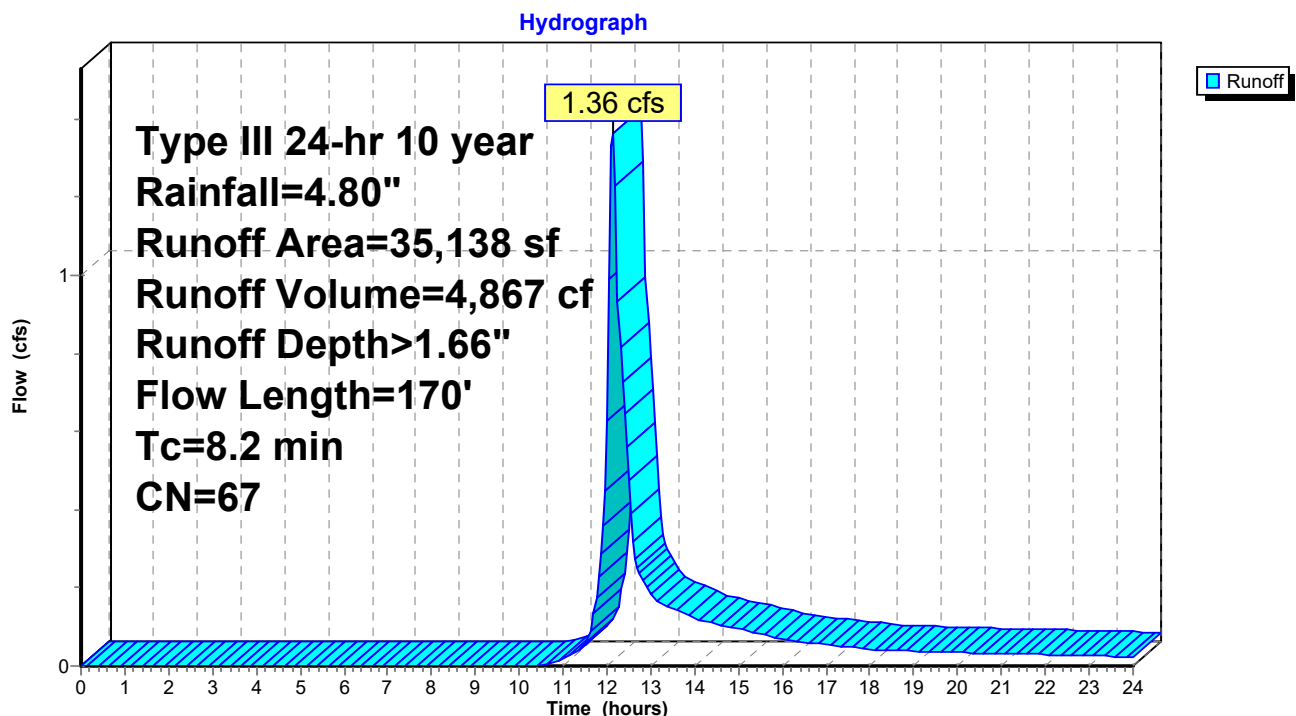
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 10 year Rainfall=4.80"

Area (sf)	CN	Description
440	98	Roofs, HSG B
0	98	Paved parking, HSG B
0	98	Paved roads w/curbs & sewers, HSG B
29,518	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
5,180	98	Water Surface, HSG B
35,138	67	Weighted Average
29,518		Pervious Area
5,620		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.1000	0.13		Sheet Flow, SHEET
					Woods: Light underbrush n= 0.400 P2= 3.20"
1.7	120	0.0580	1.20		Shallow Concentrated Flow, GRASS
					Woodland Kv= 5.0 fps
8.2	170	Total			

Subcatchment P-1I: P-1I



Summary for Subcatchment P-1J: P1-J

Runoff = 0.63 cfs @ 12.11 hrs, Volume= 2,395 cf, Depth> 1.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

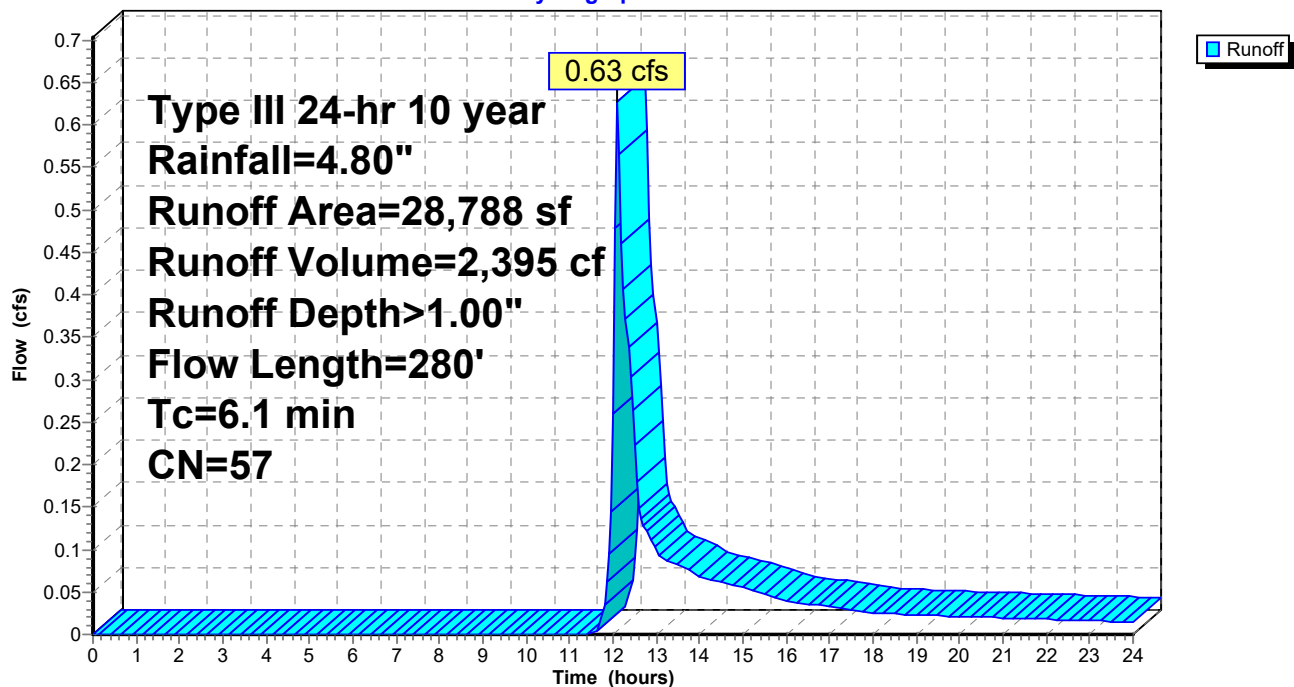
Type III 24-hr 10 year Rainfall=4.80"

Area (sf)	CN	Description
21,119	55	Woods, Good, HSG B
7,579	61	>75% Grass cover, Good, HSG B
* 90	98	Paved roads w/curbs & sewers, HSG B
28,788	57	Weighted Average
28,698		Pervious Area
90		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.2	50	0.0800	0.26		Sheet Flow, Flow over grass Grass: Short n= 0.150 P2= 3.20"
2.9	230	0.0690	1.31		Shallow Concentrated Flow, Flow in woods Woodland Kv= 5.0 fps
6.1	280	Total			

Subcatchment P-1J: P1-J

Hydrograph



Summary for Subcatchment P-2A: P-2A

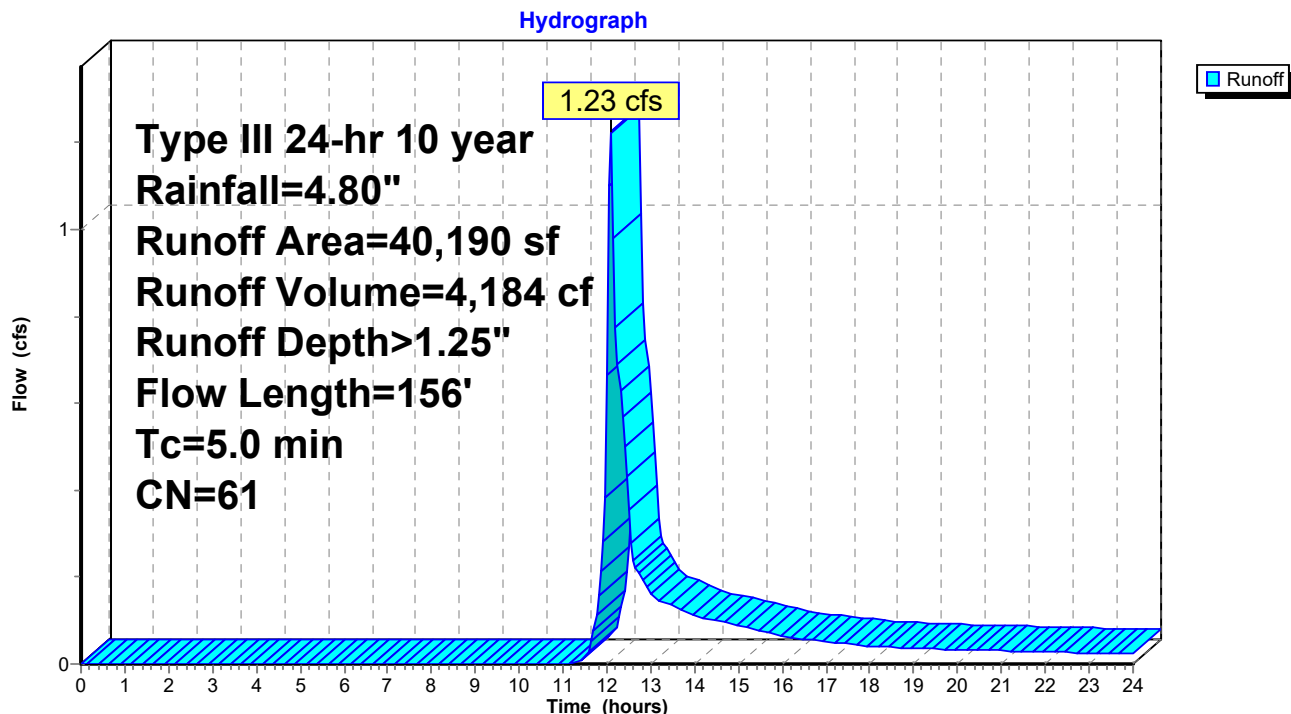
Runoff = 1.23 cfs @ 12.09 hrs, Volume= 4,184 cf, Depth> 1.25"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 10 year Rainfall=4.80"

Area (sf)	CN	Description
4,400	98	Roofs, HSG B
0	98	Paved parking, HSG B
0	98	Paved roads w/curbs & sewers, HSG B
10,645	61	>75% Grass cover, Good, HSG B
25,145	55	Woods, Good, HSG B
40,190	61	Weighted Average
35,790		Pervious Area
4,400		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3					Direct Entry, DIRECT
3.9	50	0.0500	0.21		Sheet Flow, SHEET GRASS Grass: Short n= 0.150 P2= 3.20"
0.8	106	0.1085	2.31		Shallow Concentrated Flow, GRASS SHALLOW Short Grass Pasture Kv= 7.0 fps
5.0	156	Total			

Subcatchment P-2A: P-2A

Summary for Subcatchment P-3A: P-3A

Runoff = 0.75 cfs @ 12.10 hrs, Volume= 2,713 cf, Depth> 1.06"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

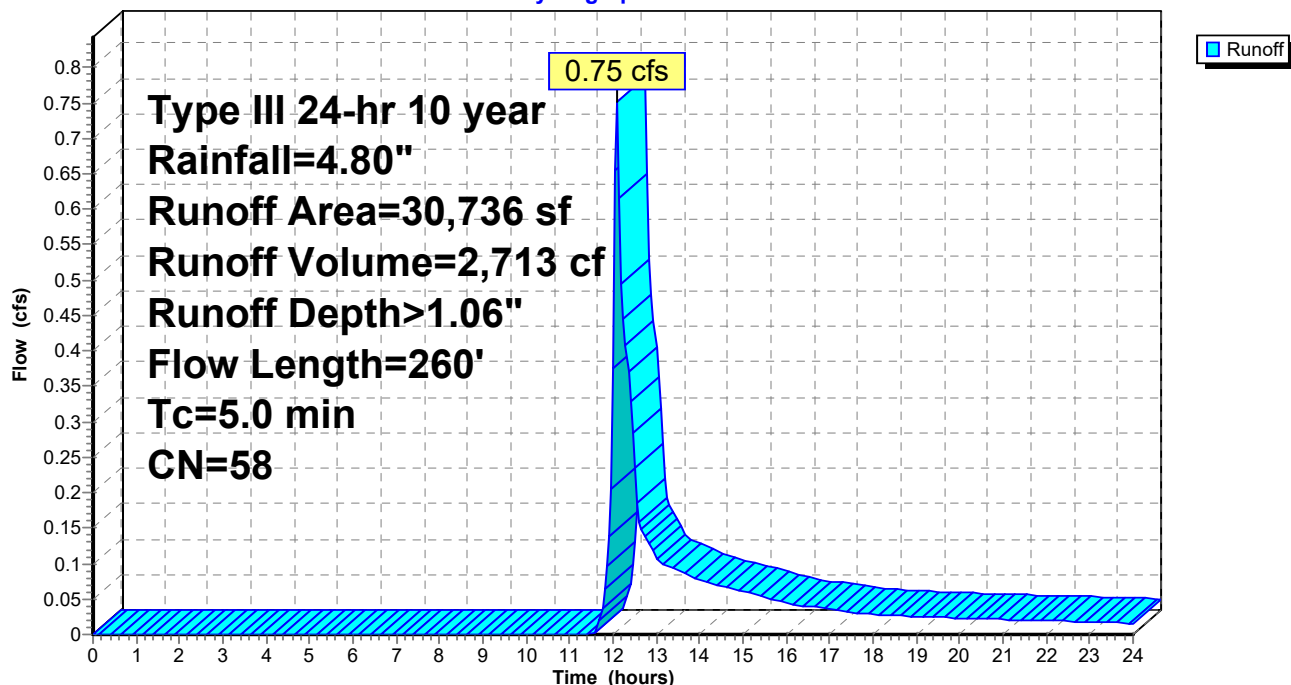
Type III 24-hr 10 year Rainfall=4.80"

Area (sf)	CN	Description
0	98	Roofs, HSG B
0	98	Unconnected pavement, HSG B
0	98	Paved roads w/curbs & sewers, HSG B
13,964	61	>75% Grass cover, Good, HSG B
16,772	55	Woods, Good, HSG B
30,736	58	Weighted Average
30,736		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0					Direct Entry, DIRECT
2.0	50	0.2700	0.42		Sheet Flow, SHEET GRASS
					Grass: Short n= 0.150 P2= 3.20"
2.0	210	0.0595	1.71		Shallow Concentrated Flow, SHALLOW GRASS
					Short Grass Pasture Kv= 7.0 fps
5.0	260	Total			

Subcatchment P-3A: P-3A

Hydrograph



Summary for Subcatchment P-3B: P-3B

Runoff = 4.25 cfs @ 12.08 hrs, Volume= 13,190 cf, Depth> 2.20"

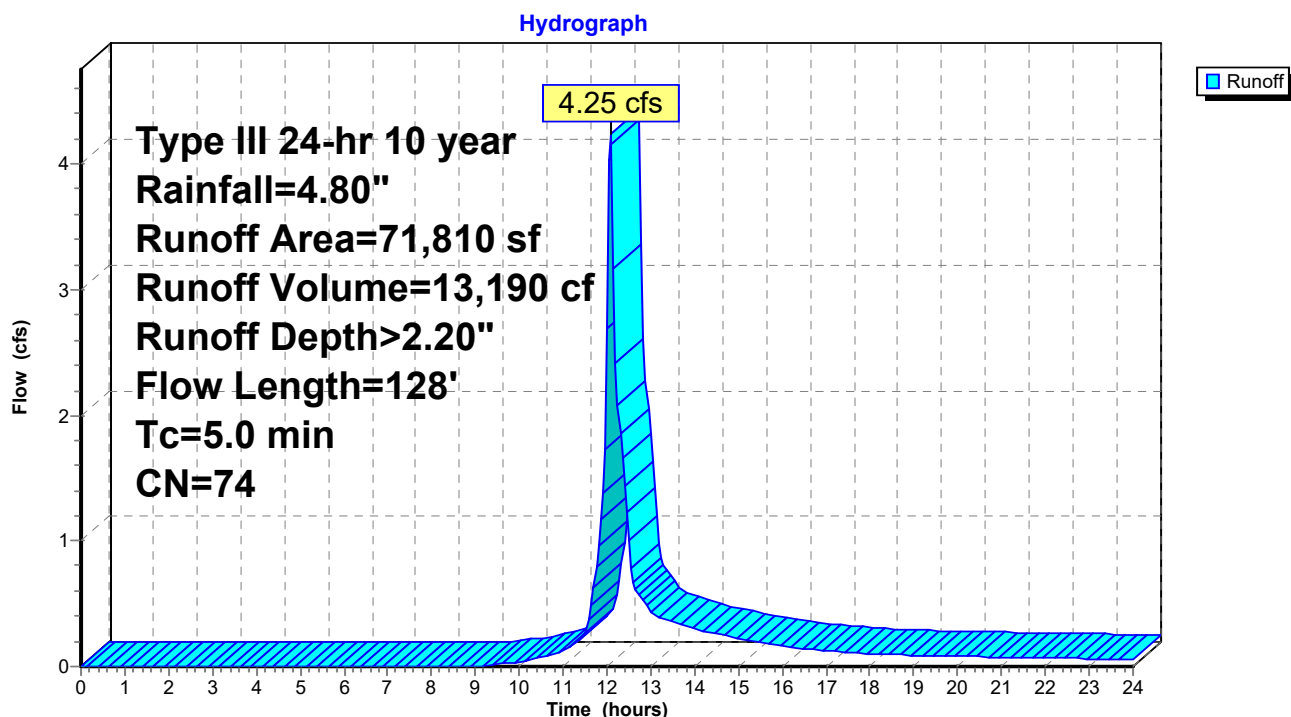
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 10 year Rainfall=4.80"

Area (sf)	CN	Description
15,400	98	Roofs, HSG B
0	98	Paved parking, HSG B
0	98	Paved roads w/curbs & sewers, HSG B
47,365	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
9,045	98	Water Surface, HSG B
71,810	74	Weighted Average
47,365		Pervious Area
24,445		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8					Direct Entry, DIRECT
2.7	50	0.1300	0.31		Sheet Flow, SHEET GRASS
					Grass: Short n= 0.150 P2= 3.20"
0.5	78	0.1218	2.44		Shallow Concentrated Flow, SHALLOW GRASS
					Short Grass Pasture Kv= 7.0 fps
5.0	128	Total			

Subcatchment P-3B: P-3B



Summary for Subcatchment P-3C: P-3C

Runoff = 2.95 cfs @ 12.08 hrs, Volume= 9,125 cf, Depth> 2.63"

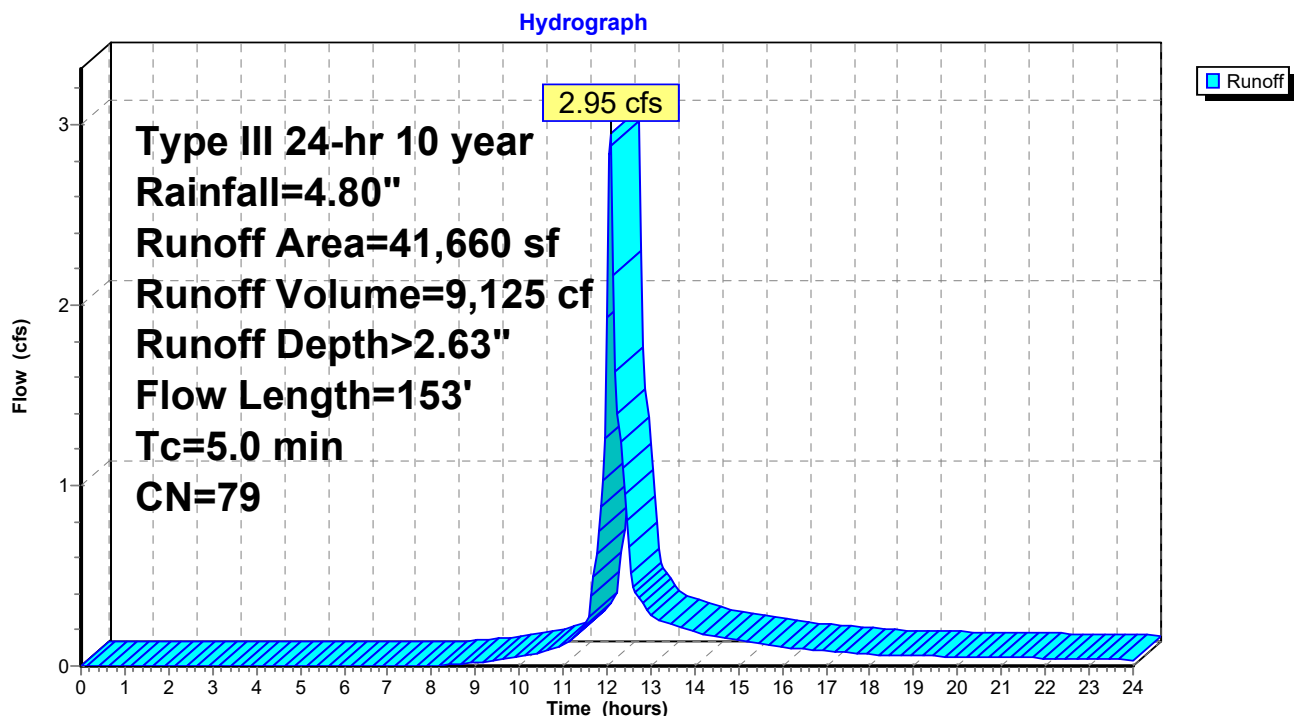
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 10 year Rainfall=4.80"

Area (sf)	CN	Description
3,520	98	Roofs, HSG B
0	98	Paved parking, HSG B
16,527	98	Paved roads w/curbs & sewers, HSG B
21,613	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
41,660	79	Weighted Average
21,613		Pervious Area
20,047		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3					Direct Entry, DIRECT
0.9	50	0.0096	0.89		Sheet Flow, SHEET PAVEMENT
					Smooth surfaces n= 0.011 P2= 3.20"
0.8	103	0.0116	2.19		Shallow Concentrated Flow, SHALLOW PAVEMENT
					Paved Kv= 20.3 fps
5.0	153	Total			

Subcatchment P-3C: P-3C



Summary for Subcatchment P-3D: P-3D

Runoff = 1.75 cfs @ 12.08 hrs, Volume= 5,430 cf, Depth> 2.90"

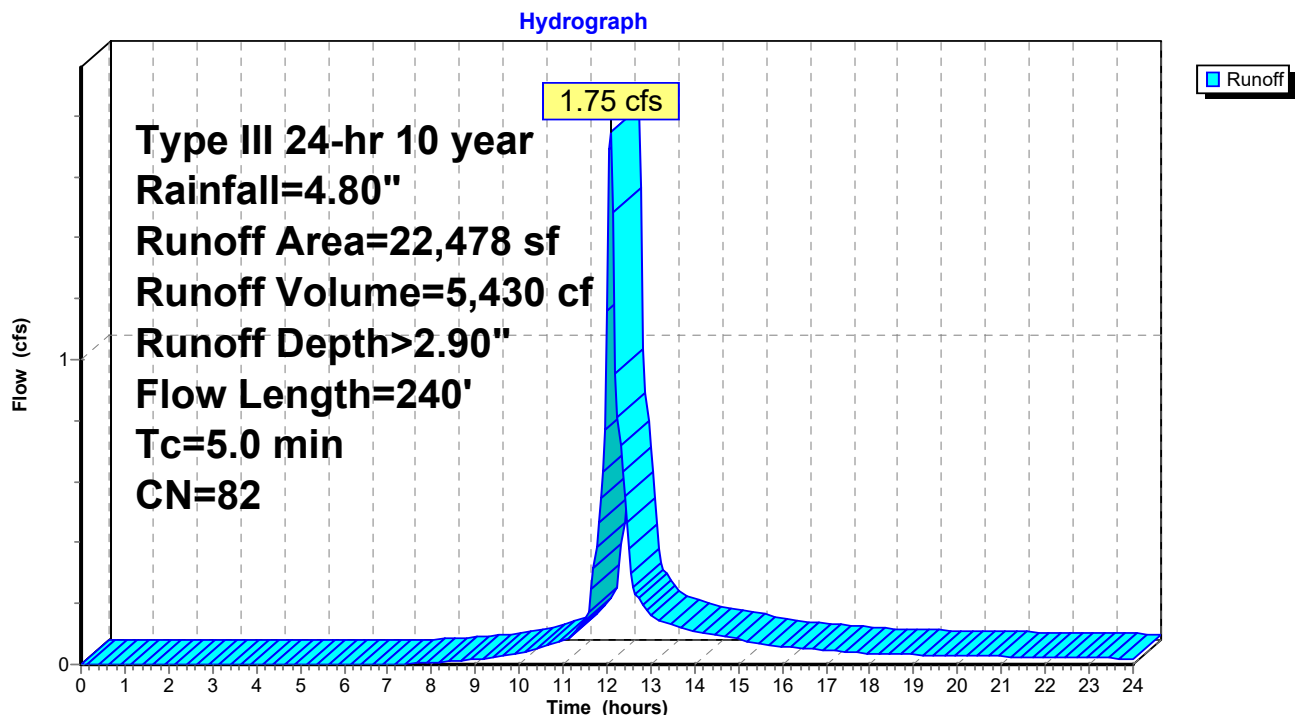
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 10 year Rainfall=4.80"

Area (sf)	CN	Description
6,160	98	Roofs, HSG B
6,458	98	Paved roads w/curbs & sewers, HSG B
9,860	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
22,478	82	Weighted Average
9,860		Pervious Area
12,618		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1					Direct Entry, DIRECT
1.3	50	0.0040	0.63		Sheet Flow, SHEET PAVEMENT
					Smooth surfaces n= 0.011 P2= 3.20"
1.6	190	0.0095	1.98		Shallow Concentrated Flow, SHALLOW PAVEMENT
					Paved Kv= 20.3 fps
5.0	240	Total			

Subcatchment P-3D: P-3D



Summary for Subcatchment P-3E: P-3F

Runoff = 0.40 cfs @ 12.07 hrs, Volume= 1,238 cf, Depth> 3.28"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

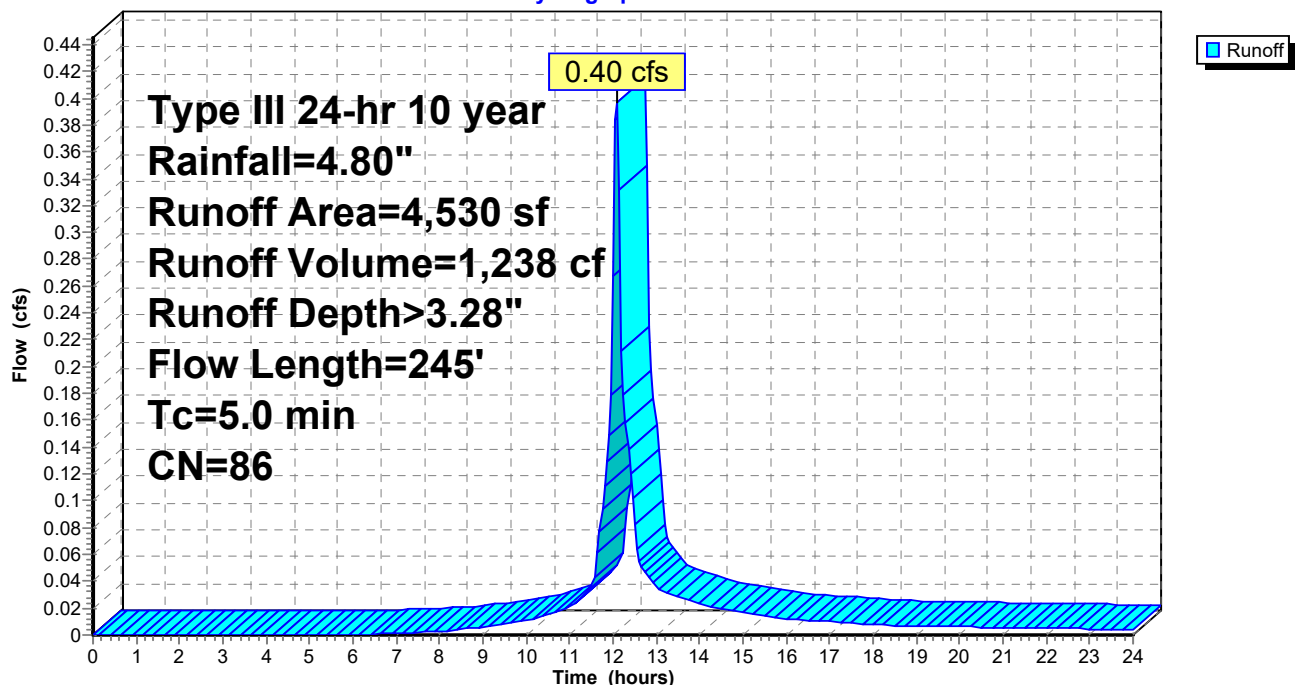
Type III 24-hr 10 year Rainfall=4.80"

Area (sf)	CN	Description
440	98	Roofs, HSG B
0	98	Paved parking, HSG B
2,664	98	Paved roads w/curbs & sewers, HSG B
1,426	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
4,530	86	Weighted Average
1,426		Pervious Area
3,104		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0					Direct Entry, DIRECT
1.3	50	0.0040	0.63		Sheet Flow, SHEET PAVEMENT Smooth surfaces n= 0.011 P2= 3.20"
1.7	195	0.0092	1.95		Shallow Concentrated Flow, SHALLOW PAVEMENT Paved Kv= 20.3 fps
5.0	245	Total			

Subcatchment P-3E: P-3F

Hydrograph



Summary for Pond 3P: INFILTRATOR

Routing by Dyn-Stor-Ind method

Peak Elev= 0.00' @ 0.00 hrs Surf.Area= 50 sf Storage= 0 cf

Plug-Flow detention time= (not calculated)

Center-of-Mass det. time= (not calculated)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	52 cf	5.00'W x 10.00'L x 3.50'H Prismatoid 175 cf Overall - 46 cf Embedded = 129 cf x 40.0% Voids
#2	0.00'	46 cf	44.6"W x 30.0"H x 7.12'L StormTech SC-740 Inside #1
		98 cf	Total Available Storage

Summary for Pond CB1: CB1

Inflow Area = 3,632 sf, 56.17% Impervious, Inflow Depth > 2.90" for 10 year event
 Inflow = 0.31 cfs @ 12.03 hrs, Volume= 878 cf
 Outflow = 0.31 cfs @ 12.03 hrs, Volume= 878 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.31 cfs @ 12.03 hrs, Volume= 878 cf

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

Peak Elev= 51.41' @ 12.53 hrs

Flood Elev= 53.86'

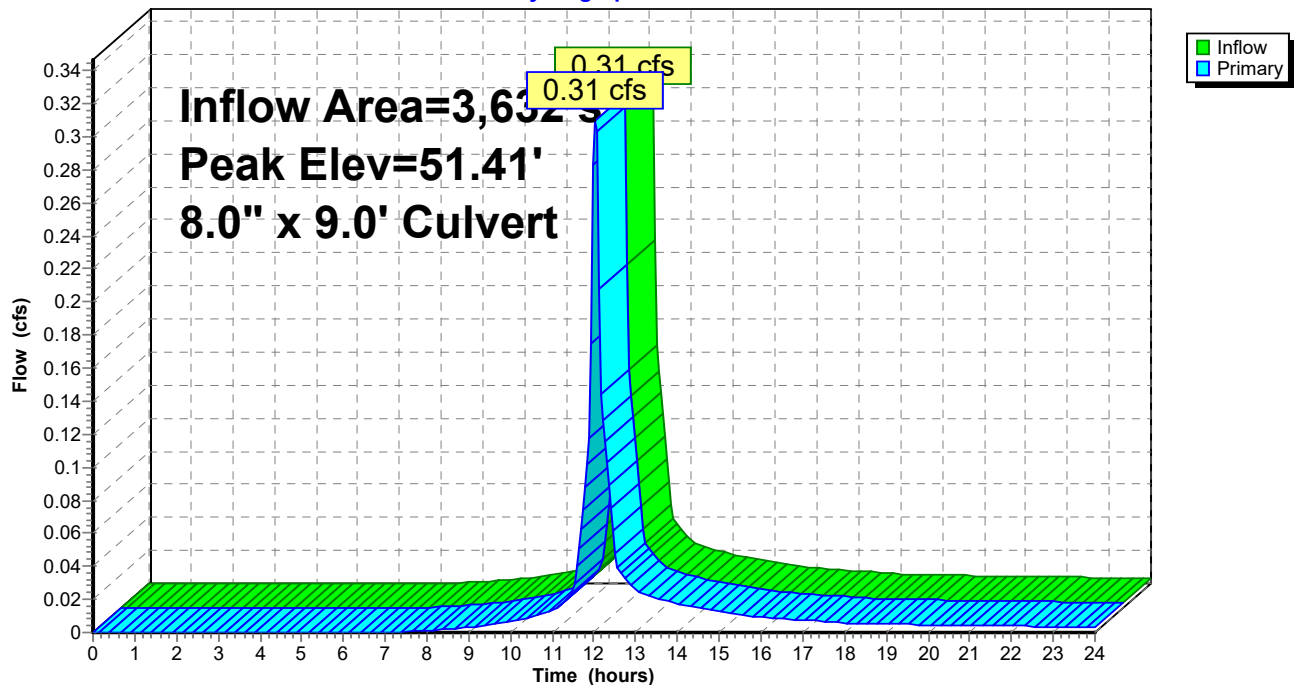
Device	Routing	Invert	Outlet Devices
#1	Primary	50.60'	8.0" x 9.0' long Culvert RCP, groove end projecting, Ke= 0.200 Outlet Invert= 50.50' S= 0.0111 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.00 cfs @ 12.03 hrs HW=50.96' TW=50.97' (Dynamic Tailwater)

↑1=Culvert (Controls 0.00 cfs)

Pond CB1: CB1

Hydrograph



Summary for Pond CB2: CB2

Inflow Area = 3,713 sf, 81.12% Impervious, Inflow Depth > 3.79" for 10 year event
 Inflow = 0.40 cfs @ 12.02 hrs, Volume= 1,172 cf
 Outflow = 0.40 cfs @ 12.02 hrs, Volume= 1,172 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.40 cfs @ 12.02 hrs, Volume= 1,172 cf

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

Peak Elev= 51.41' @ 12.53 hrs

Flood Elev= 53.86'

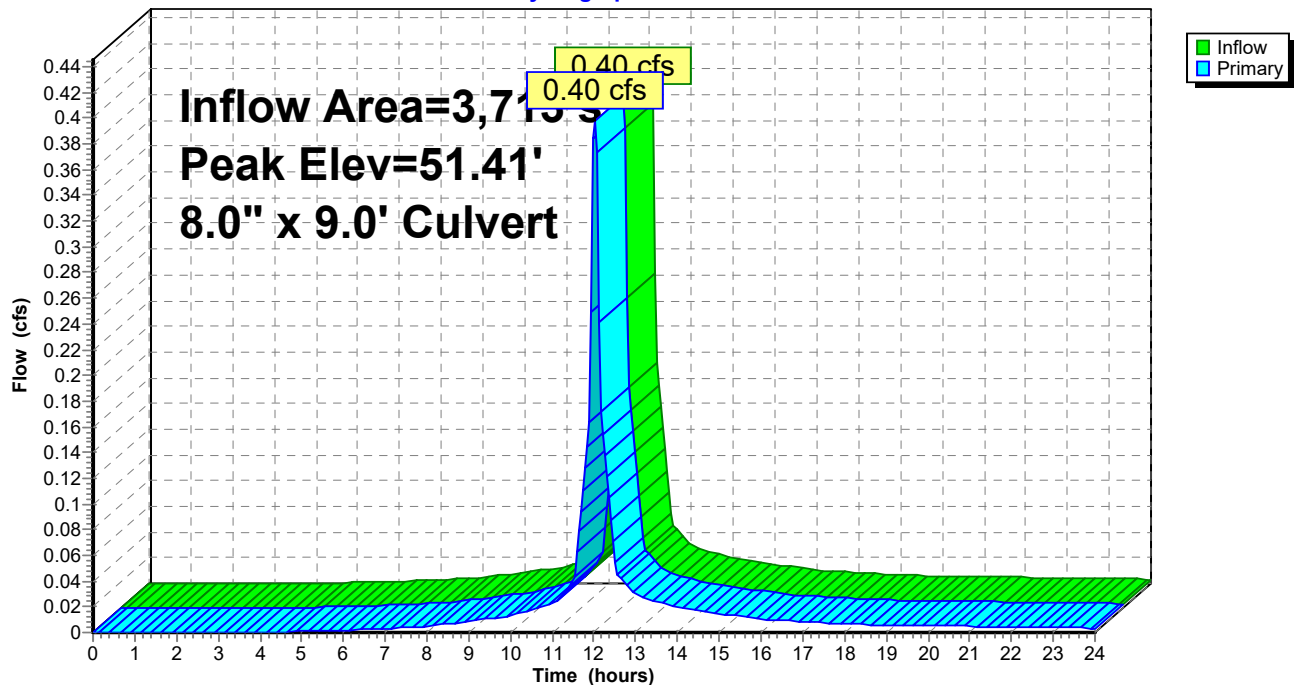
Device	Routing	Invert	Outlet Devices
#1	Primary	50.60'	8.0" x 9.0' long Culvert RCP, groove end projecting, Ke= 0.200 Outlet Invert= 50.50' S= 0.0111 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.24 cfs @ 12.02 hrs HW=50.99' TW=50.93' (Dynamic Tailwater)

1=Culvert (Outlet Controls 0.24 cfs @ 1.58 fps)

Pond CB2: CB2

Hydrograph



Summary for Pond CB3: CB3

Inflow Area = 12,786 sf, 39.18% Impervious, Inflow Depth > 2.29" for 10 year event
 Inflow = 0.79 cfs @ 12.08 hrs, Volume= 2,436 cf
 Outflow = 0.79 cfs @ 12.08 hrs, Volume= 2,436 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.79 cfs @ 12.08 hrs, Volume= 2,436 cf

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

Peak Elev= 53.37' @ 12.53 hrs

Flood Elev= 54.77'

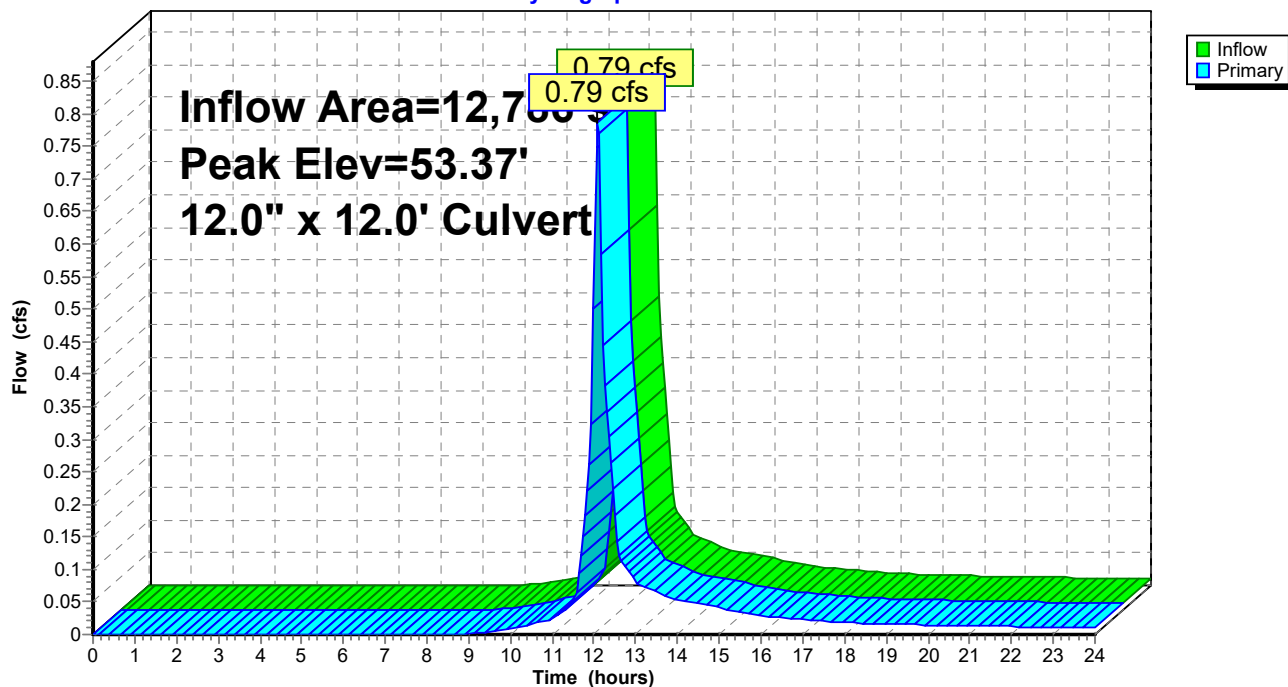
Device	Routing	Invert	Outlet Devices
#1	Primary	52.34'	12.0" x 12.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 52.28' S= 0.0050 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean

Primary OutFlow Max=0.00 cfs @ 12.08 hrs HW=53.23' TW=53.28' (Dynamic Tailwater)

↑1=Culvert (Controls 0.00 cfs)

Pond CB3: CB3

Hydrograph



Summary for Pond CB4: CB4

Inflow Area = 20,654 sf, 69.31% Impervious, Inflow Depth > 3.38" for 10 year event
 Inflow = 1.86 cfs @ 12.07 hrs, Volume= 5,813 cf
 Outflow = 1.86 cfs @ 12.07 hrs, Volume= 5,813 cf, Atten= 0%, Lag= 0.0 min
 Primary = 1.86 cfs @ 12.07 hrs, Volume= 5,813 cf

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

Peak Elev= 53.51' @ 12.11 hrs

Flood Elev= 54.77'

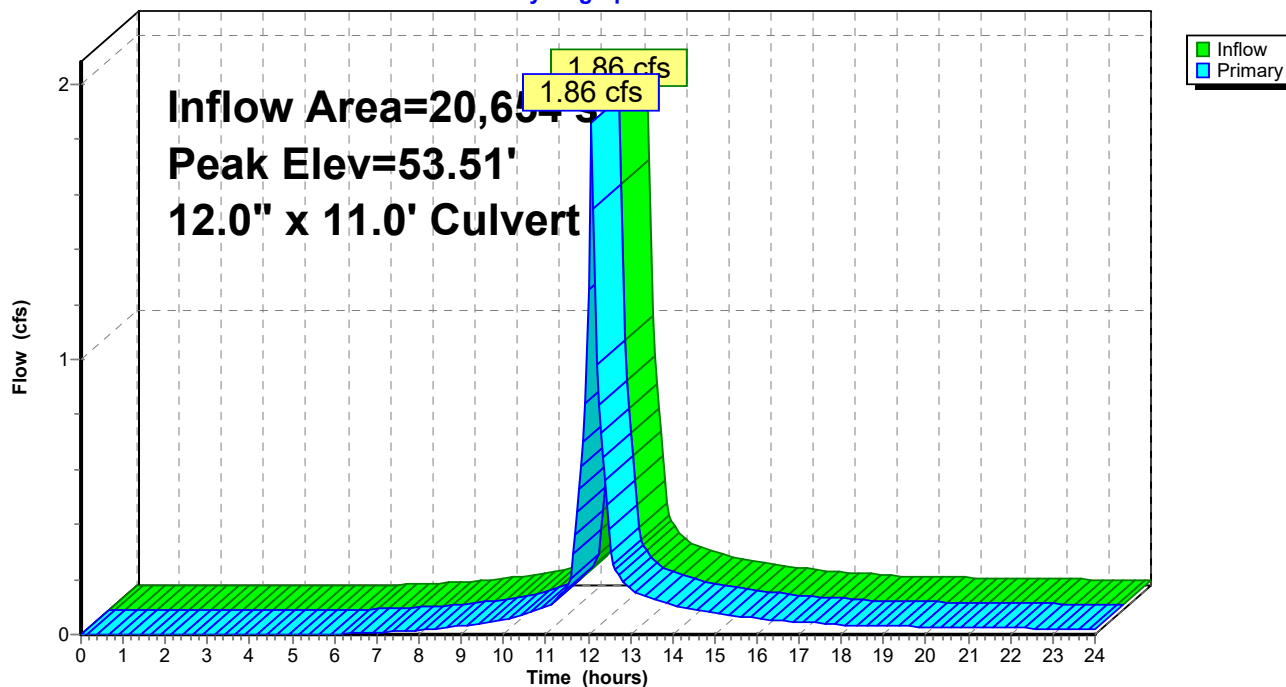
Device	Routing	Invert	Outlet Devices
#1	Primary	52.34'	12.0" x 11.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 52.28' S= 0.0055 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean

Primary OutFlow Max=1.19 cfs @ 12.07 hrs HW=53.38' TW=53.28' (Dynamic Tailwater)

↑ **1=Culvert** (Inlet Controls 1.19 cfs @ 1.52 fps)

Pond CB4: CB4

Hydrograph



Summary for Pond CB5: CB5

Inflow Area = 19,745 sf, 42.54% Impervious, Inflow Depth > 2.45" for 10 year event
 Inflow = 1.31 cfs @ 12.08 hrs, Volume= 4,039 cf
 Outflow = 1.31 cfs @ 12.08 hrs, Volume= 4,039 cf, Atten= 0%, Lag= 0.0 min
 Primary = 1.31 cfs @ 12.08 hrs, Volume= 4,039 cf

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

Peak Elev= 61.65' @ 12.08 hrs

Flood Elev= 65.00'

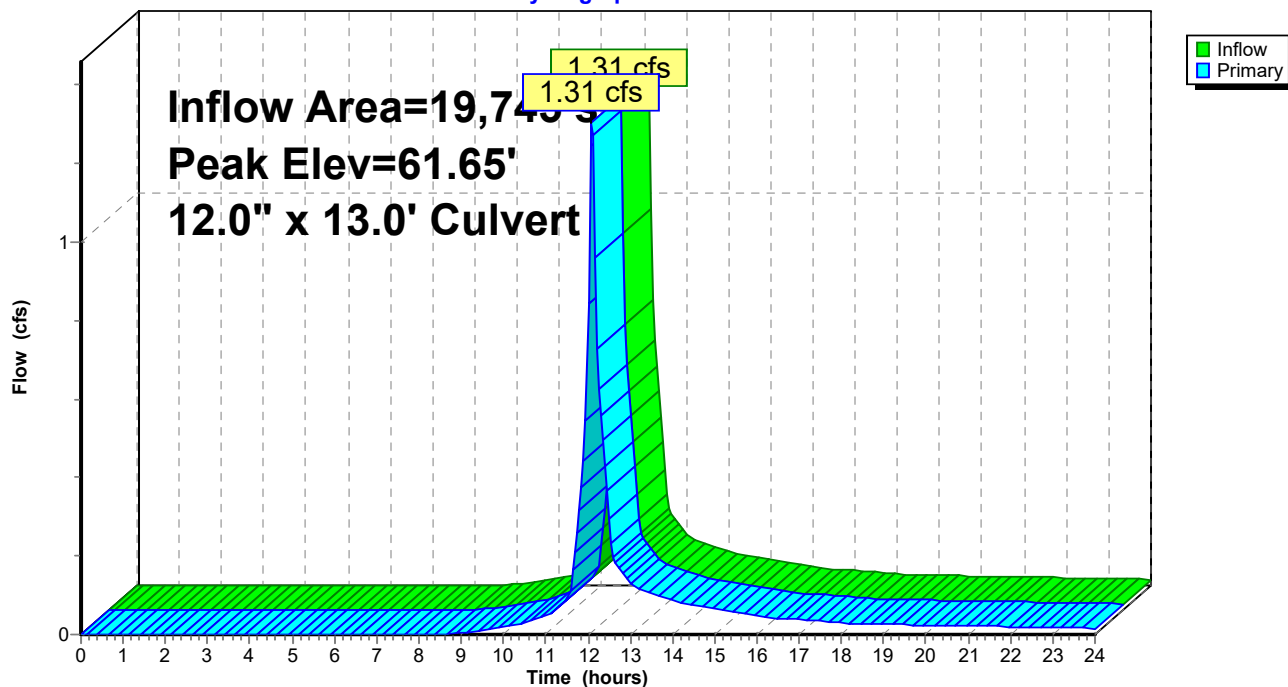
Device	Routing	Invert	Outlet Devices
#1	Primary	61.00'	12.0" x 13.0' long Culvert RCP, groove end projecting, Ke= 0.200 Outlet Invert= 60.87' S= 0.0100 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=1.26 cfs @ 12.08 hrs HW=61.64' TW=58.97' (Dynamic Tailwater)

↑1=Culvert (Barrel Controls 1.26 cfs @ 3.39 fps)

Pond CB5: CB5

Hydrograph



Summary for Pond CB6: CB6

Inflow Area = 5,773 sf, 64.25% Impervious, Inflow Depth > 3.18" for 10 year event
 Inflow = 0.49 cfs @ 12.07 hrs, Volume= 1,531 cf
 Outflow = 0.49 cfs @ 12.07 hrs, Volume= 1,531 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.49 cfs @ 12.07 hrs, Volume= 1,531 cf

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

Peak Elev= 61.39' @ 12.07 hrs

Flood Elev= 65.00'

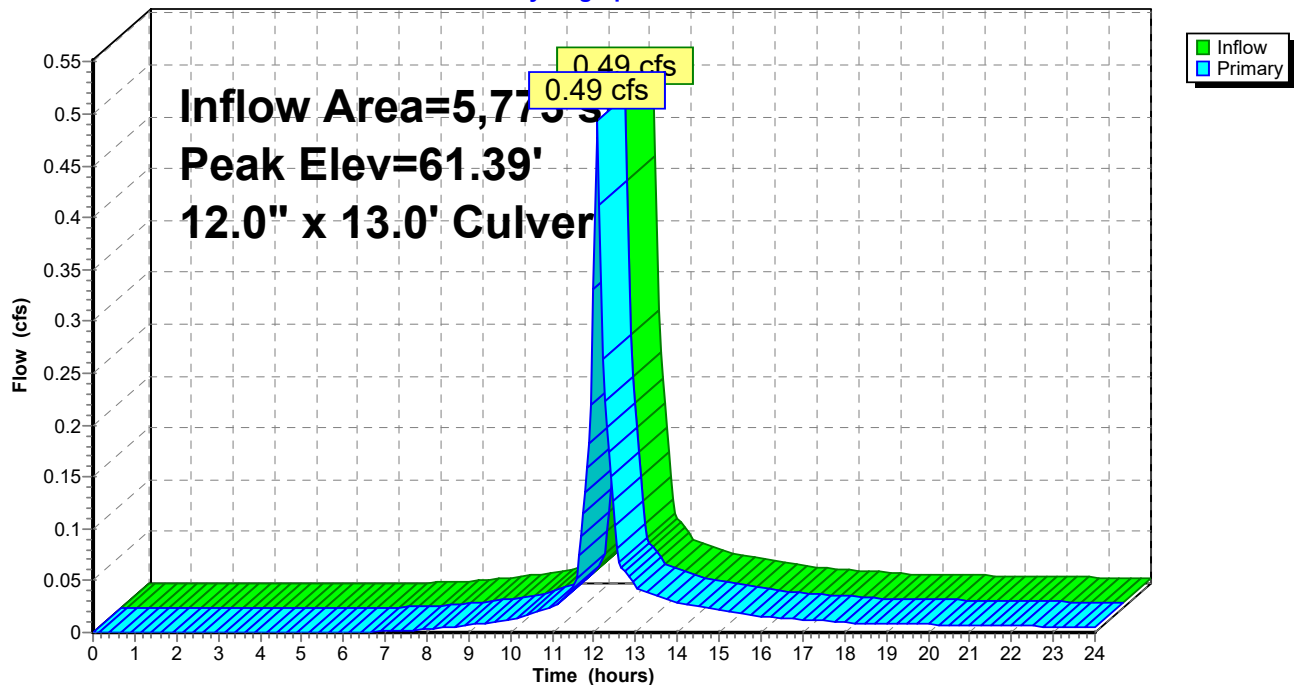
Device	Routing	Invert	Outlet Devices
#1	Primary	61.00'	12.0" x 13.0' long Culvert CPP, square edge headwall, Ke= 0.500 Outlet Invert= 60.87' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.47 cfs @ 12.07 hrs HW=61.38' TW=58.97' (Dynamic Tailwater)

↑1=Culvert (Barrel Controls 0.47 cfs @ 2.56 fps)

Pond CB6: CB6

Hydrograph



Summary for Pond CB7: CB7

Inflow Area = 4,530 sf, 68.52% Impervious, Inflow Depth > 3.28" for 10 year event
 Inflow = 0.40 cfs @ 12.07 hrs, Volume= 1,238 cf
 Outflow = 0.40 cfs @ 12.07 hrs, Volume= 1,238 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.40 cfs @ 12.07 hrs, Volume= 1,238 cf

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

Peak Elev= 66.62' @ 12.14 hrs

Flood Elev= 69.00'

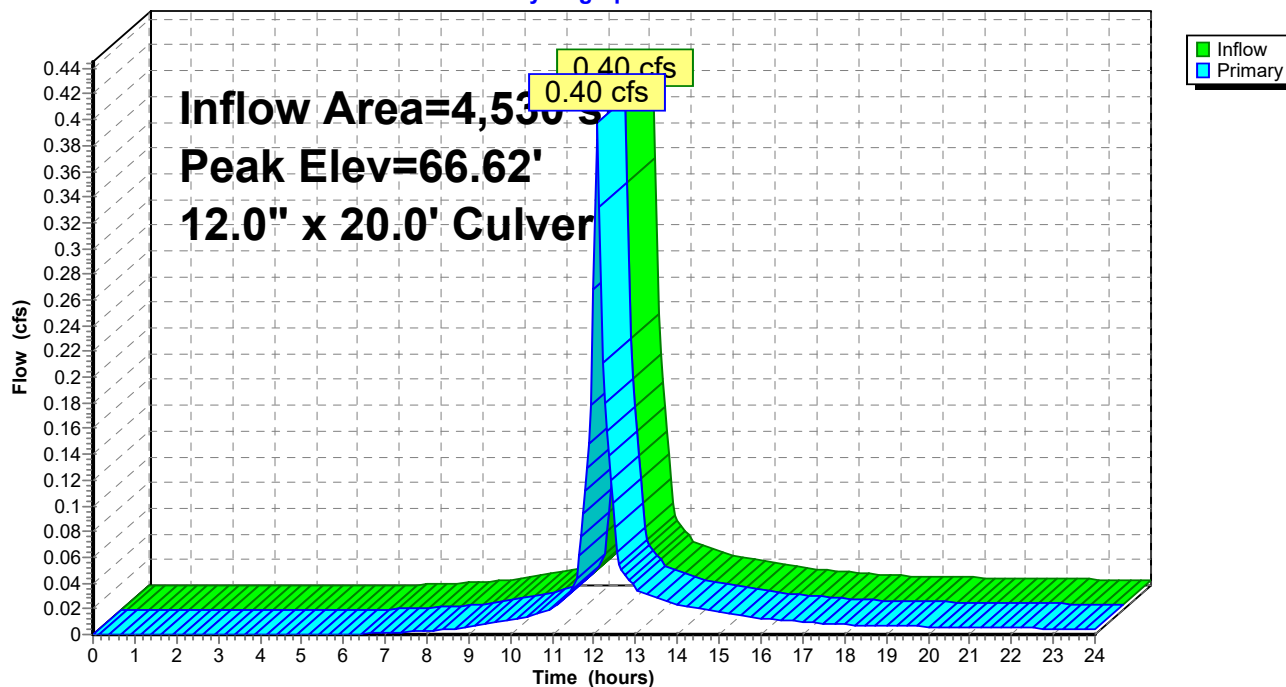
Device	Routing	Invert	Outlet Devices
#1	Primary	65.91'	12.0" x 20.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 65.81' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.00 cfs @ 12.07 hrs HW=66.50' TW=66.57' (Dynamic Tailwater)

1=Culvert (Controls 0.00 cfs)

Pond CB7: CB7

Hydrograph



Summary for Pond CB8: CB8

Inflow Area = 22,478 sf, 56.13% Impervious, Inflow Depth > 2.90" for 10 year event
 Inflow = 1.75 cfs @ 12.08 hrs, Volume= 5,430 cf
 Outflow = 1.75 cfs @ 12.08 hrs, Volume= 5,430 cf, Atten= 0%, Lag= 0.0 min
 Primary = 1.75 cfs @ 12.08 hrs, Volume= 5,430 cf

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

Peak Elev= 66.82' @ 12.10 hrs

Flood Elev= 69.00'

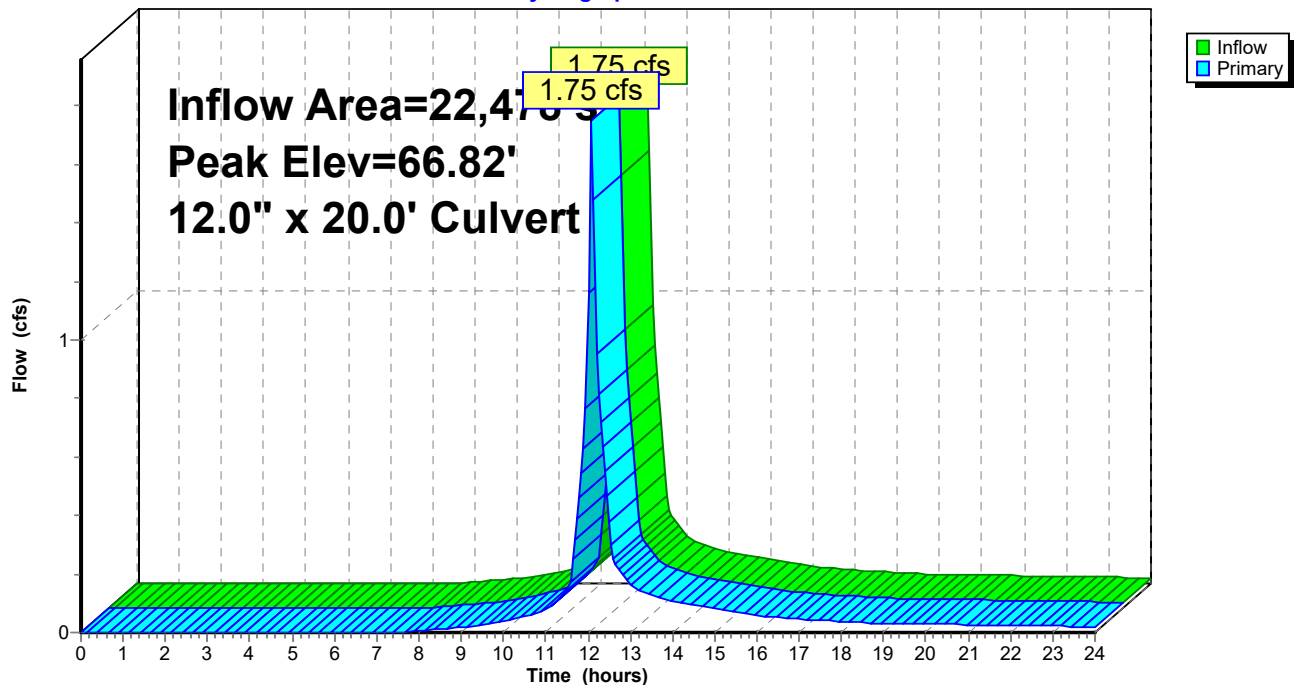
Device	Routing	Invert	Outlet Devices
#1	Primary	65.91'	12.0" x 20.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 65.81' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=1.47 cfs @ 12.08 hrs HW=66.80' TW=66.57' (Dynamic Tailwater)

↑1=Culvert (Outlet Controls 1.47 cfs @ 2.66 fps)

Pond CB8: CB8

Hydrograph



Summary for Pond CB9: CB9

Inflow Area = 41,660 sf, 48.12% Impervious, Inflow Depth > 2.63" for 10 year event
 Inflow = 2.95 cfs @ 12.08 hrs, Volume= 9,125 cf
 Outflow = 2.95 cfs @ 12.08 hrs, Volume= 9,125 cf, Atten= 0%, Lag= 0.0 min
 Primary = 2.95 cfs @ 12.08 hrs, Volume= 9,125 cf

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

Peak Elev= 66.86' @ 12.10 hrs

Flood Elev= 69.40'

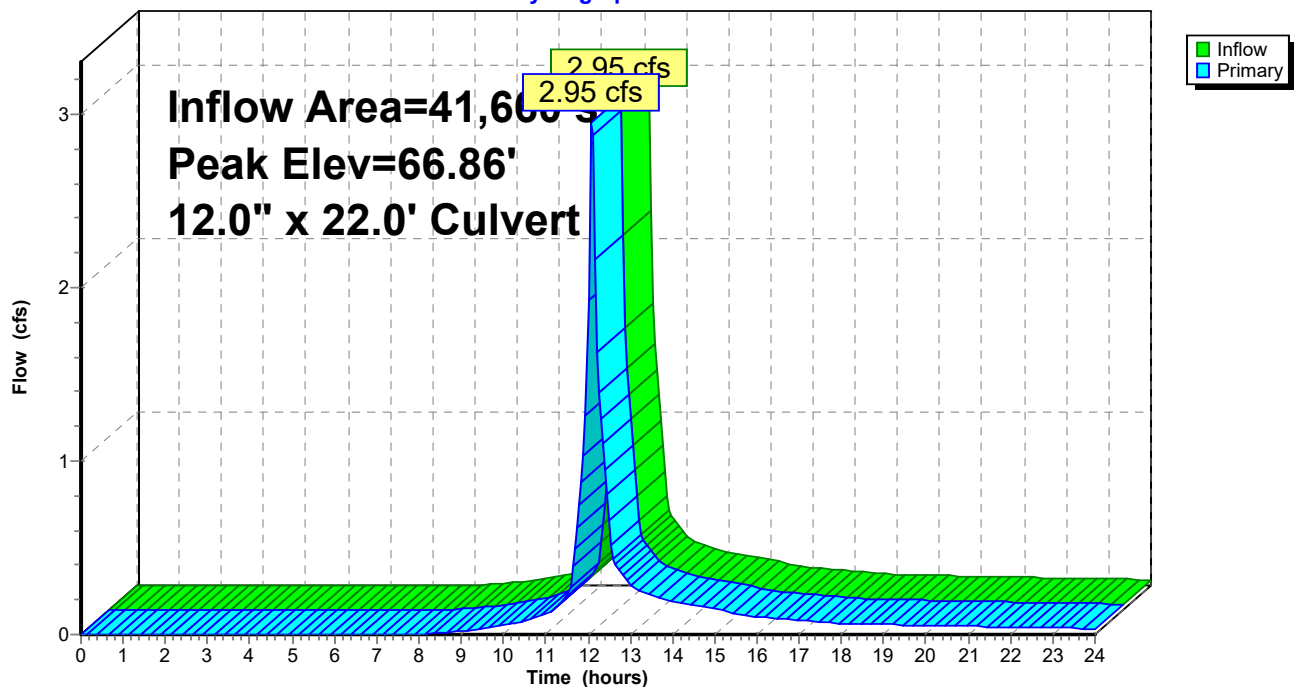
Device	Routing	Invert	Outlet Devices
#1	Primary	65.11'	12.0" x 22.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 65.00' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=2.45 cfs @ 12.08 hrs HW=66.71' TW=66.29' (Dynamic Tailwater)

↑ **1=Culvert** (Inlet Controls 2.45 cfs @ 3.12 fps)

Pond CB9: CB9

Hydrograph



Summary for Pond DMH 10: DMH9

Inflow Area = 68,668 sf, 52.09% Impervious, Inflow Depth > 2.32" for 10 year event
 Inflow = 1.71 cfs @ 12.38 hrs, Volume= 13,269 cf
 Outflow = 1.71 cfs @ 12.38 hrs, Volume= 13,269 cf, Atten= 0%, Lag= 0.0 min
 Primary = 1.71 cfs @ 12.38 hrs, Volume= 13,269 cf

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

Peak Elev= 61.64' @ 12.38 hrs

Flood Elev= 69.78'

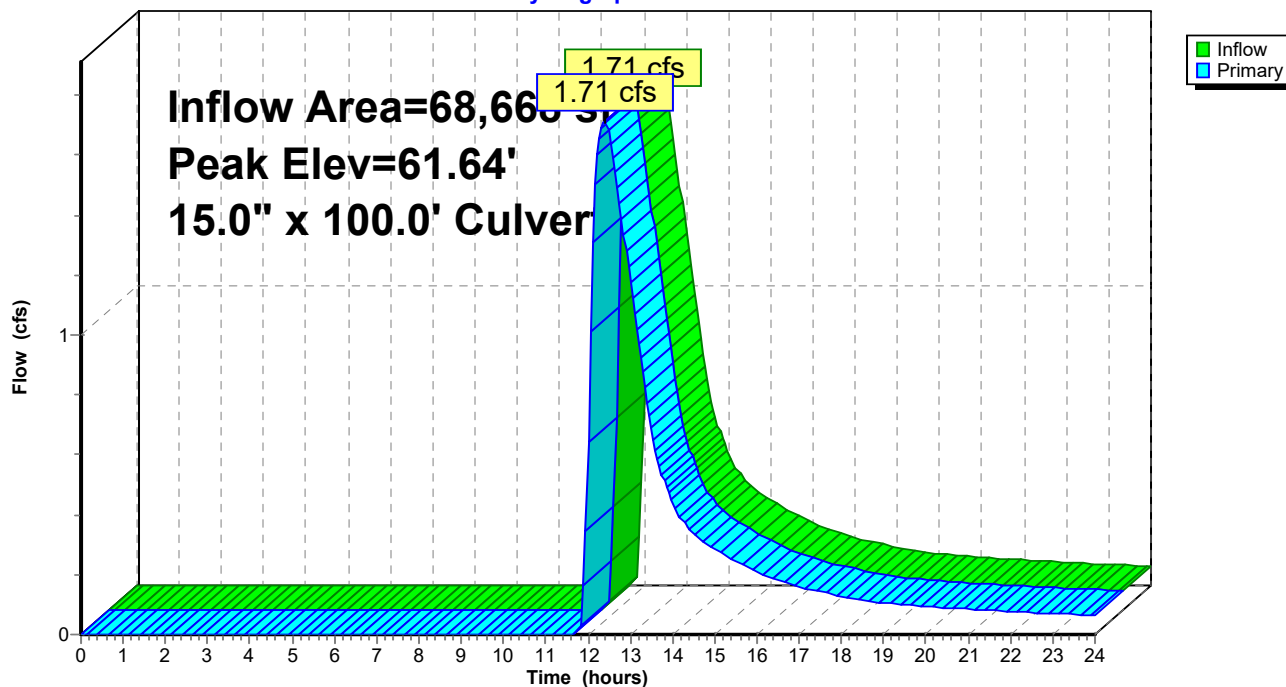
Device	Routing	Invert	Outlet Devices
#1	Primary	61.00'	15.0" x 100.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 56.00' S= 0.0500 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=1.70 cfs @ 12.38 hrs HW=61.64' TW=55.93' (Dynamic Tailwater)

↑ **1=Culvert** (Inlet Controls 1.70 cfs @ 2.72 fps)

Pond DMH 10: DMH9

Hydrograph



Summary for Pond DMH 11: DMH 10

Inflow Area = 68,668 sf, 52.09% Impervious, Inflow Depth > 2.32" for 10 year event
 Inflow = 1.71 cfs @ 12.38 hrs, Volume= 13,269 cf
 Outflow = 1.71 cfs @ 12.38 hrs, Volume= 13,269 cf, Atten= 0%, Lag= 0.0 min
 Primary = 1.71 cfs @ 12.38 hrs, Volume= 13,269 cf

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

Peak Elev= 55.93' @ 12.38 hrs

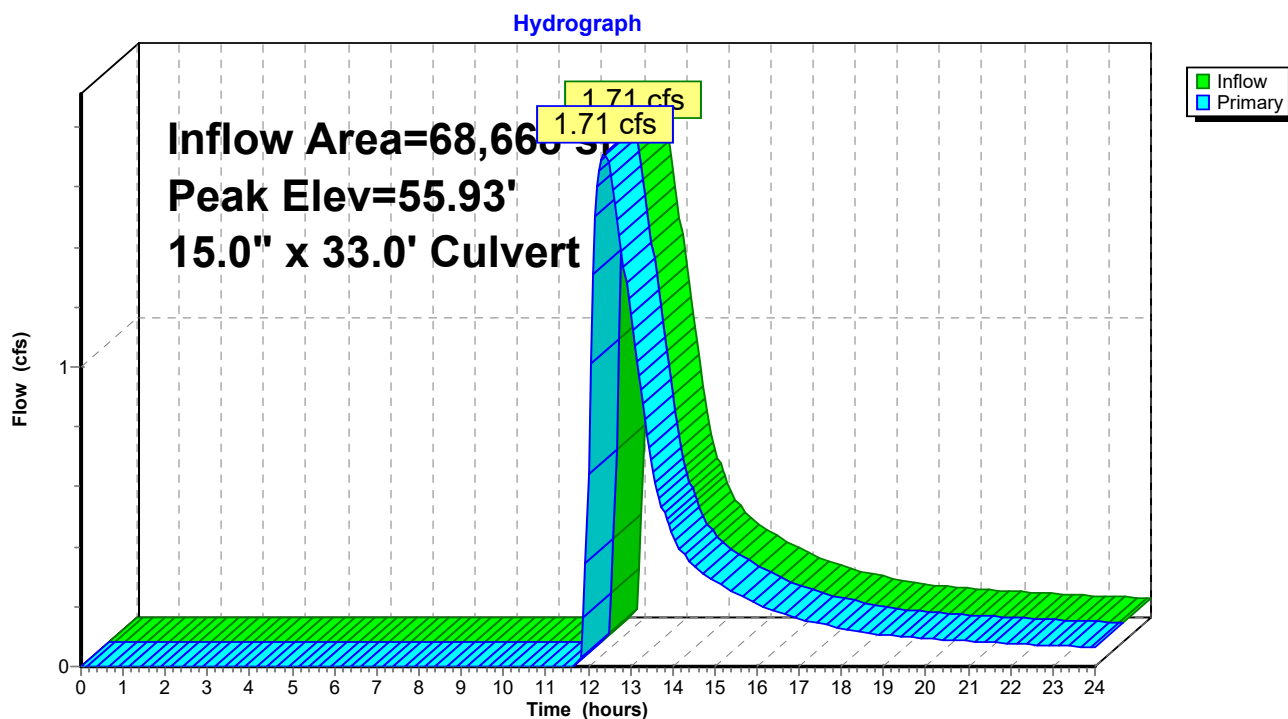
Flood Elev= 58.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	55.17'	15.0" x 33.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 55.00' S= 0.0052 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=1.70 cfs @ 12.38 hrs HW=55.93' TW=52.02' (Dynamic Tailwater)

1=Culvert (Barrel Controls 1.70 cfs @ 3.15 fps)

Pond DMH 11: DMH 10



Summary for Pond DMH 6: DMH 6

Inflow Area = 27,008 sf, 58.21% Impervious, Inflow Depth > 2.96" for 10 year event
 Inflow = 2.15 cfs @ 12.08 hrs, Volume= 6,668 cf
 Outflow = 2.15 cfs @ 12.08 hrs, Volume= 6,668 cf, Atten= 0%, Lag= 0.0 min
 Primary = 2.15 cfs @ 12.08 hrs, Volume= 6,668 cf

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

Peak Elev= 66.38' @ 12.46 hrs

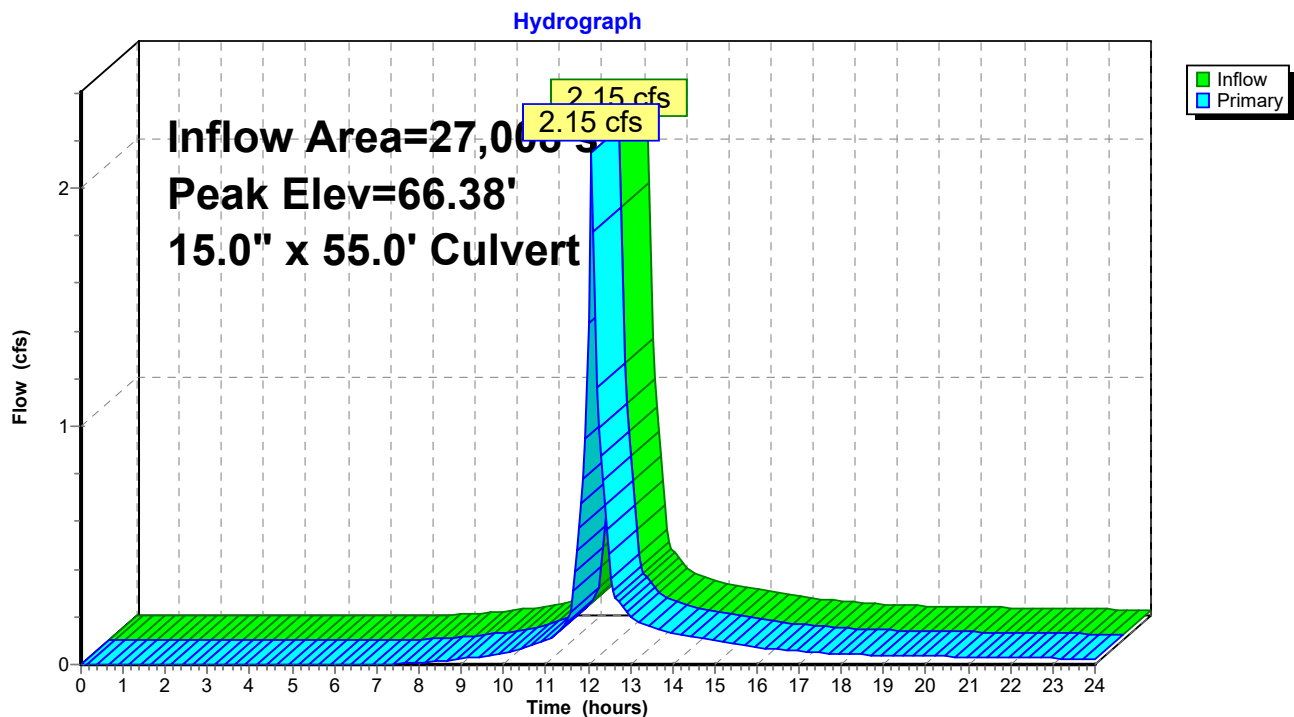
Flood Elev= 71.33'

Device	Routing	Invert	Outlet Devices
#1	Primary	65.14'	15.0" x 55.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 65.00' S= 0.0025 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=2.01 cfs @ 12.08 hrs HW=66.06' TW=65.72' (Dynamic Tailwater)

↑1=Culvert (Outlet Controls 2.01 cfs @ 2.88 fps)

Pond DMH 6: DMH 6



Summary for Pond DMH2: DMH2

Inflow Area = 33,440 sf, 57.79% Impervious, Inflow Depth > 2.96" for 10 year event
 Inflow = 2.63 cfs @ 12.08 hrs, Volume= 8,249 cf
 Outflow = 2.63 cfs @ 12.08 hrs, Volume= 8,249 cf, Atten= 0%, Lag= 0.0 min
 Primary = 2.63 cfs @ 12.08 hrs, Volume= 8,249 cf

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

Peak Elev= 53.37' @ 12.49 hrs

Flood Elev= 55.00'

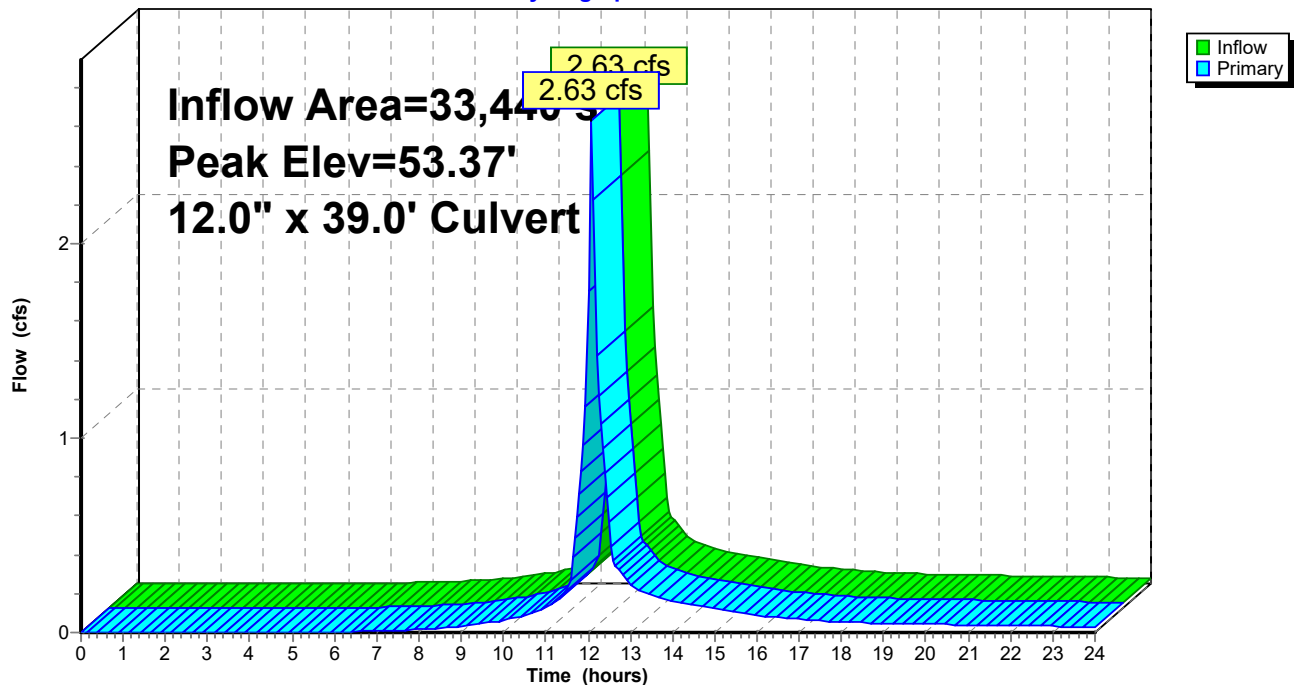
Device	Routing	Invert	Outlet Devices
#1	Primary	52.18'	12.0" x 39.0' long Culvert RCP, square edge headwall, Ke= 0.500 Outlet Invert= 52.00' S= 0.0046 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean

Primary OutFlow Max=2.55 cfs @ 12.08 hrs HW=53.28' TW=52.65' (Dynamic Tailwater)

↑1=Culvert (Barrel Controls 2.55 cfs @ 3.67 fps)

Pond DMH2: DMH2

Hydrograph



Summary for Pond DMH3: DMH3

Inflow Area = 25,518 sf, 47.45% Impervious, Inflow Depth > 2.62" for 10 year event
 Inflow = 1.80 cfs @ 12.08 hrs, Volume= 5,570 cf
 Outflow = 1.80 cfs @ 12.08 hrs, Volume= 5,570 cf, Atten= 0%, Lag= 0.0 min
 Primary = 1.80 cfs @ 12.08 hrs, Volume= 5,570 cf

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

Peak Elev= 56.06' @ 12.08 hrs

Flood Elev= 61.00'

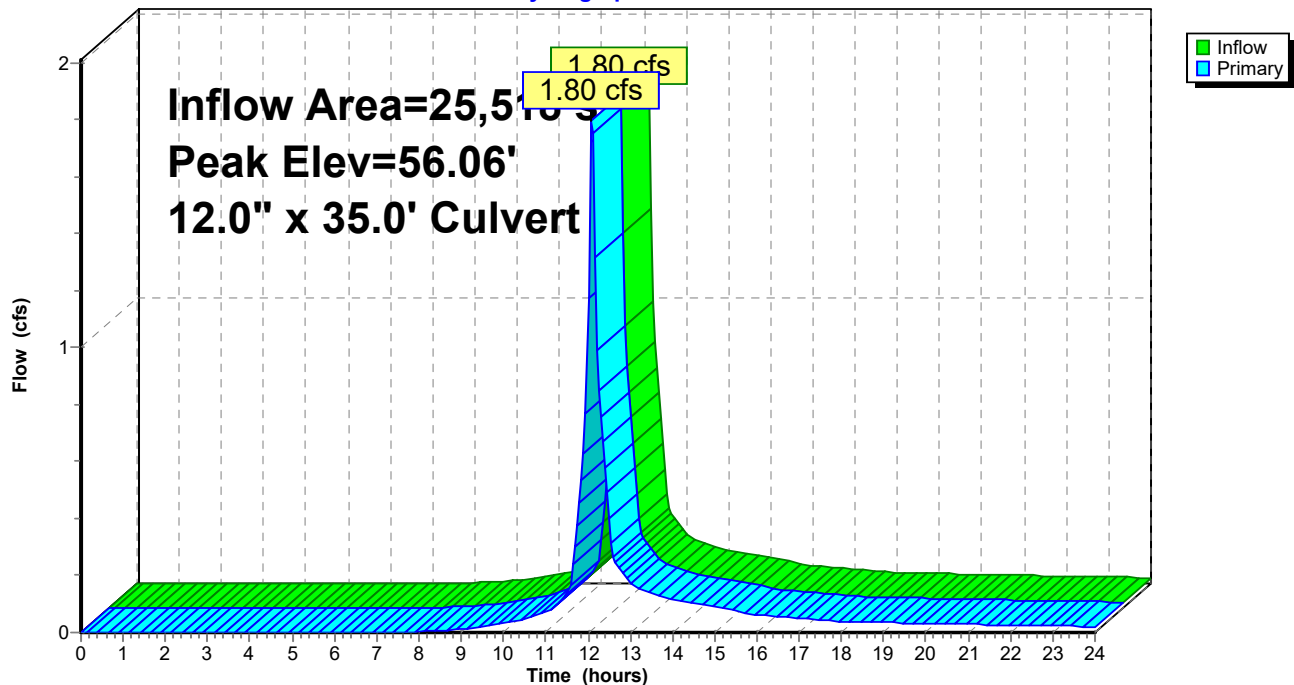
Device	Routing	Invert	Outlet Devices
#1	Primary	55.17'	12.0" x 35.0' long Culvert CPP, square edge headwall, Ke= 0.500 Outlet Invert= 55.00' S= 0.0049 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=1.74 cfs @ 12.08 hrs HW=56.04' TW=52.66' (Dynamic Tailwater)

↑ **1=Culvert** (Barrel Controls 1.74 cfs @ 3.22 fps)

Pond DMH3: DMH3

Hydrograph



Summary for Pond DMH4: DMH4

Inflow Area = 25,518 sf, 47.45% Impervious, Inflow Depth > 2.62" for 10 year event
 Inflow = 1.80 cfs @ 12.08 hrs, Volume= 5,570 cf
 Outflow = 1.80 cfs @ 12.08 hrs, Volume= 5,570 cf, Atten= 0%, Lag= 0.0 min
 Primary = 1.80 cfs @ 12.08 hrs, Volume= 5,570 cf

