RANGER
ENGINEERING &
DESIGN, LLC

STORMWATER MANAGEMENT REPORT

40B DEVELOPMENT
AT
55 PEARSON DRIVE
ASSESSOR'S MAP 20 LOT 75
BYFIELD, MASSACHUSETTS 01922

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Prepared for:

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II. TABLE OF CONTENTS:

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 two 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 on 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, 50-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.

VIII. DRAINAGE ANALYSIS

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-3B 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	0.29
	10-year	1.95	1.07
	25-year	3.82	2.56
	50-year	5.60	4.00
	100-year	8.60	6.50

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	1.22
	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 (East Wetland)	2-year	0.27	0.22
	10-year	1.81	1.72
	25-year	3.65	2.98
	50-year	5.38	4.39
	100-year	8.24	8.20

** 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 101,174 square feet in the post development condition which is broken down as follows:

Paved Area = 58,934 square feet
Roof Areas = 42,240 square feet

The 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 101,174 square feet x 0.35 inches. The equation is as follows:

103,8145 sf x (0.35"/12"/') = **2,951 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:

ReV (roof area each unit) = 1760 sf x (0.35”/12) = **54 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’ x 58’ x .5) x .4] + [(3.5 x 3.5 x.5) x 192] + [(68’ x 58’ – 3072 sq. ft.) x .5’ x .4] = **2,079 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 = footprint area of 192 - 4’ x 4’ 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) + 2,079cf = **4,431 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 = 32,997 square feet.

The total amount of impervious surface directed to the infiltration systems = 42,240 sf + 32,997 = 75,237 square feet.

The percentage of impervious area flowing to the infiltration systems is 75,237 sf. / 101,174 sf. = **74.4% > 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:

101,174 sf impervious area on site / 75,237 sf flowing to infiltration systems = 1.35

The required available infiltration capacity must be adjusted by 1.353 %. The required infiltration can be calculated as 1.35% x 2,951 cu ft. = **3,983 cu ft. < 4,431 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 8,934 square feet. Water quality will be provided in three 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:

Impervious pavement area draining to detention basin = 20,063 sf
Required WQV = 20,063 sf x (0.50"/12) = 836 cf

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:

Impervious pavement area draining to detention basin = 32,997 sf
Required WQV = 32,997 sf x (0.50”/12) = 1375 cf

The volume of water being treated is the same as is infiltrated which was calculated previously as **2079 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 25%., and the subsurface structure with filter fabric wrap which provides an 80% TSS removal rate. The total TSS removal rate for this treatment chain is 85%

The volume of water below the outlet structure does not flow from the structure until it is filtered through the fabric and it drains through the buried perforated underdrain. The volume calculation required can be calculated as follows:

Impervious pavement area draining to detention basin = 5,052 sf
Required WQV = 5,052 sf x (0.50”/12) = 210 cf

The volume being treated can be calculated as follows:

Volume of chamber below the outlet elevation =
13’ x 7’ x 1.25’ x 2 chambers **= 227.5 cf > 210 cf**

Sediment Forebay Sizing

The sediment forebays 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) x 20,383 = 250 cf
Provided Volume	= **260 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 waddles, 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.

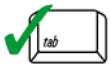
DEP STORMWATER CHECKLIST AND CERTIFICATION

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

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 8[2]
- Operation and Maintenance Plan required by Standard 9

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

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

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

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[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

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 Field[1]

☐ Runoff from all impervious areas at the site discharging to the infiltration BMP.

☒ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.

☒ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:

- ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
- ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
- ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
- ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

☒ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

[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 Structure P 1-3

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
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: **1/3/2018**

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

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

Mass. Dept. of Environmental Protection

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 BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	**0.25**	**100.00**	**25.00**	**75.00**
Wet Basin	**0.80**	**75.00**	**60.00**	**15.00**

Total TSS Removal = **85%**

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

Project: **Byfield Estates**
Prepared By: **BCO. JR**
Date: **1/3/2018**

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

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

Mass. Dept. of Environmental Protection

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.

Location: Detention Structure P 3-1

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
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**
		0.15	**0.15**	**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: **1/3/2018**

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

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

XI. POLLUTION PREVENTION PLANS

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/repaired 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.

<u>Inspection Costs</u>

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

<u>Public Safety</u>

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	• 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	• 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	• Inspect annually for the evidence of structural damage, silt accumulation and improper function. • Clean pipes when					

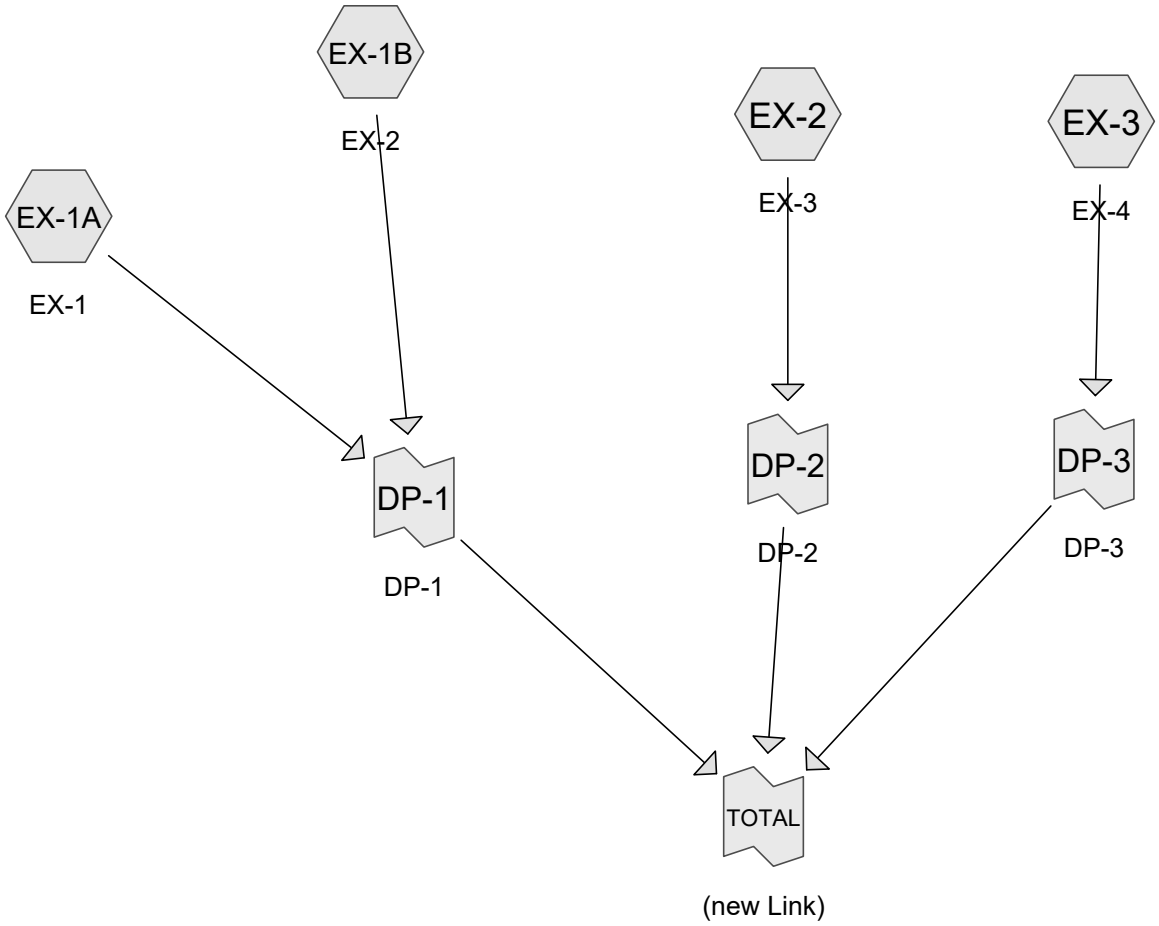
BMP/System Component	Maintenance Required & Frequency	Date of Inspection	Inspection Inspector	Cleaning/Repair Needed (list items/comments)	Date of Cleaning/ Repair	Cleaning/ Repair Performed by
	sediment occupies more than 20% of pipe diameter.					
Buried Chamber Systems	• Inspect after every major 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	• 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,					

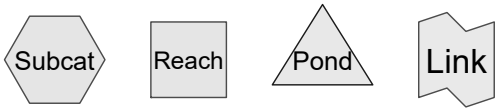
BMP/System Component	Maintenance Required & Frequency	Date of Inspection	Inspection Inspector	Cleaning/Repair Needed (list items/comments)	Date of Cleaning/ Repair	Cleaning/ Repair Performed by
	remove trash and debris, grass clippings and accumulated organic dead `matter every six months.					
Graded Slopes/ Rip-Rap	• Inspect every spring for erosion. Repair any erosion by placing rip-rap/ loam and seed in place and nurtured					

RANGER
ENGINEERING &
DESIGN, LLC

STORMWATER MANAGEMENT REPORT

PRE-DEVELOPMENT DRAINAGE





Drainage Diagram for 2018-01-03_PRE DEV. PEARSON DRIVE
Prepared by RANGER ENGINEERING & DESIGN, LLC, Printed 1/3/2018
HydroCAD® 8.50 s/n 002248 © 2007 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
356,501	55	Woods, Good, HSG B (EX-1A,EX-1B,EX-2,EX-3)
3,186	61	>75% Grass cover, Good, HSG B (EX-1A)
359,687		**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Goup	Subcatchment Numbers
0	HSG A	
359,687	HSG B	EX-1A, EX-1B, EX-2, EX-3
0	HSG C	
0	HSG D	
0	Other	
359,687		**TOTAL AREA**

RANGER
ENGINEERING &
DESIGN, LLC

STORMWATER MANAGEMENT REPORT

PRE-DEVELOPMENT DRAINAGE

2 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-1 Runoff Area=9,440 sf 0.00% Impervious Runoff Depth>0.31"
Flow Length=117' Tc=5.0 min CN=57 Runoff=0.03 cfs 243 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=96,944 sf 0.00% Impervious Runoff Depth>0.25"
Flow Length=287' Tc=10.8 min CN=55 Runoff=0.22 cfs 2,017 cf

Subcatchment EX-3: EX-4 Runoff Area=118,057 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 3,051 cf
Primary=0.31 cfs 3,051 cf

Link DP-2: DP-2 Inflow=0.22 cfs 2,017 cf
Primary=0.22 cfs 2,017 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 7,526 cf
Primary=0.79 cfs 7,526 cf

Total Runoff Area = 359,687 sf Runoff Volume = 7,526 cf Average Runoff Depth = 0.25"
100.00% Pervious = 359,687 sf 0.00% Impervious = 0 sf

Summary for Subcatchment EX-1A: EX-1

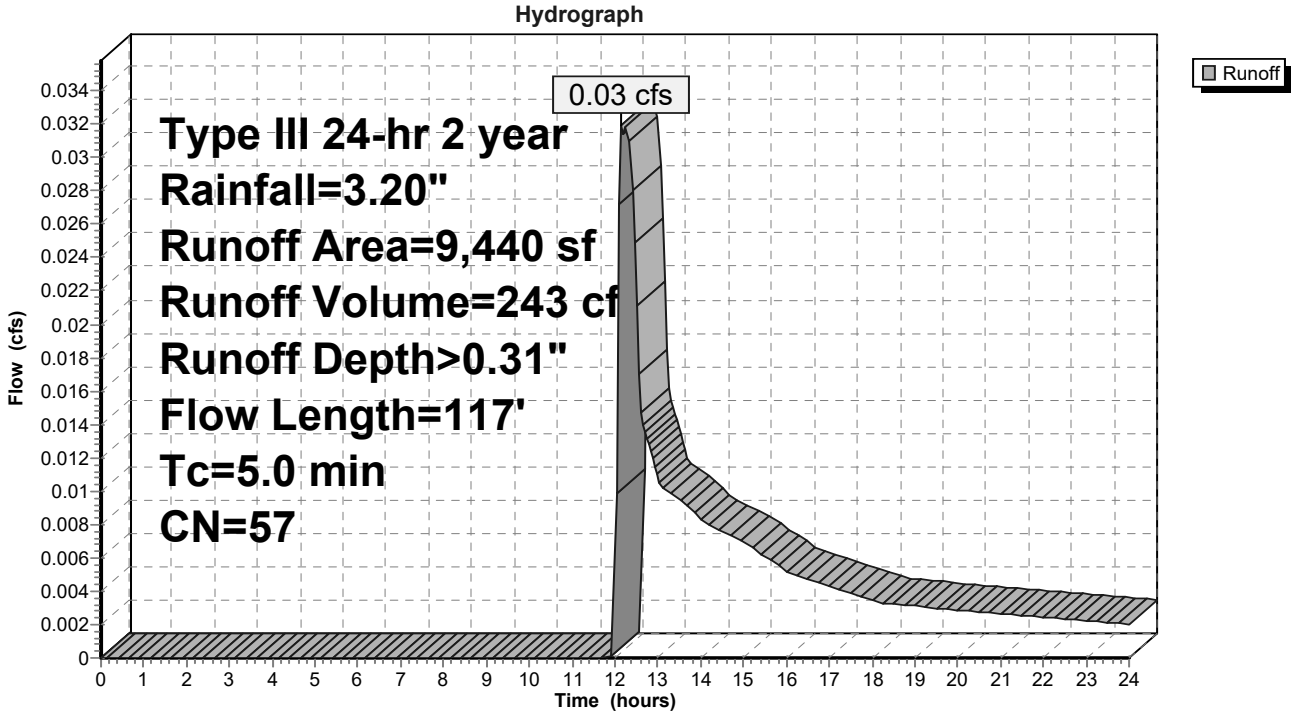
Runoff = 0.03 cfs @ 12.15 hrs, Volume= 243 cf, Depth> 0.31"

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
6,254	55	Woods, Good, HSG B
0	98	Water Surface, HSG B
0	98	Unconnected pavement, HSG B
9,440	57	Weighted Average
9,440		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

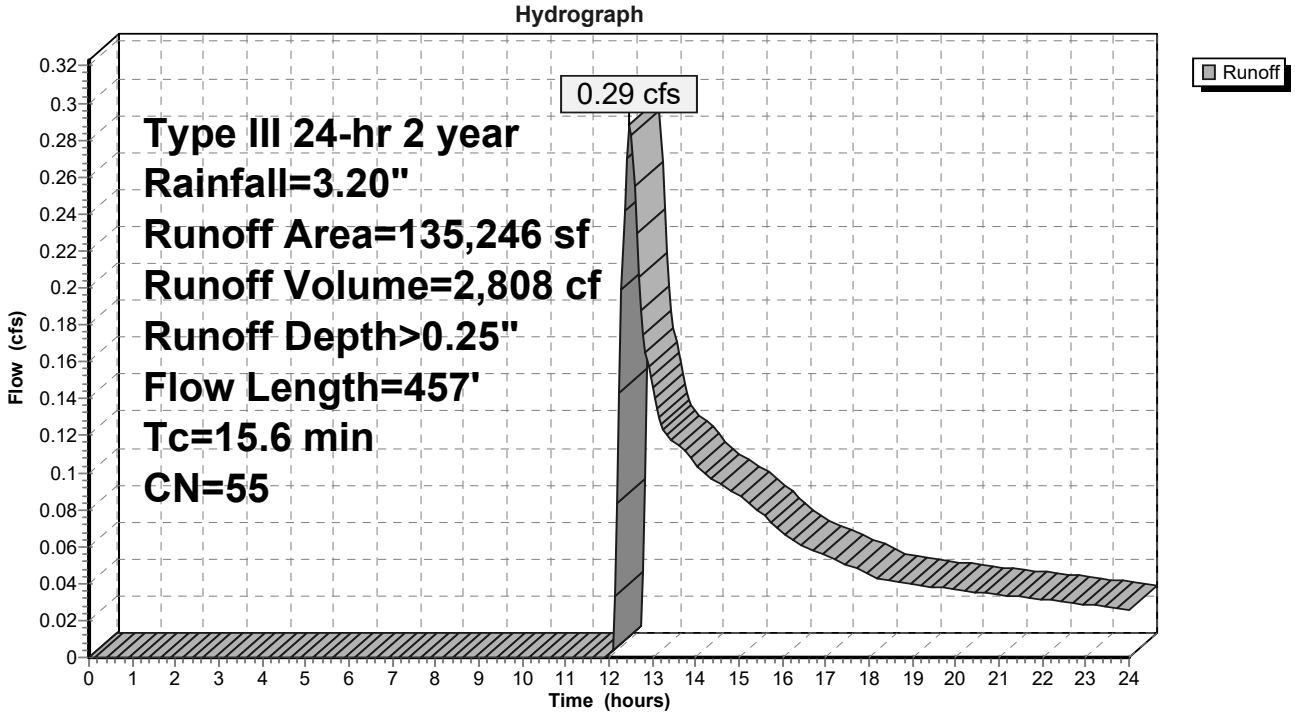
Runoff = 0.29 cfs @ 12.48 hrs, Volume= 2,808 cf, Depth> 0.25"

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



Summary for Subcatchment EX-2: EX-3

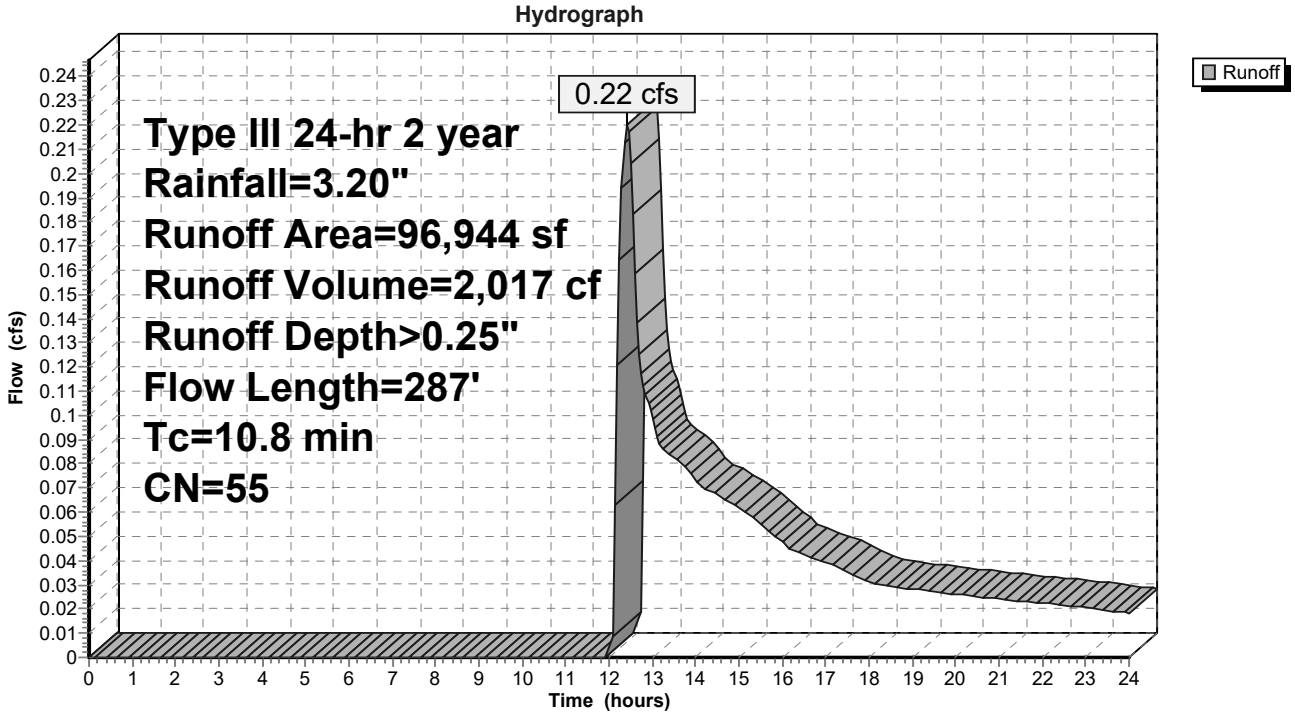
Runoff = 0.22 cfs @ 12.41 hrs, Volume= 2,017 cf, Depth> 0.25"

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
96,944	55	Woods, Good, HSG B
0	98	Water Surface, HSG B
0	98	Unconnected pavement, HSG B
96,944	55	Weighted Average
96,944		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

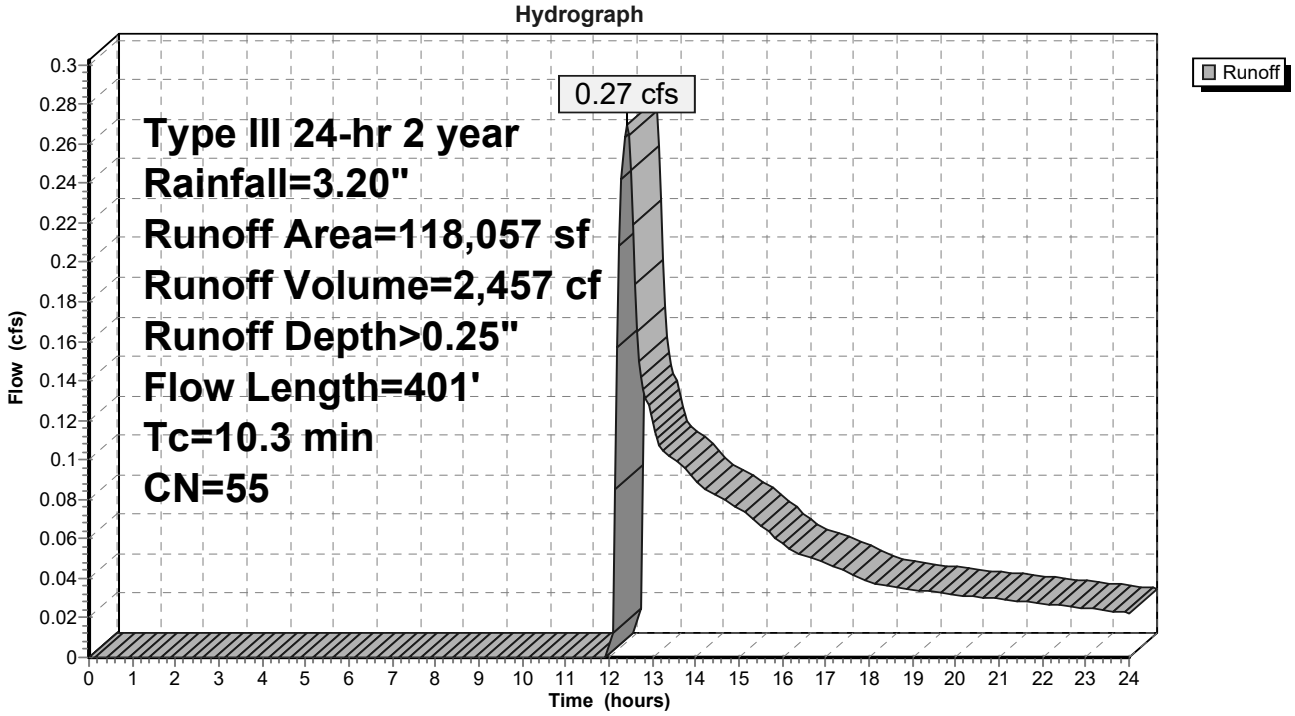
Runoff = 0.27 cfs @ 12.40 hrs, Volume= 2,457 cf, Depth> 0.25"

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
118,057	55	Woods, Good, HSG B
0	98	Water Surface, HSG B
0	98	Unconnected pavement, HSG B
118,057	55	Weighted Average
118,057		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

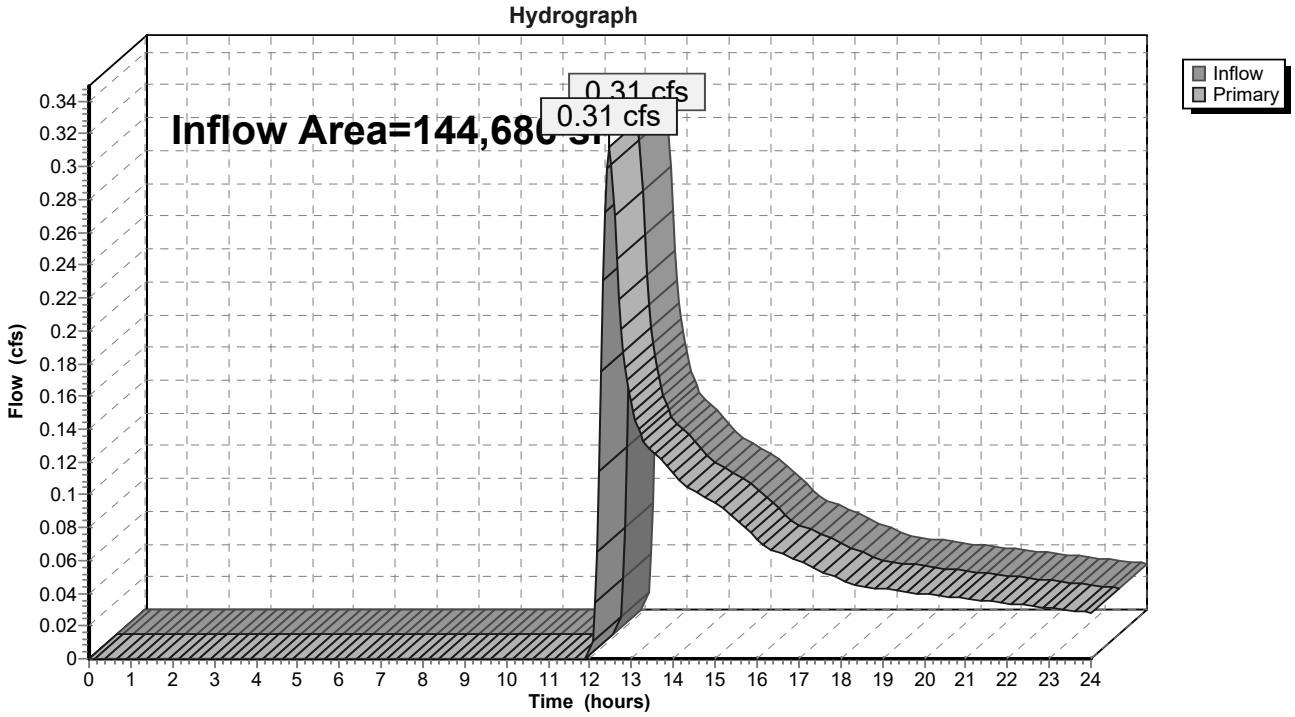


Summary for Link DP-1: DP-1

Inflow Area = 144,686 sf, 0.00% Impervious, Inflow Depth > 0.25" for 2 year event
Inflow = 0.31 cfs @ 12.47 hrs, Volume= 3,051 cf
Primary = 0.31 cfs @ 12.47 hrs, Volume= 3,051 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

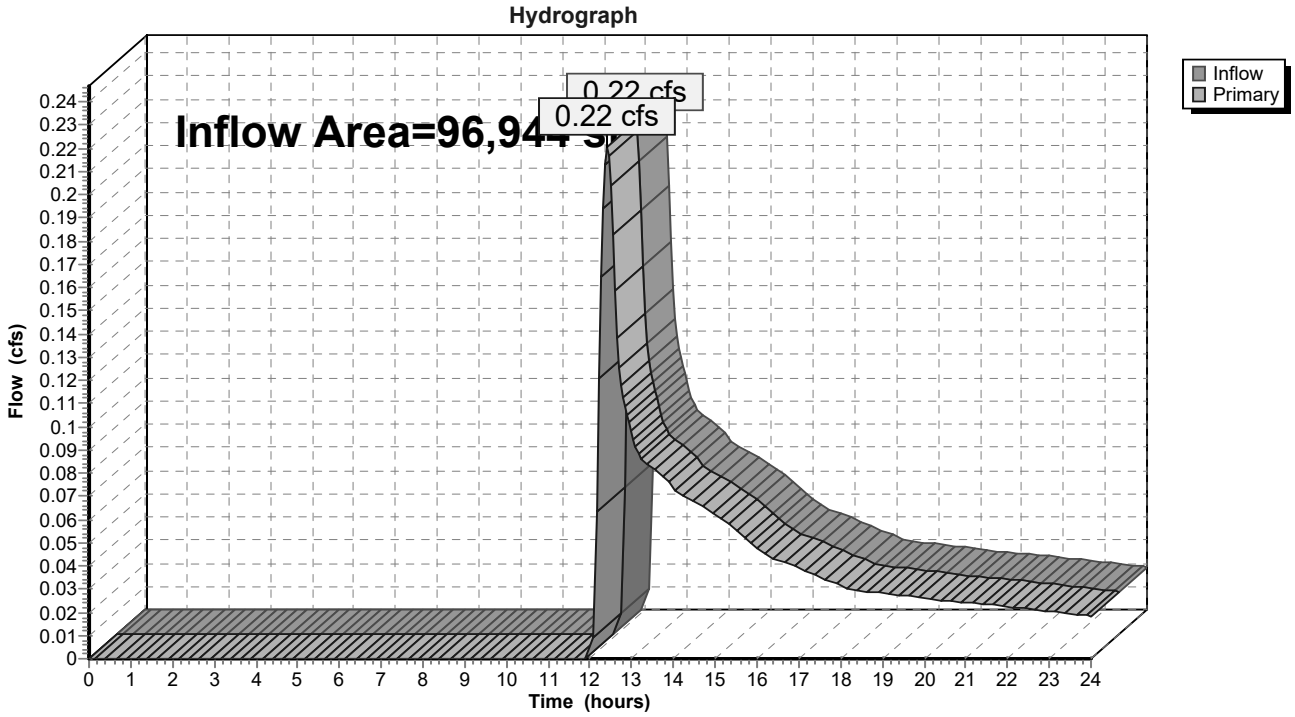


Summary for Link DP-2: DP-2

Inflow Area = 96,944 sf, 0.00% Impervious, Inflow Depth > 0.25" for 2 year event
Inflow = 0.22 cfs @ 12.41 hrs, Volume= 2,017 cf
Primary = 0.22 cfs @ 12.41 hrs, Volume= 2,017 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

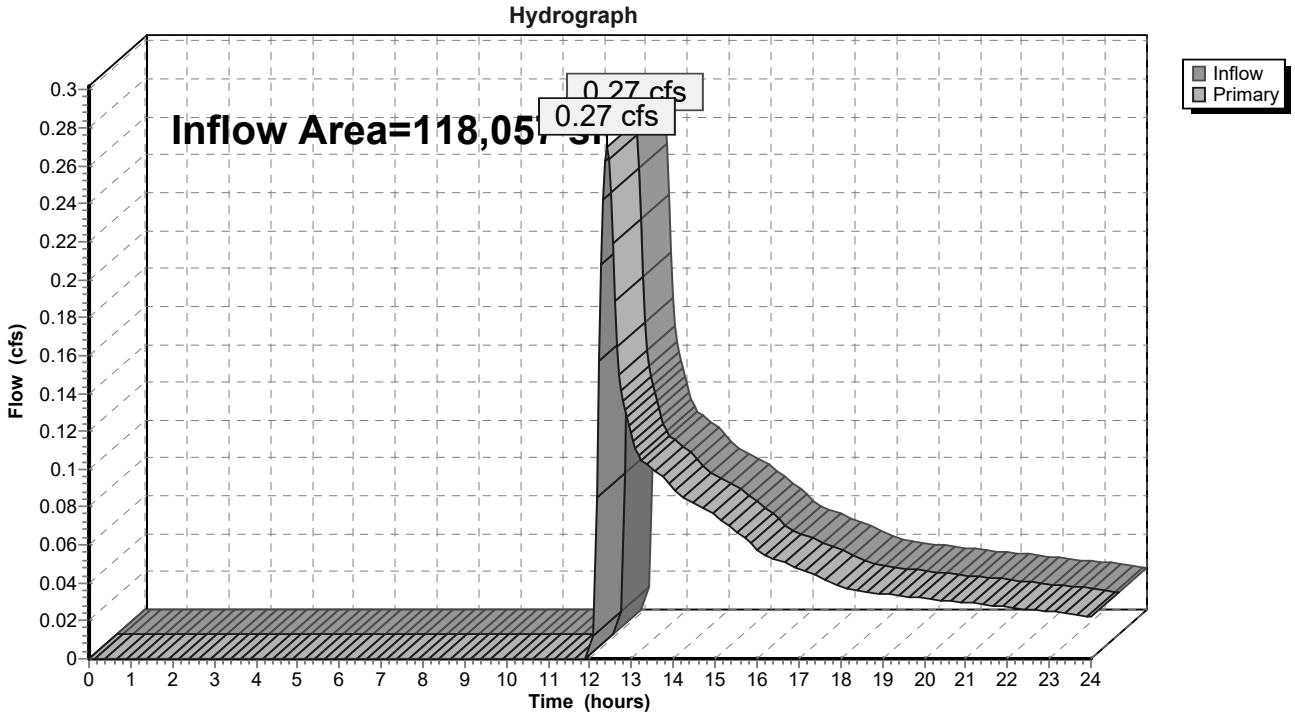


Summary for Link DP-3: DP-3

Inflow Area = 118,057 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

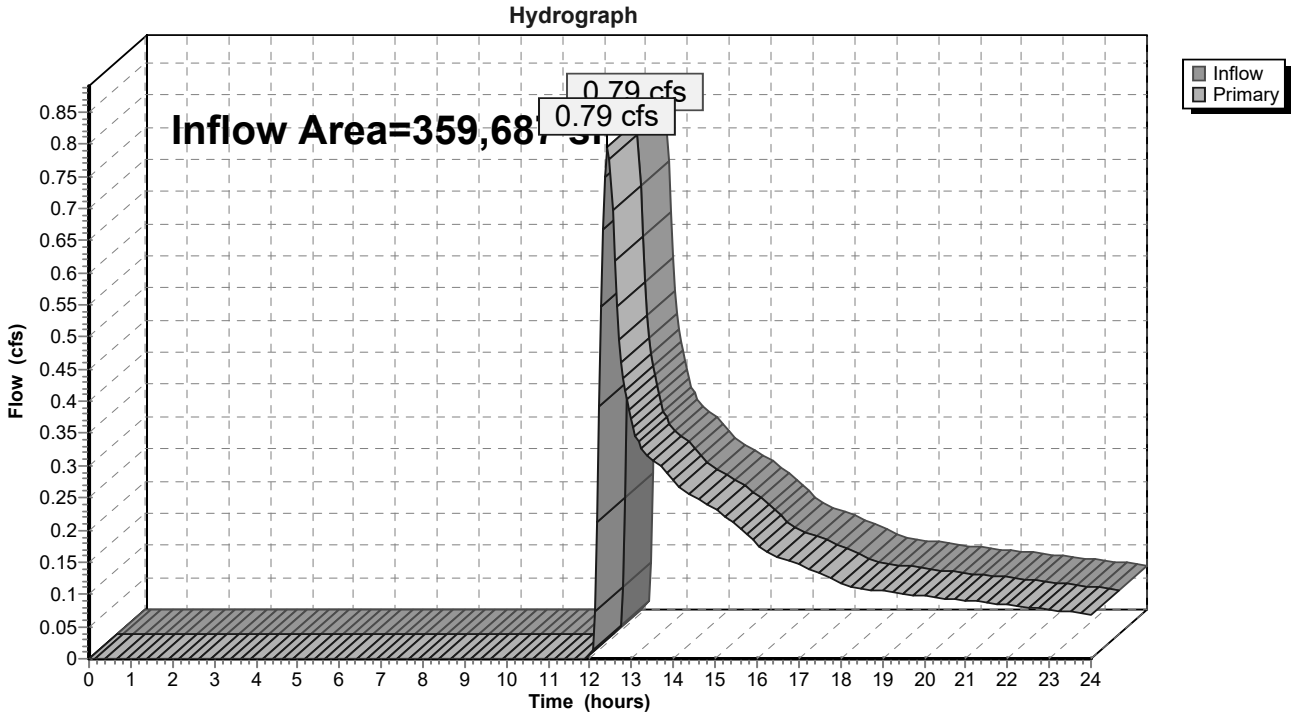


Summary for Link TOTAL: (new Link)

Inflow Area = 359,687 sf, 0.00% Impervious, Inflow Depth > 0.25" for 2 year event
Inflow = 0.79 cfs @ 12.43 hrs, Volume= 7,526 cf
Primary = 0.79 cfs @ 12.43 hrs, Volume= 7,526 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)



RANGER
ENGINEERING &
DESIGN, LLC

STORMWATER MANAGEMENT REPORT

PRE-DEVELOPMENT DRAINAGE

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-1 Runoff Area=9,440 sf 0.00% Impervious Runoff Depth>1.00"
Flow Length=117' Tc=5.0 min CN=57 Runoff=0.21 cfs 786 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=96,944 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=118,057 sf 0.00% Impervious Runoff Depth>0.88"
Flow Length=401' Tc=10.3 min CN=55 Runoff=1.81 cfs 8,653 cf

Link DP-1: DP-1 Inflow=1.95 cfs 10,680 cf
Primary=1.95 cfs 10,680 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 8,653 cf
Primary=1.81 cfs 8,653 cf

Link TOTAL: (new Link) Inflow=5.08 cfs 26,436 cf
Primary=5.08 cfs 26,436 cf

Total Runoff Area = 359,687 sf Runoff Volume = 26,436 cf Average Runoff Depth = 0.88"
100.00% Pervious = 359,687 sf 0.00% Impervious = 0 sf

Summary for Subcatchment EX-1A: EX-1

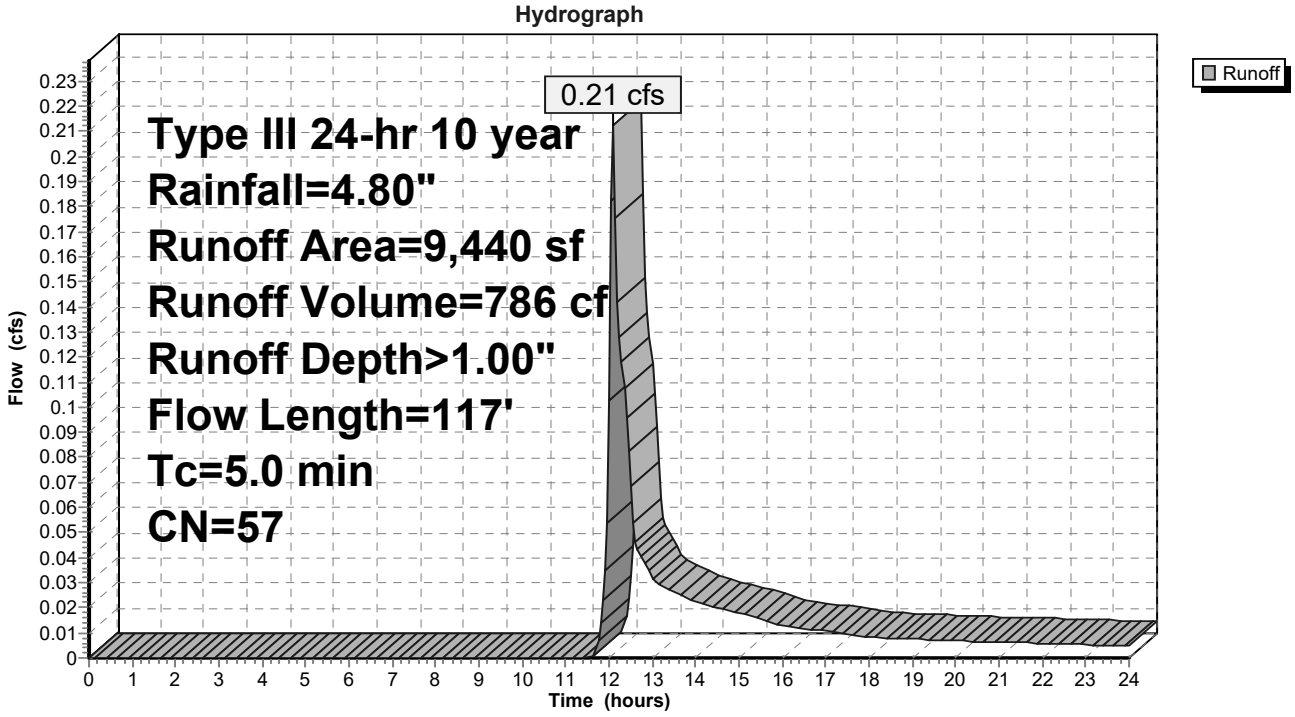
Runoff = 0.21 cfs @ 12.10 hrs, Volume= 786 cf, Depth> 1.00"

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
6,254	55	Woods, Good, HSG B
0	98	Water Surface, HSG B
0	98	Unconnected pavement, HSG B
9,440	57	Weighted Average
9,440		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

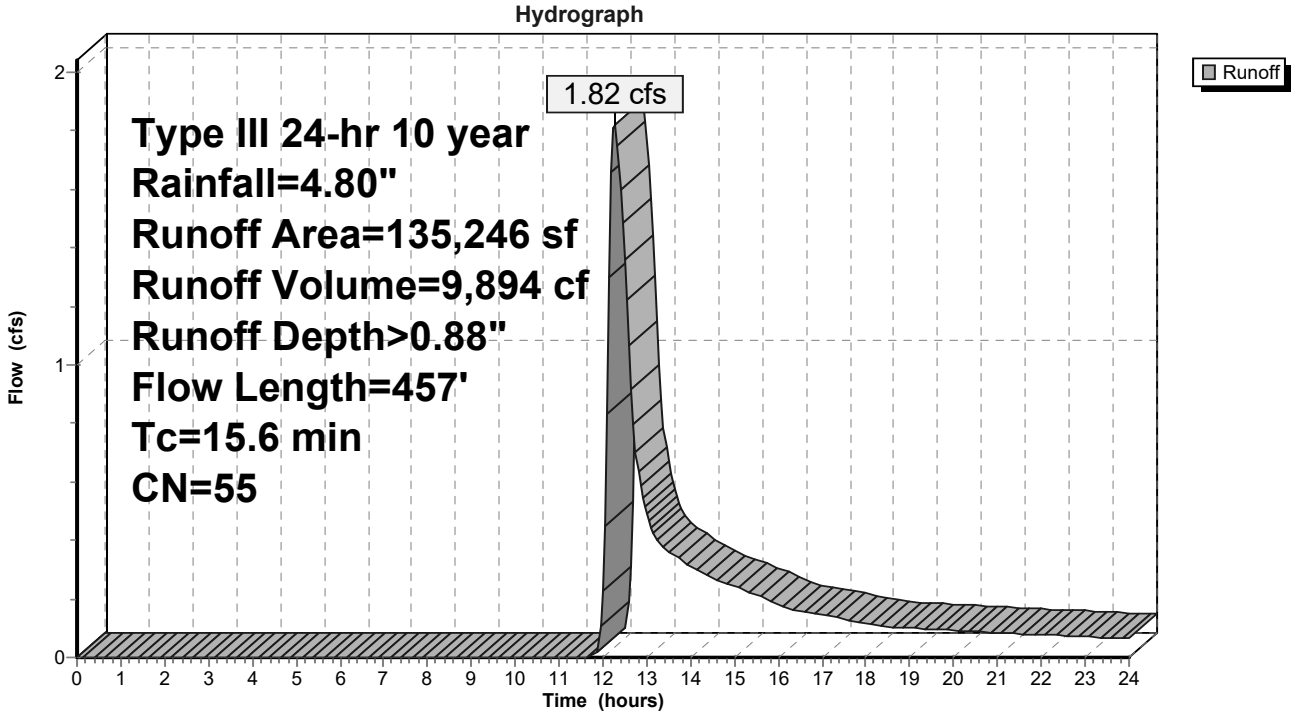
Runoff = 1.82 cfs @ 12.27 hrs, Volume= 9,894 cf, Depth> 0.88"

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

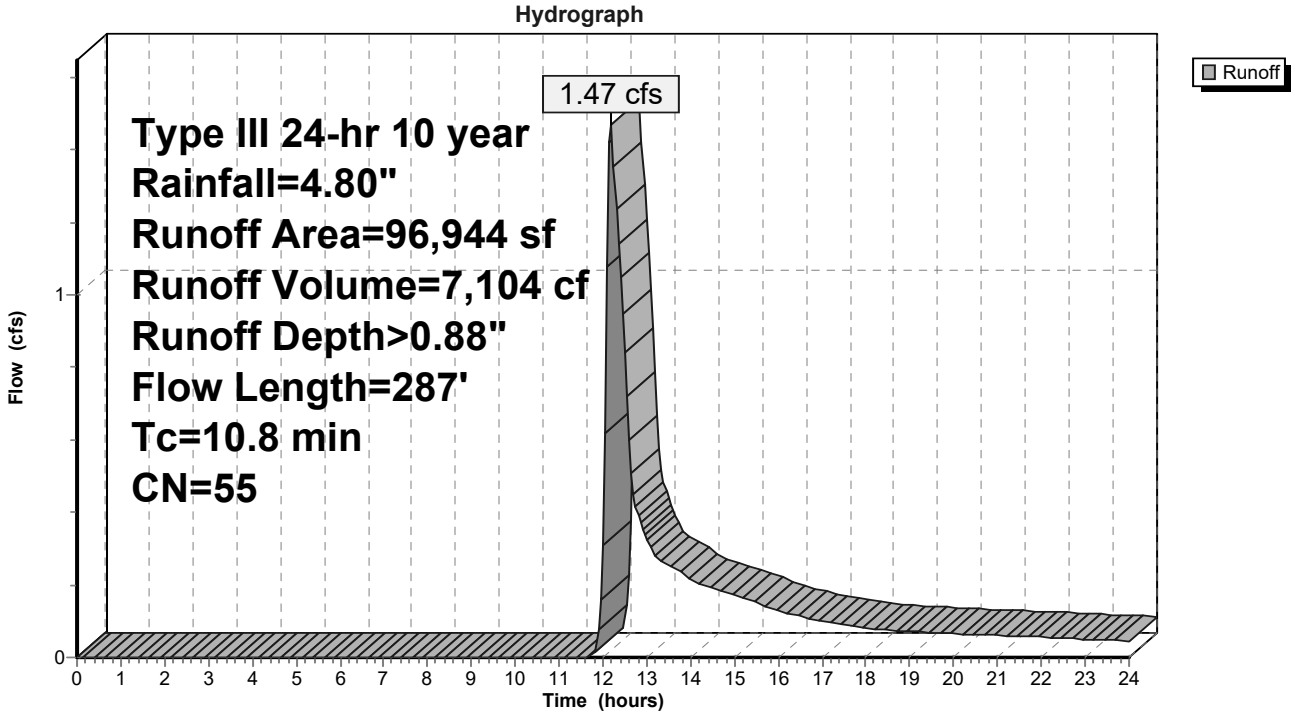
Runoff = 1.47 cfs @ 12.19 hrs, Volume= 7,104 cf, Depth> 0.88"

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
96,944	55	Woods, Good, HSG B
0	98	Water Surface, HSG B
0	98	Unconnected pavement, HSG B
96,944	55	Weighted Average
96,944		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

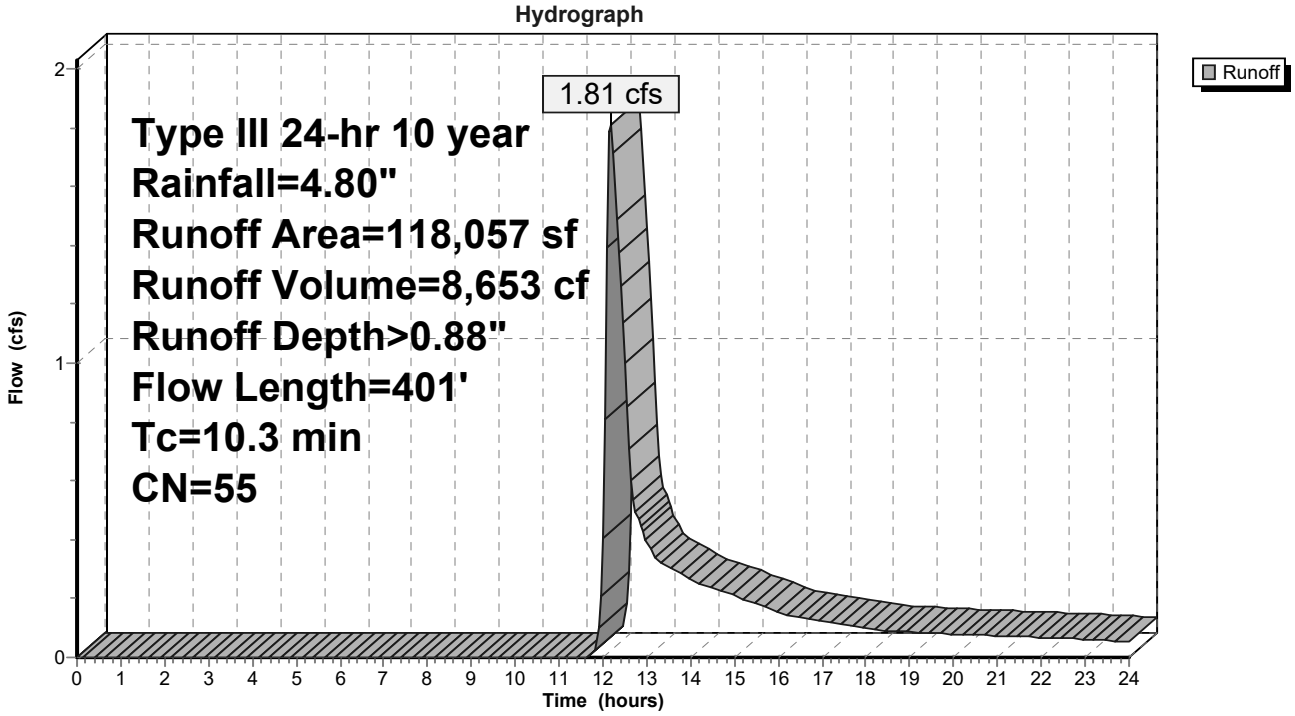
Runoff = 1.81 cfs @ 12.18 hrs, Volume= 8,653 cf, Depth> 0.88"

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
118,057	55	Woods, Good, HSG B
0	98	Water Surface, HSG B
0	98	Unconnected pavement, HSG B
118,057	55	Weighted Average
118,057		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

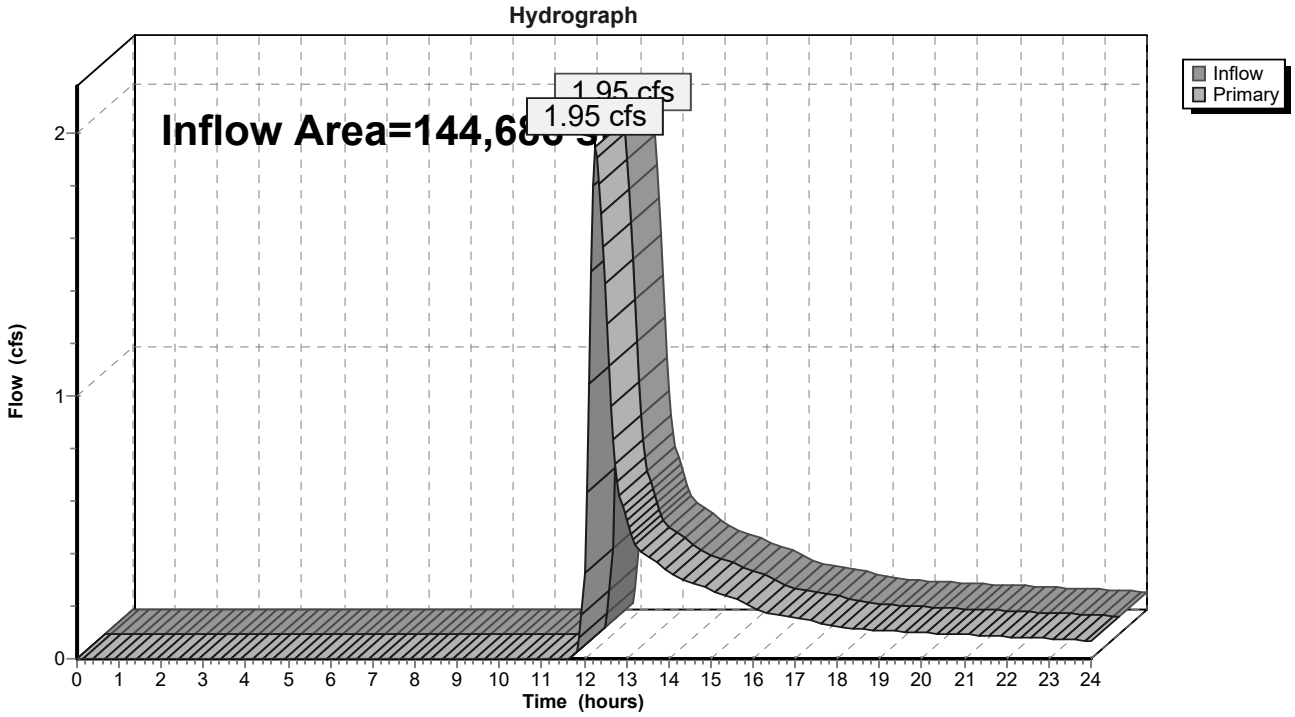


Summary for Link DP-1: DP-1

Inflow Area = 144,686 sf, 0.00% Impervious, Inflow Depth > 0.89" for 10 year event
Inflow = 1.95 cfs @ 12.27 hrs, Volume= 10,680 cf
Primary = 1.95 cfs @ 12.27 hrs, Volume= 10,680 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

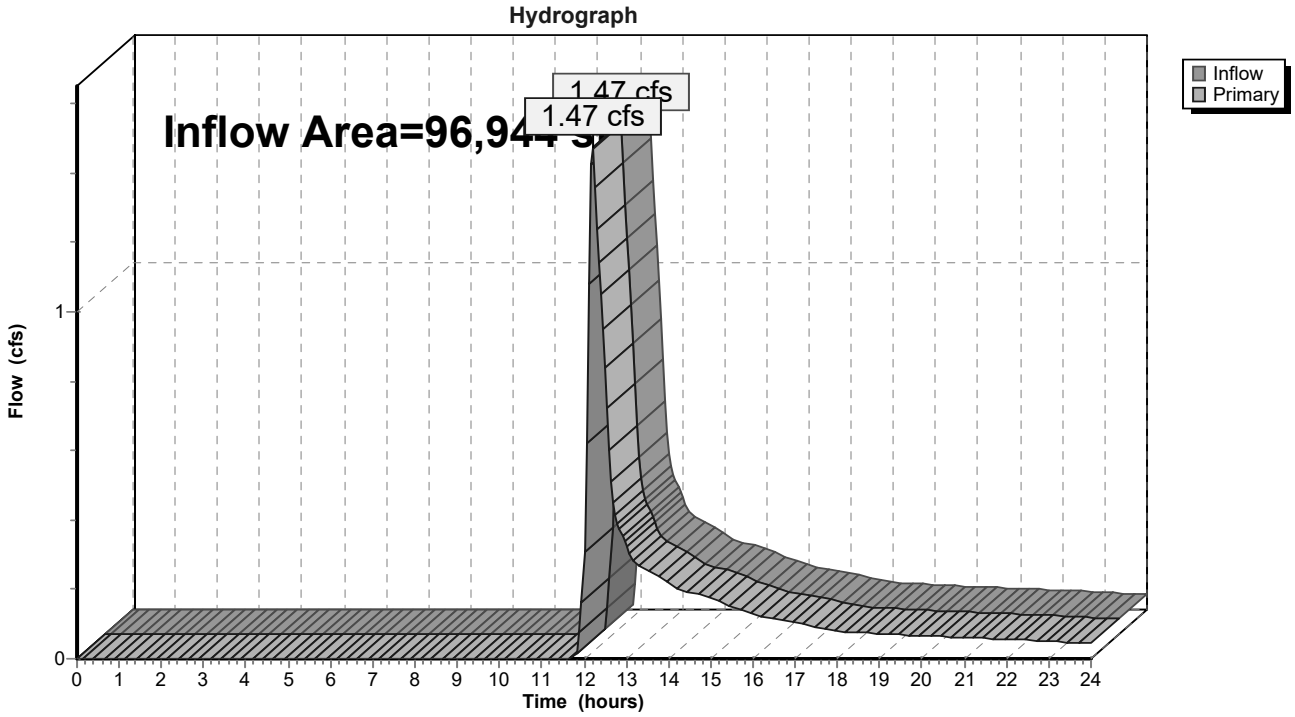


Summary for Link DP-2: DP-2

Inflow Area = 96,944 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

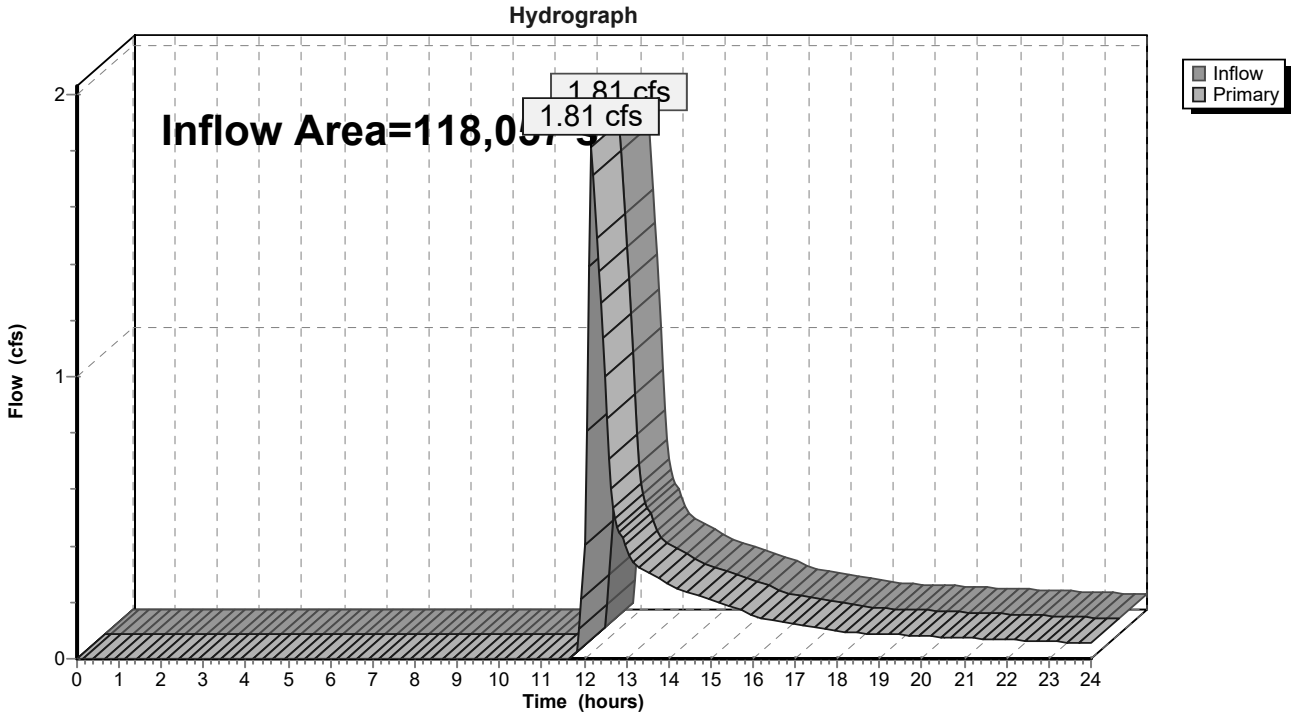


Summary for Link DP-3: DP-3

Inflow Area = 118,057 sf, 0.00% Impervious, Inflow Depth > 0.88" for 10 year event
Inflow = 1.81 cfs @ 12.18 hrs, Volume= 8,653 cf
Primary = 1.81 cfs @ 12.18 hrs, Volume= 8,653 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

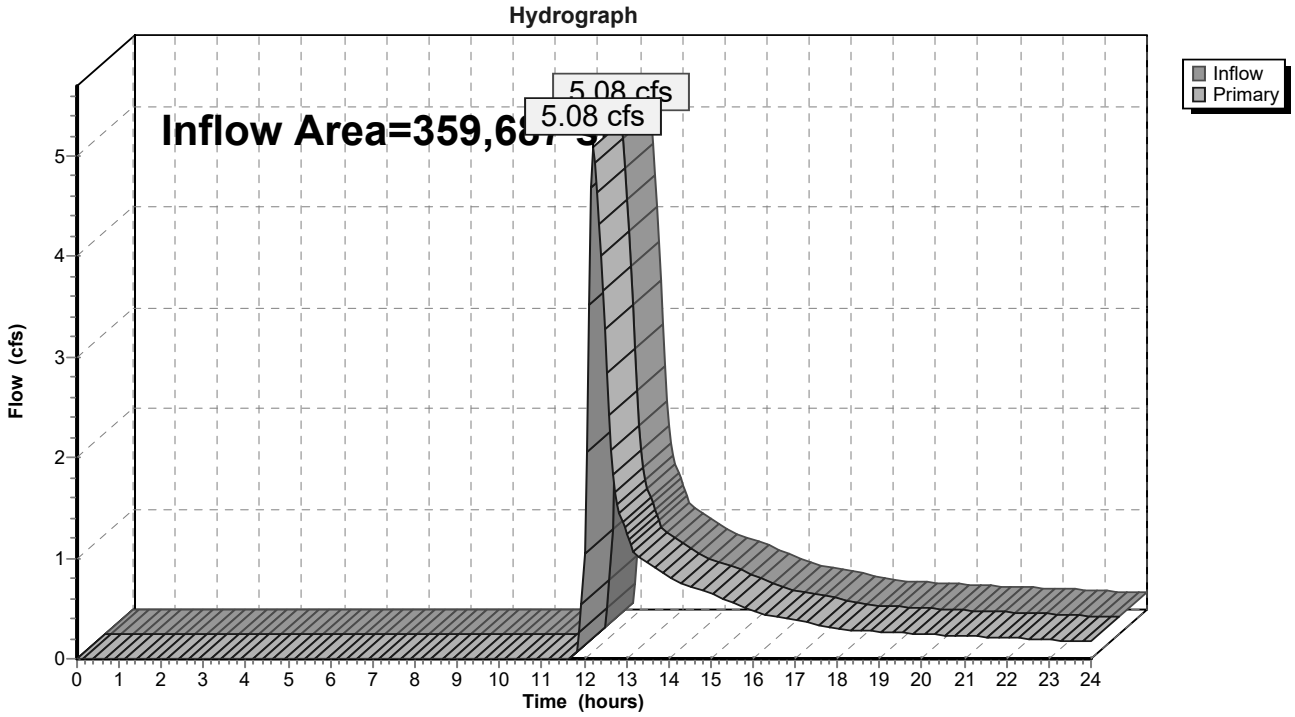


Summary for Link TOTAL: (new Link)

Inflow Area = 359,687 sf, 0.00% Impervious, Inflow Depth > 0.88" for 10 year event
Inflow = 5.08 cfs @ 12.21 hrs, Volume= 26,436 cf
Primary = 5.08 cfs @ 12.21 hrs, Volume= 26,436 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)



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-1 Runoff Area=9,440 sf 0.00% Impervious Runoff Depth>1.67"
Flow Length=117' Tc=5.0 min CN=57 Runoff=0.39 cfs 1,317 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=96,944 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=118,057 sf 0.00% Impervious Runoff Depth>1.51"
Flow Length=401' Tc=10.3 min CN=55 Runoff=3.65 cfs 14,893 cf

Link DP-1: DP-1 Inflow=3.82 cfs 18,351 cf
Primary=3.82 cfs 18,351 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 14,893 cf
Primary=3.65 cfs 14,893 cf

Link TOTAL: (new Link) Inflow=10.05 cfs 45,471 cf
Primary=10.05 cfs 45,471 cf

Total Runoff Area = 359,687 sf Runoff Volume = 45,471 cf Average Runoff Depth = 1.52"
100.00% Pervious = 359,687 sf 0.00% Impervious = 0 sf

Summary for Subcatchment EX-1A: EX-1

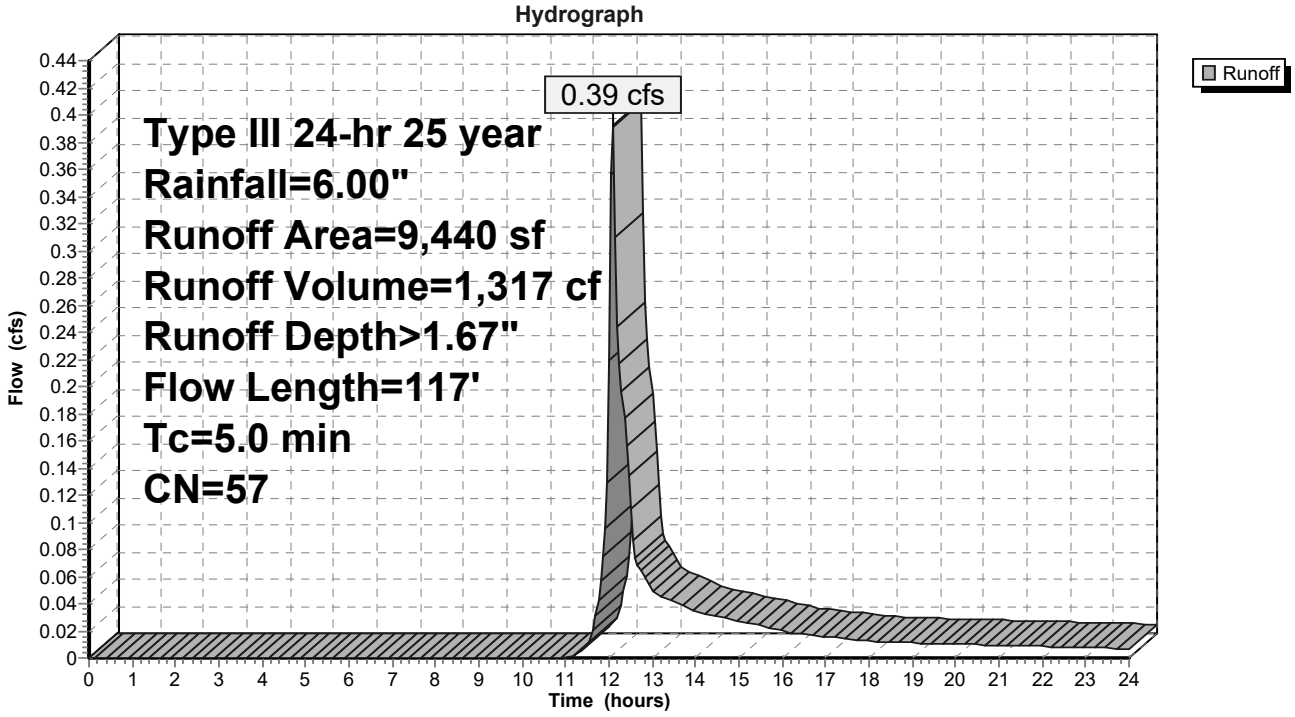
Runoff = 0.39 cfs @ 12.09 hrs, Volume= 1,317 cf, Depth> 1.67"

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
6,254	55	Woods, Good, HSG B
0	98	Water Surface, HSG B
0	98	Unconnected pavement, HSG B
9,440	57	Weighted Average
9,440		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

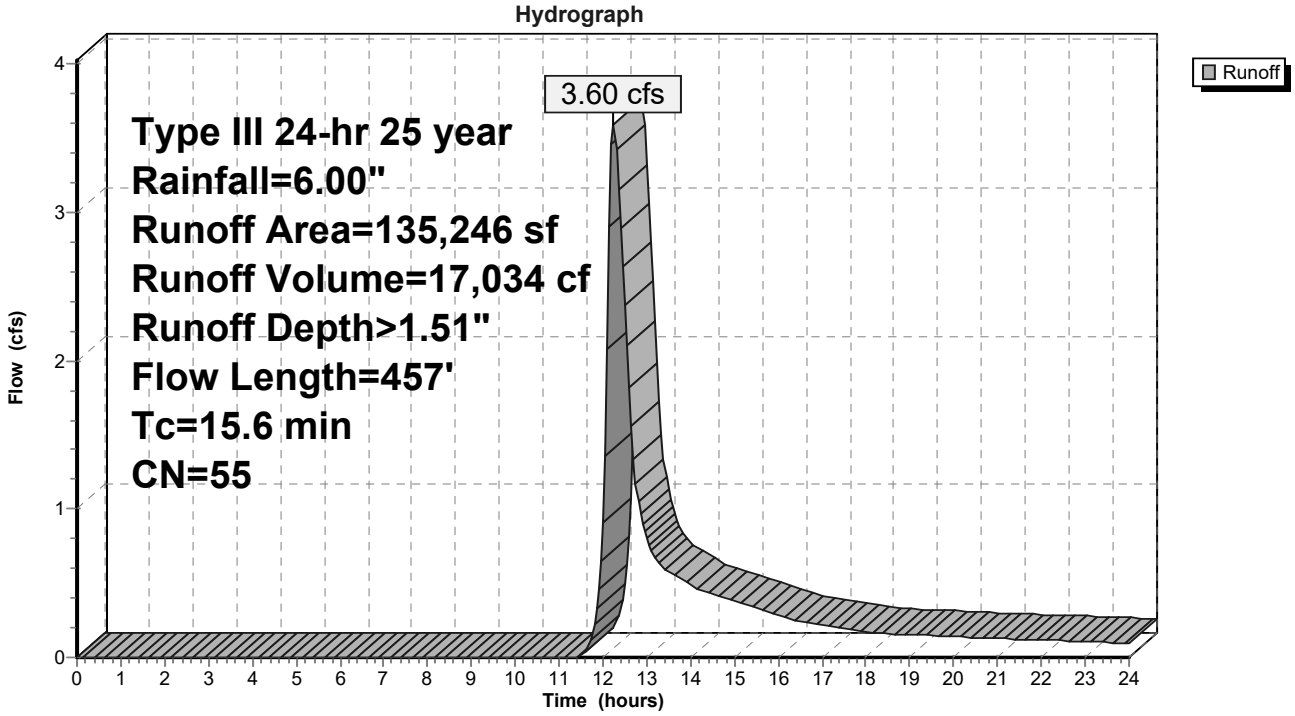
Runoff = 3.60 cfs @ 12.25 hrs, Volume= 17,034 cf, Depth> 1.51"

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

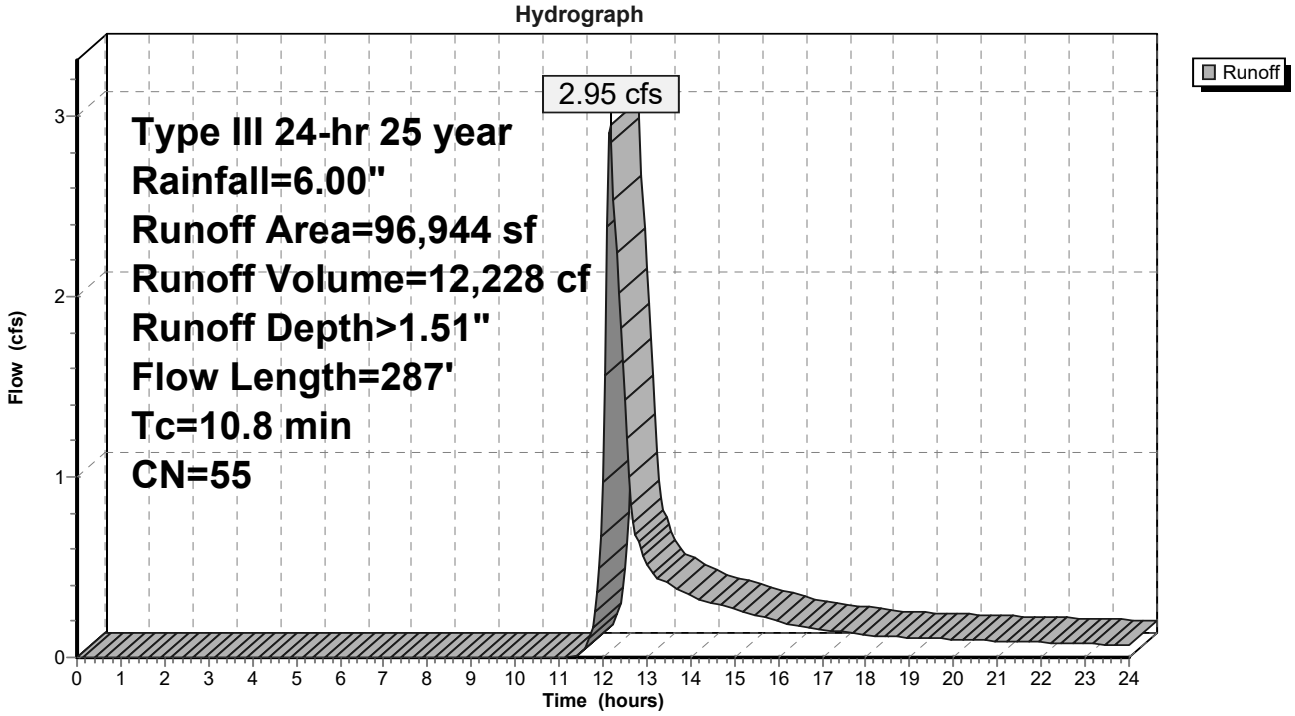
Runoff = 2.95 cfs @ 12.17 hrs, Volume= 12,228 cf, Depth> 1.51"

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
96,944	55	Woods, Good, HSG B
0	98	Water Surface, HSG B
0	98	Unconnected pavement, HSG B
96,944	55	Weighted Average
96,944		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

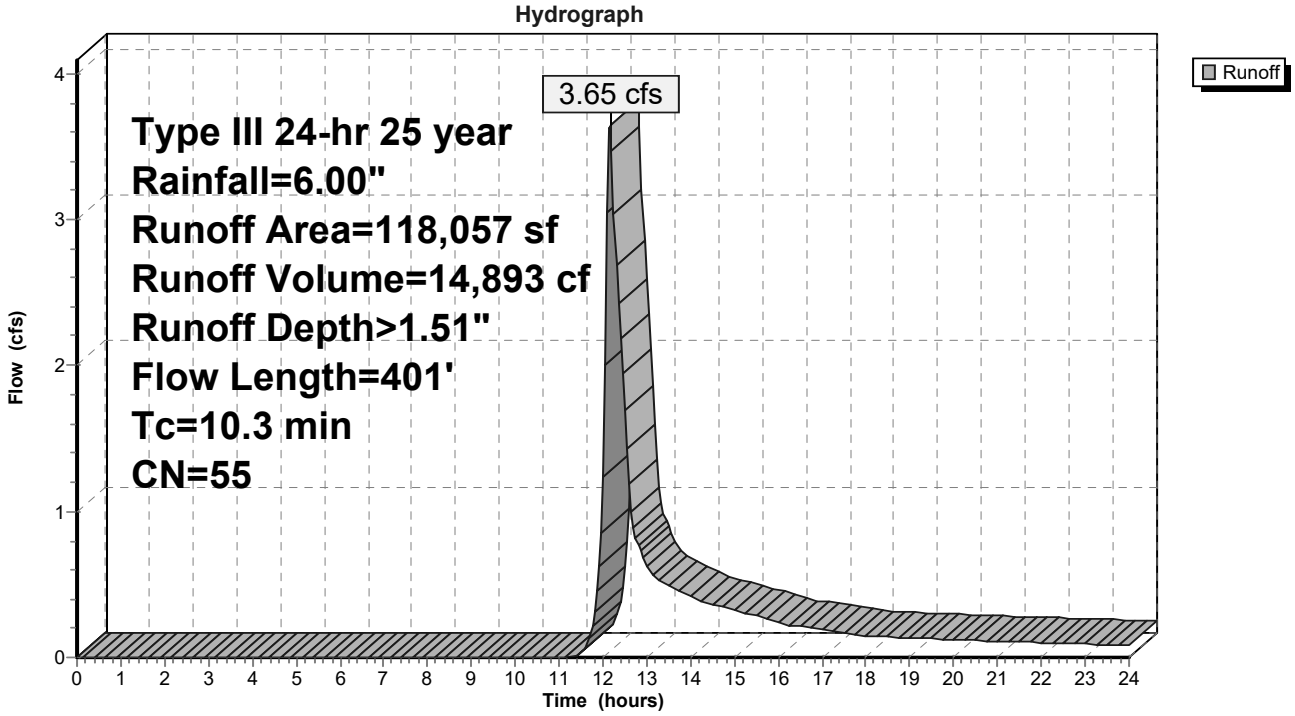
Runoff = 3.65 cfs @ 12.16 hrs, Volume= 14,893 cf, Depth> 1.51"

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
118,057	55	Woods, Good, HSG B
0	98	Water Surface, HSG B
0	98	Unconnected pavement, HSG B
118,057	55	Weighted Average
118,057		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

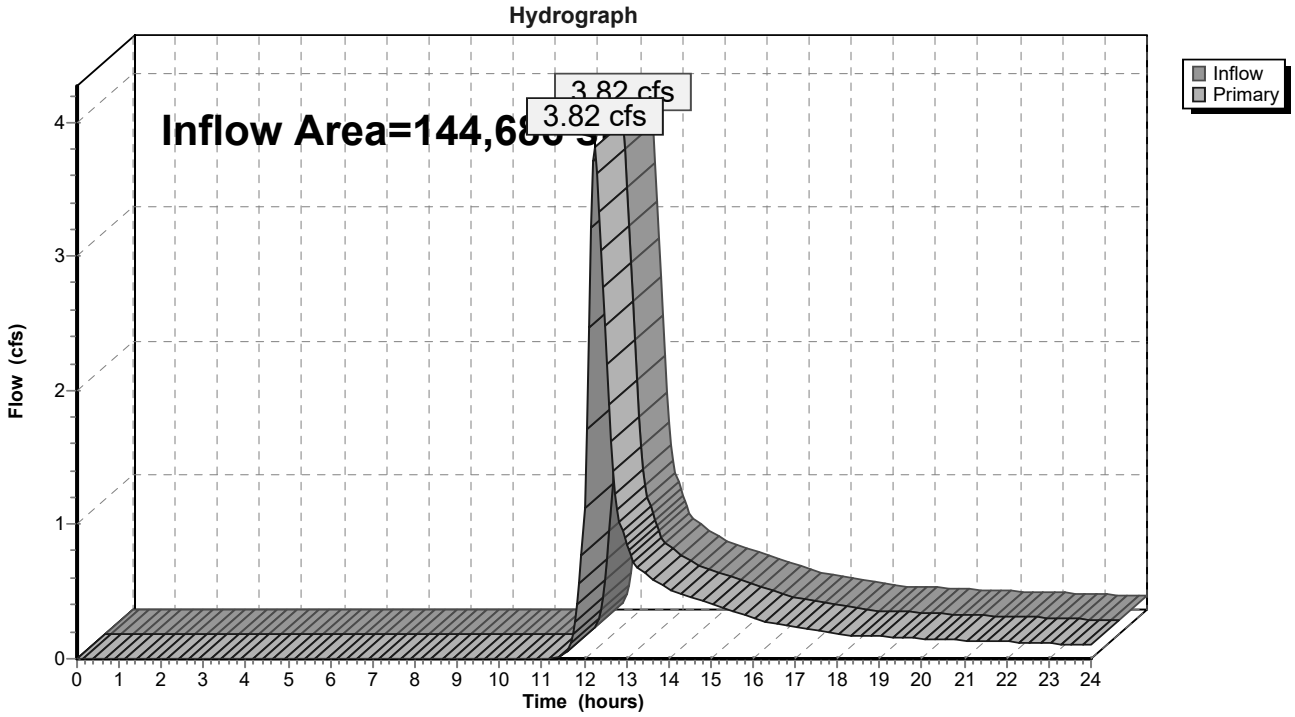


Summary for Link DP-1: DP-1

Inflow Area = 144,686 sf, 0.00% Impervious, Inflow Depth > 1.52" for 25 year event
Inflow = 3.82 cfs @ 12.24 hrs, Volume= 18,351 cf
Primary = 3.82 cfs @ 12.24 hrs, Volume= 18,351 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

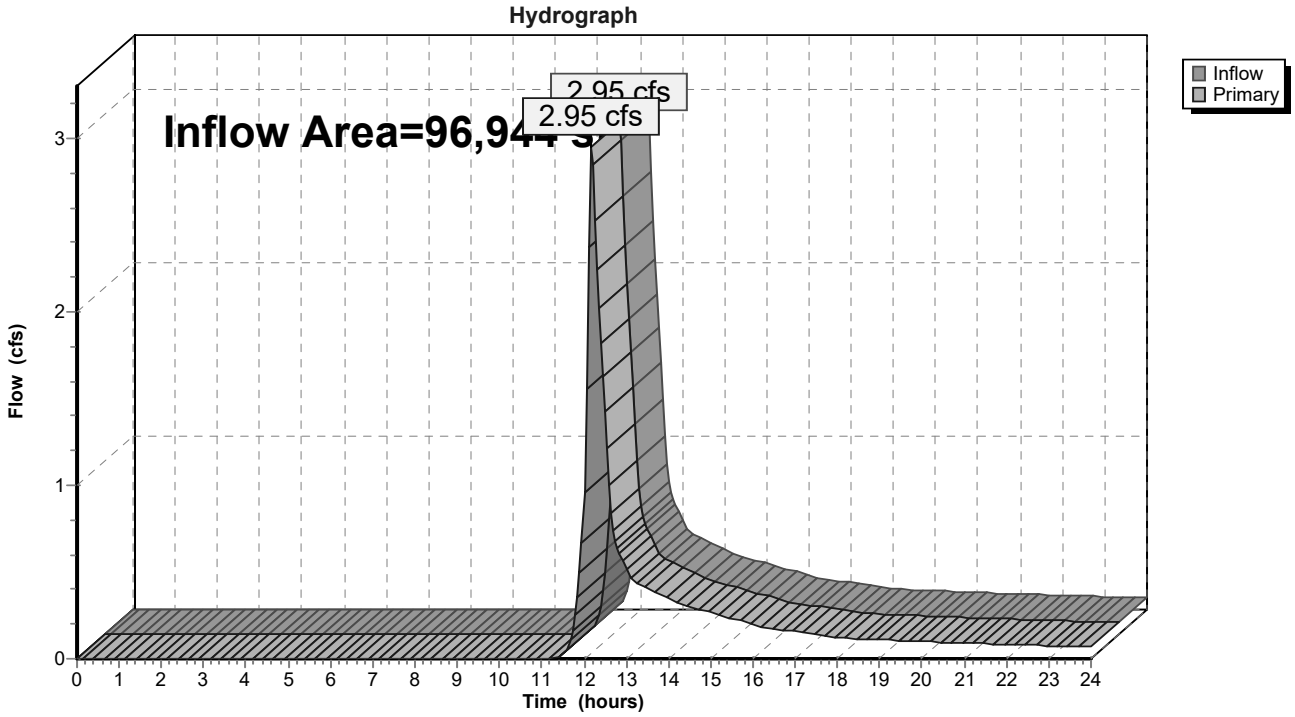


Summary for Link DP-2: DP-2

Inflow Area = 96,944 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

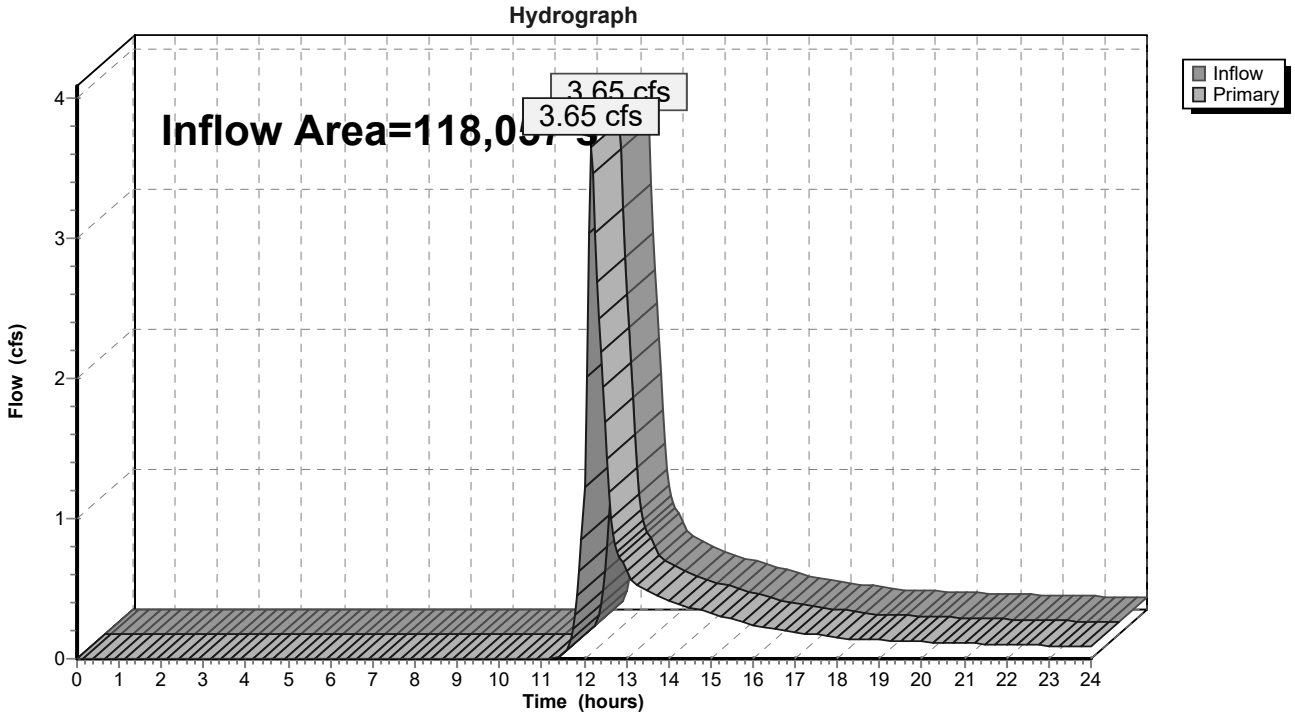


Summary for Link DP-3: DP-3

Inflow Area = 118,057 sf, 0.00% Impervious, Inflow Depth > 1.51" for 25 year event
Inflow = 3.65 cfs @ 12.16 hrs, Volume= 14,893 cf
Primary = 3.65 cfs @ 12.16 hrs, Volume= 14,893 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

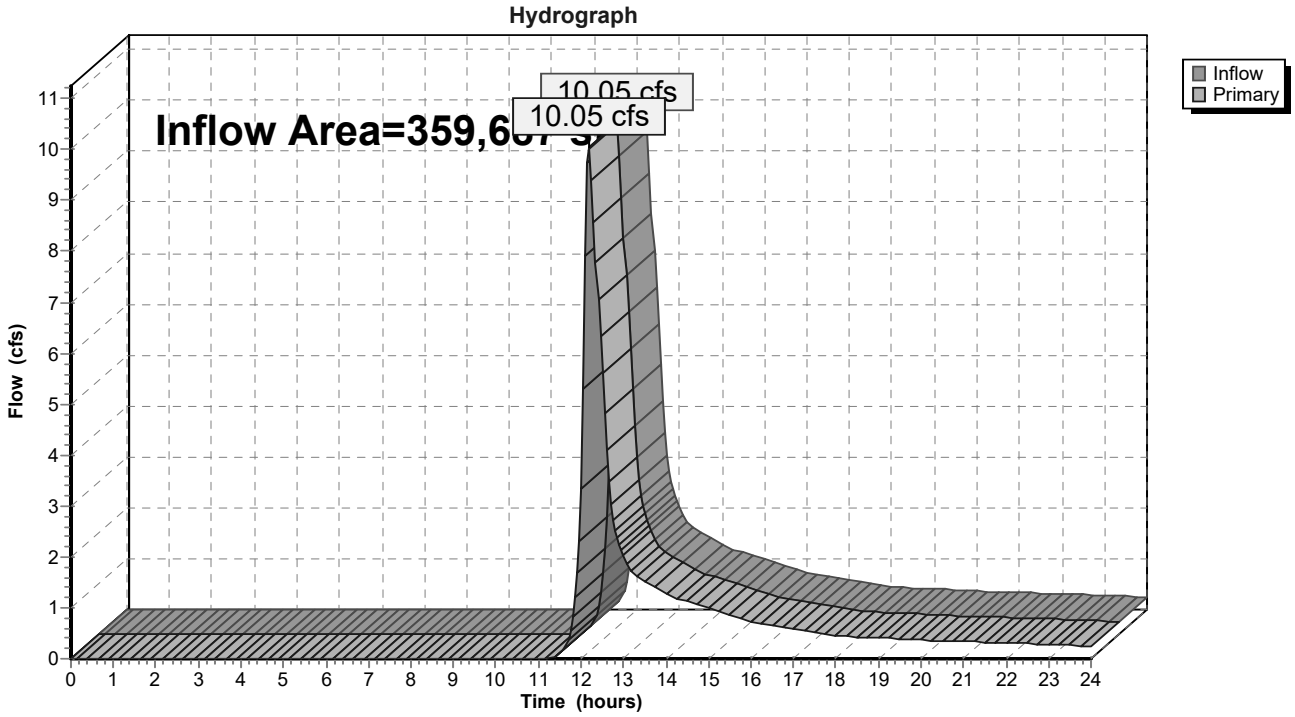


Summary for Link TOTAL: (new Link)

Inflow Area = 359,687 sf, 0.00% Impervious, Inflow Depth > 1.52" for 25 year event
Inflow = 10.05 cfs @ 12.19 hrs, Volume= 45,471 cf
Primary = 10.05 cfs @ 12.19 hrs, Volume= 45,471 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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STORMWATER MANAGEMENT REPORT

PRE-DEVELOPMENT DRAINAGE

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-1 Runoff Area=9,440 sf 0.00% Impervious Runoff Depth>2.31"
Flow Length=117' Tc=5.0 min CN=57 Runoff=0.56 cfs 1,818 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=96,944 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=118,057 sf 0.00% Impervious Runoff Depth>2.12"
Flow Length=401' Tc=10.3 min CN=55 Runoff=5.38 cfs 20,844 cf

Link DP-1: DP-1 Inflow=5.60 cfs 25,661 cf
Primary=5.60 cfs 25,661 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 20,844 cf
Primary=5.38 cfs 20,844 cf

Link TOTAL: (new Link) Inflow=14.80 cfs 63,620 cf
Primary=14.80 cfs 63,620 cf

Total Runoff Area = 359,687 sf Runoff Volume = 63,620 cf Average Runoff Depth = 2.12"
100.00% Pervious = 359,687 sf 0.00% Impervious = 0 sf

Summary for Subcatchment EX-1A: EX-1

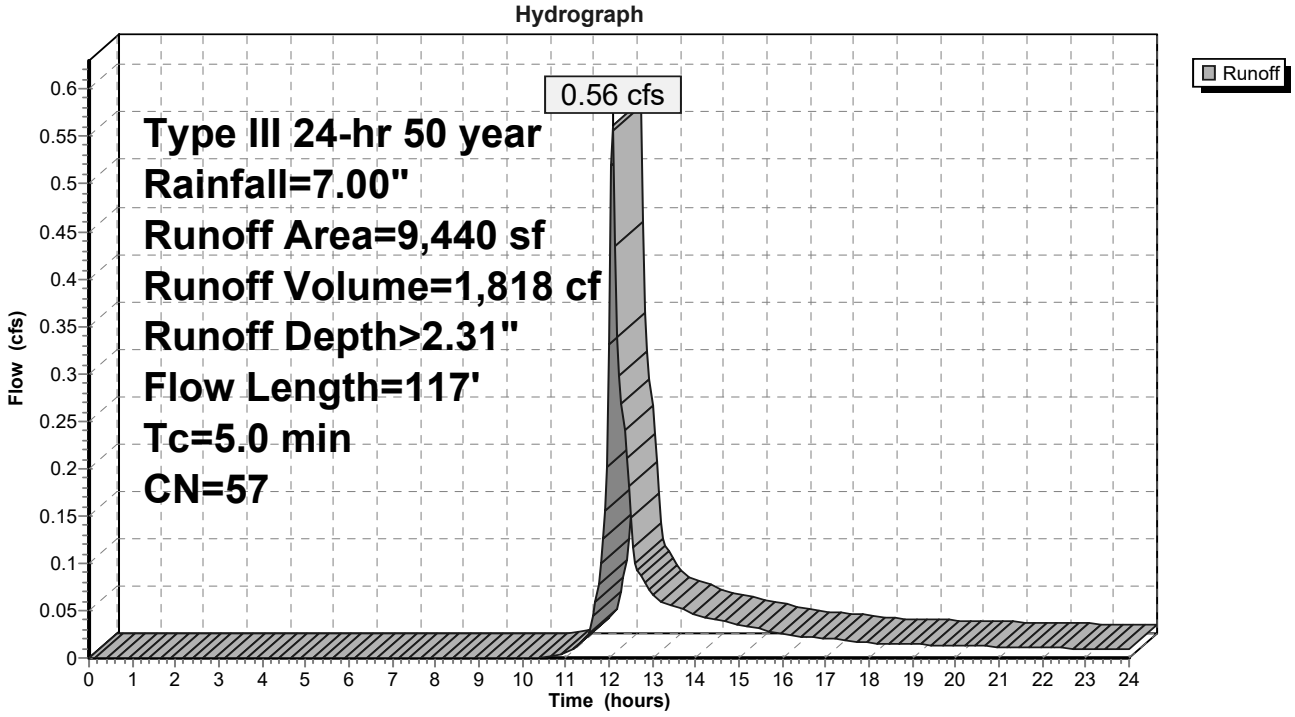
Runoff = 0.56 cfs @ 12.09 hrs, Volume= 1,818 cf, Depth> 2.31"

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
6,254	55	Woods, Good, HSG B
0	98	Water Surface, HSG B
0	98	Unconnected pavement, HSG B
9,440	57	Weighted Average
9,440		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

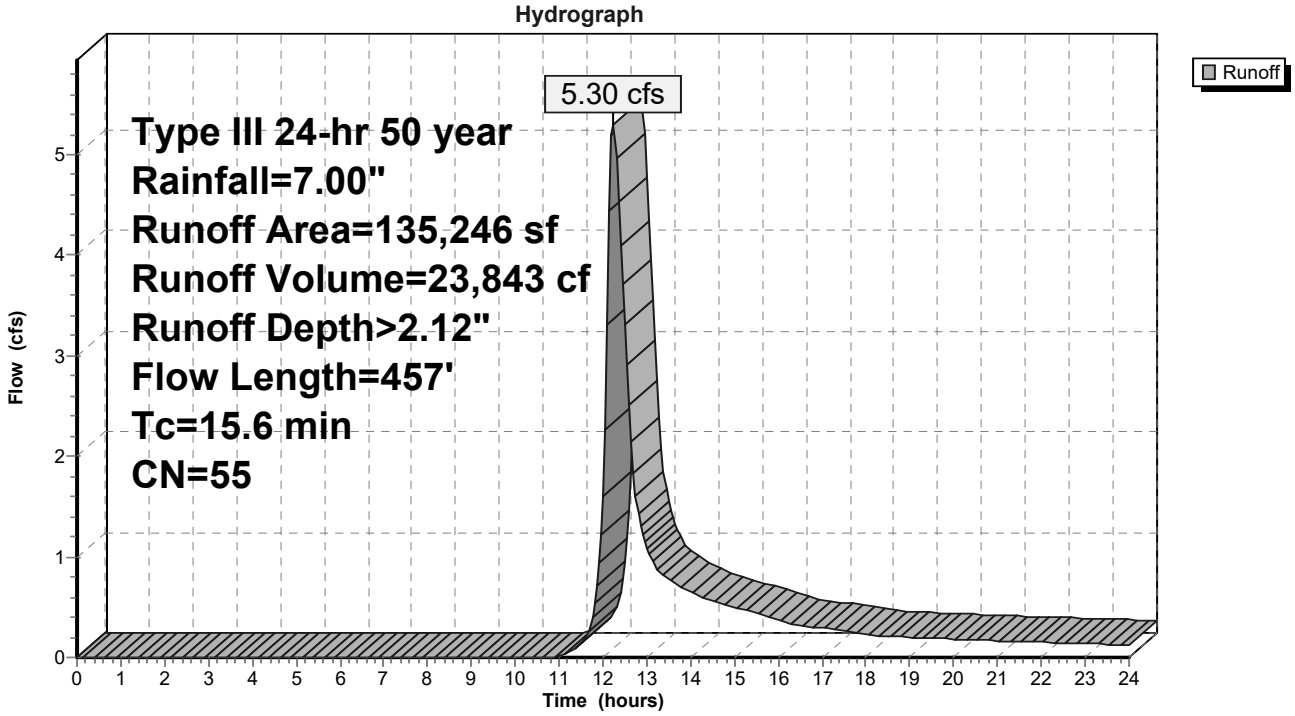
Runoff = 5.30 cfs @ 12.24 hrs, Volume= 23,843 cf, Depth> 2.12"

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

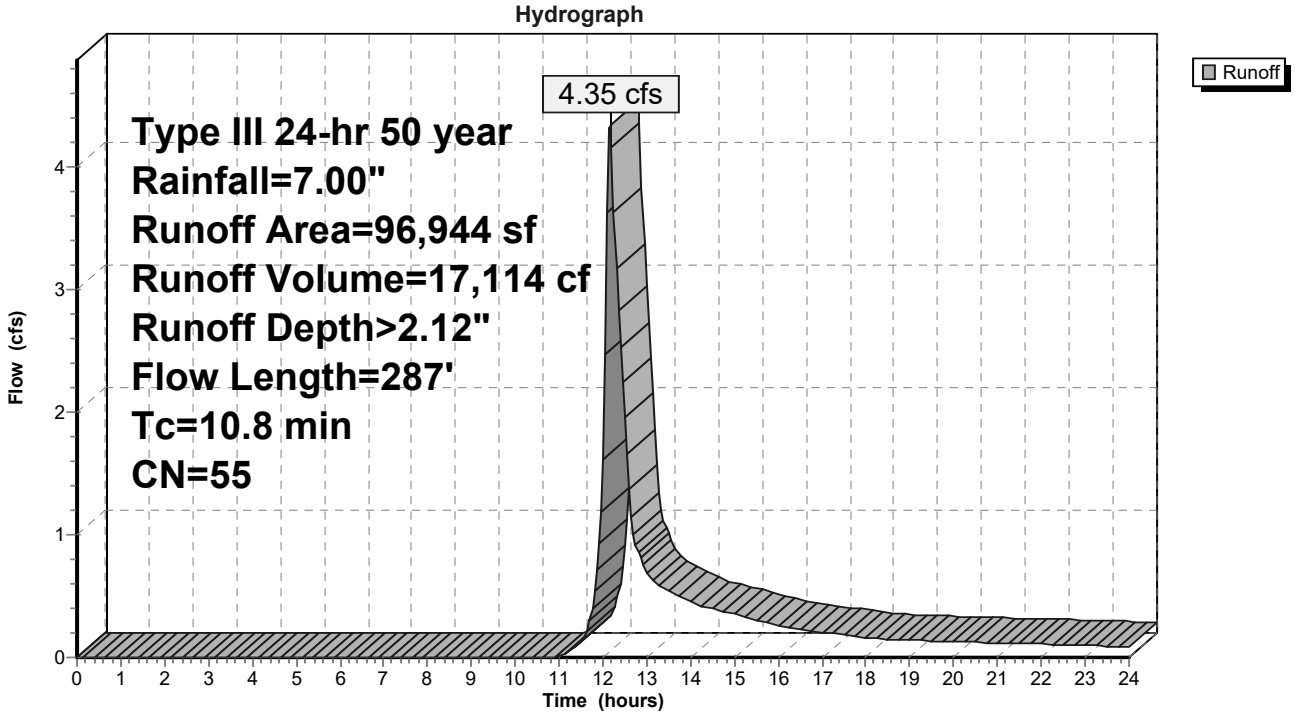
Runoff = 4.35 cfs @ 12.17 hrs, Volume= 17,114 cf, Depth> 2.12"

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
96,944	55	Woods, Good, HSG B
0	98	Water Surface, HSG B
0	98	Unconnected pavement, HSG B
96,944	55	Weighted Average
96,944		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

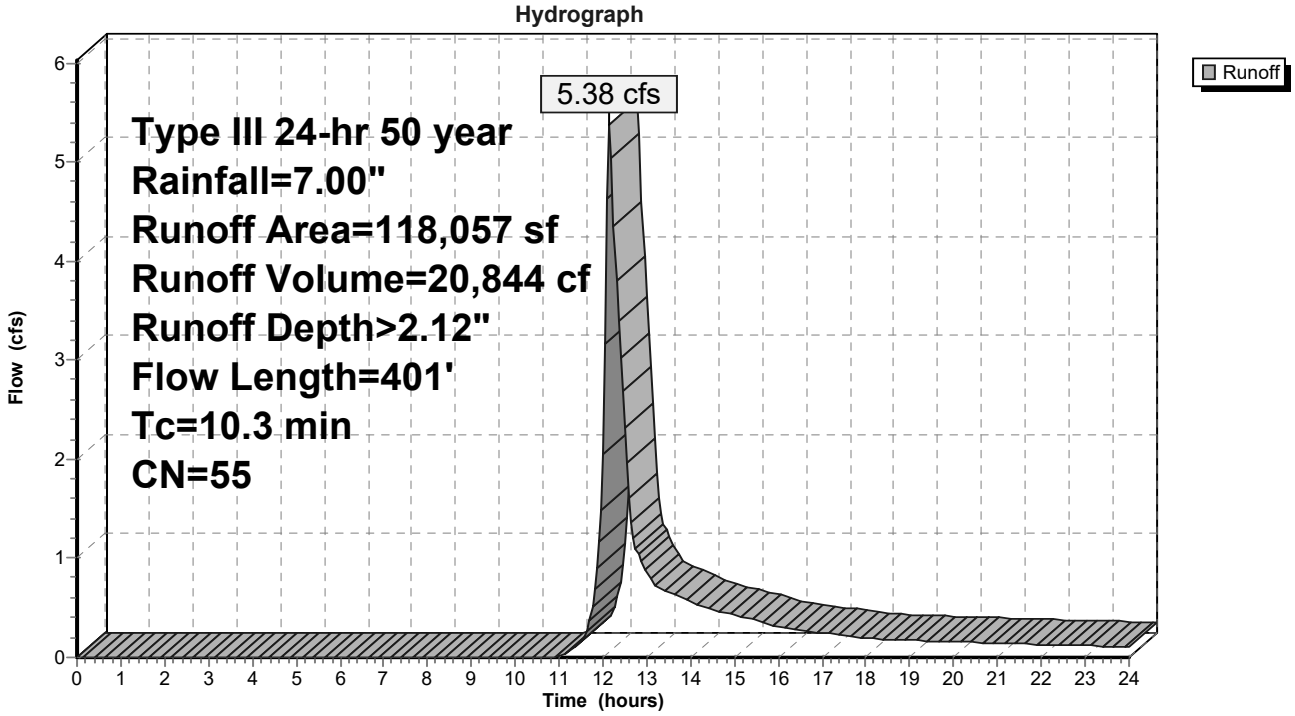
Runoff = 5.38 cfs @ 12.16 hrs, Volume= 20,844 cf, Depth> 2.12"

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
118,057	55	Woods, Good, HSG B
0	98	Water Surface, HSG B
0	98	Unconnected pavement, HSG B
118,057	55	Weighted Average
118,057		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

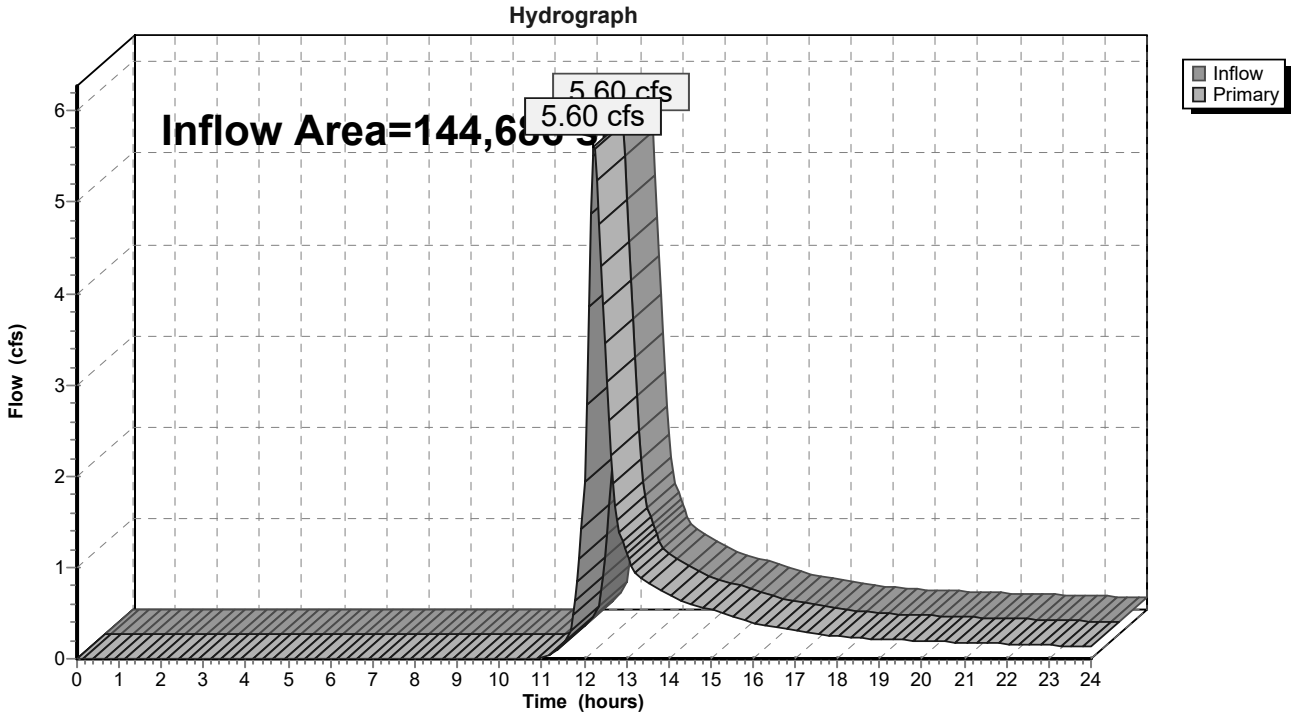


Summary for Link DP-1: DP-1

Inflow Area = 144,686 sf, 0.00% Impervious, Inflow Depth > 2.13" for 50 year event
Inflow = 5.60 cfs @ 12.23 hrs, Volume= 25,661 cf
Primary = 5.60 cfs @ 12.23 hrs, Volume= 25,661 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

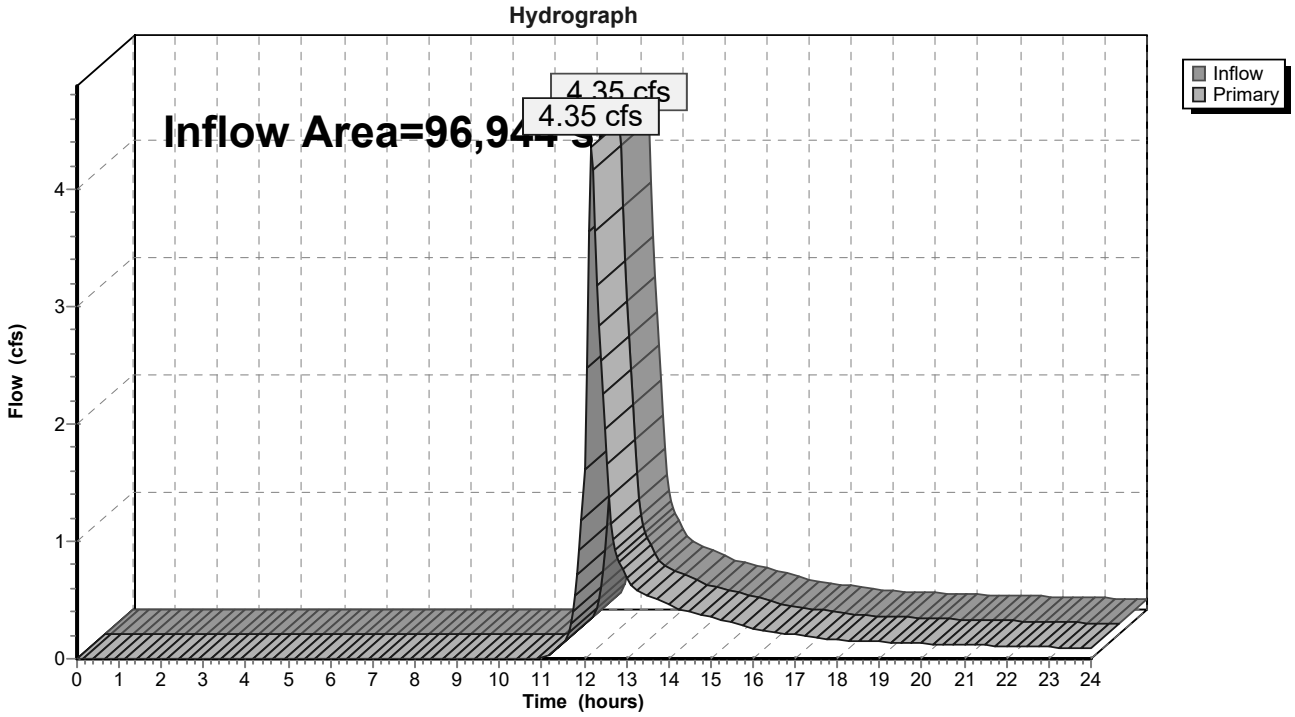


Summary for Link DP-2: DP-2

Inflow Area = 96,944 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

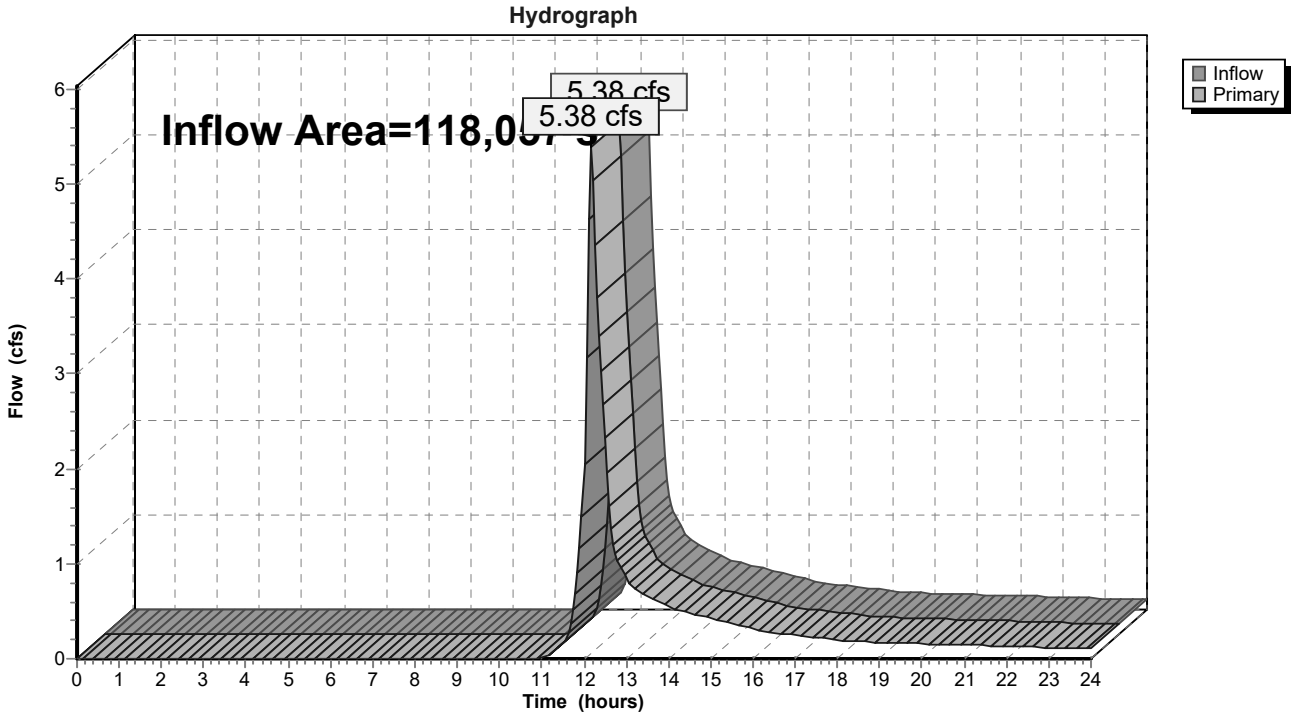


Summary for Link DP-3: DP-3

Inflow Area = 118,057 sf, 0.00% Impervious, Inflow Depth > 2.12" for 50 year event
Inflow = 5.38 cfs @ 12.16 hrs, Volume= 20,844 cf
Primary = 5.38 cfs @ 12.16 hrs, Volume= 20,844 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

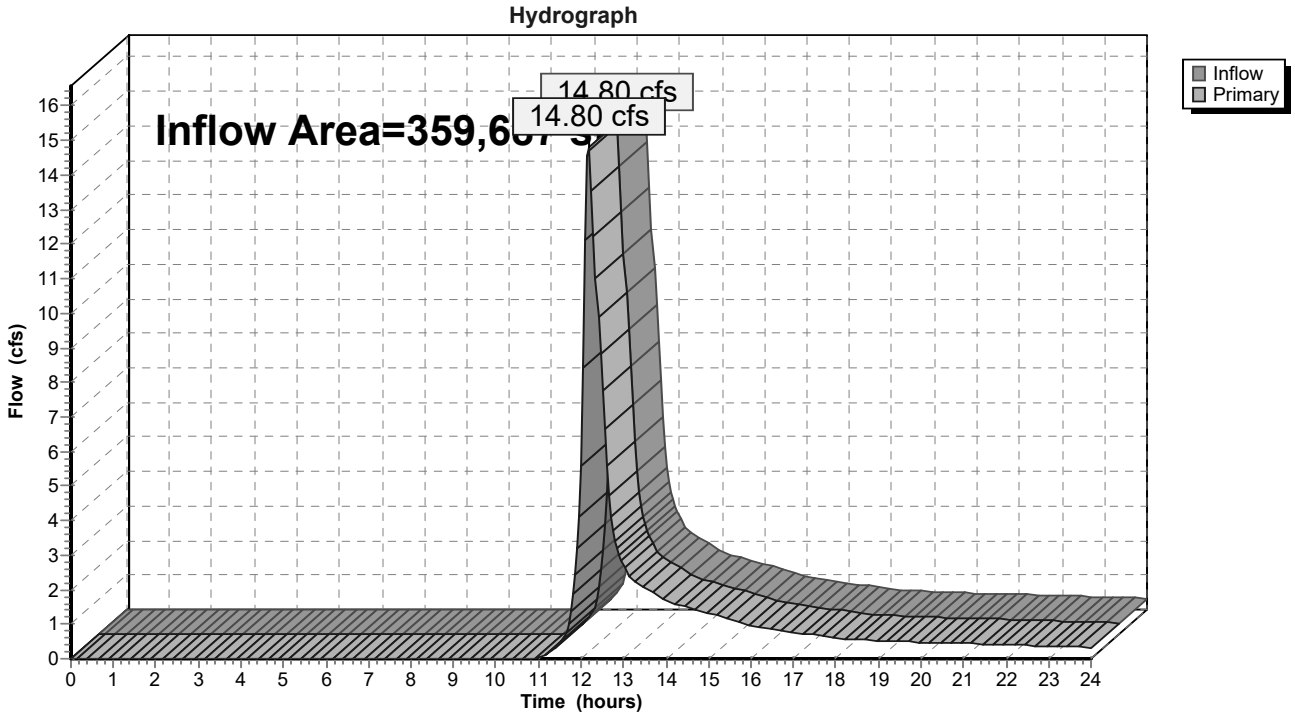


Summary for Link TOTAL: (new Link)

Inflow Area = 359,687 sf, 0.00% Impervious, Inflow Depth > 2.12" for 50 year event
Inflow = 14.80 cfs @ 12.18 hrs, Volume= 63,620 cf
Primary = 14.80 cfs @ 12.18 hrs, Volume= 63,620 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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STORMWATER MANAGEMENT REPORT

PRE-DEVELOPMENT DRAINAGE

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-1 Runoff Area=9,440 sf 0.00% Impervious Runoff Depth>3.36"
Flow Length=117' Tc=5.0 min CN=57 Runoff=0.84 cfs 2,643 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=96,944 sf 0.00% Impervious Runoff Depth>3.12"
Flow Length=287' Tc=10.8 min CN=55 Runoff=6.67 cfs 25,236 cf

Subcatchment EX-3: EX-4 Runoff Area=118,057 sf 0.00% Impervious Runoff Depth>3.12"
Flow Length=401' Tc=10.3 min CN=55 Runoff=8.24 cfs 30,737 cf

Link DP-1: DP-1 Inflow=8.60 cfs 37,807 cf
Primary=8.60 cfs 37,807 cf

Link DP-2: DP-2 Inflow=6.67 cfs 25,236 cf
Primary=6.67 cfs 25,236 cf

Link DP-3: DP-3 Inflow=8.24 cfs 30,737 cf
Primary=8.24 cfs 30,737 cf

Link TOTAL: (new Link) Inflow=22.90 cfs 93,780 cf
Primary=22.90 cfs 93,780 cf

Total Runoff Area = 359,687 sf Runoff Volume = 93,780 cf Average Runoff Depth = 3.13"
100.00% Pervious = 359,687 sf 0.00% Impervious = 0 sf

Summary for Subcatchment EX-1A: EX-1

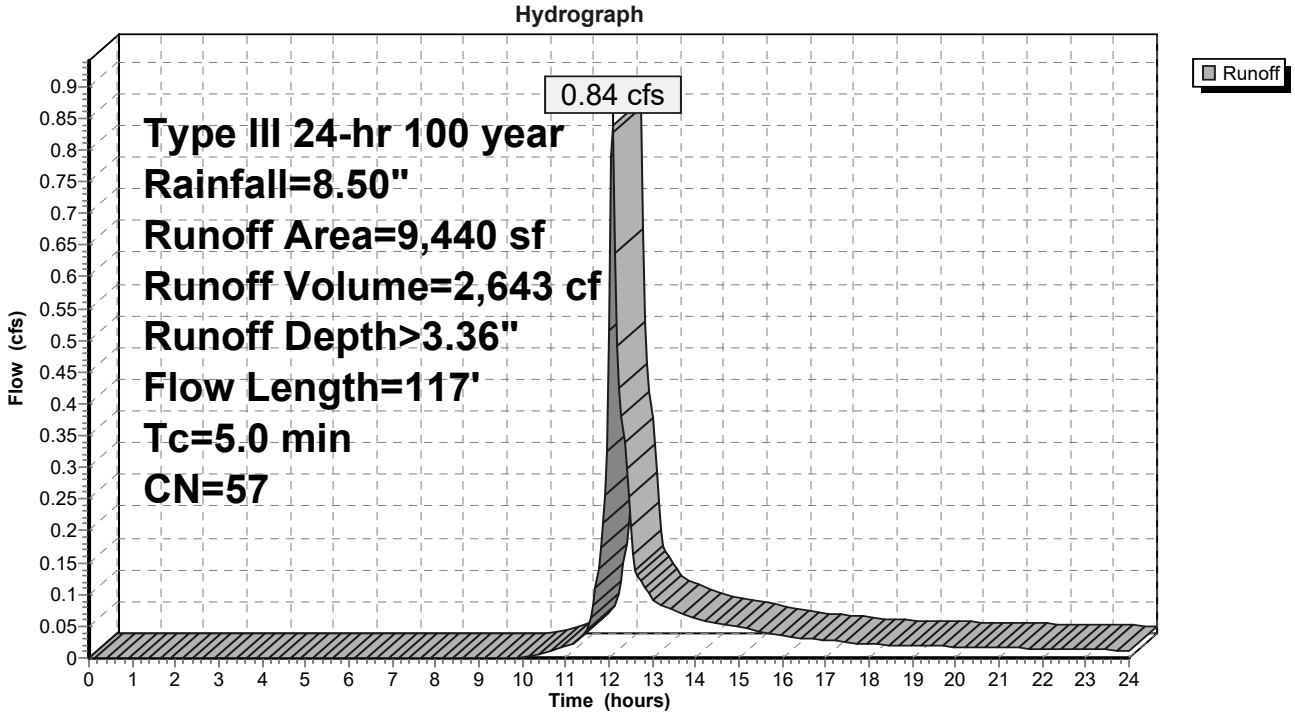
Runoff = 0.84 cfs @ 12.08 hrs, Volume= 2,643 cf, Depth> 3.36"

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
6,254	55	Woods, Good, HSG B
0	98	Water Surface, HSG B
0	98	Unconnected pavement, HSG B
9,440	57	Weighted Average
9,440		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

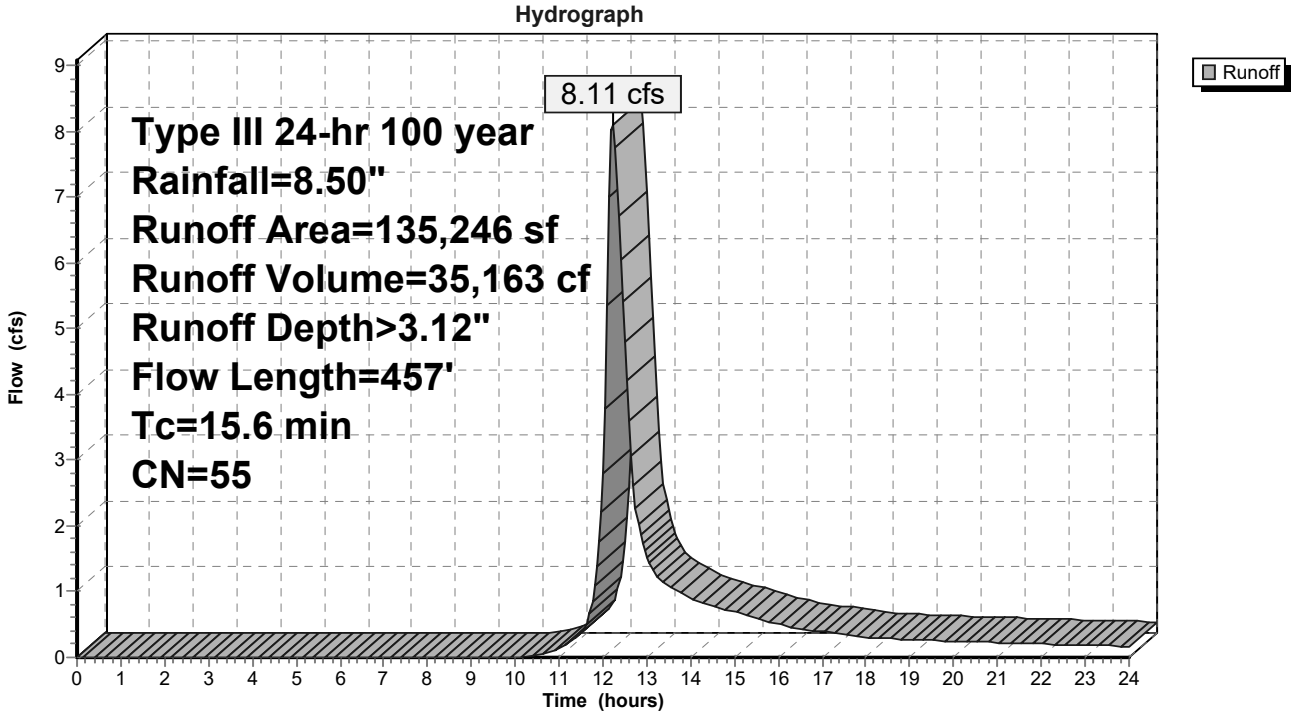
Runoff = 8.11 cfs @ 12.23 hrs, Volume= 35,163 cf, Depth> 3.12"

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

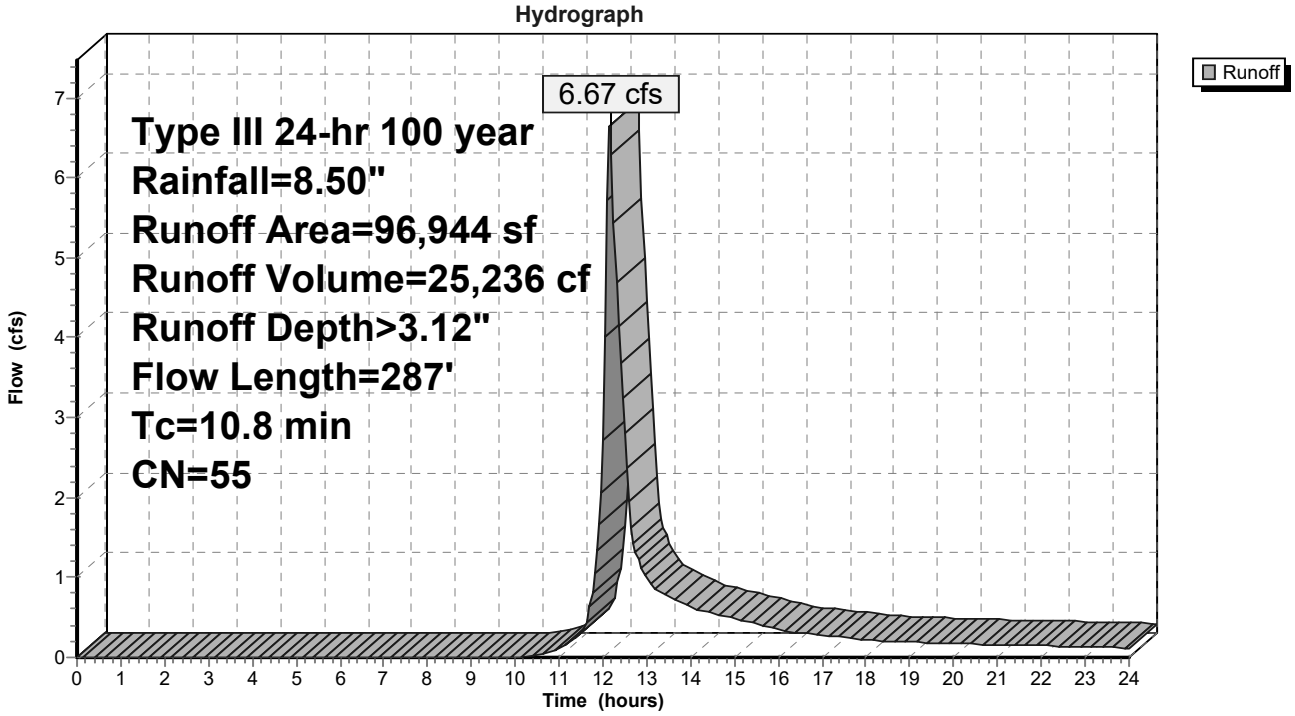
Runoff = 6.67 cfs @ 12.16 hrs, Volume= 25,236 cf, Depth> 3.12"

