Drainage Report

Nichols College Townhouses
Center Road, Dudley, MA

CHA Project Number: 076491.000

Prepared for:
Nichols College
121 Center Road
Dudley, MA 01571

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May 23, 2022
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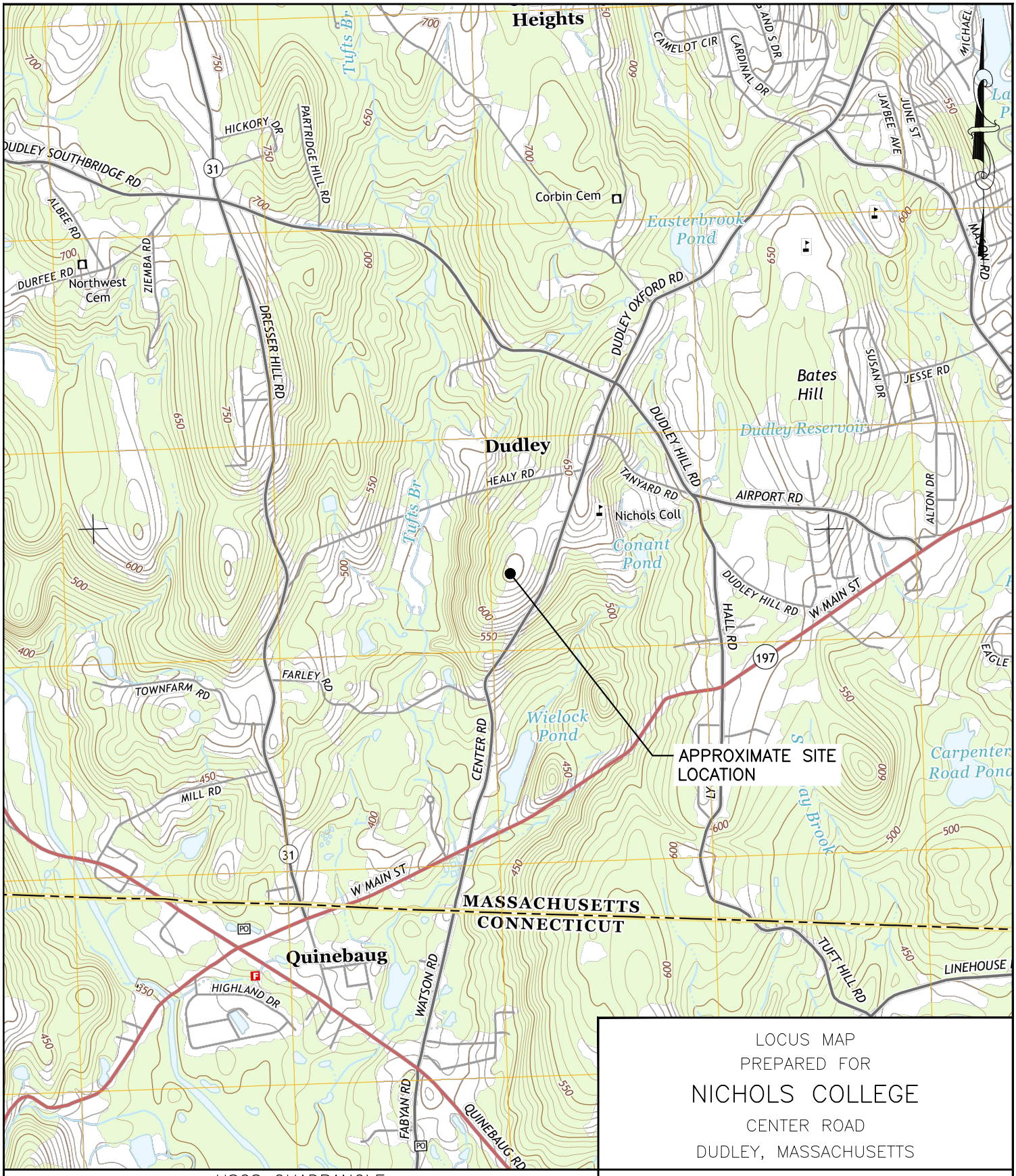
LOCUS & SUMMARY



LOCUS MAP
PREPARED FOR
NICHOLS COLLEGE
CENTER ROAD
DUDLEY, MASSACHUSETTS

USGS QUADRANGLE
WEBSTER, MA
2015

2000 1000 0 2000
GRAPHIC SCALE IN FEET

DATE: 05/22/2022	SCALE: 1" = 2000'	SHEET: 1 OF 1

CHA
101 East River Drive, 1st Floor
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SUMMARY

Nichols College proposes to construct two ±6,400 square foot Townhouse style student residence buildings at the south end of their campus in Dudley. The proposed location is on the west side of Center Road, approximately 1,500-feet south of Healy Road. Storm flows from the existing site drain primarily to the East, to the existing Center Road Drainage System, and to the West towards Tufts Brook, along the center of the existing athletic field. Available USDA soils mapping (See Section G) indicates that soils in the proposed development area consist primarily of fine sandy loams with a hydrologic group of 'C'.

The proposed project will consist of two student residence buildings, underground utilities, associated parking and access driveways. Storm flows from the majority of the developed site will be collected by a series of catch basins and discharged through a hydrodynamic separator into a water quality basin in the northeast corner of the site. This basin will discharge to the existing driveway drainage system which connects to the existing system in Center Road.

CHA utilized a computer model, HydroCAD®, to perform drainage calculations. The model used the Soil Conservation Service TR-20 method with NOAA 24-hour rainfall data to calculate the runoff. The design points for calculating the existing and proposed peak storm flows are the existing Drainage System in Center Road, the existing stormwater basin to the north, the western property line and the southern property line. Calculations for the 2, 10, 25, and 100-year storm events are provided. Peak storm flows for existing and proposed conditions are listed in Table 1-1.

Table 1-1. Existing & Proposed Peak Storm Flows

Storm Event	To Center RD		To Ex. Basin		To West		To South	
	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
2 Year Storm	11.4 cfs	10.4 cfs	5.9 cfs	5.7 cfs	6.1 cfs	5.0 cfs	0.5 cfs	0.5 cfs
10 Year Storm	23.0 cfs	20.5 cfs	10.0 cfs	9.5 cfs	14.8 cfs	12.6 cfs	1.2 cfs	1.2 cfs
25 Year Storm	30.6 cfs	26.9 cfs	12.5 cfs	11.9 cfs	20.8 cfs	17.9 cfs	1.7 cfs	1.7 cfs
100 Year Storm	42.5 cfs	36.7 cfs	16.4 cfs	15.5 cfs	30.6 cfs	26.6 cfs	2.5 cfs	2.5 cfs

Peak Flows to all Design Points will be reduced or maintained through the 100-year storm event.

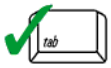
MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION CHECKLIST FOR STORMWATER REPORT

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.

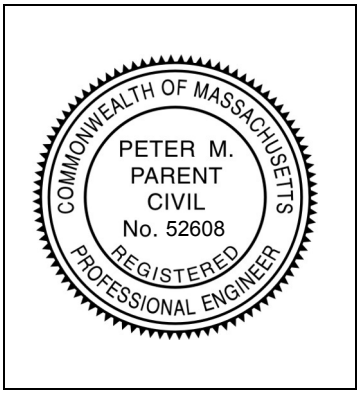
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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



09/29/2022
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.

WATER QUALITY VOLUME, RECHARGE VOLUME, & TSS REMOVAL CALCULATIONS

Water Quality Flow

Project Name: Nichols Townhouses Project # 076491

Date: September 29, 2022

Following Guidelines From "Massachusetts Department of Environmental Protection Wetlands Program"

Hydrodynamic Separator 1

Water Quality Volume

WQV = 1" (I) / 12

Where:

WQV = Water Quality Volume (ac-ft)
I = Impervious Area (ac)

Areas From AutoCAD

	SQ. FT	Acres
Impervious	28,560	0.656
Pervious	53,400	1.226
Total (A)	81,960	1.882

WQV REQUIRED = 0.055 ac ft
2,380 cf

Determine Unit Peak Discharge

Ia / P = **0.034** (1" Runoff)

Read Unit Peak Discharge From Figure 4

qu = +/- **795**

Water Quality Flow

APP B

WQF = (qu) (A) (WQV)

Where:

qu = unit peak discharge (cfs/sqmi/in)
A = Drainage Area (sqmi)
WQV = Water Quality Volume (watershed inches)

WQF = **0.8** cfs

Prepared By: PMP Checked By:_____

Massachusetts Department of Environmental Protection Wetlands Program

Standard Method to Convert Required Water Quality Volume to a Discharge Rate for Sizing Flow Based Manufactured Proprietary Stormwater Treatment Practices

Effective October 15, 2013, computations following the standardized method must be submitted with a Wetlands Notice of Intent (NOI) when a proprietary manufactured stormwater treatment device sized using a flow rate is proposed in connection with work proposed in a wetland resource area or associated buffer zone. The computational method will primarily affect the sizing of the proprietary manufactured stormwater treatment separators, and not other types of stormwater treatment practices that are volume based (such as extended detention basins) or proprietary stormwater treatment filters sized using the Water Quality Volume (WQV).

Stormwater Standard No. 4 requires structural stormwater management practices to be sized to capture the required WQV in accordance with the Massachusetts Stormwater Handbook (310 CMR 10.05(6)(k)(4) and 314 CMR 9.06(6)(a)(4)) . Stormwater Standard No. 4 requires that the full WQV be captured and treated to remove 80% of the Total Suspended Solid (TSS) load.

Since manufactured proprietary stormwater separators are sized using discharge rates and not volume, MassDEP is requiring the standardized method described below be used to convert the required WQV to a discharge rate (Q). No other methods are allowed to convert the WQV to the Q rate. This will ensure that flow rate based manufactured proprietary stormwater treatment practices are sized consistently from manufacturer to manufacturer. This section contains the following: caveats for method use, method description, examples of how to use the method, and documentation describing how the method was derived. This method will be incorporated into the Massachusetts Stormwater Handbook.

The following caveats apply to use of the method:

- Device sized using the Q rate must only be used as pretreatment practice.
- Device sized using this method shall be designed to be “offline”, unless approved otherwise through written reciprocity granted by MassDEP to a final certification pursuant to the Technology Acceptance Reciprocity Partnership (TARP). This means the device must be sized at a minimum to fully treat the Q rate without any overflow, by-pass, surcharge of runoff, or scouring of sediments or oils previously trapped or entrained in the device.
- The computations described below must be provided in the Stormwater Report accompanying Wetlands Notice of Intent or application for 401 Water Quality Certification.
- MassDEP reserves ability to revise this method in the future as may be needed to reflect documented increases to precipitation intensity (Douglas 2011), updates to design intensity storms currently being considered by the National Weather Service or Northeast Climate Center (NECC)[1] to Technical Paper 40 (upon which this methodology is based), NRCS revisions to the WinTR55/TR20 methods,[2] or changes to the National Pollution Discharge Elimination System (NPDES) permits issued by EPA for Massachusetts.

[1] On web, see precipitation intensities at http://precip.net

[2] On web, See MA-NRCS description at: http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs144p2_013763.pdf

METHOD

1. Determine if the WQV is the first ½-inch or 1-inch of runoff. If WQV is the first ½ -inch, go to STEP 2. If WQV is the first 1-inch of runoff, go to STEP 7.

FOR FIRST ½ INCH RUNOFF WQV

2. Use Curve Number (CN) 98 to represent the runoff potential for impervious surfaces (see Method Derivation section below for explanation regarding how CN 98 was obtained).

   Only use impervious surfaces for these computations. Runoff from pervious surfaces should not be included in the WQV computations for the Q rate. The WQV required by the Massachusetts Wetlands Protection (310 CMR 10.05(6)(k)(4)) and 401 Water Quality Certification (314 CMR 9.06(6)(a)(4)) regulations for Stormwater Standard No. 4 is based only on impervious surfaces.

3. Compute the time of concentration (tc) using the methods described in TR-55 1986, Chapter 3.

4. Refer to Figure 1, Ia/P Curve = 0.058

5. Determine unit peak discharge using Figure 1 or 2. Figure 2 is in tabular form so is preferred. Using the tc determined in STEP 3, read the unit peak discharge (qu) from Figure 1 or Table in Figure 2. qu is expressed in the following units: cfs/mi²/watershed inches (csm/in).

6. Compute Q rate using the following equation:

$$Q_{0.5} = (qu)(A)(WQV)$$

Where:

$Q_{0.5}$ = flow rate associated with first ½ -inch of runoff

qu = the unit peak discharge, in csm/in.

A = impervious surface drainage area (in square miles)

WQV = water quality volume in watershed inches (½ -inch in this case)

See Example 1, page 8 applying use of the method to convert first ½ -inch WQV to minimum $Q_{0.5}$ rate.

Figure 1: For First ½-inch Runoff, Ia/P Curve = 0.058, Relationship Between Unit Peak Discharge and Time of Concentration for NRCS Type III Storm Distribution.

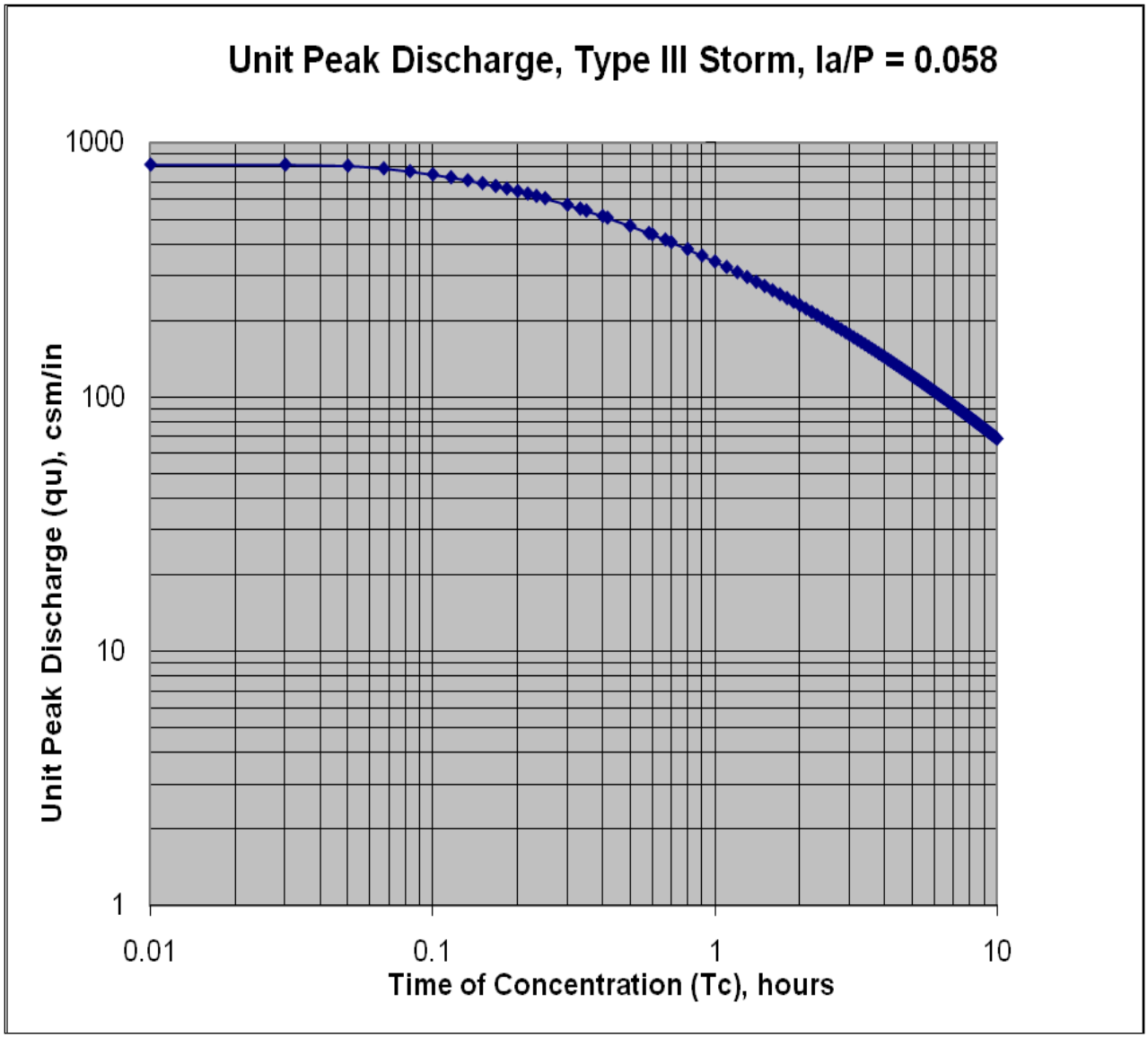


Figure 2: For First ½-inch of Runoff, Table of qu values for Ia/P Curve = 0.0.058, listed by tc, for Type III Storm Distribution

Tc (Hours)	qu (csm/in)
0.01	821
0.03	821
0.05	813
0.067	794
0.083	773
0.1	752
0.116	733
0.133	713
0.15	694
0.167	677
0.183	662
0.2	646
0.217	632
0.233	619
0.25	606
0.3	572
0.333	552
0.35	542
0.4	516
0.416	508
0.5	472
0.583	443
0.6	437
0.667	417
0.7	408
0.8	383
0.9	361
1	342
1.1	325
1.2	311
1.3	297
1.4	285
1.5	274
1.6	264
1.7	254

Tc (Hours)	qu (csm/in)
1.8	246
1.9	238
2	230
2.1	223
2.2	217
2.3	211
2.4	205
2.5	200
2.6	194
2.7	190
2.8	185
2.9	181
3	176
3.1	173
3.2	169
3.3	165
3.4	162
3.5	158
3.6	155
3.7	152
3.8	149
3.9	147
4	144
4.1	141
4.2	139
4.3	136
4.4	134
4.5	132
4.6	130
4.7	128
4.8	126
4.9	124
5	122
5.1	120
5.2	118

Tc (Hours)	qu (csm/in)
5.3	116
5.4	115
5.5	113
5.6	112
5.7	110
5.8	109
5.9	107
6	106
6.1	104
6.2	103
6.3	102
6.4	100
6.5	99
6.6	98
6.7	97
6.8	96
6.9	94
7	93
7.1	92
7.2	91
7.3	90
7.4	89
7.5	88
7.6	87
7.7	86
7.8	85
7.9	84
8	84
8.1	83
8.2	82
8.3	81
8.4	80
8.5	79
8.6	79
8.7	78

Tc (Hours)	qu (csm/in)
8.8	77
8.9	76
9	76
9.1	75
9.2	74
9.3	74
9.4	73
9.5	72
9.6	72
9.7	71
9.8	70
9.9	70
10	69

FOR FIRST 1-INCH RUNOFF WQV

7. Use Curve Number (CN) 98 to represent the runoff potential for impervious surfaces (see Method Derivation section below for explanation regarding how CN 98 was obtained).

   Only use impervious surfaces for these computations. Runoff from pervious surfaces should not be included in the WQV computations for peak WQF. The WQV required by the Massachusetts Wetlands Protection (310 CMR 10.05(6)(k)(4)) and 401 Water Quality Certification (314 CMR 9.06(6)(a)(4)) regulations for Stormwater Standard No. 4 is based only on impervious surfaces.

8. Compute the time of concentration (tc) using the methods described in TR-55 1986, Chapter 3.

9. Refer to Ia/P Curve = 0.034 (Figure 3)

10. Determine unit peak discharge using Figure 3 or 4. Figure 4 is in tabular form so is preferred. Using the tc determined in STEP 8, read the unit peak discharge (qu) from Figure 2 or from Table in Figure 4. qu is expressed in the following units: cfs/mi²/watershed inches (csm/in).

11. Compute the water quality flow (WQF) using the following equation:

$$Q_1 = (qu)(A)(WQV)$$

Where:

Q_1 = peak flow rate associated with first 1-inch of runoff

qu = the unit peak discharge, in csm/in.

A = impervious surface drainage area (in square miles)

WQV = water quality volume in watershed inches (1.0-inches in this case)

See Example 2, page 8 applying use of the method to convert first 1-inch WQV to minimum Q_1 rate.

Figure 3: For First 1-inch Runoff, Ia/P Curve = 0.034, Relationship Between Unit Peak Discharge and Time of Concentration for NRCS Type III Storm Distribution

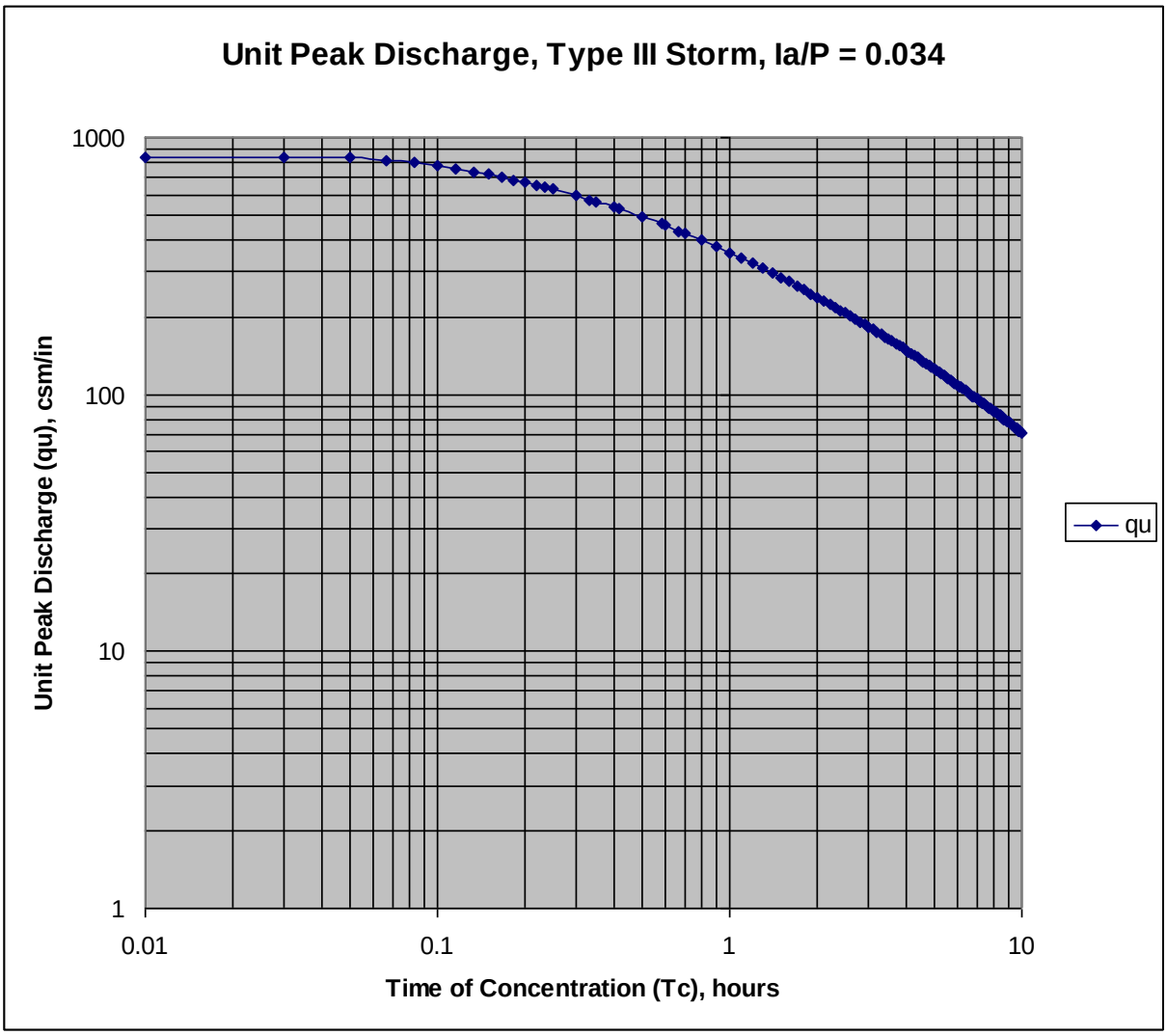


Figure 4: for First 1-inch Runoff, Table of qu values for Ia/P Curve = 0.034, listed by tc, for Type III Storm Distribution

Tc (Hours)	qu (csm/in)
0.01	835
0.03	835
0.05	831
0.067	814
0.083	795
0.1	774
0.116	755
0.133	736
0.15	717
0.167	700
0.183	685
0.2	669
0.217	654
0.233	641
0.25	628
0.3	593
0.333	572
0.35	563
0.4	536
0.416	528
0.5	491
0.583	460
0.6	454
0.667	433
0.7	424
0.8	398
0.9	376
1	356
1.1	339
1.2	323
1.3	309
1.4	296
1.5	285
1.6	274
1.7	264
1.8	255
1.9	247
2	239
2.1	232
2.2	225
2.3	219
2.4	213
2.5	207
2.6	202
2.7	197
2.8	192
2.9	187
3	183
3.1	179
3.2	175
3.3	171
3.4	168
3.5	164
3.6	161
3.7	158
3.8	155
3.9	152
4	149
4.1	146
4.2	144
4.3	141
4.4	139
4.5	137
4.6	134
4.7	132
4.8	130
4.9	128
5	126
5.1	124
5.2	122
5.3	120
5.4	119
5.5	117
5.6	115
5.7	114
5.8	112
5.9	111
6	109
6.1	108
6.2	106
6.3	105
6.4	104
6.5	102
6.6	101
6.7	100
6.8	99
6.9	98
7	96
7.1	95
7.2	94
7.3	93
7.4	92
7.5	91
7.6	90
7.7	89
7.8	88
7.9	87
8	86
8.1	85
8.2	84
8.3	84
8.4	83
8.5	82
8.6	81
8.7	80
8.8	79
8.9	79
9	78
9.1	77
9.2	76
9.3	76
9.4	75
9.5	74
9.6	74
9.7	73
9.8	72
9.9	72
10	71

Examples

Example 1: 2.28-acre asphalt parking lot (impervious surface), with time of concentration equal to 0.25 hours. The proposed parking lot drains to a wetland resource area, which is not a critical area, nor is the site located "near" a critical area. A proprietary separator is proposed to pretreat runoff to be directed to an Extended Detention Basin.

Because site does not drain to or located near a critical area, WQV = ½ -inch

1-acre = 0.0015625 mi^2

Step 1: Use CN = 98 to represent the 2.28-acre impervious surface.

Step 2: Determine tc

tc = 0.25 hours (given).

Step 3: Determine qu using Figure 2

With tc = 0.25 hours, qu is determined to be 606 csm/inch using Table in Figure 2.

Step 4 (Final Step): Determine $Q_{0.5}$

$Q_{0.5}$ = (qu)(A)(WQV)

$Q_{0.5}$ = (606 csm/in)(2.28-acre)(0.0015625 mi^2/acre)(½ -inch)

$Q_{0.5} \approx$ 1.1 CFS

Example 2: One-acre site composed entirely of impervious surfaces, with time of concentration equal to 6 minutes. The proposed impervious surfaces are to be drained to a stream located in Zone II of a public drinking water supply. A proprietary separator is proposed to pretreat runoff to be directed to an Infiltration Basin.

Because site drains to a critical area, WQV = 1-inch

1-acre = 0.0015625 mi^2

Step 1: Use CN = 98 to represent the 1-acre impervious surface.

Step 2: Determine tc

tc = 6 minutes (given).

Convert minutes to hours

tc = (6 minutes) /(60 minutes/hr) = 0.1 hours

Step 3: Determine qu using Table in Figure 4

Using the tc column, read down to find tc = 0.1 hours. Read to the right of tc = 0.1 hours to find the qu value which is 774 csm/inch.

Alternatively, you may use Figure 3 (Ia/P curve = 0.034). Find tc = 0.1 hours, read up to the Ia/P curve, then follow intersecting line to the left to interpolate the qu value. You'll note that using Figure 4 is quicker in so far as no interpolation is required. In cases where the tc is not listed in Figure 4, you may need to use Figure 3. In such instances, Figure 4 may still assist you in bracketing the qu values to interpolate.

Step 4 (Final Step): Determine Q_1

$Q_1 = (qu)(A)(WQV)$

$Q_1 = (774 \text{ csm/in})(1\text{-acre})(0.0015625 \text{ mi}^2/\text{acre})(1\text{-inch})$

$Q_1 \approx 1.2$ CFS

If the conversion factor to convert acres to square miles is not included, the result will not be correct. As different units are used in the computations, double check your units to ensure the result is correct.

Method Derivation

The Stormwater Advisory Committee convened to assist MassDEP with the 2008 stormwater revisions to the Wetlands and 401 Water Quality Certification regulations. The Advisory Committee tabled a method proposed at that time and asked its Proprietary BMP subcommittee to study the issue further. Subsequently, the Proprietary BMP subcommittee met from 2008 to 2011, examining multiple methods. Among the methods reviewed included the Rational Method used by New Jersey DEP, Ahlfeld et al 2004, Winkler et al 2001, Claytor and Scheuler 1996, Imbrium PCSWMM, and Bryant. The Ahlfeld and Winkler methods were funded by MassDEP through 319 funds and developed using Massachusetts precipitation data. The Claytor method is based on SCS TR-55 graphical methods. The PCSWMM method is a proprietary version of the EPA SWMM method, based on Mannings equation. The Bryant method was based on precipitation data compiled in the Ahlfeld and Winkler methods.

To assist in selecting a method, Rees and Schoen 2009 conducted third party review of the different approaches. Rees and Schoen found that the various methods produced different peak rate flows.

Differences were also found between peak flow rates in coastal and inland areas. With some methods, the precipitation intensity associated with the ½-inch water quality volume produced a greater flow rate than the 1-inch water quality volume. The study concluded that the Claytor and Schueler 1996 method was the most complete in attempting to transform the Water Quality Volume to a flow rate.

Subsequent to the study, flow rate results from the Claytor and Schueler method were adapted for use in Massachusetts using both the first ½ - inch and 1-inch Water Quality Volumes. Flow rates were found to bypass a portion of the Water Quality Volume for the both the first ½ -inch and 1-inch of runoff depending on drainage area and treatment device size. As bypassed runoff is not treated, the Proprietary BMP Subcommittee agreed on meeting held in March 2011 that practices sized using the flow conversion method must be restricted to pretreatment only and directed to stormwater treatment practices. The Proprietary BMP Subcommittee subsequently recommended the Claytor and Schueler 1996 method be used, as adapted for use in Massachusetts, to the Stormwater Advisory Committee in May 2011.

The Claytor and Schueler 1996 approach in part utilizes the U.S. Natural Resource and Conservation Service Technical Release 55 (TR-55) Graphical Peak Discharge Method (NRCS / SCS 1986), adapted for small storm hydrology (Pitt 1999). It was adapted for use in Massachusetts by determining the precipitation values that generate the first ½ -inch and 1-inch of runoff, using the NRCS / SCS 1986 equations as described below.

1. The Massachusetts Stormwater Standard No. 4 sets the required WQV equal to 0.5-inch or 1.0- inch, depending if the discharge is to or near a critical area, Land Use with Higher Potential Pollutant Load (LUHPPL), or soil with rapid infiltration rate.

2. The Claytor and Scheuler 1996 method requires a Curve Number (CN) be determined to represent the ability of a surface to effectively convey runoff. CN 98 was derived for impervious surfaces using small storm hydrology using the following equation (NRCS / SCS 1986). The precipitation depth associated with the first 1.0-inch of runoff is 1.2 watershed inches based on Figure 4 (NRCS 1986 Table 2-1) and Figure 5 (NRCS 1986 Figure 2-1). The precipitation depth associated with the first ½ - inch of runoff is 0.7 watershed inches.

   ½-inch WQV Derivation:

   Solve for P_t

$$CN = \frac{1000}{10 + 5P_t + 10Q_{WQV} - 10(Q_{WQV}{}^2 + 1.25Q_{WQV}P_t)^{0.5}}$$

   Where:

   CN = Runoff Curve Number = 98 for runoff impervious surfaces

   P_t = Precipitation depth

   Q_{WQV} = Runoff depth related to Water Quality Volume = 0.5 watershed inches

This equation produces the result **P_t = 0.7** inches, when CN = 98 and Q_{WQV} = 0.5 inches.

1-inch WQV Derivation

$$CN = \frac{1000}{10 + 5P_t + 10Q_{WQV} - 10(Q_{WQV}{}^2 + 1.25Q_{WQV}P_t)^{0.5}}$$

Where:

CN = Runoff Curve Number = 98 for runoff from impervious surfaces

P_t = Precipitation depth

Q_{WQV} = Runoff depth related to Water Quality Volume = 1.0 watershed inches

This equation produces the result **P_t = 1.2** inches, when CN = 98 and Q_{WQV} = 1.0 inches

3. Potential maximum retention (S) in inches was derived using the following equation (NRCS 1986):

   ½-inch WQV Derivation / 1-inch WQV Derivation (result same for both):

   $$S = (1000/CN) - 10$$

   This equation produces the result S = 0.204 when the CN = 98

4. The initial abstraction (Ia) was derived using the following equation (NRCS 1986):

   ½-inch WQV Derivation / 1-inch WQV Derivation (result same for both):

   $$Ia = 0.2S$$

   This equation produces the result Ia = 0.041, when S = 0.204

   Also See Figure 6 (NRCS 1986, Table 4-1), where Ia = 0.041, for CN = 98

5. The Ia/P Ratio was derived using the following equation (NRCS 1986):

   ½-inch WQV Derivation

   Solve for Ia/P Ratio using the following equation (NRCS 1986):

   $$Ia/P\ Ratio = Ia/P_t$$

   Where:

   Ia = 0.041 (for CN = 98)

   P_t = 0.7 watershed inches

   $$Ia/P\ Ratio = 0.041/0.7 = 0.058$$

1-inch WQV Derivation

$$Ia/P\ Ratio = Ia/\ P_t$$

Where:

Ia = 0.041 (for CN = 98)

P_t = 1.2 watershed inches

$$Ia/P\ Ratio = 0.041/\ 1.2 = 0.034$$

6. For the first ½ -inch runoff, Ia/P curve for 0.058 ratio (Figure 1) and corresponding table (Figure 2) were generated using coefficients C_0, C_1 and C_2 derived from regression of coefficients published in Appendix F in NRCS / SCS TR-55 1986.
7. For the first 1-inch runoff, Ia/P curve for 0.034 ratio (Figure 3) and corresponding table (Figure 4) were generated using coefficients C_0, C_1 and C_2 derived from regression of coefficients published in Appendix F in NRCS / SCS TR-55 1986.

Figures Used for Method Derivation

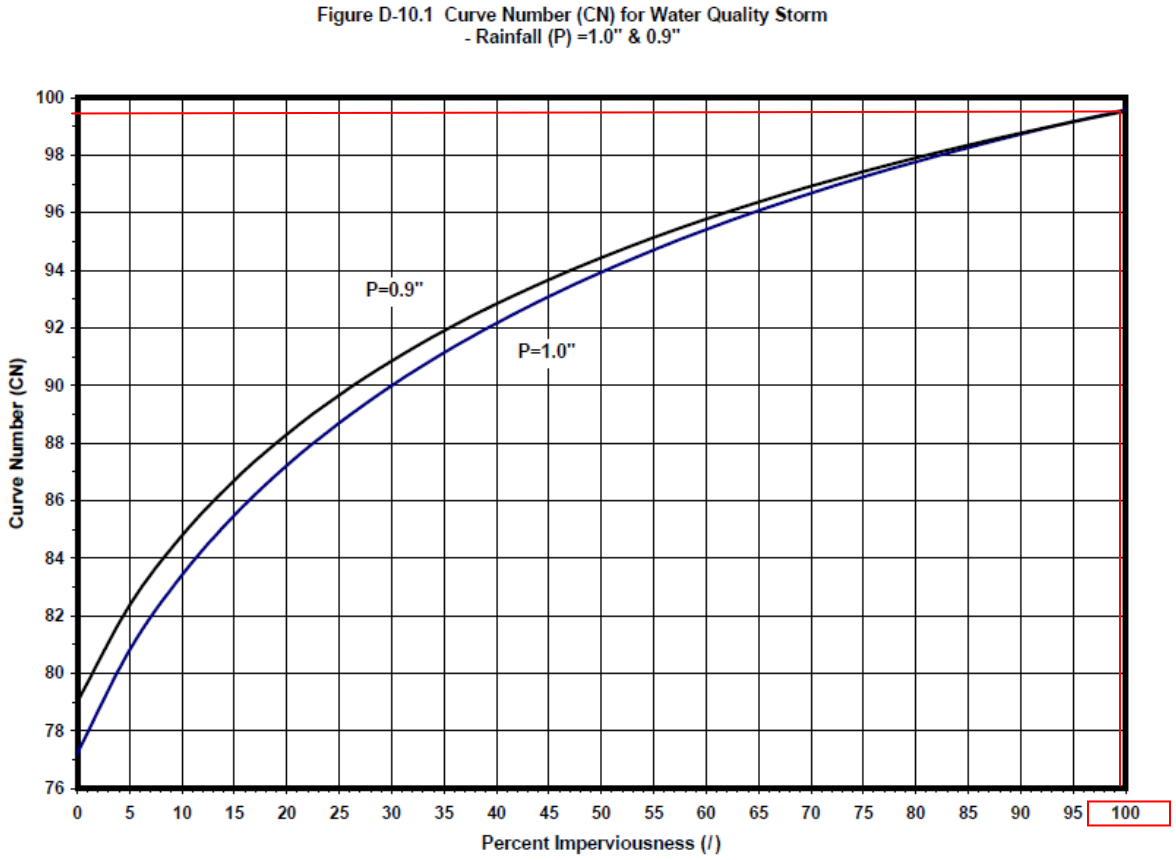


Figure 5: Graph Depicting CN to Percent Impervious Relationship by Precipitation Depth (MD 2000, Figure D-10.1). Note at 100% imperviousness, precipitation depths coincide, making corresponding Runoff CN greater than 98.

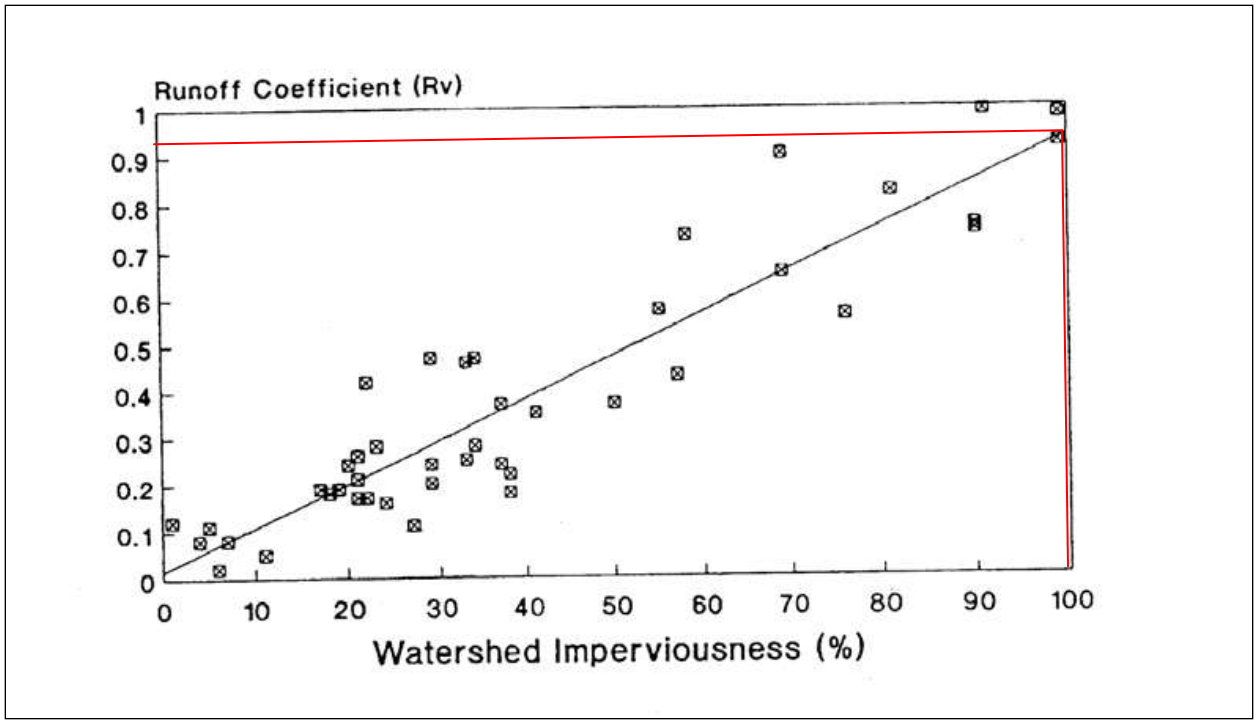


Figure 6: Relationship Between Impervious Cover & Runoff Coefficient (Vermont 2002, from Schueler, 1987). Note at 100% imperviousness, Rv is between 0.9 and 1, meaning that most of the precipitation effectively becomes runoff.

Table 2-1 Runoff depth for selected CN's and rainfall amounts 1/

Rainfall	Runoff depth for curve number of—												
	40	45	50	55	60	65	70	75	80	85	90	95	98
	inches												
1.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.08	0.17	0.32	0.56	0.79
1.2	.00	.00	.00	.00	.00	.00	.03	.07	.15	.27	.46	.74	.99
1.4	.00	.00	.00	.00	.00	.02	.06	.13	.24	.39	.61	.92	1.18
1.6	.00	.00	.00	.00	.01	.05	.11	.20	.34	.52	.76	1.11	1.38
1.8	.00	.00	.00	.00	.03	.09	.17	.29	.44	.65	.93	1.29	1.58
2.0	.00	.00	.00	.02	.06	.14	.24	.38	.56	.80	1.09	1.48	1.77
2.5	.00	.00	.02	.08	.17	.30	.46	.65	.89	1.18	1.53	1.96	2.27
3.0	.00	.02	.09	.19	.33	.51	.71	.96	1.25	1.59	1.98	2.45	2.77
3.5	.02	.08	.20	.35	.53	.75	1.01	1.30	1.64	2.02	2.45	2.94	3.27
4.0	.06	.18	.33	.53	.76	1.03	1.33	1.67	2.04	2.46	2.92	3.43	3.77
4.5	.14	.30	.50	.74	1.02	1.33	1.67	2.05	2.46	2.91	3.40	3.92	4.26
5.0	.24	.44	.69	.98	1.30	1.65	2.04	2.45	2.89	3.37	3.88	4.42	4.76
6.0	.50	.80	1.14	1.52	1.92	2.35	2.81	3.28	3.78	4.30	4.85	5.41	5.76
7.0	.84	1.24	1.68	2.12	2.60	3.10	3.62	4.15	4.69	5.25	5.82	6.41	6.76
8.0	1.25	1.74	2.25	2.78	3.33	3.89	4.46	5.04	5.63	6.21	6.81	7.40	7.76
9.0	1.71	2.29	2.88	3.49	4.10	4.72	5.33	5.95	6.57	7.18	7.79	8.40	8.76
10.0	2.23	2.89	3.56	4.23	4.90	5.56	6.22	6.88	7.52	8.16	8.78	9.40	9.76
11.0	2.78	3.52	4.26	5.00	5.72	6.43	7.13	7.81	8.48	9.13	9.77	10.39	10.76
12.0	3.38	4.19	5.00	5.79	6.56	7.32	8.05	8.76	9.45	10.11	10.76	11.39	11.76
13.0	4.00	4.89	5.76	6.61	7.42	8.21	8.98	9.71	10.42	11.10	11.76	12.39	12.76
14.0	4.65	5.62	6.55	7.44	8.30	9.12	9.91	10.67	11.39	12.08	12.75	13.39	13.76
15.0	5.33	6.36	7.35	8.29	9.19	10.04	10.85	11.63	12.37	13.07	13.74	14.39	14.76

Figure 7: Table Depicting Relationship Between Precipitation (P) and Direct Runoff (Q) by Curve Number (NRCS 1986, Table 2-1). 1.2 inches of precipitation effectively becomes 0.99-inch of runoff.

Figure 2-1 Solution of runoff equation.

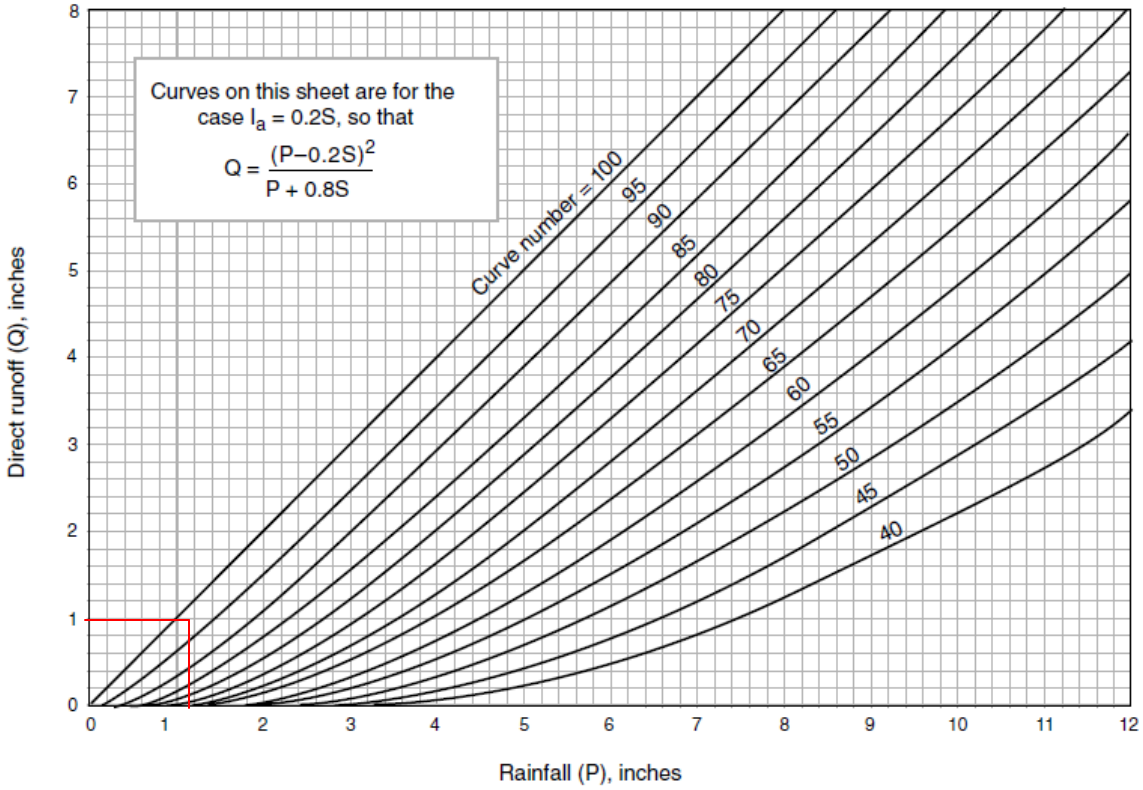


Figure 8: Graph Depicting Relationship Between Precipitation (P) and Direct Runoff (Q) by Curve Number (NRCS 1986, Figure 2-1). This indicates that for a CN 98 (representing impervious surfaces), 1.2 inches of precipitation effectively equals 1-inch of direct runoff.

Table 4-1 I_a values for runoff curve numbers

Curve number	I_a (in)	Curve number	I_a (in)
40	3.000	70	0.857
41	2.878	71	0.817
42	2.762	72	0.778
43	2.651	73	0.740
44	2.545	74	0.703
45	2.444	75	0.667
46	2.348	76	0.632
47	2.255	77	0.597
48	2.167	78	0.564
49	2.082	79	0.532
50	2.000	80	0.500
51	1.922	81	0.469
52	1.846	82	0.439
53	1.774	83	0.410
54	1.704	84	0.381
55	1.636	85	0.353
56	1.571	86	0.326
57	1.509	87	0.299
58	1.448	88	0.273
59	1.390	89	0.247
60	1.333	90	0.222
61	1.279	91	0.198
62	1.226	92	0.174
63	1.175	93	0.151
64	1.125	94	0.128
65	1.077	95	0.105
66	1.030	96	0.083
67	0.985	97	0.062
68	0.941	98	0.041
69	0.899		

Figure 9: Table Listing Ia by CN (NRCS 1986, Table 4-1). This indicates Initial Abstraction (Ia) for CN 98 = 0.041

Figure 4-1 Variation of I_a / P for P and CN

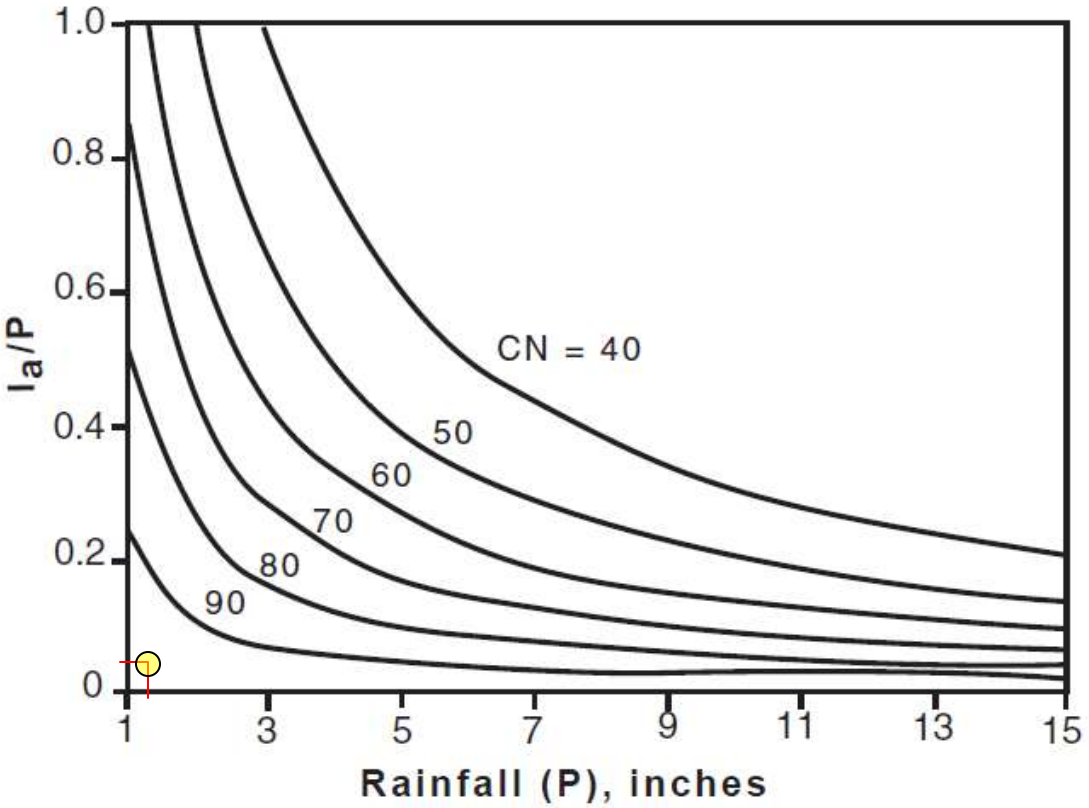


Figure 10: Graph Depicting Ia/P to Precipitation Relationship by CN (NRCS 1986, Figure 4-1). Ia/P ratio of 0.034 corresponding to 1.2 inches of precipitation added. Ia/P ratio determined for CN 98, using Ia = 0.041, P = 1.2

Exhibit 4-III Unit peal discharge (q_u) for NRCS (SCS) type III rainfall distribution

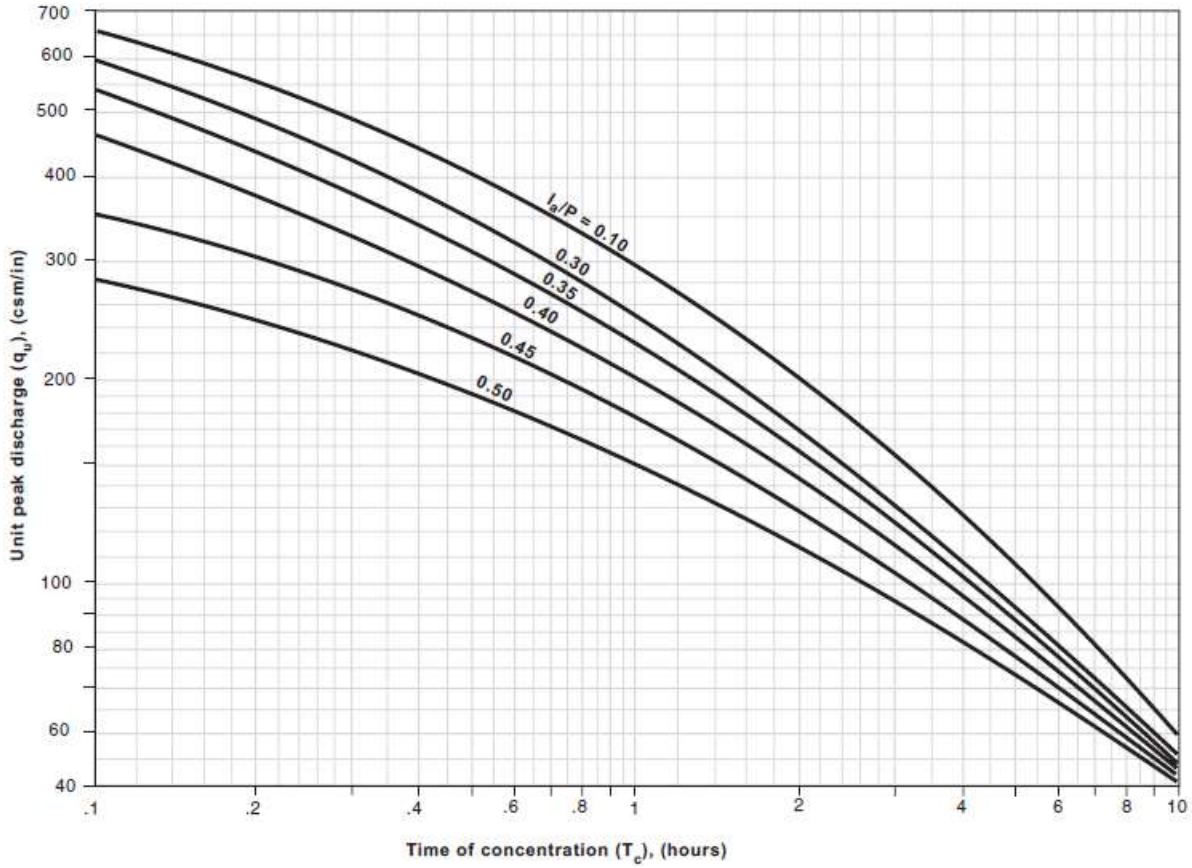


Figure 11: Relationship Between Time of Concentration and Unit Peak Discharge for Ia/P Ratios from 0.10 to 0.50 for NRCS Type III Storm Distribution (NRCS 1986, Exhibit 4-III). NRCS / SCS 1986 specifies Type III storm distribution (tropical influenced storms) for Massachusetts. See Figure 3 and 4 for Ia/P Ratio = 0.034

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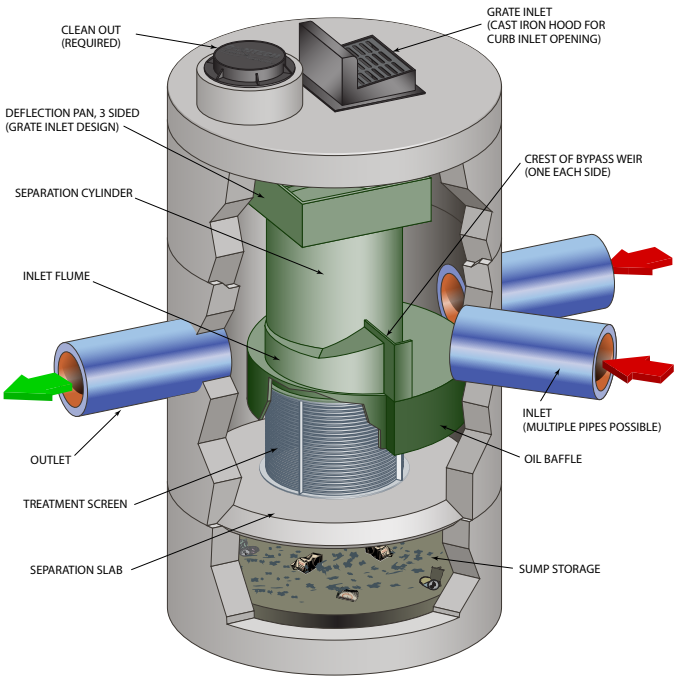
Continuous Deflective Separation - CDS®

Superior Stormwater Trash and Sediment Removal

The CDS is a swirl concentrator hybrid technology that uses continuous deflective separation – a combination of swirl concentration and indirect screening to screen, separate and trap debris, sediment, and hydrocarbons from stormwater runoff. The indirect screening capability of the system allows for 100% removal of floatables and neutrally buoyant material debris 2.4 mm or larger, without binding. CDS retains all captured pollutants, even at high flow rates, and provides easy access for maintenance.

CDS is used to meet trash Total Maximum Daily Load (TMDL) requirements, for stormwater quality control, inlet and outlet pollution control, and as pretreatment for filtration, detention/infiltration, bioretention, rainwater harvesting systems, and a variety of green infrastructure practices.



Learn more about the CDS system at www.ContechES.com/CDS ❖ ❖ ❖

CDS® Approvals

CDS has been verified by some of the most stringent stormwater technology evaluation organizations in North America, including:

- Washington State Department of Ecology
- New Jersey Department of Environmental Protection
- Canadian Environmental Technology Verification (ETV)
- California Statewide Trash Amendments Full Capture System Certified*

Performance Claim Verified by the Canadian ETV Program

** The CDS System has been certified by the California State Water Resources Control Board as a Full Capture System provided that it is sized to treat the peak flow rate from the region specific 1-year, 1-hour design storm, or the peak flow capacity of the corresponding storm drain, whichever is less.*

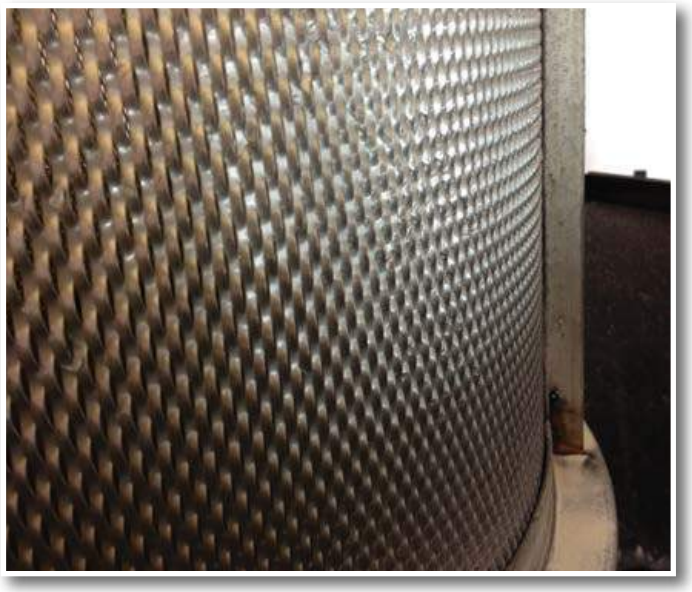
CDS® Features & Benefits

Feature	Benefit
1. Captures and retains 100% of floatables and neutrally buoyant debris 2.4 mm or larger	1. Superior pollutant removal
2. Self-cleaning screen	2. Ease of maintenance
3. Isolated storage sump eliminates scour potential	3. Excellent pollutant retention
4. Internal bypass	4. Eliminates the need for additional structures
5. Multiple pipe inlets and 90-180° angles	5. Design flexibility
6. Numerous regulatory approvals	6. Proven performance

The CDS® Screen

Traditional approaches to trash control typically involve "direct screening" that can easily become clogged, as trash is pinned to the screen as water passes through. Clogged screens can lead to flooding as water backs up.

The design of the CDS screen is fundamentally different. Flow is introduced to the screen face which is louvered so that it is smooth in the downstream direction. The effect created is called "Continuous Deflective Separation." The power of the incoming flow is harnessed to continually shear debris off the screen and to direct trash and sediment toward the center of the separation cylinder.

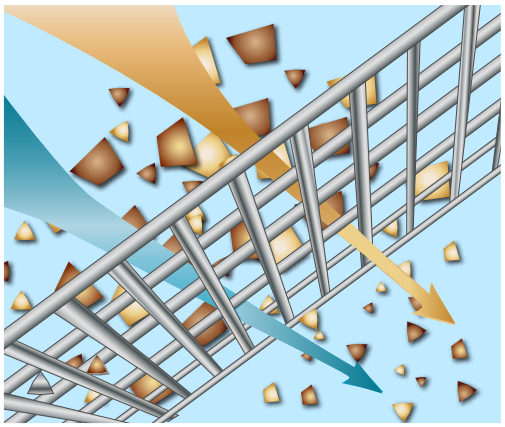


Key Features:

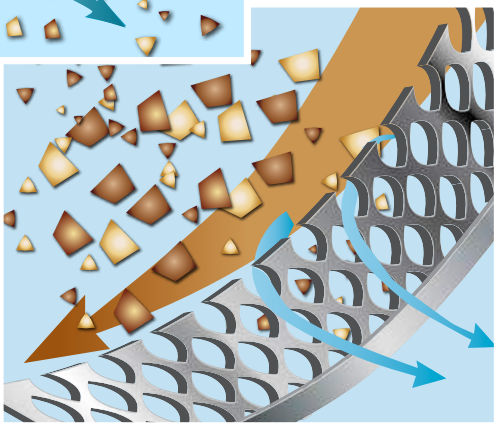
Self-Cleaning Screening Technology

- CDS Screen captures neutrally buoyant materials missed by other separator systems.
- Screen is hydraulically designed to be self-cleaning.
- Runoff entering the separation cylinder must pass through the screen prior to discharge, eliminating potential for scouring previously captured trash at high flow rates.

The CDS Screen – Self-Cleaning Screening Technology ❖ ❖ ❖



Direct Screening – particles that are larger than the aperture size of the screen can cause clogging, resulting in flooding if not maintained frequently.



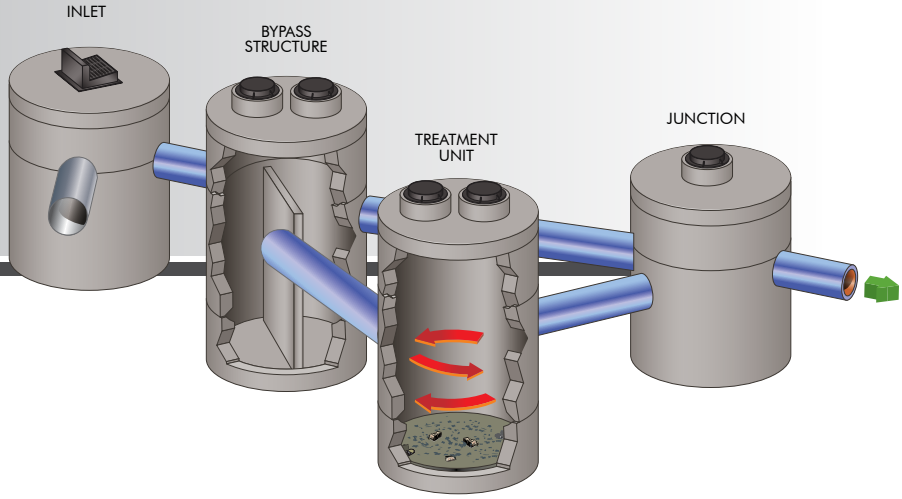
Continuous Deflective Separation Indirect Screening – water velocities within the swirl chamber continually shear debris off the screen to keep it clean.

CDS® Configuration - One System that Can Do It All!

The CDS effectively treats stormwater runoff while reducing the number of structures on your site.

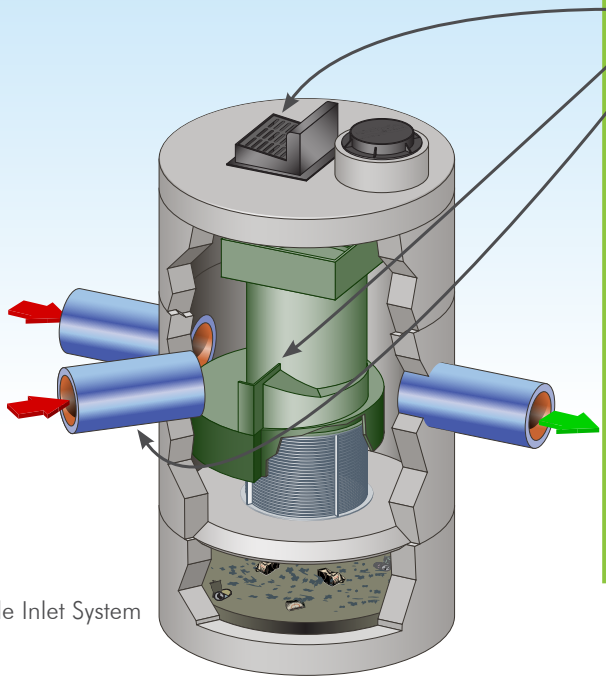
WHY GO THROUGH ALL THIS?

TRADITIONAL STORMWATER TREATMENT SITE DESIGN



ONE SYSTEM CAN DO IT ALL!

- Inline, offline, grate inlet, and drop inlet configurations available
- Internal and external peak bypass options available



CDS® Multiple Inlet System

Save Time, Space, and Money with CDS®

- Grate inlet option available
- Internal bypass weir
- Accepts multiple inlets at a variety of angles
- Advanced hydrodynamic separator
- Captures and retains 100% of floatables and neutrally buoyant debris 2.4 mm or larger
- Indirect screening capability keeps screen from clogging
- Retention of all captured pollutants, even at high flows
- Performance verified by NJCAT, WA Ecology, and ETV Canada

CDS® Applications

CDS is commonly used in the following stormwater applications:

- Stormwater quality control – trash, debris, sediment, and hydrocarbon removal
- Urban retrofit and redevelopment
- Inlet and outlet protection
- Pretreatment for filtration, detention/infiltration, bioretention, rainwater harvesting systems, and Low Impact Development designs.

CDS provides trash control.

CDS pretreats a bioswale.

CDS pretreats a rainwater harvesting cistern.

CDS standalone system removes trash and sediment.

CDS® Models and Capacities

	CDS MODEL	Treatment Flow Rates[1]			Estimated Maximum Peak Conveyance Flow[3] (cfs)/(L/s)	Minimum Sump Storage Capacity[4] (yd^3)/(m^3)	Minimum Oil Storage Capacity[4] (gal)/(L)
		75 microns (cfs)/(L/s)	125 microns[2] (cfs)/(L/s)	Trash & Debris (cfs)/(L/s)			
PRECAST	CDS2015-4	0.5 (14.2)	0.7 (19.8)	1.0 (28.3)	10 (283)	0.9 (0.7)	61 (232)
	CDS2015-5	0.5 (14.2)	0.7(19.8)	1.0 (28.3)	10 (283)	1.5 (1.1)	83 (313)
	CDS2020-5	0.7 (19.8)	1.1 (31.2)	1.5 (42.5)	14 (396)	1.5 (1.1)	99 (376)
	CDS2025-5	1.1 (31.2)	1.6 (45.3)	2.2 (62.3)	14 (396)	1.5 (1.1)	116 (439)
	CDS3020-6	1.4 (39.6)	2.0 (56.6)	2.8 (79.3)	20 (566)	2.1 (1.6)	184 (696)
	CDS3025-6	1.7 (48.1)	2.5 (70.8)	3.5 (99.2)	20 (566)	2.1 (1.6)	210 (795)
	CDS3030-6	2.0 (56.6)	3.0 (85.0)	4.2 (118.9)	20 (566)	2.1 (1.6)	236 (895)
	CDS3035-6	2.6 (73.6)	3.8 (106.2)	5.3 (150.0)	20 (566)	2.1 (1.6)	263 (994)
	CDS4030-8	3.1 (87.7)	4.5 (127.4)	6.3 (178.3)	30 (850)	5.6 (4.3)	426 (1612)
	CDS4040-8	4.1 (116.1)	6.0 (169.9)	8.4 (237.8)	30 (850)	5.6 (4.3)	520 (1970)
	CDS4045-8	5.1 (144.4)	7.5 (212.4)	10.5 (297.2)	30 (850)	5.6 (4.3)	568 (2149)
	CDS5640-10	6.1 (172.7)	9.0 (254.9)	12.6 (356.7)	50 (1416)	8.7 (6.7)	758 (2869)
	CDS5653-10	9.5 (268.9)	14.0 (396.5)	19.6 (554.8)	50 (1416)	8.7 (6.7)	965 (3652)
	CDS5668-10	12.9 (365.1)	19.0 (538.1)	26.6 (752.9)	50 (1416)	8.7 (6.7)	1172 (4435)
	CDS5678-10	17.0 (481.2)	25.0 (708.0)	35.0 (990.7)	50 (1416)	8.7 (6.7)	1309 (4956)
	CDS9280-12	27.2 (770.2)	40.0 (1132.7)	56.0 (1585.7)	Offline	16.8 (12.8)	N/A
	CDS9290-12	35.4 (1002.4)	52.0 (1472.5)	72 (2038.8)		16.8 (12.8)	
	CDS92100-12	42.8 (1212.0)	63.0 (1783.9)	88 (2491.9)		16.8 (12.8)	
CAST-IN-PLACE	CDS150134-22	100.7 (2851.5)	148.0 (4190.9)	270 (7645.6)		56.3 (43.0)	
	CDS200164-26	183.6 (5199.0)	270.0 (7645.6)	378.0 (10703.8)		78.7 (60.2)	
	CDS240160-32	204 (5776.6)	300.0 (8495.1)	420.0 (8495.1)		119.1 (91.1)	
	Additional Cast-in-Place models available upon request.						

1. Alternative PSD/D_{50} sizing is available upon request.
2. 125 micron flows are based on the CDS Washington State Department of Ecology approval for 80% removal of a particle size distribution (PSD) having a mean particle size (D_{50}) of 125 microns.
3. Estimated maximum peak conveyance flow is calculated using conservative values and may be exceeded on sites with lower inflow velocities and sufficient head over the weir.
4. Sump and oil capacities can be customized to meet site needs

CDS® Maintenance

Systems vary in their maintenance needs, and the selection of a cost-effective and easy-to-access treatment system can mean a huge difference in maintenance expenses for years to come.

A CDS unit is designed to minimize maintenance and make it as easy and inexpensive as possible to keep our systems working properly.

Most CDS units can easily be cleaned in 30 minutes.

Inspection

Inspection is the key to effective maintenance. Pollutant deposition and transport may vary from year to year and site to site. Semi-annual inspections will help ensure that the system is cleaned out at the appropriate time. Inspections should be performed more frequently where site conditions may cause rapid accumulation of pollutants.

Recommendations for CDS Maintenance

The recommended cleanout of solids within the CDS unit's sump should occur at 75% of the sump capacity. Access to the CDS unit is typically achieved through two manhole access covers – one allows inspection and cleanout of the separation chamber and sump, and another allows inspection and cleanout of sediment captured and retained behind the screen. A vacuum truck is recommended for cleanout of the CDS unit and can be easily accomplished in less than 30 minutes for most installations.

DYOHDS™ Tool

Design Your Own Hydrodynamic Separator

Features

- Choose from three HDS technologies - CDS®, Vortechs® and VortSentry® HS
- Site specific questions ensure the selected unit will comply with site constraints
- Unit size based on selected mean particle size and targeted removal percentage
- Localized rainfall data allows for region specific designs
- PDF report includes detailed performance calculations, specification and standard drawing for the unit that was sized

DYO Project design made easy.

Design Your Own (DYO) Hydrodynamic Separator online at www.ContechES.com/dyohds

Next Steps

Learn more

See our CDS systems in action at **www.ContechES.com/videos**

Connect with Us

We're here to make your job easier – and that includes being able to get in touch with us when you need to. **www.ContechES.com/localresources**

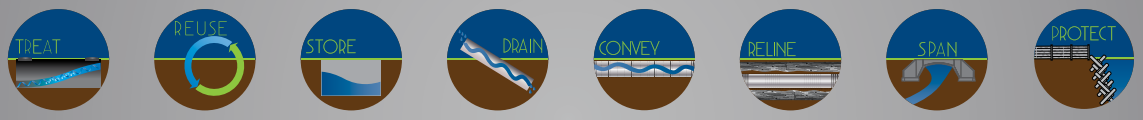
Start a Project

If you are ready to begin a project, visit us at **www.ContechES.com/startaproject**

Contech Engineered Solutions LLC provides site solutions for the civil engineering industry. Contech's portfolio includes bridges, drainage, retaining walls, sanitary sewer, stormwater, erosion control and soil stabilization products.

CONTECH® ENGINEERED SOLUTIONS

COMPLETE SITE SOLUTIONS



Stormwater Solutions

Helping to satisfy stormwater management requirements on land development projects

- Stormwater Treatment
- Detention/Infiltration
- Rainwater Harvesting
- Biofiltration/Bioretention

Pipe Solutions

Meeting project needs for durability, hydraulics, corrosion resistance, and stiffness

- Corrugated Metal Pipe (CMP)
- Steel Reinforced Polyethylene (SRPE)
- High Density Polyethylene (HDPE)
- Polyvinyl Chloride (PVC)

Structures Solutions

Providing innovative options and support for crossings, culverts, and bridges

- Plate, Precast & Truss bridges
- Hard Armor
- Retaining Walls
- Tunnel Liner Plate

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CDS Brochure - 06/2017 (PDF)

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FSC

RECHARGE VOLUME

Project Name: Nichols Townhouses Project # 076491

Date: September 29, 2022

Following Guidelines From "Massachusetts Stormwater Management Technical Handbook"

Recharge Volume

Rv = F * Impervious Area

Where:

Rv = Required Recharge Volume
F = Target Depth Factor

Areas From AutoCAD

Hydrologic Soil Group	Recharge Factor	Acres
A	0.60	0.000
B	0.35	0.000
C	0.25	0.761
D	0.10	0.000

Rv REQUIRED = 0.016 ac ft
691 cf

Capture Area Adjustment

Total New Impervious Area	=	0.761	acres
Captured Impervious Area	=	0.761	acres
Ratio	=	1.00	
Rv REQUIRED	=	**691**	**cf**

Available Storage

Volumes From HydroCAD

Water Quality Basin to Elev. 623.6 → 2,039 cu.ft.

Total Available Storage = **2,039** cu.ft.

2,039 ≥ 691

Drawdown

T = Rv / K (Btm Area)

Where:

T = Time (hrs)
Rv = Required Recharge Volume
K = Saturated Hydraulic Conductivity

Table 2.3.3
K=Rawls Rates for Type "C" Silt Loam

T = 2039 / (0.27 * (3145 / 12))

T = **28.8 hrs**

28.8 ≤ 72

Prepared By: PMP Checked By:_____

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: Nichols College

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
Oil Grit Separator	0.25	0.75	0.19	0.56
Water Quality Swale - Dry	0.70	0.56	0.39	0.17
	0.00	0.17	0.00	0.17
	0.00	0.17	0.00	0.17

Total TSS Removal = 83%

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

Project: Townhouses
Prepared By: P.Parent
Date: 5/22/2022

*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

EXISTING CONDITIONS DRAINAGE CALCULATIONS

60 30 0 60
GRAPHIC SCALE IN FEET

Juster Pope Frazier, LLC
Architects and Planners
82 North Street
Northampton, Massachusetts 01060
413 . 586 . 1600

Clough Harbour Associates, LLP
Civil Engineers
101 East River Drive, 1st Floor
East Hartford, CT 06108
860.290.4100

OWNER/APPLICANT
NICHOLS COLLEGE
121 CENTER ROAD
PO BOX 5000
DUDLEY, MA 01571
508-213-2217

TOWNHOMES

CENTER ROAD, DUDLEY, MA 01571

REVISIONS

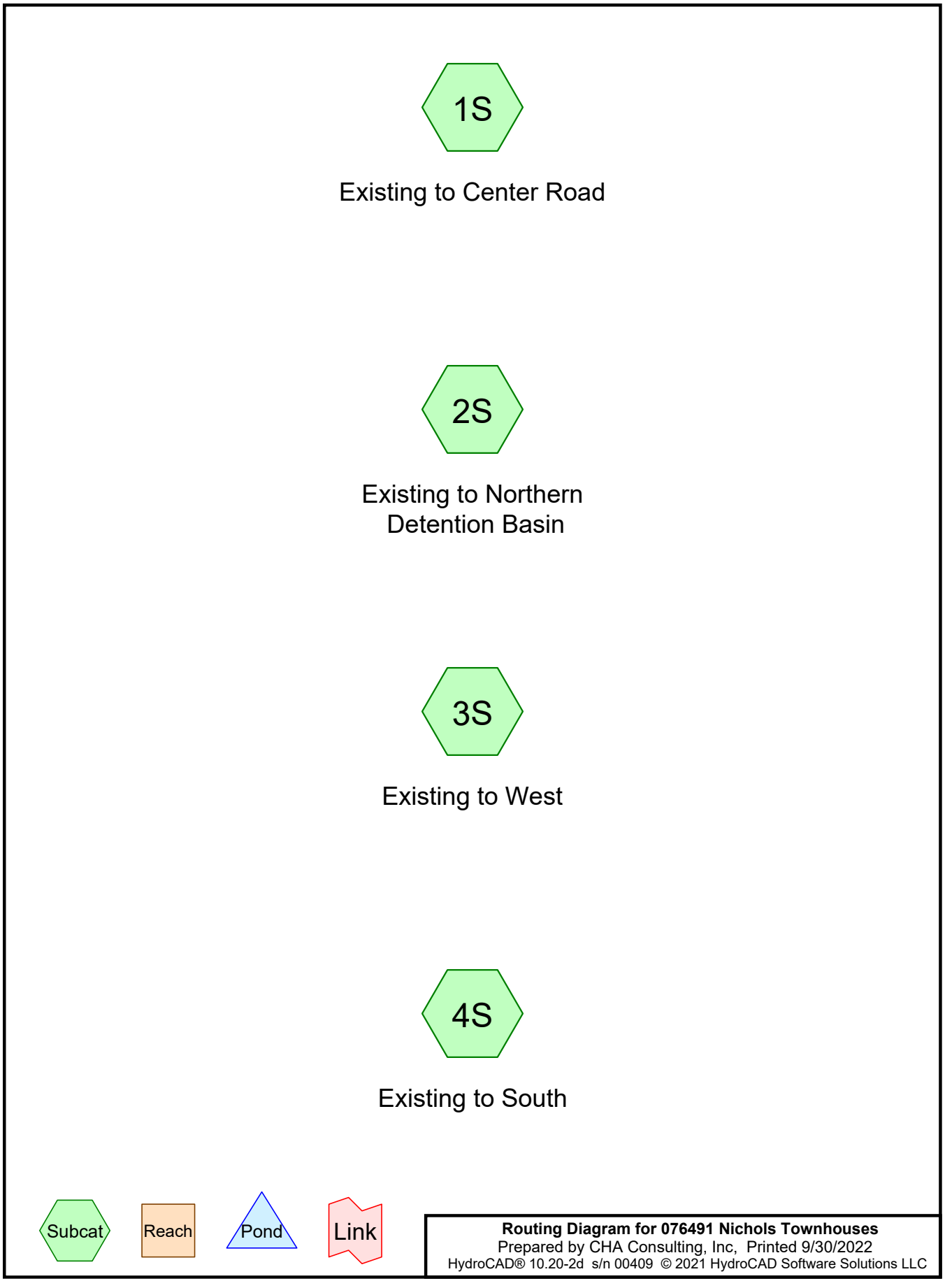
NO.	DATE	BY	REMARKS
1	6/30/22	PMP	REVIEW COMMENTS
2	10/3/22	PMP	REVISED SITE LAYOUT

SET
PLANNING BOARD SUBMISSION

SHEET TITLE
EXISTING CONDITIONS DRAINAGE BASIN MAP

DATE	MAY 25, 2022
SCALE	1" = 60'
DRAWN BY	PMP
CHECKED BY	

SHEET NO.
C6.1


1S
Existing to Center Road
2S
Existing to Northern
Detention Basin
3S
Existing to West
4S
Existing to South
Subcat
Reach
Pond
Link
Routing Diagram for 076491 Nichols Townhouses
Prepared by CHA Consulting, Inc, Printed 9/30/2022
HydroCAD® 10.20-2d s/n 00409 © 2021 HydroCAD Software Solutions LLC

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-yr	Type III 24-hr		Default	24.00	1	3.29	2
2	10-yr	Type III 24-hr		Default	24.00	1	5.08	2
3	25-yr	Type III 24-hr		Default	24.00	1	6.20	2
4	100-yr	Type III 24-hr		Default	24.00	1	7.93	2

Area Listing (selected nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
280,035	74	>75% Grass cover, Good, HSG C (1S, 2S, 3S, 4S)
86,440	98	Paved (1S, 2S)
186,175	70	Woods, Good, HSG C (1S, 3S, 4S)
552,650	**76**	**TOTAL AREA**

Time span=0.00-60.00 hrs, dt=0.01 hrs, 6001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: Existing to Center Runoff Area=210,930 sf 20.55% Impervious Runoff Depth=1.40"
Flow Length=205' Tc=7.9 min CN=79 Runoff=7.36 cfs 24,691 cf

Subcatchment2S: Existing to Northern Runoff Area=63,790 sf 67.55% Impervious Runoff Depth=2.25"
Tc=5.0 min CN=90 Runoff=3.96 cfs 11,972 cf

Subcatchment3S: Existing to West Runoff Area=258,900 sf 0.00% Impervious Runoff Depth=0.99"
Flow Length=530' Tc=20.1 min CN=72 Runoff=4.27 cfs 21,272 cf

Subcatchment4S: Existing to South Runoff Area=19,030 sf 0.00% Impervious Runoff Depth=0.99"
Flow Length=255' Tc=16.0 min CN=72 Runoff=0.34 cfs 1,564 cf

Total Runoff Area = 552,650 sf Runoff Volume = 59,498 cf Average Runoff Depth = 1.29"
84.36% Pervious = 466,210 sf 15.64% Impervious = 86,440 sf

Summary for Subcatchment 1S: Existing to Center Road

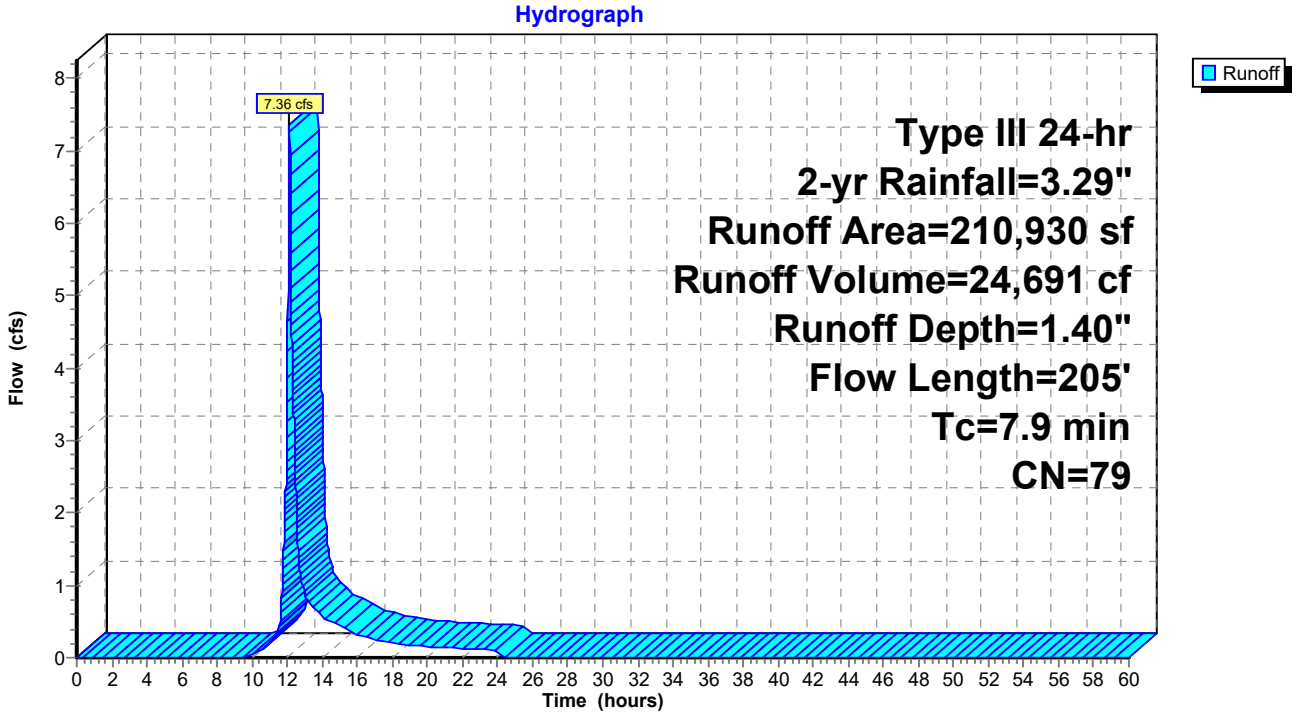
Runoff = 7.36 cfs @ 12.12 hrs, Volume= 24,691 cf, Depth= 1.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.29"

	Area (sf)	CN	Description
*	43,350	98	Paved
	147,665	74	>75% Grass cover, Good, HSG C
	19,915	70	Woods, Good, HSG C
	210,930	79	Weighted Average
	167,580		79.45% Pervious Area
	43,350		20.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	35	0.0060	0.09		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.29"
1.1	170	0.1300	2.52		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
7.9	205	Total			

Subcatchment 1S: Existing to Center Road



Summary for Subcatchment 2S: Existing to Northern Detention Basin

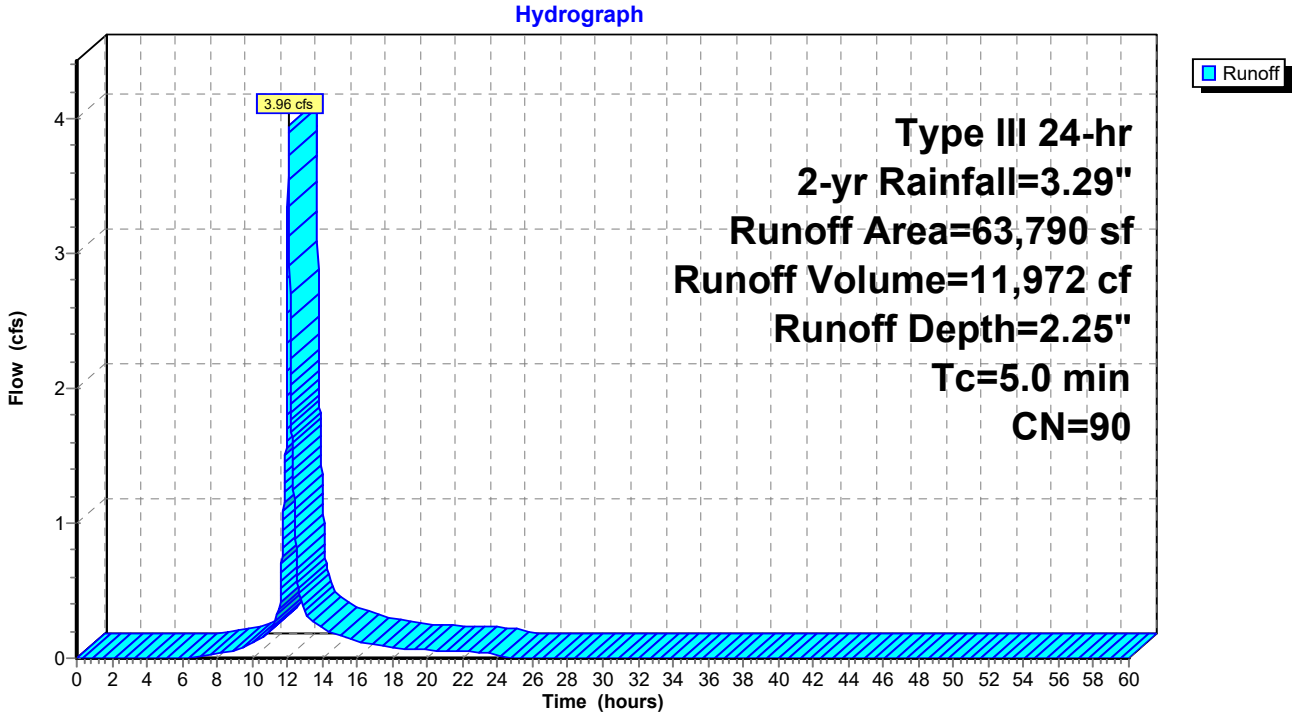
Runoff = 3.96 cfs @ 12.07 hrs, Volume= 11,972 cf, Depth= 2.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.29"

	Area (sf)	CN	Description
*	43,090	98	Paved
	20,700	74	>75% Grass cover, Good, HSG C
	63,790	90	Weighted Average
	20,700		32.45% Pervious Area
	43,090		67.55% Impervious Area

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

Subcatchment 2S: Existing to Northern Detention Basin



Summary for Subcatchment 3S: Existing to West

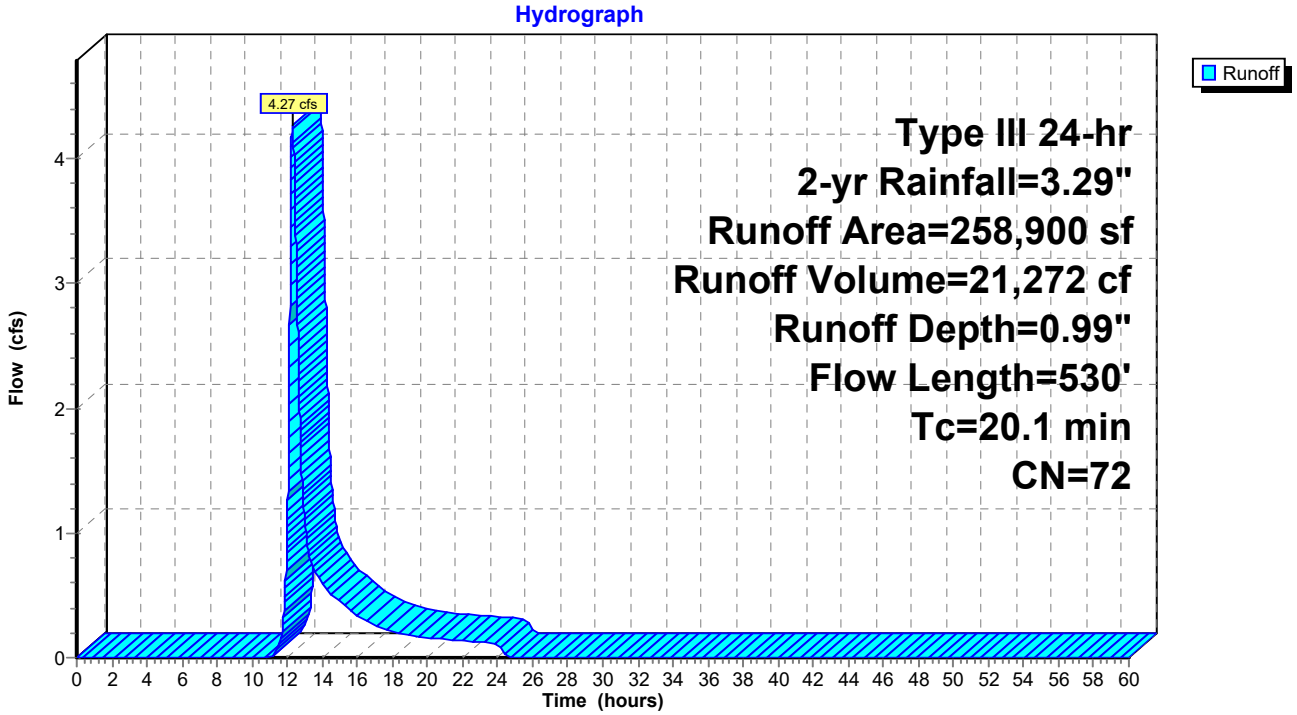
Runoff = 4.27 cfs @ 12.31 hrs, Volume= 21,272 cf, Depth= 0.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.29"

Area (sf)	CN	Description
101,210	74	>75% Grass cover, Good, HSG C
157,690	70	Woods, Good, HSG C
258,900	72	Weighted Average
258,900		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	75	0.0060	0.10		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.29"
5.6	165	0.0050	0.49		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
2.1	290	0.1070	2.29		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
20.1	530	Total			

Subcatchment 3S: Existing to West



Summary for Subcatchment 4S: Existing to South

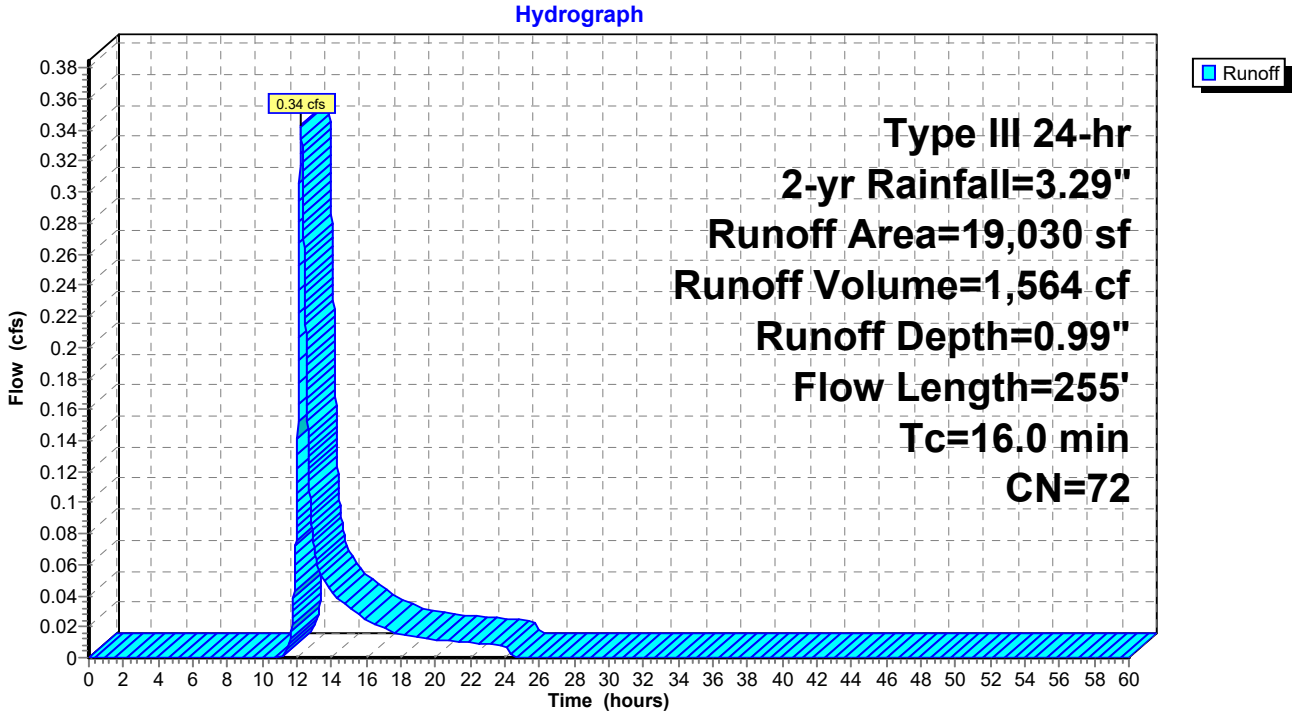
Runoff = 0.34 cfs @ 12.24 hrs, Volume= 1,564 cf, Depth= 0.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.29"

Area (sf)	CN	Description
10,460	74	>75% Grass cover, Good, HSG C
8,570	70	Woods, Good, HSG C
19,030	72	Weighted Average
19,030		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	75	0.0060	0.10		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.29"
2.4	100	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.2	80	0.0250	1.11		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
16.0	255	Total			

Subcatchment 4S: Existing to South



Time span=0.00-60.00 hrs, dt=0.01 hrs, 6001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: Existing to Center Runoff Area=210,930 sf 20.55% Impervious Runoff Depth=2.87"
Flow Length=205' Tc=7.9 min CN=79 Runoff=15.26 cfs 50,459 cf

Subcatchment2S: Existing to Northern Runoff Area=63,790 sf 67.55% Impervious Runoff Depth=3.95"
Tc=5.0 min CN=90 Runoff=6.78 cfs 21,016 cf

Subcatchment3S: Existing to West Runoff Area=258,900 sf 0.00% Impervious Runoff Depth=2.26"
Flow Length=530' Tc=20.1 min CN=72 Runoff=10.45 cfs 48,752 cf

Subcatchment4S: Existing to South Runoff Area=19,030 sf 0.00% Impervious Runoff Depth=2.26"
Flow Length=255' Tc=16.0 min CN=72 Runoff=0.84 cfs 3,583 cf

Total Runoff Area = 552,650 sf Runoff Volume = 123,810 cf Average Runoff Depth = 2.69"
84.36% Pervious = 466,210 sf 15.64% Impervious = 86,440 sf

Summary for Subcatchment 1S: Existing to Center Road

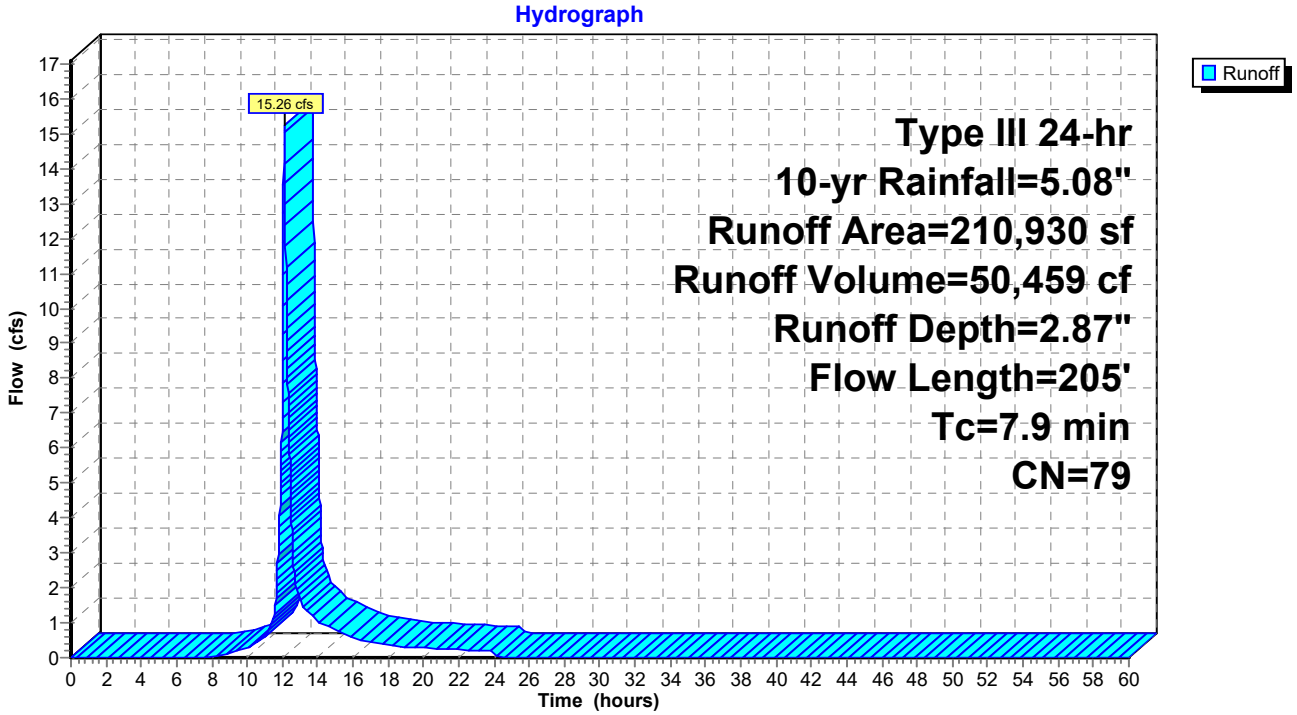
Runoff = 15.26 cfs @ 12.11 hrs, Volume= 50,459 cf, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.08"

	Area (sf)	CN	Description
*	43,350	98	Paved
	147,665	74	>75% Grass cover, Good, HSG C
	19,915	70	Woods, Good, HSG C
	210,930	79	Weighted Average
	167,580		79.45% Pervious Area
	43,350		20.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	35	0.0060	0.09		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.29"
1.1	170	0.1300	2.52		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
7.9	205	Total			

Subcatchment 1S: Existing to Center Road



Summary for Subcatchment 2S: Existing to Northern Detention Basin

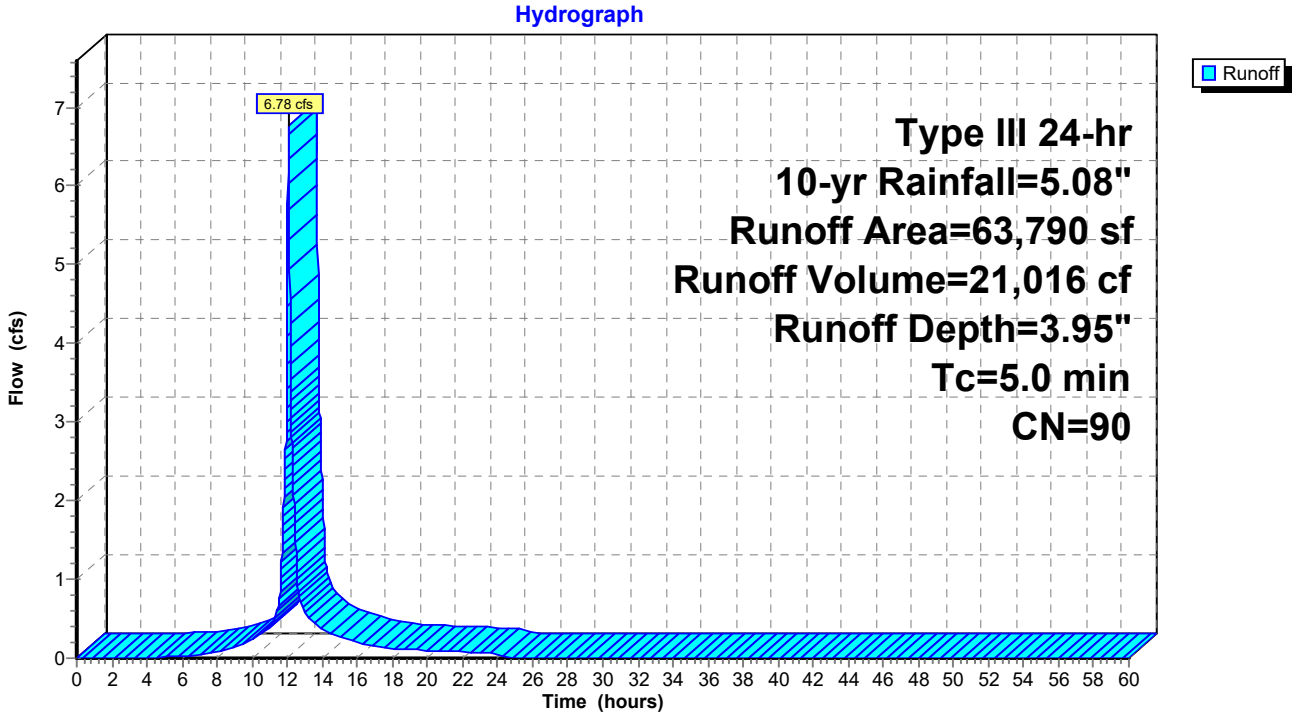
Runoff = 6.78 cfs @ 12.07 hrs, Volume= 21,016 cf, Depth= 3.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.08"

	Area (sf)	CN	Description
*	43,090	98	Paved
	20,700	74	>75% Grass cover, Good, HSG C
	63,790	90	Weighted Average
	20,700		32.45% Pervious Area
	43,090		67.55% Impervious Area