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

Peak Elev= 58.98' @ 12.08 hrs

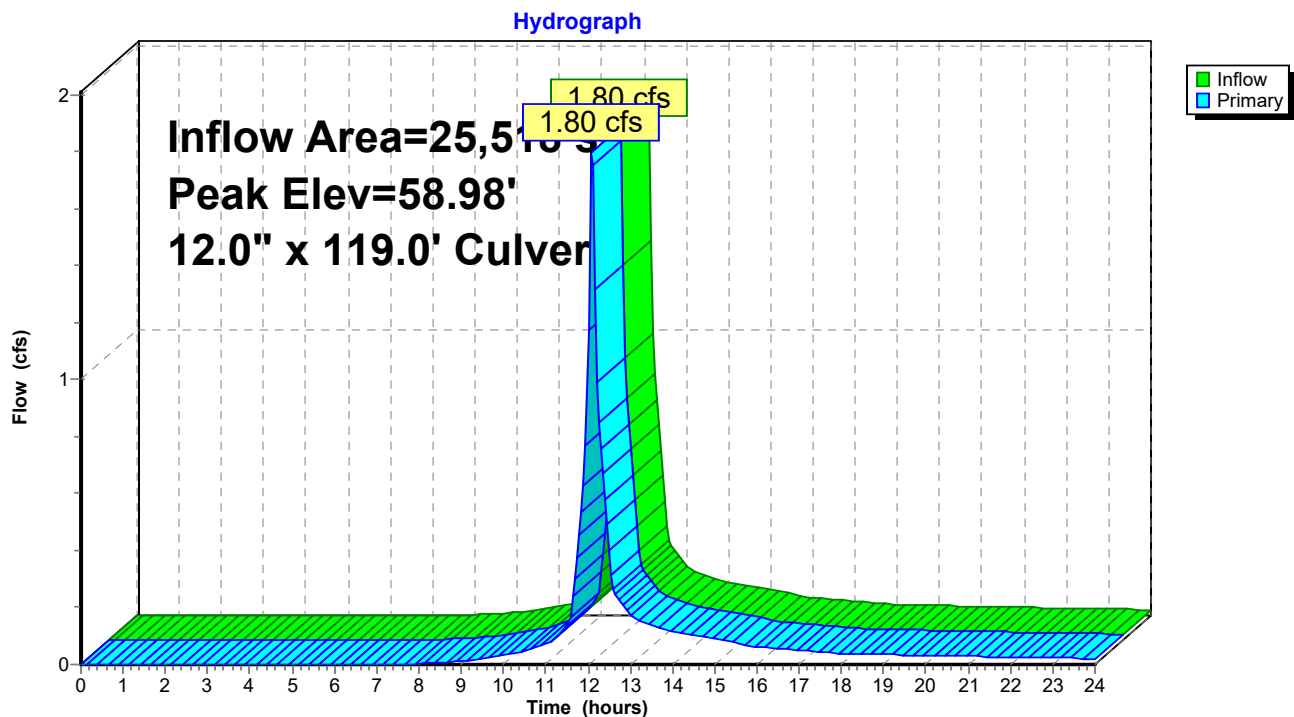
Flood Elev= 65.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	58.25'	12.0" x 119.0' long Culvert CPP, square edge headwall, Ke= 0.500 Outlet Invert= 55.28' S= 0.0250 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=1.74 cfs @ 12.08 hrs HW=58.97' TW=56.04' (Dynamic Tailwater)

↑ **1=Culvert** (Inlet Controls 1.74 cfs @ 2.88 fps)

Pond DMH4: DMH4



Summary for Pond DMH5: DMH 5

Inflow Area = 27,008 sf, 58.21% Impervious, Inflow Depth > 2.96" for 10 year event
 Inflow = 2.15 cfs @ 12.08 hrs, Volume= 6,668 cf
 Outflow = 2.15 cfs @ 12.08 hrs, Volume= 6,668 cf, Atten= 0%, Lag= 0.0 min
 Primary = 2.15 cfs @ 12.08 hrs, Volume= 6,668 cf

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

Peak Elev= 66.60' @ 12.09 hrs

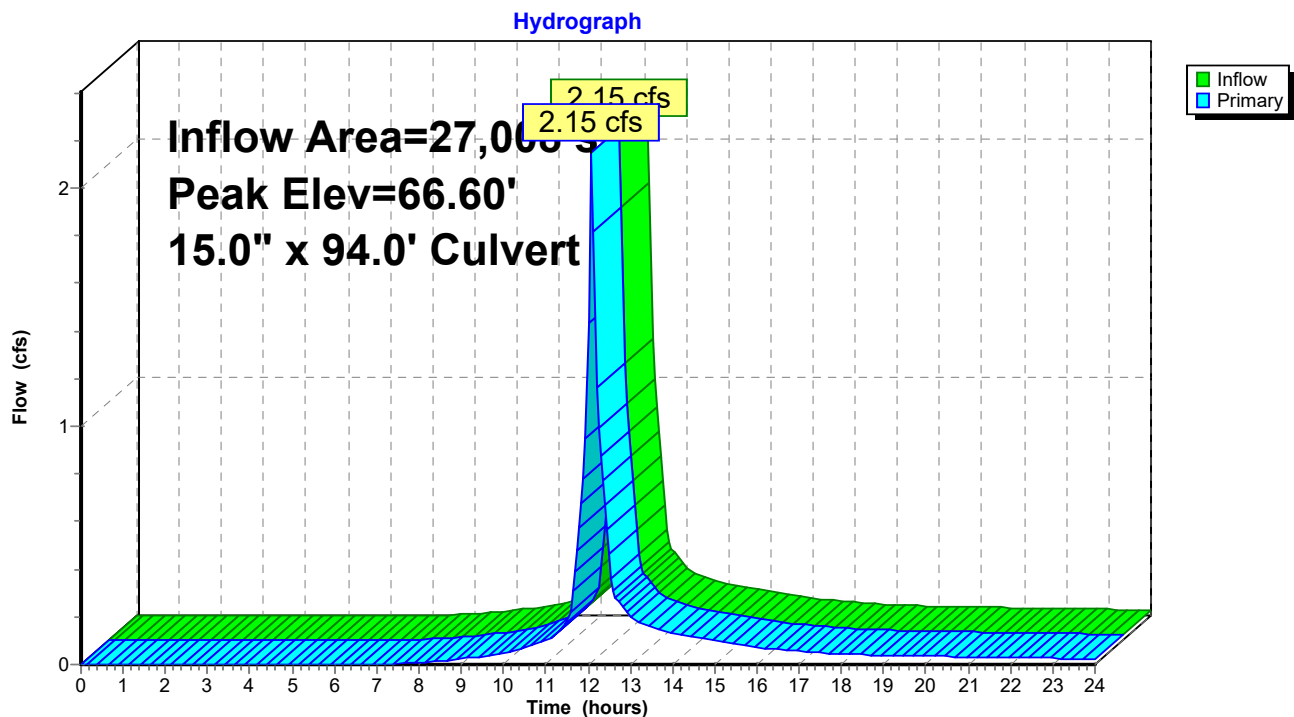
Flood Elev= 69.53'

Device	Routing	Invert	Outlet Devices
#1	Primary	65.71'	15.0" x 94.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 65.24' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=1.93 cfs @ 12.08 hrs HW=66.57' TW=66.06' (Dynamic Tailwater)

↑ **1=Culvert** (Outlet Controls 1.93 cfs @ 3.01 fps)

Pond DMH5: DMH 5



Summary for Pond DMH7: DMH7

Inflow Area = 27,008 sf, 58.21% Impervious, Inflow Depth > 2.96" for 10 year event
 Inflow = 2.15 cfs @ 12.08 hrs, Volume= 6,668 cf
 Outflow = 2.15 cfs @ 12.08 hrs, Volume= 6,668 cf, Atten= 0%, Lag= 0.0 min
 Primary = 2.15 cfs @ 12.08 hrs, Volume= 6,668 cf

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

Peak Elev= 66.37' @ 12.43 hrs

Flood Elev= 70.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	65.00'	12.0" x 1.0' long Culvert CPP, square edge headwall, Ke= 0.500 Outlet Invert= 65.00' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Primary	64.90'	12.0" x 1.0' long Culvert CPP, square edge headwall, Ke= 0.500 Outlet Invert= 64.90' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

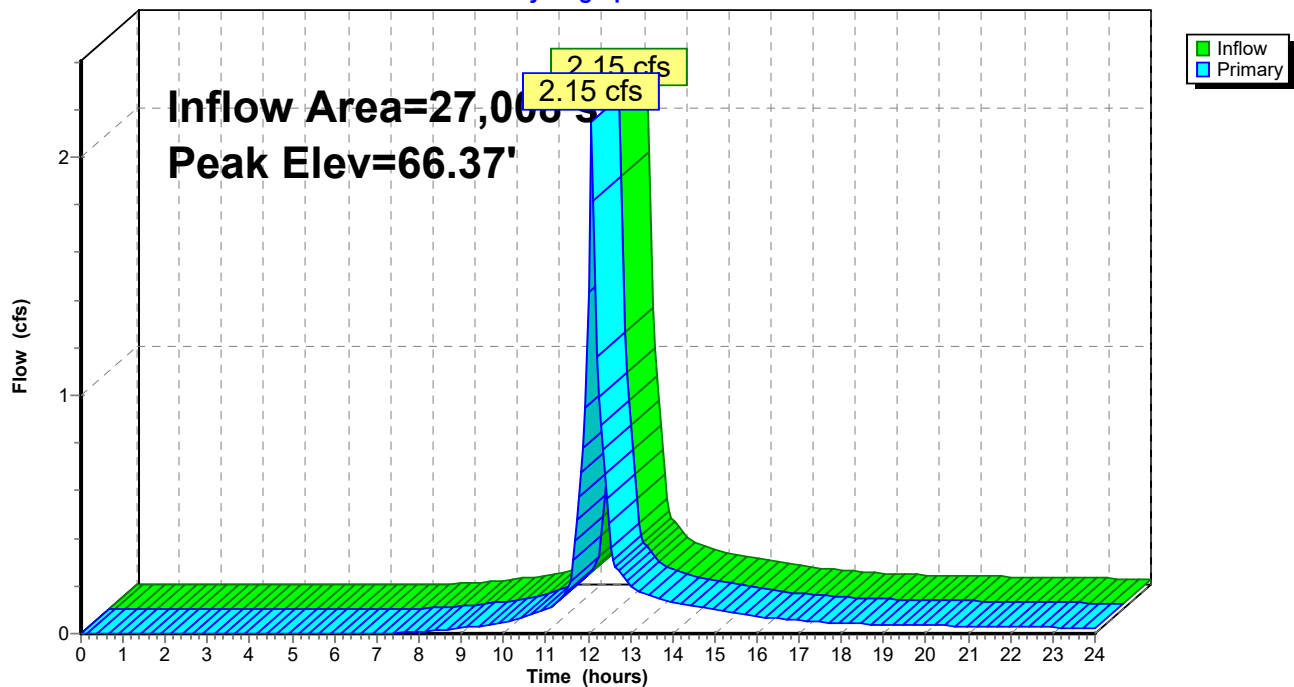
Primary OutFlow Max=0.00 cfs @ 12.08 hrs HW=65.72' TW=65.82' (Dynamic Tailwater)

1=Culvert (Controls 0.00 cfs)

2=Culvert (Controls 0.00 cfs)

Pond DMH7: DMH7

Hydrograph



Summary for Pond DMH8: DMH8

Inflow Area = 41,660 sf, 48.12% Impervious, Inflow Depth > 2.63" for 10 year event
 Inflow = 2.95 cfs @ 12.08 hrs, Volume= 9,125 cf
 Outflow = 2.95 cfs @ 12.08 hrs, Volume= 9,125 cf, Atten= 0%, Lag= 0.0 min
 Primary = 2.95 cfs @ 12.08 hrs, Volume= 9,125 cf

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

Peak Elev= 66.43' @ 12.37 hrs

Flood Elev= 70.00'

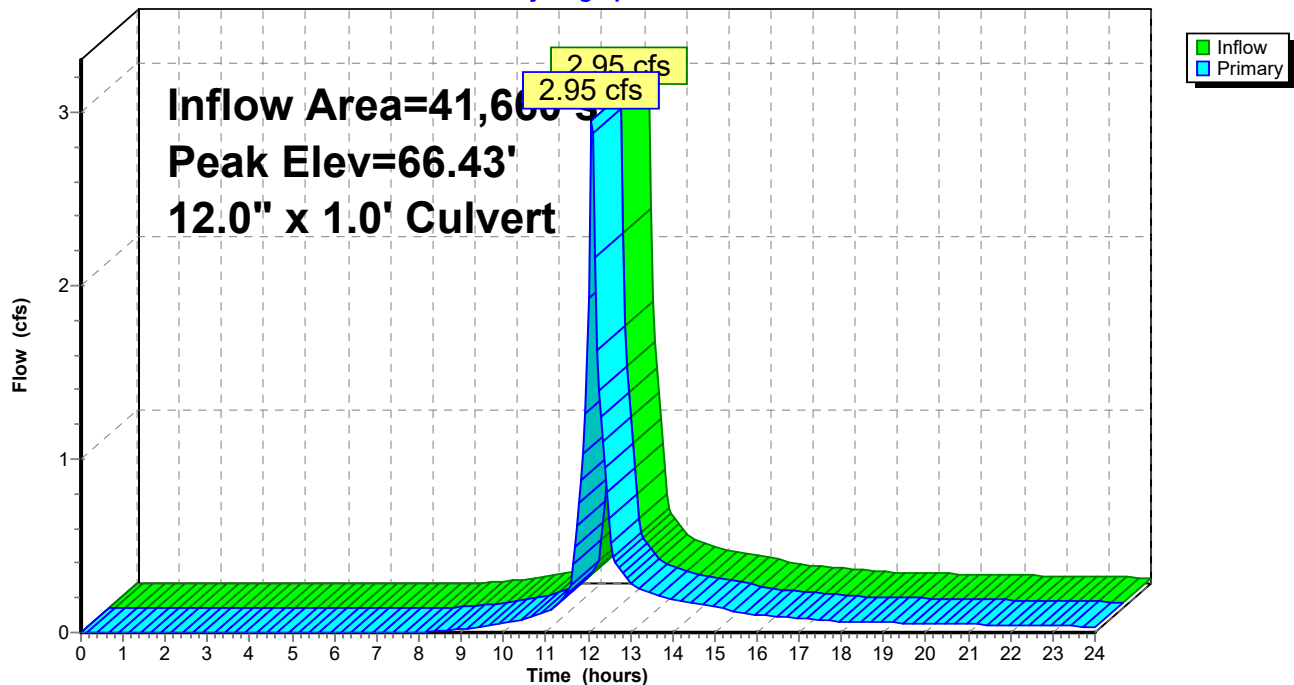
Device	Routing	Invert	Outlet Devices
#1	Primary	65.00'	12.0" x 1.0' long Culvert CPP, square edge headwall, Ke= 0.500 Outlet Invert= 65.00' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=2.55 cfs @ 12.08 hrs HW=66.29' TW=65.83' (Dynamic Tailwater)

↑ **1=Culvert** (Inlet Controls 2.55 cfs @ 3.25 fps)

Pond DMH8: DMH8

Hydrograph



Summary for Pond P1-1: P1-1

Inflow Area = 74,610 sf, 49.91% Impervious, Inflow Depth > 2.68" for 10 year event
 Inflow = 5.35 cfs @ 12.08 hrs, Volume= 16,694 cf
 Outflow = 1.30 cfs @ 12.48 hrs, Volume= 12,536 cf, Atten= 76%, Lag= 24.1 min
 Primary = 1.30 cfs @ 12.48 hrs, Volume= 12,536 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 53.35' @ 12.48 hrs Surf.Area= 4,125 sf Storage= 7,345 cf
 Flood Elev= 55.50' Surf.Area= 5,973 sf Storage= 18,004 cf

Plug-Flow detention time= 199.4 min calculated for 12,536 cf (75% of inflow)
 Center-of-Mass det. time= 111.8 min (932.1 - 820.3)

Volume	Invert	Avail.Storage	Storage Description
#1	51.00'	18,004 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
51.00	2,080	0	0
52.00	2,814	2,447	2,447
52.50	3,624	1,610	4,057
54.00	4,509	6,100	10,156
55.00	5,467	4,988	15,144
55.50	5,973	2,860	18,004

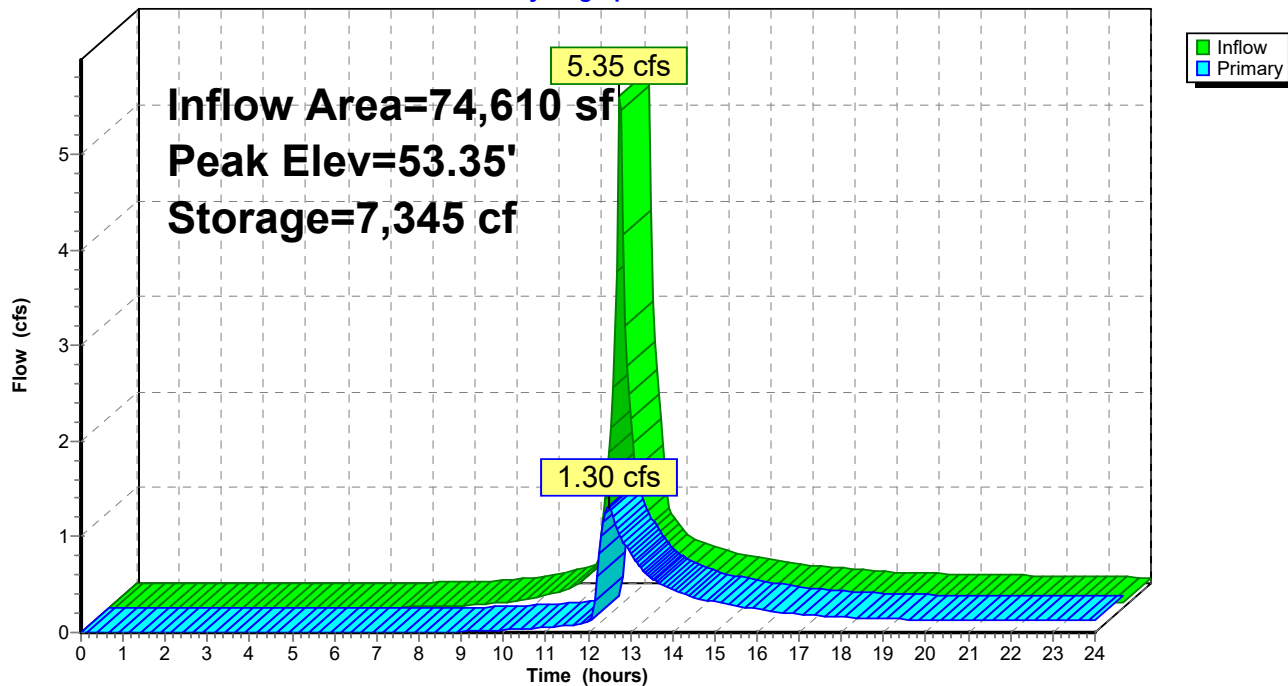
Device	Routing	Invert	Outlet Devices
#1	Primary	51.00'	12.0" x 80.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 50.00' S= 0.0125 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Device 1	51.00'	2.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	52.75'	10.0" Vert. Orifice/Grate C= 0.600
#4	Device 1	53.25'	10.0" Vert. Orifice/Grate C= 0.600
#5	Device 1	54.25'	2.00' x 2.00' Horiz. Orifice/Grate Limited to weir flow C= 0.600

Primary OutFlow Max=1.30 cfs @ 12.48 hrs HW=53.35' TW=0.00' (Dynamic Tailwater)

1=Culvert (Passes 1.30 cfs of 4.82 cfs potential flow)
 2=Orifice/Grate (Orifice Controls 0.16 cfs @ 7.25 fps)
 3=Orifice/Grate (Orifice Controls 1.10 cfs @ 2.63 fps)
 4=Orifice/Grate (Orifice Controls 0.04 cfs @ 1.06 fps)
 5=Orifice/Grate (Controls 0.00 cfs)

Pond P1-1: P1-1

Hydrograph



Summary for Pond P1-2: DP-1-2

Inflow Area = 35,138 sf, 15.99% Impervious, Inflow Depth > 1.66" for 10 year event
 Inflow = 1.36 cfs @ 12.13 hrs, Volume= 4,867 cf
 Outflow = 0.02 cfs @ 23.42 hrs, Volume= 1,015 cf, Atten= 98%, Lag= 677.4 min
 Primary = 0.02 cfs @ 23.42 hrs, Volume= 1,015 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 57.93' @ 23.42 hrs Surf.Area= 5,040 sf Storage= 3,854 cf
 Flood Elev= 59.75' Surf.Area= 7,130 sf Storage= 10,384 cf

Plug-Flow detention time= 377.4 min calculated for 1,013 cf (21% of inflow)
 Center-of-Mass det. time= 234.3 min (1,093.2 - 858.9)

Volume	Invert	Avail.Storage	Storage Description
#1	57.00'	10,384 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
57.00	3,285	0	0
58.00	5,180	4,233	4,233
58.50	6,148	2,832	7,065
59.00	7,130	3,320	10,384

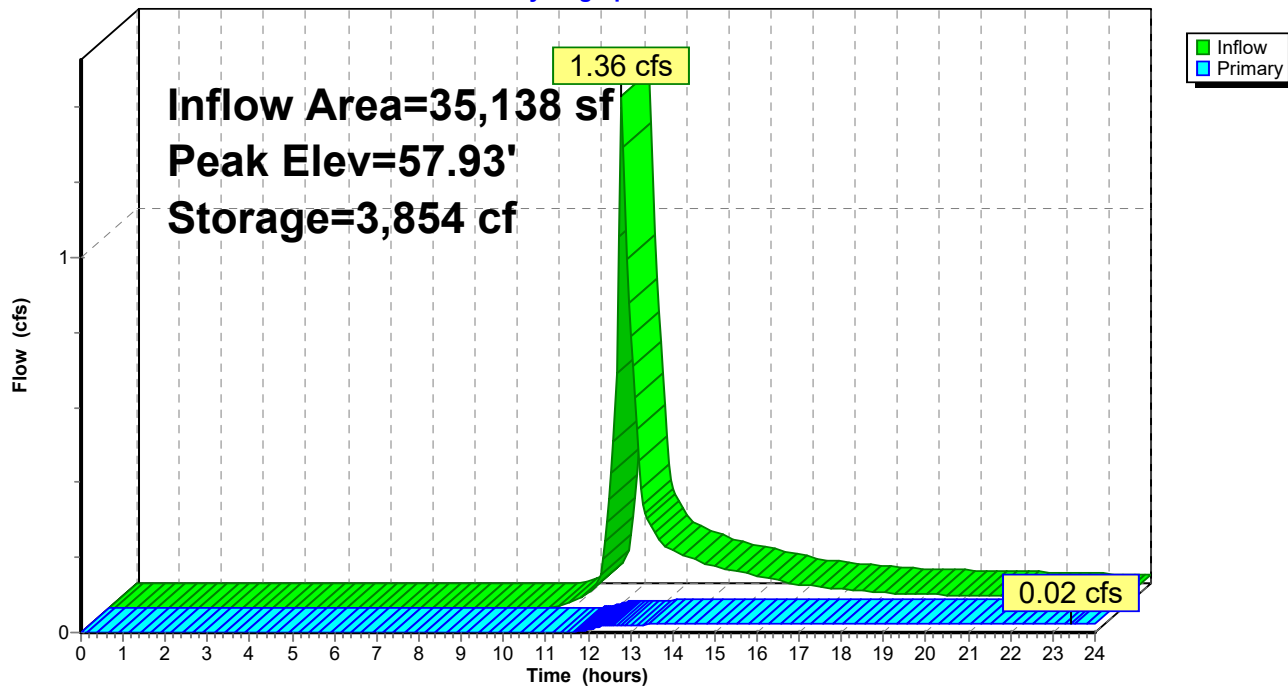
Device	Routing	Invert	Outlet Devices
#1	Primary	57.00'	12.0" x 25.0' long Culvert RCP, square edge headwall, Ke= 0.500 Outlet Invert= 56.50' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Device 1	57.00'	1.0" Vert. Orifice/Grate C= 0.600
#3	Primary	58.75'	3.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.02 cfs @ 23.42 hrs HW=57.93' TW=0.00' (Dynamic Tailwater)

1=Culvert (Passes 0.02 cfs of 2.49 cfs potential flow)
 2=Orifice/Grate (Orifice Controls 0.02 cfs @ 4.53 fps)
 3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond P1-2: DP-1-2

Hydrograph



Summary for Pond P1-3: P1-3

Inflow Area = 7,345 sf, 68.78% Impervious, Inflow Depth > 3.35" for 10 year event
 Inflow = 0.70 cfs @ 12.03 hrs, Volume= 2,050 cf
 Outflow = 0.11 cfs @ 12.49 hrs, Volume= 1,901 cf, Atten= 84%, Lag= 27.5 min
 Primary = 0.11 cfs @ 12.49 hrs, Volume= 1,901 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 51.41' @ 12.49 hrs Surf.Area= 1,505 sf Storage= 886 cf
 Flood Elev= 54.27' Surf.Area= 1,400 sf Storage= 1,861 cf

Plug-Flow detention time= 126.7 min calculated for 1,901 cf (93% of inflow)
 Center-of-Mass det. time= 88.9 min (885.7 - 796.8)

Volume	Invert	Avail.Storage	Storage Description
#1	50.00'	1,680 cf	10.00'W x 35.00'L x 3.00'H Prismatoid x 4 4,200 cf Overall x 40.0% Voids
#2	50.50'	181 cf	48.0"W x 24.0"H x 8.00'L Galley 4x8x2 x 4
		1,861 cf	Total Available Storage

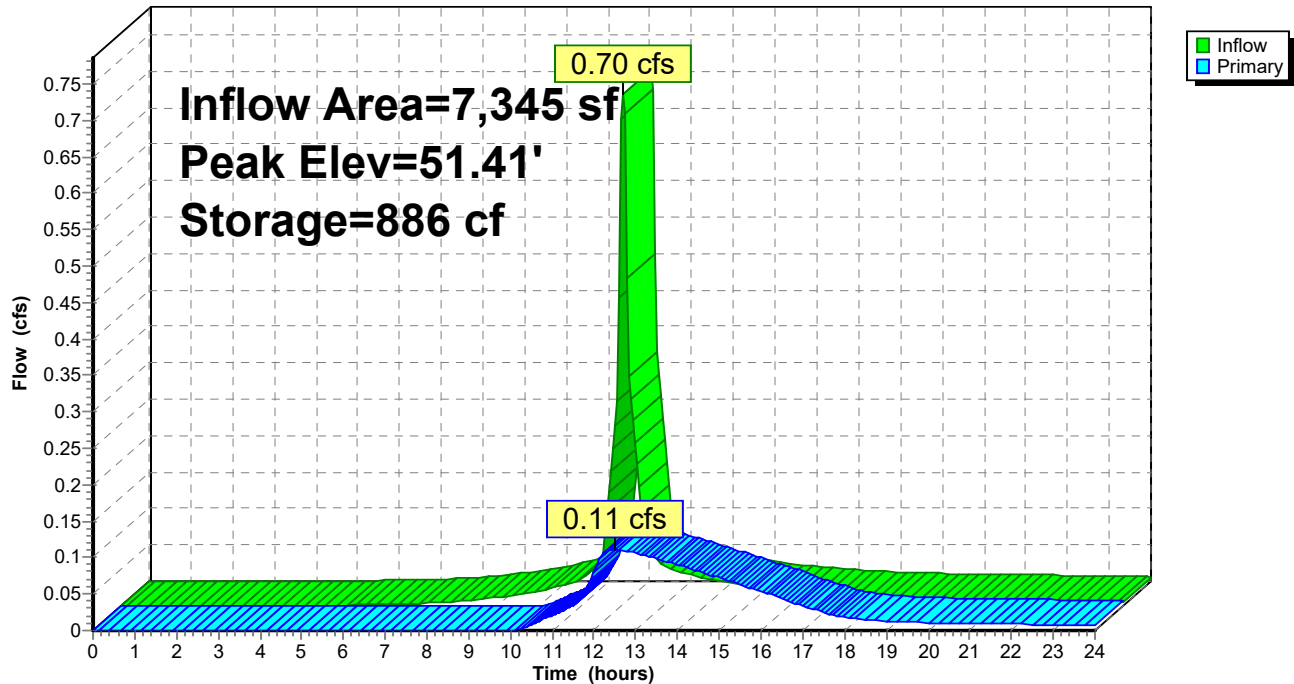
Device	Routing	Invert	Outlet Devices
#1	Primary	50.20'	12.0" x 16.0' long Culvert CPP, square edge headwall, Ke= 0.500 Outlet Invert= 50.00' S= 0.0125 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Device 1	50.20'	2.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	53.00'	12.0" Horiz. Orifice/Grate Limited to weir flow C= 0.600

Primary OutFlow Max=0.11 cfs @ 12.49 hrs HW=51.41' TW=0.00' (Dynamic Tailwater)

1=Culvert (Passes 0.11 cfs of 3.09 cfs potential flow)
 2=Orifice/Grate (Orifice Controls 0.11 cfs @ 5.11 fps)
 3=Orifice/Grate (Controls 0.00 cfs)

Pond P1-3: P1-3

Hydrograph



Summary for Pond P3-1: P3-2

Inflow Area = 68,668 sf, 52.09% Impervious, Inflow Depth > 2.76" for 10 year event
 Inflow = 5.10 cfs @ 12.08 hrs, Volume= 15,793 cf
 Outflow = 1.71 cfs @ 12.38 hrs, Volume= 13,269 cf, Atten= 67%, Lag= 18.5 min
 Primary = 1.71 cfs @ 12.38 hrs, Volume= 13,269 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 66.36' @ 12.38 hrs Surf.Area= 3,825 sf Storage= 5,954 cf
 Flood Elev= 70.00' Surf.Area= 3,825 sf Storage= 10,877 cf

Plug-Flow detention time= 123.3 min calculated for 13,269 cf (84% of inflow)
 Center-of-Mass det. time= 56.3 min (876.8 - 820.5)

Volume	Invert	Avail.Storage	Storage Description
#1	64.00'	2,363 cf	Custom Stage Data (Prismatic) Listed below (Recalc) 17,213 cf Overall - 11,304 cf Embedded = 5,908 cf x 40.0% Voids
#2	64.50'	8,514 cf	52.8"W x 48.0"H x 4.00'L Galley 4x4x4 x 192 Inside #1
		10,877 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
64.00	3,825	0	0
68.50	3,825	17,213	17,213

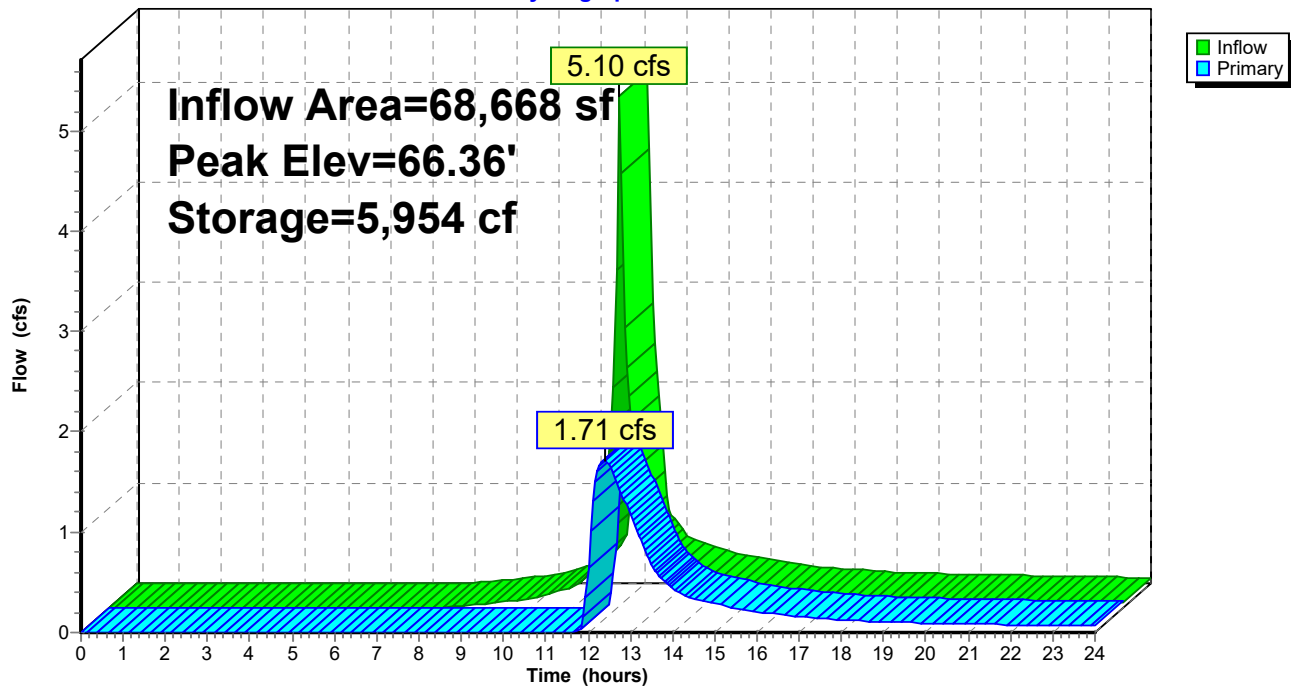
Device	Routing	Invert	Outlet Devices
#1	Primary	64.00'	15.0" x 41.0' long Culvert CPP, square edge headwall, Ke= 0.500 Outlet Invert= 62.00' S= 0.0488 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Device 1	65.00'	8.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	67.50'	15.0" Horiz. Orifice/Grate Limited to weir flow C= 0.600

Primary OutFlow Max=1.70 cfs @ 12.38 hrs HW=66.36' TW=61.64' (Dynamic Tailwater)

1=Culvert (Passes 1.70 cfs of 7.79 cfs potential flow)
 2=Orifice/Grate (Orifice Controls 1.70 cfs @ 4.88 fps)
 3=Orifice/Grate (Controls 0.00 cfs)

Pond P3-1: P3-2

Hydrograph



Summary for Pond P3-2: P3-3

Inflow Area = 140,478 sf, 42.86% Impervious, Inflow Depth > 2.26" for 10 year event
 Inflow = 5.48 cfs @ 12.09 hrs, Volume= 26,459 cf
 Outflow = 1.13 cfs @ 13.41 hrs, Volume= 18,435 cf, Atten= 79%, Lag= 79.1 min
 Primary = 1.13 cfs @ 13.41 hrs, Volume= 18,435 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 52.66' @ 13.41 hrs Surf.Area= 6,616 sf Storage= 11,729 cf
 Flood Elev= 55.50' Surf.Area= 12,548 sf Storage= 38,610 cf

Plug-Flow detention time= 205.8 min calculated for 18,435 cf (70% of inflow)
 Center-of-Mass det. time= 107.2 min (964.6 - 857.5)

Volume	Invert	Avail.Storage	Storage Description
#1	50.00'	38,610 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
50.00	2,426	0	0
52.00	5,354	7,780	7,780
54.00	9,180	14,534	22,314
55.50	12,548	16,296	38,610

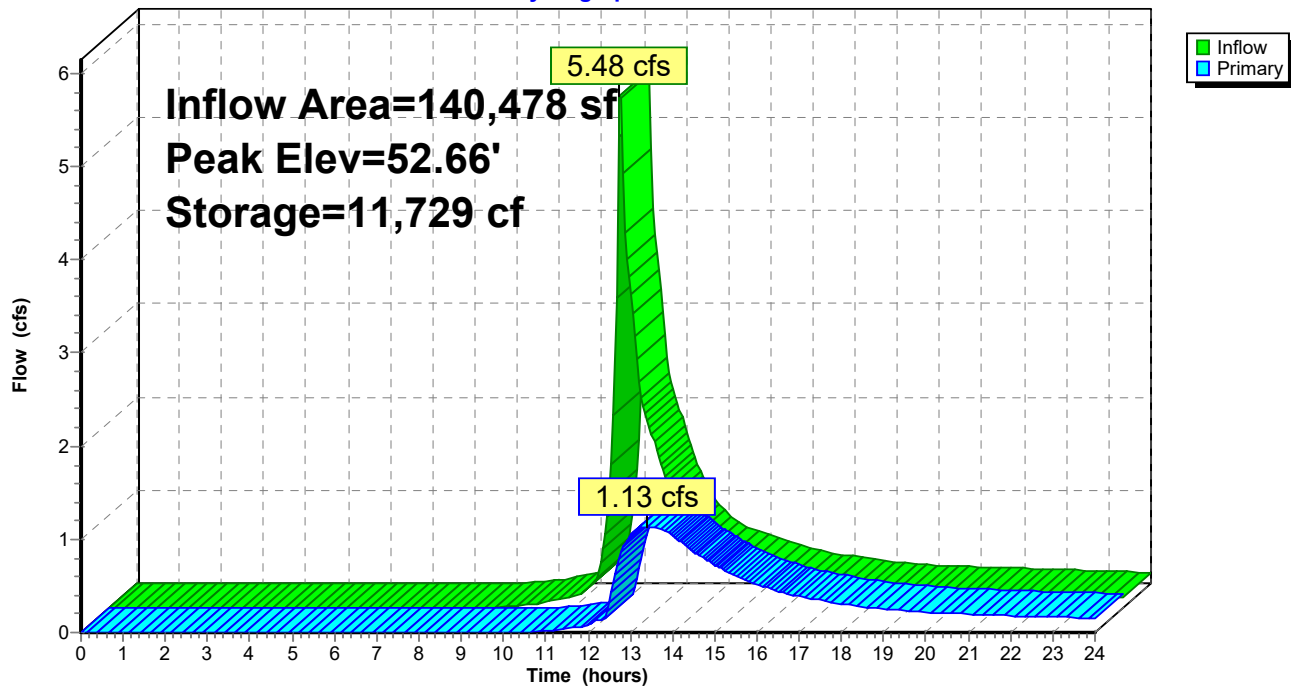
Device	Routing	Invert	Outlet Devices
#1	Primary	50.00'	12.0" x 29.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 49.00' S= 0.0345 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Device 1	50.00'	2.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	52.00'	8.0" Vert. Orifice/Grate C= 0.600
#4	Device 1	54.00'	2.00' x 2.00' Horiz. Orifice/Grate Limited to weir flow C= 0.600
#5	Primary	54.55'	10.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=1.13 cfs @ 13.41 hrs HW=52.66' TW=0.00' (Dynamic Tailwater)

1=Culvert (Passes 1.13 cfs of 5.56 cfs potential flow)
 2=Orifice/Grate (Orifice Controls 0.17 cfs @ 7.73 fps)
 3=Orifice/Grate (Orifice Controls 0.96 cfs @ 2.77 fps)
 4=Orifice/Grate (Controls 0.00 cfs)
 5=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond P3-2: P3-3

Hydrograph

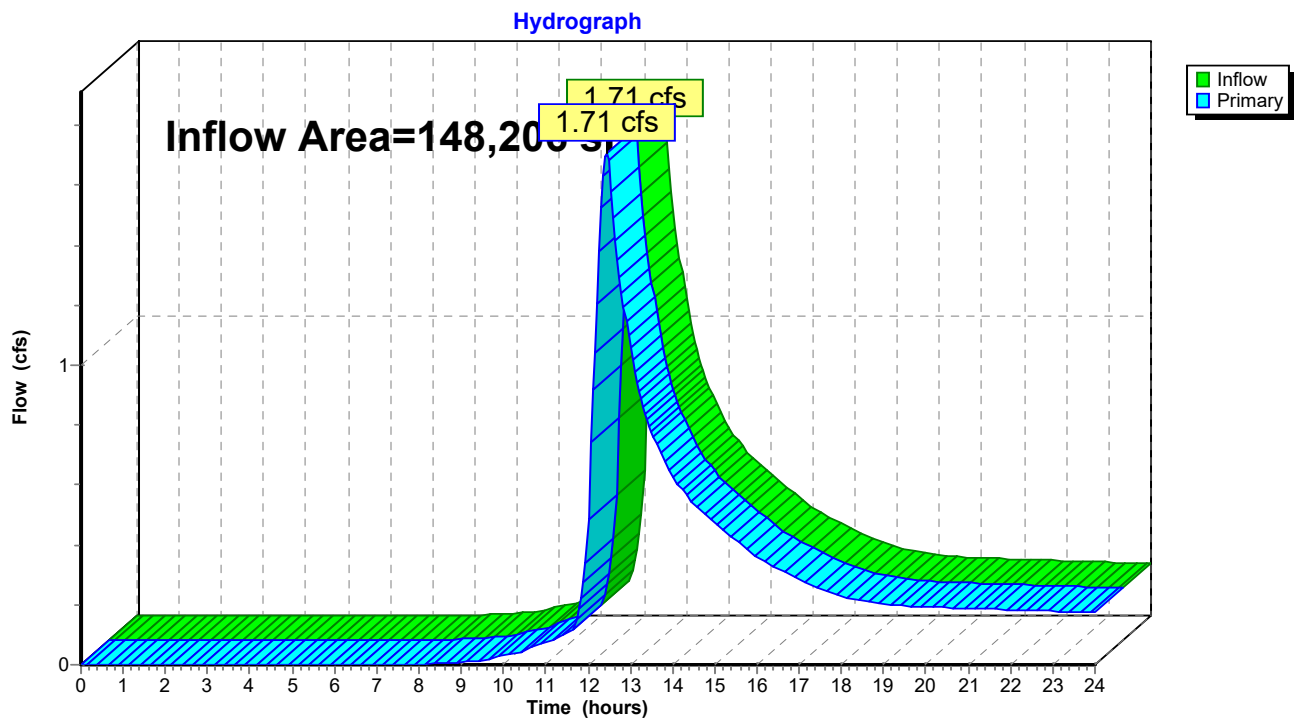


Summary for Link DP-1: DP-1

Inflow Area = 148,206 sf, 32.39% Impervious, Inflow Depth > 1.46" for 10 year event
Inflow = 1.71 cfs @ 12.43 hrs, Volume= 18,029 cf
Primary = 1.71 cfs @ 12.43 hrs, Volume= 18,029 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP-1: DP-1

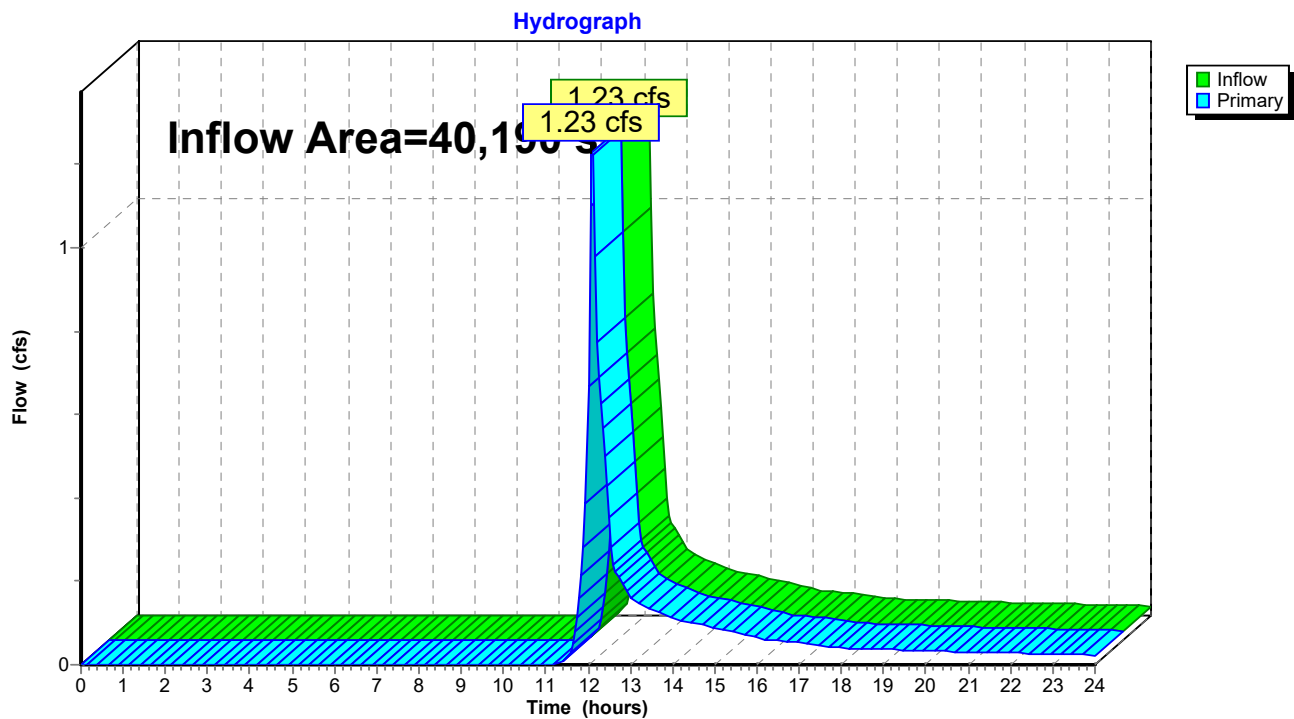


Summary for Link DP-2: DP-2

Inflow Area = 40,190 sf, 10.95% Impervious, Inflow Depth > 1.25" for 10 year event
Inflow = 1.23 cfs @ 12.09 hrs, Volume= 4,184 cf
Primary = 1.23 cfs @ 12.09 hrs, Volume= 4,184 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP-2: DP-2

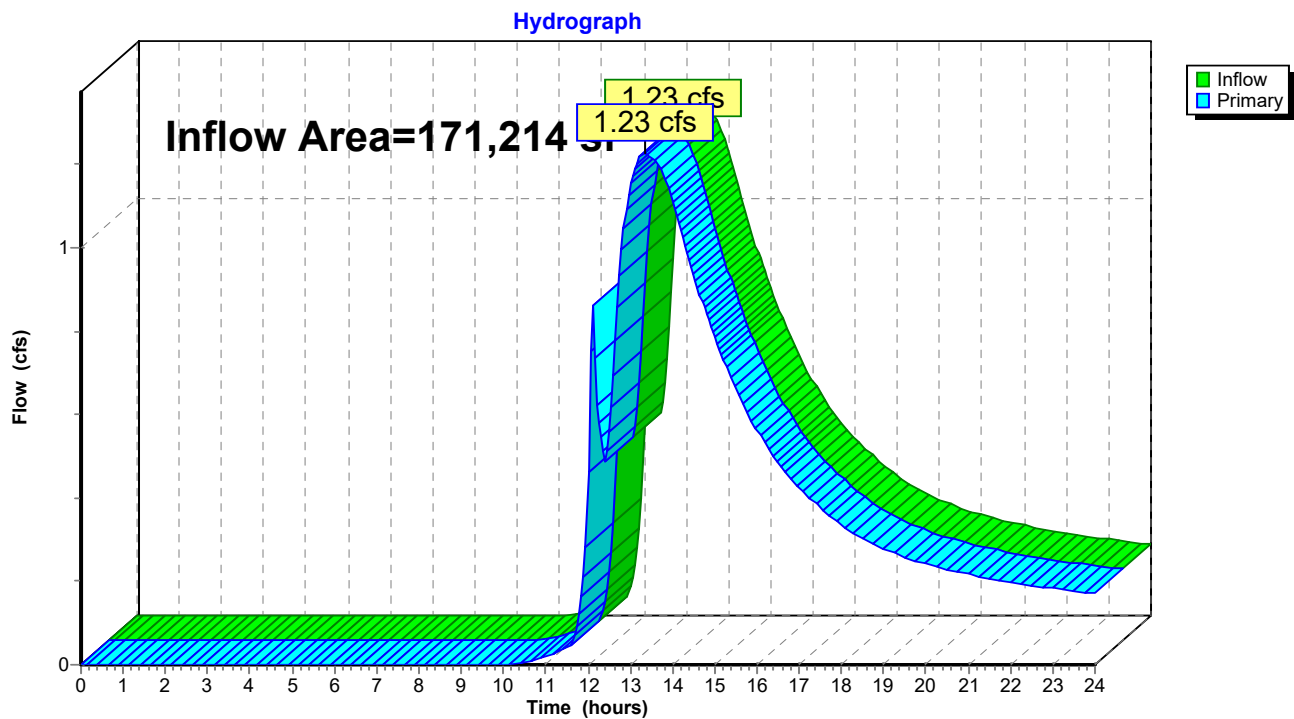


Summary for Link DP-3: DP-3

Inflow Area = 171,214 sf, 35.17% Impervious, Inflow Depth > 1.48" for 10 year event
Inflow = 1.23 cfs @ 13.37 hrs, Volume= 21,148 cf
Primary = 1.23 cfs @ 13.37 hrs, Volume= 21,148 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP-3: DP-3

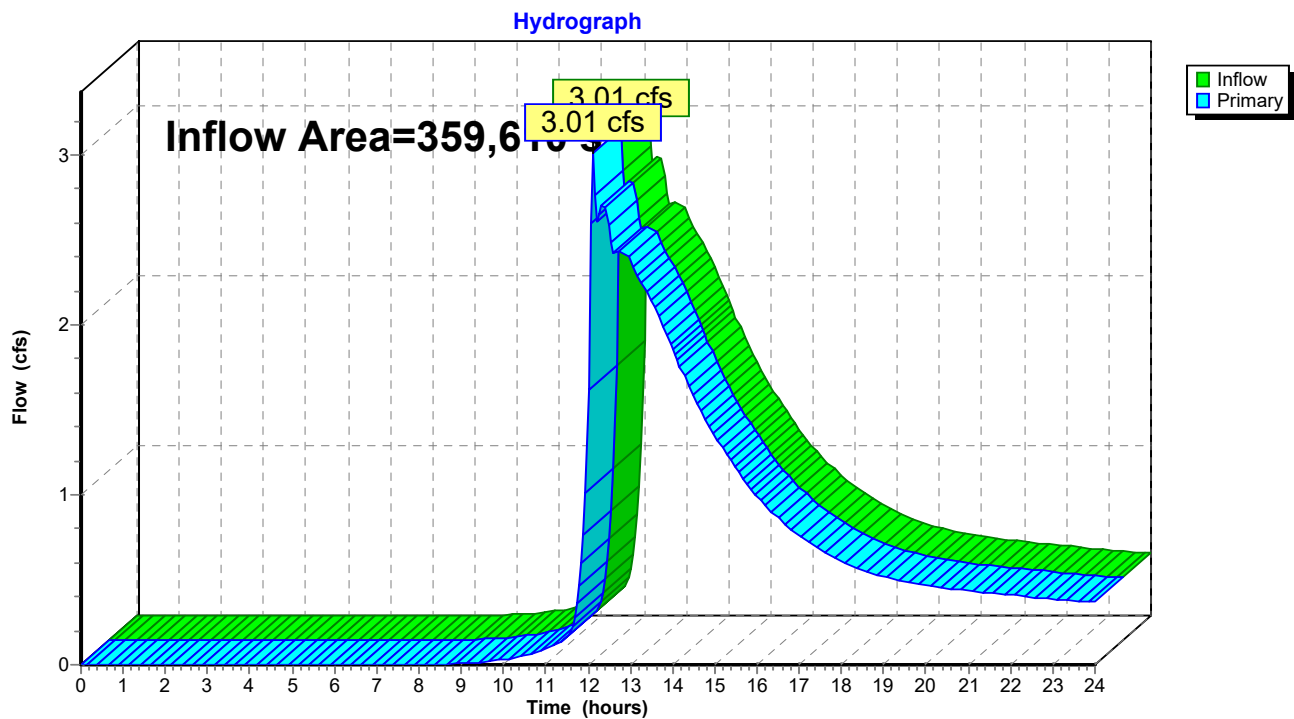


Summary for Link TOTAL: (new Link)

Inflow Area = 359,610 sf, 31.32% Impervious, Inflow Depth > 1.45" for 10 year event
Inflow = 3.01 cfs @ 12.11 hrs, Volume= 43,362 cf
Primary = 3.01 cfs @ 12.11 hrs, Volume= 43,362 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link TOTAL: (new Link)





Hydrocad

POST-DEVELOPMENT

25-Year Storm

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment P-1A: P-1A	Runoff Area=2,325 sf 0.00% Impervious Runoff Depth>1.59" Flow Length=106' Tc=5.0 min CN=56 Runoff=0.09 cfs 309 cf
Subcatchment P-1B: P-1E	Runoff Area=12,786 sf 39.18% Impervious Runoff Depth>3.28" Tc=5.0 min CN=75 Runoff=1.13 cfs 3,495 cf
Subcatchment P-1C: P-1C	Runoff Area=3,632 sf 56.17% Impervious Runoff Depth>3.99" Flow Length=301' Tc=1.8 min CN=82 Runoff=0.42 cfs 1,207 cf
Subcatchment P-1D: P-1D	Runoff Area=3,713 sf 81.12% Impervious Runoff Depth>4.96" Flow Length=235' Tc=1.4 min CN=91 Runoff=0.51 cfs 1,534 cf
Subcatchment P-1E: P-1E	Runoff Area=15,652 sf 37.11% Impervious Runoff Depth>3.18" Flow Length=108' Tc=5.0 min CN=74 Runoff=1.34 cfs 4,151 cf
Subcatchment P-1F: P-1F	Runoff Area=20,654 sf 69.31% Impervious Runoff Depth>4.51" Flow Length=272' Tc=5.0 min CN=87 Runoff=2.45 cfs 7,770 cf
Subcatchment P-1G: P-1I	Runoff Area=5,773 sf 64.25% Impervious Runoff Depth>4.30" Flow Length=177' Tc=5.0 min CN=85 Runoff=0.66 cfs 2,069 cf
Subcatchment P-1H: P-1H	Runoff Area=19,745 sf 42.54% Impervious Runoff Depth>3.48" Flow Length=158' Tc=5.0 min CN=77 Runoff=1.85 cfs 5,721 cf
Subcatchment P-1I: P-1I	Runoff Area=35,138 sf 15.99% Impervious Runoff Depth>2.53" Flow Length=170' Tc=8.2 min CN=67 Runoff=2.15 cfs 7,397 cf
Subcatchment P-1J: P-1J	Runoff Area=28,788 sf 0.31% Impervious Runoff Depth>1.67" Flow Length=280' Tc=6.1 min CN=57 Runoff=1.17 cfs 4,016 cf
Subcatchment P-2A: P-2A	Runoff Area=40,190 sf 10.95% Impervious Runoff Depth>2.00" Flow Length=156' Tc=5.0 min CN=61 Runoff=2.08 cfs 6,711 cf
Subcatchment P-3A: P-3A	Runoff Area=30,736 sf 0.00% Impervious Runoff Depth>1.76" Flow Length=260' Tc=5.0 min CN=58 Runoff=1.36 cfs 4,495 cf
Subcatchment P-3B: P-3B	Runoff Area=71,810 sf 34.04% Impervious Runoff Depth>3.18" Flow Length=128' Tc=5.0 min CN=74 Runoff=6.16 cfs 19,045 cf
Subcatchment P-3C: P-3C	Runoff Area=41,660 sf 48.12% Impervious Runoff Depth>3.68" Flow Length=153' Tc=5.0 min CN=79 Runoff=4.11 cfs 12,766 cf
Subcatchment P-3D: P-3D	Runoff Area=22,478 sf 56.13% Impervious Runoff Depth>3.98" Flow Length=240' Tc=5.0 min CN=82 Runoff=2.40 cfs 7,464 cf
Subcatchment P-3E: P-3F	Runoff Area=4,530 sf 68.52% Impervious Runoff Depth>4.41" Flow Length=245' Tc=5.0 min CN=86 Runoff=0.53 cfs 1,664 cf

Pond 3P: INFILTRATOR

Peak Elev=0.00' Storage=0 cf

Pond CB1: CB1Peak Elev=51.86' Inflow=0.42 cfs 1,207 cf
8.0" x 9.0' Culvert Outflow=0.42 cfs 1,207 cf**Pond CB2: CB2**Peak Elev=51.86' Inflow=0.51 cfs 1,534 cf
8.0" x 9.0' Culvert Outflow=0.51 cfs 1,534 cf**Pond CB3: CB3**Peak Elev=53.96' Inflow=1.13 cfs 3,495 cf
12.0" x 12.0' Culvert Outflow=1.13 cfs 3,495 cf**Pond CB4: CB4**Peak Elev=54.13' Inflow=2.45 cfs 7,770 cf
12.0" x 11.0' Culvert Outflow=2.45 cfs 7,770 cf**Pond CB5: CB5**Peak Elev=61.81' Inflow=1.85 cfs 5,721 cf
12.0" x 13.0' Culvert Outflow=1.85 cfs 5,721 cf**Pond CB6: CB6**Peak Elev=61.46' Inflow=0.66 cfs 2,069 cf
12.0" x 13.0' Culvert Outflow=0.66 cfs 2,069 cf**Pond CB7: CB7**Peak Elev=67.17' Inflow=0.53 cfs 1,664 cf
12.0" x 20.0' Culvert Outflow=0.53 cfs 1,664 cf**Pond CB8: CB8**Peak Elev=67.18' Inflow=2.40 cfs 7,464 cf
12.0" x 20.0' Culvert Outflow=2.40 cfs 7,464 cf**Pond CB9: CB9**Peak Elev=68.19' Inflow=4.11 cfs 12,766 cf
12.0" x 22.0' Culvert Outflow=4.11 cfs 12,766 cf**Pond DMH 10: DMH9**Peak Elev=61.75' Inflow=2.25 cfs 19,317 cf
15.0" x 100.0' Culvert Outflow=2.25 cfs 19,317 cf**Pond DMH 11: DMH 10**Peak Elev=56.06' Inflow=2.25 cfs 19,317 cf
15.0" x 33.0' Culvert Outflow=2.25 cfs 19,317 cf**Pond DMH 6: DMH 6**Peak Elev=67.16' Inflow=2.93 cfs 9,127 cf
15.0" x 55.0' Culvert Outflow=2.93 cfs 9,127 cf**Pond DMH2: DMH2**Peak Elev=53.91' Inflow=3.59 cfs 11,265 cf
12.0" x 39.0' Culvert Outflow=3.59 cfs 11,265 cf**Pond DMH3: DMH3**Peak Elev=56.30' Inflow=2.50 cfs 7,789 cf
12.0" x 35.0' Culvert Outflow=2.50 cfs 7,789 cf**Pond DMH4: DMH4**Peak Elev=59.18' Inflow=2.50 cfs 7,789 cf
12.0" x 119.0' Culvert Outflow=2.50 cfs 7,789 cf**Pond DMH5: DMH 5**Peak Elev=67.17' Inflow=2.93 cfs 9,127 cf
15.0" x 94.0' Culvert Outflow=2.93 cfs 9,127 cf**Pond DMH7: DMH7**Peak Elev=67.14' Inflow=2.93 cfs 9,127 cf
Outflow=2.93 cfs 9,127 cf

Pearson Drive, Newbury, MA POST DEV

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Type III 24-hr 25 year Rainfall=6.00"

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Pond DMH8: DMH8Peak Elev=67.33' Inflow=4.11 cfs 12,766 cf
12.0" x 1.0' Culvert Outflow=4.11 cfs 12,766 cf**Pond P1-1: P1-1**Peak Elev=53.71' Storage=8,889 cf Inflow=7.41 cfs 23,206 cf
Outflow=2.84 cfs 18,566 cf**Pond P1-2: DP-1-2**Peak Elev=58.35' Storage=6,146 cf Inflow=2.15 cfs 7,397 cf
Outflow=0.03 cfs 1,251 cf**Pond P1-3: P1-3**Peak Elev=51.86' Storage=1,187 cf Inflow=0.93 cfs 2,740 cf
Outflow=0.13 cfs 2,586 cf**Pond P3-1: P3-2**Peak Elev=67.13' Storage=8,083 cf Inflow=7.03 cfs 21,894 cf
Outflow=2.25 cfs 19,317 cf**Pond P3-2: P3-3**Peak Elev=53.22' Storage=15,724 cf Inflow=7.92 cfs 38,362 cf
Outflow=1.77 cfs 30,024 cf**Link DP-1: DP-1**Inflow=3.65 cfs 26,728 cf
Primary=3.65 cfs 26,728 cf**Link DP-2: DP-2**Inflow=2.08 cfs 6,711 cf
Primary=2.08 cfs 6,711 cf**Link DP-3: DP-3**Inflow=1.91 cfs 34,520 cf
Primary=1.91 cfs 34,520 cf**Link TOTAL: (new Link)**Inflow=6.40 cfs 67,959 cf
Primary=6.40 cfs 67,959 cf**Total Runoff Area = 359,610 sf Runoff Volume = 89,813 cf Average Runoff Depth = 3.00"**
68.68% Pervious = 246,993 sf 31.32% Impervious = 112,617 sf

Summary for Subcatchment P-1A: P-1A

Runoff = 0.09 cfs @ 12.09 hrs, Volume= 309 cf, Depth> 1.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

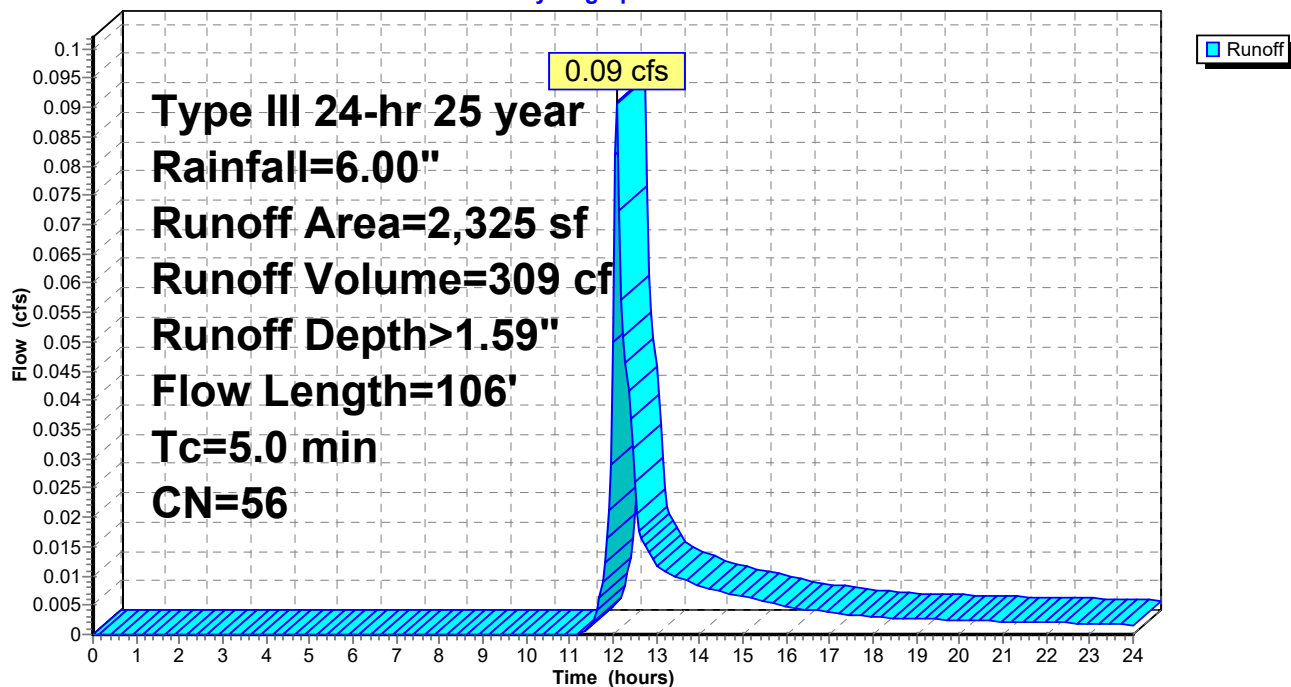
Type III 24-hr 25 year Rainfall=6.00"

Area (sf)	CN	Description
1,780	55	Woods, Good, HSG B
545	61	>75% Grass cover, Good, HSG B
0	98	Roofs, HSG B
0	98	Paved parking, HSG B
0	98	Paved roads w/curbs & sewers, HSG B
2,325	56	Weighted Average
2,325		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1					Direct Entry, DIRECT
3.2	50	0.0800	0.26		Sheet Flow, SHEET FLOW
					Grass: Short n= 0.150 P2= 3.20"
0.7	56	0.0357	1.32		Shallow Concentrated Flow, GRASS
					Short Grass Pasture Kv= 7.0 fps
5.0	106	Total			

Subcatchment P-1A: P-1A

Hydrograph



Pearson Drive, Newbury, MA POST DEV

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Type III 24-hr 25 year Rainfall=6.00"

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Summary for Subcatchment P-1B: P-1E

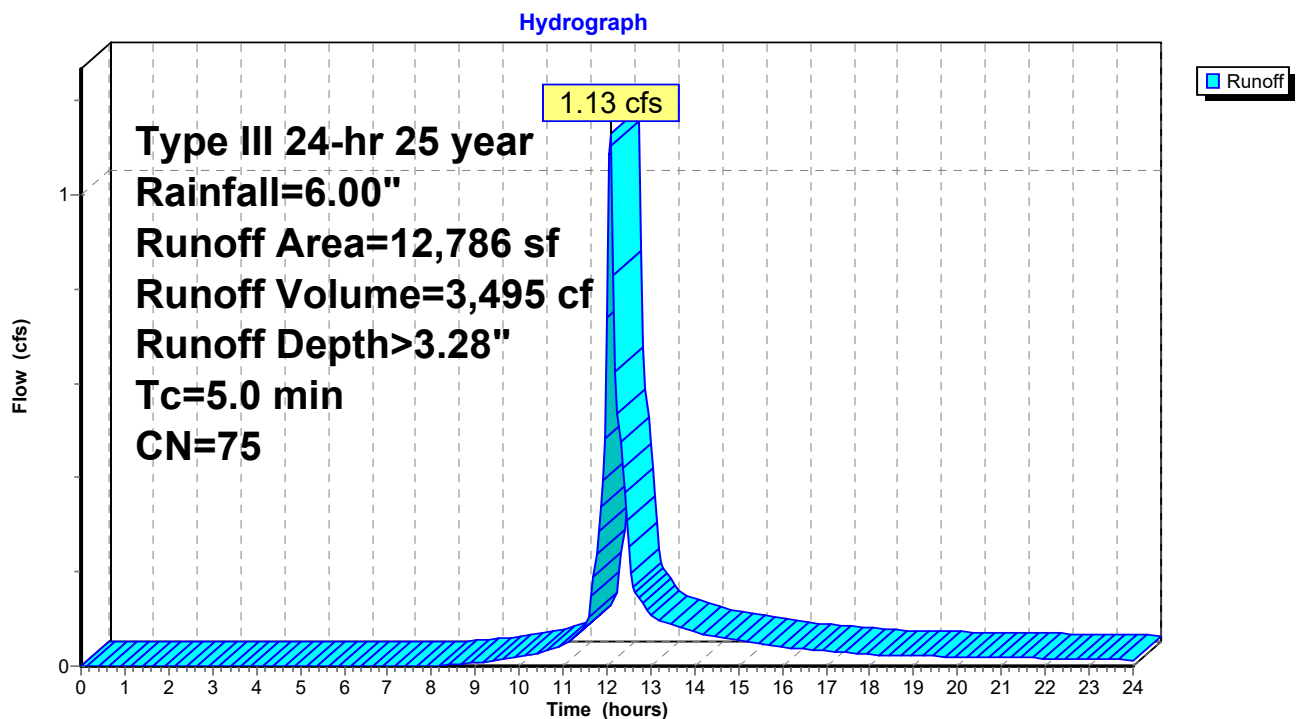
Runoff = 1.13 cfs @ 12.08 hrs, Volume= 3,495 cf, Depth> 3.28"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 25 year Rainfall=6.00"

Area (sf)	CN	Description
0	98	Roofs, HSG B
5,009	98	Paved roads w/curbs & sewers, HSG B
7,777	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
0	98	Water Surface, HSG B
12,786	75	Weighted Average
7,777		Pervious Area
5,009		Impervious Area

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

Subcatchment P-1B: P-1E

Summary for Subcatchment P-1C: P-1C

Runoff = 0.42 cfs @ 12.03 hrs, Volume= 1,207 cf, Depth> 3.99"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 25 year Rainfall=6.00"

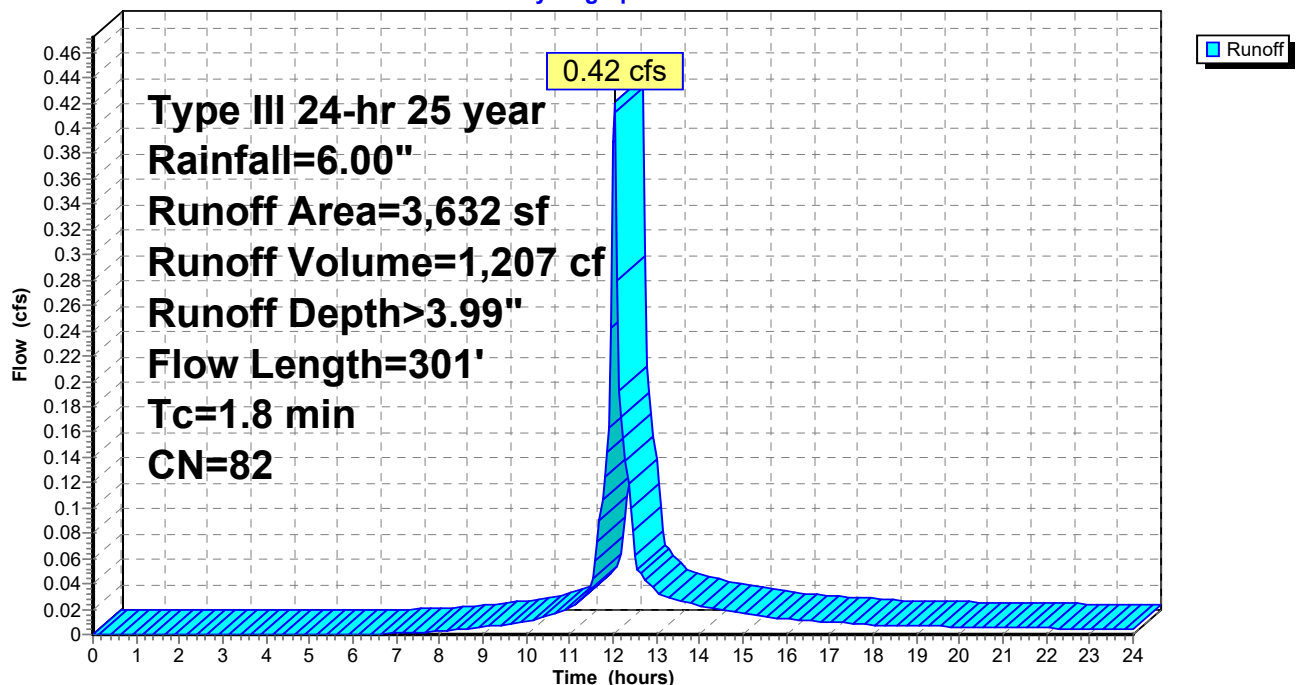
Area (sf)	CN	Description
0	98	Roofs, HSG B
0	98	Paved parking, HSG B
2,040	98	Paved roads w/curbs & sewers, HSG B
1,592	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B

3,632	82	Weighted Average
1,592		Pervious Area
2,040		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	50	0.0300	1.41		Sheet Flow, SHEET
					Smooth surfaces n= 0.011 P2= 3.20"
1.2	251	0.0287	3.44		Shallow Concentrated Flow, PAVEMENT
					Paved Kv= 20.3 fps
1.8	301	Total			

Subcatchment P-1C: P-1C

Hydrograph



Summary for Subcatchment P-1D: P-1D

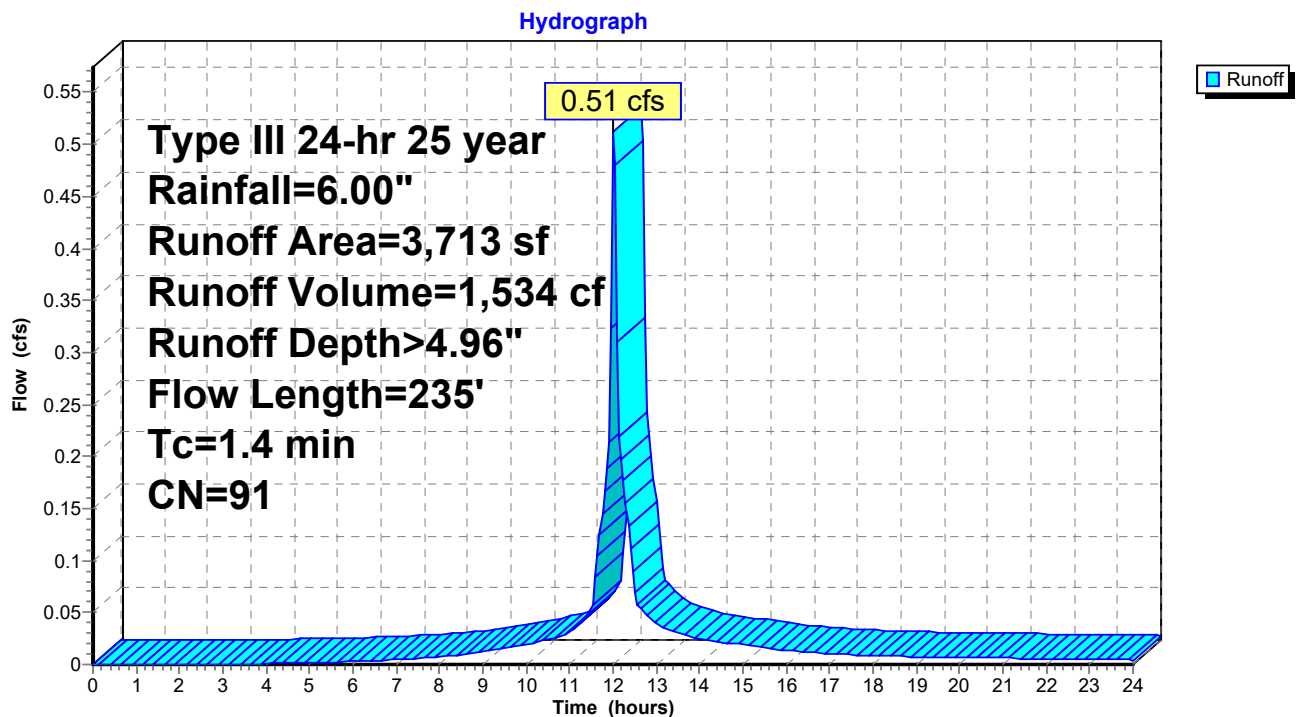
Runoff = 0.51 cfs @ 12.02 hrs, Volume= 1,534 cf, Depth> 4.96"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 year Rainfall=6.00"

Area (sf)	CN	Description
0	98	Roofs, HSG B
0	98	Paved parking, HSG B
3,012	98	Paved roads w/curbs & sewers, HSG B
701	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
3,713	91	Weighted Average
701		Pervious Area
3,012		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0400	1.58		Sheet Flow, SHEET
					Smooth surfaces n= 0.011 P2= 3.20"
0.9	185	0.0282	3.41		Shallow Concentrated Flow, PAVEMENT
					Paved Kv= 20.3 fps
1.4	235	Total			

Subcatchment P-1D: P-1D



Summary for Subcatchment P-1E: P-1E

Runoff = 1.34 cfs @ 12.08 hrs, Volume= 4,151 cf, Depth> 3.18"

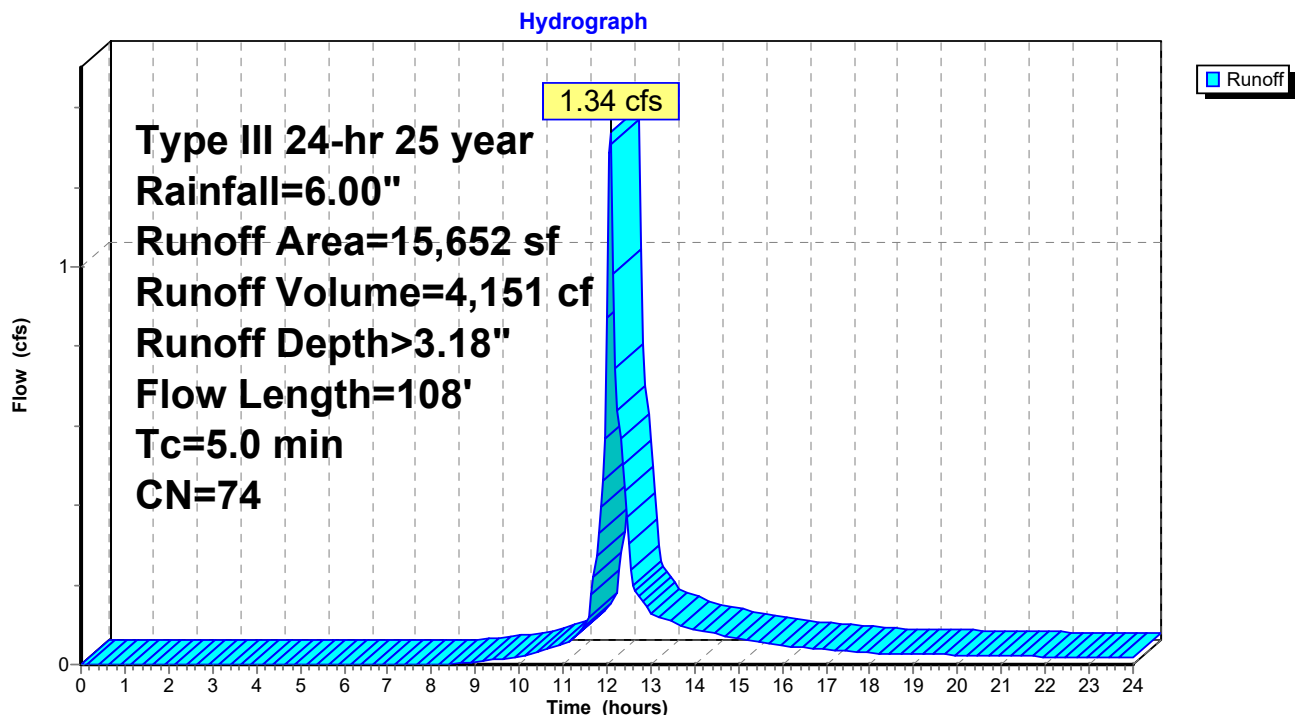
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 25 year Rainfall=6.00"

Area (sf)	CN	Description
880	98	Roofs, HSG B
0	98	Paved parking, HSG B
0	98	Paved roads w/curbs & sewers, HSG B
8,844	61	>75% Grass cover, Good, HSG B
4,928	98	Water Surface, HSG B
1,000	55	Woods, Good, HSG B
15,652	74	Weighted Average
9,844		Pervious Area
5,808		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4					Direct Entry, DIRECT
3.3	50	0.0760	0.25		Sheet Flow, SHEET
					Grass: Short n= 0.150 P2= 3.20"
0.3	58	0.1897	3.05		Shallow Concentrated Flow, GRASS
					Short Grass Pasture Kv= 7.0 fps
5.0	108	Total			

Subcatchment P-1E: P-1E



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Type III 24-hr 25 year Rainfall=6.00"

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Summary for Subcatchment P-1F: P-1F

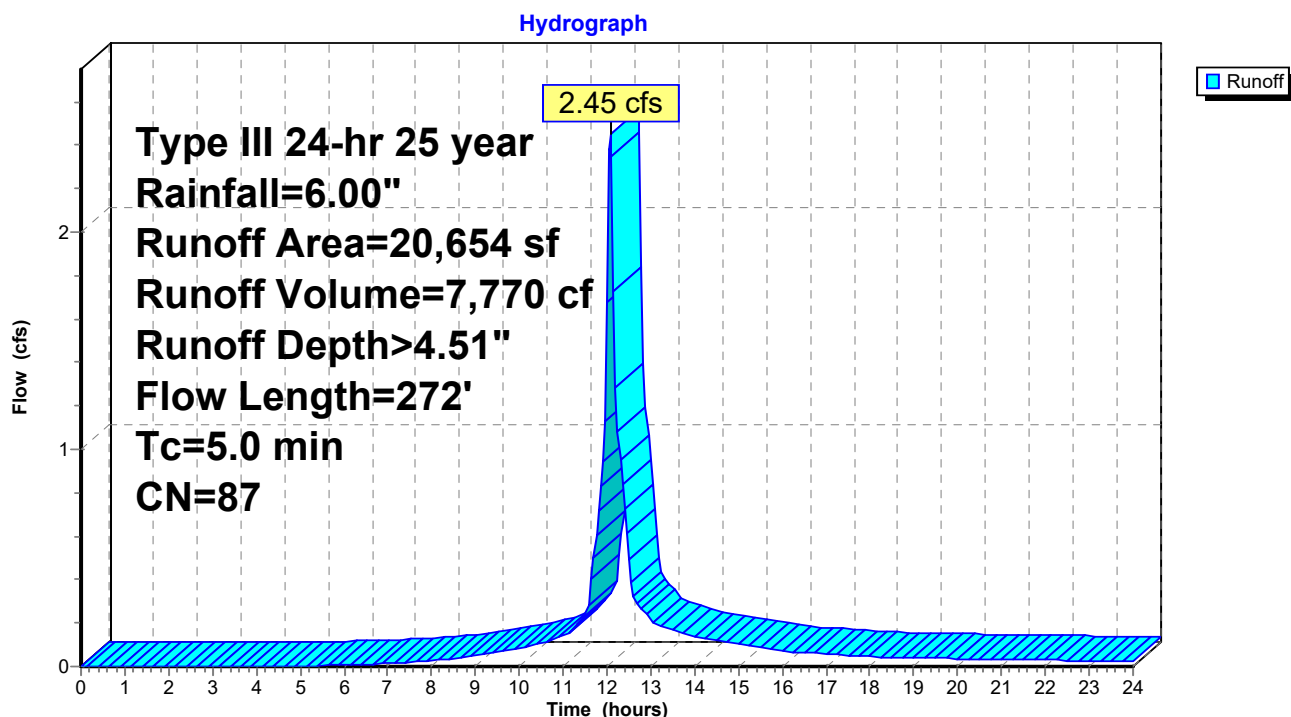
Runoff = 2.45 cfs @ 12.07 hrs, Volume= 7,770 cf, Depth> 4.51"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 25 year Rainfall=6.00"

Area (sf)	CN	Description
4,840	98	Roofs, HSG B
0	98	Paved parking, HSG B
9,476	98	Paved roads w/curbs & sewers, HSG B
6,338	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
0	98	Water Surface, HSG B
20,654	87	Weighted Average
6,338		Pervious Area
14,316		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0					Direct Entry, DIRECT
3.0	50	0.1000	0.28		Sheet Flow, SHEET
					Grass: Short n= 0.150 P2= 3.20"
2.0	222	0.0676	1.82		Shallow Concentrated Flow, GRASS
					Short Grass Pasture Kv= 7.0 fps
5.0	272	Total			

Subcatchment P-1F: P-1F

Summary for Subcatchment P-1G: P-1I

Runoff = 0.66 cfs @ 12.07 hrs, Volume= 2,069 cf, Depth> 4.30"

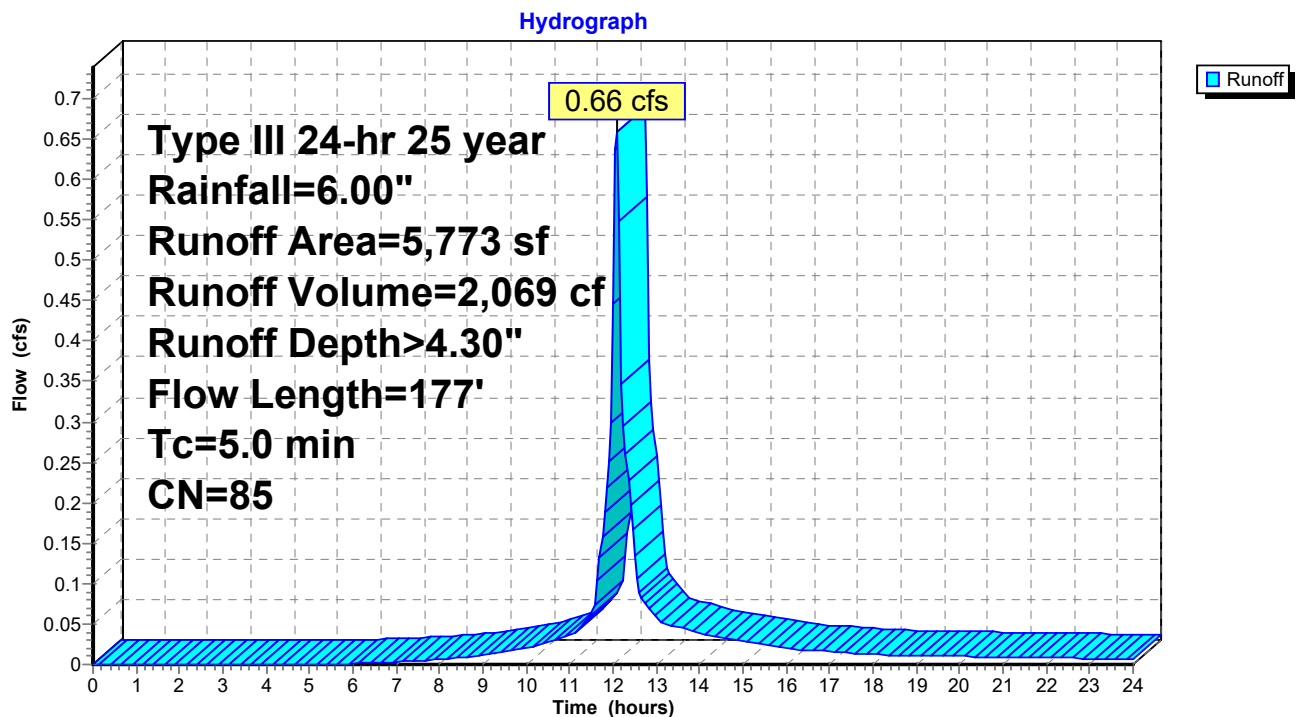
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 25 year Rainfall=6.00"