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
96,944	55	Woods, Good, HSG B
0	98	Water Surface, HSG B
0	98	Unconnected pavement, HSG B
96,944	55	Weighted Average
96,944		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

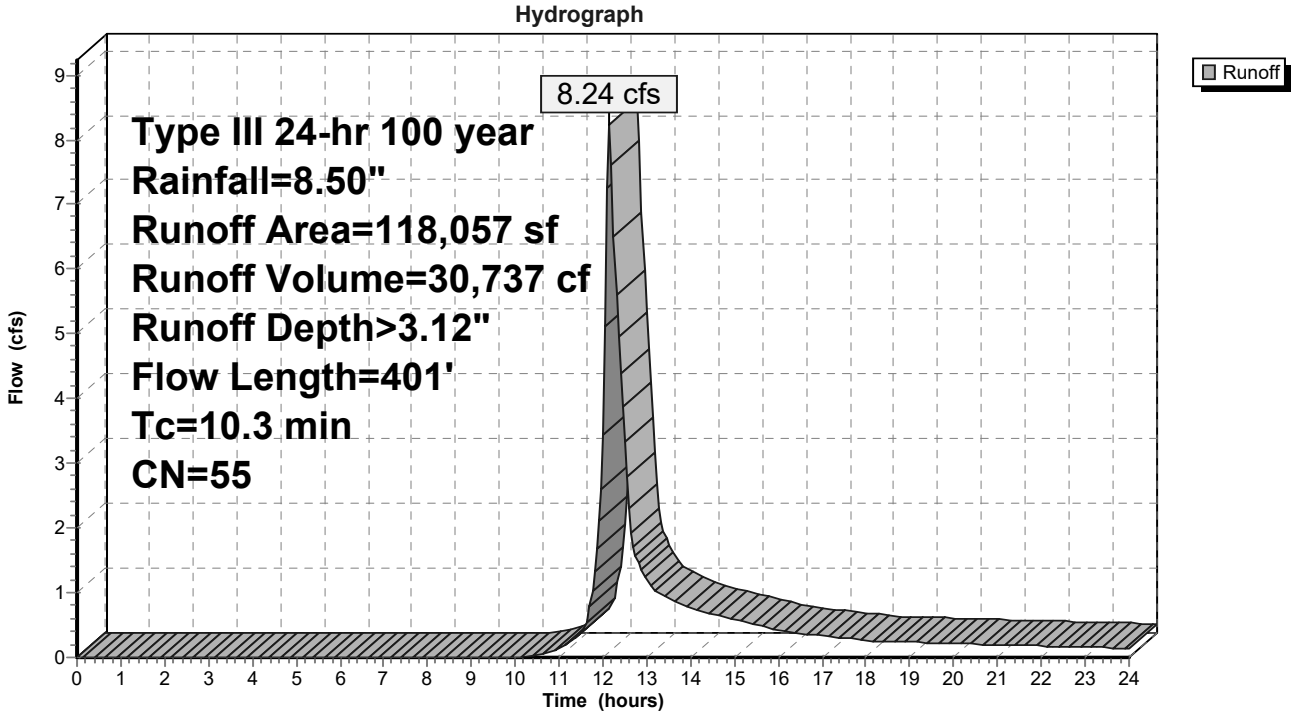
Runoff = 8.24 cfs @ 12.16 hrs, Volume= 30,737 cf, Depth> 3.12"

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
118,057	55	Woods, Good, HSG B
0	98	Water Surface, HSG B
0	98	Unconnected pavement, HSG B
118,057	55	Weighted Average
118,057		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

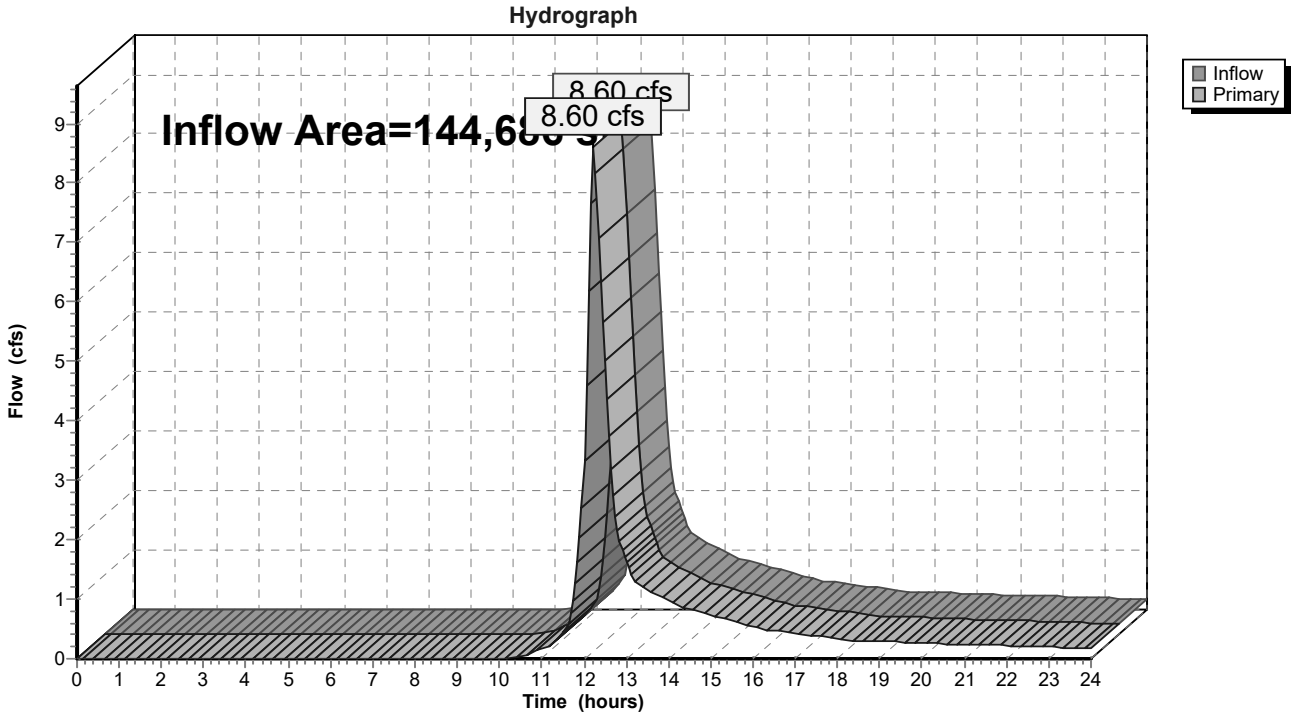


Summary for Link DP-1: DP-1

Inflow Area = 144,686 sf, 0.00% Impervious, Inflow Depth > 3.14" for 100 year event
Inflow = 8.60 cfs @ 12.22 hrs, Volume= 37,807 cf
Primary = 8.60 cfs @ 12.22 hrs, Volume= 37,807 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

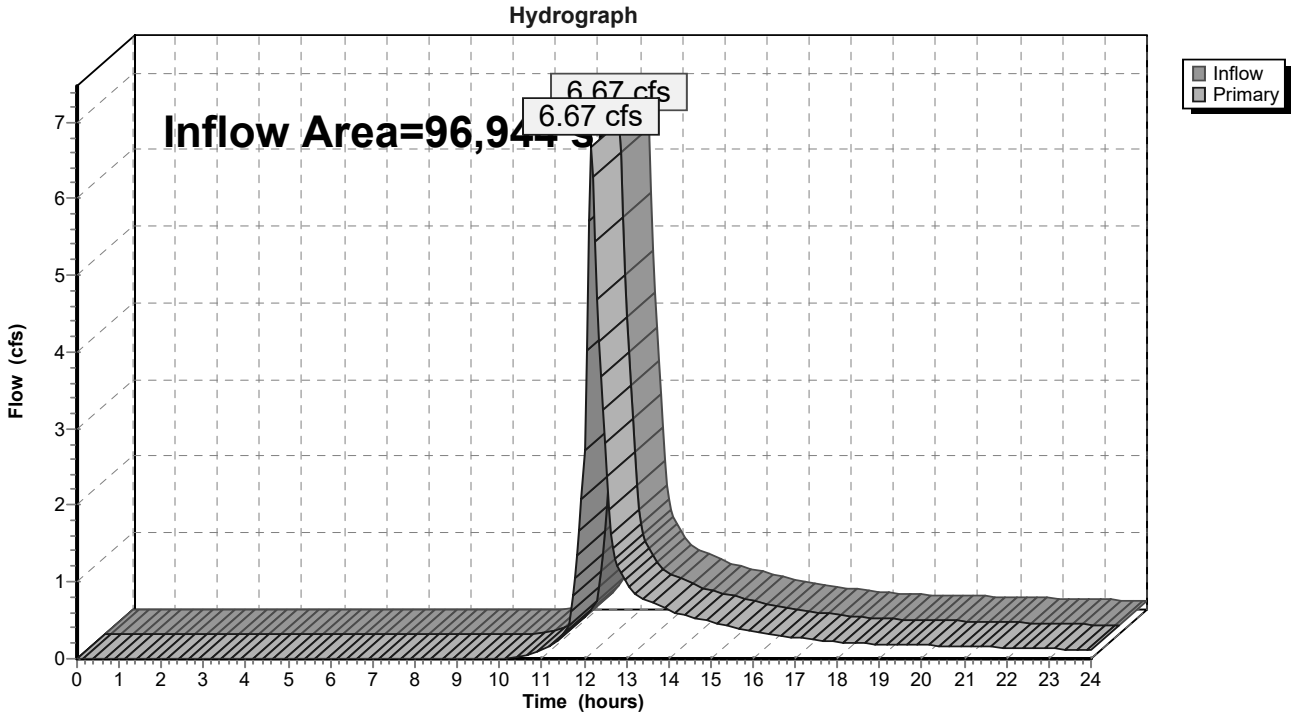


Summary for Link DP-2: DP-2

Inflow Area = 96,944 sf, 0.00% Impervious, Inflow Depth > 3.12" for 100 year event
Inflow = 6.67 cfs @ 12.16 hrs, Volume= 25,236 cf
Primary = 6.67 cfs @ 12.16 hrs, Volume= 25,236 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

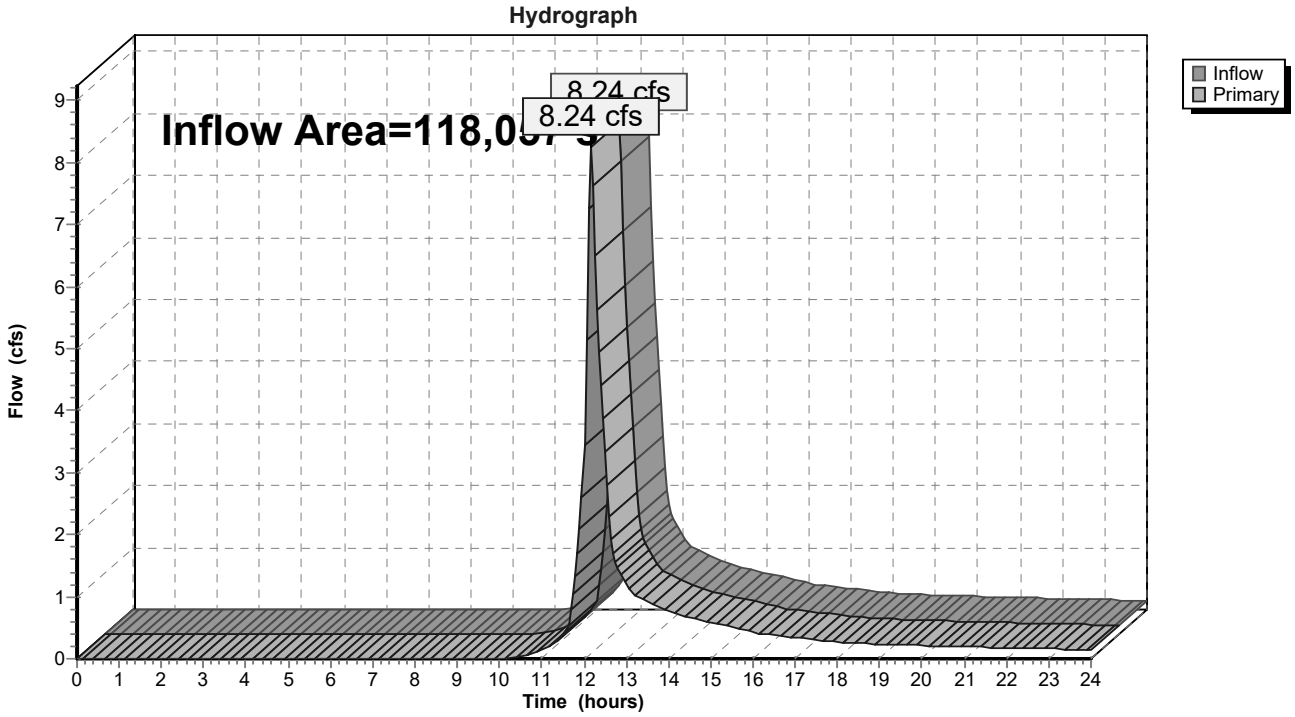


Summary for Link DP-3: DP-3

Inflow Area = 118,057 sf, 0.00% Impervious, Inflow Depth > 3.12" for 100 year event
Inflow = 8.24 cfs @ 12.16 hrs, Volume= 30,737 cf
Primary = 8.24 cfs @ 12.16 hrs, Volume= 30,737 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

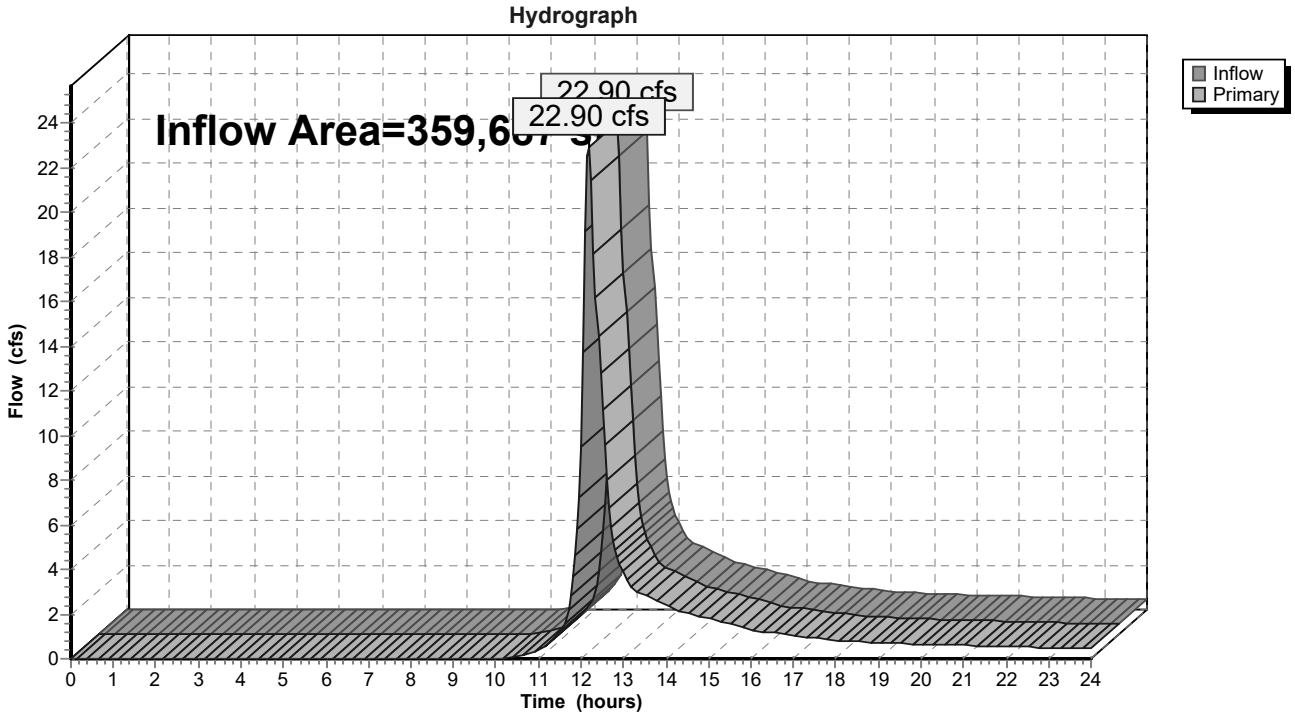


Summary for Link TOTAL: (new Link)

Inflow Area = 359,687 sf, 0.00% Impervious, Inflow Depth > 3.13" for 100 year event
Inflow = 22.90 cfs @ 12.17 hrs, Volume= 93,780 cf
Primary = 22.90 cfs @ 12.17 hrs, Volume= 93,780 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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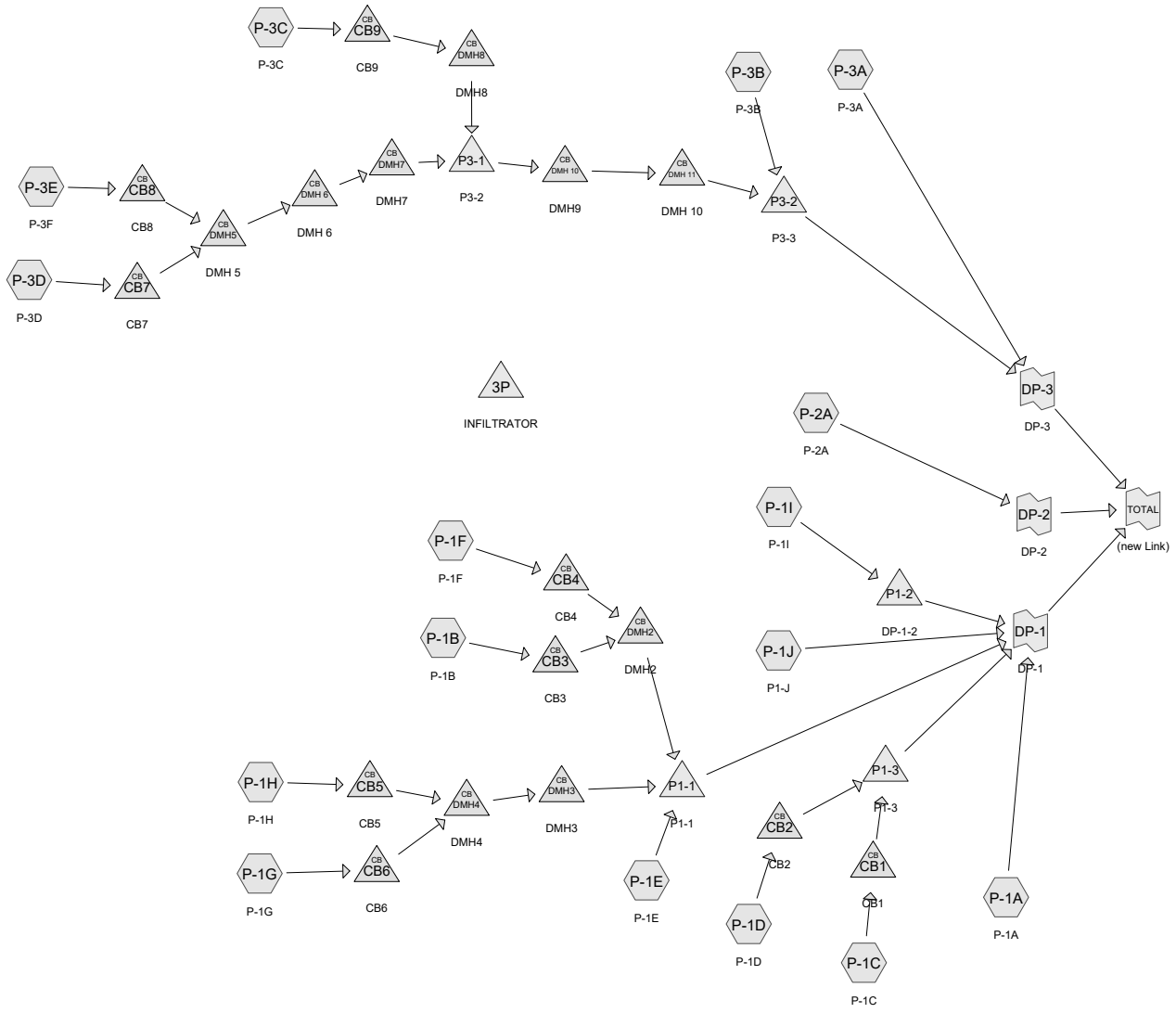
STORMWATER MANAGEMENT REPORT

POST-DEVELOPMENT DRAINAGE



Subcat Reach Pond Link

Drainage Diagram for 2018-01-03_POST DEV. PEARSON DRIVE
Prepared by RANGER ENGINEERING & DESIGN, LLC, Printed 1/3/2018
HydroCAD® 8.50 s/n 002248 © 2007 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
54,869	55	Woods, Good, HSG B (P-1A,P-1E,P-1J,P-2A,P-3A)
180,974	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-2
58,934	98	Paved roads w/curbs & sewers, HSG B (P-1B,P-1C,P-1D,P-1E,P-1F,P-1G,P-1H,P-1I,P-1J,P-2
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)
22,670	98	Water Surface, HSG B (P-1E,P-1I,P-3B)
359,687		**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Goup	Subcatchment Numbers
0	HSG A	
359,687	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	
359,687		**TOTAL AREA**

RANGER
ENGINEERING &
DESIGN, LLC

STORMWATER MANAGEMENT REPORT

POST-DEVELOPMENT DRAINAGE

2 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>0.28"
Flow Length=106' Tc=5.0 min CN=56 Runoff=0.01 cfs 54 cf

Subcatchment P-1B: P-1B Runoff Area=7,118 sf 74.36% Impervious Runoff Depth>2.08"
Flow Length=319' Tc=8.6 min CN=89 Runoff=0.36 cfs 1,233 cf

Subcatchment P-1C: P-1C Runoff Area=3,632 sf 56.17% Impervious Runoff Depth>1.54"
Flow Length=96' Tc=5.0 min CN=82 Runoff=0.15 cfs 465 cf

Subcatchment P-1D: P-1D Runoff Area=3,713 sf 81.12% Impervious Runoff Depth>2.26"
Flow Length=96' Slope=0.0100 '/' Tc=5.0 min CN=91 Runoff=0.22 cfs 698 cf

Subcatchment P-1E: P-1E Runoff Area=15,678 sf 38.38% Impervious Runoff Depth>1.09"
Flow Length=100' Tc=5.0 min CN=75 Runoff=0.44 cfs 1,428 cf

Subcatchment P-1F: P-1F Runoff Area=20,660 sf 69.29% Impervious Runoff Depth>1.91"
Flow Length=380' Tc=5.0 min CN=87 Runoff=1.06 cfs 3,295 cf

Subcatchment P-1G: P-1G Runoff Area=5,772 sf 64.26% Impervious Runoff Depth>1.76"
Flow Length=90' Tc=5.0 min CN=85 Runoff=0.27 cfs 845 cf

Subcatchment P-1H: P-1H Runoff Area=5,661 sf 39.83% Impervious Runoff Depth>1.15"
Flow Length=130' Tc=5.0 min CN=76 Runoff=0.17 cfs 543 cf

Subcatchment P-1I: P-1I Runoff Area=47,228 sf 25.39% Impervious Runoff Depth>0.83"
Flow Length=145' Tc=5.0 min CN=70 Runoff=0.95 cfs 3,256 cf

Subcatchment P-1J: P1-J Runoff Area=27,093 sf 0.25% Impervious Runoff Depth>0.37"
Flow Length=280' Tc=6.3 min CN=59 Runoff=0.14 cfs 843 cf

Subcatchment P-2A: P-2A Runoff Area=40,080 sf 11.21% Impervious Runoff Depth>0.44"
Flow Length=140' Tc=5.0 min CN=61 Runoff=0.31 cfs 1,481 cf

Subcatchment P-3A: P-3A Runoff Area=30,200 sf 0.00% Impervious Runoff Depth>0.34"
Flow Length=230' Tc=5.0 min CN=58 Runoff=0.13 cfs 857 cf

Subcatchment P-3B: P-3B Runoff Area=71,600 sf 34.77% Impervious Runoff Depth>1.04"
Flow Length=370' Tc=5.4 min CN=74 Runoff=1.89 cfs 6,184 cf

Subcatchment P-3C: P-3C Runoff Area=41,255 sf 48.59% Impervious Runoff Depth>1.34"
Flow Length=280' Tc=5.0 min CN=79 Runoff=1.47 cfs 4,592 cf

Subcatchment P-3D: P-3D Runoff Area=33,144 sf 68.21% Impervious Runoff Depth>1.83"
Flow Length=240' Tc=7.3 min CN=86 Runoff=1.55 cfs 5,063 cf

Subcatchment P-3E: P-3F Runoff Area=4,528 sf 68.55% Impervious Runoff Depth>1.83"
Flow Length=140' Tc=5.0 min CN=86 Runoff=0.22 cfs 692 cf

Pond 3P: INFILTRATOR Peak Elev=0.00' Storage=0 cf

Pond CB1: CB1 Peak Elev=50.93' Inflow=0.15 cfs 465 cf
8.0" x 9.0' Culvert Outflow=0.15 cfs 465 cf

Pond CB2: CB2 Peak Elev=50.93' Inflow=0.22 cfs 698 cf
8.0" x 9.0' Culvert Outflow=0.22 cfs 698 cf

Pond CB3: CB3 Peak Elev=52.94' Inflow=0.36 cfs 1,233 cf
12.0" x 12.0' Culvert Outflow=0.36 cfs 1,233 cf

Pond CB4: CB4 Peak Elev=53.04' Inflow=1.06 cfs 3,295 cf
12.0" x 11.0' Culvert Outflow=1.06 cfs 3,295 cf

Pond CB5: CB5 Peak Elev=58.22' Inflow=0.17 cfs 543 cf
12.0" x 23.9' Culvert Outflow=0.17 cfs 543 cf

Pond CB6: CB6 Peak Elev=58.28' Inflow=0.27 cfs 845 cf
12.0" x 15.9' Culvert Outflow=0.27 cfs 845 cf

Pond CB7: CB7 Peak Elev=66.73' Inflow=1.55 cfs 5,063 cf
12.0" x 20.0' Culvert Outflow=1.55 cfs 5,063 cf

Pond CB8: CB8 Peak Elev=66.50' Inflow=0.22 cfs 692 cf
12.0" x 20.0' Culvert Outflow=0.22 cfs 692 cf

Pond CB9: CB9 Peak Elev=66.00' Inflow=1.47 cfs 4,592 cf
12.0" x 22.0' Culvert Outflow=1.47 cfs 4,592 cf

Pond DMH 10: DMH9 Peak Elev=61.48' Inflow=1.02 cfs 7,881 cf
15.0" x 100.0' Culvert Outflow=1.02 cfs 7,881 cf

Pond DMH 11: DMH 10 Peak Elev=55.74' Inflow=1.02 cfs 7,881 cf
15.0" x 33.0' Culvert Outflow=1.02 cfs 7,881 cf

Pond DMH 6: DMH 6 Peak Elev=65.98' Inflow=1.76 cfs 5,755 cf
15.0" x 55.0' Culvert Outflow=1.76 cfs 5,755 cf

Pond DMH2: DMH2 Peak Elev=52.91' Inflow=1.40 cfs 4,528 cf
12.0" x 39.0' Culvert Outflow=1.40 cfs 4,528 cf

Pond DMH3: DMH3 Peak Elev=55.68' Inflow=0.44 cfs 1,388 cf
12.0" x 57.3' Culvert Outflow=0.44 cfs 1,388 cf

Pond DMH4: DMH4 Peak Elev=57.99' Inflow=0.44 cfs 1,388 cf
12.0" x 65.0' Culvert Outflow=0.44 cfs 1,388 cf

Pond DMH5: DMH 5 Peak Elev=66.49' Inflow=1.76 cfs 5,755 cf
15.0" x 94.0' Culvert Outflow=1.76 cfs 5,755 cf

Pond DMH7: DMH7 Peak Elev=65.71' Inflow=1.76 cfs 5,755 cf
Outflow=1.76 cfs 5,755 cf

Pond DMH8: DMH8	Peak Elev=65.81'	Inflow=1.47 cfs	4,592 cf
	12.0" x 1.0' Culvert	Outflow=1.47 cfs	4,592 cf
Pond P1-1: P1-1	Peak Elev=52.52' Storage=4,129 cf	Inflow=2.28 cfs	7,343 cf
		Outflow=0.13 cfs	5,188 cf
Pond P1-2: DP-1-2	Peak Elev=57.47' Storage=2,571 cf	Inflow=0.95 cfs	3,256 cf
		Outflow=0.02 cfs	685 cf
Pond P1-3: P1-3	Peak Elev=50.93' Storage=566 cf	Inflow=0.37 cfs	1,164 cf
		Outflow=0.05 cfs	1,019 cf
Pond P3-1: P3-2	Peak Elev=65.70' Storage=4,110 cf	Inflow=3.21 cfs	10,347 cf
		Outflow=1.02 cfs	7,881 cf
Pond P3-2: P3-3	Peak Elev=52.12' Storage=8,439 cf	Inflow=2.14 cfs	14,065 cf
		Outflow=0.20 cfs	6,807 cf
Link DP-1: DP-1		Inflow=0.29 cfs	7,789 cf
		Primary=0.29 cfs	7,789 cf
Link DP-2: DP-2		Inflow=0.31 cfs	1,481 cf
		Primary=0.31 cfs	1,481 cf
Link DP-3: DP-3		Inflow=0.22 cfs	7,664 cf
		Primary=0.22 cfs	7,664 cf
Link TOTAL: (new Link)		Inflow=0.77 cfs	16,934 cf
		Primary=0.77 cfs	16,934 cf

Total Runoff Area = 359,687 sf Runoff Volume = 31,529 cf Average Runoff Depth = 1.05"
65.57% Pervious = 235,843 sf 34.43% Impervious = 123,844 sf

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

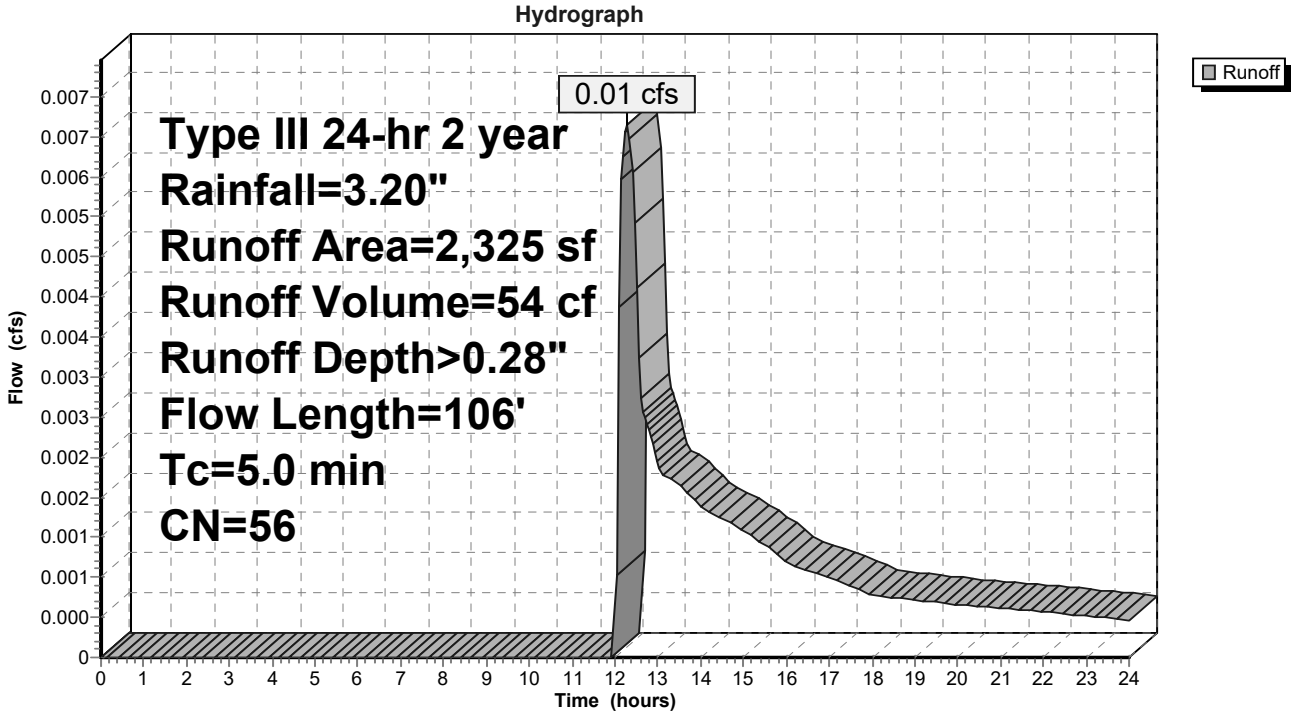
Runoff = 0.01 cfs @ 12.29 hrs, Volume= 54 cf, Depth> 0.28"

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



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

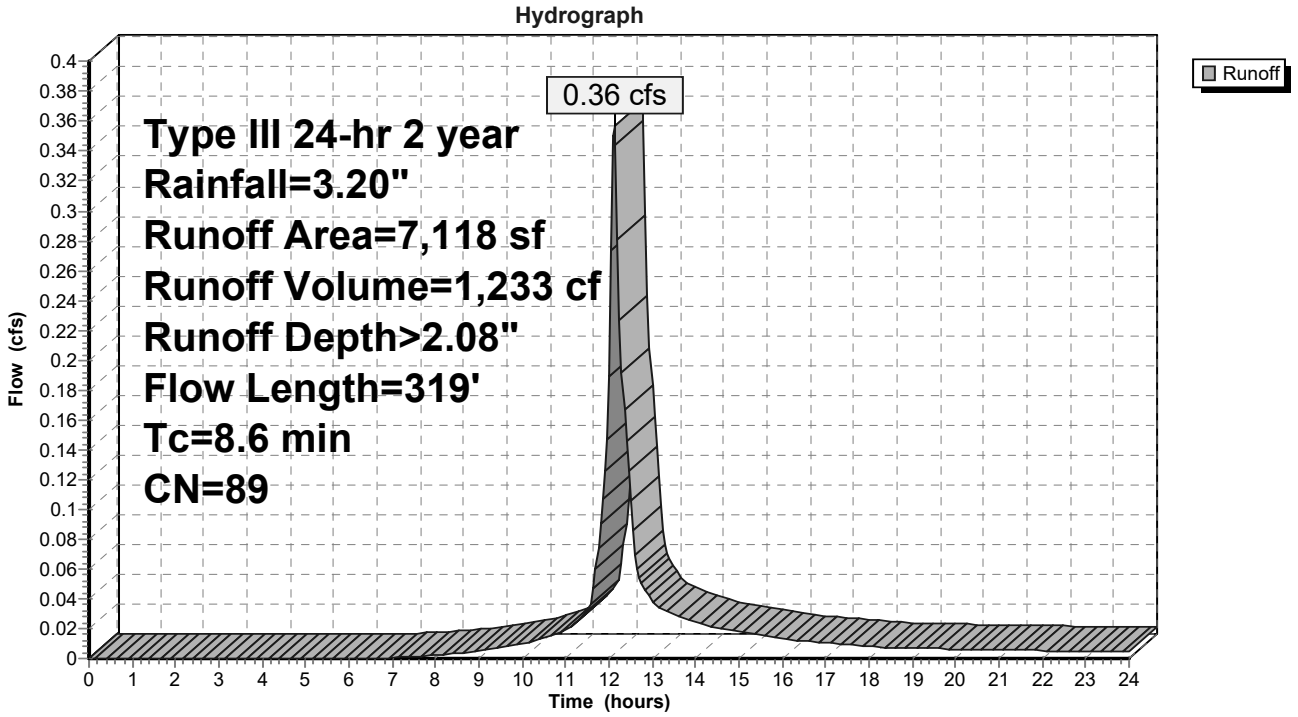
Runoff = 0.36 cfs @ 12.12 hrs, Volume= 1,233 cf, Depth> 2.08"

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
5,293	98	Paved roads w/curbs & sewers, HSG B
1,825	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
0	98	Water Surface, HSG B
7,118	89	Weighted Average
1,825		Pervious Area
5,293		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0					**Direct Entry, DIRECT**
4.8	50	0.0300	0.17		**Sheet Flow, SHEET FLOW** Grass: Short n= 0.150 P2= 3.20"
2.9	60	0.0025	0.35		**Shallow Concentrated Flow, SHALLOW GRASS** Short Grass Pasture Kv= 7.0 fps
0.9	209	0.0350	3.80		**Shallow Concentrated Flow, SHALLOW PAVE** Paved Kv= 20.3 fps
8.6	319	Total			

Subcatchment P-1B: P-1B



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

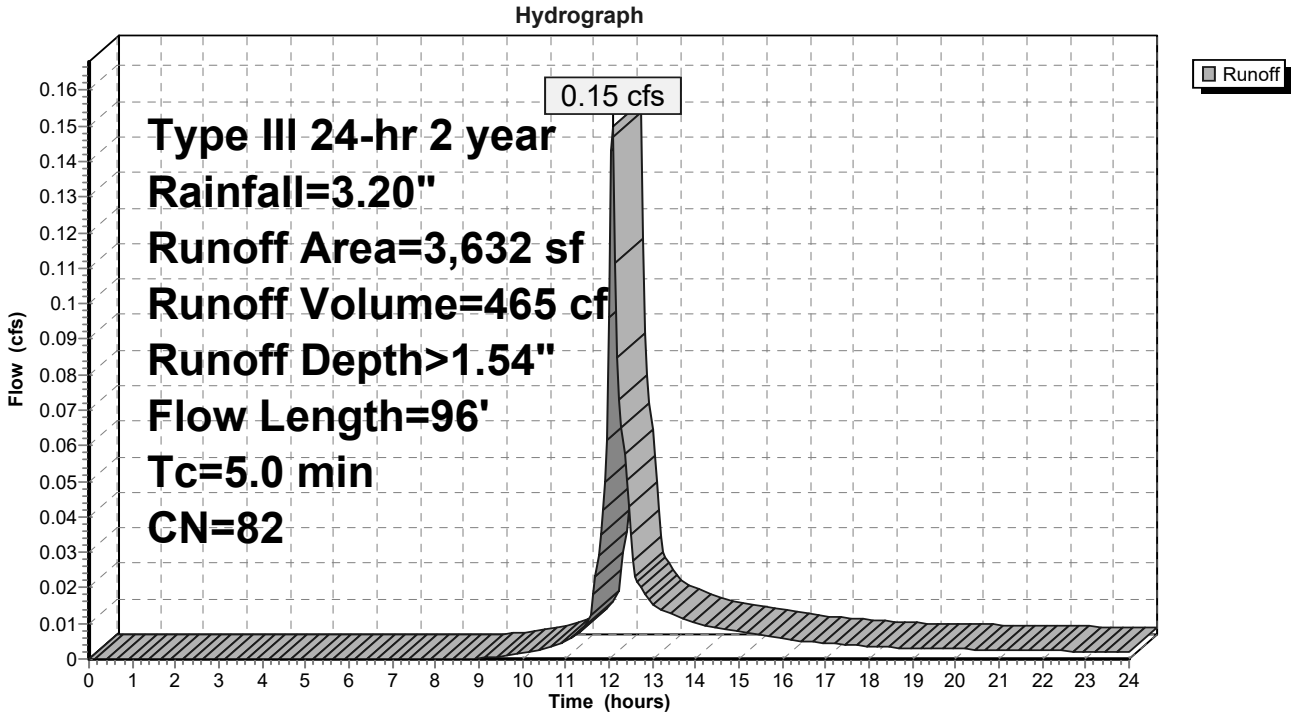
Runoff = 0.15 cfs @ 12.08 hrs, Volume= 465 cf, Depth> 1.54"

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
2.8	50	0.1100	0.29		**Sheet Flow, SHEET** Grass: Short n= 0.150 P2= 3.20"
0.2	46	0.0300	3.52		**Shallow Concentrated Flow, PAVEMENT** Paved Kv= 20.3 fps
2.0					**Direct Entry, DIRECT**
5.0	96	Total			

Subcatchment P-1C: P-1C



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

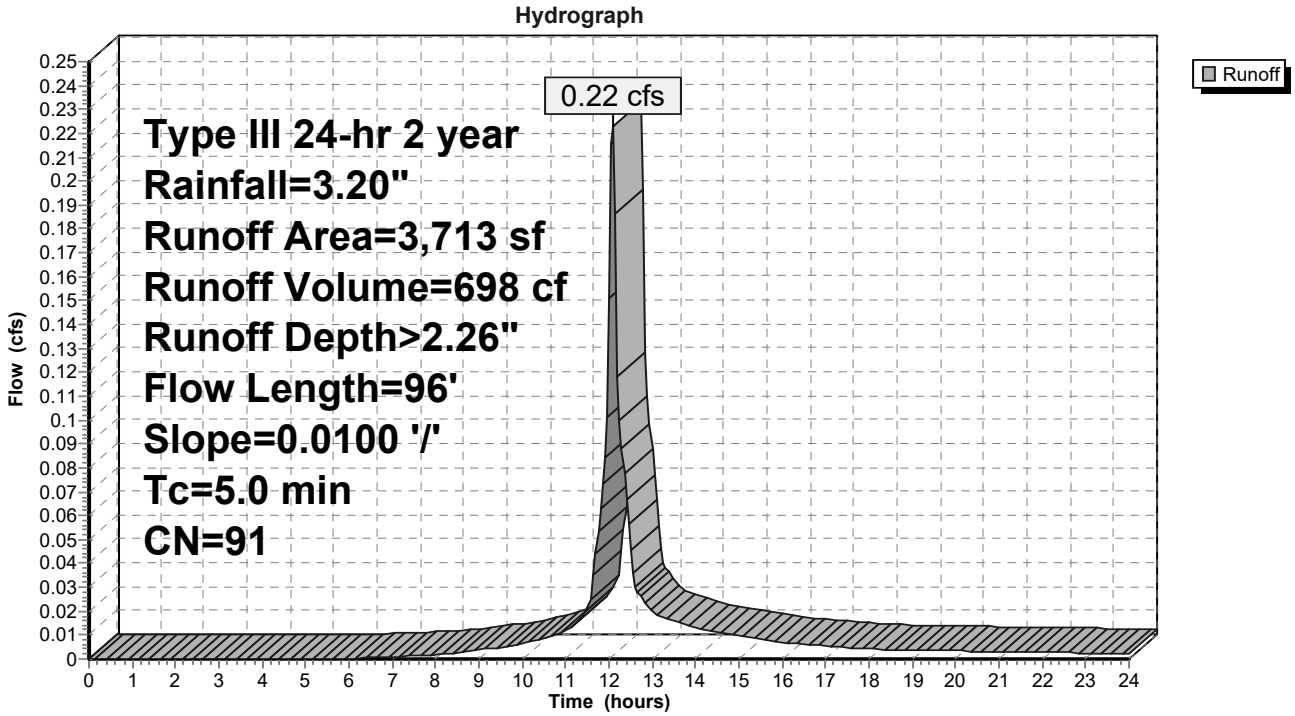
Runoff = 0.22 cfs @ 12.07 hrs, Volume= 698 cf, Depth> 2.26"

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
0.9	50	0.0100	0.91		**Sheet Flow, SHEET** Smooth surfaces n= 0.011 P2= 3.20"
0.4	46	0.0100	2.03		**Shallow Concentrated Flow, PAVEMENT** Paved Kv= 20.3 fps
3.7					**Direct Entry, DIRECT**
5.0	96	Total			

Subcatchment P-1D: P-1D



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

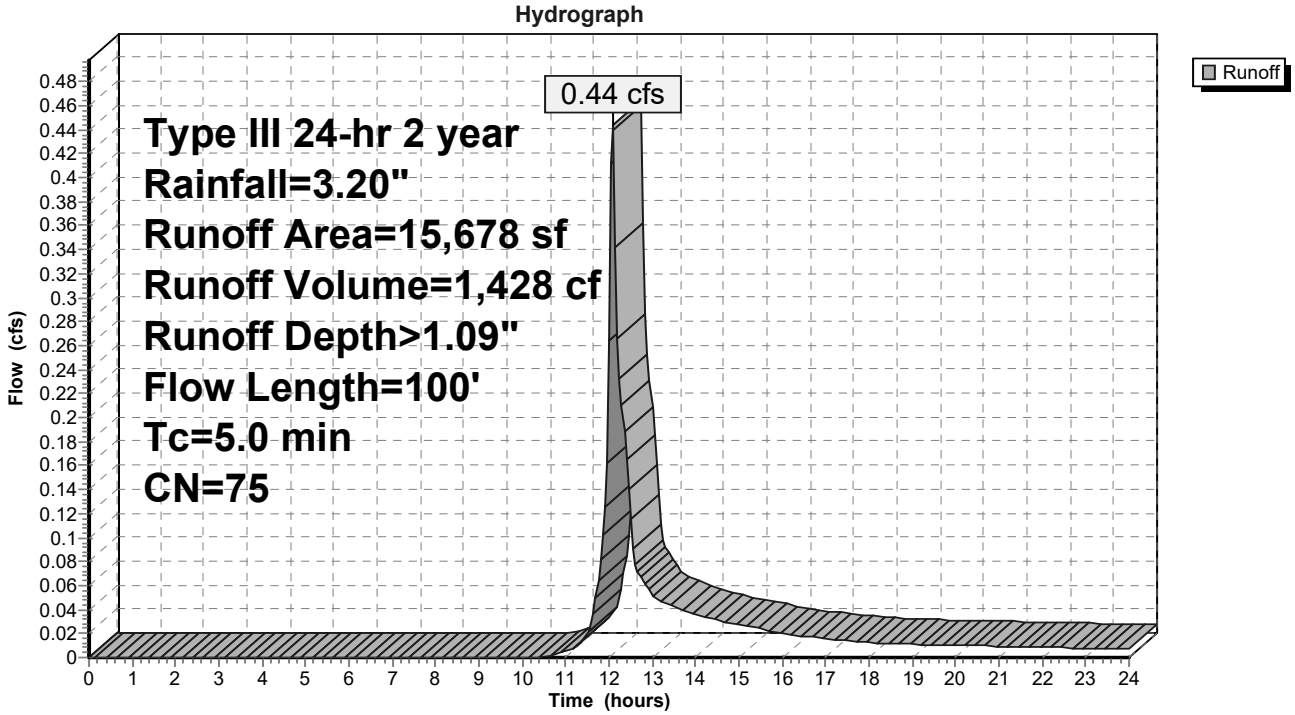
Runoff = 0.44 cfs @ 12.09 hrs, Volume= 1,428 cf, Depth> 1.09"

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
880	98	Roofs, HSG B
0	98	Paved parking, HSG B
210	98	Paved roads w/curbs & sewers, HSG B
8,660	61	>75% Grass cover, Good, HSG B
4,928	98	Water Surface, HSG B
1,000	55	Woods, Good, HSG B
15,678	75	Weighted Average
9,660		Pervious Area
6,018		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2					**Direct Entry, DIRECT**
3.6	50	0.0600	0.23		**Sheet Flow, SHEET** Grass: Short n= 0.150 P2= 3.20"
0.2	50	0.2700	3.64		**Shallow Concentrated Flow, SHALLOW GRASS** Short Grass Pasture Kv= 7.0 fps
5.0	100	Total			

Subcatchment P-1E: P-1E



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

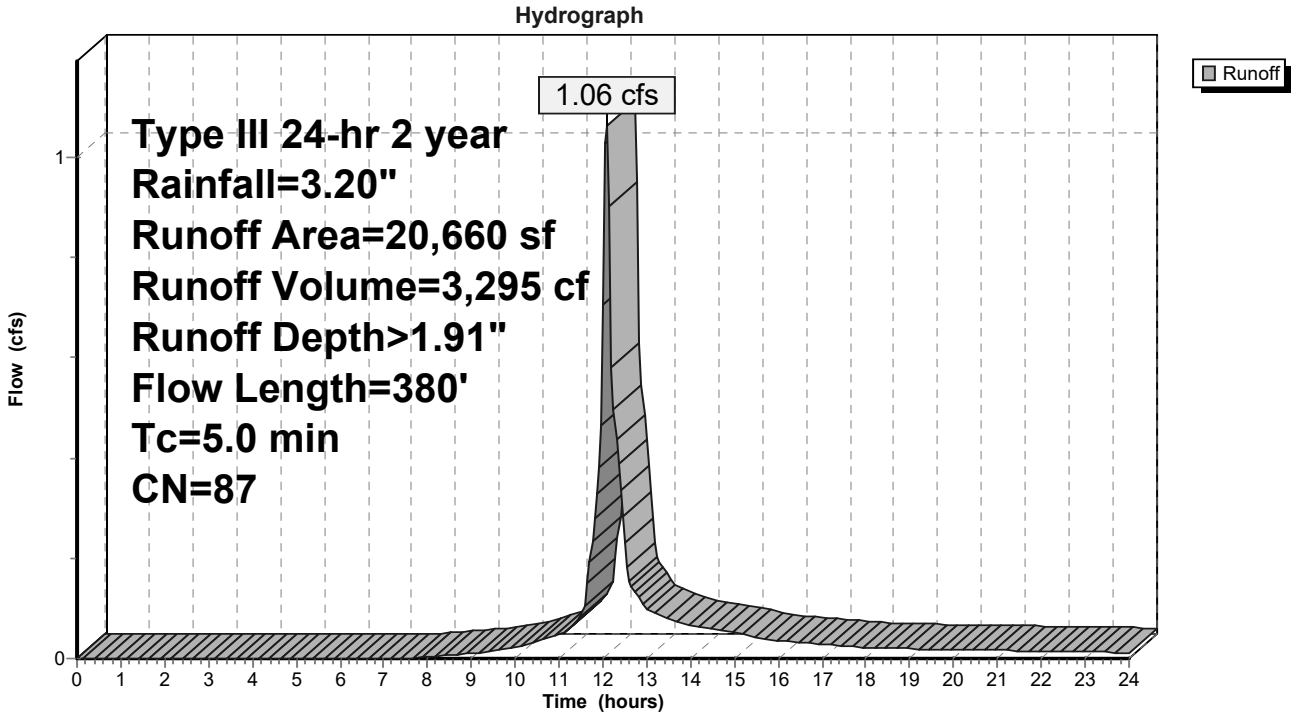
Runoff = 1.06 cfs @ 12.08 hrs, Volume= 3,295 cf, Depth> 1.91"

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
6,344	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
0	98	Water Surface, HSG B
20,660	87	Weighted Average
6,344		Pervious Area
14,316		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	30	0.0830	0.24		**Sheet Flow, SHEET GRASS** Grass: Short n= 0.150 P2= 3.20"
0.4	20	0.0125	0.83		**Sheet Flow, SHEET PAVE** Smooth surfaces n= 0.011 P2= 3.20"
1.3	330	0.0440	4.26		**Shallow Concentrated Flow, SHALLOW PAVE** Paved Kv= 20.3 fps
1.2					**Direct Entry, DIRECT**
5.0	380	Total			

Subcatchment P-1F: P-1F



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

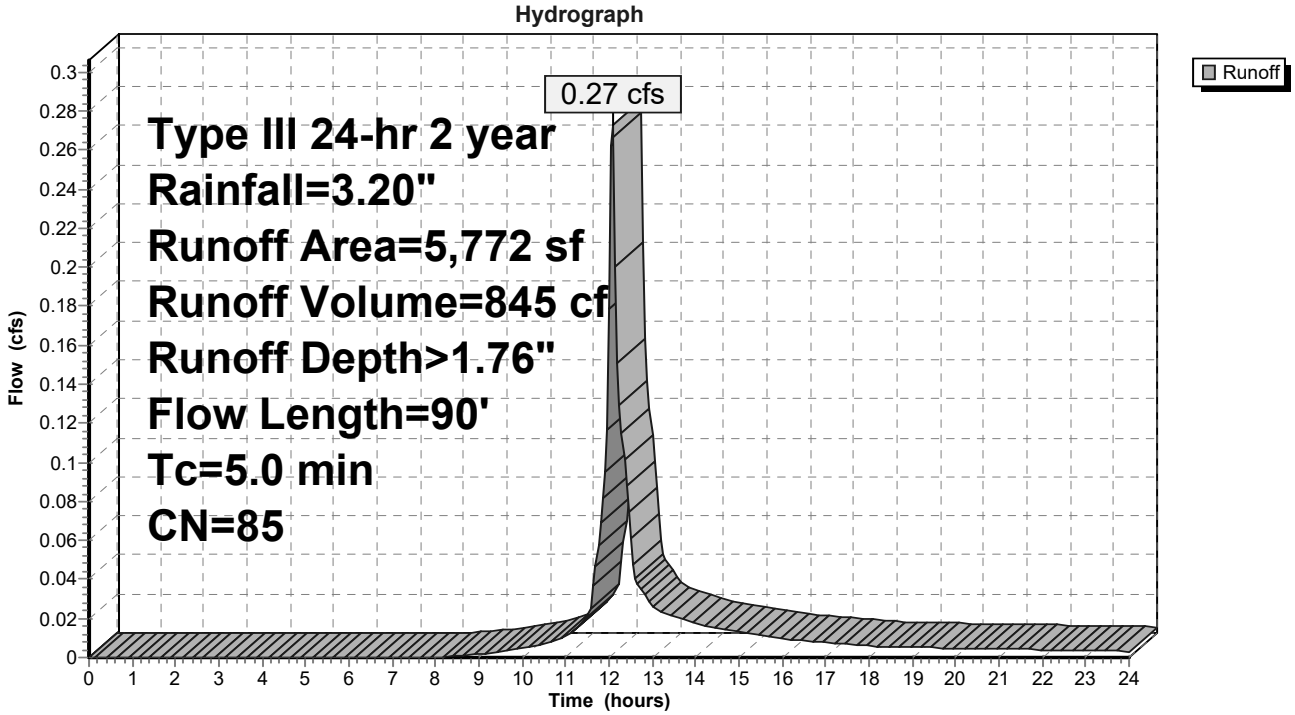
Runoff = 0.27 cfs @ 12.08 hrs, Volume= 845 cf, Depth> 1.76"

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
2,063	61	>75% Grass cover, Good, HSG B
440	98	Roofs, HSG B
3,269	98	Paved roads w/curbs & sewers, HSG B
5,772	85	Weighted Average
2,063		Pervious Area
3,709		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	50	0.0500	0.21		**Sheet Flow, SHEET GRASS** Grass: Short n= 0.150 P2= 3.20"
0.4	30	0.0330	1.32		**Sheet Flow, SHEET PAVE** Smooth surfaces n= 0.011 P2= 3.20"
0.0	10	0.0290	3.46		**Shallow Concentrated Flow, PAVED** Paved Kv= 20.3 fps
0.7					**Direct Entry, DIRECT**
5.0	90	Total			

Subcatchment P-1G: P-1G



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

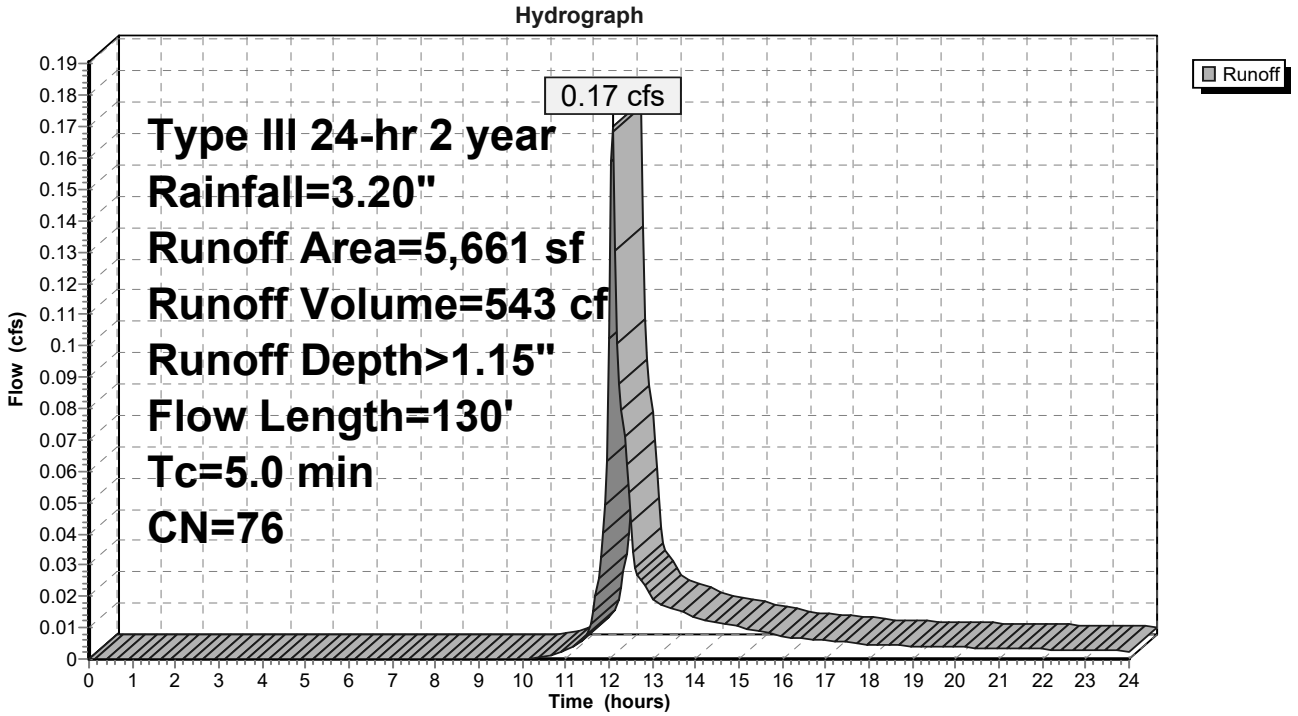
Runoff = 0.17 cfs @ 12.08 hrs, Volume= 543 cf, Depth> 1.15"

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
1,815	98	Paved roads w/curbs & sewers, HSG B
3,406	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
5,661	76	Weighted Average
3,406		Pervious Area
2,255		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 GRASS** Smooth surfaces n= 0.011 P2= 3.20"
0.4	80	0.0250	3.21		**Shallow Concentrated Flow, PAVEMENT** Paved Kv= 20.3 fps
4.1					**Direct Entry, DIRECT**
5.0	130	Total			

Subcatchment P-1H: P-1H



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

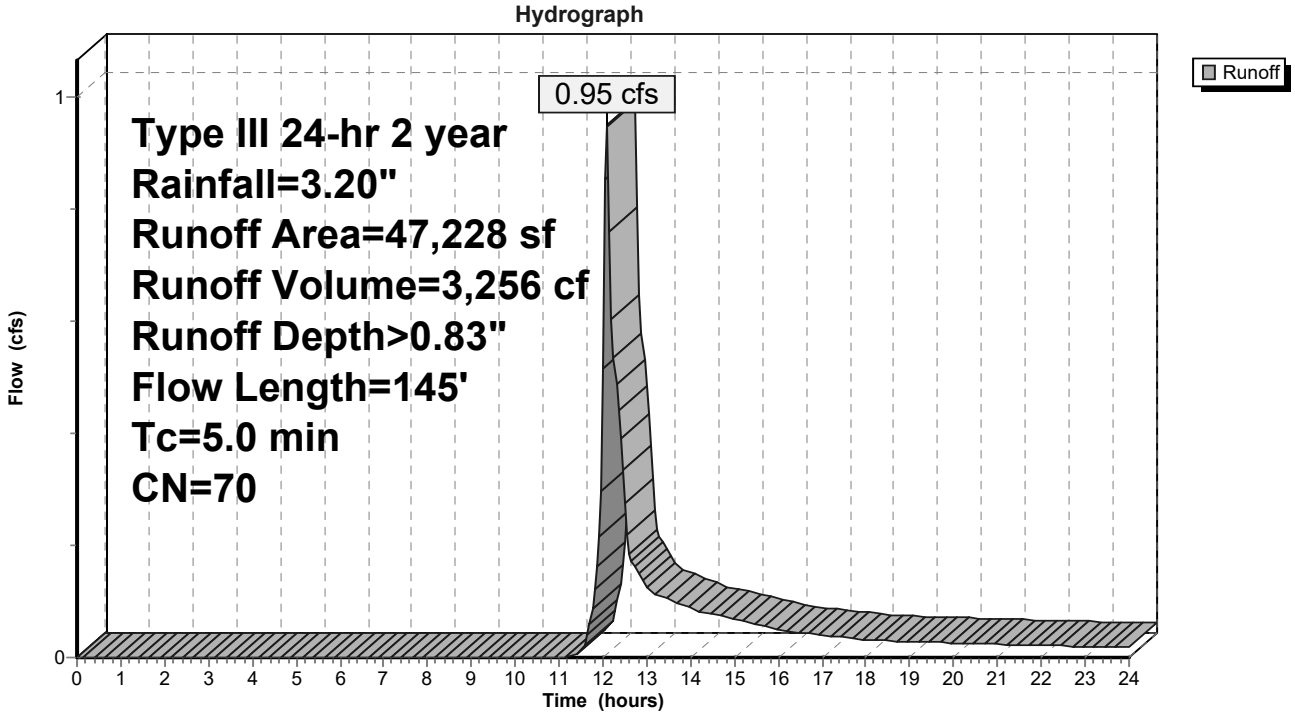
Runoff = 0.95 cfs @ 12.09 hrs, Volume= 3,256 cf, Depth> 0.83"

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
3,080	98	Roofs, HSG B
0	98	Paved parking, HSG B
212	98	Paved roads w/curbs & sewers, HSG B
35,239	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
8,697	98	Water Surface, HSG B
47,228	70	Weighted Average
35,239		Pervious Area
11,989		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.1	50	0.0900	0.27		**Sheet Flow, SHEET** Grass: Short n= 0.150 P2= 3.20"
0.8	95	0.0860	2.05		**Shallow Concentrated Flow, GRASS** Short Grass Pasture Kv= 7.0 fps
1.1					**Direct Entry, DIRECT**
5.0	145	Total			

Subcatchment P-1I: P-1I



Summary for Subcatchment P-1J: P1-J

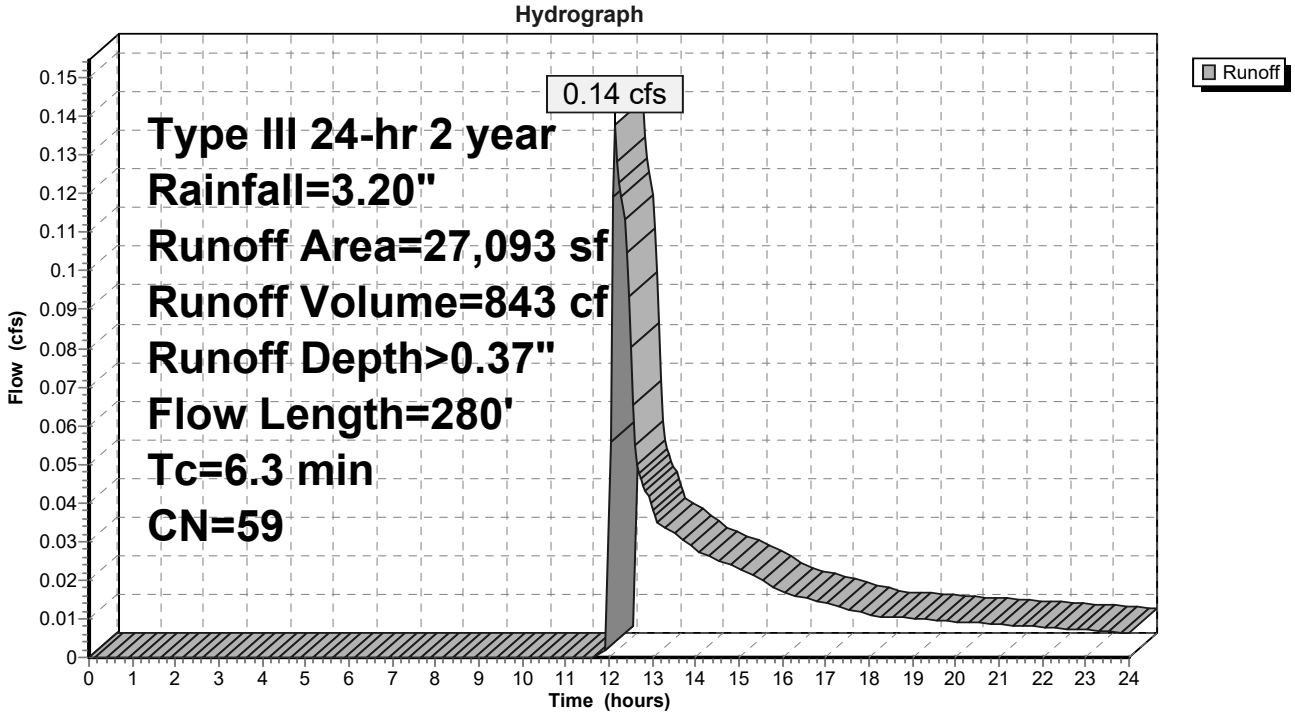
Runoff = 0.14 cfs @ 12.16 hrs, Volume= 843 cf, Depth> 0.37"

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
	8,800	55	Woods, Good, HSG B
	18,225	61	>75% Grass cover, Good, HSG B
*	68	98	Paved roads w/curbs & sewers, HSG B
	27,093	59	Weighted Average
	27,025		Pervious Area
	68		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"
3.1	230	0.0600	1.22		**Shallow Concentrated Flow, Flow in woods** Woodland Kv= 5.0 fps
6.3	280	Total			

Subcatchment P-1J: P1-J



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

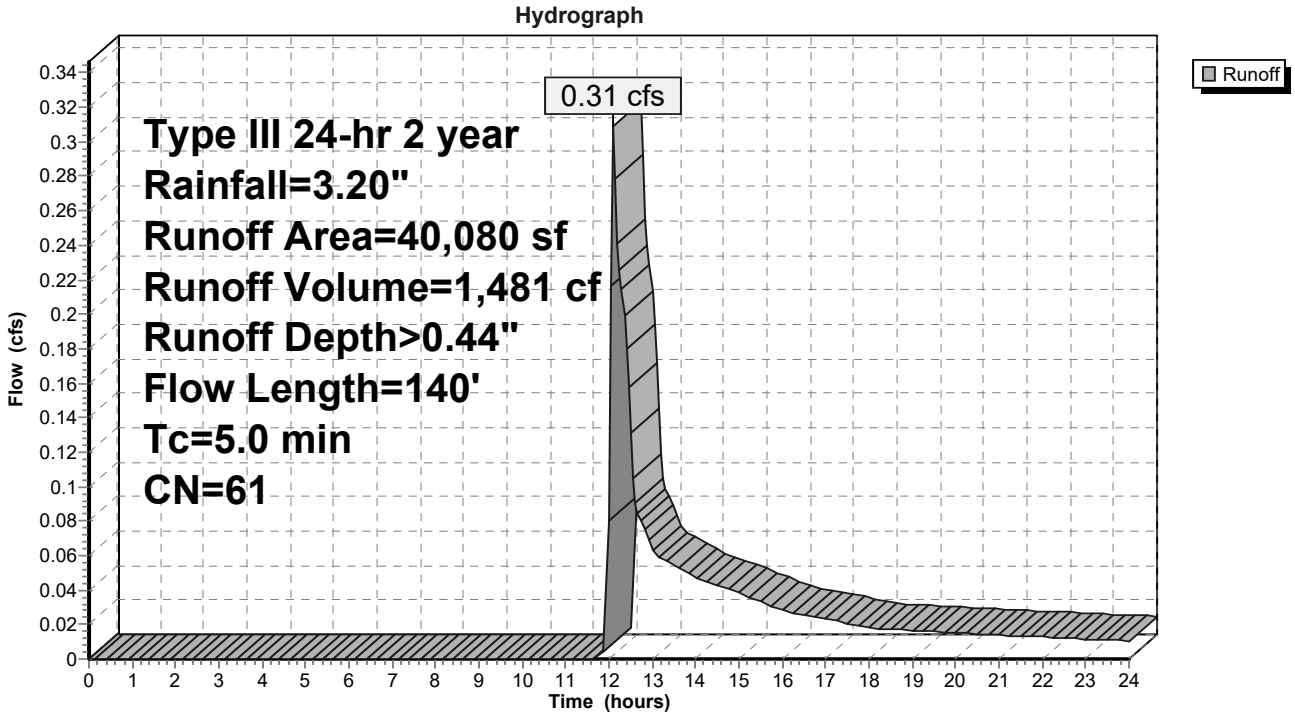
Runoff = 0.31 cfs @ 12.11 hrs, Volume= 1,481 cf, Depth> 0.44"

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
94	98	Paved roads w/curbs & sewers, HSG B
9,069	61	>75% Grass cover, Good, HSG B
26,517	55	Woods, Good, HSG B
40,080	61	Weighted Average
35,586		Pervious Area
4,494		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	50	0.0600	0.23		**Sheet Flow, SHEET GRASS** Grass: Short n= 0.150 P2= 3.20"
0.5	90	0.1560	2.76		**Shallow Concentrated Flow, GRASS SHALLOW** Short Grass Pasture Kv= 7.0 fps
0.9					**Direct Entry, DIRECT**
5.0	140	Total			

Subcatchment P-2A: P-2A



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

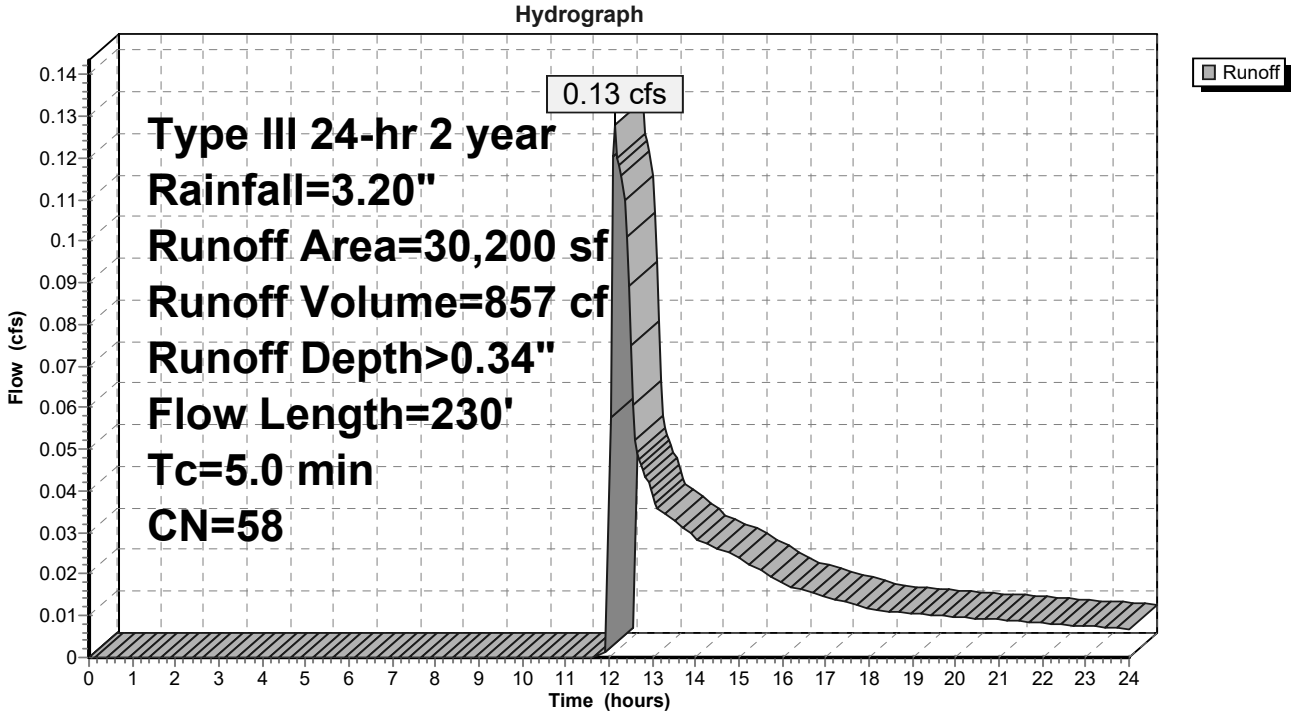
Runoff = 0.13 cfs @ 12.15 hrs, Volume= 857 cf, Depth> 0.34"

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
13,428	61	>75% Grass cover, Good, HSG B
16,772	55	Woods, Good, HSG B
30,200	58	Weighted Average
30,200		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0	50	0.2600	0.41		**Sheet Flow, SHEET GRASS** Grass: Short n= 0.150 P2= 3.20"
1.6	180	0.0720	1.88		**Shallow Concentrated Flow, SHALLOW GRASS** Short Grass Pasture Kv= 7.0 fps
1.4					**Direct Entry, DIRECT**
5.0	230	Total			

Subcatchment P-3A: P-3A



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

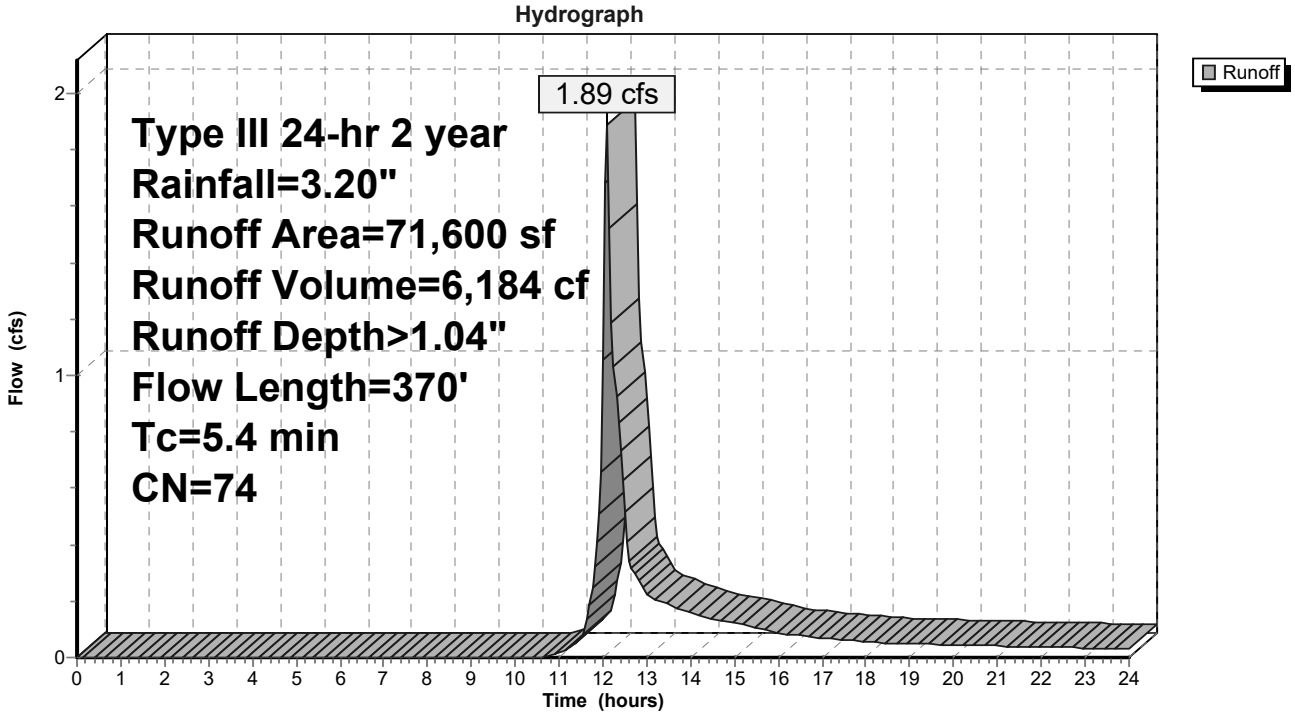
Runoff = 1.89 cfs @ 12.09 hrs, Volume= 6,184 cf, Depth> 1.04"

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
448	98	Paved roads w/curbs & sewers, HSG B
46,707	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
9,045	98	Water Surface, HSG B
71,600	74	Weighted Average
46,707		Pervious Area
24,893		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.2	50	0.0800	0.26		**Sheet Flow, SHEET GRASS** Grass: Short n= 0.150 P2= 3.20"
2.2	320	0.1218	2.44		**Shallow Concentrated Flow, SHALLOW GRASS** Short Grass Pasture Kv= 7.0 fps
0.0					**Direct Entry, DIRECT**
5.4	370	Total			

Subcatchment P-3B: P-3B



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

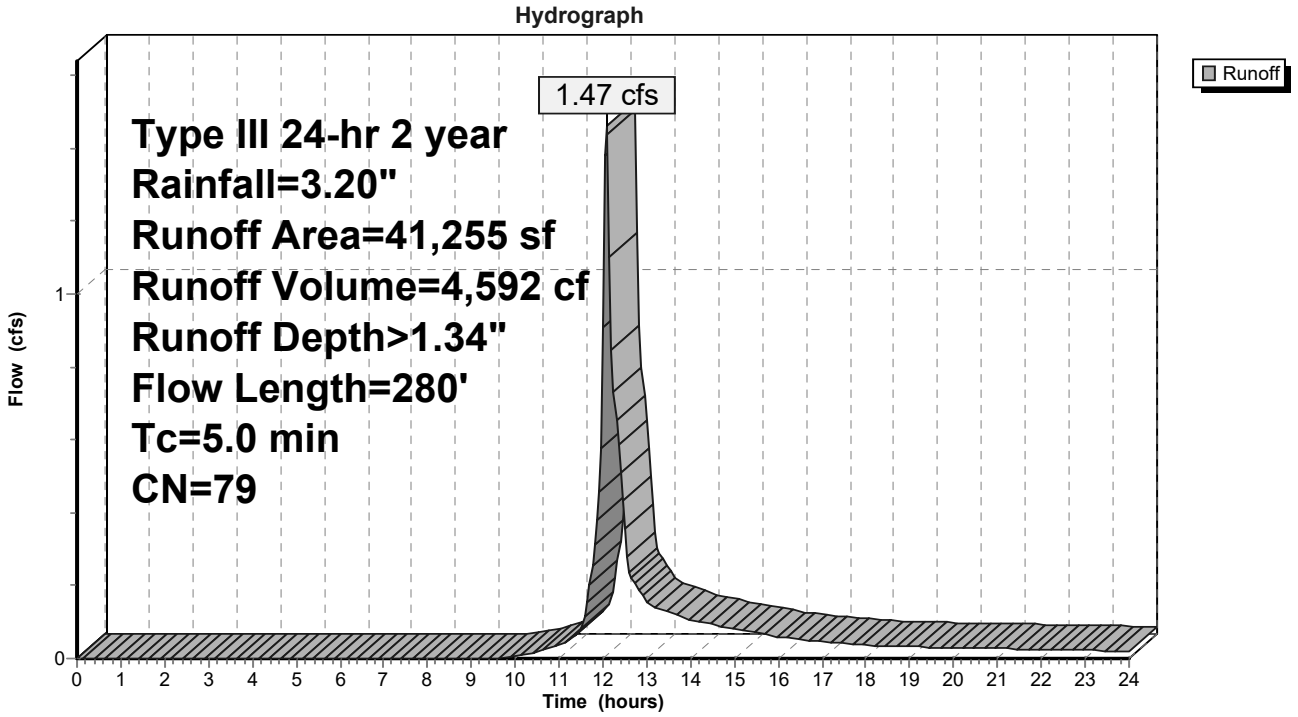
Runoff = 1.47 cfs @ 12.08 hrs, Volume= 4,592 cf, Depth> 1.34"

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
21,208	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
41,255	79	Weighted Average
21,208		Pervious Area
20,047		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	50	0.0600	1.86		**Sheet Flow, SHEET GRASS** Smooth surfaces n= 0.011 P2= 3.20"
1.2	90	0.0310	1.23		**Shallow Concentrated Flow, SHALLOW GRASS** Short Grass Pasture Kv= 7.0 fps
1.5	140	0.0060	1.57		**Shallow Concentrated Flow, SHALLOW PAVEMENT** Paved Kv= 20.3 fps
1.9					**Direct Entry, DIRECT**
5.0	280	Total			

Subcatchment P-3C: P-3C



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

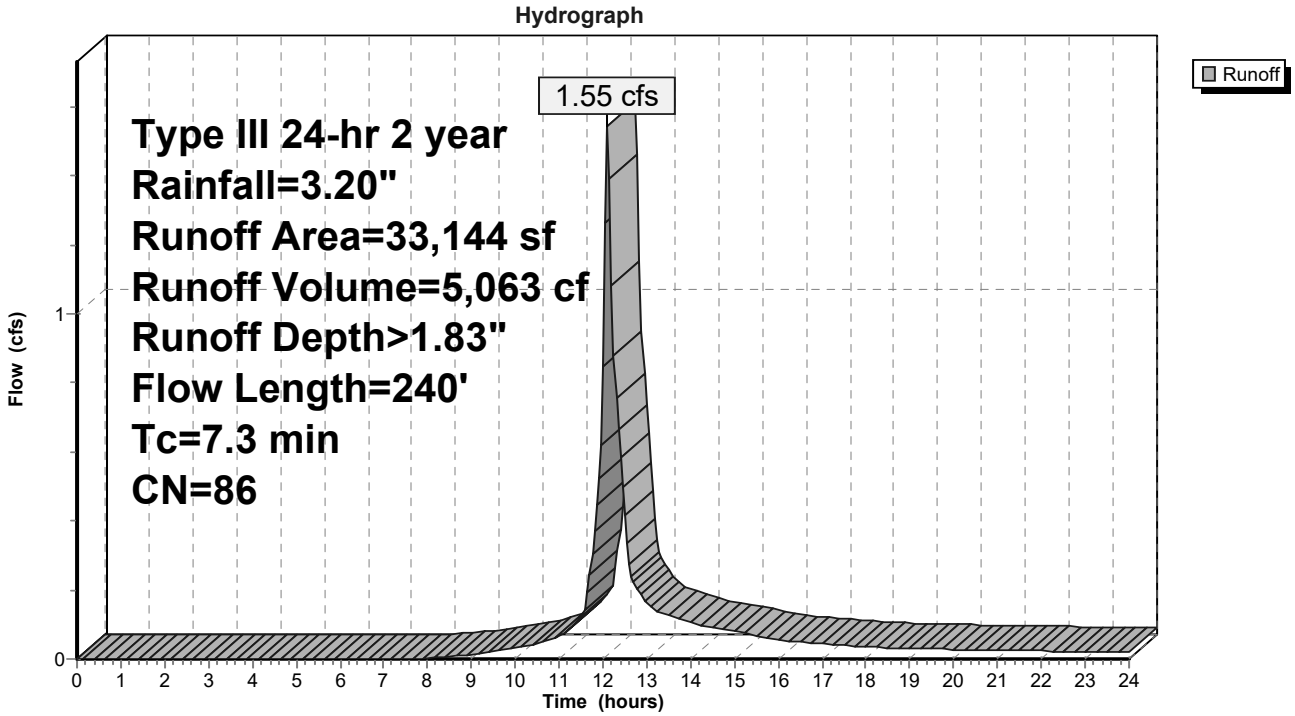
Runoff = 1.55 cfs @ 12.11 hrs, Volume= 5,063 cf, Depth> 1.83"

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
8,800	98	Roofs, HSG B
13,806	98	Paved roads w/curbs & sewers, HSG B
10,538	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
33,144	86	Weighted Average
10,538		Pervious Area
22,606		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0200	0.15		**Sheet Flow, SHEET GR** Grass: Short n= 0.150 P2= 3.20"
1.0	90	0.0500	1.57		**Shallow Concentrated Flow, SHALLOW GRASS** Short Grass Pasture Kv= 7.0 fps
0.7	100	0.0150	2.49		**Shallow Concentrated Flow, SHALLOW PAVE** Paved Kv= 20.3 fps
7.3	240	Total			

Subcatchment P-3D: P-3D



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

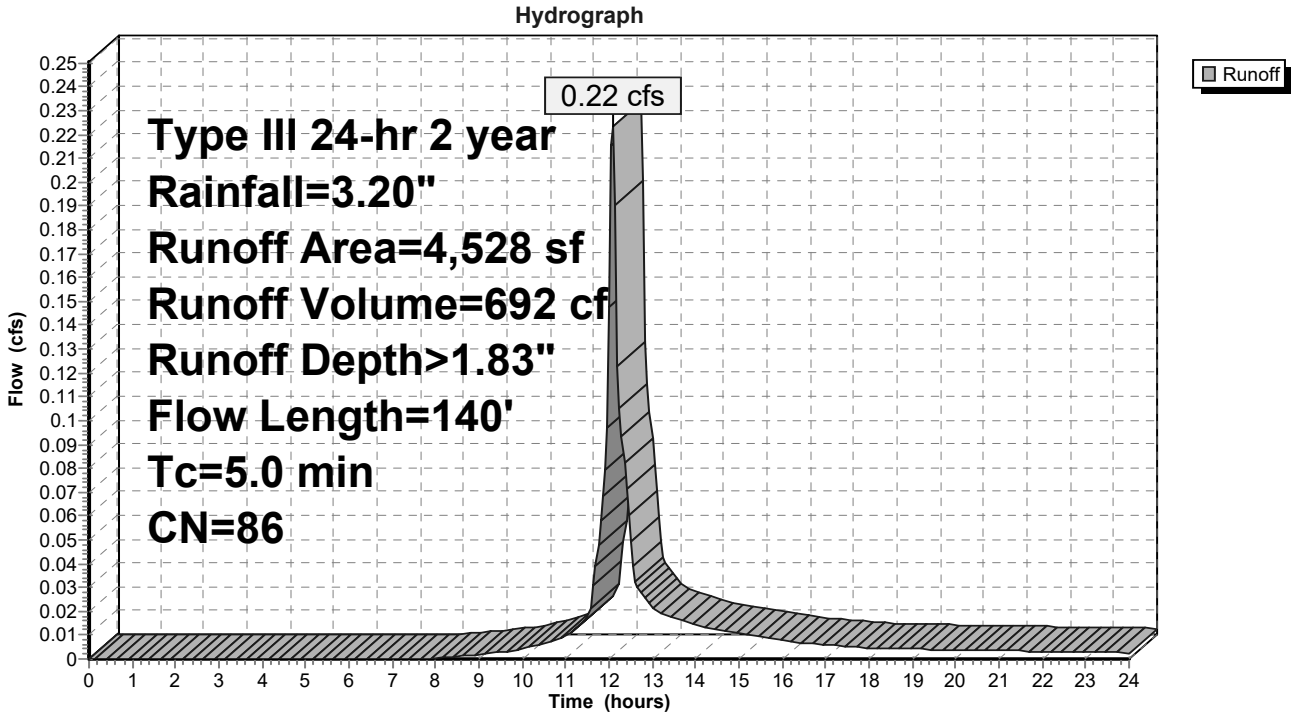
Runoff = 0.22 cfs @ 12.08 hrs, Volume= 692 cf, Depth> 1.83"

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
1,424	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
4,528	86	Weighted Average
1,424		Pervious Area
3,104		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.20		**Sheet Flow, SHEET PAVEMENT** Smooth surfaces n= 0.011 P2= 3.20"
0.5	90	0.0220	3.01		**Shallow Concentrated Flow, SHALLOW PAVEMENT** Paved Kv= 20.3 fps
3.8					**Direct Entry, DIRECT**
5.0	140	Total			

Subcatchment P-3E: P-3F



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

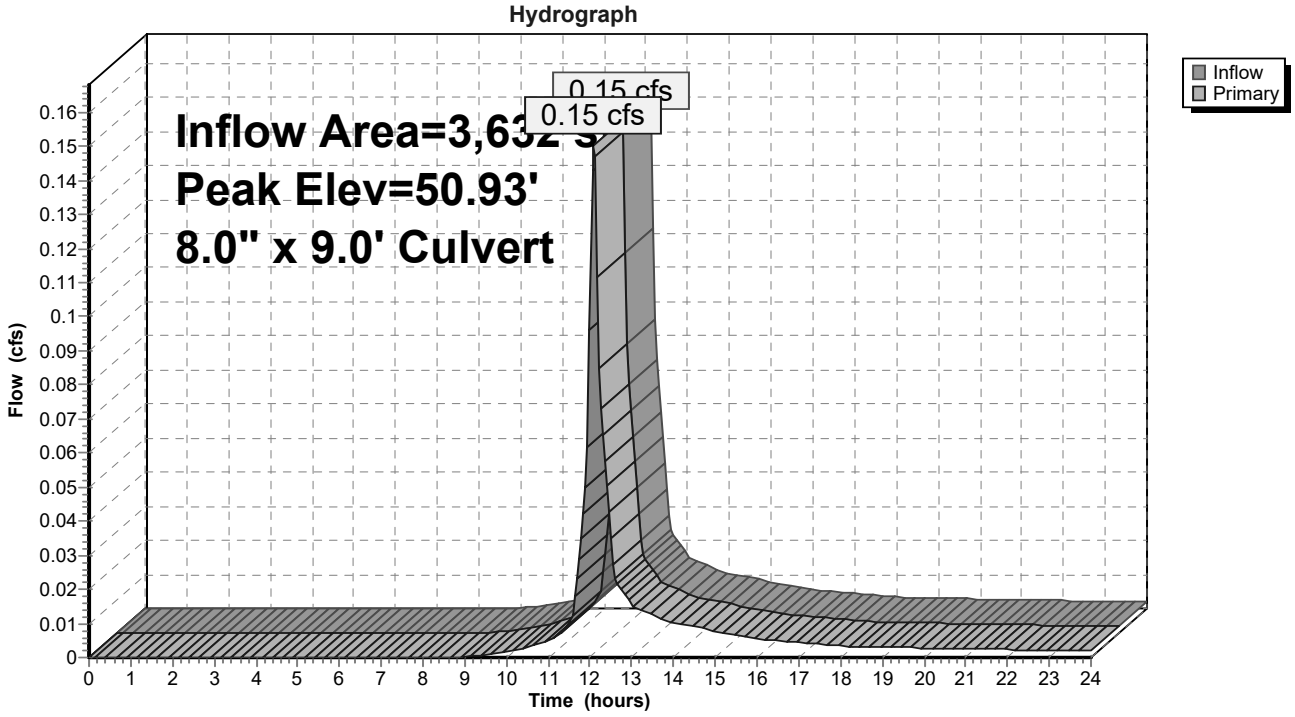
Inflow Area = 3,632 sf, 56.17% Impervious, Inflow Depth > 1.54" for 2 year event
Inflow = 0.15 cfs @ 12.08 hrs, Volume= 465 cf
Outflow = 0.15 cfs @ 12.08 hrs, Volume= 465 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.15 cfs @ 12.08 hrs, Volume= 465 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 50.93' @ 12.72 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=0.15 cfs @ 12.08 hrs HW=50.82' TW=50.61' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 0.15 cfs @ 2.14 fps)

Pond CB1: CB1



Summary for Pond CB2: CB2

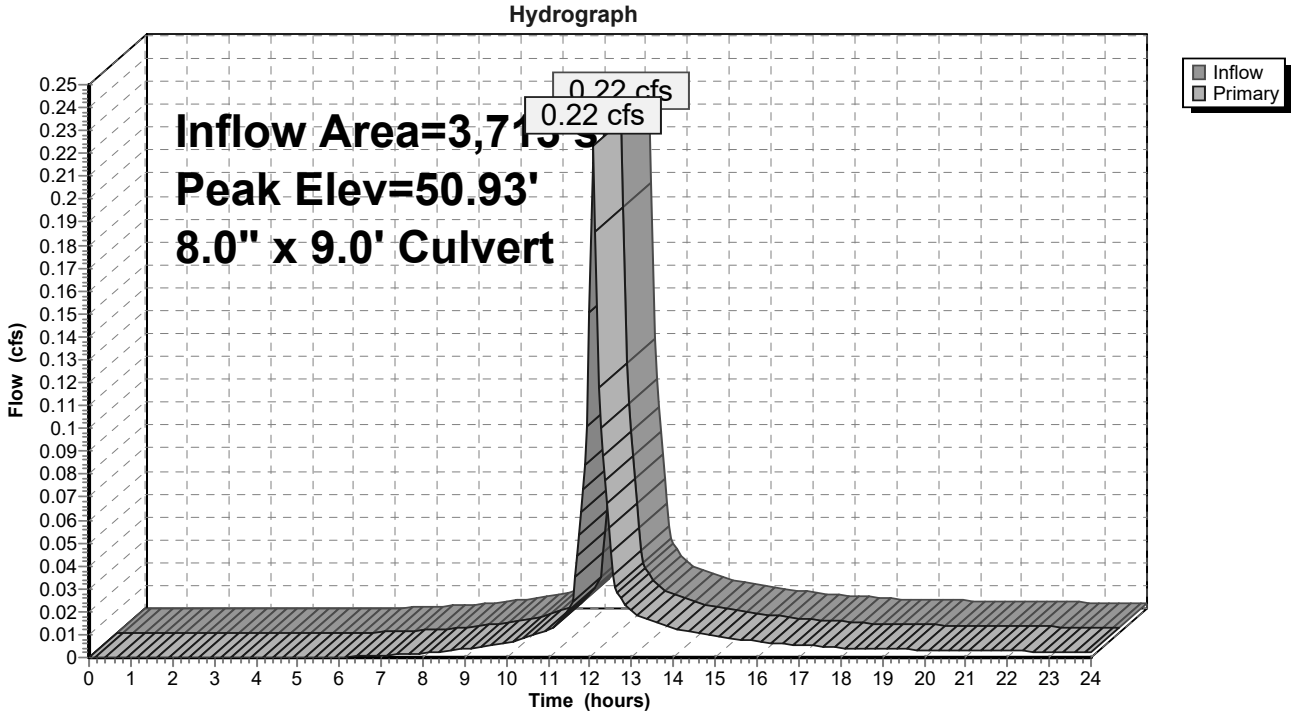
Inflow Area =	3,713 sf, 81.12% Impervious, Inflow Depth > 2.26" for 2 year event				
Inflow =	0.22 cfs @	12.07 hrs,	Volume=	698 cf	
Outflow =	0.22 cfs @	12.07 hrs,	Volume=	698 cf,	Atten= 0%, Lag= 0.0 min
Primary =	0.22 cfs @	12.07 hrs,	Volume=	698 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 50.93' @ 12.72 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=0.21 cfs @ 12.07 hrs HW=50.87' TW=50.60' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 0.21 cfs @ 2.34 fps)

Pond CB2: CB2



Summary for Pond CB3: CB3

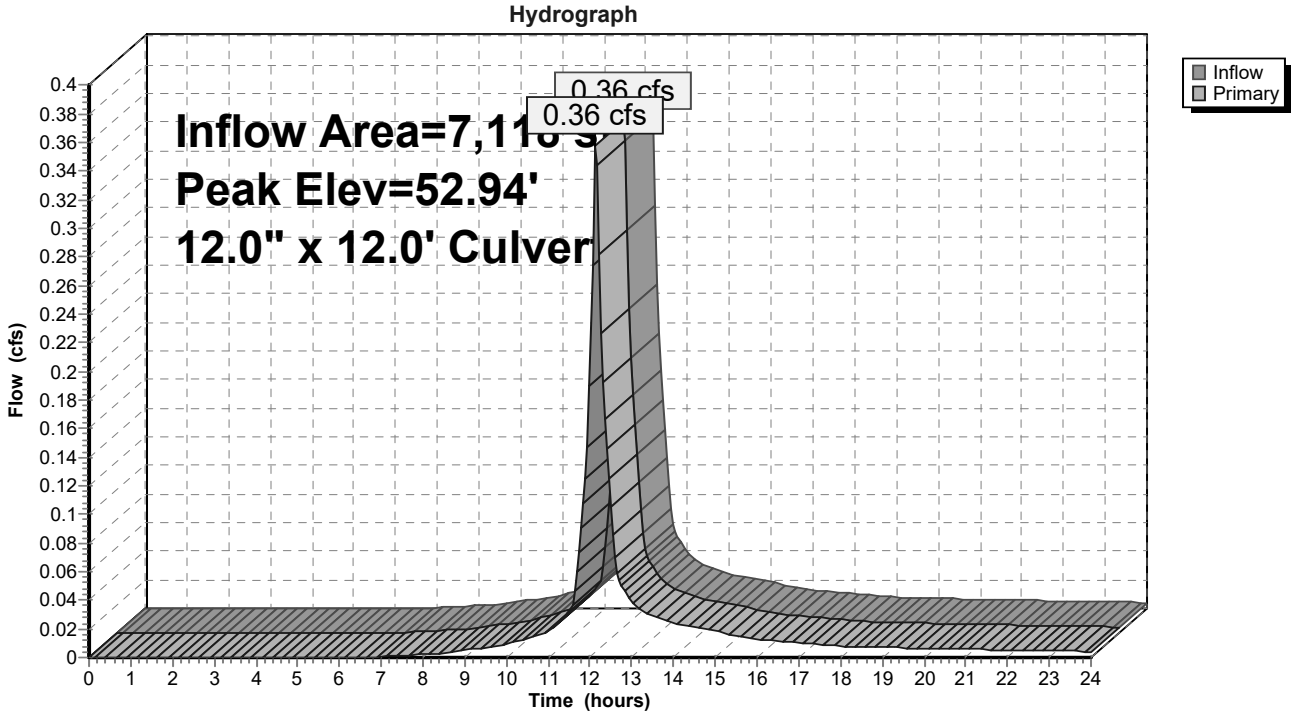
Inflow Area = 7,118 sf, 74.36% Impervious, Inflow Depth > 2.08" for 2 year event
Inflow = 0.36 cfs @ 12.12 hrs, Volume= 1,233 cf
Outflow = 0.36 cfs @ 12.12 hrs, Volume= 1,233 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.36 cfs @ 12.12 hrs, Volume= 1,233 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 52.94' @ 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=0.45 cfs @ 12.12 hrs HW=52.92' TW=52.87' (Dynamic Tailwater)
└**1=Culvert** (Outlet Controls 0.45 cfs @ 1.38 fps)

Pond CB3: CB3



Summary for Pond CB4: CB4

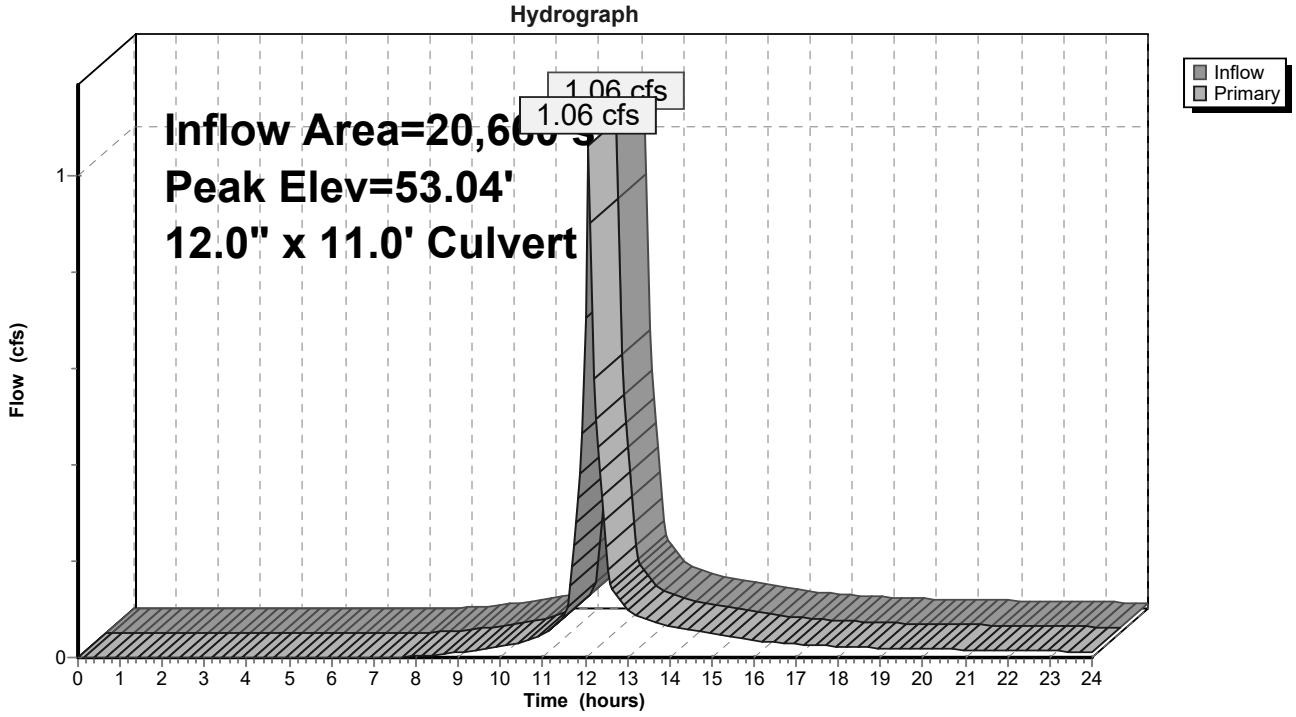
Inflow Area = 20,660 sf, 69.29% Impervious, Inflow Depth > 1.91" for 2 year event
Inflow = 1.06 cfs @ 12.08 hrs, Volume= 3,295 cf
Outflow = 1.06 cfs @ 12.08 hrs, Volume= 3,295 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.06 cfs @ 12.08 hrs, Volume= 3,295 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 53.04' @ 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=0.81 cfs @ 12.08 hrs HW=53.01' TW=52.89' (Dynamic Tailwater)
└**1=Culvert** (Outlet Controls 0.81 cfs @ 2.06 fps)

Pond CB4: CB4



Summary for Pond CB5: CB5

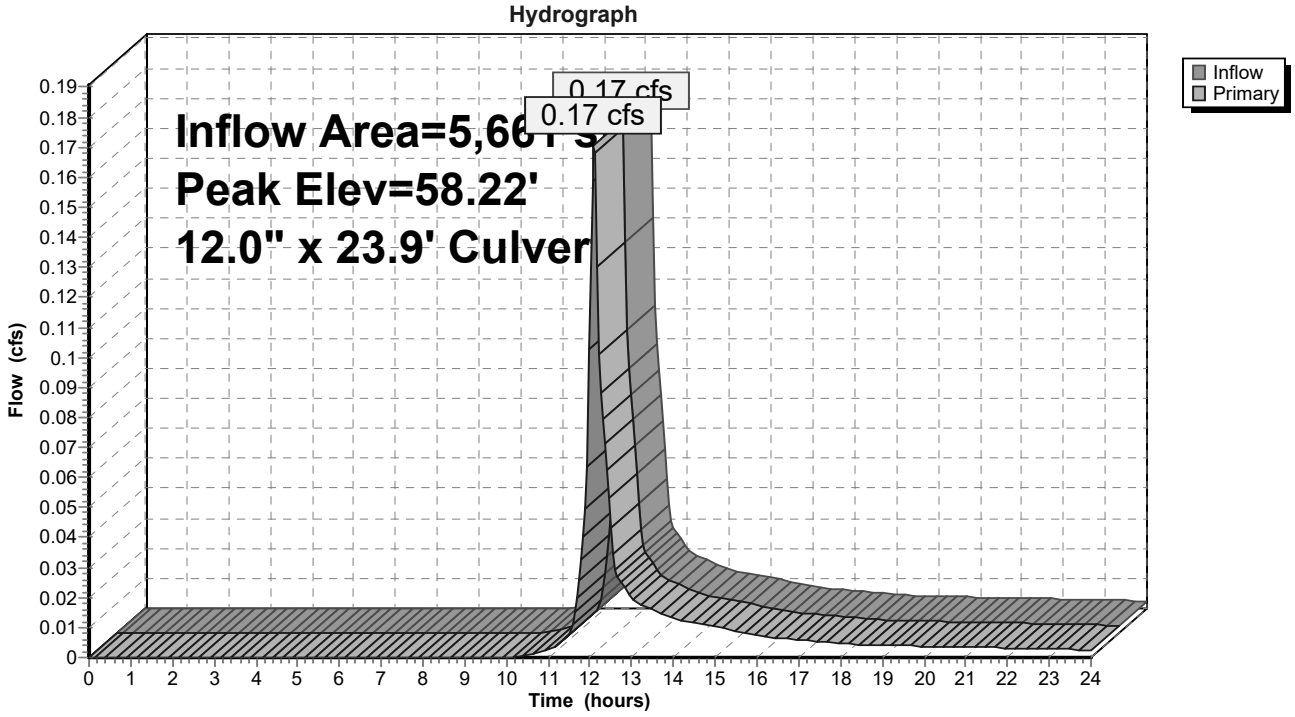
Inflow Area = 5,661 sf, 39.83% Impervious, Inflow Depth > 1.15" for 2 year event
Inflow = 0.17 cfs @ 12.08 hrs, Volume= 543 cf
Outflow = 0.17 cfs @ 12.08 hrs, Volume= 543 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.17 cfs @ 12.08 hrs, Volume= 543 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 58.22' @ 12.10 hrs
Flood Elev= 65.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	58.00'	**12.0" x 23.9' long Culvert** RCP, groove end projecting, Ke= 0.200 Outlet Invert= 57.76' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.16 cfs @ 12.08 hrs HW=58.21' TW=57.99' (Dynamic Tailwater)
└**1=Culvert** (Outlet Controls 0.16 cfs @ 1.96 fps)

Pond CB5: CB5



Summary for Pond CB6: CB6

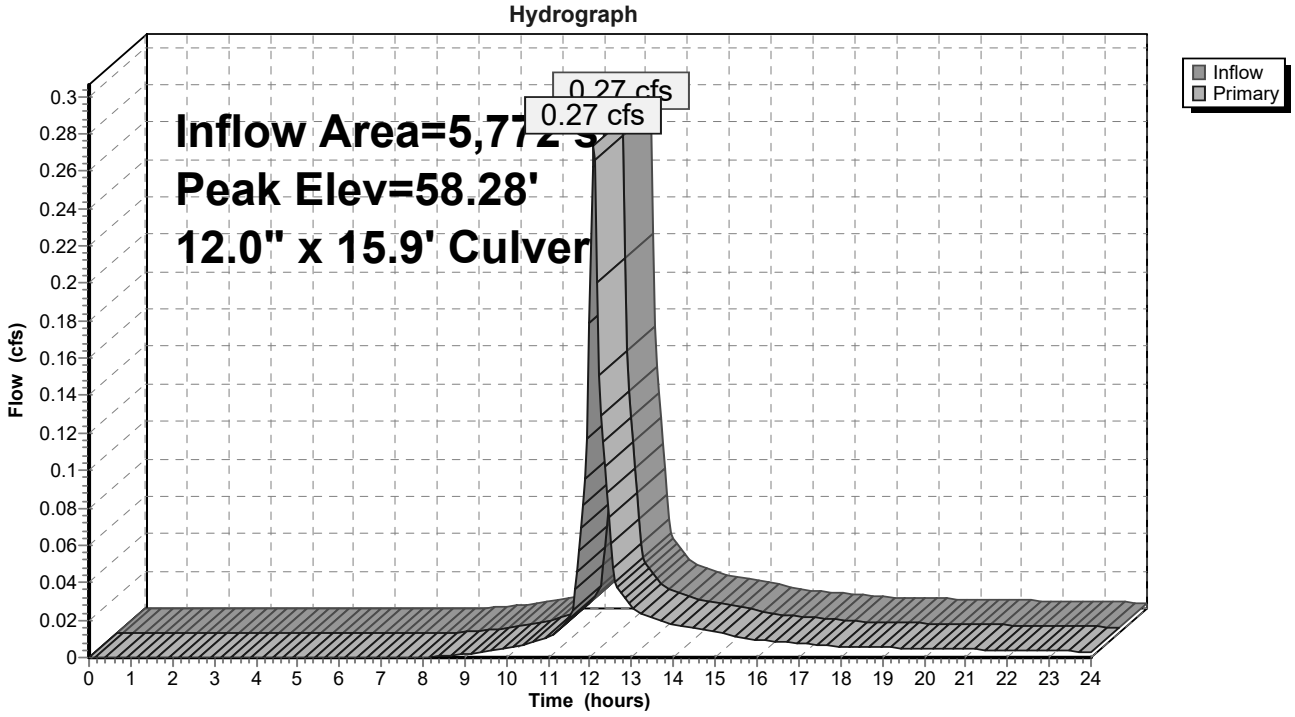
Inflow Area = 5,772 sf, 64.26% Impervious, Inflow Depth > 1.76" for 2 year event
Inflow = 0.27 cfs @ 12.08 hrs, Volume= 845 cf
Outflow = 0.27 cfs @ 12.08 hrs, Volume= 845 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.27 cfs @ 12.08 hrs, Volume= 845 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 58.28' @ 12.08 hrs
Flood Elev= 65.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	58.00'	**12.0" x 15.9' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 57.84' S= 0.0101 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.26 cfs @ 12.08 hrs HW=58.27' TW=57.98' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 0.26 cfs @ 2.30 fps)

Pond CB6: CB6



Summary for Pond CB7: CB7

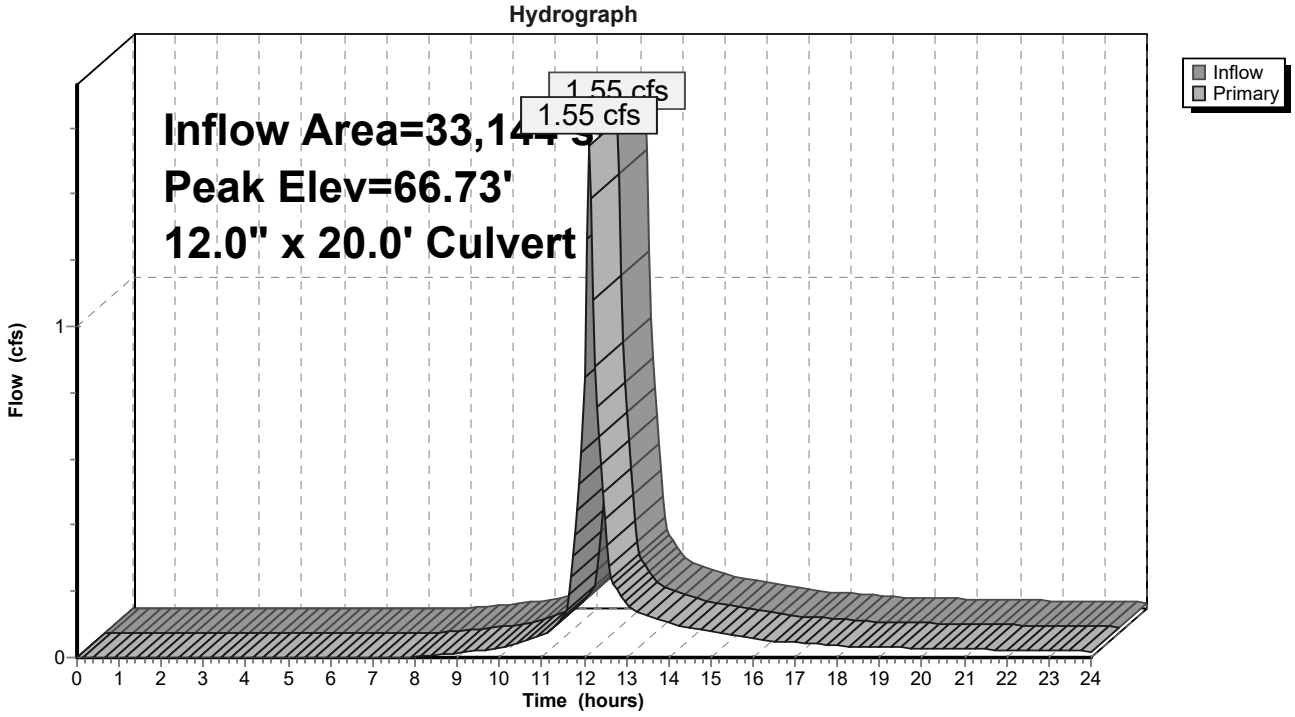
Inflow Area = 33,144 sf, 68.21% Impervious, Inflow Depth > 1.83" for 2 year event
Inflow = 1.55 cfs @ 12.11 hrs, Volume= 5,063 cf
Outflow = 1.55 cfs @ 12.11 hrs, Volume= 5,063 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.55 cfs @ 12.11 hrs, Volume= 5,063 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 66.73' @ 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=1.37 cfs @ 12.11 hrs HW=66.72' TW=66.48' (Dynamic Tailwater)
└**1=Culvert** (Outlet Controls 1.37 cfs @ 2.73 fps)

Pond CB7: CB7



Summary for Pond CB8: CB8

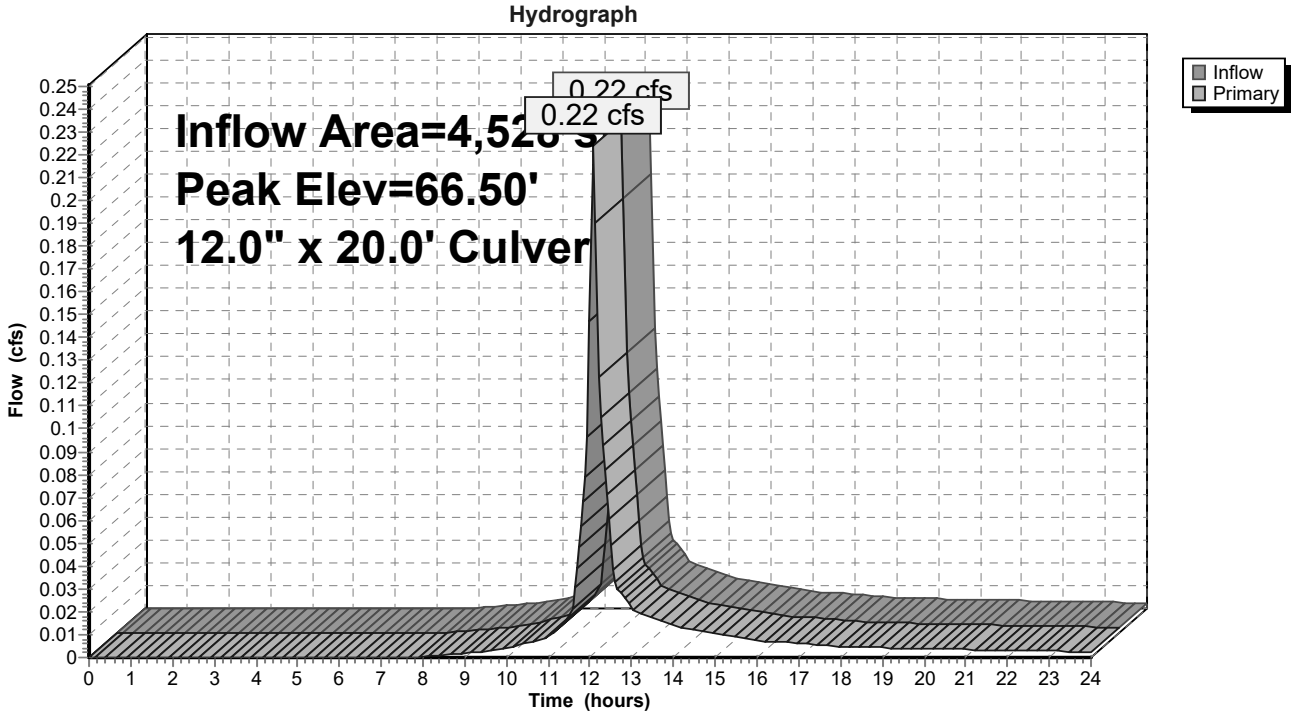
Inflow Area = 4,528 sf, 68.55% Impervious, Inflow Depth > 1.83" for 2 year event
Inflow = 0.22 cfs @ 12.08 hrs, Volume= 692 cf
Outflow = 0.22 cfs @ 12.08 hrs, Volume= 692 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.22 cfs @ 12.08 hrs, Volume= 692 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 66.50' @ 12.16 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=66.36' TW=66.44' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.00 cfs)

Pond CB8: CB8



Summary for Pond CB9: CB9

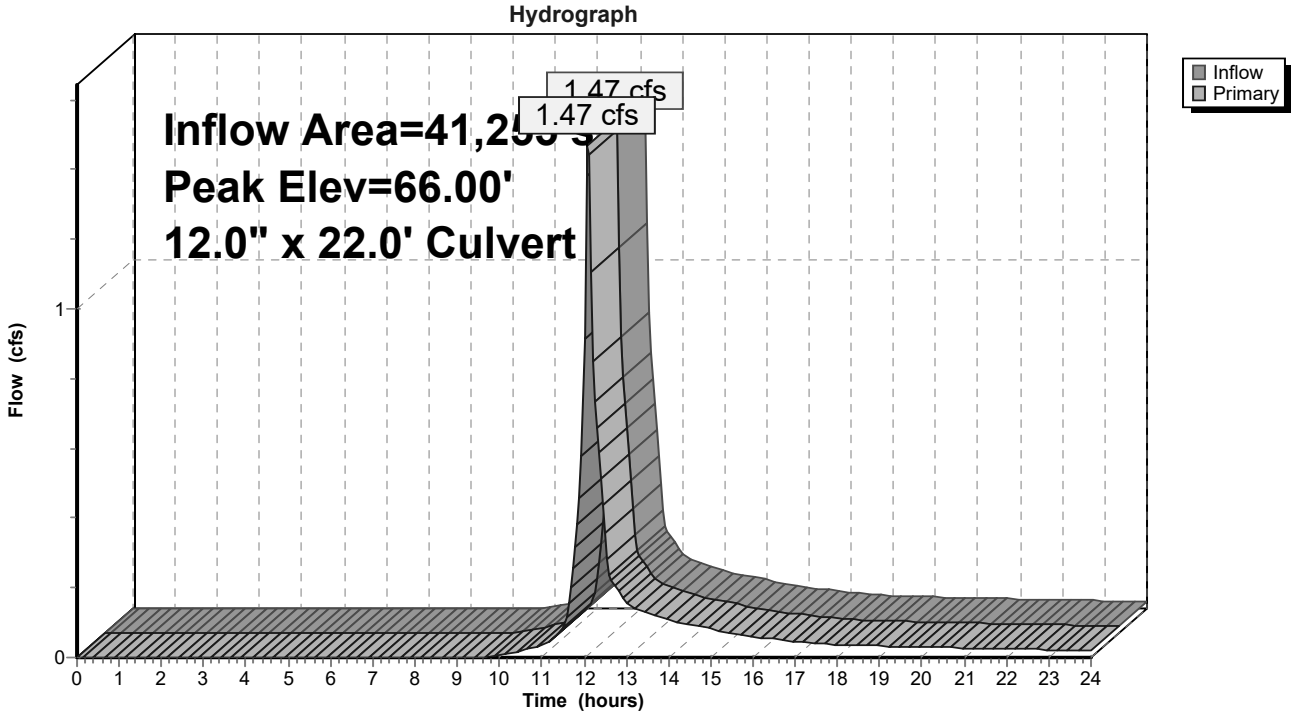
Inflow Area = 41,255 sf, 48.59% Impervious, Inflow Depth > 1.34" for 2 year event
Inflow = 1.47 cfs @ 12.08 hrs, Volume= 4,592 cf
Outflow = 1.47 cfs @ 12.08 hrs, Volume= 4,592 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.47 cfs @ 12.08 hrs, Volume= 4,592 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 66.00' @ 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=1.20 cfs @ 12.08 hrs HW=65.96' TW=65.80' (Dynamic Tailwater)
└**1=Culvert** (Outlet Controls 1.20 cfs @ 2.26 fps)

Pond CB9: CB9



Summary for Pond DMH 10: DMH9

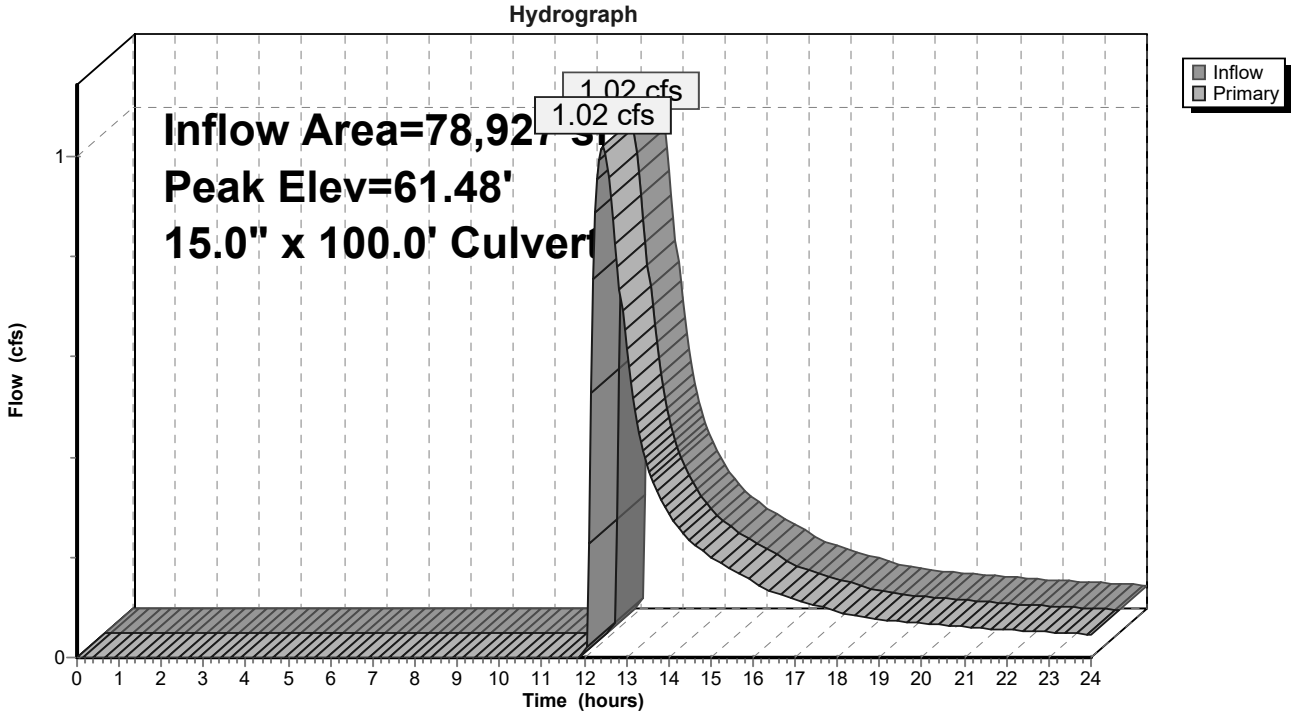
Inflow Area = 78,927 sf, 57.97% Impervious, Inflow Depth > 1.20" for 2 year event
Inflow = 1.02 cfs @ 12.44 hrs, Volume= 7,881 cf
Outflow = 1.02 cfs @ 12.44 hrs, Volume= 7,881 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.02 cfs @ 12.44 hrs, Volume= 7,881 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 61.48' @ 12.44 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=1.02 cfs @ 12.44 hrs HW=61.48' TW=55.74' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 1.02 cfs @ 2.36 fps)