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

Subcatchment 2S: Existing to Northern Detention Basin



Summary for Subcatchment 3S: Existing to West

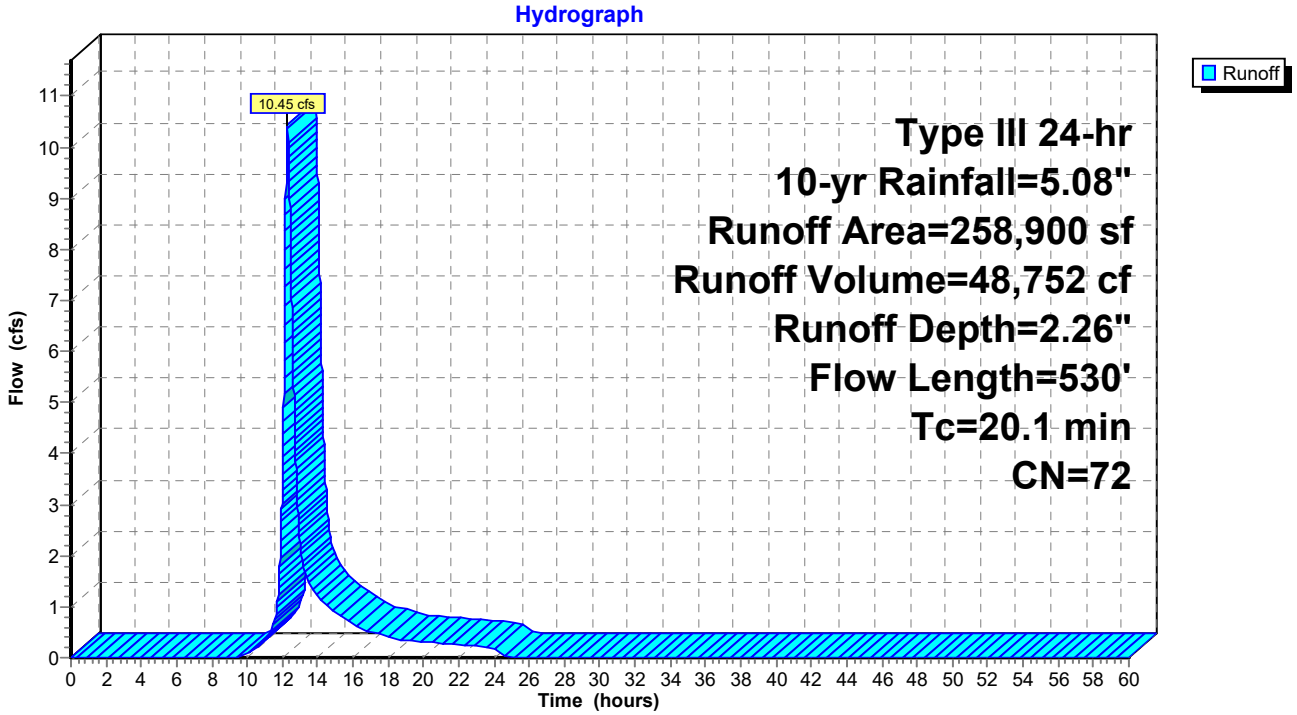
Runoff = 10.45 cfs @ 12.29 hrs, Volume= 48,752 cf, Depth= 2.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.08"

Area (sf)	CN	Description
101,210	74	>75% Grass cover, Good, HSG C
157,690	70	Woods, Good, HSG C
258,900	72	Weighted Average
258,900		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	75	0.0060	0.10		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.29"
5.6	165	0.0050	0.49		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
2.1	290	0.1070	2.29		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
20.1	530	Total			

Subcatchment 3S: Existing to West



Summary for Subcatchment 4S: Existing to South

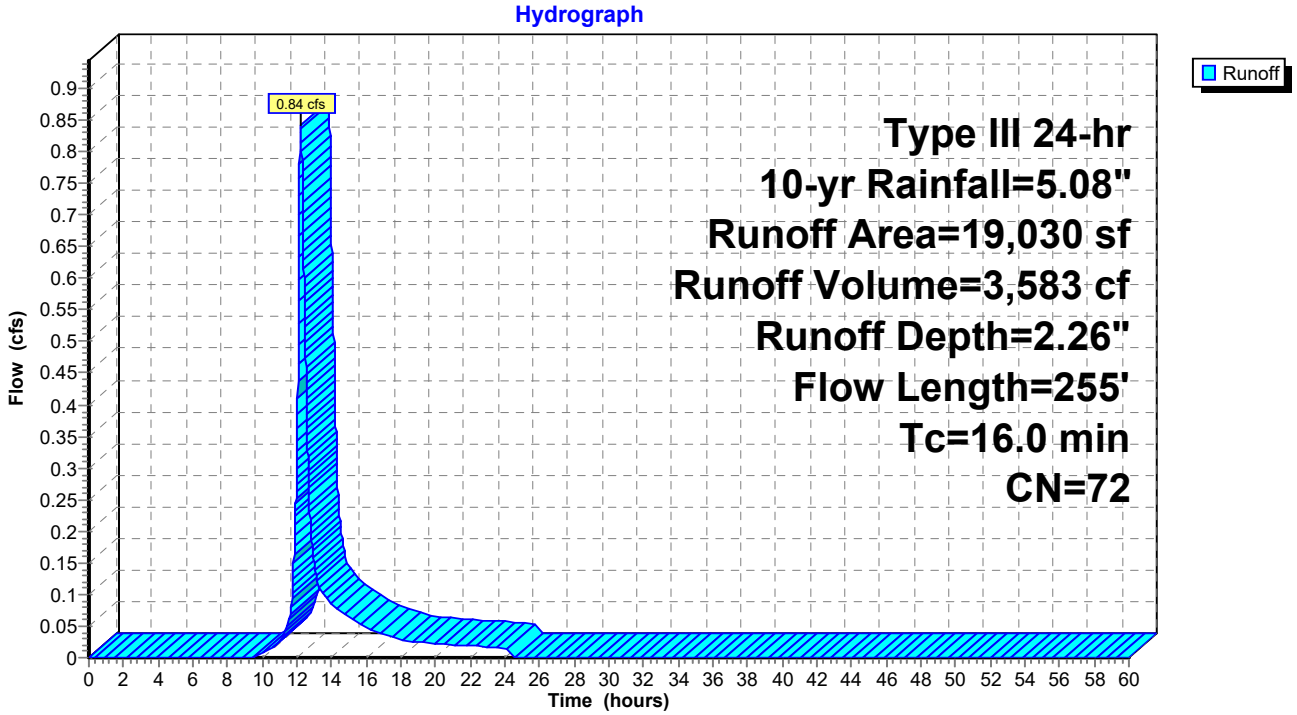
Runoff = 0.84 cfs @ 12.22 hrs, Volume= 3,583 cf, Depth= 2.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.08"

Area (sf)	CN	Description
10,460	74	>75% Grass cover, Good, HSG C
8,570	70	Woods, Good, HSG C
19,030	72	Weighted Average
19,030		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	75	0.0060	0.10		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.29"
2.4	100	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.2	80	0.0250	1.11		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
16.0	255	Total			

Subcatchment 4S: Existing to South



Time span=0.00-60.00 hrs, dt=0.01 hrs, 6001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: Existing to Center Runoff Area=210,930 sf 20.55% Impervious Runoff Depth=3.86"
Flow Length=205' Tc=7.9 min CN=79 Runoff=20.45 cfs 67,827 cf

Subcatchment2S: Existing to Northern Runoff Area=63,790 sf 67.55% Impervious Runoff Depth=5.04"
Tc=5.0 min CN=90 Runoff=8.53 cfs 26,796 cf

Subcatchment3S: Existing to West Runoff Area=258,900 sf 0.00% Impervious Runoff Depth=3.16"
Flow Length=530' Tc=20.1 min CN=72 Runoff=14.75 cfs 68,125 cf

Subcatchment4S: Existing to South Runoff Area=19,030 sf 0.00% Impervious Runoff Depth=3.16"
Flow Length=255' Tc=16.0 min CN=72 Runoff=1.19 cfs 5,007 cf

Total Runoff Area = 552,650 sf Runoff Volume = 167,755 cf Average Runoff Depth = 3.64"
84.36% Pervious = 466,210 sf 15.64% Impervious = 86,440 sf

Summary for Subcatchment 1S: Existing to Center Road

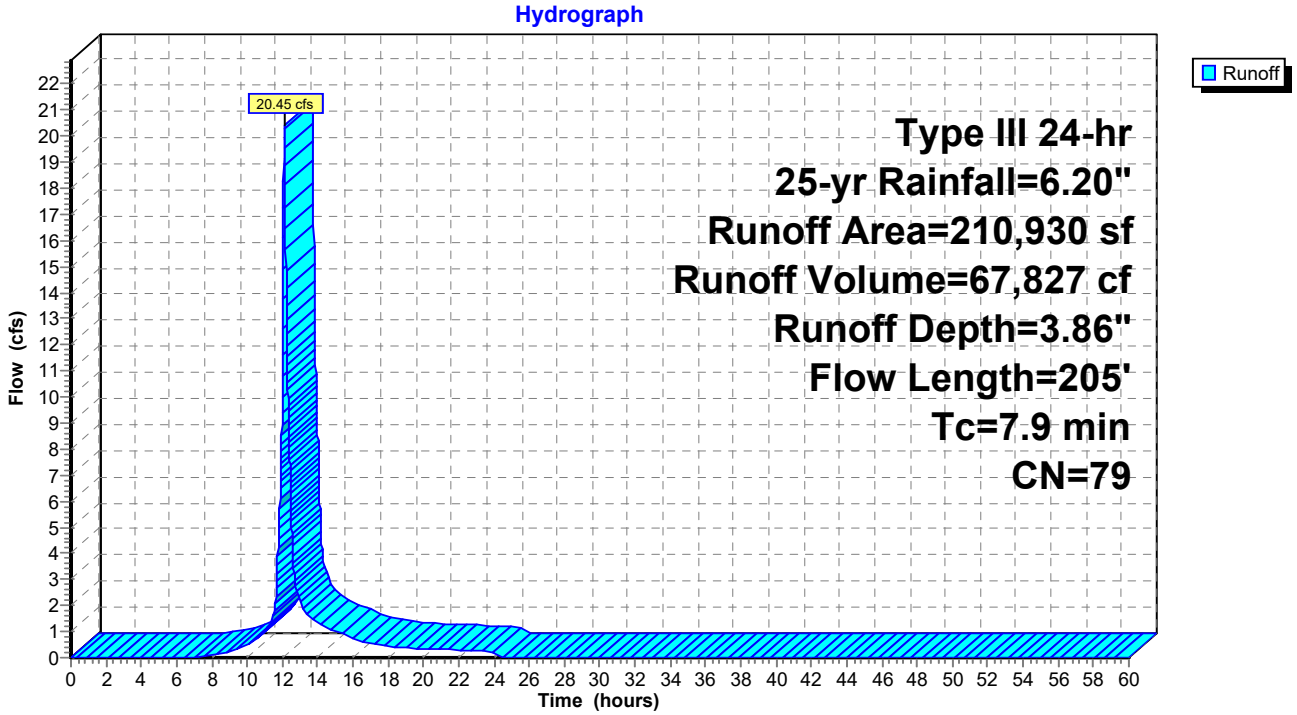
Runoff = 20.45 cfs @ 12.11 hrs, Volume= 67,827 cf, Depth= 3.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.20"

	Area (sf)	CN	Description
*	43,350	98	Paved
	147,665	74	>75% Grass cover, Good, HSG C
	19,915	70	Woods, Good, HSG C
	210,930	79	Weighted Average
	167,580		79.45% Pervious Area
	43,350		20.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	35	0.0060	0.09		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.29"
1.1	170	0.1300	2.52		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
7.9	205	Total			

Subcatchment 1S: Existing to Center Road



Summary for Subcatchment 2S: Existing to Northern Detention Basin

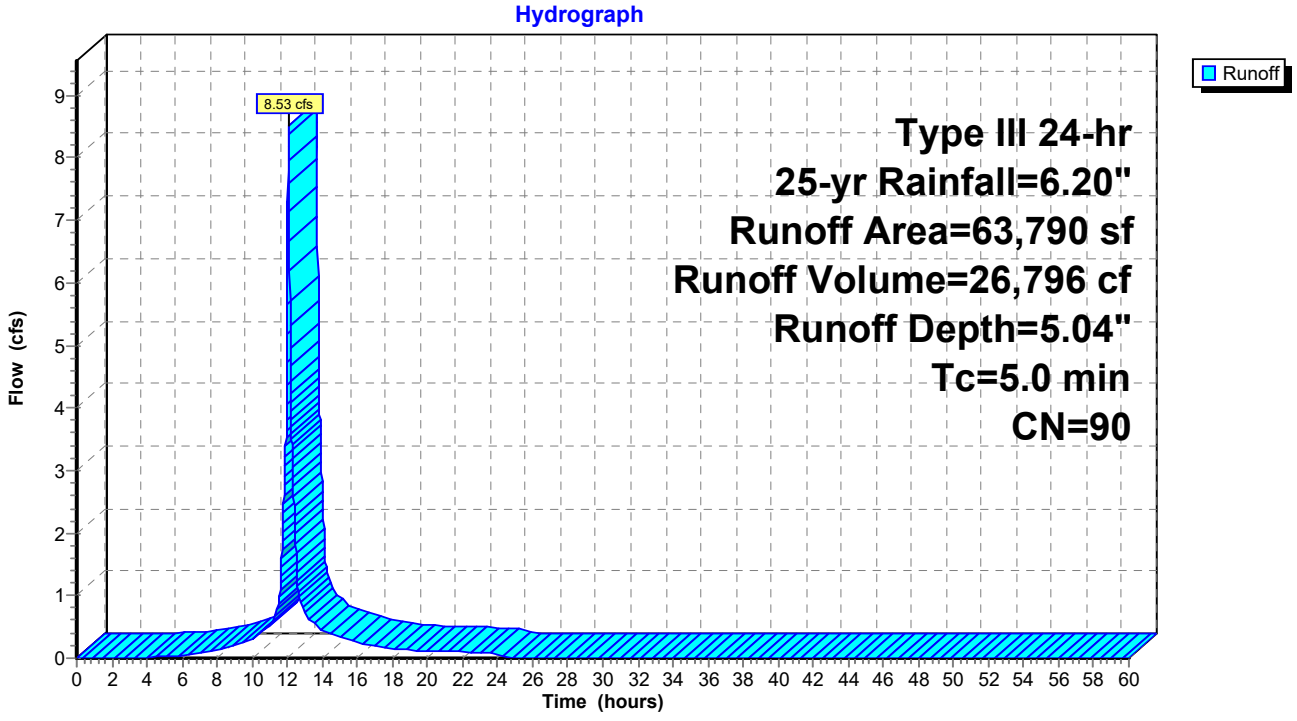
Runoff = 8.53 cfs @ 12.07 hrs, Volume= 26,796 cf, Depth= 5.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.20"

	Area (sf)	CN	Description
*	43,090	98	Paved
	20,700	74	>75% Grass cover, Good, HSG C
	63,790	90	Weighted Average
	20,700		32.45% Pervious Area
	43,090		67.55% Impervious Area

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

Subcatchment 2S: Existing to Northern Detention Basin



Summary for Subcatchment 3S: Existing to West

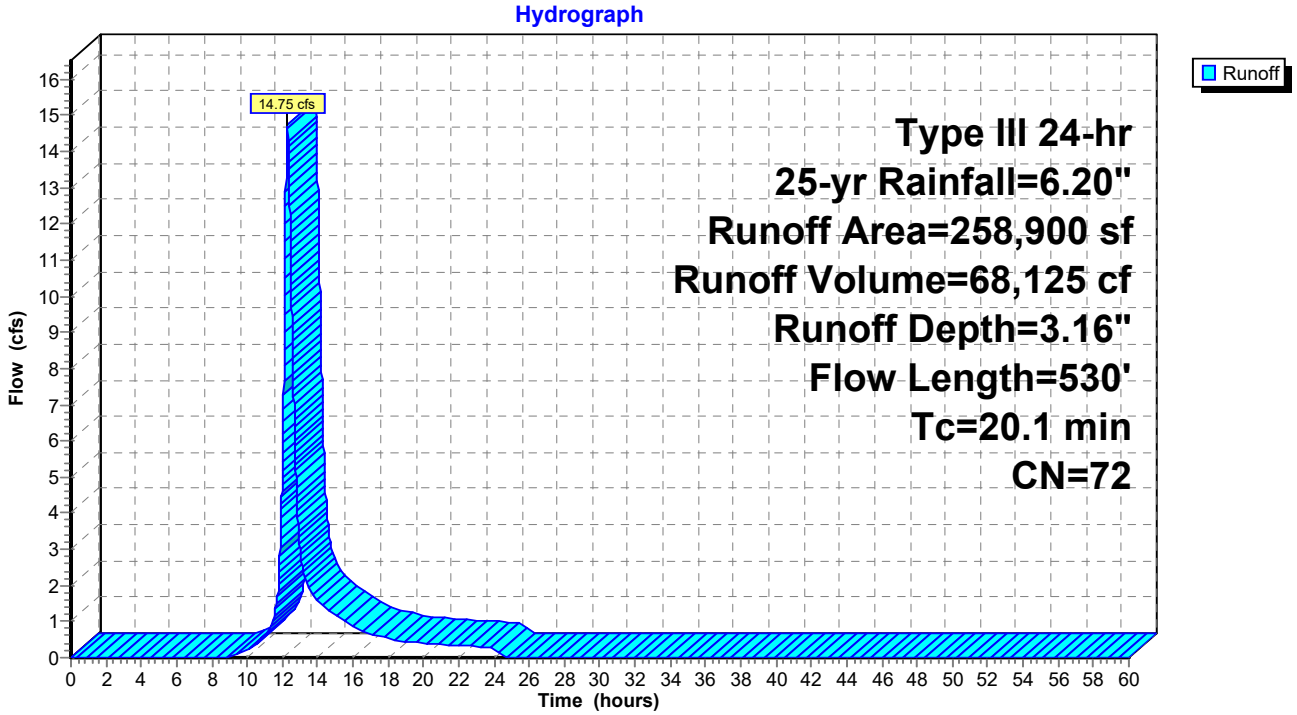
Runoff = 14.75 cfs @ 12.28 hrs, Volume= 68,125 cf, Depth= 3.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.20"

Area (sf)	CN	Description
101,210	74	>75% Grass cover, Good, HSG C
157,690	70	Woods, Good, HSG C
258,900	72	Weighted Average
258,900		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	75	0.0060	0.10		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.29"
5.6	165	0.0050	0.49		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
2.1	290	0.1070	2.29		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
20.1	530	Total			

Subcatchment 3S: Existing to West



Summary for Subcatchment 4S: Existing to South

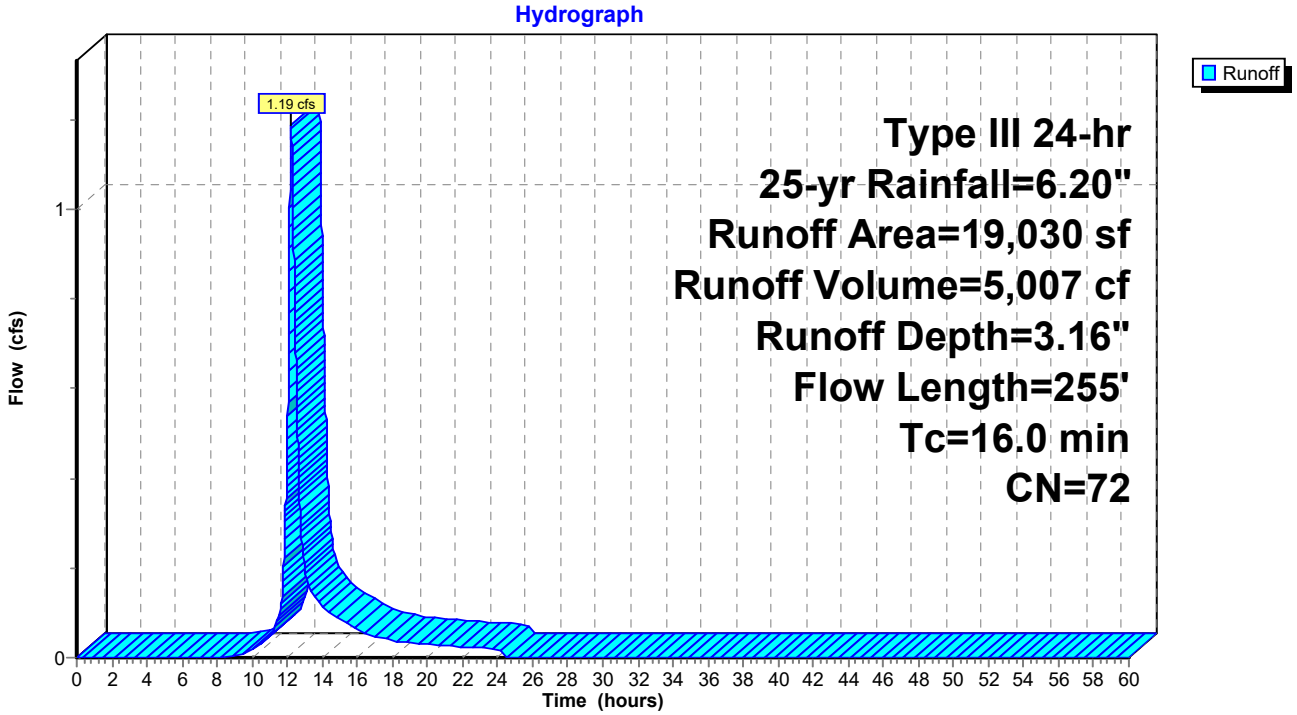
Runoff = 1.19 cfs @ 12.22 hrs, Volume= 5,007 cf, Depth= 3.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.20"

Area (sf)	CN	Description
10,460	74	>75% Grass cover, Good, HSG C
8,570	70	Woods, Good, HSG C
19,030	72	Weighted Average
19,030		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	75	0.0060	0.10		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.29"
2.4	100	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.2	80	0.0250	1.11		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
16.0	255	Total			

Subcatchment 4S: Existing to South



Time span=0.00-60.00 hrs, dt=0.01 hrs, 6001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: Existing to Center Runoff Area=210,930 sf 20.55% Impervious Runoff Depth=5.44"
Flow Length=205' Tc=7.9 min CN=79 Runoff=28.59 cfs 95,670 cf

Subcatchment2S: Existing to Northern Runoff Area=63,790 sf 67.55% Impervious Runoff Depth=6.74"
Tc=5.0 min CN=90 Runoff=11.21 cfs 35,811 cf

Subcatchment3S: Existing to West Runoff Area=258,900 sf 0.00% Impervious Runoff Depth=4.63"
Flow Length=530' Tc=20.1 min CN=72 Runoff=21.71 cfs 99,959 cf

Subcatchment4S: Existing to South Runoff Area=19,030 sf 0.00% Impervious Runoff Depth=4.63"
Flow Length=255' Tc=16.0 min CN=72 Runoff=1.75 cfs 7,347 cf

Total Runoff Area = 552,650 sf Runoff Volume = 238,787 cf Average Runoff Depth = 5.18"
84.36% Pervious = 466,210 sf 15.64% Impervious = 86,440 sf

Summary for Subcatchment 1S: Existing to Center Road

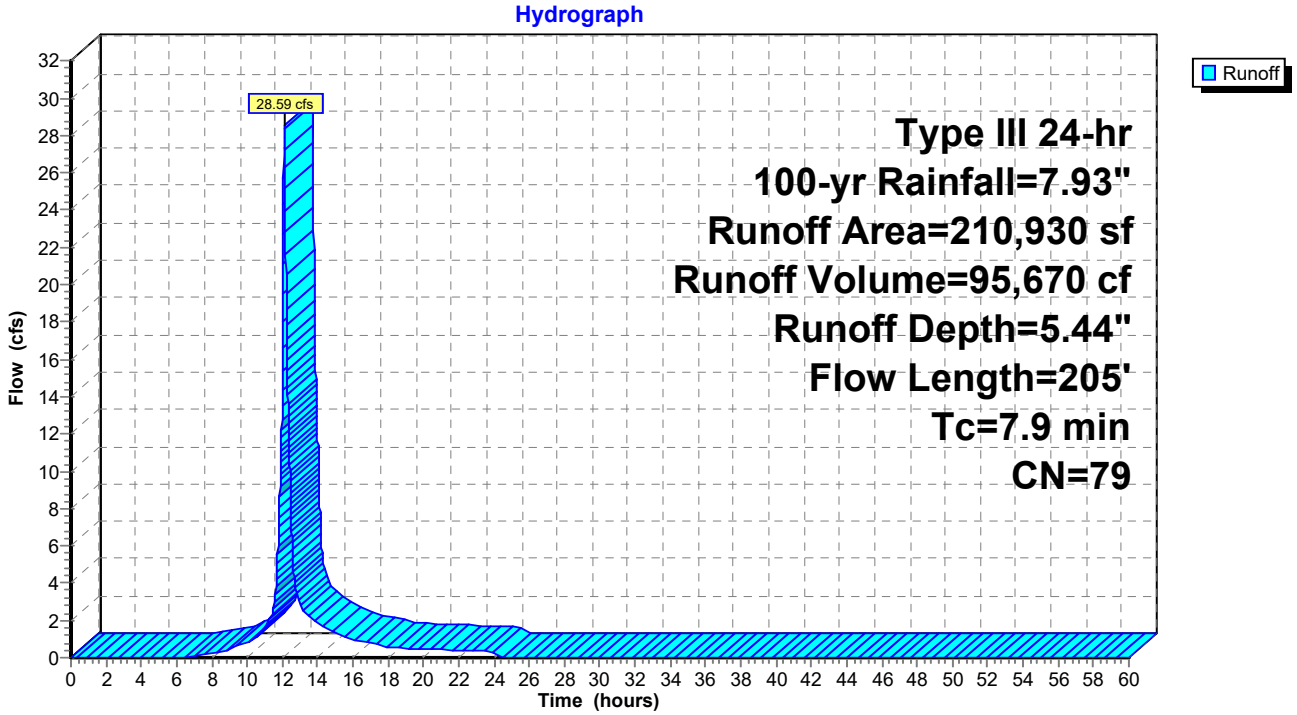
Runoff = 28.59 cfs @ 12.11 hrs, Volume= 95,670 cf, Depth= 5.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=7.93"

	Area (sf)	CN	Description
*	43,350	98	Paved
	147,665	74	>75% Grass cover, Good, HSG C
	19,915	70	Woods, Good, HSG C
	210,930	79	Weighted Average
	167,580		79.45% Pervious Area
	43,350		20.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	35	0.0060	0.09		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.29"
1.1	170	0.1300	2.52		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
7.9	205	Total			

Subcatchment 1S: Existing to Center Road



Summary for Subcatchment 2S: Existing to Northern Detention Basin

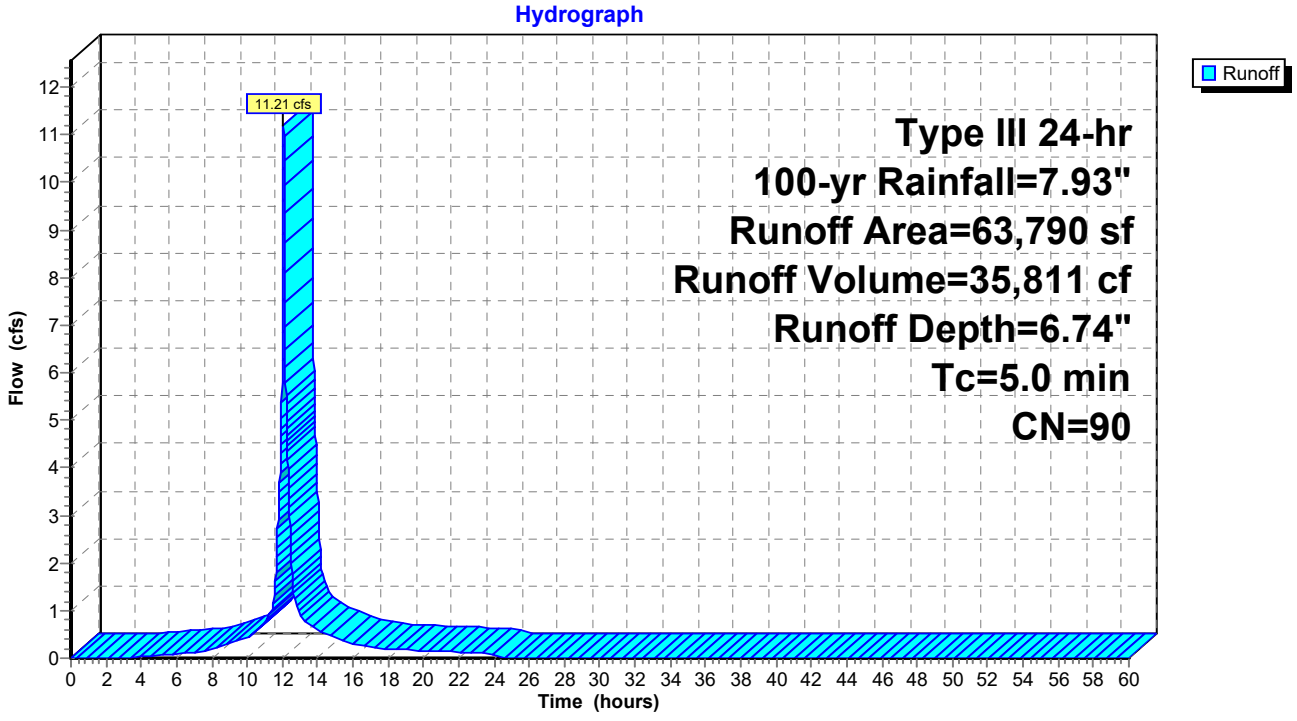
Runoff = 11.21 cfs @ 12.07 hrs, Volume= 35,811 cf, Depth= 6.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=7.93"

	Area (sf)	CN	Description
*	43,090	98	Paved
	20,700	74	>75% Grass cover, Good, HSG C
	63,790	90	Weighted Average
	20,700		32.45% Pervious Area
	43,090		67.55% Impervious Area

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

Subcatchment 2S: Existing to Northern Detention Basin



Summary for Subcatchment 3S: Existing to West

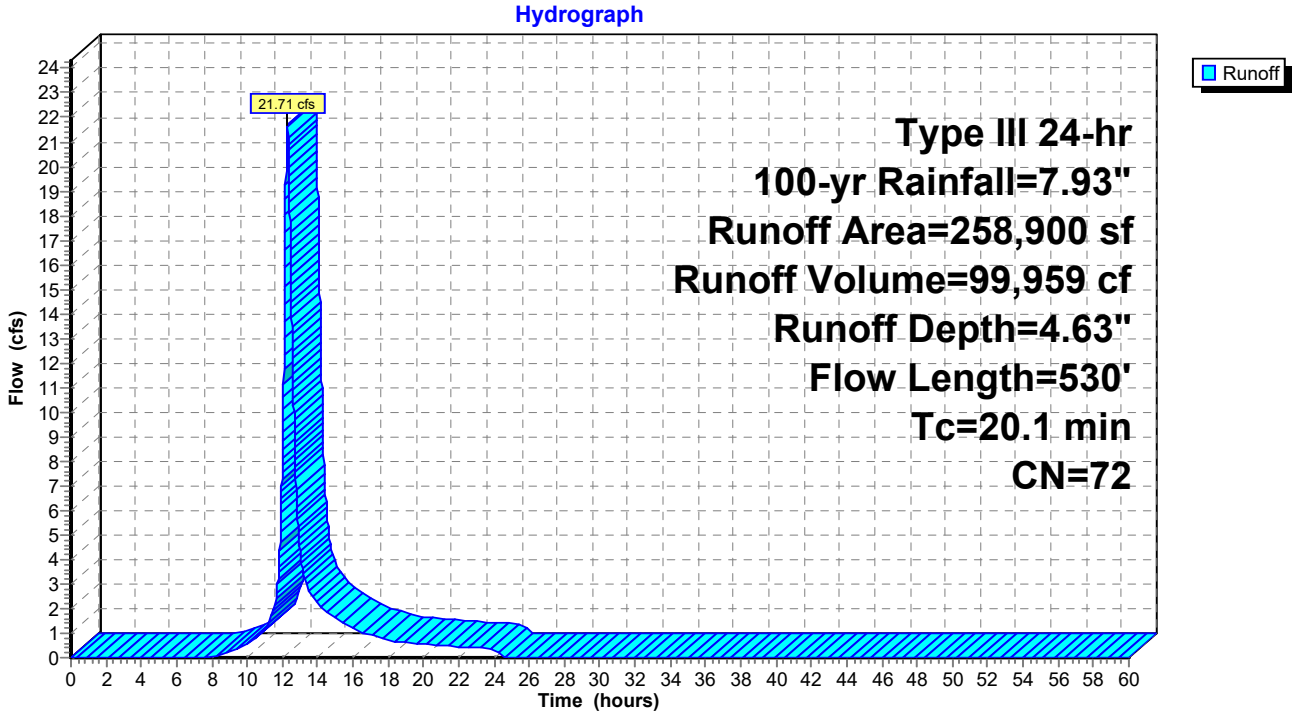
Runoff = 21.71 cfs @ 12.27 hrs, Volume= 99,959 cf, Depth= 4.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=7.93"

Area (sf)	CN	Description
101,210	74	>75% Grass cover, Good, HSG C
157,690	70	Woods, Good, HSG C
258,900	72	Weighted Average
258,900		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	75	0.0060	0.10		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.29"
5.6	165	0.0050	0.49		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
2.1	290	0.1070	2.29		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
20.1	530	Total			

Subcatchment 3S: Existing to West



Summary for Subcatchment 4S: Existing to South

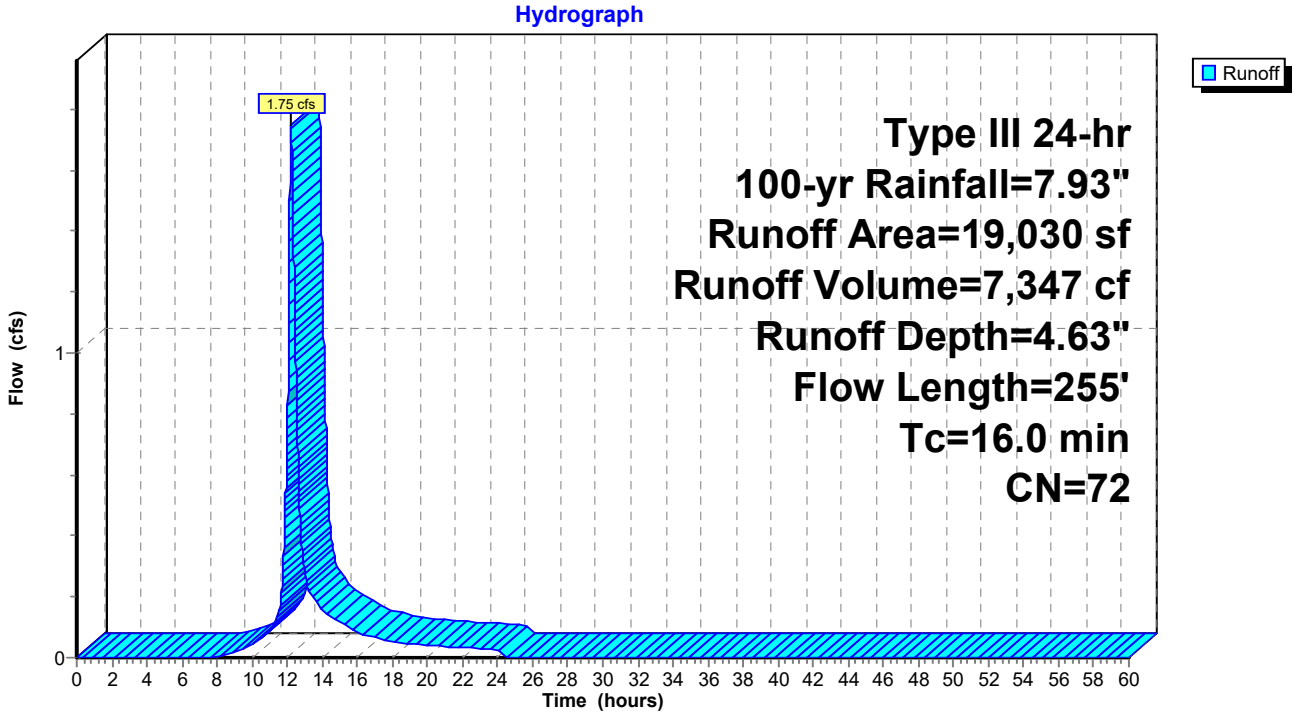
Runoff = 1.75 cfs @ 12.22 hrs, Volume= 7,347 cf, Depth= 4.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=7.93"

Area (sf)	CN	Description
10,460	74	>75% Grass cover, Good, HSG C
8,570	70	Woods, Good, HSG C
19,030	72	Weighted Average
19,030		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	75	0.0060	0.10		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.29"
2.4	100	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.2	80	0.0250	1.11		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
16.0	255	Total			

Subcatchment 4S: Existing to South



PROPOSED CONDITIONS DRAINAGE CALCULATIONS

Juster Pope Frazier, LLC
Architects and Planners
82 North Street
Northampton, Massachusetts 01060
413 . 586 . 1600

Clough Harbour Associates, LLP
Civil Engineers
101 East River Drive, 1st Floor
East Hartford, CT 06108
860.290.4100

OWNER/APPLICANT
NICHOLS COLLEGE
121 CENTER ROAD
PO BOX 5000
DUDLEY, MA 01571
508-213-2217

TOWNHOMES

CENTER ROAD, DUDLEY, MA 01571

REVISIONS

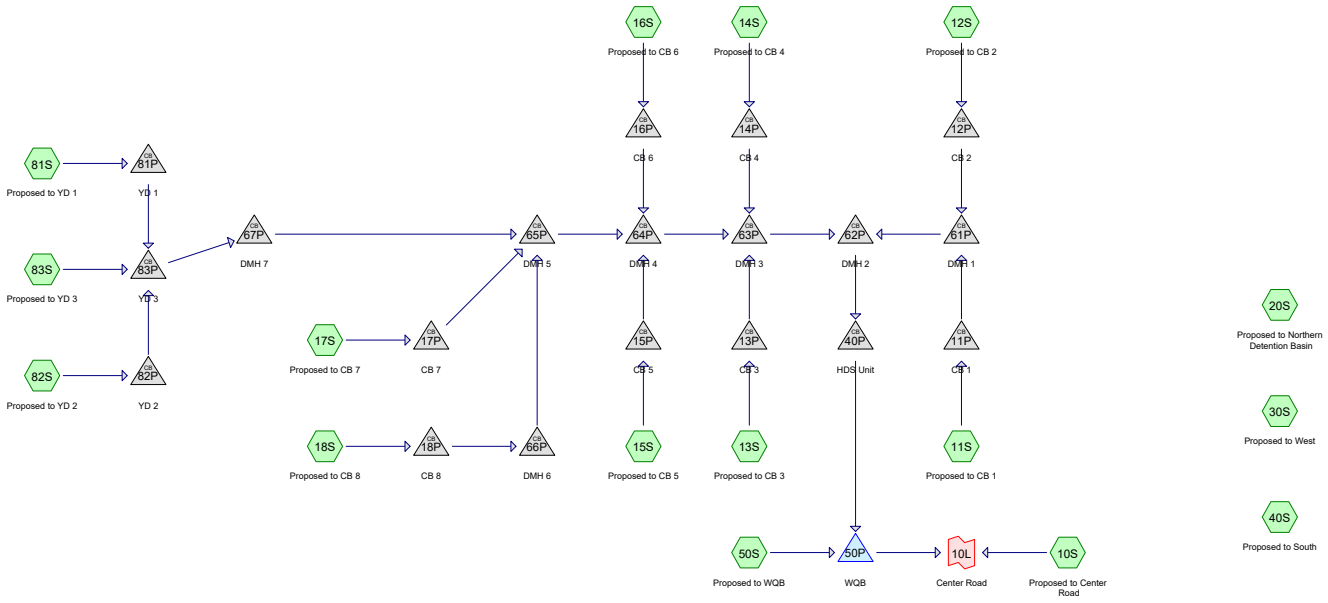
NO.	DATE	BY	REMARKS
1	6/30/22	PMP	REVIEW COMMENTS
2	10/3/22	PMP	REVISED SITE LAYOUT

SET
PLANNING BOARD SUBMISSION

SHEET TITLE
PROPOSED CONDITIONS DRAINAGE BASIN MAP

DATE	MAY 25, 2022
SCALE	1" = 60'
DRAWN BY	PMP
CHECKED BY	

SHEET NO.
C6.2



Subcat Reach Pond Link

Routing Diagram for 076491 Nichols Townhouses
Prepared by CHA Consulting, Inc, Printed 9/30/2022

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-yr	Type III 24-hr		Default	24.00	1	3.29	2
2	10-yr	Type III 24-hr		Default	24.00	1	5.08	2
3	25-yr	Type III 24-hr		Default	24.00	1	6.20	2
4	100-yr	Type III 24-hr		Default	24.00	1	7.93	2

Area Listing (selected nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
258,050	74	>75% Grass cover, Good, HSG C (10S, 11S, 12S, 14S, 16S, 17S, 18S, 20S, 30S, 40S, 50S, 83S)
105,420	98	Paved (10S, 11S, 12S, 13S, 14S, 15S, 16S, 17S, 18S, 20S, 30S, 81S, 82S, 83S)
6,400	98	Roof (81S, 82S)
175,560	70	Woods, Good, HSG C (10S, 30S, 40S)
545,430	**78**	**TOTAL AREA**

Time span=0.00-60.00 hrs, dt=0.01 hrs, 6001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment10S: Proposed to Center Runoff Area=154,140 sf 25.53% Impervious Runoff Depth=1.47"
Tc=5.0 min CN=80 Runoff=6.28 cfs 18,901 cf

Subcatchment11S: Proposed to CB 1 Runoff Area=7,750 sf 41.81% Impervious Runoff Depth=1.76"
Tc=5.0 min CN=84 Runoff=0.38 cfs 1,135 cf

Subcatchment12S: Proposed to CB 2 Runoff Area=4,140 sf 22.46% Impervious Runoff Depth=1.40"
Tc=5.0 min CN=79 Runoff=0.16 cfs 485 cf

Subcatchment13S: Proposed to CB 3 Runoff Area=930 sf 100.00% Impervious Runoff Depth=3.06"
Tc=5.0 min CN=98 Runoff=0.07 cfs 237 cf

Subcatchment14S: Proposed to CB 4 Runoff Area=2,000 sf 34.50% Impervious Runoff Depth=1.61"
Tc=5.0 min CN=82 Runoff=0.09 cfs 268 cf

Subcatchment15S: Proposed to CB 5 Runoff Area=660 sf 100.00% Impervious Runoff Depth=3.06"
Tc=5.0 min CN=98 Runoff=0.05 cfs 168 cf

Subcatchment16S: Proposed to CB 6 Runoff Area=5,850 sf 56.41% Impervious Runoff Depth=2.08"
Tc=5.0 min CN=88 Runoff=0.34 cfs 1,013 cf

Subcatchment17S: Proposed to CB 7 Runoff Area=3,330 sf 75.98% Impervious Runoff Depth=2.44"
Tc=5.0 min CN=92 Runoff=0.22 cfs 676 cf

Subcatchment18S: Proposed to CB 8 Runoff Area=11,800 sf 50.17% Impervious Runoff Depth=1.91"
Tc=5.0 min CN=86 Runoff=0.63 cfs 1,882 cf

Subcatchment20S: Proposed to Northern Runoff Area=59,900 sf 71.94% Impervious Runoff Depth=2.34"
Tc=5.0 min CN=91 Runoff=3.84 cfs 11,695 cf

Subcatchment30S: Proposed to West Runoff Area=230,400 sf 0.36% Impervious Runoff Depth=0.93"
Flow Length=530' Tc=20.1 min CN=71 Runoff=3.55 cfs 17,908 cf

Subcatchment40S: Proposed to South Runoff Area=19,030 sf 0.00% Impervious Runoff Depth=0.99"
Flow Length=255' Tc=16.0 min CN=72 Runoff=0.34 cfs 1,564 cf

Subcatchment50S: Proposed to WQB Runoff Area=24,770 sf 0.00% Impervious Runoff Depth=1.10"
Tc=5.0 min CN=74 Runoff=0.72 cfs 2,265 cf

Subcatchment81S: Proposed to YD 1 Runoff Area=4,470 sf 100.00% Impervious Runoff Depth=3.06"
Tc=5.0 min CN=98 Runoff=0.34 cfs 1,139 cf

Subcatchment82S: Proposed to YD 2 Runoff Area=4,470 sf 100.00% Impervious Runoff Depth=3.06"
Tc=5.0 min CN=98 Runoff=0.34 cfs 1,139 cf

Subcatchment83S: Proposed to YD 3 Runoff Area=11,790 sf 12.04% Impervious Runoff Depth=1.28"
Tc=5.0 min CN=77 Runoff=0.41 cfs 1,254 cf

Pond 11P: CB 1 Peak Elev=630.02' Inflow=0.38 cfs 1,135 cf
12.0" Round Culvert n=0.012 L=3.0' S=0.0333 '/' Outflow=0.38 cfs 1,135 cf

Pond 12P: CB 2 Peak Elev=630.79' Inflow=0.16 cfs 485 cf
12.0" Round Culvert n=0.012 L=15.0' S=0.0467 '/' Outflow=0.16 cfs 485 cf

Pond 13P: CB 3 Peak Elev=636.60' Inflow=0.07 cfs 237 cf
12.0" Round Culvert n=0.012 L=3.0' S=0.0333 '/' Outflow=0.07 cfs 237 cf

Pond 14P: CB 4 Peak Elev=636.60' Inflow=0.09 cfs 268 cf
12.0" Round Culvert n=0.012 L=15.0' S=0.0200 '/' Outflow=0.09 cfs 268 cf

Pond 15P: CB 5 Peak Elev=646.11' Inflow=0.05 cfs 168 cf
12.0" Round Culvert n=0.012 L=14.0' S=0.0214 '/' Outflow=0.05 cfs 168 cf

Pond 16P: CB 6 Peak Elev=646.29' Inflow=0.34 cfs 1,013 cf
12.0" Round Culvert n=0.012 L=16.0' S=0.0187 '/' Outflow=0.34 cfs 1,013 cf

Pond 17P: CB 7 Peak Elev=650.53' Inflow=0.22 cfs 676 cf
12.0" Round Culvert n=0.012 L=11.0' S=0.0273 '/' Outflow=0.22 cfs 676 cf

Pond 18P: CB 8 Peak Elev=650.51' Inflow=0.63 cfs 1,882 cf
12.0" Round Culvert n=0.012 L=6.0' S=0.0250 '/' Outflow=0.63 cfs 1,882 cf

Pond 40P: HDS Unit Peak Elev=626.99' Inflow=3.03 cfs 9,396 cf
15.0" Round Culvert n=0.012 L=42.0' S=0.0500 '/' Outflow=3.03 cfs 9,396 cf

Pond 50P: WQB Peak Elev=625.20' Storage=5,551 cf Inflow=3.75 cfs 11,661 cf
Outflow=0.63 cfs 9,479 cf

Pond 61P: DMH 1 Peak Elev=629.84' Inflow=0.54 cfs 1,620 cf
15.0" Round Culvert n=0.012 L=90.0' S=0.0200 '/' Outflow=0.54 cfs 1,620 cf

Pond 62P: DMH 2 Peak Elev=627.32' Inflow=3.03 cfs 9,396 cf
15.0" Round Culvert n=0.012 L=6.0' S=0.0250 '/' Outflow=3.03 cfs 9,396 cf

Pond 63P: DMH 3 Peak Elev=636.59' Inflow=2.49 cfs 7,776 cf
15.0" Round Culvert n=0.012 L=43.0' S=0.0395 '/' Outflow=2.49 cfs 7,776 cf

Pond 64P: DMH 4 Peak Elev=643.76' Inflow=2.33 cfs 7,271 cf
15.0" Round Culvert n=0.012 L=123.0' S=0.0537 '/' Outflow=2.33 cfs 7,271 cf

Pond 65P: DMH 5 Peak Elev=646.58' Inflow=1.94 cfs 6,090 cf
15.0" Round Culvert n=0.012 L=141.0' S=0.0199 '/' Outflow=1.94 cfs 6,090 cf

Pond 66P: DMH 6 Peak Elev=650.22' Inflow=0.63 cfs 1,882 cf
15.0" Round Culvert n=0.012 L=78.0' S=0.0128 '/' Outflow=0.63 cfs 1,882 cf

Pond 67P: DMH 7 Peak Elev=647.75' Inflow=1.09 cfs 3,532 cf
15.0" Round Culvert n=0.012 L=125.0' S=0.0100 '/' Outflow=1.09 cfs 3,532 cf

Pond 81P: YD 1 Peak Elev=653.29' Inflow=0.34 cfs 1,139 cf
12.0" Round Culvert n=0.012 L=46.0' S=0.0380 '/' Outflow=0.34 cfs 1,139 cf

Pond 82P: YD 2 Peak Elev=653.29' Inflow=0.34 cfs 1,139 cf
12.0" Round Culvert n=0.012 L=46.0' S=0.0380 '/' Outflow=0.34 cfs 1,139 cf

Pond 83P: YD 3 Peak Elev=651.80' Inflow=1.09 cfs 3,532 cf
12.0" Round Culvert n=0.012 L=8.0' S=0.0250 '/' Outflow=1.09 cfs 3,532 cf

Link 10L: Center Road Inflow=6.53 cfs 28,380 cf
Primary=6.53 cfs 28,380 cf

Total Runoff Area = 545,430 sf Runoff Volume = 61,728 cf Average Runoff Depth = 1.36"
79.50% Pervious = 433,610 sf 20.50% Impervious = 111,820 sf

Summary for Subcatchment 10S: Proposed to Center Road

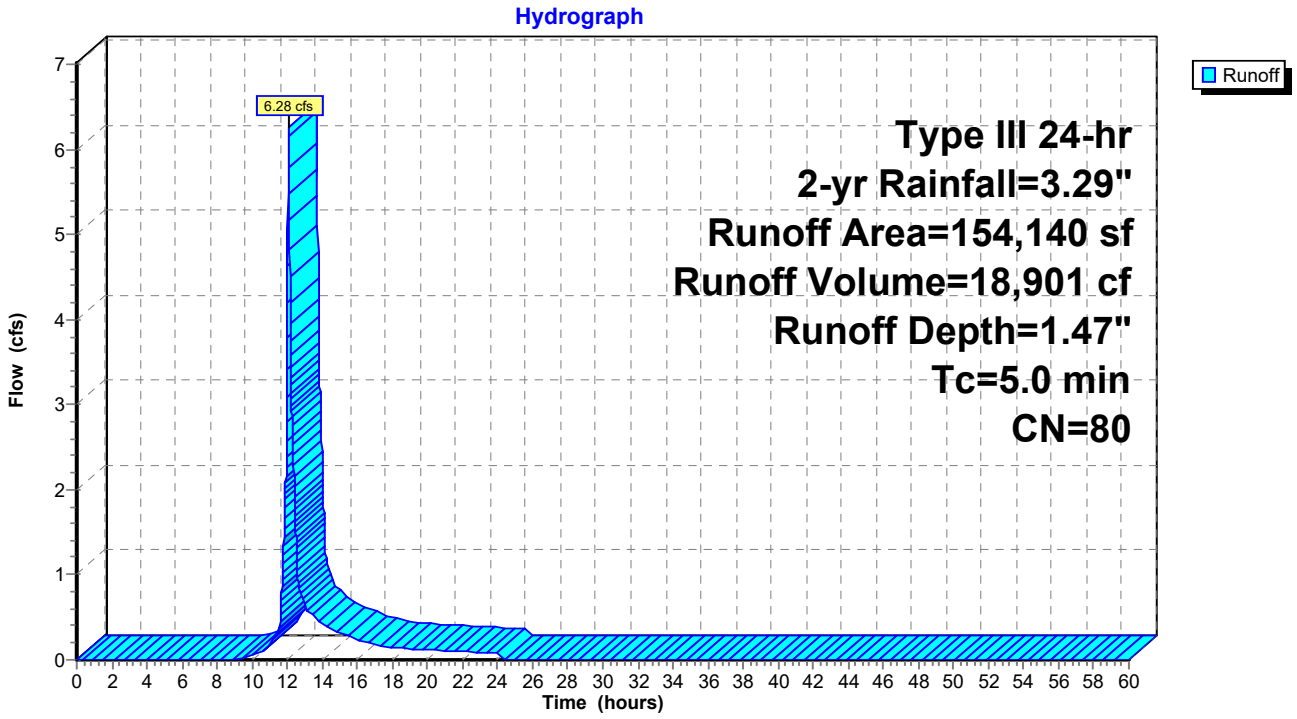
Runoff = 6.28 cfs @ 12.08 hrs, Volume= 18,901 cf, Depth= 1.47"
Routed to Link 10L : Center Road

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.29"

	Area (sf)	CN	Description
*	39,350	98	Paved
	105,490	74	>75% Grass cover, Good, HSG C
	9,300	70	Woods, Good, HSG C
	154,140	80	Weighted Average
	114,790		74.47% Pervious Area
	39,350		25.53% Impervious Area

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

Subcatchment 10S: Proposed to Center Road



Summary for Subcatchment 11S: Proposed to CB 1

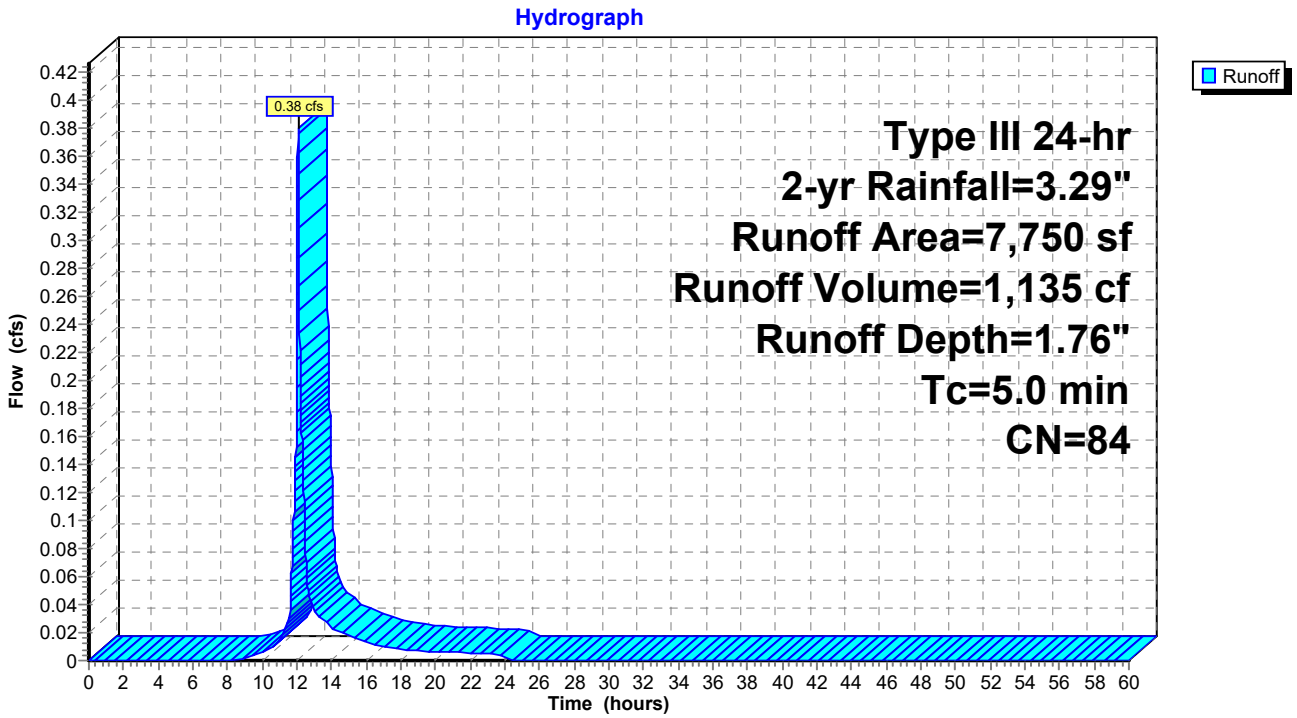
Runoff = 0.38 cfs @ 12.08 hrs, Volume= 1,135 cf, Depth= 1.76"
Routed to Pond 11P : CB 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.29"

	Area (sf)	CN	Description
*	3,240	98	Paved
	4,510	74	>75% Grass cover, Good, HSG C
	7,750	84	Weighted Average
	4,510		58.19% Pervious Area
	3,240		41.81% Impervious Area

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

Subcatchment 11S: Proposed to CB 1



Summary for Subcatchment 12S: Proposed to CB 2

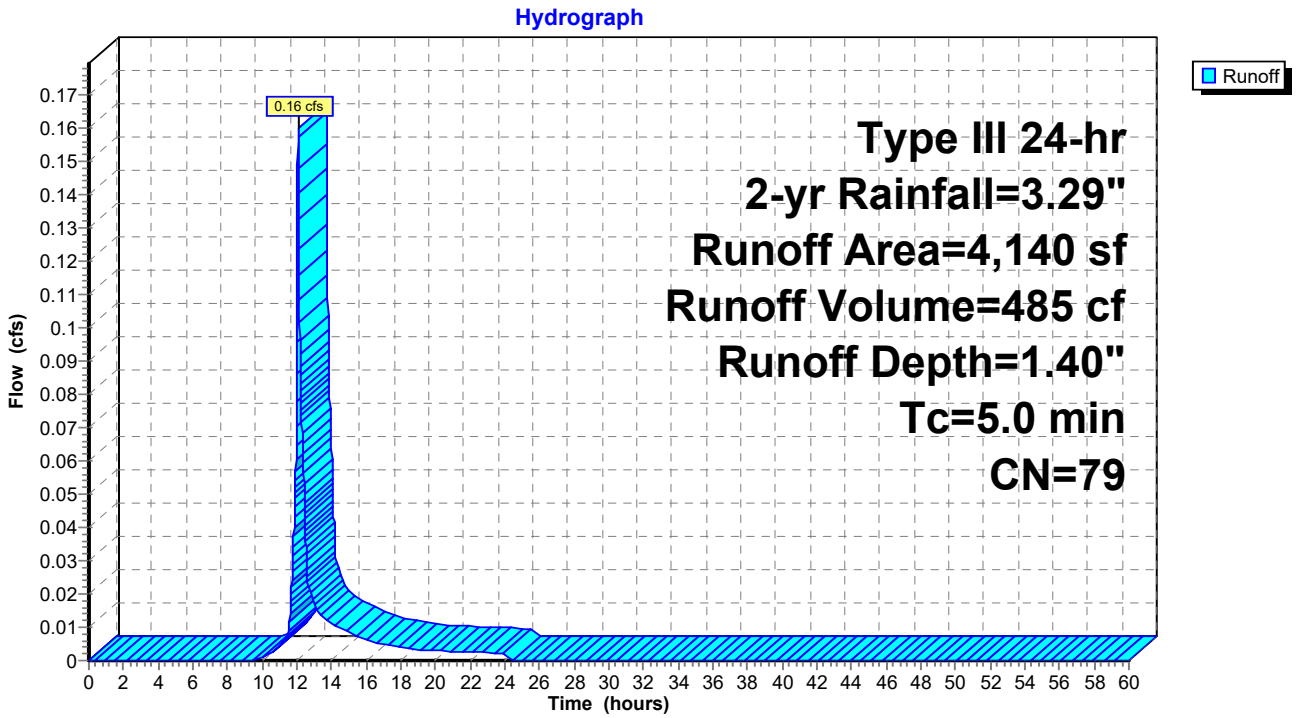
Runoff = 0.16 cfs @ 12.08 hrs, Volume= 485 cf, Depth= 1.40"
Routed to Pond 12P : CB 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.29"

	Area (sf)	CN	Description
*	930	98	Paved
	3,210	74	>75% Grass cover, Good, HSG C
	4,140	79	Weighted Average
	3,210		77.54% Pervious Area
	930		22.46% Impervious Area

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

Subcatchment 12S: Proposed to CB 2



Summary for Subcatchment 13S: Proposed to CB 3

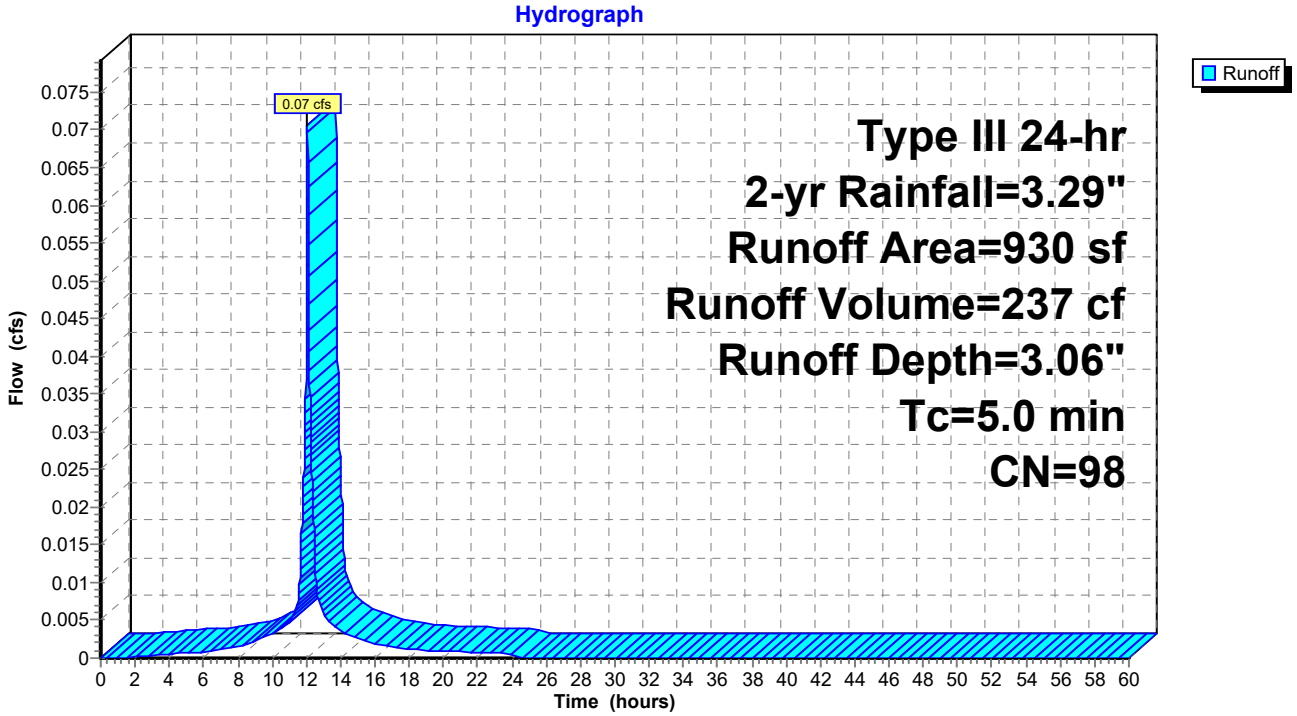
Runoff = 0.07 cfs @ 12.07 hrs, Volume= 237 cf, Depth= 3.06"
Routed to Pond 13P : CB 3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.29"

	Area (sf)	CN	Description
*	930	98	Paved
	930		100.00% Impervious Area

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

Subcatchment 13S: Proposed to CB 3



Summary for Subcatchment 14S: Proposed to CB 4

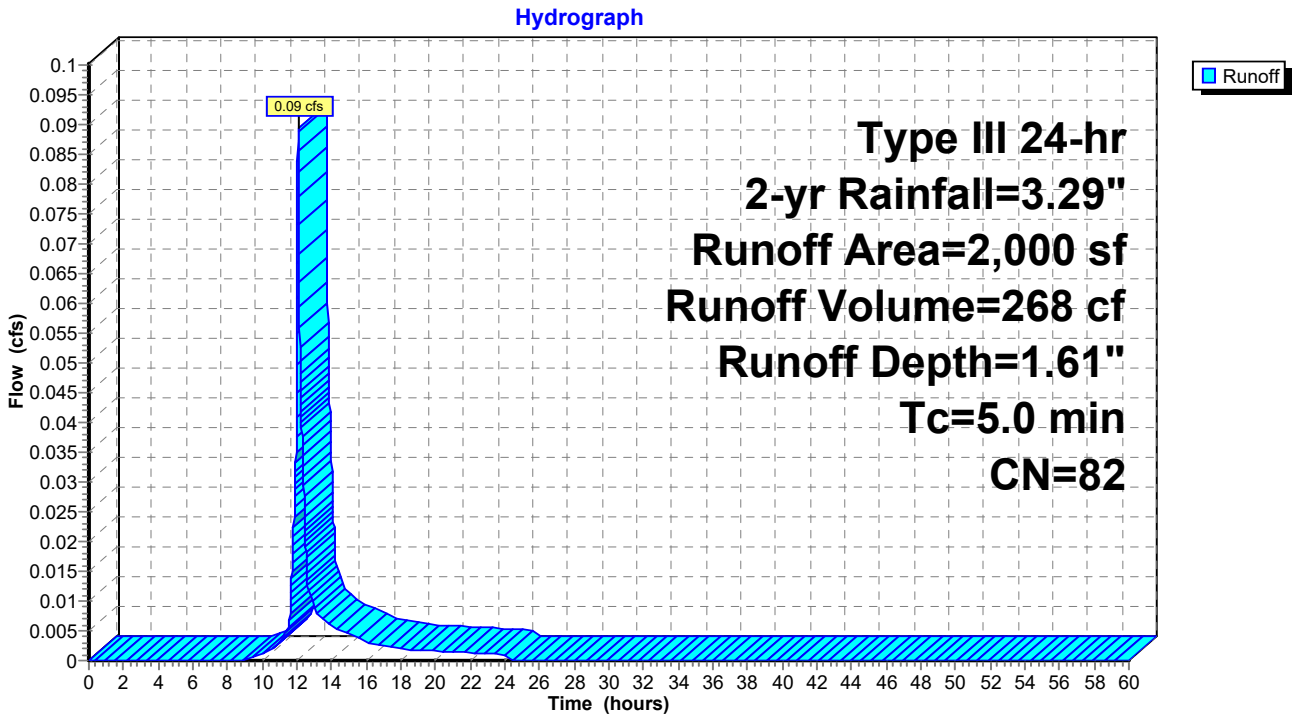
Runoff = 0.09 cfs @ 12.08 hrs, Volume= 268 cf, Depth= 1.61"
Routed to Pond 14P : CB 4

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.29"

	Area (sf)	CN	Description
*	690	98	Paved
	1,310	74	>75% Grass cover, Good, HSG C
	2,000	82	Weighted Average
	1,310		65.50% Pervious Area
	690		34.50% Impervious Area

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

Subcatchment 14S: Proposed to CB 4



Summary for Subcatchment 15S: Proposed to CB 5

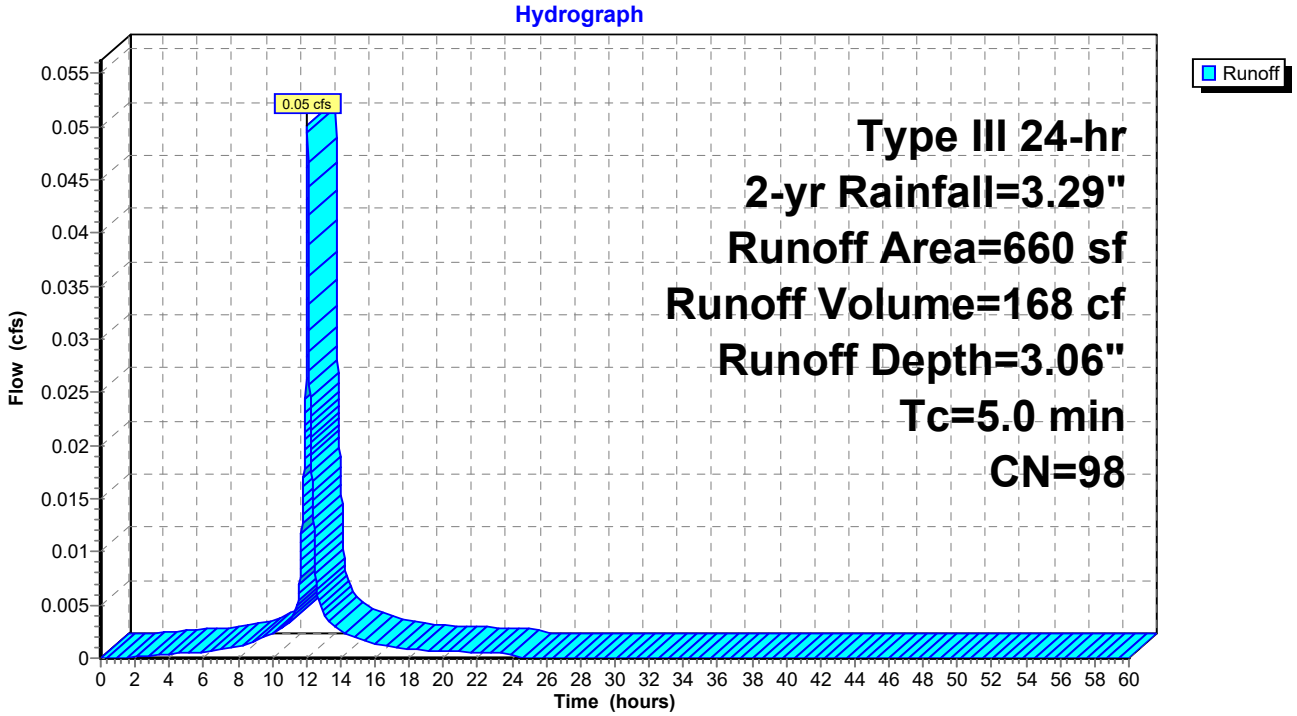
Runoff = 0.05 cfs @ 12.07 hrs, Volume= 168 cf, Depth= 3.06"
Routed to Pond 15P : CB 5

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.29"

	Area (sf)	CN	Description
*	660	98	Paved
	660		100.00% Impervious Area

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

Subcatchment 15S: Proposed to CB 5



Summary for Subcatchment 16S: Proposed to CB 6

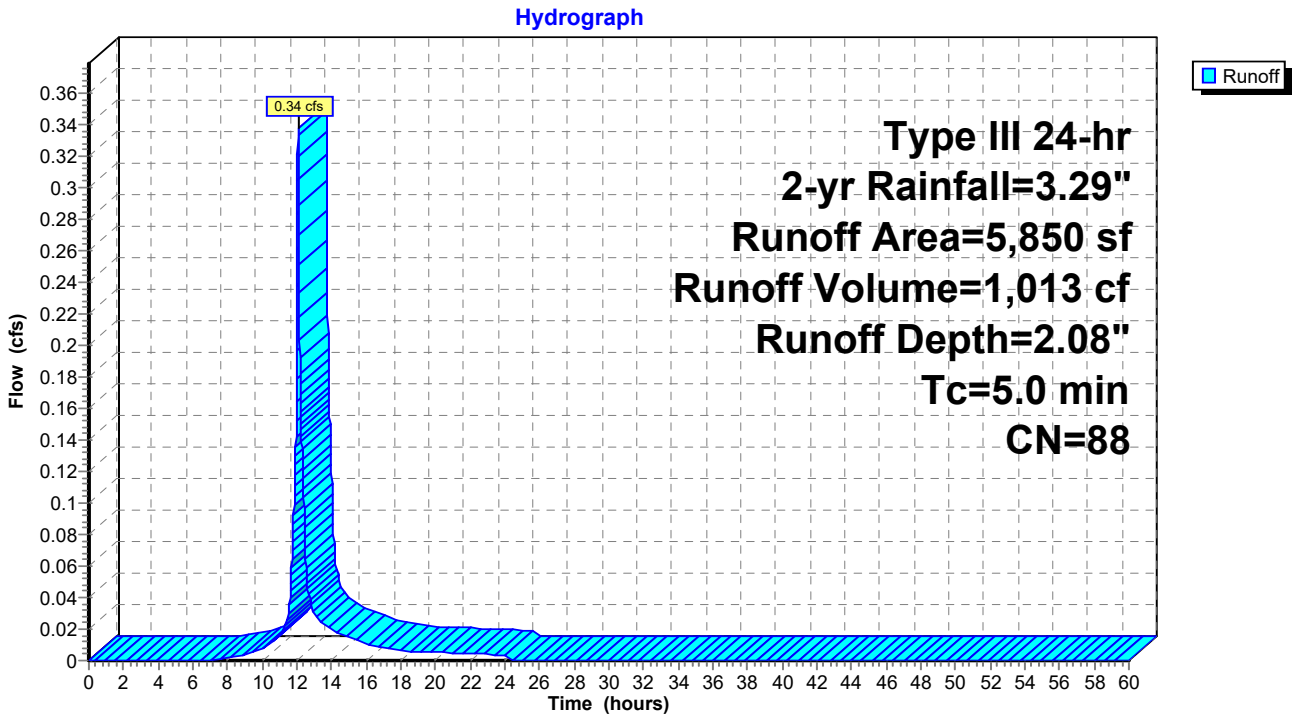
Runoff = 0.34 cfs @ 12.07 hrs, Volume= 1,013 cf, Depth= 2.08"
Routed to Pond 16P : CB 6

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.29"

	Area (sf)	CN	Description
*	3,300	98	Paved
	2,550	74	>75% Grass cover, Good, HSG C
	5,850	88	Weighted Average
	2,550		43.59% Pervious Area
	3,300		56.41% Impervious Area

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

Subcatchment 16S: Proposed to CB 6



Summary for Subcatchment 17S: Proposed to CB 7

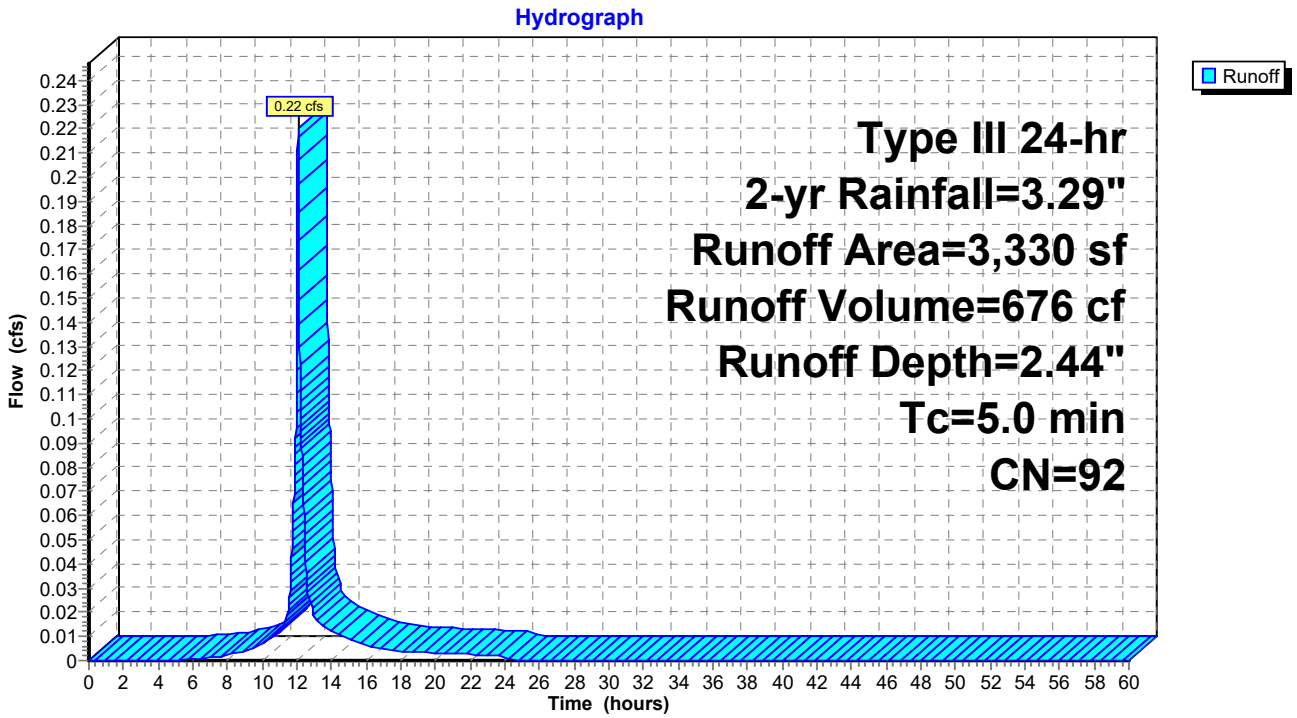
Runoff = 0.22 cfs @ 12.07 hrs, Volume= 676 cf, Depth= 2.44"
Routed to Pond 17P : CB 7

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.29"

	Area (sf)	CN	Description
*	2,530	98	Paved
	800	74	>75% Grass cover, Good, HSG C
	3,330	92	Weighted Average
	800		24.02% Pervious Area
	2,530		75.98% Impervious Area

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

Subcatchment 17S: Proposed to CB 7



Summary for Subcatchment 18S: Proposed to CB 8

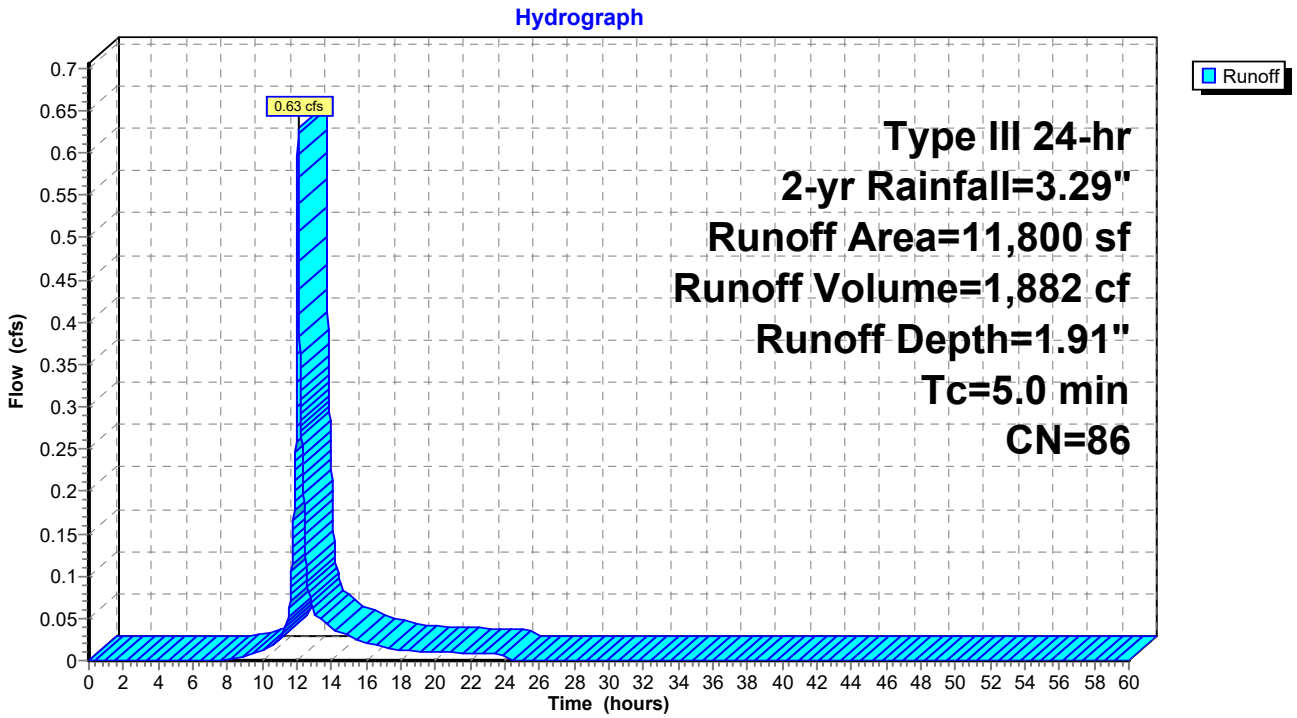
Runoff = 0.63 cfs @ 12.07 hrs, Volume= 1,882 cf, Depth= 1.91"
Routed to Pond 18P : CB 8

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.29"

	Area (sf)	CN	Description
*	5,920	98	Paved
	5,880	74	>75% Grass cover, Good, HSG C
	11,800	86	Weighted Average
	5,880		49.83% Pervious Area
	5,920		50.17% Impervious Area

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

Subcatchment 18S: Proposed to CB 8



Summary for Subcatchment 20S: Proposed to Northern Detention Basin

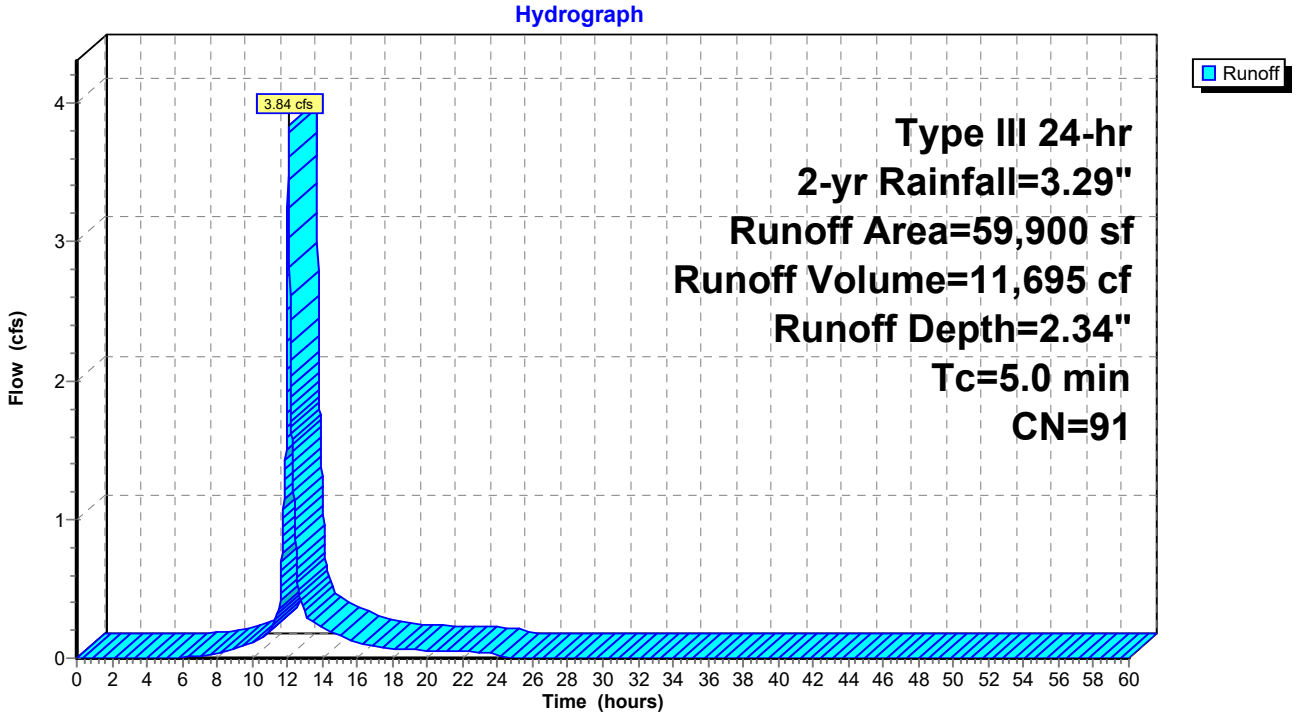
Runoff = 3.84 cfs @ 12.07 hrs, Volume= 11,695 cf, Depth= 2.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.29"

	Area (sf)	CN	Description
*	43,090	98	Paved
	16,810	74	>75% Grass cover, Good, HSG C
	59,900	91	Weighted Average
	16,810		28.06% Pervious Area
	43,090		71.94% Impervious Area

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

Subcatchment 20S: Proposed to Northern Detention Basin



Summary for Subcatchment 30S: Proposed to West

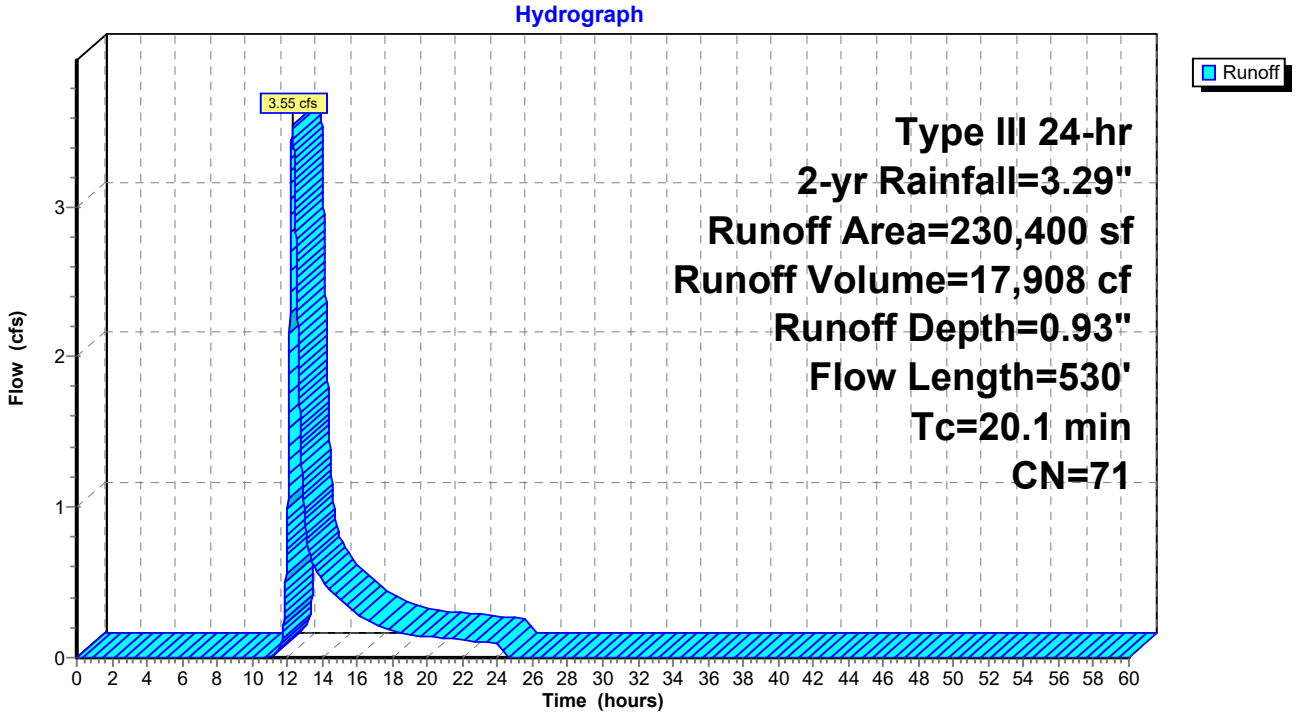
Runoff = 3.55 cfs @ 12.31 hrs, Volume= 17,908 cf, Depth= 0.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.29"

	Area (sf)	CN	Description
*	820	98	Paved
	71,890	74	>75% Grass cover, Good, HSG C
	157,690	70	Woods, Good, HSG C
	230,400	71	Weighted Average
	229,580		99.64% Pervious Area
	820		0.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	75	0.0060	0.10		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.29"
5.6	165	0.0050	0.49		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
2.1	290	0.1070	2.29		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
20.1	530	Total			

Subcatchment 30S: Proposed to West



Summary for Subcatchment 40S: Proposed to South

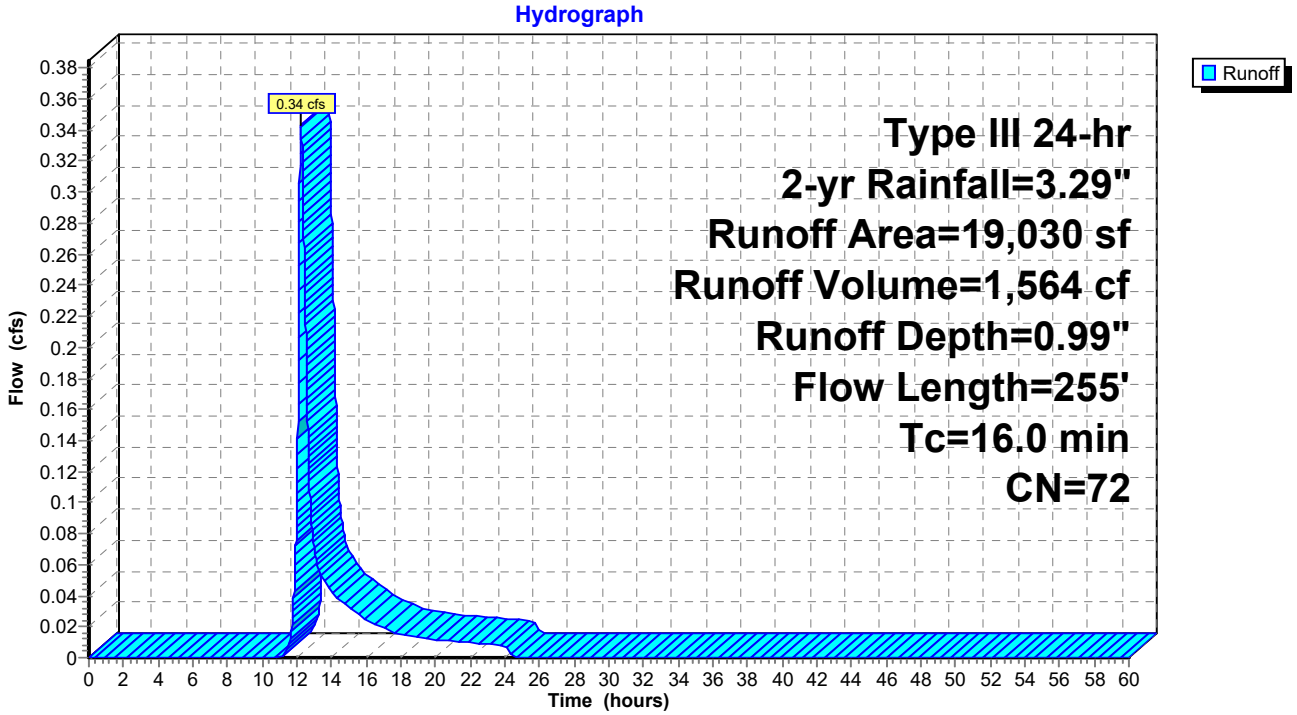
Runoff = 0.34 cfs @ 12.24 hrs, Volume= 1,564 cf, Depth= 0.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.29"

Area (sf)	CN	Description
10,460	74	>75% Grass cover, Good, HSG C
8,570	70	Woods, Good, HSG C
19,030	72	Weighted Average
19,030		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	75	0.0060	0.10		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.29"
2.4	100	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.2	80	0.0250	1.11		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
16.0	255	Total			

Subcatchment 40S: Proposed to South



Summary for Subcatchment 50S: Proposed to WQB

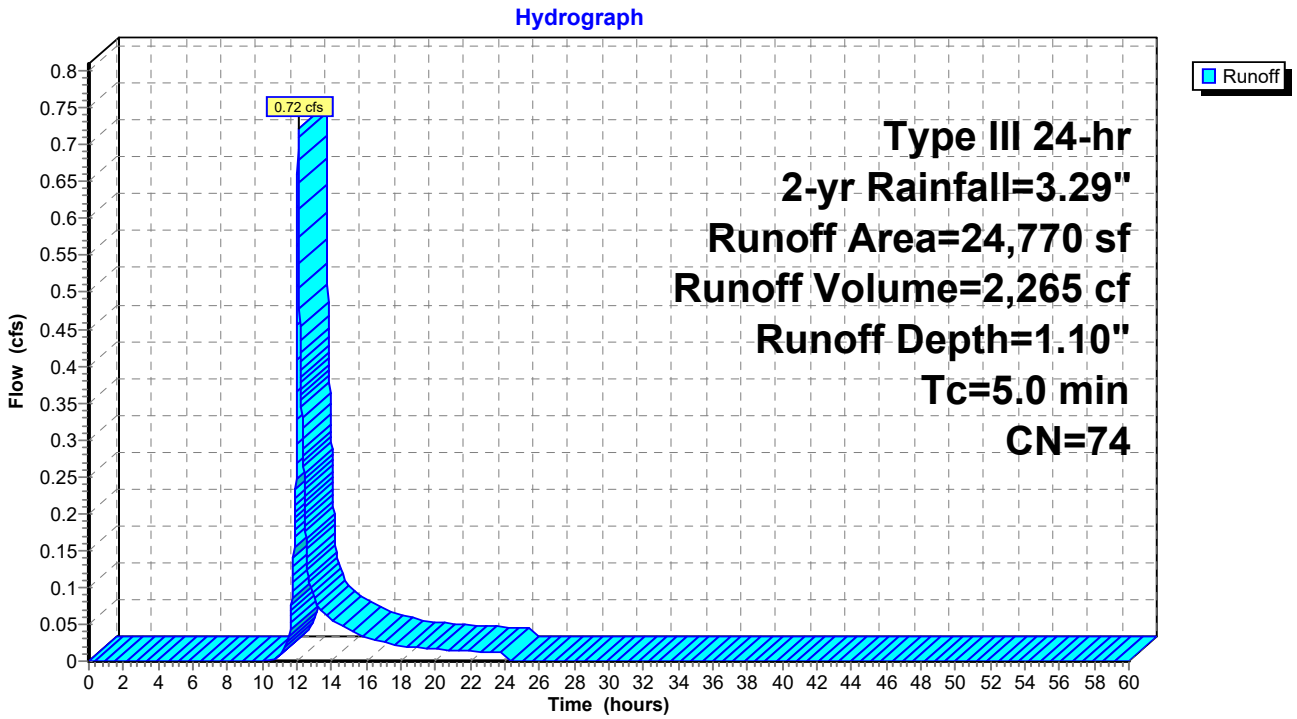
Runoff = 0.72 cfs @ 12.08 hrs, Volume= 2,265 cf, Depth= 1.10"
Routed to Pond 50P : WQB

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.29"

Area (sf)	CN	Description
24,770	74	>75% Grass cover, Good, HSG C
24,770		100.00% Pervious Area

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

Subcatchment 50S: Proposed to WQB



Summary for Subcatchment 81S: Proposed to YD 1

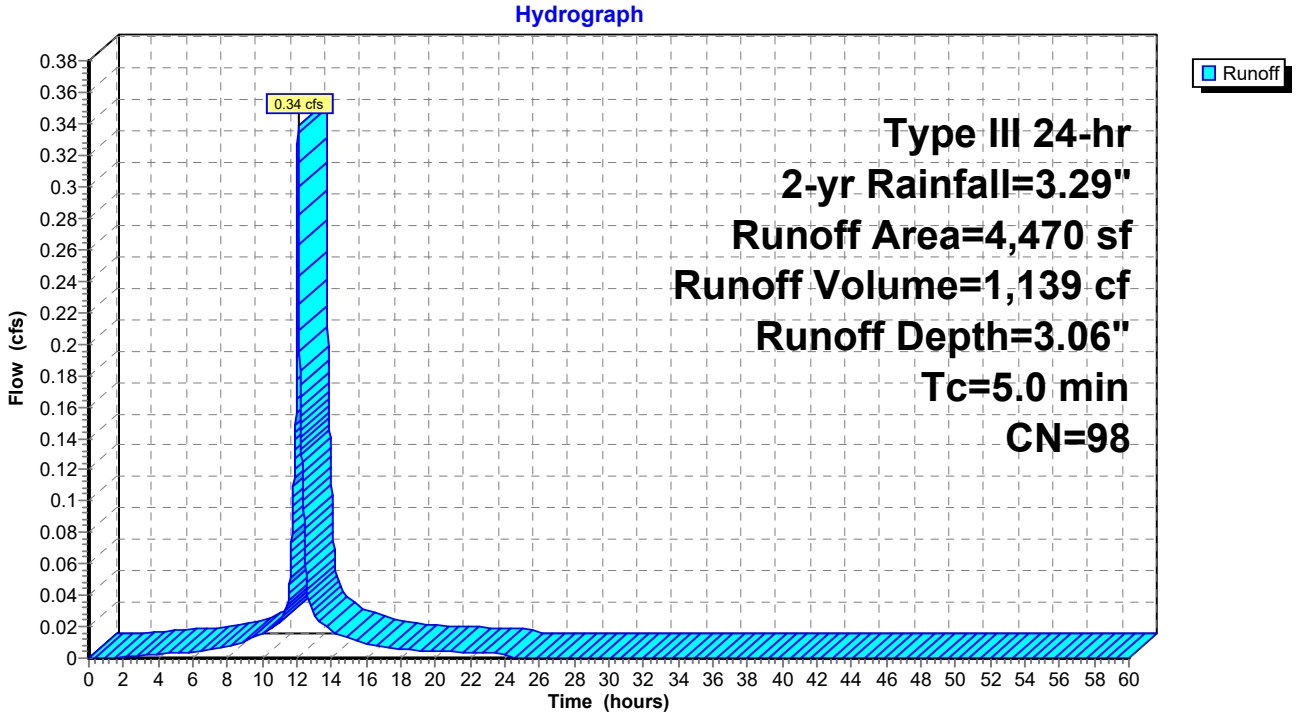
Runoff = 0.34 cfs @ 12.07 hrs, Volume= 1,139 cf, Depth= 3.06"
Routed to Pond 81P : YD 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.29"

	Area (sf)	CN	Description
*	3,200	98	Roof
*	1,270	98	Paved
	4,470	98	Weighted Average
	4,470		100.00% Impervious Area

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

Subcatchment 81S: Proposed to YD 1



Summary for Subcatchment 82S: Proposed to YD 2

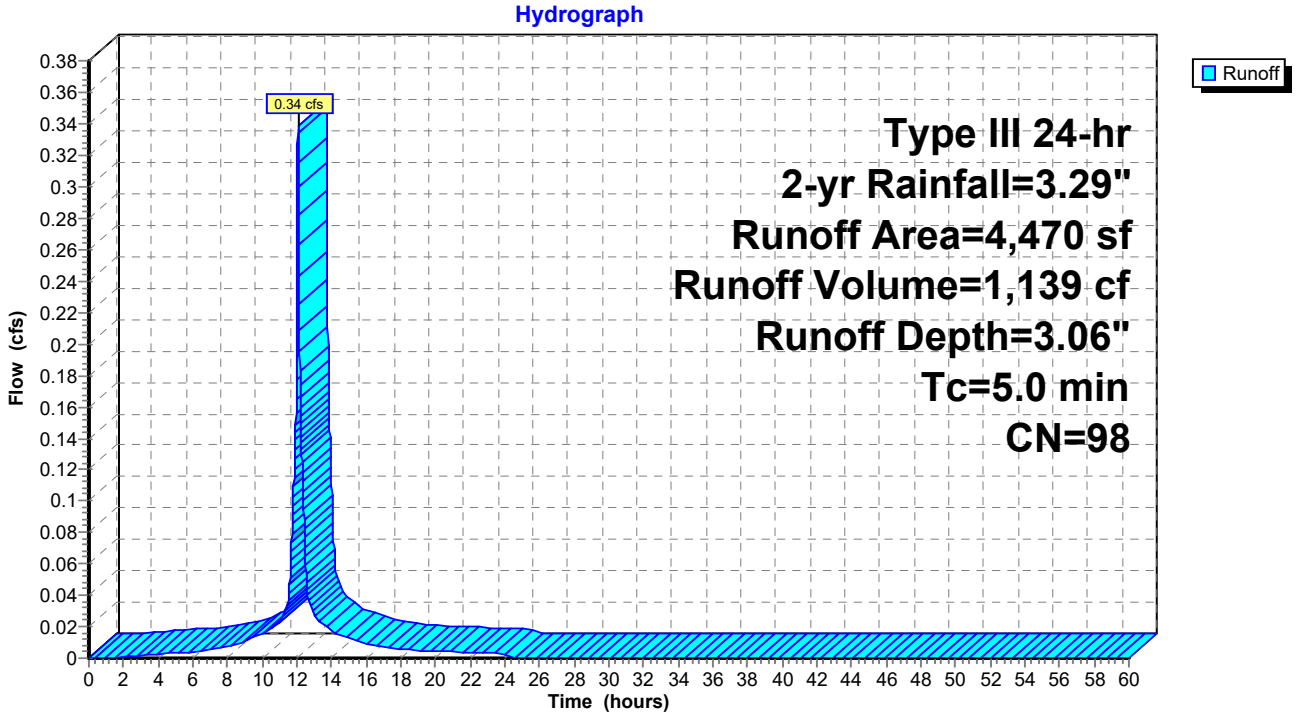
Runoff = 0.34 cfs @ 12.07 hrs, Volume= 1,139 cf, Depth= 3.06"
Routed to Pond 82P : YD 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.29"

	Area (sf)	CN	Description
*	3,200	98	Roof
*	1,270	98	Paved
	4,470	98	Weighted Average
	4,470		100.00% Impervious Area

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

Subcatchment 82S: Proposed to YD 2



Summary for Subcatchment 83S: Proposed to YD 3

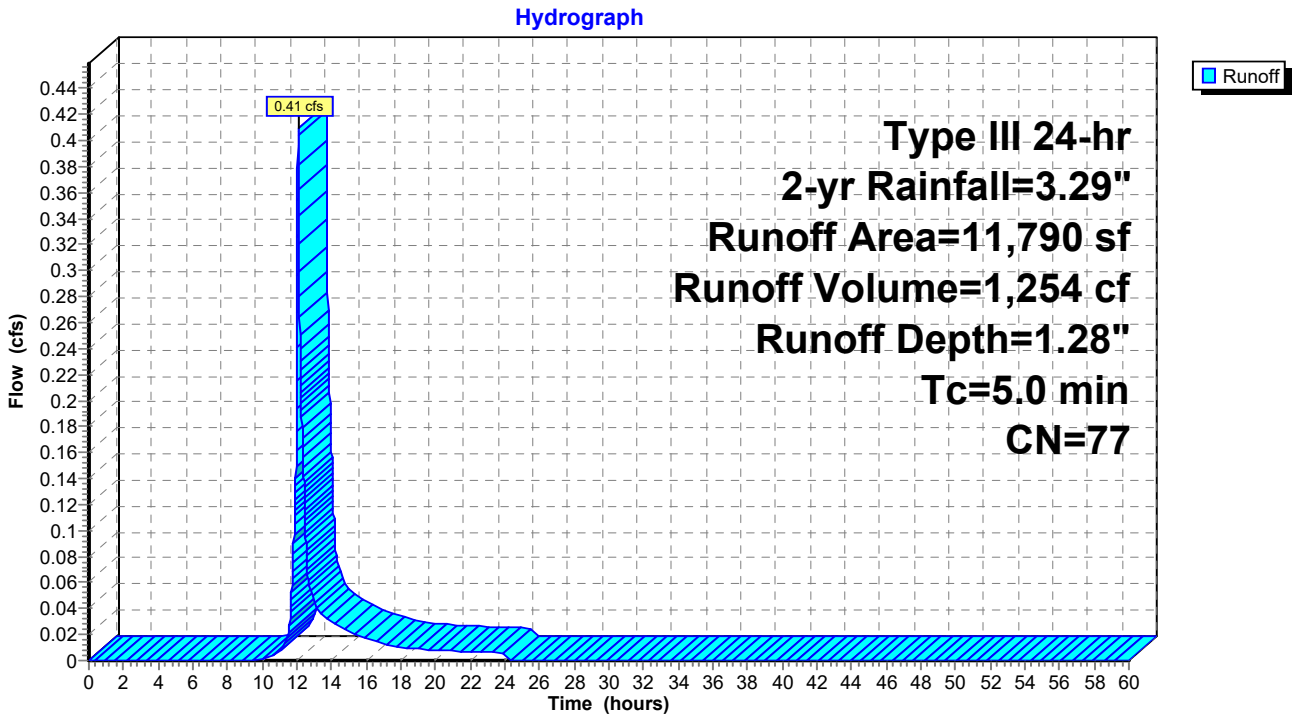
Runoff = 0.41 cfs @ 12.08 hrs, Volume= 1,254 cf, Depth= 1.28"
Routed to Pond 83P : YD 3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.29"