Area (sf)	CN	Description
0	55	Woods, Good, HSG B
2,064	61	>75% Grass cover, Good, HSG B
440	98	Roofs, HSG B
3,269	98	Paved roads w/curbs & sewers, HSG B
5,773	85	Weighted Average
2,064		Pervious Area
3,709		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7					Direct Entry, DIRECT
0.6	50	0.0300	1.41		Sheet Flow, SHEET FLOW
					Smooth surfaces n= 0.011 P2= 3.20"
0.7	127	0.0197	2.85		Shallow Concentrated Flow, PAVED
					Paved Kv= 20.3 fps
5.0	177	Total			

Subcatchment P-1G: P-1I



Summary for Subcatchment P-1H: P-1H

Runoff = 1.85 cfs @ 12.08 hrs, Volume= 5,721 cf, Depth> 3.48"

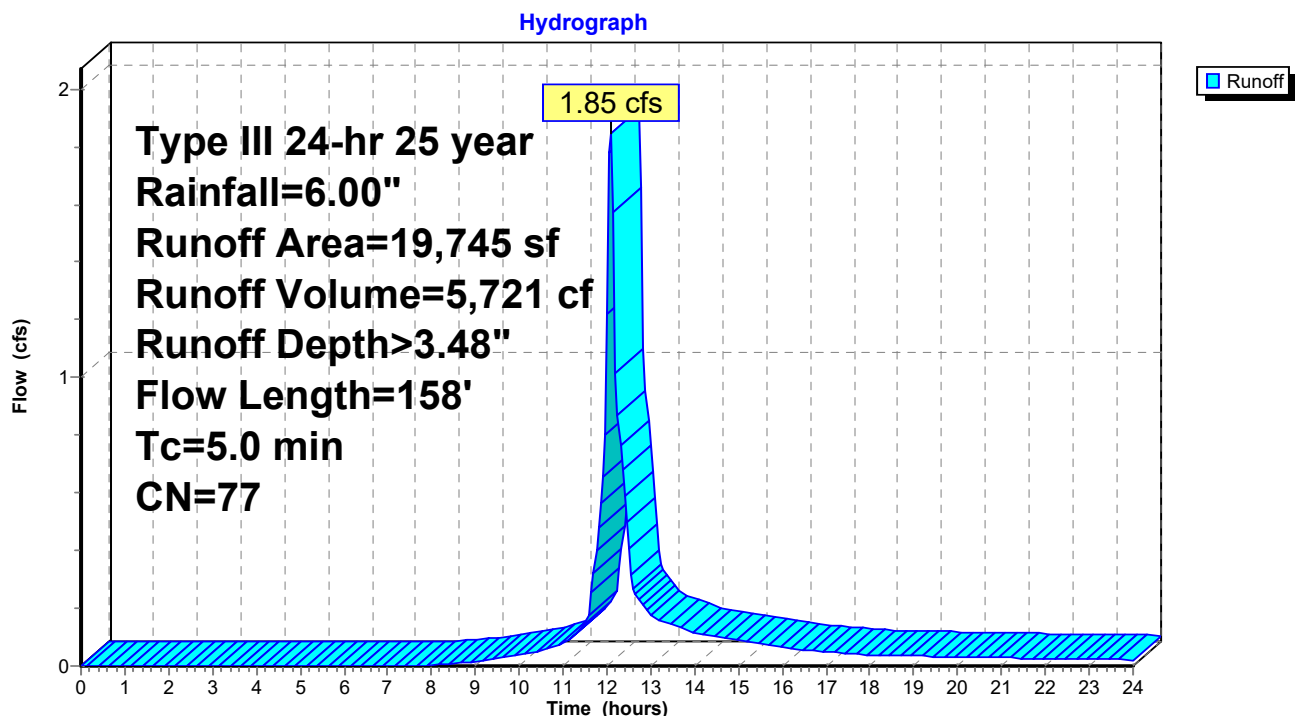
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 25 year Rainfall=6.00"

Area (sf)	CN	Description
5,720	98	Roofs, HSG B
0	98	Paved parking, HSG B
2,679	98	Paved roads w/curbs & sewers, HSG B
11,346	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
19,745	77	Weighted Average
11,346		Pervious Area
8,399		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.8					Direct Entry, DIRECT
0.6	50	0.0300	1.41		Sheet Flow, SHEET
					Smooth surfaces n= 0.011 P2= 3.20"
0.6	108	0.0231	3.09		Shallow Concentrated Flow, PAVEMENT
					Paved Kv= 20.3 fps
5.0	158	Total			

Subcatchment P-1H: P-1H



Summary for Subcatchment P-1I: P-1I

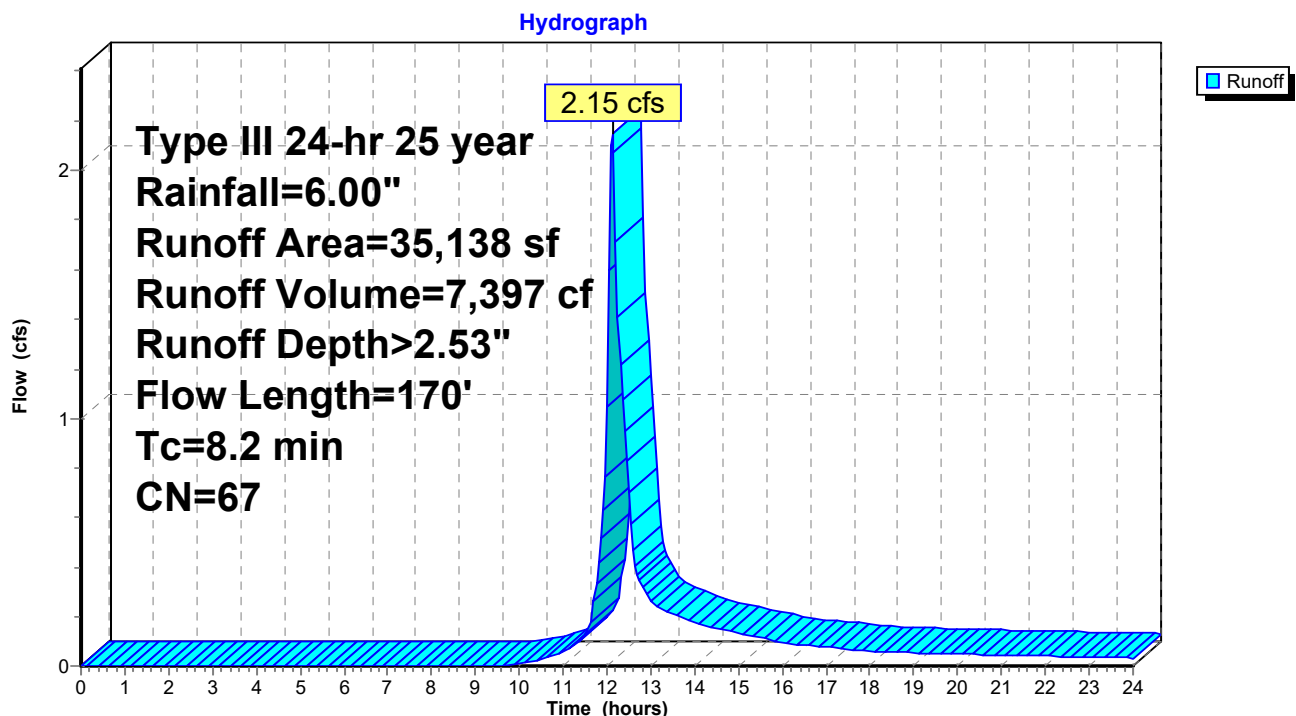
Runoff = 2.15 cfs @ 12.12 hrs, Volume= 7,397 cf, Depth> 2.53"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 year Rainfall=6.00"

Area (sf)	CN	Description
440	98	Roofs, HSG B
0	98	Paved parking, HSG B
0	98	Paved roads w/curbs & sewers, HSG B
29,518	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
5,180	98	Water Surface, HSG B
35,138	67	Weighted Average
29,518		Pervious Area
5,620		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.1000	0.13		Sheet Flow, SHEET Woods: Light underbrush n= 0.400 P2= 3.20"
1.7	120	0.0580	1.20		Shallow Concentrated Flow, GRASS Woodland Kv= 5.0 fps
8.2	170	Total			

Subcatchment P-1I: P-1I



Summary for Subcatchment P-1J: P1-J

Runoff = 1.17 cfs @ 12.10 hrs, Volume= 4,016 cf, Depth> 1.67"

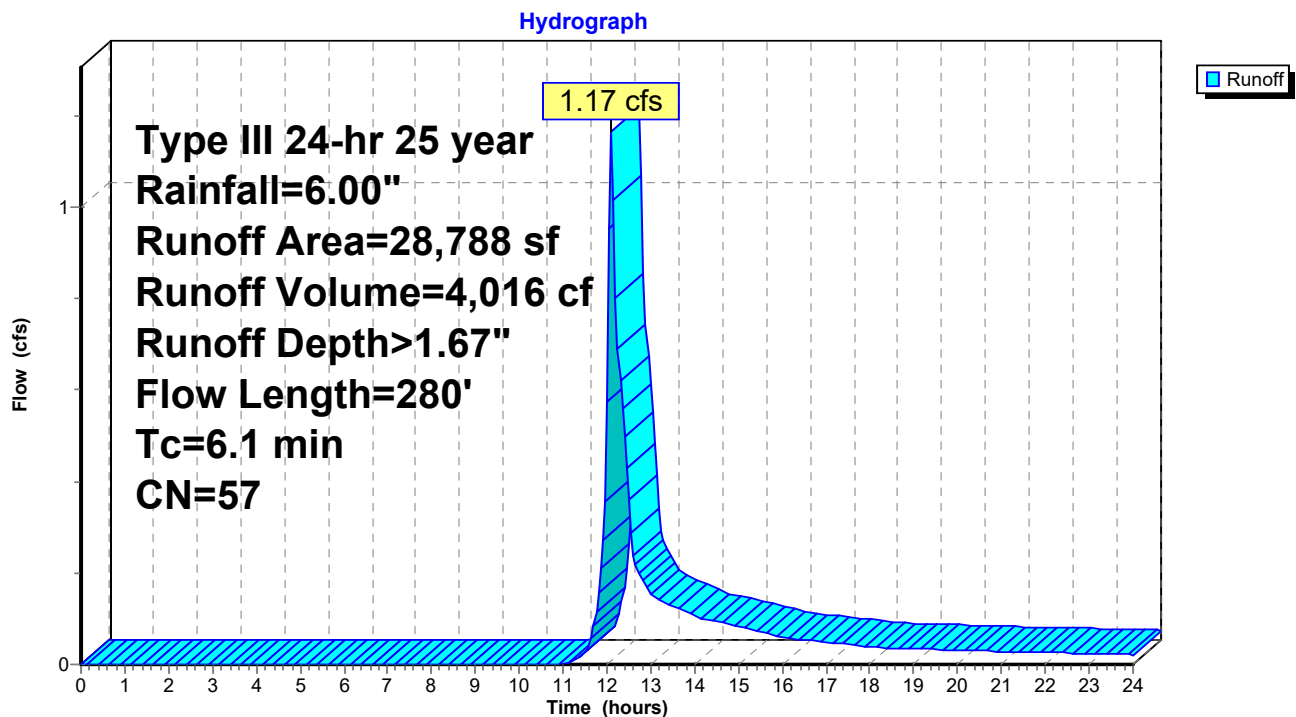
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 25 year Rainfall=6.00"

Area (sf)	CN	Description
21,119	55	Woods, Good, HSG B
7,579	61	>75% Grass cover, Good, HSG B
* 90	98	Paved roads w/curbs & sewers, HSG B
28,788	57	Weighted Average
28,698		Pervious Area
90		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.2	50	0.0800	0.26		Sheet Flow, Flow over grass Grass: Short n= 0.150 P2= 3.20"
2.9	230	0.0690	1.31		Shallow Concentrated Flow, Flow in woods Woodland Kv= 5.0 fps
6.1	280	Total			

Subcatchment P-1J: P1-J



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Type III 24-hr 25 year Rainfall=6.00"

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Summary for Subcatchment P-2A: P-2A

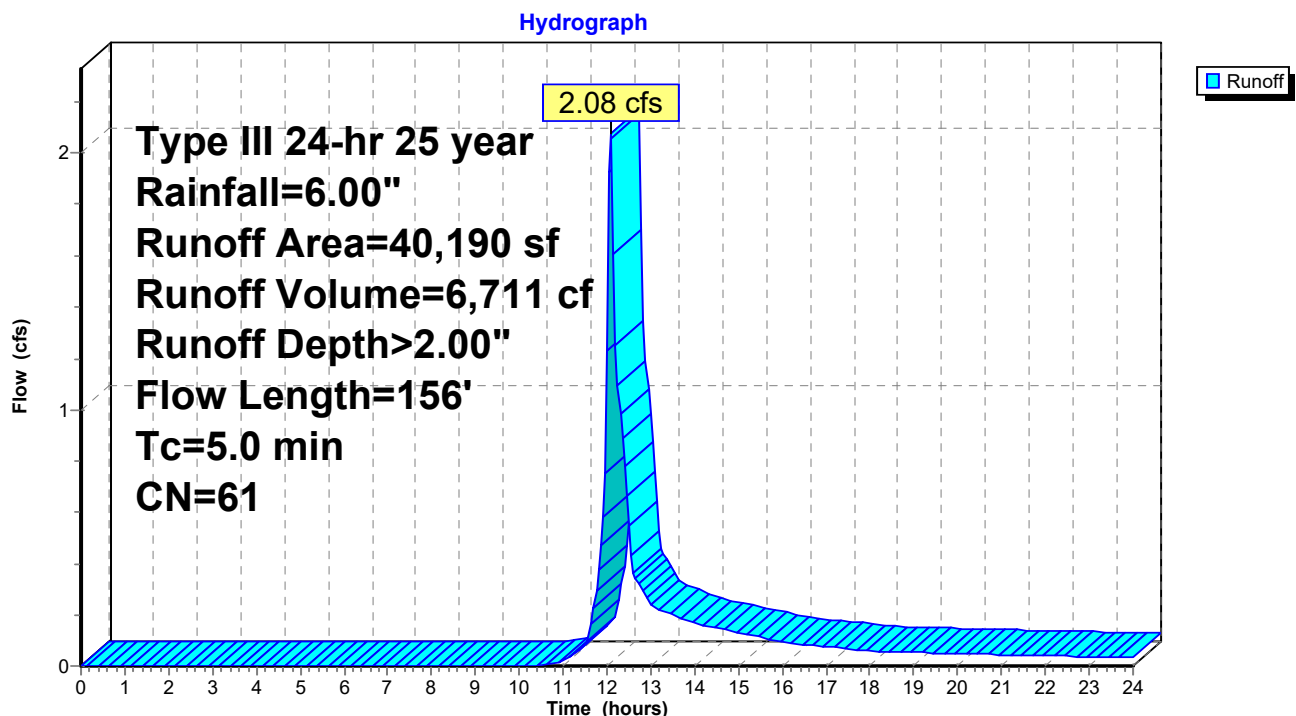
Runoff = 2.08 cfs @ 12.09 hrs, Volume= 6,711 cf, Depth> 2.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 25 year Rainfall=6.00"

Area (sf)	CN	Description
4,400	98	Roofs, HSG B
0	98	Paved parking, HSG B
0	98	Paved roads w/curbs & sewers, HSG B
10,645	61	>75% Grass cover, Good, HSG B
25,145	55	Woods, Good, HSG B
40,190	61	Weighted Average
35,790		Pervious Area
4,400		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3					Direct Entry, DIRECT
3.9	50	0.0500	0.21		Sheet Flow, SHEET GRASS Grass: Short n= 0.150 P2= 3.20"
0.8	106	0.1085	2.31		Shallow Concentrated Flow, GRASS SHALLOW Short Grass Pasture Kv= 7.0 fps
5.0	156	Total			

Subcatchment P-2A: P-2A

Summary for Subcatchment P-3A: P-3A

Runoff = 1.36 cfs @ 12.09 hrs, Volume= 4,495 cf, Depth> 1.76"

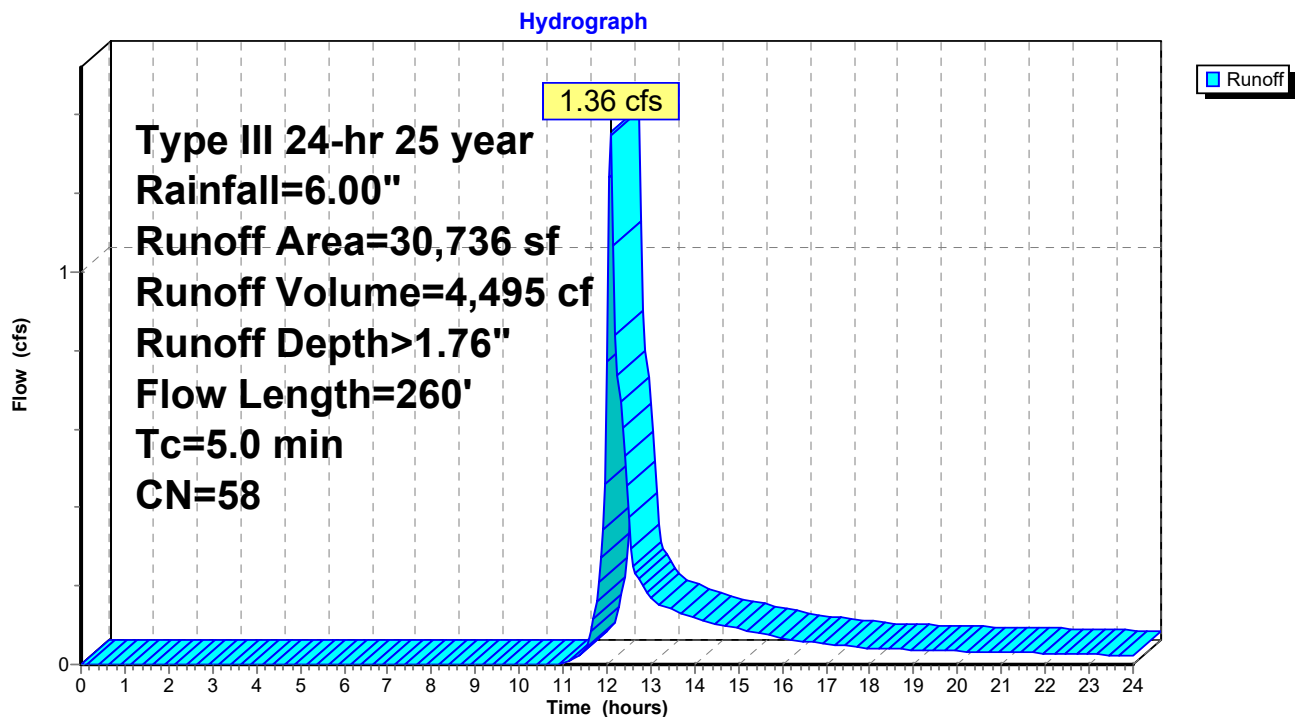
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 25 year Rainfall=6.00"

Area (sf)	CN	Description
0	98	Roofs, HSG B
0	98	Unconnected pavement, HSG B
0	98	Paved roads w/curbs & sewers, HSG B
13,964	61	>75% Grass cover, Good, HSG B
16,772	55	Woods, Good, HSG B
30,736	58	Weighted Average
30,736		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0					Direct Entry, DIRECT
2.0	50	0.2700	0.42		Sheet Flow, SHEET GRASS
					Grass: Short n= 0.150 P2= 3.20"
2.0	210	0.0595	1.71		Shallow Concentrated Flow, SHALLOW GRASS
					Short Grass Pasture Kv= 7.0 fps
5.0	260	Total			

Subcatchment P-3A: P-3A



Summary for Subcatchment P-3B: P-3B

Runoff = 6.16 cfs @ 12.08 hrs, Volume= 19,045 cf, Depth> 3.18"

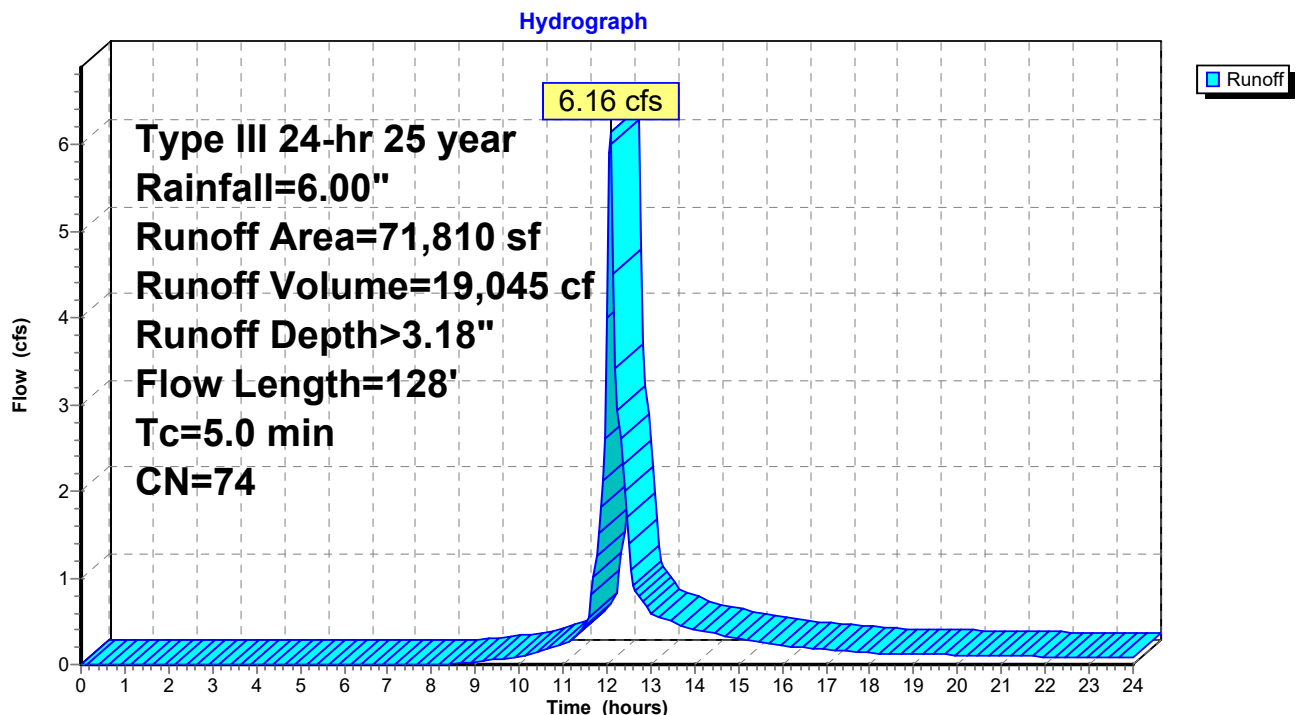
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 25 year Rainfall=6.00"

Area (sf)	CN	Description
15,400	98	Roofs, HSG B
0	98	Paved parking, HSG B
0	98	Paved roads w/curbs & sewers, HSG B
47,365	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
9,045	98	Water Surface, HSG B
71,810	74	Weighted Average
47,365		Pervious Area
24,445		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8					Direct Entry, DIRECT
2.7	50	0.1300	0.31		Sheet Flow, SHEET GRASS
					Grass: Short n= 0.150 P2= 3.20"
0.5	78	0.1218	2.44		Shallow Concentrated Flow, SHALLOW GRASS
					Short Grass Pasture Kv= 7.0 fps
5.0	128	Total			

Subcatchment P-3B: P-3B



Summary for Subcatchment P-3C: P-3C

Runoff = 4.11 cfs @ 12.08 hrs, Volume= 12,766 cf, Depth> 3.68"

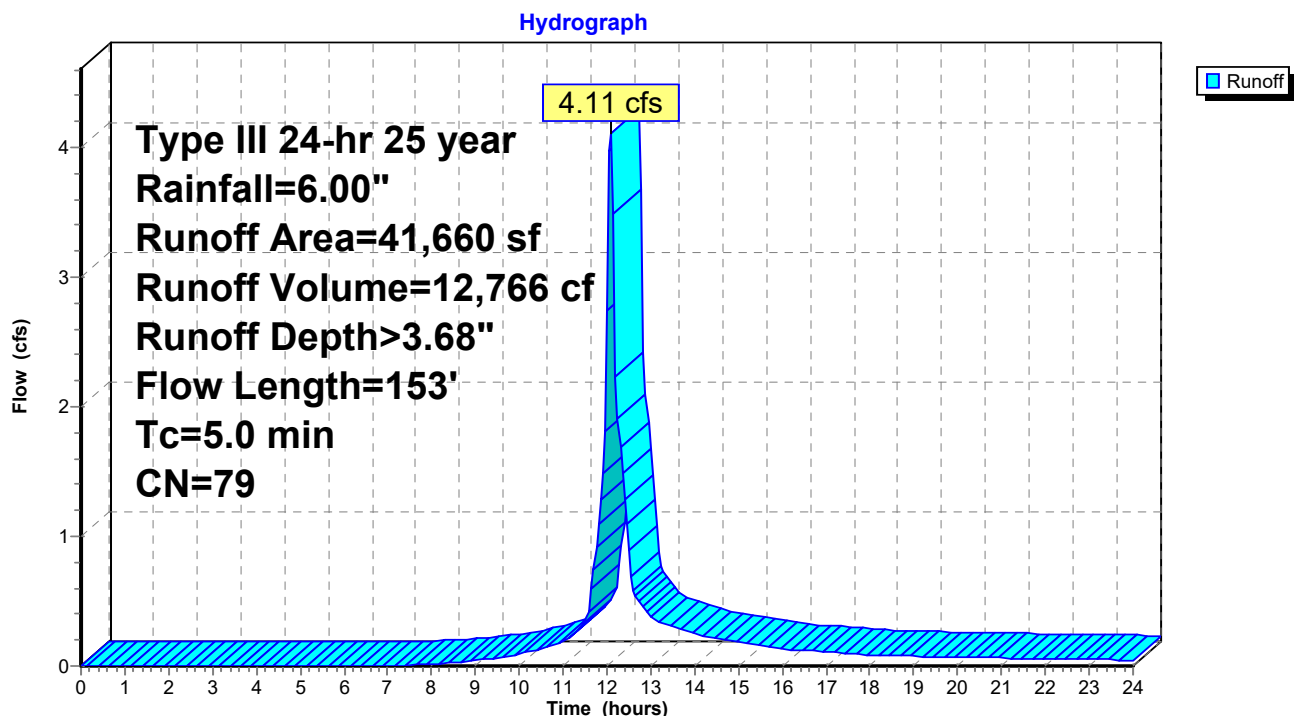
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 25 year Rainfall=6.00"

Area (sf)	CN	Description
3,520	98	Roofs, HSG B
0	98	Paved parking, HSG B
16,527	98	Paved roads w/curbs & sewers, HSG B
21,613	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
41,660	79	Weighted Average
21,613		Pervious Area
20,047		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3					Direct Entry, DIRECT
0.9	50	0.0096	0.89		Sheet Flow, SHEET PAVEMENT
					Smooth surfaces n= 0.011 P2= 3.20"
0.8	103	0.0116	2.19		Shallow Concentrated Flow, SHALLOW PAVEMENT
					Paved Kv= 20.3 fps
5.0	153	Total			

Subcatchment P-3C: P-3C



Summary for Subcatchment P-3D: P-3D

Runoff = 2.40 cfs @ 12.07 hrs, Volume= 7,464 cf, Depth> 3.98"

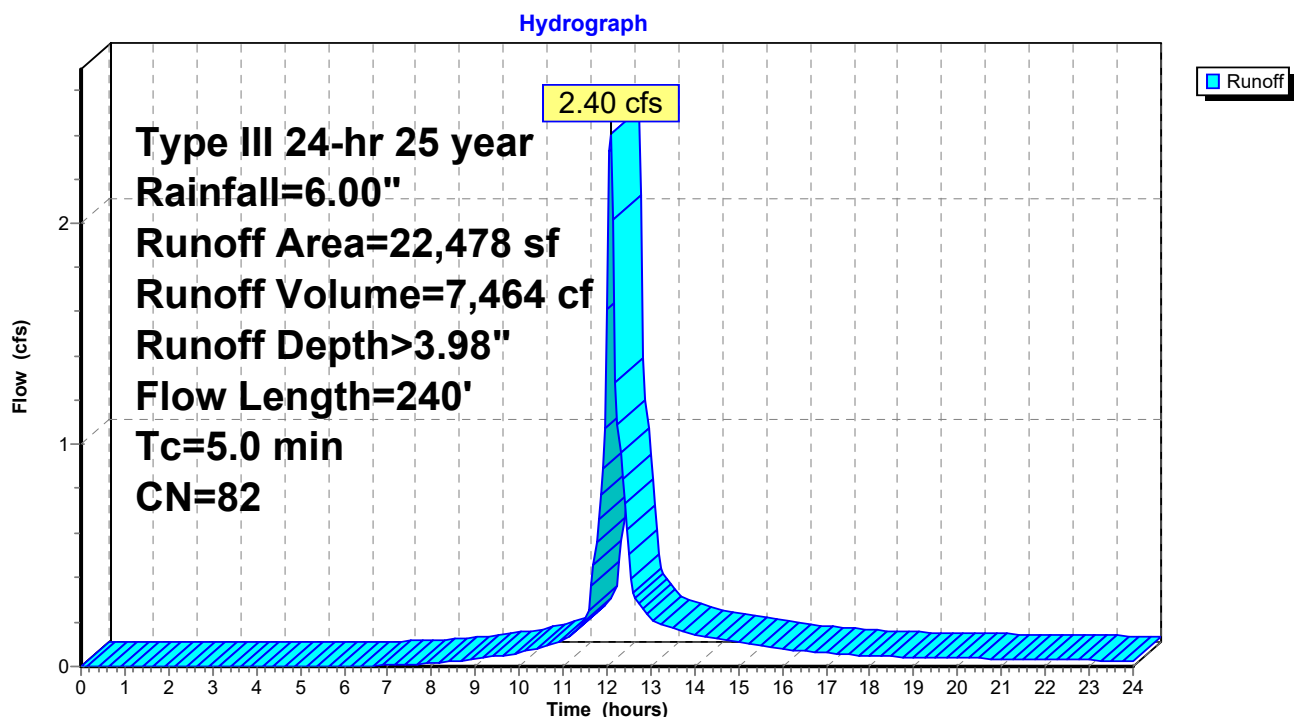
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 25 year Rainfall=6.00"

Area (sf)	CN	Description
6,160	98	Roofs, HSG B
6,458	98	Paved roads w/curbs & sewers, HSG B
9,860	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
22,478	82	Weighted Average
9,860		Pervious Area
12,618		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1					Direct Entry, DIRECT
1.3	50	0.0040	0.63		Sheet Flow, SHEET PAVEMENT
					Smooth surfaces n= 0.011 P2= 3.20"
1.6	190	0.0095	1.98		Shallow Concentrated Flow, SHALLOW PAVEMENT
					Paved Kv= 20.3 fps
5.0	240	Total			

Subcatchment P-3D: P-3D



Summary for Subcatchment P-3E: P-3F

Runoff = 0.53 cfs @ 12.07 hrs, Volume= 1,664 cf, Depth> 4.41"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

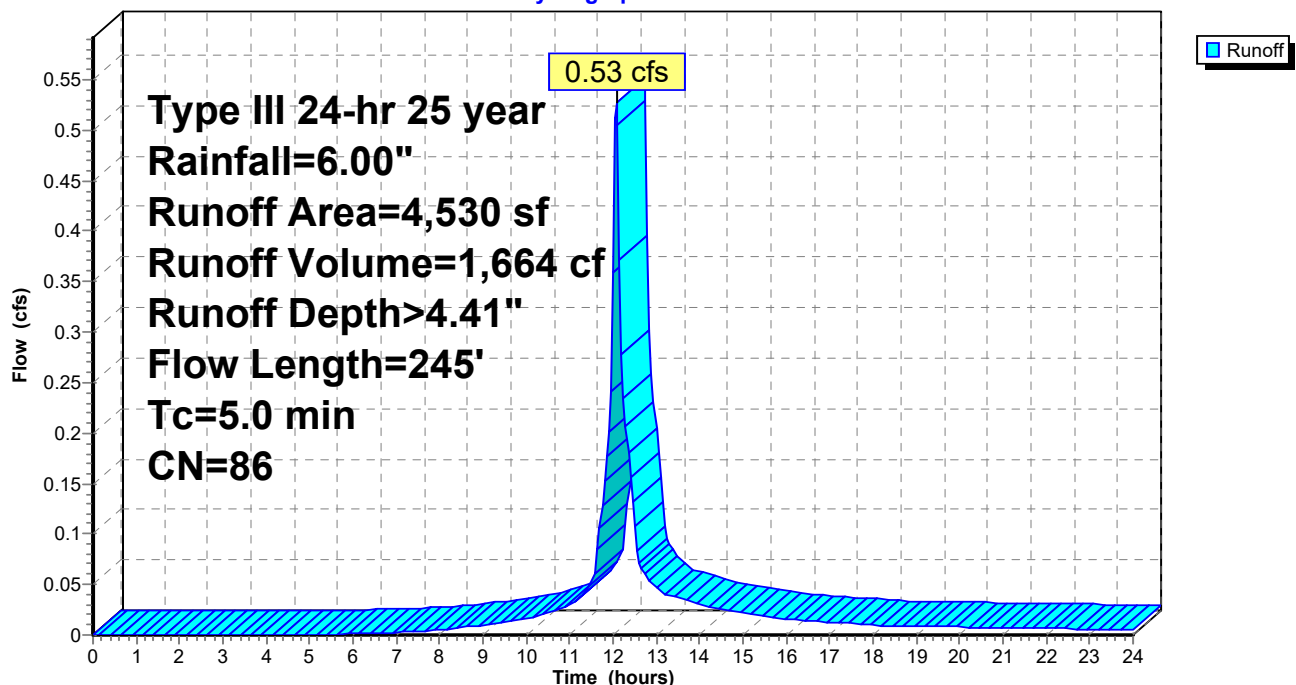
Type III 24-hr 25 year Rainfall=6.00"

Area (sf)	CN	Description
440	98	Roofs, HSG B
0	98	Paved parking, HSG B
2,664	98	Paved roads w/curbs & sewers, HSG B
1,426	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
4,530	86	Weighted Average
1,426		Pervious Area
3,104		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0					Direct Entry, DIRECT
1.3	50	0.0040	0.63		Sheet Flow, SHEET PAVEMENT
					Smooth surfaces n= 0.011 P2= 3.20"
1.7	195	0.0092	1.95		Shallow Concentrated Flow, SHALLOW PAVEMENT
					Paved Kv= 20.3 fps
5.0	245	Total			

Subcatchment P-3E: P-3F

Hydrograph



Summary for Pond 3P: INFILTRATOR

Routing by Dyn-Stor-Ind method

Peak Elev= 0.00' @ 0.00 hrs Surf.Area= 50 sf Storage= 0 cf

Plug-Flow detention time= (not calculated)

Center-of-Mass det. time= (not calculated)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	52 cf	5.00'W x 10.00'L x 3.50'H Prismatoid 175 cf Overall - 46 cf Embedded = 129 cf x 40.0% Voids
#2	0.00'	46 cf	44.6"W x 30.0"H x 7.12'L StormTech SC-740 Inside #1
		98 cf	Total Available Storage

Summary for Pond CB1: CB1

Inflow Area = 3,632 sf, 56.17% Impervious, Inflow Depth > 3.99" for 25 year event
 Inflow = 0.42 cfs @ 12.03 hrs, Volume= 1,207 cf
 Outflow = 0.42 cfs @ 12.03 hrs, Volume= 1,207 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.42 cfs @ 12.03 hrs, Volume= 1,207 cf

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

Peak Elev= 51.86' @ 12.56 hrs

Flood Elev= 53.86'

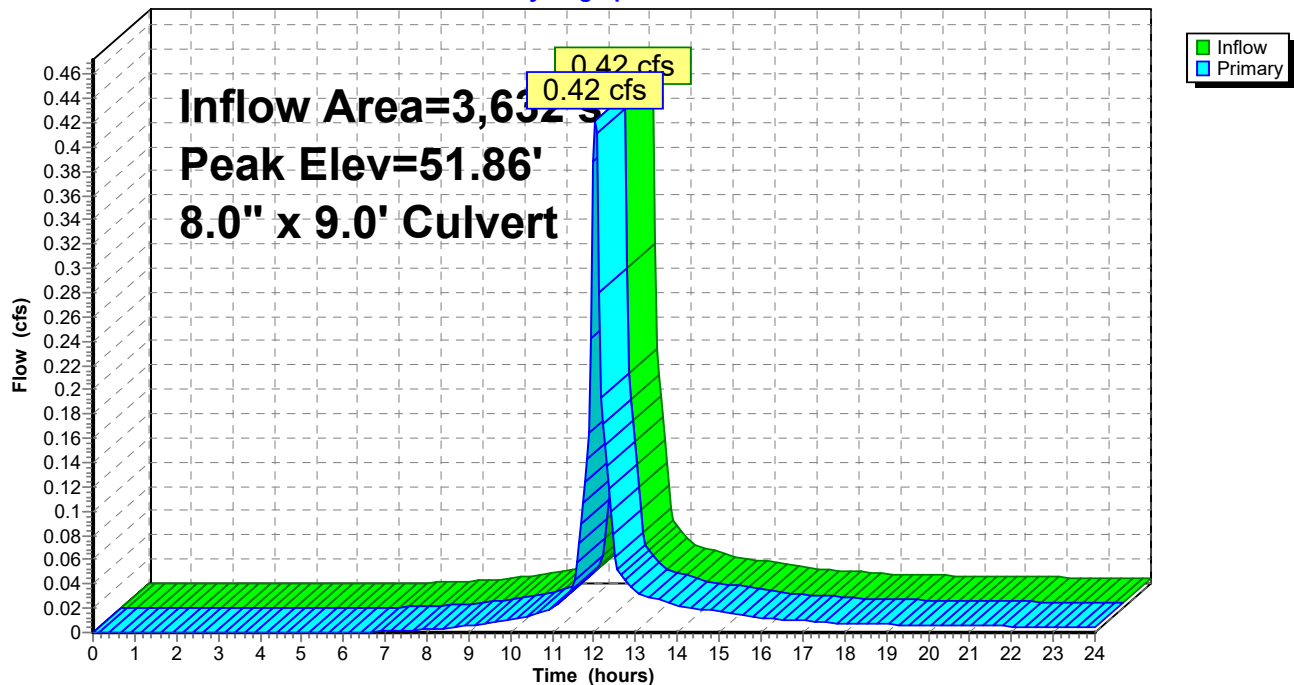
Device	Routing	Invert	Outlet Devices
#1	Primary	50.60'	8.0" x 9.0' long Culvert RCP, groove end projecting, Ke= 0.200 Outlet Invert= 50.50' S= 0.0111 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.00 cfs @ 12.03 hrs HW=51.14' TW=51.24' (Dynamic Tailwater)

↑1=Culvert (Controls 0.00 cfs)

Pond CB1: CB1

Hydrograph



Summary for Pond CB2: CB2

Inflow Area = 3,713 sf, 81.12% Impervious, Inflow Depth > 4.96" for 25 year event
 Inflow = 0.51 cfs @ 12.02 hrs, Volume= 1,534 cf
 Outflow = 0.51 cfs @ 12.02 hrs, Volume= 1,534 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.51 cfs @ 12.02 hrs, Volume= 1,534 cf

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

Peak Elev= 51.86' @ 12.56 hrs

Flood Elev= 53.86'

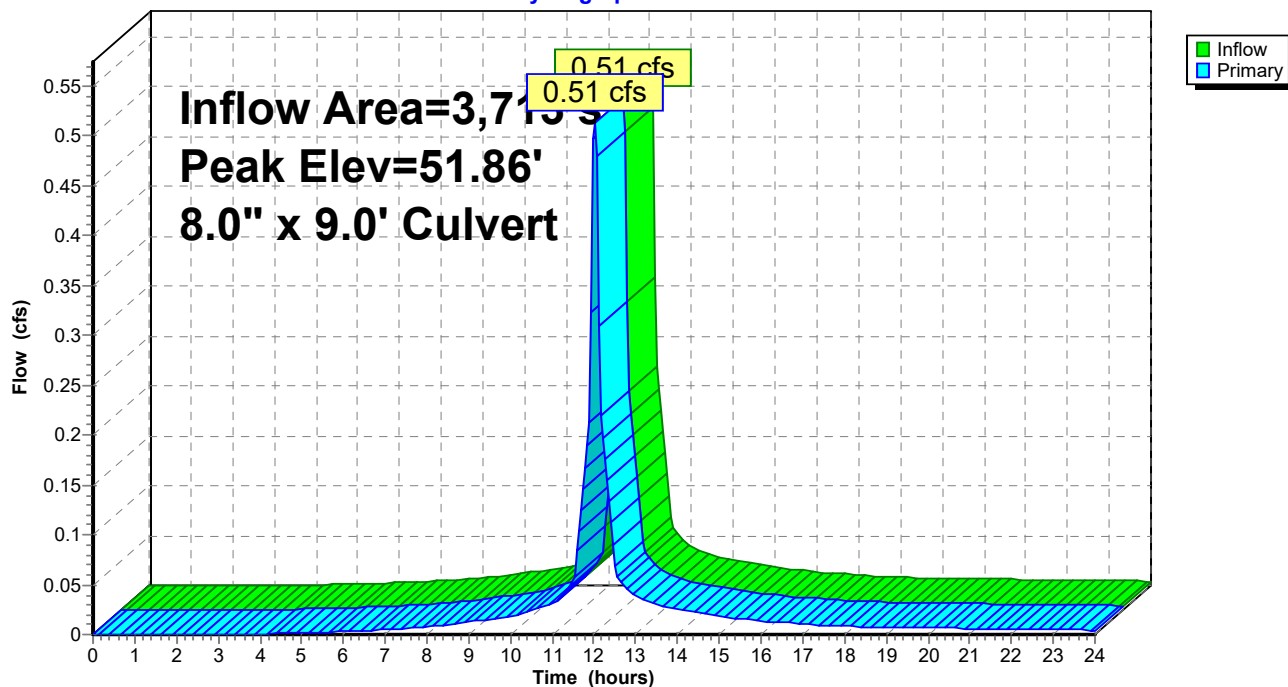
Device	Routing	Invert	Outlet Devices
#1	Primary	50.60'	8.0" x 9.0' long Culvert RCP, groove end projecting, Ke= 0.200 Outlet Invert= 50.50' S= 0.0111 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.00 cfs @ 12.02 hrs HW=51.14' TW=51.19' (Dynamic Tailwater)

↑1=Culvert (Controls 0.00 cfs)

Pond CB2: CB2

Hydrograph



Summary for Pond CB3: CB3

Inflow Area = 12,786 sf, 39.18% Impervious, Inflow Depth > 3.28" for 25 year event
 Inflow = 1.13 cfs @ 12.08 hrs, Volume= 3,495 cf
 Outflow = 1.13 cfs @ 12.08 hrs, Volume= 3,495 cf, Atten= 0%, Lag= 0.0 min
 Primary = 1.13 cfs @ 12.08 hrs, Volume= 3,495 cf

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

Peak Elev= 53.96' @ 12.15 hrs

Flood Elev= 54.77'

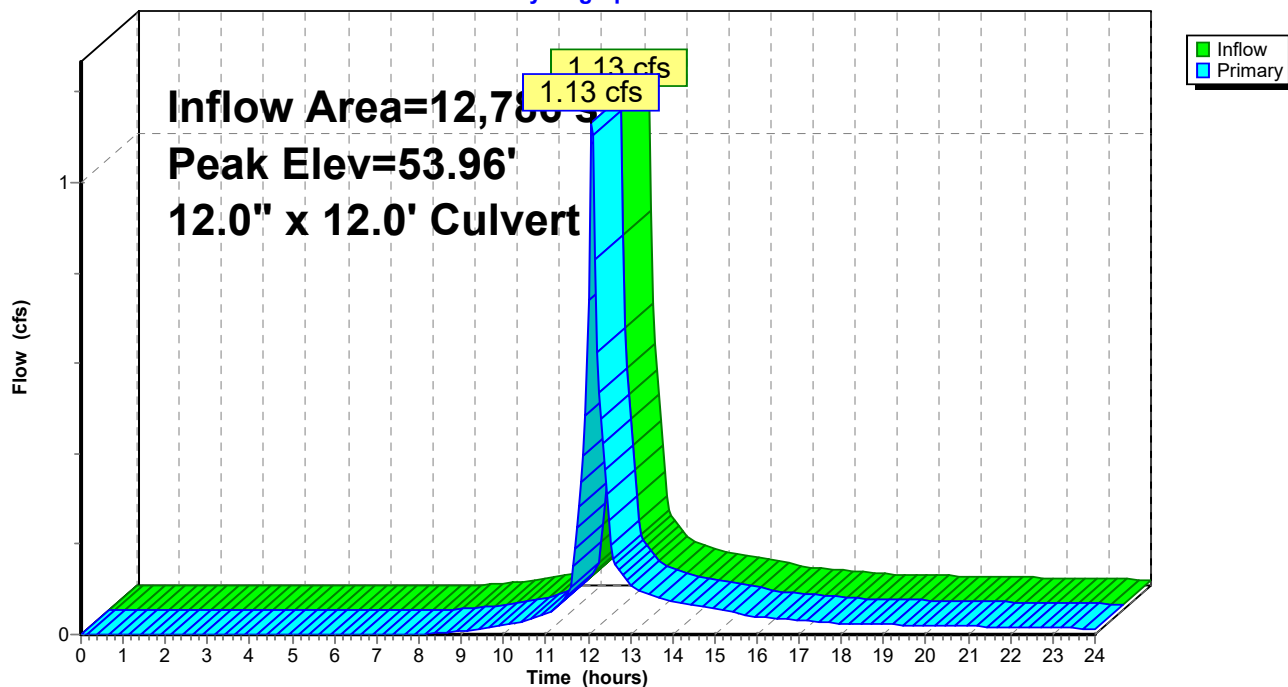
Device	Routing	Invert	Outlet Devices
#1	Primary	52.34'	12.0" x 12.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 52.28' S= 0.0050 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean

Primary OutFlow Max=0.00 cfs @ 12.08 hrs HW=53.59' TW=53.82' (Dynamic Tailwater)

↑1=Culvert (Controls 0.00 cfs)

Pond CB3: CB3

Hydrograph



Summary for Pond CB4: CB4

Inflow Area = 20,654 sf, 69.31% Impervious, Inflow Depth > 4.51" for 25 year event
 Inflow = 2.45 cfs @ 12.07 hrs, Volume= 7,770 cf
 Outflow = 2.45 cfs @ 12.07 hrs, Volume= 7,770 cf, Atten= 0%, Lag= 0.0 min
 Primary = 2.45 cfs @ 12.07 hrs, Volume= 7,770 cf

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

Peak Elev= 54.13' @ 12.13 hrs

Flood Elev= 54.77'

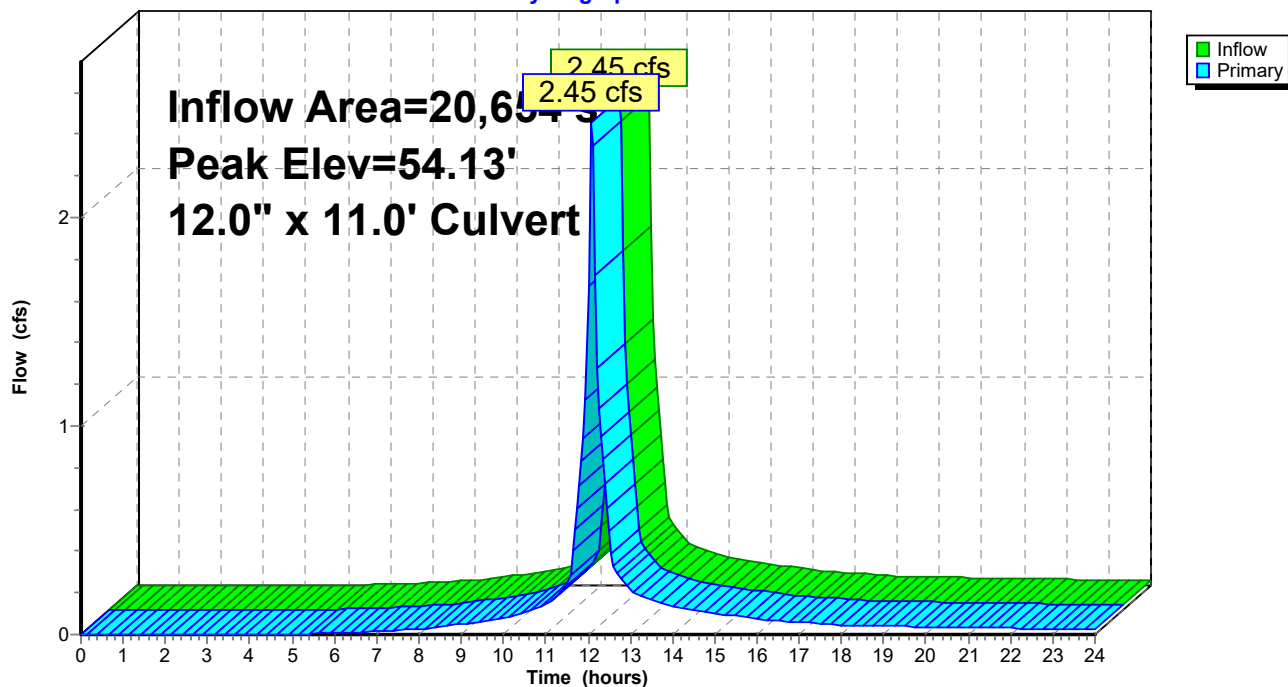
Device	Routing	Invert	Outlet Devices
#1	Primary	52.34'	12.0" x 11.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 52.28' S= 0.0055 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean

Primary OutFlow Max=0.76 cfs @ 12.07 hrs HW=53.84' TW=53.80' (Dynamic Tailwater)

↑ **1=Culvert** (Inlet Controls 0.76 cfs @ 0.97 fps)

Pond CB4: CB4

Hydrograph



Summary for Pond CB5: CB5

Inflow Area = 19,745 sf, 42.54% Impervious, Inflow Depth > 3.48" for 25 year event
 Inflow = 1.85 cfs @ 12.08 hrs, Volume= 5,721 cf
 Outflow = 1.85 cfs @ 12.08 hrs, Volume= 5,721 cf, Atten= 0%, Lag= 0.0 min
 Primary = 1.85 cfs @ 12.08 hrs, Volume= 5,721 cf

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

Peak Elev= 61.81' @ 12.08 hrs

Flood Elev= 65.00'

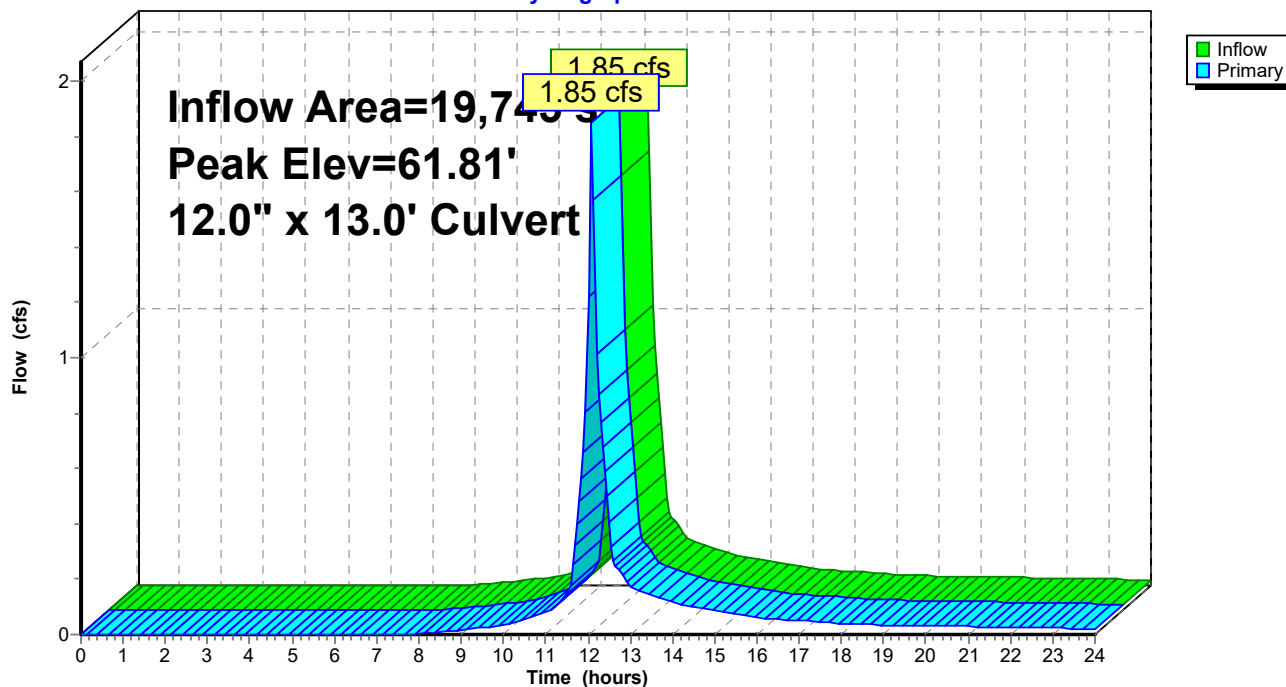
Device	Routing	Invert	Outlet Devices
#1	Primary	61.00'	12.0" x 13.0' long Culvert RCP, groove end projecting, Ke= 0.200 Outlet Invert= 60.87' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=1.79 cfs @ 12.08 hrs HW=61.79' TW=59.16' (Dynamic Tailwater)

↑1=Culvert (Barrel Controls 1.79 cfs @ 3.68 fps)

Pond CB5: CB5

Hydrograph



Summary for Pond CB6: CB6

Inflow Area = 5,773 sf, 64.25% Impervious, Inflow Depth > 4.30" for 25 year event
 Inflow = 0.66 cfs @ 12.07 hrs, Volume= 2,069 cf
 Outflow = 0.66 cfs @ 12.07 hrs, Volume= 2,069 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.66 cfs @ 12.07 hrs, Volume= 2,069 cf

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

Peak Elev= 61.46' @ 12.07 hrs

Flood Elev= 65.00'

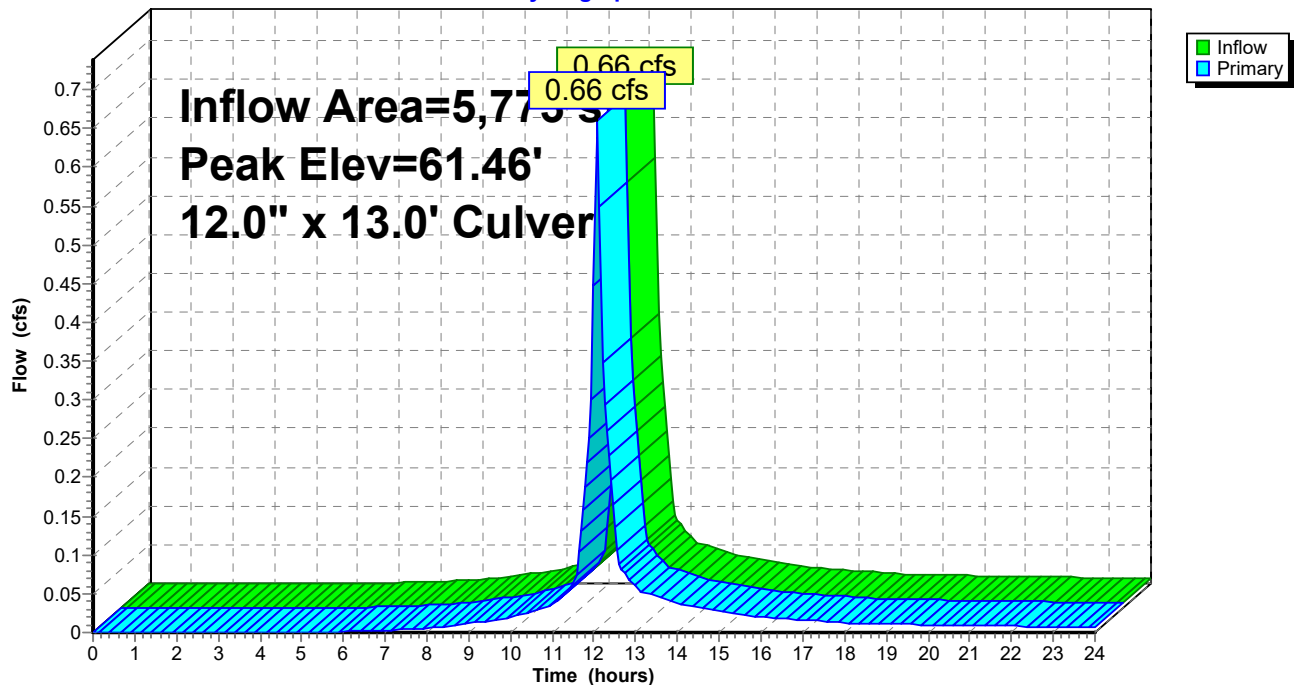
Device	Routing	Invert	Outlet Devices
#1	Primary	61.00'	12.0" x 13.0' long Culvert CPP, square edge headwall, Ke= 0.500 Outlet Invert= 60.87' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.63 cfs @ 12.07 hrs HW=61.45' TW=59.16' (Dynamic Tailwater)

1=Culvert (Barrel Controls 0.63 cfs @ 2.73 fps)

Pond CB6: CB6

Hydrograph



Summary for Pond CB7: CB7

Inflow Area = 4,530 sf, 68.52% Impervious, Inflow Depth > 4.41" for 25 year event
 Inflow = 0.53 cfs @ 12.07 hrs, Volume= 1,664 cf
 Outflow = 0.53 cfs @ 12.07 hrs, Volume= 1,664 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.53 cfs @ 12.07 hrs, Volume= 1,664 cf

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

Peak Elev= 67.17' @ 12.55 hrs

Flood Elev= 69.00'

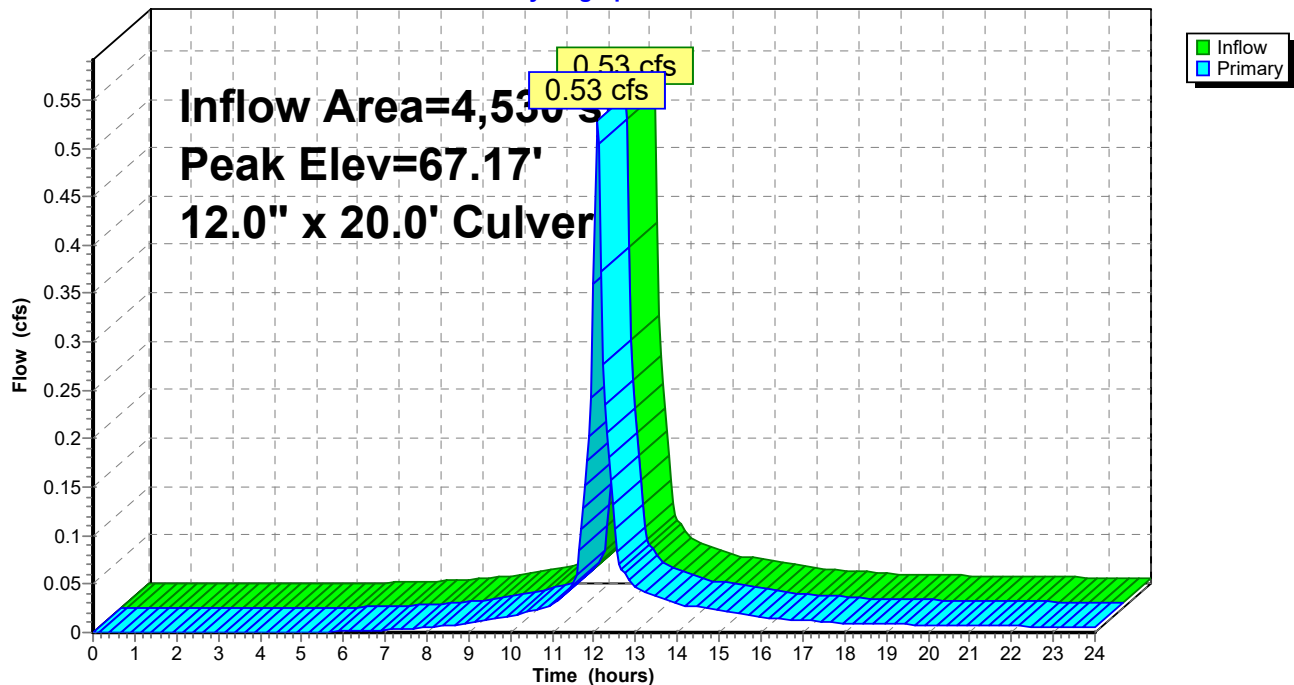
Device	Routing	Invert	Outlet Devices
#1	Primary	65.91'	12.0" x 20.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 65.81' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.00 cfs @ 12.07 hrs HW=66.66' TW=66.76' (Dynamic Tailwater)

↑1=Culvert (Controls 0.00 cfs)

Pond CB7: CB7

Hydrograph



Summary for Pond CB8: CB8

Inflow Area = 22,478 sf, 56.13% Impervious, Inflow Depth > 3.98" for 25 year event
 Inflow = 2.40 cfs @ 12.07 hrs, Volume= 7,464 cf
 Outflow = 2.40 cfs @ 12.07 hrs, Volume= 7,464 cf, Atten= 0%, Lag= 0.0 min
 Primary = 2.40 cfs @ 12.07 hrs, Volume= 7,464 cf

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

Peak Elev= 67.18' @ 12.54 hrs

Flood Elev= 69.00'

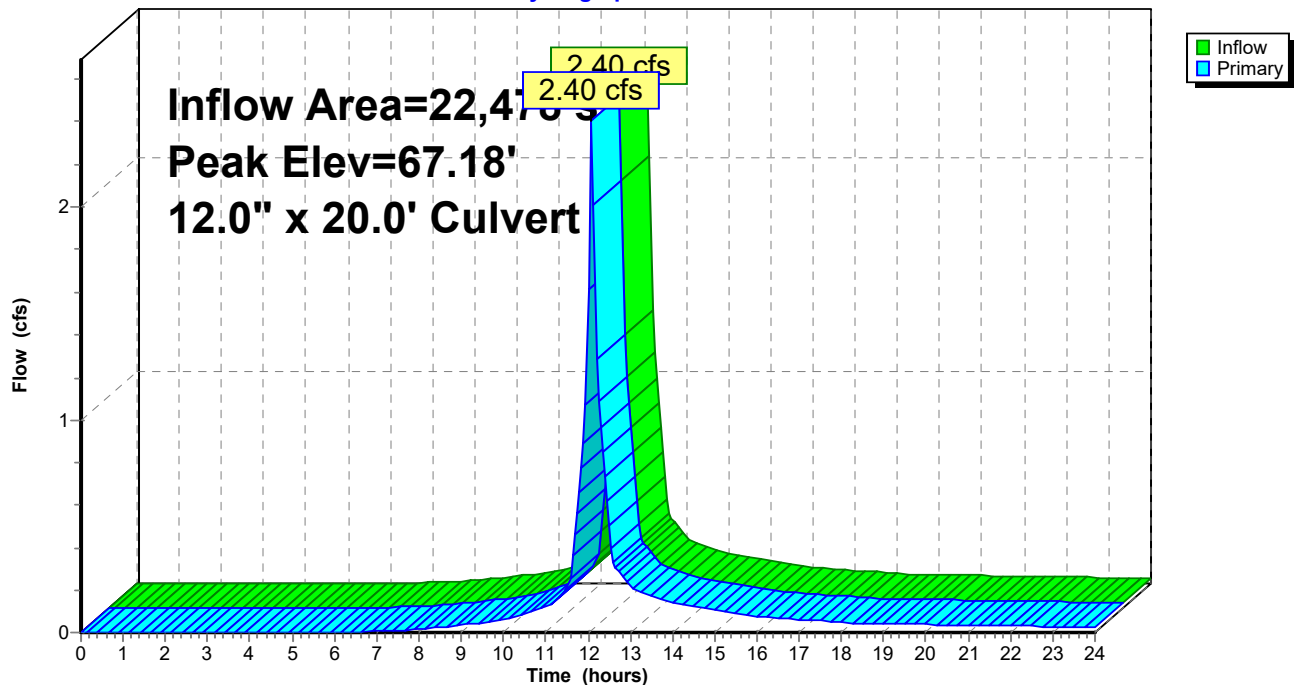
Device	Routing	Invert	Outlet Devices
#1	Primary	65.91'	12.0" x 20.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 65.81' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=1.97 cfs @ 12.07 hrs HW=67.04' TW=66.77' (Dynamic Tailwater)

↑ **1=Culvert** (Inlet Controls 1.97 cfs @ 2.50 fps)

Pond CB8: CB8

Hydrograph



Summary for Pond CB9: CB9

Inflow Area = 41,660 sf, 48.12% Impervious, Inflow Depth > 3.68" for 25 year event
 Inflow = 4.11 cfs @ 12.08 hrs, Volume= 12,766 cf
 Outflow = 4.11 cfs @ 12.08 hrs, Volume= 12,766 cf, Atten= 0%, Lag= 0.0 min
 Primary = 4.11 cfs @ 12.08 hrs, Volume= 12,766 cf

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

Peak Elev= 68.19' @ 12.11 hrs

Flood Elev= 69.40'

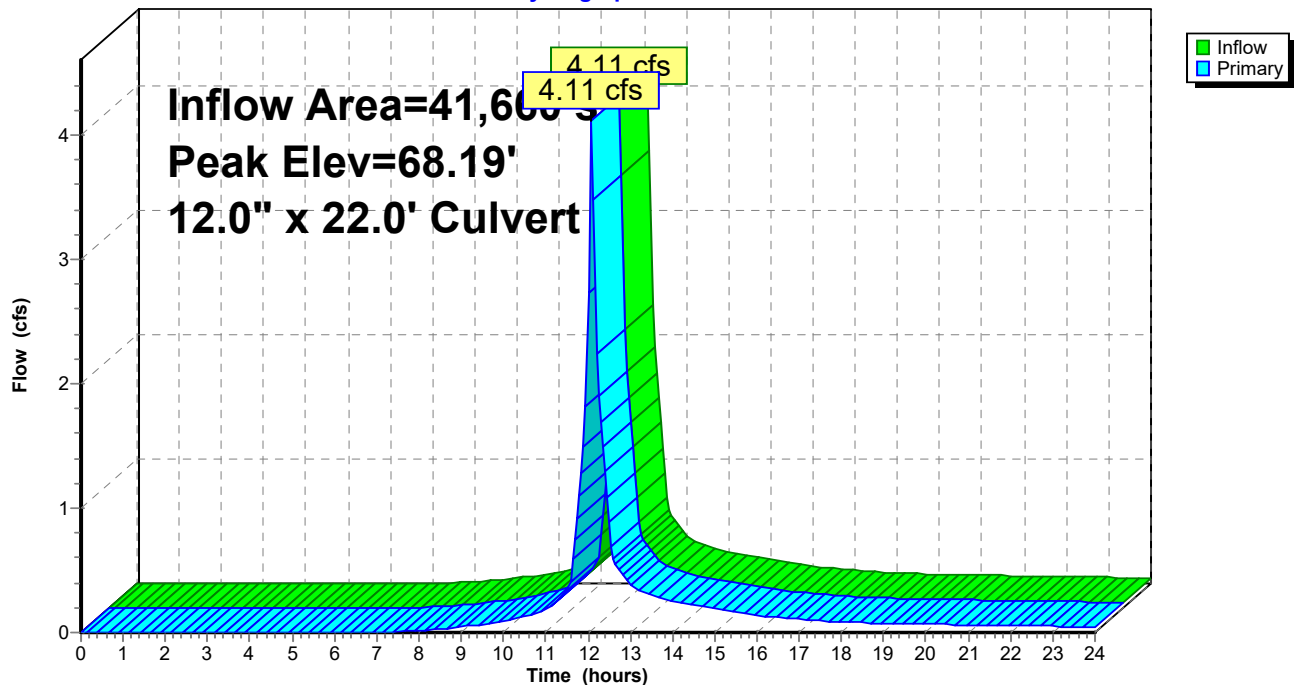
Device	Routing	Invert	Outlet Devices
#1	Primary	65.11'	12.0" x 22.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 65.00' S= 0.0050 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=2.92 cfs @ 12.08 hrs HW=67.78' TW=67.19' (Dynamic Tailwater)

↑ **1=Culvert** (Inlet Controls 2.92 cfs @ 3.72 fps)

Pond CB9: CB9

Hydrograph



Summary for Pond DMH 10: DMH9

Inflow Area = 68,668 sf, 52.09% Impervious, Inflow Depth > 3.38" for 25 year event
 Inflow = 2.25 cfs @ 12.39 hrs, Volume= 19,317 cf
 Outflow = 2.25 cfs @ 12.39 hrs, Volume= 19,317 cf, Atten= 0%, Lag= 0.0 min
 Primary = 2.25 cfs @ 12.39 hrs, Volume= 19,317 cf

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

Peak Elev= 61.75' @ 12.39 hrs

Flood Elev= 69.78'

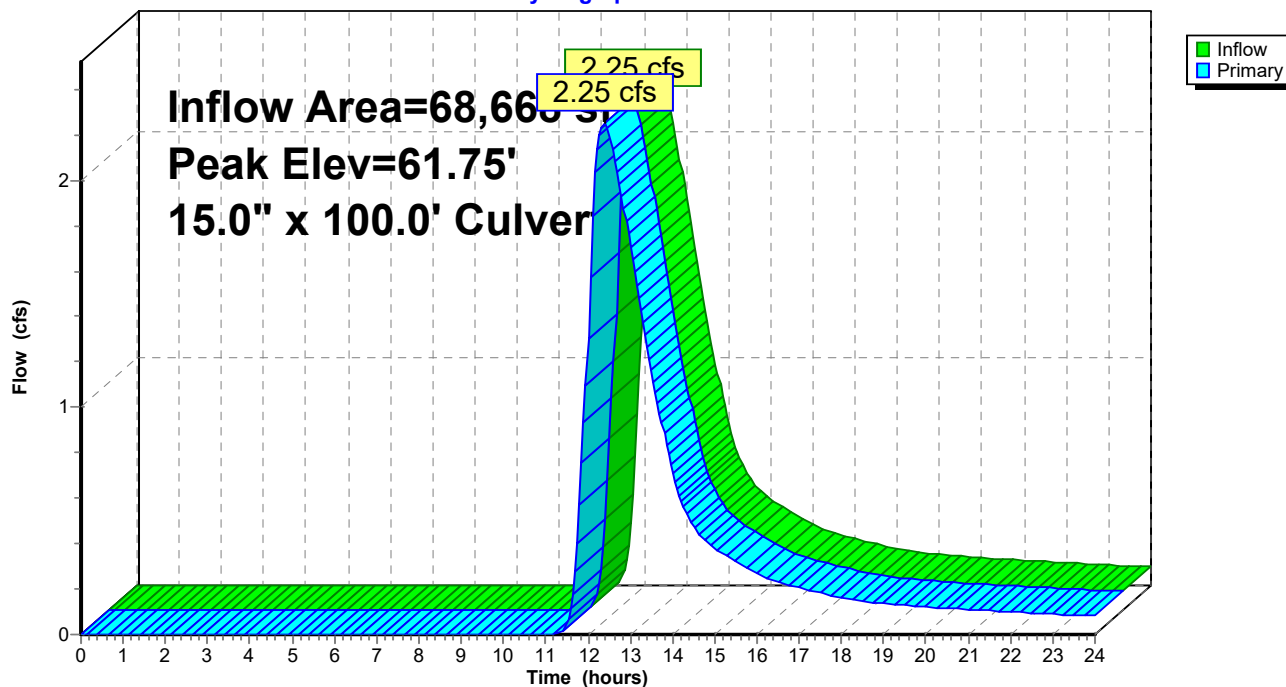
Device	Routing	Invert	Outlet Devices
#1	Primary	61.00'	15.0" x 100.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 56.00' S= 0.0500 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=2.25 cfs @ 12.39 hrs HW=61.75' TW=56.06' (Dynamic Tailwater)

↑1=Culvert (Inlet Controls 2.25 cfs @ 2.94 fps)

Pond DMH 10: DMH9

Hydrograph



Summary for Pond DMH 11: DMH 10

Inflow Area = 68,668 sf, 52.09% Impervious, Inflow Depth > 3.38" for 25 year event
 Inflow = 2.25 cfs @ 12.39 hrs, Volume= 19,317 cf
 Outflow = 2.25 cfs @ 12.39 hrs, Volume= 19,317 cf, Atten= 0%, Lag= 0.0 min
 Primary = 2.25 cfs @ 12.39 hrs, Volume= 19,317 cf

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

Peak Elev= 56.06' @ 12.39 hrs

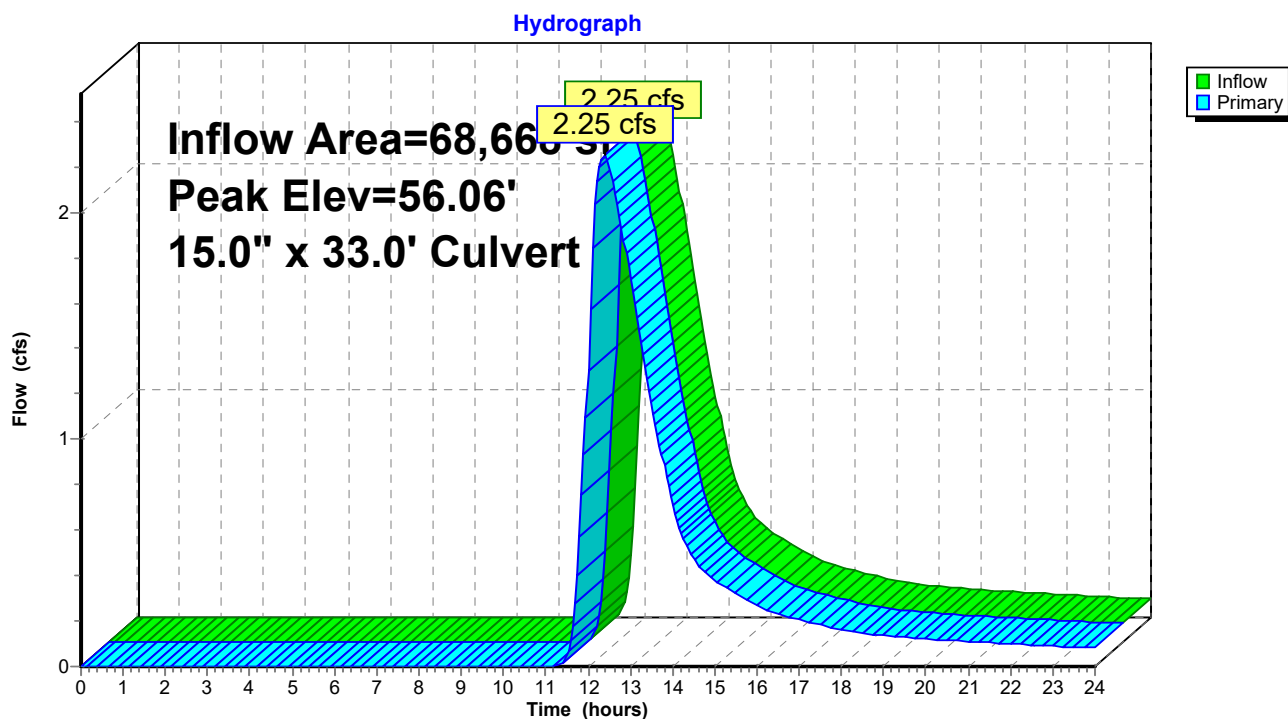
Flood Elev= 58.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	55.17'	15.0" x 33.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 55.00' S= 0.0052 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=2.25 cfs @ 12.39 hrs HW=56.06' TW=52.71' (Dynamic Tailwater)

↑1=Culvert (Barrel Controls 2.25 cfs @ 3.37 fps)

Pond DMH 11: DMH 10



Summary for Pond DMH 6: DMH 6

Inflow Area = 27,008 sf, 58.21% Impervious, Inflow Depth > 4.06" for 25 year event
 Inflow = 2.93 cfs @ 12.07 hrs, Volume= 9,127 cf
 Outflow = 2.93 cfs @ 12.07 hrs, Volume= 9,127 cf, Atten= 0%, Lag= 0.0 min
 Primary = 2.93 cfs @ 12.07 hrs, Volume= 9,127 cf

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

Peak Elev= 67.16' @ 12.47 hrs

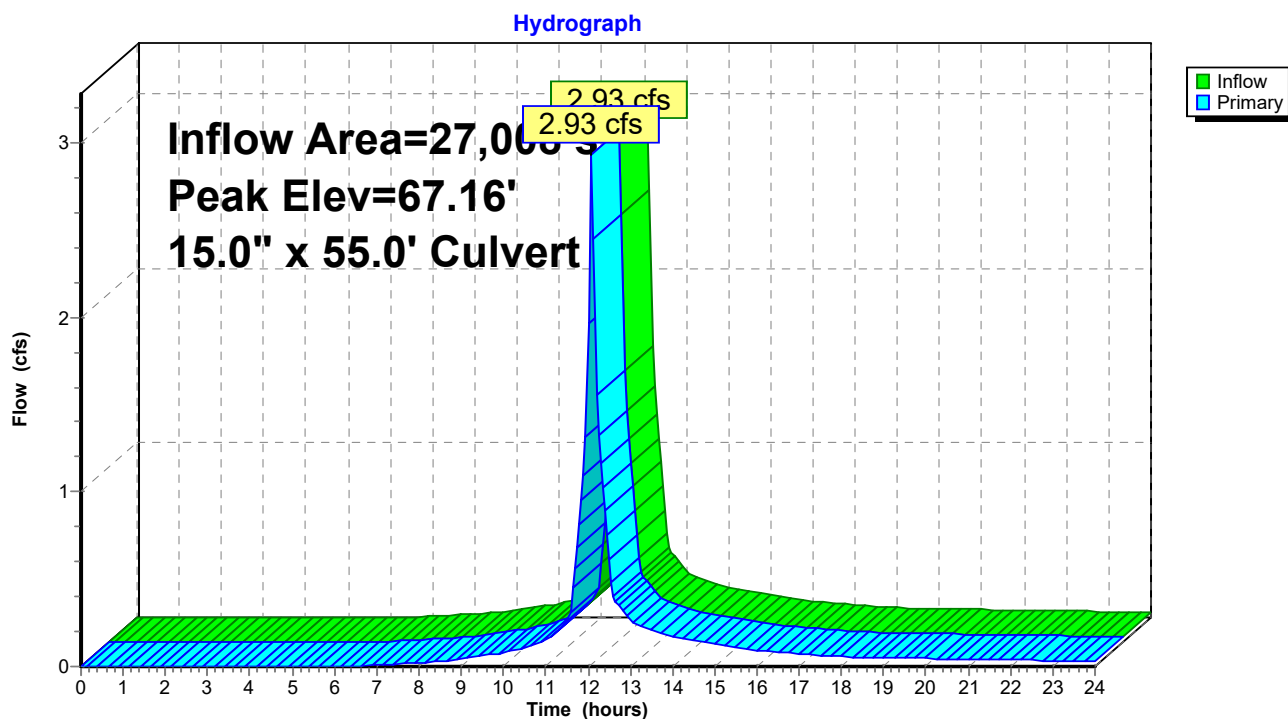
Flood Elev= 71.33'

Device	Routing	Invert	Outlet Devices
#1	Primary	65.14'	15.0" x 55.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 65.00' S= 0.0025 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=1.56 cfs @ 12.07 hrs HW=66.32' TW=66.21' (Dynamic Tailwater)

↑ **1=Culvert** (Outlet Controls 1.56 cfs @ 1.69 fps)

Pond DMH 6: DMH 6



Summary for Pond DMH2: DMH2

Inflow Area = 33,440 sf, 57.79% Impervious, Inflow Depth > 4.04" for 25 year event
 Inflow = 3.59 cfs @ 12.07 hrs, Volume= 11,265 cf
 Outflow = 3.59 cfs @ 12.07 hrs, Volume= 11,265 cf, Atten= 0%, Lag= 0.0 min
 Primary = 3.59 cfs @ 12.07 hrs, Volume= 11,265 cf

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

Peak Elev= 53.91' @ 12.11 hrs

Flood Elev= 55.00'

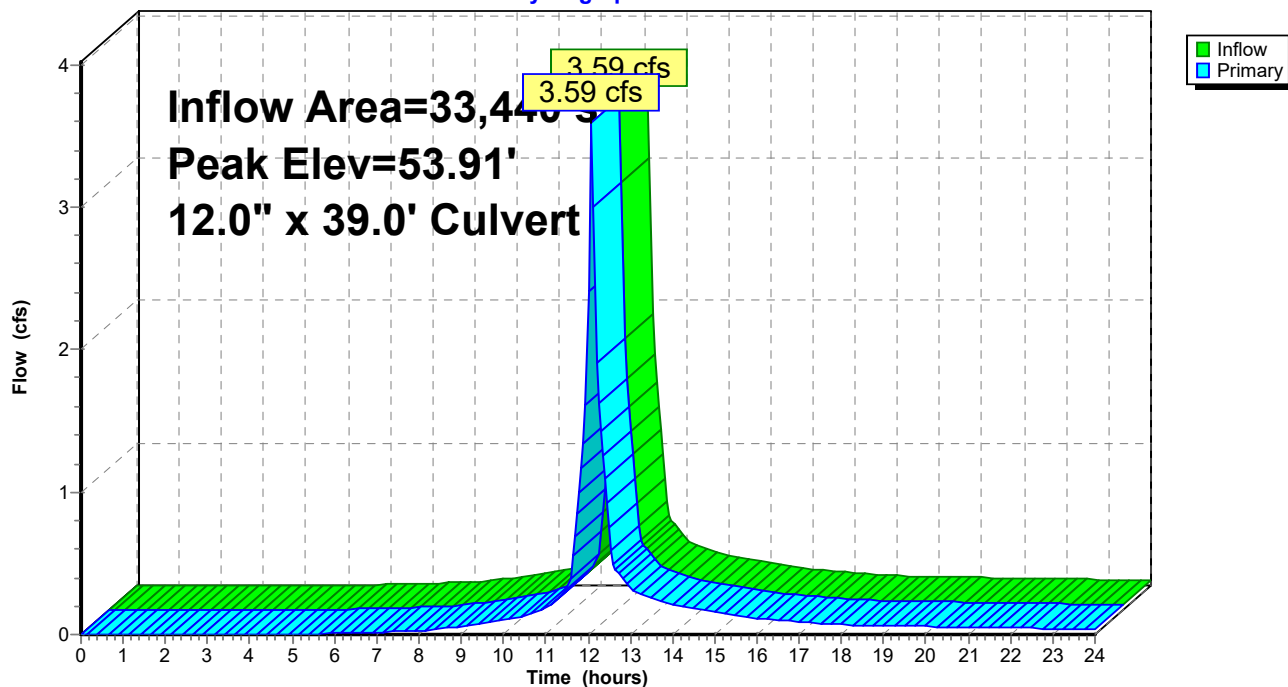
Device	Routing	Invert	Outlet Devices
#1	Primary	52.18'	12.0" x 39.0' long Culvert RCP, square edge headwall, Ke= 0.500 Outlet Invert= 52.00' S= 0.0046 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean

Primary OutFlow Max=2.92 cfs @ 12.07 hrs HW=53.81' TW=53.21' (Dynamic Tailwater)

↑ **1=Culvert** (Inlet Controls 2.92 cfs @ 3.72 fps)

Pond DMH2: DMH2

Hydrograph



Summary for Pond DMH3: DMH3

Inflow Area = 25,518 sf, 47.45% Impervious, Inflow Depth > 3.66" for 25 year event
 Inflow = 2.50 cfs @ 12.08 hrs, Volume= 7,789 cf
 Outflow = 2.50 cfs @ 12.08 hrs, Volume= 7,789 cf, Atten= 0%, Lag= 0.0 min
 Primary = 2.50 cfs @ 12.08 hrs, Volume= 7,789 cf

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

Peak Elev= 56.30' @ 12.08 hrs

Flood Elev= 61.00'