Pond DMH 10: DMH9



Summary for Pond DMH 11: DMH 10

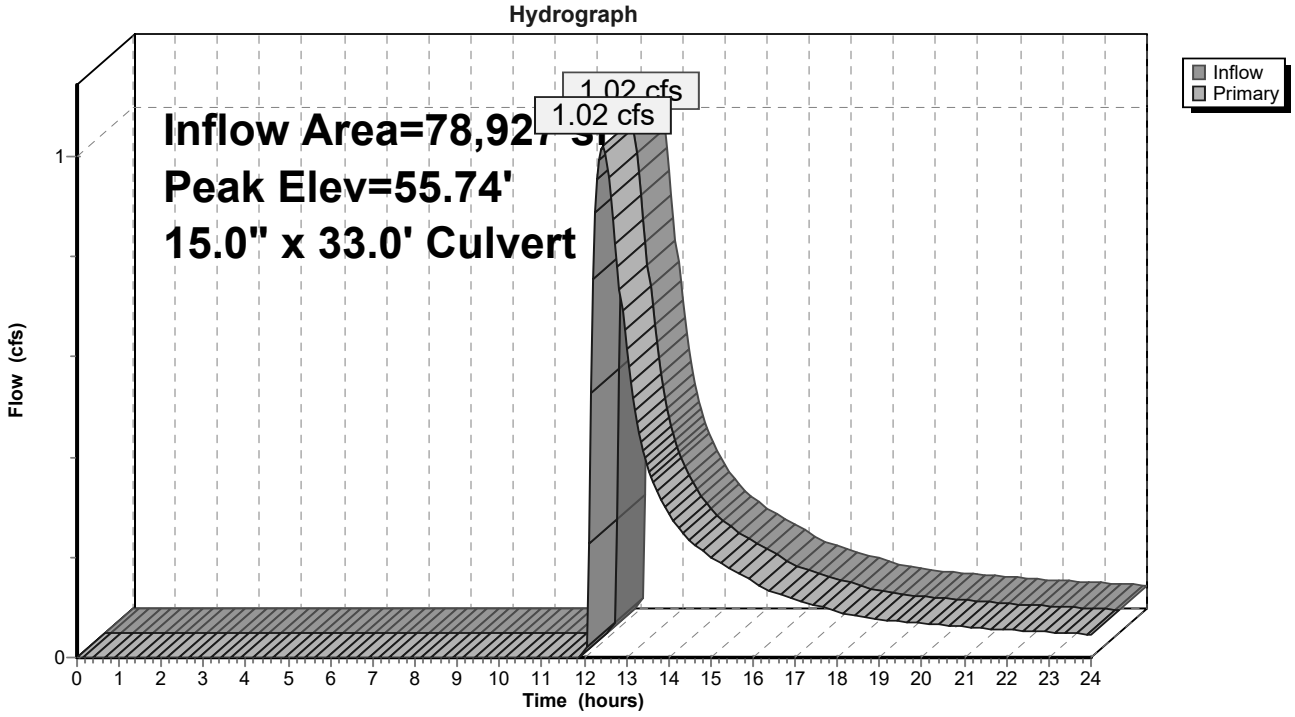
Inflow Area = 78,927 sf, 57.97% Impervious, Inflow Depth > 1.20" for 2 year event
Inflow = 1.02 cfs @ 12.44 hrs, Volume= 7,881 cf
Outflow = 1.02 cfs @ 12.44 hrs, Volume= 7,881 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.02 cfs @ 12.44 hrs, Volume= 7,881 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 55.74' @ 12.44 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=1.02 cfs @ 12.44 hrs HW=55.74' TW=51.07' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 1.02 cfs @ 2.77 fps)

Pond DMH 11: DMH 10



Summary for Pond DMH 6: DMH 6

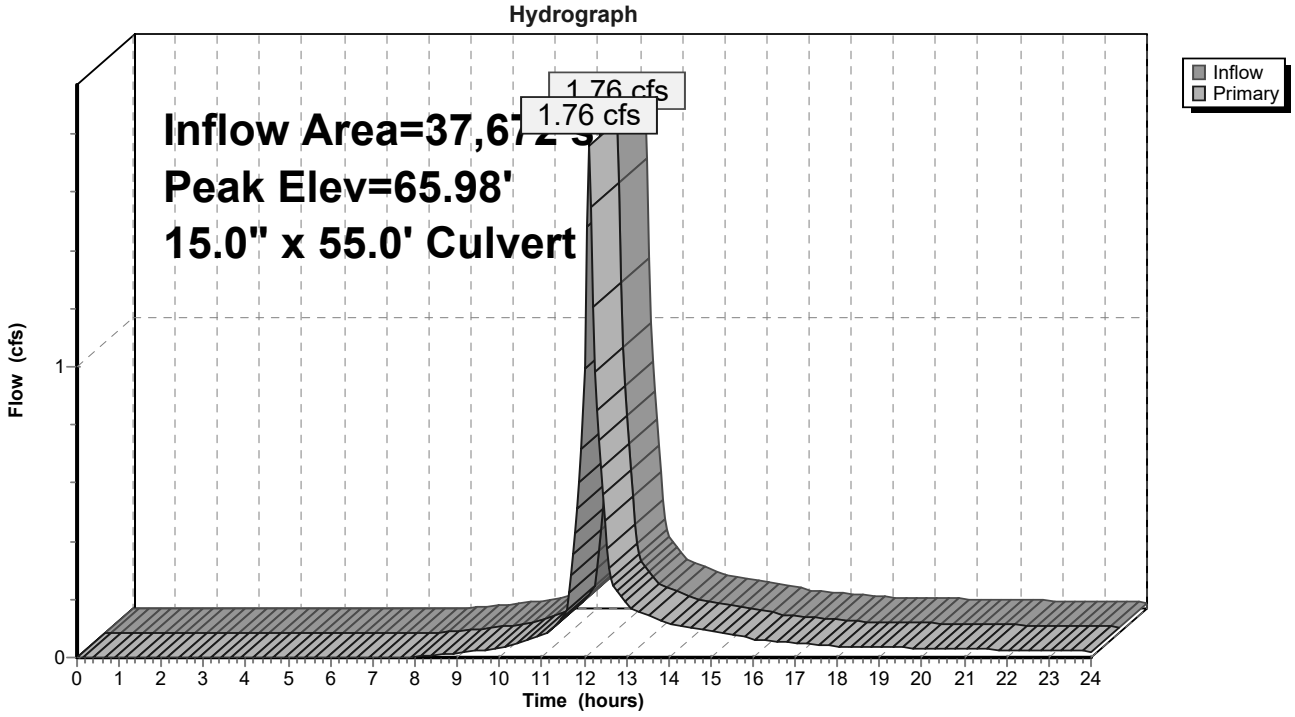
Inflow Area =	37,672 sf, 68.25% Impervious, Inflow Depth > 1.83" for 2 year event				
Inflow =	1.76 cfs @	12.10 hrs, Volume=	5,755 cf		
Outflow =	1.76 cfs @	12.10 hrs, Volume=	5,755 cf, Atten= 0%, Lag= 0.0 min		
Primary =	1.76 cfs @	12.10 hrs, Volume=	5,755 cf		

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 65.98' @ 12.10 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=1.74 cfs @ 12.10 hrs HW=65.97' TW=65.55' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 1.74 cfs @ 2.84 fps)

Pond DMH 6: DMH 6



Summary for Pond DMH2: DMH2

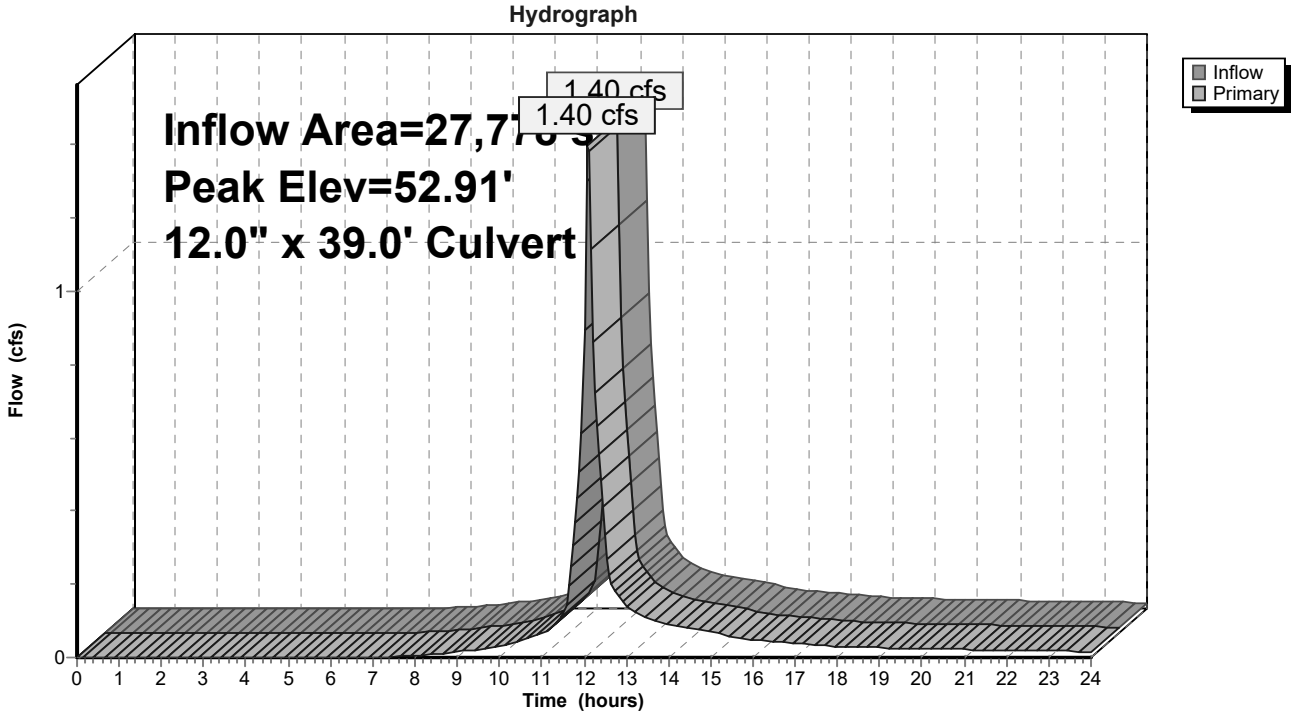
Inflow Area = 27,778 sf, 70.59% Impervious, Inflow Depth > 1.96" for 2 year event
Inflow = 1.40 cfs @ 12.09 hrs, Volume= 4,528 cf
Outflow = 1.40 cfs @ 12.09 hrs, Volume= 4,528 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.40 cfs @ 12.09 hrs, Volume= 4,528 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 52.91' @ 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=1.36 cfs @ 12.09 hrs HW=52.90' TW=51.79' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 1.36 cfs @ 3.16 fps)

Pond DMH2: DMH2



Summary for Pond DMH3: DMH3

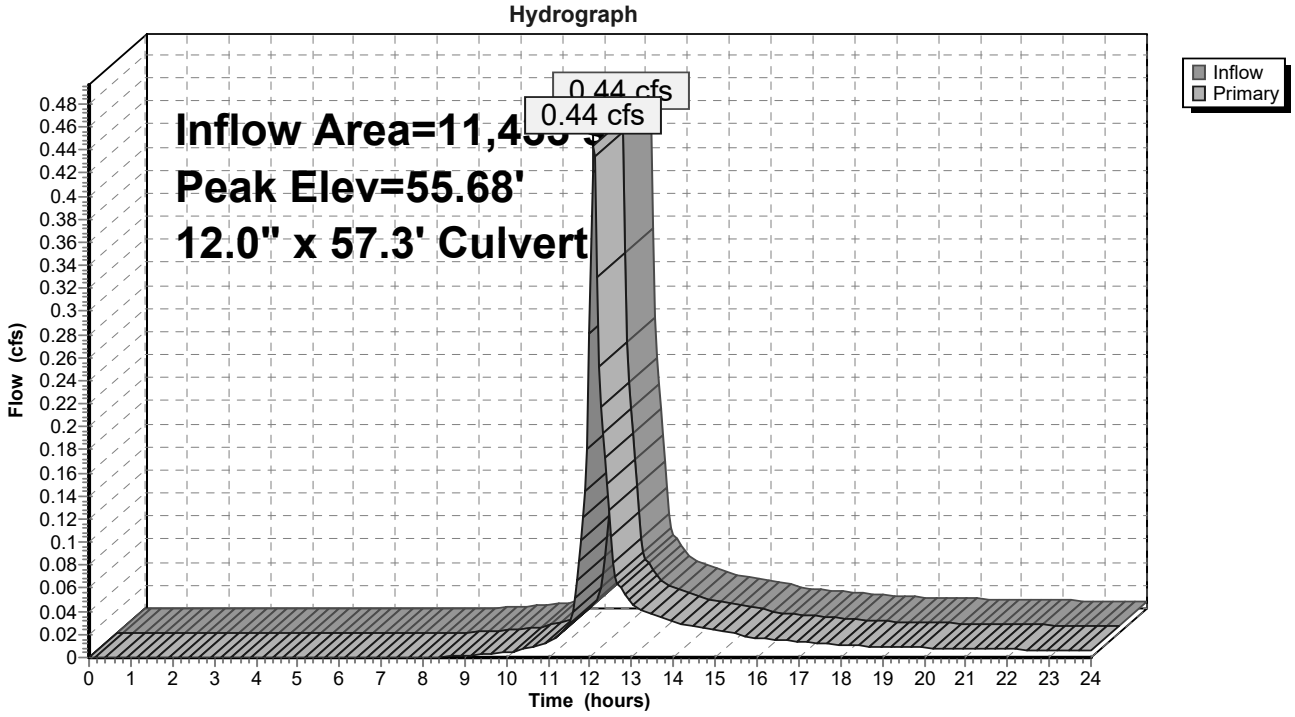
Inflow Area = 11,433 sf, 52.16% Impervious, Inflow Depth > 1.46" for 2 year event
Inflow = 0.44 cfs @ 12.08 hrs, Volume= 1,388 cf
Outflow = 0.44 cfs @ 12.08 hrs, Volume= 1,388 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.44 cfs @ 12.08 hrs, Volume= 1,388 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 55.68' @ 12.08 hrs
Flood Elev= 62.48'

Device	Routing	Invert	Outlet Devices
#1	Primary	55.29'	**12.0" x 57.3' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 55.00' S= 0.0051 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.43 cfs @ 12.08 hrs HW=55.67' TW=51.78' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 0.43 cfs @ 2.31 fps)

Pond DMH3: DMH3



Summary for Pond DMH4: DMH4

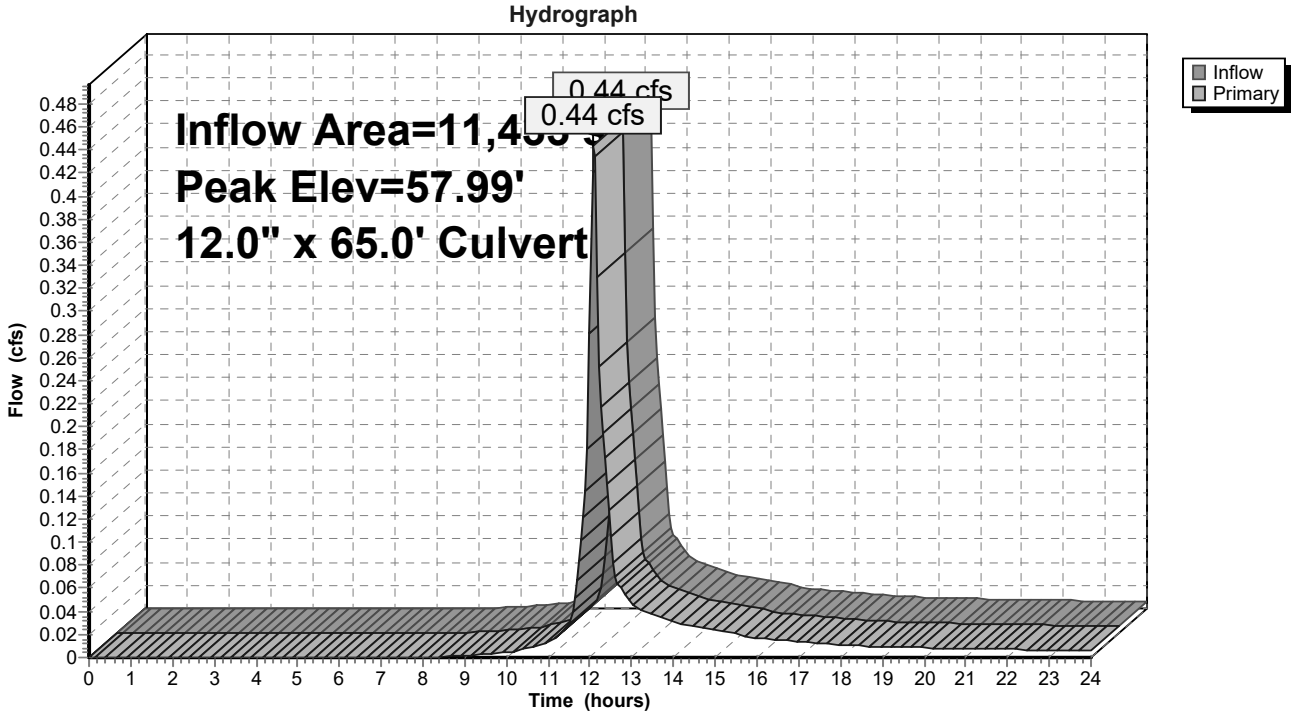
Inflow Area = 11,433 sf, 52.16% Impervious, Inflow Depth > 1.46" for 2 year event
Inflow = 0.44 cfs @ 12.08 hrs, Volume= 1,388 cf
Outflow = 0.44 cfs @ 12.08 hrs, Volume= 1,388 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.44 cfs @ 12.08 hrs, Volume= 1,388 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 57.99' @ 12.08 hrs
Flood Elev= 64.52'

Device	Routing	Invert	Outlet Devices
#1	Primary	57.66'	**12.0" x 65.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 55.39' S= 0.0349 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.43 cfs @ 12.08 hrs HW=57.98' TW=55.67' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 0.43 cfs @ 1.94 fps)

Pond DMH4: DMH4



Summary for Pond DMH5: DMH 5

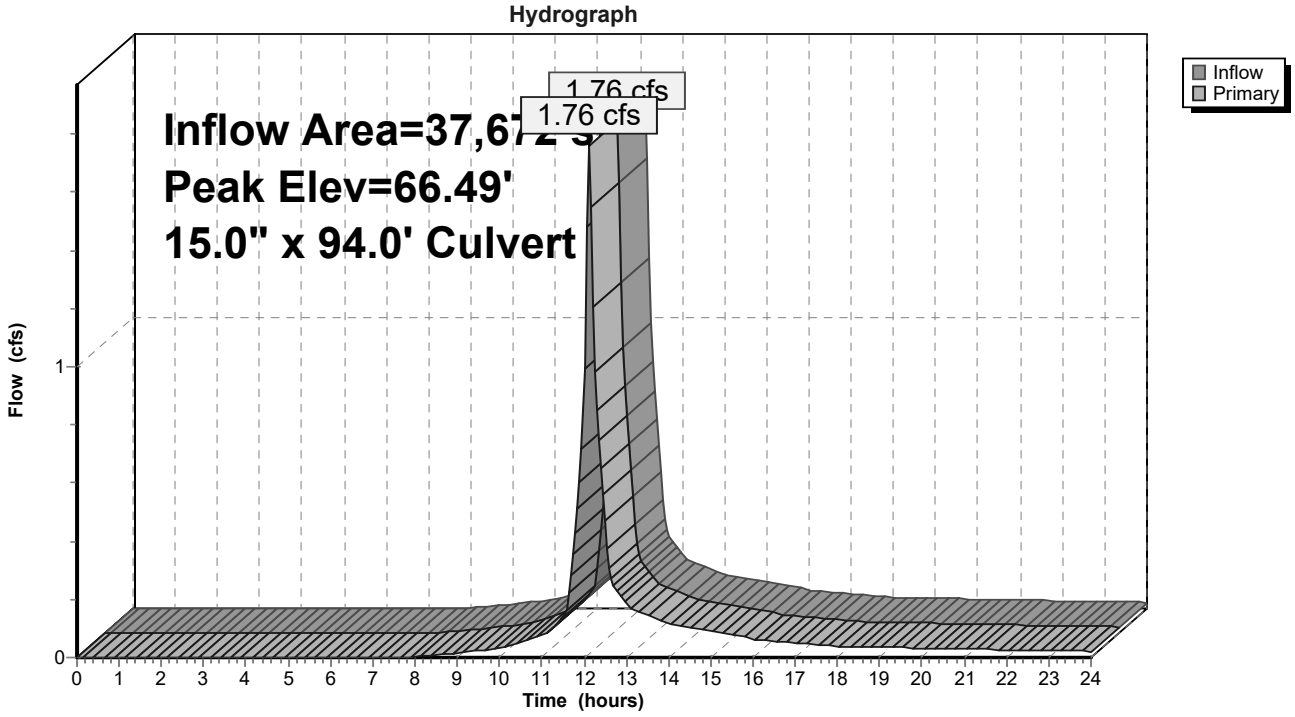
Inflow Area = 37,672 sf, 68.25% Impervious, Inflow Depth > 1.83" for 2 year event
Inflow = 1.76 cfs @ 12.10 hrs, Volume= 5,755 cf
Outflow = 1.76 cfs @ 12.10 hrs, Volume= 5,755 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.76 cfs @ 12.10 hrs, Volume= 5,755 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 66.49' @ 12.12 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=1.64 cfs @ 12.10 hrs HW=66.49' TW=65.97' (Dynamic Tailwater)
└**1=Culvert** (Outlet Controls 1.64 cfs @ 2.93 fps)

Pond DMH5: DMH 5



Summary for Pond DMH7: DMH7

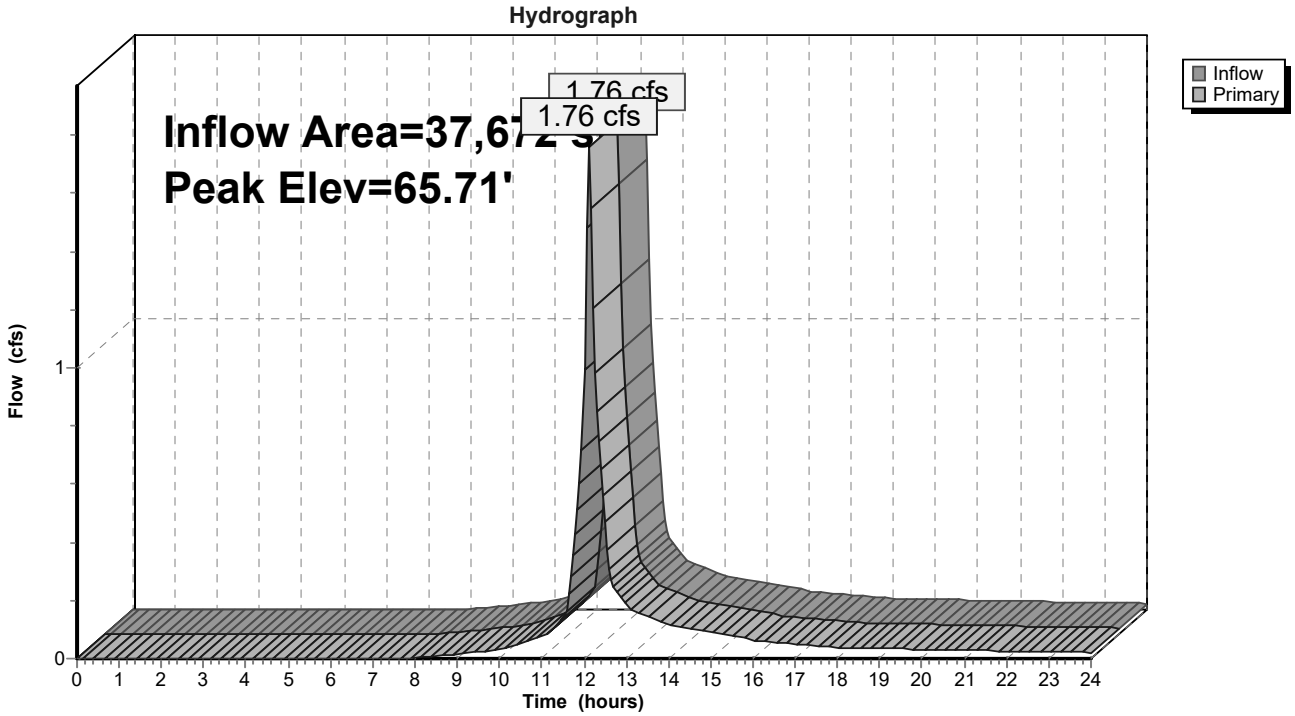
Inflow Area = 37,672 sf, 68.25% Impervious, Inflow Depth > 1.83" for 2 year event
Inflow = 1.76 cfs @ 12.10 hrs, Volume= 5,755 cf
Outflow = 1.76 cfs @ 12.10 hrs, Volume= 5,755 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.76 cfs @ 12.10 hrs, Volume= 5,755 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 65.71' @ 12.48 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=1.74 cfs @ 12.10 hrs HW=65.55' TW=65.28' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 0.74 cfs @ 2.41 fps)
└─**2=Culvert** (Barrel Controls 1.00 cfs @ 2.62 fps)

Pond DMH7: DMH7



Summary for Pond DMH8: DMH8

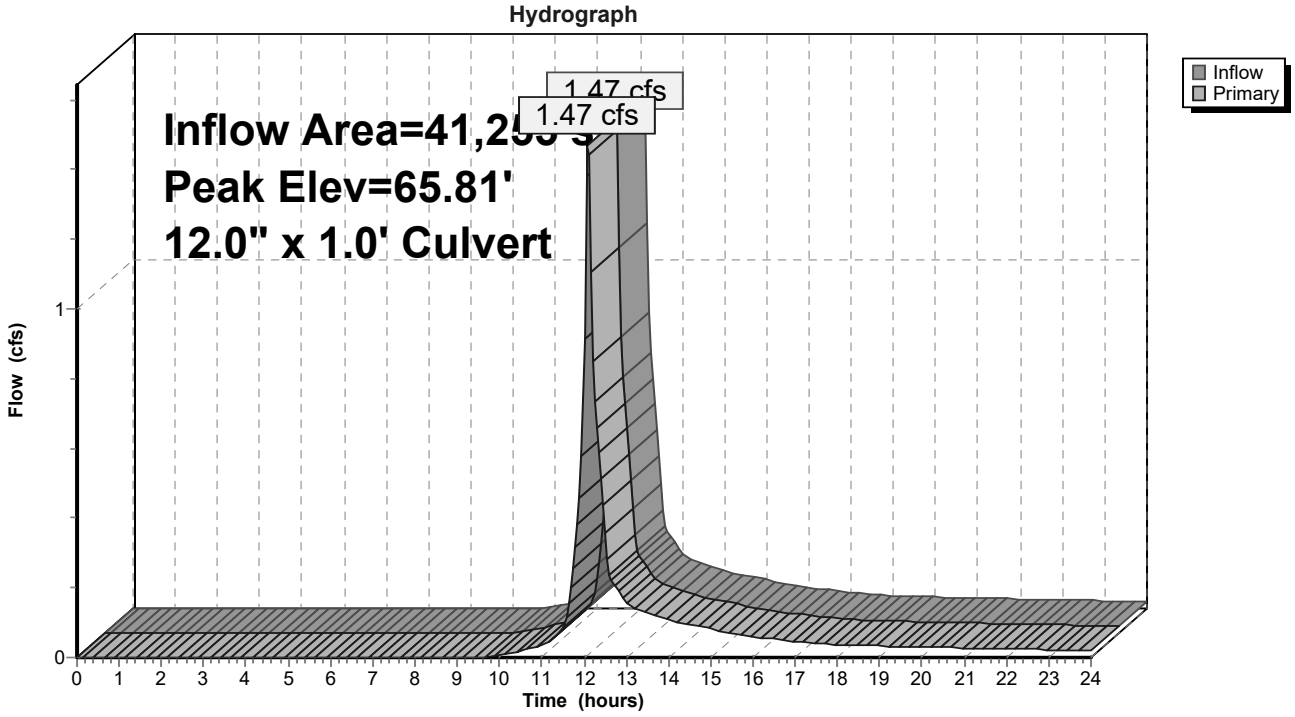
Inflow Area = 41,255 sf, 48.59% Impervious, Inflow Depth > 1.34" for 2 year event
Inflow = 1.47 cfs @ 12.08 hrs, Volume= 4,592 cf
Outflow = 1.47 cfs @ 12.08 hrs, Volume= 4,592 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.47 cfs @ 12.08 hrs, Volume= 4,592 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 65.81' @ 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=1.42 cfs @ 12.08 hrs HW=65.80' TW=65.20' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 1.42 cfs @ 2.90 fps)

Pond DMH8: DMH8



Summary for Pond P1-1: P1-1

Inflow Area = 54,889 sf, 57.55% Impervious, Inflow Depth > 1.61" for 2 year event
Inflow = 2.28 cfs @ 12.09 hrs, Volume= 7,343 cf
Outflow = 0.13 cfs @ 14.82 hrs, Volume= 5,188 cf, Atten= 94%, Lag= 163.9 min
Primary = 0.13 cfs @ 14.82 hrs, Volume= 5,188 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 52.52' @ 14.82 hrs Surf.Area= 3,636 sf Storage= 4,129 cf
Flood Elev= 55.50' Surf.Area= 5,973 sf Storage= 18,004 cf

Plug-Flow detention time= 320.7 min calculated for 5,188 cf (71% of inflow)
Center-of-Mass det. time= 224.2 min (1,052.2 - 828.0)

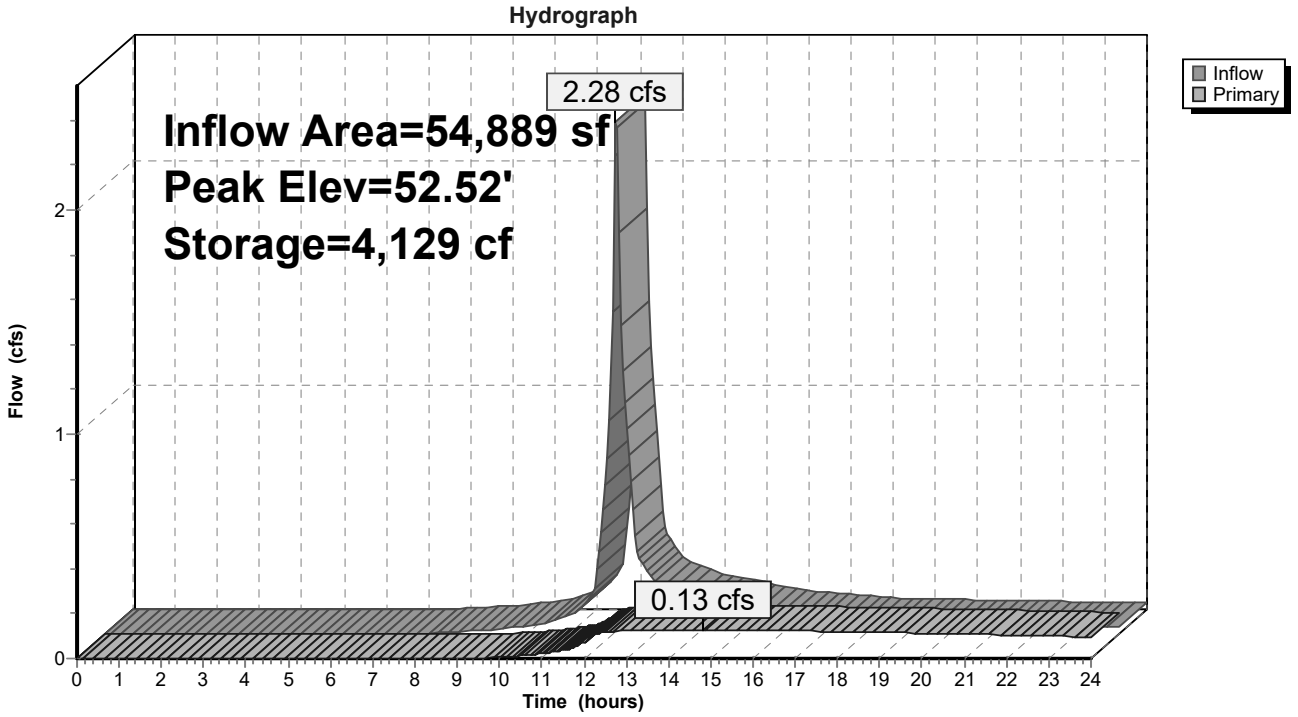
Volume	Invert	Avail.Storage	Storage Description
#1	51.00'	18,004 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

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=0.13 cfs @ 14.82 hrs HW=52.52' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.13 cfs of 3.82 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.13 cfs @ 5.77 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
Inflow
Primary
2.28 cfs
Inflow Area=54,889 sf
Peak Elev=52.52'
Storage=4,129 cf
0.13 cfs
Flow (cfs)
0
1
2
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Time (hours)

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

Inflow Area = 47,228 sf, 25.39% Impervious, Inflow Depth > 0.83" for 2 year event
Inflow = 0.95 cfs @ 12.09 hrs, Volume= 3,256 cf
Outflow = 0.02 cfs @ 24.00 hrs, Volume= 685 cf, Atten= 98%, Lag= 714.5 min
Primary = 0.02 cfs @ 24.00 hrs, Volume= 685 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 57.47' @ 24.00 hrs Surf.Area= 5,847 sf Storage= 2,571 cf
Flood Elev= 59.75' Surf.Area= 8,697 sf Storage= 15,495 cf

Plug-Flow detention time= 379.6 min calculated for 684 cf (21% of inflow)
Center-of-Mass det. time= 226.5 min (1,100.7 - 874.2)

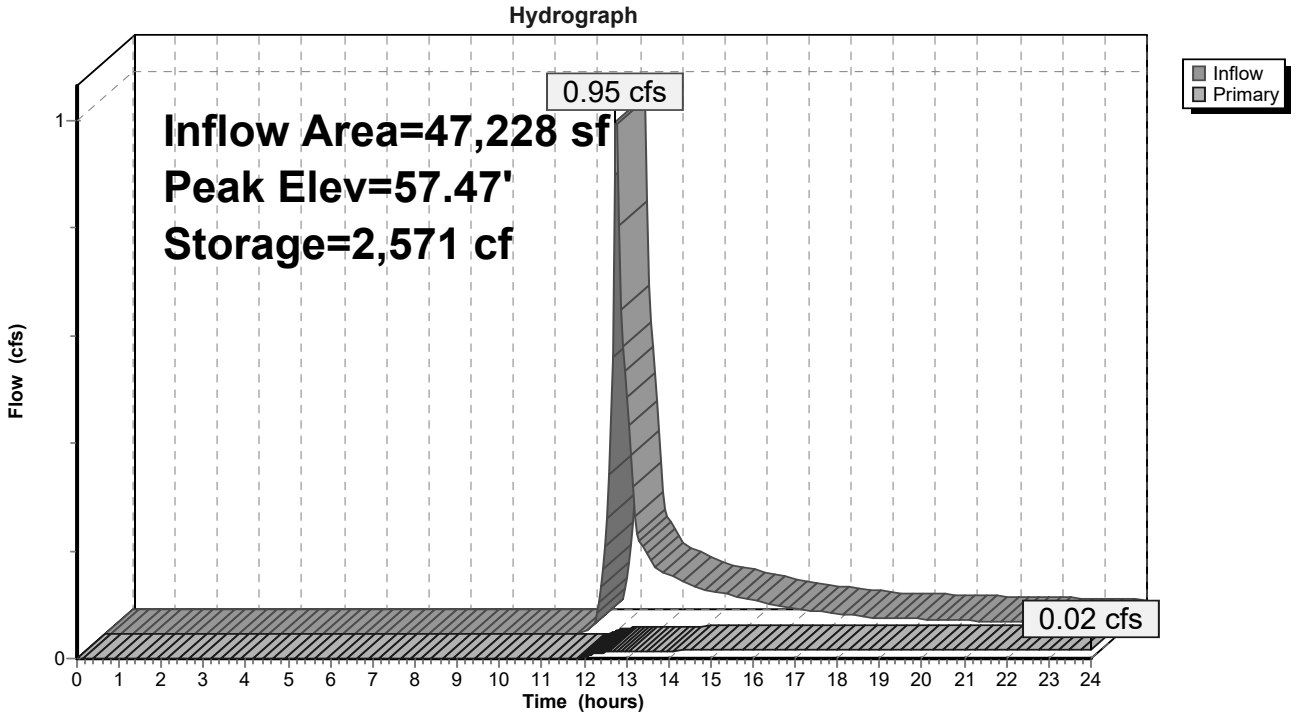
Volume	Invert	Avail.Storage	Storage Description
#1	57.00'	15,495 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
57.00	5,117	0	0
58.00	6,673	5,895	5,895
58.50	7,472	3,536	9,431
59.25	8,697	6,063	15,495

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 @ 24.00 hrs HW=57.47' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Passes 0.02 cfs of 0.84 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 0.02 cfs @ 3.15 fps)
- **3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond P1-2: DP-1-2



Summary for Pond P1-3: P1-3

Inflow Area = 7,345 sf, 68.78% Impervious, Inflow Depth > 1.90" for 2 year event
Inflow = 0.37 cfs @ 12.08 hrs, Volume= 1,164 cf
Outflow = 0.05 cfs @ 12.68 hrs, Volume= 1,019 cf, Atten= 87%, Lag= 36.0 min
Primary = 0.05 cfs @ 12.68 hrs, Volume= 1,019 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 50.93' @ 12.68 hrs Surf.Area= 1,505 sf Storage= 566 cf
Flood Elev= 54.27' Surf.Area= 1,400 sf Storage= 1,861 cf

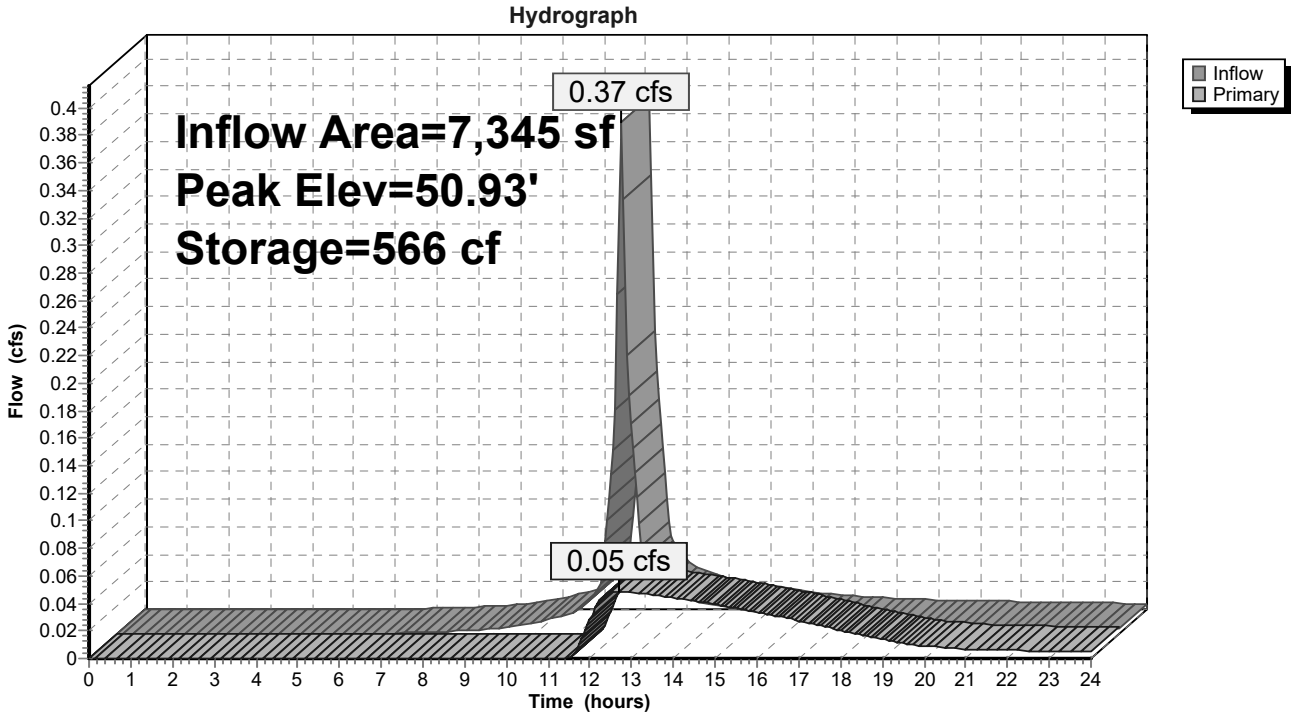
Plug-Flow detention time= 180.1 min calculated for 1,017 cf (87% of inflow)
Center-of-Mass det. time= 123.9 min (938.6 - 814.6)

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'	**1.5" 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=0.05 cfs @ 12.68 hrs HW=50.93' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.05 cfs of 1.56 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.05 cfs @ 3.93 fps)
  └─**3=Orifice/Grate** (Controls 0.00 cfs)

Pond P1-3: P1-3


Hydrograph
Inflow
Primary
0.37 cfs
0.05 cfs
Inflow Area=7,345 sf
Peak Elev=50.93'
Storage=566 cf
Flow (cfs)
Time (hours)

Summary for Pond P3-1: P3-2

Inflow Area = 78,927 sf, 57.97% Impervious, Inflow Depth > 1.57" for 2 year event
Inflow = 3.21 cfs @ 12.09 hrs, Volume= 10,347 cf
Outflow = 1.02 cfs @ 12.44 hrs, Volume= 7,881 cf, Atten= 68%, Lag= 21.0 min
Primary = 1.02 cfs @ 12.44 hrs, Volume= 7,881 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 65.70' @ 12.44 hrs Surf.Area= 3,825 sf Storage= 4,110 cf
Flood Elev= 70.00' Surf.Area= 3,825 sf Storage= 13,172 cf

Plug-Flow detention time= 155.2 min calculated for 7,865 cf (76% of inflow)
Center-of-Mass det. time= 69.6 min (902.0 - 832.5)

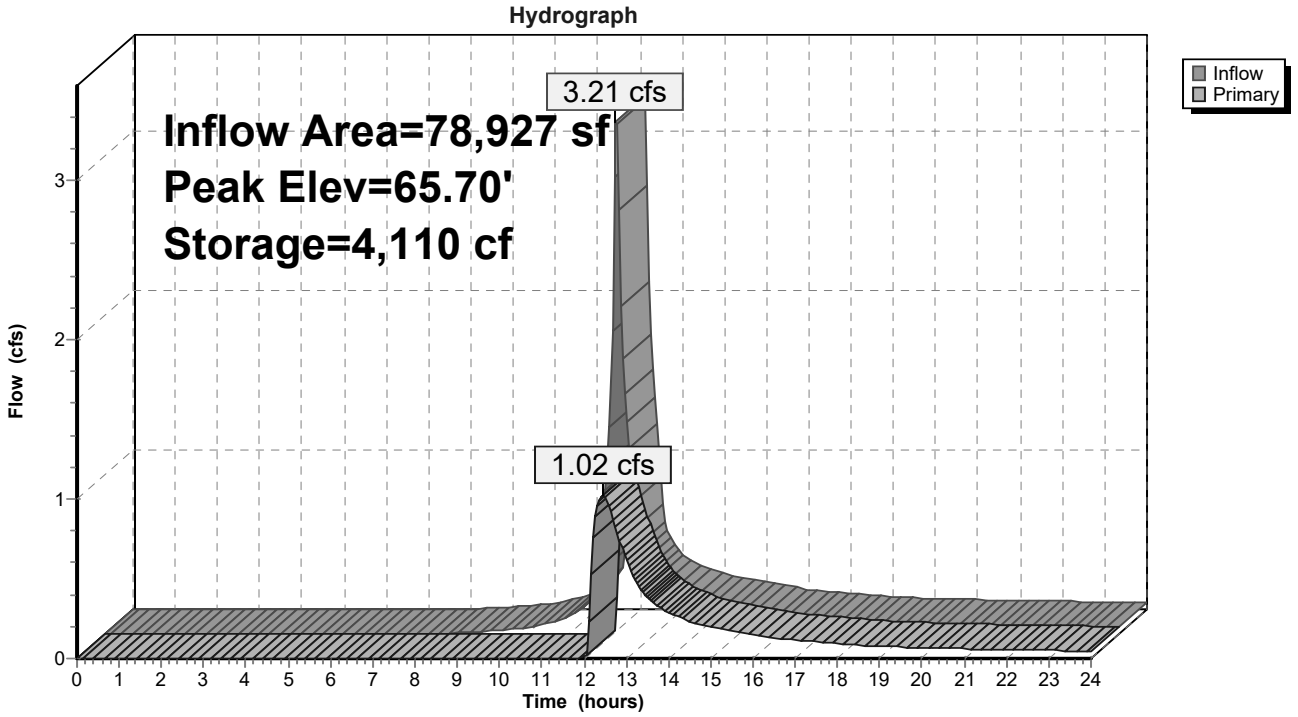
Volume	Invert	Avail.Storage	Storage Description
#1	64.00'	4,658 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc) 22,950 cf Overall - 11,304 cf Embedded = 11,646 cf x 40.0% Voids
#2	64.50'	8,514 cf	**52.8"W x 48.0"H x 4.00'L Galley 4x4x4** x 192 Inside #1
		13,172 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
64.00	3,825	0	0
70.00	3,825	22,950	22,950

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=1.02 cfs @ 12.44 hrs HW=65.70' TW=61.48' (Dynamic Tailwater)
└─**1=Culvert** (Passes 1.02 cfs of 6.13 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 1.02 cfs @ 2.92 fps)
  └─**3=Orifice/Grate** (Controls 0.00 cfs)

Pond P3-1: P3-2


Hydrograph
Inflow
Primary
3.21 cfs
1.02 cfs
Inflow Area=78,927 sf
Peak Elev=65.70'
Storage=4,110 cf
Flow (cfs)
0
1
2
3
Time (hours)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

Summary for Pond P3-2: P3-3

Inflow Area = 150,527 sf, 46.94% Impervious, Inflow Depth > 1.12" for 2 year event
Inflow = 2.14 cfs @ 12.12 hrs, Volume= 14,065 cf
Outflow = 0.20 cfs @ 16.59 hrs, Volume= 6,807 cf, Atten= 90%, Lag= 268.3 min
Primary = 0.20 cfs @ 16.59 hrs, Volume= 6,807 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 52.12' @ 16.59 hrs Surf.Area= 5,585 sf Storage= 8,439 cf
Flood Elev= 55.50' Surf.Area= 12,548 sf Storage= 38,610 cf

Plug-Flow detention time= 335.1 min calculated for 6,792 cf (48% of inflow)
Center-of-Mass det. time= 199.4 min (1,083.3 - 884.0)

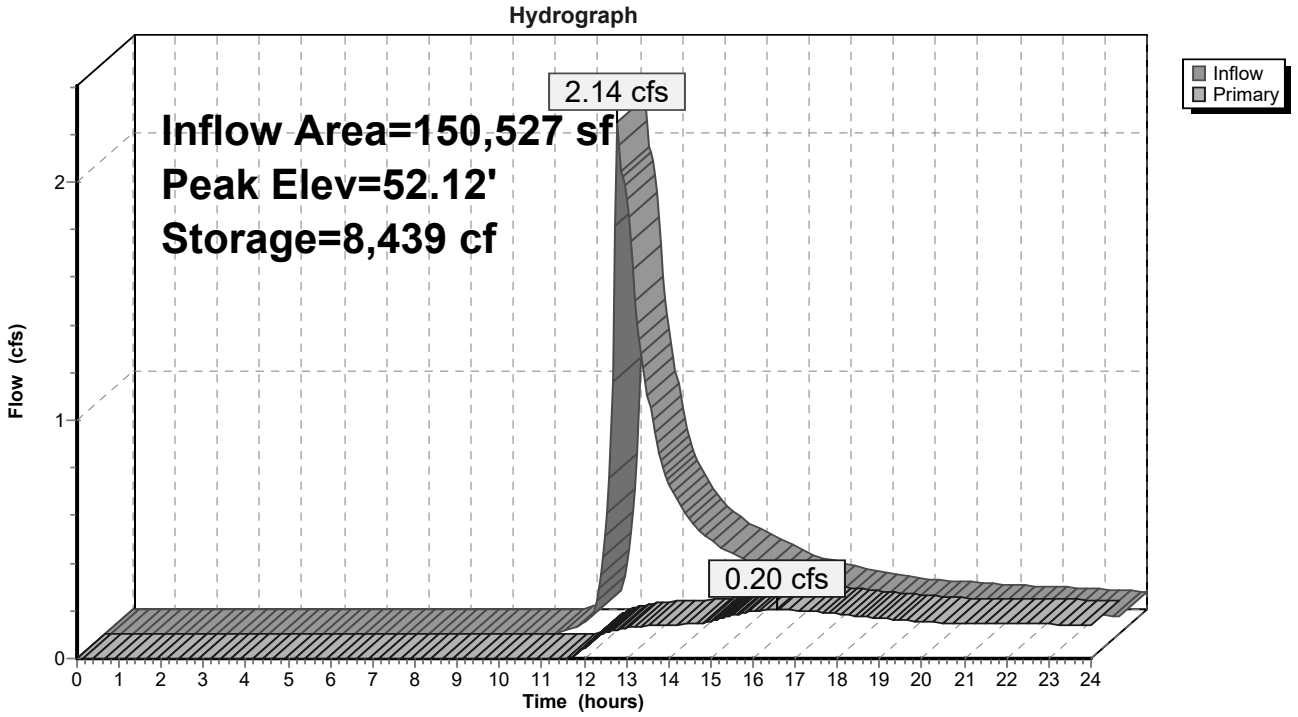
Volume	Invert	Avail.Storage	Storage Description
#1	50.00'	38,610 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

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'	**9.0" Vert. Orifice/Grate** C= 0.600
#4	Device 1	52.50'	**8.0" Vert. Orifice/Grate** C= 0.600
#5	Device 1	54.00'	**2.00' x 2.00' Horiz. Orifice/Grate** Limited to weir flow C= 0.600
#6	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=0.20 cfs @ 16.59 hrs HW=52.12' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Passes 0.20 cfs of 4.81 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 0.15 cfs @ 6.87 fps)
  - **3=Orifice/Grate** (Orifice Controls 0.05 cfs @ 1.18 fps)
  - **4=Orifice/Grate** (Controls 0.00 cfs)
  - **5=Orifice/Grate** (Controls 0.00 cfs)
- **6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond P3-2: P3-3

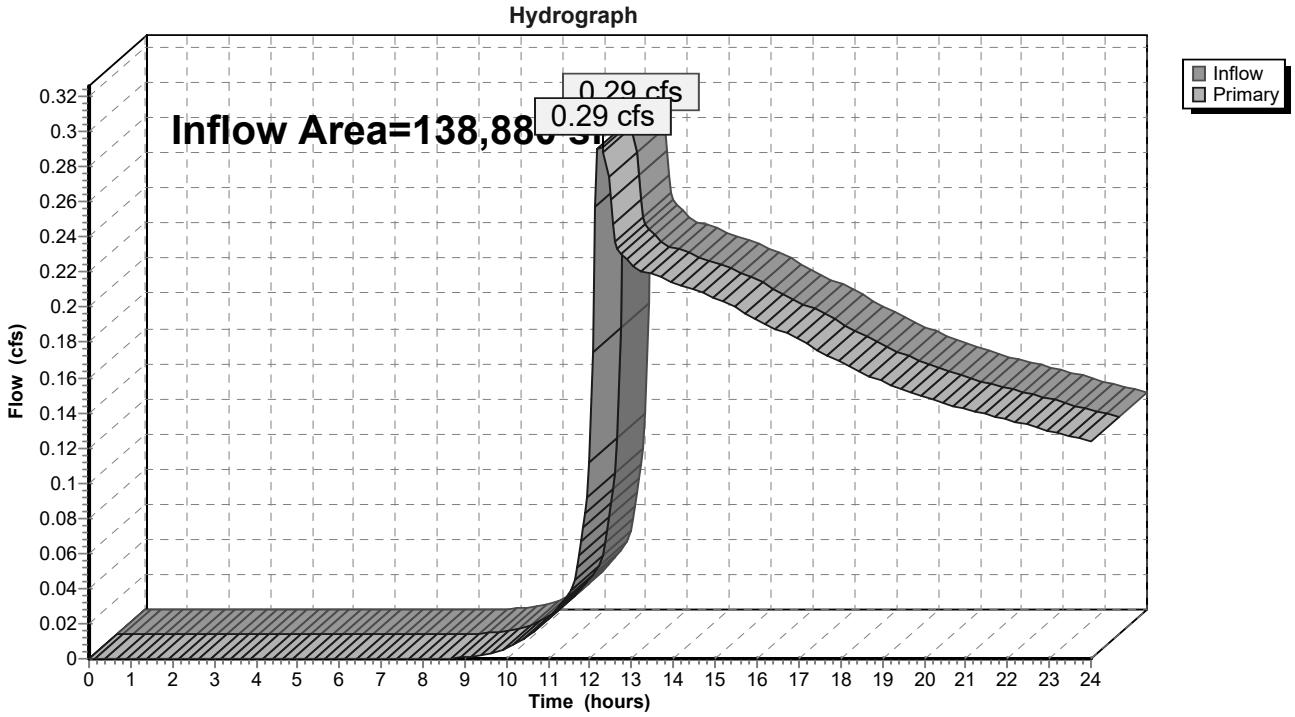

Hydrograph
Inflow
Primary
2.14 cfs
Inflow Area=150,527 sf
Peak Elev=52.12'
Storage=8,439 cf
0.20 cfs
Flow (cfs)
0
1
2
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Time (hours)

Summary for Link DP-1: DP-1

Inflow Area = 138,880 sf, 35.07% Impervious, Inflow Depth > 0.67" for 2 year event
Inflow = 0.29 cfs @ 12.29 hrs, Volume= 7,789 cf
Primary = 0.29 cfs @ 12.29 hrs, Volume= 7,789 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

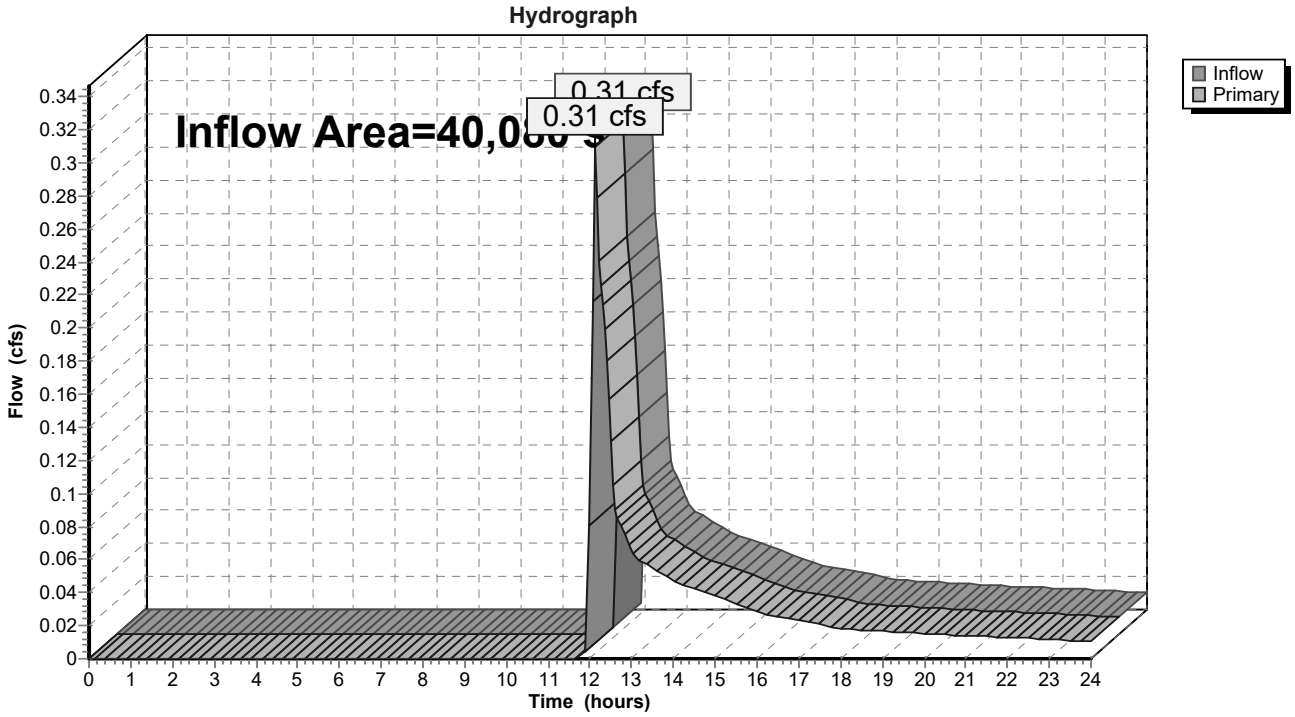


Summary for Link DP-2: DP-2

Inflow Area = 40,080 sf, 11.21% Impervious, Inflow Depth > 0.44" for 2 year event
Inflow = 0.31 cfs @ 12.11 hrs, Volume= 1,481 cf
Primary = 0.31 cfs @ 12.11 hrs, Volume= 1,481 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

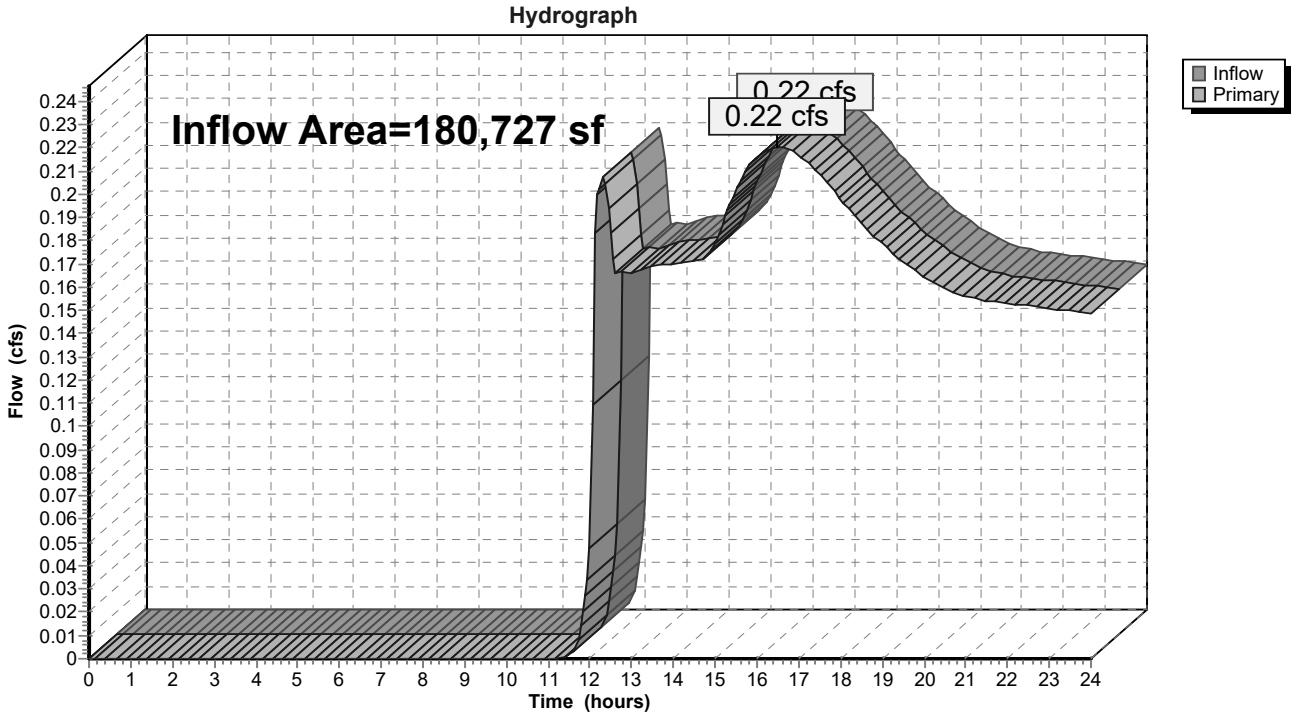


Summary for Link DP-3: DP-3

Inflow Area = 180,727 sf, 39.09% Impervious, Inflow Depth > 0.51" for 2 year event
Inflow = 0.22 cfs @ 16.50 hrs, Volume= 7,664 cf
Primary = 0.22 cfs @ 16.50 hrs, Volume= 7,664 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

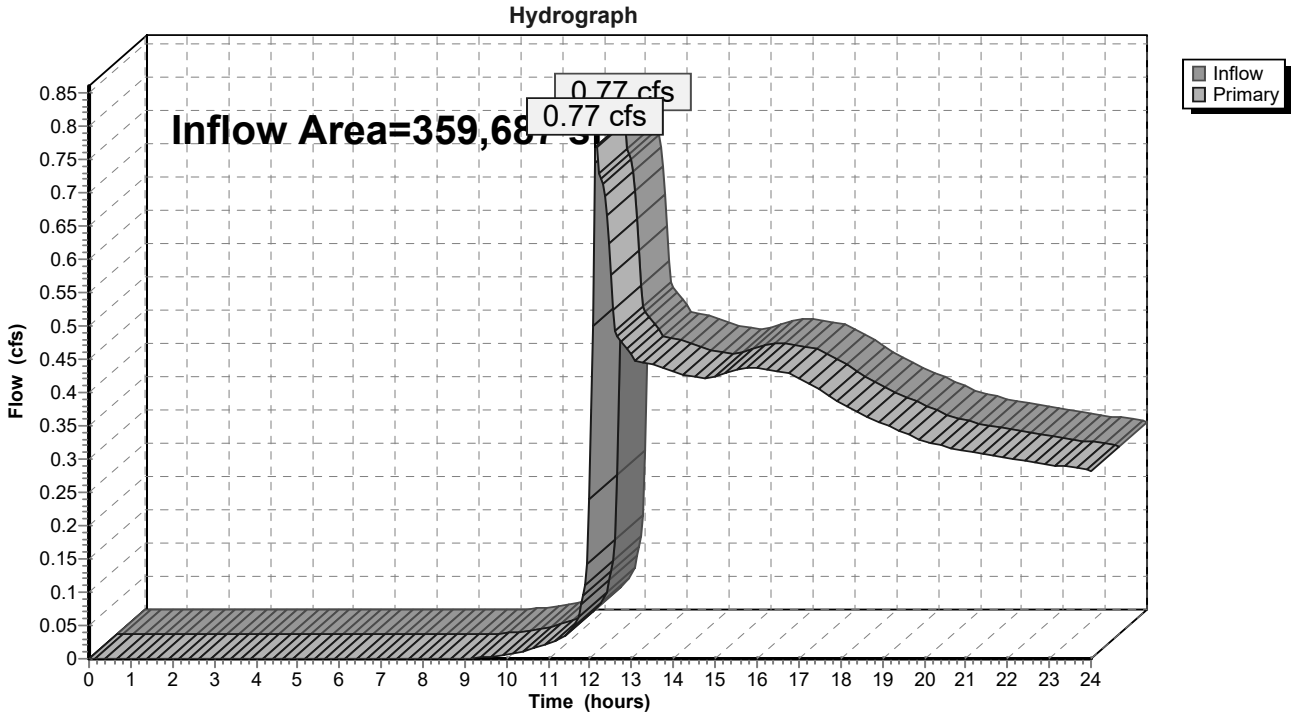


Summary for Link TOTAL: (new Link)

Inflow Area = 359,687 sf, 34.43% Impervious, Inflow Depth > 0.56" for 2 year event
Inflow = 0.77 cfs @ 12.14 hrs, Volume= 16,934 cf
Primary = 0.77 cfs @ 12.14 hrs, Volume= 16,934 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)



RANGER
ENGINEERING &
DESIGN, LLC

STORMWATER MANAGEMENT REPORT

POST-DEVELOPMENT DRAINAGE

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-1B Runoff Area=7,118 sf 74.36% Impervious Runoff Depth>3.58"
Flow Length=319' Tc=8.6 min CN=89 Runoff=0.60 cfs 2,121 cf

Subcatchment P-1C: P-1C Runoff Area=3,632 sf 56.17% Impervious Runoff Depth>2.90"
Flow Length=96' Tc=5.0 min CN=82 Runoff=0.28 cfs 877 cf

Subcatchment P-1D: P-1D Runoff Area=3,713 sf 81.12% Impervious Runoff Depth>3.79"
Flow Length=96' Slope=0.0100 '/' Tc=5.0 min CN=91 Runoff=0.37 cfs 1,171 cf

Subcatchment P-1E: P-1E Runoff Area=15,678 sf 38.38% Impervious Runoff Depth>2.29"
Flow Length=100' Tc=5.0 min CN=75 Runoff=0.96 cfs 2,987 cf

Subcatchment P-1F: P-1F Runoff Area=20,660 sf 69.29% Impervious Runoff Depth>3.38"
Flow Length=380' Tc=5.0 min CN=87 Runoff=1.86 cfs 5,815 cf

Subcatchment P-1G: P-1G Runoff Area=5,772 sf 64.26% Impervious Runoff Depth>3.18"
Flow Length=90' Tc=5.0 min CN=85 Runoff=0.49 cfs 1,530 cf

Subcatchment P-1H: P-1H Runoff Area=5,661 sf 39.83% Impervious Runoff Depth>2.37"
Flow Length=130' Tc=5.0 min CN=76 Runoff=0.36 cfs 1,118 cf

Subcatchment P-1I: P-1I Runoff Area=47,228 sf 25.39% Impervious Runoff Depth>1.89"
Flow Length=145' Tc=5.0 min CN=70 Runoff=2.36 cfs 7,429 cf

Subcatchment P-1J: P1-J Runoff Area=27,093 sf 0.25% Impervious Runoff Depth>1.12"
Flow Length=280' Tc=6.3 min CN=59 Runoff=0.69 cfs 2,531 cf

Subcatchment P-2A: P-2A Runoff Area=40,080 sf 11.21% Impervious Runoff Depth>1.25"
Flow Length=140' Tc=5.0 min CN=61 Runoff=1.22 cfs 4,173 cf

Subcatchment P-3A: P-3A Runoff Area=30,200 sf 0.00% Impervious Runoff Depth>1.06"
Flow Length=230' Tc=5.0 min CN=58 Runoff=0.74 cfs 2,666 cf

Subcatchment P-3B: P-3B Runoff Area=71,600 sf 34.77% Impervious Runoff Depth>2.20"
Flow Length=370' Tc=5.4 min CN=74 Runoff=4.20 cfs 13,150 cf

Subcatchment P-3C: P-3C Runoff Area=41,255 sf 48.59% Impervious Runoff Depth>2.63"
Flow Length=280' Tc=5.0 min CN=79 Runoff=2.92 cfs 9,036 cf

Subcatchment P-3D: P-3D Runoff Area=33,144 sf 68.21% Impervious Runoff Depth>3.28"
Flow Length=240' Tc=7.3 min CN=86 Runoff=2.73 cfs 9,052 cf

Subcatchment P-3E: P-3F Runoff Area=4,528 sf 68.55% Impervious Runoff Depth>3.28"
Flow Length=140' Tc=5.0 min CN=86 Runoff=0.40 cfs 1,237 cf

Pond 3P: INFILTRATOR Peak Elev=0.00' Storage=0 cf

Pond CB1: CB1 Peak Elev=51.62' Inflow=0.28 cfs 877 cf
8.0" x 9.0' Culvert Outflow=0.28 cfs 877 cf

Pond CB2: CB2 Peak Elev=51.62' Inflow=0.37 cfs 1,171 cf
8.0" x 9.0' Culvert Outflow=0.37 cfs 1,171 cf

Pond CB3: CB3 Peak Elev=53.26' Inflow=0.60 cfs 2,121 cf
12.0" x 12.0' Culvert Outflow=0.60 cfs 2,121 cf

Pond CB4: CB4 Peak Elev=53.41' Inflow=1.86 cfs 5,815 cf
12.0" x 11.0' Culvert Outflow=1.86 cfs 5,815 cf

Pond CB5: CB5 Peak Elev=58.34' Inflow=0.36 cfs 1,118 cf
12.0" x 23.9' Culvert Outflow=0.36 cfs 1,118 cf

Pond CB6: CB6 Peak Elev=58.38' Inflow=0.49 cfs 1,530 cf
12.0" x 15.9' Culvert Outflow=0.49 cfs 1,530 cf

Pond CB7: CB7 Peak Elev=67.26' Inflow=2.73 cfs 9,052 cf
12.0" x 20.0' Culvert Outflow=2.73 cfs 9,052 cf

Pond CB8: CB8 Peak Elev=66.88' Inflow=0.40 cfs 1,237 cf
12.0" x 20.0' Culvert Outflow=0.40 cfs 1,237 cf

Pond CB9: CB9 Peak Elev=66.91' Inflow=2.92 cfs 9,036 cf
12.0" x 22.0' Culvert Outflow=2.92 cfs 9,036 cf

Pond DMH 10: DMH9 Peak Elev=61.70' Inflow=2.04 cfs 16,770 cf
15.0" x 100.0' Culvert Outflow=2.04 cfs 16,770 cf

Pond DMH 11: DMH 10 Peak Elev=56.01' Inflow=2.04 cfs 16,770 cf
15.0" x 33.0' Culvert Outflow=2.04 cfs 16,770 cf

Pond DMH 6: DMH 6 Peak Elev=66.84' Inflow=3.11 cfs 10,289 cf
15.0" x 55.0' Culvert Outflow=3.11 cfs 10,289 cf

Pond DMH2: DMH2 Peak Elev=53.23' Inflow=2.41 cfs 7,936 cf
12.0" x 39.0' Culvert Outflow=2.41 cfs 7,936 cf

Pond DMH3: DMH3 Peak Elev=55.84' Inflow=0.85 cfs 2,648 cf
12.0" x 57.3' Culvert Outflow=0.85 cfs 2,648 cf

Pond DMH4: DMH4 Peak Elev=58.13' Inflow=0.85 cfs 2,648 cf
12.0" x 65.0' Culvert Outflow=0.85 cfs 2,648 cf

Pond DMH5: DMH 5 Peak Elev=66.88' Inflow=3.11 cfs 10,289 cf
15.0" x 94.0' Culvert Outflow=3.11 cfs 10,289 cf

Pond DMH7: DMH7 Peak Elev=66.82' Inflow=3.11 cfs 10,289 cf
Outflow=3.11 cfs 10,289 cf

Pond DMH8: DMH8	Peak Elev=66.86' Inflow=2.92 cfs 9,036 cf 12.0" x 1.0' Culvert Outflow=2.92 cfs 9,036 cf
Pond P1-1: P1-1	Peak Elev=53.16' Storage=6,589 cf Inflow=4.22 cfs 13,572 cf Outflow=0.74 cfs 9,884 cf
Pond P1-2: DP-1-2	Peak Elev=58.07' Storage=6,341 cf Inflow=2.36 cfs 7,429 cf Outflow=0.03 cfs 1,088 cf
Pond P1-3: P1-3	Peak Elev=51.62' Storage=1,023 cf Inflow=0.65 cfs 2,049 cf Outflow=0.07 cfs 1,891 cf
Pond P3-1: P3-2	Peak Elev=66.80' Storage=7,180 cf Inflow=5.99 cfs 19,326 cf Outflow=2.04 cfs 16,770 cf
Pond P3-2: P3-3	Peak Elev=52.73' Storage=12,199 cf Inflow=5.74 cfs 29,920 cf Outflow=1.62 cfs 21,812 cf
Link DP-1: DP-1	Inflow=1.07 cfs 15,576 cf Primary=1.07 cfs 15,576 cf
Link DP-2: DP-2	Inflow=1.22 cfs 4,173 cf Primary=1.22 cfs 4,173 cf
Link DP-3: DP-3	Inflow=1.72 cfs 24,478 cf Primary=1.72 cfs 24,478 cf
Link TOTAL: (new Link)	Inflow=3.00 cfs 44,227 cf Primary=3.00 cfs 44,227 cf

Total Runoff Area = 359,687 sf Runoff Volume = 65,077 cf Average Runoff Depth = 2.17"
65.57% Pervious = 235,843 sf 34.43% Impervious = 123,844 sf

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

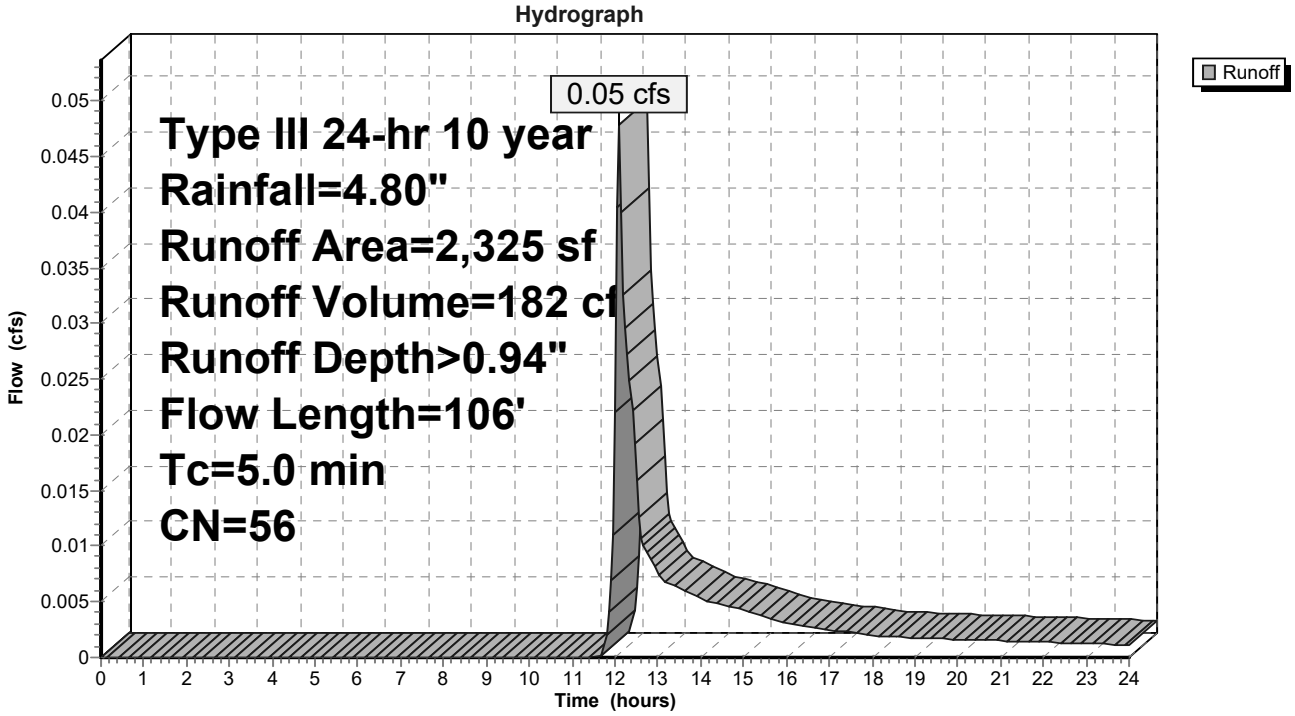
Runoff = 0.05 cfs @ 12.10 hrs, Volume= 182 cf, Depth> 0.94"

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



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

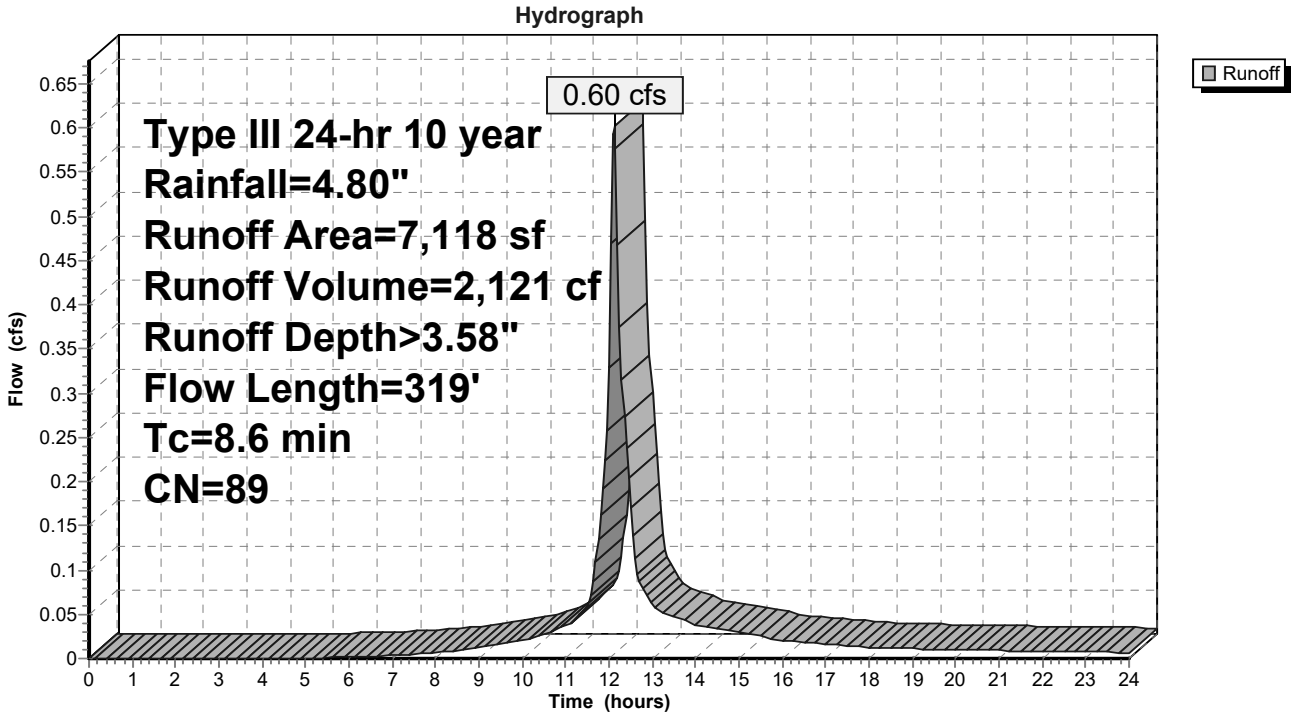
Runoff = 0.60 cfs @ 12.12 hrs, Volume= 2,121 cf, Depth> 3.58"

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
5,293	98	Paved roads w/curbs & sewers, HSG B
1,825	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
0	98	Water Surface, HSG B
7,118	89	Weighted Average
1,825		Pervious Area
5,293		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0					**Direct Entry, DIRECT**
4.8	50	0.0300	0.17		**Sheet Flow, SHEET FLOW** Grass: Short n= 0.150 P2= 3.20"
2.9	60	0.0025	0.35		**Shallow Concentrated Flow, SHALLOW GRASS** Short Grass Pasture Kv= 7.0 fps
0.9	209	0.0350	3.80		**Shallow Concentrated Flow, SHALLOW PAVE** Paved Kv= 20.3 fps
8.6	319	Total			

Subcatchment P-1B: P-1B



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

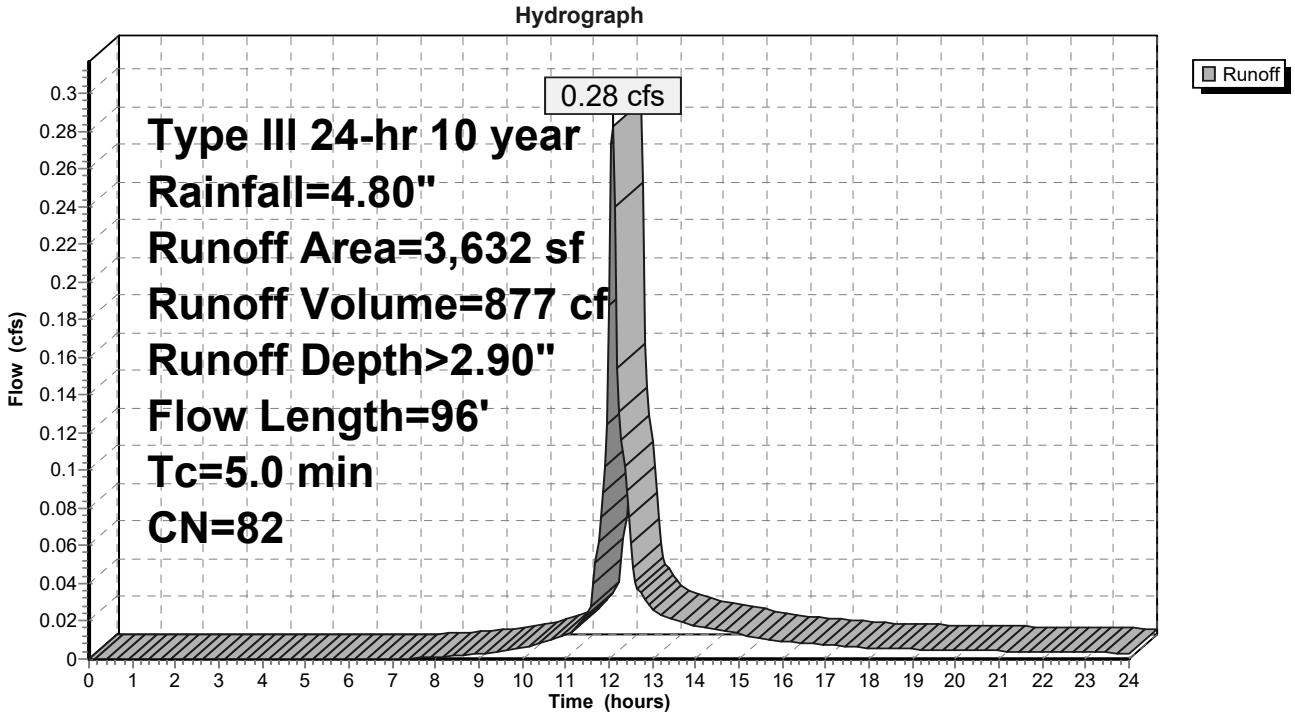
Runoff = 0.28 cfs @ 12.08 hrs, Volume= 877 cf, Depth> 2.90"

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
2.8	50	0.1100	0.29		**Sheet Flow, SHEET** Grass: Short n= 0.150 P2= 3.20"
0.2	46	0.0300	3.52		**Shallow Concentrated Flow, PAVEMENT** Paved Kv= 20.3 fps
2.0					**Direct Entry, DIRECT**
5.0	96	Total			

Subcatchment P-1C: P-1C



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

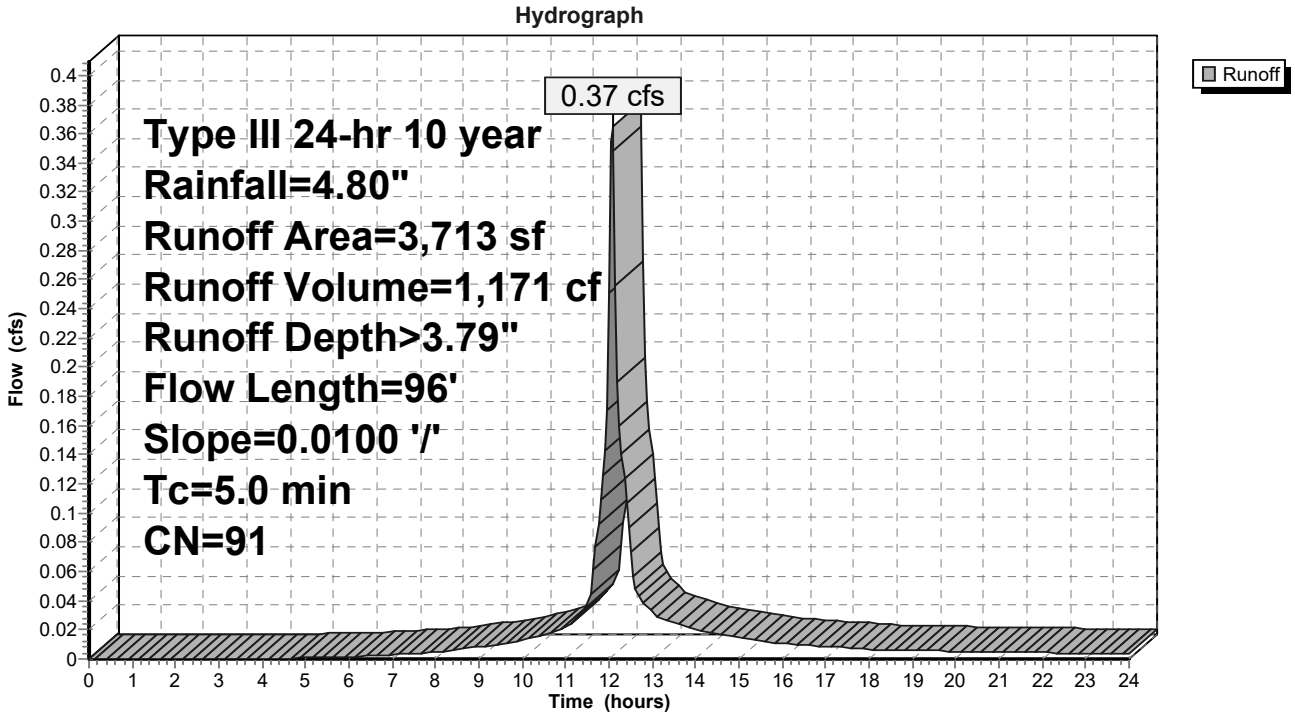
Runoff = 0.37 cfs @ 12.07 hrs, Volume= 1,171 cf, Depth> 3.79"

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
0.9	50	0.0100	0.91		**Sheet Flow, SHEET** Smooth surfaces n= 0.011 P2= 3.20"
0.4	46	0.0100	2.03		**Shallow Concentrated Flow, PAVEMENT** Paved Kv= 20.3 fps
3.7					**Direct Entry, DIRECT**
5.0	96	Total			

Subcatchment P-1D: P-1D



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

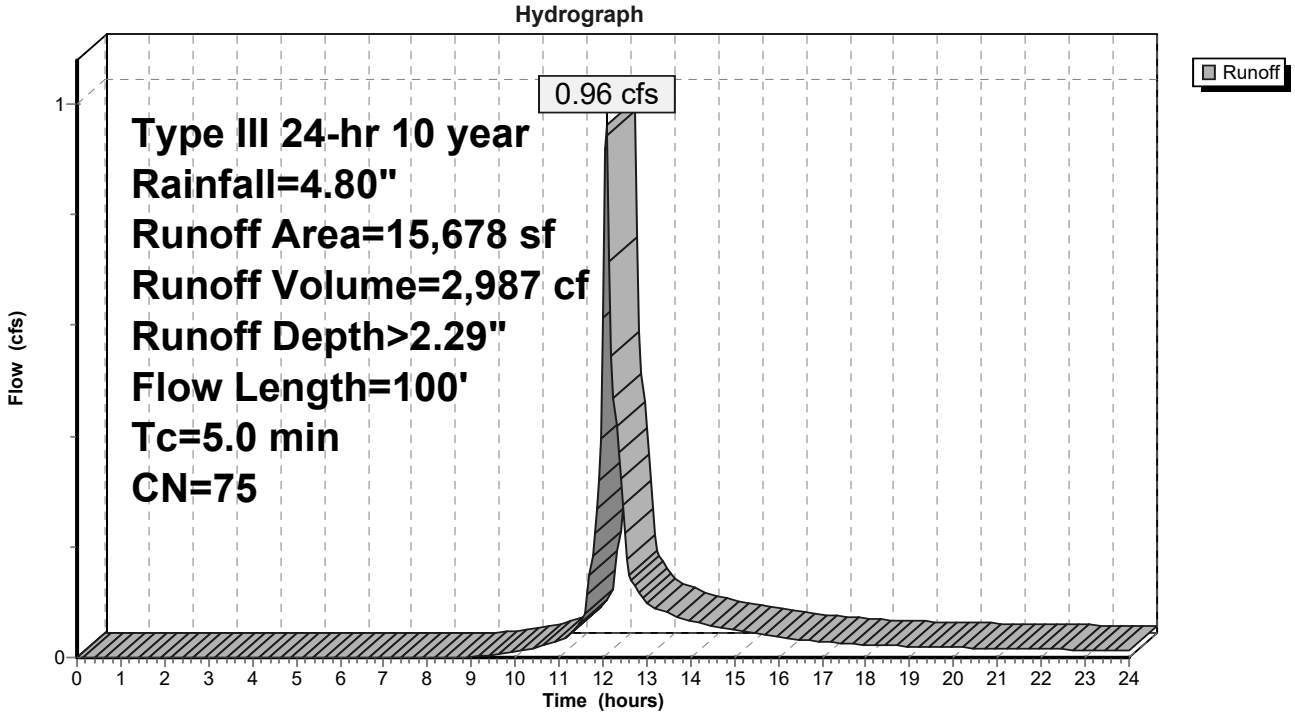
Runoff = 0.96 cfs @ 12.08 hrs, Volume= 2,987 cf, Depth> 2.29"

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
880	98	Roofs, HSG B
0	98	Paved parking, HSG B
210	98	Paved roads w/curbs & sewers, HSG B
8,660	61	>75% Grass cover, Good, HSG B
4,928	98	Water Surface, HSG B
1,000	55	Woods, Good, HSG B
15,678	75	Weighted Average
9,660		Pervious Area
6,018		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2					**Direct Entry, DIRECT**
3.6	50	0.0600	0.23		**Sheet Flow, SHEET** Grass: Short n= 0.150 P2= 3.20"
0.2	50	0.2700	3.64		**Shallow Concentrated Flow, SHALLOW GRASS** Short Grass Pasture Kv= 7.0 fps
5.0	100	Total			

Subcatchment P-1E: P-1E



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

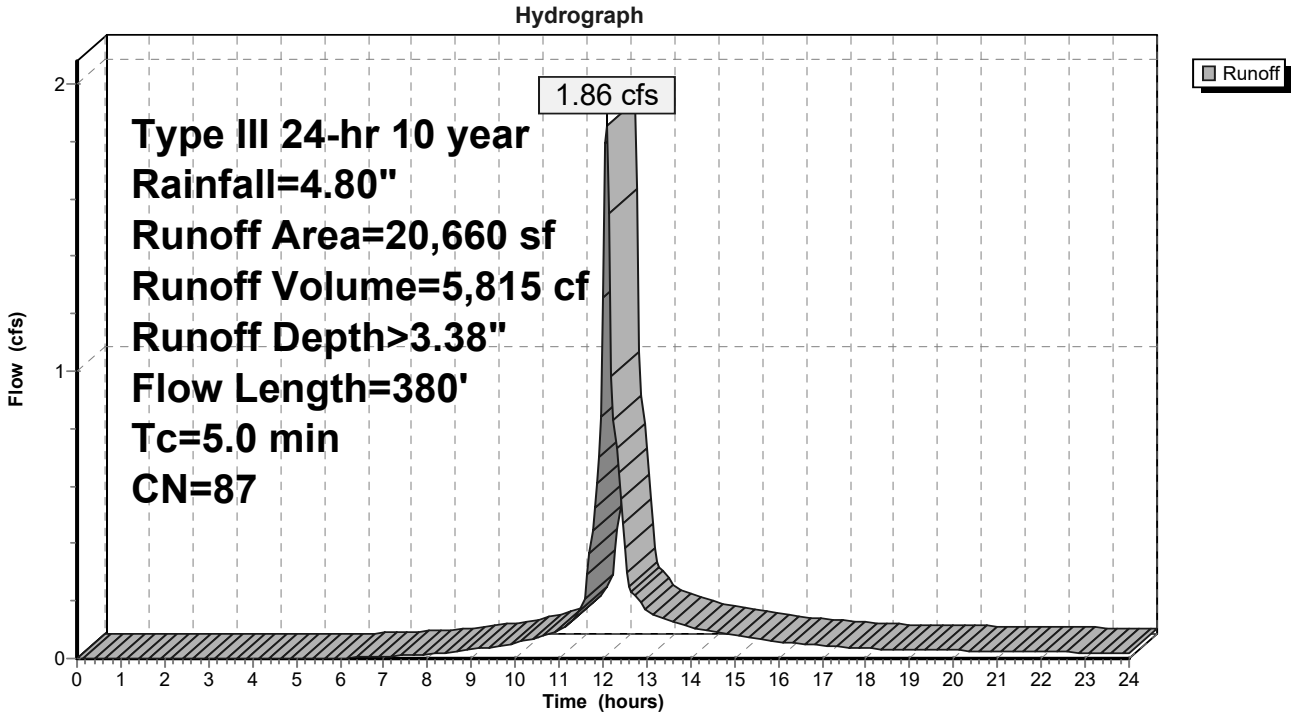
Runoff = 1.86 cfs @ 12.07 hrs, Volume= 5,815 cf, Depth> 3.38"

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
6,344	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
0	98	Water Surface, HSG B
20,660	87	Weighted Average
6,344		Pervious Area
14,316		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	30	0.0830	0.24		**Sheet Flow, SHEET GRASS** Grass: Short n= 0.150 P2= 3.20"
0.4	20	0.0125	0.83		**Sheet Flow, SHEET PAVE** Smooth surfaces n= 0.011 P2= 3.20"
1.3	330	0.0440	4.26		**Shallow Concentrated Flow, SHALLOW PAVE** Paved Kv= 20.3 fps
1.2					**Direct Entry, DIRECT**
5.0	380	Total			

Subcatchment P-1F: P-1F



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

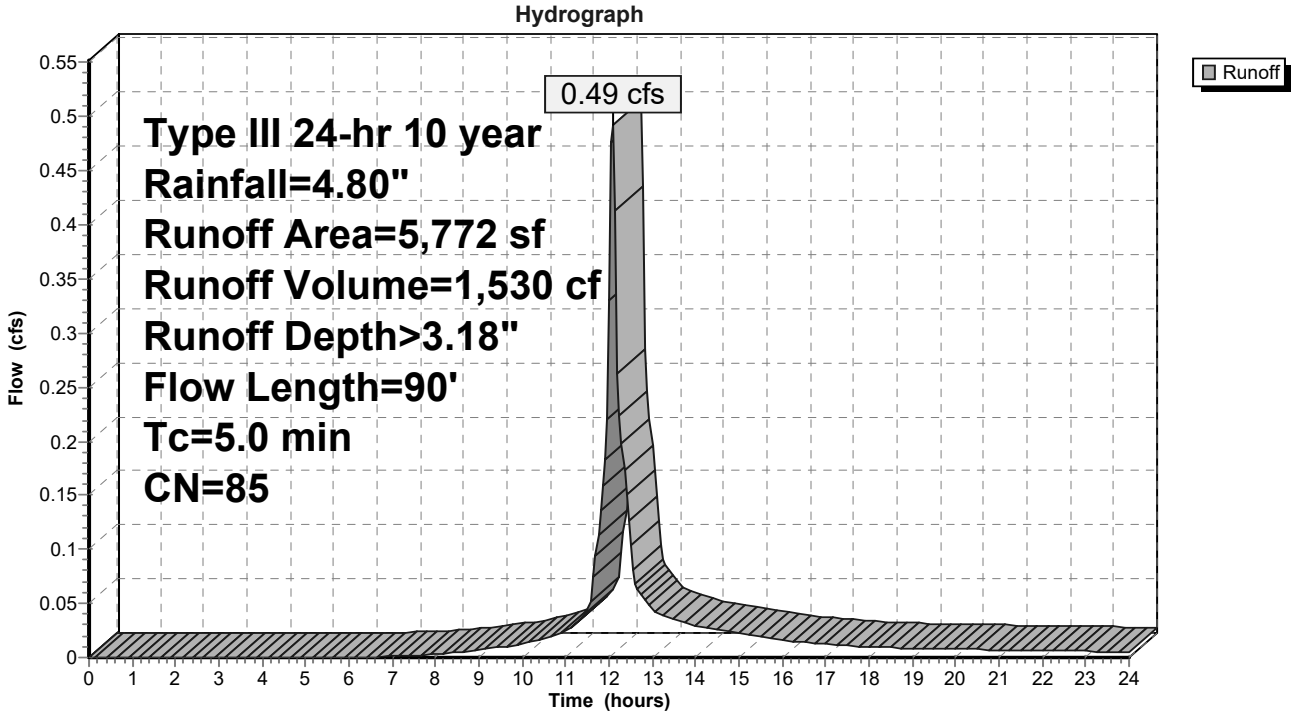
Runoff = 0.49 cfs @ 12.07 hrs, Volume= 1,530 cf, Depth> 3.18"

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
2,063	61	>75% Grass cover, Good, HSG B
440	98	Roofs, HSG B
3,269	98	Paved roads w/curbs & sewers, HSG B
5,772	85	Weighted Average
2,063		Pervious Area
3,709		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	50	0.0500	0.21		**Sheet Flow, SHEET GRASS** Grass: Short n= 0.150 P2= 3.20"
0.4	30	0.0330	1.32		**Sheet Flow, SHEET PAVE** Smooth surfaces n= 0.011 P2= 3.20"
0.0	10	0.0290	3.46		**Shallow Concentrated Flow, PAVED** Paved Kv= 20.3 fps
0.7					**Direct Entry, DIRECT**
5.0	90	Total			

Subcatchment P-1G: P-1G



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

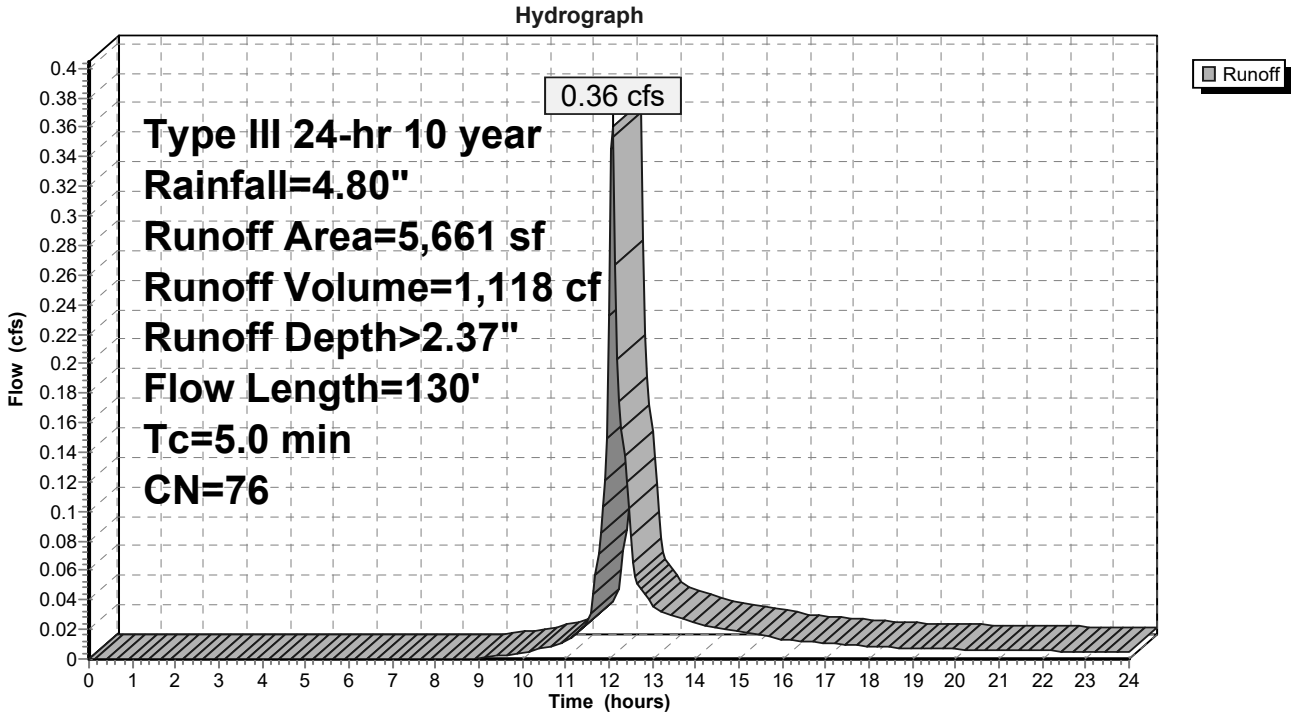
Runoff = 0.36 cfs @ 12.08 hrs, Volume= 1,118 cf, Depth> 2.37"

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
1,815	98	Paved roads w/curbs & sewers, HSG B
3,406	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
5,661	76	Weighted Average
3,406		Pervious Area
2,255		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 GRASS** Smooth surfaces n= 0.011 P2= 3.20"
0.4	80	0.0250	3.21		**Shallow Concentrated Flow, PAVEMENT** Paved Kv= 20.3 fps
4.1					**Direct Entry, DIRECT**
5.0	130	Total			

Subcatchment P-1H: P-1H



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

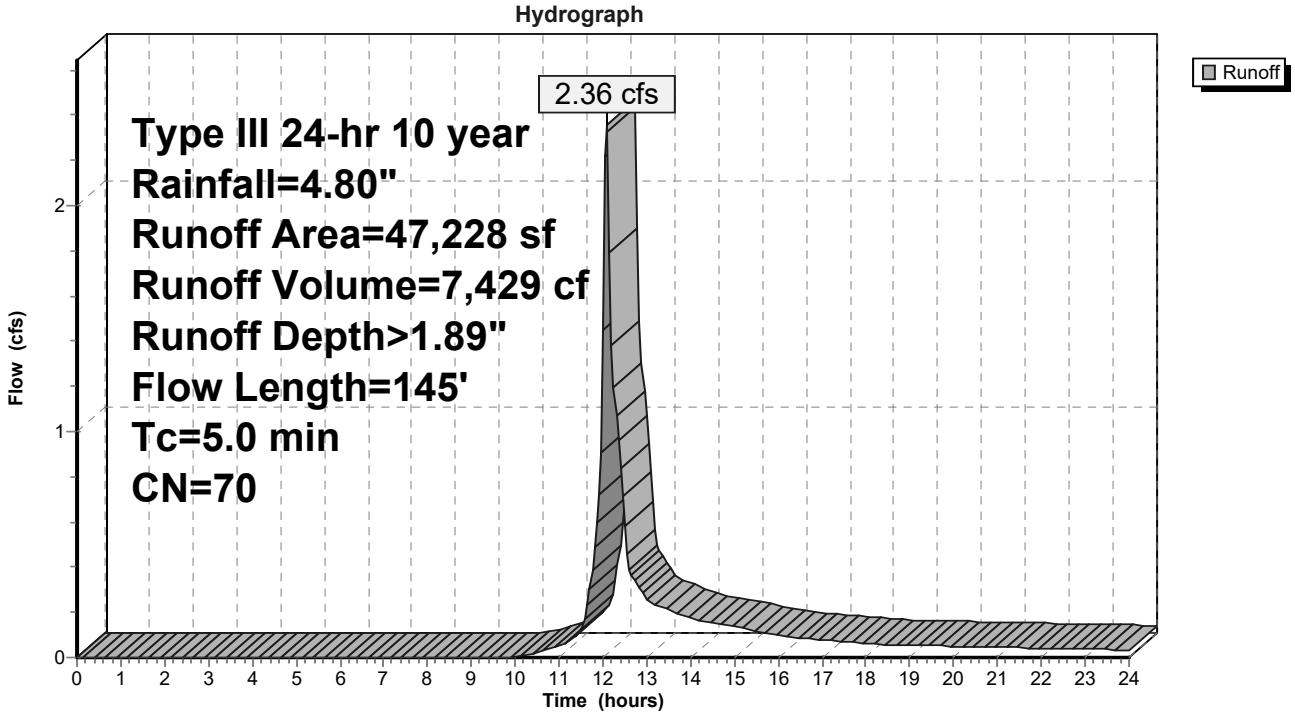
Runoff = 2.36 cfs @ 12.08 hrs, Volume= 7,429 cf, Depth> 1.89"

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
3,080	98	Roofs, HSG B
0	98	Paved parking, HSG B
212	98	Paved roads w/curbs & sewers, HSG B
35,239	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
8,697	98	Water Surface, HSG B
47,228	70	Weighted Average
35,239		Pervious Area
11,989		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.1	50	0.0900	0.27		**Sheet Flow, SHEET** Grass: Short n= 0.150 P2= 3.20"
0.8	95	0.0860	2.05		**Shallow Concentrated Flow, GRASS** Short Grass Pasture Kv= 7.0 fps
1.1					**Direct Entry, DIRECT**
5.0	145	Total			

Subcatchment P-1I: P-1I



Summary for Subcatchment P-1J: P1-J

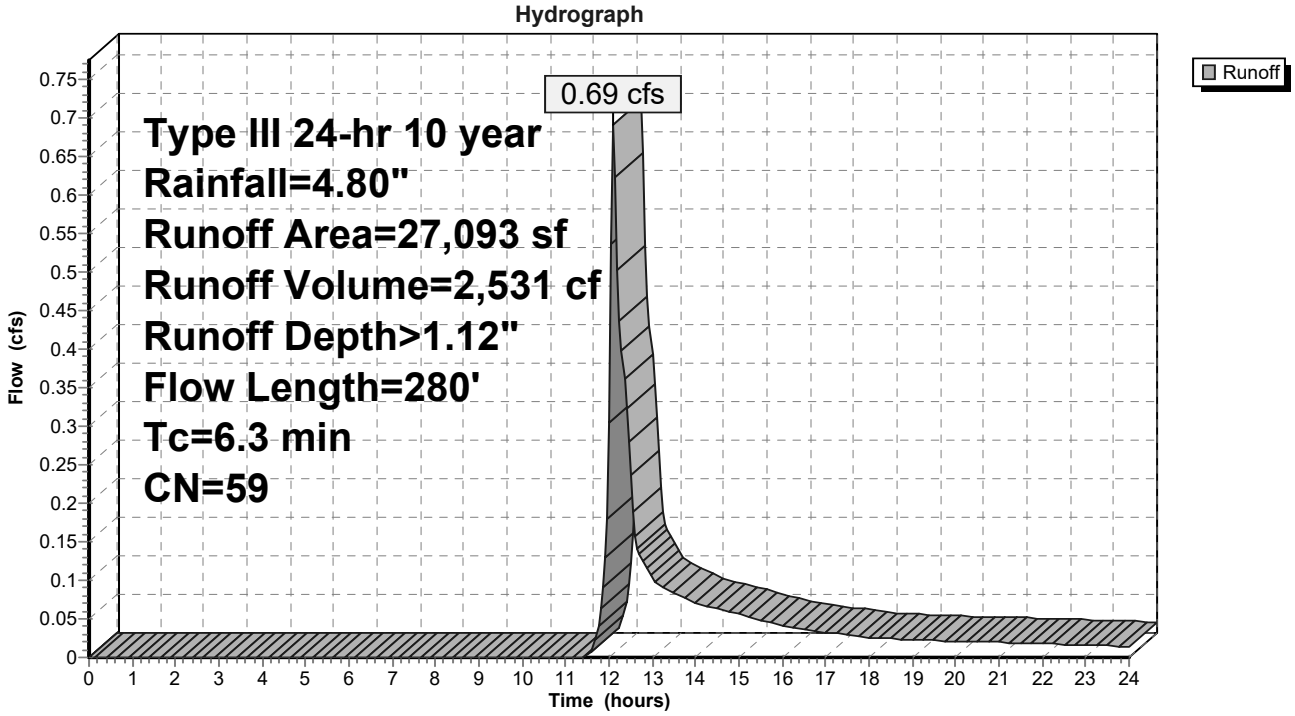
Runoff = 0.69 cfs @ 12.11 hrs, Volume= 2,531 cf, Depth> 1.12"

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
	8,800	55	Woods, Good, HSG B
	18,225	61	>75% Grass cover, Good, HSG B
*	68	98	Paved roads w/curbs & sewers, HSG B
	27,093	59	Weighted Average
	27,025		Pervious Area
	68		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"
3.1	230	0.0600	1.22		**Shallow Concentrated Flow, Flow in woods** Woodland Kv= 5.0 fps
6.3	280	Total			

Subcatchment P-1J: P1-J



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

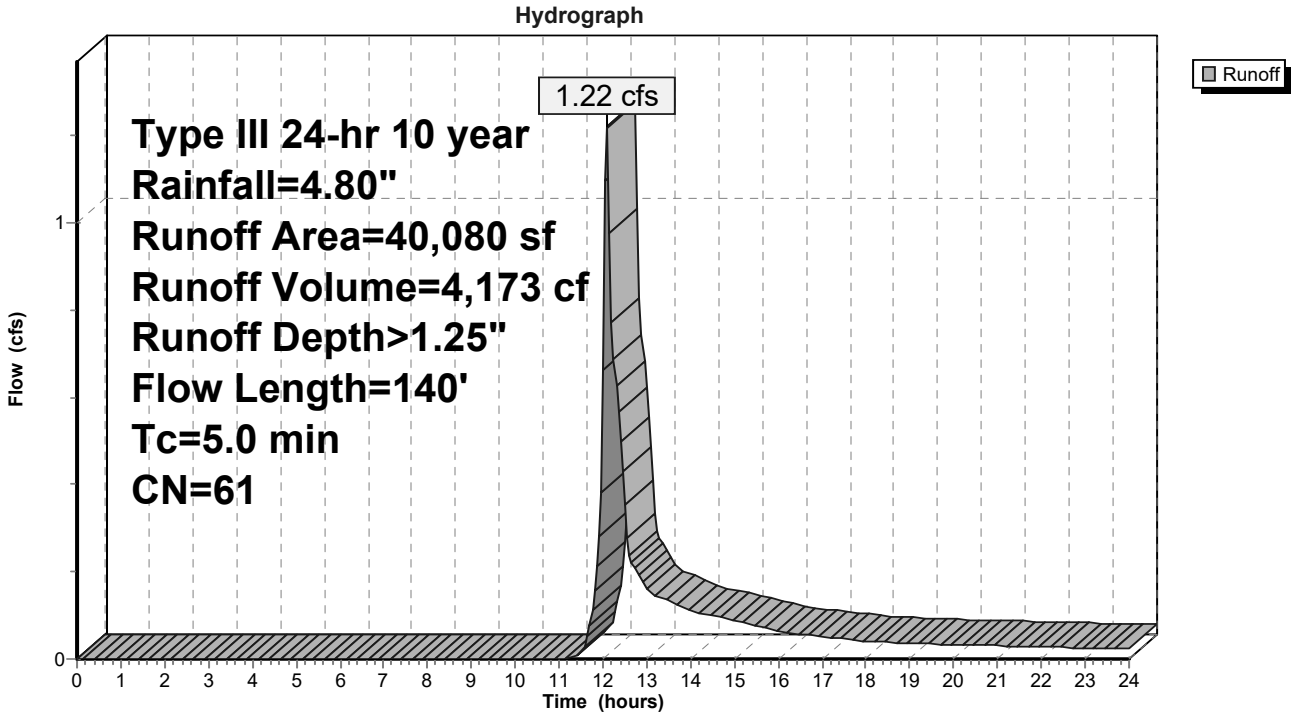
Runoff = 1.22 cfs @ 12.09 hrs, Volume= 4,173 cf, Depth> 1.25"

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
94	98	Paved roads w/curbs & sewers, HSG B
9,069	61	>75% Grass cover, Good, HSG B
26,517	55	Woods, Good, HSG B
40,080	61	Weighted Average
35,586		Pervious Area
4,494		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	50	0.0600	0.23		**Sheet Flow, SHEET GRASS** Grass: Short n= 0.150 P2= 3.20"
0.5	90	0.1560	2.76		**Shallow Concentrated Flow, GRASS SHALLOW** Short Grass Pasture Kv= 7.0 fps
0.9					**Direct Entry, DIRECT**
5.0	140	Total			

Subcatchment P-2A: P-2A



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

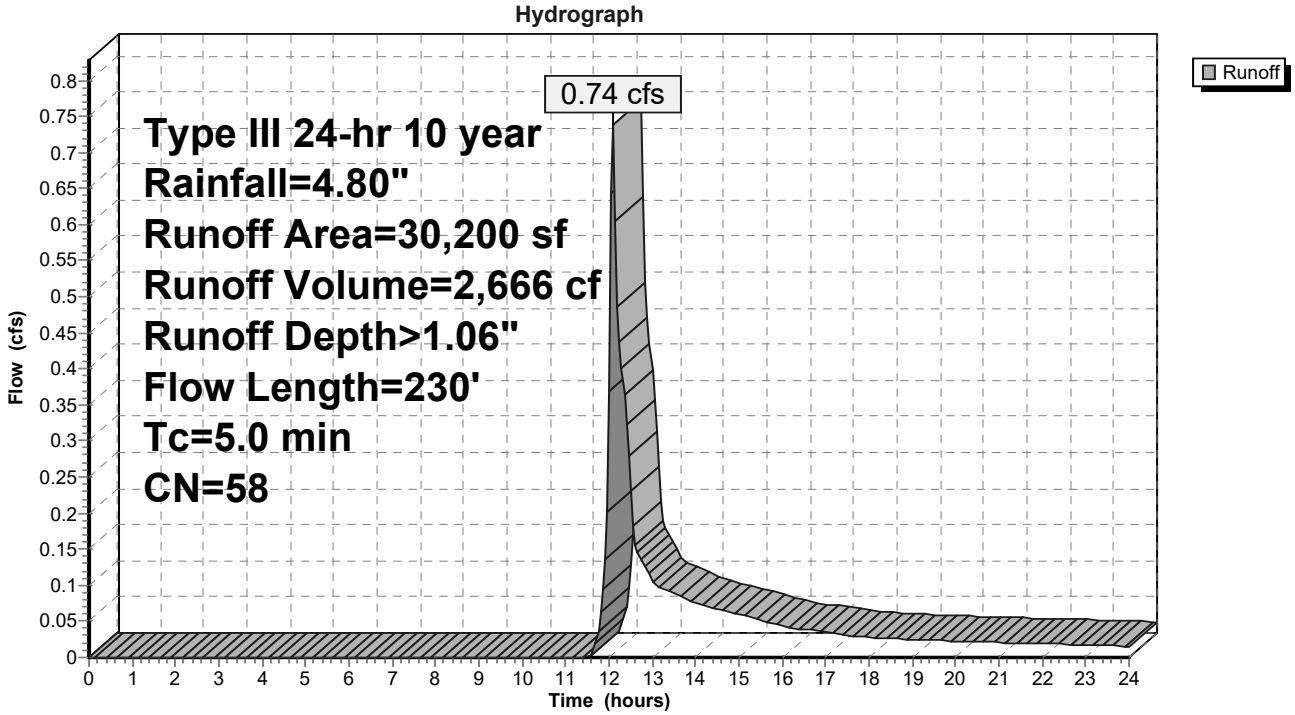
Runoff = 0.74 cfs @ 12.10 hrs, Volume= 2,666 cf, Depth> 1.06"

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
13,428	61	>75% Grass cover, Good, HSG B
16,772	55	Woods, Good, HSG B
30,200	58	Weighted Average
30,200		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0	50	0.2600	0.41		**Sheet Flow, SHEET GRASS** Grass: Short n= 0.150 P2= 3.20"
1.6	180	0.0720	1.88		**Shallow Concentrated Flow, SHALLOW GRASS** Short Grass Pasture Kv= 7.0 fps
1.4					**Direct Entry, DIRECT**
5.0	230	Total			

Subcatchment P-3A: P-3A



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

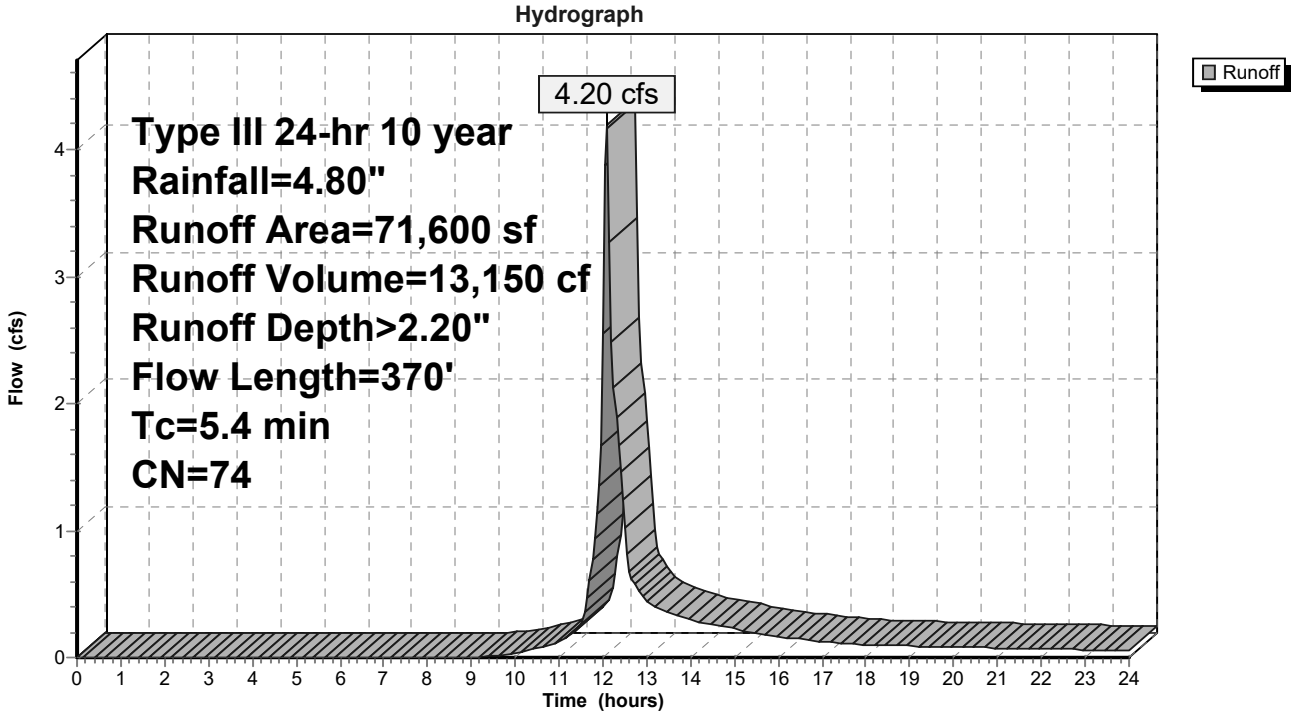
Runoff = 4.20 cfs @ 12.09 hrs, Volume= 13,150 cf, Depth> 2.20"

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
448	98	Paved roads w/curbs & sewers, HSG B
46,707	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
9,045	98	Water Surface, HSG B
71,600	74	Weighted Average
46,707		Pervious Area
24,893		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.2	50	0.0800	0.26		**Sheet Flow, SHEET GRASS** Grass: Short n= 0.150 P2= 3.20"
2.2	320	0.1218	2.44		**Shallow Concentrated Flow, SHALLOW GRASS** Short Grass Pasture Kv= 7.0 fps
0.0					**Direct Entry, DIRECT**
5.4	370	Total			

Subcatchment P-3B: P-3B



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

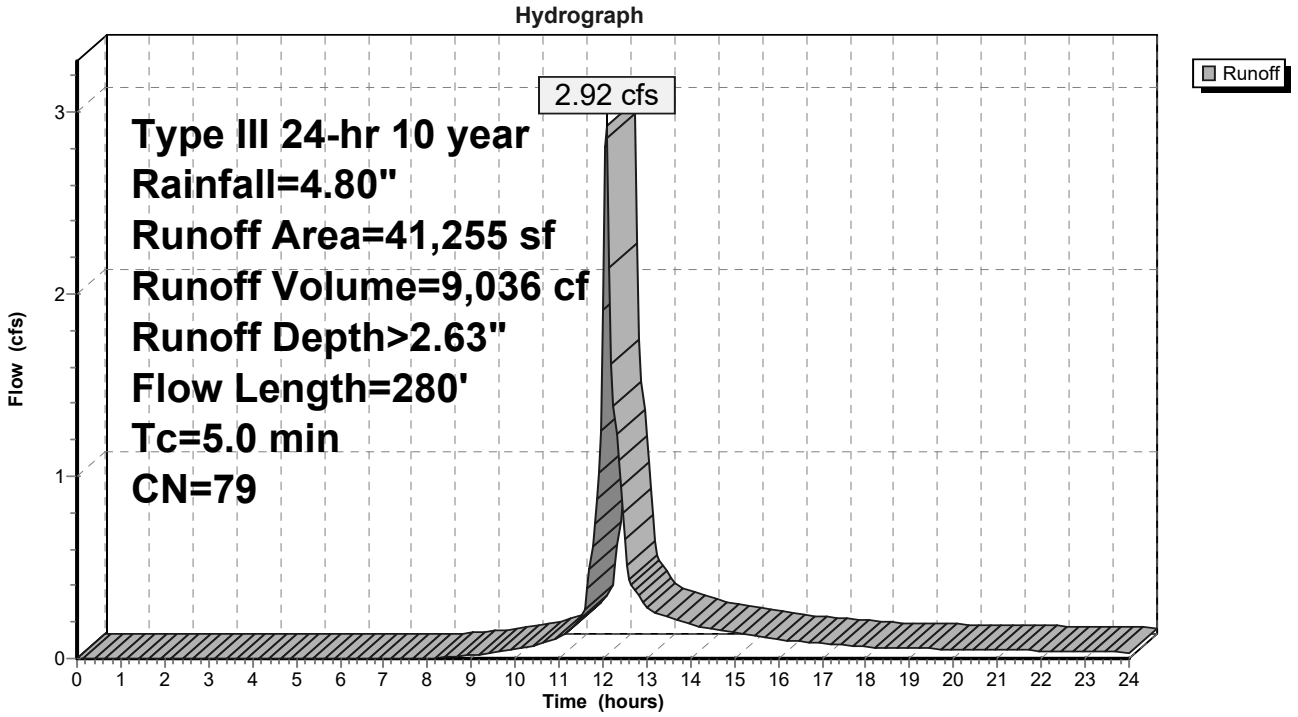
Runoff = 2.92 cfs @ 12.08 hrs, Volume= 9,036 cf, Depth> 2.63"

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
21,208	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
41,255	79	Weighted Average
21,208		Pervious Area
20,047		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	50	0.0600	1.86		**Sheet Flow, SHEET GRASS** Smooth surfaces n= 0.011 P2= 3.20"
1.2	90	0.0310	1.23		**Shallow Concentrated Flow, SHALLOW GRASS** Short Grass Pasture Kv= 7.0 fps
1.5	140	0.0060	1.57		**Shallow Concentrated Flow, SHALLOW PAVEMENT** Paved Kv= 20.3 fps
1.9					**Direct Entry, DIRECT**
5.0	280	Total			

Subcatchment P-3C: P-3C



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

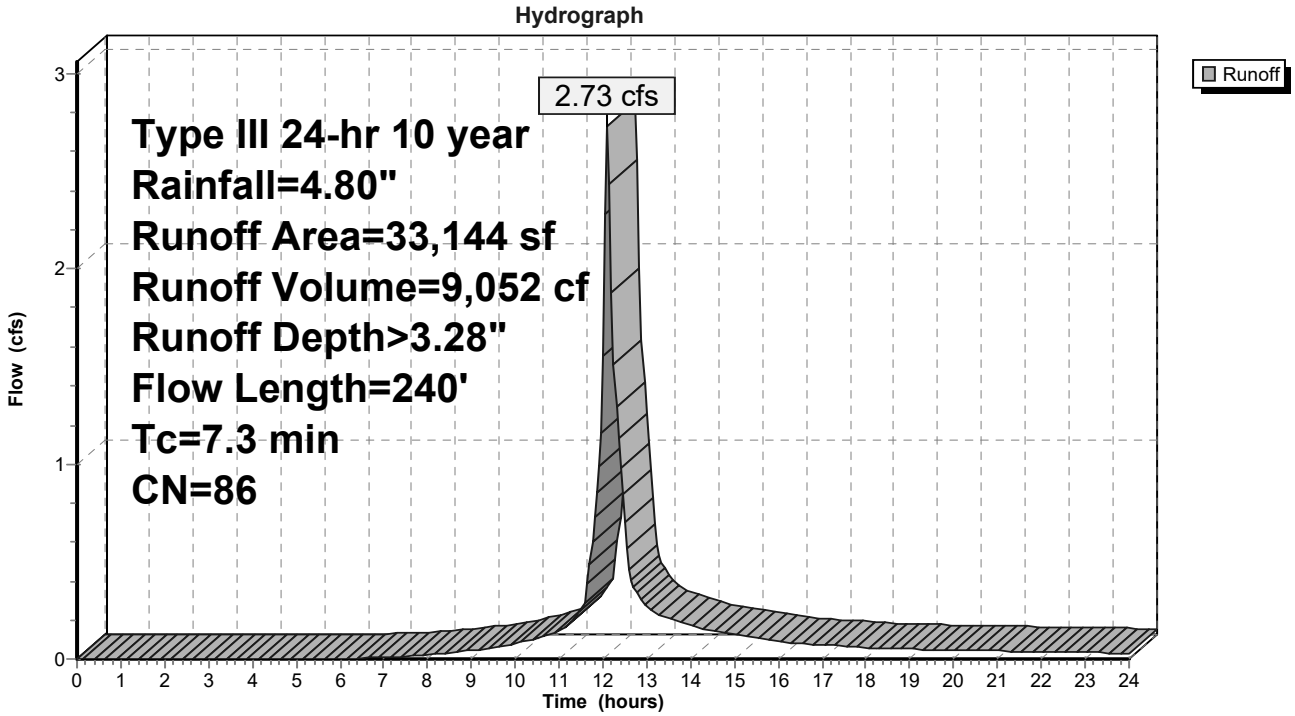
Runoff = 2.73 cfs @ 12.11 hrs, Volume= 9,052 cf, Depth> 3.28"

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
8,800	98	Roofs, HSG B
13,806	98	Paved roads w/curbs & sewers, HSG B
10,538	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
33,144	86	Weighted Average
10,538		Pervious Area
22,606		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0200	0.15		**Sheet Flow, SHEET GR** Grass: Short n= 0.150 P2= 3.20"
1.0	90	0.0500	1.57		**Shallow Concentrated Flow, SHALLOW GRASS** Short Grass Pasture Kv= 7.0 fps
0.7	100	0.0150	2.49		**Shallow Concentrated Flow, SHALLOW PAVE** Paved Kv= 20.3 fps
7.3	240	Total			