	Area (sf)	CN	Description
*	1,420	98	Paved
	10,370	74	>75% Grass cover, Good, HSG C
	11,790	77	Weighted Average
	10,370		87.96% Pervious Area
	1,420		12.04% Impervious Area

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

Subcatchment 83S: Proposed to YD 3



Summary for Pond 11P: CB 1

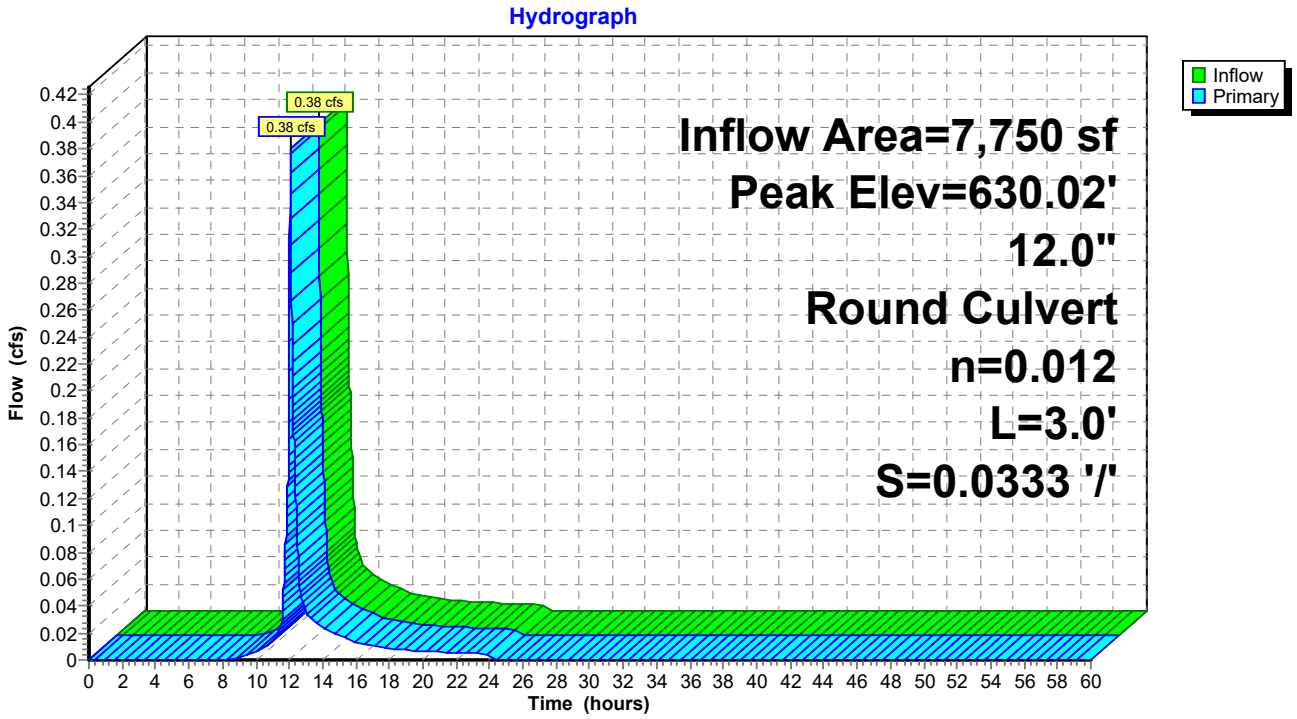
Inflow Area = 7,750 sf, 41.81% Impervious, Inflow Depth = 1.76" for 2-yr event
Inflow = 0.38 cfs @ 12.08 hrs, Volume= 1,135 cf
Outflow = 0.38 cfs @ 12.08 hrs, Volume= 1,135 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.38 cfs @ 12.08 hrs, Volume= 1,135 cf
Routed to Pond 61P : DMH 1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 630.02' @ 12.08 hrs
Flood Elev= 633.20'

Device	Routing	Invert	Outlet Devices
#1	Primary	629.70'	**12.0" Round Culvert** L= 3.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 629.70' / 629.60' S= 0.0333 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.38 cfs @ 12.08 hrs HW=630.02' TW=629.84' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 0.38 cfs @ 2.62 fps)

Pond 11P: CB 1



Summary for Pond 12P: CB 2

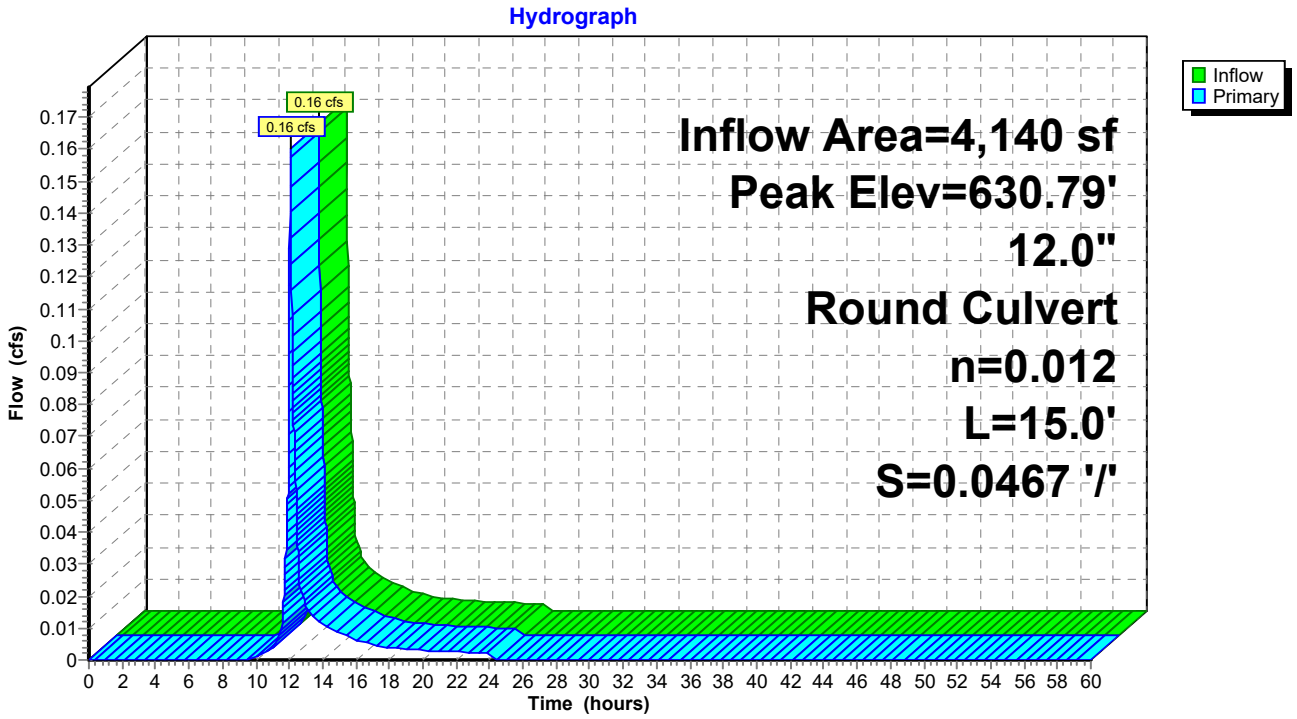
Inflow Area = 4,140 sf, 22.46% Impervious, Inflow Depth = 1.40" for 2-yr event
Inflow = 0.16 cfs @ 12.08 hrs, Volume= 485 cf
Outflow = 0.16 cfs @ 12.08 hrs, Volume= 485 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.16 cfs @ 12.08 hrs, Volume= 485 cf
Routed to Pond 61P : DMH 1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 630.79' @ 12.08 hrs
Flood Elev= 634.10'

Device	Routing	Invert	Outlet Devices
#1	Primary	630.60'	**12.0" Round Culvert** L= 15.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 630.60' / 629.90' S= 0.0467 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.16 cfs @ 12.08 hrs HW=630.79' TW=629.84' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.16 cfs @ 1.50 fps)

Pond 12P: CB 2



Summary for Pond 13P: CB 3

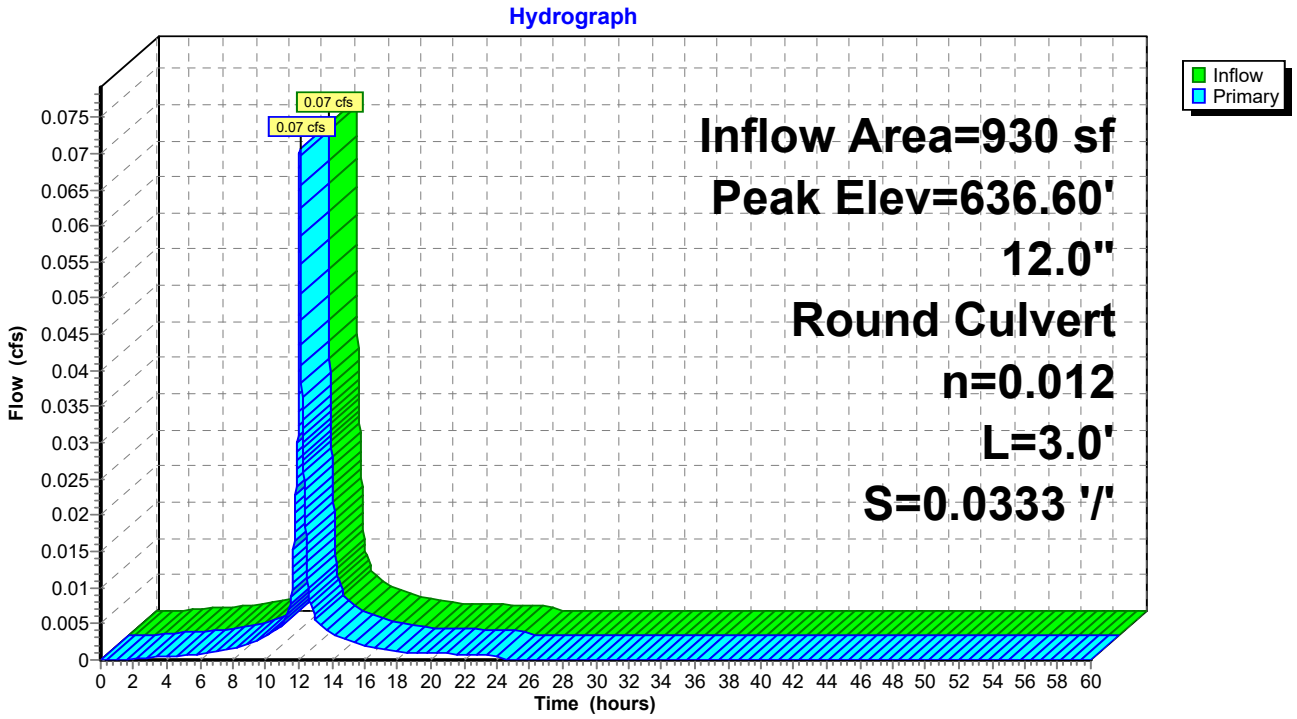
Inflow Area = 930 sf,100.00% Impervious, Inflow Depth = 3.06" for 2-yr event
Inflow = 0.07 cfs @ 12.07 hrs, Volume= 237 cf
Outflow = 0.07 cfs @ 12.07 hrs, Volume= 237 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.07 cfs @ 12.07 hrs, Volume= 237 cf
Routed to Pond 63P : DMH 3

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 636.60' @ 12.08 hrs
Flood Elev= 639.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	636.20'	**12.0" Round Culvert** L= 3.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 636.20' / 636.10' S= 0.0333 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.07 hrs HW=636.59' TW=636.59' (Dynamic Tailwater)
1=Culvert (Controls 0.00 cfs)

Pond 13P: CB 3



Summary for Pond 14P: CB 4

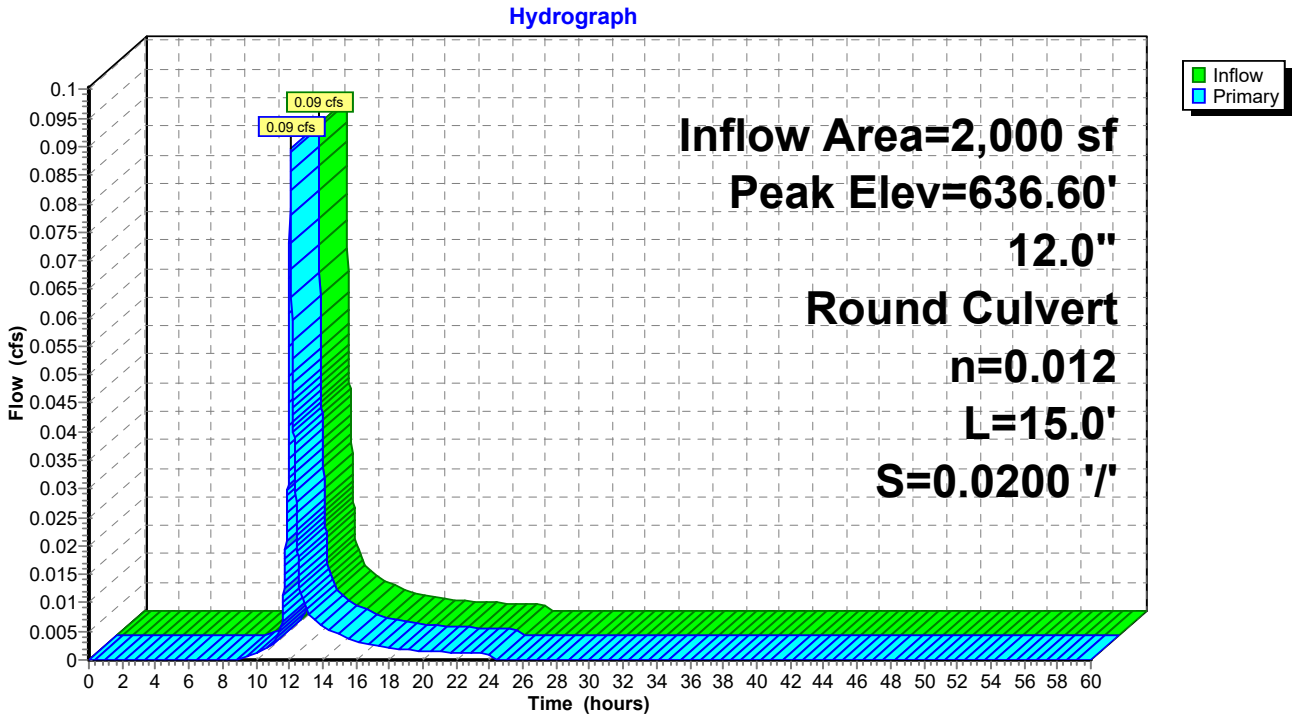
Inflow Area = 2,000 sf, 34.50% Impervious, Inflow Depth = 1.61" for 2-yr event
Inflow = 0.09 cfs @ 12.08 hrs, Volume= 268 cf
Outflow = 0.09 cfs @ 12.08 hrs, Volume= 268 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.09 cfs @ 12.08 hrs, Volume= 268 cf
Routed to Pond 63P : DMH 3

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 636.60' @ 12.08 hrs
Flood Elev= 639.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	636.20'	**12.0" Round Culvert** L= 15.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 636.20' / 635.90' S= 0.0200 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.08 cfs @ 12.08 hrs HW=636.60' TW=636.59' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 0.08 cfs @ 0.39 fps)

Pond 14P: CB 4



Summary for Pond 15P: CB 5

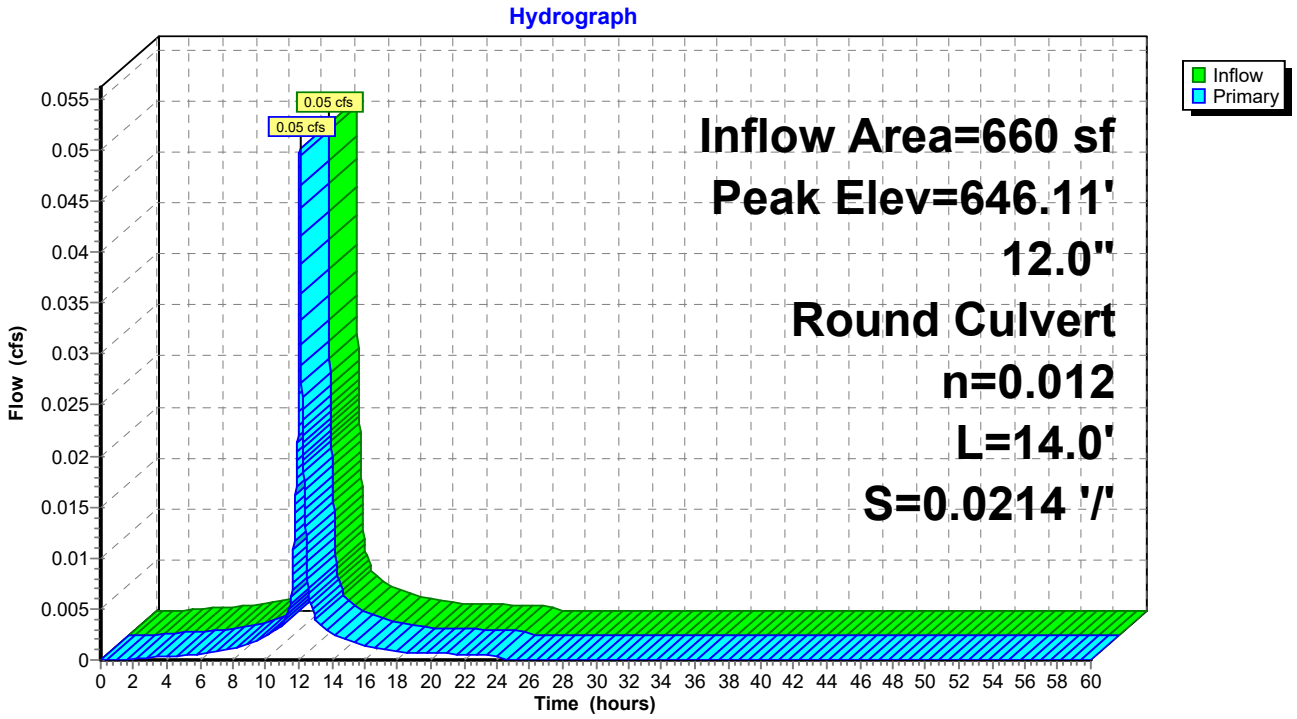
Inflow Area = 660 sf,100.00% Impervious, Inflow Depth = 3.06" for 2-yr event
Inflow = 0.05 cfs @ 12.07 hrs, Volume= 168 cf
Outflow = 0.05 cfs @ 12.07 hrs, Volume= 168 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.05 cfs @ 12.07 hrs, Volume= 168 cf
Routed to Pond 64P : DMH 4

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 646.11' @ 12.07 hrs
Flood Elev= 649.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	646.00'	**12.0" Round Culvert** L= 14.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 646.00' / 645.70' S= 0.0214 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.05 cfs @ 12.07 hrs HW=646.11' TW=643.76' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 0.05 cfs @ 1.11 fps)

Pond 15P: CB 5



Summary for Pond 16P: CB 6

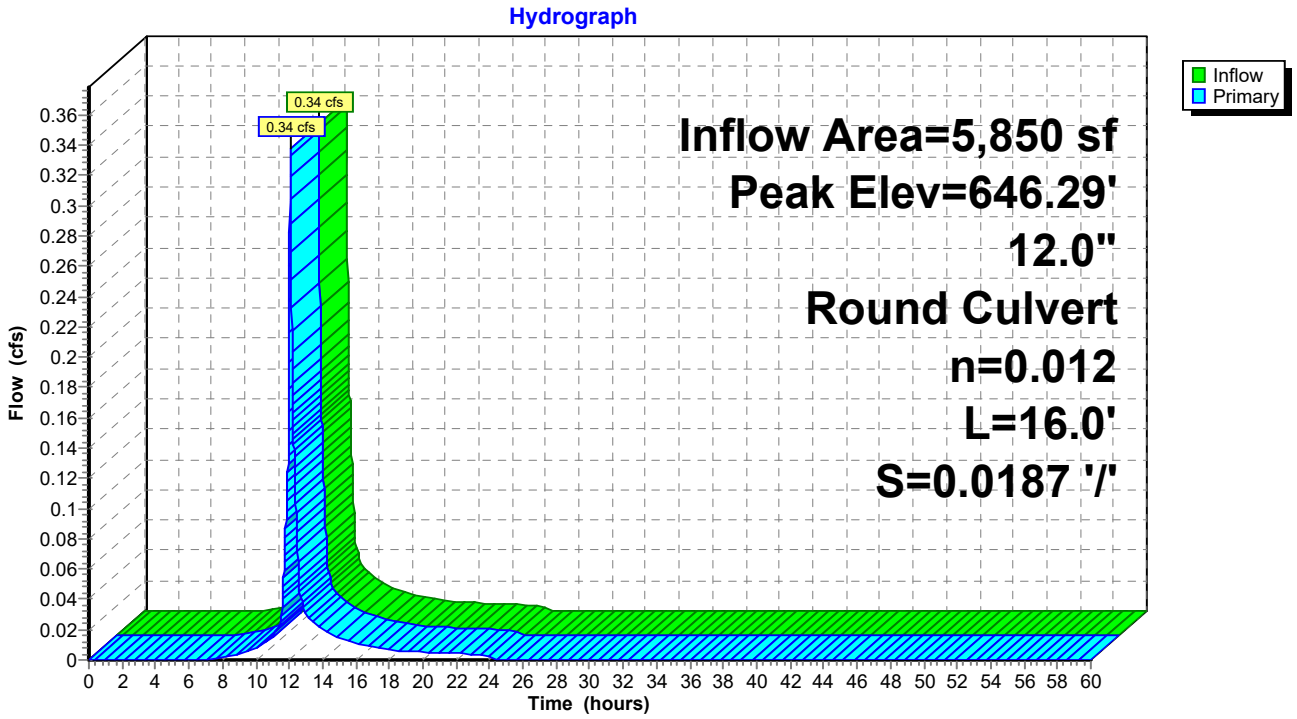
Inflow Area = 5,850 sf, 56.41% Impervious, Inflow Depth = 2.08" for 2-yr event
Inflow = 0.34 cfs @ 12.07 hrs, Volume= 1,013 cf
Outflow = 0.34 cfs @ 12.07 hrs, Volume= 1,013 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.34 cfs @ 12.07 hrs, Volume= 1,013 cf
Routed to Pond 64P : DMH 4

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 646.29' @ 12.07 hrs
Flood Elev= 649.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	646.00'	**12.0" Round Culvert** L= 16.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 646.00' / 645.70' S= 0.0187 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.34 cfs @ 12.07 hrs HW=646.29' TW=643.76' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 0.34 cfs @ 1.82 fps)

Pond 16P: CB 6



Summary for Pond 17P: CB 7

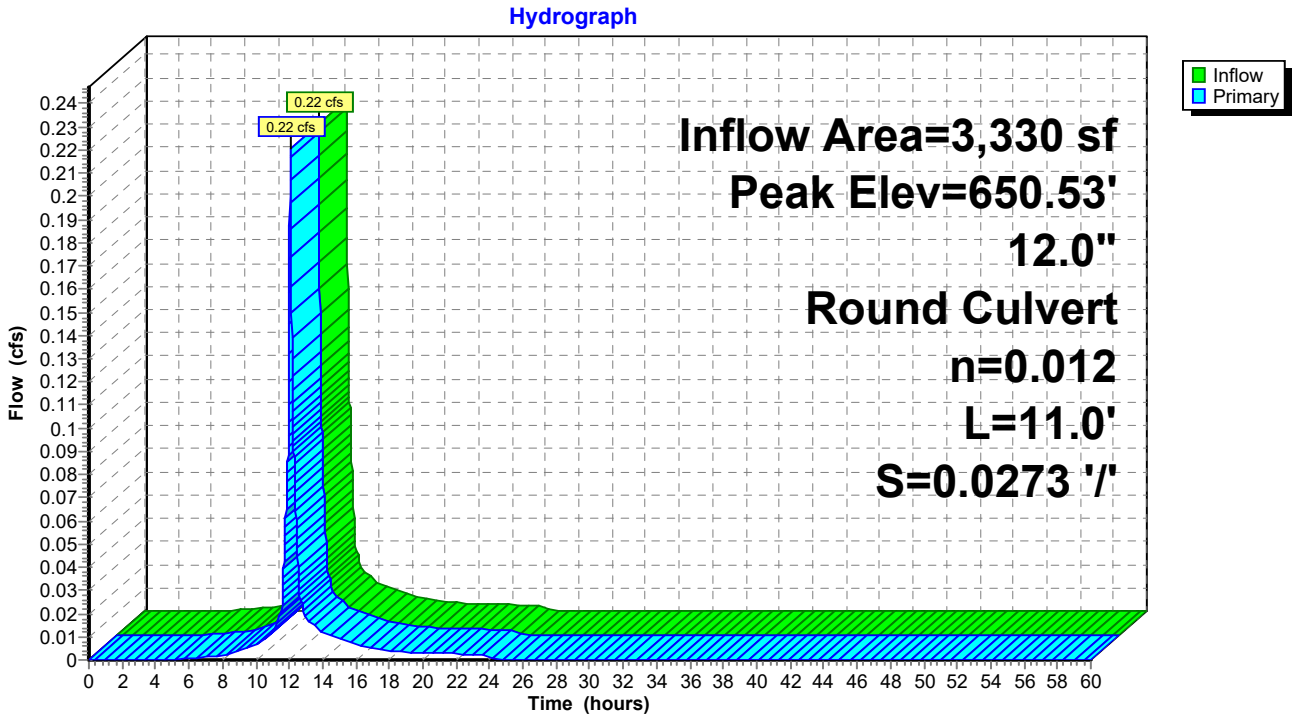
Inflow Area = 3,330 sf, 75.98% Impervious, Inflow Depth = 2.44" for 2-yr event
Inflow = 0.22 cfs @ 12.07 hrs, Volume= 676 cf
Outflow = 0.22 cfs @ 12.07 hrs, Volume= 676 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.22 cfs @ 12.07 hrs, Volume= 676 cf
Routed to Pond 65P : DMH 5

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 650.53' @ 12.07 hrs
Flood Elev= 653.80'

Device	Routing	Invert	Outlet Devices
#1	Primary	650.30'	**12.0" Round Culvert** L= 11.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 650.30' / 650.00' S= 0.0273 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.22 cfs @ 12.07 hrs HW=650.53' TW=646.58' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 0.22 cfs @ 1.63 fps)

Pond 17P: CB 7



Summary for Pond 18P: CB 8

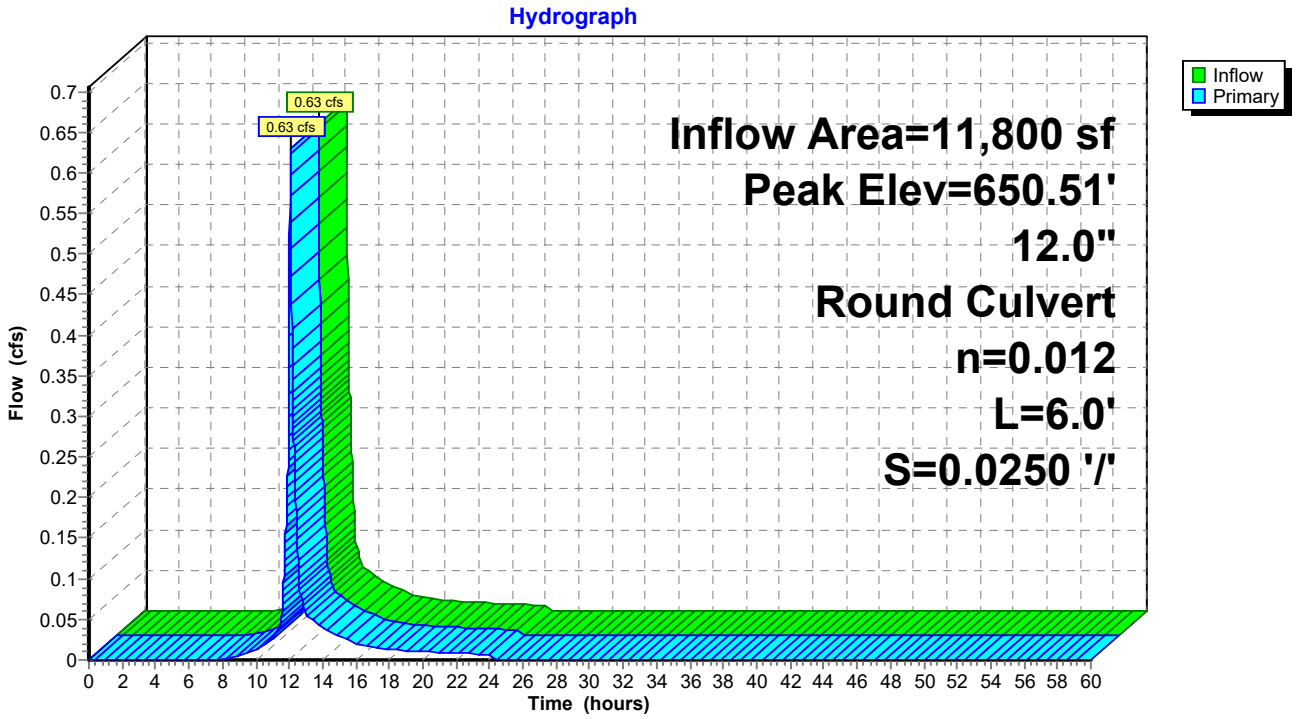
Inflow Area = 11,800 sf, 50.17% Impervious, Inflow Depth = 1.91" for 2-yr event
Inflow = 0.63 cfs @ 12.07 hrs, Volume= 1,882 cf
Outflow = 0.63 cfs @ 12.07 hrs, Volume= 1,882 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.63 cfs @ 12.07 hrs, Volume= 1,882 cf
Routed to Pond 66P : DMH 6

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 650.51' @ 12.07 hrs
Flood Elev= 653.60'

Device	Routing	Invert	Outlet Devices
#1	Primary	650.10'	**12.0" Round Culvert** L= 6.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 650.10' / 649.95' S= 0.0250 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.63 cfs @ 12.07 hrs HW=650.51' TW=650.22' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 0.63 cfs @ 3.04 fps)

Pond 18P: CB 8



Summary for Pond 40P: HDS Unit

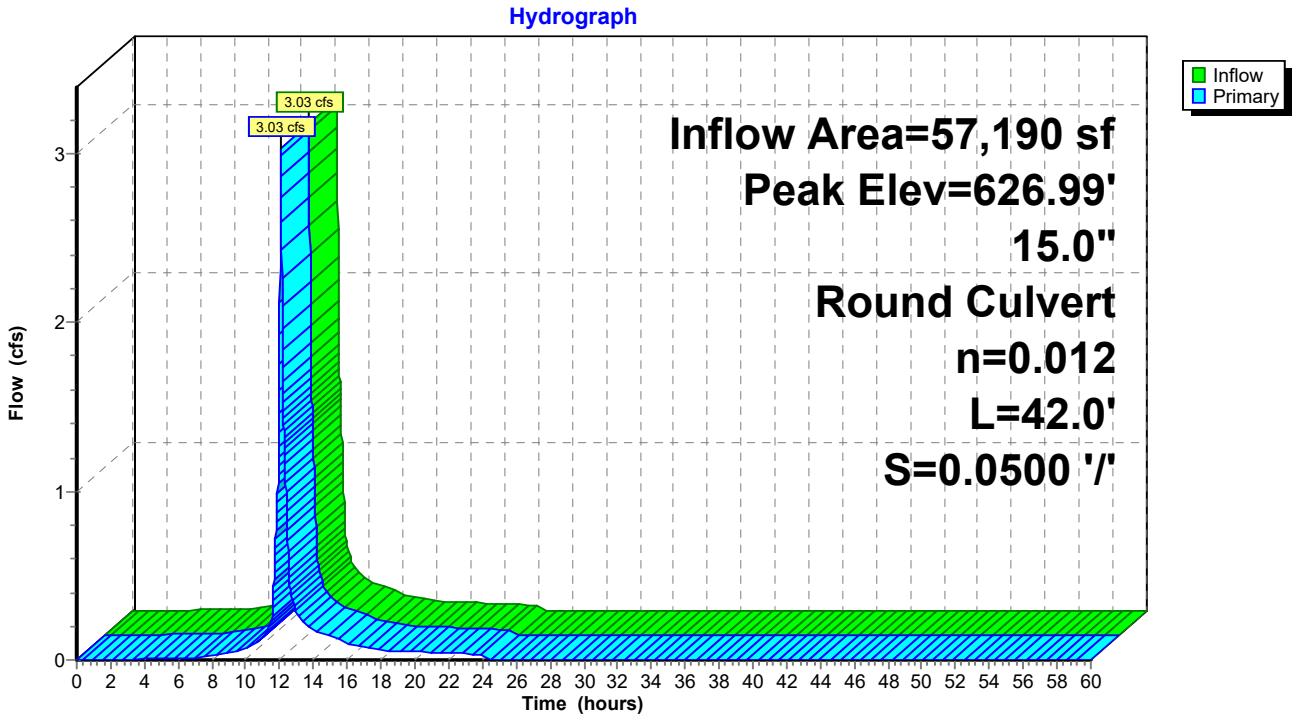
Inflow Area = 57,190 sf, 49.94% Impervious, Inflow Depth = 1.97" for 2-yr event
Inflow = 3.03 cfs @ 12.07 hrs, Volume= 9,396 cf
Outflow = 3.03 cfs @ 12.07 hrs, Volume= 9,396 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.03 cfs @ 12.07 hrs, Volume= 9,396 cf
Routed to Pond 50P : WQB

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 626.99' @ 12.07 hrs
Flood Elev= 653.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	626.10'	**15.0" Round Culvert** L= 42.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 626.10' / 624.00' S= 0.0500 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=3.02 cfs @ 12.07 hrs HW=626.99' TW=624.80' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 3.02 cfs @ 3.22 fps)

Pond 40P: HDS Unit



Summary for Pond 50P: WQB

Inflow Area = 81,960 sf, 34.85% Impervious, Inflow Depth = 1.71" for 2-yr event
Inflow = 3.75 cfs @ 12.08 hrs, Volume= 11,661 cf
Outflow = 0.63 cfs @ 12.55 hrs, Volume= 9,479 cf, Atten= 83%, Lag= 28.6 min
Primary = 0.63 cfs @ 12.55 hrs, Volume= 9,479 cf
Routed to Link 10L : Center Road

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 625.20' @ 12.55 hrs Surf.Area= 5,285 sf Storage= 5,551 cf
Flood Elev= 630.00' Surf.Area= 11,884 sf Storage= 45,891 cf

Plug-Flow detention time= 234.2 min calculated for 9,479 cf (81% of inflow)
Center-of-Mass det. time= 157.7 min (973.7 - 816.0)

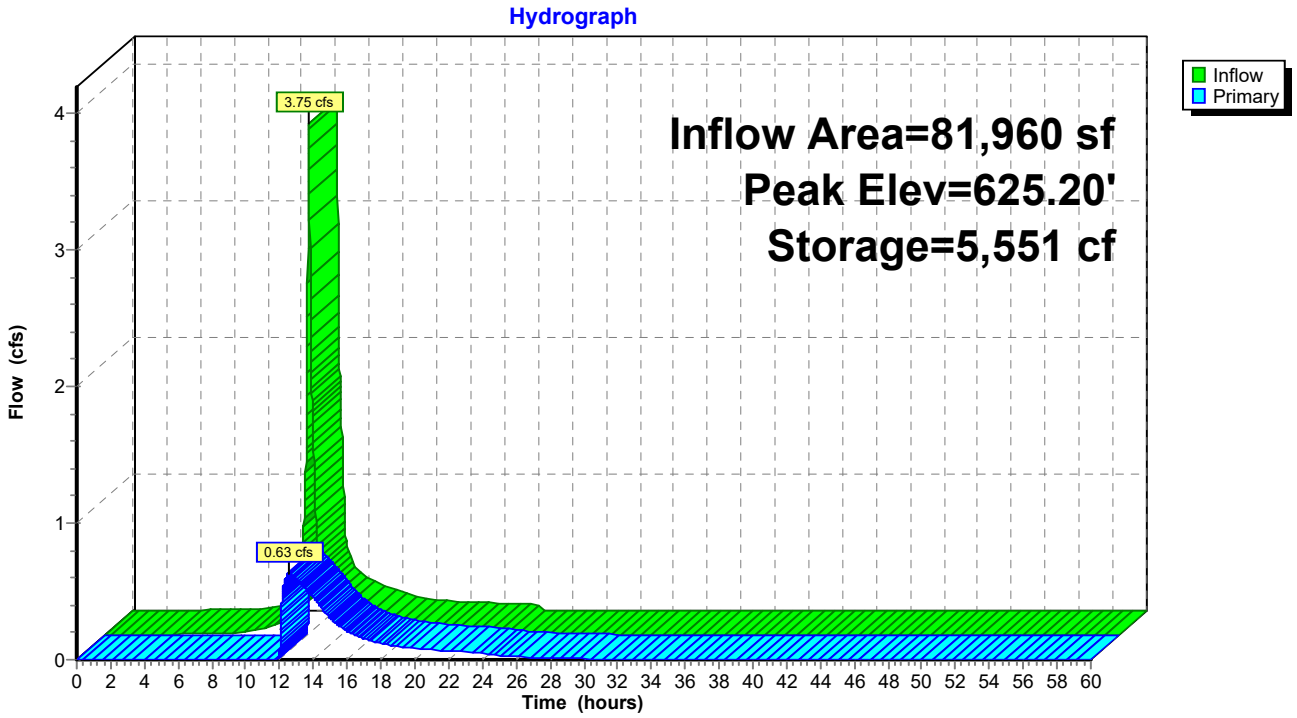
Volume	Invert	Avail.Storage	Storage Description
#1	624.00'	45,891 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
624.00	4,019	300.6	0	0	4,019
625.00	5,066	331.0	4,532	4,532	5,579
626.00	6,226	362.2	5,636	10,168	7,335
627.00	7,493	392.8	6,850	17,018	9,212
628.00	8,879	424.2	8,176	25,194	11,294
629.00	10,333	449.9	9,597	34,791	13,134
630.00	11,884	475.7	11,099	45,891	15,090

Device	Routing	Invert	Outlet Devices
#1	Primary	623.00'	**12.0" Round Culvert** L= 46.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 623.00' / 620.30' S= 0.0587 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	624.50'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	628.50'	**6.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=0.63 cfs @ 12.55 hrs HW=625.20' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.63 cfs of 4.93 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.63 cfs @ 3.22 fps)
  └─**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 50P: WQB


Hydrograph
Inflow Area=81,960 sf
Peak Elev=625.20'
Storage=5,551 cf
3.75 cfs
0.63 cfs
Inflow
Primary
Flow (cfs)
Time (hours)
0 1 2 3 4
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60

Summary for Pond 61P: DMH 1

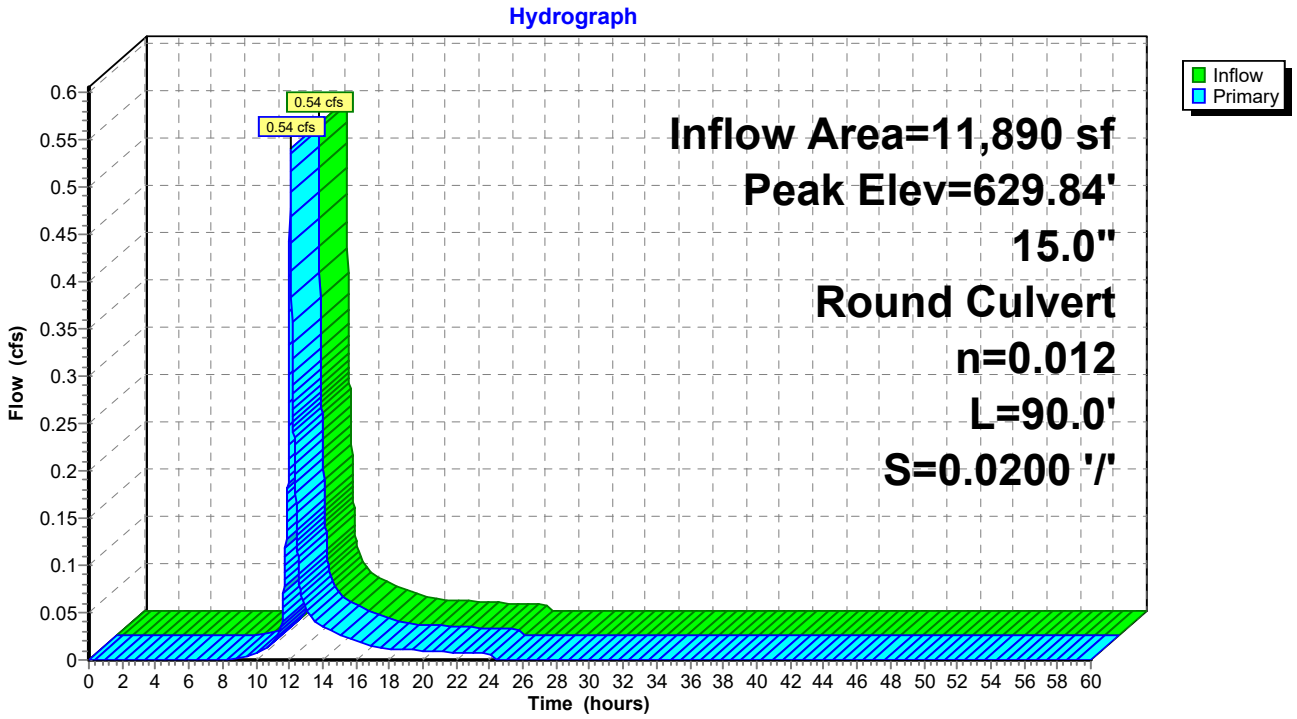
Inflow Area = 11,890 sf, 35.07% Impervious, Inflow Depth = 1.63" for 2-yr event
Inflow = 0.54 cfs @ 12.08 hrs, Volume= 1,620 cf
Outflow = 0.54 cfs @ 12.08 hrs, Volume= 1,620 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.54 cfs @ 12.08 hrs, Volume= 1,620 cf
Routed to Pond 62P : DMH 2

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 629.84' @ 12.08 hrs
Flood Elev= 633.40'

Device	Routing	Invert	Outlet Devices
#1	Primary	629.50'	**15.0" Round Culvert** L= 90.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 629.50' / 627.70' S= 0.0200 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=0.54 cfs @ 12.08 hrs HW=629.84' TW=627.32' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 0.54 cfs @ 1.99 fps)

Pond 61P: DMH 1



Summary for Pond 62P: DMH 2

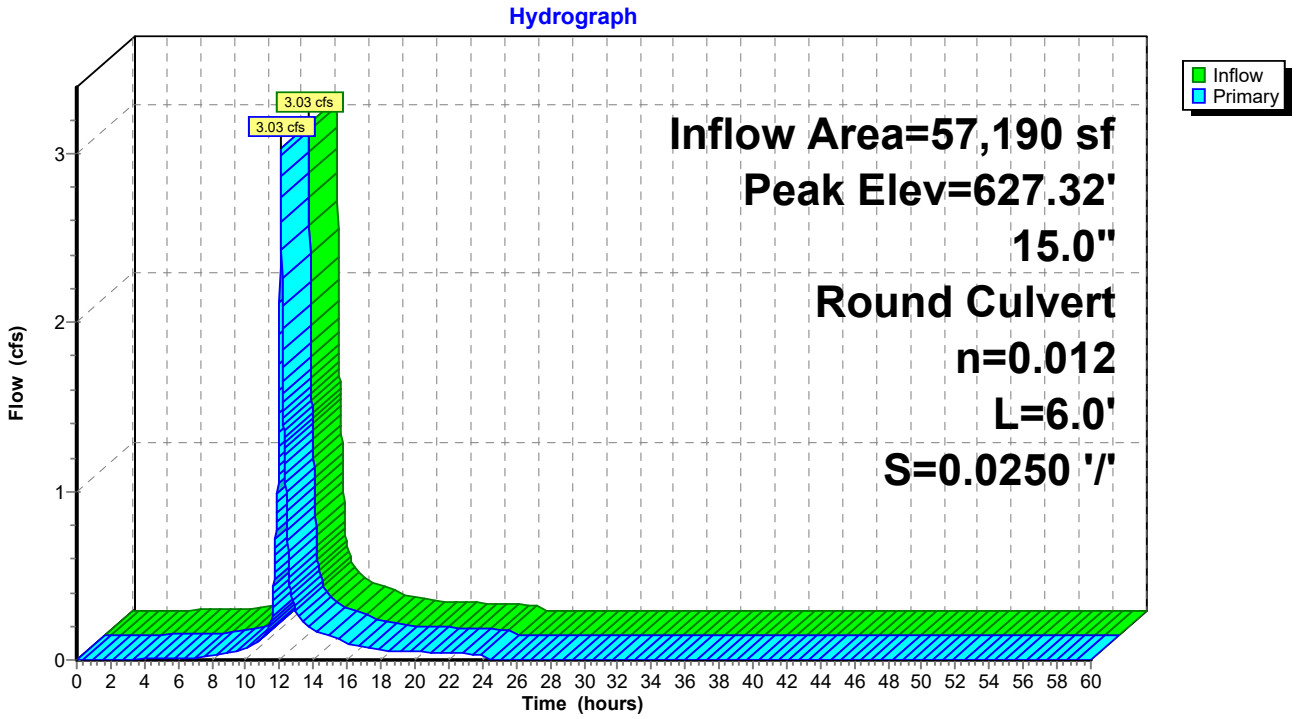
Inflow Area = 57,190 sf, 49.94% Impervious, Inflow Depth = 1.97" for 2-yr event
Inflow = 3.03 cfs @ 12.07 hrs, Volume= 9,396 cf
Outflow = 3.03 cfs @ 12.07 hrs, Volume= 9,396 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.03 cfs @ 12.07 hrs, Volume= 9,396 cf
Routed to Pond 40P : HDS Unit

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 627.32' @ 12.08 hrs
Flood Elev= 637.60'

Device	Routing	Invert	Outlet Devices
#1	Primary	626.25'	**15.0" Round Culvert** L= 6.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 626.25' / 626.10' S= 0.0250 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=3.00 cfs @ 12.07 hrs HW=627.32' TW=626.99' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 3.00 cfs @ 3.61 fps)

Pond 62P: DMH 2



Summary for Pond 63P: DMH 3

[80] Warning: Exceeded Pond 13P by 0.03' @ 12.03 hrs (0.14 cfs 36 cf)
[80] Warning: Exceeded Pond 14P by 0.02' @ 12.03 hrs (0.11 cfs 23 cf)

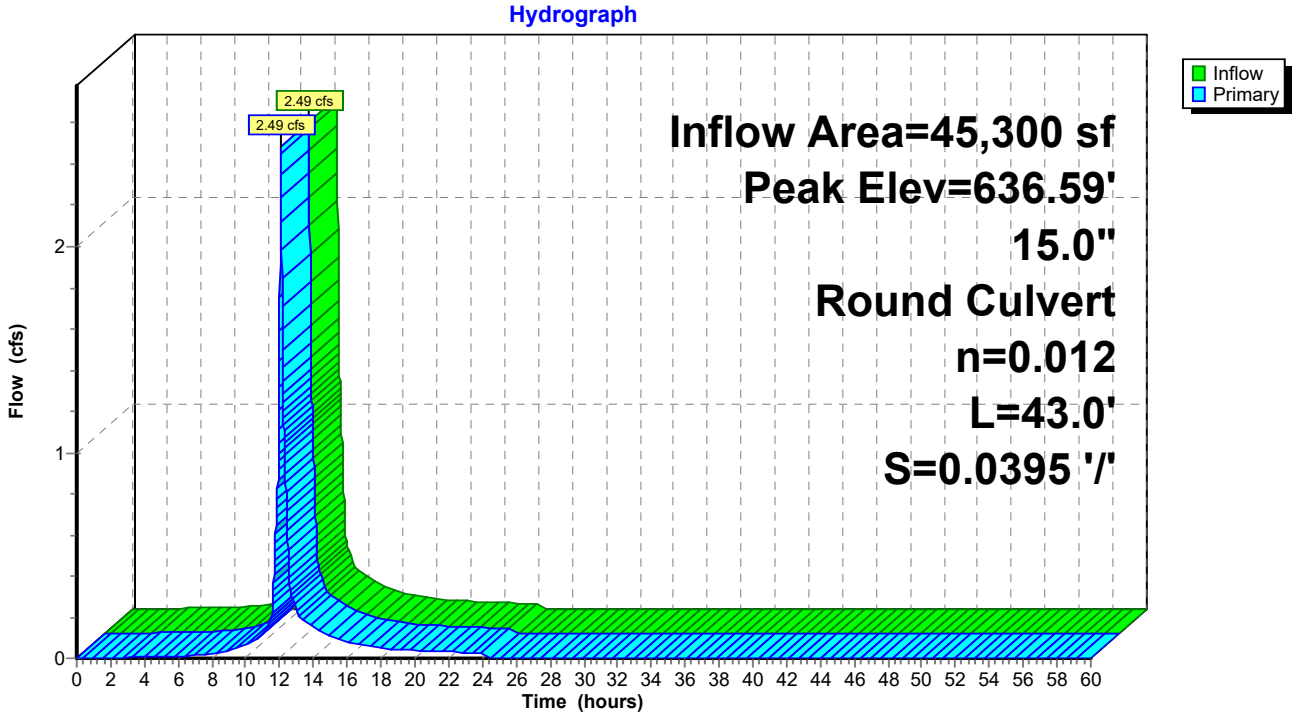
Inflow Area = 45,300 sf, 53.84% Impervious, Inflow Depth = 2.06" for 2-yr event
Inflow = 2.49 cfs @ 12.07 hrs, Volume= 7,776 cf
Outflow = 2.49 cfs @ 12.07 hrs, Volume= 7,776 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.49 cfs @ 12.07 hrs, Volume= 7,776 cf
Routed to Pond 62P : DMH 2

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 636.59' @ 12.07 hrs
Flood Elev= 642.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	635.80'	**15.0" Round Culvert** L= 43.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 635.80' / 634.10' S= 0.0395 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=2.48 cfs @ 12.07 hrs HW=636.59' TW=627.32' (Dynamic Tailwater)
↳**1=Culvert** (Inlet Controls 2.48 cfs @ 3.03 fps)

Pond 63P: DMH 3



Summary for Pond 64P: DMH 4

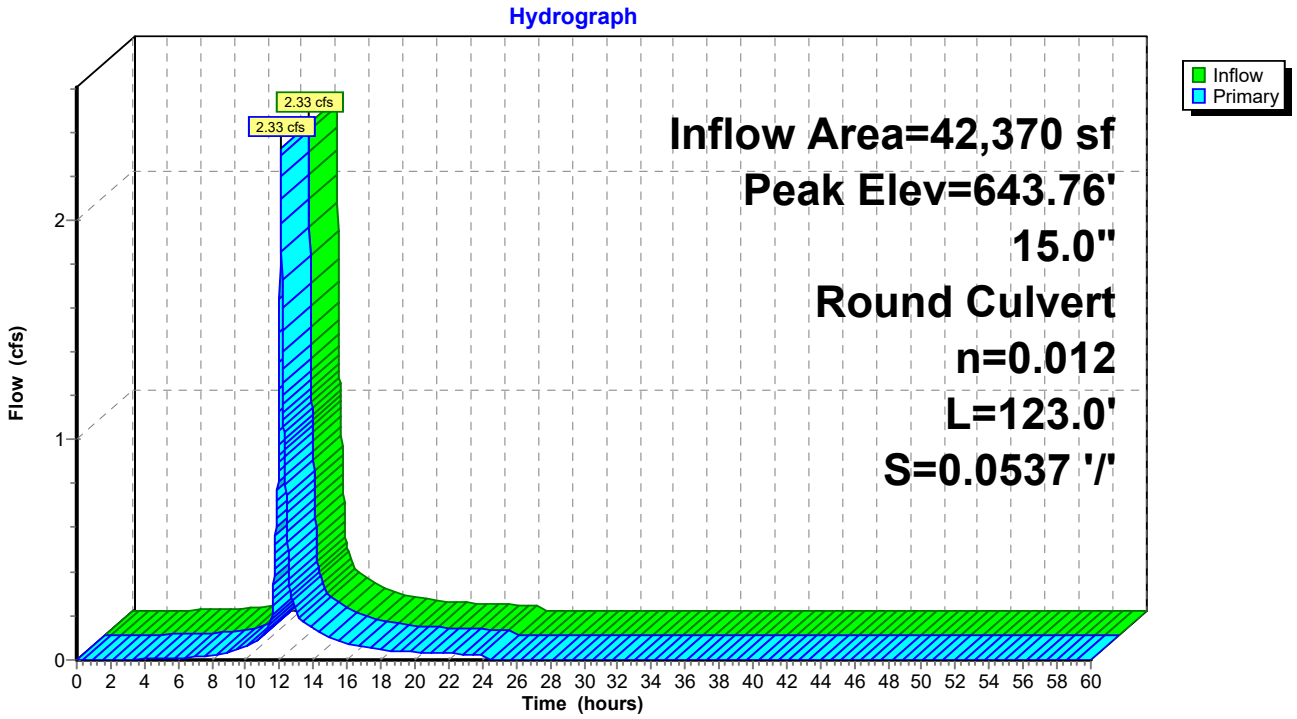
Inflow Area = 42,370 sf, 53.74% Impervious, Inflow Depth = 2.06" for 2-yr event
Inflow = 2.33 cfs @ 12.07 hrs, Volume= 7,271 cf
Outflow = 2.33 cfs @ 12.07 hrs, Volume= 7,271 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.33 cfs @ 12.07 hrs, Volume= 7,271 cf
Routed to Pond 63P : DMH 3

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 643.76' @ 12.07 hrs
Flood Elev= 649.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	643.00'	**15.0" Round Culvert** L= 123.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 643.00' / 636.40' S= 0.0537 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=2.32 cfs @ 12.07 hrs HW=643.76' TW=636.59' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 2.32 cfs @ 2.97 fps)

Pond 64P: DMH 4



Summary for Pond 65P: DMH 5

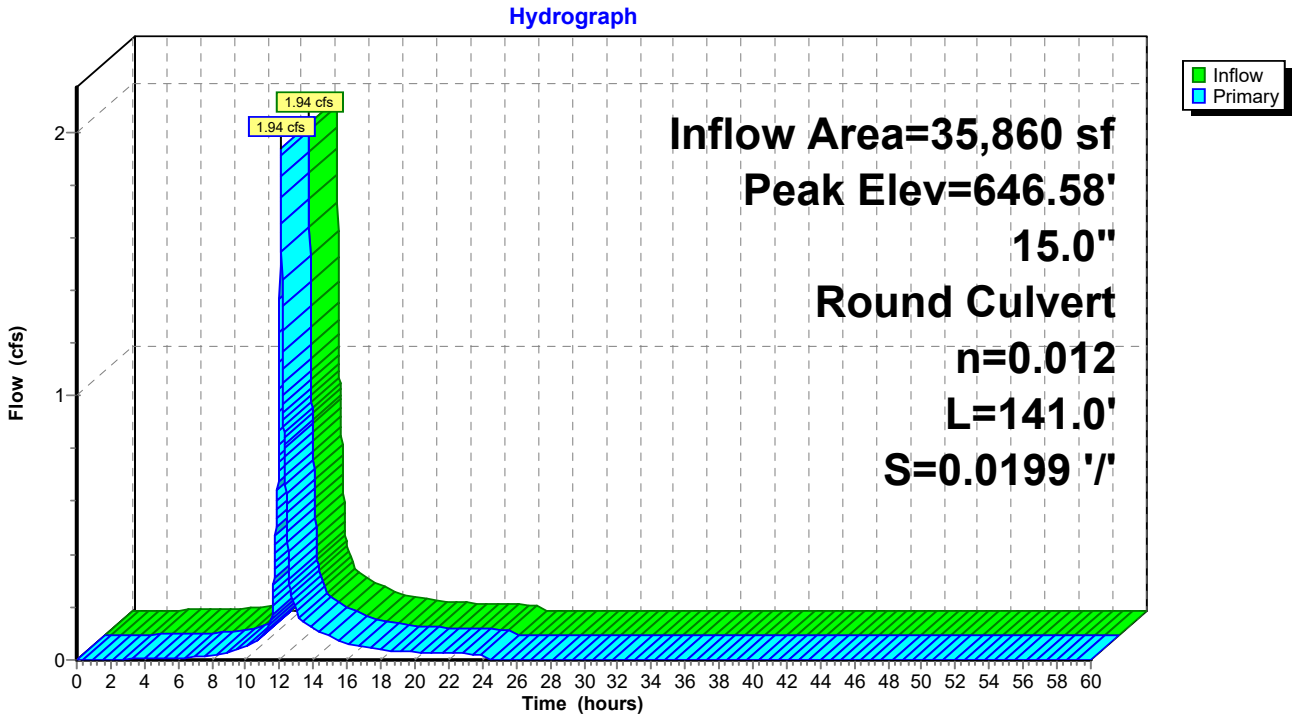
Inflow Area = 35,860 sf, 52.45% Impervious, Inflow Depth = 2.04" for 2-yr event
Inflow = 1.94 cfs @ 12.07 hrs, Volume= 6,090 cf
Outflow = 1.94 cfs @ 12.07 hrs, Volume= 6,090 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.94 cfs @ 12.07 hrs, Volume= 6,090 cf
Routed to Pond 64P : DMH 4

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 646.58' @ 12.07 hrs
Flood Elev= 654.20'

Device	Routing	Invert	Outlet Devices
#1	Primary	645.90'	**15.0" Round Culvert** L= 141.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 645.90' / 643.10' S= 0.0199 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=1.93 cfs @ 12.07 hrs HW=646.58' TW=643.76' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 1.93 cfs @ 2.82 fps)

Pond 65P: DMH 5



Summary for Pond 66P: DMH 6

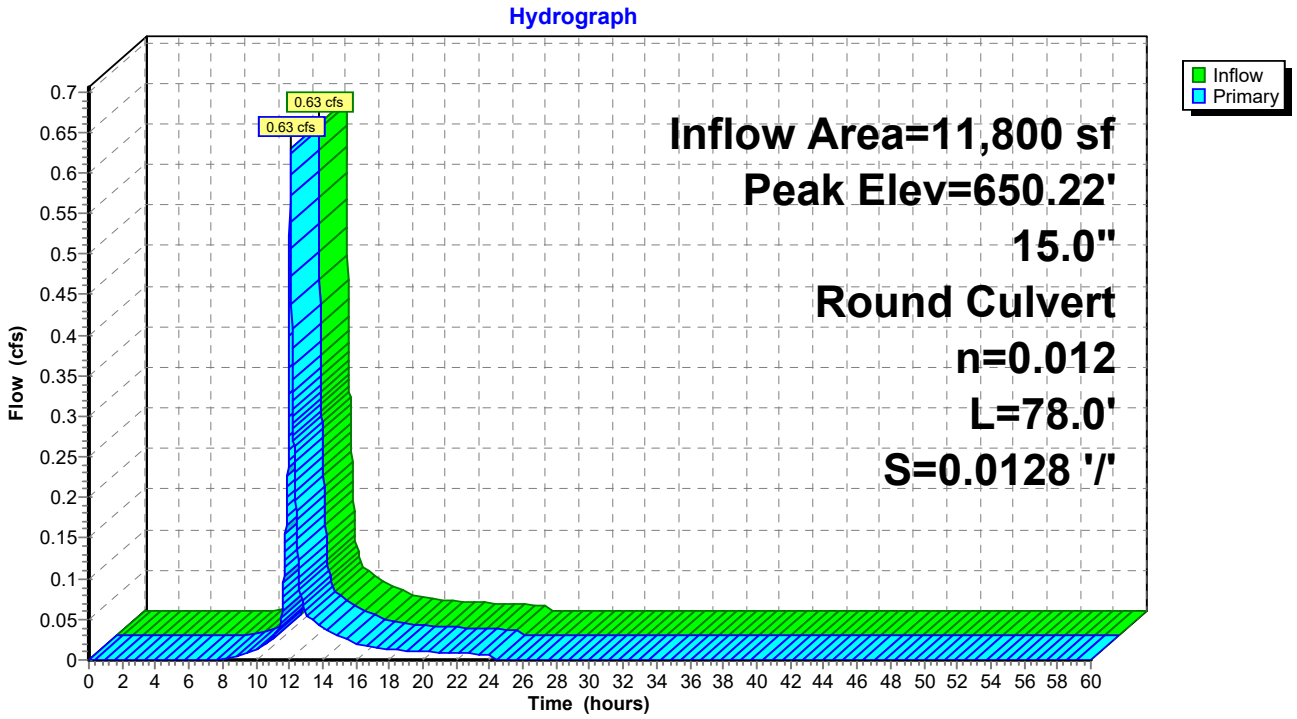
Inflow Area = 11,800 sf, 50.17% Impervious, Inflow Depth = 1.91" for 2-yr event
Inflow = 0.63 cfs @ 12.07 hrs, Volume= 1,882 cf
Outflow = 0.63 cfs @ 12.07 hrs, Volume= 1,882 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.63 cfs @ 12.07 hrs, Volume= 1,882 cf
Routed to Pond 65P : DMH 5

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 650.22' @ 12.07 hrs
Flood Elev= 654.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	649.85'	**15.0" Round Culvert** L= 78.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 649.85' / 648.85' S= 0.0128 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=0.63 cfs @ 12.07 hrs HW=650.22' TW=646.58' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 0.63 cfs @ 2.07 fps)

Pond 66P: DMH 6



Summary for Pond 67P: DMH 7

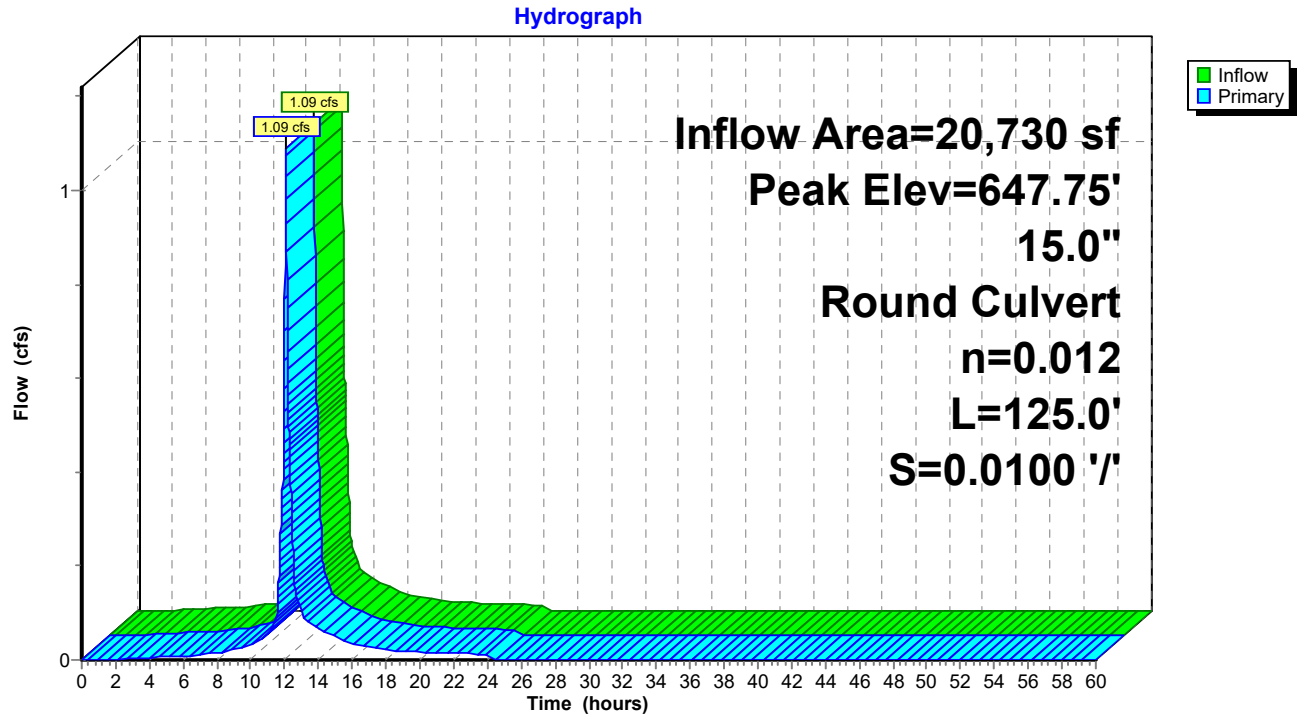
Inflow Area = 20,730 sf, 49.98% Impervious, Inflow Depth = 2.04" for 2-yr event
Inflow = 1.09 cfs @ 12.07 hrs, Volume= 3,532 cf
Outflow = 1.09 cfs @ 12.07 hrs, Volume= 3,532 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.09 cfs @ 12.07 hrs, Volume= 3,532 cf
Routed to Pond 65P : DMH 5

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 647.75' @ 12.07 hrs
Flood Elev= 654.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	647.25'	**15.0" Round Culvert** L= 125.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 647.25' / 646.00' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=1.09 cfs @ 12.07 hrs HW=647.75' TW=646.58' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 1.09 cfs @ 2.40 fps)

Pond 67P: DMH 7



Summary for Pond 81P: YD 1

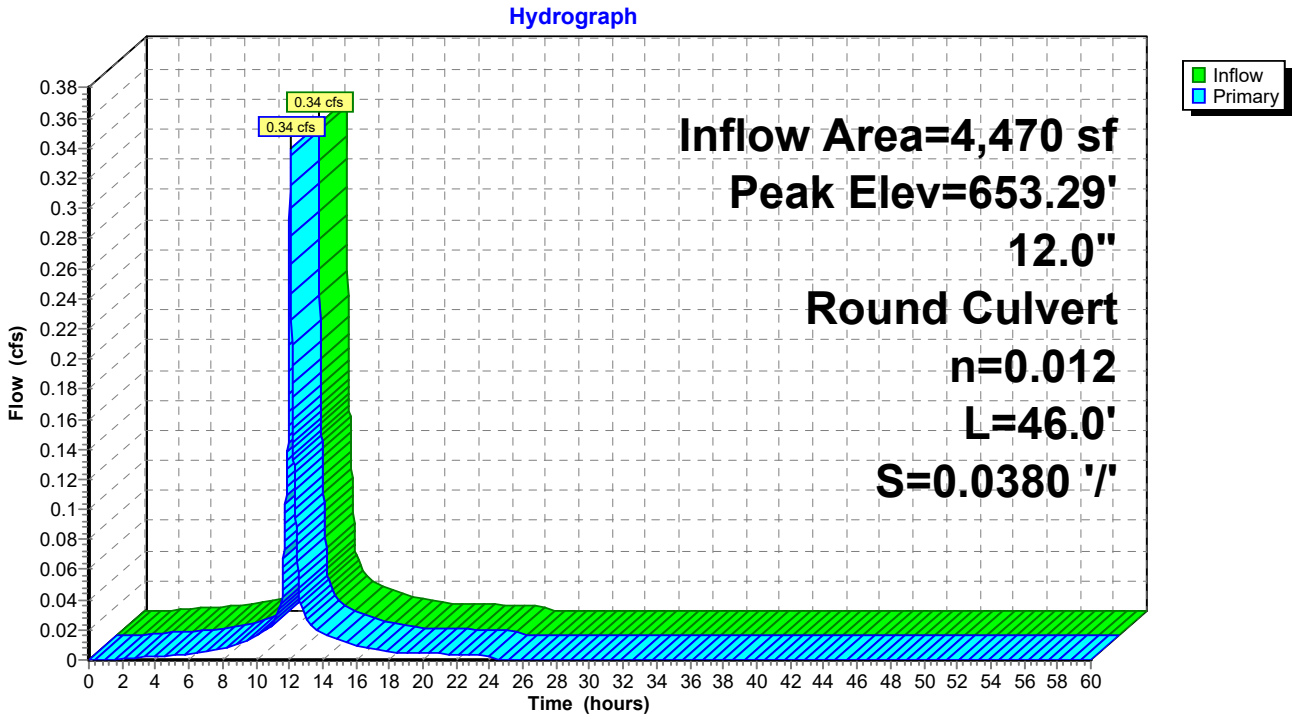
Inflow Area = 4,470 sf,100.00% Impervious, Inflow Depth = 3.06" for 2-yr event
Inflow = 0.34 cfs @ 12.07 hrs, Volume= 1,139 cf
Outflow = 0.34 cfs @ 12.07 hrs, Volume= 1,139 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.34 cfs @ 12.07 hrs, Volume= 1,139 cf
Routed to Pond 83P : YD 3

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 653.29' @ 12.07 hrs
Flood Elev= 656.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	653.00'	**12.0" Round Culvert** L= 46.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 653.00' / 651.25' S= 0.0380 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.34 cfs @ 12.07 hrs HW=653.29' TW=651.80' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 0.34 cfs @ 1.82 fps)

Pond 81P: YD 1



Summary for Pond 82P: YD 2

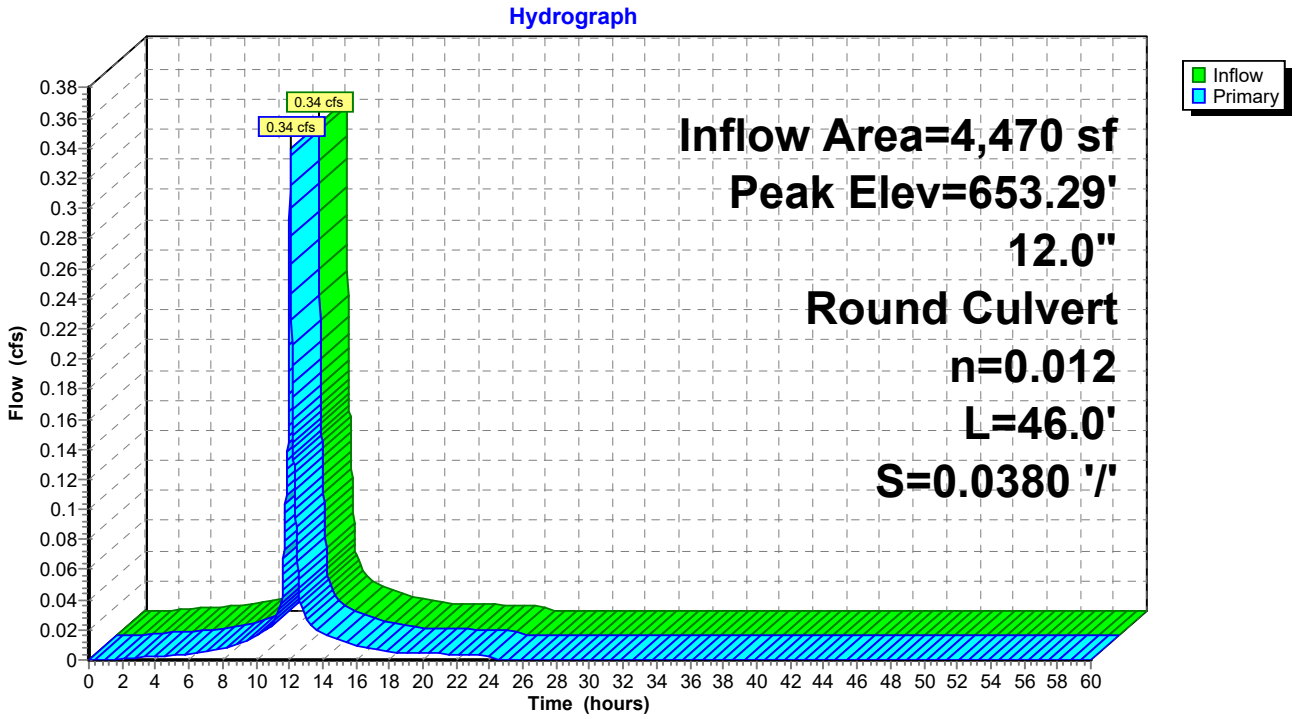
Inflow Area = 4,470 sf,100.00% Impervious, Inflow Depth = 3.06" for 2-yr event
Inflow = 0.34 cfs @ 12.07 hrs, Volume= 1,139 cf
Outflow = 0.34 cfs @ 12.07 hrs, Volume= 1,139 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.34 cfs @ 12.07 hrs, Volume= 1,139 cf
Routed to Pond 83P : YD 3

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 653.29' @ 12.07 hrs
Flood Elev= 656.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	653.00'	**12.0" Round Culvert** L= 46.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 653.00' / 651.25' S= 0.0380 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.34 cfs @ 12.07 hrs HW=653.29' TW=651.80' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 0.34 cfs @ 1.82 fps)

Pond 82P: YD 2



Summary for Pond 83P: YD 3

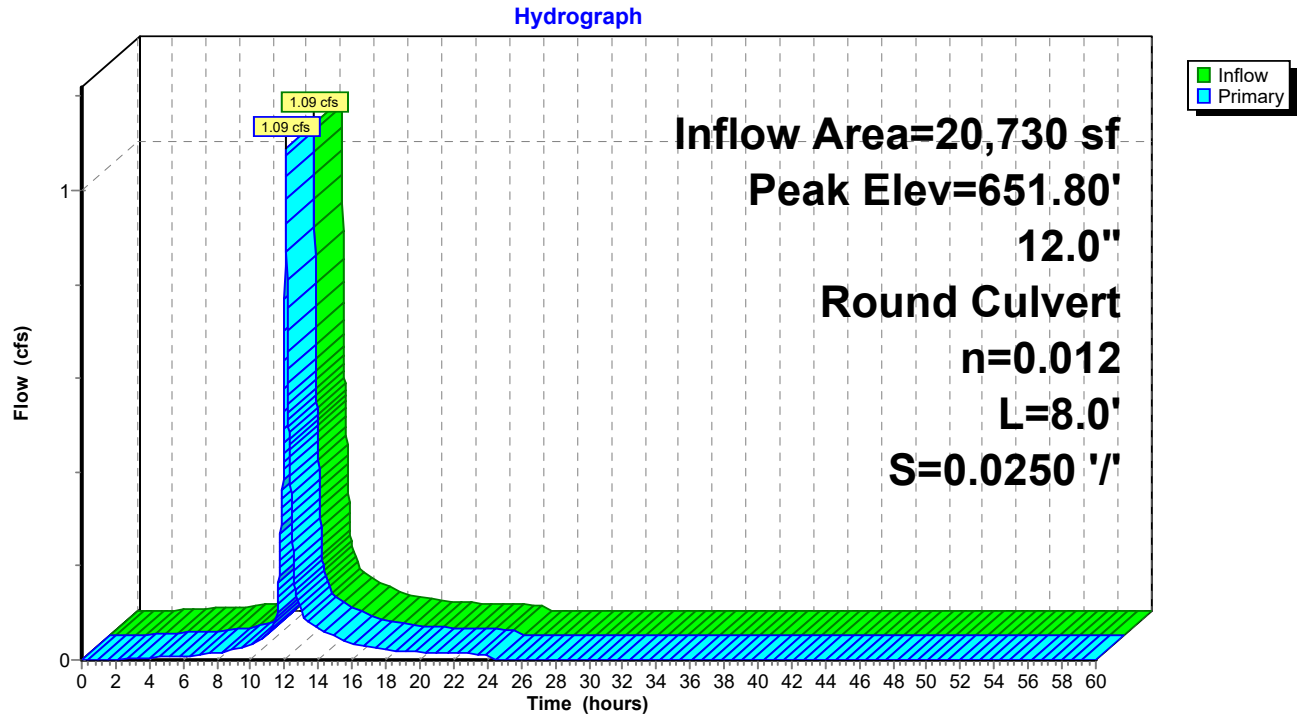
Inflow Area = 20,730 sf, 49.98% Impervious, Inflow Depth = 2.04" for 2-yr event
Inflow = 1.09 cfs @ 12.07 hrs, Volume= 3,532 cf
Outflow = 1.09 cfs @ 12.07 hrs, Volume= 3,532 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.09 cfs @ 12.07 hrs, Volume= 3,532 cf
Routed to Pond 67P : DMH 7

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 651.80' @ 12.07 hrs
Flood Elev= 654.75'

Device	Routing	Invert	Outlet Devices
#1	Primary	651.25'	**12.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 651.25' / 651.05' S= 0.0250 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=1.09 cfs @ 12.07 hrs HW=651.80' TW=647.75' (Dynamic Tailwater)
1=Culvert (Barrel Controls 1.09 cfs @ 3.52 fps)

Pond 83P: YD 3

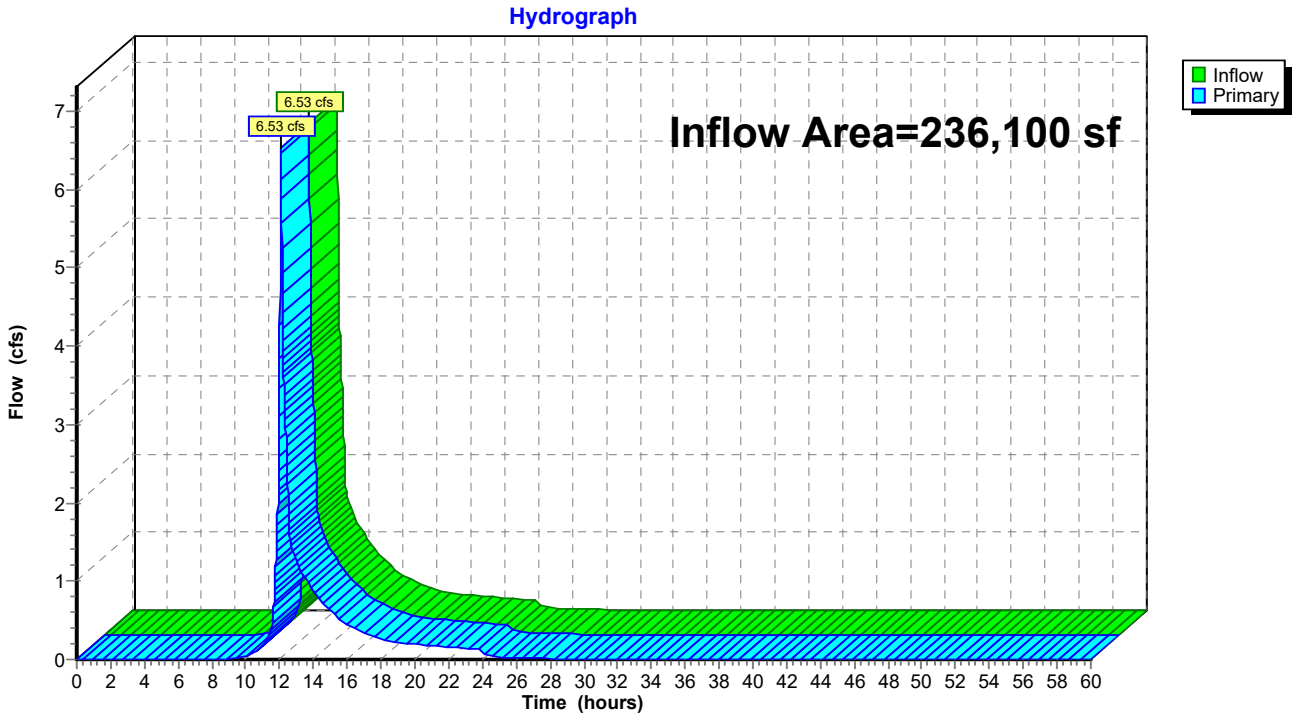


Summary for Link 10L: Center Road

Inflow Area = 236,100 sf, 28.76% Impervious, Inflow Depth = 1.44" for 2-yr event
Inflow = 6.53 cfs @ 12.08 hrs, Volume= 28,380 cf
Primary = 6.53 cfs @ 12.08 hrs, Volume= 28,380 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs

Link 10L: Center Road



Time span=0.00-60.00 hrs, dt=0.01 hrs, 6001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment10S: Proposed to Center Runoff Area=154,140 sf 25.53% Impervious Runoff Depth=2.96"
Tc=5.0 min CN=80 Runoff=12.74 cfs 38,057 cf

Subcatchment11S: Proposed to CB 1 Runoff Area=7,750 sf 41.81% Impervious Runoff Depth=3.34"
Tc=5.0 min CN=84 Runoff=0.72 cfs 2,159 cf

Subcatchment12S: Proposed to CB 2 Runoff Area=4,140 sf 22.46% Impervious Runoff Depth=2.87"
Tc=5.0 min CN=79 Runoff=0.33 cfs 990 cf

Subcatchment13S: Proposed to CB 3 Runoff Area=930 sf 100.00% Impervious Runoff Depth=4.84"
Tc=5.0 min CN=98 Runoff=0.11 cfs 375 cf

Subcatchment14S: Proposed to CB 4 Runoff Area=2,000 sf 34.50% Impervious Runoff Depth=3.15"
Tc=5.0 min CN=82 Runoff=0.18 cfs 525 cf

Subcatchment15S: Proposed to CB 5 Runoff Area=660 sf 100.00% Impervious Runoff Depth=4.84"
Tc=5.0 min CN=98 Runoff=0.08 cfs 266 cf

Subcatchment16S: Proposed to CB 6 Runoff Area=5,850 sf 56.41% Impervious Runoff Depth=3.74"
Tc=5.0 min CN=88 Runoff=0.60 cfs 1,826 cf

Subcatchment17S: Proposed to CB 7 Runoff Area=3,330 sf 75.98% Impervious Runoff Depth=4.17"
Tc=5.0 min CN=92 Runoff=0.37 cfs 1,156 cf

Subcatchment18S: Proposed to CB 8 Runoff Area=11,800 sf 50.17% Impervious Runoff Depth=3.54"
Tc=5.0 min CN=86 Runoff=1.15 cfs 3,483 cf

Subcatchment20S: Proposed to Northern Runoff Area=59,900 sf 71.94% Impervious Runoff Depth=4.06"
Tc=5.0 min CN=91 Runoff=6.49 cfs 20,265 cf

Subcatchment30S: Proposed to West Runoff Area=230,400 sf 0.36% Impervious Runoff Depth=2.18"
Flow Length=530' Tc=20.1 min CN=71 Runoff=8.92 cfs 41,801 cf

Subcatchment40S: Proposed to South Runoff Area=19,030 sf 0.00% Impervious Runoff Depth=2.26"
Flow Length=255' Tc=16.0 min CN=72 Runoff=0.84 cfs 3,583 cf

Subcatchment50S: Proposed to WQB Runoff Area=24,770 sf 0.00% Impervious Runoff Depth=2.43"
Tc=5.0 min CN=74 Runoff=1.67 cfs 5,012 cf

Subcatchment81S: Proposed to YD 1 Runoff Area=4,470 sf 100.00% Impervious Runoff Depth=4.84"
Tc=5.0 min CN=98 Runoff=0.53 cfs 1,804 cf

Subcatchment82S: Proposed to YD 2 Runoff Area=4,470 sf 100.00% Impervious Runoff Depth=4.84"
Tc=5.0 min CN=98 Runoff=0.53 cfs 1,804 cf

Subcatchment83S: Proposed to YD 3 Runoff Area=11,790 sf 12.04% Impervious Runoff Depth=2.69"
Tc=5.0 min CN=77 Runoff=0.88 cfs 2,643 cf

Pond 11P: CB 1 Peak Elev=630.18' Inflow=0.72 cfs 2,159 cf
12.0" Round Culvert n=0.012 L=3.0' S=0.0333 '/' Outflow=0.72 cfs 2,159 cf

Pond 12P: CB 2 Peak Elev=630.88' Inflow=0.33 cfs 990 cf
12.0" Round Culvert n=0.012 L=15.0' S=0.0467 '/' Outflow=0.33 cfs 990 cf

Pond 13P: CB 3 Peak Elev=636.98' Inflow=0.11 cfs 375 cf
12.0" Round Culvert n=0.012 L=3.0' S=0.0333 '/' Outflow=0.11 cfs 375 cf

Pond 14P: CB 4 Peak Elev=636.98' Inflow=0.18 cfs 525 cf
12.0" Round Culvert n=0.012 L=15.0' S=0.0200 '/' Outflow=0.18 cfs 525 cf

Pond 15P: CB 5 Peak Elev=646.13' Inflow=0.08 cfs 266 cf
12.0" Round Culvert n=0.012 L=14.0' S=0.0214 '/' Outflow=0.08 cfs 266 cf

Pond 16P: CB 6 Peak Elev=646.39' Inflow=0.60 cfs 1,826 cf
12.0" Round Culvert n=0.012 L=16.0' S=0.0187 '/' Outflow=0.60 cfs 1,826 cf

Pond 17P: CB 7 Peak Elev=650.60' Inflow=0.37 cfs 1,156 cf
12.0" Round Culvert n=0.012 L=11.0' S=0.0273 '/' Outflow=0.37 cfs 1,156 cf

Pond 18P: CB 8 Peak Elev=650.70' Inflow=1.15 cfs 3,483 cf
12.0" Round Culvert n=0.012 L=6.0' S=0.0250 '/' Outflow=1.15 cfs 3,483 cf

Pond 40P: HDS Unit Peak Elev=627.58' Inflow=5.46 cfs 17,033 cf
15.0" Round Culvert n=0.012 L=42.0' S=0.0500 '/' Outflow=5.46 cfs 17,033 cf

Pond 50P: WQB Peak Elev=626.07' Storage=10,596 cf Inflow=7.14 cfs 22,045 cf
Outflow=1.09 cfs 19,862 cf

Pond 61P: DMH 1 Peak Elev=629.99' Inflow=1.05 cfs 3,150 cf
15.0" Round Culvert n=0.012 L=90.0' S=0.0200 '/' Outflow=1.05 cfs 3,150 cf

Pond 62P: DMH 2 Peak Elev=628.43' Inflow=5.46 cfs 17,033 cf
15.0" Round Culvert n=0.012 L=6.0' S=0.0250 '/' Outflow=5.46 cfs 17,033 cf

Pond 63P: DMH 3 Peak Elev=636.97' Inflow=4.42 cfs 13,883 cf
15.0" Round Culvert n=0.012 L=43.0' S=0.0395 '/' Outflow=4.42 cfs 13,883 cf

Pond 64P: DMH 4 Peak Elev=644.11' Inflow=4.13 cfs 12,982 cf
15.0" Round Culvert n=0.012 L=123.0' S=0.0537 '/' Outflow=4.13 cfs 12,982 cf

Pond 65P: DMH 5 Peak Elev=646.88' Inflow=3.46 cfs 10,890 cf
15.0" Round Culvert n=0.012 L=141.0' S=0.0199 '/' Outflow=3.46 cfs 10,890 cf

Pond 66P: DMH 6 Peak Elev=650.36' Inflow=1.15 cfs 3,483 cf
15.0" Round Culvert n=0.012 L=78.0' S=0.0128 '/' Outflow=1.15 cfs 3,483 cf

Pond 67P: DMH 7 Peak Elev=647.95' Inflow=1.94 cfs 6,251 cf
15.0" Round Culvert n=0.012 L=125.0' S=0.0100 '/' Outflow=1.94 cfs 6,251 cf

Pond 81P: YD 1 Peak Elev=653.36' Inflow=0.53 cfs 1,804 cf
12.0" Round Culvert n=0.012 L=46.0' S=0.0380 '/' Outflow=0.53 cfs 1,804 cf

Pond 82P: YD 2 Peak Elev=653.36' Inflow=0.53 cfs 1,804 cf
12.0" Round Culvert n=0.012 L=46.0' S=0.0380 '/' Outflow=0.53 cfs 1,804 cf

Pond 83P: YD 3 Peak Elev=652.05' Inflow=1.94 cfs 6,251 cf
12.0" Round Culvert n=0.012 L=8.0' S=0.0250 '/' Outflow=1.94 cfs 6,251 cf

Link 10L: Center Road Inflow=13.53 cfs 57,919 cf
Primary=13.53 cfs 57,919 cf

Total Runoff Area = 545,430 sf Runoff Volume = 125,751 cf Average Runoff Depth = 2.77"
79.50% Pervious = 433,610 sf 20.50% Impervious = 111,820 sf

Summary for Subcatchment 10S: Proposed to Center Road

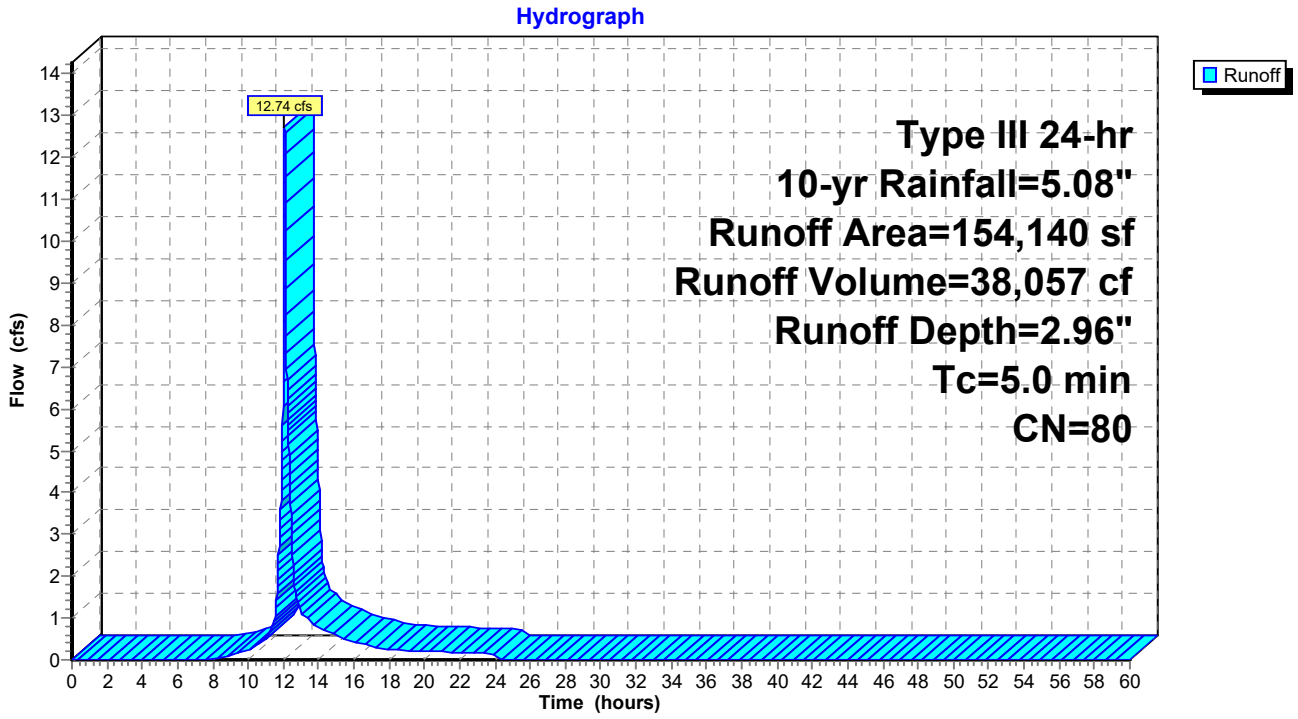
Runoff = 12.74 cfs @ 12.07 hrs, Volume= 38,057 cf, Depth= 2.96"
Routed to Link 10L : Center Road

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.08"

	Area (sf)	CN	Description
*	39,350	98	Paved
	105,490	74	>75% Grass cover, Good, HSG C
	9,300	70	Woods, Good, HSG C
	154,140	80	Weighted Average
	114,790		74.47% Pervious Area
	39,350		25.53% Impervious Area

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

Subcatchment 10S: Proposed to Center Road



Summary for Subcatchment 11S: Proposed to CB 1

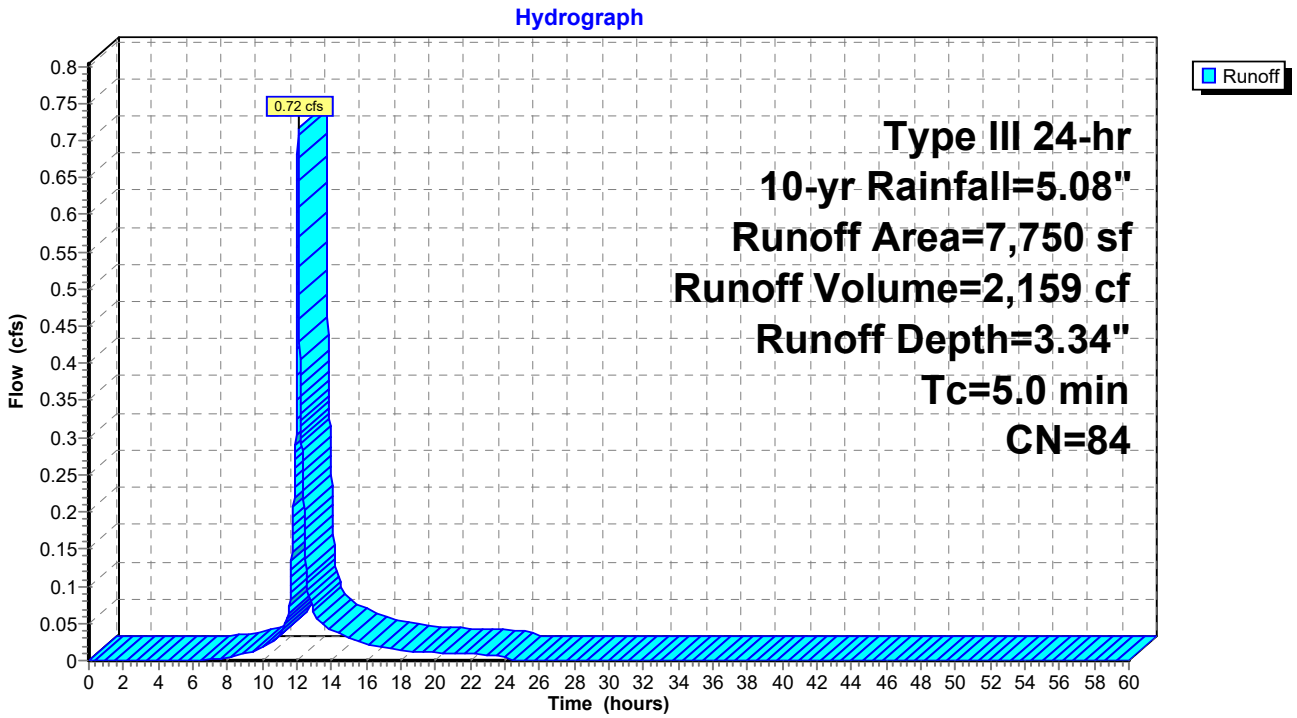
Runoff = 0.72 cfs @ 12.07 hrs, Volume= 2,159 cf, Depth= 3.34"
Routed to Pond 11P : CB 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.08"

	Area (sf)	CN	Description
*	3,240	98	Paved
	4,510	74	>75% Grass cover, Good, HSG C
	7,750	84	Weighted Average
	4,510		58.19% Pervious Area
	3,240		41.81% Impervious Area

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

Subcatchment 11S: Proposed to CB 1



Summary for Subcatchment 12S: Proposed to CB 2

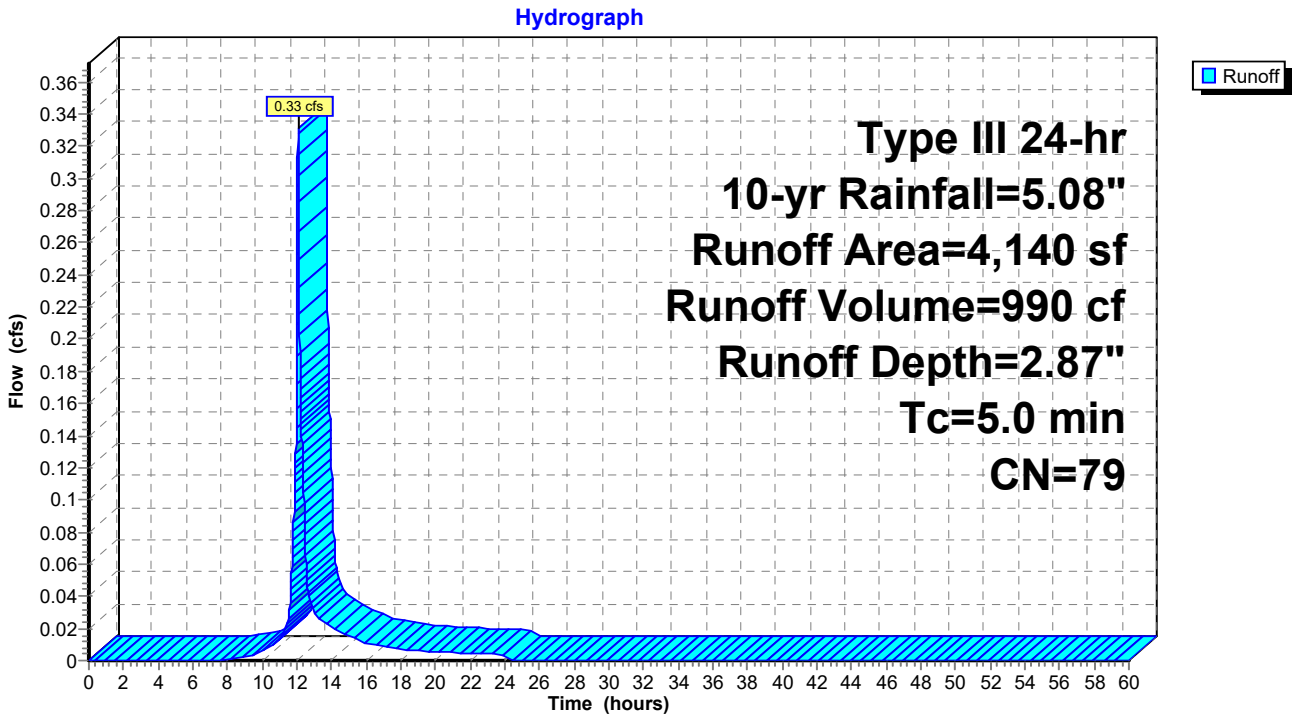
Runoff = 0.33 cfs @ 12.07 hrs, Volume= 990 cf, Depth= 2.87"
Routed to Pond 12P : CB 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.08"

	Area (sf)	CN	Description
*	930	98	Paved
	3,210	74	>75% Grass cover, Good, HSG C
	4,140	79	Weighted Average
	3,210		77.54% Pervious Area
	930		22.46% Impervious Area

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

Subcatchment 12S: Proposed to CB 2



Summary for Subcatchment 13S: Proposed to CB 3

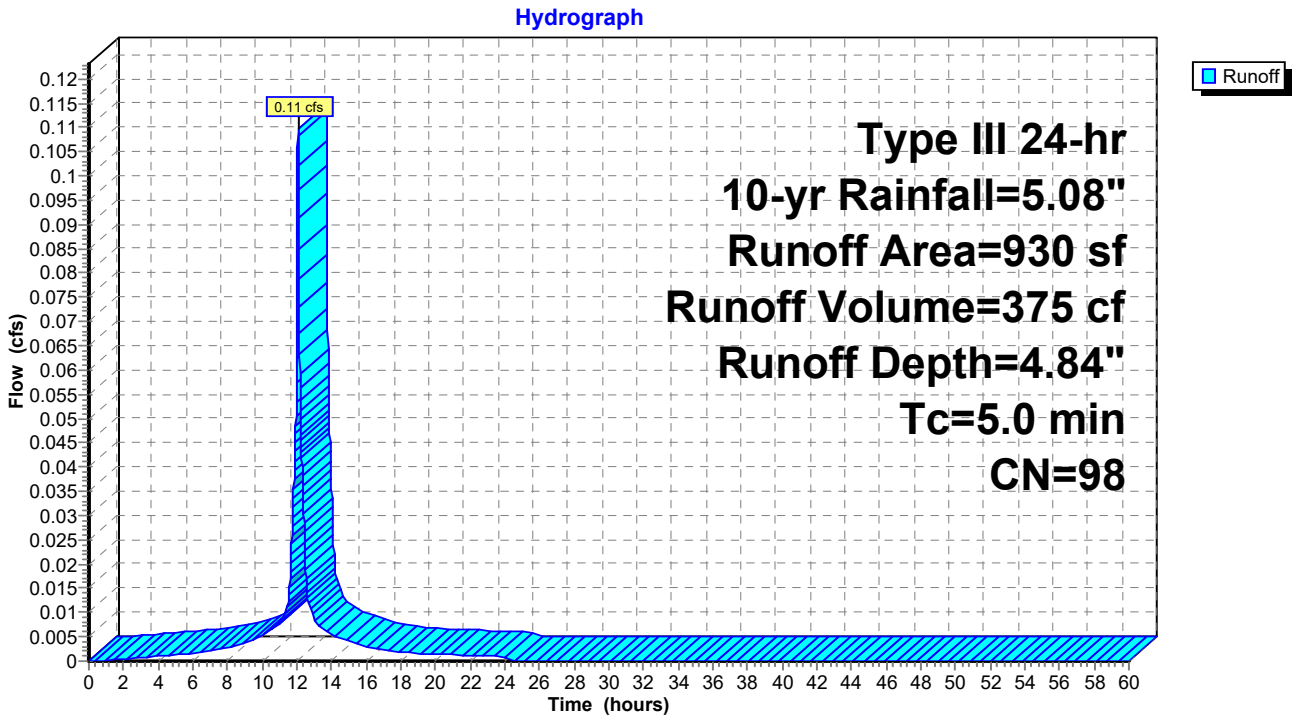
Runoff = 0.11 cfs @ 12.07 hrs, Volume= 375 cf, Depth= 4.84"
Routed to Pond 13P : CB 3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.08"

	Area (sf)	CN	Description
*	930	98	Paved
	930		100.00% Impervious Area

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

Subcatchment 13S: Proposed to CB 3



Summary for Subcatchment 14S: Proposed to CB 4

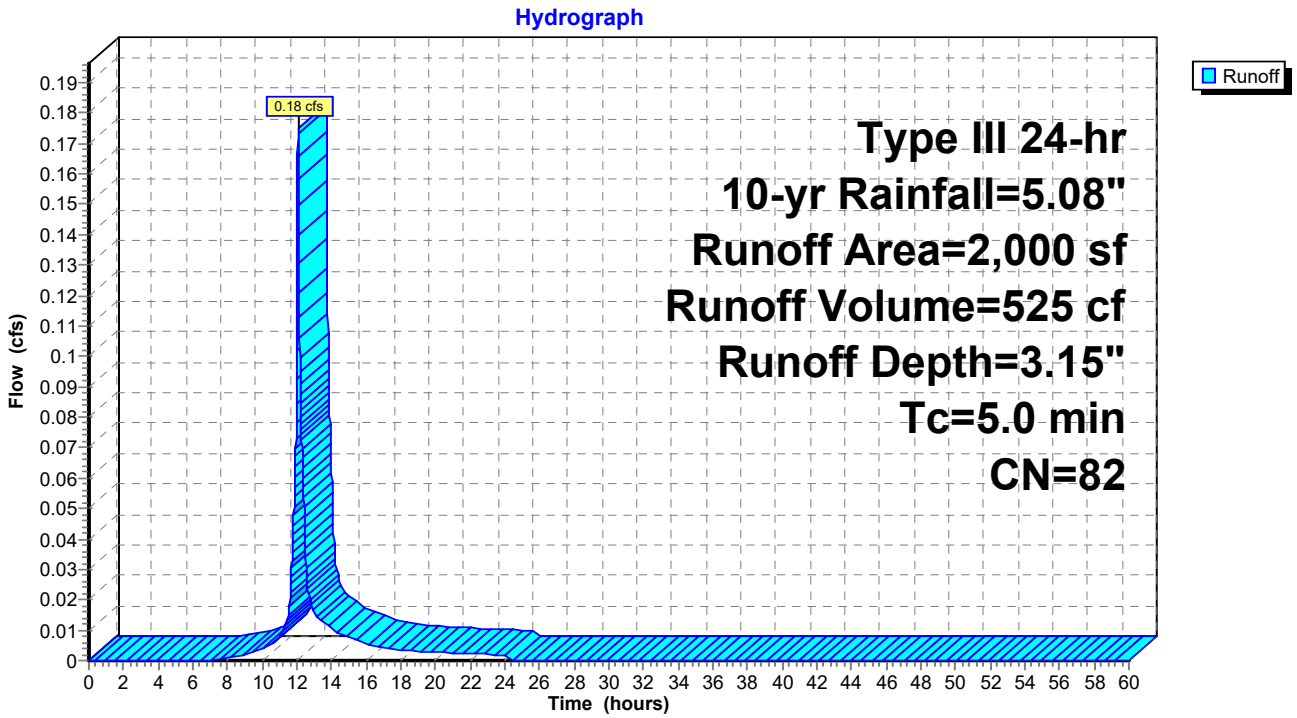
Runoff = 0.18 cfs @ 12.07 hrs, Volume= 525 cf, Depth= 3.15"
Routed to Pond 14P : CB 4