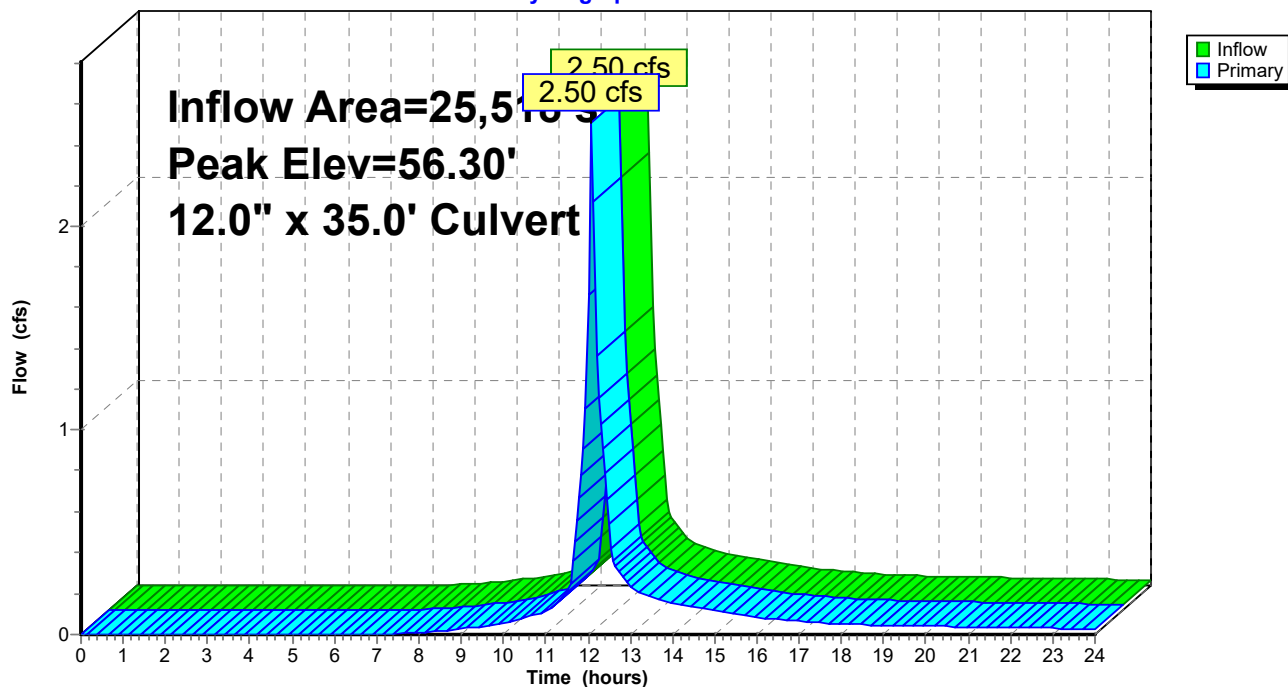
Device	Routing	Invert	Outlet Devices
#1	Primary	55.17'	12.0" x 35.0' long Culvert CPP, square edge headwall, Ke= 0.500 Outlet Invert= 55.00' S= 0.0049 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=2.42 cfs @ 12.08 hrs HW=56.27' TW=53.22' (Dynamic Tailwater)

↑ **1=Culvert** (Barrel Controls 2.42 cfs @ 3.50 fps)

Pond DMH3: DMH3

Hydrograph



Summary for Pond DMH4: DMH4

Inflow Area = 25,518 sf, 47.45% Impervious, Inflow Depth > 3.66" for 25 year event
 Inflow = 2.50 cfs @ 12.08 hrs, Volume= 7,789 cf
 Outflow = 2.50 cfs @ 12.08 hrs, Volume= 7,789 cf, Atten= 0%, Lag= 0.0 min
 Primary = 2.50 cfs @ 12.08 hrs, Volume= 7,789 cf

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

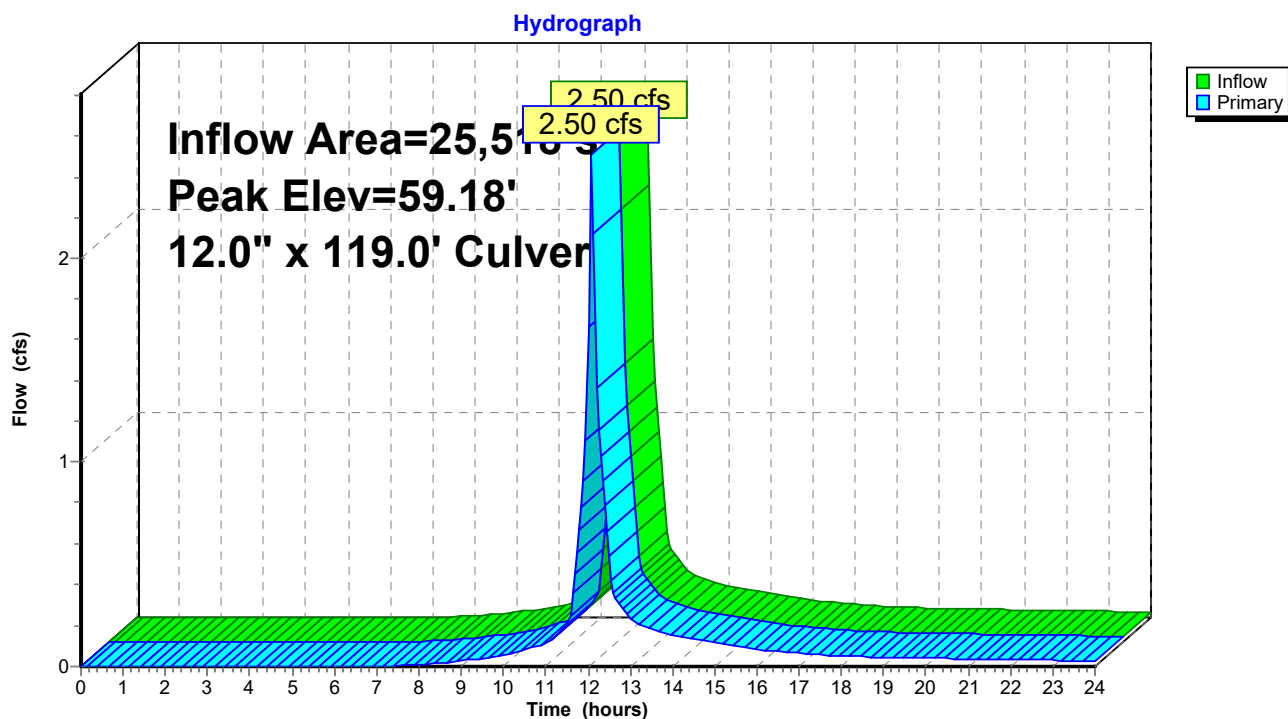
Peak Elev= 59.18' @ 12.08 hrs

Flood Elev= 65.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	58.25'	12.0" x 119.0' long Culvert CPP, square edge headwall, Ke= 0.500 Outlet Invert= 55.28' S= 0.0250 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=2.42 cfs @ 12.08 hrs HW=59.16' TW=56.27' (Dynamic Tailwater)

↑ **1=Culvert** (Inlet Controls 2.42 cfs @ 3.24 fps)

Pond DMH4: DMH4

Summary for Pond DMH5: DMH 5

Inflow Area = 27,008 sf, 58.21% Impervious, Inflow Depth > 4.06" for 25 year event
 Inflow = 2.93 cfs @ 12.07 hrs, Volume= 9,127 cf
 Outflow = 2.93 cfs @ 12.07 hrs, Volume= 9,127 cf, Atten= 0%, Lag= 0.0 min
 Primary = 2.93 cfs @ 12.07 hrs, Volume= 9,127 cf

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

Peak Elev= 67.17' @ 12.50 hrs

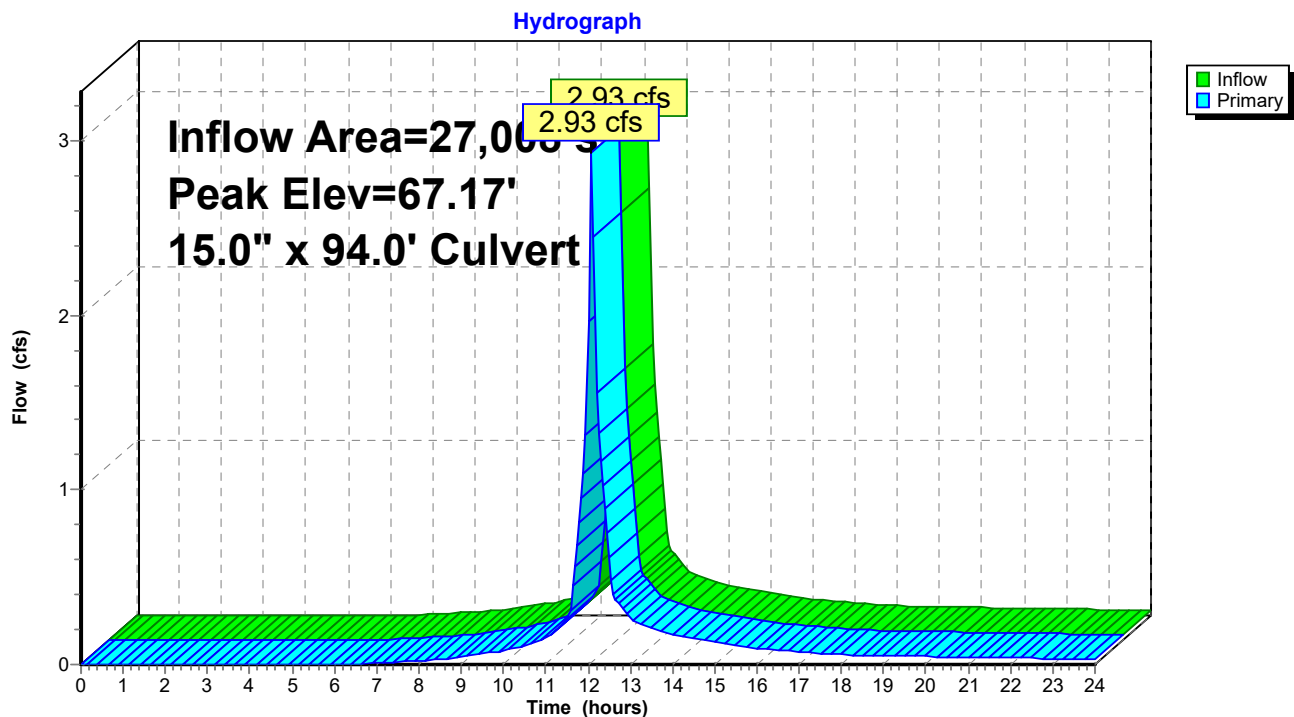
Flood Elev= 69.53'

Device	Routing	Invert	Outlet Devices
#1	Primary	65.71'	15.0" x 94.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 65.24' S= 0.0050 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=2.41 cfs @ 12.07 hrs HW=66.77' TW=66.32' (Dynamic Tailwater)

↑1=Culvert (Outlet Controls 2.41 cfs @ 2.93 fps)

Pond DMH5: DMH 5



Summary for Pond DMH7: DMH7

Inflow Area = 27,008 sf, 58.21% Impervious, Inflow Depth > 4.06" for 25 year event
 Inflow = 2.93 cfs @ 12.07 hrs, Volume= 9,127 cf
 Outflow = 2.93 cfs @ 12.07 hrs, Volume= 9,127 cf, Atten= 0%, Lag= 0.0 min
 Primary = 2.93 cfs @ 12.07 hrs, Volume= 9,127 cf

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

Peak Elev= 67.14' @ 12.43 hrs

Flood Elev= 70.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	65.00'	12.0" x 1.0' long Culvert CPP, square edge headwall, Ke= 0.500 Outlet Invert= 65.00' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Primary	64.90'	12.0" x 1.0' long Culvert CPP, square edge headwall, Ke= 0.500 Outlet Invert= 64.90' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

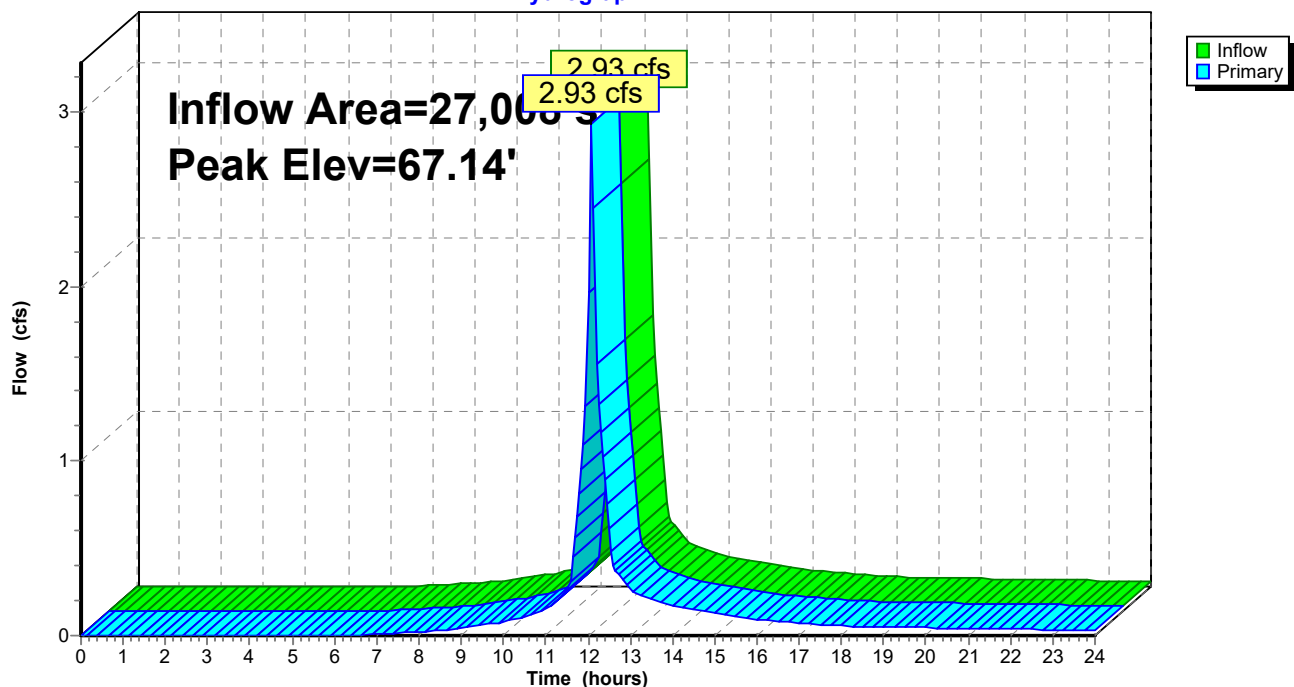
Primary OutFlow Max=0.00 cfs @ 12.07 hrs HW=66.21' TW=66.37' (Dynamic Tailwater)

1=Culvert (Controls 0.00 cfs)

2=Culvert (Controls 0.00 cfs)

Pond DMH7: DMH7

Hydrograph



Summary for Pond DMH8: DMH8

Inflow Area = 41,660 sf, 48.12% Impervious, Inflow Depth > 3.68" for 25 year event
 Inflow = 4.11 cfs @ 12.08 hrs, Volume= 12,766 cf
 Outflow = 4.11 cfs @ 12.08 hrs, Volume= 12,766 cf, Atten= 0%, Lag= 0.0 min
 Primary = 4.11 cfs @ 12.08 hrs, Volume= 12,766 cf

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

Peak Elev= 67.33' @ 12.11 hrs

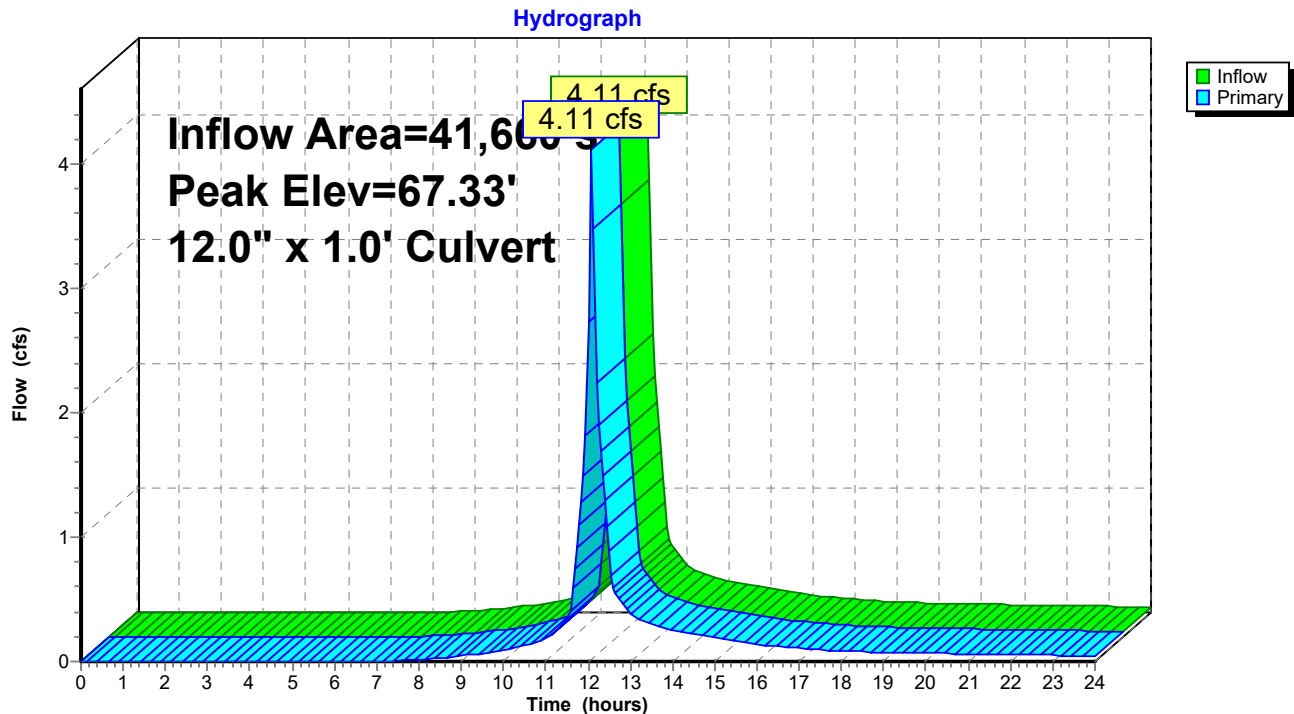
Flood Elev= 70.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	65.00'	12.0" x 1.0' long Culvert CPP, square edge headwall, Ke= 0.500 Outlet Invert= 65.00' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=3.39 cfs @ 12.08 hrs HW=67.19' TW=66.38' (Dynamic Tailwater)

↑ **1=Culvert** (Inlet Controls 3.39 cfs @ 4.32 fps)

Pond DMH8: DMH8



Summary for Pond P1-1: P1-1

Inflow Area = 74,610 sf, 49.91% Impervious, Inflow Depth > 3.73" for 25 year event
 Inflow = 7.41 cfs @ 12.08 hrs, Volume= 23,206 cf
 Outflow = 2.84 cfs @ 12.33 hrs, Volume= 18,566 cf, Atten= 62%, Lag= 15.1 min
 Primary = 2.84 cfs @ 12.33 hrs, Volume= 18,566 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 53.71' @ 12.33 hrs Surf.Area= 4,340 sf Storage= 8,889 cf
 Flood Elev= 55.50' Surf.Area= 5,973 sf Storage= 18,004 cf

Plug-Flow detention time= 152.5 min calculated for 18,528 cf (80% of inflow)
 Center-of-Mass det. time= 76.6 min (888.0 - 811.4)

Volume	Invert	Avail.Storage	Storage Description
#1	51.00'	18,004 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
51.00	2,080	0	0
52.00	2,814	2,447	2,447
52.50	3,624	1,610	4,057
54.00	4,509	6,100	10,156
55.00	5,467	4,988	15,144
55.50	5,973	2,860	18,004

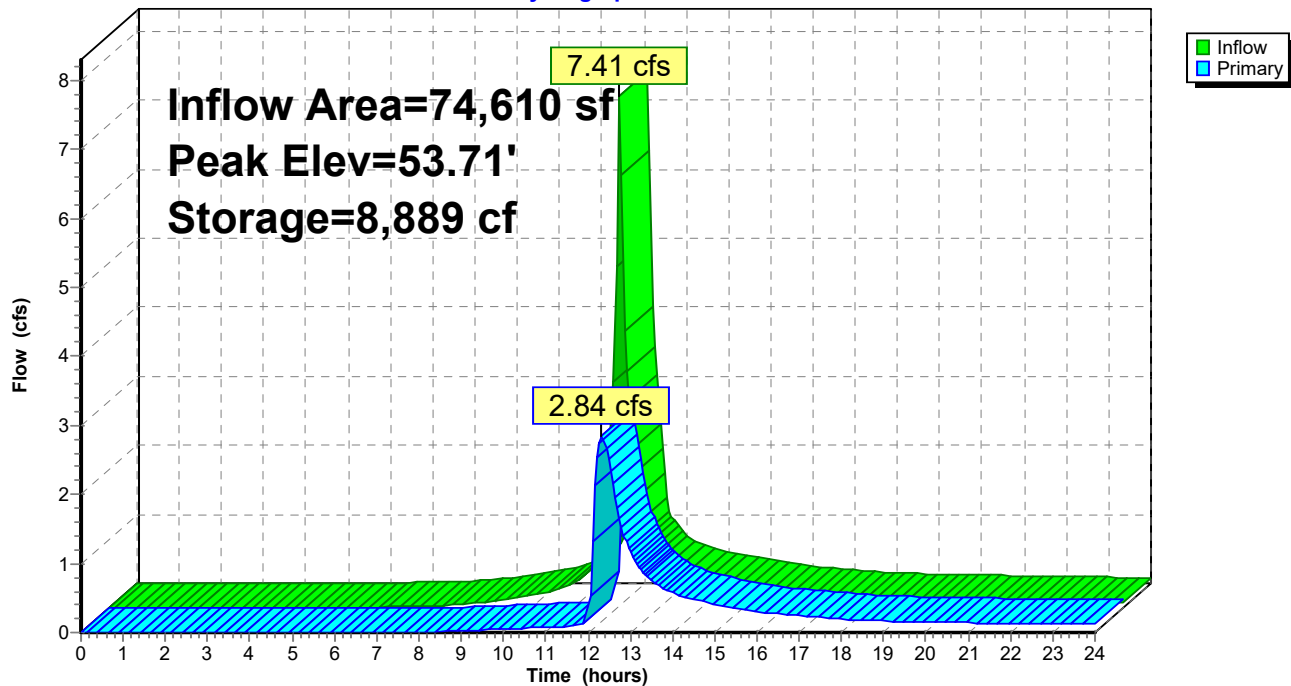
Device	Routing	Invert	Outlet Devices
#1	Primary	51.00'	12.0" x 80.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 50.00' S= 0.0125 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Device 1	51.00'	2.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	52.75'	10.0" Vert. Orifice/Grate C= 0.600
#4	Device 1	53.25'	10.0" Vert. Orifice/Grate C= 0.600
#5	Device 1	54.25'	2.00' x 2.00' Horiz. Orifice/Grate Limited to weir flow C= 0.600

Primary OutFlow Max=2.83 cfs @ 12.33 hrs HW=53.71' TW=0.00' (Dynamic Tailwater)

- 1=Culvert (Passes 2.83 cfs of 5.18 cfs potential flow)
- 2=Orifice/Grate (Orifice Controls 0.17 cfs @ 7.81 fps)
- 3=Orifice/Grate (Orifice Controls 1.94 cfs @ 3.56 fps)
- 4=Orifice/Grate (Orifice Controls 0.72 cfs @ 2.31 fps)
- 5=Orifice/Grate (Controls 0.00 cfs)

Pond P1-1: P1-1

Hydrograph



Summary for Pond P1-2: DP-1-2

Inflow Area = 35,138 sf, 15.99% Impervious, Inflow Depth > 2.53" for 25 year event
 Inflow = 2.15 cfs @ 12.12 hrs, Volume= 7,397 cf
 Outflow = 0.03 cfs @ 24.00 hrs, Volume= 1,251 cf, Atten= 99%, Lag= 712.7 min
 Primary = 0.03 cfs @ 24.00 hrs, Volume= 1,251 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 58.35' @ 24.00 hrs Surf.Area= 5,851 sf Storage= 6,146 cf
 Flood Elev= 59.75' Surf.Area= 7,130 sf Storage= 10,384 cf

Plug-Flow detention time= 385.6 min calculated for 1,251 cf (17% of inflow)
 Center-of-Mass det. time= 240.9 min (1,087.3 - 846.5)

Volume	Invert	Avail.Storage	Storage Description
#1	57.00'	10,384 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
57.00	3,285	0	0
58.00	5,180	4,233	4,233
58.50	6,148	2,832	7,065
59.00	7,130	3,320	10,384

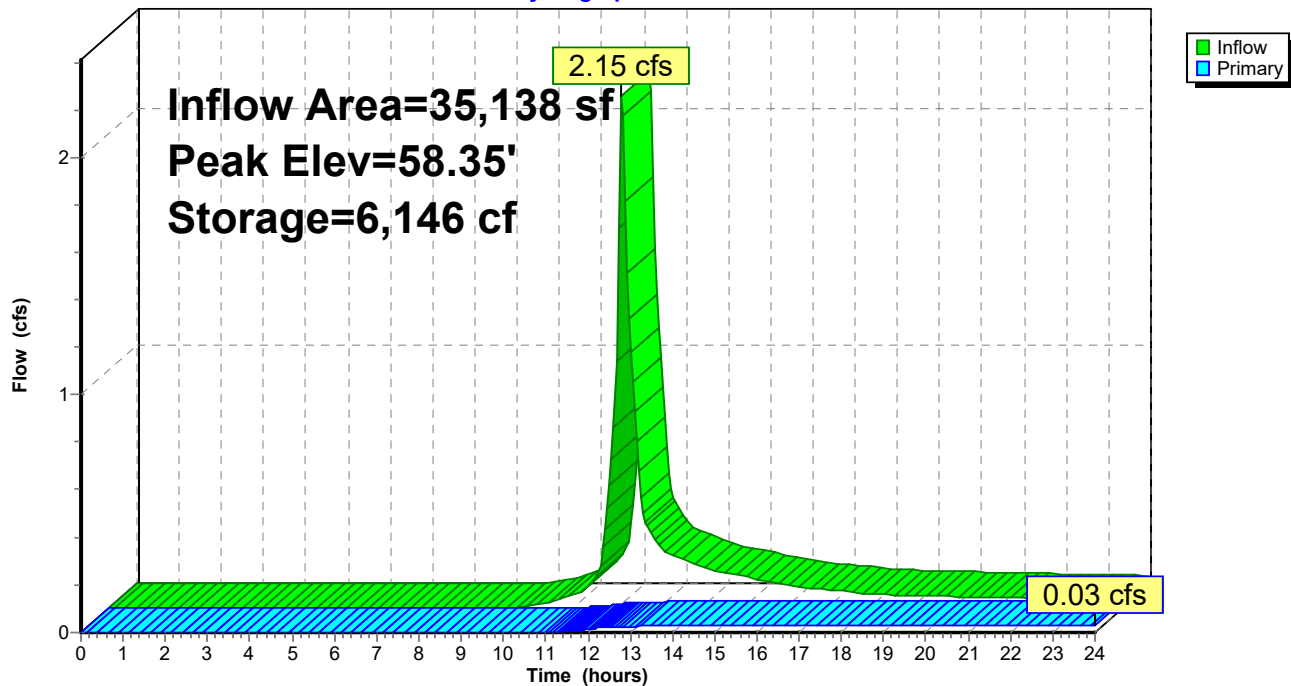
Device	Routing	Invert	Outlet Devices
#1	Primary	57.00'	12.0" x 25.0' long Culvert RCP, square edge headwall, Ke= 0.500 Outlet Invert= 56.50' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Device 1	57.00'	1.0" Vert. Orifice/Grate C= 0.600
#3	Primary	58.75'	3.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.03 cfs @ 24.00 hrs HW=58.35' TW=0.00' (Dynamic Tailwater)

1=Culvert (Passes 0.03 cfs of 3.48 cfs potential flow)
 2=Orifice/Grate (Orifice Controls 0.03 cfs @ 5.50 fps)
 3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond P1-2: DP-1-2

Hydrograph



Summary for Pond P1-3: P1-3

Inflow Area = 7,345 sf, 68.78% Impervious, Inflow Depth > 4.48" for 25 year event
 Inflow = 0.93 cfs @ 12.03 hrs, Volume= 2,740 cf
 Outflow = 0.13 cfs @ 12.51 hrs, Volume= 2,586 cf, Atten= 86%, Lag= 28.8 min
 Primary = 0.13 cfs @ 12.51 hrs, Volume= 2,586 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 51.86' @ 12.51 hrs Surf.Area= 1,505 sf Storage= 1,187 cf
 Flood Elev= 54.27' Surf.Area= 1,400 sf Storage= 1,861 cf

Plug-Flow detention time= 129.6 min calculated for 2,581 cf (94% of inflow)
 Center-of-Mass det. time= 99.1 min (888.3 - 789.2)

Volume	Invert	Avail.Storage	Storage Description
#1	50.00'	1,680 cf	10.00'W x 35.00'L x 3.00'H Prismatoid x 4 4,200 cf Overall x 40.0% Voids
#2	50.50'	181 cf	48.0"W x 24.0"H x 8.00'L Galley 4x8x2 x 4
		1,861 cf	Total Available Storage

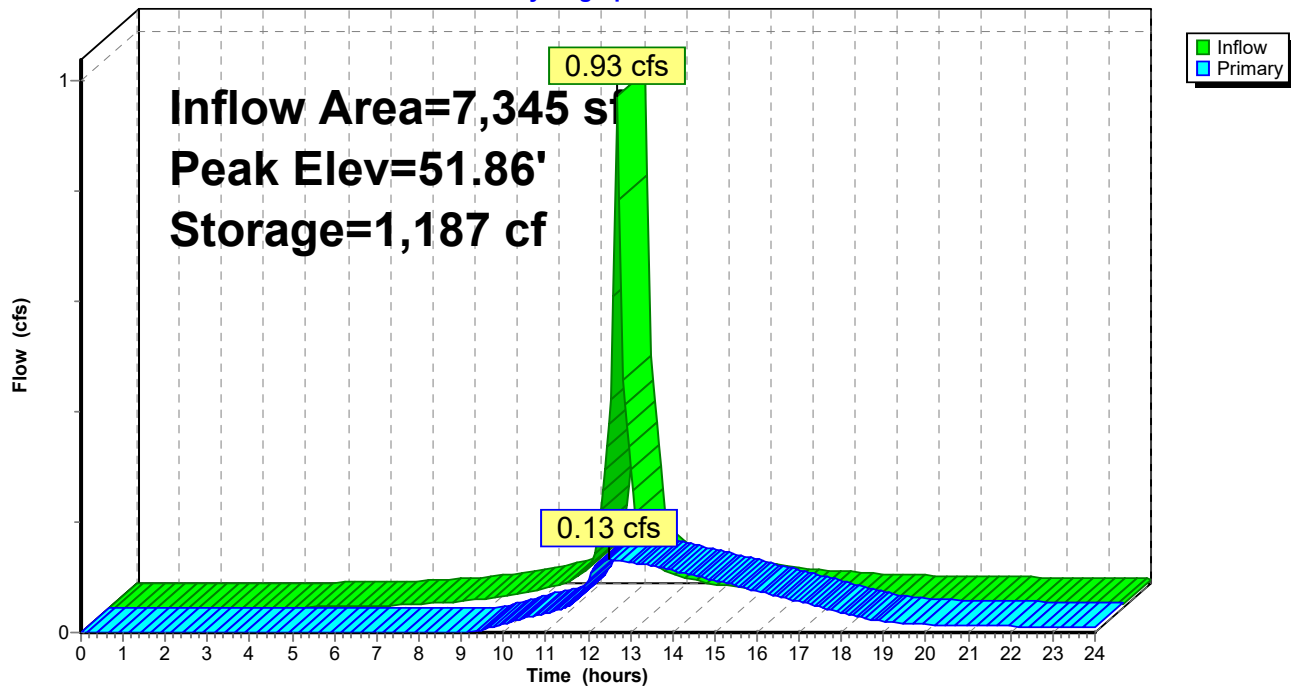
Device	Routing	Invert	Outlet Devices
#1	Primary	50.20'	12.0" x 16.0' long Culvert CPP, square edge headwall, Ke= 0.500 Outlet Invert= 50.00' S= 0.0125 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Device 1	50.20'	2.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	53.00'	12.0" Horiz. Orifice/Grate Limited to weir flow C= 0.600

Primary OutFlow Max=0.13 cfs @ 12.51 hrs HW=51.86' TW=0.00' (Dynamic Tailwater)

1=Culvert (Passes 0.13 cfs of 4.08 cfs potential flow)
 2=Orifice/Grate (Orifice Controls 0.13 cfs @ 6.05 fps)
 3=Orifice/Grate (Controls 0.00 cfs)

Pond P1-3: P1-3

Hydrograph



Summary for Pond P3-1: P3-2

Inflow Area = 68,668 sf, 52.09% Impervious, Inflow Depth > 3.83" for 25 year event
 Inflow = 7.03 cfs @ 12.08 hrs, Volume= 21,894 cf
 Outflow = 2.25 cfs @ 12.39 hrs, Volume= 19,317 cf, Atten= 68%, Lag= 18.9 min
 Primary = 2.25 cfs @ 12.39 hrs, Volume= 19,317 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 67.13' @ 12.39 hrs Surf.Area= 3,825 sf Storage= 8,083 cf
 Flood Elev= 70.00' Surf.Area= 3,825 sf Storage= 10,877 cf

Plug-Flow detention time= 107.6 min calculated for 19,317 cf (88% of inflow)
 Center-of-Mass det. time= 53.4 min (864.7 - 811.3)

Volume	Invert	Avail.Storage	Storage Description
#1	64.00'	2,363 cf	Custom Stage Data (Prismatic) Listed below (Recalc) 17,213 cf Overall - 11,304 cf Embedded = 5,908 cf x 40.0% Voids
#2	64.50'	8,514 cf	52.8"W x 48.0"H x 4.00'L Galley 4x4x4 x 192 Inside #1
		10,877 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
64.00	3,825	0	0
68.50	3,825	17,213	17,213

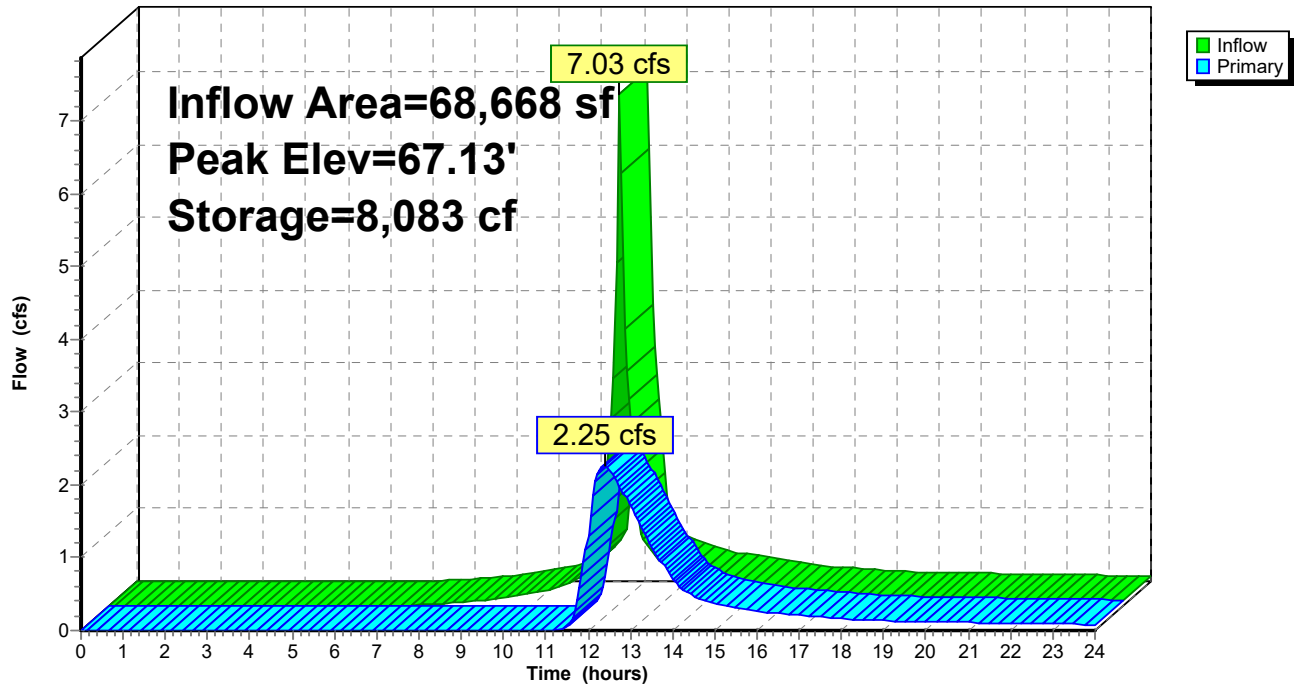
Device	Routing	Invert	Outlet Devices
#1	Primary	64.00'	15.0" x 41.0' long Culvert CPP, square edge headwall, Ke= 0.500 Outlet Invert= 62.00' S= 0.0488 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Device 1	65.00'	8.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	67.50'	15.0" Horiz. Orifice/Grate Limited to weir flow C= 0.600

Primary OutFlow Max=2.25 cfs @ 12.39 hrs HW=67.13' TW=61.75' (Dynamic Tailwater)

1=Culvert (Passes 2.25 cfs of 9.35 cfs potential flow)
 2=Orifice/Grate (Orifice Controls 2.25 cfs @ 6.45 fps)
 3=Orifice/Grate (Controls 0.00 cfs)

Pond P3-1: P3-2

Hydrograph



Summary for Pond P3-2: P3-3

Inflow Area = 140,478 sf, 42.86% Impervious, Inflow Depth > 3.28" for 25 year event
 Inflow = 7.92 cfs @ 12.09 hrs, Volume= 38,362 cf
 Outflow = 1.77 cfs @ 13.40 hrs, Volume= 30,024 cf, Atten= 78%, Lag= 79.0 min
 Primary = 1.77 cfs @ 13.40 hrs, Volume= 30,024 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 53.22' @ 13.40 hrs Surf.Area= 7,685 sf Storage= 15,724 cf
 Flood Elev= 55.50' Surf.Area= 12,548 sf Storage= 38,610 cf

Plug-Flow detention time= 169.5 min calculated for 30,024 cf (78% of inflow)
 Center-of-Mass det. time= 90.0 min (936.2 - 846.2)

Volume	Invert	Avail.Storage	Storage Description
#1	50.00'	38,610 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
50.00	2,426	0	0
52.00	5,354	7,780	7,780
54.00	9,180	14,534	22,314
55.50	12,548	16,296	38,610

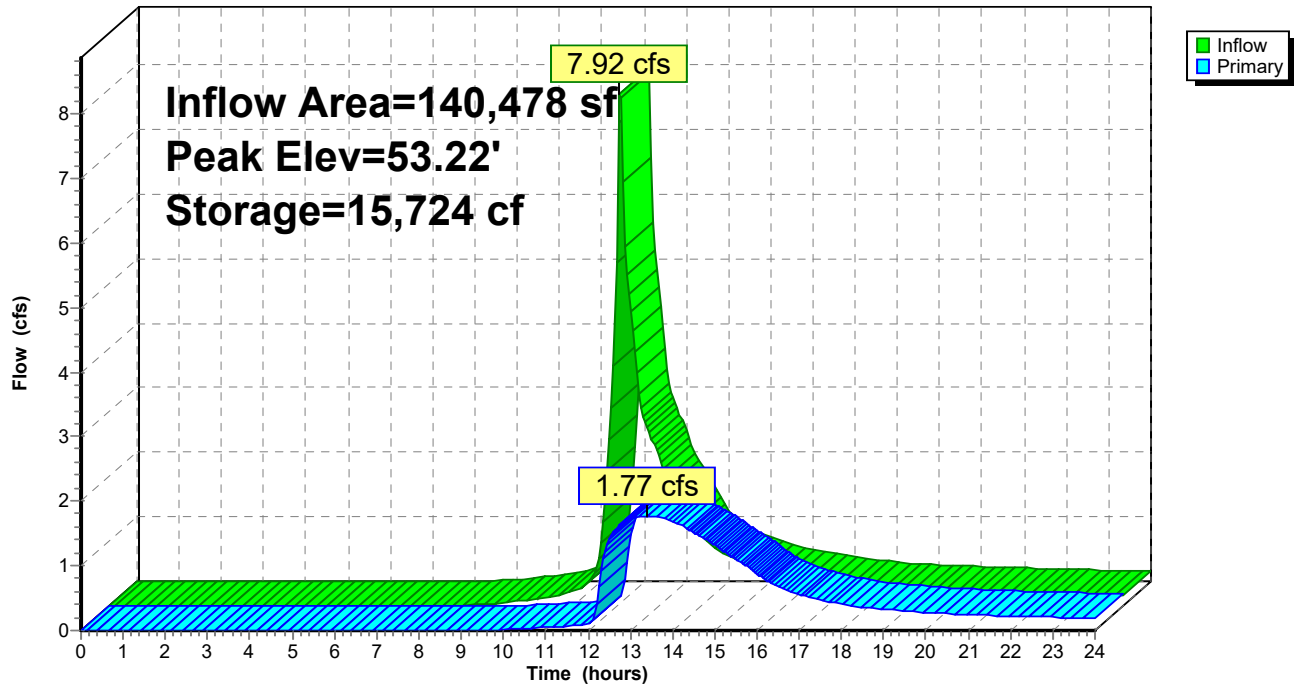
Device	Routing	Invert	Outlet Devices
#1	Primary	50.00'	12.0" x 29.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 49.00' S= 0.0345 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Device 1	50.00'	2.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	52.00'	8.0" Vert. Orifice/Grate C= 0.600
#4	Device 1	54.00'	2.00' x 2.00' Horiz. Orifice/Grate Limited to weir flow C= 0.600
#5	Primary	54.55'	10.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=1.77 cfs @ 13.40 hrs HW=53.22' TW=0.00' (Dynamic Tailwater)

1=Culvert (Passes 1.77 cfs of 6.24 cfs potential flow)
 2=Orifice/Grate (Orifice Controls 0.19 cfs @ 8.53 fps)
 3=Orifice/Grate (Orifice Controls 1.58 cfs @ 4.53 fps)
 4=Orifice/Grate (Controls 0.00 cfs)
 5=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond P3-2: P3-3

Hydrograph

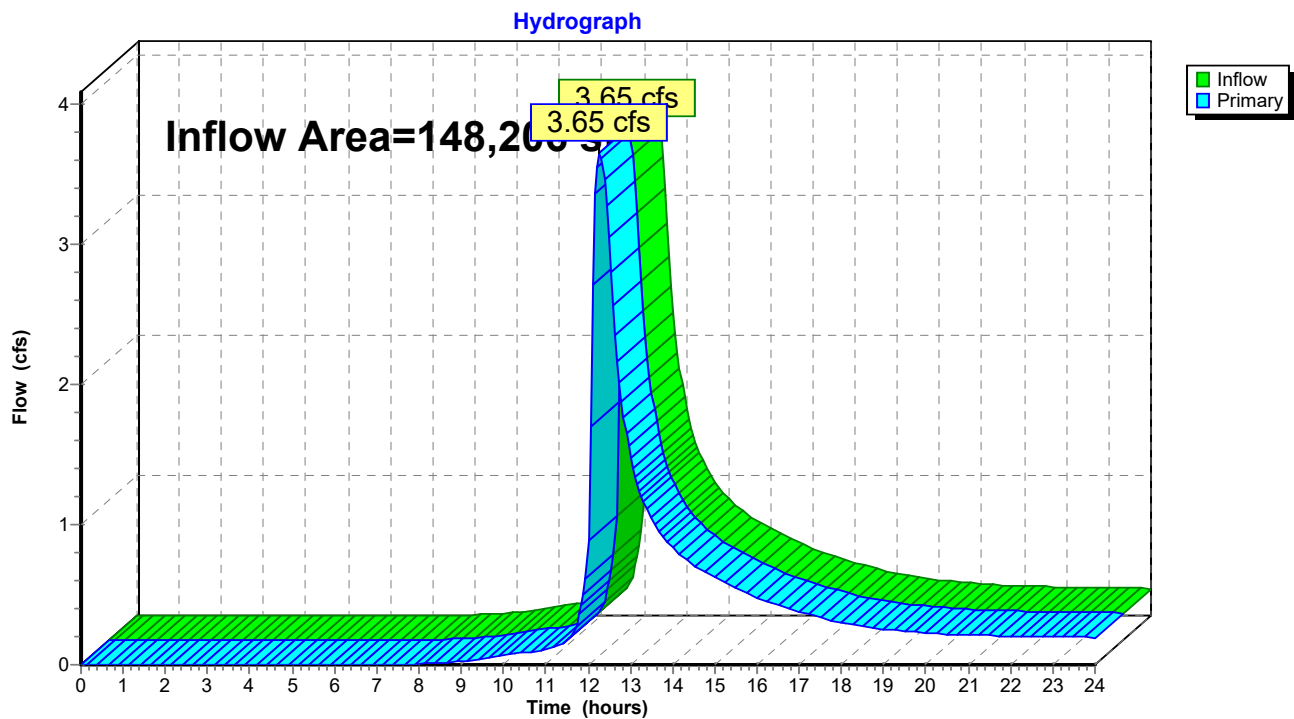


Summary for Link DP-1: DP-1

Inflow Area = 148,206 sf, 32.39% Impervious, Inflow Depth > 2.16" for 25 year event
Inflow = 3.65 cfs @ 12.28 hrs, Volume= 26,728 cf
Primary = 3.65 cfs @ 12.28 hrs, Volume= 26,728 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP-1: DP-1

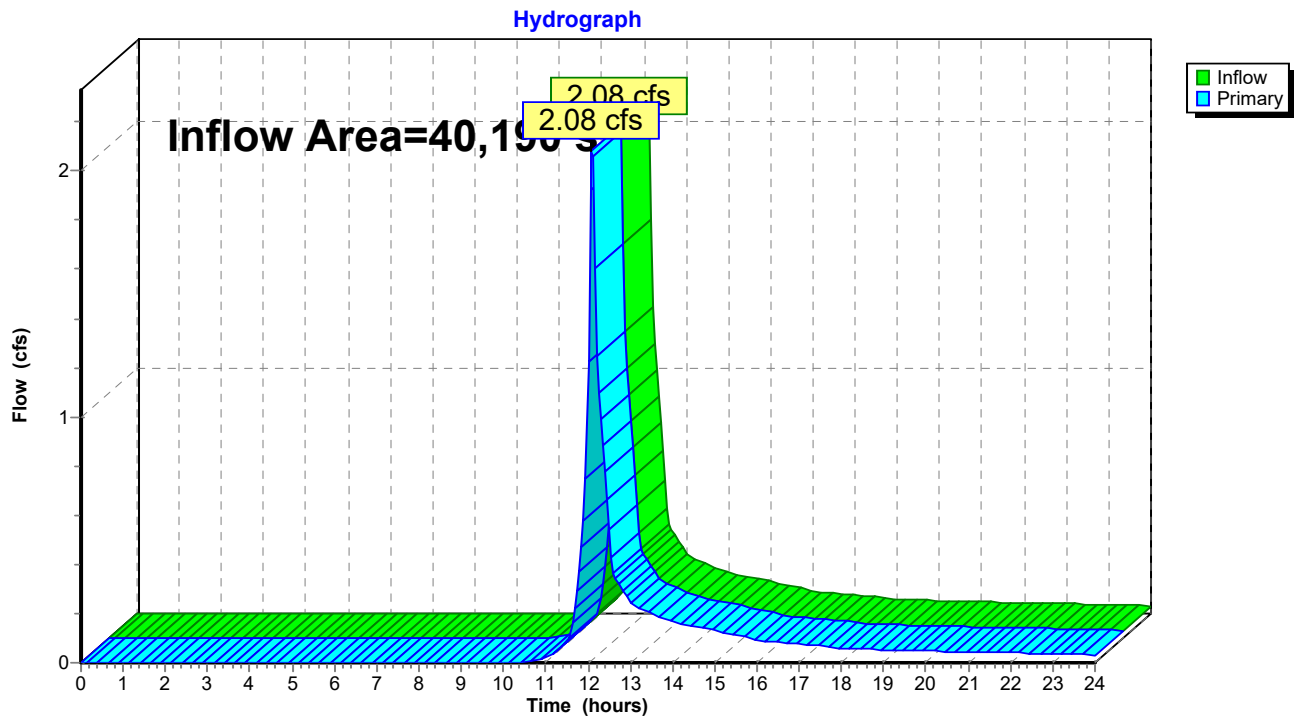


Summary for Link DP-2: DP-2

Inflow Area = 40,190 sf, 10.95% Impervious, Inflow Depth > 2.00" for 25 year event
Inflow = 2.08 cfs @ 12.09 hrs, Volume= 6,711 cf
Primary = 2.08 cfs @ 12.09 hrs, Volume= 6,711 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP-2: DP-2

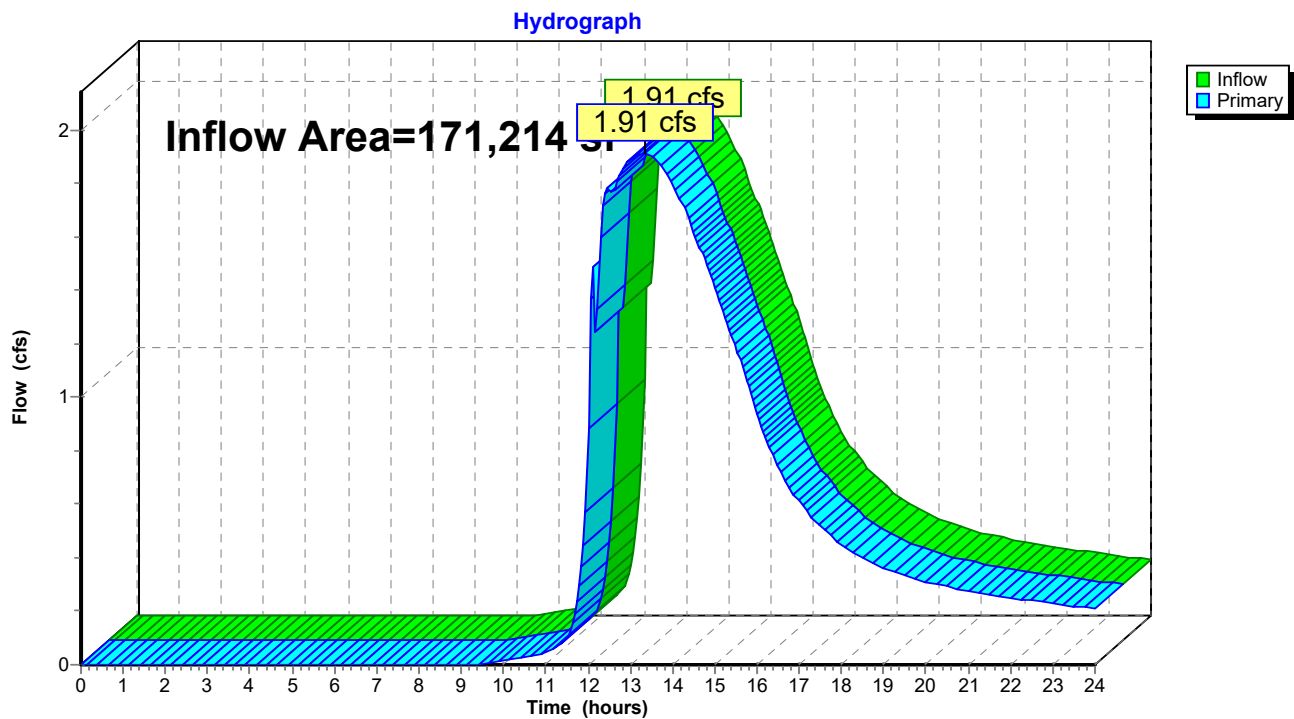


Summary for Link DP-3: DP-3

Inflow Area = 171,214 sf, 35.17% Impervious, Inflow Depth > 2.42" for 25 year event
Inflow = 1.91 cfs @ 13.33 hrs, Volume= 34,520 cf
Primary = 1.91 cfs @ 13.33 hrs, Volume= 34,520 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP-3: DP-3

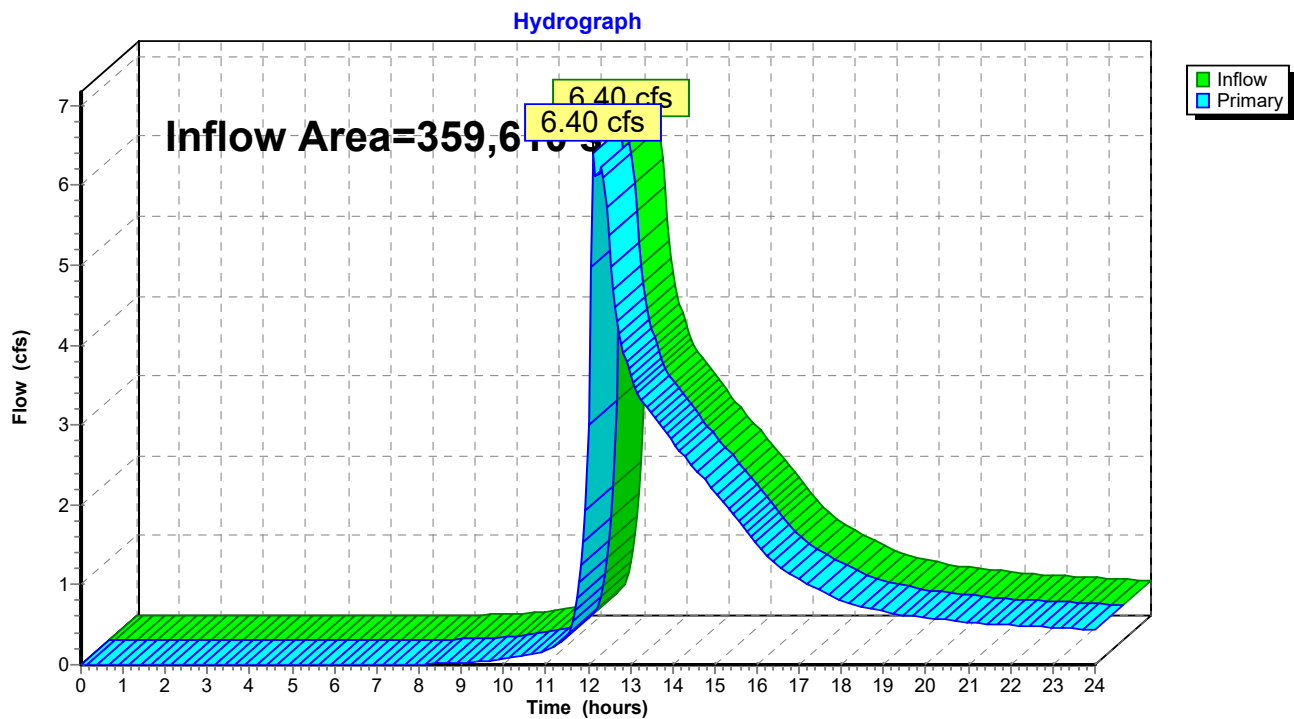


Summary for Link TOTAL: (new Link)

Inflow Area = 359,610 sf, 31.32% Impervious, Inflow Depth > 2.27" for 25 year event
Inflow = 6.40 cfs @ 12.12 hrs, Volume= 67,959 cf
Primary = 6.40 cfs @ 12.12 hrs, Volume= 67,959 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link TOTAL: (new Link)





Hydrocad

POST-DEVELOPMENT

50-Year Storm

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment P-1A: P-1A	Runoff Area=2,325 sf 0.00% Impervious Runoff Depth>2.22" Flow Length=106' Tc=5.0 min CN=56 Runoff=0.13 cfs 429 cf
Subcatchment P-1B: P-1E	Runoff Area=12,786 sf 39.18% Impervious Runoff Depth>4.15" Tc=5.0 min CN=75 Runoff=1.43 cfs 4,418 cf
Subcatchment P-1C: P-1C	Runoff Area=3,632 sf 56.17% Impervious Runoff Depth>4.92" Flow Length=301' Tc=1.8 min CN=82 Runoff=0.52 cfs 1,488 cf
Subcatchment P-1D: P-1D	Runoff Area=3,713 sf 81.12% Impervious Runoff Depth>5.94" Flow Length=235' Tc=1.4 min CN=91 Runoff=0.61 cfs 1,837 cf
Subcatchment P-1E: P-1E	Runoff Area=15,652 sf 37.11% Impervious Runoff Depth>4.04" Flow Length=108' Tc=5.0 min CN=74 Runoff=1.70 cfs 5,269 cf
Subcatchment P-1F: P-1F	Runoff Area=20,654 sf 69.31% Impervious Runoff Depth>5.48" Flow Length=272' Tc=5.0 min CN=87 Runoff=2.95 cfs 9,426 cf
Subcatchment P-1G: P-1I	Runoff Area=5,773 sf 64.25% Impervious Runoff Depth>5.25" Flow Length=177' Tc=5.0 min CN=85 Runoff=0.80 cfs 2,525 cf
Subcatchment P-1H: P-1H	Runoff Area=19,745 sf 42.54% Impervious Runoff Depth>4.36" Flow Length=158' Tc=5.0 min CN=77 Runoff=2.31 cfs 7,179 cf
Subcatchment P-1I: P-1I	Runoff Area=35,138 sf 15.99% Impervious Runoff Depth>3.30" Flow Length=170' Tc=8.2 min CN=67 Runoff=2.84 cfs 9,669 cf
Subcatchment P-1J: P-1J	Runoff Area=28,788 sf 0.31% Impervious Runoff Depth>2.31" Flow Length=280' Tc=6.1 min CN=57 Runoff=1.67 cfs 5,543 cf
Subcatchment P-2A: P-2A	Runoff Area=40,190 sf 10.95% Impervious Runoff Depth>2.70" Flow Length=156' Tc=5.0 min CN=61 Runoff=2.86 cfs 9,042 cf
Subcatchment P-3A: P-3A	Runoff Area=30,736 sf 0.00% Impervious Runoff Depth>2.41" Flow Length=260' Tc=5.0 min CN=58 Runoff=1.92 cfs 6,165 cf
Subcatchment P-3B: P-3B	Runoff Area=71,810 sf 34.04% Impervious Runoff Depth>4.04" Flow Length=128' Tc=5.0 min CN=74 Runoff=7.81 cfs 24,172 cf
Subcatchment P-3C: P-3C	Runoff Area=41,660 sf 48.12% Impervious Runoff Depth>4.58" Flow Length=153' Tc=5.0 min CN=79 Runoff=5.13 cfs 15,905 cf
Subcatchment P-3D: P-3D	Runoff Area=22,478 sf 56.13% Impervious Runoff Depth>4.91" Flow Length=240' Tc=5.0 min CN=82 Runoff=2.94 cfs 9,203 cf
Subcatchment P-3E: P-3F	Runoff Area=4,530 sf 68.52% Impervious Runoff Depth>5.36" Flow Length=245' Tc=5.0 min CN=86 Runoff=0.64 cfs 2,024 cf

Pond 3P: INFILTRATOR

Peak Elev=0.00' Storage=0 cf

Pond CB1: CB1Peak Elev=52.26' Inflow=0.52 cfs 1,488 cf
8.0" x 9.0' Culvert Outflow=0.52 cfs 1,488 cf**Pond CB2: CB2**Peak Elev=52.26' Inflow=0.61 cfs 1,837 cf
8.0" x 9.0' Culvert Outflow=0.61 cfs 1,837 cf**Pond CB3: CB3**Peak Elev=54.80' Inflow=1.43 cfs 4,418 cf
12.0" x 12.0' Culvert Outflow=1.43 cfs 4,418 cf**Pond CB4: CB4**Peak Elev=55.12' Inflow=2.95 cfs 9,426 cf
12.0" x 11.0' Culvert Outflow=2.95 cfs 9,426 cf**Pond CB5: CB5**Peak Elev=61.94' Inflow=2.31 cfs 7,179 cf
12.0" x 13.0' Culvert Outflow=2.31 cfs 7,179 cf**Pond CB6: CB6**Peak Elev=61.51' Inflow=0.80 cfs 2,525 cf
12.0" x 13.0' Culvert Outflow=0.80 cfs 2,525 cf**Pond CB7: CB7**Peak Elev=67.75' Inflow=0.64 cfs 2,024 cf
12.0" x 20.0' Culvert Outflow=0.64 cfs 2,024 cf**Pond CB8: CB8**Peak Elev=67.79' Inflow=2.94 cfs 9,203 cf
12.0" x 20.0' Culvert Outflow=2.94 cfs 9,203 cf**Pond CB9: CB9**Peak Elev=69.70' Inflow=5.13 cfs 15,905 cf
12.0" x 22.0' Culvert Outflow=5.13 cfs 15,905 cf**Pond DMH 10: DMH9**Peak Elev=61.96' Inflow=3.36 cfs 24,516 cf
15.0" x 100.0' Culvert Outflow=3.36 cfs 24,516 cf**Pond DMH 11: DMH 10**Peak Elev=56.32' Inflow=3.36 cfs 24,516 cf
15.0" x 33.0' Culvert Outflow=3.36 cfs 24,516 cf**Pond DMH 6: DMH 6**Peak Elev=67.71' Inflow=3.58 cfs 11,228 cf
15.0" x 55.0' Culvert Outflow=3.58 cfs 11,228 cf**Pond DMH2: DMH2**Peak Elev=54.72' Inflow=4.38 cfs 13,844 cf
12.0" x 39.0' Culvert Outflow=4.38 cfs 13,844 cf**Pond DMH3: DMH3**Peak Elev=56.65' Inflow=3.12 cfs 9,704 cf
12.0" x 35.0' Culvert Outflow=3.12 cfs 9,704 cf**Pond DMH4: DMH4**Peak Elev=59.42' Inflow=3.12 cfs 9,704 cf
12.0" x 119.0' Culvert Outflow=3.12 cfs 9,704 cf**Pond DMH5: DMH 5**Peak Elev=67.75' Inflow=3.58 cfs 11,228 cf
15.0" x 94.0' Culvert Outflow=3.58 cfs 11,228 cf**Pond DMH7: DMH7**Peak Elev=67.68' Inflow=3.58 cfs 11,228 cf
Outflow=3.58 cfs 11,228 cf

Pearson Drive, Newbury, MA POST DEV

Prepared by Ranger Engineering & Design, LLC

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Type III 24-hr 50 year Rainfall=7.00"

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Pond DMH8: DMH8Peak Elev=68.30' Inflow=5.13 cfs 15,905 cf
12.0" x 1.0' Culvert Outflow=5.13 cfs 15,905 cf**Pond P1-1: P1-1**Peak Elev=54.02' Storage=10,237 cf Inflow=9.21 cfs 28,817 cf
Outflow=4.17 cfs 23,907 cf**Pond P1-2: DP-1-2**Peak Elev=58.69' Storage=8,246 cf Inflow=2.84 cfs 9,669 cf
Outflow=0.03 cfs 1,423 cf**Pond P1-3: P1-3**Peak Elev=52.26' Storage=1,449 cf Inflow=1.11 cfs 3,325 cf
Outflow=0.15 cfs 3,167 cf**Pond P3-1: P3-2**Peak Elev=67.66' Storage=9,534 cf Inflow=8.71 cfs 27,133 cf
Outflow=3.36 cfs 24,516 cf**Pond P3-2: P3-3**Peak Elev=53.72' Storage=19,811 cf Inflow=9.89 cfs 48,688 cf
Outflow=2.18 cfs 40,153 cf**Link DP-1: DP-1**Inflow=5.55 cfs 34,469 cf
Primary=5.55 cfs 34,469 cf**Link DP-2: DP-2**Inflow=2.86 cfs 9,042 cf
Primary=2.86 cfs 9,042 cf**Link DP-3: DP-3**Inflow=2.55 cfs 46,319 cf
Primary=2.55 cfs 46,319 cf**Link TOTAL: (new Link)**Inflow=10.54 cfs 89,829 cf
Primary=10.54 cfs 89,829 cf**Total Runoff Area = 359,610 sf Runoff Volume = 114,296 cf Average Runoff Depth = 3.81"**
68.68% Pervious = 246,993 sf 31.32% Impervious = 112,617 sf

Summary for Subcatchment P-1A: P-1A

Runoff = 0.13 cfs @ 12.09 hrs, Volume= 429 cf, Depth> 2.22"

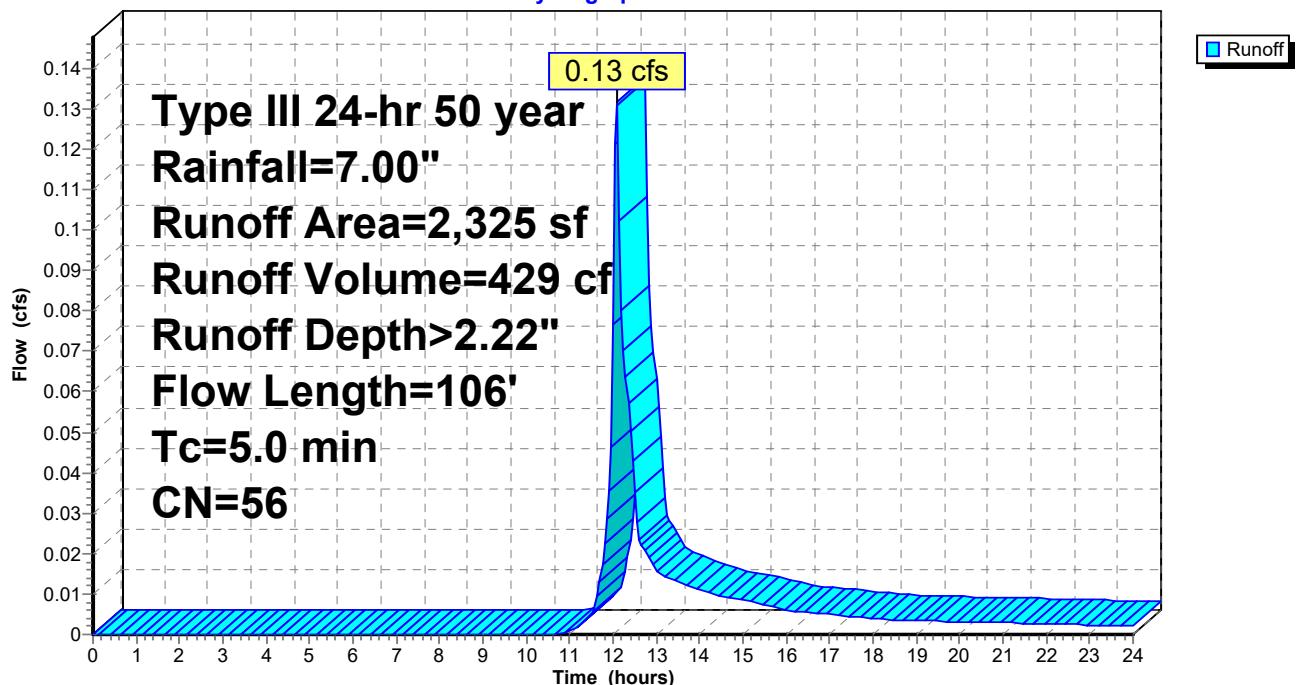
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 50 year Rainfall=7.00"

Area (sf)	CN	Description
1,780	55	Woods, Good, HSG B
545	61	>75% Grass cover, Good, HSG B
0	98	Roofs, HSG B
0	98	Paved parking, HSG B
0	98	Paved roads w/curbs & sewers, HSG B
2,325	56	Weighted Average
2,325		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1					Direct Entry, DIRECT
3.2	50	0.0800	0.26		Sheet Flow, SHEET FLOW
					Grass: Short n= 0.150 P2= 3.20"
0.7	56	0.0357	1.32		Shallow Concentrated Flow, GRASS
					Short Grass Pasture Kv= 7.0 fps
5.0	106	Total			

Subcatchment P-1A: P-1A

Hydrograph



Summary for Subcatchment P-1B: P-1E

Runoff = 1.43 cfs @ 12.08 hrs, Volume= 4,418 cf, Depth> 4.15"

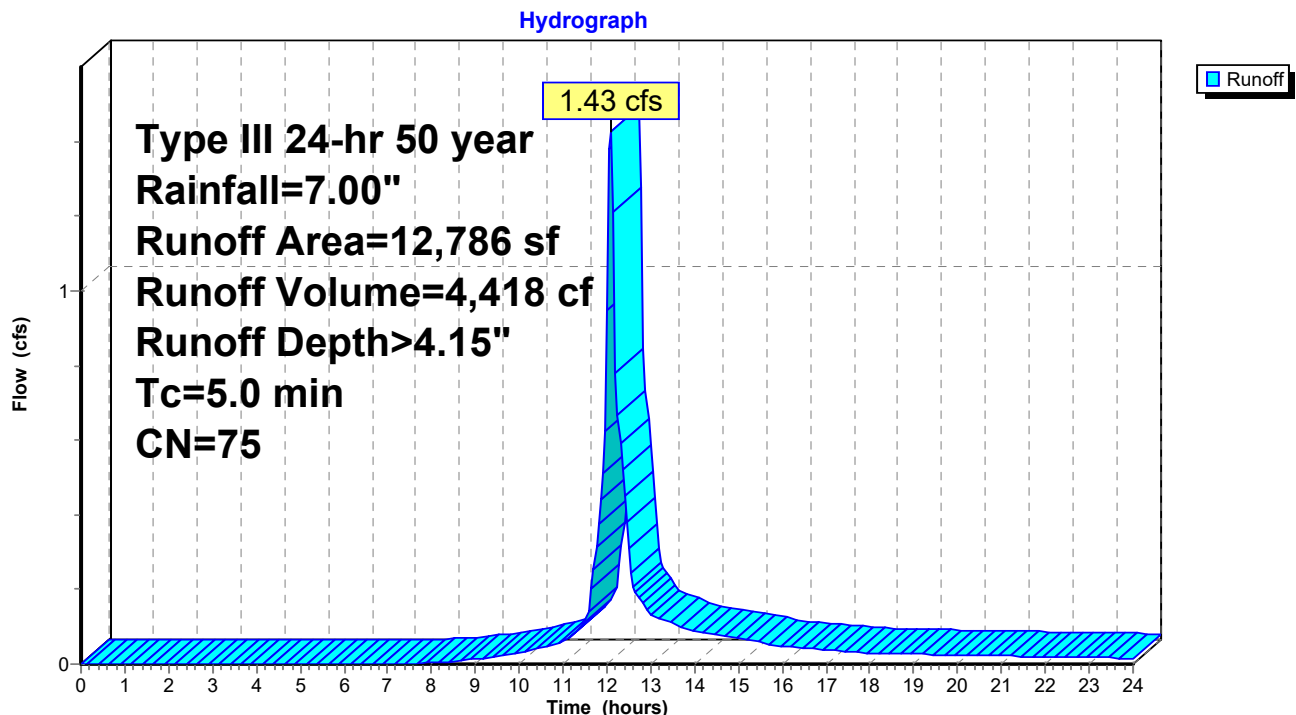
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 50 year Rainfall=7.00"

Area (sf)	CN	Description
0	98	Roofs, HSG B
5,009	98	Paved roads w/curbs & sewers, HSG B
7,777	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
0	98	Water Surface, HSG B
12,786	75	Weighted Average
7,777		Pervious Area
5,009		Impervious Area

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

Subcatchment P-1B: P-1E



Summary for Subcatchment P-1C: P-1C

Runoff = 0.52 cfs @ 12.03 hrs, Volume= 1,488 cf, Depth> 4.92"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

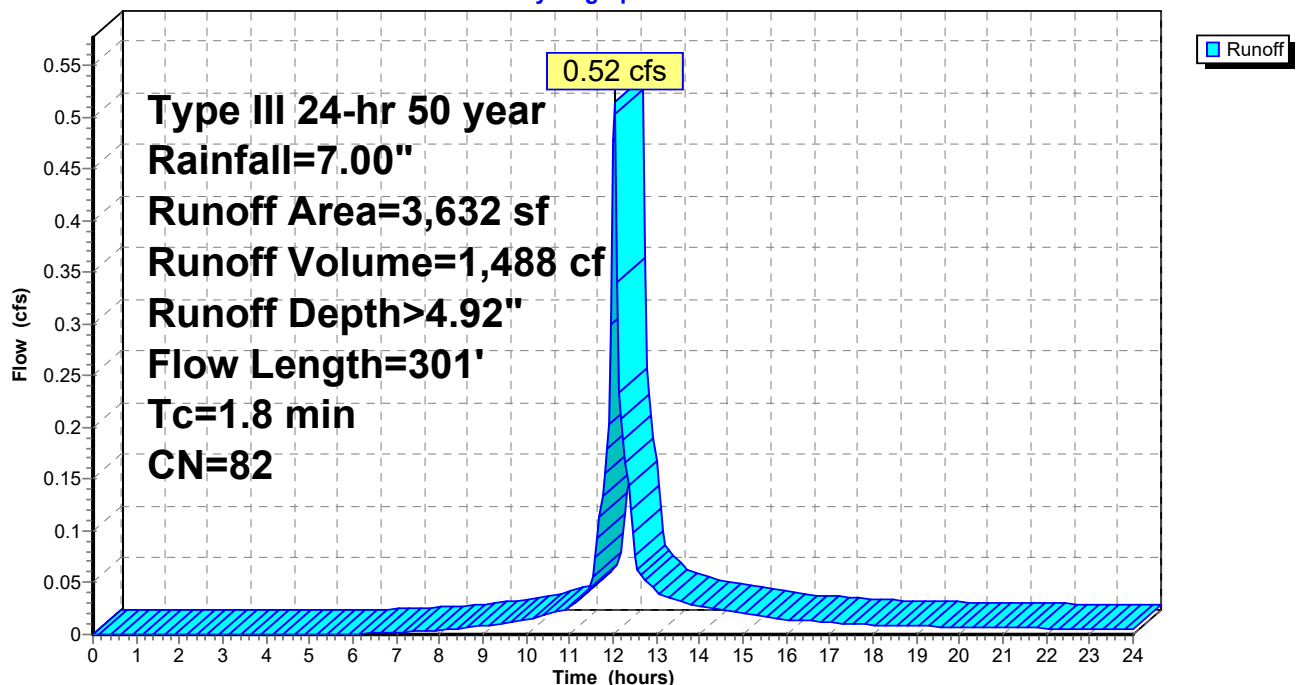
Type III 24-hr 50 year Rainfall=7.00"

Area (sf)	CN	Description
0	98	Roofs, HSG B
0	98	Paved parking, HSG B
2,040	98	Paved roads w/curbs & sewers, HSG B
1,592	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
3,632	82	Weighted Average
1,592		Pervious Area
2,040		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	50	0.0300	1.41		Sheet Flow, SHEET
					Smooth surfaces n= 0.011 P2= 3.20"
1.2	251	0.0287	3.44		Shallow Concentrated Flow, PAVEMENT
					Paved Kv= 20.3 fps
1.8	301	Total			

Subcatchment P-1C: P-1C

Hydrograph



Summary for Subcatchment P-1D: P-1D

Runoff = 0.61 cfs @ 12.02 hrs, Volume= 1,837 cf, Depth> 5.94"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

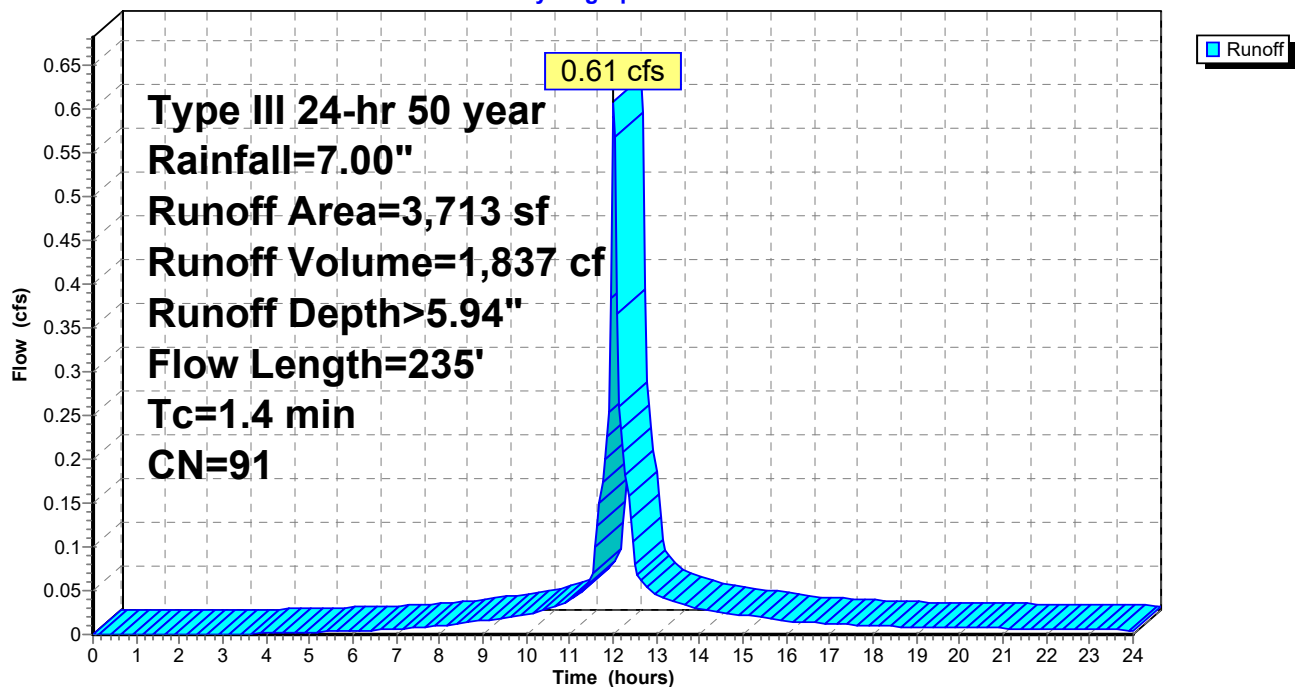
Type III 24-hr 50 year Rainfall=7.00"

Area (sf)	CN	Description
0	98	Roofs, HSG B
0	98	Paved parking, HSG B
3,012	98	Paved roads w/curbs & sewers, HSG B
701	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
3,713	91	Weighted Average
701		Pervious Area
3,012		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0400	1.58		Sheet Flow, SHEET
					Smooth surfaces n= 0.011 P2= 3.20"
0.9	185	0.0282	3.41		Shallow Concentrated Flow, PAVEMENT
					Paved Kv= 20.3 fps
1.4	235	Total			

Subcatchment P-1D: P-1D

Hydrograph



Summary for Subcatchment P-1E: P-1E

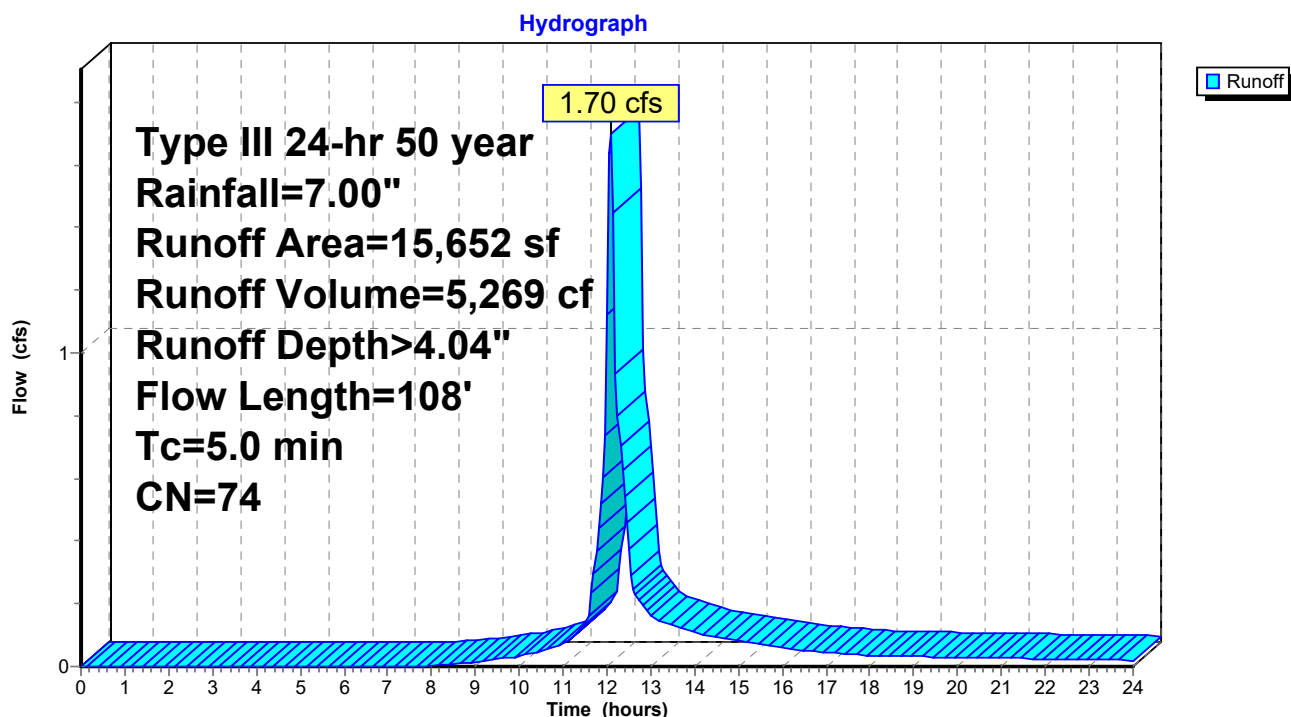
Runoff = 1.70 cfs @ 12.08 hrs, Volume= 5,269 cf, Depth> 4.04"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 50 year Rainfall=7.00"

Area (sf)	CN	Description
880	98	Roofs, HSG B
0	98	Paved parking, HSG B
0	98	Paved roads w/curbs & sewers, HSG B
8,844	61	>75% Grass cover, Good, HSG B
4,928	98	Water Surface, HSG B
1,000	55	Woods, Good, HSG B
15,652	74	Weighted Average
9,844		Pervious Area
5,808		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4					Direct Entry, DIRECT
3.3	50	0.0760	0.25		Sheet Flow, SHEET
					Grass: Short n= 0.150 P2= 3.20"
0.3	58	0.1897	3.05		Shallow Concentrated Flow, GRASS
					Short Grass Pasture Kv= 7.0 fps
5.0	108	Total			

Subcatchment P-1E: P-1E

Summary for Subcatchment P-1F: P-1F

Runoff = 2.95 cfs @ 12.07 hrs, Volume= 9,426 cf, Depth> 5.48"

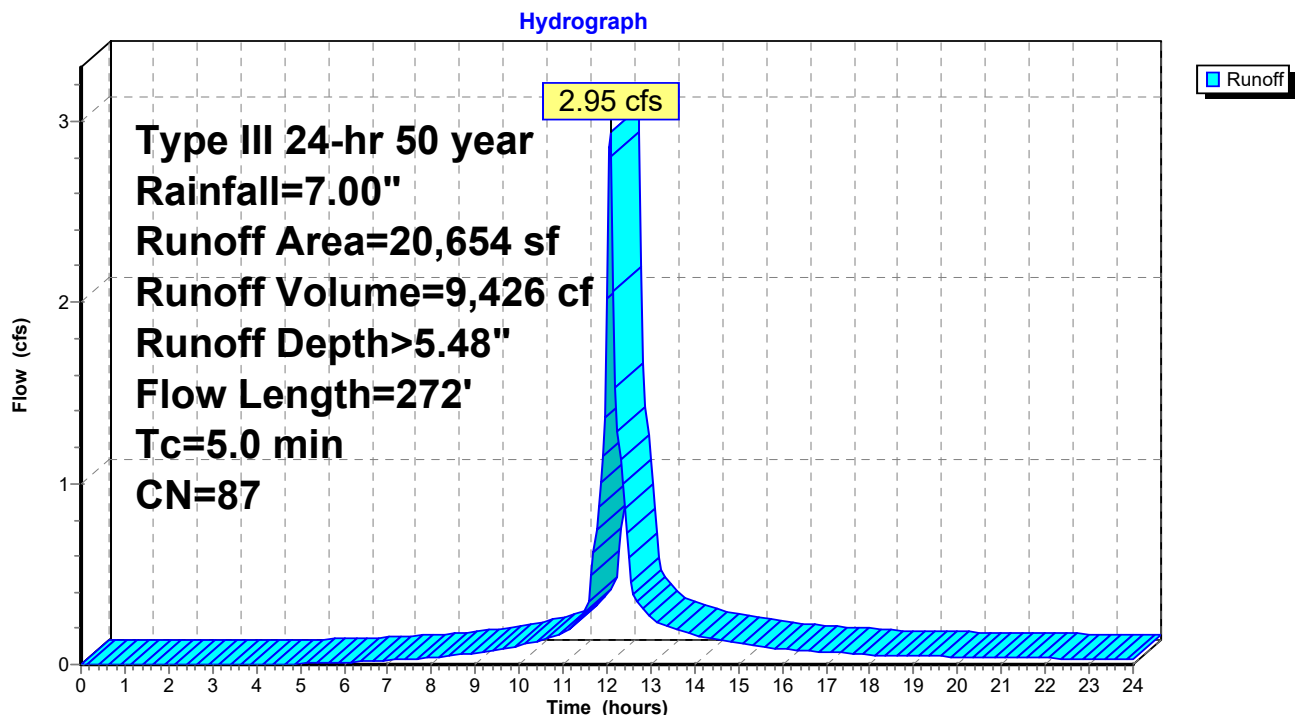
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 50 year Rainfall=7.00"