Subcatchment P-3D: P-3D



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

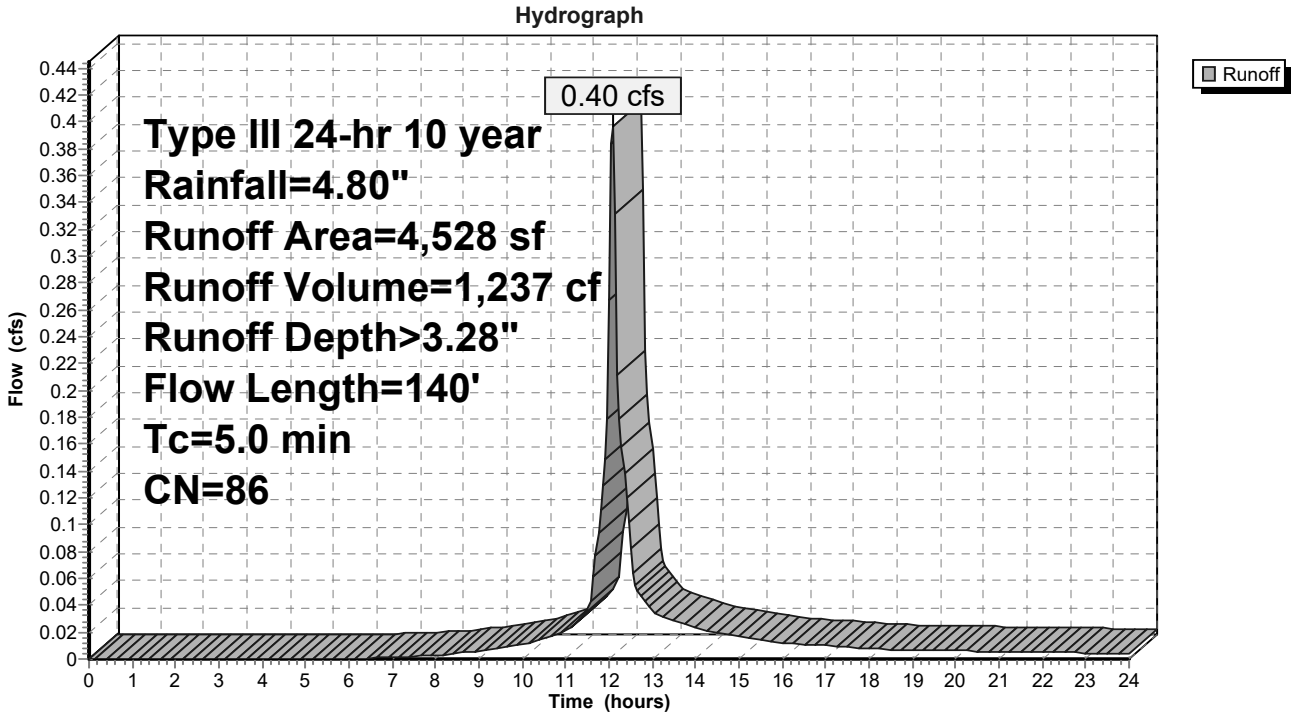
Runoff = 0.40 cfs @ 12.07 hrs, Volume= 1,237 cf, Depth> 3.28"

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
1,424	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
4,528	86	Weighted Average
1,424		Pervious Area
3,104		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.20		**Sheet Flow, SHEET PAVEMENT** Smooth surfaces n= 0.011 P2= 3.20"
0.5	90	0.0220	3.01		**Shallow Concentrated Flow, SHALLOW PAVEMENT** Paved Kv= 20.3 fps
3.8					**Direct Entry, DIRECT**
5.0	140	Total			

Subcatchment P-3E: P-3F



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

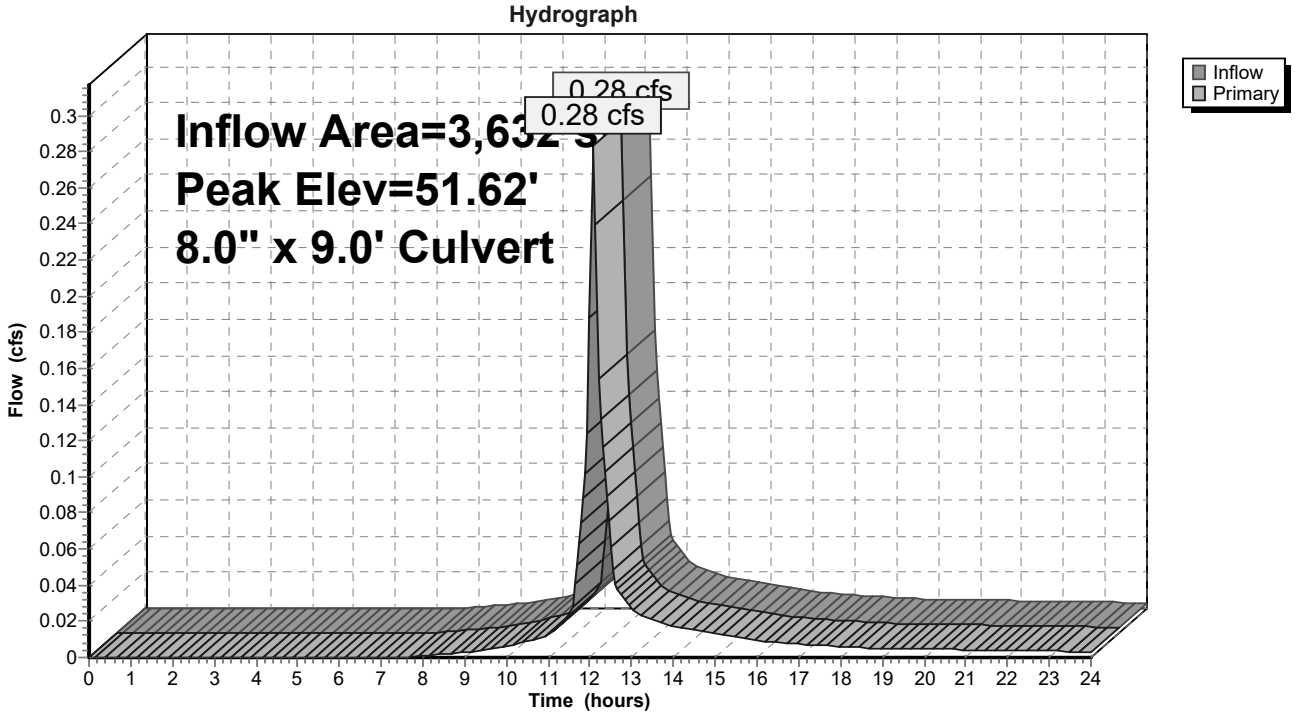
Inflow Area = 3,632 sf, 56.17% Impervious, Inflow Depth > 2.90" for 10 year event
Inflow = 0.28 cfs @ 12.08 hrs, Volume= 877 cf
Outflow = 0.28 cfs @ 12.08 hrs, Volume= 877 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.28 cfs @ 12.08 hrs, Volume= 877 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 51.62' @ 12.89 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 @ 12.08 hrs HW=50.98' TW=51.02' (Dynamic Tailwater)
└**1=Culvert** (Controls 0.00 cfs)

Pond CB1: CB1



Summary for Pond CB2: CB2

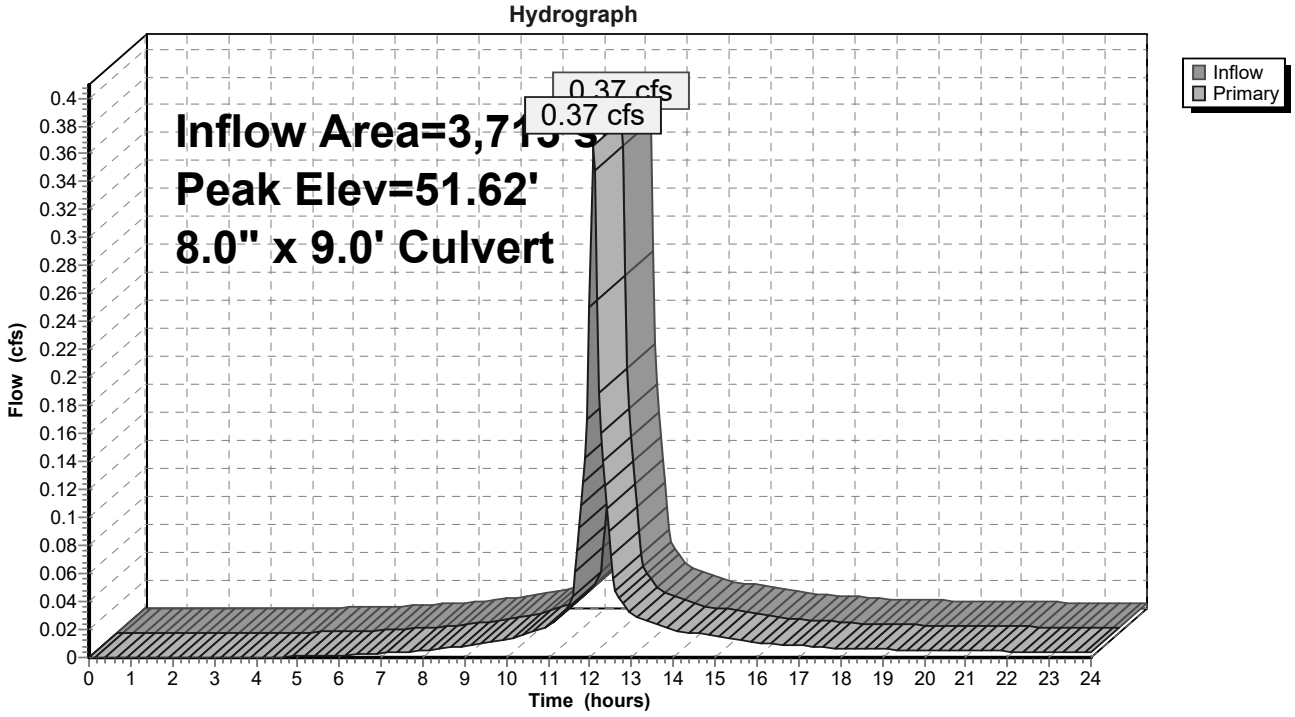
Inflow Area = 3,713 sf, 81.12% Impervious, Inflow Depth > 3.79" for 10 year event
Inflow = 0.37 cfs @ 12.07 hrs, Volume= 1,171 cf
Outflow = 0.37 cfs @ 12.07 hrs, Volume= 1,171 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.37 cfs @ 12.07 hrs, Volume= 1,171 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 51.62' @ 12.89 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 @ 12.07 hrs HW=51.01' TW=51.01' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.00 cfs)

Pond CB2: CB2



Summary for Pond CB3: CB3

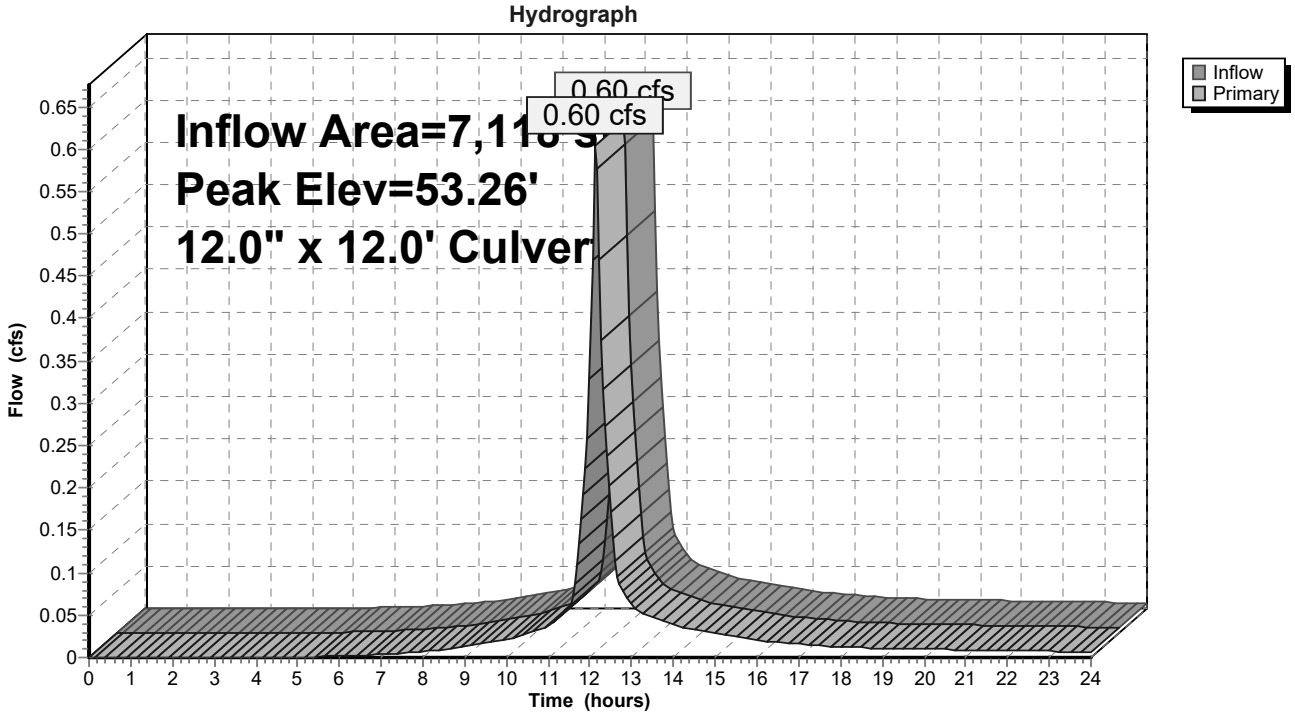
Inflow Area = 7,118 sf, 74.36% Impervious, Inflow Depth > 3.58" for 10 year event
Inflow = 0.60 cfs @ 12.12 hrs, Volume= 2,121 cf
Outflow = 0.60 cfs @ 12.12 hrs, Volume= 2,121 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.60 cfs @ 12.12 hrs, Volume= 2,121 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 53.26' @ 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=0.88 cfs @ 12.12 hrs HW=53.23' TW=53.16' (Dynamic Tailwater)
└**1=Culvert** (Outlet Controls 0.88 cfs @ 1.58 fps)

Pond CB3: CB3



Summary for Pond CB4: CB4

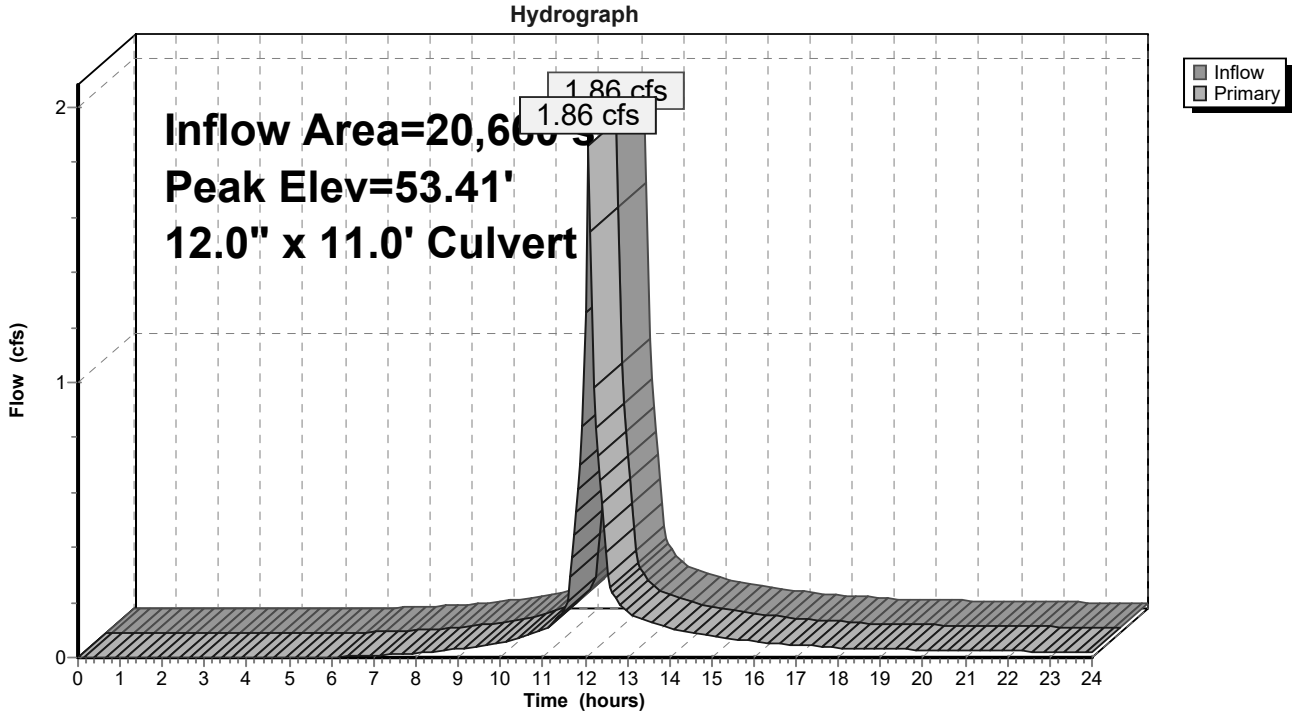
Inflow Area = 20,660 sf, 69.29% Impervious, Inflow Depth > 3.38" for 10 year event
Inflow = 1.86 cfs @ 12.07 hrs, Volume= 5,815 cf
Outflow = 1.86 cfs @ 12.07 hrs, Volume= 5,815 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.86 cfs @ 12.07 hrs, Volume= 5,815 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 53.41' @ 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=1.28 cfs @ 12.07 hrs HW=53.32' TW=53.20' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 1.28 cfs @ 1.64 fps)

Pond CB4: CB4



Summary for Pond CB5: CB5

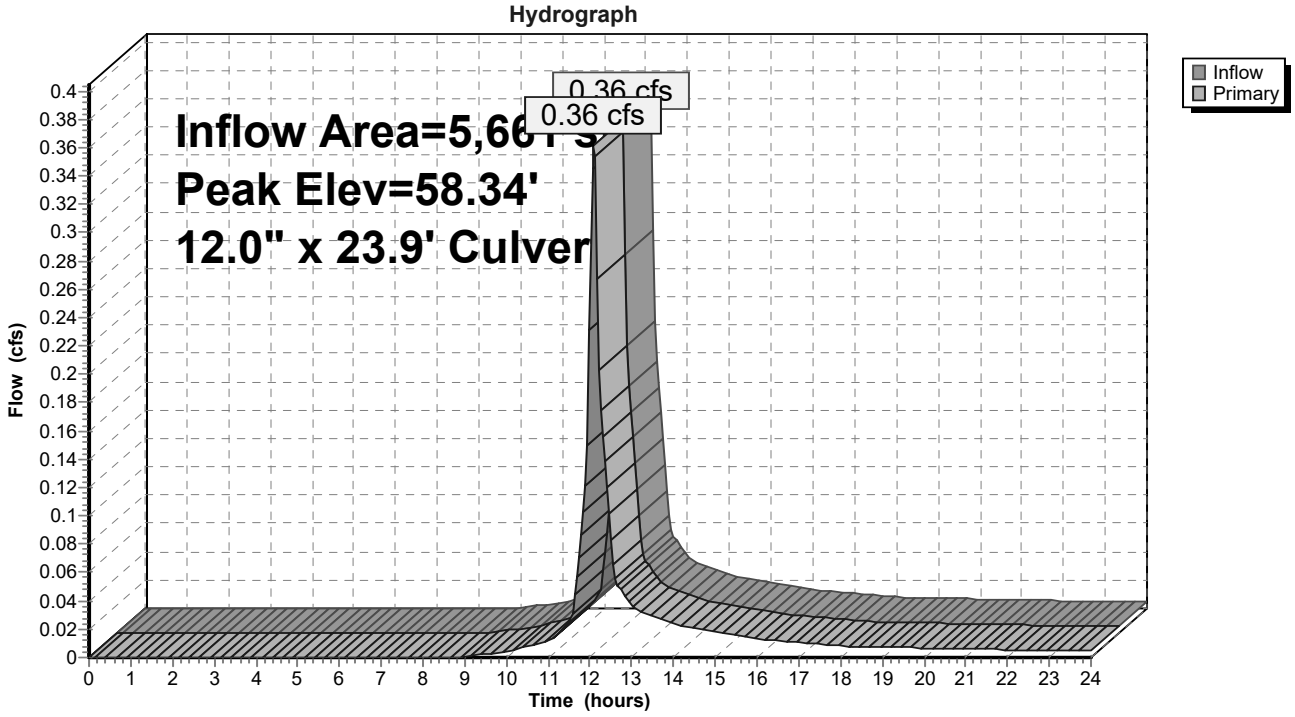
Inflow Area = 5,661 sf, 39.83% Impervious, Inflow Depth > 2.37" for 10 year event
Inflow = 0.36 cfs @ 12.08 hrs, Volume= 1,118 cf
Outflow = 0.36 cfs @ 12.08 hrs, Volume= 1,118 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.36 cfs @ 12.08 hrs, Volume= 1,118 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 58.34' @ 12.10 hrs
Flood Elev= 65.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	58.00'	**12.0" x 23.9' long Culvert** RCP, groove end projecting, Ke= 0.200 Outlet Invert= 57.76' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.32 cfs @ 12.08 hrs HW=58.33' TW=58.12' (Dynamic Tailwater)
└**1=Culvert** (Outlet Controls 0.32 cfs @ 2.17 fps)

Pond CB5: CB5



Summary for Pond CB6: CB6

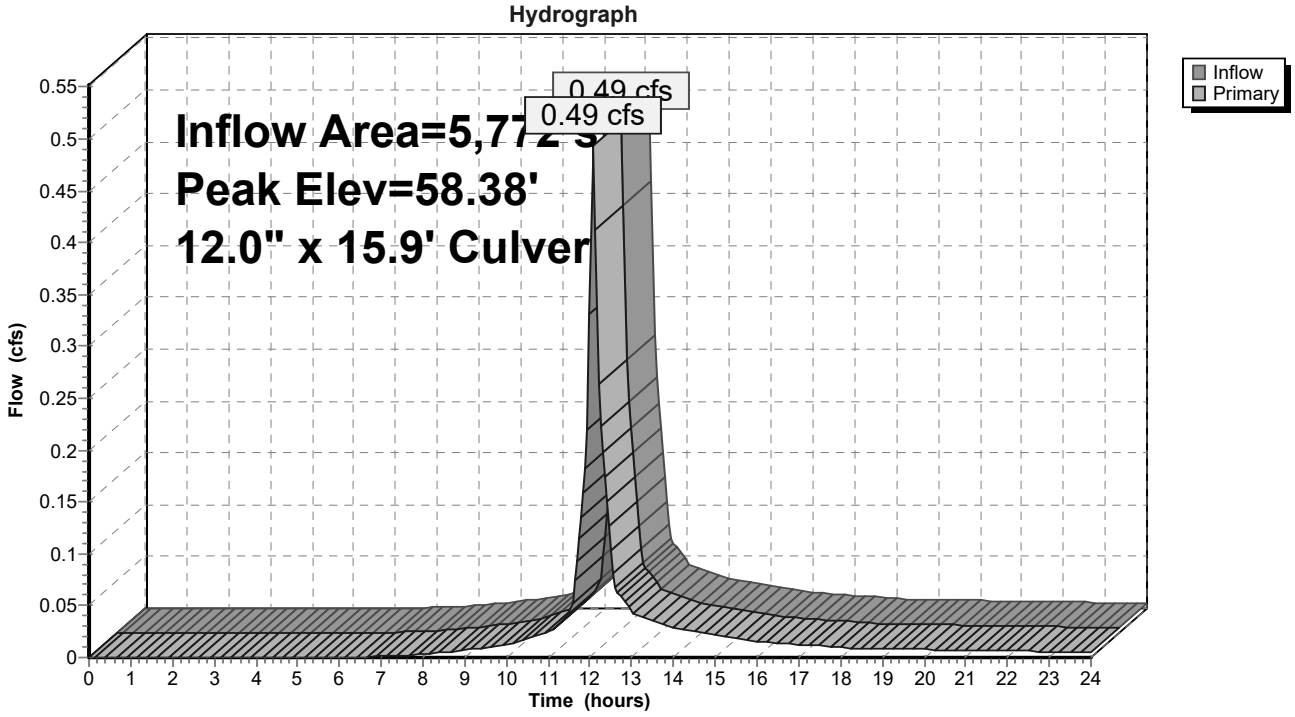
Inflow Area = 5,772 sf, 64.26% Impervious, Inflow Depth > 3.18" for 10 year event
Inflow = 0.49 cfs @ 12.07 hrs, Volume= 1,530 cf
Outflow = 0.49 cfs @ 12.07 hrs, Volume= 1,530 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.49 cfs @ 12.07 hrs, Volume= 1,530 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 58.38' @ 12.07 hrs
Flood Elev= 65.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	58.00'	**12.0" x 15.9' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 57.84' S= 0.0101 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.47 cfs @ 12.07 hrs HW=58.38' TW=58.12' (Dynamic Tailwater)
└**1=Culvert** (Outlet Controls 0.47 cfs @ 2.61 fps)

Pond CB6: CB6



Summary for Pond CB7: CB7

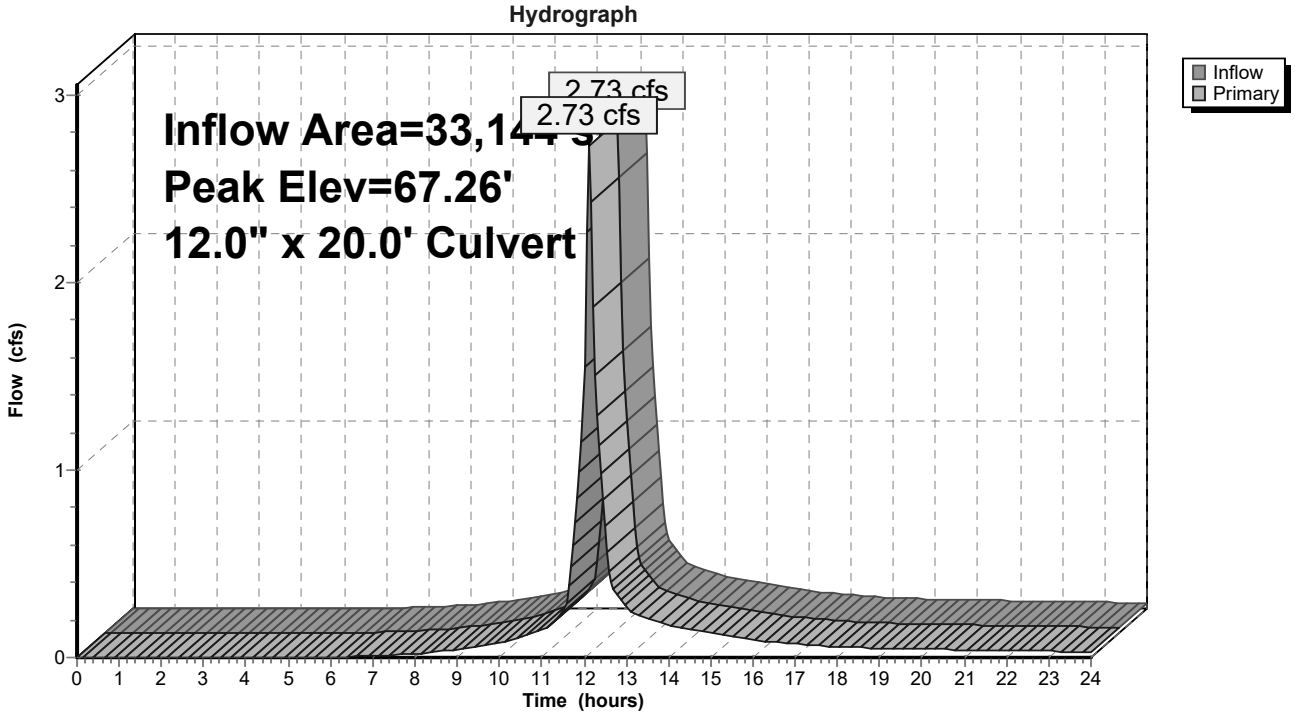
Inflow Area = 33,144 sf, 68.21% Impervious, Inflow Depth > 3.28" for 10 year event
Inflow = 2.73 cfs @ 12.11 hrs, Volume= 9,052 cf
Outflow = 2.73 cfs @ 12.11 hrs, Volume= 9,052 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.73 cfs @ 12.11 hrs, Volume= 9,052 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 67.26' @ 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=2.30 cfs @ 12.11 hrs HW=67.21' TW=66.84' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 2.30 cfs @ 2.93 fps)

Pond CB7: CB7



Summary for Pond CB8: CB8

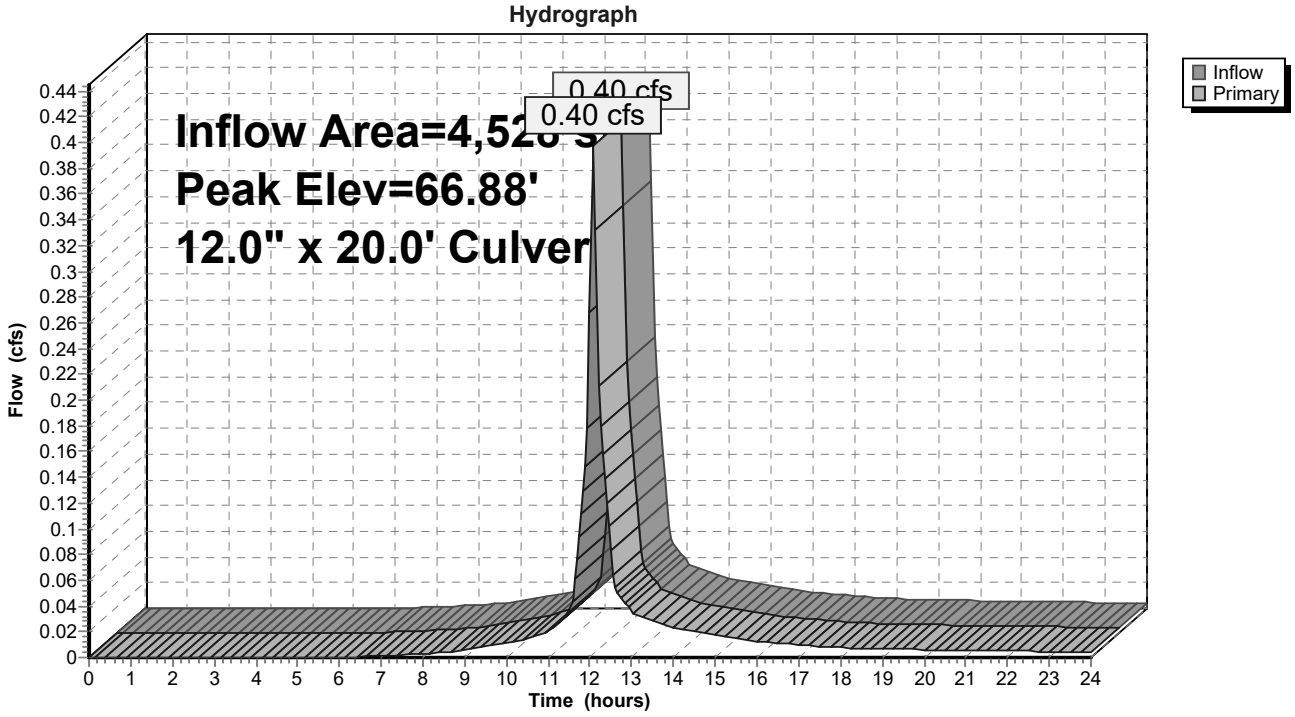
Inflow Area = 4,528 sf, 68.55% Impervious, Inflow Depth > 3.28" for 10 year event
Inflow = 0.40 cfs @ 12.07 hrs, Volume= 1,237 cf
Outflow = 0.40 cfs @ 12.07 hrs, Volume= 1,237 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.40 cfs @ 12.07 hrs, Volume= 1,237 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 66.88' @ 12.52 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=66.61' TW=66.76' (Dynamic Tailwater)
└**1=Culvert** (Controls 0.00 cfs)

Pond CB8: CB8



Summary for Pond CB9: CB9

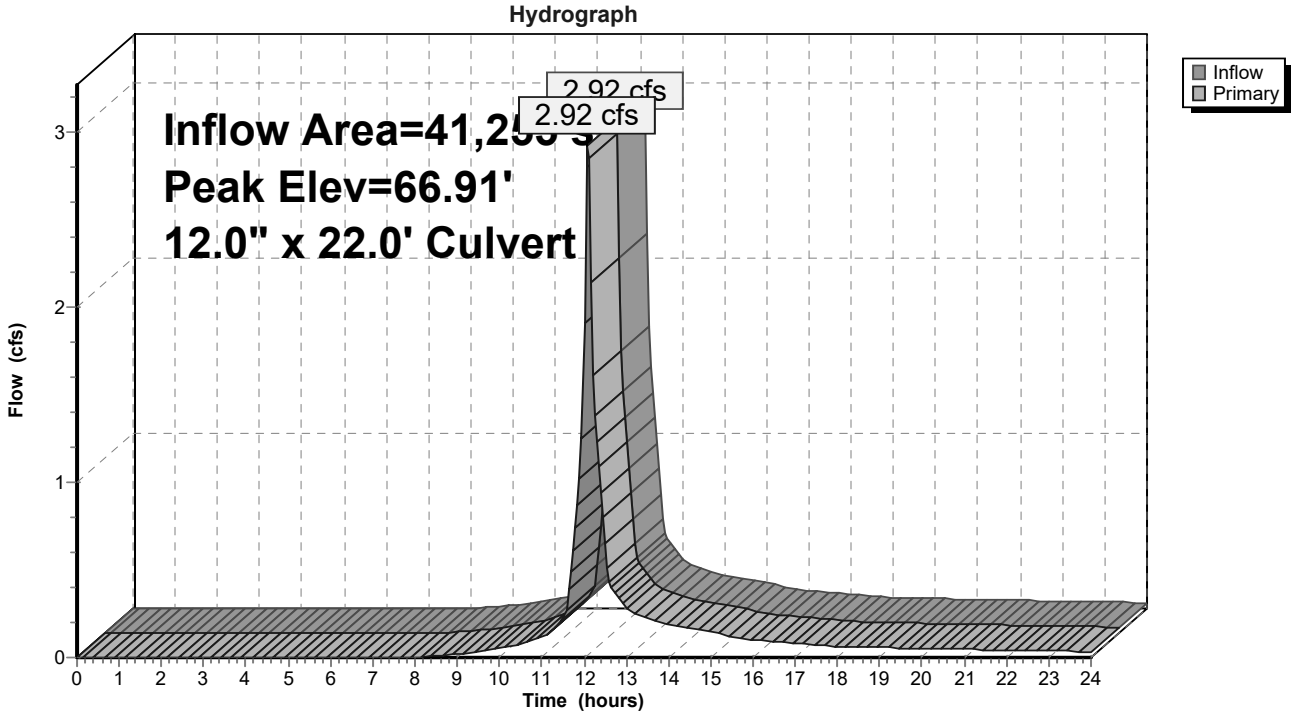
Inflow Area = 41,255 sf, 48.59% Impervious, Inflow Depth > 2.63" for 10 year event
Inflow = 2.92 cfs @ 12.08 hrs, Volume= 9,036 cf
Outflow = 2.92 cfs @ 12.08 hrs, Volume= 9,036 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.92 cfs @ 12.08 hrs, Volume= 9,036 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 66.91' @ 12.41 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=2.04 cfs @ 12.08 hrs HW=66.69' TW=66.40' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 2.04 cfs @ 2.60 fps)

Pond CB9: CB9



Summary for Pond DMH 10: DMH9

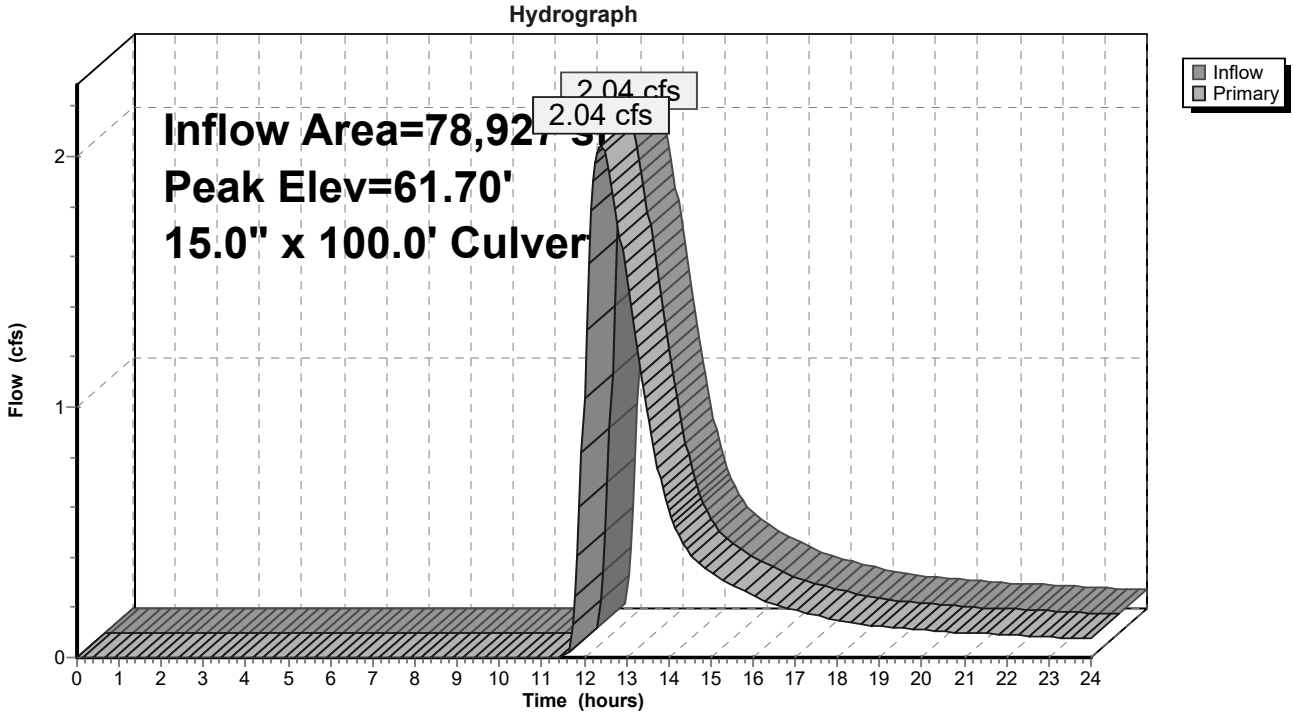
Inflow Area = 78,927 sf, 57.97% Impervious, Inflow Depth > 2.55" for 10 year event
Inflow = 2.04 cfs @ 12.40 hrs, Volume= 16,770 cf
Outflow = 2.04 cfs @ 12.40 hrs, Volume= 16,770 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.04 cfs @ 12.40 hrs, Volume= 16,770 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 61.70' @ 12.40 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=2.04 cfs @ 12.40 hrs HW=61.70' TW=56.01' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 2.04 cfs @ 2.86 fps)

Pond DMH 10: DMH9



Summary for Pond DMH 11: DMH 10

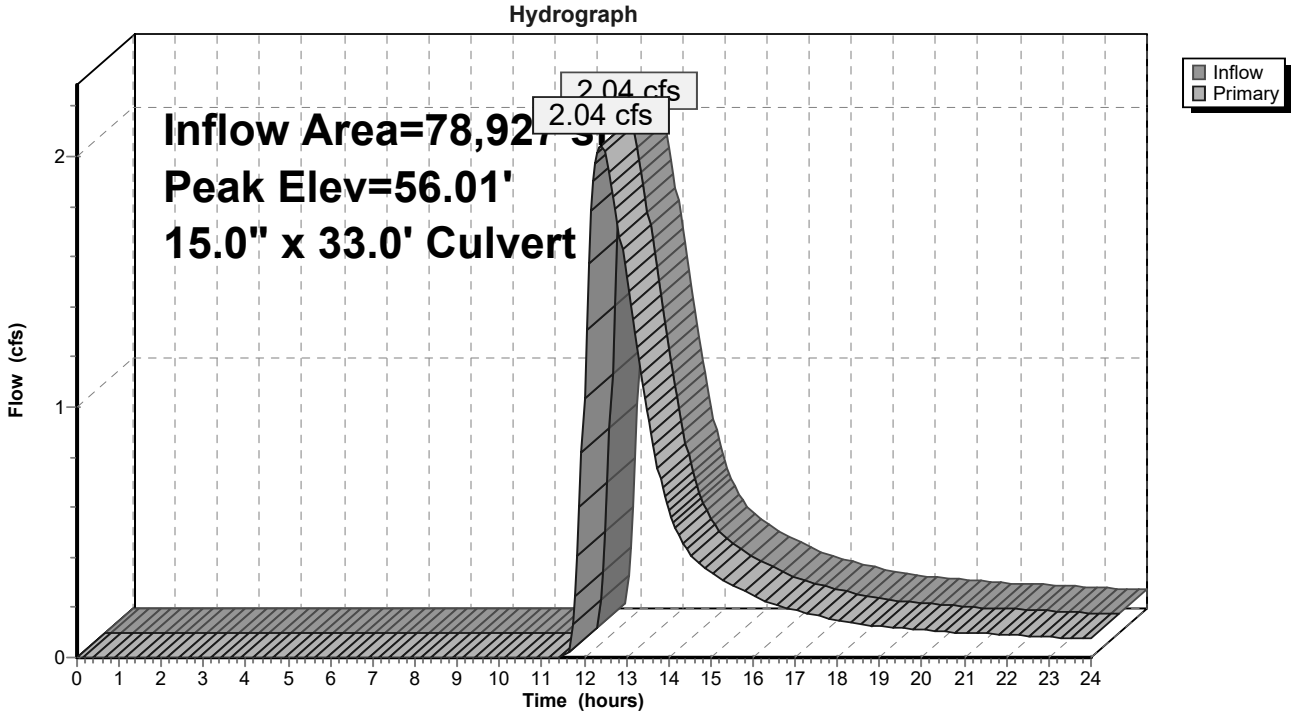
Inflow Area = 78,927 sf, 57.97% Impervious, Inflow Depth > 2.55" for 10 year event
Inflow = 2.04 cfs @ 12.40 hrs, Volume= 16,770 cf
Outflow = 2.04 cfs @ 12.40 hrs, Volume= 16,770 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.04 cfs @ 12.40 hrs, Volume= 16,770 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 56.01' @ 12.40 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=2.04 cfs @ 12.40 hrs HW=56.01' TW=52.19' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 2.04 cfs @ 3.29 fps)

Pond DMH 11: DMH 10



Summary for Pond DMH 6: DMH 6

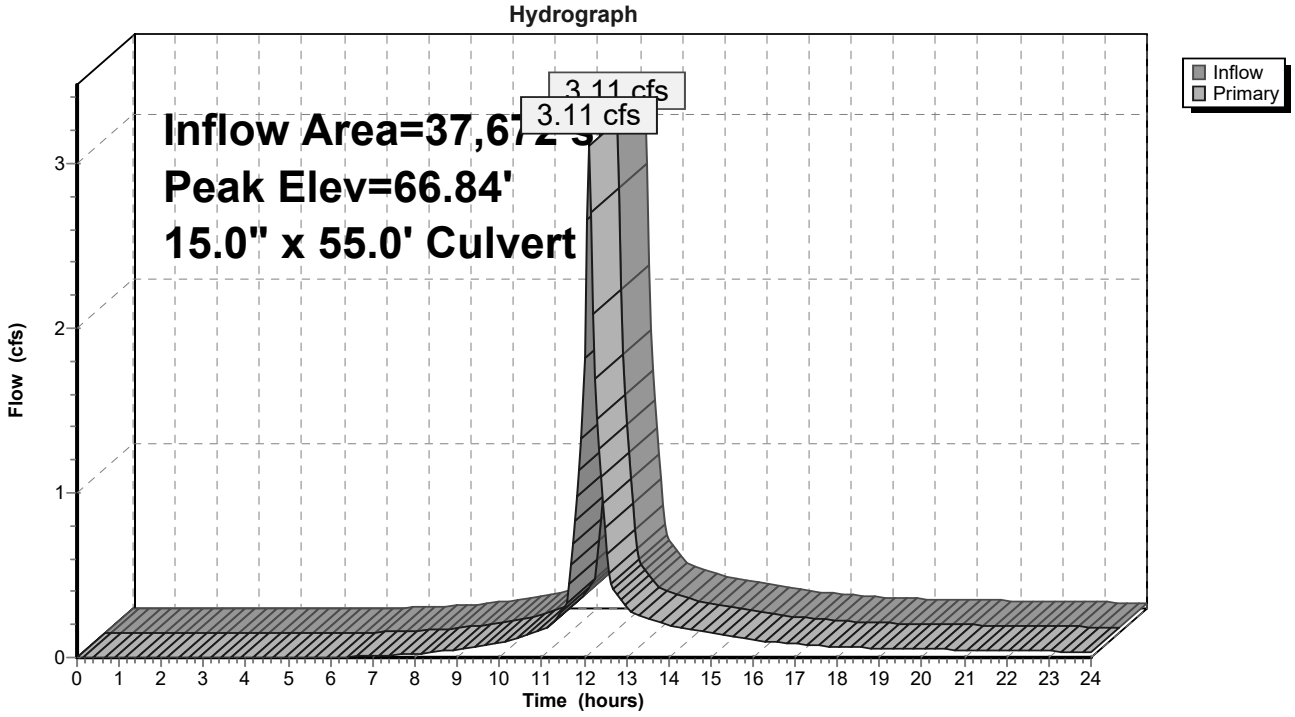
Inflow Area = 37,672 sf, 68.25% Impervious, Inflow Depth > 3.28" for 10 year event
Inflow = 3.11 cfs @ 12.10 hrs, Volume= 10,289 cf
Outflow = 3.11 cfs @ 12.10 hrs, Volume= 10,289 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.11 cfs @ 12.10 hrs, Volume= 10,289 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 66.84' @ 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=2.19 cfs @ 12.10 hrs HW=66.32' TW=66.11' (Dynamic Tailwater)
└**1=Culvert** (Outlet Controls 2.19 cfs @ 2.34 fps)

Pond DMH 6: DMH 6



Summary for Pond DMH2: DMH2

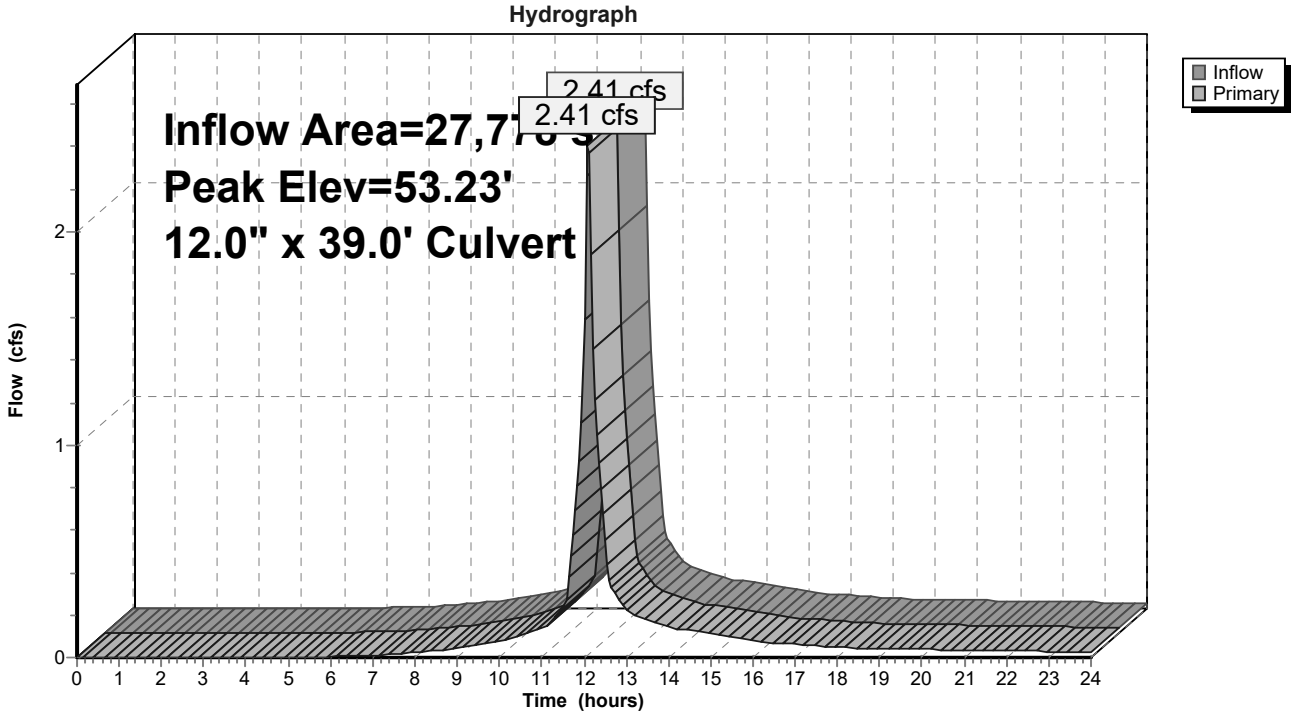
Inflow Area = 27,778 sf, 70.59% Impervious, Inflow Depth > 3.43" for 10 year event
Inflow = 2.41 cfs @ 12.08 hrs, Volume= 7,936 cf
Outflow = 2.41 cfs @ 12.08 hrs, Volume= 7,936 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.41 cfs @ 12.08 hrs, Volume= 7,936 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 53.23' @ 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=2.34 cfs @ 12.08 hrs HW=53.21' TW=52.48' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 2.34 cfs @ 3.60 fps)

Pond DMH2: DMH2



Summary for Pond DMH3: DMH3

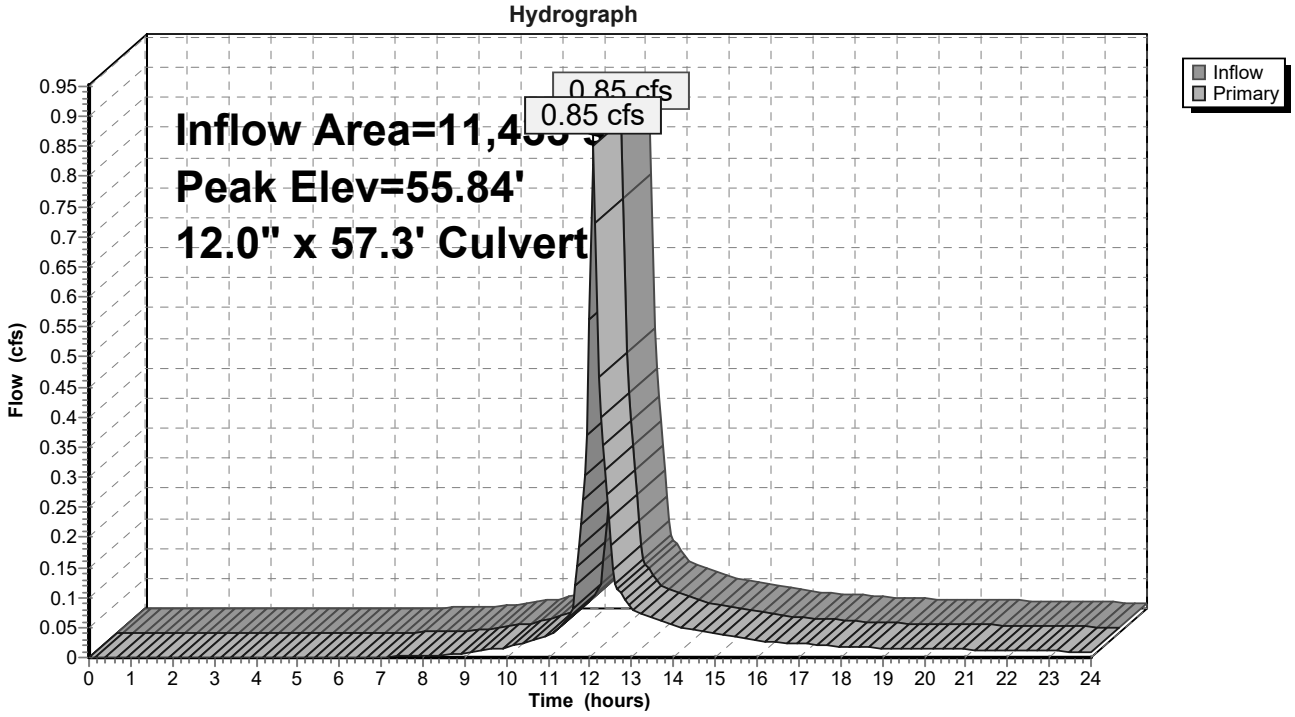
Inflow Area = 11,433 sf, 52.16% Impervious, Inflow Depth > 2.78" for 10 year event
Inflow = 0.85 cfs @ 12.08 hrs, Volume= 2,648 cf
Outflow = 0.85 cfs @ 12.08 hrs, Volume= 2,648 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.85 cfs @ 12.08 hrs, Volume= 2,648 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 55.84' @ 12.08 hrs
Flood Elev= 62.48'

Device	Routing	Invert	Outlet Devices
#1	Primary	55.29'	**12.0" x 57.3' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 55.00' S= 0.0051 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.82 cfs @ 12.08 hrs HW=55.83' TW=52.45' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 0.82 cfs @ 2.74 fps)

Pond DMH3: DMH3



Summary for Pond DMH4: DMH4

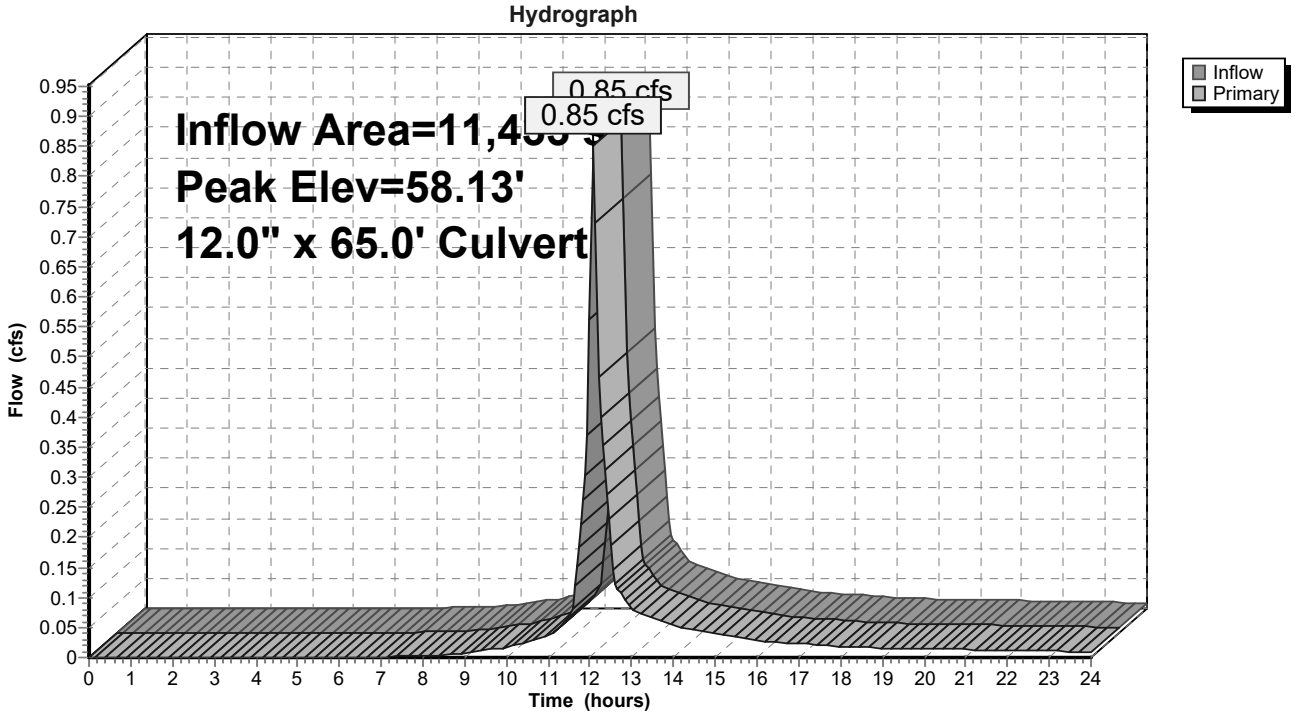
Inflow Area = 11,433 sf, 52.16% Impervious, Inflow Depth > 2.78" for 10 year event
Inflow = 0.85 cfs @ 12.08 hrs, Volume= 2,648 cf
Outflow = 0.85 cfs @ 12.08 hrs, Volume= 2,648 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.85 cfs @ 12.08 hrs, Volume= 2,648 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 58.13' @ 12.08 hrs
Flood Elev= 64.52'

Device	Routing	Invert	Outlet Devices
#1	Primary	57.66'	**12.0" x 65.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 55.39' S= 0.0349 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.82 cfs @ 12.08 hrs HW=58.12' TW=55.83' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.82 cfs @ 2.32 fps)

Pond DMH4: DMH4



Summary for Pond DMH5: DMH 5

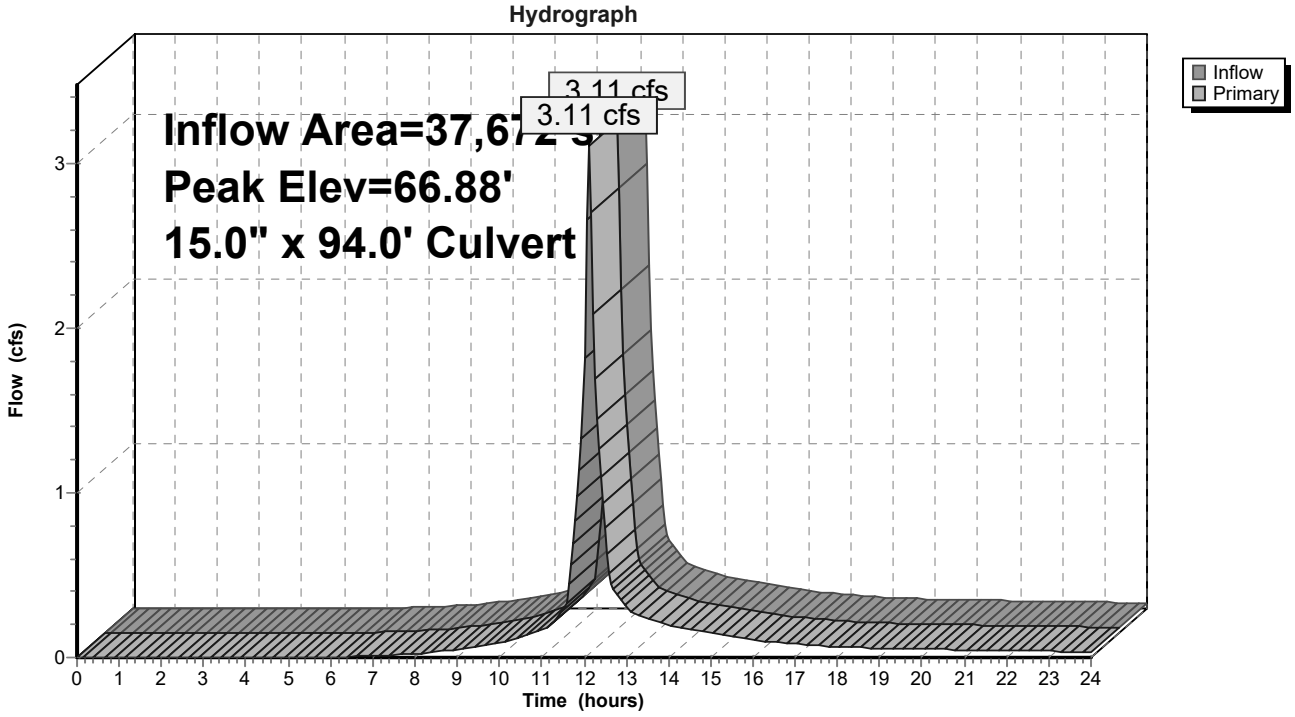
Inflow Area = 37,672 sf, 68.25% Impervious, Inflow Depth > 3.28" for 10 year event
Inflow = 3.11 cfs @ 12.10 hrs, Volume= 10,289 cf
Outflow = 3.11 cfs @ 12.10 hrs, Volume= 10,289 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.11 cfs @ 12.10 hrs, Volume= 10,289 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 66.88' @ 12.47 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=2.81 cfs @ 12.10 hrs HW=66.84' TW=66.32' (Dynamic Tailwater)
└**1=Culvert** (Outlet Controls 2.81 cfs @ 3.18 fps)

Pond DMH5: DMH 5



Summary for Pond DMH7: DMH7

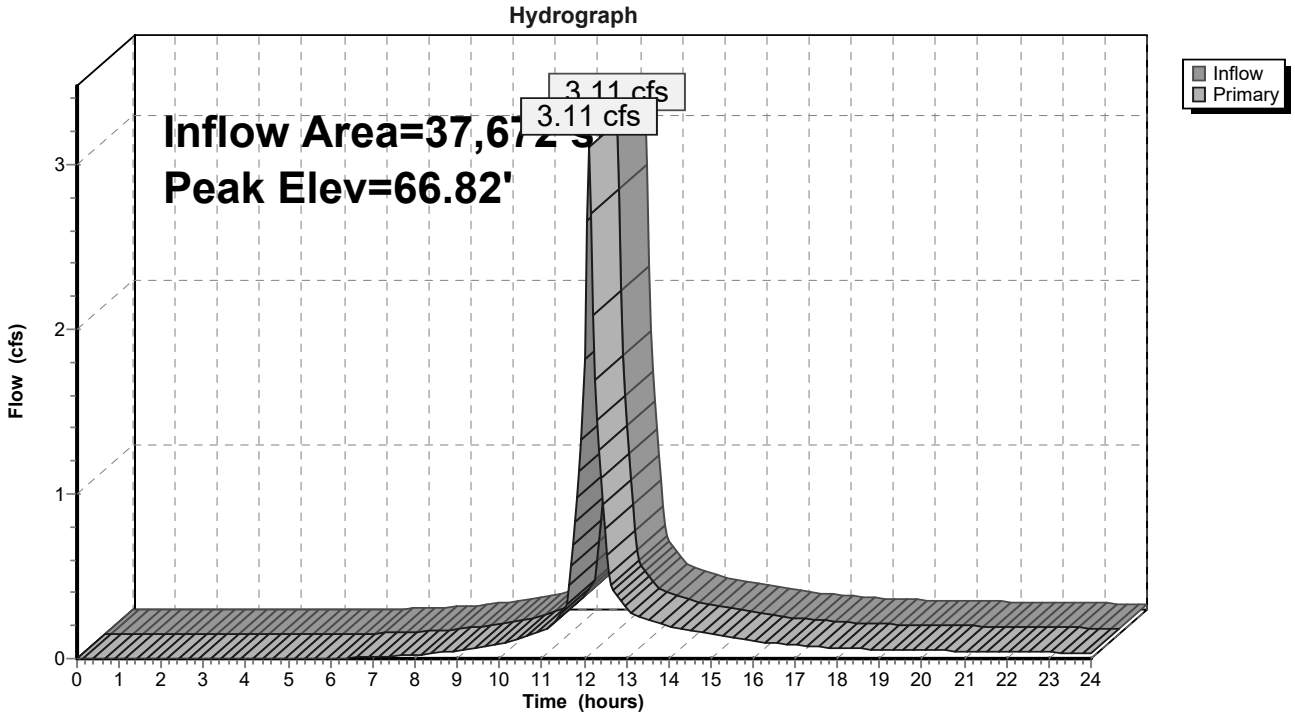
Inflow Area = 37,672 sf, 68.25% Impervious, Inflow Depth > 3.28" for 10 year event
Inflow = 3.11 cfs @ 12.10 hrs, Volume= 10,289 cf
Outflow = 3.11 cfs @ 12.10 hrs, Volume= 10,289 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.11 cfs @ 12.10 hrs, Volume= 10,289 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 66.82' @ 12.44 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 @ 12.10 hrs HW=66.11' TW=66.22' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.00 cfs)
└─**2=Culvert** (Controls 0.00 cfs)

Pond DMH7: DMH7



Summary for Pond DMH8: DMH8

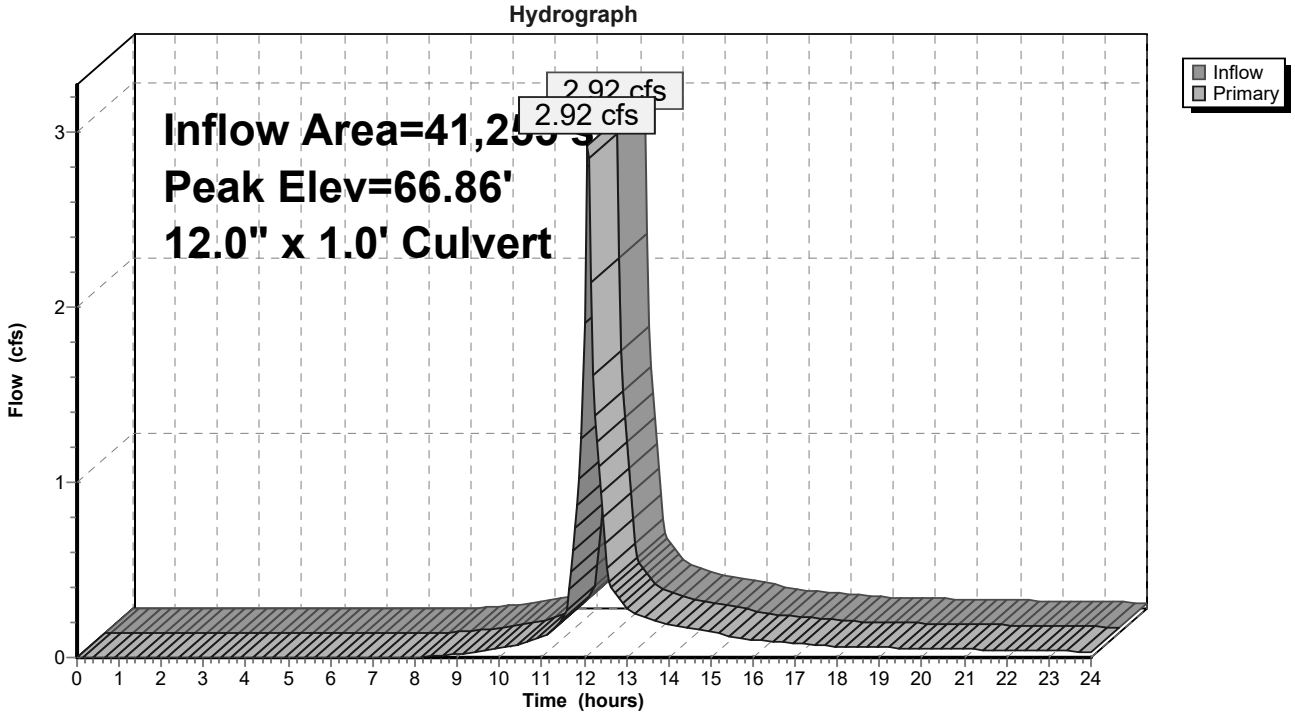
Inflow Area = 41,255 sf, 48.59% Impervious, Inflow Depth > 2.63" for 10 year event
Inflow = 2.92 cfs @ 12.08 hrs, Volume= 9,036 cf
Outflow = 2.92 cfs @ 12.08 hrs, Volume= 9,036 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.92 cfs @ 12.08 hrs, Volume= 9,036 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 66.86' @ 12.41 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=2.10 cfs @ 12.08 hrs HW=66.40' TW=66.09' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 2.10 cfs @ 2.68 fps)

Pond DMH8: DMH8



Summary for Pond P1-1: P1-1

Inflow Area = 54,889 sf, 57.55% Impervious, Inflow Depth > 2.97" for 10 year event
Inflow = 4.22 cfs @ 12.08 hrs, Volume= 13,572 cf
Outflow = 0.74 cfs @ 12.56 hrs, Volume= 9,884 cf, Atten= 82%, Lag= 28.9 min
Primary = 0.74 cfs @ 12.56 hrs, Volume= 9,884 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 53.16' @ 12.56 hrs Surf.Area= 4,015 sf Storage= 6,589 cf
Flood Elev= 55.50' Surf.Area= 5,973 sf Storage= 18,004 cf

Plug-Flow detention time= 237.0 min calculated for 9,884 cf (73% of inflow)
Center-of-Mass det. time= 146.7 min (958.3 - 811.6)

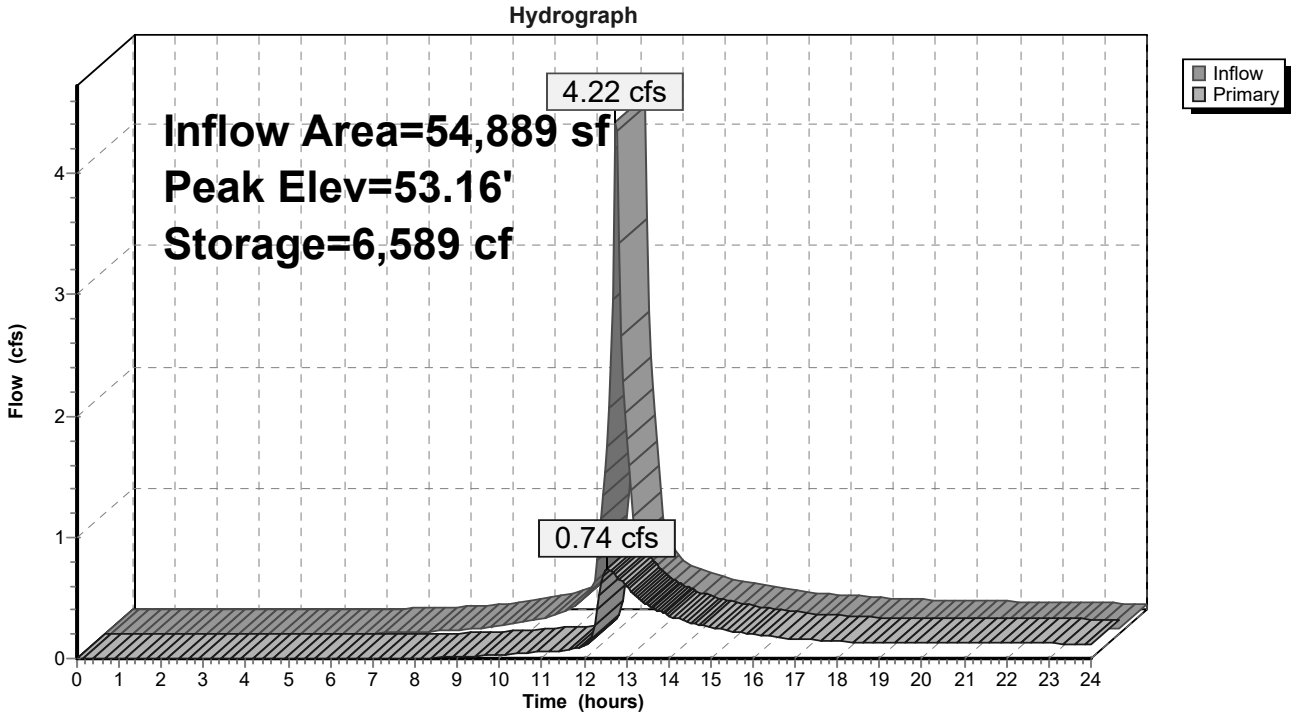
Volume	Invert	Avail.Storage	Storage Description
#1	51.00'	18,004 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

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=0.74 cfs @ 12.56 hrs HW=53.16' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.74 cfs of 4.63 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.15 cfs @ 6.94 fps)
  ├─**3=Orifice/Grate** (Orifice Controls 0.59 cfs @ 2.19 fps)
  ├─**4=Orifice/Grate** (Controls 0.00 cfs)
  └─**5=Orifice/Grate** (Controls 0.00 cfs)

Pond P1-1: P1-1


Hydrograph
Inflow
Primary
4.22 cfs
0.74 cfs
Inflow Area=54,889 sf
Peak Elev=53.16'
Storage=6,589 cf
Flow (cfs)
Time (hours)
0
1
2
3
4
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

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

Inflow Area = 47,228 sf, 25.39% Impervious, Inflow Depth > 1.89" for 10 year event
Inflow = 2.36 cfs @ 12.08 hrs, Volume= 7,429 cf
Outflow = 0.03 cfs @ 24.00 hrs, Volume= 1,088 cf, Atten= 99%, Lag= 715.0 min
Primary = 0.03 cfs @ 24.00 hrs, Volume= 1,088 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 58.07' @ 24.00 hrs Surf.Area= 6,779 sf Storage= 6,341 cf
Flood Elev= 59.75' Surf.Area= 8,697 sf Storage= 15,495 cf

Plug-Flow detention time= 391.1 min calculated for 1,088 cf (15% of inflow)
Center-of-Mass det. time= 243.3 min (1,091.7 - 848.5)

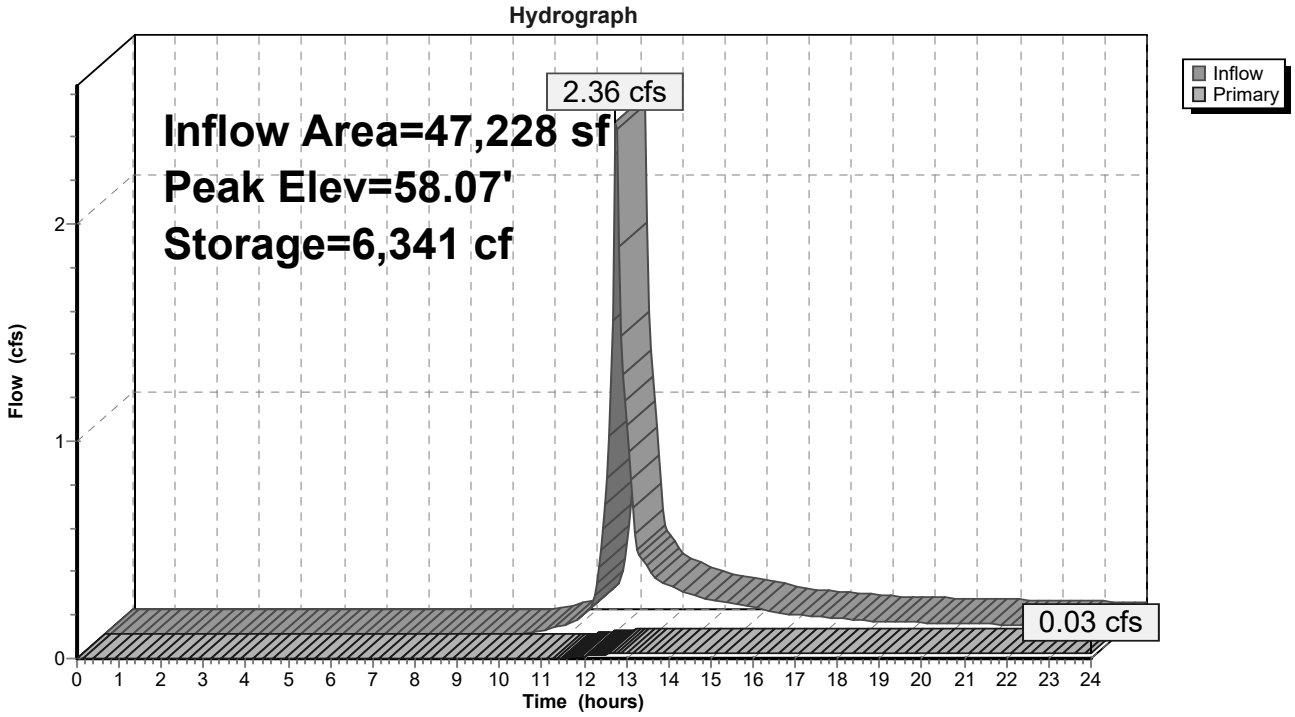
Volume	Invert	Avail.Storage	Storage Description
#1	57.00'	15,495 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
57.00	5,117	0	0
58.00	6,673	5,895	5,895
58.50	7,472	3,536	9,431
59.25	8,697	6,063	15,495

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=58.07' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Passes 0.03 cfs of 2.85 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 0.03 cfs @ 4.87 fps)
- **3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond P1-2: DP-1-2



Summary for Pond P1-3: P1-3

Inflow Area = 7,345 sf, 68.78% Impervious, Inflow Depth > 3.35" for 10 year event
Inflow = 0.65 cfs @ 12.07 hrs, Volume= 2,049 cf
Outflow = 0.07 cfs @ 12.84 hrs, Volume= 1,891 cf, Atten= 89%, Lag= 45.9 min
Primary = 0.07 cfs @ 12.84 hrs, Volume= 1,891 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 51.62' @ 12.84 hrs Surf.Area= 1,505 sf Storage= 1,023 cf
Flood Elev= 54.27' Surf.Area= 1,400 sf Storage= 1,861 cf

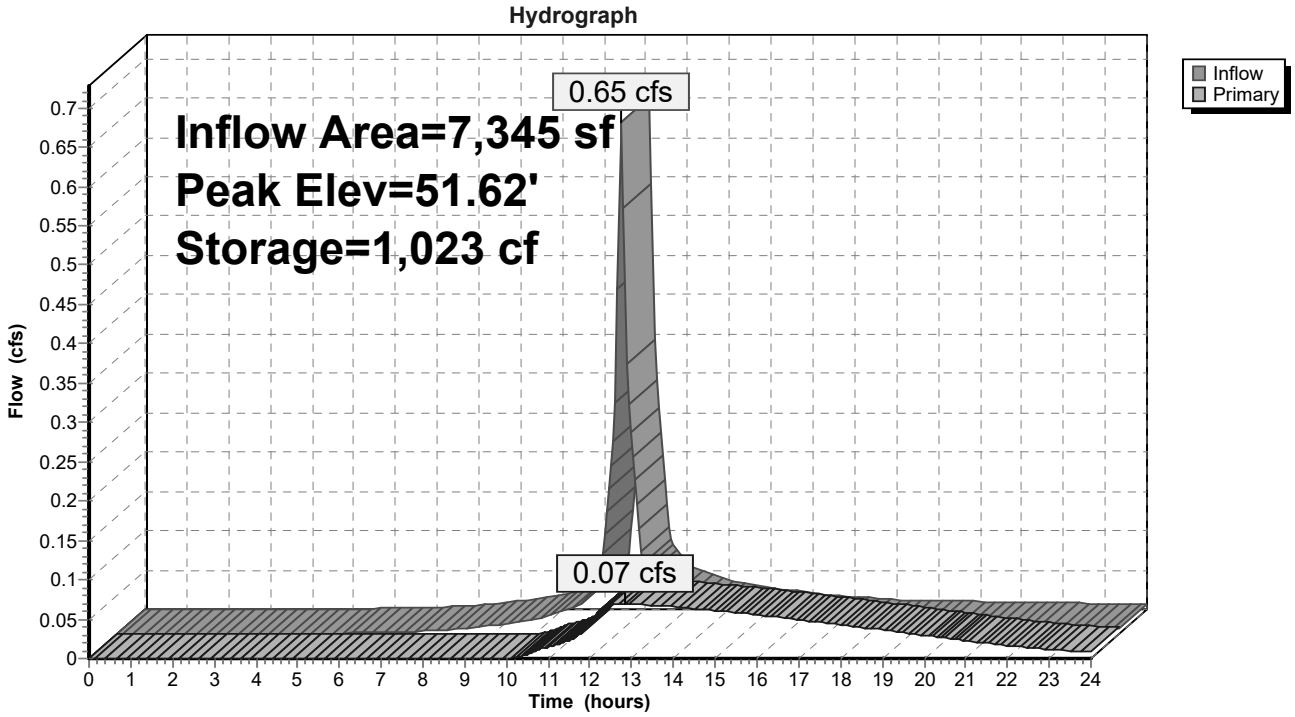
Plug-Flow detention time= 203.5 min calculated for 1,887 cf (92% of inflow)
Center-of-Mass det. time= 164.2 min (963.9 - 799.6)

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'	**1.5" 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=0.07 cfs @ 12.84 hrs HW=51.62' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.07 cfs of 3.50 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.07 cfs @ 5.60 fps)
  └─**3=Orifice/Grate** (Controls 0.00 cfs)

Pond P1-3: P1-3


Hydrograph
Inflow Area=7,345 sf
Peak Elev=51.62'
Storage=1,023 cf
0.65 cfs
0.07 cfs
Inflow
Primary
Flow (cfs)
Time (hours)

Summary for Pond P3-1: P3-2

Inflow Area = 78,927 sf, 57.97% Impervious, Inflow Depth > 2.94" for 10 year event
Inflow = 5.99 cfs @ 12.09 hrs, Volume= 19,326 cf
Outflow = 2.04 cfs @ 12.40 hrs, Volume= 16,770 cf, Atten= 66%, Lag= 18.7 min
Primary = 2.04 cfs @ 12.40 hrs, Volume= 16,770 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 66.80' @ 12.40 hrs Surf.Area= 3,825 sf Storage= 7,180 cf
Flood Elev= 70.00' Surf.Area= 3,825 sf Storage= 13,172 cf

Plug-Flow detention time= 113.2 min calculated for 16,770 cf (87% of inflow)
Center-of-Mass det. time= 54.4 min (869.4 - 815.0)

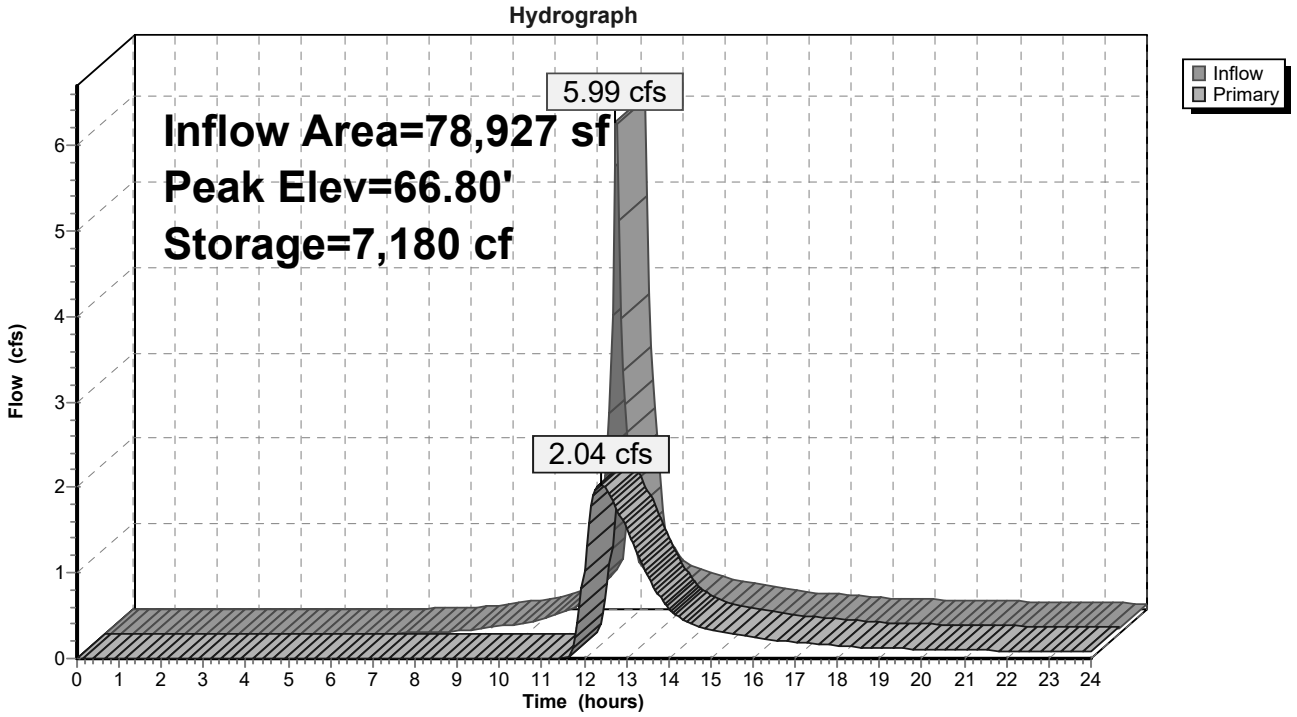
Volume	Invert	Avail.Storage	Storage Description
#1	64.00'	4,658 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc) 22,950 cf Overall - 11,304 cf Embedded = 11,646 cf x 40.0% Voids
#2	64.50'	8,514 cf	**52.8"W x 48.0"H x 4.00'L Galley 4x4x4** x 192 Inside #1
		13,172 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
64.00	3,825	0	0
70.00	3,825	22,950	22,950

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=2.04 cfs @ 12.40 hrs HW=66.80' TW=61.70' (Dynamic Tailwater)
└─**1=Culvert** (Passes 2.04 cfs of 8.72 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 2.04 cfs @ 5.84 fps)
  └─**3=Orifice/Grate** (Controls 0.00 cfs)

Pond P3-1: P3-2


Hydrograph
Inflow
Primary
5.99 cfs
2.04 cfs
Inflow Area=78,927 sf
Peak Elev=66.80'
Storage=7,180 cf
Flow (cfs)
Time (hours)

Summary for Pond P3-2: P3-3

Inflow Area = 150,527 sf, 46.94% Impervious, Inflow Depth > 2.39" for 10 year event
Inflow = 5.74 cfs @ 12.10 hrs, Volume= 29,920 cf
Outflow = 1.62 cfs @ 13.25 hrs, Volume= 21,812 cf, Atten= 72%, Lag= 69.4 min
Primary = 1.62 cfs @ 13.25 hrs, Volume= 21,812 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 52.73' @ 13.25 hrs Surf.Area= 6,751 sf Storage= 12,199 cf
Flood Elev= 55.50' Surf.Area= 12,548 sf Storage= 38,610 cf

Plug-Flow detention time= 182.8 min calculated for 21,812 cf (73% of inflow)
Center-of-Mass det. time= 91.9 min (947.7 - 855.8)

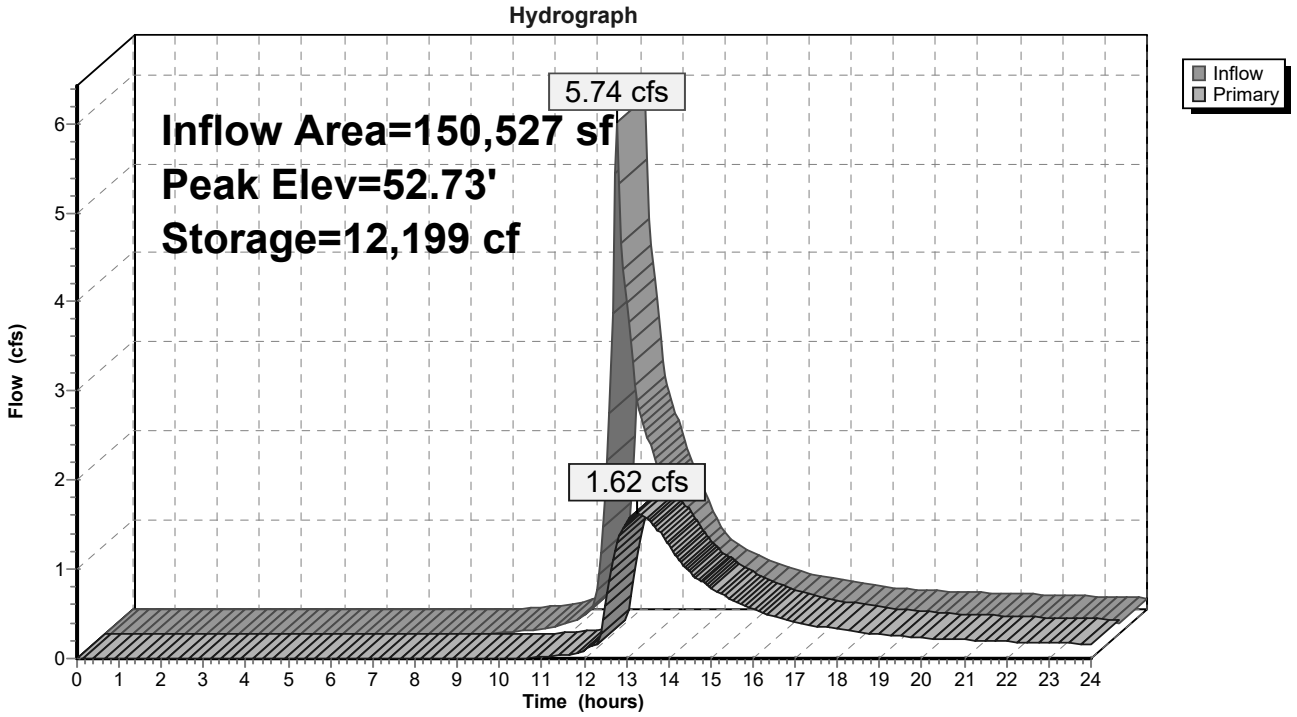
Volume	Invert	Avail.Storage	Storage Description
#1	50.00'	38,610 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

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'	**9.0" Vert. Orifice/Grate** C= 0.600
#4	Device 1	52.50'	**8.0" Vert. Orifice/Grate** C= 0.600
#5	Device 1	54.00'	**2.00' x 2.00' Horiz. Orifice/Grate** Limited to weir flow C= 0.600
#6	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=1.62 cfs @ 13.25 hrs HW=52.73' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Passes 1.62 cfs of 5.65 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 0.17 cfs @ 7.83 fps)
  - **3=Orifice/Grate** (Orifice Controls 1.28 cfs @ 2.91 fps)
  - **4=Orifice/Grate** (Orifice Controls 0.17 cfs @ 1.63 fps)
  - **5=Orifice/Grate** (Controls 0.00 cfs)
- **6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond P3-2: P3-3

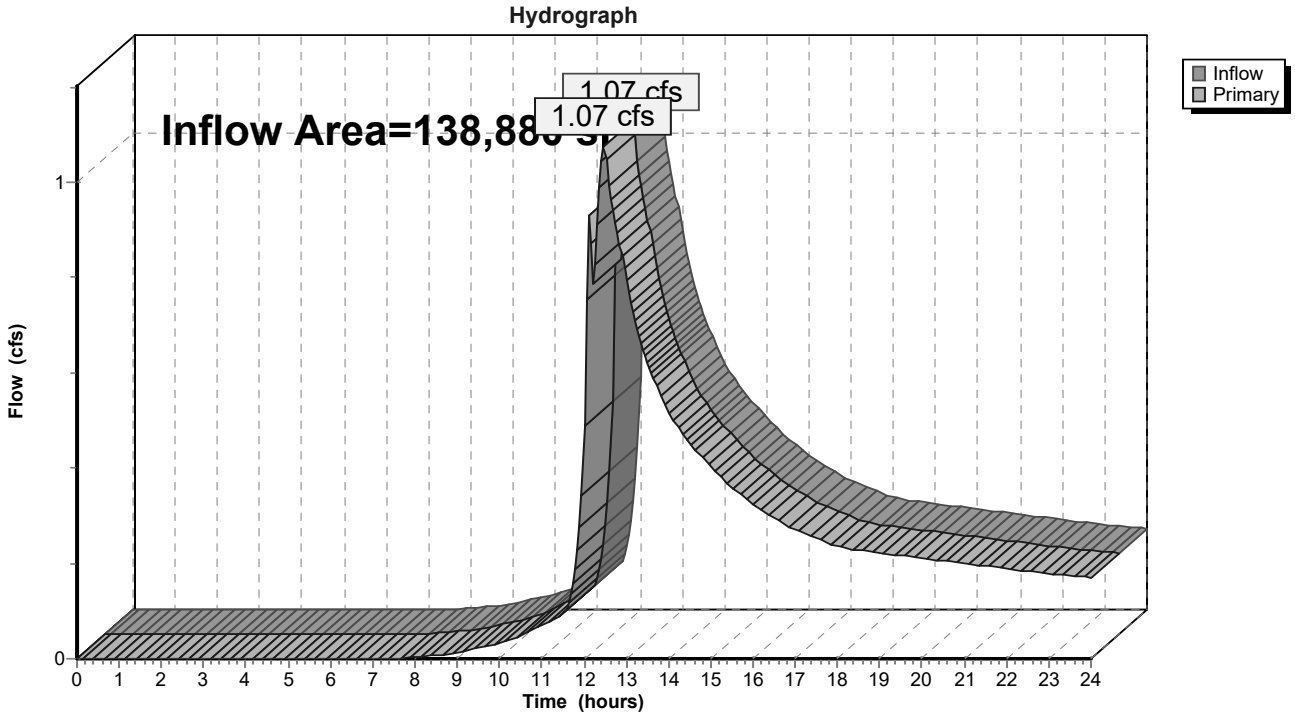

Hydrograph
Inflow
Primary
5.74 cfs
1.62 cfs
Inflow Area=150,527 sf
Peak Elev=52.73'
Storage=12,199 cf
Flow (cfs)
Time (hours)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24

Summary for Link DP-1: DP-1

Inflow Area = 138,880 sf, 35.07% Impervious, Inflow Depth > 1.35" for 10 year event
Inflow = 1.07 cfs @ 12.47 hrs, Volume= 15,576 cf
Primary = 1.07 cfs @ 12.47 hrs, Volume= 15,576 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

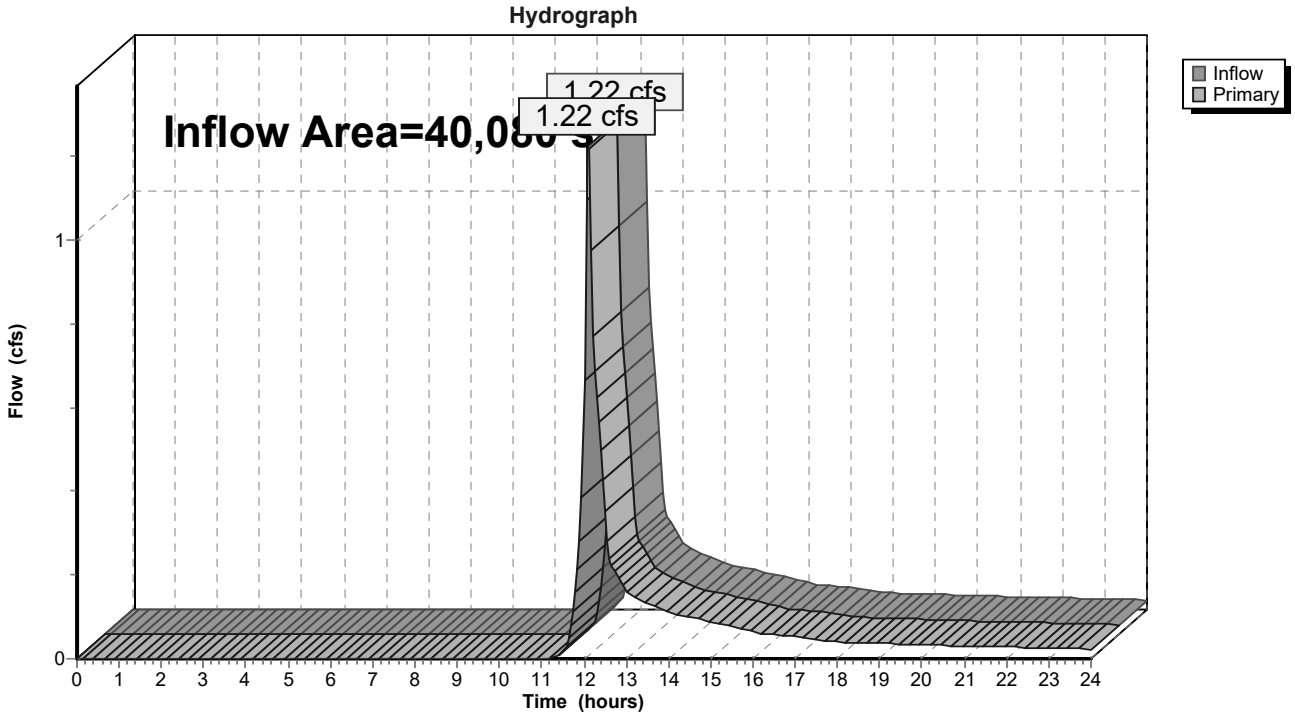


Summary for Link DP-2: DP-2

Inflow Area = 40,080 sf, 11.21% Impervious, Inflow Depth > 1.25" for 10 year event
Inflow = 1.22 cfs @ 12.09 hrs, Volume= 4,173 cf
Primary = 1.22 cfs @ 12.09 hrs, Volume= 4,173 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

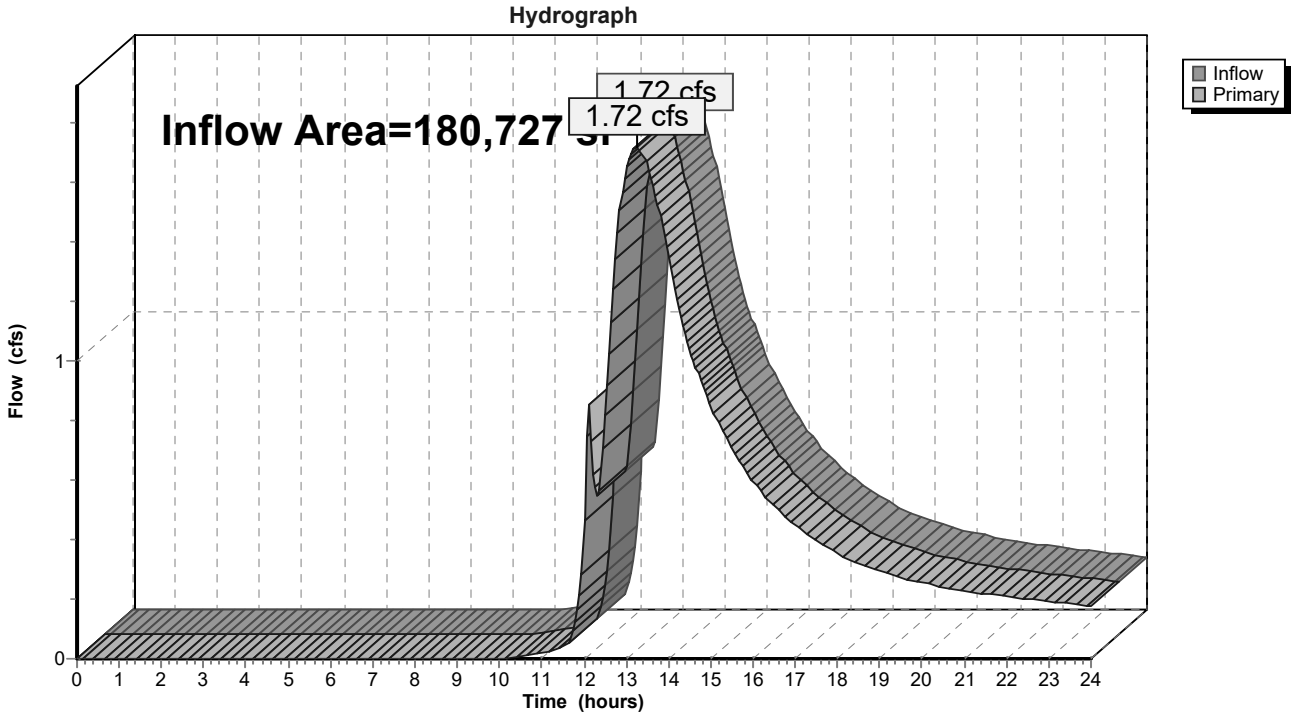


Summary for Link DP-3: DP-3

Inflow Area = 180,727 sf, 39.09% Impervious, Inflow Depth > 1.63" for 10 year event
Inflow = 1.72 cfs @ 13.24 hrs, Volume= 24,478 cf
Primary = 1.72 cfs @ 13.24 hrs, Volume= 24,478 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

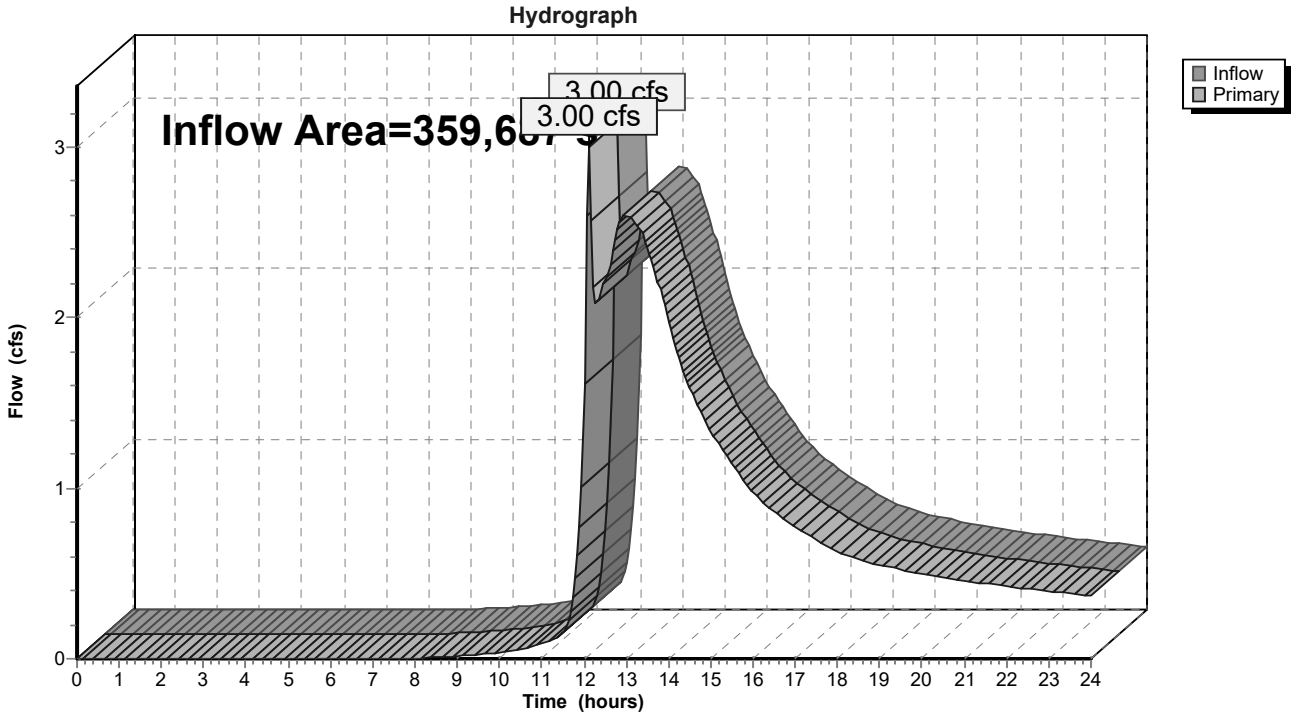


Summary for Link TOTAL: (new Link)

Inflow Area = 359,687 sf, 34.43% Impervious, Inflow Depth > 1.48" for 10 year event
Inflow = 3.00 cfs @ 12.10 hrs, Volume= 44,227 cf
Primary = 3.00 cfs @ 12.10 hrs, Volume= 44,227 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)



RANGER
ENGINEERING &
DESIGN, LLC

STORMWATER MANAGEMENT REPORT

POST-DEVELOPMENT DRAINAGE

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-1B Runoff Area=7,118 sf 74.36% Impervious Runoff Depth>4.73"
Flow Length=319' Tc=8.6 min CN=89 Runoff=0.79 cfs 2,806 cf

Subcatchment P-1C: P-1C Runoff Area=3,632 sf 56.17% Impervious Runoff Depth>3.98"
Flow Length=96' Tc=5.0 min CN=82 Runoff=0.39 cfs 1,206 cf

Subcatchment P-1D: P-1D Runoff Area=3,713 sf 81.12% Impervious Runoff Depth>4.95"
Flow Length=96' Slope=0.0100 '/' Tc=5.0 min CN=91 Runoff=0.47 cfs 1,533 cf

Subcatchment P-1E: P-1E Runoff Area=15,678 sf 38.38% Impervious Runoff Depth>3.28"
Flow Length=100' Tc=5.0 min CN=75 Runoff=1.39 cfs 4,285 cf

Subcatchment P-1F: P-1F Runoff Area=20,660 sf 69.29% Impervious Runoff Depth>4.51"
Flow Length=380' Tc=5.0 min CN=87 Runoff=2.45 cfs 7,773 cf

Subcatchment P-1G: P-1G Runoff Area=5,772 sf 64.26% Impervious Runoff Depth>4.30"
Flow Length=90' Tc=5.0 min CN=85 Runoff=0.66 cfs 2,068 cf

Subcatchment P-1H: P-1H Runoff Area=5,661 sf 39.83% Impervious Runoff Depth>3.38"
Flow Length=130' Tc=5.0 min CN=76 Runoff=0.52 cfs 1,593 cf

Subcatchment P-1I: P-1I Runoff Area=47,228 sf 25.39% Impervious Runoff Depth>2.80"
Flow Length=145' Tc=5.0 min CN=70 Runoff=3.55 cfs 11,032 cf

Subcatchment P-1J: P1-J Runoff Area=27,093 sf 0.25% Impervious Runoff Depth>1.84"
Flow Length=280' Tc=6.3 min CN=59 Runoff=1.23 cfs 4,146 cf

Subcatchment P-2A: P-2A Runoff Area=40,080 sf 11.21% Impervious Runoff Depth>2.00"
Flow Length=140' Tc=5.0 min CN=61 Runoff=2.08 cfs 6,692 cf

Subcatchment P-3A: P-3A Runoff Area=30,200 sf 0.00% Impervious Runoff Depth>1.76"
Flow Length=230' Tc=5.0 min CN=58 Runoff=1.33 cfs 4,417 cf

Subcatchment P-3B: P-3B Runoff Area=71,600 sf 34.77% Impervious Runoff Depth>3.18"
Flow Length=370' Tc=5.4 min CN=74 Runoff=6.10 cfs 18,988 cf

Subcatchment P-3C: P-3C Runoff Area=41,255 sf 48.59% Impervious Runoff Depth>3.68"
Flow Length=280' Tc=5.0 min CN=79 Runoff=4.07 cfs 12,642 cf

Subcatchment P-3D: P-3D Runoff Area=33,144 sf 68.21% Impervious Runoff Depth>4.41"
Flow Length=240' Tc=7.3 min CN=86 Runoff=3.63 cfs 12,167 cf

Subcatchment P-3E: P-3F Runoff Area=4,528 sf 68.55% Impervious Runoff Depth>4.41"
Flow Length=140' Tc=5.0 min CN=86 Runoff=0.53 cfs 1,663 cf

Pond 3P: INFILTRATOR Peak Elev=0.00' Storage=0 cf

Pond CB1: CB1 Peak Elev=52.17' Inflow=0.39 cfs 1,206 cf
8.0" x 9.0' Culvert Outflow=0.39 cfs 1,206 cf

Pond CB2: CB2 Peak Elev=52.17' Inflow=0.47 cfs 1,533 cf
8.0" x 9.0' Culvert Outflow=0.47 cfs 1,533 cf

Pond CB3: CB3 Peak Elev=53.63' Inflow=0.79 cfs 2,806 cf
12.0" x 12.0' Culvert Outflow=0.79 cfs 2,806 cf

Pond CB4: CB4 Peak Elev=53.94' Inflow=2.45 cfs 7,773 cf
12.0" x 11.0' Culvert Outflow=2.45 cfs 7,773 cf

Pond CB5: CB5 Peak Elev=58.42' Inflow=0.52 cfs 1,593 cf
12.0" x 23.9' Culvert Outflow=0.52 cfs 1,593 cf

Pond CB6: CB6 Peak Elev=58.46' Inflow=0.66 cfs 2,068 cf
12.0" x 15.9' Culvert Outflow=0.66 cfs 2,068 cf

Pond CB7: CB7 Peak Elev=67.88' Inflow=3.63 cfs 12,167 cf
12.0" x 20.0' Culvert Outflow=3.63 cfs 12,167 cf

Pond CB8: CB8 Peak Elev=67.76' Inflow=0.53 cfs 1,663 cf
12.0" x 20.0' Culvert Outflow=0.53 cfs 1,663 cf

Pond CB9: CB9 Peak Elev=68.37' Inflow=4.07 cfs 12,642 cf
12.0" x 22.0' Culvert Outflow=4.07 cfs 12,642 cf

Pond DMH 10: DMH9 Peak Elev=61.90' Inflow=3.07 cfs 23,859 cf
15.0" x 100.0' Culvert Outflow=3.07 cfs 23,859 cf

Pond DMH 11: DMH 10 Peak Elev=56.25' Inflow=3.07 cfs 23,859 cf
15.0" x 33.0' Culvert Outflow=3.07 cfs 23,859 cf

Pond DMH 6: DMH 6 Peak Elev=67.71' Inflow=4.13 cfs 13,830 cf
15.0" x 55.0' Culvert Outflow=4.13 cfs 13,830 cf

Pond DMH2: DMH2 Peak Elev=53.59' Inflow=3.16 cfs 10,578 cf
12.0" x 39.0' Culvert Outflow=3.16 cfs 10,578 cf

Pond DMH3: DMH3 Peak Elev=55.96' Inflow=1.18 cfs 3,662 cf
12.0" x 57.3' Culvert Outflow=1.18 cfs 3,662 cf

Pond DMH4: DMH4 Peak Elev=58.23' Inflow=1.18 cfs 3,662 cf
12.0" x 65.0' Culvert Outflow=1.18 cfs 3,662 cf

Pond DMH5: DMH 5 Peak Elev=67.76' Inflow=4.13 cfs 13,830 cf
15.0" x 94.0' Culvert Outflow=4.13 cfs 13,830 cf

Pond DMH7: DMH7 Peak Elev=67.65' Inflow=4.13 cfs 13,830 cf
Outflow=4.13 cfs 13,830 cf

Pond DMH8: DMH8	Peak Elev=67.75' Inflow=4.07 cfs 12,642 cf 12.0" x 1.0' Culvert Outflow=4.07 cfs 12,642 cf
Pond P1-1: P1-1	Peak Elev=53.49' Storage=7,914 cf Inflow=5.72 cfs 18,525 cf Outflow=1.86 cfs 14,375 cf
Pond P1-2: DP-1-2	Peak Elev=58.53' Storage=9,693 cf Inflow=3.55 cfs 11,032 cf Outflow=0.03 cfs 1,338 cf
Pond P1-3: P1-3	Peak Elev=52.17' Storage=1,386 cf Inflow=0.86 cfs 2,739 cf Outflow=0.08 cfs 2,546 cf
Pond P3-1: P3-2	Peak Elev=67.62' Storage=9,430 cf Inflow=8.14 cfs 26,472 cf Outflow=3.07 cfs 23,859 cf
Pond P3-2: P3-3	Peak Elev=53.07' Storage=14,641 cf Inflow=8.09 cfs 42,847 cf Outflow=2.79 cfs 34,449 cf
Link DP-1: DP-1	Inflow=2.56 cfs 22,713 cf Primary=2.56 cfs 22,713 cf
Link DP-2: DP-2	Inflow=2.08 cfs 6,692 cf Primary=2.08 cfs 6,692 cf
Link DP-3: DP-3	Inflow=2.98 cfs 38,866 cf Primary=2.98 cfs 38,866 cf
Link TOTAL: (new Link)	Inflow=5.84 cfs 68,272 cf Primary=5.84 cfs 68,272 cf

Total Runoff Area = 359,687 sf Runoff Volume = 93,320 cf Average Runoff Depth = 3.11"
65.57% Pervious = 235,843 sf 34.43% Impervious = 123,844 sf

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

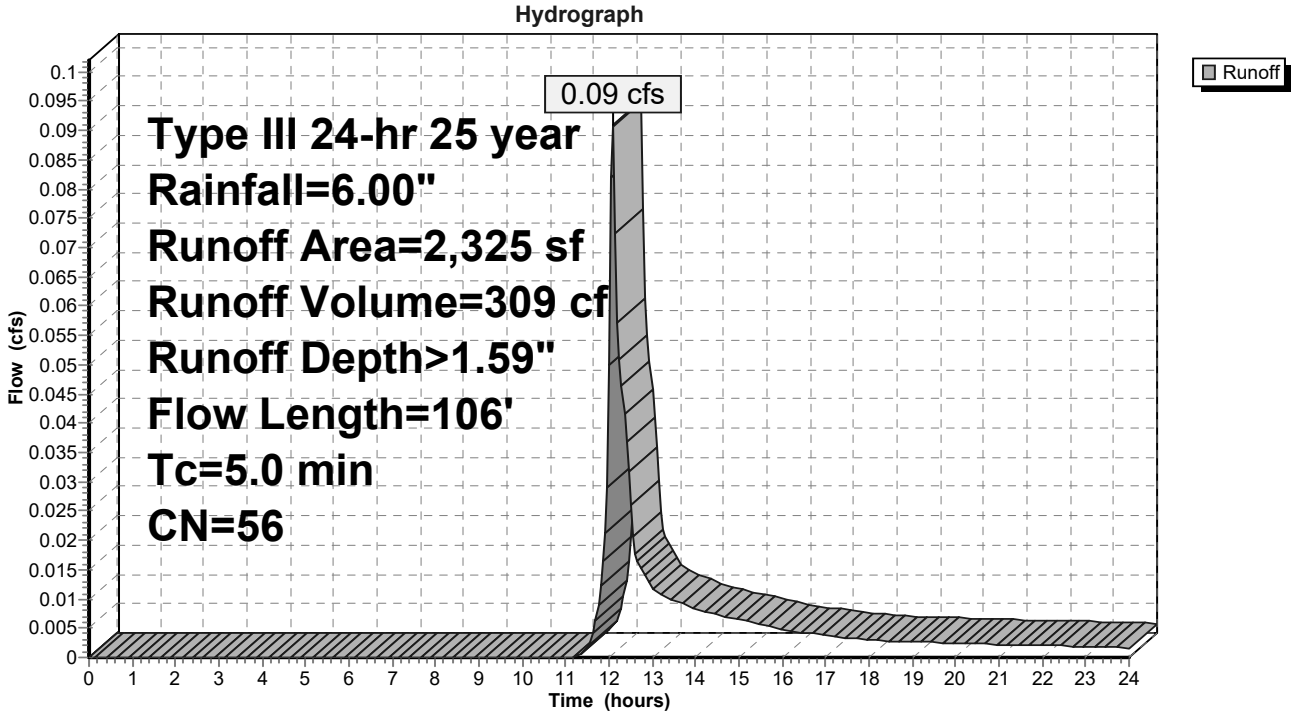
Runoff = 0.09 cfs @ 12.09 hrs, Volume= 309 cf, Depth> 1.59"

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



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

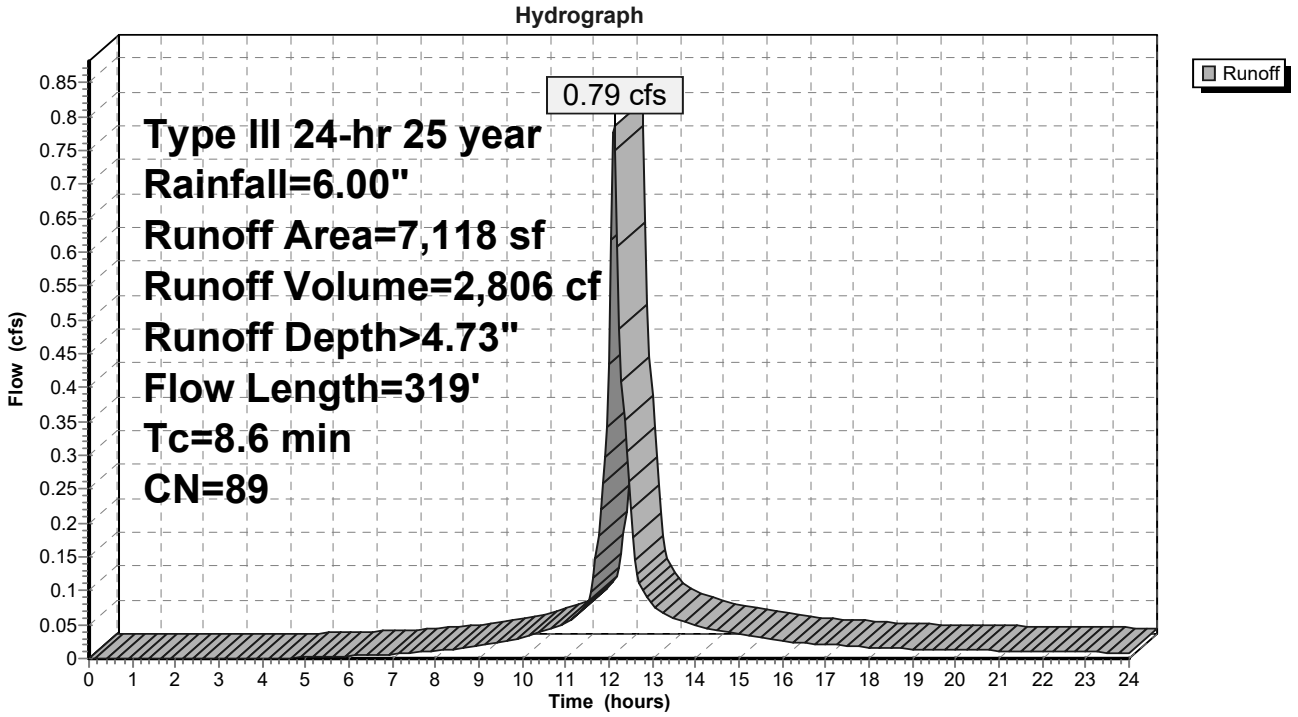
Runoff = 0.79 cfs @ 12.12 hrs, Volume= 2,806 cf, Depth> 4.73"

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
5,293	98	Paved roads w/curbs & sewers, HSG B
1,825	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
0	98	Water Surface, HSG B
7,118	89	Weighted Average
1,825		Pervious Area
5,293		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0					**Direct Entry, DIRECT**
4.8	50	0.0300	0.17		**Sheet Flow, SHEET FLOW** Grass: Short n= 0.150 P2= 3.20"
2.9	60	0.0025	0.35		**Shallow Concentrated Flow, SHALLOW GRASS** Short Grass Pasture Kv= 7.0 fps
0.9	209	0.0350	3.80		**Shallow Concentrated Flow, SHALLOW PAVE** Paved Kv= 20.3 fps
8.6	319	Total			

Subcatchment P-1B: P-1B



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

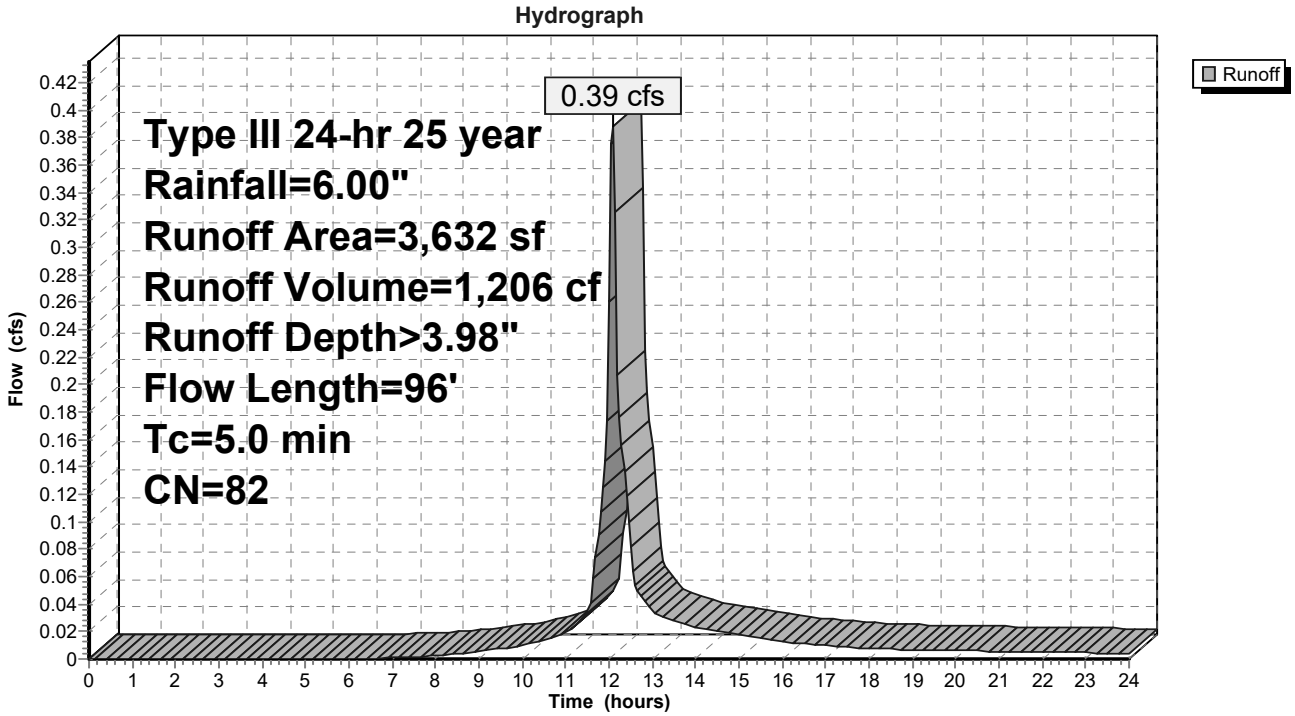
Runoff = 0.39 cfs @ 12.07 hrs, Volume= 1,206 cf, Depth> 3.98"

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
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
2.8	50	0.1100	0.29		**Sheet Flow, SHEET** Grass: Short n= 0.150 P2= 3.20"
0.2	46	0.0300	3.52		**Shallow Concentrated Flow, PAVEMENT** Paved Kv= 20.3 fps
2.0					**Direct Entry, DIRECT**
5.0	96	Total			

Subcatchment P-1C: P-1C



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

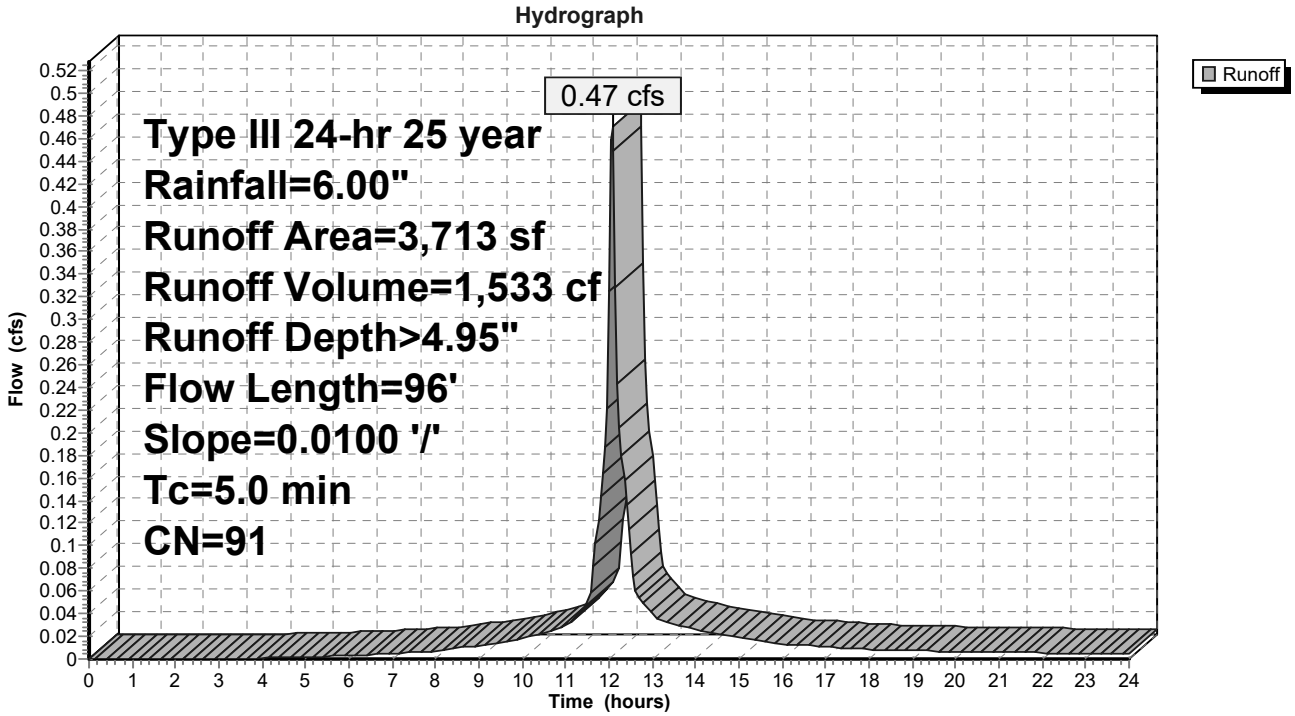
Runoff = 0.47 cfs @ 12.07 hrs, Volume= 1,533 cf, Depth> 4.95"

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
0.9	50	0.0100	0.91		**Sheet Flow, SHEET** Smooth surfaces n= 0.011 P2= 3.20"
0.4	46	0.0100	2.03		**Shallow Concentrated Flow, PAVEMENT** Paved Kv= 20.3 fps
3.7					**Direct Entry, DIRECT**
5.0	96	Total			

Subcatchment P-1D: P-1D



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

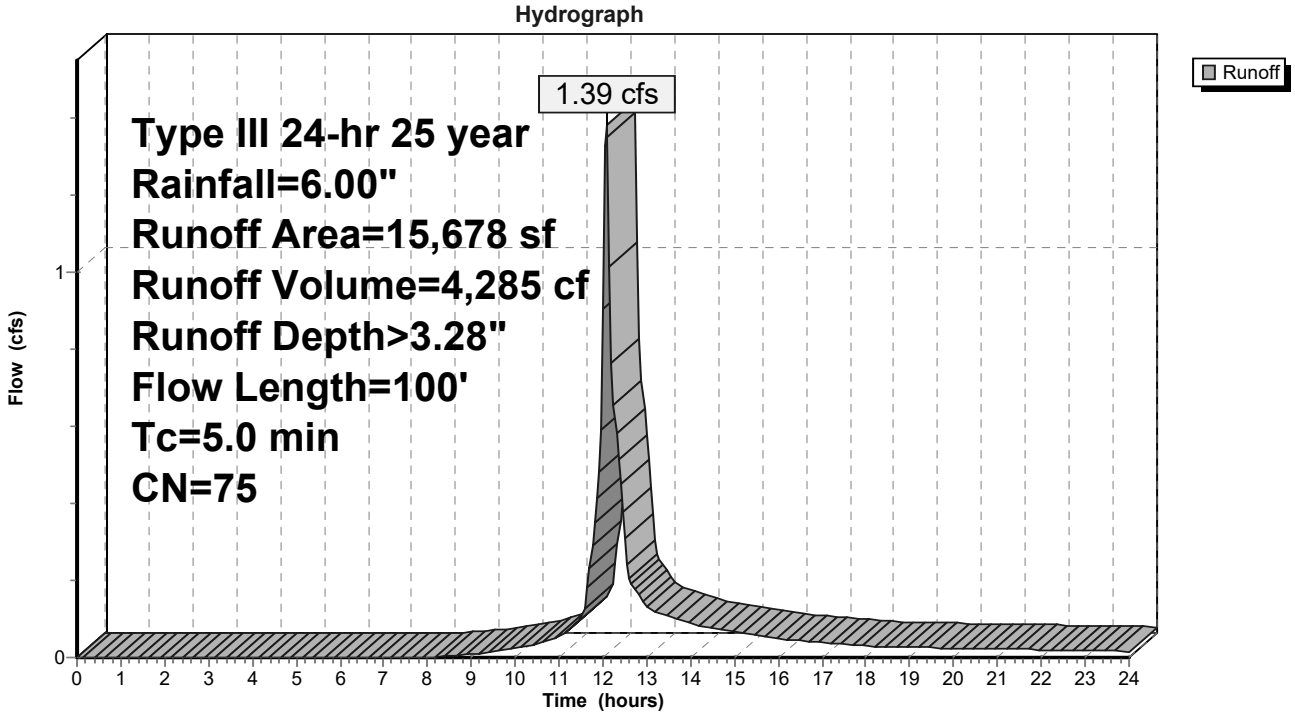
Runoff = 1.39 cfs @ 12.08 hrs, Volume= 4,285 cf, Depth> 3.28"

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
880	98	Roofs, HSG B
0	98	Paved parking, HSG B
210	98	Paved roads w/curbs & sewers, HSG B
8,660	61	>75% Grass cover, Good, HSG B
4,928	98	Water Surface, HSG B
1,000	55	Woods, Good, HSG B
15,678	75	Weighted Average
9,660		Pervious Area
6,018		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2					**Direct Entry, DIRECT**
3.6	50	0.0600	0.23		**Sheet Flow, SHEET** Grass: Short n= 0.150 P2= 3.20"
0.2	50	0.2700	3.64		**Shallow Concentrated Flow, SHALLOW GRASS** Short Grass Pasture Kv= 7.0 fps
5.0	100	Total			

Subcatchment P-1E: P-1E



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

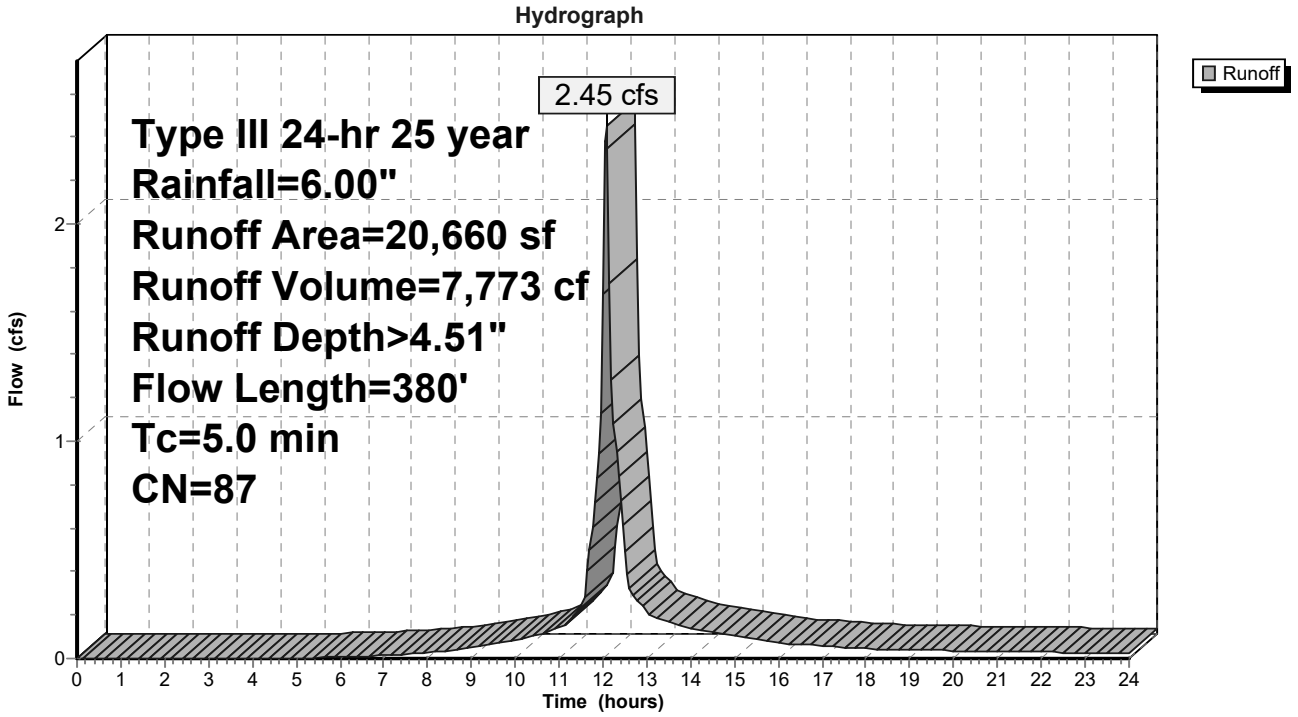
Runoff = 2.45 cfs @ 12.07 hrs, Volume= 7,773 cf, Depth> 4.51"

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
6,344	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
0	98	Water Surface, HSG B
20,660	87	Weighted Average
6,344		Pervious Area
14,316		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	30	0.0830	0.24		**Sheet Flow, SHEET GRASS** Grass: Short n= 0.150 P2= 3.20"
0.4	20	0.0125	0.83		**Sheet Flow, SHEET PAVE** Smooth surfaces n= 0.011 P2= 3.20"
1.3	330	0.0440	4.26		**Shallow Concentrated Flow, SHALLOW PAVE** Paved Kv= 20.3 fps
1.2					**Direct Entry, DIRECT**
5.0	380	Total			

Subcatchment P-1F: P-1F



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

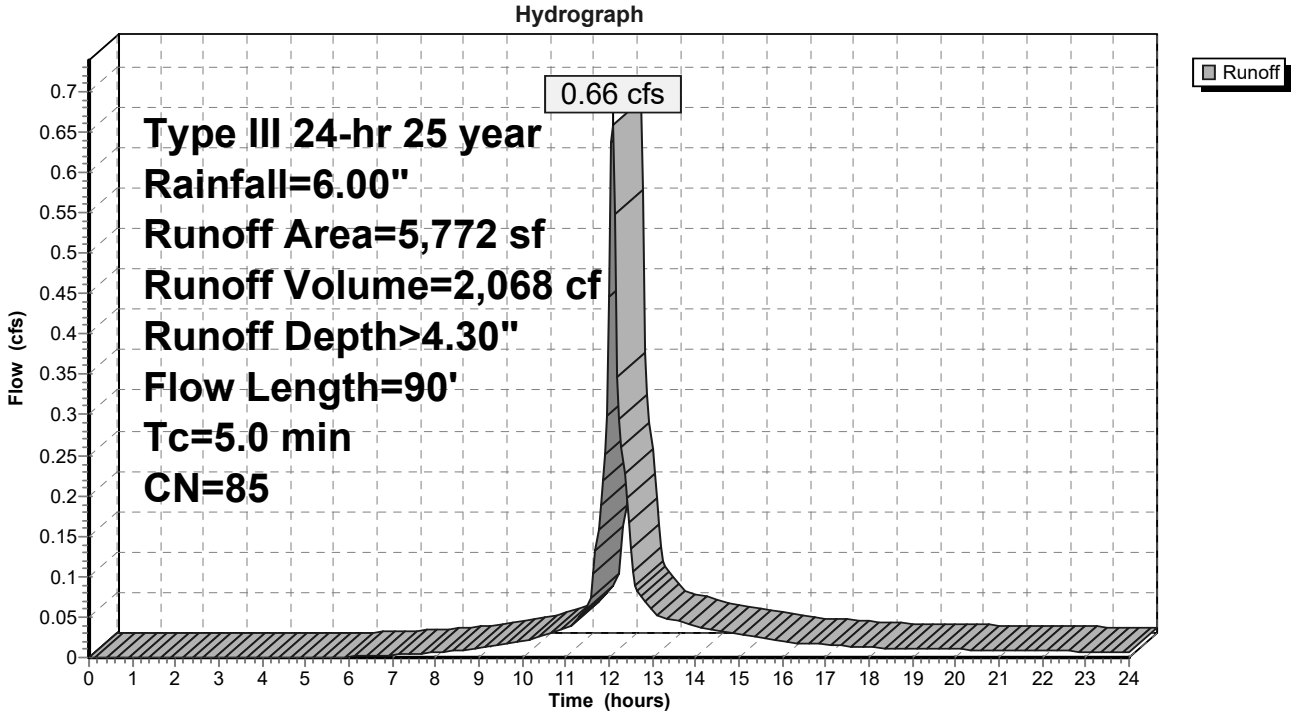
Runoff = 0.66 cfs @ 12.07 hrs, Volume= 2,068 cf, Depth> 4.30"

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
2,063	61	>75% Grass cover, Good, HSG B
440	98	Roofs, HSG B
3,269	98	Paved roads w/curbs & sewers, HSG B
5,772	85	Weighted Average
2,063		Pervious Area
3,709		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	50	0.0500	0.21		**Sheet Flow, SHEET GRASS** Grass: Short n= 0.150 P2= 3.20"
0.4	30	0.0330	1.32		**Sheet Flow, SHEET PAVE** Smooth surfaces n= 0.011 P2= 3.20"
0.0	10	0.0290	3.46		**Shallow Concentrated Flow, PAVED** Paved Kv= 20.3 fps
0.7					**Direct Entry, DIRECT**
5.0	90	Total			

Subcatchment P-1G: P-1G



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

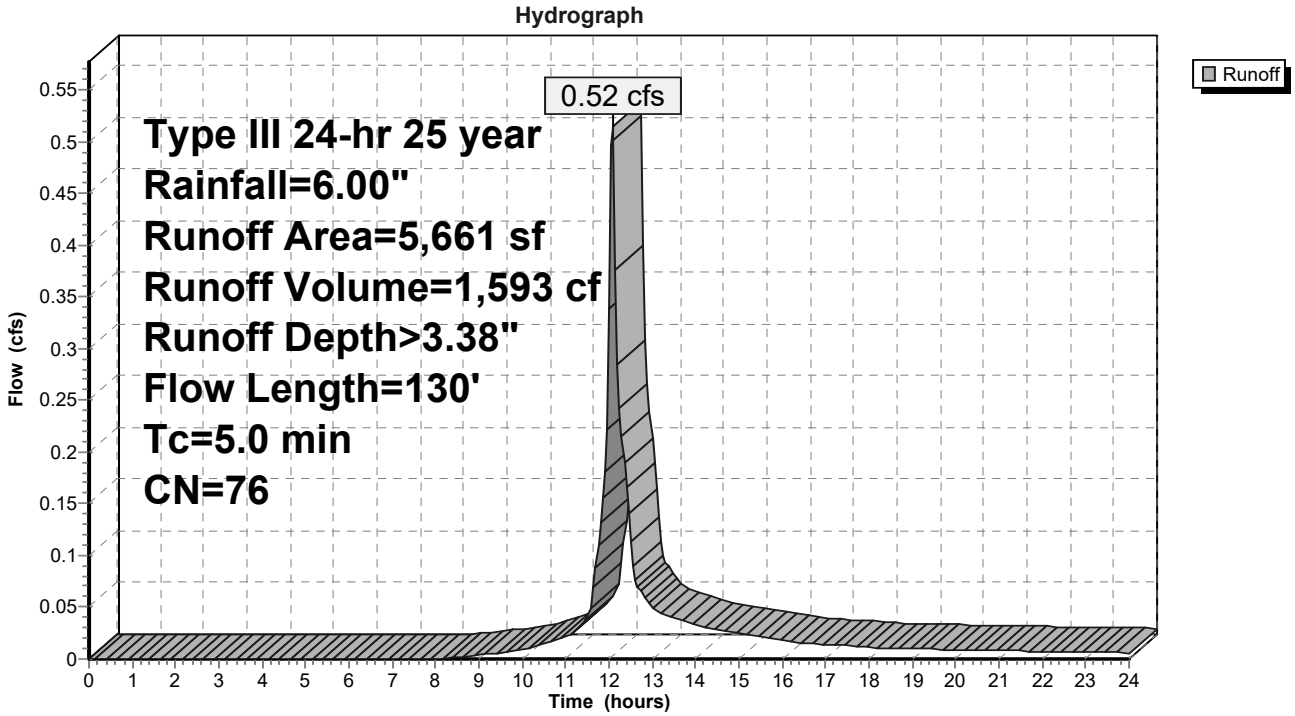
Runoff = 0.52 cfs @ 12.08 hrs, Volume= 1,593 cf, Depth> 3.38"

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

Area (sf)	CN	Description
440	98	Roofs, HSG B
0	98	Paved parking, HSG B
1,815	98	Paved roads w/curbs & sewers, HSG B
3,406	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
5,661	76	Weighted Average
3,406		Pervious Area
2,255		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 GRASS** Smooth surfaces n= 0.011 P2= 3.20"
0.4	80	0.0250	3.21		**Shallow Concentrated Flow, PAVEMENT** Paved Kv= 20.3 fps
4.1					**Direct Entry, DIRECT**
5.0	130	Total			

Subcatchment P-1H: P-1H



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

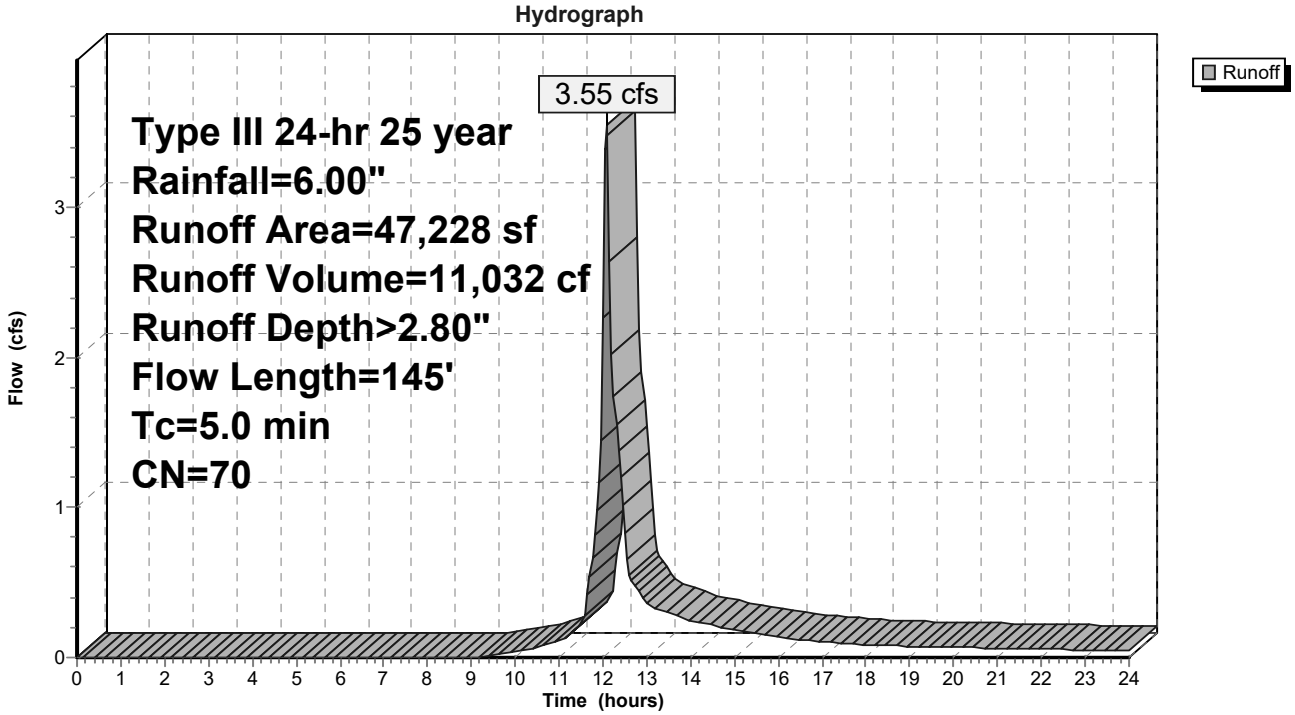
Runoff = 3.55 cfs @ 12.08 hrs, Volume= 11,032 cf, Depth> 2.80"

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
3,080	98	Roofs, HSG B
0	98	Paved parking, HSG B
212	98	Paved roads w/curbs & sewers, HSG B
35,239	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
8,697	98	Water Surface, HSG B
47,228	70	Weighted Average
35,239		Pervious Area
11,989		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.1	50	0.0900	0.27		**Sheet Flow, SHEET** Grass: Short n= 0.150 P2= 3.20"
0.8	95	0.0860	2.05		**Shallow Concentrated Flow, GRASS** Short Grass Pasture Kv= 7.0 fps
1.1					**Direct Entry, DIRECT**
5.0	145	Total			

Subcatchment P-1I: P-1I



Summary for Subcatchment P-1J: P1-J

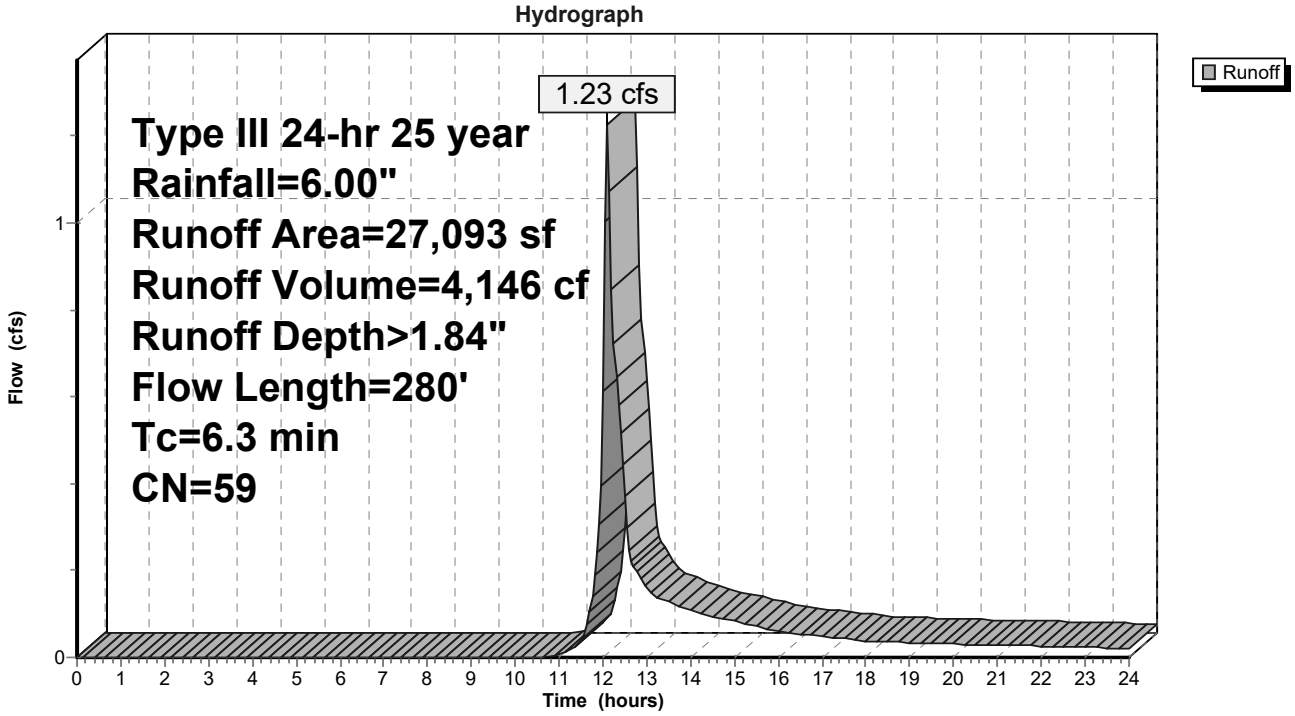
Runoff = 1.23 cfs @ 12.10 hrs, Volume= 4,146 cf, Depth> 1.84"

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
	8,800	55	Woods, Good, HSG B
	18,225	61	>75% Grass cover, Good, HSG B
*	68	98	Paved roads w/curbs & sewers, HSG B
	27,093	59	Weighted Average
	27,025		Pervious Area
	68		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"
3.1	230	0.0600	1.22		**Shallow Concentrated Flow, Flow in woods** Woodland Kv= 5.0 fps
6.3	280	Total			

Subcatchment P-1J: P1-J



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

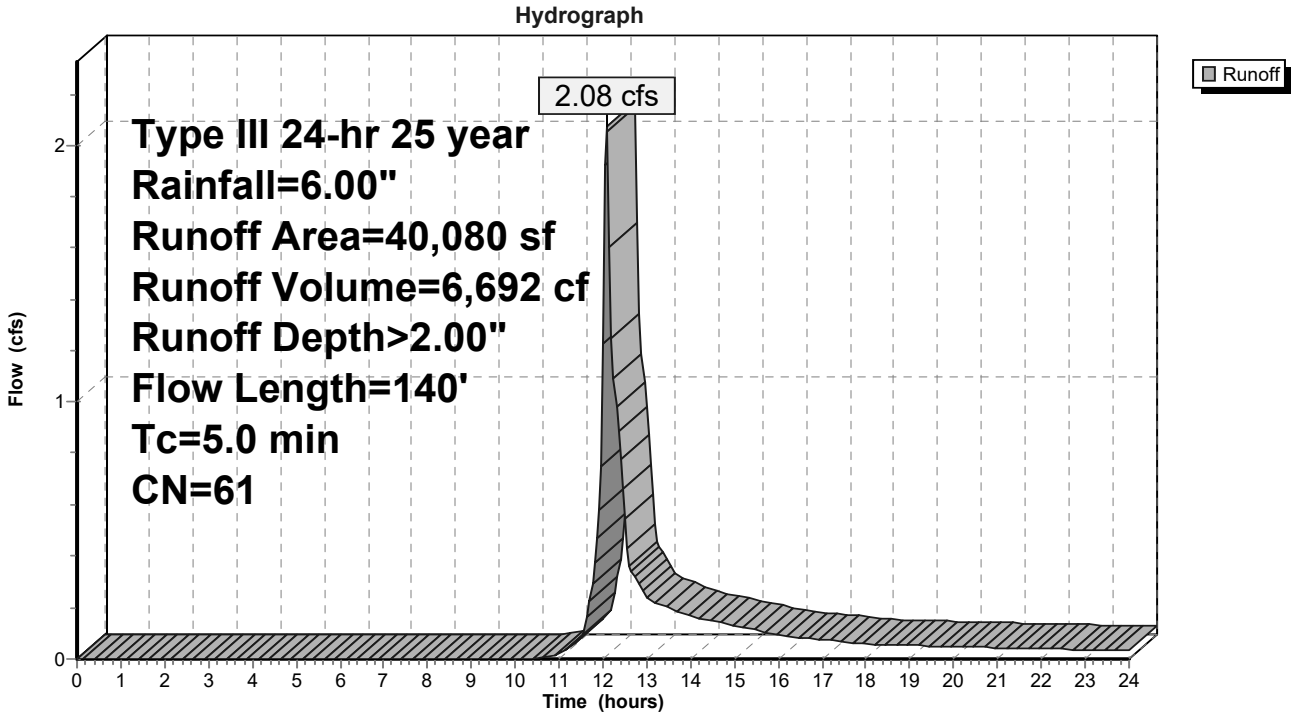
Runoff = 2.08 cfs @ 12.09 hrs, Volume= 6,692 cf, Depth> 2.00"

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
94	98	Paved roads w/curbs & sewers, HSG B
9,069	61	>75% Grass cover, Good, HSG B
26,517	55	Woods, Good, HSG B
40,080	61	Weighted Average
35,586		Pervious Area
4,494		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	50	0.0600	0.23		**Sheet Flow, SHEET GRASS** Grass: Short n= 0.150 P2= 3.20"
0.5	90	0.1560	2.76		**Shallow Concentrated Flow, GRASS SHALLOW** Short Grass Pasture Kv= 7.0 fps
0.9					**Direct Entry, DIRECT**
5.0	140	Total			

Subcatchment P-2A: P-2A



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

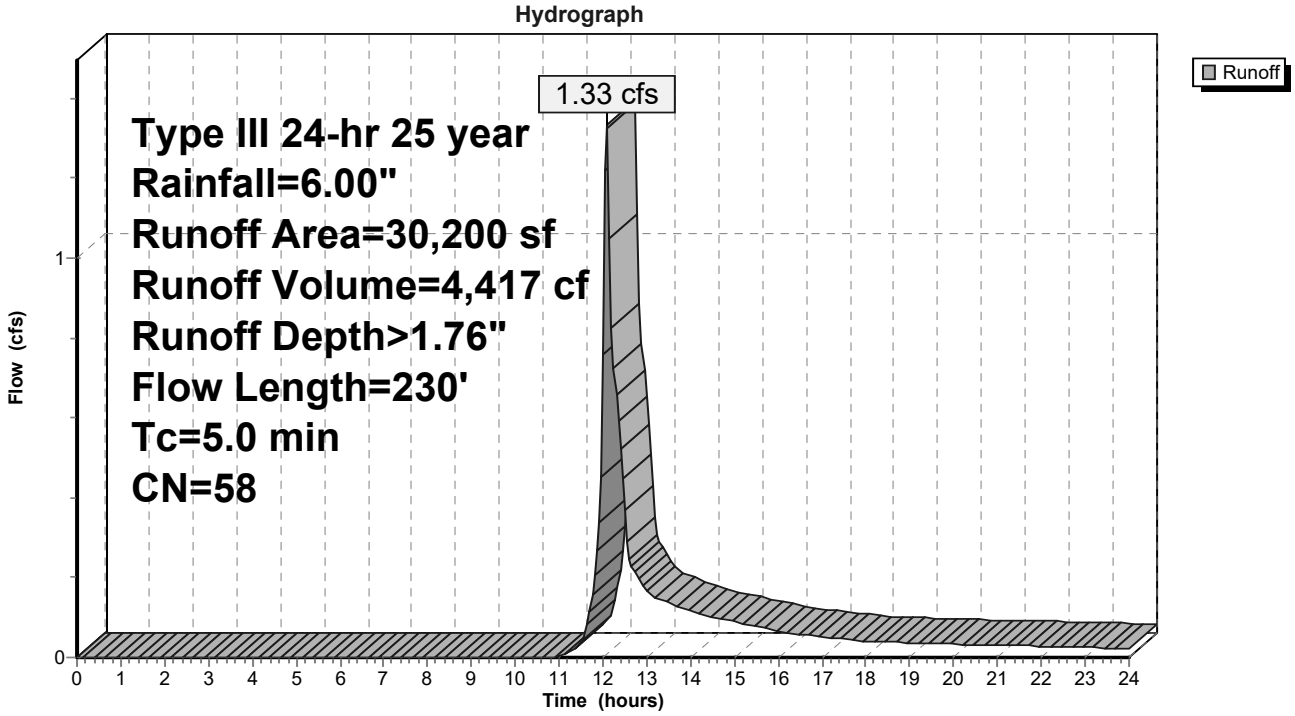
Runoff = 1.33 cfs @ 12.09 hrs, Volume= 4,417 cf, Depth> 1.76"

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
13,428	61	>75% Grass cover, Good, HSG B
16,772	55	Woods, Good, HSG B
30,200	58	Weighted Average
30,200		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0	50	0.2600	0.41		**Sheet Flow, SHEET GRASS** Grass: Short n= 0.150 P2= 3.20"
1.6	180	0.0720	1.88		**Shallow Concentrated Flow, SHALLOW GRASS** Short Grass Pasture Kv= 7.0 fps
1.4					**Direct Entry, DIRECT**
5.0	230	Total			

Subcatchment P-3A: P-3A



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

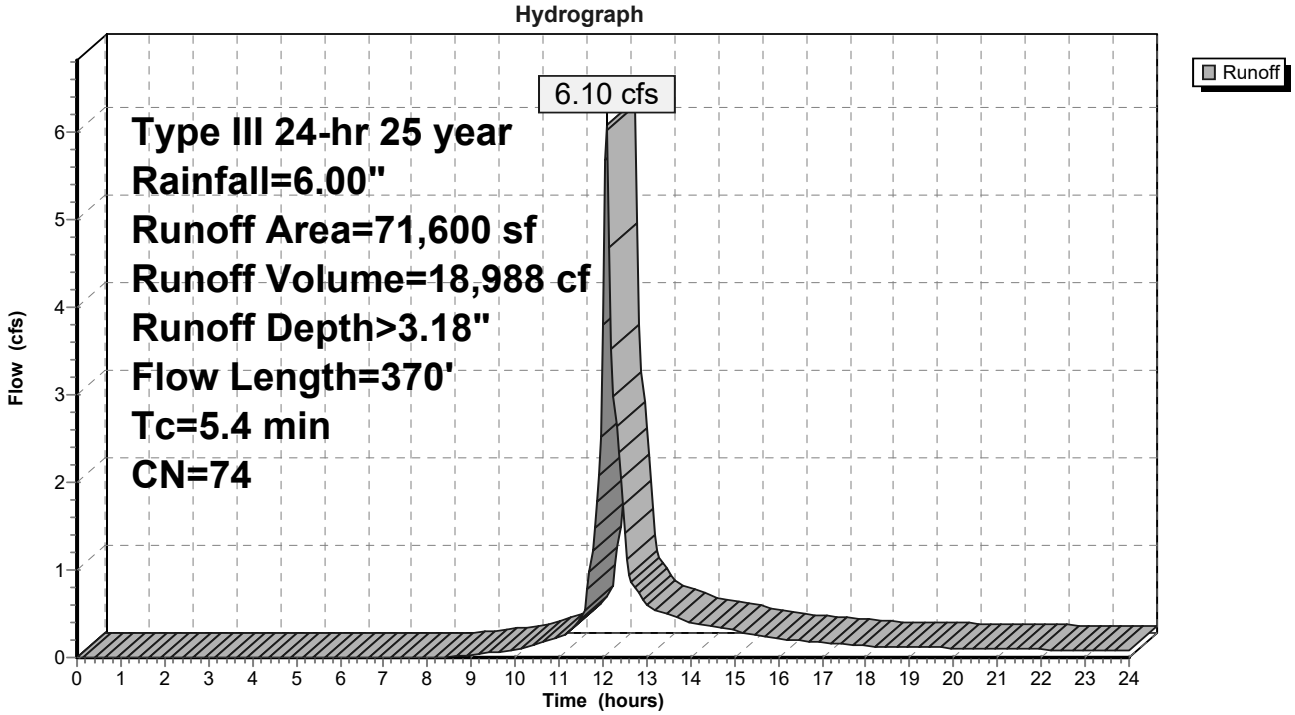
Runoff = 6.10 cfs @ 12.09 hrs, Volume= 18,988 cf, Depth> 3.18"

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
448	98	Paved roads w/curbs & sewers, HSG B
46,707	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
9,045	98	Water Surface, HSG B
71,600	74	Weighted Average
46,707		Pervious Area
24,893		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.2	50	0.0800	0.26		**Sheet Flow, SHEET GRASS** Grass: Short n= 0.150 P2= 3.20"
2.2	320	0.1218	2.44		**Shallow Concentrated Flow, SHALLOW GRASS** Short Grass Pasture Kv= 7.0 fps
0.0					**Direct Entry, DIRECT**
5.4	370	Total			

Subcatchment P-3B: P-3B



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

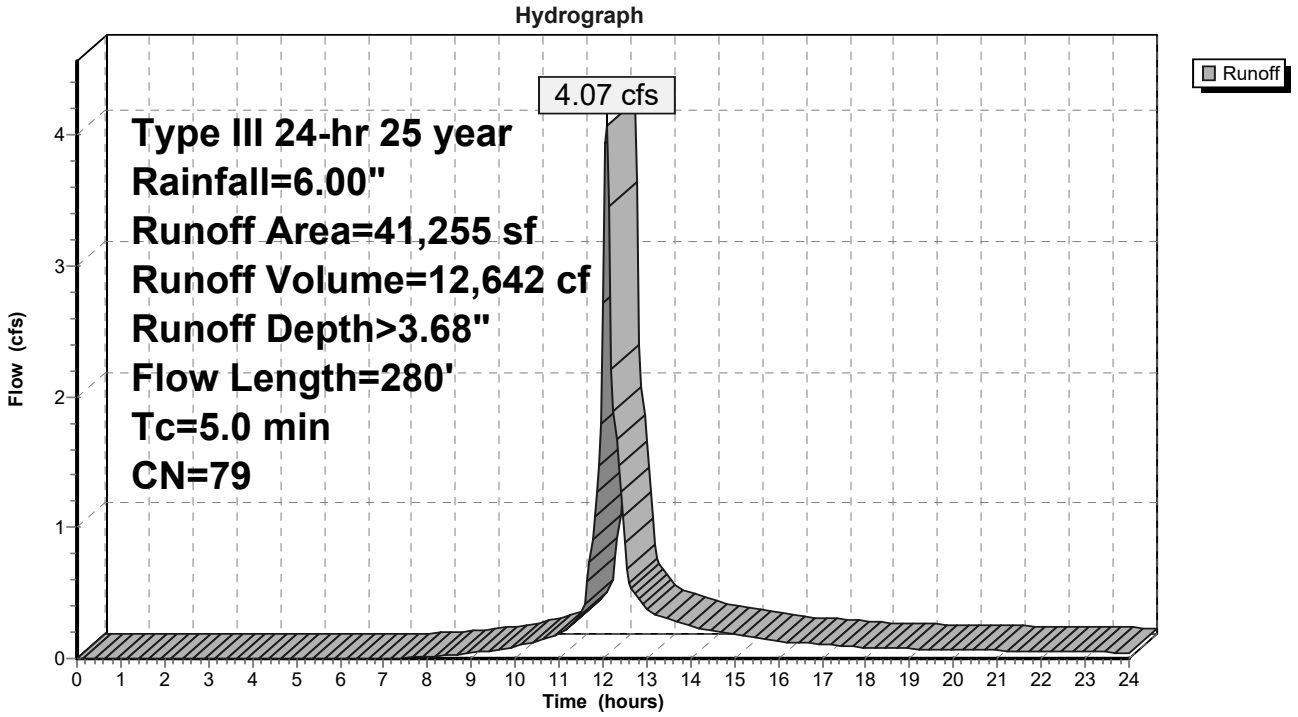
Runoff = 4.07 cfs @ 12.08 hrs, Volume= 12,642 cf, Depth> 3.68"

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
21,208	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
41,255	79	Weighted Average
21,208		Pervious Area
20,047		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	50	0.0600	1.86		**Sheet Flow, SHEET GRASS** Smooth surfaces n= 0.011 P2= 3.20"
1.2	90	0.0310	1.23		**Shallow Concentrated Flow, SHALLOW GRASS** Short Grass Pasture Kv= 7.0 fps
1.5	140	0.0060	1.57		**Shallow Concentrated Flow, SHALLOW PAVEMENT** Paved Kv= 20.3 fps
1.9					**Direct Entry, DIRECT**
5.0	280	Total			

Subcatchment P-3C: P-3C



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

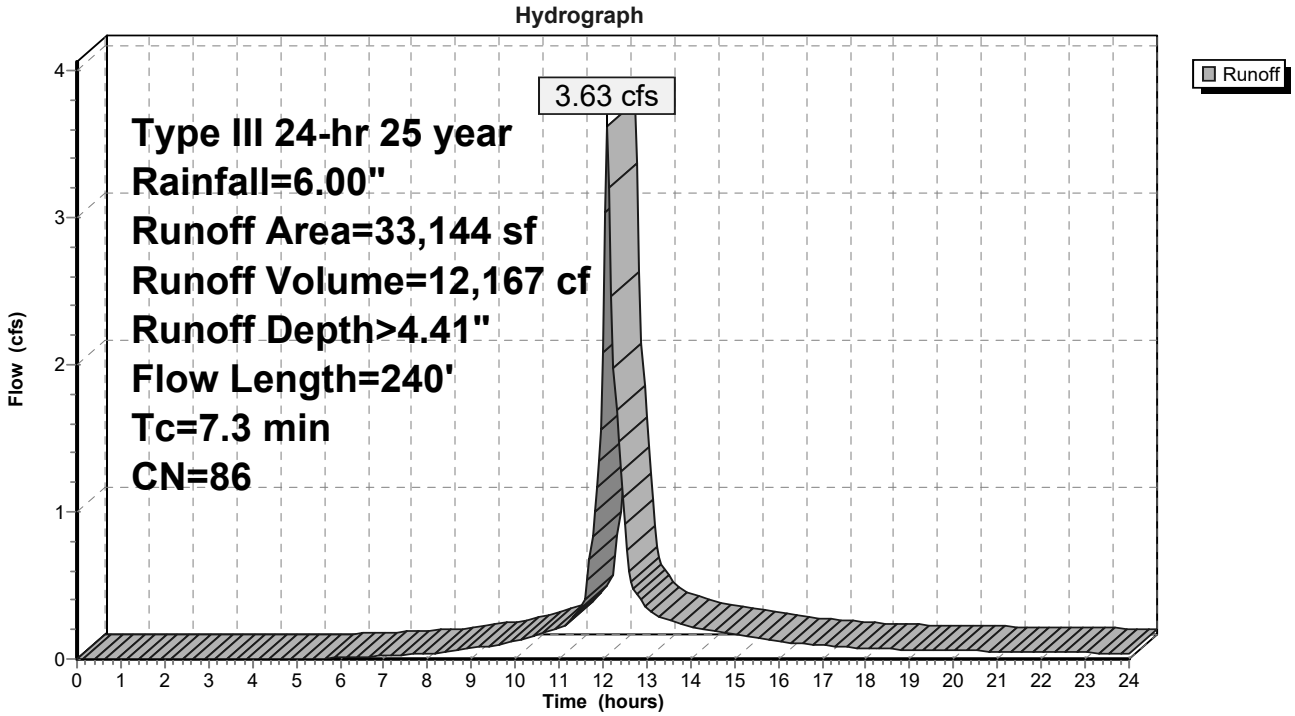
Runoff = 3.63 cfs @ 12.10 hrs, Volume= 12,167 cf, Depth> 4.41"

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
8,800	98	Roofs, HSG B
13,806	98	Paved roads w/curbs & sewers, HSG B
10,538	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
33,144	86	Weighted Average
10,538		Pervious Area
22,606		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0200	0.15		**Sheet Flow, SHEET GR** Grass: Short n= 0.150 P2= 3.20"
1.0	90	0.0500	1.57		**Shallow Concentrated Flow, SHALLOW GRASS** Short Grass Pasture Kv= 7.0 fps
0.7	100	0.0150	2.49		**Shallow Concentrated Flow, SHALLOW PAVE** Paved Kv= 20.3 fps
7.3	240	Total			

Subcatchment P-3D: P-3D



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

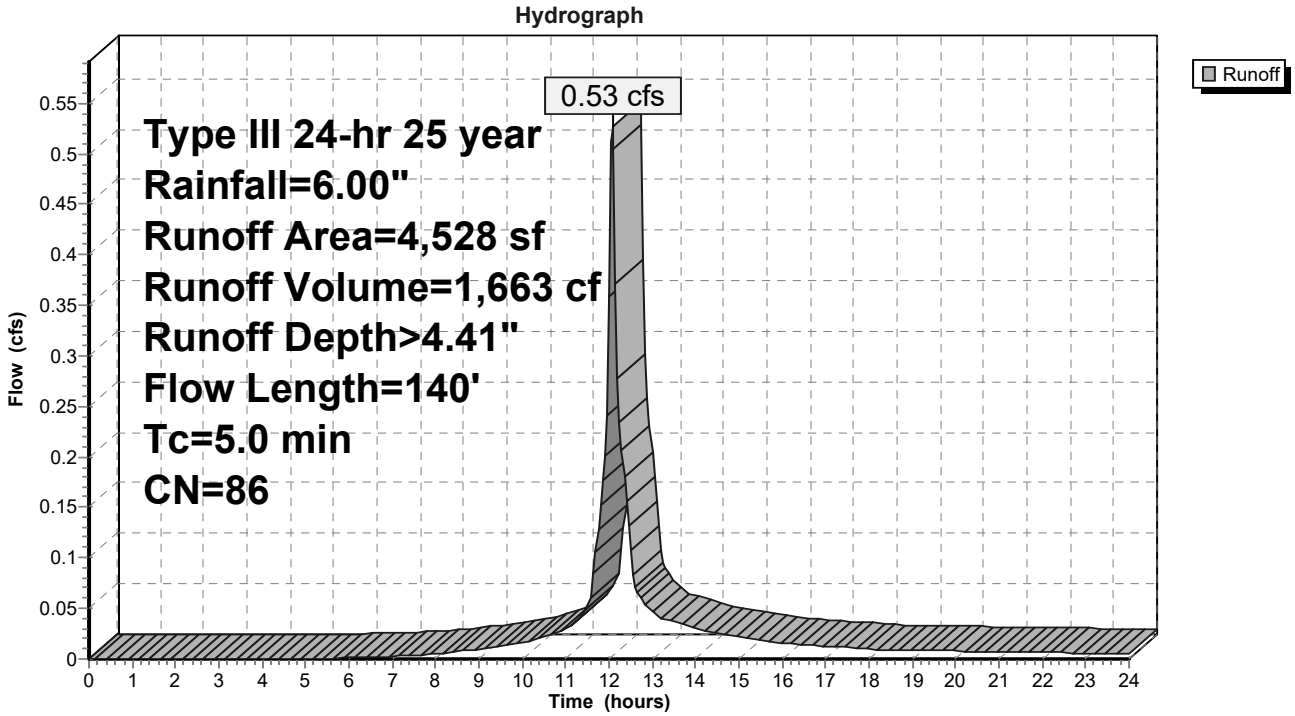
Runoff = 0.53 cfs @ 12.07 hrs, Volume= 1,663 cf, Depth> 4.41"

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
1,424	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
4,528	86	Weighted Average
1,424		Pervious Area
3,104		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.20		**Sheet Flow, SHEET PAVEMENT** Smooth surfaces n= 0.011 P2= 3.20"
0.5	90	0.0220	3.01		**Shallow Concentrated Flow, SHALLOW PAVEMENT** Paved Kv= 20.3 fps
3.8					**Direct Entry, DIRECT**
5.0	140	Total			

Subcatchment P-3E: P-3F



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

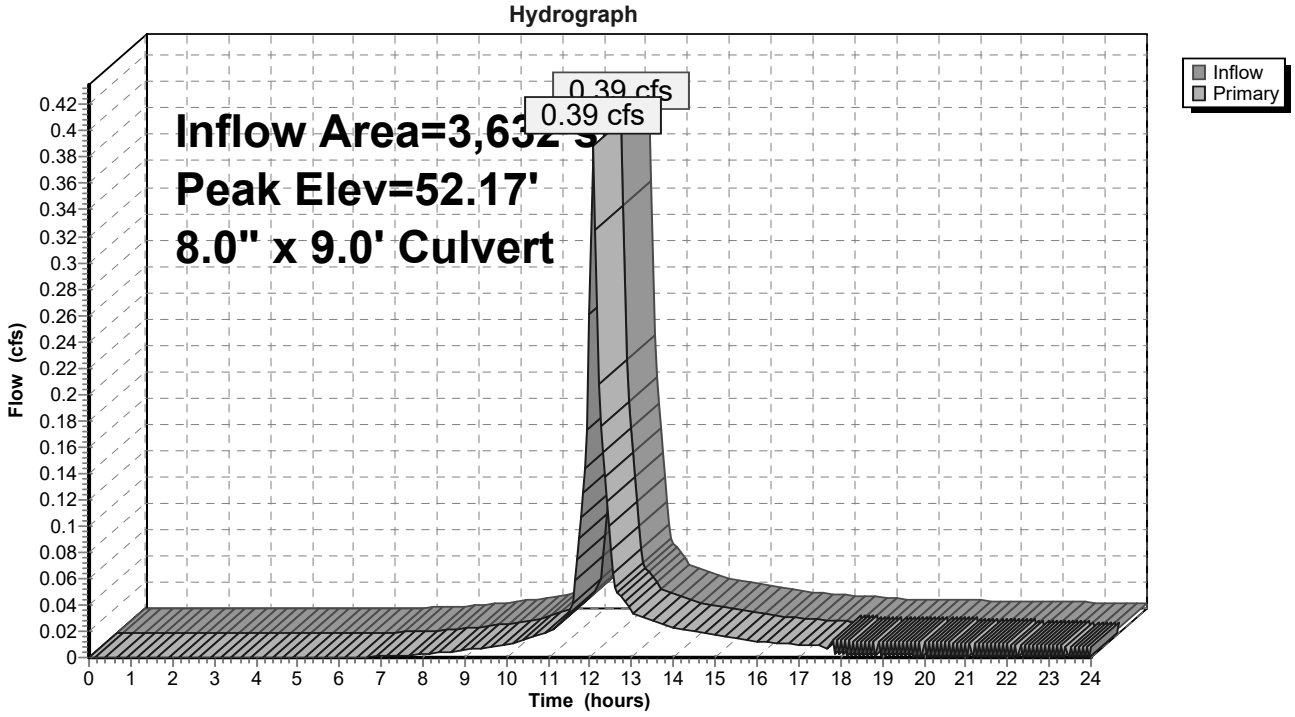
Inflow Area = 3,632 sf, 56.17% Impervious, Inflow Depth > 3.98" for 25 year event
Inflow = 0.39 cfs @ 12.07 hrs, Volume= 1,206 cf
Outflow = 0.39 cfs @ 12.07 hrs, Volume= 1,206 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.39 cfs @ 12.07 hrs, Volume= 1,206 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 52.17' @ 12.97 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 @ 12.07 hrs HW=51.21' TW=51.34' (Dynamic Tailwater)
└**1=Culvert** (Controls 0.00 cfs)

Pond CB1: CB1



Summary for Pond CB2: CB2

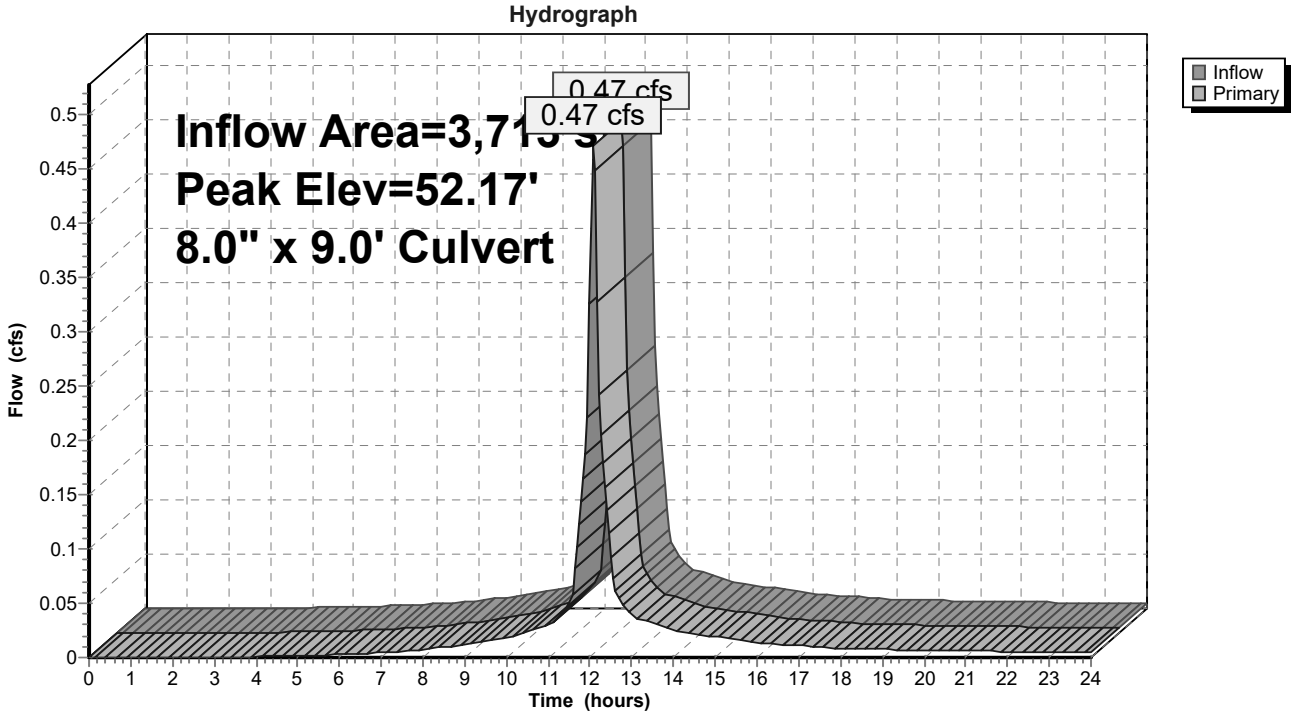
Inflow Area = 3,713 sf, 81.12% Impervious, Inflow Depth > 4.95" for 25 year event
Inflow = 0.47 cfs @ 12.07 hrs, Volume= 1,533 cf
Outflow = 0.47 cfs @ 12.07 hrs, Volume= 1,533 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.47 cfs @ 12.07 hrs, Volume= 1,533 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 52.17' @ 12.97 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 @ 12.07 hrs HW=51.22' TW=51.33' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.00 cfs)

Pond CB2: CB2



Summary for Pond CB3: CB3

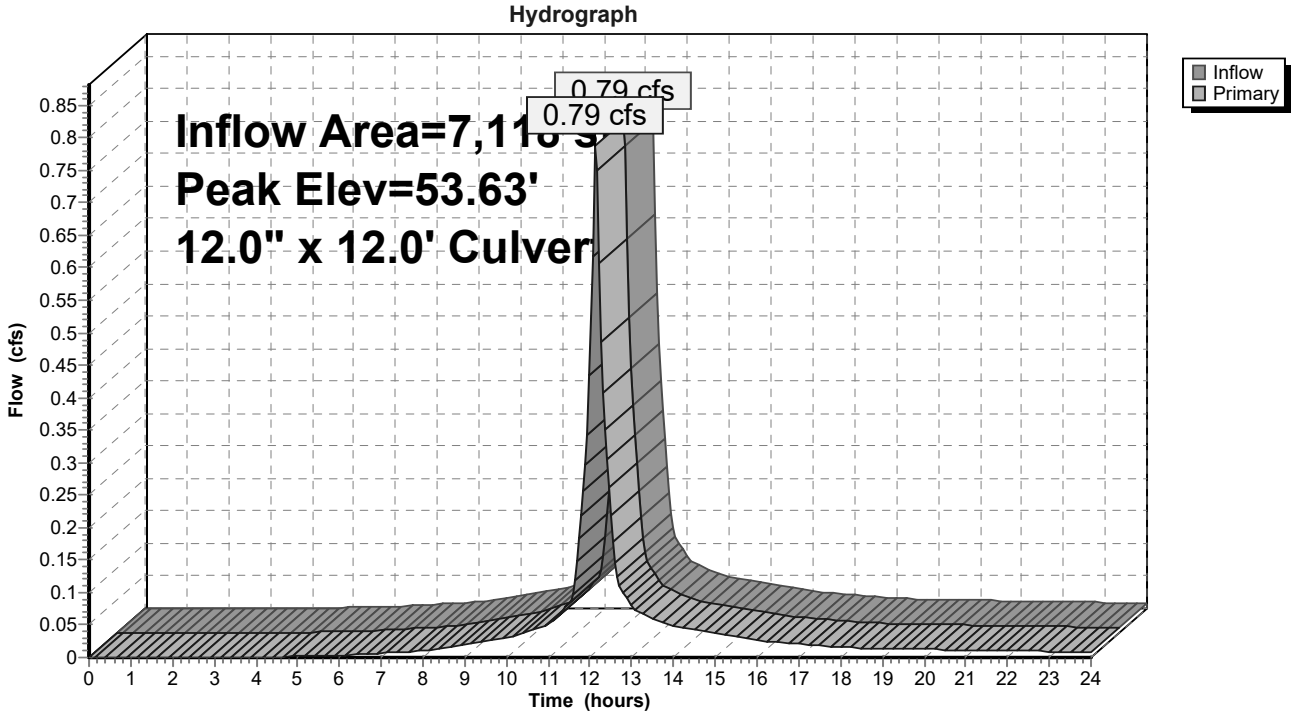
Inflow Area = 7,118 sf, 74.36% Impervious, Inflow Depth > 4.73" for 25 year event
Inflow = 0.79 cfs @ 12.12 hrs, Volume= 2,806 cf
Outflow = 0.79 cfs @ 12.12 hrs, Volume= 2,806 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.79 cfs @ 12.12 hrs, Volume= 2,806 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 53.63' @ 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=0.88 cfs @ 12.12 hrs HW=53.59' TW=53.54' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 0.88 cfs @ 1.12 fps)

Pond CB3: CB3



Summary for Pond CB4: CB4

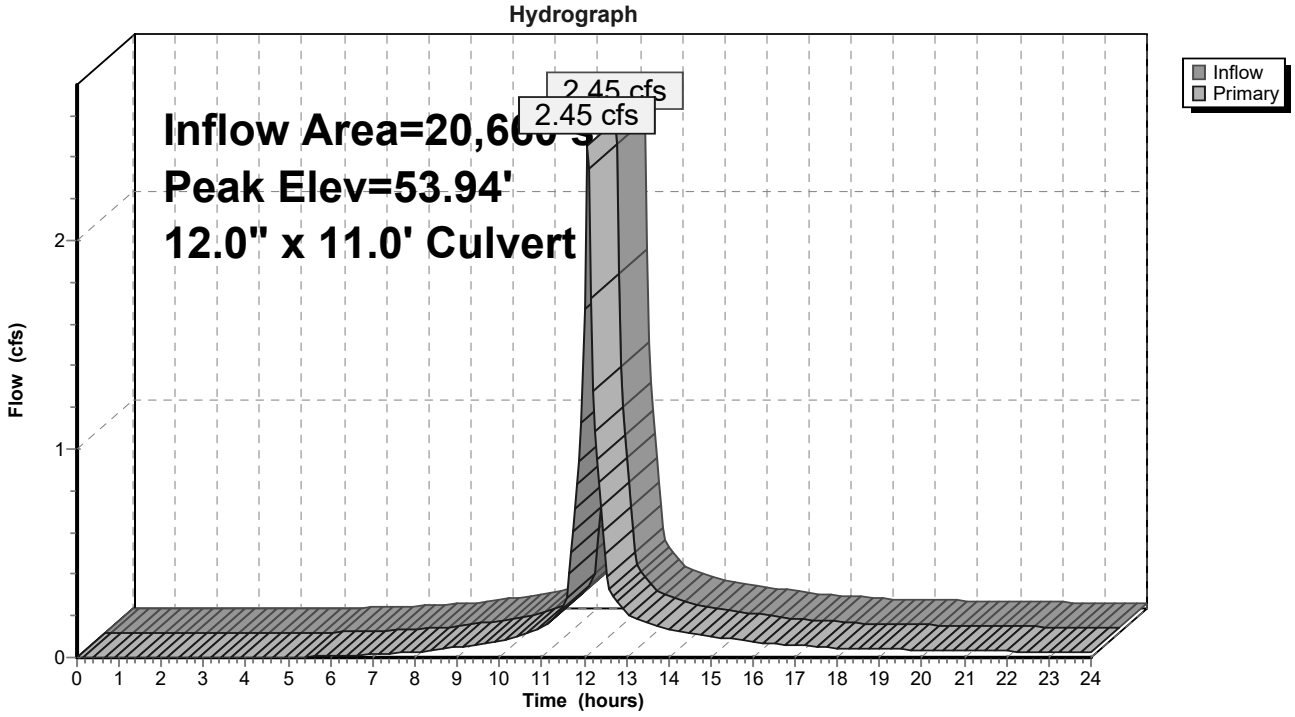
Inflow Area = 20,660 sf, 69.29% Impervious, Inflow Depth > 4.51" for 25 year event
Inflow = 2.45 cfs @ 12.07 hrs, Volume= 7,773 cf
Outflow = 2.45 cfs @ 12.07 hrs, Volume= 7,773 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.45 cfs @ 12.07 hrs, Volume= 7,773 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 53.94' @ 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=1.47 cfs @ 12.07 hrs HW=53.71' TW=53.56' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 1.47 cfs @ 1.87 fps)

Pond CB4: CB4



Summary for Pond CB5: CB5

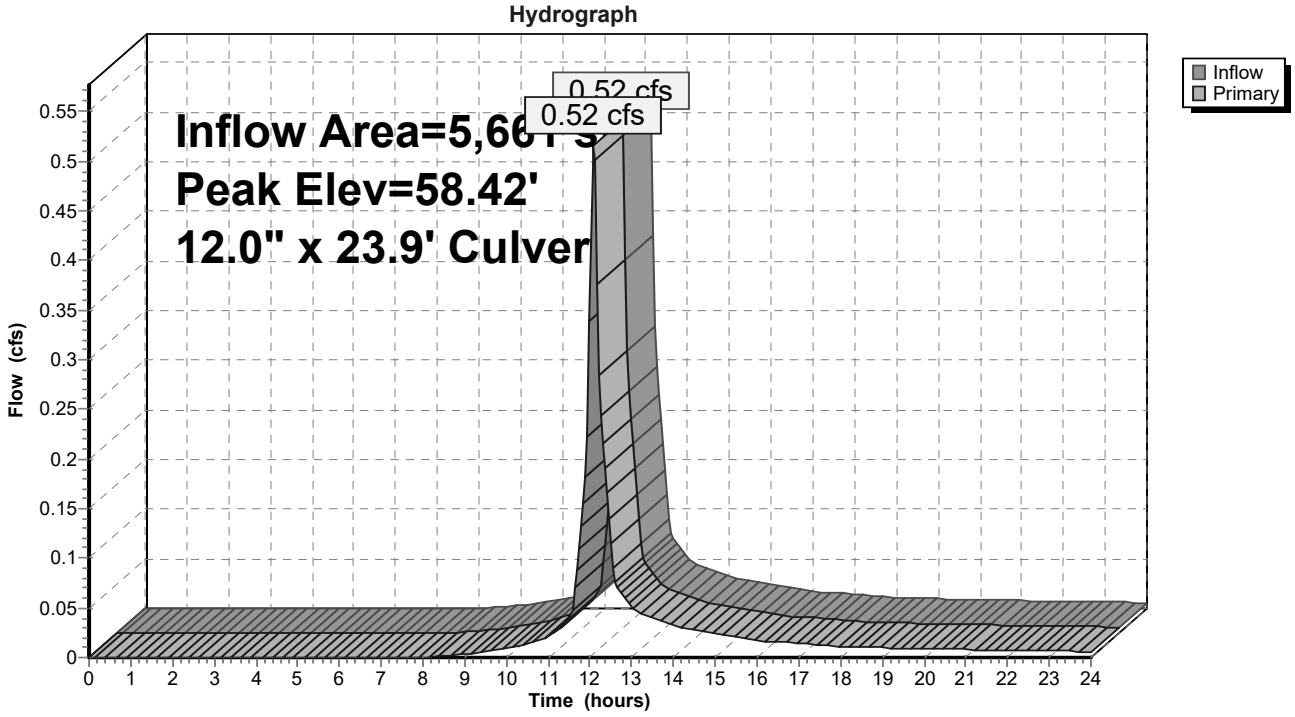
Inflow Area = 5,661 sf, 39.83% Impervious, Inflow Depth > 3.38" for 25 year event
Inflow = 0.52 cfs @ 12.08 hrs, Volume= 1,593 cf
Outflow = 0.52 cfs @ 12.08 hrs, Volume= 1,593 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.52 cfs @ 12.08 hrs, Volume= 1,593 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 58.42' @ 12.10 hrs
Flood Elev= 65.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	58.00'	**12.0" x 23.9' long Culvert** RCP, groove end projecting, Ke= 0.200 Outlet Invert= 57.76' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.45 cfs @ 12.08 hrs HW=58.40' TW=58.21' (Dynamic Tailwater)
└**1=Culvert** (Outlet Controls 0.45 cfs @ 2.24 fps)

Pond CB5: CB5



Summary for Pond CB6: CB6

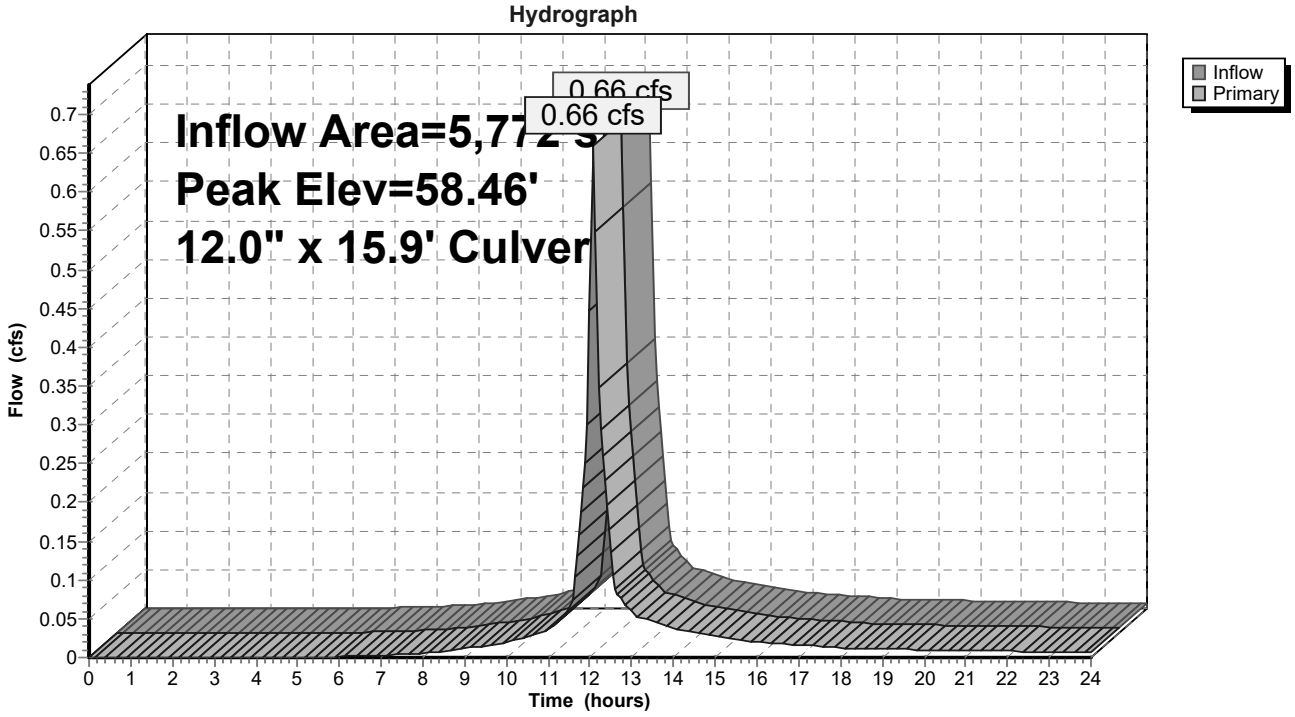
Inflow Area = 5,772 sf, 64.26% Impervious, Inflow Depth > 4.30" for 25 year event
Inflow = 0.66 cfs @ 12.07 hrs, Volume= 2,068 cf
Outflow = 0.66 cfs @ 12.07 hrs, Volume= 2,068 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.66 cfs @ 12.07 hrs, Volume= 2,068 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 58.46' @ 12.09 hrs
Flood Elev= 65.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	58.00'	**12.0" x 15.9' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 57.84' S= 0.0101 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.61 cfs @ 12.07 hrs HW=58.45' TW=58.21' (Dynamic Tailwater)
└**1=Culvert** (Outlet Controls 0.61 cfs @ 2.61 fps)

Pond CB6: CB6



Summary for Pond CB7: CB7

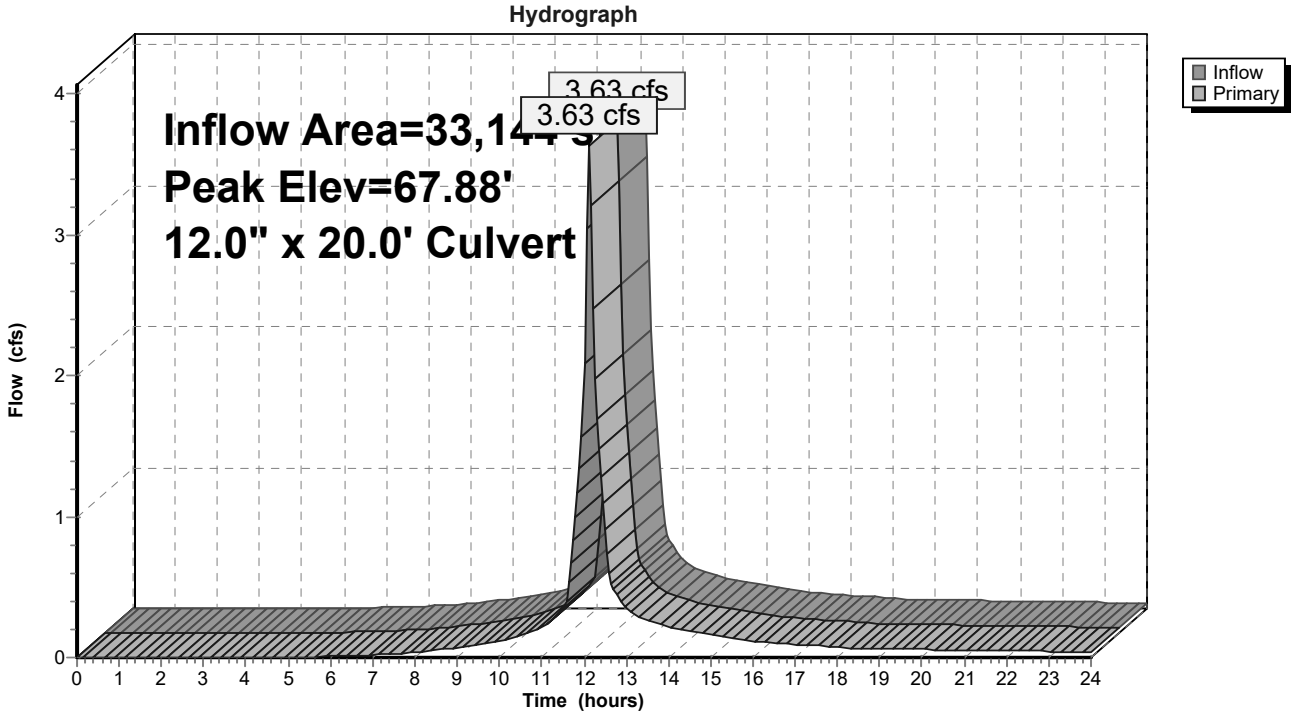
Inflow Area = 33,144 sf, 68.21% Impervious, Inflow Depth > 4.41" for 25 year event
Inflow = 3.63 cfs @ 12.10 hrs, Volume= 12,167 cf
Outflow = 3.63 cfs @ 12.10 hrs, Volume= 12,167 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.63 cfs @ 12.10 hrs, Volume= 12,167 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 67.88' @ 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=3.10 cfs @ 12.10 hrs HW=67.84' TW=67.17' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 3.10 cfs @ 3.95 fps)

Pond CB7: CB7



Summary for Pond CB8: CB8

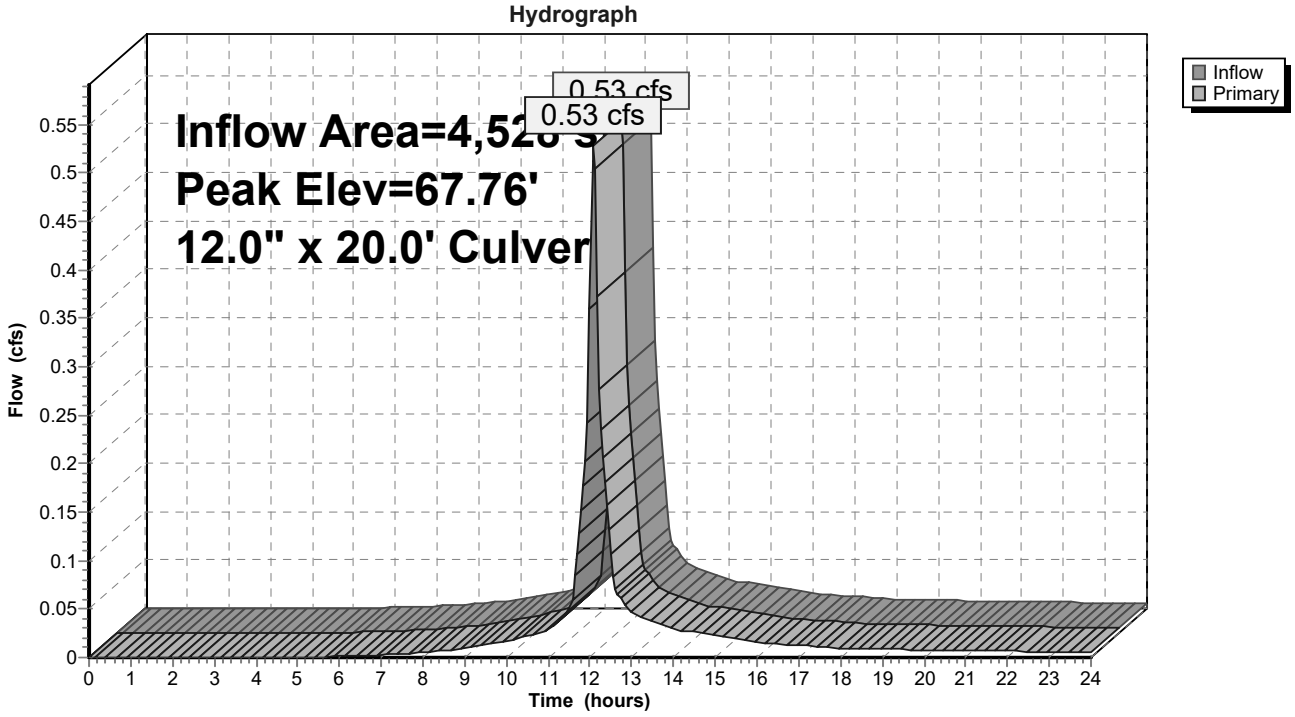
Inflow Area = 4,528 sf, 68.55% Impervious, Inflow Depth > 4.41" for 25 year event
Inflow = 0.53 cfs @ 12.07 hrs, Volume= 1,663 cf
Outflow = 0.53 cfs @ 12.07 hrs, Volume= 1,663 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.53 cfs @ 12.07 hrs, Volume= 1,663 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 67.76' @ 12.50 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=67.03' (Dynamic Tailwater)
└**1=Culvert** (Controls 0.00 cfs)

Pond CB8: CB8



Summary for Pond CB9: CB9

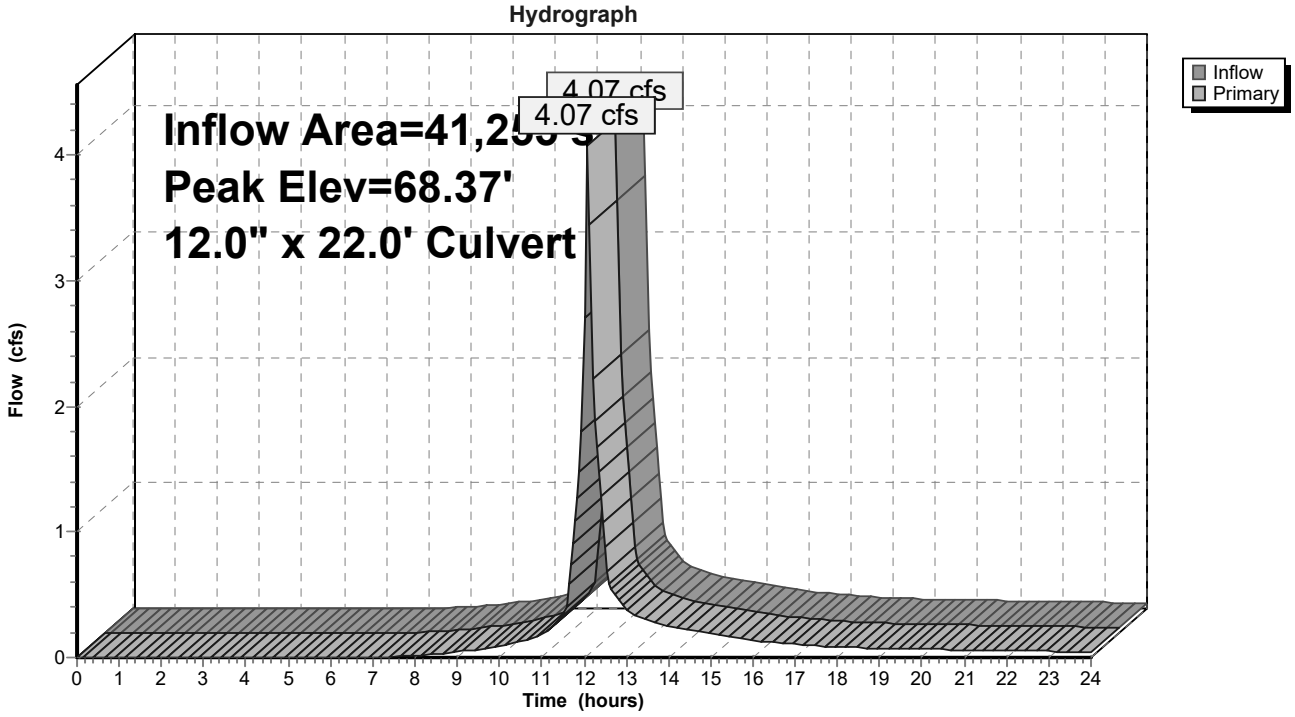
Inflow Area = 41,255 sf, 48.59% Impervious, Inflow Depth > 3.68" for 25 year event
Inflow = 4.07 cfs @ 12.08 hrs, Volume= 12,642 cf
Outflow = 4.07 cfs @ 12.08 hrs, Volume= 12,642 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.07 cfs @ 12.08 hrs, Volume= 12,642 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 68.37' @ 12.12 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=2.83 cfs @ 12.08 hrs HW=67.95' TW=67.39' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 2.83 cfs @ 3.60 fps)

Pond CB9: CB9



Summary for Pond DMH 10: DMH9

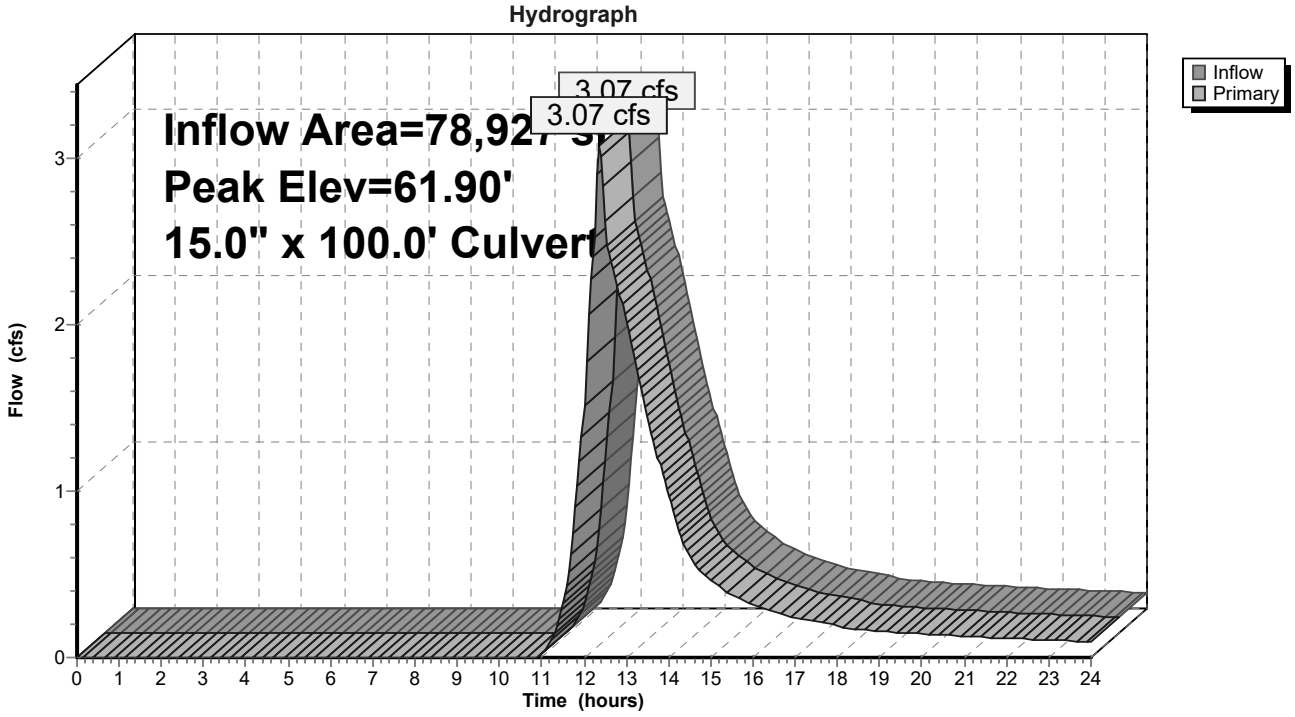
Inflow Area = 78,927 sf, 57.97% Impervious, Inflow Depth > 3.63" for 25 year event
Inflow = 3.07 cfs @ 12.36 hrs, Volume= 23,859 cf
Outflow = 3.07 cfs @ 12.36 hrs, Volume= 23,859 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.07 cfs @ 12.36 hrs, Volume= 23,859 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 61.90' @ 12.36 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=3.05 cfs @ 12.36 hrs HW=61.90' TW=56.25' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 3.05 cfs @ 3.23 fps)

Pond DMH 10: DMH9



Summary for Pond DMH 11: DMH 10

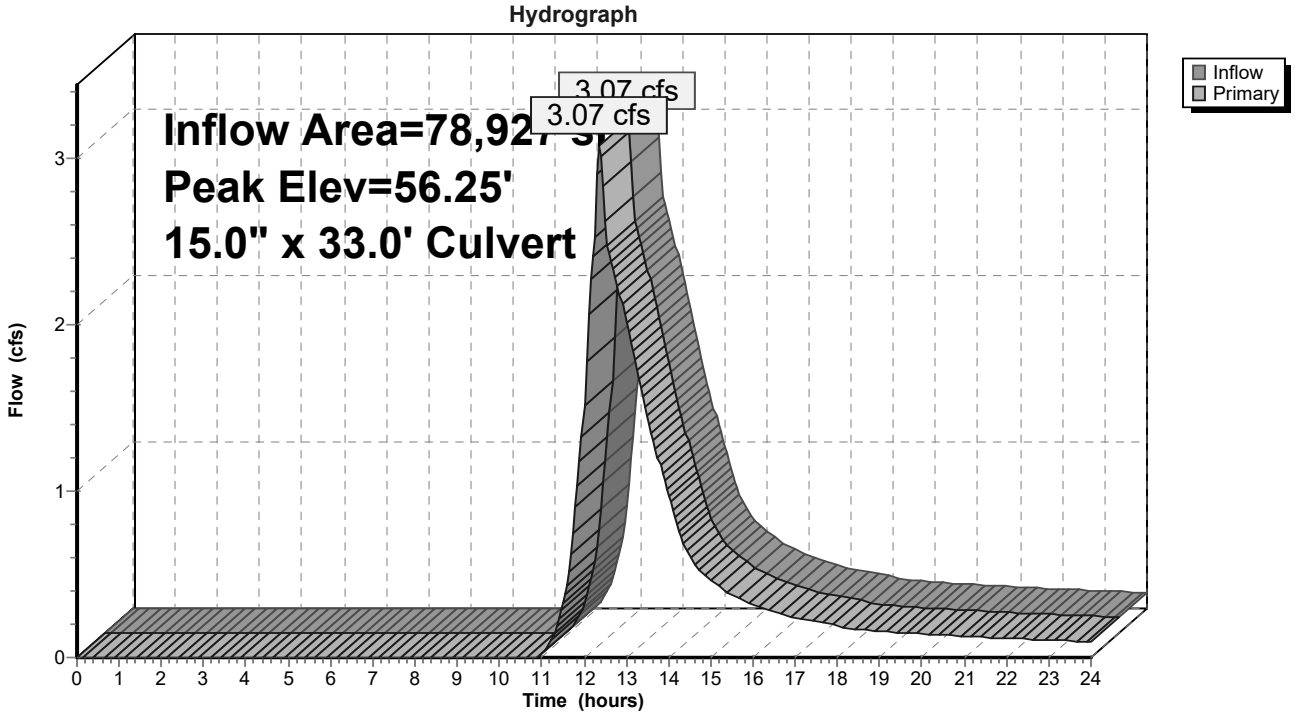
Inflow Area = 78,927 sf, 57.97% Impervious, Inflow Depth > 3.63" for 25 year event
Inflow = 3.07 cfs @ 12.36 hrs, Volume= 23,859 cf
Outflow = 3.07 cfs @ 12.36 hrs, Volume= 23,859 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.07 cfs @ 12.36 hrs, Volume= 23,859 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 56.25' @ 12.36 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=3.05 cfs @ 12.36 hrs HW=56.25' TW=52.79' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 3.05 cfs @ 3.64 fps)

Pond DMH 11: DMH 10



Summary for Pond DMH 6: DMH 6

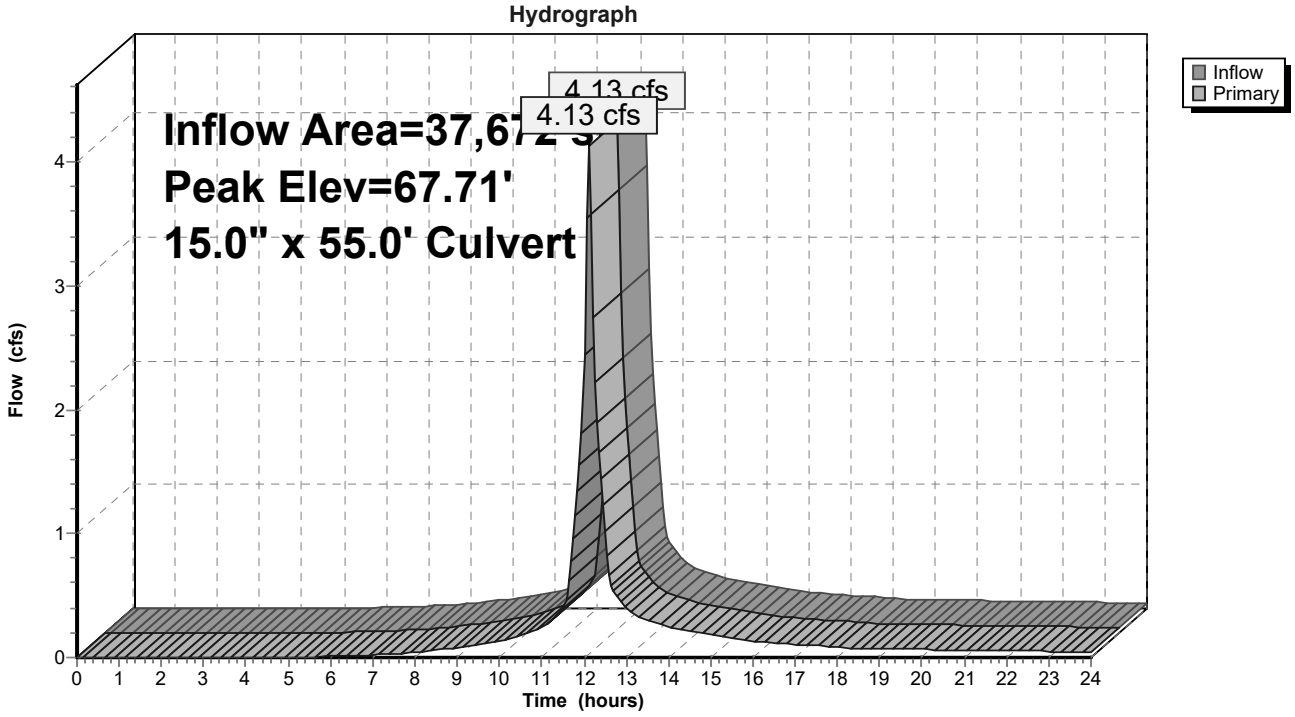
Inflow Area = 37,672 sf, 68.25% Impervious, Inflow Depth > 4.41" for 25 year event
Inflow = 4.13 cfs @ 12.10 hrs, Volume= 13,830 cf
Outflow = 4.13 cfs @ 12.10 hrs, Volume= 13,830 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.13 cfs @ 12.10 hrs, Volume= 13,830 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 67.71' @ 12.42 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=1.94 cfs @ 12.10 hrs HW=66.86' TW=66.75' (Dynamic Tailwater)
└**1=Culvert** (Outlet Controls 1.94 cfs @ 1.58 fps)

Pond DMH 6: DMH 6



Summary for Pond DMH2: DMH2

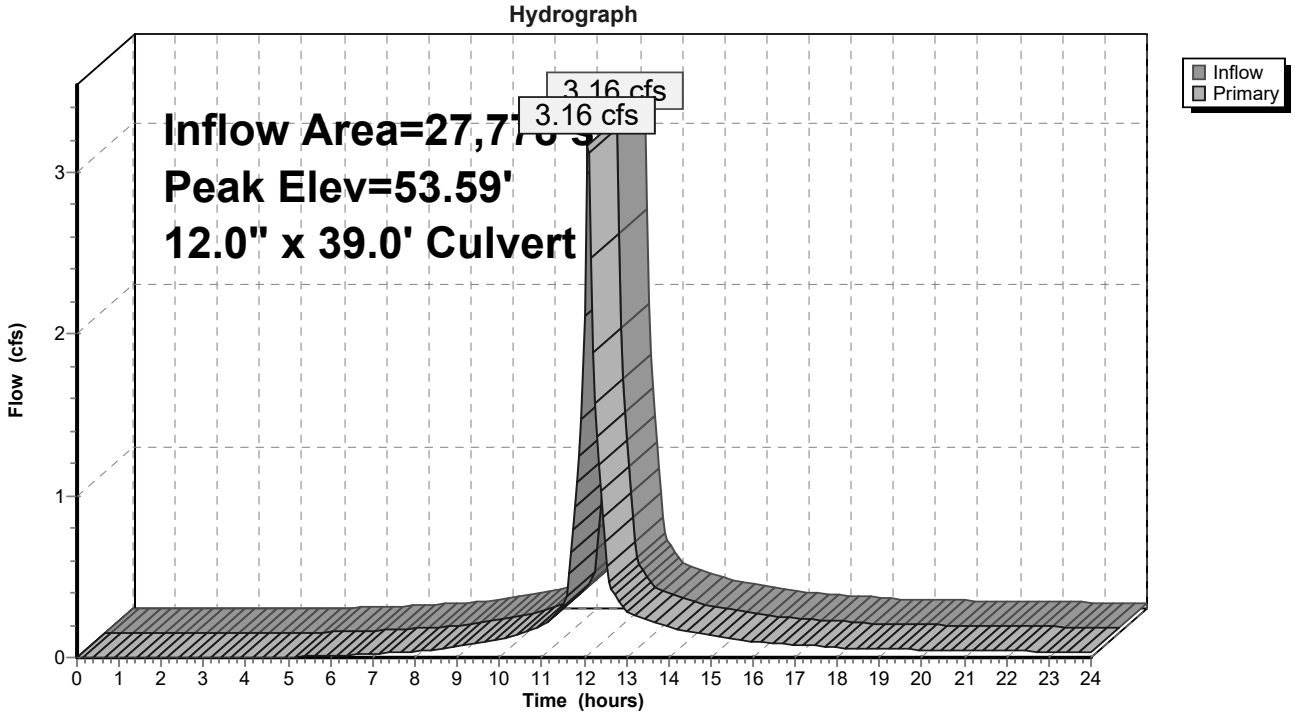
Inflow Area = 27,778 sf, 70.59% Impervious, Inflow Depth > 4.57" for 25 year event
Inflow = 3.16 cfs @ 12.08 hrs, Volume= 10,578 cf
Outflow = 3.16 cfs @ 12.08 hrs, Volume= 10,578 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.16 cfs @ 12.08 hrs, Volume= 10,578 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 53.59' @ 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=2.95 cfs @ 12.08 hrs HW=53.57' TW=52.96' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 2.95 cfs @ 3.76 fps)

Pond DMH2: DMH2



Summary for Pond DMH3: DMH3

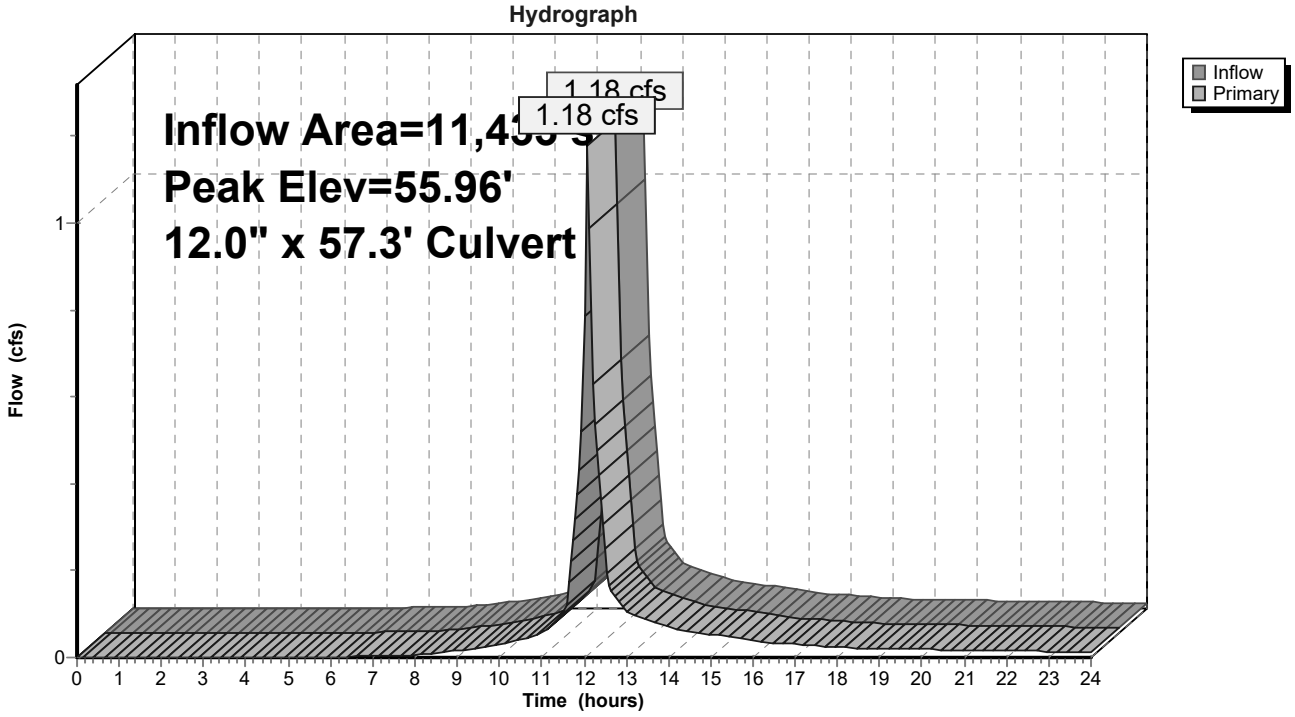
Inflow Area = 11,433 sf, 52.16% Impervious, Inflow Depth > 3.84" for 25 year event
Inflow = 1.18 cfs @ 12.07 hrs, Volume= 3,662 cf
Outflow = 1.18 cfs @ 12.07 hrs, Volume= 3,662 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.18 cfs @ 12.07 hrs, Volume= 3,662 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 55.96' @ 12.07 hrs
Flood Elev= 62.48'

Device	Routing	Invert	Outlet Devices
#1	Primary	55.29'	**12.0" x 57.3' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 55.00' S= 0.0051 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=1.13 cfs @ 12.07 hrs HW=55.94' TW=52.92' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 1.13 cfs @ 2.96 fps)

Pond DMH3: DMH3



Summary for Pond DMH4: DMH4

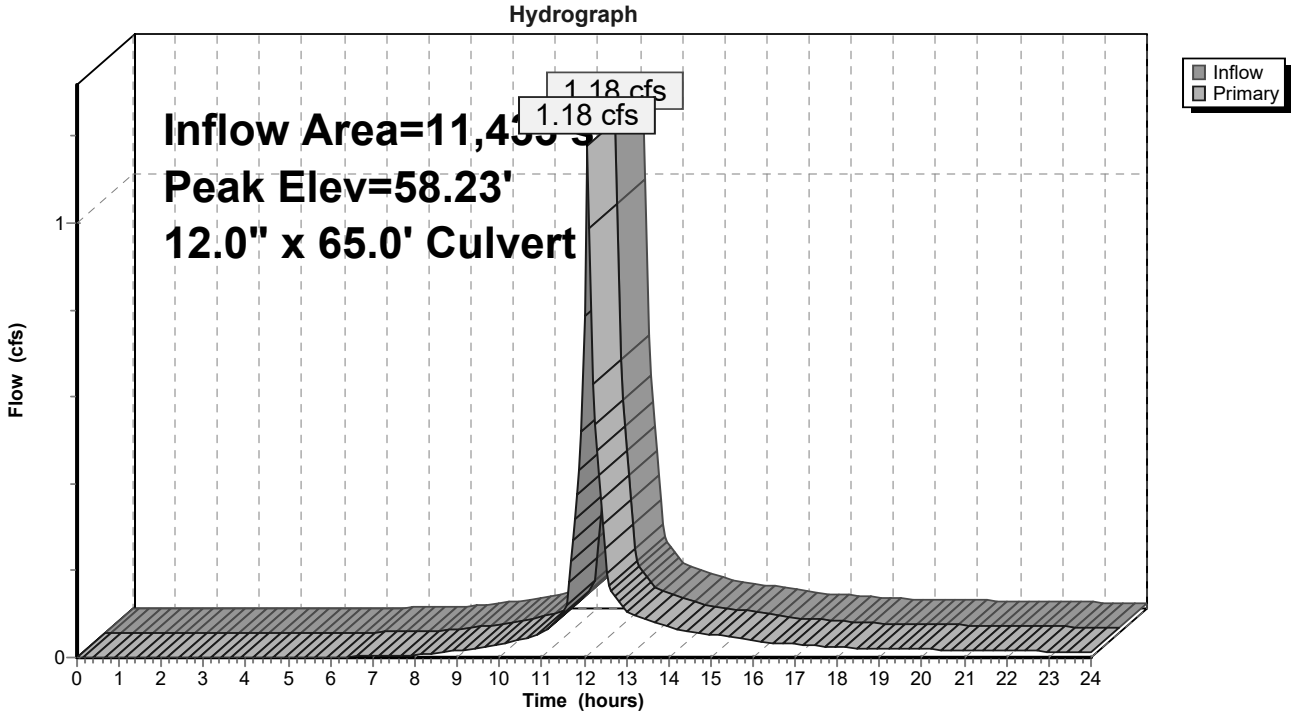
Inflow Area = 11,433 sf, 52.16% Impervious, Inflow Depth > 3.84" for 25 year event
Inflow = 1.18 cfs @ 12.07 hrs, Volume= 3,662 cf
Outflow = 1.18 cfs @ 12.07 hrs, Volume= 3,662 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.18 cfs @ 12.07 hrs, Volume= 3,662 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 58.23' @ 12.07 hrs
Flood Elev= 64.52'

Device	Routing	Invert	Outlet Devices
#1	Primary	57.66'	**12.0" x 65.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 55.39' S= 0.0349 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=1.13 cfs @ 12.07 hrs HW=58.21' TW=55.94' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 1.13 cfs @ 2.54 fps)

Pond DMH4: DMH4



Summary for Pond DMH5: DMH 5

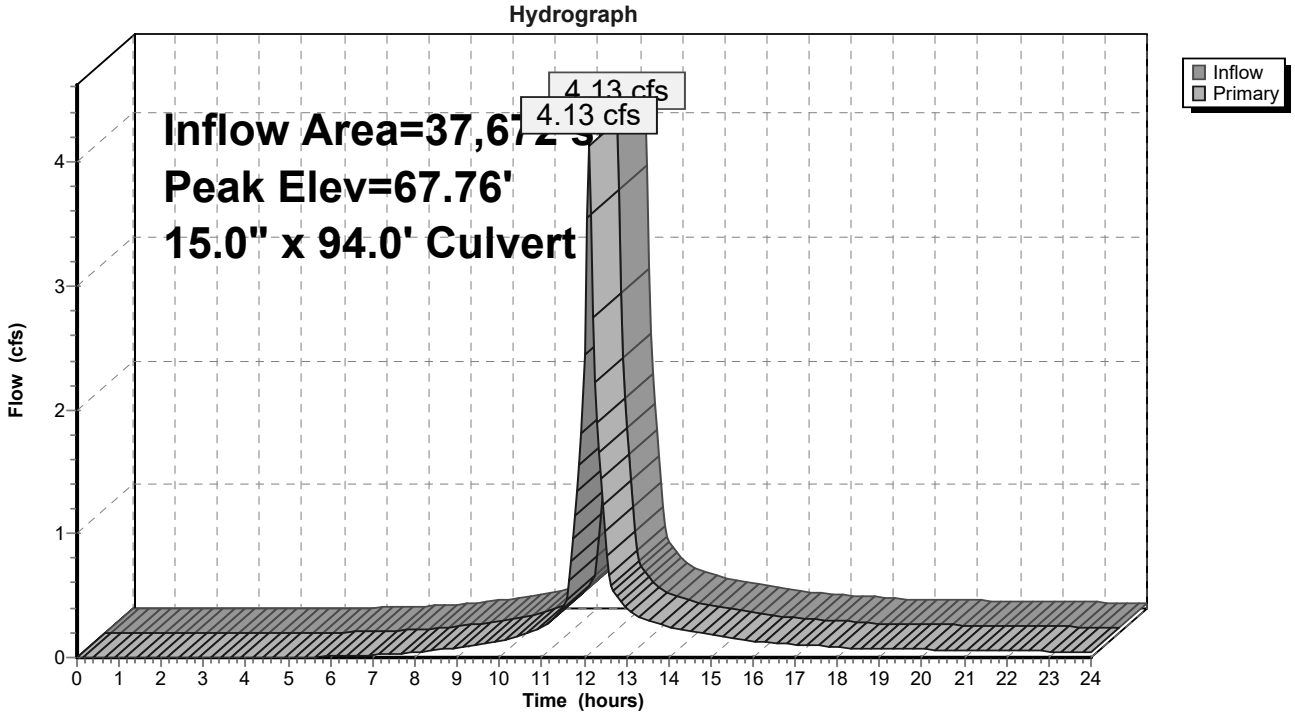
Inflow Area = 37,672 sf, 68.25% Impervious, Inflow Depth > 4.41" for 25 year event
Inflow = 4.13 cfs @ 12.10 hrs, Volume= 13,830 cf
Outflow = 4.13 cfs @ 12.10 hrs, Volume= 13,830 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.13 cfs @ 12.10 hrs, Volume= 13,830 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 67.76' @ 12.45 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=2.76 cfs @ 12.10 hrs HW=67.16' TW=66.86' (Dynamic Tailwater)
└**1=Culvert** (Outlet Controls 2.76 cfs @ 2.44 fps)

Pond DMH5: DMH 5



Summary for Pond DMH7: DMH7

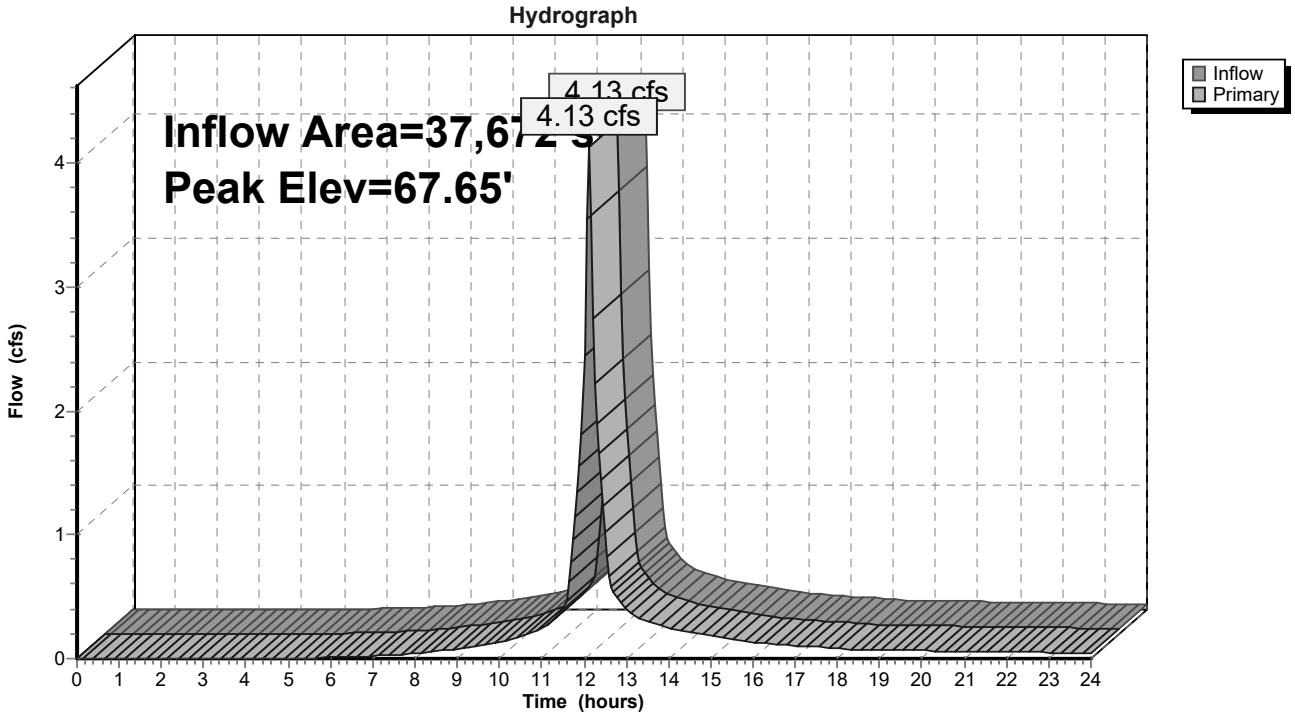
Inflow Area = 37,672 sf, 68.25% Impervious, Inflow Depth > 4.41" for 25 year event
Inflow = 4.13 cfs @ 12.10 hrs, Volume= 13,830 cf
Outflow = 4.13 cfs @ 12.10 hrs, Volume= 13,830 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.13 cfs @ 12.10 hrs, Volume= 13,830 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 67.65' @ 12.40 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 @ 12.10 hrs HW=66.75' TW=66.83' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.00 cfs)
└─**2=Culvert** (Controls 0.00 cfs)

Pond DMH7: DMH7



Summary for Pond DMH8: DMH8

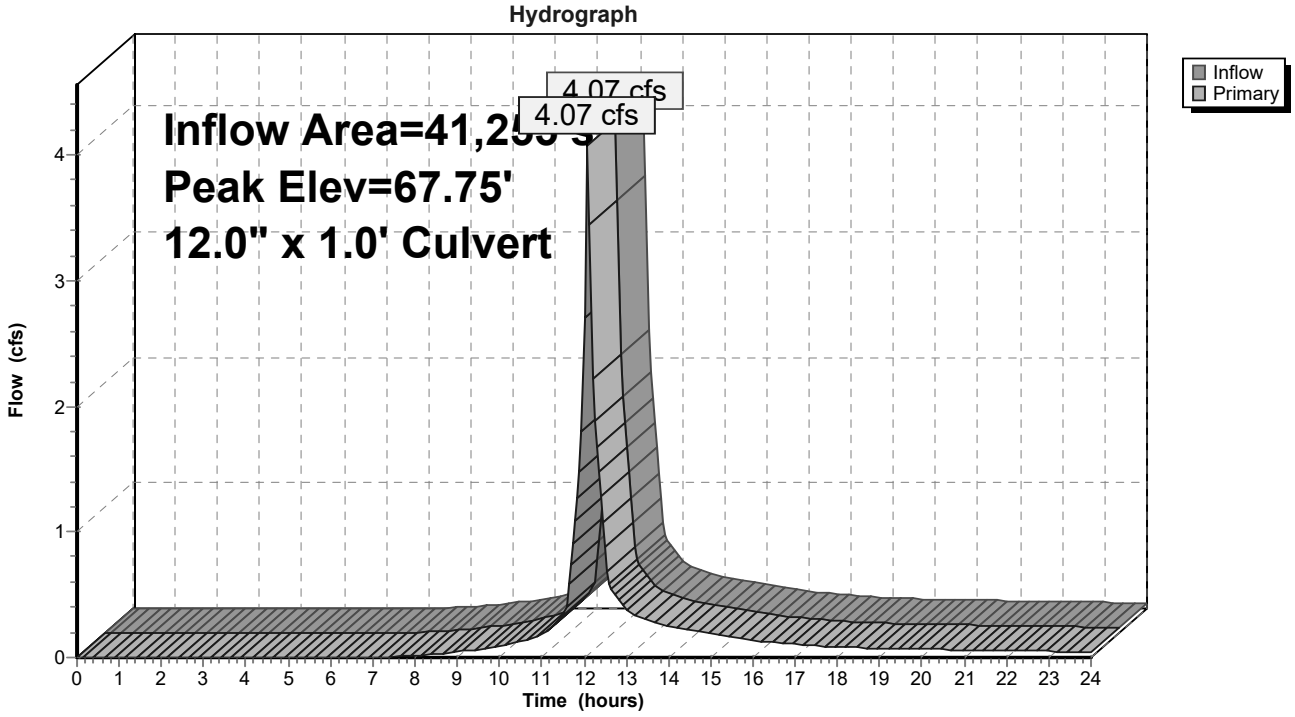
Inflow Area = 41,255 sf, 48.59% Impervious, Inflow Depth > 3.68" for 25 year event
Inflow = 4.07 cfs @ 12.08 hrs, Volume= 12,642 cf
Outflow = 4.07 cfs @ 12.08 hrs, Volume= 12,642 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.07 cfs @ 12.08 hrs, Volume= 12,642 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 67.75' @ 12.36 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=3.27 cfs @ 12.08 hrs HW=67.39' TW=66.65' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 3.27 cfs @ 4.16 fps)

Pond DMH8: DMH8



Summary for Pond P1-1: P1-1

Inflow Area = 54,889 sf, 57.55% Impervious, Inflow Depth > 4.05" for 25 year event
Inflow = 5.72 cfs @ 12.08 hrs, Volume= 18,525 cf
Outflow = 1.86 cfs @ 12.40 hrs, Volume= 14,375 cf, Atten= 67%, Lag= 19.1 min
Primary = 1.86 cfs @ 12.40 hrs, Volume= 14,375 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 53.49' @ 12.40 hrs Surf.Area= 4,205 sf Storage= 7,914 cf
Flood Elev= 55.50' Surf.Area= 5,973 sf Storage= 18,004 cf

Plug-Flow detention time= 183.6 min calculated for 14,375 cf (78% of inflow)
Center-of-Mass det. time= 102.6 min (905.9 - 803.3)

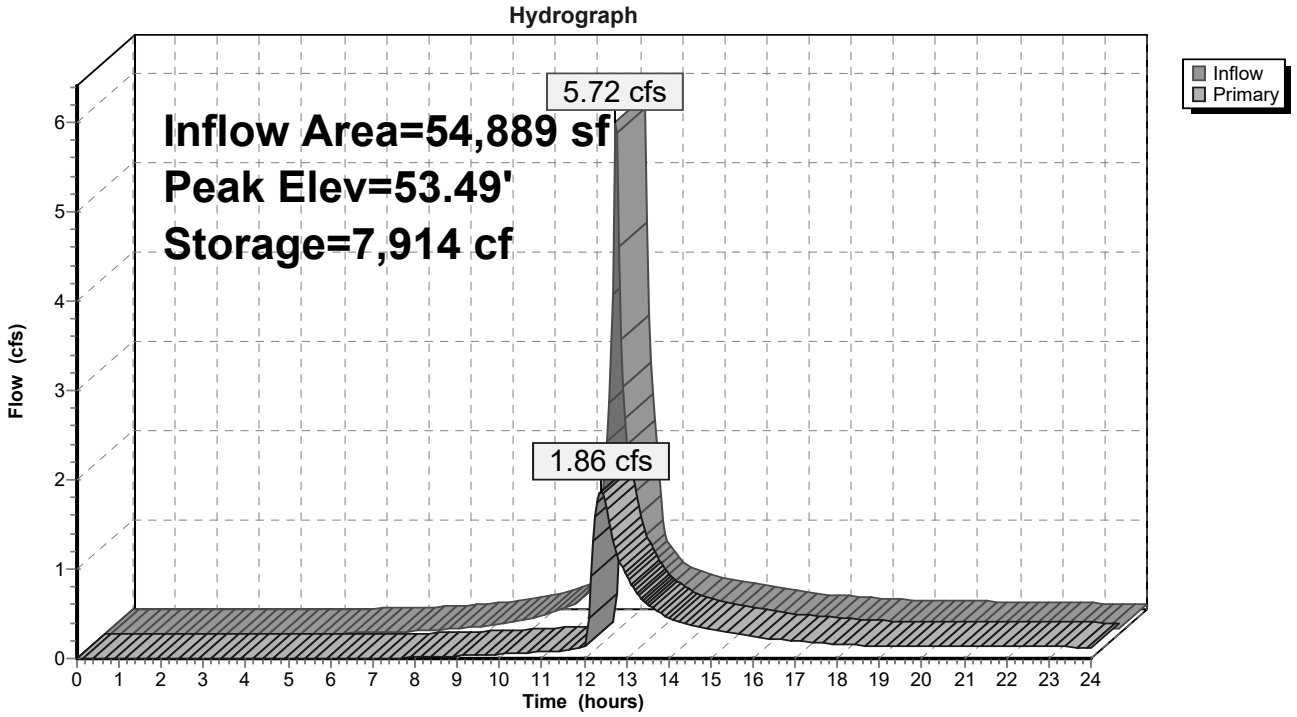
Volume	Invert	Avail.Storage	Storage Description
#1	51.00'	18,004 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

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=1.86 cfs @ 12.40 hrs HW=53.49' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 1.86 cfs of 4.96 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.16 cfs @ 7.46 fps)
  ├─**3=Orifice/Grate** (Orifice Controls 1.49 cfs @ 2.92 fps)
  ├─**4=Orifice/Grate** (Orifice Controls 0.21 cfs @ 1.65 fps)
  └─**5=Orifice/Grate** (Controls 0.00 cfs)

Pond P1-1: P1-1


Hydrograph
Inflow
Primary
5.72 cfs
1.86 cfs
Inflow Area=54,889 sf
Peak Elev=53.49'
Storage=7,914 cf
Flow (cfs)
Time (hours)

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

Inflow Area = 47,228 sf, 25.39% Impervious, Inflow Depth > 2.80" for 25 year event
Inflow = 3.55 cfs @ 12.08 hrs, Volume= 11,032 cf
Outflow = 0.03 cfs @ 24.00 hrs, Volume= 1,338 cf, Atten= 99%, Lag= 715.2 min
Primary = 0.03 cfs @ 24.00 hrs, Volume= 1,338 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 58.53' @ 24.00 hrs Surf.Area= 7,529 sf Storage= 9,693 cf
Flood Elev= 59.75' Surf.Area= 8,697 sf Storage= 15,495 cf

Plug-Flow detention time= 403.4 min calculated for 1,335 cf (12% of inflow)
Center-of-Mass det. time= 248.1 min (1,084.9 - 836.9)

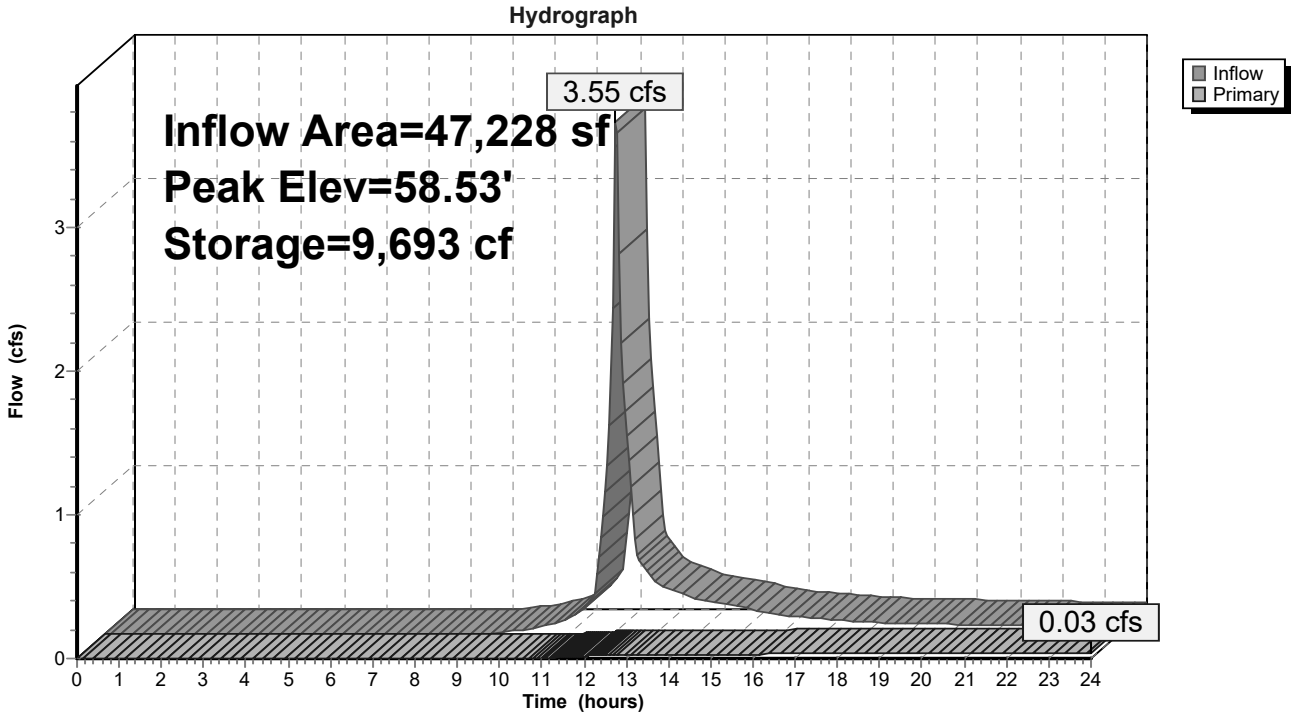
Volume	Invert	Avail.Storage	Storage Description
#1	57.00'	15,495 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
57.00	5,117	0	0
58.00	6,673	5,895	5,895
58.50	7,472	3,536	9,431
59.25	8,697	6,063	15,495

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=58.53' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Passes 0.03 cfs of 3.85 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 0.03 cfs @ 5.88 fps)
- **3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond P1-2: DP-1-2



Summary for Pond P1-3: P1-3

Inflow Area = 7,345 sf, 68.78% Impervious, Inflow Depth > 4.47" for 25 year event
Inflow = 0.86 cfs @ 12.07 hrs, Volume= 2,739 cf
Outflow = 0.08 cfs @ 12.93 hrs, Volume= 2,546 cf, Atten= 91%, Lag= 51.2 min
Primary = 0.08 cfs @ 12.93 hrs, Volume= 2,546 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 52.17' @ 12.93 hrs Surf.Area= 1,490 sf Storage= 1,386 cf
Flood Elev= 54.27' Surf.Area= 1,400 sf Storage= 1,861 cf

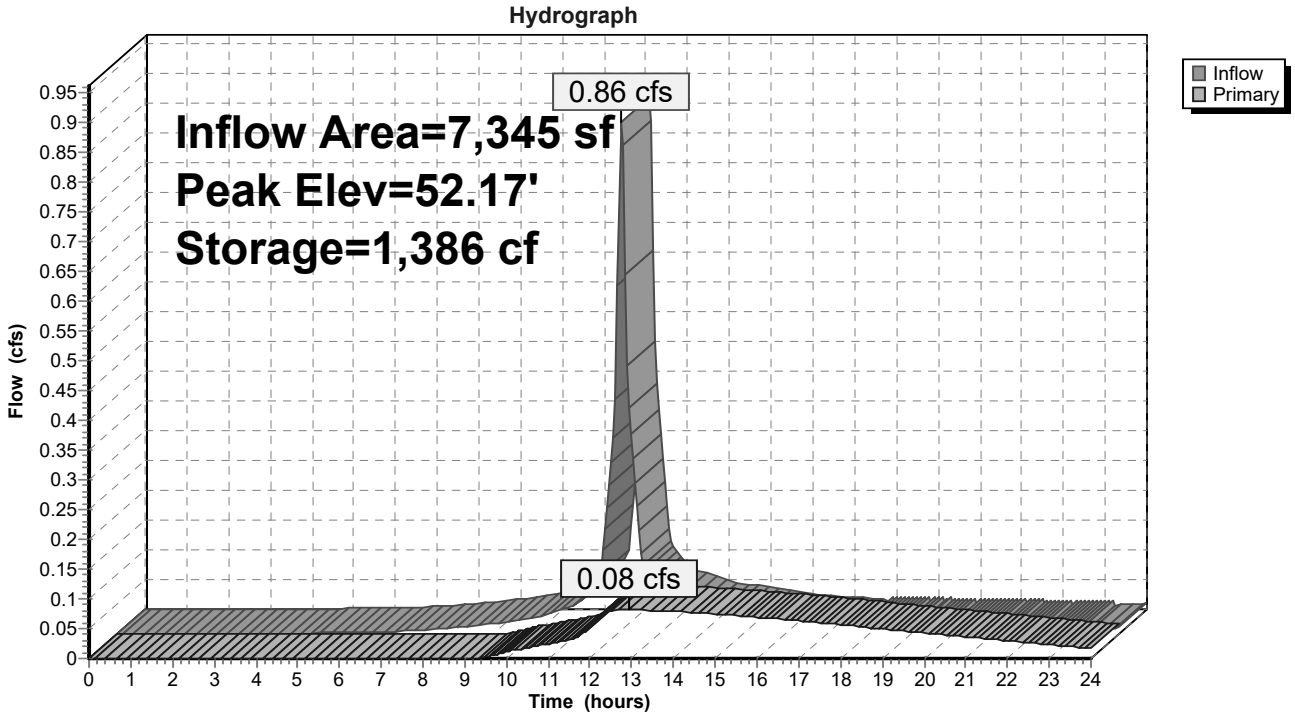
Plug-Flow detention time= 222.8 min calculated for 2,540 cf (93% of inflow)
Center-of-Mass det. time= 186.0 min (978.1 - 792.1)

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'	**1.5" 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 @ 12.93 hrs HW=52.16' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.08 cfs of 4.58 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.08 cfs @ 6.64 fps)
  └─**3=Orifice/Grate** (Controls 0.00 cfs)

Pond P1-3: P1-3


Hydrograph
Inflow
Primary
0.86 cfs
0.08 cfs
Inflow Area=7,345 sf
Peak Elev=52.17'
Storage=1,386 cf
Flow (cfs)
Time (hours)

Summary for Pond P3-1: P3-2

Inflow Area = 78,927 sf, 57.97% Impervious, Inflow Depth > 4.02" for 25 year event
Inflow = 8.14 cfs @ 12.09 hrs, Volume= 26,472 cf
Outflow = 3.07 cfs @ 12.36 hrs, Volume= 23,859 cf, Atten= 62%, Lag= 16.4 min
Primary = 3.07 cfs @ 12.36 hrs, Volume= 23,859 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 67.62' @ 12.36 hrs Surf.Area= 3,825 sf Storage= 9,430 cf
Flood Elev= 70.00' Surf.Area= 3,825 sf Storage= 13,172 cf

Plug-Flow detention time= 99.7 min calculated for 23,810 cf (90% of inflow)
Center-of-Mass det. time= 52.6 min (858.9 - 806.3)

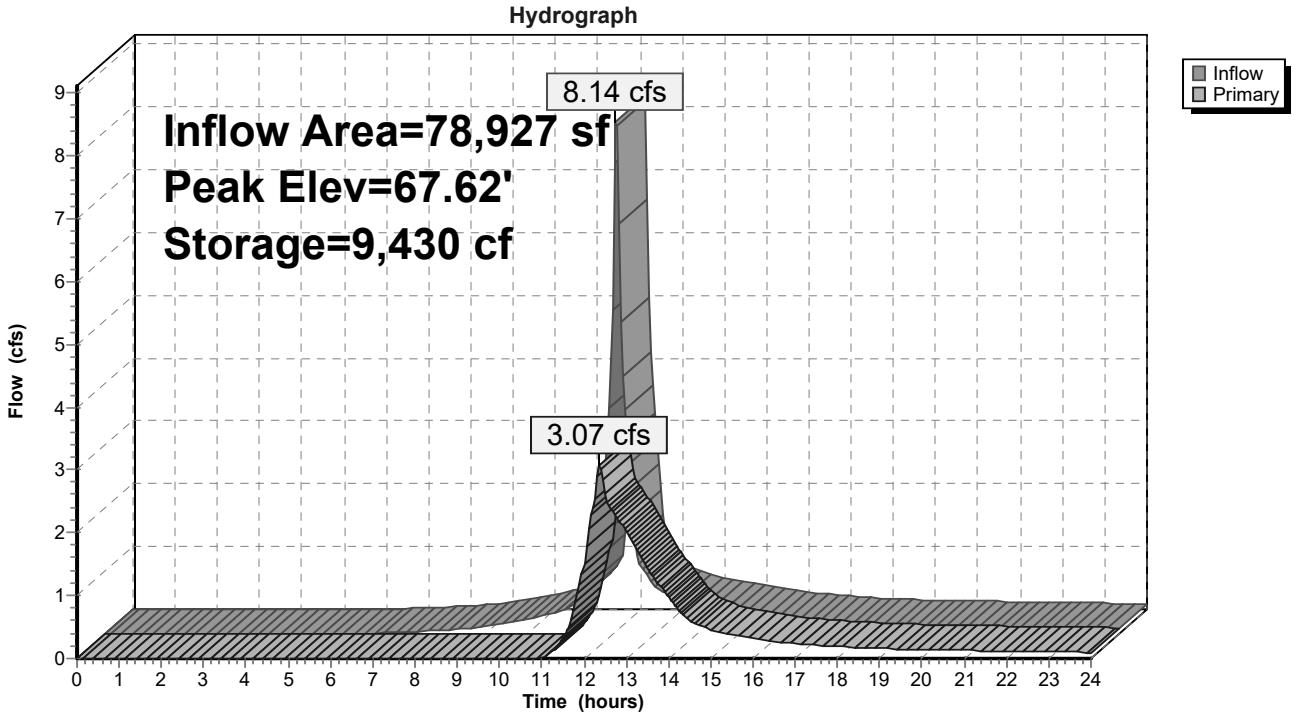
Volume	Invert	Avail.Storage	Storage Description
#1	64.00'	4,658 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc) 22,950 cf Overall - 11,304 cf Embedded = 11,646 cf x 40.0% Voids
#2	64.50'	8,514 cf	**52.8"W x 48.0"H x 4.00'L Galley 4x4x4** x 192 Inside #1
		13,172 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
64.00	3,825	0	0
70.00	3,825	22,950	22,950

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=3.05 cfs @ 12.36 hrs HW=67.62' TW=61.90' (Dynamic Tailwater)
└─**1=Culvert** (Passes 3.05 cfs of 10.22 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 2.54 cfs @ 7.28 fps)
  └─**3=Orifice/Grate** (Weir Controls 0.51 cfs @ 1.12 fps)

Pond P3-1: P3-2


Hydrograph
Inflow
Primary
8.14 cfs
3.07 cfs
Inflow Area=78,927 sf
Peak Elev=67.62'
Storage=9,430 cf
Flow (cfs)
Time (hours)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24

Summary for Pond P3-2: P3-3

Inflow Area = 150,527 sf, 46.94% Impervious, Inflow Depth > 3.42" for 25 year event
Inflow = 8.09 cfs @ 12.09 hrs, Volume= 42,847 cf
Outflow = 2.79 cfs @ 12.91 hrs, Volume= 34,449 cf, Atten= 66%, Lag= 49.0 min
Primary = 2.79 cfs @ 12.91 hrs, Volume= 34,449 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 53.07' @ 12.91 hrs Surf.Area= 7,410 sf Storage= 14,641 cf
Flood Elev= 55.50' Surf.Area= 12,548 sf Storage= 38,610 cf

Plug-Flow detention time= 143.6 min calculated for 34,449 cf (80% of inflow)
Center-of-Mass det. time= 69.8 min (914.9 - 845.1)

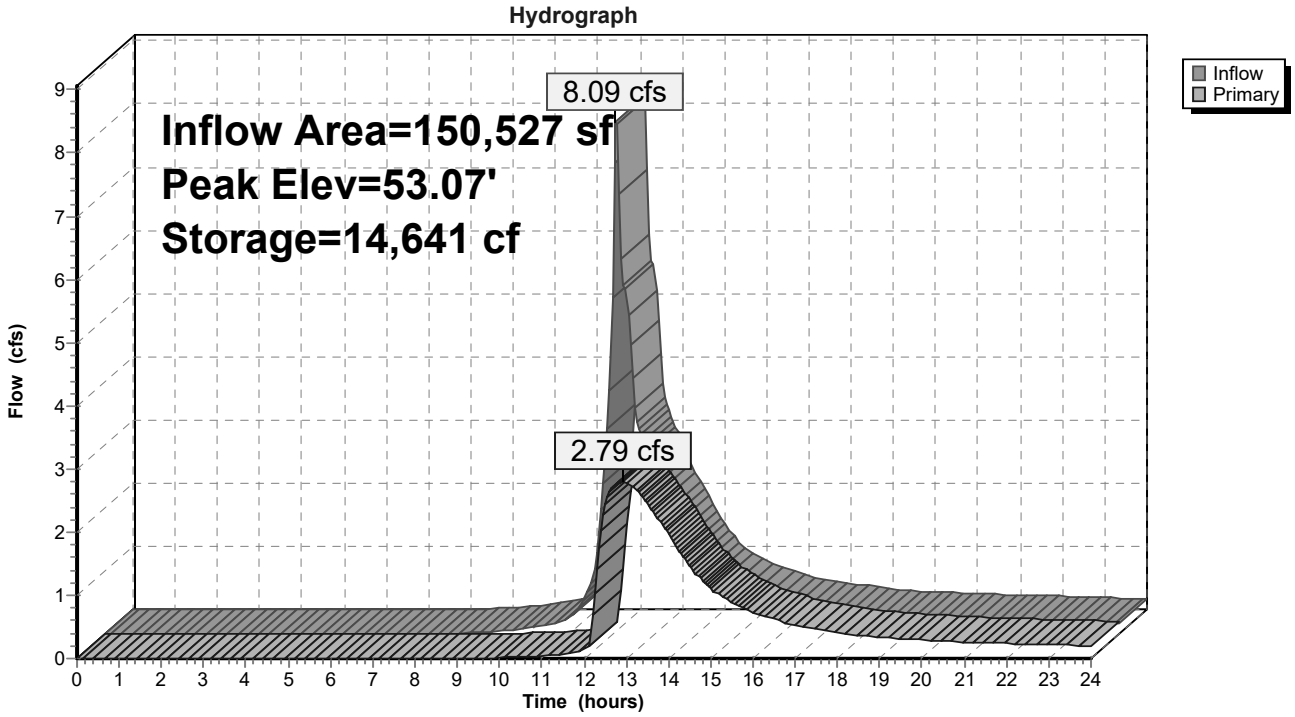
Volume	Invert	Avail.Storage	Storage Description
#1	50.00'	38,610 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

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'	**9.0" Vert. Orifice/Grate** C= 0.600
#4	Device 1	52.50'	**8.0" Vert. Orifice/Grate** C= 0.600
#5	Device 1	54.00'	**2.00' x 2.00' Horiz. Orifice/Grate** Limited to weir flow C= 0.600
#6	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=2.79 cfs @ 12.91 hrs HW=53.07' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Passes 2.79 cfs of 6.07 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 0.18 cfs @ 8.33 fps)
  - **3=Orifice/Grate** (Orifice Controls 1.78 cfs @ 4.03 fps)
  - **4=Orifice/Grate** (Orifice Controls 0.83 cfs @ 2.58 fps)
  - **5=Orifice/Grate** (Controls 0.00 cfs)
- **6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond P3-2: P3-3


Hydrograph
Inflow
Primary
8.09 cfs
2.79 cfs
Inflow Area=150,527 sf
Peak Elev=53.07'
Storage=14,641 cf
Flow (cfs)
Time (hours)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
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19
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21
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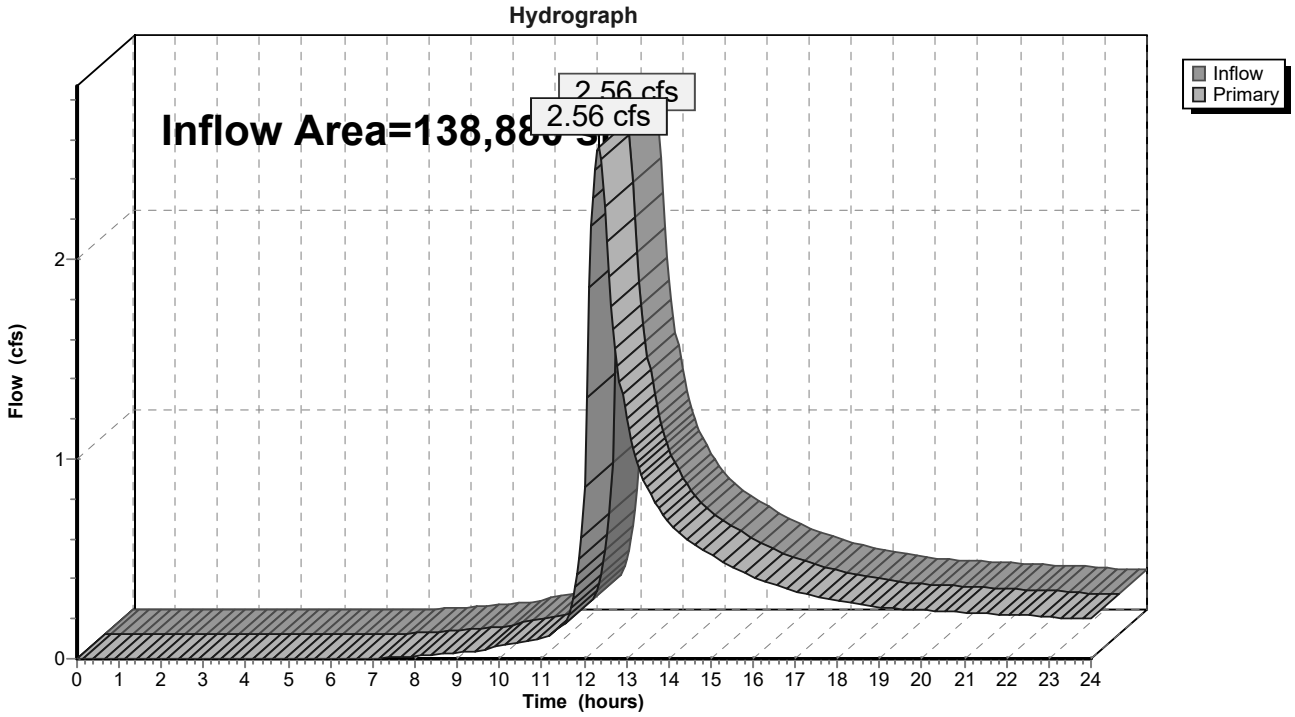
23
24

Summary for Link DP-1: DP-1

Inflow Area = 138,880 sf, 35.07% Impervious, Inflow Depth > 1.96" for 25 year event
Inflow = 2.56 cfs @ 12.34 hrs, Volume= 22,713 cf
Primary = 2.56 cfs @ 12.34 hrs, Volume= 22,713 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

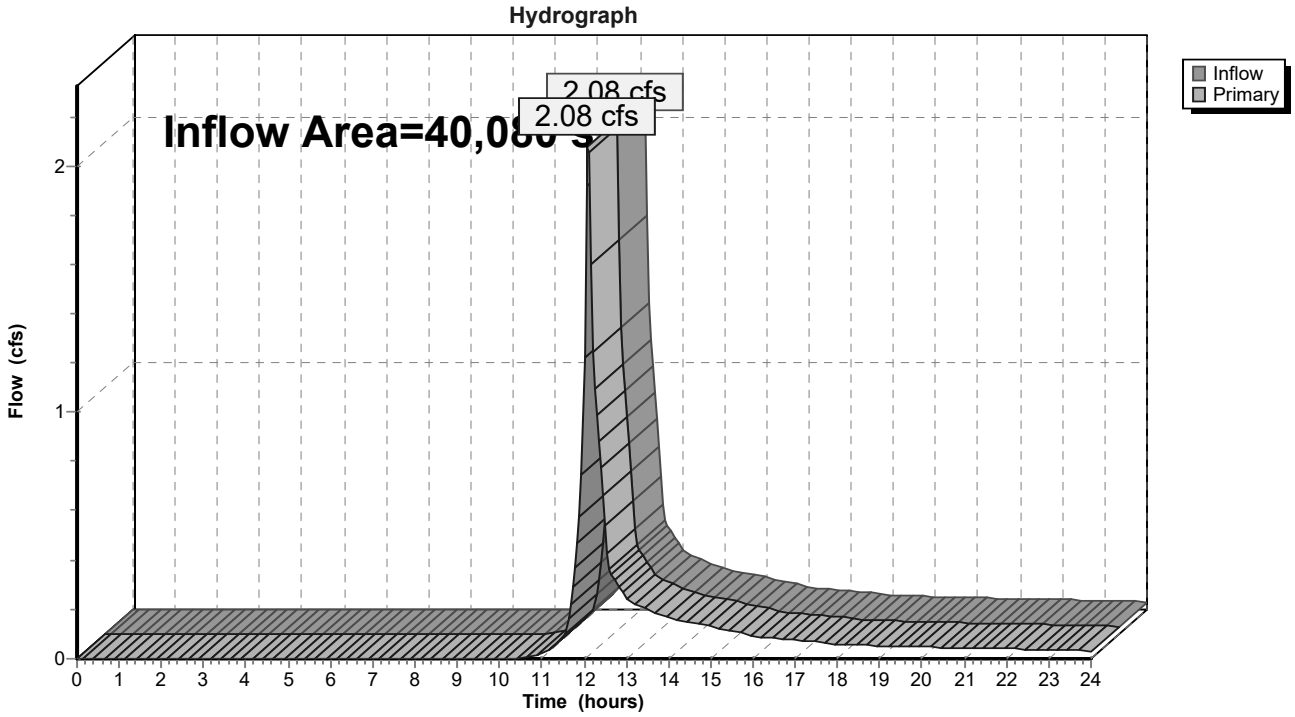


Summary for Link DP-2: DP-2

Inflow Area = 40,080 sf, 11.21% Impervious, Inflow Depth > 2.00" for 25 year event
Inflow = 2.08 cfs @ 12.09 hrs, Volume= 6,692 cf
Primary = 2.08 cfs @ 12.09 hrs, Volume= 6,692 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

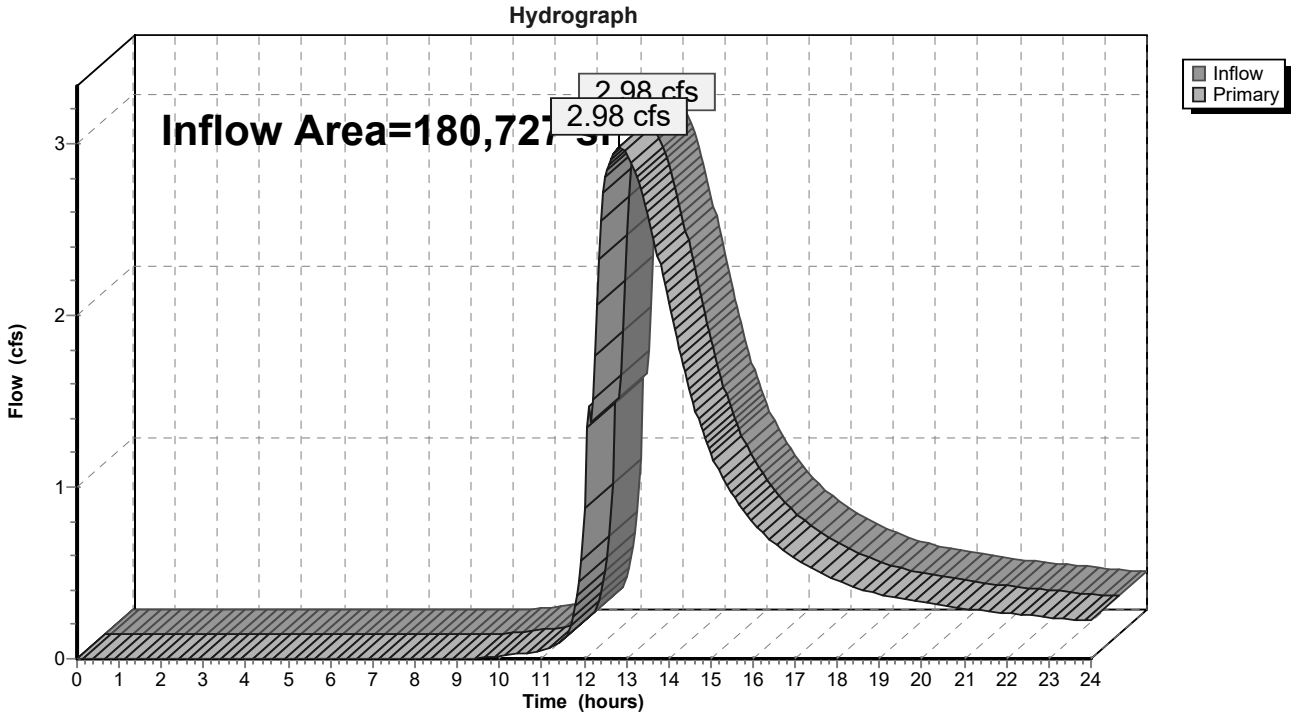


Summary for Link DP-3: DP-3

Inflow Area = 180,727 sf, 39.09% Impervious, Inflow Depth > 2.58" for 25 year event
Inflow = 2.98 cfs @ 12.85 hrs, Volume= 38,866 cf
Primary = 2.98 cfs @ 12.85 hrs, Volume= 38,866 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

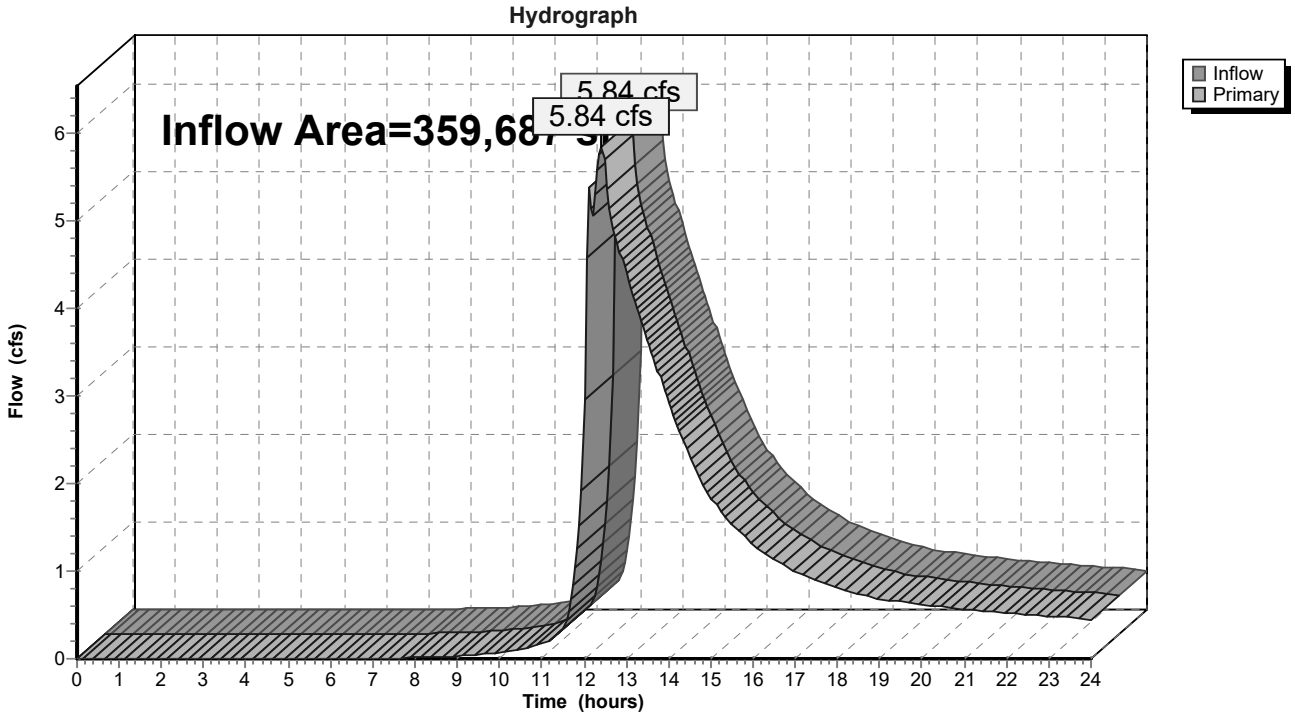


Summary for Link TOTAL: (new Link)

Inflow Area = 359,687 sf, 34.43% Impervious, Inflow Depth > 2.28" for 25 year event
Inflow = 5.84 cfs @ 12.40 hrs, Volume= 68,272 cf
Primary = 5.84 cfs @ 12.40 hrs, Volume= 68,272 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)



RANGER
ENGINEERING &
DESIGN, LLC

STORMWATER MANAGEMENT REPORT

POST-DEVELOPMENT DRAINAGE

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-1B Runoff Area=7,118 sf 74.36% Impervious Runoff Depth>5.70"
Flow Length=319' Tc=8.6 min CN=89 Runoff=0.94 cfs 3,382 cf

Subcatchment P-1C: P-1C Runoff Area=3,632 sf 56.17% Impervious Runoff Depth>4.91"
Flow Length=96' Tc=5.0 min CN=82 Runoff=0.48 cfs 1,487 cf

Subcatchment P-1D: P-1D Runoff Area=3,713 sf 81.12% Impervious Runoff Depth>5.94"
Flow Length=96' Slope=0.0100 '/' Tc=5.0 min CN=91 Runoff=0.56 cfs 1,837 cf

Subcatchment P-1E: P-1E Runoff Area=15,678 sf 38.38% Impervious Runoff Depth>4.15"
Flow Length=100' Tc=5.0 min CN=75 Runoff=1.75 cfs 5,418 cf

Subcatchment P-1F: P-1F Runoff Area=20,660 sf 69.29% Impervious Runoff Depth>5.48"
Flow Length=380' Tc=5.0 min CN=87 Runoff=2.95 cfs 9,428 cf

Subcatchment P-1G: P-1G Runoff Area=5,772 sf 64.26% Impervious Runoff Depth>5.25"
Flow Length=90' Tc=5.0 min CN=85 Runoff=0.80 cfs 2,525 cf

Subcatchment P-1H: P-1H Runoff Area=5,661 sf 39.83% Impervious Runoff Depth>4.25"
Flow Length=130' Tc=5.0 min CN=76 Runoff=0.65 cfs 2,007 cf

Subcatchment P-1I: P-1I Runoff Area=47,228 sf 25.39% Impervious Runoff Depth>3.62"
Flow Length=145' Tc=5.0 min CN=70 Runoff=4.60 cfs 14,231 cf

Subcatchment P-1J: P1-J Runoff Area=27,093 sf 0.25% Impervious Runoff Depth>2.50"
Flow Length=280' Tc=6.3 min CN=59 Runoff=1.72 cfs 5,651 cf

Subcatchment P-2A: P-2A Runoff Area=40,080 sf 11.21% Impervious Runoff Depth>2.70"
Flow Length=140' Tc=5.0 min CN=61 Runoff=2.86 cfs 9,017 cf

Subcatchment P-3A: P-3A Runoff Area=30,200 sf 0.00% Impervious Runoff Depth>2.41"
Flow Length=230' Tc=5.0 min CN=58 Runoff=1.89 cfs 6,058 cf

Subcatchment P-3B: P-3B Runoff Area=71,600 sf 34.77% Impervious Runoff Depth>4.04"
Flow Length=370' Tc=5.4 min CN=74 Runoff=7.73 cfs 24,099 cf

Subcatchment P-3C: P-3C Runoff Area=41,255 sf 48.59% Impervious Runoff Depth>4.58"
Flow Length=280' Tc=5.0 min CN=79 Runoff=5.08 cfs 15,751 cf

Subcatchment P-3D: P-3D Runoff Area=33,144 sf 68.21% Impervious Runoff Depth>5.36"
Flow Length=240' Tc=7.3 min CN=86 Runoff=4.37 cfs 14,806 cf

Subcatchment P-3E: P-3F Runoff Area=4,528 sf 68.55% Impervious Runoff Depth>5.36"
Flow Length=140' 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: CB1 Peak Elev=52.71' Inflow=0.48 cfs 1,487 cf
8.0" x 9.0' Culvert Outflow=0.48 cfs 1,486 cf

Pond CB2: CB2 Peak Elev=52.71' Inflow=0.56 cfs 1,837 cf
8.0" x 9.0' Culvert Outflow=0.56 cfs 1,837 cf

Pond CB3: CB3 Peak Elev=54.20' Inflow=0.94 cfs 3,382 cf
12.0" x 12.0' Culvert Outflow=0.94 cfs 3,382 cf

Pond CB4: CB4 Peak Elev=54.45' Inflow=2.95 cfs 9,428 cf
12.0" x 11.0' Culvert Outflow=2.95 cfs 9,428 cf

Pond CB5: CB5 Peak Elev=58.49' Inflow=0.65 cfs 2,007 cf
12.0" x 23.9' Culvert Outflow=0.65 cfs 2,007 cf

Pond CB6: CB6 Peak Elev=58.52' Inflow=0.80 cfs 2,525 cf
12.0" x 15.9' Culvert Outflow=0.80 cfs 2,525 cf

Pond CB7: CB7 Peak Elev=68.92' Inflow=4.37 cfs 14,806 cf
12.0" x 20.0' Culvert Outflow=4.37 cfs 14,806 cf

Pond CB8: CB8 Peak Elev=68.30' Inflow=0.64 cfs 2,024 cf
12.0" x 20.0' Culvert Outflow=0.64 cfs 2,024 cf

Pond CB9: CB9 Peak Elev=69.85' Inflow=5.08 cfs 15,751 cf
12.0" x 22.0' Culvert Outflow=5.08 cfs 15,751 cf

Pond DMH 10: DMH9 Peak Elev=62.49' Inflow=5.50 cfs 29,925 cf
15.0" x 100.0' Culvert Outflow=5.50 cfs 29,925 cf

Pond DMH 11: DMH 10 Peak Elev=56.96' Inflow=5.50 cfs 29,925 cf
15.0" x 33.0' Culvert Outflow=5.50 cfs 29,925 cf

Pond DMH 6: DMH 6 Peak Elev=68.13' Inflow=4.98 cfs 16,830 cf
15.0" x 55.0' Culvert Outflow=4.98 cfs 16,830 cf

Pond DMH2: DMH2 Peak Elev=54.15' Inflow=3.79 cfs 12,810 cf
12.0" x 39.0' Culvert Outflow=3.79 cfs 12,810 cf

Pond DMH3: DMH3 Peak Elev=56.05' Inflow=1.45 cfs 4,532 cf
12.0" x 57.3' Culvert Outflow=1.45 cfs 4,532 cf

Pond DMH4: DMH4 Peak Elev=58.30' Inflow=1.45 cfs 4,532 cf
12.0" x 65.0' Culvert Outflow=1.45 cfs 4,532 cf

Pond DMH5: DMH 5 Peak Elev=68.29' Inflow=4.98 cfs 16,830 cf
15.0" x 94.0' Culvert Outflow=4.98 cfs 16,830 cf

Pond DMH7: DMH7 Peak Elev=67.98' Inflow=4.98 cfs 16,830 cf
Outflow=4.98 cfs 16,830 cf

Pond DMH8: DMH8 Peak Elev=68.51' Inflow=5.08 cfs 15,751 cf
12.0" x 1.0' Culvert Outflow=5.08 cfs 15,751 cf

Pond P1-1: P1-1 Peak Elev=53.72' Storage=8,934 cf Inflow=6.98 cfs 22,760 cf
Outflow=2.88 cfs 18,297 cf

Pond P1-2: DP-1-2 Peak Elev=58.79' Storage=11,676 cf Inflow=4.60 cfs 14,231 cf
Outflow=0.09 cfs 2,680 cf

Pond P1-3: P1-3 Peak Elev=52.71' Storage=1,698 cf Inflow=1.03 cfs 3,323 cf
Outflow=0.09 cfs 3,061 cf

Pond P3-1: P3-2 Peak Elev=67.86' Storage=10,103 cf Inflow=9.94 cfs 32,580 cf
Outflow=5.50 cfs 29,925 cf

Pond P3-2: P3-3 Peak Elev=53.53' Storage=18,236 cf Inflow=9.99 cfs 54,025 cf
Outflow=3.89 cfs 45,440 cf

Link DP-1: DP-1 Inflow=4.00 cfs 30,119 cf
Primary=4.00 cfs 30,119 cf

Link DP-2: DP-2 Inflow=2.86 cfs 9,017 cf
Primary=2.86 cfs 9,017 cf

Link DP-3: DP-3 Inflow=4.39 cfs 51,498 cf
Primary=4.39 cfs 51,498 cf

Link TOTAL: (new Link) Inflow=9.40 cfs 90,634 cf
Primary=9.40 cfs 90,634 cf

Total Runoff Area = 359,687 sf Runoff Volume = 118,150 cf Average Runoff Depth = 3.94"
65.57% Pervious = 235,843 sf 34.43% Impervious = 123,844 sf

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

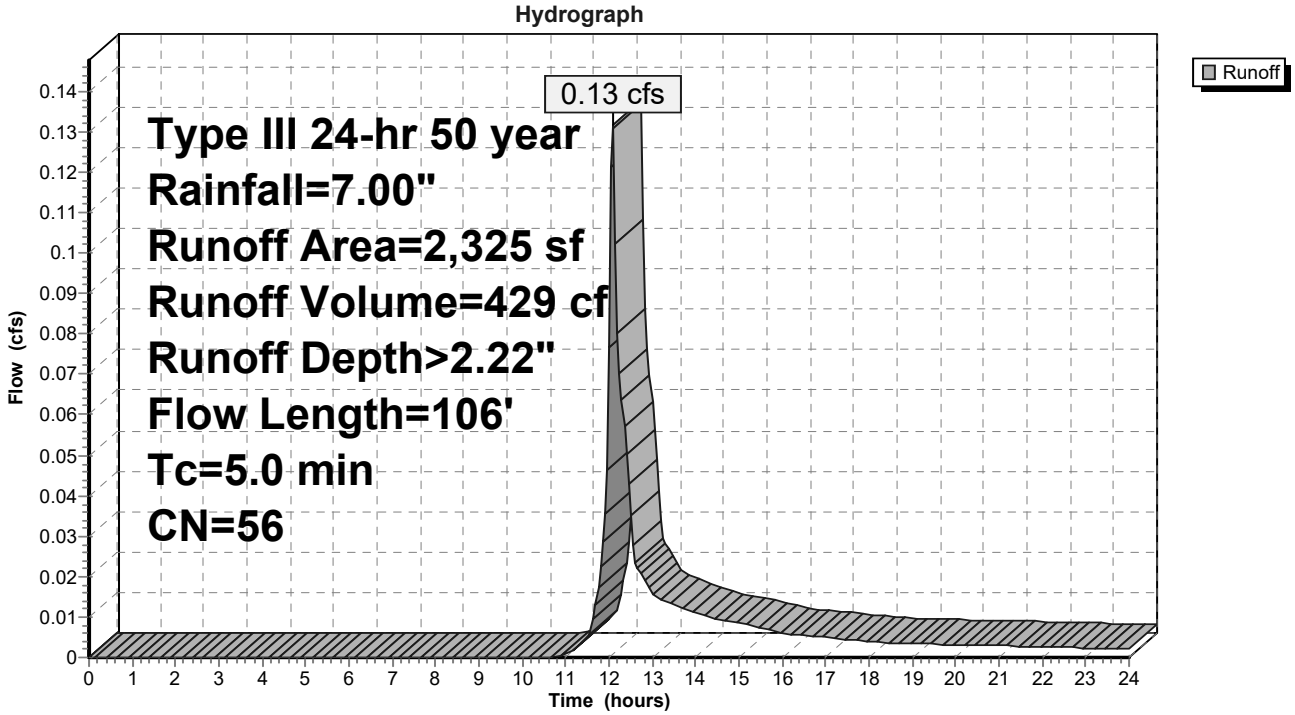
Runoff = 0.13 cfs @ 12.09 hrs, Volume= 429 cf, Depth> 2.22"

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



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

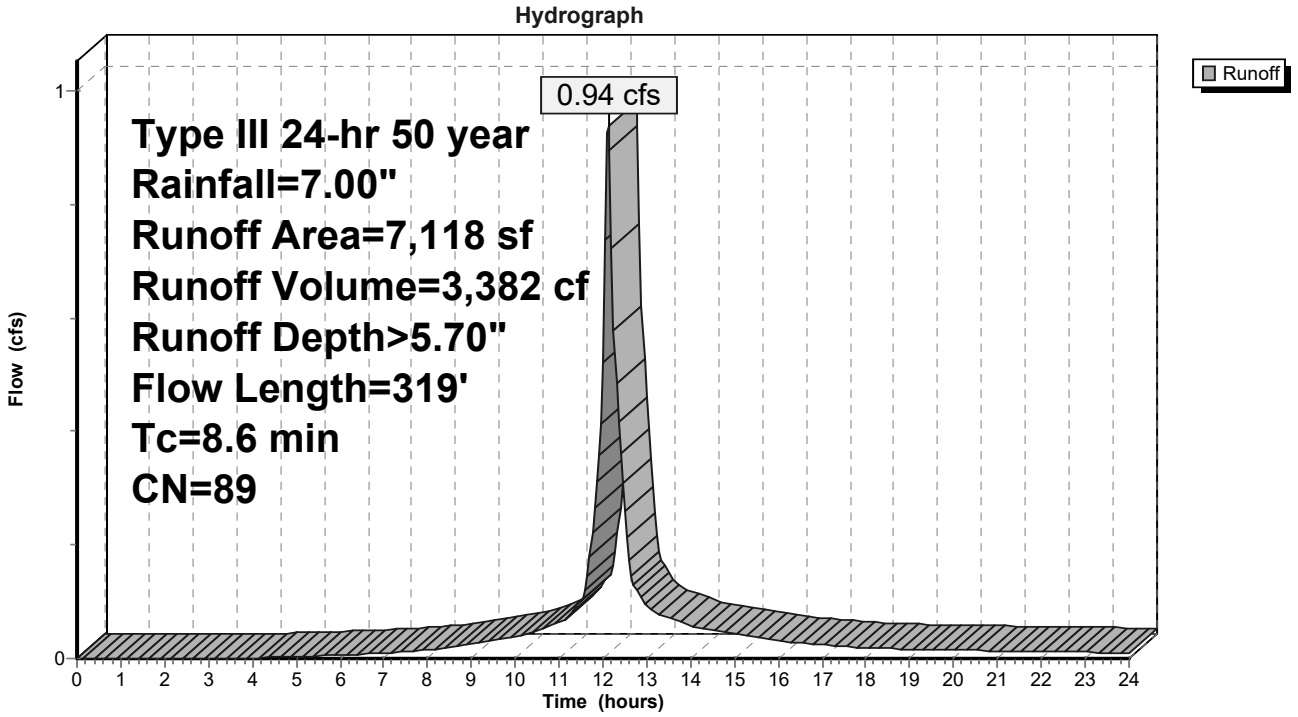
Runoff = 0.94 cfs @ 12.12 hrs, Volume= 3,382 cf, Depth> 5.70"

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
0	98	Roofs, HSG B
5,293	98	Paved roads w/curbs & sewers, HSG B
1,825	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
0	98	Water Surface, HSG B
7,118	89	Weighted Average
1,825		Pervious Area
5,293		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0					**Direct Entry, DIRECT**
4.8	50	0.0300	0.17		**Sheet Flow, SHEET FLOW** Grass: Short n= 0.150 P2= 3.20"
2.9	60	0.0025	0.35		**Shallow Concentrated Flow, SHALLOW GRASS** Short Grass Pasture Kv= 7.0 fps
0.9	209	0.0350	3.80		**Shallow Concentrated Flow, SHALLOW PAVE** Paved Kv= 20.3 fps
8.6	319	Total			

Subcatchment P-1B: P-1B



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

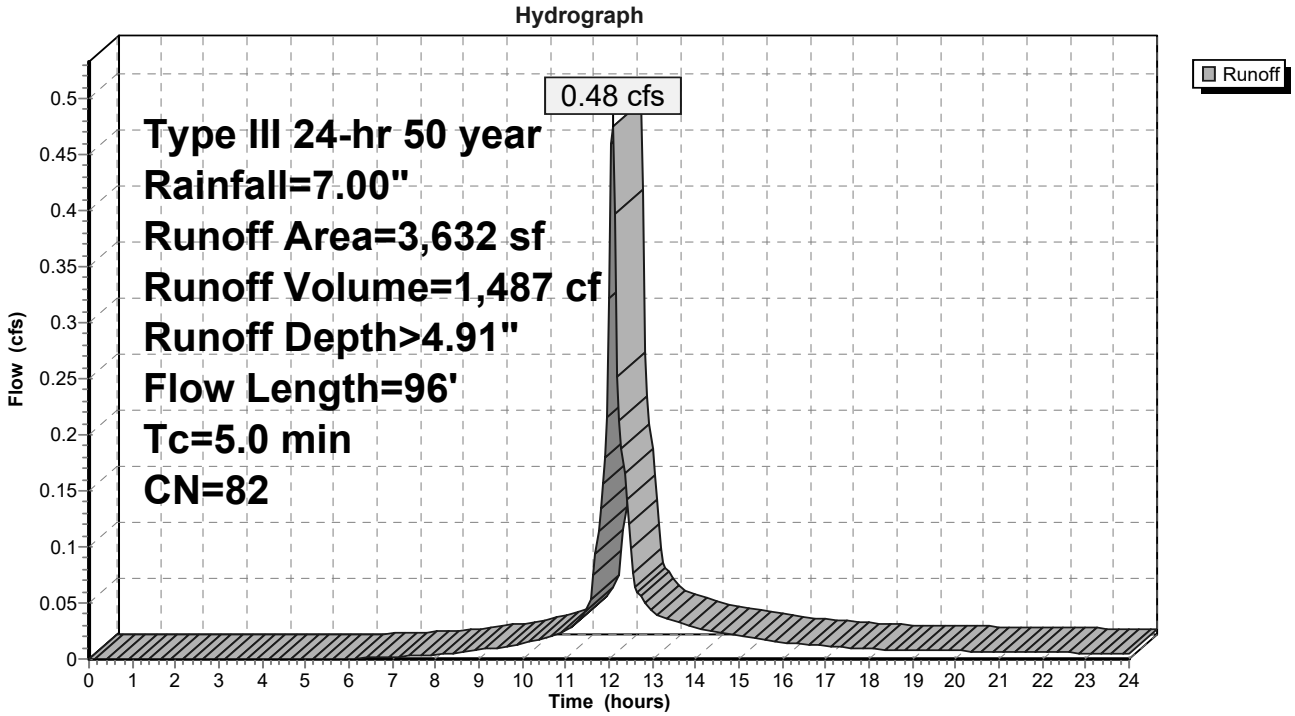
Runoff = 0.48 cfs @ 12.07 hrs, Volume= 1,487 cf, Depth> 4.91"

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
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
2.8	50	0.1100	0.29		**Sheet Flow, SHEET** Grass: Short n= 0.150 P2= 3.20"
0.2	46	0.0300	3.52		**Shallow Concentrated Flow, PAVEMENT** Paved Kv= 20.3 fps
2.0					**Direct Entry, DIRECT**
5.0	96	Total			

Subcatchment P-1C: P-1C



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

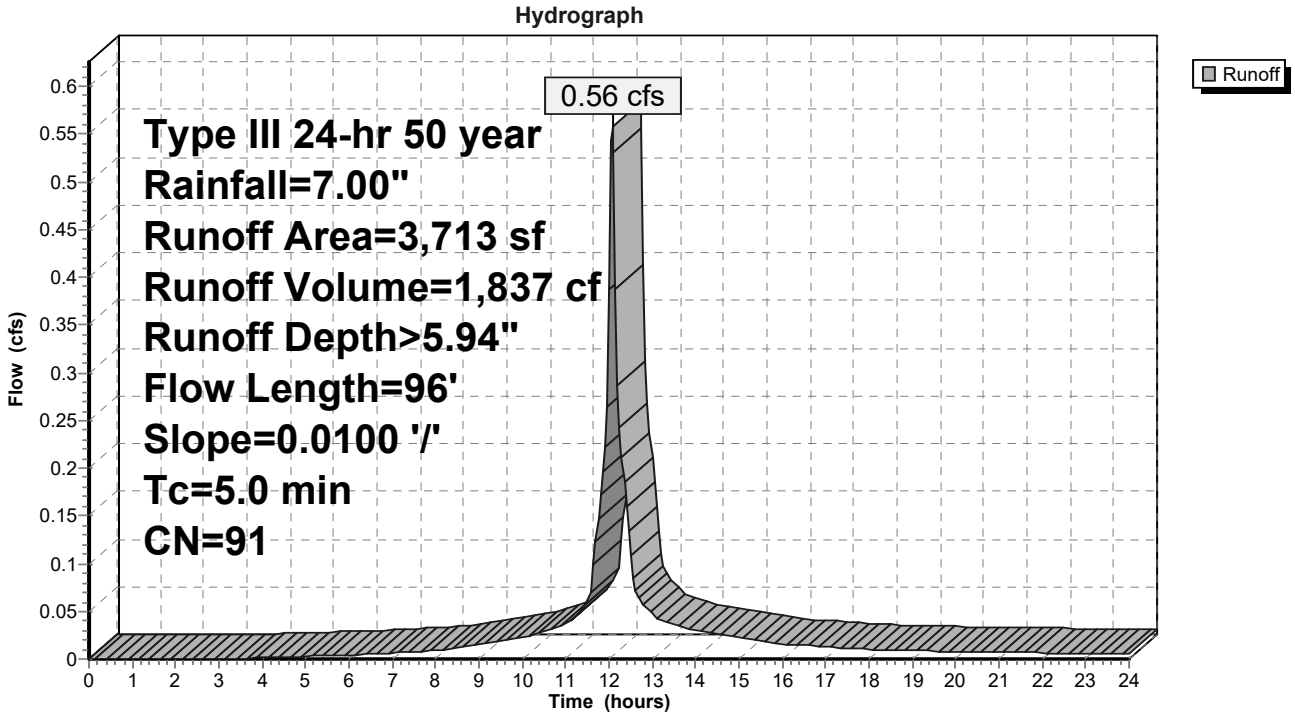
Runoff = 0.56 cfs @ 12.07 hrs, Volume= 1,837 cf, Depth> 5.94"

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
0.9	50	0.0100	0.91		**Sheet Flow, SHEET** Smooth surfaces n= 0.011 P2= 3.20"
0.4	46	0.0100	2.03		**Shallow Concentrated Flow, PAVEMENT** Paved Kv= 20.3 fps
3.7					**Direct Entry, DIRECT**
5.0	96	Total			

Subcatchment P-1D: P-1D



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

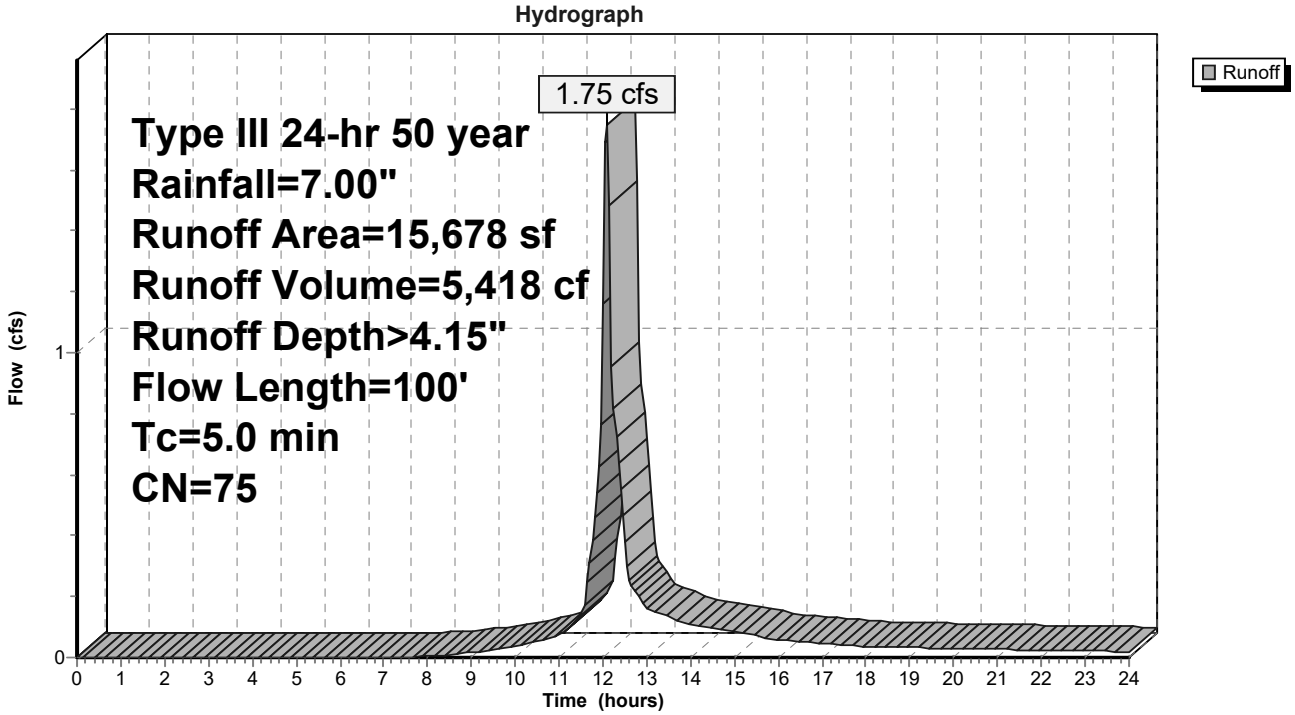
Runoff = 1.75 cfs @ 12.08 hrs, Volume= 5,418 cf, Depth> 4.15"

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
880	98	Roofs, HSG B
0	98	Paved parking, HSG B
210	98	Paved roads w/curbs & sewers, HSG B
8,660	61	>75% Grass cover, Good, HSG B
4,928	98	Water Surface, HSG B
1,000	55	Woods, Good, HSG B
15,678	75	Weighted Average
9,660		Pervious Area
6,018		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2					**Direct Entry, DIRECT**
3.6	50	0.0600	0.23		**Sheet Flow, SHEET** Grass: Short n= 0.150 P2= 3.20"
0.2	50	0.2700	3.64		**Shallow Concentrated Flow, SHALLOW GRASS** Short Grass Pasture Kv= 7.0 fps
5.0	100	Total			

Subcatchment P-1E: P-1E



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

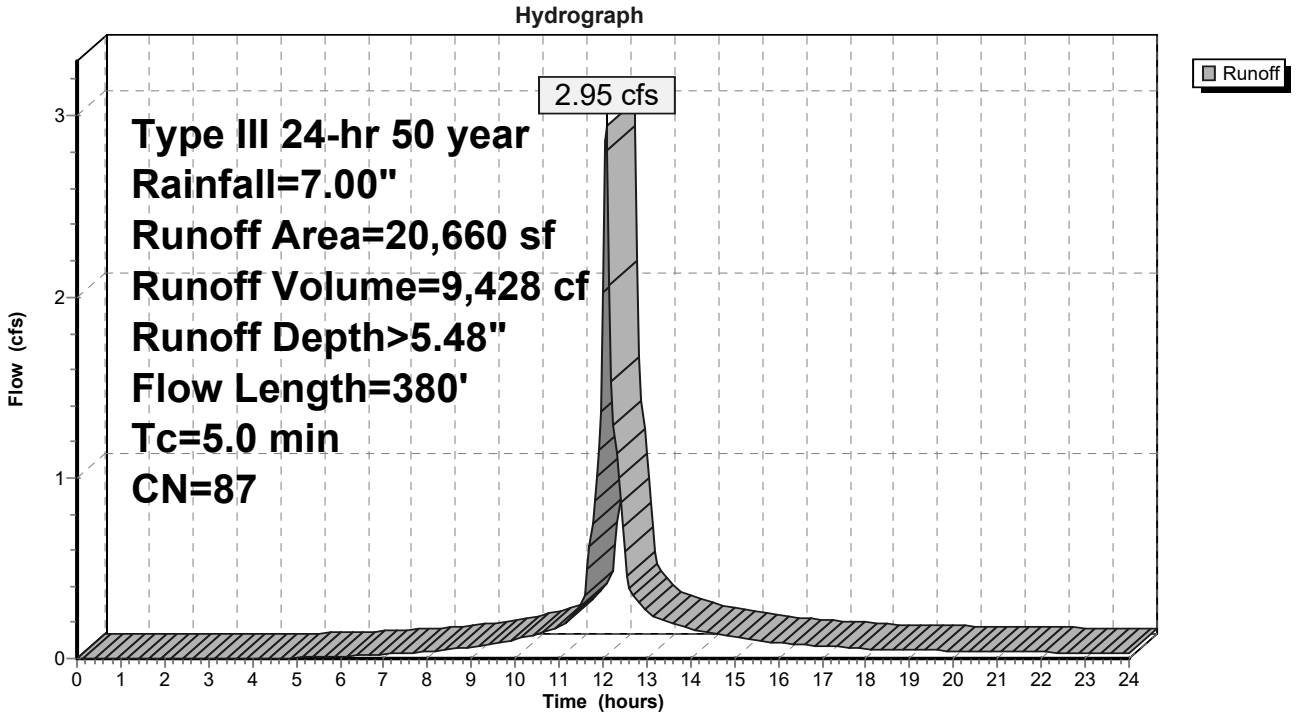
Runoff = 2.95 cfs @ 12.07 hrs, Volume= 9,428 cf, Depth> 5.48"

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
6,344	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
0	98	Water Surface, HSG B
20,660	87	Weighted Average
6,344		Pervious Area
14,316		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	30	0.0830	0.24		**Sheet Flow, SHEET GRASS** Grass: Short n= 0.150 P2= 3.20"
0.4	20	0.0125	0.83		**Sheet Flow, SHEET PAVE** Smooth surfaces n= 0.011 P2= 3.20"
1.3	330	0.0440	4.26		**Shallow Concentrated Flow, SHALLOW PAVE** Paved Kv= 20.3 fps
1.2					**Direct Entry, DIRECT**
5.0	380	Total			

Subcatchment P-1F: P-1F



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

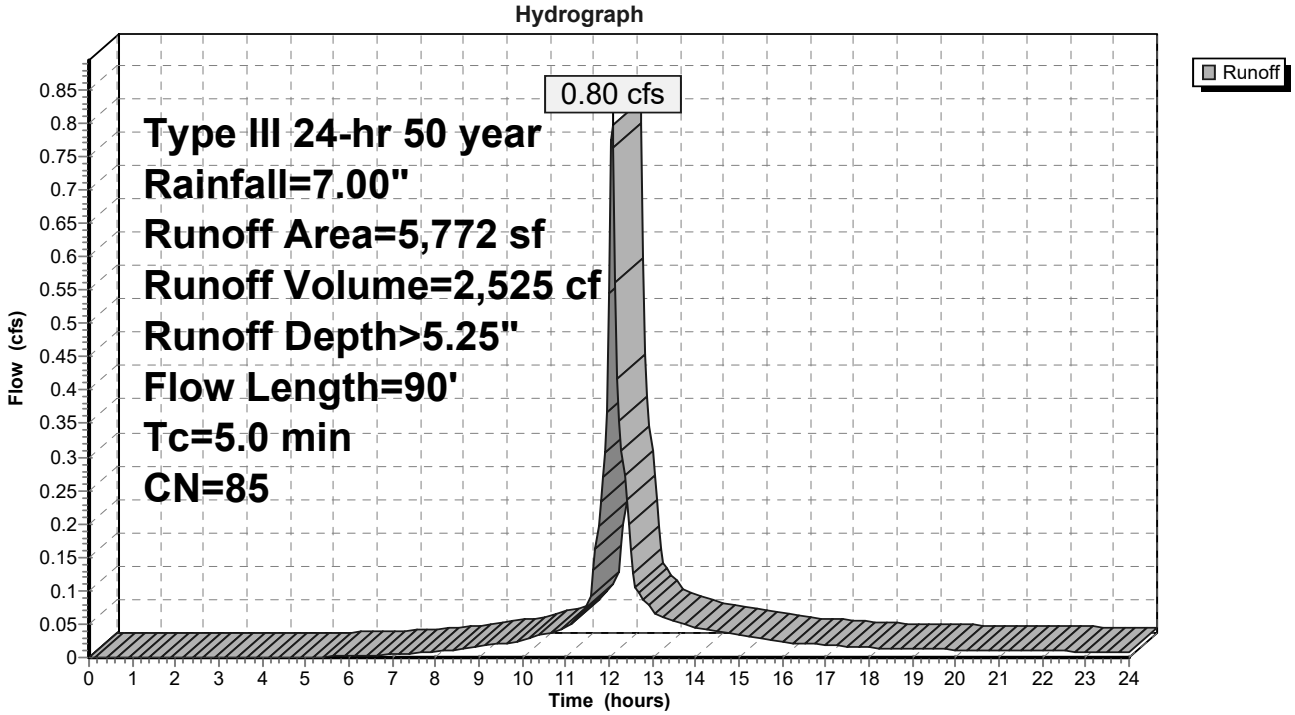
Runoff = 0.80 cfs @ 12.07 hrs, Volume= 2,525 cf, Depth> 5.25"

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
2,063	61	>75% Grass cover, Good, HSG B
440	98	Roofs, HSG B
3,269	98	Paved roads w/curbs & sewers, HSG B
5,772	85	Weighted Average
2,063		Pervious Area
3,709		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	50	0.0500	0.21		**Sheet Flow, SHEET GRASS** Grass: Short n= 0.150 P2= 3.20"
0.4	30	0.0330	1.32		**Sheet Flow, SHEET PAVE** Smooth surfaces n= 0.011 P2= 3.20"
0.0	10	0.0290	3.46		**Shallow Concentrated Flow, PAVED** Paved Kv= 20.3 fps
0.7					**Direct Entry, DIRECT**
5.0	90	Total			

Subcatchment P-1G: P-1G



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

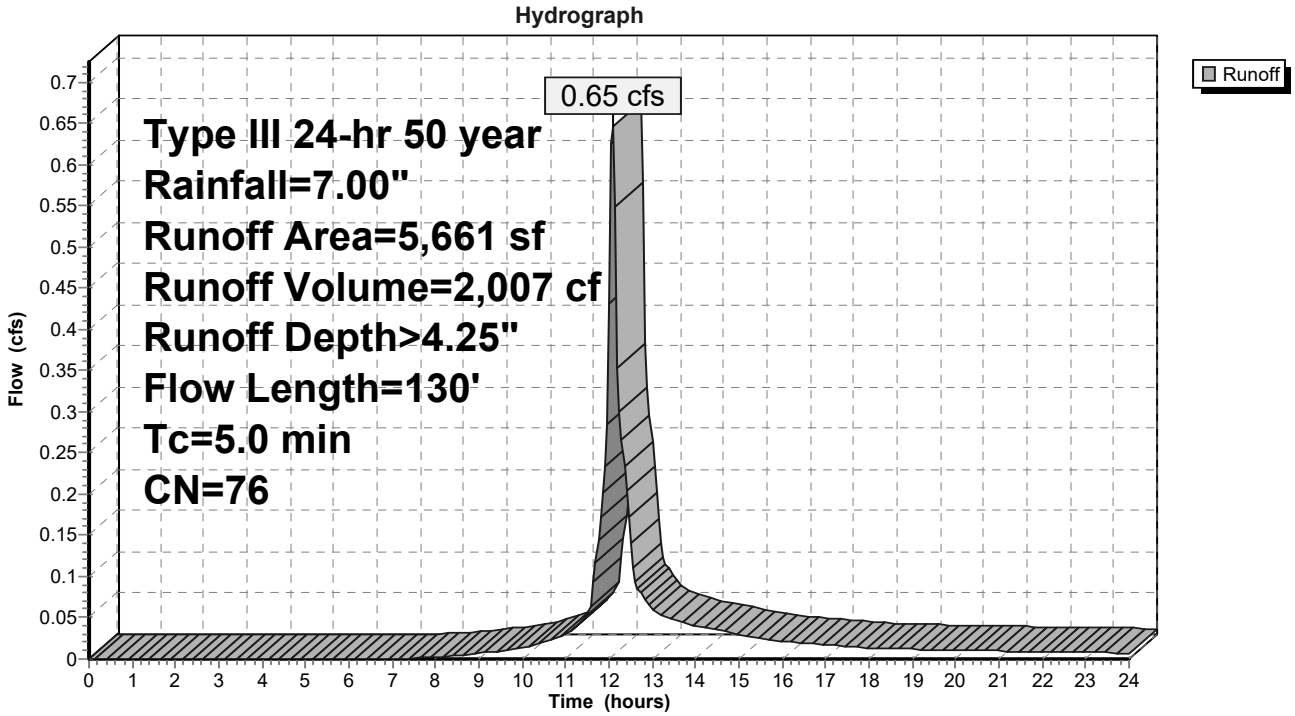
Runoff = 0.65 cfs @ 12.08 hrs, Volume= 2,007 cf, Depth> 4.25"

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
440	98	Roofs, HSG B
0	98	Paved parking, HSG B
1,815	98	Paved roads w/curbs & sewers, HSG B
3,406	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
5,661	76	Weighted Average
3,406		Pervious Area
2,255		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 GRASS** Smooth surfaces n= 0.011 P2= 3.20"
0.4	80	0.0250	3.21		**Shallow Concentrated Flow, PAVEMENT** Paved Kv= 20.3 fps
4.1					**Direct Entry, DIRECT**
5.0	130	Total			

Subcatchment P-1H: P-1H



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

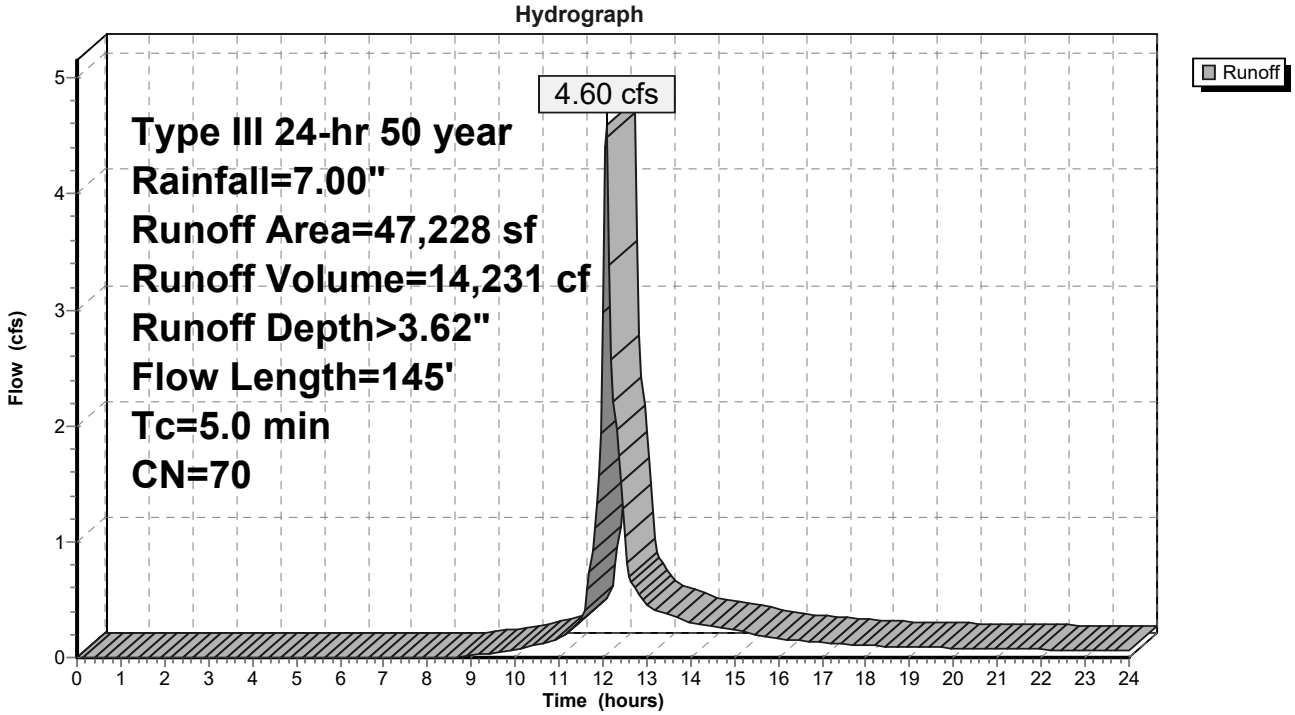
Runoff = 4.60 cfs @ 12.08 hrs, Volume= 14,231 cf, Depth> 3.62"

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
3,080	98	Roofs, HSG B
0	98	Paved parking, HSG B
212	98	Paved roads w/curbs & sewers, HSG B
35,239	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
8,697	98	Water Surface, HSG B
47,228	70	Weighted Average
35,239		Pervious Area
11,989		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.1	50	0.0900	0.27		**Sheet Flow, SHEET** Grass: Short n= 0.150 P2= 3.20"
0.8	95	0.0860	2.05		**Shallow Concentrated Flow, GRASS** Short Grass Pasture Kv= 7.0 fps
1.1					**Direct Entry, DIRECT**
5.0	145	Total			

Subcatchment P-1I: P-1I



Summary for Subcatchment P-1J: P1-J

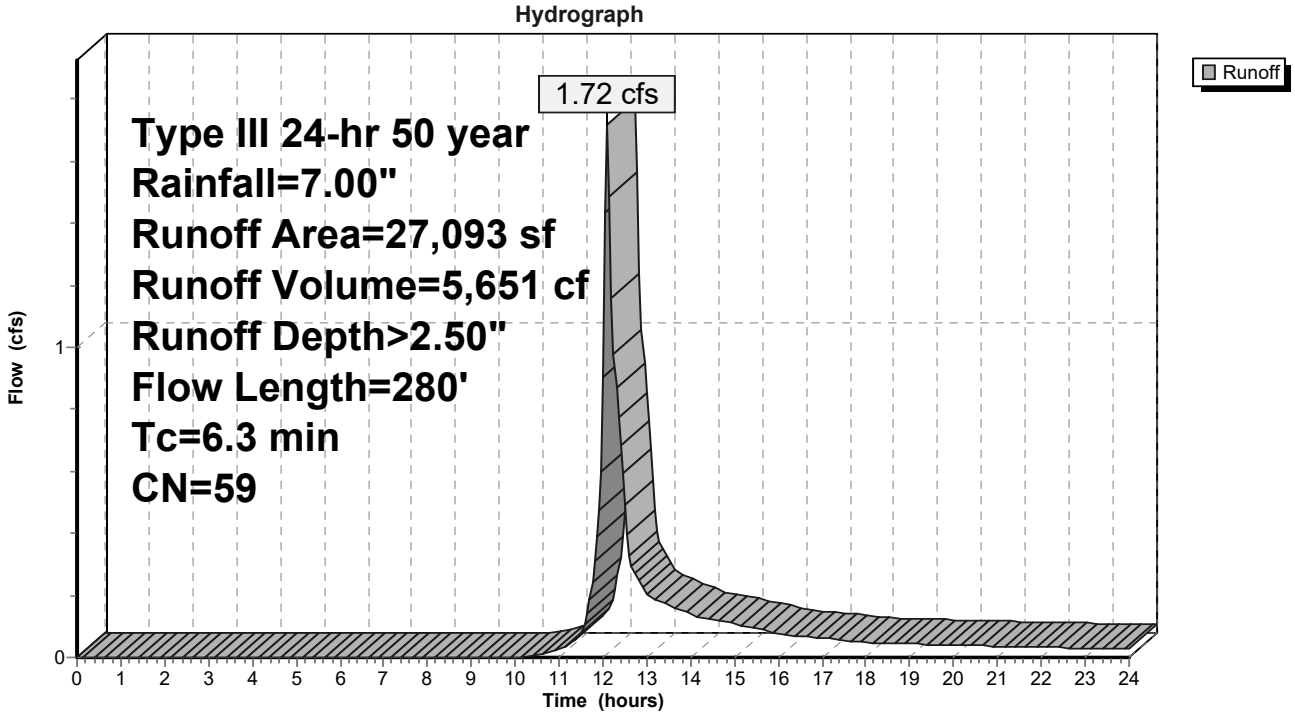
Runoff = 1.72 cfs @ 12.10 hrs, Volume= 5,651 cf, Depth> 2.50"

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
	8,800	55	Woods, Good, HSG B
	18,225	61	>75% Grass cover, Good, HSG B
*	68	98	Paved roads w/curbs & sewers, HSG B
	27,093	59	Weighted Average
	27,025		Pervious Area
	68		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"
3.1	230	0.0600	1.22		**Shallow Concentrated Flow, Flow in woods** Woodland Kv= 5.0 fps
6.3	280	Total			

Subcatchment P-1J: P1-J



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

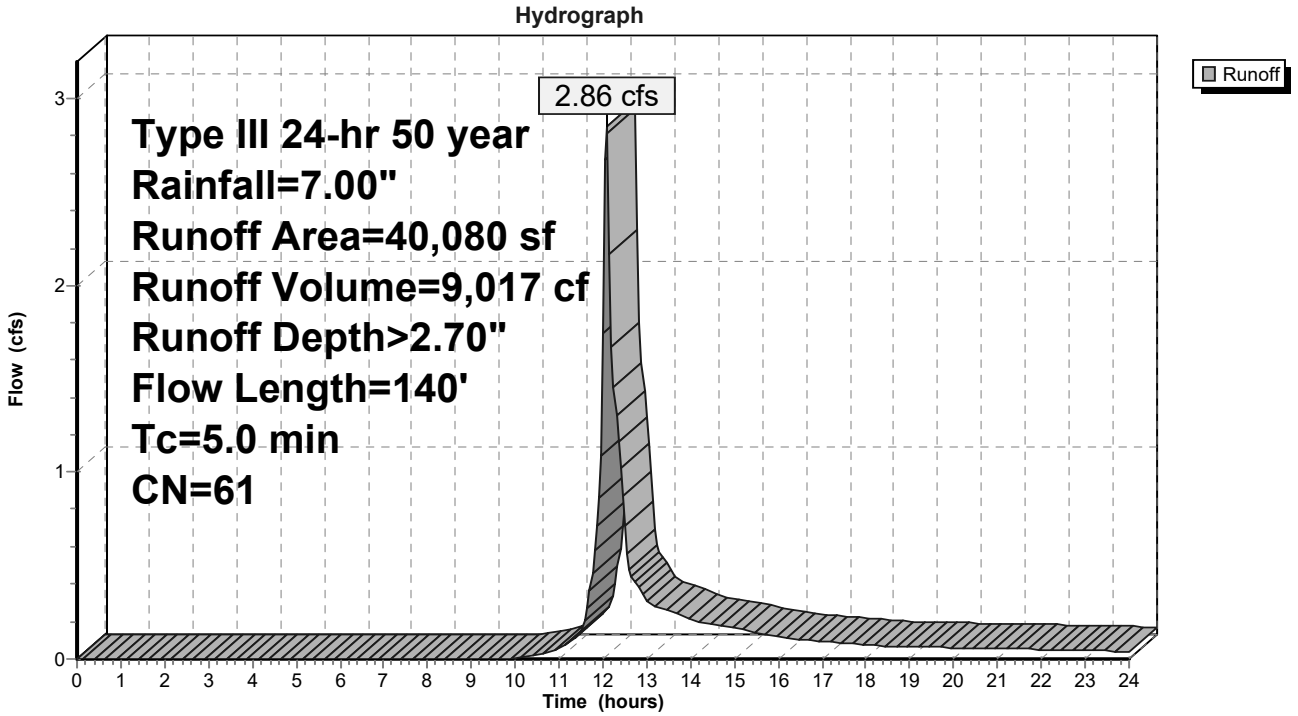
Runoff = 2.86 cfs @ 12.08 hrs, Volume= 9,017 cf, Depth> 2.70"

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
94	98	Paved roads w/curbs & sewers, HSG B
9,069	61	>75% Grass cover, Good, HSG B
26,517	55	Woods, Good, HSG B
40,080	61	Weighted Average
35,586		Pervious Area
4,494		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	50	0.0600	0.23		**Sheet Flow, SHEET GRASS** Grass: Short n= 0.150 P2= 3.20"
0.5	90	0.1560	2.76		**Shallow Concentrated Flow, GRASS SHALLOW** Short Grass Pasture Kv= 7.0 fps
0.9					**Direct Entry, DIRECT**
5.0	140	Total			

Subcatchment P-2A: P-2A



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

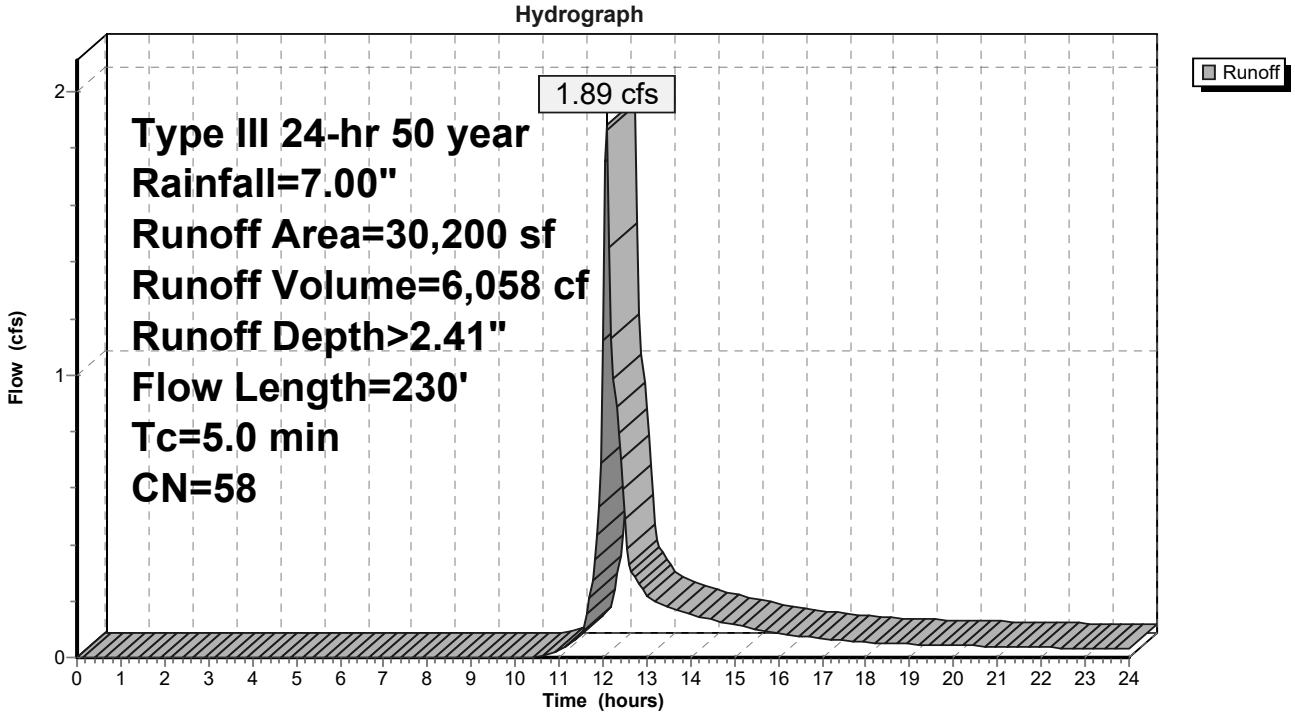
Runoff = 1.89 cfs @ 12.09 hrs, Volume= 6,058 cf, Depth> 2.41"

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
13,428	61	>75% Grass cover, Good, HSG B
16,772	55	Woods, Good, HSG B
30,200	58	Weighted Average
30,200		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0	50	0.2600	0.41		**Sheet Flow, SHEET GRASS** Grass: Short n= 0.150 P2= 3.20"
1.6	180	0.0720	1.88		**Shallow Concentrated Flow, SHALLOW GRASS** Short Grass Pasture Kv= 7.0 fps
1.4					**Direct Entry, DIRECT**
5.0	230	Total			

Subcatchment P-3A: P-3A



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

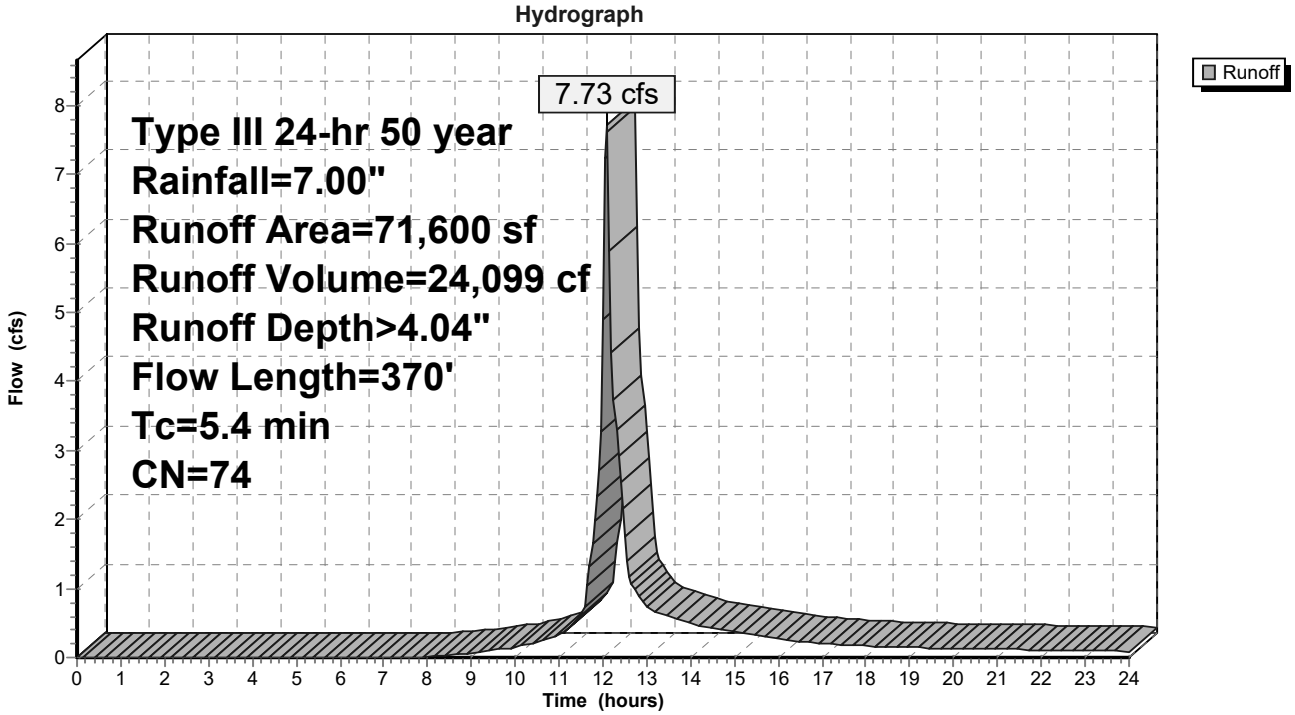
Runoff = 7.73 cfs @ 12.08 hrs, Volume= 24,099 cf, Depth> 4.04"

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
448	98	Paved roads w/curbs & sewers, HSG B
46,707	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
9,045	98	Water Surface, HSG B
71,600	74	Weighted Average
46,707		Pervious Area
24,893		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.2	50	0.0800	0.26		**Sheet Flow, SHEET GRASS** Grass: Short n= 0.150 P2= 3.20"
2.2	320	0.1218	2.44		**Shallow Concentrated Flow, SHALLOW GRASS** Short Grass Pasture Kv= 7.0 fps
0.0					**Direct Entry, DIRECT**
5.4	370	Total			

Subcatchment P-3B: P-3B



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

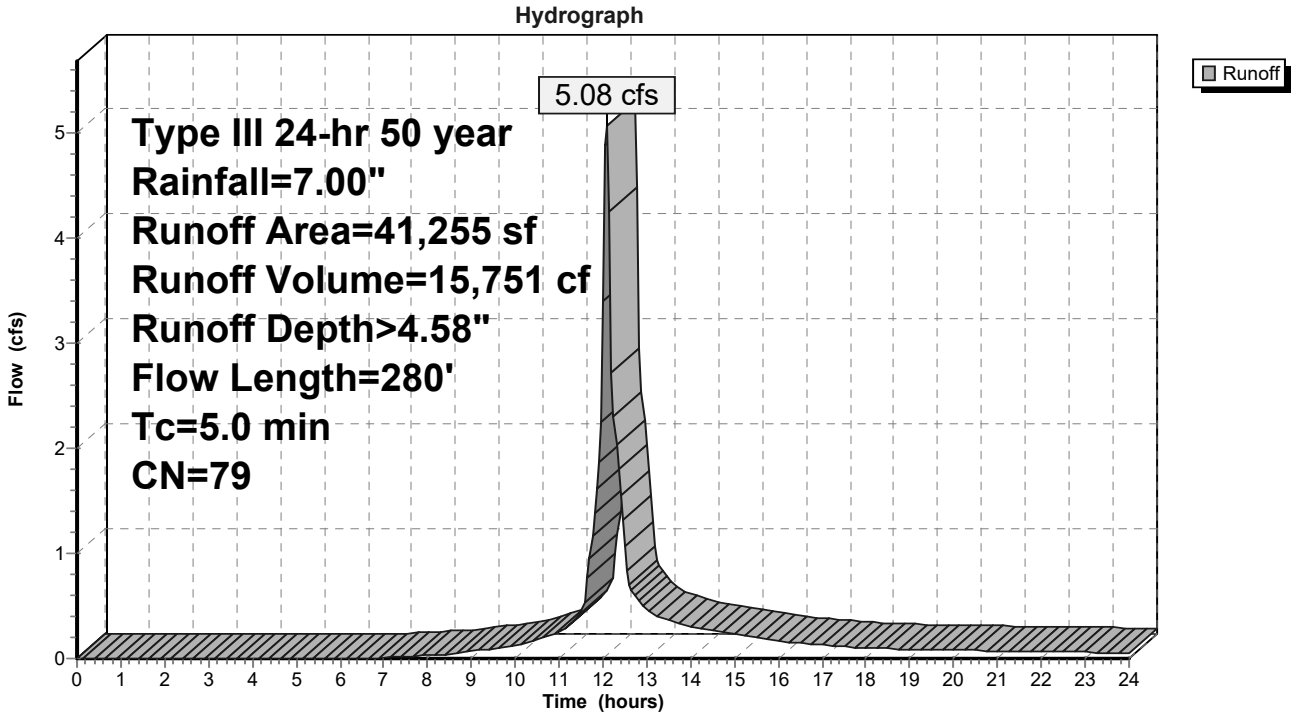
Runoff = 5.08 cfs @ 12.07 hrs, Volume= 15,751 cf, Depth> 4.58"

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
21,208	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
41,255	79	Weighted Average
21,208		Pervious Area
20,047		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	50	0.0600	1.86		**Sheet Flow, SHEET GRASS** Smooth surfaces n= 0.011 P2= 3.20"
1.2	90	0.0310	1.23		**Shallow Concentrated Flow, SHALLOW GRASS** Short Grass Pasture Kv= 7.0 fps
1.5	140	0.0060	1.57		**Shallow Concentrated Flow, SHALLOW PAVEMENT** Paved Kv= 20.3 fps
1.9					**Direct Entry, DIRECT**
5.0	280	Total			

Subcatchment P-3C: P-3C



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

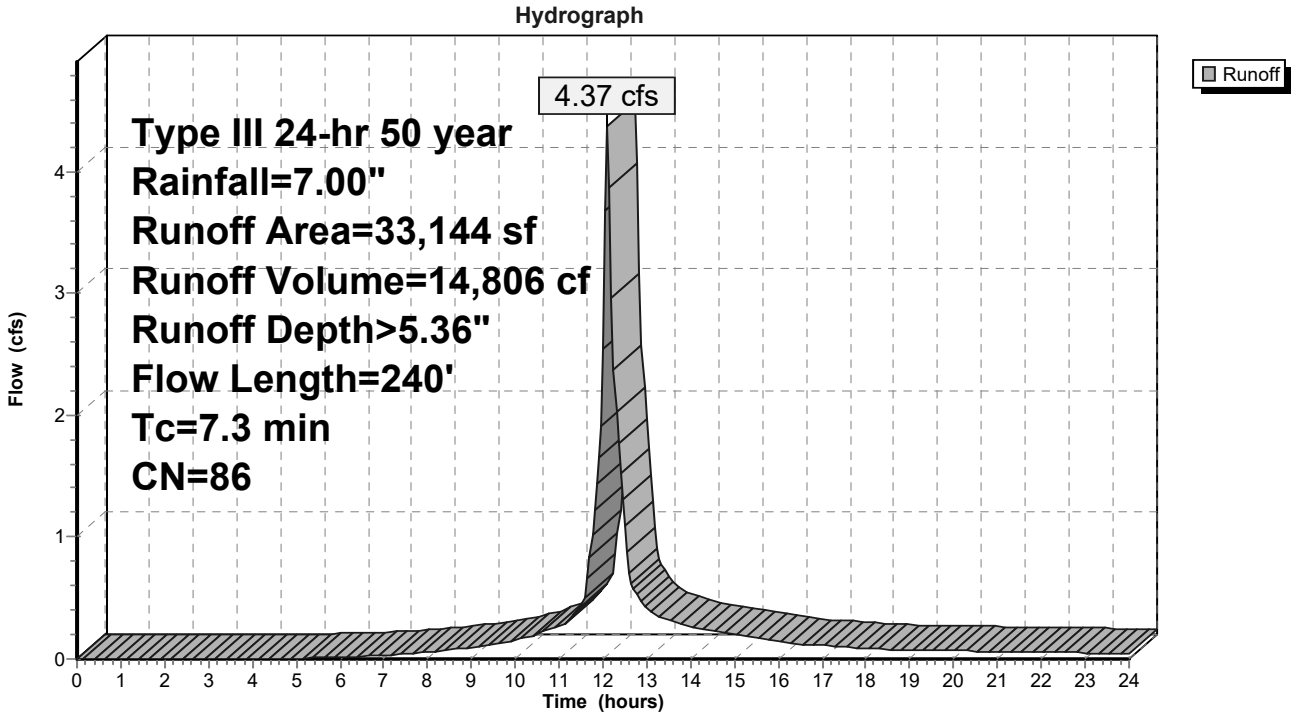
Runoff = 4.37 cfs @ 12.10 hrs, Volume= 14,806 cf, Depth> 5.36"

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
8,800	98	Roofs, HSG B
13,806	98	Paved roads w/curbs & sewers, HSG B
10,538	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
33,144	86	Weighted Average
10,538		Pervious Area
22,606		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0200	0.15		**Sheet Flow, SHEET GR** Grass: Short n= 0.150 P2= 3.20"
1.0	90	0.0500	1.57		**Shallow Concentrated Flow, SHALLOW GRASS** Short Grass Pasture Kv= 7.0 fps
0.7	100	0.0150	2.49		**Shallow Concentrated Flow, SHALLOW PAVE** Paved Kv= 20.3 fps
7.3	240	Total			

Subcatchment P-3D: P-3D



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

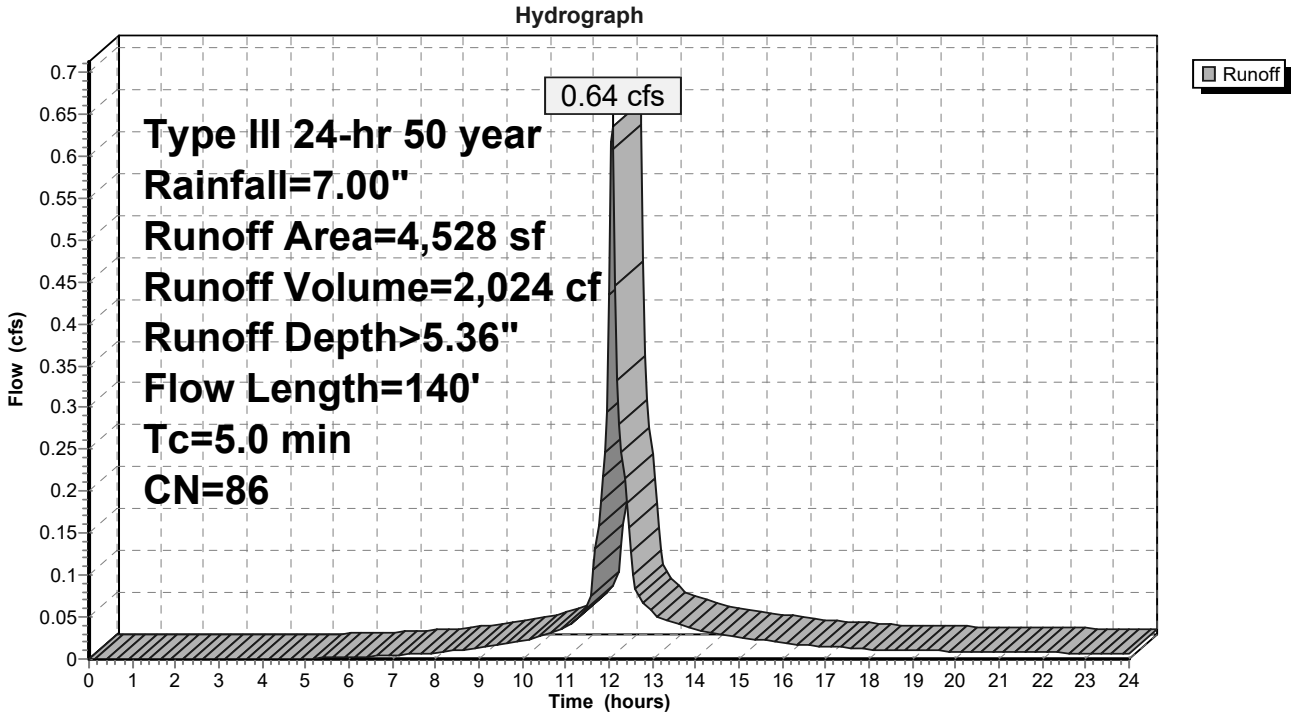
Runoff = 0.64 cfs @ 12.07 hrs, Volume= 2,024 cf, Depth> 5.36"

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
1,424	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
4,528	86	Weighted Average
1,424		Pervious Area
3,104		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.20		**Sheet Flow, SHEET PAVEMENT** Smooth surfaces n= 0.011 P2= 3.20"
0.5	90	0.0220	3.01		**Shallow Concentrated Flow, SHALLOW PAVEMENT** Paved Kv= 20.3 fps
3.8					**Direct Entry, DIRECT**
5.0	140	Total			

Subcatchment P-3E: P-3F



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

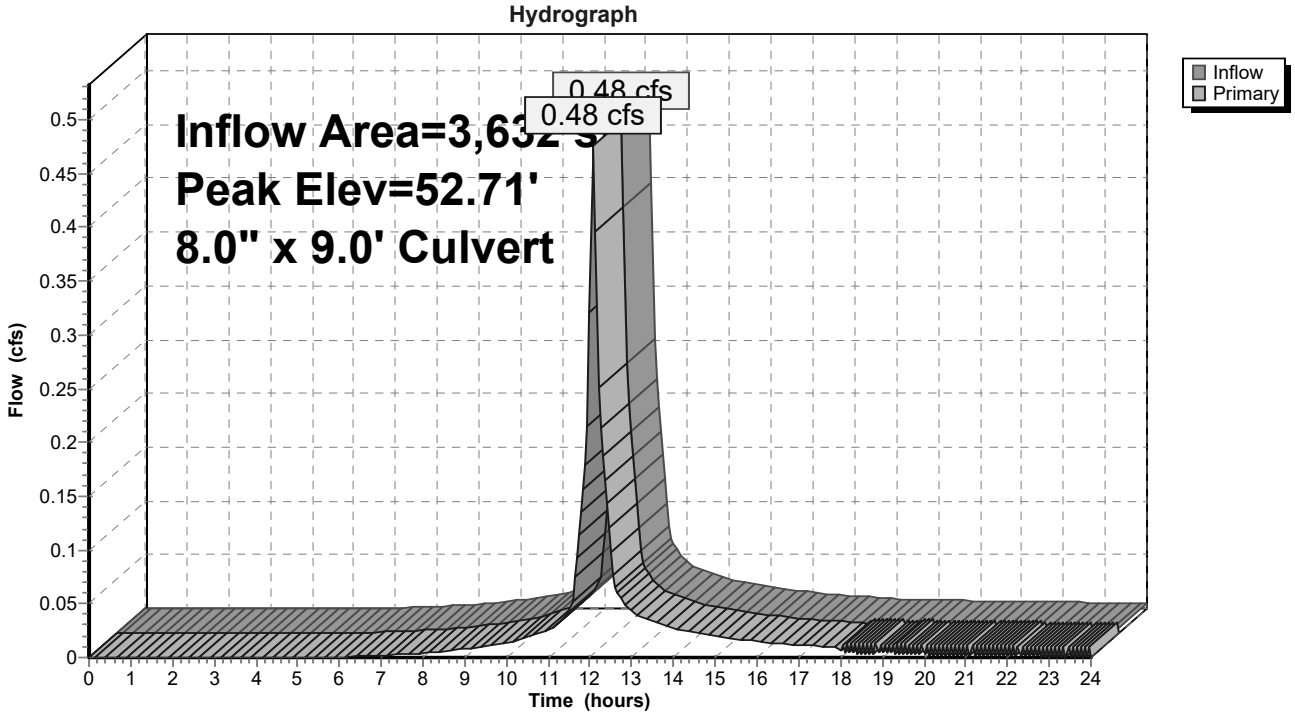
Inflow Area = 3,632 sf, 56.17% Impervious, Inflow Depth > 4.91" for 50 year event
Inflow = 0.48 cfs @ 12.07 hrs, Volume= 1,487 cf
Outflow = 0.48 cfs @ 12.07 hrs, Volume= 1,486 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.48 cfs @ 12.07 hrs, Volume= 1,486 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 52.71' @ 13.02 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=0.00 cfs @ 12.07 hrs HW=51.44' TW=51.62' (Dynamic Tailwater)
└**1=Culvert** (Controls 0.00 cfs)

Pond CB1: CB1



Summary for Pond CB2: CB2

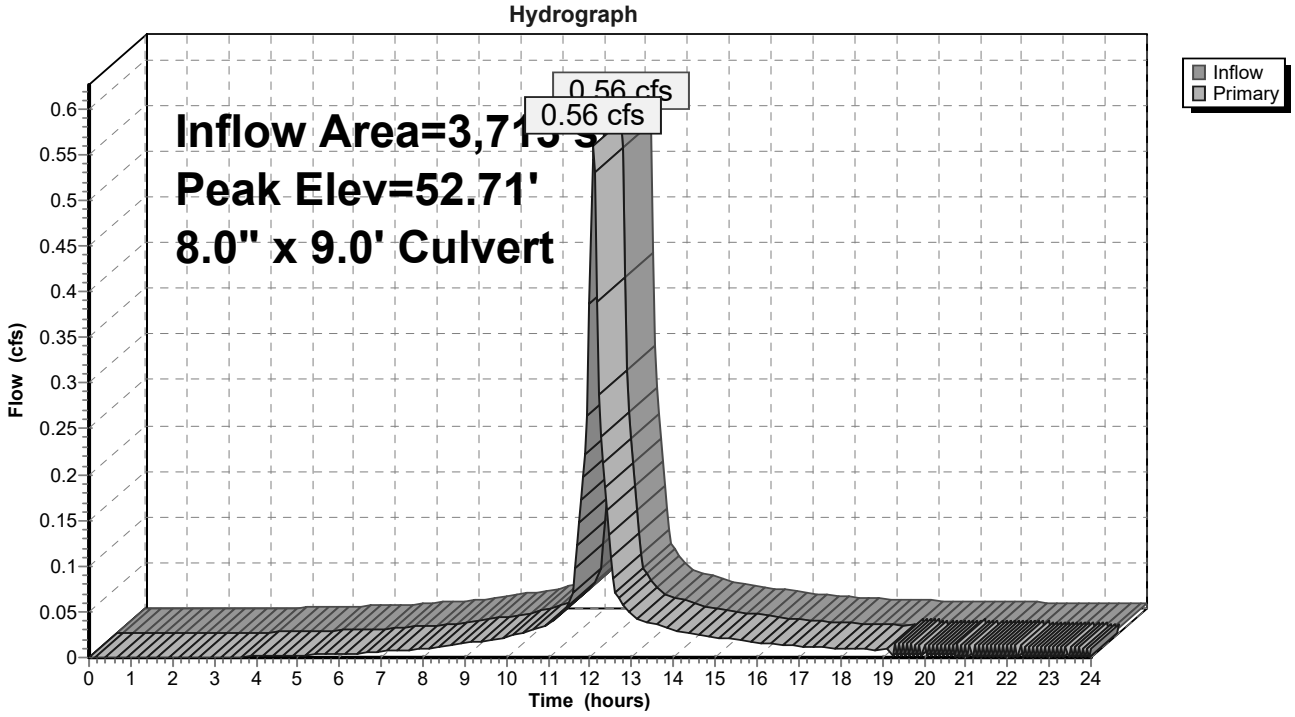
Inflow Area = 3,713 sf, 81.12% Impervious, Inflow Depth > 5.94" for 50 year event
Inflow = 0.56 cfs @ 12.07 hrs, Volume= 1,837 cf
Outflow = 0.56 cfs @ 12.07 hrs, Volume= 1,837 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.56 cfs @ 12.07 hrs, Volume= 1,837 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 52.71' @ 13.02 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=0.00 cfs @ 12.07 hrs HW=51.45' TW=51.61' (Dynamic Tailwater)
└**1=Culvert** (Controls 0.00 cfs)

Pond CB2: CB2



Summary for Pond CB3: CB3

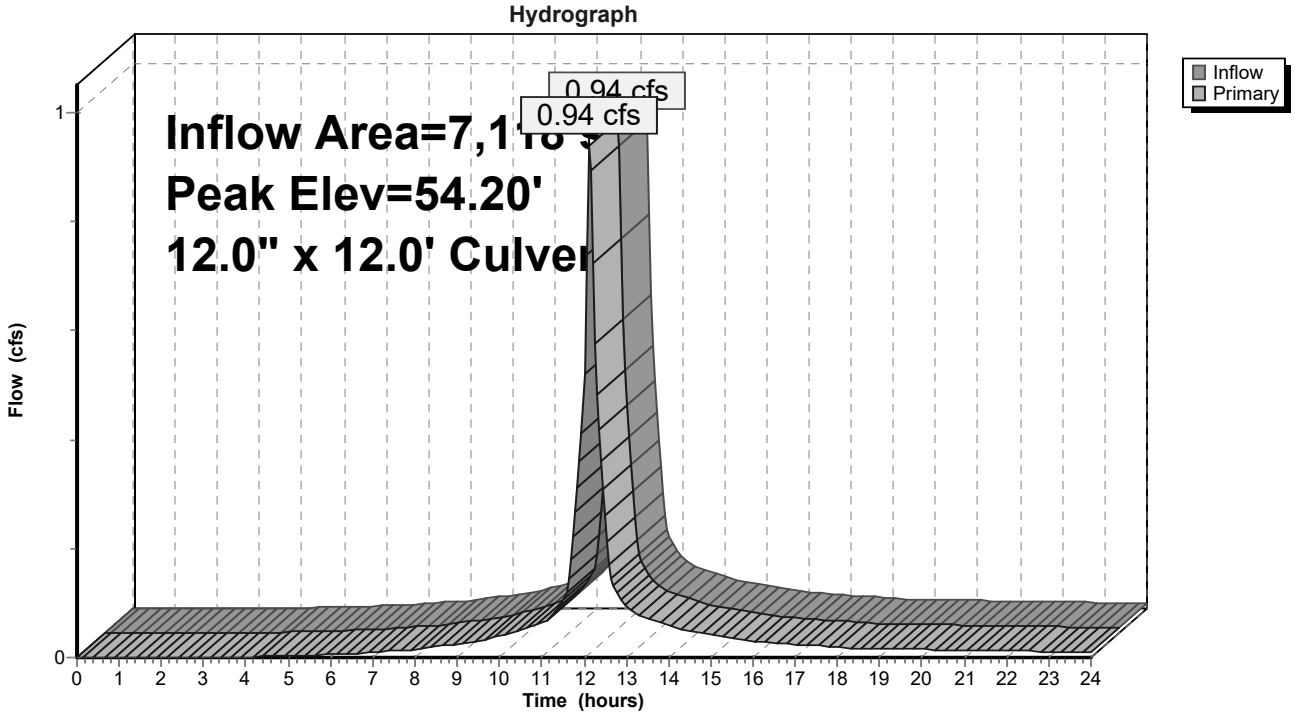
Inflow Area = 7,118 sf, 74.36% Impervious, Inflow Depth > 5.70" for 50 year event
Inflow = 0.94 cfs @ 12.12 hrs, Volume= 3,382 cf
Outflow = 0.94 cfs @ 12.12 hrs, Volume= 3,382 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.94 cfs @ 12.12 hrs, Volume= 3,382 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 54.20' @ 12.16 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 @ 12.12 hrs HW=54.00' TW=54.09' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.00 cfs)

Pond CB3: CB3



Summary for Pond CB4: CB4

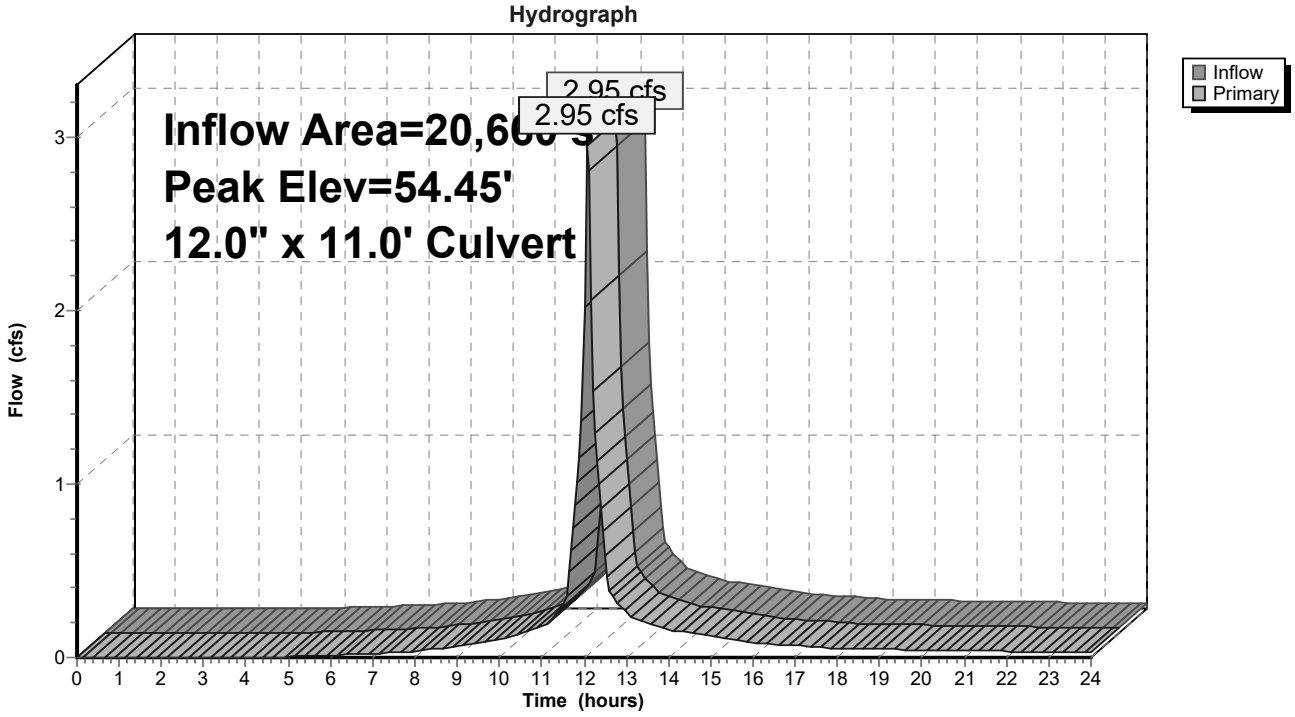
Inflow Area = 20,660 sf, 69.29% Impervious, Inflow Depth > 5.48" for 50 year event
Inflow = 2.95 cfs @ 12.07 hrs, Volume= 9,428 cf
Outflow = 2.95 cfs @ 12.07 hrs, Volume= 9,428 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.95 cfs @ 12.07 hrs, Volume= 9,428 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 54.45' @ 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=1.32 cfs @ 12.07 hrs HW=54.09' TW=53.97' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 1.32 cfs @ 1.69 fps)

Pond CB4: CB4



Summary for Pond CB5: CB5

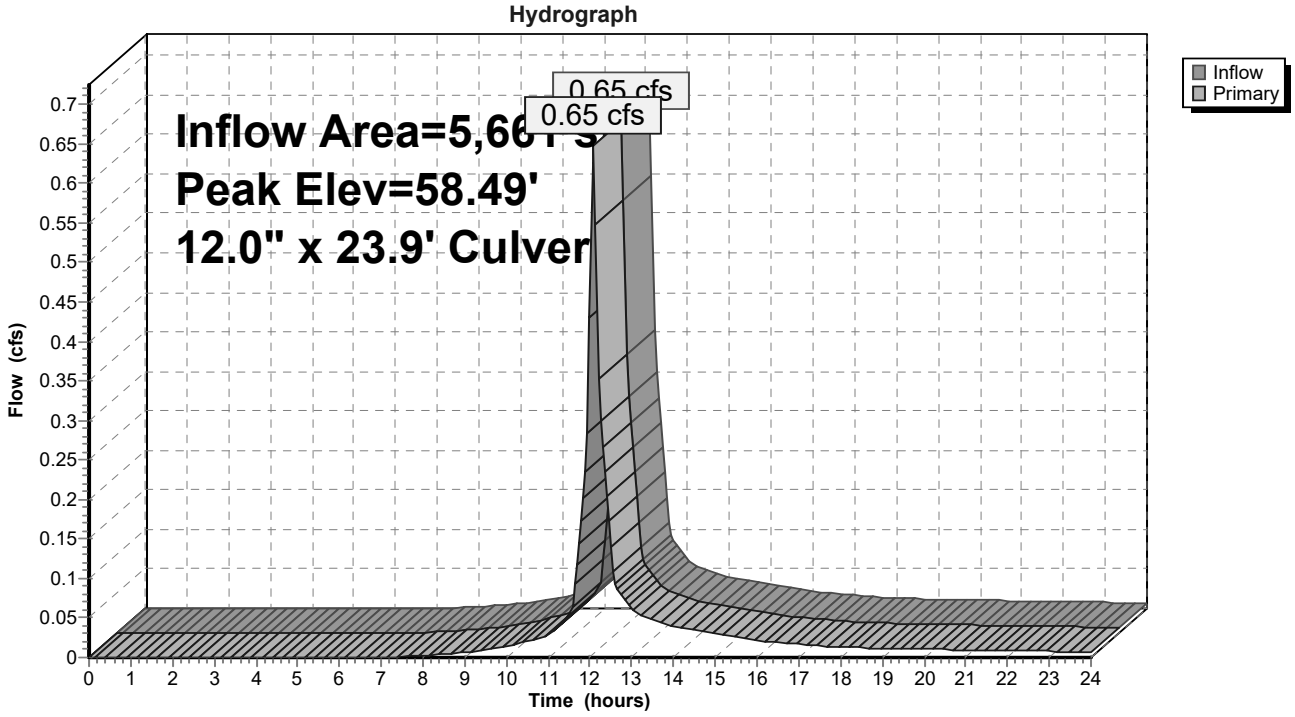
Inflow Area = 5,661 sf, 39.83% Impervious, Inflow Depth > 4.25" for 50 year event
Inflow = 0.65 cfs @ 12.08 hrs, Volume= 2,007 cf
Outflow = 0.65 cfs @ 12.08 hrs, Volume= 2,007 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.65 cfs @ 12.08 hrs, Volume= 2,007 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 58.49' @ 12.10 hrs
Flood Elev= 65.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	58.00'	**12.0" x 23.9' long Culvert** RCP, groove end projecting, Ke= 0.200 Outlet Invert= 57.76' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.55 cfs @ 12.08 hrs HW=58.47' TW=58.29' (Dynamic Tailwater)
└**1=Culvert** (Outlet Controls 0.55 cfs @ 2.26 fps)

Pond CB5: CB5



Summary for Pond CB6: CB6

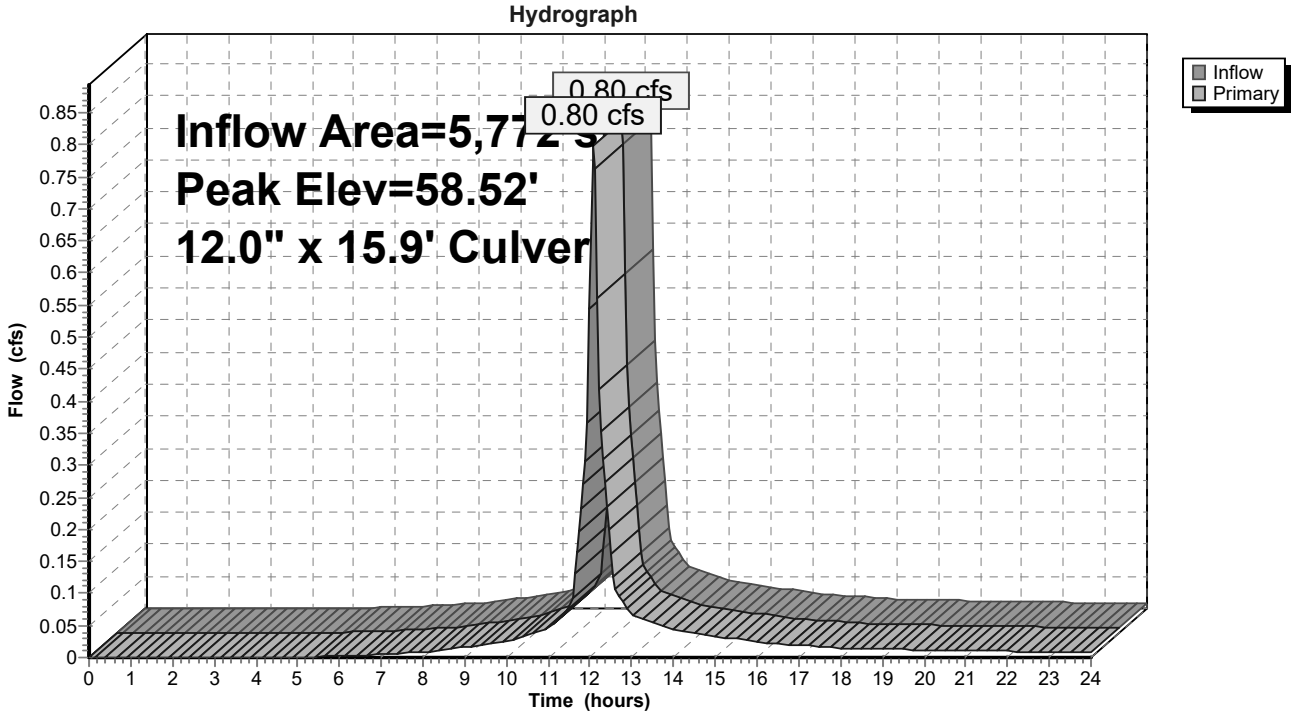
Inflow Area = 5,772 sf, 64.26% Impervious, Inflow Depth > 5.25" for 50 year event
Inflow = 0.80 cfs @ 12.07 hrs, Volume= 2,525 cf
Outflow = 0.80 cfs @ 12.07 hrs, Volume= 2,525 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.80 cfs @ 12.07 hrs, Volume= 2,525 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 58.52' @ 12.09 hrs
Flood Elev= 65.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	58.00'	**12.0" x 15.9' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 57.84' S= 0.0101 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.71 cfs @ 12.07 hrs HW=58.51' TW=58.29' (Dynamic Tailwater)
└**1=Culvert** (Outlet Controls 0.71 cfs @ 2.58 fps)

Pond CB6: CB6



Summary for Pond CB7: CB7

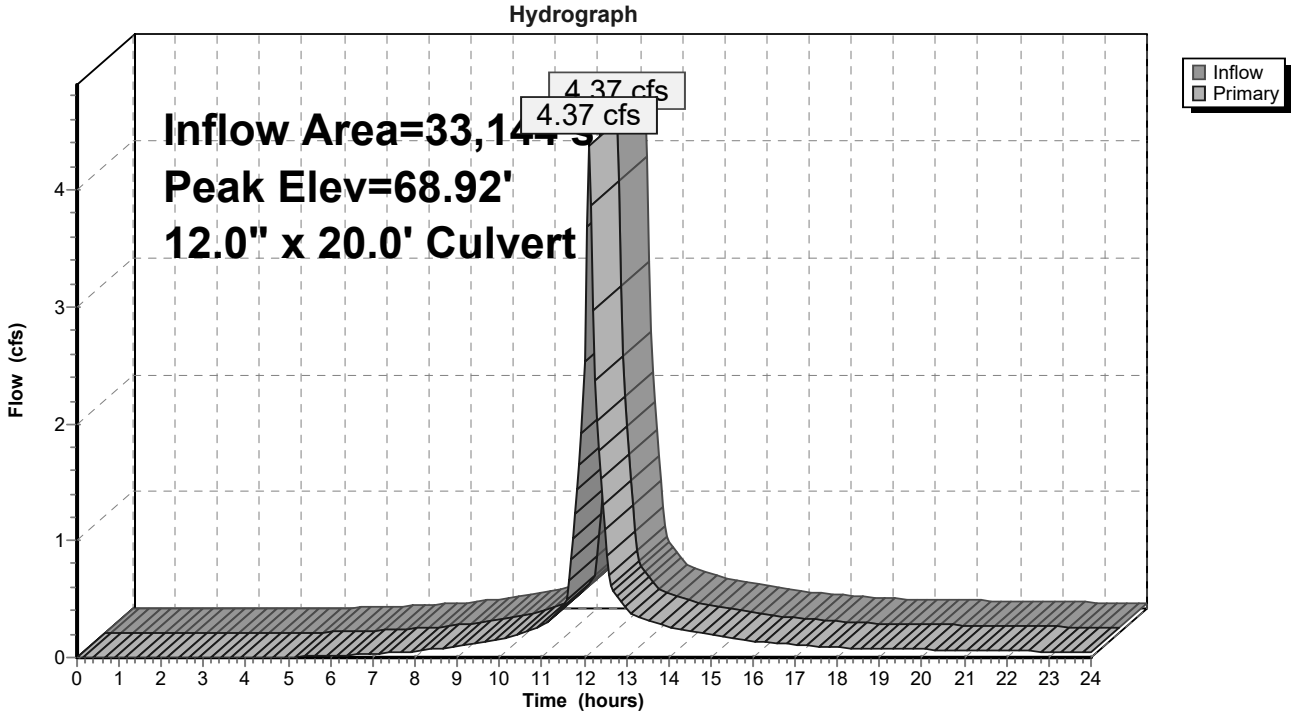
Inflow Area = 33,144 sf, 68.21% Impervious, Inflow Depth > 5.36" for 50 year event
Inflow = 4.37 cfs @ 12.10 hrs, Volume= 14,806 cf
Outflow = 4.37 cfs @ 12.10 hrs, Volume= 14,806 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.37 cfs @ 12.10 hrs, Volume= 14,806 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 68.92' @ 12.17 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=3.06 cfs @ 12.10 hrs HW=68.53' TW=67.87' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 3.06 cfs @ 3.90 fps)

Pond CB7: CB7



Summary for Pond CB8: CB8

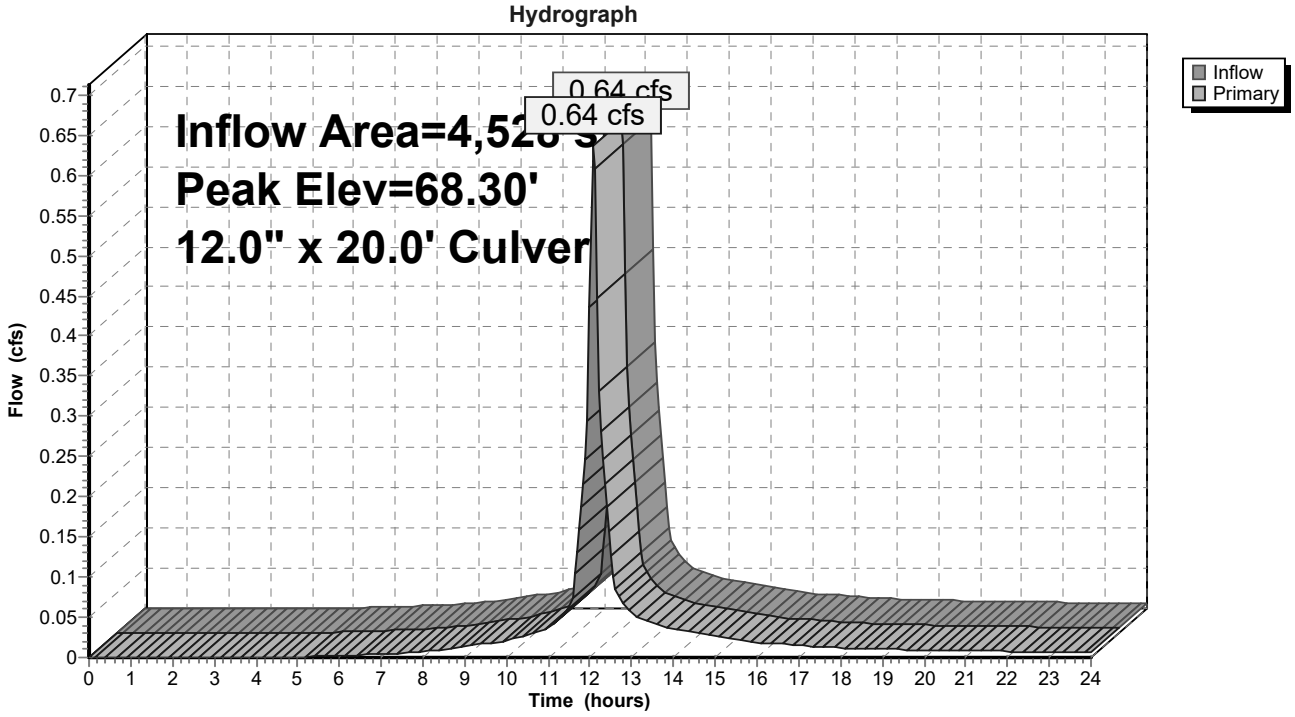
Inflow Area = 4,528 sf, 68.55% Impervious, Inflow Depth > 5.36" for 50 year event
Inflow = 0.64 cfs @ 12.07 hrs, Volume= 2,024 cf
Outflow = 0.64 cfs @ 12.07 hrs, Volume= 2,024 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.64 cfs @ 12.07 hrs, Volume= 2,024 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 68.30' @ 12.37 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=67.01' TW=67.47' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.00 cfs)

Pond CB8: CB8



Summary for Pond CB9: CB9

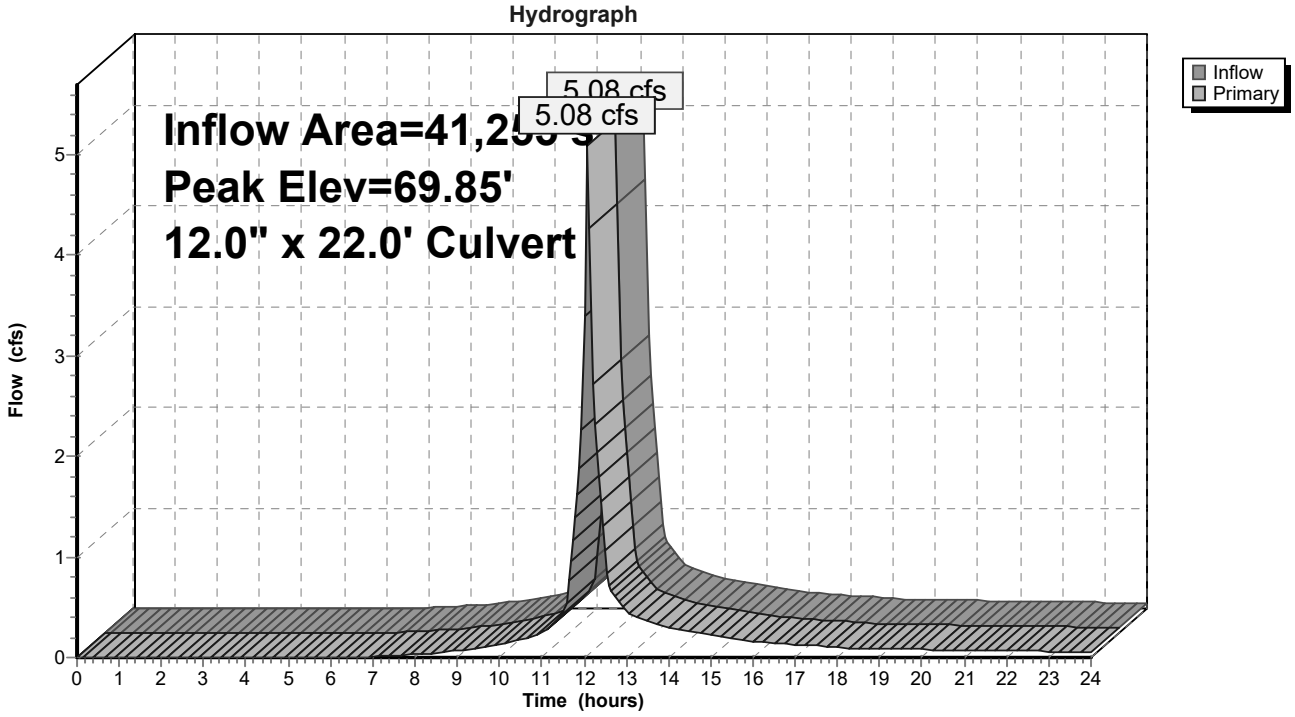
Inflow Area = 41,255 sf, 48.59% Impervious, Inflow Depth > 4.58" for 50 year event
Inflow = 5.08 cfs @ 12.07 hrs, Volume= 15,751 cf
Outflow = 5.08 cfs @ 12.07 hrs, Volume= 15,751 cf, Atten= 0%, Lag= 0.0 min
Primary = 5.08 cfs @ 12.07 hrs, Volume= 15,751 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 69.85' @ 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=3.64 cfs @ 12.07 hrs HW=69.25' TW=68.32' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 3.64 cfs @ 4.64 fps)

Pond CB9: CB9



Summary for Pond DMH 10: DMH9

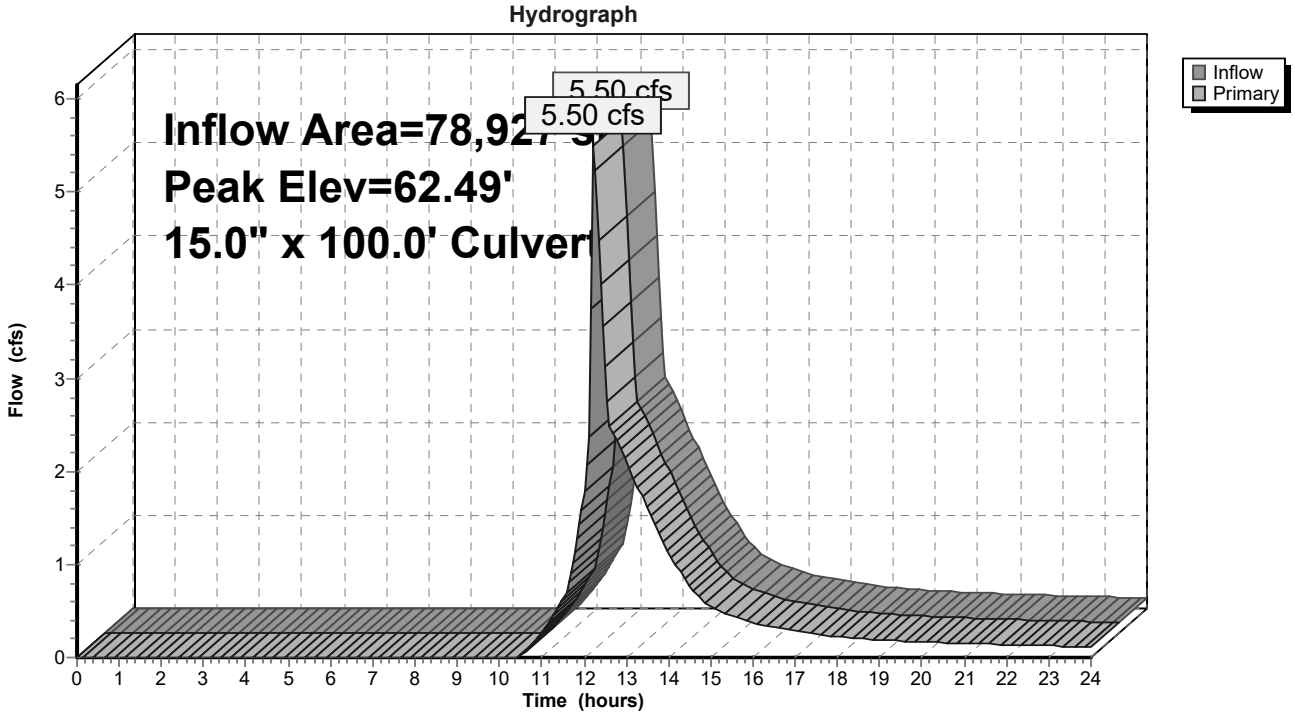
Inflow Area =	78,927 sf, 57.97% Impervious, Inflow Depth > 4.55" for 50 year event				
Inflow =	5.50 cfs @	12.23 hrs, Volume=	29,925 cf		
Outflow =	5.50 cfs @	12.23 hrs, Volume=	29,925 cf, Atten= 0%, Lag= 0.0 min		
Primary =	5.50 cfs @	12.23 hrs, Volume=	29,925 cf		

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 62.49' @ 12.23 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=5.43 cfs @ 12.23 hrs HW=62.47' TW=56.94' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 5.43 cfs @ 4.43 fps)

Pond DMH 10: DMH9



Summary for Pond DMH 11: DMH 10

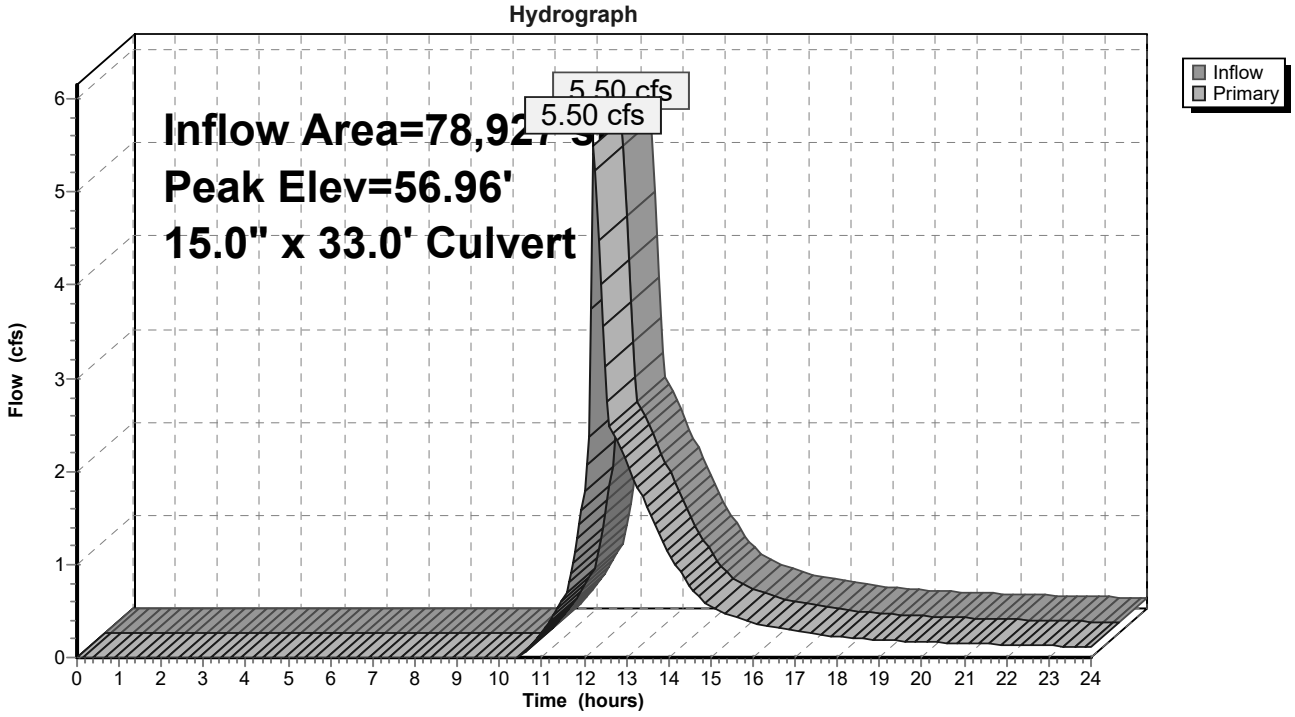
Inflow Area = 78,927 sf, 57.97% Impervious, Inflow Depth > 4.55" for 50 year event
Inflow = 5.50 cfs @ 12.23 hrs, Volume= 29,925 cf
Outflow = 5.50 cfs @ 12.23 hrs, Volume= 29,925 cf, Atten= 0%, Lag= 0.0 min
Primary = 5.50 cfs @ 12.23 hrs, Volume= 29,925 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 56.96' @ 12.23 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=5.43 cfs @ 12.23 hrs HW=56.94' TW=53.05' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 5.43 cfs @ 4.43 fps)

Pond DMH 11: DMH 10



Summary for Pond DMH 6: DMH 6

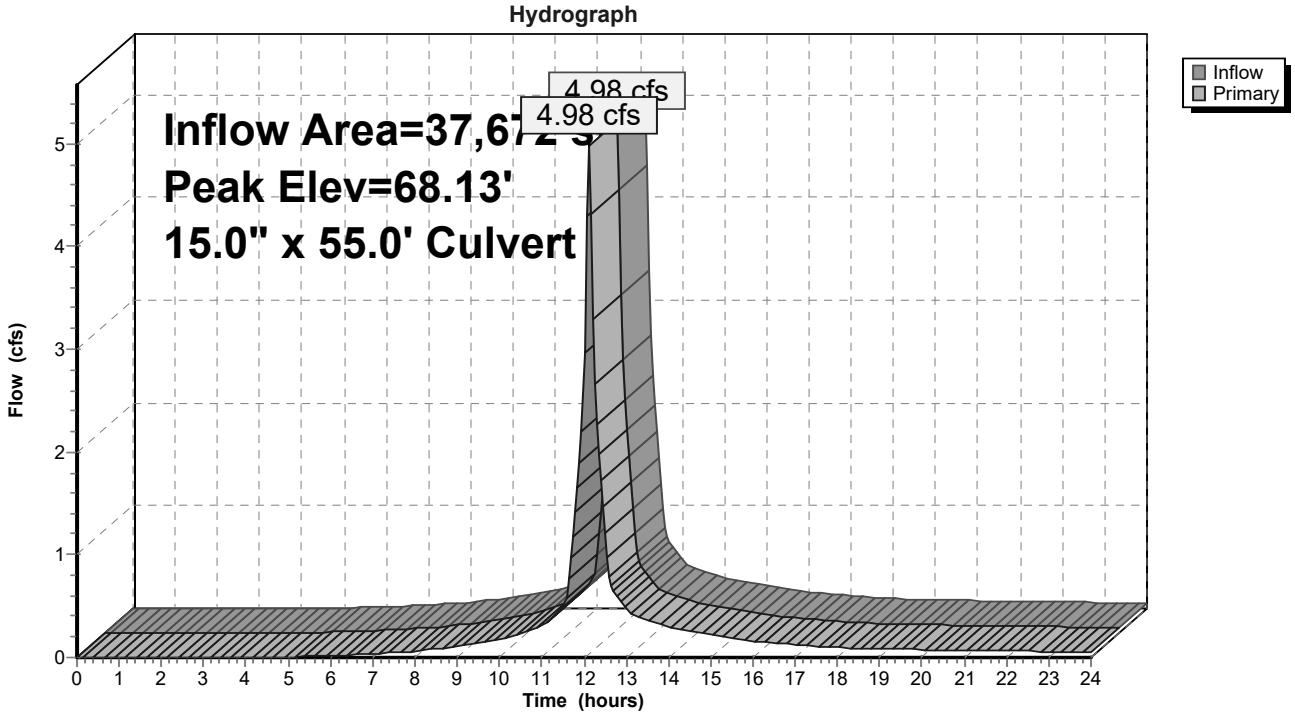
Inflow Area = 37,672 sf, 68.25% Impervious, Inflow Depth > 5.36" for 50 year event
Inflow = 4.98 cfs @ 12.10 hrs, Volume= 16,830 cf
Outflow = 4.98 cfs @ 12.10 hrs, Volume= 16,830 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.98 cfs @ 12.10 hrs, Volume= 16,830 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 68.13' @ 12.29 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=2.77 cfs @ 12.10 hrs HW=67.50' TW=67.28' (Dynamic Tailwater)
└**1=Culvert** (Outlet Controls 2.77 cfs @ 2.26 fps)

Pond DMH 6: DMH 6



Summary for Pond DMH2: DMH2

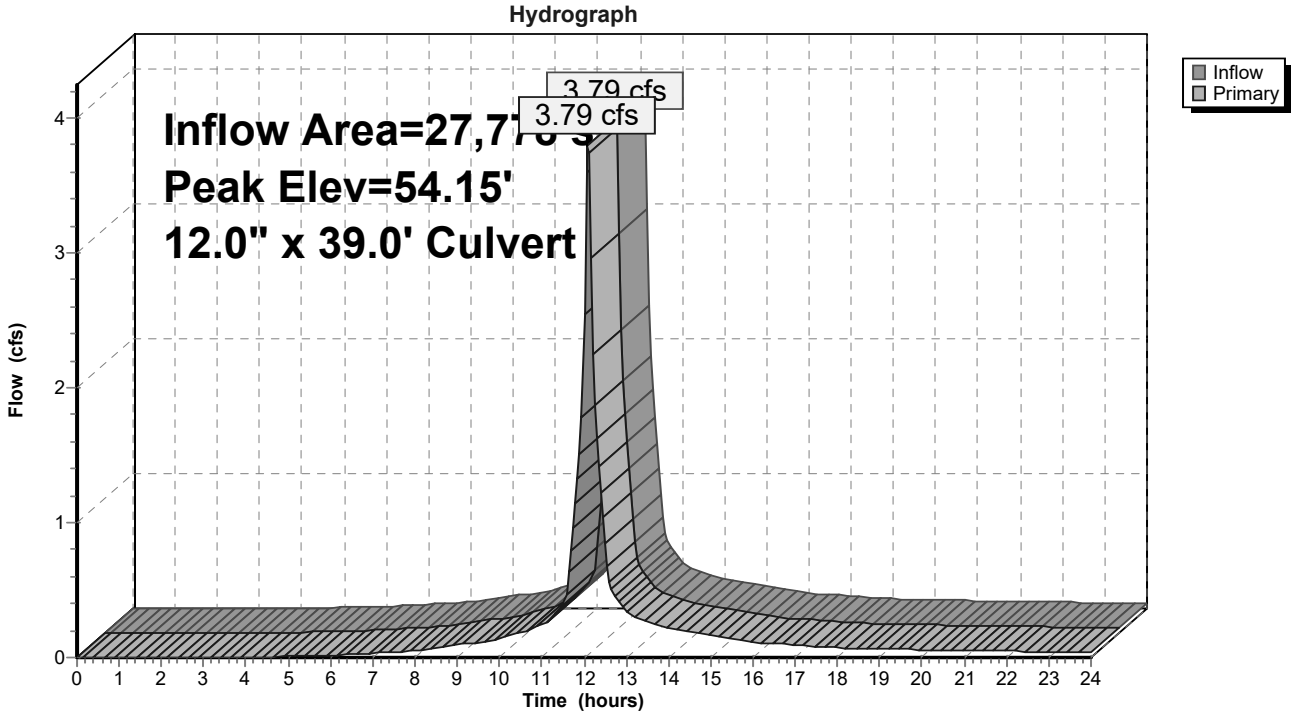
Inflow Area = 27,778 sf, 70.59% Impervious, Inflow Depth > 5.53" for 50 year event
Inflow = 3.79 cfs @ 12.08 hrs, Volume= 12,810 cf
Outflow = 3.79 cfs @ 12.08 hrs, Volume= 12,810 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.79 cfs @ 12.08 hrs, Volume= 12,810 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 54.15' @ 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=3.18 cfs @ 12.08 hrs HW=54.03' TW=53.32' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 3.18 cfs @ 4.05 fps)

Pond DMH2: DMH2



Summary for Pond DMH3: DMH3

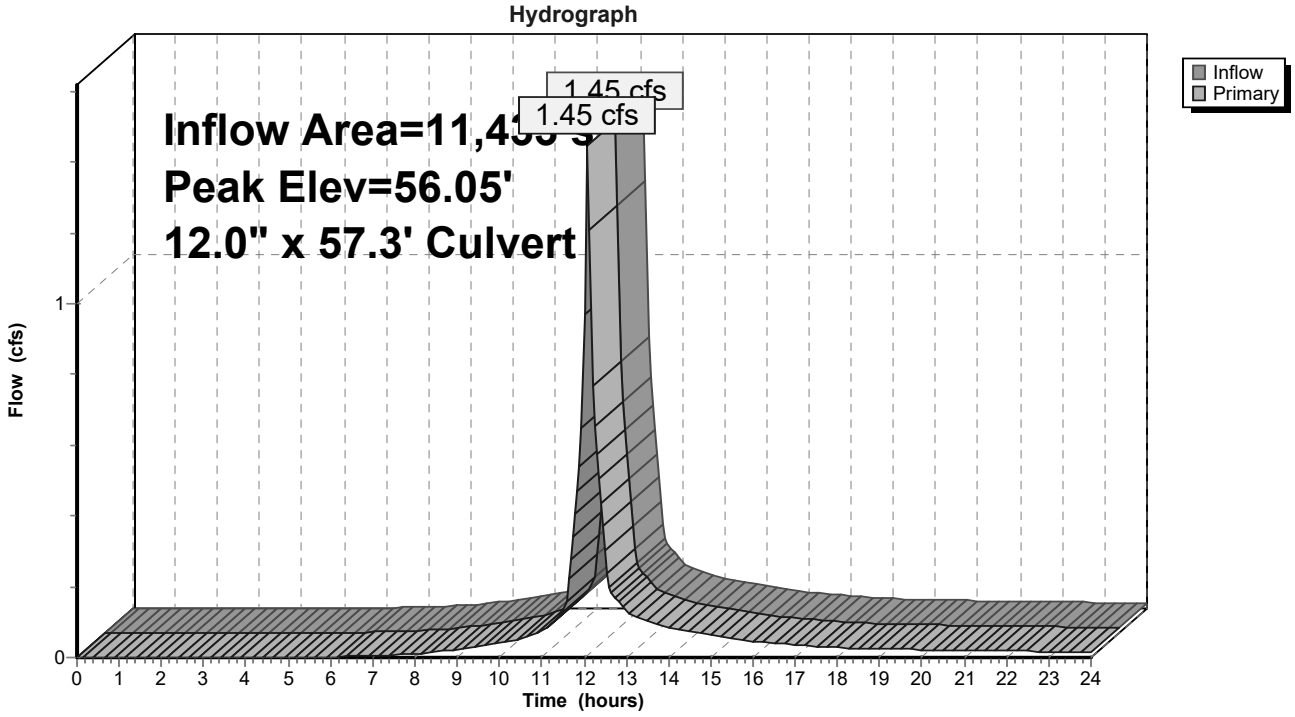
Inflow Area = 11,433 sf, 52.16% Impervious, Inflow Depth > 4.76" for 50 year event
Inflow = 1.45 cfs @ 12.07 hrs, Volume= 4,532 cf
Outflow = 1.45 cfs @ 12.07 hrs, Volume= 4,532 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.45 cfs @ 12.07 hrs, Volume= 4,532 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 56.05' @ 12.07 hrs
Flood Elev= 62.48'

Device	Routing	Invert	Outlet Devices
#1	Primary	55.29'	**12.0" x 57.3' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 55.00' S= 0.0051 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=1.39 cfs @ 12.07 hrs HW=56.03' TW=53.28' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 1.39 cfs @ 3.11 fps)

Pond DMH3: DMH3



Summary for Pond DMH4: DMH4

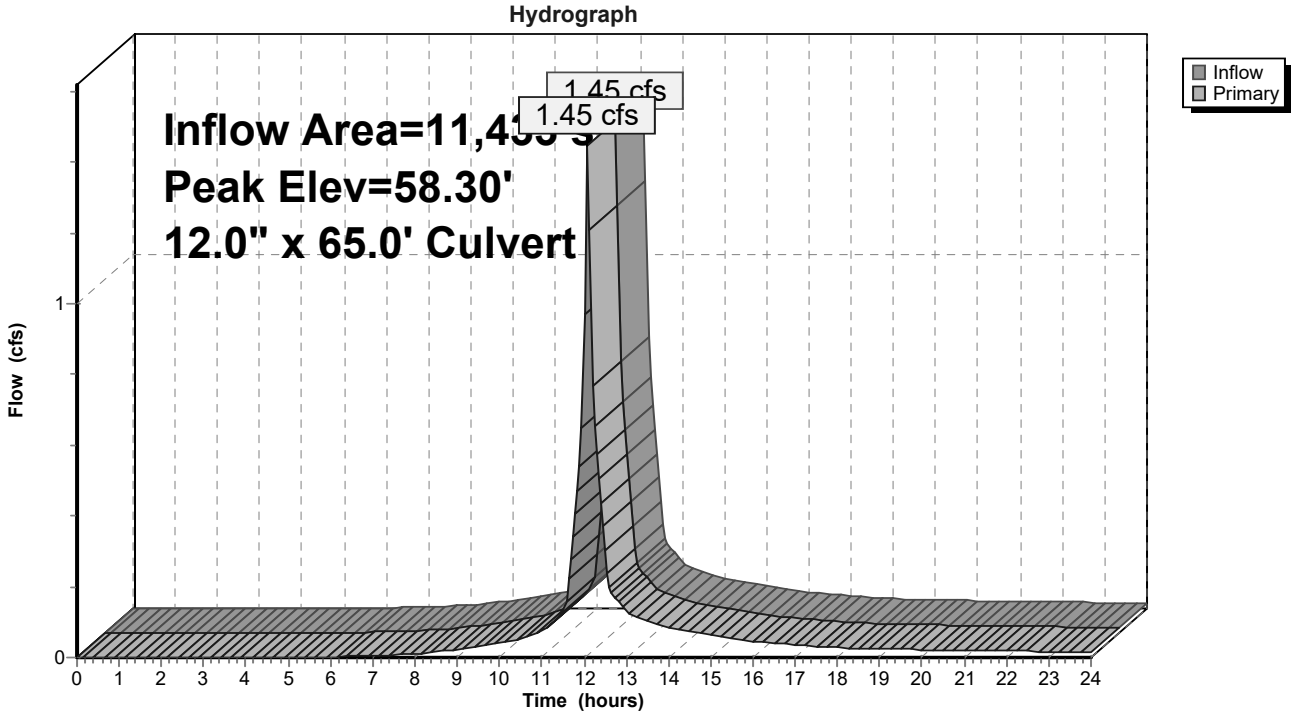
Inflow Area = 11,433 sf, 52.16% Impervious, Inflow Depth > 4.76" for 50 year event
Inflow = 1.45 cfs @ 12.07 hrs, Volume= 4,532 cf
Outflow = 1.45 cfs @ 12.07 hrs, Volume= 4,532 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.45 cfs @ 12.07 hrs, Volume= 4,532 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 58.30' @ 12.07 hrs
Flood Elev= 64.52'

Device	Routing	Invert	Outlet Devices
#1	Primary	57.66'	**12.0" x 65.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 55.39' S= 0.0349 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=1.39 cfs @ 12.07 hrs HW=58.29' TW=56.03' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 1.39 cfs @ 2.69 fps)

Pond DMH4: DMH4



Summary for Pond DMH5: DMH 5

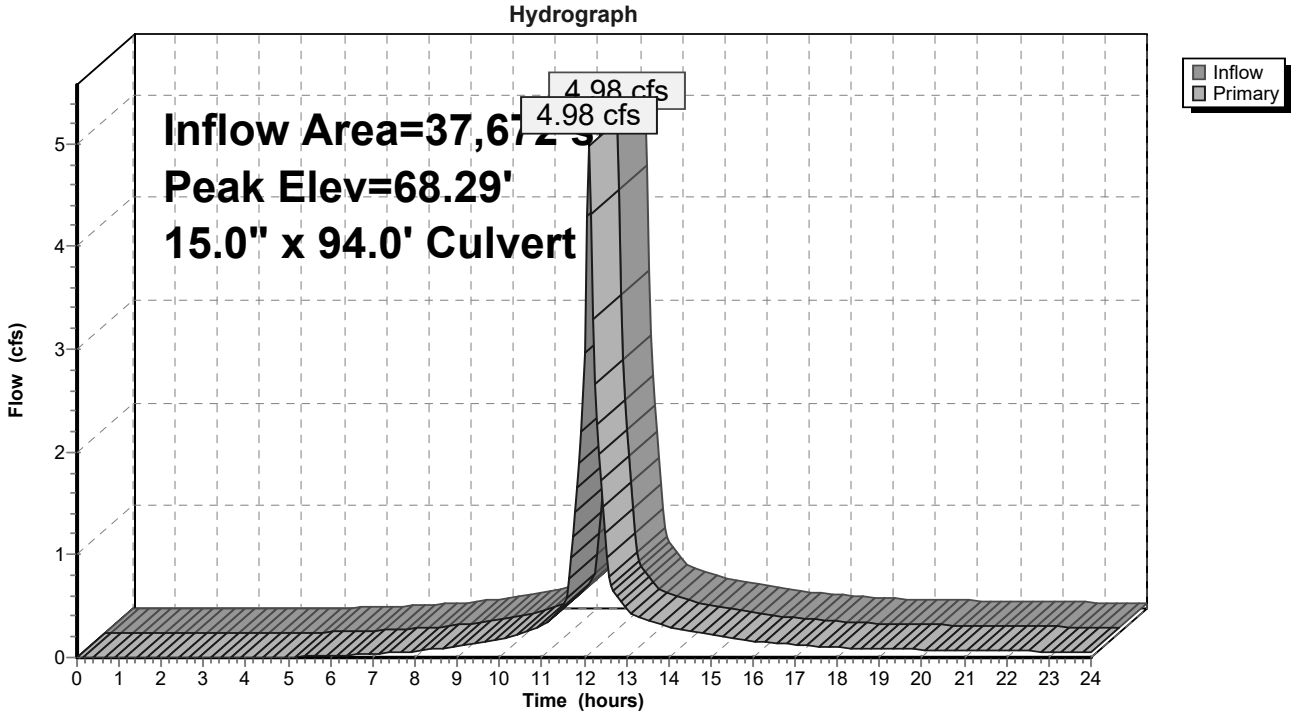
Inflow Area = 37,672 sf, 68.25% Impervious, Inflow Depth > 5.36" for 50 year event
Inflow = 4.98 cfs @ 12.10 hrs, Volume= 16,830 cf
Outflow = 4.98 cfs @ 12.10 hrs, Volume= 16,830 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.98 cfs @ 12.10 hrs, Volume= 16,830 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 68.29' @ 12.32 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=3.04 cfs @ 12.10 hrs HW=67.85' TW=67.50' (Dynamic Tailwater)
└**1=Culvert** (Outlet Controls 3.04 cfs @ 2.48 fps)

Pond DMH5: DMH 5



Summary for Pond DMH7: DMH7

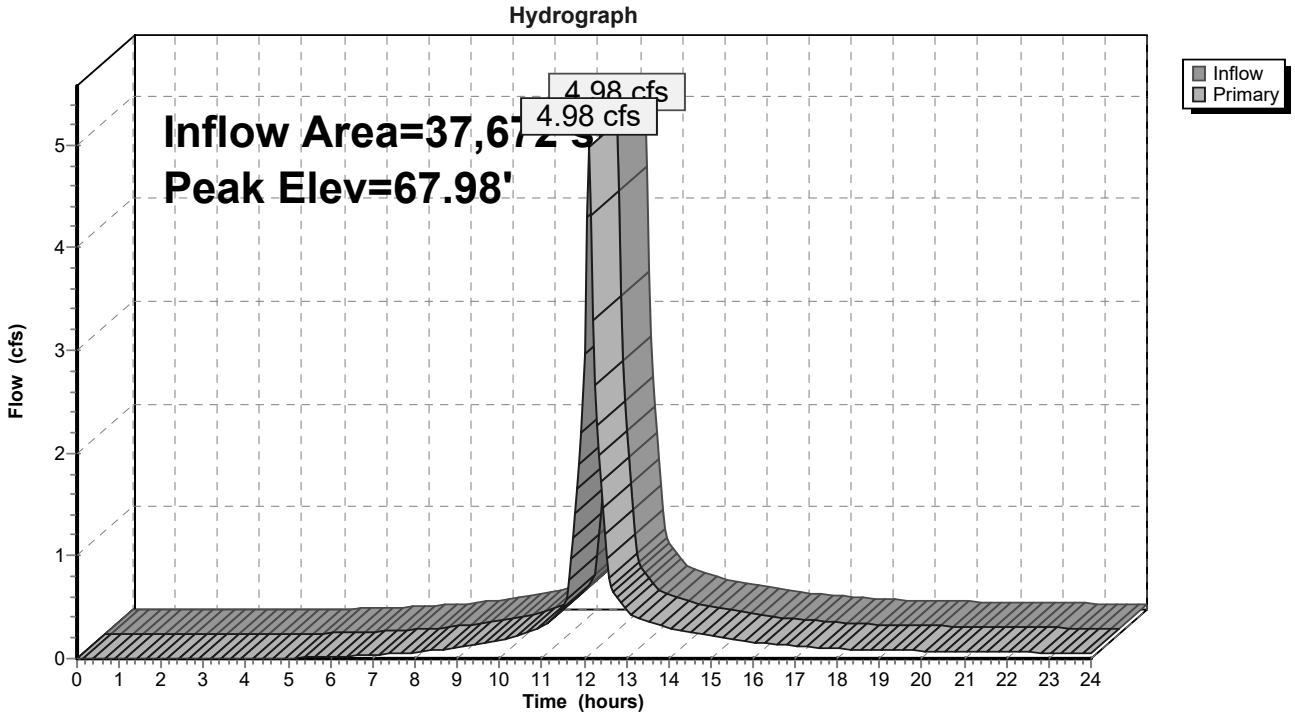
Inflow Area = 37,672 sf, 68.25% Impervious, Inflow Depth > 5.36" for 50 year event
Inflow = 4.98 cfs @ 12.10 hrs, Volume= 16,830 cf
Outflow = 4.98 cfs @ 12.10 hrs, Volume= 16,830 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.98 cfs @ 12.10 hrs, Volume= 16,830 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 67.98' @ 12.26 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 @ 12.10 hrs HW=67.28' TW=67.32' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.00 cfs)
└─**2=Culvert** (Controls 0.00 cfs)

Pond DMH7: DMH7



Summary for Pond DMH8: DMH8

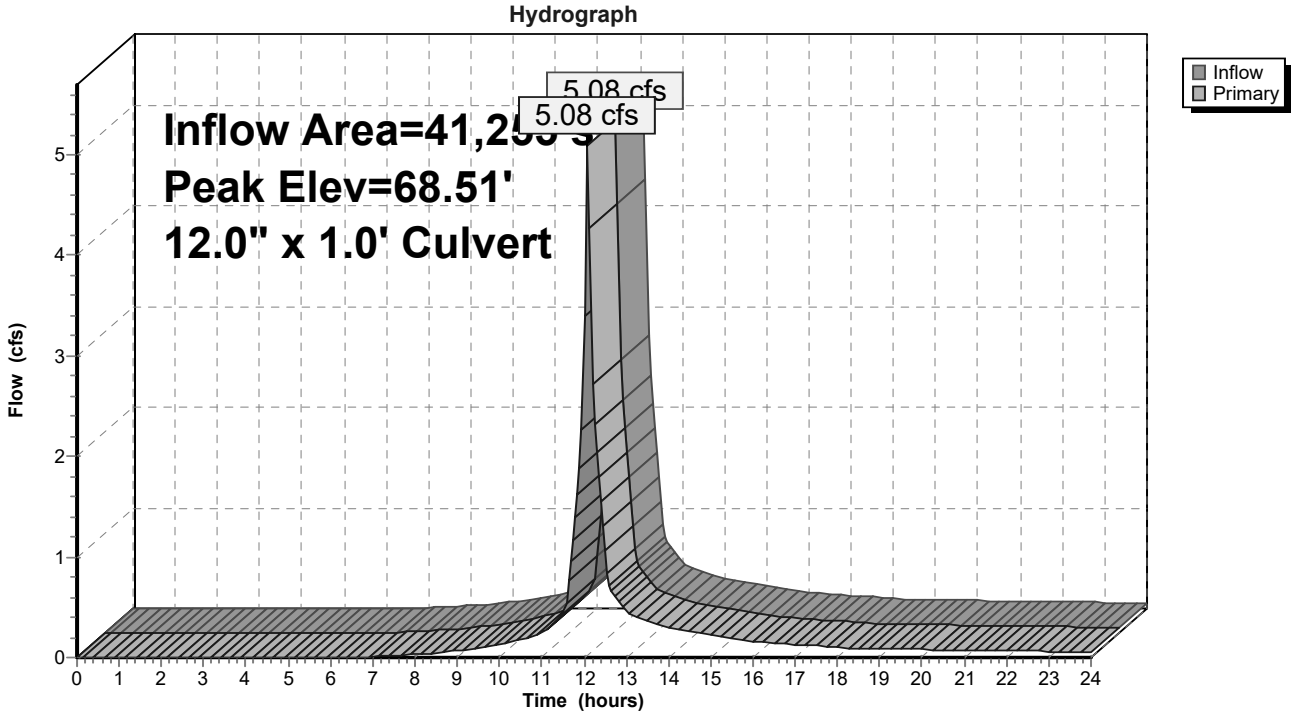
Inflow Area = 41,255 sf, 48.59% Impervious, Inflow Depth > 4.58" for 50 year event
Inflow = 5.08 cfs @ 12.07 hrs, Volume= 15,751 cf
Outflow = 5.08 cfs @ 12.07 hrs, Volume= 15,751 cf, Atten= 0%, Lag= 0.0 min
Primary = 5.08 cfs @ 12.07 hrs, Volume= 15,751 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 68.51' @ 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=4.22 cfs @ 12.07 hrs HW=68.32' TW=67.08' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 4.22 cfs @ 5.38 fps)

Pond DMH8: DMH8



Summary for Pond P1-1: P1-1

Inflow Area = 54,889 sf, 57.55% Impervious, Inflow Depth > 4.98" for 50 year event
Inflow = 6.98 cfs @ 12.08 hrs, Volume= 22,760 cf
Outflow = 2.88 cfs @ 12.31 hrs, Volume= 18,297 cf, Atten= 59%, Lag= 13.8 min
Primary = 2.88 cfs @ 12.31 hrs, Volume= 18,297 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 53.72' @ 12.31 hrs Surf.Area= 4,346 sf Storage= 8,934 cf
Flood Elev= 55.50' Surf.Area= 5,973 sf Storage= 18,004 cf

Plug-Flow detention time= 156.5 min calculated for 18,259 cf (80% of inflow)
Center-of-Mass det. time= 82.4 min (880.3 - 797.9)

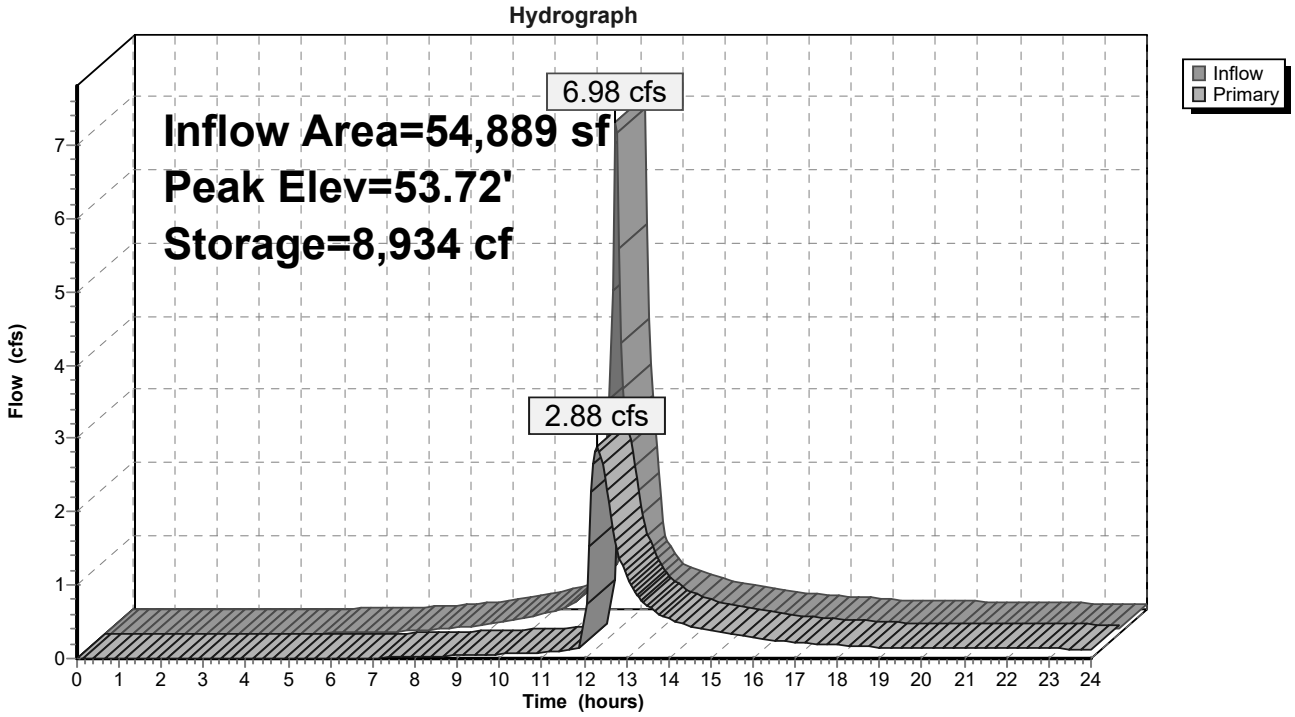
Volume	Invert	Avail.Storage	Storage Description
#1	51.00'	18,004 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

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=2.88 cfs @ 12.31 hrs HW=53.72' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 2.88 cfs of 5.19 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.17 cfs @ 7.82 fps)
  ├─**3=Orifice/Grate** (Orifice Controls 1.96 cfs @ 3.59 fps)
  ├─**4=Orifice/Grate** (Orifice Controls 0.75 cfs @ 2.34 fps)
  └─**5=Orifice/Grate** (Controls 0.00 cfs)

Pond P1-1: P1-1


Hydrograph
Inflow
Primary
6.98 cfs
2.88 cfs
Inflow Area=54,889 sf
Peak Elev=53.72'
Storage=8,934 cf
Flow (cfs)
Time (hours)

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

Inflow Area = 47,228 sf, 25.39% Impervious, Inflow Depth > 3.62" for 50 year event
Inflow = 4.60 cfs @ 12.08 hrs, Volume= 14,231 cf
Outflow = 0.09 cfs @ 18.78 hrs, Volume= 2,680 cf, Atten= 98%, Lag= 402.1 min
Primary = 0.09 cfs @ 18.78 hrs, Volume= 2,680 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 58.79' @ 18.78 hrs Surf.Area= 7,948 sf Storage= 11,676 cf
Flood Elev= 59.75' Surf.Area= 8,697 sf Storage= 15,495 cf

Plug-Flow detention time= 451.1 min calculated for 2,675 cf (19% of inflow)
Center-of-Mass det. time= 306.6 min (1,136.1 - 829.5)

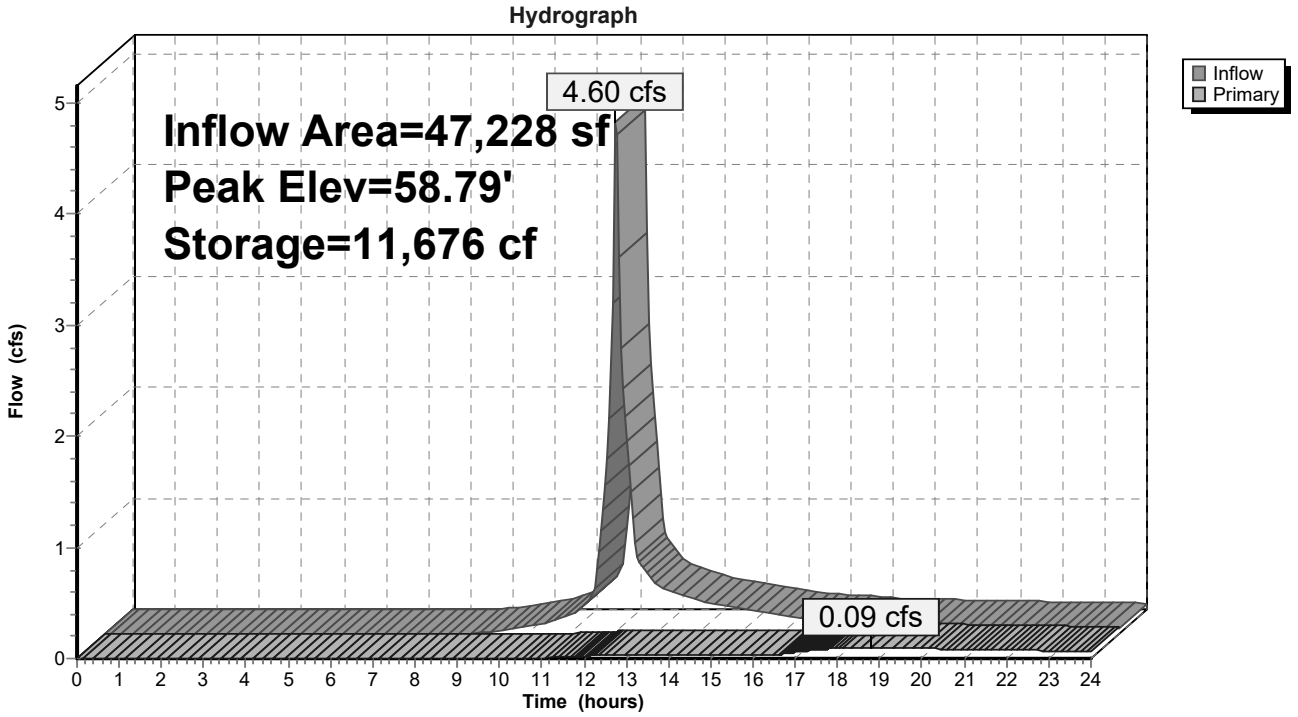
Volume	Invert	Avail.Storage	Storage Description
#1	57.00'	15,495 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
57.00	5,117	0	0
58.00	6,673	5,895	5,895
58.50	7,472	3,536	9,431
59.25	8,697	6,063	15,495

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=0.09 cfs @ 18.78 hrs HW=58.79' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Passes 0.03 cfs of 4.30 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 0.03 cfs @ 6.37 fps)
- **3=Broad-Crested Rectangular Weir** (Weir Controls 0.06 cfs @ 0.47 fps)

Pond P1-2: DP-1-2



Summary for Pond P1-3: P1-3

Inflow Area = 7,345 sf, 68.78% Impervious, Inflow Depth > 5.43" for 50 year event
Inflow = 1.03 cfs @ 12.07 hrs, Volume= 3,323 cf
Outflow = 0.09 cfs @ 12.97 hrs, Volume= 3,061 cf, Atten= 91%, Lag= 53.8 min
Primary = 0.09 cfs @ 12.97 hrs, Volume= 3,061 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 52.71' @ 12.97 hrs Surf.Area= 1,400 sf Storage= 1,698 cf
Flood Elev= 54.27' Surf.Area= 1,400 sf Storage= 1,861 cf

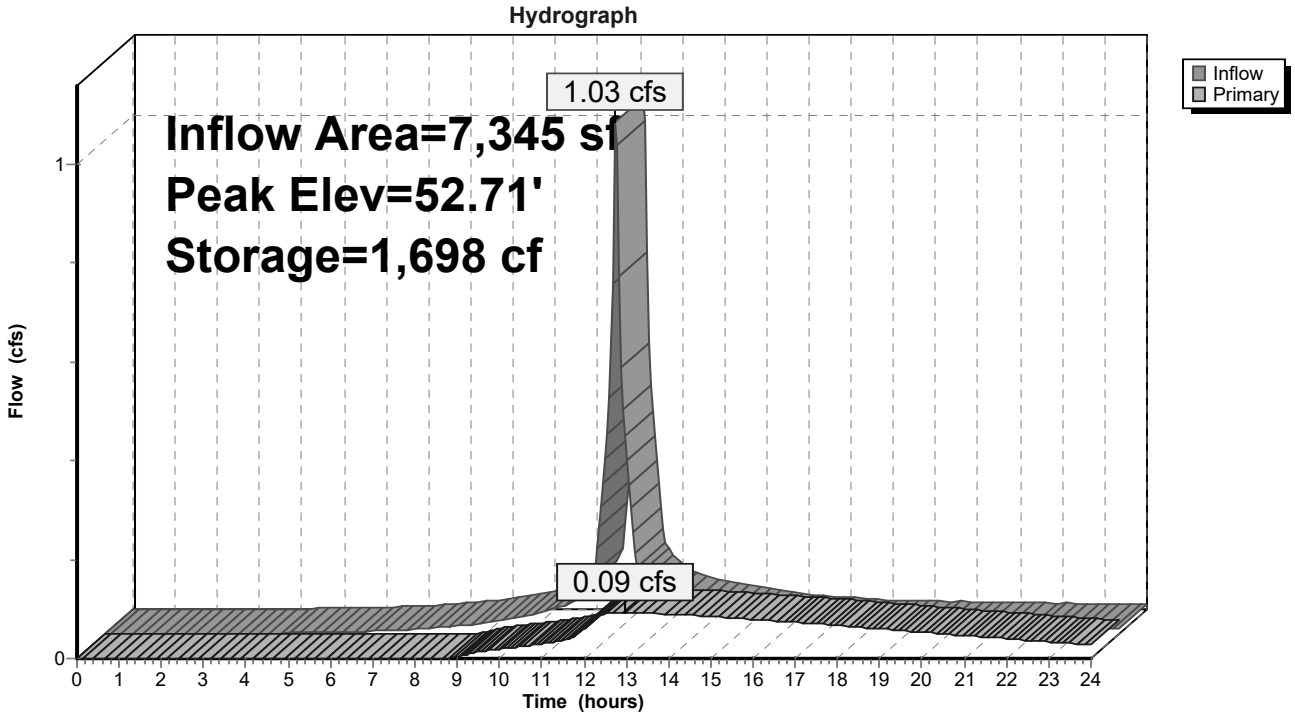
Plug-Flow detention time= 236.8 min calculated for 3,055 cf (92% of inflow)
Center-of-Mass det. time= 196.6 min (983.5 - 787.0)

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'	**1.5" 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=0.09 cfs @ 12.97 hrs HW=52.71' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.09 cfs of 5.36 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.09 cfs @ 7.53 fps)
  └─**3=Orifice/Grate** (Controls 0.00 cfs)

Pond P1-3: P1-3


Hydrograph
Inflow
Primary
1.03 cfs
0.09 cfs
Inflow Area=7,345 sf
Peak Elev=52.71'
Storage=1,698 cf
Flow (cfs)
Time (hours)
0
1
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

Summary for Pond P3-1: P3-2

Inflow Area = 78,927 sf, 57.97% Impervious, Inflow Depth > 4.95" for 50 year event
Inflow = 9.94 cfs @ 12.09 hrs, Volume= 32,580 cf
Outflow = 5.50 cfs @ 12.23 hrs, Volume= 29,925 cf, Atten= 45%, Lag= 8.5 min
Primary = 5.50 cfs @ 12.23 hrs, Volume= 29,925 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 67.86' @ 12.23 hrs Surf.Area= 3,825 sf Storage= 10,103 cf
Flood Elev= 70.00' Surf.Area= 3,825 sf Storage= 13,172 cf

Plug-Flow detention time= 89.0 min calculated for 29,863 cf (92% of inflow)
Center-of-Mass det. time= 48.3 min (848.9 - 800.6)

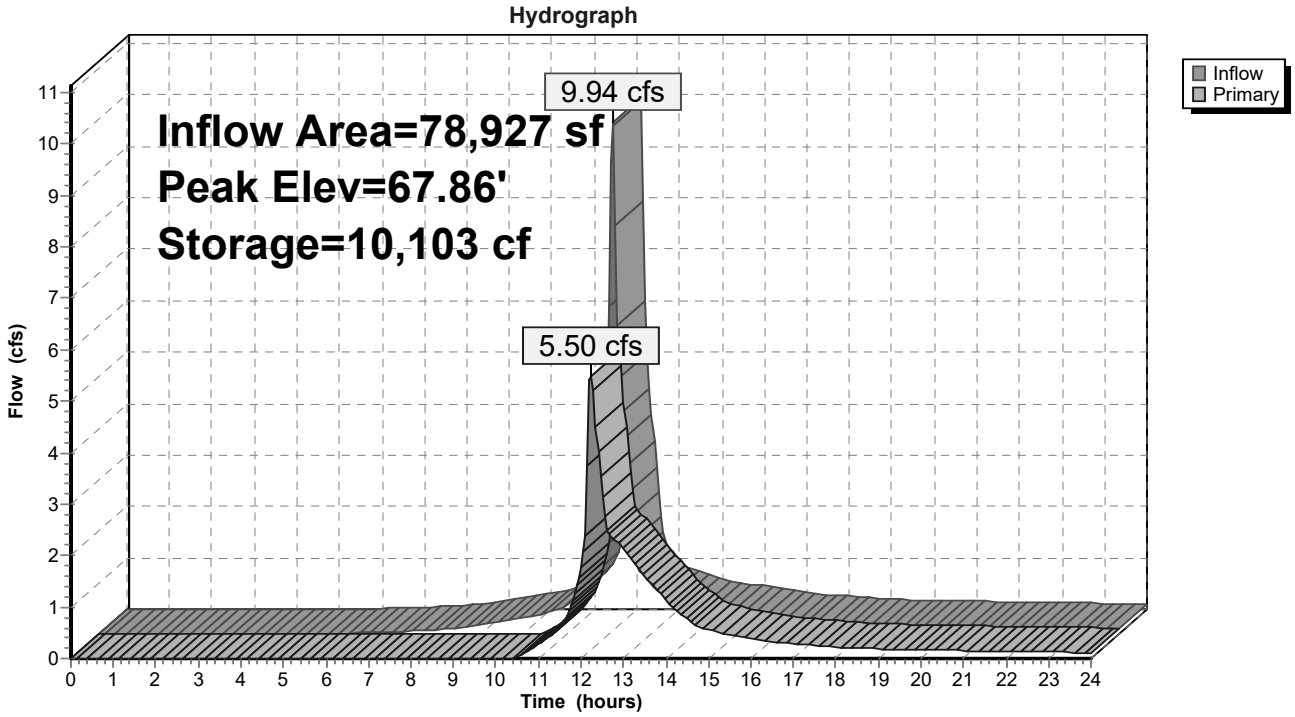
Volume	Invert	Avail.Storage	Storage Description
#1	64.00'	4,658 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc) 22,950 cf Overall - 11,304 cf Embedded = 11,646 cf x 40.0% Voids
#2	64.50'	8,514 cf	**52.8"W x 48.0"H x 4.00'L Galley 4x4x4** x 192 Inside #1
		13,172 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
64.00	3,825	0	0
70.00	3,825	22,950	22,950

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=5.43 cfs @ 12.23 hrs HW=67.86' TW=62.47' (Dynamic Tailwater)
└─**1=Culvert** (Passes 5.43 cfs of 10.63 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 2.67 cfs @ 7.65 fps)
  └─**3=Orifice/Grate** (Weir Controls 2.76 cfs @ 1.96 fps)

Pond P3-1: P3-2


Hydrograph
Inflow Area=78,927 sf
Peak Elev=67.86'
Storage=10,103 cf
9.94 cfs
5.50 cfs
Inflow
Primary
Flow (cfs)
Time (hours)
0 1 2 3 4 5 6 7 8 9 10 11
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

Summary for Pond P3-2: P3-3

Inflow Area = 150,527 sf, 46.94% Impervious, Inflow Depth > 4.31" for 50 year event
Inflow = 9.99 cfs @ 12.10 hrs, Volume= 54,025 cf
Outflow = 3.89 cfs @ 12.57 hrs, Volume= 45,440 cf, Atten= 61%, Lag= 28.5 min
Primary = 3.89 cfs @ 12.57 hrs, Volume= 45,440 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 53.53' @ 12.57 hrs Surf.Area= 8,287 sf Storage= 18,236 cf
Flood Elev= 55.50' Surf.Area= 12,548 sf Storage= 38,610 cf

Plug-Flow detention time= 126.5 min calculated for 45,345 cf (84% of inflow)
Center-of-Mass det. time= 62.6 min (899.0 - 836.4)

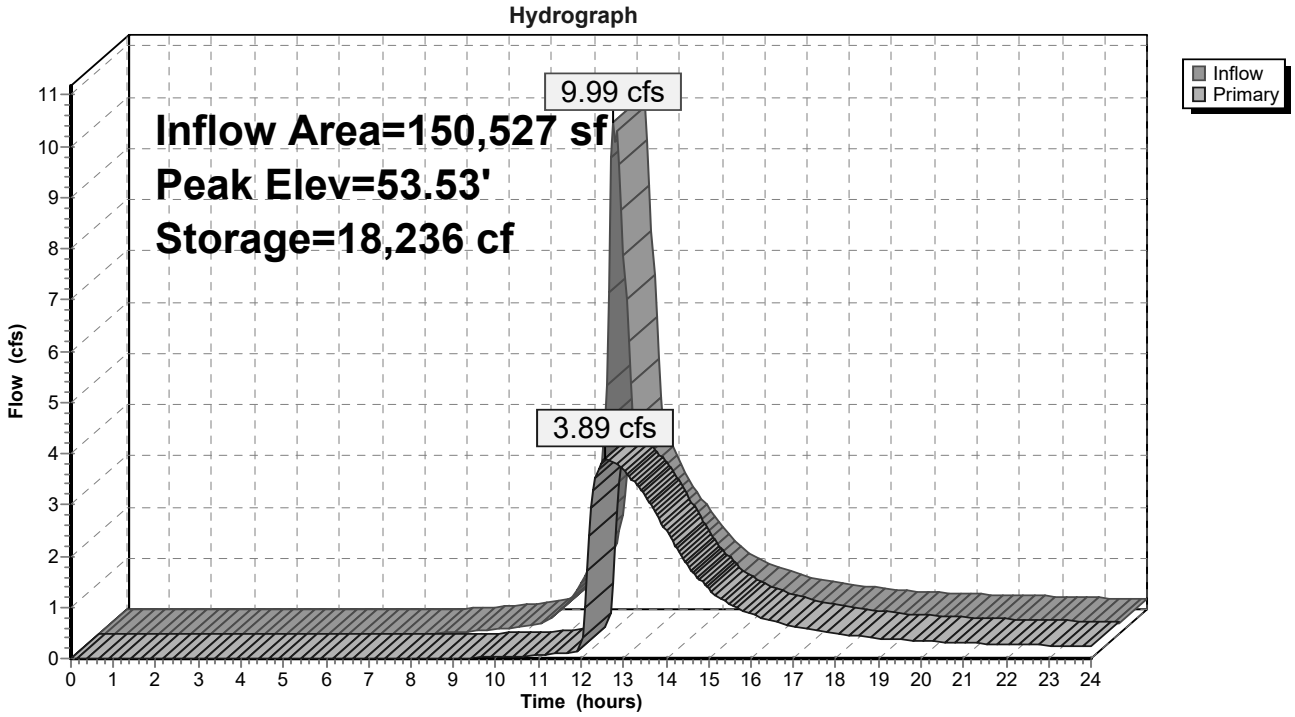
Volume	Invert	Avail.Storage	Storage Description
#1	50.00'	38,610 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

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'	**9.0" Vert. Orifice/Grate** C= 0.600
#4	Device 1	52.50'	**8.0" Vert. Orifice/Grate** C= 0.600
#5	Device 1	54.00'	**2.00' x 2.00' Horiz. Orifice/Grate** Limited to weir flow C= 0.600
#6	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=3.89 cfs @ 12.57 hrs HW=53.53' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Passes 3.89 cfs of 6.58 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 0.20 cfs @ 8.94 fps)
  - **3=Orifice/Grate** (Orifice Controls 2.29 cfs @ 5.18 fps)
  - **4=Orifice/Grate** (Orifice Controls 1.40 cfs @ 4.02 fps)
  - **5=Orifice/Grate** (Controls 0.00 cfs)
- **6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond P3-2: P3-3

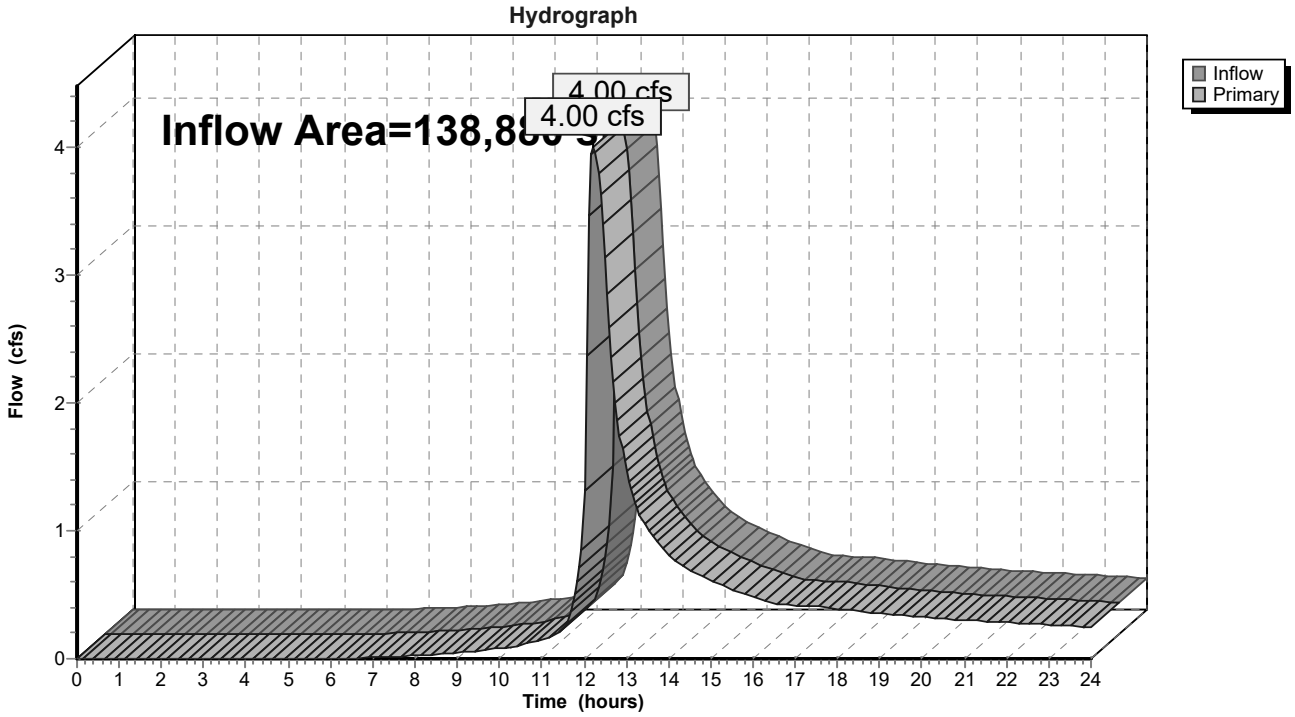

Hydrograph
Inflow
Primary
9.99 cfs
3.89 cfs
Inflow Area=150,527 sf
Peak Elev=53.53'
Storage=18,236 cf
Flow (cfs)
Time (hours)

Summary for Link DP-1: DP-1

Inflow Area = 138,880 sf, 35.07% Impervious, Inflow Depth > 2.60" for 50 year event
Inflow = 4.00 cfs @ 12.21 hrs, Volume= 30,119 cf
Primary = 4.00 cfs @ 12.21 hrs, Volume= 30,119 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

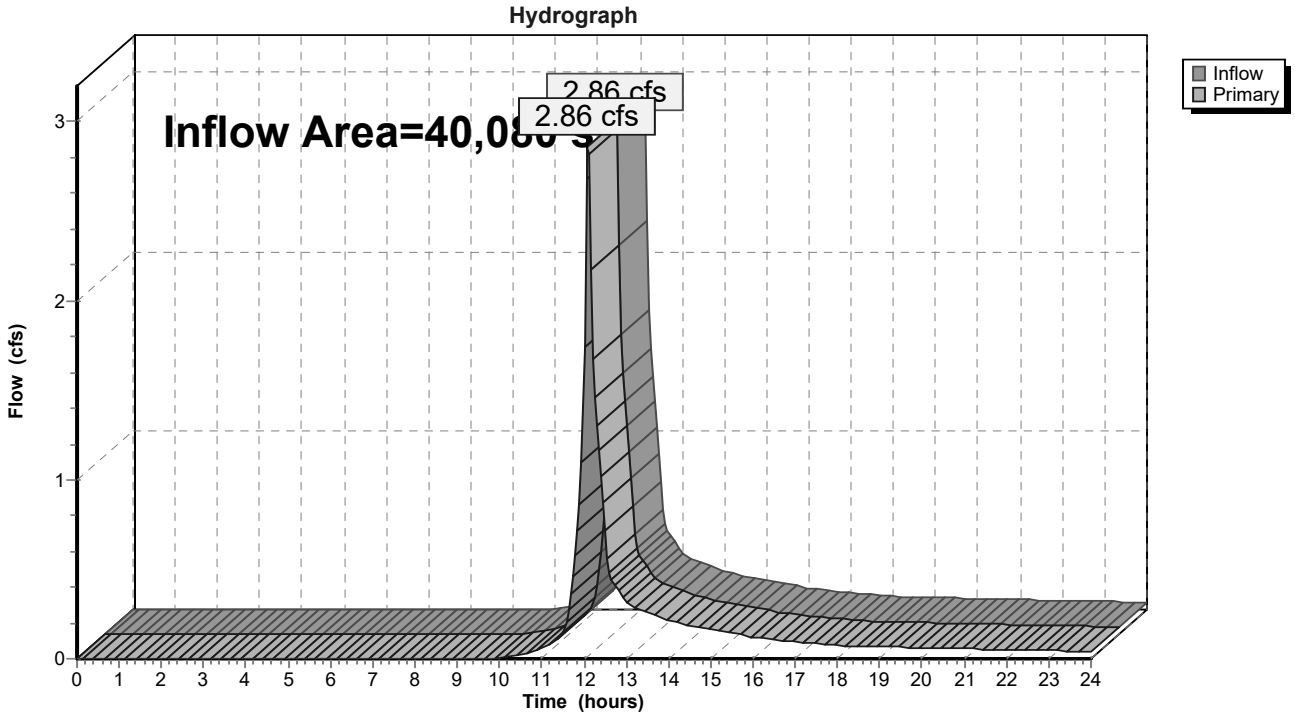


Summary for Link DP-2: DP-2

Inflow Area = 40,080 sf, 11.21% Impervious, Inflow Depth > 2.70" for 50 year event
Inflow = 2.86 cfs @ 12.08 hrs, Volume= 9,017 cf
Primary = 2.86 cfs @ 12.08 hrs, Volume= 9,017 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

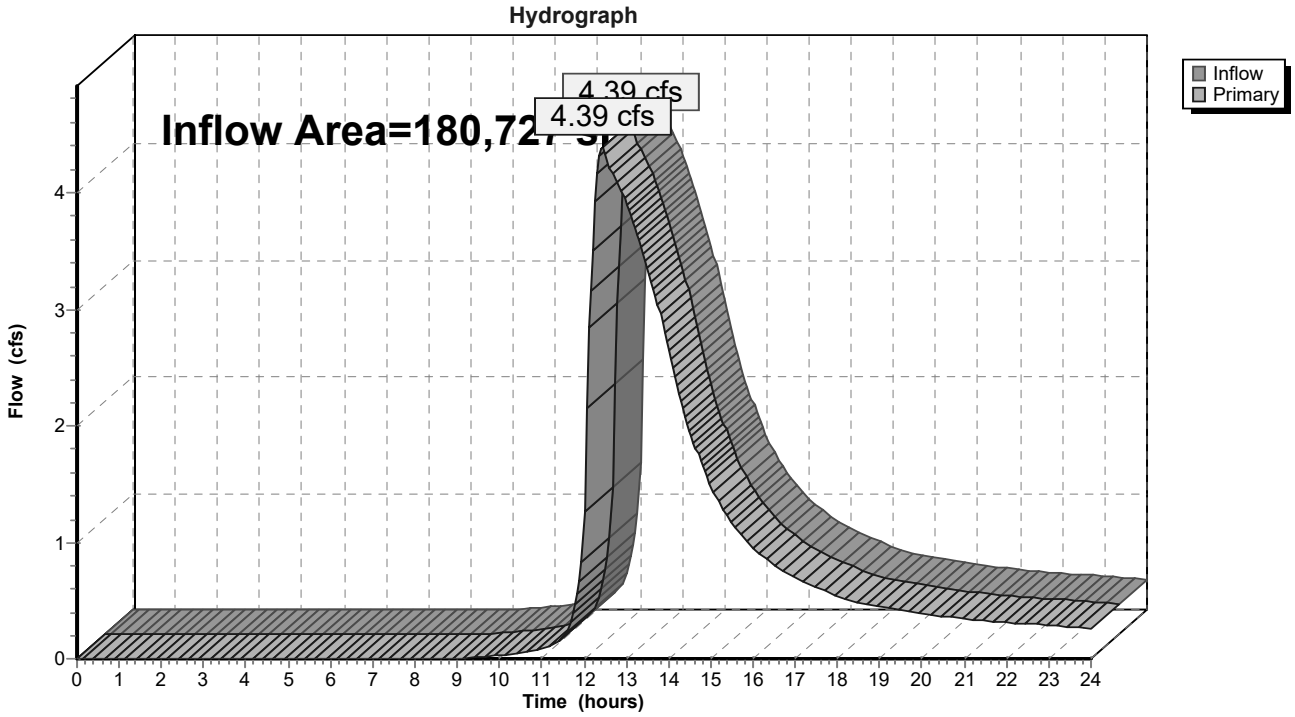


Summary for Link DP-3: DP-3

Inflow Area = 180,727 sf, 39.09% Impervious, Inflow Depth > 3.42" for 50 year event
Inflow = 4.39 cfs @ 12.43 hrs, Volume= 51,498 cf
Primary = 4.39 cfs @ 12.43 hrs, Volume= 51,498 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

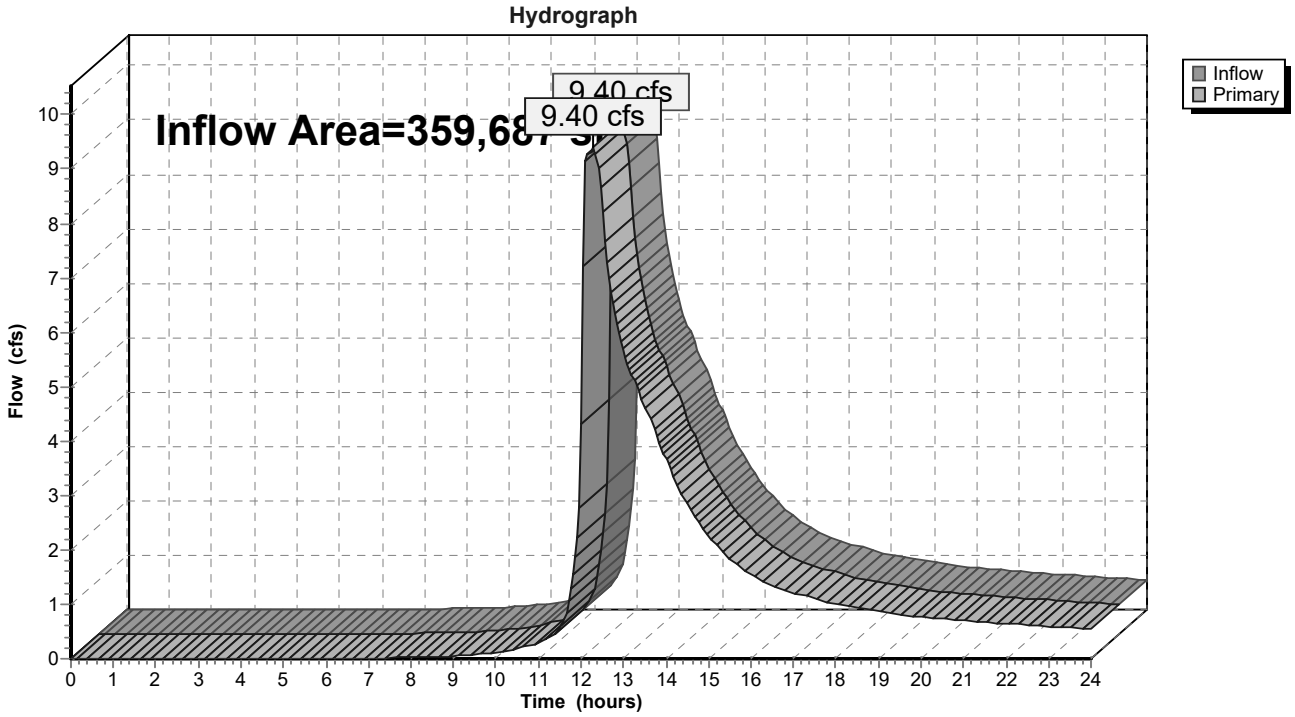


Summary for Link TOTAL: (new Link)

Inflow Area = 359,687 sf, 34.43% Impervious, Inflow Depth > 3.02" for 50 year event
Inflow = 9.40 cfs @ 12.29 hrs, Volume= 90,634 cf
Primary = 9.40 cfs @ 12.29 hrs, Volume= 90,634 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)



RANGER
ENGINEERING &
DESIGN, LLC

STORMWATER MANAGEMENT REPORT

POST-DEVELOPMENT DRAINAGE

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-1B Runoff Area=7,118 sf 74.36% Impervious Runoff Depth>7.17"
Flow Length=319' Tc=8.6 min CN=89 Runoff=1.17 cfs 4,253 cf

Subcatchment P-1C: P-1C Runoff Area=3,632 sf 56.17% Impervious Runoff Depth>6.33"
Flow Length=96' Tc=5.0 min CN=82 Runoff=0.61 cfs 1,916 cf

Subcatchment P-1D: P-1D Runoff Area=3,713 sf 81.12% Impervious Runoff Depth>7.41"
Flow Length=96' Slope=0.0100 '/' Tc=5.0 min CN=91 Runoff=0.69 cfs 2,294 cf

Subcatchment P-1E: P-1E Runoff Area=15,678 sf 38.38% Impervious Runoff Depth>5.49"
Flow Length=100' Tc=5.0 min CN=75 Runoff=2.32 cfs 7,175 cf

Subcatchment P-1F: P-1F Runoff Area=20,660 sf 69.29% Impervious Runoff Depth>6.93"
Flow Length=380' Tc=5.0 min CN=87 Runoff=3.69 cfs 11,937 cf

Subcatchment P-1G: P-1G Runoff Area=5,772 sf 64.26% Impervious Runoff Depth>6.69"
Flow Length=90' Tc=5.0 min CN=85 Runoff=1.01 cfs 3,219 cf

Subcatchment P-1H: P-1H Runoff Area=5,661 sf 39.83% Impervious Runoff Depth>5.61"
Flow Length=130' Tc=5.0 min CN=76 Runoff=0.85 cfs 2,647 cf

Subcatchment P-1I: P-1I Runoff Area=47,228 sf 25.39% Impervious Runoff Depth>4.89"
Flow Length=145' Tc=5.0 min CN=70 Runoff=6.23 cfs 19,260 cf

Subcatchment P-1J: P1-J Runoff Area=27,093 sf 0.25% Impervious Runoff Depth>3.59"
Flow Length=280' Tc=6.3 min CN=59 Runoff=2.52 cfs 8,109 cf

Subcatchment P-2A: P-2A Runoff Area=40,080 sf 11.21% Impervious Runoff Depth>3.83"
Flow Length=140' Tc=5.0 min CN=61 Runoff=4.11 cfs 12,783 cf

Subcatchment P-3A: P-3A Runoff Area=30,200 sf 0.00% Impervious Runoff Depth>3.48"
Flow Length=230' Tc=5.0 min CN=58 Runoff=2.79 cfs 8,749 cf

Subcatchment P-3B: P-3B Runoff Area=71,600 sf 34.77% Impervious Runoff Depth>5.37"
Flow Length=370' Tc=5.4 min CN=74 Runoff=10.22 cfs 32,049 cf

Subcatchment P-3C: P-3C Runoff Area=41,255 sf 48.59% Impervious Runoff Depth>5.97"
Flow Length=280' Tc=5.0 min CN=79 Runoff=6.57 cfs 20,530 cf

Subcatchment P-3D: P-3D Runoff Area=33,144 sf 68.21% Impervious Runoff Depth>6.81"
Flow Length=240' Tc=7.3 min CN=86 Runoff=5.49 cfs 18,811 cf

Subcatchment P-3E: P-3F Runoff Area=4,528 sf 68.55% Impervious Runoff Depth>6.81"
Flow Length=140' Tc=5.0 min CN=86 Runoff=0.80 cfs 2,571 cf

Pond 3P: INFILTRATOR Peak Elev=0.00' Storage=0 cf

Pond CB1: CB1 Peak Elev=53.15' Inflow=0.61 cfs 1,916 cf
8.0" x 9.0' Culvert Outflow=0.61 cfs 1,916 cf

Pond CB2: CB2 Peak Elev=53.15' Inflow=0.69 cfs 2,294 cf
8.0" x 9.0' Culvert Outflow=0.69 cfs 2,294 cf

Pond CB3: CB3 Peak Elev=55.20' Inflow=1.17 cfs 4,253 cf
12.0" x 12.0' Culvert Outflow=1.17 cfs 4,253 cf

Pond CB4: CB4 Peak Elev=55.73' Inflow=3.69 cfs 11,937 cf
12.0" x 11.0' Culvert Outflow=3.69 cfs 11,937 cf

Pond CB5: CB5 Peak Elev=58.59' Inflow=0.85 cfs 2,647 cf
12.0" x 23.9' Culvert Outflow=0.85 cfs 2,647 cf

Pond CB6: CB6 Peak Elev=58.62' Inflow=1.01 cfs 3,219 cf
12.0" x 15.9' Culvert Outflow=1.01 cfs 3,219 cf

Pond CB7: CB7 Peak Elev=70.85' Inflow=5.49 cfs 18,811 cf
12.0" x 20.0' Culvert Outflow=5.49 cfs 18,811 cf

Pond CB8: CB8 Peak Elev=69.72' Inflow=0.80 cfs 2,571 cf
12.0" x 20.0' Culvert Outflow=0.80 cfs 2,571 cf

Pond CB9: CB9 Peak Elev=72.57' Inflow=6.57 cfs 20,530 cf
12.0" x 22.0' Culvert Outflow=6.57 cfs 20,530 cf

Pond DMH 10: DMH9 Peak Elev=64.10' Inflow=9.35 cfs 39,198 cf
15.0" x 100.0' Culvert Outflow=9.35 cfs 39,198 cf

Pond DMH 11: DMH 10 Peak Elev=58.27' Inflow=9.35 cfs 39,198 cf
15.0" x 33.0' Culvert Outflow=9.35 cfs 39,198 cf

Pond DMH 6: DMH 6 Peak Elev=69.16' Inflow=6.25 cfs 21,382 cf
15.0" x 55.0' Culvert Outflow=6.25 cfs 21,382 cf

Pond DMH2: DMH2 Peak Elev=55.12' Inflow=4.73 cfs 16,190 cf
12.0" x 39.0' Culvert Outflow=4.73 cfs 16,190 cf

Pond DMH3: DMH3 Peak Elev=56.18' Inflow=1.86 cfs 5,866 cf
12.0" x 57.3' Culvert Outflow=1.86 cfs 5,866 cf

Pond DMH4: DMH4 Peak Elev=58.41' Inflow=1.86 cfs 5,866 cf
12.0" x 65.0' Culvert Outflow=1.86 cfs 5,866 cf

Pond DMH5: DMH 5 Peak Elev=69.71' Inflow=6.25 cfs 21,382 cf
15.0" x 94.0' Culvert Outflow=6.25 cfs 21,382 cf

Pond DMH7: DMH7 Peak Elev=68.86' Inflow=6.25 cfs 21,382 cf
Outflow=6.25 cfs 21,382 cf

Pond DMH8: DMH8	Peak Elev=70.22'	Inflow=6.57 cfs	20,530 cf
	12.0" x 1.0' Culvert	Outflow=6.57 cfs	20,530 cf
Pond P1-1: P1-1	Peak Elev=54.07' Storage=10,477 cf	Inflow=8.87 cfs	29,231 cf
		Outflow=4.36 cfs	24,418 cf
Pond P1-2: DP-1-2	Peak Elev=58.89' Storage=12,437 cf	Inflow=6.23 cfs	19,260 cf
		Outflow=0.39 cfs	7,640 cf
Pond P1-3: P1-3	Peak Elev=53.14' Storage=1,861 cf	Inflow=1.30 cfs	4,210 cf
		Outflow=0.61 cfs	3,852 cf
Pond P3-1: P3-2	Peak Elev=68.61' Storage=11,051 cf	Inflow=12.65 cfs	41,911 cf
		Outflow=9.35 cfs	39,198 cf
Pond P3-2: P3-3	Peak Elev=54.20' Storage=24,176 cf	Inflow=16.95 cfs	71,247 cf
		Outflow=7.27 cfs	62,429 cf
Link DP-1: DP-1		Inflow=6.50 cfs	44,647 cf
		Primary=6.50 cfs	44,647 cf
Link DP-2: DP-2		Inflow=4.11 cfs	12,783 cf
		Primary=4.11 cfs	12,783 cf
Link DP-3: DP-3		Inflow=8.20 cfs	71,178 cf
		Primary=8.20 cfs	71,178 cf
Link TOTAL: (new Link)		Inflow=16.25 cfs	128,608 cf
		Primary=16.25 cfs	128,608 cf

Total Runoff Area = 359,687 sf Runoff Volume = 156,932 cf Average Runoff Depth = 5.24"
65.57% Pervious = 235,843 sf 34.43% Impervious = 123,844 sf

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

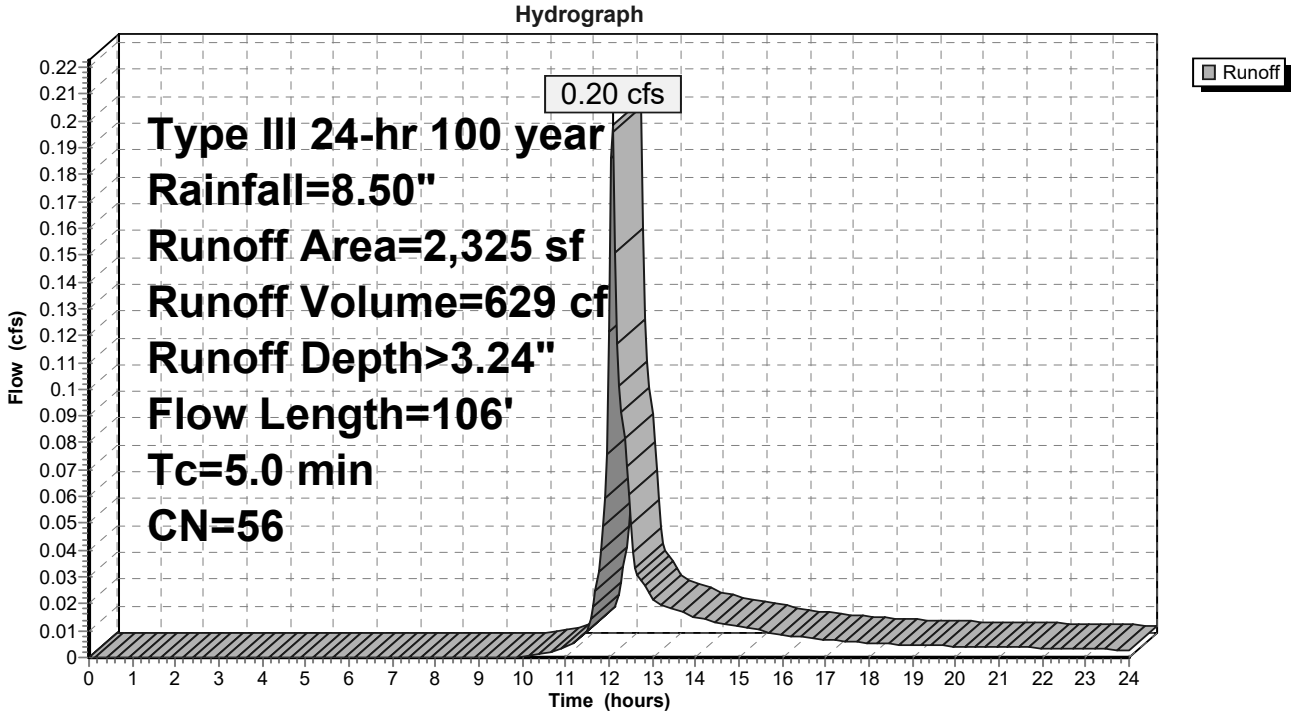
Runoff = 0.20 cfs @ 12.08 hrs, Volume= 629 cf, Depth> 3.24"

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



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

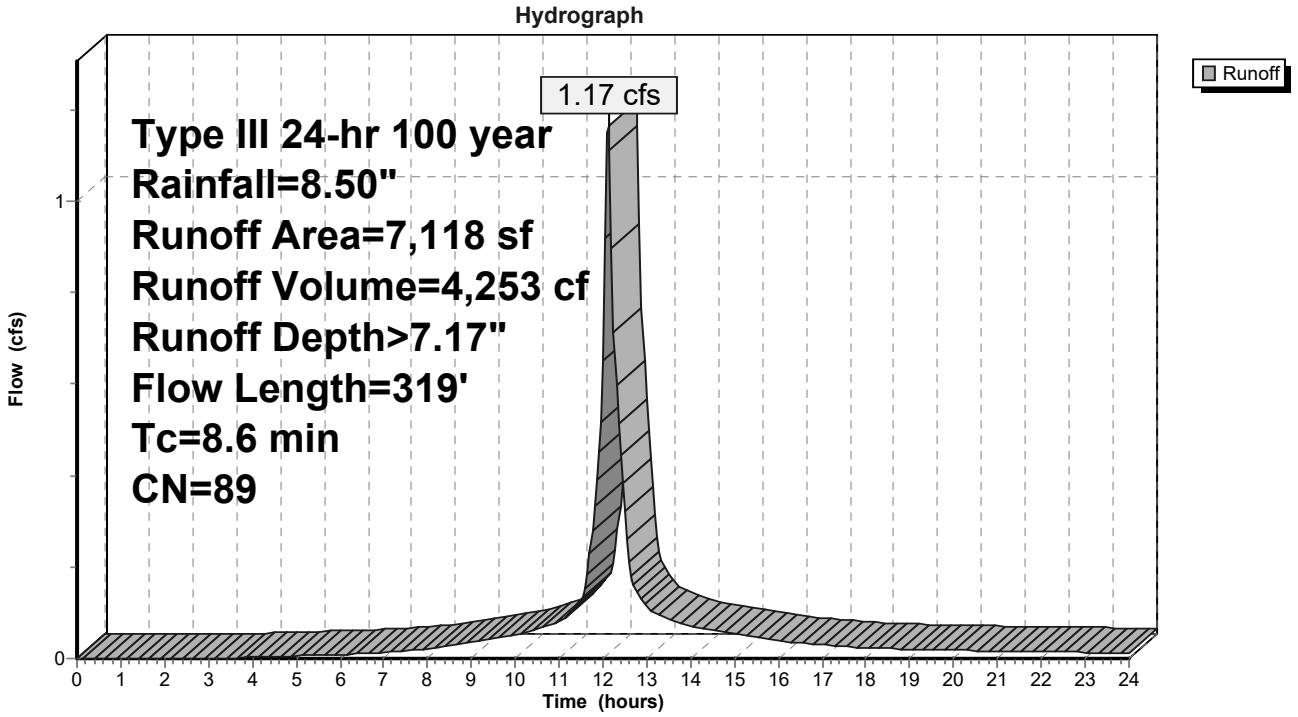
Runoff = 1.17 cfs @ 12.12 hrs, Volume= 4,253 cf, Depth> 7.17"

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
5,293	98	Paved roads w/curbs & sewers, HSG B
1,825	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
0	98	Water Surface, HSG B
7,118	89	Weighted Average
1,825		Pervious Area
5,293		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0					**Direct Entry, DIRECT**
4.8	50	0.0300	0.17		**Sheet Flow, SHEET FLOW** Grass: Short n= 0.150 P2= 3.20"
2.9	60	0.0025	0.35		**Shallow Concentrated Flow, SHALLOW GRASS** Short Grass Pasture Kv= 7.0 fps
0.9	209	0.0350	3.80		**Shallow Concentrated Flow, SHALLOW PAVE** Paved Kv= 20.3 fps
8.6	319	Total			

Subcatchment P-1B: P-1B



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

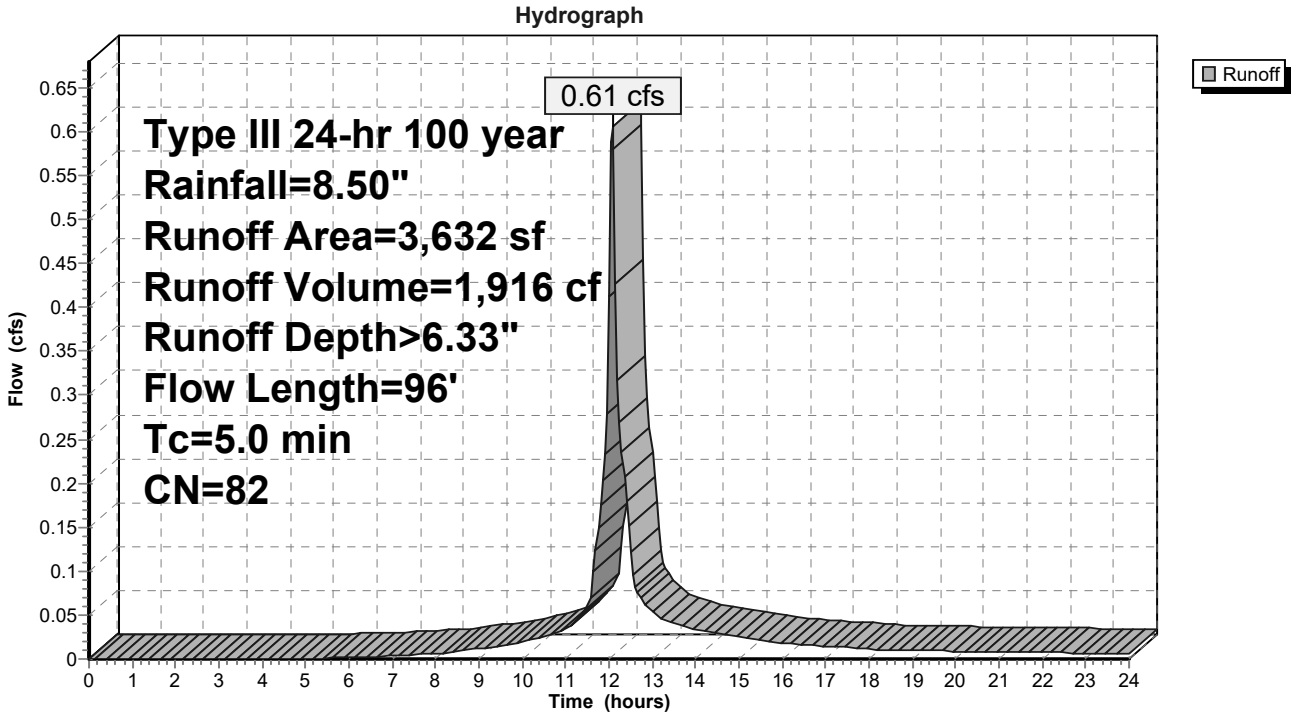
Runoff = 0.61 cfs @ 12.07 hrs, Volume= 1,916 cf, Depth> 6.33"

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
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
2.8	50	0.1100	0.29		**Sheet Flow, SHEET** Grass: Short n= 0.150 P2= 3.20"
0.2	46	0.0300	3.52		**Shallow Concentrated Flow, PAVEMENT** Paved Kv= 20.3 fps
2.0					**Direct Entry, DIRECT**
5.0	96	Total			

Subcatchment P-1C: P-1C



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

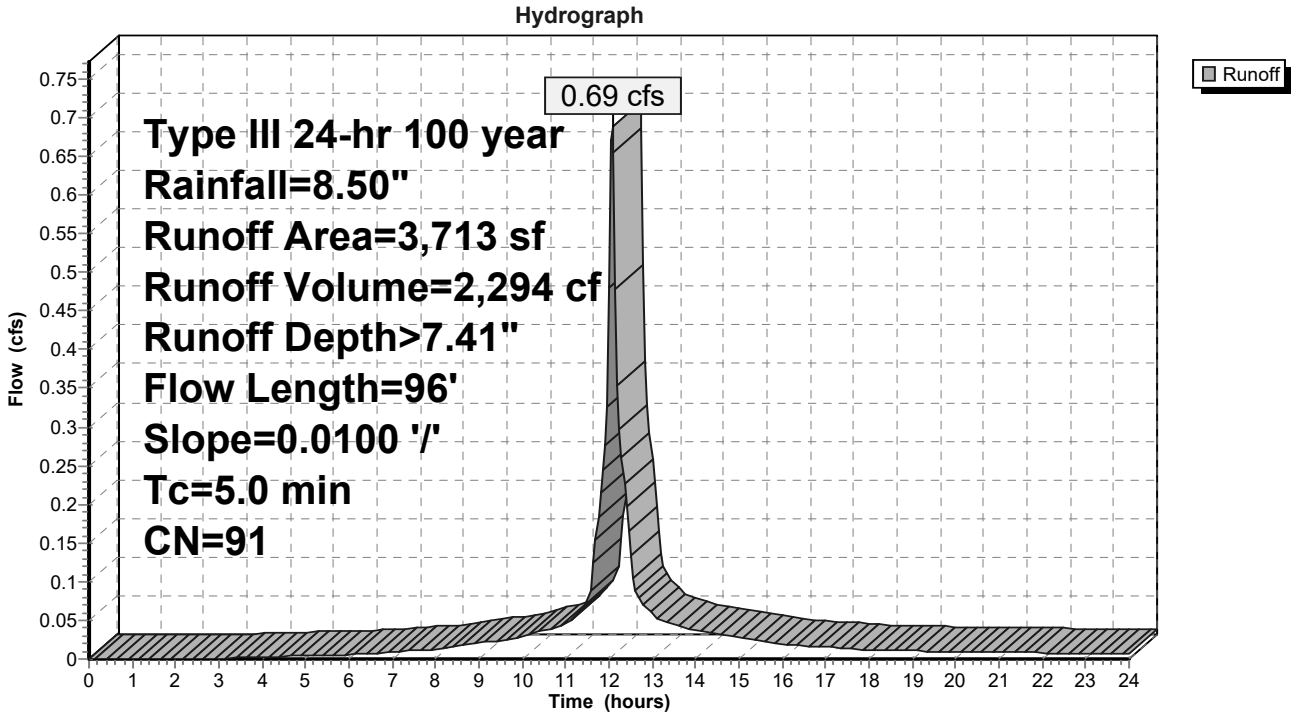
Runoff = 0.69 cfs @ 12.07 hrs, Volume= 2,294 cf, Depth> 7.41"

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
0.9	50	0.0100	0.91		**Sheet Flow, SHEET** Smooth surfaces n= 0.011 P2= 3.20"
0.4	46	0.0100	2.03		**Shallow Concentrated Flow, PAVEMENT** Paved Kv= 20.3 fps
3.7					**Direct Entry, DIRECT**
5.0	96	Total			

Subcatchment P-1D: P-1D



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

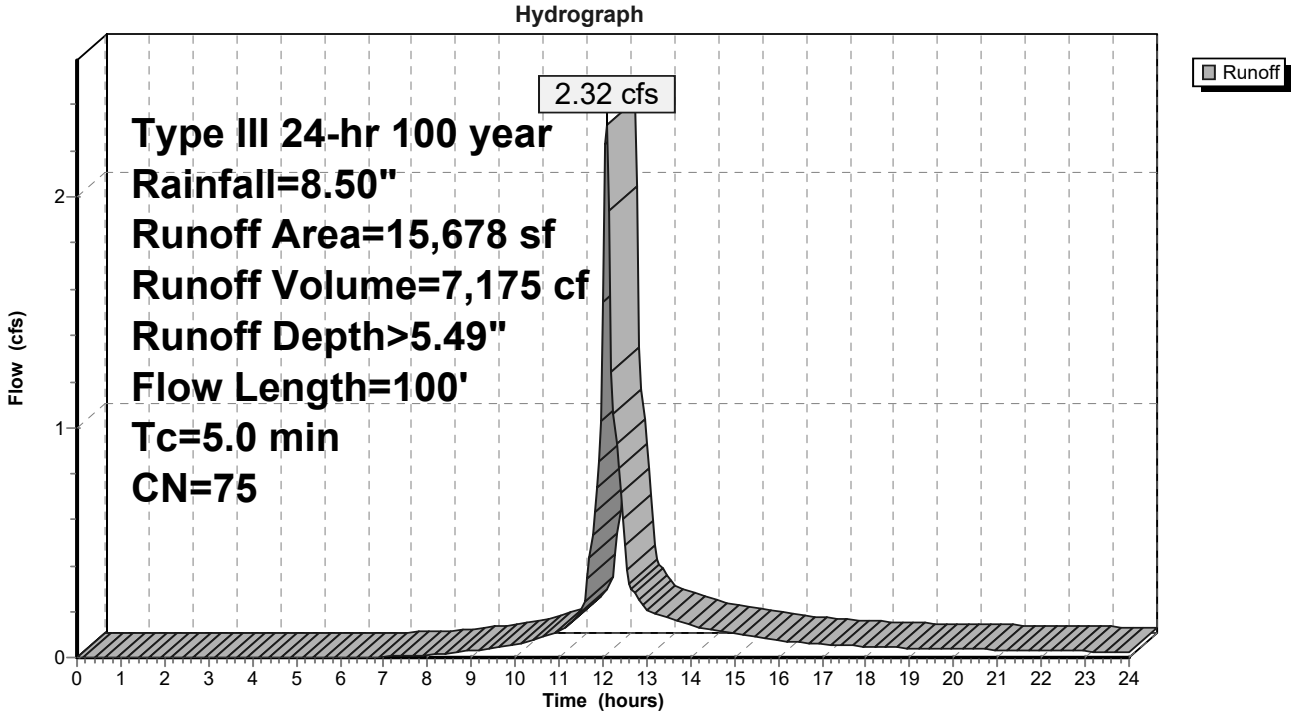
Runoff = 2.32 cfs @ 12.07 hrs, Volume= 7,175 cf, Depth> 5.49"

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
880	98	Roofs, HSG B
0	98	Paved parking, HSG B
210	98	Paved roads w/curbs & sewers, HSG B
8,660	61	>75% Grass cover, Good, HSG B
4,928	98	Water Surface, HSG B
1,000	55	Woods, Good, HSG B
15,678	75	Weighted Average
9,660		Pervious Area
6,018		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2					**Direct Entry, DIRECT**
3.6	50	0.0600	0.23		**Sheet Flow, SHEET** Grass: Short n= 0.150 P2= 3.20"
0.2	50	0.2700	3.64		**Shallow Concentrated Flow, SHALLOW GRASS** Short Grass Pasture Kv= 7.0 fps
5.0	100	Total			

Subcatchment P-1E: P-1E



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

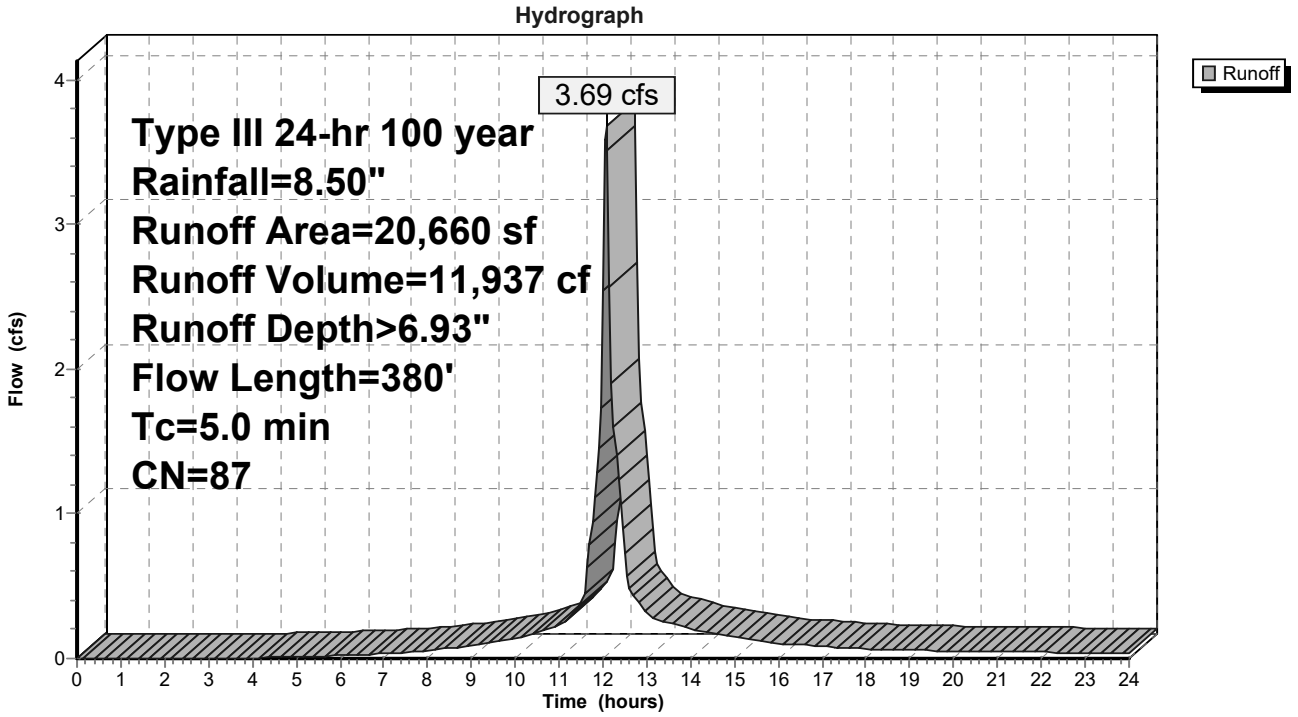
Runoff = 3.69 cfs @ 12.07 hrs, Volume= 11,937 cf, Depth> 6.93"

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
6,344	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
0	98	Water Surface, HSG B
20,660	87	Weighted Average
6,344		Pervious Area
14,316		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	30	0.0830	0.24		**Sheet Flow, SHEET GRASS** Grass: Short n= 0.150 P2= 3.20"
0.4	20	0.0125	0.83		**Sheet Flow, SHEET PAVE** Smooth surfaces n= 0.011 P2= 3.20"
1.3	330	0.0440	4.26		**Shallow Concentrated Flow, SHALLOW PAVE** Paved Kv= 20.3 fps
1.2					**Direct Entry, DIRECT**
5.0	380	Total			

Subcatchment P-1F: P-1F



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

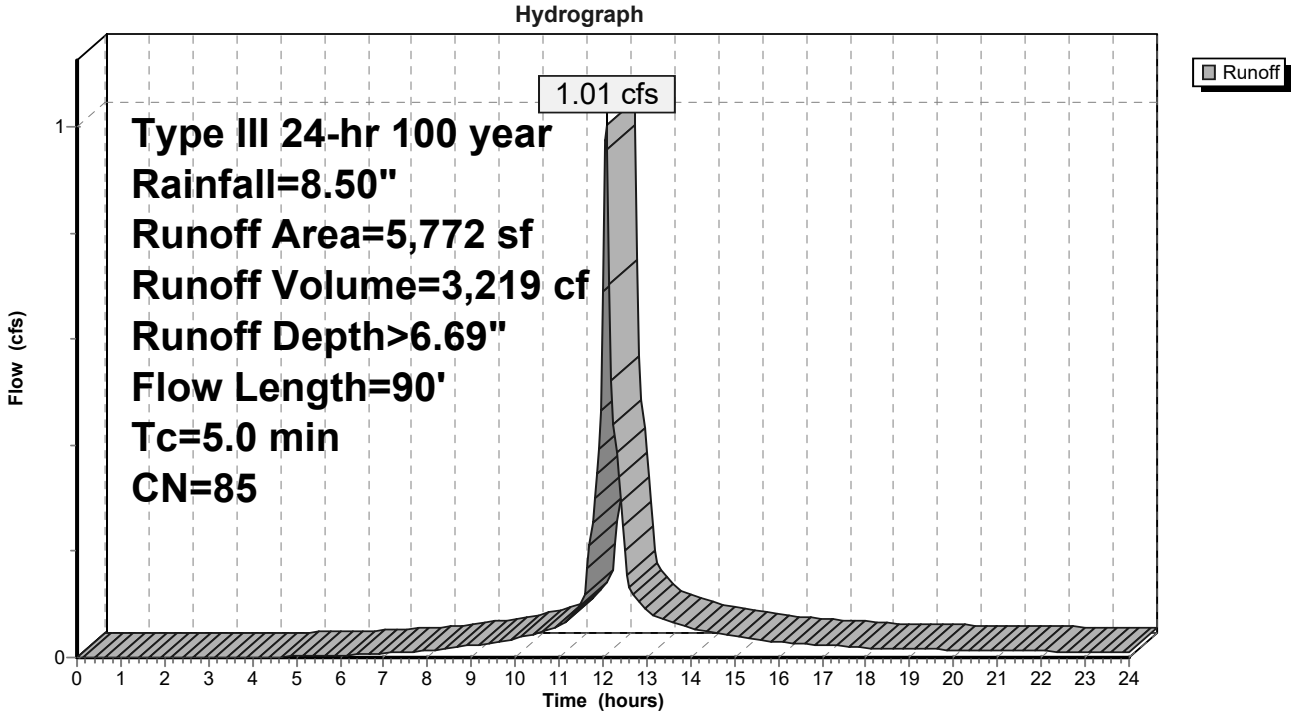
Runoff = 1.01 cfs @ 12.07 hrs, Volume= 3,219 cf, Depth> 6.69"

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
2,063	61	>75% Grass cover, Good, HSG B
440	98	Roofs, HSG B
3,269	98	Paved roads w/curbs & sewers, HSG B
5,772	85	Weighted Average
2,063		Pervious Area
3,709		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	50	0.0500	0.21		**Sheet Flow, SHEET GRASS** Grass: Short n= 0.150 P2= 3.20"
0.4	30	0.0330	1.32		**Sheet Flow, SHEET PAVE** Smooth surfaces n= 0.011 P2= 3.20"
0.0	10	0.0290	3.46		**Shallow Concentrated Flow, PAVED** Paved Kv= 20.3 fps
0.7					**Direct Entry, DIRECT**
5.0	90	Total			

Subcatchment P-1G: P-1G



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

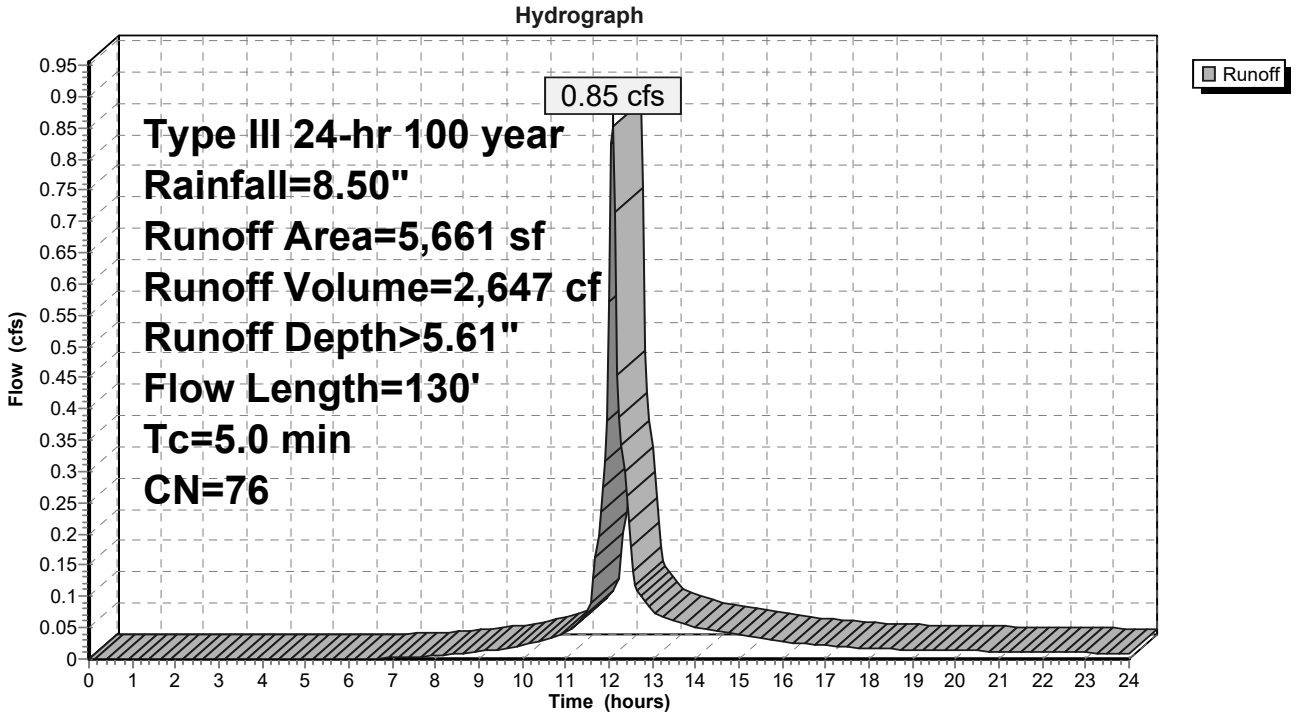
Runoff = 0.85 cfs @ 12.07 hrs, Volume= 2,647 cf, Depth> 5.61"

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
1,815	98	Paved roads w/curbs & sewers, HSG B
3,406	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
5,661	76	Weighted Average
3,406		Pervious Area
2,255		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 GRASS** Smooth surfaces n= 0.011 P2= 3.20"
0.4	80	0.0250	3.21		**Shallow Concentrated Flow, PAVEMENT** Paved Kv= 20.3 fps
4.1					**Direct Entry, DIRECT**
5.0	130	Total			

Subcatchment P-1H: P-1H



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

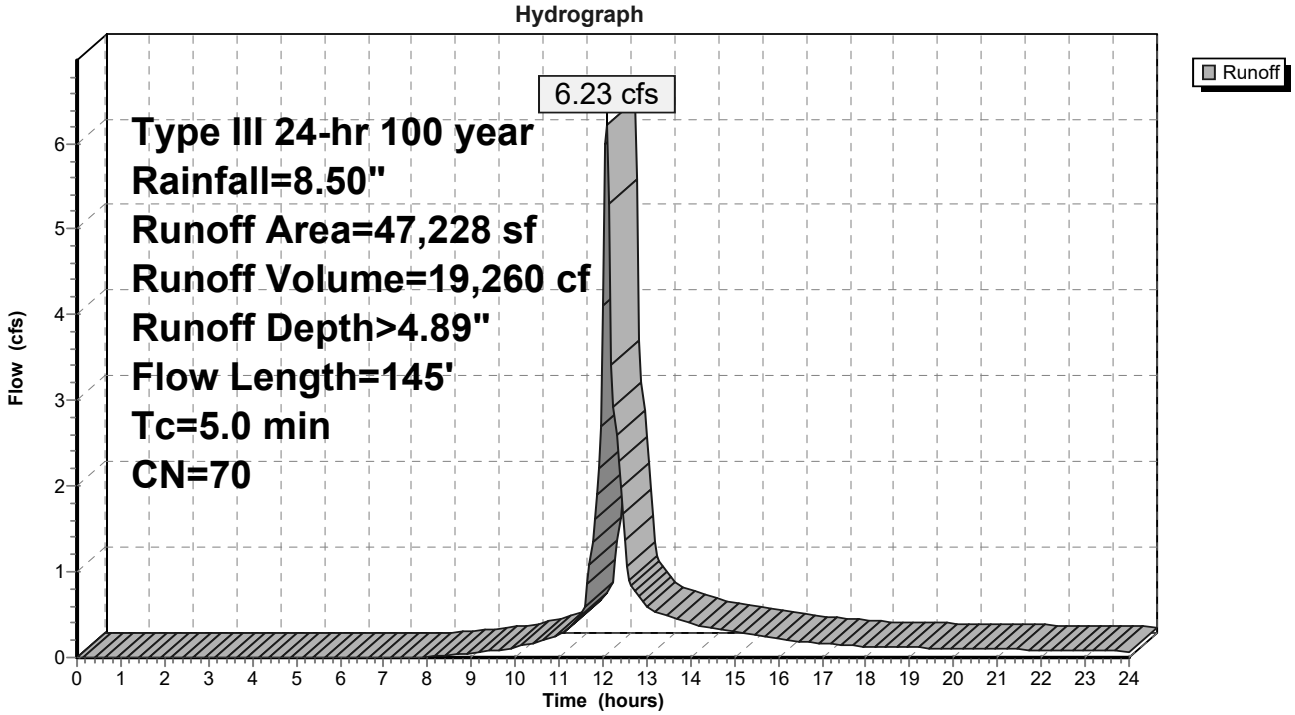
Runoff = 6.23 cfs @ 12.08 hrs, Volume= 19,260 cf, Depth> 4.89"

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
3,080	98	Roofs, HSG B
0	98	Paved parking, HSG B
212	98	Paved roads w/curbs & sewers, HSG B
35,239	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
8,697	98	Water Surface, HSG B
47,228	70	Weighted Average
35,239		Pervious Area
11,989		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.1	50	0.0900	0.27		**Sheet Flow, SHEET** Grass: Short n= 0.150 P2= 3.20"
0.8	95	0.0860	2.05		**Shallow Concentrated Flow, GRASS** Short Grass Pasture Kv= 7.0 fps
1.1					**Direct Entry, DIRECT**
5.0	145	Total			

Subcatchment P-1I: P-1I



Summary for Subcatchment P-1J: P1-J

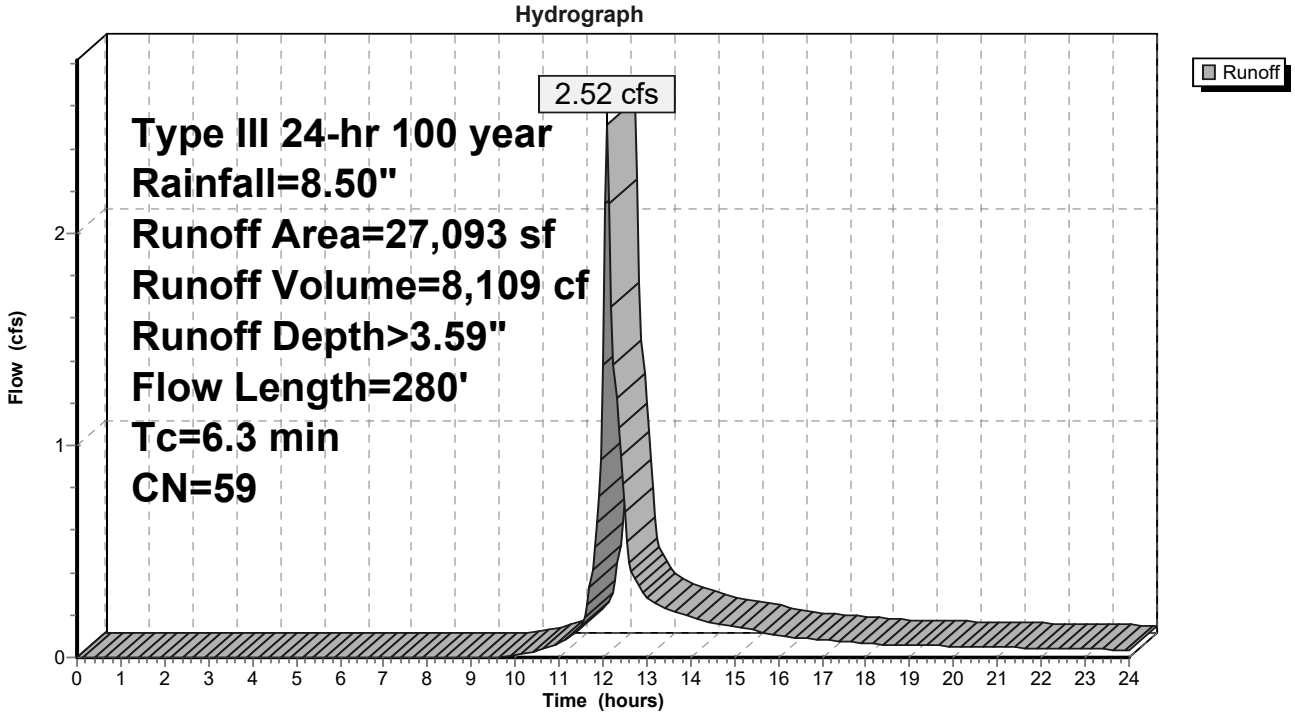
Runoff = 2.52 cfs @ 12.10 hrs, Volume= 8,109 cf, Depth> 3.59"

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
	8,800	55	Woods, Good, HSG B
	18,225	61	>75% Grass cover, Good, HSG B
*	68	98	Paved roads w/curbs & sewers, HSG B
	27,093	59	Weighted Average
	27,025		Pervious Area
	68		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"
3.1	230	0.0600	1.22		**Shallow Concentrated Flow, Flow in woods** Woodland Kv= 5.0 fps
6.3	280	Total			

Subcatchment P-1J: P1-J



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

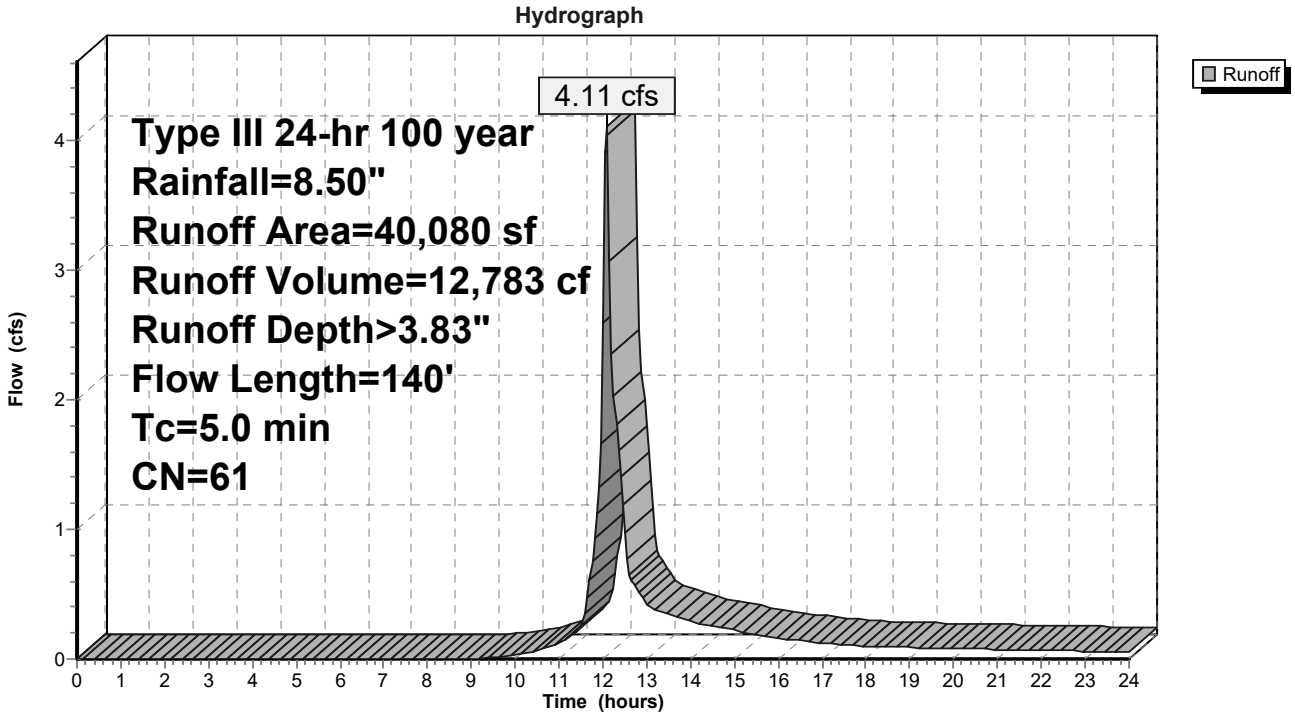
Runoff = 4.11 cfs @ 12.08 hrs, Volume= 12,783 cf, Depth> 3.83"

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
94	98	Paved roads w/curbs & sewers, HSG B
9,069	61	>75% Grass cover, Good, HSG B
26,517	55	Woods, Good, HSG B
40,080	61	Weighted Average
35,586		Pervious Area
4,494		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	50	0.0600	0.23		**Sheet Flow, SHEET GRASS** Grass: Short n= 0.150 P2= 3.20"
0.5	90	0.1560	2.76		**Shallow Concentrated Flow, GRASS SHALLOW** Short Grass Pasture Kv= 7.0 fps
0.9					**Direct Entry, DIRECT**
5.0	140	Total			

Subcatchment P-2A: P-2A



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

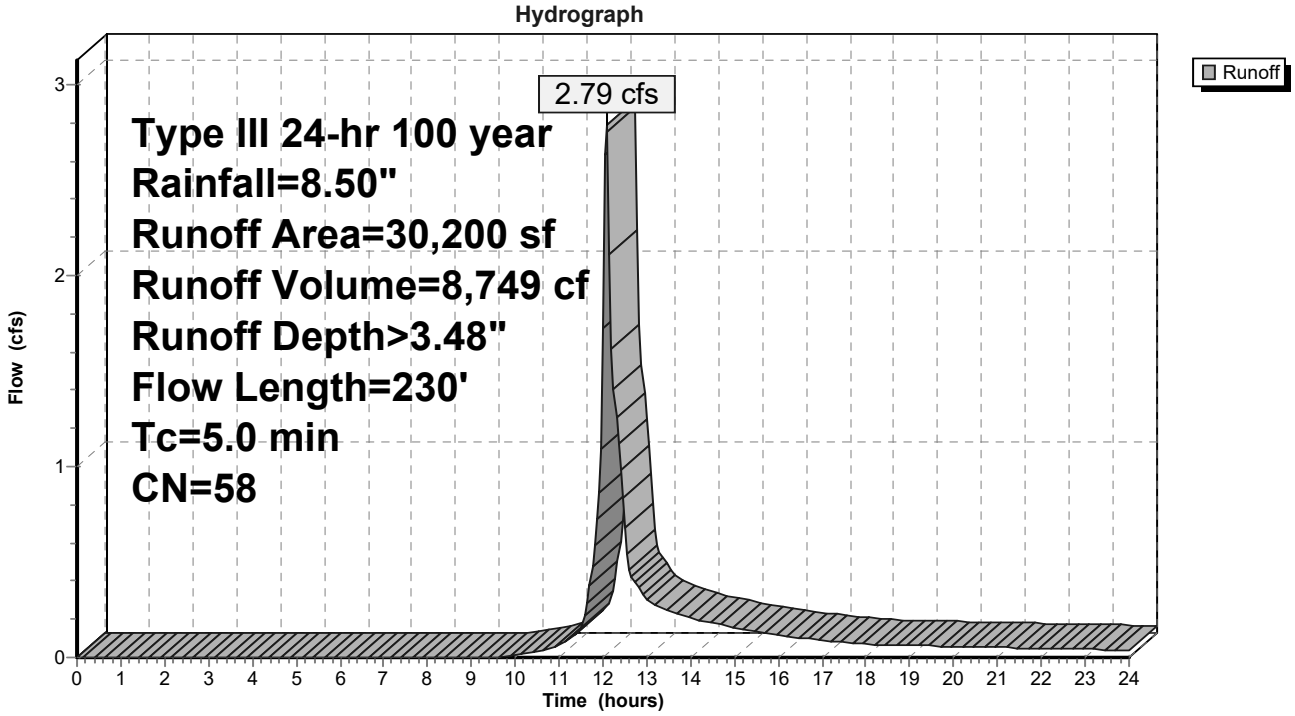
Runoff = 2.79 cfs @ 12.08 hrs, Volume= 8,749 cf, Depth> 3.48"

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
13,428	61	>75% Grass cover, Good, HSG B
16,772	55	Woods, Good, HSG B
30,200	58	Weighted Average
30,200		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0	50	0.2600	0.41		**Sheet Flow, SHEET GRASS** Grass: Short n= 0.150 P2= 3.20"
1.6	180	0.0720	1.88		**Shallow Concentrated Flow, SHALLOW GRASS** Short Grass Pasture Kv= 7.0 fps
1.4					**Direct Entry, DIRECT**
5.0	230	Total			

Subcatchment P-3A: P-3A



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

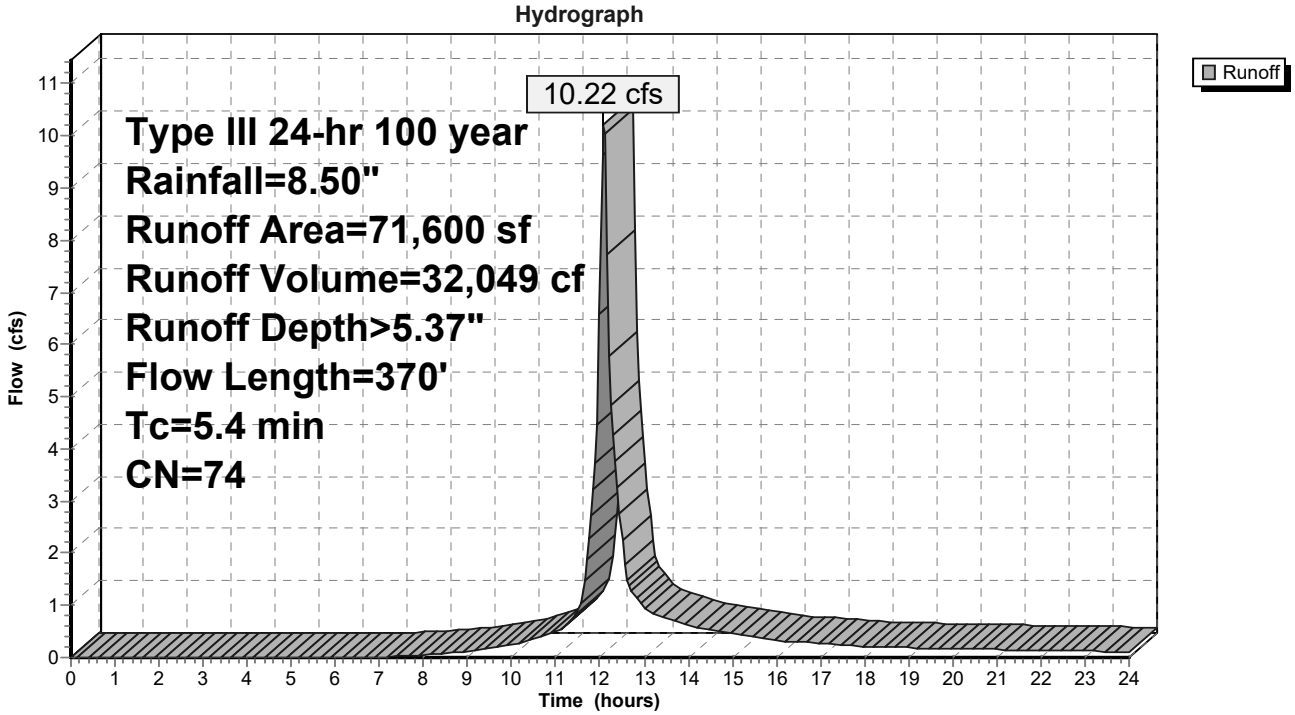
Runoff = 10.22 cfs @ 12.08 hrs, Volume= 32,049 cf, Depth> 5.37"

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
448	98	Paved roads w/curbs & sewers, HSG B
46,707	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
9,045	98	Water Surface, HSG B
71,600	74	Weighted Average
46,707		Pervious Area
24,893		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.2	50	0.0800	0.26		**Sheet Flow, SHEET GRASS** Grass: Short n= 0.150 P2= 3.20"
2.2	320	0.1218	2.44		**Shallow Concentrated Flow, SHALLOW GRASS** Short Grass Pasture Kv= 7.0 fps
0.0					**Direct Entry, DIRECT**
5.4	370	Total			

Subcatchment P-3B: P-3B



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

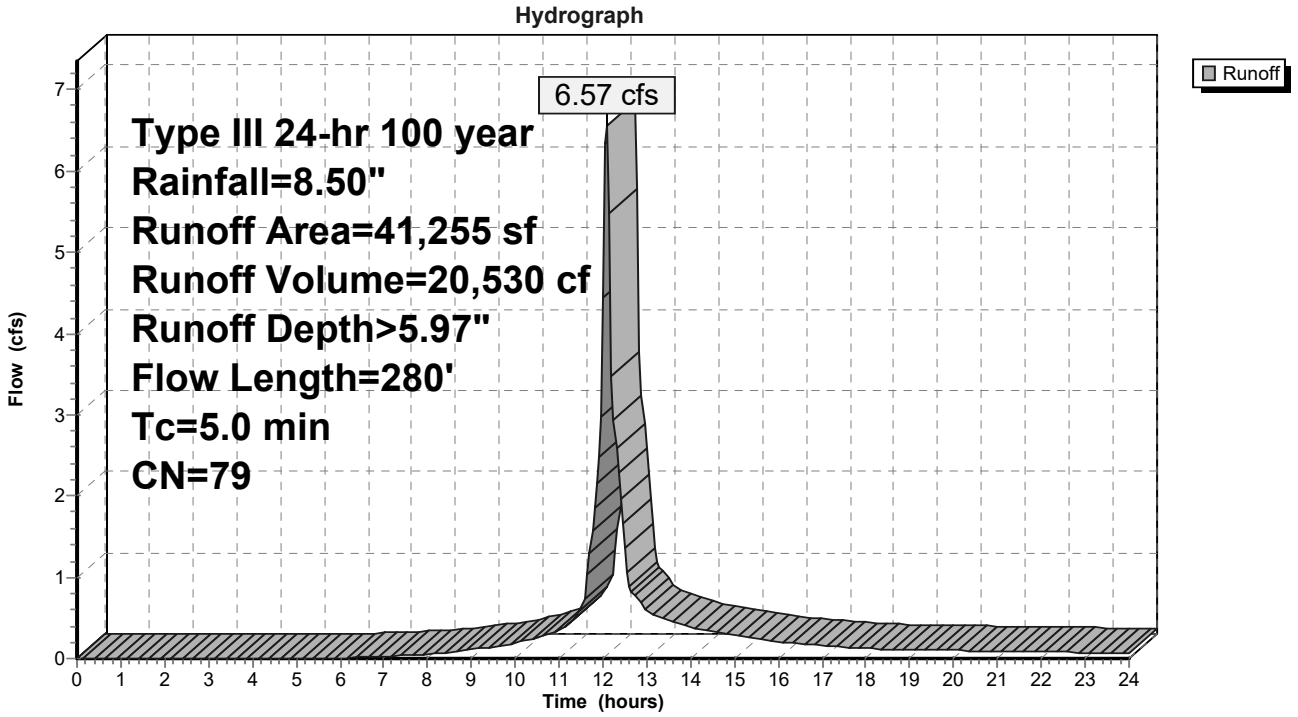
Runoff = 6.57 cfs @ 12.07 hrs, Volume= 20,530 cf, Depth> 5.97"

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
21,208	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
41,255	79	Weighted Average
21,208		Pervious Area
20,047		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	50	0.0600	1.86		**Sheet Flow, SHEET GRASS** Smooth surfaces n= 0.011 P2= 3.20"
1.2	90	0.0310	1.23		**Shallow Concentrated Flow, SHALLOW GRASS** Short Grass Pasture Kv= 7.0 fps
1.5	140	0.0060	1.57		**Shallow Concentrated Flow, SHALLOW PAVEMENT** Paved Kv= 20.3 fps
1.9					**Direct Entry, DIRECT**
5.0	280	Total			

Subcatchment P-3C: P-3C



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

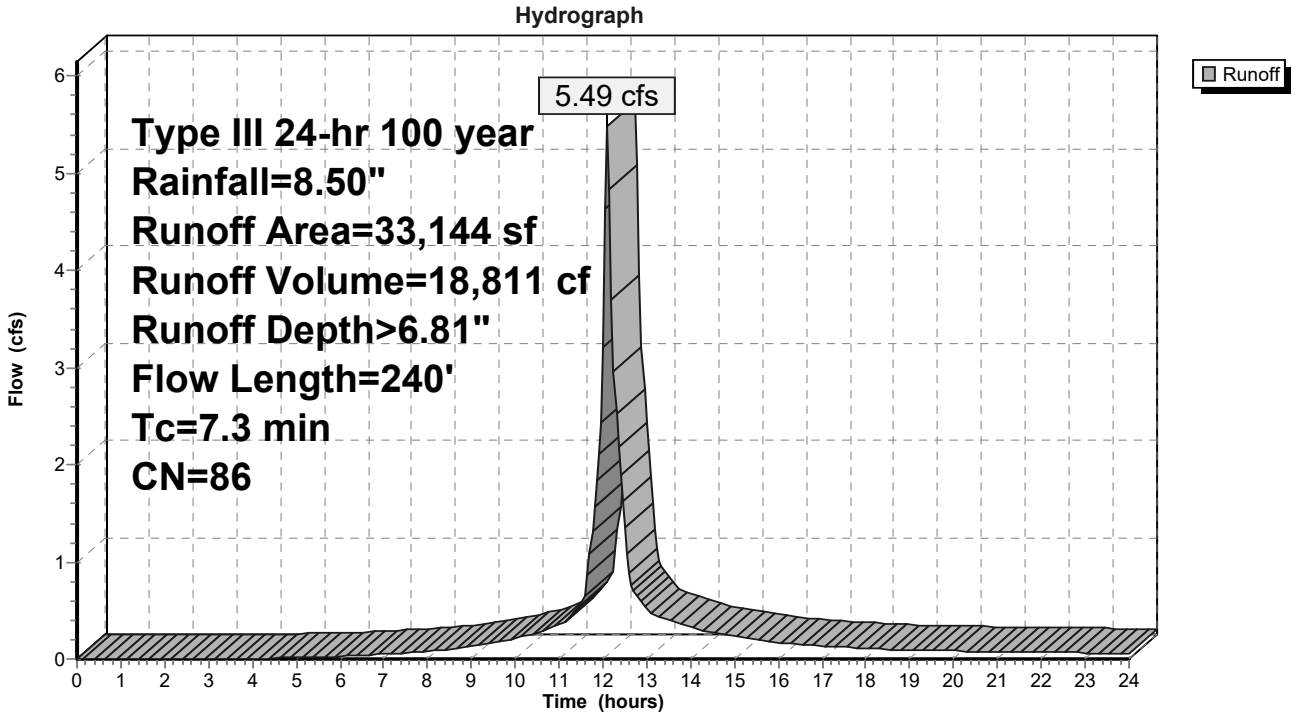
Runoff = 5.49 cfs @ 12.10 hrs, Volume= 18,811 cf, Depth> 6.81"

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
8,800	98	Roofs, HSG B
13,806	98	Paved roads w/curbs & sewers, HSG B
10,538	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
33,144	86	Weighted Average
10,538		Pervious Area
22,606		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0200	0.15		**Sheet Flow, SHEET GR** Grass: Short n= 0.150 P2= 3.20"
1.0	90	0.0500	1.57		**Shallow Concentrated Flow, SHALLOW GRASS** Short Grass Pasture Kv= 7.0 fps
0.7	100	0.0150	2.49		**Shallow Concentrated Flow, SHALLOW PAVE** Paved Kv= 20.3 fps
7.3	240	Total			

Subcatchment P-3D: P-3D



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

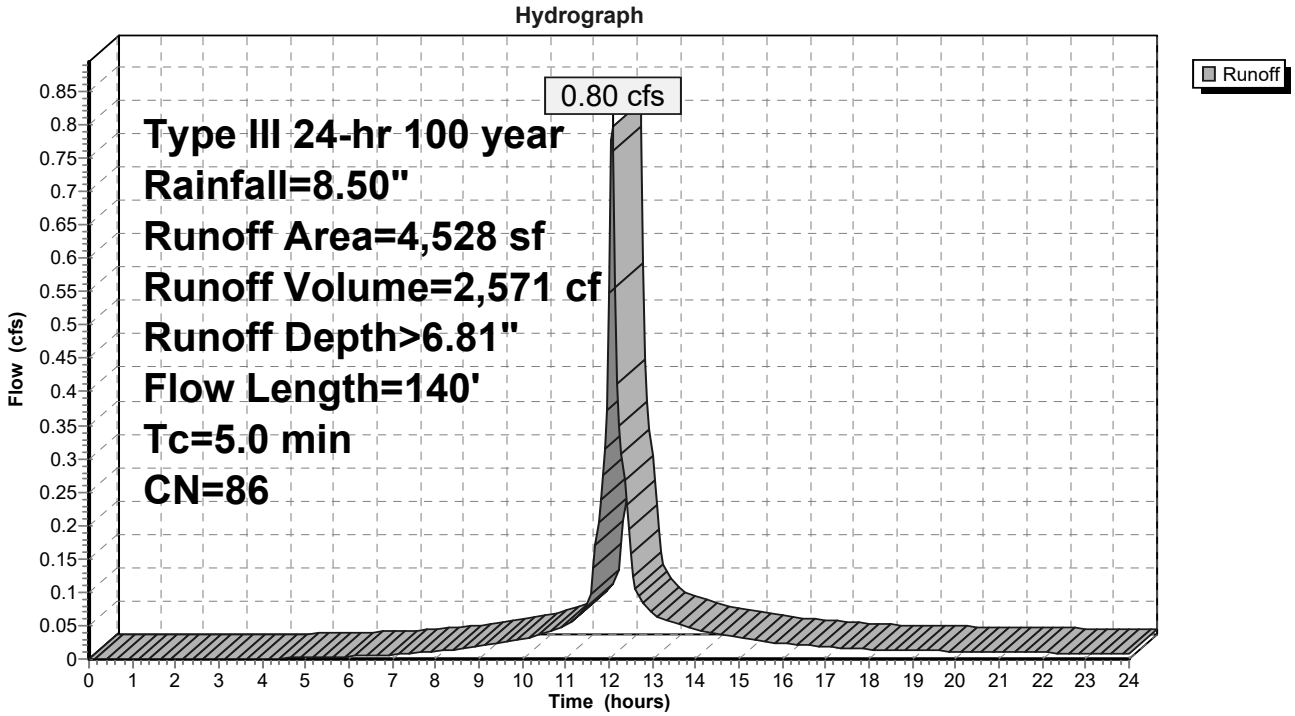
Runoff = 0.80 cfs @ 12.07 hrs, Volume= 2,571 cf, Depth> 6.81"

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
1,424	61	>75% Grass cover, Good, HSG B
0	55	Woods, Good, HSG B
4,528	86	Weighted Average
1,424		Pervious Area
3,104		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.20		**Sheet Flow, SHEET PAVEMENT** Smooth surfaces n= 0.011 P2= 3.20"
0.5	90	0.0220	3.01		**Shallow Concentrated Flow, SHALLOW PAVEMENT** Paved Kv= 20.3 fps
3.8					**Direct Entry, DIRECT**
5.0	140	Total			

Subcatchment P-3E: P-3F



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

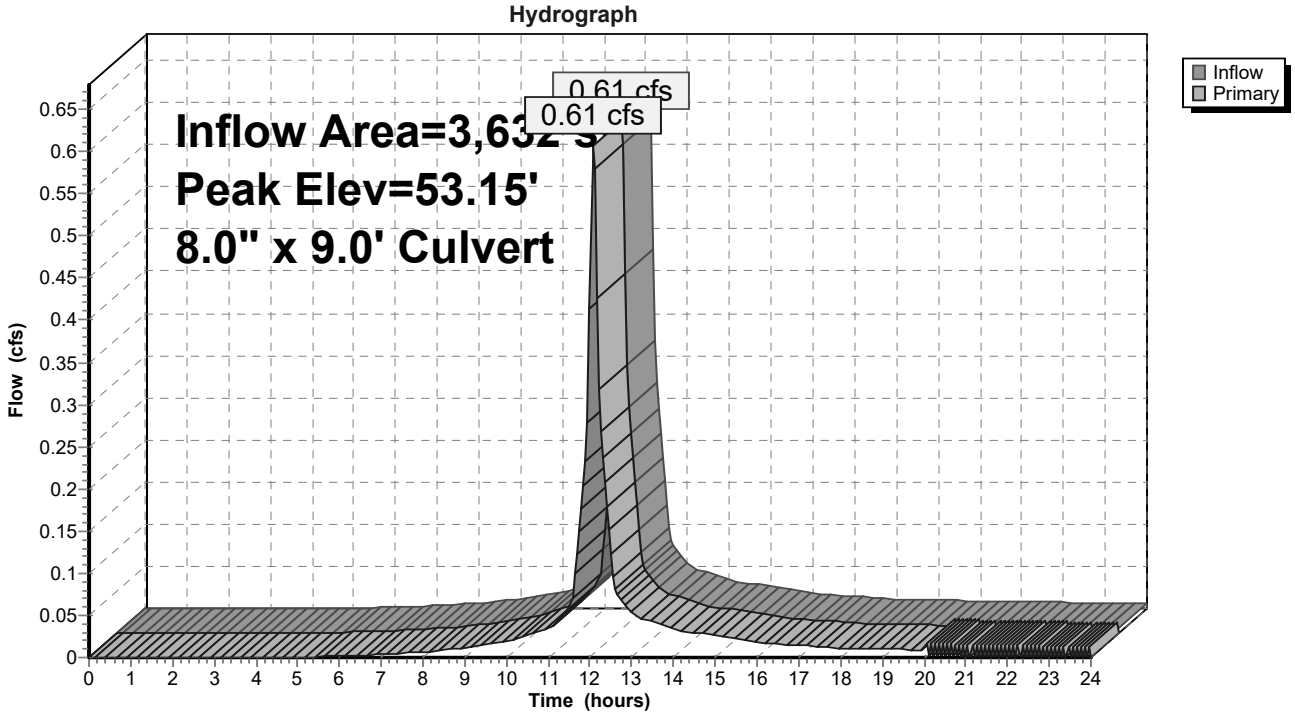
Inflow Area = 3,632 sf, 56.17% Impervious, Inflow Depth > 6.33" for 100 year event
Inflow = 0.61 cfs @ 12.07 hrs, Volume= 1,916 cf
Outflow = 0.61 cfs @ 12.07 hrs, Volume= 1,916 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.61 cfs @ 12.07 hrs, Volume= 1,916 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 53.15' @ 12.36 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 @ 12.07 hrs HW=51.85' TW=52.06' (Dynamic Tailwater)
└**1=Culvert** (Controls 0.00 cfs)

Pond CB1: CB1



Summary for Pond CB2: CB2

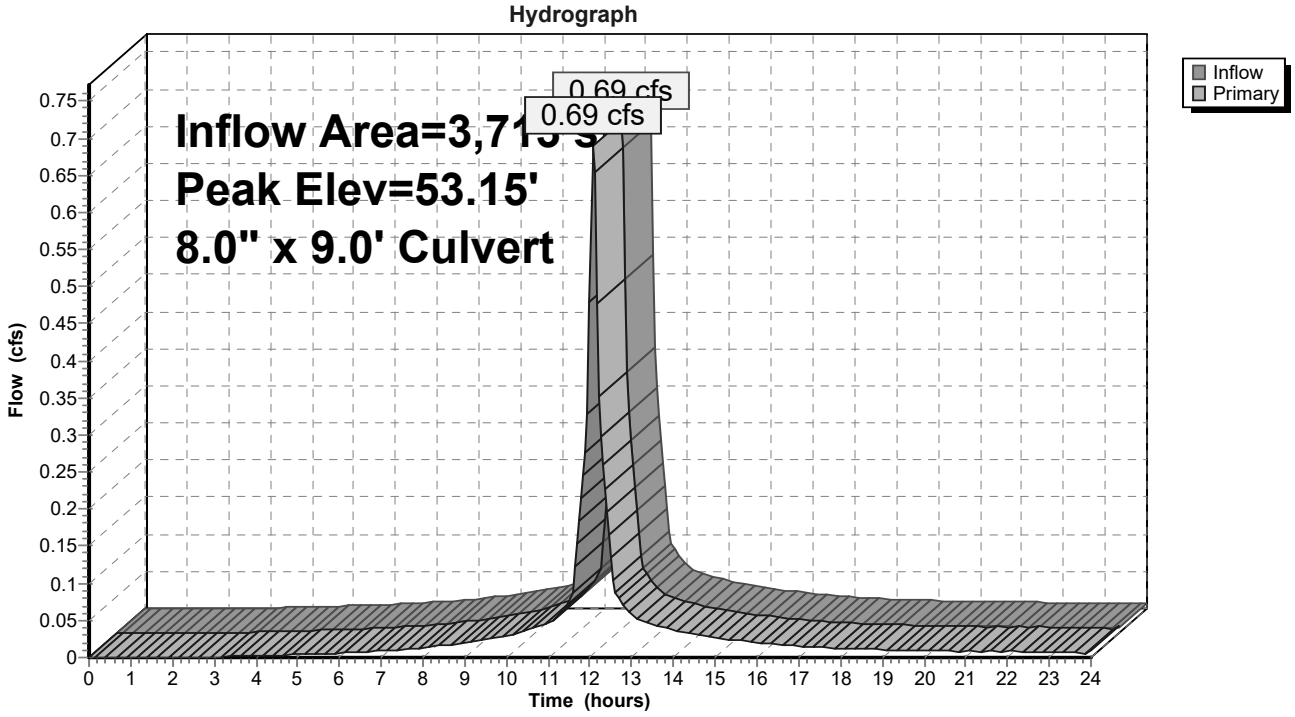
Inflow Area = 3,713 sf, 81.12% Impervious, Inflow Depth > 7.41" for 100 year event
Inflow = 0.69 cfs @ 12.07 hrs, Volume= 2,294 cf
Outflow = 0.69 cfs @ 12.07 hrs, Volume= 2,294 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.69 cfs @ 12.07 hrs, Volume= 2,294 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 53.15' @ 12.36 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 @ 12.07 hrs HW=51.86' TW=52.05' (Dynamic Tailwater)
└**1=Culvert** (Controls 0.00 cfs)

Pond CB2: CB2



Summary for Pond CB3: CB3

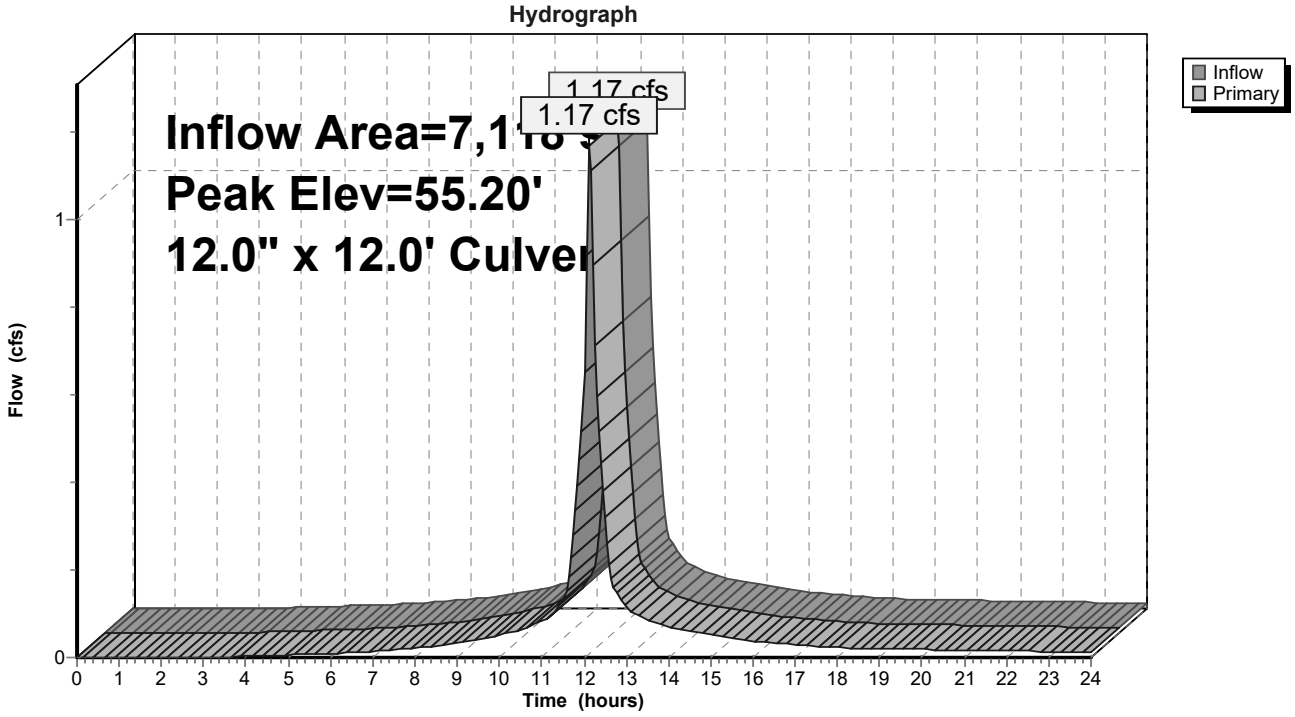
Inflow Area = 7,118 sf, 74.36% Impervious, Inflow Depth > 7.17" for 100 year event
Inflow = 1.17 cfs @ 12.12 hrs, Volume= 4,253 cf
Outflow = 1.17 cfs @ 12.12 hrs, Volume= 4,253 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.17 cfs @ 12.12 hrs, Volume= 4,253 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 55.20' @ 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 @ 12.12 hrs HW=54.99' TW=55.00' (Dynamic Tailwater)
└**1=Culvert** (Controls 0.00 cfs)

Pond CB3: CB3



Summary for Pond CB4: CB4

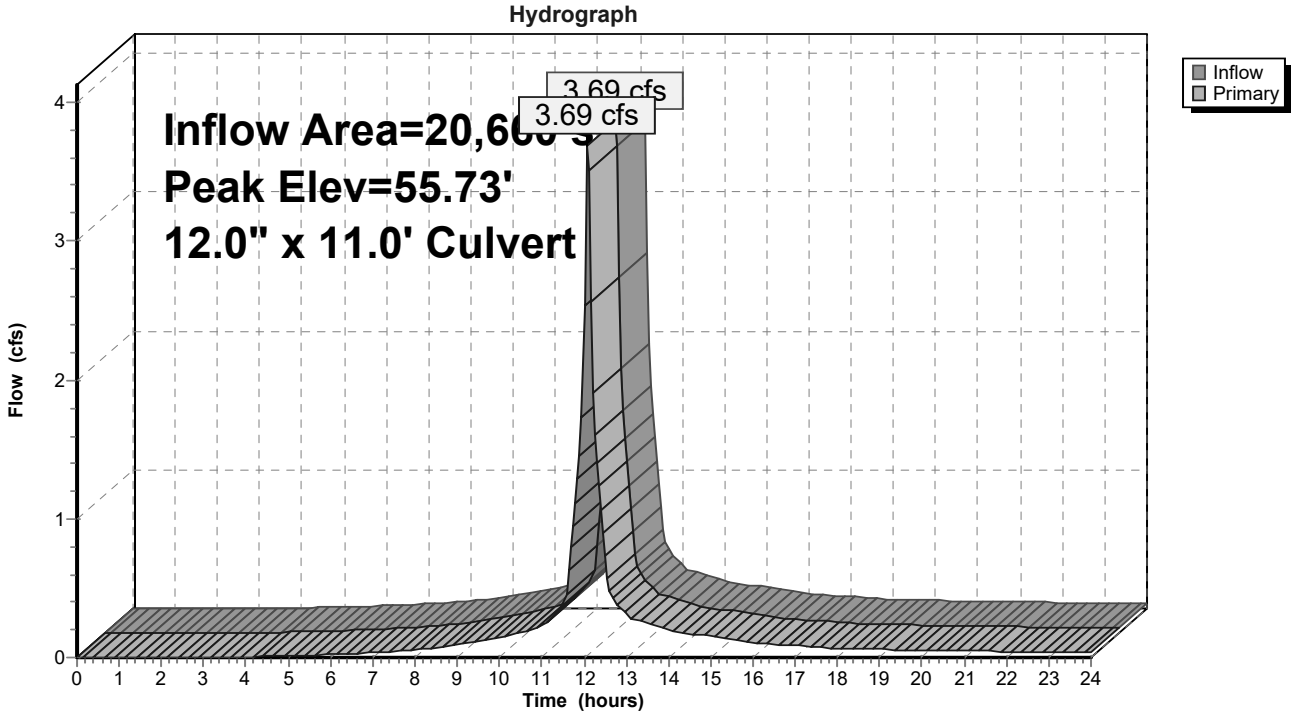
Inflow Area = 20,660 sf, 69.29% Impervious, Inflow Depth > 6.93" for 100 year event
Inflow = 3.69 cfs @ 12.07 hrs, Volume= 11,937 cf
Outflow = 3.69 cfs @ 12.07 hrs, Volume= 11,937 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.69 cfs @ 12.07 hrs, Volume= 11,937 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 55.73' @ 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=1.85 cfs @ 12.07 hrs HW=55.17' TW=54.93' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 1.85 cfs @ 2.36 fps)

Pond CB4: CB4



Summary for Pond CB5: CB5

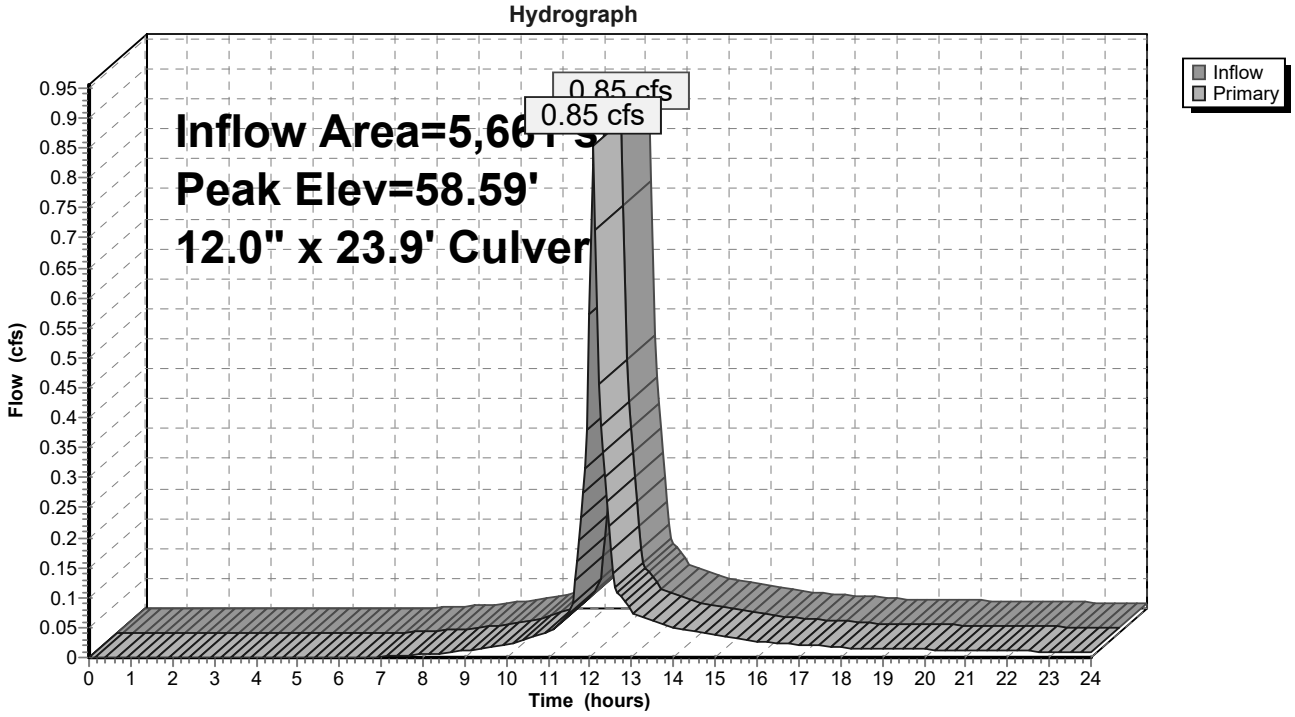
Inflow Area = 5,661 sf, 39.83% Impervious, Inflow Depth > 5.61" for 100 year event
Inflow = 0.85 cfs @ 12.07 hrs, Volume= 2,647 cf
Outflow = 0.85 cfs @ 12.07 hrs, Volume= 2,647 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.85 cfs @ 12.07 hrs, Volume= 2,647 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 58.59' @ 12.10 hrs
Flood Elev= 65.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	58.00'	**12.0" x 23.9' long Culvert** RCP, groove end projecting, Ke= 0.200 Outlet Invert= 57.76' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.70 cfs @ 12.07 hrs HW=58.55' TW=58.39' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 0.70 cfs @ 2.25 fps)

Pond CB5: CB5



Summary for Pond CB6: CB6

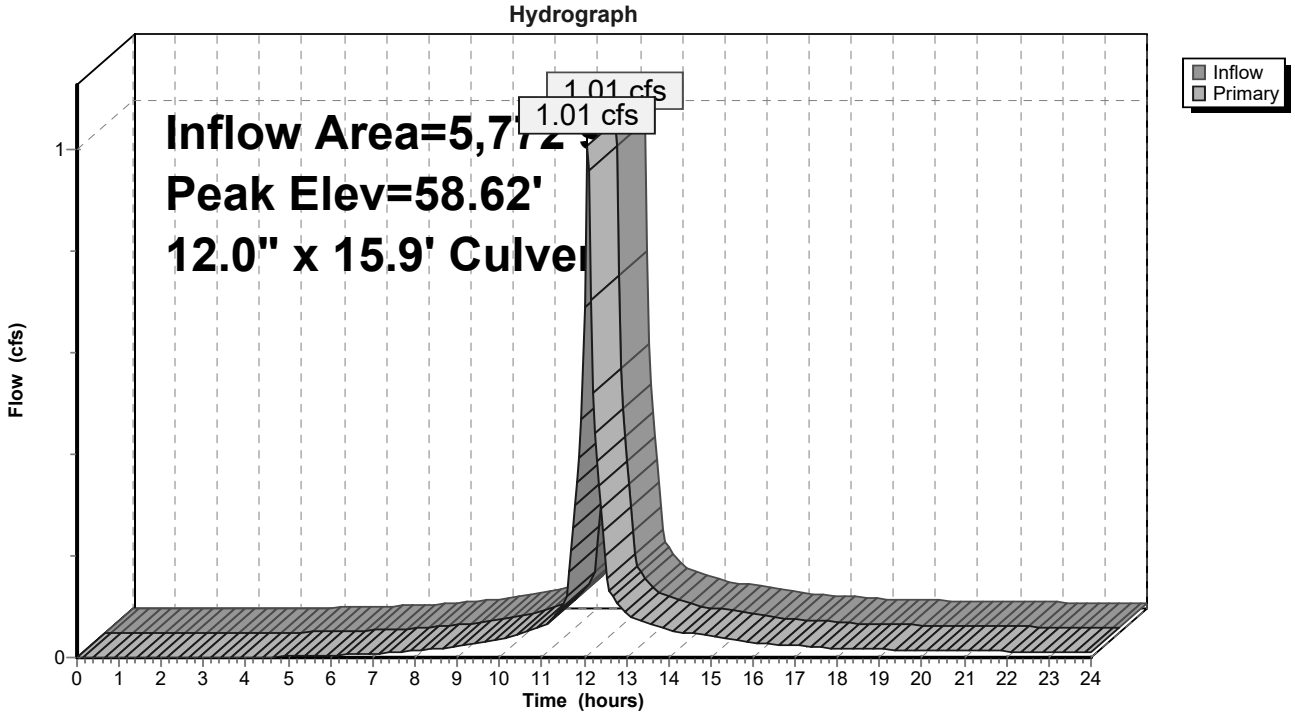
Inflow Area = 5,772 sf, 64.26% Impervious, Inflow Depth > 6.69" for 100 year event
Inflow = 1.01 cfs @ 12.07 hrs, Volume= 3,219 cf
Outflow = 1.01 cfs @ 12.07 hrs, Volume= 3,219 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.01 cfs @ 12.07 hrs, Volume= 3,219 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 58.62' @ 12.10 hrs
Flood Elev= 65.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	58.00'	**12.0" x 15.9' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 57.84' S= 0.0101 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=0.84 cfs @ 12.07 hrs HW=58.59' TW=58.39' (Dynamic Tailwater)
└**1=Culvert** (Outlet Controls 0.84 cfs @ 2.50 fps)

Pond CB6: CB6



Summary for Pond CB7: CB7

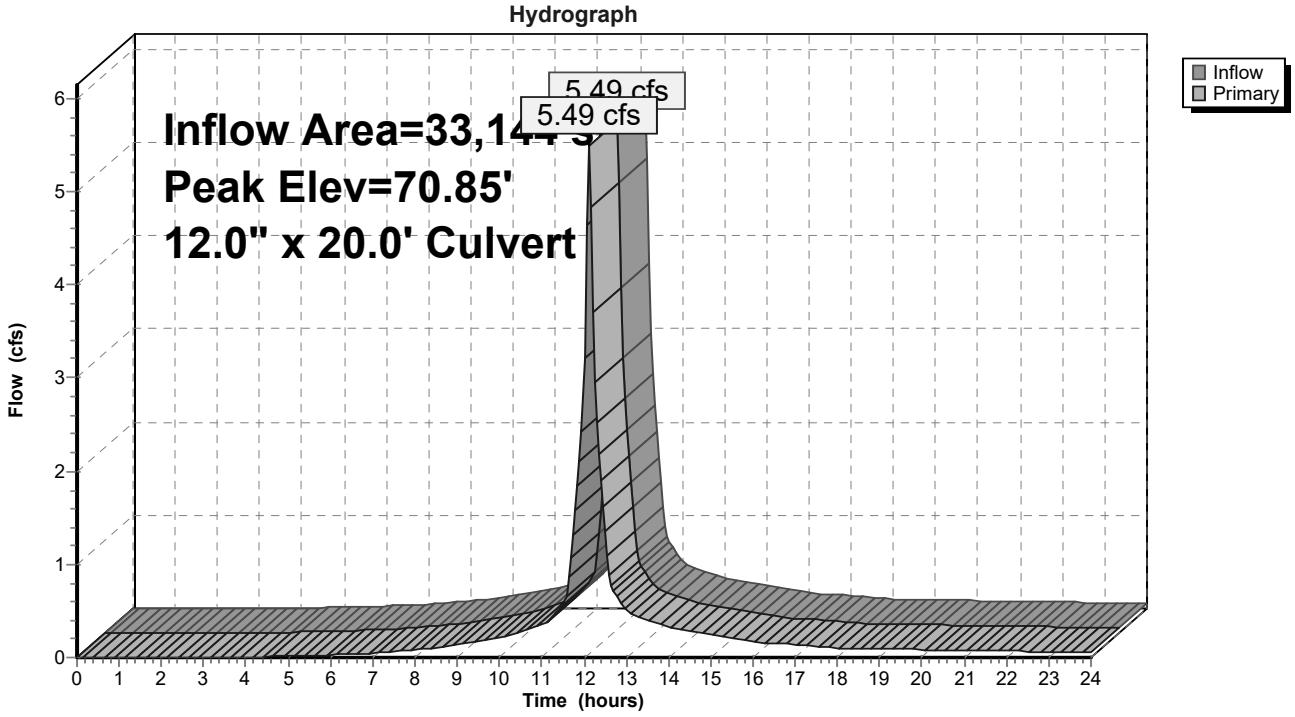
Inflow Area = 33,144 sf, 68.21% Impervious, Inflow Depth > 6.81" for 100 year event
Inflow = 5.49 cfs @ 12.10 hrs, Volume= 18,811 cf
Outflow = 5.49 cfs @ 12.10 hrs, Volume= 18,811 cf, Atten= 0%, Lag= 0.0 min
Primary = 5.49 cfs @ 12.10 hrs, Volume= 18,811 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 70.85' @ 12.16 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=3.73 cfs @ 12.10 hrs HW=70.19' TW=69.22' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 3.73 cfs @ 4.75 fps)

Pond CB7: CB7



Summary for Pond CB8: CB8

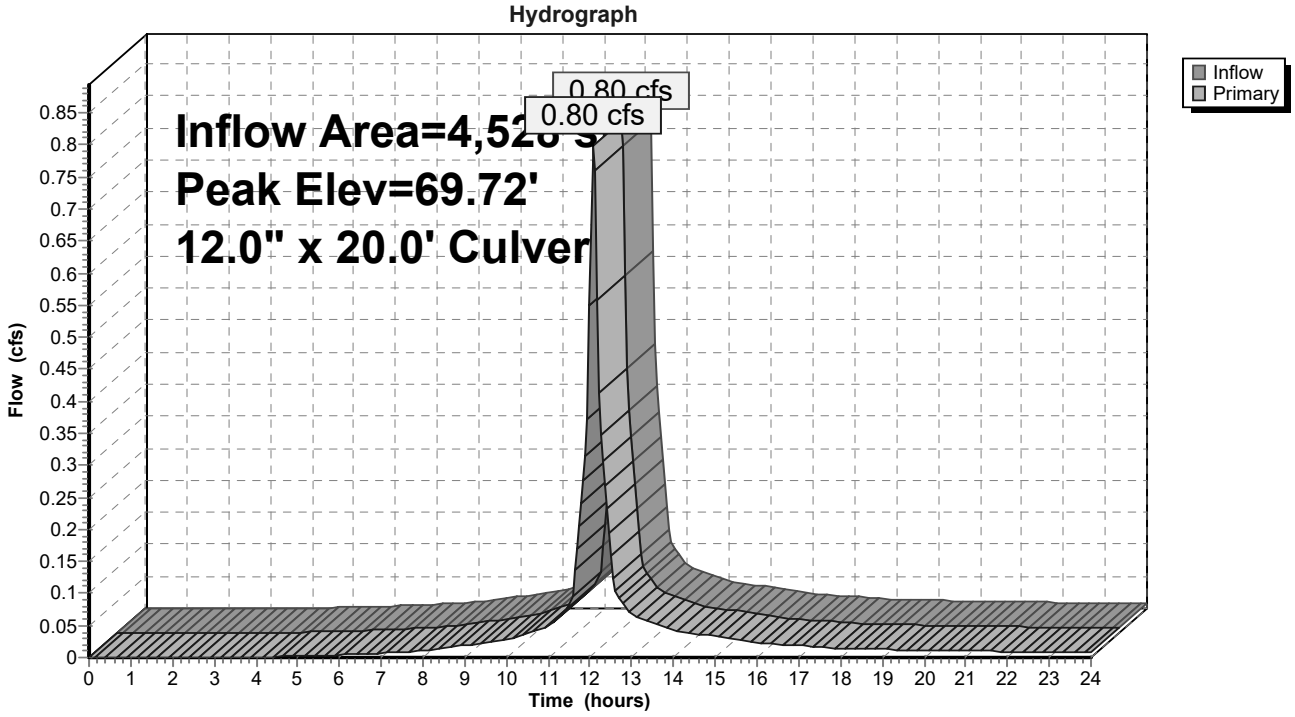
Inflow Area = 4,528 sf, 68.55% Impervious, Inflow Depth > 6.81" for 100 year event
Inflow = 0.80 cfs @ 12.07 hrs, Volume= 2,571 cf
Outflow = 0.80 cfs @ 12.07 hrs, Volume= 2,571 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.80 cfs @ 12.07 hrs, Volume= 2,571 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 69.72' @ 12.22 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=67.57' TW=68.55' (Dynamic Tailwater)
└**1=Culvert** (Controls 0.00 cfs)

Pond CB8: CB8



Summary for Pond CB9: CB9

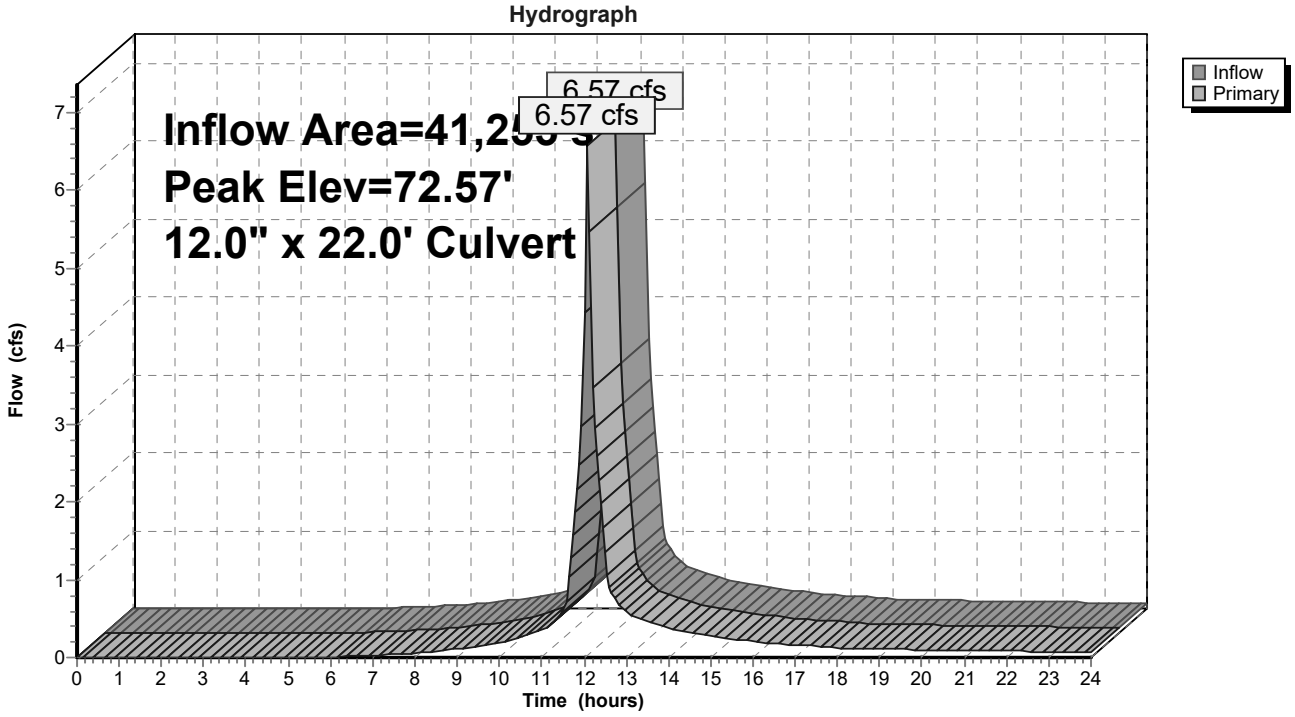
Inflow Area = 41,255 sf, 48.59% Impervious, Inflow Depth > 5.97" for 100 year event
Inflow = 6.57 cfs @ 12.07 hrs, Volume= 20,530 cf
Outflow = 6.57 cfs @ 12.07 hrs, Volume= 20,530 cf, Atten= 0%, Lag= 0.0 min
Primary = 6.57 cfs @ 12.07 hrs, Volume= 20,530 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 72.57' @ 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=4.86 cfs @ 12.07 hrs HW=71.62' TW=69.97' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 4.86 cfs @ 6.19 fps)

Pond CB9: CB9



Summary for Pond DMH 10: DMH9

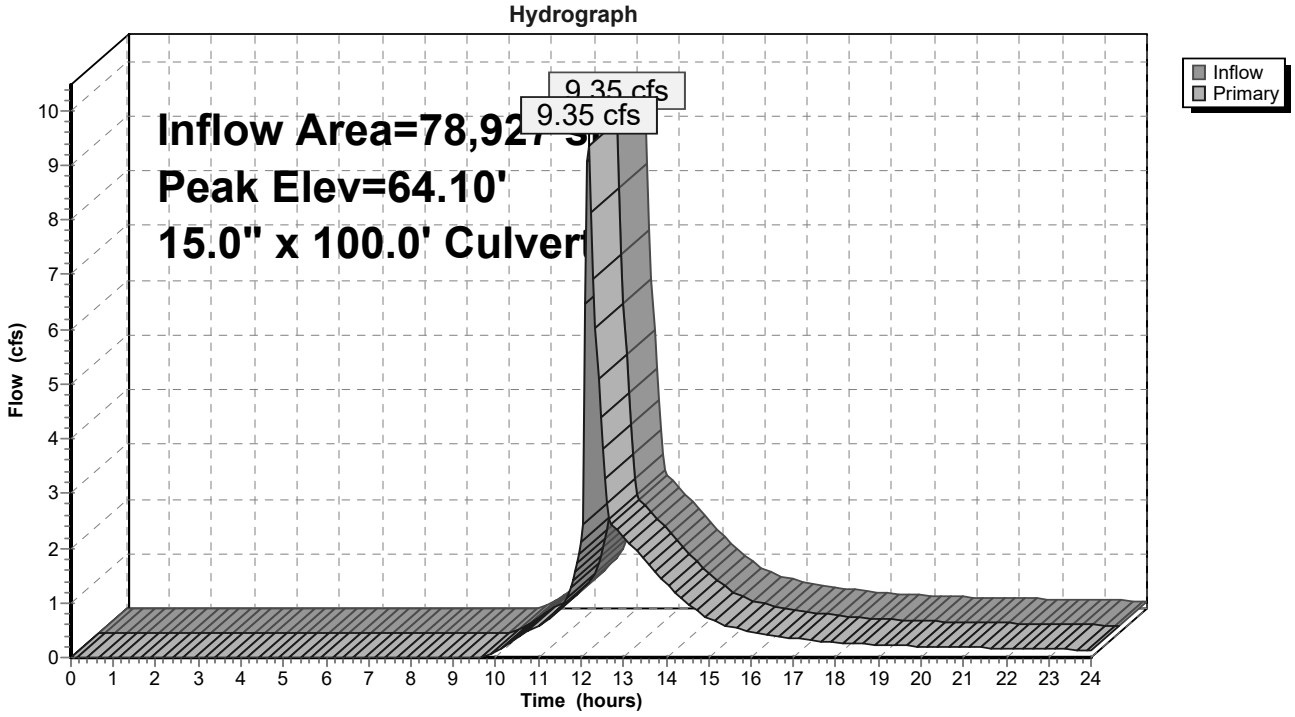
Inflow Area = 78,927 sf, 57.97% Impervious, Inflow Depth > 5.96" for 100 year event
Inflow = 9.35 cfs @ 12.17 hrs, Volume= 39,198 cf
Outflow = 9.35 cfs @ 12.17 hrs, Volume= 39,198 cf, Atten= 0%, Lag= 0.0 min
Primary = 9.35 cfs @ 12.17 hrs, Volume= 39,198 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 64.10' @ 12.17 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=9.02 cfs @ 12.17 hrs HW=63.96' TW=58.15' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 9.02 cfs @ 7.35 fps)

Pond DMH 10: DMH9



Summary for Pond DMH 11: DMH 10

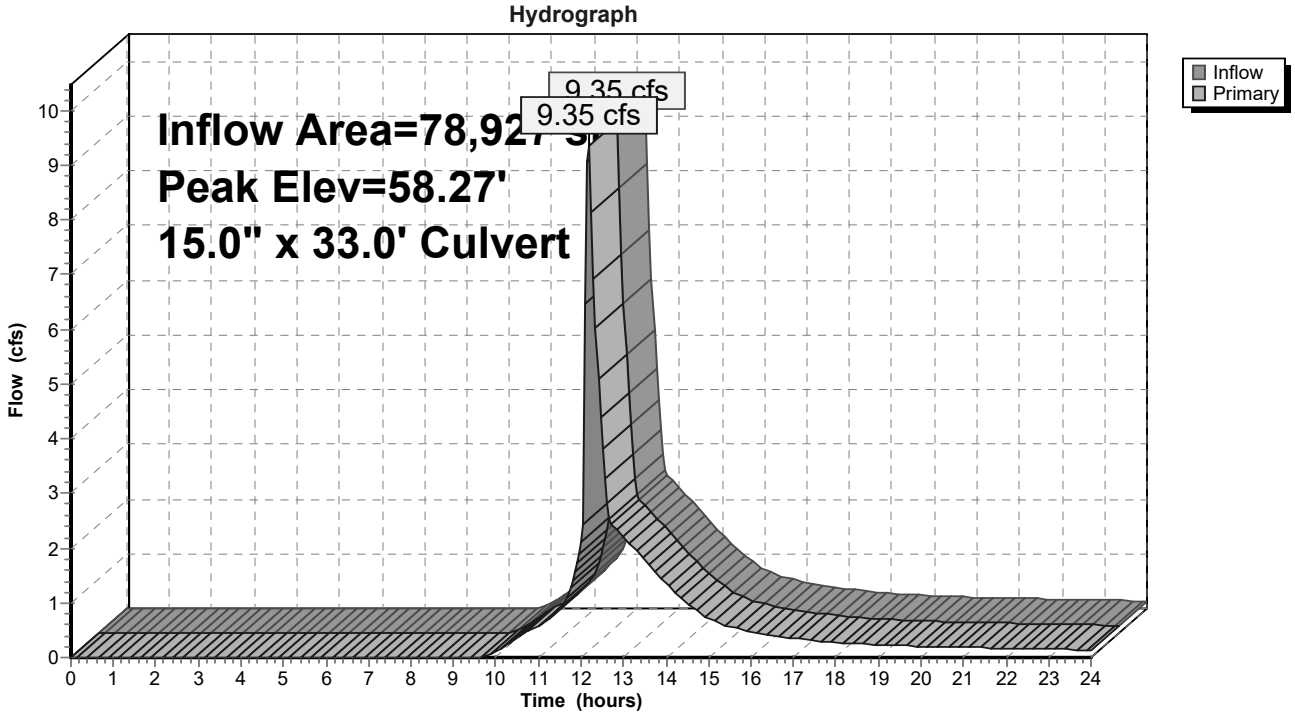
Inflow Area = 78,927 sf, 57.97% Impervious, Inflow Depth > 5.96" for 100 year event
Inflow = 9.35 cfs @ 12.17 hrs, Volume= 39,198 cf
Outflow = 9.35 cfs @ 12.17 hrs, Volume= 39,198 cf, Atten= 0%, Lag= 0.0 min
Primary = 9.35 cfs @ 12.17 hrs, Volume= 39,198 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 58.27' @ 12.17 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=9.02 cfs @ 12.17 hrs HW=58.15' TW=53.61' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 9.02 cfs @ 7.35 fps)

Pond DMH 11: DMH 10



Summary for Pond DMH 6: DMH 6

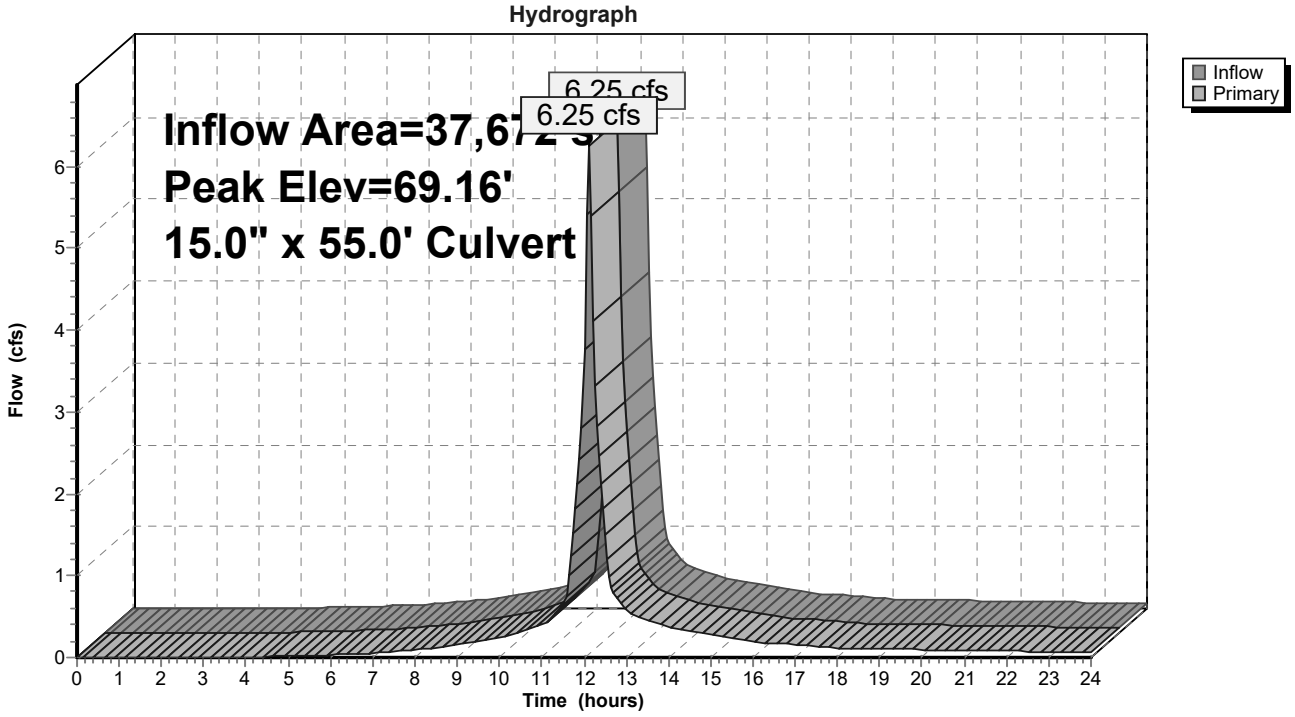
Inflow Area = 37,672 sf, 68.25% Impervious, Inflow Depth > 6.81" for 100 year event
Inflow = 6.25 cfs @ 12.10 hrs, Volume= 21,382 cf
Outflow = 6.25 cfs @ 12.10 hrs, Volume= 21,382 cf, Atten= 0%, Lag= 0.0 min
Primary = 6.25 cfs @ 12.10 hrs, Volume= 21,382 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 69.16' @ 12.25 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=3.95 cfs @ 12.10 hrs HW=68.56' TW=68.12' (Dynamic Tailwater)
└**1=Culvert** (Outlet Controls 3.95 cfs @ 3.22 fps)

Pond DMH 6: DMH 6



Summary for Pond DMH2: DMH2

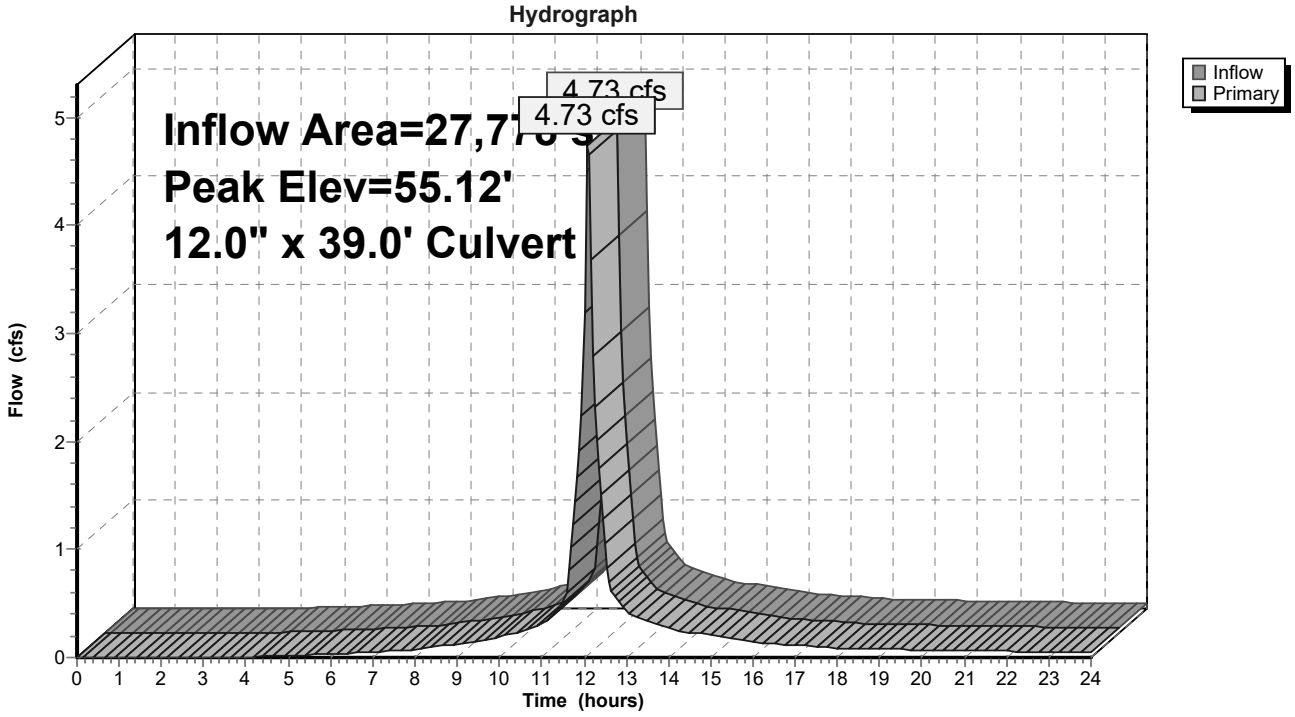
Inflow Area = 27,778 sf, 70.59% Impervious, Inflow Depth > 6.99" for 100 year event
Inflow = 4.73 cfs @ 12.08 hrs, Volume= 16,190 cf
Outflow = 4.73 cfs @ 12.08 hrs, Volume= 16,190 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.73 cfs @ 12.08 hrs, Volume= 16,190 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 55.12' @ 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=4.22 cfs @ 12.08 hrs HW=55.00' TW=53.75' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 4.22 cfs @ 5.37 fps)

Pond DMH2: DMH2



Summary for Pond DMH3: DMH3

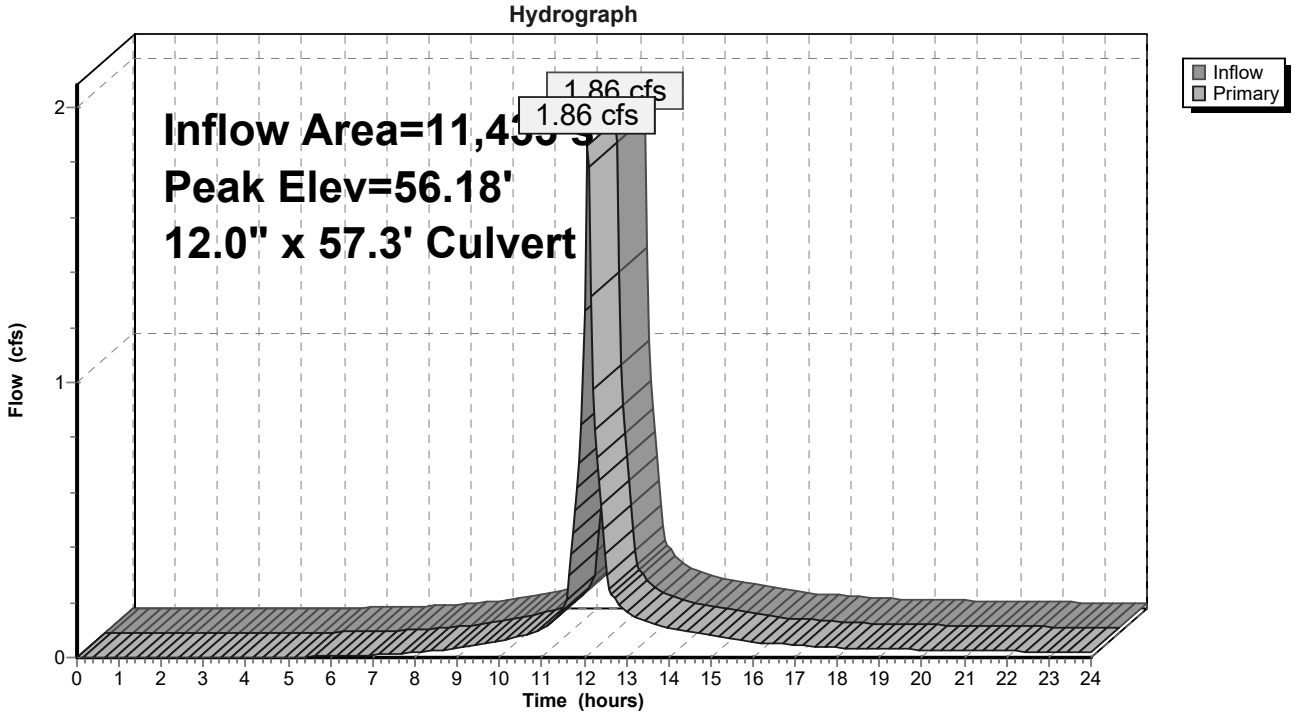
Inflow Area = 11,433 sf, 52.16% Impervious, Inflow Depth > 6.16" for 100 year event
Inflow = 1.86 cfs @ 12.07 hrs, Volume= 5,866 cf
Outflow = 1.86 cfs @ 12.07 hrs, Volume= 5,866 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.86 cfs @ 12.07 hrs, Volume= 5,866 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 56.18' @ 12.07 hrs
Flood Elev= 62.48'

Device	Routing	Invert	Outlet Devices
#1	Primary	55.29'	**12.0" x 57.3' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 55.00' S= 0.0051 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=1.79 cfs @ 12.07 hrs HW=56.16' TW=53.71' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 1.79 cfs @ 3.31 fps)

Pond DMH3: DMH3



Summary for Pond DMH4: DMH4

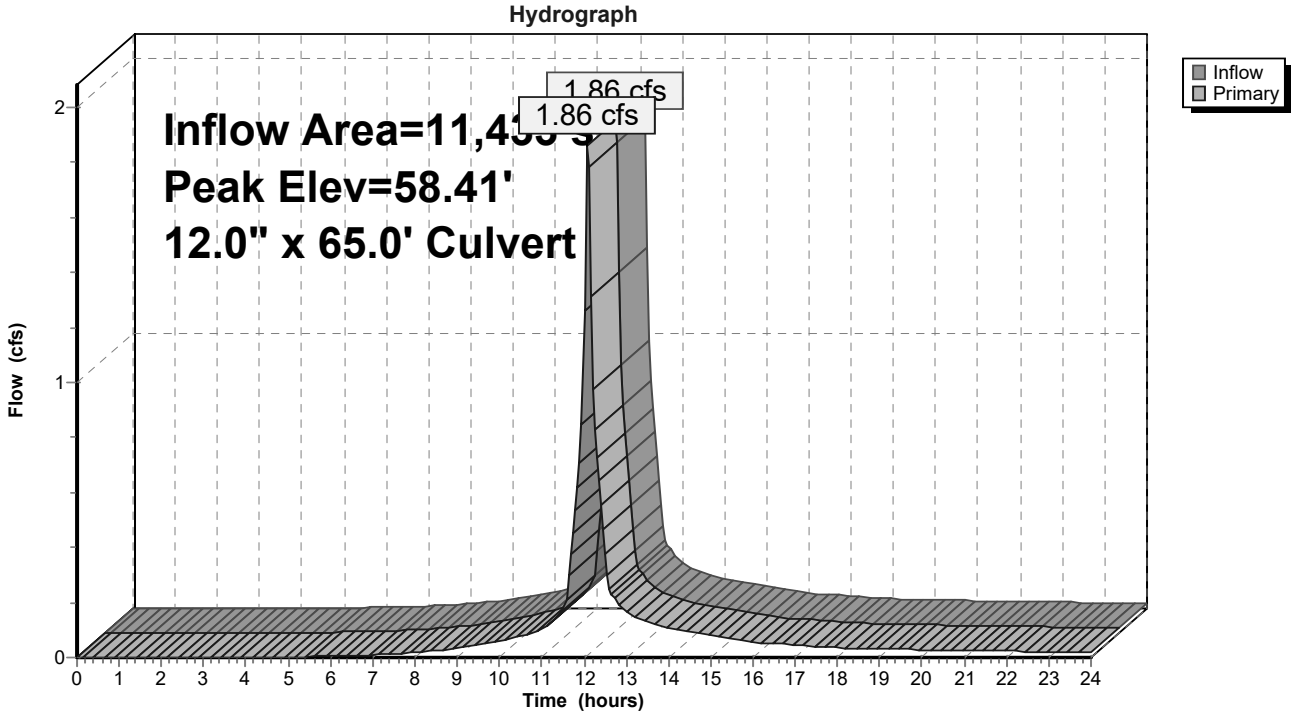
Inflow Area = 11,433 sf, 52.16% Impervious, Inflow Depth > 6.16" for 100 year event
Inflow = 1.86 cfs @ 12.07 hrs, Volume= 5,866 cf
Outflow = 1.86 cfs @ 12.07 hrs, Volume= 5,866 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.86 cfs @ 12.07 hrs, Volume= 5,866 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 58.41' @ 12.07 hrs
Flood Elev= 64.52'

Device	Routing	Invert	Outlet Devices
#1	Primary	57.66'	**12.0" x 65.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 55.39' S= 0.0349 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=1.79 cfs @ 12.07 hrs HW=58.39' TW=56.16' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 1.79 cfs @ 2.91 fps)

Pond DMH4: DMH4



Summary for Pond DMH5: DMH 5

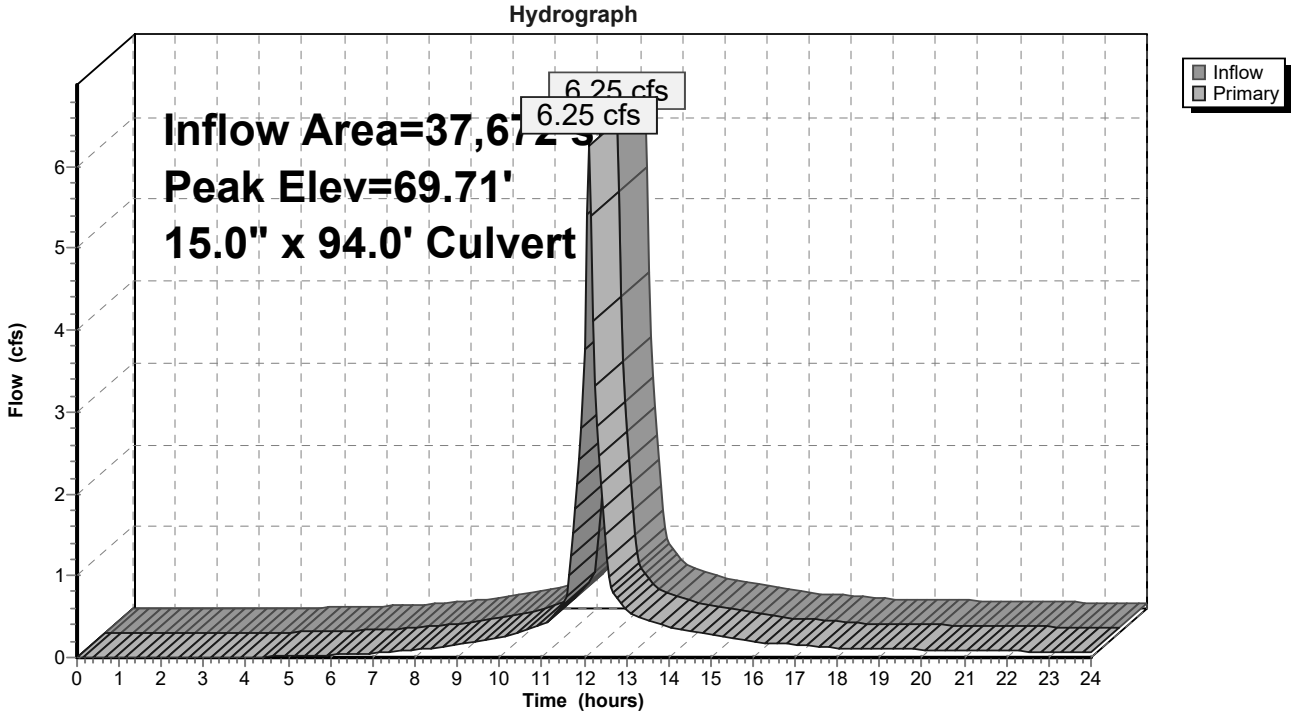
Inflow Area = 37,672 sf, 68.25% Impervious, Inflow Depth > 6.81" for 100 year event
Inflow = 6.25 cfs @ 12.10 hrs, Volume= 21,382 cf
Outflow = 6.25 cfs @ 12.10 hrs, Volume= 21,382 cf, Atten= 0%, Lag= 0.0 min
Primary = 6.25 cfs @ 12.10 hrs, Volume= 21,382 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 69.71' @ 12.17 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=4.02 cfs @ 12.10 hrs HW=69.18' TW=68.56' (Dynamic Tailwater)
└**1=Culvert** (Outlet Controls 4.02 cfs @ 3.28 fps)

Pond DMH5: DMH 5



Summary for Pond DMH7: DMH7

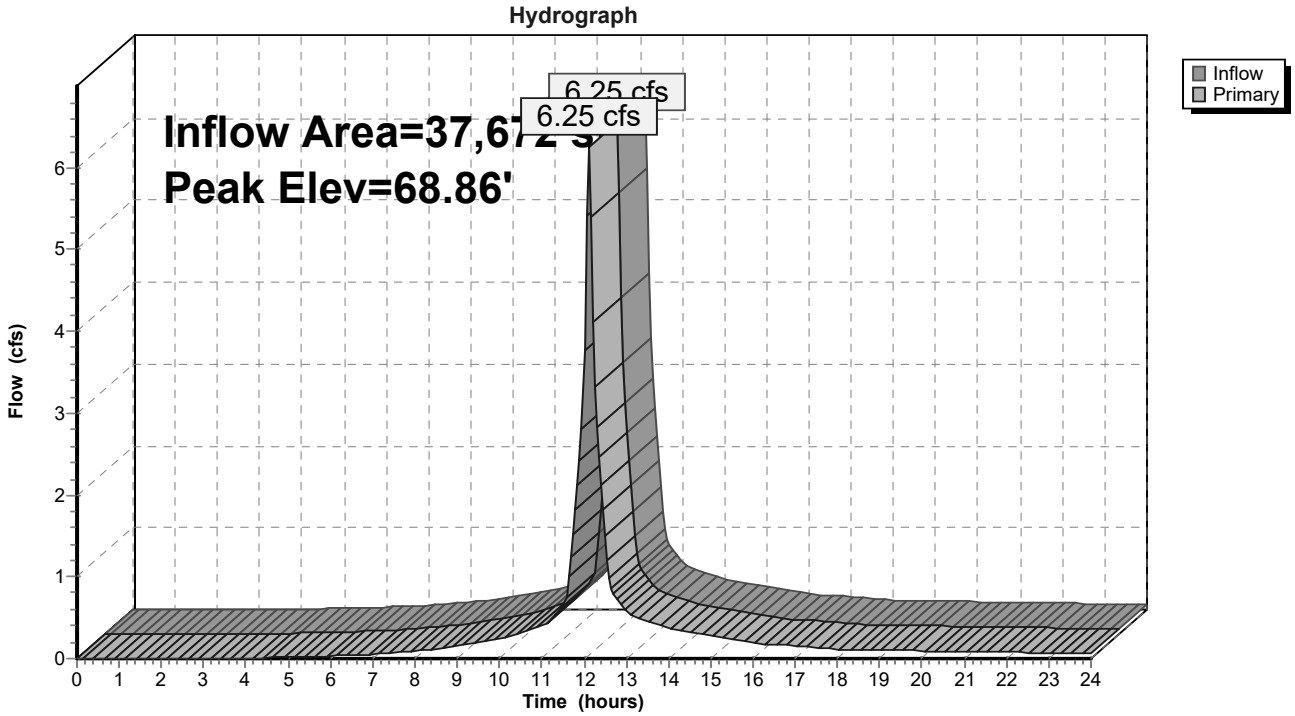
Inflow Area = 37,672 sf, 68.25% Impervious, Inflow Depth > 6.81" for 100 year event
Inflow = 6.25 cfs @ 12.10 hrs, Volume= 21,382 cf
Outflow = 6.25 cfs @ 12.10 hrs, Volume= 21,382 cf, Atten= 0%, Lag= 0.0 min
Primary = 6.25 cfs @ 12.10 hrs, Volume= 21,382 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 68.86' @ 12.21 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=3.19 cfs @ 12.10 hrs HW=68.12' TW=67.94' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 1.59 cfs @ 2.03 fps)
└─**2=Culvert** (Inlet Controls 1.59 cfs @ 2.03 fps)

Pond DMH7: DMH7



Summary for Pond DMH8: DMH8

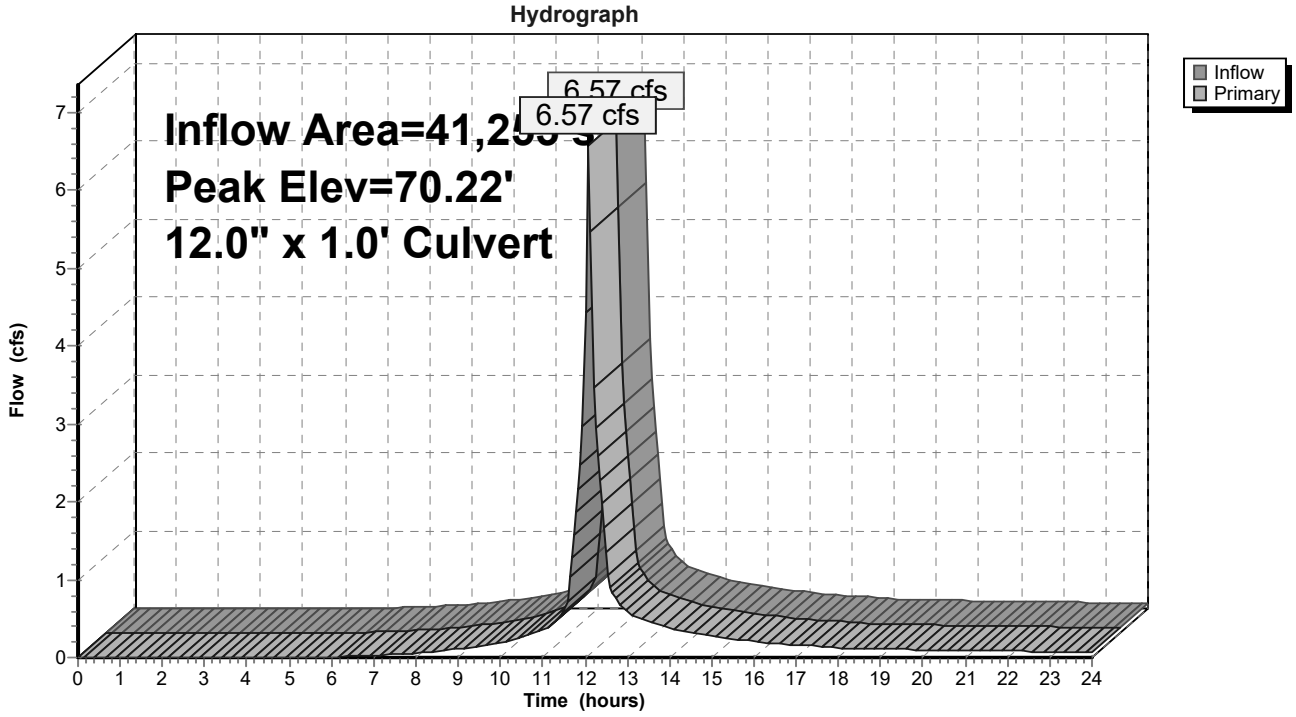
Inflow Area = 41,255 sf, 48.59% Impervious, Inflow Depth > 5.97" for 100 year event
Inflow = 6.57 cfs @ 12.07 hrs, Volume= 20,530 cf
Outflow = 6.57 cfs @ 12.07 hrs, Volume= 20,530 cf, Atten= 0%, Lag= 0.0 min
Primary = 6.57 cfs @ 12.07 hrs, Volume= 20,530 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 70.22' @ 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=5.73 cfs @ 12.07 hrs HW=69.97' TW=67.68' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 5.73 cfs @ 7.29 fps)

Pond DMH8: DMH8



Summary for Pond P1-1: P1-1

Inflow Area = 54,889 sf, 57.55% Impervious, Inflow Depth > 6.39" for 100 year event
Inflow = 8.87 cfs @ 12.08 hrs, Volume= 29,231 cf
Outflow = 4.36 cfs @ 12.24 hrs, Volume= 24,418 cf, Atten= 51%, Lag= 10.0 min
Primary = 4.36 cfs @ 12.24 hrs, Volume= 24,418 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 54.07' @ 12.25 hrs Surf.Area= 4,577 sf Storage= 10,477 cf
Flood Elev= 55.50' Surf.Area= 5,973 sf Storage= 18,004 cf

Plug-Flow detention time= 133.2 min calculated for 24,418 cf (84% of inflow)
Center-of-Mass det. time= 65.7 min (857.1 - 791.4)

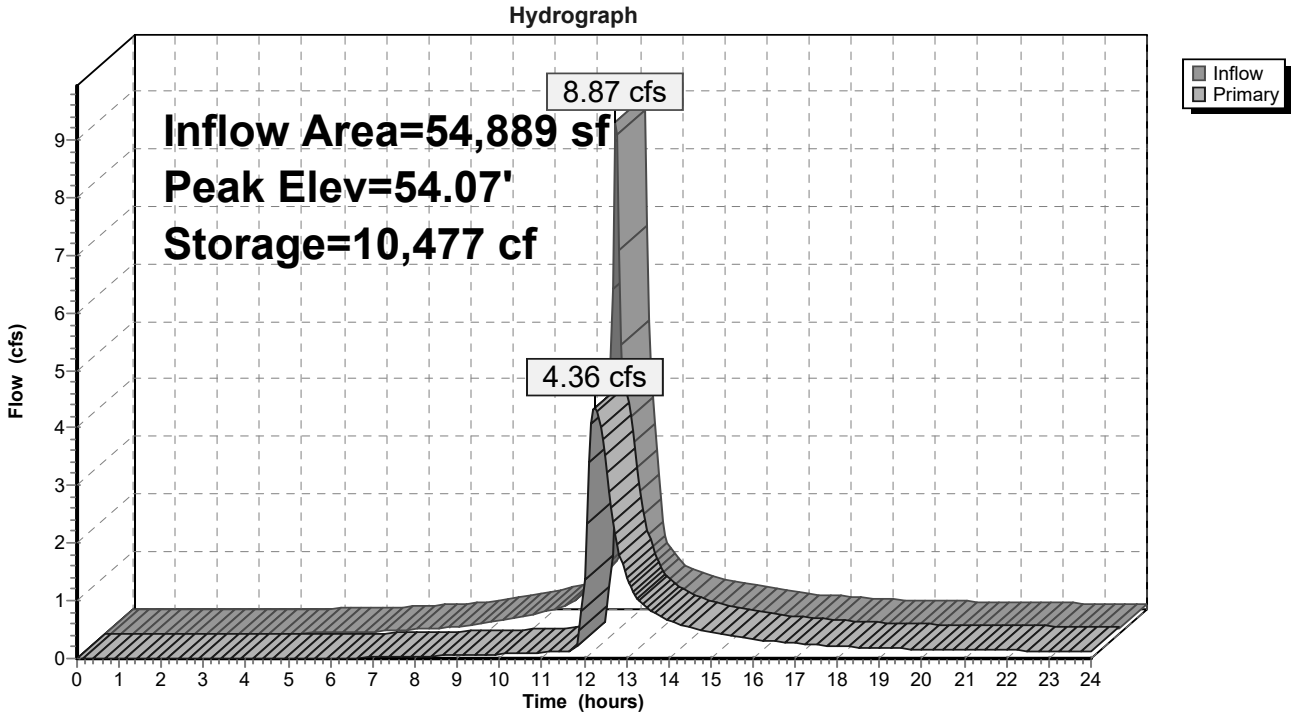
Volume	Invert	Avail.Storage	Storage Description
#1	51.00'	18,004 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

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=4.35 cfs @ 12.24 hrs HW=54.07' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 4.35 cfs of 5.51 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.18 cfs @ 8.32 fps)
  ├─**3=Orifice/Grate** (Orifice Controls 2.50 cfs @ 4.57 fps)
  ├─**4=Orifice/Grate** (Orifice Controls 1.67 cfs @ 3.08 fps)
  └─**5=Orifice/Grate** (Controls 0.00 cfs)

Pond P1-1: P1-1


Hydrograph
Inflow
Primary
8.87 cfs
4.36 cfs
Inflow Area=54,889 sf
Peak Elev=54.07'
Storage=10,477 cf
Flow (cfs)
Time (hours)

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

Inflow Area = 47,228 sf, 25.39% Impervious, Inflow Depth > 4.89" for 100 year event
Inflow = 6.23 cfs @ 12.08 hrs, Volume= 19,260 cf
Outflow = 0.39 cfs @ 14.02 hrs, Volume= 7,640 cf, Atten= 94%, Lag= 116.5 min
Primary = 0.39 cfs @ 14.02 hrs, Volume= 7,640 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 58.89' @ 14.02 hrs Surf.Area= 8,102 sf Storage= 12,437 cf
Flood Elev= 59.75' Surf.Area= 8,697 sf Storage= 15,495 cf

Plug-Flow detention time= 310.5 min calculated for 7,640 cf (40% of inflow)
Center-of-Mass det. time= 188.5 min (1,009.3 - 820.8)

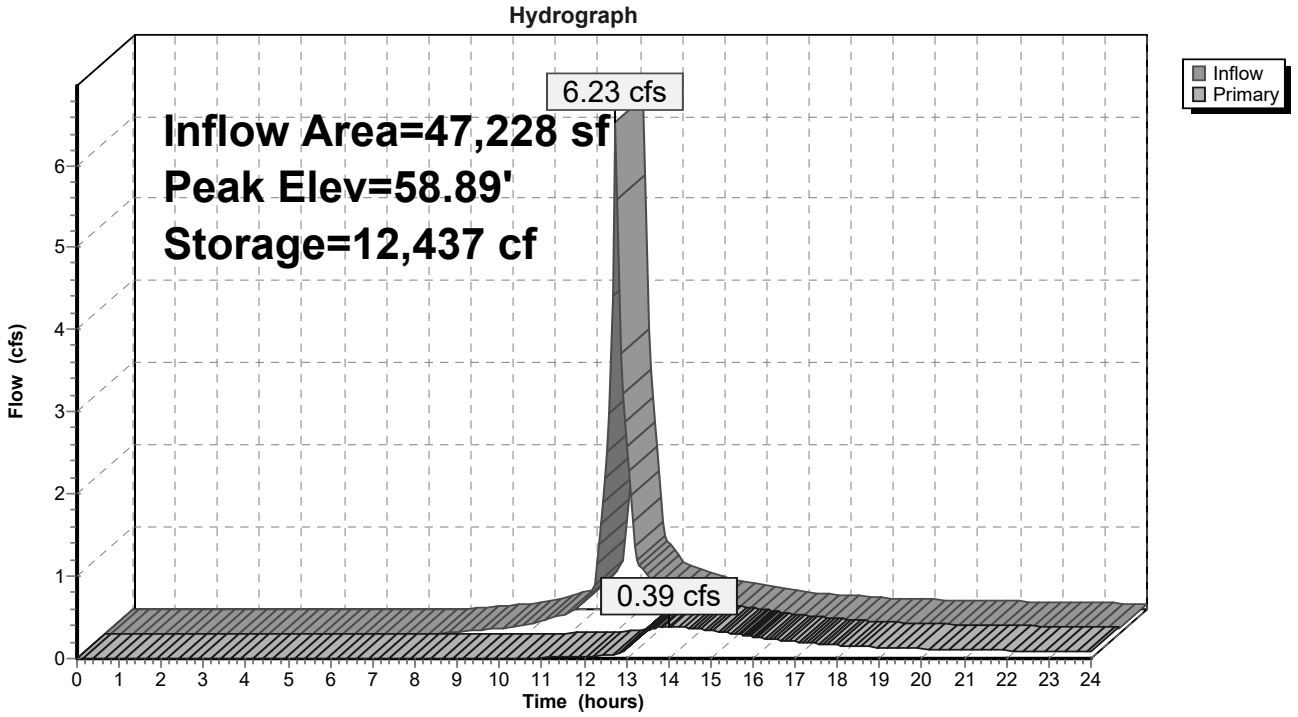
Volume	Invert	Avail.Storage	Storage Description
#1	57.00'	15,495 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
57.00	5,117	0	0
58.00	6,673	5,895	5,895
58.50	7,472	3,536	9,431
59.25	8,697	6,063	15,495

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=0.39 cfs @ 14.02 hrs HW=58.89' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Passes 0.04 cfs of 4.45 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 0.04 cfs @ 6.54 fps)
- **3=Broad-Crested Rectangular Weir** (Weir Controls 0.35 cfs @ 0.86 fps)

Pond P1-2: DP-1-2



Summary for Pond P1-3: P1-3

Inflow Area = 7,345 sf, 68.78% Impervious, Inflow Depth > 6.88" for 100 year event
Inflow = 1.30 cfs @ 12.07 hrs, Volume= 4,210 cf
Outflow = 0.61 cfs @ 12.31 hrs, Volume= 3,852 cf, Atten= 53%, Lag= 14.1 min
Primary = 0.61 cfs @ 12.31 hrs, Volume= 3,852 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 53.14' @ 12.31 hrs Surf.Area= 1,400 sf Storage= 1,861 cf
Flood Elev= 54.27' Surf.Area= 1,400 sf Storage= 1,861 cf

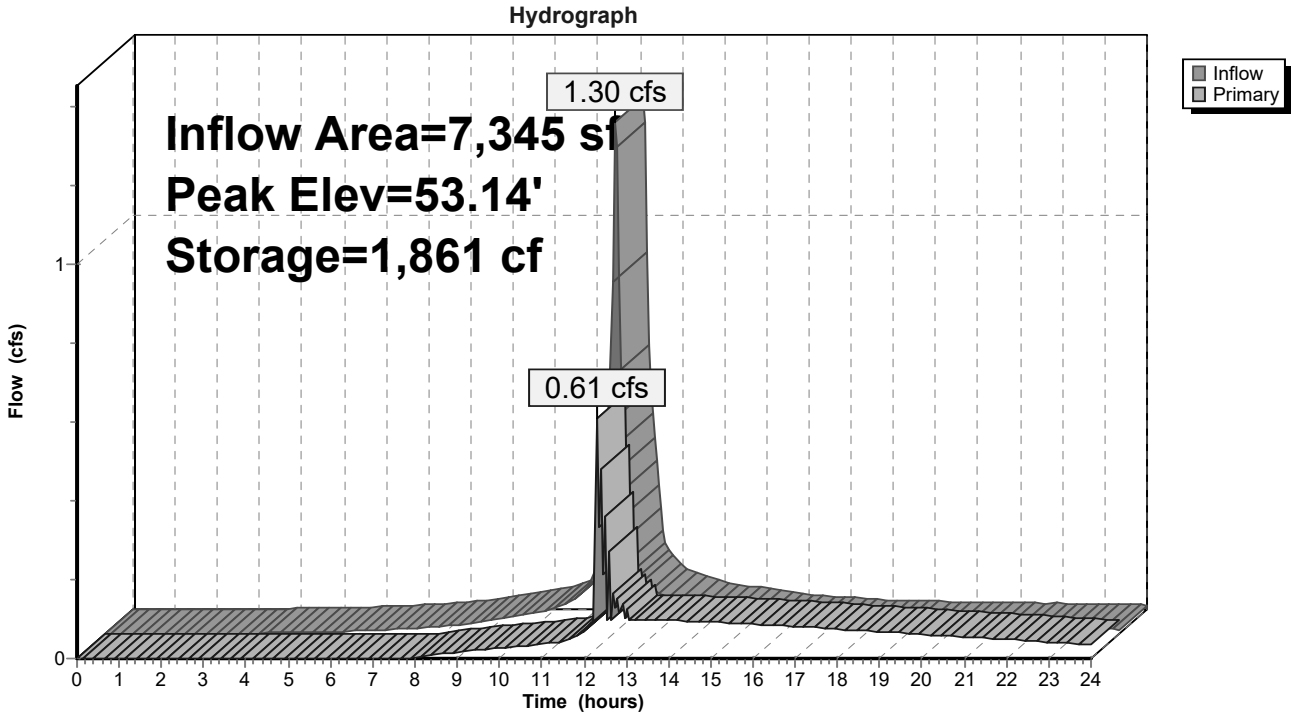
Plug-Flow detention time= 222.2 min calculated for 3,844 cf (91% of inflow)
Center-of-Mass det. time= 179.6 min (960.5 - 780.9)

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'	**1.5" 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=0.55 cfs @ 12.31 hrs HW=53.12' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.55 cfs of 5.89 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.10 cfs @ 8.15 fps)
  └─**3=Orifice/Grate** (Weir Controls 0.45 cfs @ 1.16 fps)

Pond P1-3: P1-3


Hydrograph
Inflow
Primary
1.30 cfs
0.61 cfs
Inflow Area=7,345 sf
Peak Elev=53.14'
Storage=1,861 cf
Flow (cfs)
0
1
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Time (hours)

Summary for Pond P3-1: P3-2

Inflow Area = 78,927 sf, 57.97% Impervious, Inflow Depth > 6.37" for 100 year event
Inflow = 12.65 cfs @ 12.09 hrs, Volume= 41,911 cf
Outflow = 9.35 cfs @ 12.17 hrs, Volume= 39,198 cf, Atten= 26%, Lag= 5.2 min
Primary = 9.35 cfs @ 12.17 hrs, Volume= 39,198 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 68.61' @ 12.17 hrs Surf.Area= 3,825 sf Storage= 11,051 cf
Flood Elev= 70.00' Surf.Area= 3,825 sf Storage= 13,172 cf

Plug-Flow detention time= 77.4 min calculated for 39,116 cf (93% of inflow)
Center-of-Mass det. time= 43.5 min (837.2 - 793.7)

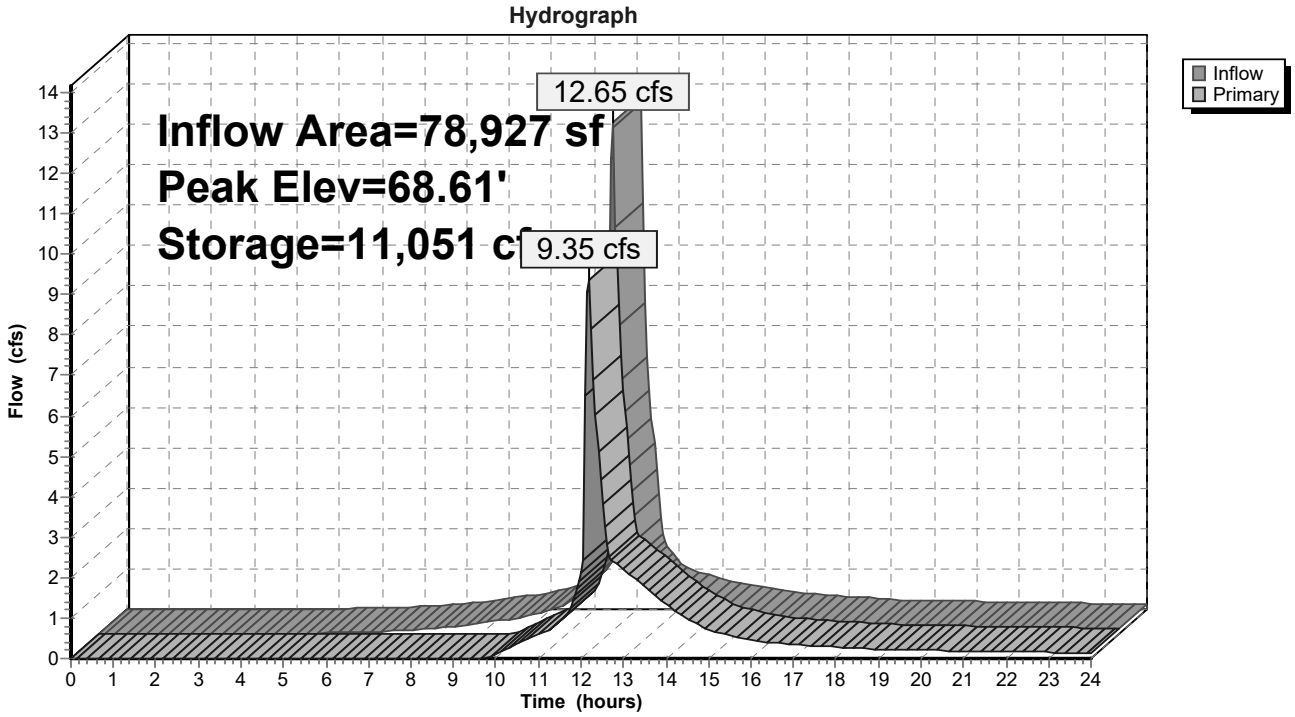
Volume	Invert	Avail.Storage	Storage Description
#1	64.00'	4,658 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc) 22,950 cf Overall - 11,304 cf Embedded = 11,646 cf x 40.0% Voids
#2	64.50'	8,514 cf	**52.8"W x 48.0"H x 4.00'L Galley 4x4x4** x 192 Inside #1
		13,172 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
64.00	3,825	0	0
70.00	3,825	22,950	22,950

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=9.02 cfs @ 12.17 hrs HW=68.54' TW=63.96' (Dynamic Tailwater)
└─**1=Culvert** (Passes 9.02 cfs of 11.68 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 3.01 cfs @ 8.62 fps)
  └─**3=Orifice/Grate** (Orifice Controls 6.01 cfs @ 4.90 fps)

Pond P3-1: P3-2


Hydrograph
Inflow
Primary
12.65 cfs
9.35 cfs
Inflow Area=78,927 sf
Peak Elev=68.61'
Storage=11,051 cf
Flow (cfs)
Time (hours)

Summary for Pond P3-2: P3-3

Inflow Area = 150,527 sf, 46.94% Impervious, Inflow Depth > 5.68" for 100 year event
Inflow = 16.95 cfs @ 12.13 hrs, Volume= 71,247 cf
Outflow = 7.27 cfs @ 12.45 hrs, Volume= 62,429 cf, Atten= 57%, Lag= 19.1 min
Primary = 7.27 cfs @ 12.45 hrs, Volume= 62,429 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 54.20' @ 12.45 hrs Surf.Area= 9,625 sf Storage= 24,176 cf
Flood Elev= 55.50' Surf.Area= 12,548 sf Storage= 38,610 cf

Plug-Flow detention time= 112.5 min calculated for 62,300 cf (87% of inflow)
Center-of-Mass det. time= 58.4 min (884.7 - 826.2)

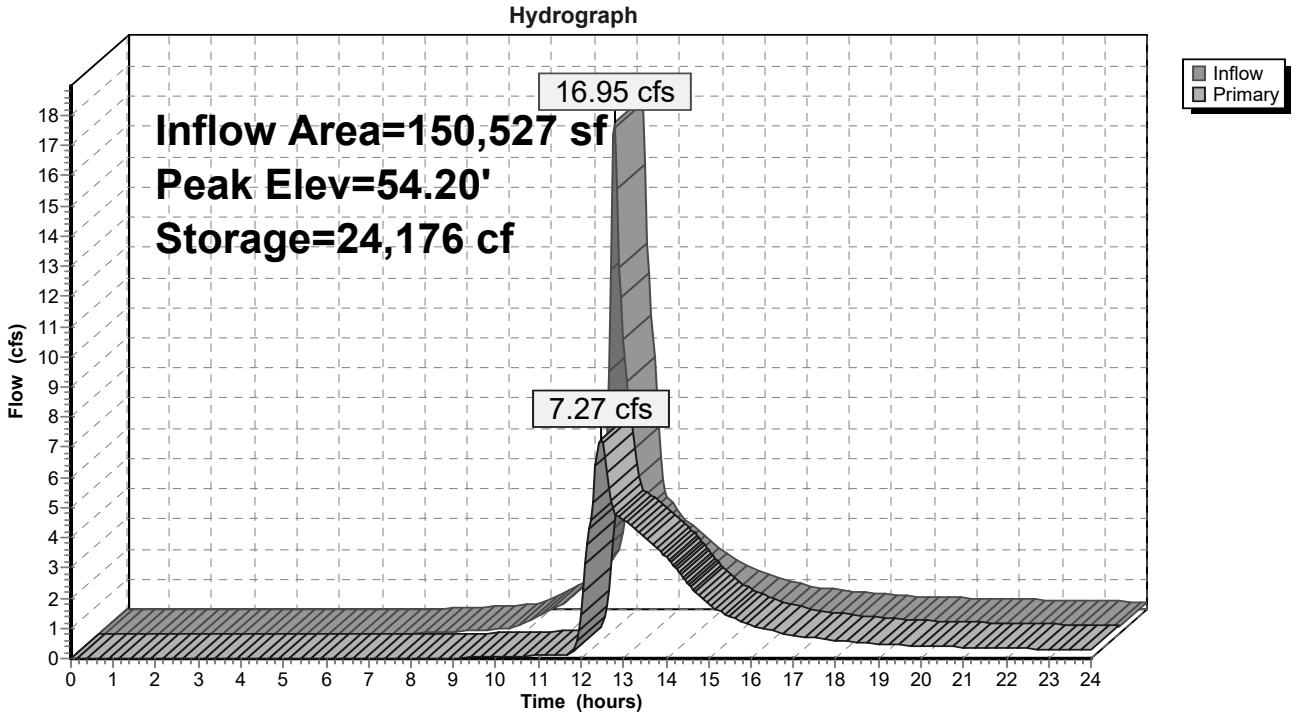
Volume	Invert	Avail.Storage	Storage Description
#1	50.00'	38,610 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

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'	**9.0" Vert. Orifice/Grate** C= 0.600
#4	Device 1	52.50'	**8.0" Vert. Orifice/Grate** C= 0.600
#5	Device 1	54.00'	**2.00' x 2.00' Horiz. Orifice/Grate** Limited to weir flow C= 0.600
#6	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=7.27 cfs @ 12.45 hrs HW=54.20' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Inlet Controls 7.27 cfs @ 9.26 fps)
  - **2=Orifice/Grate** (Passes < 0.21 cfs potential flow)
  - **3=Orifice/Grate** (Passes < 2.87 cfs potential flow)
  - **4=Orifice/Grate** (Passes < 1.96 cfs potential flow)
  - **5=Orifice/Grate** (Passes < 2.30 cfs potential flow)
- **6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond P3-2: P3-3

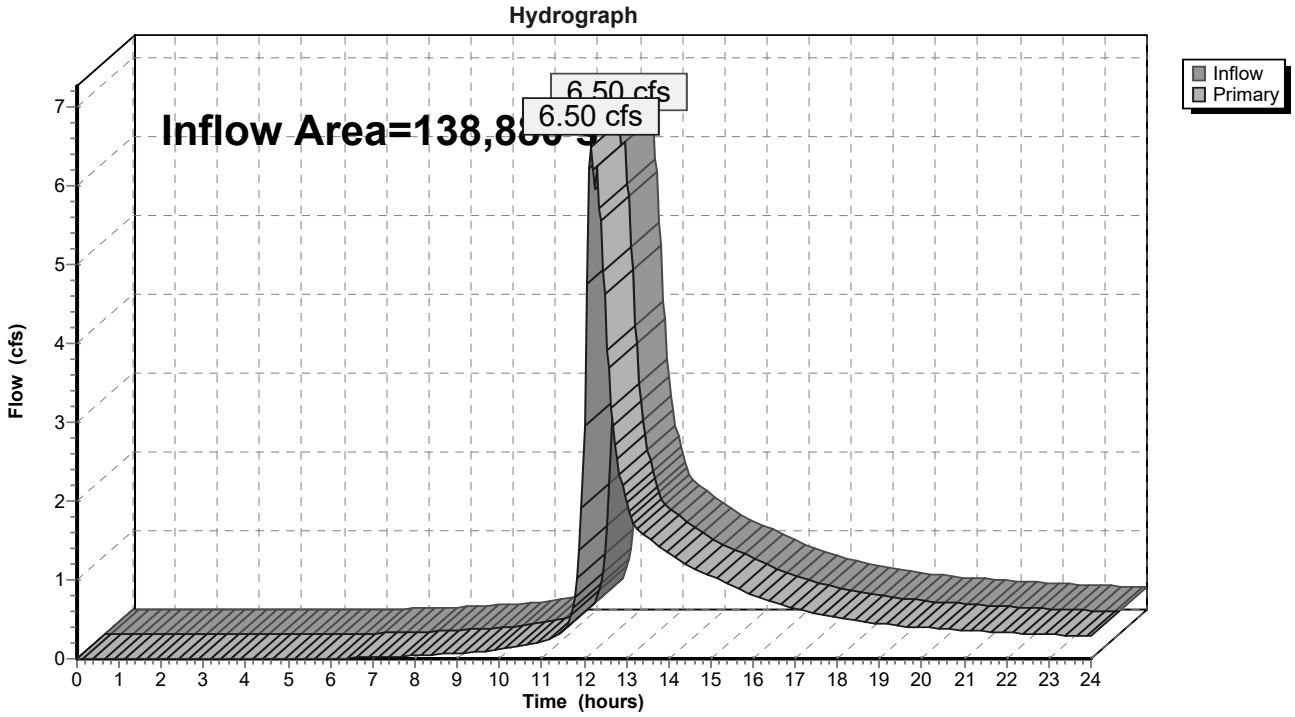

Hydrograph
Inflow
Primary
16.95 cfs
7.27 cfs
Inflow Area=150,527 sf
Peak Elev=54.20'
Storage=24,176 cf
Flow (cfs)
Time (hours)

Summary for Link DP-1: DP-1

Inflow Area = 138,880 sf, 35.07% Impervious, Inflow Depth > 3.86" for 100 year event
Inflow = 6.50 cfs @ 12.15 hrs, Volume= 44,647 cf
Primary = 6.50 cfs @ 12.15 hrs, Volume= 44,647 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

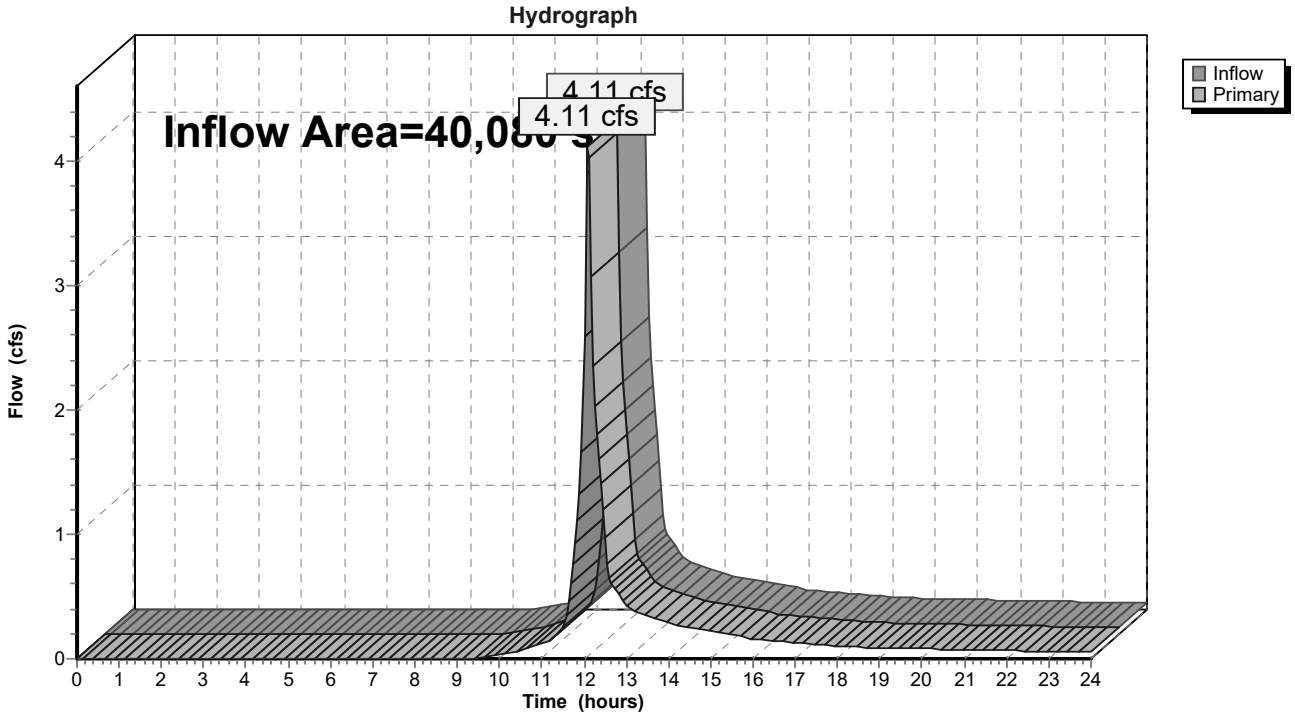


Summary for Link DP-2: DP-2

Inflow Area = 40,080 sf, 11.21% Impervious, Inflow Depth > 3.83" for 100 year event
Inflow = 4.11 cfs @ 12.08 hrs, Volume= 12,783 cf
Primary = 4.11 cfs @ 12.08 hrs, Volume= 12,783 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

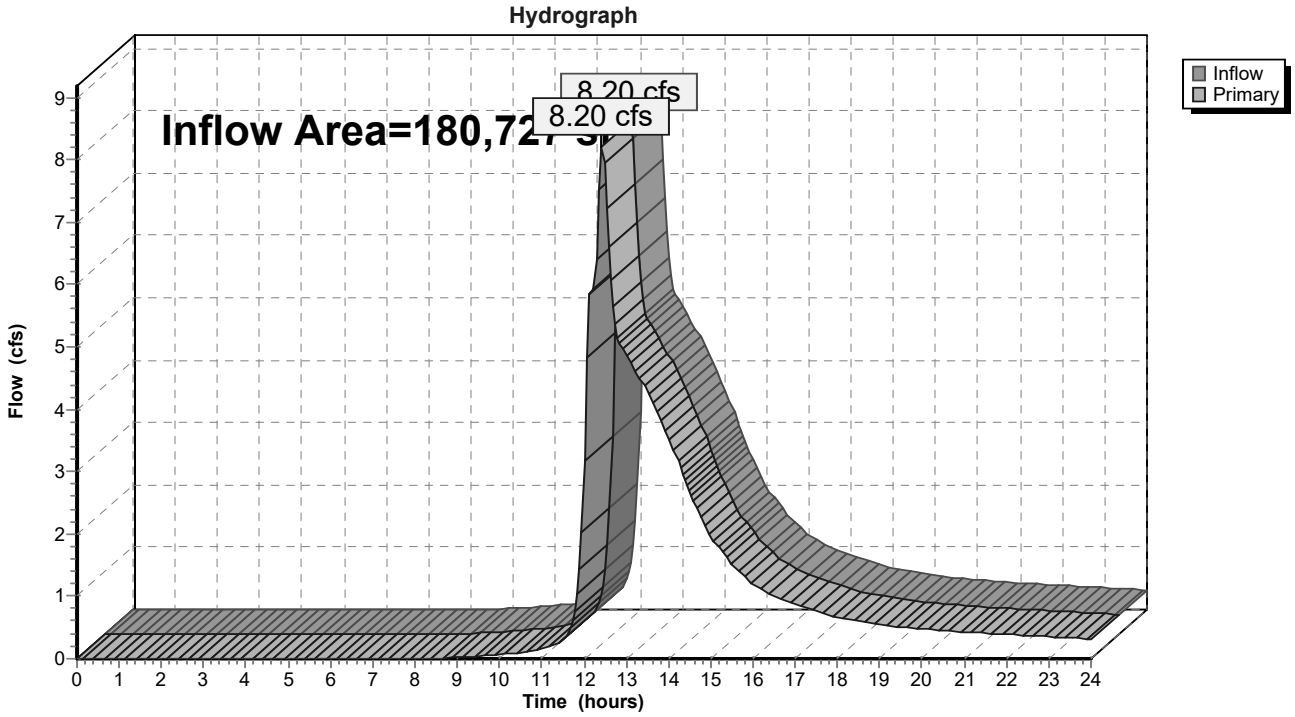


Summary for Link DP-3: DP-3

Inflow Area = 180,727 sf, 39.09% Impervious, Inflow Depth > 4.73" for 100 year event
Inflow = 8.20 cfs @ 12.42 hrs, Volume= 71,178 cf
Primary = 8.20 cfs @ 12.42 hrs, Volume= 71,178 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

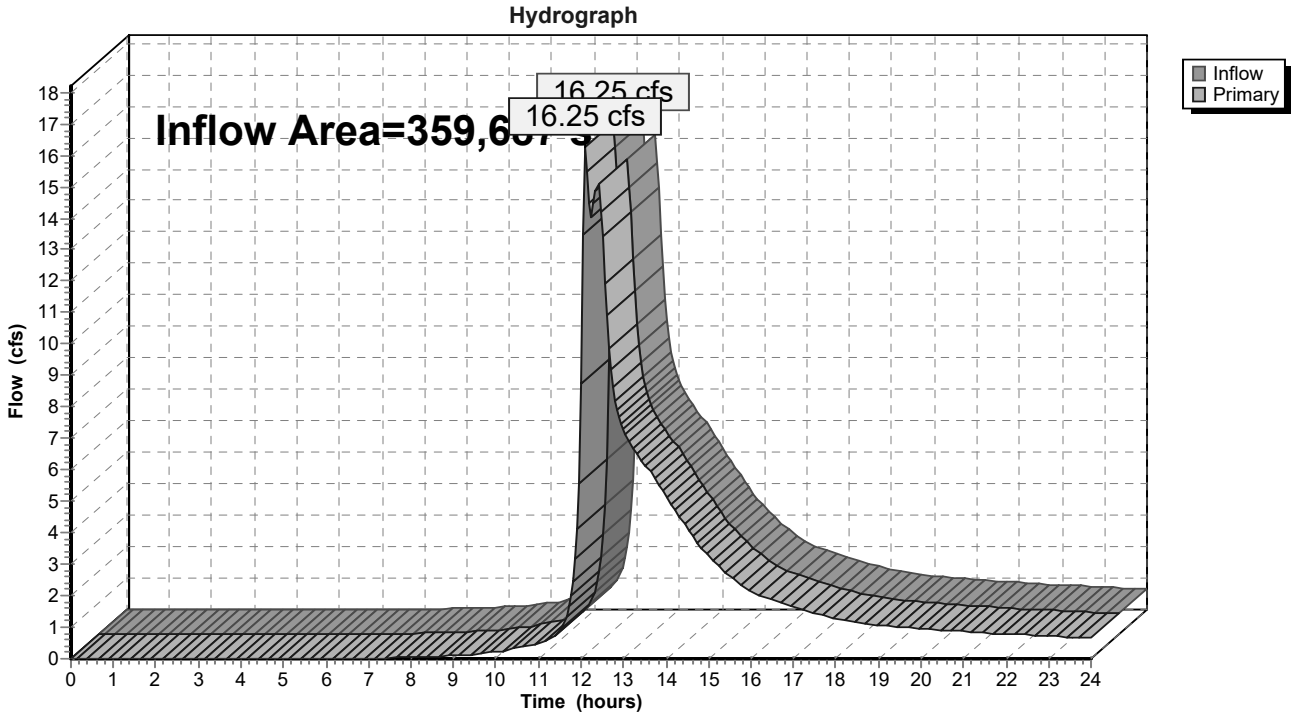


Summary for Link TOTAL: (new Link)

Inflow Area = 359,687 sf, 34.43% Impervious, Inflow Depth > 4.29" for 100 year event
Inflow = 16.25 cfs @ 12.12 hrs, Volume= 128,608 cf
Primary = 16.25 cfs @ 12.12 hrs, Volume= 128,608 cf, Atten= 0%, Lag= 0.0 min

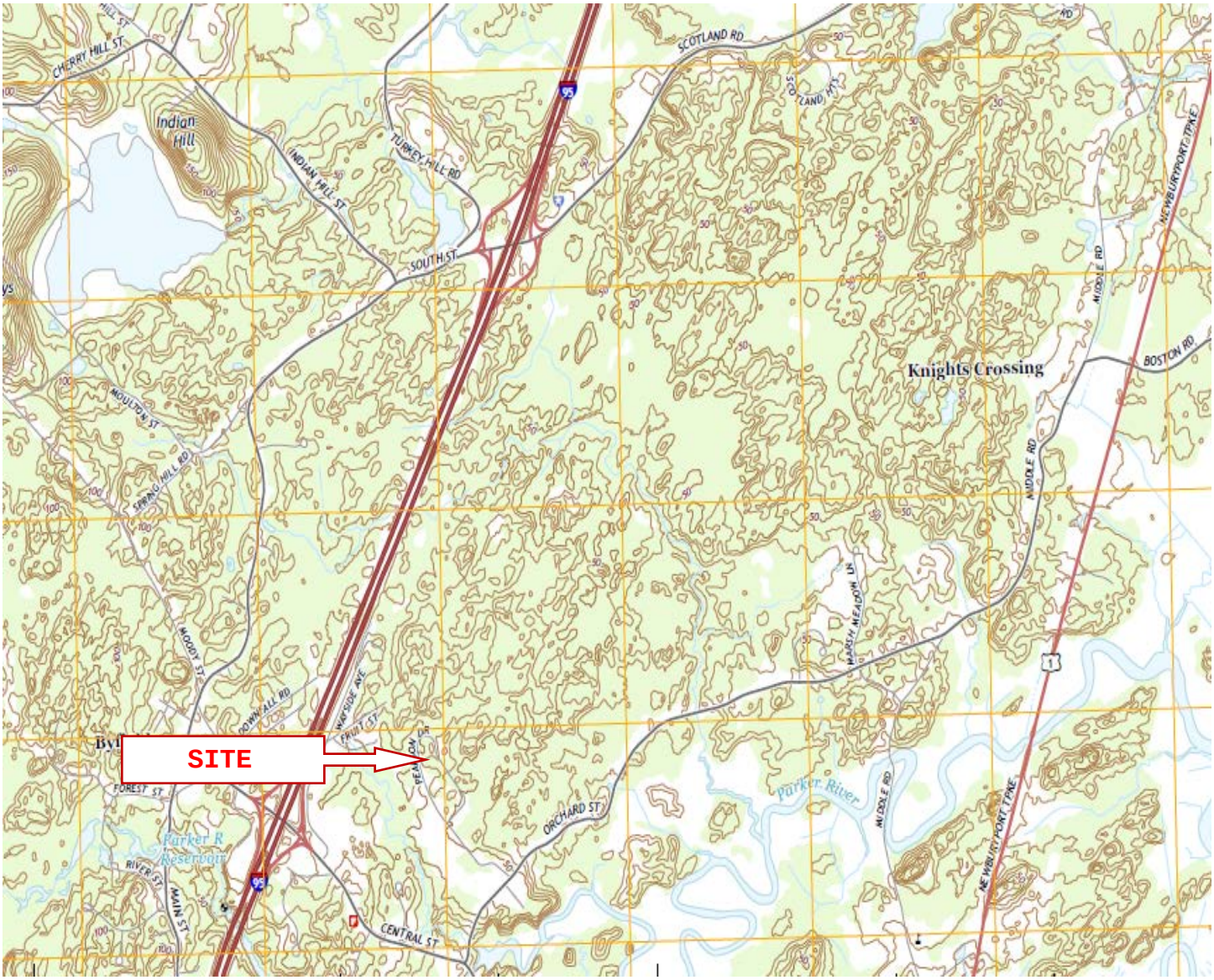
Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link TOTAL: (new Link)



MAPS

USGS LOCUS
SCS SOILS
FEMA
CS 9201 PRE-DEVELOPMENT DRAINAGE
CS 9301 POST DEVELOPMENT DRAINAGE
CS 8502 MAINTAINANCE PLAN

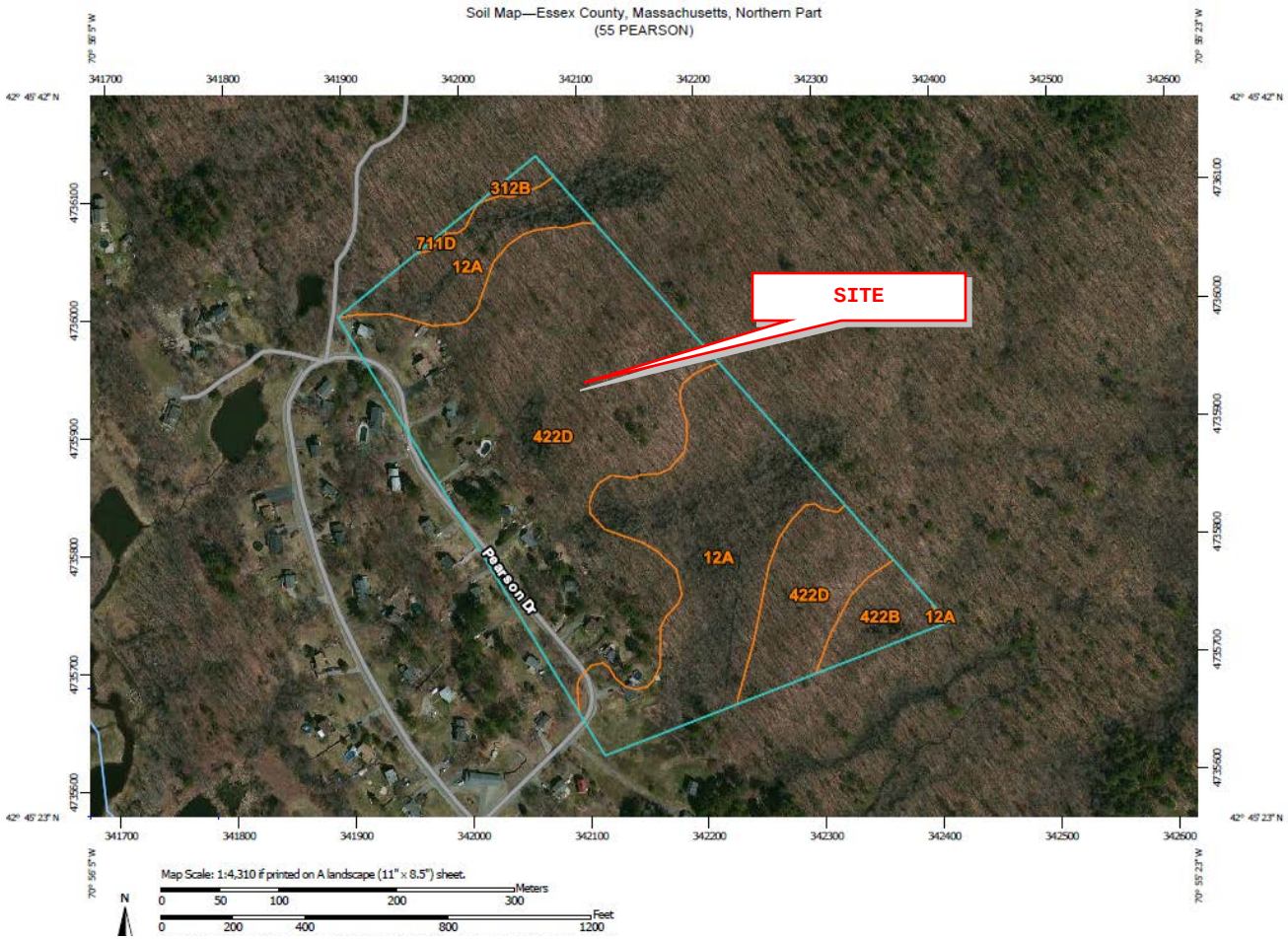


USGS QUADRANGLE MAP

55 PEARSON DRIVE
NEWBURY, MASSACHUSETTS

RANGER ENGINEERING & DESIGN, LLC

SCALE	DRAWN BY	DATE
Not To Scale	U.S.G.S	09/2016
PROJECT	APP'D BY	DRAWING NO.
15-1516	BO	NA



RANGER ENGINEERING & DESIGN, LLC

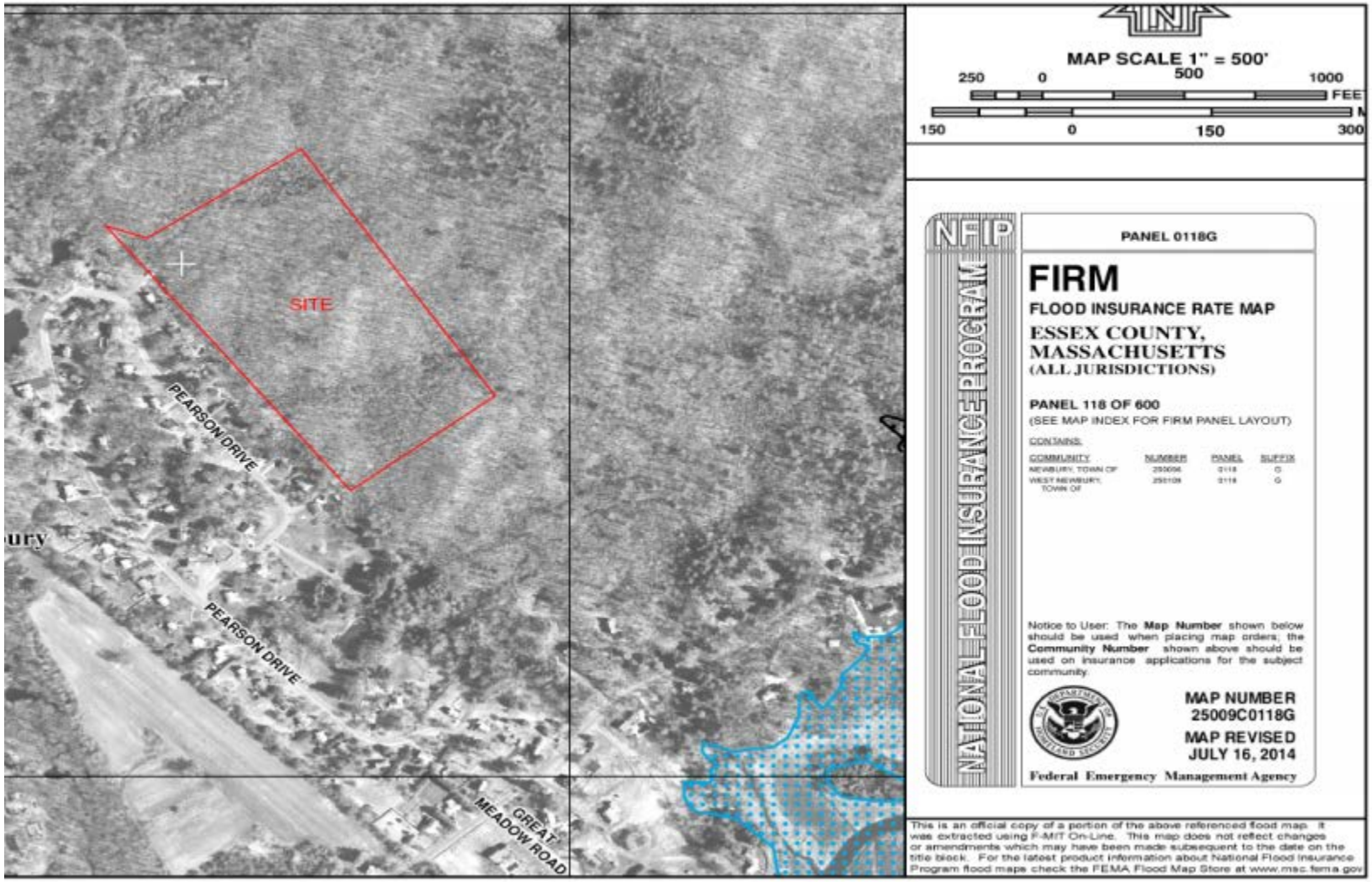
Ranger Engineering & Design LLC
13 BRANCH STREET
SUITE 101
METHUEN, MA 01844

55 PEARSON DRIVE BYFIELD, MA

N

USDA SOILS MAP

SCALE	DRAWN BY	DATE
N.T.S	USDA	2/17
PROJECT	APP'D BY	DRAWING NO.
	BCO	NA



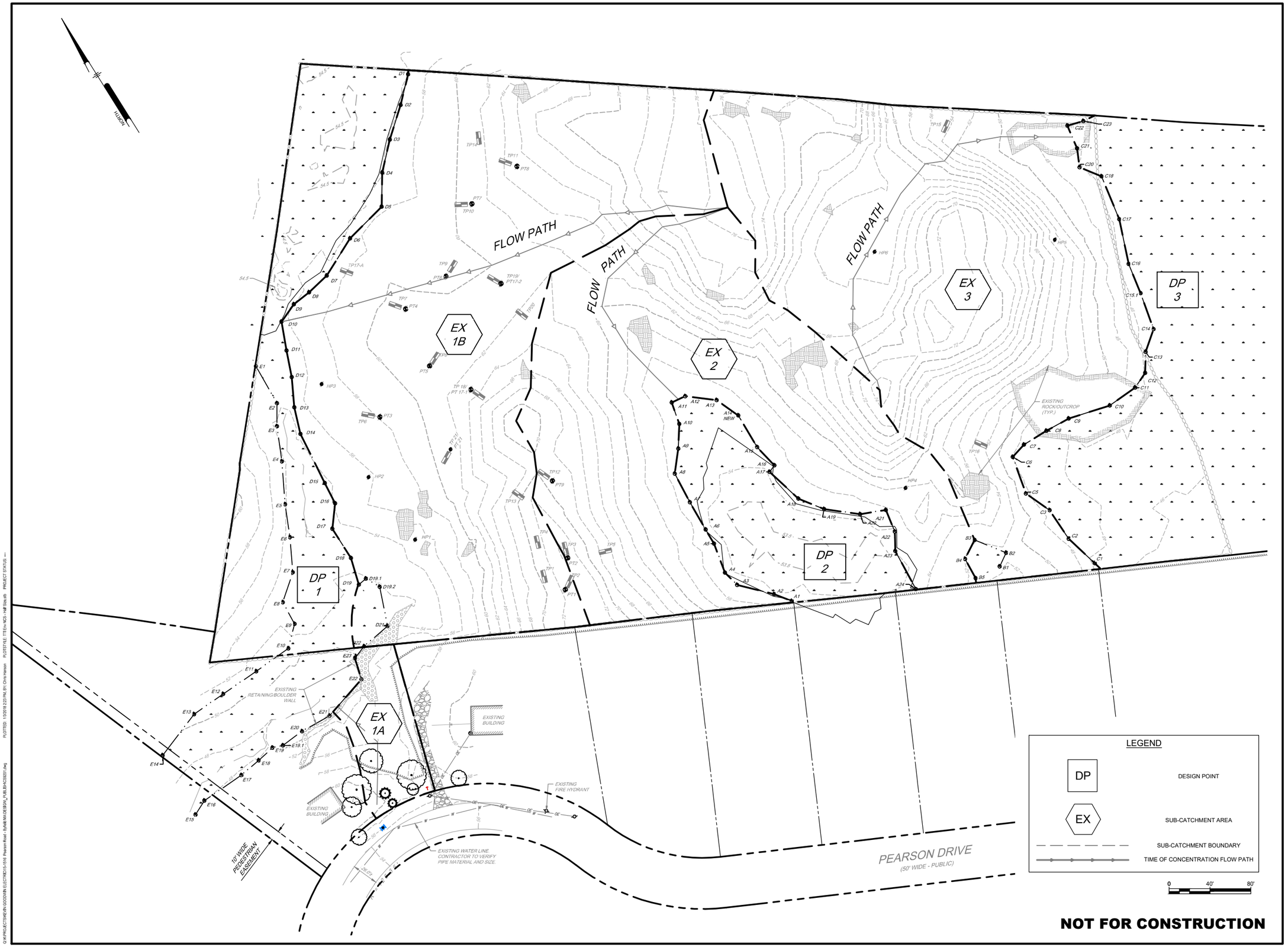
RANGER ENGINEERING & DESIGN, LLC

Ranger Engineering & Design LLC
13 Branch Street Suite 101
METHUEN, MA 01844

55 PEARSON DRIVE BYFIELD, MA

FLOOD INSURANCE RATE MAP

SCALE	DRAWN BY	DATE
N.T.S	FEMA	JULY 16, 2014
PROJECT	APP'D BY	PAGE NO.
	BCO	



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BYFIELD ESTATES
BYFIELD (NEWBURY), MA
ASSESSOR'S MAP R-20 LOT 75

PRE-DEVELOPMENT WATERSHED PLAN

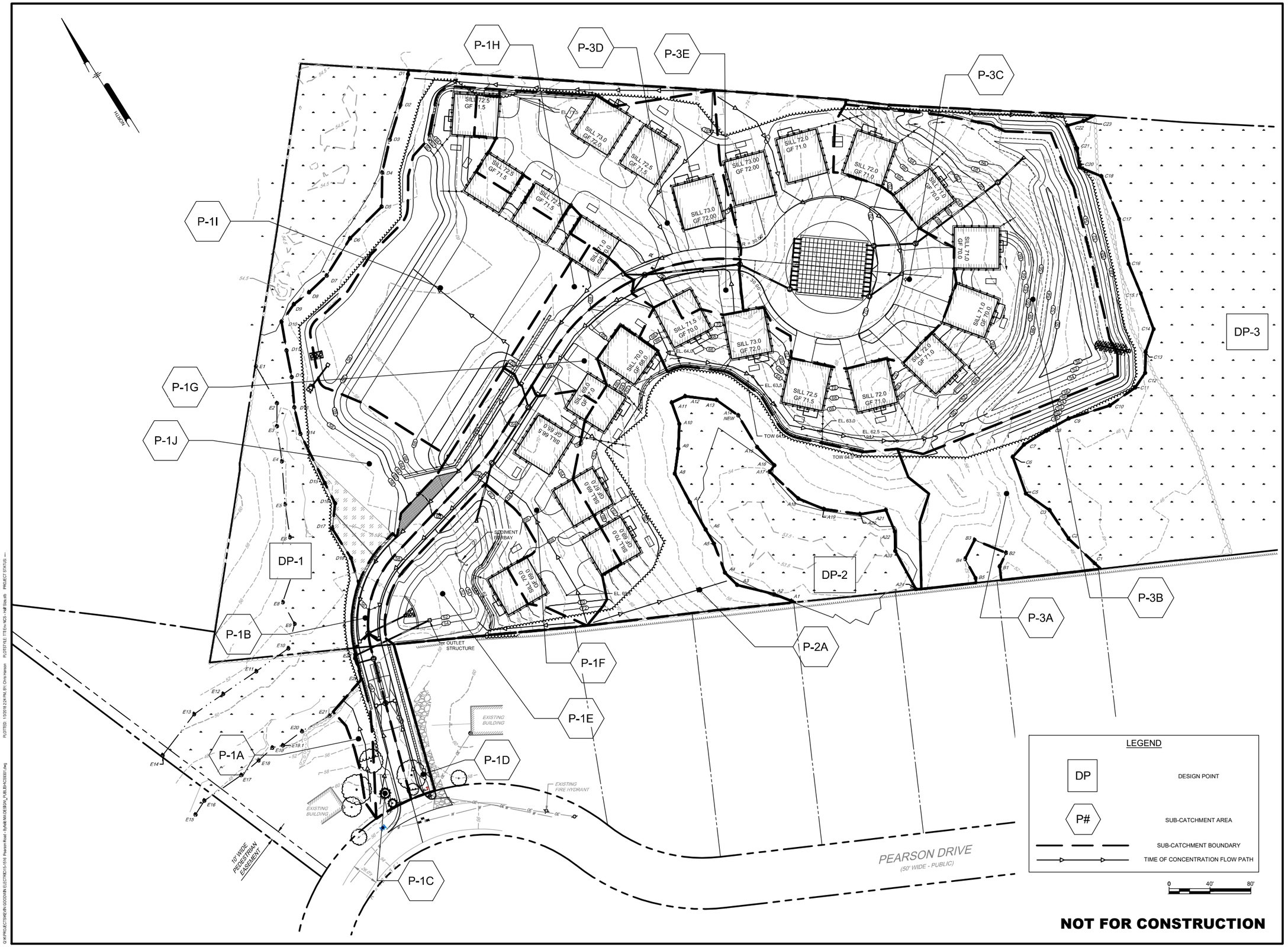
BYFIELD ESTATES, LLC
2 DEARBORN WAY
MIDDLETON, MA 01949

NO.	DATE	REVISIONS	BY

PROJECT	15-1516
DATE	2017-11-15
DRAWING SCALE	1"=40'
DRAWN BY	JRA
APPROVED BY	BCO

CS9201

SHEET 1 OF 2



RANGER ENGINEERING & DESIGN, LLC
13 Branch Street, Suite 101
Methuen, MA 01844
T 978.435.1324

PEARSON DRIVE
BYFIELD (NEWBURY), MA 01922
ASSESSOR'S MAP R-20 LOT 75

POST-DEVELOPMENT WATERSHED PLAN

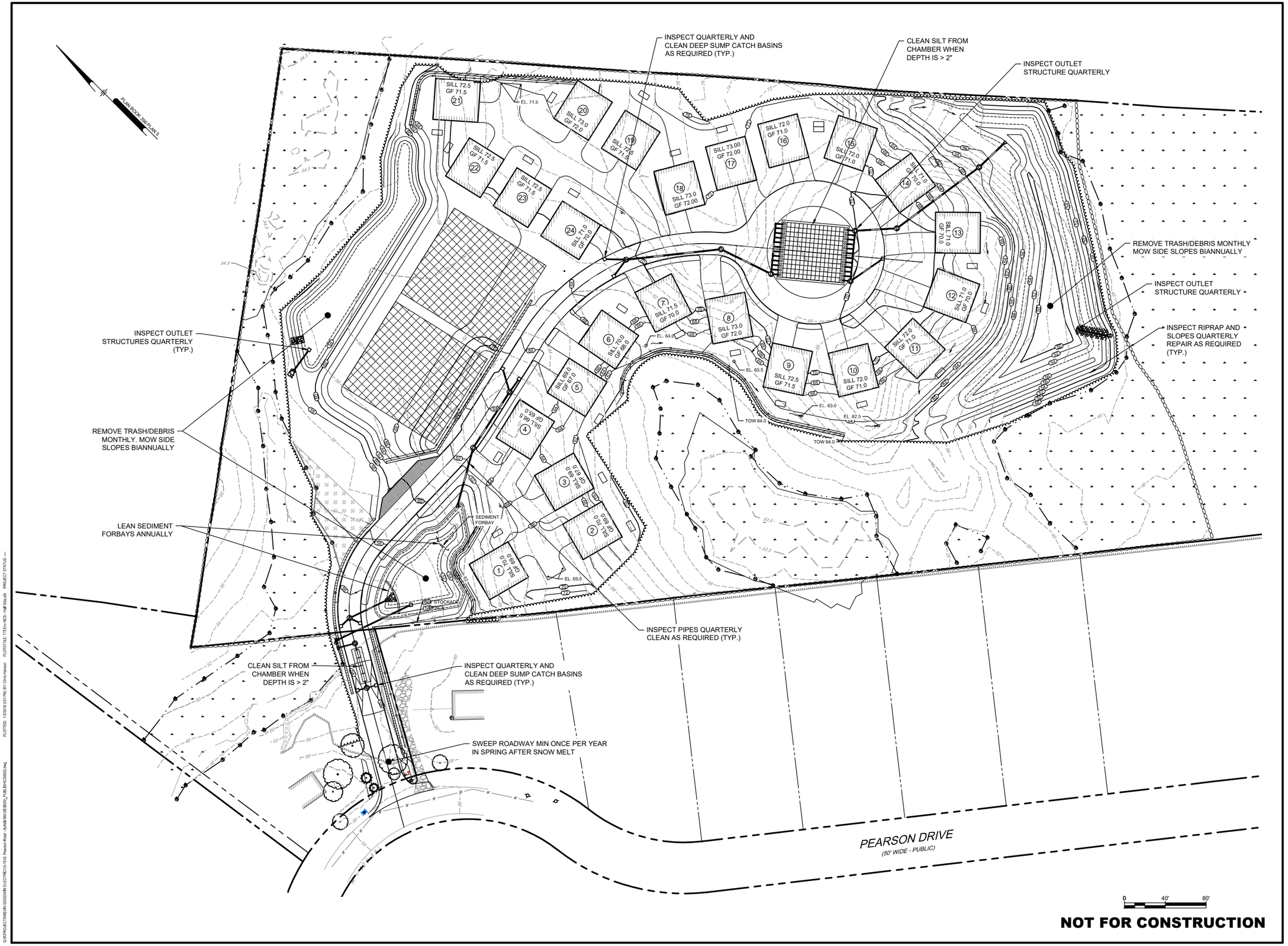
BYFIELD ESTATES, LLC
2 DEARBORN WAY
MIDDLETON, MA 01949

NO.	DATE	REVISIONS	BY
1	01-03-2018	RESPONSE TO COMMENTS	BCO

PROJECT	15-1516
DATE	2017-11-15
DRAWING SCALE	1"=40'
DRAWN BY	JRA
APPROVED BY	BCO

CS9301

SHEET 2 OF 2



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Methuen, MA 01844
T 978.435.1324

BYFIELD ESTATES

BYFIELD (NEWBURY), MA
ASSESSOR'S MAP R-20 LOT 75

MAINTENANCE PLAN

BYFIELD ESTATES, LLC
2 DEARBORN WAY
MIDDLETON,MA 01949

DATE	NO.	REVISIONS	BY

PROJECT	15-1516
DATE	2018-01-03
DRAWING SCALE	1"=40'
DRAWN BY	JRA
APPROVED BY	BCO

CS8502

SHEET 1 OF 1