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.08"

	Area (sf)	CN	Description
*	690	98	Paved
	1,310	74	>75% Grass cover, Good, HSG C
	2,000	82	Weighted Average
	1,310		65.50% Pervious Area
	690		34.50% Impervious Area

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

Subcatchment 14S: Proposed to CB 4



Summary for Subcatchment 15S: Proposed to CB 5

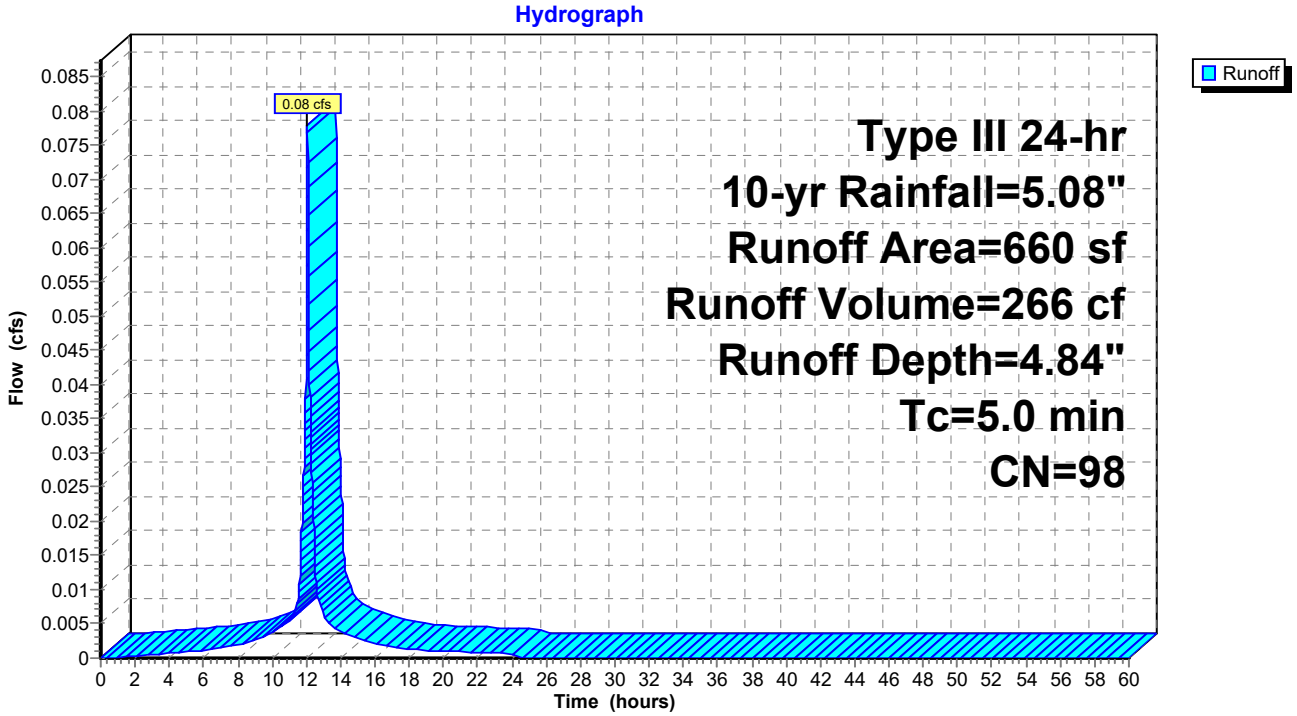
Runoff = 0.08 cfs @ 12.07 hrs, Volume= 266 cf, Depth= 4.84"
Routed to Pond 15P : CB 5

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.08"

	Area (sf)	CN	Description
*	660	98	Paved
	660		100.00% Impervious Area

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

Subcatchment 15S: Proposed to CB 5



Summary for Subcatchment 16S: Proposed to CB 6

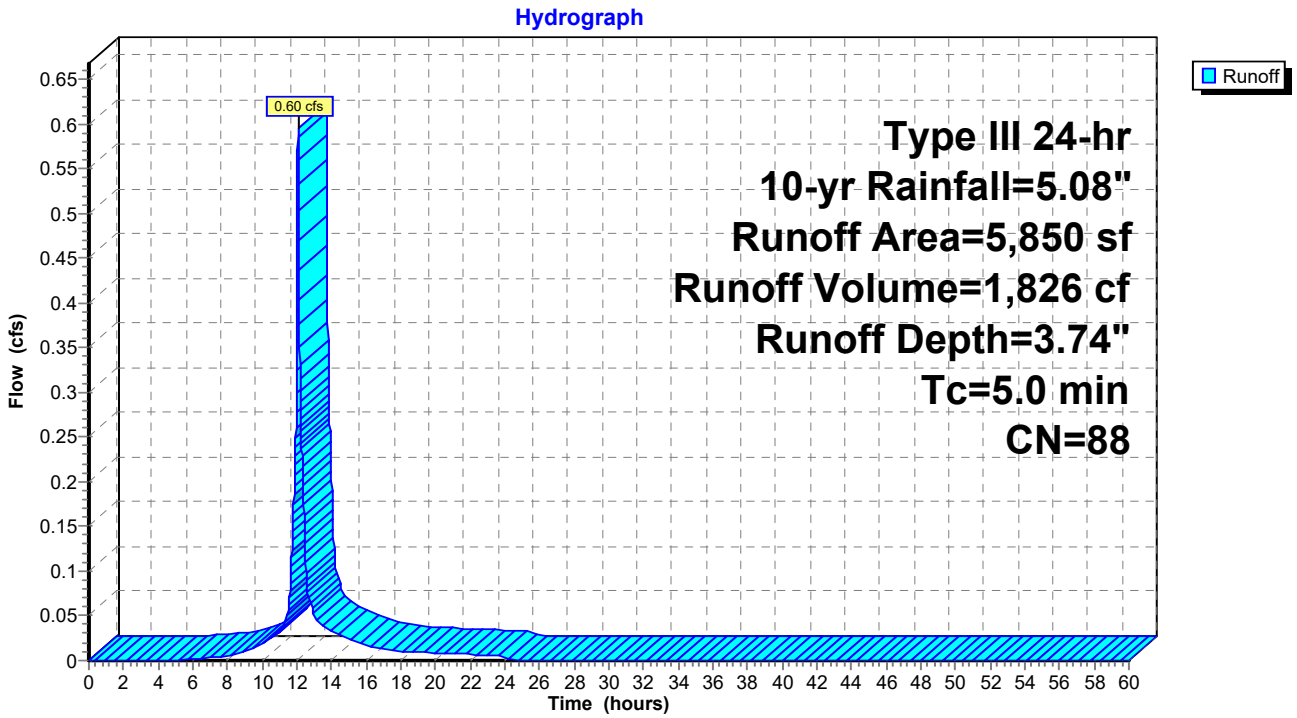
Runoff = 0.60 cfs @ 12.07 hrs, Volume= 1,826 cf, Depth= 3.74"
Routed to Pond 16P : CB 6

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.08"

	Area (sf)	CN	Description
*	3,300	98	Paved
	2,550	74	>75% Grass cover, Good, HSG C
	5,850	88	Weighted Average
	2,550		43.59% Pervious Area
	3,300		56.41% Impervious Area

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

Subcatchment 16S: Proposed to CB 6



Summary for Subcatchment 17S: Proposed to CB 7

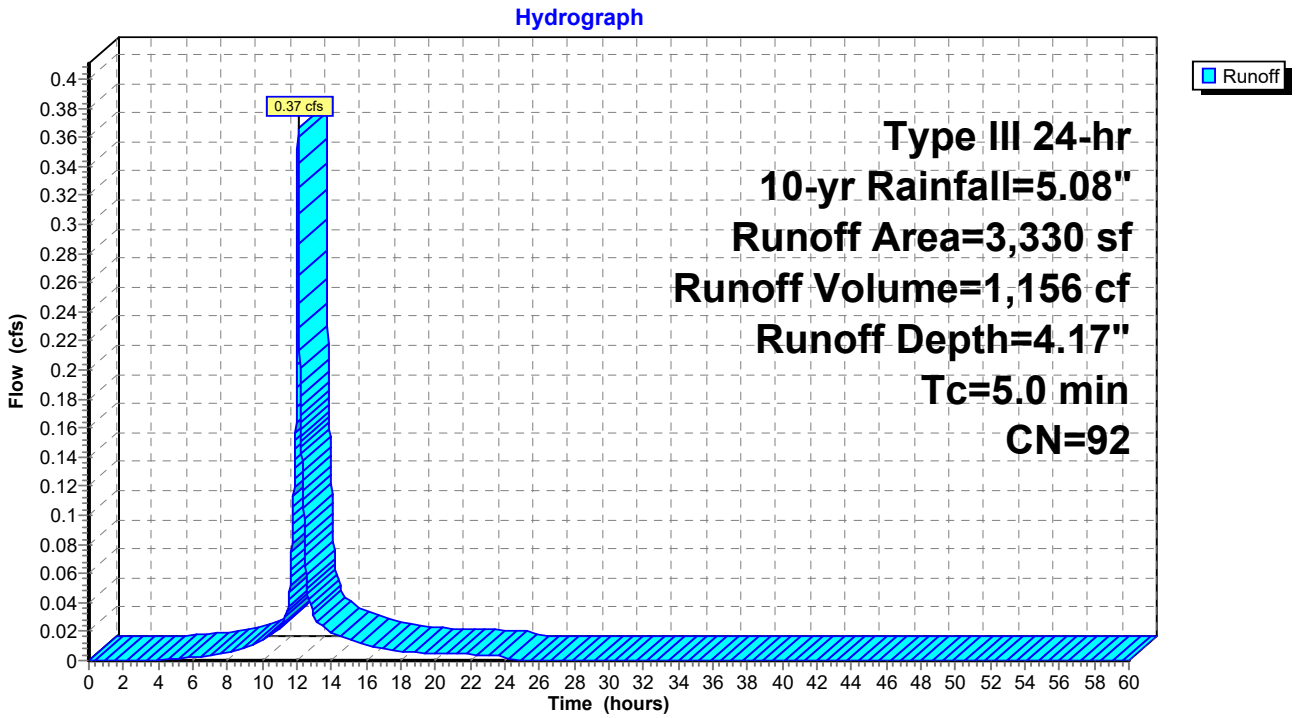
Runoff = 0.37 cfs @ 12.07 hrs, Volume= 1,156 cf, Depth= 4.17"
Routed to Pond 17P : CB 7

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.08"

	Area (sf)	CN	Description
*	2,530	98	Paved
	800	74	>75% Grass cover, Good, HSG C
	3,330	92	Weighted Average
	800		24.02% Pervious Area
	2,530		75.98% Impervious Area

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

Subcatchment 17S: Proposed to CB 7



Summary for Subcatchment 18S: Proposed to CB 8

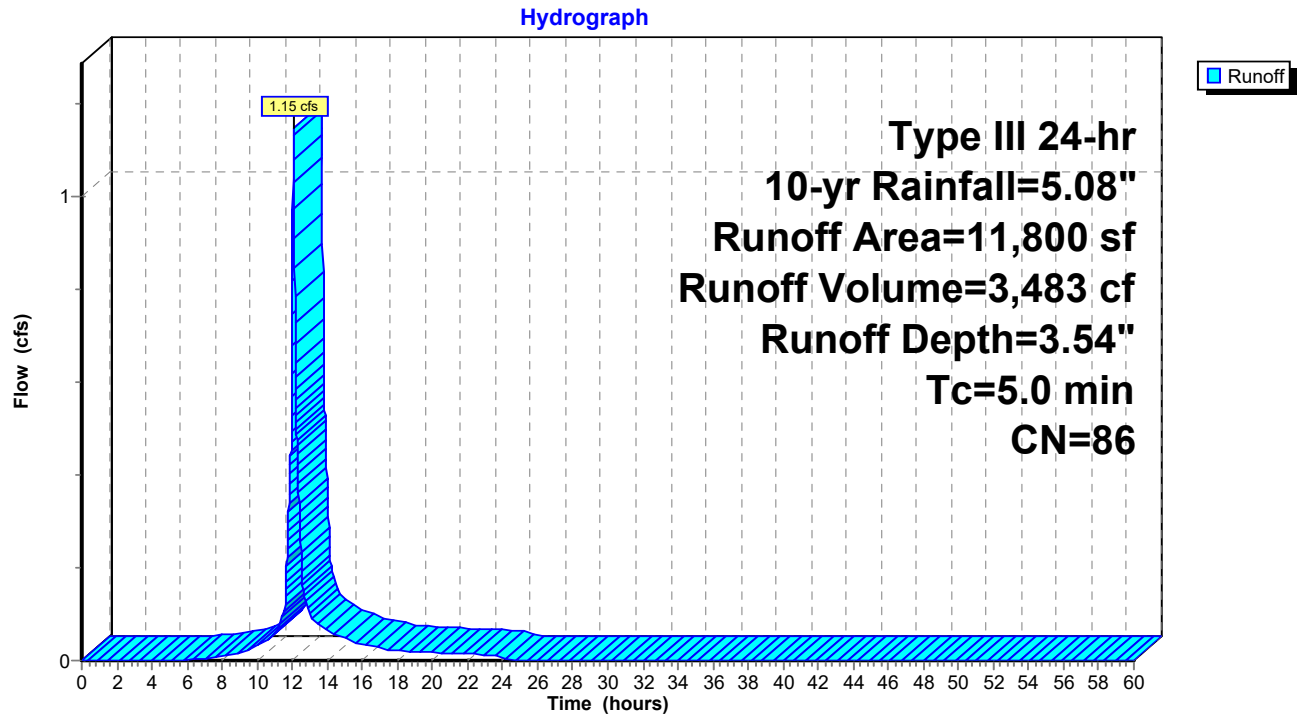
Runoff = 1.15 cfs @ 12.07 hrs, Volume= 3,483 cf, Depth= 3.54"
Routed to Pond 18P : CB 8

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.08"

	Area (sf)	CN	Description
*	5,920	98	Paved
	5,880	74	>75% Grass cover, Good, HSG C
	11,800	86	Weighted Average
	5,880		49.83% Pervious Area
	5,920		50.17% Impervious Area

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

Subcatchment 18S: Proposed to CB 8



Summary for Subcatchment 20S: Proposed to Northern Detention Basin

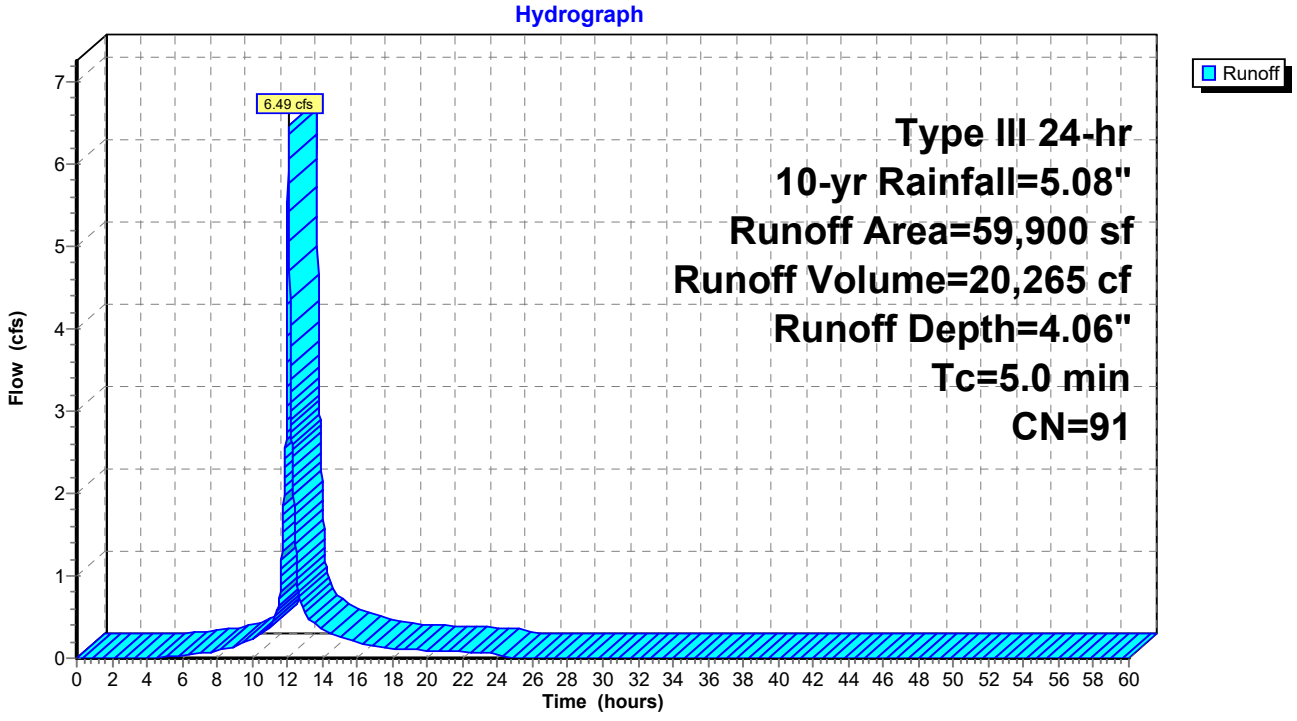
Runoff = 6.49 cfs @ 12.07 hrs, Volume= 20,265 cf, Depth= 4.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.08"

	Area (sf)	CN	Description
*	43,090	98	Paved
	16,810	74	>75% Grass cover, Good, HSG C
	59,900	91	Weighted Average
	16,810		28.06% Pervious Area
	43,090		71.94% Impervious Area

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

Subcatchment 20S: Proposed to Northern Detention Basin



Summary for Subcatchment 30S: Proposed to West

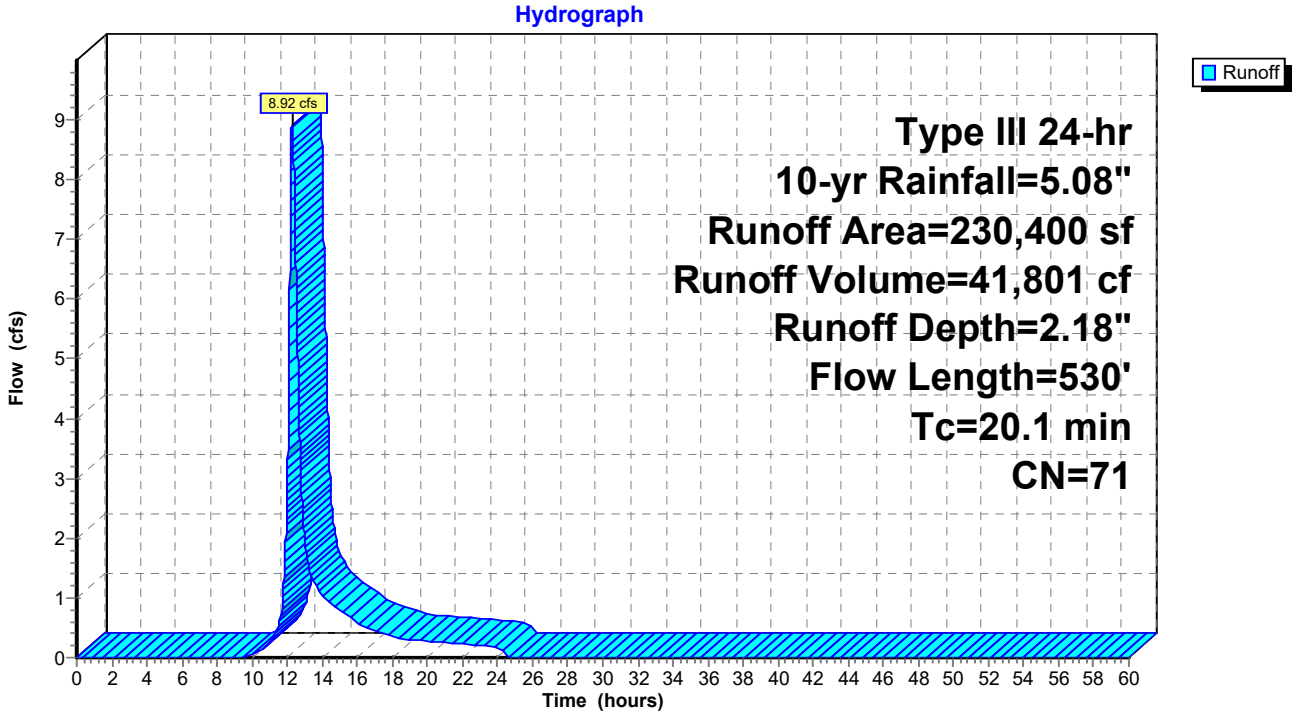
Runoff = 8.92 cfs @ 12.29 hrs, Volume= 41,801 cf, Depth= 2.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.08"

	Area (sf)	CN	Description
*	820	98	Paved
	71,890	74	>75% Grass cover, Good, HSG C
	157,690	70	Woods, Good, HSG C
	230,400	71	Weighted Average
	229,580		99.64% Pervious Area
	820		0.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	75	0.0060	0.10		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.29"
5.6	165	0.0050	0.49		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
2.1	290	0.1070	2.29		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
20.1	530	Total			

Subcatchment 30S: Proposed to West



Summary for Subcatchment 40S: Proposed to South

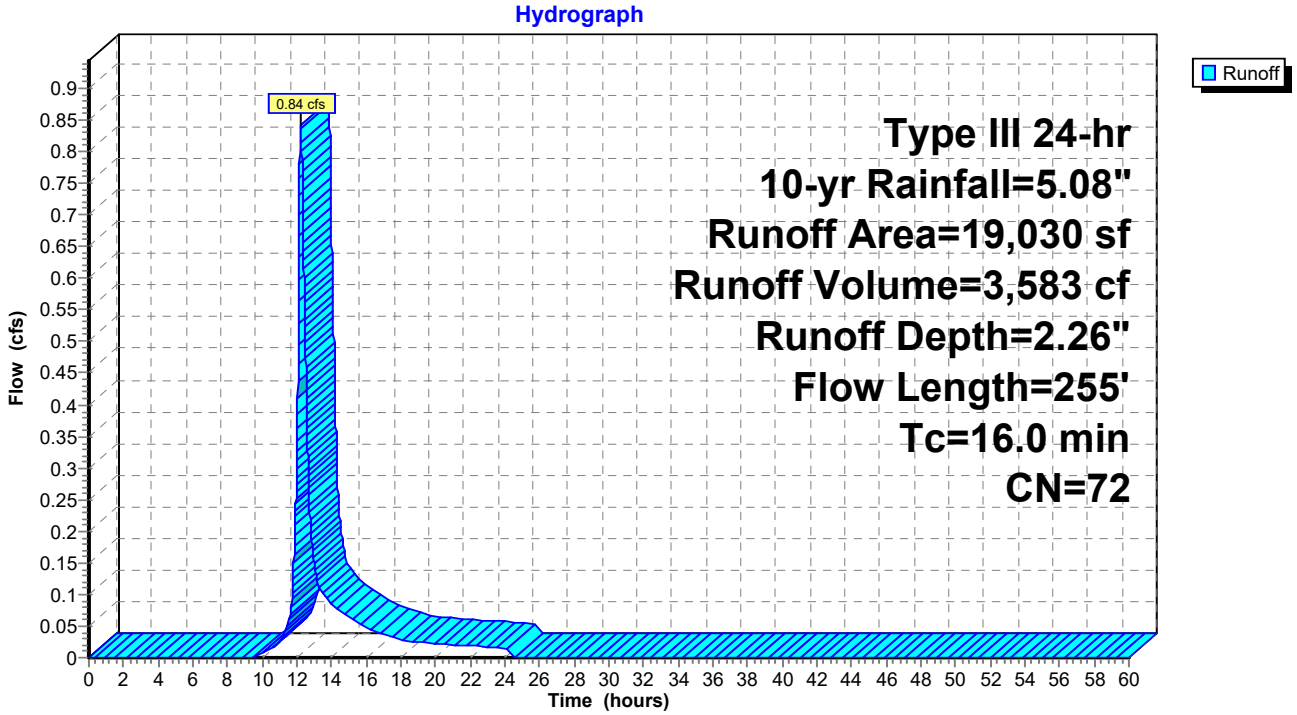
Runoff = 0.84 cfs @ 12.22 hrs, Volume= 3,583 cf, Depth= 2.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.08"

Area (sf)	CN	Description
10,460	74	>75% Grass cover, Good, HSG C
8,570	70	Woods, Good, HSG C
19,030	72	Weighted Average
19,030		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	75	0.0060	0.10		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.29"
2.4	100	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.2	80	0.0250	1.11		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
16.0	255	Total			

Subcatchment 40S: Proposed to South



Summary for Subcatchment 50S: Proposed to WQB

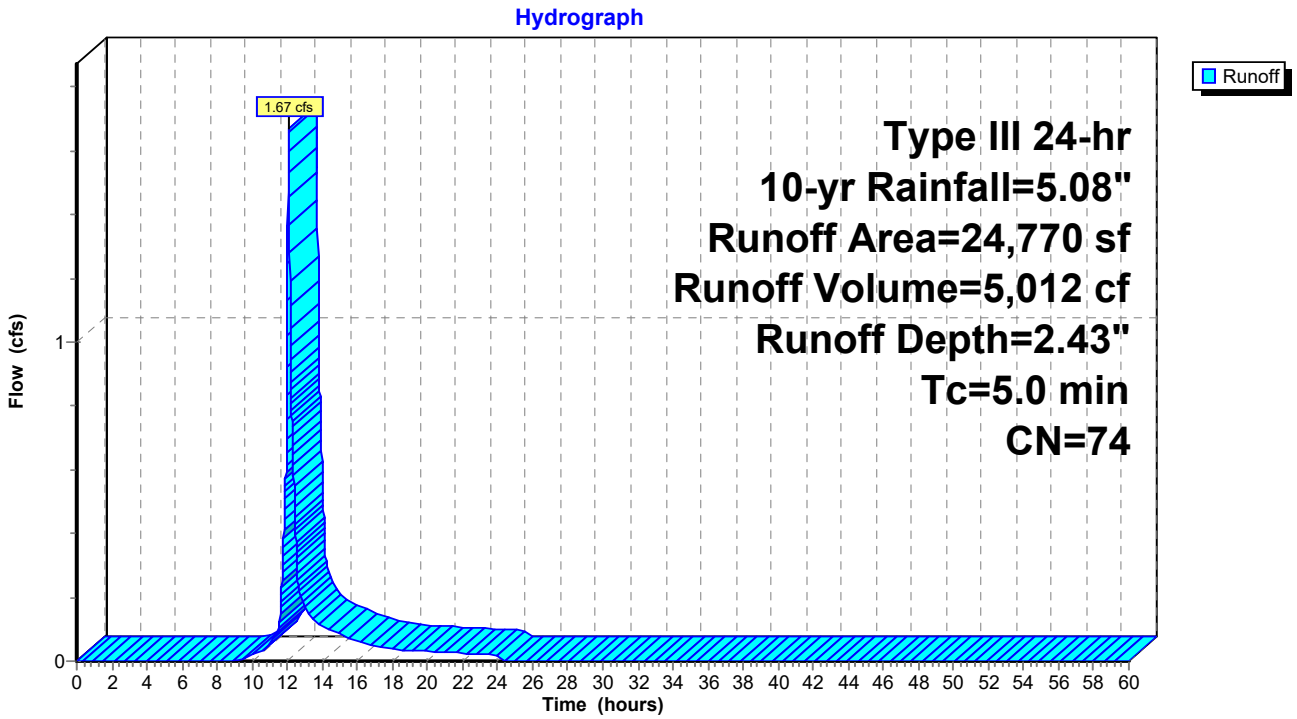
Runoff = 1.67 cfs @ 12.08 hrs, Volume= 5,012 cf, Depth= 2.43"
Routed to Pond 50P : WQB

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.08"

Area (sf)	CN	Description
24,770	74	>75% Grass cover, Good, HSG C
24,770		100.00% Pervious Area

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

Subcatchment 50S: Proposed to WQB



Summary for Subcatchment 81S: Proposed to YD 1

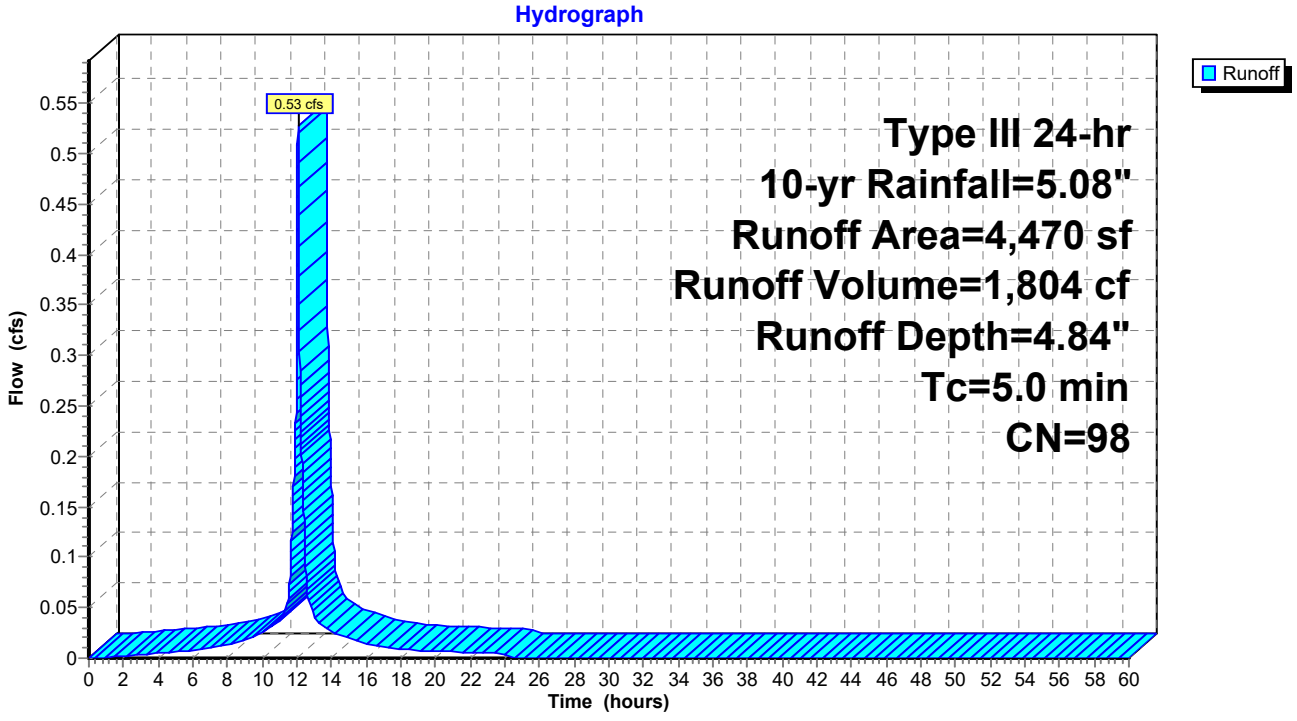
Runoff = 0.53 cfs @ 12.07 hrs, Volume= 1,804 cf, Depth= 4.84"
Routed to Pond 81P : YD 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.08"

	Area (sf)	CN	Description
*	3,200	98	Roof
*	1,270	98	Paved
	4,470	98	Weighted Average
	4,470		100.00% Impervious Area

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

Subcatchment 81S: Proposed to YD 1



Summary for Subcatchment 82S: Proposed to YD 2

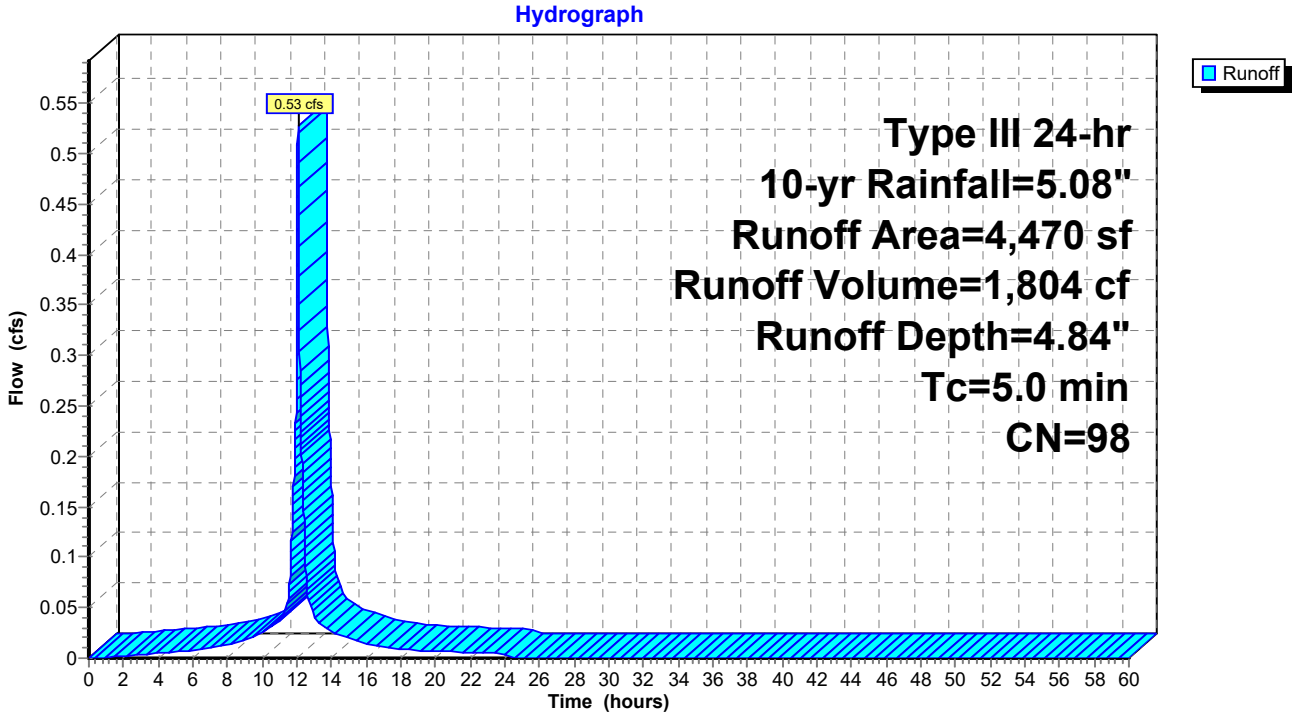
Runoff = 0.53 cfs @ 12.07 hrs, Volume= 1,804 cf, Depth= 4.84"
Routed to Pond 82P : YD 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.08"

	Area (sf)	CN	Description
*	3,200	98	Roof
*	1,270	98	Paved
	4,470	98	Weighted Average
	4,470		100.00% Impervious Area

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

Subcatchment 82S: Proposed to YD 2



Summary for Subcatchment 83S: Proposed to YD 3

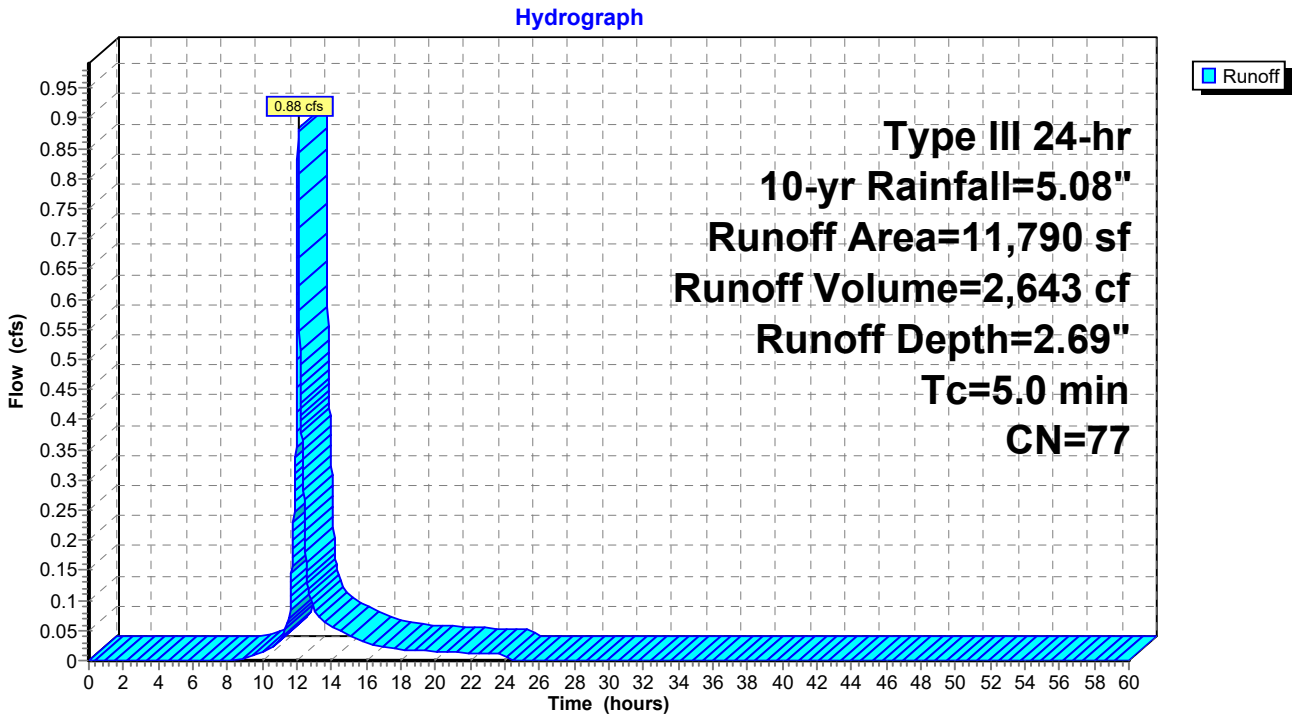
Runoff = 0.88 cfs @ 12.08 hrs, Volume= 2,643 cf, Depth= 2.69"
Routed to Pond 83P : YD 3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.08"

	Area (sf)	CN	Description
*	1,420	98	Paved
	10,370	74	>75% Grass cover, Good, HSG C
	11,790	77	Weighted Average
	10,370		87.96% Pervious Area
	1,420		12.04% Impervious Area

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

Subcatchment 83S: Proposed to YD 3



Summary for Pond 11P: CB 1

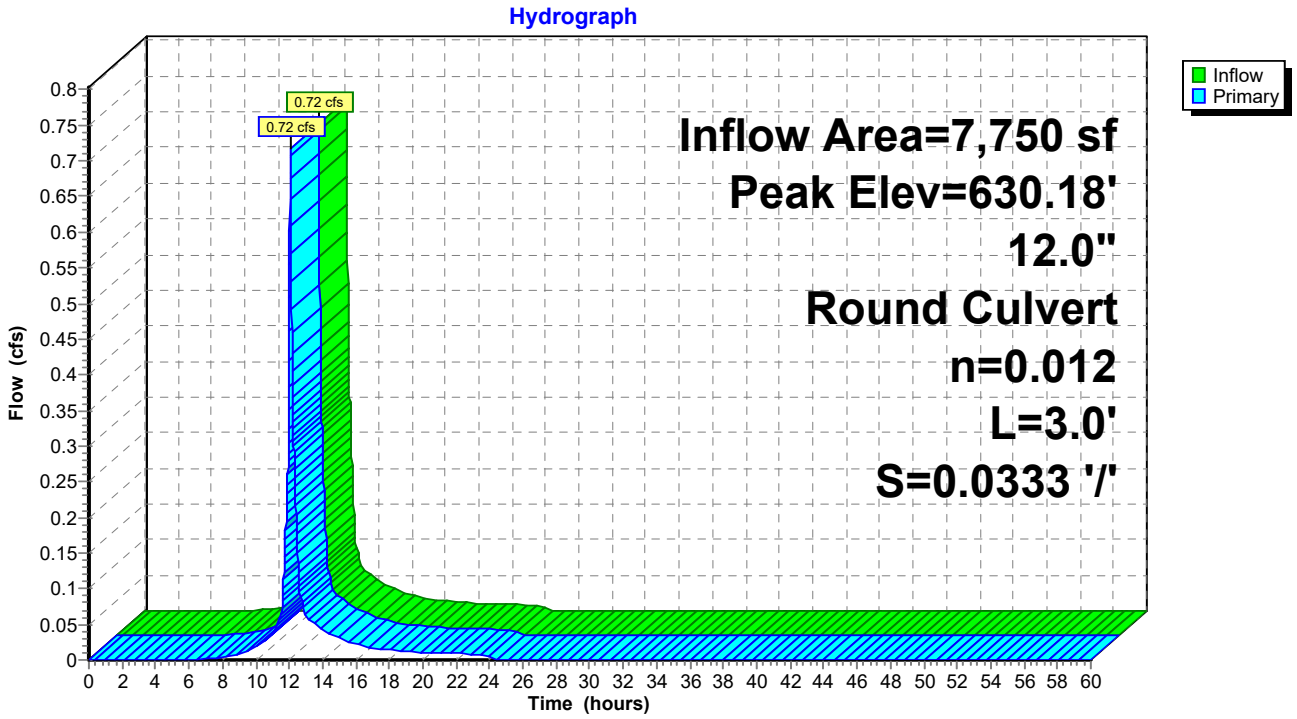
Inflow Area = 7,750 sf, 41.81% Impervious, Inflow Depth = 3.34" for 10-yr event
Inflow = 0.72 cfs @ 12.07 hrs, Volume= 2,159 cf
Outflow = 0.72 cfs @ 12.07 hrs, Volume= 2,159 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.72 cfs @ 12.07 hrs, Volume= 2,159 cf
Routed to Pond 61P : DMH 1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 630.18' @ 12.08 hrs
Flood Elev= 633.20'

Device	Routing	Invert	Outlet Devices
#1	Primary	629.70'	**12.0" Round Culvert** L= 3.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 629.70' / 629.60' S= 0.0333 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.71 cfs @ 12.07 hrs HW=630.18' TW=629.99' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 0.71 cfs @ 2.79 fps)

Pond 11P: CB 1



Summary for Pond 12P: CB 2

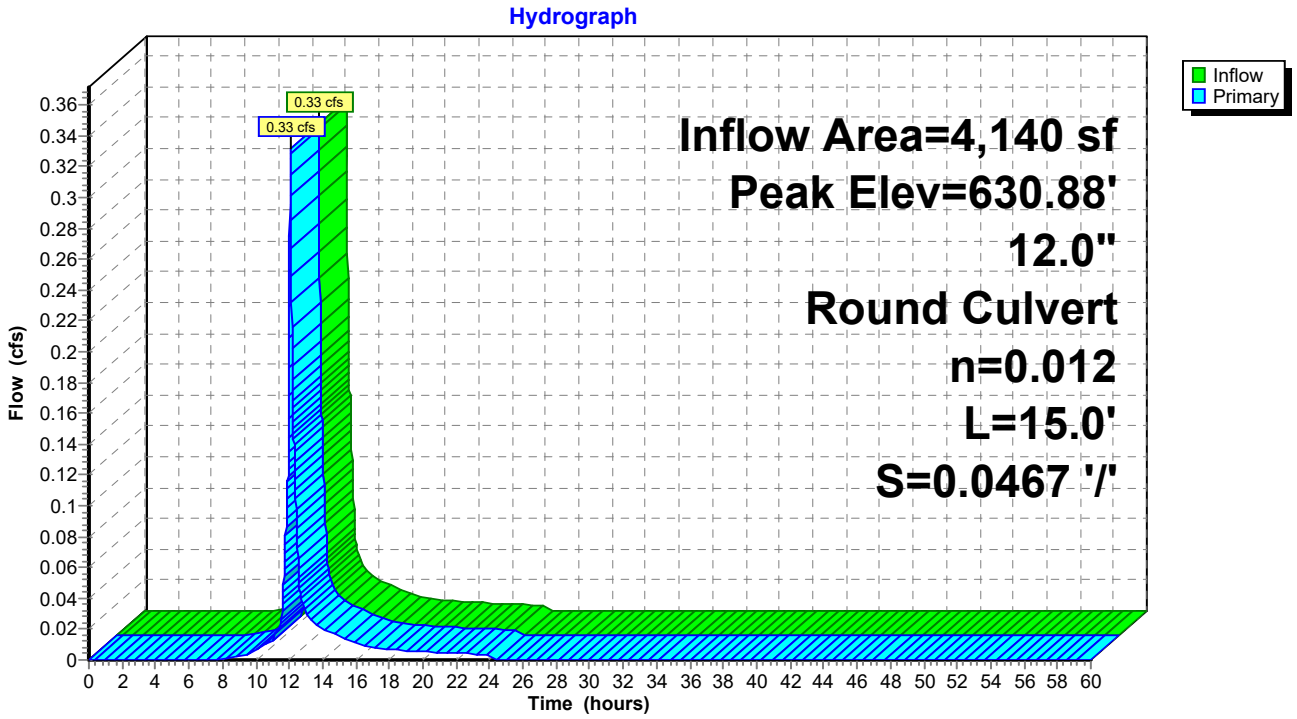
Inflow Area = 4,140 sf, 22.46% Impervious, Inflow Depth = 2.87" for 10-yr event
Inflow = 0.33 cfs @ 12.07 hrs, Volume= 990 cf
Outflow = 0.33 cfs @ 12.07 hrs, Volume= 990 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.33 cfs @ 12.07 hrs, Volume= 990 cf
Routed to Pond 61P : DMH 1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 630.88' @ 12.07 hrs
Flood Elev= 634.10'

Device	Routing	Invert	Outlet Devices
#1	Primary	630.60'	**12.0" Round Culvert** L= 15.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 630.60' / 629.90' S= 0.0467 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.33 cfs @ 12.07 hrs HW=630.88' TW=629.99' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 0.33 cfs @ 1.81 fps)

Pond 12P: CB 2



Summary for Pond 13P: CB 3

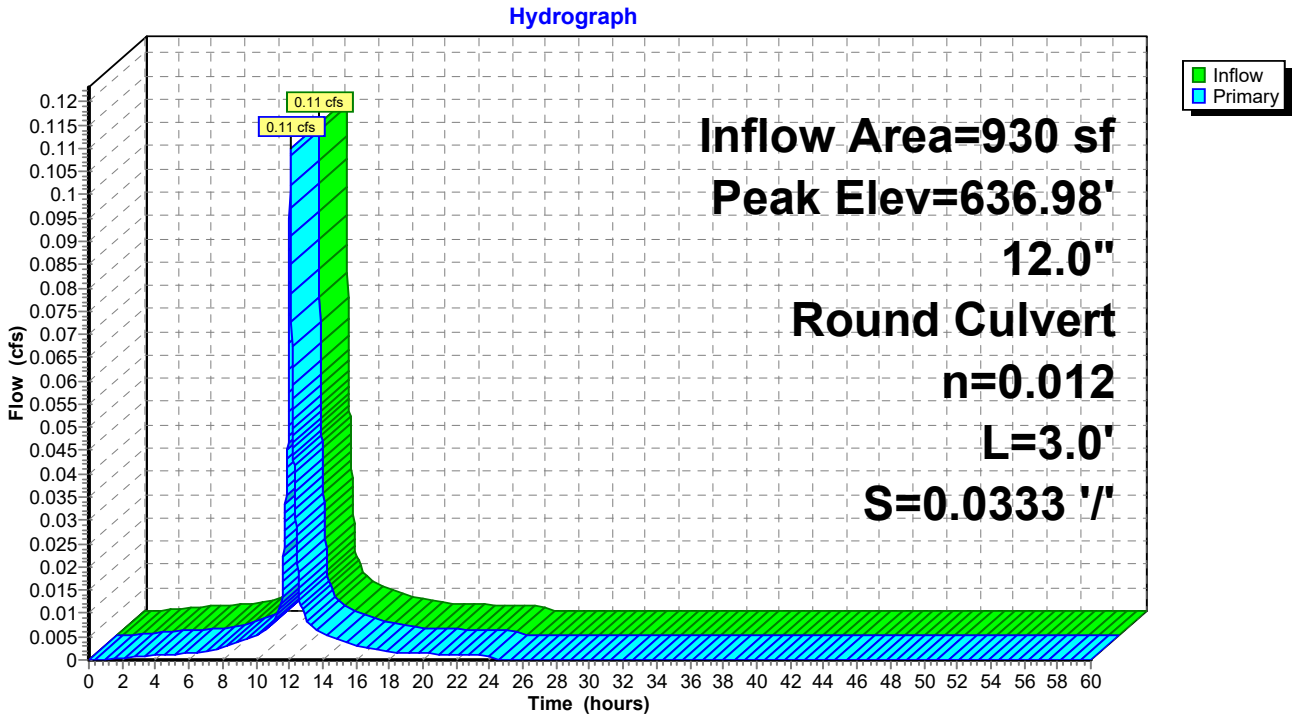
Inflow Area = 930 sf,100.00% Impervious, Inflow Depth = 4.84" for 10-yr event
Inflow = 0.11 cfs @ 12.07 hrs, Volume= 375 cf
Outflow = 0.11 cfs @ 12.07 hrs, Volume= 375 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.11 cfs @ 12.07 hrs, Volume= 375 cf
Routed to Pond 63P : DMH 3

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 636.98' @ 12.08 hrs
Flood Elev= 639.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	636.20'	**12.0" Round Culvert** L= 3.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 636.20' / 636.10' S= 0.0333 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.07 hrs HW=636.96' TW=636.97' (Dynamic Tailwater)
↑—**1=Culvert** (Controls 0.00 cfs)

Pond 13P: CB 3



Summary for Pond 14P: CB 4

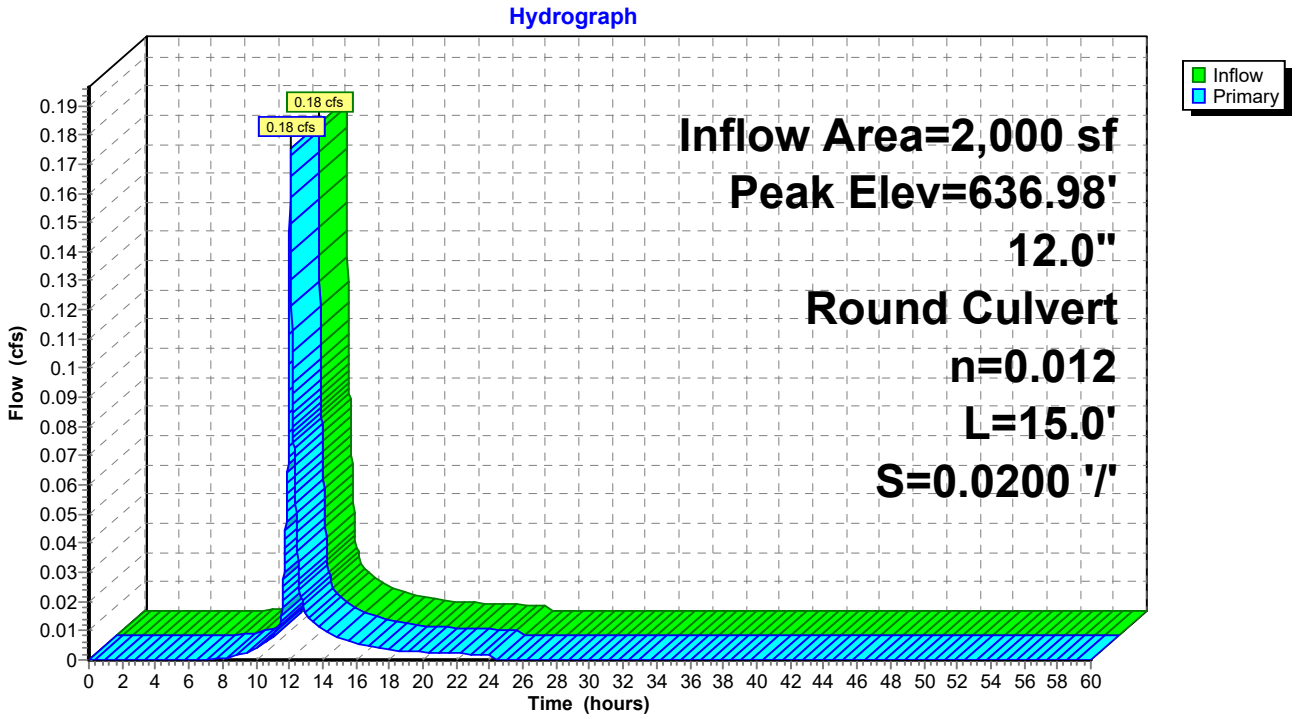
Inflow Area = 2,000 sf, 34.50% Impervious, Inflow Depth = 3.15" for 10-yr event
Inflow = 0.18 cfs @ 12.07 hrs, Volume= 525 cf
Outflow = 0.18 cfs @ 12.07 hrs, Volume= 525 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.18 cfs @ 12.07 hrs, Volume= 525 cf
Routed to Pond 63P : DMH 3

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 636.98' @ 12.08 hrs
Flood Elev= 639.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	636.20'	**12.0" Round Culvert** L= 15.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 636.20' / 635.90' S= 0.0200 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.07 hrs HW=636.97' TW=636.97' (Dynamic Tailwater)
1=Culvert (Controls 0.00 cfs)

Pond 14P: CB 4



Summary for Pond 15P: CB 5

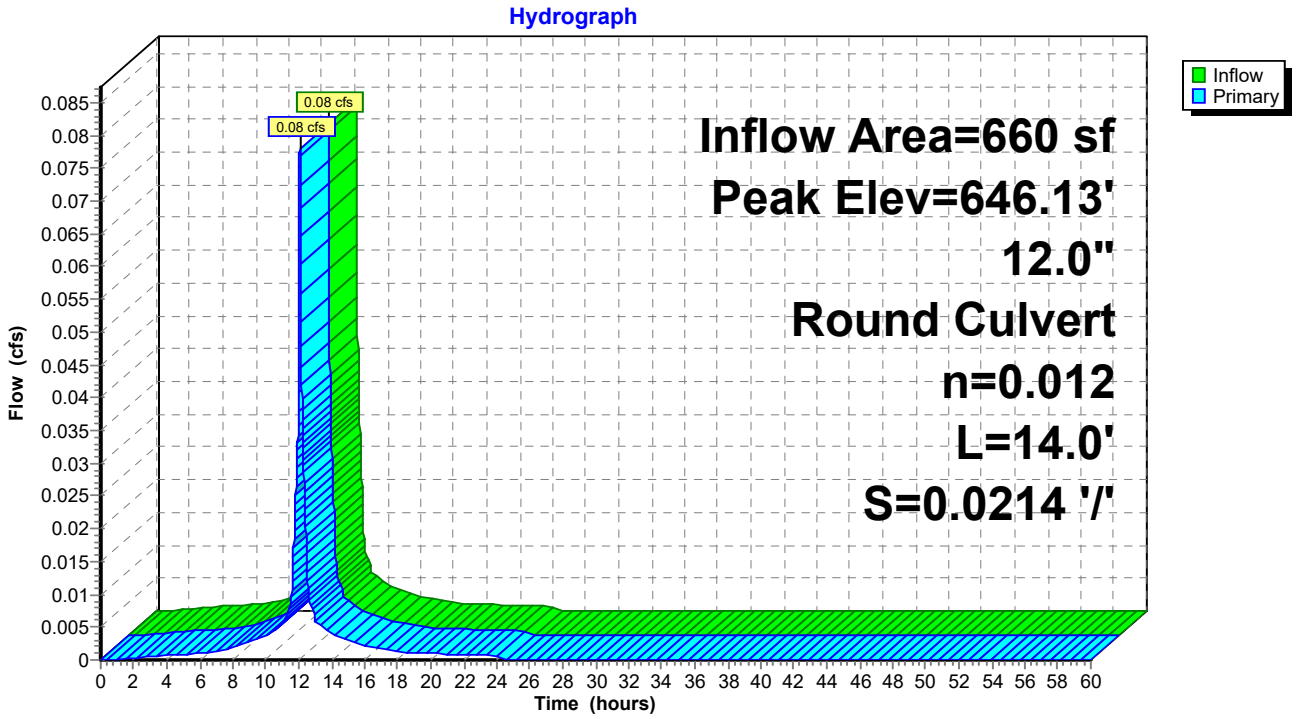
Inflow Area = 660 sf,100.00% Impervious, Inflow Depth = 4.84" for 10-yr event
Inflow = 0.08 cfs @ 12.07 hrs, Volume= 266 cf
Outflow = 0.08 cfs @ 12.07 hrs, Volume= 266 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.08 cfs @ 12.07 hrs, Volume= 266 cf
Routed to Pond 64P : DMH 4

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 646.13' @ 12.07 hrs
Flood Elev= 649.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	646.00'	**12.0" Round Culvert** L= 14.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 646.00' / 645.70' S= 0.0214 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.08 cfs @ 12.07 hrs HW=646.13' TW=644.11' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.08 cfs @ 1.25 fps)

Pond 15P: CB 5



Summary for Pond 16P: CB 6

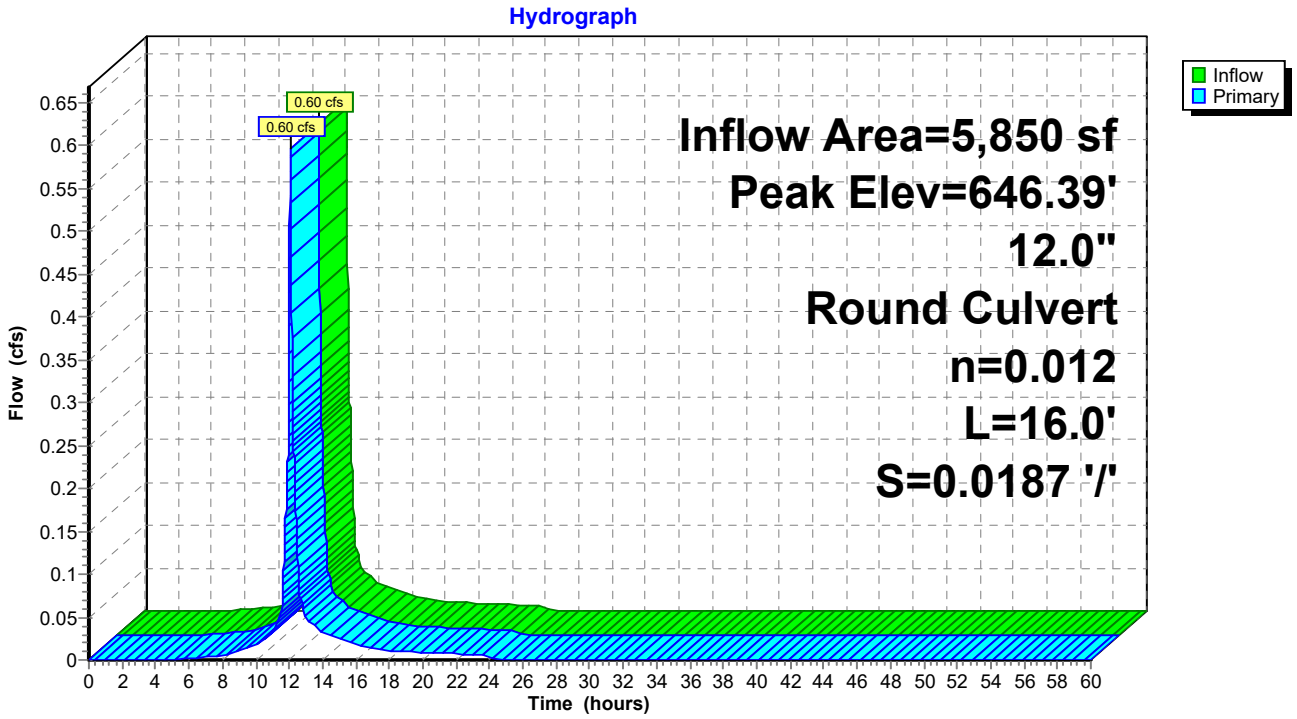
Inflow Area = 5,850 sf, 56.41% Impervious, Inflow Depth = 3.74" for 10-yr event
Inflow = 0.60 cfs @ 12.07 hrs, Volume= 1,826 cf
Outflow = 0.60 cfs @ 12.07 hrs, Volume= 1,826 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.60 cfs @ 12.07 hrs, Volume= 1,826 cf
Routed to Pond 64P : DMH 4

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 646.39' @ 12.07 hrs
Flood Elev= 649.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	646.00'	**12.0" Round Culvert** L= 16.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 646.00' / 645.70' S= 0.0187 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.60 cfs @ 12.07 hrs HW=646.39' TW=644.11' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 0.60 cfs @ 2.12 fps)

Pond 16P: CB 6



Summary for Pond 17P: CB 7

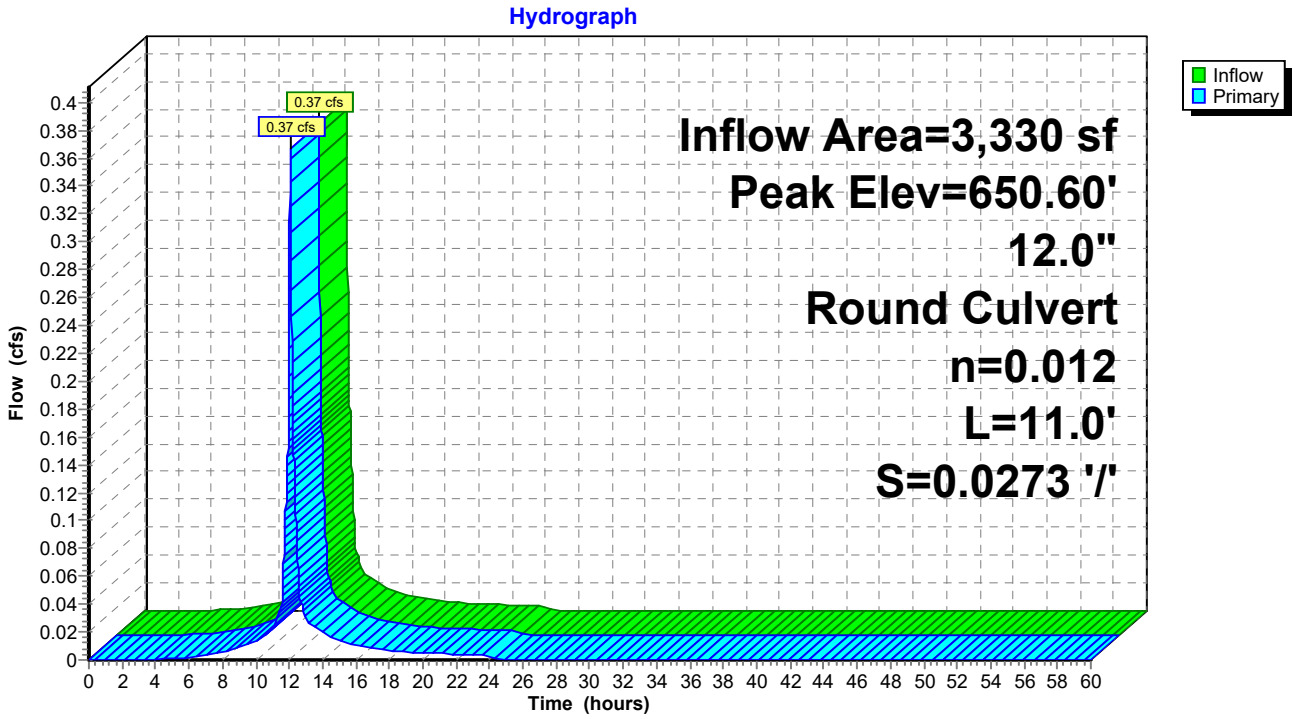
Inflow Area = 3,330 sf, 75.98% Impervious, Inflow Depth = 4.17" for 10-yr event
Inflow = 0.37 cfs @ 12.07 hrs, Volume= 1,156 cf
Outflow = 0.37 cfs @ 12.07 hrs, Volume= 1,156 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.37 cfs @ 12.07 hrs, Volume= 1,156 cf
Routed to Pond 65P : DMH 5

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 650.60' @ 12.07 hrs
Flood Elev= 653.80'

Device	Routing	Invert	Outlet Devices
#1	Primary	650.30'	**12.0" Round Culvert** L= 11.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 650.30' / 650.00' S= 0.0273 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.37 cfs @ 12.07 hrs HW=650.60' TW=646.88' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 0.37 cfs @ 1.86 fps)

Pond 17P: CB 7



Summary for Pond 18P: CB 8

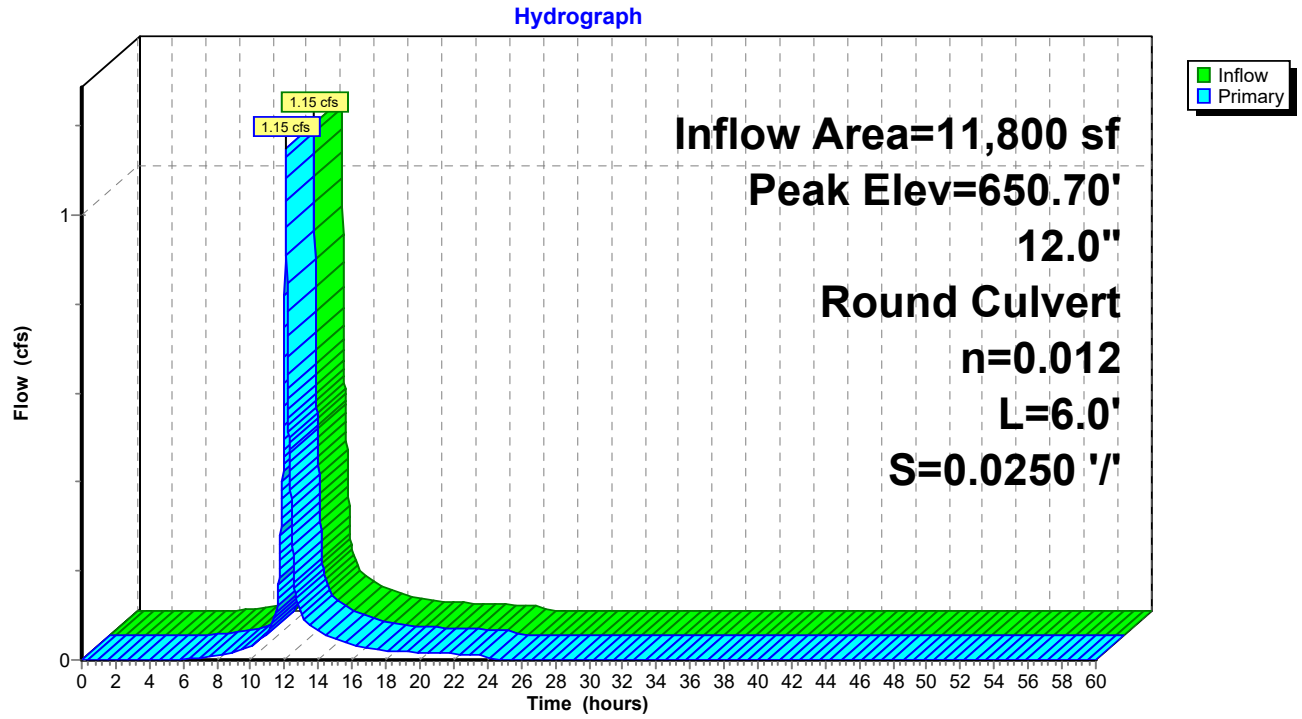
Inflow Area = 11,800 sf, 50.17% Impervious, Inflow Depth = 3.54" for 10-yr event
Inflow = 1.15 cfs @ 12.07 hrs, Volume= 3,483 cf
Outflow = 1.15 cfs @ 12.07 hrs, Volume= 3,483 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.15 cfs @ 12.07 hrs, Volume= 3,483 cf
Routed to Pond 66P : DMH 6

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 650.70' @ 12.07 hrs
Flood Elev= 653.60'

Device	Routing	Invert	Outlet Devices
#1	Primary	650.10'	**12.0" Round Culvert** L= 6.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 650.10' / 649.95' S= 0.0250 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=1.15 cfs @ 12.07 hrs HW=650.69' TW=650.36' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 1.15 cfs @ 3.39 fps)

Pond 18P: CB 8



Summary for Pond 40P: HDS Unit

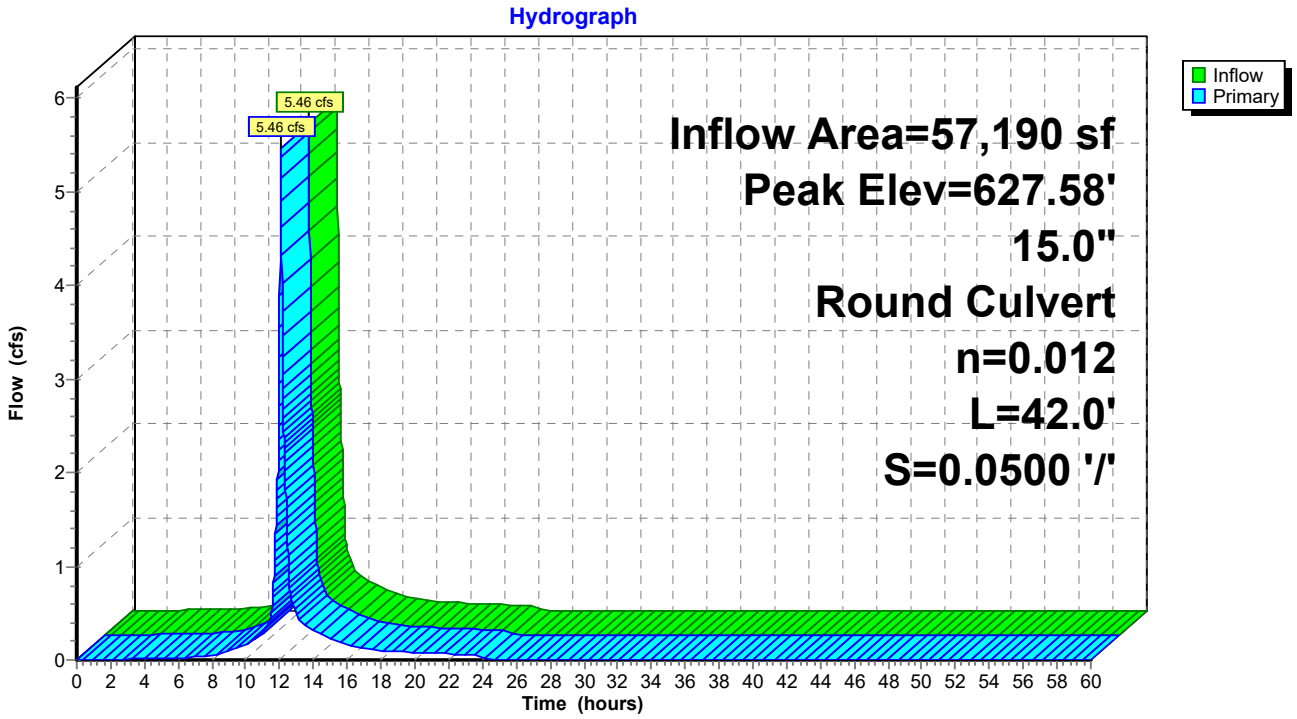
Inflow Area = 57,190 sf, 49.94% Impervious, Inflow Depth = 3.57" for 10-yr event
Inflow = 5.46 cfs @ 12.07 hrs, Volume= 17,033 cf
Outflow = 5.46 cfs @ 12.07 hrs, Volume= 17,033 cf, Atten= 0%, Lag= 0.0 min
Primary = 5.46 cfs @ 12.07 hrs, Volume= 17,033 cf
Routed to Pond 50P : WQB

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 627.58' @ 12.07 hrs
Flood Elev= 653.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	626.10'	**15.0" Round Culvert** L= 42.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 626.10' / 624.00' S= 0.0500 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=5.46 cfs @ 12.07 hrs HW=627.58' TW=625.45' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 5.46 cfs @ 4.45 fps)

Pond 40P: HDS Unit



Summary for Pond 50P: WQB

Inflow Area = 81,960 sf, 34.85% Impervious, Inflow Depth = 3.23" for 10-yr event
Inflow = 7.14 cfs @ 12.07 hrs, Volume= 22,045 cf
Outflow = 1.09 cfs @ 12.56 hrs, Volume= 19,862 cf, Atten= 85%, Lag= 29.3 min
Primary = 1.09 cfs @ 12.56 hrs, Volume= 19,862 cf
Routed to Link 10L : Center Road

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 626.07' @ 12.56 hrs Surf.Area= 6,309 sf Storage= 10,596 cf
Flood Elev= 630.00' Surf.Area= 11,884 sf Storage= 45,891 cf

Plug-Flow detention time= 191.8 min calculated for 19,858 cf (90% of inflow)
Center-of-Mass det. time= 143.3 min (946.0 - 802.7)

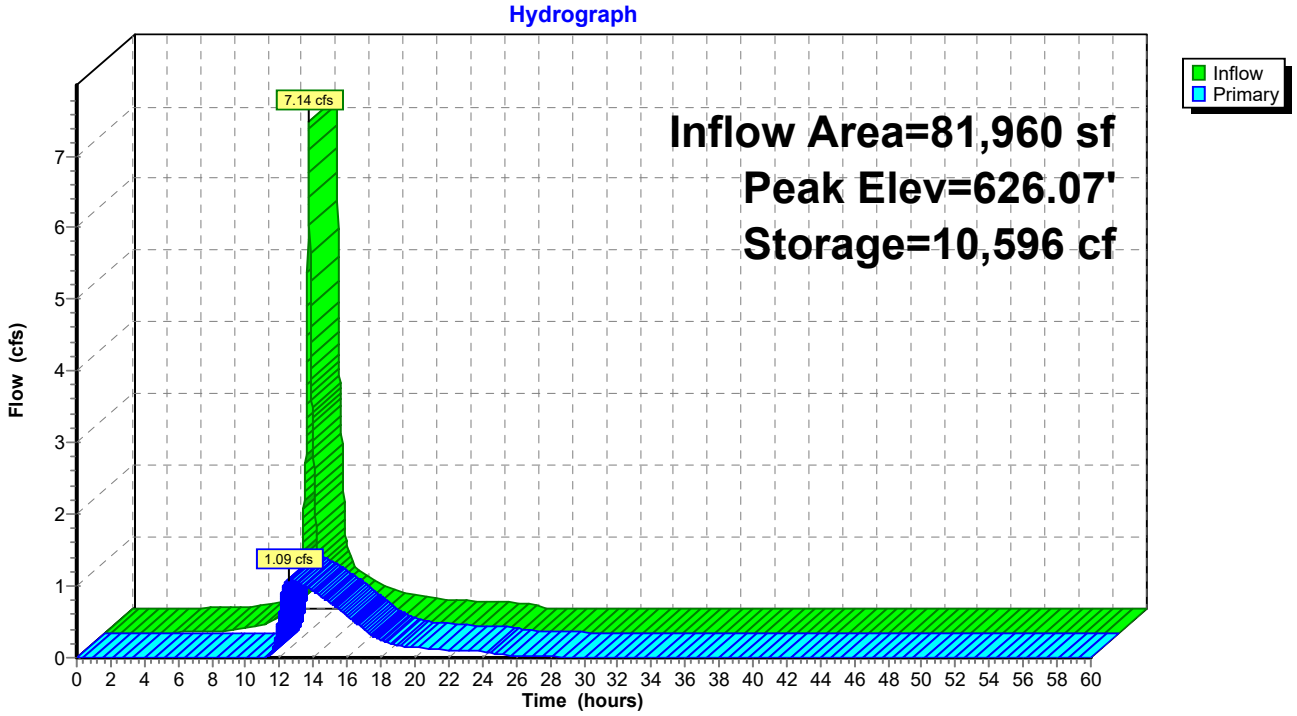
Volume	Invert	Avail.Storage	Storage Description
#1	624.00'	45,891 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
624.00	4,019	300.6	0	0	4,019
625.00	5,066	331.0	4,532	4,532	5,579
626.00	6,226	362.2	5,636	10,168	7,335
627.00	7,493	392.8	6,850	17,018	9,212
628.00	8,879	424.2	8,176	25,194	11,294
629.00	10,333	449.9	9,597	34,791	13,134
630.00	11,884	475.7	11,099	45,891	15,090

Device	Routing	Invert	Outlet Devices
#1	Primary	623.00'	**12.0" Round Culvert** L= 46.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 623.00' / 620.30' S= 0.0587 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	624.50'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	628.50'	**6.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=1.09 cfs @ 12.56 hrs HW=626.07' TW=0.00' (Dynamic Tailwater)
↑**1=Culvert** (Passes 1.09 cfs of 6.06 cfs potential flow)
↑**2=Orifice/Grate** (Orifice Controls 1.09 cfs @ 5.53 fps)
3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 50P: WQB


Hydrograph
Inflow Area=81,960 sf
Peak Elev=626.07'
Storage=10,596 cf
7.14 cfs
1.09 cfs
Inflow
Primary
Flow (cfs)
Time (hours)
0 1 2 3 4 5 6 7
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60

Summary for Pond 61P: DMH 1

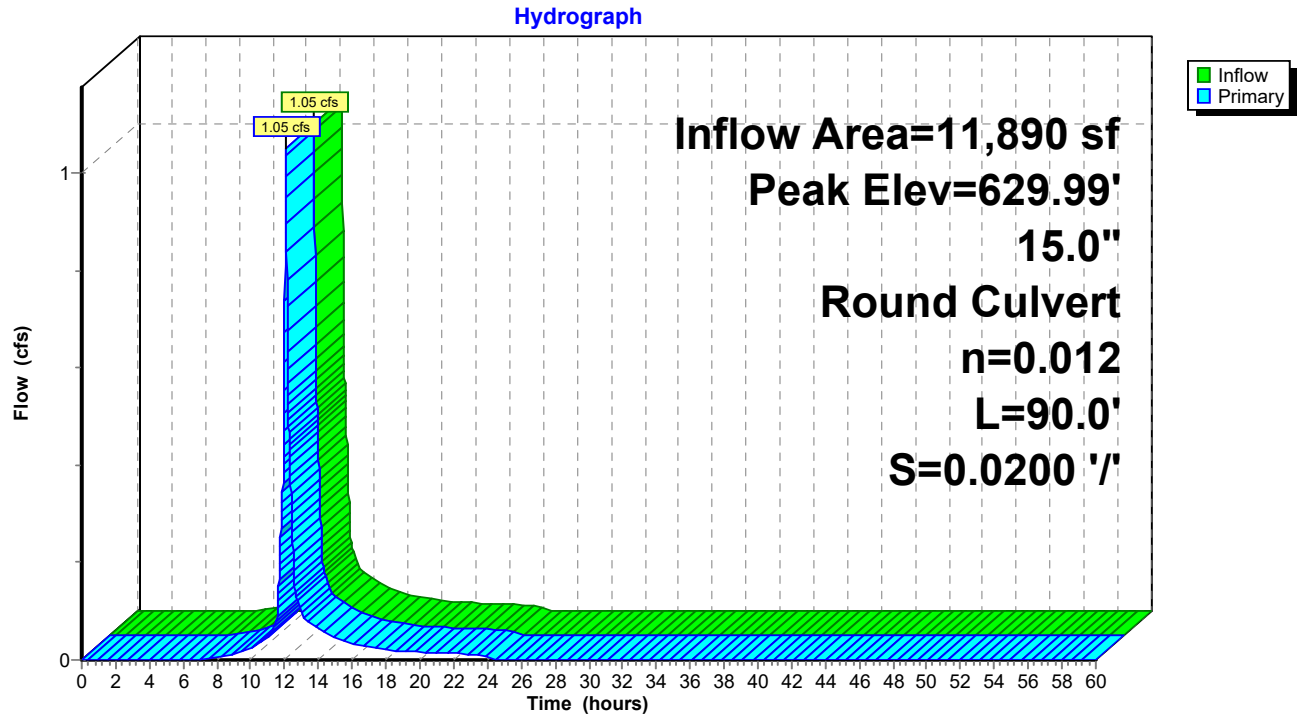
Inflow Area = 11,890 sf, 35.07% Impervious, Inflow Depth = 3.18" for 10-yr event
Inflow = 1.05 cfs @ 12.07 hrs, Volume= 3,150 cf
Outflow = 1.05 cfs @ 12.07 hrs, Volume= 3,150 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.05 cfs @ 12.07 hrs, Volume= 3,150 cf
Routed to Pond 62P : DMH 2

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 629.99' @ 12.07 hrs
Flood Elev= 633.40'

Device	Routing	Invert	Outlet Devices
#1	Primary	629.50'	**15.0" Round Culvert** L= 90.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 629.50' / 627.70' S= 0.0200 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=1.05 cfs @ 12.07 hrs HW=629.99' TW=628.42' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 1.05 cfs @ 2.37 fps)

Pond 61P: DMH 1



Summary for Pond 62P: DMH 2

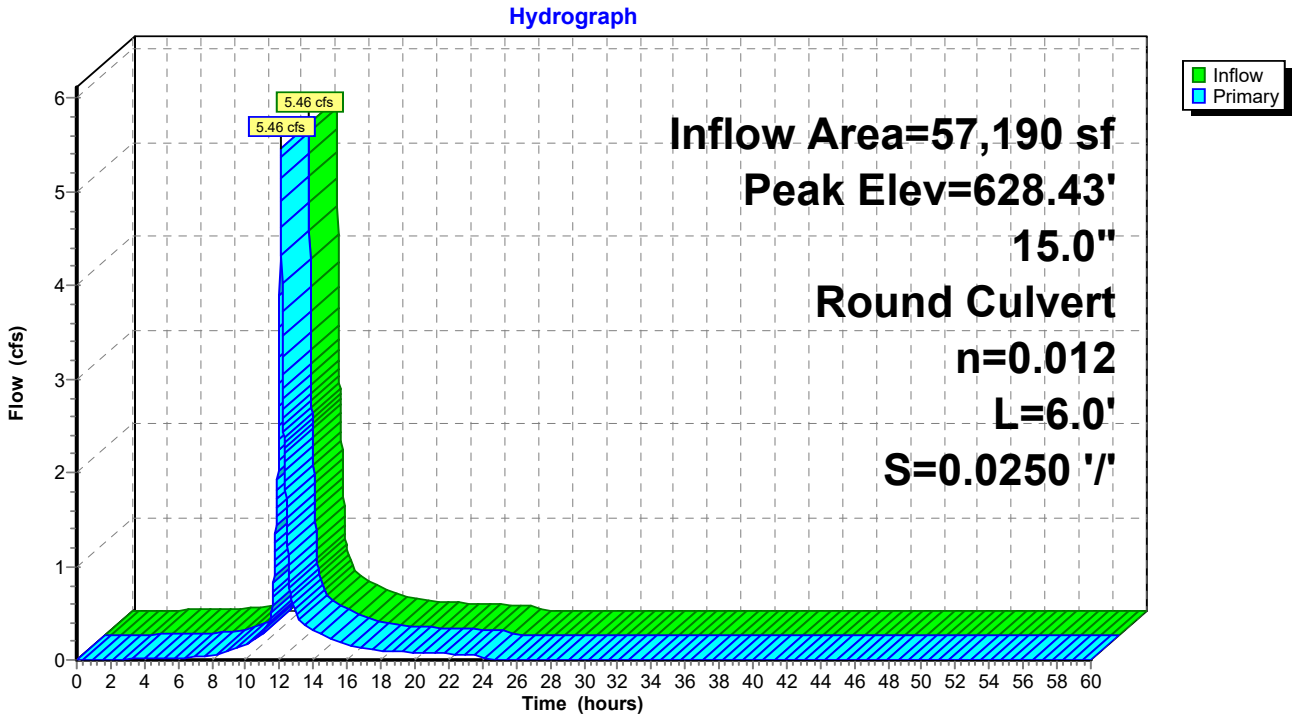
Inflow Area = 57,190 sf, 49.94% Impervious, Inflow Depth = 3.57" for 10-yr event
Inflow = 5.46 cfs @ 12.07 hrs, Volume= 17,033 cf
Outflow = 5.46 cfs @ 12.07 hrs, Volume= 17,033 cf, Atten= 0%, Lag= 0.0 min
Primary = 5.46 cfs @ 12.07 hrs, Volume= 17,033 cf
Routed to Pond 40P : HDS Unit

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 628.43' @ 12.08 hrs
Flood Elev= 637.60'

Device	Routing	Invert	Outlet Devices
#1	Primary	626.25'	**15.0" Round Culvert** L= 6.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 626.25' / 626.10' S= 0.0250 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=5.41 cfs @ 12.07 hrs HW=628.41' TW=627.58' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 5.41 cfs @ 4.41 fps)

Pond 62P: DMH 2



Summary for Pond 63P: DMH 3

[80] Warning: Exceeded Pond 13P by 0.05' @ 12.03 hrs (0.54 cfs 173 cf)
[80] Warning: Exceeded Pond 14P by 0.05' @ 12.03 hrs (0.47 cfs 138 cf)

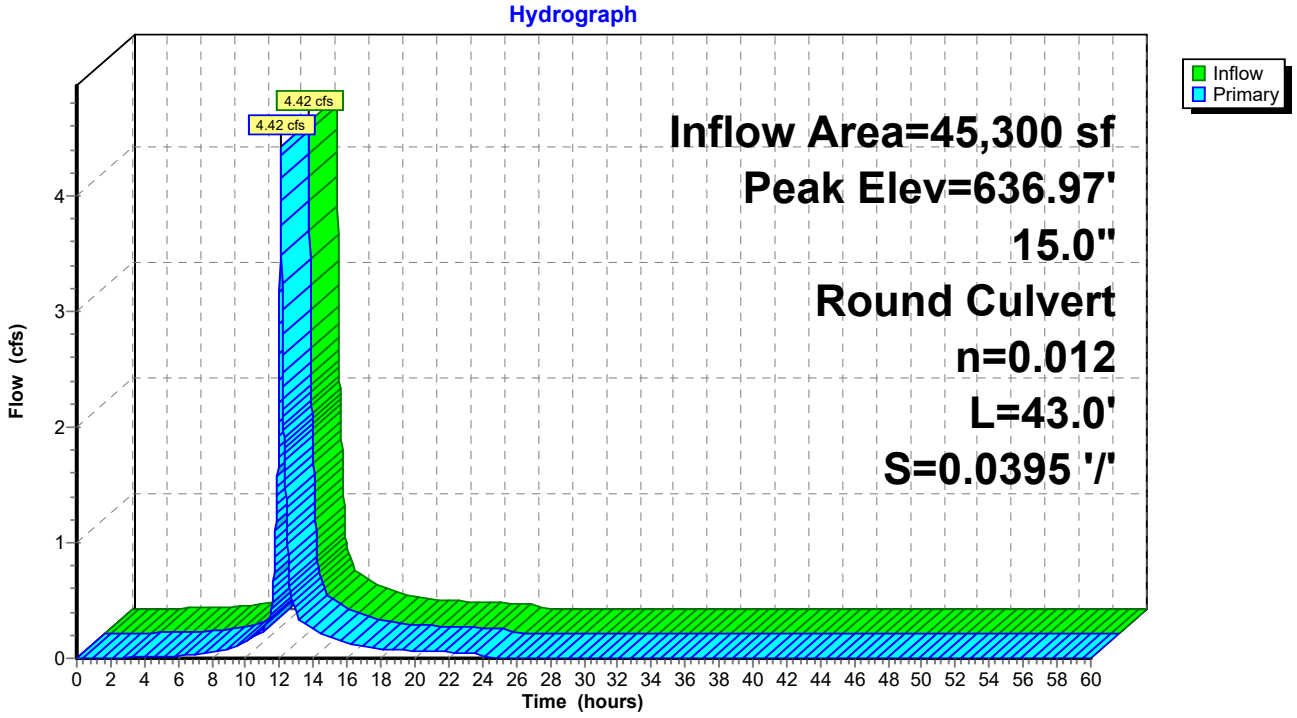
Inflow Area = 45,300 sf, 53.84% Impervious, Inflow Depth = 3.68" for 10-yr event
Inflow = 4.42 cfs @ 12.07 hrs, Volume= 13,883 cf
Outflow = 4.42 cfs @ 12.07 hrs, Volume= 13,883 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.42 cfs @ 12.07 hrs, Volume= 13,883 cf
Routed to Pond 62P : DMH 2

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 636.97' @ 12.07 hrs
Flood Elev= 642.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	635.80'	**15.0" Round Culvert** L= 43.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 635.80' / 634.10' S= 0.0395 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=4.41 cfs @ 12.07 hrs HW=636.97' TW=628.41' (Dynamic Tailwater)
↳**1=Culvert** (Inlet Controls 4.41 cfs @ 3.69 fps)

Pond 63P: DMH 3



Summary for Pond 64P: DMH 4

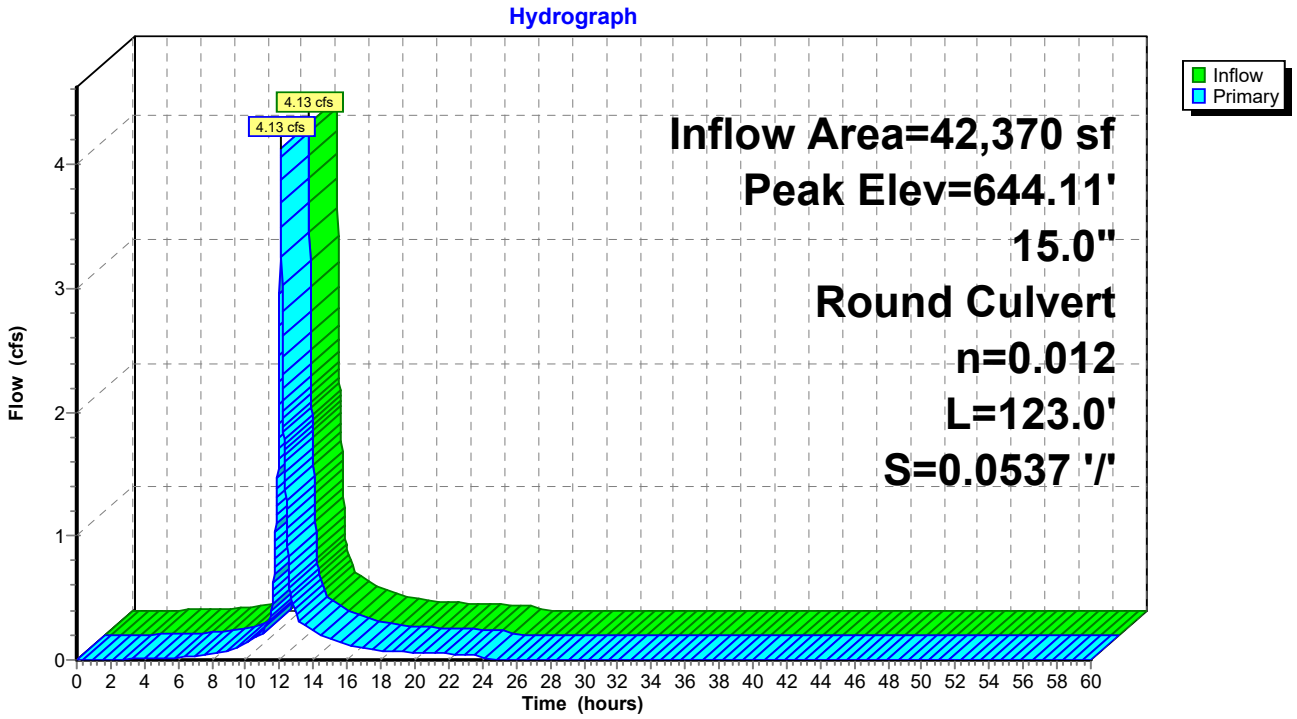
Inflow Area = 42,370 sf, 53.74% Impervious, Inflow Depth = 3.68" for 10-yr event
Inflow = 4.13 cfs @ 12.07 hrs, Volume= 12,982 cf
Outflow = 4.13 cfs @ 12.07 hrs, Volume= 12,982 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.13 cfs @ 12.07 hrs, Volume= 12,982 cf
Routed to Pond 63P : DMH 3

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 644.11' @ 12.07 hrs
Flood Elev= 649.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	643.00'	**15.0" Round Culvert** L= 123.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 643.00' / 636.40' S= 0.0537 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=4.12 cfs @ 12.07 hrs HW=644.11' TW=636.97' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 4.12 cfs @ 3.58 fps)

Pond 64P: DMH 4



Summary for Pond 65P: DMH 5

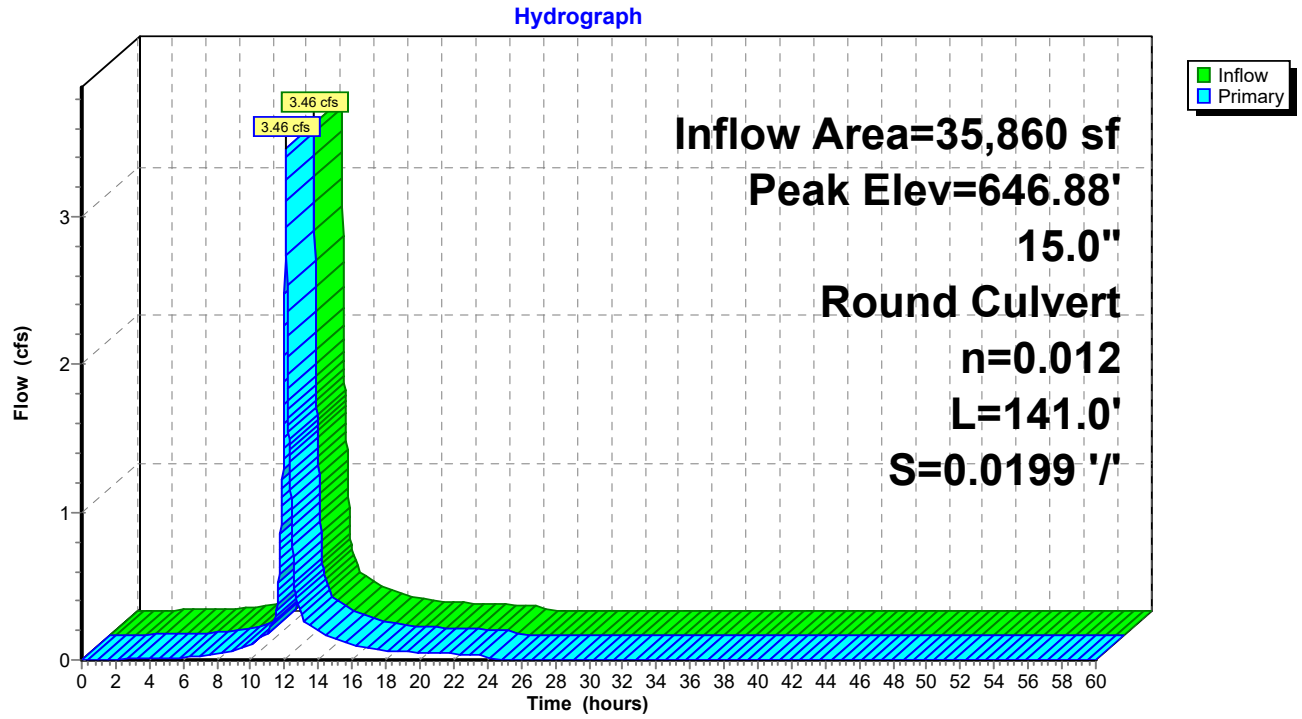
Inflow Area = 35,860 sf, 52.45% Impervious, Inflow Depth = 3.64" for 10-yr event
Inflow = 3.46 cfs @ 12.07 hrs, Volume= 10,890 cf
Outflow = 3.46 cfs @ 12.07 hrs, Volume= 10,890 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.46 cfs @ 12.07 hrs, Volume= 10,890 cf
Routed to Pond 64P : DMH 4

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 646.88' @ 12.07 hrs
Flood Elev= 654.20'

Device	Routing	Invert	Outlet Devices
#1	Primary	645.90'	**15.0" Round Culvert** L= 141.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 645.90' / 643.10' S= 0.0199 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=3.45 cfs @ 12.07 hrs HW=646.87' TW=644.11' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 3.45 cfs @ 3.36 fps)

Pond 65P: DMH 5



Summary for Pond 66P: DMH 6

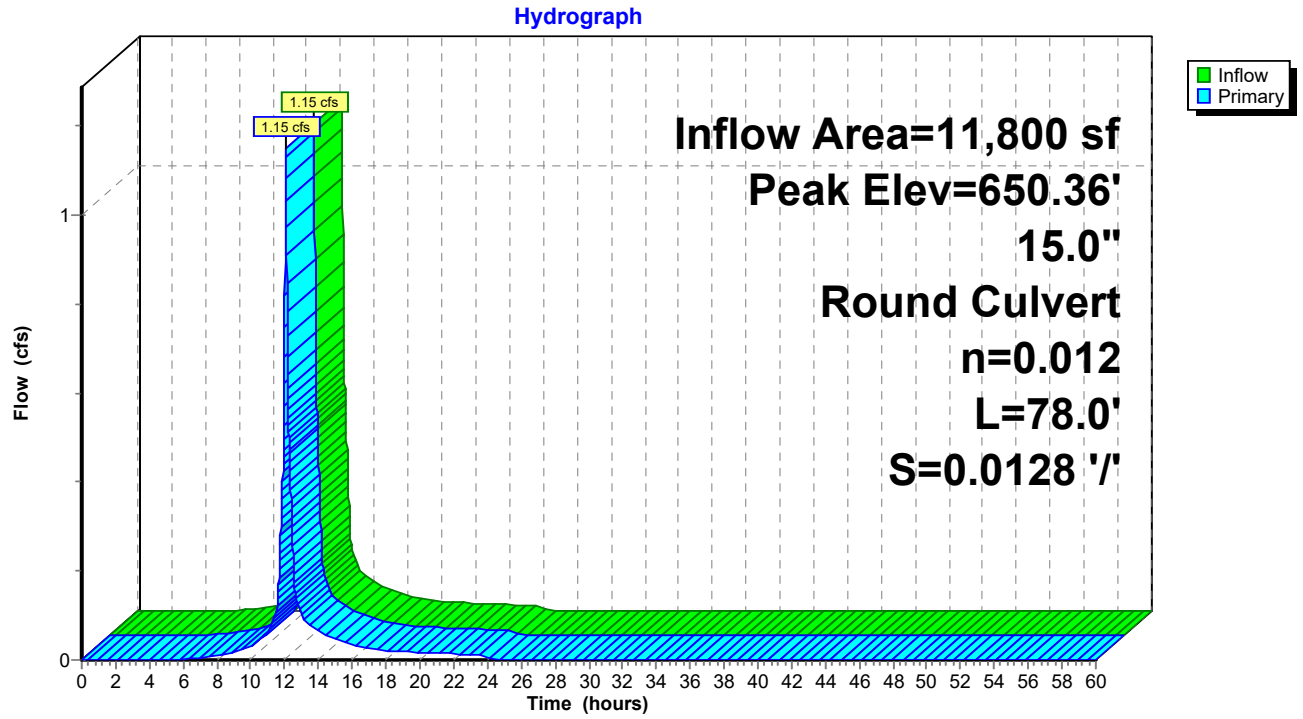
Inflow Area = 11,800 sf, 50.17% Impervious, Inflow Depth = 3.54" for 10-yr event
Inflow = 1.15 cfs @ 12.07 hrs, Volume= 3,483 cf
Outflow = 1.15 cfs @ 12.07 hrs, Volume= 3,483 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.15 cfs @ 12.07 hrs, Volume= 3,483 cf
Routed to Pond 65P : DMH 5

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 650.36' @ 12.07 hrs
Flood Elev= 654.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	649.85'	**15.0" Round Culvert** L= 78.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 649.85' / 648.85' S= 0.0128 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=1.15 cfs @ 12.07 hrs HW=650.36' TW=646.87' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 1.15 cfs @ 2.43 fps)

Pond 66P: DMH 6



Summary for Pond 67P: DMH 7

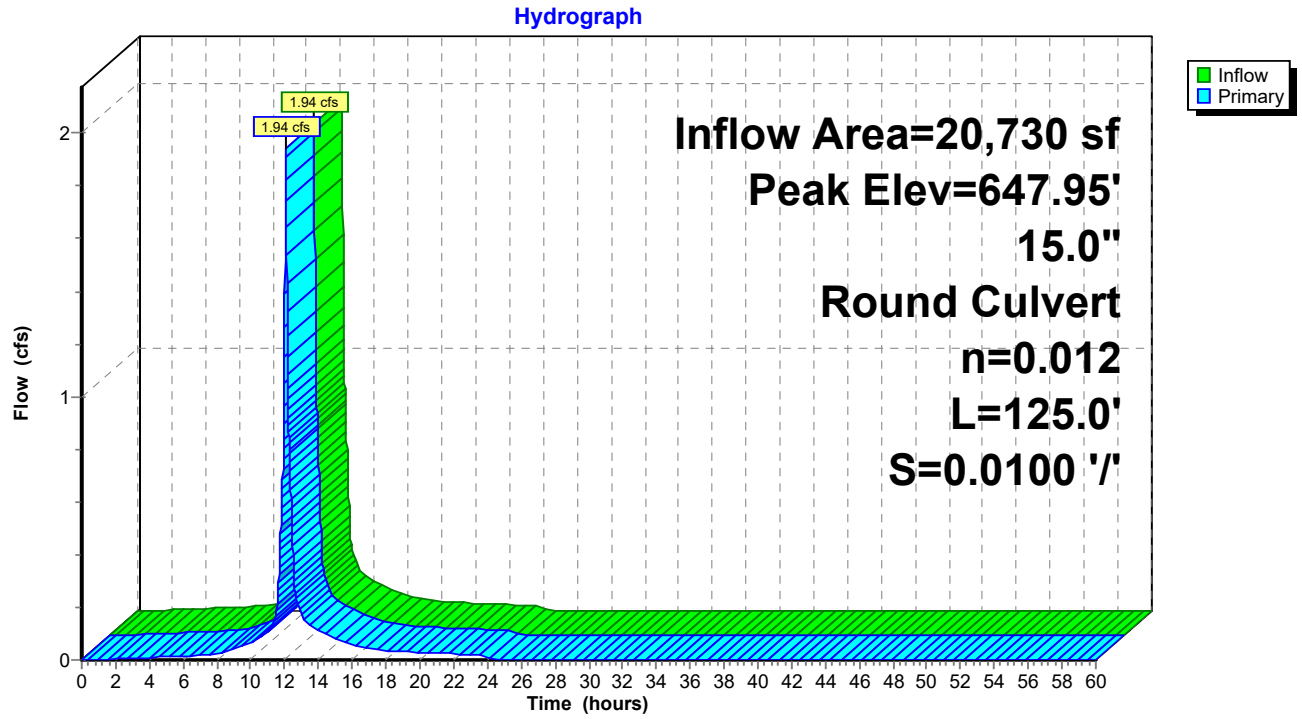
Inflow Area = 20,730 sf, 49.98% Impervious, Inflow Depth = 3.62" for 10-yr event
Inflow = 1.94 cfs @ 12.07 hrs, Volume= 6,251 cf
Outflow = 1.94 cfs @ 12.07 hrs, Volume= 6,251 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.94 cfs @ 12.07 hrs, Volume= 6,251 cf
Routed to Pond 65P : DMH 5

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 647.95' @ 12.07 hrs
Flood Elev= 654.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	647.25'	**15.0" Round Culvert** L= 125.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 647.25' / 646.00' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=1.93 cfs @ 12.07 hrs HW=647.95' TW=646.87' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 1.93 cfs @ 3.96 fps)

Pond 67P: DMH 7



Summary for Pond 81P: YD 1

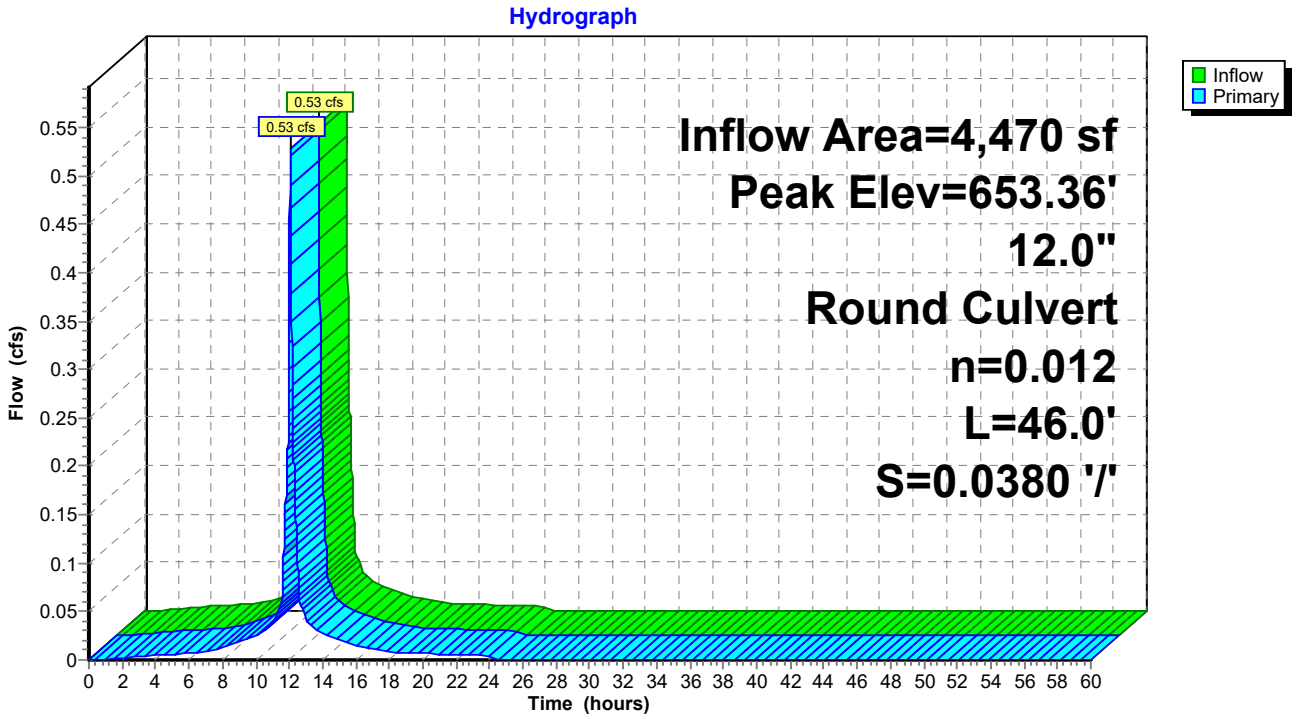
Inflow Area = 4,470 sf,100.00% Impervious, Inflow Depth = 4.84" for 10-yr event
Inflow = 0.53 cfs @ 12.07 hrs, Volume= 1,804 cf
Outflow = 0.53 cfs @ 12.07 hrs, Volume= 1,804 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.53 cfs @ 12.07 hrs, Volume= 1,804 cf
Routed to Pond 83P : YD 3

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 653.36' @ 12.07 hrs
Flood Elev= 656.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	653.00'	**12.0" Round Culvert** L= 46.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 653.00' / 651.25' S= 0.0380 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.53 cfs @ 12.07 hrs HW=653.36' TW=652.05' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 0.53 cfs @ 2.05 fps)

Pond 81P: YD 1



Summary for Pond 82P: YD 2

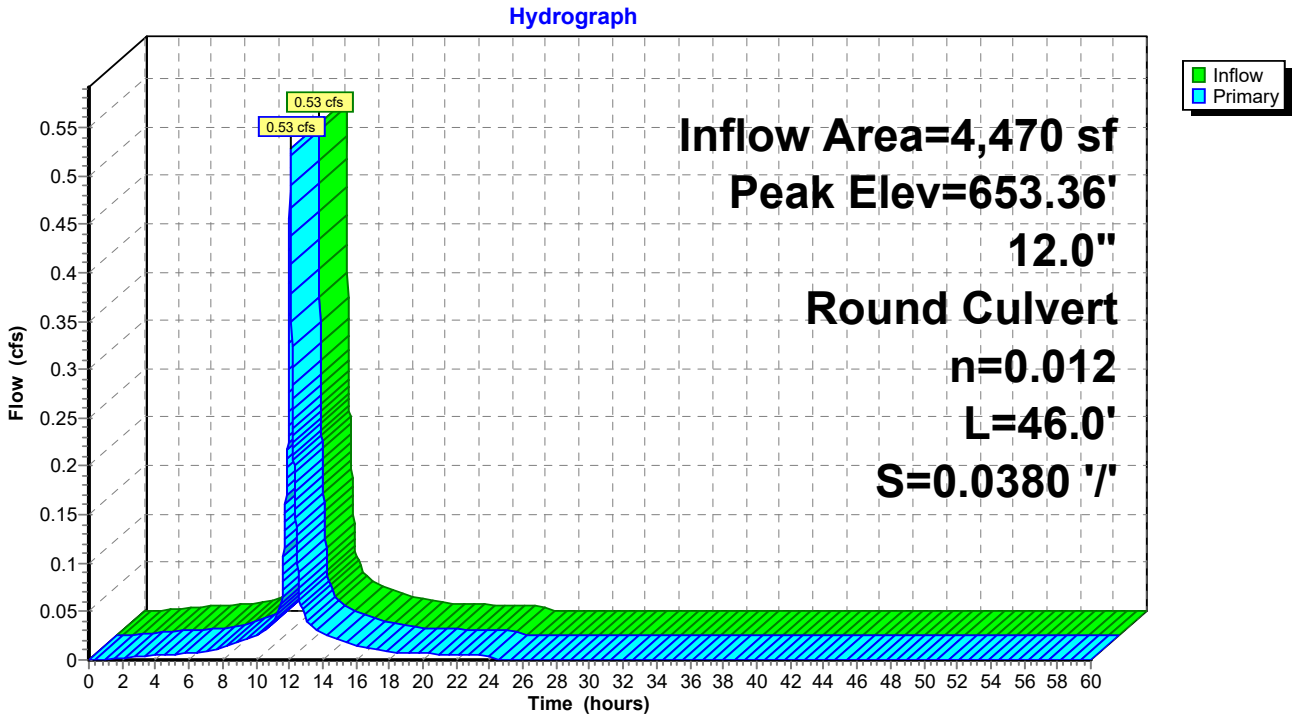
Inflow Area = 4,470 sf,100.00% Impervious, Inflow Depth = 4.84" for 10-yr event
Inflow = 0.53 cfs @ 12.07 hrs, Volume= 1,804 cf
Outflow = 0.53 cfs @ 12.07 hrs, Volume= 1,804 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.53 cfs @ 12.07 hrs, Volume= 1,804 cf
Routed to Pond 83P : YD 3

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 653.36' @ 12.07 hrs
Flood Elev= 656.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	653.00'	**12.0" Round Culvert** L= 46.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 653.00' / 651.25' S= 0.0380 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.53 cfs @ 12.07 hrs HW=653.36' TW=652.05' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 0.53 cfs @ 2.05 fps)

Pond 82P: YD 2



Summary for Pond 83P: YD 3

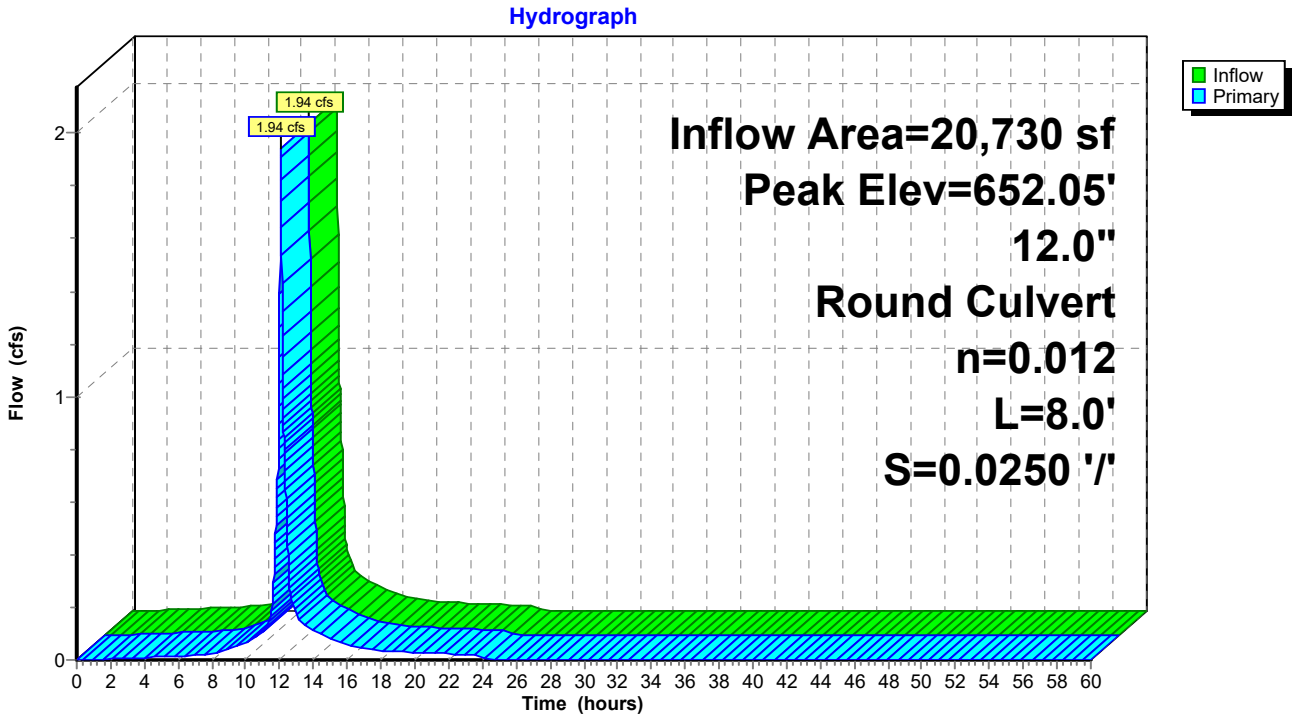
Inflow Area = 20,730 sf, 49.98% Impervious, Inflow Depth = 3.62" for 10-yr event
Inflow = 1.94 cfs @ 12.07 hrs, Volume= 6,251 cf
Outflow = 1.94 cfs @ 12.07 hrs, Volume= 6,251 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.94 cfs @ 12.07 hrs, Volume= 6,251 cf
Routed to Pond 67P : DMH 7

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 652.05' @ 12.07 hrs
Flood Elev= 654.75'

Device	Routing	Invert	Outlet Devices
#1	Primary	651.25'	**12.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 651.25' / 651.05' S= 0.0250 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=1.94 cfs @ 12.07 hrs HW=652.05' TW=647.95' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 1.94 cfs @ 3.91 fps)

Pond 83P: YD 3

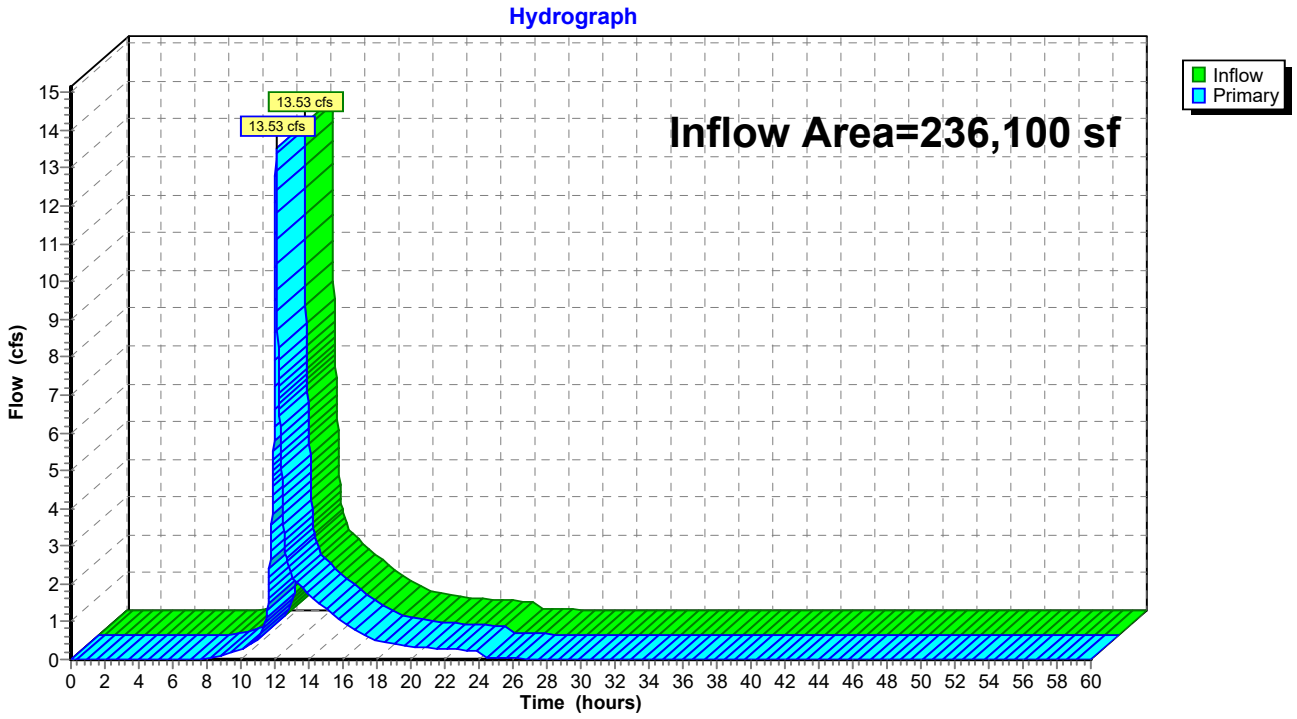


Summary for Link 10L: Center Road

Inflow Area = 236,100 sf, 28.76% Impervious, Inflow Depth = 2.94" for 10-yr event
Inflow = 13.53 cfs @ 12.08 hrs, Volume= 57,919 cf
Primary = 13.53 cfs @ 12.08 hrs, Volume= 57,919 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs

Link 10L: Center Road



Time span=0.00-60.00 hrs, dt=0.01 hrs, 6001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment10S: Proposed to Center Runoff Area=154,140 sf 25.53% Impervious Runoff Depth=3.96"
Tc=5.0 min CN=80 Runoff=16.95 cfs 50,894 cf

Subcatchment11S: Proposed to CB 1 Runoff Area=7,750 sf 41.81% Impervious Runoff Depth=4.38"
Tc=5.0 min CN=84 Runoff=0.93 cfs 2,831 cf

Subcatchment12S: Proposed to CB 2 Runoff Area=4,140 sf 22.46% Impervious Runoff Depth=3.86"
Tc=5.0 min CN=79 Runoff=0.44 cfs 1,331 cf

Subcatchment13S: Proposed to CB 3 Runoff Area=930 sf 100.00% Impervious Runoff Depth=5.96"
Tc=5.0 min CN=98 Runoff=0.13 cfs 462 cf

Subcatchment14S: Proposed to CB 4 Runoff Area=2,000 sf 34.50% Impervious Runoff Depth=4.17"
Tc=5.0 min CN=82 Runoff=0.23 cfs 695 cf

Subcatchment15S: Proposed to CB 5 Runoff Area=660 sf 100.00% Impervious Runoff Depth=5.96"
Tc=5.0 min CN=98 Runoff=0.10 cfs 328 cf

Subcatchment16S: Proposed to CB 6 Runoff Area=5,850 sf 56.41% Impervious Runoff Depth=4.82"
Tc=5.0 min CN=88 Runoff=0.76 cfs 2,349 cf

Subcatchment17S: Proposed to CB 7 Runoff Area=3,330 sf 75.98% Impervious Runoff Depth=5.27"
Tc=5.0 min CN=92 Runoff=0.46 cfs 1,461 cf

Subcatchment18S: Proposed to CB 8 Runoff Area=11,800 sf 50.17% Impervious Runoff Depth=4.60"
Tc=5.0 min CN=86 Runoff=1.48 cfs 4,523 cf

Subcatchment20S: Proposed to Northern Runoff Area=59,900 sf 71.94% Impervious Runoff Depth=5.15"
Tc=5.0 min CN=91 Runoff=8.12 cfs 25,723 cf

Subcatchment30S: Proposed to West Runoff Area=230,400 sf 0.36% Impervious Runoff Depth=3.06"
Flow Length=530' Tc=20.1 min CN=71 Runoff=12.70 cfs 58,766 cf

Subcatchment40S: Proposed to South Runoff Area=19,030 sf 0.00% Impervious Runoff Depth=3.16"
Flow Length=255' Tc=16.0 min CN=72 Runoff=1.19 cfs 5,007 cf

Subcatchment50S: Proposed to WQB Runoff Area=24,770 sf 0.00% Impervious Runoff Depth=3.35"
Tc=5.0 min CN=74 Runoff=2.32 cfs 6,923 cf

Subcatchment81S: Proposed to YD 1 Runoff Area=4,470 sf 100.00% Impervious Runoff Depth=5.96"
Tc=5.0 min CN=98 Runoff=0.65 cfs 2,221 cf

Subcatchment82S: Proposed to YD 2 Runoff Area=4,470 sf 100.00% Impervious Runoff Depth=5.96"
Tc=5.0 min CN=98 Runoff=0.65 cfs 2,221 cf

Subcatchment83S: Proposed to YD 3 Runoff Area=11,790 sf 12.04% Impervious Runoff Depth=3.65"
Tc=5.0 min CN=77 Runoff=1.20 cfs 3,590 cf

Pond 11P: CB 1 Peak Elev=630.30' Inflow=0.93 cfs 2,831 cf
12.0" Round Culvert n=0.012 L=3.0' S=0.0333 '/' Outflow=0.93 cfs 2,831 cf

Pond 12P: CB 2 Peak Elev=630.93' Inflow=0.44 cfs 1,331 cf
12.0" Round Culvert n=0.012 L=15.0' S=0.0467 '/' Outflow=0.44 cfs 1,331 cf

Pond 13P: CB 3 Peak Elev=637.34' Inflow=0.13 cfs 462 cf
12.0" Round Culvert n=0.012 L=3.0' S=0.0333 '/' Outflow=0.13 cfs 462 cf

Pond 14P: CB 4 Peak Elev=637.34' Inflow=0.23 cfs 695 cf
12.0" Round Culvert n=0.012 L=15.0' S=0.0200 '/' Outflow=0.23 cfs 695 cf

Pond 15P: CB 5 Peak Elev=646.15' Inflow=0.10 cfs 328 cf
12.0" Round Culvert n=0.012 L=14.0' S=0.0214 '/' Outflow=0.10 cfs 328 cf

Pond 16P: CB 6 Peak Elev=646.44' Inflow=0.76 cfs 2,349 cf
12.0" Round Culvert n=0.012 L=16.0' S=0.0187 '/' Outflow=0.76 cfs 2,349 cf

Pond 17P: CB 7 Peak Elev=650.64' Inflow=0.46 cfs 1,461 cf
12.0" Round Culvert n=0.012 L=11.0' S=0.0273 '/' Outflow=0.46 cfs 1,461 cf

Pond 18P: CB 8 Peak Elev=650.80' Inflow=1.48 cfs 4,523 cf
12.0" Round Culvert n=0.012 L=6.0' S=0.0250 '/' Outflow=1.48 cfs 4,523 cf

Pond 40P: HDS Unit Peak Elev=628.14' Inflow=7.02 cfs 22,013 cf
15.0" Round Culvert n=0.012 L=42.0' S=0.0500 '/' Outflow=7.02 cfs 22,013 cf

Pond 50P: WQB Peak Elev=626.57' Storage=13,934 cf Inflow=9.34 cfs 28,936 cf
Outflow=1.28 cfs 26,752 cf

Pond 61P: DMH 1 Peak Elev=630.13' Inflow=1.38 cfs 4,163 cf
15.0" Round Culvert n=0.012 L=90.0' S=0.0200 '/' Outflow=1.38 cfs 4,163 cf

Pond 62P: DMH 2 Peak Elev=629.53' Inflow=7.02 cfs 22,013 cf
15.0" Round Culvert n=0.012 L=6.0' S=0.0250 '/' Outflow=7.02 cfs 22,013 cf

Pond 63P: DMH 3 Peak Elev=637.34' Inflow=5.64 cfs 17,851 cf
15.0" Round Culvert n=0.012 L=43.0' S=0.0395 '/' Outflow=5.64 cfs 17,851 cf

Pond 64P: DMH 4 Peak Elev=644.42' Inflow=5.28 cfs 16,693 cf
15.0" Round Culvert n=0.012 L=123.0' S=0.0537 '/' Outflow=5.28 cfs 16,693 cf

Pond 65P: DMH 5 Peak Elev=647.08' Inflow=4.43 cfs 14,016 cf
15.0" Round Culvert n=0.012 L=141.0' S=0.0199 '/' Outflow=4.43 cfs 14,016 cf

Pond 66P: DMH 6 Peak Elev=650.44' Inflow=1.48 cfs 4,523 cf
15.0" Round Culvert n=0.012 L=78.0' S=0.0128 '/' Outflow=1.48 cfs 4,523 cf

Pond 67P: DMH 7 Peak Elev=648.08' Inflow=2.49 cfs 8,032 cf
15.0" Round Culvert n=0.012 L=125.0' S=0.0100 '/' Outflow=2.49 cfs 8,032 cf

Pond 81P: YD 1 Peak Elev=653.40' Inflow=0.65 cfs 2,221 cf
12.0" Round Culvert n=0.012 L=46.0' S=0.0380 '/' Outflow=0.65 cfs 2,221 cf

Pond 82P: YD 2 Peak Elev=653.40' Inflow=0.65 cfs 2,221 cf
12.0" Round Culvert n=0.012 L=46.0' S=0.0380 '/' Outflow=0.65 cfs 2,221 cf

Pond 83P: YD 3 Peak Elev=652.21' Inflow=2.49 cfs 8,032 cf
12.0" Round Culvert n=0.012 L=8.0' S=0.0250 '/' Outflow=2.49 cfs 8,032 cf

Link 10L: Center Road Inflow=17.93 cfs 77,647 cf
Primary=17.93 cfs 77,647 cf

Total Runoff Area = 545,430 sf Runoff Volume = 169,326 cf Average Runoff Depth = 3.73"
79.50% Pervious = 433,610 sf 20.50% Impervious = 111,820 sf

Summary for Subcatchment 10S: Proposed to Center Road

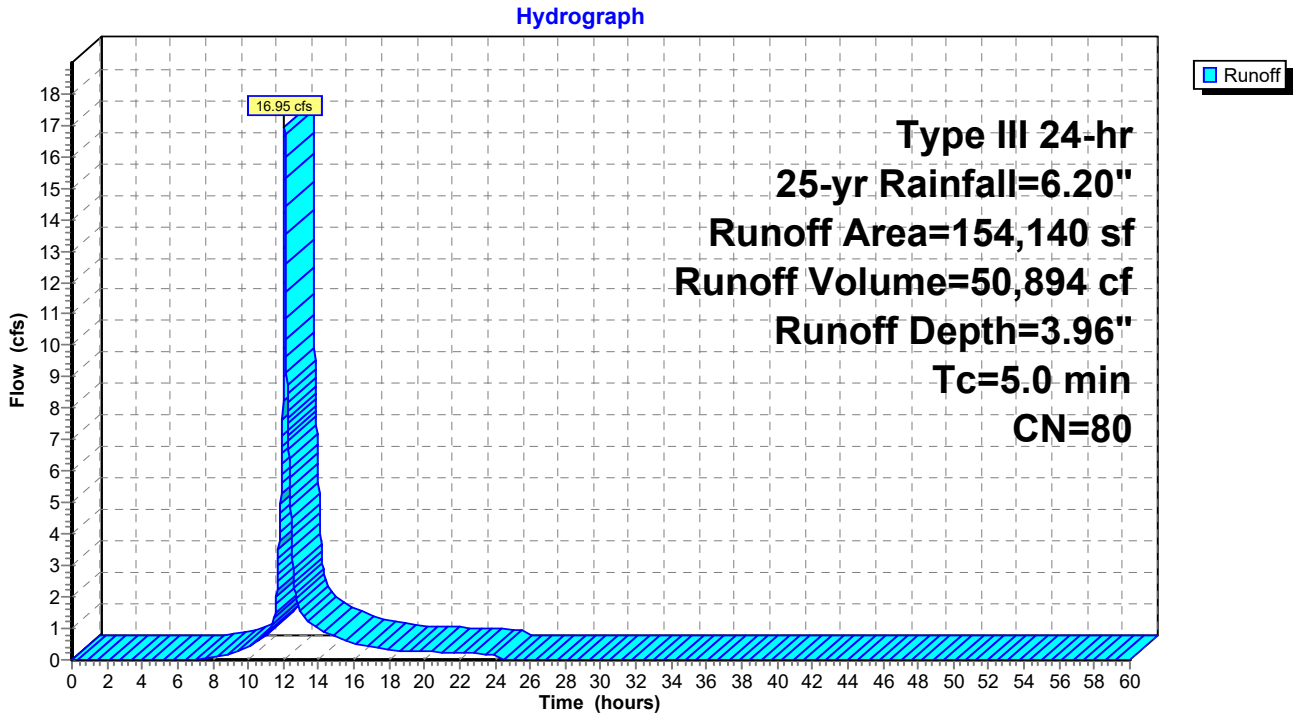
Runoff = 16.95 cfs @ 12.07 hrs, Volume= 50,894 cf, Depth= 3.96"
Routed to Link 10L : Center Road

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.20"

	Area (sf)	CN	Description
*	39,350	98	Paved
	105,490	74	>75% Grass cover, Good, HSG C
	9,300	70	Woods, Good, HSG C
	154,140	80	Weighted Average
	114,790		74.47% Pervious Area
	39,350		25.53% Impervious Area

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

Subcatchment 10S: Proposed to Center Road



Summary for Subcatchment 11S: Proposed to CB 1

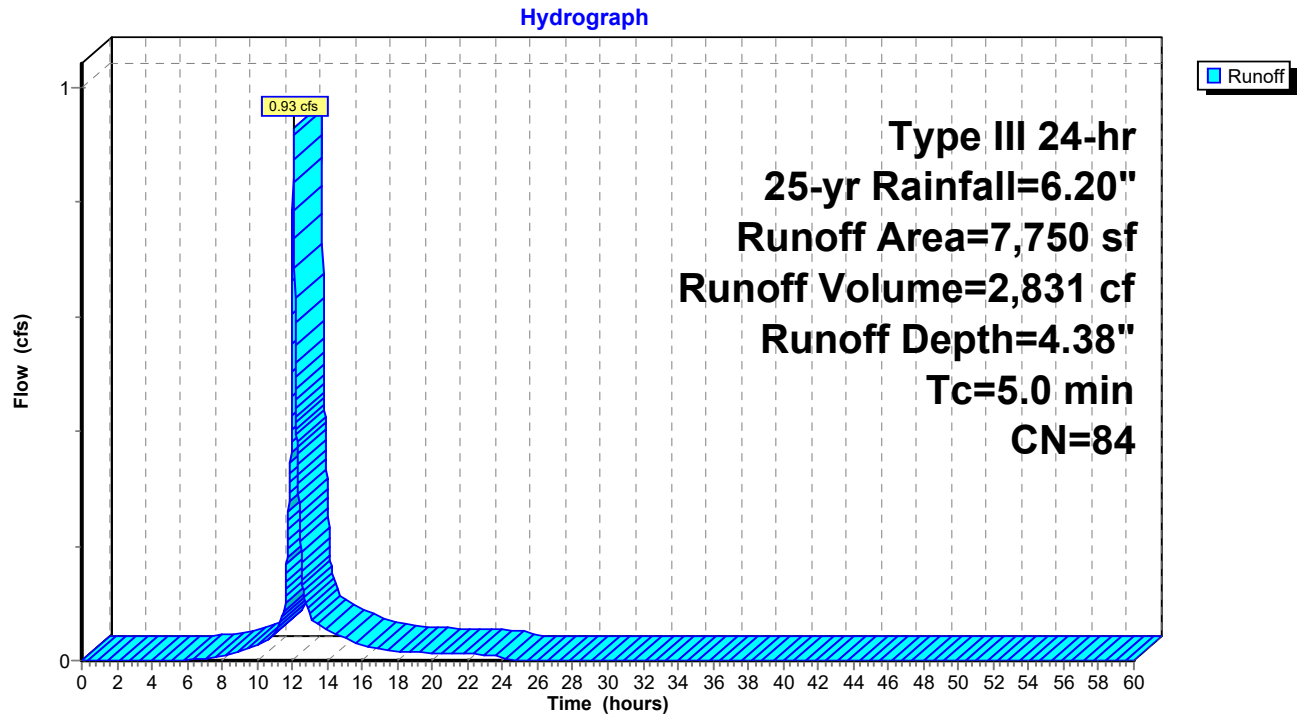
Runoff = 0.93 cfs @ 12.07 hrs, Volume= 2,831 cf, Depth= 4.38"
Routed to Pond 11P : CB 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.20"

	Area (sf)	CN	Description
*	3,240	98	Paved
	4,510	74	>75% Grass cover, Good, HSG C
	7,750	84	Weighted Average
	4,510		58.19% Pervious Area
	3,240		41.81% Impervious Area

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

Subcatchment 11S: Proposed to CB 1



Summary for Subcatchment 12S: Proposed to CB 2

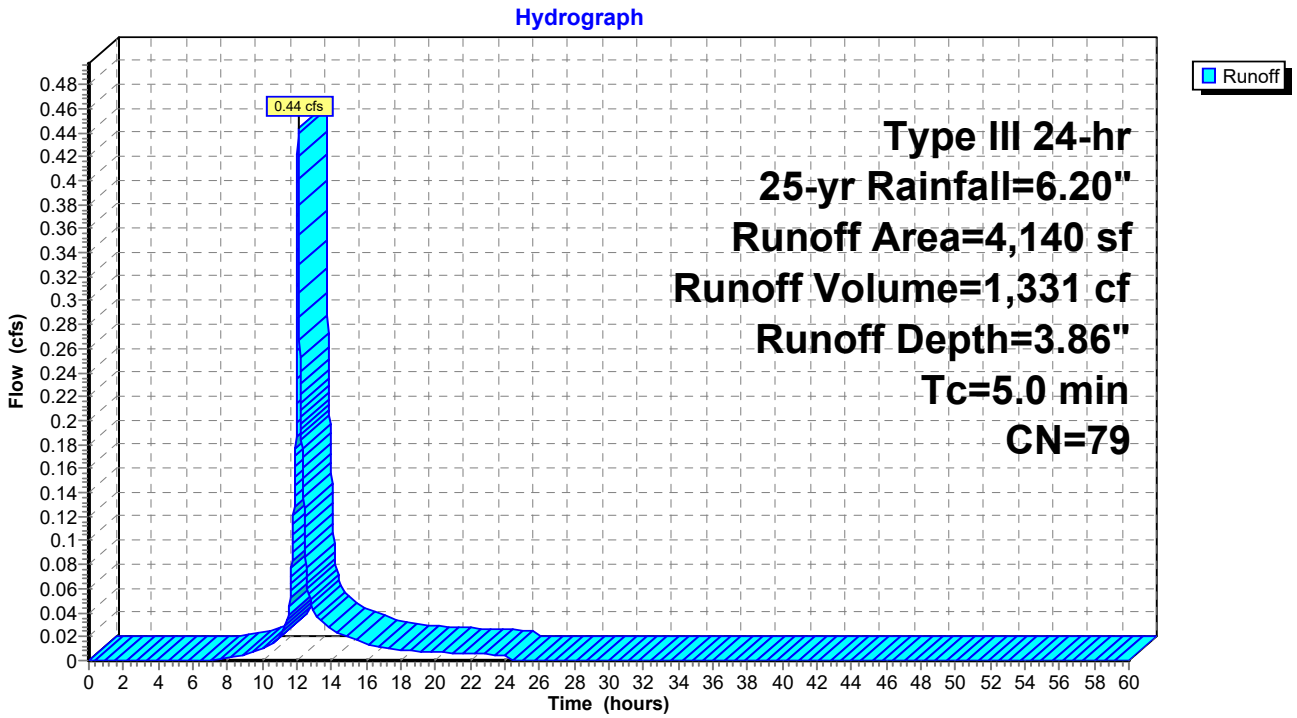
Runoff = 0.44 cfs @ 12.07 hrs, Volume= 1,331 cf, Depth= 3.86"
Routed to Pond 12P : CB 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.20"

	Area (sf)	CN	Description
*	930	98	Paved
	3,210	74	>75% Grass cover, Good, HSG C
	4,140	79	Weighted Average
	3,210		77.54% Pervious Area
	930		22.46% Impervious Area

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

Subcatchment 12S: Proposed to CB 2



Summary for Subcatchment 13S: Proposed to CB 3

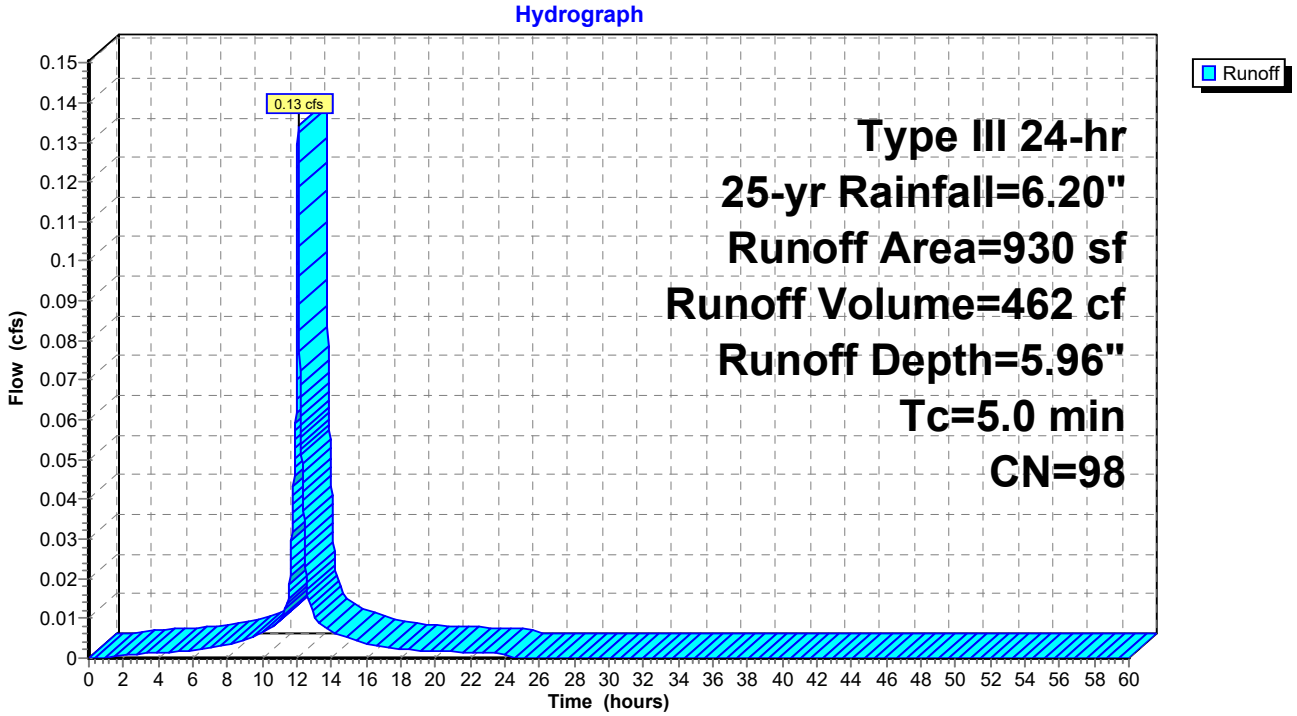
Runoff = 0.13 cfs @ 12.07 hrs, Volume= 462 cf, Depth= 5.96"
Routed to Pond 13P : CB 3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.20"

	Area (sf)	CN	Description
*	930	98	Paved
	930		100.00% Impervious Area

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

Subcatchment 13S: Proposed to CB 3



Summary for Subcatchment 14S: Proposed to CB 4

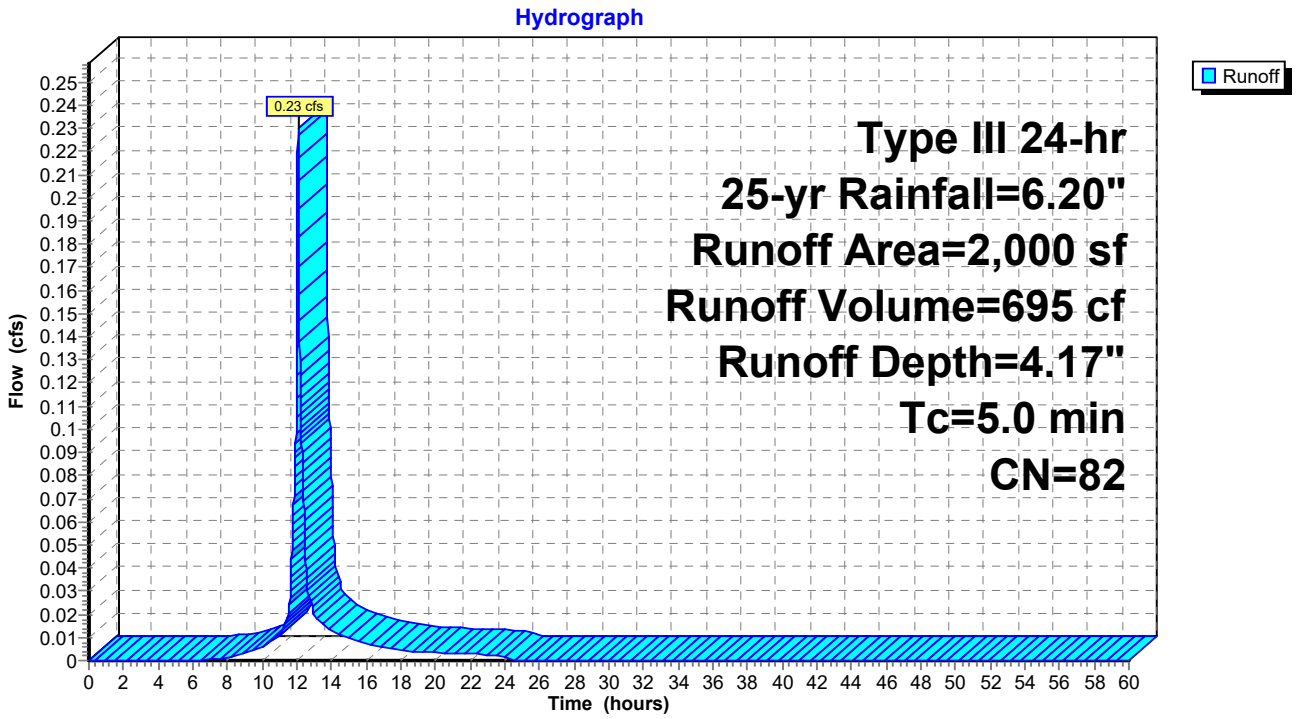
Runoff = 0.23 cfs @ 12.07 hrs, Volume= 695 cf, Depth= 4.17"
Routed to Pond 14P : CB 4

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.20"

	Area (sf)	CN	Description
*	690	98	Paved
	1,310	74	>75% Grass cover, Good, HSG C
	2,000	82	Weighted Average
	1,310		65.50% Pervious Area
	690		34.50% Impervious Area

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

Subcatchment 14S: Proposed to CB 4



Summary for Subcatchment 15S: Proposed to CB 5

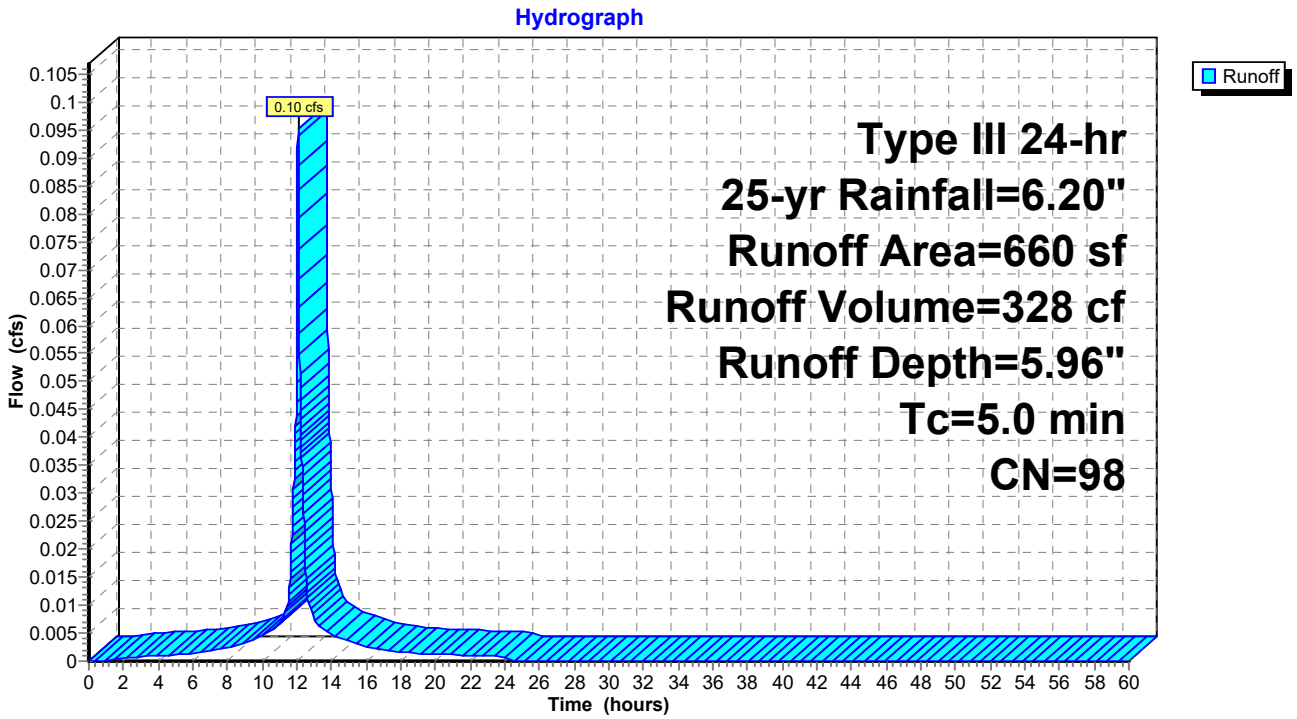
Runoff = 0.10 cfs @ 12.07 hrs, Volume= 328 cf, Depth= 5.96"
Routed to Pond 15P : CB 5

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.20"

	Area (sf)	CN	Description
*	660	98	Paved
	660		100.00% Impervious Area

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

Subcatchment 15S: Proposed to CB 5



Summary for Subcatchment 16S: Proposed to CB 6

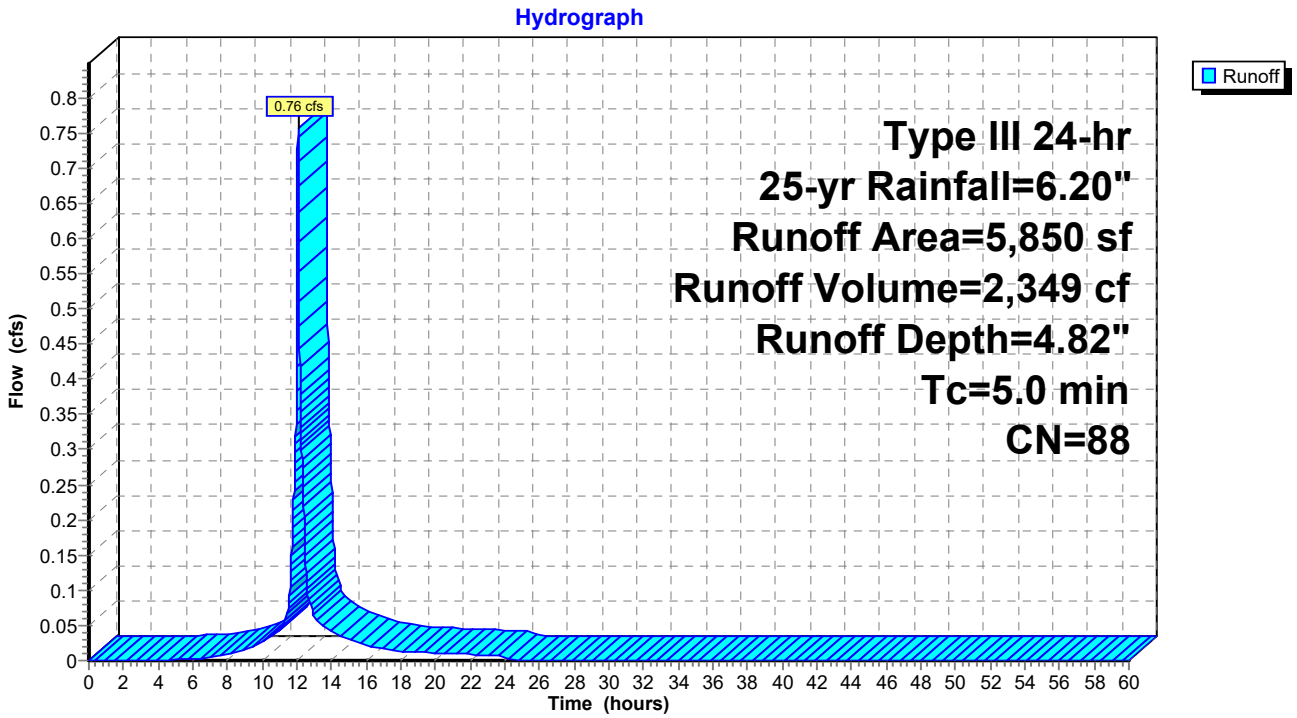
Runoff = 0.76 cfs @ 12.07 hrs, Volume= 2,349 cf, Depth= 4.82"
Routed to Pond 16P : CB 6

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.20"

	Area (sf)	CN	Description
*	3,300	98	Paved
	2,550	74	>75% Grass cover, Good, HSG C
	5,850	88	Weighted Average
	2,550		43.59% Pervious Area
	3,300		56.41% Impervious Area

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

Subcatchment 16S: Proposed to CB 6



Summary for Subcatchment 17S: Proposed to CB 7

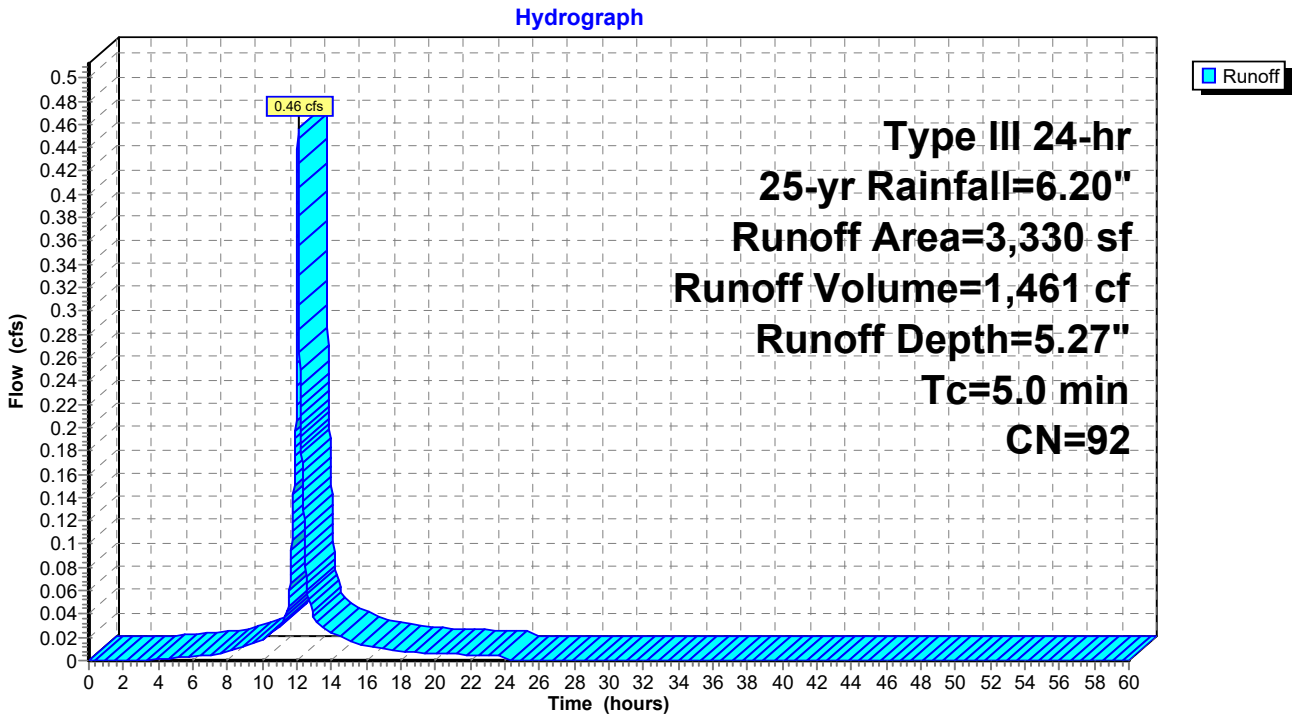
Runoff = 0.46 cfs @ 12.07 hrs, Volume= 1,461 cf, Depth= 5.27"
Routed to Pond 17P : CB 7

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.20"

	Area (sf)	CN	Description
*	2,530	98	Paved
	800	74	>75% Grass cover, Good, HSG C
	3,330	92	Weighted Average
	800		24.02% Pervious Area
	2,530		75.98% Impervious Area

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

Subcatchment 17S: Proposed to CB 7



Summary for Subcatchment 18S: Proposed to CB 8

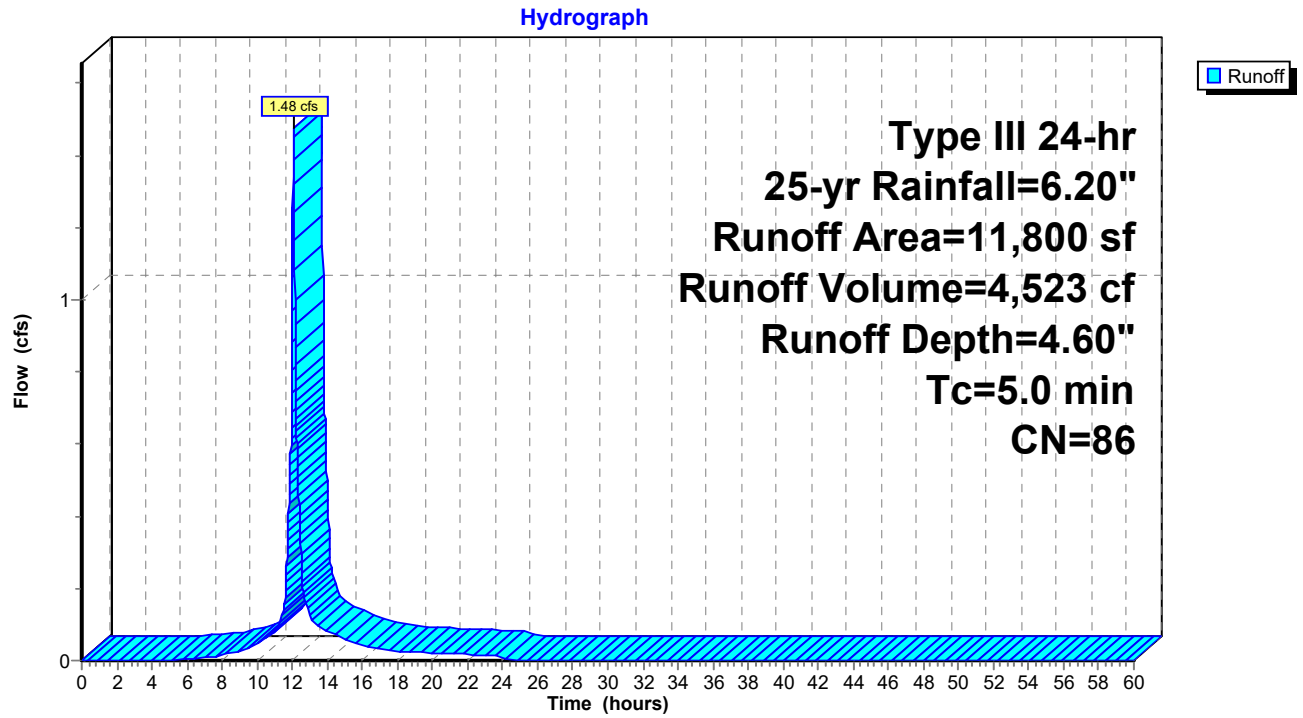
Runoff = 1.48 cfs @ 12.07 hrs, Volume= 4,523 cf, Depth= 4.60"
Routed to Pond 18P : CB 8

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.20"

	Area (sf)	CN	Description
*	5,920	98	Paved
	5,880	74	>75% Grass cover, Good, HSG C
	11,800	86	Weighted Average
	5,880		49.83% Pervious Area
	5,920		50.17% Impervious Area

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

Subcatchment 18S: Proposed to CB 8



Summary for Subcatchment 20S: Proposed to Northern Detention Basin

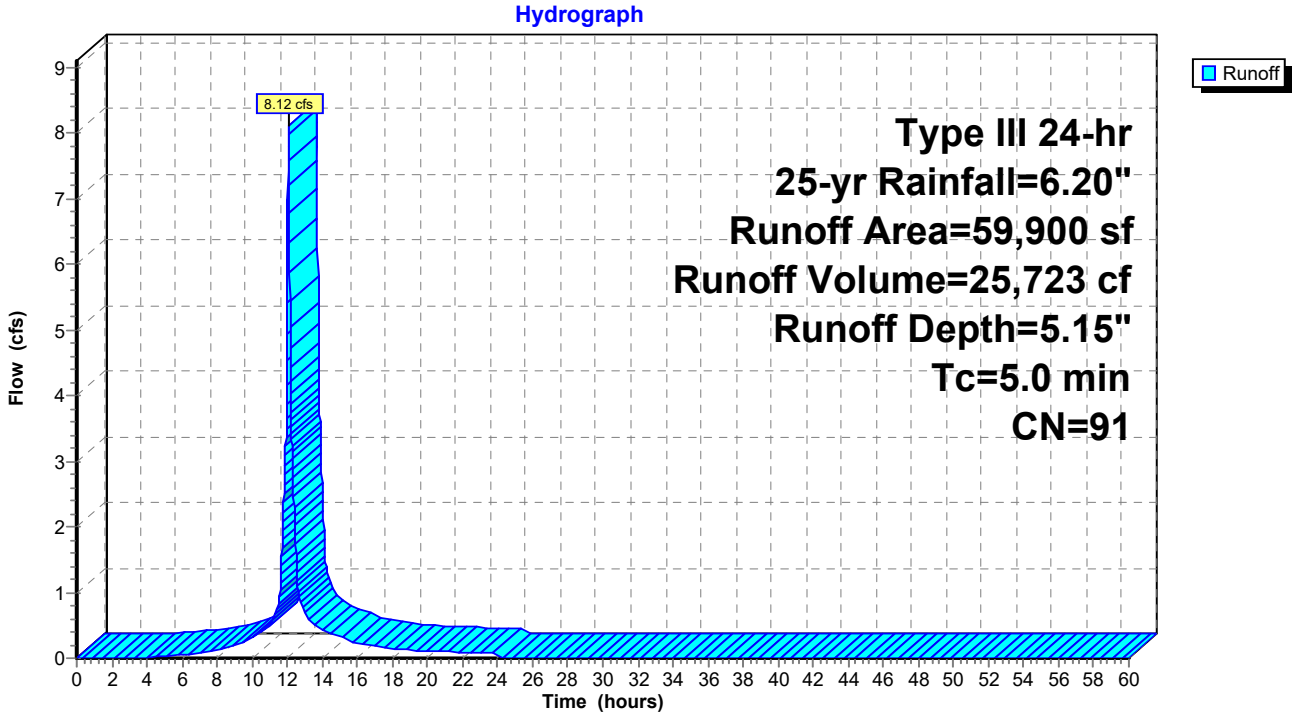
Runoff = 8.12 cfs @ 12.07 hrs, Volume= 25,723 cf, Depth= 5.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.20"

	Area (sf)	CN	Description
*	43,090	98	Paved
	16,810	74	>75% Grass cover, Good, HSG C
	59,900	91	Weighted Average
	16,810		28.06% Pervious Area
	43,090		71.94% Impervious Area

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

Subcatchment 20S: Proposed to Northern Detention Basin



Summary for Subcatchment 30S: Proposed to West

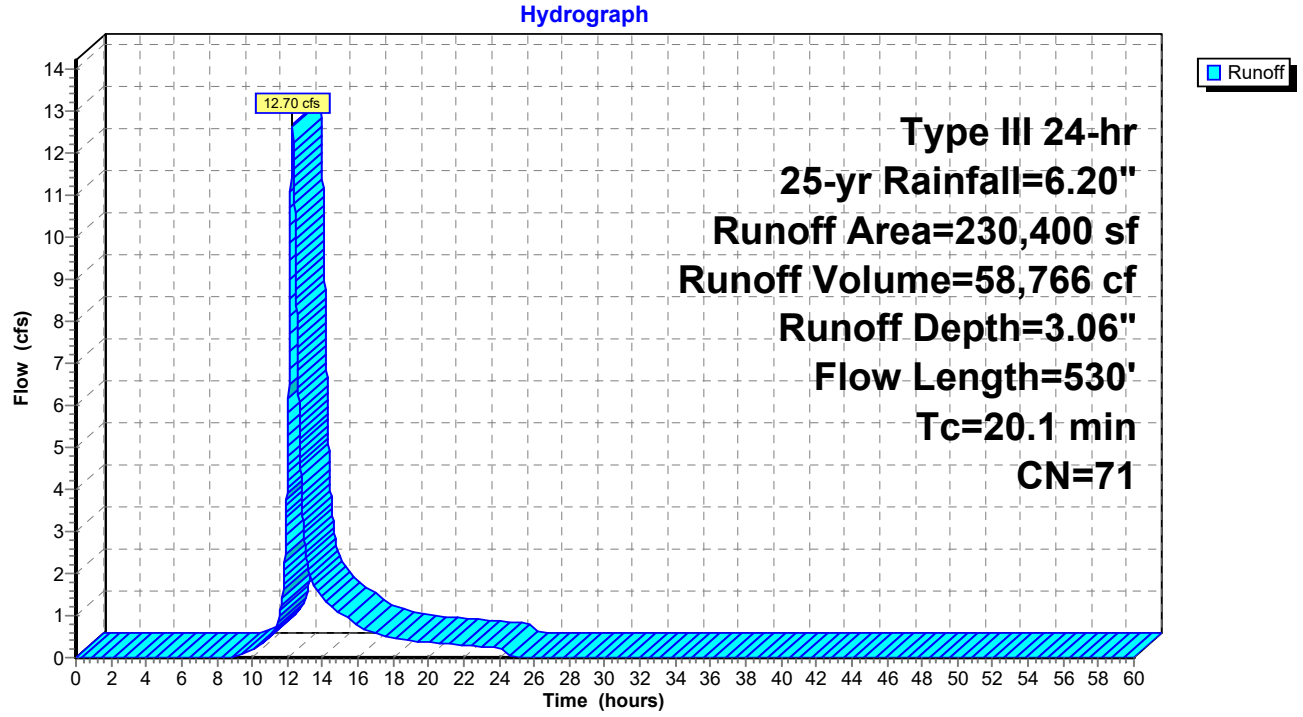
Runoff = 12.70 cfs @ 12.28 hrs, Volume= 58,766 cf, Depth= 3.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.20"

	Area (sf)	CN	Description
*	820	98	Paved
	71,890	74	>75% Grass cover, Good, HSG C
	157,690	70	Woods, Good, HSG C
	230,400	71	Weighted Average
	229,580		99.64% Pervious Area
	820		0.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	75	0.0060	0.10		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.29"
5.6	165	0.0050	0.49		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
2.1	290	0.1070	2.29		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
20.1	530	Total			

Subcatchment 30S: Proposed to West



Summary for Subcatchment 40S: Proposed to South

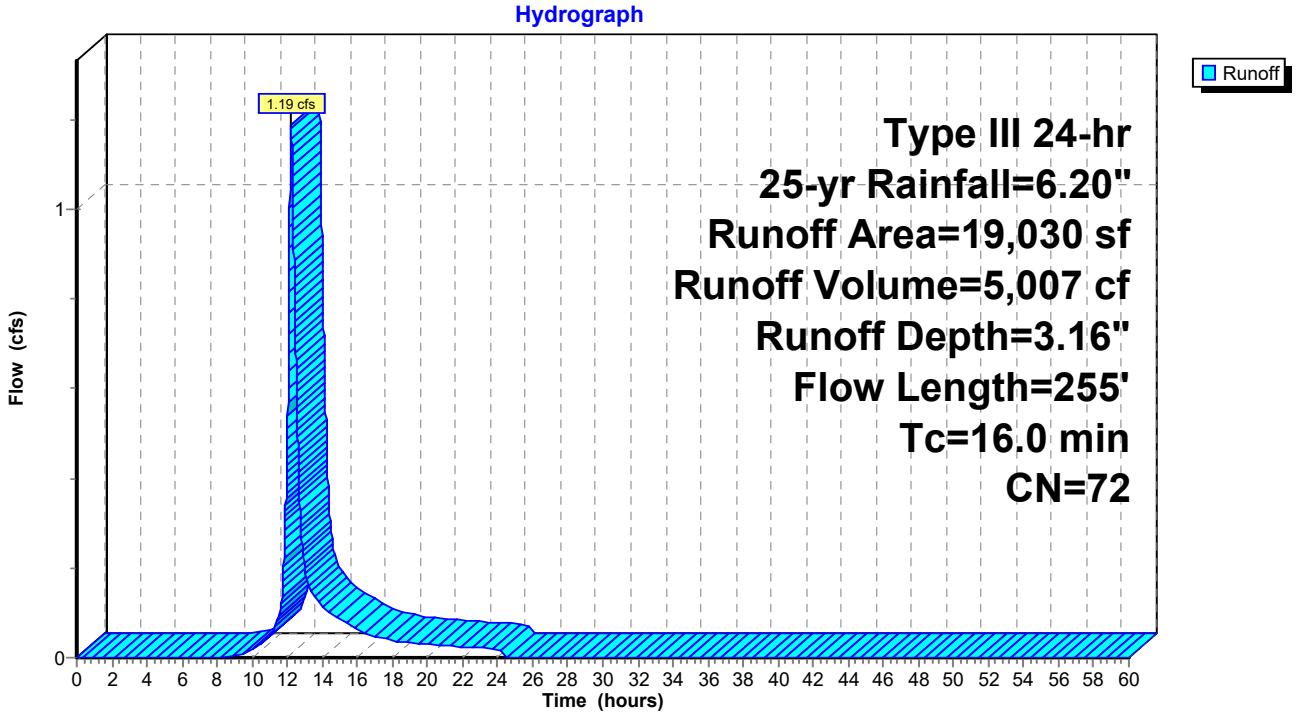
Runoff = 1.19 cfs @ 12.22 hrs, Volume= 5,007 cf, Depth= 3.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.20"

Area (sf)	CN	Description
10,460	74	>75% Grass cover, Good, HSG C
8,570	70	Woods, Good, HSG C
19,030	72	Weighted Average
19,030		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	75	0.0060	0.10		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.29"
2.4	100	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.2	80	0.0250	1.11		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
16.0	255	Total			

Subcatchment 40S: Proposed to South



Summary for Subcatchment 50S: Proposed to WQB

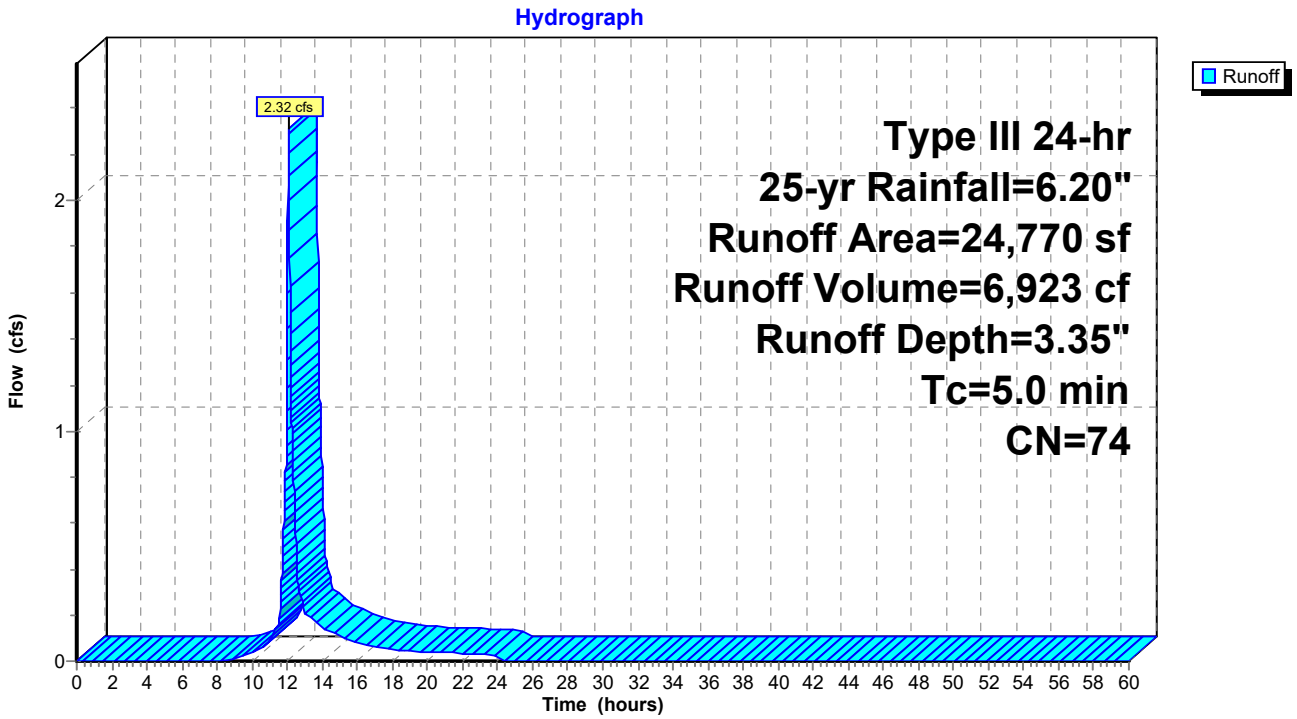
Runoff = 2.32 cfs @ 12.08 hrs, Volume= 6,923 cf, Depth= 3.35"
Routed to Pond 50P : WQB

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.20"

Area (sf)	CN	Description
24,770	74	>75% Grass cover, Good, HSG C
24,770		100.00% Pervious Area

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

Subcatchment 50S: Proposed to WQB



Summary for Subcatchment 81S: Proposed to YD 1

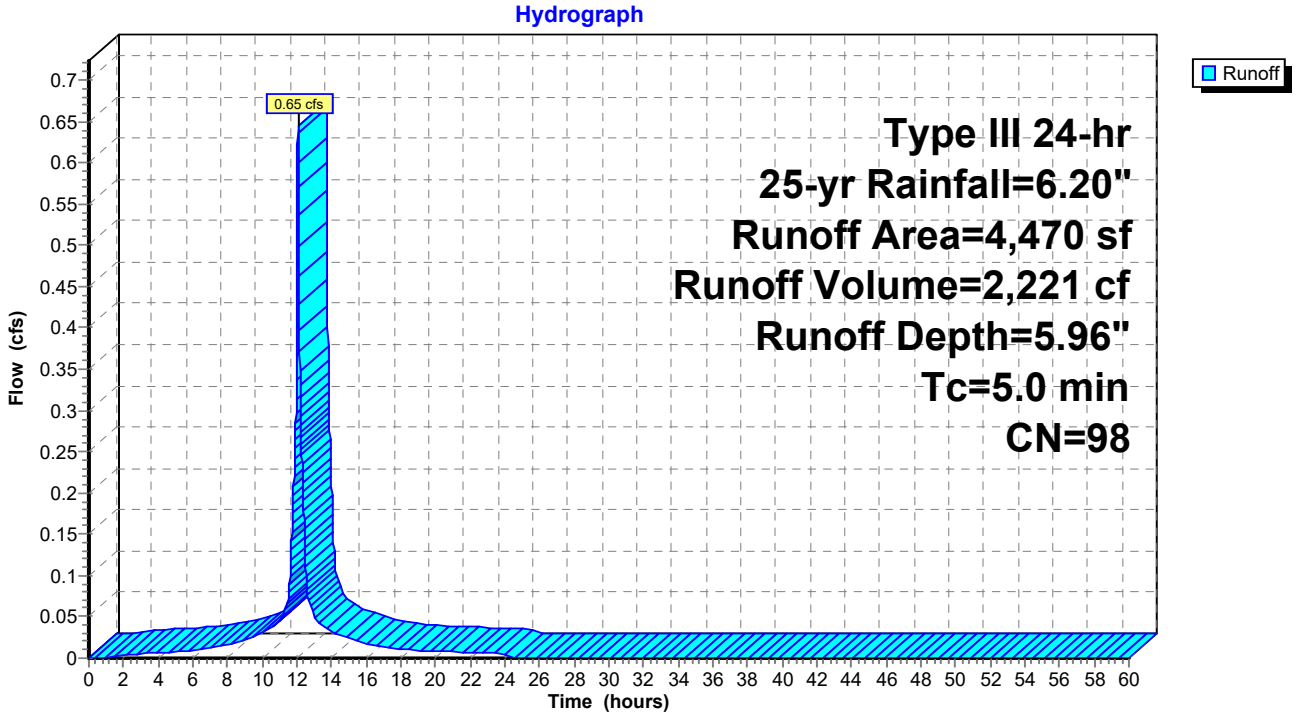
Runoff = 0.65 cfs @ 12.07 hrs, Volume= 2,221 cf, Depth= 5.96"
Routed to Pond 81P : YD 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.20"

	Area (sf)	CN	Description
*	3,200	98	Roof
*	1,270	98	Paved
	4,470	98	Weighted Average
	4,470		100.00% Impervious Area

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

Subcatchment 81S: Proposed to YD 1



Summary for Subcatchment 82S: Proposed to YD 2

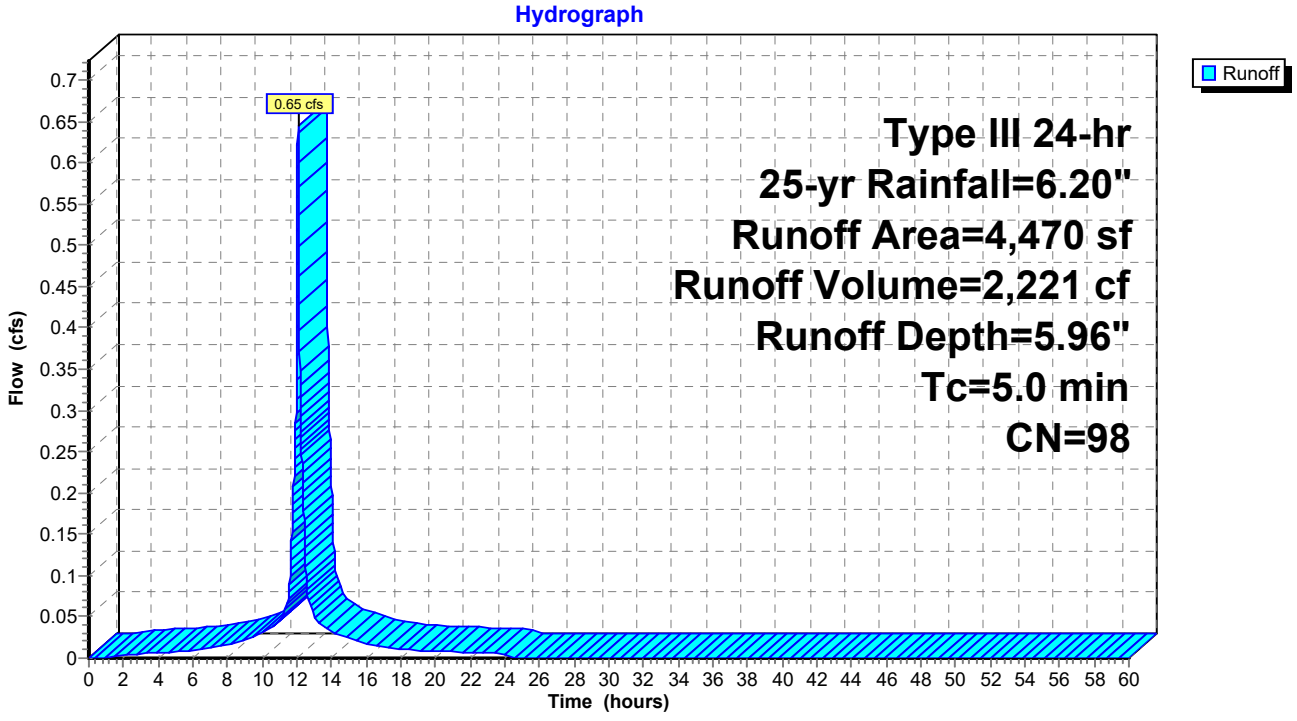
Runoff = 0.65 cfs @ 12.07 hrs, Volume= 2,221 cf, Depth= 5.96"
Routed to Pond 82P : YD 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.20"

	Area (sf)	CN	Description
*	3,200	98	Roof
*	1,270	98	Paved
	4,470	98	Weighted Average
	4,470		100.00% Impervious Area

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

Subcatchment 82S: Proposed to YD 2



Summary for Subcatchment 83S: Proposed to YD 3

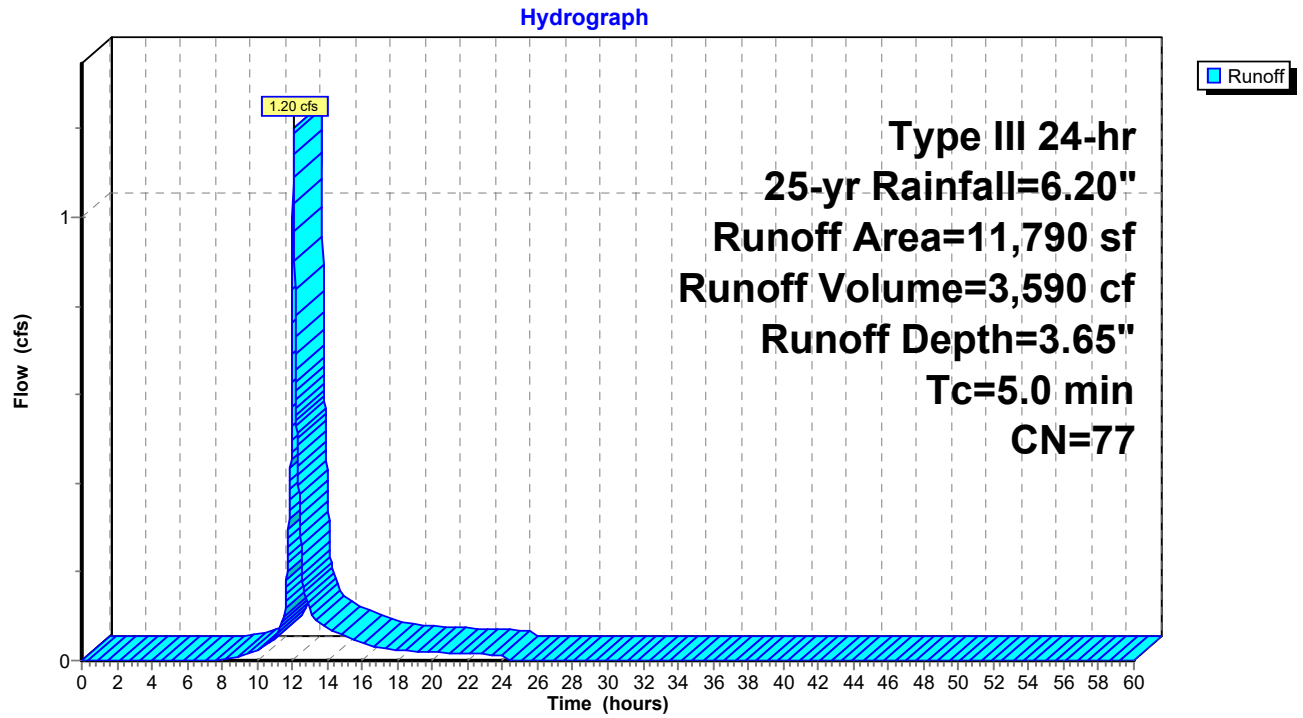
Runoff = 1.20 cfs @ 12.07 hrs, Volume= 3,590 cf, Depth= 3.65"
Routed to Pond 83P : YD 3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.20"

	Area (sf)	CN	Description
*	1,420	98	Paved
	10,370	74	>75% Grass cover, Good, HSG C
	11,790	77	Weighted Average
	10,370		87.96% Pervious Area
	1,420		12.04% Impervious Area

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

Subcatchment 83S: Proposed to YD 3



Summary for Pond 11P: CB 1

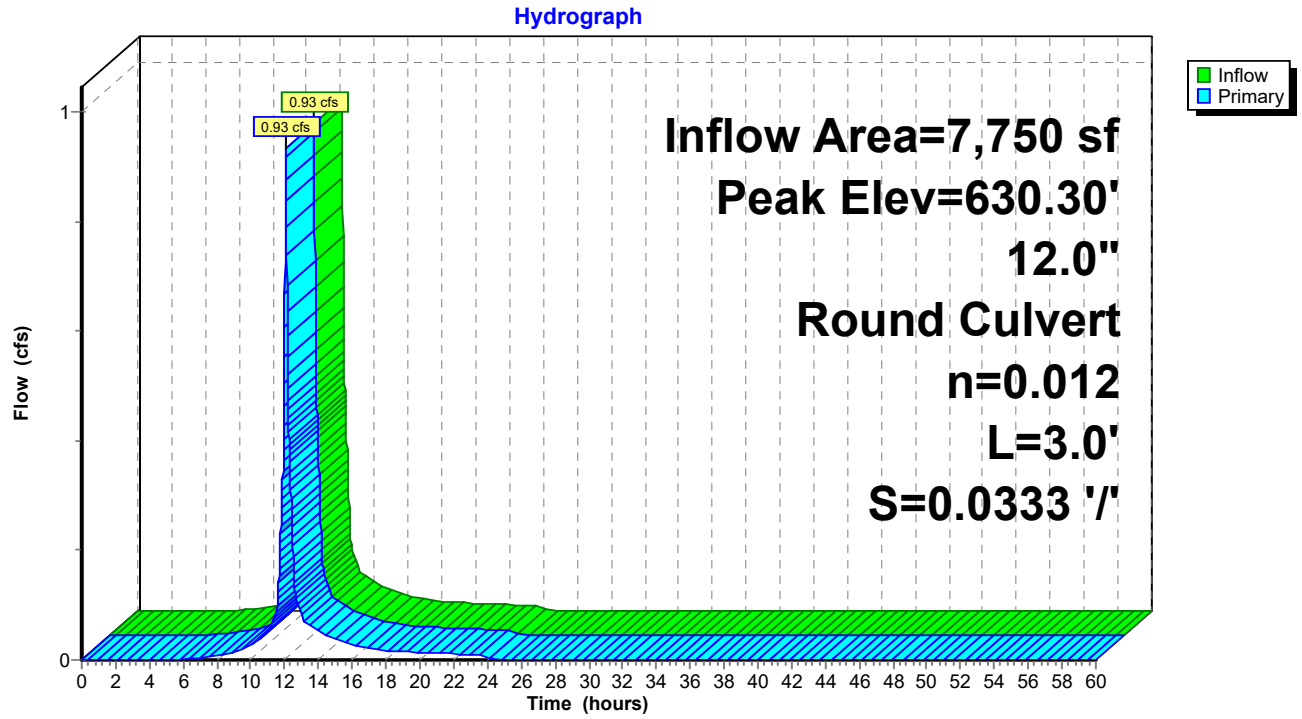
Inflow Area = 7,750 sf, 41.81% Impervious, Inflow Depth = 4.38" for 25-yr event
Inflow = 0.93 cfs @ 12.07 hrs, Volume= 2,831 cf
Outflow = 0.93 cfs @ 12.07 hrs, Volume= 2,831 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.93 cfs @ 12.07 hrs, Volume= 2,831 cf
Routed to Pond 61P : DMH 1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 630.30' @ 12.09 hrs
Flood Elev= 633.20'

Device	Routing	Invert	Outlet Devices
#1	Primary	629.70'	**12.0" Round Culvert** L= 3.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 629.70' / 629.60' S= 0.0333 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.84 cfs @ 12.07 hrs HW=630.28' TW=630.11' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 0.84 cfs @ 2.59 fps)

Pond 11P: CB 1



Summary for Pond 12P: CB 2

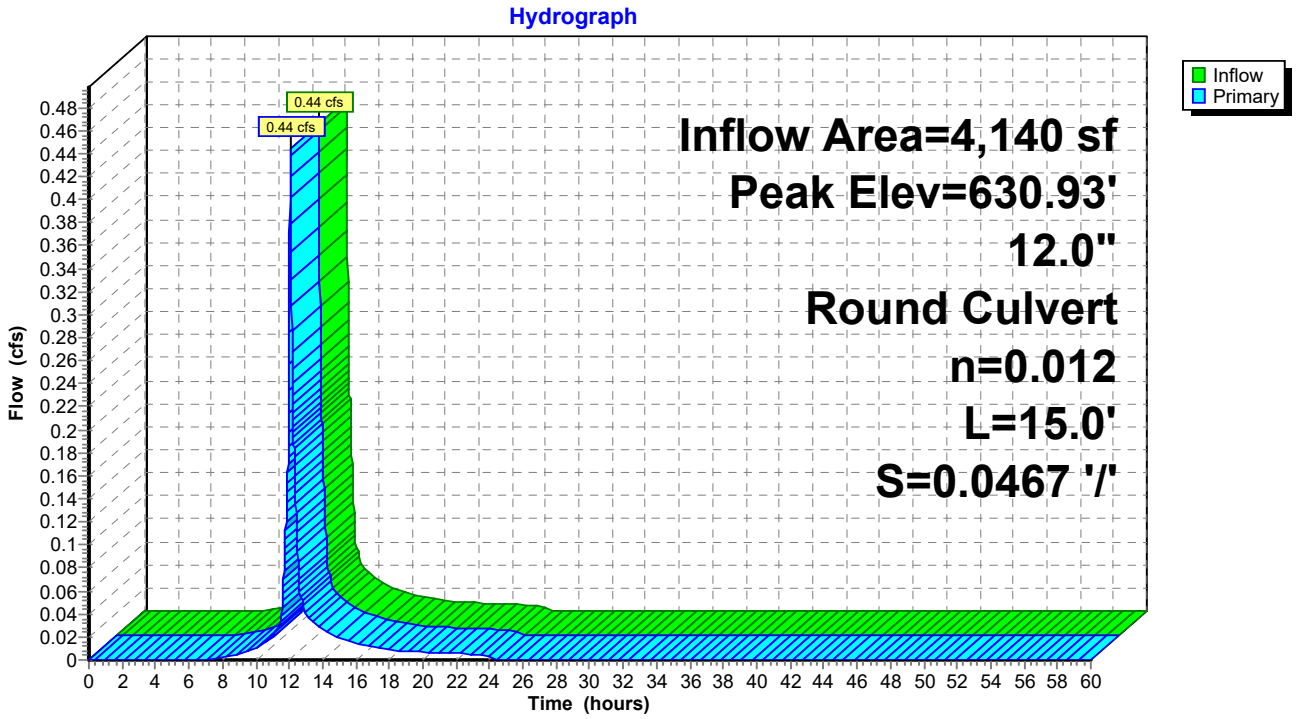
Inflow Area = 4,140 sf, 22.46% Impervious, Inflow Depth = 3.86" for 25-yr event
Inflow = 0.44 cfs @ 12.07 hrs, Volume= 1,331 cf
Outflow = 0.44 cfs @ 12.07 hrs, Volume= 1,331 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.44 cfs @ 12.07 hrs, Volume= 1,331 cf
Routed to Pond 61P : DMH 1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 630.93' @ 12.07 hrs
Flood Elev= 634.10'

Device	Routing	Invert	Outlet Devices
#1	Primary	630.60'	**12.0" Round Culvert** L= 15.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 630.60' / 629.90' S= 0.0467 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.44 cfs @ 12.07 hrs HW=630.93' TW=630.11' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 0.44 cfs @ 1.96 fps)

Pond 12P: CB 2



Summary for Pond 13P: CB 3

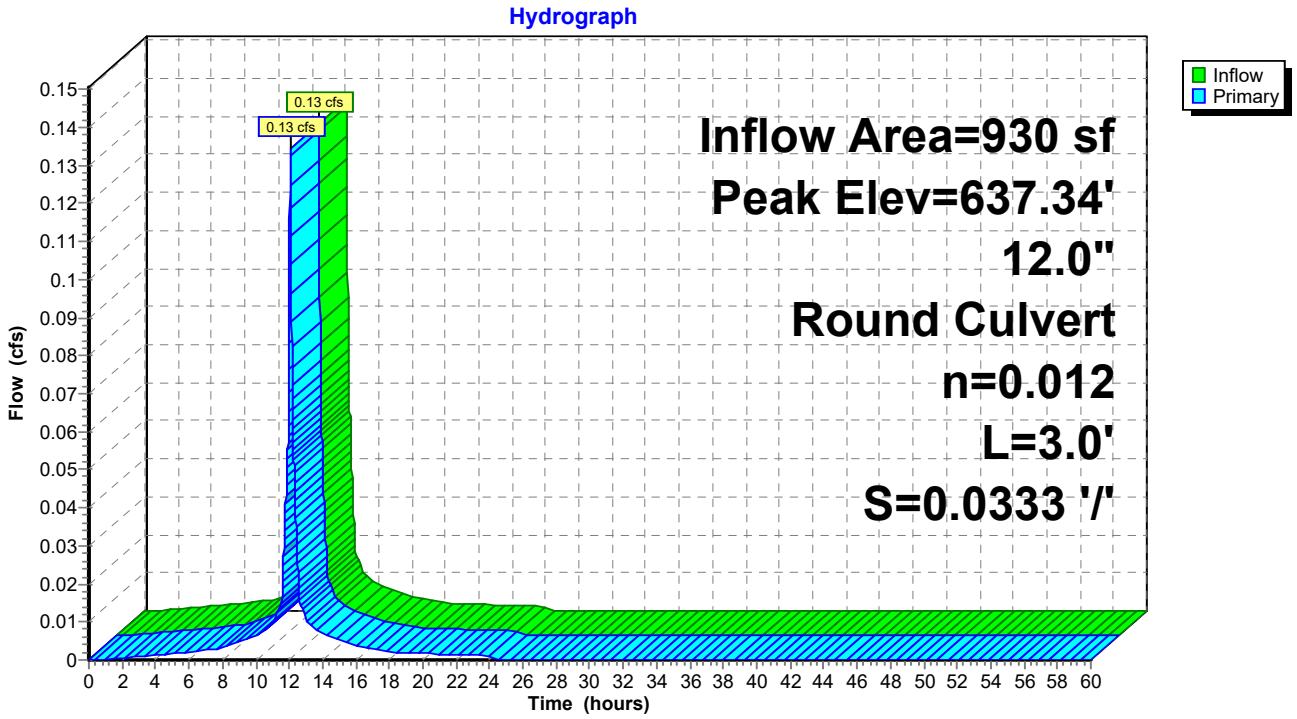
Inflow Area = 930 sf,100.00% Impervious, Inflow Depth = 5.96" for 25-yr event
Inflow = 0.13 cfs @ 12.07 hrs, Volume= 462 cf
Outflow = 0.13 cfs @ 12.07 hrs, Volume= 462 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.13 cfs @ 12.07 hrs, Volume= 462 cf
Routed to Pond 63P : DMH 3

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 637.34' @ 12.08 hrs
Flood Elev= 639.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	636.20'	**12.0" Round Culvert** L= 3.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 636.20' / 636.10' S= 0.0333 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.07 hrs HW=637.32' TW=637.34' (Dynamic Tailwater)
↑—**1=Culvert** (Controls 0.00 cfs)

Pond 13P: CB 3



Summary for Pond 14P: CB 4

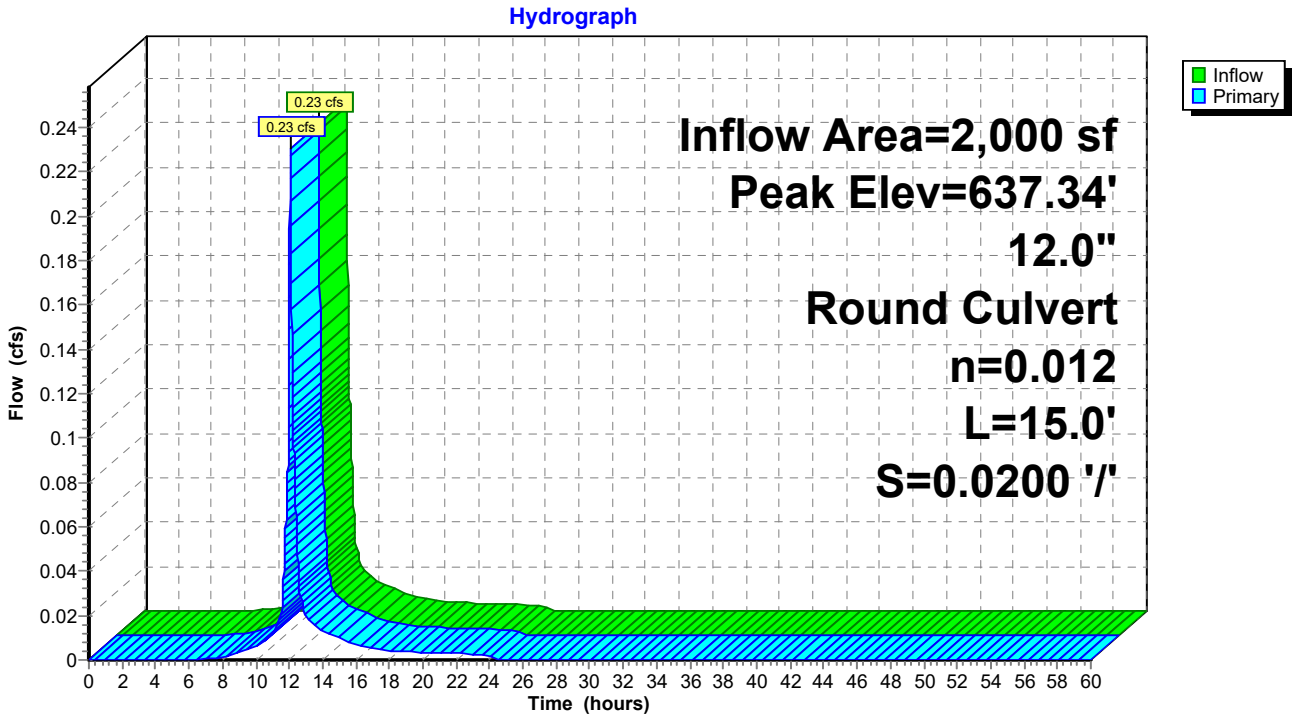
Inflow Area = 2,000 sf, 34.50% Impervious, Inflow Depth = 4.17" for 25-yr event
Inflow = 0.23 cfs @ 12.07 hrs, Volume= 695 cf
Outflow = 0.23 cfs @ 12.07 hrs, Volume= 695 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.23 cfs @ 12.07 hrs, Volume= 695 cf
Routed to Pond 63P : DMH 3

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 637.34' @ 12.08 hrs
Flood Elev= 639.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	636.20'	**12.0" Round Culvert** L= 15.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 636.20' / 635.90' S= 0.0200 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.07 hrs HW=637.32' TW=637.33' (Dynamic Tailwater)
↑—**1=Culvert** (Controls 0.00 cfs)

Pond 14P: CB 4



Summary for Pond 15P: CB 5

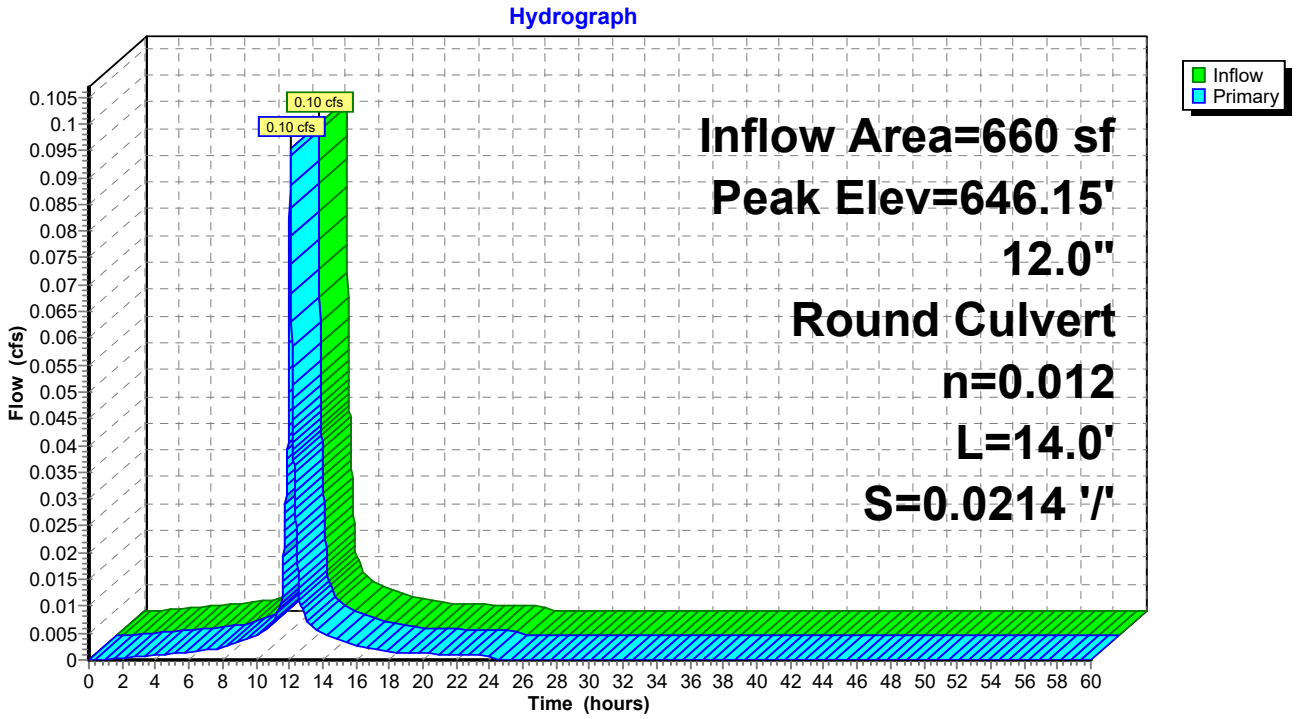
Inflow Area = 660 sf,100.00% Impervious, Inflow Depth = 5.96" for 25-yr event
Inflow = 0.10 cfs @ 12.07 hrs, Volume= 328 cf
Outflow = 0.10 cfs @ 12.07 hrs, Volume= 328 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.10 cfs @ 12.07 hrs, Volume= 328 cf
Routed to Pond 64P : DMH 4

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 646.15' @ 12.07 hrs
Flood Elev= 649.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	646.00'	**12.0" Round Culvert** L= 14.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 646.00' / 645.70' S= 0.0214 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.10 cfs @ 12.07 hrs HW=646.15' TW=644.42' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.10 cfs @ 1.31 fps)

Pond 15P: CB 5



Summary for Pond 16P: CB 6

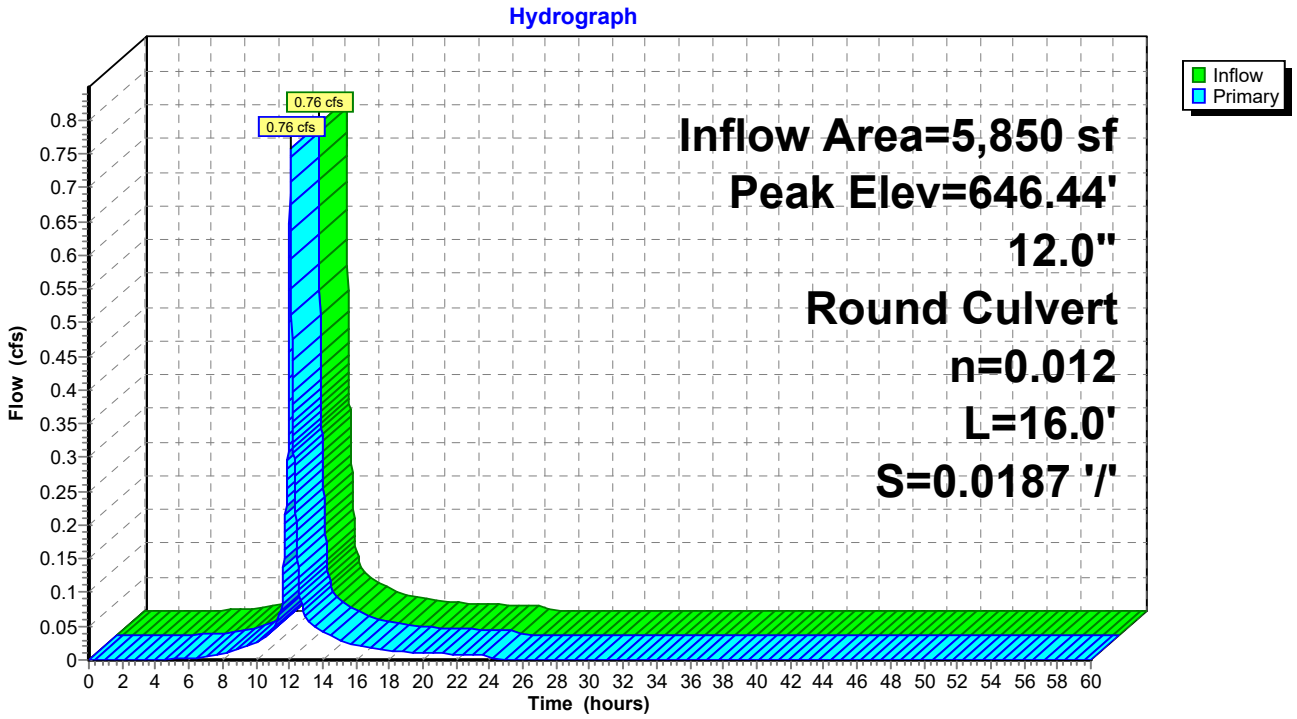
Inflow Area = 5,850 sf, 56.41% Impervious, Inflow Depth = 4.82" for 25-yr event
Inflow = 0.76 cfs @ 12.07 hrs, Volume= 2,349 cf
Outflow = 0.76 cfs @ 12.07 hrs, Volume= 2,349 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.76 cfs @ 12.07 hrs, Volume= 2,349 cf
Routed to Pond 64P : DMH 4

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 646.44' @ 12.07 hrs
Flood Elev= 649.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	646.00'	**12.0" Round Culvert** L= 16.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 646.00' / 645.70' S= 0.0187 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.76 cfs @ 12.07 hrs HW=646.44' TW=644.42' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 0.76 cfs @ 2.26 fps)

Pond 16P: CB 6



Summary for Pond 17P: CB 7

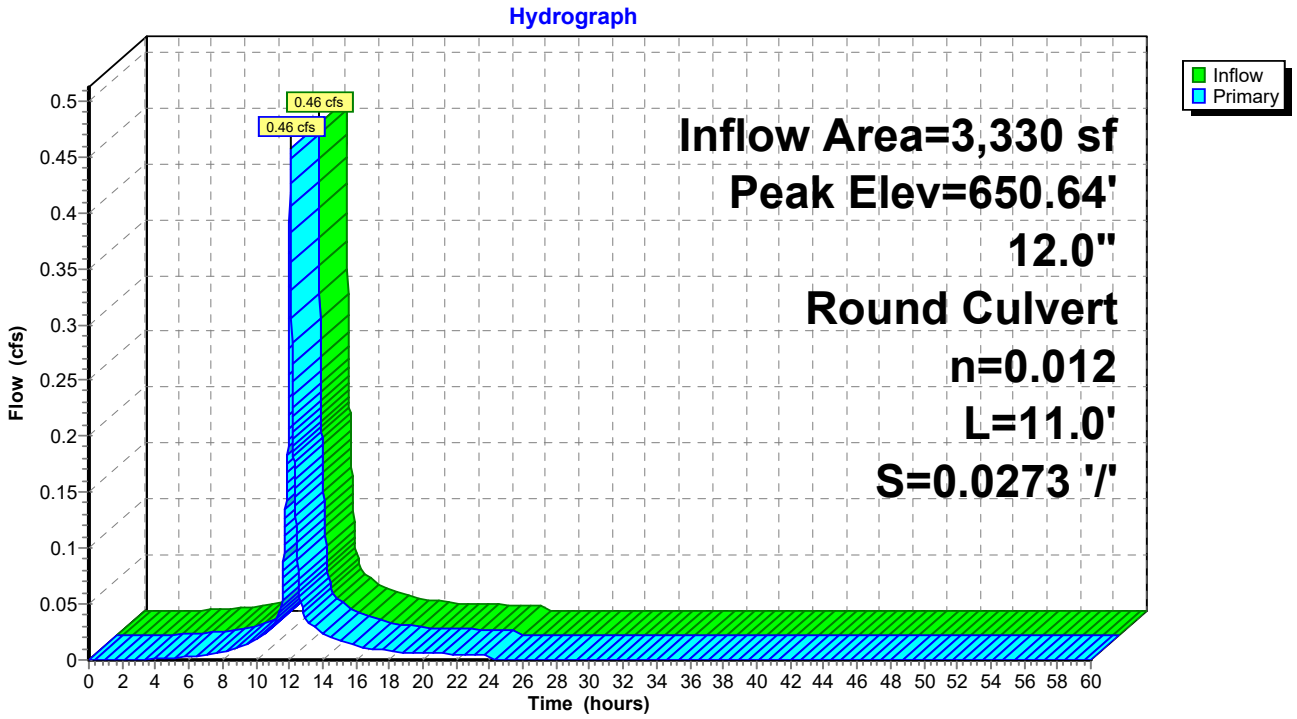
Inflow Area = 3,330 sf, 75.98% Impervious, Inflow Depth = 5.27" for 25-yr event
Inflow = 0.46 cfs @ 12.07 hrs, Volume= 1,461 cf
Outflow = 0.46 cfs @ 12.07 hrs, Volume= 1,461 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.46 cfs @ 12.07 hrs, Volume= 1,461 cf
Routed to Pond 65P : DMH 5

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 650.64' @ 12.07 hrs
Flood Elev= 653.80'

Device	Routing	Invert	Outlet Devices
#1	Primary	650.30'	**12.0" Round Culvert** L= 11.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 650.30' / 650.00' S= 0.0273 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.46 cfs @ 12.07 hrs HW=650.64' TW=647.08' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 0.46 cfs @ 1.97 fps)

Pond 17P: CB 7



Summary for Pond 18P: CB 8

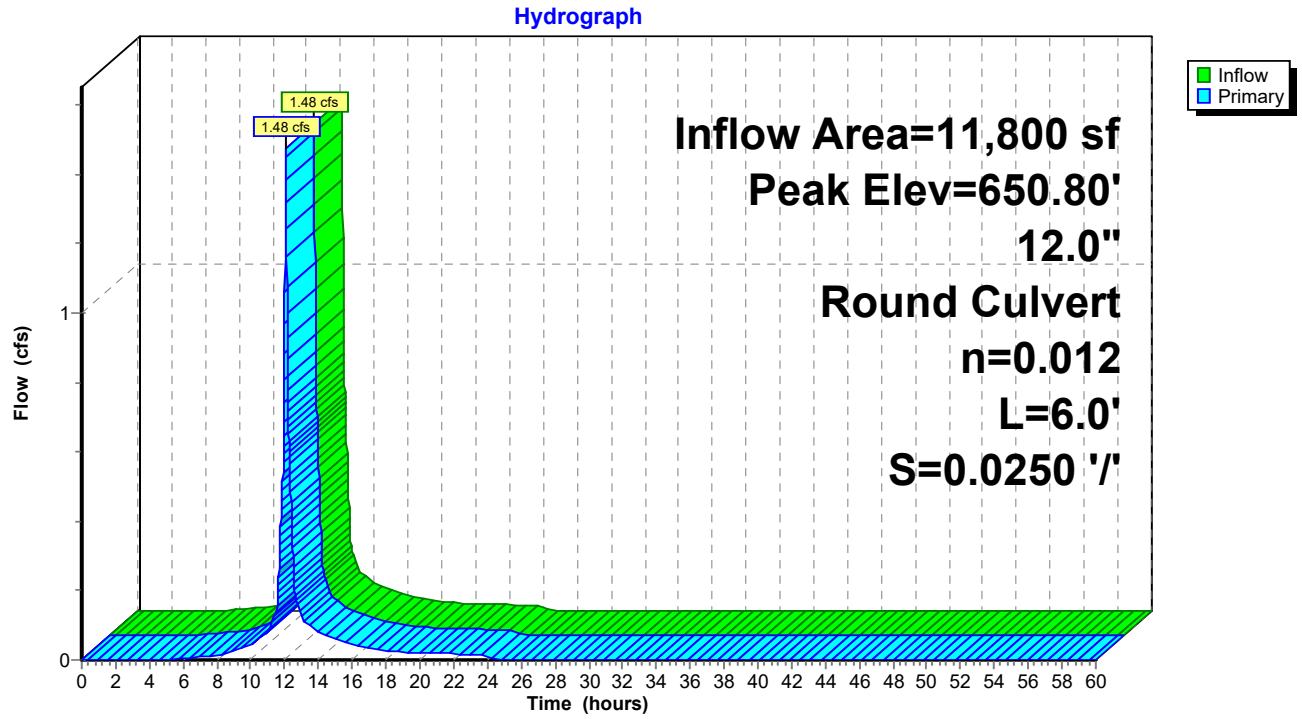
Inflow Area = 11,800 sf, 50.17% Impervious, Inflow Depth = 4.60" for 25-yr event
Inflow = 1.48 cfs @ 12.07 hrs, Volume= 4,523 cf
Outflow = 1.48 cfs @ 12.07 hrs, Volume= 4,523 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.48 cfs @ 12.07 hrs, Volume= 4,523 cf
Routed to Pond 66P : DMH 6

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 650.80' @ 12.07 hrs
Flood Elev= 653.60'

Device	Routing	Invert	Outlet Devices
#1	Primary	650.10'	**12.0" Round Culvert** L= 6.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 650.10' / 649.95' S= 0.0250 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=1.47 cfs @ 12.07 hrs HW=650.80' TW=650.44' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 1.47 cfs @ 3.55 fps)

Pond 18P: CB 8



Summary for Pond 40P: HDS Unit

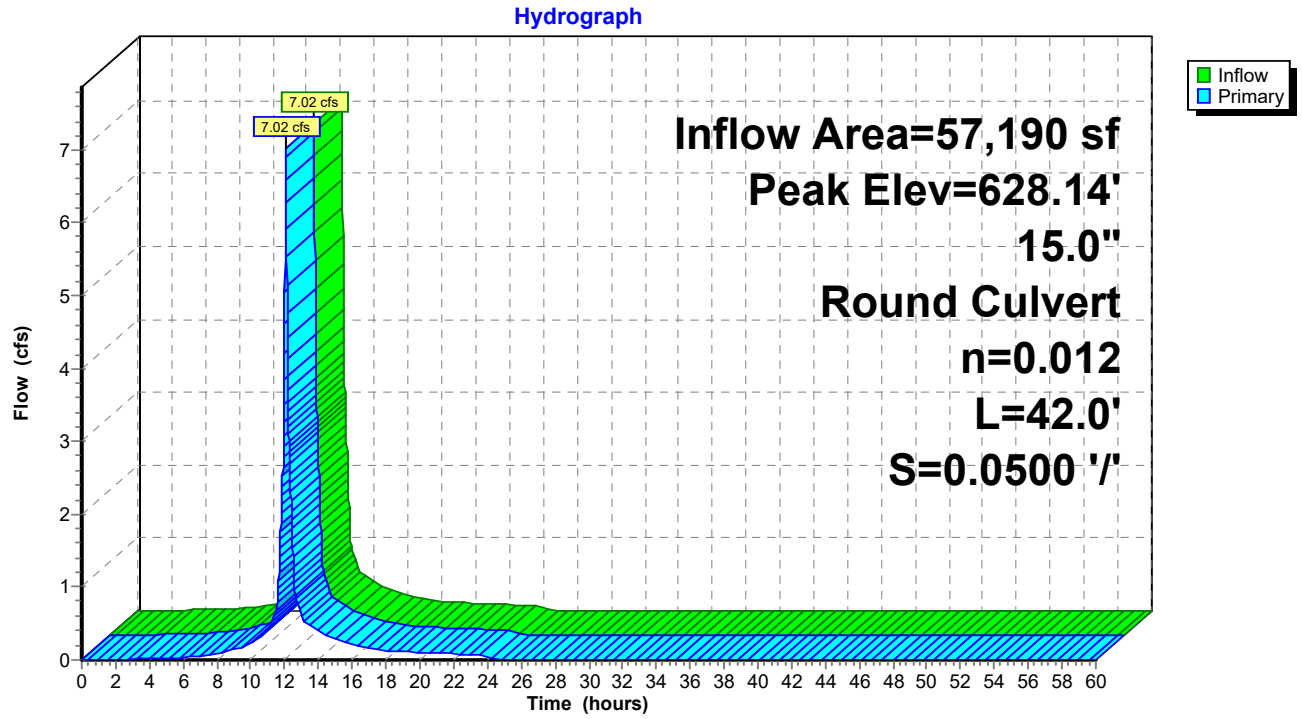
Inflow Area = 57,190 sf, 49.94% Impervious, Inflow Depth = 4.62" for 25-yr event
Inflow = 7.02 cfs @ 12.07 hrs, Volume= 22,013 cf
Outflow = 7.02 cfs @ 12.07 hrs, Volume= 22,013 cf, Atten= 0%, Lag= 0.0 min
Primary = 7.02 cfs @ 12.07 hrs, Volume= 22,013 cf
Routed to Pond 50P : WQB

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 628.14' @ 12.07 hrs
Flood Elev= 653.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	626.10'	**15.0" Round Culvert** L= 42.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 626.10' / 624.00' S= 0.0500 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=7.01 cfs @ 12.07 hrs HW=628.13' TW=625.80' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 7.01 cfs @ 5.71 fps)

Pond 40P: HDS Unit



Summary for Pond 50P: WQB

Inflow Area = 81,960 sf, 34.85% Impervious, Inflow Depth = 4.24" for 25-yr event
Inflow = 9.34 cfs @ 12.07 hrs, Volume= 28,936 cf
Outflow = 1.28 cfs @ 12.59 hrs, Volume= 26,752 cf, Atten= 86%, Lag= 30.9 min
Primary = 1.28 cfs @ 12.59 hrs, Volume= 26,752 cf
Routed to Link 10L : Center Road

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 626.57' @ 12.59 hrs Surf.Area= 6,937 sf Storage= 13,934 cf
Flood Elev= 630.00' Surf.Area= 11,884 sf Storage= 45,891 cf

Plug-Flow detention time= 188.0 min calculated for 26,752 cf (92% of inflow)
Center-of-Mass det. time= 148.4 min (945.1 - 796.7)

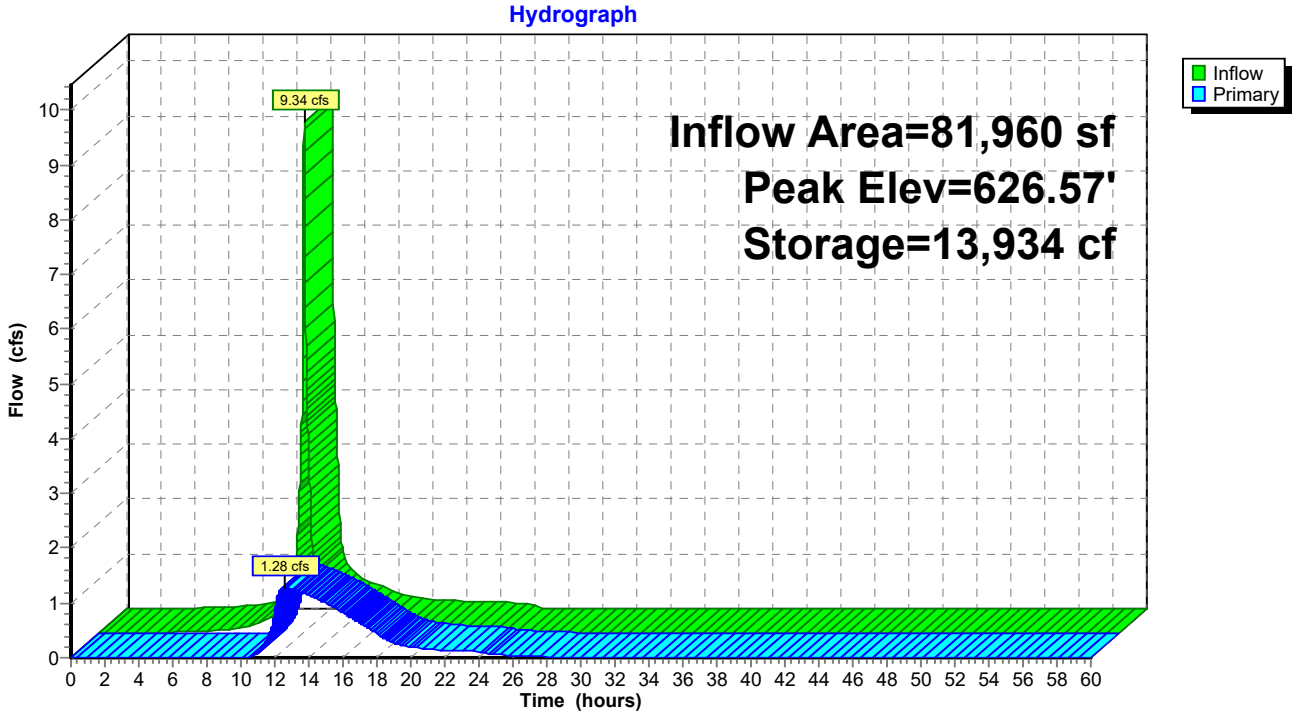
Volume	Invert	Avail.Storage	Storage Description
#1	624.00'	45,891 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
624.00	4,019	300.6	0	0	4,019
625.00	5,066	331.0	4,532	4,532	5,579
626.00	6,226	362.2	5,636	10,168	7,335
627.00	7,493	392.8	6,850	17,018	9,212
628.00	8,879	424.2	8,176	25,194	11,294
629.00	10,333	449.9	9,597	34,791	13,134
630.00	11,884	475.7	11,099	45,891	15,090

Device	Routing	Invert	Outlet Devices
#1	Primary	623.00'	**12.0" Round Culvert** L= 46.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 623.00' / 620.30' S= 0.0587 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	624.50'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	628.50'	**6.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=1.28 cfs @ 12.59 hrs HW=626.57' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 1.28 cfs of 6.63 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 1.28 cfs @ 6.50 fps)
  └─**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 50P: WQB


Hydrograph
Inflow Area=81,960 sf
Peak Elev=626.57'
Storage=13,934 cf
9.34 cfs
1.28 cfs
Inflow
Primary
Flow (cfs)
Time (hours)
0 1 2 3 4 5 6 7 8 9 10
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60

Summary for Pond 61P: DMH 1

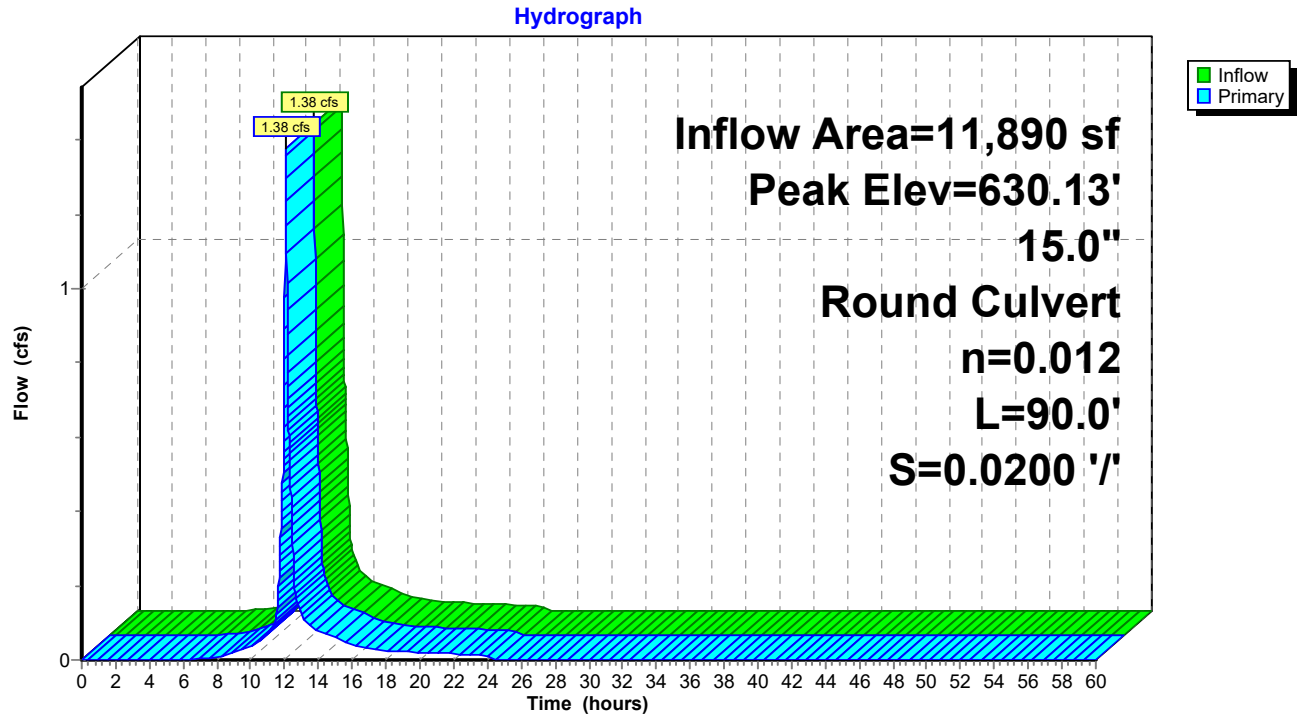
Inflow Area = 11,890 sf, 35.07% Impervious, Inflow Depth = 4.20" for 25-yr event
Inflow = 1.38 cfs @ 12.07 hrs, Volume= 4,163 cf
Outflow = 1.38 cfs @ 12.07 hrs, Volume= 4,163 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.38 cfs @ 12.07 hrs, Volume= 4,163 cf
Routed to Pond 62P : DMH 2

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 630.13' @ 12.08 hrs
Flood Elev= 633.40'

Device	Routing	Invert	Outlet Devices
#1	Primary	629.50'	**15.0" Round Culvert** L= 90.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 629.50' / 627.70' S= 0.0200 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=1.28 cfs @ 12.07 hrs HW=630.11' TW=629.52' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 1.28 cfs @ 3.14 fps)

Pond 61P: DMH 1



Summary for Pond 62P: DMH 2

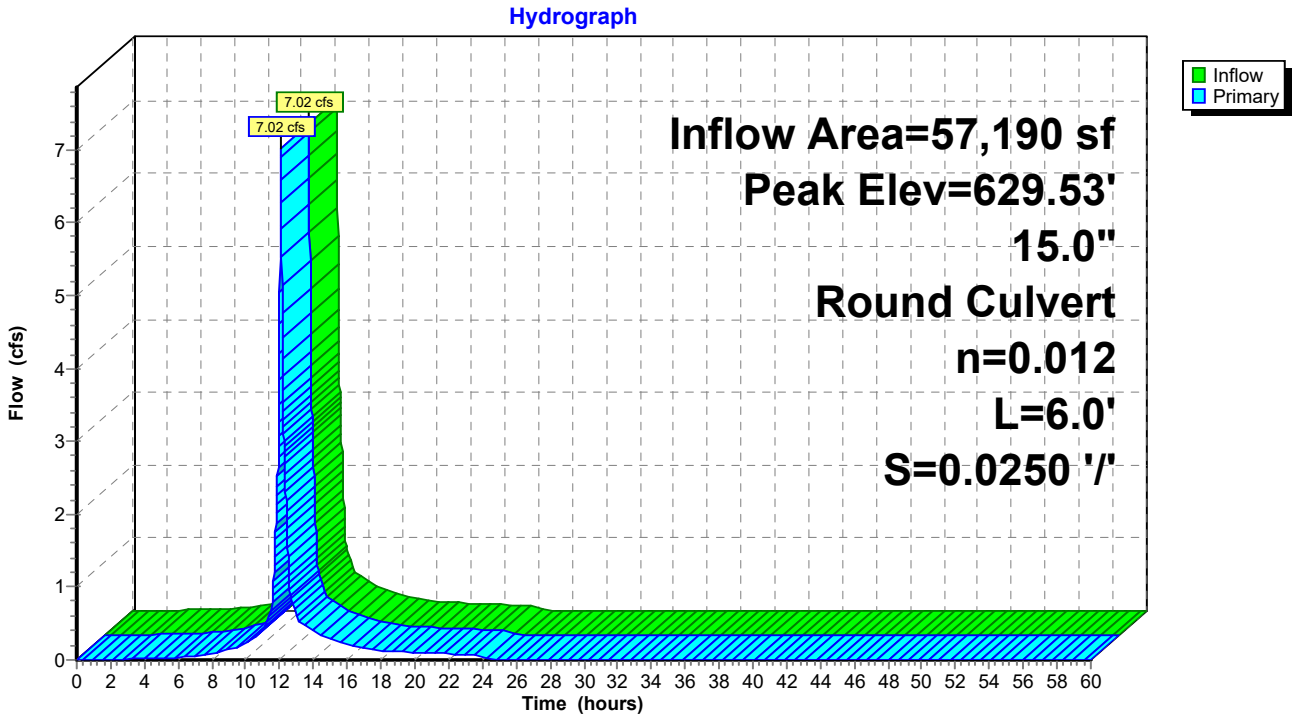
Inflow Area = 57,190 sf, 49.94% Impervious, Inflow Depth = 4.62" for 25-yr event
Inflow = 7.02 cfs @ 12.07 hrs, Volume= 22,013 cf
Outflow = 7.02 cfs @ 12.07 hrs, Volume= 22,013 cf, Atten= 0%, Lag= 0.0 min
Primary = 7.02 cfs @ 12.07 hrs, Volume= 22,013 cf
Routed to Pond 40P : HDS Unit

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 629.53' @ 12.08 hrs
Flood Elev= 637.60'

Device	Routing	Invert	Outlet Devices
#1	Primary	626.25'	**15.0" Round Culvert** L= 6.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 626.25' / 626.10' S= 0.0250 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=6.95 cfs @ 12.07 hrs HW=629.51' TW=628.13' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 6.95 cfs @ 5.66 fps)

Pond 62P: DMH 2



Summary for Pond 63P: DMH 3

[80] Warning: Exceeded Pond 13P by 0.10' @ 12.03 hrs (1.14 cfs 339 cf)
[80] Warning: Exceeded Pond 14P by 0.10' @ 12.03 hrs (1.04 cfs 281 cf)

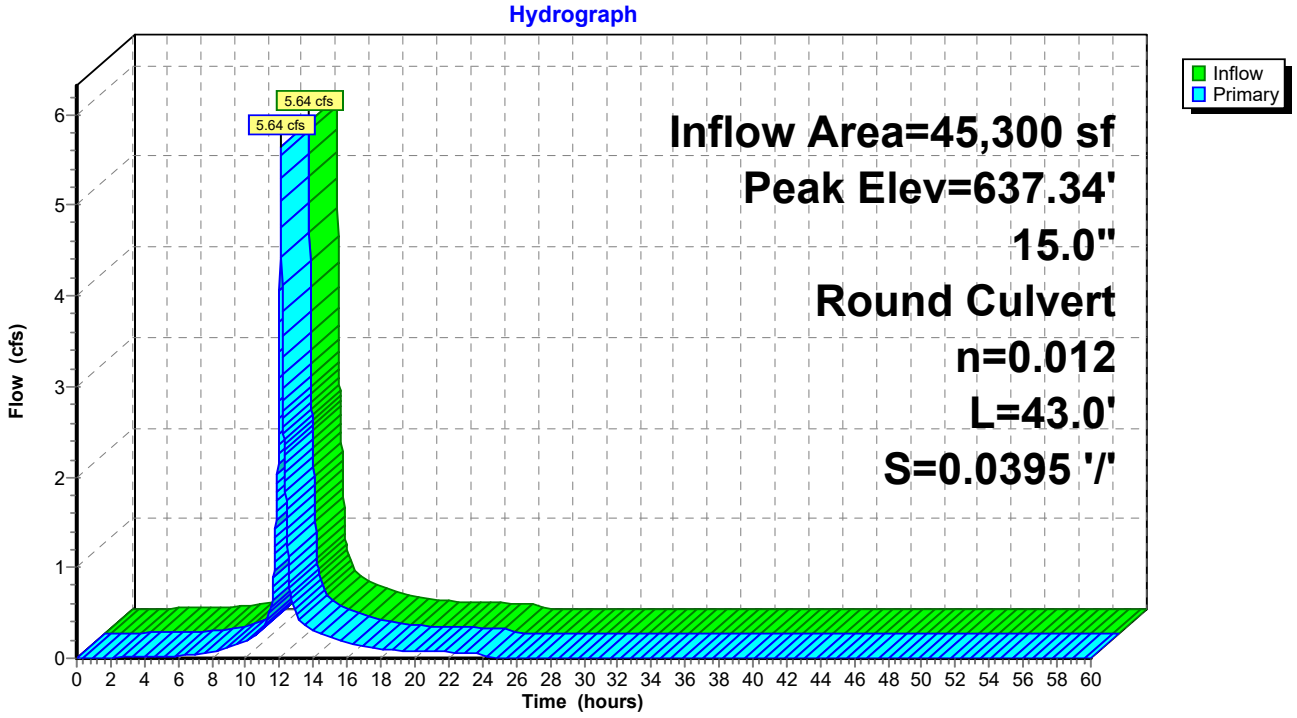
Inflow Area = 45,300 sf, 53.84% Impervious, Inflow Depth = 4.73" for 25-yr event
Inflow = 5.64 cfs @ 12.07 hrs, Volume= 17,851 cf
Outflow = 5.64 cfs @ 12.07 hrs, Volume= 17,851 cf, Atten= 0%, Lag= 0.0 min
Primary = 5.64 cfs @ 12.07 hrs, Volume= 17,851 cf
Routed to Pond 62P : DMH 2

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 637.34' @ 12.07 hrs
Flood Elev= 642.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	635.80'	**15.0" Round Culvert** L= 43.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 635.80' / 634.10' S= 0.0395 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=5.64 cfs @ 12.07 hrs HW=637.33' TW=629.51' (Dynamic Tailwater)
↳**1=Culvert** (Inlet Controls 5.64 cfs @ 4.59 fps)

Pond 63P: DMH 3



Summary for Pond 64P: DMH 4

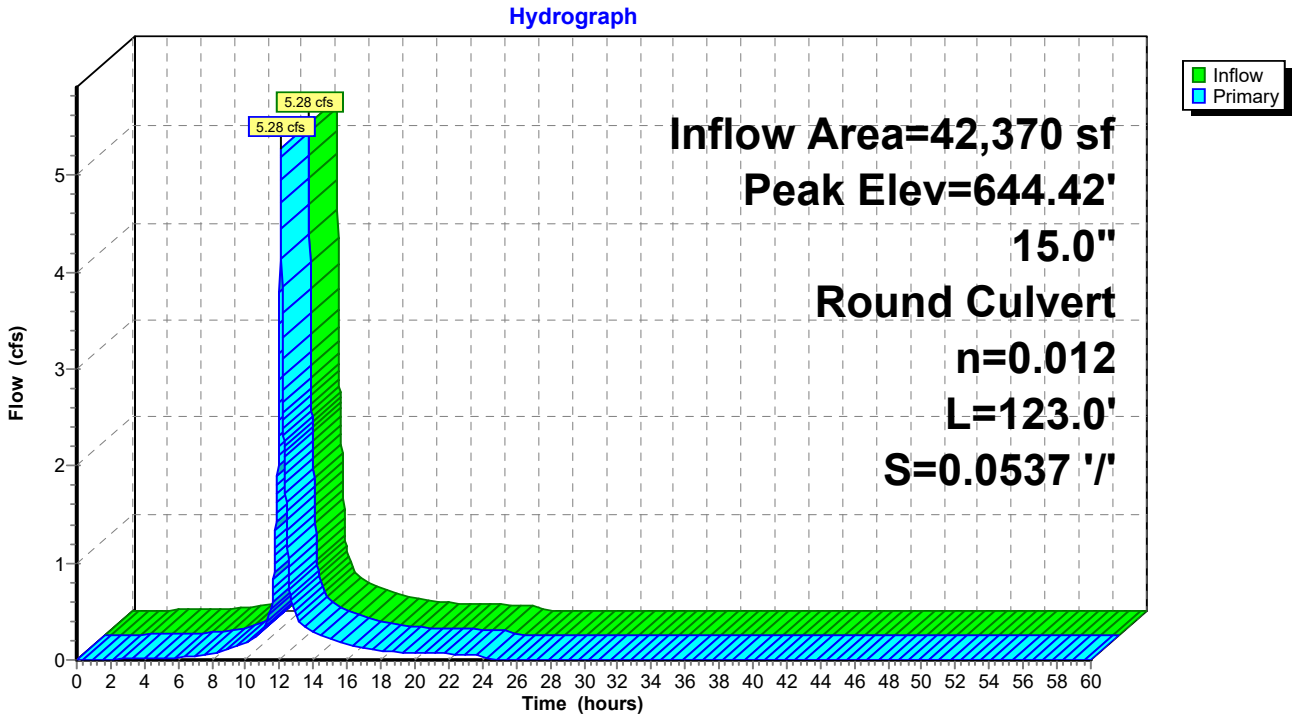
Inflow Area = 42,370 sf, 53.74% Impervious, Inflow Depth = 4.73" for 25-yr event
Inflow = 5.28 cfs @ 12.07 hrs, Volume= 16,693 cf
Outflow = 5.28 cfs @ 12.07 hrs, Volume= 16,693 cf, Atten= 0%, Lag= 0.0 min
Primary = 5.28 cfs @ 12.07 hrs, Volume= 16,693 cf
Routed to Pond 63P : DMH 3

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 644.42' @ 12.07 hrs
Flood Elev= 649.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	643.00'	**15.0" Round Culvert** L= 123.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 643.00' / 636.40' S= 0.0537 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=5.27 cfs @ 12.07 hrs HW=644.42' TW=637.33' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 5.27 cfs @ 4.30 fps)

Pond 64P: DMH 4



Summary for Pond 65P: DMH 5

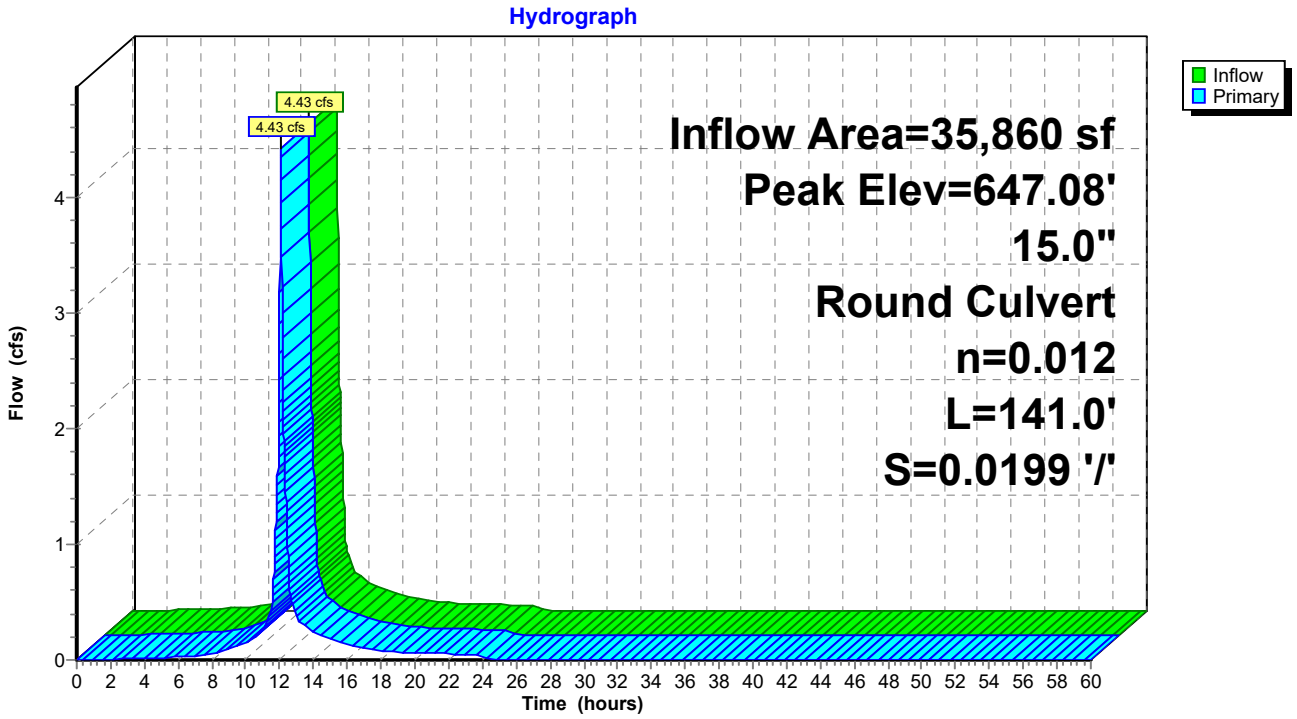
Inflow Area = 35,860 sf, 52.45% Impervious, Inflow Depth = 4.69" for 25-yr event
Inflow = 4.43 cfs @ 12.07 hrs, Volume= 14,016 cf
Outflow = 4.43 cfs @ 12.07 hrs, Volume= 14,016 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.43 cfs @ 12.07 hrs, Volume= 14,016 cf
Routed to Pond 64P : DMH 4

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 647.08' @ 12.07 hrs
Flood Elev= 654.20'

Device	Routing	Invert	Outlet Devices
#1	Primary	645.90'	**15.0" Round Culvert** L= 141.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 645.90' / 643.10' S= 0.0199 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=4.42 cfs @ 12.07 hrs HW=647.08' TW=644.42' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 4.42 cfs @ 3.69 fps)

Pond 65P: DMH 5



Summary for Pond 66P: DMH 6

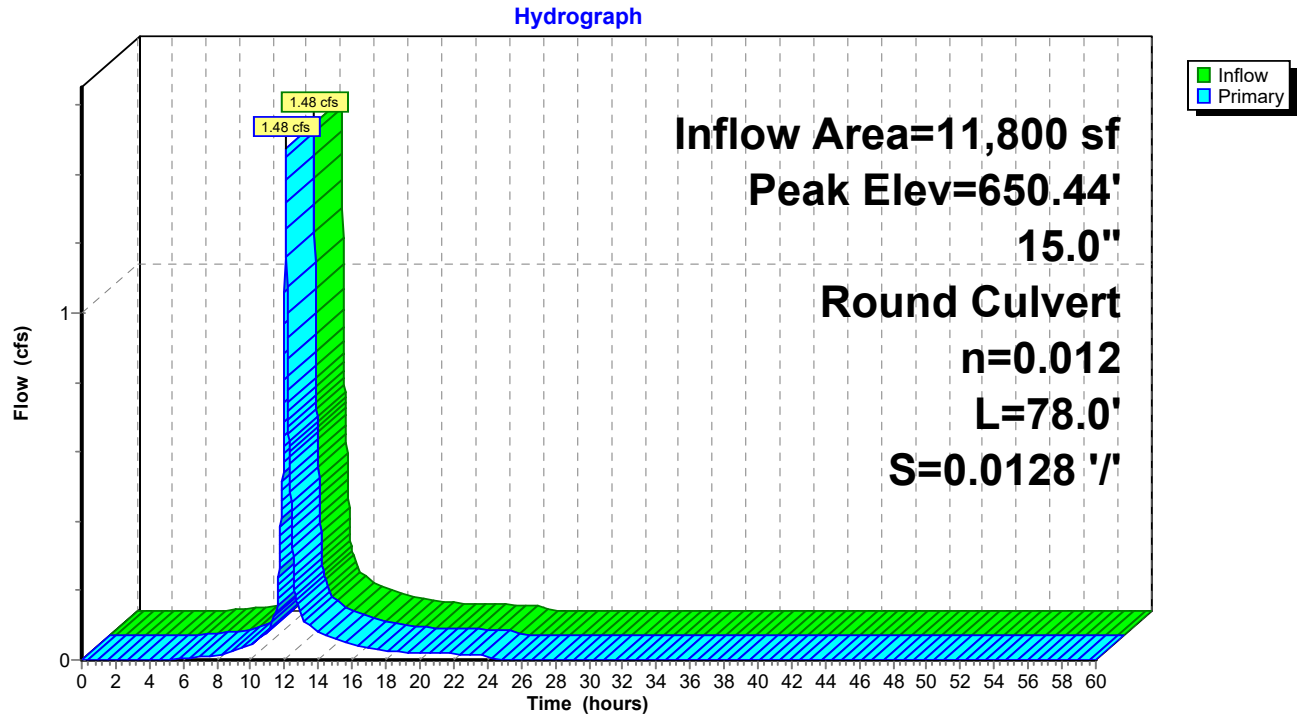
Inflow Area = 11,800 sf, 50.17% Impervious, Inflow Depth = 4.60" for 25-yr event
Inflow = 1.48 cfs @ 12.07 hrs, Volume= 4,523 cf
Outflow = 1.48 cfs @ 12.07 hrs, Volume= 4,523 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.48 cfs @ 12.07 hrs, Volume= 4,523 cf
Routed to Pond 65P : DMH 5

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 650.44' @ 12.07 hrs
Flood Elev= 654.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	649.85'	**15.0" Round Culvert** L= 78.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 649.85' / 648.85' S= 0.0128 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=1.47 cfs @ 12.07 hrs HW=650.44' TW=647.08' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 1.47 cfs @ 2.61 fps)

Pond 66P: DMH 6



Summary for Pond 67P: DMH 7

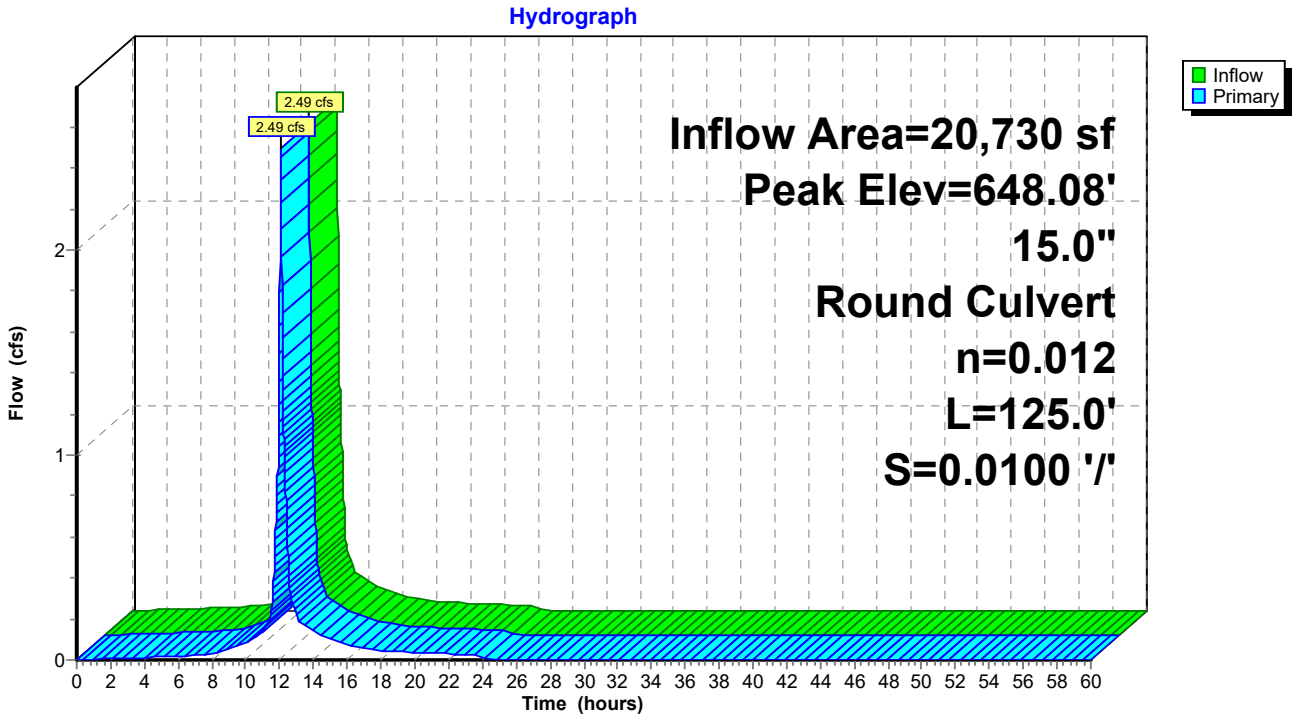
Inflow Area = 20,730 sf, 49.98% Impervious, Inflow Depth = 4.65" for 25-yr event
Inflow = 2.49 cfs @ 12.07 hrs, Volume= 8,032 cf
Outflow = 2.49 cfs @ 12.07 hrs, Volume= 8,032 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.49 cfs @ 12.07 hrs, Volume= 8,032 cf
Routed to Pond 65P : DMH 5

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 648.08' @ 12.08 hrs
Flood Elev= 654.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	647.25'	**15.0" Round Culvert** L= 125.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 647.25' / 646.00' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=2.48 cfs @ 12.07 hrs HW=648.08' TW=647.08' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 2.48 cfs @ 4.04 fps)

Pond 67P: DMH 7



Summary for Pond 81P: YD 1

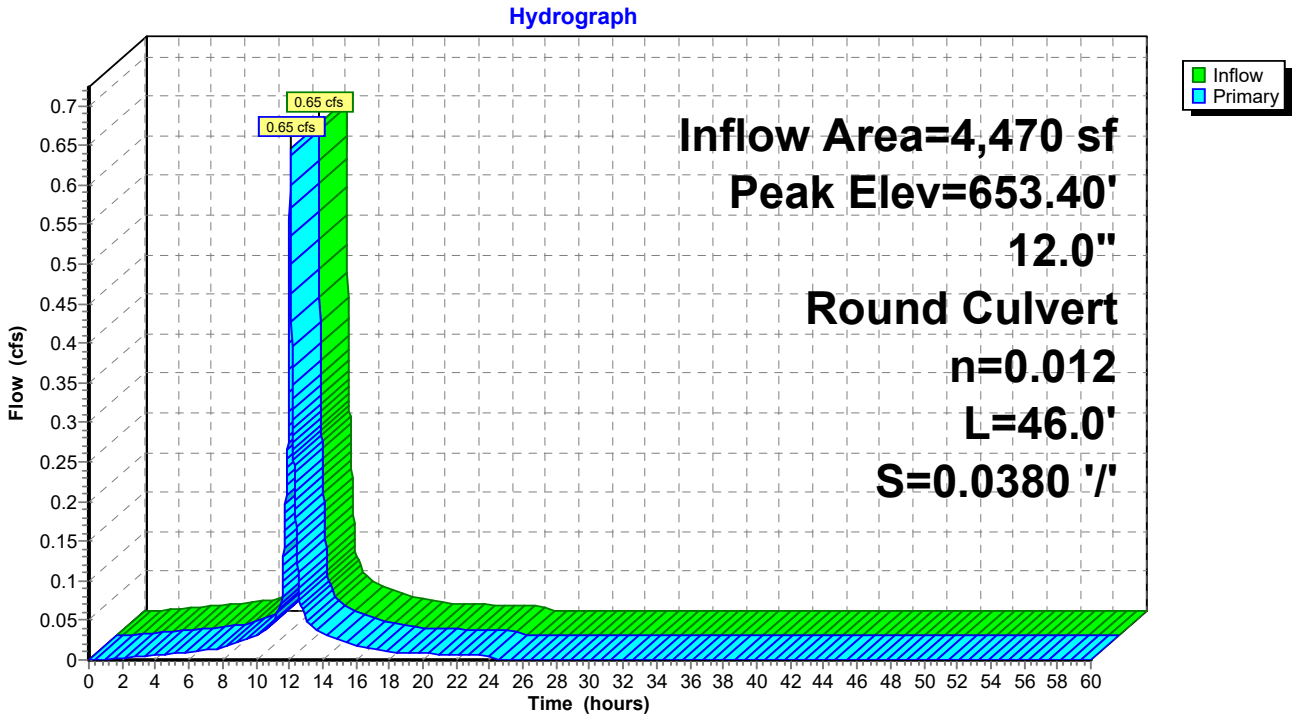
Inflow Area = 4,470 sf,100.00% Impervious, Inflow Depth = 5.96" for 25-yr event
Inflow = 0.65 cfs @ 12.07 hrs, Volume= 2,221 cf
Outflow = 0.65 cfs @ 12.07 hrs, Volume= 2,221 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.65 cfs @ 12.07 hrs, Volume= 2,221 cf
Routed to Pond 83P : YD 3

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 653.40' @ 12.07 hrs
Flood Elev= 656.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	653.00'	**12.0" Round Culvert** L= 46.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 653.00' / 651.25' S= 0.0380 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.65 cfs @ 12.07 hrs HW=653.40' TW=652.21' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 0.65 cfs @ 2.17 fps)

Pond 81P: YD 1



Summary for Pond 82P: YD 2

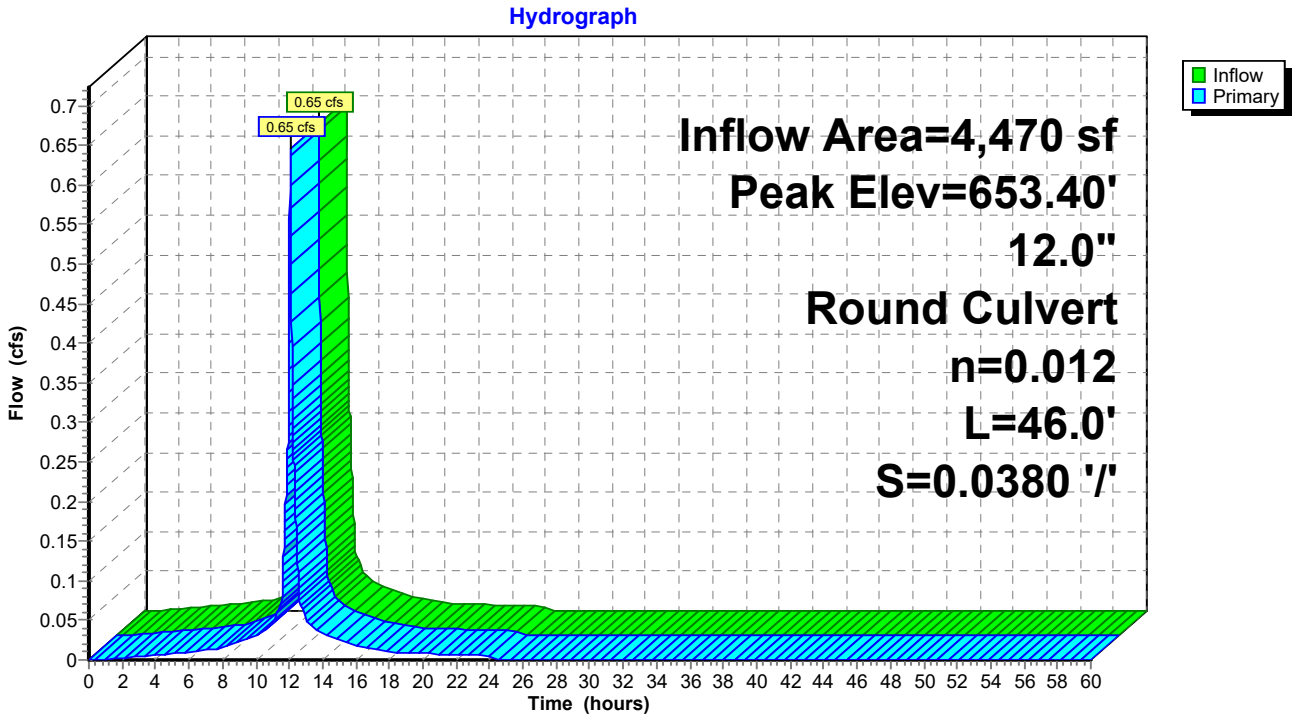
Inflow Area = 4,470 sf,100.00% Impervious, Inflow Depth = 5.96" for 25-yr event
Inflow = 0.65 cfs @ 12.07 hrs, Volume= 2,221 cf
Outflow = 0.65 cfs @ 12.07 hrs, Volume= 2,221 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.65 cfs @ 12.07 hrs, Volume= 2,221 cf
Routed to Pond 83P : YD 3

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 653.40' @ 12.07 hrs
Flood Elev= 656.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	653.00'	**12.0" Round Culvert** L= 46.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 653.00' / 651.25' S= 0.0380 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.65 cfs @ 12.07 hrs HW=653.40' TW=652.21' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 0.65 cfs @ 2.17 fps)

Pond 82P: YD 2



Summary for Pond 83P: YD 3

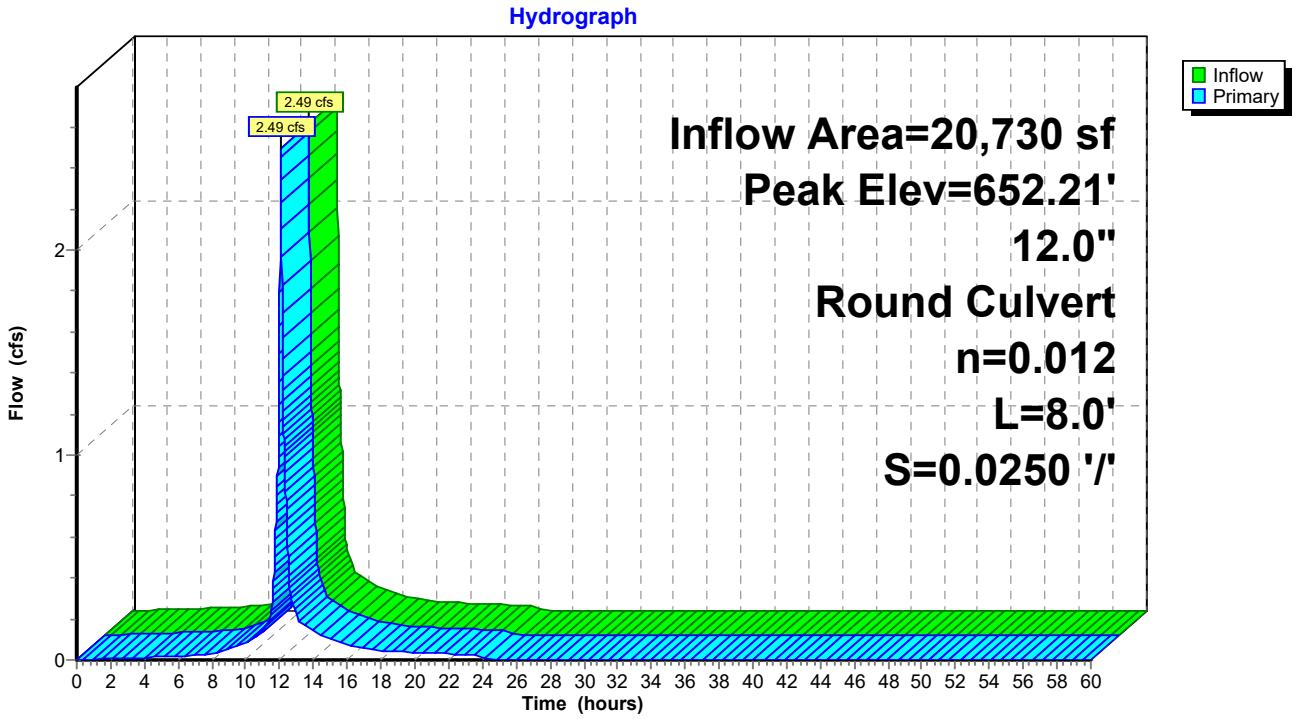
Inflow Area = 20,730 sf, 49.98% Impervious, Inflow Depth = 4.65" for 25-yr event
Inflow = 2.49 cfs @ 12.07 hrs, Volume= 8,032 cf
Outflow = 2.49 cfs @ 12.07 hrs, Volume= 8,032 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.49 cfs @ 12.07 hrs, Volume= 8,032 cf
Routed to Pond 67P : DMH 7

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 652.21' @ 12.07 hrs
Flood Elev= 654.75'

Device	Routing	Invert	Outlet Devices
#1	Primary	651.25'	**12.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 651.25' / 651.05' S= 0.0250 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=2.49 cfs @ 12.07 hrs HW=652.21' TW=648.08' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 2.49 cfs @ 4.12 fps)

Pond 83P: YD 3

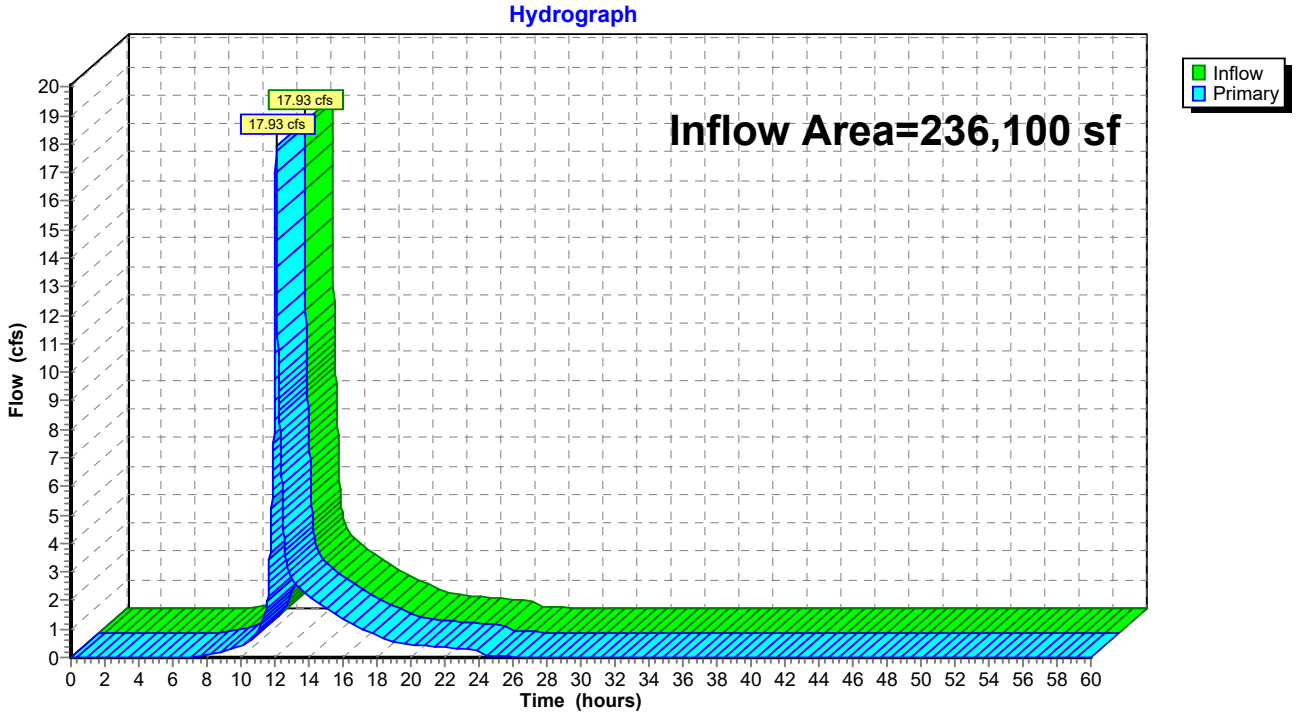


Summary for Link 10L: Center Road

Inflow Area = 236,100 sf, 28.76% Impervious, Inflow Depth = 3.95" for 25-yr event
Inflow = 17.93 cfs @ 12.07 hrs, Volume= 77,647 cf
Primary = 17.93 cfs @ 12.07 hrs, Volume= 77,647 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs

Link 10L: Center Road



Time span=0.00-60.00 hrs, dt=0.01 hrs, 6001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment10S: Proposed to Center Runoff Area=154,140 sf 25.53% Impervious Runoff Depth=5.56"
Tc=5.0 min CN=80 Runoff=23.54 cfs 71,411 cf

Subcatchment11S: Proposed to CB 1 Runoff Area=7,750 sf 41.81% Impervious Runoff Depth=6.03"
Tc=5.0 min CN=84 Runoff=1.26 cfs 3,893 cf

Subcatchment12S: Proposed to CB 2 Runoff Area=4,140 sf 22.46% Impervious Runoff Depth=5.44"
Tc=5.0 min CN=79 Runoff=0.62 cfs 1,878 cf

Subcatchment13S: Proposed to CB 3 Runoff Area=930 sf 100.00% Impervious Runoff Depth=7.69"
Tc=5.0 min CN=98 Runoff=0.17 cfs 596 cf

Subcatchment14S: Proposed to CB 4 Runoff Area=2,000 sf 34.50% Impervious Runoff Depth=5.79"
Tc=5.0 min CN=82 Runoff=0.32 cfs 966 cf

Subcatchment15S: Proposed to CB 5 Runoff Area=660 sf 100.00% Impervious Runoff Depth=7.69"
Tc=5.0 min CN=98 Runoff=0.12 cfs 423 cf

Subcatchment16S: Proposed to CB 6 Runoff Area=5,850 sf 56.41% Impervious Runoff Depth=6.50"
Tc=5.0 min CN=88 Runoff=1.01 cfs 3,169 cf

Subcatchment17S: Proposed to CB 7 Runoff Area=3,330 sf 75.98% Impervious Runoff Depth=6.97"
Tc=5.0 min CN=92 Runoff=0.60 cfs 1,935 cf

Subcatchment18S: Proposed to CB 8 Runoff Area=11,800 sf 50.17% Impervious Runoff Depth=6.26"
Tc=5.0 min CN=86 Runoff=1.98 cfs 6,159 cf

Subcatchment20S: Proposed to Northern Runoff Area=59,900 sf 71.94% Impervious Runoff Depth=6.86"
Tc=5.0 min CN=91 Runoff=10.63 cfs 34,220 cf

Subcatchment30S: Proposed to West Runoff Area=230,400 sf 0.36% Impervious Runoff Depth=4.52"
Flow Length=530' Tc=20.1 min CN=71 Runoff=18.84 cfs 86,755 cf

Subcatchment40S: Proposed to South Runoff Area=19,030 sf 0.00% Impervious Runoff Depth=4.63"
Flow Length=255' Tc=16.0 min CN=72 Runoff=1.75 cfs 7,347 cf

Subcatchment50S: Proposed to WQB Runoff Area=24,770 sf 0.00% Impervious Runoff Depth=4.86"
Tc=5.0 min CN=74 Runoff=3.35 cfs 10,038 cf

Subcatchment81S: Proposed to YD 1 Runoff Area=4,470 sf 100.00% Impervious Runoff Depth=7.69"
Tc=5.0 min CN=98 Runoff=0.83 cfs 2,865 cf

Subcatchment82S: Proposed to YD 2 Runoff Area=4,470 sf 100.00% Impervious Runoff Depth=7.69"
Tc=5.0 min CN=98 Runoff=0.83 cfs 2,865 cf

Subcatchment83S: Proposed to YD 3 Runoff Area=11,790 sf 12.04% Impervious Runoff Depth=5.21"
Tc=5.0 min CN=77 Runoff=1.70 cfs 5,119 cf

Pond 11P: CB 1 Peak Elev=632.01' Inflow=1.26 cfs 3,893 cf
12.0" Round Culvert n=0.012 L=3.0' S=0.0333 '/' Outflow=1.26 cfs 3,893 cf

Pond 12P: CB 2 Peak Elev=631.93' Inflow=0.62 cfs 1,878 cf
12.0" Round Culvert n=0.012 L=15.0' S=0.0467 '/' Outflow=0.62 cfs 1,878 cf

Pond 13P: CB 3 Peak Elev=638.06' Inflow=0.17 cfs 596 cf
12.0" Round Culvert n=0.012 L=3.0' S=0.0333 '/' Outflow=0.17 cfs 596 cf

Pond 14P: CB 4 Peak Elev=638.06' Inflow=0.32 cfs 966 cf
12.0" Round Culvert n=0.012 L=15.0' S=0.0200 '/' Outflow=0.32 cfs 966 cf

Pond 15P: CB 5 Peak Elev=646.17' Inflow=0.12 cfs 423 cf
12.0" Round Culvert n=0.012 L=14.0' S=0.0214 '/' Outflow=0.12 cfs 423 cf

Pond 16P: CB 6 Peak Elev=646.52' Inflow=1.01 cfs 3,169 cf
12.0" Round Culvert n=0.012 L=16.0' S=0.0187 '/' Outflow=1.01 cfs 3,169 cf

Pond 17P: CB 7 Peak Elev=650.69' Inflow=0.60 cfs 1,935 cf
12.0" Round Culvert n=0.012 L=11.0' S=0.0273 '/' Outflow=0.60 cfs 1,935 cf

Pond 18P: CB 8 Peak Elev=650.94' Inflow=1.98 cfs 6,159 cf
12.0" Round Culvert n=0.012 L=6.0' S=0.0250 '/' Outflow=1.98 cfs 6,159 cf

Pond 40P: HDS Unit Peak Elev=629.27' Inflow=9.43 cfs 29,867 cf
15.0" Round Culvert n=0.012 L=42.0' S=0.0500 '/' Outflow=9.43 cfs 29,867 cf

Pond 50P: WQB Peak Elev=627.29' Storage=19,247 cf Inflow=12.78 cfs 39,905 cf
Outflow=1.51 cfs 37,721 cf

Pond 61P: DMH 1 Peak Elev=631.91' Inflow=1.88 cfs 5,771 cf
15.0" Round Culvert n=0.012 L=90.0' S=0.0200 '/' Outflow=1.88 cfs 5,771 cf

Pond 62P: DMH 2 Peak Elev=631.79' Inflow=9.43 cfs 29,867 cf
15.0" Round Culvert n=0.012 L=6.0' S=0.0250 '/' Outflow=9.43 cfs 29,867 cf

Pond 63P: DMH 3 Peak Elev=638.06' Inflow=7.55 cfs 24,096 cf
15.0" Round Culvert n=0.012 L=43.0' S=0.0395 '/' Outflow=7.55 cfs 24,096 cf

Pond 64P: DMH 4 Peak Elev=645.05' Inflow=7.06 cfs 22,534 cf
15.0" Round Culvert n=0.012 L=123.0' S=0.0537 '/' Outflow=7.06 cfs 22,534 cf

Pond 65P: DMH 5 Peak Elev=647.53' Inflow=5.93 cfs 18,943 cf
15.0" Round Culvert n=0.012 L=141.0' S=0.0199 '/' Outflow=5.93 cfs 18,943 cf

Pond 66P: DMH 6 Peak Elev=650.54' Inflow=1.98 cfs 6,159 cf
15.0" Round Culvert n=0.012 L=78.0' S=0.0128 '/' Outflow=1.98 cfs 6,159 cf

Pond 67P: DMH 7 Peak Elev=648.35' Inflow=3.36 cfs 10,848 cf
15.0" Round Culvert n=0.012 L=125.0' S=0.0100 '/' Outflow=3.36 cfs 10,848 cf

Pond 81P: YD 1 Peak Elev=653.46' Inflow=0.83 cfs 2,865 cf
12.0" Round Culvert n=0.012 L=46.0' S=0.0380 '/' Outflow=0.83 cfs 2,865 cf

Pond 82P: YD 2 Peak Elev=653.46' Inflow=0.83 cfs 2,865 cf
12.0" Round Culvert n=0.012 L=46.0' S=0.0380 '/' Outflow=0.83 cfs 2,865 cf

Pond 83P: YD 3 Peak Elev=652.54' Inflow=3.36 cfs 10,848 cf
12.0" Round Culvert n=0.012 L=8.0' S=0.0250 '/' Outflow=3.36 cfs 10,848 cf

Link 10L: Center Road Inflow=24.72 cfs 109,132 cf
Primary=24.72 cfs 109,132 cf

Total Runoff Area = 545,430 sf Runoff Volume = 239,637 cf Average Runoff Depth = 5.27"
79.50% Pervious = 433,610 sf 20.50% Impervious = 111,820 sf

Summary for Subcatchment 10S: Proposed to Center Road

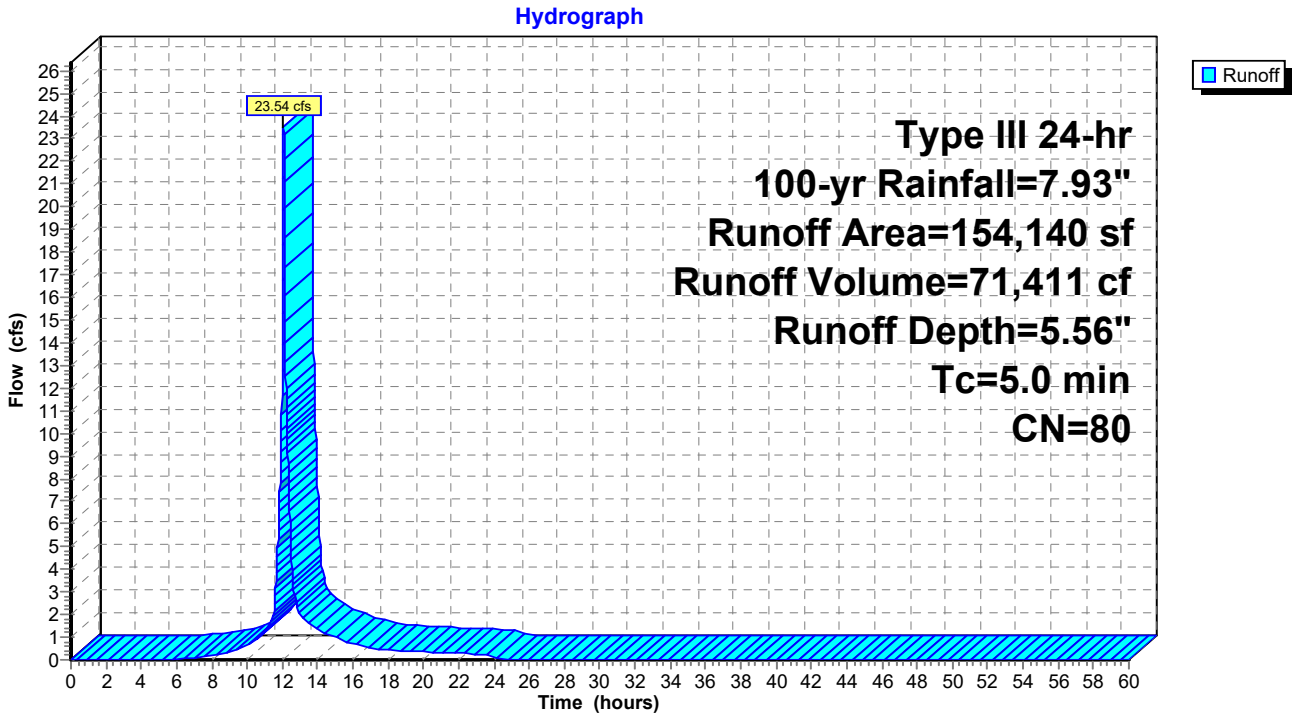
Runoff = 23.54 cfs @ 12.07 hrs, Volume= 71,411 cf, Depth= 5.56"
Routed to Link 10L : Center Road

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=7.93"

	Area (sf)	CN	Description
*	39,350	98	Paved
	105,490	74	>75% Grass cover, Good, HSG C
	9,300	70	Woods, Good, HSG C
	154,140	80	Weighted Average
	114,790		74.47% Pervious Area
	39,350		25.53% Impervious Area

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

Subcatchment 10S: Proposed to Center Road



Summary for Subcatchment 11S: Proposed to CB 1

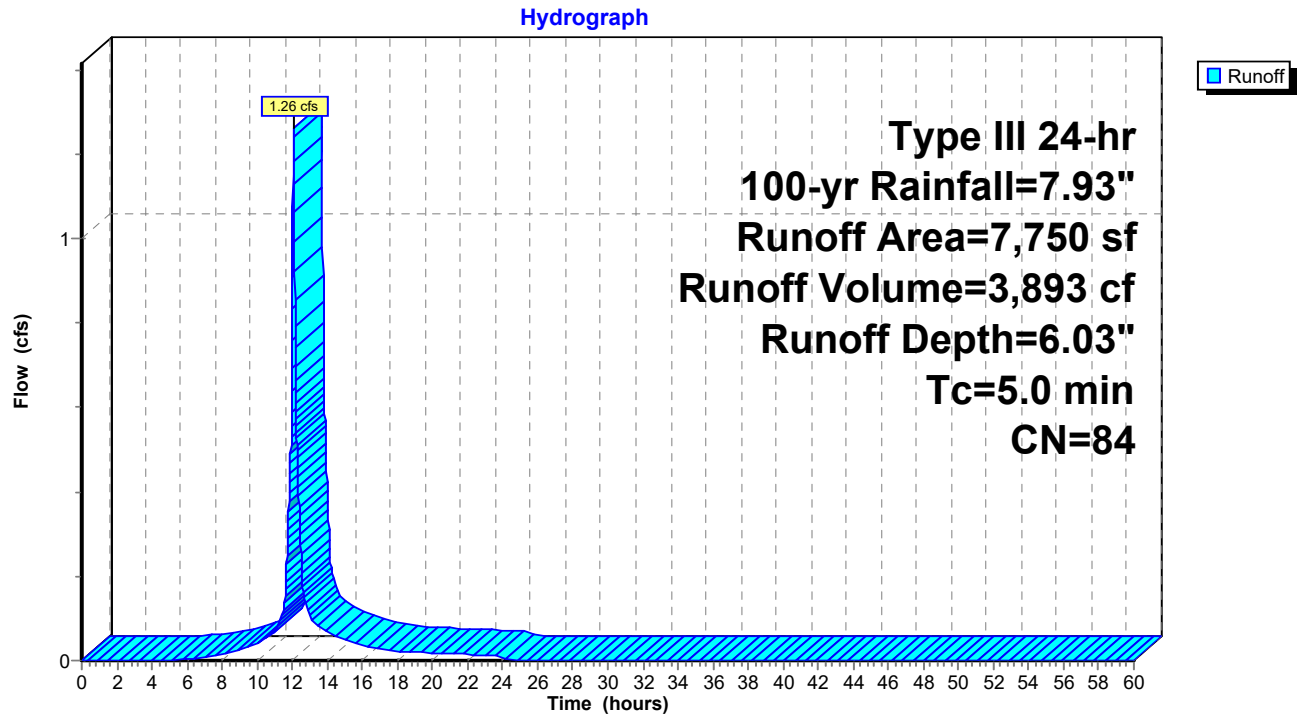
Runoff = 1.26 cfs @ 12.07 hrs, Volume= 3,893 cf, Depth= 6.03"
Routed to Pond 11P : CB 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=7.93"

	Area (sf)	CN	Description
*	3,240	98	Paved
	4,510	74	>75% Grass cover, Good, HSG C
	7,750	84	Weighted Average
	4,510		58.19% Pervious Area
	3,240		41.81% Impervious Area

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

Subcatchment 11S: Proposed to CB 1



Summary for Subcatchment 12S: Proposed to CB 2

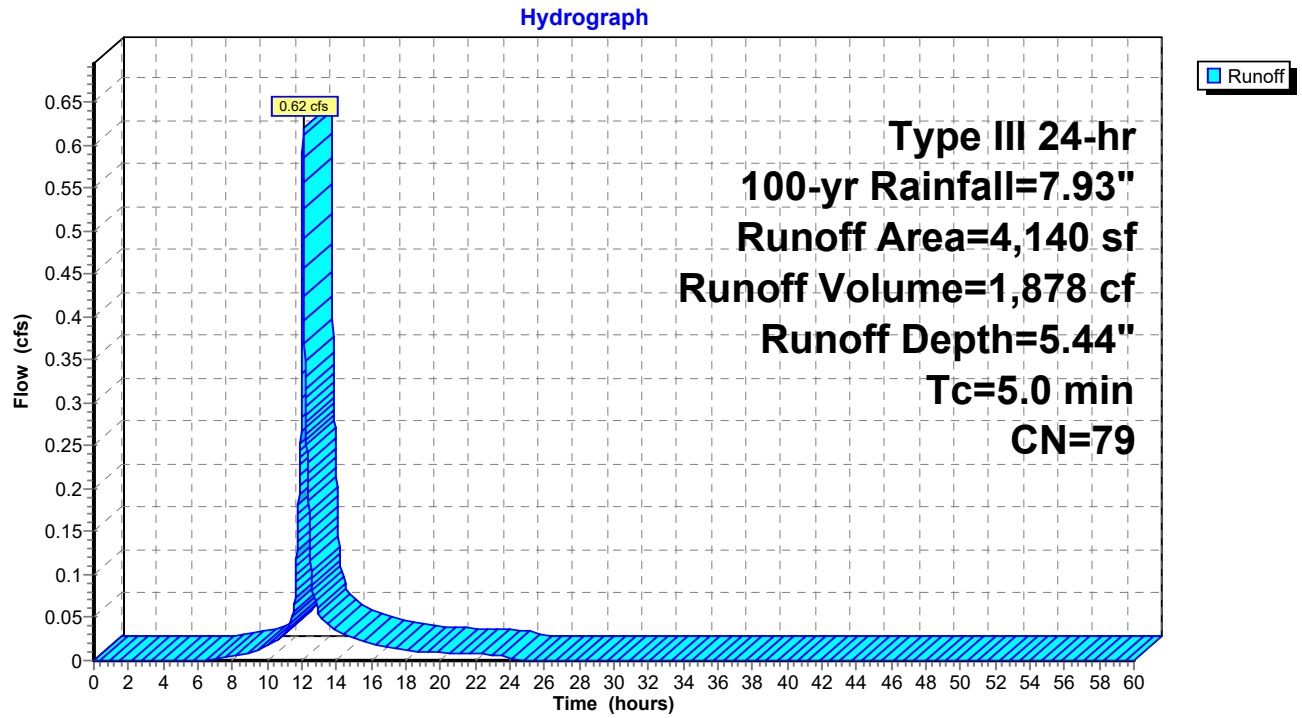
Runoff = 0.62 cfs @ 12.07 hrs, Volume= 1,878 cf, Depth= 5.44"
Routed to Pond 12P : CB 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=7.93"

	Area (sf)	CN	Description
*	930	98	Paved
	3,210	74	>75% Grass cover, Good, HSG C
	4,140	79	Weighted Average
	3,210		77.54% Pervious Area
	930		22.46% Impervious Area

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

Subcatchment 12S: Proposed to CB 2



Summary for Subcatchment 13S: Proposed to CB 3

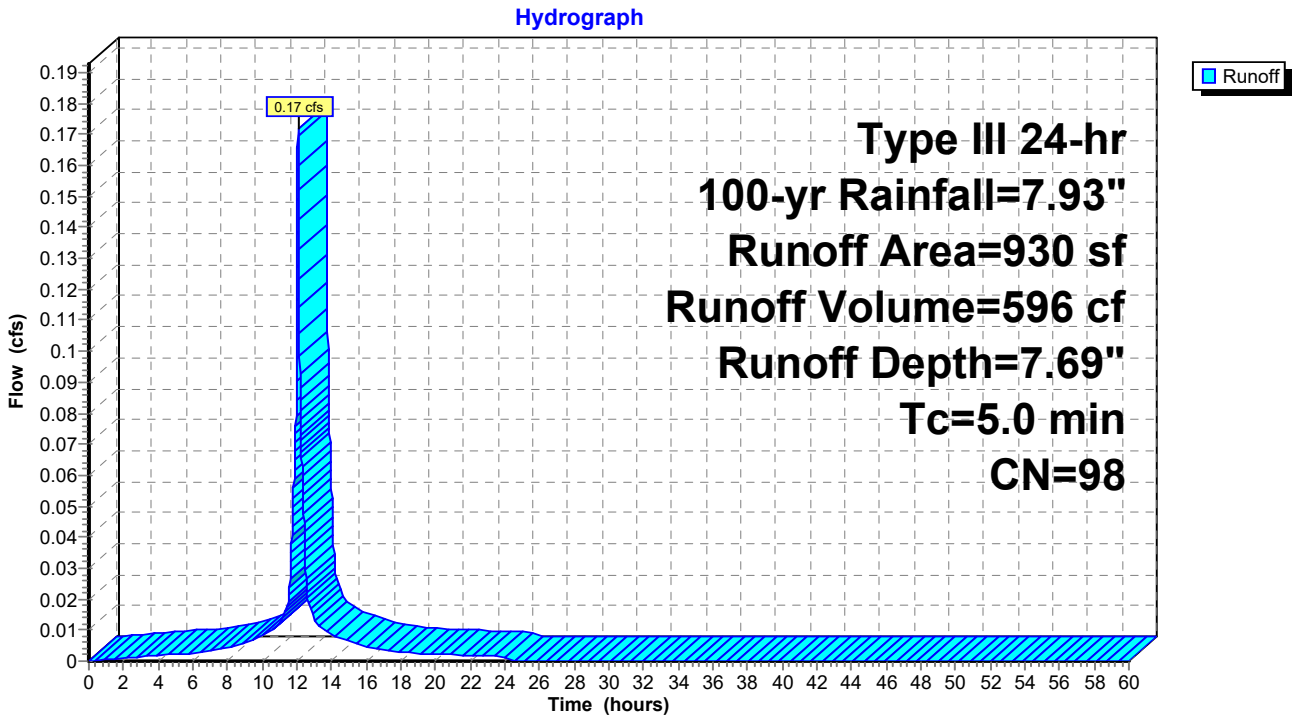
Runoff = 0.17 cfs @ 12.07 hrs, Volume= 596 cf, Depth= 7.69"
Routed to Pond 13P : CB 3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=7.93"

	Area (sf)	CN	Description
*	930	98	Paved
	930		100.00% Impervious Area

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

Subcatchment 13S: Proposed to CB 3



Summary for Subcatchment 14S: Proposed to CB 4

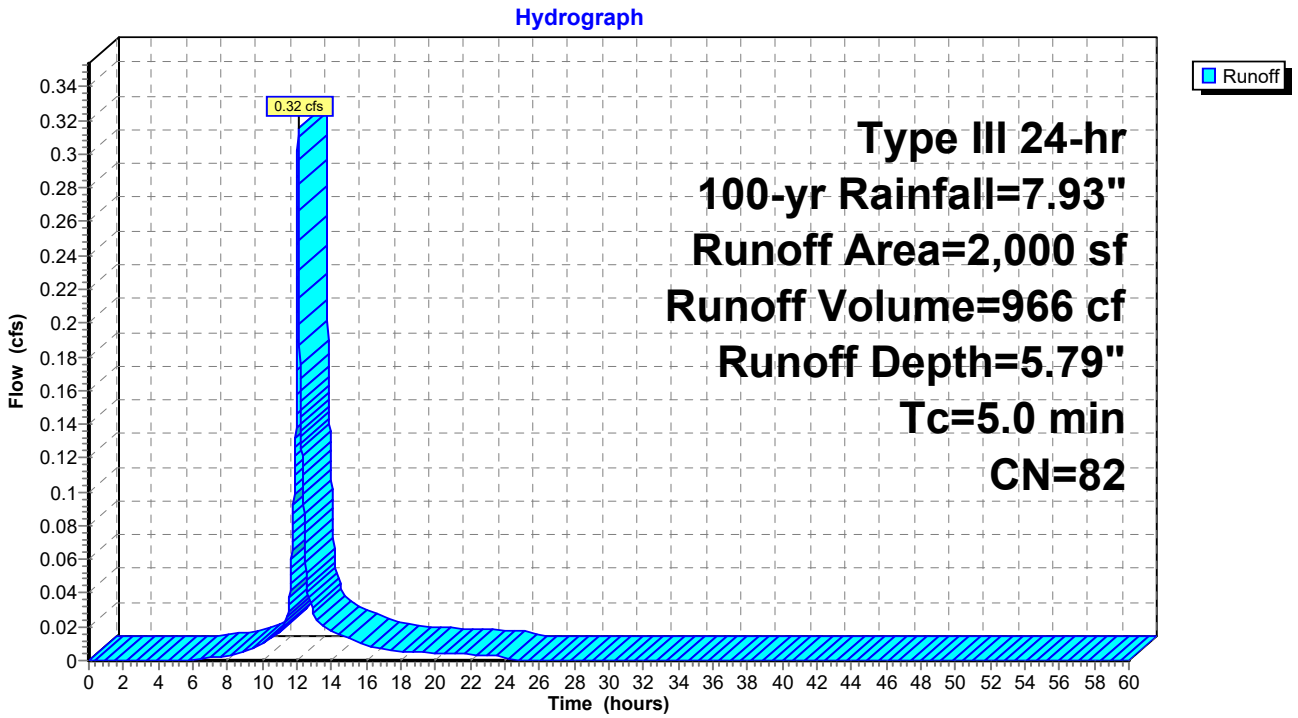
Runoff = 0.32 cfs @ 12.07 hrs, Volume= 966 cf, Depth= 5.79"
Routed to Pond 14P : CB 4

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=7.93"

	Area (sf)	CN	Description
*	690	98	Paved
	1,310	74	>75% Grass cover, Good, HSG C
	2,000	82	Weighted Average
	1,310		65.50% Pervious Area
	690		34.50% Impervious Area

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

Subcatchment 14S: Proposed to CB 4



Summary for Subcatchment 15S: Proposed to CB 5

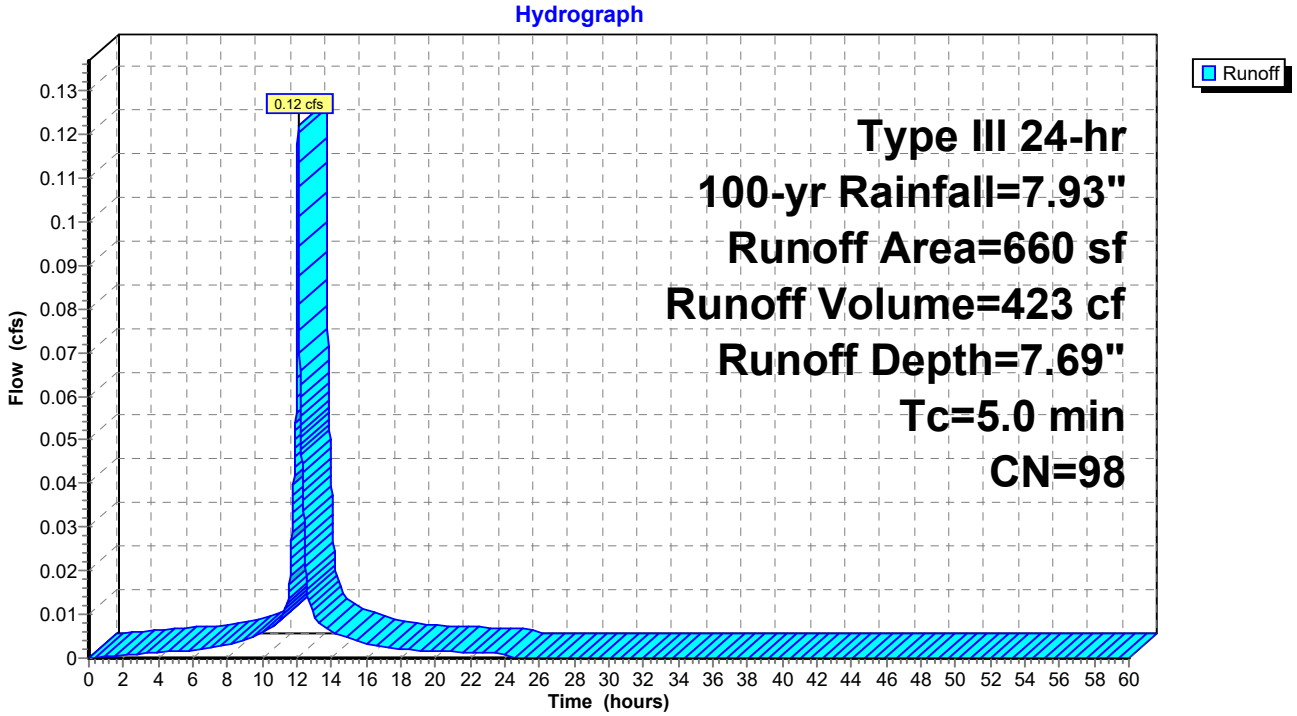
Runoff = 0.12 cfs @ 12.07 hrs, Volume= 423 cf, Depth= 7.69"
Routed to Pond 15P : CB 5

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=7.93"

	Area (sf)	CN	Description
*	660	98	Paved
	660		100.00% Impervious Area

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

Subcatchment 15S: Proposed to CB 5



Summary for Subcatchment 16S: Proposed to CB 6

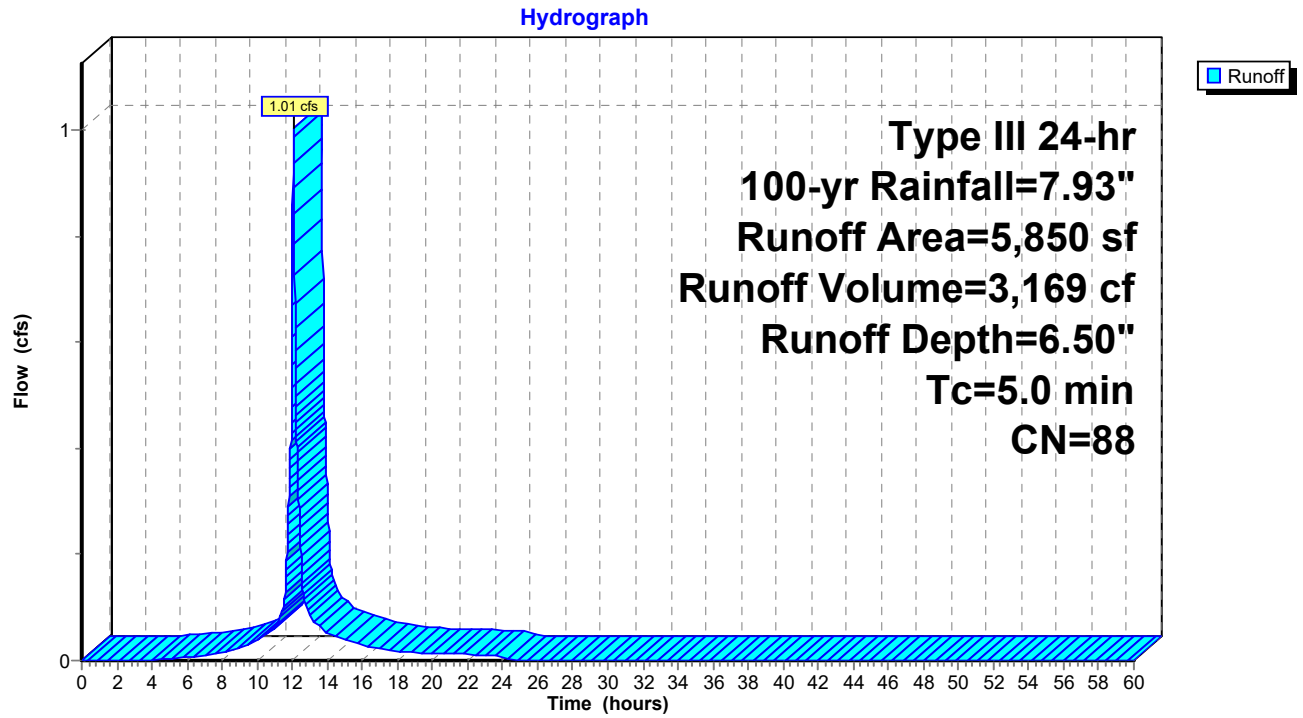
Runoff = 1.01 cfs @ 12.07 hrs, Volume= 3,169 cf, Depth= 6.50"
Routed to Pond 16P : CB 6

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=7.93"

	Area (sf)	CN	Description
*	3,300	98	Paved
	2,550	74	>75% Grass cover, Good, HSG C
	5,850	88	Weighted Average
	2,550		43.59% Pervious Area
	3,300		56.41% Impervious Area

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

Subcatchment 16S: Proposed to CB 6



Summary for Subcatchment 17S: Proposed to CB 7

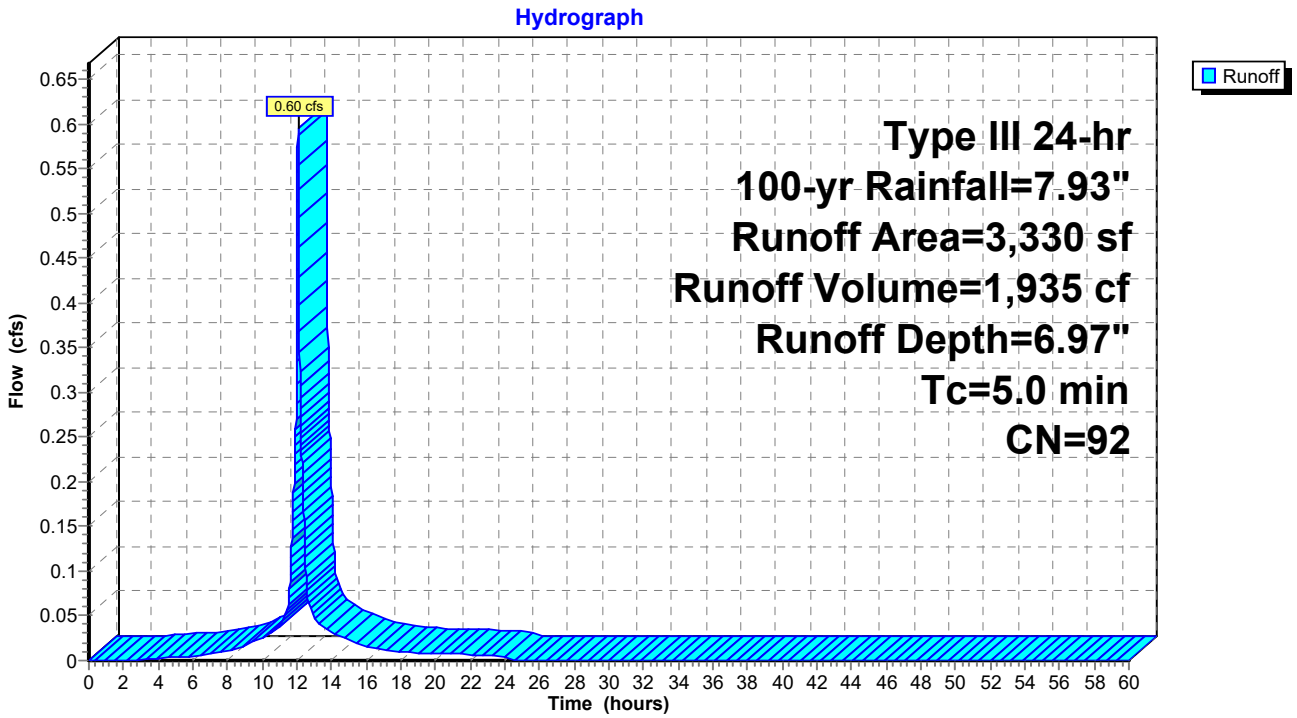
Runoff = 0.60 cfs @ 12.07 hrs, Volume= 1,935 cf, Depth= 6.97"
Routed to Pond 17P : CB 7

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=7.93"

	Area (sf)	CN	Description
*	2,530	98	Paved
	800	74	>75% Grass cover, Good, HSG C
	3,330	92	Weighted Average
	800		24.02% Pervious Area
	2,530		75.98% Impervious Area

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

Subcatchment 17S: Proposed to CB 7



Summary for Subcatchment 18S: Proposed to CB 8

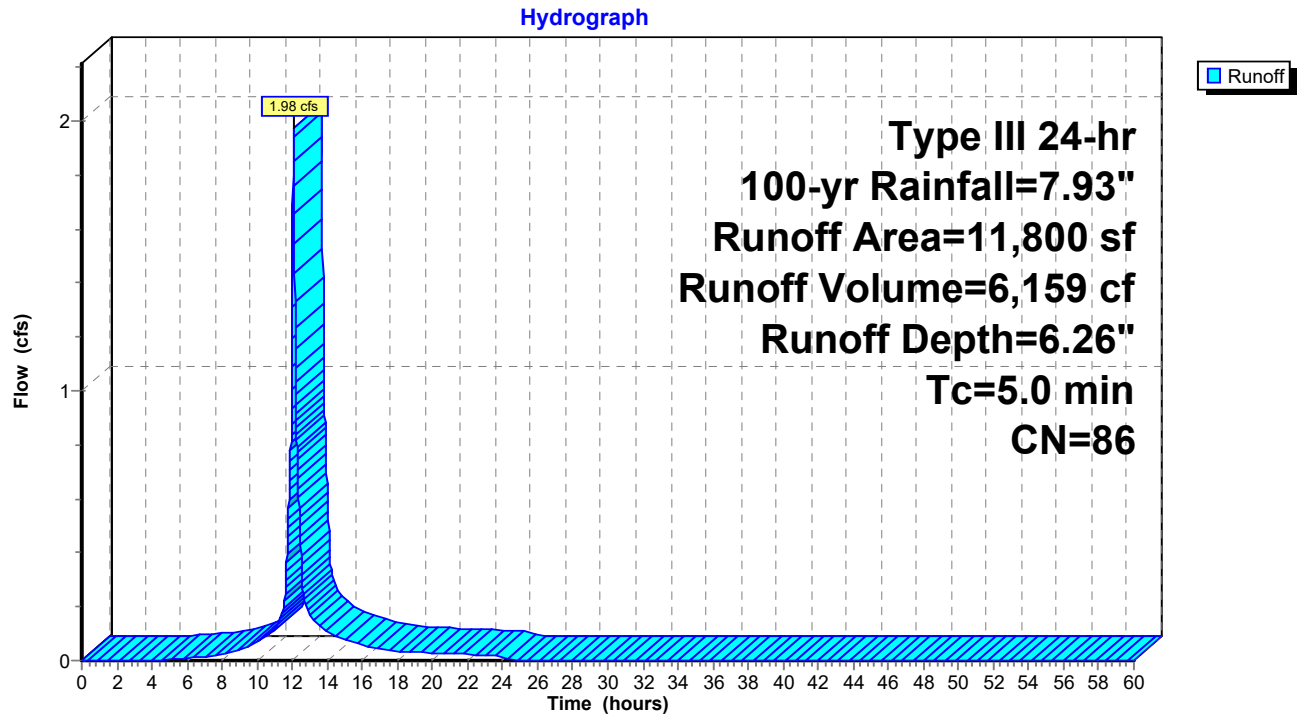
Runoff = 1.98 cfs @ 12.07 hrs, Volume= 6,159 cf, Depth= 6.26"
Routed to Pond 18P : CB 8

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=7.93"

	Area (sf)	CN	Description
*	5,920	98	Paved
	5,880	74	>75% Grass cover, Good, HSG C
	11,800	86	Weighted Average
	5,880		49.83% Pervious Area
	5,920		50.17% Impervious Area

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

Subcatchment 18S: Proposed to CB 8



Summary for Subcatchment 20S: Proposed to Northern Detention Basin

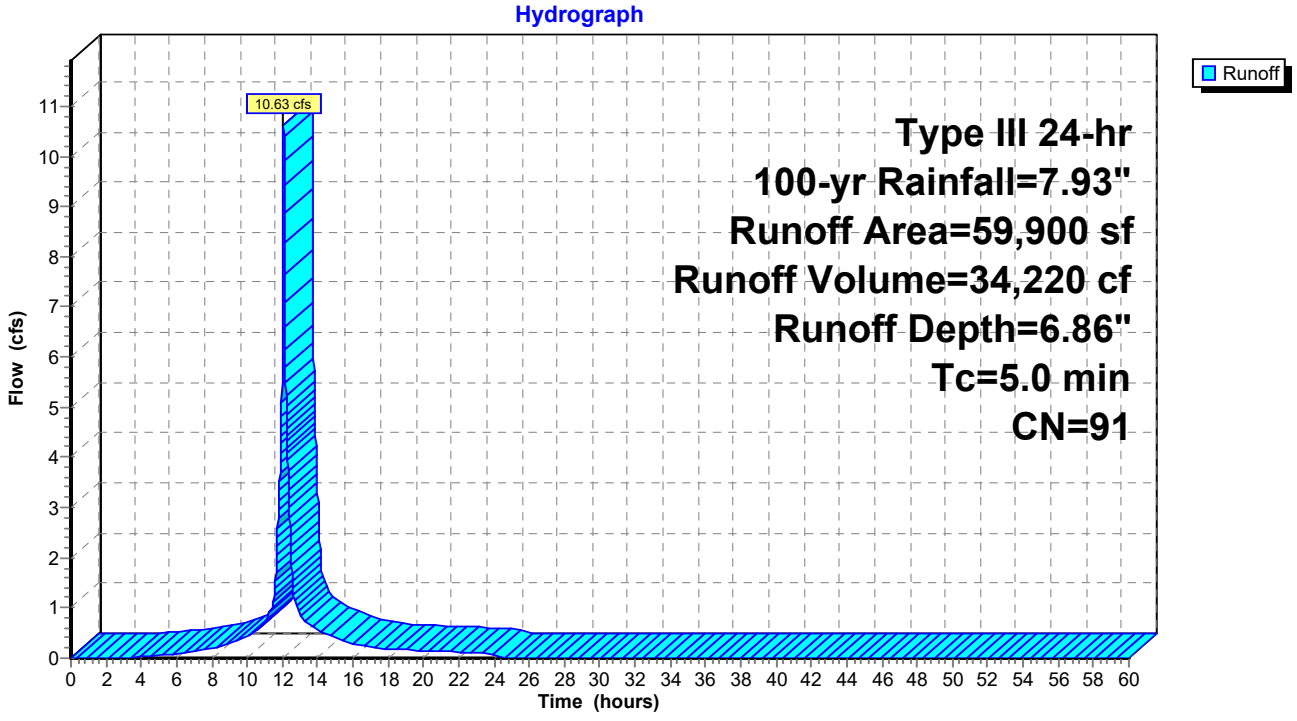
Runoff = 10.63 cfs @ 12.07 hrs, Volume= 34,220 cf, Depth= 6.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=7.93"

	Area (sf)	CN	Description
*	43,090	98	Paved
	16,810	74	>75% Grass cover, Good, HSG C
	59,900	91	Weighted Average
	16,810		28.06% Pervious Area
	43,090		71.94% Impervious Area

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

Subcatchment 20S: Proposed to Northern Detention Basin



Summary for Subcatchment 30S: Proposed to West

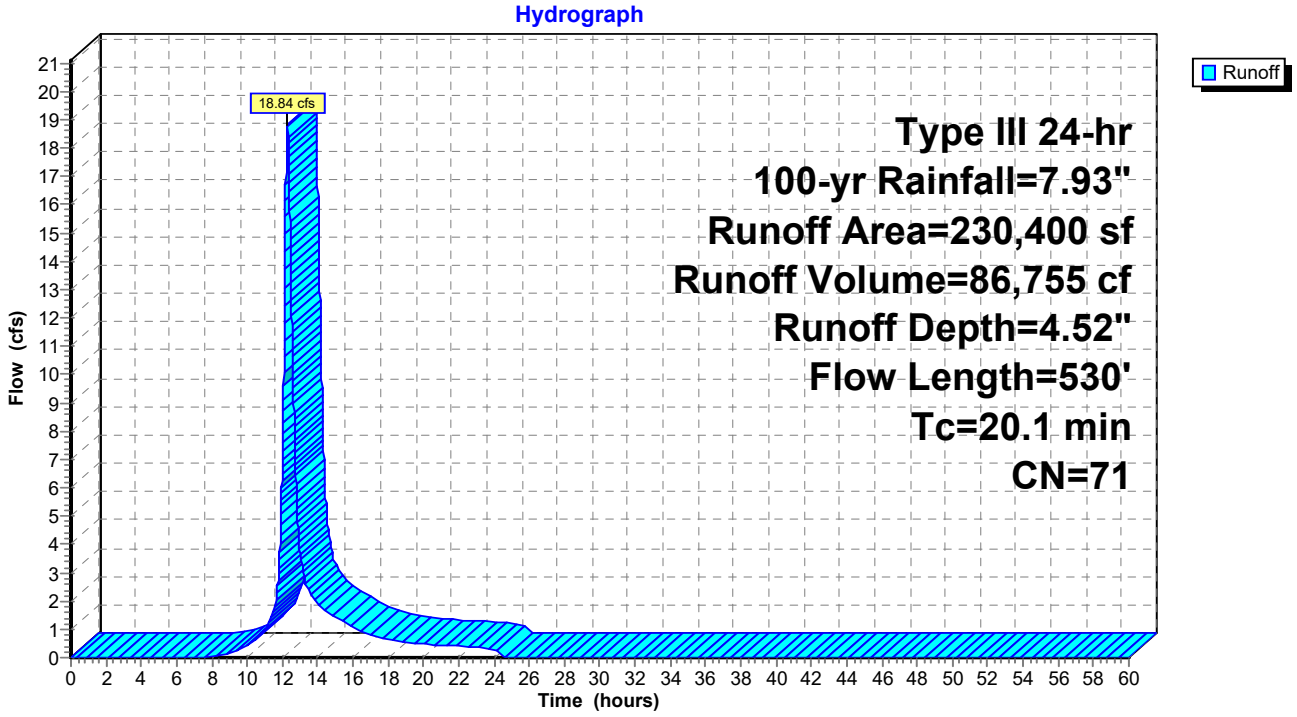
Runoff = 18.84 cfs @ 12.27 hrs, Volume= 86,755 cf, Depth= 4.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=7.93"

	Area (sf)	CN	Description
*	820	98	Paved
	71,890	74	>75% Grass cover, Good, HSG C
	157,690	70	Woods, Good, HSG C
	230,400	71	Weighted Average
	229,580		99.64% Pervious Area
	820		0.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	75	0.0060	0.10		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.29"
5.6	165	0.0050	0.49		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
2.1	290	0.1070	2.29		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
20.1	530	Total			

Subcatchment 30S: Proposed to West



Summary for Subcatchment 40S: Proposed to South

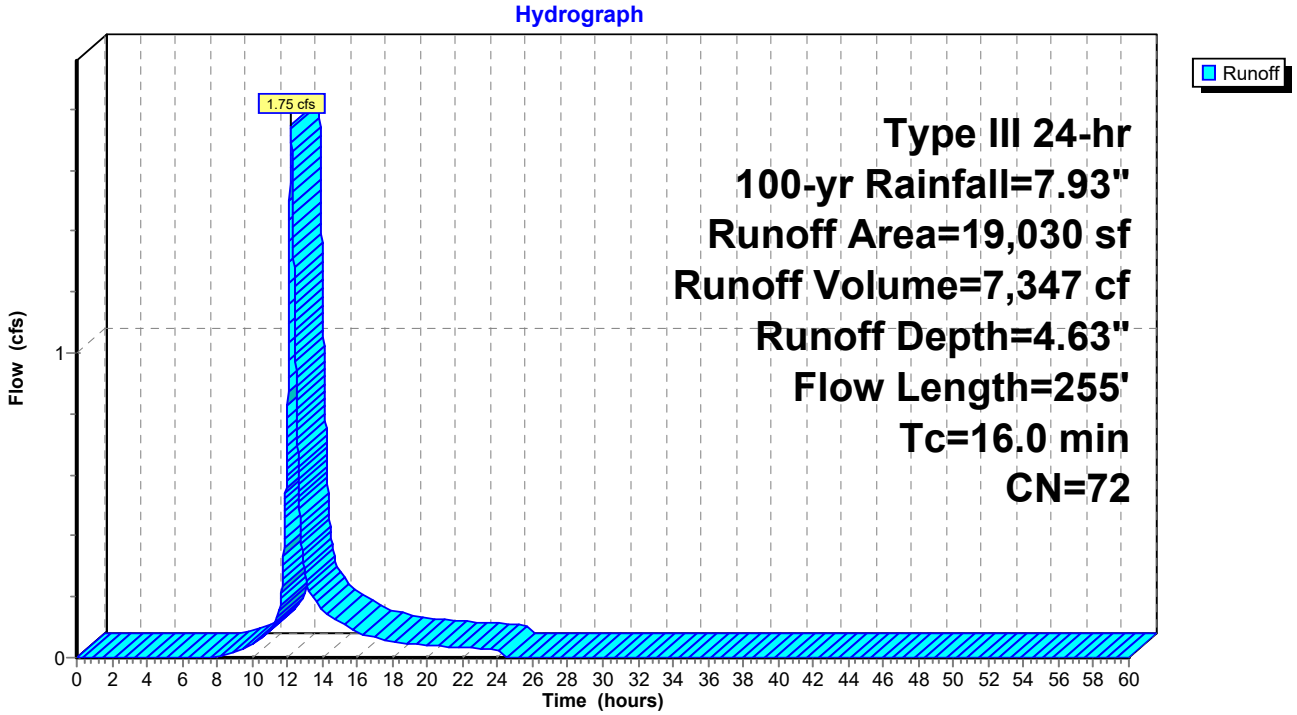
Runoff = 1.75 cfs @ 12.22 hrs, Volume= 7,347 cf, Depth= 4.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=7.93"

Area (sf)	CN	Description
10,460	74	>75% Grass cover, Good, HSG C
8,570	70	Woods, Good, HSG C
19,030	72	Weighted Average
19,030		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	75	0.0060	0.10		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.29"
2.4	100	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.2	80	0.0250	1.11		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
16.0	255	Total			

Subcatchment 40S: Proposed to South



Summary for Subcatchment 50S: Proposed to WQB

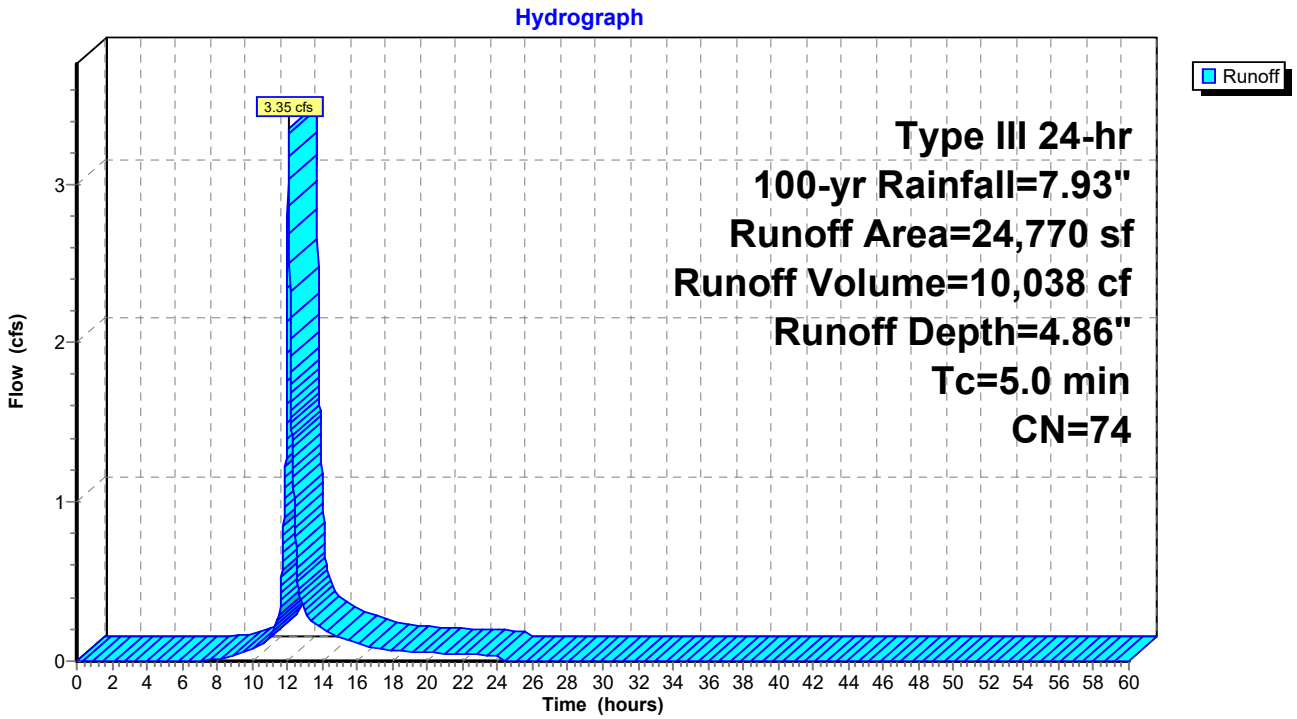
Runoff = 3.35 cfs @ 12.07 hrs, Volume= 10,038 cf, Depth= 4.86"
Routed to Pond 50P : WQB

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=7.93"

Area (sf)	CN	Description
24,770	74	>75% Grass cover, Good, HSG C
24,770		100.00% Pervious Area

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

Subcatchment 50S: Proposed to WQB



Summary for Subcatchment 81S: Proposed to YD 1

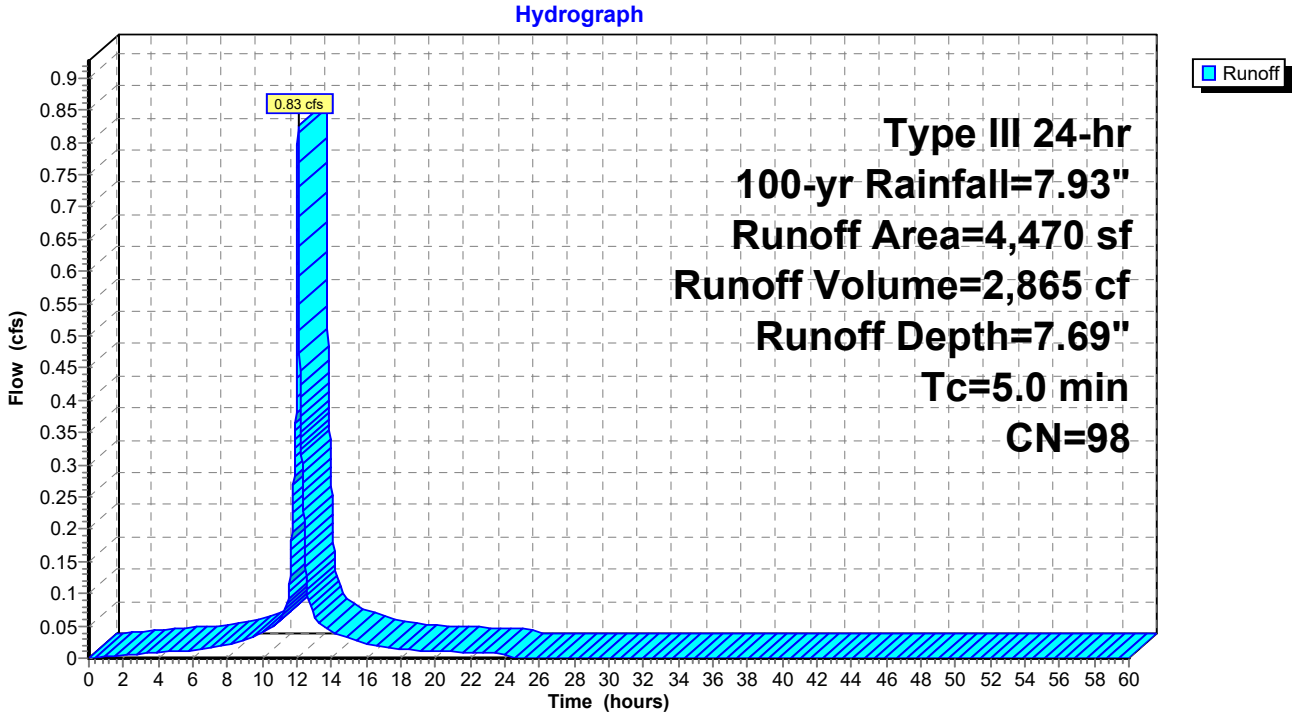
Runoff = 0.83 cfs @ 12.07 hrs, Volume= 2,865 cf, Depth= 7.69"
Routed to Pond 81P : YD 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=7.93"

	Area (sf)	CN	Description
*	3,200	98	Roof
*	1,270	98	Paved
	4,470	98	Weighted Average
	4,470		100.00% Impervious Area

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

Subcatchment 81S: Proposed to YD 1



Summary for Subcatchment 82S: Proposed to YD 2

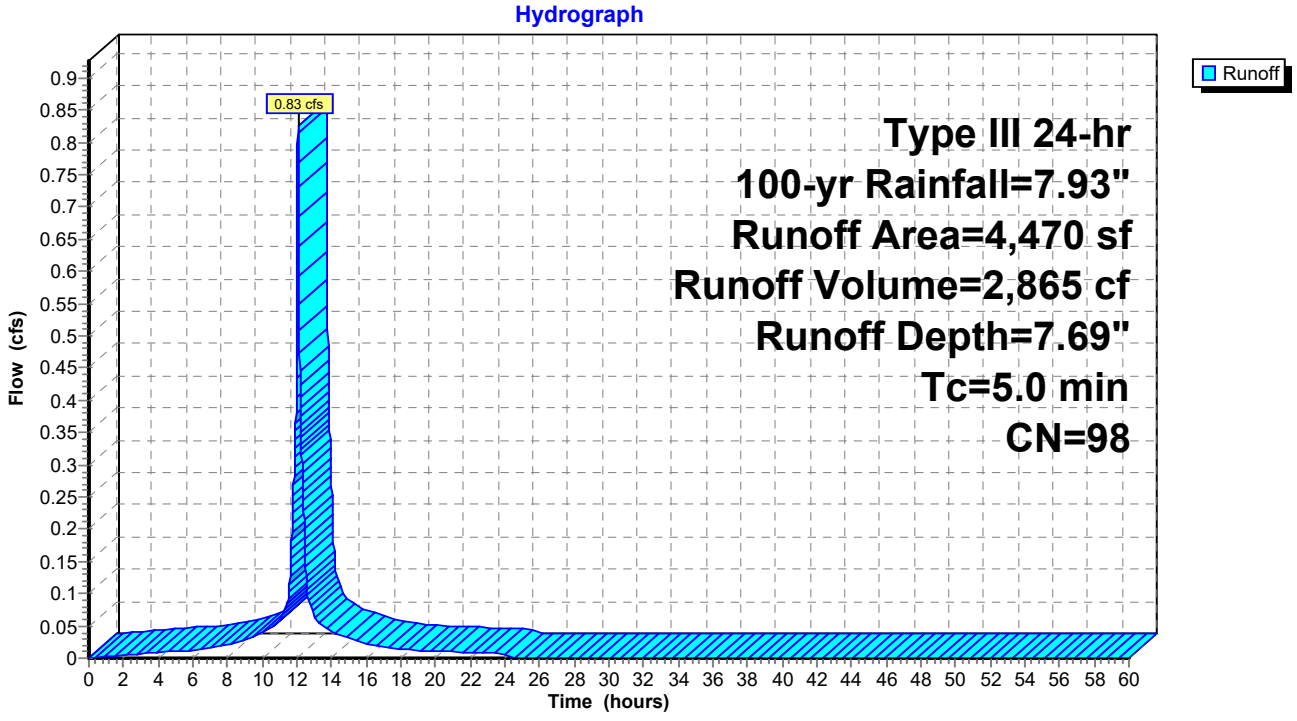
Runoff = 0.83 cfs @ 12.07 hrs, Volume= 2,865 cf, Depth= 7.69"
Routed to Pond 82P : YD 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=7.93"

	Area (sf)	CN	Description
*	3,200	98	Roof
*	1,270	98	Paved
	4,470	98	Weighted Average
	4,470		100.00% Impervious Area

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

Subcatchment 82S: Proposed to YD 2



Summary for Subcatchment 83S: Proposed to YD 3

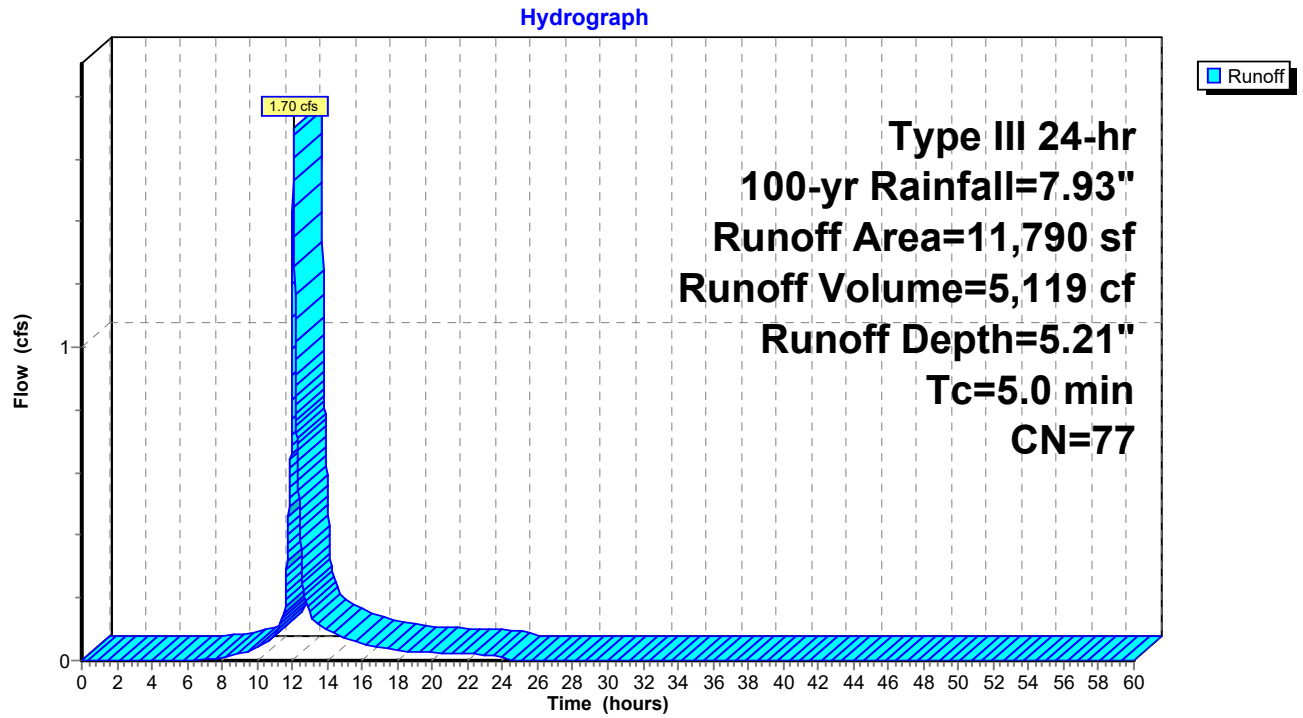
Runoff = 1.70 cfs @ 12.07 hrs, Volume= 5,119 cf, Depth= 5.21"
Routed to Pond 83P : YD 3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=7.93"

	Area (sf)	CN	Description
*	1,420	98	Paved
	10,370	74	>75% Grass cover, Good, HSG C
	11,790	77	Weighted Average
	10,370		87.96% Pervious Area
	1,420		12.04% Impervious Area

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

Subcatchment 83S: Proposed to YD 3



Summary for Pond 11P: CB 1

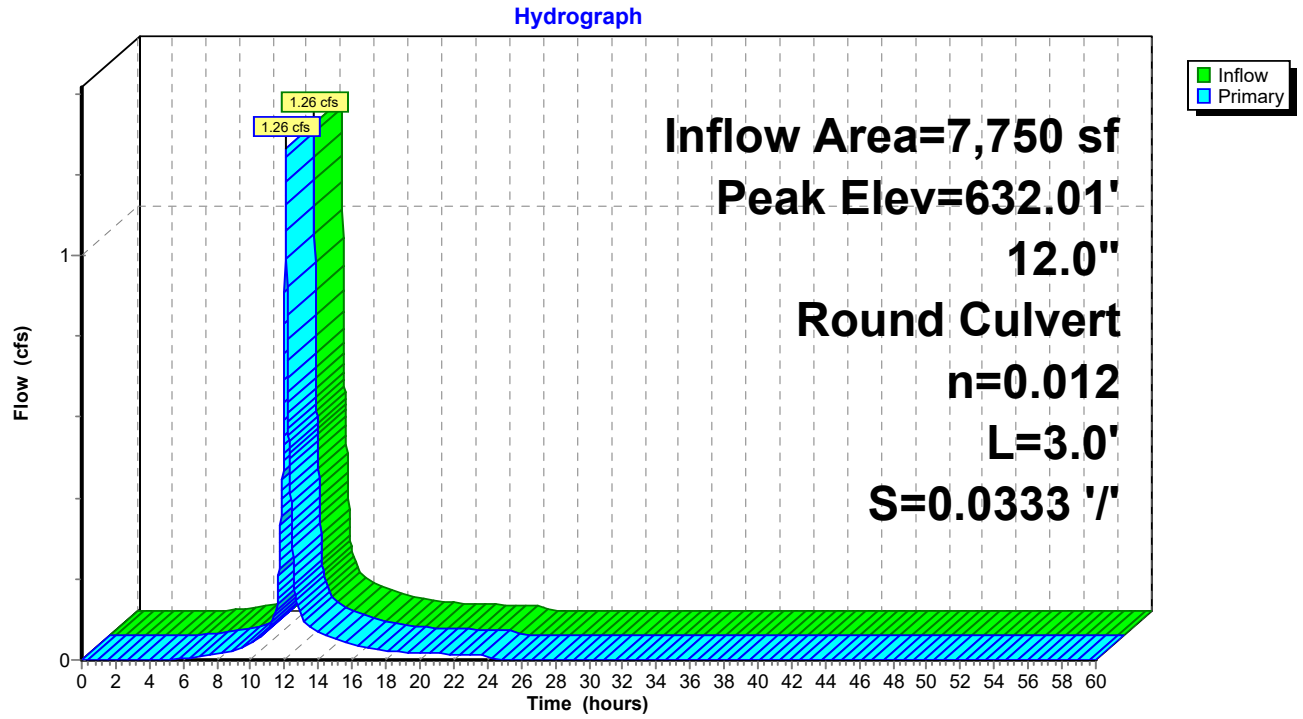
Inflow Area = 7,750 sf, 41.81% Impervious, Inflow Depth = 6.03" for 100-yr event
Inflow = 1.26 cfs @ 12.07 hrs, Volume= 3,893 cf
Outflow = 1.26 cfs @ 12.07 hrs, Volume= 3,893 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.26 cfs @ 12.07 hrs, Volume= 3,893 cf
Routed to Pond 61P : DMH 1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 632.01' @ 12.10 hrs
Flood Elev= 633.20'

Device	Routing	Invert	Outlet Devices
#1	Primary	629.70'	**12.0" Round Culvert** L= 3.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 629.70' / 629.60' S= 0.0333 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.07 hrs HW=631.47' TW=631.70' (Dynamic Tailwater)
↑—**1=Culvert** (Controls 0.00 cfs)

Pond 11P: CB 1



Summary for Pond 12P: CB 2

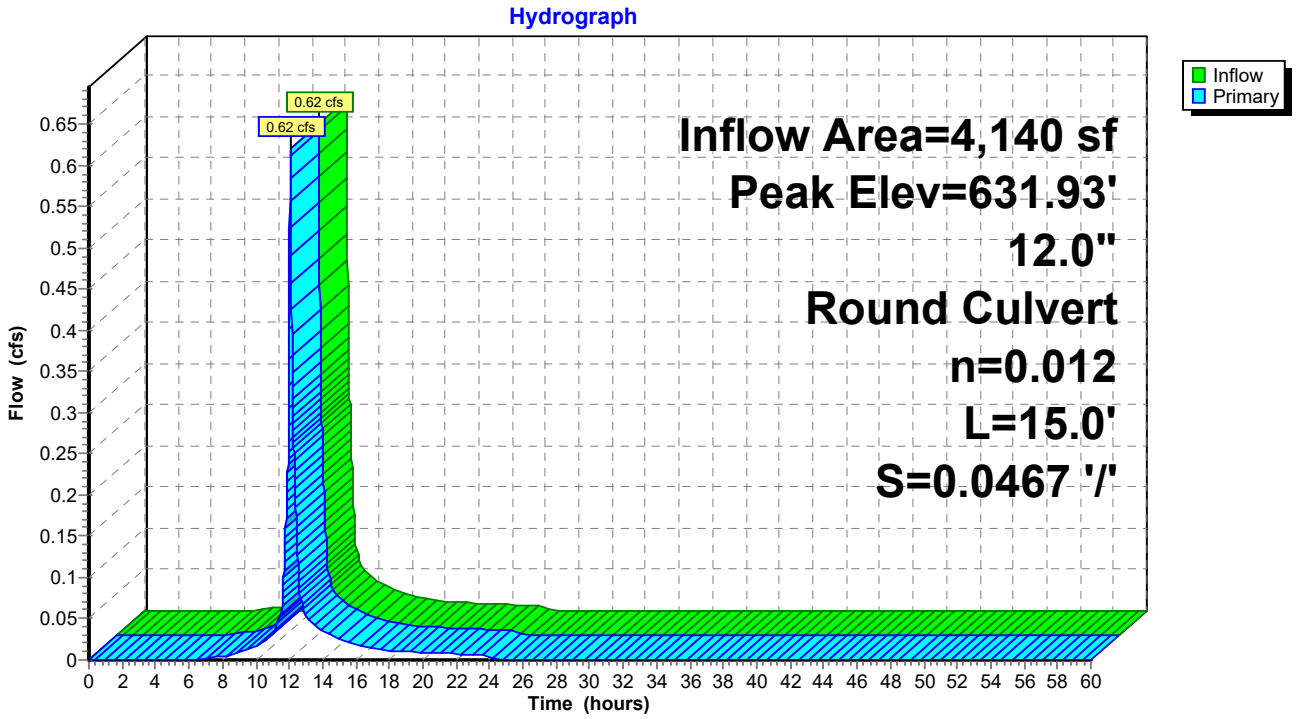
Inflow Area = 4,140 sf, 22.46% Impervious, Inflow Depth = 5.44" for 100-yr event
Inflow = 0.62 cfs @ 12.07 hrs, Volume= 1,878 cf
Outflow = 0.62 cfs @ 12.07 hrs, Volume= 1,878 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.62 cfs @ 12.07 hrs, Volume= 1,878 cf
Routed to Pond 61P : DMH 1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 631.93' @ 12.10 hrs
Flood Elev= 634.10'

Device	Routing	Invert	Outlet Devices
#1	Primary	630.60'	**12.0" Round Culvert** L= 15.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 630.60' / 629.90' S= 0.0467 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.07 hrs HW=631.44' TW=631.72' (Dynamic Tailwater)
↑—**1=Culvert** (Controls 0.00 cfs)

Pond 12P: CB 2



Summary for Pond 13P: CB 3

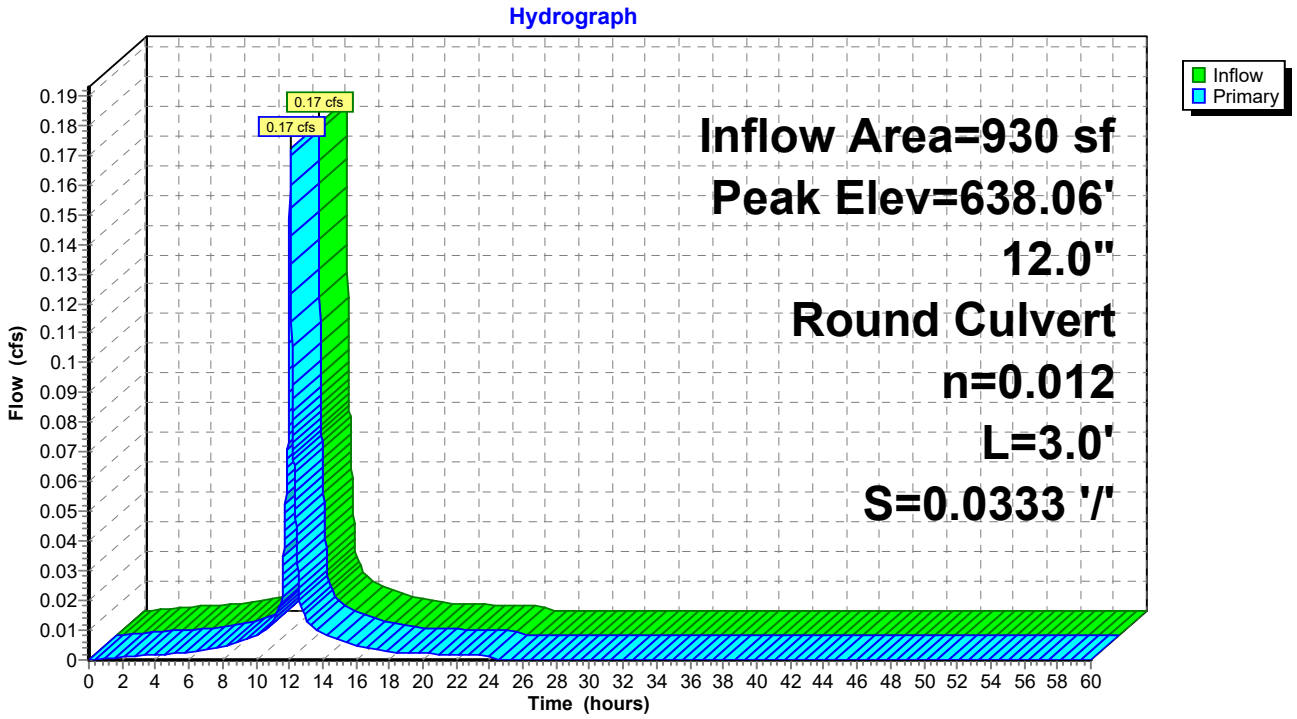
Inflow Area = 930 sf,100.00% Impervious, Inflow Depth = 7.69" for 100-yr event
Inflow = 0.17 cfs @ 12.07 hrs, Volume= 596 cf
Outflow = 0.17 cfs @ 12.07 hrs, Volume= 596 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.17 cfs @ 12.07 hrs, Volume= 596 cf
Routed to Pond 63P : DMH 3

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 638.06' @ 12.08 hrs
Flood Elev= 639.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	636.20'	**12.0" Round Culvert** L= 3.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 636.20' / 636.10' S= 0.0333 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.07 hrs HW=638.02' TW=638.05' (Dynamic Tailwater)
↑—**1=Culvert** (Controls 0.00 cfs)

Pond 13P: CB 3



Summary for Pond 14P: CB 4

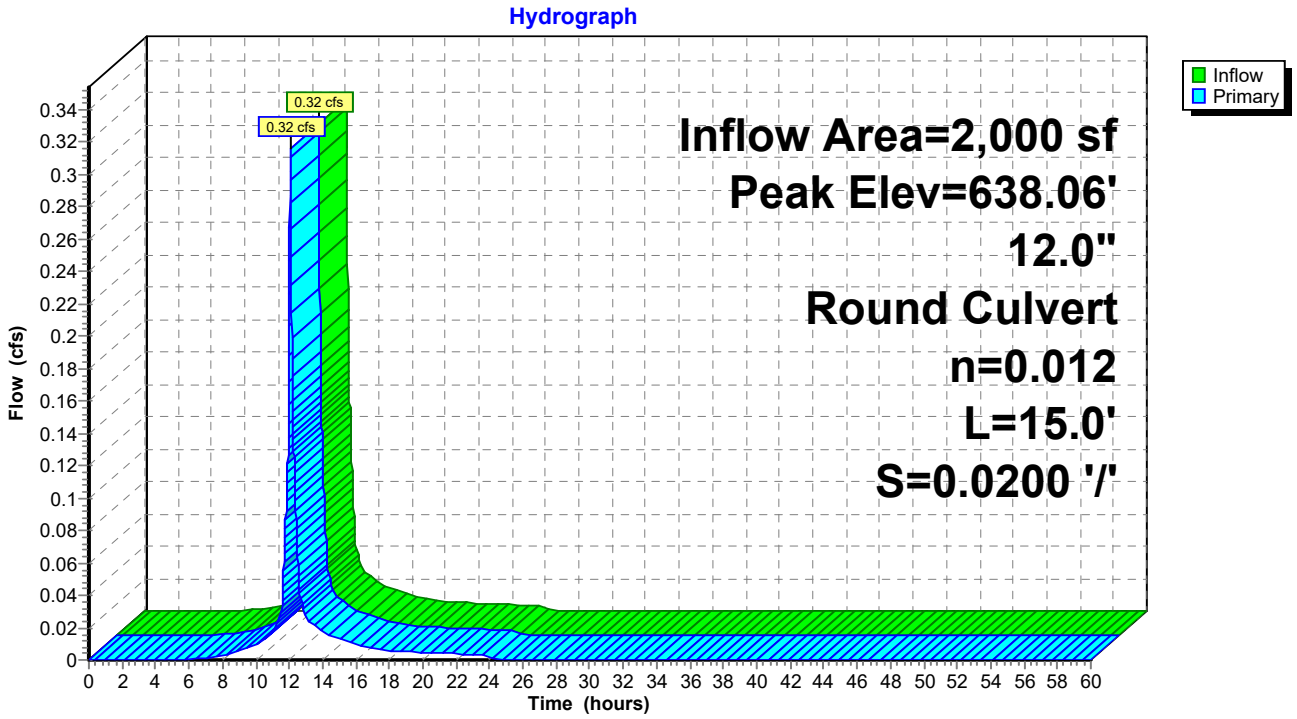
Inflow Area = 2,000 sf, 34.50% Impervious, Inflow Depth = 5.79" for 100-yr event
Inflow = 0.32 cfs @ 12.07 hrs, Volume= 966 cf
Outflow = 0.32 cfs @ 12.07 hrs, Volume= 966 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.32 cfs @ 12.07 hrs, Volume= 966 cf
Routed to Pond 63P : DMH 3

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 638.06' @ 12.08 hrs
Flood Elev= 639.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	636.20'	**12.0" Round Culvert** L= 15.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 636.20' / 635.90' S= 0.0200 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.07 hrs HW=638.03' TW=638.05' (Dynamic Tailwater)
↑—**1=Culvert** (Controls 0.00 cfs)

Pond 14P: CB 4



Summary for Pond 15P: CB 5

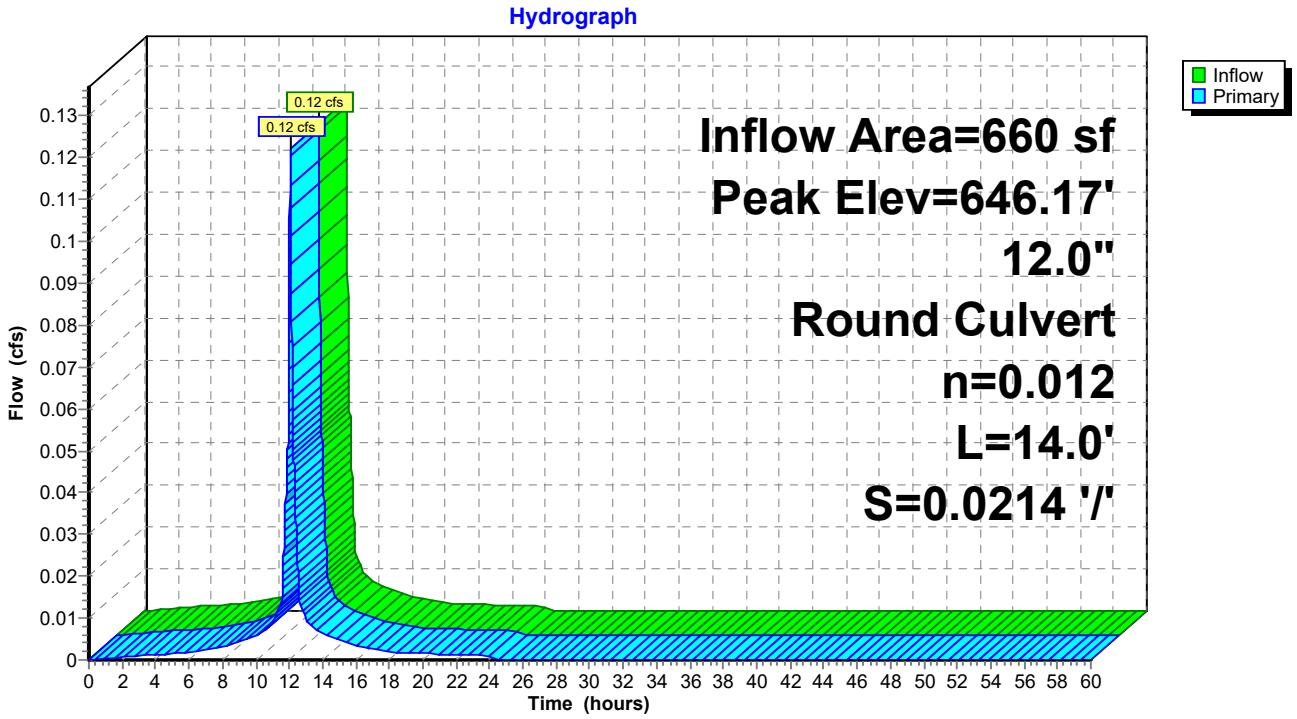
Inflow Area = 660 sf,100.00% Impervious, Inflow Depth = 7.69" for 100-yr event
Inflow = 0.12 cfs @ 12.07 hrs, Volume= 423 cf
Outflow = 0.12 cfs @ 12.07 hrs, Volume= 423 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.12 cfs @ 12.07 hrs, Volume= 423 cf
Routed to Pond 64P : DMH 4

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 646.17' @ 12.07 hrs
Flood Elev= 649.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	646.00'	**12.0" Round Culvert** L= 14.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 646.00' / 645.70' S= 0.0214 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.12 cfs @ 12.07 hrs HW=646.17' TW=645.05' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 0.12 cfs @ 1.40 fps)

Pond 15P: CB 5



Summary for Pond 16P: CB 6

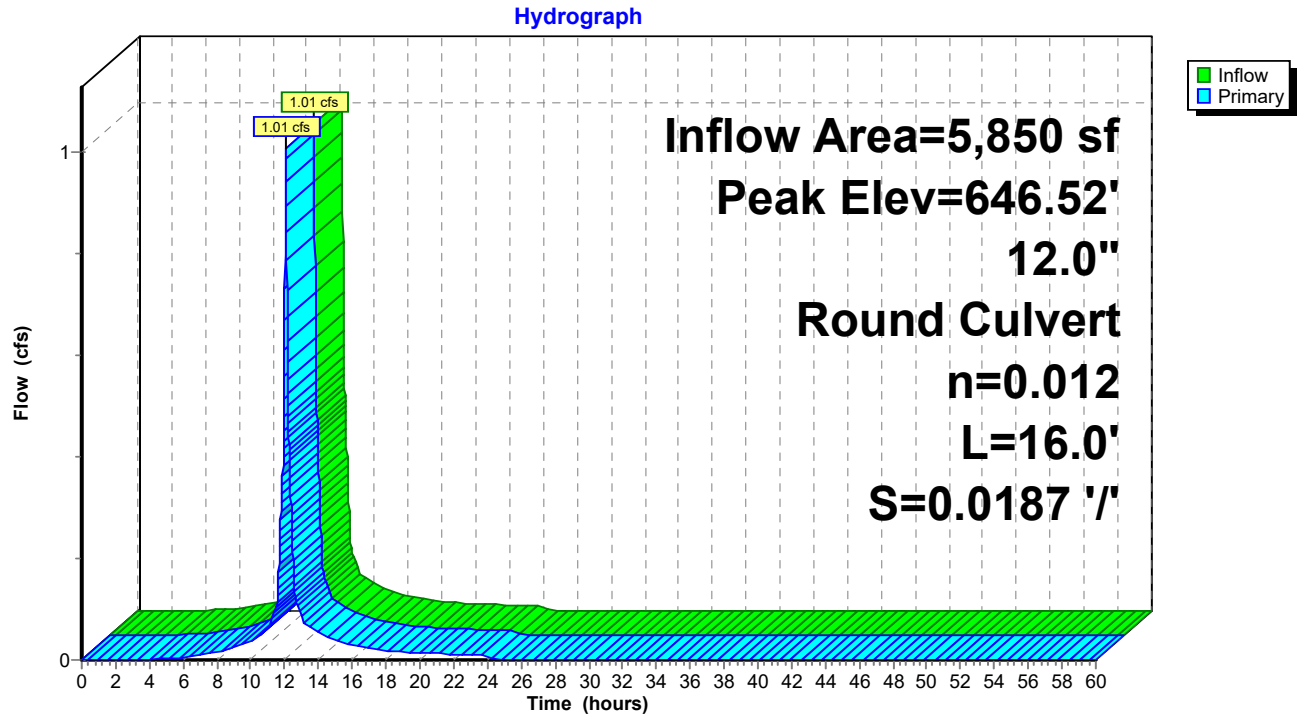
Inflow Area = 5,850 sf, 56.41% Impervious, Inflow Depth = 6.50" for 100-yr event
Inflow = 1.01 cfs @ 12.07 hrs, Volume= 3,169 cf
Outflow = 1.01 cfs @ 12.07 hrs, Volume= 3,169 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.01 cfs @ 12.07 hrs, Volume= 3,169 cf
Routed to Pond 64P : DMH 4

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 646.52' @ 12.07 hrs
Flood Elev= 649.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	646.00'	**12.0" Round Culvert** L= 16.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 646.00' / 645.70' S= 0.0187 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=1.00 cfs @ 12.07 hrs HW=646.52' TW=645.05' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 1.00 cfs @ 2.45 fps)

Pond 16P: CB 6



Summary for Pond 17P: CB 7

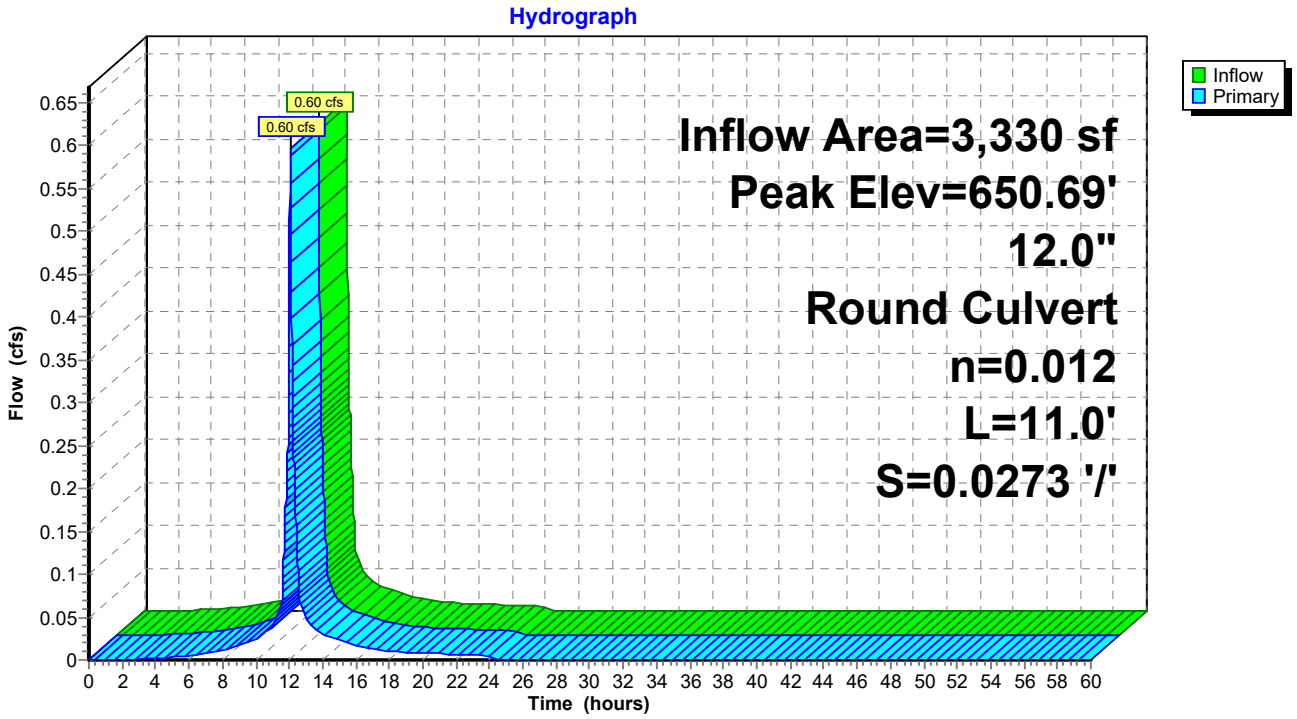
Inflow Area = 3,330 sf, 75.98% Impervious, Inflow Depth = 6.97" for 100-yr event
Inflow = 0.60 cfs @ 12.07 hrs, Volume= 1,935 cf
Outflow = 0.60 cfs @ 12.07 hrs, Volume= 1,935 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.60 cfs @ 12.07 hrs, Volume= 1,935 cf
Routed to Pond 65P : DMH 5

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 650.69' @ 12.07 hrs
Flood Elev= 653.80'

Device	Routing	Invert	Outlet Devices
#1	Primary	650.30'	**12.0" Round Culvert** L= 11.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 650.30' / 650.00' S= 0.0273 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.60 cfs @ 12.07 hrs HW=650.69' TW=647.53' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 0.60 cfs @ 2.12 fps)

Pond 17P: CB 7



Summary for Pond 18P: CB 8

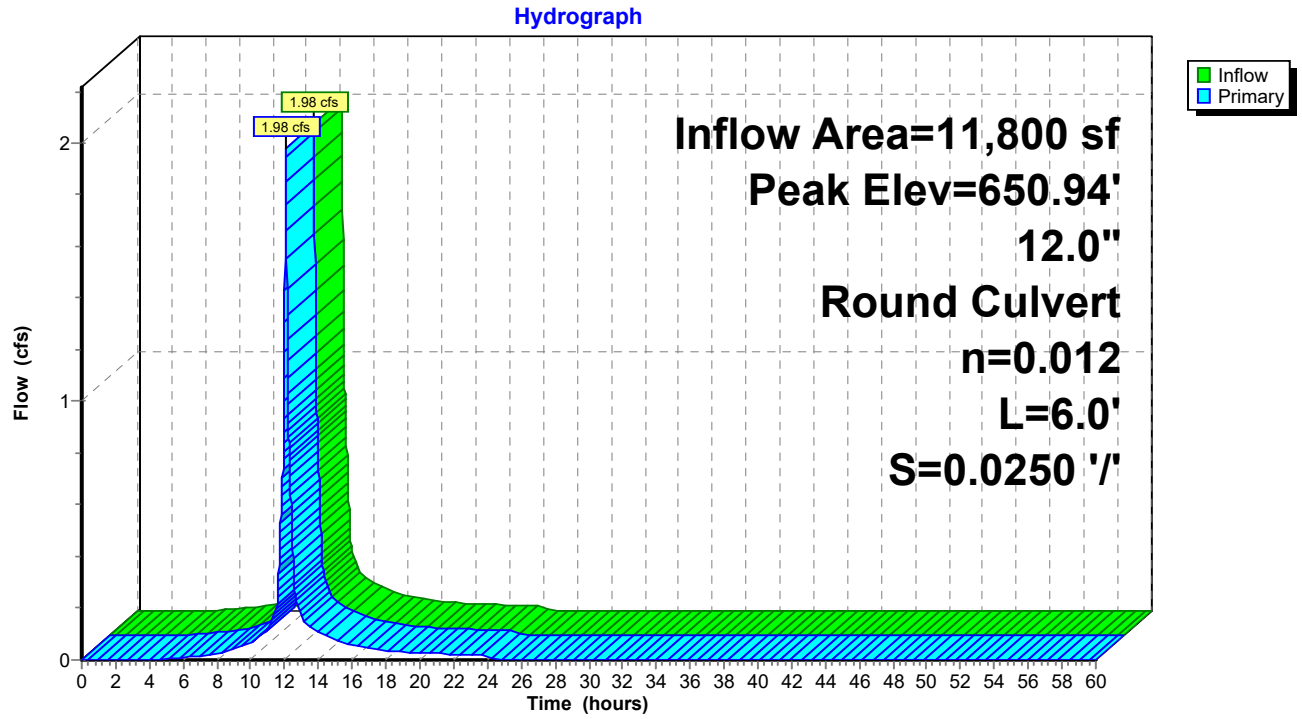
Inflow Area = 11,800 sf, 50.17% Impervious, Inflow Depth = 6.26" for 100-yr event
Inflow = 1.98 cfs @ 12.07 hrs, Volume= 6,159 cf
Outflow = 1.98 cfs @ 12.07 hrs, Volume= 6,159 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.98 cfs @ 12.07 hrs, Volume= 6,159 cf
Routed to Pond 66P : DMH 6

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 650.94' @ 12.07 hrs
Flood Elev= 653.60'

Device	Routing	Invert	Outlet Devices
#1	Primary	650.10'	**12.0" Round Culvert** L= 6.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 650.10' / 649.95' S= 0.0250 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=1.98 cfs @ 12.07 hrs HW=650.94' TW=650.54' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 1.98 cfs @ 3.77 fps)

Pond 18P: CB 8



Summary for Pond 40P: HDS Unit

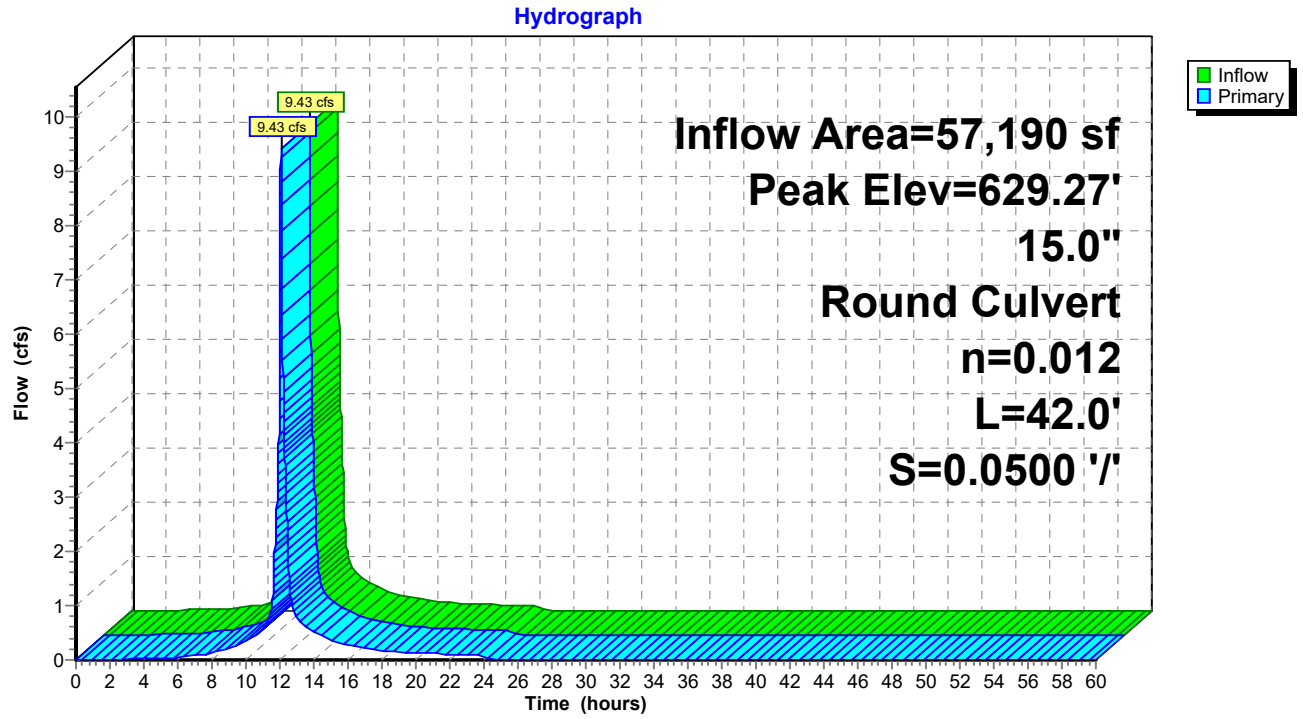
Inflow Area = 57,190 sf, 49.94% Impervious, Inflow Depth = 6.27" for 100-yr event
Inflow = 9.43 cfs @ 12.07 hrs, Volume= 29,867 cf
Outflow = 9.43 cfs @ 12.07 hrs, Volume= 29,867 cf, Atten= 0%, Lag= 0.0 min
Primary = 9.43 cfs @ 12.07 hrs, Volume= 29,867 cf
Routed to Pond 50P : WQB

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 629.27' @ 12.07 hrs
Flood Elev= 653.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	626.10'	**15.0" Round Culvert** L= 42.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 626.10' / 624.00' S= 0.0500 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=9.42 cfs @ 12.07 hrs HW=629.27' TW=626.30' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 9.42 cfs @ 7.68 fps)

Pond 40P: HDS Unit



Summary for Pond 50P: WQB

Inflow Area = 81,960 sf, 34.85% Impervious, Inflow Depth = 5.84" for 100-yr event
Inflow = 12.78 cfs @ 12.07 hrs, Volume= 39,905 cf
Outflow = 1.51 cfs @ 12.67 hrs, Volume= 37,721 cf, Atten= 88%, Lag= 35.9 min
Primary = 1.51 cfs @ 12.67 hrs, Volume= 37,721 cf
Routed to Link 10L : Center Road

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 627.29' @ 12.67 hrs Surf.Area= 7,883 sf Storage= 19,247 cf
Flood Elev= 630.00' Surf.Area= 11,884 sf Storage= 45,891 cf

Plug-Flow detention time= 191.2 min calculated for 37,715 cf (95% of inflow)
Center-of-Mass det. time= 161.1 min (950.6 - 789.5)

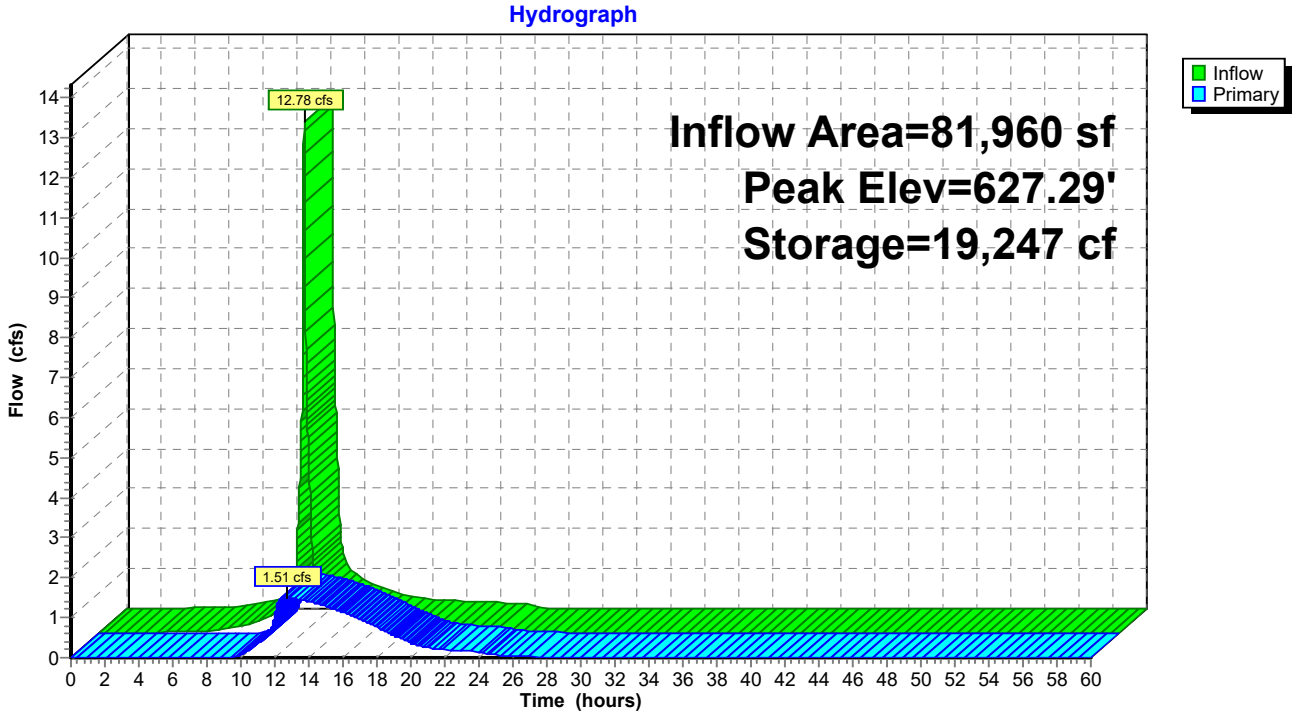
Volume	Invert	Avail.Storage	Storage Description
#1	624.00'	45,891 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
624.00	4,019	300.6	0	0	4,019
625.00	5,066	331.0	4,532	4,532	5,579
626.00	6,226	362.2	5,636	10,168	7,335
627.00	7,493	392.8	6,850	17,018	9,212
628.00	8,879	424.2	8,176	25,194	11,294
629.00	10,333	449.9	9,597	34,791	13,134
630.00	11,884	475.7	11,099	45,891	15,090

Device	Routing	Invert	Outlet Devices
#1	Primary	623.00'	**12.0" Round Culvert** L= 46.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 623.00' / 620.30' S= 0.0587 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Device 1	624.50'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	628.50'	**6.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=1.51 cfs @ 12.67 hrs HW=627.29' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Passes 1.51 cfs of 7.36 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 1.51 cfs @ 7.67 fps)
  └**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 50P: WQB


Hydrograph
Inflow Area=81,960 sf
Peak Elev=627.29'
Storage=19,247 cf
12.78 cfs
1.51 cfs
Inflow
Primary
Flow (cfs)
Time (hours)
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14

Summary for Pond 61P: DMH 1

[80] Warning: Exceeded Pond 11P by 0.36' @ 12.06 hrs (2.27 cfs 285 cf)
[80] Warning: Exceeded Pond 12P by 0.32' @ 12.07 hrs (2.15 cfs 178 cf)

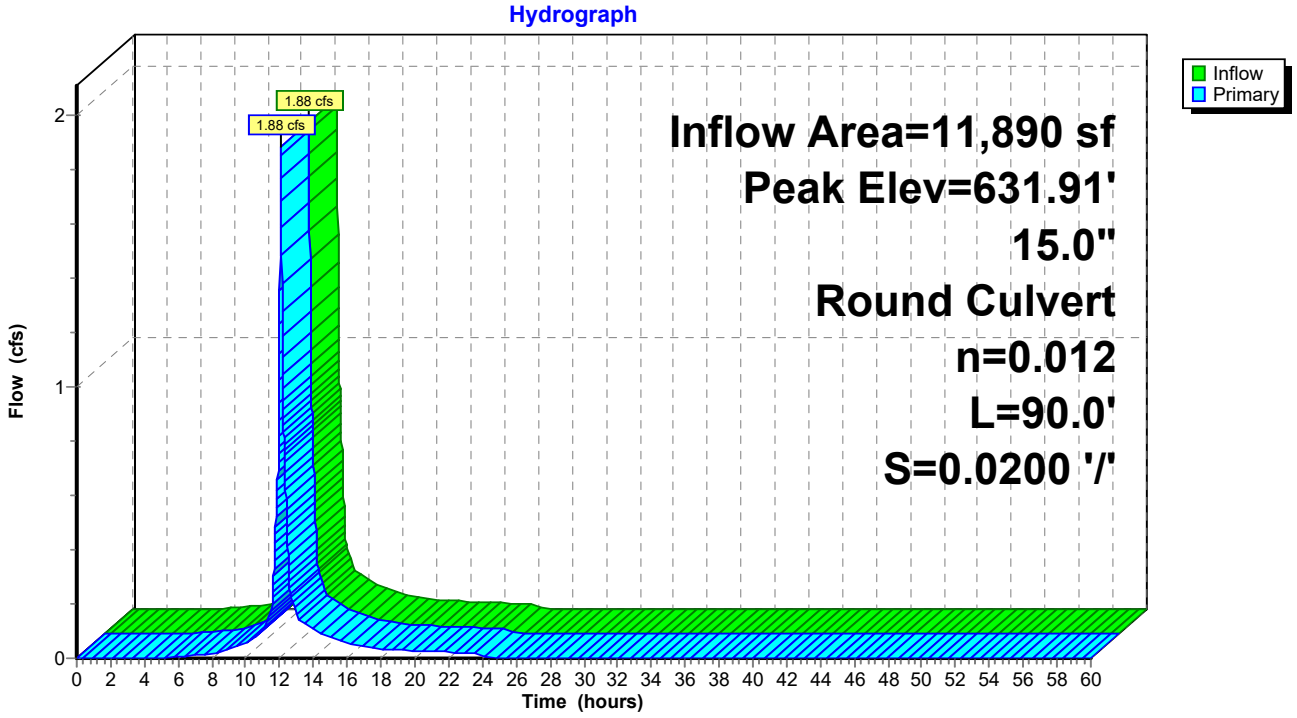
Inflow Area = 11,890 sf, 35.07% Impervious, Inflow Depth = 5.82" for 100-yr event
Inflow = 1.88 cfs @ 12.07 hrs, Volume= 5,771 cf
Outflow = 1.88 cfs @ 12.07 hrs, Volume= 5,771 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.88 cfs @ 12.07 hrs, Volume= 5,771 cf
Routed to Pond 62P : DMH 2

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 631.91' @ 12.09 hrs
Flood Elev= 633.40'

Device	Routing	Invert	Outlet Devices
#1	Primary	629.50'	**15.0" Round Culvert** L= 90.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 629.50' / 627.70' S= 0.0200 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=0.00 cfs @ 12.07 hrs HW=631.71' TW=631.76' (Dynamic Tailwater)
↑—**1=Culvert** (Controls 0.00 cfs)

Pond 61P: DMH 1



Summary for Pond 62P: DMH 2

[80] Warning: Exceeded Pond 61P by 0.35' @ 12.05 hrs (3.23 cfs 353 cf)

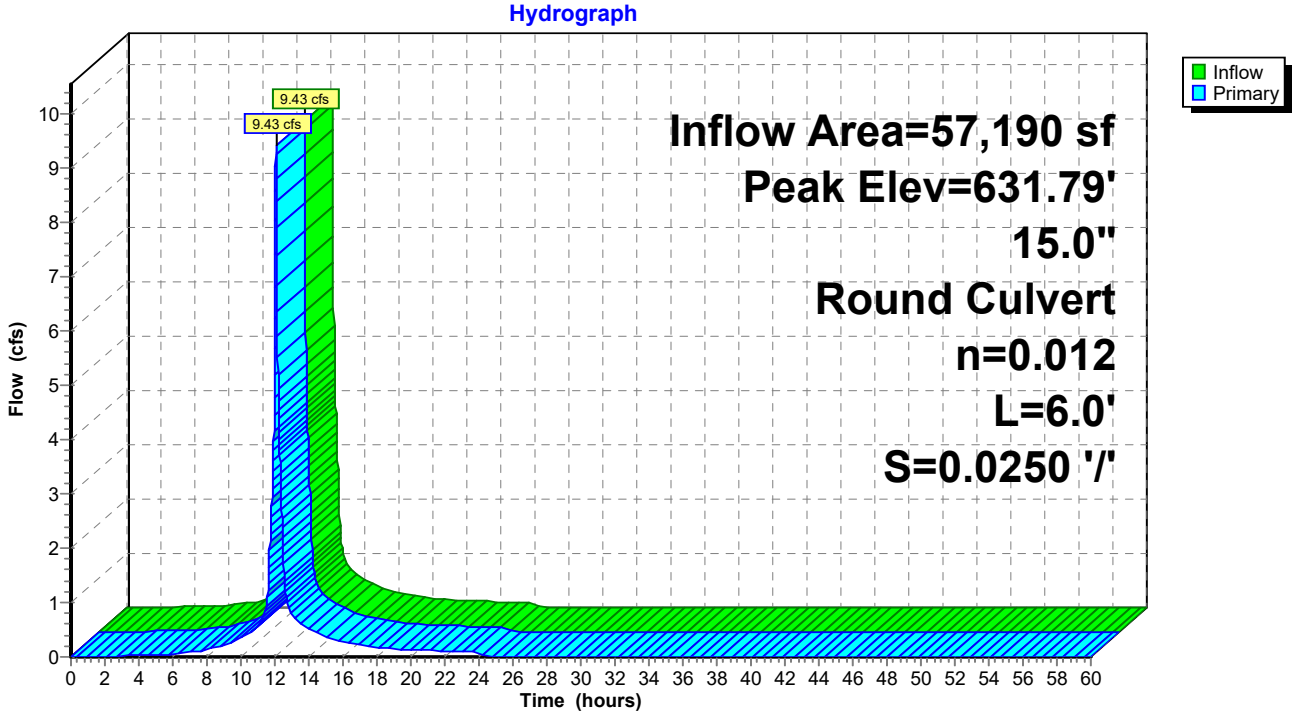
Inflow Area = 57,190 sf, 49.94% Impervious, Inflow Depth = 6.27" for 100-yr event
Inflow = 9.43 cfs @ 12.07 hrs, Volume= 29,867 cf
Outflow = 9.43 cfs @ 12.07 hrs, Volume= 29,867 cf, Atten= 0%, Lag= 0.0 min
Primary = 9.43 cfs @ 12.07 hrs, Volume= 29,867 cf
Routed to Pond 40P : HDS Unit

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 631.79' @ 12.08 hrs
Flood Elev= 637.60'

Device	Routing	Invert	Outlet Devices
#1	Primary	626.25'	**15.0" Round Culvert** L= 6.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 626.25' / 626.10' S= 0.0250 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=9.33 cfs @ 12.07 hrs HW=631.76' TW=629.27' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 9.33 cfs @ 7.61 fps)

Pond 62P: DMH 2



Summary for Pond 63P: DMH 3

[80] Warning: Exceeded Pond 13P by 0.17' @ 12.03 hrs (1.56 cfs 594 cf)
[80] Warning: Exceeded Pond 14P by 0.17' @ 12.03 hrs (1.54 cfs 514 cf)

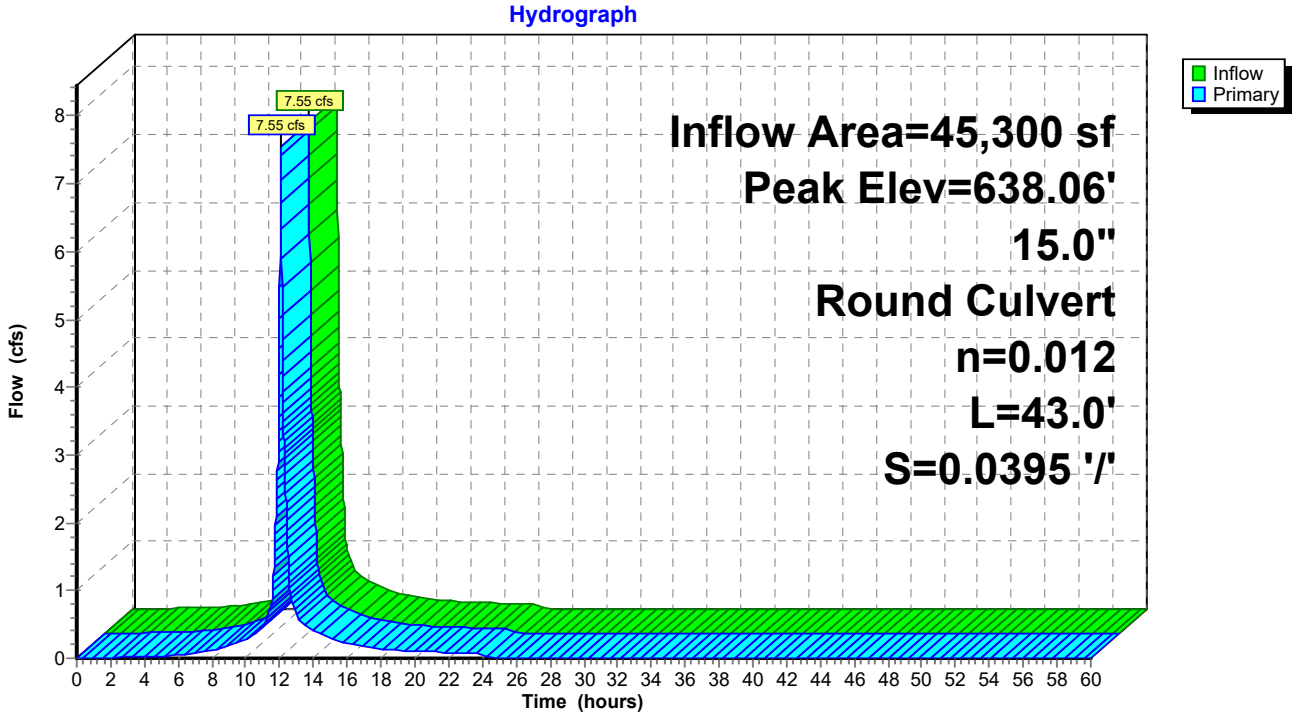
Inflow Area = 45,300 sf, 53.84% Impervious, Inflow Depth = 6.38" for 100-yr event
Inflow = 7.55 cfs @ 12.07 hrs, Volume= 24,096 cf
Outflow = 7.55 cfs @ 12.07 hrs, Volume= 24,096 cf, Atten= 0%, Lag= 0.0 min
Primary = 7.55 cfs @ 12.07 hrs, Volume= 24,096 cf
Routed to Pond 62P : DMH 2

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 638.06' @ 12.07 hrs
Flood Elev= 642.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	635.80'	**15.0" Round Culvert** L= 43.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 635.80' / 634.10' S= 0.0395 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=7.54 cfs @ 12.07 hrs HW=638.05' TW=631.76' (Dynamic Tailwater)
↳**1=Culvert** (Inlet Controls 7.54 cfs @ 6.14 fps)

Pond 63P: DMH 3



Summary for Pond 64P: DMH 4

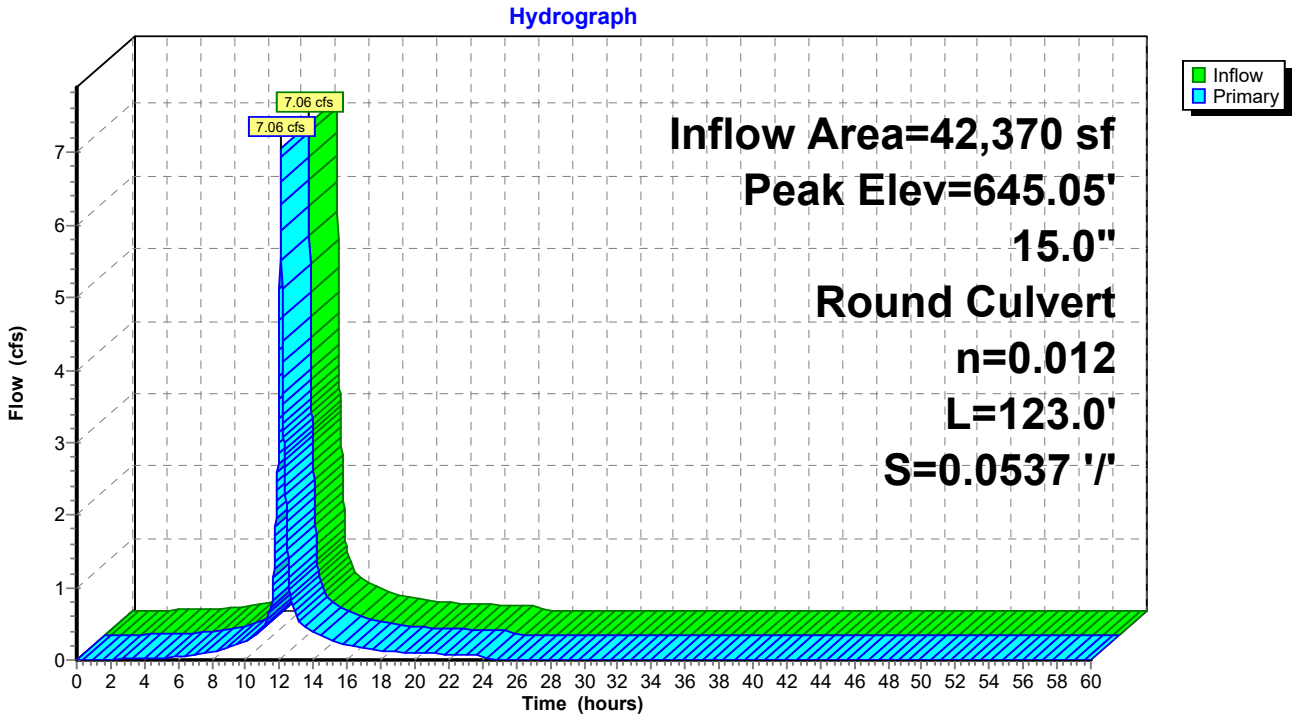
Inflow Area = 42,370 sf, 53.74% Impervious, Inflow Depth = 6.38" for 100-yr event
Inflow = 7.06 cfs @ 12.07 hrs, Volume= 22,534 cf
Outflow = 7.06 cfs @ 12.07 hrs, Volume= 22,534 cf, Atten= 0%, Lag= 0.0 min
Primary = 7.06 cfs @ 12.07 hrs, Volume= 22,534 cf
Routed to Pond 63P : DMH 3

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 645.05' @ 12.07 hrs
Flood Elev= 649.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	643.00'	**15.0" Round Culvert** L= 123.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 643.00' / 636.40' S= 0.0537 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=7.05 cfs @ 12.07 hrs HW=645.05' TW=638.05' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 7.05 cfs @ 5.75 fps)

Pond 64P: DMH 4



Summary for Pond 65P: DMH 5

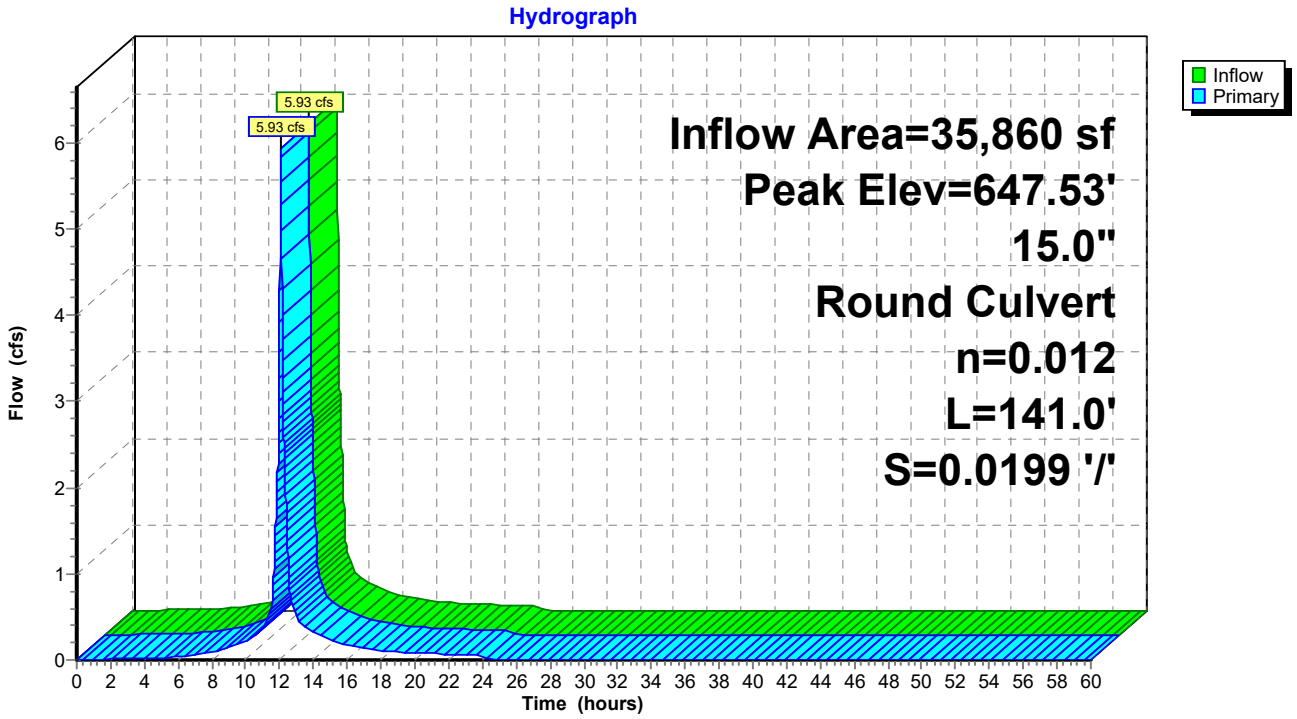
Inflow Area = 35,860 sf, 52.45% Impervious, Inflow Depth = 6.34" for 100-yr event
Inflow = 5.93 cfs @ 12.07 hrs, Volume= 18,943 cf
Outflow = 5.93 cfs @ 12.07 hrs, Volume= 18,943 cf, Atten= 0%, Lag= 0.0 min
Primary = 5.93 cfs @ 12.07 hrs, Volume= 18,943 cf
Routed to Pond 64P : DMH 4

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 647.53' @ 12.07 hrs
Flood Elev= 654.20'

Device	Routing	Invert	Outlet Devices
#1	Primary	645.90'	**15.0" Round Culvert** L= 141.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 645.90' / 643.10' S= 0.0199 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=5.92 cfs @ 12.07 hrs HW=647.53' TW=645.05' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 5.92 cfs @ 4.83 fps)

Pond 65P: DMH 5



Summary for Pond 66P: DMH 6

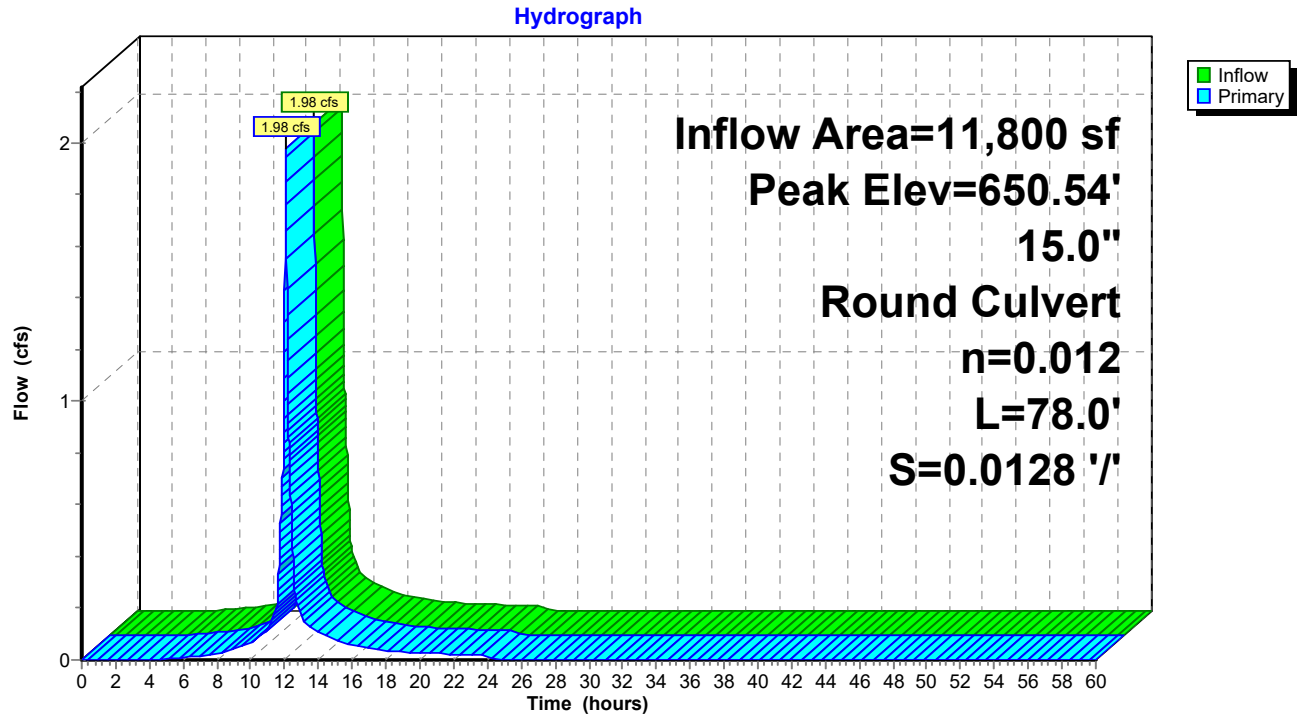
Inflow Area = 11,800 sf, 50.17% Impervious, Inflow Depth = 6.26" for 100-yr event
Inflow = 1.98 cfs @ 12.07 hrs, Volume= 6,159 cf
Outflow = 1.98 cfs @ 12.07 hrs, Volume= 6,159 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.98 cfs @ 12.07 hrs, Volume= 6,159 cf
Routed to Pond 65P : DMH 5

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 650.54' @ 12.07 hrs
Flood Elev= 654.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	649.85'	**15.0" Round Culvert** L= 78.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 649.85' / 648.85' S= 0.0128 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=1.98 cfs @ 12.07 hrs HW=650.54' TW=647.53' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 1.98 cfs @ 2.83 fps)

Pond 66P: DMH 6



Summary for Pond 67P: DMH 7

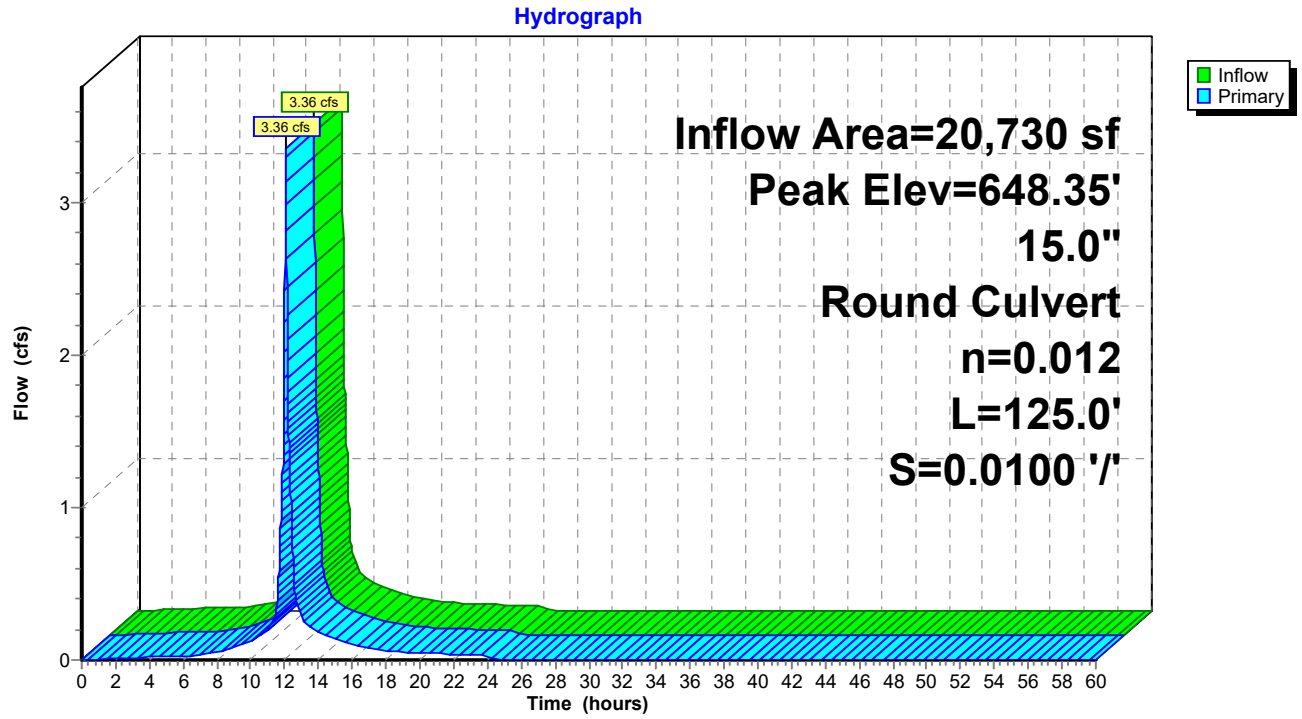
Inflow Area = 20,730 sf, 49.98% Impervious, Inflow Depth = 6.28" for 100-yr event
Inflow = 3.36 cfs @ 12.07 hrs, Volume= 10,848 cf
Outflow = 3.36 cfs @ 12.07 hrs, Volume= 10,848 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.36 cfs @ 12.07 hrs, Volume= 10,848 cf
Routed to Pond 65P : DMH 5

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 648.35' @ 12.08 hrs
Flood Elev= 654.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	647.25'	**15.0" Round Culvert** L= 125.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 647.25' / 646.00' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=3.32 cfs @ 12.07 hrs HW=648.35' TW=647.53' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 3.32 cfs @ 3.86 fps)

Pond 67P: DMH 7



Summary for Pond 81P: YD 1

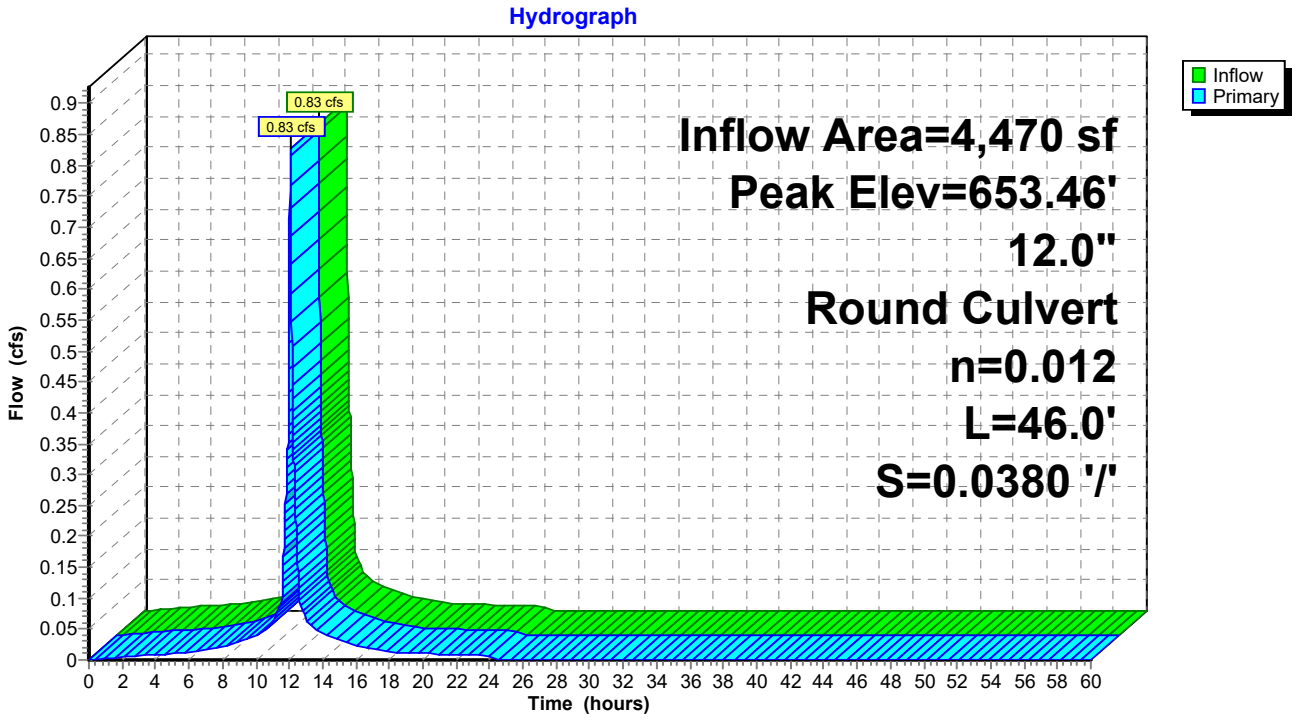
Inflow Area = 4,470 sf,100.00% Impervious, Inflow Depth = 7.69" for 100-yr event
Inflow = 0.83 cfs @ 12.07 hrs, Volume= 2,865 cf
Outflow = 0.83 cfs @ 12.07 hrs, Volume= 2,865 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.83 cfs @ 12.07 hrs, Volume= 2,865 cf
Routed to Pond 83P : YD 3

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 653.46' @ 12.07 hrs
Flood Elev= 656.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	653.00'	**12.0" Round Culvert** L= 46.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 653.00' / 651.25' S= 0.0380 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.83 cfs @ 12.07 hrs HW=653.46' TW=652.54' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 0.83 cfs @ 2.32 fps)

Pond 81P: YD 1



Summary for Pond 82P: YD 2

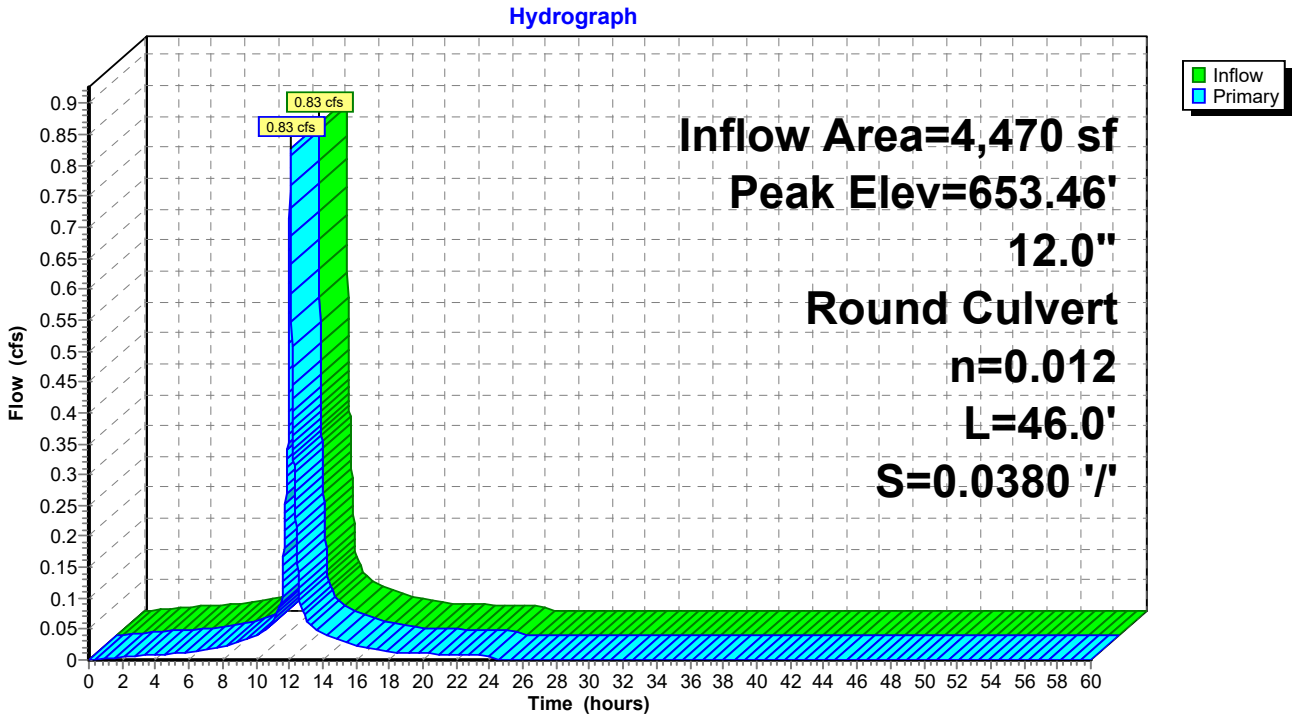
Inflow Area = 4,470 sf,100.00% Impervious, Inflow Depth = 7.69" for 100-yr event
Inflow = 0.83 cfs @ 12.07 hrs, Volume= 2,865 cf
Outflow = 0.83 cfs @ 12.07 hrs, Volume= 2,865 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.83 cfs @ 12.07 hrs, Volume= 2,865 cf
Routed to Pond 83P : YD 3

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 653.46' @ 12.07 hrs
Flood Elev= 656.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	653.00'	**12.0" Round Culvert** L= 46.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 653.00' / 651.25' S= 0.0380 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.83 cfs @ 12.07 hrs HW=653.46' TW=652.54' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 0.83 cfs @ 2.32 fps)

Pond 82P: YD 2



Summary for Pond 83P: YD 3

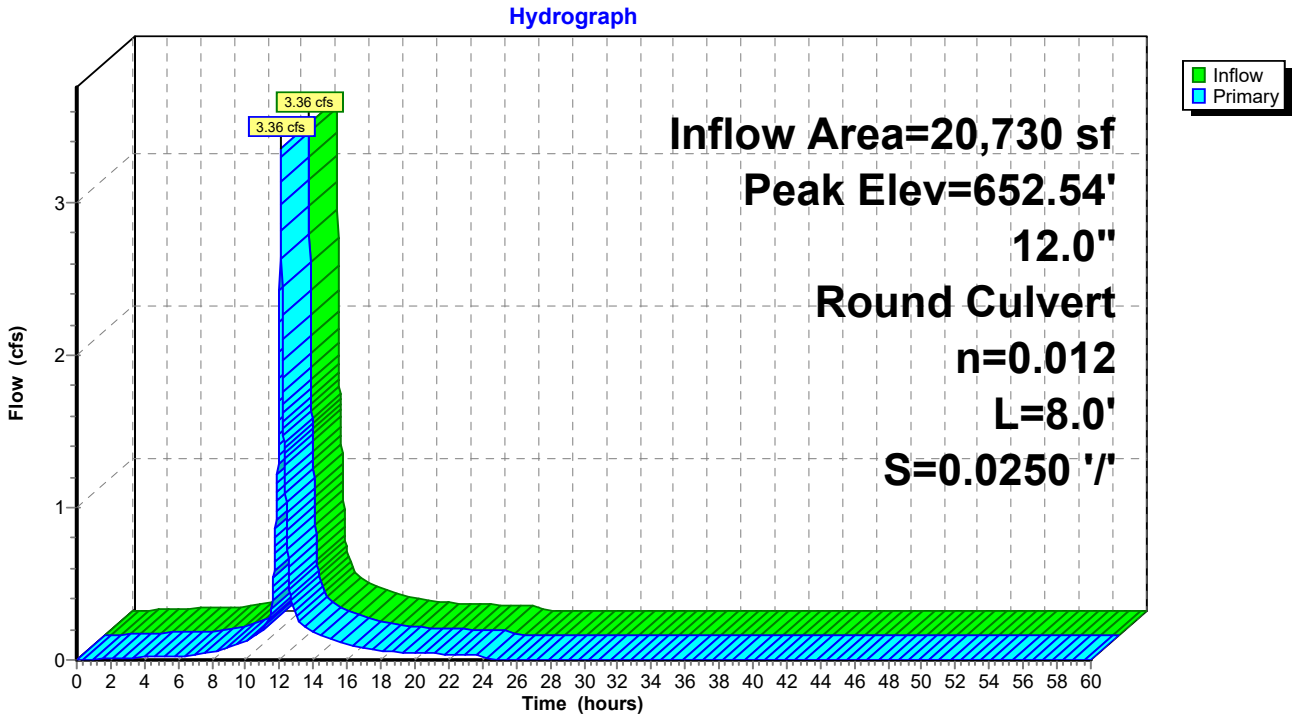
Inflow Area = 20,730 sf, 49.98% Impervious, Inflow Depth = 6.28" for 100-yr event
Inflow = 3.36 cfs @ 12.07 hrs, Volume= 10,848 cf
Outflow = 3.36 cfs @ 12.07 hrs, Volume= 10,848 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.36 cfs @ 12.07 hrs, Volume= 10,848 cf
Routed to Pond 67P : DMH 7

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 652.54' @ 12.07 hrs
Flood Elev= 654.75'

Device	Routing	Invert	Outlet Devices
#1	Primary	651.25'	**12.0" Round Culvert** L= 8.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 651.25' / 651.05' S= 0.0250 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=3.35 cfs @ 12.07 hrs HW=652.54' TW=648.35' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 3.35 cfs @ 4.27 fps)

Pond 83P: YD 3

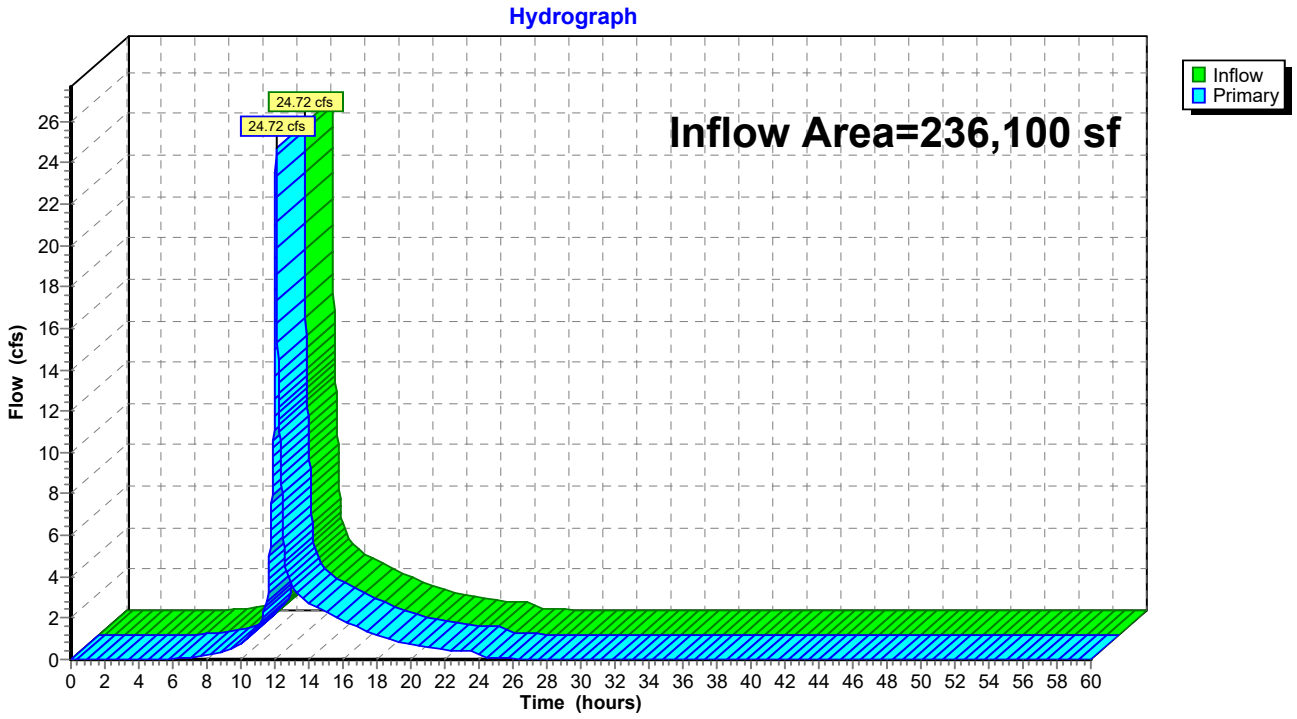


Summary for Link 10L: Center Road

Inflow Area = 236,100 sf, 28.76% Impervious, Inflow Depth = 5.55" for 100-yr event
Inflow = 24.72 cfs @ 12.07 hrs, Volume= 109,132 cf
Primary = 24.72 cfs @ 12.07 hrs, Volume= 109,132 cf, Atten= 0%, Lag= 0.0 min

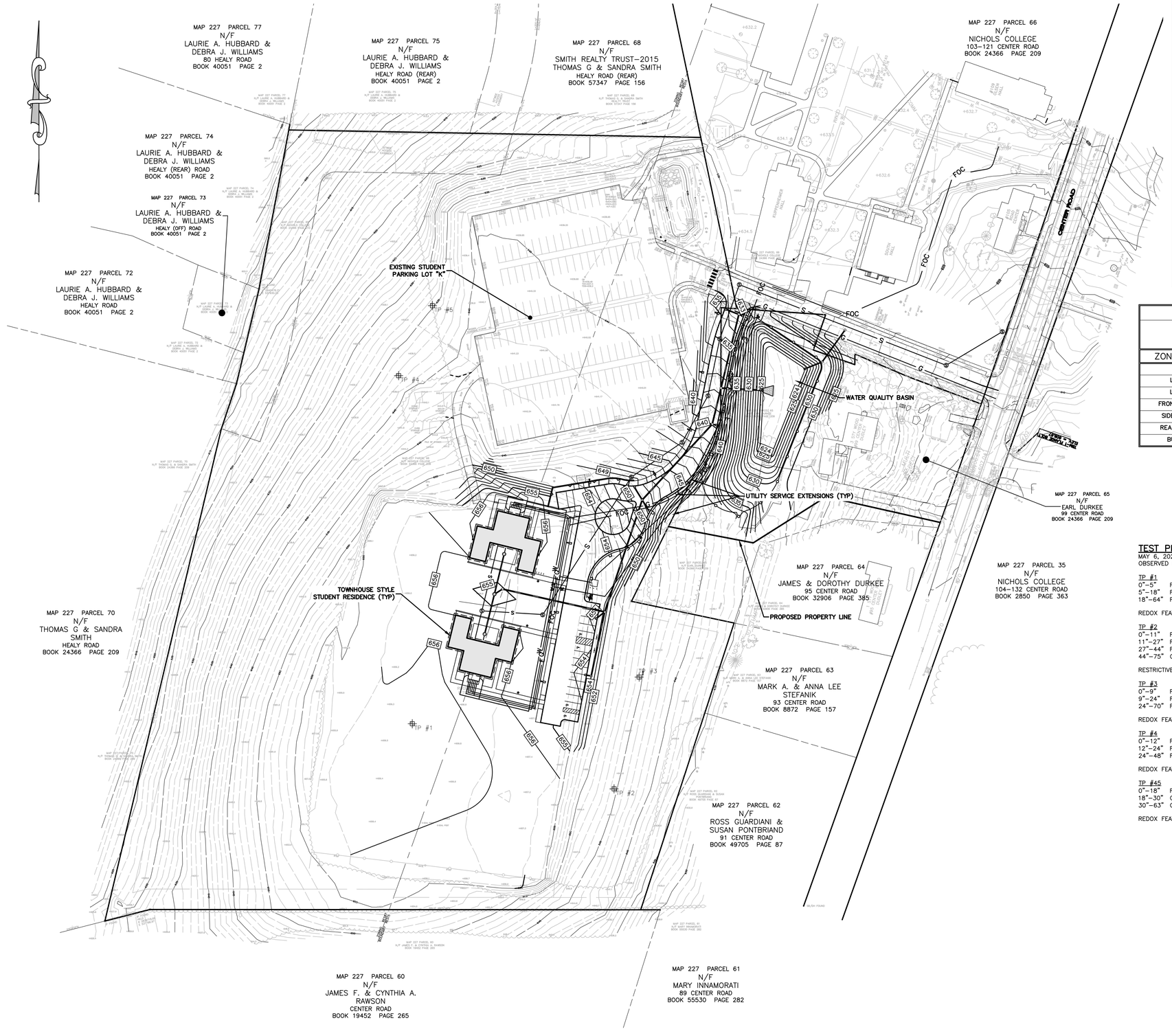
Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs

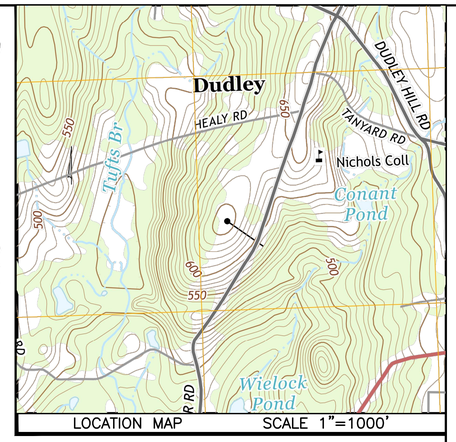
Link 10L: Center Road



DESIGN PLANS

(Includes Construction Period Pollution Prevention Plan, Erosion & Sedimentation Control Plan, and Post Construction Operation & Maintenance Plan)





LOCATION MAP SCALE 1"=1000'

DIMENSIONAL REQUIREMENTS		
RESIDENTIAL 15/RESIDENTIAL 87		
ZONING CRITERIA	REQUIRED	PROVIDED
LOT AREA	15,000 SF / 87,000 SF	>1,000,000 SF
LOT FRONTAGE	100' / 150'	>1000'
LOT COVERAGE	30% / 20%	±20%
FRONT YARD SETBACK	30' / 40'	>100'
SIDE YARD SETBACK	15' / 25'	±120'
REAR YARD SETBACK	20' / 25'	±330'
BUILDING HEIGHT	35'	35'

TEST PITS
MAY 6, 2022
OBSERVED BY P. PARENT (CHA)

TP #1
0"-5" FINE SANDY LOAM WITH GRAVEL 7.5YR 3/3
5"-18" FINE SANDY LOAM WITH GRAVEL 7.5YR 3/4
18"-64" FINE SANDY LOAM WITH GRAVEL & COBBLES 10YR 3/3

REDOX FEATURES OBSERVED AT 18"

TP #2
0"-11" FINE SANDY LOAM 7.5YR 3/3
11"-27" FINE SANDY LOAM 10YR 3/6
27"-44" FINE SANDY LOAM 10YR 3/3
44"-75" COMPACT LOAMY SAND 10YR 5/2

RESTRICTIVE LAYER AT 44"

TP #3
0"-9" FINE SANDY LOAM 7.5YR 3/3
9"-24" FINE SANDY LOAM 10YR 3/6
24"-70" FINE SANDY LOAM WITH GRAVEL & COBBLES 2.5YR 5/3

REDOX FEATURES OBSERVED AT 38"

TP #4
0"-12" FINE SANDY LOAM 7.5YR 3/4
12"-24" FINE SANDY LOAM 7.5YR 5/4
24"-48" FINE SANDY LOAM WITH GRAVEL & COBBLES 7.5YR 5/4

REDOX FEATURES OBSERVED AT 24"

TP #45
0"-18" FINE SANDY LOAM 7.5YR 3/3
18"-30" COMPACT FINE SANDY LOAM WITH GRAVEL 7.5YR 3/4
30"-63" COMPACT FINE SANDY LOAM WITH GRAVEL 10YR 3/3

REDOX FEATURES OBSERVED AT 18"

60 30 0 60
GRAPHIC SCALE IN FEET

APPROVED BY THE
PLANNING BOARD

_____
_____
_____
_____
_____

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508-213-2217

TOWNHOMES
CENTER ROAD, DUDLEY, MA 01571

REVISIONS

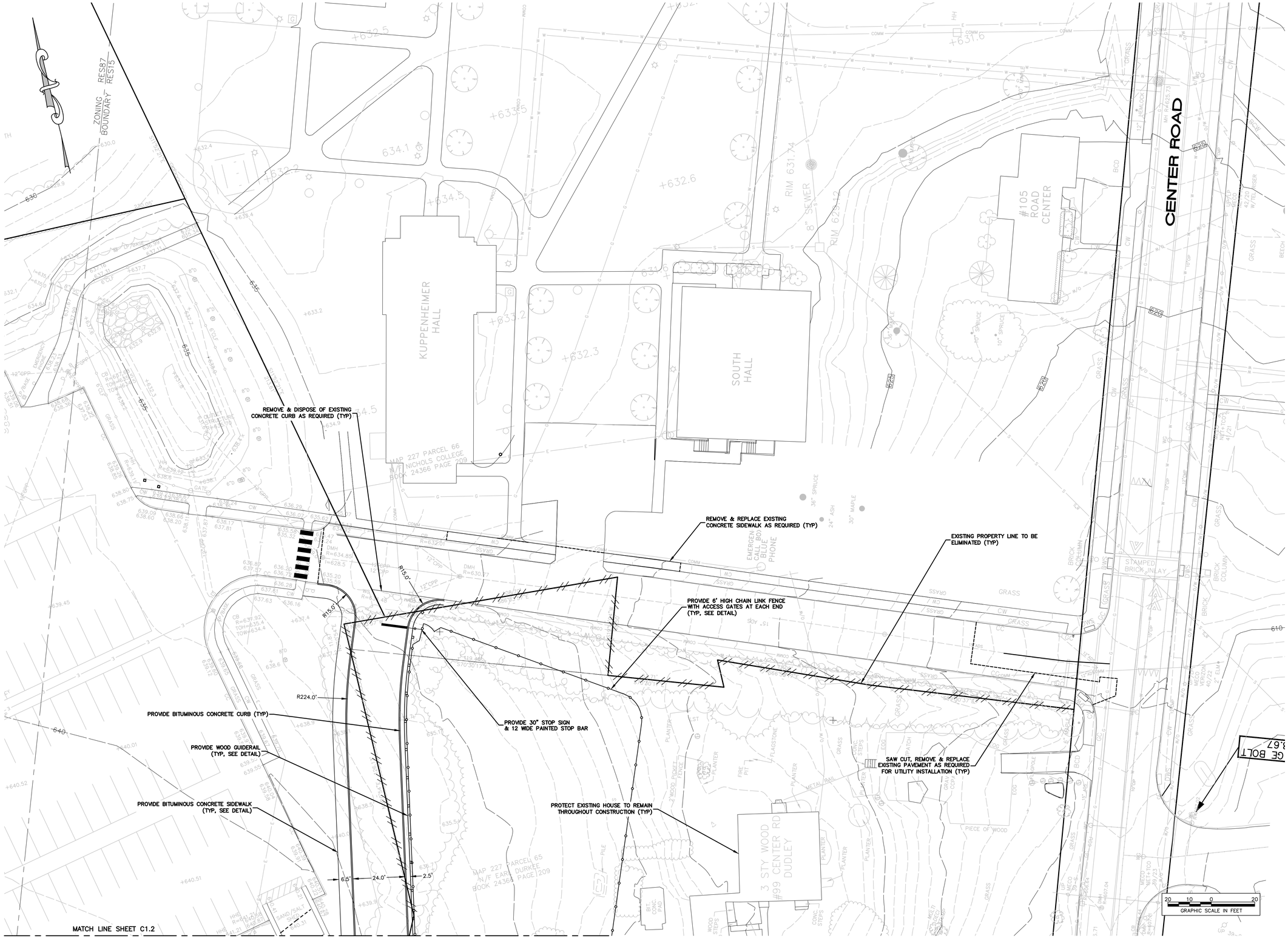
NO.	DATE	BY	REMARKS
1	6/30/22	PMP	REVIEW COMMENTS
2	10/3/22	PMP	REVISED SITE LAYOUT

SET
PLANNING BOARD SUBMISSION

SHEET TITLE
OVERALL SITE PLAN

DATE	MAY 25, 2022
SCALE	1" = 60'
DRAWN BY	PMP
CHECKED BY	

SHEET NO.
C1.0



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REVISIONS

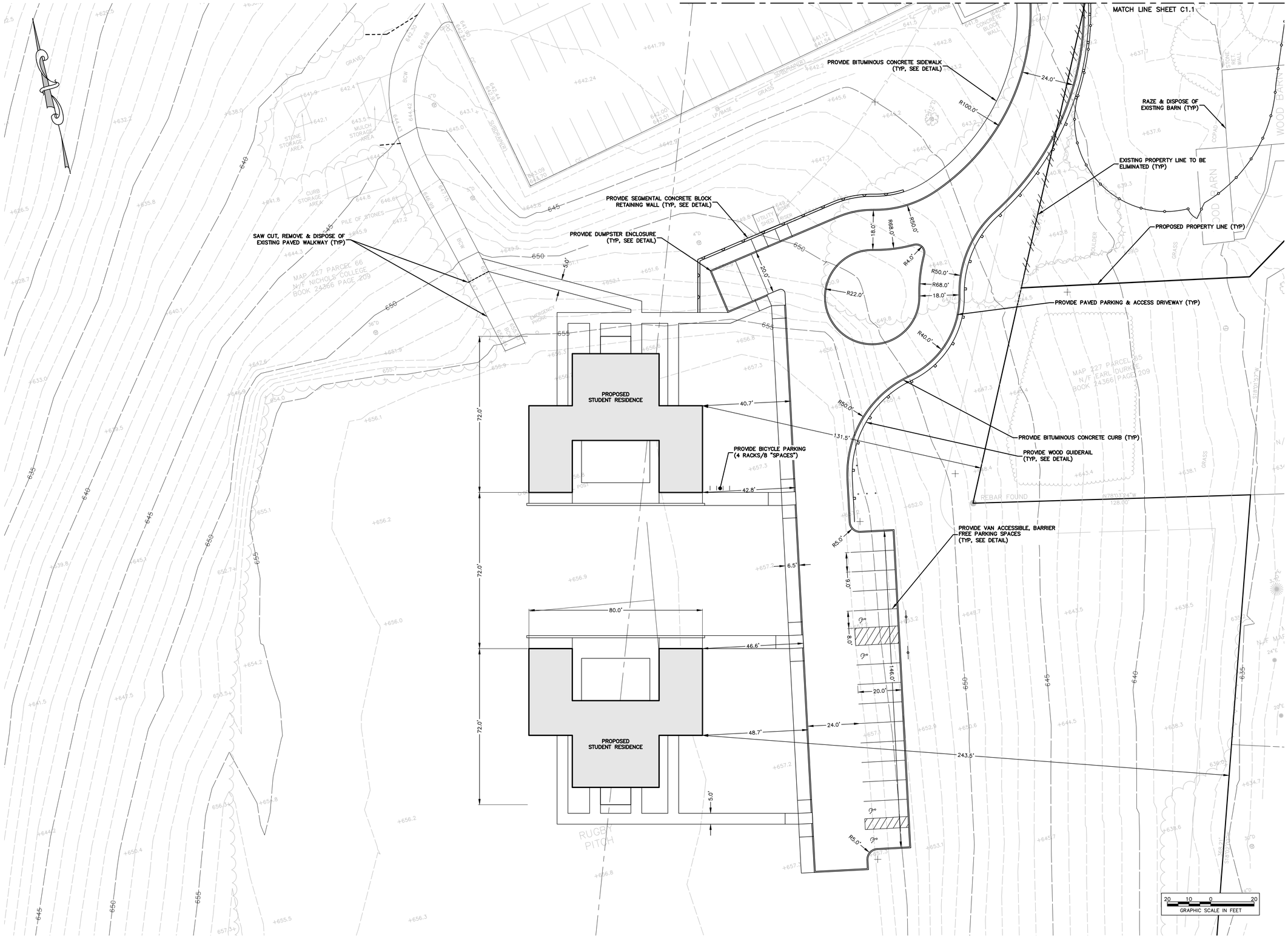
NO.	DATE	BY	REMARKS
1	6/30/22	PMP	REVIEW COMMENTS
2	10/3/22	PMP	REVISED SITE LAYOUT

SET
PLANNING BOARD SUBMISSION

SHEET TITLE
SITE LAYOUT PLAN

DATE	MAY 25, 2022
SCALE	1" = 20'
DRAWN BY	PMP
CHECKED BY	

SHEET NO.
C1.1



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REVISIONS

NO.	DATE	BY	REMARKS
1	6/30/22	PMP	REVIEW COMMENTS
2	10/3/22	PMP	REVISED SITE LAYOUT

SET

PLANNING BOARD SUBMISSION

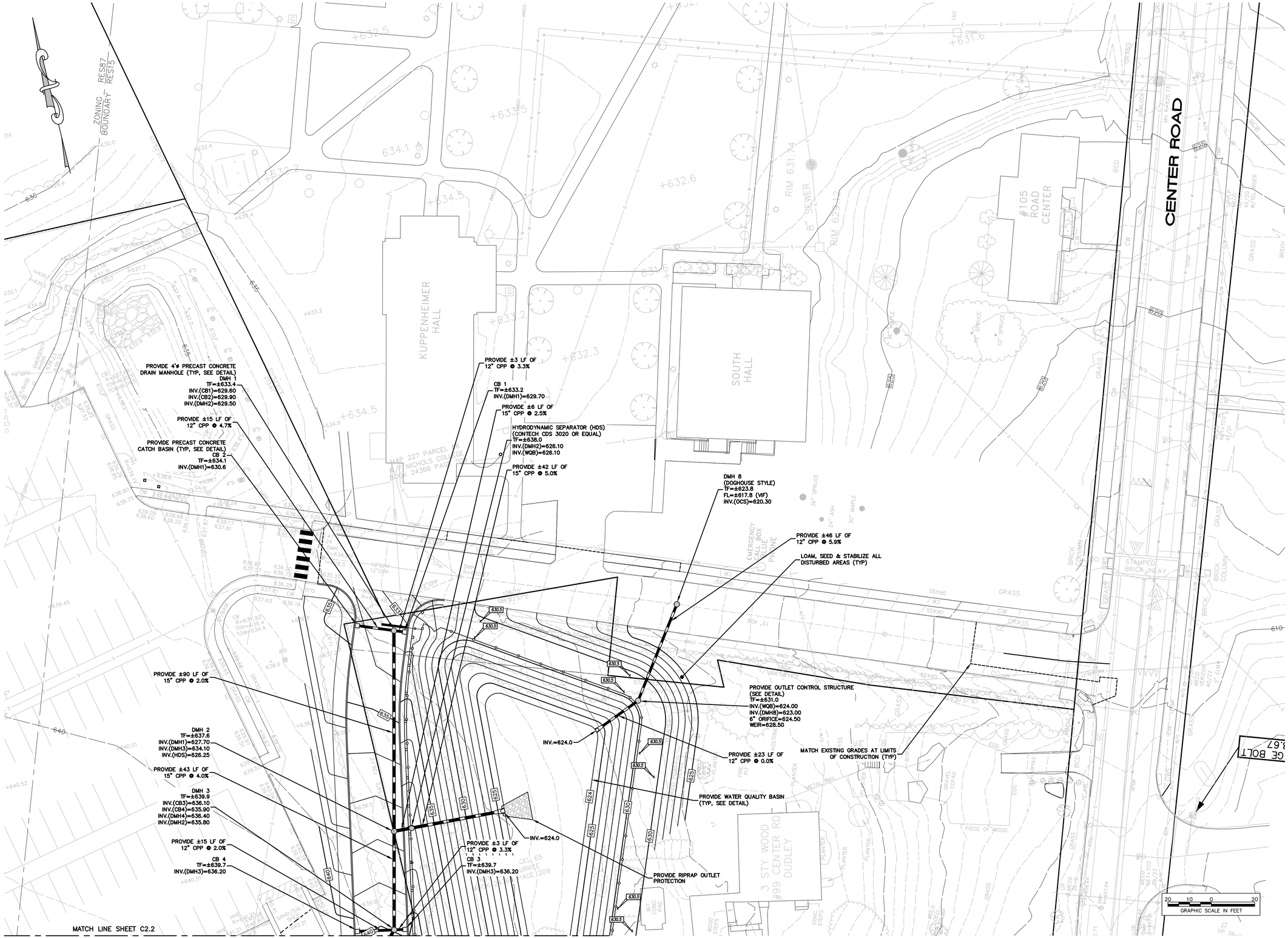
SHEET TITLE

SITE LAYOUT PLAN

DATE	MAY 25, 2022
SCALE	1" = 20'
DRAWN BY	PMP
CHECKED BY	

SHEET NO.

C1.2



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CENTER ROAD, DUDLEY, MA 01571

REVISIONS

NO.	DATE	BY	REMARKS
1	6/30/22	PMP	REVIEW COMMENTS
2	10/3/22	PMP	REVISED SITE LAYOUT

SET
PLANNING BOARD SUBMISSION

SHEET TITLE
SITE GRADING & DRAINAGE PLAN

DATE	MAY 25, 2022
SCALE	1" = 20'
DRAWN BY	PMP
CHECKED BY	

SHEET NO.
C2.1

PROVIDE WATER QUALITY BASIN
(TYP, SEE DETAIL)

MATCH LINE SHEET C2.1

PROVIDE PRECAST CONCRETE
CATCH BASIN (TYP, SEE DETAIL)
CB 6
TF=±649.5
INV.(DMH4)=646.00

TW=±650.0
BW=±649.5

PROVIDE ±16 LF OF 12" CPP @ 1.9%

TW=±654.5
BW=±649.6

PROVIDE 4'ø PRECAST CONCRETE
DRAIN MANHOLE (TYP, SEE DETAIL)
DMH 4
TF=±649.5
INV.(CB5)=645.70
INV.(CB6)=645.70
INV.(DMH5)=643.10
INV.(DMH3)=643.00

TW=±656.0
BW=±651.0

PROVIDE ±14 LF OF 12" CPP @ 2.1%

TW=±656.0
BW=±655.9

CB 5
TF=±649.5
INV.(DMH4)=646.00

MAP 227 PARCEL 66
N/F NICHOLS COLLEGE
BOOK 24366 PAGE 209

MAP 227 PARCEL 65
N/F EARL IDURKEE
BOOK 24366 PAGE 209

PROPOSED
STUDENT RESIDENCE
FF=657.0

PROVIDE 10" SDR 35 PVC ROOF DRAIN MANIFOLD
MAINTAIN 0.5% SLOPE TO OUTLET (TYP)
COORDINATE 6" PVC UPRIGHTS FOR DOWNSPOUTS
WITH ARCHITECTURAL PLANS

PROVIDE ±141 LF OF
15" CPP @ 2.0%

YD 1
TF=±656.5
INV.(YD3)=653.00

PROVIDE ±46 LF OF
12" CPP @ 3.8%

DMH 7
TF=±654.9
INV.(YD3)=651.05
INV.(DMH5)=647.25

LOAM, SEED & STABILIZE ALL
DISTURBED AREAS (TYP)

PROVIDE ±11 LF OF
12" CPP @ 2.7%

DMH 5
TF=±654.2
INV.(CB7)=650.00
INV.(DMH6)=648.85
INV.(DMH7)=646.00
INV.(DMH4)=645.90

CB 7
TF=±653.8
INV.(DMH5)=650.3

PROVIDE ±125 LF OF
15" CPP @ 1.0%

PROVIDE ±78 LF OF
15" CPP @ 1.3%

PROVIDE ±8 LF OF
12" CPP @ 2.5%

PROVIDE ±46 LF OF
12" CPP @ 3.8%

PROVIDE YARD DRAIN (TYP, SEE DETAIL)
(NYLOPLAST 24" DRAIN BASIN OR EQUAL)
YD 3
TF=±654.75
INV.(YD1)=651.25
INV.(YD2)=651.25
INV.(DMH7)=651.25

CB 8
TF=±653.6
INV.(DMH6)=650.1

YD 2
TF=±656.5
INV.(YD3)=653.00

PROVIDE ±6 LF OF
12" CPP @ 2.5%

DMH 6
TF=±654.0
INV.(CB8)=649.95
INV.(DMH5)=649.85

PROPOSED
STUDENT RESIDENCE
FF=657.0

RUGBY
PITCH

REBAR FOUND

GRAPHIC SCALE IN FEET
20 10 0 20

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PETER M. PARENT
CIVIL
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REGISTERED PROFESSIONAL ENGINEER

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508-213-2217

TOWNHOMES

CENTER ROAD, DUDLEY, MA 01571

REVISIONS

NO.	DATE	BY	REMARKS
1	6/30/22	PMP	REVIEW COMMENTS
2	10/3/22	PMP	REVISED SITE LAYOUT

SET
PLANNING BOARD SUBMISSION

SHEET TITLE
SITE GRADING & DRAINAGE PLAN

DATE	MAY 25, 2022
SCALE	1" = 20'
DRAWN BY	PMP
CHECKED BY	

SHEET NO.
C2.2

LOAM, SEED & STABILIZE ALL DISTURBED AREAS (TYP)

PROVIDE WATER QUALITY BASIN (TYP, SEE DETAIL)

PROVIDE 8' WIDE TOP OF BERM AT ELEV. 630.5

PROVIDE 6' HIGH CHAIN LINK FENCE WITH 8' WIDE ACCESS GATES AT EACH END (TYP, SEE DETAIL)

PROVIDE OUTLET CONTROL STRUCTURE (SEE DETAIL)

RAZE & DISPOSE OF EXISTING BARN (TYP)

PROTECT EXISTING HOUSE TO REMAIN THROUGHOUT CONSTRUCTION (TYP)

GRAPHIC SCALE IN FEET
10 5 0 10

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REVISIONS

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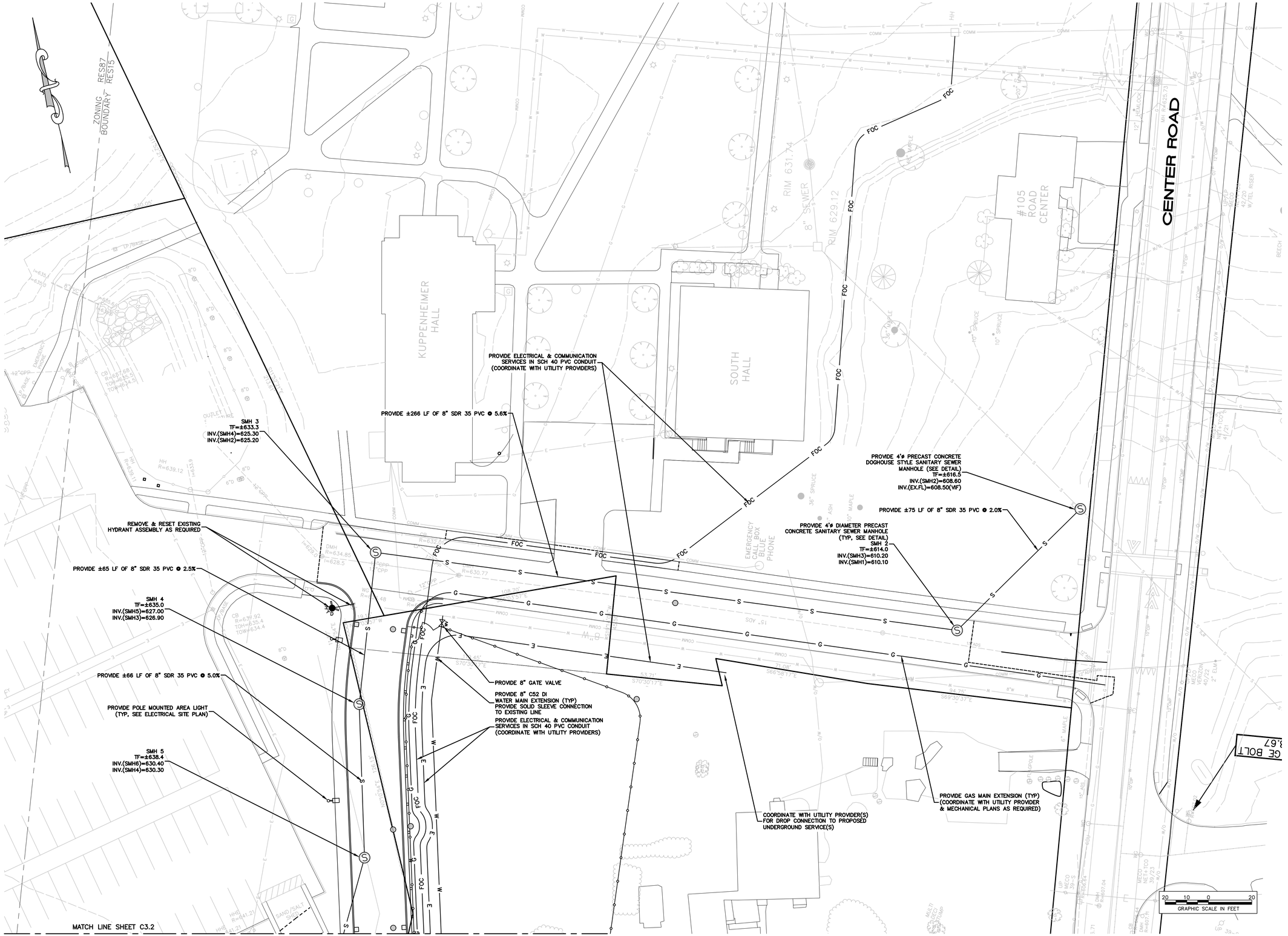
2	10/3/22	PMP	REVISED SITE LAYOUT

SET
PLANNING BOARD SUBMISSION

SHEET TITLE
WATER QUALITY BASIN ENLARGEMENT PLAN

DATE	MAY 25, 2022
SCALE	1" = 10'
DRAWN BY	PMP
CHECKED BY	

SHEET NO.
C2.3



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REVISIONS

NO.	DATE	BY	REMARKS
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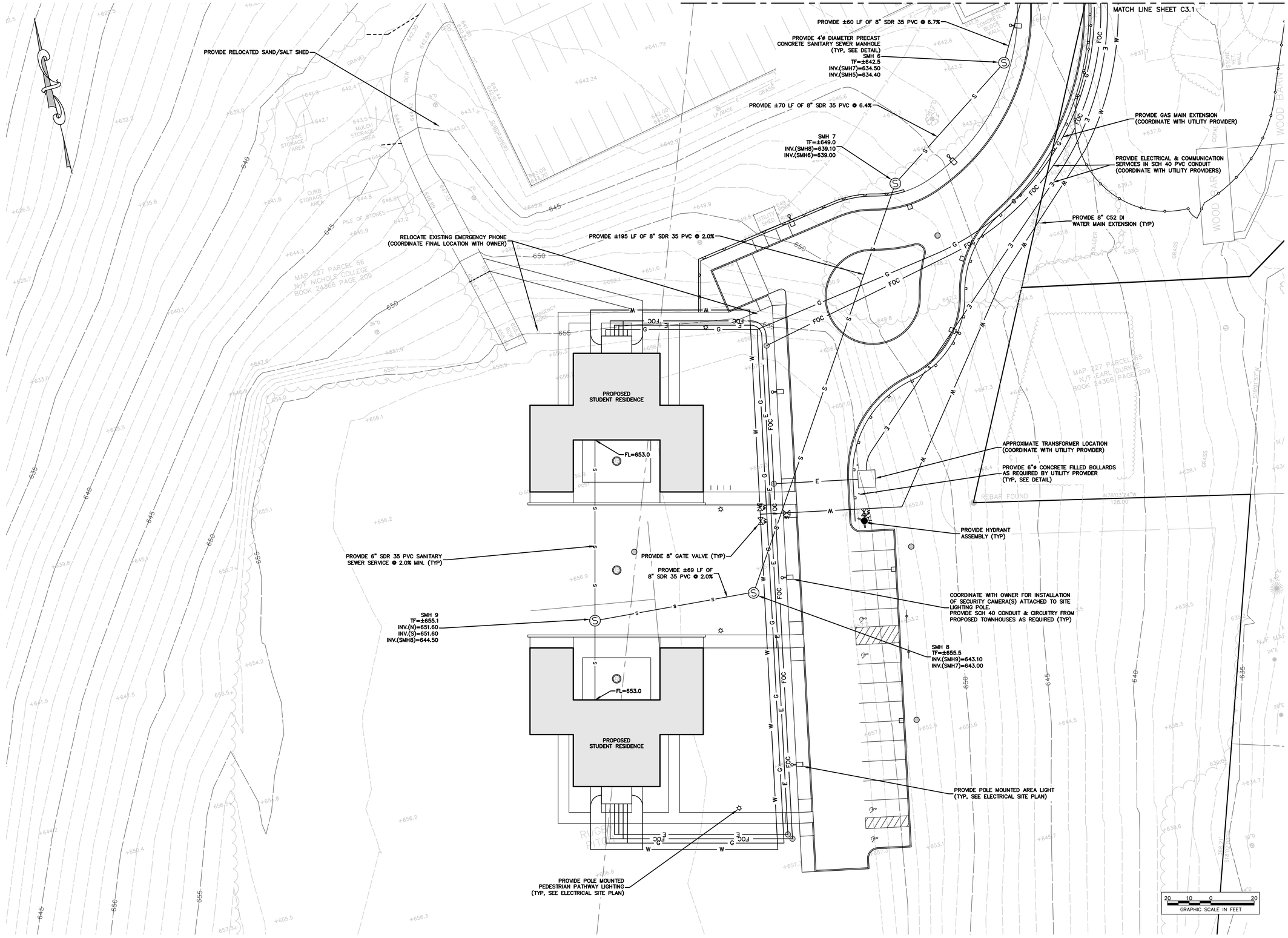
2	10/3/22	PMP	REVISED SITE LAYOUT

SET
PLANNING BOARD SUBMISSION

SHEET TITLE
SITE UTILITY PLAN

DATE	MAY 25, 2022
SCALE	1" = 20'
DRAWN BY	PMP
CHECKED BY	

SHEET NO.
C3.1



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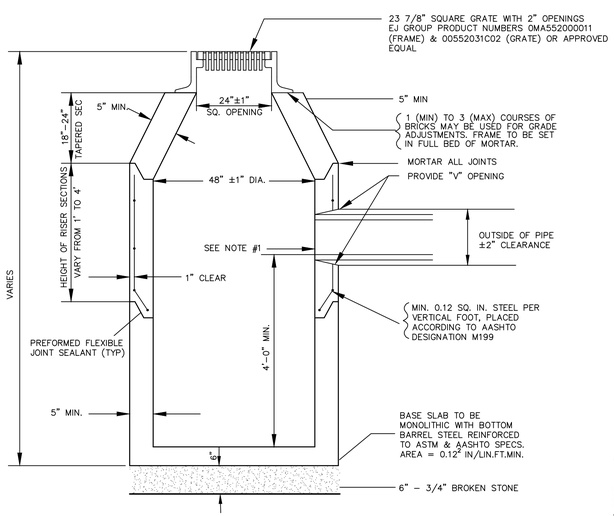
2	10/3/22	PMP	REVISED SITE LAYOUT

SET
PLANNING BOARD SUBMISSION

SHEET TITLE
SITE UTILITY PLAN

DATE	MAY 25, 2022
SCALE	1" = 20'
DRAWN BY	PMP
CHECKED BY	

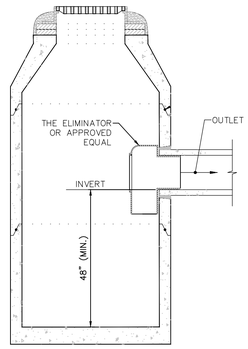
SHEET NO.
C3.2



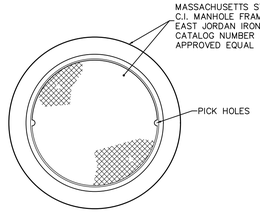
PRECAST CONCRETE CATCH BASIN
NOT TO SCALE

NOTES:

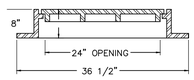
1. FACE OF PIPE SHALL BE FLUSH OR NOT TO PROJECT MORE THAN 4" FROM FACE OF WALL ALONG CENTERLINE OF PIPE.
2. FOR DESCRIPTION, MATERIALS, AND CONSTRUCTION METHODS SEE MASSDOT "STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES" AND CONSTRUCTION STANDARDS AND THE CONTRACT DOCUMENT SPECIFICATIONS.
3. MINIMUM DEPTH OF SUMP TO BE 4'.
4. WHEN A CURB INLET IS INSTALLED, THE OPENING IS TO BE 24" ±1" X 27" ±1".
5. ALL CATCH BASINS SHALL INCLUDE A CATCH BASIN HOOD FOR THE OUTLET PIPE.
6. CATCH BASIN AND ALL APPURTENANCES SHALL MEET H-20 LOADING.



CATCH BASIN HOOD
NOT TO SCALE



PLAN



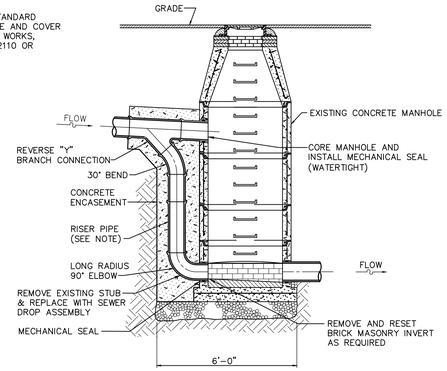
CROSS SECTION

STANDARD FRAME AND COVER
NTS

NOTE: CONTRACTOR SHALL SUBMIT SHOP DRAWINGS OF FRAME AND COVER SHOWING CASTING FOR APPROVAL

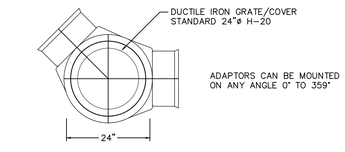
DRAINAGE MANHOLE SHALL HAVE "DRAINAGE" OR "STORM" IMPRINTED ON COVER

SEWER MANHOLE SHALL HAVE "SEWER" IMPRINTED ON COVER

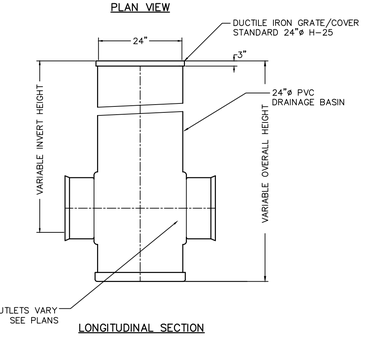


NOTE: USE 8" RISER PIPE AND BENDS FOR INCOMING SEWER OF 12" OR LESS. FOR INCOMING SEWER LARGER THAN 12", THE RISER PIPE AND BENDS SHALL BE 10"

DROP MANHOLE CROSS SECTION
NOT TO SCALE



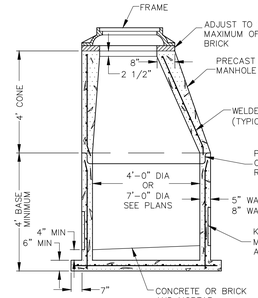
PLAN VIEW



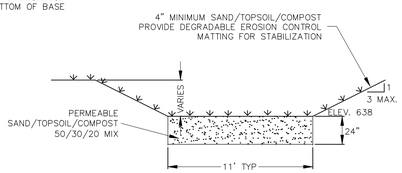
LONGITUDINAL SECTION

NYLOPLAST 24" DRAIN BASIN (YARD DRAIN)
NTS

NOTE:
PROVIDE POURED IN PLACE CONCRETE RING UNDER GRATE AS REQUIRED BY MANUFACTURER.



DRAINAGE MANHOLE CROSS SECTION
NOT TO SCALE

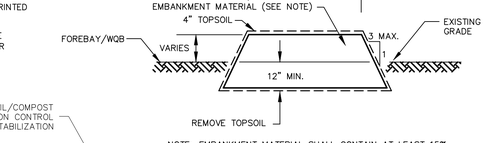


NOTES:

1.) SAND/TOPSOIL/COMPOST MIXTURE SHALL NOT BE COMPACTED AND THE ENTIRE WATER QUALITY BASIN SHALL BE PROTECTED FROM HEAVY EQUIPMENT TRAFFIC THROUGHOUT CONSTRUCTION.

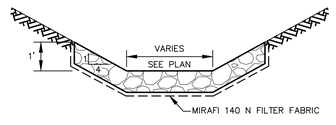
2.) THE CONTRACTOR SHALL BE LIABLE FOR THE REPLACEMENT OF THE SAND/TOPSOIL/COMPOST MIXTURE IF E&S CONTROLS ARE NOT INSTALLED & MAINTAINED AS INDICATED.

WATER QUALITY BASIN
NOT TO SCALE



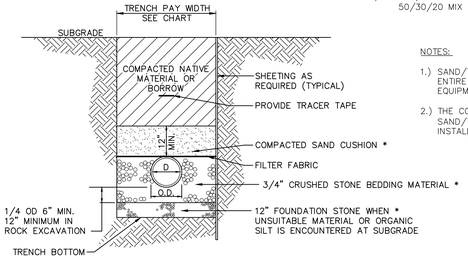
NOTE: EMBANKMENT MATERIAL SHALL CONTAIN AT LEAST 15% PASSING THE #200 SIEVE AND NOT MORE THAN 50% PASSING THE #200 SIEVE. NO STONES LARGER THAN 6 INCHES SHALL BE ALLOWED WITHIN THE COMPACTED EMBANKMENT. WITHIN TWO FEET OF ANY STRUCTURE, THE MAXIMUM SIZE SHALL BE 3 INCHES. CONSTRUCTION SHALL NOT TAKE PLACE DURING COLD PERIODS WHERE TEMPERATURES ARE CONSISTENTLY LOWER THAN 40 DEGREES FAHRENHEIT. EMBANKMENT MATERIAL TO BE COMPACTED IN LIFTS TO 95% MAXIMUM DRY DENSITY.

EARTH BERM DETAIL
NTS



CHECK DAM CROSS SECTION
NOT TO SCALE

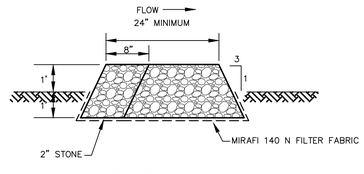
PIPE DIAMETER	MAXIMUM TRENCH WIDTH
≤6"	2'-6"
8"	3'-0"
10"	3'-0"
12"	3'-0"
15"	3'-3"
18"	3'-6"
21"	4'-0"
24"	4'-6"
30"	5'-0"
60"	8'-0"



TRENCH SECTION FOR SANITARY SEWER & STORM DRAINS
NOT TO SCALE

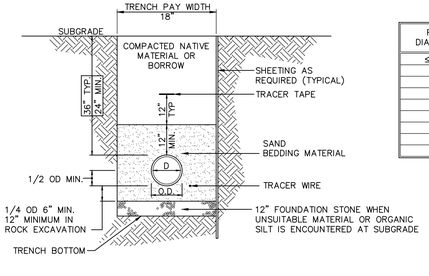
NOTE:
BACKFILL MATERIAL TO BE PLACED IN 12" MAXIMUM LIFTS & COMPACTED TO 95% MAXIMUM DRY DENSITY (AS DETERMINED BY THE MODIFIED PROCTOR METHOD)

* PROVIDE NATIVE MATERIAL WITHIN 50' OF SEPTIC SYSTEM LEACHING FIELDS



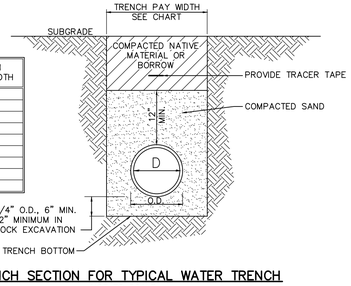
CRUSHED STONE CHECK DAM
NOT TO SCALE

NOTE: KEY ENDS INTO EXISTING GRADE



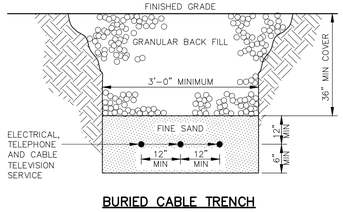
TRENCH SECTION FOR GAS LINES
NOT TO SCALE

PIPE DIAMETER	MAXIMUM TRENCH WIDTH
≤6"	2'-6"
8"	3'-0"
10"	3'-0"
12"	3'-0"
15"	3'-3"
18"	3'-6"
21"	4'-0"
24"	4'-6"
30"	5'-0"

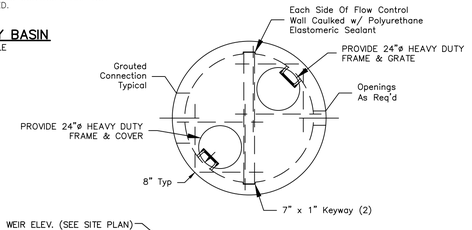


TRENCH SECTION FOR TYPICAL WATER TRENCH
NOT TO SCALE

NOTE:
BACKFILL MATERIAL TO BE PLACED IN 12" MAXIMUM LIFTS & COMPACTED TO 95% MAXIMUM DRY DENSITY (AS DETERMINED BY THE MODIFIED PROCTOR METHOD)



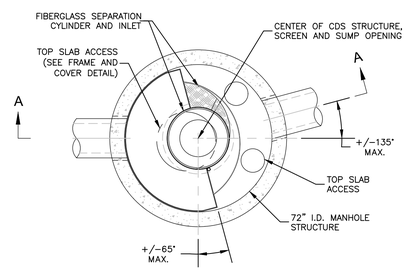
BURIED CABLE TRENCH CROSS SECTION
NOT TO SCALE

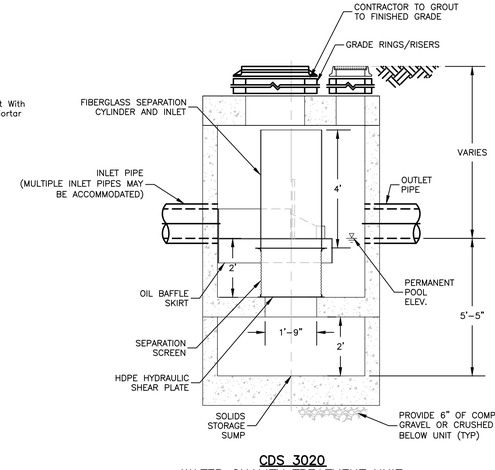


OUTLET CONTROL DEVICE
NOT TO SCALE

NOTES:

1. MANHOLE SECTIONS TO BE MANUFACTURED TO ASTM C-478 SPECIFICATIONS.
2. REINFORCING SHOWN FOR SCHEMATIC ONLY. STRUCTURE MUST BE DESIGNED TO MEET H-20 LOADING REQUIREMENTS.
3. CONTRACTOR TO SEAL BETWEEN PRECAST WALL & BASE W/BUTYL ROPE.





CDS 3020 WATER QUALITY TREATMENT UNIT
NOT TO SCALE

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REVISIONS

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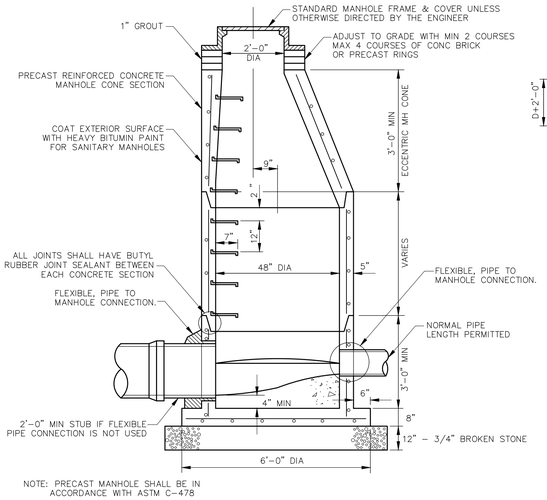
1	6/30/22	PMP	REVIEW COMMENTS
2	10/3/22	PMP	REVISED SITE LAYOUT

SET
PLANNING BOARD SUBMISSION

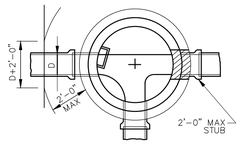
SHEET TITLE
CONSTRUCTION DETAILS

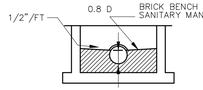
DATE	MAY 25, 2022
SCALE	AS NOTED
DRAWN BY	PMP
CHECKED BY	

SHEET NO.
C4.1

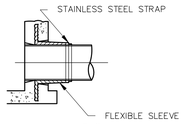


STANDARD SANITARY MANHOLE DETAIL
NOT TO SCALE

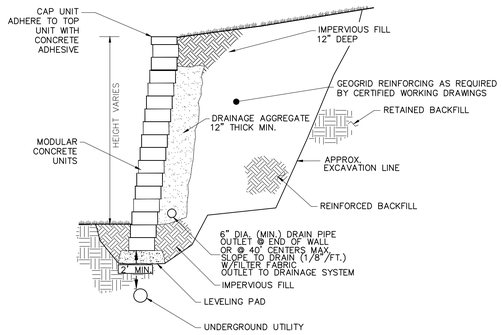




*NOTE: CONCRETE MAY BE SUBSTITUTED FOR DRAINAGE MANHOLES

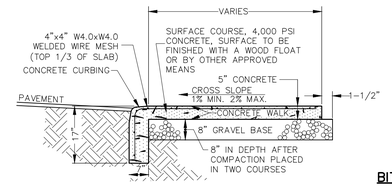


DETAIL "A"

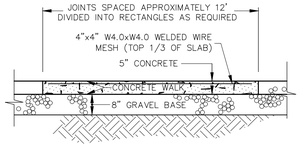


NOTES:
1. SEGMENTAL BLOCK WALL TO BE VERSA-IOK, ALLAN BLOCK, KEYSTONE OR APPROVED EQUAL.
2. APPLICANT TO PROVIDE DESIGN AND WORKING DRAWINGS CERTIFIED BY A MA REGISTERED PROFESSIONAL ENGINEER TO THE TOWN FOR THEIR REVIEW PRIOR TO ISSUANCE OF A BUILDING PERMIT.

TYPICAL SECTION–REINFORCED RETAINING WALL MODULAR CONCRETE UNIT
NTS

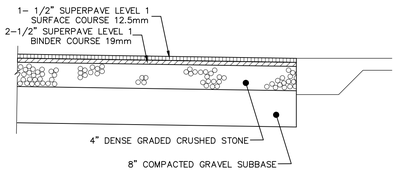


CROSS SECTION

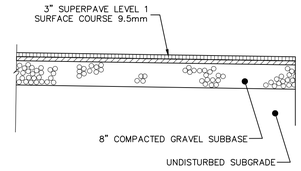


LONGITUDINAL SECTION

5" CONCRETE SIDEWALK WITH FLUSH CONCRETE CURBING
NOT TO SCALE



BITUMINOUS CONCRETE PAVEMENT (PARKING & DRIVEWAY)
NOT TO SCALE



BITUMINOUS CONCRETE PAVEMENT (SIDEWALK)
NOT TO SCALE

TYPICAL CHAIN LINK FENCING
NOT TO SCALE

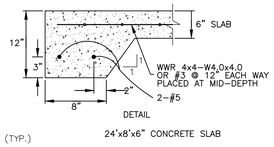
HANDICAP PARKING LAYOUT
NOT TO SCALE

HANDICAPPED PARKING SIGN
NOT TO SCALE

6" BOLLARD–STEEL
NOT TO SCALE

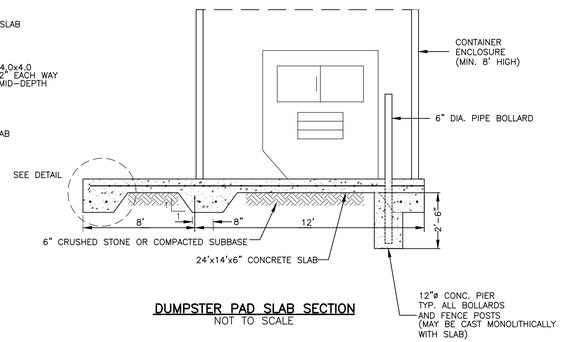
NOTE: HYDRANTS SHALL BE SET AT BACK OF SIDEWALKS ALLOWING 3.0' MINIMUM TO FACE OF CURB.

HYDRANT DETAIL
NOT TO SCALE



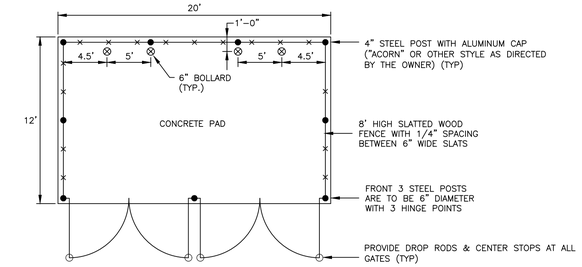
DETAIL

24'x8'x6" CONCRETE SLAB



DUMPSTER PAD SLAB SECTION
NOT TO SCALE

NOTES:
1.) GATE POSTS AND BOLLARDS SHALL BE SET IN PLACE PRIOR TO CASTING SLAB.
2.) ENTIRE SLAB SHALL BE CAST ON MINIMUM OF 6" CRUSHED STONE OR COMPACTED GRAVEL.
3.) CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI AND SHALL BE PLACED IN ACCORDANCE WITH ACI 318-02.
4.) WELDED WIRE REINFORCEMENT SHALL CONFORM TO ASTM A 185.
5.) STEEL REINFORCING SHALL HAVE A YIELD STRENGTH OF 60ksi.



DUMPSTER ENCLOSURE DETAIL
NTS

NOTES:
1.) GATE TO BE REINFORCED WITH GALVANIZED STEEL TUBING AND SHEATHED WITH MATERIALS CONSISTENT IN TYPE AND COLOR TO THE REMAINDER OF THE DUMPSTER ENCLOSURE.
2.) GATE POSTS AND BOLLARDS SHALL BE SET IN PLACE PRIOR TO CASTING SLAB.
3.) ENTIRE SLAB SHALL BE CAST ON MINIMUM OF 6" CRUSHED STONE OR COMPACTED GRAVEL.
4.) CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI AND SHALL BE PLACED IN ACCORDANCE WITH ACI 318-02.
5.) WELDED WIRE REINFORCEMENT SHALL CONFORM TO ASTM A 185.
6.) STEEL REINFORCING SHALL HAVE A YIELD STRENGTH OF 60ksi.

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REVISIONS

NO.	DATE	BY	REMARKS
1	6/30/22	PMP	REVIEW COMMENTS
2	10/3/22	PMP	REVISED SITE LAYOUT

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SHEET TITLE
CONSTRUCTION DETAILS

DATE	MAY 25, 2022
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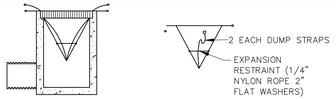
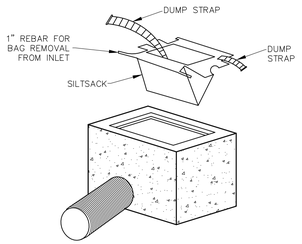
C4.2

EROSION AND SEDIMENTATION CONTROL DETAILS



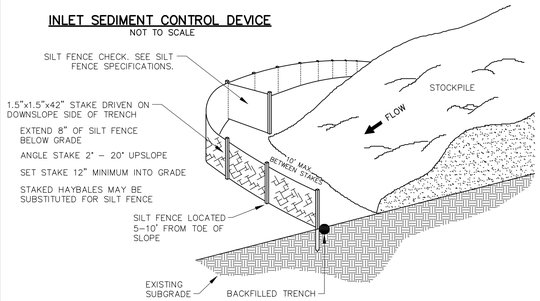
INSTALLATION DETAIL

BAG DETAIL



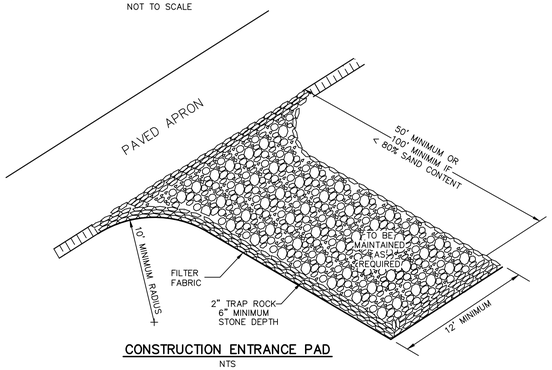
INLET SEDIMENT CONTROL DEVICE

NOT TO SCALE



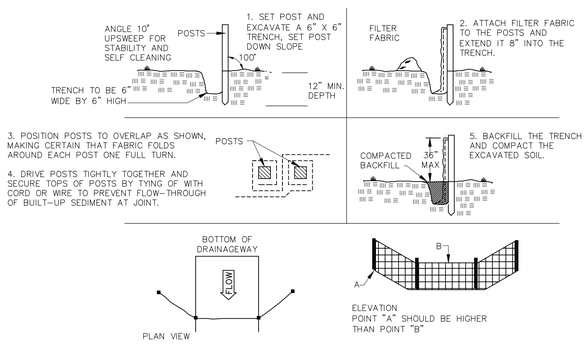
SILT FENCE AT TOE OF SLOPE APPLICATION

NOT TO SCALE



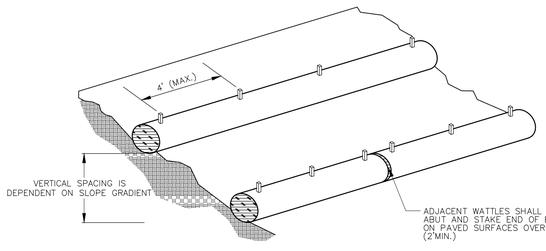
CONSTRUCTION ENTRANCE PAD

NTS

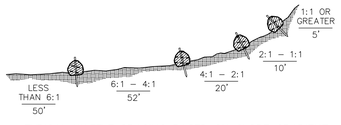


PLACEMENT AND CONSTRUCTION OF A SILT FENCE

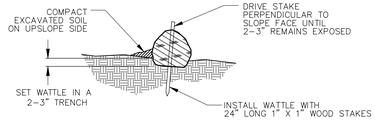
NOT TO SCALE



TYPICAL WATTLE INSTALLATION GUIDE



TYPICAL WATTLE SPACING BASED ON SLOPE GRADIENT



ENRICHMENT DETAIL

STRAW WATTLE NOTES:

1. BEGIN AT THE LOCATION WHERE THE WATTLE IS TO BE INSTALLED BY EXCAVATING A 2–3" DEEP BY 9" WIDE TRENCH ALONG THE CONTOUR OF THE SLOPE. EXCAVATED SOIL SHOULD BE PLACED UP–SLOPE FROM THE ANCHOR TRENCH.
2. PLACE THE WATTLE IN THE TRENCH SO THAT IT CONTOURS TO THE SOIL SURFACE. COMPACT THE SOIL FROM THE EXCAVATED TRENCH AGAINST THE WATTLE ON THE UPHILL SIDE. ADJACENT WATTLES SHOULD TIGHTLY ABUT.
3. SECURE THE WATTLE WITH 24" LONG STAKES EVERY 3–4' WITH A STAKE ON EACH END. STAKES SHOULD BE DRIVEN THROUGH THE MIDDLE OF THE WATTLES LEAVING 2–3" OF STAKE EXTENDING ABOVE. THE WATTLE STAKES SHOULD BE DRIVEN PERPENDICULAR TO THE SLOPE FACE.
4. SECURE WATTLES PLACED ON PAVED SURFACES WITH SANDBAGS SPACED AT AN INTERVAL SUFFICIENT TO PREVENT MOVEMENT OF WATTLE AND TO ENSURE THAT ENDS OF ADJACENT WATTLES REMAIN TIGHTLY ABUTTED.

STRAW WATTLE INSTALLATION

NOT TO SCALE

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C5.1

EROSION AND SEDIMENTATION CONTROL NARRATIVE & NOTES

PROJECT NARRATIVE

THIS PROJECT CONSISTS OF CONSTRUCTING TWO NEW STUDENT HOUSING RESIDENCES ON AT THE SOUTH END OF THE NICHOLS COLLEGE CAMPUS IN DUDLEY, MASSACHUSETTS. THE LOCATION OF THE SITE IS ON THE WEST SIDE OF CENTER ROAD APPROXIMATELY 1,500' SOUTH OF ITS INTERSECTION WITH HEALY ROAD. THIS PROJECT WILL CONSIST OF TWO NEW RESIDENCES, ASSOCIATED PARKING AND ACCESS DRIVEWAYS, CONCRETE SIDEWALKS, RETAINING WALLS, DRAINAGE PIPING AND STRUCTURES, AND UNDERGROUND UTILITIES.

IT IS ANTICIPATED THAT APPROXIMATELY 4 ACRES OF THE 25.6 ACRE SITE WILL BE DISTURBED DURING THE CONSTRUCTION OF THE FACILITY.

THE PROJECT SHALL BE DEVELOPED IN A SINGLE PHASE, HOWEVER, DISTURBED AREAS SHALL BE STABILIZED AT MILESTONE POINTS DURING CONSTRUCTION. ALL WORK SHALL BE SCHEDULED SUCH THAT STABILIZATION COINCIDES WITH THE ABILITY TO VEGETATE DISTURBED AREAS, APRIL 1 THROUGH JUNE 15 AND AUGUST 15 THROUGH OCTOBER 1.

THIS PROJECT REQUIRES THE FOLLOWING PERMITS:
PLANNING & ZONING MAJOR SITE PLAN REVIEW

ESTIMATED CONSTRUCTION SCHEDULE

A. INSTALL EROSION AND SEDIMENT CONTROL SYSTEMS – APRIL 2023

B. ROUGH GRADE SITE – MAY 2023

C. INSTALL STORMWATER AND UTILITY SYSTEMS – MAY THRU AUGUST 2023

D. CONSTRUCT BUILDING STRUCTURES – MAY 2023 THRU AUGUST 2024

E. FINISH GRADE SITE AND INSTALL LANDSCAPING – JUNE/JULY 2024

GENERAL NOTES

A. ELEVATIONS ARE BASED ON AN ASSUMED DATUM.

B. ALL UTILITIES SHALL BE APPROVED BY LOCAL UTILITY COMPANIES PRIOR TO CONSTRUCTION; ALL UTILITIES SHALL BE CONSTRUCTED TO UTILITY COMPANY SPECIFICATIONS.

C. ALL CONSTRUCTION SHALL BE TO TOWN SPECIFICATIONS & REGULATIONS.

D. NO CHANGES CAN BE MADE TO THESE PLANS WITHOUT THE TOWN'S APPROVAL.

E. CONTRACTOR SHALL OBTAIN ALL REQUIRED LOCAL & STATE PERMITS PRIOR TO BEGINNING ANY CONSTRUCTION.

F. FIELD CHANGES SHALL HAVE PRIOR APPROVAL OF THE TOWN.

G. CATCH BASIN TOPS SHALL NOT BE CEMENTED DOWN UNTIL FINAL GRADES ARE SET.

H. UNLESS OTHERWISE NOTED OR SPECIFIED, ALL ROADWAYS & STORM DRAINAGE SHALL BE CONSTRUCTED IN CONFORMANCE WITH THE COMMONWEALTH OF MASSACHUSETTS, D.O.T. "STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES, 2020". SIMILARLY PERTINENT CONSTRUCTION DETAILS THAT ARE NOT INCLUDED WITH THESE DRAWINGS SHALL CONFORM TO THE COMMONWEALTH OF MASSACHUSETTS, D.O.T. STANDARD ROADWAY DRAWINGS.

I. CONTRACTOR SHALL NOTIFY THE TOWN OF CONSTRUCTION SCHEDULE SO THAT INSPECTION MAY BE PROVIDED.

J. UNDERGROUND UTILITY, STRUCTURE AND FACILITY LOCATIONS DEPICTED ON PLANS HAVE BEEN COMPILED, IN PART, FROM RECORD MAPPING SUPPLIED BY THE RESPECTIVE UTILITY COMPANIES OR GOVERNMENTAL AGENCIES, FROM PAROL TESTIMONY, FIELD MEASUREMENTS AND FROM OTHER SOURCES. THESE LOCATIONS MUST BE CONSIDERED APPROXIMATE IN NATURE. ADDITIONALLY, OTHER SUCH FEATURES MAY EXIST ON THE SITE, THE EXISTENCE OF WHICH ARE UNKNOWN TO CME ASSOCIATES, INC. THE SIZE, LOCATION AND EXISTENCE OF ALL SUCH FEATURES MUST BE FIELD DETERMINED AND VERIFIED BY THE APPROPRIATE AUTHORITIES PRIOR TO CONSTRUCTION.

K. CONTACT "DIG SAFE" AT 1-888-344-7233. THREE WORKING DAYS PRIOR TO THE START OF ANY CONSTRUCTION ACTIVITY.

SEEDING SPECIFICATIONS

A. IF GROUND HAS BEEN PREVIOUSLY MULCHED, MULCH MUST BE REMOVED OR ADDITIONAL NITROGEN MUST BE ADDED.

B. REMOVE ALL SURFACE STONES 2" OR LARGER AS WELL AS ALL DEBRIS SUCH AS WIRE, CABLE, TREE ROOTS, PIECES OF CONCRETE, CLODS, CLUMPS, OR OTHER UNSUITABLE MATERIAL.

C. APPLY FERTILIZER AT 7.5 POUNDS PER 1,000 SQUARE FEET AND LIME AT 200 POUNDS PER 1,000 SQUARE FEET UNLESS SOIL TESTING FOR REQUIREMENTS IS PERFORMED.

D. NO MOWING IS TO BE UNDERTAKEN UNTIL THE MAJORITY OF THE VEGETATION IS AT LEAST 6" HIGH. MOWING SHOULD CUT THE TOP 1/3 OF VEGETATION. DO NOT UNDER ANY CIRCUMSTANCES CUT VEGETATION BELOW 3".

E. DO NOT APPLY ANY FORM OF WEED CONTROL UNTIL GRASS HAS BEEN MOWED AT LEAST 4 TIMES.

F. THESE SEEDING MEASURES ARE NOT TO BE USED ON SLOPES IN EXCESS OF 2:1 GRADING.

G. PERMANENT SEEDING MEASURES ARE TO BE USED INSTEAD OF TEMPORARY SEEDING MEASURES WHERE WORK IS TO BE SUSPENDED FOR A PERIOD OF TIME LONGER THAN 1 YEAR.

H. IF THERE IS NO EROSION, BUT SEED SURVIVAL IS LESS THAN 100 PLANTS PER SQUARE FOOT AFTER 4 WEEKS OF GROWTH, RE-SEED AS PLANTING SEASON ALLOWS.

CONSTRUCTION SEQUENCE

A. STAKEOUT LIMIT OF DISTURBANCE.

B. HOLD A PRECONSTRUCTION MEETING.

C. CONTACT "DIG SAFE" AT 1-888-344-7233. THREE WORKING DAYS PRIOR TO THE START OF ANY CONSTRUCTION ACTIVITY.

D. INSTALL THE CONSTRUCTION ENTRANCE.

E. INSTALL PERIMETER FILTER (SILT FENCE)

F. PERFORM ALL NECESSARY CLEARING AND GRUBBING OPERATIONS.

G. EXCAVATE & DISPOSE OF ALL STUMPS OFF SITE.

H. STRIP ALL TOPSOIL WITHIN THE FOOTPRINT OF THE CONSTRUCTION SITE. STOCKPILE ALL TOPSOIL IN AN APPROVED AREA AND SECURE WITH EROSION AND SEDIMENT CONTROLS.

I. ROUGH GRADE SITE.

J. DIG FOUNDATIONS AND STOCKPILE MATERIAL AS REQUIRED.

K. PRIOR TO INSTALLATION OF SURFACE WATER CONTROLS SUCH AS TEMPORARY DIVERSIONS AND STONE DIKES, INSPECT EXISTING CONDITIONS TO ENSURE DISCHARGE LOCATIONS ARE STABLE. IF NOT STABLE, REVIEW DISCHARGE CONDITIONS WITH THE DESIGN ENGINEER AND IMPLEMENT ADDITIONAL STABILIZATION MEASURES PRIOR TO INSTALLING WATER SURFACE CONTROLS.

L. STABILIZE CUT AND FILL SLOPES.

M. CONSTRUCT FOUNDATION AND ERECT STRUCTURES.

N. INSTALL SERVICE UTILITIES.

O. CONSTRUCT CONCRETE SIDEWALKS.

P. FINISH GRADE ACCESS DRIVEWAYS & PARKING AREAS.

Q. PLACE TOPSOIL WHERE REQUIRED. INSTALL PERIMETER LANDSCAPE PLANTINGS.

R. FINISH GRADE SIDE SLOPES, SEED AND MULCH.

S. UPON SUBSTANTIAL COMPLETION OF THE BUILDING, COMPLETE THE BALANCE OF SITE WORK AND STABILIZATION OF ALL OTHER DISTURBED AREAS.

T. ALL REMAINING EXPOSED AREAS SHALL BE LOAMED, SEEDED AND MULCHED OR SODDED WITHIN 14 DAYS OF FINAL GRADING.

U. REMOVE TEMPORARY EROSION AND SEDIMENT CONTROLS.

V. CONTRACTOR TO REMOVE ANY ACCUMULATED SEDIMENT FROM DRAINAGE STRUCTURES OR BASINS.

NOTE: SEVERAL OF THE ABOVE ACTIVITIES MAY BE DONE SIMULTANEOUSLY.

SILT FENCE SPECIFICATIONS

A. SYNTHETIC FILTER FABRIC SHALL BE A PERVIOUS SHEET OF PROPYLENE, NYLON, POLYESTER, ETHYLENE, OR SIMILAR FILAMENTS AND SHALL BE CERTIFIED BY THE MANUFACTURER OR SUPPLIER AS CONFORMING TO THE FOLLOWING MINIMUM REQUIREMENTS:

1. FILTERING EFFICIENCY	75 PERCENT (MIN)
2. GRAB TENSILE STRENGTH	100 POUNDS
3. ELONGATION AT FAILURE	15 PERCENT
4. MULLEN BURST STRENGTH	250 POUNDS PER SQUARE INCH
5. PUNCTURE STRENGTH	50 POUNDS
6. APPARENT OPENING SIZE	0.60mm< X <0.90mm
7. FLOW RATE	0.2 GALLONS PER SQUARE FOOT PER MINUTE
8. PERMITTIVITY	0.05 PER SECOND (MIN)
9. ULTRAVIOLET RADIATION STABILITY	70 PERCENT AFTER 500 HOURS OF EXPOSURE (MIN)

B. STAKES ARE TO BE MADE OUT OF HARDWOOD WITH A MINIMUM CROSS SECTIONAL AREA OF 1.5 SQUARE INCHES OR STEEL POSTS WITH A MINIMUM WEIGHT OF 0.5 POUNDS PER LINEAR FOOT.

C. TORN OR PUNCTURED GEOTEXTILES SHALL NOT BE USED.

D. ON SLOPES WHERE SURFACE FLOW FOLLOWS THE SILT FENCE LINE, PERPENDICULAR SILT FENCE CHECKS SHALL BE INSTALLED AT 50 FOOT INTERVALS.

E. LINES OF SILT FENCE SHOULD FOLLOW CONTOUR LINES 5-10 FEET DOWN GRADIENT FROM THE SLOPE. WHERE CONTOUR LINES CAN NOT BE FOLLOWED PERPENDICULAR WINGS SHOULD BE PLACED AT 50 FOOT INTERVALS.

EROSION & SEDIMENT CONTROL OPERATIONS AND MAINTENANCE

A. EROSION AND SEDIMENTATION CONTROL AND RESTORATION MEASURES SHALL CONFORM TO THE "1997 MASSACHUSETTS EROSION AND SEDIMENT CONTROL GUIDELINES FOR URBAN AND SUBURBAN AREAS", PUBLISHED BY THE MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION, BUREAU OF RESOURCE PROTECTION; AND TO CITY REGULATIONS.

B. INSTALLATION OF SEDIMENT AND EROSION CONTROLS SUCH AS WATTLES AND SILT FENCES SHALL BE ESTABLISHED PRIOR TO COMMENCING ANY LAND DISTURBANCE ACTIVITIES.

C. ALL STOCKPILED MATERIAL SHALL BE RINGED WITH WATTLES OR SILT FENCES. ANY MATERIAL TO BE STOCKPILED LONGER THAN 14 DAYS SHALL BE STABILIZED WITH TEMPORARY SEEDING OR JUTE NETTING.

D. PAVEMENT AND CURBING SHOULD BE INSTALLED AS SOON AS POSSIBLE AFTER STORM DRAINAGE IS INSTALLED.

E. CATCH BASINS SHALL BE PROTECTED FROM SEDIMENTATION UNTIL ALL AREAS ARE PERMANENTLY VEGETATED OR STABILIZED.

F. CATCH BASIN SUMPS SHALL BE CLEANED OF SILT PERIODICALLY DURING CONSTRUCTION.

G. WATTLES OR SILT FENCE SHALL BE PLACED 5-10 FEET FROM THE TOE OF ALL CRITICAL SLOPES AS SHOWN ON THE PLAN. THESE SHALL BE CHECKED BY THE CONTRACTOR REGULARLY AND REPAIRED WHENEVER THEY FAIL TO ENSURE CLEAN RUN-OFF FROM THE SITE.

H. ADDITIONAL CONTROL MEASURES IF REQUESTED BY THE TOWN SHALL BE INSTALLED IMMEDIATELY UPON REQUEST.

I. ALL DISTURBED AREAS SHALL BE PROTECTED WITH A MINIMUM VEGETATION COVER AS SHOWN IN ACCOMPANYING CHART.

J. THE CONTRACTOR SHALL PLAN ALL LAND DISTURBING ACTIVITIES IN A MANNER AS TO MINIMIZE THE EXTENT OF THE DISTURBED AREAS.

K. THE CONTRACTOR SHALL MAKE DAILY INSPECTIONS OF THE SITE TO INSURE EFFECTIVENESS OF EROSION AND SEDIMENTATION CONTROL MEASURES AND WILL IMMEDIATELY MAKE NECESSARY REPAIRS IF REQUIRED BY THE TOWN.

L. ALL EROSION AND SEDIMENT CONTROL MEASURES ARE TO BE INSPECTED AT A MINIMUM OF ONCE A WEEK AND WITHIN 24 HOURS OF THE END OF A STORM WITH A RAINFALL AMOUNT OF 0.1 INCHES OR GREATER TO DETERMINE MAINTENANCE NEEDS.

M. ALL EROSION AND SEDIMENT CONTROL MEASURES ARE TO BE REPLACED WITHIN 24 HOURS OF AN OBSERVED FAILURE.

N. ALL CONSTRUCTION TRAFFIC SHALL ENTER AND LEAVE BY THE DESIGNATED ENTRANCE. ALL SOIL, MISCELLANEOUS DEBRIS, OR OTHER MATERIAL SPILLED, DUMPED OR OTHERWISE DEPOSITED ON PUBLIC STREETS, HIGHWAYS, SIDEWALKS OR OTHER PUBLIC THOROUGHFARES DURING TRANSIT TO OR FROM THE SITE SHALL BE REMOVED PROMPTLY.

O. THE CONTRACTOR HEREBY ACKNOWLEDGES HIS RESPONSIBILITY TO INSTALL SOIL EROSION AND SEDIMENTATION CONTROL MEASURES ON THIS SITE AND THAT HIS FAILURE TO INSTALL AND MAINTAIN THESE DEVICES COULD RESULT IN FINES OR SUSPENSION OF WORK BY THE TOWN.

P. MINIMIZE OR ELIMINATE ANY UNNECESSARY LAND DISTURBANCE OR CLEARING.

PERSON RESPONSIBLE FOR MAINTAINING CONTROL MEASURES DURING CONSTRUCTION.

NAME _____

ADDRESS _____

TELEPHONE # _____

MAINTENANCE LOG

LOCATION	DESCRIPTION	DATE	INITIALS

PROJECT DATES — DATE — INITIALS

PROJECT GROUNDBREAKING

FINAL STABILIZATION

STORMWATER OPERATION AND MAINTENANCE

STORMWATER FACILITY
OPERATION AND MAINTENANCE PLAN:

CONSTRUCTION PHASE

GENERAL PROVISIONS:

1. CONTRACTOR TO INSTALL AND MAINTAIN DRAINAGE FACILITIES AS SHOWN ON THE PLAN SET.
2. PRIOR TO CONSTRUCTION, ALL EROSION/SILTATION CONTROL DEVICES SHOWN ON ABOVE PLAN SHALL BE INSTALLED. TO PREVENT SILT INTRUSION INTO THE DRAINAGE SYSTEM DURING CONSTRUCTION, THE CONTRACTOR IS TO INSTALL INLET PROTECTION AT ALL CATCH BASINS AND SET SILT FENCE AT ALL SLOPES WHICH MAY ERODE IN THE DIRECTION OF ANY OPEN DRAINAGE FACILITIES. SUCH PREVENTIVE MEASURES ARE TO BE MAINTAINED THROUGHOUT THE CONSTRUCTION PROCESS.
3. EROSION CONTROLS ARE TO BE INSPECTED ON A DAILY BASIS. UPON DISCOVERY, THE CONTRACTOR SHALL REMOVE ANY SEDIMENT FROM AN EROSION CONTROL STRUCTURE.
4. ALL EXPOSED SOILS SHALL BE IMMEDIATELY STABILIZED TO PREVENT EROSION.
5. UPON INSTALLATION OF CATCH BASINS, INLET PROTECTION SHALL BE INSTALLED AND MAINTAINED UNTIL READY FOR PAVING.
6. PRIOR TO CONSTRUCTION OF IMPERVIOUS AREAS, ALL DRAINAGE STRUCTURES AND PIPES SHALL BE INSTALLED AND INSPECTED FOR PROPER FUNCTION. DURING CONSTRUCTION OF OTHER SITE FEATURES, DRAINAGE FACILITIES SHALL BE INSPECTED ON A DAILY BASIS AND CLEANED/REPAIRED IMMEDIATELY UPON DISCOVERY OF SEDIMENT BUILD-UP OR DAMAGE.
7. AFTER PAVING IS INSTALLED, IT SHALL BE SWEPT CLEAN ON A MONTHLY BASIS.

CATCH BASIN SUMPS:

1. CONTRACTOR TO INSPECT WEEKLY OR AFTER EACH 0.5 INCH RAIN EVENT AND CLEAN AS NEEDED.
2. CONTRACTOR SHALL CLEAN SUMPS AFTER SITE IS COMPLETELY STABILIZED AND PRIOR TO TRANSFER TO OWNER.

HYDRODYNAMIC OIL & PARTICLE SEPARATOR:

1. PRIOR TO TURNOVER TO OWNER THE OIL WATER SEPARATOR WILL BE CLEANED USING A VACUUM TRUCK OR OTHER ORDINARY CATCH BASIN CLEANING EQUIPMENT. THE DEBRIS WILL BE REMOVED FROM THE SITE AND DISPOSED OF ACCORDING TO ALL LOCAL, STATE, AND FEDERAL REGULATIONS. THIS WORK WILL BE DONE BY A LICENSED HAULER OF CONTAMINATED MATERIALS.

WATER QUALITY BASIN:

1. CONTRACTOR TO INSPECT WEEKLY OR AFTER EACH 0.5 INCH RAIN EVENT.
2. INSPECTIONS SHOULD FOCUS ON THE DURATION OF STANDING WATER IN THE BASIN. (PONDING AFTER 48 HOURS INDICATES POSSIBLE CLOGGING OF THE BOTTOM OF THE BASIN)
3. CONTRACTOR SHALL CLEAN INSPECT DETENTION SYSTEM AFTER SITE IS COMPLETELY STABILIZED AND PRIOR TO TRANSFER TO OWNER.

POST-DEVELOPMENT PHASE

GENERAL PROVISIONS:

SNOW STOCKPILING:

SNOW ACCUMULATIONS REMOVED FROM DRIVEWAYS AND PARKING AREAS SHALL BE PLACED IN UPLAND AREAS, WHERE SAND AND DEBRIS WILL REMAIN AFTER SNOW MELT FOR LATER REMOVAL. CARE SHOULD BE TAKEN NOT TO DEPOSIT SNOW IN THE IMMEDIATE VICINITY OF CATCH BASINS, DRAINAGE SWALES, OR SLOPES LEADING TO BODIES OF WATER, AND DRINKING WATER WELL SUPPLIES.

PAVEMENT SWEEPING:

DRIVEWAYS AND PARKING AREAS SHOULD BE SWEPT CLEAN AT LEAST TWICE ANNUALLY, WITH ONE SWEEPING PREFERABLY OCCURRING IMMEDIATELY AFTER WINTER SNOW MELT AND BEFORE SPRING RAINS. SWEEPING DURING THIS PERIOD CAPTURES PEAK SEDIMENT LOADS AND EXTENDS THE SERVICE LIFE OF THE STORM WATER MANAGEMENT SYSTEM.

CATCH BASIN SUMPS:

CATCH BASINS SHALL BE INSPECTED BI-ANNUALLY AND CLEANED AT LEAST ANNUALLY, AFTER THE SNOW AND ICE SEASON, AND AS SOON AS POSSIBLE BEFORE SPRING RAINS. IN GENERAL, A CATCH BASIN SHOULD BE CLEANED IF THE DEPTH OF DEPOSITS IS GREATER THAN ONE HALF THE SUMP DEPTH. IF A CATCH BASIN SIGNIFICANTLY EXCEEDS THIS STANDARD THEN MORE FREQUENT CLEANINGS SHALL BE SCHEDULED. IN AREAS WITH HIGHER POLLUTANT LOADINGS OR DISCHARGES INTO SENSITIVE BODIES OF WATER, MORE FREQUENT CLEANINGS WILL BE NECESSARY.

HYDRODYNAMIC OIL & PARTICLE SEPARATOR:

THE OIL WATER SEPARATOR WILL BE INSPECTED QUARTERLY FOR THE PRESENCE OF ACCUMULATED OIL AND GREASE, FLOATABLES AND SEDIMENT, IF FOUND, THE STRUCTURE WILL BE CLEANED USING A VACUUM TRUCK OR OTHER ORDINARY CATCH BASIN CLEANING EQUIPMENT. THE DEBRIS WILL BE REMOVED FROM THE SITE AND DISPOSED OF ACCORDING TO ALL LOCAL, STATE, AND FEDERAL REGULATIONS. THIS WORK WILL BE DONE BY A LICENSED HAULER OF CONTAMINATED MATERIALS. THE SCHEDULE OF INSPECTIONS WILL BE ADJUSTED TO AN ANNUAL INSPECTION IF NO OIL OR GREASE IS FOUND ON A REGULAR BASIS. OWNER WILL BE RESPONSIBLE FOR THE INSPECTIONS AND CLEANING.

WATER QUALITY BASIN

WATER QUALITY BASIN SHALL BE INSPECTED AT LEAST TWICE ANNUALLY AND AFTER ALL MAJOR STORMS TO ENSURE THAT IT IS OPERATING AS INTENDED. PRETREATMENT BMP'S SHALL BE INSPECTED AND CLEANED DURING THE REGULAR BI-ANNUAL INSPECTIONS. POTENTIAL PROBLEMS THAT SHOULD BE CHECKED INCLUDE:

- PONDING
- EROSION
- CLOGGING OF INLET AND OUTLET PIPES

ANY NECESSARY REPAIRS SHALL BE MADE IMMEDIATELY. TRASH SHALL BE REMOVED AND THE BANKS, OF BASINS, MOWED AT LEAST TWICE PER YEAR. (MOWING SHOULD BE PERFORMED WHEN GROUND IS DRY TO AVOID RUTS AND COMPACTION) SEDIMENT SHALL BE REMOVED FROM THE BASIN AND PRETREATMENT AREA AS NECESSARY, AND AT LEAST ONCE EVERY FIVE YEARS.

RECORD KEEPING

RECORDS SHALL BE MAINTAINED BY THE OWNER AT THEIR OFFICES & SHALL DOCUMENT ALL ROUTINE & EMERGENCY MAINTENANCE WORK PERFORMED TO THE STORMWATER MANAGEMENT SYSTEM & SHALL BEAR THE SIGNATURE OF THE INDIVIDUAL SUPERVISING THE WORK. THESE RECORDS & THE SITE, SHALL BE MADE AVAILABLE TO THE TOWN FOR INSPECTION UPON REQUEST IN ORDER TO ENSURE COMPLIANCE WITH THIS PLAN.

SUGGESTED SEEDING MIXTURES AND PRACTICES

AREAS WHERE SEED MIX APPLIES	SEEDING MIXTURES BY WEIGHT		RATE PER 1,000 SQ. FT.	SEEDING DATES
ALL LAWN AREAS	RED FESCUES KENTUCKY BLUEGRASS PERENNIAL RYEGRASS	45% 45% 10%	1 LBS.	APRIL 1 – JUNE 15 OR AUG. 15 – OCT. 1
ROAD CUTS, FILLS, DIVERSION DITCHES, & STORMWATER BASINS	KENTUCKY TALL FESCUE REDTOP CREEPING RED FESCUE	47% 6% 47%	0.95 LBS.	APRIL 1 – JUNE 15 OR AUG. 15 – OCT. 1
WHERE TREES ARE TO BE RETAINED, THE SEED MIXTURE SHOULD BE ADAPTED FOR SHADY CONDITIONS.				
TEMPORARY SEEDING	ANNUAL RYEGRASS OR PERENNIAL RYEGRASS		1-1/2 LBS.	WITHIN 7 DAYS AFTER SUSPENSION OF GRADING WORK

Juster Pope Frazier, LLC
Architects and Planners
82 North Street
Northampton, Massachusetts 01060
413 . 586 . 1600

Clough Harbour Associates, LLP
Civil Engineers
101 East River Drive, 1st Floor
East Hartford, CT 06108
860.290.4100

COMMONWEALTH OF MASSACHUSETTS
PETER M. PARENT
CIVIL
No. 52608
REGISTERED PROFESSIONAL ENGINEER

OWNER/APPLICANT
NICHOLS COLLEGE
121 CENTER ROAD
PO BOX 5000
DUDLEY, MA 01571
508-213-2217

TOWNHOMES

CENTER ROAD, DUDLEY, MA 01571

REVISIONS

NO.	DATE	BY	REMARKS
1	6/30/22	PMP	REVIEW COMMENTS
2	10/3/22	PMP	REVISED SITE LAYOUT

SET
PLANNING BOARD SUBMISSION

SHEET TITLE
EROSION & SEDIMENT CONTROL PLAN

DATE MAY 25, 2022
SCALE AS NOTED
DRAWN BY PMP
CHECKED BY

SHEET NO.
C5.2

SOILS MAPPING

Map Scale: 1:2,490 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 35 70 140 210

Feet
0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Worcester County, Massachusetts, Southern Part
Survey Area Data: Version 14, Sep 3, 2021

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

Date(s) aerial images were photographed: May 18, 2019—Jul 9, 2019

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
305B	Paxton fine sandy loam, 3 to 8 percent slopes	11.3	65.6%
305C	Paxton fine sandy loam, 8 to 15 percent slopes	3.3	19.3%
305D	Paxton fine sandy loam, 15 to 25 percent slopes	2.6	15.1%
Totals for Area of Interest		**17.2**	**100.0%**

Map Scale: 1:2,490 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 35 70 140 210

Feet
0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A
A/D
B
B/D
C
C/D
D
Not rated or not available

Soil Rating Lines

A
A/D
B
B/D
C
C/D
D
Not rated or not available

Soil Rating Points

A
A/D
B
B/D
C
C/D
D
Not rated or not available

Water Features

Streams and Canals

Transportation

Rails
Interstate Highways
US Routes
Major Roads
Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Worcester County, Massachusetts, Southern Part
Survey Area Data: Version 14, Sep 3, 2021

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

Date(s) aerial images were photographed: May 18, 2019—Jul 9, 2019

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
305B	Paxton fine sandy loam, 3 to 8 percent slopes	C	11.3	65.6%
305C	Paxton fine sandy loam, 8 to 15 percent slopes	C	3.3	19.3%
305D	Paxton fine sandy loam, 15 to 25 percent slopes	C	2.6	15.1%
Totals for Area of Interest			**17.2**	**100.0%**

Description

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.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined 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 claypan 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.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

HYDROLOGIC DATA

NOAA Atlas 14, Volume 10, Version 3
Location name: Dudley, Massachusetts, USA*
Latitude: 42.0417°, Longitude: -71.9342°
Elevation: 640.33 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.333** (0.262-0.419)	**0.395** (0.310-0.497)	**0.496** (0.388-0.626)	**0.580** (0.451-0.736)	**0.695** (0.522-0.924)	**0.782** (0.575-1.06)	**0.872** (0.621-1.23)	**0.971** (0.657-1.41)	**1.11** (0.721-1.68)	**1.23** (0.775-1.89)
10-min	**0.472** (0.371-0.593)	**0.560** (0.440-0.703)	**0.703** (0.550-0.886)	**0.821** (0.639-1.04)	**0.984** (0.740-1.31)	**1.11** (0.814-1.51)	**1.24** (0.880-1.75)	**1.38** (0.930-2.00)	**1.58** (1.02-2.38)	**1.74** (1.10-2.68)
15-min	**0.556** (0.437-0.698)	**0.658** (0.517-0.828)	**0.826** (0.646-1.04)	**0.966** (0.751-1.23)	**1.16** (0.870-1.54)	**1.30** (0.958-1.77)	**1.45** (1.03-2.06)	**1.62** (1.09-2.36)	**1.85** (1.20-2.80)	**2.04** (1.29-3.16)
30-min	**0.766** (0.603-0.962)	**0.908** (0.713-1.14)	**1.14** (0.892-1.44)	**1.33** (1.04-1.69)	**1.60** (1.20-2.13)	**1.80** (1.32-2.45)	**2.01** (1.43-2.84)	**2.24** (1.51-3.25)	**2.56** (1.66-3.87)	**2.82** (1.78-4.36)
60-min	**0.977** (0.768-1.23)	**1.16** (0.910-1.46)	**1.45** (1.14-1.83)	**1.70** (1.32-2.16)	**2.04** (1.53-2.71)	**2.30** (1.69-3.12)	**2.56** (1.82-3.62)	**2.85** (1.93-4.15)	**3.27** (2.12-4.94)	**3.60** (2.28-5.56)
2-hr	**1.26** (0.995-1.57)	**1.49** (1.18-1.85)	**1.86** (1.47-2.33)	**2.17** (1.70-2.73)	**2.59** (1.97-3.44)	**2.91** (2.16-3.96)	**3.25** (2.35-4.61)	**3.65** (2.48-5.28)	**4.25** (2.77-6.39)	**4.76** (3.02-7.32)
3-hr	**1.45** (1.15-1.80)	**1.71** (1.36-2.13)	**2.15** (1.70-2.68)	**2.50** (1.97-3.15)	**3.00** (2.29-3.97)	**3.37** (2.52-4.57)	**3.76** (2.74-5.34)	**4.25** (2.88-6.12)	**4.99** (3.25-7.47)	**5.62** (3.58-8.60)
6-hr	**1.83** (1.46-2.25)	**2.18** (1.74-2.69)	**2.75** (2.20-3.41)	**3.23** (2.56-4.03)	**3.89** (2.99-5.12)	**4.37** (3.29-5.91)	**4.90** (3.59-6.94)	**5.56** (3.79-7.96)	**6.58** (4.30-9.79)	**7.46** (4.76-11.3)
12-hr	**2.26** (1.83-2.77)	**2.74** (2.21-3.36)	**3.51** (2.82-4.32)	**4.15** (3.32-5.15)	**5.04** (3.89-6.58)	**5.69** (4.30-7.63)	**6.40** (4.71-8.98)	**7.27** (4.98-10.3)	**8.61** (5.65-12.7)	**9.77** (6.25-14.7)
24-hr	**2.68** (2.18-3.27)	**3.29** (2.67-4.00)	**4.27** (3.45-5.22)	**5.08** (4.09-6.25)	**6.20** (4.82-8.05)	**7.03** (5.35-9.37)	**7.93** (5.87-11.1)	**9.03** (6.21-12.8)	**10.7** (7.06-15.7)	**12.2** (7.82-18.2)
2-day	**3.05** (2.50-3.68)	**3.76** (3.08-4.55)	**4.92** (4.01-5.97)	**5.89** (4.77-7.19)	**7.21** (5.65-9.31)	**8.19** (6.28-10.8)	**9.26** (6.89-12.8)	**10.6** (7.30-14.8)	**12.6** (8.34-18.4)	**14.4** (9.27-21.4)
3-day	**3.31** (2.73-3.98)	**4.09** (3.36-4.92)	**5.35** (4.38-6.47)	**6.40** (5.21-7.78)	**7.84** (6.16-10.1)	**8.90** (6.85-11.8)	**10.1** (7.53-13.9)	**11.5** (7.97-16.1)	**13.8** (9.11-20.0)	**15.7** (10.1-23.3)
4-day	**3.55** (2.93-4.25)	**4.37** (3.60-5.24)	**5.71** (4.69-6.88)	**6.82** (5.57-8.27)	**8.35** (6.59-10.7)	**9.48** (7.31-12.5)	**10.7** (8.03-14.8)	**12.3** (8.49-17.1)	**14.7** (9.72-21.2)	**16.7** (10.8-24.7)
7-day	**4.20** (3.49-5.01)	**5.12** (4.25-6.11)	**6.62** (5.48-7.94)	**7.87** (6.46-9.49)	**9.58** (7.60-12.2)	**10.8** (8.41-14.2)	**12.2** (9.20-16.8)	**13.9** (9.70-19.3)	**16.6** (11.1-23.9)	**18.9** (12.3-27.8)
10-day	**4.87** (4.06-5.78)	**5.84** (4.87-6.94)	**7.43** (6.17-8.87)	**8.74** (7.21-10.5)	**10.6** (8.39-13.4)	**11.9** (9.24-15.5)	**13.4** (10.0-18.2)	**15.1** (10.6-20.9)	**17.9** (11.9-25.6)	**20.2** (13.1-29.6)
20-day	**6.97** (5.86-8.22)	**8.00** (6.72-9.44)	**9.68** (8.10-11.5)	**11.1** (9.20-13.2)	**13.0** (10.4-16.2)	**14.4** (11.2-18.5)	**16.0** (11.9-21.2)	**17.7** (12.4-24.1)	**20.1** (13.5-28.5)	**22.1** (14.4-32.1)
30-day	**8.73** (7.38-10.3)	**9.78** (8.26-11.5)	**11.5** (9.66-13.6)	**12.9** (10.8-15.4)	**14.9** (11.9-18.4)	**16.4** (12.8-20.7)	**17.9** (13.4-23.5)	**19.5** (13.8-26.5)	**21.6** (14.5-30.5)	**23.3** (15.2-33.6)
45-day	**10.9** (9.26-12.8)	**12.0** (10.2-14.0)	**13.7** (11.6-16.2)	**15.2** (12.7-18.0)	**17.2** (13.8-21.1)	**18.8** (14.6-23.5)	**20.3** (15.1-26.3)	**21.8** (15.4-29.4)	**23.6** (15.9-33.1)	**24.8** (16.2-35.8)
60-day	**12.7** (10.8-14.8)	**13.8** (11.8-16.1)	**15.6** (13.2-18.3)	**17.1** (14.4-20.2)	**19.2** (15.4-23.4)	**20.8** (16.3-25.9)	**22.4** (16.6-28.7)	**23.7** (16.9-31.9)	**25.3** (17.1-35.4)	**26.4** (17.2-37.8)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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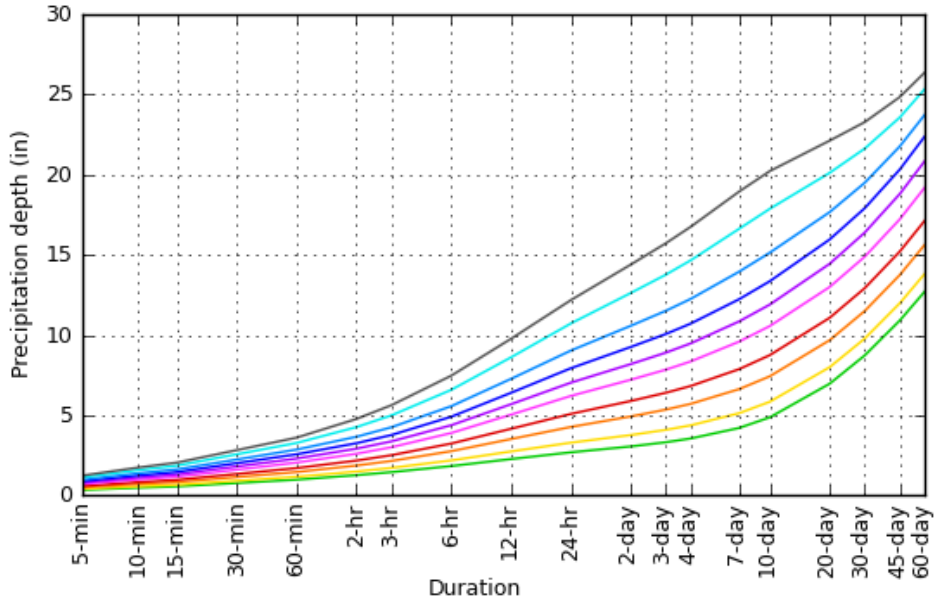
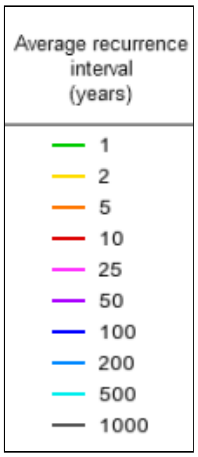
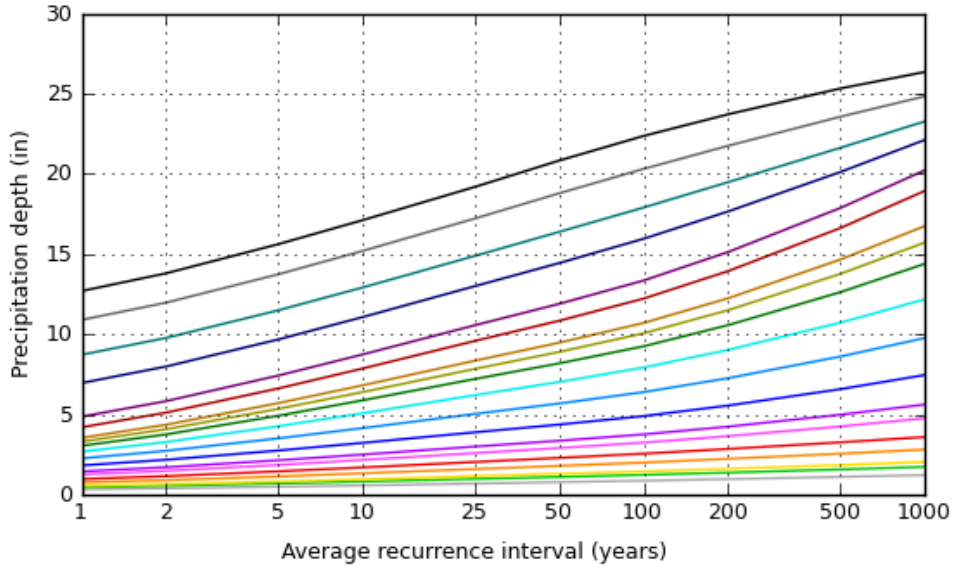
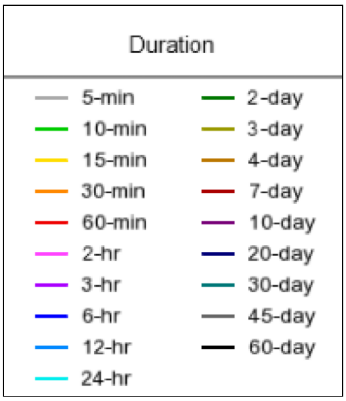
PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 42.0417°, Longitude: -71.9342°









NOAA Atlas 14, Volume 10, Version 3

Created (GMT): Sun May 22 19:54:59 2022

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Maps & aerials

Small scale terrain

NOAA Atlas 14, Volume 10, Version 3
Location name: Dudley, Massachusetts, USA*
Latitude: 42.0417°, Longitude: -71.9342°
Elevation: 640.33 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**4.00** (3.14-5.03)	**4.74** (3.72-5.96)	**5.95** (4.66-7.51)	**6.96** (5.41-8.83)	**8.34** (6.26-11.1)	**9.38** (6.90-12.8)	**10.5** (7.45-14.8)	**11.7** (7.88-17.0)	**13.3** (8.65-20.2)	**14.7** (9.30-22.7)
10-min	**2.83** (2.23-3.56)	**3.36** (2.64-4.22)	**4.22** (3.30-5.32)	**4.93** (3.83-6.25)	**5.90** (4.44-7.85)	**6.65** (4.88-9.04)	**7.42** (5.28-10.5)	**8.26** (5.58-12.0)	**9.45** (6.14-14.3)	**10.4** (6.59-16.1)
15-min	**2.22** (1.75-2.79)	**2.63** (2.07-3.31)	**3.30** (2.58-4.17)	**3.86** (3.00-4.90)	**4.63** (3.48-6.16)	**5.21** (3.83-7.09)	**5.82** (4.14-8.22)	**6.48** (4.38-9.42)	**7.41** (4.81-11.2)	**8.16** (5.17-12.6)
30-min	**1.53** (1.21-1.92)	**1.82** (1.43-2.28)	**2.28** (1.78-2.88)	**2.67** (2.07-3.39)	**3.20** (2.40-4.25)	**3.60** (2.65-4.89)	**4.01** (2.86-5.68)	**4.47** (3.02-6.51)	**5.12** (3.32-7.74)	**5.64** (3.57-8.72)
60-min	**0.977** (0.768-1.23)	**1.16** (0.910-1.46)	**1.45** (1.14-1.83)	**1.70** (1.32-2.16)	**2.04** (1.53-2.71)	**2.30** (1.69-3.12)	**2.56** (1.82-3.62)	**2.85** (1.93-4.15)	**3.27** (2.12-4.94)	**3.60** (2.28-5.56)
2-hr	**0.628** (0.498-0.784)	**0.742** (0.588-0.926)	**0.929** (0.732-1.16)	**1.08** (0.849-1.37)	**1.30** (0.984-1.72)	**1.46** (1.08-1.98)	**1.63** (1.17-2.31)	**1.83** (1.24-2.64)	**2.13** (1.38-3.20)	**2.38** (1.51-3.66)
3-hr	**0.482** (0.383-0.598)	**0.570** (0.453-0.709)	**0.714** (0.565-0.891)	**0.834** (0.656-1.05)	**0.999** (0.762-1.32)	**1.12** (0.837-1.52)	**1.25** (0.911-1.78)	**1.41** (0.960-2.04)	**1.66** (1.08-2.49)	**1.87** (1.19-2.86)
6-hr	**0.305** (0.244-0.376)	**0.364** (0.291-0.449)	**0.460** (0.367-0.570)	**0.540** (0.428-0.673)	**0.649** (0.499-0.855)	**0.730** (0.550-0.986)	**0.819** (0.600-1.16)	**0.929** (0.633-1.33)	**1.10** (0.718-1.63)	**1.25** (0.795-1.89)
12-hr	**0.188** (0.152-0.230)	**0.227** (0.183-0.279)	**0.291** (0.234-0.359)	**0.345** (0.275-0.427)	**0.418** (0.323-0.546)	**0.472** (0.357-0.633)	**0.531** (0.391-0.746)	**0.603** (0.413-0.858)	**0.715** (0.469-1.06)	**0.811** (0.519-1.22)
24-hr	**0.112** (0.091-0.136)	**0.137** (0.111-0.167)	**0.178** (0.144-0.217)	**0.212** (0.170-0.260)	**0.258** (0.201-0.336)	**0.293** (0.223-0.390)	**0.330** (0.244-0.461)	**0.376** (0.259-0.532)	**0.447** (0.294-0.655)	**0.508** (0.326-0.760)
2-day	**0.064** (0.052-0.077)	**0.078** (0.064-0.095)	**0.103** (0.084-0.124)	**0.123** (0.099-0.150)	**0.150** (0.118-0.194)	**0.171** (0.131-0.226)	**0.193** (0.144-0.268)	**0.220** (0.152-0.309)	**0.263** (0.174-0.383)	**0.300** (0.193-0.446)
3-day	**0.046** (0.038-0.055)	**0.057** (0.047-0.068)	**0.074** (0.061-0.090)	**0.089** (0.072-0.108)	**0.109** (0.086-0.140)	**0.124** (0.095-0.163)	**0.140** (0.105-0.193)	**0.160** (0.111-0.223)	**0.191** (0.127-0.277)	**0.218** (0.141-0.323)
4-day	**0.037** (0.031-0.044)	**0.045** (0.038-0.055)	**0.059** (0.049-0.072)	**0.071** (0.058-0.086)	**0.087** (0.069-0.112)	**0.099** (0.076-0.130)	**0.112** (0.084-0.154)	**0.128** (0.088-0.178)	**0.153** (0.101-0.221)	**0.174** (0.113-0.258)
7-day	**0.025** (0.021-0.030)	**0.030** (0.025-0.036)	**0.039** (0.033-0.047)	**0.047** (0.038-0.056)	**0.057** (0.045-0.073)	**0.065** (0.050-0.084)	**0.073** (0.055-0.100)	**0.083** (0.058-0.115)	**0.099** (0.066-0.142)	**0.113** (0.073-0.165)
10-day	**0.020** (0.017-0.024)	**0.024** (0.020-0.029)	**0.031** (0.026-0.037)	**0.036** (0.030-0.044)	**0.044** (0.035-0.056)	**0.050** (0.039-0.064)	**0.056** (0.042-0.076)	**0.063** (0.044-0.087)	**0.074** (0.050-0.107)	**0.084** (0.055-0.123)
20-day	**0.015** (0.012-0.017)	**0.017** (0.014-0.020)	**0.020** (0.017-0.024)	**0.023** (0.019-0.028)	**0.027** (0.022-0.034)	**0.030** (0.023-0.038)	**0.033** (0.025-0.044)	**0.037** (0.026-0.050)	**0.042** (0.028-0.059)	**0.046** (0.030-0.067)
30-day	**0.012** (0.010-0.014)	**0.014** (0.011-0.016)	**0.016** (0.013-0.019)	**0.018** (0.015-0.021)	**0.021** (0.017-0.026)	**0.023** (0.018-0.029)	**0.025** (0.019-0.033)	**0.027** (0.019-0.037)	**0.030** (0.020-0.042)	**0.032** (0.021-0.047)
45-day	**0.010** (0.009-0.012)	**0.011** (0.009-0.013)	**0.013** (0.011-0.015)	**0.014** (0.012-0.017)	**0.016** (0.013-0.020)	**0.017** (0.014-0.022)	**0.019** (0.014-0.024)	**0.020** (0.014-0.027)	**0.022** (0.015-0.031)	**0.023** (0.015-0.033)
60-day	**0.009** (0.008-0.010)	**0.010** (0.008-0.011)	**0.011** (0.009-0.013)	**0.012** (0.010-0.014)	**0.013** (0.011-0.016)	**0.014** (0.011-0.018)	**0.016** (0.012-0.020)	**0.016** (0.012-0.022)	**0.018** (0.012-0.025)	**0.018** (0.012-0.026)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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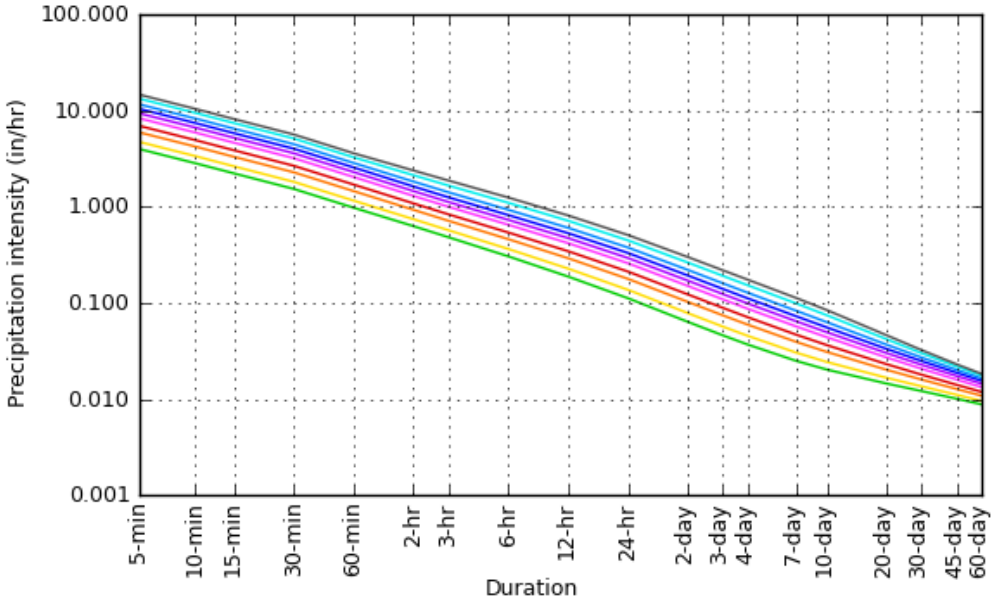
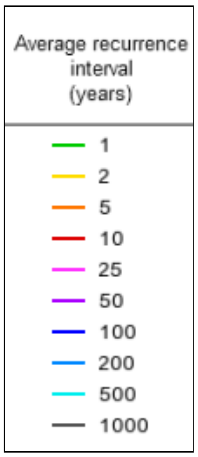
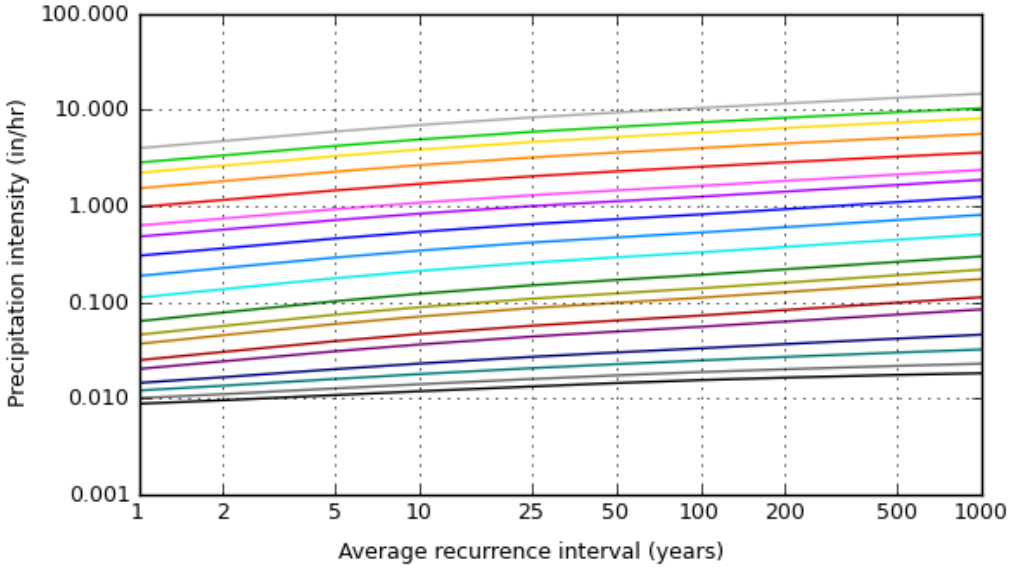
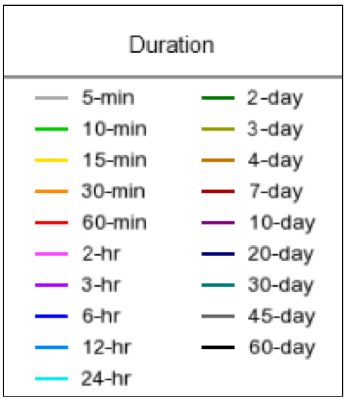
PF graphical

PDS-based intensity-duration-frequency (IDF) curves
Latitude: 42.0417°, Longitude: -71.9342°









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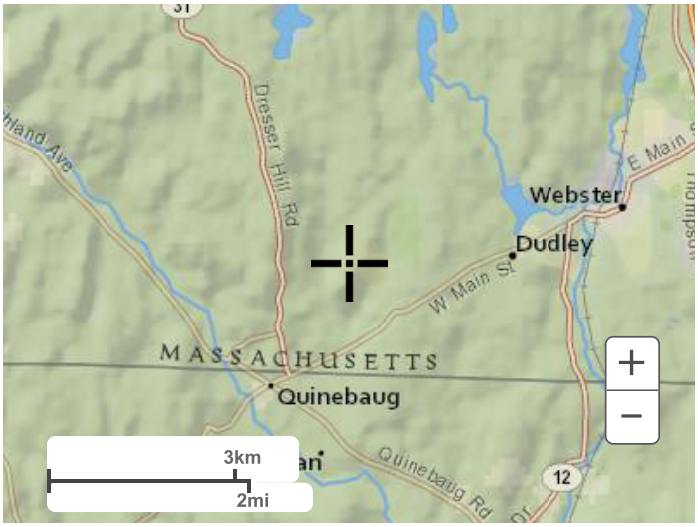
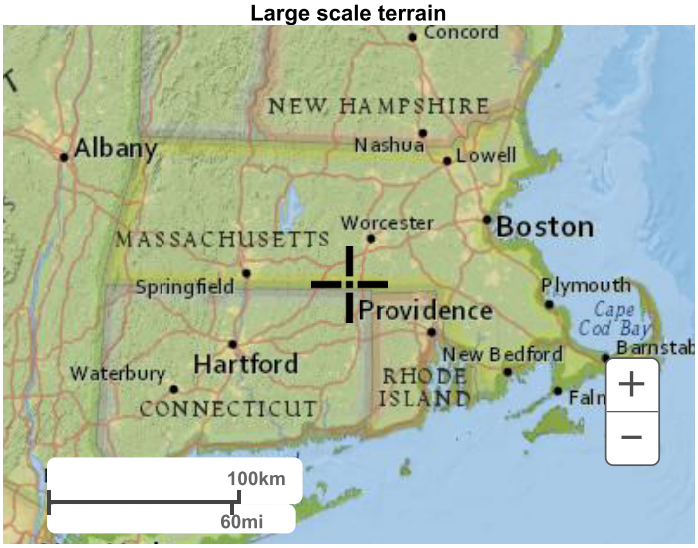
Maps & aerials

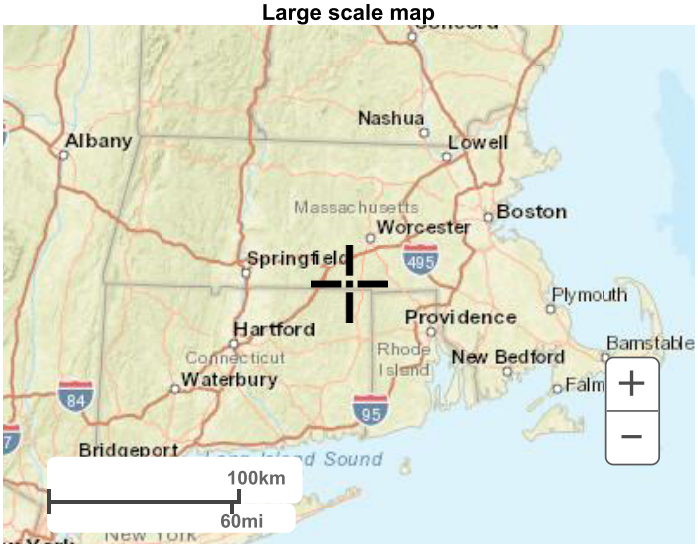
Small scale terrain



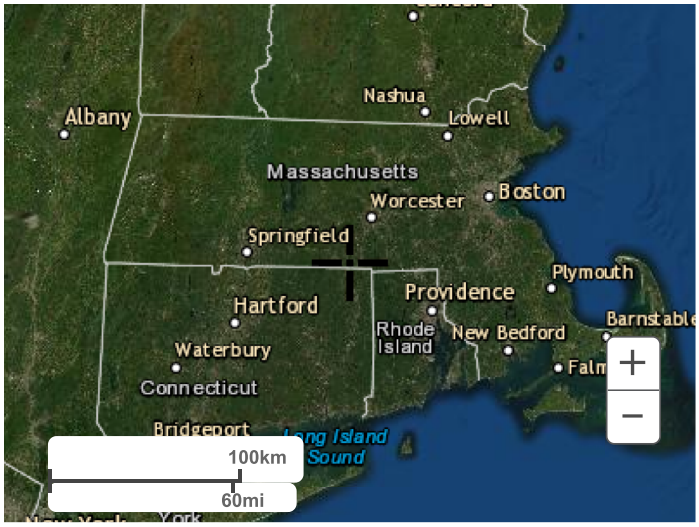
Large scale terrain



Large scale map



Large scale aerial



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