Area (sf)	CN	Description
4,840	98	Roofs, HSG B
0	98	Paved parking, HSG B
9,476	98	Paved roads w/curbs & sewers, HSG B
6,338	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
0	98	Water Surface, HSG B
20,654	87	Weighted Average
6,338		Pervious Area
14,316		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0					Direct Entry, DIRECT
3.0	50	0.1000	0.28		Sheet Flow, SHEET
					Grass: Short n= 0.150 P2= 3.20"
2.0	222	0.0676	1.82		Shallow Concentrated Flow, GRASS
					Short Grass Pasture Kv= 7.0 fps
5.0	272	Total			

Subcatchment P-1F: P-1F



Summary for Subcatchment P-1G: P-1I

Runoff = 0.80 cfs @ 12.07 hrs, Volume= 2,525 cf, Depth> 5.25"

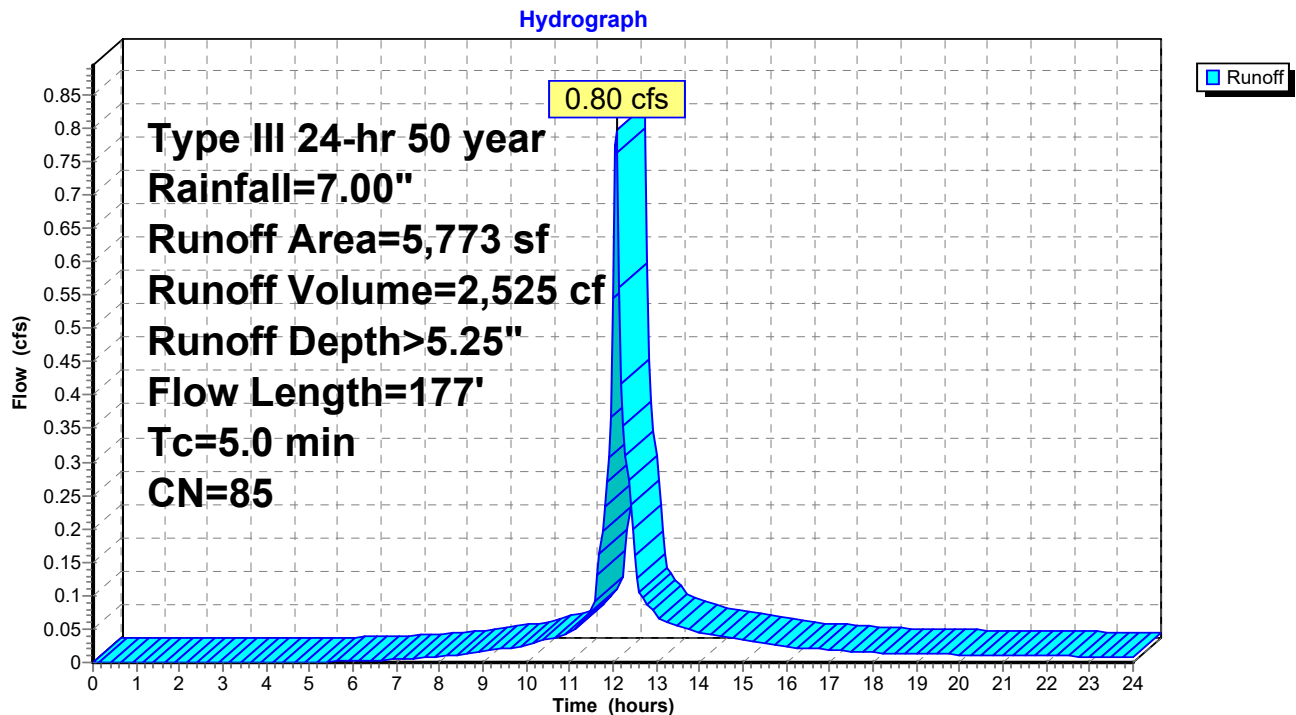
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 50 year Rainfall=7.00"

Area (sf)	CN	Description
0	55	Woods, Good, HSG B
2,064	61	>75% Grass cover, Good, HSG B
440	98	Roofs, HSG B
3,269	98	Paved roads w/curbs & sewers, HSG B
5,773	85	Weighted Average
2,064		Pervious Area
3,709		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7					Direct Entry, DIRECT
0.6	50	0.0300	1.41		Sheet Flow, SHEET FLOW
					Smooth surfaces n= 0.011 P2= 3.20"
0.7	127	0.0197	2.85		Shallow Concentrated Flow, PAVED
					Paved Kv= 20.3 fps
5.0	177	Total			

Subcatchment P-1G: P-1I



Summary for Subcatchment P-1H: P-1H

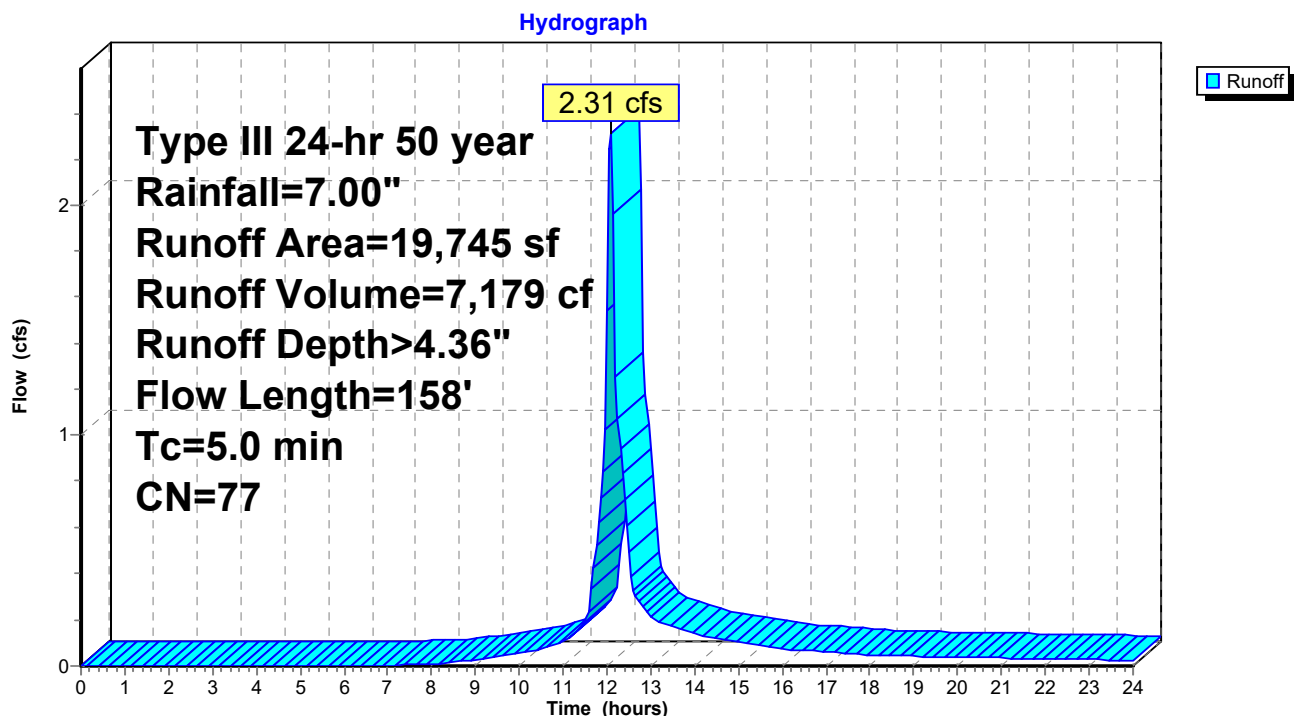
Runoff = 2.31 cfs @ 12.08 hrs, Volume= 7,179 cf, Depth> 4.36"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 50 year Rainfall=7.00"

Area (sf)	CN	Description
5,720	98	Roofs, HSG B
0	98	Paved parking, HSG B
2,679	98	Paved roads w/curbs & sewers, HSG B
11,346	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
19,745	77	Weighted Average
11,346		Pervious Area
8,399		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.8					Direct Entry, DIRECT
0.6	50	0.0300	1.41		Sheet Flow, SHEET
					Smooth surfaces n= 0.011 P2= 3.20"
0.6	108	0.0231	3.09		Shallow Concentrated Flow, PAVEMENT
					Paved Kv= 20.3 fps
5.0	158	Total			

Subcatchment P-1H: P-1H

Summary for Subcatchment P-1I: P-1I

Runoff = 2.84 cfs @ 12.12 hrs, Volume= 9,669 cf, Depth> 3.30"

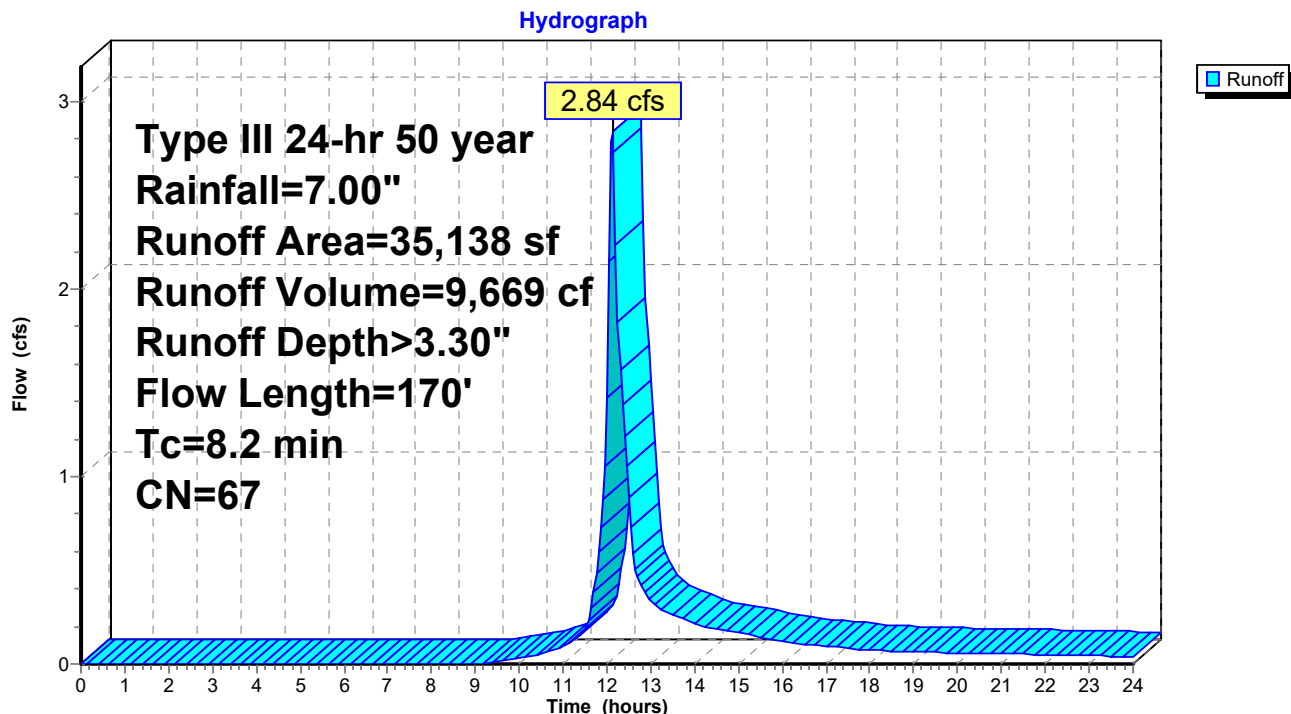
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 50 year Rainfall=7.00"

Area (sf)	CN	Description
440	98	Roofs, HSG B
0	98	Paved parking, HSG B
0	98	Paved roads w/curbs & sewers, HSG B
29,518	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
5,180	98	Water Surface, HSG B
35,138	67	Weighted Average
29,518		Pervious Area
5,620		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.1000	0.13		Sheet Flow, SHEET
					Woods: Light underbrush n= 0.400 P2= 3.20"
1.7	120	0.0580	1.20		Shallow Concentrated Flow, GRASS
					Woodland Kv= 5.0 fps
8.2	170	Total			

Subcatchment P-1I: P-1I



Summary for Subcatchment P-1J: P1-J

Runoff = 1.67 cfs @ 12.10 hrs, Volume= 5,543 cf, Depth> 2.31"

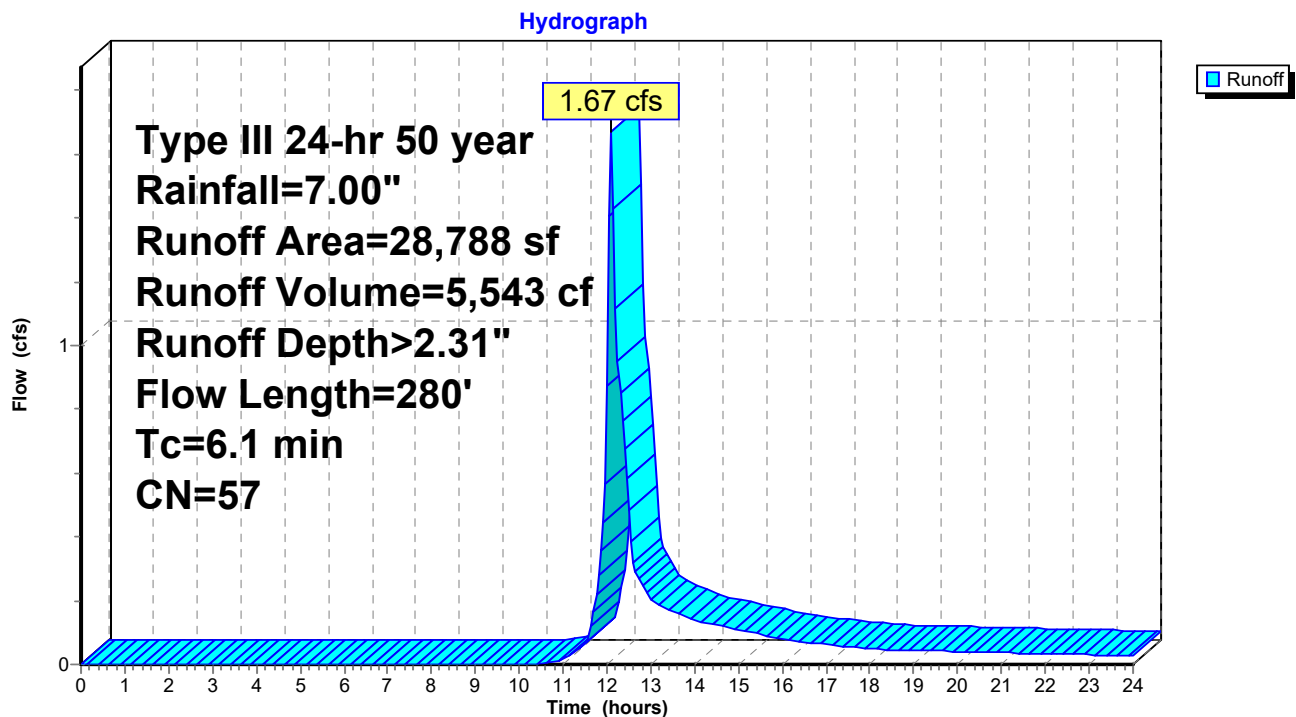
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 50 year Rainfall=7.00"

Area (sf)	CN	Description
21,119	55	Woods, Good, HSG B
7,579	61	>75% Grass cover, Good, HSG B
* 90	98	Paved roads w/curbs & sewers, HSG B
28,788	57	Weighted Average
28,698		Pervious Area
90		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.2	50	0.0800	0.26		Sheet Flow, Flow over grass Grass: Short n= 0.150 P2= 3.20"
2.9	230	0.0690	1.31		Shallow Concentrated Flow, Flow in woods Woodland Kv= 5.0 fps
6.1	280	Total			

Subcatchment P-1J: P1-J



Summary for Subcatchment P-2A: P-2A

Runoff = 2.86 cfs @ 12.08 hrs, Volume= 9,042 cf, Depth> 2.70"

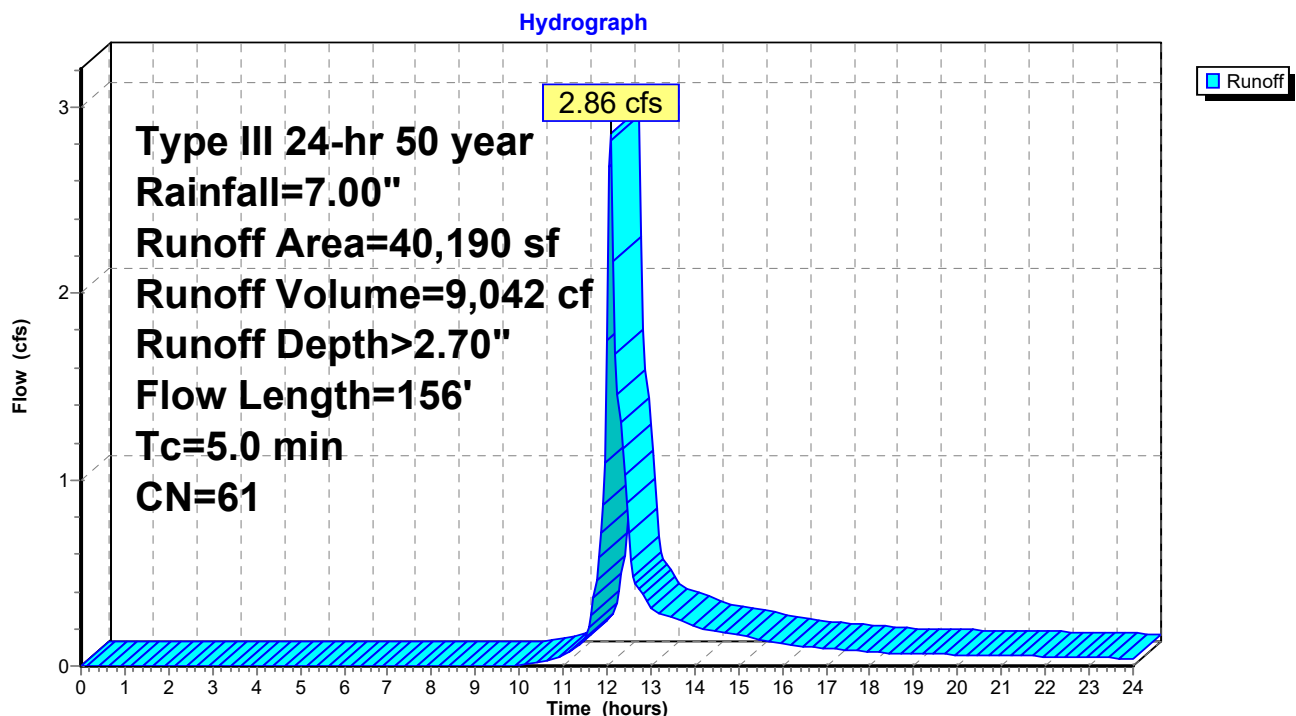
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 50 year Rainfall=7.00"

Area (sf)	CN	Description
4,400	98	Roofs, HSG B
0	98	Paved parking, HSG B
0	98	Paved roads w/curbs & sewers, HSG B
10,645	61	>75% Grass cover, Good, HSG B
25,145	55	Woods, Good, HSG B
40,190	61	Weighted Average
35,790		Pervious Area
4,400		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3					Direct Entry, DIRECT
3.9	50	0.0500	0.21		Sheet Flow, SHEET GRASS Grass: Short n= 0.150 P2= 3.20"
0.8	106	0.1085	2.31		Shallow Concentrated Flow, GRASS SHALLOW Short Grass Pasture Kv= 7.0 fps
5.0	156	Total			

Subcatchment P-2A: P-2A



Summary for Subcatchment P-3A: P-3A

Runoff = 1.92 cfs @ 12.09 hrs, Volume= 6,165 cf, Depth> 2.41"

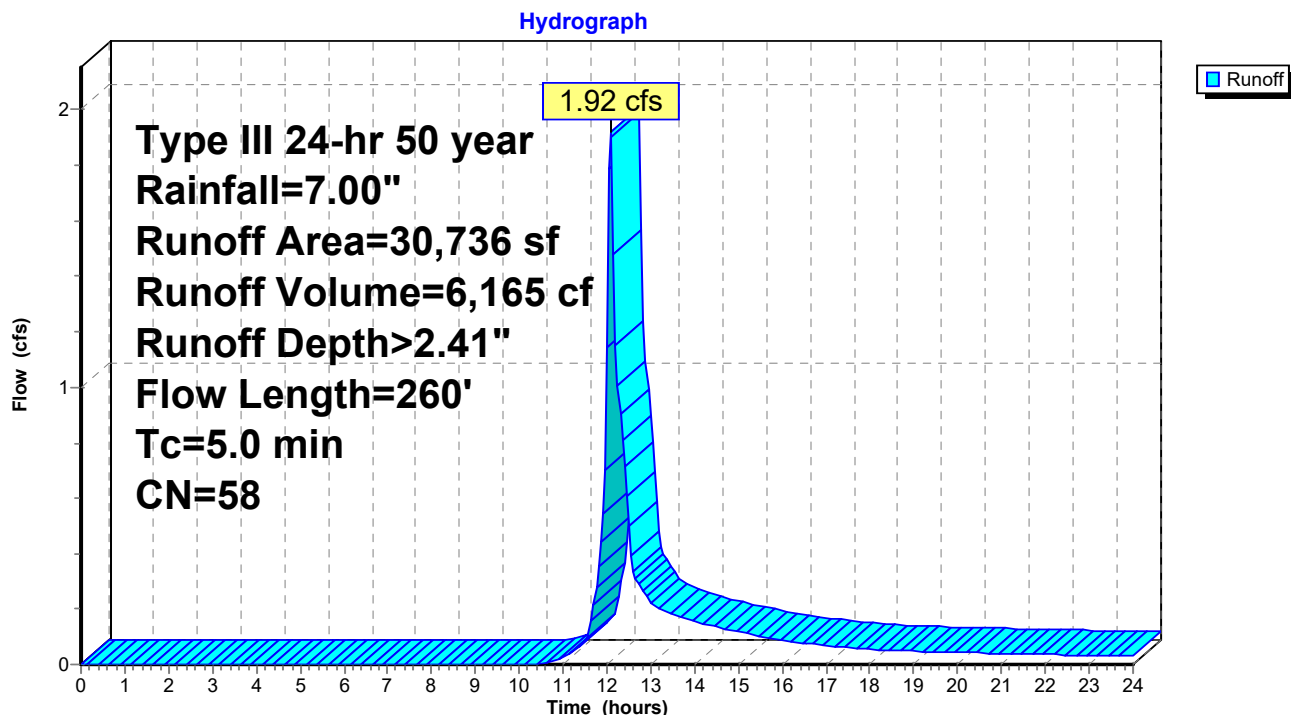
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 50 year Rainfall=7.00"

Area (sf)	CN	Description
0	98	Roofs, HSG B
0	98	Unconnected pavement, HSG B
0	98	Paved roads w/curbs & sewers, HSG B
13,964	61	>75% Grass cover, Good, HSG B
16,772	55	Woods, Good, HSG B
30,736	58	Weighted Average
30,736		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0					Direct Entry, DIRECT
2.0	50	0.2700	0.42		Sheet Flow, SHEET GRASS
					Grass: Short n= 0.150 P2= 3.20"
2.0	210	0.0595	1.71		Shallow Concentrated Flow, SHALLOW GRASS
					Short Grass Pasture Kv= 7.0 fps
5.0	260	Total			

Subcatchment P-3A: P-3A



Summary for Subcatchment P-3B: P-3B

Runoff = 7.81 cfs @ 12.08 hrs, Volume= 24,172 cf, Depth> 4.04"

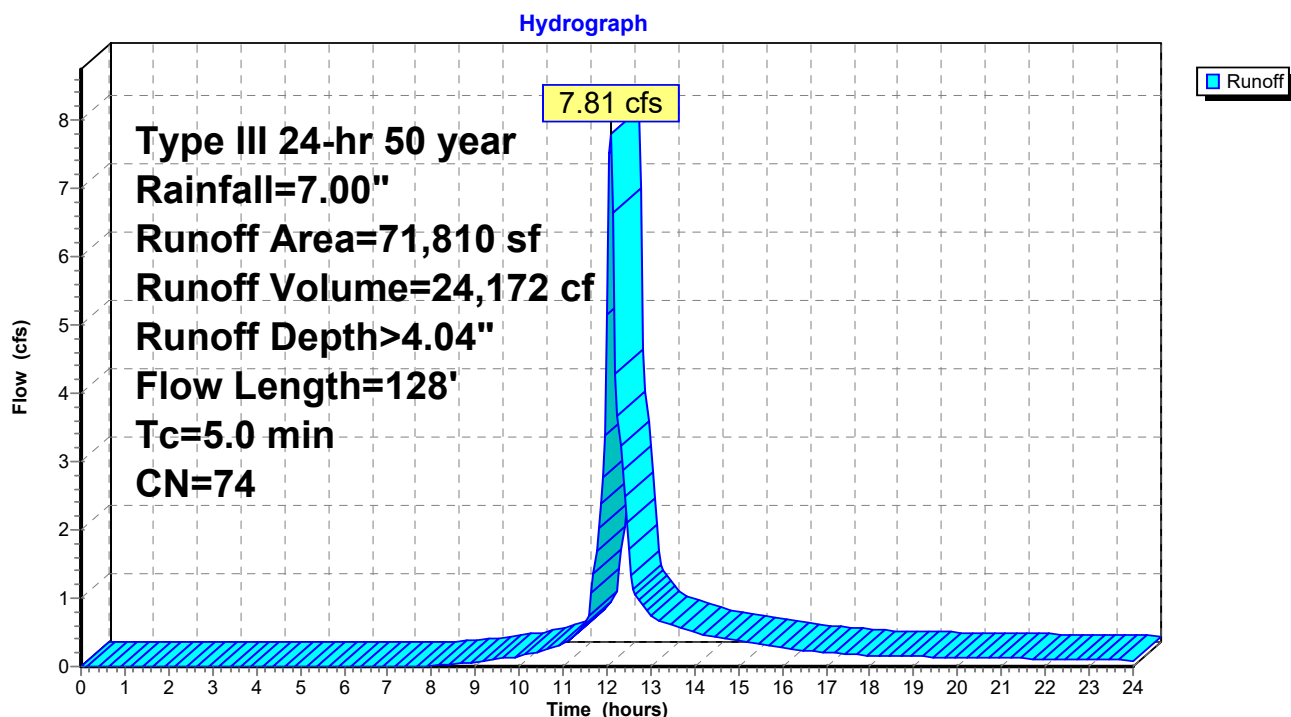
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 50 year Rainfall=7.00"

Area (sf)	CN	Description
15,400	98	Roofs, HSG B
0	98	Paved parking, HSG B
0	98	Paved roads w/curbs & sewers, HSG B
47,365	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
9,045	98	Water Surface, HSG B
71,810	74	Weighted Average
47,365		Pervious Area
24,445		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8					Direct Entry, DIRECT
2.7	50	0.1300	0.31		Sheet Flow, SHEET GRASS
					Grass: Short n= 0.150 P2= 3.20"
0.5	78	0.1218	2.44		Shallow Concentrated Flow, SHALLOW GRASS
					Short Grass Pasture Kv= 7.0 fps
5.0	128	Total			

Subcatchment P-3B: P-3B



Summary for Subcatchment P-3C: P-3C

Runoff = 5.13 cfs @ 12.07 hrs, Volume= 15,905 cf, Depth> 4.58"

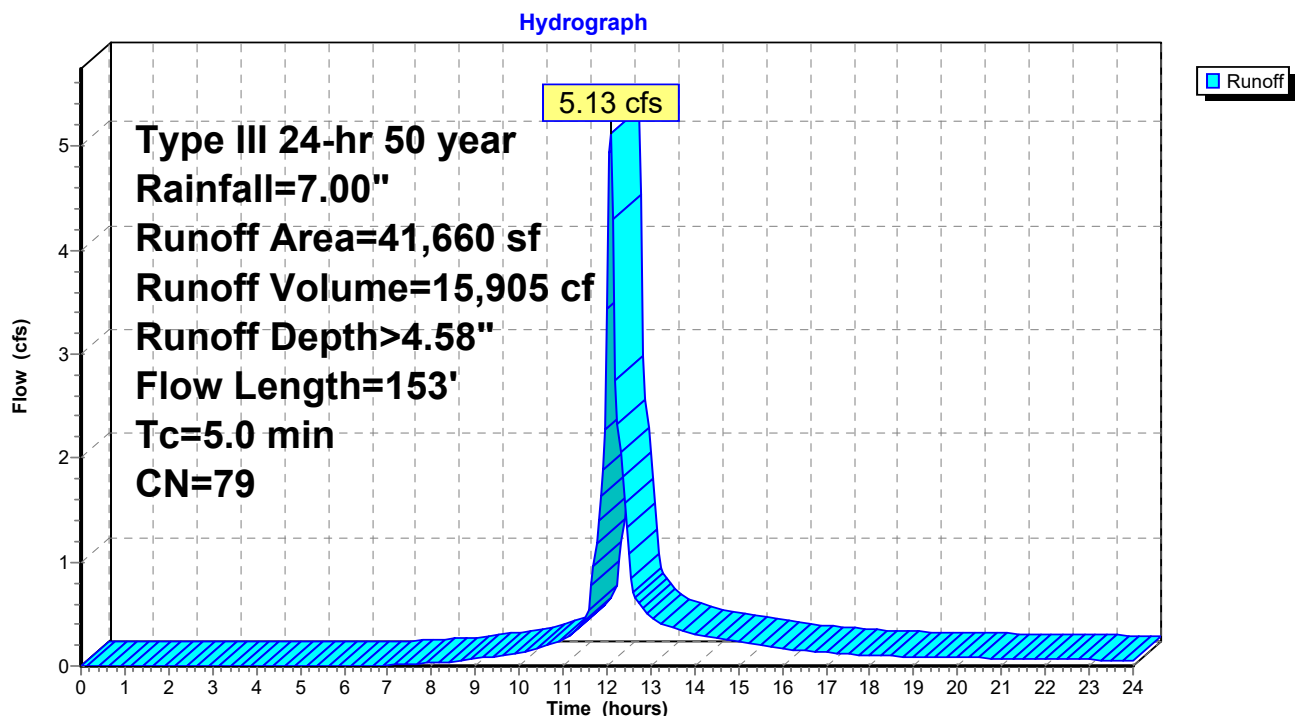
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 50 year Rainfall=7.00"

Area (sf)	CN	Description
3,520	98	Roofs, HSG B
0	98	Paved parking, HSG B
16,527	98	Paved roads w/curbs & sewers, HSG B
21,613	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
41,660	79	Weighted Average
21,613		Pervious Area
20,047		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3					Direct Entry, DIRECT
0.9	50	0.0096	0.89		Sheet Flow, SHEET PAVEMENT Smooth surfaces n= 0.011 P2= 3.20"
0.8	103	0.0116	2.19		Shallow Concentrated Flow, SHALLOW PAVEMENT Paved Kv= 20.3 fps
5.0	153	Total			

Subcatchment P-3C: P-3C



Summary for Subcatchment P-3D: P-3D

Runoff = 2.94 cfs @ 12.07 hrs, Volume= 9,203 cf, Depth> 4.91"

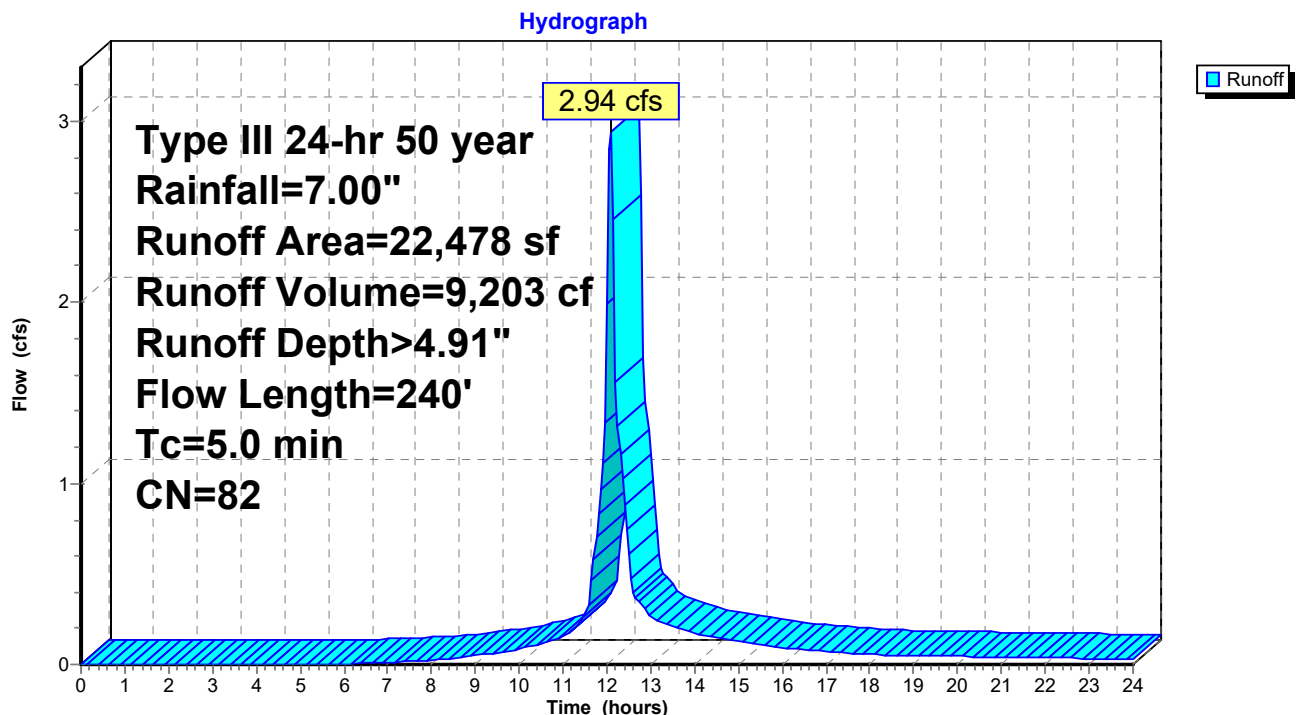
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 50 year Rainfall=7.00"

Area (sf)	CN	Description
6,160	98	Roofs, HSG B
6,458	98	Paved roads w/curbs & sewers, HSG B
9,860	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
22,478	82	Weighted Average
9,860		Pervious Area
12,618		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1					Direct Entry, DIRECT
1.3	50	0.0040	0.63		Sheet Flow, SHEET PAVEMENT
					Smooth surfaces n= 0.011 P2= 3.20"
1.6	190	0.0095	1.98		Shallow Concentrated Flow, SHALLOW PAVEMENT
					Paved Kv= 20.3 fps
5.0	240	Total			

Subcatchment P-3D: P-3D



Summary for Subcatchment P-3E: P-3F

Runoff = 0.64 cfs @ 12.07 hrs, Volume= 2,024 cf, Depth> 5.36"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

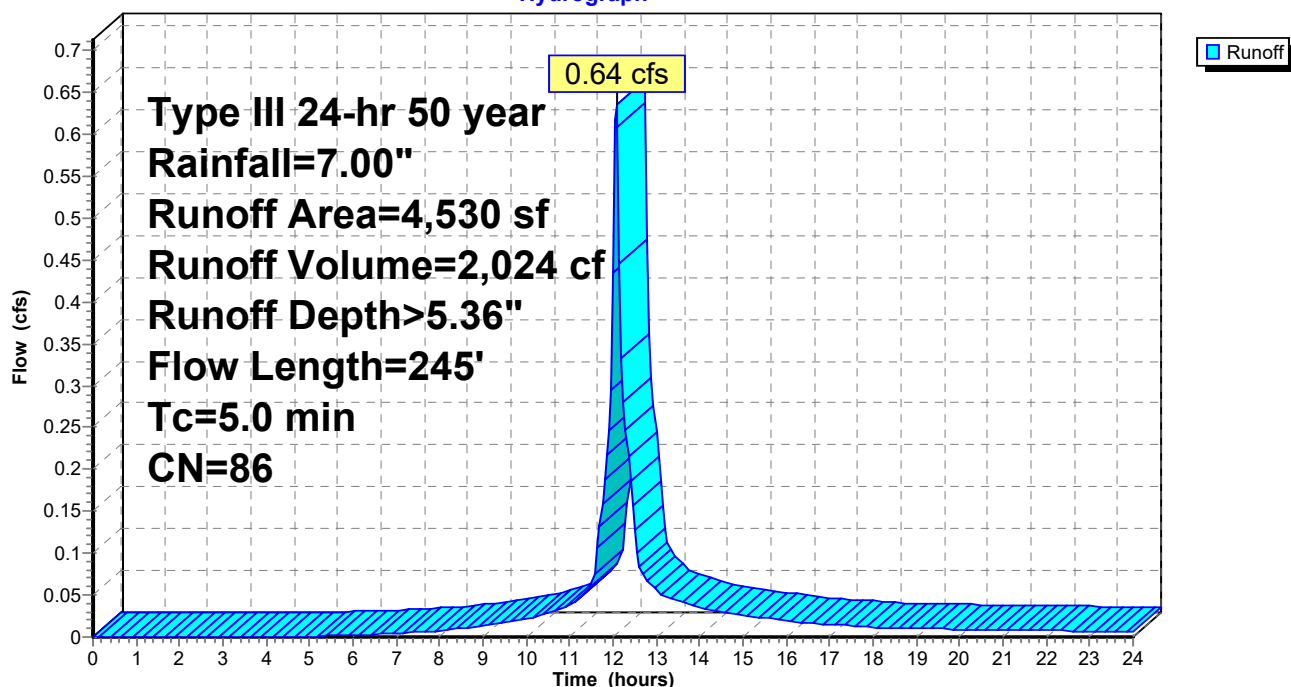
Type III 24-hr 50 year Rainfall=7.00"

Area (sf)	CN	Description
440	98	Roofs, HSG B
0	98	Paved parking, HSG B
2,664	98	Paved roads w/curbs & sewers, HSG B
1,426	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
4,530	86	Weighted Average
1,426		Pervious Area
3,104		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0					Direct Entry, DIRECT
1.3	50	0.0040	0.63		Sheet Flow, SHEET PAVEMENT Smooth surfaces n= 0.011 P2= 3.20"
1.7	195	0.0092	1.95		Shallow Concentrated Flow, SHALLOW PAVEMENT Paved Kv= 20.3 fps
5.0	245	Total			

Subcatchment P-3E: P-3F

Hydrograph



Summary for Pond 3P: INFILTRATOR

Routing by Dyn-Stor-Ind method

Peak Elev= 0.00' @ 0.00 hrs Surf.Area= 50 sf Storage= 0 cf

Plug-Flow detention time= (not calculated)

Center-of-Mass det. time= (not calculated)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	52 cf	5.00'W x 10.00'L x 3.50'H Prismatoid 175 cf Overall - 46 cf Embedded = 129 cf x 40.0% Voids
#2	0.00'	46 cf	44.6"W x 30.0"H x 7.12'L StormTech SC-740 Inside #1
		98 cf	Total Available Storage

Summary for Pond CB1: CB1

Inflow Area = 3,632 sf, 56.17% Impervious, Inflow Depth > 4.92" for 50 year event
 Inflow = 0.52 cfs @ 12.03 hrs, Volume= 1,488 cf
 Outflow = 0.52 cfs @ 12.03 hrs, Volume= 1,488 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.52 cfs @ 12.03 hrs, Volume= 1,488 cf

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

Peak Elev= 52.26' @ 12.57 hrs

Flood Elev= 53.86'

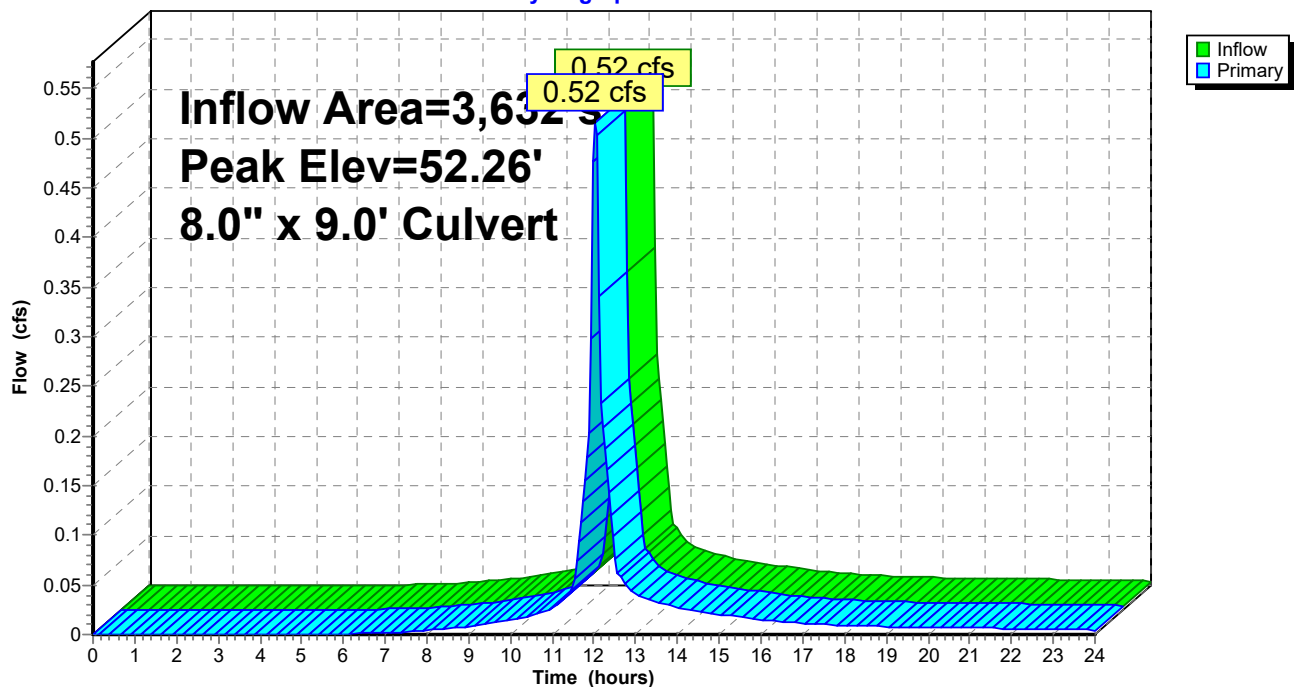
Device	Routing	Invert	Outlet Devices
#1	Primary	50.60'	8.0" x 9.0' long Culvert RCP, groove end projecting, Ke= 0.200 Outlet Invert= 50.50' S= 0.0111 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.00 cfs @ 12.03 hrs HW=51.32' TW=51.49' (Dynamic Tailwater)

↑1=Culvert (Controls 0.00 cfs)

Pond CB1: CB1

Hydrograph



Summary for Pond CB2: CB2

Inflow Area = 3,713 sf, 81.12% Impervious, Inflow Depth > 5.94" for 50 year event
 Inflow = 0.61 cfs @ 12.02 hrs, Volume= 1,837 cf
 Outflow = 0.61 cfs @ 12.02 hrs, Volume= 1,837 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.61 cfs @ 12.02 hrs, Volume= 1,837 cf

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

Peak Elev= 52.26' @ 12.57 hrs

Flood Elev= 53.86'

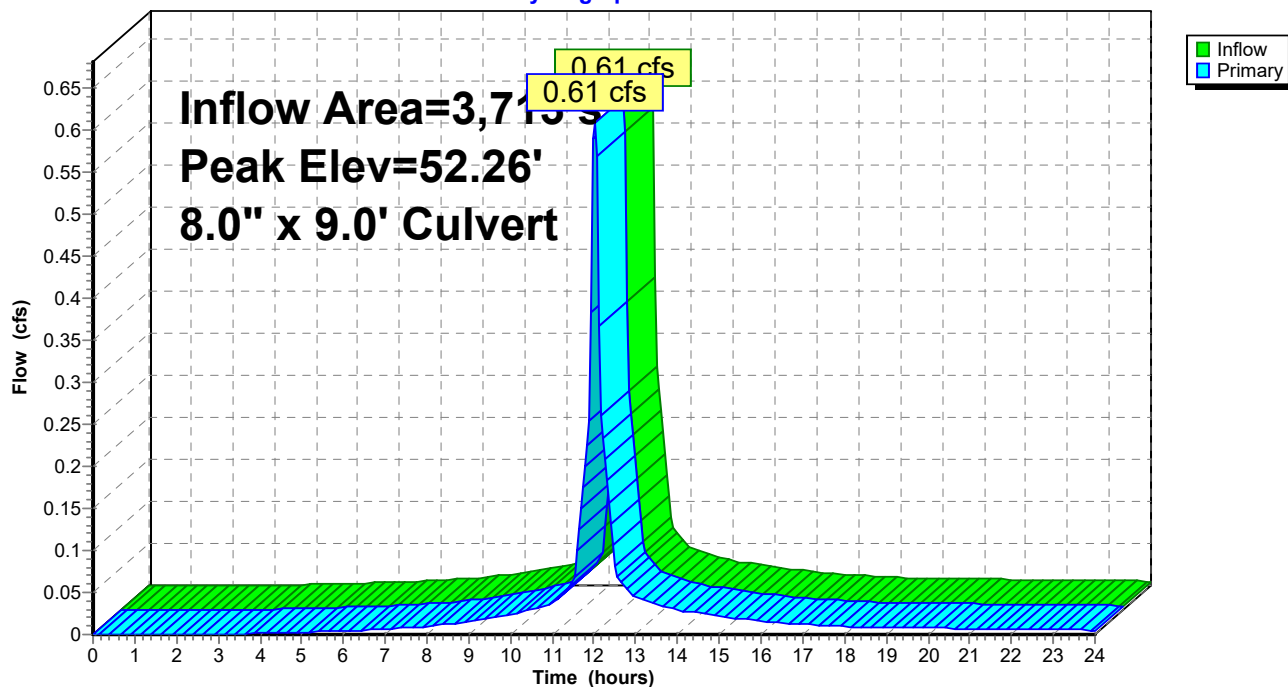
Device	Routing	Invert	Outlet Devices
#1	Primary	50.60'	8.0" x 9.0' long Culvert RCP, groove end projecting, Ke= 0.200 Outlet Invert= 50.50' S= 0.0111 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.00 cfs @ 12.02 hrs HW=51.30' TW=51.43' (Dynamic Tailwater)

↑1=Culvert (Controls 0.00 cfs)

Pond CB2: CB2

Hydrograph



Summary for Pond CB3: CB3

Inflow Area = 12,786 sf, 39.18% Impervious, Inflow Depth > 4.15" for 50 year event
 Inflow = 1.43 cfs @ 12.08 hrs, Volume= 4,418 cf
 Outflow = 1.43 cfs @ 12.08 hrs, Volume= 4,418 cf, Atten= 0%, Lag= 0.0 min
 Primary = 1.43 cfs @ 12.08 hrs, Volume= 4,418 cf

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

Peak Elev= 54.80' @ 12.14 hrs

Flood Elev= 54.77'

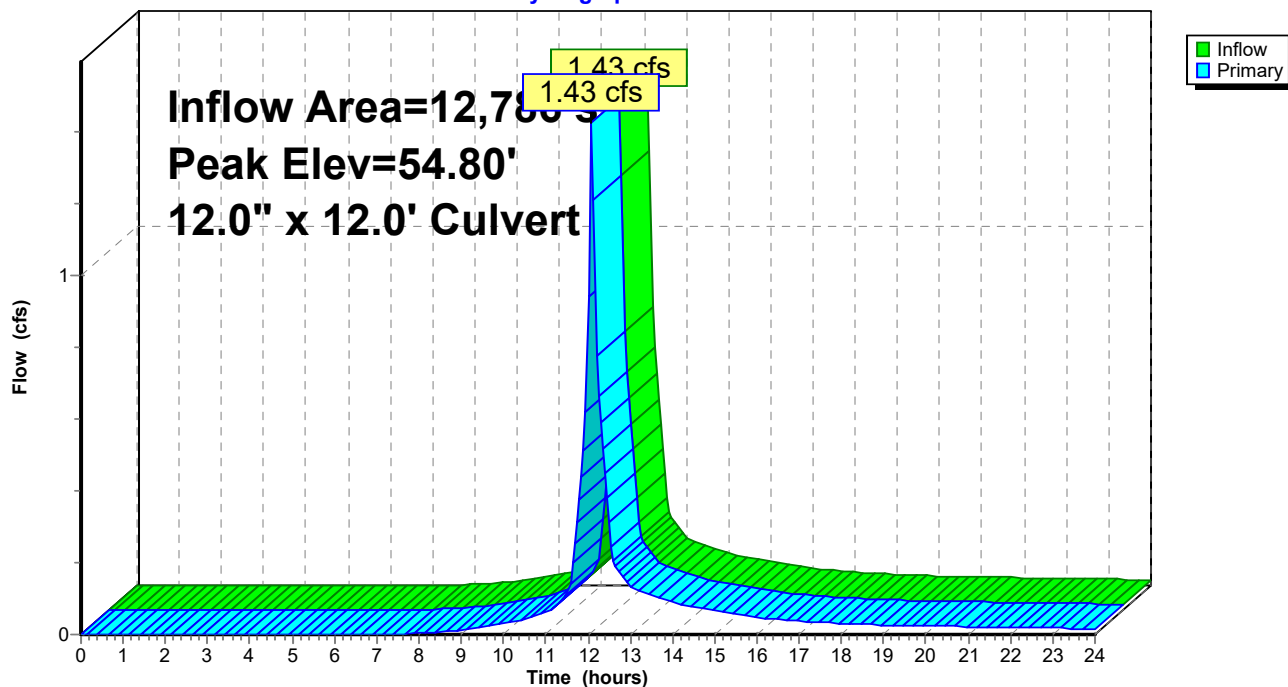
Device	Routing	Invert	Outlet Devices
#1	Primary	52.34'	12.0" x 12.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 52.28' S= 0.0050 '/ Cc= 0.900 n= 0.011 Concrete pipe, straight & clean

Primary OutFlow Max=0.00 cfs @ 12.08 hrs HW=54.21' TW=54.60' (Dynamic Tailwater)

↑1=Culvert (Controls 0.00 cfs)

Pond CB3: CB3

Hydrograph



Summary for Pond CB4: CB4

Inflow Area = 20,654 sf, 69.31% Impervious, Inflow Depth > 5.48" for 50 year event
 Inflow = 2.95 cfs @ 12.07 hrs, Volume= 9,426 cf
 Outflow = 2.95 cfs @ 12.07 hrs, Volume= 9,426 cf, Atten= 0%, Lag= 0.0 min
 Primary = 2.95 cfs @ 12.07 hrs, Volume= 9,426 cf

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

Peak Elev= 55.12' @ 12.12 hrs

Flood Elev= 54.77'

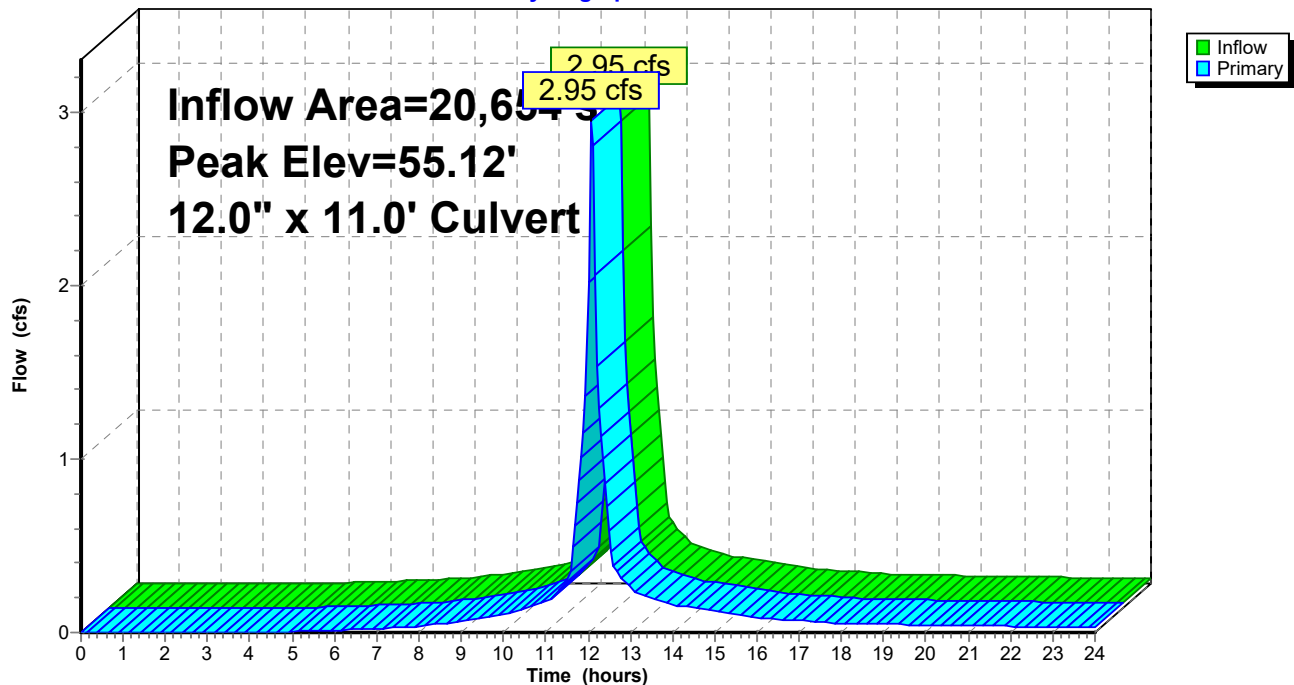
Device	Routing	Invert	Outlet Devices
#1	Primary	52.34'	12.0" x 11.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 52.28' S= 0.0055 ' /' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean

Primary OutFlow Max=0.00 cfs @ 12.07 hrs HW=54.57' TW=54.58' (Dynamic Tailwater)

↑1=Culvert (Controls 0.00 cfs)

Pond CB4: CB4

Hydrograph



Summary for Pond CB5: CB5

Inflow Area = 19,745 sf, 42.54% Impervious, Inflow Depth > 4.36" for 50 year event
 Inflow = 2.31 cfs @ 12.08 hrs, Volume= 7,179 cf
 Outflow = 2.31 cfs @ 12.08 hrs, Volume= 7,179 cf, Atten= 0%, Lag= 0.0 min
 Primary = 2.31 cfs @ 12.08 hrs, Volume= 7,179 cf

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

Peak Elev= 61.94' @ 12.08 hrs

Flood Elev= 65.00'

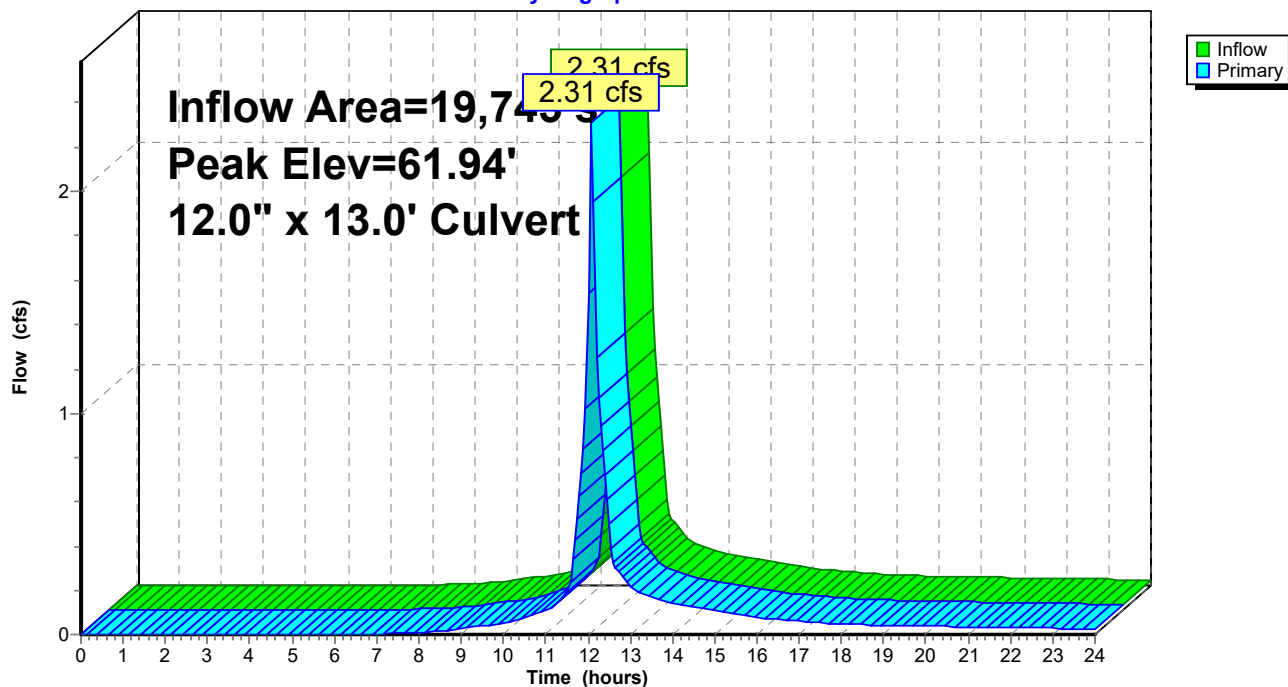
Device	Routing	Invert	Outlet Devices
#1	Primary	61.00'	12.0" x 13.0' long Culvert RCP, groove end projecting, Ke= 0.200 Outlet Invert= 60.87' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=2.24 cfs @ 12.08 hrs HW=61.92' TW=59.38' (Dynamic Tailwater)

↑1=Culvert (Barrel Controls 2.24 cfs @ 3.89 fps)

Pond CB5: CB5

Hydrograph



Summary for Pond CB6: CB6

Inflow Area = 5,773 sf, 64.25% Impervious, Inflow Depth > 5.25" for 50 year event
 Inflow = 0.80 cfs @ 12.07 hrs, Volume= 2,525 cf
 Outflow = 0.80 cfs @ 12.07 hrs, Volume= 2,525 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.80 cfs @ 12.07 hrs, Volume= 2,525 cf

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

Peak Elev= 61.51' @ 12.07 hrs

Flood Elev= 65.00'

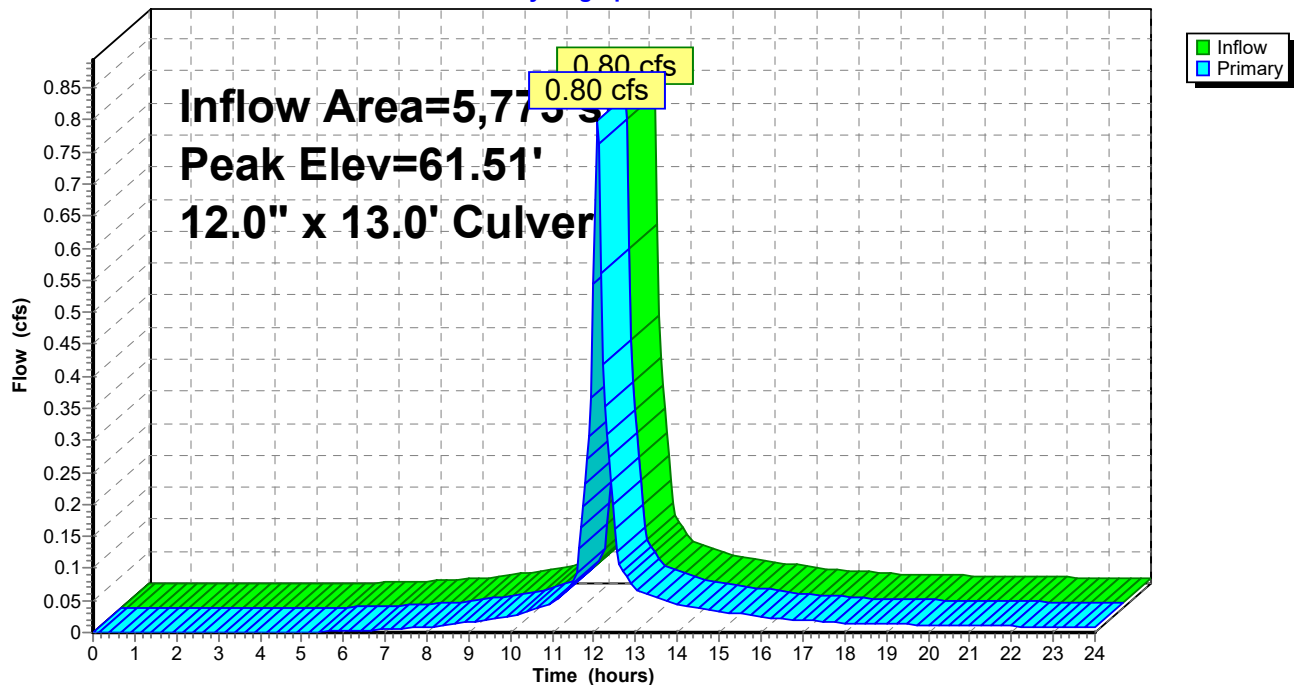
Device	Routing	Invert	Outlet Devices
#1	Primary	61.00'	12.0" x 13.0' long Culvert CPP, square edge headwall, Ke= 0.500 Outlet Invert= 60.87' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.77 cfs @ 12.07 hrs HW=61.50' TW=59.38' (Dynamic Tailwater)

1=Culvert (Barrel Controls 0.77 cfs @ 2.84 fps)

Pond CB6: CB6

Hydrograph



Summary for Pond CB7: CB7

Inflow Area = 4,530 sf, 68.52% Impervious, Inflow Depth > 5.36" for 50 year event
 Inflow = 0.64 cfs @ 12.07 hrs, Volume= 2,024 cf
 Outflow = 0.64 cfs @ 12.07 hrs, Volume= 2,024 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.64 cfs @ 12.07 hrs, Volume= 2,024 cf

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

Peak Elev= 67.75' @ 12.47 hrs

Flood Elev= 69.00'

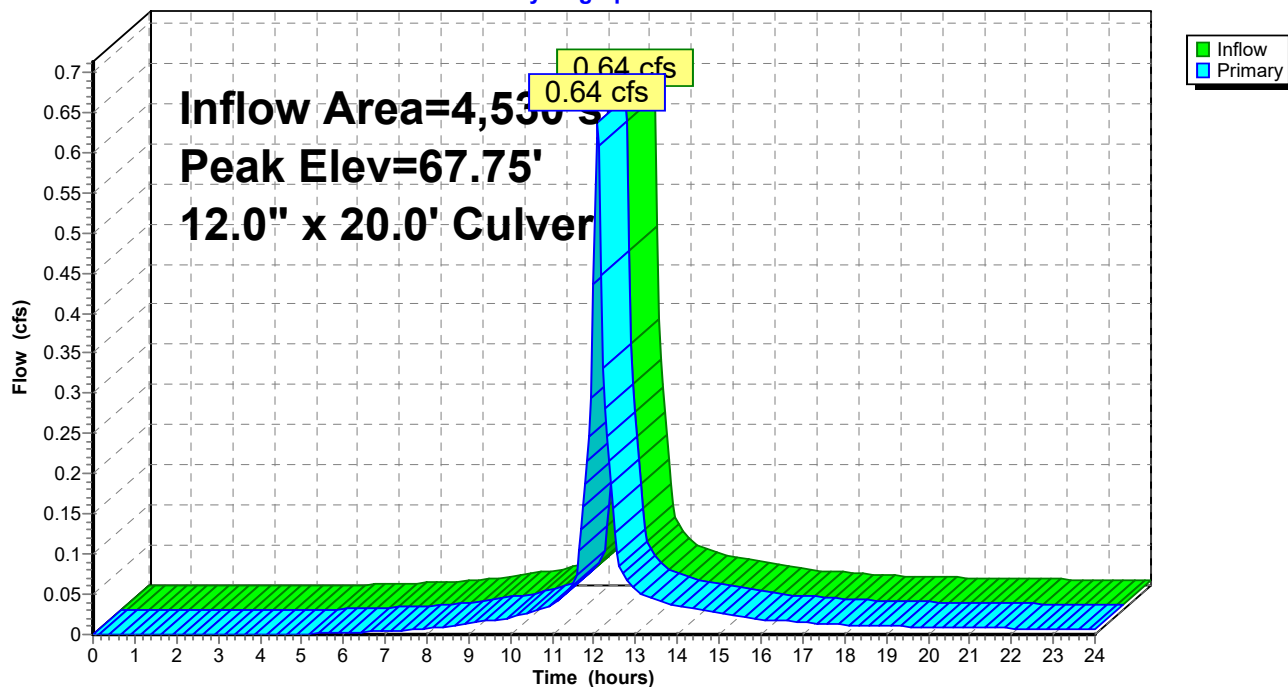
Device	Routing	Invert	Outlet Devices
#1	Primary	65.91'	12.0" x 20.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 65.81' S= 0.0050 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.00 cfs @ 12.07 hrs HW=66.81' TW=66.97' (Dynamic Tailwater)

↑1=Culvert (Controls 0.00 cfs)

Pond CB7: CB7

Hydrograph



Summary for Pond CB8: CB8

Inflow Area = 22,478 sf, 56.13% Impervious, Inflow Depth > 4.91" for 50 year event
 Inflow = 2.94 cfs @ 12.07 hrs, Volume= 9,203 cf
 Outflow = 2.94 cfs @ 12.07 hrs, Volume= 9,203 cf, Atten= 0%, Lag= 0.0 min
 Primary = 2.94 cfs @ 12.07 hrs, Volume= 9,203 cf

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

Peak Elev= 67.79' @ 12.46 hrs

Flood Elev= 69.00'

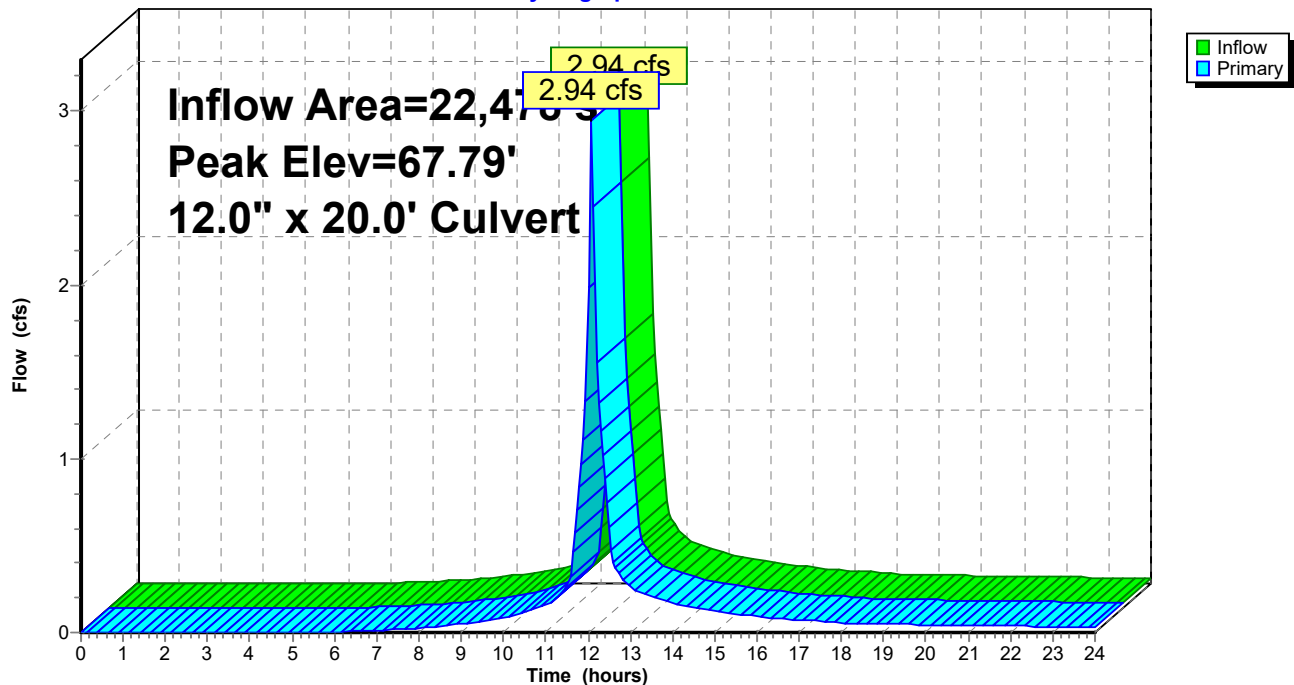
Device	Routing	Invert	Outlet Devices
#1	Primary	65.91'	12.0" x 20.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 65.81' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=2.28 cfs @ 12.07 hrs HW=67.34' TW=66.98' (Dynamic Tailwater)

↑1=Culvert (Inlet Controls 2.28 cfs @ 2.90 fps)

Pond CB8: CB8

Hydrograph



Summary for Pond CB9: CB9

Inflow Area = 41,660 sf, 48.12% Impervious, Inflow Depth > 4.58" for 50 year event
 Inflow = 5.13 cfs @ 12.07 hrs, Volume= 15,905 cf
 Outflow = 5.13 cfs @ 12.07 hrs, Volume= 15,905 cf, Atten= 0%, Lag= 0.0 min
 Primary = 5.13 cfs @ 12.07 hrs, Volume= 15,905 cf

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

Peak Elev= 69.70' @ 12.11 hrs

Flood Elev= 69.40'

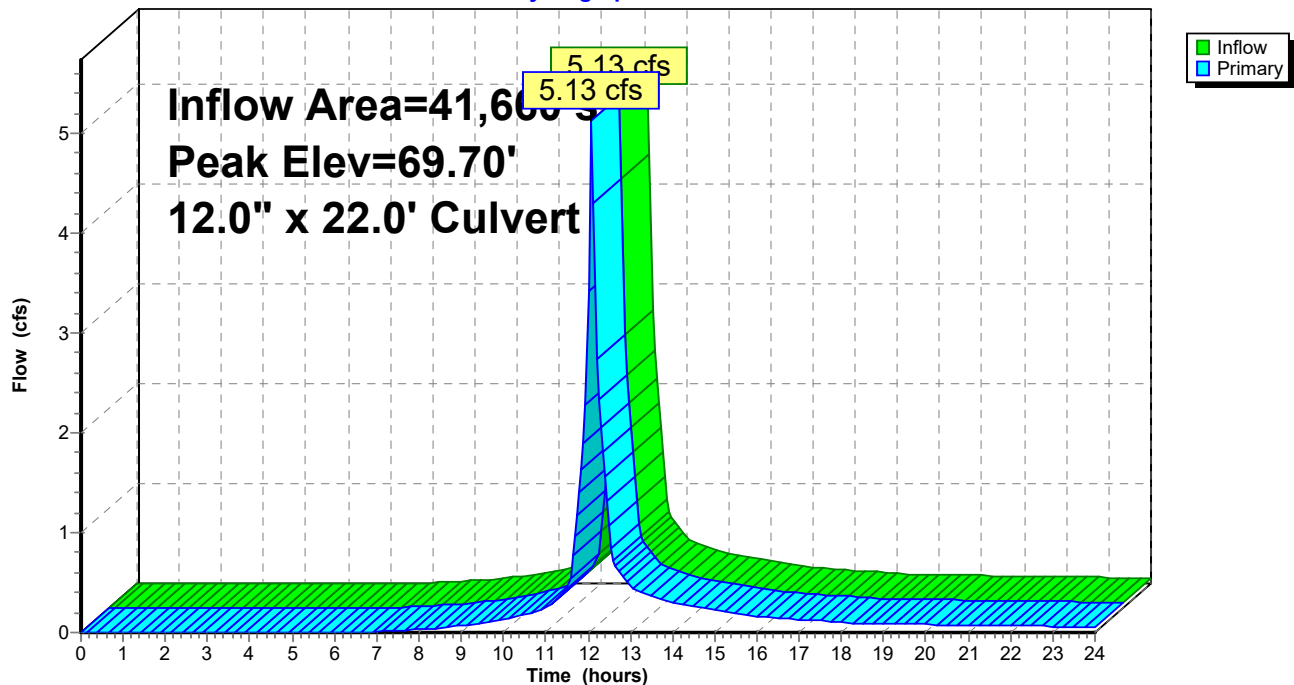
Device	Routing	Invert	Outlet Devices
#1	Primary	65.11'	12.0" x 22.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 65.00' S= 0.0050 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=3.74 cfs @ 12.07 hrs HW=69.11' TW=68.13' (Dynamic Tailwater)

↑ **1=Culvert** (Inlet Controls 3.74 cfs @ 4.76 fps)

Pond CB9: CB9

Hydrograph



Summary for Pond DMH 10: DMH9

Inflow Area = 68,668 sf, 52.09% Impervious, Inflow Depth > 4.28" for 50 year event
 Inflow = 3.36 cfs @ 12.32 hrs, Volume= 24,516 cf
 Outflow = 3.36 cfs @ 12.32 hrs, Volume= 24,516 cf, Atten= 0%, Lag= 0.0 min
 Primary = 3.36 cfs @ 12.32 hrs, Volume= 24,516 cf

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

Peak Elev= 61.96' @ 12.32 hrs

Flood Elev= 69.78'

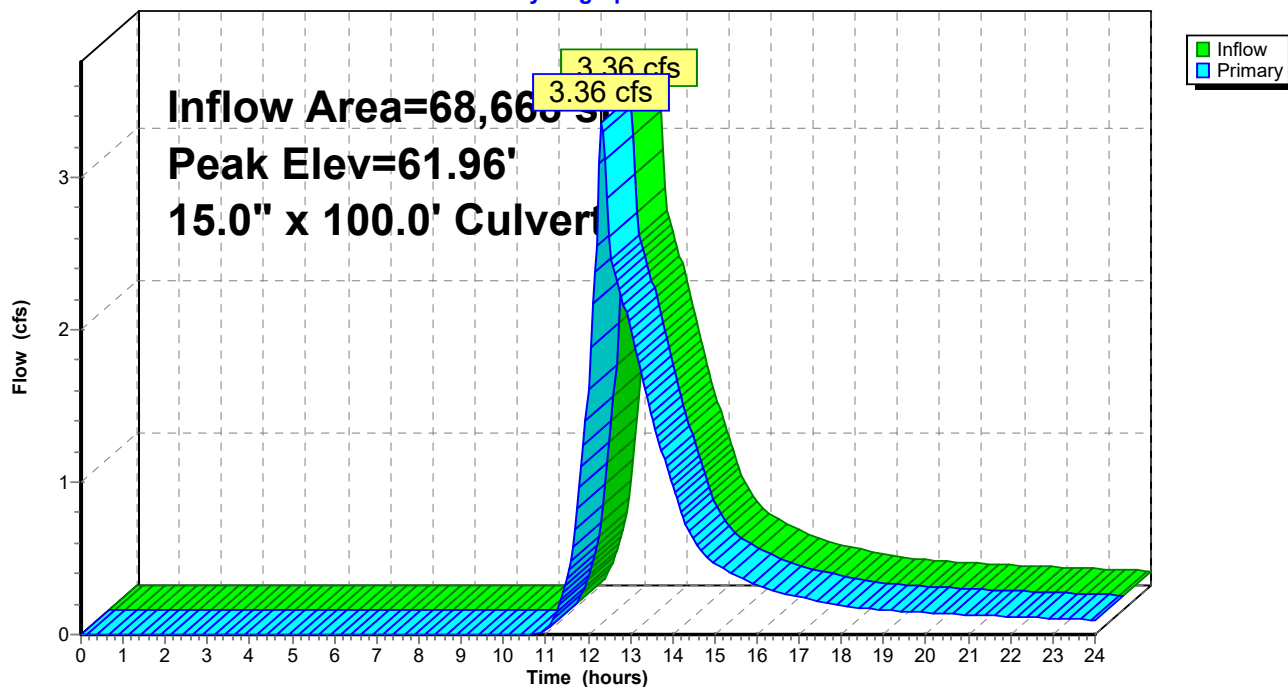
Device	Routing	Invert	Outlet Devices
#1	Primary	61.00'	15.0" x 100.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 56.00' S= 0.0500 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=3.33 cfs @ 12.32 hrs HW=61.95' TW=56.31' (Dynamic Tailwater)

↑ **1=Culvert** (Inlet Controls 3.33 cfs @ 3.32 fps)

Pond DMH 10: DMH9

Hydrograph



Summary for Pond DMH 11: DMH 10

Inflow Area = 68,668 sf, 52.09% Impervious, Inflow Depth > 4.28" for 50 year event
 Inflow = 3.36 cfs @ 12.32 hrs, Volume= 24,516 cf
 Outflow = 3.36 cfs @ 12.32 hrs, Volume= 24,516 cf, Atten= 0%, Lag= 0.0 min
 Primary = 3.36 cfs @ 12.32 hrs, Volume= 24,516 cf

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

Peak Elev= 56.32' @ 12.32 hrs

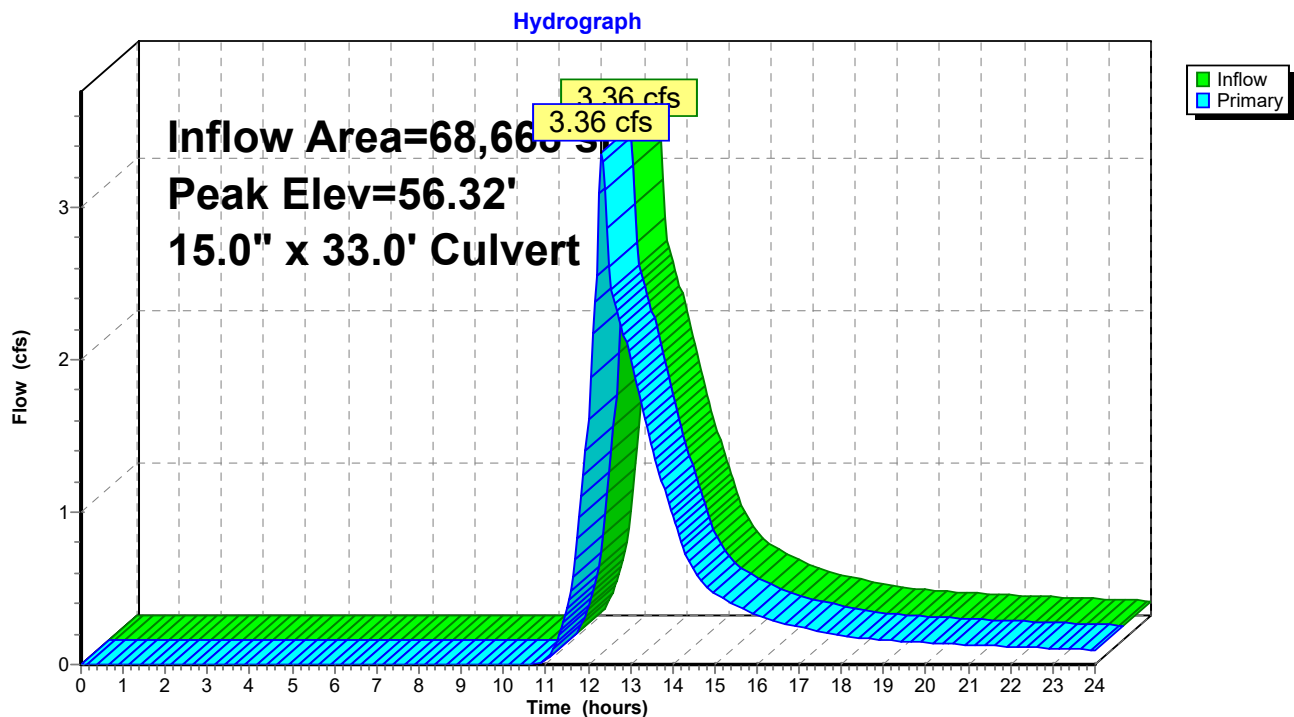
Flood Elev= 58.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	55.17'	15.0" x 33.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 55.00' S= 0.0052 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=3.33 cfs @ 12.32 hrs HW=56.31' TW=53.10' (Dynamic Tailwater)

1=Culvert (Barrel Controls 3.33 cfs @ 3.72 fps)

Pond DMH 11: DMH 10



Summary for Pond DMH 6: DMH 6

Inflow Area = 27,008 sf, 58.21% Impervious, Inflow Depth > 4.99" for 50 year event
 Inflow = 3.58 cfs @ 12.07 hrs, Volume= 11,228 cf
 Outflow = 3.58 cfs @ 12.07 hrs, Volume= 11,228 cf, Atten= 0%, Lag= 0.0 min
 Primary = 3.58 cfs @ 12.07 hrs, Volume= 11,228 cf

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

Peak Elev= 67.71' @ 12.39 hrs

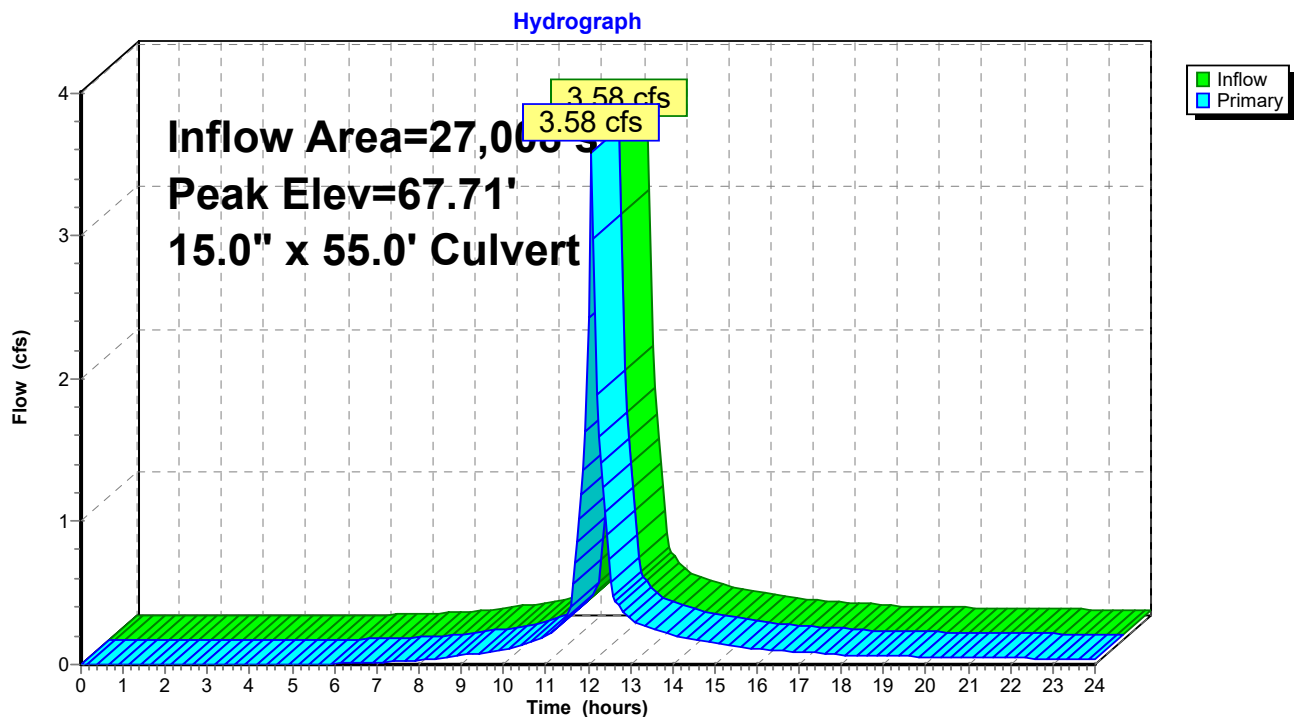
Flood Elev= 71.33'

Device	Routing	Invert	Outlet Devices
#1	Primary	65.14'	15.0" x 55.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 65.00' S= 0.0025 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=1.04 cfs @ 12.07 hrs HW=66.65' TW=66.62' (Dynamic Tailwater)

↑**1=Culvert** (Inlet Controls 1.04 cfs @ 0.85 fps)

Pond DMH 6: DMH 6



Summary for Pond DMH2: DMH2

Inflow Area = 33,440 sf, 57.79% Impervious, Inflow Depth > 4.97" for 50 year event
 Inflow = 4.38 cfs @ 12.07 hrs, Volume= 13,844 cf
 Outflow = 4.38 cfs @ 12.07 hrs, Volume= 13,844 cf, Atten= 0%, Lag= 0.0 min
 Primary = 4.38 cfs @ 12.07 hrs, Volume= 13,844 cf

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

Peak Elev= 54.72' @ 12.10 hrs

Flood Elev= 55.00'

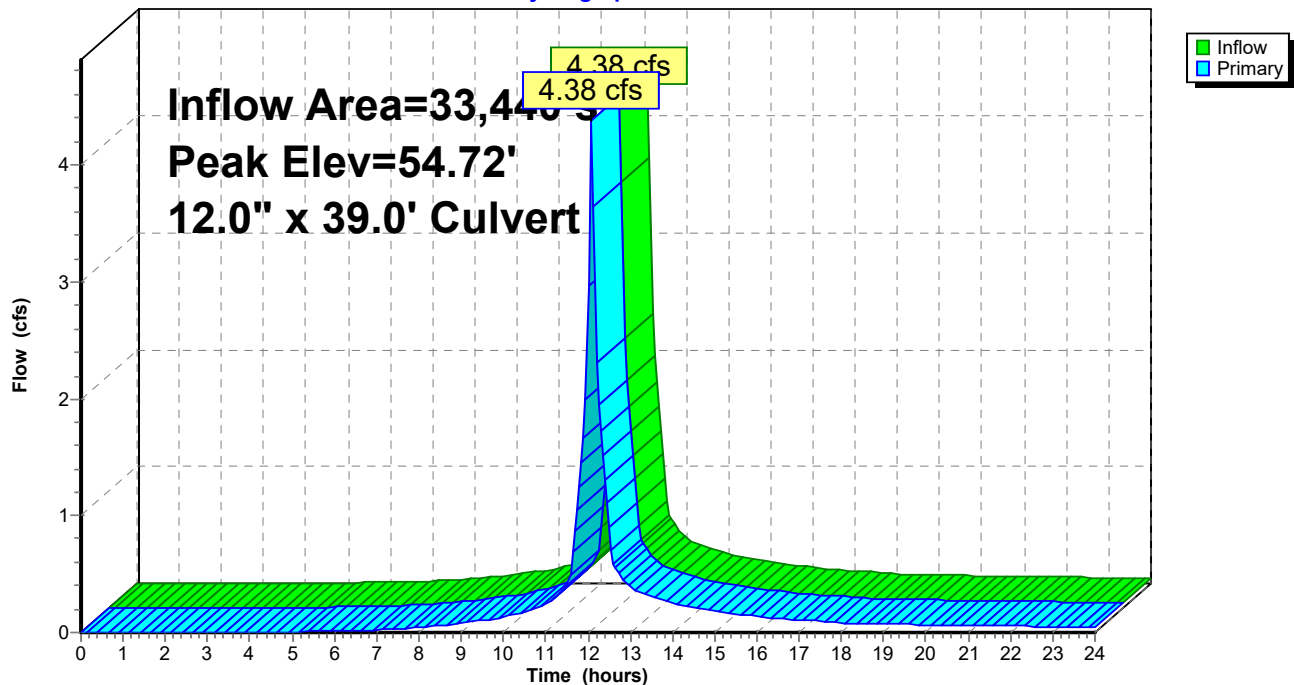
Device	Routing	Invert	Outlet Devices
#1	Primary	52.18'	12.0" x 39.0' long Culvert RCP, square edge headwall, Ke= 0.500 Outlet Invert= 52.00' S= 0.0046 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean

Primary OutFlow Max=3.73 cfs @ 12.07 hrs HW=54.59' TW=53.61' (Dynamic Tailwater)

↑1=Culvert (Inlet Controls 3.73 cfs @ 4.75 fps)

Pond DMH2: DMH2

Hydrograph



Summary for Pond DMH3: DMH3

Inflow Area = 25,518 sf, 47.45% Impervious, Inflow Depth > 4.56" for 50 year event
 Inflow = 3.12 cfs @ 12.07 hrs, Volume= 9,704 cf
 Outflow = 3.12 cfs @ 12.07 hrs, Volume= 9,704 cf, Atten= 0%, Lag= 0.0 min
 Primary = 3.12 cfs @ 12.07 hrs, Volume= 9,704 cf

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

Peak Elev= 56.65' @ 12.07 hrs

Flood Elev= 61.00'

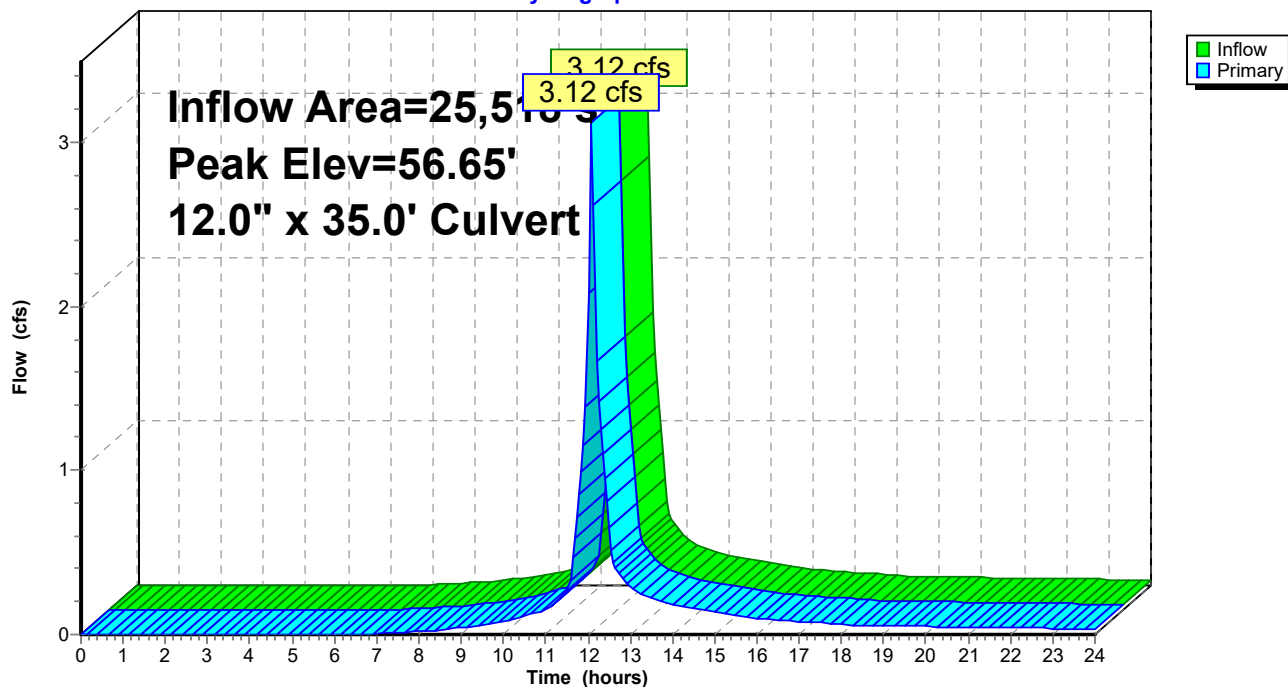
Device	Routing	Invert	Outlet Devices
#1	Primary	55.17'	12.0" x 35.0' long Culvert CPP, square edge headwall, Ke= 0.500 Outlet Invert= 55.00' S= 0.0049 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=3.01 cfs @ 12.07 hrs HW=56.59' TW=53.62' (Dynamic Tailwater)

1=Culvert (Barrel Controls 3.01 cfs @ 3.83 fps)

Pond DMH3: DMH3

Hydrograph



Summary for Pond DMH4: DMH4

Inflow Area = 25,518 sf, 47.45% Impervious, Inflow Depth > 4.56" for 50 year event
 Inflow = 3.12 cfs @ 12.07 hrs, Volume= 9,704 cf
 Outflow = 3.12 cfs @ 12.07 hrs, Volume= 9,704 cf, Atten= 0%, Lag= 0.0 min
 Primary = 3.12 cfs @ 12.07 hrs, Volume= 9,704 cf

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

Peak Elev= 59.42' @ 12.07 hrs

Flood Elev= 65.00'

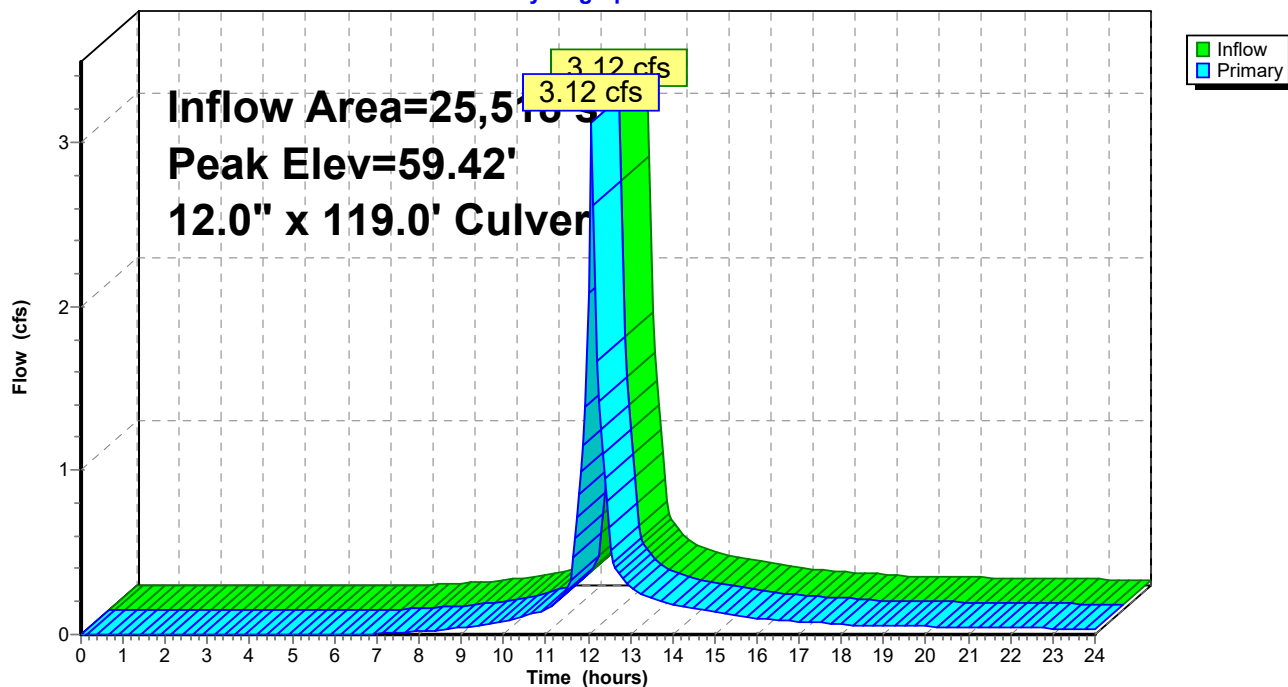
Device	Routing	Invert	Outlet Devices
#1	Primary	58.25'	12.0" x 119.0' long Culvert CPP, square edge headwall, Ke= 0.500 Outlet Invert= 55.28' S= 0.0250 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=3.01 cfs @ 12.07 hrs HW=59.38' TW=56.59' (Dynamic Tailwater)

↑ **1=Culvert** (Inlet Controls 3.01 cfs @ 3.83 fps)

Pond DMH4: DMH4

Hydrograph



Summary for Pond DMH5: DMH 5

Inflow Area = 27,008 sf, 58.21% Impervious, Inflow Depth > 4.99" for 50 year event
 Inflow = 3.58 cfs @ 12.07 hrs, Volume= 11,228 cf
 Outflow = 3.58 cfs @ 12.07 hrs, Volume= 11,228 cf, Atten= 0%, Lag= 0.0 min
 Primary = 3.58 cfs @ 12.07 hrs, Volume= 11,228 cf

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

Peak Elev= 67.75' @ 12.42 hrs

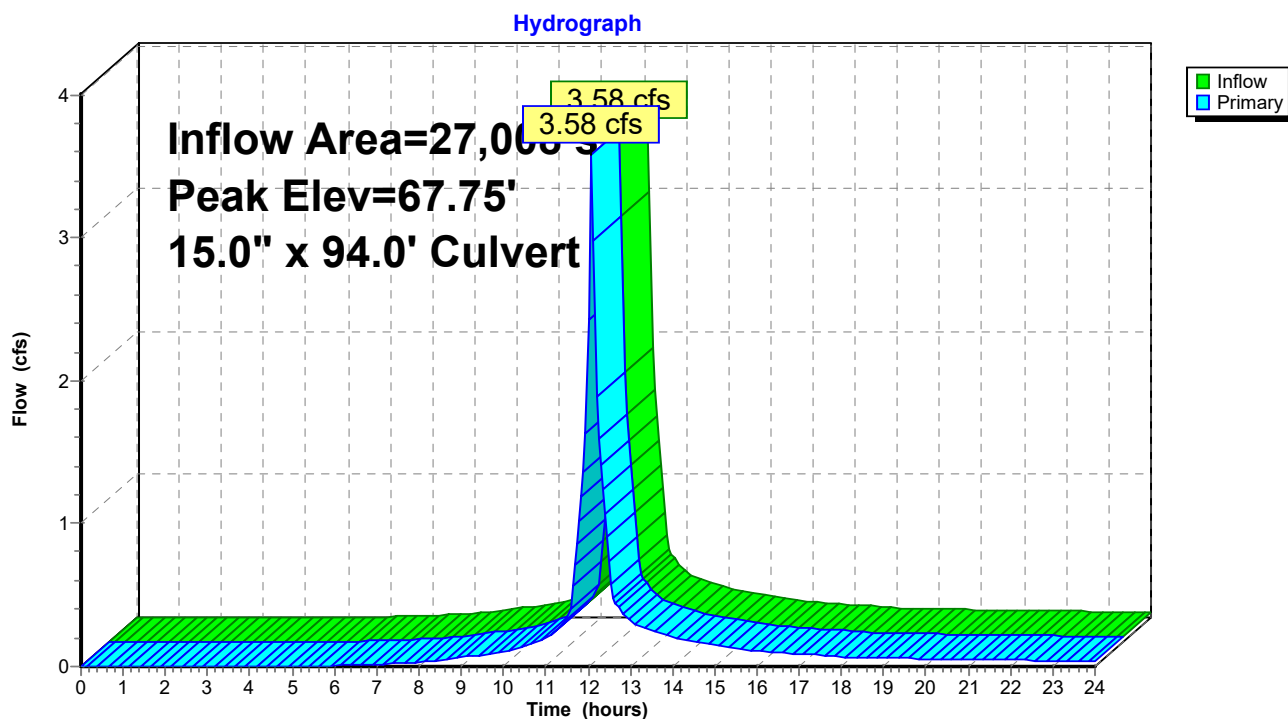
Flood Elev= 69.53'

Device	Routing	Invert	Outlet Devices
#1	Primary	65.71'	15.0" x 94.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 65.24' S= 0.0050 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=2.55 cfs @ 12.07 hrs HW=66.98' TW=66.65' (Dynamic Tailwater)

↑1=Culvert (Outlet Controls 2.55 cfs @ 2.55 fps)

Pond DMH5: DMH 5



Summary for Pond DMH7: DMH7

Inflow Area = 27,008 sf, 58.21% Impervious, Inflow Depth > 4.99" for 50 year event
 Inflow = 3.58 cfs @ 12.07 hrs, Volume= 11,228 cf
 Outflow = 3.58 cfs @ 12.07 hrs, Volume= 11,228 cf, Atten= 0%, Lag= 0.0 min
 Primary = 3.58 cfs @ 12.07 hrs, Volume= 11,228 cf

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

Peak Elev= 67.68' @ 12.36 hrs

Flood Elev= 70.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	65.00'	12.0" x 1.0' long Culvert CPP, square edge headwall, Ke= 0.500 Outlet Invert= 65.00' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Primary	64.90'	12.0" x 1.0' long Culvert CPP, square edge headwall, Ke= 0.500 Outlet Invert= 64.90' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

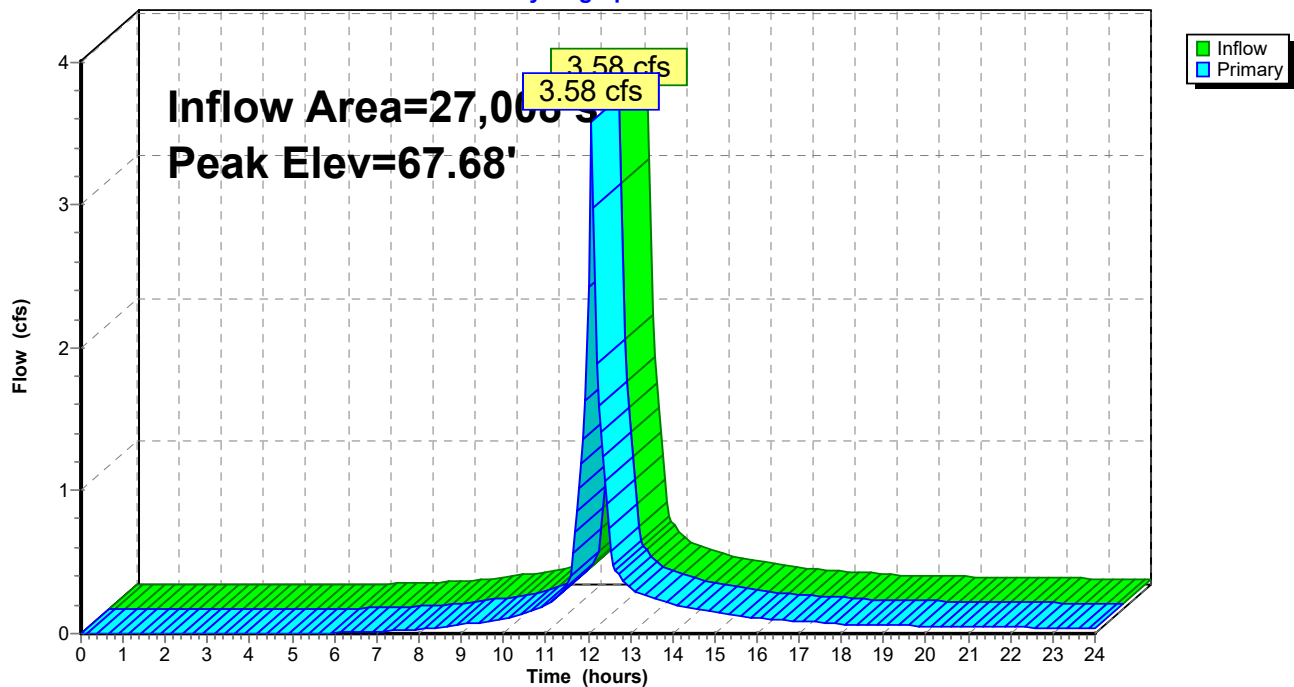
Primary OutFlow Max=0.00 cfs @ 12.07 hrs HW=66.62' TW=66.79' (Dynamic Tailwater)

1=Culvert (Controls 0.00 cfs)

2=Culvert (Controls 0.00 cfs)

Pond DMH7: DMH7

Hydrograph



Summary for Pond DMH8: DMH8

Inflow Area = 41,660 sf, 48.12% Impervious, Inflow Depth > 4.58" for 50 year event
 Inflow = 5.13 cfs @ 12.07 hrs, Volume= 15,905 cf
 Outflow = 5.13 cfs @ 12.07 hrs, Volume= 15,905 cf, Atten= 0%, Lag= 0.0 min
 Primary = 5.13 cfs @ 12.07 hrs, Volume= 15,905 cf

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

Peak Elev= 68.30' @ 12.10 hrs

Flood Elev= 70.00'

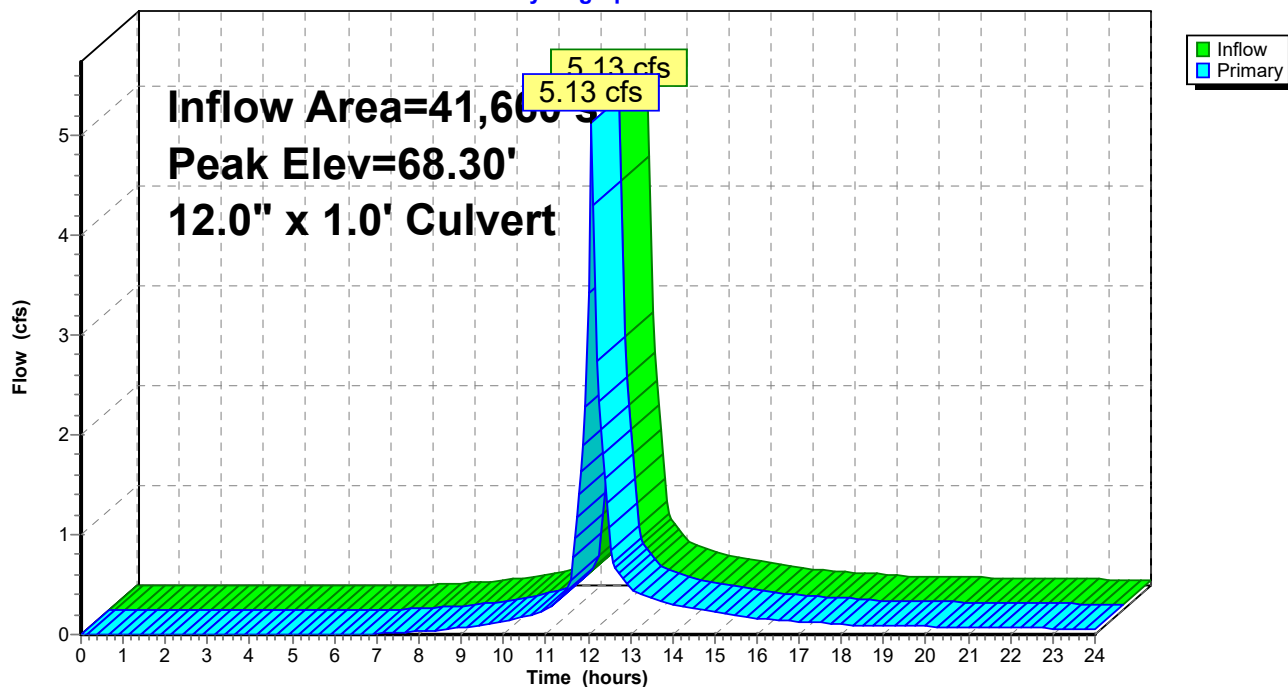
Device	Routing	Invert	Outlet Devices
#1	Primary	65.00'	12.0" x 1.0' long Culvert CPP, square edge headwall, Ke= 0.500 Outlet Invert= 65.00' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=4.36 cfs @ 12.07 hrs HW=68.13' TW=66.80' (Dynamic Tailwater)

↑ **1=Culvert** (Inlet Controls 4.36 cfs @ 5.55 fps)

Pond DMH8: DMH8

Hydrograph



Summary for Pond P1-1: P1-1

Inflow Area = 74,610 sf, 49.91% Impervious, Inflow Depth > 4.63" for 50 year event
 Inflow = 9.21 cfs @ 12.07 hrs, Volume= 28,817 cf
 Outflow = 4.17 cfs @ 12.26 hrs, Volume= 23,907 cf, Atten= 55%, Lag= 11.0 min
 Primary = 4.17 cfs @ 12.26 hrs, Volume= 23,907 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 54.02' @ 12.26 hrs Surf.Area= 4,526 sf Storage= 10,237 cf
 Flood Elev= 55.50' Surf.Area= 5,973 sf Storage= 18,004 cf

Plug-Flow detention time= 131.1 min calculated for 23,857 cf (83% of inflow)
 Center-of-Mass det. time= 62.5 min (868.1 - 805.6)

Volume	Invert	Avail.Storage	Storage Description
#1	51.00'	18,004 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
51.00	2,080	0	0
52.00	2,814	2,447	2,447
52.50	3,624	1,610	4,057
54.00	4,509	6,100	10,156
55.00	5,467	4,988	15,144
55.50	5,973	2,860	18,004

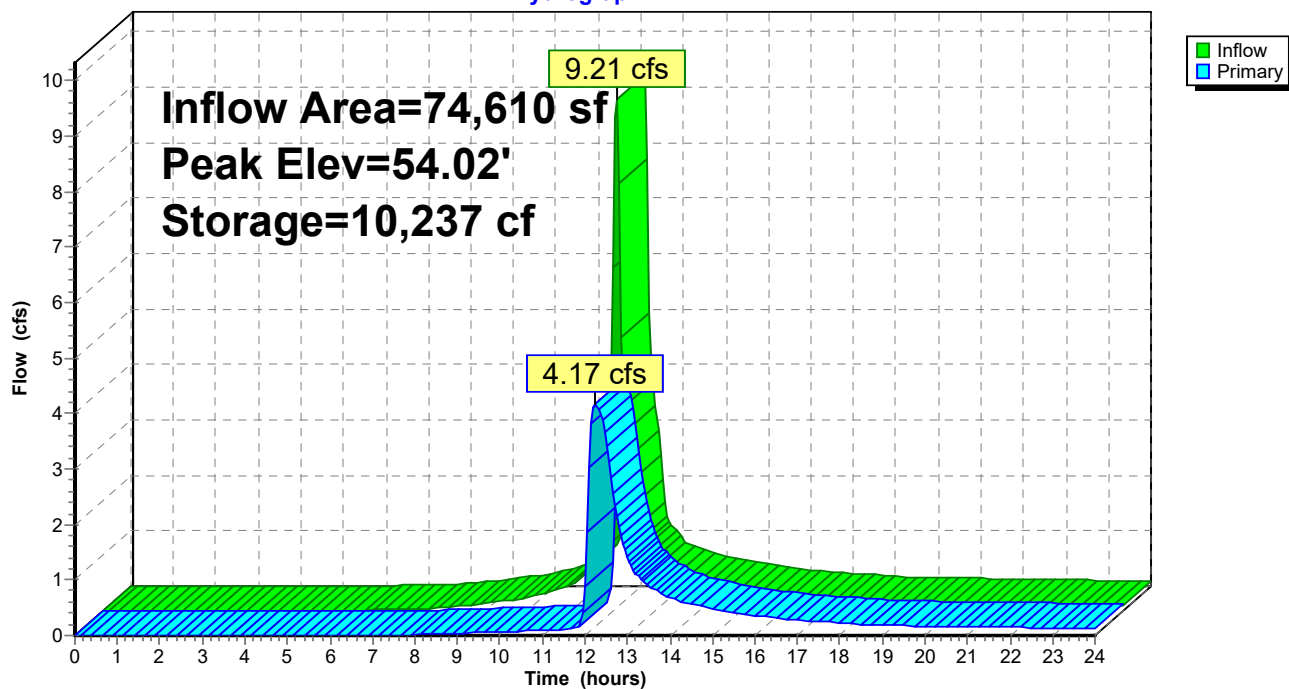
Device	Routing	Invert	Outlet Devices
#1	Primary	51.00'	12.0" x 80.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 50.00' S= 0.0125 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Device 1	51.00'	2.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	52.75'	10.0" Vert. Orifice/Grate C= 0.600
#4	Device 1	53.25'	10.0" Vert. Orifice/Grate C= 0.600
#5	Device 1	54.25'	2.00' x 2.00' Horiz. Orifice/Grate Limited to weir flow C= 0.600

Primary OutFlow Max=4.16 cfs @ 12.26 hrs HW=54.02' TW=0.00' (Dynamic Tailwater)

1=Culvert (Passes 4.16 cfs of 5.47 cfs potential flow)
 2=Orifice/Grate (Orifice Controls 0.18 cfs @ 8.25 fps)
 3=Orifice/Grate (Orifice Controls 2.42 cfs @ 4.44 fps)
 4=Orifice/Grate (Orifice Controls 1.56 cfs @ 2.98 fps)
 5=Orifice/Grate (Controls 0.00 cfs)

Pond P1-1: P1-1

Hydrograph



Summary for Pond P1-2: DP-1-2

Inflow Area = 35,138 sf, 15.99% Impervious, Inflow Depth > 3.30" for 50 year event
 Inflow = 2.84 cfs @ 12.12 hrs, Volume= 9,669 cf
 Outflow = 0.03 cfs @ 24.00 hrs, Volume= 1,423 cf, Atten= 99%, Lag= 712.8 min
 Primary = 0.03 cfs @ 24.00 hrs, Volume= 1,423 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 58.69' @ 24.00 hrs Surf.Area= 6,514 sf Storage= 8,246 cf
 Flood Elev= 59.75' Surf.Area= 7,130 sf Storage= 10,384 cf

Plug-Flow detention time= 393.5 min calculated for 1,423 cf (15% of inflow)
 Center-of-Mass det. time= 243.3 min (1,082.0 - 838.6)

Volume	Invert	Avail.Storage	Storage Description
#1	57.00'	10,384 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
57.00	3,285	0	0
58.00	5,180	4,233	4,233
58.50	6,148	2,832	7,065
59.00	7,130	3,320	10,384

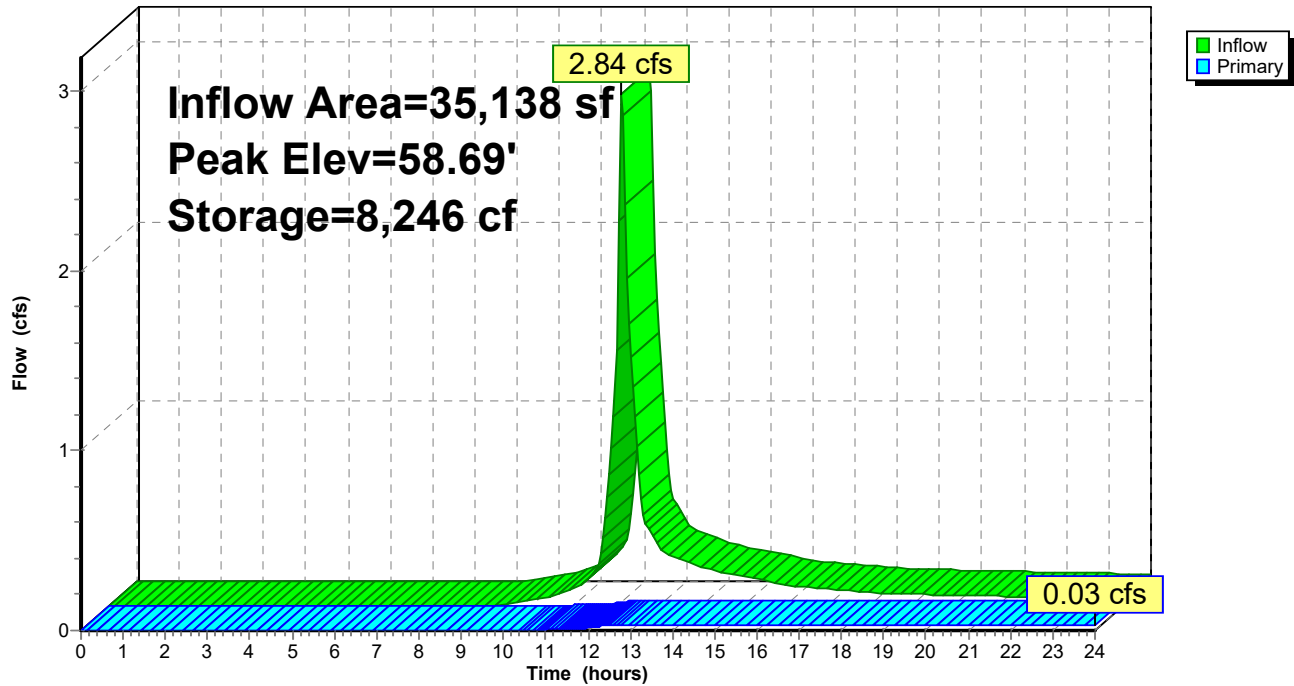
Device	Routing	Invert	Outlet Devices
#1	Primary	57.00'	12.0" x 25.0' long Culvert RCP, square edge headwall, Ke= 0.500 Outlet Invert= 56.50' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Device 1	57.00'	1.0" Vert. Orifice/Grate C= 0.600
#3	Primary	58.75'	3.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.03 cfs @ 24.00 hrs HW=58.69' TW=0.00' (Dynamic Tailwater)

1=Culvert (Passes 0.03 cfs of 4.12 cfs potential flow)
 2=Orifice/Grate (Orifice Controls 0.03 cfs @ 6.18 fps)
 3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond P1-2: DP-1-2

Hydrograph



Summary for Pond P1-3: P1-3

Inflow Area = 7,345 sf, 68.78% Impervious, Inflow Depth > 5.43" for 50 year event
 Inflow = 1.11 cfs @ 12.03 hrs, Volume= 3,325 cf
 Outflow = 0.15 cfs @ 12.52 hrs, Volume= 3,167 cf, Atten= 87%, Lag= 29.6 min
 Primary = 0.15 cfs @ 12.52 hrs, Volume= 3,167 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 52.26' @ 12.52 hrs Surf.Area= 1,400 sf Storage= 1,449 cf
 Flood Elev= 54.27' Surf.Area= 1,400 sf Storage= 1,861 cf

Plug-Flow detention time= 134.2 min calculated for 3,167 cf (95% of inflow)
 Center-of-Mass det. time= 107.5 min (891.7 - 784.2)

Volume	Invert	Avail.Storage	Storage Description
#1	50.00'	1,680 cf	10.00'W x 35.00'L x 3.00'H Prismatoid x 4 4,200 cf Overall x 40.0% Voids
#2	50.50'	181 cf	48.0"W x 24.0"H x 8.00'L Galley 4x8x2 x 4
		1,861 cf	Total Available Storage

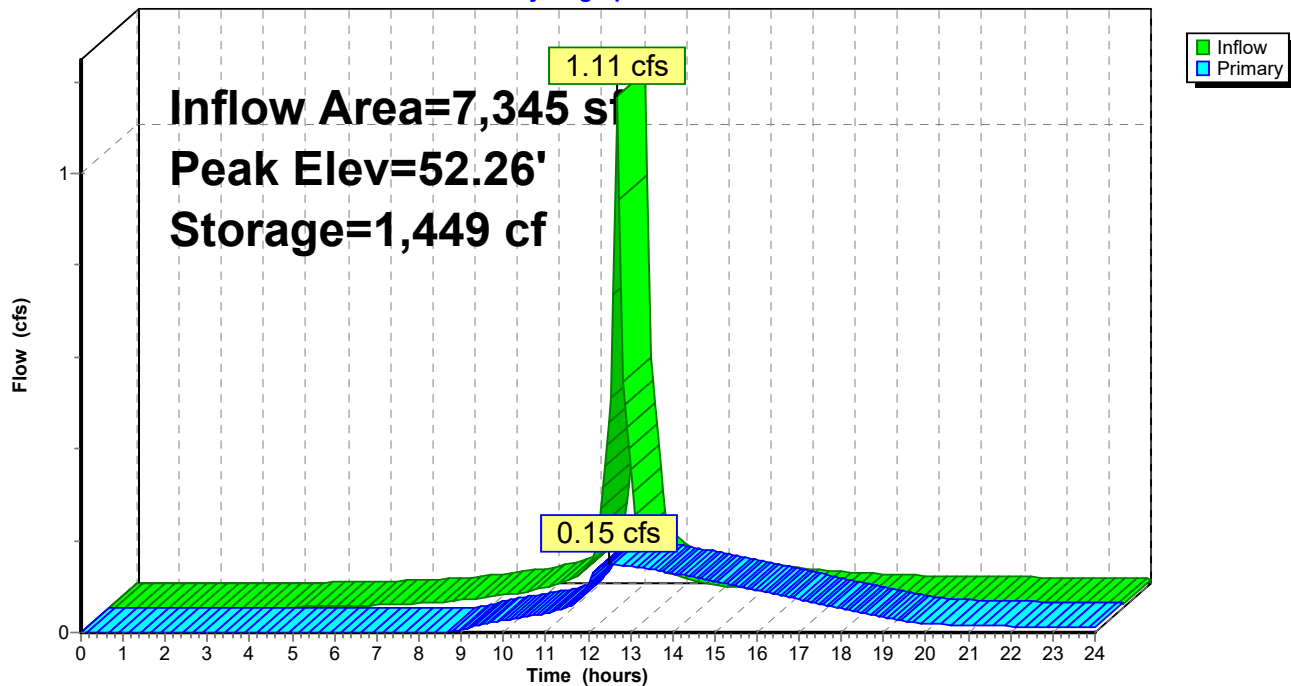
Device	Routing	Invert	Outlet Devices
#1	Primary	50.20'	12.0" x 16.0' long Culvert CPP, square edge headwall, Ke= 0.500 Outlet Invert= 50.00' S= 0.0125 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Device 1	50.20'	2.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	53.00'	12.0" Horiz. Orifice/Grate Limited to weir flow C= 0.600

Primary OutFlow Max=0.15 cfs @ 12.52 hrs HW=52.26' TW=0.00' (Dynamic Tailwater)

1=Culvert (Passes 0.15 cfs of 4.73 cfs potential flow)
 2=Orifice/Grate (Orifice Controls 0.15 cfs @ 6.77 fps)
 3=Orifice/Grate (Controls 0.00 cfs)

Pond P1-3: P1-3

Hydrograph



Summary for Pond P3-1: P3-2

Inflow Area = 68,668 sf, 52.09% Impervious, Inflow Depth > 4.74" for 50 year event
 Inflow = 8.71 cfs @ 12.07 hrs, Volume= 27,133 cf
 Outflow = 3.36 cfs @ 12.32 hrs, Volume= 24,516 cf, Atten= 61%, Lag= 14.7 min
 Primary = 3.36 cfs @ 12.32 hrs, Volume= 24,516 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 67.66' @ 12.32 hrs Surf.Area= 3,825 sf Storage= 9,534 cf
 Flood Elev= 70.00' Surf.Area= 3,825 sf Storage= 10,877 cf

Plug-Flow detention time= 98.1 min calculated for 24,465 cf (90% of inflow)
 Center-of-Mass det. time= 51.8 min (857.0 - 805.2)

Volume	Invert	Avail.Storage	Storage Description
#1	64.00'	2,363 cf	Custom Stage Data (Prismatic) Listed below (Recalc) 17,213 cf Overall - 11,304 cf Embedded = 5,908 cf x 40.0% Voids
#2	64.50'	8,514 cf	52.8"W x 48.0"H x 4.00'L Galley 4x4x4 x 192 Inside #1
		10,877 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
64.00	3,825	0	0
68.50	3,825	17,213	17,213

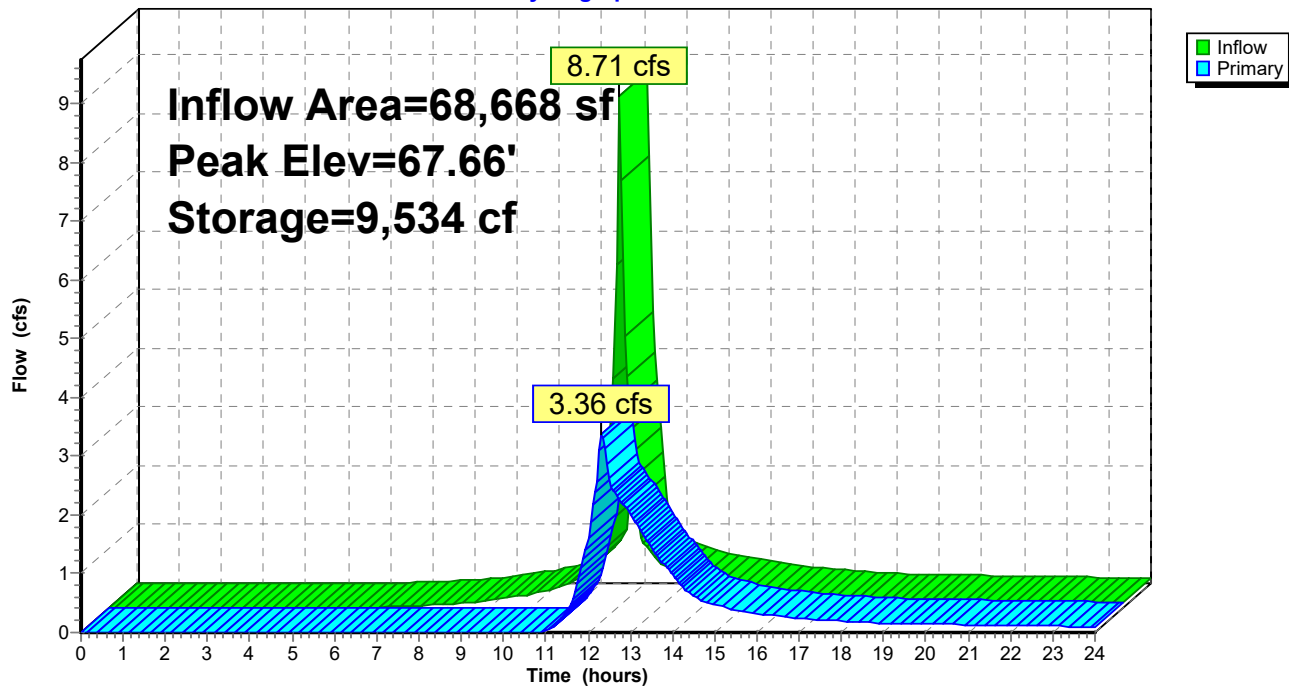
Device	Routing	Invert	Outlet Devices
#1	Primary	64.00'	15.0" x 41.0' long Culvert CPP, square edge headwall, Ke= 0.500 Outlet Invert= 62.00' S= 0.0488 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Device 1	65.00'	8.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	67.50'	15.0" Horiz. Orifice/Grate Limited to weir flow C= 0.600

Primary OutFlow Max=3.33 cfs @ 12.32 hrs HW=67.65' TW=61.95' (Dynamic Tailwater)

1=Culvert (Passes 3.33 cfs of 10.28 cfs potential flow)
 2=Orifice/Grate (Orifice Controls 2.56 cfs @ 7.33 fps)
 3=Orifice/Grate (Weir Controls 0.77 cfs @ 1.28 fps)

Pond P3-1: P3-2

Hydrograph



Summary for Pond P3-2: P3-3

Inflow Area = 140,478 sf, 42.86% Impervious, Inflow Depth > 4.16" for 50 year event
 Inflow = 9.89 cfs @ 12.08 hrs, Volume= 48,688 cf
 Outflow = 2.18 cfs @ 13.40 hrs, Volume= 40,153 cf, Atten= 78%, Lag= 79.1 min
 Primary = 2.18 cfs @ 13.40 hrs, Volume= 40,153 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 53.72' @ 13.40 hrs Surf.Area= 8,643 sf Storage= 19,811 cf
 Flood Elev= 55.50' Surf.Area= 12,548 sf Storage= 38,610 cf

Plug-Flow detention time= 160.4 min calculated for 40,153 cf (82% of inflow)
 Center-of-Mass det. time= 91.3 min (930.2 - 839.0)

Volume	Invert	Avail.Storage	Storage Description
#1	50.00'	38,610 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
50.00	2,426	0	0
52.00	5,354	7,780	7,780
54.00	9,180	14,534	22,314
55.50	12,548	16,296	38,610

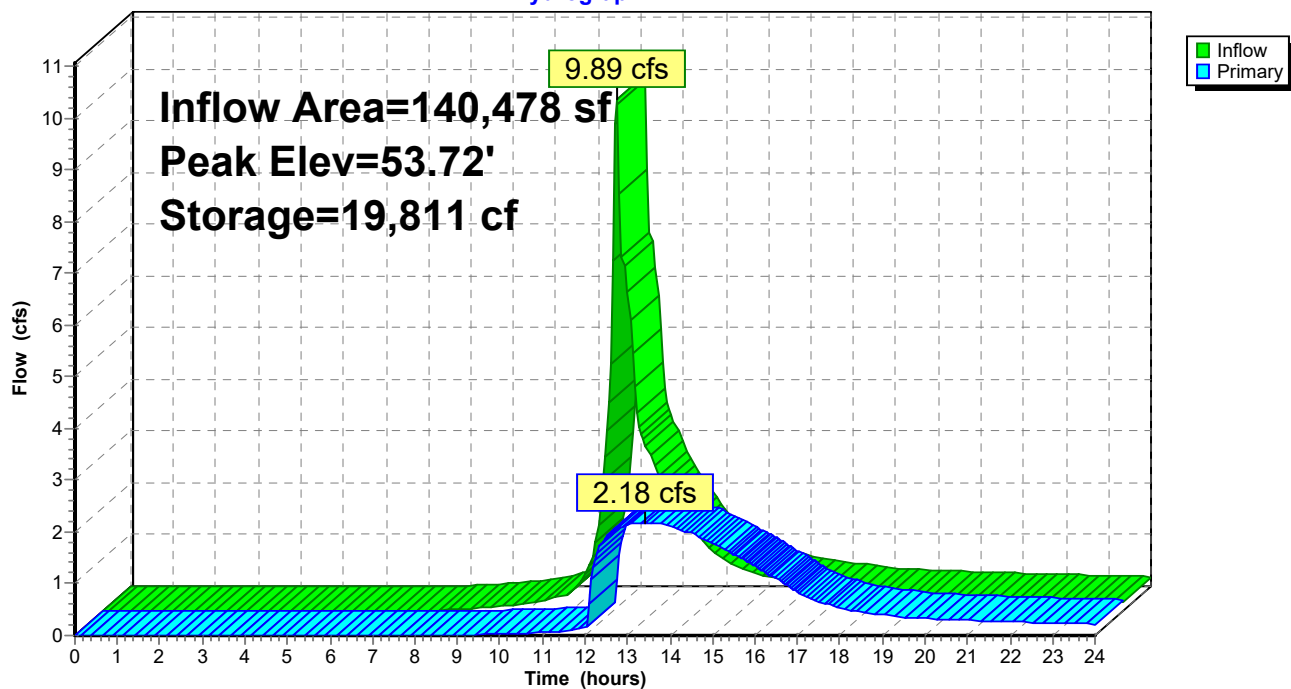
Device	Routing	Invert	Outlet Devices
#1	Primary	50.00'	12.0" x 29.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 49.00' S= 0.0345 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Device 1	50.00'	2.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	52.00'	8.0" Vert. Orifice/Grate C= 0.600
#4	Device 1	54.00'	2.00' x 2.00' Horiz. Orifice/Grate Limited to weir flow C= 0.600
#5	Primary	54.55'	10.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=2.18 cfs @ 13.40 hrs HW=53.72' TW=0.00' (Dynamic Tailwater)

1=Culvert (Passes 2.18 cfs of 6.79 cfs potential flow)
 2=Orifice/Grate (Orifice Controls 0.20 cfs @ 9.18 fps)
 3=Orifice/Grate (Orifice Controls 1.98 cfs @ 5.67 fps)
 4=Orifice/Grate (Controls 0.00 cfs)
 5=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond P3-2: P3-3

Hydrograph

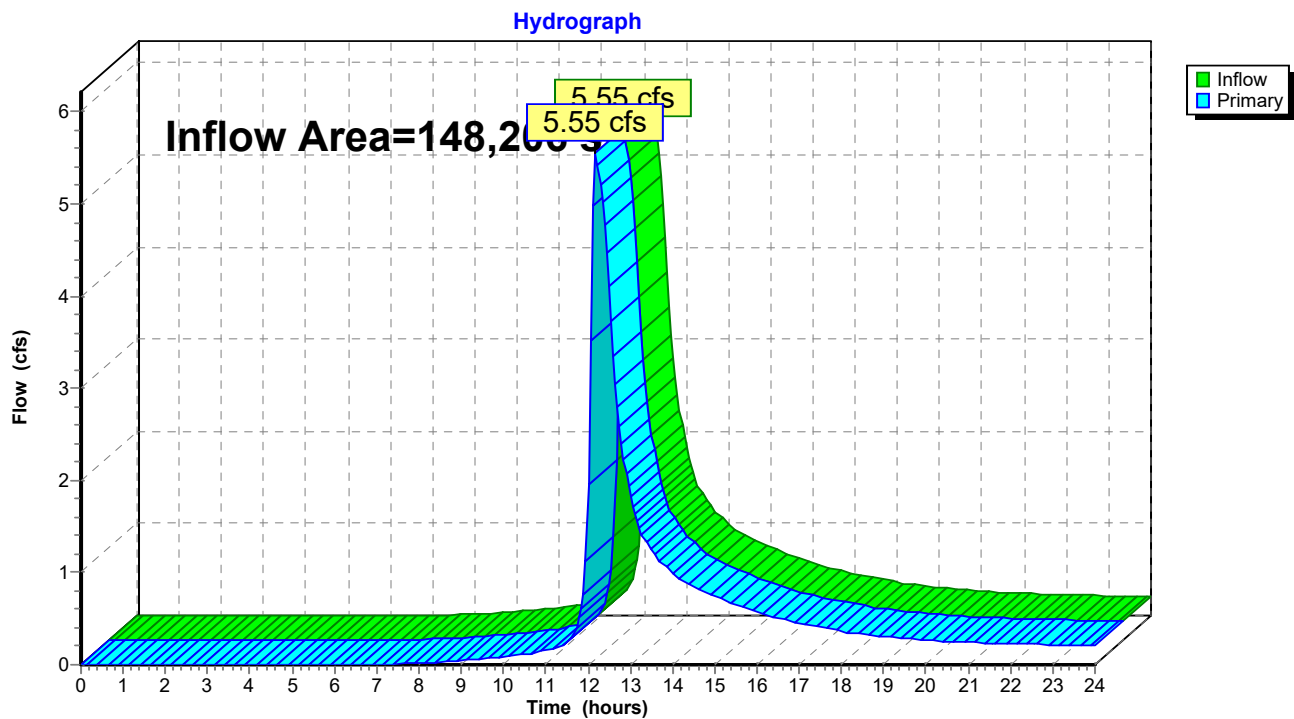


Summary for Link DP-1: DP-1

Inflow Area = 148,206 sf, 32.39% Impervious, Inflow Depth > 2.79" for 50 year event
Inflow = 5.55 cfs @ 12.17 hrs, Volume= 34,469 cf
Primary = 5.55 cfs @ 12.17 hrs, Volume= 34,469 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP-1: DP-1

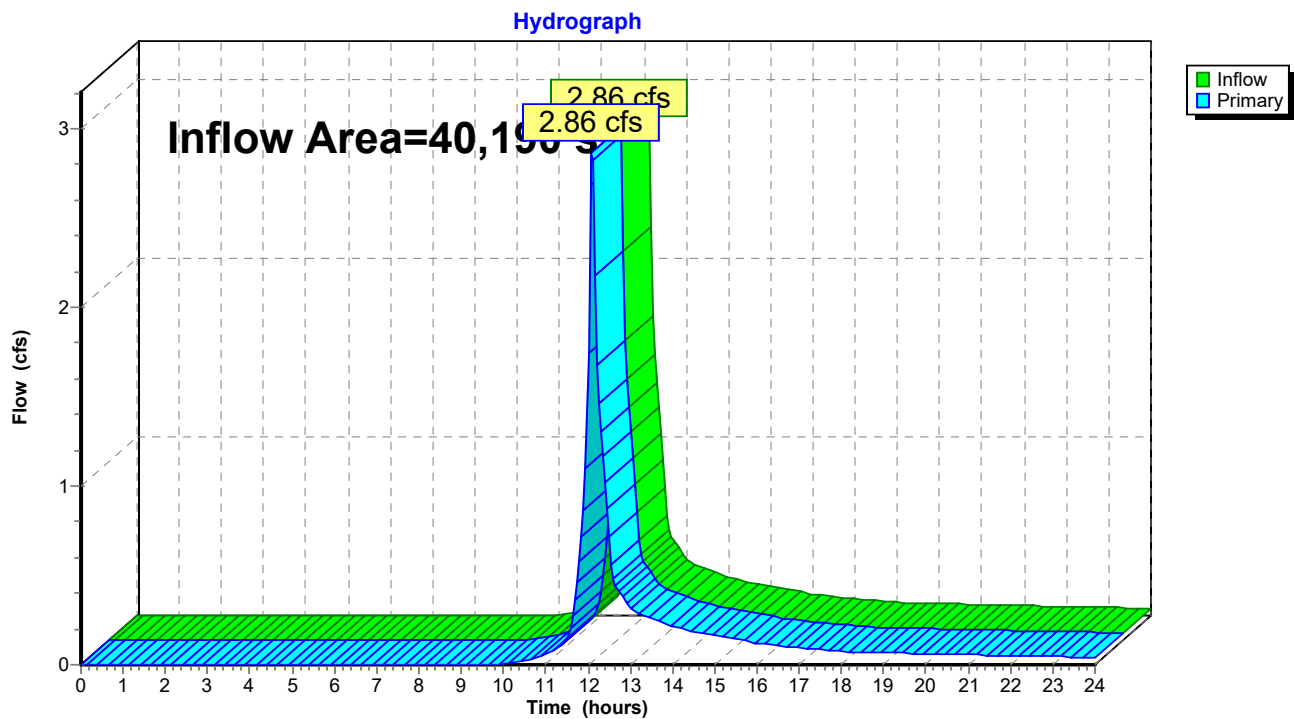


Summary for Link DP-2: DP-2

Inflow Area = 40,190 sf, 10.95% Impervious, Inflow Depth > 2.70" for 50 year event
Inflow = 2.86 cfs @ 12.08 hrs, Volume= 9,042 cf
Primary = 2.86 cfs @ 12.08 hrs, Volume= 9,042 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP-2: DP-2

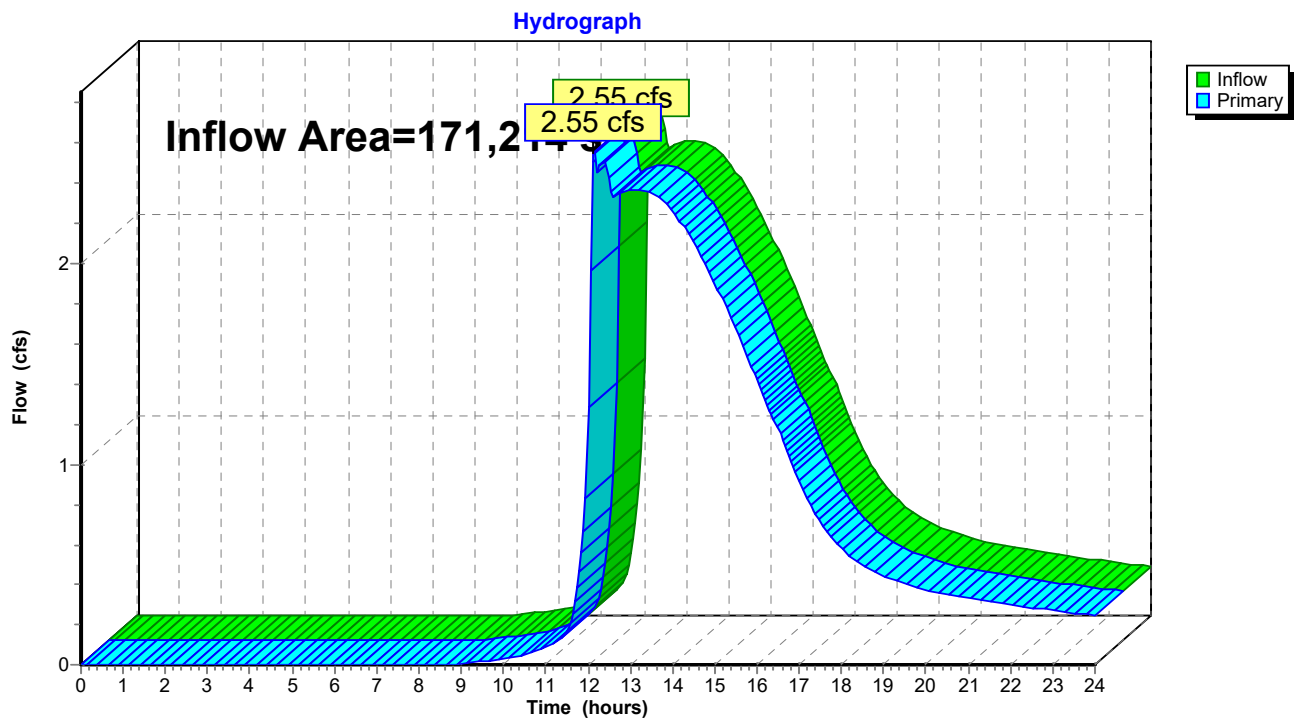


Summary for Link DP-3: DP-3

Inflow Area = 171,214 sf, 35.17% Impervious, Inflow Depth > 3.25" for 50 year event
Inflow = 2.55 cfs @ 12.14 hrs, Volume= 46,319 cf
Primary = 2.55 cfs @ 12.14 hrs, Volume= 46,319 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP-3: DP-3

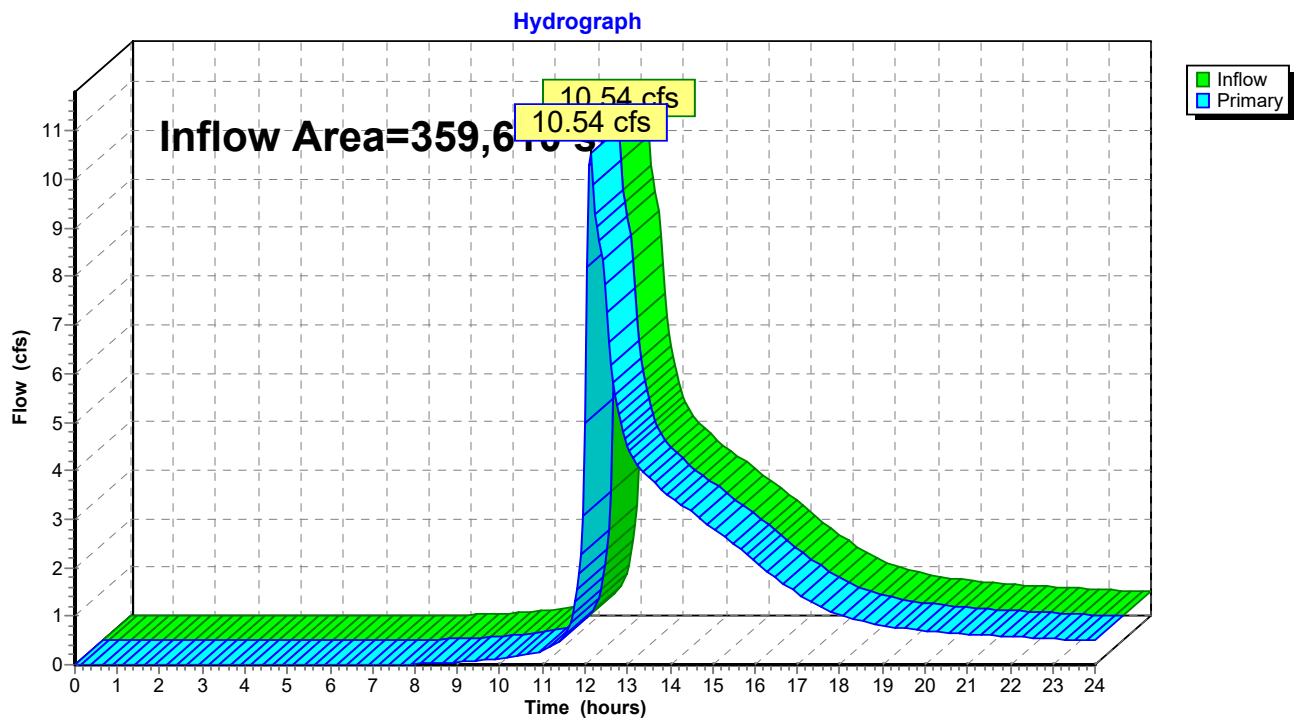


Summary for Link TOTAL: (new Link)

Inflow Area = 359,610 sf, 31.32% Impervious, Inflow Depth > 3.00" for 50 year event
Inflow = 10.54 cfs @ 12.12 hrs, Volume= 89,829 cf
Primary = 10.54 cfs @ 12.12 hrs, Volume= 89,829 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link TOTAL: (new Link)





Hydrocad

POST-DEVELOPMENT

100-Year Storm

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment P-1A: P-1A	Runoff Area=2,325 sf 0.00% Impervious Runoff Depth>3.24" Flow Length=106' Tc=5.0 min CN=56 Runoff=0.20 cfs 629 cf
Subcatchment P-1B: P-1E	Runoff Area=12,786 sf 39.18% Impervious Runoff Depth>5.49" Tc=5.0 min CN=75 Runoff=1.89 cfs 5,851 cf
Subcatchment P-1C: P-1C	Runoff Area=3,632 sf 56.17% Impervious Runoff Depth>6.34" Flow Length=301' Tc=1.8 min CN=82 Runoff=0.66 cfs 1,917 cf
Subcatchment P-1D: P-1D	Runoff Area=3,713 sf 81.12% Impervious Runoff Depth>7.42" Flow Length=235' Tc=1.4 min CN=91 Runoff=0.75 cfs 2,295 cf
Subcatchment P-1E: P-1E	Runoff Area=15,652 sf 37.11% Impervious Runoff Depth>5.37" Flow Length=108' Tc=5.0 min CN=74 Runoff=2.25 cfs 7,007 cf
Subcatchment P-1F: P-1F	Runoff Area=20,654 sf 69.31% Impervious Runoff Depth>6.93" Flow Length=272' Tc=5.0 min CN=87 Runoff=3.69 cfs 11,934 cf
Subcatchment P-1G: P-1I	Runoff Area=5,773 sf 64.25% Impervious Runoff Depth>6.69" Flow Length=177' Tc=5.0 min CN=85 Runoff=1.01 cfs 3,220 cf
Subcatchment P-1H: P-1H	Runoff Area=19,745 sf 42.54% Impervious Runoff Depth>5.73" Flow Length=158' Tc=5.0 min CN=77 Runoff=3.03 cfs 9,431 cf
Subcatchment P-1I: P-1I	Runoff Area=35,138 sf 15.99% Impervious Runoff Depth>4.53" Flow Length=170' Tc=8.2 min CN=67 Runoff=3.93 cfs 13,274 cf
Subcatchment P-1J: P-1J	Runoff Area=28,788 sf 0.31% Impervious Runoff Depth>3.36" Flow Length=280' Tc=6.1 min CN=57 Runoff=2.50 cfs 8,058 cf
Subcatchment P-2A: P-2A	Runoff Area=40,190 sf 10.95% Impervious Runoff Depth>3.83" Flow Length=156' Tc=5.0 min CN=61 Runoff=4.12 cfs 12,818 cf
Subcatchment P-3A: P-3A	Runoff Area=30,736 sf 0.00% Impervious Runoff Depth>3.48" Flow Length=260' Tc=5.0 min CN=58 Runoff=2.84 cfs 8,904 cf
Subcatchment P-3B: P-3B	Runoff Area=71,810 sf 34.04% Impervious Runoff Depth>5.37" Flow Length=128' Tc=5.0 min CN=74 Runoff=10.34 cfs 32,146 cf
Subcatchment P-3C: P-3C	Runoff Area=41,660 sf 48.12% Impervious Runoff Depth>5.97" Flow Length=153' Tc=5.0 min CN=79 Runoff=6.63 cfs 20,731 cf
Subcatchment P-3D: P-3D	Runoff Area=22,478 sf 56.13% Impervious Runoff Depth>6.33" Flow Length=240' Tc=5.0 min CN=82 Runoff=3.75 cfs 11,861 cf
Subcatchment P-3E: P-3F	Runoff Area=4,530 sf 68.52% Impervious Runoff Depth>6.81" Flow Length=245' Tc=5.0 min CN=86 Runoff=0.80 cfs 2,572 cf

Pond 3P: INFILTRATOR

Peak Elev=0.00' Storage=0 cf

Pond CB1: CB1Peak Elev=52.98' Inflow=0.66 cfs 1,917 cf
8.0" x 9.0' Culvert Outflow=0.66 cfs 1,917 cf**Pond CB2: CB2**Peak Elev=52.98' Inflow=0.75 cfs 2,295 cf
8.0" x 9.0' Culvert Outflow=0.75 cfs 2,295 cf**Pond CB3: CB3**Peak Elev=56.11' Inflow=1.89 cfs 5,851 cf
12.0" x 12.0' Culvert Outflow=1.89 cfs 5,851 cf**Pond CB4: CB4**Peak Elev=56.67' Inflow=3.69 cfs 11,934 cf
12.0" x 11.0' Culvert Outflow=3.69 cfs 11,934 cf**Pond CB5: CB5**Peak Elev=62.15' Inflow=3.03 cfs 9,431 cf
12.0" x 13.0' Culvert Outflow=3.03 cfs 9,431 cf**Pond CB6: CB6**Peak Elev=61.59' Inflow=1.01 cfs 3,220 cf
12.0" x 13.0' Culvert Outflow=1.01 cfs 3,220 cf**Pond CB7: CB7**Peak Elev=68.29' Inflow=0.80 cfs 2,572 cf
12.0" x 20.0' Culvert Outflow=0.80 cfs 2,572 cf**Pond CB8: CB8**Peak Elev=68.39' Inflow=3.75 cfs 11,861 cf
12.0" x 20.0' Culvert Outflow=3.75 cfs 11,861 cf**Pond CB9: CB9**Peak Elev=72.42' Inflow=6.63 cfs 20,731 cf
12.0" x 22.0' Culvert Outflow=6.63 cfs 20,731 cf**Pond DMH 10: DMH9**Peak Elev=62.94' Inflow=6.78 cfs 32,493 cf
15.0" x 100.0' Culvert Outflow=6.78 cfs 32,493 cf**Pond DMH 11: DMH 10**Peak Elev=57.33' Inflow=6.78 cfs 32,493 cf
15.0" x 33.0' Culvert Outflow=6.78 cfs 32,493 cf**Pond DMH 6: DMH 6**Peak Elev=68.17' Inflow=4.55 cfs 14,433 cf
15.0" x 55.0' Culvert Outflow=4.55 cfs 14,433 cf**Pond DMH2: DMH2**Peak Elev=55.95' Inflow=5.57 cfs 17,785 cf
12.0" x 39.0' Culvert Outflow=5.57 cfs 17,785 cf**Pond DMH3: DMH3**Peak Elev=57.06' Inflow=4.04 cfs 12,650 cf
12.0" x 35.0' Culvert Outflow=4.04 cfs 12,650 cf**Pond DMH4: DMH4**Peak Elev=59.88' Inflow=4.04 cfs 12,650 cf
12.0" x 119.0' Culvert Outflow=4.04 cfs 12,650 cf**Pond DMH5: DMH 5**Peak Elev=68.28' Inflow=4.55 cfs 14,433 cf
15.0" x 94.0' Culvert Outflow=4.55 cfs 14,433 cf**Pond DMH7: DMH7**Peak Elev=68.07' Inflow=4.55 cfs 14,433 cf
Outflow=4.55 cfs 14,433 cf

Pearson Drive, Newbury, MA POST DEV*Type III 24-hr 100 year Rainfall=8.50"*

Prepared by Ranger Engineering & Design, LLC

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Pond DMH8: DMH8Peak Elev=69.98' Inflow=6.63 cfs 20,731 cf
12.0" x 1.0' Culvert Outflow=6.63 cfs 20,731 cf**Pond P1-1: P1-1**Peak Elev=54.45' Storage=12,299 cf Inflow=11.88 cfs 37,442 cf
Outflow=5.84 cfs 32,302 cf**Pond P1-2: DP-1-2**Peak Elev=58.84' Storage=9,235 cf Inflow=3.93 cfs 13,274 cf
Outflow=0.21 cfs 4,466 cf**Pond P1-3: P1-3**Peak Elev=52.98' Storage=1,851 cf Inflow=1.40 cfs 4,213 cf
Outflow=0.17 cfs 4,049 cf**Pond P3-1: P3-2**Peak Elev=67.97' Storage=10,380 cf Inflow=11.18 cfs 35,164 cf
Outflow=6.78 cfs 32,493 cf**Pond P3-2: P3-3**Peak Elev=54.22' Storage=24,353 cf Inflow=14.06 cfs 64,638 cf
Outflow=5.15 cfs 55,860 cf**Link DP-1: DP-1**Inflow=8.23 cfs 49,503 cf
Primary=8.23 cfs 49,503 cf**Link DP-2: DP-2**Inflow=4.12 cfs 12,818 cf
Primary=4.12 cfs 12,818 cf**Link DP-3: DP-3**Inflow=5.83 cfs 64,764 cf
Primary=5.83 cfs 64,764 cf**Link TOTAL: (new Link)**Inflow=16.21 cfs 127,085 cf
Primary=16.21 cfs 127,085 cf**Total Runoff Area = 359,610 sf Runoff Volume = 152,647 cf Average Runoff Depth = 5.09"**
68.68% Pervious = 246,993 sf 31.32% Impervious = 112,617 sf

Summary for Subcatchment P-1A: P-1A

Runoff = 0.20 cfs @ 12.08 hrs, Volume= 629 cf, Depth> 3.24"

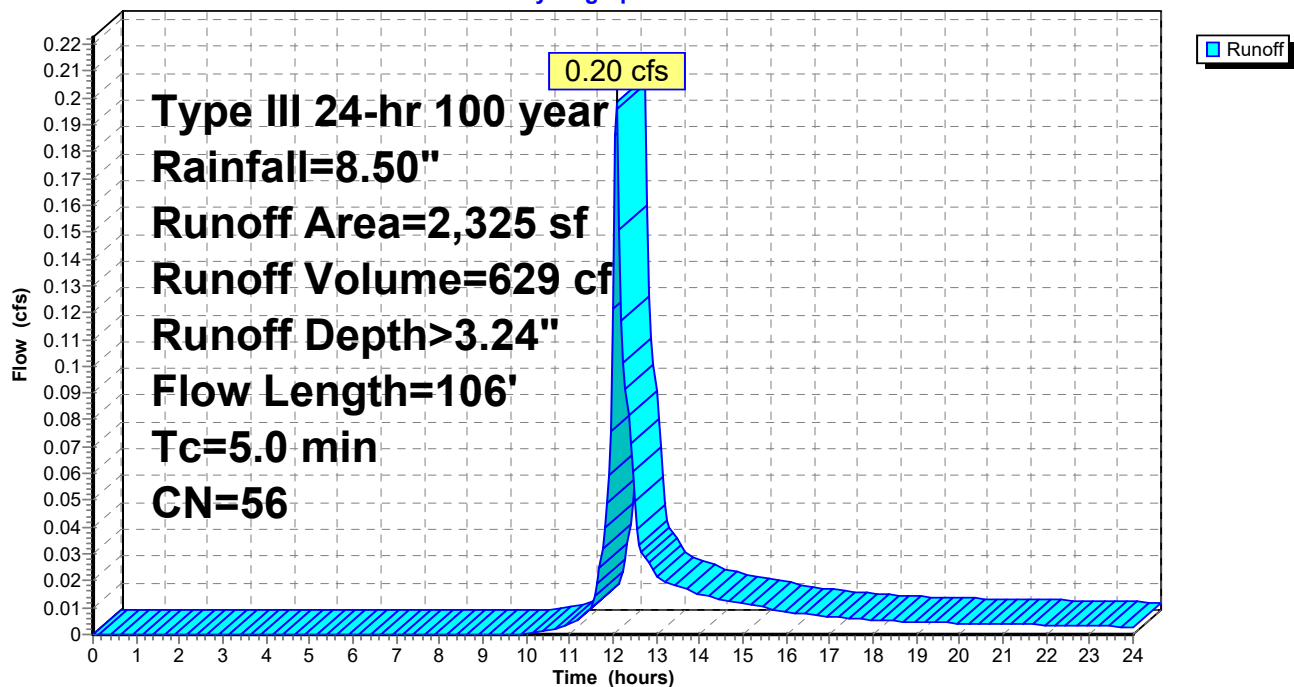
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 year Rainfall=8.50"

Area (sf)	CN	Description
1,780	55	Woods, Good, HSG B
545	61	>75% Grass cover, Good, HSG B
0	98	Roofs, HSG B
0	98	Paved parking, HSG B
0	98	Paved roads w/curbs & sewers, HSG B
2,325	56	Weighted Average
2,325		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1					Direct Entry, DIRECT
3.2	50	0.0800	0.26		Sheet Flow, SHEET FLOW
					Grass: Short n= 0.150 P2= 3.20"
0.7	56	0.0357	1.32		Shallow Concentrated Flow, GRASS
					Short Grass Pasture Kv= 7.0 fps
5.0	106	Total			

Subcatchment P-1A: P-1A

Hydrograph



Pearson Drive, Newbury, MA POST DEV

Prepared by Ranger Engineering & Design, LLC

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Type III 24-hr 100 year Rainfall=8.50"

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Summary for Subcatchment P-1B: P-1E

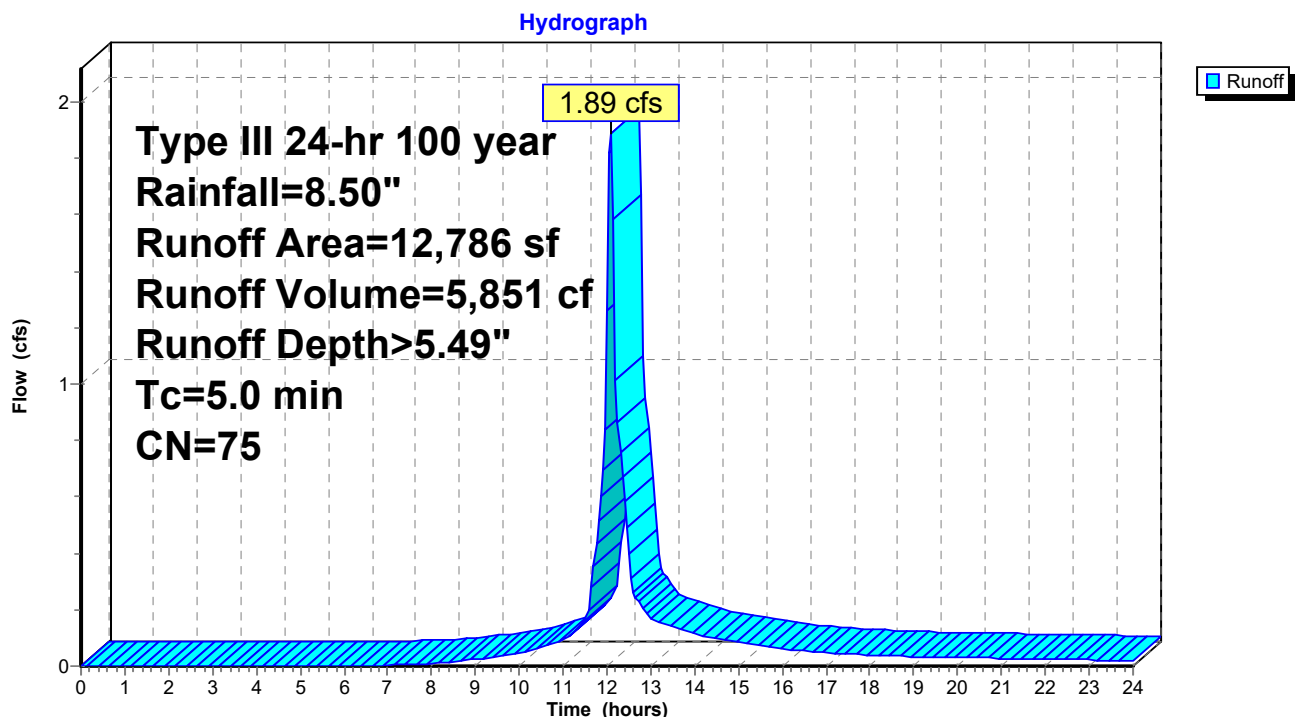
Runoff = 1.89 cfs @ 12.07 hrs, Volume= 5,851 cf, Depth> 5.49"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 100 year Rainfall=8.50"

Area (sf)	CN	Description
0	98	Roofs, HSG B
5,009	98	Paved roads w/curbs & sewers, HSG B
7,777	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
0	98	Water Surface, HSG B
12,786	75	Weighted Average
7,777		Pervious Area
5,009		Impervious Area

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

Subcatchment P-1B: P-1E

Summary for Subcatchment P-1C: P-1C

Runoff = 0.66 cfs @ 12.03 hrs, Volume= 1,917 cf, Depth> 6.34"

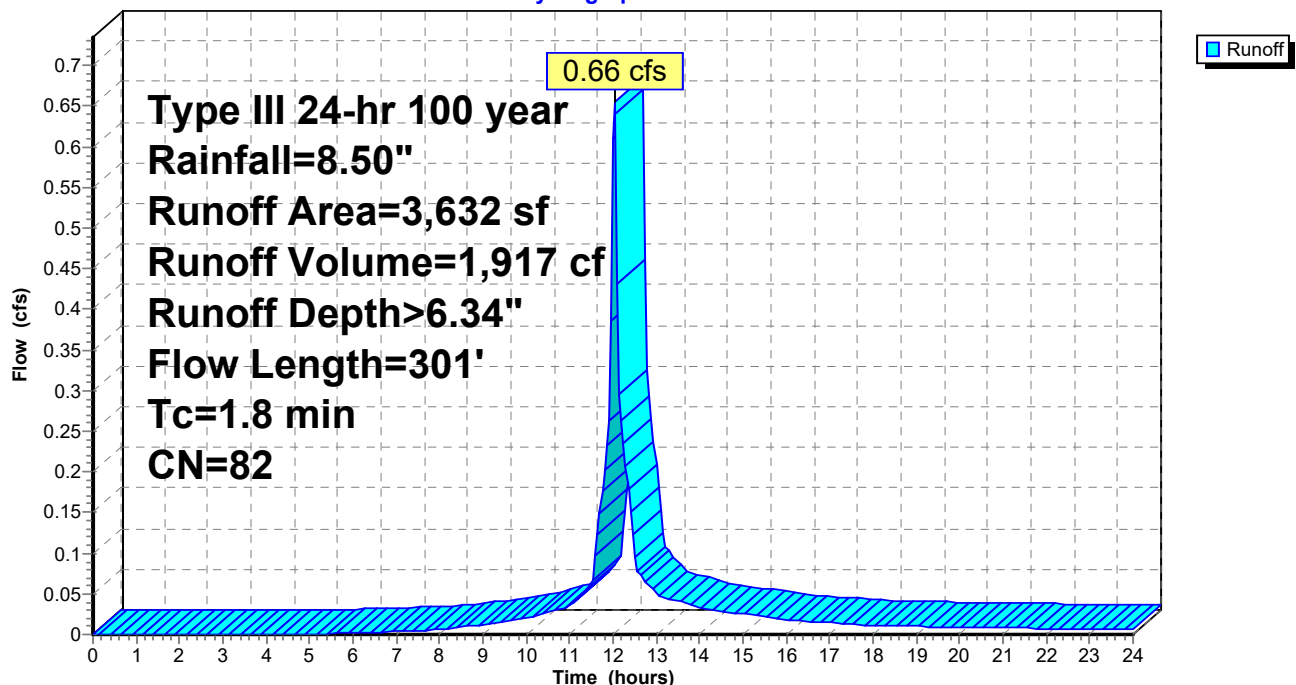
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 year Rainfall=8.50"

Area (sf)	CN	Description
0	98	Roofs, HSG B
0	98	Paved parking, HSG B
2,040	98	Paved roads w/curbs & sewers, HSG B
1,592	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
3,632	82	Weighted Average
1,592		Pervious Area
2,040		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	50	0.0300	1.41		Sheet Flow, SHEET Smooth surfaces n= 0.011 P2= 3.20"
1.2	251	0.0287	3.44		Shallow Concentrated Flow, PAVEMENT Paved Kv= 20.3 fps
1.8	301	Total			

Subcatchment P-1C: P-1C

Hydrograph



Summary for Subcatchment P-1D: P-1D

Runoff = 0.75 cfs @ 12.02 hrs, Volume= 2,295 cf, Depth> 7.42"

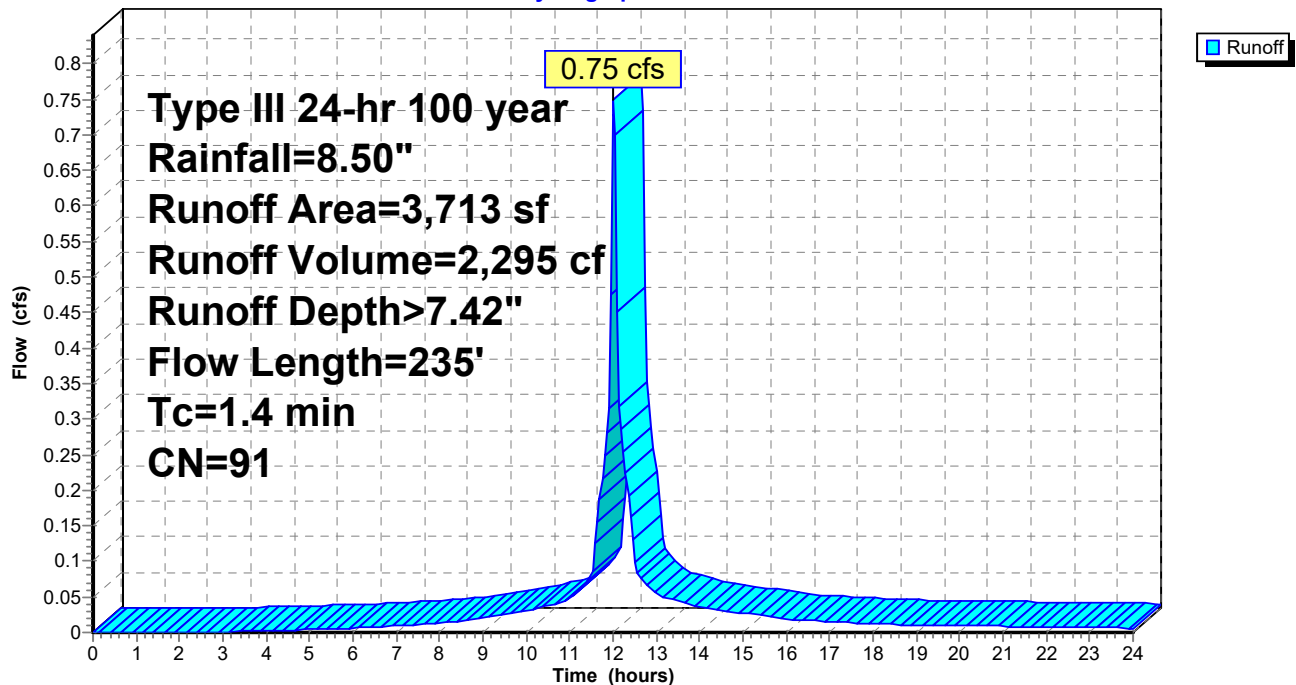
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 year Rainfall=8.50"

Area (sf)	CN	Description
0	98	Roofs, HSG B
0	98	Paved parking, HSG B
3,012	98	Paved roads w/curbs & sewers, HSG B
701	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
3,713	91	Weighted Average
701		Pervious Area
3,012		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0400	1.58		Sheet Flow, SHEET Smooth surfaces n= 0.011 P2= 3.20"
0.9	185	0.0282	3.41		Shallow Concentrated Flow, PAVEMENT Paved Kv= 20.3 fps
1.4	235	Total			

Subcatchment P-1D: P-1D

Hydrograph



Summary for Subcatchment P-1E: P-1E

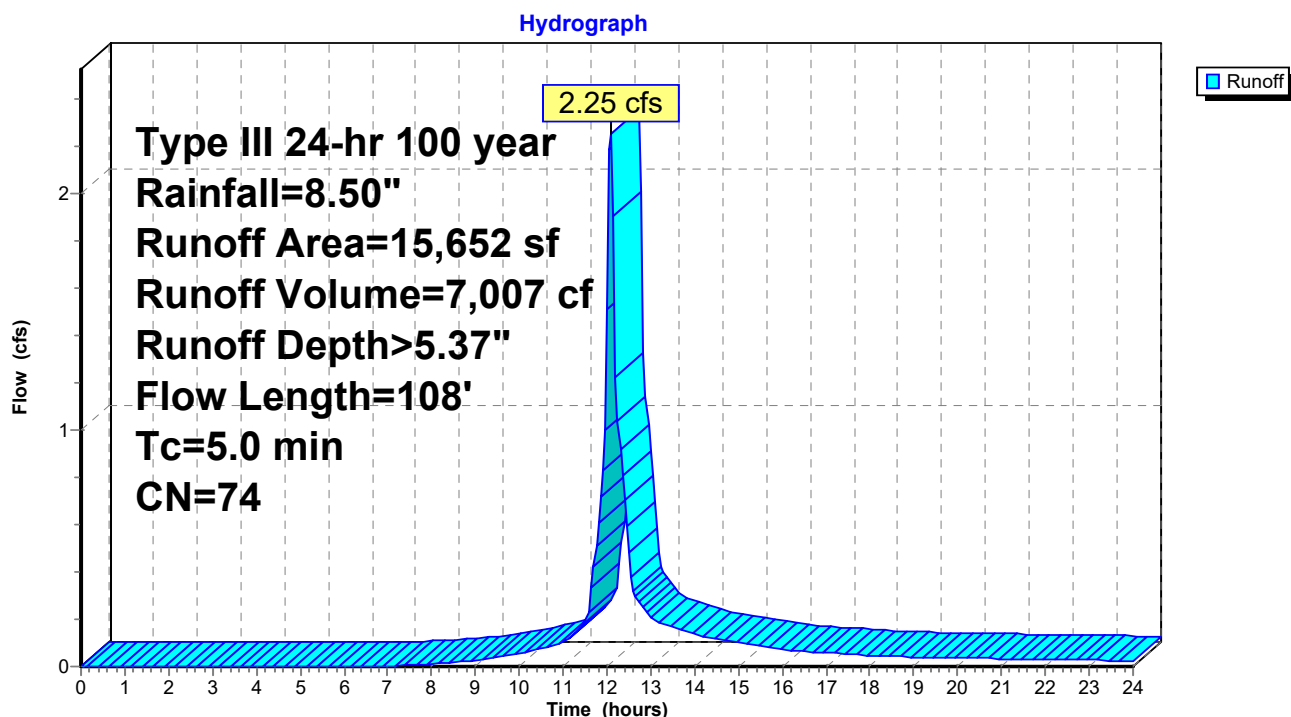
Runoff = 2.25 cfs @ 12.08 hrs, Volume= 7,007 cf, Depth> 5.37"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 100 year Rainfall=8.50"

Area (sf)	CN	Description
880	98	Roofs, HSG B
0	98	Paved parking, HSG B
0	98	Paved roads w/curbs & sewers, HSG B
8,844	61	>75% Grass cover, Good, HSG B
4,928	98	Water Surface, HSG B
1,000	55	Woods, Good, HSG B
15,652	74	Weighted Average
9,844		Pervious Area
5,808		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4					Direct Entry, DIRECT
3.3	50	0.0760	0.25		Sheet Flow, SHEET
					Grass: Short n= 0.150 P2= 3.20"
0.3	58	0.1897	3.05		Shallow Concentrated Flow, GRASS
					Short Grass Pasture Kv= 7.0 fps
5.0	108	Total			

Subcatchment P-1E: P-1E

Summary for Subcatchment P-1F: P-1F

Runoff = 3.69 cfs @ 12.07 hrs, Volume= 11,934 cf, Depth> 6.93"

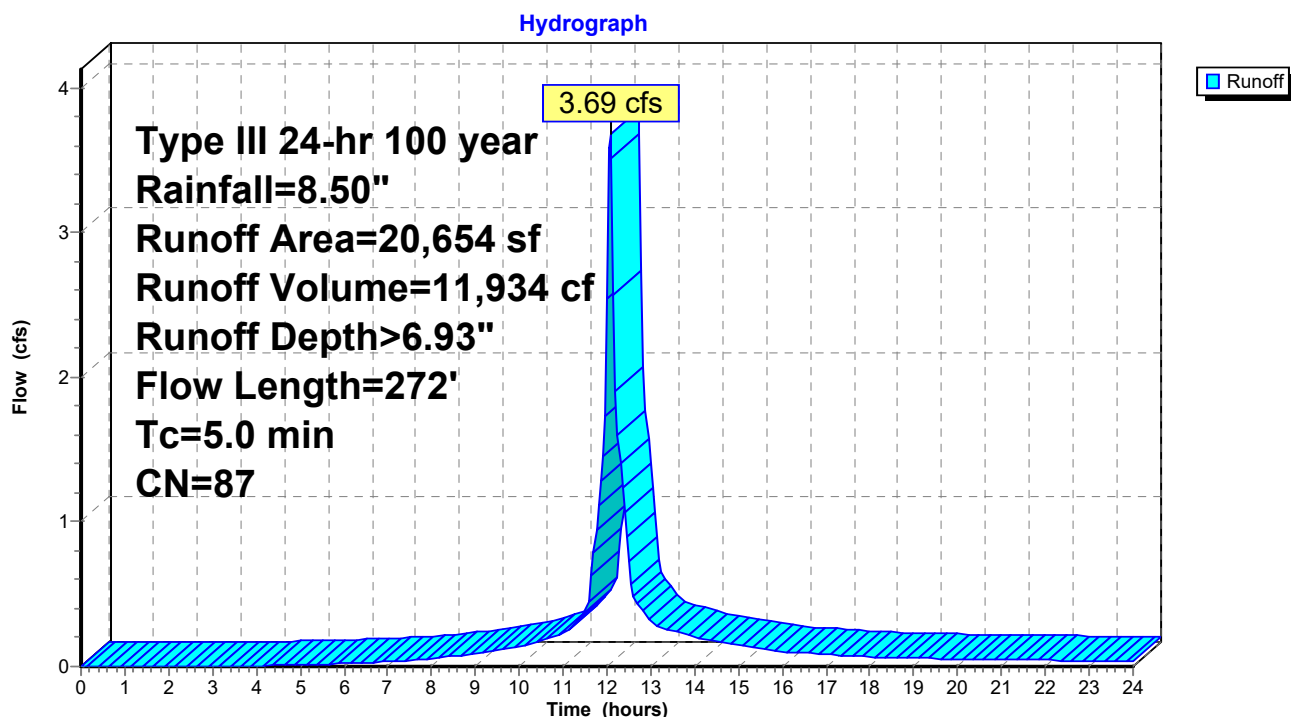
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 100 year Rainfall=8.50"

Area (sf)	CN	Description
4,840	98	Roofs, HSG B
0	98	Paved parking, HSG B
9,476	98	Paved roads w/curbs & sewers, HSG B
6,338	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
0	98	Water Surface, HSG B
20,654	87	Weighted Average
6,338		Pervious Area
14,316		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0					Direct Entry, DIRECT
3.0	50	0.1000	0.28		Sheet Flow, SHEET
					Grass: Short n= 0.150 P2= 3.20"
2.0	222	0.0676	1.82		Shallow Concentrated Flow, GRASS
					Short Grass Pasture Kv= 7.0 fps
5.0	272	Total			

Subcatchment P-1F: P-1F



Summary for Subcatchment P-1G: P-1I

Runoff = 1.01 cfs @ 12.07 hrs, Volume= 3,220 cf, Depth> 6.69"

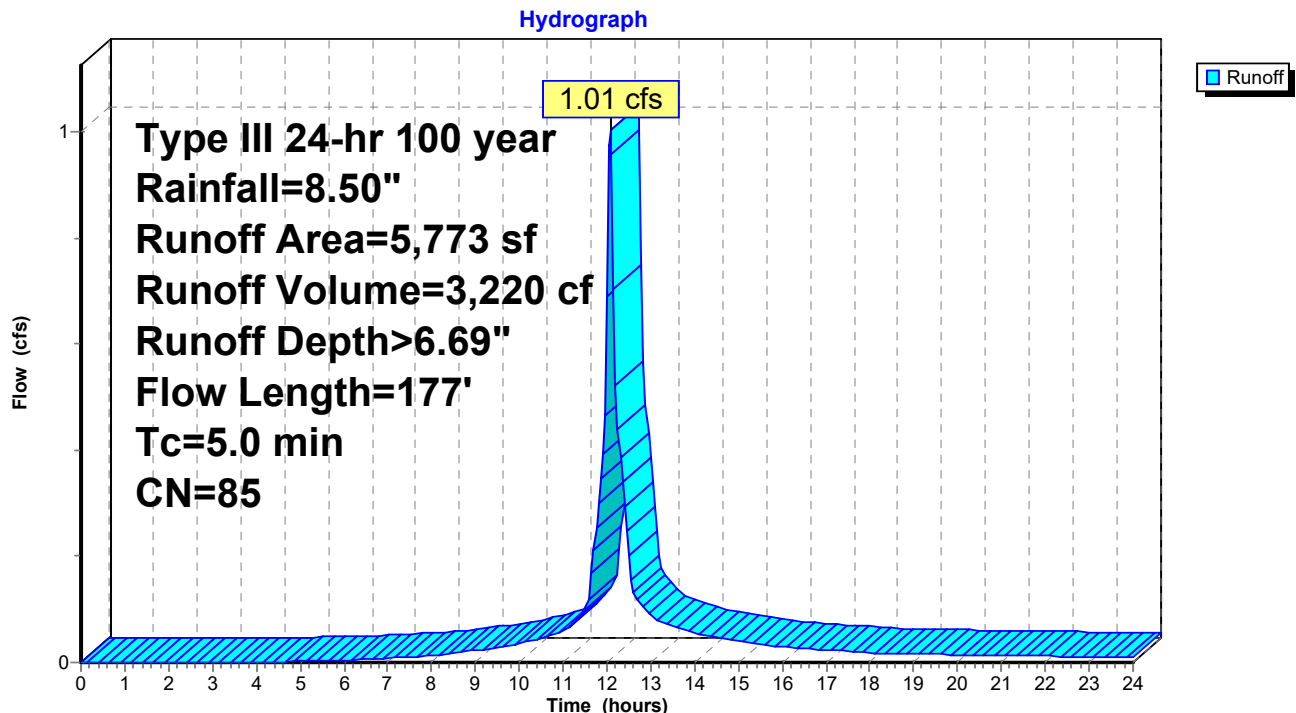
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 100 year Rainfall=8.50"

Area (sf)	CN	Description
0	55	Woods, Good, HSG B
2,064	61	>75% Grass cover, Good, HSG B
440	98	Roofs, HSG B
3,269	98	Paved roads w/curbs & sewers, HSG B
5,773	85	Weighted Average
2,064		Pervious Area
3,709		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7					Direct Entry, DIRECT
0.6	50	0.0300	1.41		Sheet Flow, SHEET FLOW
					Smooth surfaces n= 0.011 P2= 3.20"
0.7	127	0.0197	2.85		Shallow Concentrated Flow, PAVED
					Paved Kv= 20.3 fps
5.0	177	Total			

Subcatchment P-1G: P-1I



Summary for Subcatchment P-1H: P-1H

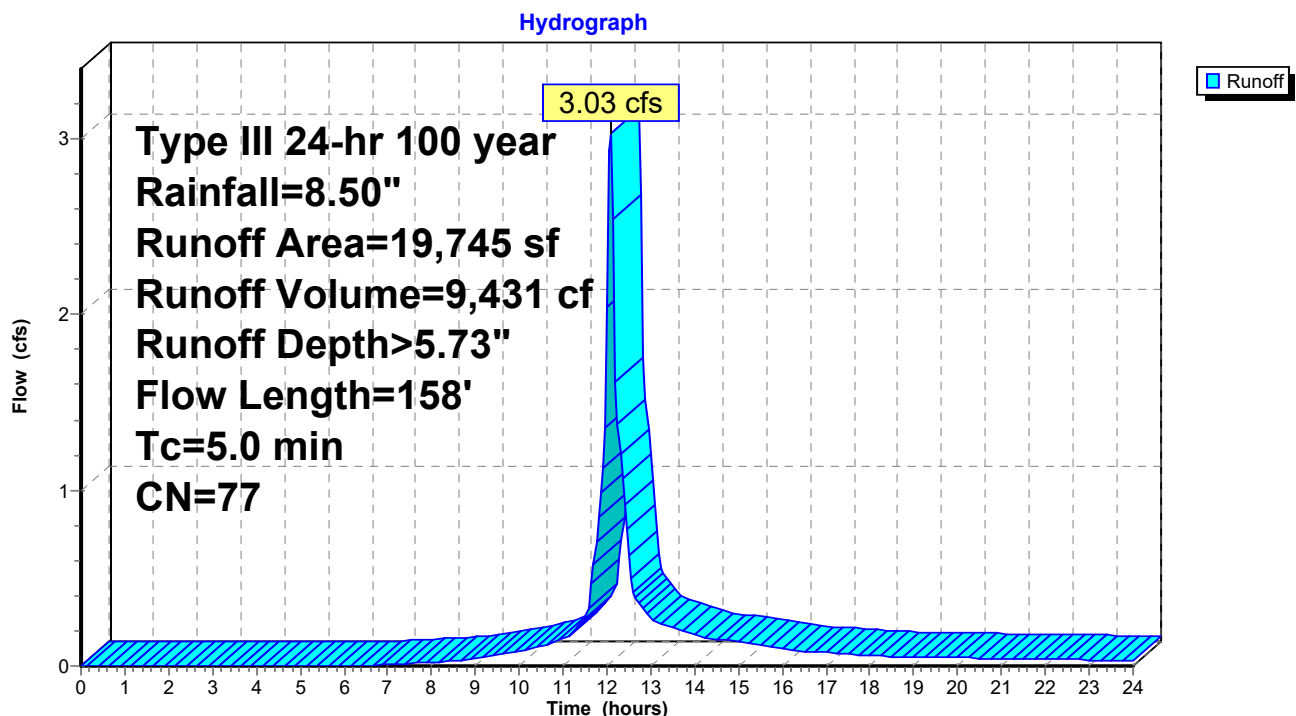
Runoff = 3.03 cfs @ 12.07 hrs, Volume= 9,431 cf, Depth> 5.73"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 year Rainfall=8.50"

Area (sf)	CN	Description
5,720	98	Roofs, HSG B
0	98	Paved parking, HSG B
2,679	98	Paved roads w/curbs & sewers, HSG B
11,346	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
19,745	77	Weighted Average
11,346		Pervious Area
8,399		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.8					Direct Entry, DIRECT
0.6	50	0.0300	1.41		Sheet Flow, SHEET
					Smooth surfaces n= 0.011 P2= 3.20"
0.6	108	0.0231	3.09		Shallow Concentrated Flow, PAVEMENT
					Paved Kv= 20.3 fps
5.0	158	Total			

Subcatchment P-1H: P-1H



Summary for Subcatchment P-1I: P-1I

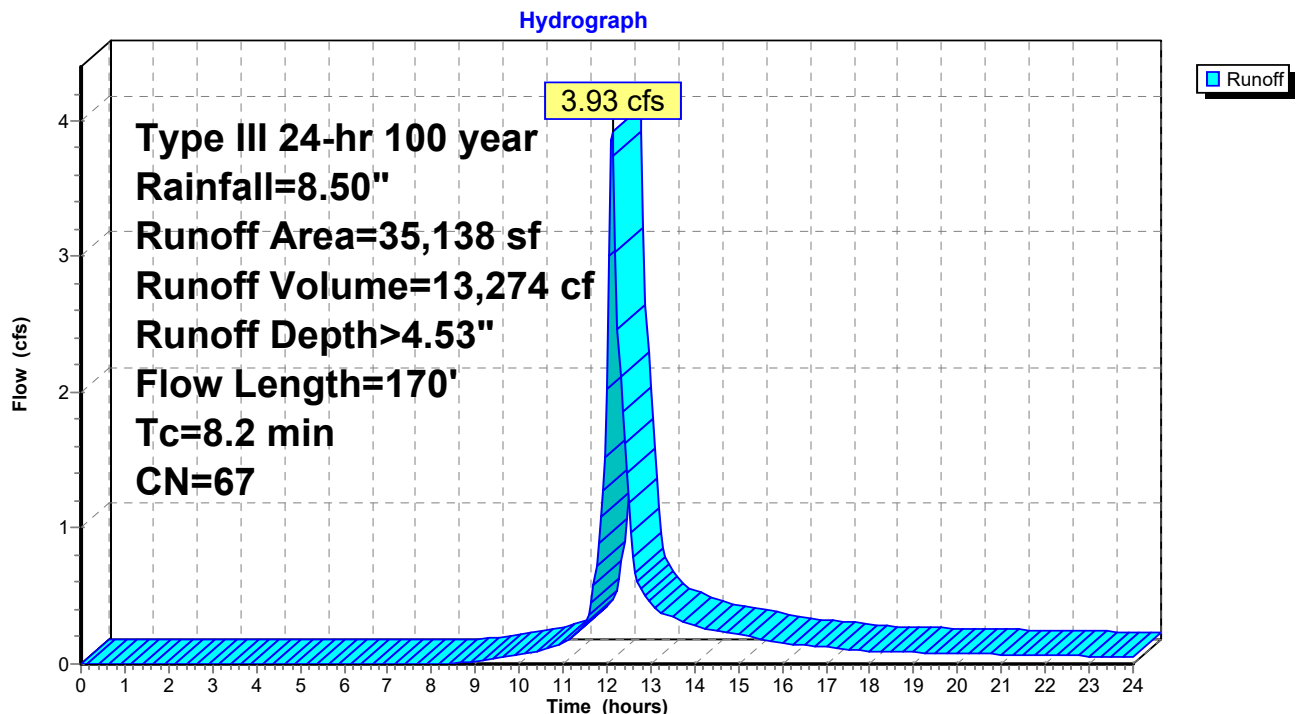
Runoff = 3.93 cfs @ 12.12 hrs, Volume= 13,274 cf, Depth> 4.53"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 year Rainfall=8.50"

Area (sf)	CN	Description
440	98	Roofs, HSG B
0	98	Paved parking, HSG B
0	98	Paved roads w/curbs & sewers, HSG B
29,518	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
5,180	98	Water Surface, HSG B
35,138	67	Weighted Average
29,518		Pervious Area
5,620		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.1000	0.13		Sheet Flow, SHEET Woods: Light underbrush n= 0.400 P2= 3.20"
1.7	120	0.0580	1.20		Shallow Concentrated Flow, GRASS Woodland Kv= 5.0 fps
8.2	170	Total			

Subcatchment P-1I: P-1I



Summary for Subcatchment P-1J: P1-J

Runoff = 2.50 cfs @ 12.10 hrs, Volume= 8,058 cf, Depth> 3.36"

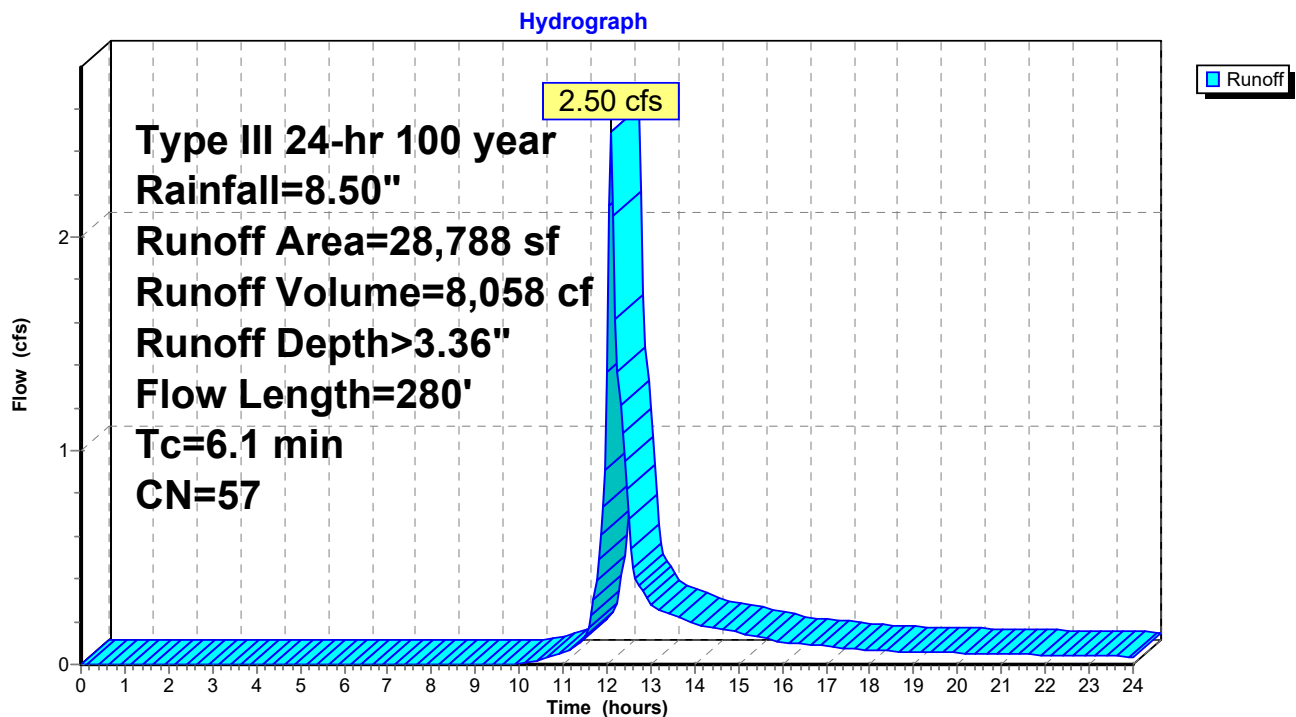
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 100 year Rainfall=8.50"

Area (sf)	CN	Description
21,119	55	Woods, Good, HSG B
7,579	61	>75% Grass cover, Good, HSG B
* 90	98	Paved roads w/curbs & sewers, HSG B
28,788	57	Weighted Average
28,698		Pervious Area
90		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.2	50	0.0800	0.26		Sheet Flow, Flow over grass Grass: Short n= 0.150 P2= 3.20"
2.9	230	0.0690	1.31		Shallow Concentrated Flow, Flow in woods Woodland Kv= 5.0 fps
6.1	280	Total			

Subcatchment P-1J: P1-J



Summary for Subcatchment P-2A: P-2A

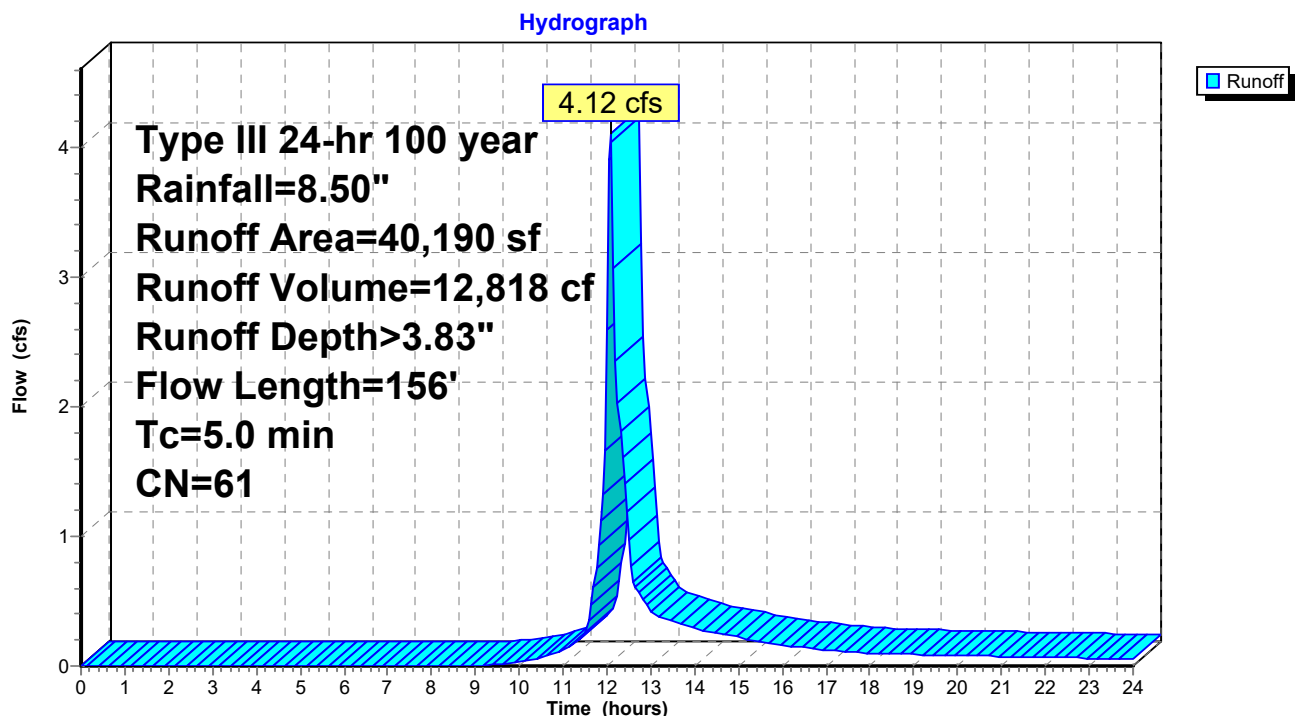
Runoff = 4.12 cfs @ 12.08 hrs, Volume= 12,818 cf, Depth> 3.83"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 year Rainfall=8.50"

Area (sf)	CN	Description
4,400	98	Roofs, HSG B
0	98	Paved parking, HSG B
0	98	Paved roads w/curbs & sewers, HSG B
10,645	61	>75% Grass cover, Good, HSG B
25,145	55	Woods, Good, HSG B
40,190	61	Weighted Average
35,790		Pervious Area
4,400		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3					Direct Entry, DIRECT
3.9	50	0.0500	0.21		Sheet Flow, SHEET GRASS Grass: Short n= 0.150 P2= 3.20"
0.8	106	0.1085	2.31		Shallow Concentrated Flow, GRASS SHALLOW Short Grass Pasture Kv= 7.0 fps
5.0	156	Total			

Subcatchment P-2A: P-2A



Summary for Subcatchment P-3A: P-3A

Runoff = 2.84 cfs @ 12.08 hrs, Volume= 8,904 cf, Depth> 3.48"

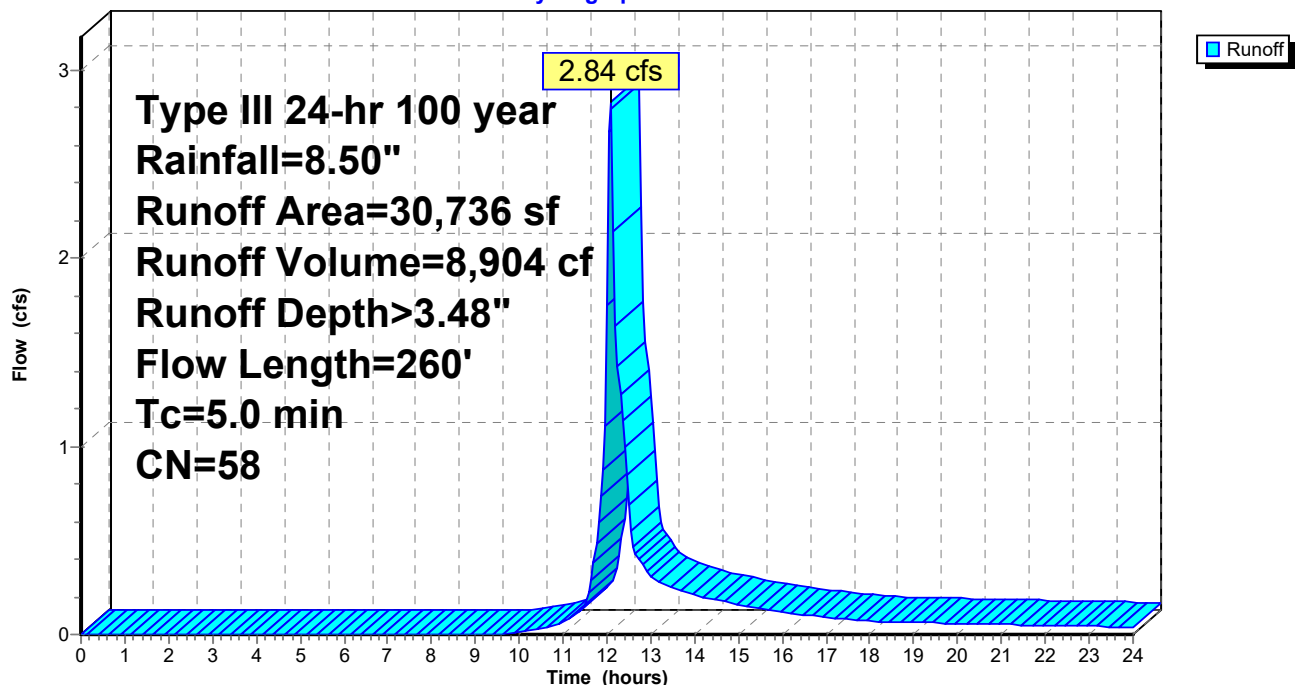
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 year Rainfall=8.50"

Area (sf)	CN	Description
0	98	Roofs, HSG B
0	98	Unconnected pavement, HSG B
0	98	Paved roads w/curbs & sewers, HSG B
13,964	61	>75% Grass cover, Good, HSG B
16,772	55	Woods, Good, HSG B
30,736	58	Weighted Average
30,736		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0					Direct Entry, DIRECT
2.0	50	0.2700	0.42		Sheet Flow, SHEET GRASS
					Grass: Short n= 0.150 P2= 3.20"
2.0	210	0.0595	1.71		Shallow Concentrated Flow, SHALLOW GRASS
					Short Grass Pasture Kv= 7.0 fps
5.0	260	Total			

Subcatchment P-3A: P-3A

Hydrograph



Pearson Drive, Newbury, MA POST DEV

Prepared by Ranger Engineering & Design, LLC

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Type III 24-hr 100 year Rainfall=8.50"

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Summary for Subcatchment P-3B: P-3B

Runoff = 10.34 cfs @ 12.08 hrs, Volume= 32,146 cf, Depth> 5.37"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

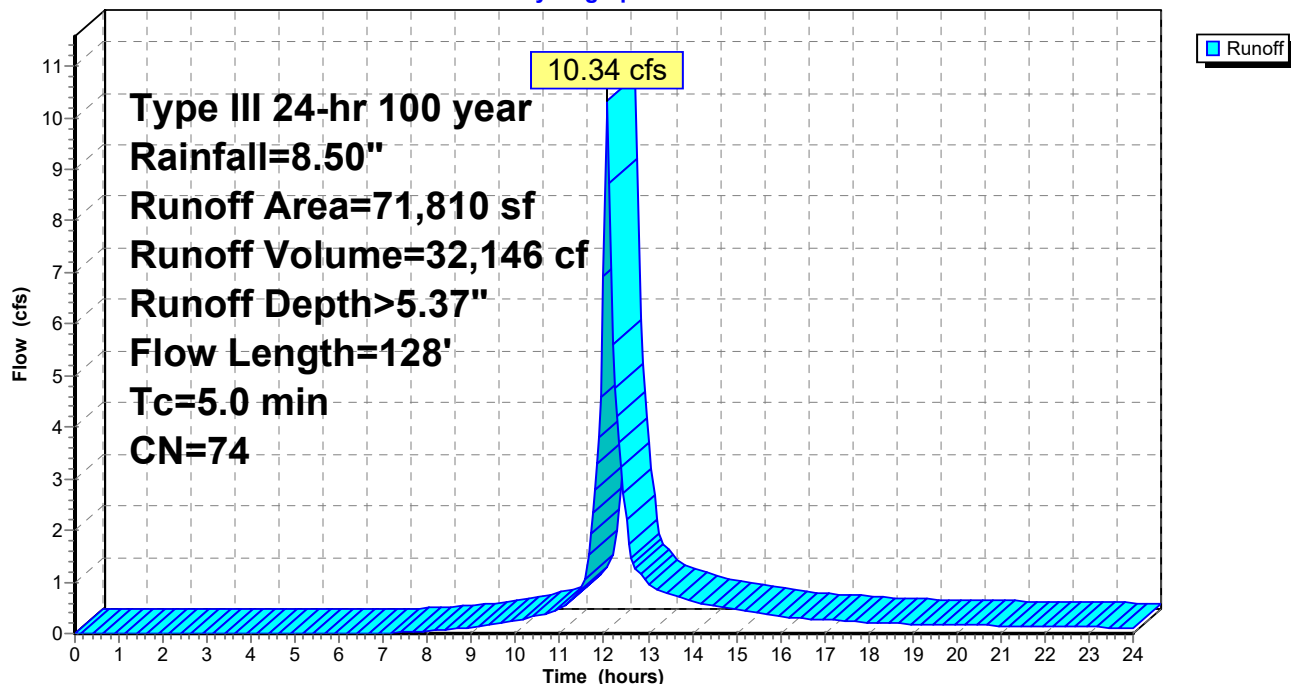
Type III 24-hr 100 year Rainfall=8.50"

Area (sf)	CN	Description
15,400	98	Roofs, HSG B
0	98	Paved parking, HSG B
0	98	Paved roads w/curbs & sewers, HSG B
47,365	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
9,045	98	Water Surface, HSG B
71,810	74	Weighted Average
47,365		Pervious Area
24,445		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8					Direct Entry, DIRECT
2.7	50	0.1300	0.31		Sheet Flow, SHEET GRASS
					Grass: Short n= 0.150 P2= 3.20"
0.5	78	0.1218	2.44		Shallow Concentrated Flow, SHALLOW GRASS
					Short Grass Pasture Kv= 7.0 fps
5.0	128	Total			

Subcatchment P-3B: P-3B

Hydrograph



Summary for Subcatchment P-3C: P-3C

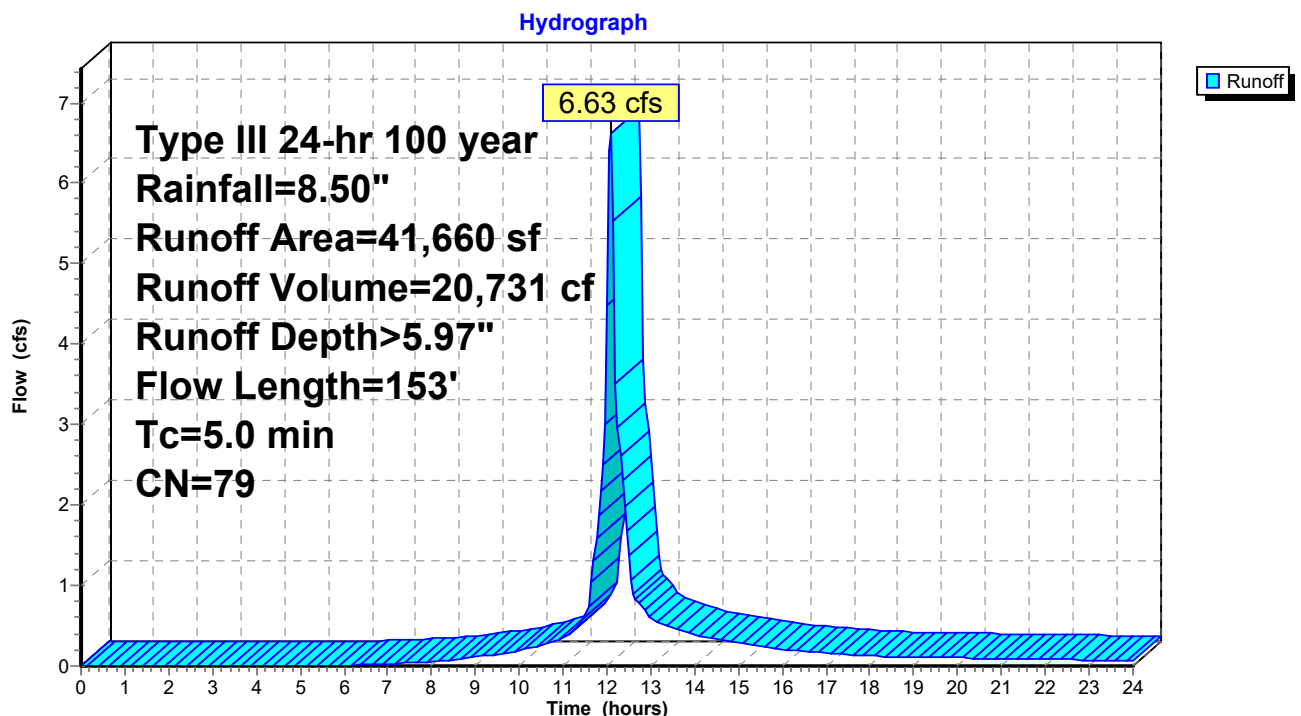
Runoff = 6.63 cfs @ 12.07 hrs, Volume= 20,731 cf, Depth> 5.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 year Rainfall=8.50"

Area (sf)	CN	Description
3,520	98	Roofs, HSG B
0	98	Paved parking, HSG B
16,527	98	Paved roads w/curbs & sewers, HSG B
21,613	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
41,660	79	Weighted Average
21,613		Pervious Area
20,047		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3					Direct Entry, DIRECT
0.9	50	0.0096	0.89		Sheet Flow, SHEET PAVEMENT Smooth surfaces n= 0.011 P2= 3.20"
0.8	103	0.0116	2.19		Shallow Concentrated Flow, SHALLOW PAVEMENT Paved Kv= 20.3 fps
5.0	153	Total			

Subcatchment P-3C: P-3C



Summary for Subcatchment P-3D: P-3D

Runoff = 3.75 cfs @ 12.07 hrs, Volume= 11,861 cf, Depth> 6.33"

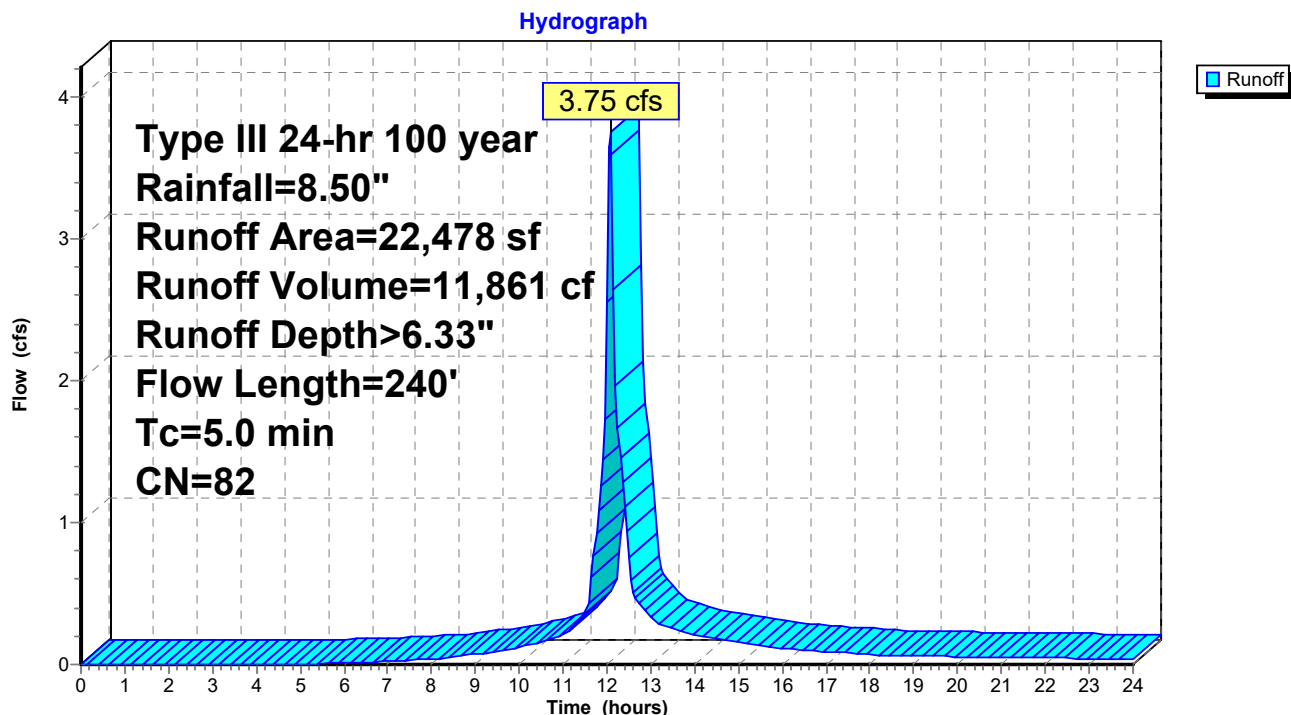
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Type III 24-hr 100 year Rainfall=8.50"

Area (sf)	CN	Description
6,160	98	Roofs, HSG B
6,458	98	Paved roads w/curbs & sewers, HSG B
9,860	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
22,478	82	Weighted Average
9,860		Pervious Area
12,618		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1					Direct Entry, DIRECT
1.3	50	0.0040	0.63		Sheet Flow, SHEET PAVEMENT
					Smooth surfaces n= 0.011 P2= 3.20"
1.6	190	0.0095	1.98		Shallow Concentrated Flow, SHALLOW PAVEMENT
					Paved Kv= 20.3 fps
5.0	240	Total			

Subcatchment P-3D: P-3D



Summary for Subcatchment P-3E: P-3F

Runoff = 0.80 cfs @ 12.07 hrs, Volume= 2,572 cf, Depth> 6.81"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

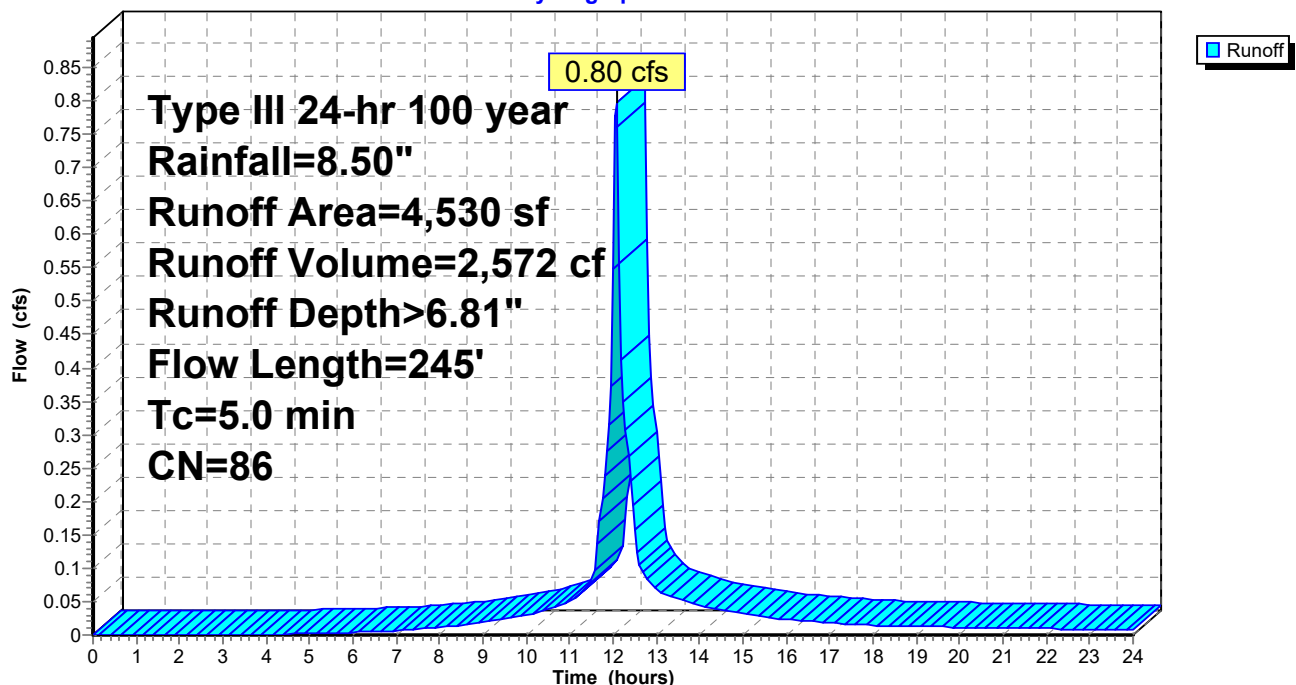
Type III 24-hr 100 year Rainfall=8.50"

Area (sf)	CN	Description
440	98	Roofs, HSG B
0	98	Paved parking, HSG B
2,664	98	Paved roads w/curbs & sewers, HSG B
1,426	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
4,530	86	Weighted Average
1,426		Pervious Area
3,104		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0					Direct Entry, DIRECT
1.3	50	0.0040	0.63		Sheet Flow, SHEET PAVEMENT Smooth surfaces n= 0.011 P2= 3.20"
1.7	195	0.0092	1.95		Shallow Concentrated Flow, SHALLOW PAVEMENT Paved Kv= 20.3 fps
5.0	245	Total			

Subcatchment P-3E: P-3F

Hydrograph



Summary for Pond 3P: INFILTRATOR

Routing by Dyn-Stor-Ind method

Peak Elev= 0.00' @ 0.00 hrs Surf.Area= 50 sf Storage= 0 cf

Plug-Flow detention time= (not calculated)

Center-of-Mass det. time= (not calculated)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	52 cf	5.00'W x 10.00'L x 3.50'H Prismatoid 175 cf Overall - 46 cf Embedded = 129 cf x 40.0% Voids
#2	0.00'	46 cf	44.6"W x 30.0"H x 7.12'L StormTech SC-740 Inside #1
		98 cf	Total Available Storage

Summary for Pond CB1: CB1

Inflow Area = 3,632 sf, 56.17% Impervious, Inflow Depth > 6.34" for 100 year event
 Inflow = 0.66 cfs @ 12.03 hrs, Volume= 1,917 cf
 Outflow = 0.66 cfs @ 12.03 hrs, Volume= 1,917 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.66 cfs @ 12.03 hrs, Volume= 1,917 cf

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

Peak Elev= 52.98' @ 12.59 hrs

Flood Elev= 53.86'

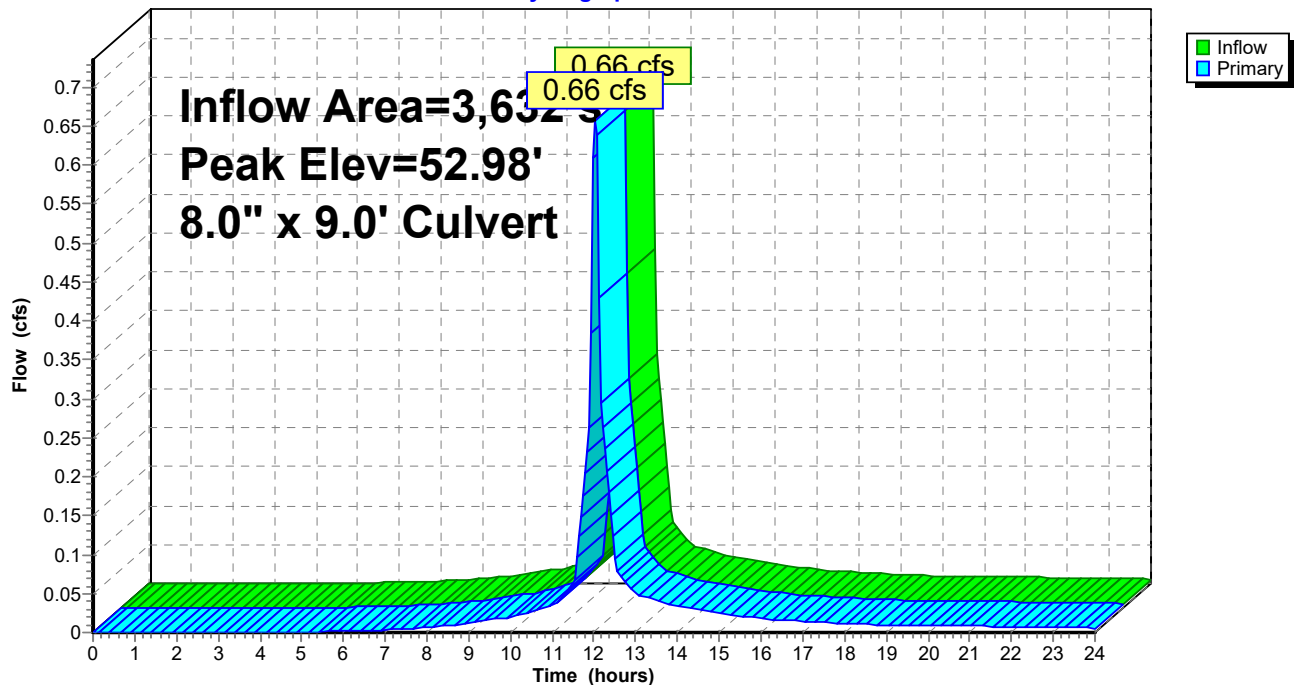
Device	Routing	Invert	Outlet Devices
#1	Primary	50.60'	8.0" x 9.0' long Culvert RCP, groove end projecting, Ke= 0.200 Outlet Invert= 50.50' S= 0.0111 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.00 cfs @ 12.03 hrs HW=51.65' TW=51.87' (Dynamic Tailwater)

↑1=Culvert (Controls 0.00 cfs)

Pond CB1: CB1

Hydrograph



Summary for Pond CB2: CB2

Inflow Area = 3,713 sf, 81.12% Impervious, Inflow Depth > 7.42" for 100 year event
 Inflow = 0.75 cfs @ 12.02 hrs, Volume= 2,295 cf
 Outflow = 0.75 cfs @ 12.02 hrs, Volume= 2,295 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.75 cfs @ 12.02 hrs, Volume= 2,295 cf

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

Peak Elev= 52.98' @ 12.59 hrs

Flood Elev= 53.86'

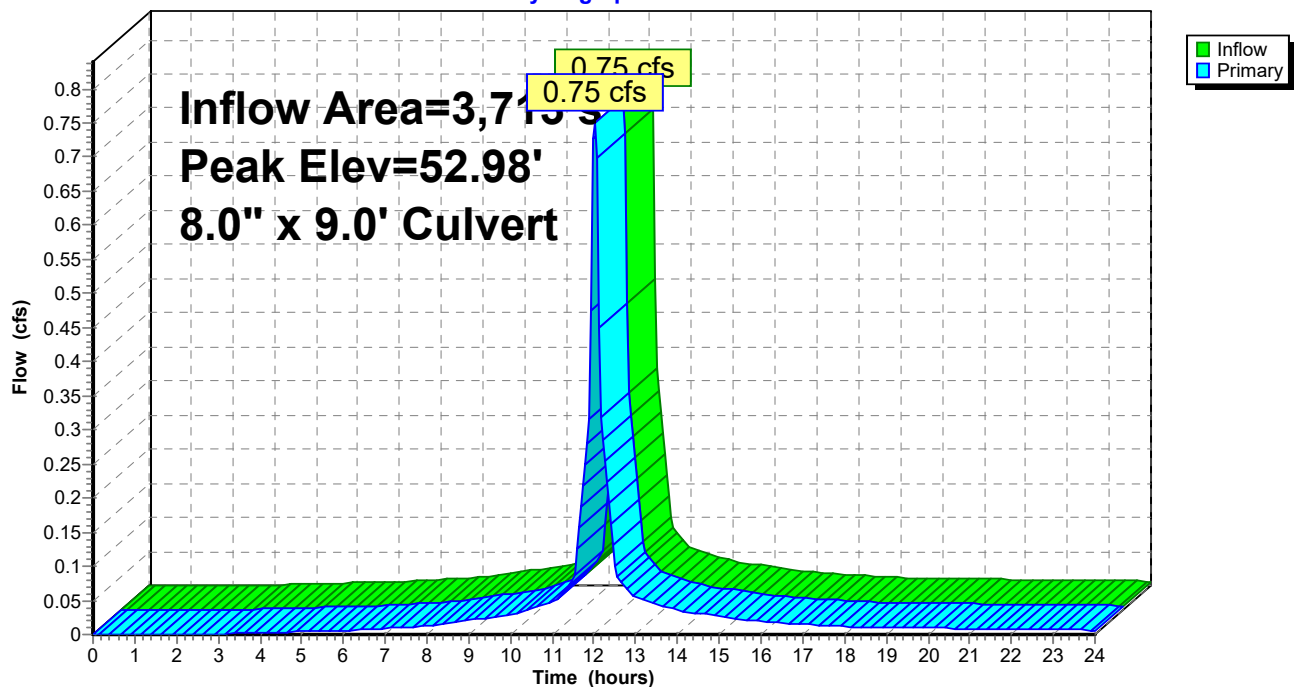
Device	Routing	Invert	Outlet Devices
#1	Primary	50.60'	8.0" x 9.0' long Culvert RCP, groove end projecting, Ke= 0.200 Outlet Invert= 50.50' S= 0.0111 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.00 cfs @ 12.02 hrs HW=51.62' TW=51.80' (Dynamic Tailwater)

↑1=Culvert (Controls 0.00 cfs)

Pond CB2: CB2

Hydrograph



Summary for Pond CB3: CB3

Inflow Area = 12,786 sf, 39.18% Impervious, Inflow Depth > 5.49" for 100 year event
 Inflow = 1.89 cfs @ 12.07 hrs, Volume= 5,851 cf
 Outflow = 1.89 cfs @ 12.07 hrs, Volume= 5,851 cf, Atten= 0%, Lag= 0.0 min
 Primary = 1.89 cfs @ 12.07 hrs, Volume= 5,851 cf

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

Peak Elev= 56.11' @ 12.13 hrs

Flood Elev= 54.77'

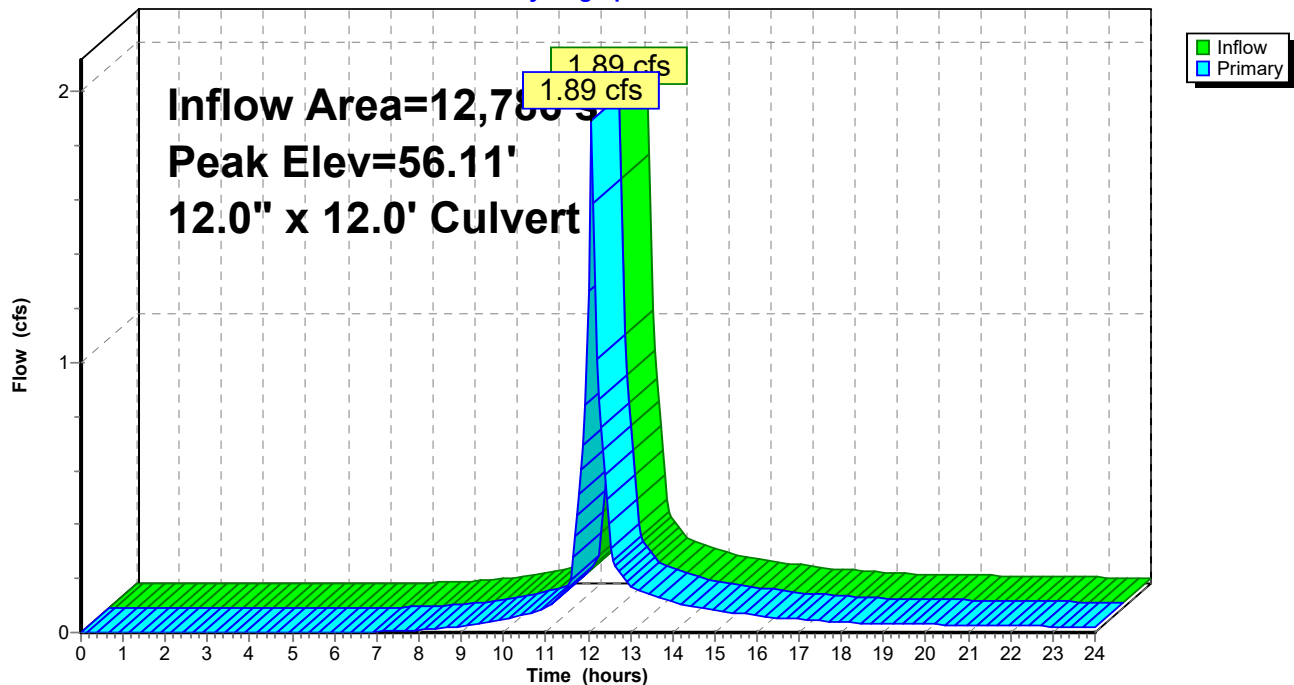
Device	Routing	Invert	Outlet Devices
#1	Primary	52.34'	12.0" x 12.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 52.28' S= 0.0050 '/ Cc= 0.900 n= 0.011 Concrete pipe, straight & clean

Primary OutFlow Max=0.00 cfs @ 12.07 hrs HW=55.34' TW=55.82' (Dynamic Tailwater)

↑1=Culvert (Controls 0.00 cfs)

Pond CB3: CB3

Hydrograph



Summary for Pond CB4: CB4

Inflow Area = 20,654 sf, 69.31% Impervious, Inflow Depth > 6.93" for 100 year event
 Inflow = 3.69 cfs @ 12.07 hrs, Volume= 11,934 cf
 Outflow = 3.69 cfs @ 12.07 hrs, Volume= 11,934 cf, Atten= 0%, Lag= 0.0 min
 Primary = 3.69 cfs @ 12.07 hrs, Volume= 11,934 cf

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

Peak Elev= 56.67' @ 12.12 hrs

Flood Elev= 54.77'

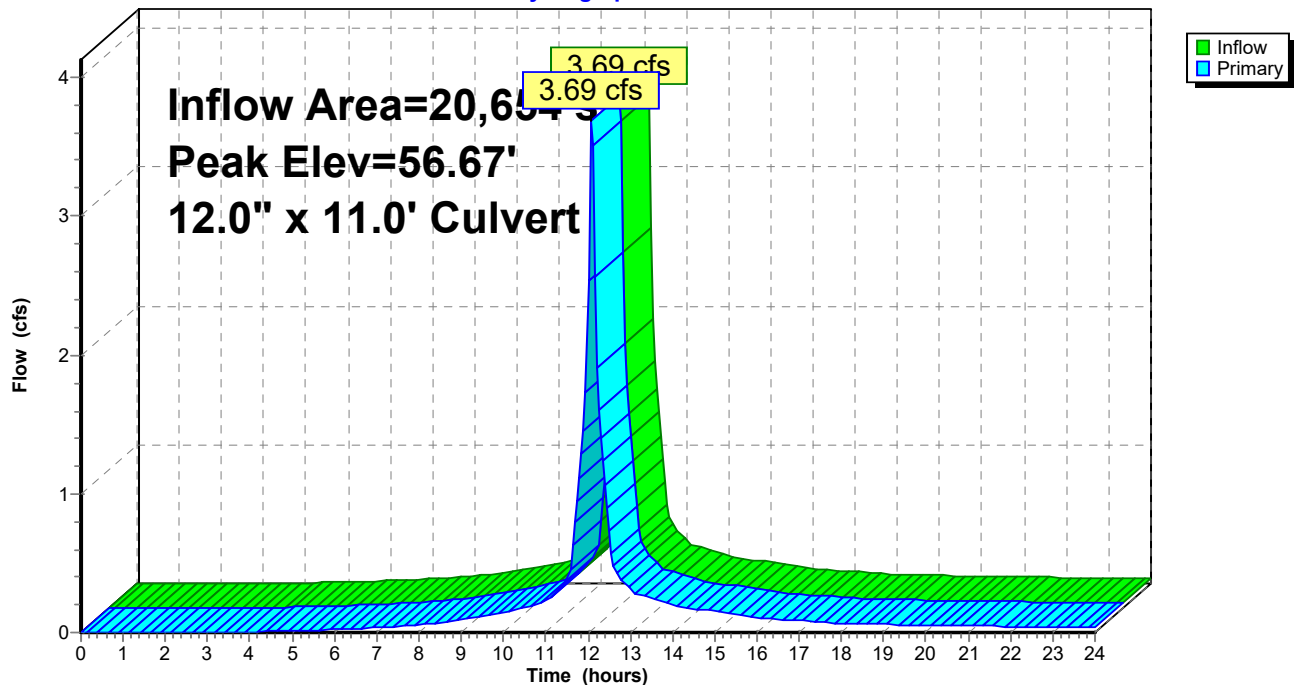
Device	Routing	Invert	Outlet Devices
#1	Primary	52.34'	12.0" x 11.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 52.28' S= 0.0055 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean

Primary OutFlow Max=1.21 cfs @ 12.07 hrs HW=55.91' TW=55.81' (Dynamic Tailwater)

↑ **1=Culvert** (Inlet Controls 1.21 cfs @ 1.54 fps)

Pond CB4: CB4

Hydrograph



Summary for Pond CB5: CB5

Inflow Area = 19,745 sf, 42.54% Impervious, Inflow Depth > 5.73" for 100 year event
 Inflow = 3.03 cfs @ 12.07 hrs, Volume= 9,431 cf
 Outflow = 3.03 cfs @ 12.07 hrs, Volume= 9,431 cf, Atten= 0%, Lag= 0.0 min
 Primary = 3.03 cfs @ 12.07 hrs, Volume= 9,431 cf

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

Peak Elev= 62.15' @ 12.07 hrs

Flood Elev= 65.00'

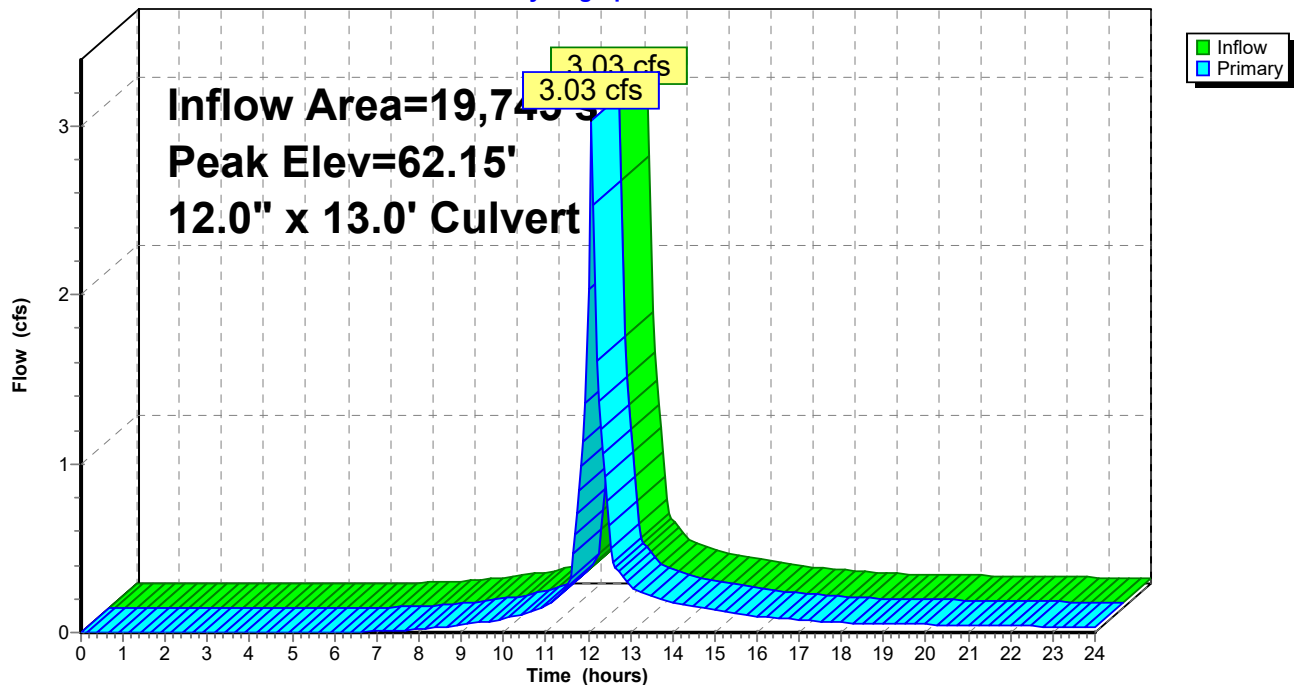
Device	Routing	Invert	Outlet Devices
#1	Primary	61.00'	12.0" x 13.0' long Culvert RCP, groove end projecting, Ke= 0.200 Outlet Invert= 60.87' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=2.92 cfs @ 12.07 hrs HW=62.11' TW=59.81' (Dynamic Tailwater)

1=Culvert (Barrel Controls 2.92 cfs @ 4.17 fps)

Pond CB5: CB5

Hydrograph



Summary for Pond CB6: CB6

Inflow Area = 5,773 sf, 64.25% Impervious, Inflow Depth > 6.69" for 100 year event
 Inflow = 1.01 cfs @ 12.07 hrs, Volume= 3,220 cf
 Outflow = 1.01 cfs @ 12.07 hrs, Volume= 3,220 cf, Atten= 0%, Lag= 0.0 min
 Primary = 1.01 cfs @ 12.07 hrs, Volume= 3,220 cf

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

Peak Elev= 61.59' @ 12.07 hrs

Flood Elev= 65.00'

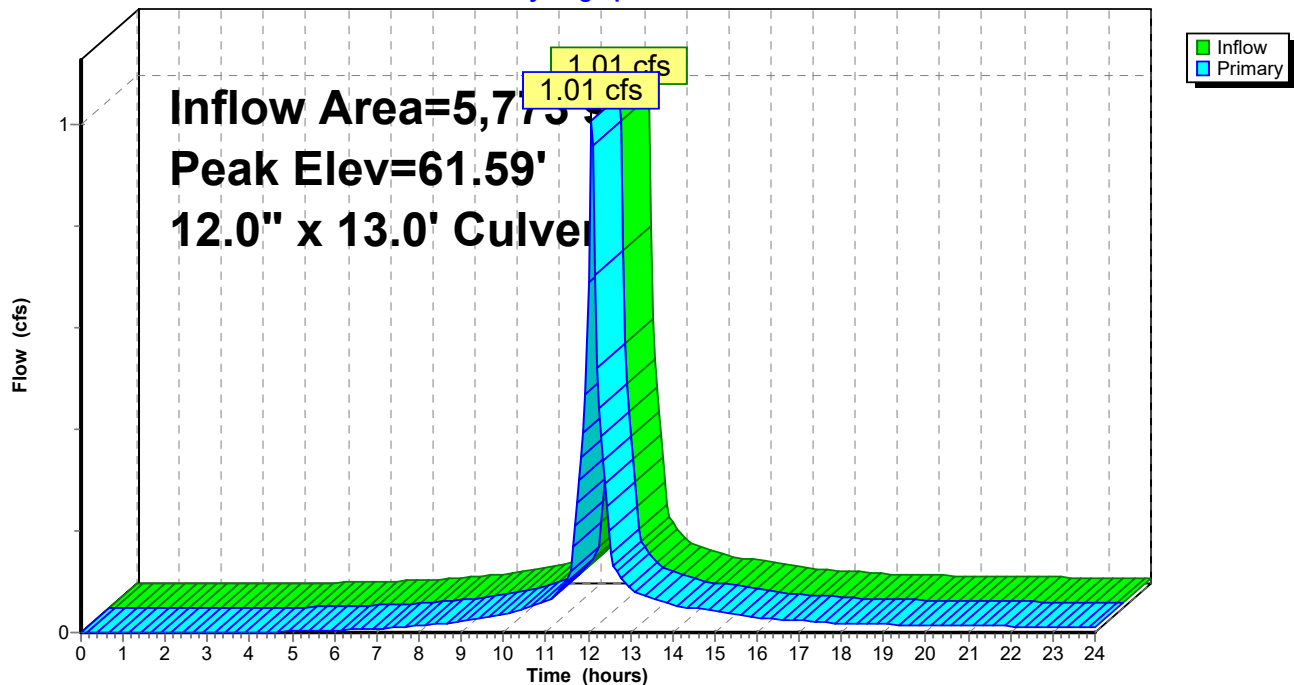
Device	Routing	Invert	Outlet Devices
#1	Primary	61.00'	12.0" x 13.0' long Culvert CPP, square edge headwall, Ke= 0.500 Outlet Invert= 60.87' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.97 cfs @ 12.07 hrs HW=61.57' TW=59.81' (Dynamic Tailwater)

↑ **1=Culvert** (Barrel Controls 0.97 cfs @ 2.99 fps)

Pond CB6: CB6

Hydrograph



Summary for Pond CB7: CB7

Inflow Area = 4,530 sf, 68.52% Impervious, Inflow Depth > 6.81" for 100 year event
 Inflow = 0.80 cfs @ 12.07 hrs, Volume= 2,572 cf
 Outflow = 0.80 cfs @ 12.07 hrs, Volume= 2,572 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.80 cfs @ 12.07 hrs, Volume= 2,572 cf

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

Peak Elev= 68.29' @ 12.36 hrs

Flood Elev= 69.00'

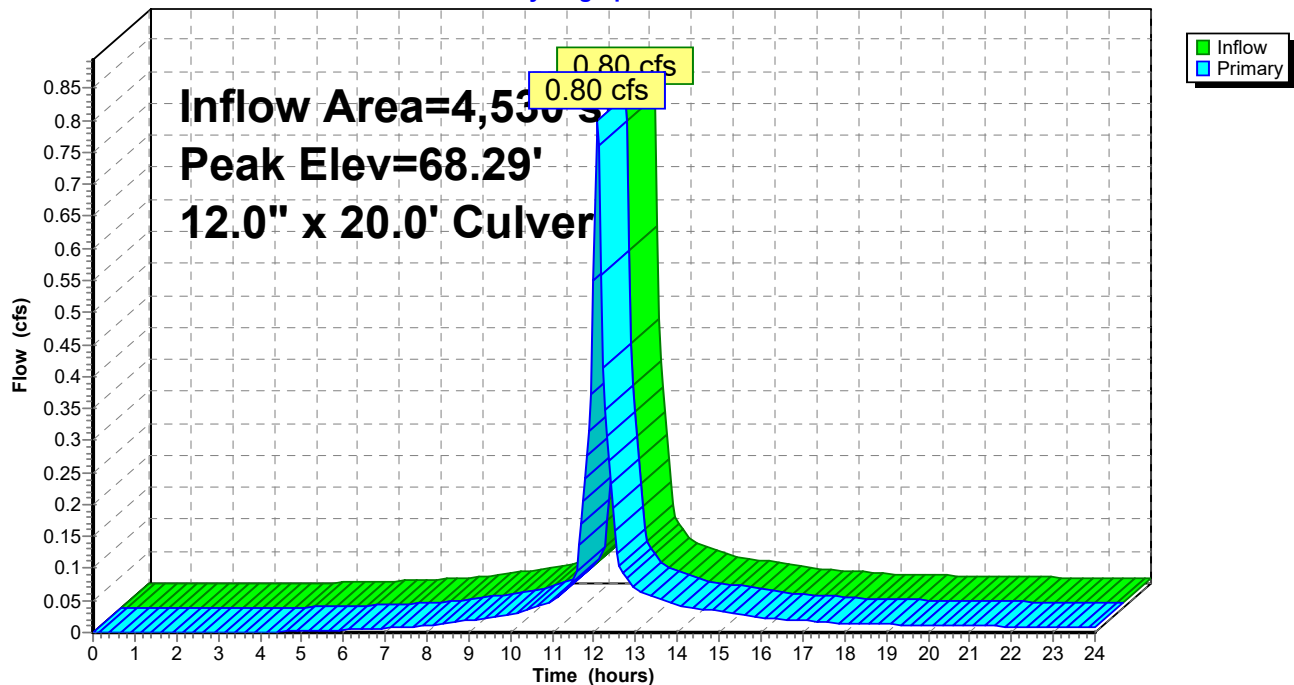
Device	Routing	Invert	Outlet Devices
#1	Primary	65.91'	12.0" x 20.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 65.81' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.00 cfs @ 12.07 hrs HW=67.09' TW=67.52' (Dynamic Tailwater)

↑1=Culvert (Controls 0.00 cfs)

Pond CB7: CB7

Hydrograph



Summary for Pond CB8: CB8

Inflow Area = 22,478 sf, 56.13% Impervious, Inflow Depth > 6.33" for 100 year event
 Inflow = 3.75 cfs @ 12.07 hrs, Volume= 11,861 cf
 Outflow = 3.75 cfs @ 12.07 hrs, Volume= 11,861 cf, Atten= 0%, Lag= 0.0 min
 Primary = 3.75 cfs @ 12.07 hrs, Volume= 11,861 cf

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

Peak Elev= 68.39' @ 12.35 hrs

Flood Elev= 69.00'

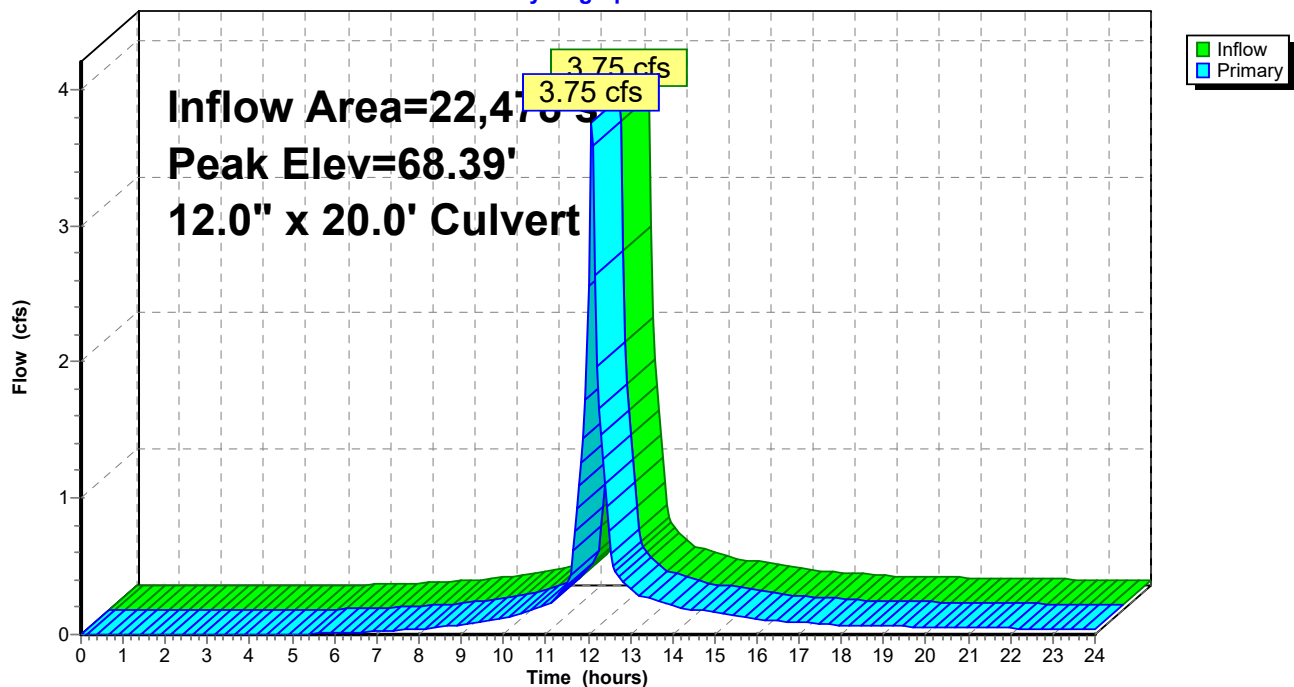
Device	Routing	Invert	Outlet Devices
#1	Primary	65.91'	12.0" x 20.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 65.81' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=2.51 cfs @ 12.07 hrs HW=67.97' TW=67.53' (Dynamic Tailwater)

↑ **1=Culvert** (Inlet Controls 2.51 cfs @ 3.19 fps)

Pond CB8: CB8

Hydrograph



Summary for Pond CB9: CB9

Inflow Area = 41,660 sf, 48.12% Impervious, Inflow Depth > 5.97" for 100 year event
 Inflow = 6.63 cfs @ 12.07 hrs, Volume= 20,731 cf
 Outflow = 6.63 cfs @ 12.07 hrs, Volume= 20,731 cf, Atten= 0%, Lag= 0.0 min
 Primary = 6.63 cfs @ 12.07 hrs, Volume= 20,731 cf

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

Peak Elev= 72.42' @ 12.11 hrs

Flood Elev= 69.40'

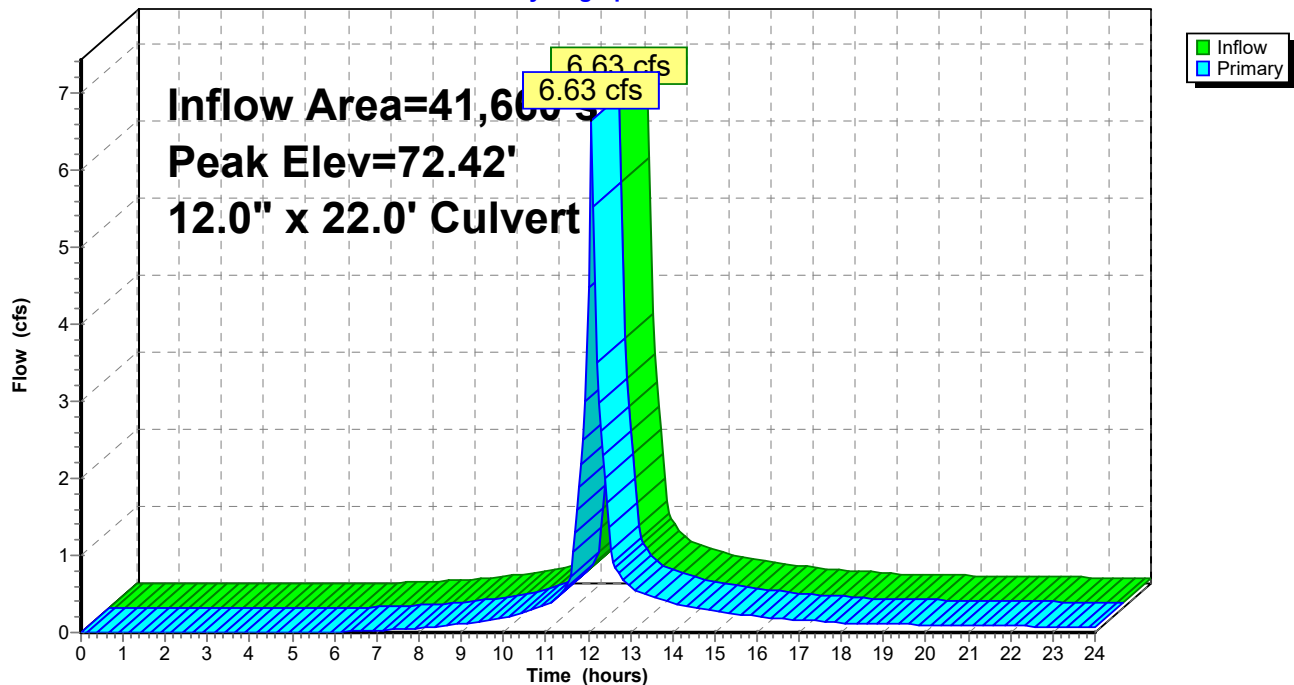
Device	Routing	Invert	Outlet Devices
#1	Primary	65.11'	12.0" x 22.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 65.00' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=4.97 cfs @ 12.07 hrs HW=71.48' TW=69.75' (Dynamic Tailwater)

↑ **1=Culvert** (Inlet Controls 4.97 cfs @ 6.33 fps)

Pond CB9: CB9

Hydrograph



Summary for Pond DMH 10: DMH9

Inflow Area = 68,668 sf, 52.09% Impervious, Inflow Depth > 5.68" for 100 year event
 Inflow = 6.78 cfs @ 12.19 hrs, Volume= 32,493 cf
 Outflow = 6.78 cfs @ 12.19 hrs, Volume= 32,493 cf, Atten= 0%, Lag= 0.0 min
 Primary = 6.78 cfs @ 12.19 hrs, Volume= 32,493 cf

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

Peak Elev= 62.94' @ 12.19 hrs

Flood Elev= 69.78'

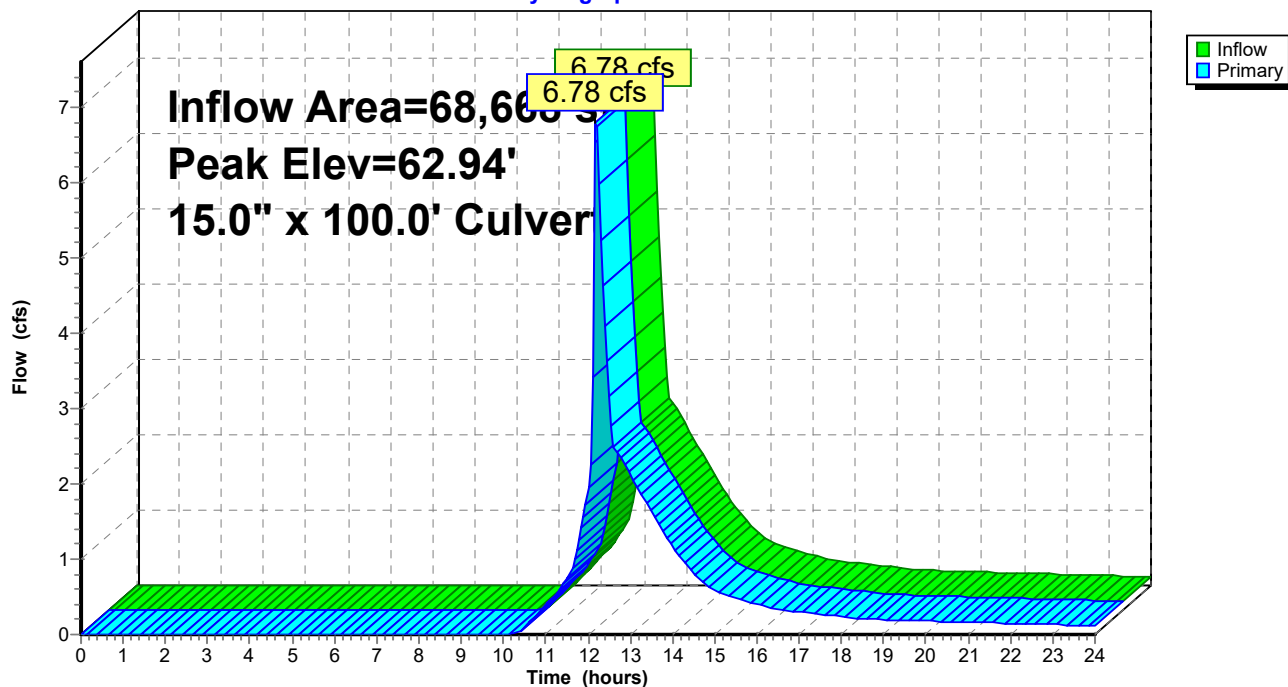
Device	Routing	Invert	Outlet Devices
#1	Primary	61.00'	15.0" x 100.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 56.00' S= 0.0500 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=6.68 cfs @ 12.19 hrs HW=62.90' TW=57.29' (Dynamic Tailwater)

↑**1=Culvert** (Inlet Controls 6.68 cfs @ 5.44 fps)

Pond DMH 10: DMH9

Hydrograph



Summary for Pond DMH 11: DMH 10

Inflow Area = 68,668 sf, 52.09% Impervious, Inflow Depth > 5.68" for 100 year event
 Inflow = 6.78 cfs @ 12.19 hrs, Volume= 32,493 cf
 Outflow = 6.78 cfs @ 12.19 hrs, Volume= 32,493 cf, Atten= 0%, Lag= 0.0 min
 Primary = 6.78 cfs @ 12.19 hrs, Volume= 32,493 cf

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

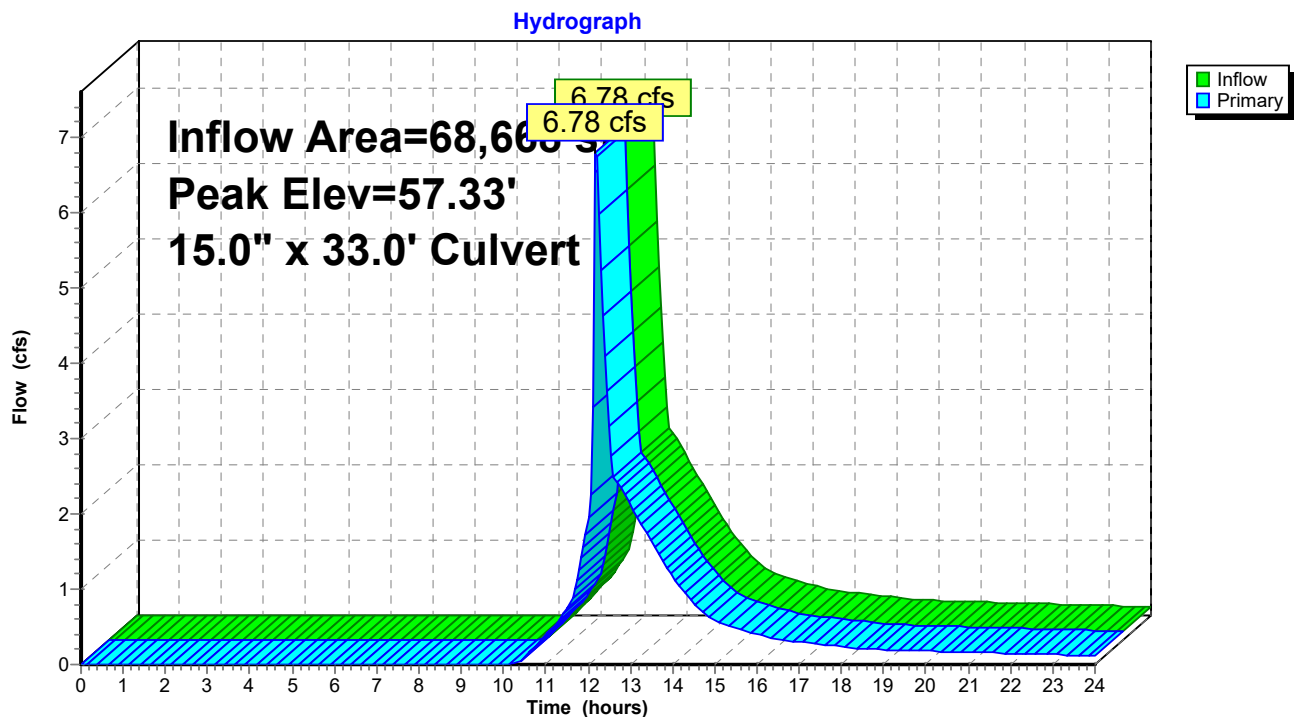
Peak Elev= 57.33' @ 12.19 hrs

Flood Elev= 58.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	55.17'	15.0" x 33.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 55.00' S= 0.0052 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=6.68 cfs @ 12.19 hrs HW=57.29' TW=53.52' (Dynamic Tailwater)

↑**1=Culvert** (Barrel Controls 6.68 cfs @ 5.44 fps)

Pond DMH 11: DMH 10

Summary for Pond DMH 6: DMH 6

Inflow Area = 27,008 sf, 58.21% Impervious, Inflow Depth > 6.41" for 100 year event
 Inflow = 4.55 cfs @ 12.07 hrs, Volume= 14,433 cf
 Outflow = 4.55 cfs @ 12.07 hrs, Volume= 14,433 cf, Atten= 0%, Lag= 0.0 min
 Primary = 4.55 cfs @ 12.07 hrs, Volume= 14,433 cf

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

Peak Elev= 68.17' @ 12.27 hrs

Flood Elev= 71.33'

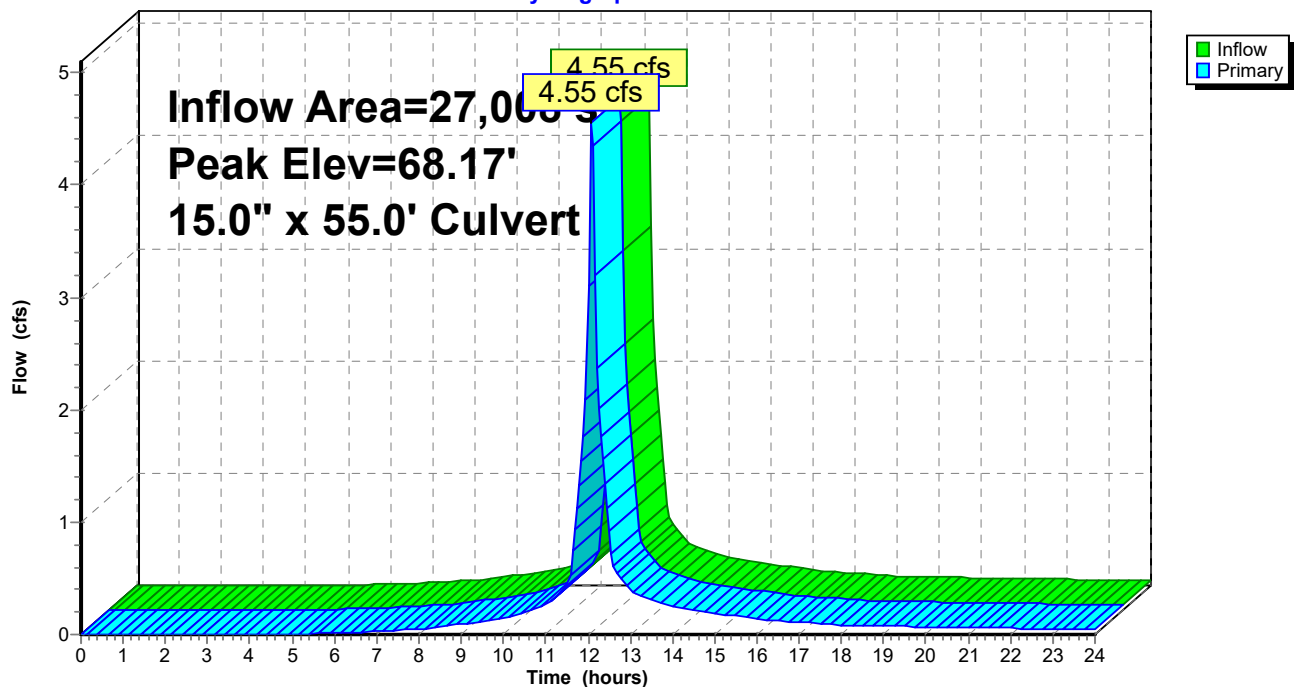
Device	Routing	Invert	Outlet Devices
#1	Primary	65.14'	15.0" x 55.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 65.00' S= 0.0025 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=1.80 cfs @ 12.07 hrs HW=67.32' TW=67.23' (Dynamic Tailwater)

↑**1=Culvert** (Outlet Controls 1.80 cfs @ 1.47 fps)

Pond DMH 6: DMH 6

Hydrograph



Summary for Pond DMH2: DMH2

Inflow Area = 33,440 sf, 57.79% Impervious, Inflow Depth > 6.38" for 100 year event
 Inflow = 5.57 cfs @ 12.07 hrs, Volume= 17,785 cf
 Outflow = 5.57 cfs @ 12.07 hrs, Volume= 17,785 cf, Atten= 0%, Lag= 0.0 min
 Primary = 5.57 cfs @ 12.07 hrs, Volume= 17,785 cf

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

Peak Elev= 55.95' @ 12.09 hrs

Flood Elev= 55.00'

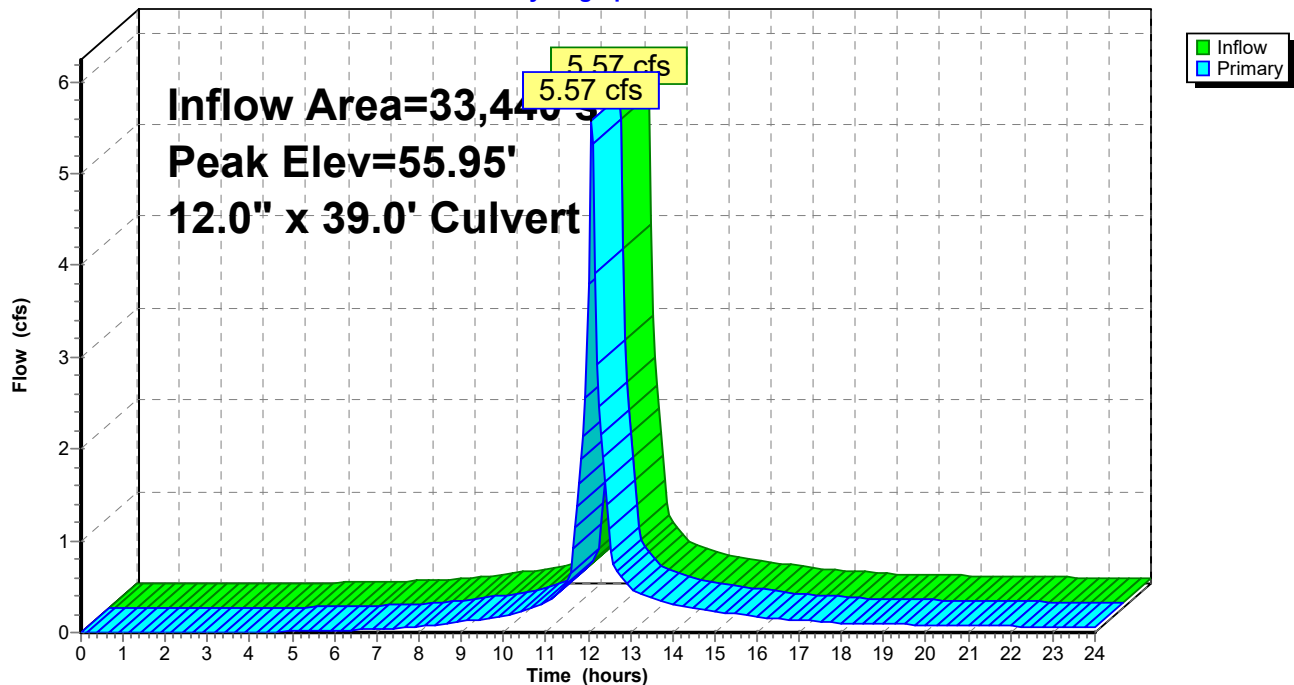
Device	Routing	Invert	Outlet Devices
#1	Primary	52.18'	12.0" x 39.0' long Culvert RCP, square edge headwall, Ke= 0.500 Outlet Invert= 52.00' S= 0.0046 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean

Primary OutFlow Max=4.99 cfs @ 12.07 hrs HW=55.81' TW=54.07' (Dynamic Tailwater)

↑ **1=Culvert** (Inlet Controls 4.99 cfs @ 6.36 fps)

Pond DMH2: DMH2

Hydrograph



Summary for Pond DMH3: DMH3

Inflow Area = 25,518 sf, 47.45% Impervious, Inflow Depth > 5.95" for 100 year event
 Inflow = 4.04 cfs @ 12.07 hrs, Volume= 12,650 cf
 Outflow = 4.04 cfs @ 12.07 hrs, Volume= 12,650 cf, Atten= 0%, Lag= 0.0 min
 Primary = 4.04 cfs @ 12.07 hrs, Volume= 12,650 cf

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

Peak Elev= 57.06' @ 12.07 hrs

Flood Elev= 61.00'

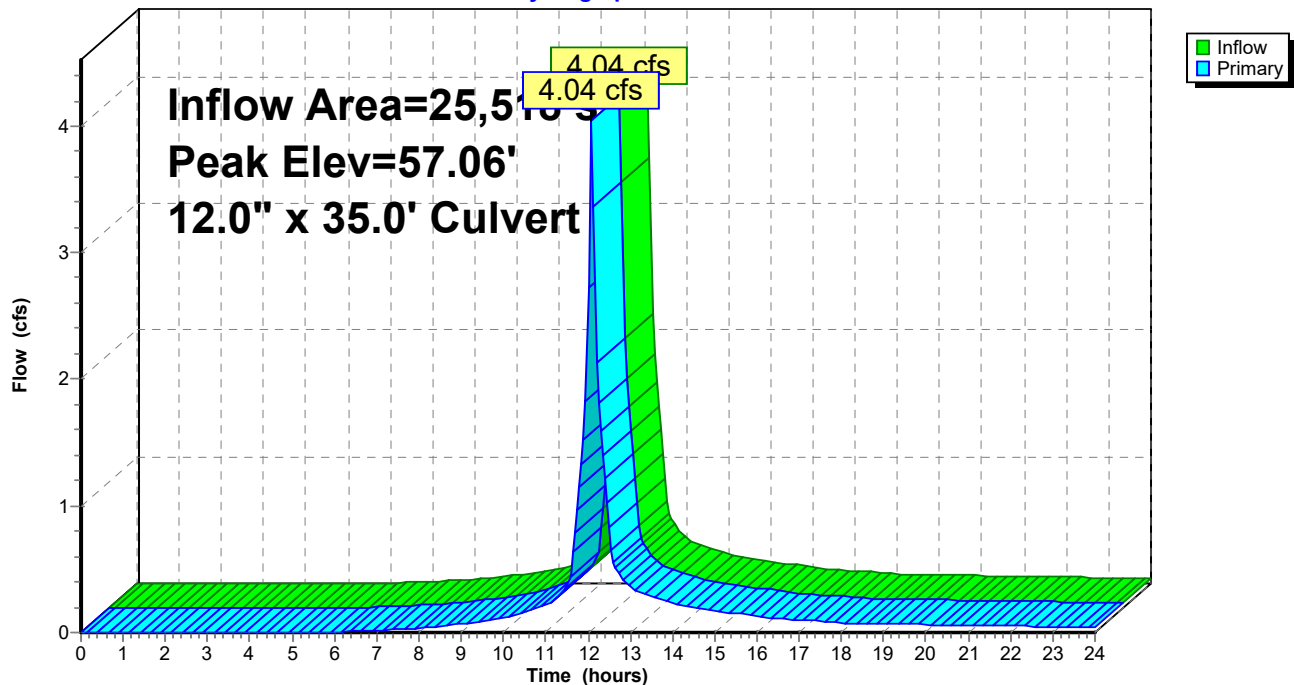
Device	Routing	Invert	Outlet Devices
#1	Primary	55.17'	12.0" x 35.0' long Culvert CPP, square edge headwall, Ke= 0.500 Outlet Invert= 55.00' S= 0.0049 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=3.89 cfs @ 12.07 hrs HW=56.99' TW=54.07' (Dynamic Tailwater)

1=Culvert (Barrel Controls 3.89 cfs @ 4.95 fps)

Pond DMH3: DMH3

Hydrograph



Summary for Pond DMH4: DMH4

Inflow Area = 25,518 sf, 47.45% Impervious, Inflow Depth > 5.95" for 100 year event
 Inflow = 4.04 cfs @ 12.07 hrs, Volume= 12,650 cf
 Outflow = 4.04 cfs @ 12.07 hrs, Volume= 12,650 cf, Atten= 0%, Lag= 0.0 min
 Primary = 4.04 cfs @ 12.07 hrs, Volume= 12,650 cf

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

Peak Elev= 59.88' @ 12.07 hrs

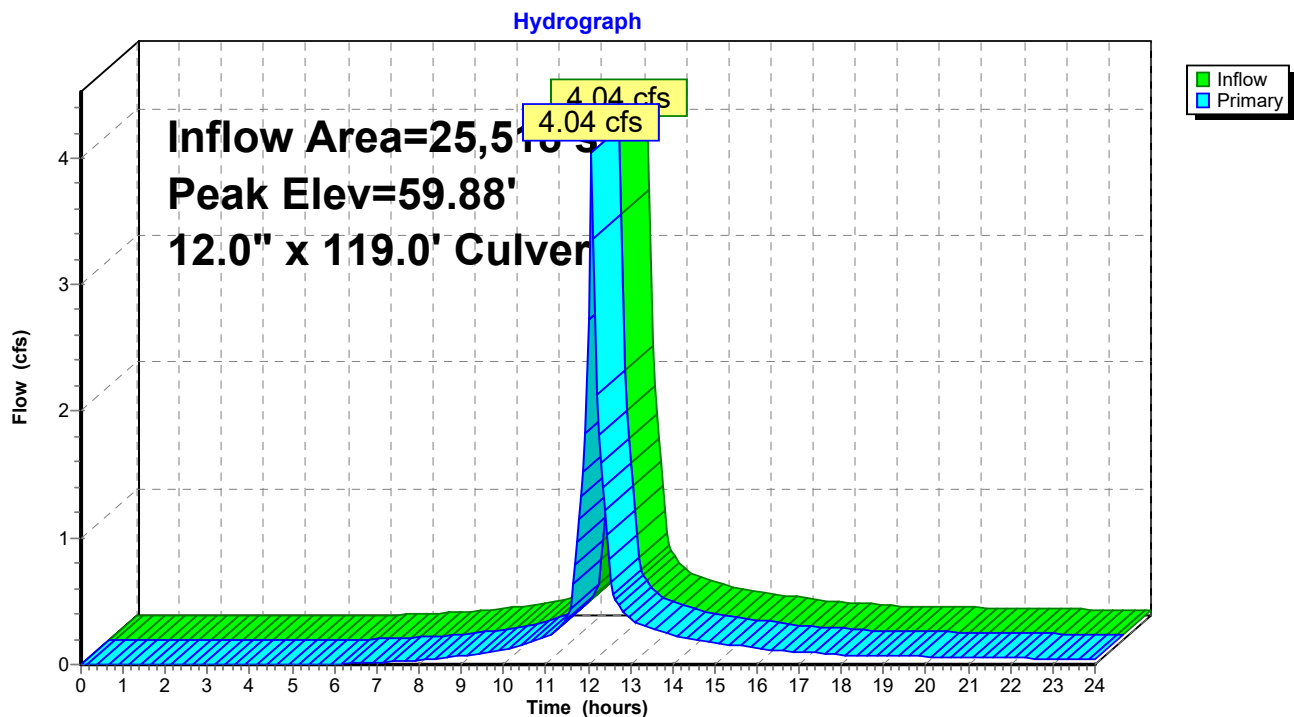
Flood Elev= 65.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	58.25'	12.0" x 119.0' long Culvert CPP, square edge headwall, Ke= 0.500 Outlet Invert= 55.28' S= 0.0250 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=3.89 cfs @ 12.07 hrs HW=59.81' TW=56.99' (Dynamic Tailwater)

↑ **1=Culvert** (Inlet Controls 3.89 cfs @ 4.95 fps)

Pond DMH4: DMH4



Summary for Pond DMH5: DMH 5

Inflow Area = 27,008 sf, 58.21% Impervious, Inflow Depth > 6.41" for 100 year event
 Inflow = 4.55 cfs @ 12.07 hrs, Volume= 14,433 cf
 Outflow = 4.55 cfs @ 12.07 hrs, Volume= 14,433 cf, Atten= 0%, Lag= 0.0 min
 Primary = 4.55 cfs @ 12.07 hrs, Volume= 14,433 cf

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

Peak Elev= 68.28' @ 12.31 hrs

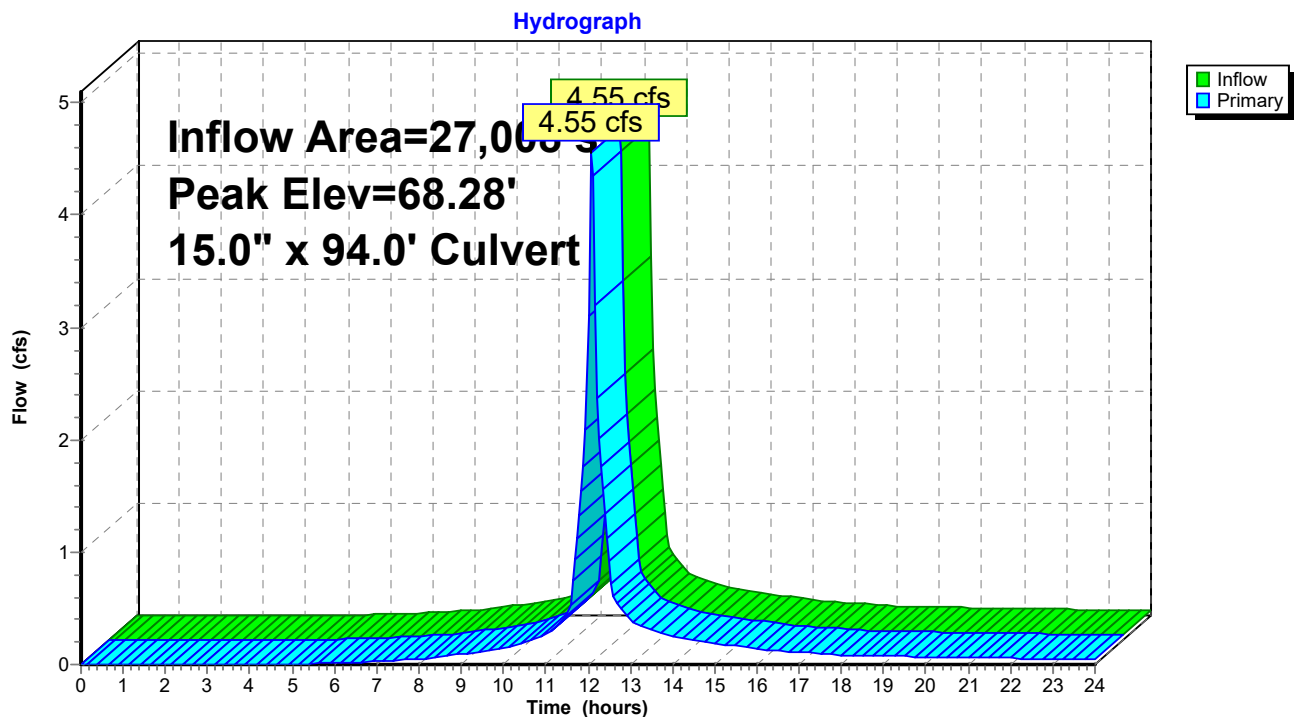
Flood Elev= 69.53'

Device	Routing	Invert	Outlet Devices
#1	Primary	65.71'	15.0" x 94.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 65.24' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=2.32 cfs @ 12.07 hrs HW=67.53' TW=67.32' (Dynamic Tailwater)

↑1=Culvert (Outlet Controls 2.32 cfs @ 1.89 fps)

Pond DMH5: DMH 5



Summary for Pond DMH7: DMH7

Inflow Area = 27,008 sf, 58.21% Impervious, Inflow Depth > 6.41" for 100 year event
 Inflow = 4.55 cfs @ 12.07 hrs, Volume= 14,433 cf
 Outflow = 4.55 cfs @ 12.07 hrs, Volume= 14,433 cf, Atten= 0%, Lag= 0.0 min
 Primary = 4.55 cfs @ 12.07 hrs, Volume= 14,433 cf

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

Peak Elev= 68.07' @ 12.22 hrs

Flood Elev= 70.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	65.00'	12.0" x 1.0' long Culvert CPP, square edge headwall, Ke= 0.500 Outlet Invert= 65.00' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Primary	64.90'	12.0" x 1.0' long Culvert CPP, square edge headwall, Ke= 0.500 Outlet Invert= 64.90' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

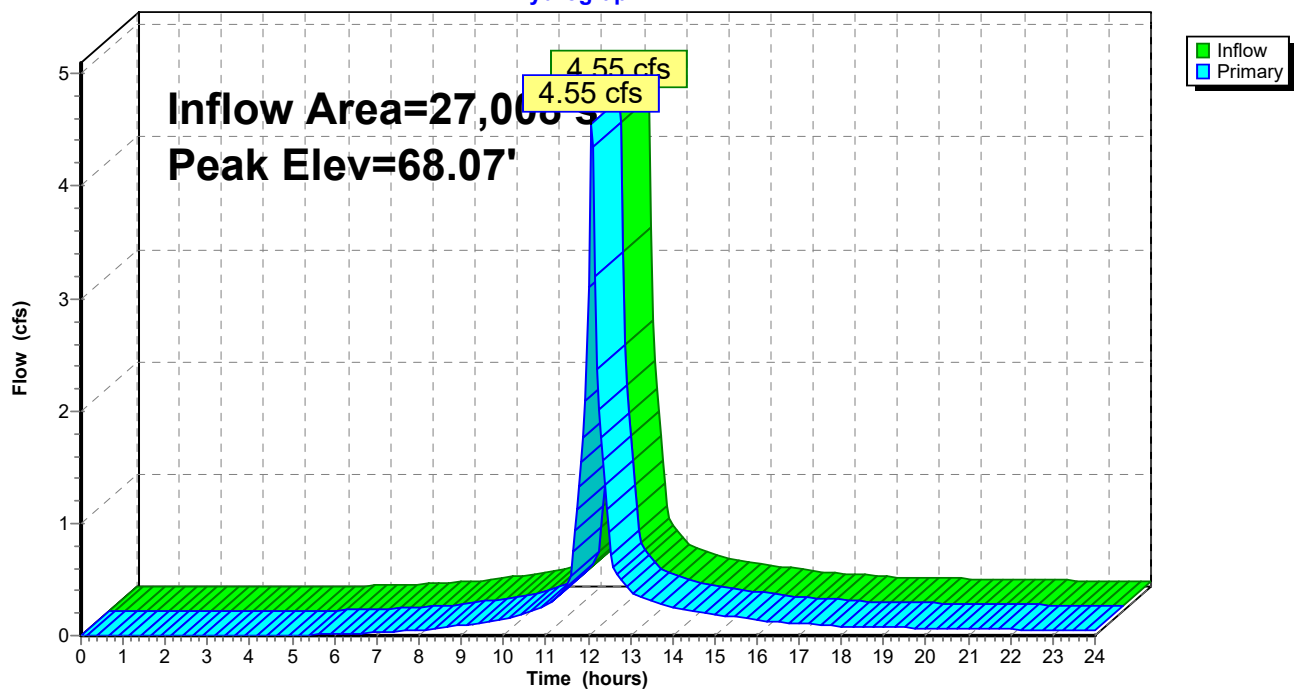
Primary OutFlow Max=0.00 cfs @ 12.07 hrs HW=67.23' TW=67.38' (Dynamic Tailwater)

1=Culvert (Controls 0.00 cfs)

2=Culvert (Controls 0.00 cfs)

Pond DMH7: DMH7

Hydrograph



Summary for Pond DMH8: DMH8

Inflow Area = 41,660 sf, 48.12% Impervious, Inflow Depth > 5.97" for 100 year event
 Inflow = 6.63 cfs @ 12.07 hrs, Volume= 20,731 cf
 Outflow = 6.63 cfs @ 12.07 hrs, Volume= 20,731 cf, Atten= 0%, Lag= 0.0 min
 Primary = 6.63 cfs @ 12.07 hrs, Volume= 20,731 cf

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

Peak Elev= 69.98' @ 12.09 hrs

Flood Elev= 70.00'

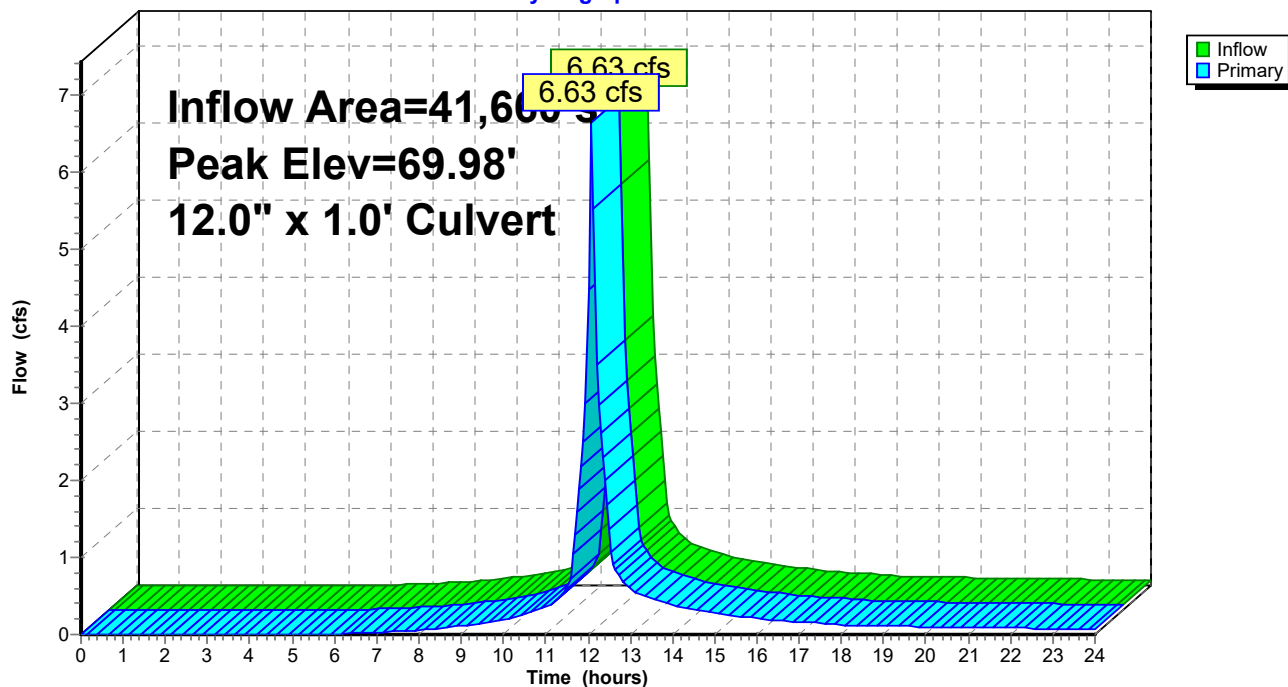
Device	Routing	Invert	Outlet Devices
#1	Primary	65.00'	12.0" x 1.0' long Culvert CPP, square edge headwall, Ke= 0.500 Outlet Invert= 65.00' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=5.81 cfs @ 12.07 hrs HW=69.75' TW=67.39' (Dynamic Tailwater)

↑ **1=Culvert** (Inlet Controls 5.81 cfs @ 7.40 fps)

Pond DMH8: DMH8

Hydrograph



Summary for Pond P1-1: P1-1

Inflow Area = 74,610 sf, 49.91% Impervious, Inflow Depth > 6.02" for 100 year event
 Inflow = 11.88 cfs @ 12.07 hrs, Volume= 37,442 cf
 Outflow = 5.84 cfs @ 12.20 hrs, Volume= 32,302 cf, Atten= 51%, Lag= 7.6 min
 Primary = 5.84 cfs @ 12.20 hrs, Volume= 32,302 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 54.45' @ 12.22 hrs Surf.Area= 4,943 sf Storage= 12,299 cf
 Flood Elev= 55.50' Surf.Area= 5,973 sf Storage= 18,004 cf

Plug-Flow detention time= 113.1 min calculated for 32,302 cf (86% of inflow)
 Center-of-Mass det. time= 52.9 min (851.4 - 798.6)

Volume	Invert	Avail.Storage	Storage Description
#1	51.00'	18,004 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
51.00	2,080	0	0
52.00	2,814	2,447	2,447
52.50	3,624	1,610	4,057
54.00	4,509	6,100	10,156
55.00	5,467	4,988	15,144
55.50	5,973	2,860	18,004

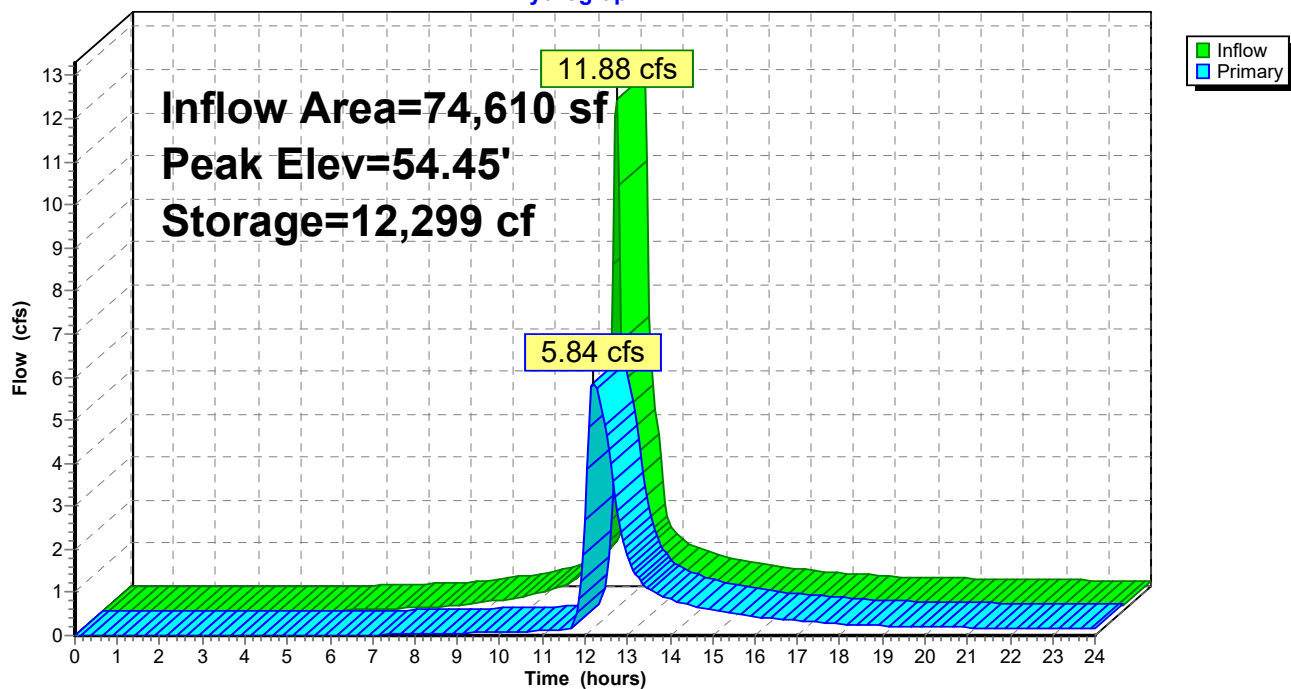
Device	Routing	Invert	Outlet Devices
#1	Primary	51.00'	12.0" x 80.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 50.00' S= 0.0125 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Device 1	51.00'	2.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	52.75'	10.0" Vert. Orifice/Grate C= 0.600
#4	Device 1	53.25'	10.0" Vert. Orifice/Grate C= 0.600
#5	Device 1	54.25'	2.00' x 2.00' Horiz. Orifice/Grate Limited to weir flow C= 0.600

Primary OutFlow Max=5.84 cfs @ 12.20 hrs HW=54.45' TW=0.00' (Dynamic Tailwater)

1=Culvert (Barrel Controls 5.84 cfs @ 7.44 fps)
 2=Orifice/Grate (Passes < 0.19 cfs potential flow)
 3=Orifice/Grate (Passes < 2.97 cfs potential flow)
 4=Orifice/Grate (Passes < 2.32 cfs potential flow)
 5=Orifice/Grate (Passes < 2.29 cfs potential flow)

Pond P1-1: P1-1

Hydrograph



Summary for Pond P1-2: DP-1-2

Inflow Area = 35,138 sf, 15.99% Impervious, Inflow Depth > 4.53" for 100 year event
 Inflow = 3.93 cfs @ 12.12 hrs, Volume= 13,274 cf
 Outflow = 0.21 cfs @ 15.12 hrs, Volume= 4,466 cf, Atten= 95%, Lag= 180.0 min
 Primary = 0.21 cfs @ 15.12 hrs, Volume= 4,466 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 58.84' @ 15.12 hrs Surf.Area= 6,806 sf Storage= 9,235 cf
 Flood Elev= 59.75' Surf.Area= 7,130 sf Storage= 10,384 cf

Plug-Flow detention time= 346.4 min calculated for 4,456 cf (34% of inflow)
 Center-of-Mass det. time= 219.8 min (1,049.3 - 829.5)

Volume	Invert	Avail.Storage	Storage Description
#1	57.00'	10,384 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
57.00	3,285	0	0
58.00	5,180	4,233	4,233
58.50	6,148	2,832	7,065
59.00	7,130	3,320	10,384

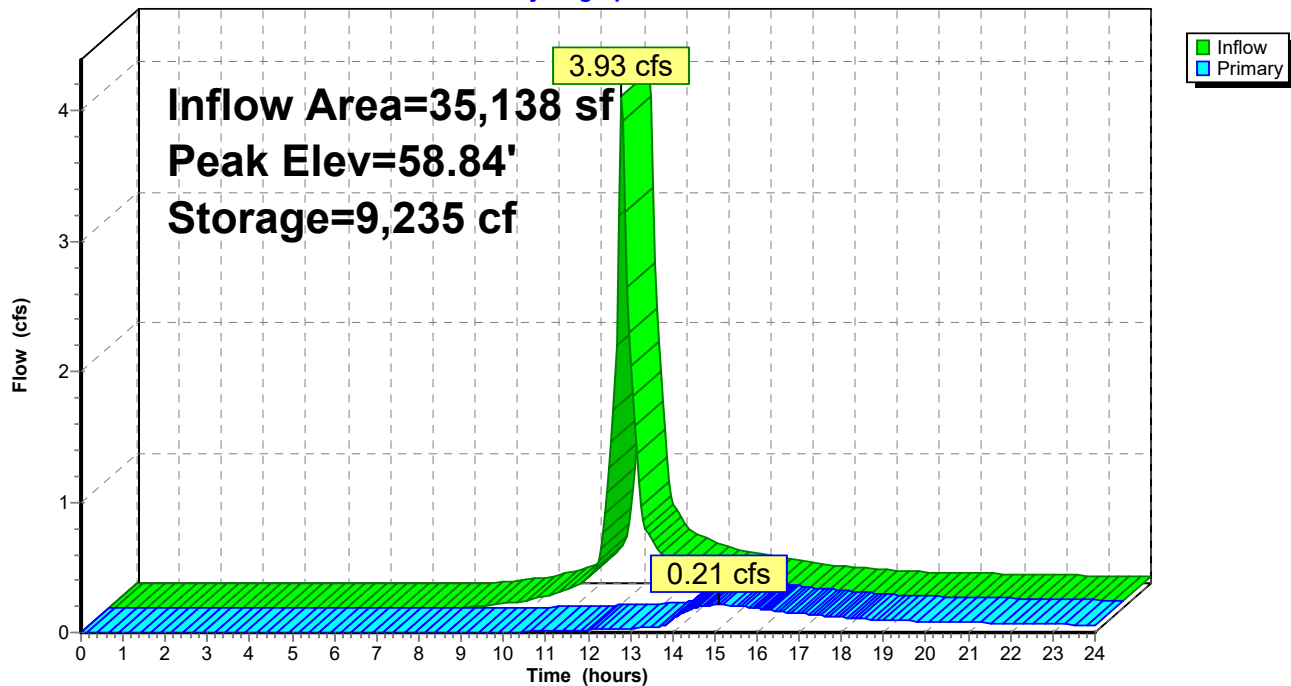
Device	Routing	Invert	Outlet Devices
#1	Primary	57.00'	12.0" x 25.0' long Culvert RCP, square edge headwall, Ke= 0.500 Outlet Invert= 56.50' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Device 1	57.00'	1.0" Vert. Orifice/Grate C= 0.600
#3	Primary	58.75'	3.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.21 cfs @ 15.12 hrs HW=58.84' TW=0.00' (Dynamic Tailwater)

1=Culvert (Passes 0.04 cfs of 4.37 cfs potential flow)
 2=Orifice/Grate (Orifice Controls 0.04 cfs @ 6.45 fps)
 3=Broad-Crested Rectangular Weir (Weir Controls 0.17 cfs @ 0.68 fps)

Pond P1-2: DP-1-2

Hydrograph



Summary for Pond P1-3: P1-3

Inflow Area = 7,345 sf, 68.78% Impervious, Inflow Depth > 6.88" for 100 year event
 Inflow = 1.40 cfs @ 12.03 hrs, Volume= 4,213 cf
 Outflow = 0.17 cfs @ 12.54 hrs, Volume= 4,049 cf, Atten= 88%, Lag= 30.7 min
 Primary = 0.17 cfs @ 12.54 hrs, Volume= 4,049 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 52.98' @ 12.54 hrs Surf.Area= 1,400 sf Storage= 1,851 cf
 Flood Elev= 54.27' Surf.Area= 1,400 sf Storage= 1,861 cf

Plug-Flow detention time= 141.5 min calculated for 4,049 cf (96% of inflow)
 Center-of-Mass det. time= 119.0 min (897.2 - 778.2)

Volume	Invert	Avail.Storage	Storage Description
#1	50.00'	1,680 cf	10.00'W x 35.00'L x 3.00'H Prismatic x 4 4,200 cf Overall x 40.0% Voids
#2	50.50'	181 cf	48.0"W x 24.0"H x 8.00'L Galley 4x8x2 x 4
		1,861 cf	Total Available Storage

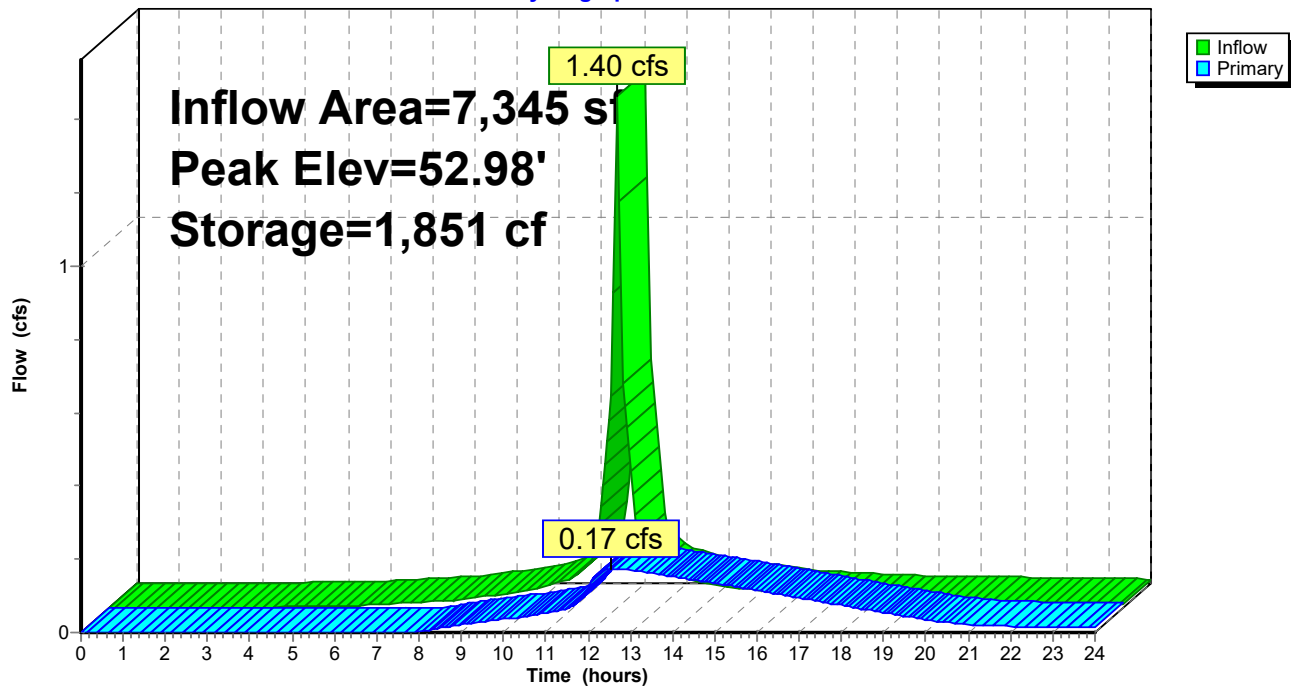
Device	Routing	Invert	Outlet Devices
#1	Primary	50.20'	12.0" x 16.0' long Culvert CPP, square edge headwall, Ke= 0.500 Outlet Invert= 50.00' S= 0.0125 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Device 1	50.20'	2.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	53.00'	12.0" Horiz. Orifice/Grate Limited to weir flow C= 0.600

Primary OutFlow Max=0.17 cfs @ 12.54 hrs HW=52.98' TW=0.00' (Dynamic Tailwater)

1=Culvert (Passes 0.17 cfs of 5.71 cfs potential flow)
 2=Orifice/Grate (Orifice Controls 0.17 cfs @ 7.91 fps)
 3=Orifice/Grate (Controls 0.00 cfs)

Pond P1-3: P1-3

Hydrograph



Summary for Pond P3-1: P3-2

Inflow Area = 68,668 sf, 52.09% Impervious, Inflow Depth > 6.15" for 100 year event
 Inflow = 11.18 cfs @ 12.07 hrs, Volume= 35,164 cf
 Outflow = 6.78 cfs @ 12.19 hrs, Volume= 32,493 cf, Atten= 39%, Lag= 6.7 min
 Primary = 6.78 cfs @ 12.19 hrs, Volume= 32,493 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 67.97' @ 12.19 hrs Surf.Area= 3,825 sf Storage= 10,380 cf
 Flood Elev= 70.00' Surf.Area= 3,825 sf Storage= 10,877 cf

Plug-Flow detention time= 85.5 min calculated for 32,493 cf (92% of inflow)
 Center-of-Mass det. time= 46.5 min (844.5 - 798.0)

Volume	Invert	Avail.Storage	Storage Description
#1	64.00'	2,363 cf	Custom Stage Data (Prismatic) Listed below (Recalc) 17,213 cf Overall - 11,304 cf Embedded = 5,908 cf x 40.0% Voids
#2	64.50'	8,514 cf	52.8"W x 48.0"H x 4.00'L Galley 4x4x4 x 192 Inside #1
		10,877 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
64.00	3,825	0	0
68.50	3,825	17,213	17,213

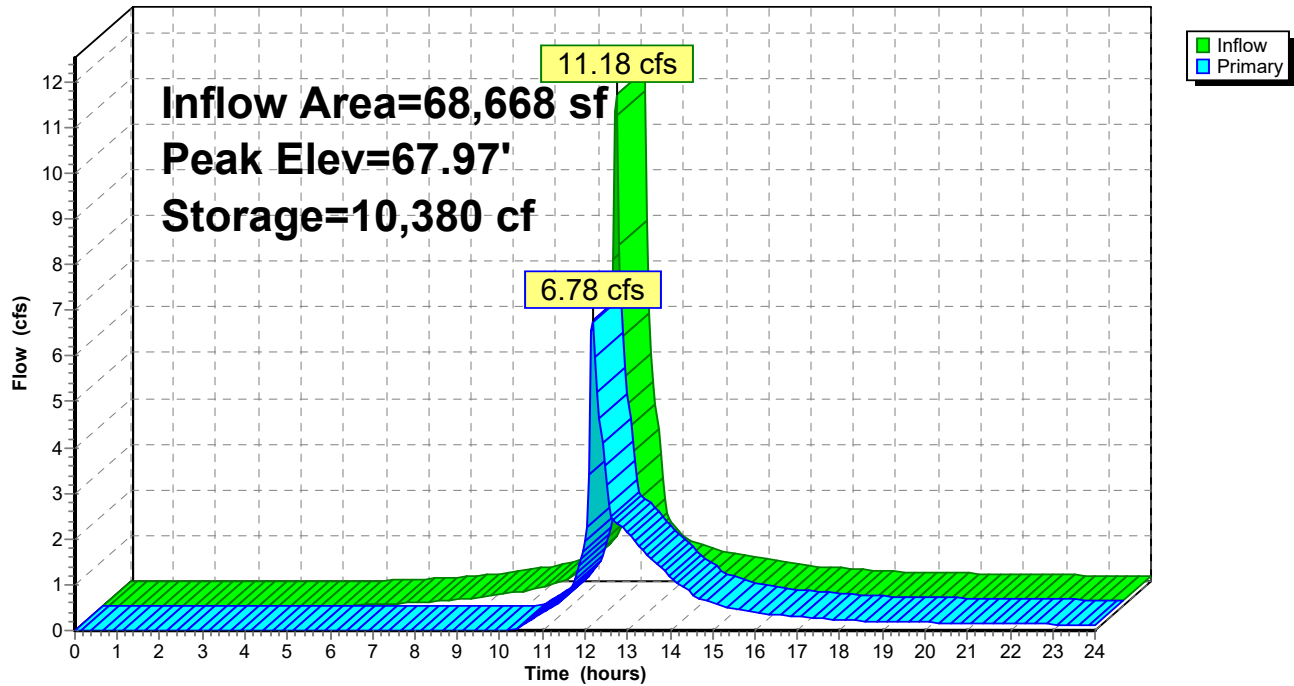
Device	Routing	Invert	Outlet Devices
#1	Primary	64.00'	15.0" x 41.0' long Culvert CPP, square edge headwall, Ke= 0.500 Outlet Invert= 62.00' S= 0.0488 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Device 1	65.00'	8.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	67.50'	15.0" Horiz. Orifice/Grate Limited to weir flow C= 0.600

Primary OutFlow Max=6.69 cfs @ 12.19 hrs HW=67.96' TW=62.90' (Dynamic Tailwater)

1=Culvert (Passes 6.69 cfs of 10.79 cfs potential flow)
 2=Orifice/Grate (Orifice Controls 2.72 cfs @ 7.80 fps)
 3=Orifice/Grate (Weir Controls 3.97 cfs @ 2.21 fps)

Pond P3-1: P3-2

Hydrograph



Summary for Pond P3-2: P3-3

Inflow Area = 140,478 sf, 42.86% Impervious, Inflow Depth > 5.52" for 100 year event
 Inflow = 14.06 cfs @ 12.14 hrs, Volume= 64,638 cf
 Outflow = 5.15 cfs @ 12.52 hrs, Volume= 55,860 cf, Atten= 63%, Lag= 22.7 min
 Primary = 5.15 cfs @ 12.52 hrs, Volume= 55,860 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 54.22' @ 12.52 hrs Surf.Area= 9,666 sf Storage= 24,353 cf
 Flood Elev= 55.50' Surf.Area= 12,548 sf Storage= 38,610 cf

Plug-Flow detention time= 145.0 min calculated for 55,860 cf (86% of inflow)
 Center-of-Mass det. time= 86.6 min (915.2 - 828.6)

Volume	Invert	Avail.Storage	Storage Description
#1	50.00'	38,610 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
50.00	2,426	0	0
52.00	5,354	7,780	7,780
54.00	9,180	14,534	22,314
55.50	12,548	16,296	38,610

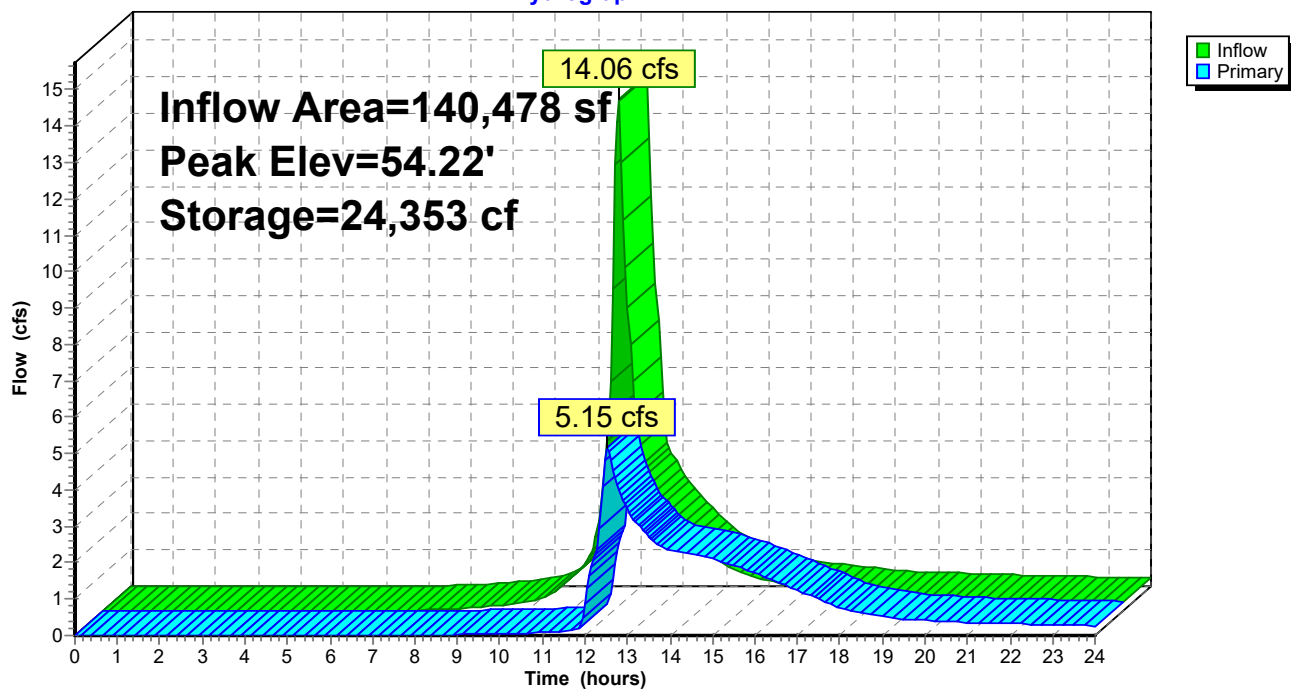
Device	Routing	Invert	Outlet Devices
#1	Primary	50.00'	12.0" x 29.0' long Culvert RCP, sq.cut end projecting, Ke= 0.500 Outlet Invert= 49.00' S= 0.0345 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Device 1	50.00'	2.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	52.00'	8.0" Vert. Orifice/Grate C= 0.600
#4	Device 1	54.00'	2.00' x 2.00' Horiz. Orifice/Grate Limited to weir flow C= 0.600
#5	Primary	54.55'	10.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=5.11 cfs @ 12.52 hrs HW=54.21' TW=0.00' (Dynamic Tailwater)

1=Culvert (Passes 5.11 cfs of 7.29 cfs potential flow)
 2=Orifice/Grate (Orifice Controls 0.21 cfs @ 9.79 fps)
 3=Orifice/Grate (Orifice Controls 2.31 cfs @ 6.60 fps)
 4=Orifice/Grate (Weir Controls 2.59 cfs @ 1.51 fps)
 5=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond P3-2: P3-3

Hydrograph



Summary for Link DP-1: DP-1

Inflow Area = 148,206 sf, 32.39% Impervious, Inflow Depth > 4.01" for 100 year event

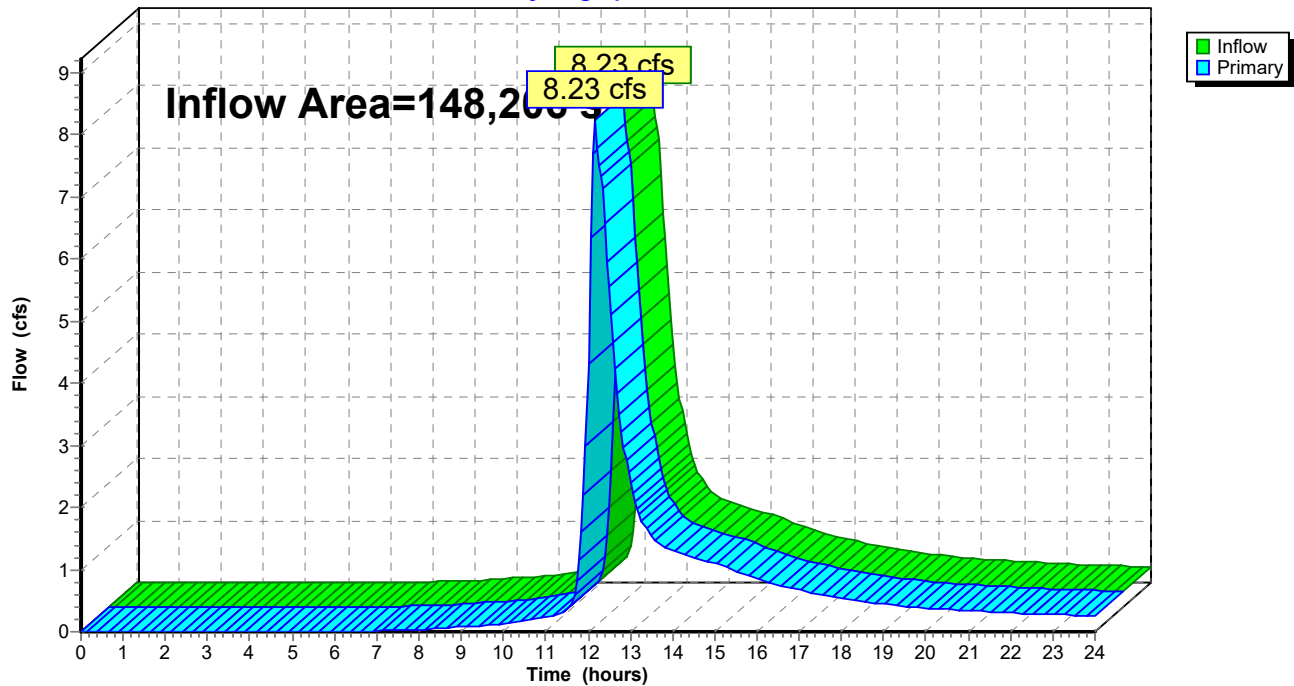
Inflow = 8.23 cfs @ 12.15 hrs, Volume= 49,503 cf

Primary = 8.23 cfs @ 12.15 hrs, Volume= 49,503 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP-1: DP-1

Hydrograph



Summary for Link DP-2: DP-2

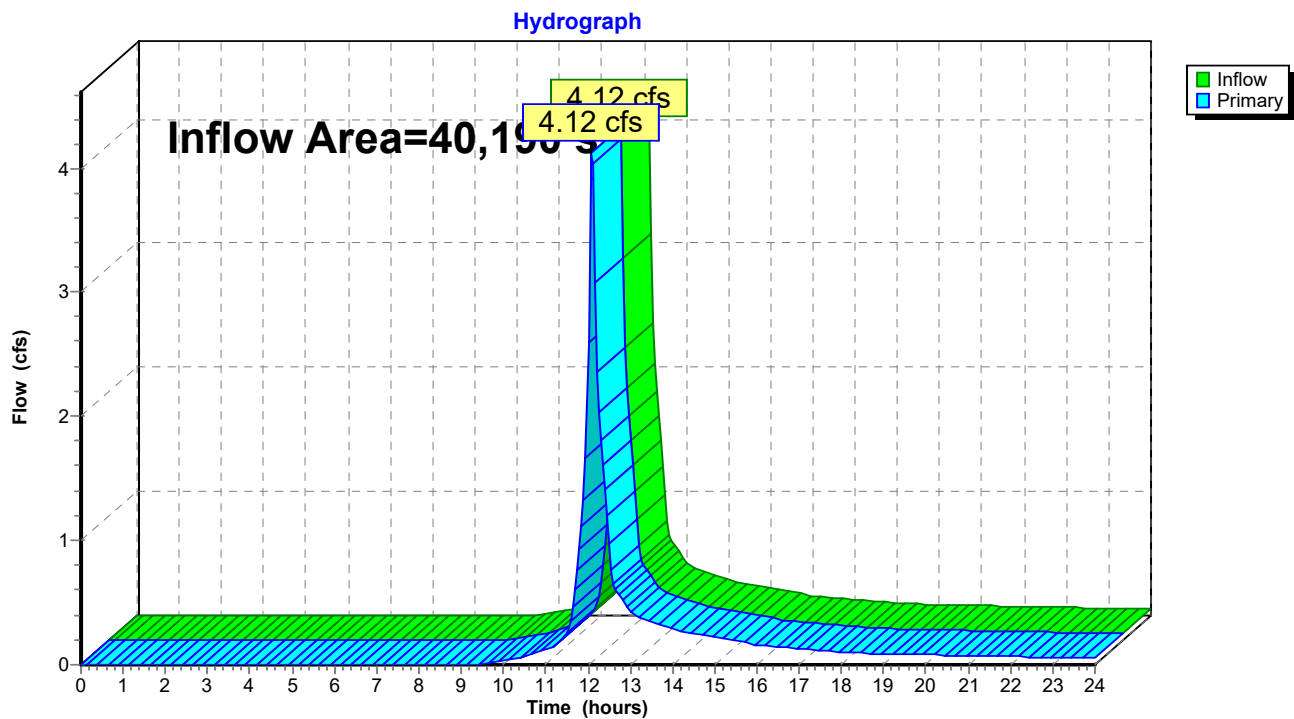
Inflow Area = 40,190 sf, 10.95% Impervious, Inflow Depth > 3.83" for 100 year event

Inflow = 4.12 cfs @ 12.08 hrs, Volume= 12,818 cf

Primary = 4.12 cfs @ 12.08 hrs, Volume= 12,818 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP-2: DP-2



Summary for Link DP-3: DP-3

Inflow Area = 171,214 sf, 35.17% Impervious, Inflow Depth > 4.54" for 100 year event

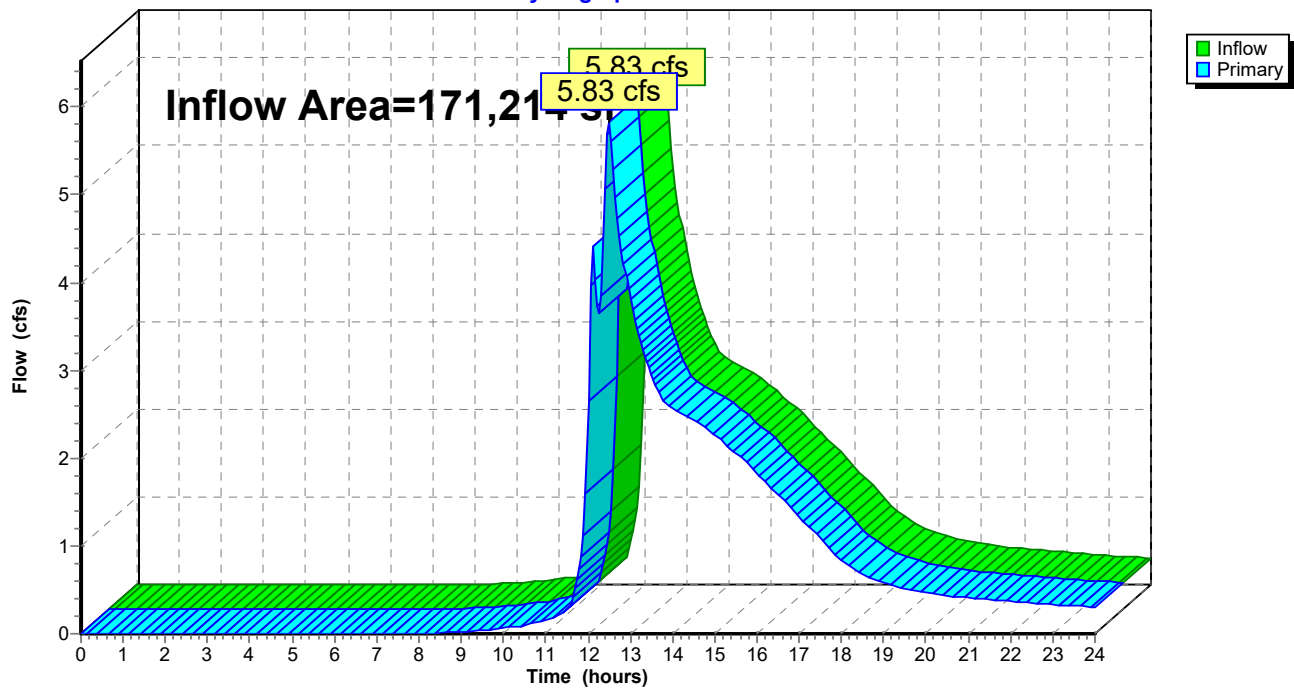
Inflow = 5.83 cfs @ 12.50 hrs, Volume= 64,764 cf

Primary = 5.83 cfs @ 12.50 hrs, Volume= 64,764 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link DP-3: DP-3

Hydrograph



Summary for Link TOTAL: (new Link)

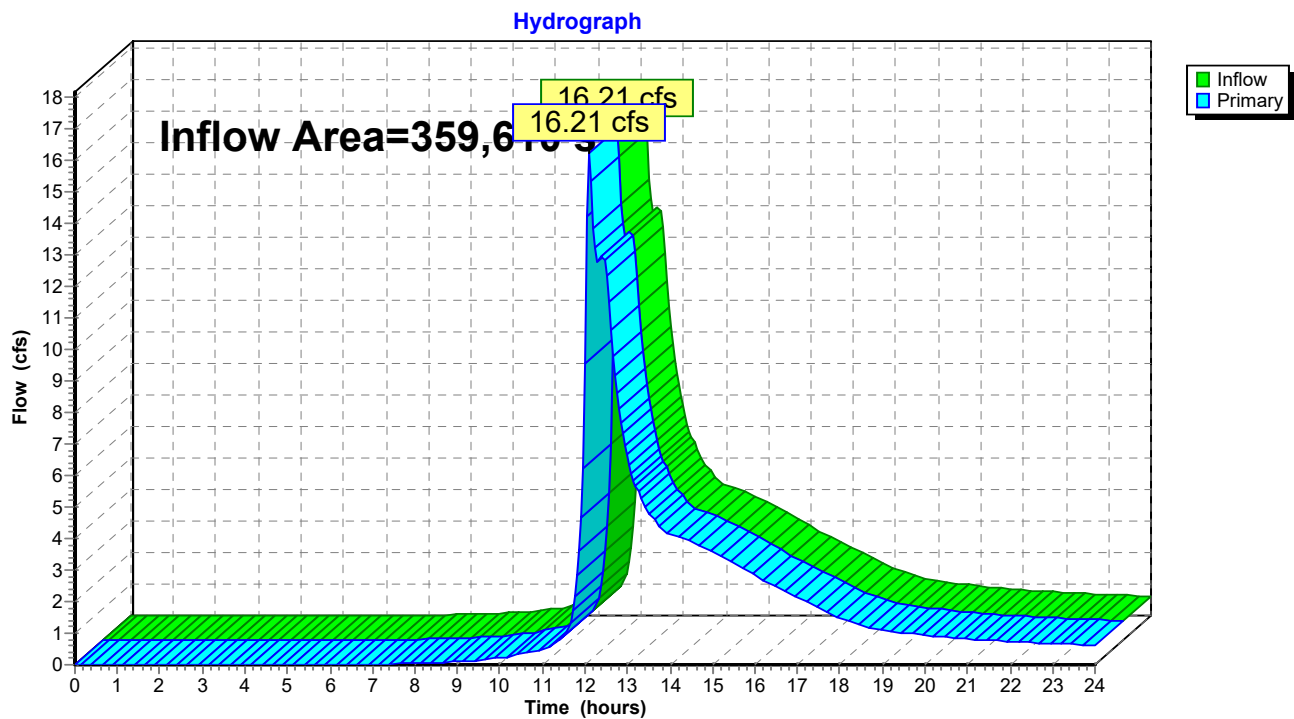
Inflow Area = 359,610 sf, 31.32% Impervious, Inflow Depth > 4.24" for 100 year event

Inflow = 16.21 cfs @ 12.11 hrs, Volume= 127,085 cf

Primary = 16.21 cfs @ 12.11 hrs, Volume= 127,085 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link TOTAL: (new Link)



**PARTICLE SIZE ANALYSIS
REPORTS**

**Soil and Plant Nutrient Testing Laboratory**

203 Paige Laboratory
161 Holdsworth Way
University of Massachusetts
Amherst, MA 01003
Phone: (413) 545-2311
e-mail: soiltest@umass.edu
website: soiltest.umass.edu

Particle Size Analysis - Basic**Prepared For:**

Ben Osgood
TTI Environmental Inc
13 Branch Street
Methuen, MA 01844

beno@ttienv.com
978-749-9929

Sample Information:

Sample ID: HP 1

Order Number: 31909

Lab Number: X170727-101

Received: 7/27/2017

Reported: 8/1/2017

<u>USDA Size Fraction</u>		
<u>Main Fractions</u>	<u>Size (mm)</u>	<u>Percent</u>
Sand	0.05-2.0	67.8
Silt	0.002-0.05	16.2
Clay	<0.002	16.0

USDA Textural Class: sandy loam

MA Title V Textural Class II

**Soil and Plant Nutrient Testing Laboratory**

203 Paige Laboratory
161 Holdsworth Way
University of Massachusetts
Amherst, MA 01003
Phone: (413) 545-2311
e-mail: soiltest@umass.edu
website: soiltest.umass.edu

Particle Size Analysis - Basic**Prepared For:**

Ben Osgood
TTI Environmental Inc
13 Branch Street
Methuen, MA 01844

beno@ttienv.com
978-749-9929

Sample Information:

Sample ID: HP 2

Order Number: 31909

Lab Number: X170727-102

Received: 7/27/2017

Reported: 8/1/2017

<u>USDA Size Fraction</u>		
<u>Main Fractions</u>	<u>Size (mm)</u>	<u>Percent</u>
Sand	0.05-2.0	23.7
Silt	0.002-0.05	43.3
Clay	<0.002	33.0

USDA Textural Class: clay loam

MA Title V Textural Class IV

Particle Size Analysis - Basic

Prepared For:

Ben Osgood
TTI Environmental Inc
13 Branch Street
Methuen, MA 01844

beno@ttienv.com
978-749-9929

Sample Information:

Sample ID: HP 3

Order Number: 31909

Lab Number: X170727-103

Received: 7/27/2017

Reported: 8/1/2017

<u>USDA Size Fraction</u>			
<u>Main Fractions</u>	<u>Size (mm)</u>	<u>Percent</u>	
Sand	0.05-2.0	6.1	
Silt	0.002-0.05	49.6	
Clay	<0.002	44.3	

USDA Textural Class: silty clay

MA Title V Textural Class IV

**Soil and Plant Nutrient Testing Laboratory**

203 Paige Laboratory
161 Holdsworth Way
University of Massachusetts
Amherst, MA 01003
Phone: (413) 545-2311
e-mail: soiltest@umass.edu
website: soiltest.umass.edu

Particle Size Analysis - Basic**Prepared For:**

Ben Osgood
TTI Environmental Inc
13 Branch Street
Methuen, MA 01844

beno@ttienv.com
978-749-9929

Sample Information:

Sample ID: HP 4

Order Number: 31909

Lab Number: X170727-104

Received: 7/27/2017

Reported: 8/1/2017

<u>USDA Size Fraction</u>		
<u>Main Fractions</u>	<u>Size (mm)</u>	<u>Percent</u>
Sand	0.05-2.0	11.9
Silt	0.002-0.05	61.5
Clay	<0.002	26.6

USDA Textural Class: silt loam

MA Title V Textural Class III

**Soil and Plant Nutrient Testing Laboratory**

203 Paige Laboratory
161 Holdsworth Way
University of Massachusetts
Amherst, MA 01003
Phone: (413) 545-2311
e-mail: soiltest@umass.edu
website: soiltest.umass.edu

Particle Size Analysis - Basic**Prepared For:**

Ben Osgood
TTI Environmental Inc
13 Branch Street
Methuen, MA 01844

beno@ttienv.com
978-749-9929

Sample Information:

Sample ID: HP 5

Order Number: 31909

Lab Number: X170727-105

Received: 7/27/2017

Reported: 8/1/2017

<u>USDA Size Fraction</u>		
<u>Main Fractions</u>	<u>Size (mm)</u>	<u>Percent</u>
Sand	0.05-2.0	5.5
Silt	0.002-0.05	63.1
Clay	<0.002	31.4

USDA Textural Class: silt loam

MA Title V Textural Class III

**Soil and Plant Nutrient Testing Laboratory**

203 Paige Laboratory
161 Holdsworth Way
University of Massachusetts
Amherst, MA 01003
Phone: (413) 545-2311
e-mail: soiltest@umass.edu
website: soiltest.umass.edu

Particle Size Analysis - Basic**Prepared For:**

Ben Osgood
TTI Environmental Inc
13 Branch Street
Methuen, MA 01844

beno@ttienv.com
978-749-9929

Sample Information:

Sample ID: HP 6

Order Number: 31909

Lab Number: X170727-106

Received: 7/27/2017

Reported: 8/1/2017

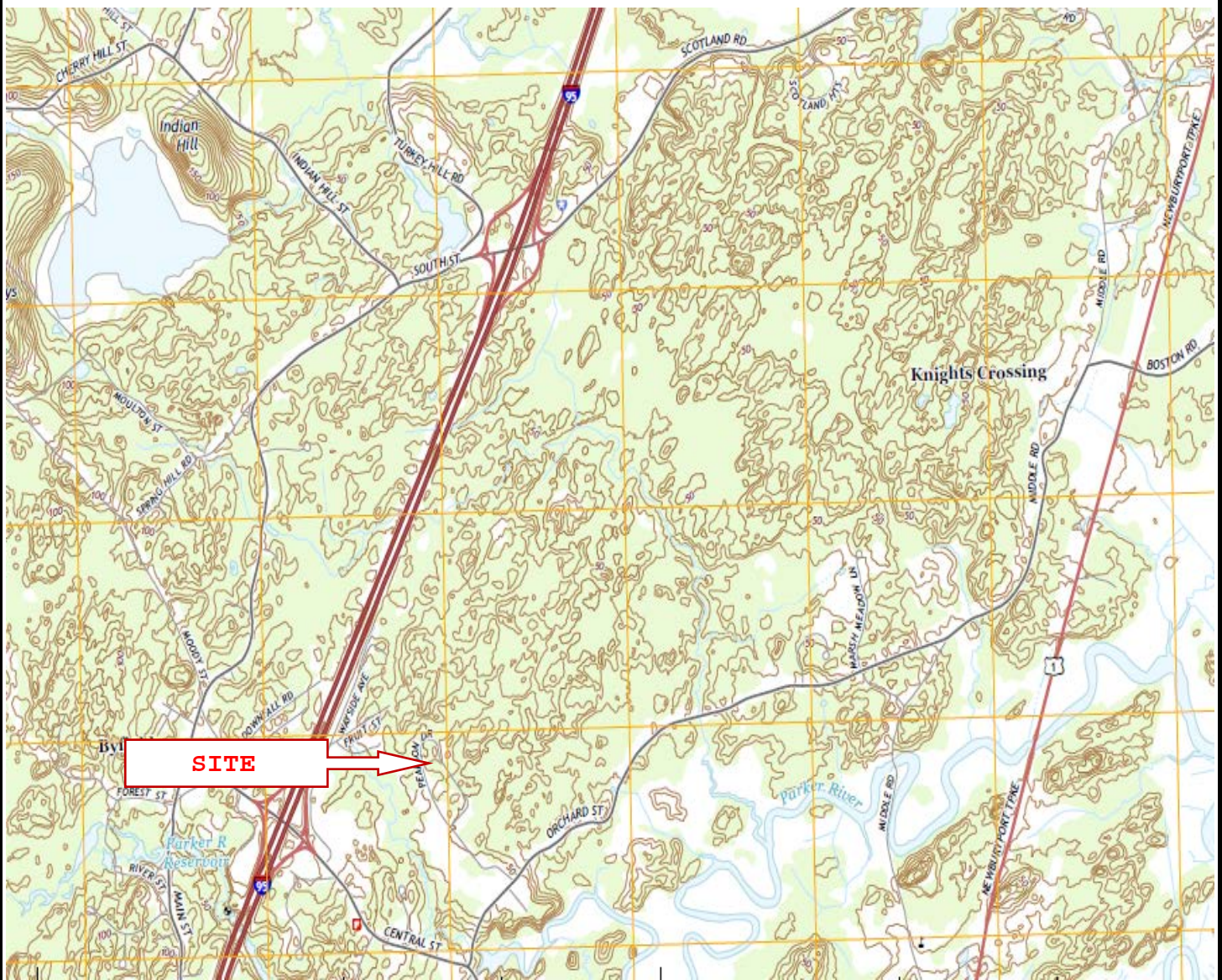
<u>USDA Size Fraction</u>		
<u>Main Fractions</u>	<u>Size (mm)</u>	<u>Percent</u>
Sand	0.05-2.0	1.8
Silt	0.002-0.05	60.6
Clay	<0.002	37.5

USDA Textural Class: silt loam

MA Title V Textural Class III



MAPS:



USGS QUADRANGLE MAP

55 REAR PEARSON DRIVE
NEWBURY, MASSACHUSETTS



TTI Environmental
Engineering Division

SCALE
Not To Scale

DRAWN BY
U.S.G.S

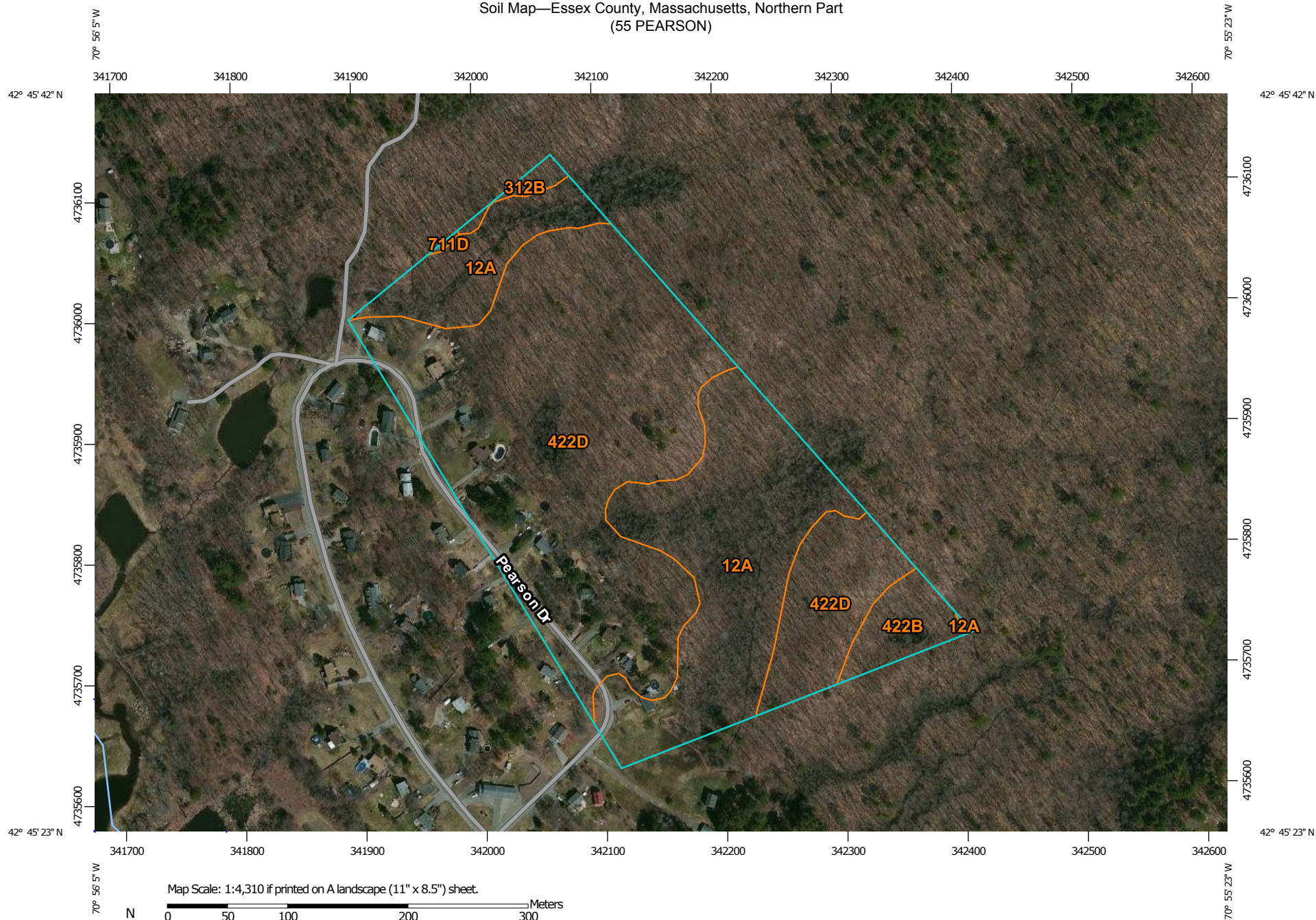
DATE
09/2016

PROJECT
15-1516

APP'D BY
BO

DRAWING NO.
NA

Soil Map—Essex County, Massachusetts, Northern Part
(55 PEARSON)



Map Scale: 1:4,310 if printed on A landscape (11" x 8.5") sheet.

0 50 100 200 300 Meters

0 200 400 800 1200 Feet

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



**Natural Resources
Conservation Service**

Web Soil Survey
National Cooperative Soil Survey

11/9/2015
Page 1 of 3

Soil Map—Essex County, Massachusetts, Northern Part
(55 PEARSON)

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features



Blowout



Borrow Pit



Clay Spot



Closed Depression



Gravel Pit



Gravelly Spot



Landfill



Lava Flow



Marsh or swamp



Mine or Quarry



Miscellaneous Water



Perennial Water



Rock Outcrop



Saline Spot



Sandy Spot



Severely Eroded Spot



Sinkhole



Slide or Slip



Sodic Spot



Spoil Area



Stony Spot



Very Stony Spot



Wet Spot



Other



Special Line Features

Water Features



Streams and Canals

Transportation



Rails



Interstate Highways



US Routes



Major Roads



Local Roads

Background



Aerial Photography

MAP INFORMATION

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

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Essex County, Massachusetts, Northern Part
Survey Area Data: Version 11, Sep 28, 2015

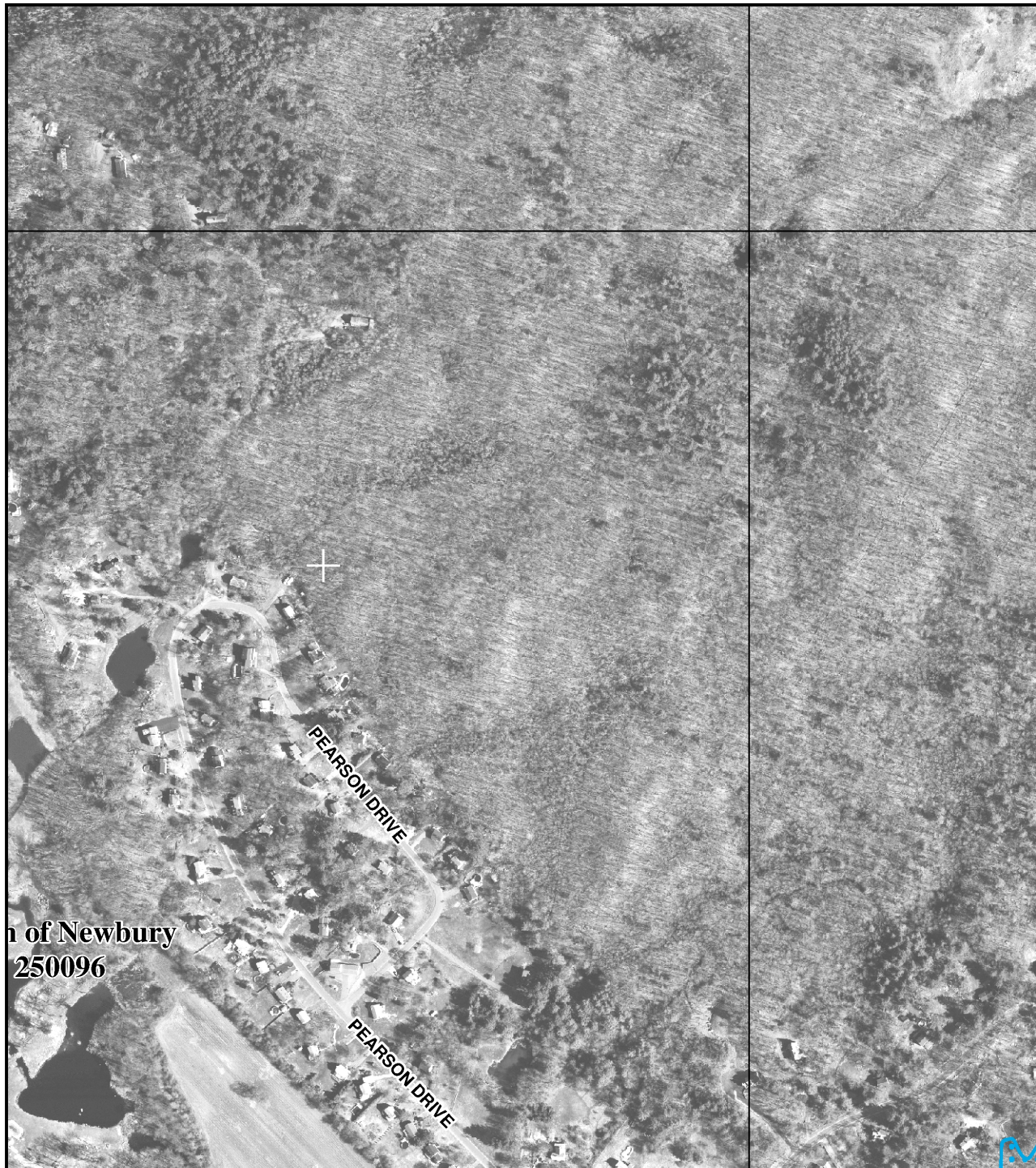
Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 30, 2011—Apr 8, 2011

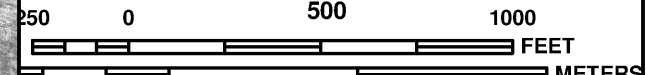
The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Essex County, Massachusetts, Northern Part (MA605)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
12A	Maybid silt loam, 0 to 3 percent slopes	10.3	33.4%
312B	Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony	0.3	0.9%
422B	Canton fine sandy loam, 3 to 8 percent slopes, extremely stony	1.2	3.9%
422D	Canton fine sandy loam, 15 to 25 percent slopes, extremely stony	19.0	61.7%
711D	Charlton-Rock outcrop-Hollis complex, 15 to 25 percent slopes	0.0	0.1%
Totals for Area of Interest		30.9	100.0%



MAP SCALE 1" = 500'



NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0118G

FIRM

FLOOD INSURANCE RATE MAP
ESSEX COUNTY,
MASSACHUSETTS
(ALL JURISDICTIONS)

PANEL 118 OF 600

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

<u>COMMUNITY</u>	<u>NUMBER</u>	<u>PANEL</u>	<u>SUFFIX</u>
NEWBURY, TOWN OF	250096	0118	G
WEST NEWBURY, TOWN OF	250108	0118	G

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
25009C0118G

MAP REVISED
JULY 16, 2014

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov