

Prepared for/Applicant:

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STORMWATER REPORT FOR THE PROPOSED LOW IMPACT DEVELOPMENT (LID) STORMWATER CONTROLS AT PINE HILL VILLAGE IN HARVARD, MA

Prepared by:

Geosyntec 
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Project Number: BW0118

October 18, 2010

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STORMWATER REPORT

TABLE OF CONTENTS

PURPOSE	6
PROJECT INFORMATION	7
LOW IMPACT DEVELOPMENT MEASURES	8
STORMWATER STANDARDS	10
RESULTS	13
DESIGN CALCULATIONS	21
REFERENCES.....	27

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STORMWATER REPORT

TABLES

Table 1: Proposed LID Practices for Village

Table 2: Stormwater Management System Discharge Point Velocity

Table 3: Design Storm Rainfall Depth

Table 4A: Peak Summary Results Table

Table 4B: Volume Summary Results Table

Table 5: Site Soil Evaluation Table

Table 6: Recharge Volume Using Static Method

Table 7: Parabolic Channel Schedule

Table 8A: Catch Basin Grate Analysis

Table 8B: Raingarden Atrium Grate Analysis

FIGURES

Figure 11: Existing Conditions Drainage Map

Figure 12: Proposed Conditions Drainage Map

Figure 13: Soil Map

Figure 14: Stormwater Management Plan

Figure 15A, B, C and D: Stormwater Management Plan Details

Figure 6: Interim Wellhead Protection Area Map

ATTACHMENTS

Attachment A NRCS Soils Information and Infiltration

Attachment B Design Calculations

Attachment C Long Term Pollution Prevention Plan

Attachment D Operation and Maintenance Plan

Attachment E Checklist

Attachment F FEMA Flood Map

Attachment G HydroCAD Output

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STORMWATER REPORT

Client: Transformations, Inc. **Project:** Pine Hill **Project/Proposal #:** BW0118 **Task #:** 01

TITLE OF COMPUTATIONS: Stormwater Report for the Low Impact Development Stormwater Management Plan at the Pine Hill Village Development, Harvard, Massachusetts

COMPUTATIONS BY:

Signature



6/16/2011

Printed Name

Renee Fitsik

and Title

Engineer

DATE

ASSUMPTIONS AND

PROCEDURES CHECKED BY:

Signature



6/16/2011

(Peer Reviewer)

Printed Name

Renee Fitsik

and Title

Engineer

DATE

COMPUTATIONS CHECKED BY:

Signature



6/16/2011

Printed Name

Daniel Bourdeau, PE

and Title

Professional Engineer

DATE

COMPUTATIONS

BACKCHECKED BY:

Signature



6/16/2011

(Originator)

Printed Name

Renee Fitsik

and Title

Engineer

DATE

APPROVED BY:

(PM or Designate)

Signature

Printed Name

Steve Roy

and Title

Principal

6/16/2011

DATE

REVISIONS:

2/15/2018 – Revised per new grading plan dated 10/19/2017. Approved by DHB.


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STORMWATER REPORT

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 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 (Attachment E) 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

 7/2/18
Signature and Date

Written by: R. Fitsik Date: 06/02/2011 Reviewed by: Daniel Bourdeau, PE Date: 06/03/2011Client: Transformations Project: Pine Hill Village Project/Proposal No.: BW0118 Task No.: 01

STORMWATER REPORT
LOW IMPACT DEVELOPMENT STORMWATER MANAGEMENT PLAN
PINE HILL VILLAGE DEVELOPMENT
HARVARD, MASSACHUSETTS

PURPOSE

The purpose of this calculation package and report is to present supporting information and calculations to accompany the design of the proposed low impact development (LID) stormwater management plan for the proposed Pine Hill Village in Harvard, Massachusetts (the Village). The proposed plan was designed by Geosyntec Consultants, Inc. (Geosyntec) in accordance with the Stormwater Management Standards as described in the Massachusetts Stormwater Handbook, dated February 2008 (Handbook) and in compliance with the Wetlands Protection Act Regulations (310 CMR 10.00 and 314 CMR 9.00 revised January 2, 2008). The project is defined as New Development and is required to meet the Stormwater Management Standards.

The Village is a five-lot subdivision proposed under a Comprehensive Permit (Chapter 40b). Geosyntec's proposed stormwater management plan utilizes a system of distributed LID bioretention and raingarden controls in combination with a more centralized constructed treatment wetland. The proposed stormwater management plan as described herein and designed by Geosyntec is identified on Figure 14, Proposed Conditions Stormwater Management Plan attached to this report.

Written by: R. Fitsik Date: 06/02/2011 Reviewed by: Daniel Bourdeau, PE Date: 06/03/2011Client: Transformations Project: Pine Hill Village Project/Proposal No.: BW0118 Task No.: 01**PROJECT INFORMATION**

The following is information related to the proposed development project and watershed:

Project Location:

Street Address:	<u>Stow Road</u>	City/Town:	<u>Harvard</u>	Zip Code:	<u>01451</u>
Latitude:	<u>42.462513</u>	Longitude:	<u>-71.558429</u>	Source:	<u>Google</u>
Assessors Map:	<u>36</u>	Parcel/Lot No.	<u>96.1</u>		

Project Type:

- ☒ New Development (Residential Subdivision)
☐ Redevelopment
☐ Mix of New Development and Redevelopment

Project Description:

The Village is a five-lot residential subdivision proposed under a Comprehensive Permit. The Village consists of one cul-de-sac that services twenty-four residential units. The development plan incorporates LID techniques for stormwater management including bioretention cells, raingardens, vegetated swales and a centralized constructed treatment wetland.

Watershed Information:

Receiving Water: Unnamed Perennial Tributary of Elizabeth Brook that drains to Delaney Pond

Water Quality None Identified

Impairments:

Source: EPA EnviroMapper for Water (<http://map24.epa.gov/emr/>; December 2010)

FEMA Flood Hazard A portion of the site is located within a FEMA Zone B boundary as identified on Panel Number 250308 0006B dated June 15, 1983. The FEMA Flood Hazard Boundary is shown on Figure 11. FEMA defines Zone B as “area of moderate flood hazard, usually the area between the limits of the 100-year and 500-year floods. B Zones are also used to designate base floodplains of lesser hazards, such as areas protected by levees from 100-year flood, or shallow flooding areas with average depths of less than one foot or drainage areas less than 1 square mile” (www.msd.fema.gov, December 2010).

Written by: R. Fitsik Date: 06/02/2011 Reviewed by: Daniel Bourdeau, PE Date: 06/03/2011Client: Transformations Project: Pine Hill Village Project/Proposal No.: BW0118 Task No.: 01**LOW IMPACT DEVELOPMENT MEASURES**

LID is a sustainable stormwater runoff management approach that uses distributed micro-scale stormwater runoff management principles and practices in order to mimic how natural hydrologic cycles treat runoff through the processes of storage, infiltration, or evapotranspiration.

Measures

The following LID measures are proposed for implementation at the Village. Site specific design criteria are provided on Figure 14.

Table 1. Proposed LID Practices for the Village

LID Measure	Description
Site Design Practice (e.g., clustered development, reduced frontage setbacks)	The housing and infrastructure are clustered on approximately 38% of the total site leaving 62% of the site as open space. The LID design of the road for the Pine Hill Village Development is in compliance with the Comprehensive Permit issued by the Harvard Zoning Board of Appeals, issued October 29, 2008, which allows a reduced 20-foot road pavement width and 40-foot total street right-of-way width."
Minimizing disturbance to existing trees and shrubs	The proposed design incorporates the existing site slopes and grades and does not include large cuts and fills. This results in reduced disturbance to existing trees and vegetation to the extent practicable.
Country Drainage	Portions of the proposed road have a crowned roadway center and country drainage that drains to vegetated swales.
Bioretention Cells and Raingardens	Bioretention cells and raingardens, both exfiltrating and non-exfiltrating, have been distributed throughout the proposed village to treat the storm water quality volume and infiltrating the required recharge volume.
Constructed Wetland	A constructed wetland is included in the proposed stormwater management plan to provide water quality treatment as well as control peak discharge rates for the 2 year, 10 year and 100 year design storm events.
Grass Channels	Vegetated channels have been incorporated in the stormwater management plan where swales could be used in place of culverts.

Written by: R. Fitsik Date: 06/02/2011 Reviewed by: Daniel Bourdeau, PE Date: 06/03/2011

Client: Transformations Project: Pine Hill Village Project/Proposal No.: BW0118 Task No.: 01

Site Design Credit

The proposed development incorporates elements of LID site design including environmentally sensitive development and disconnection of rooftop, roadway, driveway, and parking areas. The stormwater management plan does *not* use the LID Site Design Credits because the requirements listed in Volume 3 of the Handbook were not fully met for any of the three credit systems. The proposed development uses “cluster development” design to reduce the total site imperviousness and to leave a significant area of the site undisturbed in its predevelopment condition. Additionally, all building roofs are disconnected and flow onto pervious site areas and portions of the paved roadway area are disconnected through open road drainage that drain to vegetated channels. In addition to the site design practices, LID controls were used to control runoff and are described in the following section.

Written by: R. Fitsik Date: 06/02/2011 Reviewed by: Daniel Bourdeau, PE Date: 06/03/2011Client: Transformations Project: Pine Hill Village Project/Proposal No.: BW0118 Task No.: 01

STORMWATER STANDARDS

The following is a summary of how each Standard was addressed for the project. Each standard has a summary of the standard requirements, supporting calculations and results.

Standard 1: (Untreated discharges)

No new stormwater conveyances (e.g., outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.

Storm water runoff currently drains via overland flow from the forested area to one of two outfall locations referred to as Compliance Points. Figure 11 includes an existing conditions plan of the site with the Compliance Points identified. Compliance Point 1 is located in a topographic low-point on the north property boundary which receives runoff from approximately 3.2 acres of forest. Compliance Point 2 is located in the unnamed tributary of Elizabeth Brook at the culvert at Stow Road. This Compliance Point receives the majority of runoff from the forested site (i.e., 13.7 acres) including the wetland complex in the east portion of the site.

The Village incorporates a LID based stormwater management system that was evaluated at the same two Compliance Points. The Compliance Points have been used to compare pre and post-development discharge rates. Figure 12 includes the development plan for the Village with the stormwater management system drainages for Compliance Points 1 and 2. The boundaries of the pre-development drainage areas were used as the drainage boundaries in the post-development evaluation. There are no new untreated stormwater conveyances to wetland resource areas as part of this project.

The site has six discharge points as identified in Table 2. In general, one raingarden (Raingarden #3) to the north of Tucks Way overflows onto the grassed area and ultimately drain to Compliance Point #1. The constructed wetland which receives runoff from the remaining portions of the development in the west discharges to Compliance Point #2. In addition, the Bus Stop Bioretention Cell and two raingardens at the entrance (Raingarden #22 and #23) also drain to Compliance Point 2. Table 2 includes estimated discharge velocities and ground surface at each outfall. Permissible velocities for each ground surface were taken from Table 2.3.1 of the Handbook.

Energy dissipation is required at the outfall of the constructed wetland to reduce concentrated pipe flow to an allowable velocity of 2.5 feet per second. Energy dissipation is also required at the outfall of each culvert throughout the site.

Written by: R. Fitsik Date: 06/02/2011 Reviewed by: Daniel Bourdeau, PE Date: 06/03/2011Client: Transformations Project: Pine Hill Village Project/Proposal No.: BW0118 Task No.: 01**Table 2. Stormwater Management System Discharge Point Velocity**

Compliance Point	Stormwater Management Feature	2-Year Peak Velocity (fps)	10-Year Peak Velocity (fps)	Ground Surface	Permissible Velocity (fps)
1	Raingarden #3	0.4	0.8	Landscape Lawn	2.5
2	Constructed Wetland	5.1 ¹	7.1 ¹	Shrub/Bushes	2.5
	Bus Station Bioretention Cell	0.6	1.5	Landscape Lawn	2.5
	Raingarden #22	0	0.6	Landscape Lawn	2.5
	Raingarden #23	0	0.4	Landscape Lawn	2.5

Note 1: Energy dissipation is required at the constructed wetland outfall to reduce the velocity to 2.5 fps or less, refer to Attachment B9 for energy dissipation sizing.

Standard 2: (Peak rate control and flood prevention)

Stormwater management systems must be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates. This Standard may be waived for land subject to coastal storm flowage.

Hydrologic calculations were performed to evaluate the pre-development and post-development site conditions. Modeling was performed to estimate peak discharge and runoff volume associated with 2-year, 10-year, and 100-year, 24-hour design storm event, the output can be found in Attachment G. These parameters were estimated using *HydroCAD™ Stormwater Modeling System*, Version 5 (Applied Microcomputer Systems, 2001). *HydroCAD™* is a computer aided design package for modeling hydrology and hydraulics of stormwater runoff. *HydroCAD™* incorporates TR-20 [Soil Conservation Service (SCS), 1982] methods for runoff analysis, standard hydraulic calculations for analysis of open channel flow, and reservoir routing techniques for ponds. The following describes the selection of the various hydrologic parameters used for the model development for pre- and post-development conditions:

- **Rainfall Distribution and Depth:** A 24-hour duration, SCS Type III rainfall distribution was used in the hydrologic model with the following characteristics:

Written by: R. Fitsik Date: 06/02/2011 Reviewed by: Daniel Bourdeau, PE Date: 06/03/2011Client: Transformations Project: Pine Hill Village Project/Proposal No.: BW0118 Task No.: 01**Table 3. Design Storm Rainfall Depth**

Return Period (years)	Rainfall Depth (inches)
2	3.1
10	4.6
25	5.3
100	6.8

- **Hydrologic Soil Groups:** According to the NRCS Web Soil Survey, soils in the project vicinity include a combination of: Chatfield-Hollis-Rock outcrop complex, 3-15% slopes; Chatfield-Hollis-Rock outcrop complex, 15-25% slopes; Woodbridge fine sand loam, 0-8% slopes, extremely stony; Ridgebury fine sand loam, 0-3% slopes; Canton fine sand loam, 3-8% slopes; and Swansea muck. These soils are a mixture of hydrologic soil groups (HSG) B and C soils. The full NRCS soils report is included in Attachment A.

Developed HSGs in the vicinity of development (e.g., roads, buildings, etc.) were selected as the next lower soil type to compensate for compaction, clearing and excavation that occurs during development. For example, the majority of the site is a HSG B and C soil and was modeled as C and D soils for the developed condition.

- **Curve Number:** Hydrologic Curve Number (CN) values for each cover type were modeled as follows:

Impervious: Road and sidewalks were modeled as impervious cover and were assigned a CN of 98, which is the recommended value for “impervious areas (SCS, 1985)”.

Woods: The pre-development condition for the project site is woods in fair condition. For pre-development conditions CNs of 60, 73, and 79 were chosen based on HSG B, C, and D, respectively.

Grass Cover: The developed condition for the majority of project site is grass cover, >75%, in good condition. Developed CNs of 61, 74, and 80 were chosen based on HSG B, C, and D, respectively.

Written by: R. Fitsik Date: 06/02/2011 Reviewed by: Daniel Bourdeau, PE Date: 06/03/2011
 Client: Transformations Project: Pine Hill Village Project/Proposal No.: BW0118 Task No.: 01

- **The Antecedent Moisture Condition:** The Antecedent Moisture Condition (AMC) for the design event was assumed to be 3, reflecting near saturated conditions.

RESULTS

Estimated pre and post-development peak discharge rates at the Compliance Points for the 2-year, 10-year and 100-year, 24-hour design storms are summarized in Table 4A. The results suggest that the LID design proposal achieves significant flow attenuation down to below estimated pre-development conditions.

Table 4A. Peak Summary Results Table

Return Period (years)	Pre-Development Peak Discharge (cfs)		Post-Development Peak Discharge (cfs)		Percent Change	
	Compliance Point 1	Compliance Point 2	Compliance Point 1	Compliance Point 2	Compliance Point 1	Compliance Point 2
2	0.6	6.7	0.30	3.74	-50%	-44%
10	3.3	19.5	0.93	13.0	-72%	-33%
100	8.4	40.8	2.51	30.8	-70%	-25%

Table 4B. Volume Summary Results Table

Return Period (years)	Pre-Development Volume (ac-ft)		Post-Development Volume (ac-ft)		Percent Change	
	Compliance Point 1	Compliance Point 2	Compliance Point 1	Compliance Point 2	Compliance Point 1	Compliance Point 2
2	0.1	0.77	0.04	1.0	-65%	30%
10	0.3	1.92	0.1	2.3	-70%	20%
100	0.7	3.86	0.2	4.6	-73%	19%

Standard 2 requires that the post-development peak discharge rate is equal to or less than the pre-development rate from the 2-year and the 10-year, 24-hour storms. As summarized in Table 4A, the peak discharge associated with the post-development condition is expected to be less than the pre-development condition for the 2-year, 10-year and 100-year, 24-hour events for Compliance Point #1 and #2.

In accordance with Standard 2 of the Handbook, the impact of the peak discharges from the 100-year, 24-hour storm was evaluated. The post-development flows associated with the 100-year, 24-hour storm event from Compliance Point #1 and #2 are expected to be less than the pre-development flows, therefore, downstream impacts are not anticipated as a result of the stormwater management system described in this plan.

Table 4B summarizes the changes in volume due to the proposed development.

Written by: R. Fitsik Date: 06/02/2011 Reviewed by: Daniel Bourdeau, PE Date: 06/03/2011Client: Transformations Project: Pine Hill Village Project/Proposal No.: BW0118 Task No.: 01**Standard 3:(Recharge to Ground water)**

Loss of annual recharge to ground water shall be eliminated or minimized through the use of infiltration measures, including environmentally sensitive site design, low impact development techniques, best management practices, and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from the pre-development conditions based on soil type. This Standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook.

On-site soil evaluation was conducted in accordance with the Handbook. The following steps were taken:

- 1) NRCS Soil Survey's were reviewed using NRCS Web Soil Survey.
- 2) A site visit was conducted to verify surface soils.
- 3) Soil test pits were excavated at several locations on-site to verify NRCS soil information and determine depth to seasonal high water table.
- 4) Soil samples were evaluated in the office for Hydrologic Soils Group classification by a Competent Soils Professional
- 5) Hydrologic Soils Groups (HSG) were identified at locations where recharge is proposed.
- 6) A plan was prepared identifying the Hydrologic Soils Group on-site.

Figure 13, Soils Map, shows the verified hydrologic soils group for surface soils and soils at the location where recharge is proposed. Depth to seasonal high groundwater table is also shown in the figure. During the site visit, test pits were conducted in several locations on-site to verify the NRCS soils information and verify the depth to seasonal high groundwater. Table 5 shows the site soils evaluation test pit locations on-site. Based on a texture analysis conducted on-site it was confirmed that the areas of the Site that were characterized as being in HSG B or C, were all consistent with the soils found at these locations. Based on the test pit locations, it was verified that the depth to seasonal high groundwater was approximately 30-inches below existing ground surface. ***For the purposes of designing to the "worst-case scenario" condition, a value of 30-inches was used across for all raingarden designs as the depth to season high groundwater.***

In-situ soil infiltration tests were conducted using a double-ring infiltrometer at three of the test pit locations and are recorded in Table 5. The infiltration rates observed at these test pit locations exceeded the Rawls Rates for the NRCS hydrologic soil group. To be conservative, the Rawls infiltration rates were used for determining BMP sizing and drawdown time. The slowest infiltration rates for each soil ground were chosen for the proposed BMPs. The values of

Written by: R. Fitsik Date: 06/02/2011 Reviewed by: Daniel Bourdeau, PE Date: 06/03/2011Client: Transformations Project: Pine Hill Village Project/Proposal No.: BW0118 Task No.: 01

0.52 in/hour were chosen for the proposed BMPs in the HSG B soil group and 0.17 in/hour for the proposed BMPs in the HSG C soil group.

Written by: R. Fitsik Date: 06/02/2011 Reviewed by: Daniel Bourdeau, PE Date: 06/03/2011

Client: Transformations Project: Pine Hill Village Project/Proposal No.: BW0118 Task No.: 01

Table 5. Site Soil Evaluation Table

Site Information		Soil Evaluation					Saturated Hydraulic Conductivity				
Test Pit ID	Depth BGS (ft)	% Gravel	% Silt	% Clay	USDA Texture Class From Field Observations	NRCS WSS USDA Texture Class	Rawls Infiltration Rate (in/hr)	In-Situ Infiltration Rate (in/hr)	50% In-Situ Infiltration Rate (in/hr)	NRCS WSS Infiltration Rate - Low (micro m/sec)	NRCS WSS Infiltration Rate - High (micro m/sec)
TP#1	6.5	15	59	6	Silt Loam	-	0.27	0.67	0.34		
TP#2	3.0	5	37	5	Sandy Loam		1.02	-	-	0.00	1.41
TP#2*	0.25-0.5	-	-	-	-	Fine Sandy Loam	1.02	5.01	2.51	4.23	14.11
TP#3	3.0	5	37	5	Sandy Loam		1.02	-	-		
TP#4	2.5	10	33	11	Sandy Loam		1.02	1.06	0.53		
TP#5	3.0	0	70	5	Silt Loam		0.27	-	-		
TP#6	3.0	10	50	6	Silt Loam		0.27	-	-		
TP#7	3.0	10	50	6	Silt Loam		0.27	-	-		
TP#8	3.0	15	18	0	Loamy Sand		2.41	-	-		
TP#9	3.0	5	58	11	Loam		0.52	-	-		
TP#10	3.0	5	42	11	Loam		0.52	-	-		

* Soil not classified due to high organic content. Since this is a surface sample, NRCS soils classification is sufficient.

Written by: R. Fitsik Date: 06/02/2011 Reviewed by: Daniel Bourdeau, PE Date: 06/03/2011Client: Transformations Project: Pine Hill Village Project/Proposal No.: BW0118 Task No.: 01

Recharge volume was estimated for the entire site based on impervious area described in the Handbook and using the Static Method. Of the total 2.17 acres of impervious area on-site, 1.65 acres is in HSG B and the remaining 0.52 acres is in HSB C (Table 6).

Table 6. Recharge Volume Using Static Method

Soil Type (Table 2.3.2)	Soil Texture (Table 2.3.2)	F (in) (Table 2.3.2)	Imp. Area (ac) (from plans)	Rv (cf) -
HSG A	sand	0.60	0.00	0
HSG B	loam	0.35	1.65	2096
HSG C	silty loam	0.25	0.52	472
HSG D	clay	0.10	0.00	0
		Total	2.17	2568

The statically calculated recharge volume is approximately 2,600 cubic feet. The required recharge volume (3,875 cubic feet) was calculated by multiplying the statically calculated recharge volume by the ratio of impervious area draining to recharge to total drainage area. This calculation is included in Attachment B.4 The required recharge volume is met through the use of distributed exfiltrating raingardens and bioretention cells. The proposed design provides approximately 16,174 cubic feet of storage in these exfiltrating raingardens which exceeds the required recharge volume (see Attachment B.4 – Raingarden Schedule).

All raingardens were designed to dewater in less than 72 hours, in accordance with the Handbook. Drawdown calculations, which can be found in Attachment B were performed using the Static Method and based on the slowest Rawls Rates at the proposed location where recharge is proposed. The calculations indicate all infiltrating raingardens are expected to drain within 72 hours.

A mounding analysis was not performed for the proposed raingardens since none were designed to attenuate the peak discharge from a 10-year or higher 24-hour storm.

Written by: R. Fitsik Date: 06/02/2011 Reviewed by: Daniel Bourdeau, PE Date: 06/03/2011Client: Transformations Project: Pine Hill Village Project/Proposal No.: BW0118 Task No.: 01**Standard 4: Water Quality and 80% TSS Removal**

Stormwater management systems must be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS). This standard is met when:

- a. Suitable practices for source control and pollution prevention are identified in a long-term pollution prevention plan and thereafter are implemented and maintained;*
- b. Stormwater BMPs are sized to capture the required water quality volume determined in accordance with the Massachusetts Stormwater Handbook; and*
- c. Pretreatment is provided in accordance with the Massachusetts Stormwater Handbook.*

The stormwater management system captures and treats runoff from the village to achieve the required TSS removal. When feasible, a treatment train approach to pollutant removal was incorporated into the designs. The required water quality volume equals 1-inch of runoff times the total impervious area of the post-development project site for a discharge within a Zone II or Interim Wellhead Protection Area (IWPA) (Figure 6). Approximately 7.36 acres of the Site resides within the IWPA. Within this area, 1.13 acres of impervious area is proposed. Therefore, based on 1-inch of runoff times the total impervious area, the required water quality volume from the IWPA is 2124 cubic feet. The remaining 1.17 acres of impervious area is located outside the IWPA and the required water quality volume is calculated as 0.5-inches, requiring an additional 4,102 cubic feet of storage. The total water quality volume required for this project is 6,225 cubic feet.

Since the required water quality volume is greater than the recharge volume (calculated under Standard 3), all BMPs were designed to capture and treat the water quality volume.

The proposed stormwater management raingardens provide 17,714 cubic feet of storage which exceeds the required water quality volume. All proposed stormwater management features have pretreatment in the form of a pea gravel filter and vegetated filter strip, a vegetated filter strip or a vegetated swale. A channel and sediment forebay provide pre-treatment for the constructed wetland. Details can be found in Attachment B and in 15A, B, C and D.

A Long Term Pollution Prevention Plan for the proposed stormwater management system is provided in Attachment C.

Standard 5 (Higher Potential Pollutant Loads (HPPL))

For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable. If through source control and/or pollution prevention, all land uses with higher potential pollutant loads cannot be completely protected from exposure to rain, snow, snow melt and stormwater runoff, the proponent shall use the specific stormwater BMPs determined by the Department to be suitable for such use as provided in the Massachusetts Stormwater Handbook. Stormwater discharges from land uses with

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higher potential pollutant loads shall also comply with the requirements of the Massachusetts Clean Waters Act, M.G.L. c. 21, §§ 26-53, and the regulations promulgated thereunder at 314 CMR 3.00, 314 CMR 4.00 and 314 CMR 5.00.

The project is not considered a land use with higher potential pollutant loads.

Standard 6 (Critical Areas)

Stormwater discharges to a Zone II or Interim Wellhead Protection Area of a public water supply and stormwater discharges near or any other critical area require the use of the specific source control and pollution prevention measures and the specific stormwater best management practices determined by the Department to be suitable for managing discharges to such area, as provided in the Massachusetts Stormwater Handbook. A discharge is near a critical area if there is a strong likelihood of a significant impact occurring to said area, taking into account site-specific factors. Stormwater discharges to Outstanding Resource Waters or Special Resource Waters shall be set back from the receiving water and receive the highest and best practical method of treatment. A “stormwater discharge,” as defined in 314 CMR 3.04(2)(a)1. or (b), to an Outstanding Resource Water or Special Resource Water shall comply with 314 CMR 3.00 and 314 CMR 4.00. Stormwater discharges to a Zone I or Zone A are prohibited unless essential to the operation of the public water supply.

The Village includes four public supply wells proposed on the western site perimeter (Figure 6). Wells 1, 2, and 4 are approved for an average daily pumping volume of 1,440 gallons per day (GPD). The assigned Zone I radius for each well is 124 feet and the Interim Wellhead Protection Areas (IWPA) is 432 feet. Well 3 is approved for an average daily pumping volume of 2,060 GPD with a corresponding Zone I radius of 147 feet and an IWPA of 446 feet.

In accordance with the Massachusetts Stormwater Handbook, a stormwater discharge to a Zone II or IWPA requires that use of a treatment train that provides 80% TSS removal. All proposed infiltrating raingardens in the IWPA have the required pretreatment (i.e., pea gravel and vegetated filter strip) to provide the 44% TSS removal prior to the infiltration practice. The proposed BMPs in the IWPA have the required water quality and recharge volume to provide at least 80% TSS removal for each practice. The TSS calculations can be found in Attachment B.

Standard 7: Redevelopment

This is not a redevelopment project.

Standard 8: (Erosion, Sediment Control)

A plan to control construction-related impacts, including erosion sedimentation and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plan), must be developed and implemented.

An erosion and sediment control plan (ESCP) is being prepared under a separate submittal to satisfy the requirements of Standard #8. The ESCP has not been reviewed as part of this Stormwater Report. The project construction will disturb more than five acres and will require a

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National Pollutant Discharge Elimination System (NPDES) Construction General Permit. No Storm Water Pollution Prevention Plan (SWPPP) has been submitted with this Stormwater Report; however, the SWPPP will be developed and submitted prior to any land disturbing activities on-site.

Standard 9: (Operation and Maintenance)

A long-term operation and maintenance plan must be developed and implemented to ensure that stormwater management systems function as designed.

A Post Construction Operation and Maintenance Plan for the proposed stormwater management system are provided in Attachment D. Operation and Maintenance during construction activities will be included in the SWPPP.

Standard 10: Prohibition of Illicit Discharges

All illicit discharges to the stormwater management system are prohibited.

Measures to prevent illicit discharges are included in the Long Term Pollution Prevention Plan (Attachment C). It is the responsibility of the developer and owner to ensure that no illicit discharges will occur at the Village. An illicit discharge statement can be found in Attachment C.

Written by: R. Fitsik Date: 06/02/2011 Reviewed by: Daniel Bourdeau, PE Date: 06/03/2011Client: Transformations Project: Pine Hill Village Project/Proposal No.: BW0118 Task No.: 01

DESIGN CALCULATIONS

The following is a summary of hydraulic design computations that were used in the design of the stormwater controls described on the Plan Set.

Roof Runoff

Most of the roof runoff is assumed to stay on-site (won't infiltrate) and will be conveyed to a stormwater management feature for capture, treatment and attenuation. The roof areas in drainage areas 14S, S15 and 4S (See Figure 12) will be guttered and runoff will routed to a pervious area and allowed to infiltrate.

Open Channel Flow Calculations

The hydraulic parameters described were used to size conveyance structures and portions of the stormwater management system. The following summarizes the selection of hydraulic parameters used for this evaluation:

- **Discharge:** Open-channel stormwater conveyances (i.e., culverts and swales) were evaluated based on a circular cross section for culverts and parabolic cross section for swales. Calculations of discharge rates, flow velocities and flow depths for each type of conveyance feature are based on Manning's Equation (Chow, 1959) expressed as:

$$Q = \frac{1.49}{n} AR^{2/3} S^{1/2}$$

where: Q = discharge (ft³/sec);
 n = Manning's roughness coefficient (dimensionless);
 A = area of cross-section of flow (ft²);
 R = hydraulic radius = A/P ;
 P = wetted perimeter (ft); and
 S = longitudinal slope of the channel (ft/ft).

The velocity (V , in ft/sec) of the flow in a channel may be calculated from the continuity equation, as follows:

$$V = \frac{Q}{A}$$

The hydraulic calculations for each type of conveyance are summarized in Attachment B.

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Client: Transformations Project: Pine Hill Village Project/Proposal No.: BW0118 Task No.: 01

Vegetated Parabolic Drainage Swales

Sheet flow along the road and overland flow on steep slopes is conveyed to vegetated drainage swales (in specified locations). Channels were designed for the following conditions:

- Convey 10-year design storm peak discharge without erosion of channel lining (not to exceed 5.0 feet/second for vegetated lining);
- Convey 10-year design storm event with minimum of 0.3' of freeboard; and
- Convey the 100-year design storm event without overtopping.

The following parameters are assumed to apply to vegetated drainage channel evaluation:

- Parabolic cross-section,
- Longitudinal slope of 0.01 (minimum), and
- Lined with vegetation ($n = 0.20$).

The general characteristics for each type of parabolic channel are summarized below in Table 7 and additional hydraulic calculations in Attachment G (HydroCAD Output).

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 Client: Transformations Project: Pine Hill Village Project/Proposal No.: BW0118 Task No.: 01
Table 7. Parabolic Channel Schedule

Channel ID	Drawing Grid Location	Channel Type	Protective Lining	Mannings N-value	Channel Top Width, T (ft)	Channel Depth, d (ft)	S (Bed Slope, ft/ft)	10-year Maximum Velocity (fps)
PS1	C2	Parabolic	Coconut Fiber - Double Net	0.035	4.0	1.0	0.07	4.1
		Parabolic	Vegetation, Class C	0.041				
PS2	C3	Parabolic	Coconut Fiber - Double Net	0.035	4.0	1.0	0.06	2.0
		Parabolic	Vegetation, Class C	0.041				
PS3	E2	Parabolic	Coconut Fiber - Double Net	0.035	4.0	1.0	0.07	2.5
		Parabolic	Vegetation, Class C	0.041				
PS4	D3	Parabolic	Coconut Fiber - Double Net	0.035	4.0	1.0	0.03	1.7
		Parabolic	Vegetation, Class C	0.041				
PS6	D4	Parabolic	Coconut Fiber - Double Net	0.035	4.0	1.0	0.02	1.9
		Parabolic	Vegetation, Class C	0.041				
PS7	C5	Parabolic	Coconut Fiber - Double Net	0.035	6.0	2.0	0.04	3.5
		Parabolic	Vegetation, Class C	0.041				
PS8	C6	Parabolic	TRM	0.023	8.0	2.0	0.01	3.7
PS9	B7	Parabolic	Coconut Fiber - Double Net	0.035	4.0	1.0	0.02	2.0
		Parabolic	Vegetation, Class C	0.041				
PS10A	C2	Parabolic	Coconut Fiber - Double Net	0.035	10	2.5	0.08	1.7
		Parabolic	Vegetation, Class C	0.041				
PS10B	C2	Parabolic	Coconut Fiber - Double Net	0.035	10	2.5	.07	1.6
		Parabolic	Vegetation, Class C	0.041				

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Bioretention Cells and Raingardens

Road, roof and vegetated area runoff is managed by bioretention cells and raingardens distributed throughout Pine Hill Village. Bioretention cell and raingardens were designed for the following conditions:

- Provide storage for and attenuate the water quality volume;
- Overflow riser is designed to convey the 25-year storm event;
- Atrium grate capacity was analyzed for the 25-year storm event;
- Exfiltrating bioretention cells and raingardens are designed to provide recharge volume; and
- Non-exfiltrating bioretention cells and raingardens are designed with a perforated underdrain to ensure BMP drains during and after storm events, reducing ponding.

In accordance with the Stormwater Handbook the raingardens were sized with the following design considerations and assumptions (from bottom of raingarden to rim):

- Soil surface of raingarden is at least 2' above season high groundwater table;
- 4" of sand on the bottom of the raingarden (assumed 30% void space) or non-woven geotextile for lined raingardens;
- 3" to 1' of pea gravel above the sand layer (assumed 30% void space);
- Bioretention soil (varying depth) (assumed 30% void space);
- 3" mulch (assumed 30% void space);
- 6" ponding depth (except RG #21, which has 1.2" of ponding depth); and
- 3" of freeboard above riser structure (if present).

For raingardens that were designed to exfiltrate, an overflow riser structure or overflow berm will be installed to ensure safe conveyance of flows exceeding the water quality volume. For raingardens designed as filtering BMPs, they will be lined with an impermeable liner and have a perforated underdrain that will be connected to the storm sewer system.

Grate Capacity

Proposed catch basin grates were evaluated under the peak discharge associated with the 25-year, 24-hour design storm event for required head over the grate to pass the peak discharge rate. The catch basin grate with the greatest peak discharge was evaluated for the maximum head using procedures described in the ASCE Manual and Reports of Engineering Practice No. 77 [The Urban Water Resources Research Council, 1992].

In accordance with manufacturer and local regulations:

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- Single grate catch basin shall be considered to have a maximum inlet capacity of 2.5 cfs.

Raingarden atrium grates were evaluated under the peak discharge associated with the 25-year, 24-hour design storm event for the required head over the grate to pass the peak discharge rate.

A summary of the peak discharge (Q) and associated required maximum head over the grate (d) is summarized in Tables 8A and 8B below.

Perimeter of grating:

- Catch Basins – Grates are 2' x 2' with 12" effective area on each side of the grate

$$P = 12'' * 4 = 48'' \text{ or } 4'$$

- Raingarden – 12" and 18" diameter atrium grates

Weir coefficient: $C_w = 3.0$

Weir equation (solve for depth):

$$d = \left[\frac{Q}{C_w \cdot P} \right]^{2/3}$$

Table 8A. Catch Basin Grate Analysis

CB #	Grate Perimeter Dimensions (P,ft)	Weir Coefficient (C _w)	Q ₂₅ (cfs)	d (ft)	d (in)
CB1	4	3	1.6	0.26	3
CB2	4	3	0.4	0.10	1
CB3	4	3	0.2	0.07	1
CB4	4	3	0.7	0.15	2
CB5	4	3	1.0	0.19	2

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Table 8B. Raingarden Atrium Grate Analysis

Raingarden #	Atrium Drain Dia. (in)	Grate Perimeter (P, ft)	Weir Coefficient (C_w)	Q₂₅ (cfs)	d (ft)	d (in)
Bus Station	18	2.4	3	2.1	0.44	5
RG4	12	1.6	3	0	0.00	0
RG5	12	1.6	3	0.01	0.02	0
Cul-de-sac	12	1.6	3	0	0.00	0
RG10	12	1.6	3	0.02	0.03	0
RG11	12	1.6	3	0.1	0.08	1
RG12	12	1.6	3	0.6	0.25	3
RG13	12	1.6	3	0.1	0.08	1
RG14	12	1.6	3	0.2	0.12	1
RG15	18	2.4	3	2.5	0.49	6
RG20	18	2.4	3	0.03	0.03	0
RG21	12	1.6	3	0.9	0.33	4
RG22	12	1.6	3	0.2	0.12	1
RG23	12	1.6	3	0.07	0.06	1

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REFERENCES

Applied Microcomputer Systems, “*HydroCAD® Stormwater Modeling System*”, Version 6, Chocorua, New Hampshire 2002.

Northeast Regional Climate Center, “*Atlas of Precipitation Extremes for the Northeastern United States and Southeastern Canada*,” Cornell University, Ithaca, New York, 1993.

United States Department of Agriculture, Soil Conservation Service, “*Computer Program for Project Formulation Hydrology, Technical Release 20*,” Washington D.C., 1982.

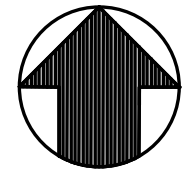
United States Department of Agriculture, Soil Conservation Service, “*National Engineering Handbook, Section 4 Hydrology (NEH-4)*,” National Technical Information Service, 1985.

United States Department of Agriculture, Soil Conservation Service, “*Urban Hydrology for Small Watersheds, Technical Release 55*,” 2nd ed., Washington, D.C., 1986.

Chow, V.T., *Open Channel-Hydraulics*. New York: McGraw-Hill, 1959.

The Urban Water Resources Research Council, *Manuals and Reports of Engineering Practice No. 77, Design and construction of Urban Stormwater Management Systems*, American Society of Civil Engineers, New York, New York, 1992.

FIGURES



50 25 0 50 100
SCALE IN FEET

N / F
ROBERT L. & BRIGETTE A.
VOELK

N / F
JUDITH A. & EDWARD C.
GUSTAFSON

N / F
LAPIERRE

EXISTING FILL
EASEMENT FOR THE
BENEFIT OF LOT 6

EXISTING DRIVEWAY

EXISTING DRY
HYDRANT
EXISTING FIRE POND
EL.=254±

STOW ROAD
(LEFT COUNTY LOT 60 WIDE)

LEGEND

- CONTOUR LINE
- STONE WALL
- EDGE OF WETLAND
- WETLAND
- EDGE OF PAVEMENT
- DRAIN LINE
- UTILITY POLE
- FLOOD HAZARD LINE
- FLOOD PLAIN LINE
- DRAINAGE BOUNDARY
- FLOW PATH
- DRAINAGE AREA ID
- COMPLIANCE POINT

NOTES:

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PINE HILL VILLAGE LLC
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TYNGSBORO, MA 01879

TITLE:

EXISTING CONDITIONS DRAINAGE MAP

PROJECT:

PINE HILL VILLAGE
HARVARD, MASSACHUSETTS

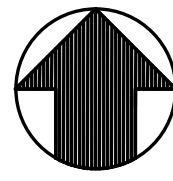
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REVIEWED BY: RLF
APPROVED BY: DHB

DATE: FEBRUARY 22, 2011
PROJECT NO.: BW0118C
FILE:
SHEET NO.: 11

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AT FULL SCALE PLOT



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SCALE IN FEET

LEGEND

- CONTOUR LINE — 300 —
STONE WALL —————
EDGE OF WETLAND - - - - -
WETLAND ————
EDGE OF PAVEMENT ————
DRAIN LINE ————
UTILITY POLE ————
FLOOD HAZARD LINE —WFH—
FLOOD PLAIN LINE —W—
DRAINAGE BOUNDARY ————
COMPLIANCE POINT —△1—

NOTES:

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D	3/16/11	REVISED PER NITSCH ENGINEERING COMMENTS 3/15/11	RLF	SR
C	3/9/11	REVISED PER NITSCH ENGINEERING COMMENTS 3/3/11	DHB	SR
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A	1/25/11	REVISED PER NITSCH ENGINEERING COMMENTS 1/17/11	DHB	SR
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TITLE: PROPOSED CONDITIONS DRAINAGE MAP

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HARVARD, MASSACHUSETTS

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SCALE IN FEET

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1 INCH
AT FULL SCALE PLOT

LEGEND

CONTOUR LINE ——— 300 ———

STONE WALL ————

EDGE OF WETLAND - - - - -

WETLAND

COMPLIANCE POINT

SOIL BOUNDARY ————

TEST PIT NUMBER

TP#1

6.5' BGS DEPTH TO GW

SILT LOAM SOIL CLASSIFICATION

HSG C HYDROLOGIC SOIL GROUP

SOIL CODE

102D HSG B HYDROLOGIC SOIL GROUP

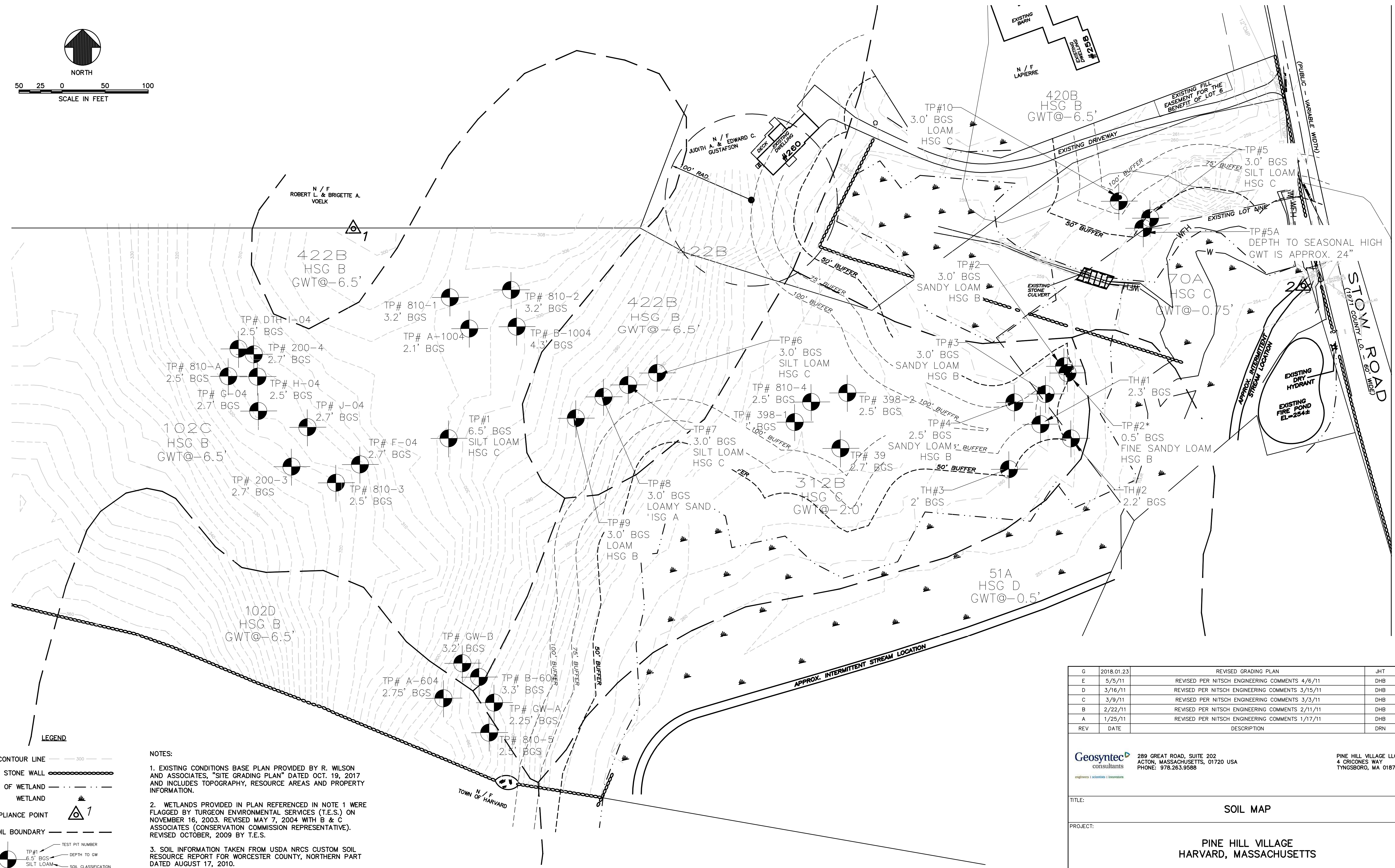
GWTO-6.5' DEPTH TO GROUNDWATER

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3. SOIL INFORMATION TAKEN FROM USDA NRCS CUSTOM SOIL RESOURCE REPORT FOR WORCESTER COUNTY, NORTHERN PART DATED AUGUST 17, 2010.



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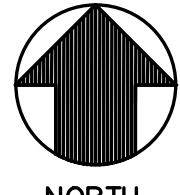
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HARVARD, MASSACHUSETTS

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RLF	BW0118C
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RLF	13
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DHB	



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SCALE IN FEET

LEGEND

CONTOUR LINE	---
STONE WALL	=====
EDGE OF WETLAND	- - - - -
WETLAND	
EDGE OF PAVEMENT	=====
DRAIN LINE	---
UTILITY POLE	○
FLOOD HAZARD LINE	W-FH
FLOOD PLAIN LINE	W
COMPLIANCE POINT	△ 1

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D	3/16/11	REVISED PER NITSCH ENGINEERING COMMENTS 3/15/11	DHB	SR
C	3/9/11	REVISED PER NITSCH ENGINEERING COMMENTS 3/3/11	DHB	SR
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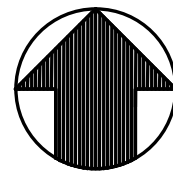
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TITLE:	PROPOSED CONDITIONS STORMWATER MANAGEMENT PLAN
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PINE HILL VILLAGE HARVARD, MASSACHUSETTS			
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		APPROVED BY: DHB	



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SCALE IN FEET

LEGEND

- CONTOUR LINE — 300 —
STONE WALL —————
EDGE OF WETLAND - - - - -
WETLAND ————
EDGE OF PAVEMENT ————
DRAIN LINE ————
UTILITY POLE ————
FLOOD HAZARD LINE —WFH—
FLOOD PLAIN LINE —W—
COMPLIANCE POINT —○—

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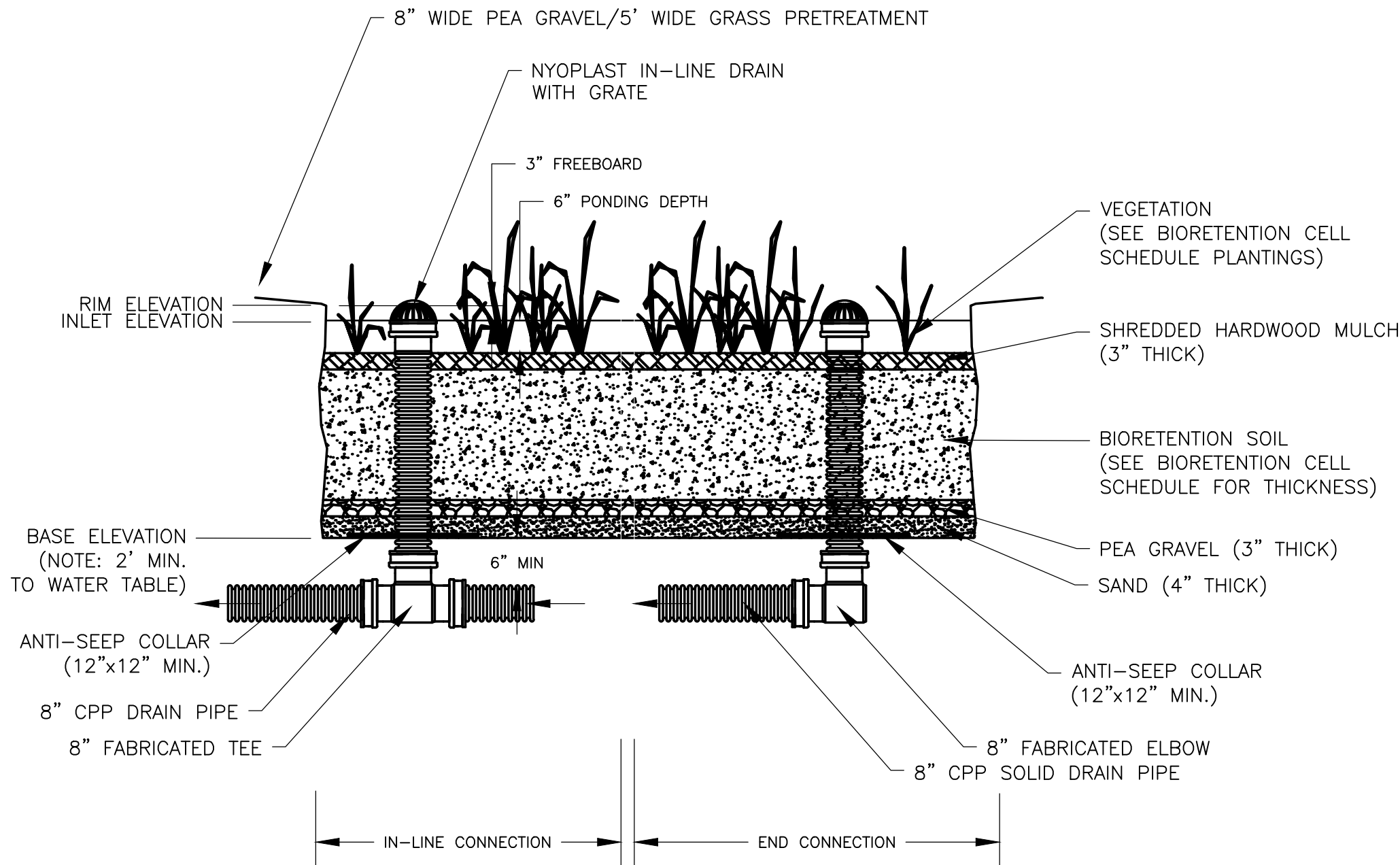
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A	1/25/11	REVISED PER NITSCH ENGINEERING COMMENTS 1/17/11	DHB	SR
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TITLE: INTERIM WELLHEAD PROTECTION AREA MAP				
PROJECT: PINE HILL VILLAGE HARVARD, MASSACHUSETTS				
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		APPROVED BY: DHB		

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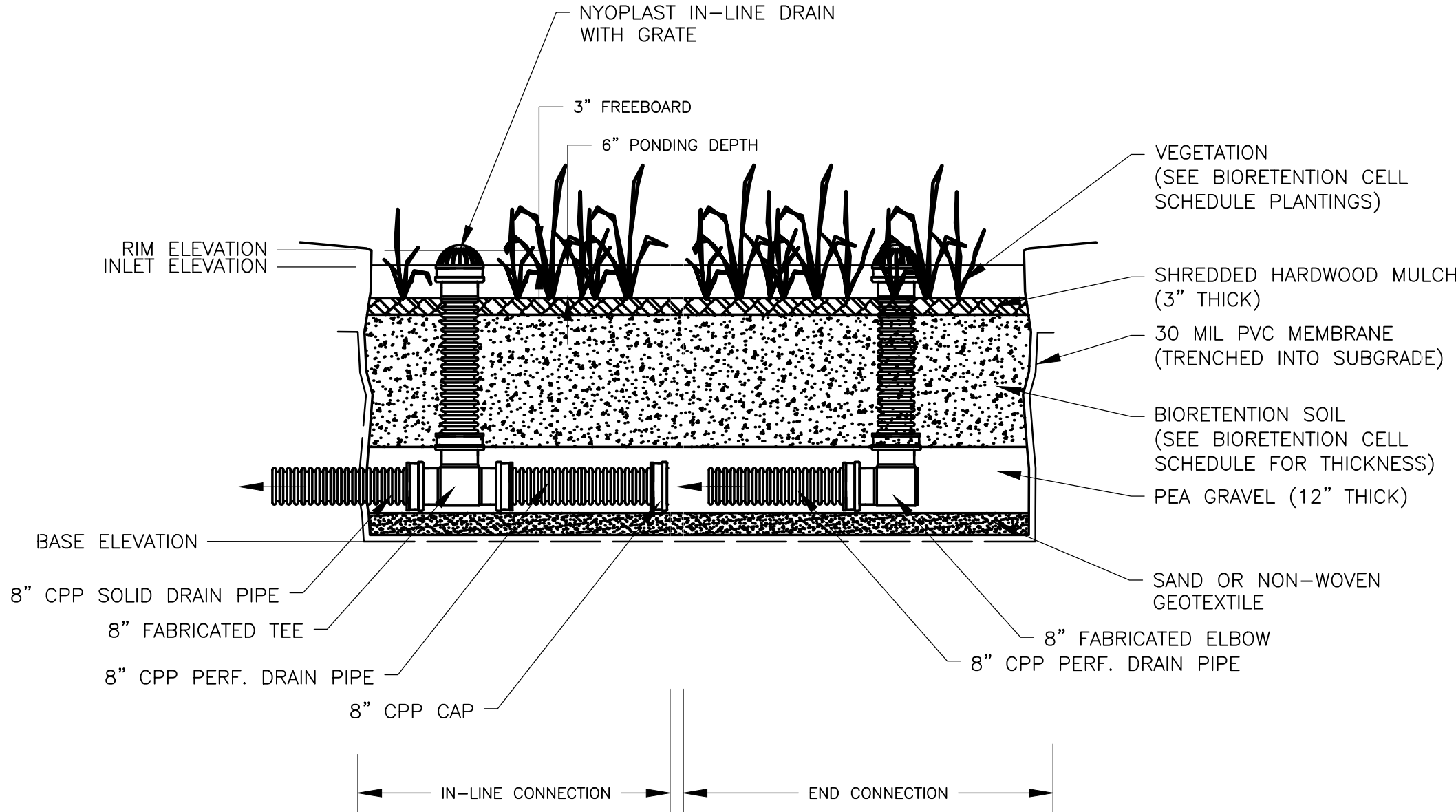
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T:\Projects\CADD\PAINE HILL\BW0118C\DRAWINGS\BW0118C-1002 (Details Figure)_REV.dwg

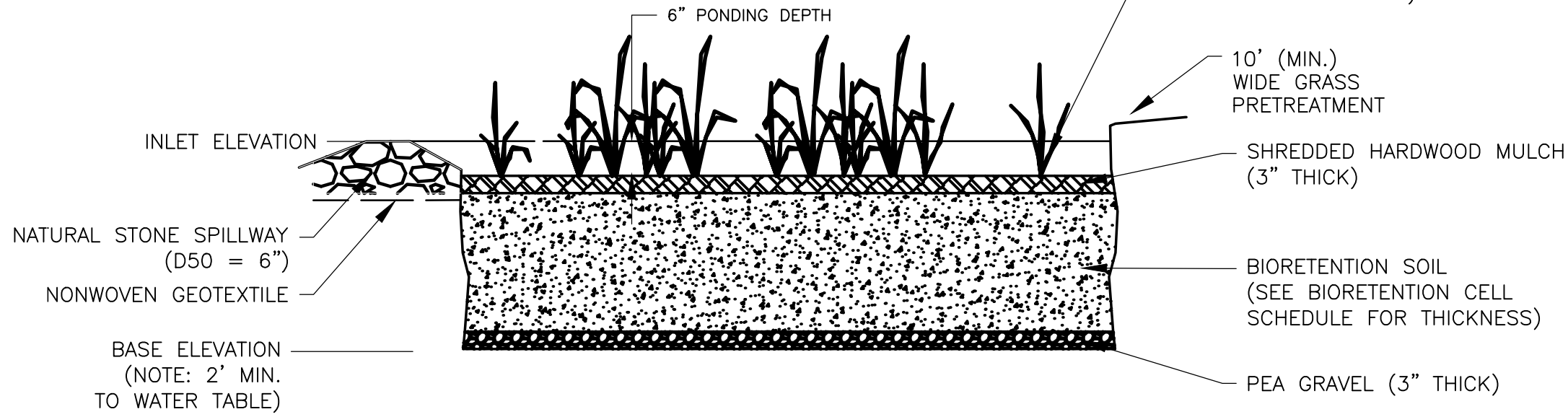
1 INCH
AT FULL SCALE PLOT



1
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DETAIL
RAINGARDEN TYPE A (WITH OVERFLOW)
SCALE: NTS



2
—
DETAIL
RAINGARDEN TYPE B (LINED)
SCALE: NTS



3
—
DETAIL
RAINGARDEN TYPE C (WITH SPILLWAY)
SCALE: NTS

RAINGARDEN SCHEDULE

Raingarden ID*	Designed to Exfiltrate (No = Lined) ¹	Standard Detail No. (Figure 5)	Drainage Area (Ft^2)	Drainage Area (ac)	Impervious Area (ac)	BMP Water Quality Volume (cf) ²	Storage Volume (cf) ³	Surface Area (sf)	Depth of Bioretention Soil (ft)	Pre-treatment Device ⁴	Rim Elev. (ft)	Base Elev. (ft)	High Groundwater Elevation (ft)	Existing Ground Surface Elevation (ft)
RG #3	YES	C	6534	0.150	0.070	254	635	423	0.50	V	311.0	309.5	301.5	304.0
RG #4	YES	A	1568	0.036	0.012	44	792	391	3.00	GV	307.0	302.4	299.5	302.0
RG #5	YES	A	2265	0.052	0.021	76	485	266	3.00	GV	307.0	302.4	298.5	301.0
RG #10	NO	B	2091	0.048	0.015	54	509	334	2.00	GV	306.0	301.7	301.5	304.0
RG #11	YES	A	1873	0.043	0.027	98	281	184	2.00	GV	307.1	303.5	301.5	304.0
RG #12	NO	B	9278	0.213	0.050	182	567	585	1.25	VS and GV	310.0	306.4	309.5	312.0
RG #13	NO	B	4312	0.099	0.053	192	527	415	2.33	VS and GV	307.0	302.3	303.5	306.0
RG #14	NO	B	2352	0.054	0.035	127	315	207	1.33	GV	305.0	301.3	301.5	304.0
RG #15	NO	B	44213	1.015	0.199	722	772	542	1.00	GV	301.0	297.7	301.5	304.0
RG #16	NO	B	10716	0.246	0.000	0	541	523	1.00	VS and GV	301.0	297.7	302.5	305.0
RG #19	YES	A	31233	0.717	0.168	305	1484	973	1.25	VS and V	294.0	290.0	287.5	290.0
RG #20	NO	B	11543	0.265	0.000	0	1226	672	1.50	-	292.0	288.2	291.5	294.0
RG #21	NO	B	9932	0.228	0.155	281	485	529	1.00	GV	290.0	286.7	288.5	291.0
RG #22	NO	B	6665	0.153	0.023	42	935	656	1.00	GV	257.0	253.7	255.5	258.0
RG #23	NO	B	1307	0.030	0.007	13	589	413	1.25	GV	257.0	253.4	254.5	257.0
Bus Station	NO	B	6882	0.158	0.024	44	1026	943	1.00	VS	257.0	253.7	254.5	257.0
Cul-de-sac	NO	B	10585	0.243	0.072	131	2754	2834	1.00	GV	300.0	297.0	297.5	300.0

Notes

- *Bold and Italics Raingarden ID, indicates raingarden located in IWPA (required water quality volume = 1.0 inch).
- Raingardens not designed to exfiltrate will be lined ensuring no infiltration
 - All BMPs are designed to provide storage for the Water Quality Volume, which is greater than the Recharge Volume for the Site
 - Storage Volume is calculated assuming 30% void space in mulch, bioretention soil, pea gravel and sand layers.
 - GV = 8-inches of pea gavel and 3 to 5-foot vegetated filter strip; V = 10' vegetated filter strip; VS = vegetated swale

4
—
DETAIL
RAINGARDEN SCHEDULE
SCALE: NTS

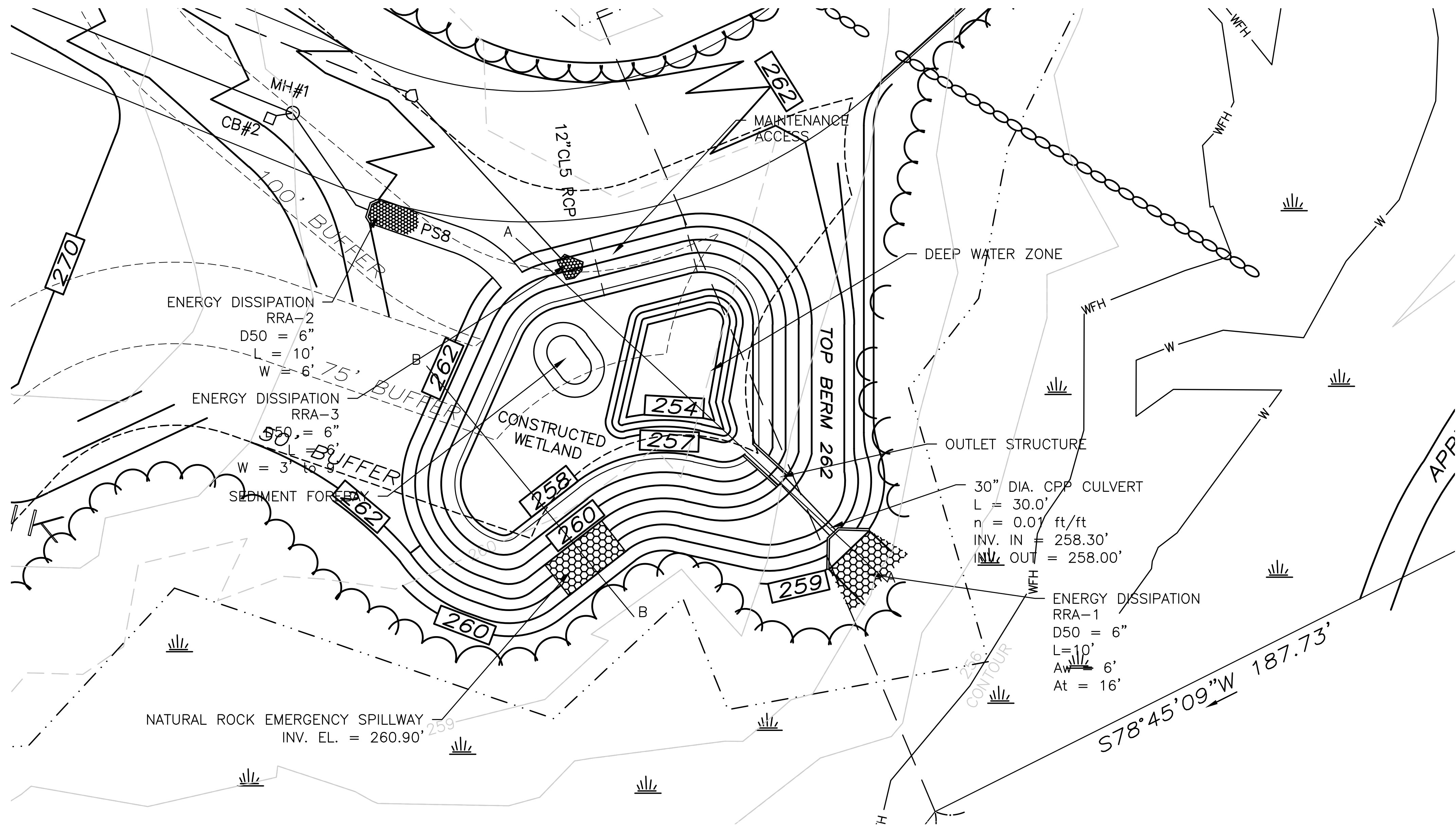
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A	1/25/11	REVISED PER NITSCH ENGINEERING COMMENTS 1/17/11	DHB	SR
REV	DATE	DESCRIPTION	DRN	APP

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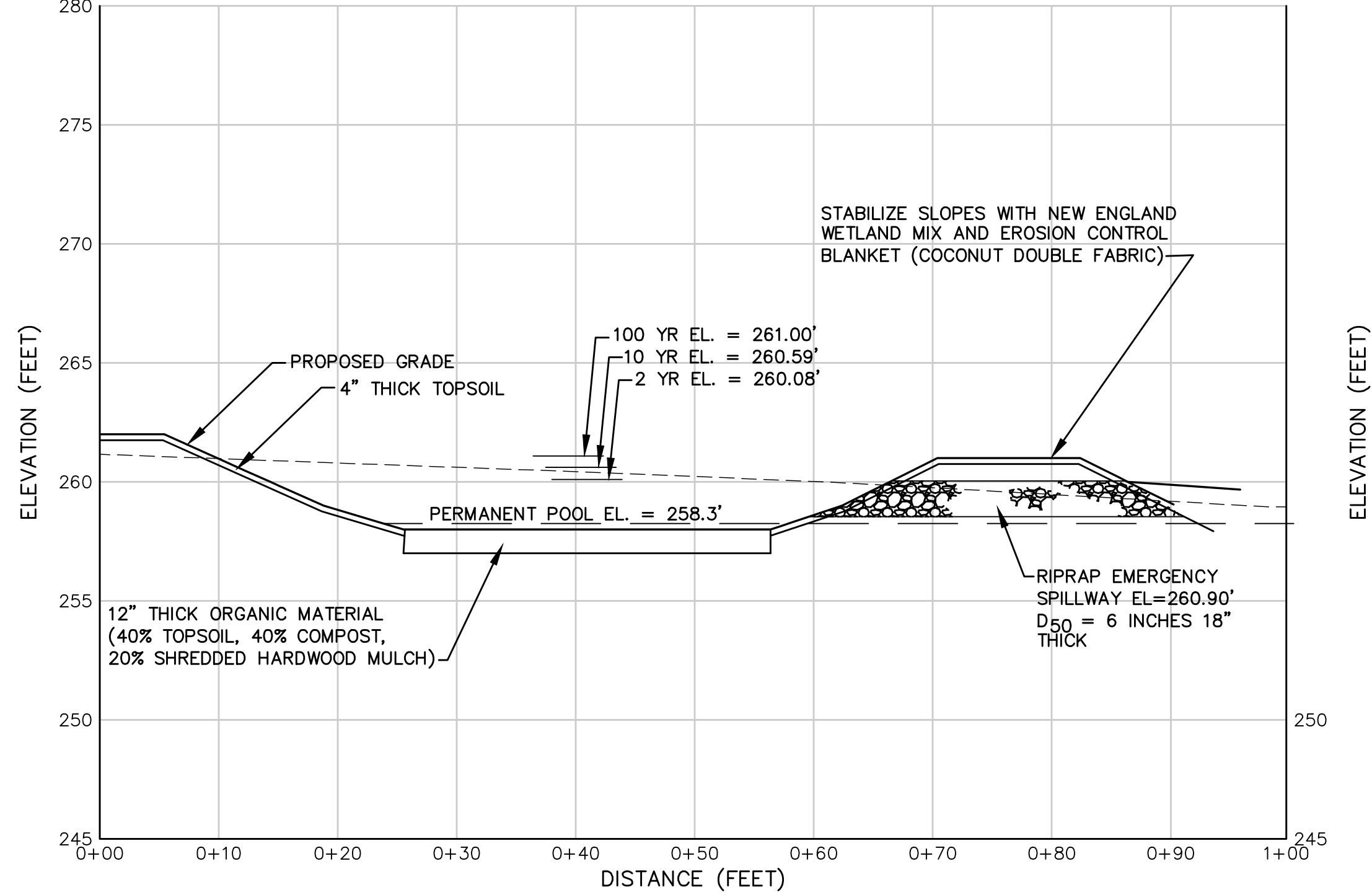
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PHONE: 978.263.9588

PINE HILL VILLAGE LLC
4 CRICONES WAY
TYNGSBORO, MA 01879

TITLE: STORMWATER MANAGEMENT PLAN DETAILS			
PROJECT: PINE HILL VILLAGE HARVARD, MASSACHUSETTS			
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1 PLAN VIEW
CONSTRUCTED WETLAND
SCALE: NTS



2 SECTION B-B'
CONSTRUCTED WETLAND
SCALE: NTS

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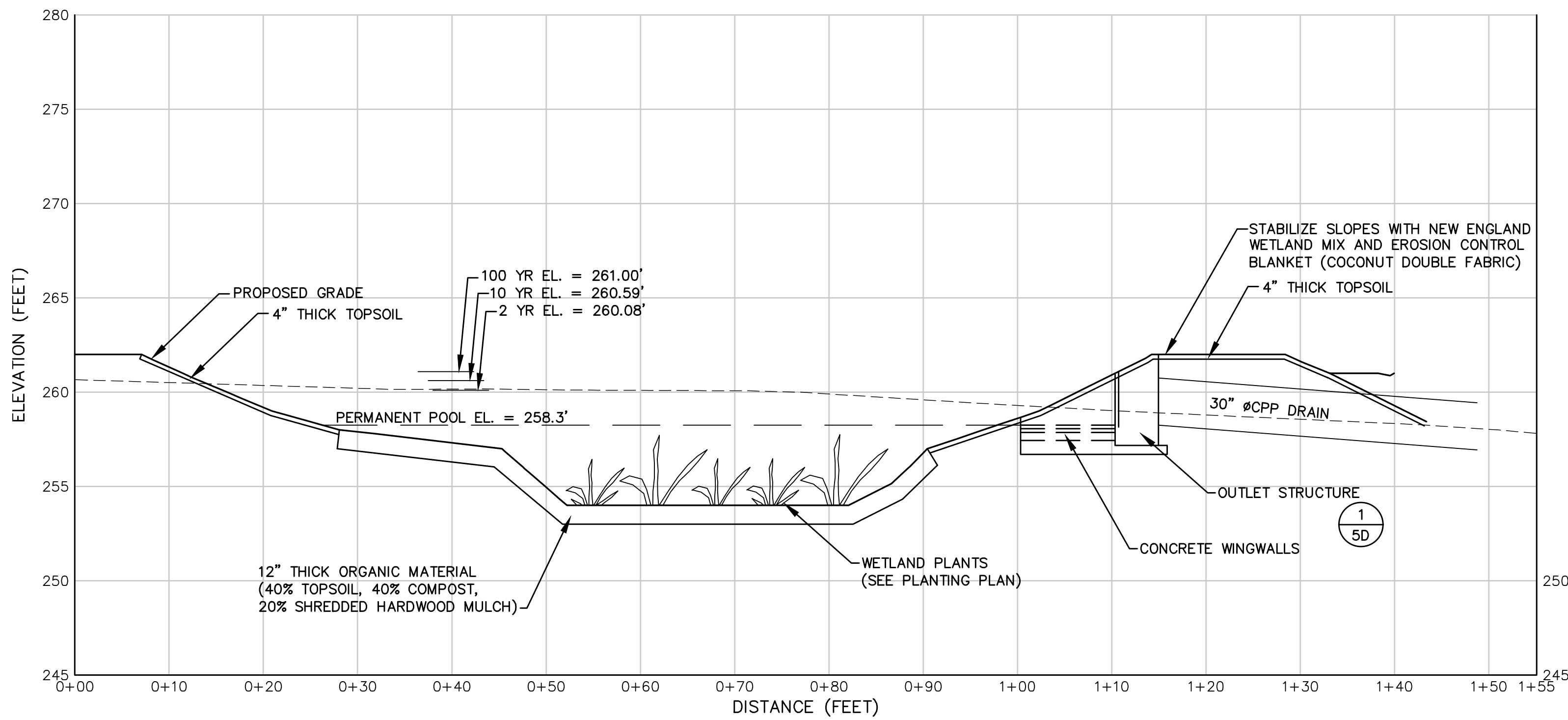
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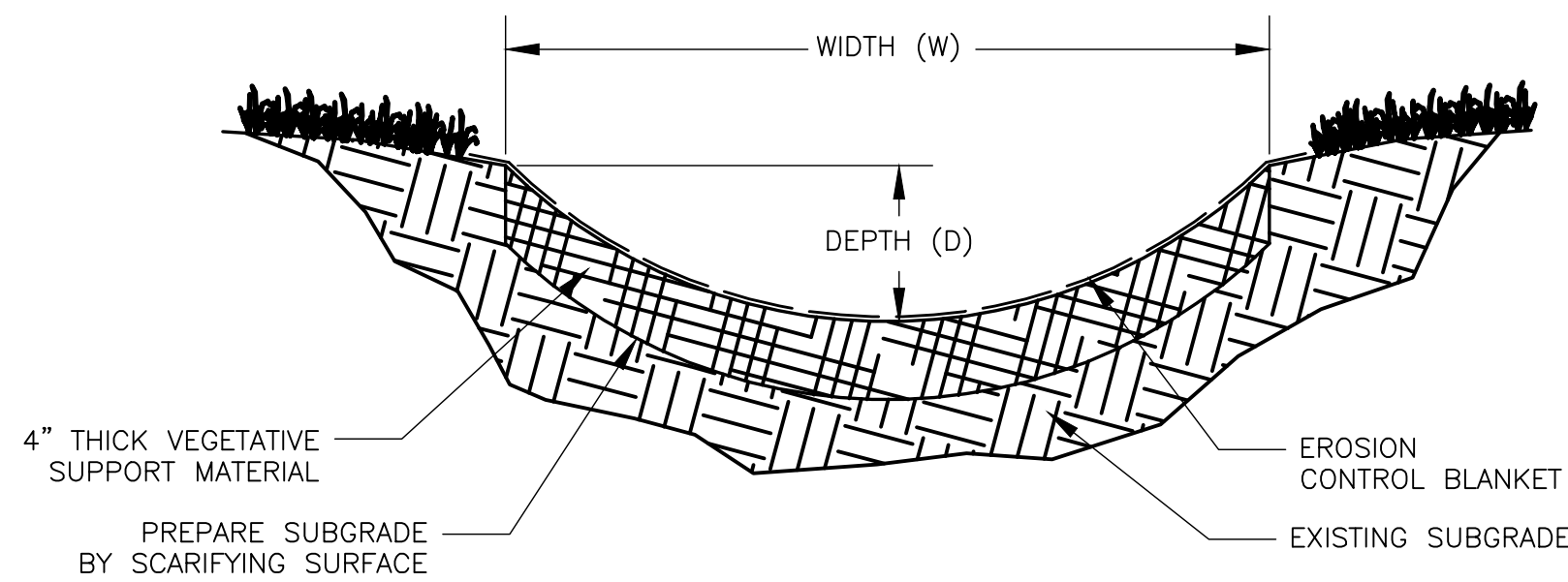
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PROJECT: PINE HILL VILLAGE
HARVARD, MASSACHUSETTS

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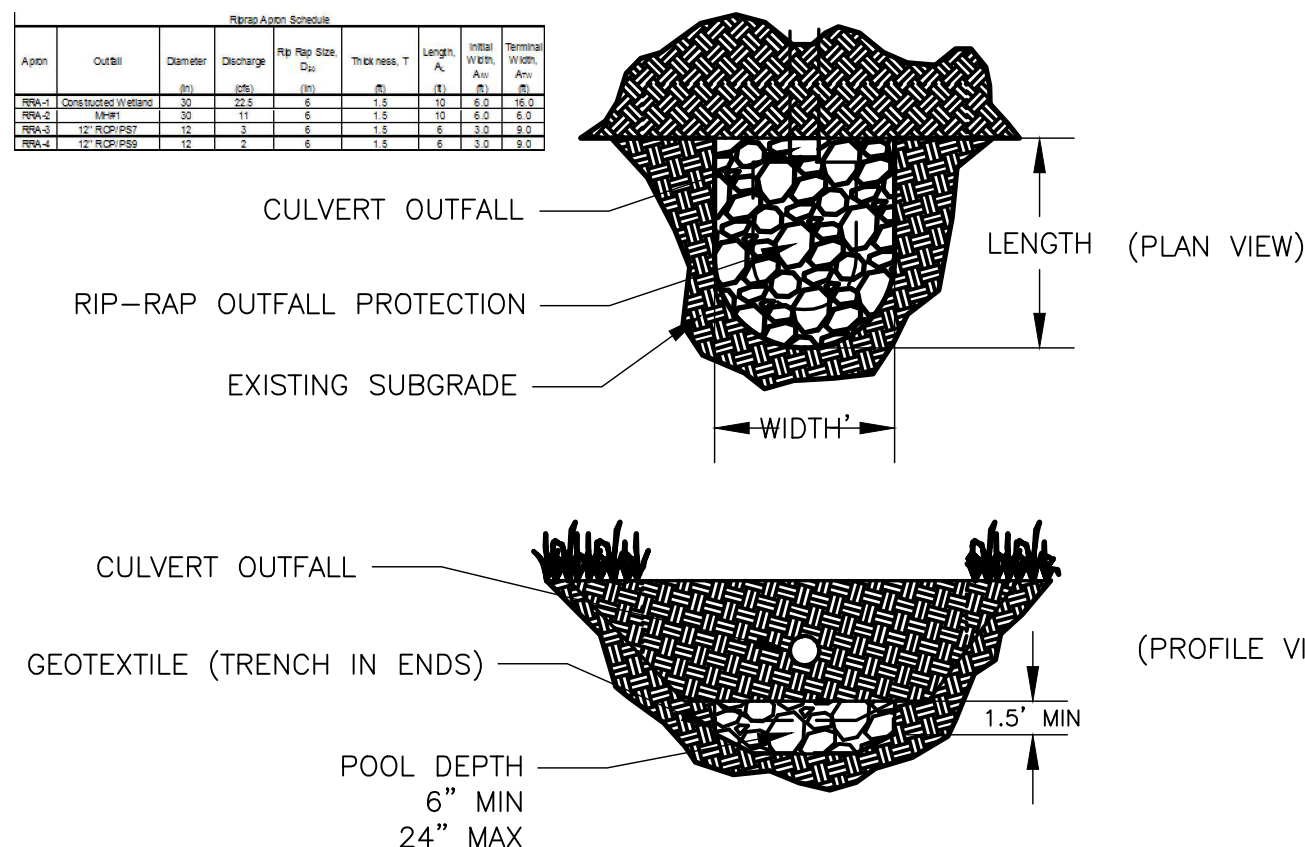


1 SECTION A-A'
CONSTRUCTED WETLAND
SCALE: NTS

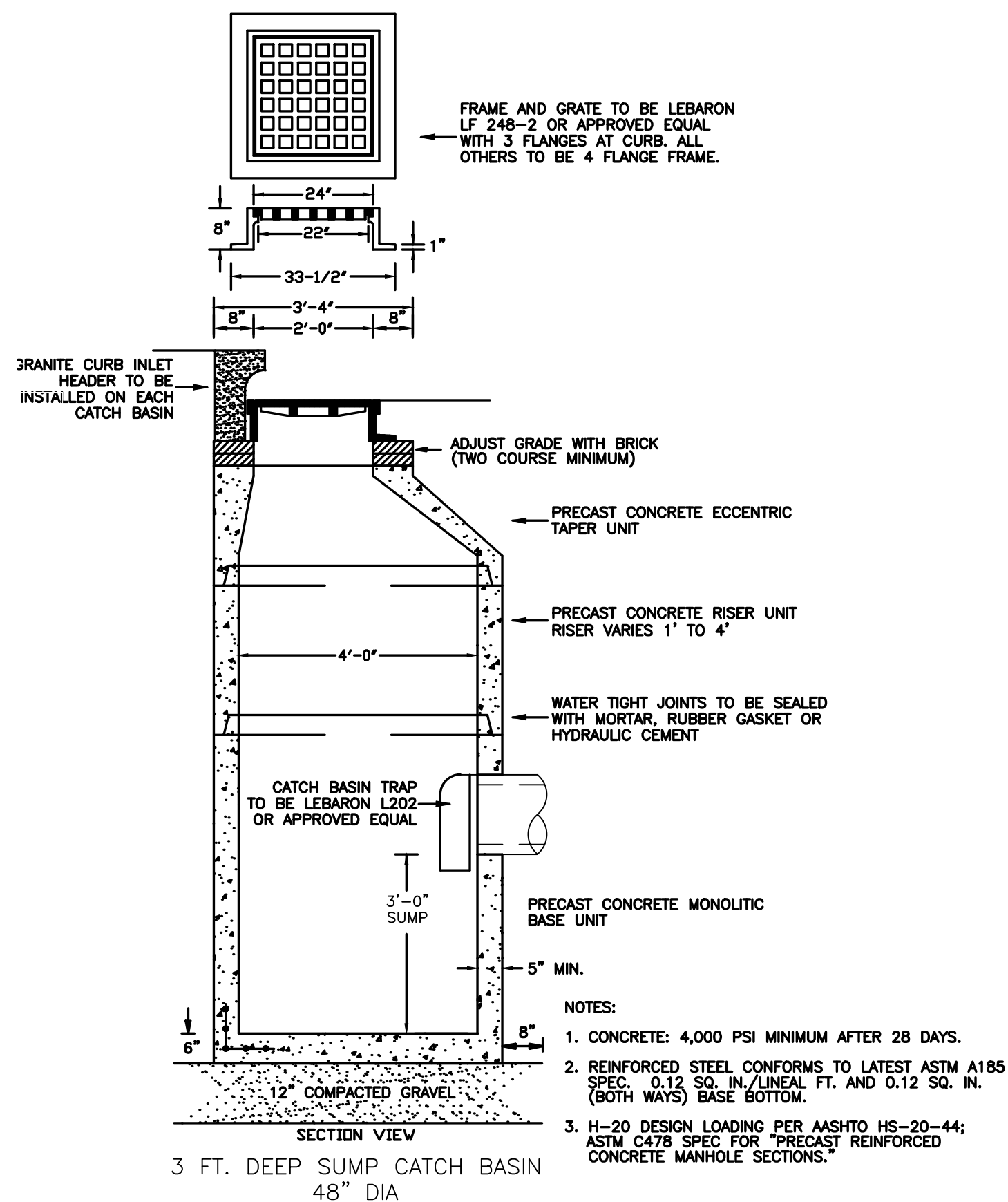


2 DETAIL
PARABOLIC CHANNEL
SCALE: NTS

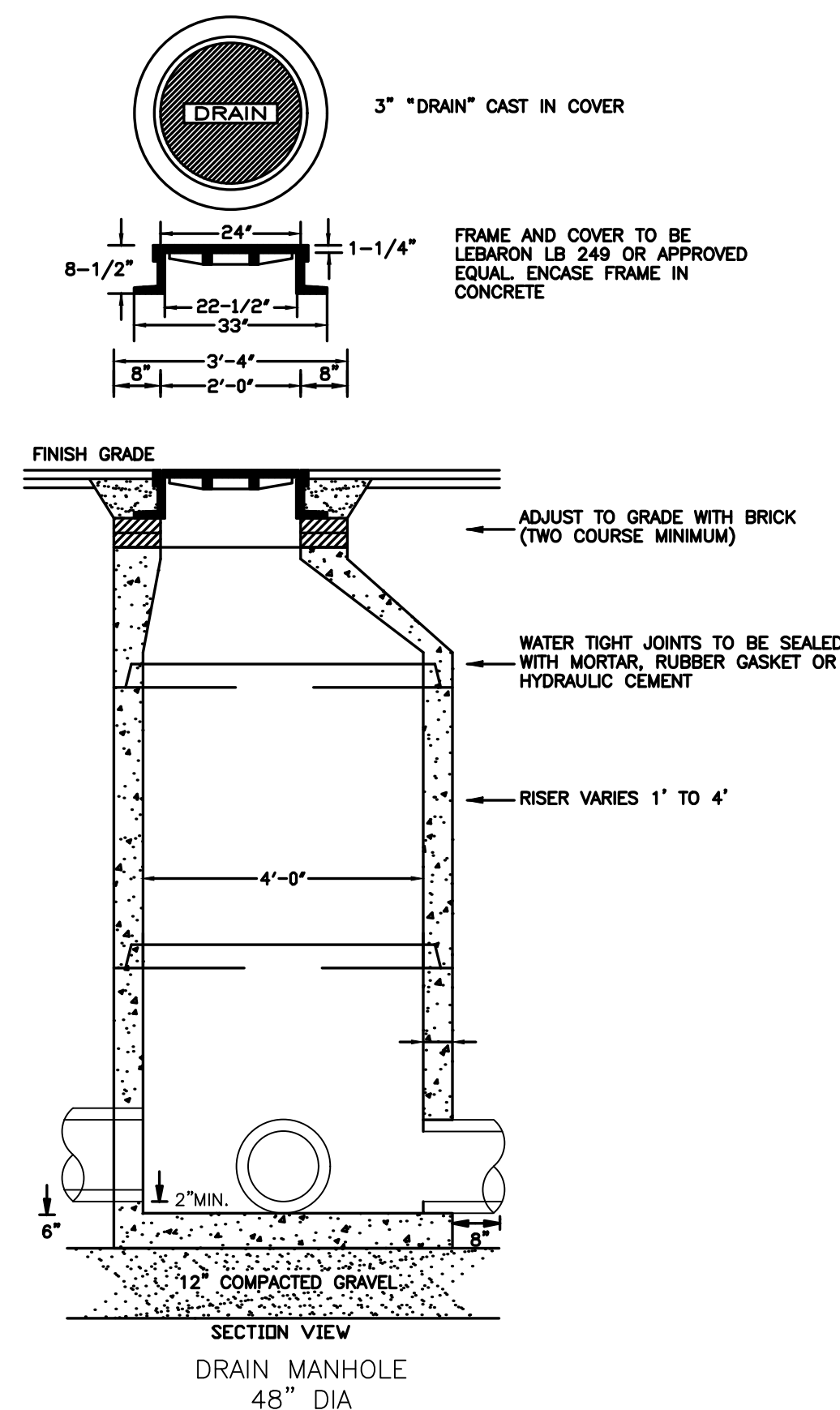
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NO.	QTY	DATE	DESCRIPTION	PERIOD	PERIOD	PERIOD	PERIOD	PERIOD	PERIOD
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2	1	1/15/11	1.000	1.000	1.000	1.000	1.000	1.000	1.000
3	1	1/15/11	1.000	1.000	1.000	1.000	1.000	1.000	1.000
4	1	1/15/11	1.000	1.000	1.000	1.000	1.000	1.000	1.000
5	1	1/15/11	1.000	1.000	1.000	1.000	1.000	1.000	1.000
6	1	1/15/11	1.000	1.000	1.000	1.000	1.000	1.000	1.000
7	1	1/15/11	1.000	1.000	1.000	1.000	1.000	1.000	1.000
8	1	1/15/11	1.000	1.000	1.000	1.000	1.000	1.000	1.000
9	1	1/15/11	1.000	1.000	1.000	1.000	1.000	1.000	1.000



3 DETAIL
CULVERT OUTFALL PROTECTION
SCALE: NTS



4 DETAIL
CATCH BASIN STRUCTURE
SCALE: NTS



5 DETAIL
MANHOLE STRUCTURE
SCALE: NTS

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A	1/25/11	REVISED PER NITSCH ENGINEERING COMMENTS 1/17/11	DHB	SR

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TITLE: STORMWATER MANAGEMENT PLAN DETAILS
PROJECT: PINE HILL VILLAGE
HARVARD, MASSACHUSETTS

PROJECT:

PINE HILL VILLAGE
HARVARD, MASSACHUSETTS

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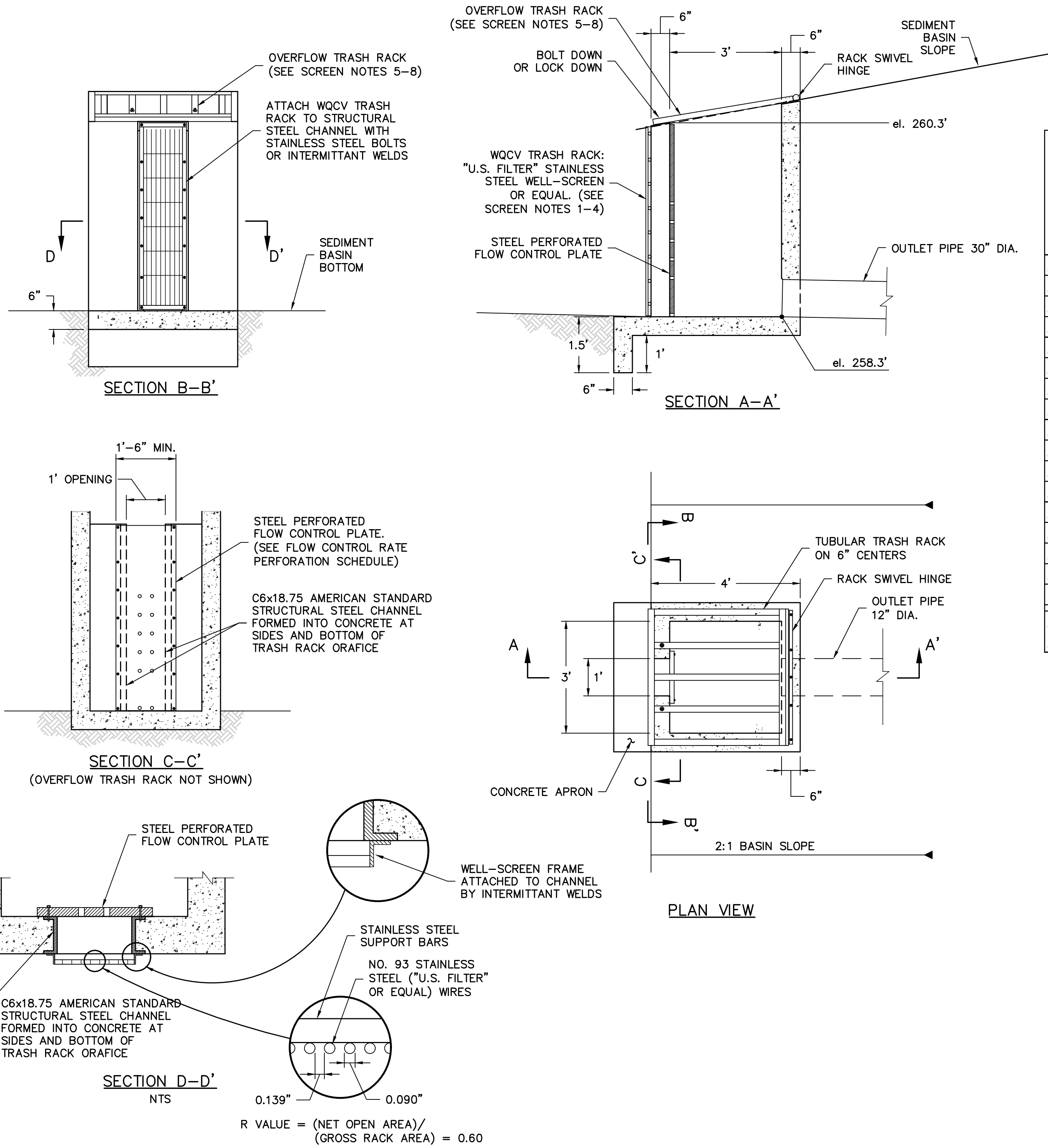
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SHEET NO.: 15C



SCREEN NOTES:

- WQCV TRASH RACK
- WELL-SCREEN TRASH RACK SHALL BE STAINLESS STEEL AND SHALL BE ATTACHED BY INTERMITTENT WELDS ALONG THE EDGE OF THE MOUNTING FRAME.
 - BAR GRATE TRASH RACK SHALL BE STAINLESS STEEL AND SHALL BE BOLTED USING STAINLESS STEEL HARDWARE.
 - TRASH RACK WIDTH IS FOR SPECIFIED TRASH RACK MATERIAL. FINER WELL-SCREEN OR MESH SIZE THAN SPECIFIED IS ACCEPTABLE, HOWEVER, TRASH RACK DIMENSIONS NEED TO BE ADJUSTED FOR MATERIALS HAVING A DIFFERENT OPEN AREA/GROSS AREA RATIO (R VALUE).
 - STRUCTURAL DESIGN OF TRASH RACK SHALL BE BASED ON FULL HYDROSTATIC HEAD WITH ZERO HEAD DOWNSTREAM OF THE RACK.
- OVERFLOW TRASH RACKS
- TRASH RACK SHALL BE MOUNTED USING STAINLESS STEEL HARDWARE AND PROVIDED WITH HINGED AND LOCKABLE OR BOLTABLE ACCESS PANELS.
 - TRASH RACK SHALL BE STAINLESS STEEL OR ALUMINUM.
 - TRASH RACK SHALL BE DESIGNED SUCH THAT THE DIAGONAL DIMENSION OF EACH OPENING IS SMALLER THAN THE DIAMETER OF THE OUTLET PIPE.
 - STRUCTURAL DESIGN OF TRASH RACK SHALL BE BASED ON FULL HYDROSTATIC HEAD WITH ZERO HEAD DOWNSTREAM OF THE RACK.

1
—
DETAIL
OUTLET STRUCTURE
SCALE: NTS

RAINGARDEN PLANTING SCHEDULE												
Raingarden ID	COMMON AND SCIENTIFIC NAME FOR PLANTS AND SHRUBS											Total Plants per Raingarden¹
	Bayberry	Red Osier Dogwood	Sweet Pepperbrush	Highbush Blueberry	Gray Dogwood	Serviceberry	Nannyberry	Inkberry	Meadowsweet	Common Juniper	Black Chokeberry	
	Myrica	Cornus Sericea	Clethra Alnifolia	Vaccinium corymbosum	Cornus racemosa	Amelanchier	Viburnum lentago	Ilex glabra	Filipendula ulmaria	Juniperus communis	Aronia melanocarpa	
	NUMBER OF PLANTS PER RAINGARDEN											
RG #3	2	3	-	1	-	2	1	-	2	1	2	14
RG #4	2	2	2	-	1	-	-	2	-	2	2	13
RG #5	2	-	-	-	-	-	2	-	2	-	2	8
RG #10	-	-	2	-	2	1	-	3	-	2	-	10
RG #11	2	-	1	-	-	-	-	-	1	-	2	6
RG #12	2	2	-	1	2	1	3	2	3	2	1	19
RG #13	2	1	3	-	2	-	1	-	2	1	2	14
RG #14	-	2	-	-	-	3	-	1	-	-	-	6
RG #15	3	-	2	3	-	1	-	2	2	1	3	17
RG #16	1	-	2	-	2	1	1	3	-	2	4	16
RG #19	3	3	2	4	2	3	2	4	2	3	2	30
RG #20	1	2	3	-	1	2	4	-	3	1	3	20
RG #21	2	-	3	3	1	1	1	3	1	2	1	18
RG #22	2	3	5	-	3	2	1	-	2	-	1	19
RG #23	-	-	-	1	5	-	1	3	1	2	-	13
Bus Station	2	4	1	5	-	1	6	2	6	-	3	30
Cul-de-sac	8	10	6	8	10	8	8	6	10	5	10	89
Individual Plant Count	34	32	32	26	31	26	31	31	37	24	38	342

1. Recommended number of plantings is based on 1 plant per 30 square feet of raingarden surface area.

CONSTRUCTED TREATMENT WETLAND PLANTING SCHEDULE									
COMMON AND SCIENTIFIC NAME FOR WETLAND PLUGS									
Constructed Treatment Wetland	Fox Sedge	Wooldgrass	Bluestem	Highbush Blueberry	Bulrush 1	Bulrush 2	Arrowhead	Threesquare	Total Plants per Marsh Area ¹
	<i>Carex vulpinoide</i>	<i>Scirpus cyperinus</i>	<i>Clethra Alnifolia</i>	<i>Andorpogon glomeratus</i>	<i>Scirpus validus</i>	<i>Scirpus fluviatilis</i>	<i>Sagittaria latifolia</i>	<i>Scirpus americanus</i>	
Wetland Marsh Depth	WETLAND PLANTS SHALL BE INSTALLED 3 FT ON CENTER								
High Marsh (0 to 0.5 FT)	75	75	75	75	-	-	-	-	300
Low Marsh (0 to 1.5 FT)	-	-	-	-	30	30	30	30	120
Individual Plant Count	75	75	75	75	30	30	30	30	420

1. Recommended number of plantings is based on 1 plant per 30 square feet of wetland surface area.

G.1	2018.06.19	PLANTING SCHEDULES	JHT	?
G	2018.01.23	REVISED GRADING PLAN	JHT	DB
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ATTACHMENT A

NRCS Soils Information and Infiltration



United States
Department of
Agriculture



NRCS

Natural
Resources
Conservation
Service

A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for Worcester County, Massachusetts, Northeastern Part



Preface

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

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

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

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

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

Information about soils is updated periodically. Updated information is available through the NRCS Soil Data Mart Web site or the NRCS Web Soil Survey. The Soil Data Mart is the data storage site for the official soil survey information.

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Contents

Preface	2
How Soil Surveys Are Made	5
Soil Map	7
Soil Map.....	8
Legend.....	9
Map Unit Legend.....	10
Map Unit Descriptions.....	10
Worcester County, Massachusetts, Northeastern Part.....	12
51A—Swansea muck, 0 to 1 percent slopes.....	12
70A—Ridgebury fine sandy loam, 0 to 3 percent slopes.....	13
102C—Chatfield-Hollis-Rock outcrop complex, 3 to 15 percent slopes.....	14
102D—Chatfield-Hollis-Rock outcrop complex, 15 to 25 percent slopes....	16
312B—Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony.....	18
420B—Canton fine sandy loam, 3 to 8 percent slopes.....	19
422B—Canton fine sandy loam, 3 to 8 percent slopes, extremely stony...	20
Soil Information for All Uses	22
Soil Properties and Qualities.....	22
Soil Qualities and Features.....	22
Drainage Class.....	22
Hydrologic Soil Group.....	25
Water Features.....	29
Depth to Water Table.....	29
Soil Reports	34
Soil Physical Properties.....	34
Engineering Properties.....	34
Particle Size and Coarse Fragments.....	41
Physical Soil Properties.....	45
Soil Qualities and Features.....	52
Soil Features.....	52
Water Features.....	56
Water Features.....	56
References	61

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the

individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

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


Custom Soil Resource Report Soil Map



Custom Soil Resource Report

MAP LEGEND






















Area of Interest (AOI)




 Area of Interest (AOI)

Soils




 Soil Map Units

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

-  Gully
-  Short Steep Slope
-  Other






Political Features

-  Cities

Water Features

-  Oceans
-  Streams and Canals

Transportation

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

MAP INFORMATION

Map Scale: 1:3,670 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
Coordinate System: UTM Zone 19N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Worcester County, Massachusetts,
Northeastern Part
Survey Area Data: Version 7, May 5, 2008

Date(s) aerial images were photographed: 8/15/2003; 7/15/2003

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

Worcester County, Massachusetts, Northeastern Part (MA613)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
51A	Swansea muck, 0 to 1 percent slopes	2.3	6.7%
70A	Ridgebury fine sandy loam, 0 to 3 percent slopes	3.1	9.1%
102C	Chatfield-Hollis-Rock outcrop complex, 3 to 15 percent slopes	14.3	42.6%
102D	Chatfield-Hollis-Rock outcrop complex, 15 to 25 percent slopes	6.4	19.0%
312B	Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony	4.1	12.0%
420B	Canton fine sandy loam, 3 to 8 percent slopes	0.7	2.0%
422B	Canton fine sandy loam, 3 to 8 percent slopes, extremely stony	2.9	8.6%
Totals for Area of Interest		33.7	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially

where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Worcester County, Massachusetts, Northeastern Part

51A—Swansea muck, 0 to 1 percent slopes

Map Unit Setting

Mean annual precipitation: 32 to 50 inches

Mean annual air temperature: 45 to 50 degrees F

Frost-free period: 145 to 240 days

Map Unit Composition

Swansea and similar soils: 80 percent

Minor components: 20 percent

Description of Swansea

Setting

Landform: Bogs, depressions

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Dip

Down-slope shape: Concave

Across-slope shape: Concave

Parent material: Highly-decomposed herbaceous organic material over loose sandy glaciofluvial deposits

Properties and qualities

Slope: 0 to 1 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Very poorly drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)

Depth to water table: About 0 to 12 inches

Frequency of flooding: None

Frequency of ponding: None

Available water capacity: High (about 9.9 inches)

Interpretive groups

Land capability (nonirrigated): 5w

Typical profile

0 to 13 inches: Muck

13 to 36 inches: Muck

36 to 60 inches: Sand

Minor Components

Freetown

Percent of map unit: 5 percent

Landform: Bogs

Saco

Percent of map unit: 5 percent

Landform: Alluvial flats

Scarboro

Percent of map unit: 5 percent

Landform: Terraces

Whitman

Percent of map unit: 5 percent

Landform: Depressions

70A—Ridgebury fine sandy loam, 0 to 3 percent slopes

Map Unit Setting

Elevation: 50 to 1,000 feet

Mean annual precipitation: 32 to 50 inches

Mean annual air temperature: 45 to 50 degrees F

Frost-free period: 145 to 240 days

Map Unit Composition

Ridgebury and similar soils: 85 percent

Minor components: 15 percent

Description of Ridgebury

Setting

Landform: Depressions

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Dip

Down-slope shape: Concave

Across-slope shape: Concave

Parent material: Friable coarse-loamy eolian deposits over dense coarse-loamy lodgment till

Properties and qualities

Slope: 0 to 3 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Poorly drained

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)

Depth to water table: About 0 to 18 inches

Frequency of flooding: None

Frequency of ponding: None

Available water capacity: Low (about 4.1 inches)

Typical profile

0 to 9 inches: Fine sandy loam

9 to 23 inches: Gravelly fine sandy loam

23 to 60 inches: Fine sandy loam

Minor Components

Whitman

Percent of map unit: 10 percent

Landform: Depressions

Woodbridge

Percent of map unit: 5 percent

102C—Chatfield-Hollis-Rock outcrop complex, 3 to 15 percent slopes

Map Unit Setting

Elevation: 100 to 1,000 feet

Mean annual precipitation: 32 to 50 inches

Mean annual air temperature: 45 to 50 degrees F

Frost-free period: 145 to 240 days

Map Unit Composition

Chatfield and similar soils: 45 percent

Hollis and similar soils: 25 percent

Rock outcrop: 15 percent

Minor components: 15 percent

Description of Chatfield

Setting

Landform: Hills

Landform position (two-dimensional): Shoulder, summit

Landform position (three-dimensional): Side slope, crest

Down-slope shape: Linear

Across-slope shape: Convex

Parent material: Friable, moderately-deep coarse-loamy basal till derived from granite and gneiss over granite and gneiss

Properties and qualities

Slope: 8 to 15 percent

Surface area covered with cobbles, stones or boulders: 9.0 percent

Depth to restrictive feature: 20 to 40 inches to lithic bedrock

Drainage class: Well drained

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water capacity: Low (about 3.7 inches)

Interpretive groups

Land capability (nonirrigated): 7s

Typical profile

0 to 2 inches: Muck

2 to 5 inches: Fine sandy loam

5 to 32 inches: Fine sandy loam

32 to 34 inches: Unweathered bedrock

Description of Hollis

Setting

Landform: Hills

Custom Soil Resource Report

Landform position (two-dimensional): Shoulder, summit

Down-slope shape: Linear

Across-slope shape: Convex

Parent material: Friable, shallow loamy basal till derived from metamorphic rock over metamorphic rock

Properties and qualities

Slope: 8 to 15 percent

Surface area covered with cobbles, stones or boulders: 9.0 percent

Depth to restrictive feature: 10 to 20 inches to lithic bedrock

Drainage class: Well drained

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water capacity: Very low (about 1.7 inches)

Interpretive groups

Land capability (nonirrigated): 7s

Typical profile

0 to 2 inches: Muck

2 to 6 inches: Fine sandy loam

6 to 14 inches: Fine sandy loam

14 to 19 inches: Gravelly fine sandy loam

19 to 21 inches: Unweathered bedrock

Description of Rock Outcrop

Setting

Parent material: Metamorphic rock

Properties and qualities

Slope: 8 to 15 percent

Depth to restrictive feature: 0 inches to lithic bedrock

Interpretive groups

Land capability (nonirrigated): 8s

Minor Components

Canton

Percent of map unit: 5 percent

Paxton

Percent of map unit: 5 percent

Woodbridge

Percent of map unit: 5 percent

102D—Chatfield-Hollis-Rock outcrop complex, 15 to 25 percent slopes

Map Unit Setting

Elevation: 100 to 1,000 feet

Mean annual precipitation: 32 to 50 inches

Mean annual air temperature: 45 to 50 degrees F

Frost-free period: 145 to 240 days

Map Unit Composition

Chatfield and similar soils: 40 percent

Hollis and similar soils: 25 percent

Rock outcrop: 20 percent

Minor components: 15 percent

Description of Chatfield

Setting

Landform: Hills

Landform position (two-dimensional): Shoulder, summit

Landform position (three-dimensional): Side slope, crest

Down-slope shape: Linear

Across-slope shape: Convex

Parent material: Friable, moderately-deep coarse-loamy basal till derived from granite and gneiss over granite and gneiss

Properties and qualities

Slope: 15 to 25 percent

Surface area covered with cobbles, stones or boulders: 9.0 percent

Depth to restrictive feature: 20 to 40 inches to lithic bedrock

Drainage class: Well drained

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water capacity: Low (about 3.7 inches)

Interpretive groups

Land capability (nonirrigated): 7s

Typical profile

0 to 2 inches: Muck

2 to 5 inches: Fine sandy loam

5 to 32 inches: Fine sandy loam

32 to 34 inches: Unweathered bedrock

Description of Hollis

Setting

Landform: Hills

Landform position (two-dimensional): Summit, shoulder

Down-slope shape: Linear

Across-slope shape: Convex

Parent material: Friable, shallow loamy basal till derived from metamorphic rock over metamorphic rock

Properties and qualities

Slope: 15 to 25 percent

Surface area covered with cobbles, stones or boulders: 9.0 percent

Depth to restrictive feature: 10 to 20 inches to lithic bedrock

Drainage class: Well drained

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water capacity: Very low (about 1.7 inches)

Interpretive groups

Land capability (nonirrigated): 7s

Typical profile

0 to 2 inches: Muck

2 to 6 inches: Fine sandy loam

6 to 14 inches: Fine sandy loam

14 to 19 inches: Gravelly fine sandy loam

19 to 21 inches: Unweathered bedrock

Description of Rock Outcrop

Setting

Parent material: Metamorphic rock

Properties and qualities

Slope: 15 to 25 percent

Depth to restrictive feature: 0 inches to lithic bedrock

Interpretive groups

Land capability (nonirrigated): 8s

Minor Components

Canton

Percent of map unit: 10 percent

Paxton

Percent of map unit: 3 percent

Woodbridge

Percent of map unit: 2 percent

312B—Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony

Map Unit Setting

Mean annual precipitation: 32 to 50 inches

Mean annual air temperature: 45 to 50 degrees F

Frost-free period: 145 to 240 days

Map Unit Composition

Woodbridge and similar soils: 85 percent

Minor components: 15 percent

Description of Woodbridge

Setting

Landform: Drumlins

Landform position (two-dimensional): Backslope, shoulder

Landform position (three-dimensional): Side slope

Down-slope shape: Linear

Across-slope shape: Concave

Parent material: Friable coarse-loamy eolian deposits over dense coarse-loamy lodgment till

Properties and qualities

Slope: 0 to 8 percent

Surface area covered with cobbles, stones or boulders: 9.0 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Moderately well drained

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)

Depth to water table: About 18 to 30 inches

Frequency of flooding: None

Frequency of ponding: None

Available water capacity: Very low (about 2.9 inches)

Interpretive groups

Land capability (nonirrigated): 7s

Typical profile

0 to 9 inches: Fine sandy loam

9 to 22 inches: Sandy loam

22 to 60 inches: Sandy loam

Minor Components

Paxton

Percent of map unit: 10 percent

Ridgebury

Percent of map unit: 5 percent

Landform: Depressions

420B—Canton fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

Elevation: 0 to 1,000 feet

Mean annual precipitation: 32 to 50 inches

Mean annual air temperature: 45 to 50 degrees F

Frost-free period: 145 to 240 days

Map Unit Composition

Canton and similar soils: 75 percent

Minor components: 25 percent

Description of Canton

Setting

Landform: Hills, hills

Landform position (two-dimensional): Summit, backslope, shoulder

Landform position (three-dimensional): Crest, nose slope, side slope

Down-slope shape: Convex

Across-slope shape: Convex

Parent material: Friable coarse-loamy eolian deposits over friable sandy basal till derived from granite and gneiss

Properties and qualities

Slope: 3 to 8 percent

Depth to restrictive feature: 18 to 36 inches to strongly contrasting textural stratification

Drainage class: Well drained

Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water capacity: Low (about 3.5 inches)

Interpretive groups

Land capability (nonirrigated): 2e

Typical profile

0 to 4 inches: Fine sandy loam

4 to 13 inches: Fine sandy loam

13 to 26 inches: Gravelly fine sandy loam

26 to 60 inches: Gravelly loamy sand

Minor Components

Paxton

Percent of map unit: 15 percent

Woodbridge

Percent of map unit: 10 percent

422B—Canton fine sandy loam, 3 to 8 percent slopes, extremely stony

Map Unit Setting

Elevation: 0 to 1,000 feet

Mean annual precipitation: 32 to 50 inches

Mean annual air temperature: 45 to 50 degrees F

Frost-free period: 145 to 240 days

Map Unit Composition

Canton and similar soils: 80 percent

Minor components: 20 percent

Description of Canton

Setting

Landform: Hills, hills

Landform position (two-dimensional): Backslope, shoulder

Landform position (three-dimensional): Nose slope, side slope

Down-slope shape: Convex

Across-slope shape: Convex

Parent material: Friable coarse-loamy eolian deposits over friable sandy basal till derived from granite and gneiss

Properties and qualities

Slope: 3 to 8 percent

Surface area covered with cobbles, stones or boulders: 9.0 percent

Depth to restrictive feature: 18 to 36 inches to strongly contrasting textural stratification

Drainage class: Well drained

Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water capacity: Low (about 3.5 inches)

Interpretive groups

Land capability (nonirrigated): 7s

Typical profile

0 to 4 inches: Fine sandy loam

4 to 13 inches: Fine sandy loam

13 to 26 inches: Gravelly fine sandy loam

26 to 60 inches: Gravelly loamy sand

Minor Components

Paxton

Percent of map unit: 15 percent

Custom Soil Resource Report

Woodbridge

Percent of map unit: 5 percent

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Drainage Class

"Drainage class (natural)" refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized-excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained, and very poorly drained. These classes are defined in the "Soil Survey Manual."


Custom Soil Resource Report Map—Drainage Class



Custom Soil Resource Report

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Units



Soil Ratings

-  Excessively drained
-  Somewhat excessively drained
-  Well drained
-  Moderately well drained
-  Somewhat poorly drained
-  Poorly drained
-  Very poorly drained
-  Not rated or not available






Political Features

 Cities

Water Features

-  Oceans
-  Streams and Canals

Transportation

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

MAP INFORMATION

Map Scale: 1:3,670 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
Coordinate System: UTM Zone 19N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Worcester County, Massachusetts,
Northeastern Part
Survey Area Data: Version 7, May 5, 2008

Date(s) aerial images were photographed: 8/15/2003; 7/15/2003

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.

Table—Drainage Class

Drainage Class— Summary by Map Unit — Worcester County, Massachusetts, Northeastern Part				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
51A	Swansea muck, 0 to 1 percent slopes	Very poorly drained	2.3	6.7%
70A	Ridgebury fine sandy loam, 0 to 3 percent slopes	Poorly drained	3.1	9.1%
102C	Chatfield-Hollis-Rock outcrop complex, 3 to 15 percent slopes	Well drained	14.3	42.6%
102D	Chatfield-Hollis-Rock outcrop complex, 15 to 25 percent slopes	Well drained	6.4	19.0%
312B	Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony	Moderately well drained	4.1	12.0%
420B	Canton fine sandy loam, 3 to 8 percent slopes	Well drained	0.7	2.0%
422B	Canton fine sandy loam, 3 to 8 percent slopes, extremely stony	Well drained	2.9	8.6%
Totals for Area of Interest			33.7	100.0%

Rating Options—Drainage Class*Aggregation Method:* Dominant Condition*Component Percent Cutoff:* None Specified*Tie-break Rule:* Higher**Hydrologic Soil Group**

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.

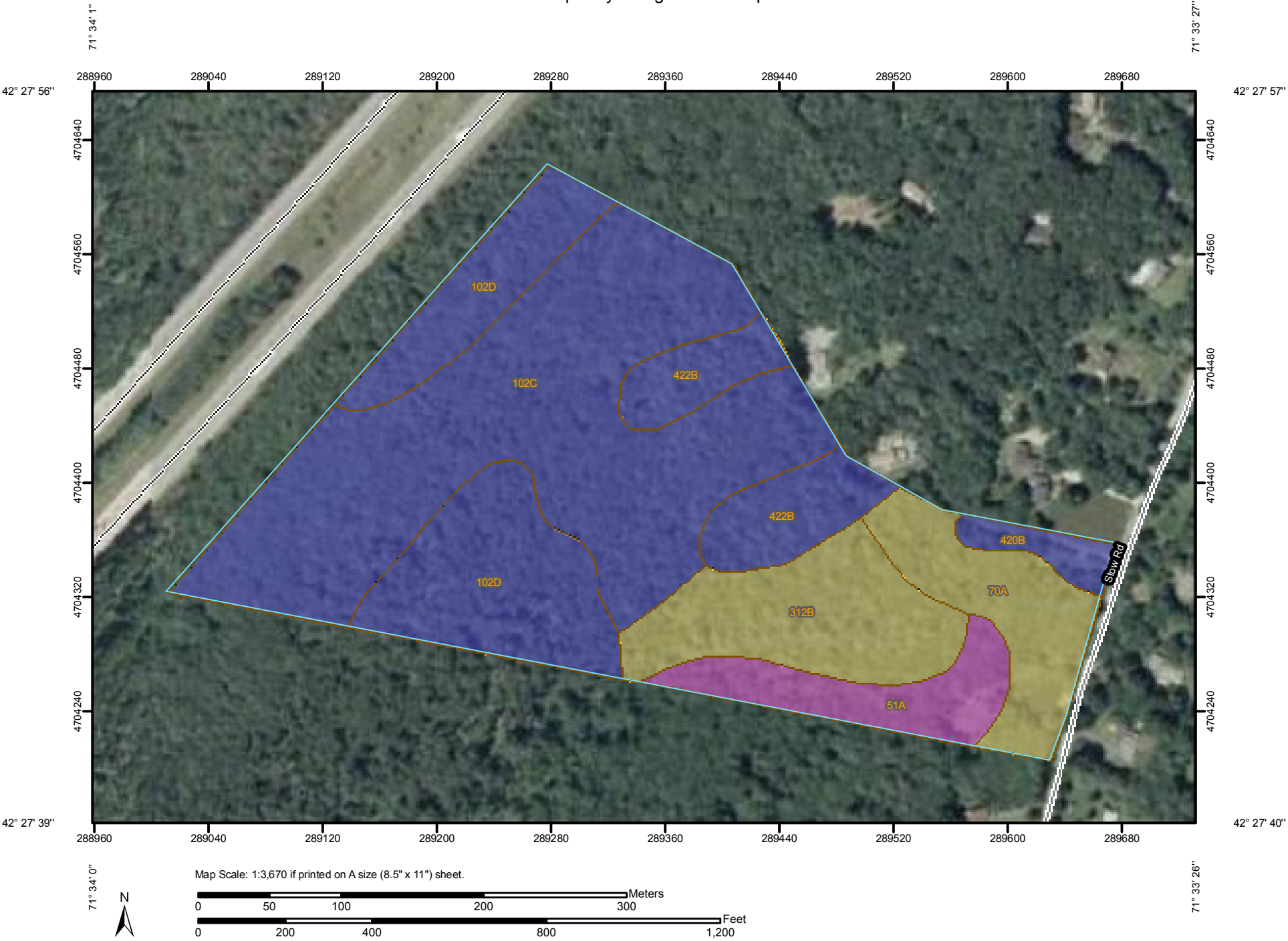
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Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water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


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Map—Hydrologic Soil Group



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MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Units

Soil Ratings

 A

 A/D


 B

 B/D

 C

 C/D

 D


 Not rated or not available

Political Features

 Cities

Water Features

 Oceans

 Streams and Canals


Transportation

 Rails

 Interstate Highways

 US Routes

 Major Roads

 Local Roads

MAP INFORMATION

Map Scale: 1:3,670 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
Coordinate System: UTM Zone 19N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Worcester County, Massachusetts,
Northeastern Part
Survey Area Data: Version 7, May 5, 2008

Date(s) aerial images were photographed: 8/15/2003; 7/15/2003

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.

Table—Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Worcester County, Massachusetts, Northeastern Part				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
51A	Swansea muck, 0 to 1 percent slopes	D	2.3	6.7%
70A	Ridgebury fine sandy loam, 0 to 3 percent slopes	C	3.1	9.1%
102C	Chatfield-Hollis-Rock outcrop complex, 3 to 15 percent slopes	B	14.3	42.6%
102D	Chatfield-Hollis-Rock outcrop complex, 15 to 25 percent slopes	B	6.4	19.0%
312B	Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony	C	4.1	12.0%
420B	Canton fine sandy loam, 3 to 8 percent slopes	B	0.7	2.0%
422B	Canton fine sandy loam, 3 to 8 percent slopes, extremely stony	B	2.9	8.6%
Totals for Area of Interest			33.7	100.0%

Rating Options—Hydrologic Soil Group*Aggregation Method:* Dominant Condition*Component Percent Cutoff:* None Specified*Tie-break Rule:* Lower**Water Features**

Water Features include ponding frequency, flooding frequency, and depth to water table.

Depth to Water Table

"Water table" refers to a saturated zone in the soil. It occurs during specified months. Estimates of the upper limit are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

This attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Map of Depth to Water Table

Map Scale: 1:3,670 if printed on A size (8.5" x 11") sheet.

Scale: 0 to 300 Meters, 0 to 1,200 Feet

Regions labeled: 102D, 422B, 312B, 70A, 51A, 420B

Feature: Slow Rd


Coordinates: 288960 to 289680 (X-axis), 4704240 to 4704640 (Y-axis)

Angles: 71° 34' 1" (top-left), 71° 33' 26" (bottom-right), 42° 27' 56" (top-left), 42° 27' 40" (bottom-right)

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MAP LEGEND

Area of Interest (AOI)


 Area of Interest (AOI)


Soils


 Soil Map Units


Soil Ratings


 0 - 25

 25 - 50

 50 - 100

 100 - 150

 150 - 200


 > 200

Political Features

 Cities

Water Features

 Oceans

 Streams and Canals


Transportation

 Rails

 Interstate Highways

 US Routes

 Major Roads

 Local Roads

MAP INFORMATION

Map Scale: 1:3,670 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
Coordinate System: UTM Zone 19N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Worcester County, Massachusetts,
Northeastern Part
Survey Area Data: Version 7, May 5, 2008

Date(s) aerial images were photographed: 8/15/2003; 7/15/2003

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.

Table—Depth to Water Table

Depth to Water Table— Summary by Map Unit — Worcester County, Massachusetts, Northeastern Part				
Map unit symbol	Map unit name	Rating (centimeters)	Acres in AOI	Percent of AOI
51A	Swansea muck, 0 to 1 percent slopes	15	2.3	6.7%
70A	Ridgebury fine sandy loam, 0 to 3 percent slopes	23	3.1	9.1%
102C	Chatfield-Hollis-Rock outcrop complex, 3 to 15 percent slopes	>200	14.3	42.6%
102D	Chatfield-Hollis-Rock outcrop complex, 15 to 25 percent slopes	>200	6.4	19.0%
312B	Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony	61	4.1	12.0%
420B	Canton fine sandy loam, 3 to 8 percent slopes	>200	0.7	2.0%
422B	Canton fine sandy loam, 3 to 8 percent slopes, extremely stony	>200	2.9	8.6%
Totals for Area of Interest			33.7	100.0%

Rating Options—Depth to Water Table

Units of Measure: centimeters

Aggregation Method: Dominant Component

Aggregation is the process by which a set of component attribute values is reduced to a single value that represents the map unit as a whole.

A map unit is typically composed of one or more "components". A component is either some type of soil or some nonsoil entity, e.g., rock outcrop. For the attribute being aggregated, the first step of the aggregation process is to derive one attribute value for each of a map unit's components. From this set of component attributes, the next step of the aggregation process derives a single value that represents the map unit as a whole. Once a single value for each map unit is derived, a thematic map for soil map units can be rendered. Aggregation must be done because, on any soil map, map units are delineated but components are not.

For each of a map unit's components, a corresponding percent composition is recorded. A percent composition of 60 indicates that the corresponding component typically makes up approximately 60% of the map unit. Percent composition is a critical factor in some, but not all, aggregation methods.

The aggregation method "Dominant Component" returns the attribute value associated with the component with the highest percent composition in the map unit. If more than one component shares the highest percent composition, the corresponding "tie-break" rule determines which value should be returned. The "tie-break" rule indicates whether the lower or higher attribute value should be returned in the case of a percent composition tie.

The result returned by this aggregation method may or may not represent the dominant condition throughout the map unit.

Component Percent Cutoff: None Specified

Components whose percent composition is below the cutoff value will not be considered. If no cutoff value is specified, all components in the database will be considered. The data for some contrasting soils of minor extent may not be in the database, and therefore are not considered.

Tie-break Rule: Lower

The tie-break rule indicates which value should be selected from a set of multiple candidate values, or which value should be selected in the event of a percent composition tie.

Interpret Nulls as Zero: No

This option indicates if a null value for a component should be converted to zero before aggregation occurs. This will be done only if a map unit has at least one component where this value is not null.

Beginning Month: January

Ending Month: December

Soil Reports

The Soil Reports section includes various formatted tabular and narrative reports (tables) containing data for each selected soil map unit and each component of each unit. No aggregation of data has occurred as is done in reports in the Soil Properties and Qualities and Suitabilities and Limitations sections.

The reports contain soil interpretive information as well as basic soil properties and qualities. A description of each report (table) is included.

Soil Physical Properties

This folder contains a collection of tabular reports that present soil physical properties. The reports (tables) include all selected map units and components for each map unit. Soil physical properties are measured or inferred from direct observations in the field or laboratory. Examples of soil physical properties include percent clay, organic matter, saturated hydraulic conductivity, available water capacity, and bulk density.

Engineering Properties

This table gives the engineering classifications and the range of engineering properties for the layers of each soil in the survey area.

Depth to the upper and lower boundaries of each layer is indicated.

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, an appropriate modifier is added, for example, "gravelly."

Classification of the soils is determined according to the Unified soil classification system (ASTM, 2005) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2004).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

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If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an oven-dry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

References:

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

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Absence of an entry indicates that the data were not estimated. The asterisk '*' denotes the representative texture; other possible textures follow the dash.

Engineering Properties— Worcester County, Massachusetts, Northeastern Part												
Map unit symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	<i>In</i>				<i>Pct</i>	<i>Pct</i>					<i>Pct</i>	
51A—Swansea muck, 0 to 1 percent slopes												
Swansea	0-13	*Muck, Mucky peat	SM, SP, SP-SM	A-1, A-2, A-3	0	0	100	95-100	30-70	0-15	—	NP
	13-36	*Muck, Mucky peat	PT	A-8	—	—	—	—	—	0-15	—	—
	36-60	*Sand, Loamy coarse sand, gravelly loamy coarse sand	SM, SP-SM	A-1, A-2, A-3	0	0	60-100	60-100	30-70	5-30	—	NP
70A—Ridgebury fine sandy loam, 0 to 3 percent slopes												
Ridgebury	0-9	*Fine sandy loam	ML, SM	A-1, A-2, A-4	0	0-5	80-100	75-90	40-90	20-70	—	NP
	9-23	*Gravelly fine sandy loam, Sandy loam	GM, ML, SM	A-1, A-2, A-4	0	0-15	65-95	55-90	40-80	20-60	—	NP
	23-60	*Fine sandy loam, Gravelly loam	GM, ML, SM	A-1, A-2, A-4	0	0	75-95	75-90	35-80	20-60	—	NP

Custom Soil Resource Report

Engineering Properties– Worcester County, Massachusetts, Northeastern Part												
Map unit symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	<i>In</i>				<i>Pct</i>	<i>Pct</i>					<i>Pct</i>	
102C—Chatfield-Hollis-Rock outcrop complex, 3 to 15 percent slopes												
Chatfield	0-2	*Muck, Mucky peat	SM, SP, SP-SM	A-1, A-3	0	0	100	95-100	30-70	0-15	—	NP
	2-5	*Fine sandy loam	GC-GM, GM, SC-SM, SM	A-1, A-2, A-4	0	0	75-95	70-90	30-65	15-50	10-20	1-6
	5-32	*Fine sandy loam, Gravelly loam, gravelly sandy loam	CL-ML, GM, ML, SM	A-1, A-2, A-4	0	0	75-95	70-90	33-85	15-75	10-20	1-6
	32-34	*Unweathered bedrock	—	—	—	—	—	—	—	—	—	—
Hollis	0-2	*Muck, Mucky peat	SM, SP, SP-SM	A-1, A-3	0	0	100	95-100	30-70	0-15	—	NP
	2-6	*Fine sandy loam	GM, ML, SM	A-2, A-4	0-5	0	65-100	60-95	40-85	20-65	15-25	NP-5
	6-14	*Fine sandy loam, Sandy loam, loam	GM, ML, SM	A-2, A-4	0-5	0	65-100	60-95	40-80	20-65	15-25	NP-5
	14-19	*Gravelly fine sandy loam, Sandy loam, loam	GM, ML, SM	A-2, A-4	0-5	0-15	65-100	60-95	40-80	20-65	15-25	NP-5
	19-21	*Unweathered bedrock	—	—	—	—	—	—	—	—	—	—
Rock outcrop	—	—	—	—	—	—	—	—	—	—	—	—

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Engineering Properties– Worcester County, Massachusetts, Northeastern Part												
Map unit symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	<i>In</i>				<i>Pct</i>	<i>Pct</i>					<i>Pct</i>	
102D—Chatfield-Hollis-Rock outcrop complex, 15 to 25 percent slopes												
Chatfield	0-2	*Muck, Mucky peat	SM, SP, SP-SM	A-1, A-3	0	0	100	95-100	30-70	0-15	—	NP
	2-5	*Fine sandy loam	GC-GM, GM, SC-SM, SM	A-1, A-2, A-4	0	0	75-95	70-90	30-65	15-50	10-20	1-6
	5-32	*Fine sandy loam, Gravelly loam, gravelly sandy loam	CL-ML, GM, ML, SM	A-1, A-2, A-4	0	0	75-95	70-90	33-85	15-75	10-20	1-6
	32-34	*Unweathered bedrock	—	—	—	—	—	—	—	—	—	—
Hollis	0-2	*Muck, Mucky peat	SM, SP, SP-SM	A-1, A-3	0	0	100	95-100	30-70	0-15	—	NP
	2-6	*Fine sandy loam	GM, ML, SM	A-2, A-4	0-5	0	65-100	60-95	40-85	20-65	15-25	NP-5
	6-14	*Fine sandy loam, Sandy loam, loam	GM, ML, SM	A-2, A-4	0-5	0	65-100	60-95	40-80	20-65	15-25	NP-5
	14-19	*Gravelly fine sandy loam, Sandy loam, loam	GM, ML, SM	A-2, A-4	0-5	0-15	65-100	60-95	40-80	20-65	15-25	NP-5
	19-21	*Unweathered bedrock	—	—	—	—	—	—	—	—	—	—
Rock outcrop	—	—	—	—	—	—	—	—	—	—	—	—

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Engineering Properties– Worcester County, Massachusetts, Northeastern Part												
Map unit symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	<i>In</i>				<i>Pct</i>	<i>Pct</i>					<i>Pct</i>	
312B—Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony												
Woodbridge	0-9	*Fine sandy loam	GM, ML, SM	A-2, A-4	0	0-4	75-95	75-90	40-80	25-65	15-40	NP-10
	9-22	*Sandy loam, Loam, gravelly fine sandy loam	GM, ML, SM	A-2, A-4	0	0-4	75-95	75-90	45-80	25-60	15-30	NP-7
	22-60	*Sandy loam, Loam, gravelly fine sandy loam	GM, ML, SM	A-1, A-2, A-4	0	0-4	75-95	75-90	40-75	20-60	15-30	NP-7
420B—Canton fine sandy loam, 3 to 8 percent slopes												
Canton	0-4	*Fine sandy loam	ML, SM	A-2, A-4	0	0-10	85-95	75-90	55-85	30-60	15-18	NP-8
	4-13	*Fine sandy loam, Very fine sandy loam, gravelly loam	ML, SM	A-2, A-4	0	0-10	80-95	70-90	50-85	30-60	0-12	NP-8
	13-26	*Gravelly fine sandy loam, Very fine sandy loam, gravelly loam	ML, SM	A-2, A-4	0-10	0-20	80-95	70-90	50-85	30-60	0-12	NP-8
	26-60	*Gravelly loamy sand, Loamy fine sand, gravelly loamy coarse sand	SM, SP-SM	A-1, A-2	0-10	0-20	65-85	50-80	20-60	10-30	—	NP

Custom Soil Resource Report

Engineering Properties– Worcester County, Massachusetts, Northeastern Part												
Map unit symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	<i>In</i>				<i>Pct</i>	<i>Pct</i>					<i>Pct</i>	
422B—Canton fine sandy loam, 3 to 8 percent slopes, extremely stony												
Canton	0-4	*Fine sandy loam	ML, SM	A-2, A-4	0	0-10	85-95	75-90	55-85	30-60	15-18	NP-8
	4-13	*Fine sandy loam, Very fine sandy loam, gravelly loam	ML, SM	A-2, A-4	0	0-10	80-95	70-90	50-85	30-60	0-12	NP-8
	13-26	*Gravelly fine sandy loam, Very fine sandy loam, gravelly loam	ML, SM	A-2, A-4	0-10	0-20	80-95	70-90	50-85	30-60	0-12	NP-8
	26-60	*Gravelly loamy sand, Loamy fine sand, gravelly loamy coarse sand	SM, SP-SM	A-1, A-2	0-10	0-20	65-85	50-80	20-60	10-30	—	NP

Particle Size and Coarse Fragments

This table shows estimates of particle size distribution and coarse fragment content of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Particle size is the effective diameter of a soil particle as measured by sedimentation, sieving, or micrometric methods. Particle sizes are expressed as classes with specific effective diameter class limits. The broad classes are sand, silt, and clay, ranging from the larger to the smaller.

Sand as a soil separate consists of mineral soil particles that are 0.05 millimeter to 2 millimeters in diameter. In this table, the estimated sand content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Silt as a soil separate consists of mineral soil particles that are 0.002 to 0.05 millimeter in diameter. In this table, the estimated silt content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of sand, silt, and clay affects the physical behavior of a soil. Particle size is important for engineering and agronomic interpretations, for determination of soil hydrologic qualities, and for soil classification.

The amount and kind of clay affect the fertility and physical condition of the soil and the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, saturated hydraulic conductivity (Ksat), plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Total fragments is the content of fragments of rock and other materials larger than 2 millimeters in diameter on volumetric basis of the whole soil.

Fragments 2-74 mm refers to the content of coarse fragments in the 2 to 74 millimeter size fraction.

Fragments 75-249 mm refers to the content of coarse fragments in the 75 to 249 millimeter size fraction.

Fragments 250-599 mm refers to the content of coarse fragments in the 250 to 599 millimeter size fraction.

Fragments ≥ 600 mm refers to the content of coarse fragments in the greater than or equal to 600 millimeter size fraction.

Reference:

United States Department of Agriculture, Natural Resources Conservation Service.
National soil survey handbook, title 430-VI. (<http://soils.usda.gov>)

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[illegible]

Physical Soil Properties

This table shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Particle size is the effective diameter of a soil particle as measured by sedimentation, sieving, or micrometric methods. Particle sizes are expressed as classes with specific effective diameter class limits. The broad classes are sand, silt, and clay, ranging from the larger to the smaller.

Sand as a soil separate consists of mineral soil particles that are 0.05 millimeter to 2 millimeters in diameter. In this table, the estimated sand content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Silt as a soil separate consists of mineral soil particles that are 0.002 to 0.05 millimeter in diameter. In this table, the estimated silt content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of sand, silt, and clay affects the physical behavior of a soil. Particle size is important for engineering and agronomic interpretations, for determination of soil hydrologic qualities, and for soil classification.

The amount and kind of clay affect the fertility and physical condition of the soil and the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, saturated hydraulic conductivity (*K_{sat}*), plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (oven-dry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3- or 1/10-bar (33kPa or 10kPa) moisture tension. Weight is determined after the soil is dried at 105 degrees C. In the table, the estimated moist bulk density of each soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute linear extensibility, shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. Depending on soil texture, a bulk density of more than 1.4 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

*Saturated hydraulic conductivity (*K_{sat}*)* refers to the ease with which pores in a saturated soil transmit water. The estimates in the table are expressed in terms of micrometers per second. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Saturated hydraulic conductivity (*K_{sat}*) is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Linear extensibility refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at 1/3- or 1/10-bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported in the table as percent change for the whole soil. The amount and type of clay minerals in the soil influence volume change.

Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In this table, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter. The content of organic matter in a soil can be maintained by returning crop residue to the soil.

Organic matter has a positive effect on available water capacity, water infiltration, soil organism activity, and tilth. It is a source of nitrogen and other nutrients for crops and soil organisms.

Erosion factors are shown in the table as the K factor (K_w and K_f) and the T factor. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and K_{sat} . Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor K_w indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Erosion factor K_f indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind and/or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. The groups are described in the "National Soil Survey Handbook."

Wind erodibility index is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion.

Custom Soil Resource Report

There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion.

Reference:

United States Department of Agriculture, Natural Resources Conservation Service.
National soil survey handbook, title 430-VI. (<http://soils.usda.gov>)

Custom Soil Resource Report

Physical Soil Properties– Worcester County, Massachusetts, Northeastern Part														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	<i>In</i>	<i>Pct</i>	<i>Pct</i>	<i>Pct</i>	<i>g/cc</i>	<i>micro m/sec</i>	<i>In/In</i>	<i>Pct</i>	<i>Pct</i>					
51A—Swansea muck, 0 to 1 percent slopes														
Swansea	0-13	- 5-	—	—	1.10-1.35	42.34-141.14	0.03-0.08	0.0-2.9	30.0-90.0	.02	.02	2	8	0
	13-36	- 5-	—	—	0.15-0.30	4.23-42.34	0.35-0.45	0.0-2.9	30.0-90.0	.02	.02			
	36-60	-96-	- 2-	1- 3- 5	1.15-1.40	141.14-705.00	0.01-0.08	0.0-2.9	5.0-15.0	.10	.15			
70A— Ridgebury fine sandy loam, 0 to 3 percent slopes														
Ridgebury	0-9	-71-	-22-	3- 7- 10	1.00-1.30	4.23-42.34	0.06-0.24	0.0-2.9	4.0-7.0	.24	.28	3	8	0
	9-23	-66-	-29-	2- 5- 8	1.60-1.90	4.23-42.34	0.04-0.20	0.0-2.9	0.0-1.0	.32	.55			
	23-60	-66-	-29-	2- 5- 8	1.80-2.00	0.00-1.41	0.01-0.05	0.0-2.9	0.0-1.0	.24	.43			

Custom Soil Resource Report

Physical Soil Properties– Worcester County, Massachusetts, Northeastern Part														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	<i>In</i>	<i>Pct</i>	<i>Pct</i>	<i>Pct</i>	<i>g/cc</i>	<i>micro m/sec</i>	<i>In/In</i>	<i>Pct</i>	<i>Pct</i>					
102C— Chatfield-Hollis-Rock outcrop complex, 3 to 15 percent slopes														
Chatfield	0-2	- 5-	—	—	1.10-1.35	42.34-141.14	0.03-0.08	0.0-2.9	30.0-90.0	.02	.02	2	8	0
	2-5	-71-	-17-	7-13- 18	1.10-1.40	4.23-42.34	0.08-0.14	0.0-2.9	2.0-10.0	.20	.43			
	5-32	-61-	-27-	7-13- 18	1.20-1.50	4.23-42.34	0.08-0.18	0.0-2.9	1.0-5.0	.20	.32			
	32-34	—	—	—	—	0.00-1.00	—	—	—					
Hollis	0-2	- 5-	—	—	1.10-1.35	42.34-141.14	0.03-0.08	0.0-2.9	30.0-90.0	.02	.02	1	8	0
	2-6	-71-	-22-	3- 7- 10	1.10-1.40	4.23-42.34	0.08-0.17	0.0-2.9	2.0-5.0	.20	.37			
	6-14	-65-	-31-	1- 5- 8	1.30-1.55	4.23-42.34	0.06-0.18	0.0-2.9	1.0-3.0	.32	.49			
	14-19	-65-	-31-	1- 5- 8	1.30-1.55	4.23-42.34	0.06-0.18	0.0-2.9	1.0-3.0	.32	.49			
	19-21	—	—	—	—	0.00-1.00	—	—	—					
Rock outcrop	—	—	—	—	—	—	—	—	—			1		

Custom Soil Resource Report

Physical Soil Properties– Worcester County, Massachusetts, Northeastern Part														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	<i>In</i>	<i>Pct</i>	<i>Pct</i>	<i>Pct</i>	<i>g/cc</i>	<i>micro m/sec</i>	<i>In/In</i>	<i>Pct</i>	<i>Pct</i>					
102D— Chatfield-Hollis-Rock outcrop complex, 15 to 25 percent slopes														
Chatfield	0-2	- 5-	—	—	1.10-1.35	42.34-141.14	0.03-0.08	0.0-2.9	30.0-90.0	.02	.02	2	8	0
	2-5	-71-	-17-	7-13- 18	1.10-1.40	4.23-42.34	0.08-0.14	0.0-2.9	2.0-10.0	.20	.43			
	5-32	-61-	-27-	7-13- 18	1.20-1.50	4.23-42.34	0.08-0.18	0.0-2.9	1.0-5.0	.20	.32			
	32-34	—	—	—	—	0.00-1.00	—	—	—					
Hollis	0-2	- 5-	—	—	1.10-1.35	42.34-141.14	0.03-0.08	0.0-2.9	30.0-90.0	.02	.02	1	8	0
	2-6	-71-	-22-	3- 7- 10	1.10-1.40	4.23-42.34	0.08-0.17	0.0-2.9	2.0-5.0	.20	.37			
	6-14	-65-	-31-	1- 5- 8	1.30-1.55	4.23-42.34	0.06-0.18	0.0-2.9	1.0-3.0	.32	.49			
	14-19	-65-	-31-	1- 5- 8	1.30-1.55	4.23-42.34	0.06-0.18	0.0-2.9	1.0-3.0	.32	.49			
	19-21	—	—	—	—	0.00-1.00	—	—	—					
Rock outcrop	—	—	—	—	—	—	—	—	—			1	8	0
312B— Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony														
Woodbridge	0-9	-70-	-22-	3- 8- 12	1.00-1.25	4.23-14.11	0.08-0.18	0.0-2.9	2.0-6.0	.20	.37	3	8	0
	9-22	-70-	-22-	3- 8- 12	1.35-1.60	4.23-14.11	0.08-0.18	0.0-2.9	1.0-3.0	.32	.49			
	22-60	-70-	-22-	3- 8- 12	1.70-2.00	0.00-1.41	0.05-0.10	0.0-2.9	0.0-2.0	.24	.37			

Custom Soil Resource Report

Physical Soil Properties– Worcester County, Massachusetts, Northeastern Part														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	<i>In</i>	<i>Pct</i>	<i>Pct</i>	<i>Pct</i>	<i>g/cc</i>	<i>micro m/sec</i>	<i>In/In</i>	<i>Pct</i>	<i>Pct</i>					
420B—Canton fine sandy loam, 3 to 8 percent slopes														
Canton	0-4	-65-	-31-	1- 5- 8	0.90-1.20	14.11-42.34	0.11-0.19	0.0-2.9	1.0-6.0	.24	.32	3	3	86
	4-13	-65-	-31-	1- 5- 8	1.20-1.50	14.11-42.34	0.09-0.17	0.0-2.9	1.0-3.0	.28	.37			
	13-26	-65-	-31-	1- 5- 8	1.20-1.50	14.11-42.34	0.09-0.17	0.0-2.9	1.0-3.0	.28	.37			
	26-60	-81-	-17-	0- 3- 5	1.30-1.50	42.34-141.14	0.04-0.08	0.0-2.9	0.0-1.0	.17	.20			
422B—Canton fine sandy loam, 3 to 8 percent slopes, extremely stony														
Canton	0-4	-65-	-31-	1- 5- 8	0.90-1.20	14.11-42.34	0.11-0.19	0.0-2.9	1.0-6.0	.24	.32	3	8	0
	4-13	-65-	-31-	1- 5- 8	1.20-1.50	14.11-42.34	0.09-0.17	0.0-2.9	1.0-3.0	.28	.37			
	13-26	-65-	-31-	1- 5- 8	1.20-1.50	14.11-42.34	0.09-0.17	0.0-2.9	1.0-3.0	.28	.37			
	26-60	-81-	-17-	0- 3- 5	1.30-1.50	42.34-141.14	0.04-0.08	0.0-2.9	0.0-1.0	.17	.20			

Soil Qualities and Features

This folder contains tabular reports that present various soil qualities and features. The reports (tables) include all selected map units and components for each map unit. Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Soil Features

This table gives estimates of various soil features. The estimates are used in land use planning that involves engineering considerations.

A restrictive layer is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers. The table indicates the hardness and thickness of the restrictive layer, both of which significantly affect the ease of excavation. *Depth to top* is the vertical distance from the soil surface to the upper boundary of the restrictive layer.

Subsidence is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence generally results from either desiccation and shrinkage, or oxidation of organic material, or both, following drainage. Subsidence takes place gradually, usually over a period of several years. The table shows the expected initial subsidence, which usually is a result of drainage, and total subsidence, which results from a combination of factors.

Potential for frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, saturated hydraulic conductivity (Ksat), content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel or concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the steel

Custom Soil Resource Report

or concrete in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion also is expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Custom Soil Resource Report

Soil Features– Worcester County, Massachusetts, Northeastern Part									
Map symbol and soil name	Restrictive Layer				Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness	Initial	Total		Uncoated steel	Concrete
		<i>In</i>	<i>In</i>		<i>In</i>	<i>In</i>			
51A—Swansea muck, 0 to 1 percent slopes									
Swansea	Strongly contrasting textural stratification	—	—	Noncemented	—	—	High	High	High
70A—Ridgebury fine sandy loam, 0 to 3 percent slopes									
Ridgebury	Dense material	—	—	Very strongly cemented	—	—	High	High	High
102C—Chatfield-Hollis-Rock outcrop complex, 3 to 15 percent slopes									
Chatfield	Lithic bedrock	20-40	—	Indurated	—	—	Moderate	Low	Moderate
Hollis	Lithic bedrock	10-20	—	Indurated	—	—	Moderate	Low	High
Rock outcrop	Lithic bedrock	0	—		—	—			
102D—Chatfield-Hollis-Rock outcrop complex, 15 to 25 percent slopes									
Chatfield	Lithic bedrock	20-40	—	Indurated	—	—	Moderate	Low	Moderate
Hollis	Lithic bedrock	10-20	—	Indurated	—	—	Moderate	Low	High
Rock outcrop	Lithic bedrock	0	—		—	—			

Custom Soil Resource Report

Soil Features– Worcester County, Massachusetts, Northeastern Part									
Map symbol and soil name	Restrictive Layer				Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness	Initial	Total		Uncoated steel	Concrete
		<i>In</i>	<i>In</i>		<i>In</i>	<i>In</i>			
312B—Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony									
Woodbridge	Dense material	—	—	Very strongly cemented	—	—	High	Low	Moderate
420B—Canton fine sandy loam, 3 to 8 percent slopes									
Canton	Strongly contrasting textural stratification	18-36	—	Noncemented	—	—	Low	Low	High
422B—Canton fine sandy loam, 3 to 8 percent slopes, extremely stony									
Canton	Strongly contrasting textural stratification	18-36	—	Noncemented	—	—	Low	Low	High

Water Features

This folder contains tabular reports that present soil hydrology information. The reports (tables) include all selected map units and components for each map unit. Water Features include ponding frequency, flooding frequency, and depth to water table.

Water Features

This table gives estimates of various soil water features. The estimates are used in land use planning that involves engineering considerations.

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 four hydrologic soil groups are:

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.

Surface runoff refers to the loss of water from an area by flow over the land surface. Surface runoff classes are based on slope, climate, and vegetative cover. The concept indicates relative runoff for very specific conditions. It is assumed that the surface of the soil is bare and that the retention of surface water resulting from irregularities in the ground surface is minimal. The classes are negligible, very low, low, medium, high, and very high.

The *months* in the table indicate the portion of the year in which a water table, ponding, and/or flooding is most likely to be a concern.

Water table refers to a saturated zone in the soil. The water features table indicates, by month, depth to the top (*upper limit*) and base (*lower limit*) of the saturated zone in most years. Estimates of the upper and lower limits are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely

grayish colors or mottles (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

Ponding is standing water in a closed depression. Unless a drainage system is installed, the water is removed only by percolation, transpiration, or evaporation. The table indicates *surface water depth* and the *duration* and *frequency* of ponding. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, rare, occasional, and frequent. *None* means that ponding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of ponding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of ponding is 5 to 50 percent in any year); and *frequent* that it occurs, on the average, more than once in 2 years (the chance of ponding is more than 50 percent in any year).

Flooding is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Duration and *frequency* are estimated. Duration is expressed as *extremely brief* if 0.1 hour to 4 hours, *very brief* if 4 hours to 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent. *None* means that flooding is not probable; *very rare* that it is very unlikely but possible under extremely unusual weather conditions (the chance of flooding is less than 1 percent in any year); *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is 1 to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); *frequent* that it is likely to occur often under normal weather conditions (the chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year); and *very frequent* that it is likely to occur very often under normal weather conditions (the chance of flooding is more than 50 percent in all months of any year).

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

Custom Soil Resource Report

Water Features– Worcester County, Massachusetts, Northeastern Part										
Map unit symbol and soil name	Hydrologic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface depth	Duration	Frequency	Duration	Frequency
				<i>Ft</i>	<i>Ft</i>	<i>Ft</i>				
51A—Swansea muck, 0 to 1 percent slopes										
Swansea	D	—	January	0.0-1.0	>6.0	—	—	None	—	None
	D	—	February	0.0-1.0	>6.0	—	—	None	—	None
	D	—	March	0.0-1.0	>6.0	—	—	None	—	None
	D	—	April	0.0-1.0	>6.0	—	—	None	—	None
	D	—	May	0.0-1.0	>6.0	—	—	None	—	None
	D	—	June	0.0-1.0	>6.0	—	—	None	—	None
	D	—	July	0.0-1.0	>6.0	—	—	None	—	None
	D	—	August	0.0-1.0	>6.0	—	—	None	—	None
	D	—	September	0.0-1.0	>6.0	—	—	None	—	None
	D	—	October	0.0-1.0	>6.0	—	—	None	—	None
	D	—	November	0.0-1.0	>6.0	—	—	None	—	None
	D	—	December	0.0-1.0	>6.0	—	—	None	—	None
70A—Ridgebury fine sandy loam, 0 to 3 percent slopes										
Ridgebury	C	—	January	0.0-1.5	1.0-2.0	—	—	None	—	None
	C	—	February	0.0-1.5	1.0-2.0	—	—	None	—	None
	C	—	March	0.0-1.5	1.0-2.0	—	—	None	—	None
	C	—	April	0.0-1.5	1.0-2.0	—	—	None	—	None
	C	—	May	0.0-1.5	1.0-2.0	—	—	None	—	None
	C	—	November	0.0-1.5	1.0-2.0	—	—	None	—	None
	C	—	December	0.0-1.5	1.0-2.0	—	—	None	—	None

Custom Soil Resource Report

Water Features— Worcester County, Massachusetts, Northeastern Part										
Map unit symbol and soil name	Hydrologic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface depth	Duration	Frequency	Duration	Frequency
				<i>Ft</i>	<i>Ft</i>	<i>Ft</i>				
102C—Chatfield-Hollis-Rock outcrop complex, 3 to 15 percent slopes										
Chatfield	B	—	Jan-Dec	—	—	—	—	None	—	—
Hollis	C/D	—	Jan-Dec	—	—	—	—	None	—	—
Rock outcrop	D	—	Jan-Dec	—	—	—	—	None	—	—
102D—Chatfield-Hollis-Rock outcrop complex, 15 to 25 percent slopes										
Chatfield	B	—	Jan-Dec	—	—	—	—	None	—	—
Hollis	C/D	—	Jan-Dec	—	—	—	—	None	—	—
Rock outcrop	D	—	Jan-Dec	—	—	—	—	None	—	—
312B—Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony										
Woodbridge	C	—	January	1.5-2.5	1.6-3.3	—	—	None	—	None
	C	—	February	1.5-2.5	1.6-3.3	—	—	None	—	None
	C	—	March	1.5-2.5	1.6-3.3	—	—	None	—	None
	C	—	April	1.5-2.5	1.6-3.3	—	—	None	—	None
	C	—	May	1.5-2.5	1.6-3.3	—	—	None	—	None
	C	—	November	1.5-2.5	1.6-3.3	—	—	None	—	None
	C	—	December	1.5-2.5	1.6-3.3	—	—	None	—	None
420B—Canton fine sandy loam, 3 to 8 percent slopes										
Canton	B	—	Jan-Dec	—	—	—	—	None	—	—

Custom Soil Resource Report

Water Features– Worcester County, Massachusetts, Northeastern Part										
Map unit symbol and soil name	Hydrologic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface depth	Duration	Frequency	Duration	Frequency
				<i>Ft</i>	<i>Ft</i>	<i>Ft</i>				
422B—Canton fine sandy loam, 3 to 8 percent slopes, extremely stony										
Canton	B	—	Jan-Dec	—	—	—	—	None	—	—

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. <http://soils.usda.gov/>

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. <http://soils.usda.gov/>

Soil Survey Staff. 2006. Keys to soil taxonomy. 10th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. <http://soils.usda.gov/>

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. <http://soils.usda.gov/>

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. <http://www.glti.nrcs.usda.gov/>

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. <http://soils.usda.gov/>

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. <http://soils.usda.gov/>

Custom Soil Resource Report

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210.



Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

MAILING ADDRESS:

TRANSFORMATIONS INC
8 COPPERSMITH WAY
TOWNSEND, MASS 01469

A. Facility Information

TRANSFORMATIONS, INC

Owner Name

PINE HILL VILLAGE

Street Address

HARVARD

City

MA
State

M36 PEL 85/86-1
Map/Lot #

01451
Zip Code

LOT 1

B. Site Information

- (Check one) ☒ New Construction ☐ Upgrade ☐ Repair
- Published Soil Survey Available? ☒ Yes ☐ No
If yes: 1984 Year Published 1:20000 Publication Scale W.B. Soil Map Unit
Soil Name: WOODBRIDGE
Soil Limitations: high groundwater
- Surficial Geological Report Available? ☐ Yes ☒ No
If yes: Year Published Publication Scale Map Unit
Geologic Material: glacial till
Landform: drumlin
- Flood Rate Insurance Map
Above the 500-year flood boundary? ☒ Yes ☐ No Within the 100-year flood boundary? ☐ Yes ☒ No
Within the 500-year flood boundary? ☐ Yes ☒ No Within a velocity zone? ☐ Yes ☒ No
- Wetland Area: National Wetland Inventory Map Map Unit Name
Wetlands Conservancy Program Map Map Unit Name
- Current Water Resource Conditions (USGS): 9/10 Month/Year Range: ☐ Above Normal ☐ Normal ☒ Below Normal
- Other references reviewed:



Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserved disposal area)

Deep Observation Hole Number: 810-4 Date: 8/17/10 Time: 3:00 PM Weather: Sunny 80°

1. Location

Ground Elevation at Surface of Hole: _____ Location (identify on plan): _____

2. Land Use woodland (e.g., woodland, agricultural field, vacant lot, etc.) Surface Stones few Slope (%) 2

Vegetation trees Landform drumlin Position on Landscape (attach sheet)

3. Distances from: Open Water Body 250+ feet Drainage Way 250+ feet Possible Wet Area _____ feet

Property Line 40+ feet Drinking Water Well 80+ feet Other _____ feet

4. Parent Material: glacial till (proposed road) Unsuitable Materials Present: ☐ Yes ☒ No

If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: Depth Weeping from Pit _____ Depth Standing Water in Hole _____

Estimated Depth to High Groundwater: 30 inches elevation _____



Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number:

210-4

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Percent Depth	Color	Depth Percent		Gravel	Cobbles & Stones			
0"-4"	A	10YR2.3/2	-			SL	-	-	massive	friable	
4"-16"	B	7.5YR5/6	<5%			FSL	-	-	prismatic	friable	
16"-120"	C	5YR6/4	>5%	5YR5/2	30"	MLS	5%	5%	granular	firm in piece	

Additional Notes:



Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

☐ Depth observed standing water in observation hole

A. _____
inches

B. _____
inches

☐ Depth weeping from side of observation hole

A. _____
inches

B. _____
inches

☒ Depth to soil redoximorphic features (mottles)

A. 30
inches

B. _____
inches

☐ Groundwater adjustment (USGS methodology)

A. _____
inches

B. _____
inches

2.

Index Well Number

Reading Date

Index Well Level

Adjustment Factor

Adjusted Groundwater Level

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes

☐ No

b. If yes, at what depth was it observed?

Upper boundary:

16
inches

Lower boundary:

120
inches



Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

Russell D. Wilson
Signature of Soil Evaluator

Russell D. Wilson
Typed or Printed Name of Soil Evaluator / License #

Katene Garberg
Name of Board of Health Witness

8/20/10
Date

7125
Date of Soil Evaluator Exam

NABCH
Board of Health

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.



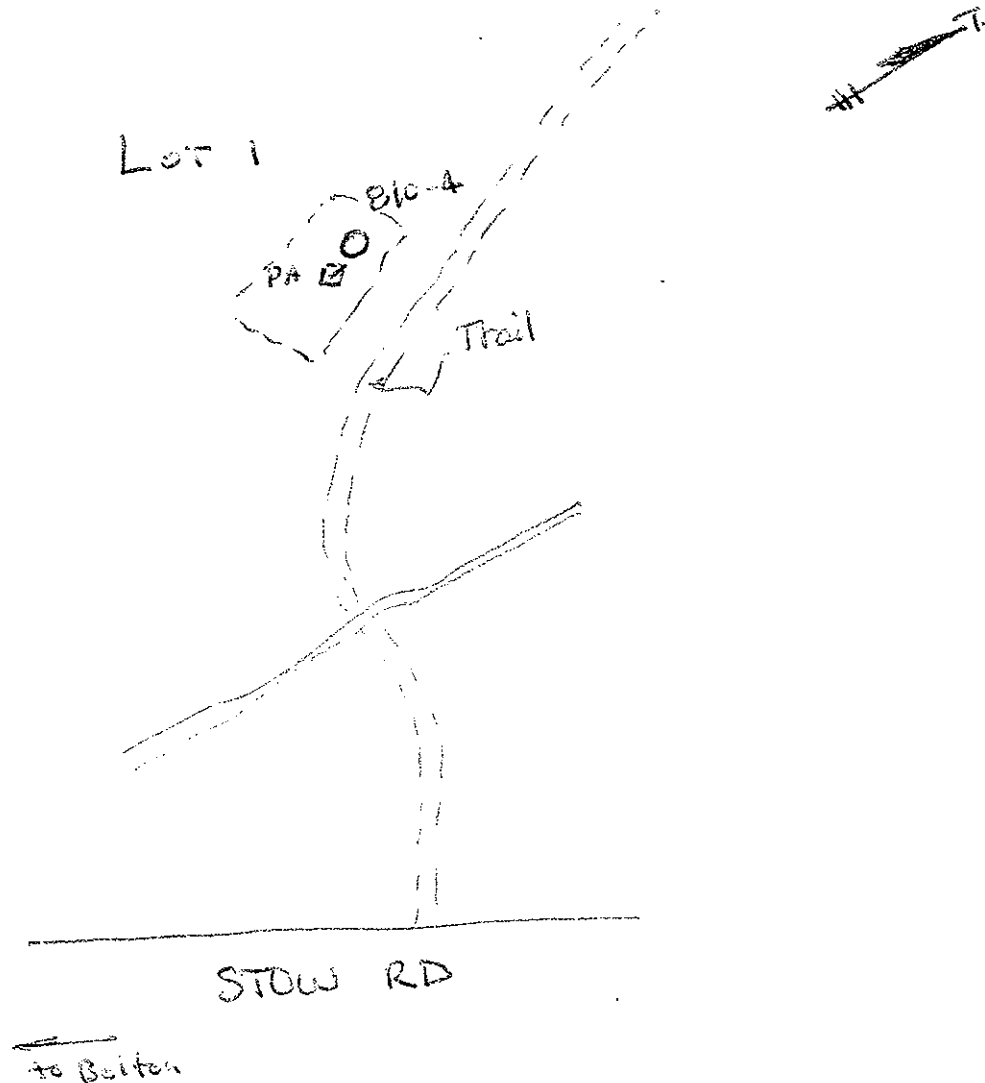
Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

Field Diagrams

Use this sheet for field diagrams:



Project
No. 4590

Date: 10/27/97

Commonwealth of Massachusetts
HARVARD, Massachusetts

Soil Suitability Assessment for On-site Sewage Disposal

Performed By: WM. MURRAY, DAVID E. ROSS ASSOC. Date: 10/12/97
Witnessed By: MR. DON MELOON, R.S. - NASHUA ASSOC. BOARDS OF HEALTH

Location Address or Lot # <u>LOT #1</u> <u>OFF STON ROAD, HARVARD, MA</u> <u>Assessor's Map 36 PARCEL 85-86</u>	Owner's Name, Address, and Telephone # <u>CHARLES B. WESTGATE</u> <u>C.B. WESTGATE, INC.</u> <u>16 SANBORN ST.</u> <u>READING, MA 01867</u> <u>(617) 935-5042</u>
New Construction <input checked="" type="checkbox"/> Repair <input type="checkbox"/>	

Office Review

Published Soil Survey Available: No ☐ Yes ☒
Year Published 1985 (Natl.) Publication Scale 1:10,000 Soil Map Unit R/A & WhB
Drainage Class B & C Soil Limitations (RIDGEBURY FINE SANDY LOAM)

Surficial Geologic Report Available: No ☒ Yes ☐

Year Published _____ Publication Scale _____

Geologic Material (Map Unit) _____

Landform _____

Flood Insurance Rate Map:

Above 500 year flood boundary No ☐ Yes ☒

Within 500 year flood boundary No ☐ Yes ☐

Within 100 year flood boundary No ☒ Yes ☐

Wetland Area:

National Wetland Inventory Map (map unit)

Wetlands Conservancy Program Map (map unit)

U - UPLANDS

Current Water Resource Conditions (USGS): Month

Range : Above Normal ☐ Normal ☐ Below Normal ☐

Other References Reviewed: HARVARD BOARD OF HEALTH REGULATIONS



Location Address or Lot No. LOT 1, OFF STOW RD, HARVARDOn-site ReviewDeep Hole Number TH1097-2 Date: 10/1/97 Time: 11:45 AM Weather Ptly. Sunny, 60°FLocation (identify on site plan) SEE SKETCHLand Use WOODED LOTSlope (%) 2-5% Surface Stones ~5% (BOULDERS)Vegetation 2ND GROWTH MIXED HARD & SOFTWOODS

Landform

Position on landscape (sketch on the back)

Distances from:

Open Water Body 7200' feetDrainage way ~200' feetPossible Wet Area 7150' feetProperty Line ~200' feet (EXISTING IF NOT PROPOSED)Drinking Water Well 7200' feet

Other

DEEP OBSERVATION HOLE LOG*

TH1097-2

Depth from Surface (Inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)
0"-8"	A	SANDY LOAM	10YR/6/6		ROOTS 730%; MASSIVE; FRIABLE BROKEN/DIFFUSE BORDER (5/0/0/5) (Pebbles/Stones/Cobbles/Blders)
8"-18"	B _w	SANDY LOAM	10YR/4/6		ROOTS ~15%; MASSIVE; FRIABLE BROKEN/DIFFUSE BORDER (5/0/0/6)
18"-36"	C ₁	LOAM	2.5Y/5/4	COMMON @ 25"	ROOTS <5%; MASSIVE; FRIABLE BROKEN-DIFFUSE BORDER (10/5/0/0)
36"-96"	C ₂	V. STONY FINE SANDY LOAM	10YR/4/4	COMMON THROUGH-OUT	ROOTS <5%; MASSIVE; FRIABLE TO DENSE; BROKEN-DIFFUSE BORDER (15/5/0/0)
96" +	C ₃	GRAVELLY FINE SANDY LOAM	2.5Y/4/6	↓	NO ROOTS; MASSIVE, DENSE (10/5/0/2)

* MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) GLACIAL TILLDepth to Bedrock: OVER 96"Depth to Groundwater: Standing Water in the Hole: @ 96" (1:25 PM)

Weeping from Pit Face:

Estimated Seasonal High Ground Water: @ MOTTLING 25"

Location Address or Lot No. LOT 1, OFF STOW RD, HARVARD

Determination for Seasonal High Water Table

Method Used:

- ☐ Depth observed standing in observation hole inches
☐ Depth weeping from side of observation hole inches
☒ Depth to soil mottles * inches
☐ Ground water adjustment feet

Index Well Number Reading Date Index well level

Adjustment factor Adjusted ground water level

* SEE INDIVIDUAL SOIL LOGS, FORM 11 FOR HOLES TH 1097-1 &
TH 1097-2

Depth of Naturally Occurring Pervious Material

Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system? YES

If not, what is the depth of naturally occurring pervious material? —

Certification

I certify that on 10/27/94 (date) I have passed the soil evaluator examination approved by the Department of Environmental Protection and that the above analysis was performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017.

Signature William E. Murray Date 10/28/97



FORM 12 - PERCOLATION TEST

Location Address or Lot No. LOT 1, OFF STOW RD., HARVARD

COMMONWEALTH OF MASSACHUSETTS

HARVARD, Massachusetts

Percolation Test* P-1097-2		
Date: <u>10/12/97</u>		Time: <u>AS BELOW</u>
Observation Hole #	<u>TH 1097-2</u>	<u>AFTER OVERNIGHT SOAK</u>
Depth of Perc	<u>80"</u>	<u>81"</u>
Start Pre-soak	<u>1:00</u>	<u>12:27</u>
End Pre-soak	<u>1:15</u>	<u>12:45</u>
Time at 12"	<u>1:15</u>	<u>12:45</u>
Time at 9"	<u>1:50</u>	<u>2:01</u>
Time at 6"	<u>OVERNIGHT SOAK</u>	<u>2:37 @ 8"</u>
Time (9"-6")	<u>REQUIRED</u>	
Rate Min./Inch		<u>OVER 30 MIN/IN</u>

* Minimum of 1 percolation test must be performed in both the primary area AND reserve area.

Site Passed ☐ Site Failed ☒

Performed By: WILLIAM MURRAY - DAVID E. ROSS ASSOC., INC.

Witnessed By: MR. DON MELOON R.S. - NABOH

Comments: _____





Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: 208-1 Date 3/31/98 Time Weather Sunny 85°

1. Location

Ground Elevation at Surface of Hole: Location (identify on plan):

2. Land Use Woodland (e.g., woodland, agricultural field, vacant lot, etc.) Surface Stones few Slope (%) 2

Vegetation trees Landform drownin Position on Landscape (attach sheet)

3. Distances from: Open Water Body 200'± feet Drainage Way 200'± feet Possible Wet Area 150'± feet
Property Line 100'± feet Drinking Water Well 200'± feet Other feet

4. Parent Material: glacial till Unsuitable Materials Present: ☐ Yes ☒ No

If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 31 Depth Weeping from Pit Depth Standing Water in Hole

Estimated Depth to High Groundwater: 32 inches elevation



Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

PINE HILL VILLAGE

C. On-Site Review (continued)

Deep Observation Hole Number: 398-1

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-8	A	10YR2/2				FSL	-		massive	friable	
8-20	B _L	10YR2/4				FSL	-		prismatic	friable	
20-36	C ₁	2.5Y5/4	32	5YR2/1	75%	FSL	-		granular 50% fines	firm in place	
36-112	C ₂	2.5Y5/3				FSL	-	10%	granular 50% fines	firm	

Additional Notes:

NOTES TAKEN FROM DAVID E. ROSS ASSOC. and NABOH

Soil Structure and Consistence added



Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number:

398-2

Date

3/31/98

Time

Weather

Sunny 80°

1. Location

Ground Elevation at Surface of Hole:

Location (identify on plan):

2. Land Use

woodland
(e.g., woodland, agricultural field, vacant lot, etc.)

few
Surface Stones

Slope (%)

Vegetation
trees

Landform
drumlin

Position on Landscape (attach sheet)

3. Distances from:

Open Water Body

200'±
feet

Drainage Way

200'±
feet

Possible Wet Area

120'±
feet

Property Line

150'±
feet

Drinking Water Well

200'±
feet

Other

feet

4. Parent Material:

glacial till

Unsuitable Materials Present:

☐ Yes

☒ No

If Yes:

☐ Disturbed Soil

☐ Fill Material

☐ Impervious Layer(s)

☐ Weathered/Fractured Rock

☐ Bedrock

5. Groundwater Observed:

☒ Yes

☐ No

If yes:

30
Depth Weeping from Pit

bottom
Depth Standing Water in Hole

Estimated Depth to High Groundwater:

30
inches

elevation



Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: 398-2

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth:	Color	Percent		Gravel	Cobbles & Stones			
0-2	A	10YR 3/2				PSL			massive	friable	
2-20	B	10YR 4/6				PSL			prismatic	friable	
20-36	C ₁	2.5YR 5/4	30	5YR 4/1	75%	PSL			granular w/ fines	firm in place	
36-81	C ₂	2.5Y 5/3				FS	10%	10%	granular	firm	

Additional Notes:

data taken from David E. Rees and NABOIL field notes

Soil structure and consistence added



Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number:

398-3

Date

5/31/98

Time

Weather

Sunny 80°

1. Location

Ground Elevation at Surface of Hole:

Location (identify on plan):

2. Land Use

woodland
(e.g., woodland, agricultural field, vacant lot, etc.)

few
Surface Stones

Slope (%)

trees
Vegetation

drumlin
Landform

Position on Landscape (attach sheet)

3. Distances from:

Open Water Body

200' ±
feet

Drainage Way

200' ±
feet

Possible Wet Area

150' ±
feet

Property Line

150' ±
feet

Drinking Water Well

200' ±
feet

Other

feet

4. Parent Material:

glacial fill

Unsuitable Materials Present:

☐ Yes

☒ No

If Yes:

☐ Disturbed Soil

☐ Fill Material

☐ Impervious Layer(s)

☐ Weathered/Fractured Rock

☐ Bedrock

5. Groundwater Observed:

☒ Yes

☐ No

If yes:

68
Depth Weeping from Pit

bottom
Depth Standing Water in Hole

Estimated Depth to High Groundwater:

32
inches

elevation



Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: 392-3

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-6	A	10YR 3/2				FSL			massive	friable	
6-21	B	10YR 4/6				FSL			prismatic	friable	
21-32	C ₁	2.5Y 5/4	32	5Y 2/1	>5%	FSL			granular w/ softening	firm in moist	
32-112	C ₂	2.5Y 5/3				FSL	10%	10%	granular (dense)	firm	

Additional Notes:

Date taken: David E. Ross Assoc. and NABON field notes
Soil Structure and Consistence added



Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

Owner Name
TRANSFORMATIONS, INC.

Street Address
PINE HILL VILLAGE

City
HARVARD

State
MA

MAILING ADDRESS:
TRANSFORMATIONS INC.
8 COPPERSMITH WAY
TOWNSEND MA 01469

Map/Lot #
M36/85 + 86.1
Zip Code
01461

LOT 2

B. Site Information

1. (Check one) ☒ New Construction ☐ Upgrade ☐ Repair
2. Published Soil Survey Available? ☒ Yes ☐ No
Soil Name PAXTON
Soil Limitations g.w. permeability
If yes: 1984 Year Published 1:20000 Publication Scale PcB Soil Map Unit
3. Surficial Geological Report Available? ☐ Yes ☒ No
Geologic Material GLACIAL TILL
Landform DRUMLIN
If yes: _____ Year Published _____ Publication Scale _____ Map Unit
4. Flood Rate Insurance Map
Above the 500-year flood boundary? ☒ Yes ☐ No Within the 100-year flood boundary? ☐ Yes ☒ No
Within the 500-year flood boundary? ☐ Yes ☒ No Within a velocity zone? ☐ Yes ☒ No
5. Wetland Area: National Wetland Inventory Map
N/A Wetlands Conservancy Program Map
Map Unit _____ Name _____
Map Unit _____ Name _____
6. Current Water Resource Conditions (USGS): _____ Month/Year Range: ☐ Above Normal ☒ Normal ☐ Below Normal
7. Other references reviewed: _____



Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: A-604 6/19/04 clay 20°
Date Time Weather

1. Location

Ground Elevation at Surface of Hole: 295.0 Location (identify on plan): _____

2. Land Use woodland few 3
(e.g., woodland, agricultural field, vacant lot, etc.) Surface Stones Slope (%)

small trees - no undergrowth Position on Landscape (attach sheet)
Vegetation Landform

3. Distances from: Open Water Body 7300' Drainage Way 7300 Possible Wet Area 150±
feet feet feet
Property Line 50± Drinking Water Well — Other feet
feet feet

4. Parent Material: glacial till Unsuitable Materials Present: ☐ Yes ☒ No

If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: Depth Weeping from Pit Depth Standing Water in Hole

Estimated Depth to High Groundwater: 33 292.25
inches elevation



Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: A-604

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-8	A	10YR3/2				SL			massive	friable	
8-26	B	7.5YR5/6				SL			columnar	friable	
26-104	C	5YR6/3	33	5YR5/8	75%	SL	10%	20%	50% gran. 50% platy	firm	

Additional Notes:

clayer not compacted



Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: B-604 Date 6/19/04 Time Weather cldy 80°

1. Location

Ground Elevation at Surface of Hole: 227.5 Location (identify on plan):

2. Land Use woodland (e.g., woodland, agricultural field, vacant lot, etc.) Surface Stones few Slope (%) 4
Vegetation Small trees - no undergrowth Landform drumlin Position on Landscape (attach sheet)

3. Distances from: Open Water Body >300 feet Drainage Way >300 feet Possible Wet Area >200 feet
Property Line 80± feet Drinking Water Well - feet Other feet

4. Parent Material: glacial till Unsuitable Materials Present: ☐ Yes ☒ No

If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: Depth Weeping from Pit Depth Standing Water in Hole

Estimated Depth to High Groundwater: 40 inches 284.17 elevation



Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: B-604

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0"-8"	A	10YR3/2				SL			massive	friable	
8"-26"	B	7.5YR5/6				SL			columnar	friable	
26"-114"	C	5YR6/3	40	5YR6/1	>5%	SL	15%	30%	granular	loose	

Additional Notes:



Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: 810-5 Date 8/17/10 Time _____ Weather Sunny 85°

1. Location

Ground Elevation at Surface of Hole: 285.5 Location (identify on plan): _____

2. Land Use woodland (e.g., woodland, agricultural field, vacant lot, etc.) Surface Stones few Slope (%) 3

small trees - no undergrowth Vegetation drumlin Landform Position on Landscape (attach sheet)

3. Distances from: Open Water Body >300 feet Drainage Way >300 feet Possible Wet Area 130+ feet
Property Line 50 feet Drinking Water Well - feet Other _____ feet

4. Parent Material: glacial till Unsuitable Materials Present: ☐ Yes ☒ No

If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: Depth Weeping from Pit _____ Depth Standing Water in Hole _____

Estimated Depth to High Groundwater: 30 inches 283.0 elevation



Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: 810-5

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-6	A	10YR3/2				SL			massive	friable	
6-22	B	7.5YR5/6				SL			columnar	friable	
22-102	C	5YR2.6/3	30	5YR2.6/1	75%	SL	20	30	70% gran 30% fines	firm in place	

Additional Notes:

Soil is not compacted



Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: GW-A Date 3/16/04 Time _____ Weather cldy 40

1. Location

Ground Elevation at Surface of Hole: 283.0 Location (identify on plan): _____

2. Land Use woodland (e.g., woodland, agricultural field, vacant lot, etc.) Surface Stones few Slope (%) 3

Vegetation Small trees Landform drumlin Position on Landscape (attach sheet) _____

3. Distances from: Open Water Body — feet Drainage Way 300+ feet Possible Wet Area 150+ feet
Property Line 40 feet Drinking Water Well — feet Other _____ feet

4. Parent Material: glacial till Unsuitable Materials Present: ☐ Yes ☒ No

If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: Depth Weeping from Pit _____ Depth Standing Water in Hole _____

Estimated Depth to High Groundwater: 27 inches 280.75 elevation



Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: GW-A

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-6	A	10YR3/2				SL			massive	friable	
6-27	B	7.5YR5/6				SL			columnar	friable	
27-108	C	5YR6/3	27	5YR6/1		SL	20	20	1/2 gran. 1/2 fines	Firm in place	

Additional Notes:



Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

PINE HILL VILLAGE

C. On-Site Review (minimum of two holes required at every proposed primary and reserved disposal area)

Deep Observation Hole Number: GW-B Date: 3/16/04 Time: _____ Weather: cldy 40

1. Location

Ground Elevation at Surface of Hole: 293.0 Location (identify on plan): _____

2. Land Use woodland (e.g., woodland, agricultural field, vacant lot, etc.) Surface Stones few Slope (%) 4

3. Distances from: Vegetation _____ Landform _____ Position on Landscape (attach sheet) _____
Open Water Body _____ feet Drainage Way _____ feet Possible Wet Area 150+ feet
Property Line 100 feet Drinking Water Well _____ feet Other _____ feet

4. Parent Material: glacial till Unsuitable Materials Present: ☐ Yes ☒ No

If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: Depth Weeping from Pit _____ Depth Standing Water in Hole _____

Estimated Depth to High Groundwater: 38 inches 287.83 elevation



Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

PINE HILL VILLAGE

C. On-Site Review (continued)

Deep Observation Hole Number: GW-B

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-6	A	10YR 3/2				SL			massive	friable	
6-24	B	7.5YR 5/6				SL			frable	friable	
24-74	C ₁	5YR 6/2	38	5YR 5/8		SL	20	20	granular (70%)	loose	
74-96	C ₂	frag rock				frag rock	-	-	-		

Additional Notes:



Commonwealth of Massachusetts

City/Town of _____

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

☐ Depth observed standing water in observation hole

A. _____
inches

B. _____
inches

☐ Depth weeping from side of observation hole

A. _____
inches

B. _____
inches

☒ Depth to soil redoximorphic features (mottles)

A. 33, 40,
inches

B. 30, 27, 38
inches

☐ Groundwater adjustment (USGS methodology)

A. _____
inches

B. _____
inches

2.

Index Well Number _____

Reading Date _____

Index Well Level _____

Adjustment Factor _____

Adjusted Groundwater Level _____

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

b. If yes, at what depth was it observed?

Upper boundary:

26 (ave)
inches

Lower boundary:

102 (ave)
inches



Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

Russell D. Wilson
Signature of Soil Evaluator
Russell D. Wilson SE 2621
Typed or Printed Name of Soil Evaluator / License #
Fra Grossman
Name of Board of Health Witness
(KALENE GARBARZ for hole B10-5)

9/12/10
Date
7/95
Date of Soil Evaluator Exam
HARVARD / NABOH
Board of Health

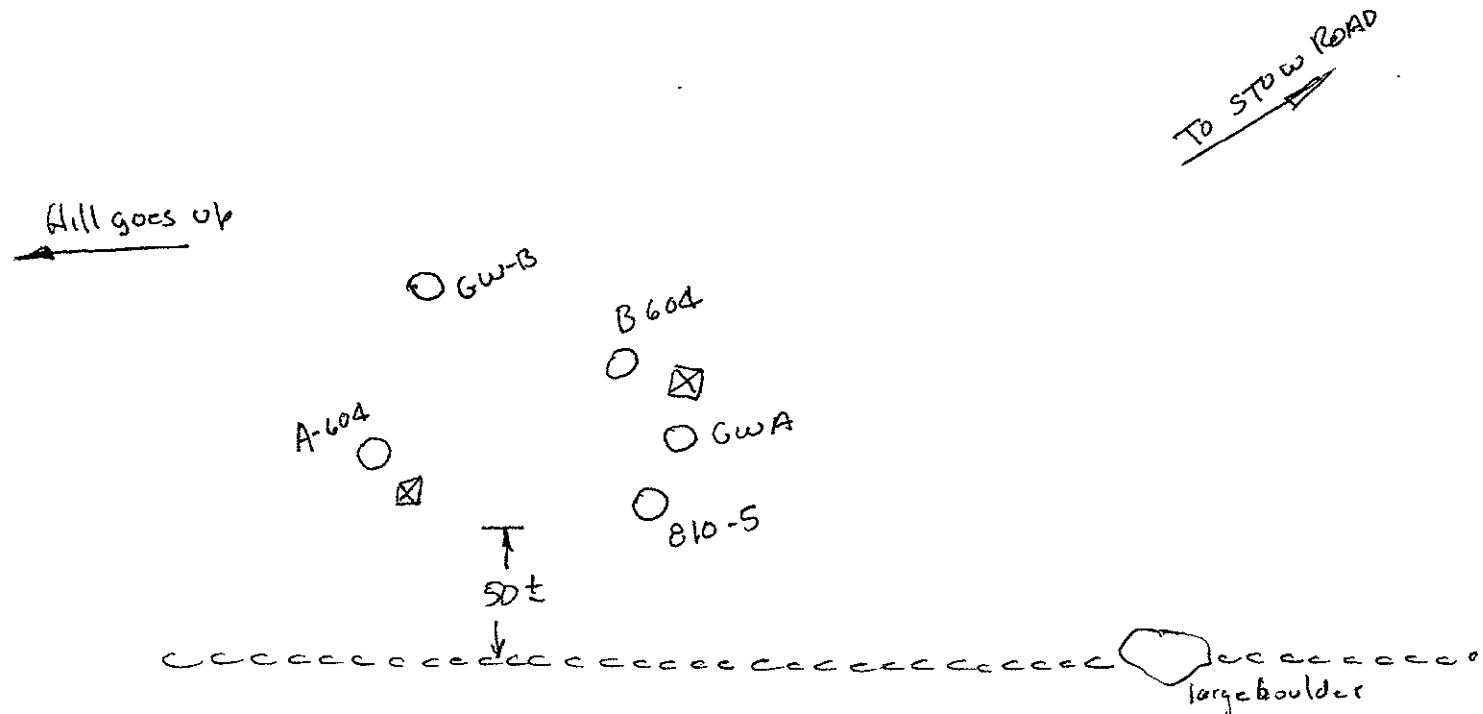
Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.



Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

Field Diagrams

Use this sheet for field diagrams:





Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

TRANSFORMATIONS INC
Owner Name

PINE HILL VILLAGE
Street Address

HARVARD
City

MA
State

MAILING ADDRESS ?
TRANSFORMATIONS INC
8 COPPERSMITH WAY
TOWNSEND, MASS 01469

M36 PCL 851241
Map/Lot #
01451
Zip Code

LOT 3

B. Site Information

1. (Check one) ☒ New Construction ☐ Upgrade ☐ Repair

2. Published Soil Survey Available? ☒ Yes ☐ No

WOODBRIDGE
Soil Name

If yes: 1984 Year Published 1:20000 Publication Scale W5B Soil Map Unit
high groundwater
Soil Limitations

3. Surficial Geological Report Available? ☐ Yes ☐ No

Geologic Material

If yes: Year Published Publication Scale Map Unit
Landform

4. Flood Rate Insurance Map

Above the 500-year flood boundary? ☒ Yes ☐ No

Within the 500-year flood boundary? ☐ Yes ☒ No

Within the 100-year flood boundary? ☐ Yes ☒ No

Within a velocity zone? ☐ Yes ☒ No

5. Wetland Area: National Wetland Inventory Map

N/A

Wetlands Conservancy Program Map

Map Unit Name

Map Unit Name

6. Current Water Resource Conditions (USGS): 8110 Month/Year

Range: ☐ Above Normal ☐ Normal ☒ Below Normal

7. Other references reviewed:



Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserved disposal area)

Deep Observation Hole Number: 810-3 Date: 8/17/10 Time: _____ Weather: Sunny 80°

1. Location
Ground Elevation at Surface of Hole: 320.0 Location (identify on plan): _____

2. Land Use Woodland (e.g., woodland, agricultural field, vacant lot, etc.) Surface Stones: none Slope (%): 3
Vegetation: hardwood trees Landform: dormin Position on Landscape (attach sheet): _____

3. Distances from: Open Water Body 300 ft Drainage Way 60 ft road Possible Wet Area 300 ft
Property Line 80 ft Drinking Water Well 215 ft Other _____

4. Parent Material: glacial till Unsuitable Materials Present: ☐ Yes ☒ No
If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: _____
Estimated Depth to High Groundwater: 30 inches _____ Depth Weeping from Pit _____ Depth Standing Water in Hole _____
elevation 317.5



Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number:

810-3

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-6	A	10YR 3/2				SL			massive	friable	
6-22	B	7.5YR 5/2				SL			prism	friable	
22-96	C	5YR 6/3	30	5YR 5/2	25%	SL	10%	15%	granular (some fines)	firm in place	

Additional Notes:

not compacted



Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserved disposal area)

Deep Observation Hole Number: F-04 Date 3/16/04 Time _____ Weather p. cldy 40°

1. Location

Ground Elevation at Surface of Hole: 315.0 Location (identify on plan): _____

2. Land Use woodland (e.g., woodland, agricultural field, vacant lot, etc.) none Surface Stones 3 Slope (%)
hardwood trees Vegetation drawn in Landform

3. Distances from: Open Water Body 300 ft Drainage Way 50 ft Possible Wet Area 300 ft
Property Line 50 ft Drinking Water Well 230 ft Other _____
glacial till Parent Material: proposed road

4. Parent Material: glacial till Unsuitable Materials Present: ☐ Yes ☒ No

If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: _____
Estimated Depth to High Groundwater: 32 inches _____
Depth Weeping from Pit _____ Depth Standing Water in Hole _____
312.3 elevation



Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: F-04

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-6	A	10YR3/2				SL			massive	friable	
6-28	B	7.5YR5/6				SL			prismatic	friable	
28-34	C	5YR6/3	32	10YR5/6	>5%	SL	10	10	granular fine fines	firm in place	

Additional Notes:

not compacted



Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserved disposal area)

Deep Observation Hole Number:

J-04

3/16/04

Date

Time

p. clay 40°

Weather

1. Location

Ground Elevation at Surface of Hole:

314.5

Location (identify on plan):

2. Land Use

Woodland
(e.g., woodland, agricultural field, vacant lot, etc.)

none
Surface Stones

3
Slope (%)

hard trees
Vegetation

dune
Landform

Position on Landscape (attach sheet)

3. Distances from:

Open Water Body

300+
feet

Drainage Way

100+
feet prop.

Possible Wet Area

300+
feet

Property Line

25+
feet

Drinking Water Well

210+
feet

Other

feet

4. Parent Material:

glacial till

Unsuitable Materials Present:

☐ Yes

☒ No

If Yes:

☐ Disturbed Soil

☐ Fill Material

☐ Impervious Layer(s)

☐ Weathered/Fractured Rock

☐ Bedrock

5. Groundwater Observed:

☐ Yes

☒ No

If yes:

Depth Weeping from Pit

Depth Standing Water in Hole

Estimated Depth to High Groundwater:

32
inches

211.8
elevation



Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: J-04

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0"-2"	A	10YR 2.5/2				SL			massive	friable	
6"-26"	B	7.5YR 2.5/6				SL			prismatic	friable	
26"-34"	C	5YR 6/3	32	5YR 5/6	>5%	SL	15	15	granular some fines	firm in pieces	

Additional Notes:

not compacted



Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: 200-3 Date 2/7/00 Time _____ Weather 30" p.cldy

1. Location

Ground Elevation at Surface of Hole: 321.0 Location (identify on plan): _____

2. Land Use

woodland
(e.g., woodland, agricultural field, vacant lot, etc.) Surface Stones none Slope (%) 3
hardwood trees
Vegetation Landform Position on Landscape (attach sheet)

3. Distances from:

Open Water Body 300 ft feet Drainage Way 130 ft feet Possible Wet Area 300 ft feet
Property Line 90 ft feet Drinking Water Well _____ feet Other _____ feet

4. Parent Material:

glacial till Unsuitable Materials Present: ☐ Yes ☒ No

If Yes:

☐

Disturbed Soil

☐

Fill Material

☐

Impervious Layer(s)

☐

Weathered/Fractured Rock

☐

Bedrock

5. Groundwater Observed: ☐ Yes

☒ No

If yes:

Depth Weeping from Pit

Depth Standing Water in Hole

Estimated Depth to High Groundwater:

32
inches

318.4
elevation

See evaluation by Seth Lajoie included

FORM 11 - SOIL EVALUATOR FORM
Page 3 of 7

Location Address or Lot No. Lots 1 Stow Rd., Harvard

DTH 200-3

On-site Review

Deep Hole Number: TH 200-3 Date: 2/7/00 Time: 1:30 PM Weather: 30° P. Cloudy

Location (identify on site plan) See attached sketch plan

Land Use Woodland Slope (%) 5-10% Surface Stones Stones ±5%

Vegetation Oaks and White Pines, Low Forest Vegetation

Landform Drumlin

Position on landscape (sketch on back) See sketch

Distances from:

Open Water Body >100' feet Drainage way >100' feet

Possible Wet Area >100' feet Property Line >100' feet

Drinking Water Well > 100' feet Other _____

DEEP OBSERVATION HOLE LOG*

Depth from Surface (Inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)
0 - 4"	Ap	Sandy Loam	10YR/4/4	few to none	blocky, friable, smooth border, <5 (% cobbles, stones, boulders)
4-29"	Bw	Sandy Loam	2.5Y/6/4	few to none	massive, friable, smooth border, <5% stones
29-112"	C	Sandy Loam	10YR/5/2	5% @ 32" 10YR/7/6 & 10YR/3/4	massive, friable, 5/5/10

* MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic): glacial till Depth to Bedrock: >112"

Depth to Groundwater: >112" Standing Water in Hole: none Weeping from pit face: none

Estimated Seasonal High Groundwater: 32"



Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

☐ Depth observed standing water in observation hole

A. _____
inches

B. _____
inches

☐ Depth weeping from side of observation hole

A. _____
inches

B. _____
inches

☒ Depth to soil redoximorphic features (mottles)

A. 32, 30
inches

B. 32, 32
inches

☐ Groundwater adjustment (USGS methodology)

A. _____
inches

B. _____
inches

2.

Index Well Number

Reading Date

Index Well Level

Adjustment Factor

Adjusted Groundwater Level

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes

☐ No

b. If yes, at what depth was it observed?

Upper boundary:

26
inches

Lower boundary:

84
inches



Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

Russell D. Wilson
Signature of Soil Evaluator

RUSSELL D. WILSON SE 2621
Typed or Printed Name of Soil Evaluator / License #

IRA GROSSMAN, KAREN GORBARZ
Name of Board of Health Witness

9/2/10
Date

7/95
Date of Soil Evaluator Exam

NABOH
Board of Health

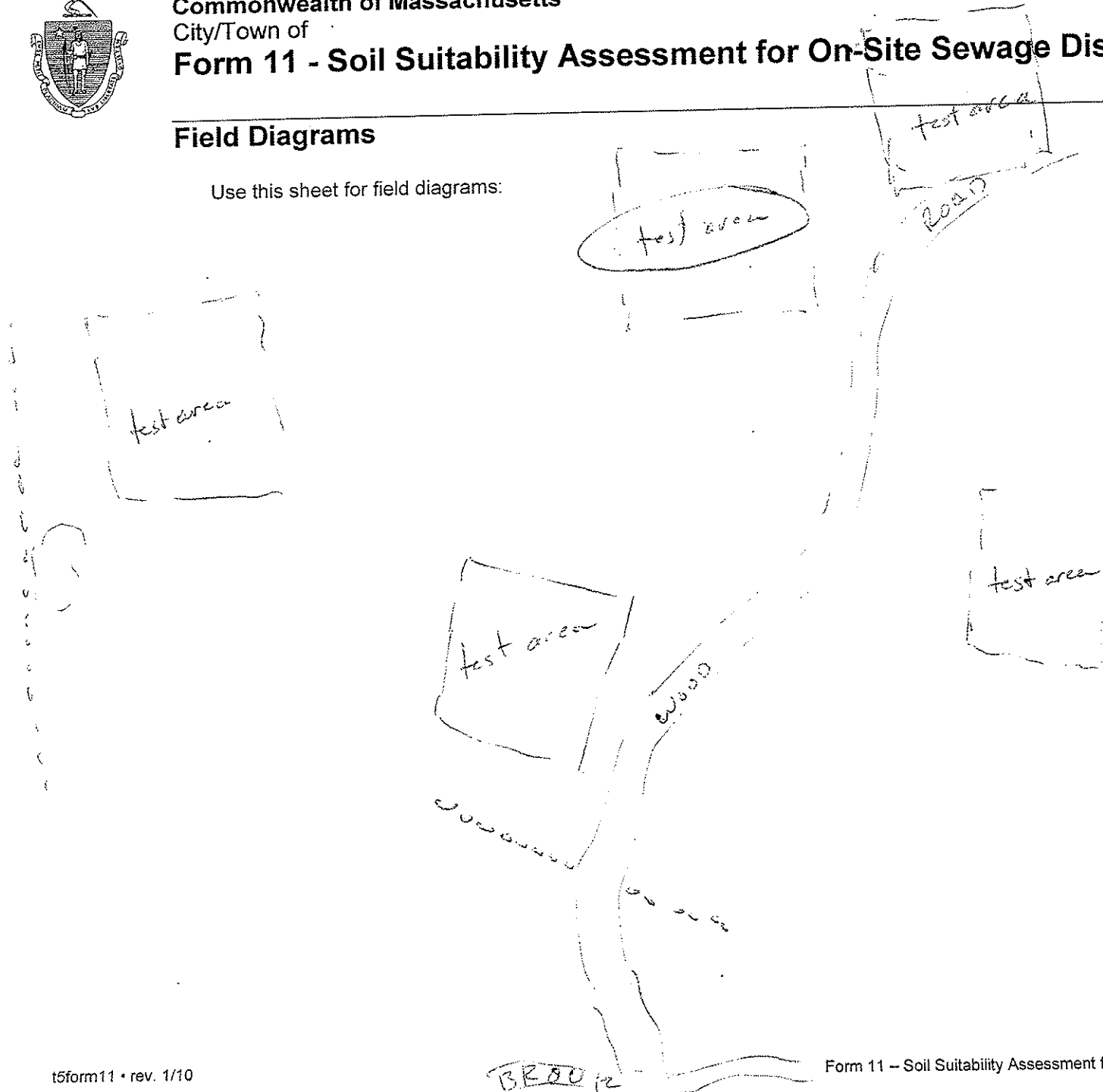
Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.



Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

Field Diagrams

Use this sheet for field diagrams:





Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

TRANSFORMATIONS, INC.

Owner Name

PINE HILL VILLAGE

Street Address

HARVARD

City

MA
State

MAILING ADDRESS:

TRANSFORMATIONS INC

8 COPPERSMITH WAY

TOWNSEND MA 01469

M 36 PCL 851 EC 1
Map/Lot #

01461
Zip Code

LOT 4

B. Site Information

1. (Check one) ☒ New Construction ☐ Upgrade

☐ Repair

2. Published Soil Survey Available? ☒ Yes ☐ No

If yes: 1984
Year Published

1:20000
Publication Scale

PcB
Soil Map Unit

PAXTON
Soil Name

Highway / permeability
Soil Limitations

3. Surficial Geological Report Available? ☐ Yes ☒ No

If yes: _____
Year Published

Publication Scale

Map Unit

Geologic Material

Landform

4. Flood Rate Insurance Map

Above the 500-year flood boundary? ☒ Yes ☐ No

Within the 100-year flood boundary? ☐ Yes ☒ No

Within the 500-year flood boundary? ☐ Yes ☒ No

Within a velocity zone? ☐ Yes ☒ No

5. Wetland Area: National Wetland Inventory Map

Map Unit

Name

Wetlands Conservancy Program Map

Map Unit

Name

6. Current Water Resource Conditions (USGS): _____
Month/Year

Range: ☐ Above Normal ☐ Normal ☒ Below Normal

7. Other references reviewed: _____



Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number:

010-4

Date

8/17/10

Time

Weather

Sunny 82°

1. Location

Ground Elevation at Surface of Hole:

317.50

Location (identify on plan):

2. Land Use

(e.g., woodland, agricultural field, vacant lot, etc.)

woodland

Surface Stones

few

Slope (%)

3

Vegetation

hardwood trees

Landform

drumlin

Position on Landscape (attach sheet)

3. Distances from:

Open Water Body

300'±
feet

Drainage Way

300'±
feet

Possible Wet Area

300'±
feet

Property Line

75'±
feet

Drinking Water Well

120'±
feet

Other

feet

4. Parent Material:

glacial till

Unsuitable Materials Present:

☐ Yes

☒ No

If Yes:

☐ Disturbed Soil

☐ Fill Material

☐ Impervious Layer(s)

☐ Weathered/Fractured Rock

☐ Bedrock

5. Groundwater Observed:

☐ Yes

☒ No

If yes:

Depth Weeping from Pit

Depth Standing Water in Hole

Estimated Depth to High Groundwater:

inches

30

elevation

315.0



Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number:

810-4

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-6	A	10YR2.3/2				SL			massive	friable	
6-20	B	7.5YR2.5/6				SL			prismatic	friable	
20-106	C	5YR 6/3	30	5YR5/6	>5%	SL	10	15	gran. y fines	firm in place	

Additional Notes:

Soil is not compacted



Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserved disposal area)

Deep Observation Hole Number: G-04 Date 3/16/04 Time _____ Weather partly cloudy

1. Location

Ground Elevation at Surface of Hole: 317.6 Location (identify on plan): _____

2. Land Use woodland (e.g., woodland, agricultural field, vacant lot, etc.) Surface Stones none Slope (%) 3
Vegetation mixed trees Landform drumlin Position on Landscape (attach sheet) _____

3. Distances from: Open Water Body 300'± feet Drainage Way 180'± (road) feet Possible Wet Area 300'± feet
Property Line 20'± feet Drinking Water Well 220'± feet Other _____ feet

4. Parent Material: _____ Unsuitable Materials Present: ☐ Yes ☐ No

If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: Depth Weeping from Pit 24 Depth Standing Water in Hole 24
Estimated Depth to High Groundwater: 32 inches 315.0 elevation



Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: G-04

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0" - 6"	A	10 YR 3/2				SL			massive	friable	
6" - 18"	B	7.5 YR 5/6	32	5 YR 5/6	>5%	SL			prismatic	friable	
20" - 126"	C	5 YR 6/3				SL	10	15	granular	firm in piece	

Additional Notes:

not compacted



Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserved disposal area)

Deep Observation Hole Number: H-04 3/16/04 12:40
Date Time Weather

1. Location

Ground Elevation at Surface of Hole: 315.6 Location (identify on plan): _____

2. Land Use woodland none 3
(e.g., woodland, agricultural field, vacant lot, etc.) Surface Stones Slope (%)

hardwood trees drumlin
Vegetation Landform

3. Distances from: Open Water Body 300'± Drainage Way 150' (road) Possible Wet Area 300'±
feet feet feet
Property Line 55'± Drinking Water Well 250'± Other _____
feet feet feet

4. Parent Material: glacial till Unsuitable Materials Present: ☐ Yes ☒ No

If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 84 84
Depth Weeping from Pit Depth Standing Water in Hole

Estimated Depth to High Groundwater: 30 315.6
inches elevation



Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: H-04

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-6	A	10YR3/2				SL			massive	friable	
6-24	B	7.5YR2.5/6				SL			prismatic	friable	
24-77	C ₁	5YR 6/3	30	5YR5/6	>5%	LS	15	10	gran.	loose	
77-88	C ₂	5YR2.5/4				SL	10	15	gran w/ roots	firm in place	

Additional Notes:

not compacted



Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

PINE HILL VILLAGE

C. On-Site Review (minimum of two holes required at every proposed primary and reserved disposal area)

Deep Observation Hole Number: I-04 3/16/04 _____ partly cloudy
Date Time Weather

1. Location

Ground Elevation at Surface of Hole: 315.2 Location (identify on plan): _____

2. Land Use

woodland none 3
(e.g., woodland, agricultural field, vacant lot, etc.) Surface Stones Slope (%)

hardwood trees drumlin
Vegetation Landform

3. Distances from:

Open Water Body 300+ Drainage Way 200+ Possible Wet Area 300+
feet feet feet
Property Line 95+ Drinking Water Well 180+ Other _____
feet feet feet

4. Parent Material:

glacial till Unsuitable Materials Present: ☐ Yes ☒ No

If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No

If yes: 0.4 0.4
Depth Weeping from Pit Depth Standing Water in Hole

Estimated Depth to High Groundwater: 30 312.7
inches elevation



Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

PIWE HILL VILLAGE

Deep Observation Hole Number:

I-04

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-6	A	10YR2.3/2				SL			massive	friable	
6-24	B	7.5YR5/6				SL			prismatic	streaky	
24-77	C ₁	5YR6/3	30	5YR5/8	>15	LS	15	10	loose	gran	
77-124	C ₂	5YR5/4				SL	10	15	firm in place	gran. - 1/4" fines	

Additional Notes:

not compacted



Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number:

200-4

Dug 2/7/00 Seth Lajoie Soil evaluator

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-6	Ap	10YR 3/2				SL			massive	friction	
6-30	Bw	7.5YR 5/6				SL			prismatic	friction	
30-92	C	5YR 5/2	32	5YR 5/2	75%	SL	15	10	firm in place	firm w/ fines	

Additional Notes:



Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

☐ Depth observed standing water in observation hole

☐ Depth weeping from side of observation hole

☒ Depth to soil redoximorphic features (mottles)

☐ Groundwater adjustment (USGS methodology)

A. 30"
inches
A. _____
inches
A. _____
inches
A. _____
inches

B. 30"
inches
B. _____
inches
B. _____
inches
B. _____
inches

2.

Index Well Number

Reading Date

Index Well Level

Adjustment Factor

Adjusted Groundwater Level

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes

☐ No

b. If yes, at what depth was it observed?

Upper boundary:

24
inches

Lower boundary:

92
inches



Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserved disposal area)

Deep Observation Hole Number: 200-4 2/7/00 Sunny 40
Date Time Weather

1. Location

Ground Elevation at Surface of Hole: 314.0 Location (identify on plan): _____

2. Land Use woodland none 4
(e.g., woodland, agricultural field, vacant lot, etc.) Surface Stones Slope (%)

deciduous trees drumlin _____
Vegetation Landform Position on Landscape (attach sheet)

3. Distances from: Open Water Body 300+ Drainage Way 175+ Possible Wet Area 300+
feet feet feet
Property Line 75+ Drinking Water Well 210+ Other _____
feet feet feet

4. Parent Material: glacial till Unsuitable Materials Present: ☐ Yes ☒ No

If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: _____
Depth Weeping from Pit Depth Standing Water in Hole
Estimated Depth to High Groundwater: 32 311.3
inches elevation



Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

Russell D. Wilson
Signature of Soil Evaluator

Russell D. Wilson
Typed or Printed Name of Soil Evaluator / License #

Era Grossman, Kalene Gorberg
Name of Board of Health Witness Ron Overton

9/1/10
Date

7/95
Date of Soil Evaluator Exam

NABOH
Board of Health

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.



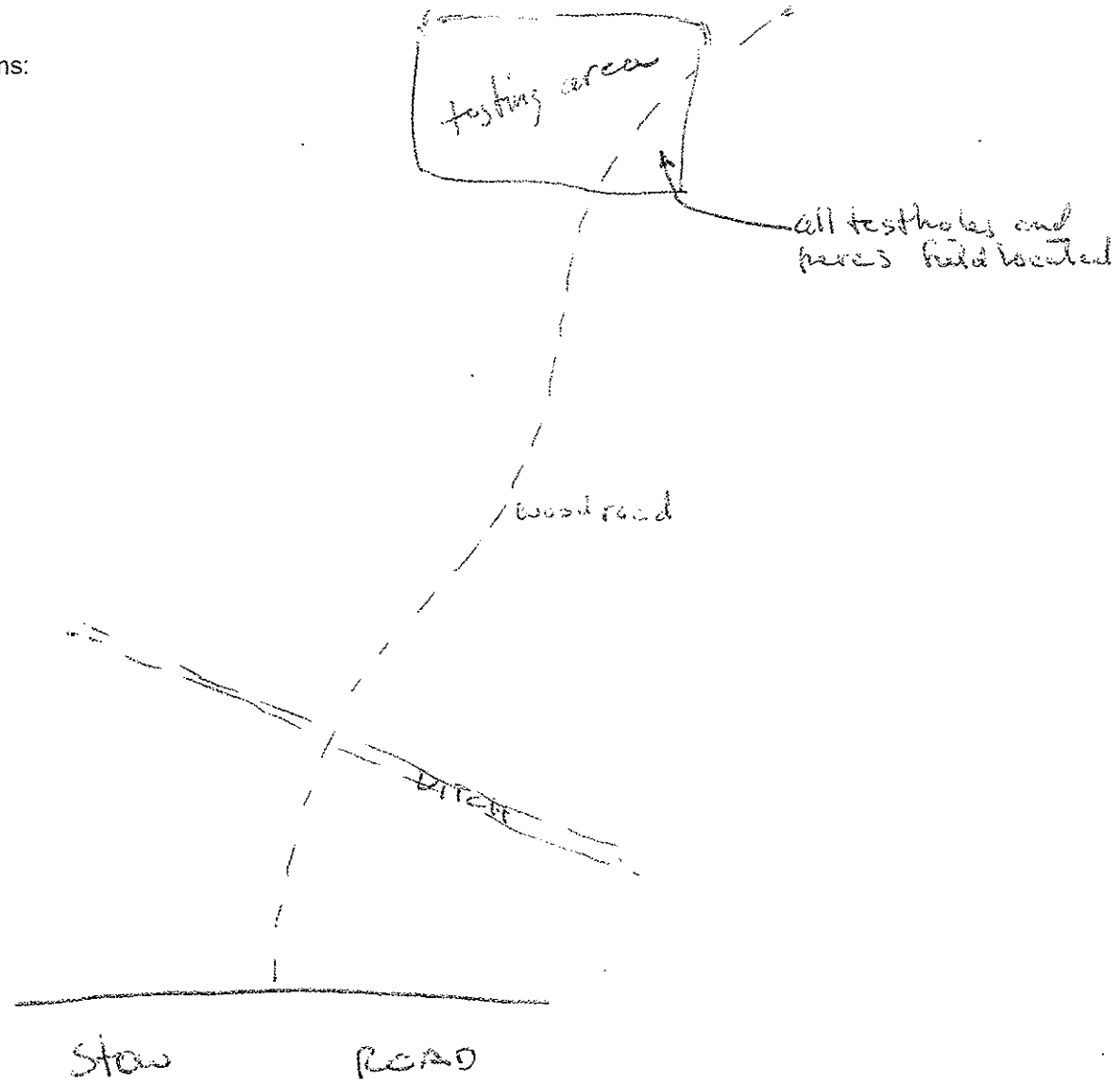
Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

Field Diagrams

Use this sheet for field diagrams:





Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

TRANSFORMATIONS INC.

Owner Name

PINE HILL VILLAGE

Street Address

HARVARD

City

MA
State

MAILING ADDRESS:
TRANSFORMATIONS INC.
8 COPPERSMITH WAY
TOWNSEND MA 01469

M3C PCLS 85186
Map/Lot #

01461
Zip Code

LOT 5

B. Site Information

1. (Check one) ☒ New Construction ☐ Upgrade ☐ Repair
2. Published Soil Survey Available? ☒ Yes ☐ No If yes: 1984 Year Published 1:20000 Publication Scale P.B. Soil Map Unit
PAXTON Soil Name g.w. permeability Soil Limitations
3. Surficial Geological Report Available? ☐ Yes ☒ No If yes: Year Published Publication Scale Map Unit
glacial till Geologic Material Drumlin Landform
4. Flood Rate Insurance Map
- Above the 500-year flood boundary? ☒ Yes ☐ No Within the 100-year flood boundary? ☐ Yes ☒ No
- Within the 500-year flood boundary? ☐ Yes ☒ No Within a velocity zone? ☐ Yes ☒ No
5. Wetland Area: National Wetland Inventory Map Map Unit Name
N/A Wetlands Conservancy Program Map Map Unit Name
6. Current Water Resource Conditions (USGS): Month/Year Range: ☐ Above Normal ☒ Normal ☐ Below Normal
7. Other references reviewed:



Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserved disposal area)

Deep Observation Hole Number: A-1004 Date 10/20/04 Time _____ Weather pcdy 40°

1. Location

Ground Elevation at Surface of Hole: 303.0 Location (identify on plan): _____

2. Land Use woodland (e.g., woodland, agricultural field, vacant lot, etc.) Surface Stones none Slope (%) 3

Vegetation small trees Some undergrowth Landform drumlin Position on Landscape (attach sheet) _____

3. Distances from: Open Water Body _____ feet Drainage Way _____ feet Possible Wet Area 300+ feet
Property Line 100+ feet Drinking Water Well 200+ feet Other _____ feet

4. Parent Material: glacial fill Unsuitable Materials Present: ☐ Yes ☒ No

If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: Depth Weeping from Pit 99" Depth Standing Water in Hole 99"

Estimated Depth to High Groundwater: 25 inches 300.92 elevation



Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: A-1004

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-6	A	10YR3/2				SL			massive	friable	
6-24	B	7.5YR5/6				SL			columnar	friable	
24-120	C	5YR4/4	25	5YR5/8	75%	SL	10	5	60% gran 40% fines	firm in place	

Additional Notes:

C layer : not compacted



Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number:

B-1004

Date

10/20/04

Time

Weather

pcldr 40°

1. Location

Ground Elevation at Surface of Hole:

300.6

Location (identify on plan):

2. Land Use

Woodland
(e.g., woodland, agricultural field, vacant lot, etc.)

none
Surface Stones

3
Slope (%)

small trees
Vegetation

drumlin
Landform

Position on Landscape (attach sheet)

3. Distances from:

Open Water Body

-
feet

Drainage Way

-
feet

Possible Wet Area

200+
feet

Property Line

100 ±
feet

Drinking Water Well

200+
feet

Other

-
feet

4. Parent Material:

glacial till

Unsuitable Materials Present:

☐ Yes

☒ No

If Yes:

☐ Disturbed Soil

☐ Fill Material

☐ Impervious Layer(s)

☐ Weathered/Fractured Rock

☐ Bedrock

5. Groundwater Observed:

☐ Yes

☒ No

If yes:

Depth Weeping from Pit

Depth Standing Water in Hole

Estimated Depth to High Groundwater:

inches

52

296.27
elevation



Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: B-1004

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-6	A	10YR3/2				SL			massive		
6-26	B	7.5YR5/6				SL			columnar		
26-114	C	5YR6/3	52	5YR5/8	75%	SL	20	30	granular (20% fines)		

Additional Notes:

Soil in C layer - not compacted



Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: 810-1 Date: 2/17/10 Time: _____ Weather: Sunny 80°

1. Location

Ground Elevation at Surface of Hole: 305.0 Location (identify on plan): _____

2. Land Use Woodland (e.g., woodland, agricultural field, vacant lot, etc.) Surface Stones none Slope (%) 3

Vegetation Small trees Landform drumlin Position on Landscape (attach sheet) _____

3. Distances from: Open Water Body - feet Drainage Way 200+ feet Possible Wet Area 200+ feet

Property Line 60± feet Drinking Water Well 200+ feet Other _____ feet

4. Parent Material: glacial till Unsuitable Materials Present: ☐ Yes ☒ No

If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: _____ Depth Weeping from Pit _____ Depth Standing Water in Hole _____

Estimated Depth to High Groundwater: 38 inches 301.83 elevation



Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: 810-1

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-6	A	10YR3/2				SL			massive	friable	
6-24	B	7.5YR5/1				SL			columnar	friable	
24-96	C	5YR 6/3	38	5YR5/8	75%	SL	30	10	granular (20% fines)	firm in place	

Additional Notes:

C layer: not compacted



Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: 810-2 Date 8/17/10 Time _____ Weather Sunny 80°

1. Location

Ground Elevation at Surface of Hole: 303.5 Location (identify on plan): _____

2. Land Use woodland (e.g., woodland, agricultural field, vacant lot, etc.) Surface Stones none Slope (%) 3

small trees Vegetation dromlin Landform Position on Landscape (attach sheet)

3. Distances from: Open Water Body _____ feet Drainage Way _____ feet Possible Wet Area 200+ feet

Property Line 60± feet Drinking Water Well 200+ feet Other _____ feet

4. Parent Material: glacial till Unsuitable Materials Present: ☐ Yes ☒ No

If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: Depth Weeping from Pit _____ Depth Standing Water in Hole _____

Estimated Depth to High Groundwater: 38 inches 300.33 elevation



Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number:

810-2

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-6	A	10YR 3/2				SL			massive	friable	
6-24	B	7.5YR 5/6				SL			columnar	friable	
24-76	C	5YR 6/3	38	5YR 5/8	75%	SL	20	20	granular 30% fines	firm in place	

Additional Notes:

boulder @ bottom hole Soil in C layer - not compacted



Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

☐ Depth observed standing water in observation hole

A. _____
inches

B. _____
inches

☐ Depth weeping from side of observation hole

A. _____
inches

B. _____
inches

☒ Depth to soil redoximorphic features (mottles)

A. 25, 52
inches

B. 38, 38
inches

☐ Groundwater adjustment (USGS methodology)

A. _____
inches

B. _____
inches

2.

Index Well Number

Reading Date

Index Well Level

Adjustment Factor

Adjusted Groundwater Level

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes

☐ No

b. If yes, at what depth was it observed?

Upper boundary:

24
inches

Lower boundary:

96
inches



Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

Russell D. Wilson
Signature of Soil Evaluator
Russell D. Wilson SE 2621
Typed or Printed Name of Soil Evaluator / License #
Ira Grossman
Name of Board of Health Witness
KALENE GARBARTZ (810-1 & 810-2)

9/12/10
Date
7/95
Date of Soil Evaluator Exam
NABOH
Board of Health

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.



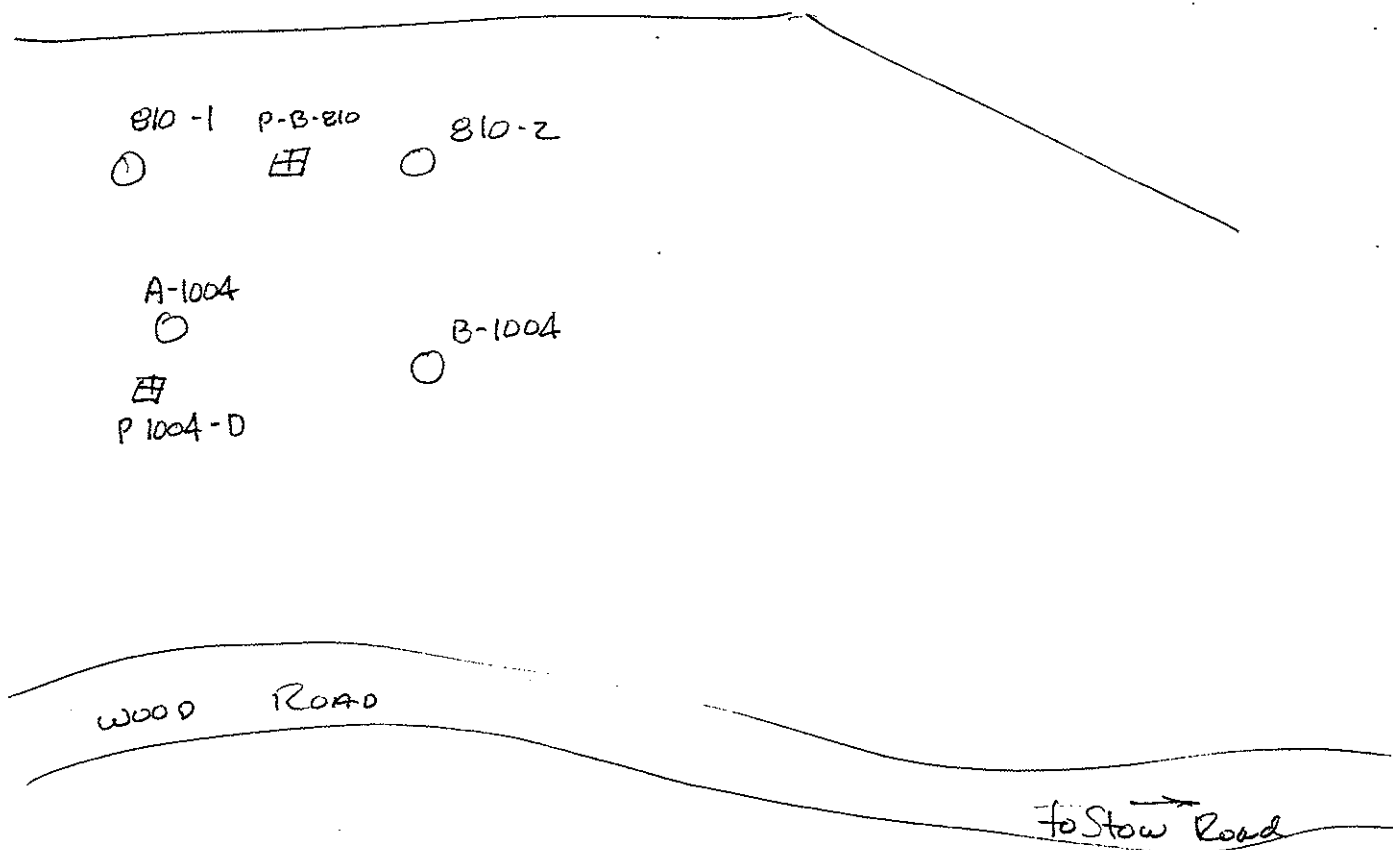
Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

Field Diagrams

Use this sheet for field diagrams:



BW0118 - Pine Hill Village Infiltration Tests: 8/18/2010

Weather: 80° and mostly sunny

Soils Information:

Test Pit ID	Depth Below Ground Surface (BGS)	Soil Description
TP#1	0-6"	brown organic soils
	6-18"	medium tan, silt with trace sand; gravel present
	18-84"	light tan, silt with trace sand; gravel present
	78"	seasonal high groundwater observed
TP#2	0-10"	brown organic soils
	10-24"	medium brown, silt with trace sand
	24-36"	light gray, silt/clay with trace sand
	36"	seasonal high groundwater observed
TP#3	0-10"	brown organic soils
	10-18"	medium brown, silt with trace sand
	18-36"	light gray, silt/clay with trace sand
	36"	seasonal high groundwater observed
TP#4	0-6"	brown organic soils
	6-30"	medium brown, silt with trace sand
	30"	seasonal high groundwater observed
TP#5	0-10"	brown organic soils
	10-28"	medium brown, silt with trace sand
	28-36"	light gray, silt/clay with trace sand
	36"	seasonal high groundwater observed
TP#6	0-6"	brown organic soils
	6-36"	medium tan, silt with trace sand; gravel present
	36"	seasonal high groundwater observed
TP#7	0-6"	brown organic soils
	6-36"	medium tan, silt with trace sand; gravel present
	36"	seasonal high groundwater observed
TP#8	0-6"	brown organic soils
	6-36"	medium tan, silt with trace sand; gravel present
	36"	seasonal high groundwater observed
TP#9	0-6"	brown organic soils
	6-36"	medium tan, silt with trace sand; gravel present
	36"	seasonal high groundwater observed
TP#10	0-10"	brown organic soils
	10-30"	medium brown, silt with trace sand
	30-36"	light gray, silt/clay with trace sand
	78"	seasonal high groundwater observed

Test Pit Information: 4/14/2011

Test Pit ID	Depth Below Ground Surface (BGS)	Soil Description
TH#1	28"	seasonal high groundwater observed
TH#2	26"	seasonal high groundwater observed
TH#3	24"	seasonal high groundwater observed

BW0118 - Pine Hill Village Infiltration Tests: 8/18/2010**Weather:** 80° and mostly sunny**Soils Information:**

Test Pit ID	Depth Below Ground Surface (BGS)	Soil Description
TP#1	0-6"	brown organic soils
	6-18"	medium tan, silt with trace sand; gravel present
	18-84"	light tan, silt with trace sand; gravel present
	78"	seasonal high groundwater observed
TP#2	0-10"	brown organic soils
	10-24"	medium brown, silt with trace sand
	24-36"	light gray, silt/clay with trace sand
	36"	seasonal high groundwater observed
TP#3	0-10"	brown organic soils
	10-18"	medium brown, silt with trace sand
	18-36"	light gray, silt/clay with trace sand
	36"	seasonal high groundwater observed
TP#4	0-6"	brown organic soils
	6-30"	medium brown, silt with trace sand
	30"	seasonal high groundwater observed
TP#5	0-10"	brown organic soils
	10-28"	medium brown, silt with trace sand
	28-36"	light gray, silt/clay with trace sand
	36"	seasonal high groundwater observed
TP#6	0-6"	brown organic soils
	6-36"	medium tan, silt with trace sand; gravel present
	36"	seasonal high groundwater observed
TP#7	0-6"	brown organic soils
	6-36"	medium tan, silt with trace sand; gravel present
	36"	seasonal high groundwater observed
TP#8	0-6"	brown organic soils
	6-36"	medium tan, silt with trace sand; gravel present
	36"	seasonal high groundwater observed
TP#9	0-6"	brown organic soils
	6-36"	medium tan, silt with trace sand; gravel present
	36"	seasonal high groundwater observed
TP#10	0-10"	brown organic soils
	10-30"	medium brown, silt with trace sand
	30-36"	light gray, silt/clay with trace sand
	78"	seasonal high groundwater observed

BW0118 - Pine Hill Village Infiltration Tests: 8/18/2010
Weather: 80° and mostly sunny

Double ring infiltrometer test
TP#1 (7 ft Below Ground Surface)

$V_{IR} = \Delta V_{IR} / (A_{IR} * \Delta t)$	Inner ring incremental infiltration velocity (cm/h)
ΔV_{IR}	Volume of liquid used during time interval to maintain constant head in the inner ring (cm ³)
A_{IR}	Internal area of inner ring (cm ²)
Δt	Time interval (h)

$V_A = \Delta V_A / (A_A * \Delta t)$	Annular space increment infiltration velocity (cm/h)
ΔV_A	Volume of liquid used during time interval to maintain constant head in the annular space between the ring I (cm ³)
A_A	Area of annular space between the rings

	Inner Ring	Outer Ring	Annulus
Diameter (cm)	30	60	
Area (cm ²)	706.9	2827	2121

time (min)	Δt (hr)	Ring Flow (cm ³)	ΔV_{IR} (cm ³)	Space Flow (cm ³)	ΔV_A (cm ³)	V_{IR} (cm/h)	V_A (cm/h)	V_{IR} (in/h)	V_A (in/h)
0.00		0		3000					
2.75	0.05	100	100	4500	1500	3.08664	15.4332066	1.2152	6.076066
6.50	0.06	400	300	5500	1000	6.79061	7.545123228	2.6735	2.970521
9.75	0.05	750	350	6700	1200	9.14121	10.4470937	3.5989	4.113029
13.00	0.05	900	150	7000	300	3.91766	2.611773425	1.5424	1.028257
17.50	0.08	900	0	7000	0	0	0	0	0
25.00	0.13	900	0	7000	0	0	0	0	0
53.75	0.48	1353	453	8650	1650	1.33746	1.623841738	0.5266	0.639308
85.75	0.53	2125	772	12400	3750	2.04779	3.315727981	0.8062	1.305405
					Average	1.69262	2.46978486	0.6664	0.972356
							50% of Avg.	0.333	

Soils Information:

0-5" brown organic soils
 5-16" medium tan, silt with trace sand; gravel present
 16-84" light tan, silt with trace sand; gravel present

BW0118 - Pine Hill Village Infiltration Tests: 8/18/2010**Weather:** 80° and mostly sunny**Double ring infiltrometer test****TP#2** (6 inches Below Ground Surface)

$V_{IR} = \Delta V_{IR} / (A_{IR} * \Delta t)$	Inner ring incremental infiltration velocity (cm/h)
ΔV_{IR}	Volume of liquid used during time interval to maintain constant head in the inner ring (cm ³)
A_{IR}	Internal area of inner ring (cm ²)
Δt	Time interval (h)

$V_A = \Delta V_A / (A_A * \Delta t)$	Annular space increment infiltration velocity (cm/h)
ΔV_A	Volume of liquid used during time interval to maintain constant head in the annular space between the ring l (cm ³)
A_A	Area of annular space between the rings

		Inner Ring	Outer Ring	Annulus						
Diamter (cm)		30	60							
Area (cm ²)		706.9	2827	2121						
time (min)	Δt (hr)	Ring Flow (cm ³)	ΔV _{IR} (cm ³)	Space Flow (cm ³)	ΔV _A (cm ³)	V _{IR} (cm/h)	V _A (cm/h)	V _{IR} (in/h)	V _A (in/h)	
0.00		2050								
15.25	0.25	3600	1550			8.62742		3.3966		
21.00	0.10	4800	1200			17.7146		6.9743		
21.00	0.00	50								
29.25	0.14	1050	1000			10.2888		4.0507		
36.50	0.12	2150	1100			12.8787		5.0704		
43.75	0.12	3450	1300			15.2203		5.9923		
49.25	0.09	4200	750			11.5749		4.557		
					Average	12.7175		5.0069		
							50% of Avg.	2.503		

Soils Information:

0-10" brown organic soils
 10-24" medium brown, silt with trace sand
 24-36" light gray, silt/clay with trace sand

BW0118 - Pine Hill Village Infiltration Tests: 8/18/2010**Weather:** 80° and mostly sunny**Double ring infiltrometer test****TP#4** (2.5 ft Below Ground Surface)

$V_{IR} = \Delta V_{IR} / (A_{IR} * \Delta t)$	Inner ring incremental infiltration velocity (cm/h)
ΔV_{IR}	Volume of liquid used during time interval to maintain constant head in the inner ring (cm ³)
A_{IR}	Internal area of inner ring (cm ²)
Δt	Time interval (h)

$V_A = \Delta V_A / (A_A * \Delta t)$	Annular space increment infiltration velocity (cm/h)
ΔV_A	Volume of liquid used during time interval to maintain constant head in the annular space between the ring I (cm ³)
A_A	Area of annular space between the rings

	Inner Ring	Outer Ring	Annulus
Diameter (cm)	30	60	
Area (cm ²)	706.9	2827	2121

time (min)	Δt (hr)	Ring Flow (cm ³)	ΔV_{IR} (cm ³)	Space Flow (cm ³)	ΔV_A (cm ³)	V_{IR} (cm/h)	V_A (cm/h)	V_{IR} (in/h)	V_A (in/h)
0.00		2275		4300					
30.25	0.50	3050	775	7500	3200	2.17468	2.993106735	0.8562	1.178388
46.00	0.26	3600	550	9900	2400	2.96416	4.311498987	1.167	1.697441
66.00	0.33	4300	700	12200	2300	2.97089	3.253834392	1.1696	1.281037
					Average	2.70324	3.519480038	1.0643	1.385622
							50% of Avg.	0.532	

Soils Information:

0-6" brown organic soils

6-30" medium brown, silt with trace sand

ATTACHMENT B

Design Calculations

Pine Hill Village

Appendix B.1 – Recharge Calculations

Attachment B.1 – Recharge Volume Calculations

Standard 3. Stormwater Recharge

RECHARGE VOLUME

STEP 1) REQUIRED RECHARGE VOLUME

Calculate *Required Recharge Volume*.⁷ The *Required Recharge Volume* equals a depth of runoff corresponding to the soil type times the impervious areas covering that soil type at the post-development site.

$$Rv = F \times \text{impervious area} \quad \text{Equation (1)}$$

Rv = *Required Recharge Volume*, expressed in Ft³, cubic yards, or acre-feet

F = Target Depth Factor associated with each Hydrologic Soil Group

Impervious Area = pavement and rooftop area on site

For Impervious Areas (excludes pervious paver walkways):

Soil Type	Soil Texture	F (in)	Imp. Area (ac)	Rv (cf)
(Table 2.3.2)	(Table 2.3.2)	(Table 2.3.2)	(from plans)	-
HSG A	sand	0.60	0.00	0
HSG B	loam	0.35	1.65	2096
HSG C	silty loam	0.25	0.52	472
HSG D	clay	0.10	0.00	0
		Total	2.17	2568

Step 2) Sizing Storage Volume Using Static Method

A) Static Method - *Rv* does not change ***Rv* = 2568 cf**

Note: Since the Required Water Quality Volume is higher; the BMPs will be sized to capture and treat the Required Water Quality Volume.

Pine Hill Village
Appendix B.2 – Drawdown Calculations

Attachment B.2 Drawdown within 72 hours

$$Time_{drawdown} = \frac{R_v}{(K)(Bottom\ Area)}$$

Where:

R_v = Storage Volume

K = Saturated Hydraulic Conductivity For “Static” and “Simple Dynamic” Methods, use Rawls Rate (see Table 2.3.3). For “Dynamic Field” Method, use 50% of the in-situ saturated hydraulic conductivity.

Bottom Area = Bottom Area of Recharge Structure²²

Raingarden ID	Storage Volume (cf)	Saturated Hydraulic Conductivity (K) (in/hr)	Bottom Area (sf)	Drawdown Time (hrs)
RG #3	338	0.52	423.0	18.46
RG #4	743	0.52	391.0	43.85
RG #5	485	0.52	266.0	42.12
RG #10	509	0.52	334.0	35.19
RG #11	281	0.52	184.0	35.19
RG #12	760	0.52	584.5	30.00
RG #13	706	0.52	415.3	39.21
RG #14	273	0.52	206.5	30.55
RG #19	2127	0.52	1309.0	37.50
RG #20	1191	0.52	733.0	37.50
RG #21	748	0.52	650.0	26.54
RG #22	853	0.52	656.0	30.00
RG #23	568	0.52	413.0	31.73
Bus Station	2200	0.52	1222.0	41.54
Cul-de-sac	4393	0.52	2834.0	35.77

NOTE: Raingardens designed to exfiltrate were evaluated for drawdown time. Raingardens that are lined were not included in the drawdown calculation (RG 15, 16).

Total Storage Volume

Provided = 6223 cf

Total Storage Volume > Required Recharge Volume **OK**

Total Storage Volume > Required Water Quality Volume **OK**

Standard 4. Water Quality Volume Calculations

WATER QUALITY TREATMENT VOLUME²⁶

$$V_{WQ} = (D_{WQ}/12 \text{ inches/foot}) * (A_{IMP} * 43,560 \text{ square feet/acre}) \quad \text{Equation (3)}$$

V_{WQ} = Required Water Quality Volume (in cubic feet)
 D_{WQ} = Water Quality Depth: one-inch for discharges within a Zone II or Interim Wellhead Protection Area, to or near another critical area, runoff from a LUHPPL, or exfiltration to soils with infiltration rate greater than 2.4 inches/hour or greater; ½-inch for discharges near or to other areas.
 A_{IMP} = Impervious Area (in acres)

For Impervious Areas (outside IWPA):

D (WQ) =	0.5 in
Total Area =	9.80 acres
A (IMP)=	1.17 acres
V (WQ)=	2124 cf

For Impervious Areas (inside IWPA):

D (WQ) =	1 in
Total Area =	7.36 acres
A (IMP)=	1.13 acres
V (WQ)=	4102 cf

Total Required Water Quality Volume = 6225 cf

Pine Hill Village

Appendix B.4 – Raingarden Schedule

RAINGARDEN SCHEDULE

Raingarden ID*	Designed to Exfiltrate (No = Lined) ¹	Standard Detail No. (Figure 5)	Drainage Area (Ft^2)	Drainage Area (ac)	Impervious Area (ac)	BMP Water Quality Volume (cf) ²	Storage Volume (cf) ^{3, 5}	Surface Area (sf)	Depth of Bioretention Soil (ft)	Pre-treatment Device ⁴	Rim Elev. (ft)	Base Elev. (ft)	High Groundwater Elevation (ft)	Existing Ground Surface Elevation (ft)
<i>RG #3</i>	YES	C	6534	0.150	0.070	254	338	423	0.50	V	311.0	309.5	301.5	304.0
<i>RG #4</i>	YES	A	1525	0.035	0.012	44	743	391	3.00	GV	307.0	302.4	299.5	302.0
<i>RG #5</i>	YES	A	2265	0.052	0.021	76	485	266	3.00	GV	307.0	302.7	298.5	301.0
<i>RG #10</i>	YES	A	2091	0.048	0.015	54	509	334	2.00	GV	307.1	303.8	301.5	304.0
<i>RG #11</i>	YES	A	1873	0.043	0.027	98	281	184	2.00	GV	307.1	303.8	301.5	304.0
<i>RG #12</i>	YES	A	9278	0.213	0.050	182	760	585	1.25	VS and GV	313.1	310.6	309.5	312.0
<i>RG #13</i>	YES	A	4312	0.099	0.053	192	706	415	2.33	VS and GV	308.2	304.3	303.5	306.0
<i>RG #14</i>	YES	A	2396	0.055	0.035	127	273	207	1.33	GV	305.2	302.5	301.5	304.0
<i>RG #15</i>	NO	B	44213	1.015	0.199	722	523	367	1.00	GV	301.0	298.0	301.5	304.0
<i>RG #16</i>	NO	B	10716	0.246	0.000	0	1017	607	1.00	VS and GV	301.0	298.0	302.5	305.0
RG #19	YES	A	31233	0.717	0.168	305	2127	1309	1.25	VS and V	296.0	293.2	287.5	290.0
RG #20	YES	A	11543	0.265	0.000	0	1191	733	1.50	-	295.3	292.5	291.5	294.0
RG #21	YES	A	9932	0.228	0.155	281	748	650	1.00	GV	291.8	289.6	289.5	292.0
RG #22	YES	A	6665	0.153	0.023	42	853	656	1.00	GV	258.8	256.2	255.5	258.0
RG #23	YES	A	1307	0.030	0.007	13	568	413	1.25	GV	258.1	255.3	254.5	257.0
Bus Station	YES	A	24132	0.554	0.204	370	2200	1222	1.00	VS	257.8	254.5	254.5	257.0
<i>Cul-de-sac</i>	YES	A	10585	0.243	0.072	261	4393	2834	1.00	GV	300.5	297.9	297.5	300.0

Notes

*Bold and Italics Raingarden ID, indicates raingarden located in IWPA (required water quality volume = 1.0 inch).

1. Raingardens not designed to exfiltrate will be lined ensuring no infiltration.

2. All BMPs are designed to provide storage for the Water Quality Volume, which is greater than the Recharge Volume for the Site.

3. Storage Volume is calculated assuming 30% void space in mulch, bioretention soil, pea gravel and sand layers.

4. GV = 8-inches of pea gravel and 3 to 5-foot vegetated filter strip; V = 10' vegetated filter strip; VS = vegetated swale

5. RG #21 has a 1.2" ponding depth instead of a 6" ponding depth.

Recharge Volume

Soil Type	F (in)	Imp. Area (ac)		Rv (cf)
HSG A	0.60	0		0
HSG B	0.35	1.65		2096
HSG C	0.25	0.52		472
HSG D	0.10	0		0
Total		2.17		2568

Required Water Quality Volume

Depth (in):	0.5		1.0
Impervious Area (ac):	1.17		1.13
WQ Volume (cf):	2124		4102

Total Proposed Storage Vol (cf) 17,714

Proposed Volume (cf)

Required WQv (cf) 6,225 17,714

Required Recharge Vol (cf) 3,875 16,174

Impervious Area draining to Raingardens (ac) 0.912

Additional Roof Area draining to Recharge (ac) 0.238

Impervious area in Draining Areas 10S and 11s draining to Recharge (ac) 0.288

Total Impervious Area routed to Recharge (ac) 1.438

Ratio of Area Draining to Recharge to Total Impervious Area 1.51

Percentage of Impervious Draining to Recharge 66%

Static Calculated Original Recharge Volume (cf) 2,568

Adjusted Minimum Required Recharge Volume (cf) 3,875

Pine Hill Village
Appendix B.4 – Raingarden Schedule (Continued)

**OTHER CONSIDERATIONS FOR STANDARD 3
CAPTURE AREA ADJUSTMENT: DETERMINING IF ENOUGH RUNOFF IS
DIRECTED TO THE RECHARGE PRACTICE²³**

Sufficient runoff must be directed to the infiltration BMPs to ensure infiltration of the *Required Recharge Volume*. In some cases, designers size exfiltration practices based on the *Required Recharge Volume*, but then direct only a portion of the site's impervious area to the practice. As a result, the infiltration BMPs may not be able to capture sufficient rainfall on an average annual basis to meet the *Required Recharge Volume*. In this case, designers and reviewers have two options: either redesign the site so that runoff from more of the impervious areas located on the site is directed to the infiltration BMPs, or increase the storage capacity of the infiltration BMPs so that they may capture more of the runoff from the impervious surfaces located within the contributing drainage area. The following procedure describes the method that must be used where runoff from only a portion of the impervious area on a site is directed to one or more infiltration BMPs. This procedure is required to ensure that the infiltration BMPs are able to capture sufficient runoff from the impervious surfaces within the contributing drainage area to infiltrate the *Required Recharge Volume*. This procedure is not required for those sites where all impervious surfaces drain to an infiltration BMP. In no case shall runoff from less than 65% of the site's impervious cover be directed to the BMPs intended to infiltrate the *Required Recharge Volume*. When less than 65% of impervious surfaces on a site are directed to infiltration BMPs, the system cannot capture sufficient runoff to infiltrate the *Required Recharge Volume*.

- 1) Calculate the *Required Recharge Volume* based on total site impervious cover and underlying soil classification and size the infiltration BMP using the "Static" Method or one of the "Dynamic" Methods
- 2) Calculate the site's impervious area that drains to proposed recharge facilities.
- 3) Divide the total site impervious area by the impervious area draining to the proposed recharge facilities.
- 4) Multiply the resulting quotient from Step 3 by the original *Required Recharge Volume* calculated under Step 1 to determine the adjusted minimum storage volume needed to meet the recharge volume requirement. The "Static" Method or either of the *Dynamic* Methods may be used to determine the storage volume.

Pine Hill Village
Appendix B.5 – Raingarden Details

ID: RG #3				
Drainage Area	0.150 ac			
Impervious Area	0.070 ac			
Water Quality Vol	254 cf			
Prop. Surface Elev.	311 ft			
Ex. Surface Elev.	304 ft			
Depth to GW	2.5 ft			
Max Depth Elev.	303.5 ft			
Depth BGS (ft)	Elevation (ft)	Description	Area (sf)	Cumm. Volume (cf)
0.00	311.00	Rim	423.00	0.00
0.50	310.50	6" Ponding	423.00	211.50
0.75	310.25	3" Mulch	423.00	243.23
1.25	309.75	0.5' Soil	423.00	306.68
1.50	309.50	3" Pea Gravel	423.00	338.40
Outlet Structure Inv. El. (ft) Out El (ft) Overflow Berm 311.00				

ID: RG #4				
Drainage Area	0.035 ac			
Impervious Area	0.012 ac			
Water Quality Vol	44 cf			
Prop. Surface Elev.	307 ft			
Ex. Surface Elev.	302 ft			
Depth to GW	2.5 ft			
Max Depth Elev.	301.5 ft			
Depth BGS (ft)	Elevation (ft)	Description	Area (sf)	Cumm. Volume (cf)
0.00	307.00	Rim	391.00	0.00
0.25	306.75	3" Freeboard	391.00	97.75
0.75	306.25	6" Ponding	391.00	293.25
1.00	306.00	3" Mulch	391.00	322.58
4.00	303.00	3' Soil	391.00	674.48
4.25	302.75	3" Pea Gravel	391.00	703.80
4.58	302.42	4" Sand	391.00	742.90
Outlet Structure Inv. El. (ft) Out El (ft) 12" HDPE Riser Pipe 306.75 8" Underdrain 301.3 301.1				

ID: RG #5				
Drainage Area	0.052 ac			
Impervious Area	0.021 ac			
Water Quality Vol	76 cf			
Prop. Surface Elev.	307 ft			
Ex. Surface Elev.	301 ft			
Depth to GW	2.5 ft			
Max Depth Elev.	300.5 ft			
Depth BGS (ft)	Elevation (ft)	Description	Area (sf)	Cumm. Volume (cf)
0.00	307.00	Rim	266.00	0.00
0.25	306.75	3" Freeboard	266.00	66.50
0.75	306.25	6" Ponding	266.00	199.50
1.00	306.00	3" Mulch	266.00	219.45
4.00	303.00	3' Soil	266.00	458.85
4.25	302.75	3" Pea Gravel	266.00	478.80
4.33	302.67	4" Sand	266.00	485.45
Outlet Structure Inv. El. (ft) Out El (ft) 12" HDPE Riser Pipe 306.75 8" Underdrain 301.30 300.1				

Pine Hill Village
Appendix B.5 – Raingarden Details

ID: RG #10				
Drainage Area	0.048 ac			
Impervious Area	0.015 ac			
Water Quality Vol	54 cf			
Prop. Surface Elev.	307.1 ft			
Ex. Surface Elev.	304 ft			
Depth to GW	2.5 ft			
Max Depth Elev.	303.5 ft			
Depth BGS (ft)	Elevation (ft)	Desc.	Area (sf)	Cumm. Volume (cf)
0.00	307.10	Rim	334.00	0.00
0.25	306.85	3" Freeboard	334.00	83.50
0.75	306.35	6" Ponding	334.00	250.50
1.00	306.10	3" Mulch	334.00	275.55
3.00	304.10	2' Soil	334.00	475.95
3.25	303.85	3" Pea Gravel	334.00	501.00
3.33	303.77	4" Sand	334.00	509.35
Outlet Structure Inv. El. (ft) Out El (ft) 12" HDPE Riser Pipe 306.85				

ID: RG #11				
Drainage Area	0.043 ac			
Impervious Area	0.027 ac			
Water Quality Vol	98 cf			
Prop. Surface Elev.	307.10 ft			
Ex. Surface Elev.	304 ft			
Depth to GW	2.5 ft			
Max Depth Elev.	303.5 ft			
Depth BGS (ft)	Elevation (ft)	Desc.	Area (sf)	Cumm. Volume (cf)
0.00	307.10	Rim	184.00	0.00
0.25	306.85	3" Freeboard	184.00	46.00
0.75	306.35	6" Ponding	184.00	138.00
1.00	306.10	3" Mulch	184.00	151.80
3.00	304.10	2' Soil	184.00	262.20
3.25	303.85	3" Pea Gravel	184.00	276.00
3.33	303.77	4" Sand	184.00	280.60
Outlet Structure Inv. El. (ft) Out El (ft) 12" HDPE Riser Pipe 306.85				

ID: Cul-de-sac Bioretention Cell				
Drainage Area	0.243 ac			
Impervious Area	0.072 ac			
Water Quality Vol	261 cf			
Prop. Surface Elev.	300.5 ft			
Ex. Surface Elev.	300 ft			
Depth to GW	2.5 ft			
Max Depth Elev.	299.5 ft			
Depth BGS (ft)	Elevation (ft)	Desc.	Area (sf)	Cumm. Volume (cf)
0.00	300.50	Rim	2834.00	0.00
0.25	300.25	3" Riser Freeboard	2834.00	708.50
0.75	299.75	6" Ponding	2834.00	2834.00
1.00	299.50	3" Mulch	2834.00	3046.55
2.00	298.50	1' Soil	2834.00	3896.75
2.25	298.25	3" Pea Gravel	2834.00	4109.30
2.58	297.92	4" Sand	2834.00	4392.70
Outlet Structure Inv. El. (ft) Out El (ft) 12" CPP Riser Pipe 300.25				

Pine Hill Village
Appendix B.5 – Raingarden Details

ID: RG #12				
Drainage Area	0.213 ac			
Impervious Area	0.050 ac			
Water Quality Vol	182 cf			
Prop. Surface Elev.	313.1 ft			
Ex. Surface Elev.	312 ft			
Depth to GW	2.5 ft			
Max Depth Elev.	311.5 ft			
Depth BGS (ft)	Elevation (ft)	Desc.	Area (sf)	Cumm. Volume (cf)
0.00	313.10	Rim	584.50	0.00
0.25	312.85	3" Freeboard	584.50	146.13
0.75	312.35	6" Ponding	584.50	438.38
1.00	312.10	3" Mulch	584.50	482.21
2.25	310.85	1.25' Soil	584.50	701.40
2.50	310.60	3" Pea Gravel	584.50	745.24
2.58	310.27	4" Sand	584.50	759.85
Outlet Structure Inv. El. (ft) Out El (ft) 12" HDPE Riser Pipe 312.85				

ID: RG #13				
Drainage Area	0.099 ac			
Impervious Area	0.053 ac			
Water Quality Vol	192 cf			
Prop. Surface Elev.	308.2 ft			
Ex. Surface Elev.	306 ft			
Depth to GW	2.5 ft			
Max Depth Elev.	305.5 ft			
Depth BGS (ft)	Elevation (ft)	Desc.	Area (sf)	Cumm. Volume (cf)
0.00	308.20	Rim	415.26	0.00
0.25	307.95	3" Freeboard	415.26	103.82
0.75	307.45	6" Ponding	415.26	311.45
1.00	307.20	3" Mulch	415.26	342.59
3.33	304.87	2.33' Soil	415.26	632.86
3.58	304.62	3" Pea Gravel	415.26	664.00
3.91	304.29	4" Sand	415.26	705.53
Outlet Structure Inv. El. (ft) Out El (ft) 12" HDPE Riser Pipe 307.95				

ID: RG #14				
Drainage Area	0.055 ac			
Impervious Area	0.035 ac			
Water Quality Vol	127 cf			
Prop. Surface Elev.	305.2 ft			
Ex. Surface Elev.	304 ft			
Depth to GW	2.5 ft			
Max Depth Elev.	303.5 ft			
Depth BGS (ft)	Elevation (ft)	Desc.	Area (sf)	Cumm. Volume (cf)
0.00	305.20	Rim	206.54	0.00
0.25	304.95	3" Freeboard	206.54	51.64
0.75	304.45	6" Ponding	206.54	154.91
1.00	304.20	3" Mulch	206.54	170.40
2.33	302.87	1.33' Soil	206.54	252.80
2.58	302.62	3" Pea Gravel	206.54	268.30
2.66	302.54	4" Sand	206.54	273.46
Outlet Structure Inv. El. (ft) Out El (ft) 12" HDPE Riser Pipe 304.95				

Pine Hill Village
Appendix B.5 – Raingarden Details

ID: RG# 15				
Drainage Area	1.015 ac			
Impervious Area	0.199 ac			
Water Quality Vol	722 cf			
Prop. Surface Elev.	301 ft			
Ex. Surface Elev.	304 ft			
Depth to GW	2.5 ft			
Max Depth Elev.	303.5 ft			
Depth BGS (ft)	Elevation (ft)	Desc.	Area (sf)	Cumm. Volume (cf)
0.00	301.00	Rim	367.00	0.00
0.25	300.75	3" Freeboard	367.00	91.75
0.75	300.25	6" Ponding	367.00	275.25
1.00	300.00	3" Mulch	367.00	302.78
2.00	299.00	1' Soil	367.00	412.88
3.00	298.00	1' Pea Gravel	367.00	522.98
Outlet Structure Inv. El. (ft) Out El (ft) 18" HDPE Riser Pipe 300.75				

ID: RG#16				
Drainage Area	0.246 ac			
Impervious Area	0.000 ac			
Water Quality Volume	0 cf			
Depth to GW	2.5 ft			
Prop. Surface Elev.	301 ft			
Ex. Surface Elev.	305 ft			
Depth BGS (ft)	Elevation (ft)	Desc.	Area (sf)	Cumm. Volume (cf)
0.00	301.00	Rim	607.00	0.00
0.25	300.75	3" Riser Free Board	607.00	151.75
0.75	300.25	6" Ponding	607.00	607.00
1.00	300.00	3" Mulch	607.00	652.53
2.00	299.00	1' Soil	607.00	834.63
3.00	298.00	1' Pea Gravel	607.00	1016.73
Outlet Structure Inv. El. (ft) 18" HDPE Rise Pipe 300.75				

ID: RG#19				
Drainage Area	0.717 ac			
Impervious Area	0.168 ac			
Water Quality Vol	305 cf			
Ex. Surface Elev.	290 ft			
Prop. Surface Elev.	296 ft			
Depth to GW	2.5 ft			
Max Depth Elev.	289.5 ft			
Depth BGS (ft)	Elevation (ft)	Desc.	Area (sf)	Cumm. Volume (cf)
0.00	296.00	Rim	1309.00	0.00
0.25	295.75	3" Free Board	1309.00	327.25
0.75	295.25	6" Ponding	1309.00	1309.00
1.00	295.00	3" Mulch	1309.00	1407.18
2.25	293.75	1.25' Soil	1309.00	1898.05
2.50	293.50	3" Pea Gravel	1309.00	1996.23
2.83	293.2	4" Sand	1309.00	2127.12
Outlet Structure Inv. El. (ft) 18" HDPE Rise Pipe 295.75				

Pine Hill Village
Appendix B.5 – Raingarden Details

ID: RG#20				
Drainage Area	0.265 ac			
Impervious Area	0.000 ac			
Water Quality Vol	0 cf			
Ex. Surface Elev.	294 ft			
Prop. Surface Elev.	295.3 ft			
Depth to GW	2.5 ft			
Max Depth Elev.	293.5 ft			
Depth BGS (ft)	Elevation (ft)	Desc.	Area (sf)	Cumm. Volume (cf)
0.00	295.30	Rim	733.00	0.00
0.25	295.05	3" Riser Free Board	733.00	183.25
0.75	294.55	6" Ponding	733.00	733.00
1.00	294.30	3" Mulch	733.00	787.98
2.50	292.80	1.5' Soil	733.00	1117.83
2.75	292.55	3" Pea Gravel	733.00	1172.80
2.83	292.47	4" Sand	733.00	1191.13
Outlet Structure Inv. Elevation (ft) 18" HDPE Riser 295.05				

ID: RG#21				
Drainage Area	0.228 ac			
Impervious Area	0.155 ac			
Water Quality Vol	281 cf			
Ex. Surface Elev.	292 ft			
Prop. Surface Elev.	291.8 ft			
Depth to GW	2.5 ft			
Max Depth Elev.	291.5 ft			
Depth BGS (ft)	Elevation (ft)	Desc.	Area (sf)	Cumm. Volume (cf)
0.00	291.80	Rim	650.00	0.00
0.25	291.55	3" Riser Free Board	650.00	162.50
0.35	291.45	1.2" Ponding	650.00	390.00
0.60	291.20	3" Mulch	650.00	438.75
1.60	290.20	1' Soil	650.00	633.75
1.85	289.95	3" Pea Gravel	650.00	682.50
2.18	289.62	4" Sand	650.00	747.50
Outlet Structure Inv. Elevation (ft) 12" HDPE Riser 291.55				

ID: RG #22				
Drainage Area	0.153 ac			
Impervious Area	0.023 ac			
Water Quality Vol	42 cf			
Ex. Surface Elev.	258 ft			
Prop. Surface Elev.	258.8 ft			
Depth to GW	2.5 ft			
Max Depth Elev.	257.5 ft			
Depth BGS (ft)	Elevation (ft)	Desc.	Area (sf)	Cumm. Volume (cf)
0.00	258.80	Rim	656.00	0.00
0.25	258.55	3" Freeboard	656.00	164.00
0.75	258.05	6" Ponding	656.00	492.00
1.00	257.80	3" Mulch	656.00	541.20
2.00	256.80	1' Soil	656.00	738.00
2.25	256.55	3" Pea Gravel	656.00	787.20
2.58	256.22	4" Sand	656.00	852.80
Outlet Structure Inv. Elevation (ft) 12" HDPE Riser Pipe 258.55				

Pine Hill Village
Appendix B.5 – Raingarden Details

ID: RG #23				
Drainage Area	0.030	ac		
Impervious Area	0.007	ac		
Water Quality Vol	13	cf		
Ex. Surface Elev.	257	ft		
Prop. Surface Elev.	258.1	ft		
Depth to GW	2.5	ft		
Max Depth Elev.	256.5	ft		
Depth BGS (ft)	Elevation (ft)	Desc.	Area (sf)	Cumm. Volume (cf)
0.00	258.10	Rim	413.00	0.00
0.25	257.85	3" Freeboard	413.00	103.25
0.75	257.35	6" Ponding	413.00	309.75
1.00	257.10	3" Mulch	413.00	340.73
2.25	255.85	1.25' Soil	413.00	495.60
2.50	255.60	3" Pea Gravel	413.00	526.58
2.83	255.27	4" Sand	413.00	567.88
Outlet Structure Inv. Elevation (ft) 12" HDPE Riser Pipe 257.85				

ID: Bus Station Bioretention Cell				
Drainage Area	0.554	ac		
Impervious Area	0.204	ac		
Water Quality Vol	370	cf		
Ex. Surface Elev.	257	ft		
Prop. Surface Elev.	257.8	ft		
Depth to GW	2.5	ft		
GW Elev.	254.5	ft		
Depth BGS (ft)	Elevation (ft)	Desc.	Area (sf)	Cumm. Volume (cf)
0.00	257.80	Rim	1222.00	0.00
0.50	257.30	6" Freeboard	1222.00	305.50
1.50	256.30	6" Ponding	1222.00	1527.50
1.75	256.05	3" Mulch	1222.00	1619.15
2.75	255.05	1' Soil	1222.00	1985.75
3.00	254.80	3" Pea Gravel	1222.00	2077.40
3.33	254.47	4" Sand	1222.00	2199.60
Outlet Structure Inv. Elevation (ft) 18" HDPE Riser 257.30				
Sediment Forebay				
Volume Required (cf)	74.1			
Depth (ft)	0.25			
Surface Area (sf)	270.0			
Surface Elevation (ft)	256.25			
Rock Weir Invert El. (ft)	256.50			
Rock Crest El. (ft)	256.75			

Attachment B.6 - Constructed Wetland Calculations I
Pine Hill Village
Harvard, Massachusetts

Constructed Wetland Water Budget

Project Name: Pine Hill Village

Location: Harvard, MA

Project Number: BW0118

Prepared By (Name and Date): Daniel Bourdeau, PE 10MAY2011

Checked By (Name and Date): Steve Roy 10MAY2011

Month	Evapotranspiration ¹					Precipitation ² (in)	Runoff ³ (in)	Inputs		Output		Storage		
	Average Temp ² (F, 30 Year Average)	Average Temp ² (C, 30 Year Average)	Heat Index	ET (cm)	ET (in)			Runoff (acre-ft)	Direct Fall ⁴ (acre-ft)	ET ⁴ (acre-ft)	Seepage ⁵ (acre-ft)	Permanent Pool ⁶ (acre-ft)	Change in Storage (acre- ft)	Storage in Excess of Permanent Pool (acre-ft)
January	29.30	-1.50	0.00	0.00	0.00	3.92	2.47	1.56	0.04	0.00	0.89	0.180	0.71	0.53
February	31.40	-0.33	0.00	0.00	0.00	3.30	1.92	1.21	0.03	0.00	0.89	0.180	0.35	0.17
March	38.90	3.83	0.67	1.17	0.46	3.85	2.41	1.52	0.04	0.00	0.89	0.180	0.66	0.48
April	48.30	9.06	2.46	3.47	1.37	3.61	2.20	1.38	0.04	0.01	0.89	0.180	0.52	0.34
May	58.50	14.72	5.13	6.42	2.53	3.23	1.86	1.17	0.03	0.02	0.89	0.180	0.29	0.11
June	68.00	20.00	8.16	9.47	3.73	3.22	1.85	1.17	0.03	0.04	0.89	0.180	0.27	0.09
July	73.80	23.22	10.23	11.44	4.51	3.06	1.71	1.08	0.03	0.04	0.89	0.180	0.18	0.00
August	72.30	22.39	9.68	10.93	4.30	3.37	1.98	1.25	0.03	0.04	0.89	0.180	0.35	0.17
September	64.70	18.17	7.05	8.38	3.30	3.47	2.07	1.31	0.03	0.03	0.89	0.180	0.42	0.24
October	54.10	12.28	3.90	5.10	2.01	3.79	2.36	1.48	0.04	0.02	0.89	0.180	0.61	0.43
November	44.90	7.17	1.72	2.58	1.02	3.98	2.53	1.59	0.04	0.01	0.89	0.180	0.73	0.55
December	34.70	1.50	0.16	0.36	0.14	3.73	2.30	1.45	0.04	0.00	0.89	0.180	0.60	0.42
Monthly Heat Index (I):			49.15											
Coefficient Rate (a):			1.27											

Notes:

1. The Thornthwaite Method was used to assess evapotranspiration and assumes that there is no evapotranspiration when temperatures are less than zero.
2. Precipitation and Annual temperature data represents 30-year average (1971 to 2000) for the Boston area taken from Northeast Regional Climate Center (http://www.nrcc.cornell.edu/page_nowdata.html, January, 2011)
3. Runoff was estimated for the entire site using TR-55 method with a CN of 86 to represent the developed residential Pine Hill developmenet of 7.56 acres.
4. Area of the wetland (5,072 sq.ft.) for ET estimates and direct fall was taken as the permanent pool elevation 258.3 ft.
5. An infiltration rate of 0.125 in/hr was used for a seepage estimate and represents the recommended value for C soils.
6. Permanent pool area was assumed to be below the 258.3 contour with a volume of 7,845cubic feet.
7. Storage in excess of Permanent Pool represents temporary ponding above the permanent pool that eventually will drain through the outlet structure. A positive value of Storage in Excess of Permanent Pool represents a positive water balance to the constructed wetland; therefore is expected to be sufficient for sustaining a permanent pool and wetland vegetation.
8. Estimated water balance in July predicts a 0.00 acre feet change in storage during the month.

Attachment B.6 - Constructed Wetland Calculations II
Pine Hill Village
Harvard, Massachusetts

Constructed Wetland Calculations

Project Name: Pine Hill Village

Location: Harvard, MA

Project Number: BW0118

Prepared By (Name and Date): Daniel Bourdeau, PE 16 June 2011

Checked By (Name and Date): Steve Roy 16 June 2011

Wetland Type: Pocket Wetland

Constructed Wetland Elevation (ft)	Surface Area (sq.ft.)	Incremental Storage Volume (cu.ft.)	Cummulative Storage Volume (cu.ft.)
254	729	0.0	0.0
255	972	850.5	850.5
256	1244	1108.0	1958.5
257	1541	1392.5	3351.0
258	4558	3049.5	6400.5
259	6345	7886.0	11237.0
260	7660	12218.0	18618.5
261	9072	15417.0	26654.0
262	10584	18244.0	36862.5

Outlet Schedule	
Elevation	Description
258.30	4" Inlet Pipe
258.32	2 Columns of 0.5 inch holes at 5" OC
260.30	Overflow Riser (4ft x 4 ft @ 4(H):1(V))
260.90	Emergency Spillway (22 feet long, 12 ft breath)

Note:

1. Elevation represents the center of the hole for ease of construction and not the invert.

Attachment B.6 - Constructed Wetland Calculations III
Pine Hill Village
Harvard, Massachusetts

Constructed Wetland Calculations

Project Name: Pine Hill Village

Location: Harvard, MA

Project Number: BW0118

Prepared By (Name and Date):

Daniel Bourdeau, PE 16 June 2011

Checked By (Name and Date):

Steve Roy 16 June 2011

Impervious Area (Untreated; sq.ft.): 24569
WQV (cf): 1024

Perm Pool Elev: 258.3
Surface Area (@ PP): 5072

Design Criteria	Recommended Criteria	(Min)	Site Design (Provided)
Minimum Drainage Area (acres)	>1	12.23	
Surface Area/Watershed Ratio	>0.01	0.01	
Length to Width Ratio	>2:1	2.03	
Extended Detention (ED)	OPTIONAL	NO	NO
Allocation of WQ Volume			
wet pools (% cf)	20	205	235
high and low marsh (% cf)	80	819	755
Extended Detention (ED; % cf)	2	20	34
Allocation of Surface Area			
deep water (1.5 ft to 6 ft)	5	254	0
low marsh (0.5 ft to 1.5 ft)	50	2536	0
high marsh (0 to 0.5 ft)	40	2029	0
semi-wet (90th Percentile Event Flood)	5	254	0
Sediment Forebay (20% of 0.5" WQV)	REQUIRED	205	259

Attachment B.7
Pine Hill Village - Harvard, MA
24" Culvert - Main Line

Drainage Area = 5.518 acres
 Required Flow Capacity¹ = 11.5 cfs

Diameter of pipe, D= 24 inches
 Longitudinal Slope, So= 0.05 ft/ft
 Manning's n= 0.011
 Density of flowing liquid, rho= 1.94 slugs/ft³

Material: CPP

Theta radians	Theta degrees	Depth of Flow y inches	Area of Flow A ft ²	Wetted Perimeter P ft	Hydraulic Radius R ft	Average Velocity V ft/s	Discharge Q=A*V cfs	Force* F lbf
0.00	0	0.0	0.000	0.00		0.0	0.00	0.0
0.25	14	0.1	0.001	0.25	0.01	0.9	0.00	0.0
0.50	29	0.4	0.010	0.50	0.02	2.3	0.02	0.1
0.75	43	0.8	0.034	0.75	0.05	3.9	0.13	1.0
1.00	57	1.5	0.079	1.00	0.08	5.6	0.44	4.8
1.25	72	2.3	0.151	1.25	0.12	7.4	1.11	15.9
1.50	86	3.2	0.251	1.50	0.17	9.2	2.31	41.2
1.75	100	4.3	0.383	1.75	0.22	11.0	4.21	89.8
2.00	115	5.5	0.545	2.00	0.27	12.7	6.94	171.5
2.25	129	6.8	0.736	2.25	0.33	14.4	10.58	295.0
2.50	143	8.2	0.951	2.50	0.38	15.9	15.11	465.9
2.75	158	9.7	1.184	2.75	0.43	17.3	20.45	684.9
3.00	172	11.2	1.429	3.00	0.48	18.5	26.41	946.3
3.25	186	12.7	1.679	3.25	0.52	19.5	32.74	1238.3
3.50	201	14.1	1.925	3.50	0.55	20.3	39.15	1544.0
3.75	215	15.6	2.161	3.75	0.58	21.0	45.31	1843.2
4.00	229	17.0	2.378	4.00	0.59	21.4	50.93	2115.7
4.25	244	18.3	2.572	4.25	0.61	21.7	55.74	2343.4
4.50	258	19.5	2.739	4.50	0.61	21.7	59.56	2513.2
4.75	272	20.6	2.875	4.75	0.61	21.7	62.29	2618.1
5.00	286	21.6	2.979	5.00	0.60	21.4	63.89	2658.1
5.25	301	22.4	3.054	5.25	0.58	21.1	64.46	2639.4
5.50	315	23.1	3.103	5.50	0.56	20.7	64.15	2573.1
5.75	329	23.6	3.129	5.75	0.54	20.2	63.16	2473.3
6.00	344	23.9	3.140	6.00	0.52	19.7	61.74	2355.3
6.25	358	24.0	3.142	6.25	0.50	19.1	60.14	2233.6

MAX FLOW CAPACITY = 64.5 CFS
REQUIRED FLOW CAPACITY = 11.5 CFS
MAX CAPACITY > REQ'D CAPACITY? Y

NOTES:

1. Required Flow Capacity (cfs) was based on 25-year peak discharge

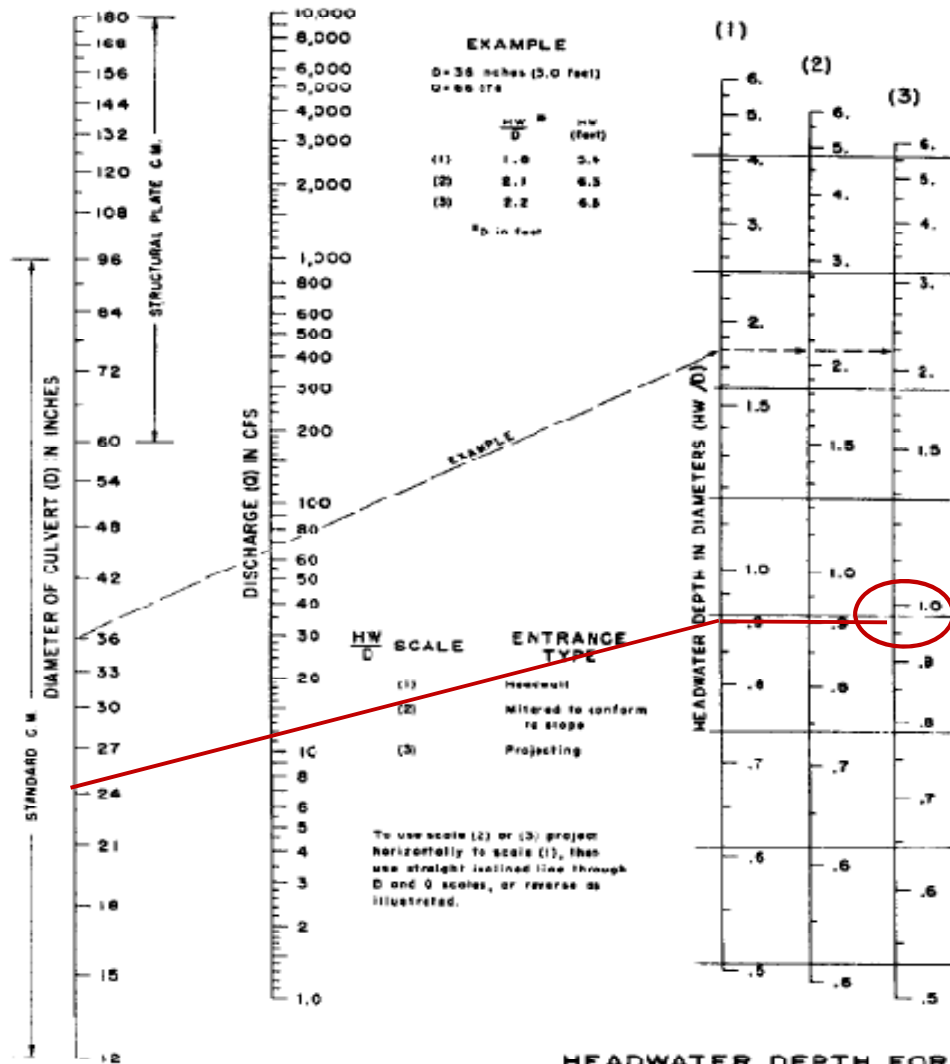
Attachment B.7
Pine Hill Village - Harvard, MA
24" Culvert - Main Line

Drainage Area³ = 5.518 acres
 Required Flow Capacity⁴ = 11.5 cfs

Diameter of pipe, D = 24 inches
 Longitudinal Slope, S_o = 0.05 ft/ft
 Manning's n = 0.011
 Density of flowing liquid, ρ = 1.94 slugs/ft³

Material: CPP

CHART 2B



Attachment B.7
Pine Hill Village - Harvard, MA
30" Pipe to Wetland

Drainage Area = 6.372 acres
 Required Flow Capacity¹ = 14.8 cfs

Diameter of pipe, D= 30 inches
 Longitudinal Slope, So= 0.01 ft/ft
 Manning's n= 0.011
 Density of flowing liquid, rho= 1.94 slugs/ft³

Material: CPP

Theta radians	Theta degrees	Depth of Flow y inches	Area of Flow A ft ²	Wetted Perimeter P ft	Hydraulic Radius R ft	Average Velocity V ft/s	Discharge Q=A*V cfs	Force* F lbf
0.00	0	0.0	0.000	0.00		0.0	0.00	0.0
0.25	14	0.1	0.002	0.31	0.01	0.5	0.00	0.0
0.50	29	0.5	0.016	0.63	0.03	1.2	0.02	0.0
0.75	43	1.0	0.053	0.94	0.06	2.0	0.11	0.4
1.00	57	1.8	0.124	1.25	0.10	2.9	0.36	2.0
1.25	72	2.8	0.235	1.56	0.15	3.8	0.90	6.7
1.50	86	4.0	0.393	1.88	0.21	4.8	1.87	17.4
1.75	100	5.4	0.598	2.19	0.27	5.7	3.41	37.8
2.00	115	6.9	0.852	2.50	0.34	6.6	5.63	72.2
2.25	129	8.5	1.150	2.81	0.41	7.5	8.58	124.1
2.50	143	10.3	1.486	3.13	0.48	8.2	12.25	196.1
2.75	158	12.1	1.850	3.44	0.54	9.0	16.58	288.2
3.00	172	13.9	2.233	3.75	0.60	9.6	21.41	398.3
3.25	186	15.8	2.624	4.06	0.65	10.1	26.55	521.1
3.50	201	17.7	3.008	4.38	0.69	10.6	31.74	649.8
3.75	215	19.5	3.376	4.69	0.72	10.9	36.74	775.7
4.00	229	21.2	3.716	5.00	0.74	11.1	41.30	890.4
4.25	244	22.9	4.020	5.31	0.76	11.2	45.20	986.2
4.50	258	24.4	4.279	5.63	0.76	11.3	48.30	1057.7
4.75	272	25.8	4.492	5.94	0.76	11.2	50.51	1101.8
5.00	286	27.0	4.655	6.25	0.74	11.1	51.81	1118.7
5.25	301	28.0	4.773	6.56	0.73	11.0	52.27	1110.8
5.50	315	28.9	4.848	6.88	0.71	10.7	52.02	1082.9
5.75	329	29.5	4.889	7.19	0.68	10.5	51.22	1040.9
6.00	344	29.8	4.906	7.50	0.65	10.2	50.07	991.2
6.25	358	30.0	4.909	7.81	0.63	9.9	48.77	940.0

MAX FLOW CAPACITY = 52.3 CFS
 REQUIRED FLOW CAPACITY = 14.8 CFS
 MAX CAPACITY > REQ'D CAPACITY? Y

NOTES:

1. Required Flow Capacity (cfs) was based on 25-year peak discharge

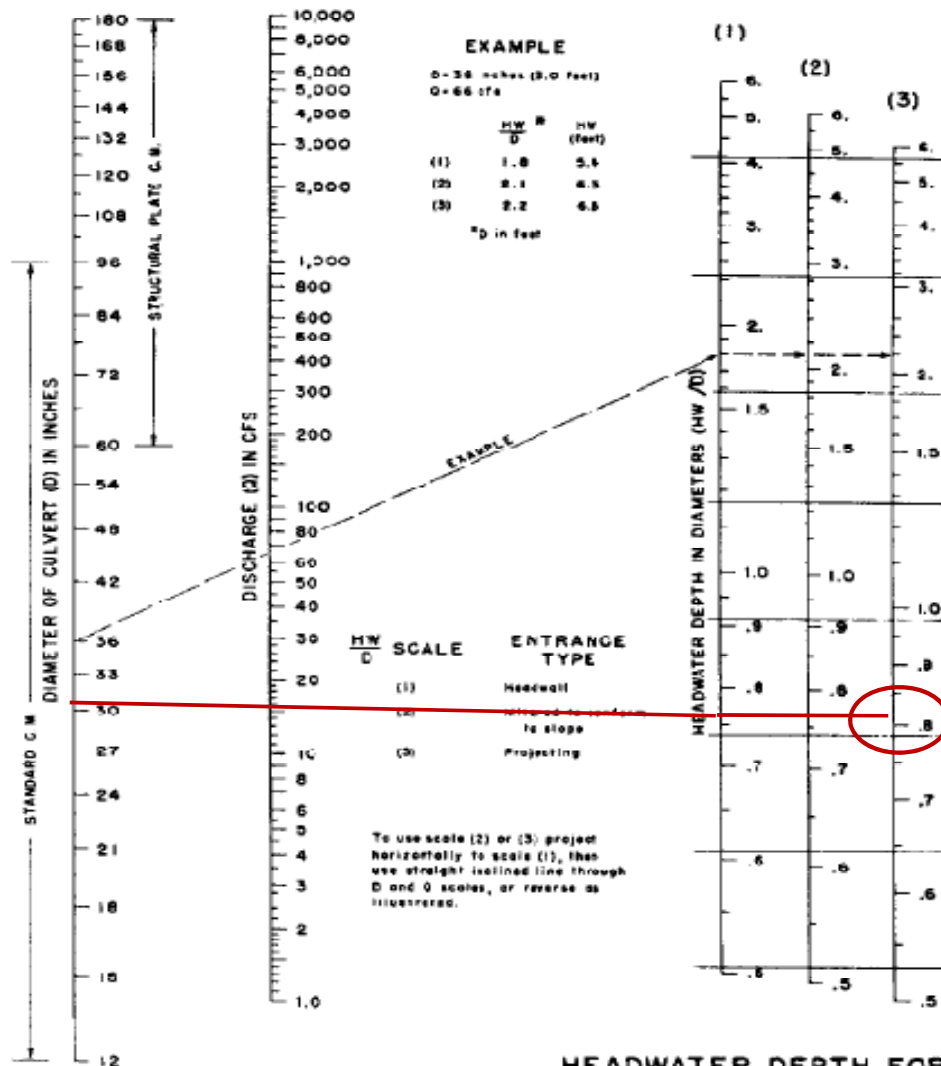
Attachment B.7
Pine Hill Village - Harvard, MA
30" Pipe to Wetland

Drainage Area³ = 6.372 acres
 Required Flow Capacity⁴ = 14.8 cfs

Diameter of pipe, D = 24 inches
 Longitudinal Slope, S_o = 0.05 ft/ft
 Manning's n = 0.011
 Density of flowing liquid, ρ = 1.94 slugs/ft³

Material: CPP

CHART 2B



**HEADWATER DEPTH FOR
 C. M. PIPE CULVERTS
 WITH INLET CONTROL**

Attachment B.7
Pine Hill Village - Harvard, MA
18" Pipe from RG15

Drainage Area = 1.388 acres
 Required Flow Capacity¹ = 4.4 cfs

Diameter of pipe, D= 18 inches
 Longitudinal Slope, So= 0.023 ft/ft
 Manning's n= 0.011
 Density of flowing liquid, rho= 1.94 slugs/ft³

Material: CPP

Theta radians	Theta degrees	Depth of Flow y inches	Area of Flow A ft ²	Wetted Perimeter P ft	Hydraulic Radius R ft	Average Velocity V ft/s	Discharge Q=A*V cfs	Force* F lbf
0.00	0	0.0	0.000	0.00		0.0	0.00	0.0
0.25	14	0.1	0.001	0.19	0.00	0.5	0.00	0.0
0.50	29	0.3	0.006	0.38	0.02	1.3	0.01	0.0
0.75	43	0.6	0.019	0.56	0.03	2.2	0.04	0.2
1.00	57	1.1	0.045	0.75	0.06	3.1	0.14	0.8
1.25	72	1.7	0.085	0.94	0.09	4.1	0.35	2.8
1.50	86	2.4	0.141	1.13	0.13	5.1	0.73	7.3
1.75	100	3.2	0.215	1.31	0.16	6.2	1.33	15.8
2.00	115	4.1	0.307	1.50	0.20	7.1	2.19	30.2
2.25	129	5.1	0.414	1.69	0.25	8.0	3.33	52.0
2.50	143	6.2	0.535	1.88	0.29	8.9	4.76	82.1
2.75	158	7.2	0.666	2.06	0.32	9.7	6.44	120.7
3.00	172	8.4	0.804	2.25	0.36	10.3	8.32	166.8
3.25	186	9.5	0.944	2.44	0.39	10.9	10.31	218.3
3.50	201	10.6	1.083	2.63	0.41	11.4	12.33	272.2
3.75	215	11.7	1.215	2.81	0.43	11.7	14.27	324.9
4.00	229	12.7	1.338	3.00	0.45	12.0	16.04	373.0
4.25	244	13.7	1.447	3.19	0.45	12.1	17.55	413.1
4.50	258	14.7	1.541	3.38	0.46	12.2	18.76	443.0
4.75	272	15.5	1.617	3.56	0.45	12.1	19.61	461.5
5.00	286	16.2	1.676	3.75	0.45	12.0	20.12	468.6
5.25	301	16.8	1.718	3.94	0.44	11.8	20.30	465.3
5.50	315	17.3	1.745	4.13	0.42	11.6	20.20	453.6
5.75	329	17.7	1.760	4.31	0.41	11.3	19.89	436.0
6.00	344	17.9	1.766	4.50	0.39	11.0	19.44	415.2
6.25	358	18.0	1.767	4.69	0.38	10.7	18.94	393.7

MAX FLOW CAPACITY = 20.3 CFS
 REQUIRED FLOW CAPACITY = 4.4 CFS
 MAX CAPACITY > REQ'D CAPACITY? Y

NOTES:

1. Required Flow Capacity (cfs) was based on 25-year peak discharge

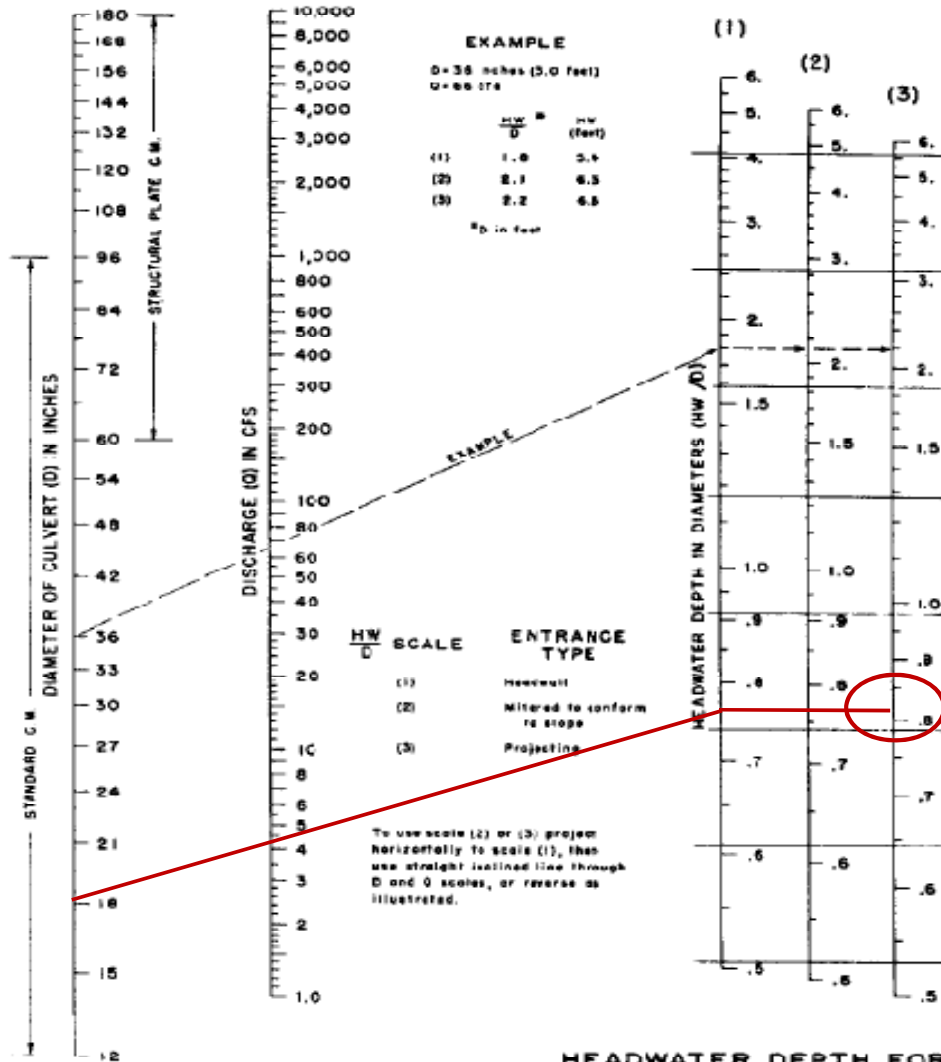
Attachment B.7
Pine Hill Village - Harvard, MA
18" Pipe from RG15

Drainage Area³ = 1.388 acres
 Required Flow Capacity⁴ = 4.4 cfs

Diameter of pipe, D = 18 inches
 Longitudinal Slope, S_o = 0.023 ft/ft
 Manning's n = 0.011
 Density of flowing liquid, ρ = 1.94 slugs/ft³

Material: CPP

CHART 2B



Attachment B.7
Pine Hill Village - Harvard, MA
18" Culvert from Lot 4

Drainage Area = 0.397 acres
 Required Flow Capacity¹ = 1.0 cfs

Diameter of pipe, D= 18 inches
 Longitudinal Slope, So= 0.021 ft/ft
 Manning's n= 0.011
 Density of flowing liquid, rho= 1.94 slugs/ft³

Material: CPP

Theta radians	Theta degrees	Depth of Flow y inches	Area of Flow A ft ²	Wetted Perimeter P ft	Hydraulic Radius R ft	Average Velocity V ft/s	Discharge Q=A*V cfs	Force* F lbf
0.00	0	0.0	0.000	0.00		0.0	0.00	0.0
0.25	14	0.1	0.001	0.19	0.00	0.5	0.00	0.0
0.50	29	0.3	0.006	0.38	0.02	1.2	0.01	0.0
0.75	43	0.6	0.019	0.56	0.03	2.1	0.04	0.2
1.00	57	1.1	0.045	0.75	0.06	3.0	0.13	0.8
1.25	72	1.7	0.085	0.94	0.09	3.9	0.33	2.6
1.50	86	2.4	0.141	1.13	0.13	4.9	0.70	6.6
1.75	100	3.2	0.215	1.31	0.16	5.9	1.27	14.5
2.00	115	4.1	0.307	1.50	0.20	6.8	2.09	27.6
2.25	129	5.1	0.414	1.69	0.25	7.7	3.18	47.5
2.50	143	6.2	0.535	1.88	0.29	8.5	4.55	75.0
2.75	158	7.2	0.666	2.06	0.32	9.2	6.15	110.2
3.00	172	8.4	0.804	2.25	0.36	9.9	7.95	152.3
3.25	186	9.5	0.944	2.44	0.39	10.4	9.85	199.3
3.50	201	10.6	1.083	2.63	0.41	10.9	11.78	248.5
3.75	215	11.7	1.215	2.81	0.43	11.2	13.63	296.7
4.00	229	12.7	1.338	3.00	0.45	11.5	15.32	340.5
4.25	244	13.7	1.447	3.19	0.45	11.6	16.77	377.2
4.50	258	14.7	1.541	3.38	0.46	11.6	17.92	404.5
4.75	272	15.5	1.617	3.56	0.45	11.6	18.74	421.4
5.00	286	16.2	1.676	3.75	0.45	11.5	19.23	427.8
5.25	301	16.8	1.718	3.94	0.44	11.3	19.40	424.8
5.50	315	17.3	1.745	4.13	0.42	11.1	19.30	414.2
5.75	329	17.7	1.760	4.31	0.41	10.8	19.00	398.1
6.00	344	17.9	1.766	4.50	0.39	10.5	18.58	379.1
6.25	358	18.0	1.767	4.69	0.38	10.2	18.10	359.5

MAX FLOW CAPACITY = 19.4 CFS
 REQUIRED FLOW CAPACITY = 1.0 CFS
 MAX CAPACITY > REQ'D CAPACITY? Y

NOTES:

1. Required Flow Capacity (cfs) was based on 25-year peak discharge

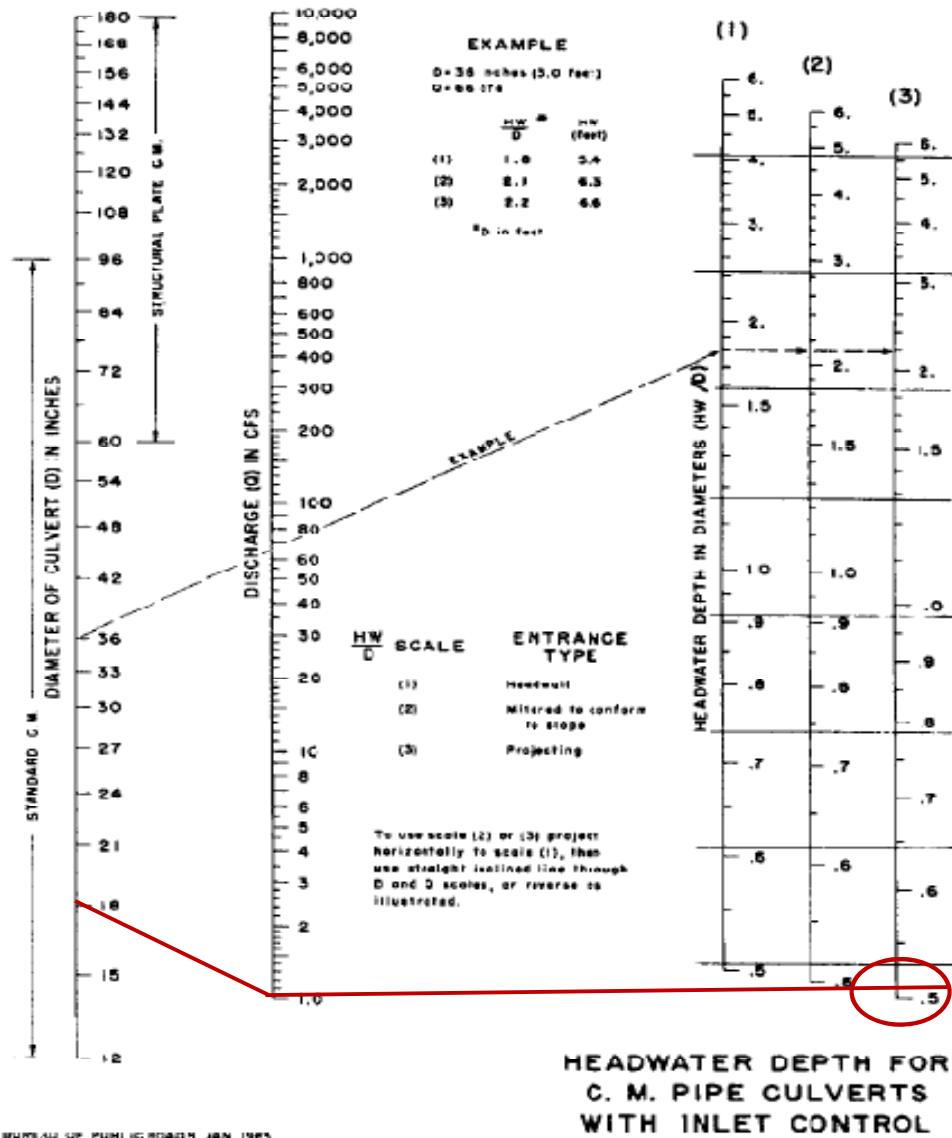
Attachment B.7
Pine Hill Village - Harvard, MA
18" Culvert from Lot 4

Drainage Area³ = 0.397 acres
 Required Flow Capacity⁴ = 1.0 cfs

Diameter of pipe, D = 18 inches
 Longitudinal Slope, S_o = 0.021 ft/ft
 Manning's n = 0.011
 Density of flowing liquid, ρ = 1.94 slugs/ft³

Material: CPP

CHART 2B



Pine Hill Village
Harvard, MA
Attachment B8. TSS Calculations

TSS Removal Percentage Calculations

Prepared By (Name and Date): Renee Fitsik (05.10.11) (updated by Julia Keay (07.30.18))

Checked By (Name and Date): Daniel Bourdeau, PE (05.10.11)

Calculated using the Simple Method

$L = [P \cdot P_j \cdot R_v / 12] \cdot C \cdot A \cdot 2.72$ where L = pollutant load (lbs); P = annual rainfall depth (42.5 inches);
P_j = correction for P for storms that don't produce runoff (0.90); R_v = 0.05 + 0.009 (I); I = % impervious area
C = pollutant concentration (TSS EMC, Stormwater Center Model Value); A = drainage area (acres)

BMP	Drainage Area (ac)	Impervious Area (ac)	% Impervious	TSS EMC (mg/L) ¹	TSS Load (lbs/year) ²	BMP Removal Efficiency with Appropriate Pretreatment ³	Load Removed (lbs/year)
RG #3	0.150	0.070	47%	100	61.12	90%	55.0
RG #4	0.035	0.012	34%	100	10.88	90%	9.8
RG #5	0.052	0.021	40%	100	18.64	90%	16.8
RG #10	0.048	0.015	31%	100	13.79	90%	12.4
RG #11	0.043	0.027	63%	100	22.93	90%	20.6
RG #12	0.213	0.050	23%	100	48.25	90%	43.4
RG #13	0.099	0.053	54%	100	45.65	90%	41.1
RG #14	0.055	0.035	64%	100	29.69	90%	26.7
RG #15	1.015	0.199	20%	100	199.28	90%	179.4
RG #16	0.246	0.000	0%	100	10.66	90%	9.6
RG #19	0.717	0.168	23%	100	162.17	90%	146.0
RG #20	0.265	0.000	0%	100	11.49	90%	10.3
RG #21	0.228	0.155	68%	100	130.83	90%	117.7
RG #22	0.153	0.023	15%	100	24.58	90%	22.1
RG #23	0.030	0.007	23%	100	6.76	90%	6.1
Bus Station	0.554	0.204	37%	100	183.20	90%	164.9
Cul-de-sac	0.243	0.072	30%	100	66.72	90%	60.0
Constructed V	9.800			100	83.21	80%	66.6

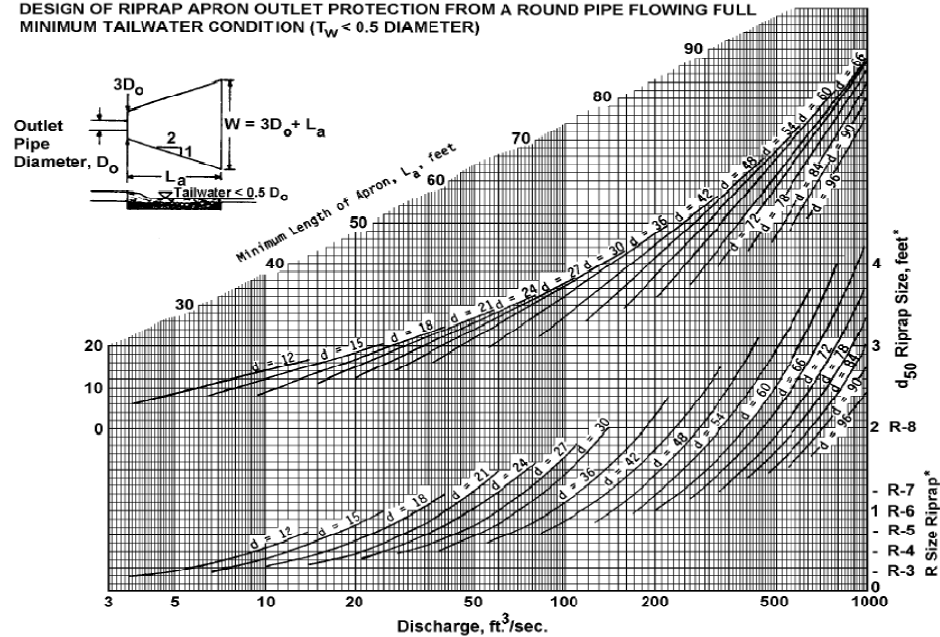
TOTAL LOAD⁵:	1046.64
TOTAL REMOVED⁶:	1008.5
% REMOVAL⁷:	96%

Notes and Supplemental Calculations

1. TSS EMC Values (<http://www.stormwatercenter.net/monitoring%20and%20assessment/simple%20meth/simple%20TSS%20table%201.htm>)
2. Annual Load (lbs) was calculated using the Simple Method
3. BMP Removal Efficiency values were taken from the MA Stormwater BMP Manual, dated February 2008.
4. Load Removed calculated by multiplying the Annual Load times the BMP Removal Efficiency
5. Total Load calculated as the sum of the TSS load within the watershed
6. Total Removal is sum of the difference between the starting load and the load after BMP removal
7. Watershed Percent removal is calculated as the total load divided by the load removed

ATTACHMENT B9
PROJECT NAME: Pine Hill Village
LOCATION: Harvard, MA
PREPARED BY: DHB DATE: 6/3/2011
CHECKED BY: SR DATE: 6/3/2011

DESIGN OF RIPRAP APRON OUTLET PROTECTION FROM A ROUND PIPE FLOWING FULL
MINIMUM TAILWATER CONDITION ($T_{TW} < 0.5$ DIAMETER)



Riprap Apron Schedule								
Apron	Outfall	Diameter (in)	Discharge (cfs)	Rip Rap Size, D_{50} (in)	Thickness, T (ft)	Length, A_L (ft)	Initial Width, A_{TW} (ft)	Terminal Width, A_{TW} (ft)
RRA-1	Constructed Wetland	30	22.5	6	1.5	10	6.0	16.0
RRA-2	MH#1	30	11	6	1.5	10	6.0	6.0
RRA-3	12" RCP/PS7	12	3	6	1.5	6	3.0	9.0
RRA-4	12" RCP/PS7	12	2	6	1.5	6	3.0	9.0
E Spill	CTW	NA	0	6	1.5	12	22.0	22.0

NOTES:

- Outfall refers to the location referenced on Figure 4.
- Peak discharge associated with the 25 year, 24 hour design storm water used in the analysis, except for the CTW calculation which uses the 100 year, 24 hour..
- Riprap aprons are required when the design velocity anticipated at the outfall of a conveyance is less than 14.5 fps.
- Table 9 is used to evaluate acceptable velocities for various rip rap gradations.

TABLE 9
Riprap Gradation, Filter Blanket Requirements, Maximum Velocities

NSA No.	Graded Rock Size (in)			Filter Blanket Requirements ^{1,2}		V_{max} (ft/sec)
	Max.	d_{50} *	Min.	Size NSA No.	Placement Thickness	
R-1	15	7.5	No. 8	FS-1	N/A	2.5
R-2	3	1.5	1	FS-1	N/A	4.5
R-3	6	3	2	FS-1	3	6.5
R-4	12	6	3	FS-2	4	9.0
R-5	18	9	5	FS-2	6	11.5
R-6	24	12	7	FS-3	8	13.0
R-7	30	15	12	FS-3	10	14.5

* The d_{50} stone size is the size exceeded by 50% of the total weight of the tonnage shipped (i.e. 50% by weight shall consist of pieces larger than the d_{50} stone size).

** This is a general standard. Soil conditions at each site should be analyzed to determine actual filter size. A suitable woven or non-woven geotextile underlayment, used according to manufacturer's recommendations, may be substituted for the filter stone.

ATTACHMENT C

Long Term Pollution Prevention Plan

Prepared for:

**Pine Hill Village LLC
PO Box 468
Tyngsboro, MA 01879**

Long Term Pollution Prevention Plan for the Storm Water Management System

**Pine Hill Village
Harvard, Massachusetts**

Prepared by:

Geosyntec 
consultants

engineers | scientists | innovators

289 Great Road, Suite 105
Acton, MA 01720

Project Number BW0118

October 18, 2010

TABLE OF CONTENTS

1.	BACKGROUND	1
2.	FACILITY DESCRIPTION AND CONTACT INFORMATION.....	1
2.1	Owner Information	Error! Bookmark not defined.
2.2	Operator Information	Error! Bookmark not defined.
3.	LONG TERM PRACTICES	1
3.1	Good Housekeeping.....	1
3.2	Material Storage.....	2
3.3	Vehicle Washing;.....	2
3.4	Spill Prevention and Response;	2
3.5	Lawns, Gardens, and Landscaped Area Maintenance;	2
3.6	Pet Waste Management;	2
3.7	On-site Sanitary Systems;.....	2
3.8	Deicing Chemicals and Snow Removal.....	3

1. BACKGROUND

The development and implementation of this Long Term Pollution Prevention Plan (LTPPP) is based on the requirements of the Massachusetts Wetland Protection Act (M.G.L. c. 131 §40) and the Massachusetts Clean Water Act (M.G.L. c. 21 §§26-53) under Stormwater Management Standard #4. The purpose of the LTPPP is to ensure that the stormwater management system covered under this plan incorporate long-term suitable practices for source control of pollutants and that these pollution prevention measures are implemented and maintained to protect the quality of Massachusetts' waters from pollutants, which may harm drinking water, fish, wildlife, and recreational activities.

2. FACILITY DESCRIPTION AND CONTACT INFORMATION

2.1 Owner Information

Name: Pine Hill Village LLC
Address: PO Box 468
City, State, Zip Code: Tyngsboro, MA 01879
Telephone Number: 978.509.3235

2.2 Operator Information

Name: Pine Hill Village LLC
Address: PO Box 468
City, State, Zip Code: Tyngsboro, MA 01879
Telephone Number: 978.509.3235

Should property owners or operators change, a formal written and signed transfer of operational control shall be made between the parties that includes requirements of this LTPPP.

3. LONG TERM PRACTICES

Long term pollution prevention practices are recommended to be implemented at the Pine Hills Village as part of the stormwater management plan:

3.1 Good Housekeeping

The owner is expected to use good housekeeping practices to ensure the following:

- Surfaces without vegetative cover are stabilized to prevent the loss of soil;
- Debris, trash and other materials are not allowed to accumulate in stormwater features; and

- Sediment on pavement including driveways, walkways, roads, etc. are swept and properly disposed prior to precipitation events to prevent sediment migration in stormwater runoff.

3.2 Material Storage

The owner is expected to use safe material storage practices to the maximum extent practicable as follows:

- Store municipal solid waste in covered containers or within storage buildings; and
- Store household materials (e.g., paints, cleaners, etc.) in storage areas that are not exposed to precipitation; and
- Store fertilizers, herbicides, chemicals and pesticides according to label requirements and if possible within storage buildings.

3.3 Vehicle Washing

The owner should use hoses equipped with trigger nozzles to reduce the amount of water used as well as to direct as much runoff water toward raingardens and/or vegetated surfaces as possible.

3.4 Spill Prevention and Response

In the event of a spill on private property or within the roadway, the local fire department should be called to respond. Spills should be cleaned according to local, state and federal regulations. If a large spill (i.e., greater than five gallons) of petroleum occurs and migrates into the stormwater system, the bioretention cells and raingardens should be inspected, cleaned and have material replaced as needed and described in the OMP for the site.

3.5 Lawns, Gardens, and Landscaped Area Maintenance

The owner should use natural lawn care and garden practices. There are no irrigation systems throughout the village and irrigation is not recommended because the vegetation of the village is drought tolerant.

3.6 Pet Waste Management

Homeowners should be educated on proper pet waste management including pickup after their pets and not disposing of pet waste in stormwater features.

3.7 On-site Sanitary Systems

The on-site sanitary system will require annual inspections to inspect septic tanks, pump stations and gravity sewers for any required cleaning, pumping or maintenance. Septic tanks will be pumped out every five to seven years typically, however if inspection reveals solids or scum in excess of design levels, more frequent pumping will be required. The treatment system is required to be inspected and sampled quarterly for the first two years, following which a reduction in sampling/inspection can be requested provided that the system is performing as designed. The dispersal systems will be inspected annually. Maintenance activities in

accordance with manufacturer's recommendations will be conducted, if necessary, during the annual inspections.

3.8 Deicing Chemicals and Snow Removal

Sand/salt mixtures will be used to reduce salt application amounts and snow will not be deposited within the constructed wetlands, bioretention cells or raingardens.

ATTACHMENT D

Operation and Maintenance Plan

Prepared for:

**Pine Hill Village LLC
PO Box 468
Tyngsboro, MA 01879**

Operations and Maintenance Plan for the Storm Water Management System

**Pine Hill Village
Harvard, Massachusetts**

Prepared by:



289 Great Road, Suite 105
Acton, MA 01720

Project Number BW0118

October 18, 2010
(Revised January 26, 2011 and July 18, 2018)

TABLE OF CONTENTS

1.	BACKGROUND	1
2.	FACILITY DESCRIPTION AND CONTACT INFORMATION.....	1
2.1	Owner Information	1
2.2	Operator Information	1
3.	MAINTENANCE	1
4.	PLANS	2
5.	PUBLIC SAFETY INFORMATION	2
6.	BUDGET	3
7.	OMP APPENDICES.....	3

1. BACKGROUND

The development and implementation of this Operation and Maintenance Plan (OMP) is based on the requirements of the Massachusetts Wetland Protection Act (M.G.L. c. 131 §40) and the Massachusetts Clean Water Act (M.G.L. c. 21 §§26-53) under Stormwater Management Standard #9, Operations and Maintenance Plan. The purpose of the OMP is to ensure that the stormwater management systems covered under this plan function as they are designed over the service life of the system and protect the quality of Massachusetts' waters from pollutants, which may harm drinking water, fish, wildlife, and recreational activities.

2. FACILITY DESCRIPTION AND CONTACT INFORMATION

2.1 Owner Information

Name: Pine Hill Village LLC
Address: PO Box 468
City, State, Zip Code: Tyngsboro, MA 01879
Telephone Number: 978.509.3235

2.2 Operator Information

Name: Pine Hill Village LLC
Address: PO Box 468
City, State, Zip Code: Tyngsboro, MA 01879
Telephone Number: 978.509.3235

Should operation control of the stormwater management features identified in this OMP be change, a formal written and signed transfer of operational control shall be made between the parties clearly identifying the responsibilities and associated budgets being transferred. The agreement shall be incorporated into this OMP.

3. MAINTENANCE

Routine maintenance shall be conducted by qualified personnel identified by the Operator. Maintenance shall be performed in a manner that minimizes impacts to wetland resource areas. Recommended routine maintenance for each type of stormwater facility is identified in Appendix A. General guidelines for maintenance for all stormwater facilities are as follows:

1. Follow local, state, and federal safety requirements as well as public safety guidelines and requirements described in this OMP.
2. Perform maintenance during daylight hours.
3. Follow recommended maintenance for each facility described in Appendix A.

4. Snow removal and storage shall be managed in accordance with the Snow Storage Plan.
5. Sediment removed from the stormwater facilities shall be managed according to Massachusetts Department of Environmental Protection (MA DEP) requirements summarized below:
 - MA DEP characterizes catch basin debris as solid waste, unless there is evidence that they have been contaminated by a spill or other means. Contaminated catch basin debris is categorized according to Hazardous Waste Regulations 310 CMR 30.000;
 - Catch basin cleanings may be taken to a landfill or other solid waste facility permitted by MA DEP to accept solid waste without any prior approvals through MA DEP; and
 - MA DEP regulations prohibit solid waste facilities to accept material that contains free-draining liquids. Catch basin cleanings should be dewatered by draining the liquid back to the stormwater facility.
6. Maintain an operation and maintenance log, including inspections, repairs, replacement and disposal (for disposal, the log shall indicate the type of material and the disposal location). A log is included in Appendix B.

4. PLANS

The following plans identify the stormwater management facilities described in this OMP:

1. “Proposed Conditions Stormwater Management Plan, Pine Hill Village in Harvard, Mass.,” dated January 2018.

5. PUBLIC SAFETY INFORMATION

Public safety guidelines and local, state, and federal safety requirements shall be followed during maintenance activities described in this OMP. Public safety shall take priority over maintenance activities. Public safety shall include, but not be limited to, the following:

1. Operators shall have required personal protective equipments (PPE) during maintenance activities;
2. Maintenance activities that are conducted entirely or partially in a right of way, shall have proper police detail according local and state requirements;
3. Although not anticipated, confined space entry regulations may be applied during inspection of catch basins, culverts, and manholes. Confined space entry is regulated under 29 CFR 1910, Occupation Safety and Health Standards (OSHA).

6. BUDGET

The annual maintenance budget for the road features (i.e., catch basins, manholes, etc...) and landscape features (i.e., constructed wetland, swales, raingardens and bioretention cells) will be incorporated under the Pine Hill Village Association annual maintenance budget. Should the road be accepted as a public way, it's annual maintenance will be incorporated under the Town of Harvard's Annual Budget. The annualized effort budget estimated for maintenance of the stormwater BMPs described in this OMP is summarized as follows:

Task	Estimate Annual Effort ¹
Clean Accumulated Sediment ²	\$6,653
Restore BMPs ³	\$3,458
Total Annual Budget	\$10,111

NOTES:

1. Assumes the hourly rate for one skilled laborer costs \$65 per hour, therefore \$524 per laborer-day
2. Assumes three skilled laborers for two full 8 hour days at \$524 per laborer-day, a light machine with operator for two days at \$1200 per day plus 20% contingency (does not include export costs to dispose sediment offsite).
3. Assume three skilled laborers for two full 8 hour days at \$524 per laborer-day, plus 10% for equipment operations.

7. OMP APPENDICES

The following documentation is attached to this OMP:

Appendix A – Routine Maintenance; and

Appendix B – Routine Maintenance Log.

APPENDIX A

ROUTINE MAINTENANCE

**Stormwater Improvements
Pine Hill Village, Harvard, Massachusetts
Routine Maintenance**

Best Management Practice	Maintenance Activity	Frequency
Sediment Forebay	Remove accumulated sediment and debris from forebay, sediment should be removed on the scheduled frequency and when sediment accumulates to the elevation of the clean out stake	Spring
	Restore denuded vegetation and vegetation damaged from cleaning activities	Spring
	Replenish sand base to original elevation	As Required
	Inspect and clean overflow spillway and low-flow outlet (if applicable) and repair rills and replenish rip-rap	Every Other Spring
	Mow vegetation and remove saplings, etc. in the areas of the access points, inlets and outlets	Spring
Vegetated Channels and Swales	Inspect channels to ensure vegetation is adequate and look for signs of riling and erosion, repair rills and replace denuded vegetation	Spring
	Mow vegetation when vegetation height exceeds the channel depth and remove debris	Spring
	Restore denuded vegetation that may be damaged from winter plowing and sanding/salting	Spring
	Remove accumulated sediment and debris	Spring
	Inspect check dams and replenish rip-rap to restore to original condition	Spring

**Stormwater Improvements
Pine Hill Village, Harvard, Massachusetts
Routine Maintenance**

Best Management Practice	Maintenance Activity	Frequency
Rip-Rap Outfalls	Remove accumulated sediment and debris	Spring
	Inspect channel lining and outfalls for signs of riling and erosion, repair rills and replace/restore rip-rap	Spring
Constructed Wetland	Maintain the sediment forebay portion of the constructed wetland according to “Sediment Forebay” described above	Spring
	Manually clear accumulated sediment from the wetland portion of the constructed wetland	Spring
	Inspect wetland plants for health and vigor, replace dead, or impaired plants with native species that are colonizing the wetland. Inspect for invasive species and manually remove from the constructed wetland	Fall
	Inspect embankments and outlet control structural damage and debris. Repair as required	Fall
	Inspect outfall and spillway for signs of riling and erosion, repair rills and replace/restore rip-rap	Fall
	Inspect wetland for rills or evidence of channelized flow; restore wetland micro-topography to ensure flows through wetland are distributed through the wetland area	Once every 10 Years

**Stormwater Improvements
Pine Hill Village, Harvard, Massachusetts
Routine Maintenance**

Best Management Practice	Maintenance Activity	Frequency
Drain Basins	Clean accumulated sediment and debris from the sump at the scheduled frequency. Sediment should also be removed when accumulated sediment depths are greater than one half the depth from the bottom of the invert of the lowest pipe in the basin.	Quarterly
Bioretention and Raingarden Areas	Inspect site including soil and plants and remove any accumulated sediment, debris and waste	Monthly
	Add mulch and fertilizers to help vegetation growth	Annually
	Remove and replace visible dead or weak vegetation	Annually
	Mow and trim adjacent areas	Annually
Porous Pavers	Inspect the pavers to ensure that the surface drains properly after storms. Replace joint material when material has settled or eroded to more than 25 percent the thickness of the paver block.	Annually
	Inspect paver surface for deterioration. Replace or reinstall pavers once paver surface deteriorates (e.g., chips, erodes, settles, etc.) to a point that causes risk to public safety.	Annually
	Clean surface using power washer and then vacuum sweep the area.	Annually

The Operation and Maintenance Log is intended for stormwater management features described in the Operations and Maintenance Plan for Pine Hill Village, Harvard, Massachusetts prepared by Geosyntec Consultants, Inc. and dated October 2010.

APPENDIX B

ROUTINE MAINTENANCE LOG

**Stormwater Improvements
Pine Hill Village, Harvard, Massachusetts
Maintenance Log**

Date	Description of Maintenance	Operator	Estimated Volume of Material Removed (CYD)	Disposal Facility

The Operation and Maintenance Log is intended for stormwater management features described in the Operations and Maintenance Plan for Pine Hill Village, Harvard, Massachusetts prepared by Geosyntec Consultants, Inc. and dated July 2018.

ATTACHMENT E

Checklist



Checklist for Stormwater Report

A. Introduction

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



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

The Stormwater Report must include:

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

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

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

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

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

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



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

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

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

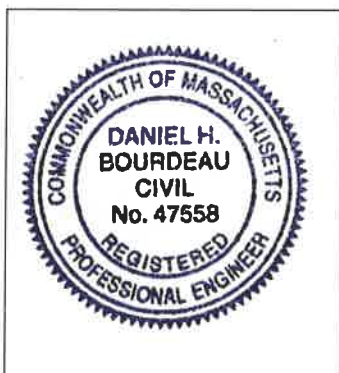
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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

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

Registered Professional Engineer's Certification

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

Registered Professional Engineer Block and Signature



 7/31/18
Signature and Date

Checklist

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

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



Checklist for Stormwater Report

Checklist (continued)

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

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

Standard 1: No New Untreated Discharges

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



Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

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

Standard 3: Recharge

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

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



Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

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

Standard 4: Water Quality

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

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



Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

- ☒ The BMP is sized (and calculations provided) based on:
 - ☒ The ½" or 1" Water Quality Volume or
 - ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.
- ☐ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the proprietary 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

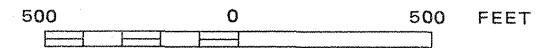
- ☒ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;
- ☐ An Illicit Discharge Compliance Statement is attached;
- ☐ NO Illicit Discharge Compliance Statement is attached but will be submitted **prior to** the discharge of any stormwater to post-construction BMPs.

ATTACHMENT F

FEMA Flood Map



APPROXIMATE SCALE



NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

TOWN OF
HARVARD,
MASSACHUSETTS
WORCESTER COUNTY

PANEL 6 OF 6

(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
250308 0006 B

EFFECTIVE DATE:
JUNE 15, 1983

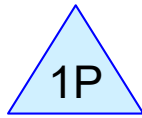


Federal Emergency Management Agency

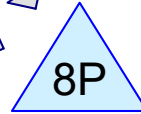
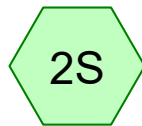
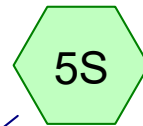
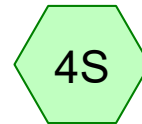
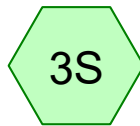
This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

ATTACHMENT G

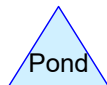
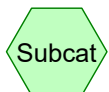
HydroCAD Output



CP#1



CP#2



Routing Diagram for Pine Hill_Existing Conditions

Prepared by SCCM-01, Printed 6/11/2018

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Pine Hill_Existing Conditions

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Page 2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.055	98	Paved parking & roofs (5S)
8.941	60	Woods, Fair, HSG B (1S, 2S, 3S, 4S)
5.569	73	Woods, Fair, HSG C (2S, 3S, 4S)
2.103	79	Woods, Fair, HSG D (2S, 3S)
16.668	67	TOTAL AREA

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Page 3

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
8.941	HSG B	1S, 2S, 3S, 4S
5.569	HSG C	2S, 3S, 4S
2.103	HSG D	2S, 3S
0.055	Other	5S
16.668		TOTAL AREA

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Page 4

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.000	0.055	0.055	Paved parking & roofs	5S
0.000	8.941	5.569	2.103	0.000	16.613	Woods, Fair	1S, 2S, 3S, 4S
0.000	8.941	5.569	2.103	0.055	16.668	TOTAL AREA	

Pine Hill_Existing Conditions

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Type III 24-hr 2-yr Rainfall=3.00"

Printed 6/11/2018

Page 5

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S:

Runoff Area=139,834 sf 0.00% Impervious Runoff Depth=0.33"
Flow Length=50' Slope=0.0700 '/' Tc=7.7 min CN=60 Runoff=0.57 cfs 0.089 af

Subcatchment2S:

Runoff Area=370,166 sf 0.00% Impervious Runoff Depth=0.58"
Flow Length=600' Tc=11.2 min CN=67 Runoff=3.86 cfs 0.414 af

Subcatchment3S:

Runoff Area=3.497 ac 0.00% Impervious Runoff Depth=0.86"
Flow Length=730' Tc=15.1 min CN=73 Runoff=2.42 cfs 0.250 af

Subcatchment4S:

Runoff Area=1.408 ac 0.00% Impervious Runoff Depth=0.54"
Flow Length=150' Tc=16.7 min CN=66 Runoff=0.50 cfs 0.064 af

Subcatchment5S:

Runoff Area=2,375 sf 100.00% Impervious Runoff Depth=2.77"
Flow Length=15' Slope=0.0150 '/' Tc=5.5 min CN=98 Runoff=0.16 cfs 0.013 af

Pond 1P: CP#1

Inflow=0.57 cfs 0.089 af
Primary=0.57 cfs 0.089 af

Pond 8P: CP#2

Inflow=6.71 cfs 0.741 af
Primary=6.71 cfs 0.741 af

Total Runoff Area = 16.668 ac Runoff Volume = 0.830 af Average Runoff Depth = 0.60"
99.67% Pervious = 16.613 ac 0.33% Impervious = 0.055 ac

Pine Hill_Existing Conditions

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Type III 24-hr 2-yr Rainfall=3.00"

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Page 6

Summary for Subcatchment 1S:

Runoff = 0.57 cfs @ 12.17 hrs, Volume= 0.089 af, Depth= 0.33"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

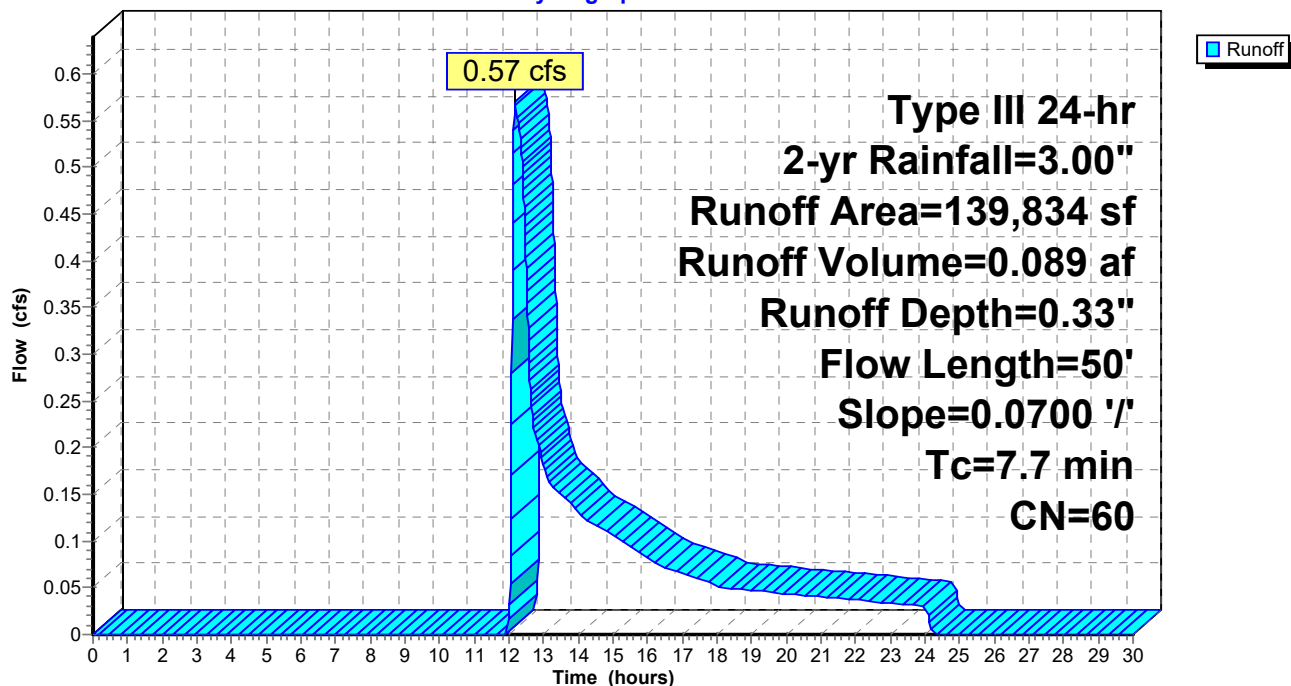
Type III 24-hr 2-yr Rainfall=3.00"

Area (sf)	CN	Description
139,834	60	Woods, Fair, HSG B
139,834		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	50	0.0700	0.11		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.00"

Subcatchment 1S:

Hydrograph



Pine Hill_Existing Conditions

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Type III 24-hr 2-yr Rainfall=3.00"

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Page 7

Summary for Subcatchment 2S:

Runoff = 3.86 cfs @ 12.18 hrs, Volume= 0.414 af, Depth= 0.58"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

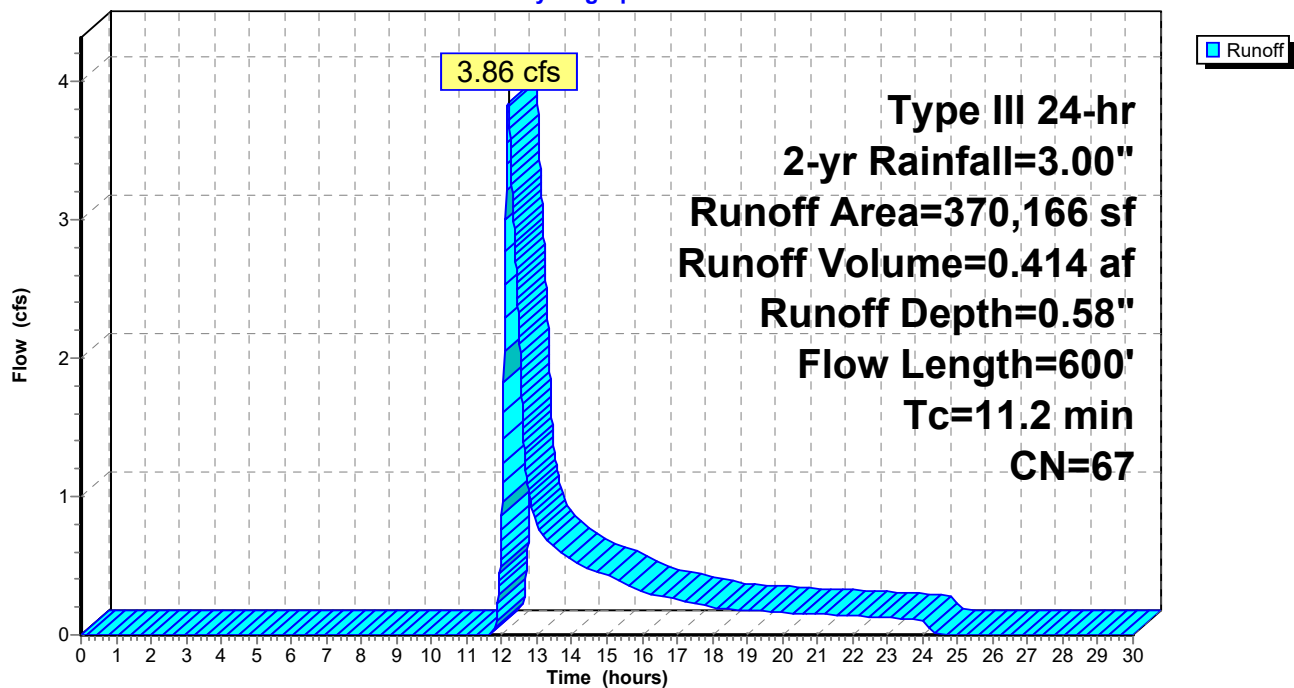
Type III 24-hr 2-yr Rainfall=3.00"

Area (sf)	CN	Description
196,710	60	Woods, Fair, HSG B
119,354	73	Woods, Fair, HSG C
54,102	79	Woods, Fair, HSG D
370,166	67	Weighted Average
370,166		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.1100	0.13		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.00"
4.8	550	0.1480	1.92		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
11.2	600	Total			

Subcatchment 2S:

Hydrograph



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Type III 24-hr 2-yr Rainfall=3.00"

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Page 8

Summary for Subcatchment 3S:

Runoff = 2.42 cfs @ 12.23 hrs, Volume= 0.250 af, Depth= 0.86"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

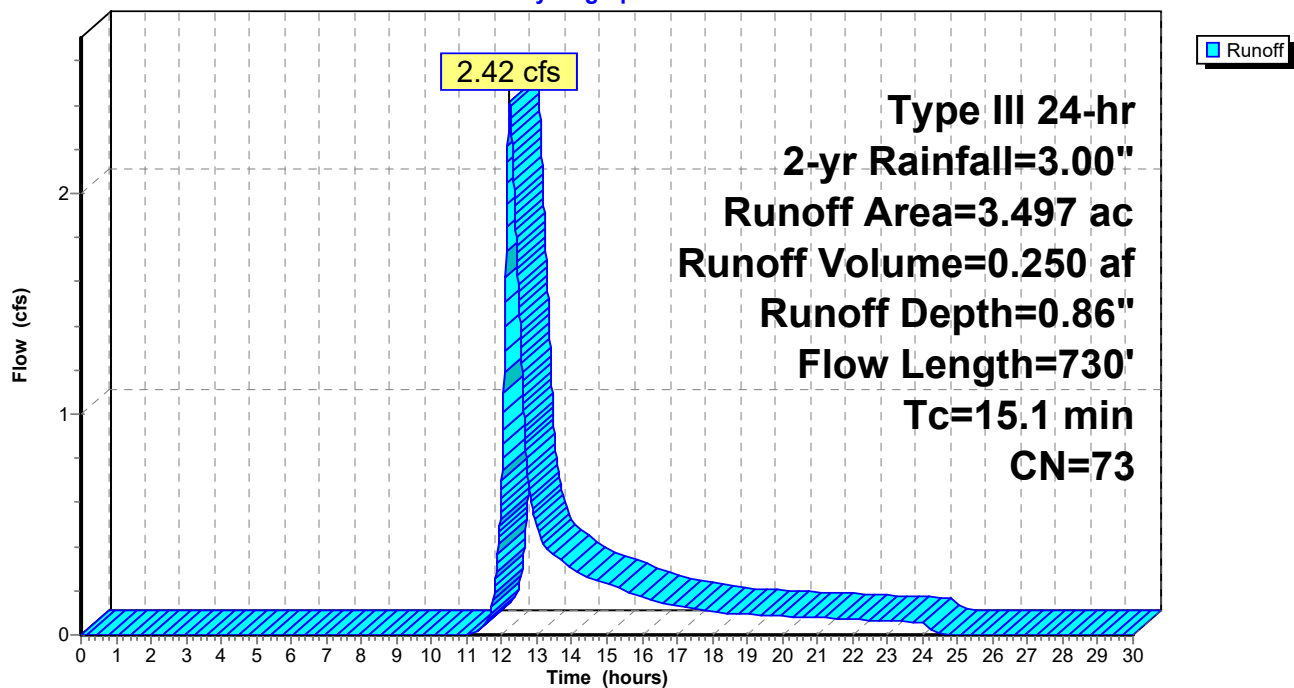
Type III 24-hr 2-yr Rainfall=3.00"

Area (ac)	CN	Description
0.465	60	Woods, Fair, HSG B
2.171	73	Woods, Fair, HSG C
0.861	79	Woods, Fair, HSG D
3.497	73	Weighted Average
3.497		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	50	0.0900	0.12		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.00"
8.1	680	0.0780	1.40		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
15.1	730	Total			

Subcatchment 3S:

Hydrograph



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Type III 24-hr 2-yr Rainfall=3.00"

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Page 9

Summary for Subcatchment 4S:

Runoff = 0.50 cfs @ 12.29 hrs, Volume= 0.064 af, Depth= 0.54"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

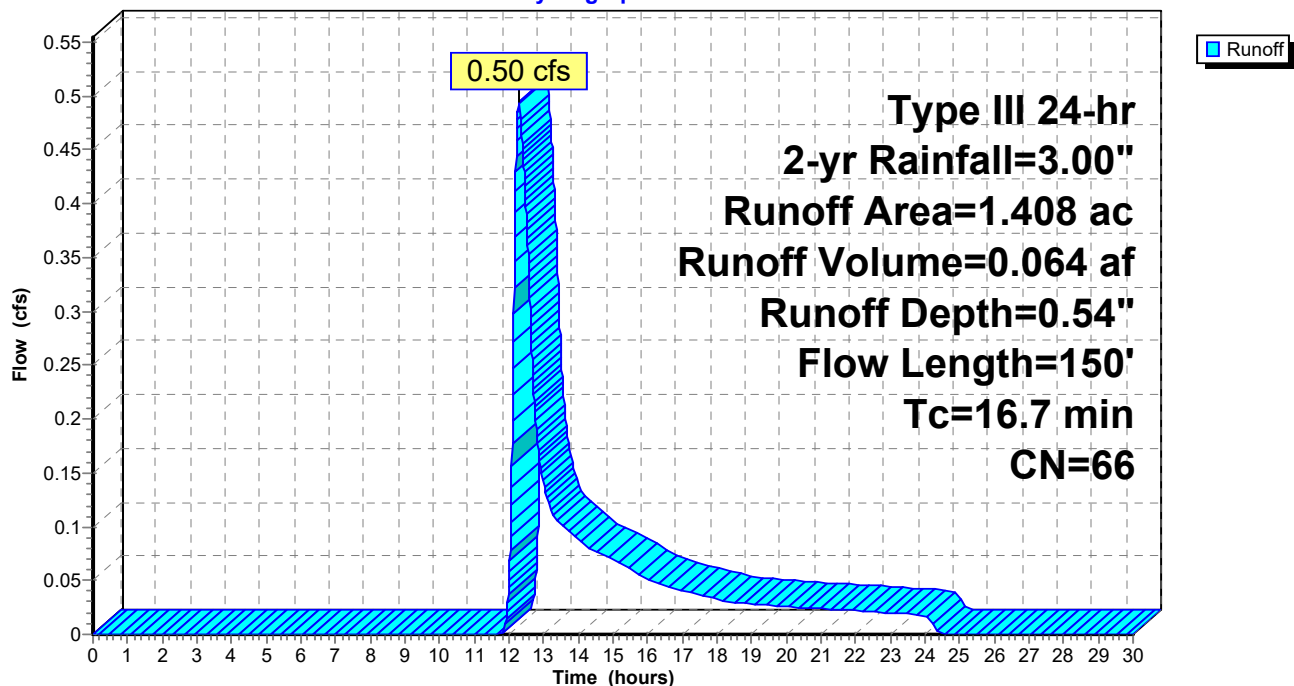
Type III 24-hr 2-yr Rainfall=3.00"

Area (ac)	CN	Description
0.750	60	Woods, Fair, HSG B
0.658	73	Woods, Fair, HSG C
1.408	66	Weighted Average
1.408		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.3	50	0.0150	0.06		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.00"
2.4	100	0.0200	0.71		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
16.7	150	Total			

Subcatchment 4S:

Hydrograph



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Type III 24-hr 2-yr Rainfall=3.00"

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Page 10

Summary for Subcatchment 5S:

Runoff = 0.16 cfs @ 12.08 hrs, Volume= 0.013 af, Depth= 2.77"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

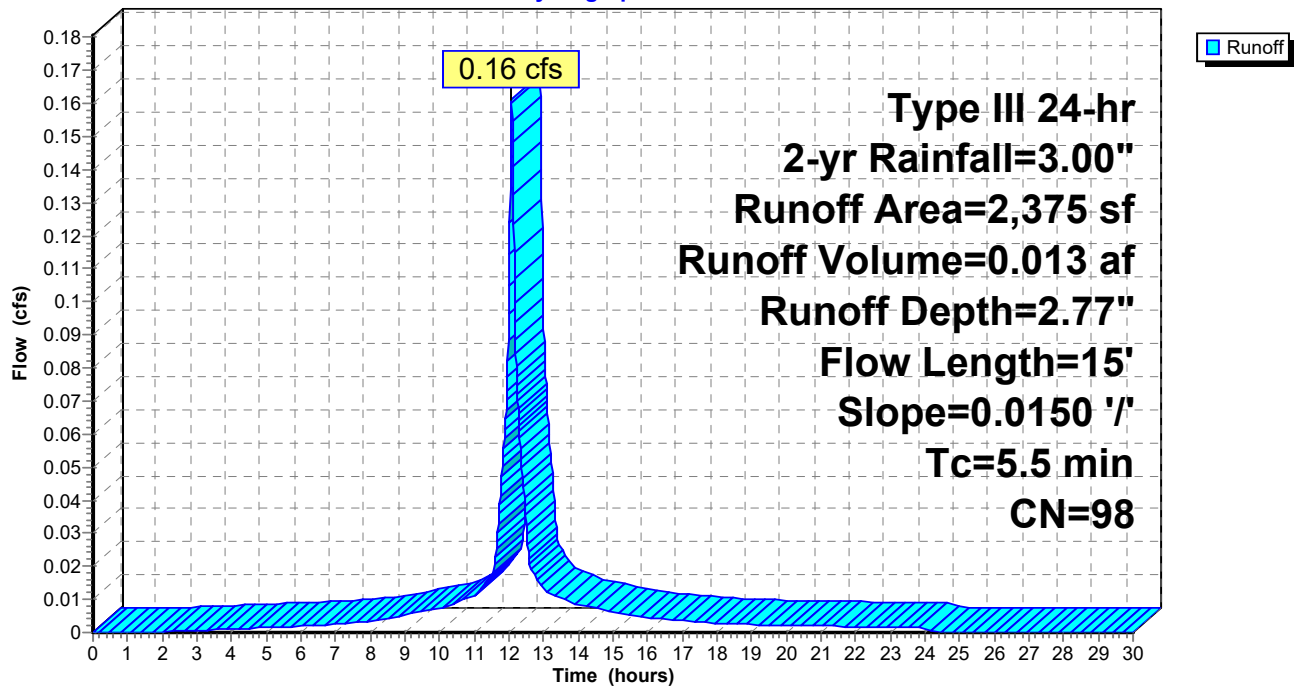
Type III 24-hr 2-yr Rainfall=3.00"

Area (sf)	CN	Description
2,375	98	Paved parking & roofs
2,375		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	15	0.0150	0.05		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.00"

Subcatchment 5S:

Hydrograph



Pine Hill_Existing Conditions

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Type III 24-hr 2-yr Rainfall=3.00"

Printed 6/11/2018

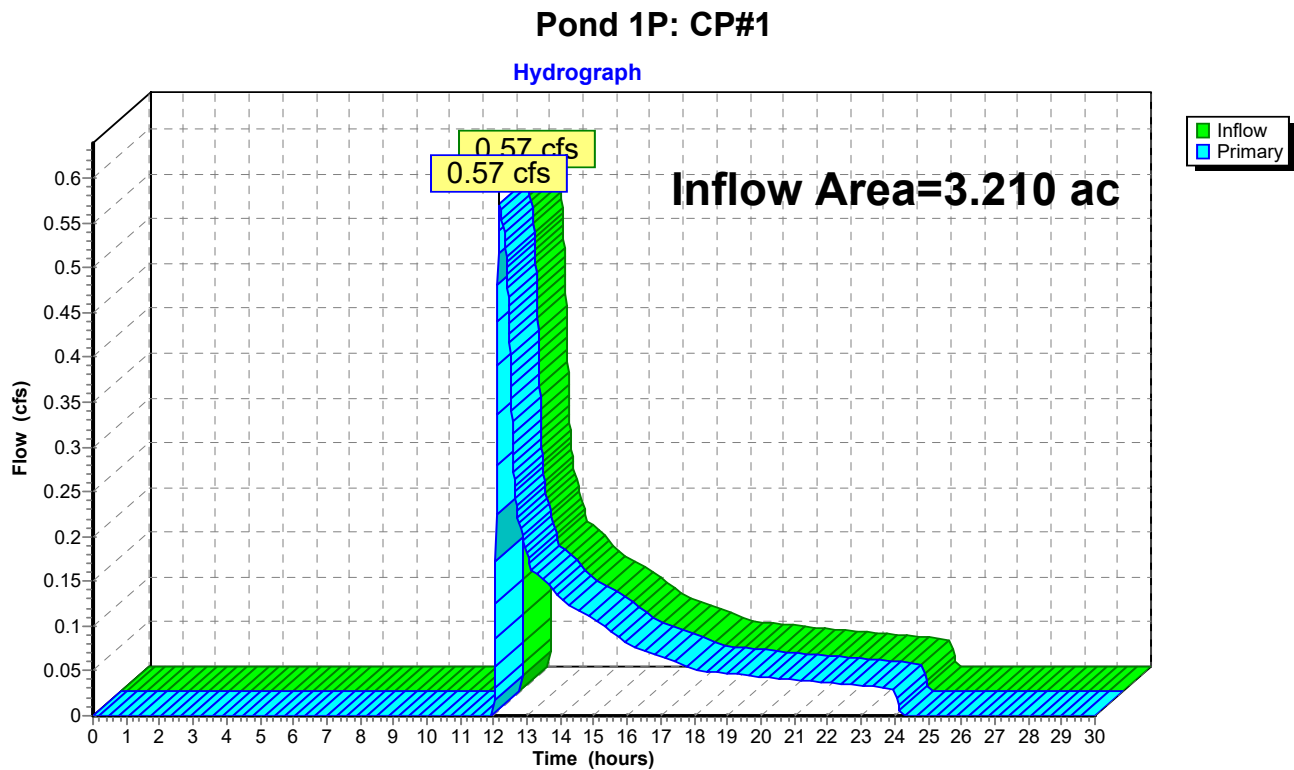
Page 11

Summary for Pond 1P: CP#1

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 3.210 ac, 0.00% Impervious, Inflow Depth = 0.33" for 2-yr event
Inflow = 0.57 cfs @ 12.17 hrs, Volume= 0.089 af
Primary = 0.57 cfs @ 12.17 hrs, Volume= 0.089 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs



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Type III 24-hr 2-yr Rainfall=3.00"

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Page 12

Summary for Pond 8P: CP#2

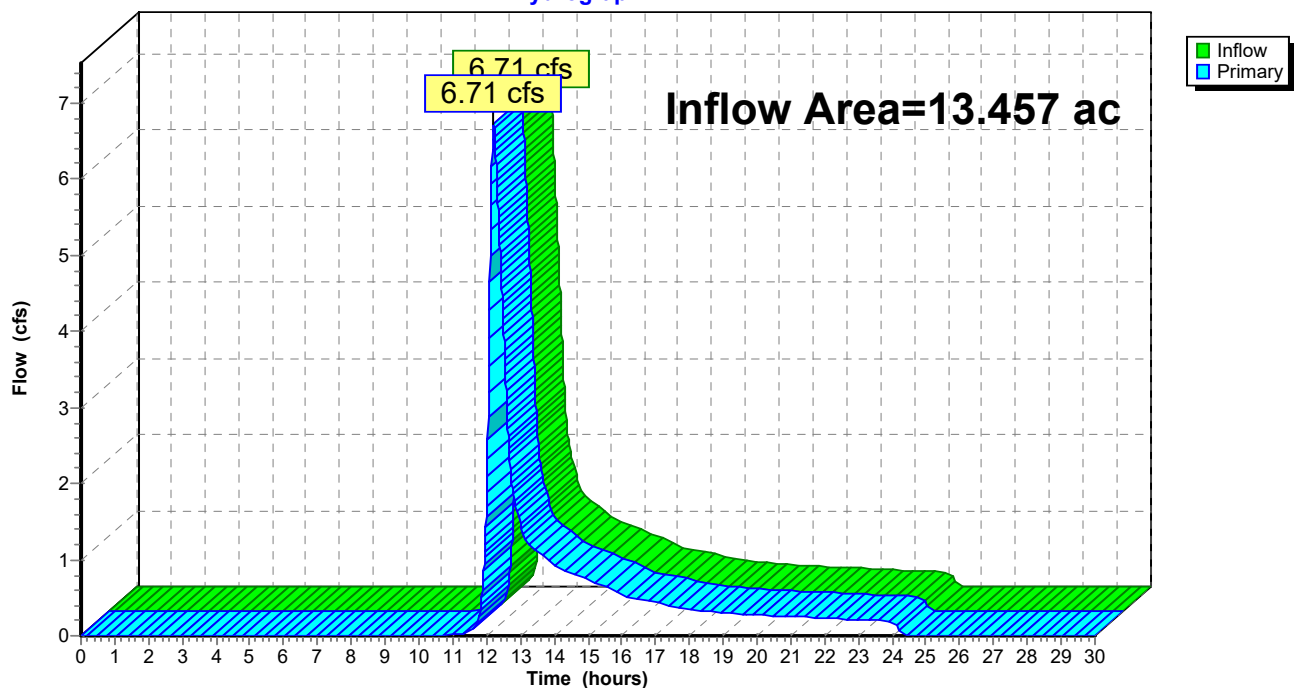
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 13.457 ac, 0.41% Impervious, Inflow Depth = 0.66" for 2-yr event
Inflow = 6.71 cfs @ 12.20 hrs, Volume= 0.741 af
Primary = 6.71 cfs @ 12.20 hrs, Volume= 0.741 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Pond 8P: CP#2

Hydrograph



Pine Hill_Existing Conditions

Prepared by SCCM-01

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Type III 24-hr 10-yr Rainfall=4.60"

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Page 13

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S:

Runoff Area=139,834 sf 0.00% Impervious Runoff Depth=1.07"
Flow Length=50' Slope=0.0700 '/' Tc=7.7 min CN=60 Runoff=3.28 cfs 0.287 af

Subcatchment2S:

Runoff Area=370,166 sf 0.00% Impervious Runoff Depth=1.53"
Flow Length=600' Tc=11.2 min CN=67 Runoff=12.15 cfs 1.084 af

Subcatchment3S:

Runoff Area=3.497 ac 0.00% Impervious Runoff Depth=1.97"
Flow Length=730' Tc=15.1 min CN=73 Runoff=5.99 cfs 0.575 af

Subcatchment4S:

Runoff Area=1.408 ac 0.00% Impervious Runoff Depth=1.46"
Flow Length=150' Tc=16.7 min CN=66 Runoff=1.64 cfs 0.171 af

Subcatchment5S:

Runoff Area=2,375 sf 100.00% Impervious Runoff Depth=4.36"
Flow Length=15' Slope=0.0150 '/' Tc=5.5 min CN=98 Runoff=0.25 cfs 0.020 af

Pond 1P: CP#1

Inflow=3.28 cfs 0.287 af
Primary=3.28 cfs 0.287 af

Pond 8P: CP#2

Inflow=19.50 cfs 1.849 af
Primary=19.50 cfs 1.849 af

Total Runoff Area = 16.668 ac Runoff Volume = 2.137 af Average Runoff Depth = 1.54"
99.67% Pervious = 16.613 ac 0.33% Impervious = 0.055 ac

Pine Hill_Existing Conditions

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Type III 24-hr 10-yr Rainfall=4.60"

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Page 14

Summary for Subcatchment 1S:

Runoff = 3.28 cfs @ 12.13 hrs, Volume= 0.287 af, Depth= 1.07"

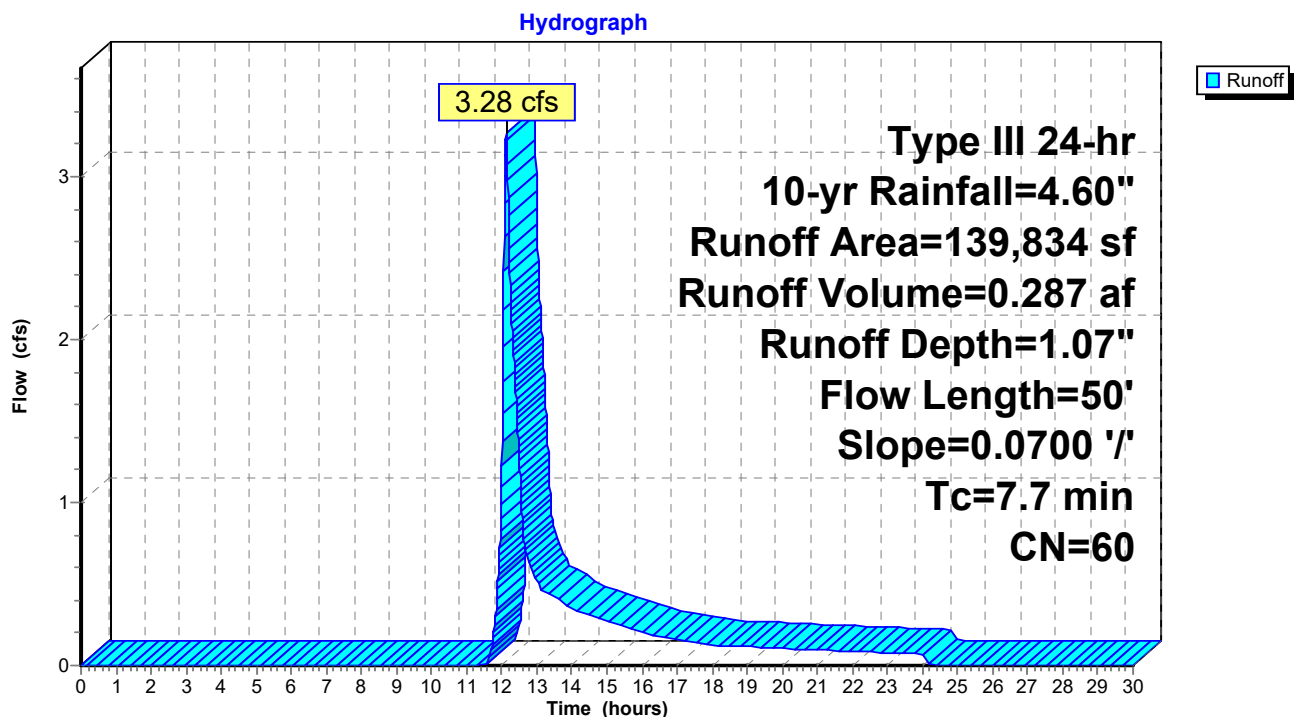
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Type III 24-hr 10-yr Rainfall=4.60"

Area (sf)	CN	Description
139,834	60	Woods, Fair, HSG B
139,834		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	50	0.0700	0.11		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.00"

Subcatchment 1S:



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Type III 24-hr 10-yr Rainfall=4.60"

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Page 15

Summary for Subcatchment 2S:

Runoff = 12.15 cfs @ 12.16 hrs, Volume= 1.084 af, Depth= 1.53"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

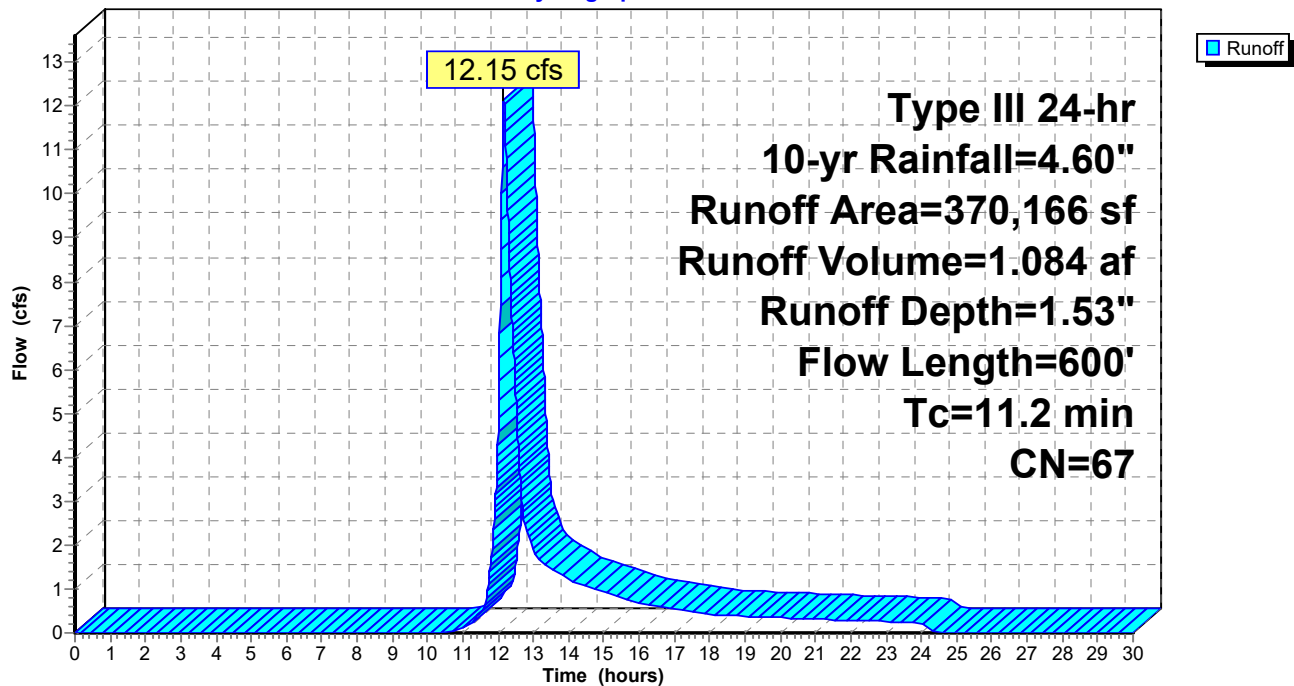
Type III 24-hr 10-yr Rainfall=4.60"

Area (sf)	CN	Description
196,710	60	Woods, Fair, HSG B
119,354	73	Woods, Fair, HSG C
54,102	79	Woods, Fair, HSG D
370,166	67	Weighted Average
370,166		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.1100	0.13		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.00"
4.8	550	0.1480	1.92		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
11.2	600	Total			

Subcatchment 2S:

Hydrograph



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Type III 24-hr 10-yr Rainfall=4.60"

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Page 16

Summary for Subcatchment 3S:

Runoff = 5.99 cfs @ 12.21 hrs, Volume= 0.575 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

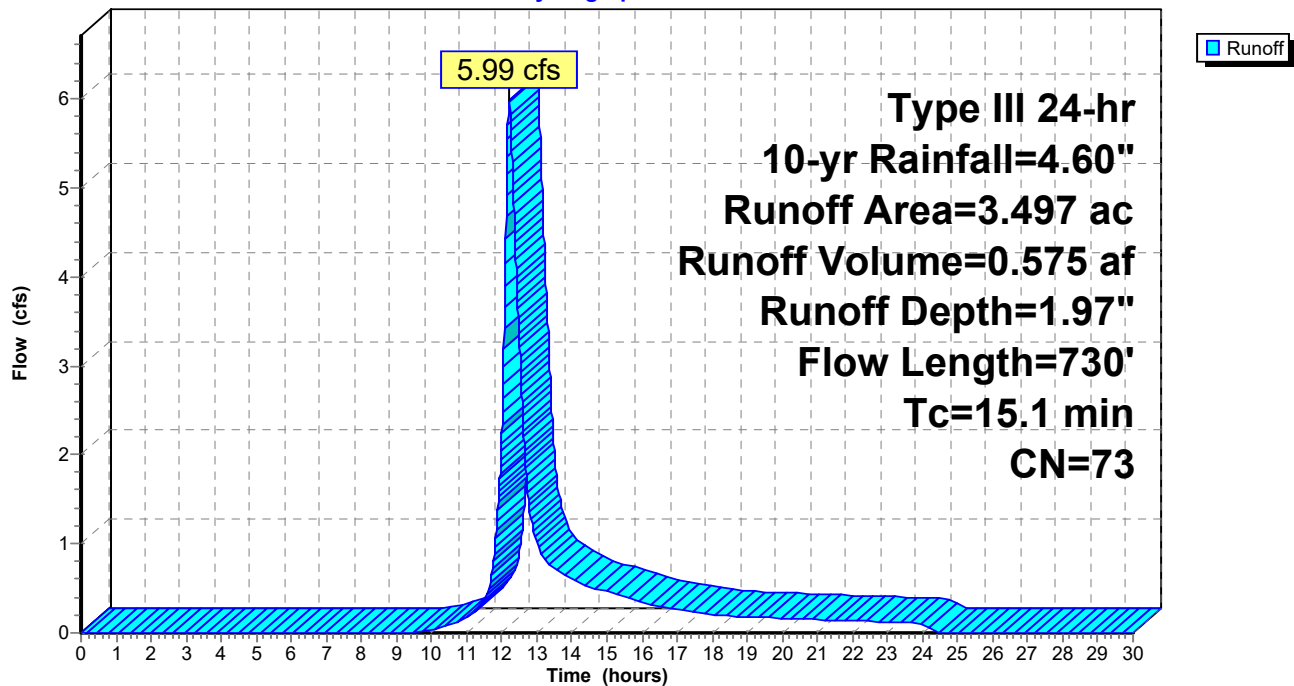
Type III 24-hr 10-yr Rainfall=4.60"

Area (ac)	CN	Description
0.465	60	Woods, Fair, HSG B
2.171	73	Woods, Fair, HSG C
0.861	79	Woods, Fair, HSG D
3.497	73	Weighted Average
3.497		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	50	0.0900	0.12		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.00"
8.1	680	0.0780	1.40		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
15.1	730	Total			

Subcatchment 3S:

Hydrograph



Pine Hill_Existing Conditions

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Type III 24-hr 10-yr Rainfall=4.60"

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Page 17

Summary for Subcatchment 4S:

Runoff = 1.64 cfs @ 12.25 hrs, Volume= 0.171 af, Depth= 1.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

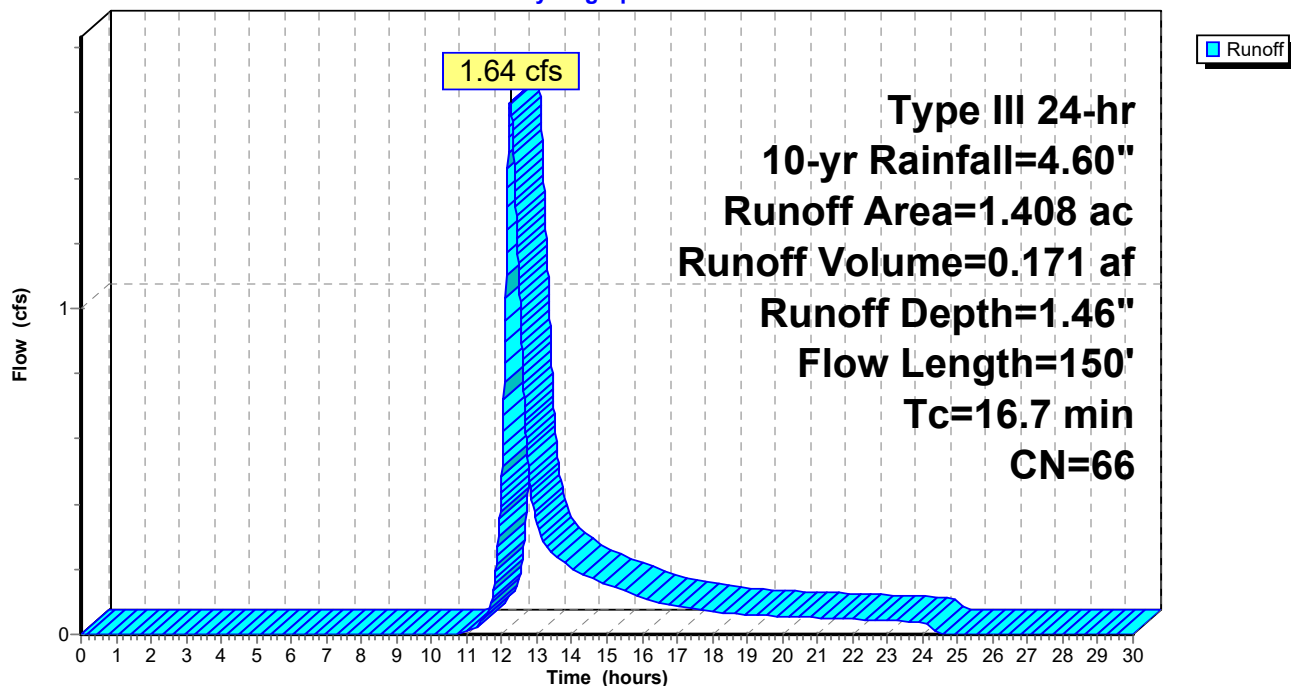
Type III 24-hr 10-yr Rainfall=4.60"

Area (ac)	CN	Description
0.750	60	Woods, Fair, HSG B
0.658	73	Woods, Fair, HSG C
1.408	66	Weighted Average
1.408		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.3	50	0.0150	0.06		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.00"
2.4	100	0.0200	0.71		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
16.7	150	Total			

Subcatchment 4S:

Hydrograph



Pine Hill_Existing Conditions

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Type III 24-hr 10-yr Rainfall=4.60"

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Page 18

Summary for Subcatchment 5S:

Runoff = 0.25 cfs @ 12.08 hrs, Volume= 0.020 af, Depth= 4.36"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

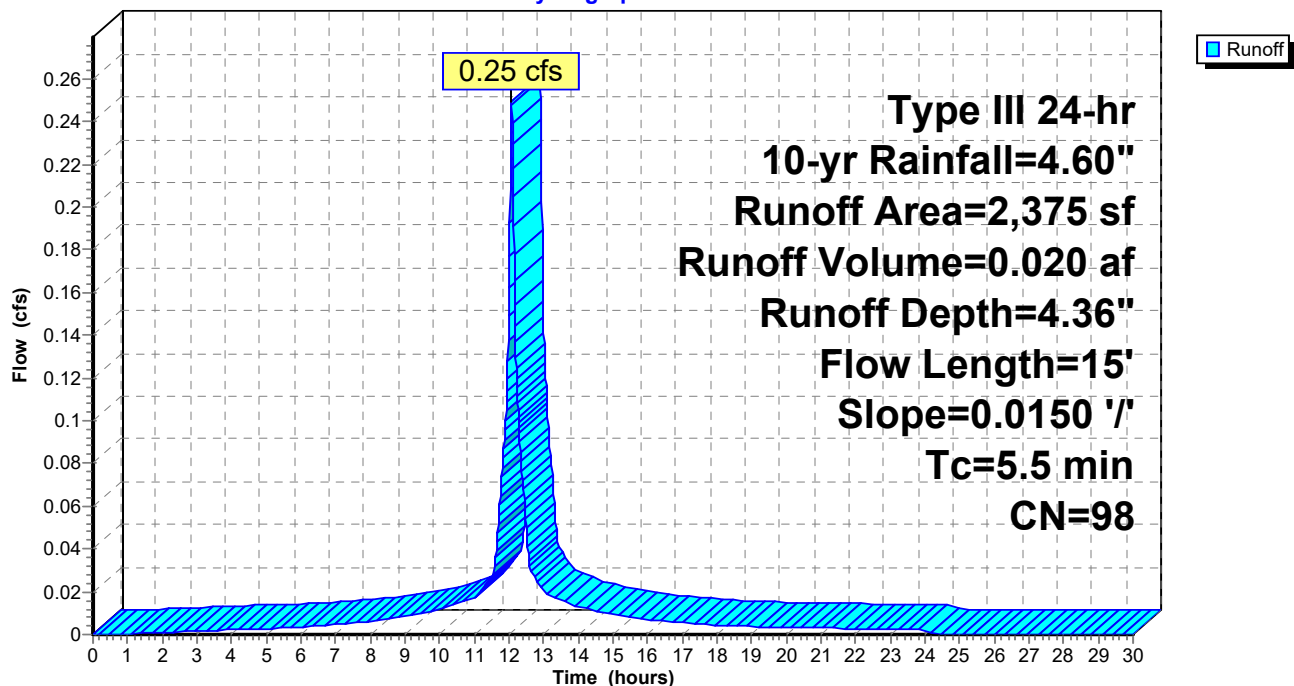
Type III 24-hr 10-yr Rainfall=4.60"

Area (sf)	CN	Description
2,375	98	Paved parking & roofs
2,375		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	15	0.0150	0.05		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.00"

Subcatchment 5S:

Hydrograph



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Type III 24-hr 10-yr Rainfall=4.60"

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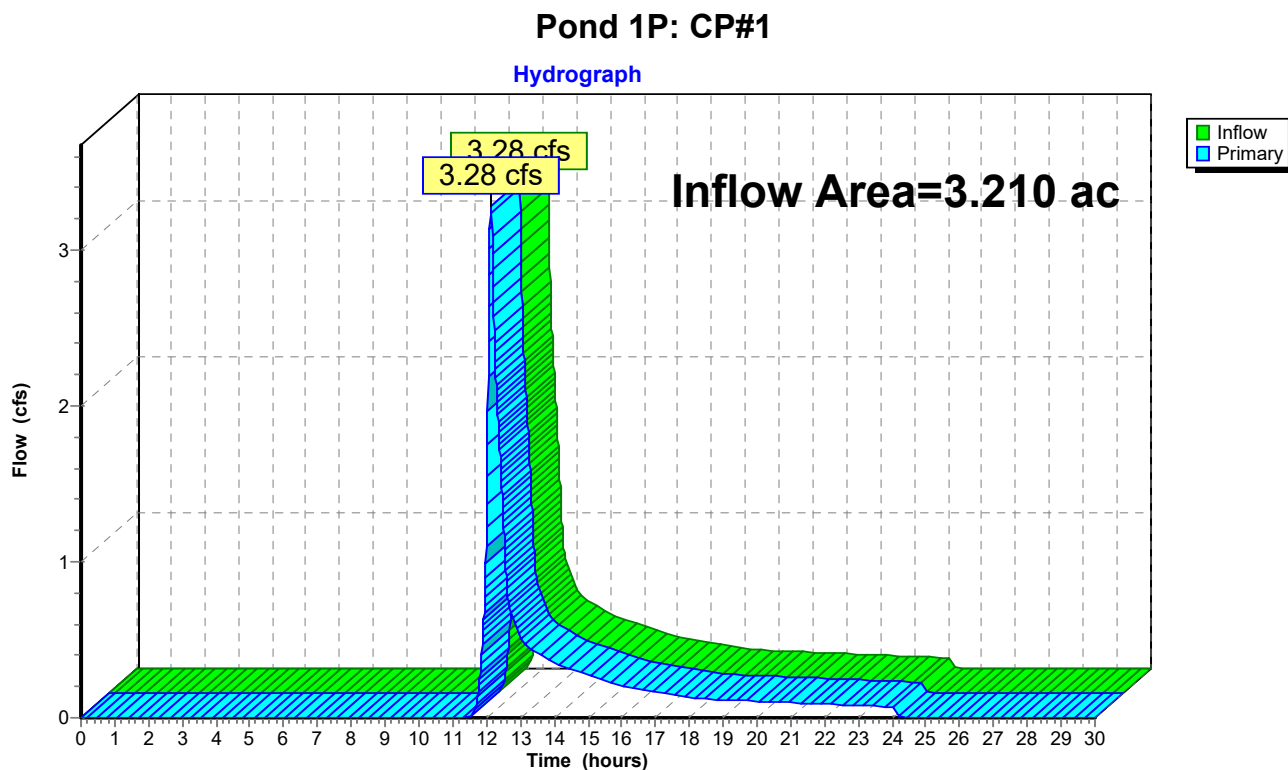
Page 19

Summary for Pond 1P: CP#1

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 3.210 ac, 0.00% Impervious, Inflow Depth = 1.07" for 10-yr event
Inflow = 3.28 cfs @ 12.13 hrs, Volume= 0.287 af
Primary = 3.28 cfs @ 12.13 hrs, Volume= 0.287 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs



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Type III 24-hr 10-yr Rainfall=4.60"

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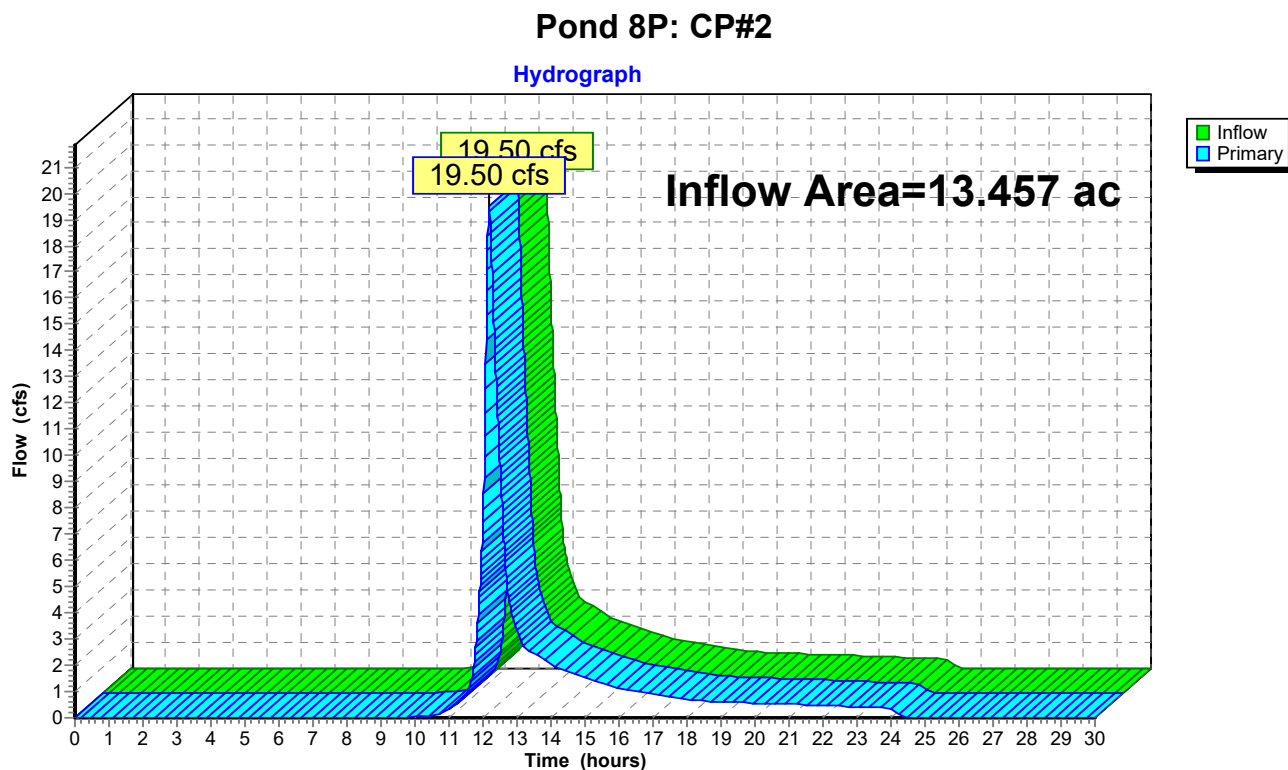
Page 20

Summary for Pond 8P: CP#2

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 13.457 ac, 0.41% Impervious, Inflow Depth = 1.65" for 10-yr event
Inflow = 19.50 cfs @ 12.18 hrs, Volume= 1.849 af
Primary = 19.50 cfs @ 12.18 hrs, Volume= 1.849 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs



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Type III 24-hr 100-yr Rainfall=6.80"

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Page 21

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Runoff Area=139,834 sf 0.00% Impervious Runoff Depth=2.46"
Flow Length=50' Slope=0.0700 '/' Tc=7.7 min CN=60 Runoff=8.43 cfs 0.659 af

Subcatchment2S: Runoff Area=370,166 sf 0.00% Impervious Runoff Depth=3.15"
Flow Length=600' Tc=11.2 min CN=67 Runoff=26.20 cfs 2.229 af

Subcatchment3S: Runoff Area=3.497 ac 0.00% Impervious Runoff Depth=3.76"
Flow Length=730' Tc=15.1 min CN=73 Runoff=11.65 cfs 1.097 af

Subcatchment4S: Runoff Area=1.408 ac 0.00% Impervious Runoff Depth=3.05"
Flow Length=150' Tc=16.7 min CN=66 Runoff=3.61 cfs 0.358 af

Subcatchment5S: Runoff Area=2,375 sf 100.00% Impervious Runoff Depth=6.56"
Flow Length=15' Slope=0.0150 '/' Tc=5.5 min CN=98 Runoff=0.37 cfs 0.030 af

Pond 1P: CP#1 Inflow=8.43 cfs 0.659 af
Primary=8.43 cfs 0.659 af

Pond 8P: CP#2 Inflow=40.78 cfs 3.714 af
Primary=40.78 cfs 3.714 af

Total Runoff Area = 16.668 ac Runoff Volume = 4.373 af Average Runoff Depth = 3.15"
99.67% Pervious = 16.613 ac 0.33% Impervious = 0.055 ac

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Type III 24-hr 100-yr Rainfall=6.80"

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Page 22

Summary for Subcatchment 1S:

Runoff = 8.43 cfs @ 12.12 hrs, Volume= 0.659 af, Depth= 2.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

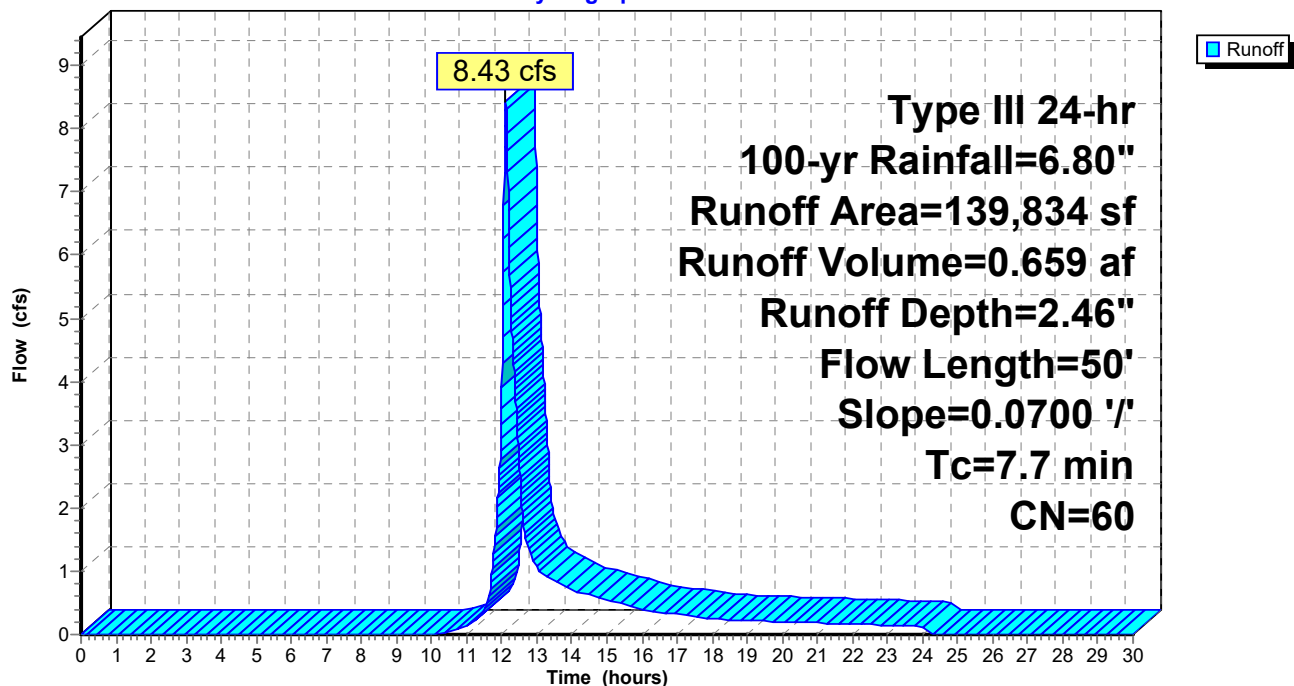
Type III 24-hr 100-yr Rainfall=6.80"

Area (sf)	CN	Description
139,834	60	Woods, Fair, HSG B
139,834		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	50	0.0700	0.11		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.00"

Subcatchment 1S:

Hydrograph



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Type III 24-hr 100-yr Rainfall=6.80"

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Page 23

Summary for Subcatchment 2S:

Runoff = 26.20 cfs @ 12.16 hrs, Volume= 2.229 af, Depth= 3.15"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

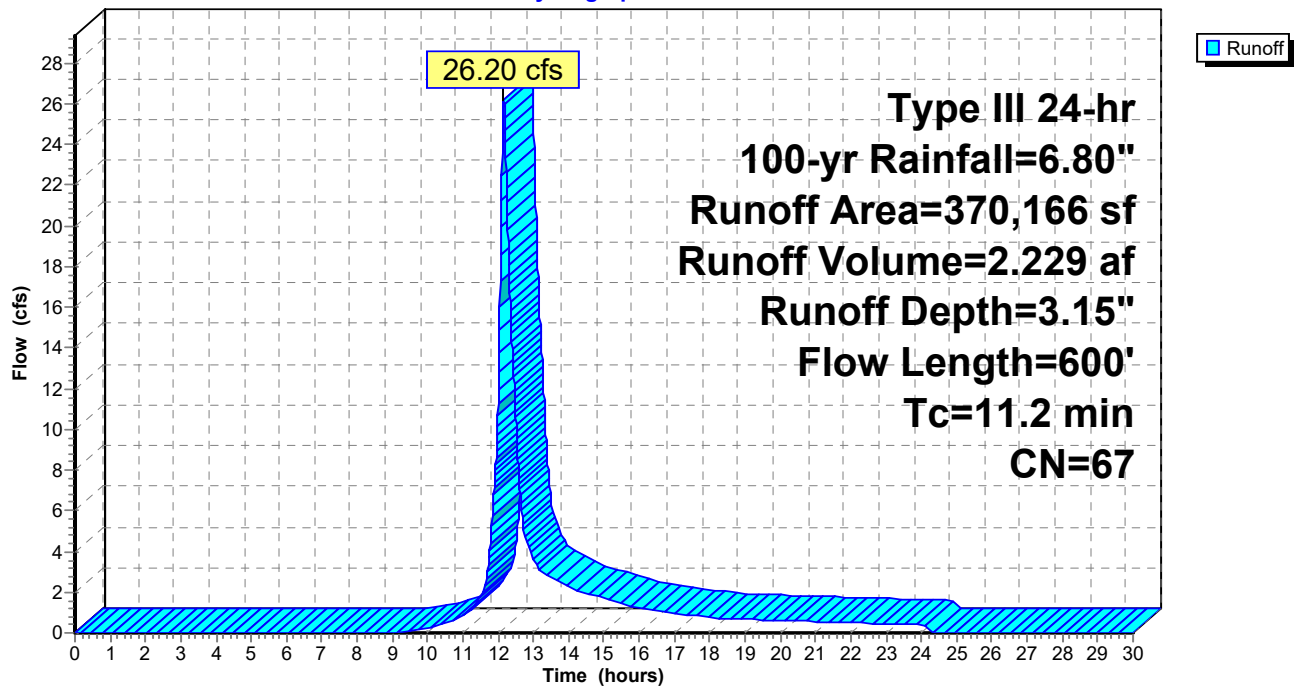
Type III 24-hr 100-yr Rainfall=6.80"

Area (sf)	CN	Description
196,710	60	Woods, Fair, HSG B
119,354	73	Woods, Fair, HSG C
54,102	79	Woods, Fair, HSG D
370,166	67	Weighted Average
370,166		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.1100	0.13		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.00"
4.8	550	0.1480	1.92		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
11.2	600	Total			

Subcatchment 2S:

Hydrograph



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Type III 24-hr 100-yr Rainfall=6.80"

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Page 24

Summary for Subcatchment 3S:

Runoff = 11.65 cfs @ 12.20 hrs, Volume= 1.097 af, Depth= 3.76"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

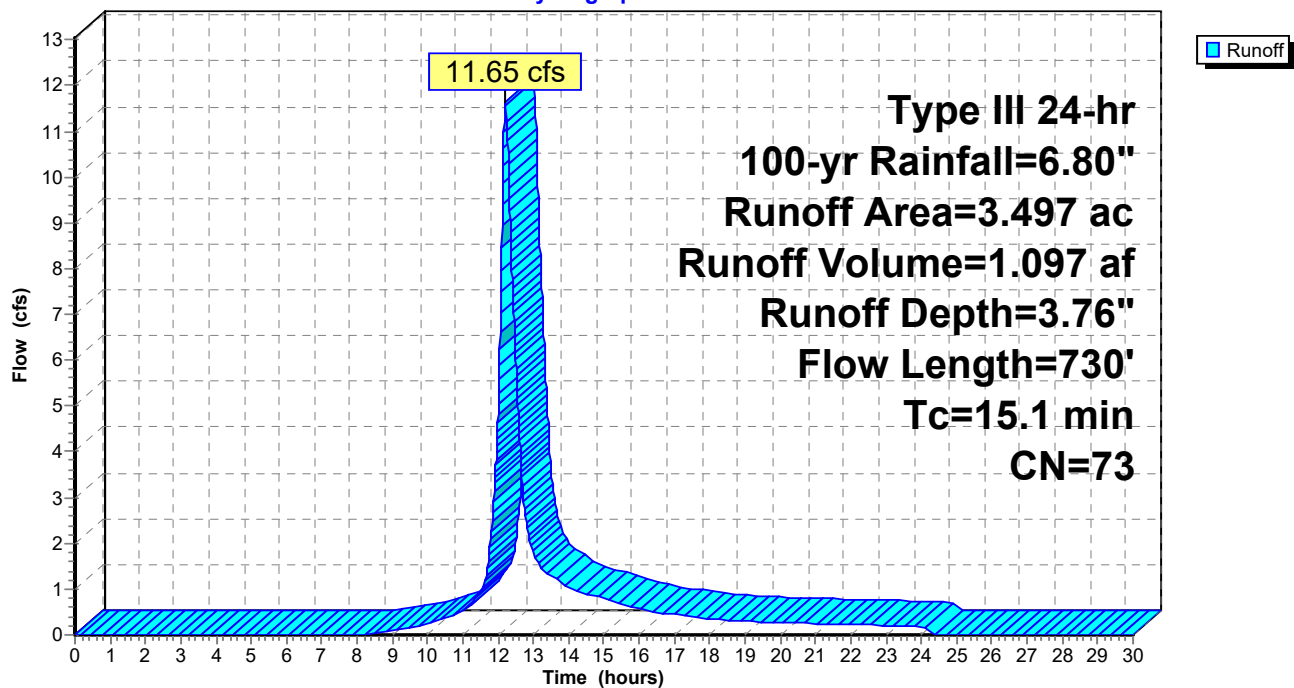
Type III 24-hr 100-yr Rainfall=6.80"

Area (ac)	CN	Description
0.465	60	Woods, Fair, HSG B
2.171	73	Woods, Fair, HSG C
0.861	79	Woods, Fair, HSG D
3.497	73	Weighted Average
3.497		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	50	0.0900	0.12		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.00"
8.1	680	0.0780	1.40		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
15.1	730	Total			

Subcatchment 3S:

Hydrograph



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Type III 24-hr 100-yr Rainfall=6.80"

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Page 25

Summary for Subcatchment 4S:

Runoff = 3.61 cfs @ 12.23 hrs, Volume= 0.358 af, Depth= 3.05"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

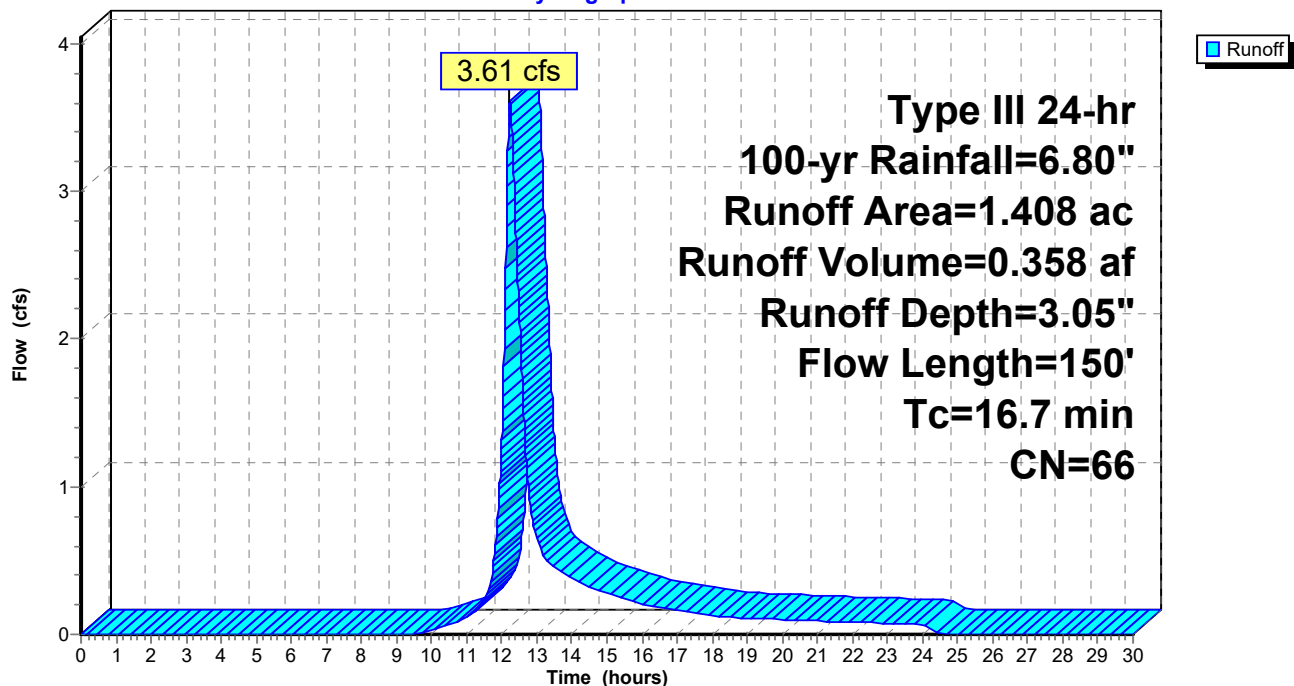
Type III 24-hr 100-yr Rainfall=6.80"

Area (ac)	CN	Description
0.750	60	Woods, Fair, HSG B
0.658	73	Woods, Fair, HSG C
1.408	66	Weighted Average
1.408		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.3	50	0.0150	0.06		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.00"
2.4	100	0.0200	0.71		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
16.7	150	Total			

Subcatchment 4S:

Hydrograph



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Type III 24-hr 100-yr Rainfall=6.80"

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Page 26

Summary for Subcatchment 5S:

Runoff = 0.37 cfs @ 12.08 hrs, Volume= 0.030 af, Depth= 6.56"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

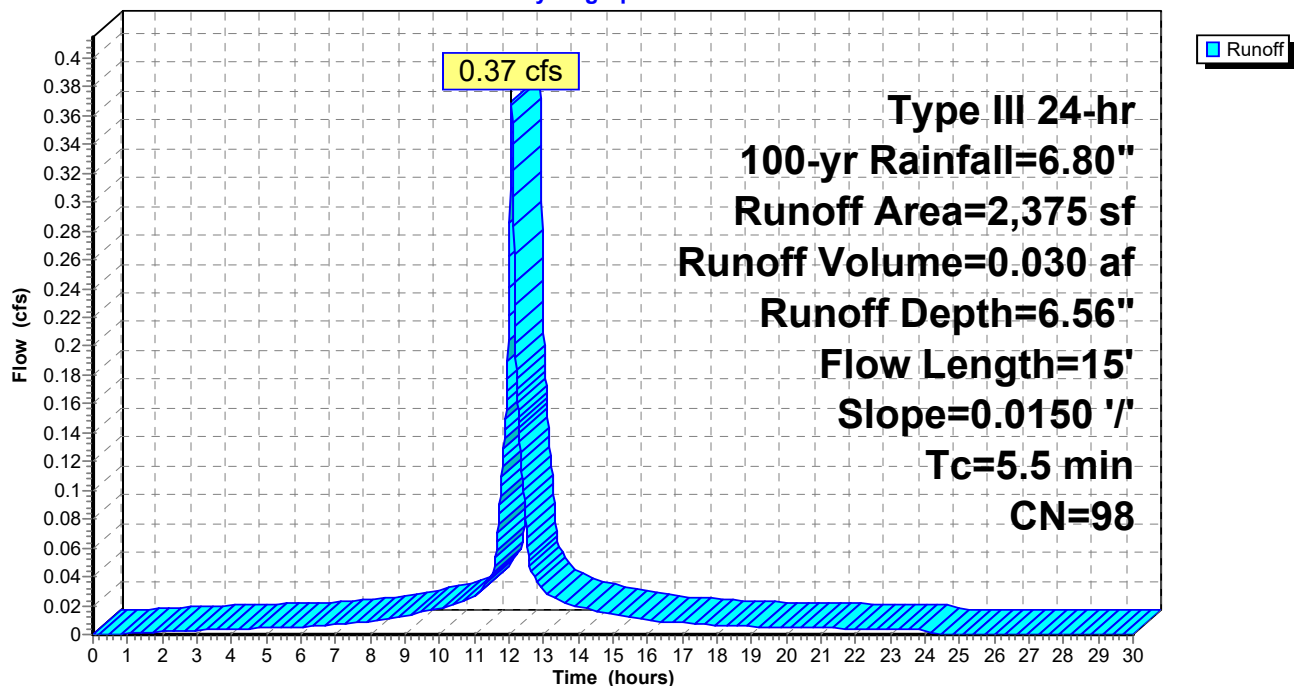
Type III 24-hr 100-yr Rainfall=6.80"

Area (sf)	CN	Description
2,375	98	Paved parking & roofs
2,375		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	15	0.0150	0.05		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.00"

Subcatchment 5S:

Hydrograph



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Type III 24-hr 100-yr Rainfall=6.80"

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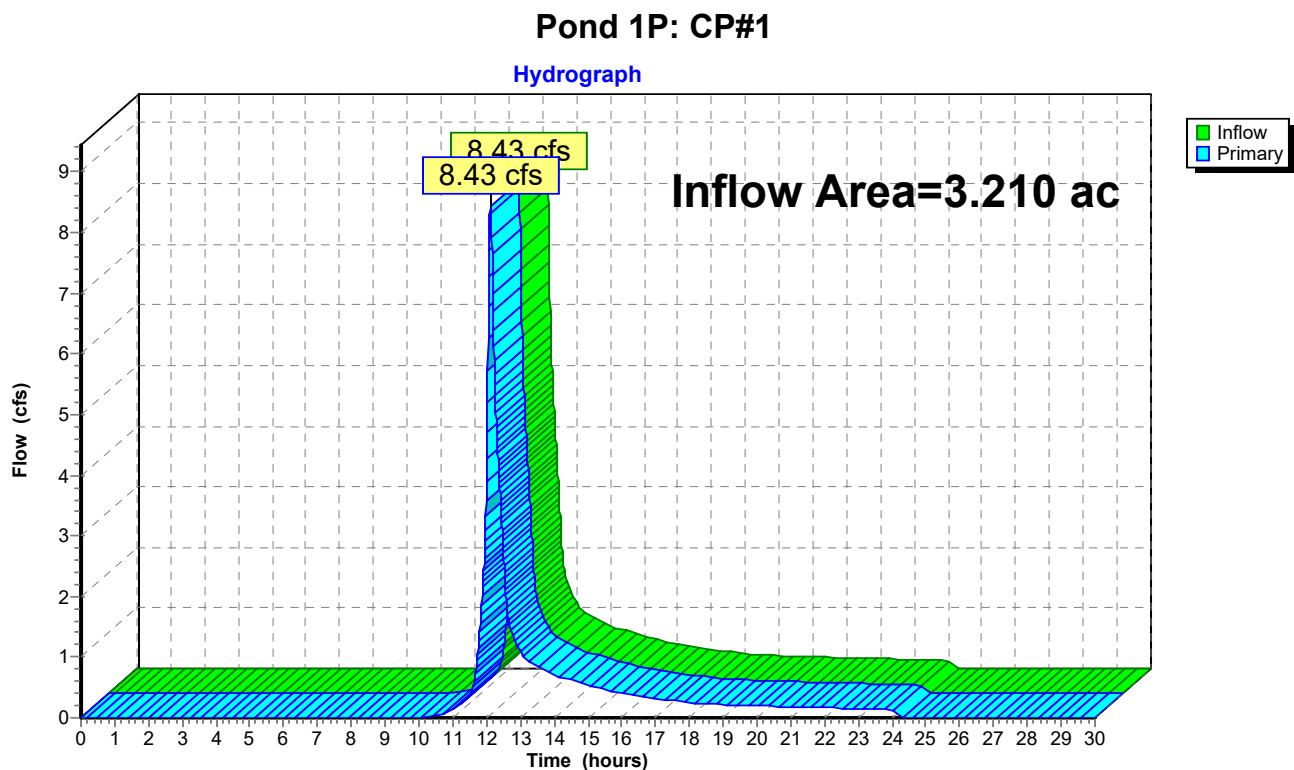
Page 27

Summary for Pond 1P: CP#1

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 3.210 ac, 0.00% Impervious, Inflow Depth = 2.46" for 100-yr event
Inflow = 8.43 cfs @ 12.12 hrs, Volume= 0.659 af
Primary = 8.43 cfs @ 12.12 hrs, Volume= 0.659 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs



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Type III 24-hr 100-yr Rainfall=6.80"

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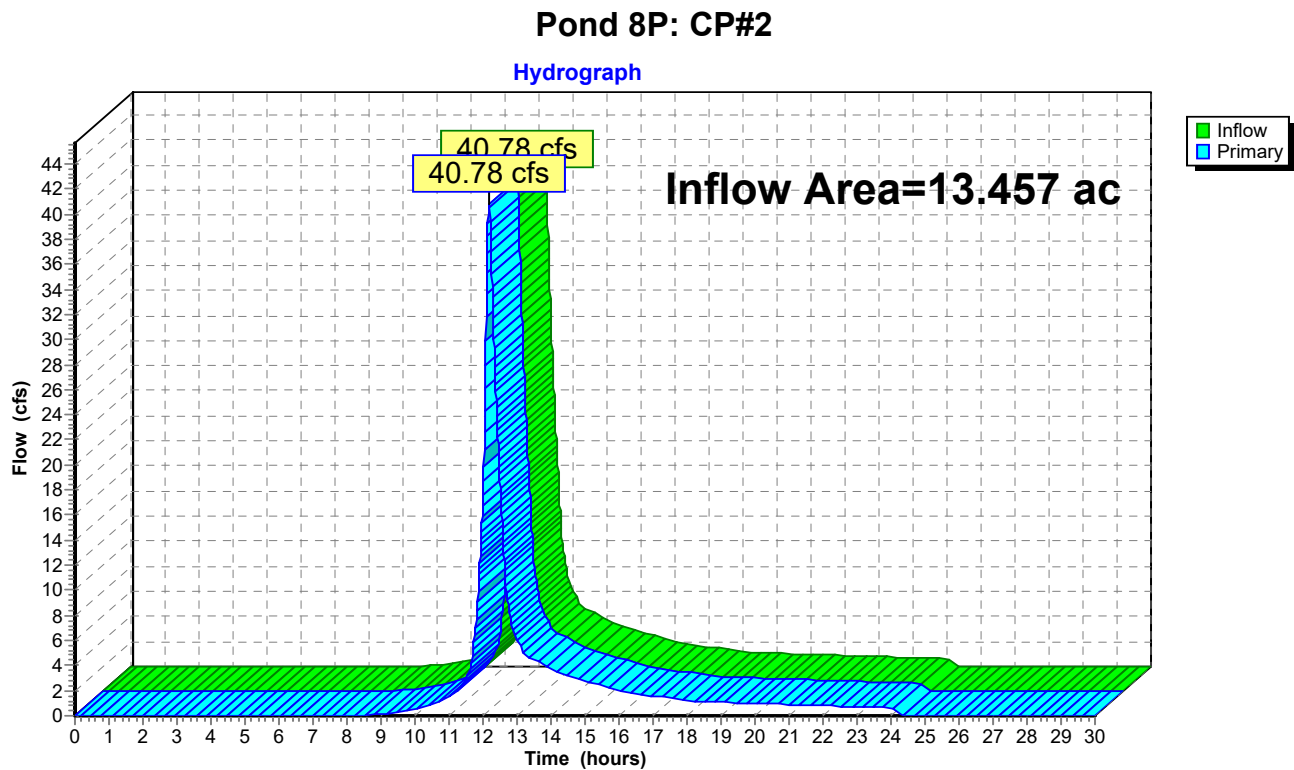
Page 28

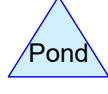
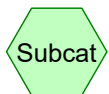
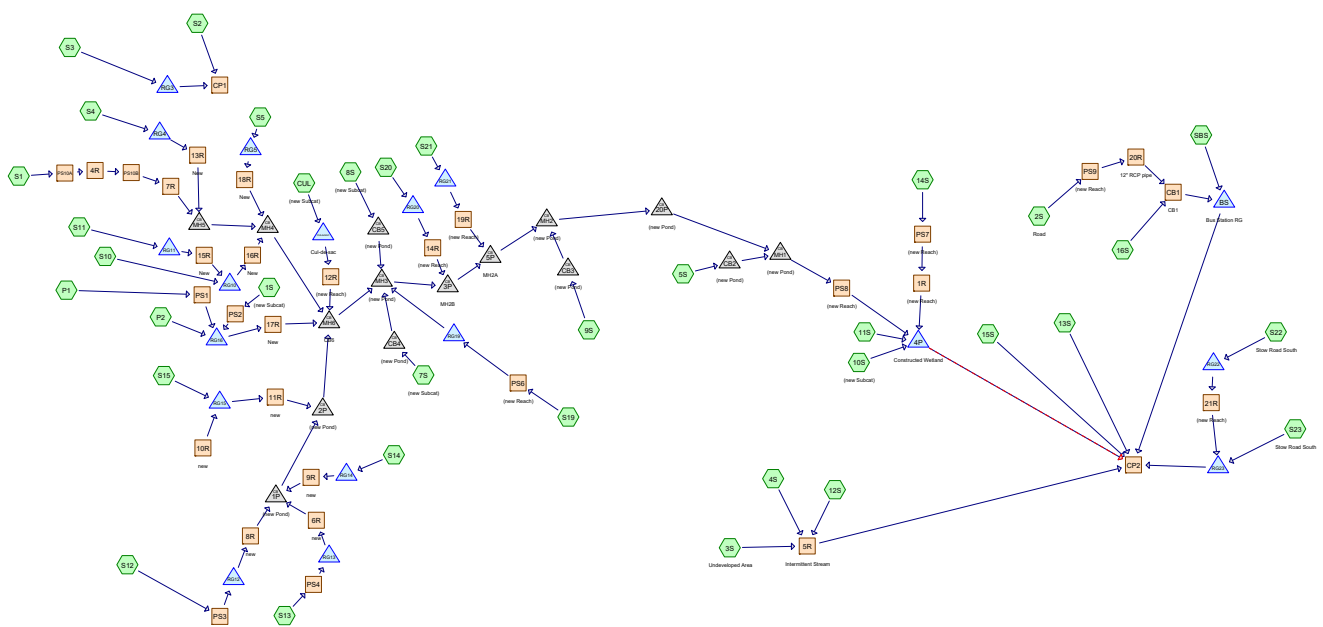
Summary for Pond 8P: CP#2

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 13.457 ac, 0.41% Impervious, Inflow Depth = 3.31" for 100-yr event
Inflow = 40.78 cfs @ 12.17 hrs, Volume= 3.714 af
Primary = 40.78 cfs @ 12.17 hrs, Volume= 3.714 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs





Routing Diagram for Pine Hill Proposed Proposed Conditions_09102018

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Page 2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.534	98	(9S, 11S, 14S, 16S, CUL, S1, S10, S11, S12, S13, S14, S15, S19, S2, S21, S22, S23, S3, S4, S5, SBS)
3.396	61	>75% Grass cover, Good, HSG B (1S, P1, S1, S13, S19, S2, S4)
1.187	74	>75% Grass cover, Good, HSG C (2S, 4S, 10S, SBS)
1.491	61	>75% grass cover, good, HSG B (3S, 7S, 8S, 14S)
0.435	74	>75% grass cover, good, HSG C (12S, 13S, 15S)
2.166	61	G+RG: >75% Grass cover, Good, HSG B (11S, P2, S10, S11, S12, S14, S15, S20, S21, S3, S5)
0.153	74	G+RG: >75% Grass cover, Good, HSG C (S22, S23)
0.171	61	G+RG: >75% grass cover, good, HSG B (CUL)
0.289	98	Impervious (2S, 7S, 8S)
0.301	98	Paved parking & roofs (1S, 4S, 5S, 10S)
2.782	73	Woods, Fair, HSG C (2S, 3S, 4S)
0.114	98	impervious (P1)
0.016	60	woods, fair, HSG B (14S)
1.997	73	woods, fair, HSG C (13S, 15S)
0.717	79	woods, fair, HSG D (12S)
16.749	72	TOTAL AREA

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Page 3

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
7.241	HSG B	1S, 3S, 7S, 8S, 11S, 14S, CUL, P1, P2, S1, S10, S11, S12, S13, S14, S15, S19, S2, S20, S21, S3, S4, S5
6.553	HSG C	2S, 3S, 4S, 10S, 12S, 13S, 15S, S22, S23, SBS
0.717	HSG D	12S
2.238	Other	1S, 2S, 4S, 5S, 7S, 8S, 9S, 10S, 11S, 14S, 16S, CUL, P1, S1, S10, S11, S12, S13, S14, S15, S19, S2, S21, S22, S23, S3, S4, S5, SBS
16.749		TOTAL AREA

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Page 4

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.000	1.534	1.534		9 S,
							11 S,
							14 S,
							16 S,
							C U L, S 1, S 10 , S 11 , S 12 , S 13 , S 14 , S 15 , S 19 , S 2, S 21 , S 22 ,

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Page 5

Ground Covers (all nodes) (continued)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	3.396	1.187	0.000	0.000	4.583	>75% Grass cover, Good	1 S,
							2 S,
							4 S,
							10 S,
							P 1, S 1, S 13 , S 19 , S 2, S 4, S B S
0.000	1.491	0.435	0.000	0.000	1.926	>75% grass cover, good	3 S,
							7 S,
							8 S,
							12 S,
							13 S,
							14 S,

Pine Hill Proposed Proposed Conditions_09102018

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Page 6

Ground Covers (all nodes) (continued)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	2.166	0.153	0.000	0.000	2.319	G+RG: >75% Grass cover, Good	11 S, P 2, S 10 , S 11 , S 12 , S 14 , S 15 , S 20 , S 21 , S 22 , S 23 , S 3, S 5
0.000	0.171	0.000	0.000	0.000	0.171	G+RG: >75% grass cover, good	C U L
0.000	0.000	0.000	0.000	0.289	0.289	Impervious	2 S, 7 S, 8

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Page 7

Ground Covers (all nodes) (continued)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.000	0.301	0.301	Paved parking & roofs	1 S,
							4 S,
							5 S,
							10 S
0.000	0.000	2.782	0.000	0.000	2.782	Woods, Fair	2 S,
							3 S,
							4 S
0.000	0.000	0.000	0.000	0.114	0.114	impervious	P 1
0.000	0.016	1.997	0.717	0.000	2.729	woods, fair	12 S,
							13 S,
							14 S,
							15 S
0.000	7.241	6.553	0.717	2.238	16.749	TOTAL AREA	

Pine Hill Proposed Proposed Conditions_09102018

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Page 8

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	1R	261.00	260.10	72.0	0.0125	0.011	12.0	0.0	0.0
2	4R	315.00	313.50	22.0	0.0682	0.011	12.0	0.0	0.0
3	6R	304.20	302.23	197.0	0.0100	0.011	8.0	0.0	0.0
4	7R	310.50	303.50	88.0	0.0795	0.014	12.0	0.0	0.0
5	8R	306.75	302.23	128.0	0.0353	0.011	8.0	0.0	0.0
6	9R	298.00	297.90	7.0	0.0143	0.011	8.0	0.0	0.0
7	10R	301.30	297.94	84.0	0.0400	0.011	18.0	0.0	0.0
8	11R	298.00	297.90	7.0	0.0143	0.011	8.0	0.0	0.0
9	12R	297.30	297.10	18.0	0.0111	0.011	8.0	0.0	0.0
10	13R	301.30	301.10	18.0	0.0111	0.011	8.0	0.0	0.0
11	14R	290.30	289.73	33.0	0.0173	0.011	8.0	0.0	0.0
12	15R	302.30	302.00	18.0	0.0167	0.011	8.0	0.0	0.0
13	16R	302.00	301.30	36.0	0.0194	0.011	8.0	0.0	0.0
14	17R	298.00	295.80	67.0	0.0328	0.011	8.0	0.0	0.0
15	18R	301.30	300.98	16.0	0.0200	0.011	8.0	0.0	0.0
16	19R	287.00	283.33	47.0	0.0781	0.011	8.0	0.0	0.0
17	20R	257.75	257.25	22.0	0.0227	0.013	12.0	0.0	0.0
18	21R	254.00	253.75	50.0	0.0050	0.011	8.0	0.0	0.0
19	CB1	257.00	256.00	27.0	0.0370	0.011	12.0	0.0	0.0
20	1P	301.30	297.80	85.0	0.0412	0.011	18.0	0.0	0.0
21	2P	297.70	296.00	47.0	0.0362	0.011	18.0	0.0	0.0
22	3P	283.44	282.00	72.0	0.0200	0.011	24.0	0.0	0.0
23	4P	258.30	258.00	30.0	0.0100	0.013	30.0	0.0	0.0
24	5P	277.40	276.20	60.0	0.0200	0.011	24.0	0.0	0.0
25	20P	264.60	261.40	160.0	0.0200	0.011	24.0	0.0	0.0
26	CB2	262.00	261.90	10.0	0.0100	0.011	12.0	0.0	0.0
27	CB3	277.20	277.00	6.0	0.0333	0.011	12.0	0.0	0.0
28	CB4	293.70	293.50	7.0	0.0286	0.011	12.0	0.0	0.0
29	CB5	293.90	293.50	17.0	0.0235	0.011	12.0	0.0	0.0
30	MH1	261.30	260.95	35.0	0.0100	0.013	30.0	0.0	0.0
31	MH2	270.50	268.00	125.0	0.0200	0.011	24.0	0.0	0.0
32	MH3	289.06	288.40	33.0	0.0200	0.011	24.0	0.0	0.0
33	MH4	300.00	296.62	169.0	0.0200	0.011	18.0	0.0	0.0
34	MH5	301.10	300.50	56.0	0.0107	0.011	18.0	0.0	0.0
35	MH6	292.92	290.90	101.0	0.0200	0.011	24.0	0.0	0.0
36	RG19	292.63	292.23	39.5	0.0101	0.011	8.0	0.0	0.0

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: (new Subcat)	Runoff Area=6,927 sf 11.13% Impervious Runoff Depth=0.55" Tc=6.0 min CN=65 Runoff=0.08 cfs 0.007 af
Subcatchment2S: Road	Runoff Area=12,547 sf 25.48% Impervious Runoff Depth=1.33" Tc=6.0 min CN=80 Runoff=0.44 cfs 0.032 af
Subcatchment3S: Undeveloped Area	Runoff Area=81,012 sf 0.00% Impervious Runoff Depth=0.72" Flow Length=525' Tc=28.2 min CN=69 Runoff=0.79 cfs 0.112 af
Subcatchment4S:	Runoff Area=87,503 sf 2.36% Impervious Runoff Depth=0.97" Flow Length=525' Tc=14.9 min CN=74 Runoff=1.62 cfs 0.163 af
Subcatchment5S:	Runoff Area=3,065 sf 100.00% Impervious Runoff Depth=2.87" Tc=6.0 min CN=98 Runoff=0.21 cfs 0.017 af
Subcatchment7S: (new Subcat)	Runoff Area=6,557 sf 79.05% Impervious Runoff Depth=2.08" Tc=6.0 min CN=90 Runoff=0.36 cfs 0.026 af
Subcatchment8S: (new Subcat)	Runoff Area=17,230 sf 24.31% Impervious Runoff Depth=0.77" Tc=6.0 min CN=70 Runoff=0.32 cfs 0.025 af
Subcatchment9S:	Runoff Area=1,988 sf 100.00% Impervious Runoff Depth=2.87" Tc=6.0 min CN=98 Runoff=0.14 cfs 0.011 af
Subcatchment10S: (new Subcat)	Runoff Area=25,265 sf 28.62% Impervious Runoff Depth=1.39" Flow Length=128' Tc=1.5 min CN=81 Runoff=1.10 cfs 0.067 af
Subcatchment11S:	Runoff Area=23,740 sf 22.38% Impervious Runoff Depth=0.72" Tc=6.0 min CN=69 Runoff=0.40 cfs 0.033 af
Subcatchment12S:	Runoff Area=36,401 sf 0.00% Impervious Runoff Depth=1.20" Flow Length=485' Slope=0.0350 '/' Tc=8.6 min CN=78 Runoff=1.05 cfs 0.084 af
Subcatchment13S:	Runoff Area=67,075 sf 0.00% Impervious Runoff Depth=0.92" Flow Length=331' Slope=0.0100 '/' Tc=22.1 min CN=73 Runoff=0.99 cfs 0.118 af
Subcatchment14S:	Runoff Area=34,193 sf 28.61% Impervious Runoff Depth=0.87" Flow Length=172' Tc=1.5 min CN=72 Runoff=0.86 cfs 0.057 af
Subcatchment15S:	Runoff Area=33,688 sf 0.00% Impervious Runoff Depth=0.92" Flow Length=1,115' Slope=0.0050 '/' Tc=105.1 min CN=73 Runoff=0.21 cfs 0.059 af
Subcatchment16S:	Runoff Area=4,678 sf 100.00% Impervious Runoff Depth=2.87" Tc=6.0 min CN=98 Runoff=0.32 cfs 0.026 af
SubcatchmentCUL: (new Subcat)	Runoff Area=10,593 sf 29.57% Impervious Runoff Depth=0.87" Tc=6.0 min CN=72 Runoff=0.23 cfs 0.018 af

SubcatchmentP1:	Runoff Area=98,881 sf 5.04% Impervious Runoff Depth=0.48" Flow Length=650' Tc=12.2 min CN=63 Runoff=0.69 cfs 0.090 af
SubcatchmentP2:	Runoff Area=10,702 sf 0.00% Impervious Runoff Depth=0.40" Flow Length=344' Tc=8.6 min CN=61 Runoff=0.06 cfs 0.008 af
SubcatchmentS1:	Runoff Area=1,539 sf 96.04% Impervious Runoff Depth=2.76" Tc=6.0 min CN=97 Runoff=0.10 cfs 0.008 af
SubcatchmentS10:	Runoff Area=2,106 sf 30.86% Impervious Runoff Depth=0.87" Tc=6.0 min CN=72 Runoff=0.05 cfs 0.003 af
SubcatchmentS11:	Runoff Area=1,858 sf 62.65% Impervious Runoff Depth=1.60" Tc=6.0 min CN=84 Runoff=0.08 cfs 0.006 af
SubcatchmentS12:	Runoff Area=9,267 sf 23.47% Impervious Runoff Depth=0.77" Tc=6.0 min CN=70 Runoff=0.17 cfs 0.014 af
SubcatchmentS13:	Runoff Area=4,314 sf 53.64% Impervious Runoff Depth=1.39" Tc=6.0 min CN=81 Runoff=0.16 cfs 0.011 af
SubcatchmentS14:	Runoff Area=2,371 sf 64.02% Impervious Runoff Depth=1.67" Tc=6.0 min CN=85 Runoff=0.11 cfs 0.008 af
SubcatchmentS15:	Runoff Area=44,214 sf 19.57% Impervious Runoff Depth=0.68" Tc=6.0 min CN=68 Runoff=0.68 cfs 0.057 af
SubcatchmentS19:	Runoff Area=31,232 sf 23.42% Impervious Runoff Depth=0.77" Tc=6.0 min CN=70 Runoff=0.57 cfs 0.046 af
SubcatchmentS2:	Runoff Area=0.550 ac 12.73% Impervious Runoff Depth=0.59" Tc=6.0 min CN=66 Runoff=0.30 cfs 0.027 af
SubcatchmentS20:	Runoff Area=11,551 sf 0.00% Impervious Runoff Depth=0.40" Tc=6.0 min CN=61 Runoff=0.07 cfs 0.009 af
SubcatchmentS21:	Runoff Area=9,941 sf 67.95% Impervious Runoff Depth=1.75" Tc=6.0 min CN=86 Runoff=0.47 cfs 0.033 af
SubcatchmentS22: Stow Road South	Runoff Area=6,662 sf 15.01% Impervious Runoff Depth=1.20" Tc=6.0 min CN=78 Runoff=0.21 cfs 0.015 af
SubcatchmentS23: Stow Road South	Runoff Area=1,297 sf 23.36% Impervious Runoff Depth=1.33" Tc=6.0 min CN=80 Runoff=0.05 cfs 0.003 af
SubcatchmentS3:	Runoff Area=6,554 sf 46.64% Impervious Runoff Depth=1.20" Flow Length=426' Tc=11.6 min CN=78 Runoff=0.17 cfs 0.015 af
SubcatchmentS4:	Runoff Area=1,550 sf 34.97% Impervious Runoff Depth=0.97" Tc=6.0 min CN=74 Runoff=0.04 cfs 0.003 af
SubcatchmentS5:	Runoff Area=2,245 sf 40.18% Impervious Runoff Depth=1.08" Tc=6.0 min CN=76 Runoff=0.06 cfs 0.005 af

SubcatchmentSBS:	Runoff Area=6,892 sf 15.19% Impervious Runoff Depth=1.20" Tc=6.0 min CN=78 Runoff=0.22 cfs 0.016 af
Reach 1R: (new Reach)	Avg. Flow Depth=0.28' Max Vel=4.47 fps Inflow=0.80 cfs 0.057 af 12.0" Round Pipe n=0.011 L=72.0' S=0.0125 '/ Capacity=4.71 cfs Outflow=0.80 cfs 0.057 af
Reach 4R:	Avg. Flow Depth=0.07' Max Vel=4.43 fps Inflow=0.10 cfs 0.008 af 12.0" Round Pipe n=0.011 L=22.0' S=0.0682 '/ Capacity=10.99 cfs Outflow=0.10 cfs 0.008 af
Reach 5R: Intermittent Stream	Avg. Flow Depth=0.49' Max Vel=1.38 fps Inflow=2.86 cfs 0.359 af n=0.050 L=845.0' S=0.0100 '/ Capacity=11.78 cfs Outflow=2.49 cfs 0.359 af
Reach 6R: new	Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af 8.0" Round Pipe n=0.011 L=197.0' S=0.0100 '/ Capacity=1.43 cfs Outflow=0.00 cfs 0.000 af
Reach 7R:	Avg. Flow Depth=0.07' Max Vel=3.95 fps Inflow=0.10 cfs 0.008 af 12.0" Round Pipe n=0.014 L=88.0' S=0.0795 '/ Capacity=9.33 cfs Outflow=0.10 cfs 0.008 af
Reach 8R: new	Avg. Flow Depth=0.11' Max Vel=4.29 fps Inflow=0.17 cfs 0.014 af 8.0" Round Pipe n=0.011 L=128.0' S=0.0353 '/ Capacity=2.68 cfs Outflow=0.17 cfs 0.014 af
Reach 9R: new	Avg. Flow Depth=0.03' Max Vel=1.24 fps Inflow=0.01 cfs 0.003 af 8.0" Round Pipe n=0.011 L=7.0' S=0.0143 '/ Capacity=1.71 cfs Outflow=0.01 cfs 0.003 af
Reach 10R: new	Avg. Flow Depth=0.00' Max Vel=0.00 fps 18.0" Round Pipe n=0.011 L=84.0' S=0.0400 '/ Capacity=24.83 cfs Outflow=0.00 cfs 0.000 af
Reach 11R: new	Avg. Flow Depth=0.24' Max Vel=4.15 fps Inflow=0.46 cfs 0.048 af 8.0" Round Pipe n=0.011 L=7.0' S=0.0143 '/ Capacity=1.71 cfs Outflow=0.46 cfs 0.048 af
Reach 12R: (new Reach)	Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af 8.0" Round Pipe n=0.011 L=18.0' S=0.0111 '/ Capacity=1.51 cfs Outflow=0.00 cfs 0.000 af
Reach 13R: New	Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af 8.0" Round Pipe n=0.011 L=18.0' S=0.0111 '/ Capacity=1.51 cfs Outflow=0.00 cfs 0.000 af
Reach 14R: (new Reach)	Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af 8.0" Round Pipe n=0.011 L=33.0' S=0.0173 '/ Capacity=1.88 cfs Outflow=0.00 cfs 0.000 af
Reach 15R: New	Avg. Flow Depth=0.01' Max Vel=0.76 fps Inflow=0.00 cfs 0.000 af 8.0" Round Pipe n=0.011 L=18.0' S=0.0167 '/ Capacity=1.84 cfs Outflow=0.00 cfs 0.000 af
Reach 16R: New	Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af 8.0" Round Pipe n=0.011 L=36.0' S=0.0194 '/ Capacity=1.99 cfs Outflow=0.00 cfs 0.000 af
Reach 17R: New	Avg. Flow Depth=0.21' Max Vel=5.98 fps Inflow=0.58 cfs 0.086 af 8.0" Round Pipe n=0.011 L=67.0' S=0.0328 '/ Capacity=2.59 cfs Outflow=0.58 cfs 0.086 af
Reach 18R: New	Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af 8.0" Round Pipe n=0.011 L=16.0' S=0.0200 '/ Capacity=2.02 cfs Outflow=0.00 cfs 0.000 af

Reach 19R: (new Reach)	Avg. Flow Depth=0.10'	Max Vel=5.87 fps	Inflow=0.19 cfs	0.020 af
8.0" Round Pipe n=0.011 L=47.0' S=0.0781 '/'	Capacity=3.99 cfs	Outflow=0.19 cfs	0.020 af	
Reach 20R: 12" RCP pipe	Avg. Flow Depth=0.19'	Max Vel=4.12 fps	Inflow=0.44 cfs	0.032 af
12.0" Round Pipe n=0.013 L=22.0' S=0.0227 '/'	Capacity=5.37 cfs	Outflow=0.44 cfs	0.032 af	
Reach 21R: (new Reach)	Avg. Flow Depth=0.00'	Max Vel=0.00 fps	Inflow=0.00 cfs	0.000 af
8.0" Round Pipe n=0.011 L=50.0' S=0.0050 '/'	Capacity=1.01 cfs	Outflow=0.00 cfs	0.000 af	
Reach CB1: CB1	Avg. Flow Depth=0.20'	Max Vel=6.44 fps	Inflow=0.75 cfs	0.057 af
12.0" Round Pipe n=0.011 L=27.0' S=0.0370 '/'	Capacity=8.10 cfs	Outflow=0.75 cfs	0.057 af	
Reach CP1:			Inflow=0.30 cfs	0.035 af
			Outflow=0.30 cfs	0.035 af
Reach CP2:			Inflow=3.74 cfs	0.996 af
			Outflow=3.74 cfs	0.996 af
Reach PS1:	Avg. Flow Depth=0.20'	Max Vel=2.82 fps	Inflow=0.69 cfs	0.090 af
n=0.035 L=228.0' S=0.0658 '/'	Capacity=20.22 cfs	Outflow=0.69 cfs	0.090 af	
Reach PS10A:	Avg. Flow Depth=0.06'	Max Vel=1.53 fps	Inflow=0.10 cfs	0.008 af
n=0.035 L=18.0' S=0.0833 '/'	Capacity=261.94 cfs	Outflow=0.10 cfs	0.008 af	
Reach PS10B:	Avg. Flow Depth=0.07'	Max Vel=1.45 fps	Inflow=0.10 cfs	0.008 af
n=0.035 L=42.0' S=0.0714 '/'	Capacity=242.51 cfs	Outflow=0.10 cfs	0.008 af	
Reach PS2:	Avg. Flow Depth=0.07'	Max Vel=1.45 fps	Inflow=0.08 cfs	0.007 af
n=0.035 L=31.0' S=0.0645 '/'	Capacity=20.02 cfs	Outflow=0.08 cfs	0.007 af	
Reach PS3:	Avg. Flow Depth=0.10'	Max Vel=1.87 fps	Inflow=0.17 cfs	0.014 af
n=0.035 L=58.0' S=0.0690 '/'	Capacity=20.70 cfs	Outflow=0.17 cfs	0.014 af	
Reach PS4:	Avg. Flow Depth=0.12'	Max Vel=1.37 fps	Inflow=0.16 cfs	0.011 af
n=0.035 L=34.0' S=0.0294 '/'	Capacity=13.52 cfs	Outflow=0.16 cfs	0.011 af	
Reach PS6: (new Reach)	Avg. Flow Depth=0.26'	Max Vel=1.39 fps	Inflow=0.57 cfs	0.046 af
n=0.035 L=398.0' S=0.0118 '/'	Capacity=8.56 cfs	Outflow=0.49 cfs	0.046 af	
Reach PS7: (new Reach)	Avg. Flow Depth=0.22'	Max Vel=2.69 fps	Inflow=0.86 cfs	0.057 af
n=0.035 L=303.0' S=0.0528 '/'	Capacity=81.69 cfs	Outflow=0.80 cfs	0.057 af	
Reach PS8: (new Reach)	Avg. Flow Depth=0.29'	Max Vel=2.24 fps	Inflow=1.30 cfs	0.274 af
n=0.023 L=40.0' S=0.0112 '/'	Capacity=80.78 cfs	Outflow=1.29 cfs	0.274 af	
Reach PS9: (new Reach)	Avg. Flow Depth=0.22'	Max Vel=1.62 fps	Inflow=0.44 cfs	0.032 af
n=0.035 L=75.0' S=0.0200 '/'	Capacity=11.15 cfs	Outflow=0.44 cfs	0.032 af	
Pond 1P: (new Pond)	Peak Elev=301.50'	Inflow=0.17 cfs	0.016 af	
18.0" Round Culvert n=0.011 L=85.0' S=0.0412 '/'	Outflow=0.17 cfs	0.016 af		
Pond 2P: (new Pond)	Peak Elev=298.08'	Inflow=0.58 cfs	0.064 af	
18.0" Round Culvert n=0.011 L=47.0' S=0.0362 '/'	Outflow=0.58 cfs	0.064 af		

Pond 3P: MH2B

Peak Elev=283.92' Inflow=1.09 cfs 0.226 af
24.0" Round Culvert n=0.011 L=72.0' S=0.0200 '/' Outflow=1.09 cfs 0.226 af

Pond 4P: Constructed Wetland

Peak Elev=259.41' Storage=14,577 cf Inflow=3.20 cfs 0.431 af
Primary=0.47 cfs 0.430 af Secondary=0.00 cfs 0.000 af Outflow=0.47 cfs 0.430 af

Pond 5P: MH2A

Peak Elev=277.91' Inflow=1.22 cfs 0.246 af
24.0" Round Culvert n=0.011 L=60.0' S=0.0200 '/' Outflow=1.22 cfs 0.246 af

Pond 20P: (new Pond)

Peak Elev=265.12' Inflow=1.25 cfs 0.257 af
24.0" Round Culvert n=0.011 L=160.0' S=0.0200 '/' Outflow=1.25 cfs 0.257 af

Pond BS: Bus Station RG

Peak Elev=257.34' Storage=1,917 cf Inflow=0.96 cfs 0.073 af
Outflow=0.11 cfs 0.030 af

Pond CB2: (new Pond)

Peak Elev=262.25' Inflow=0.21 cfs 0.017 af
12.0" Round Culvert n=0.011 L=10.0' S=0.0100 '/' Outflow=0.21 cfs 0.017 af

Pond CB3: (new Pond)

Peak Elev=277.40' Inflow=0.14 cfs 0.011 af
12.0" Round Culvert n=0.011 L=6.0' S=0.0333 '/' Outflow=0.14 cfs 0.011 af

Pond CB4: (new Pond)

Peak Elev=294.04' Inflow=0.36 cfs 0.026 af
12.0" Round Culvert n=0.011 L=7.0' S=0.0286 '/' Outflow=0.36 cfs 0.026 af

Pond CB5: (new Pond)

Peak Elev=294.21' Inflow=0.32 cfs 0.025 af
12.0" Round Culvert n=0.011 L=17.0' S=0.0235 '/' Outflow=0.32 cfs 0.025 af

Pond CULdeSAC: Cul-de-sac

Peak Elev=298.82' Storage=766 cf Inflow=0.23 cfs 0.018 af
Outflow=0.00 cfs 0.000 af

Pond MH1: (new Pond)

Peak Elev=261.77' Inflow=1.30 cfs 0.274 af
30.0" Round Culvert n=0.013 L=35.0' S=0.0100 '/' Outflow=1.30 cfs 0.274 af

Pond MH2: (new Pond)

Peak Elev=271.02' Inflow=1.25 cfs 0.257 af
24.0" Round Culvert n=0.011 L=125.0' S=0.0200 '/' Outflow=1.25 cfs 0.257 af

Pond MH3: (new Pond)

Peak Elev=289.54' Inflow=1.09 cfs 0.226 af
24.0" Round Culvert n=0.011 L=33.0' S=0.0200 '/' Outflow=1.09 cfs 0.226 af

Pond MH4:

Peak Elev=300.16' Inflow=0.10 cfs 0.008 af
18.0" Round Culvert n=0.011 L=169.0' S=0.0200 '/' Outflow=0.10 cfs 0.008 af

Pond MH5:

Peak Elev=301.26' Inflow=0.10 cfs 0.008 af
18.0" Round Culvert n=0.011 L=56.0' S=0.0107 '/' Outflow=0.10 cfs 0.008 af

Pond MH6: CB6

Peak Elev=293.36' Inflow=0.90 cfs 0.157 af
24.0" Round Culvert n=0.011 L=101.0' S=0.0200 '/' Outflow=0.90 cfs 0.157 af

Pond RG10:

Peak Elev=305.42' Storage=165 cf Inflow=0.05 cfs 0.004 af
Outflow=0.00 cfs 0.000 af

Pine Hill Proposed Proposed Conditions_09102018*Type III 24-hr 2-YR Rainfall=3.10"*

Prepared by SCCM-01

Printed 9/10/2018

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Page 14

Pond RG11:	Peak Elev=306.85' Storage=235 cf Inflow=0.08 cfs 0.006 af Outflow=0.00 cfs 0.000 af
Pond RG12:	Peak Elev=310.27' Storage=0 cf Inflow=0.17 cfs 0.014 af Outflow=0.17 cfs 0.014 af
Pond RG13:	Peak Elev=307.70' Storage=500 cf Inflow=0.16 cfs 0.011 af Outflow=0.00 cfs 0.000 af
Pond RG14:	Peak Elev=304.96' Storage=222 cf Inflow=0.11 cfs 0.008 af Outflow=0.01 cfs 0.003 af
Pond RG15:	Peak Elev=300.85' Storage=467 cf Inflow=0.68 cfs 0.057 af Outflow=0.46 cfs 0.048 af
Pond RG16:	Peak Elev=300.86' Storage=933 cf Inflow=0.80 cfs 0.106 af Outflow=0.58 cfs 0.086 af
Pond RG19:	Peak Elev=295.78' Storage=1,267 cf Inflow=0.49 cfs 0.046 af Outflow=0.05 cfs 0.018 af
Pond RG20:	Peak Elev=294.23' Storage=389 cf Inflow=0.07 cfs 0.009 af Outflow=0.00 cfs 0.000 af
Pond RG21:	Peak Elev=291.62' Storage=631 cf Inflow=0.47 cfs 0.033 af Outflow=0.19 cfs 0.020 af
Pond RG22:	Peak Elev=258.52' Storage=667 cf Inflow=0.21 cfs 0.015 af Outflow=0.00 cfs 0.000 af
Pond RG23:	Peak Elev=256.42' Storage=143 cf Inflow=0.05 cfs 0.003 af Outflow=0.00 cfs 0.000 af
Pond RG3:	Peak Elev=310.93' Storage=307 cf Inflow=0.17 cfs 0.015 af Outflow=0.04 cfs 0.008 af
Pond RG4:	Peak Elev=303.49' Storage=126 cf Inflow=0.04 cfs 0.003 af Outflow=0.00 cfs 0.000 af
Pond RG5:	Peak Elev=305.20' Storage=203 cf Inflow=0.06 cfs 0.005 af Outflow=0.00 cfs 0.000 af

Total Runoff Area = 16.749 ac Runoff Volume = 1.232 af Average Runoff Depth = 0.88"
86.64% Pervious = 14.511 ac 13.36% Impervious = 2.238 ac

Summary for Subcatchment 1S: (new Subcat)

Runoff = 0.08 cfs @ 12.11 hrs, Volume= 0.007 af, Depth= 0.55"

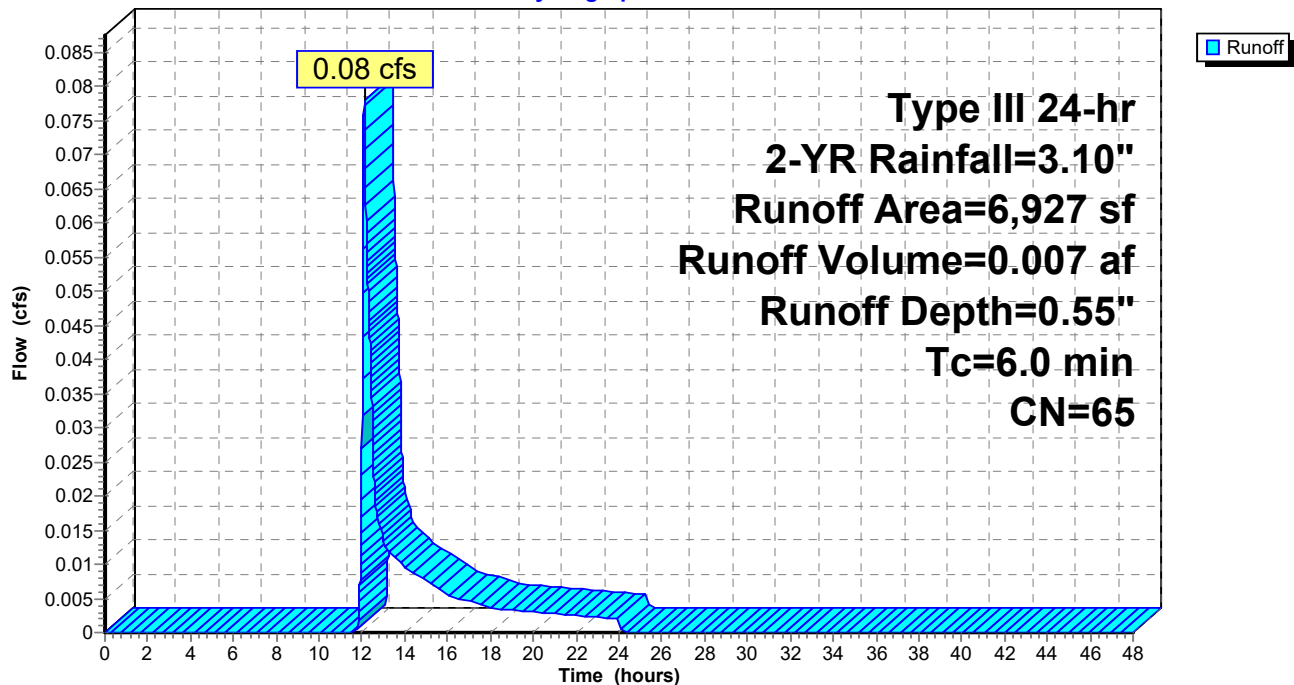
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.10"

Area (sf)	CN	Description
771	98	Paved parking & roofs
6,156	61	>75% Grass cover, Good, HSG B
6,927	65	Weighted Average
6,156		88.87% Pervious Area
771		11.13% Impervious Area

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

Subcatchment 1S: (new Subcat)

Hydrograph



Summary for Subcatchment 2S: Road

Runoff = 0.44 cfs @ 12.09 hrs, Volume= 0.032 af, Depth= 1.33"

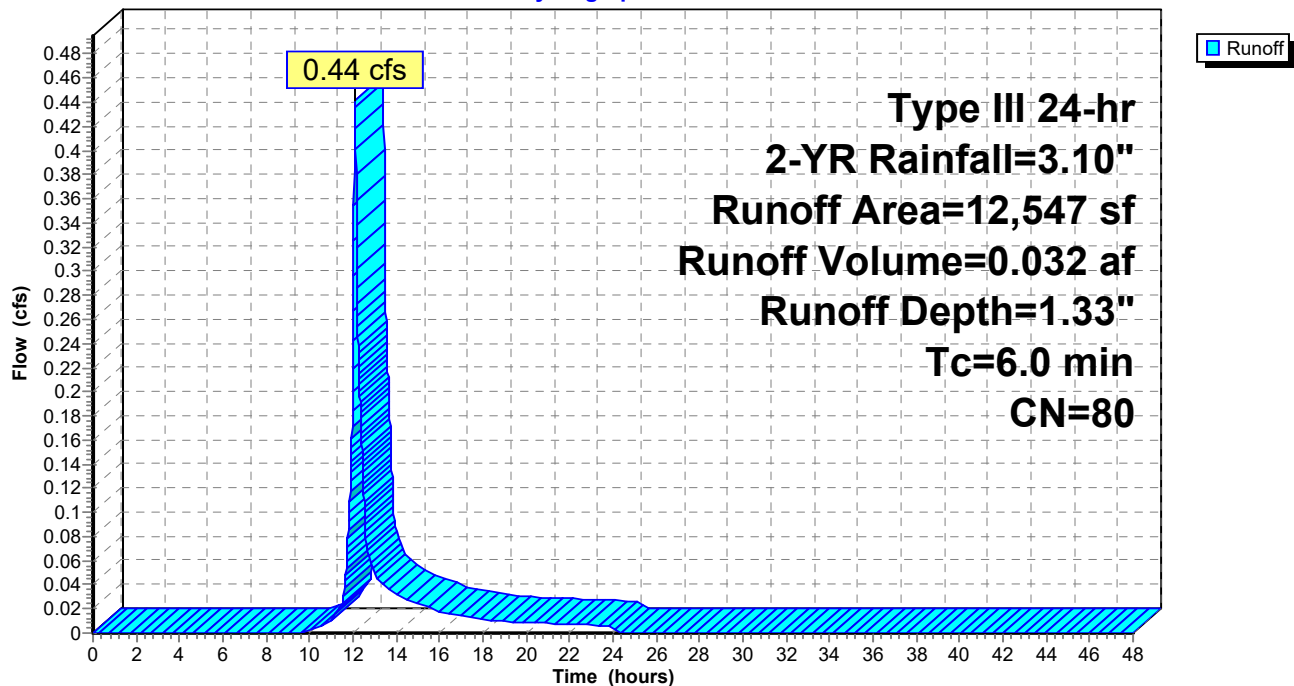
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.10"

	Area (sf)	CN	Description
*	4,975	74	>75% Grass cover, Good, HSG C
*	3,197	98	Impervious
*	4,375	73	Woods, Fair, HSG C
	12,547	80	Weighted Average
	9,350		74.52% Pervious Area
	3,197		25.48% Impervious Area

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

Subcatchment 2S: Road

Hydrograph



Summary for Subcatchment 3S: Undeveloped Area

Runoff = 0.79 cfs @ 12.45 hrs, Volume= 0.112 af, Depth= 0.72"

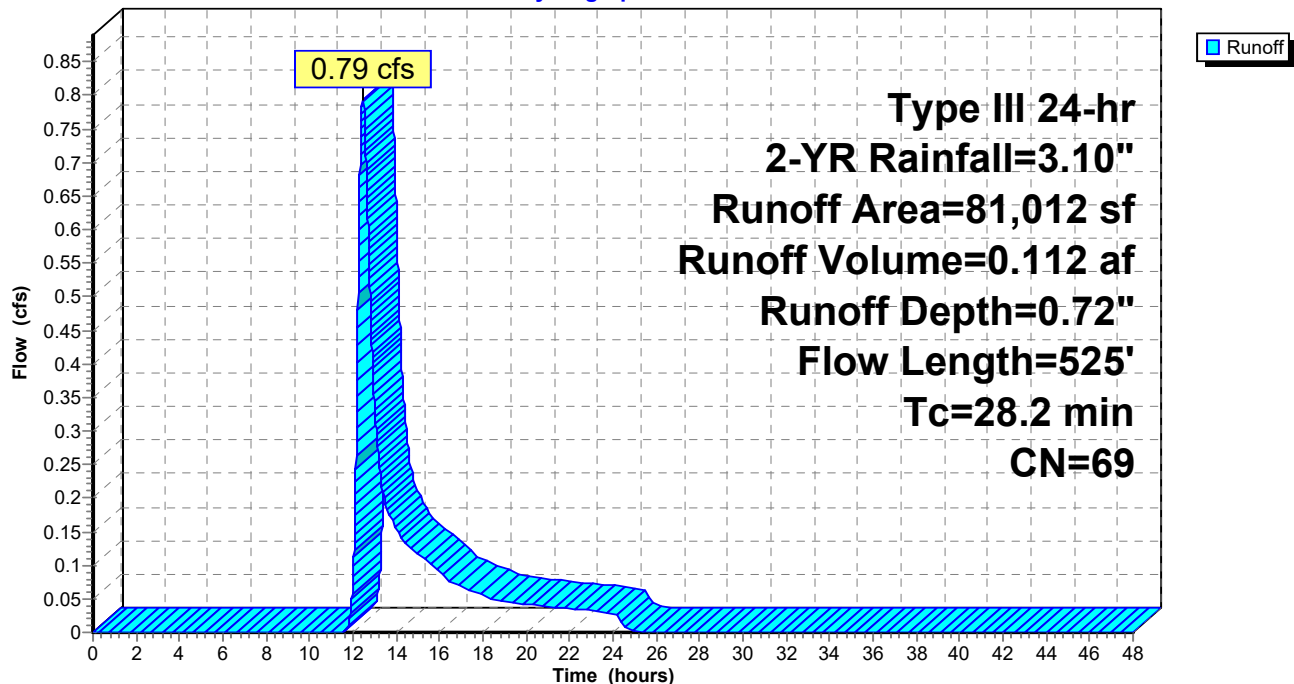
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.10"

Area (sf)	CN	Description
* 26,806	61	>75% grass cover, good, HSG B
54,206	73	Woods, Fair, HSG C
81,012	69	Weighted Average
81,012		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	50	0.0605	0.10		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.00"
20.0	475	0.0250	0.40		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps
28.2	525	Total			

Subcatchment 3S: Undeveloped Area

Hydrograph



Summary for Subcatchment 4S:

Runoff = 1.62 cfs @ 12.22 hrs, Volume= 0.163 af, Depth= 0.97"

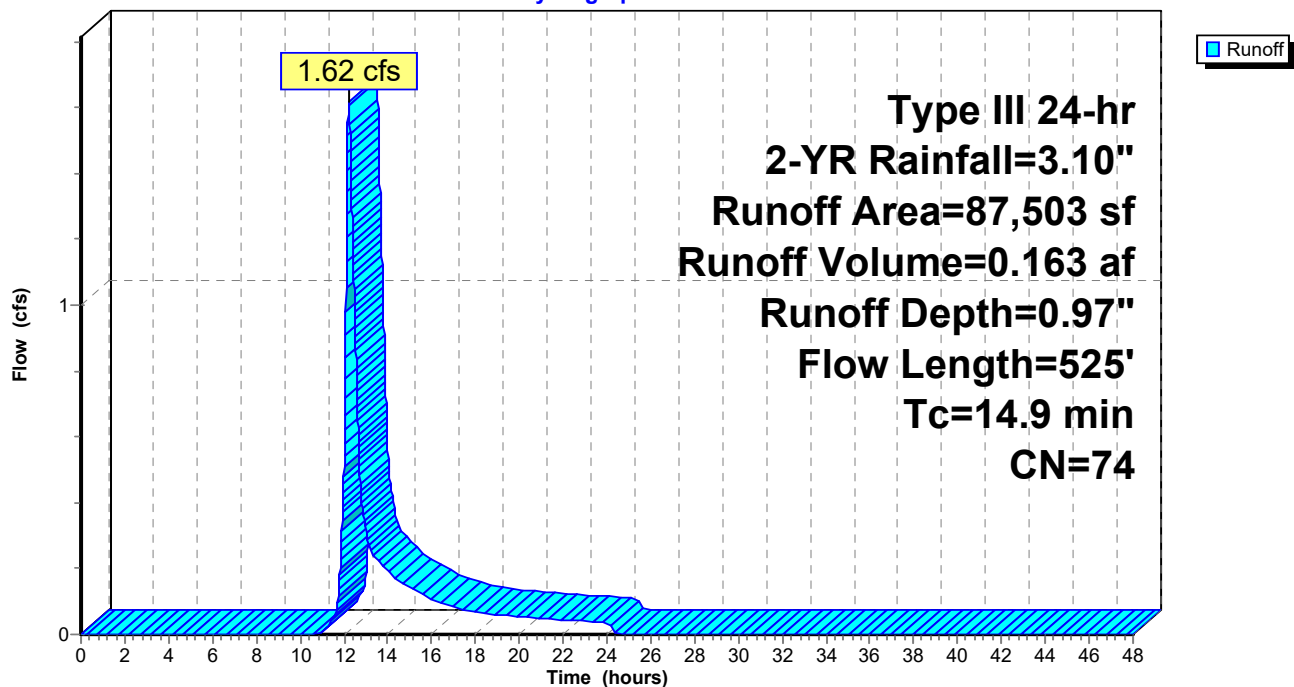
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.10"

	Area (sf)	CN	Description
*	62,598	73	Woods, Fair, HSG C
	2,061	98	Paved parking & roofs
	22,844	74	>75% Grass cover, Good, HSG C
	87,503	74	Weighted Average
	85,442		97.64% Pervious Area
	2,061		2.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	50	0.0300	0.17		Sheet Flow, Grass: Short n= 0.150 P2= 3.00"
10.0	475	0.0250	0.79		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
14.9	525	Total			

Subcatchment 4S:

Hydrograph



Summary for Subcatchment 5S:

Runoff = 0.21 cfs @ 12.08 hrs, Volume= 0.017 af, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

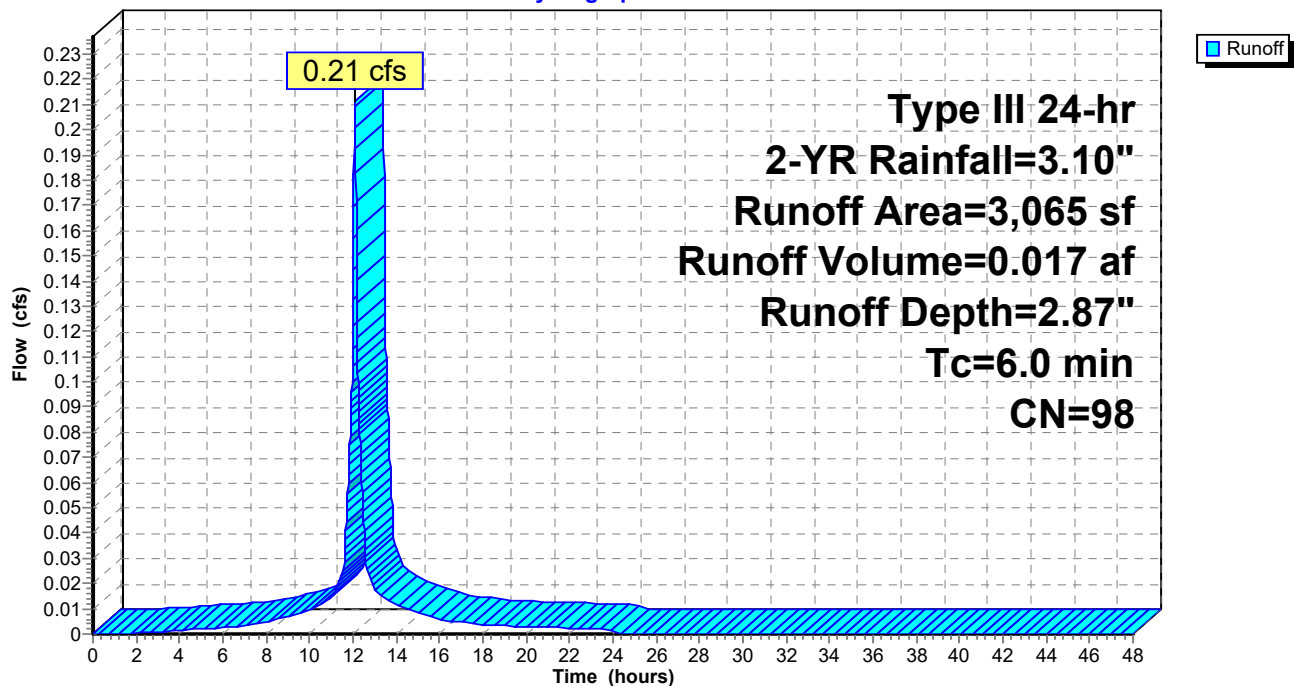
Type III 24-hr 2-YR Rainfall=3.10"

Area (sf)	CN	Description
3,065	98	Paved parking & roofs
3,065		100.00% Impervious Area

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

Subcatchment 5S:

Hydrograph



Summary for Subcatchment 7S: (new Subcat)

Runoff = 0.36 cfs @ 12.09 hrs, Volume= 0.026 af, Depth= 2.08"

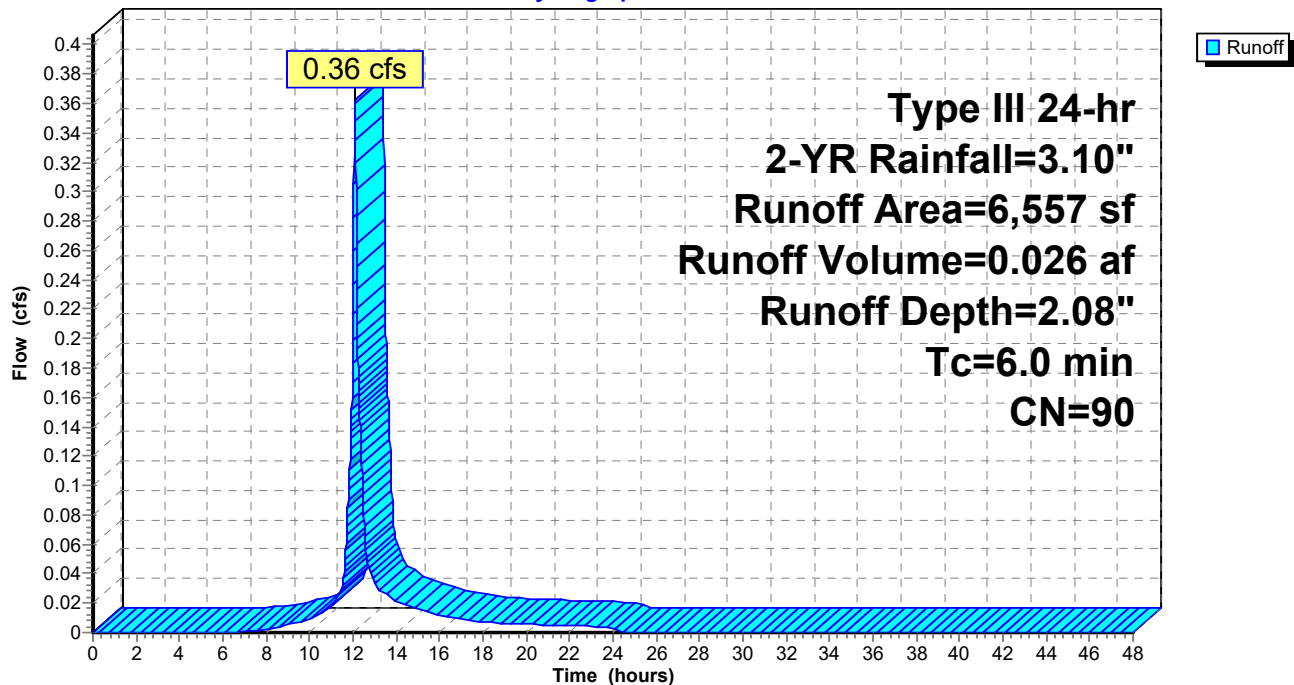
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.10"

	Area (sf)	CN	Description
*	5,183	98	Impervious
*	1,374	61	>75% grass cover, good, HSG B
	6,557	90	Weighted Average
	1,374		20.95% Pervious Area
	5,183		79.05% Impervious Area

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

Subcatchment 7S: (new Subcat)

Hydrograph



Summary for Subcatchment 8S: (new Subcat)

Runoff = 0.32 cfs @ 12.10 hrs, Volume= 0.025 af, Depth= 0.77"

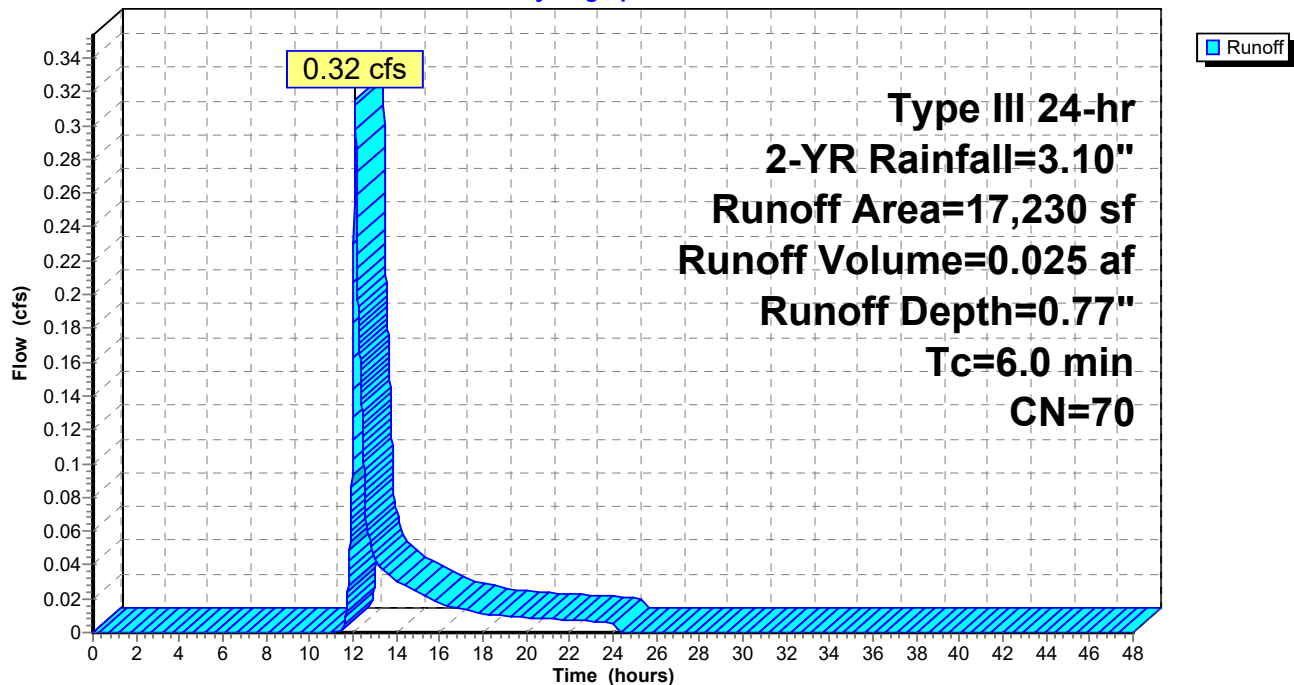
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.10"

	Area (sf)	CN	Description
*	4,188	98	Impervious
*	13,042	61	>75% grass cover, good, HSG B
	17,230	70	Weighted Average
	13,042		75.69% Pervious Area
	4,188		24.31% Impervious Area

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

Subcatchment 8S: (new Subcat)

Hydrograph



Summary for Subcatchment 9S:

Runoff = 0.14 cfs @ 12.08 hrs, Volume= 0.011 af, Depth= 2.87"

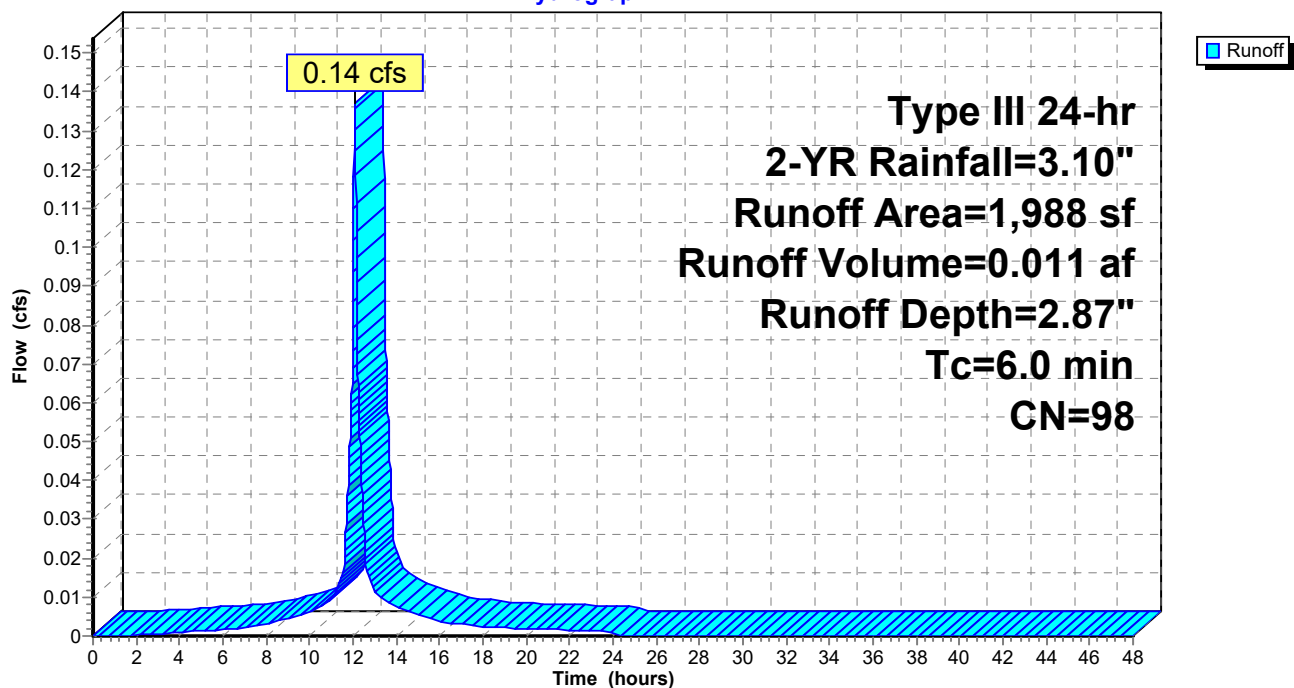
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.10"

Area (sf)	CN	Description
* 1,988	98	
1,988		100.00% Impervious Area

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

Subcatchment 9S:

Hydrograph



Summary for Subcatchment 10S: (new Subcat)

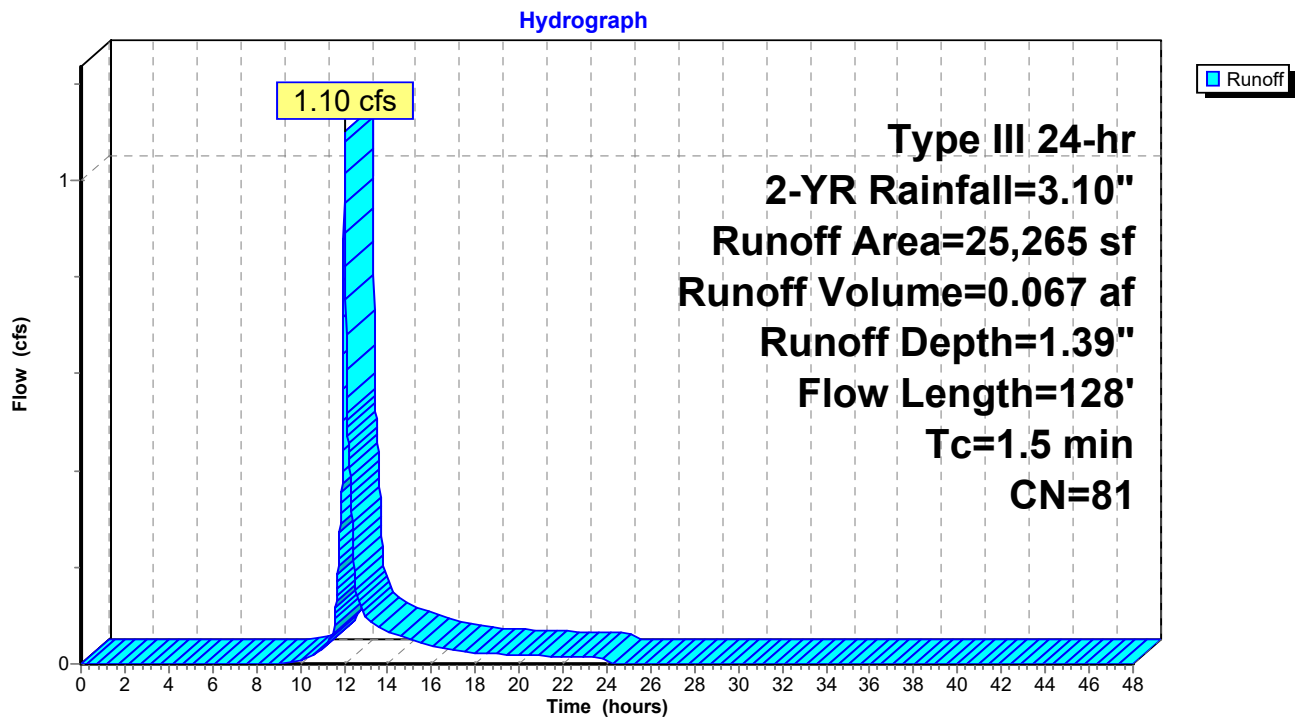
Runoff = 1.10 cfs @ 12.03 hrs, Volume= 0.067 af, Depth= 1.39"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.10"

Area (sf)	CN	Description
7,231	98	Paved parking & roofs
18,034	74	>75% Grass cover, Good, HSG C
25,265	81	Weighted Average
18,034		71.38% Pervious Area
7,231		28.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.16		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
0.8	78	0.0500	1.57		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.5	128	Total			

Subcatchment 10S: (new Subcat)



Summary for Subcatchment 11S:

Runoff = 0.40 cfs @ 12.10 hrs, Volume= 0.033 af, Depth= 0.72"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

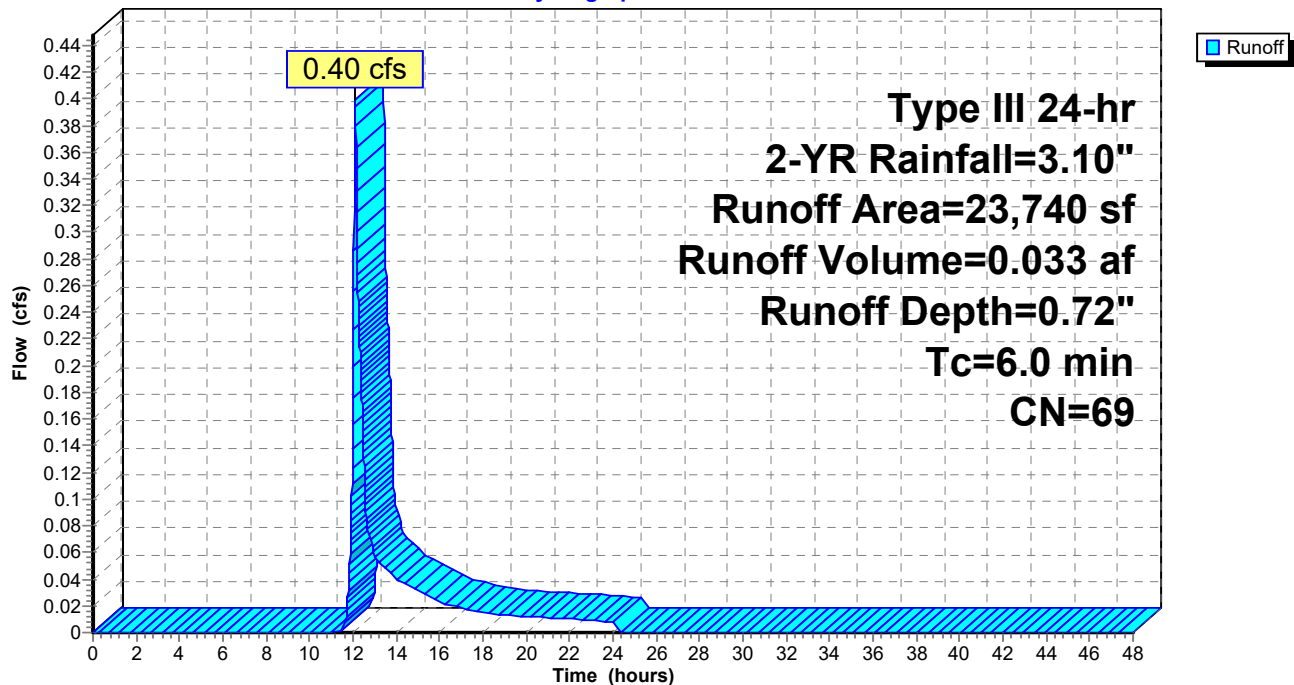
Type III 24-hr 2-YR Rainfall=3.10"

	Area (sf)	CN	Description
*	18,426	61	G+RG: >75% Grass cover, Good, HSG B
*	5,314	98	
	23,740	69	Weighted Average
	18,426		77.62% Pervious Area
	5,314		22.38% Impervious Area

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

Subcatchment 11S:

Hydrograph



Summary for Subcatchment 12S:

Runoff = 1.05 cfs @ 12.13 hrs, Volume= 0.084 af, Depth= 1.20"

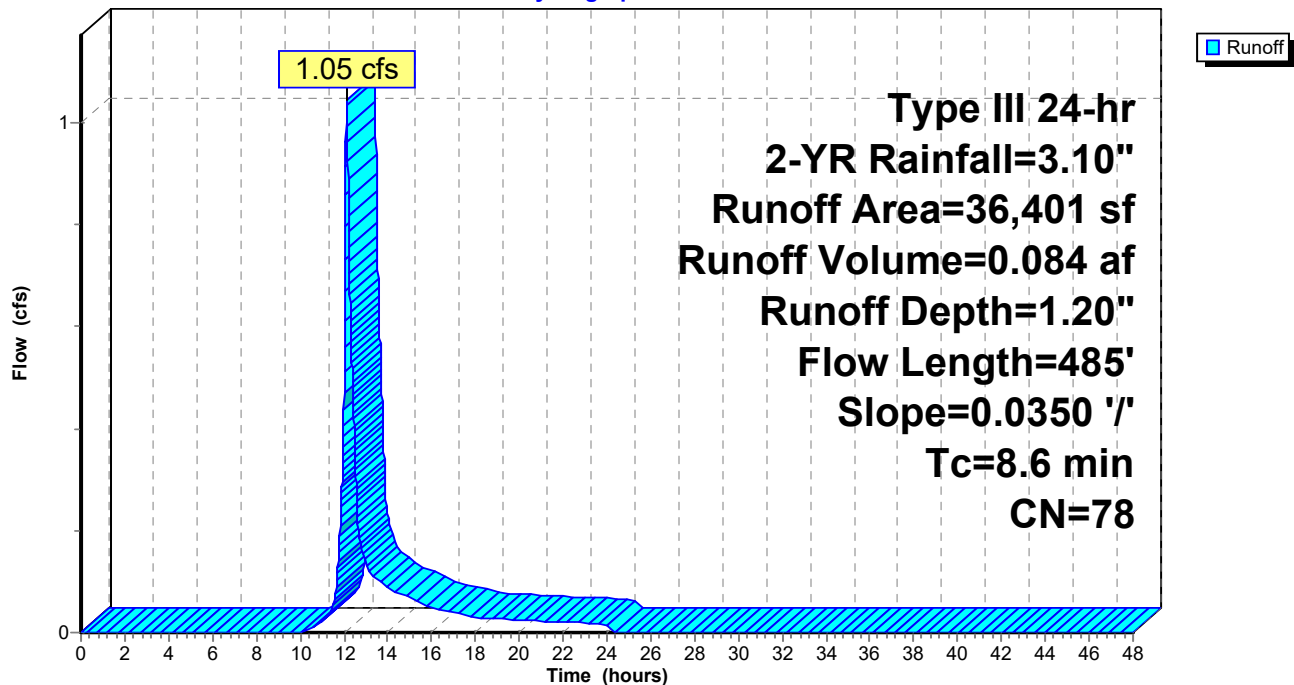
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.10"

	Area (sf)	CN	Description
*	5,171	74	>75% grass cover, good, HSG C
*	31,230	79	woods, fair, HSG D
	36,401	78	Weighted Average
	36,401		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.6	485	0.0350	0.94		Shallow Concentrated Flow, Woodland Kv= 5.0 fps

Subcatchment 12S:

Hydrograph



Summary for Subcatchment 13S:

Runoff = 0.99 cfs @ 12.35 hrs, Volume= 0.118 af, Depth= 0.92"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

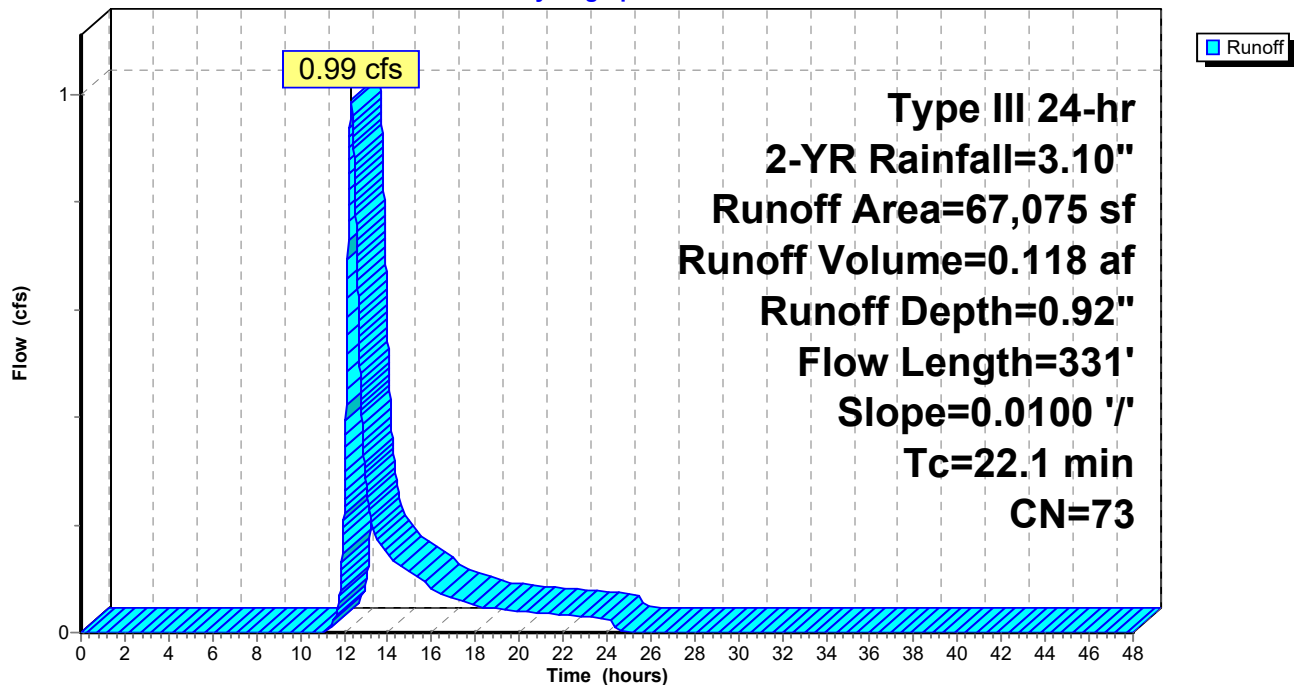
Type III 24-hr 2-YR Rainfall=3.10"

	Area (sf)	CN	Description
*	56,685	73	woods, fair, HSG C
*	10,390	74	>75% grass cover, good, HSG C
	67,075	73	Weighted Average
	67,075		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.1	331	0.0100	0.25		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps

Subcatchment 13S:

Hydrograph



Summary for Subcatchment 14S:

Runoff = 0.86 cfs @ 12.03 hrs, Volume= 0.057 af, Depth= 0.87"

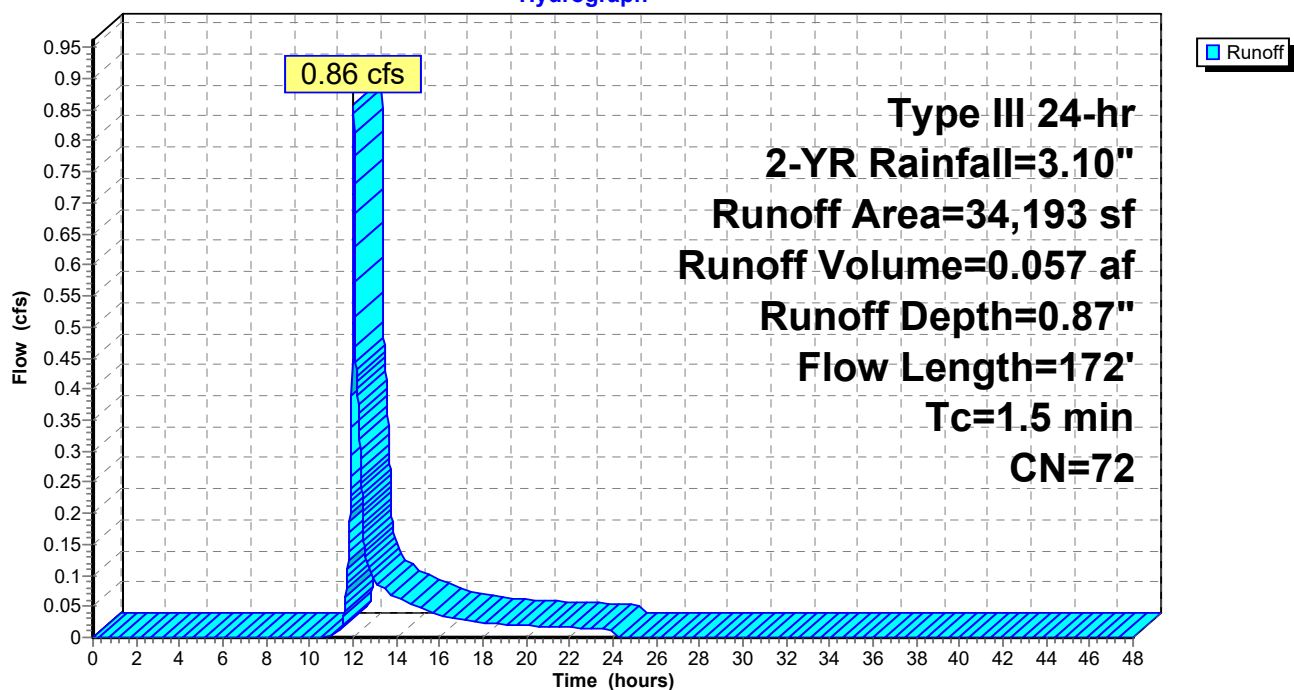
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.10"

	Area (sf)	CN	Description
*	23,718	61	>75% grass cover, good, HSG B
*	9,784	98	
*	691	60	woods, fair, HSG B
	34,193	72	Weighted Average
	24,409		71.39% Pervious Area
	9,784		28.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	47	0.1000	2.18		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
1.1	125	0.0700	1.85		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.5	172	Total			

Subcatchment 14S:

Hydrograph



Summary for Subcatchment 15S:

Runoff = 0.21 cfs @ 13.54 hrs, Volume= 0.059 af, Depth= 0.92"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

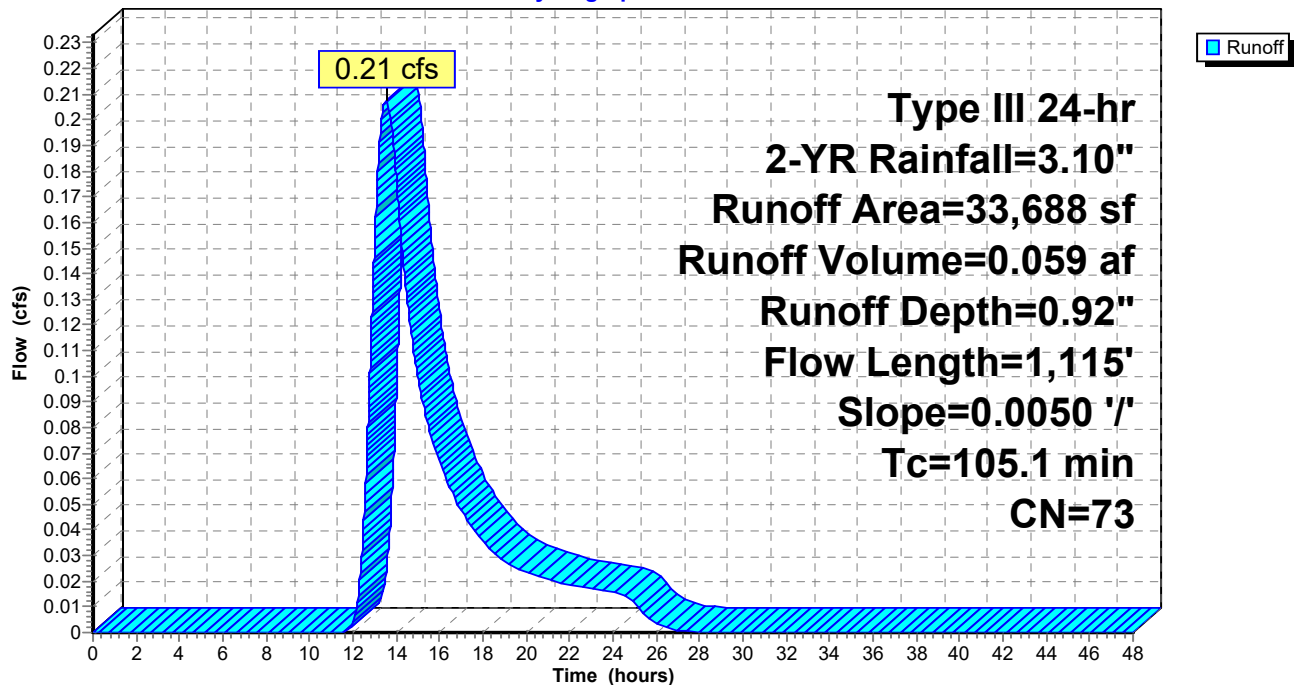
Type III 24-hr 2-YR Rainfall=3.10"

	Area (sf)	CN	Description
*	30,286	73	woods, fair, HSG C
*	3,402	74	>75% grass cover, good, HSG C
	33,688	73	Weighted Average
	33,688		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
105.1	1,115	0.0050	0.18		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps

Subcatchment 15S:

Hydrograph



Summary for Subcatchment 16S:

Runoff = 0.32 cfs @ 12.08 hrs, Volume= 0.026 af, Depth= 2.87"

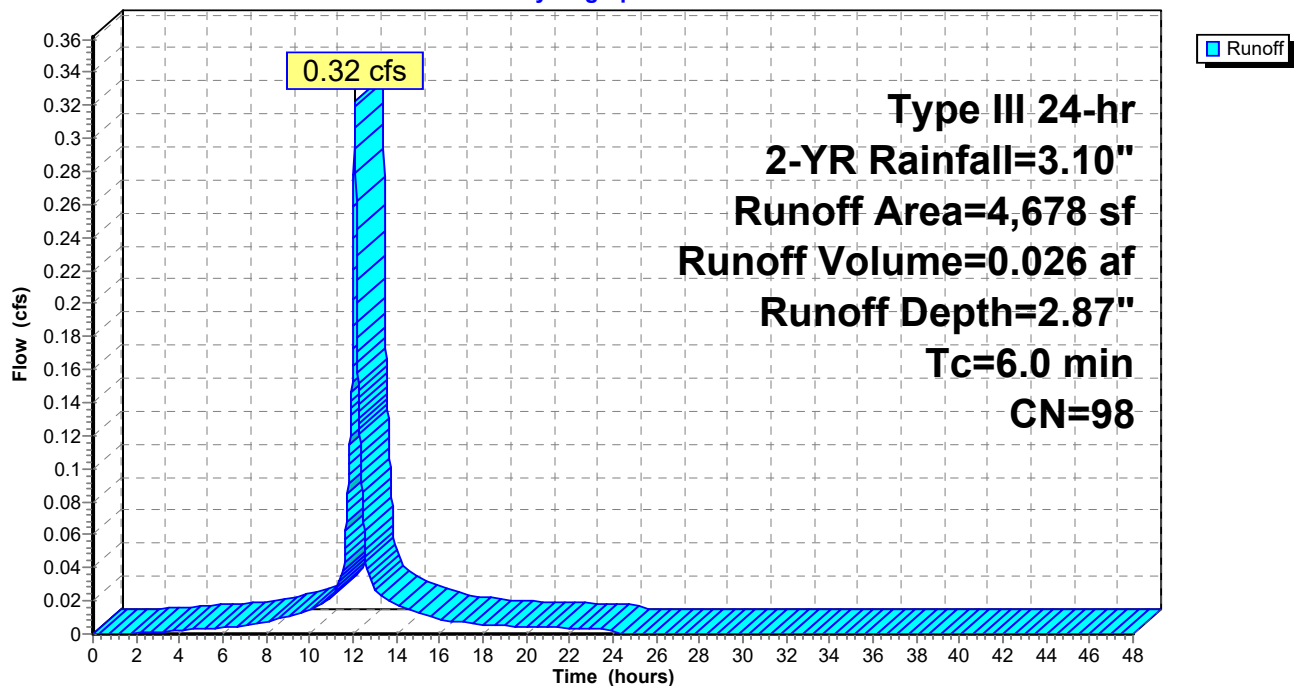
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.10"

Area (sf)	CN	Description
* 4,678	98	
4,678		100.00% Impervious Area

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

Subcatchment 16S:

Hydrograph



Summary for Subcatchment CUL: (new Subcat)

Runoff = 0.23 cfs @ 12.10 hrs, Volume= 0.018 af, Depth= 0.87"

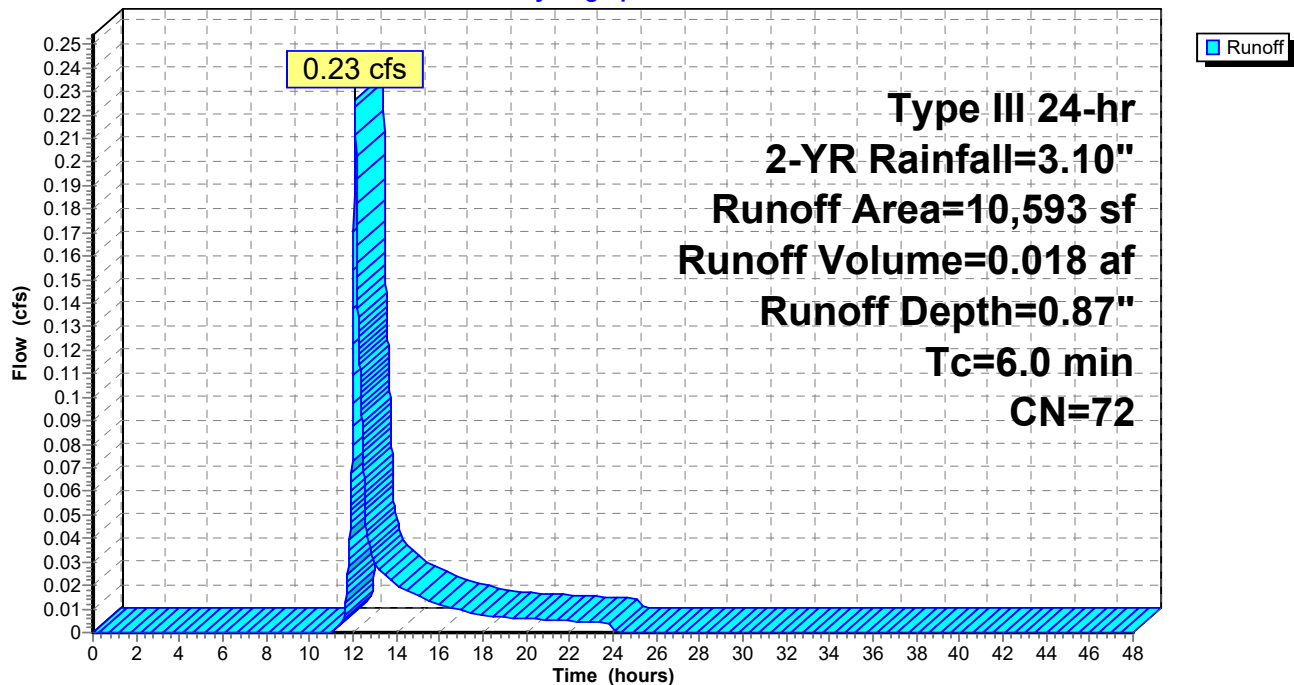
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.10"

	Area (sf)	CN	Description
*	3,132	98	
*	7,461	61	G+RG: >75% grass cover, good, HSG B
	10,593	72	Weighted Average
	7,461		70.43% Pervious Area
	3,132		29.57% Impervious Area

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

Subcatchment CUL: (new Subcat)

Hydrograph



Summary for Subcatchment P1:

Runoff = 0.69 cfs @ 12.22 hrs, Volume= 0.090 af, Depth= 0.48"

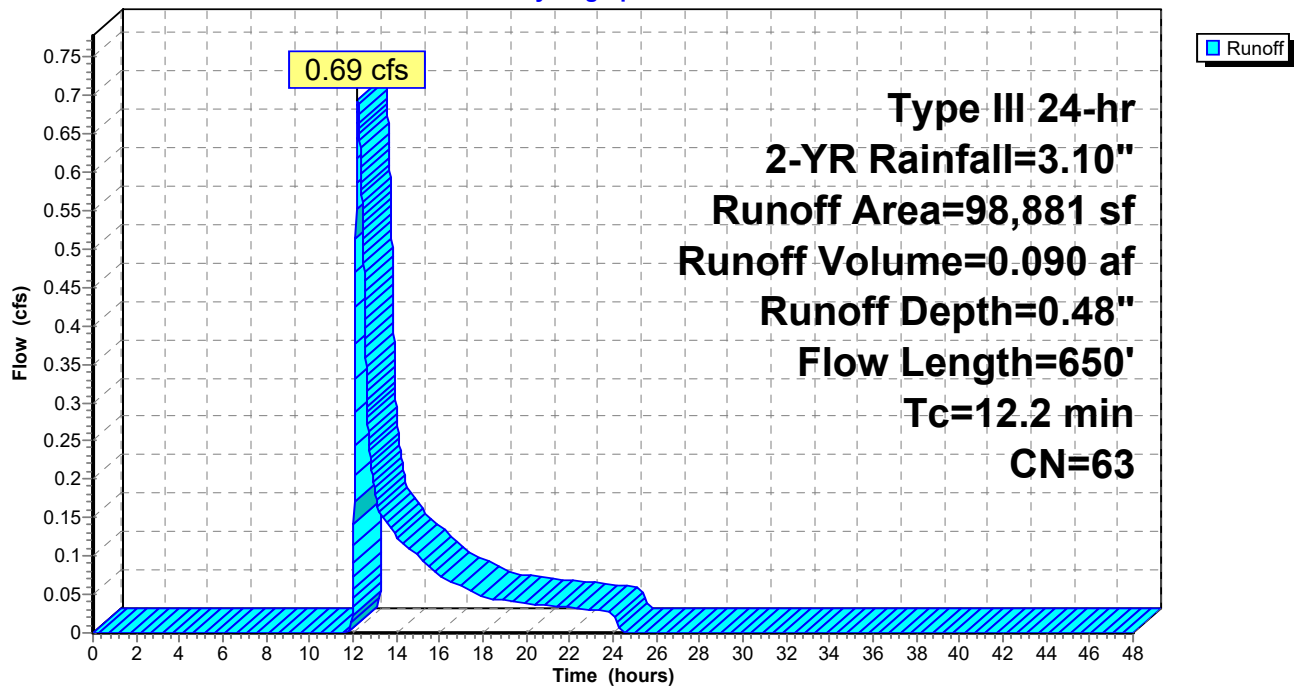
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.10"

Area (sf)	CN	Description
93,901	61	>75% Grass cover, Good, HSG B
* 4,980	98	impervious
98,881	63	Weighted Average
93,901		94.96% Pervious Area
4,980		5.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	50	0.0700	0.11		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.00"
4.5	600	0.1010	2.22		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
12.2	650	Total			

Subcatchment P1:

Hydrograph



Summary for Subcatchment P2:

Runoff = 0.06 cfs @ 12.17 hrs, Volume= 0.008 af, Depth= 0.40"

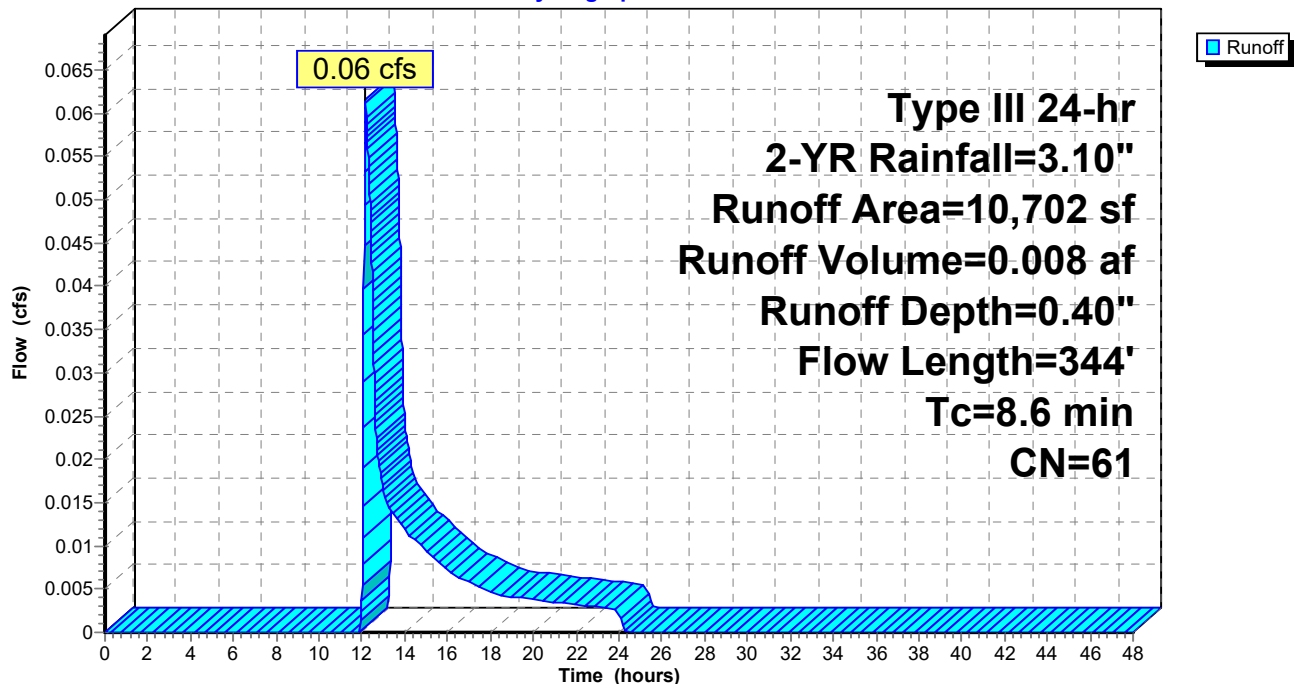
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.10"

Area (sf)	CN	Description
* 10,702	61	G+RG: >75% Grass cover, Good, HSG B
10,702		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	50	0.1000	0.12		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.00"
1.0	138	0.2200	2.35		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.9	156	0.1700	2.89		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
8.6	344	Total			

Subcatchment P2:

Hydrograph



Summary for Subcatchment S1:

Runoff = 0.10 cfs @ 12.08 hrs, Volume= 0.008 af, Depth= 2.76"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

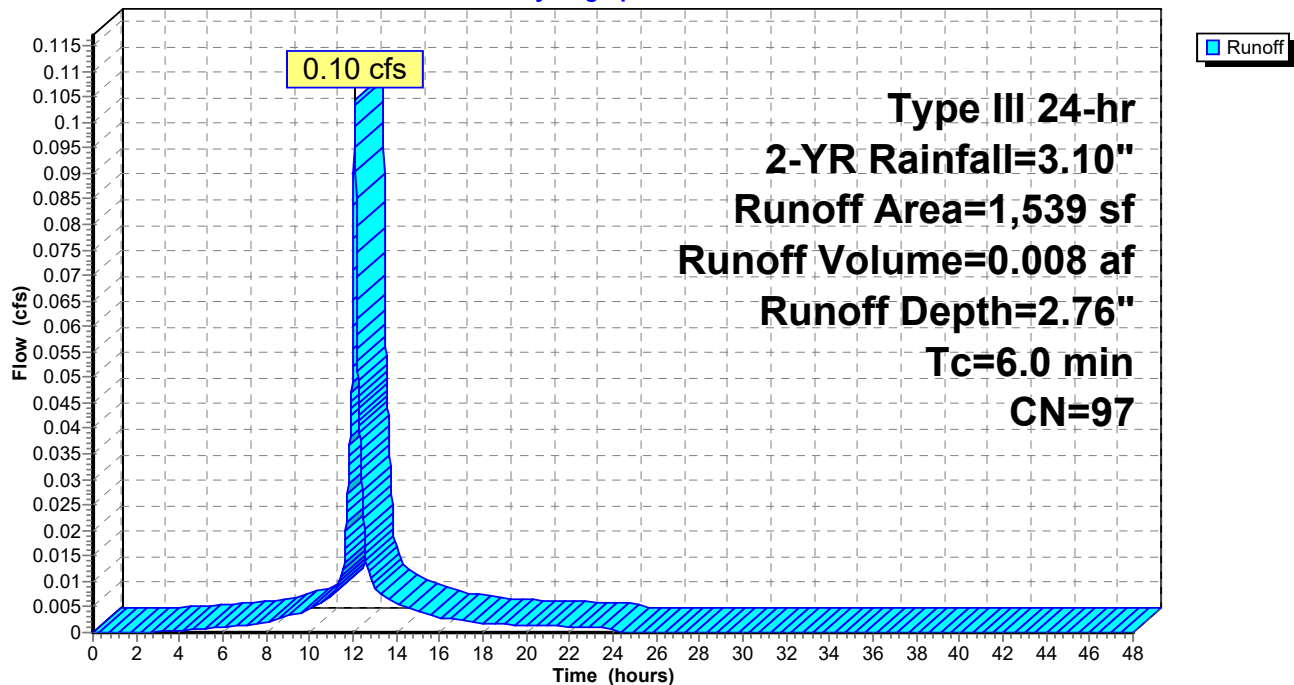
Type III 24-hr 2-YR Rainfall=3.10"

Area (sf)	CN	Description
61	61	>75% Grass cover, Good, HSG B
* 1,478	98	
1,539	97	Weighted Average
61		3.96% Pervious Area
1,478		96.04% Impervious Area

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

Subcatchment S1:

Hydrograph



Summary for Subcatchment S10:

Runoff = 0.05 cfs @ 12.10 hrs, Volume= 0.003 af, Depth= 0.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

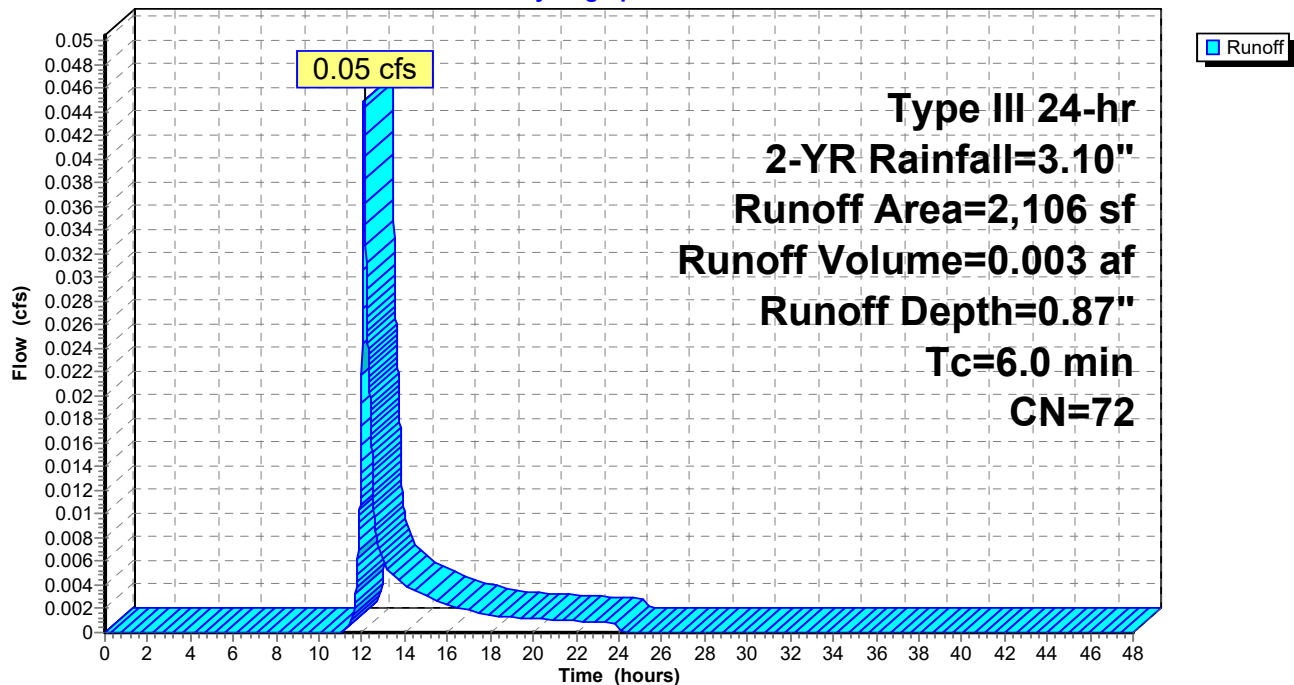
Type III 24-hr 2-YR Rainfall=3.10"

	Area (sf)	CN	Description
*	1,456	61	G+RG: >75% Grass cover, Good, HSG B
*	650	98	
	2,106	72	Weighted Average
	1,456		69.14% Pervious Area
	650		30.86% Impervious Area

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

Subcatchment S10:

Hydrograph



Summary for Subcatchment S11:

Runoff = 0.08 cfs @ 12.09 hrs, Volume= 0.006 af, Depth= 1.60"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

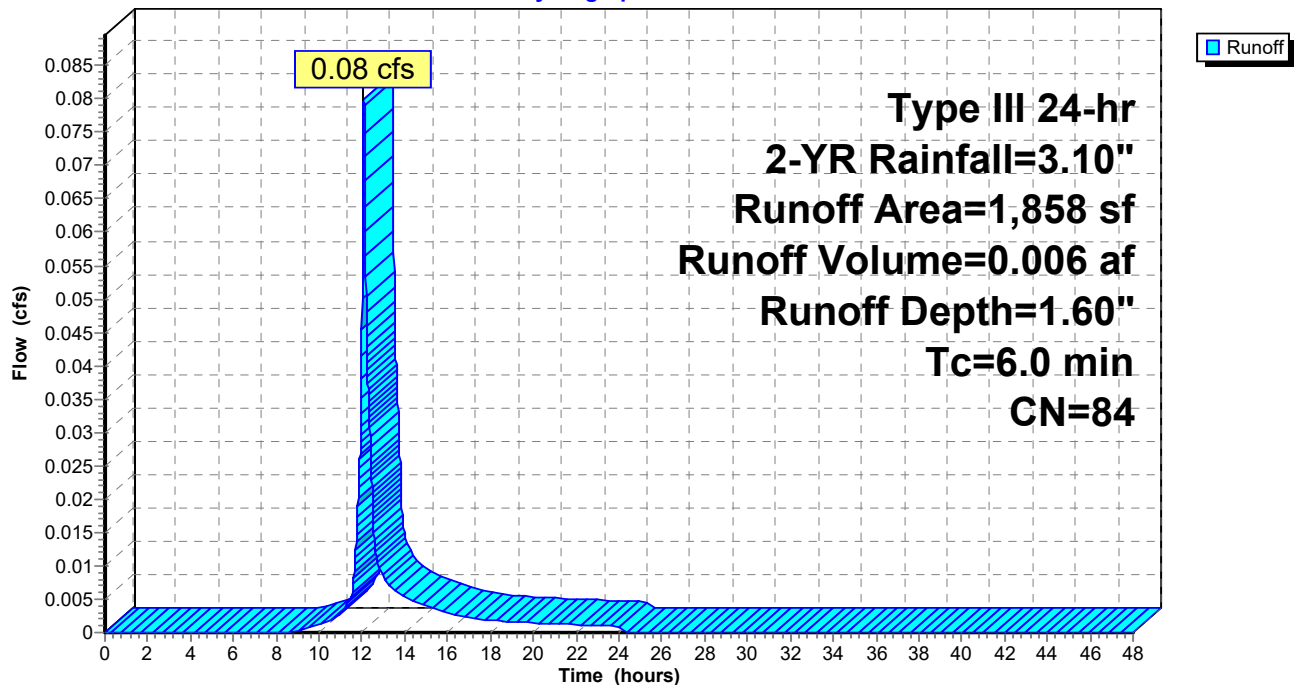
Type III 24-hr 2-YR Rainfall=3.10"

	Area (sf)	CN	Description
*	694	61	G+RG: >75% Grass cover, Good, HSG B
*	1,164	98	
	1,858	84	Weighted Average
	694		37.35% Pervious Area
	1,164		62.65% Impervious Area

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

Subcatchment S11:

Hydrograph



Summary for Subcatchment S12:

Runoff = 0.17 cfs @ 12.10 hrs, Volume= 0.014 af, Depth= 0.77"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

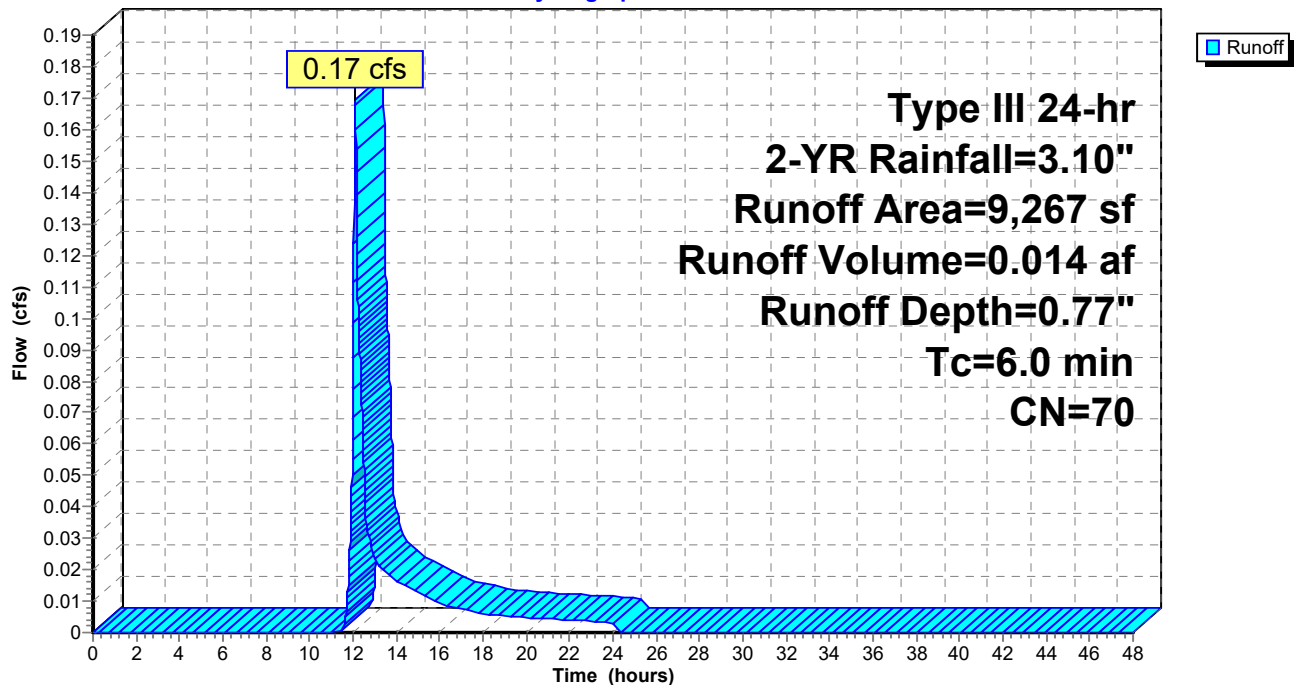
Type III 24-hr 2-YR Rainfall=3.10"

	Area (sf)	CN	Description
*	2,175	98	
*	7,092	61	G+RG: >75% Grass cover, Good, HSG B
	9,267	70	Weighted Average
	7,092		76.53% Pervious Area
	2,175		23.47% Impervious Area

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

Subcatchment S12:

Hydrograph



Summary for Subcatchment S13:

Runoff = 0.16 cfs @ 12.09 hrs, Volume= 0.011 af, Depth= 1.39"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

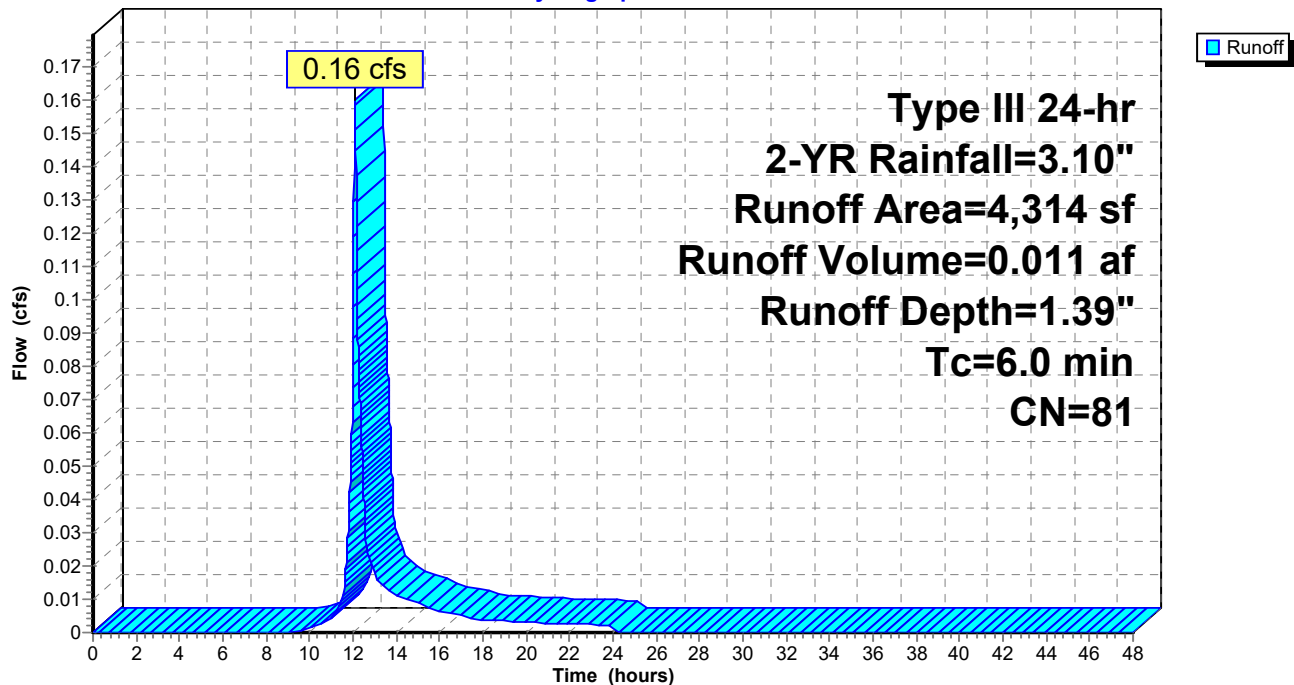
Type III 24-hr 2-YR Rainfall=3.10"

	Area (sf)	CN	Description
*	2,314	98	
	2,000	61	>75% Grass cover, Good, HSG B
	4,314	81	Weighted Average
	2,000		46.36% Pervious Area
	2,314		53.64% Impervious Area

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

Subcatchment S13:

Hydrograph



Summary for Subcatchment S14:

Runoff = 0.11 cfs @ 12.09 hrs, Volume= 0.008 af, Depth= 1.67"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

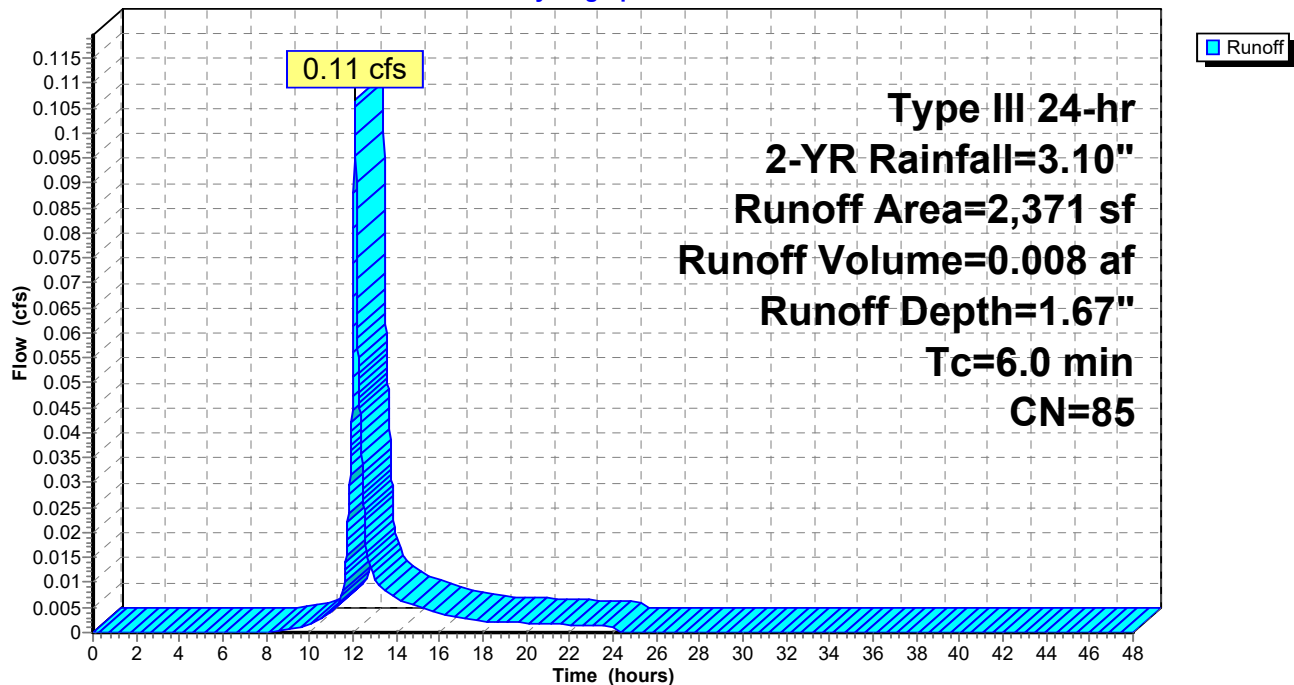
Type III 24-hr 2-YR Rainfall=3.10"

	Area (sf)	CN	Description
*	1,518	98	
*	853	61	G+RG: >75% Grass cover, Good, HSG B
	2,371	85	Weighted Average
	853		35.98% Pervious Area
	1,518		64.02% Impervious Area

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

Subcatchment S14:

Hydrograph



Summary for Subcatchment S15:

Runoff = 0.68 cfs @ 12.10 hrs, Volume= 0.057 af, Depth= 0.68"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

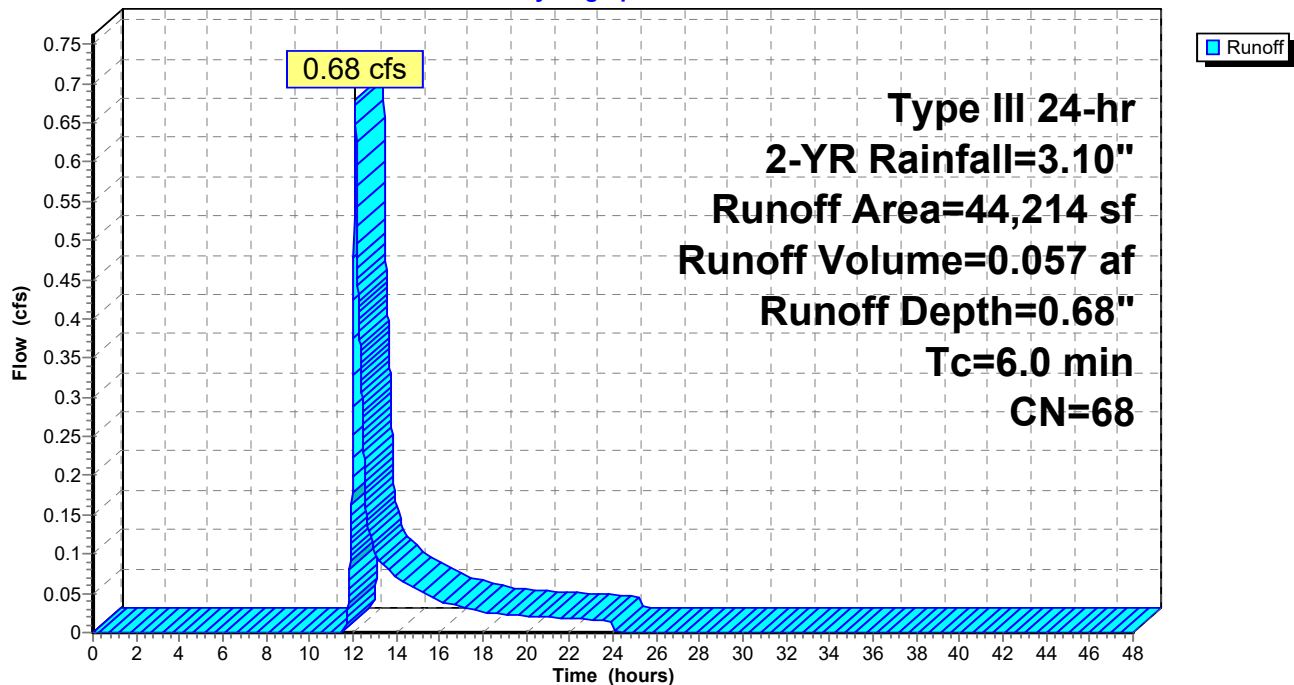
Type III 24-hr 2-YR Rainfall=3.10"

	Area (sf)	CN	Description
*	8,653	98	
*	35,561	61	G+RG: >75% Grass cover, Good, HSG B
	44,214	68	Weighted Average
	35,561		80.43% Pervious Area
	8,653		19.57% Impervious Area

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

Subcatchment S15:

Hydrograph



Summary for Subcatchment S19:

Runoff = 0.57 cfs @ 12.10 hrs, Volume= 0.046 af, Depth= 0.77"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

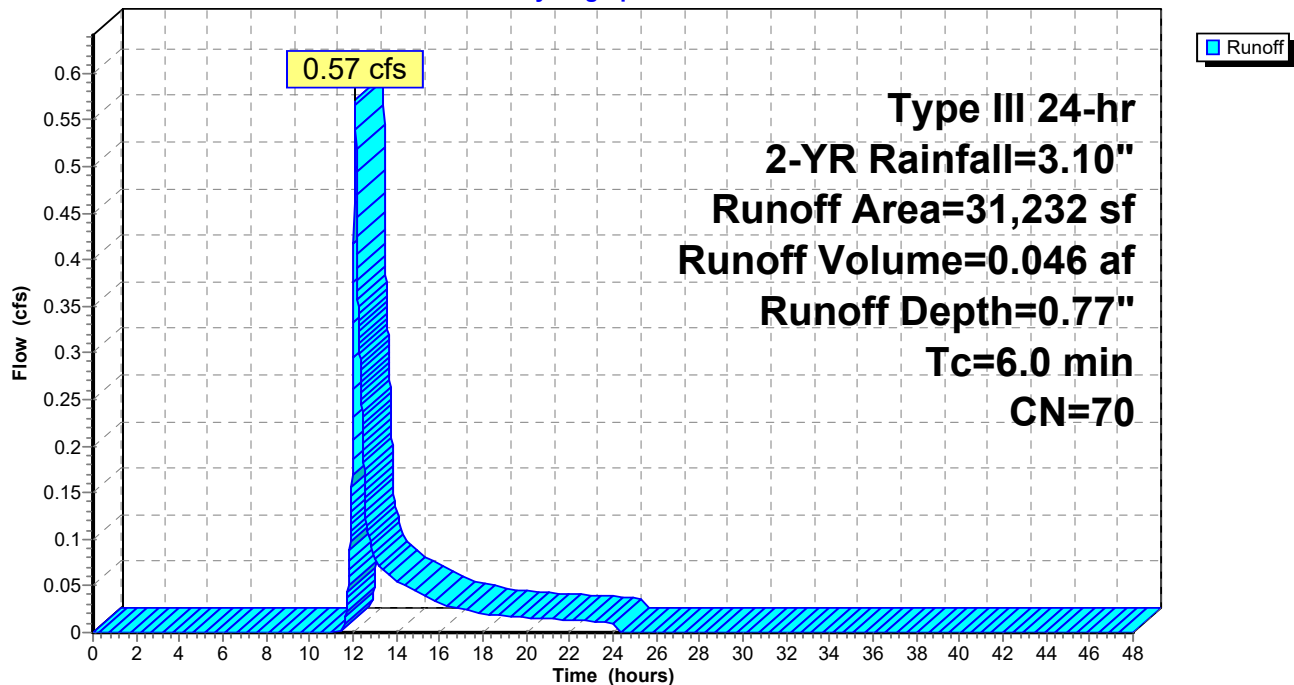
Type III 24-hr 2-YR Rainfall=3.10"

	Area (sf)	CN	Description
*	7,316	98	
	23,916	61	>75% Grass cover, Good, HSG B
	31,232	70	Weighted Average
	23,916		76.58% Pervious Area
	7,316		23.42% Impervious Area

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

Subcatchment S19:

Hydrograph



Summary for Subcatchment S2:

Runoff = 0.30 cfs @ 12.11 hrs, Volume= 0.027 af, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

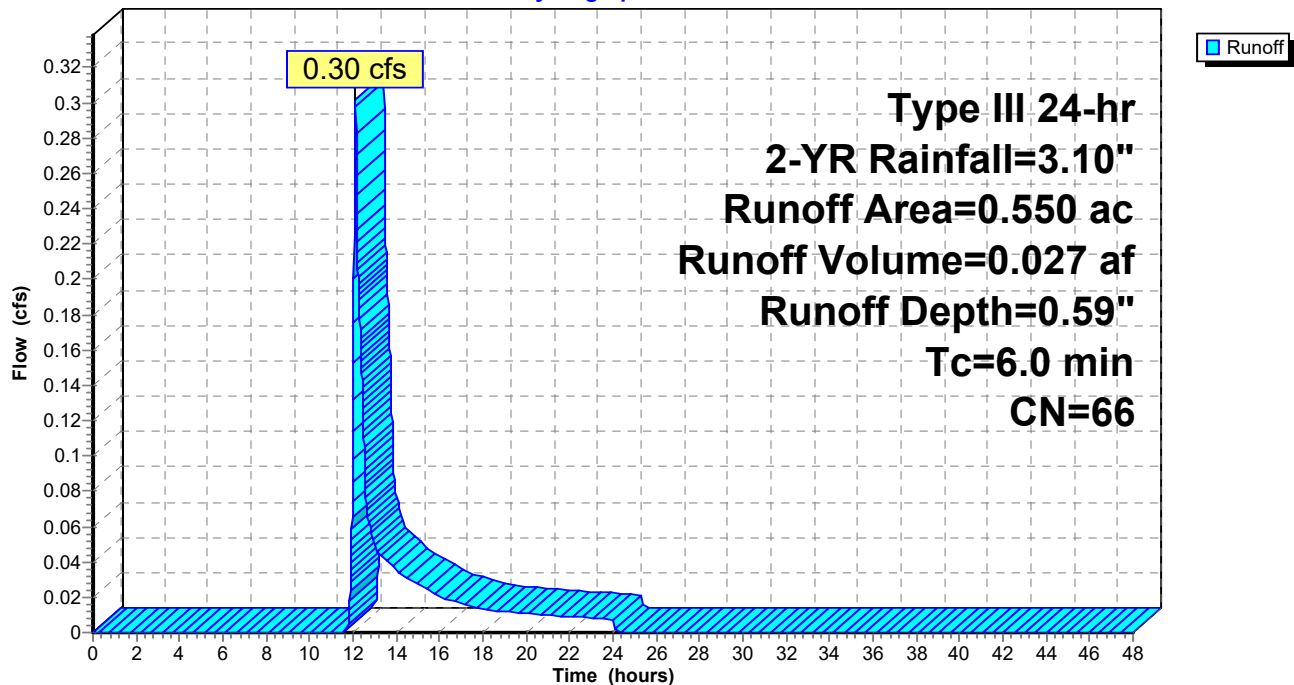
Type III 24-hr 2-YR Rainfall=3.10"

Area (ac)	CN	Description
0.480	61	>75% Grass cover, Good, HSG B
0.070	98	
0.550	66	Weighted Average
0.480		87.27% Pervious Area
0.070		12.73% Impervious Area

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

Subcatchment S2:

Hydrograph



Summary for Subcatchment S20:

Runoff = 0.07 cfs @ 12.13 hrs, Volume= 0.009 af, Depth= 0.40"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

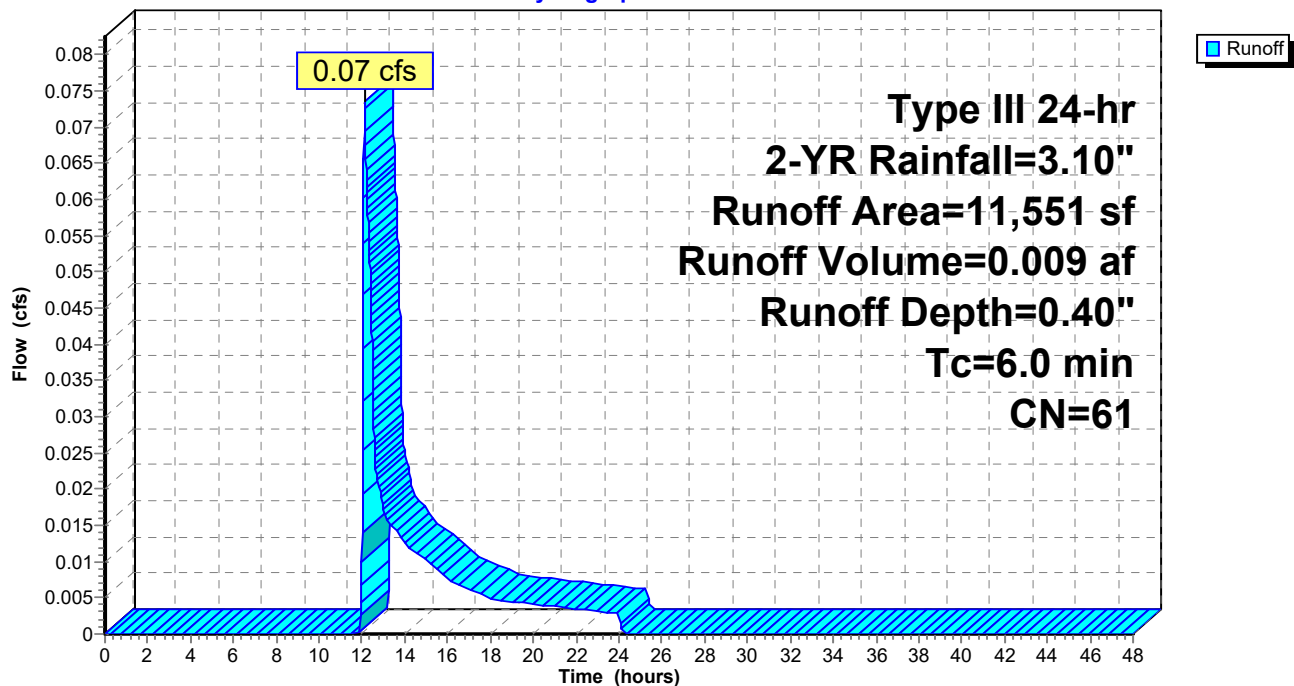
Type III 24-hr 2-YR Rainfall=3.10"

Area (sf)	CN	Description
* 11,551	61	G+RG: >75% Grass cover, Good, HSG B
11,551		100.00% Pervious Area

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

Subcatchment S20:

Hydrograph



Summary for Subcatchment S21:

Runoff = 0.47 cfs @ 12.09 hrs, Volume= 0.033 af, Depth= 1.75"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

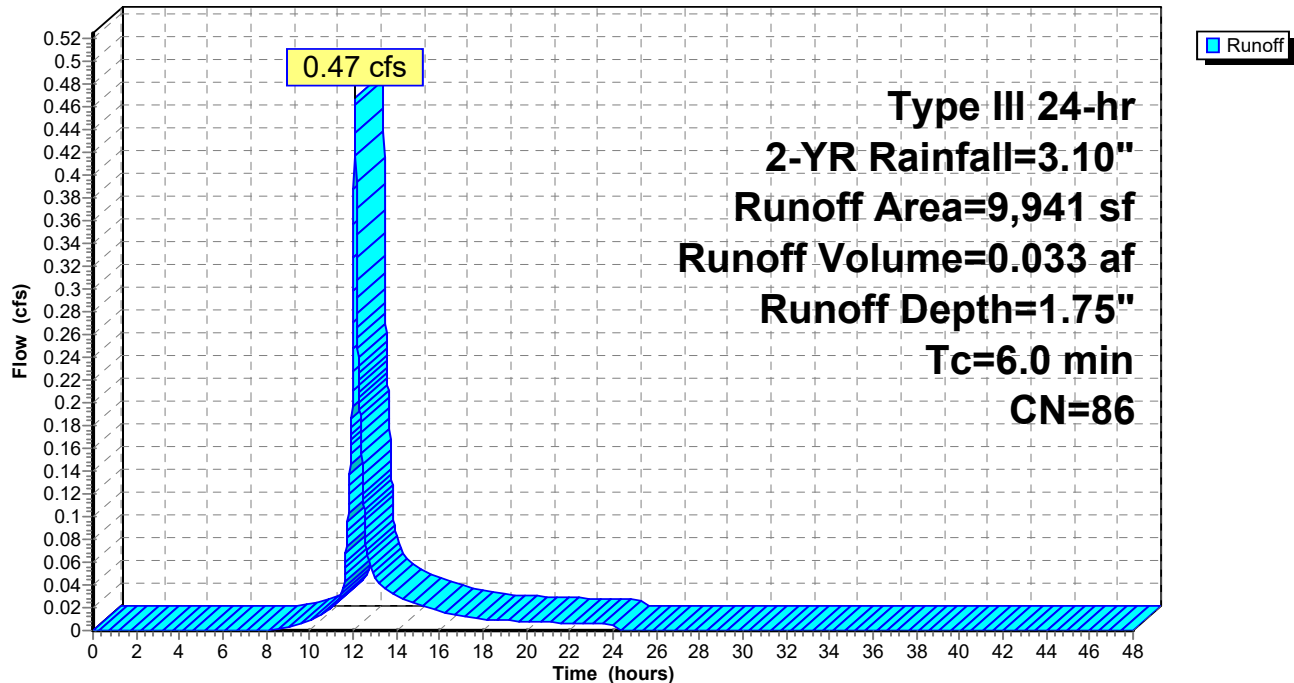
Type III 24-hr 2-YR Rainfall=3.10"

	Area (sf)	CN	Description
*	6,755	98	
*	3,186	61	G+RG: >75% Grass cover, Good, HSG B
	9,941	86	Weighted Average
	3,186		32.05% Pervious Area
	6,755		67.95% Impervious Area

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

Subcatchment S21:

Hydrograph



Summary for Subcatchment S22: Stow Road South

Runoff = 0.21 cfs @ 12.09 hrs, Volume= 0.015 af, Depth= 1.20"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

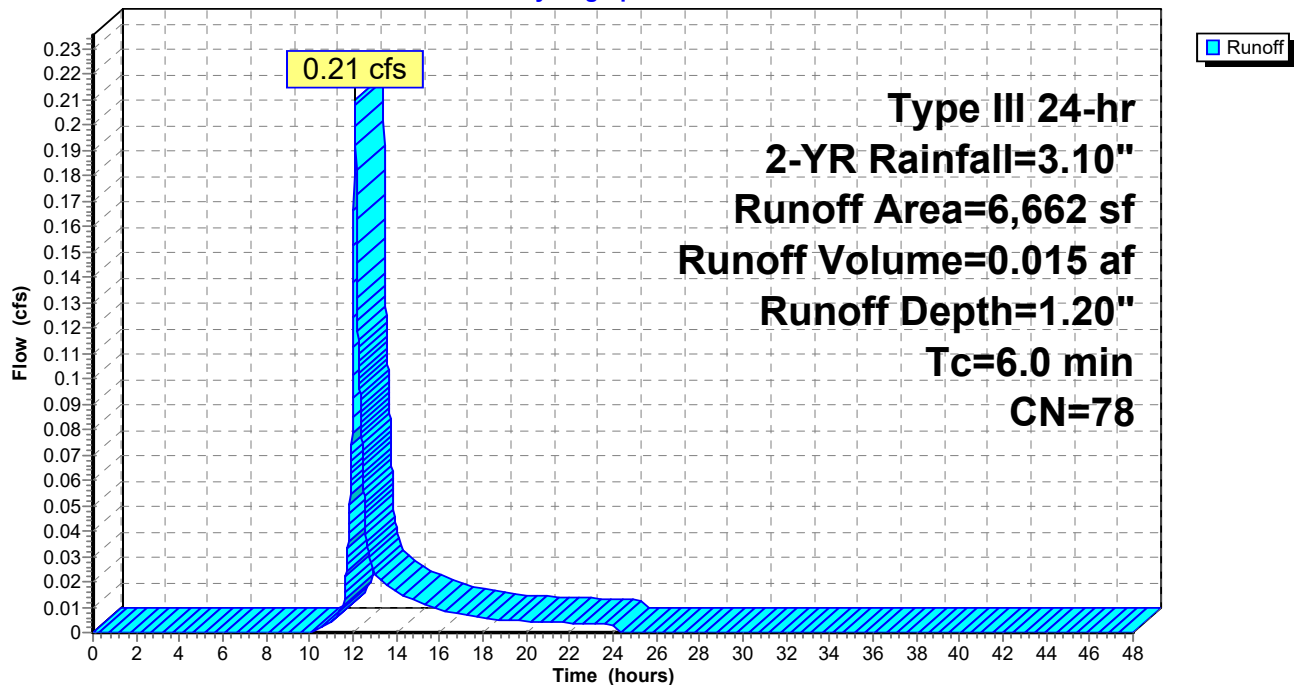
Type III 24-hr 2-YR Rainfall=3.10"

	Area (sf)	CN	Description
*	5,662	74	G+RG: >75% Grass cover, Good, HSG C
*	1,000	98	
	6,662	78	Weighted Average
	5,662		84.99% Pervious Area
	1,000		15.01% Impervious Area

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

Subcatchment S22: Stow Road South

Hydrograph



Summary for Subcatchment S23: Stow Road South

Runoff = 0.05 cfs @ 12.09 hrs, Volume= 0.003 af, Depth= 1.33"

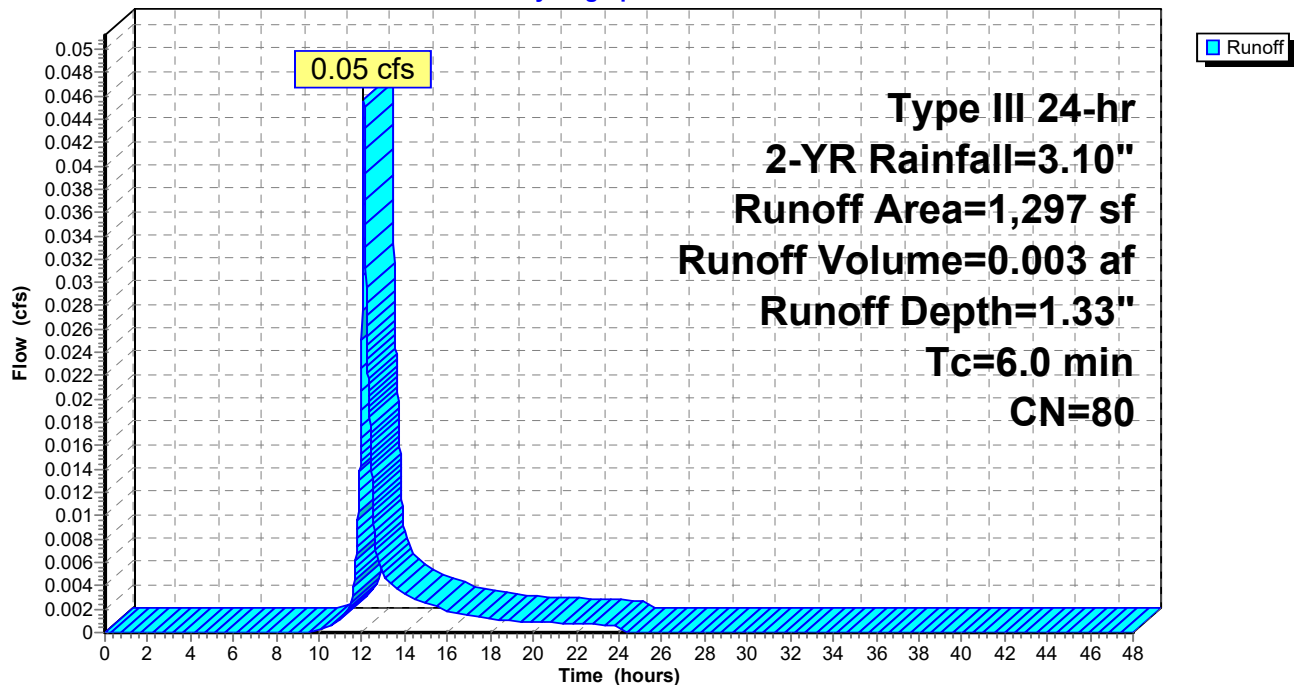
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.10"

	Area (sf)	CN	Description
*	994	74	G+RG: >75% Grass cover, Good, HSG C
*	303	98	
	1,297	80	Weighted Average
	994		76.64% Pervious Area
	303		23.36% Impervious Area

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

Subcatchment S23: Stow Road South

Hydrograph



Summary for Subcatchment S3:

Runoff = 0.17 cfs @ 12.17 hrs, Volume= 0.015 af, Depth= 1.20"

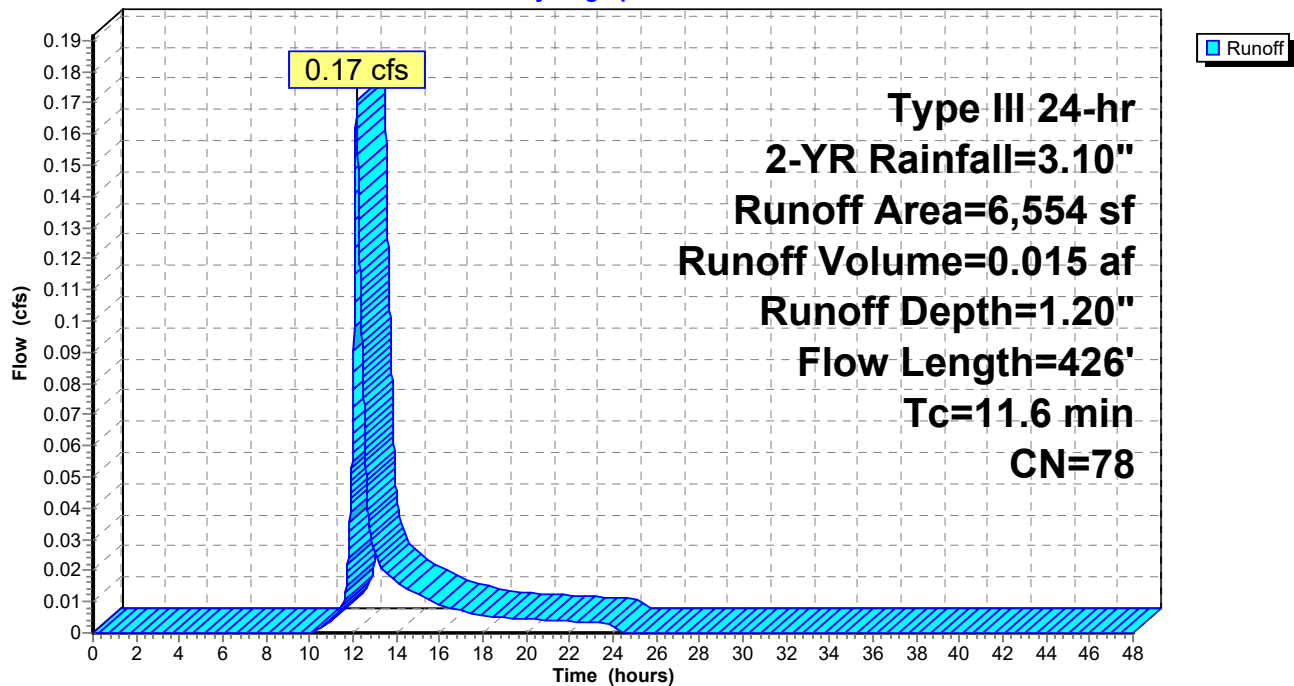
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.10"

Area (sf)	CN	Description
* 3,497	61	G+RG: >75% Grass cover, Good, HSG B
* 3,057	98	
6,554	78	Weighted Average
3,497		53.36% Pervious Area
3,057		46.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	50	0.0600	0.22		Sheet Flow, Grass: Short n= 0.150 P2= 3.00"
7.9	376	0.0130	0.80		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
11.6	426	Total			

Subcatchment S3:

Hydrograph



Summary for Subcatchment S4:

Runoff = 0.04 cfs @ 12.10 hrs, Volume= 0.003 af, Depth= 0.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

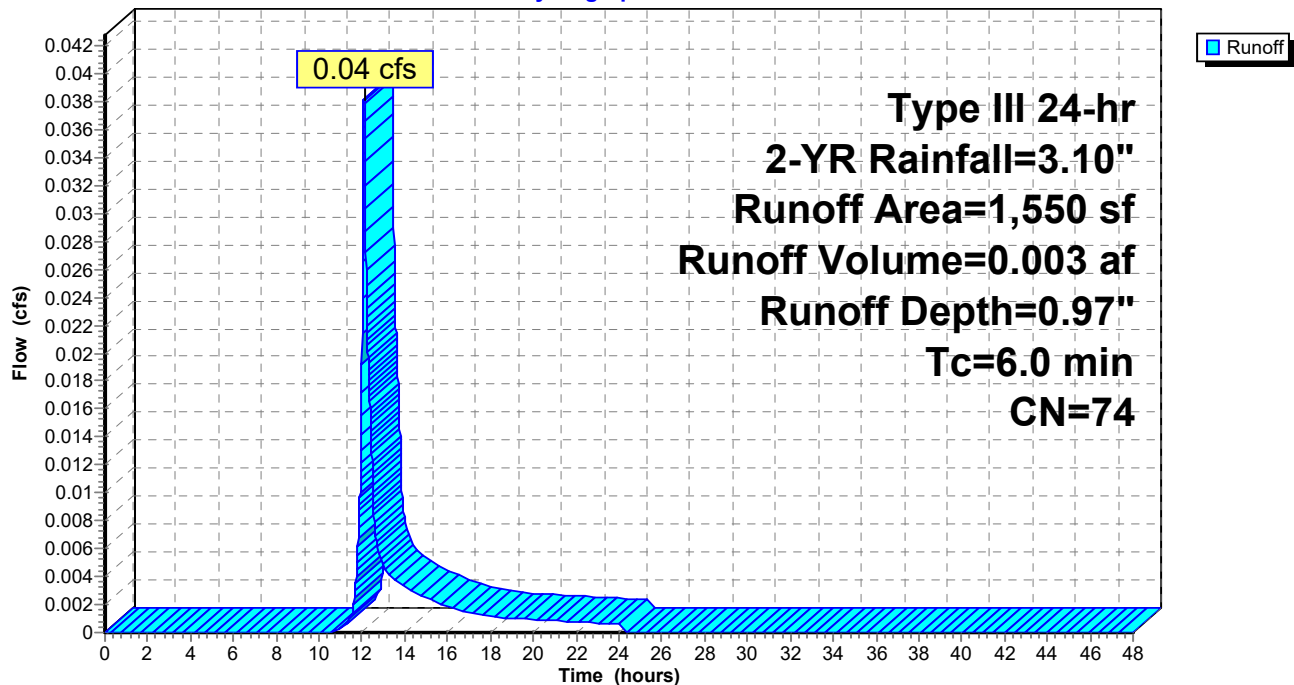
Type III 24-hr 2-YR Rainfall=3.10"

Area (sf)	CN	Description
1,008	61	>75% Grass cover, Good, HSG B
* 542	98	
1,550	74	Weighted Average
1,008		65.03% Pervious Area
542		34.97% Impervious Area

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

Subcatchment S4:

Hydrograph



Summary for Subcatchment S5:

Runoff = 0.06 cfs @ 12.09 hrs, Volume= 0.005 af, Depth= 1.08"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

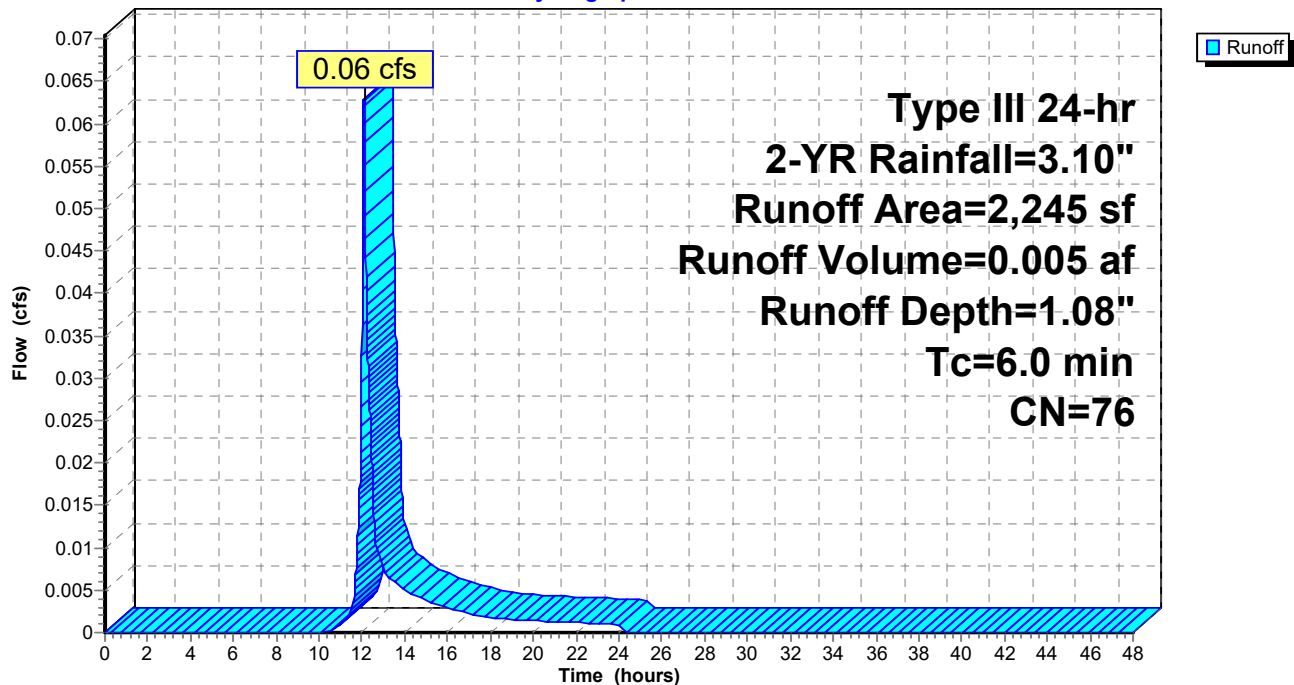
Type III 24-hr 2-YR Rainfall=3.10"

	Area (sf)	CN	Description
*	1,343	61	G+RG: >75% Grass cover, Good, HSG B
*	902	98	
	2,245	76	Weighted Average
	1,343		59.82% Pervious Area
	902		40.18% Impervious Area

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

Subcatchment S5:

Hydrograph



Summary for Subcatchment SBS:

Runoff = 0.22 cfs @ 12.09 hrs, Volume= 0.016 af, Depth= 1.20"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

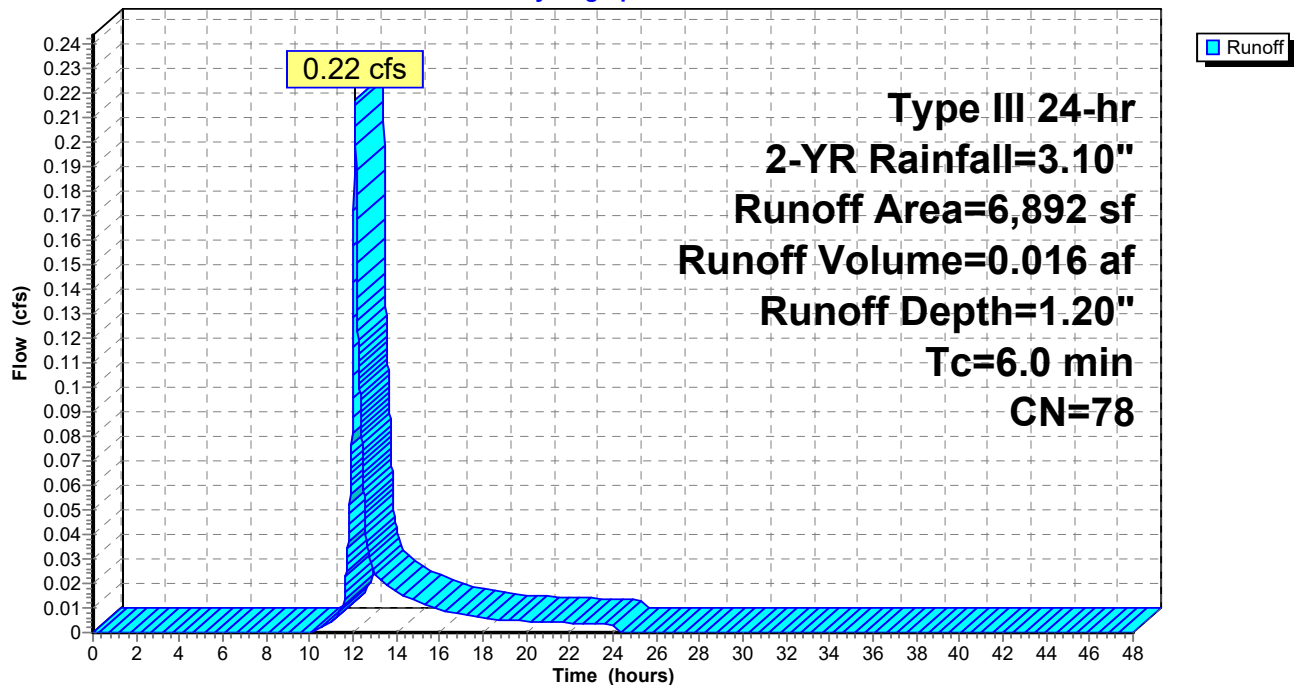
Type III 24-hr 2-YR Rainfall=3.10"

Area (sf)	CN	Description
5,845	74	>75% Grass cover, Good, HSG C
* 1,047	98	
6,892	78	Weighted Average
5,845		84.81% Pervious Area
1,047		15.19% Impervious Area

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

Subcatchment SBS:

Hydrograph



Summary for Reach 1R: (new Reach)

[52] Hint: Inlet/Outlet conditions not evaluated

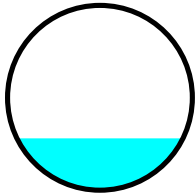
[62] Hint: Exceeded Reach PS7 OUTLET depth by 0.07' @ 12.12 hrs

Inflow Area = 0.785 ac, 28.61% Impervious, Inflow Depth = 0.87" for 2-YR event
Inflow = 0.80 cfs @ 12.08 hrs, Volume= 0.057 af
Outflow = 0.80 cfs @ 12.09 hrs, Volume= 0.057 af, Atten= 0%, Lag= 0.5 min

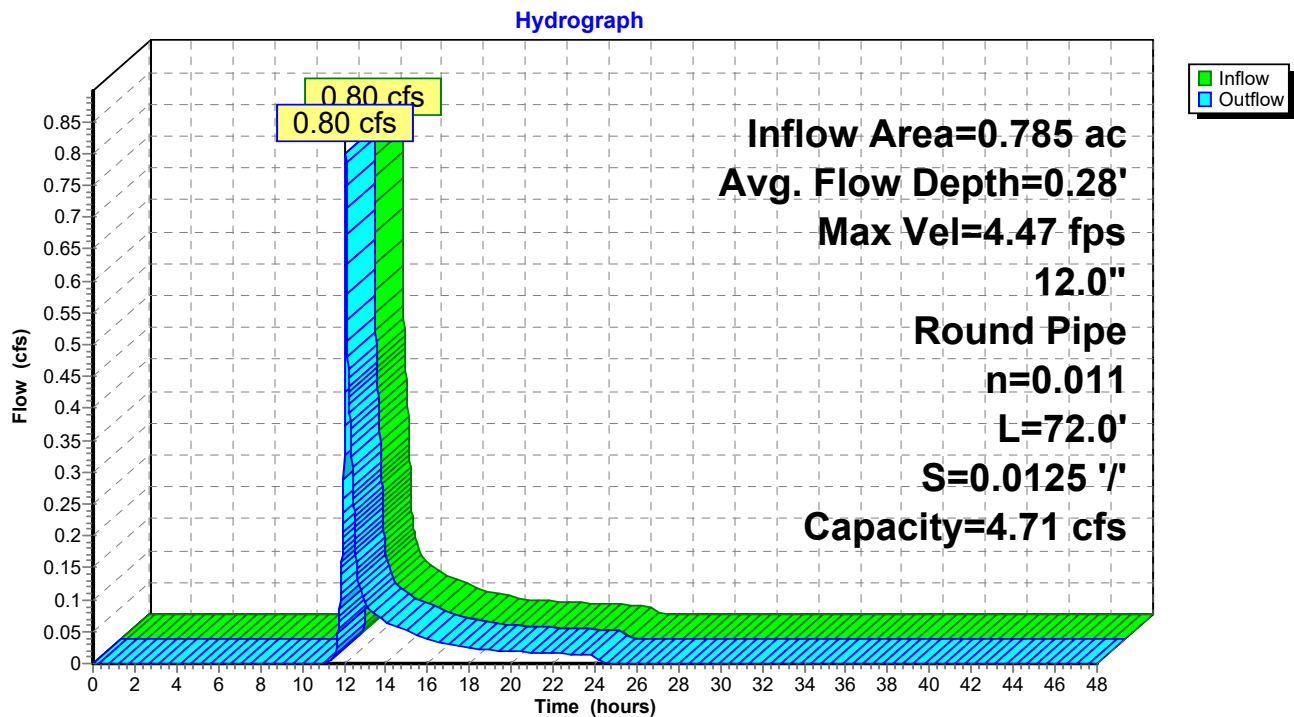
Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 4.47 fps, Min. Travel Time= 0.3 min
Avg. Velocity= 1.70 fps, Avg. Travel Time= 0.7 min

Peak Storage= 13 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.28'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 4.71 cfs

12.0" Round Pipe
n= 0.011 Concrete pipe, straight & clean
Length= 72.0' Slope= 0.0125 '/'
Inlet Invert= 261.00', Outlet Invert= 260.10'



Reach 1R: (new Reach)



Summary for Reach 4R:

[52] Hint: Inlet/Outlet conditions not evaluated

[62] Hint: Exceeded Reach PS10A OUTLET depth by 0.01' @ 18.68 hrs

Inflow Area = 0.035 ac, 96.04% Impervious, Inflow Depth = 2.76" for 2-YR event
Inflow = 0.10 cfs @ 12.09 hrs, Volume= 0.008 af
Outflow = 0.10 cfs @ 12.09 hrs, Volume= 0.008 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Max. Velocity= 4.43 fps, Min. Travel Time= 0.1 min

Avg. Velocity= 1.55 fps, Avg. Travel Time= 0.2 min

Peak Storage= 1 cf @ 12.09 hrs

Average Depth at Peak Storage= 0.07'

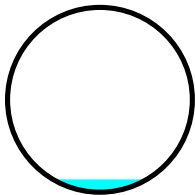
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 10.99 cfs

12.0" Round Pipe

n= 0.011

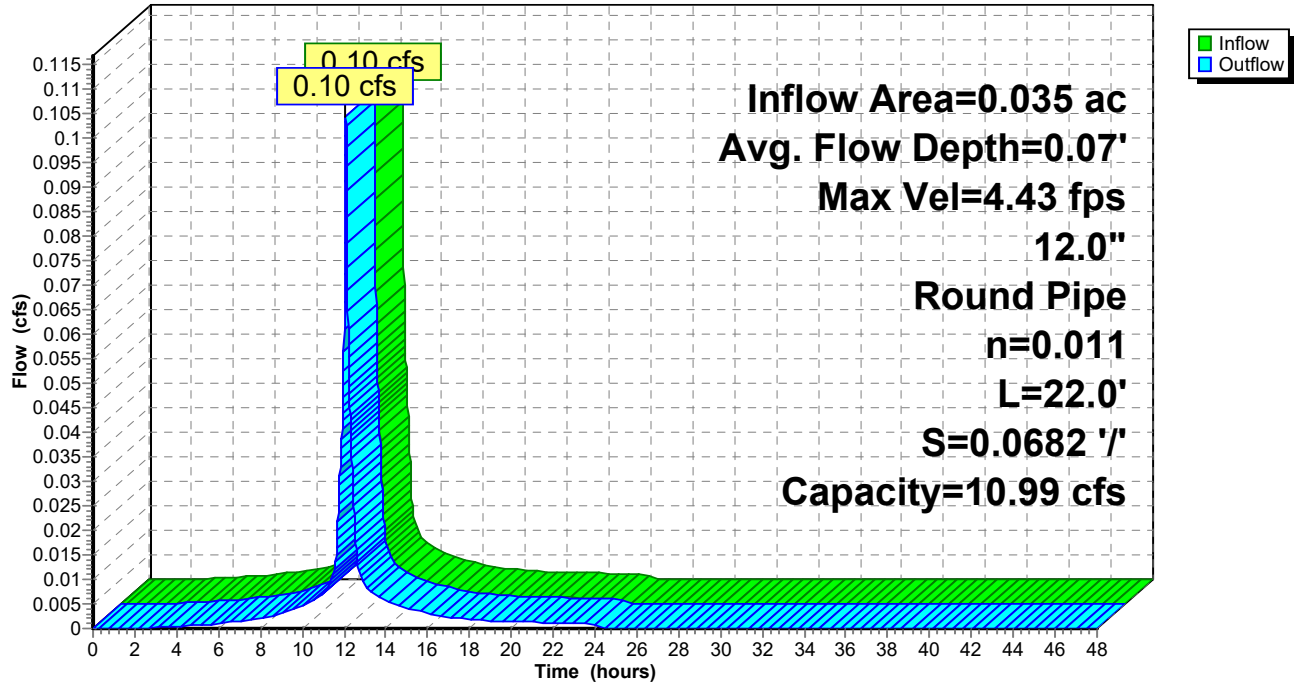
Length= 22.0' Slope= 0.0682 '/'

Inlet Invert= 315.00', Outlet Invert= 313.50'



Reach 4R:

Hydrograph



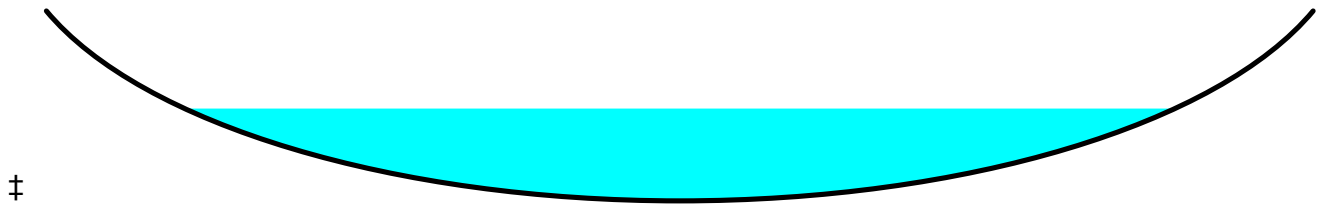
Summary for Reach 5R: Intermittent Stream

Inflow Area = 4.704 ac, 1.01% Impervious, Inflow Depth = 0.91" for 2-YR event
 Inflow = 2.86 cfs @ 12.21 hrs, Volume= 0.359 af
 Outflow = 2.49 cfs @ 12.55 hrs, Volume= 0.359 af, Atten= 13%, Lag= 20.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 1.38 fps, Min. Travel Time= 10.2 min
 Avg. Velocity = 0.39 fps, Avg. Travel Time= 35.7 min

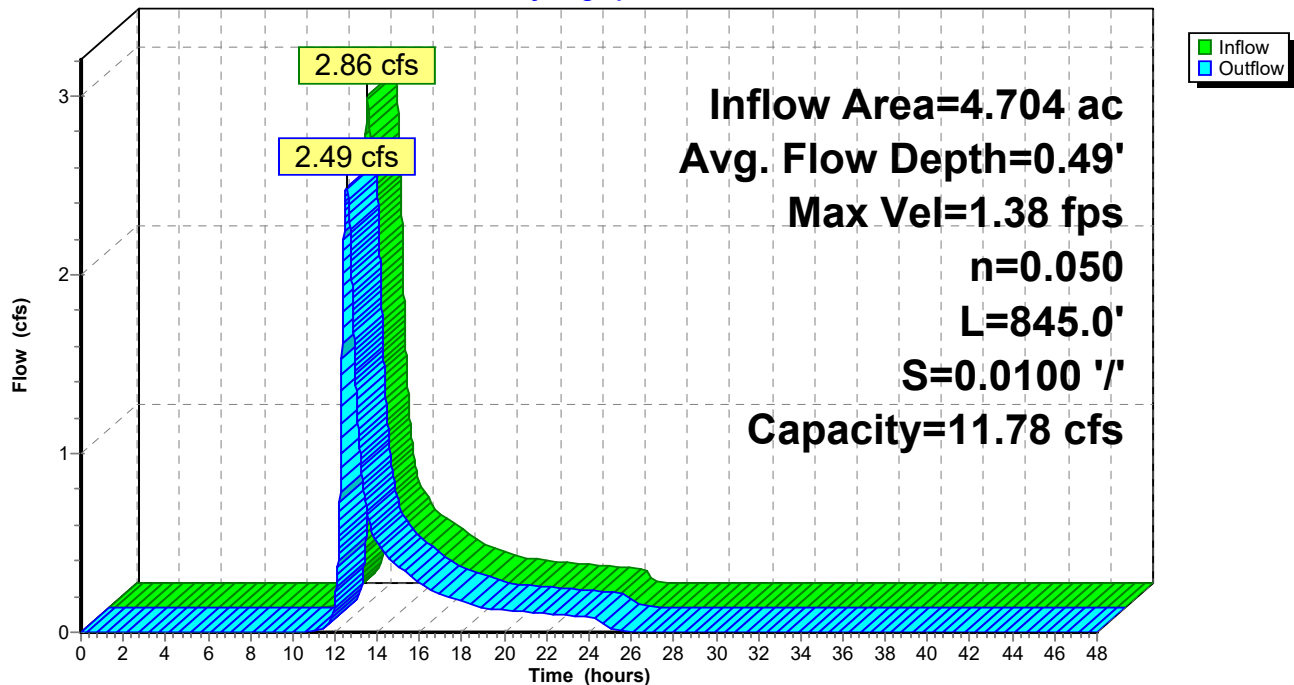
Peak Storage= 1,524 cf @ 12.38 hrs
 Average Depth at Peak Storage= 0.49'
 Bank-Full Depth= 1.00' Flow Area= 5.3 sf, Capacity= 11.78 cfs

8.00' x 1.00' deep Parabolic Channel, n= 0.050 High grass
 Length= 845.0' Slope= 0.0100 '/'
 Inlet Invert= 260.00', Outlet Invert= 251.55'



Reach 5R: Intermittent Stream

Hydrograph



Summary for Reach 6R: new

[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.099 ac, 53.64% Impervious, Inflow Depth = 0.00" for 2-YR event
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min

Avg. Velocity= 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs

Average Depth at Peak Storage= 0.00'

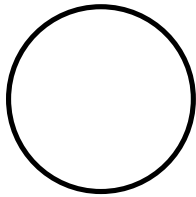
Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 1.43 cfs

8.0" Round Pipe

n= 0.011 Concrete pipe, straight & clean

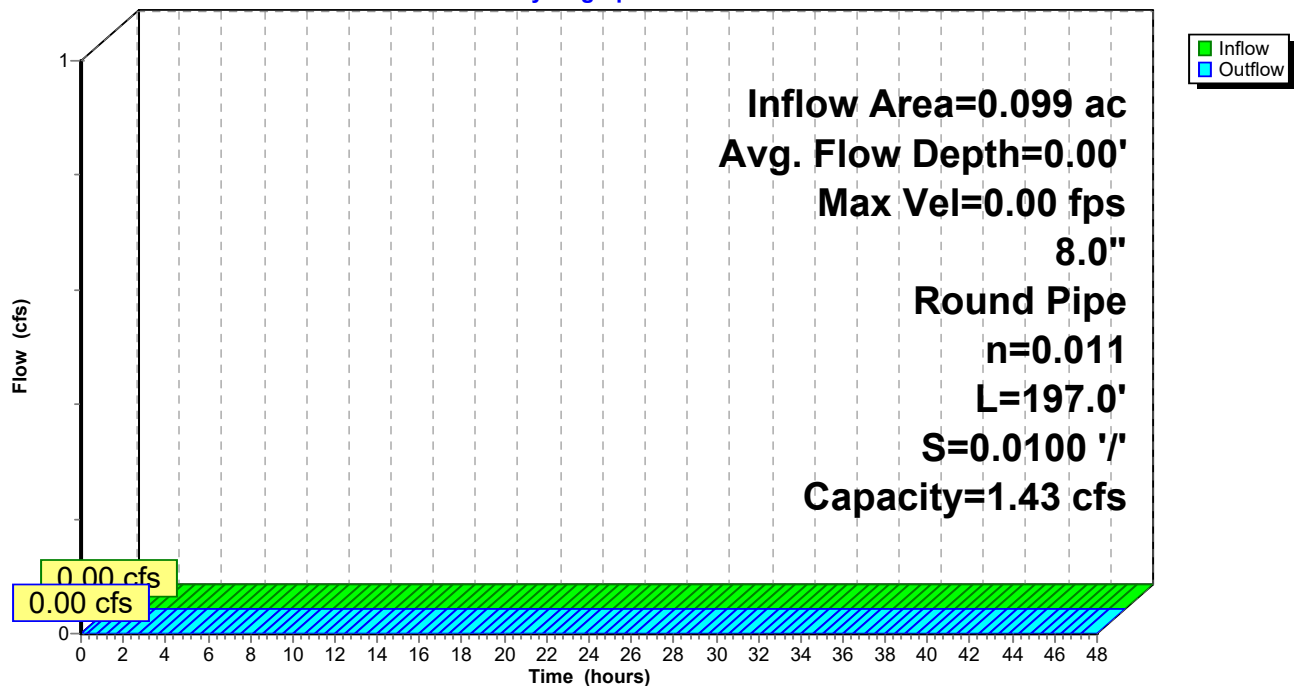
Length= 197.0' Slope= 0.0100 '/'

Inlet Invert= 304.20', Outlet Invert= 302.23'



Reach 6R: new

Hydrograph



Summary for Reach 7R:

[52] Hint: Inlet/Outlet conditions not evaluated

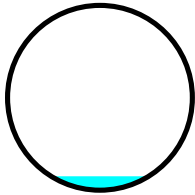
[62] Hint: Exceeded Reach PS10B OUTLET depth by 0.01' @ 12.15 hrs

Inflow Area = 0.035 ac, 96.04% Impervious, Inflow Depth = 2.76" for 2-YR event
Inflow = 0.10 cfs @ 12.11 hrs, Volume= 0.008 af
Outflow = 0.10 cfs @ 12.12 hrs, Volume= 0.008 af, Atten= 0%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.95 fps, Min. Travel Time= 0.4 min
Avg. Velocity= 1.36 fps, Avg. Travel Time= 1.1 min

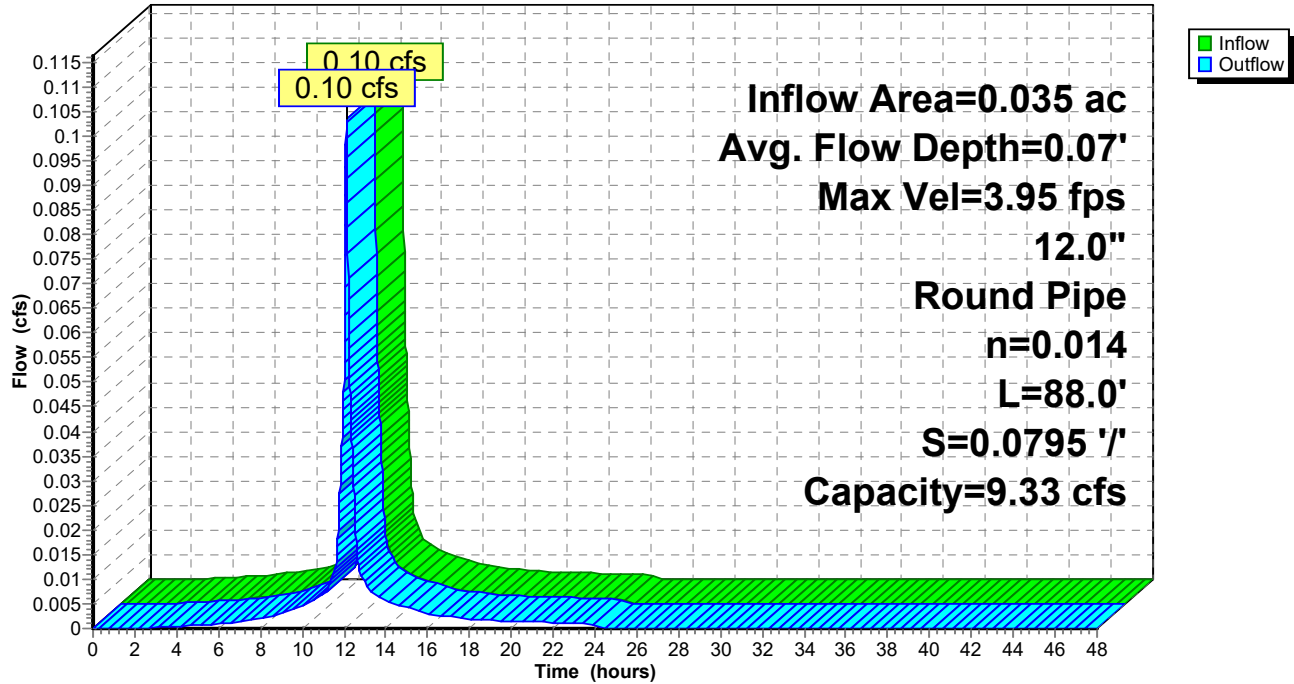
Peak Storage= 2 cf @ 12.11 hrs
Average Depth at Peak Storage= 0.07'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 9.33 cfs

12.0" Round Pipe
n= 0.014 Concrete pipe, finished
Length= 88.0' Slope= 0.0795 '/'
Inlet Invert= 310.50', Outlet Invert= 303.50'



Reach 7R:

Hydrograph



Summary for Reach 8R: new

[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.213 ac, 23.47% Impervious, Inflow Depth = 0.77" for 2-YR event
 Inflow = 0.17 cfs @ 12.12 hrs, Volume= 0.014 af
 Outflow = 0.17 cfs @ 12.13 hrs, Volume= 0.014 af, Atten= 0%, Lag= 0.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Max. Velocity= 4.29 fps, Min. Travel Time= 0.5 min

Avg. Velocity = 1.75 fps, Avg. Travel Time= 1.2 min

Peak Storage= 5 cf @ 12.12 hrs

Average Depth at Peak Storage= 0.11'

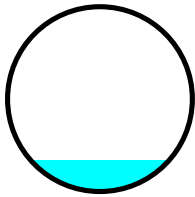
Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 2.68 cfs

8.0" Round Pipe

n= 0.011 Concrete pipe, straight & clean

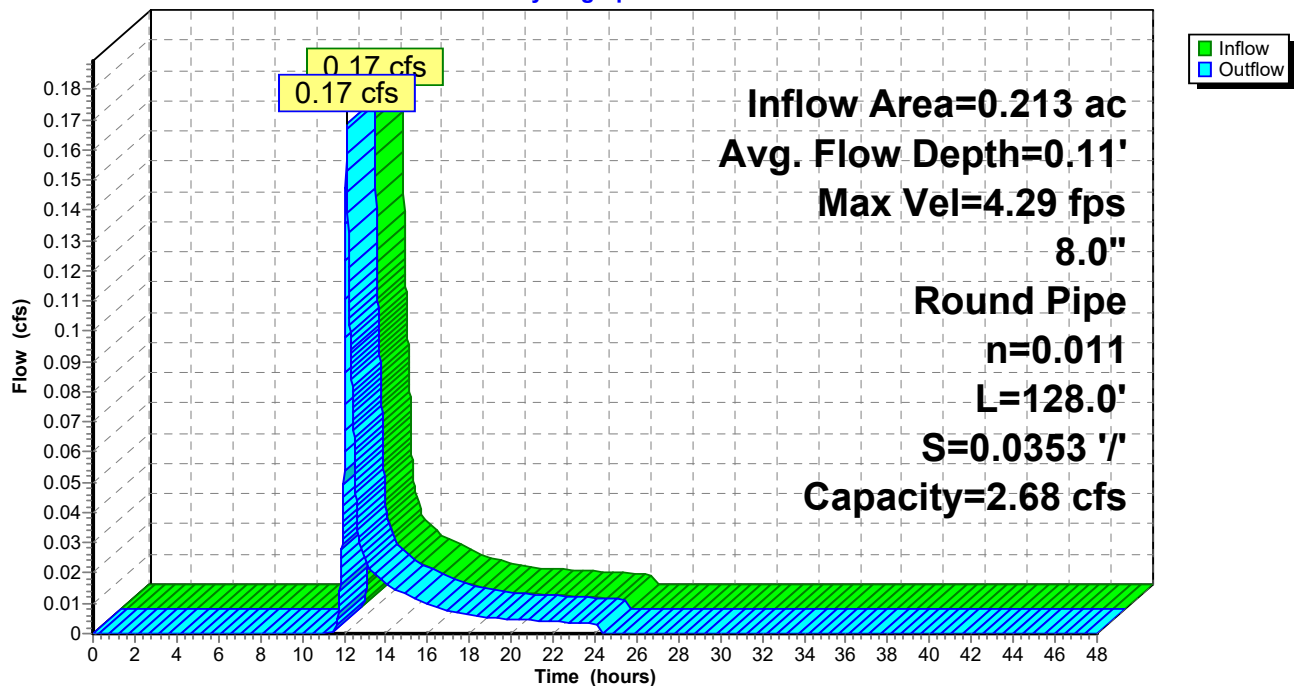
Length= 128.0' Slope= 0.0353 '/'

Inlet Invert= 306.75', Outlet Invert= 302.23'



Reach 8R: new

Hydrograph



Summary for Reach 9R: new

[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.054 ac, 64.02% Impervious, Inflow Depth = 0.56" for 2-YR event
 Inflow = 0.01 cfs @ 13.75 hrs, Volume= 0.003 af
 Outflow = 0.01 cfs @ 13.75 hrs, Volume= 0.003 af, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Max. Velocity= 1.24 fps, Min. Travel Time= 0.1 min

Avg. Velocity = 0.89 fps, Avg. Travel Time= 0.1 min

Peak Storage= 0 cf @ 13.75 hrs

Average Depth at Peak Storage= 0.03'

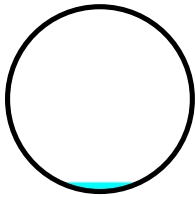
Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 1.71 cfs

8.0" Round Pipe

n= 0.011 Concrete pipe, straight & clean

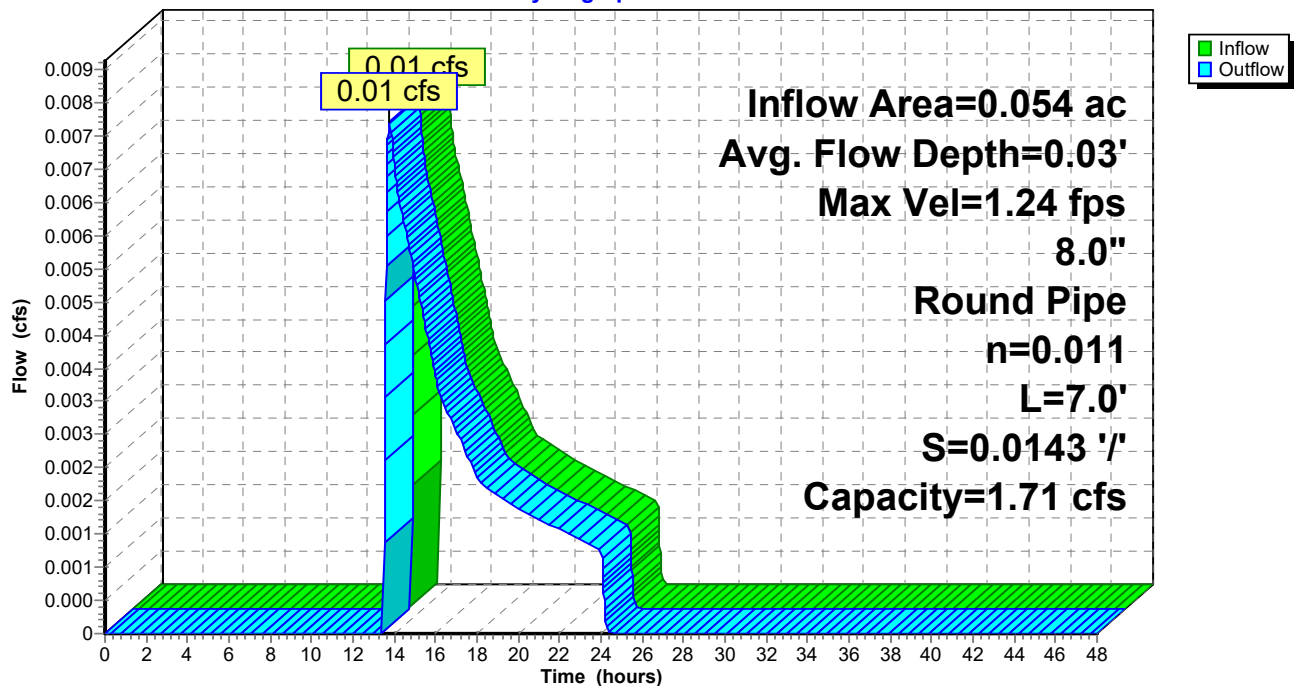
Length= 7.0' Slope= 0.0143 '/'

Inlet Invert= 298.00', Outlet Invert= 297.90'



Reach 9R: new

Hydrograph



Summary for Reach 10R: new

[43] Hint: Has no inflow (Outflow=Zero)

Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min

Avg. Velocity= 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs

Average Depth at Peak Storage= 0.00'

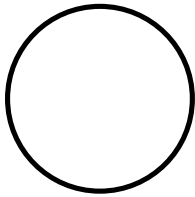
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 24.83 cfs

18.0" Round Pipe

n= 0.011 Concrete pipe, straight & clean

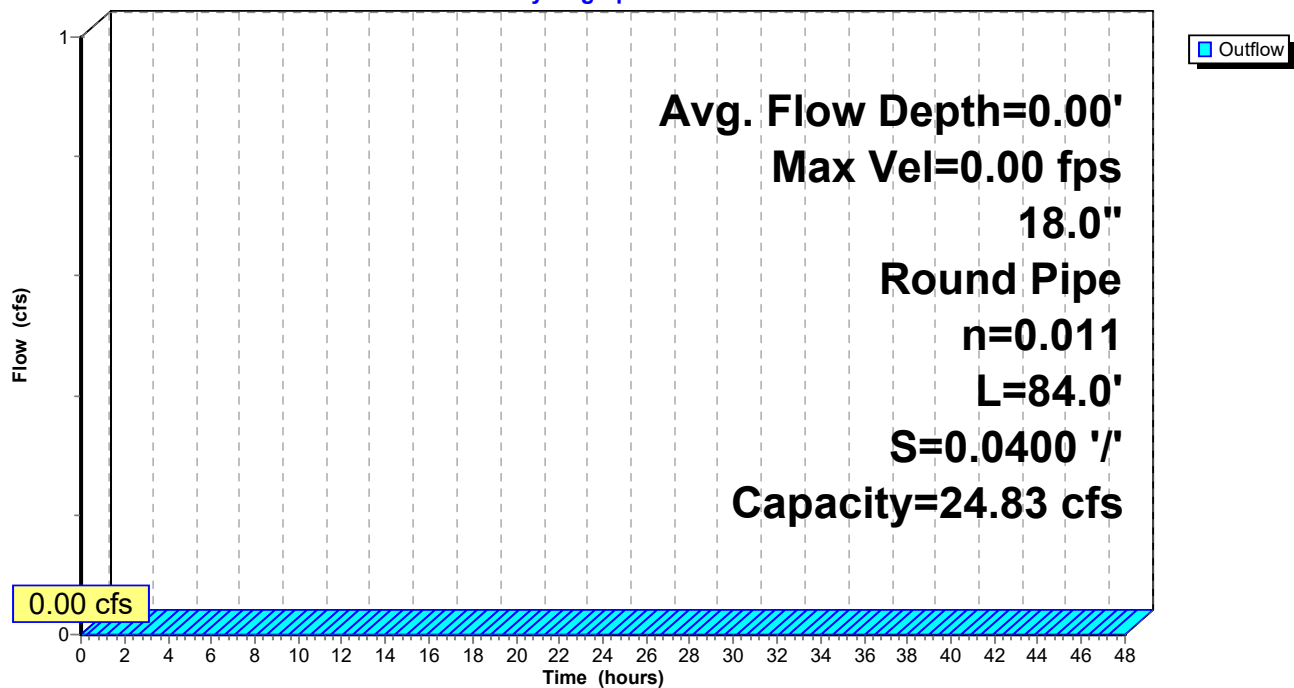
Length= 84.0' Slope= 0.0400 '/'

Inlet Invert= 301.30', Outlet Invert= 297.94'



Reach 10R: new

Hydrograph



Summary for Reach 11R: new

[52] Hint: Inlet/Outlet conditions not evaluated

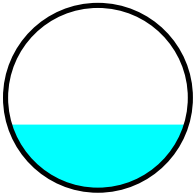
[88] Warning: Qout>Qin may require Finer Routing>1

Inflow Area = 1.015 ac, 19.57% Impervious, Inflow Depth = 0.56" for 2-YR event
Inflow = 0.46 cfs @ 12.22 hrs, Volume= 0.048 af
Outflow = 0.46 cfs @ 12.22 hrs, Volume= 0.048 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 4.15 fps, Min. Travel Time= 0.0 min
Avg. Velocity= 1.94 fps, Avg. Travel Time= 0.1 min

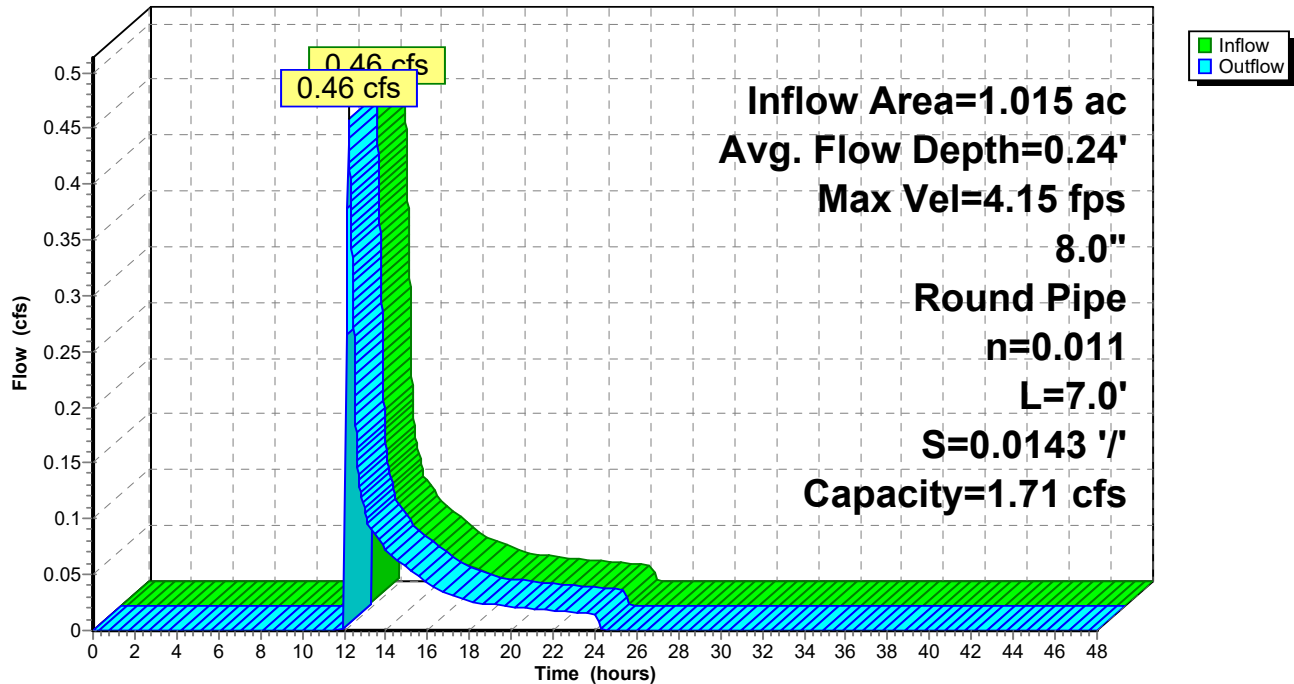
Peak Storage= 1 cf @ 12.22 hrs
Average Depth at Peak Storage= 0.24'
Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 1.71 cfs

8.0" Round Pipe
n= 0.011 Concrete pipe, straight & clean
Length= 7.0' Slope= 0.0143 '/'
Inlet Invert= 298.00', Outlet Invert= 297.90'



Reach 11R: new

Hydrograph



Summary for Reach 12R: (new Reach)

[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.243 ac, 29.57% Impervious, Inflow Depth = 0.00" for 2-YR event
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min

Avg. Velocity= 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs

Average Depth at Peak Storage= 0.00'

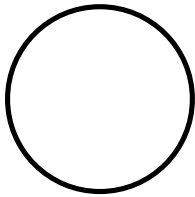
Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 1.51 cfs

8.0" Round Pipe

n= 0.011

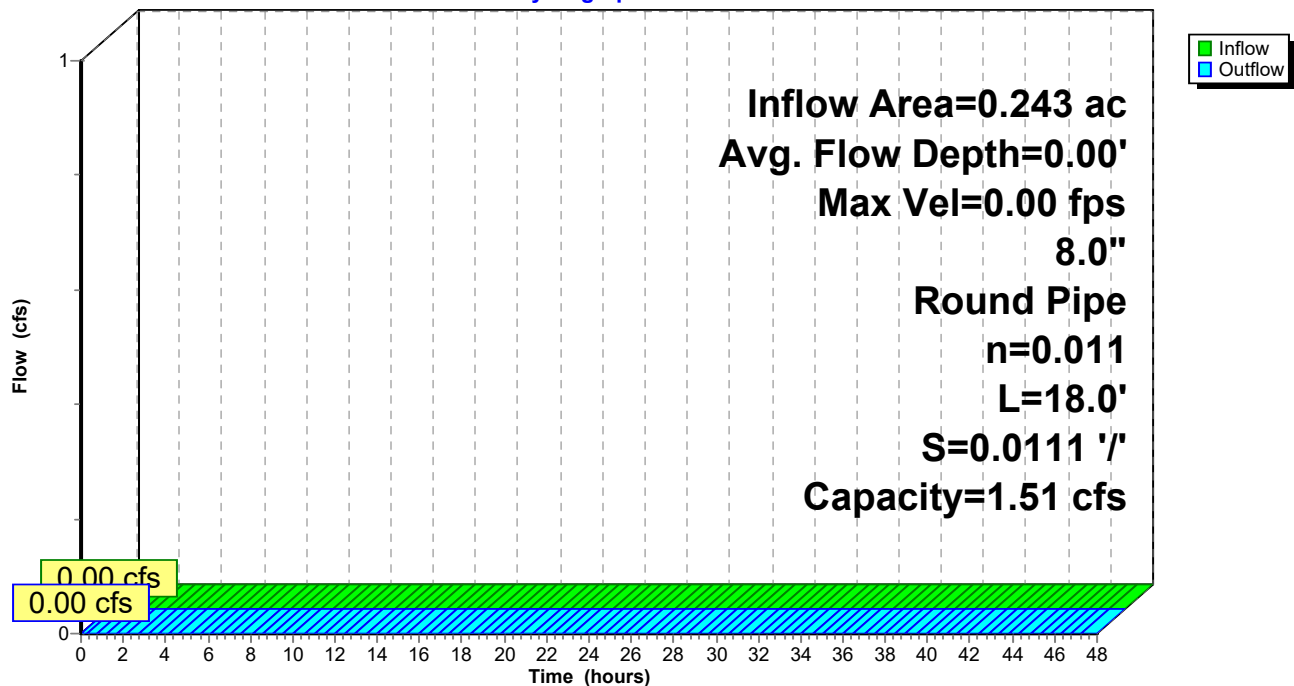
Length= 18.0' Slope= 0.0111 '/'

Inlet Invert= 297.30', Outlet Invert= 297.10'



Reach 12R: (new Reach)

Hydrograph



Summary for Reach 13R: New

[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.036 ac, 34.97% Impervious, Inflow Depth = 0.00" for 2-YR event
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min

Avg. Velocity= 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs

Average Depth at Peak Storage= 0.00'

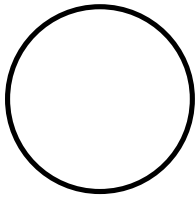
Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 1.51 cfs

8.0" Round Pipe

n= 0.011

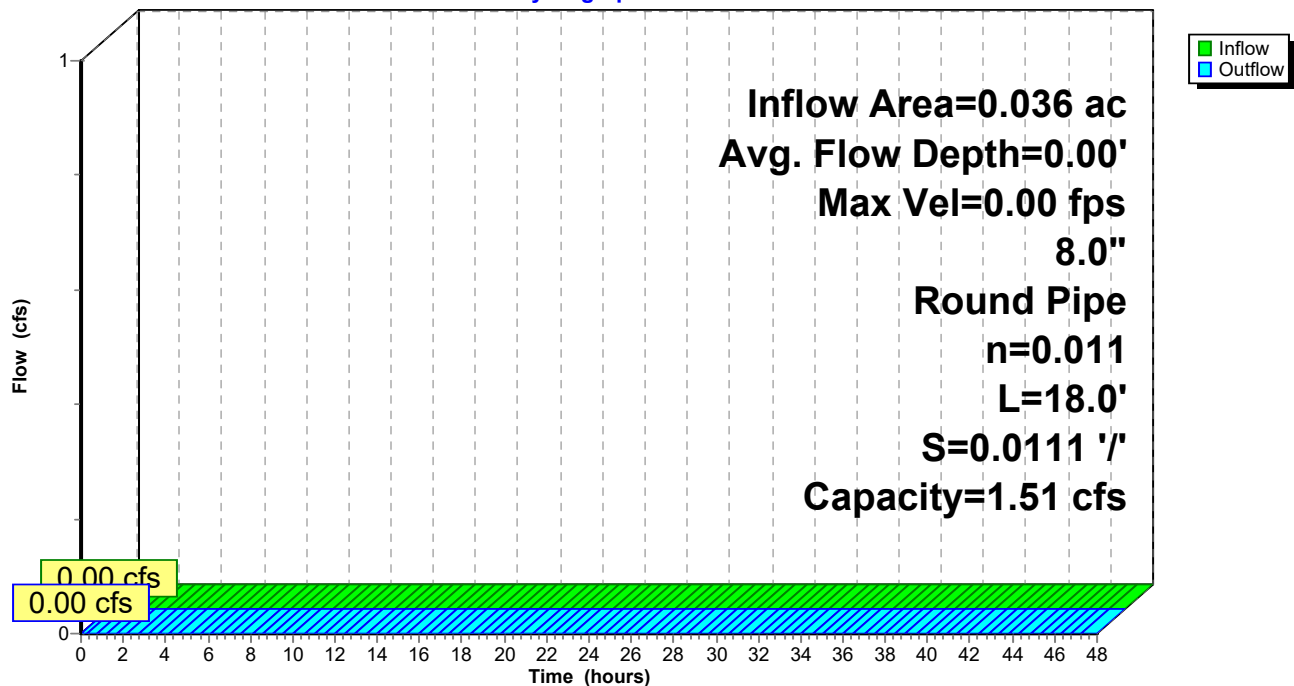
Length= 18.0' Slope= 0.0111 '/'

Inlet Invert= 301.30', Outlet Invert= 301.10'



Reach 13R: New

Hydrograph



Summary for Reach 14R: (new Reach)

[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.265 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-YR event
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min

Avg. Velocity= 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs

Average Depth at Peak Storage= 0.00'

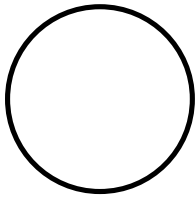
Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 1.88 cfs

8.0" Round Pipe

n= 0.011

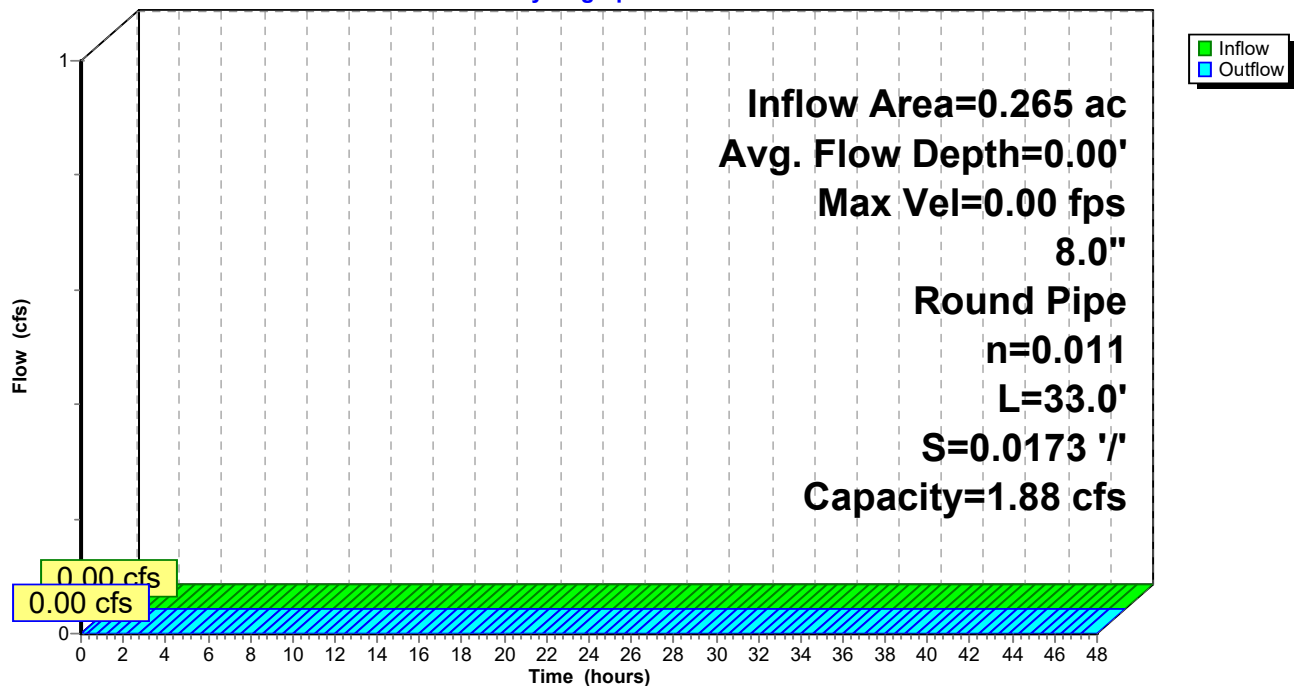
Length= 33.0' Slope= 0.0173 '/'

Inlet Invert= 290.30', Outlet Invert= 289.73'



Reach 14R: (new Reach)

Hydrograph



Summary for Reach 15R: New

[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.043 ac, 62.65% Impervious, Inflow Depth = 0.08" for 2-YR event
 Inflow = 0.00 cfs @ 21.22 hrs, Volume= 0.000 af
 Outflow = 0.00 cfs @ 21.23 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Max. Velocity= 0.76 fps, Min. Travel Time= 0.4 min

Avg. Velocity = 0.72 fps, Avg. Travel Time= 0.4 min

Peak Storage= 0 cf @ 21.22 hrs

Average Depth at Peak Storage= 0.01'

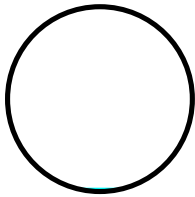
Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 1.84 cfs

8.0" Round Pipe

n= 0.011 Concrete pipe, straight & clean

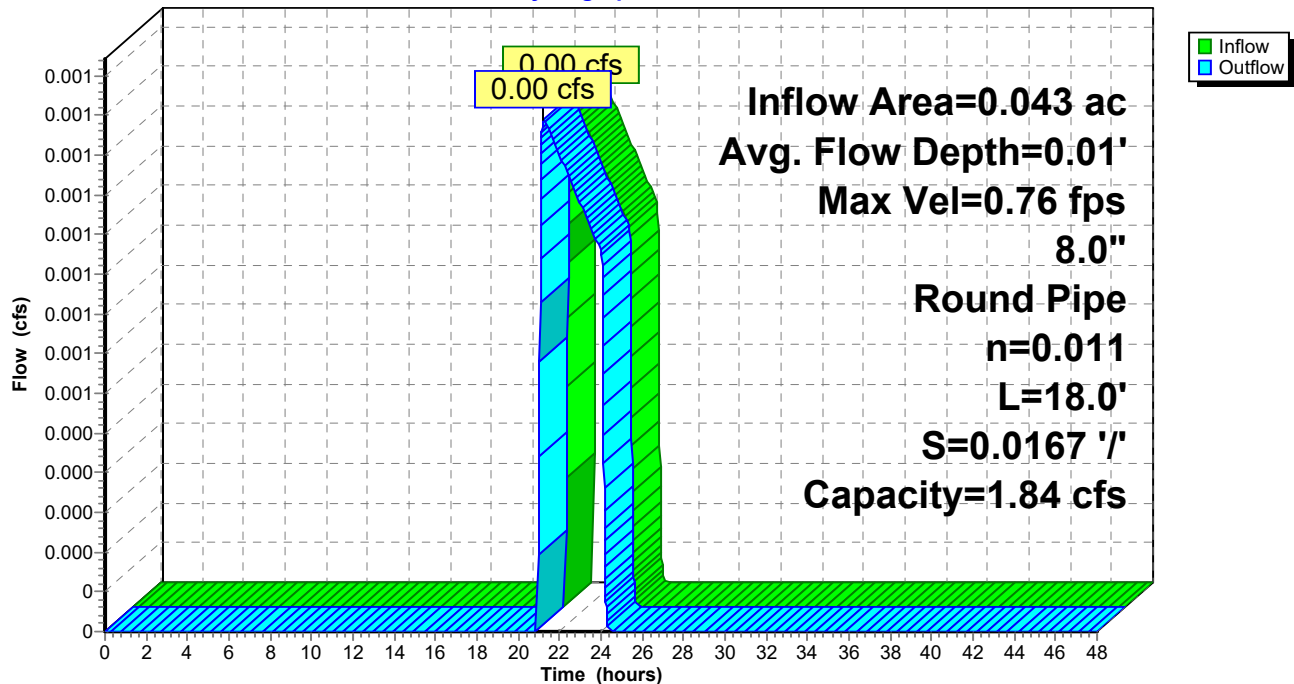
Length= 18.0' Slope= 0.0167 '/'

Inlet Invert= 302.30', Outlet Invert= 302.00'



Reach 15R: New

Hydrograph



Summary for Reach 16R: New

[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.091 ac, 45.76% Impervious, Inflow Depth = 0.00" for 2-YR event
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min

Avg. Velocity= 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs

Average Depth at Peak Storage= 0.00'

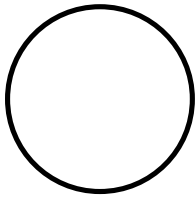
Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 1.99 cfs

8.0" Round Pipe

n= 0.011 Concrete pipe, straight & clean

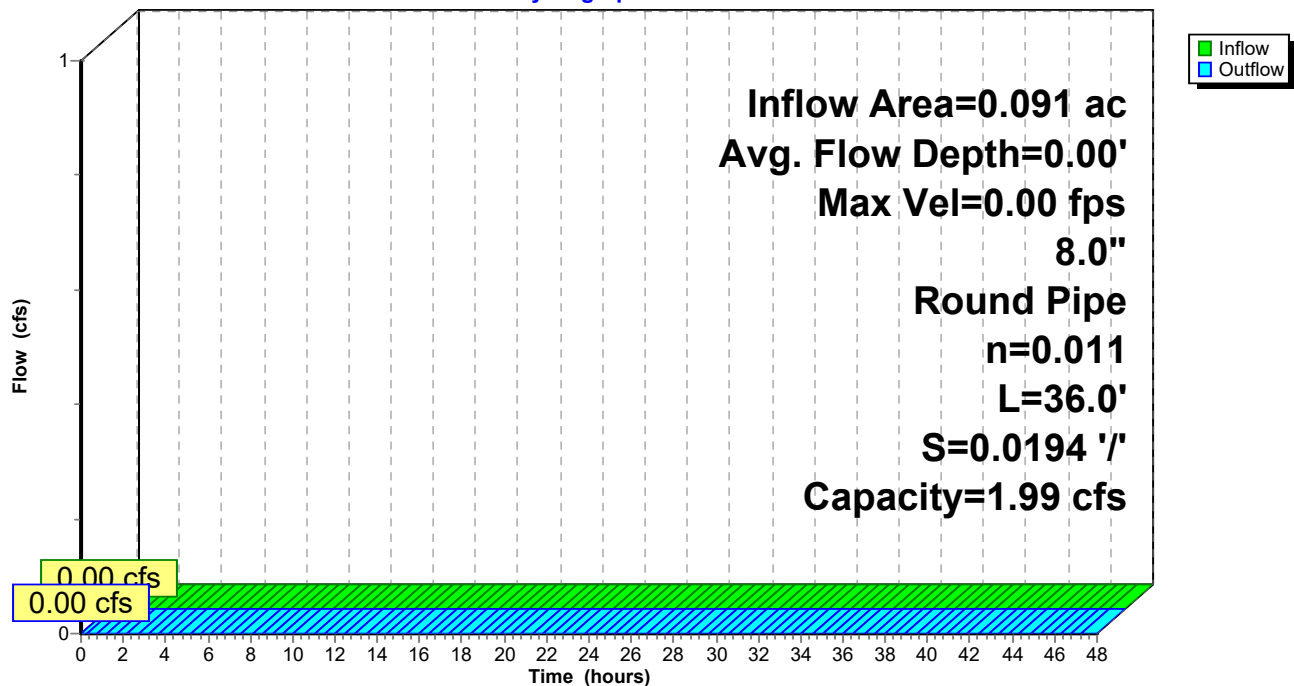
Length= 36.0' Slope= 0.0194 '/'

Inlet Invert= 302.00', Outlet Invert= 301.30'



Reach 16R: New

Hydrograph



Summary for Reach 17R: New

[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 2.675 ac, 4.94% Impervious, Inflow Depth = 0.38" for 2-YR event
 Inflow = 0.58 cfs @ 12.51 hrs, Volume= 0.086 af
 Outflow = 0.58 cfs @ 12.52 hrs, Volume= 0.086 af, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Max. Velocity= 5.98 fps, Min. Travel Time= 0.2 min

Avg. Velocity= 3.09 fps, Avg. Travel Time= 0.4 min

Peak Storage= 7 cf @ 12.51 hrs

Average Depth at Peak Storage= 0.21'

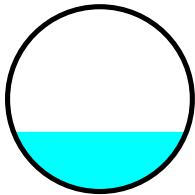
Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 2.59 cfs

8.0" Round Pipe

n= 0.011 Concrete pipe, straight & clean

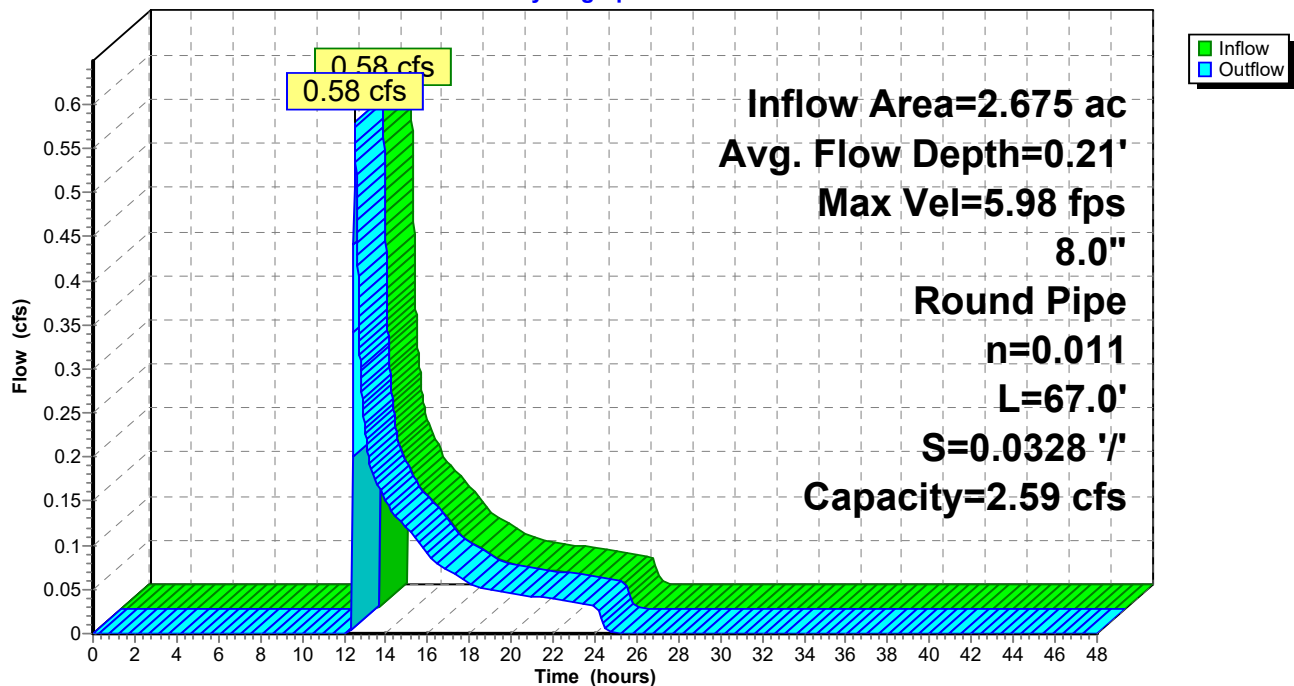
Length= 67.0' Slope= 0.0328 '/'

Inlet Invert= 298.00', Outlet Invert= 295.80'



Reach 17R: New

Hydrograph



Summary for Reach 18R: New

[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.052 ac, 40.18% Impervious, Inflow Depth = 0.00" for 2-YR event
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min

Avg. Velocity= 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs

Average Depth at Peak Storage= 0.00'

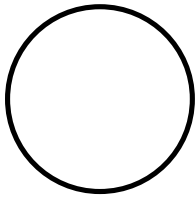
Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 2.02 cfs

8.0" Round Pipe

n= 0.011 Concrete pipe, straight & clean

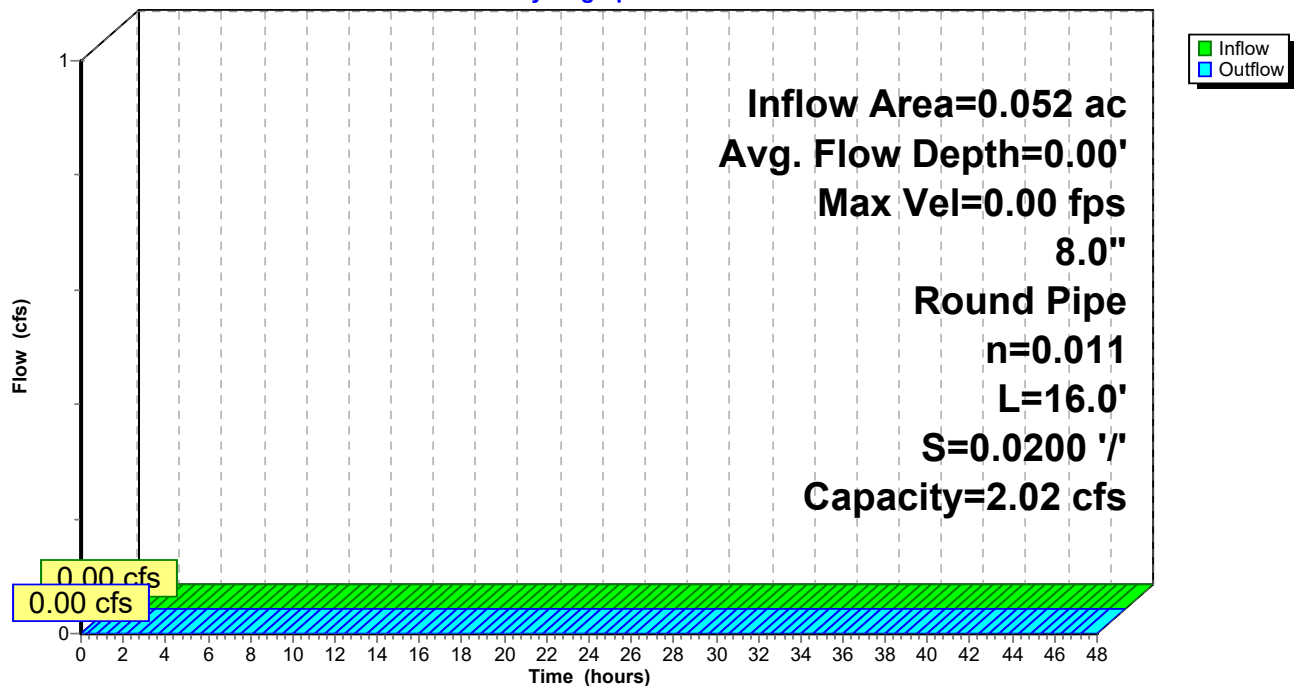
Length= 16.0' Slope= 0.0200 '/'

Inlet Invert= 301.30', Outlet Invert= 300.98'



Reach 18R: New

Hydrograph



Summary for Reach 19R: (new Reach)

[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.228 ac, 67.95% Impervious, Inflow Depth = 1.04" for 2-YR event
 Inflow = 0.19 cfs @ 12.33 hrs, Volume= 0.020 af
 Outflow = 0.19 cfs @ 12.33 hrs, Volume= 0.020 af, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Max. Velocity= 5.87 fps, Min. Travel Time= 0.1 min

Avg. Velocity= 2.64 fps, Avg. Travel Time= 0.3 min

Peak Storage= 2 cf @ 12.33 hrs

Average Depth at Peak Storage= 0.10'

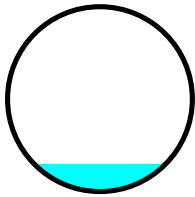
Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 3.99 cfs

8.0" Round Pipe

n= 0.011

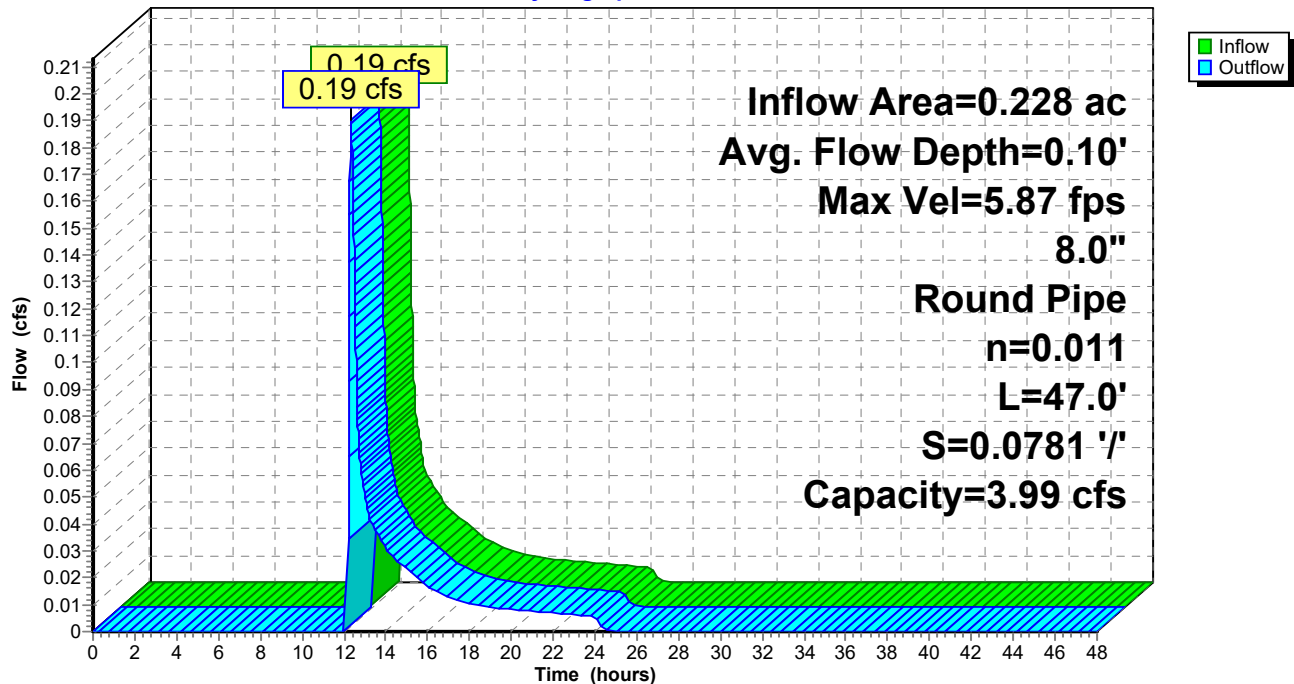
Length= 47.0' Slope= 0.0781 '/'

Inlet Invert= 287.00', Outlet Invert= 283.33'



Reach 19R: (new Reach)

Hydrograph



Summary for Reach 20R: 12" RCP pipe

[52] Hint: Inlet/Outlet conditions not evaluated

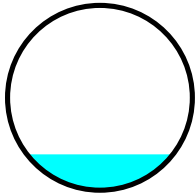
[61] Hint: Exceeded Reach PS9 outlet invert by 0.19' @ 12.12 hrs

Inflow Area = 0.288 ac, 25.48% Impervious, Inflow Depth = 1.33" for 2-YR event
Inflow = 0.44 cfs @ 12.11 hrs, Volume= 0.032 af
Outflow = 0.44 cfs @ 12.12 hrs, Volume= 0.032 af, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 4.12 fps, Min. Travel Time= 0.1 min
Avg. Velocity= 1.51 fps, Avg. Travel Time= 0.2 min

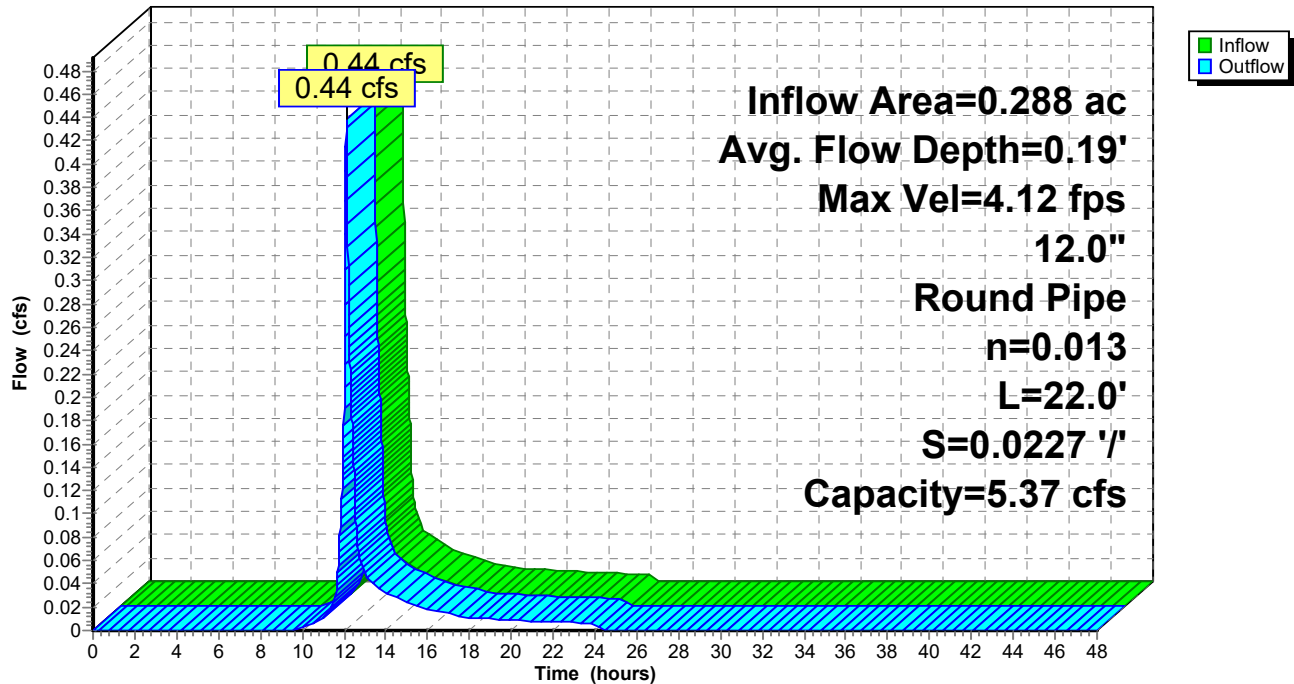
Peak Storage= 2 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.19'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 5.37 cfs

12.0" Round Pipe
n= 0.013
Length= 22.0' Slope= 0.0227 '/'
Inlet Invert= 257.75', Outlet Invert= 257.25'



Reach 20R: 12" RCP pipe

Hydrograph



Summary for Reach 21R: (new Reach)

[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.153 ac, 15.01% Impervious, Inflow Depth = 0.00" for 2-YR event
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min

Avg. Velocity= 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs

Average Depth at Peak Storage= 0.00'

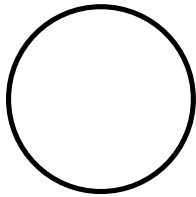
Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 1.01 cfs

8.0" Round Pipe

n= 0.011

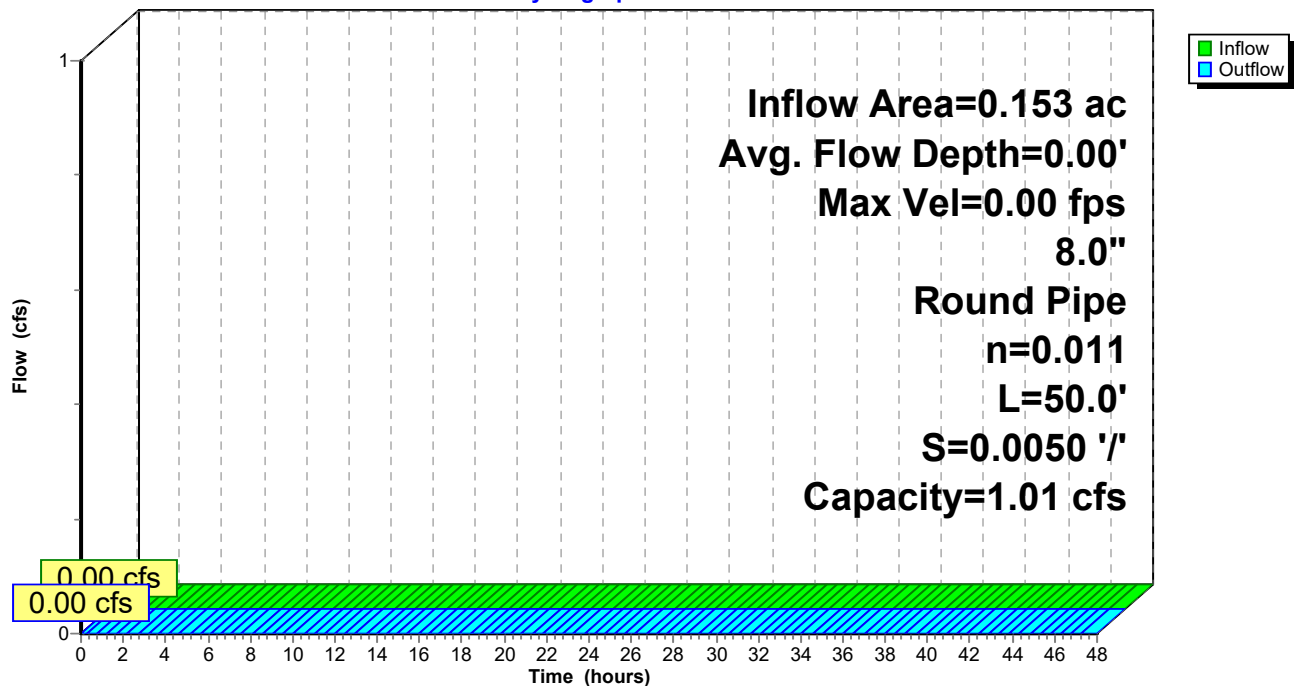
Length= 50.0' Slope= 0.0050 '/'

Inlet Invert= 254.00', Outlet Invert= 253.75'



Reach 21R: (new Reach)

Hydrograph



Summary for Reach CB1: CB1

[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.395 ac, 45.72% Impervious, Inflow Depth = 1.74" for 2-YR event
 Inflow = 0.75 cfs @ 12.10 hrs, Volume= 0.057 af
 Outflow = 0.75 cfs @ 12.11 hrs, Volume= 0.057 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Max. Velocity= 6.44 fps, Min. Travel Time= 0.1 min

Avg. Velocity= 2.01 fps, Avg. Travel Time= 0.2 min

Peak Storage= 3 cf @ 12.10 hrs

Average Depth at Peak Storage= 0.20'

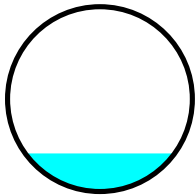
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 8.10 cfs

12.0" Round Pipe

n= 0.011

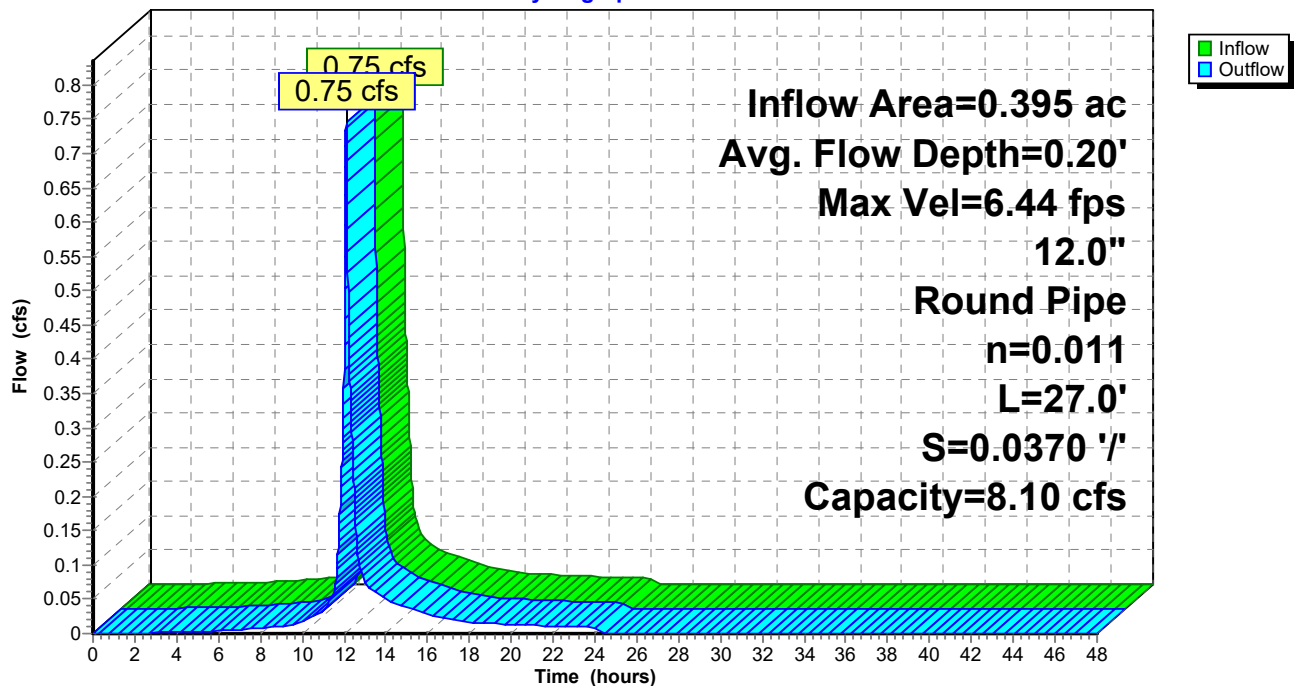
Length= 27.0' Slope= 0.0370 '/'

Inlet Invert= 257.00', Outlet Invert= 256.00'



Reach CB1: CB1

Hydrograph



Summary for Reach CP1:

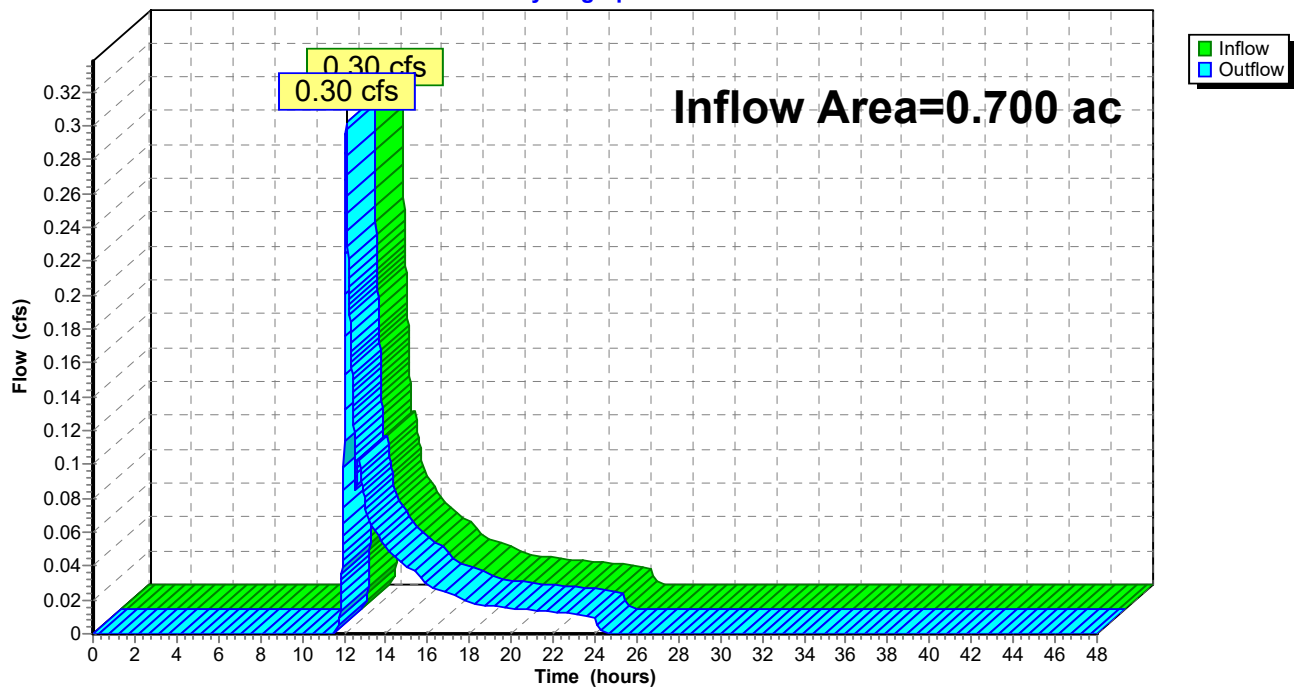
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.700 ac, 20.01% Impervious, Inflow Depth = 0.61" for 2-YR event
 Inflow = 0.30 cfs @ 12.11 hrs, Volume= 0.035 af
 Outflow = 0.30 cfs @ 12.11 hrs, Volume= 0.035 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Reach CP1:

Hydrograph



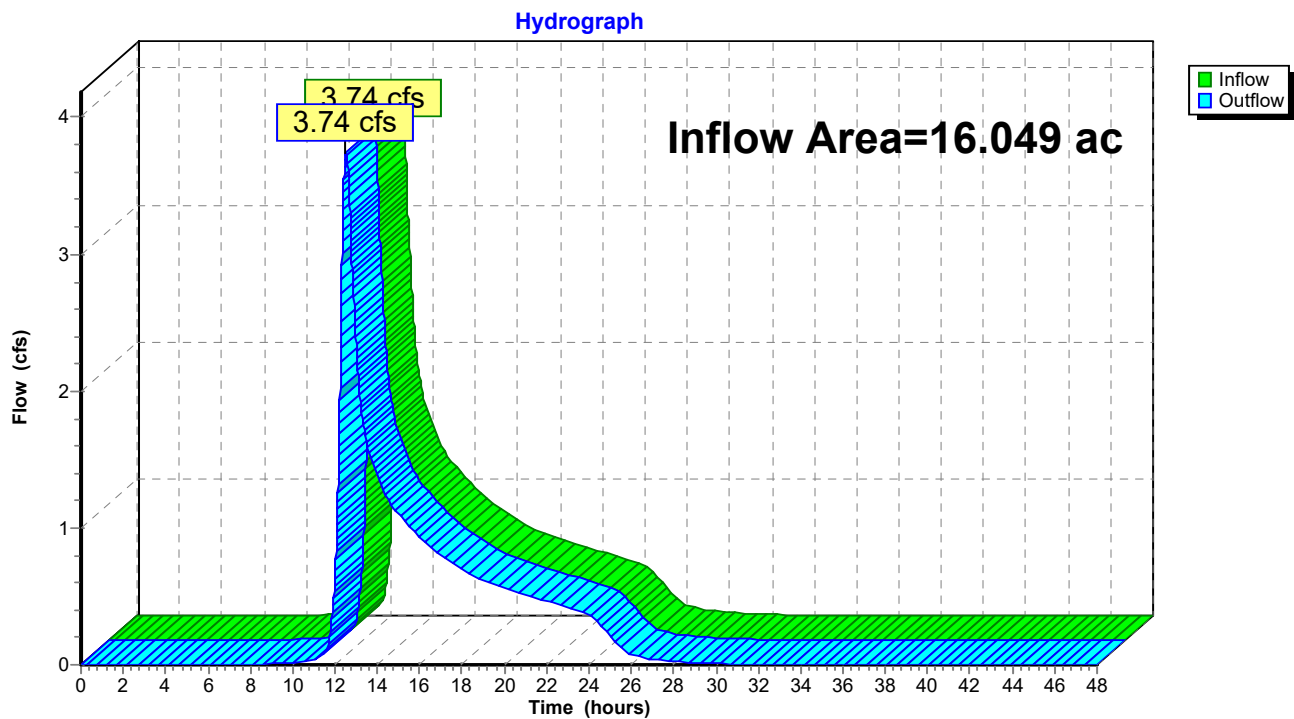
Summary for Reach CP2:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 16.049 ac, 13.07% Impervious, Inflow Depth > 0.74" for 2-YR event
 Inflow = 3.74 cfs @ 12.52 hrs, Volume= 0.996 af
 Outflow = 3.74 cfs @ 12.52 hrs, Volume= 0.996 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Reach CP2:



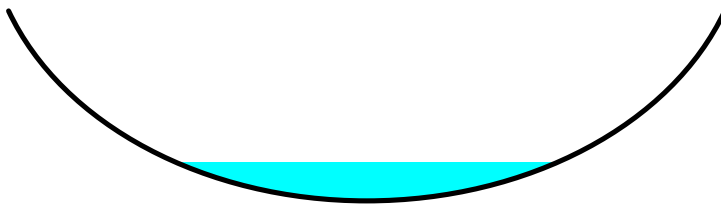
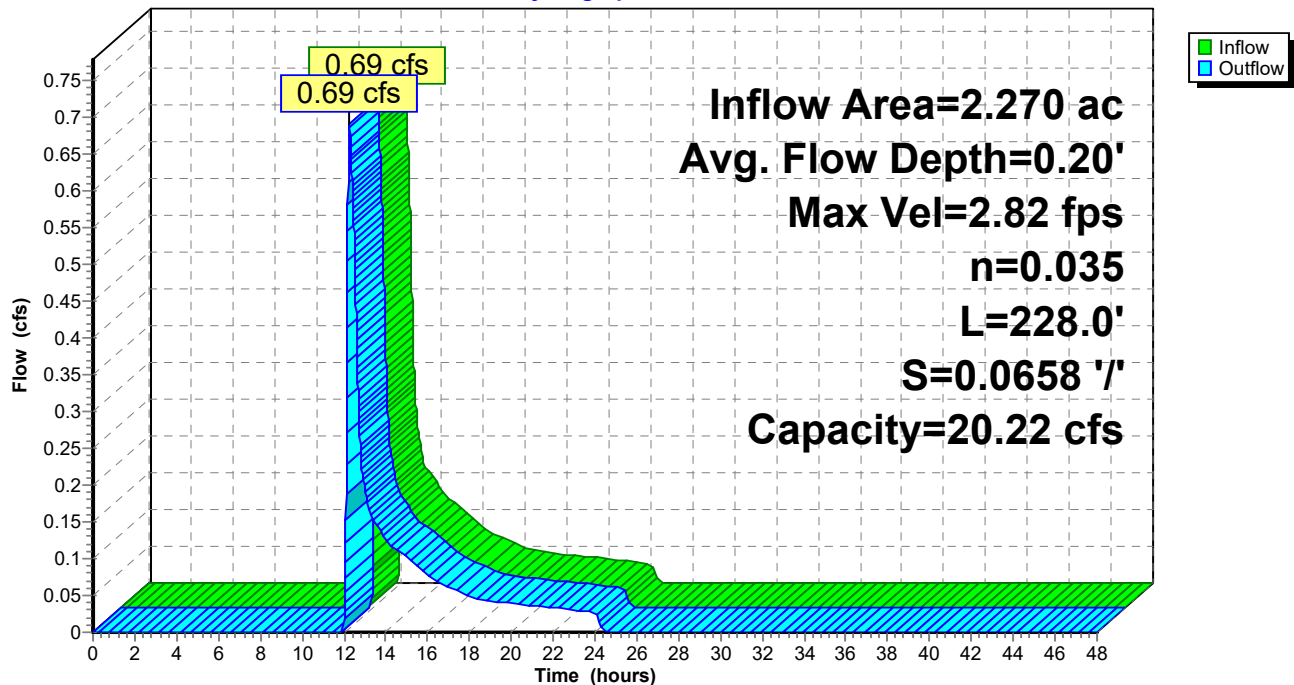
Summary for Reach PS1:

Inflow Area = 2.270 ac, 5.04% Impervious, Inflow Depth = 0.48" for 2-YR event
Inflow = 0.69 cfs @ 12.22 hrs, Volume= 0.090 af
Outflow = 0.69 cfs @ 12.26 hrs, Volume= 0.090 af, Atten= 1%, Lag= 2.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.82 fps, Min. Travel Time= 1.3 min
Avg. Velocity = 1.33 fps, Avg. Travel Time= 2.9 min

Peak Storage= 56 cf @ 12.24 hrs
Average Depth at Peak Storage= 0.20'
Bank-Full Depth= 1.00' Flow Area= 2.7 sf, Capacity= 20.22 cfs

4.00' x 1.00' deep Parabolic Channel, n= 0.035
Length= 228.0' Slope= 0.0658 '/'
Inlet Invert= 316.00', Outlet Invert= 301.00'

**Reach PS1:****Hydrograph**

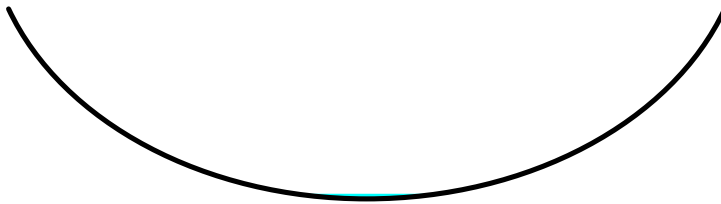
Summary for Reach PS10A:

Inflow Area = 0.035 ac, 96.04% Impervious, Inflow Depth = 2.76" for 2-YR event
 Inflow = 0.10 cfs @ 12.08 hrs, Volume= 0.008 af
 Outflow = 0.10 cfs @ 12.09 hrs, Volume= 0.008 af, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 1.53 fps, Min. Travel Time= 0.2 min
 Avg. Velocity = 0.81 fps, Avg. Travel Time= 0.4 min

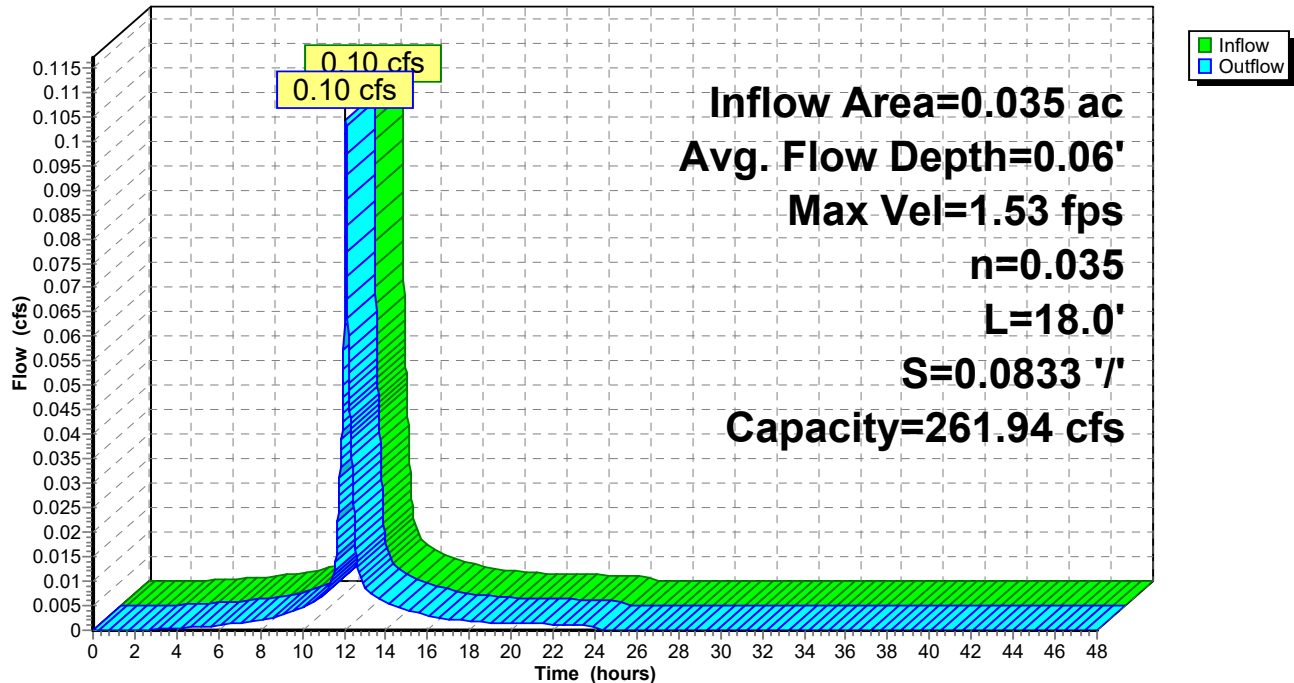
Peak Storage= 1 cf @ 12.09 hrs
 Average Depth at Peak Storage= 0.06'
 Bank-Full Depth= 2.50' Flow Area= 16.7 sf, Capacity= 261.94 cfs

10.00' x 2.50' deep Parabolic Channel, n= 0.035 Short grass
 Length= 18.0' Slope= 0.0833 '/'
 Inlet Invert= 316.50', Outlet Invert= 315.00'



Reach PS10A:

Hydrograph



Summary for Reach PS10B:

[61] Hint: Exceeded Reach 4R outlet invert by 0.07' @ 12.10 hrs

Inflow Area = 0.035 ac, 96.04% Impervious, Inflow Depth = 2.76" for 2-YR event
 Inflow = 0.10 cfs @ 12.09 hrs, Volume= 0.008 af
 Outflow = 0.10 cfs @ 12.11 hrs, Volume= 0.008 af, Atten= 0%, Lag= 0.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Max. Velocity= 1.45 fps, Min. Travel Time= 0.5 min

Avg. Velocity = 0.76 fps, Avg. Travel Time= 0.9 min

Peak Storage= 3 cf @ 12.10 hrs

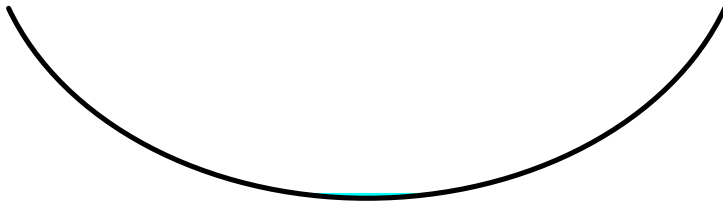
Average Depth at Peak Storage= 0.07'

Bank-Full Depth= 2.50' Flow Area= 16.7 sf, Capacity= 242.51 cfs

10.00' x 2.50' deep Parabolic Channel, n= 0.035 Short grass

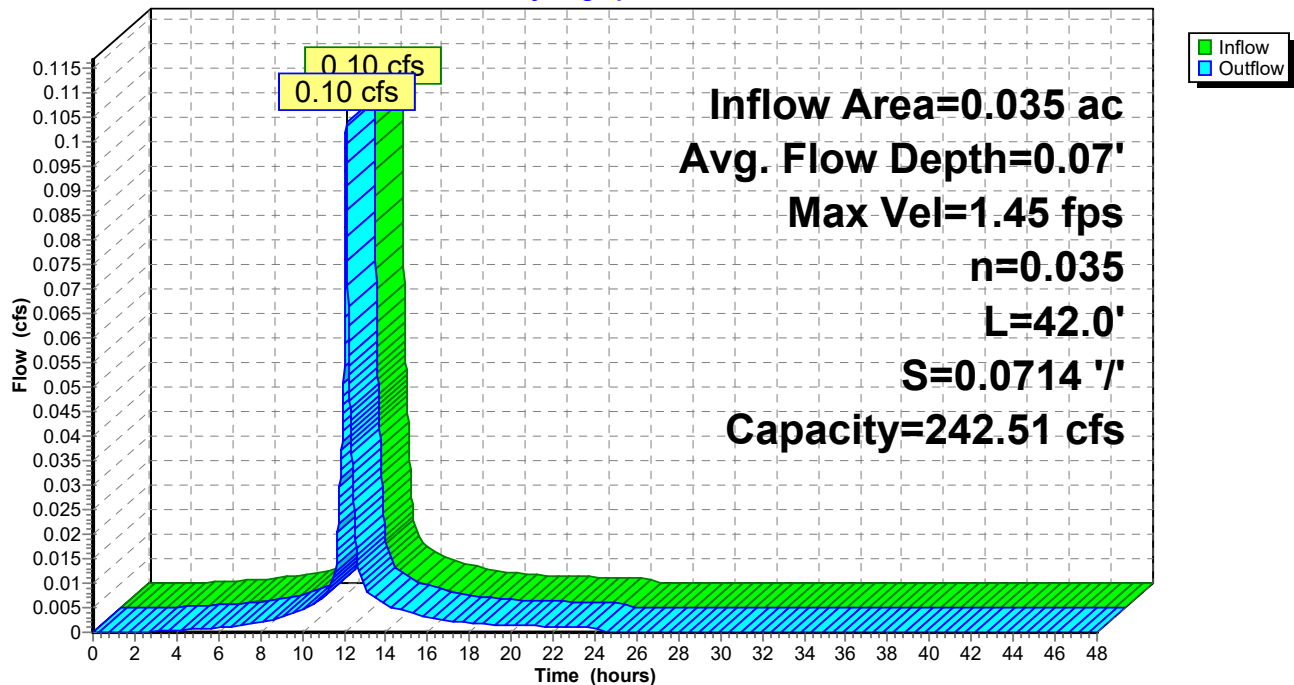
Length= 42.0' Slope= 0.0714 '/'

Inlet Invert= 313.50', Outlet Invert= 310.50'



Reach PS10B:

Hydrograph



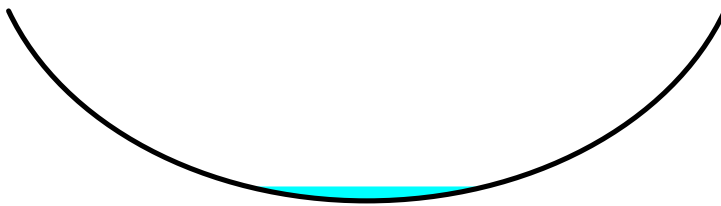
Summary for Reach PS2:

Inflow Area = 0.159 ac, 11.13% Impervious, Inflow Depth = 0.55" for 2-YR event
 Inflow = 0.08 cfs @ 12.11 hrs, Volume= 0.007 af
 Outflow = 0.08 cfs @ 12.12 hrs, Volume= 0.007 af, Atten= 0%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 1.45 fps, Min. Travel Time= 0.4 min
 Avg. Velocity = 0.65 fps, Avg. Travel Time= 0.8 min

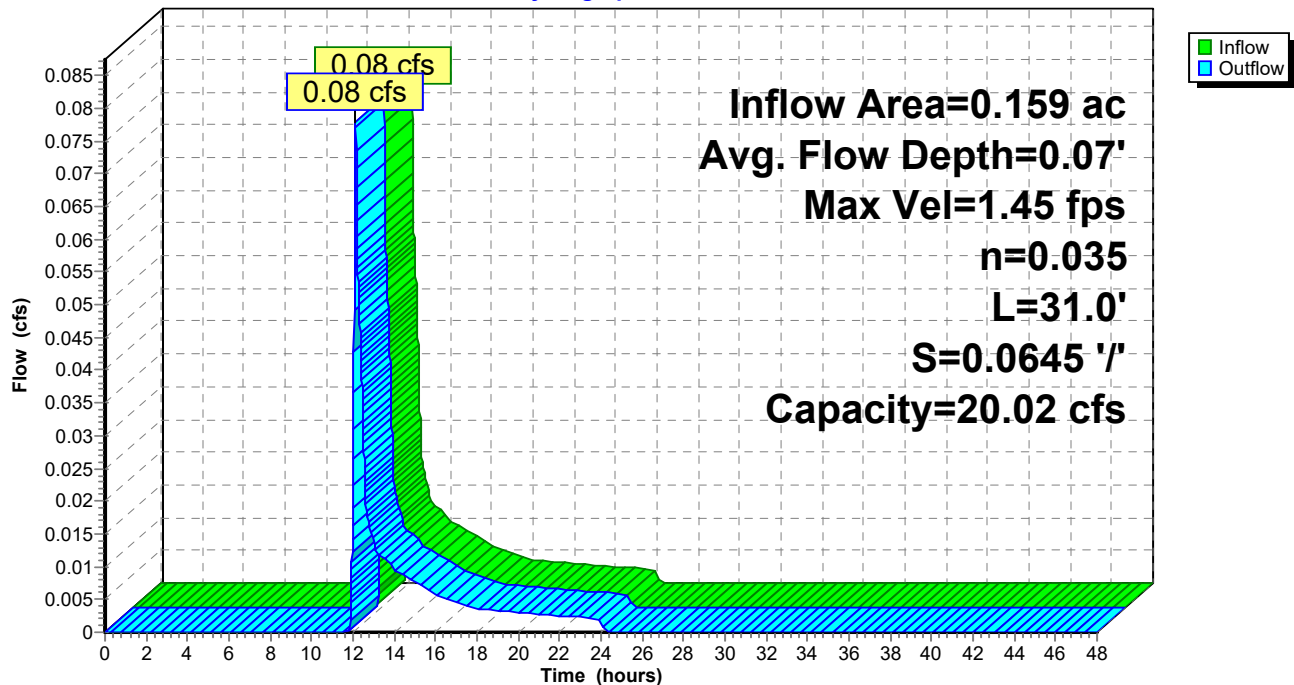
Peak Storage= 2 cf @ 12.11 hrs
 Average Depth at Peak Storage= 0.07'
 Bank-Full Depth= 1.00' Flow Area= 2.7 sf, Capacity= 20.02 cfs

4.00' x 1.00' deep Parabolic Channel, n= 0.035
 Length= 31.0' Slope= 0.0645 '/
 Inlet Invert= 303.00', Outlet Invert= 301.00'



Reach PS2:

Hydrograph



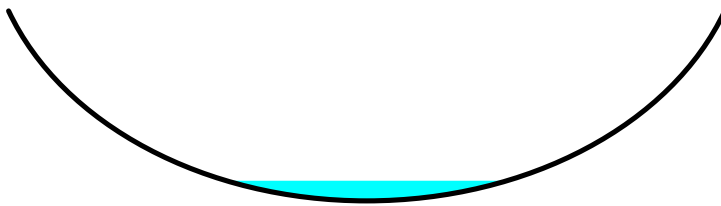
Summary for Reach PS3:

Inflow Area = 0.213 ac, 23.47% Impervious, Inflow Depth = 0.77" for 2-YR event
 Inflow = 0.17 cfs @ 12.10 hrs, Volume= 0.014 af
 Outflow = 0.17 cfs @ 12.12 hrs, Volume= 0.014 af, Atten= 0%, Lag= 0.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 1.87 fps, Min. Travel Time= 0.5 min
 Avg. Velocity = 0.76 fps, Avg. Travel Time= 1.3 min

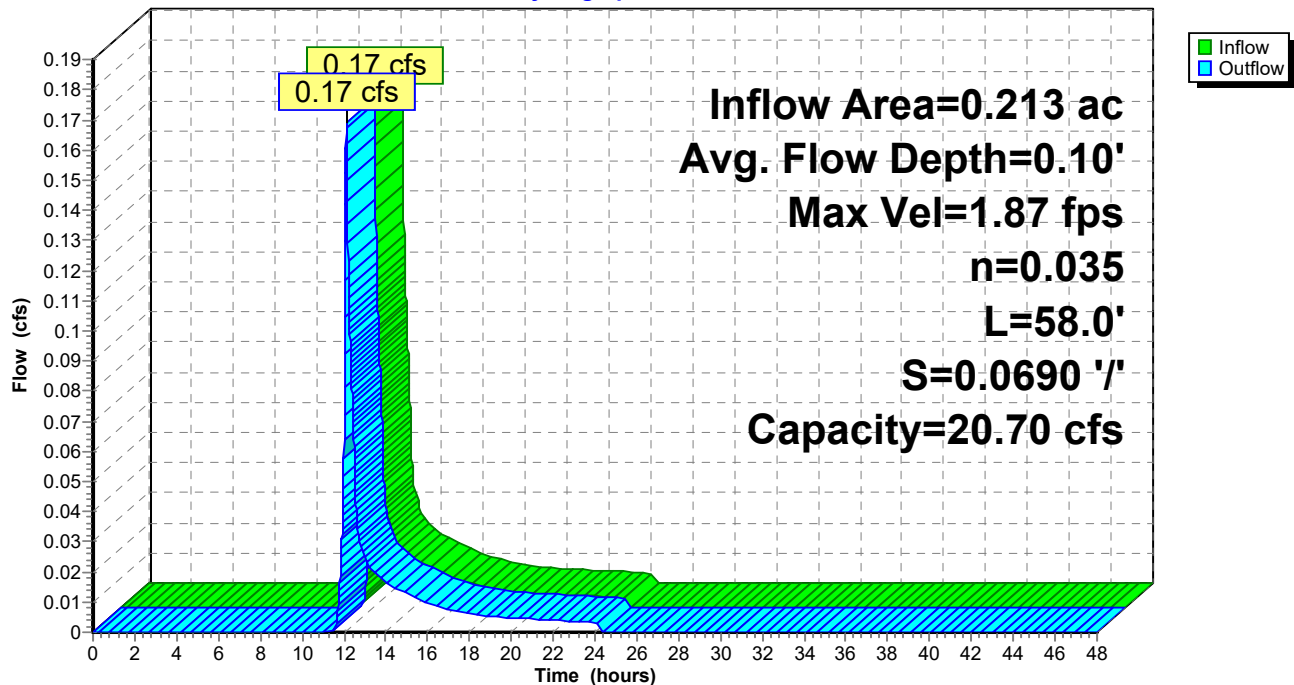
Peak Storage= 5 cf @ 12.11 hrs
 Average Depth at Peak Storage= 0.10'
 Bank-Full Depth= 1.00' Flow Area= 2.7 sf, Capacity= 20.70 cfs

4.00' x 1.00' deep Parabolic Channel, n= 0.035
 Length= 58.0' Slope= 0.0690 '/'
 Inlet Invert= 313.00', Outlet Invert= 309.00'



Reach PS3:

Hydrograph



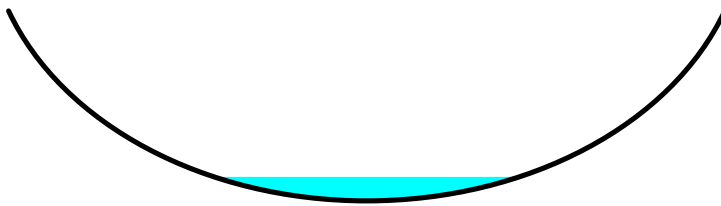
Summary for Reach PS4:

Inflow Area = 0.099 ac, 53.64% Impervious, Inflow Depth = 1.39" for 2-YR event
 Inflow = 0.16 cfs @ 12.09 hrs, Volume= 0.011 af
 Outflow = 0.16 cfs @ 12.10 hrs, Volume= 0.011 af, Atten= 0%, Lag= 0.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 1.37 fps, Min. Travel Time= 0.4 min
 Avg. Velocity = 0.50 fps, Avg. Travel Time= 1.1 min

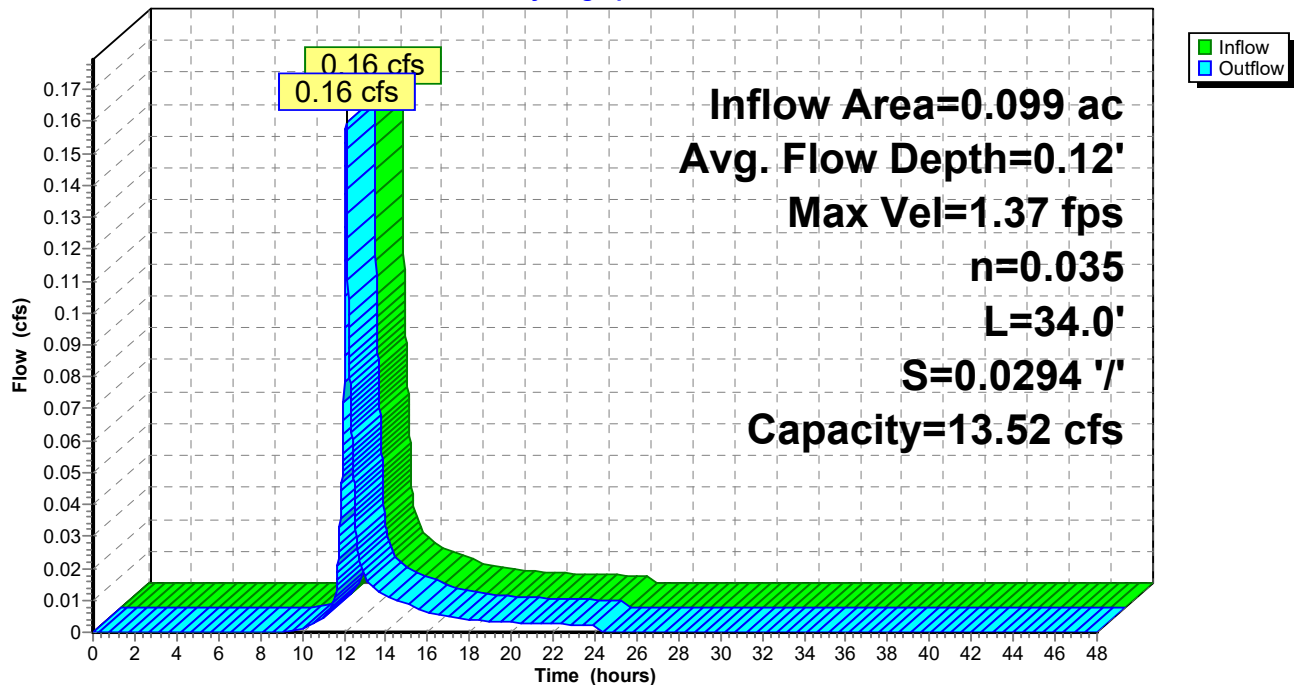
Peak Storage= 4 cf @ 12.10 hrs
 Average Depth at Peak Storage= 0.12'
 Bank-Full Depth= 1.00' Flow Area= 2.7 sf, Capacity= 13.52 cfs

4.00' x 1.00' deep Parabolic Channel, n= 0.035
 Length= 34.0' Slope= 0.0294 '/'
 Inlet Invert= 307.00', Outlet Invert= 306.00'



Reach PS4:

Hydrograph



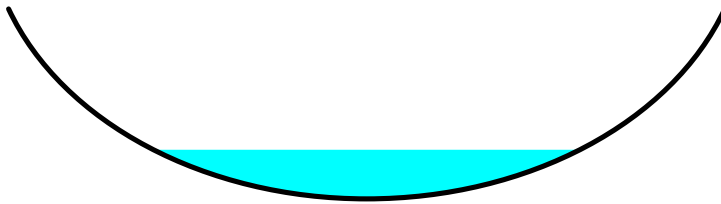
Summary for Reach PS6: (new Reach)

Inflow Area = 0.717 ac, 23.42% Impervious, Inflow Depth = 0.77" for 2-YR event
 Inflow = 0.57 cfs @ 12.10 hrs, Volume= 0.046 af
 Outflow = 0.49 cfs @ 12.23 hrs, Volume= 0.046 af, Atten= 15%, Lag= 7.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 1.39 fps, Min. Travel Time= 4.8 min
 Avg. Velocity = 0.52 fps, Avg. Travel Time= 12.8 min

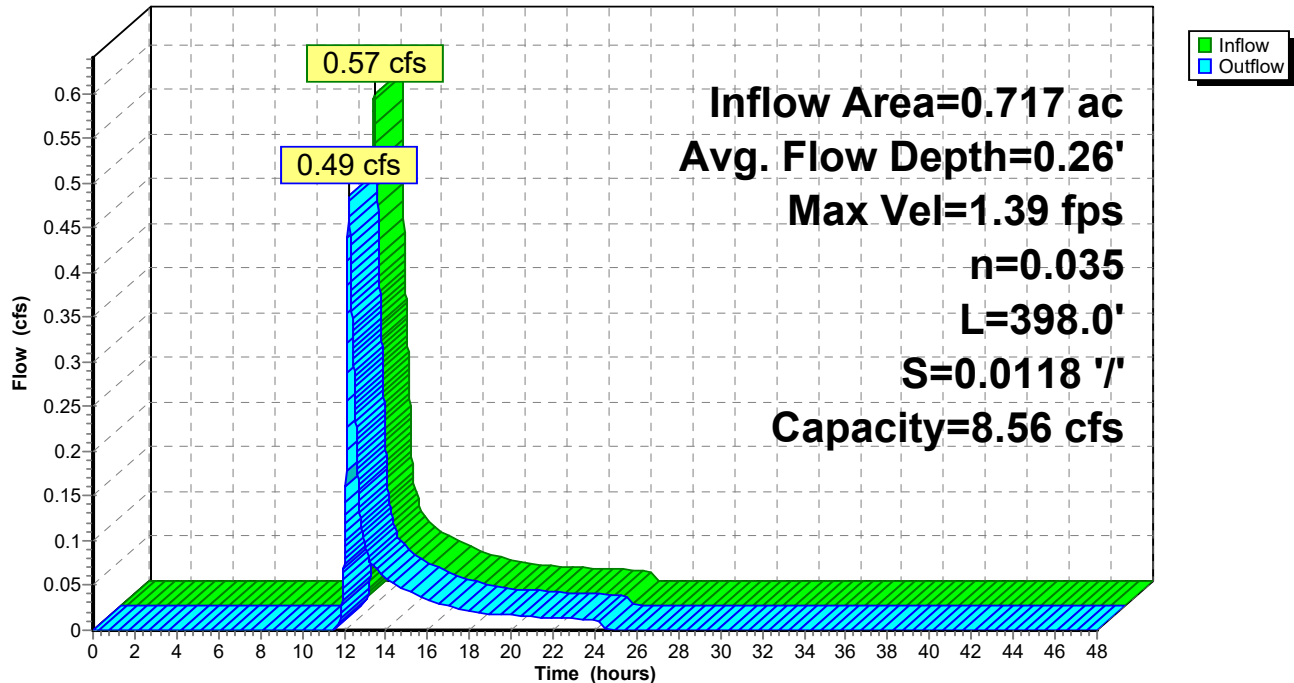
Peak Storage= 139 cf @ 12.15 hrs
 Average Depth at Peak Storage= 0.26'
 Bank-Full Depth= 1.00' Flow Area= 2.7 sf, Capacity= 8.56 cfs

4.00' x 1.00' deep Parabolic Channel, n= 0.035
 Length= 398.0' Slope= 0.0118 '/'
 Inlet Invert= 300.00', Outlet Invert= 295.30'



Reach PS6: (new Reach)

Hydrograph



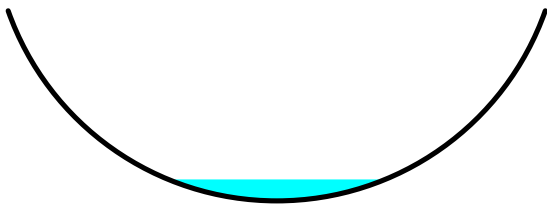
Summary for Reach PS7: (new Reach)

Inflow Area = 0.785 ac, 28.61% Impervious, Inflow Depth = 0.87" for 2-YR event
 Inflow = 0.86 cfs @ 12.03 hrs, Volume= 0.057 af
 Outflow = 0.80 cfs @ 12.08 hrs, Volume= 0.057 af, Atten= 7%, Lag= 3.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 2.69 fps, Min. Travel Time= 1.9 min
 Avg. Velocity= 1.02 fps, Avg. Travel Time= 4.9 min

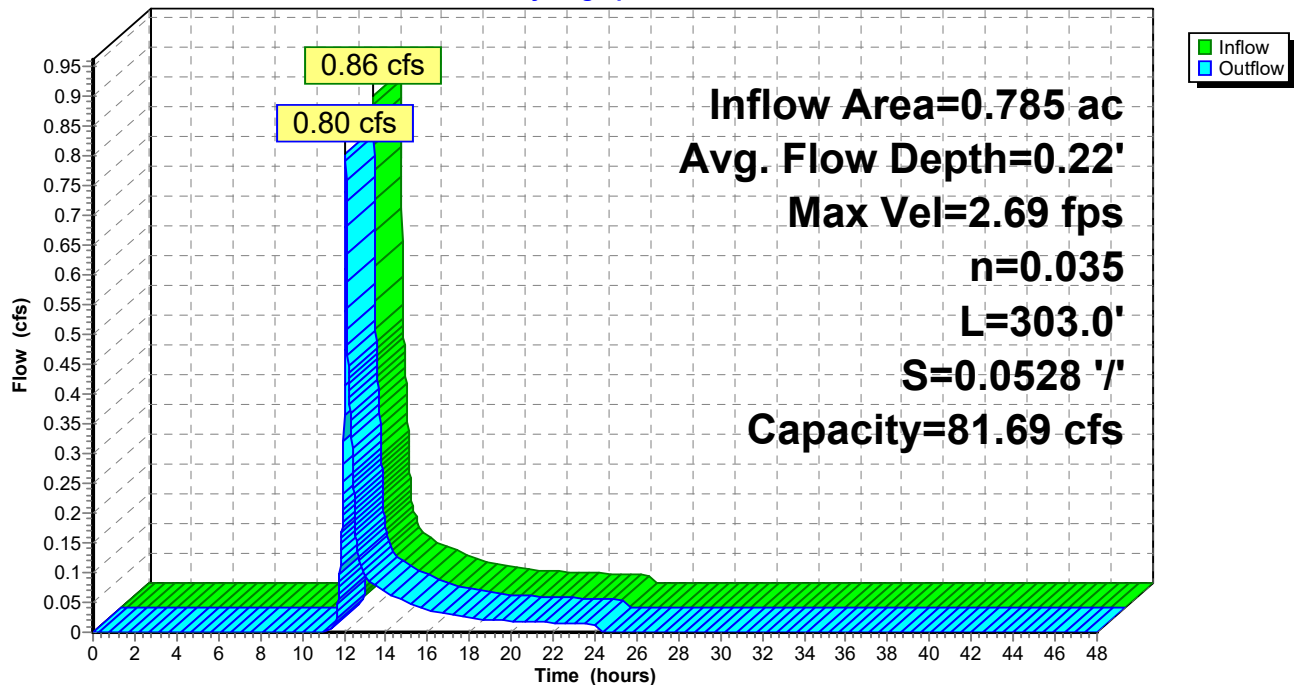
Peak Storage= 91 cf @ 12.05 hrs
 Average Depth at Peak Storage= 0.22'
 Bank-Full Depth= 2.00' Flow Area= 8.0 sf, Capacity= 81.69 cfs

6.00' x 2.00' deep Parabolic Channel, n= 0.035
 Length= 303.0' Slope= 0.0528 '/'
 Inlet Invert= 277.00', Outlet Invert= 261.00'



Reach PS7: (new Reach)

Hydrograph



Summary for Reach PS8: (new Reach)

[79] Warning: Submerged Pond MH1 Primary device # 1 OUTLET by 0.29'

Inflow Area = 6.385 ac, 20.41% Impervious, Inflow Depth = 0.51" for 2-YR event
 Inflow = 1.30 cfs @ 12.49 hrs, Volume= 0.274 af
 Outflow = 1.29 cfs @ 12.50 hrs, Volume= 0.274 af, Atten= 0%, Lag= 0.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Max. Velocity= 2.24 fps, Min. Travel Time= 0.3 min

Avg. Velocity = 0.89 fps, Avg. Travel Time= 0.8 min

Peak Storage= 23 cf @ 12.50 hrs

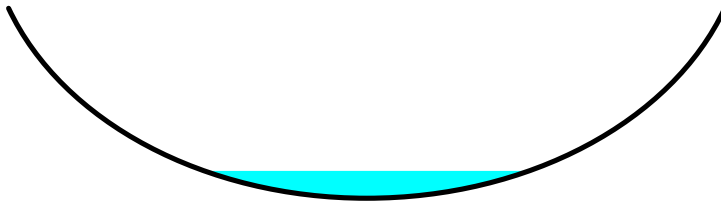
Average Depth at Peak Storage= 0.29'

Bank-Full Depth= 2.00' Flow Area= 10.7 sf, Capacity= 80.78 cfs

8.00' x 2.00' deep Parabolic Channel, n= 0.023

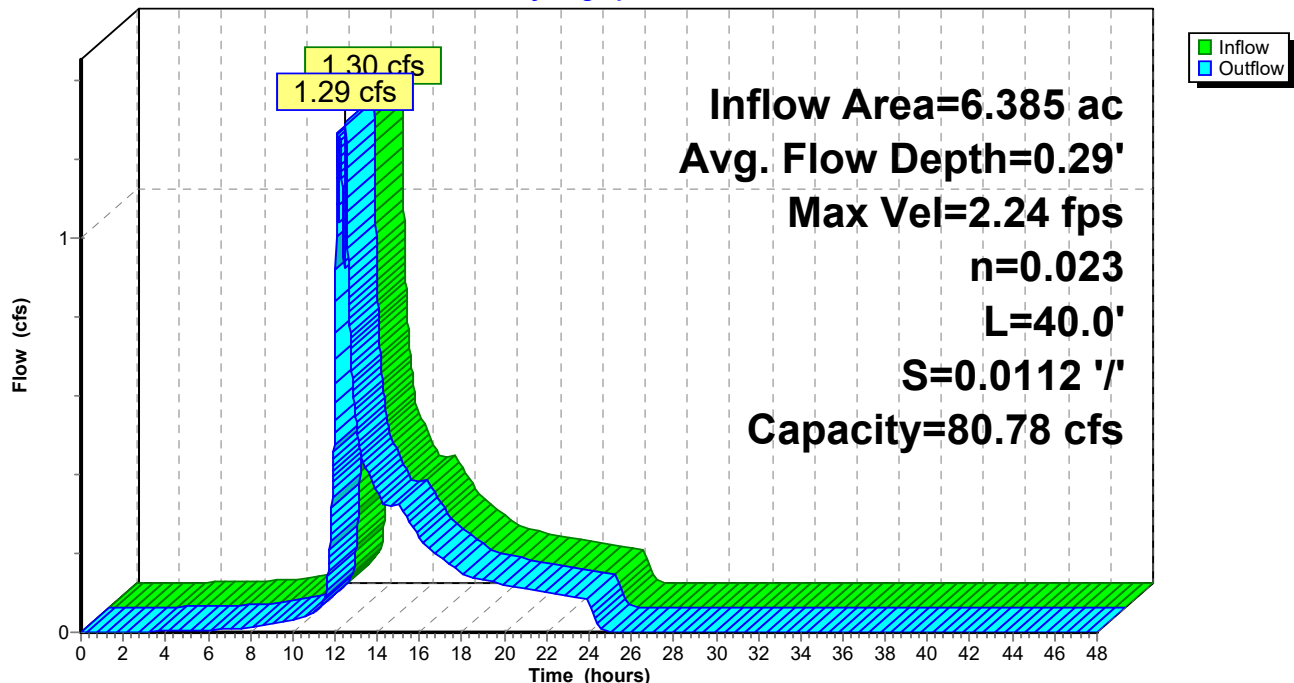
Length= 40.0' Slope= 0.0112 '/'

Inlet Invert= 260.95', Outlet Invert= 260.50'



Reach PS8: (new Reach)

Hydrograph



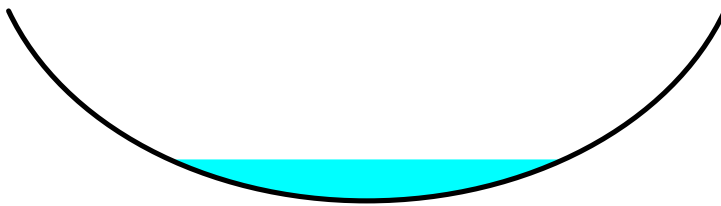
Summary for Reach PS9: (new Reach)

Inflow Area = 0.288 ac, 25.48% Impervious, Inflow Depth = 1.33" for 2-YR event
 Inflow = 0.44 cfs @ 12.09 hrs, Volume= 0.032 af
 Outflow = 0.44 cfs @ 12.11 hrs, Volume= 0.032 af, Atten= 1%, Lag= 1.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 1.62 fps, Min. Travel Time= 0.8 min
 Avg. Velocity = 0.58 fps, Avg. Travel Time= 2.1 min

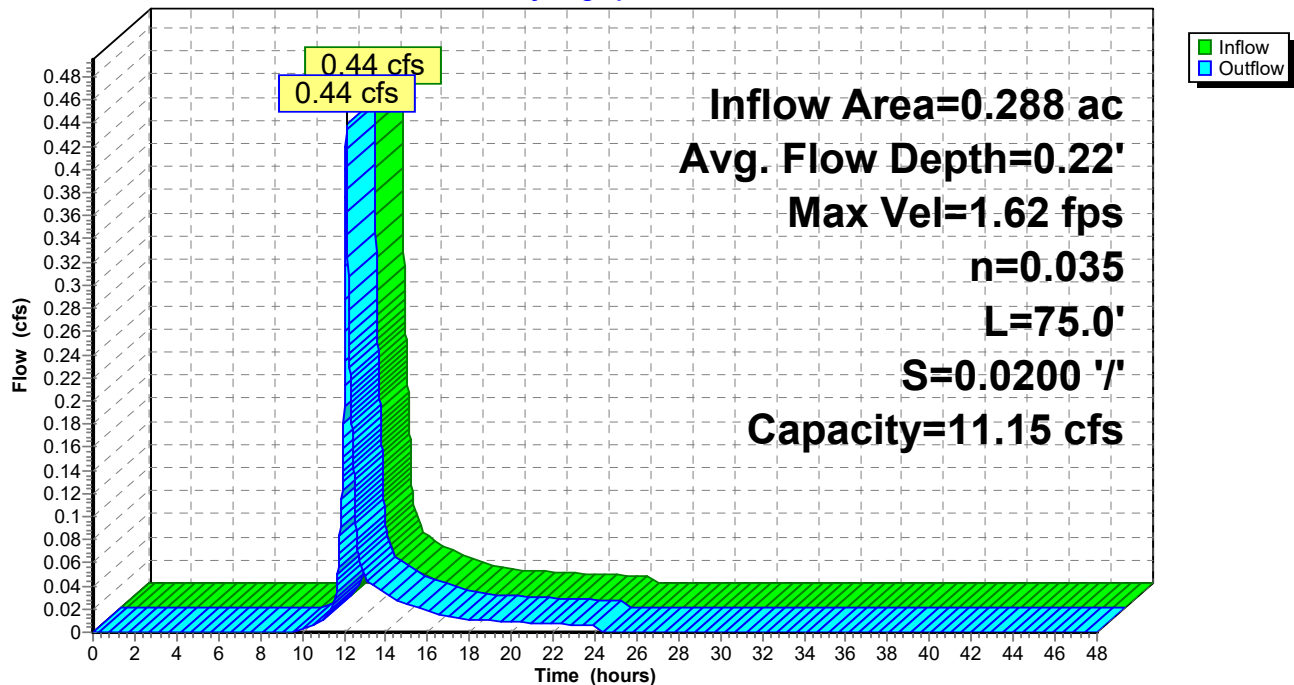
Peak Storage= 20 cf @ 12.10 hrs
 Average Depth at Peak Storage= 0.22'
 Bank-Full Depth= 1.00' Flow Area= 2.7 sf, Capacity= 11.15 cfs

4.00' x 1.00' deep Parabolic Channel, n= 0.035
 Length= 75.0' Slope= 0.0200 '/'
 Inlet Invert= 259.25', Outlet Invert= 257.75'



Reach PS9: (new Reach)

Hydrograph



Summary for Pond 1P: (new Pond)

[57] Hint: Peaked at 301.50' (Flood elevation advised)

[63] Warning: Exceeded Reach 9R INLET depth by 3.50' @ 12.13 hrs

Inflow Area = 0.366 ac, 37.66% Impervious, Inflow Depth = 0.53" for 2-YR event
 Inflow = 0.17 cfs @ 12.13 hrs, Volume= 0.016 af
 Outflow = 0.17 cfs @ 12.13 hrs, Volume= 0.016 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.17 cfs @ 12.13 hrs, Volume= 0.016 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Peak Elev= 301.50' @ 12.13 hrs

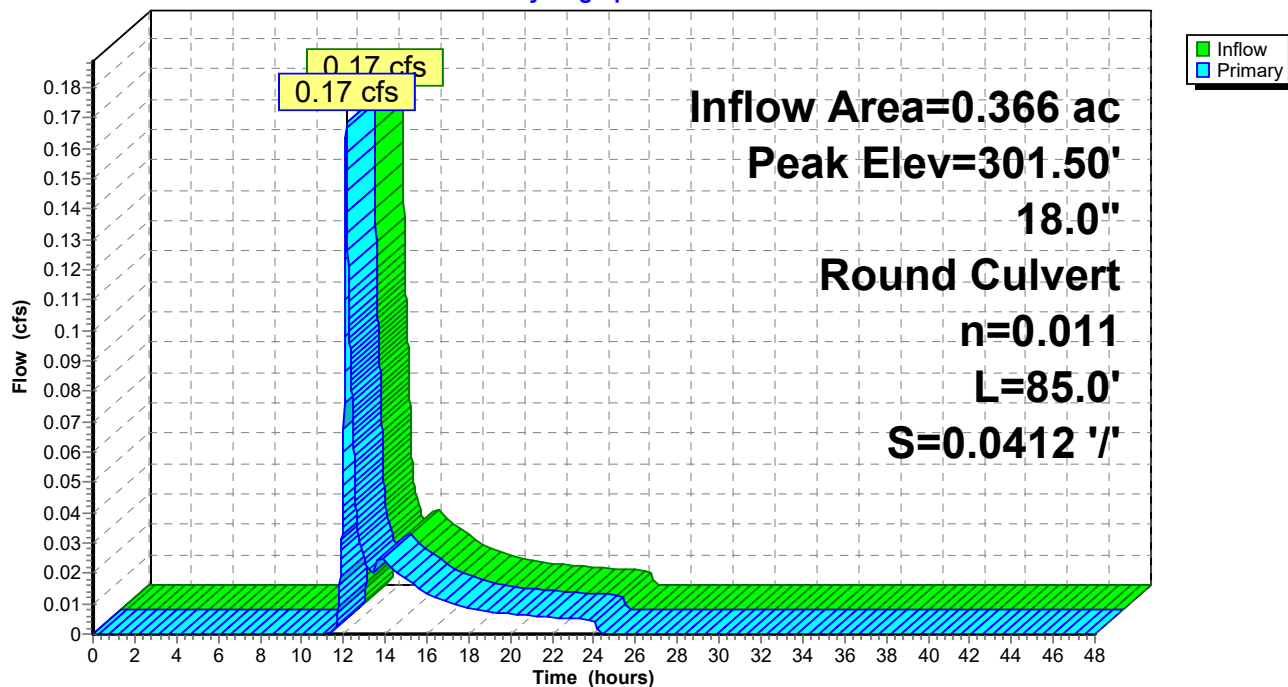
Device	Routing	Invert	Outlet Devices
#1	Primary	301.30'	18.0" Round Culvert L= 85.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 301.30' / 297.80' S= 0.0412 '/ Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=0.17 cfs @ 12.13 hrs HW=301.50' (Free Discharge)

1=Culvert (Inlet Controls 0.17 cfs @ 1.20 fps)

Pond 1P: (new Pond)

Hydrograph



Summary for Pond 2P: (new Pond)

[57] Hint: Peaked at 298.08' (Flood elevation advised)

[61] Hint: Exceeded Reach 11R outlet invert by 0.18' @ 12.22 hrs

[79] Warning: Submerged Pond 1P Primary device # 1 OUTLET by 0.28'

Inflow Area = 1.381 ac, 24.37% Impervious, Inflow Depth = 0.55" for 2-YR event
 Inflow = 0.58 cfs @ 12.22 hrs, Volume= 0.064 af
 Outflow = 0.58 cfs @ 12.22 hrs, Volume= 0.064 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.58 cfs @ 12.22 hrs, Volume= 0.064 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Peak Elev= 298.08' @ 12.22 hrs

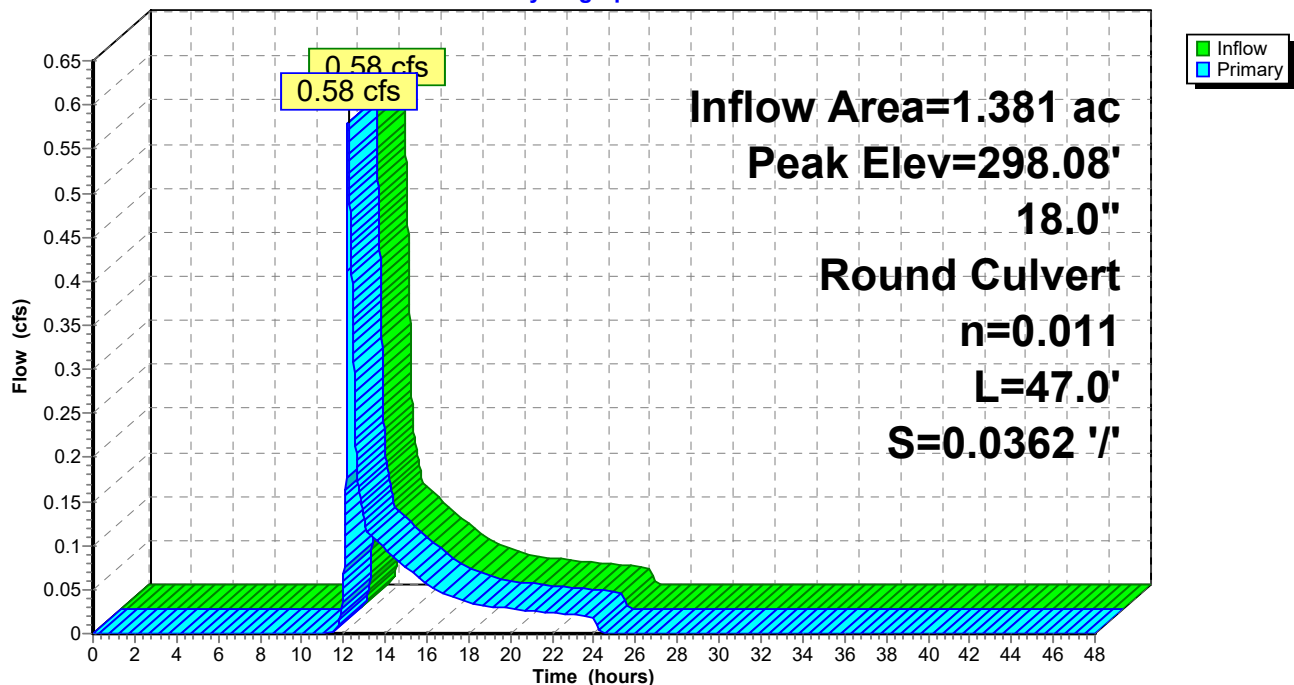
Device	Routing	Invert	Outlet Devices
#1	Primary	297.70'	18.0" Round Culvert L= 47.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 297.70' / 296.00' S= 0.0362 '/ Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=0.58 cfs @ 12.22 hrs HW=298.08' (Free Discharge)

↑1=Culvert (Inlet Controls 0.58 cfs @ 1.65 fps)

Pond 2P: (new Pond)

Hydrograph



Summary for Pond 3P: MH2B

[57] Hint: Peaked at 283.92' (Flood elevation advised)

Inflow Area = 6.041 ac, 17.09% Impervious, Inflow Depth = 0.45" for 2-YR event
 Inflow = 1.09 cfs @ 12.50 hrs, Volume= 0.226 af
 Outflow = 1.09 cfs @ 12.50 hrs, Volume= 0.226 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.09 cfs @ 12.50 hrs, Volume= 0.226 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

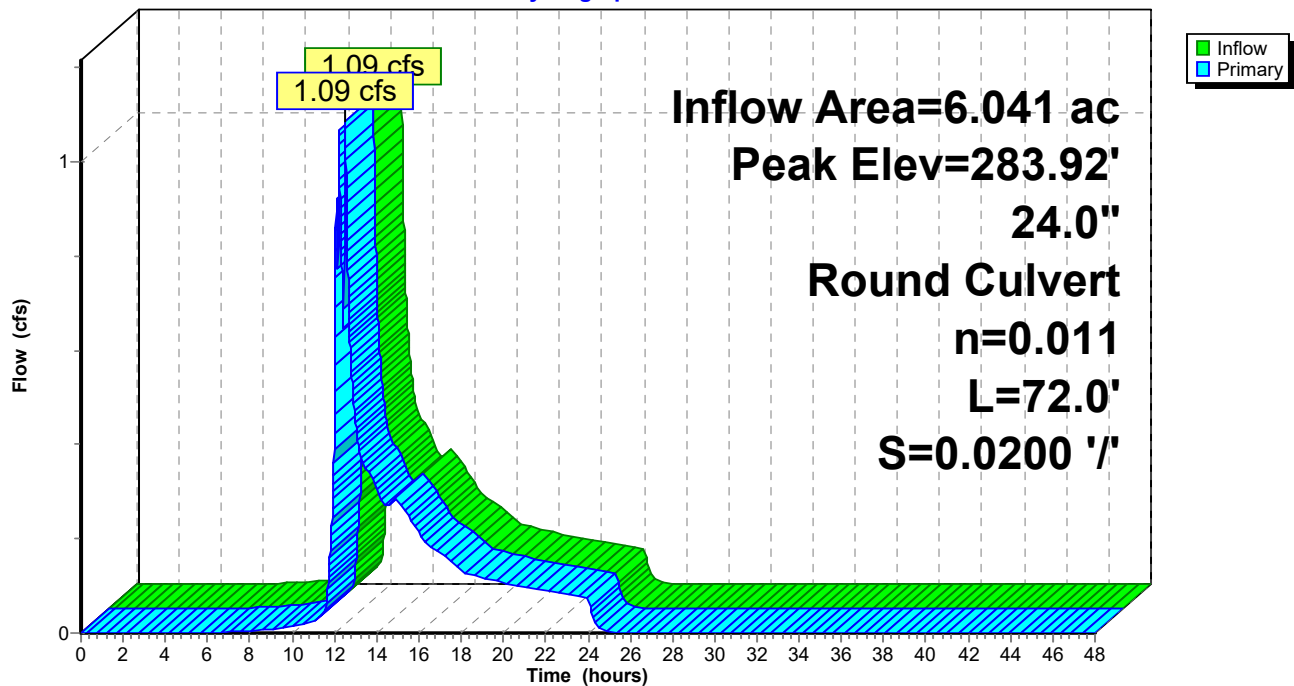
Peak Elev= 283.92' @ 12.50 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	283.44'	24.0" Round 2B L= 72.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 283.44' / 282.00' S= 0.0200 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=1.08 cfs @ 12.50 hrs HW=283.92' (Free Discharge)
 ↳ **1=2B** (Inlet Controls 1.08 cfs @ 1.86 fps)

Pond 3P: MH2B

Hydrograph



Summary for Pond 4P: Constructed Wetland

Inflow Area = 8.295 ac, 21.89% Impervious, Inflow Depth = 0.62" for 2-YR event
 Inflow = 3.20 cfs @ 12.08 hrs, Volume= 0.431 af
 Outflow = 0.47 cfs @ 14.36 hrs, Volume= 0.430 af, Atten= 85%, Lag= 136.5 min
 Primary = 0.47 cfs @ 14.36 hrs, Volume= 0.430 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Starting Elev= 258.30' Surf.Area= 5,072 sf Storage= 7,845 cf
 Peak Elev= 259.41' @ 14.36 hrs Surf.Area= 6,889 sf Storage= 14,577 cf (6,732 cf above start)

Plug-Flow detention time= 497.8 min calculated for 0.250 af (58% of inflow)
 Center-of-Mass det. time= 190.7 min (1,082.0 - 891.3)

Volume	Invert	Avail.Storage	Storage Description
#1	254.00'	37,037 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
254.00	729	0	0
255.00	972	851	851
256.00	1,244	1,108	1,959
257.00	1,541	1,393	3,351
258.00	4,558	3,050	6,401
258.30	5,072	1,445	7,845
259.00	6,345	3,996	11,841
260.00	7,660	7,003	18,843
261.00	9,072	8,366	27,209
262.00	10,584	9,828	37,037

Device	Routing	Invert	Outlet Devices
#1	Primary	258.30'	30.0" Round Culvert L= 30.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 258.30' / 258.00' S= 0.0100 1' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 4.91 sf
#2	Device 1	260.30'	48.0" x 48.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Device 1	258.30'	0.5" Vert. Orifice/Grate X 2.00 columns X 4 rows with 5.0" cc spacing C= 0.600
#4	Device 1	258.30'	4.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#5	Secondary	260.90'	22.0' long x 12.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

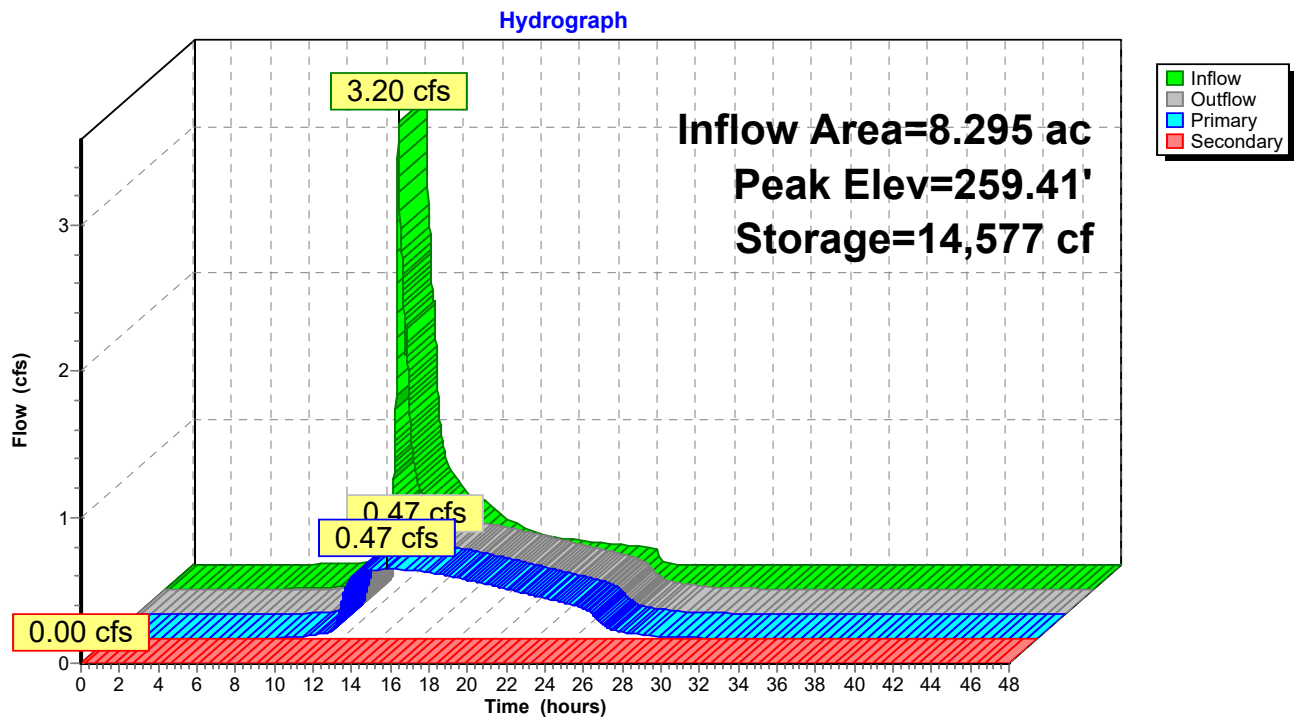
Primary OutFlow Max=0.47 cfs @ 14.36 hrs HW=259.41' (Free Discharge)

- 1=Culvert (Passes 0.47 cfs of 6.04 cfs potential flow)
- 2=Orifice/Grate (Controls 0.00 cfs)
- 3=Orifice/Grate (Orifice Controls 0.03 cfs @ 3.81 fps)
- 4=Orifice/Grate (Orifice Controls 0.44 cfs @ 5.08 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=258.30' (Free Discharge)

- 5=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 4P: Constructed Wetland



Summary for Pond 5P: MH2A

[57] Hint: Peaked at 277.91' (Flood elevation advised)

Inflow Area = 6.269 ac, 18.94% Impervious, Inflow Depth = 0.47" for 2-YR event
 Inflow = 1.22 cfs @ 12.49 hrs, Volume= 0.246 af
 Outflow = 1.22 cfs @ 12.49 hrs, Volume= 0.246 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.22 cfs @ 12.49 hrs, Volume= 0.246 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Peak Elev= 277.91' @ 12.49 hrs

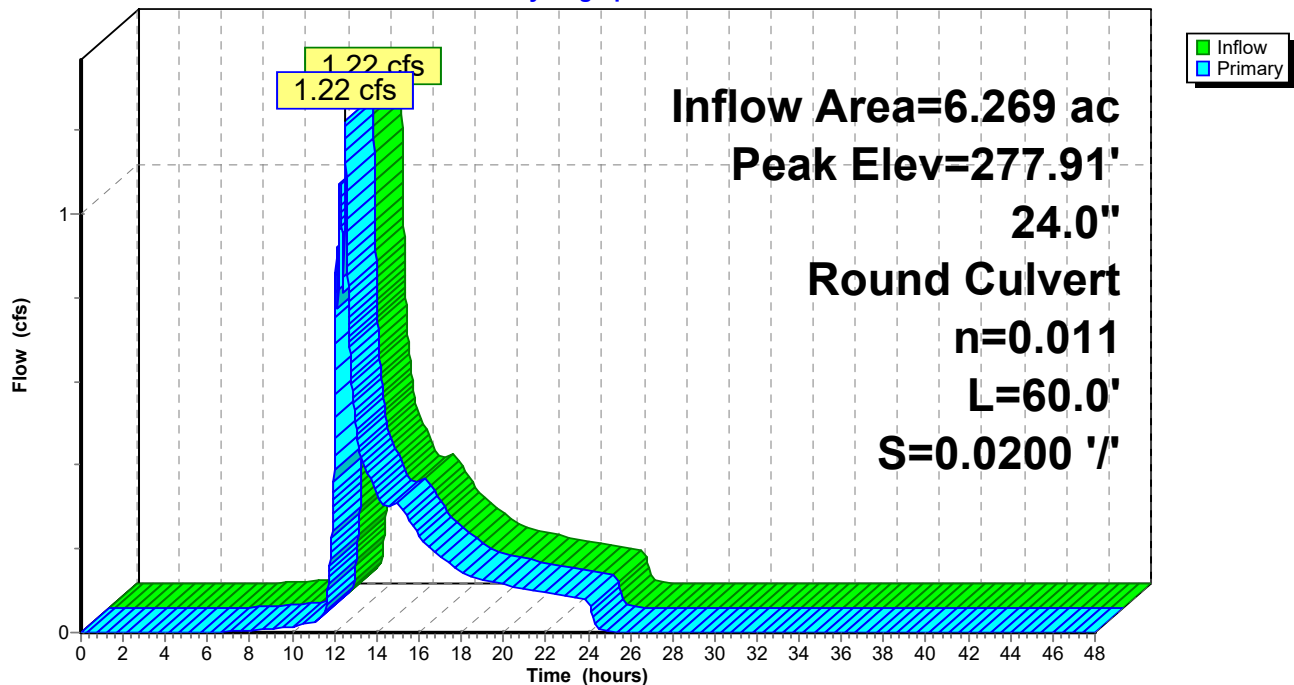
Device	Routing	Invert	Outlet Devices
#1	Primary	277.40'	24.0" Round Culvert L= 60.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 277.40' / 276.20' S= 0.0200 '/ Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=1.22 cfs @ 12.49 hrs HW=277.91' (Free Discharge)

↑1=Culvert (Inlet Controls 1.22 cfs @ 1.92 fps)

Pond 5P: MH2A

Hydrograph



Summary for Pond 20P: (new Pond)

[57] Hint: Peaked at 265.12' (Flood elevation advised)

Inflow Area = 6.315 ac, 19.53% Impervious, Inflow Depth = 0.49" for 2-YR event
 Inflow = 1.25 cfs @ 12.49 hrs, Volume= 0.257 af
 Outflow = 1.25 cfs @ 12.49 hrs, Volume= 0.257 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.25 cfs @ 12.49 hrs, Volume= 0.257 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Peak Elev= 265.12' @ 12.49 hrs

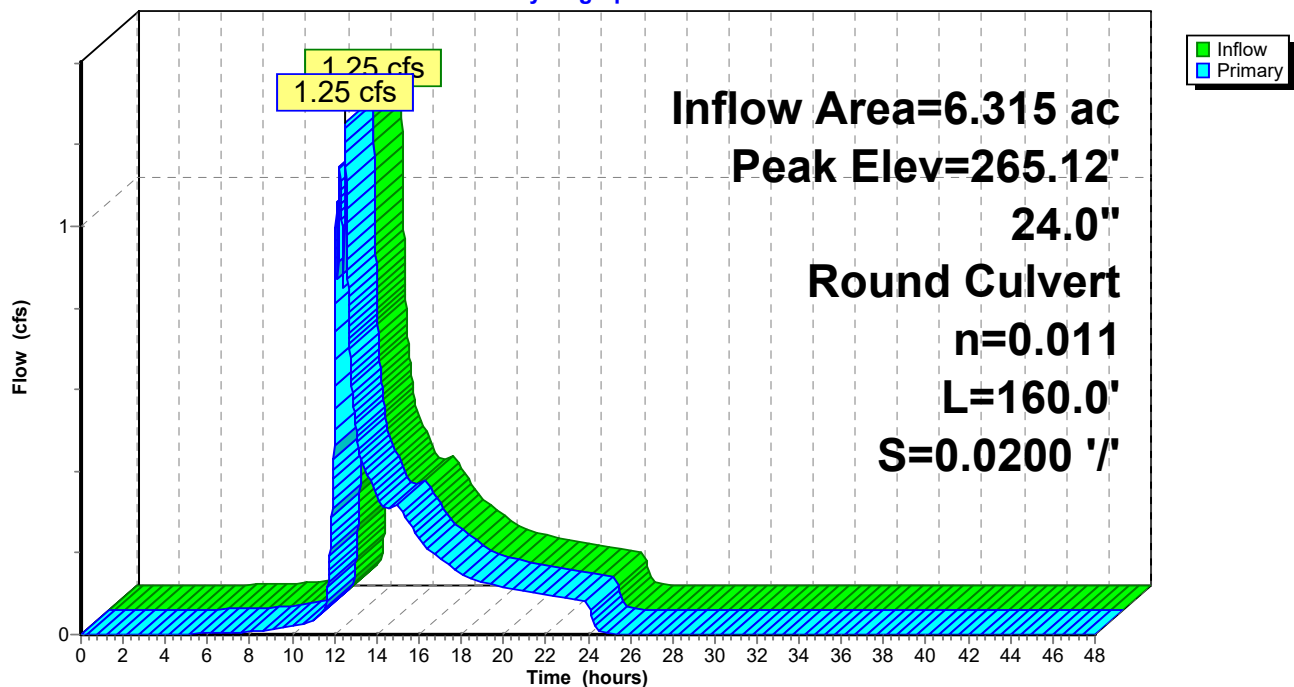
Device	Routing	Invert	Outlet Devices
#1	Primary	264.60'	24.0" Round Culvert L= 160.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 264.60' / 261.40' S= 0.0200 '/ Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=1.25 cfs @ 12.49 hrs HW=265.12' (Free Discharge)

↑1=Culvert (Inlet Controls 1.25 cfs @ 1.93 fps)

Pond 20P: (new Pond)

Hydrograph



Summary for Pond BS: Bus Station RG

[63] Warning: Exceeded Reach CB1 INLET depth by 0.30' @ 24.69 hrs

Inflow Area = 0.554 ac, 36.99% Impervious, Inflow Depth = 1.59" for 2-YR event
 Inflow = 0.96 cfs @ 12.10 hrs, Volume= 0.073 af
 Outflow = 0.11 cfs @ 12.97 hrs, Volume= 0.030 af, Atten= 89%, Lag= 52.3 min
 Primary = 0.11 cfs @ 12.97 hrs, Volume= 0.030 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 257.34' @ 12.97 hrs Surf.Area= 0 sf Storage= 1,917 cf

Plug-Flow detention time= 308.8 min calculated for 0.030 af (41% of inflow)
 Center-of-Mass det. time= 172.6 min (989.1 - 816.5)

Volume	Invert	Avail.Storage	Storage Description
#1	254.47'	2,201 cf	Custom Stage Data Listed below

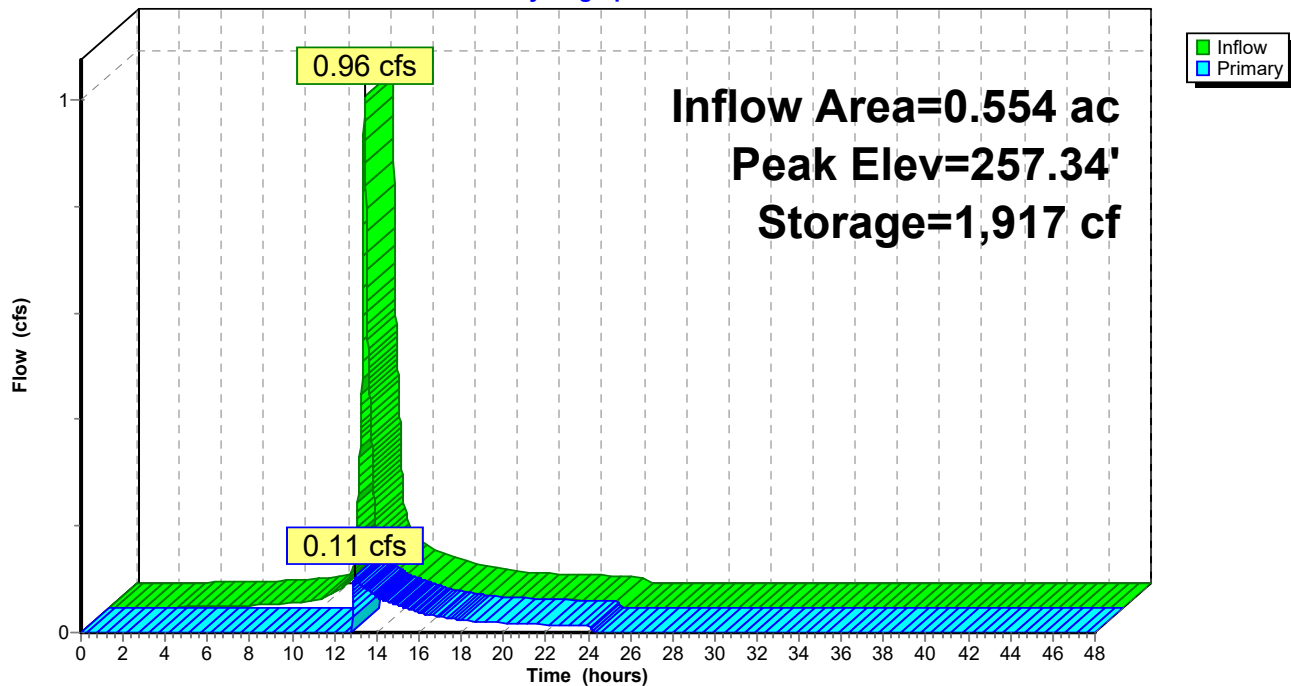
Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
254.47	0	0
254.80	122	122
255.05	92	214
256.05	367	581
256.30	92	673
257.30	1,222	1,895
257.80	306	2,201

Device	Routing	Invert	Outlet Devices
#1	Primary	257.30'	18.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.10 cfs @ 12.97 hrs HW=257.34' (Free Discharge)
 ↑1=Orifice/Grate (Weir Controls 0.10 cfs @ 0.62 fps)

Pond BS: Bus Station RG

Hydrograph



Summary for Pond CB2: (new Pond)

[57] Hint: Peaked at 262.25' (Flood elevation advised)

Inflow Area = 0.070 ac, 100.00% Impervious, Inflow Depth = 2.87" for 2-YR event
 Inflow = 0.21 cfs @ 12.08 hrs, Volume= 0.017 af
 Outflow = 0.21 cfs @ 12.08 hrs, Volume= 0.017 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.21 cfs @ 12.08 hrs, Volume= 0.017 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Peak Elev= 262.25' @ 12.08 hrs

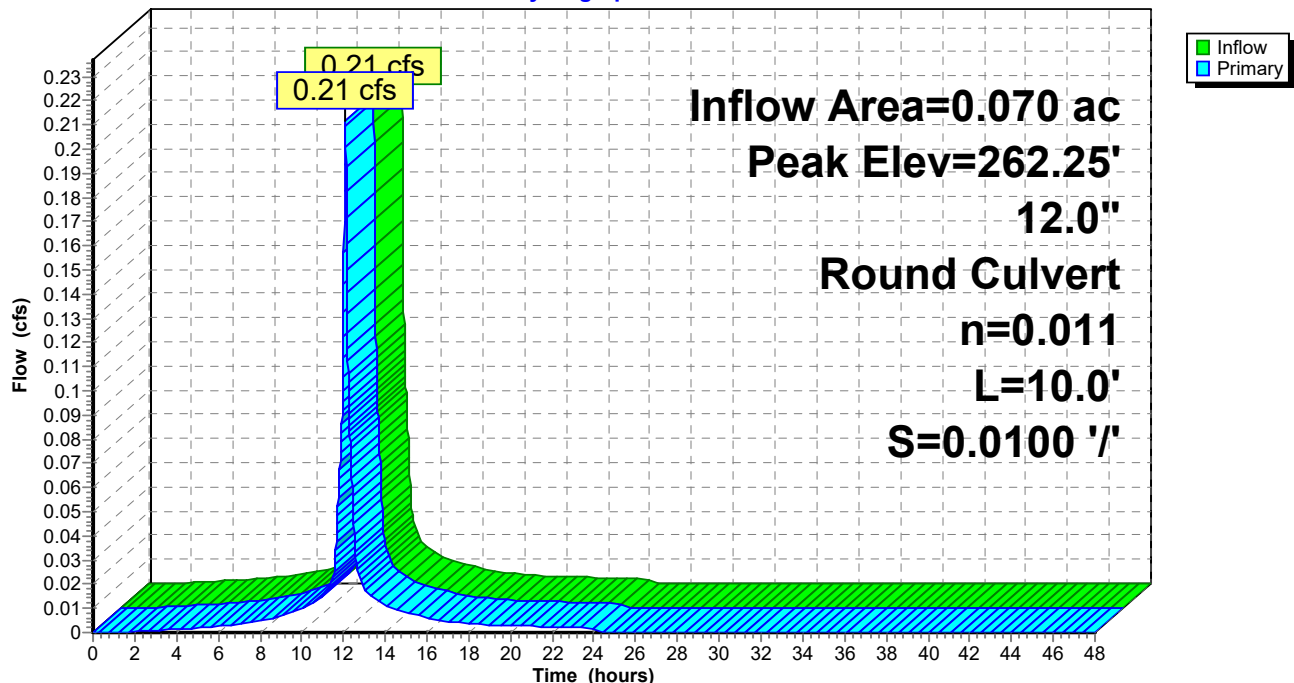
Device	Routing	Invert	Outlet Devices
#1	Primary	262.00'	12.0" Round Culvert L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 262.00' / 261.90' S= 0.0100 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.21 cfs @ 12.08 hrs HW=262.25' (Free Discharge)

↑1=Culvert (Inlet Controls 0.21 cfs @ 1.35 fps)

Pond CB2: (new Pond)

Hydrograph



Summary for Pond CB3: (new Pond)

[57] Hint: Peaked at 277.40' (Flood elevation advised)

Inflow Area = 0.046 ac, 100.00% Impervious, Inflow Depth = 2.87" for 2-YR event
 Inflow = 0.14 cfs @ 12.08 hrs, Volume= 0.011 af
 Outflow = 0.14 cfs @ 12.08 hrs, Volume= 0.011 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.14 cfs @ 12.08 hrs, Volume= 0.011 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Peak Elev= 277.40' @ 12.08 hrs

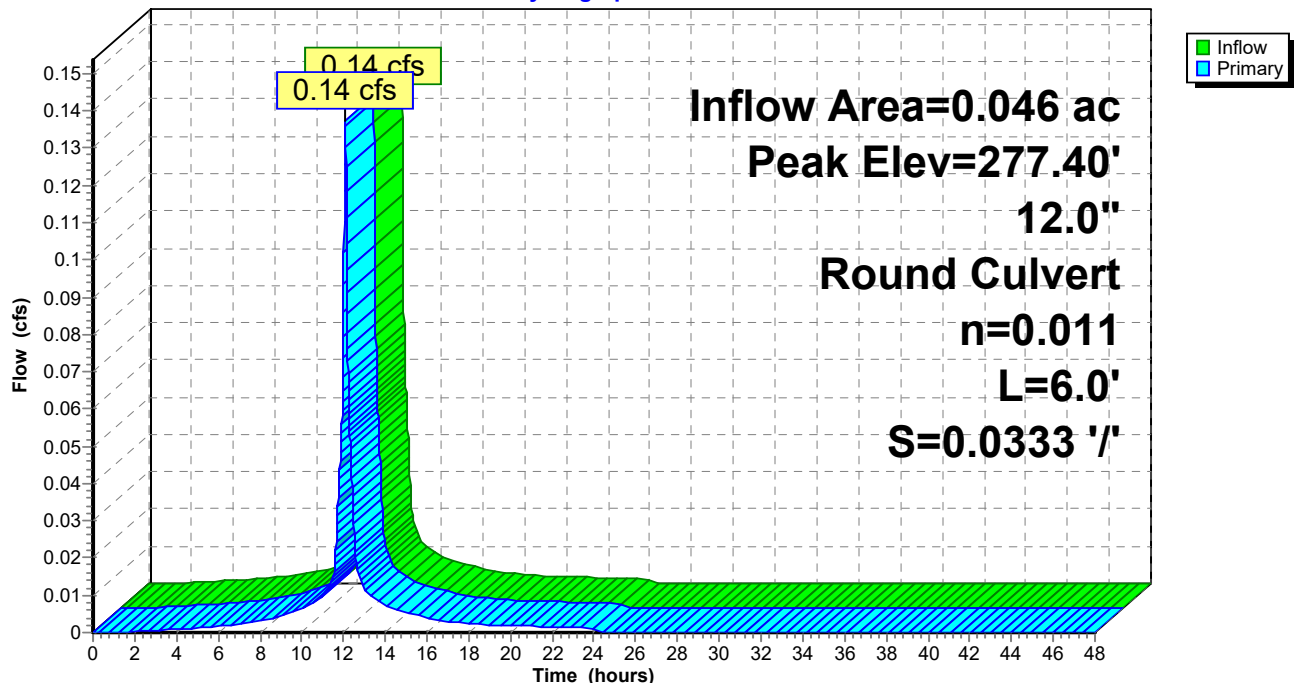
Device	Routing	Invert	Outlet Devices
#1	Primary	277.20'	12.0" Round Culvert L= 6.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 277.20' / 277.00' S= 0.0333 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.14 cfs @ 12.08 hrs HW=277.40' (Free Discharge)

↑1=Culvert (Inlet Controls 0.14 cfs @ 1.21 fps)

Pond CB3: (new Pond)

Hydrograph



Summary for Pond CB4: (new Pond)

[57] Hint: Peaked at 294.04' (Flood elevation advised)

Inflow Area = 0.151 ac, 79.05% Impervious, Inflow Depth = 2.08" for 2-YR event
 Inflow = 0.36 cfs @ 12.09 hrs, Volume= 0.026 af
 Outflow = 0.36 cfs @ 12.09 hrs, Volume= 0.026 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.36 cfs @ 12.09 hrs, Volume= 0.026 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Peak Elev= 294.04' @ 12.09 hrs

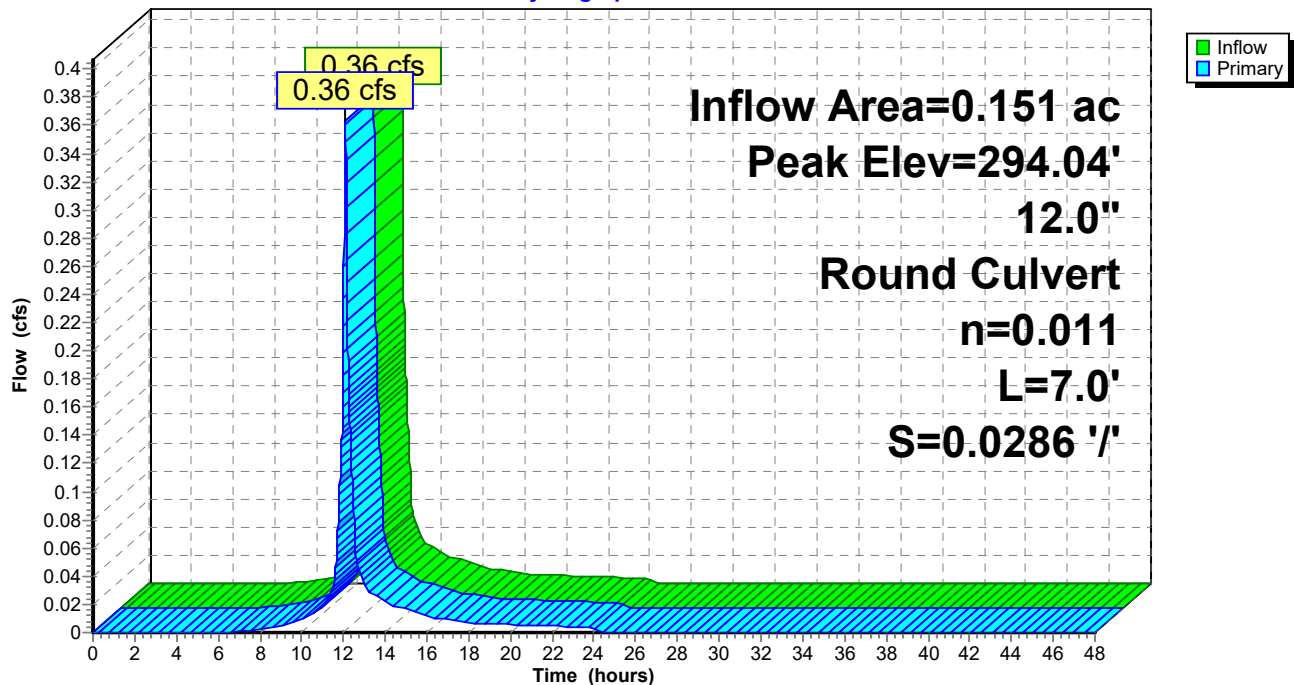
Device	Routing	Invert	Outlet Devices
#1	Primary	293.70'	12.0" Round Culvert L= 7.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 293.70' / 293.50' S= 0.0286 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.36 cfs @ 12.09 hrs HW=294.04' (Free Discharge)

↑1=Culvert (Inlet Controls 0.36 cfs @ 1.56 fps)

Pond CB4: (new Pond)

Hydrograph



Summary for Pond CB5: (new Pond)

[57] Hint: Peaked at 294.21' (Flood elevation advised)

Inflow Area = 0.396 ac, 24.31% Impervious, Inflow Depth = 0.77" for 2-YR event
 Inflow = 0.32 cfs @ 12.10 hrs, Volume= 0.025 af
 Outflow = 0.32 cfs @ 12.10 hrs, Volume= 0.025 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.32 cfs @ 12.10 hrs, Volume= 0.025 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Peak Elev= 294.21' @ 12.10 hrs

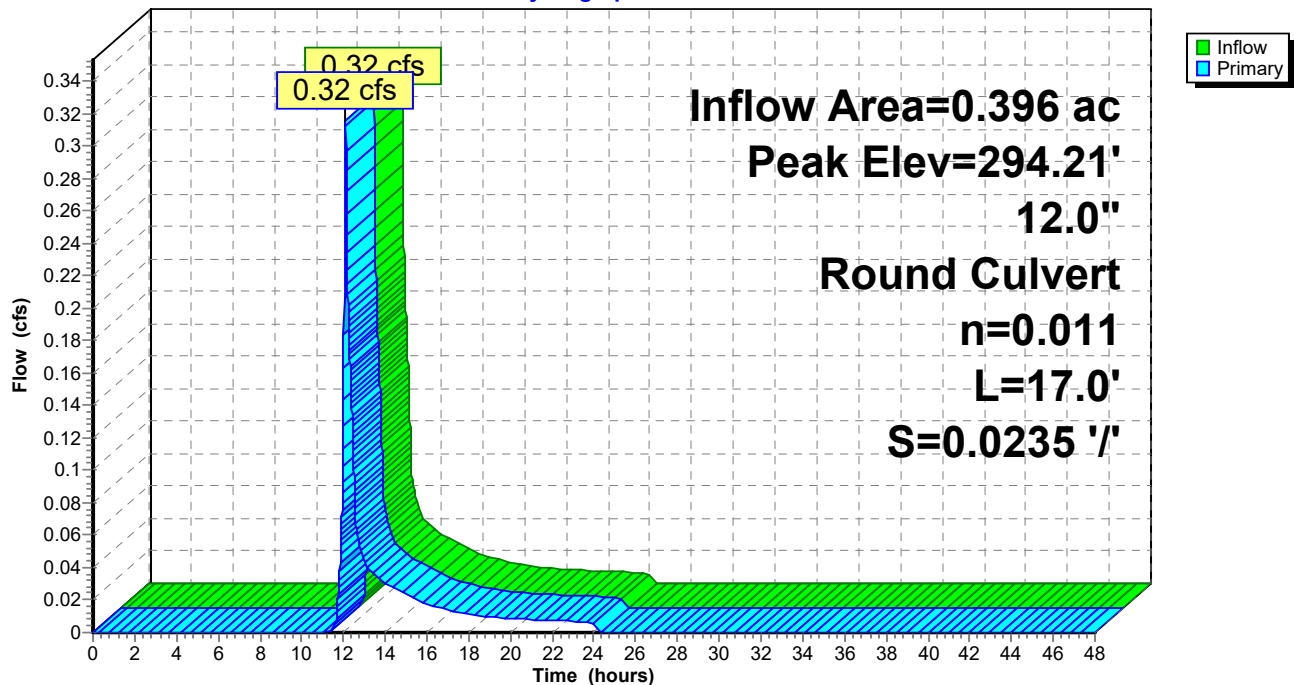
Device	Routing	Invert	Outlet Devices
#1	Primary	293.90'	12.0" Round Culvert L= 17.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 293.90' / 293.50' S= 0.0235 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.32 cfs @ 12.10 hrs HW=294.21' (Free Discharge)

↑1=Culvert (Inlet Controls 0.32 cfs @ 1.50 fps)

Pond CB5: (new Pond)

Hydrograph



Summary for Pond CULdeSAC: Cul-de-sac

Inflow Area = 0.243 ac, 29.57% Impervious, Inflow Depth = 0.87" for 2-YR event
 Inflow = 0.23 cfs @ 12.10 hrs, Volume= 0.018 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 298.82' @ 24.34 hrs Surf.Area= 0 sf Storage= 766 cf
 Flood Elev= 300.00' Surf.Area= 0 sf Storage= 2,622 cf

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

Volume	Invert	Avail.Storage	Storage Description
#1	297.92'	4,394 cf	Custom Stage Data Listed below

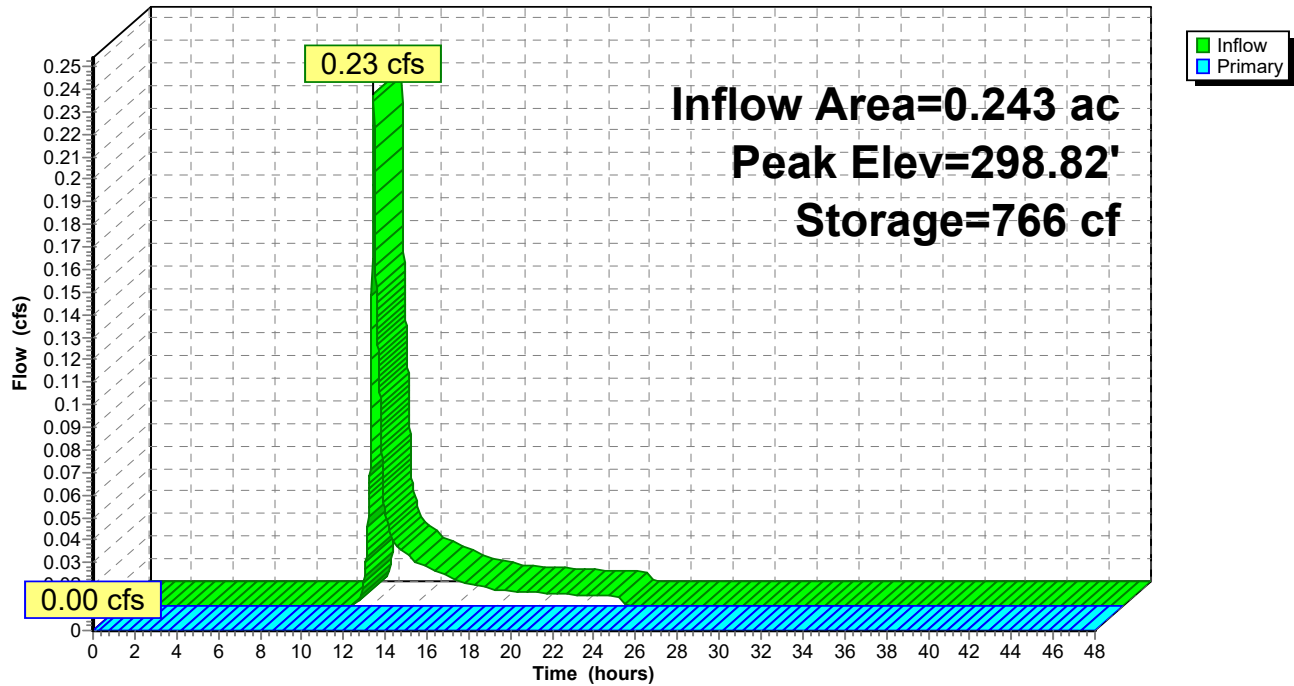
Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
297.92	0	0
298.25	283	283
298.50	213	496
299.50	850	1,346
299.75	213	1,559
300.25	2,126	3,685
300.50	709	4,394

Device	Routing	Invert	Outlet Devices
#1	Primary	300.25'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=297.92' (Free Discharge)
 ↑1=Orifice/Grate (Controls 0.00 cfs)

Pond CULdeSAC: Cul-de-sac

Hydrograph



Summary for Pond MH1: (new Pond)

[57] Hint: Peaked at 261.77' (Flood elevation advised)

[79] Warning: Submerged Pond 20P Primary device # 1 OUTLET by 0.37'

Inflow Area = 6.385 ac, 20.41% Impervious, Inflow Depth = 0.51" for 2-YR event
 Inflow = 1.30 cfs @ 12.49 hrs, Volume= 0.274 af
 Outflow = 1.30 cfs @ 12.49 hrs, Volume= 0.274 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.30 cfs @ 12.49 hrs, Volume= 0.274 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Peak Elev= 261.77' @ 12.49 hrs

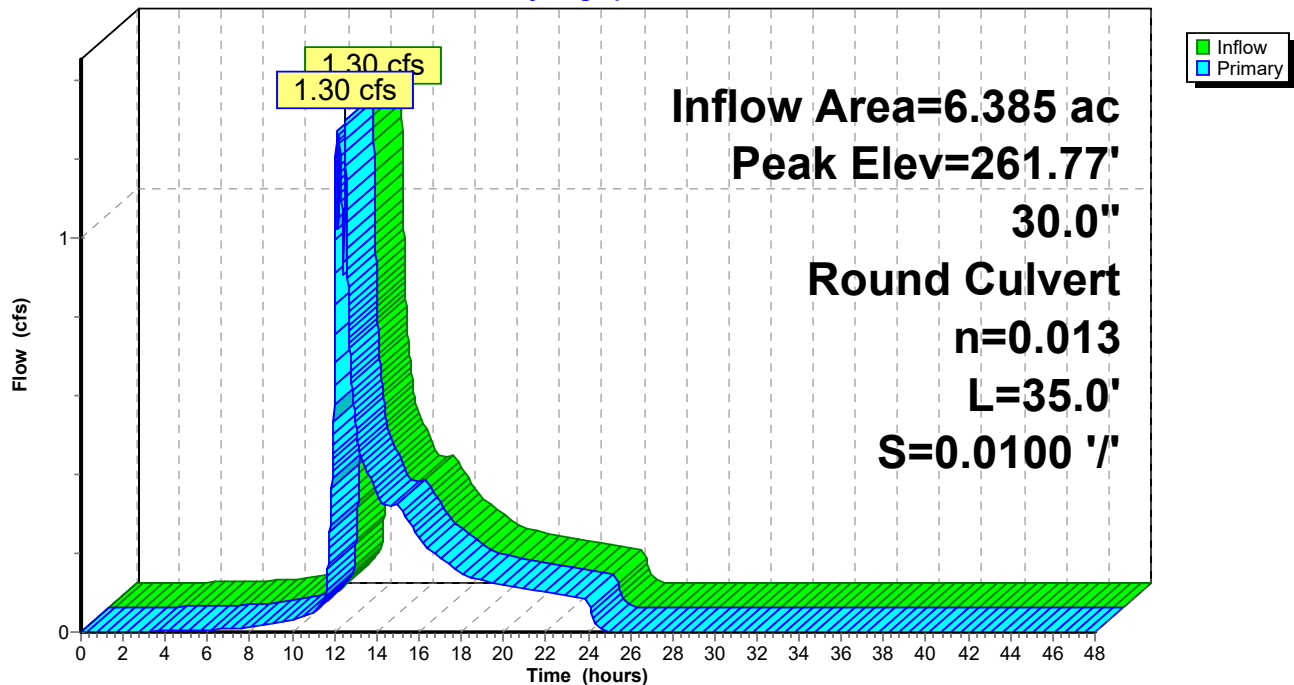
Device	Routing	Invert	Outlet Devices
#1	Primary	261.30'	30.0" Round Culvert L= 35.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 261.30' / 260.95' S= 0.0100 '/ Cc= 0.900 n= 0.013, Flow Area= 4.91 sf

Primary OutFlow Max=1.29 cfs @ 12.49 hrs HW=261.77' (Free Discharge)

↑**1=Culvert** (Inlet Controls 1.29 cfs @ 2.05 fps)

Pond MH1: (new Pond)

Hydrograph



Summary for Pond MH2: (new Pond)

[57] Hint: Peaked at 271.02' (Flood elevation advised)

Inflow Area = 6.315 ac, 19.53% Impervious, Inflow Depth = 0.49" for 2-YR event
 Inflow = 1.25 cfs @ 12.49 hrs, Volume= 0.257 af
 Outflow = 1.25 cfs @ 12.49 hrs, Volume= 0.257 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.25 cfs @ 12.49 hrs, Volume= 0.257 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Peak Elev= 271.02' @ 12.49 hrs

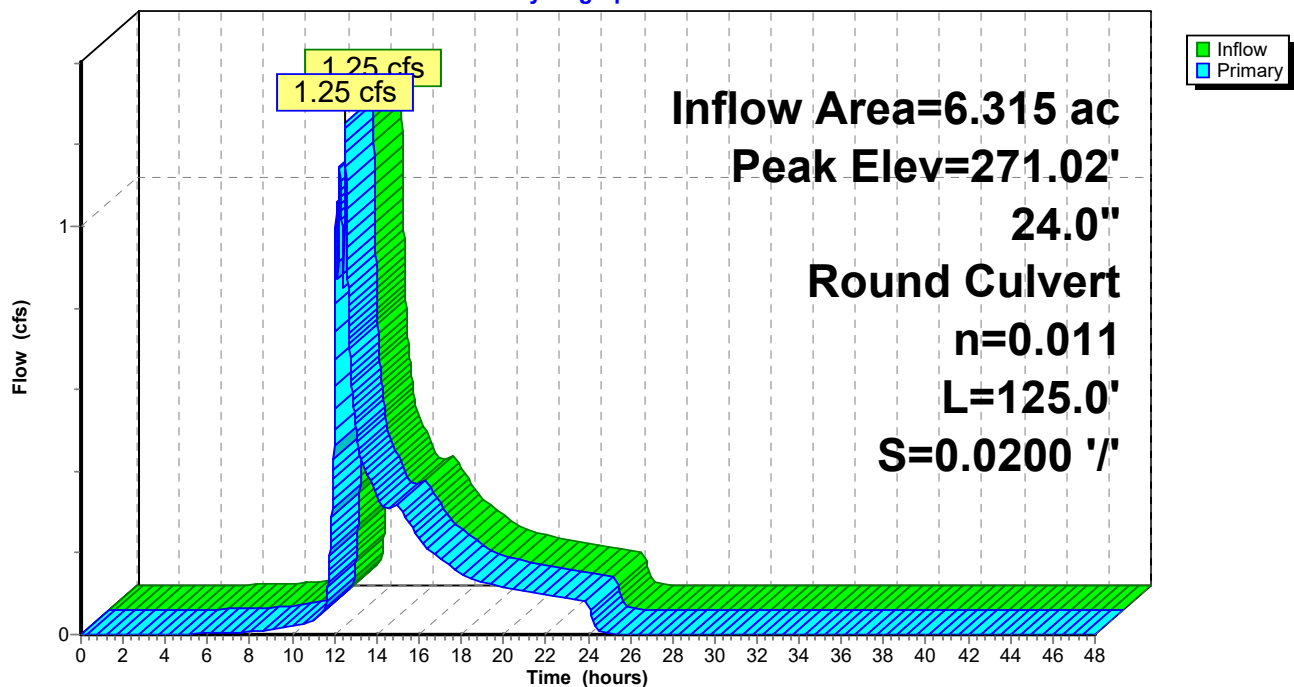
Device	Routing	Invert	Outlet Devices
#1	Primary	270.50'	24.0" Round Culvert L= 125.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 270.50' / 268.00' S= 0.0200 '/ Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=1.25 cfs @ 12.49 hrs HW=271.02' (Free Discharge)

↑1=Culvert (Inlet Controls 1.25 cfs @ 1.93 fps)

Pond MH2: (new Pond)

Hydrograph



Summary for Pond MH3: (new Pond)

[57] Hint: Peaked at 289.54' (Flood elevation advised)

Inflow Area = 5.776 ac, 17.87% Impervious, Inflow Depth = 0.47" for 2-YR event
 Inflow = 1.09 cfs @ 12.50 hrs, Volume= 0.226 af
 Outflow = 1.09 cfs @ 12.50 hrs, Volume= 0.226 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.09 cfs @ 12.50 hrs, Volume= 0.226 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Peak Elev= 289.54' @ 12.50 hrs

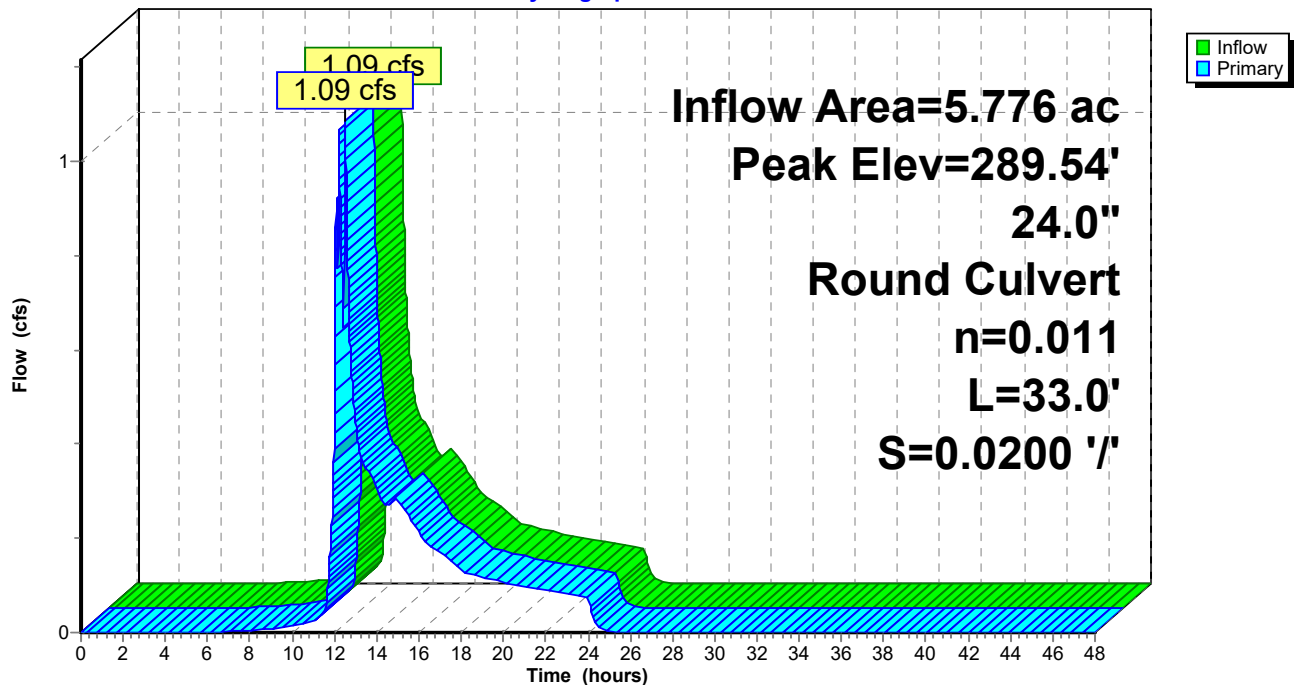
Device	Routing	Invert	Outlet Devices
#1	Primary	289.06'	24.0" Round Culvert L= 33.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 289.06' / 288.40' S= 0.0200 '/ Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf

Primary OutFlow Max=1.08 cfs @ 12.50 hrs HW=289.54' (Free Discharge)

↑1=Culvert (Inlet Controls 1.08 cfs @ 1.86 fps)

Pond MH3: (new Pond)

Hydrograph



Summary for Pond MH4:

[57] Hint: Peaked at 300.16' (Flood elevation advised)

Inflow Area = 0.213 ac, 50.94% Impervious, Inflow Depth = 0.46" for 2-YR event
 Inflow = 0.10 cfs @ 12.12 hrs, Volume= 0.008 af
 Outflow = 0.10 cfs @ 12.12 hrs, Volume= 0.008 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.10 cfs @ 12.12 hrs, Volume= 0.008 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Peak Elev= 300.16' @ 12.12 hrs

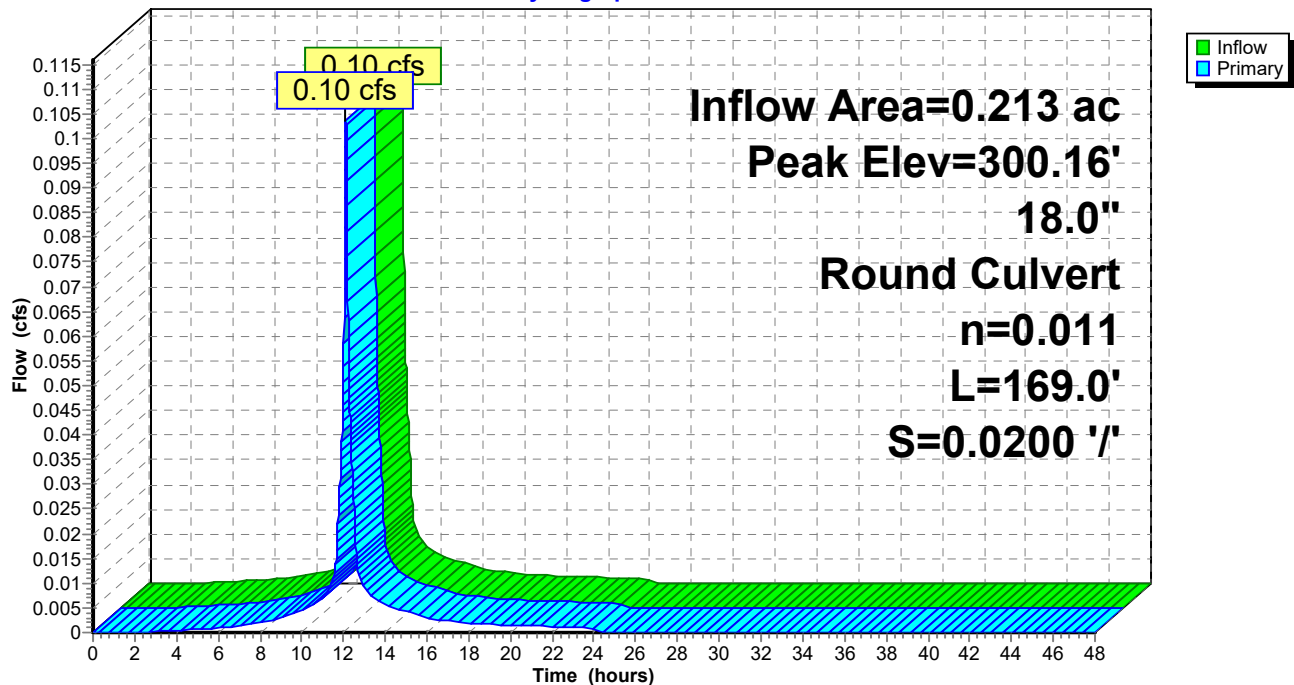
Device	Routing	Invert	Outlet Devices
#1	Primary	300.00'	18.0" Round Culvert L= 169.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 300.00' / 296.62' S= 0.0200 '/ Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=0.10 cfs @ 12.12 hrs HW=300.16' (Free Discharge)

↑1=Culvert (Inlet Controls 0.10 cfs @ 1.06 fps)

Pond MH4:

Hydrograph



Summary for Pond MH5:

[57] Hint: Peaked at 301.26' (Flood elevation advised)

[62] Hint: Exceeded Reach 13R OUTLET depth by 0.16' @ 12.12 hrs

Inflow Area = 0.071 ac, 65.39% Impervious, Inflow Depth = 1.37" for 2-YR event
 Inflow = 0.10 cfs @ 12.12 hrs, Volume= 0.008 af
 Outflow = 0.10 cfs @ 12.12 hrs, Volume= 0.008 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.10 cfs @ 12.12 hrs, Volume= 0.008 af

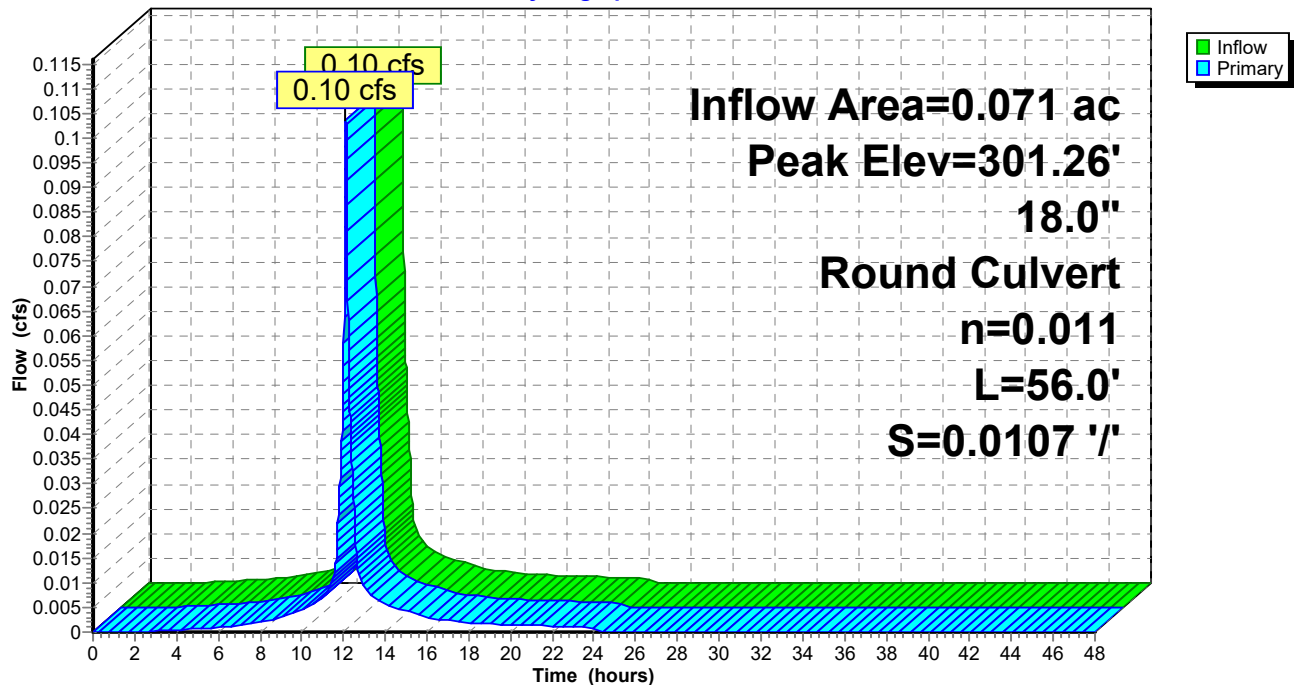
Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Peak Elev= 301.26' @ 12.12 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	301.10'	18.0" Round Culvert L= 56.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 301.10' / 300.50' S= 0.0107 '/ Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=0.10 cfs @ 12.12 hrs HW=301.26' (Free Discharge)

↑1=Culvert (Inlet Controls 0.10 cfs @ 1.06 fps)

Pond MH5:**Hydrograph**

Summary for Pond MH6: CB6

[57] Hint: Peaked at 293.36' (Flood elevation advised)

Inflow Area = 4.513 ac, 14.39% Impervious, Inflow Depth = 0.42" for 2-YR event
 Inflow = 0.90 cfs @ 12.50 hrs, Volume= 0.157 af
 Outflow = 0.90 cfs @ 12.50 hrs, Volume= 0.157 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.90 cfs @ 12.50 hrs, Volume= 0.157 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Peak Elev= 293.36' @ 12.50 hrs

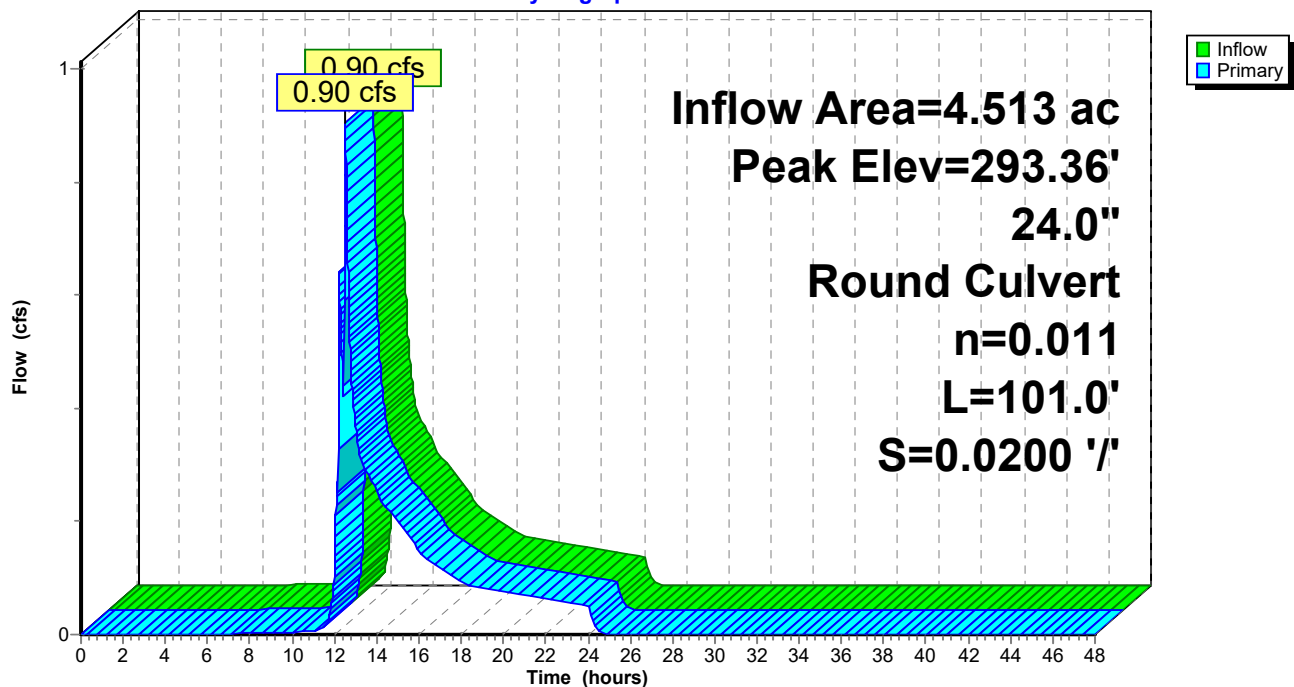
Device	Routing	Invert	Outlet Devices
#1	Primary	292.92'	24.0" Round Culvert L= 101.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 292.92' / 290.90' S= 0.0200 '/ Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=0.90 cfs @ 12.50 hrs HW=293.36' (Free Discharge)

↑1=Culvert (Inlet Controls 0.90 cfs @ 1.78 fps)

Pond MH6: CB6

Hydrograph



Summary for Pond RG10:

[63] Warning: Exceeded Reach 15R INLET depth by 3.12' @ 47.88 hrs

Inflow Area = 0.091 ac, 45.76% Impervious, Inflow Depth = 0.50" for 2-YR event
 Inflow = 0.05 cfs @ 12.10 hrs, Volume= 0.004 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 305.42' @ 47.88 hrs Surf.Area= 0 sf Storage= 165 cf

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

Volume	Invert	Avail.Storage	Storage Description
#1	303.77'	509 cf	Custom Stage Data Listed below

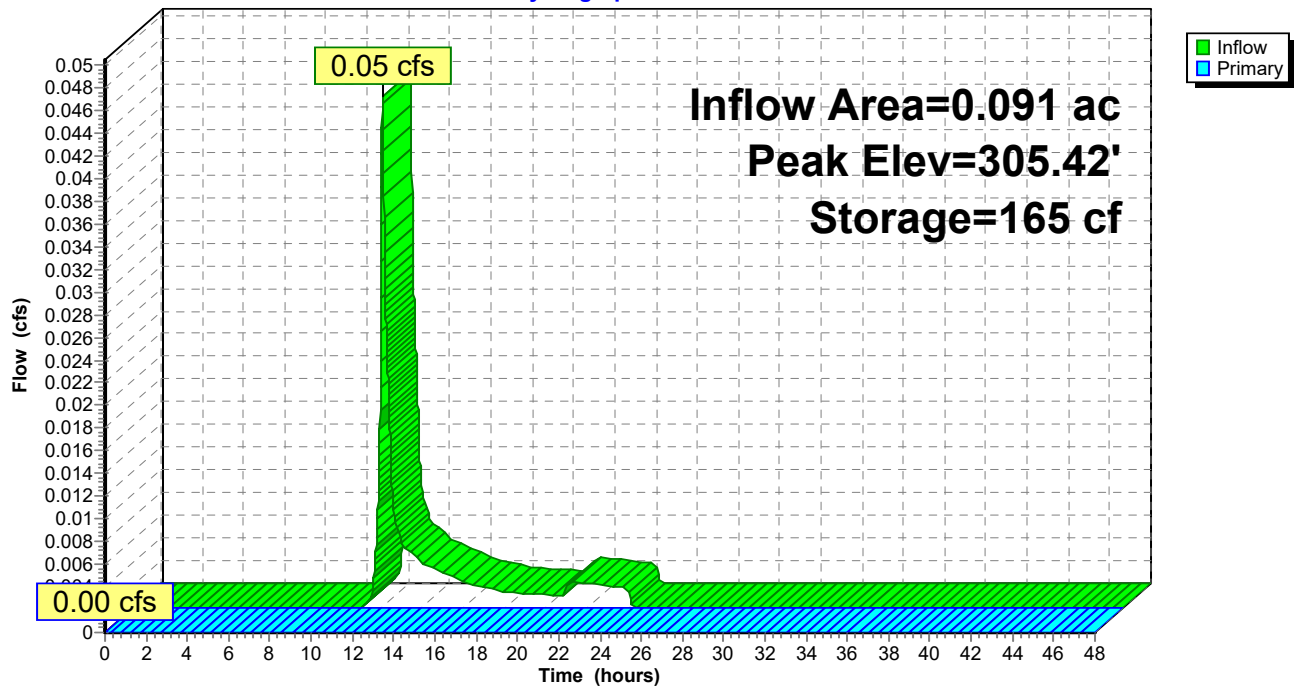
Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
303.77	0	0
303.85	8	8
304.10	25	33
306.10	200	233
306.35	25	258
306.85	167	425
307.10	84	509

Device	Routing	Invert	Outlet Devices
#1	Primary	306.85'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=303.77' (Free Discharge)
 ↑1=Orifice/Grate (Controls 0.00 cfs)

Pond RG10:

Hydrograph



Summary for Pond RG11:

Inflow Area = 0.043 ac, 62.65% Impervious, Inflow Depth = 1.60" for 2-YR event
 Inflow = 0.08 cfs @ 12.09 hrs, Volume= 0.006 af
 Outflow = 0.00 cfs @ 21.22 hrs, Volume= 0.000 af, Atten= 98%, Lag= 547.6 min
 Primary = 0.00 cfs @ 21.22 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 306.85' @ 21.22 hrs Surf.Area= 0 sf Storage= 235 cf

Plug-Flow detention time= 720.6 min calculated for 0.000 af (5% of inflow)
 Center-of-Mass det. time= 518.9 min (1,349.9 - 831.0)

Volume	Invert	Avail.Storage	Storage Description
#1	303.77'	281 cf	Custom Stage Data Listed below

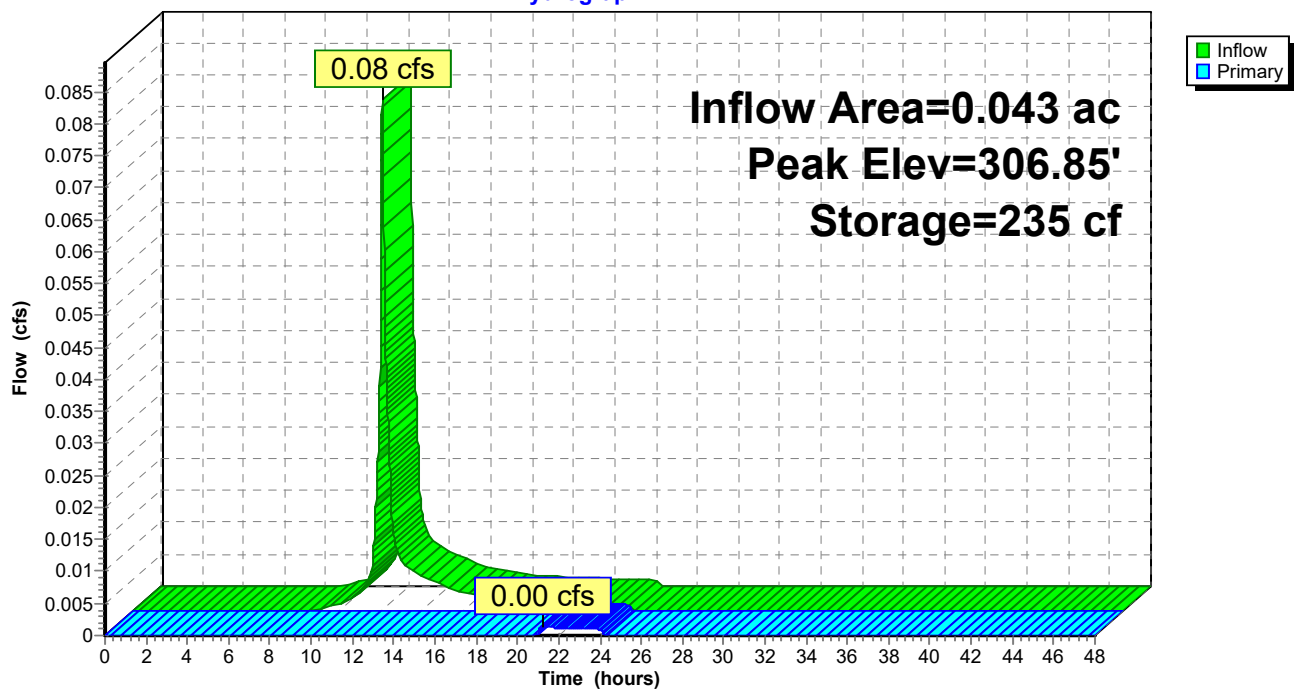
Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
303.77	0	0
303.85	5	5
304.10	14	19
306.10	110	129
306.35	14	143
306.85	92	235
307.10	46	281

Device	Routing	Invert	Outlet Devices
#1	Primary	306.85'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 21.22 hrs HW=306.85' (Free Discharge)
 ↑1=Orifice/Grate (Weir Controls 0.00 cfs @ 0.10 fps)

Pond RG11:

Hydrograph



Summary for Pond RG12:

[62] Hint: Exceeded Reach PS3 OUTLET depth by 1.27' @ 0.00 hrs

Inflow Area = 0.213 ac, 23.47% Impervious, Inflow Depth = 0.77" for 2-YR event
 Inflow = 0.17 cfs @ 12.12 hrs, Volume= 0.014 af
 Outflow = 0.17 cfs @ 12.12 hrs, Volume= 0.014 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.17 cfs @ 12.12 hrs, Volume= 0.014 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 310.27' @ 12.12 hrs Surf.Area= 0 sf Storage= 0 cf

Plug-Flow detention time= 0.0 min calculated for 0.014 af (100% of inflow)
 Center-of-Mass det. time= 0.0 min (879.7 - 879.7)

Volume	Invert	Avail.Storage	Storage Description
#1	310.27'	760 cf	Custom Stage Data Listed below

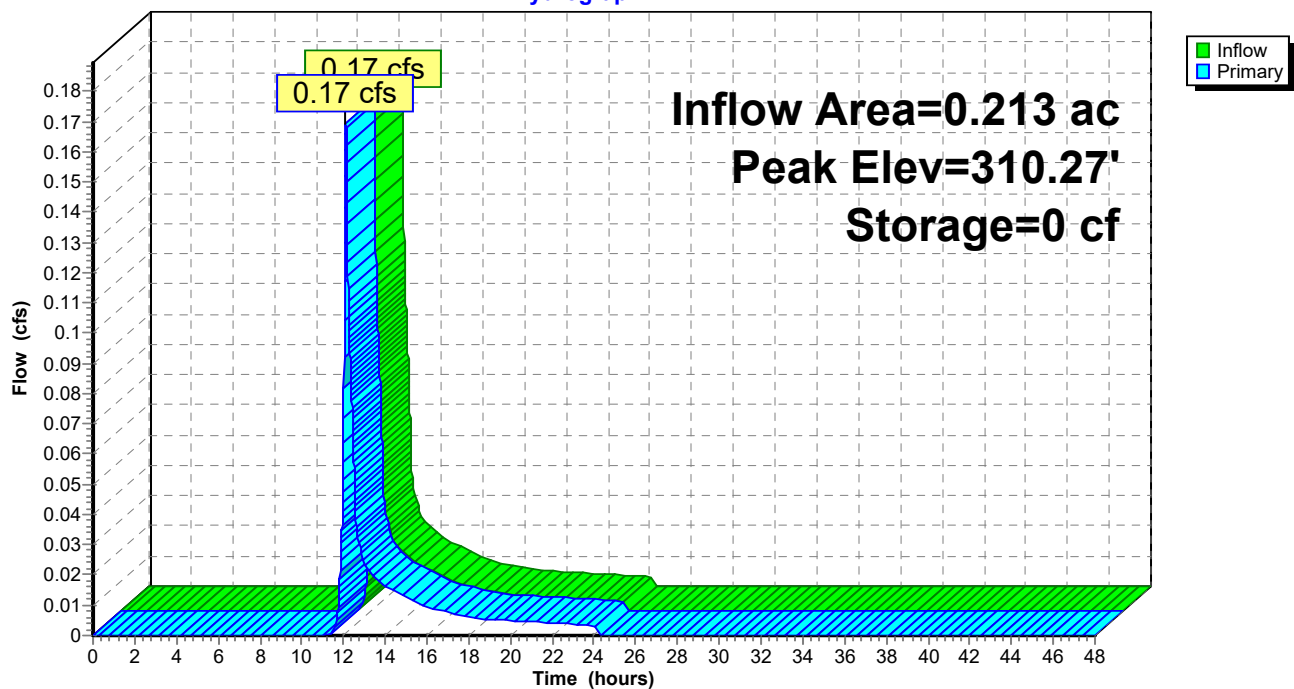
Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
310.27	0	0
310.60	15	15
310.85	44	59
312.10	219	278
312.35	44	322
312.85	292	614
313.10	146	760

Device	Routing	Invert	Outlet Devices
#1	Primary	309.75'	12.0" Horiz. Orifice/Grate X 0.50 C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.37 cfs @ 12.12 hrs HW=310.27' (Free Discharge)
 ↑1=Orifice/Grate (Orifice Controls 1.37 cfs @ 1.74 fps)

Pond RG12:

Hydrograph



Summary for Pond RG13:

[63] Warning: Exceeded Reach PS4 INLET depth by 0.70' @ 25.15 hrs

Inflow Area = 0.099 ac, 53.64% Impervious, Inflow Depth = 1.39" for 2-YR event
 Inflow = 0.16 cfs @ 12.10 hrs, Volume= 0.011 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 307.70' @ 25.03 hrs Surf.Area= 0 sf Storage= 500 cf

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

Volume	Invert	Avail.Storage	Storage Description
#1	304.29'	706 cf	Custom Stage Data Listed below

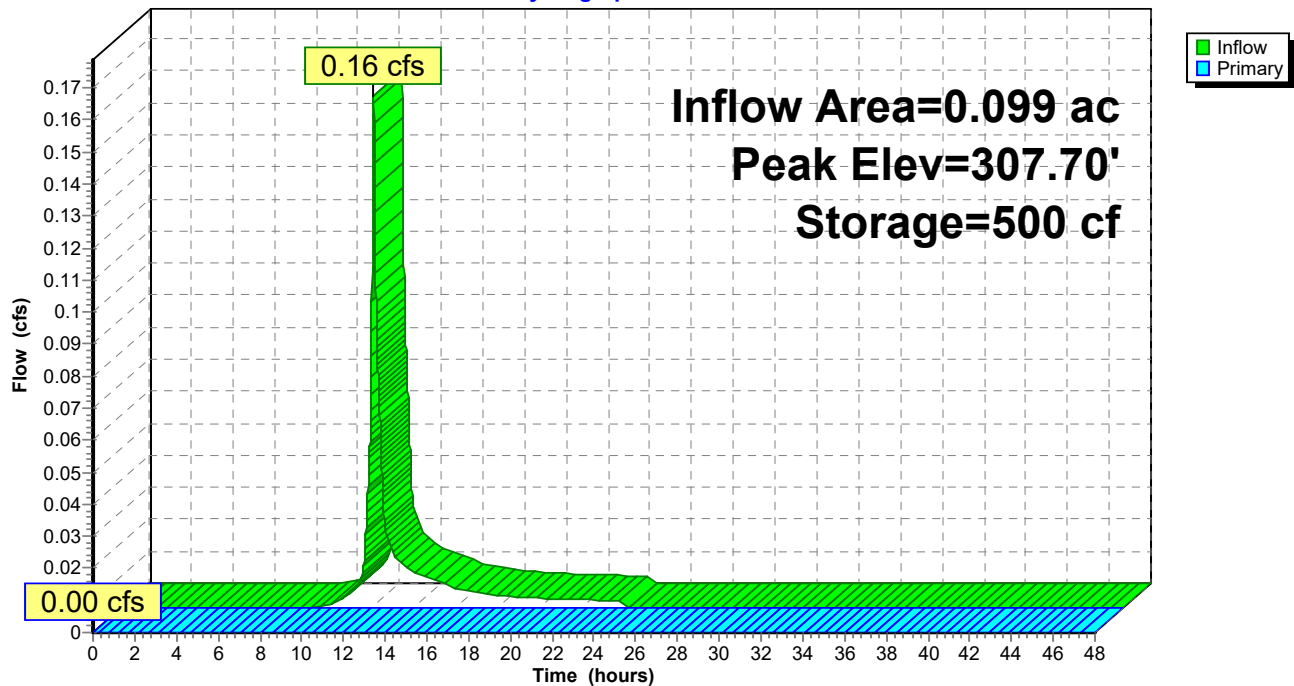
Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
304.29	0	0
304.62	42	42
304.87	31	73
307.20	290	363
307.45	31	394
307.95	208	602
308.20	104	706

Device	Routing	Invert	Outlet Devices
#1	Primary	307.95'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=304.29' (Free Discharge)
 ↑1=Orifice/Grate (Controls 0.00 cfs)

Pond RG13:

Hydrograph



Summary for Pond RG14:

Inflow Area = 0.054 ac, 64.02% Impervious, Inflow Depth = 1.67" for 2-YR event
 Inflow = 0.11 cfs @ 12.09 hrs, Volume= 0.008 af
 Outflow = 0.01 cfs @ 13.75 hrs, Volume= 0.003 af, Atten= 93%, Lag= 99.7 min
 Primary = 0.01 cfs @ 13.75 hrs, Volume= 0.003 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 304.96' @ 13.75 hrs Surf.Area= 0 sf Storage= 222 cf

Plug-Flow detention time= 333.8 min calculated for 0.003 af (33% of inflow)
 Center-of-Mass det. time= 205.6 min (1,033.1 - 827.5)

Volume	Invert	Avail.Storage	Storage Description
#1	302.54'	272 cf	Custom Stage Data Listed below

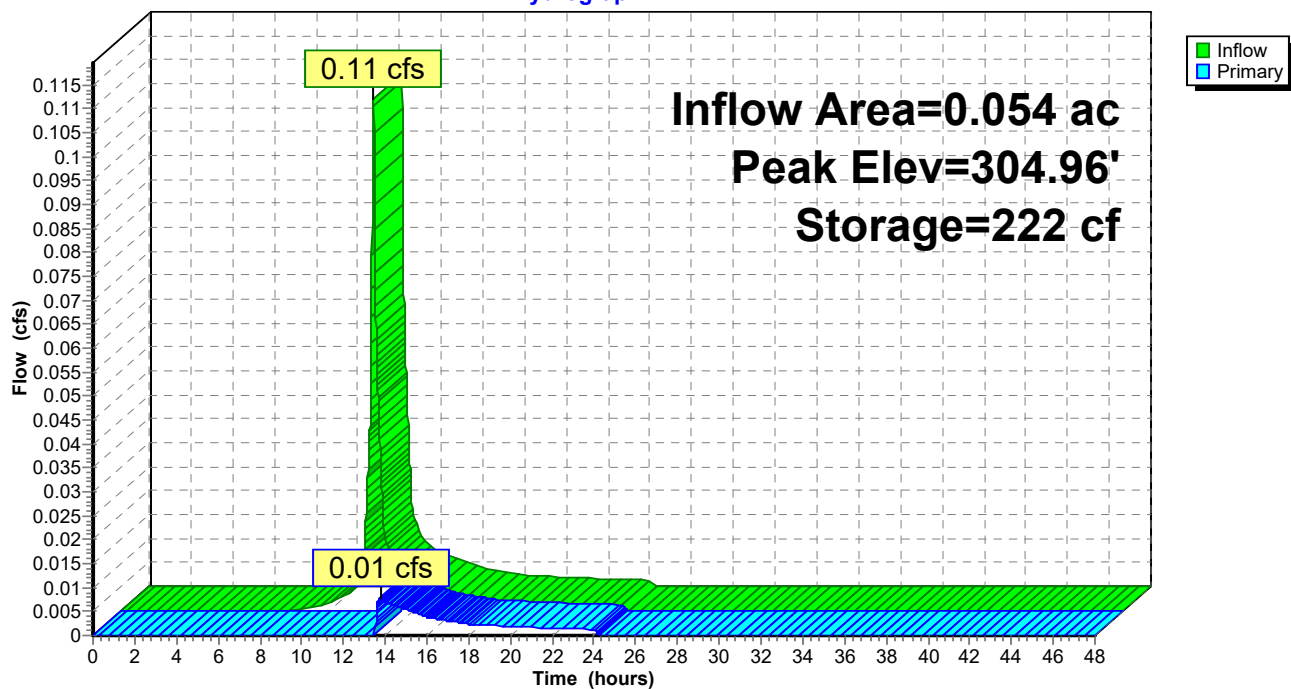
Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
302.54	0	0
302.62	5	5
302.87	15	20
304.20	82	102
304.45	15	117
304.95	103	220
305.20	52	272

Device	Routing	Invert	Outlet Devices
#1	Primary	304.95'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.01 cfs @ 13.75 hrs HW=304.96' (Free Discharge)
 ↑1=Orifice/Grate (Weir Controls 0.01 cfs @ 0.28 fps)

Pond RG14:

Hydrograph



Summary for Pond RG15:

[61] Hint: Exceeded Reach 10R outlet invert by 2.91' @ 12.22 hrs

Inflow Area = 1.015 ac, 19.57% Impervious, Inflow Depth = 0.68" for 2-YR event
 Inflow = 0.68 cfs @ 12.10 hrs, Volume= 0.057 af
 Outflow = 0.46 cfs @ 12.22 hrs, Volume= 0.048 af, Atten= 33%, Lag= 6.8 min
 Primary = 0.46 cfs @ 12.22 hrs, Volume= 0.048 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 300.85' @ 12.22 hrs Surf.Area= 0 sf Storage= 467 cf

Plug-Flow detention time= 111.5 min calculated for 0.048 af (83% of inflow)
 Center-of-Mass det. time= 36.4 min (922.2 - 885.8)

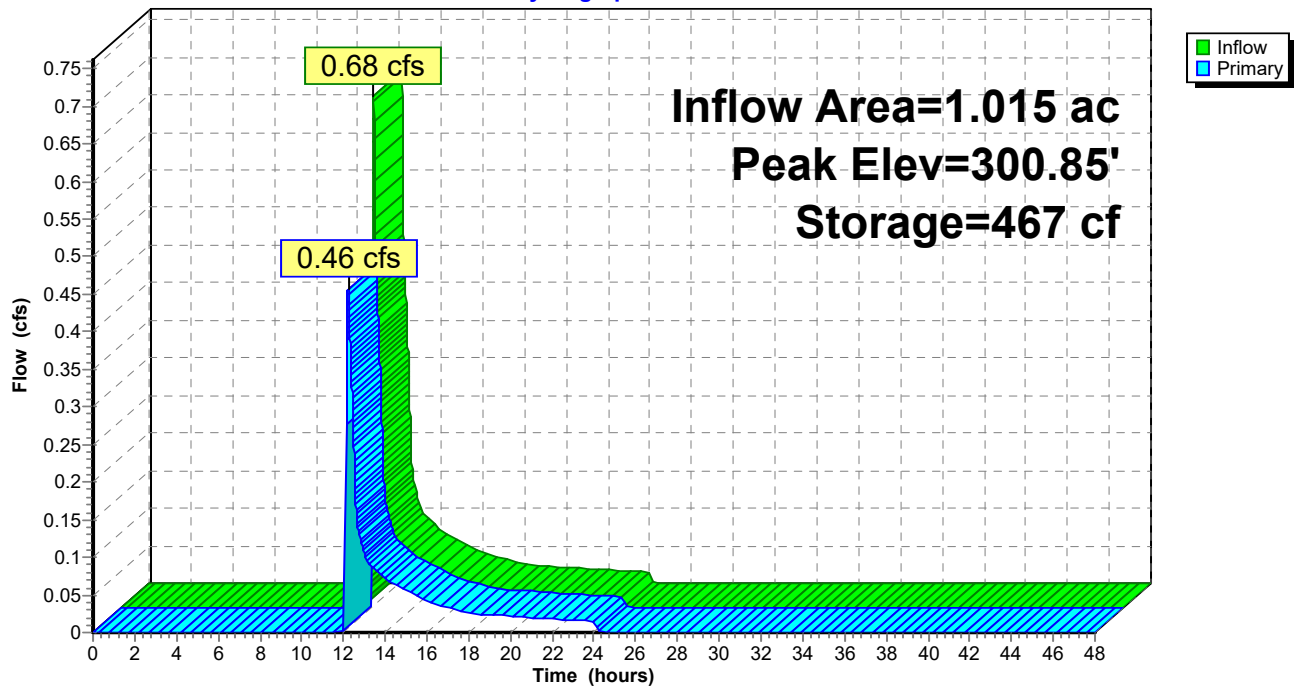
Volume	Invert	Avail.Storage	Storage Description
#1	298.00'	524 cf	Custom Stage Data Listed below
Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	
298.00	0	0	
299.00	110	110	
300.00	110	220	
300.25	28	248	
300.75	184	432	
301.00	92	524	

Device	Routing	Invert	Outlet Devices
#1	Primary	300.75'	18.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.45 cfs @ 12.22 hrs HW=300.85' (Free Discharge)
 ↑1=Orifice/Grate (Weir Controls 0.45 cfs @ 1.01 fps)

Pond RG15:

Hydrograph



Summary for Pond RG16:

Inflow Area = 2.675 ac, 4.94% Impervious, Inflow Depth = 0.47" for 2-YR event
 Inflow = 0.80 cfs @ 12.26 hrs, Volume= 0.106 af
 Outflow = 0.58 cfs @ 12.51 hrs, Volume= 0.086 af, Atten= 27%, Lag= 15.2 min
 Primary = 0.58 cfs @ 12.51 hrs, Volume= 0.086 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 300.86' @ 12.51 hrs Surf.Area= 0 sf Storage= 933 cf

Plug-Flow detention time= 126.1 min calculated for 0.086 af (81% of inflow)
 Center-of-Mass det. time= 45.3 min (961.9 - 916.6)

Volume	Invert	Avail.Storage	Storage Description
#1	298.00'	1,017 cf	Custom Stage Data Listed below

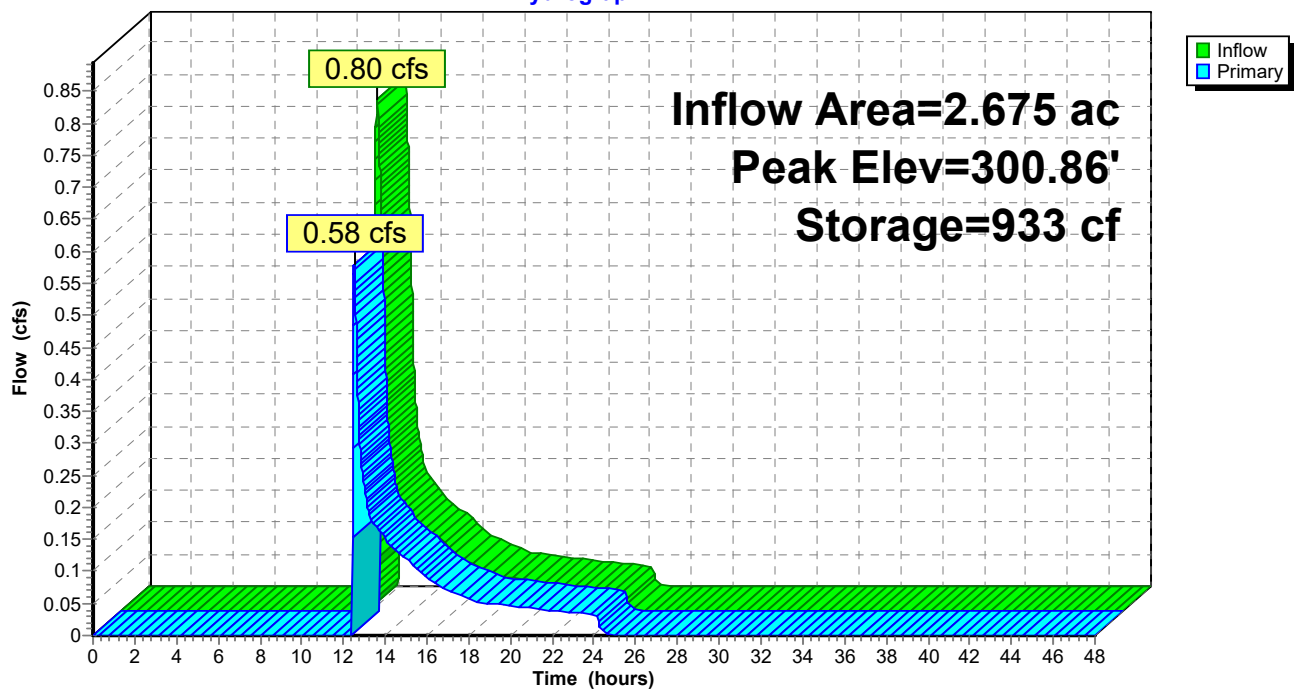
Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
298.00	0	0
299.00	182	182
300.00	182	364
300.25	46	410
300.75	455	865
301.00	152	1,017

Device	Routing	Invert	Outlet Devices
#1	Primary	300.75'	18.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.58 cfs @ 12.51 hrs HW=300.86' (Free Discharge)
 ↑1=Orifice/Grate (Weir Controls 0.58 cfs @ 1.09 fps)

Pond RG16:

Hydrograph



Summary for Pond RG19:

[62] Hint: Exceeded Reach PS6 OUTLET depth by 0.45' @ 43.03 hrs

Inflow Area = 0.717 ac, 23.42% Impervious, Inflow Depth = 0.77" for 2-YR event
 Inflow = 0.49 cfs @ 12.23 hrs, Volume= 0.046 af
 Outflow = 0.05 cfs @ 15.03 hrs, Volume= 0.018 af, Atten= 91%, Lag= 167.8 min
 Primary = 0.05 cfs @ 15.03 hrs, Volume= 0.018 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 295.78' @ 15.03 hrs Surf.Area= 0 sf Storage= 1,267 cf

Plug-Flow detention time= 364.6 min calculated for 0.018 af (38% of inflow)
 Center-of-Mass det. time= 213.0 min (1,104.7 - 891.7)

Volume	Invert	Avail.Storage	Storage Description
#1	293.50'	1,484 cf	Custom Stage Data Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
293.50	0	0
293.75	73	73
295.00	365	438
295.25	73	511
295.75	730	1,241
296.00	243	1,484

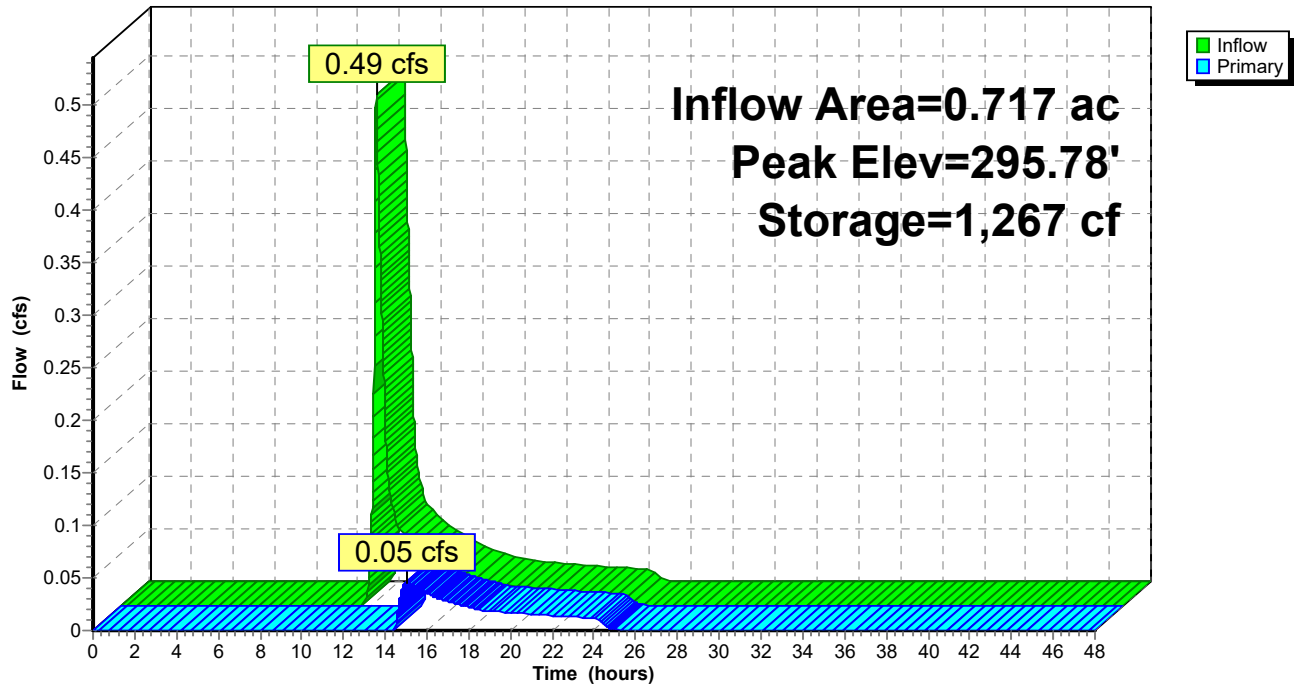
Device	Routing	Invert	Outlet Devices
#1	Primary	292.63'	8.0" Round Culvert L= 39.5' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 292.63' / 292.23' S= 0.0101 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf
#2	Device 1	295.75'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.04 cfs @ 15.03 hrs HW=295.78' (Free Discharge)

↑ **1=Culvert** (Passes 0.04 cfs of 2.23 cfs potential flow)
 ↑ **2=Orifice/Grate** (Weir Controls 0.04 cfs @ 0.53 fps)

Pond RG19:

Hydrograph



Summary for Pond RG20:

Inflow Area = 0.265 ac, 0.00% Impervious, Inflow Depth = 0.40" for 2-YR event
 Inflow = 0.07 cfs @ 12.13 hrs, Volume= 0.009 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 294.23' @ 24.34 hrs Surf.Area= 0 sf Storage= 389 cf

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

Volume	Invert	Avail.Storage	Storage Description
#1	292.47'	1,191 cf	Custom Stage Data Listed below

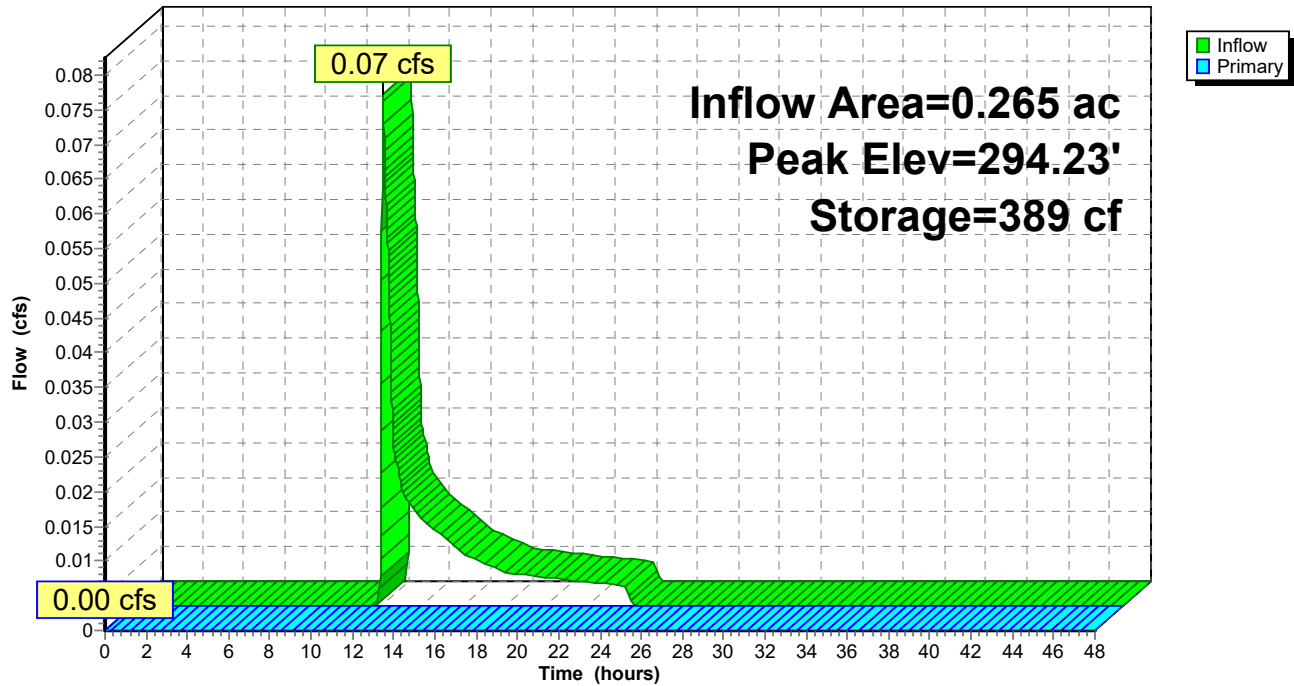
Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
292.47	0	0
292.55	18	18
292.80	55	73
294.30	330	403
294.55	55	458
295.05	550	1,008
295.30	183	1,191

Device	Routing	Invert	Outlet Devices
#1	Primary	295.05'	18.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=292.47' (Free Discharge)
 ↑1=Orifice/Grate (Controls 0.00 cfs)

Pond RG20:

Hydrograph



Summary for Pond RG21:

Inflow Area = 0.228 ac, 67.95% Impervious, Inflow Depth = 1.75" for 2-YR event
 Inflow = 0.47 cfs @ 12.09 hrs, Volume= 0.033 af
 Outflow = 0.19 cfs @ 12.33 hrs, Volume= 0.020 af, Atten= 59%, Lag= 14.4 min
 Primary = 0.19 cfs @ 12.33 hrs, Volume= 0.020 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 291.62' @ 12.33 hrs Surf.Area= 0 sf Storage= 631 cf

Plug-Flow detention time= 198.6 min calculated for 0.020 af (60% of inflow)
 Center-of-Mass det. time= 90.2 min (914.1 - 823.9)

Volume	Invert	Avail.Storage	Storage Description
#1	289.62'	749 cf	Custom Stage Data Listed below

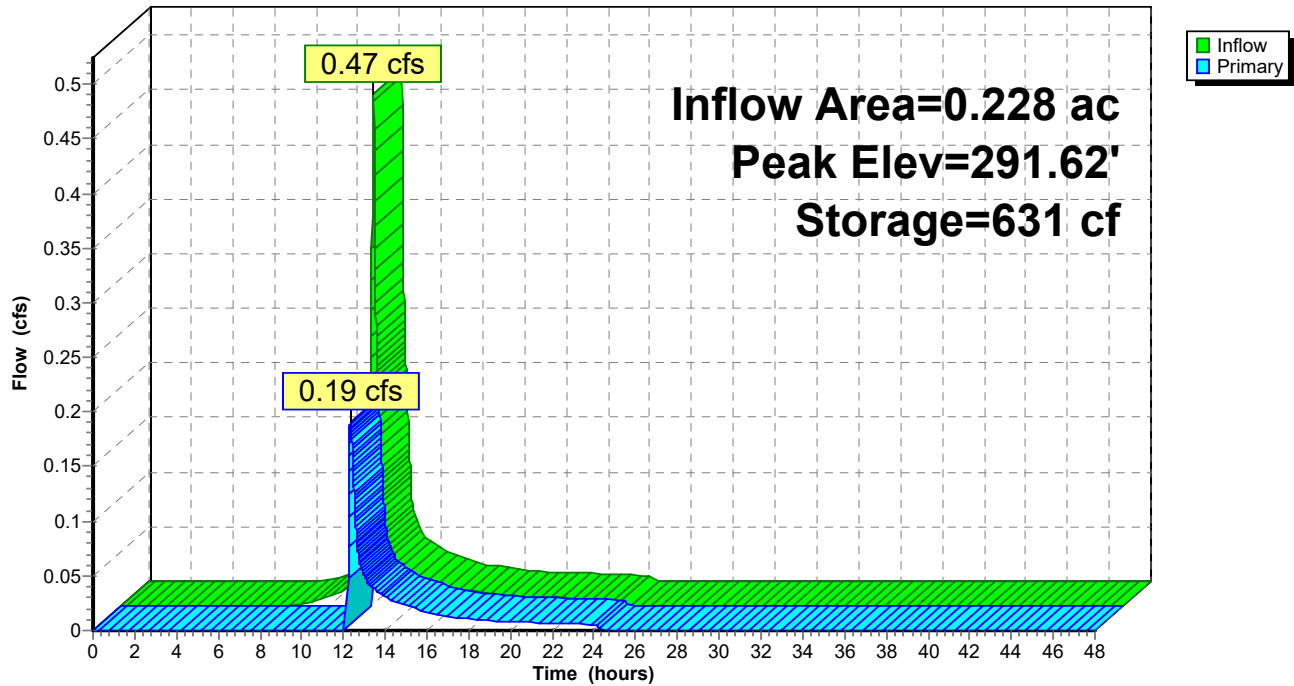
Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
289.62	0	0
289.95	65	65
290.20	49	114
291.20	195	309
291.45	49	358
291.55	228	586
291.80	163	749

Device	Routing	Invert	Outlet Devices
#1	Primary	291.55'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.19 cfs @ 12.33 hrs HW=291.62' (Free Discharge)
 ↑1=Orifice/Grate (Weir Controls 0.19 cfs @ 0.86 fps)

Pond RG21:

Hydrograph



Summary for Pond RG22:

Inflow Area = 0.153 ac, 15.01% Impervious, Inflow Depth = 1.20" for 2-YR event
 Inflow = 0.21 cfs @ 12.09 hrs, Volume= 0.015 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 258.52' @ 24.34 hrs Surf.Area= 0 sf Storage= 667 cf

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

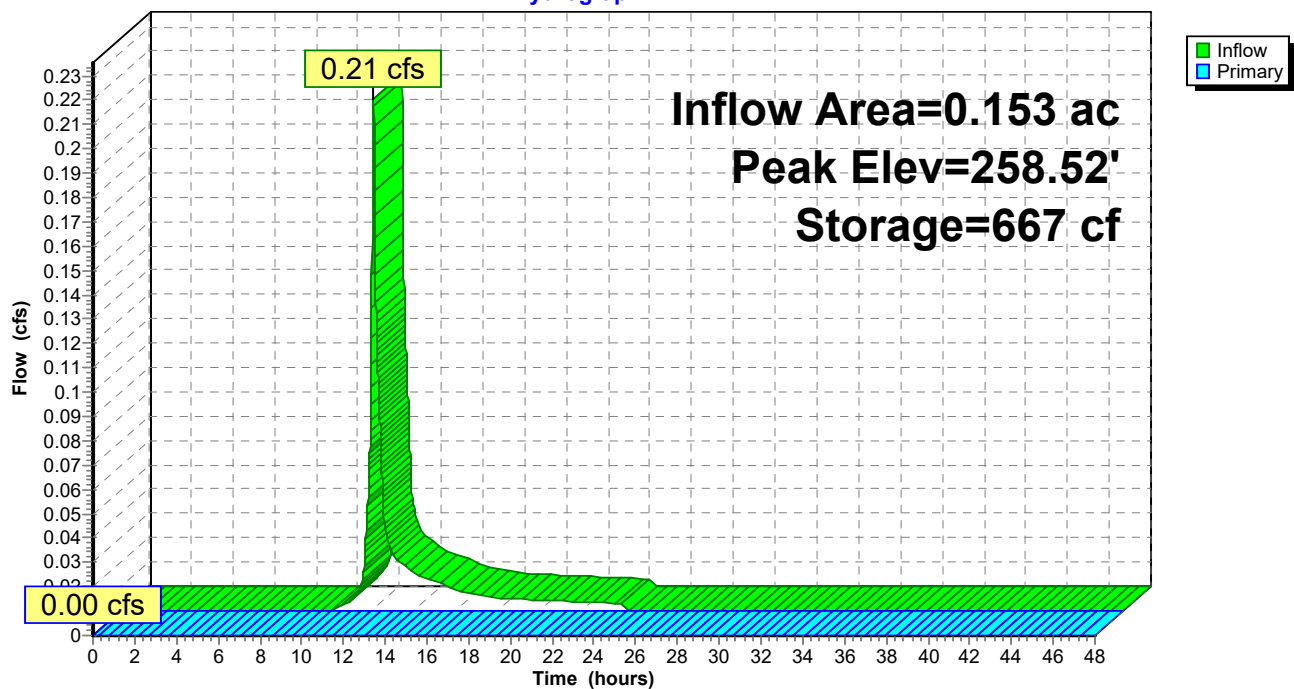
Volume	Invert	Avail.Storage	Storage Description
#1	256.22'	853 cf	Custom Stage Data Listed below
Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	
256.22	0	0	
256.55	66	66	
256.80	49	115	
257.80	197	312	
258.05	49	361	
258.55	328	689	
258.80	164	853	

Device	Routing	Invert	Outlet Devices
#1	Primary	258.55'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=256.22' (Free Discharge)
 ↑1=Orifice/Grate (Controls 0.00 cfs)

Pond RG22:

Hydrograph



Summary for Pond RG23:

[63] Warning: Exceeded Reach 21R INLET depth by 2.42' @ 24.34 hrs

Inflow Area = 0.183 ac, 16.37% Impervious, Inflow Depth = 0.22" for 2-YR event
 Inflow = 0.05 cfs @ 12.09 hrs, Volume= 0.003 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 256.42' @ 24.34 hrs Surf.Area= 0 sf Storage= 143 cf

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

Volume	Invert	Avail.Storage	Storage Description
#1	255.27'	568 cf	Custom Stage Data Listed below

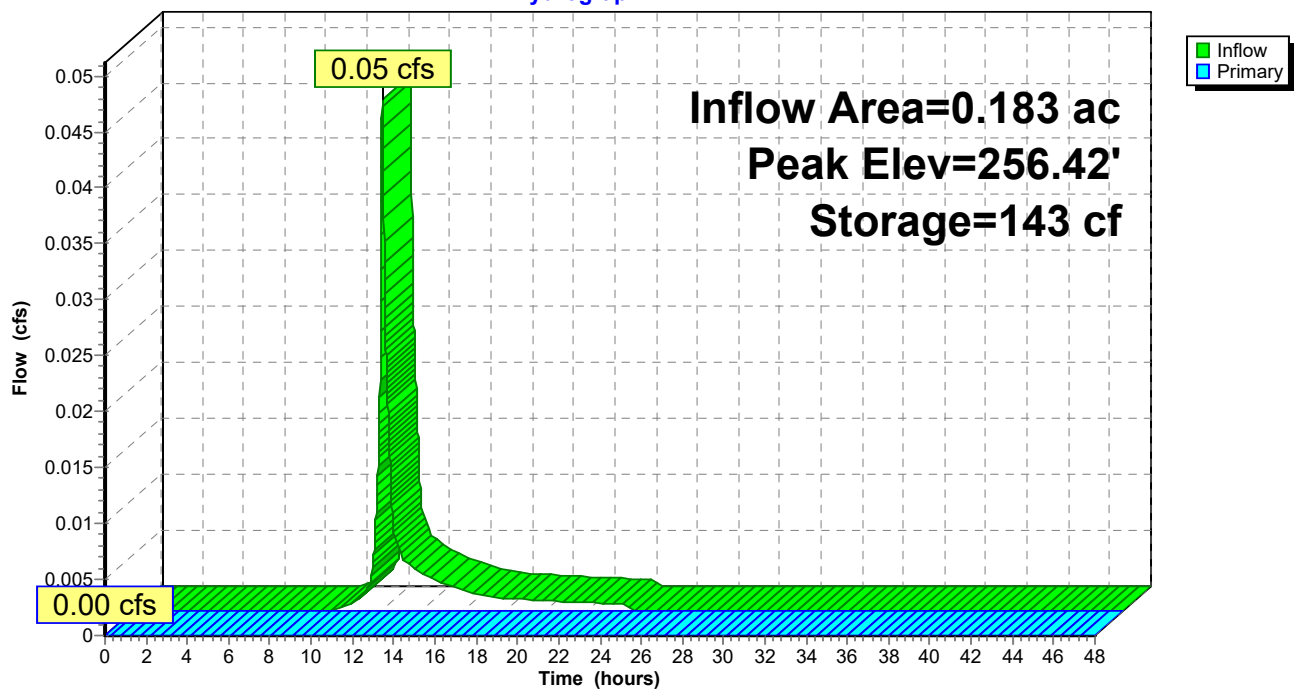
Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
255.27	0	0
255.60	41	41
255.85	31	72
257.10	155	227
257.35	31	258
257.85	207	465
258.10	103	568

Device	Routing	Invert	Outlet Devices
#1	Primary	257.85'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=255.27' (Free Discharge)
 ↑1=Orifice/Grate (Controls 0.00 cfs)

Pond RG23:

Hydrograph



Summary for Pond RG3:

Inflow Area = 0.150 ac, 46.64% Impervious, Inflow Depth = 1.20" for 2-YR event
 Inflow = 0.17 cfs @ 12.17 hrs, Volume= 0.015 af
 Outflow = 0.04 cfs @ 12.70 hrs, Volume= 0.008 af, Atten= 77%, Lag= 31.7 min
 Primary = 0.04 cfs @ 12.70 hrs, Volume= 0.008 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 310.93' @ 12.70 hrs Surf.Area= 0 sf Storage= 307 cf

Plug-Flow detention time= 234.5 min calculated for 0.008 af (55% of inflow)
 Center-of-Mass det. time= 112.7 min (968.8 - 856.1)

Volume	Invert	Avail.Storage	Storage Description
#1	309.50'	339 cf	Custom Stage Data Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
309.50	0	0
309.75	32	32
310.25	63	95
310.50	32	127
311.00	212	339

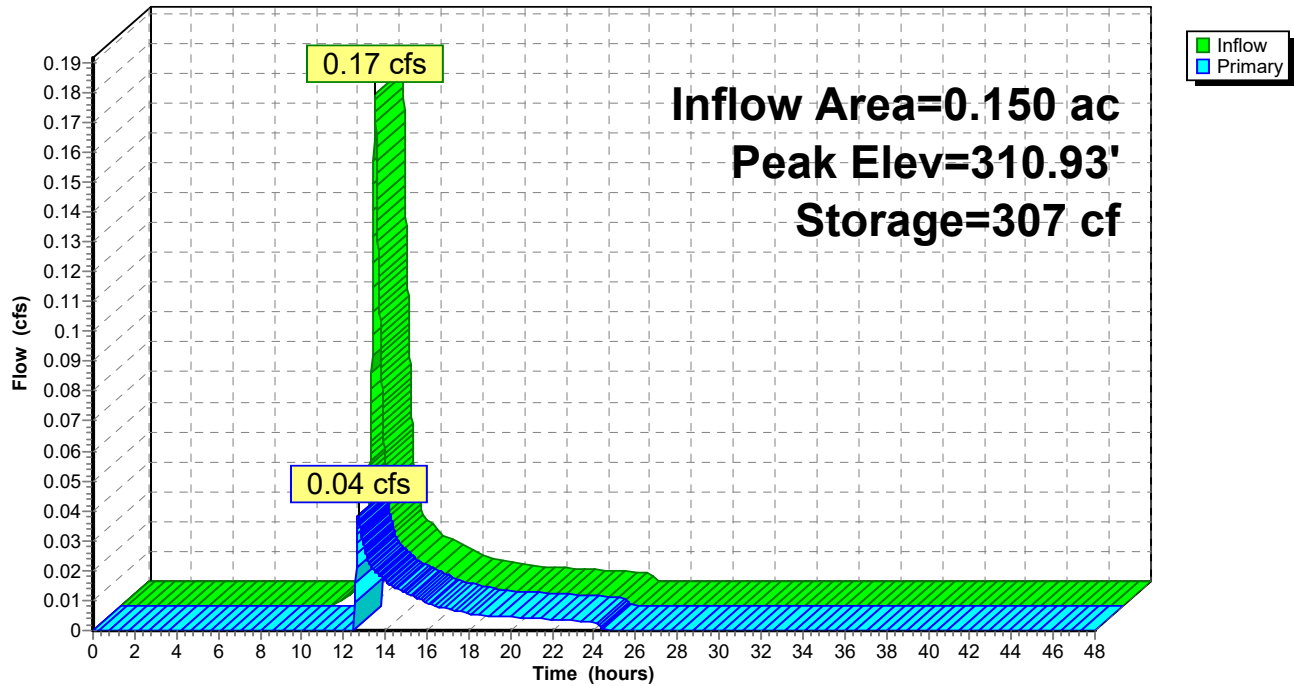
Device	Routing	Invert	Outlet Devices
#1	Primary	310.90'	4.0' long x 4.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=0.04 cfs @ 12.70 hrs HW=310.93' (Free Discharge)

↑1=**Broad-Crested Rectangular Weir** (Weir Controls 0.04 cfs @ 0.38 fps)

Pond RG3:

Hydrograph



Summary for Pond RG4:

Inflow Area = 0.036 ac, 34.97% Impervious, Inflow Depth = 0.97" for 2-YR event
 Inflow = 0.04 cfs @ 12.10 hrs, Volume= 0.003 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 303.49' @ 24.34 hrs Surf.Area= 0 sf Storage= 126 cf

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

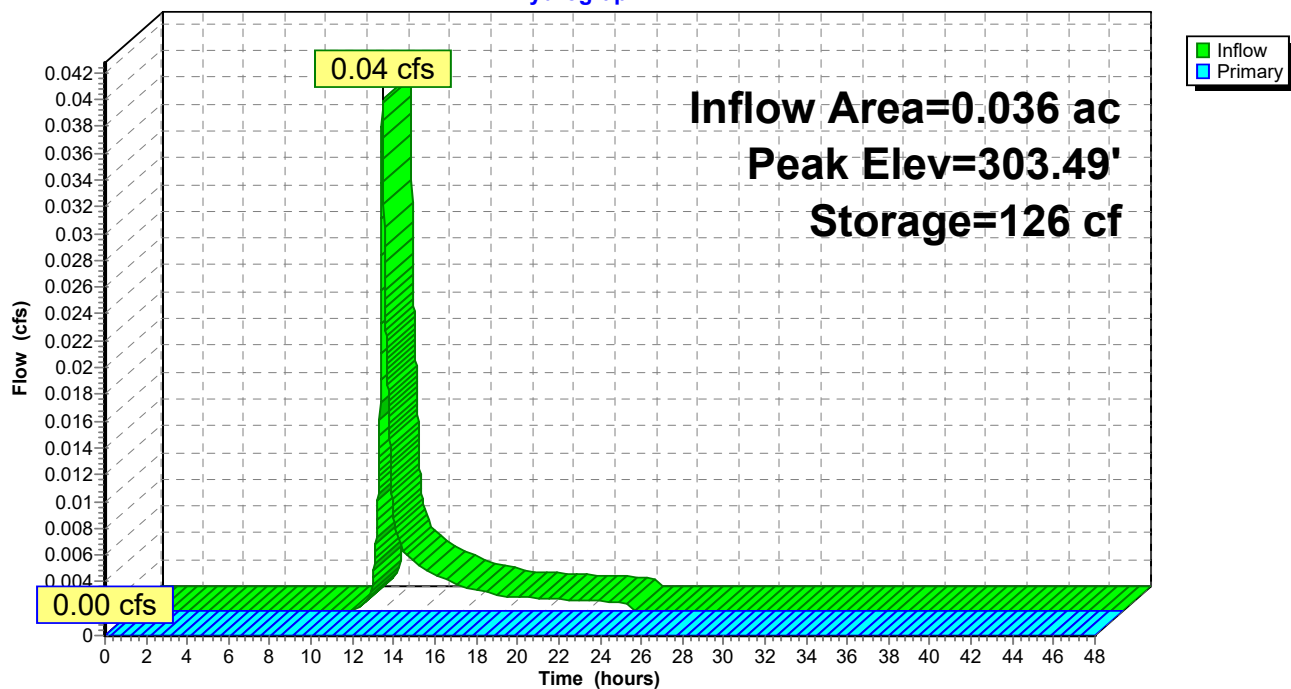
Volume	Invert	Avail.Storage	Storage Description
#1	302.42'	743 cf	Custom Stage Data Listed below
Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	
302.42	0	0	
302.75	39	39	
303.00	29	68	
306.00	352	420	
306.25	29	449	
306.75	196	645	
307.00	98	743	

Device	Routing	Invert	Outlet Devices
#1	Primary	306.75'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=302.42' (Free Discharge)
 ↑1=Orifice/Grate (Controls 0.00 cfs)

Pond RG4:

Hydrograph



Summary for Pond RG5:

Inflow Area = 0.052 ac, 40.18% Impervious, Inflow Depth = 1.08" for 2-YR event
 Inflow = 0.06 cfs @ 12.09 hrs, Volume= 0.005 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 305.20' @ 24.34 hrs Surf.Area= 0 sf Storage= 203 cf

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

Volume	Invert	Avail.Storage	Storage Description
#1	302.67'	486 cf	Custom Stage Data Listed below

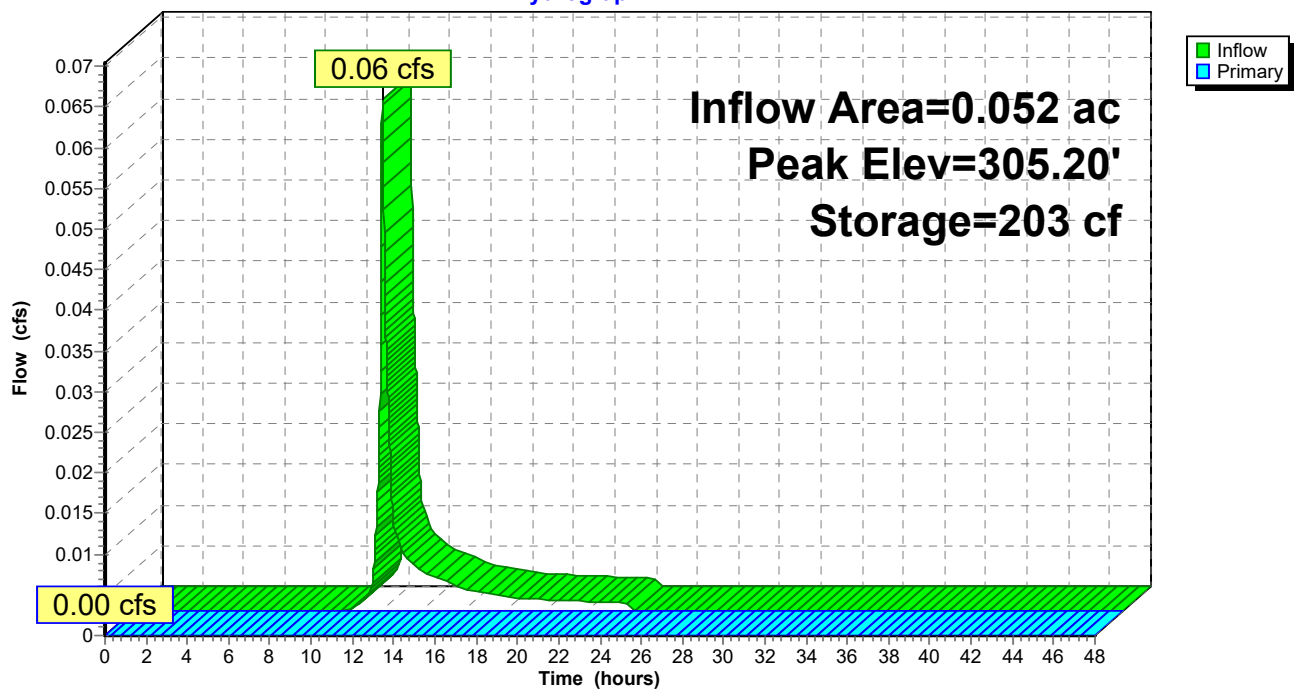
Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
302.67	0	0
302.75	7	7
303.00	20	27
306.00	239	266
306.25	20	286
306.75	133	419
307.00	67	486

Device	Routing	Invert	Outlet Devices
#1	Primary	306.75'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=302.67' (Free Discharge)
 ↑1=Orifice/Grate (Controls 0.00 cfs)

Pond RG5:

Hydrograph



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

Subcatchment1S: (new Subcat)	Runoff Area=6,927 sf 11.13% Impervious Runoff Depth=1.39" Tc=6.0 min CN=65 Runoff=0.24 cfs 0.018 af
Subcatchment2S: Road	Runoff Area=12,547 sf 25.48% Impervious Runoff Depth=2.55" Tc=6.0 min CN=80 Runoff=0.86 cfs 0.061 af
Subcatchment3S: Undeveloped Area	Runoff Area=81,012 sf 0.00% Impervious Runoff Depth=1.67" Flow Length=525' Tc=28.2 min CN=69 Runoff=2.04 cfs 0.259 af
Subcatchment4S:	Runoff Area=87,503 sf 2.36% Impervious Runoff Depth=2.05" Flow Length=525' Tc=14.9 min CN=74 Runoff=3.62 cfs 0.343 af
Subcatchment5S:	Runoff Area=3,065 sf 100.00% Impervious Runoff Depth=4.36" Tc=6.0 min CN=98 Runoff=0.32 cfs 0.026 af
Subcatchment7S: (new Subcat)	Runoff Area=6,557 sf 79.05% Impervious Runoff Depth=3.49" Tc=6.0 min CN=90 Runoff=0.60 cfs 0.044 af
Subcatchment8S: (new Subcat)	Runoff Area=17,230 sf 24.31% Impervious Runoff Depth=1.74" Tc=6.0 min CN=70 Runoff=0.79 cfs 0.058 af
Subcatchment9S:	Runoff Area=1,988 sf 100.00% Impervious Runoff Depth=4.36" Tc=6.0 min CN=98 Runoff=0.21 cfs 0.017 af
Subcatchment10S: (new Subcat)	Runoff Area=25,265 sf 28.62% Impervious Runoff Depth=2.63" Flow Length=128' Tc=1.5 min CN=81 Runoff=2.11 cfs 0.127 af
Subcatchment11S:	Runoff Area=23,740 sf 22.38% Impervious Runoff Depth=1.67" Tc=6.0 min CN=69 Runoff=1.03 cfs 0.076 af
Subcatchment12S:	Runoff Area=36,401 sf 0.00% Impervious Runoff Depth=2.38" Flow Length=485' Slope=0.0350 '/' Tc=8.6 min CN=78 Runoff=2.13 cfs 0.165 af
Subcatchment13S:	Runoff Area=67,075 sf 0.00% Impervious Runoff Depth=1.97" Flow Length=331' Slope=0.0100 '/' Tc=22.1 min CN=73 Runoff=2.26 cfs 0.253 af
Subcatchment14S:	Runoff Area=34,193 sf 28.61% Impervious Runoff Depth=1.89" Flow Length=172' Tc=1.5 min CN=72 Runoff=2.02 cfs 0.124 af
Subcatchment15S:	Runoff Area=33,688 sf 0.00% Impervious Runoff Depth=1.97" Flow Length=1,115' Slope=0.0050 '/' Tc=105.1 min CN=73 Runoff=0.48 cfs 0.127 af
Subcatchment16S:	Runoff Area=4,678 sf 100.00% Impervious Runoff Depth=4.36" Tc=6.0 min CN=98 Runoff=0.48 cfs 0.039 af
SubcatchmentCUL: (new Subcat)	Runoff Area=10,593 sf 29.57% Impervious Runoff Depth=1.89" Tc=6.0 min CN=72 Runoff=0.53 cfs 0.038 af

SubcatchmentP1:	Runoff Area=98,881 sf 5.04% Impervious Runoff Depth=1.26" Flow Length=650' Tc=12.2 min CN=63 Runoff=2.47 cfs 0.239 af
SubcatchmentP2:	Runoff Area=10,702 sf 0.00% Impervious Runoff Depth=1.14" Flow Length=344' Tc=8.6 min CN=61 Runoff=0.26 cfs 0.023 af
SubcatchmentS1:	Runoff Area=1,539 sf 96.04% Impervious Runoff Depth=4.25" Tc=6.0 min CN=97 Runoff=0.16 cfs 0.013 af
SubcatchmentS10:	Runoff Area=2,106 sf 30.86% Impervious Runoff Depth=1.89" Tc=6.0 min CN=72 Runoff=0.11 cfs 0.008 af
SubcatchmentS11:	Runoff Area=1,858 sf 62.65% Impervious Runoff Depth=2.91" Tc=6.0 min CN=84 Runoff=0.14 cfs 0.010 af
SubcatchmentS12:	Runoff Area=9,267 sf 23.47% Impervious Runoff Depth=1.74" Tc=6.0 min CN=70 Runoff=0.42 cfs 0.031 af
SubcatchmentS13:	Runoff Area=4,314 sf 53.64% Impervious Runoff Depth=2.63" Tc=6.0 min CN=81 Runoff=0.31 cfs 0.022 af
SubcatchmentS14:	Runoff Area=2,371 sf 64.02% Impervious Runoff Depth=3.00" Tc=6.0 min CN=85 Runoff=0.19 cfs 0.014 af
SubcatchmentS15:	Runoff Area=44,214 sf 19.57% Impervious Runoff Depth=1.60" Tc=6.0 min CN=68 Runoff=1.83 cfs 0.135 af
SubcatchmentS19:	Runoff Area=31,232 sf 23.42% Impervious Runoff Depth=1.74" Tc=6.0 min CN=70 Runoff=1.43 cfs 0.104 af
SubcatchmentS2:	Runoff Area=0.550 ac 12.73% Impervious Runoff Depth=1.46" Tc=6.0 min CN=66 Runoff=0.89 cfs 0.067 af
SubcatchmentS20:	Runoff Area=11,551 sf 0.00% Impervious Runoff Depth=1.14" Tc=6.0 min CN=61 Runoff=0.31 cfs 0.025 af
SubcatchmentS21:	Runoff Area=9,941 sf 67.95% Impervious Runoff Depth=3.10" Tc=6.0 min CN=86 Runoff=0.82 cfs 0.059 af
SubcatchmentS22: Stow Road South	Runoff Area=6,662 sf 15.01% Impervious Runoff Depth=2.38" Tc=6.0 min CN=78 Runoff=0.43 cfs 0.030 af
SubcatchmentS23: Stow Road South	Runoff Area=1,297 sf 23.36% Impervious Runoff Depth=2.55" Tc=6.0 min CN=80 Runoff=0.09 cfs 0.006 af
SubcatchmentS3:	Runoff Area=6,554 sf 46.64% Impervious Runoff Depth=2.38" Flow Length=426' Tc=11.6 min CN=78 Runoff=0.35 cfs 0.030 af
SubcatchmentS4:	Runoff Area=1,550 sf 34.97% Impervious Runoff Depth=2.05" Tc=6.0 min CN=74 Runoff=0.08 cfs 0.006 af
SubcatchmentS5:	Runoff Area=2,245 sf 40.18% Impervious Runoff Depth=2.21" Tc=6.0 min CN=76 Runoff=0.13 cfs 0.009 af

Subcatchment SBS: Runoff Area=6,892 sf 15.19% Impervious Runoff Depth=2.38"
Tc=6.0 min CN=78 Runoff=0.44 cfs 0.031 af

Reach 1R: (new Reach) Avg. Flow Depth=0.44' Max Vel=5.69 fps Inflow=1.92 cfs 0.124 af
12.0" Round Pipe n=0.011 L=72.0' S=0.0125 '/' Capacity=4.71 cfs Outflow=1.91 cfs 0.124 af

Reach 4R: Avg. Flow Depth=0.08' Max Vel=5.02 fps Inflow=0.16 cfs 0.013 af
12.0" Round Pipe n=0.011 L=22.0' S=0.0682 ' Capacity=10.99 cfs Outflow=0.16 cfs 0.013 af

Reach 5R: Intermittent Stream Avg. Flow Depth=0.73' Max Vel=1.80 fps Inflow=6.58 cfs 0.768 af
n=0.050 L=845.0' S=0.0100 '/' Capacity=11.78 cfs Outflow=5.97 cfs 0.768 af

Reach 6R: new Avg. Flow Depth=0.06' Max Vel=1.55 fps Inflow=0.02 cfs 0.008 af
8.0" Round Pipe n=0.011 L=197.0' S=0.0100 '/' Capacity=1.43 cfs Outflow=0.02 cfs 0.008 af

Reach 7R: Avg. Flow Depth=0.09' Max Vel=4.46 fps Inflow=0.16 cfs 0.013 af
12.0" Round Pipe n=0.014 L=88.0' S=0.0795 '/' Capacity=9.33 cfs Outflow=0.16 cfs 0.013 af

Reach 8R: new Avg. Flow Depth=0.18' Max Vel=5.60 fps Inflow=0.42 cfs 0.031 af
8.0" Round Pipe n=0.011 L=128.0' S=0.0353 '/' Capacity=2.68 cfs Outflow=0.42 cfs 0.031 af

Reach 9R: new Avg. Flow Depth=0.13' Max Vel=2.92 fps Inflow=0.13 cfs 0.009 af
8.0" Round Pipe n=0.011 L=7.0' S=0.0143 '/' Capacity=1.71 cfs Outflow=0.14 cfs 0.009 af

Reach 10R: new Avg. Flow Depth=0.00' Max Vel=0.00 fps
18.0" Round Pipe n=0.011 L=84.0' S=0.0400 '/' Capacity=24.83 cfs Outflow=0.00 cfs 0.000 af

Reach 11R: new Avg. Flow Depth=0.60' Max Vel=5.57 fps Inflow=1.82 cfs 0.125 af
8.0" Round Pipe n=0.011 L=7.0' S=0.0143 '/' Capacity=1.71 cfs Outflow=1.82 cfs 0.125 af

Reach 12R: (new Reach) Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
8.0" Round Pipe n=0.011 L=18.0' S=0.0111 '/' Capacity=1.51 cfs Outflow=0.00 cfs 0.000 af

Reach 13R: New Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
8.0" Round Pipe n=0.011 L=18.0' S=0.0111 '/' Capacity=1.51 cfs Outflow=0.00 cfs 0.000 af

Reach 14R: (new Reach) Avg. Flow Depth=0.03' Max Vel=1.34 fps Inflow=0.01 cfs 0.002 af
8.0" Round Pipe n=0.011 L=33.0' S=0.0173 '/' Capacity=1.88 cfs Outflow=0.01 cfs 0.002 af

Reach 15R: New Avg. Flow Depth=0.07' Max Vel=2.18 fps Inflow=0.04 cfs 0.005 af
8.0" Round Pipe n=0.011 L=18.0' S=0.0167 '/' Capacity=1.84 cfs Outflow=0.04 cfs 0.005 af

Reach 16R: New Avg. Flow Depth=0.03' Max Vel=1.36 fps Inflow=0.01 cfs 0.003 af
8.0" Round Pipe n=0.011 L=36.0' S=0.0194 '/' Capacity=1.99 cfs Outflow=0.01 cfs 0.003 af

Reach 17R: New Avg. Flow Depth=0.67' Max Vel=8.45 fps Inflow=3.04 cfs 0.261 af
8.0" Round Pipe n=0.011 L=67.0' S=0.0328 '/' Capacity=2.59 cfs Outflow=2.77 cfs 0.261 af

Reach 18R: New Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
8.0" Round Pipe n=0.011 L=16.0' S=0.0200 '/' Capacity=2.02 cfs Outflow=0.00 cfs 0.000 af

Reach 19R: (new Reach)	Avg. Flow Depth=0.20' Max Vel=8.85 fps Inflow=0.78 cfs 0.045 af
8.0" Round Pipe n=0.011 L=47.0' S=0.0781 '/'	Capacity=3.99 cfs Outflow=0.77 cfs 0.045 af
Reach 20R: 12" RCP pipe	Avg. Flow Depth=0.27' Max Vel=5.01 fps Inflow=0.86 cfs 0.061 af
12.0" Round Pipe n=0.013 L=22.0' S=0.0227 '/'	Capacity=5.37 cfs Outflow=0.86 cfs 0.061 af
Reach 21R: (new Reach)	Avg. Flow Depth=0.11' Max Vel=1.58 fps Inflow=0.06 cfs 0.014 af
8.0" Round Pipe n=0.011 L=50.0' S=0.0050 '/'	Capacity=1.01 cfs Outflow=0.06 cfs 0.014 af
Reach CB1: CB1	Avg. Flow Depth=0.27' Max Vel=7.60 fps Inflow=1.32 cfs 0.100 af
12.0" Round Pipe n=0.011 L=27.0' S=0.0370 '/'	Capacity=8.10 cfs Outflow=1.32 cfs 0.100 af
Reach CP1:	Inflow=0.93 cfs 0.090 af Outflow=0.93 cfs 0.090 af
Reach CP2:	Inflow=12.95 cfs 2.287 af Outflow=12.95 cfs 2.287 af
Reach PS1:	Avg. Flow Depth=0.37' Max Vel=4.12 fps Inflow=2.47 cfs 0.239 af n=0.035 L=228.0' S=0.0658 '/'
	Capacity=20.22 cfs Outflow=2.46 cfs 0.239 af
Reach PS10A:	Avg. Flow Depth=0.08' Max Vel=1.71 fps Inflow=0.16 cfs 0.013 af n=0.035 L=18.0' S=0.0833 '/'
	Capacity=261.94 cfs Outflow=0.16 cfs 0.013 af
Reach PS10B:	Avg. Flow Depth=0.08' Max Vel=1.63 fps Inflow=0.16 cfs 0.013 af n=0.035 L=42.0' S=0.0714 '/'
	Capacity=242.51 cfs Outflow=0.16 cfs 0.013 af
Reach PS2:	Avg. Flow Depth=0.13' Max Vel=2.04 fps Inflow=0.24 cfs 0.018 af n=0.035 L=31.0' S=0.0645 '/'
	Capacity=20.02 cfs Outflow=0.24 cfs 0.018 af
Reach PS3:	Avg. Flow Depth=0.16' Max Vel=2.47 fps Inflow=0.42 cfs 0.031 af n=0.035 L=58.0' S=0.0690 '/'
	Capacity=20.70 cfs Outflow=0.42 cfs 0.031 af
Reach PS4:	Avg. Flow Depth=0.17' Max Vel=1.66 fps Inflow=0.31 cfs 0.022 af n=0.035 L=34.0' S=0.0294 '/'
	Capacity=13.52 cfs Outflow=0.31 cfs 0.022 af
Reach PS6: (new Reach)	Avg. Flow Depth=0.41' Max Vel=1.86 fps Inflow=1.43 cfs 0.104 af n=0.035 L=398.0' S=0.0118 '/'
	Capacity=8.56 cfs Outflow=1.29 cfs 0.104 af
Reach PS7: (new Reach)	Avg. Flow Depth=0.34' Max Vel=3.49 fps Inflow=2.02 cfs 0.124 af n=0.035 L=303.0' S=0.0528 '/'
	Capacity=81.69 cfs Outflow=1.92 cfs 0.124 af
Reach PS8: (new Reach)	Avg. Flow Depth=0.63' Max Vel=3.73 fps Inflow=7.16 cfs 0.715 af n=0.023 L=40.0' S=0.0112 '/'
	Capacity=80.78 cfs Outflow=7.08 cfs 0.715 af
Reach PS9: (new Reach)	Avg. Flow Depth=0.30' Max Vel=1.98 fps Inflow=0.86 cfs 0.061 af n=0.035 L=75.0' S=0.0200 '/'
	Capacity=11.15 cfs Outflow=0.86 cfs 0.061 af
Pond 1P: (new Pond)	Peak Elev=301.66' Inflow=0.51 cfs 0.047 af 18.0" Round Culvert n=0.011 L=85.0' S=0.0412 '/'
	Outflow=0.51 cfs 0.047 af
Pond 2P: (new Pond)	Peak Elev=298.49' Inflow=2.23 cfs 0.173 af 18.0" Round Culvert n=0.011 L=47.0' S=0.0362 '/'
	Outflow=2.23 cfs 0.173 af

Pond 3P: MH2B	Peak Elev=284.67' Inflow=6.00 cfs 0.628 af 24.0" Round Culvert n=0.011 L=72.0' S=0.0200 ' Outflow=6.00 cfs 0.628 af
Pond 4P: Constructed Wetland	Peak Elev=260.48' Storage=22,660 cf Inflow=10.15 cfs 1.043 af Primary=4.60 cfs 1.042 af Secondary=0.00 cfs 0.000 af Outflow=4.60 cfs 1.042 af
Pond 5P: MH2A	Peak Elev=278.71' Inflow=6.74 cfs 0.673 af 24.0" Round Culvert n=0.011 L=60.0' S=0.0200 ' Outflow=6.74 cfs 0.673 af
Pond 20P: (new Pond)	Peak Elev=265.93' Inflow=6.91 cfs 0.690 af 24.0" Round Culvert n=0.011 L=160.0' S=0.0200 ' Outflow=6.91 cfs 0.690 af
Pond BS: Bus Station RG	Peak Elev=257.51' Storage=2,027 cf Inflow=1.76 cfs 0.132 af Outflow=1.54 cfs 0.088 af
Pond CB2: (new Pond)	Peak Elev=262.32' Inflow=0.32 cfs 0.026 af 12.0" Round Culvert n=0.011 L=10.0' S=0.0100 ' Outflow=0.32 cfs 0.026 af
Pond CB3: (new Pond)	Peak Elev=277.45' Inflow=0.21 cfs 0.017 af 12.0" Round Culvert n=0.011 L=6.0' S=0.0333 ' Outflow=0.21 cfs 0.017 af
Pond CB4: (new Pond)	Peak Elev=294.14' Inflow=0.60 cfs 0.044 af 12.0" Round Culvert n=0.011 L=7.0' S=0.0286 ' Outflow=0.60 cfs 0.044 af
Pond CB5: (new Pond)	Peak Elev=294.42' Inflow=0.79 cfs 0.058 af 12.0" Round Culvert n=0.011 L=17.0' S=0.0235 ' Outflow=0.79 cfs 0.058 af
Pond CULdeSAC: Cul-de-sac	Peak Elev=299.78' Storage=1,672 cf Inflow=0.53 cfs 0.038 af Outflow=0.00 cfs 0.000 af
Pond MH1: (new Pond)	Peak Elev=262.51' Inflow=7.16 cfs 0.715 af 30.0" Round Culvert n=0.013 L=35.0' S=0.0100 ' Outflow=7.16 cfs 0.715 af
Pond MH2: (new Pond)	Peak Elev=271.83' Inflow=6.91 cfs 0.690 af 24.0" Round Culvert n=0.011 L=125.0' S=0.0200 ' Outflow=6.91 cfs 0.690 af
Pond MH3: (new Pond)	Peak Elev=290.29' Inflow=6.00 cfs 0.626 af 24.0" Round Culvert n=0.011 L=33.0' S=0.0200 ' Outflow=6.00 cfs 0.626 af
Pond MH4:	Peak Elev=300.19' Inflow=0.16 cfs 0.015 af 18.0" Round Culvert n=0.011 L=169.0' S=0.0200 ' Outflow=0.16 cfs 0.015 af
Pond MH5:	Peak Elev=301.29' Inflow=0.16 cfs 0.013 af 18.0" Round Culvert n=0.011 L=56.0' S=0.0107 ' Outflow=0.16 cfs 0.013 af
Pond MH6: CB6	Peak Elev=294.00' Inflow=4.80 cfs 0.449 af 24.0" Round Culvert n=0.011 L=101.0' S=0.0200 ' Outflow=4.80 cfs 0.449 af
Pond RG10:	Peak Elev=306.86' Storage=427 cf Inflow=0.11 cfs 0.013 af Outflow=0.01 cfs 0.003 af

Pond RG11:	Peak Elev=306.87' Storage=239 cf Inflow=0.14 cfs 0.010 af Outflow=0.04 cfs 0.005 af
Pond RG12:	Peak Elev=310.28' Storage=0 cf Inflow=0.42 cfs 0.031 af Outflow=0.42 cfs 0.031 af
Pond RG13:	Peak Elev=307.97' Storage=609 cf Inflow=0.31 cfs 0.022 af Outflow=0.02 cfs 0.008 af
Pond RG14:	Peak Elev=305.00' Storage=231 cf Inflow=0.19 cfs 0.014 af Outflow=0.13 cfs 0.009 af
Pond RG15:	Peak Elev=300.99' Storage=520 cf Inflow=1.83 cfs 0.135 af Outflow=1.82 cfs 0.125 af
Pond RG16:	Peak Elev=301.09' Storage=1,017 cf Inflow=2.84 cfs 0.280 af Outflow=3.04 cfs 0.261 af
Pond RG19:	Peak Elev=295.92' Storage=1,404 cf Inflow=1.29 cfs 0.104 af Outflow=0.71 cfs 0.076 af
Pond RG20:	Peak Elev=295.05' Storage=1,010 cf Inflow=0.31 cfs 0.025 af Outflow=0.01 cfs 0.002 af
Pond RG21:	Peak Elev=291.73' Storage=702 cf Inflow=0.82 cfs 0.059 af Outflow=0.78 cfs 0.045 af
Pond RG22:	Peak Elev=258.58' Storage=709 cf Inflow=0.43 cfs 0.030 af Outflow=0.06 cfs 0.014 af
Pond RG23:	Peak Elev=257.87' Storage=472 cf Inflow=0.09 cfs 0.021 af Outflow=0.03 cfs 0.010 af
Pond RG3:	Peak Elev=311.01' Storage=339 cf Inflow=0.35 cfs 0.030 af Outflow=0.34 cfs 0.023 af
Pond RG4:	Peak Elev=304.68' Storage=265 cf Inflow=0.08 cfs 0.006 af Outflow=0.00 cfs 0.000 af
Pond RG5:	Peak Elev=306.73' Storage=413 cf Inflow=0.13 cfs 0.009 af Outflow=0.00 cfs 0.000 af

Total Runoff Area = 16.749 ac Runoff Volume = 2.638 af Average Runoff Depth = 1.89"
86.64% Pervious = 14.511 ac 13.36% Impervious = 2.238 ac

Summary for Subcatchment 1S: (new Subcat)

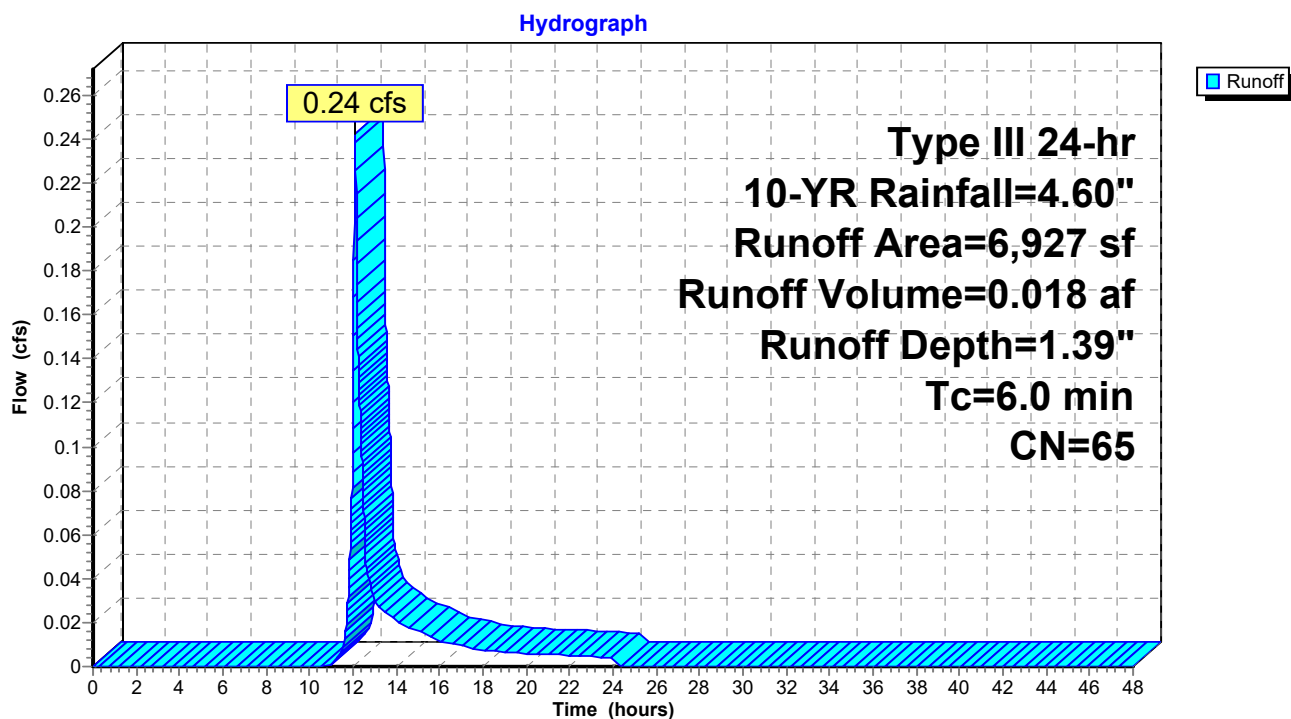
Runoff = 0.24 cfs @ 12.10 hrs, Volume= 0.018 af, Depth= 1.39"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-YR Rainfall=4.60"

Area (sf)	CN	Description
771	98	Paved parking & roofs
6,156	61	>75% Grass cover, Good, HSG B
6,927	65	Weighted Average
6,156		88.87% Pervious Area
771		11.13% Impervious Area

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

Subcatchment 1S: (new Subcat)



Summary for Subcatchment 2S: Road

Runoff = 0.86 cfs @ 12.09 hrs, Volume= 0.061 af, Depth= 2.55"

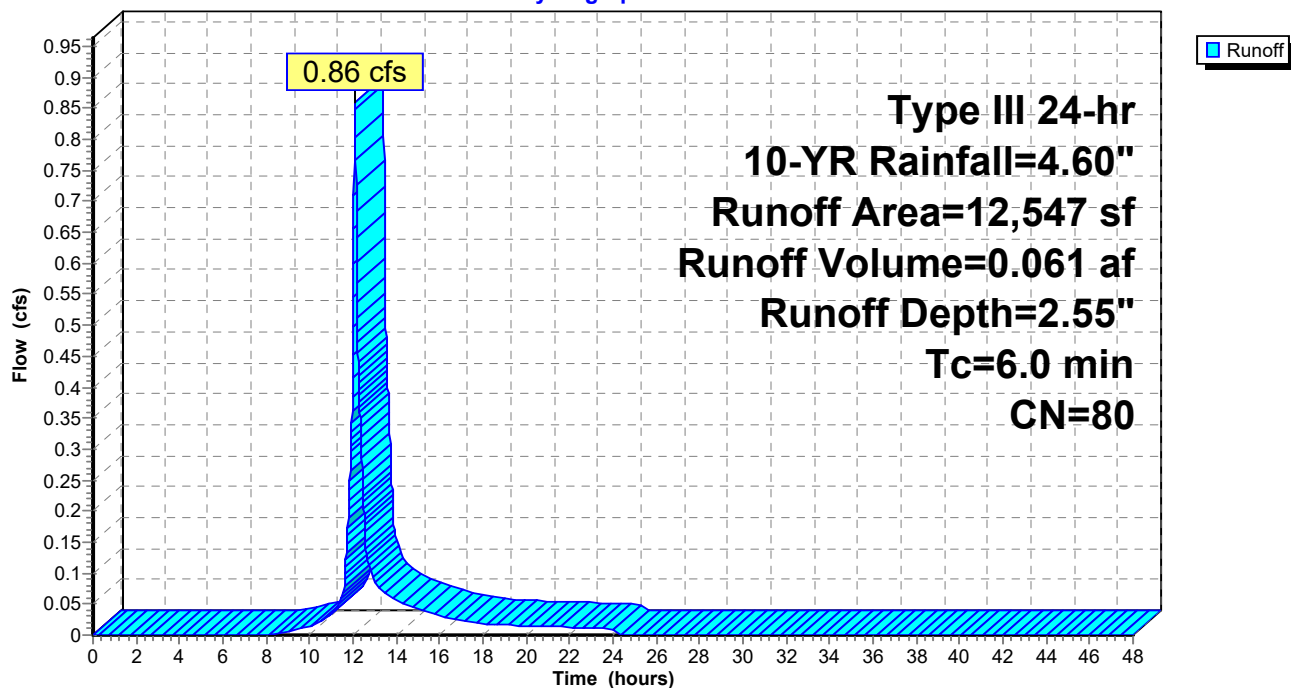
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-YR Rainfall=4.60"

	Area (sf)	CN	Description
*	4,975	74	>75% Grass cover, Good, HSG C
*	3,197	98	Impervious
*	4,375	73	Woods, Fair, HSG C
	12,547	80	Weighted Average
	9,350		74.52% Pervious Area
	3,197		25.48% Impervious Area

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

Subcatchment 2S: Road

Hydrograph



Summary for Subcatchment 3S: Undeveloped Area

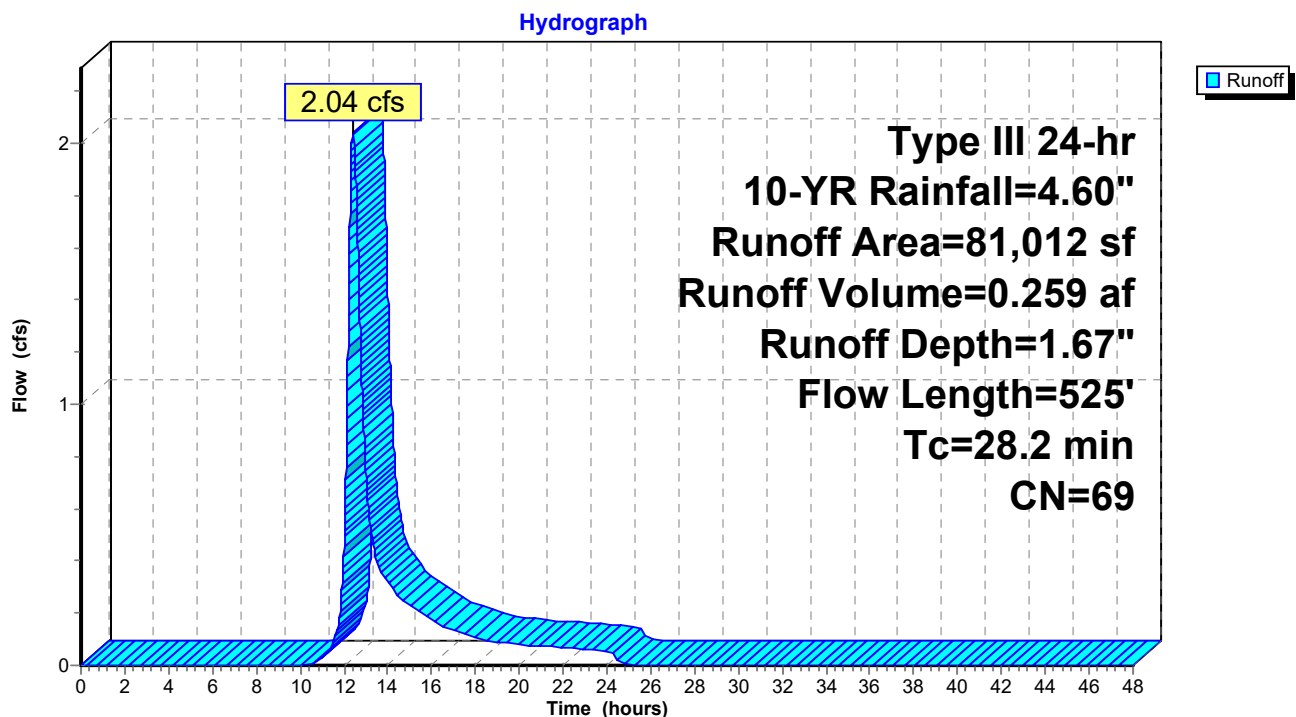
Runoff = 2.04 cfs @ 12.42 hrs, Volume= 0.259 af, Depth= 1.67"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-YR Rainfall=4.60"

Area (sf)	CN	Description
* 26,806	61	>75% grass cover, good, HSG B
54,206	73	Woods, Fair, HSG C
81,012	69	Weighted Average
81,012		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	50	0.0605	0.10		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.00"
20.0	475	0.0250	0.40		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps
28.2	525	Total			

Subcatchment 3S: Undeveloped Area



Summary for Subcatchment 4S:

Runoff = 3.62 cfs @ 12.21 hrs, Volume= 0.343 af, Depth= 2.05"

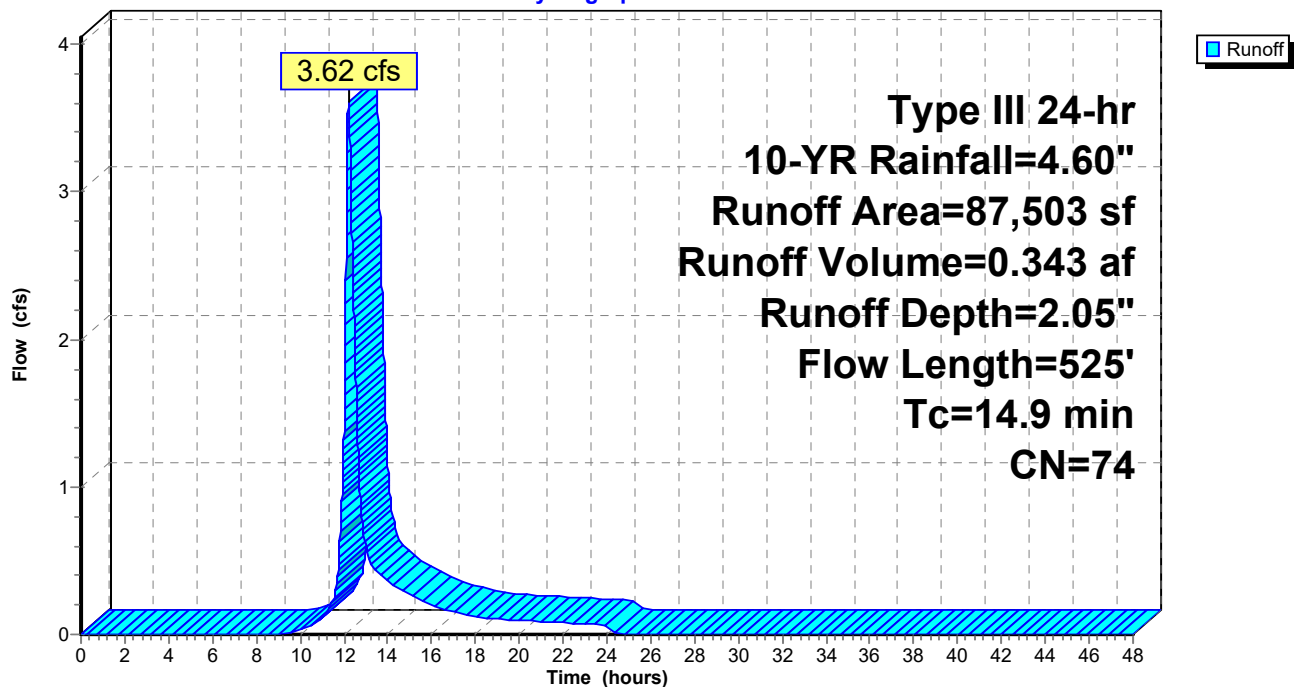
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-YR Rainfall=4.60"

	Area (sf)	CN	Description
*	62,598	73	Woods, Fair, HSG C
	2,061	98	Paved parking & roofs
	22,844	74	>75% Grass cover, Good, HSG C
	87,503	74	Weighted Average
	85,442		97.64% Pervious Area
	2,061		2.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	50	0.0300	0.17		Sheet Flow, Grass: Short n= 0.150 P2= 3.00"
10.0	475	0.0250	0.79		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
14.9	525	Total			

Subcatchment 4S:

Hydrograph



Summary for Subcatchment 5S:

Runoff = 0.32 cfs @ 12.08 hrs, Volume= 0.026 af, Depth= 4.36"

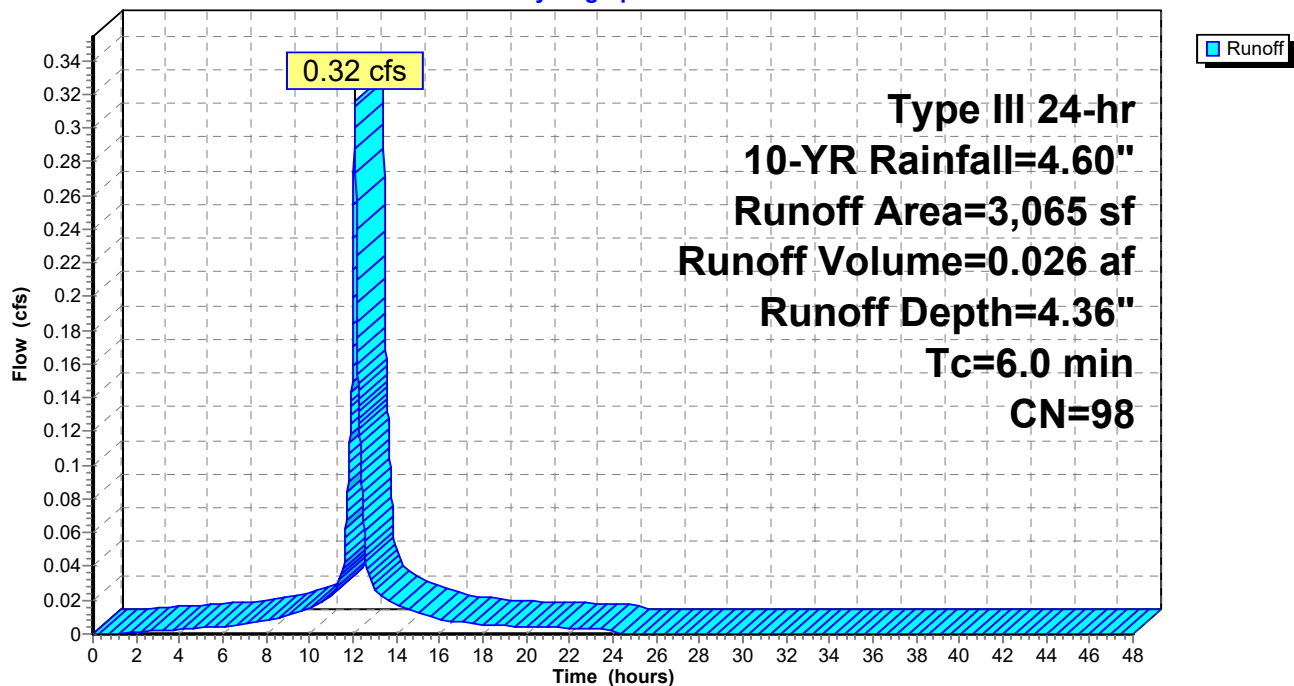
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-YR Rainfall=4.60"

Area (sf)	CN	Description
3,065	98	Paved parking & roofs
3,065		100.00% Impervious Area

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

Subcatchment 5S:

Hydrograph



Summary for Subcatchment 7S: (new Subcat)

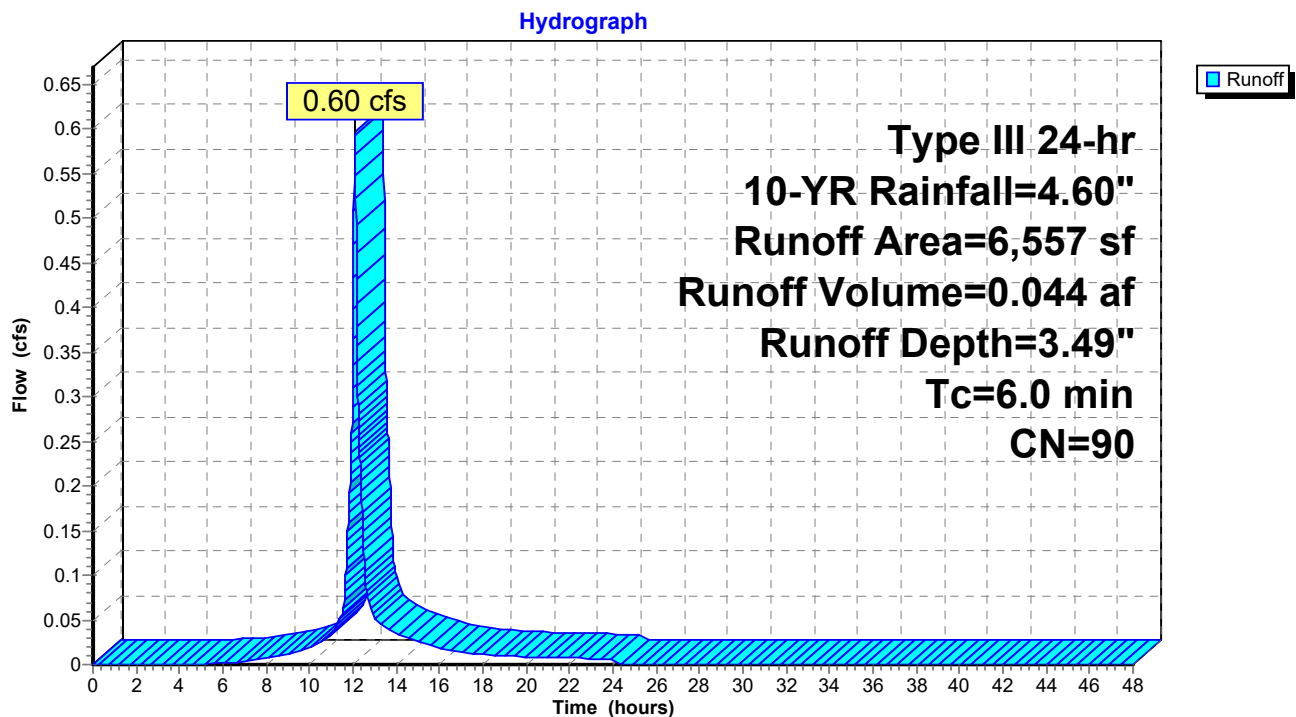
Runoff = 0.60 cfs @ 12.09 hrs, Volume= 0.044 af, Depth= 3.49"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-YR Rainfall=4.60"

	Area (sf)	CN	Description
*	5,183	98	Impervious
*	1,374	61	>75% grass cover, good, HSG B
	6,557	90	Weighted Average
	1,374		20.95% Pervious Area
	5,183		79.05% Impervious Area

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

Subcatchment 7S: (new Subcat)



Summary for Subcatchment 8S: (new Subcat)

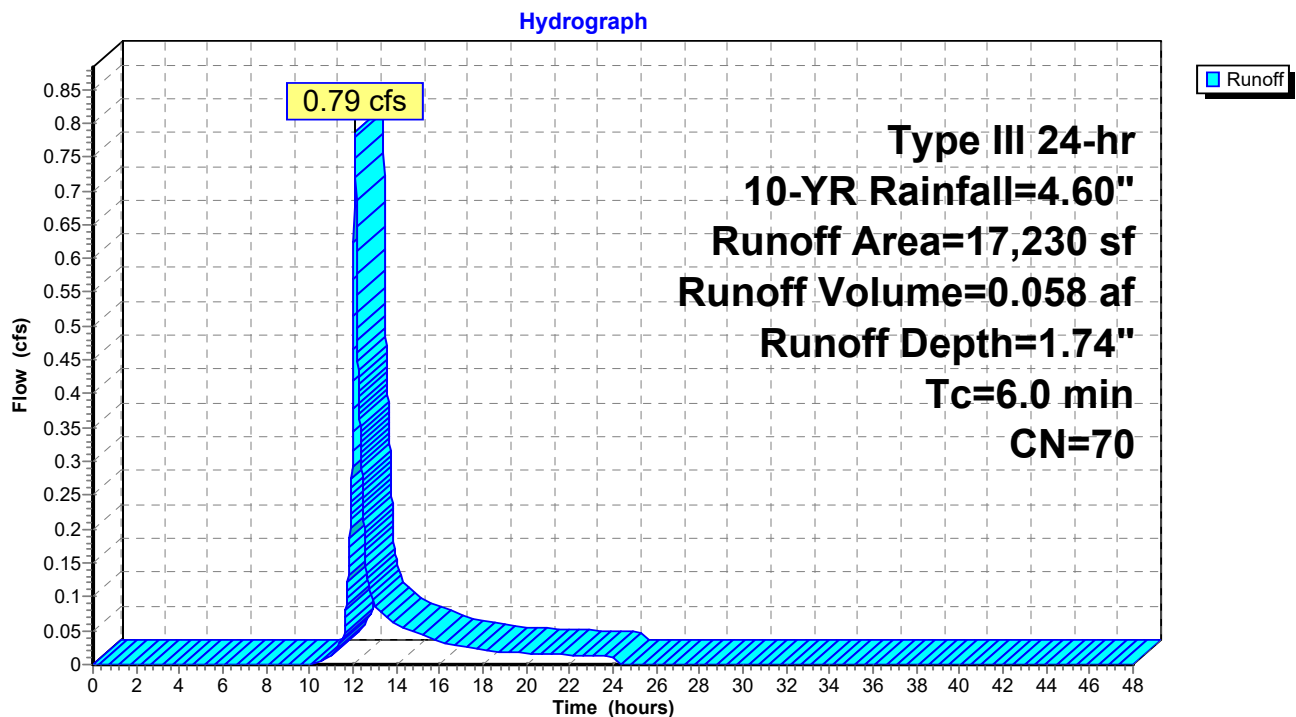
Runoff = 0.79 cfs @ 12.09 hrs, Volume= 0.058 af, Depth= 1.74"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-YR Rainfall=4.60"

	Area (sf)	CN	Description
*	4,188	98	Impervious
*	13,042	61	>75% grass cover, good, HSG B
	17,230	70	Weighted Average
	13,042		75.69% Pervious Area
	4,188		24.31% Impervious Area

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

Subcatchment 8S: (new Subcat)



Summary for Subcatchment 9S:

Runoff = 0.21 cfs @ 12.08 hrs, Volume= 0.017 af, Depth= 4.36"

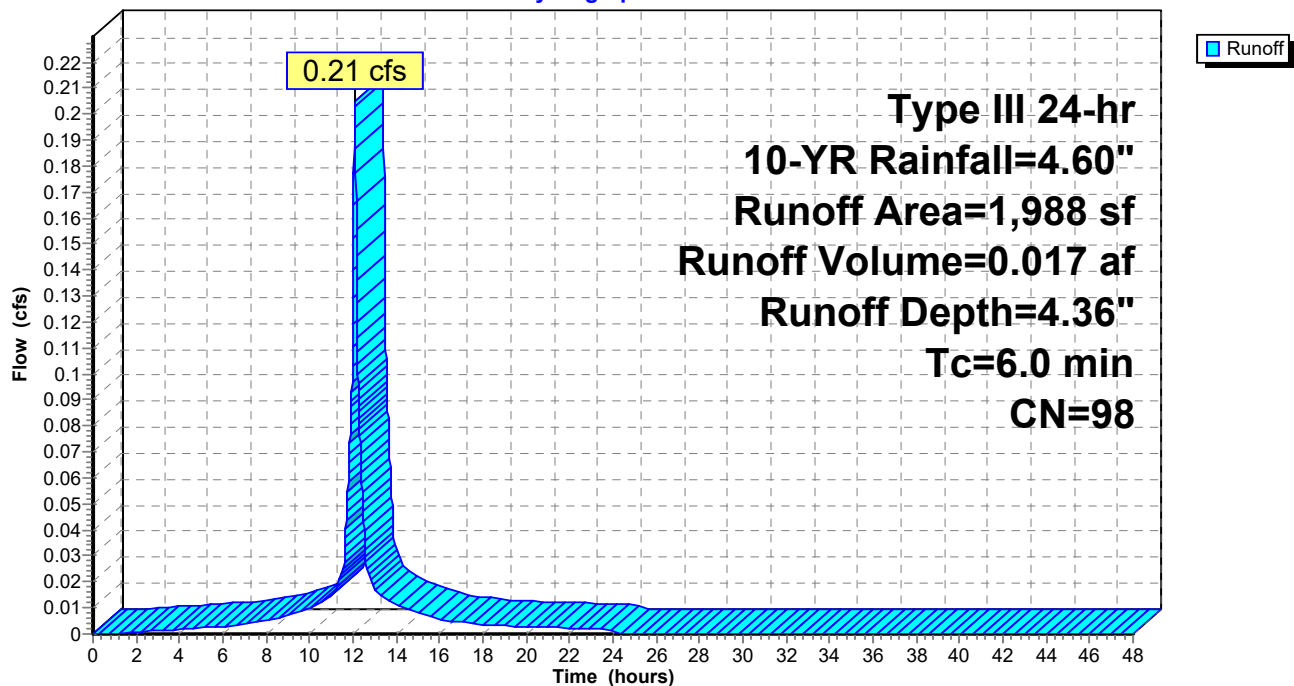
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-YR Rainfall=4.60"

Area (sf)	CN	Description
* 1,988	98	
1,988		100.00% Impervious Area

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

Subcatchment 9S:

Hydrograph



Summary for Subcatchment 10S: (new Subcat)

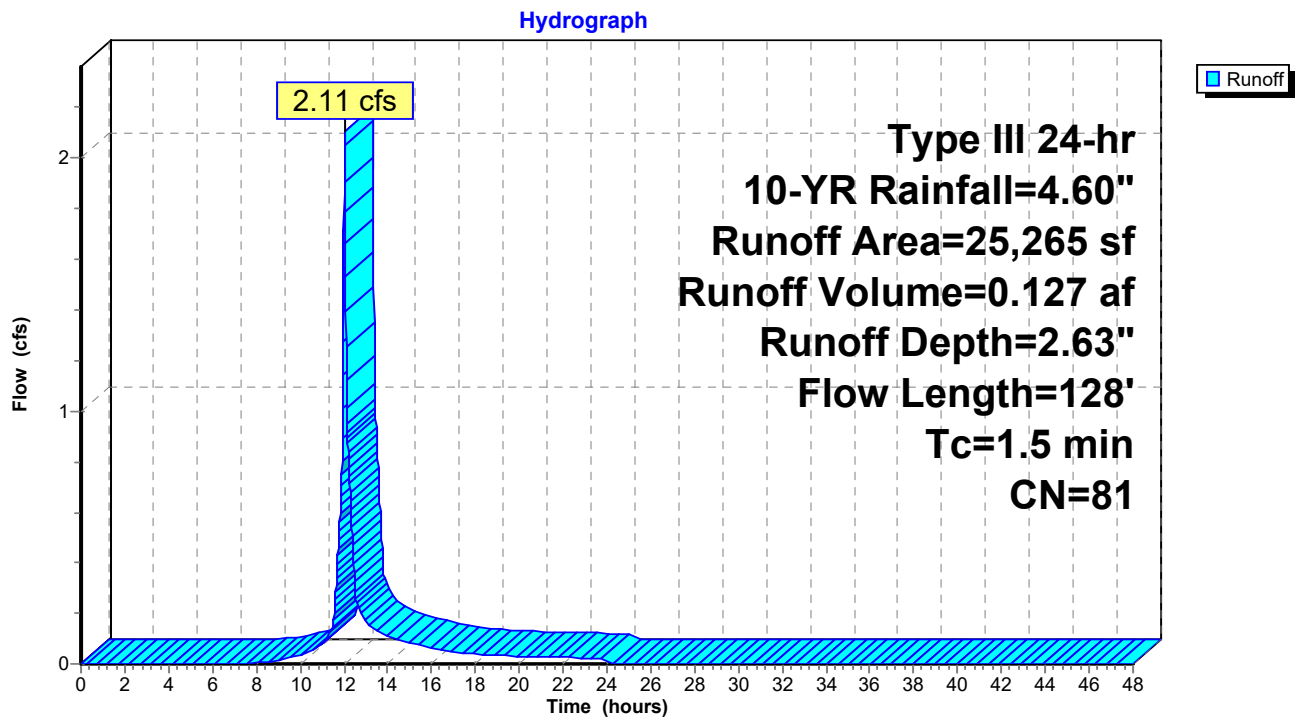
Runoff = 2.11 cfs @ 12.02 hrs, Volume= 0.127 af, Depth= 2.63"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-YR Rainfall=4.60"

Area (sf)	CN	Description
7,231	98	Paved parking & roofs
18,034	74	>75% Grass cover, Good, HSG C
25,265	81	Weighted Average
18,034		71.38% Pervious Area
7,231		28.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.16		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
0.8	78	0.0500	1.57		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.5	128	Total			

Subcatchment 10S: (new Subcat)



Summary for Subcatchment 11S:

Runoff = 1.03 cfs @ 12.09 hrs, Volume= 0.076 af, Depth= 1.67"

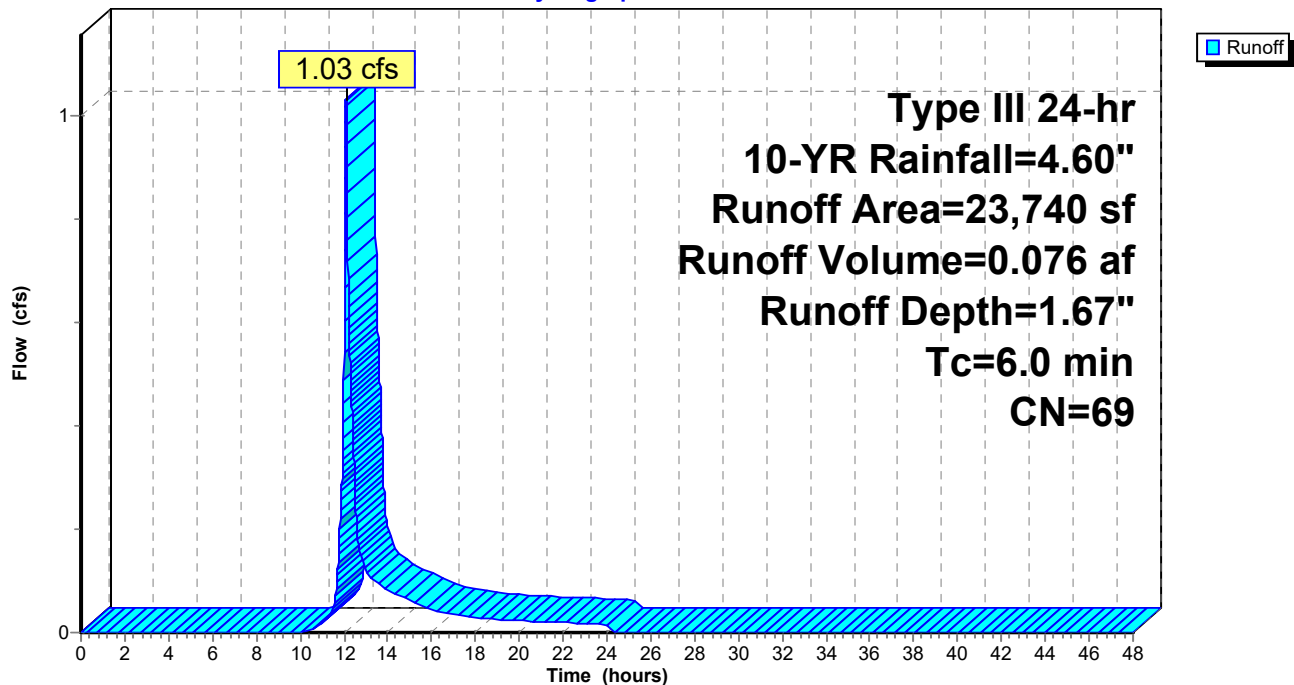
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-YR Rainfall=4.60"

	Area (sf)	CN	Description
*	18,426	61	G+RG: >75% Grass cover, Good, HSG B
*	5,314	98	
	23,740	69	Weighted Average
	18,426		77.62% Pervious Area
	5,314		22.38% Impervious Area

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

Subcatchment 11S:

Hydrograph



Summary for Subcatchment 12S:

Runoff = 2.13 cfs @ 12.12 hrs, Volume= 0.165 af, Depth= 2.38"

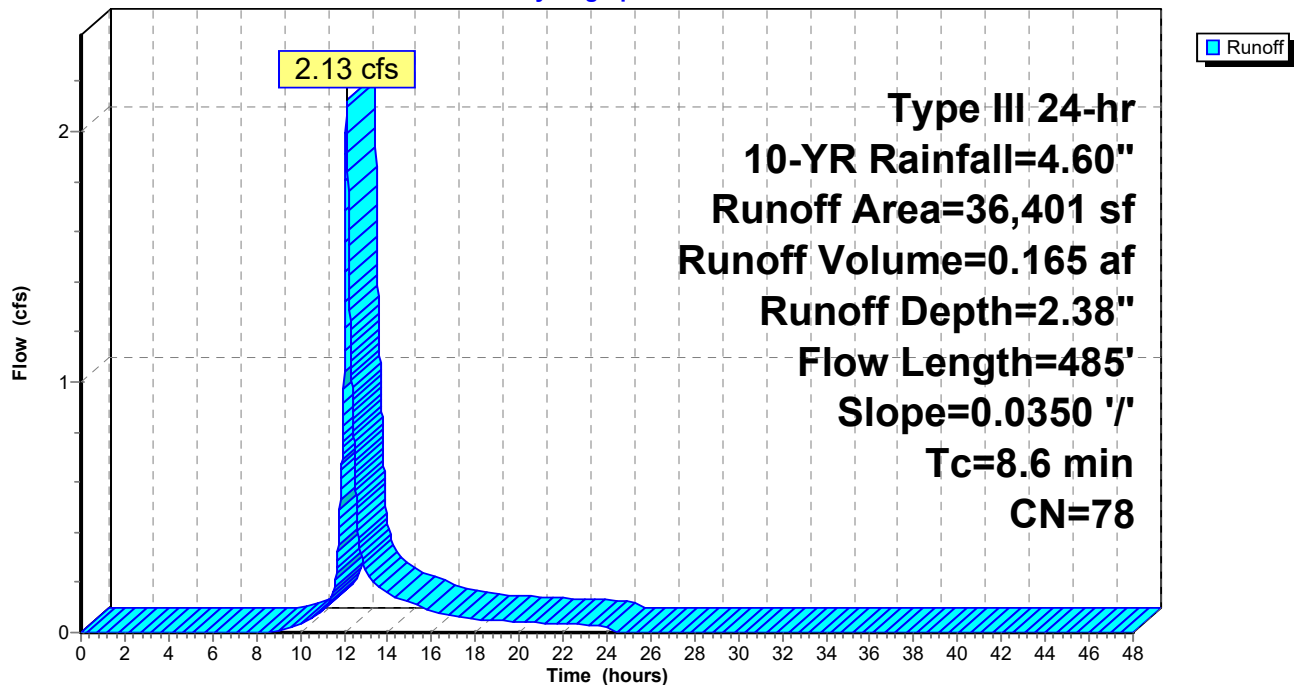
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-YR Rainfall=4.60"

	Area (sf)	CN	Description
*	5,171	74	>75% grass cover, good, HSG C
*	31,230	79	woods, fair, HSG D
	36,401	78	Weighted Average
	36,401		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.6	485	0.0350	0.94		Shallow Concentrated Flow, Woodland Kv= 5.0 fps

Subcatchment 12S:

Hydrograph



Summary for Subcatchment 13S:

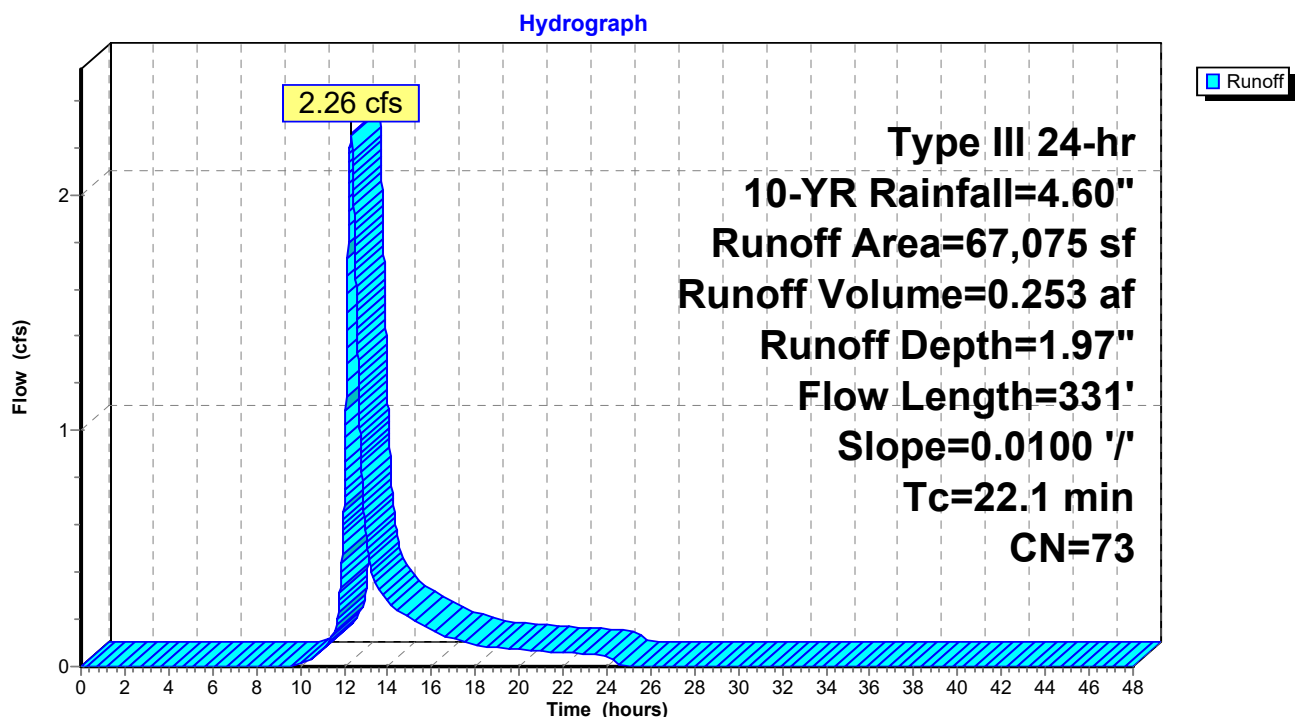
Runoff = 2.26 cfs @ 12.31 hrs, Volume= 0.253 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-YR Rainfall=4.60"

	Area (sf)	CN	Description
*	56,685	73	woods, fair, HSG C
*	10,390	74	>75% grass cover, good, HSG C
	67,075	73	Weighted Average
	67,075		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.1	331	0.0100	0.25		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps

Subcatchment 13S:



Summary for Subcatchment 14S:

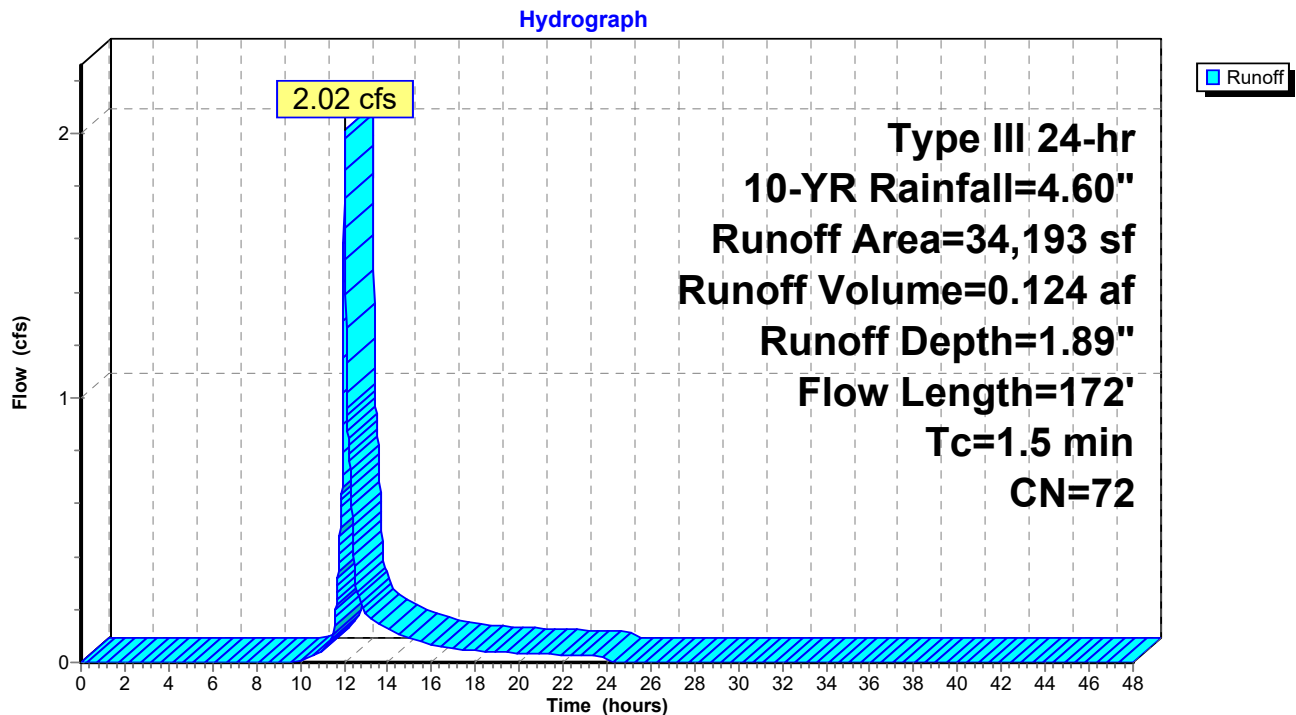
Runoff = 2.02 cfs @ 12.03 hrs, Volume= 0.124 af, Depth= 1.89"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-YR Rainfall=4.60"

	Area (sf)	CN	Description
*	23,718	61	>75% grass cover, good, HSG B
*	9,784	98	
*	691	60	woods, fair, HSG B
	34,193	72	Weighted Average
	24,409		71.39% Pervious Area
	9,784		28.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	47	0.1000	2.18		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
1.1	125	0.0700	1.85		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.5	172	Total			

Subcatchment 14S:



Summary for Subcatchment 15S:

Runoff = 0.48 cfs @ 13.43 hrs, Volume= 0.127 af, Depth= 1.97"

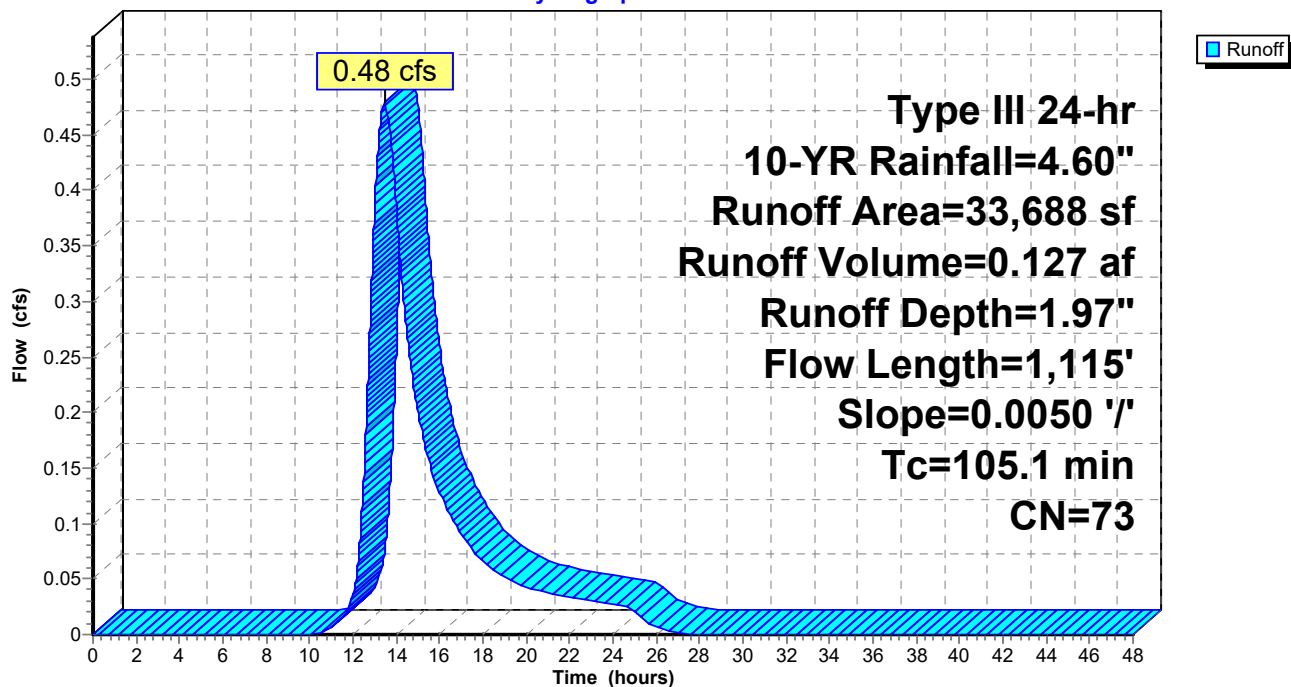
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-YR Rainfall=4.60"

	Area (sf)	CN	Description
*	30,286	73	woods, fair, HSG C
*	3,402	74	>75% grass cover, good, HSG C
	33,688	73	Weighted Average
	33,688		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
105.1	1,115	0.0050	0.18		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps

Subcatchment 15S:

Hydrograph



Summary for Subcatchment 16S:

Runoff = 0.48 cfs @ 12.08 hrs, Volume= 0.039 af, Depth= 4.36"

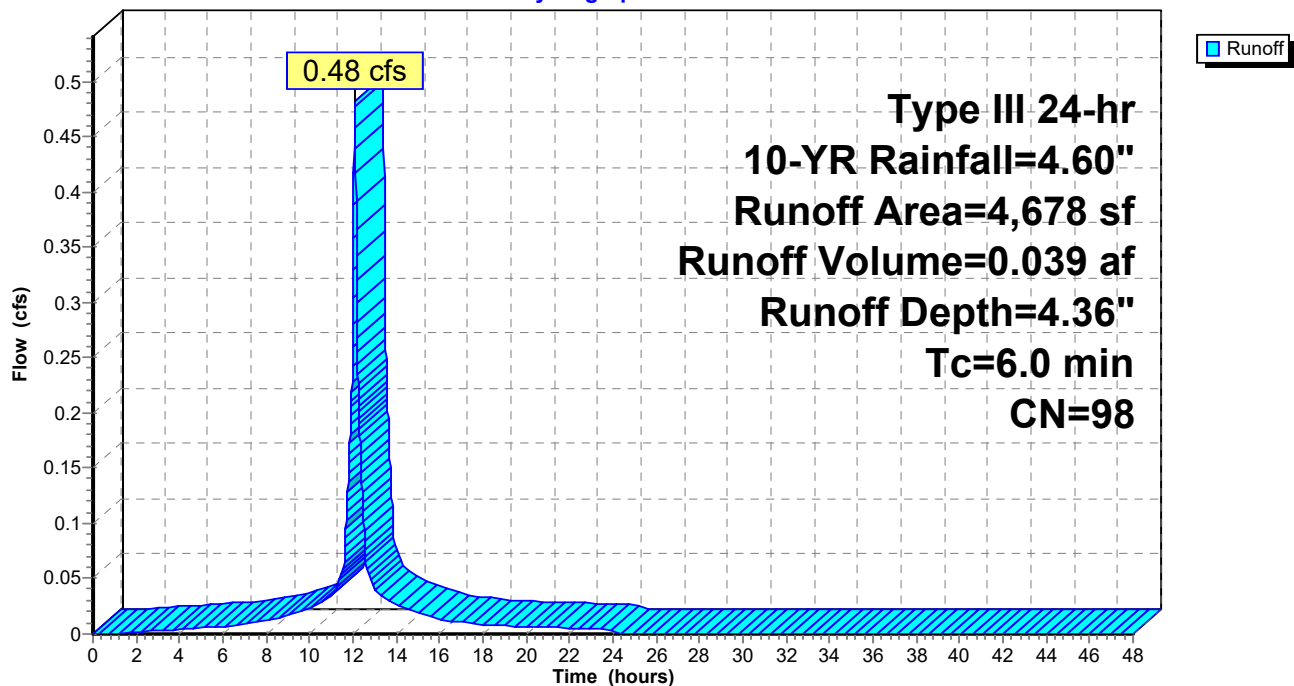
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-YR Rainfall=4.60"

Area (sf)	CN	Description
* 4,678	98	
4,678		100.00% Impervious Area

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

Subcatchment 16S:

Hydrograph



Summary for Subcatchment CUL: (new Subcat)

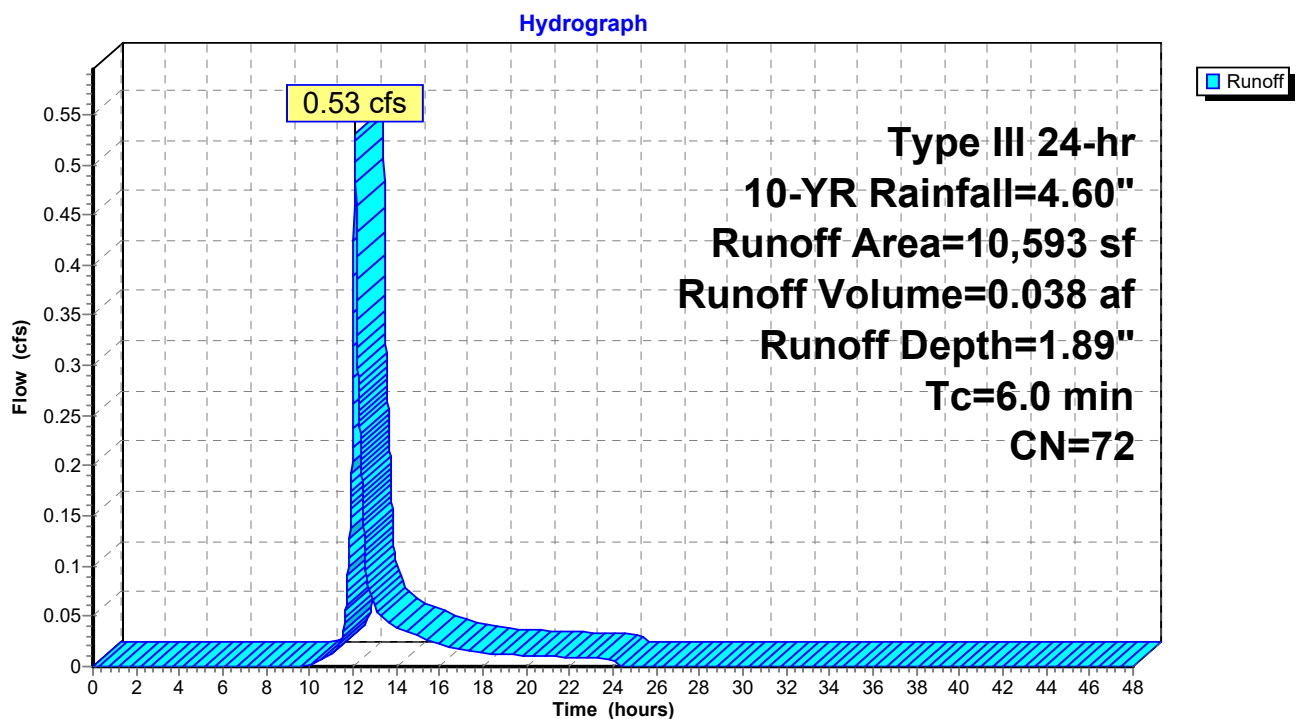
Runoff = 0.53 cfs @ 12.09 hrs, Volume= 0.038 af, Depth= 1.89"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-YR Rainfall=4.60"

	Area (sf)	CN	Description
*	3,132	98	
*	7,461	61	G+RG: >75% grass cover, good, HSG B
	10,593	72	Weighted Average
	7,461		70.43% Pervious Area
	3,132		29.57% Impervious Area

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

Subcatchment CUL: (new Subcat)



Summary for Subcatchment P1:

Runoff = 2.47 cfs @ 12.19 hrs, Volume= 0.239 af, Depth= 1.26"

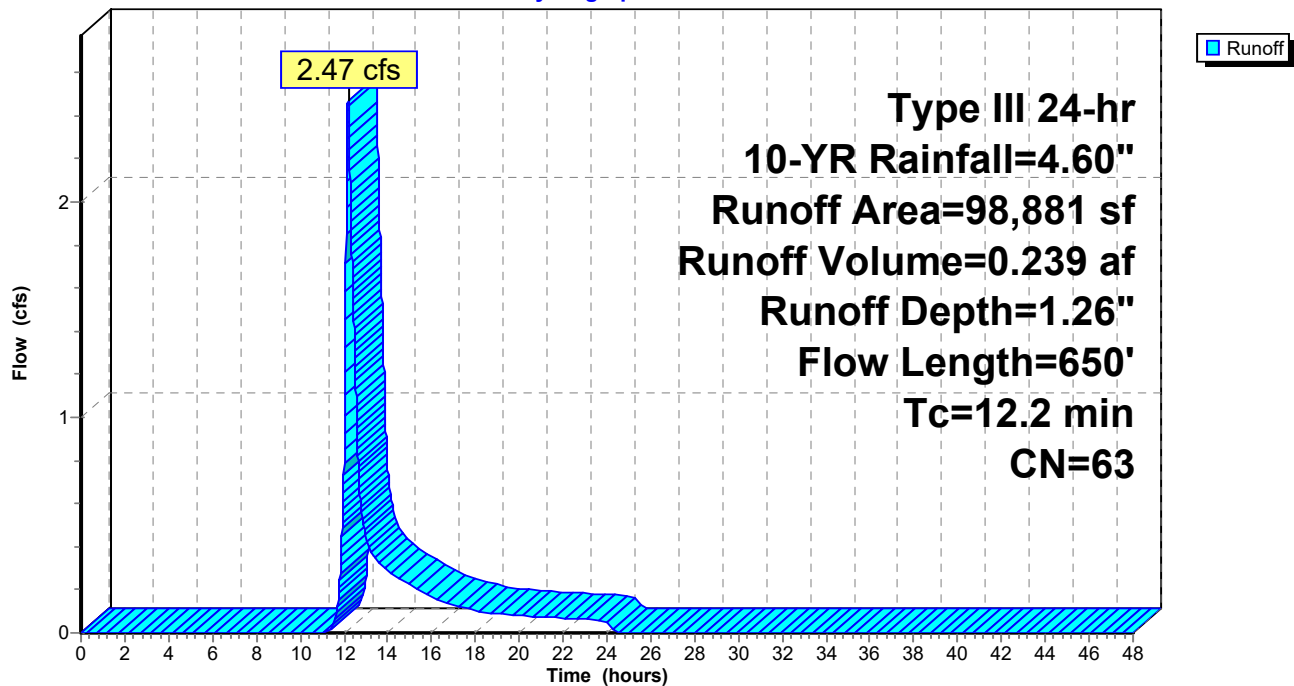
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-YR Rainfall=4.60"

Area (sf)	CN	Description
93,901	61	>75% Grass cover, Good, HSG B
* 4,980	98	impervious
98,881	63	Weighted Average
93,901		94.96% Pervious Area
4,980		5.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	50	0.0700	0.11		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.00"
4.5	600	0.1010	2.22		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
12.2	650	Total			

Subcatchment P1:

Hydrograph



Summary for Subcatchment P2:

Runoff = 0.26 cfs @ 12.14 hrs, Volume= 0.023 af, Depth= 1.14"

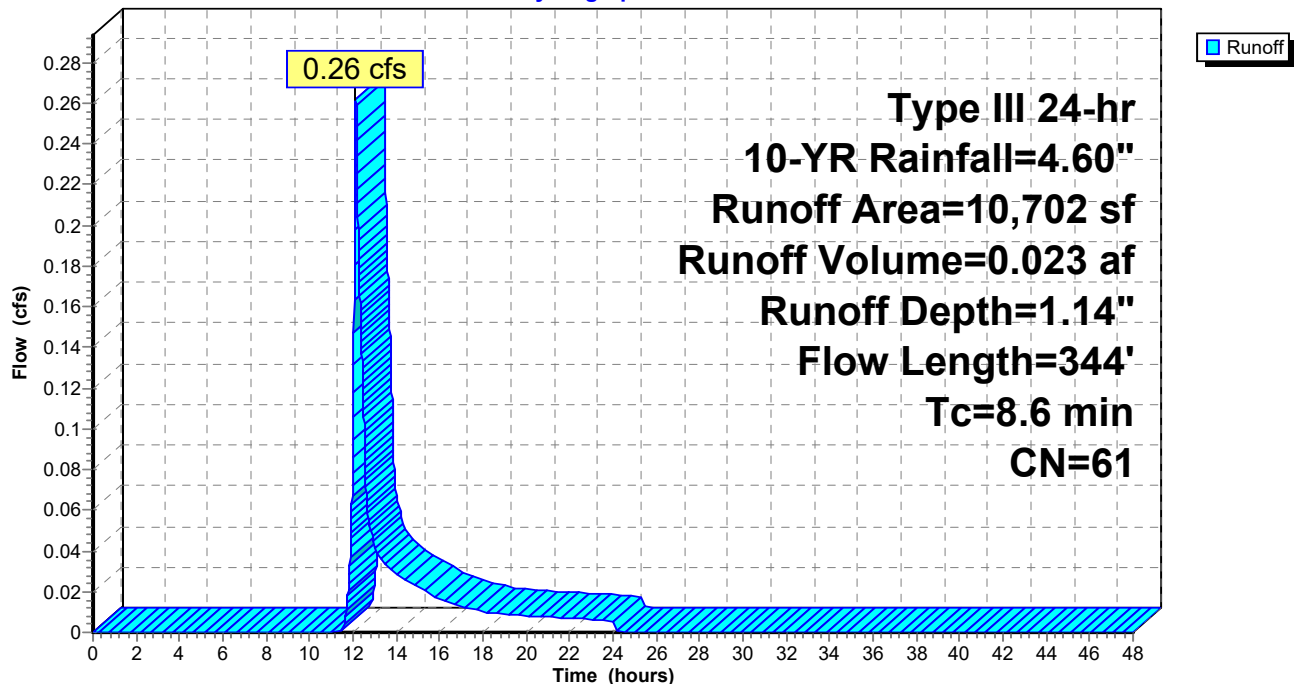
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-YR Rainfall=4.60"

Area (sf)	CN	Description
* 10,702	61	G+RG: >75% Grass cover, Good, HSG B
10,702		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	50	0.1000	0.12		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.00"
1.0	138	0.2200	2.35		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.9	156	0.1700	2.89		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
8.6	344	Total			

Subcatchment P2:

Hydrograph



Summary for Subcatchment S1:

Runoff = 0.16 cfs @ 12.08 hrs, Volume= 0.013 af, Depth= 4.25"

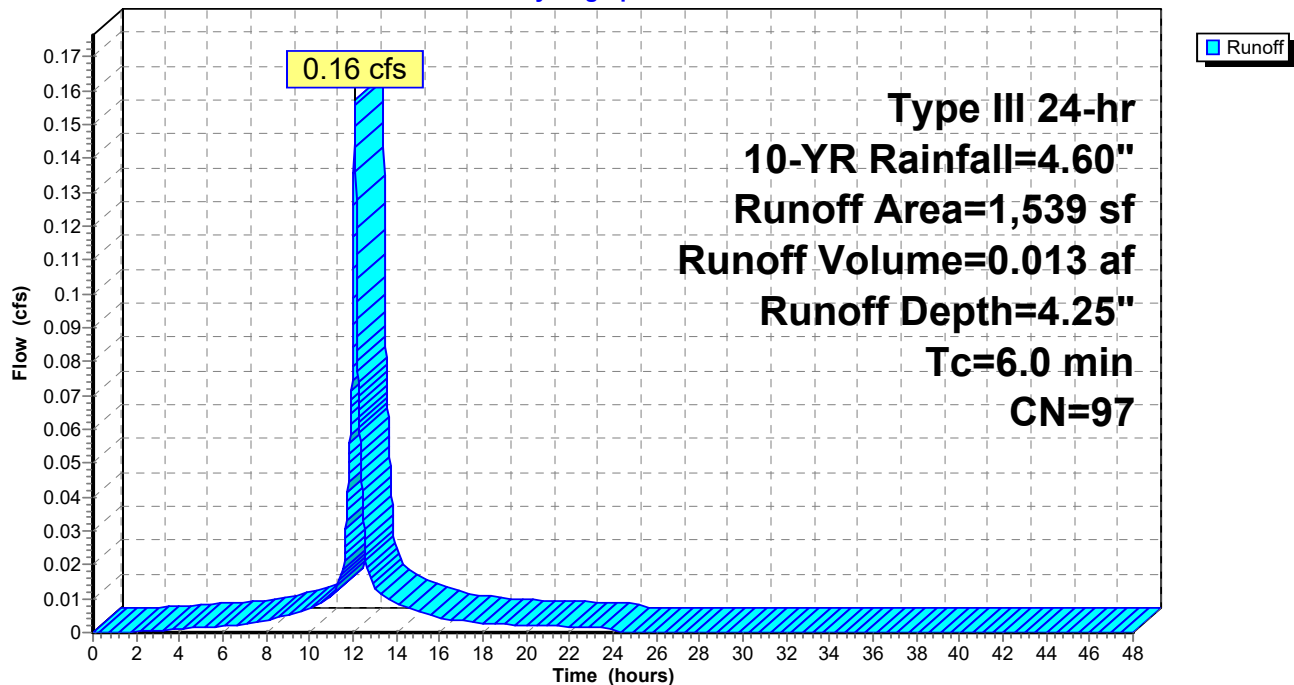
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-YR Rainfall=4.60"

Area (sf)	CN	Description
61	61	>75% Grass cover, Good, HSG B
* 1,478	98	
1,539	97	Weighted Average
61		3.96% Pervious Area
1,478		96.04% Impervious Area

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

Subcatchment S1:

Hydrograph



Summary for Subcatchment S10:

Runoff = 0.11 cfs @ 12.09 hrs, Volume= 0.008 af, Depth= 1.89"

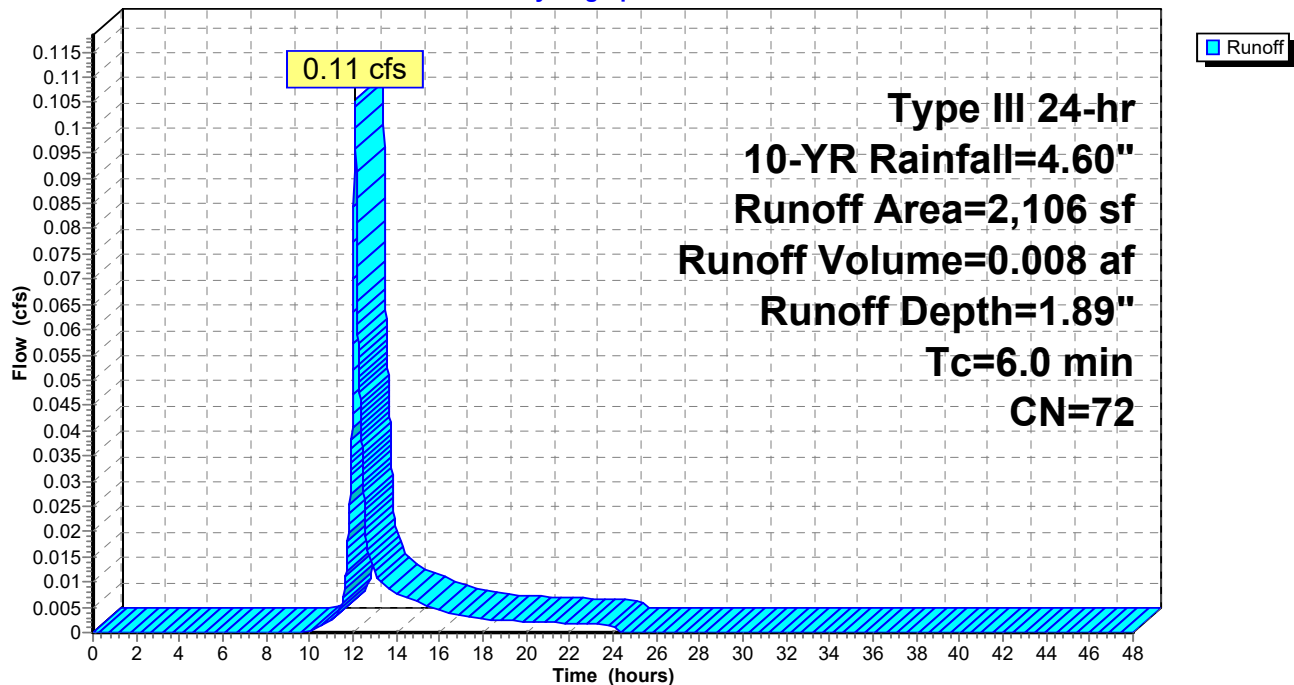
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-YR Rainfall=4.60"

	Area (sf)	CN	Description
*	1,456	61	G+RG: >75% Grass cover, Good, HSG B
*	650	98	
	2,106	72	Weighted Average
	1,456		69.14% Pervious Area
	650		30.86% Impervious Area

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

Subcatchment S10:

Hydrograph



Summary for Subcatchment S11:

Runoff = 0.14 cfs @ 12.09 hrs, Volume= 0.010 af, Depth= 2.91"

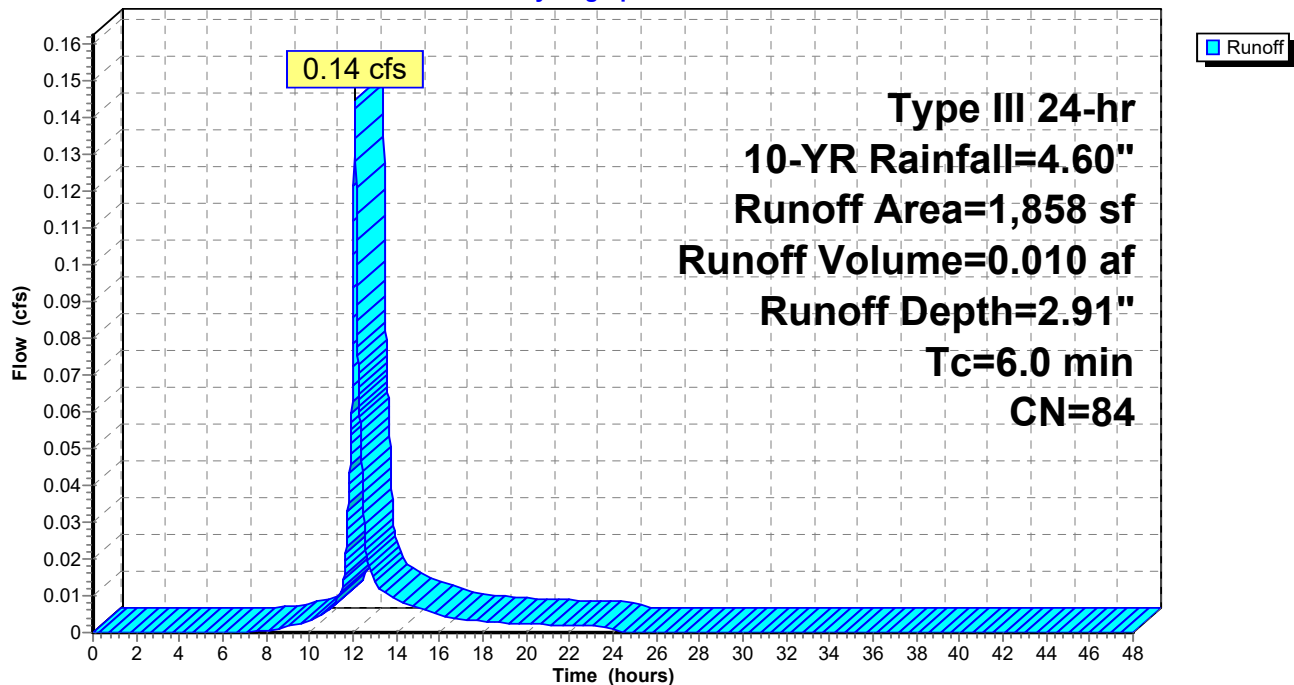
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-YR Rainfall=4.60"

	Area (sf)	CN	Description
*	694	61	G+RG: >75% Grass cover, Good, HSG B
*	1,164	98	
	1,858	84	Weighted Average
	694		37.35% Pervious Area
	1,164		62.65% Impervious Area

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

Subcatchment S11:

Hydrograph



Summary for Subcatchment S12:

Runoff = 0.42 cfs @ 12.09 hrs, Volume= 0.031 af, Depth= 1.74"

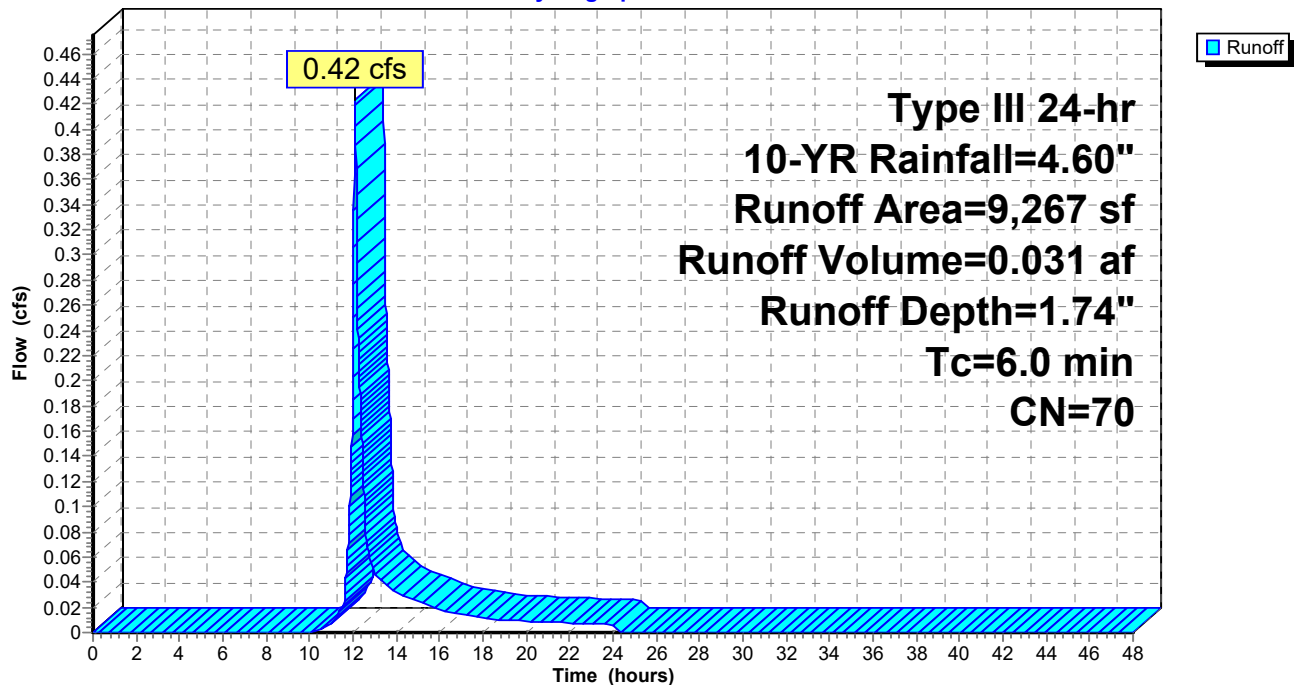
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-YR Rainfall=4.60"

	Area (sf)	CN	Description
*	2,175	98	
*	7,092	61	G+RG: >75% Grass cover, Good, HSG B
	9,267	70	Weighted Average
	7,092		76.53% Pervious Area
	2,175		23.47% Impervious Area

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

Subcatchment S12:

Hydrograph



Summary for Subcatchment S13:

Runoff = 0.31 cfs @ 12.09 hrs, Volume= 0.022 af, Depth= 2.63"

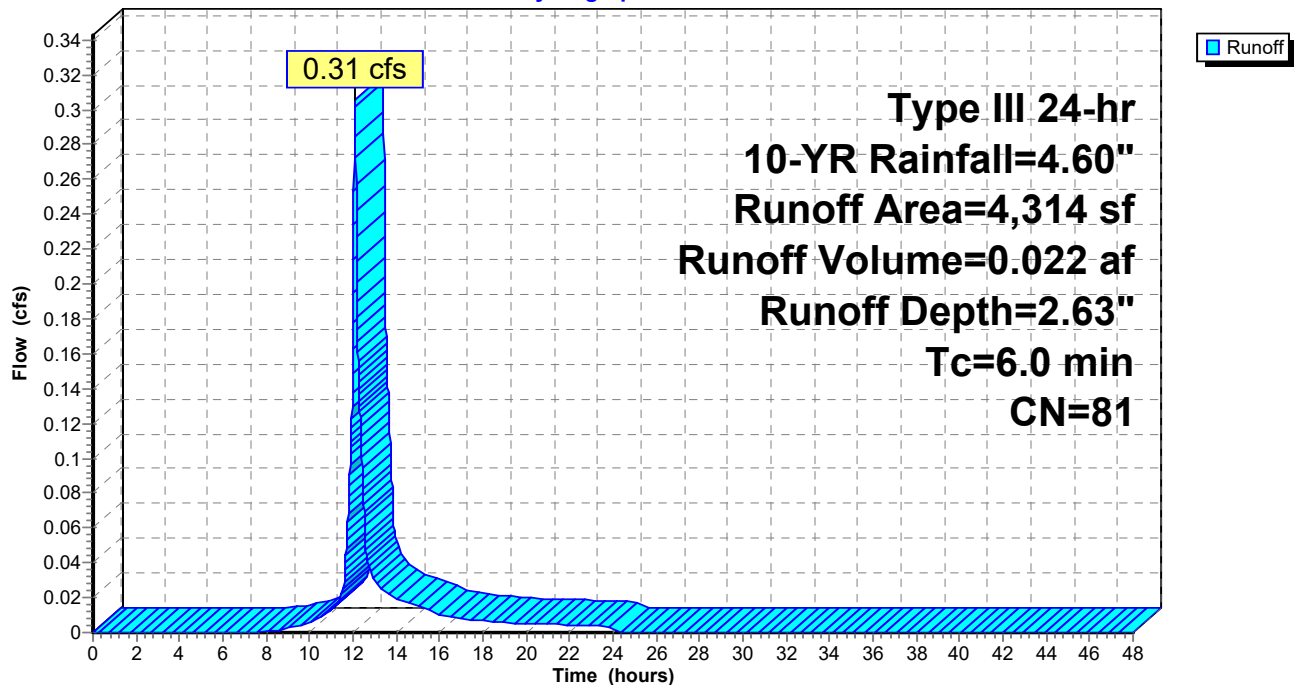
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-YR Rainfall=4.60"

	Area (sf)	CN	Description
*	2,314	98	
	2,000	61	>75% Grass cover, Good, HSG B
	4,314	81	Weighted Average
	2,000		46.36% Pervious Area
	2,314		53.64% Impervious Area

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

Subcatchment S13:

Hydrograph



Summary for Subcatchment S14:

Runoff = 0.19 cfs @ 12.09 hrs, Volume= 0.014 af, Depth= 3.00"

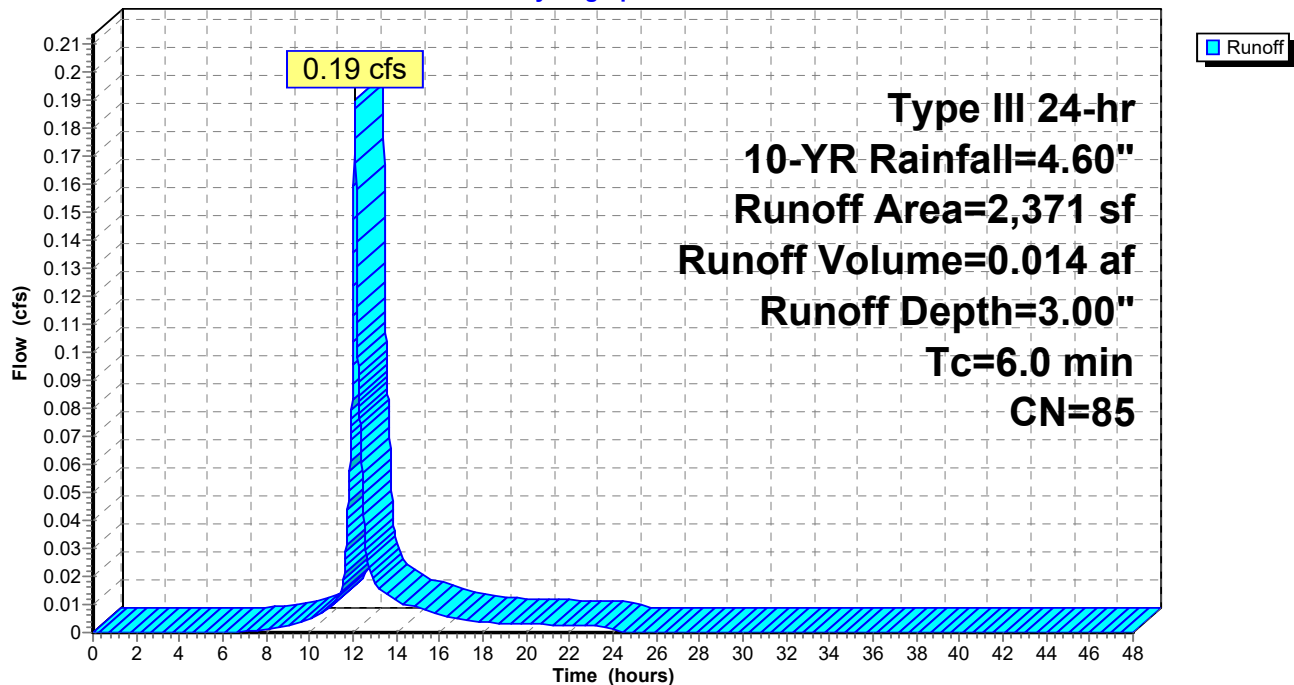
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-YR Rainfall=4.60"

	Area (sf)	CN	Description
*	1,518	98	
*	853	61	G+RG: >75% Grass cover, Good, HSG B
	2,371	85	Weighted Average
	853		35.98% Pervious Area
	1,518		64.02% Impervious Area

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

Subcatchment S14:

Hydrograph



Summary for Subcatchment S15:

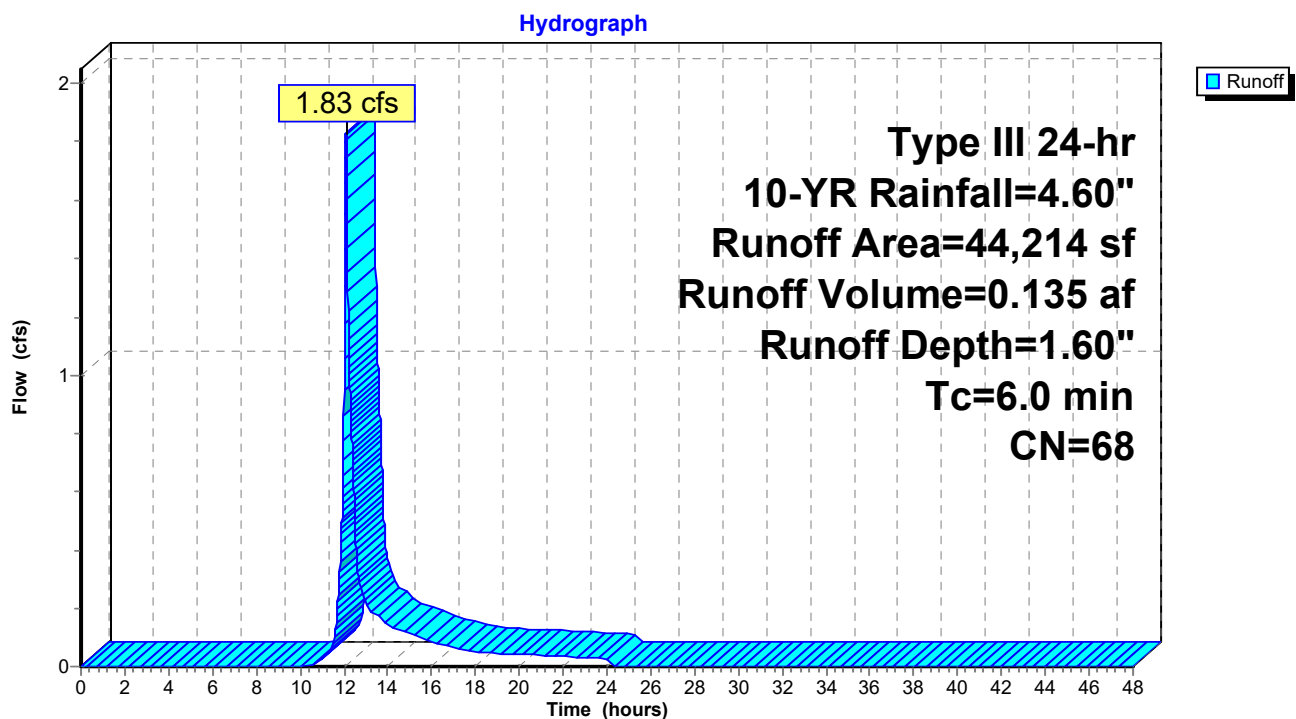
Runoff = 1.83 cfs @ 12.09 hrs, Volume= 0.135 af, Depth= 1.60"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-YR Rainfall=4.60"

	Area (sf)	CN	Description
*	8,653	98	
*	35,561	61	G+RG: >75% Grass cover, Good, HSG B
	44,214	68	Weighted Average
	35,561		80.43% Pervious Area
	8,653		19.57% Impervious Area

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

Subcatchment S15:



Summary for Subcatchment S19:

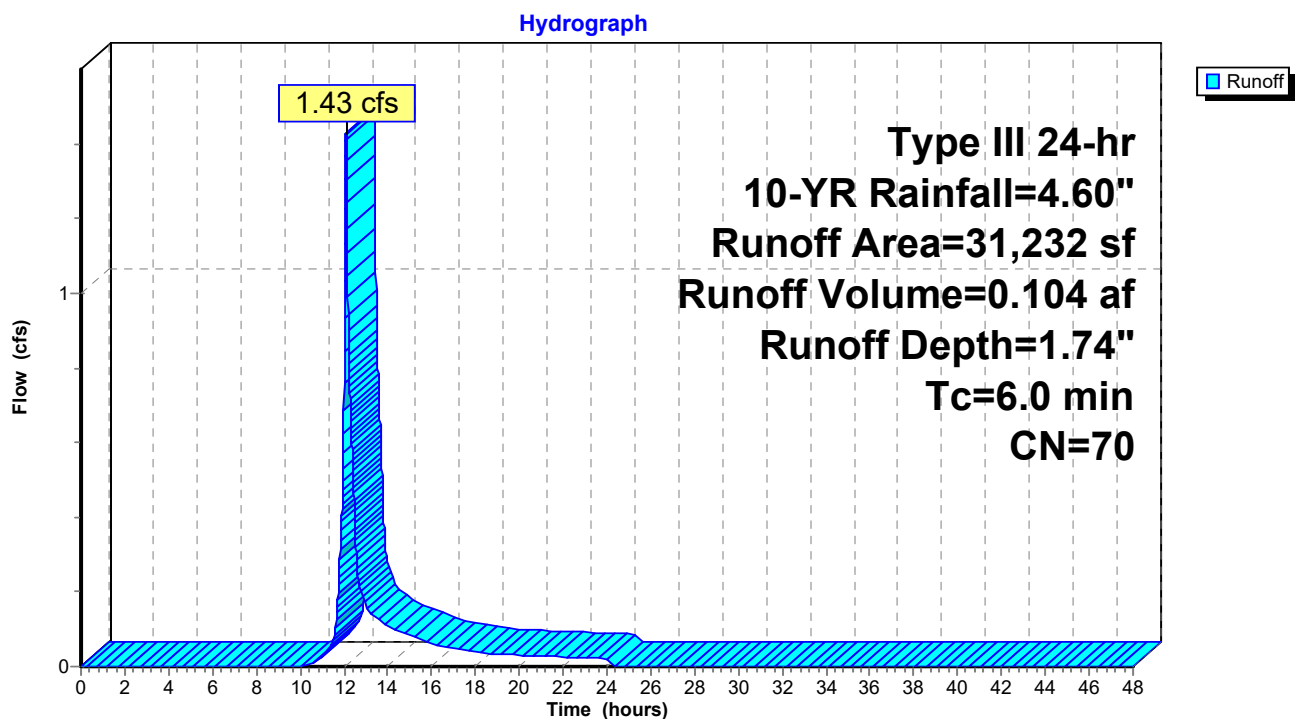
Runoff = 1.43 cfs @ 12.09 hrs, Volume= 0.104 af, Depth= 1.74"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-YR Rainfall=4.60"

	Area (sf)	CN	Description
*	7,316	98	
	23,916	61	>75% Grass cover, Good, HSG B
	31,232	70	Weighted Average
	23,916		76.58% Pervious Area
	7,316		23.42% Impervious Area

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

Subcatchment S19:



Summary for Subcatchment S2:

Runoff = 0.89 cfs @ 12.10 hrs, Volume= 0.067 af, Depth= 1.46"

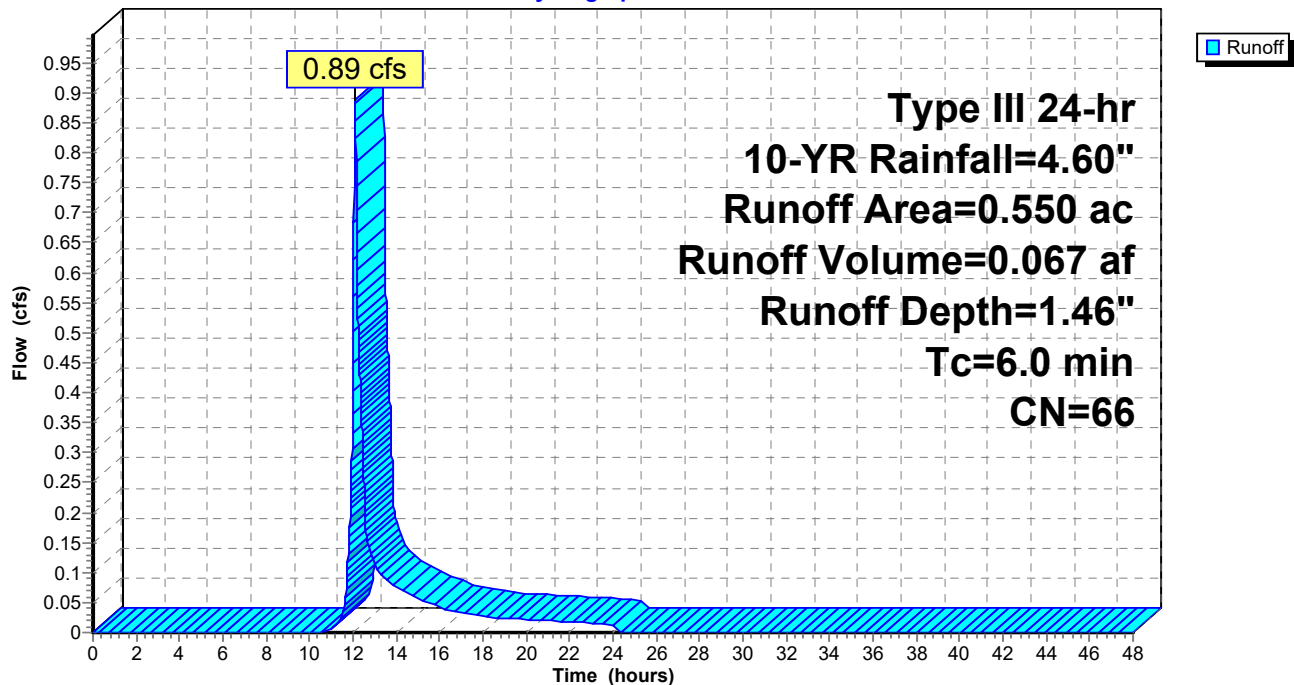
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-YR Rainfall=4.60"

Area (ac)	CN	Description
0.480	61	>75% Grass cover, Good, HSG B
0.070	98	
0.550	66	Weighted Average
0.480		87.27% Pervious Area
0.070		12.73% Impervious Area

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

Subcatchment S2:

Hydrograph



Summary for Subcatchment S20:

Runoff = 0.31 cfs @ 12.10 hrs, Volume= 0.025 af, Depth= 1.14"

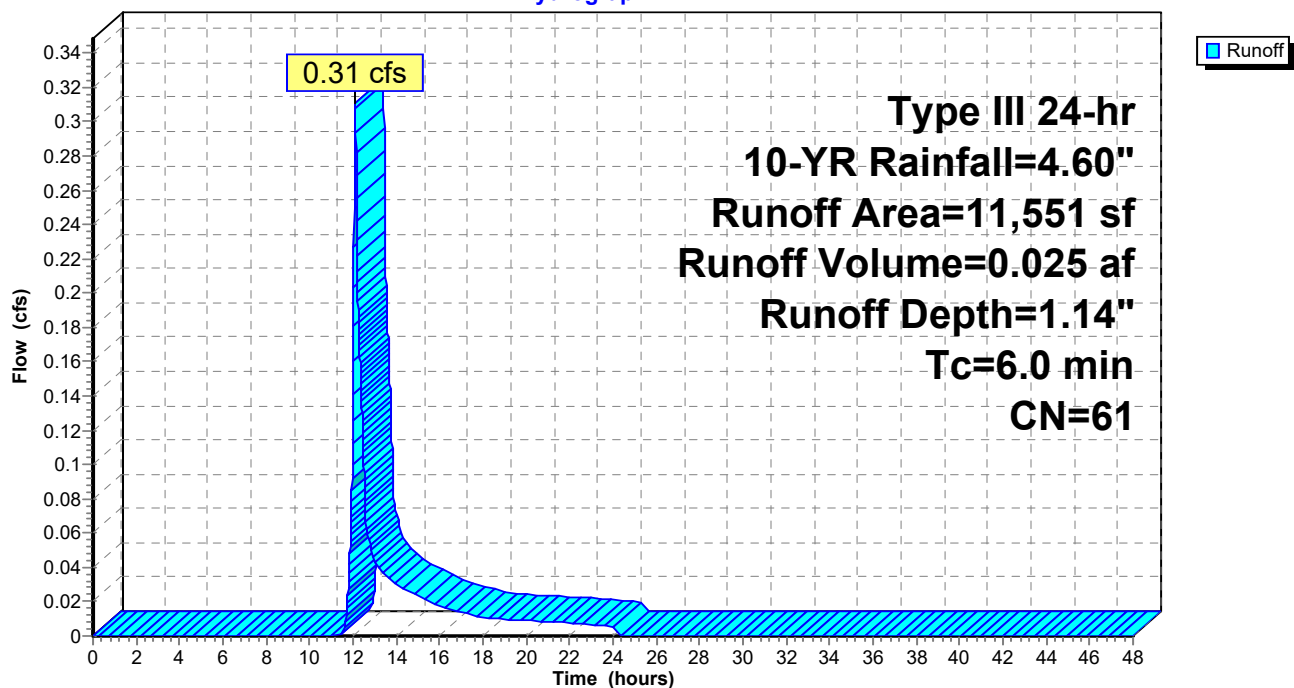
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-YR Rainfall=4.60"

Area (sf)	CN	Description
* 11,551	61	G+RG: >75% Grass cover, Good, HSG B
11,551		100.00% Pervious Area

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

Subcatchment S20:

Hydrograph



Summary for Subcatchment S21:

Runoff = 0.82 cfs @ 12.09 hrs, Volume= 0.059 af, Depth= 3.10"

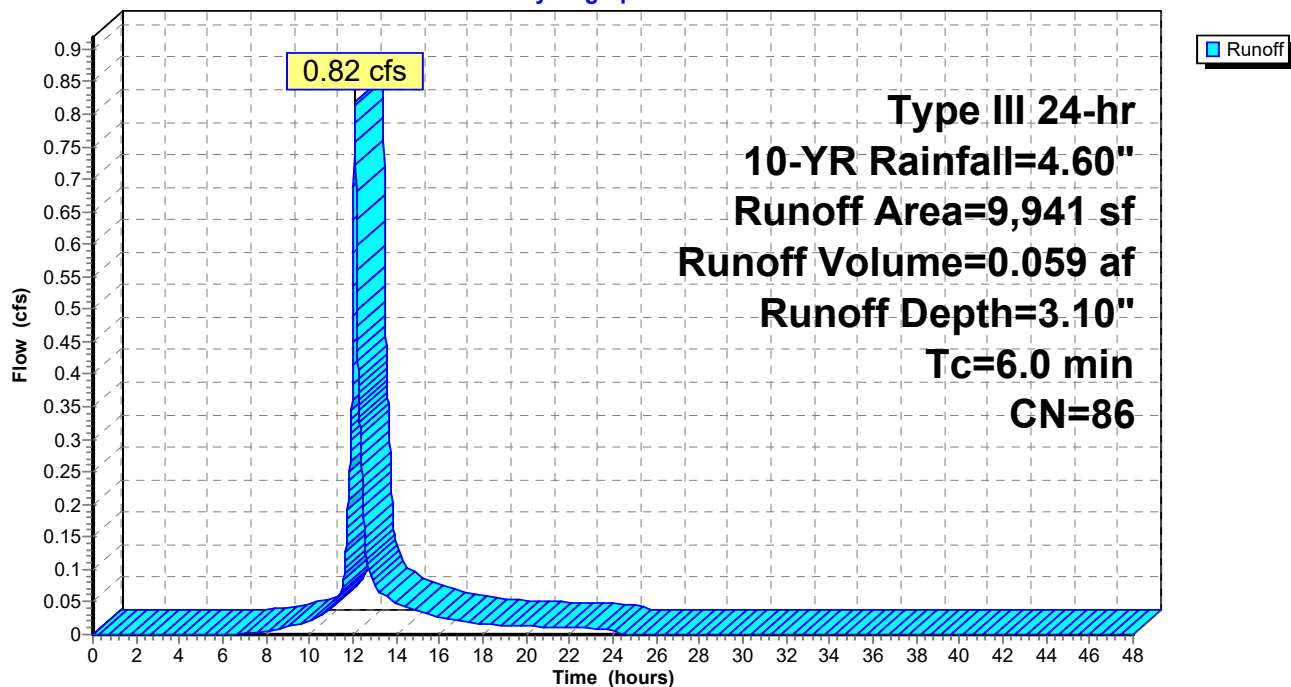
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-YR Rainfall=4.60"

	Area (sf)	CN	Description
*	6,755	98	
*	3,186	61	G+RG: >75% Grass cover, Good, HSG B
	9,941	86	Weighted Average
	3,186		32.05% Pervious Area
	6,755		67.95% Impervious Area

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

Subcatchment S21:

Hydrograph



Summary for Subcatchment S22: Stow Road South

Runoff = 0.43 cfs @ 12.09 hrs, Volume= 0.030 af, Depth= 2.38"

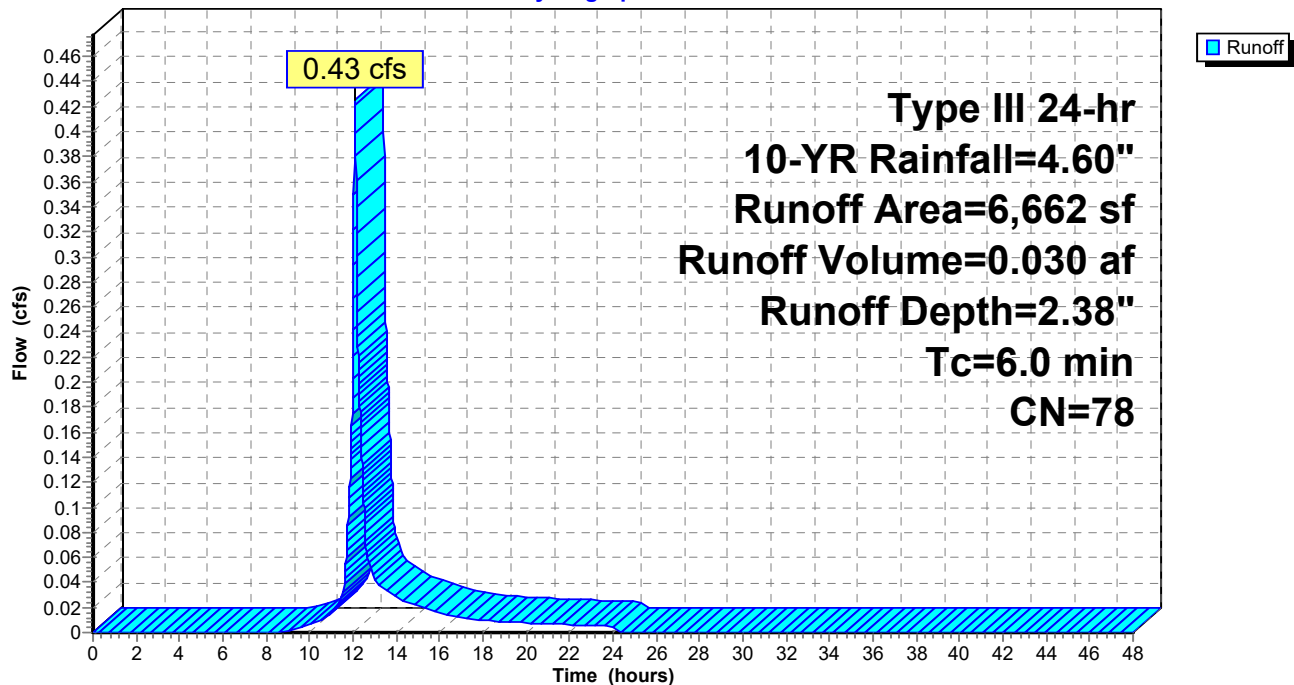
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-YR Rainfall=4.60"

	Area (sf)	CN	Description
*	5,662	74	G+RG: >75% Grass cover, Good, HSG C
*	1,000	98	
	6,662	78	Weighted Average
	5,662		84.99% Pervious Area
	1,000		15.01% Impervious Area

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

Subcatchment S22: Stow Road South

Hydrograph



Summary for Subcatchment S23: Stow Road South

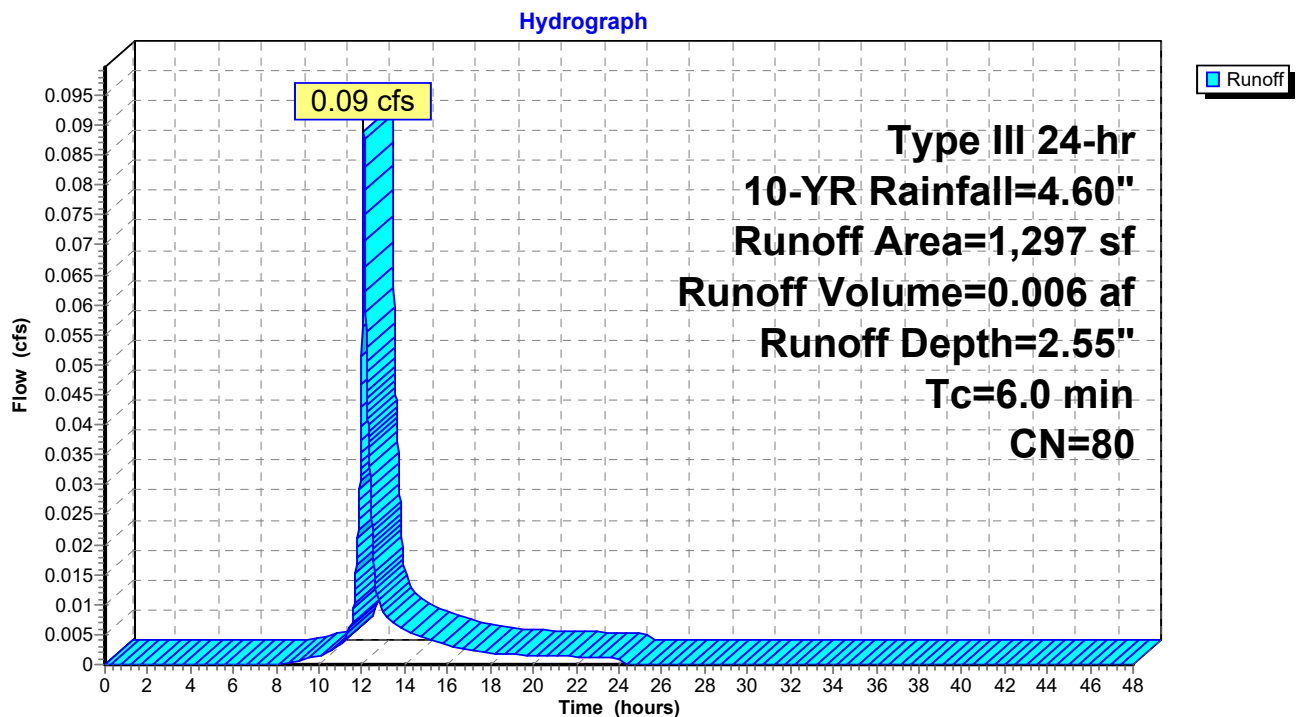
Runoff = 0.09 cfs @ 12.09 hrs, Volume= 0.006 af, Depth= 2.55"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-YR Rainfall=4.60"

	Area (sf)	CN	Description
*	994	74	G+RG: >75% Grass cover, Good, HSG C
*	303	98	
	1,297	80	Weighted Average
	994		76.64% Pervious Area
	303		23.36% Impervious Area

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

Subcatchment S23: Stow Road South



Summary for Subcatchment S3:

Runoff = 0.35 cfs @ 12.16 hrs, Volume= 0.030 af, Depth= 2.38"

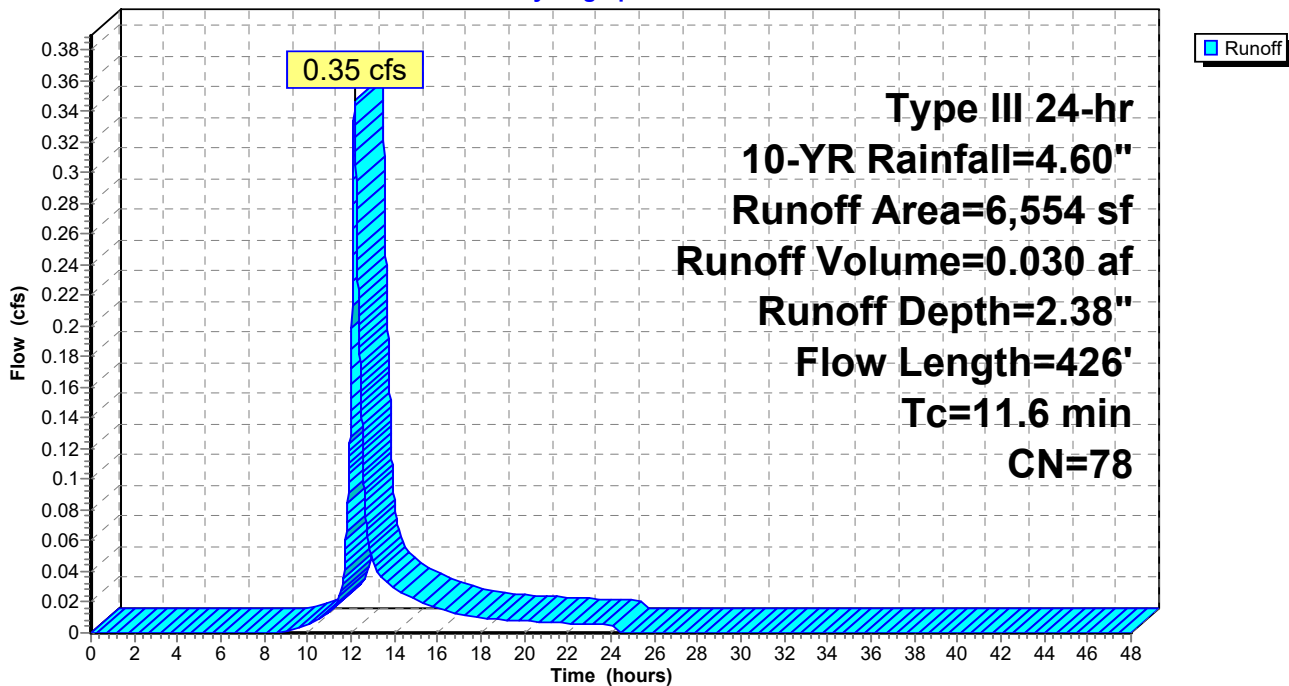
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-YR Rainfall=4.60"

	Area (sf)	CN	Description
*	3,497	61	G+RG: >75% Grass cover, Good, HSG B
*	3,057	98	
	6,554	78	Weighted Average
	3,497		53.36% Pervious Area
	3,057		46.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	50	0.0600	0.22		Sheet Flow, Grass: Short n= 0.150 P2= 3.00"
7.9	376	0.0130	0.80		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
11.6	426	Total			

Subcatchment S3:

Hydrograph



Summary for Subcatchment S4:

Runoff = 0.08 cfs @ 12.09 hrs, Volume= 0.006 af, Depth= 2.05"

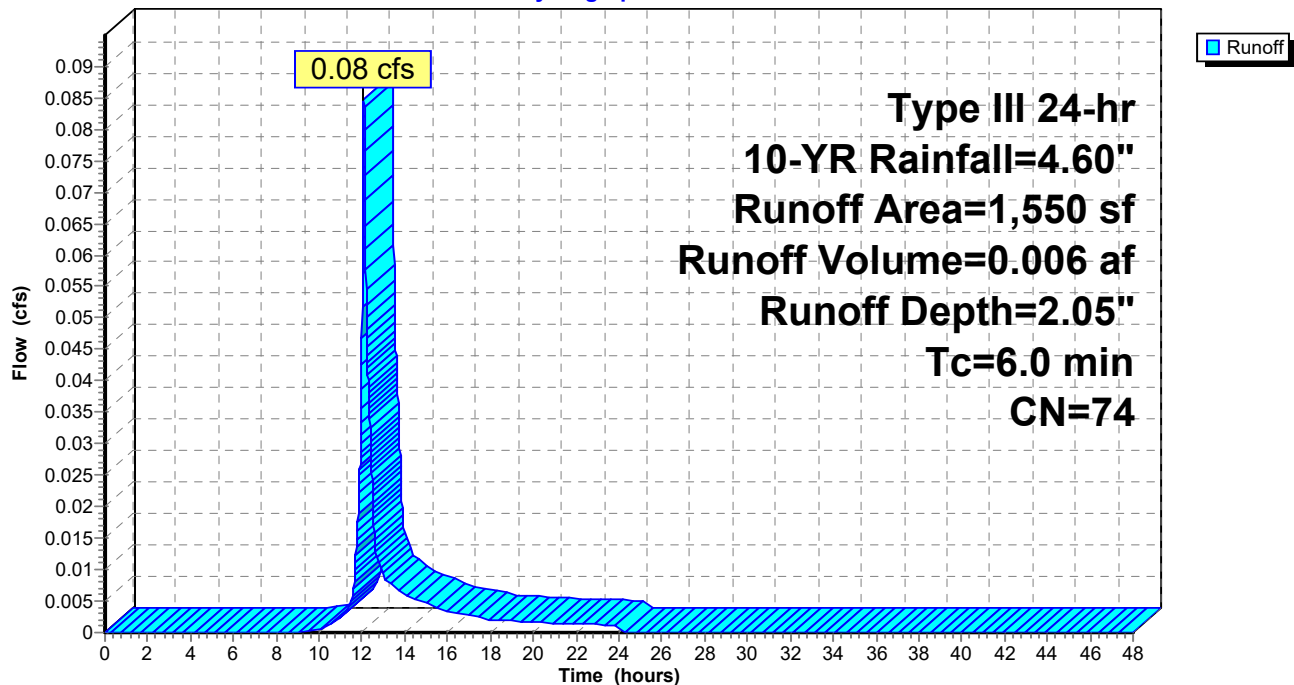
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-YR Rainfall=4.60"

Area (sf)	CN	Description
1,008	61	>75% Grass cover, Good, HSG B
* 542	98	
1,550	74	Weighted Average
1,008		65.03% Pervious Area
542		34.97% Impervious Area

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

Subcatchment S4:

Hydrograph



Summary for Subcatchment S5:

Runoff = 0.13 cfs @ 12.09 hrs, Volume= 0.009 af, Depth= 2.21"

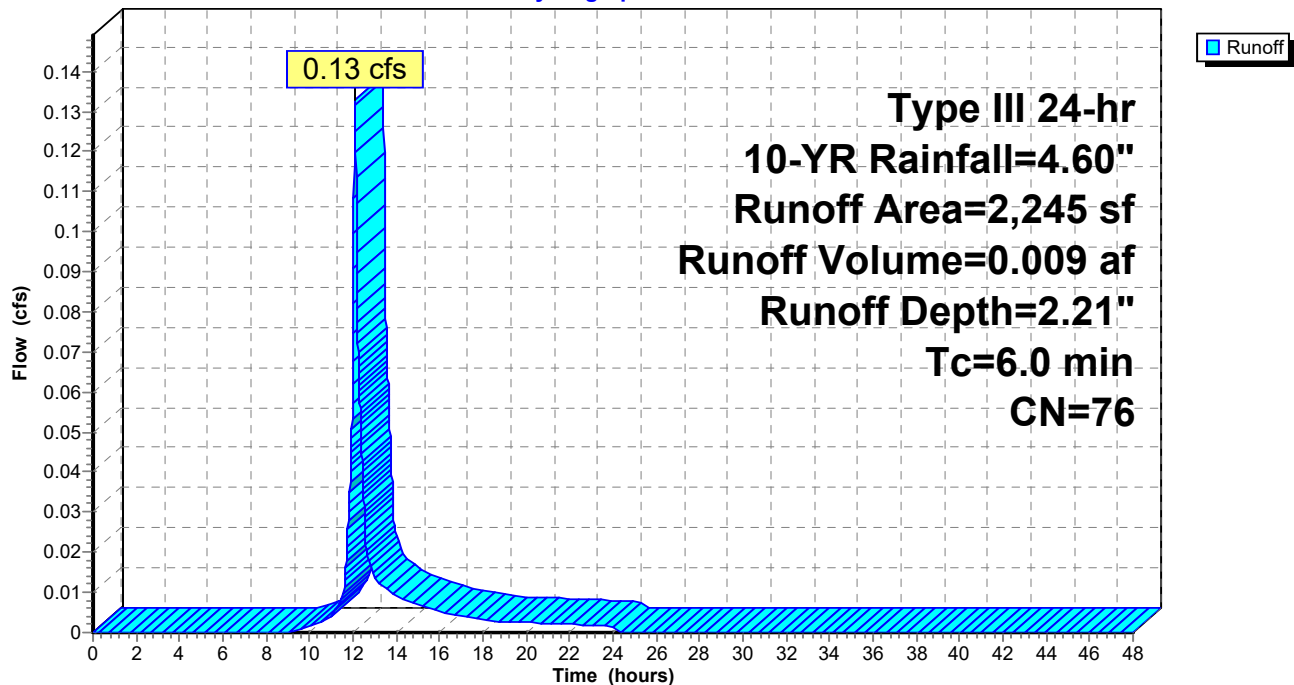
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-YR Rainfall=4.60"

	Area (sf)	CN	Description
*	1,343	61	G+RG: >75% Grass cover, Good, HSG B
*	902	98	
	2,245	76	Weighted Average
	1,343		59.82% Pervious Area
	902		40.18% Impervious Area

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

Subcatchment S5:

Hydrograph



Summary for Subcatchment SBS:

Runoff = 0.44 cfs @ 12.09 hrs, Volume= 0.031 af, Depth= 2.38"

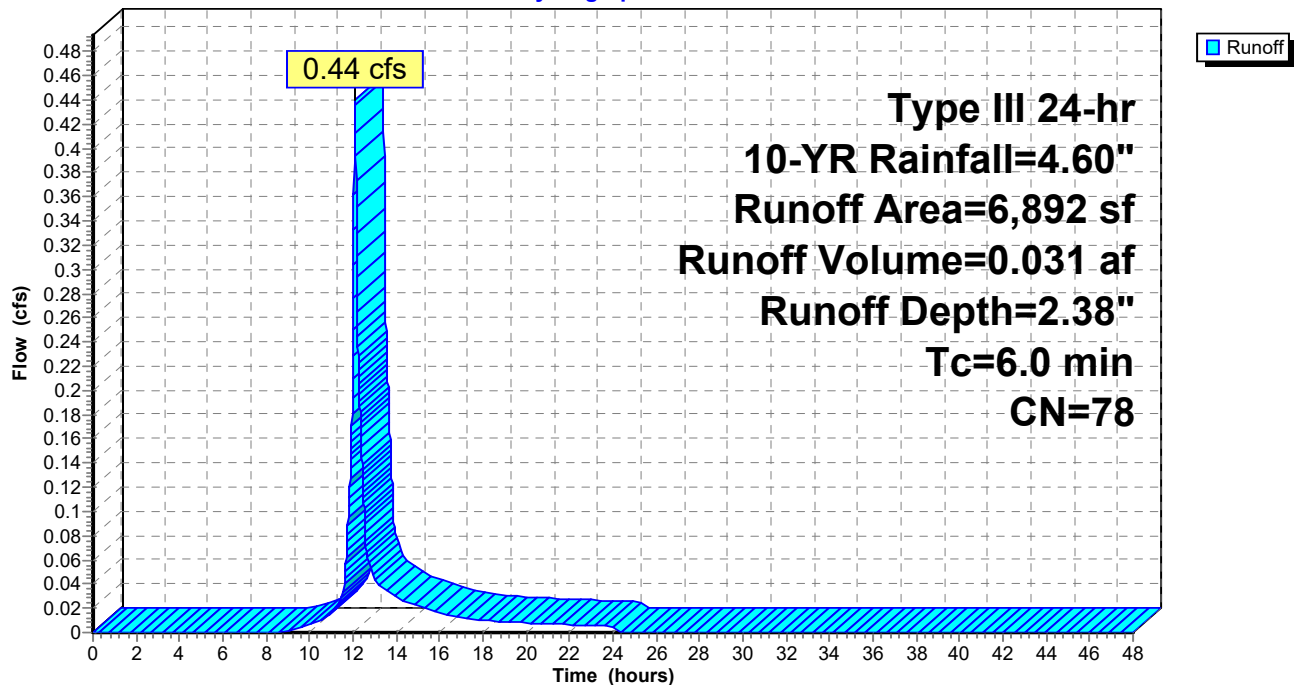
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-YR Rainfall=4.60"

Area (sf)	CN	Description
5,845	74	>75% Grass cover, Good, HSG C
* 1,047	98	
6,892	78	Weighted Average
5,845		84.81% Pervious Area
1,047		15.19% Impervious Area

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

Subcatchment SBS:

Hydrograph



Summary for Reach 1R: (new Reach)

[52] Hint: Inlet/Outlet conditions not evaluated

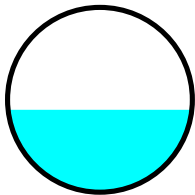
[62] Hint: Exceeded Reach PS7 OUTLET depth by 0.13' @ 12.09 hrs

Inflow Area = 0.785 ac, 28.61% Impervious, Inflow Depth = 1.89" for 10-YR event
Inflow = 1.92 cfs @ 12.07 hrs, Volume= 0.124 af
Outflow = 1.91 cfs @ 12.07 hrs, Volume= 0.124 af, Atten= 0%, Lag= 0.4 min

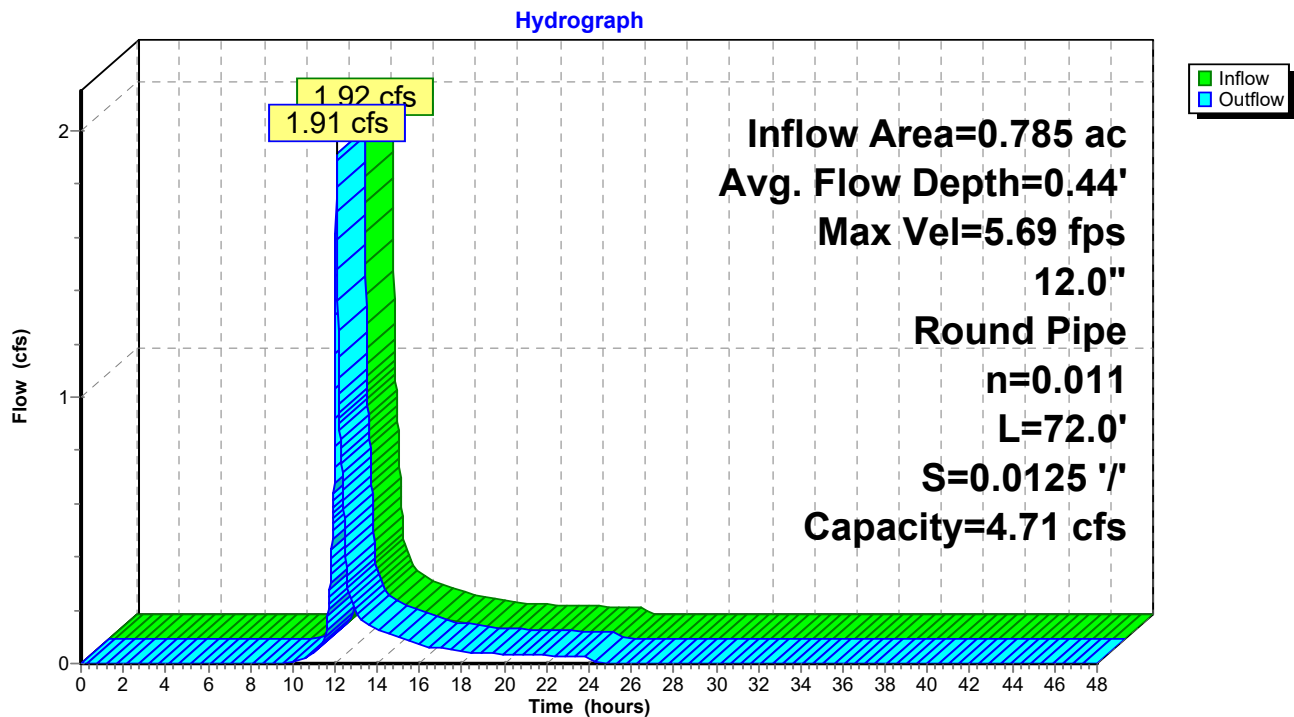
Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.69 fps, Min. Travel Time= 0.2 min
Avg. Velocity= 2.03 fps, Avg. Travel Time= 0.6 min

Peak Storage= 24 cf @ 12.07 hrs
Average Depth at Peak Storage= 0.44'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 4.71 cfs

12.0" Round Pipe
n= 0.011 Concrete pipe, straight & clean
Length= 72.0' Slope= 0.0125 '/'
Inlet Invert= 261.00', Outlet Invert= 260.10'



Reach 1R: (new Reach)



Summary for Reach 4R:

[52] Hint: Inlet/Outlet conditions not evaluated

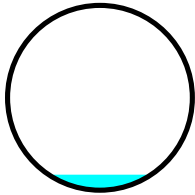
[62] Hint: Exceeded Reach PS10A OUTLET depth by 0.01' @ 22.64 hrs

Inflow Area = 0.035 ac, 96.04% Impervious, Inflow Depth = 4.25" for 10-YR event
Inflow = 0.16 cfs @ 12.09 hrs, Volume= 0.013 af
Outflow = 0.16 cfs @ 12.09 hrs, Volume= 0.013 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.02 fps, Min. Travel Time= 0.1 min
Avg. Velocity= 1.69 fps, Avg. Travel Time= 0.2 min

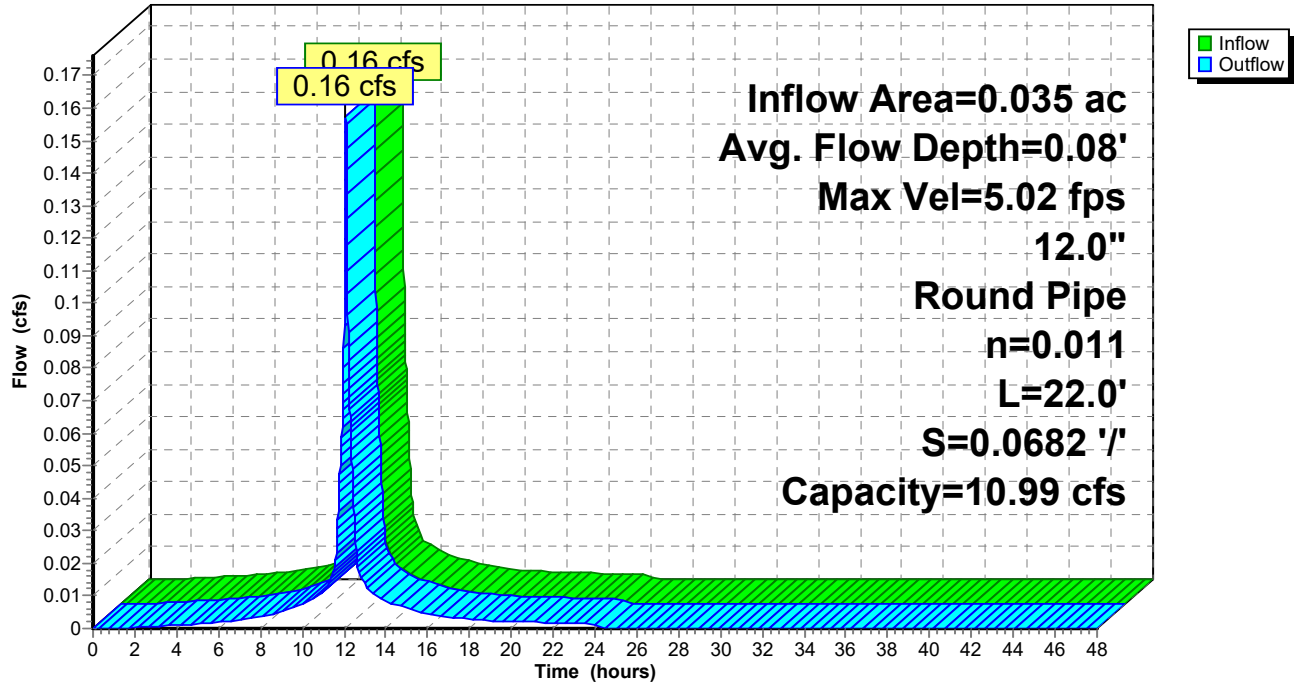
Peak Storage= 1 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.08'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 10.99 cfs

12.0" Round Pipe
n= 0.011
Length= 22.0' Slope= 0.0682 '/'
Inlet Invert= 315.00', Outlet Invert= 313.50'



Reach 4R:

Hydrograph



Summary for Reach 5R: Intermittent Stream

Inflow Area = 4.704 ac, 1.01% Impervious, Inflow Depth = 1.96" for 10-YR event
 Inflow = 6.58 cfs @ 12.20 hrs, Volume= 0.768 af
 Outflow = 5.97 cfs @ 12.45 hrs, Volume= 0.768 af, Atten= 9%, Lag= 15.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 1.80 fps, Min. Travel Time= 7.8 min
 Avg. Velocity = 0.47 fps, Avg. Travel Time= 29.9 min

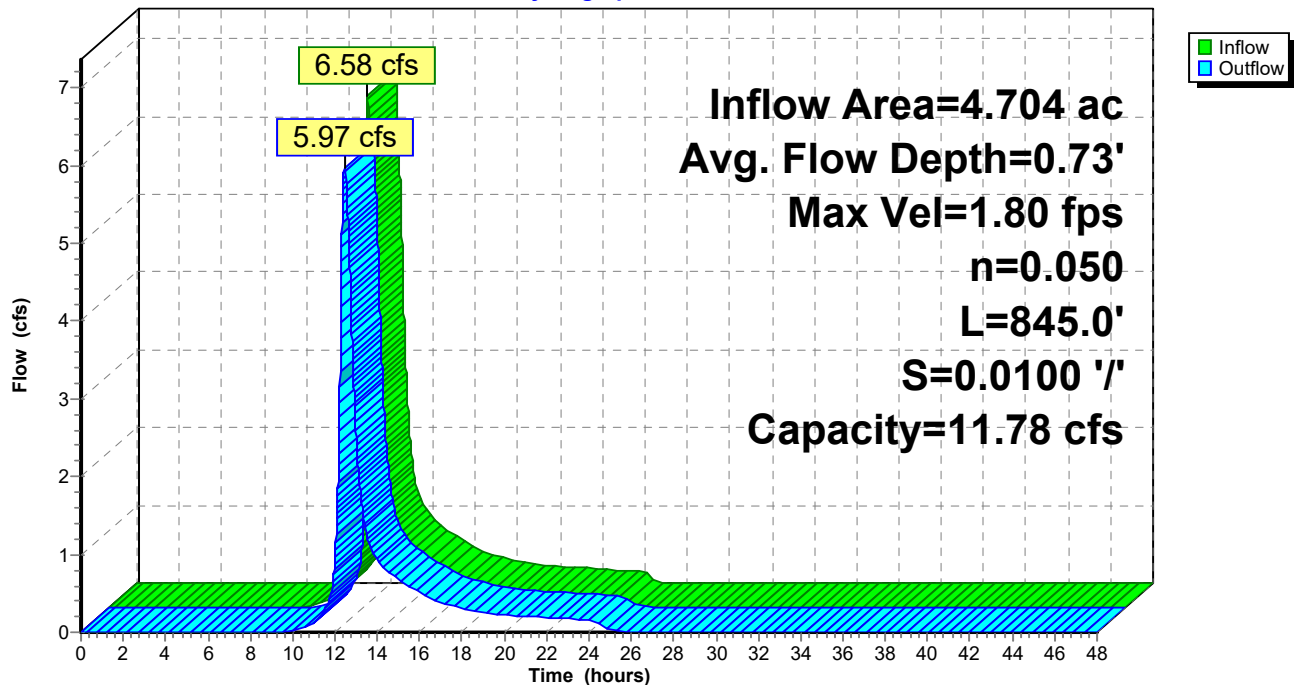
Peak Storage= 2,802 cf @ 12.32 hrs
 Average Depth at Peak Storage= 0.73'
 Bank-Full Depth= 1.00' Flow Area= 5.3 sf, Capacity= 11.78 cfs

8.00' x 1.00' deep Parabolic Channel, n= 0.050 High grass
 Length= 845.0' Slope= 0.0100 '/
 Inlet Invert= 260.00', Outlet Invert= 251.55'



Reach 5R: Intermittent Stream

Hydrograph



Summary for Reach 6R: new

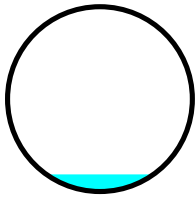
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.099 ac, 53.64% Impervious, Inflow Depth = 0.96" for 10-YR event
 Inflow = 0.02 cfs @ 13.38 hrs, Volume= 0.008 af
 Outflow = 0.02 cfs @ 13.45 hrs, Volume= 0.008 af, Atten= 0%, Lag= 4.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 1.55 fps, Min. Travel Time= 2.1 min
 Avg. Velocity = 1.05 fps, Avg. Travel Time= 3.1 min

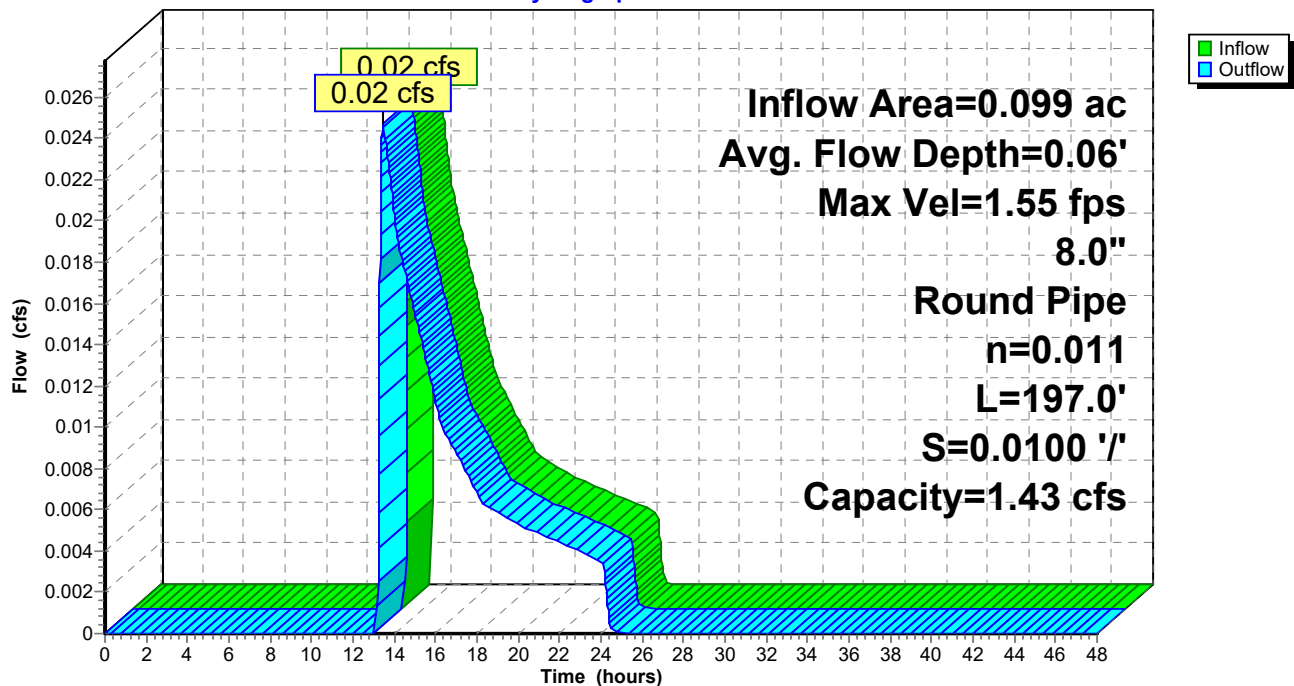
Peak Storage= 3 cf @ 13.42 hrs
 Average Depth at Peak Storage= 0.06'
 Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 1.43 cfs

8.0" Round Pipe
 n= 0.011 Concrete pipe, straight & clean
 Length= 197.0' Slope= 0.0100 '/
 Inlet Invert= 304.20', Outlet Invert= 302.23'



Reach 6R: new

Hydrograph



Summary for Reach 7R:

[52] Hint: Inlet/Outlet conditions not evaluated

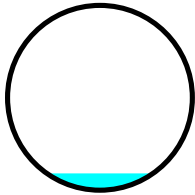
[62] Hint: Exceeded Reach PS10B OUTLET depth by 0.01' @ 12.17 hrs

Inflow Area = 0.035 ac, 96.04% Impervious, Inflow Depth = 4.25" for 10-YR event
Inflow = 0.16 cfs @ 12.10 hrs, Volume= 0.013 af
Outflow = 0.16 cfs @ 12.11 hrs, Volume= 0.013 af, Atten= 0%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 4.46 fps, Min. Travel Time= 0.3 min
Avg. Velocity= 1.50 fps, Avg. Travel Time= 1.0 min

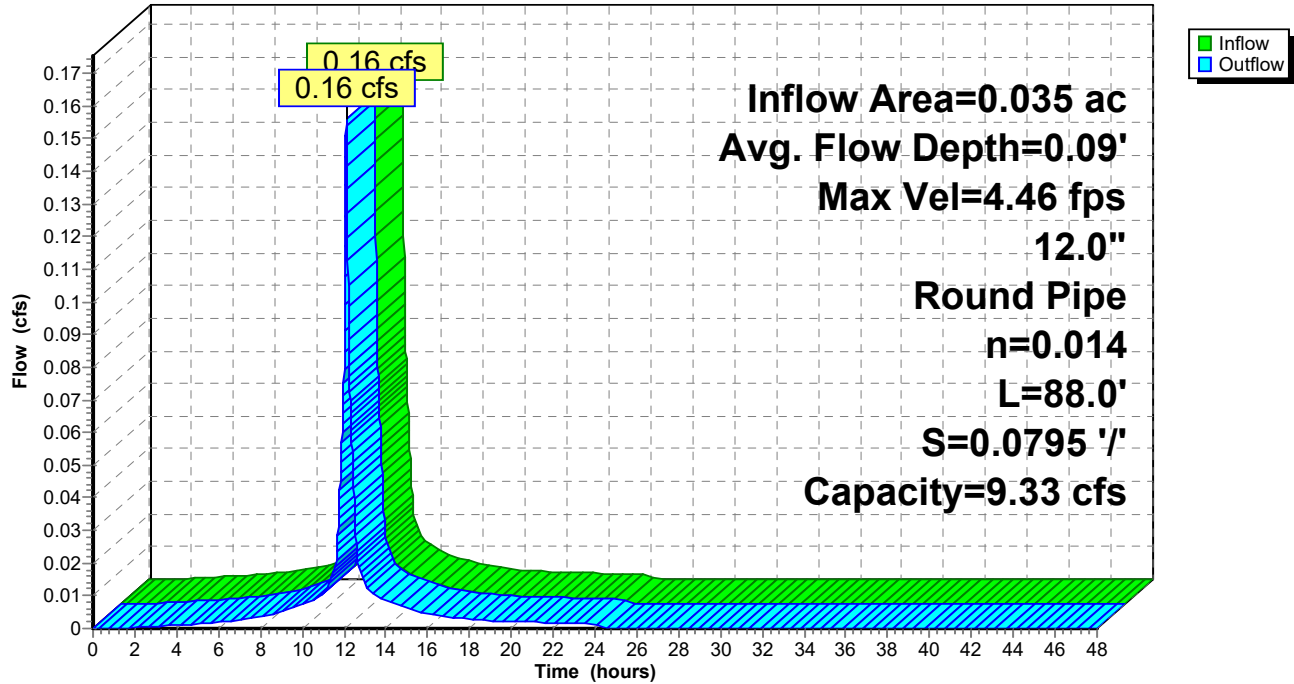
Peak Storage= 3 cf @ 12.11 hrs
Average Depth at Peak Storage= 0.09'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 9.33 cfs

12.0" Round Pipe
n= 0.014 Concrete pipe, finished
Length= 88.0' Slope= 0.0795 '/'
Inlet Invert= 310.50', Outlet Invert= 303.50'



Reach 7R:

Hydrograph



Summary for Reach 8R: new

[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.213 ac, 23.47% Impervious, Inflow Depth = 1.74" for 10-YR event
 Inflow = 0.42 cfs @ 12.11 hrs, Volume= 0.031 af
 Outflow = 0.42 cfs @ 12.12 hrs, Volume= 0.031 af, Atten= 0%, Lag= 0.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Max. Velocity= 5.60 fps, Min. Travel Time= 0.4 min

Avg. Velocity = 2.11 fps, Avg. Travel Time= 1.0 min

Peak Storage= 10 cf @ 12.11 hrs

Average Depth at Peak Storage= 0.18'

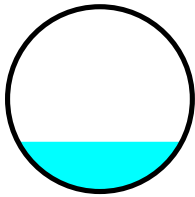
Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 2.68 cfs

8.0" Round Pipe

n= 0.011 Concrete pipe, straight & clean

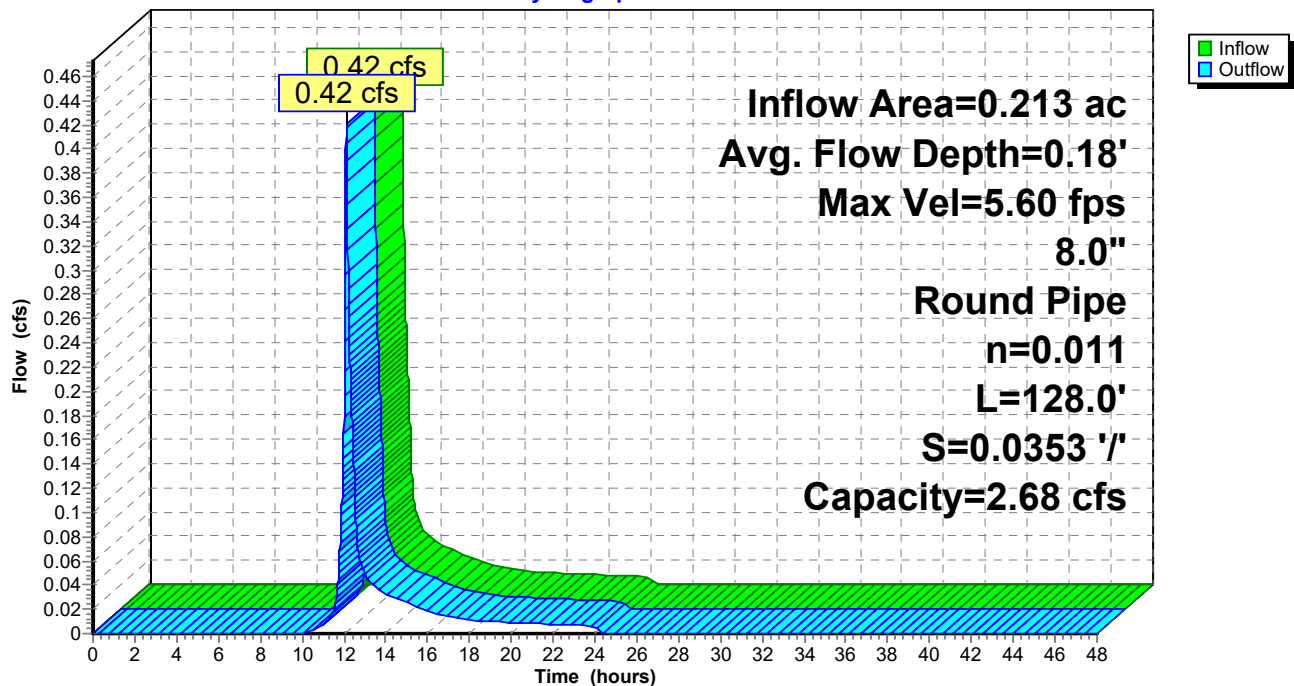
Length= 128.0' Slope= 0.0353 '/'

Inlet Invert= 306.75', Outlet Invert= 302.23'



Reach 8R: new

Hydrograph



Summary for Reach 9R: new

[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.054 ac, 64.02% Impervious, Inflow Depth = 1.89" for 10-YR event
 Inflow = 0.13 cfs @ 12.17 hrs, Volume= 0.009 af
 Outflow = 0.14 cfs @ 12.16 hrs, Volume= 0.009 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Max. Velocity= 2.92 fps, Min. Travel Time= 0.0 min

Avg. Velocity= 1.12 fps, Avg. Travel Time= 0.1 min

Peak Storage= 0 cf @ 12.16 hrs

Average Depth at Peak Storage= 0.13'

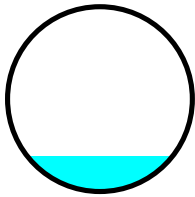
Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 1.71 cfs

8.0" Round Pipe

n= 0.011 Concrete pipe, straight & clean

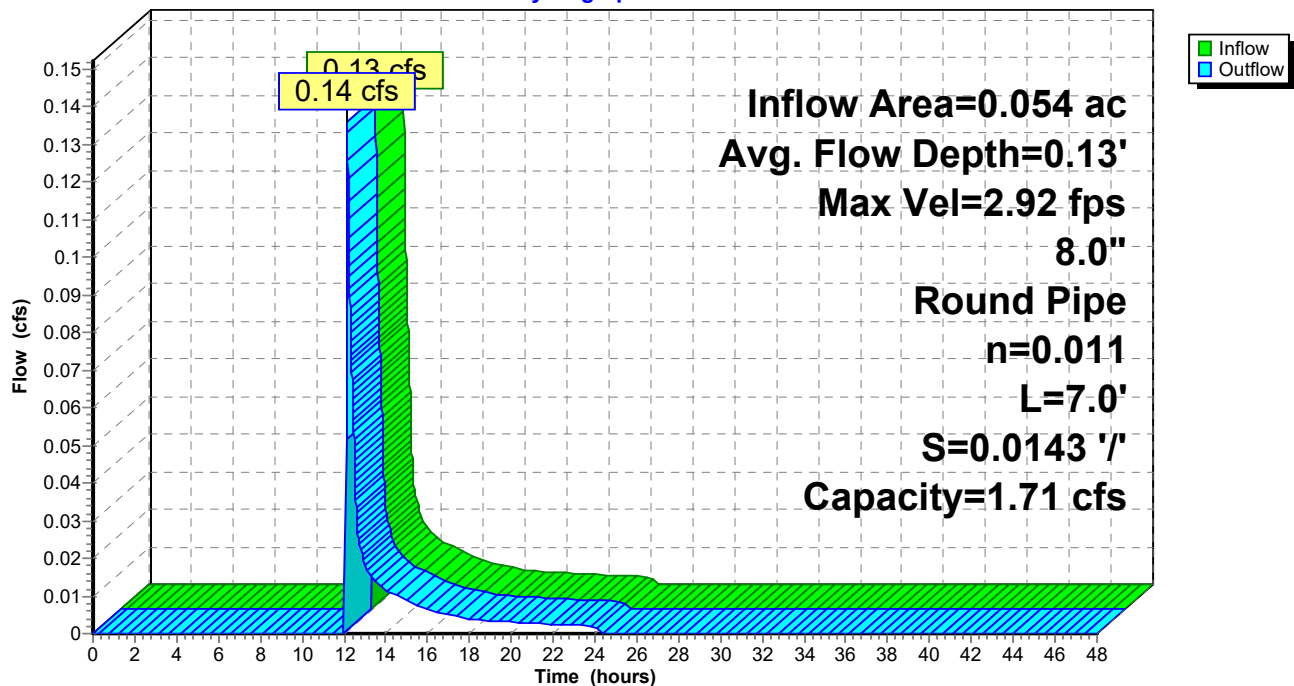
Length= 7.0' Slope= 0.0143 '/'

Inlet Invert= 298.00', Outlet Invert= 297.90'



Reach 9R: new

Hydrograph



Summary for Reach 10R: new

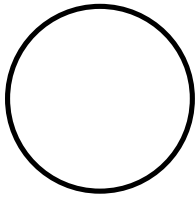
[43] Hint: Has no inflow (Outflow=Zero)

Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

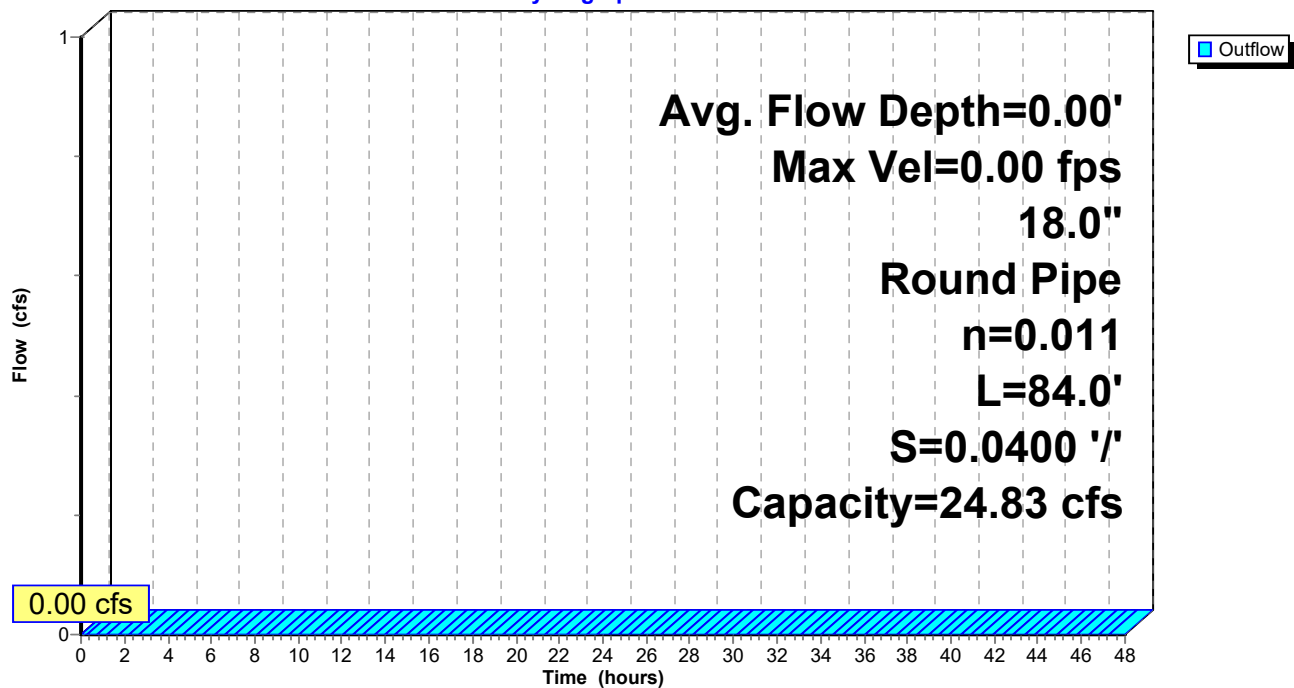
Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 24.83 cfs

18.0" Round Pipe
n= 0.011 Concrete pipe, straight & clean
Length= 84.0' Slope= 0.0400 '/
Inlet Invert= 301.30', Outlet Invert= 297.94'



Reach 10R: new

Hydrograph



Summary for Reach 11R: new

[52] Hint: Inlet/Outlet conditions not evaluated

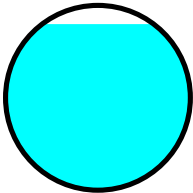
[55] Hint: Peak inflow is 106% of Manning's capacity

Inflow Area = 1.015 ac, 19.57% Impervious, Inflow Depth = 1.48" for 10-YR event
Inflow = 1.82 cfs @ 12.10 hrs, Volume= 0.125 af
Outflow = 1.82 cfs @ 12.10 hrs, Volume= 0.125 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.57 fps, Min. Travel Time= 0.0 min
Avg. Velocity= 2.43 fps, Avg. Travel Time= 0.0 min

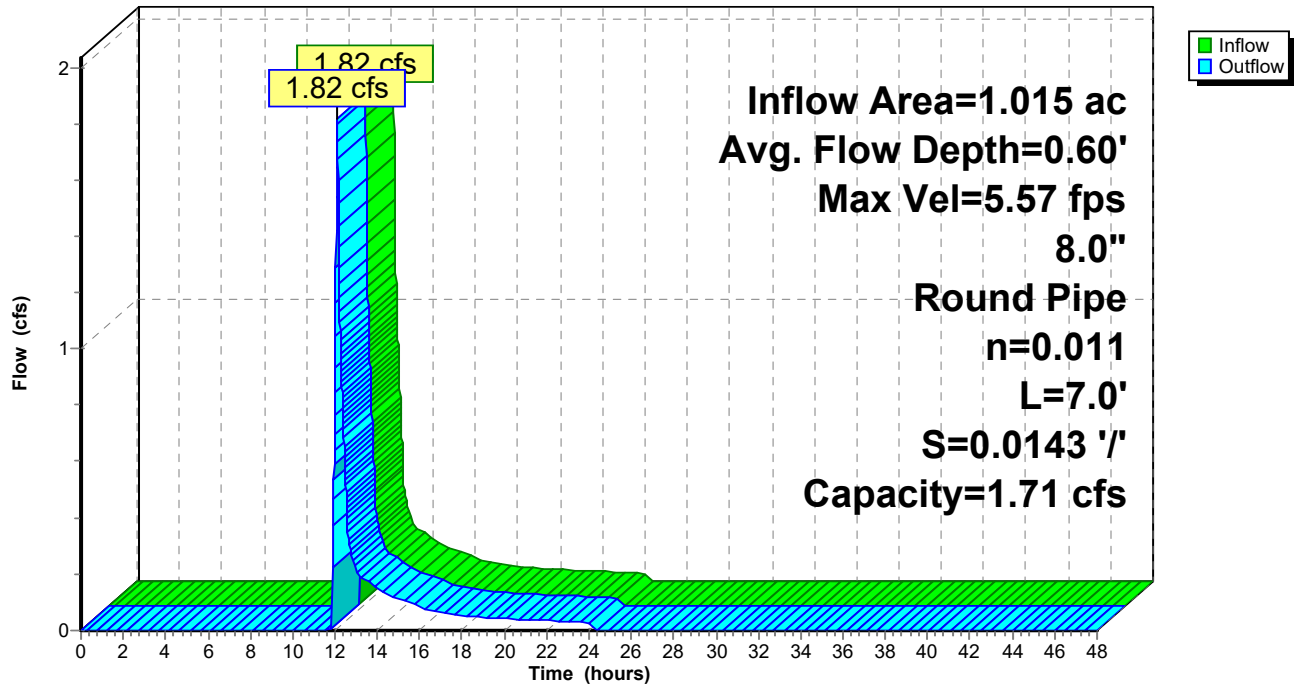
Peak Storage= 2 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.60'
Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 1.71 cfs

8.0" Round Pipe
n= 0.011 Concrete pipe, straight & clean
Length= 7.0' Slope= 0.0143 '/'
Inlet Invert= 298.00', Outlet Invert= 297.90'



Reach 11R: new

Hydrograph



Summary for Reach 12R: (new Reach)

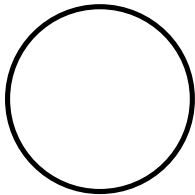
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.243 ac, 29.57% Impervious, Inflow Depth = 0.00" for 10-YR event
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
 Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

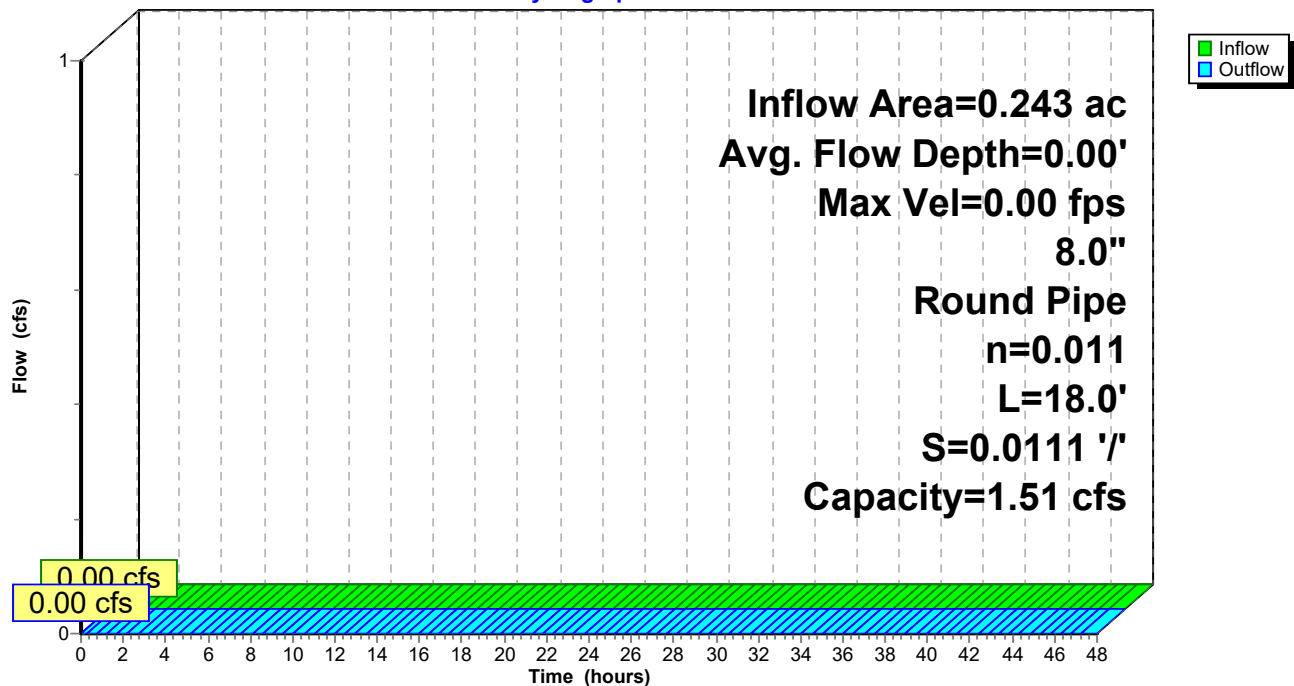
Peak Storage= 0 cf @ 0.00 hrs
 Average Depth at Peak Storage= 0.00'
 Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 1.51 cfs

8.0" Round Pipe
 n= 0.011
 Length= 18.0' Slope= 0.0111 '/'
 Inlet Invert= 297.30', Outlet Invert= 297.10'



Reach 12R: (new Reach)

Hydrograph



Summary for Reach 13R: New

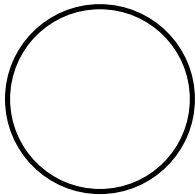
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.036 ac, 34.97% Impervious, Inflow Depth = 0.00" for 10-YR event
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
 Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

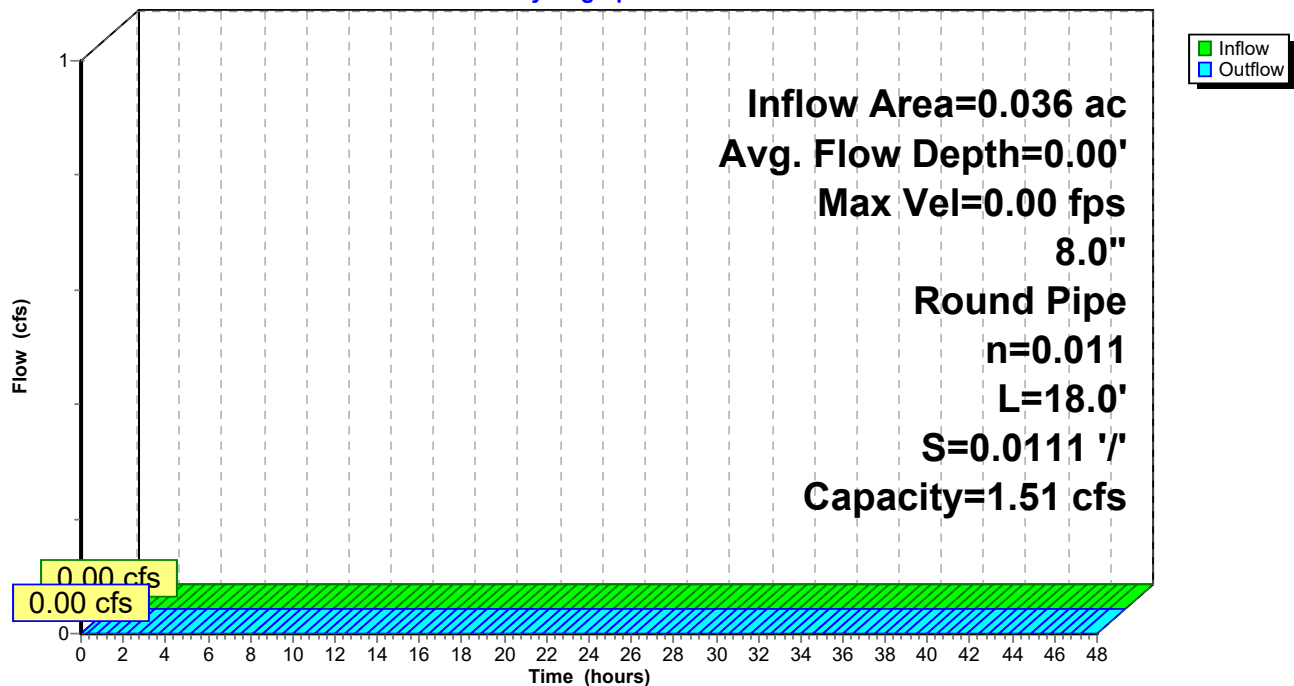
Peak Storage= 0 cf @ 0.00 hrs
 Average Depth at Peak Storage= 0.00'
 Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 1.51 cfs

8.0" Round Pipe
 n= 0.011
 Length= 18.0' Slope= 0.0111 '/'
 Inlet Invert= 301.30', Outlet Invert= 301.10'



Reach 13R: New

Hydrograph



Summary for Reach 14R: (new Reach)

[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.265 ac, 0.00% Impervious, Inflow Depth = 0.09" for 10-YR event
 Inflow = 0.01 cfs @ 21.21 hrs, Volume= 0.002 af
 Outflow = 0.01 cfs @ 21.22 hrs, Volume= 0.002 af, Atten= 0%, Lag= 0.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Max. Velocity= 1.34 fps, Min. Travel Time= 0.4 min

Avg. Velocity= 1.21 fps, Avg. Travel Time= 0.5 min

Peak Storage= 0 cf @ 21.21 hrs

Average Depth at Peak Storage= 0.03'

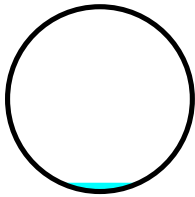
Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 1.88 cfs

8.0" Round Pipe

n= 0.011

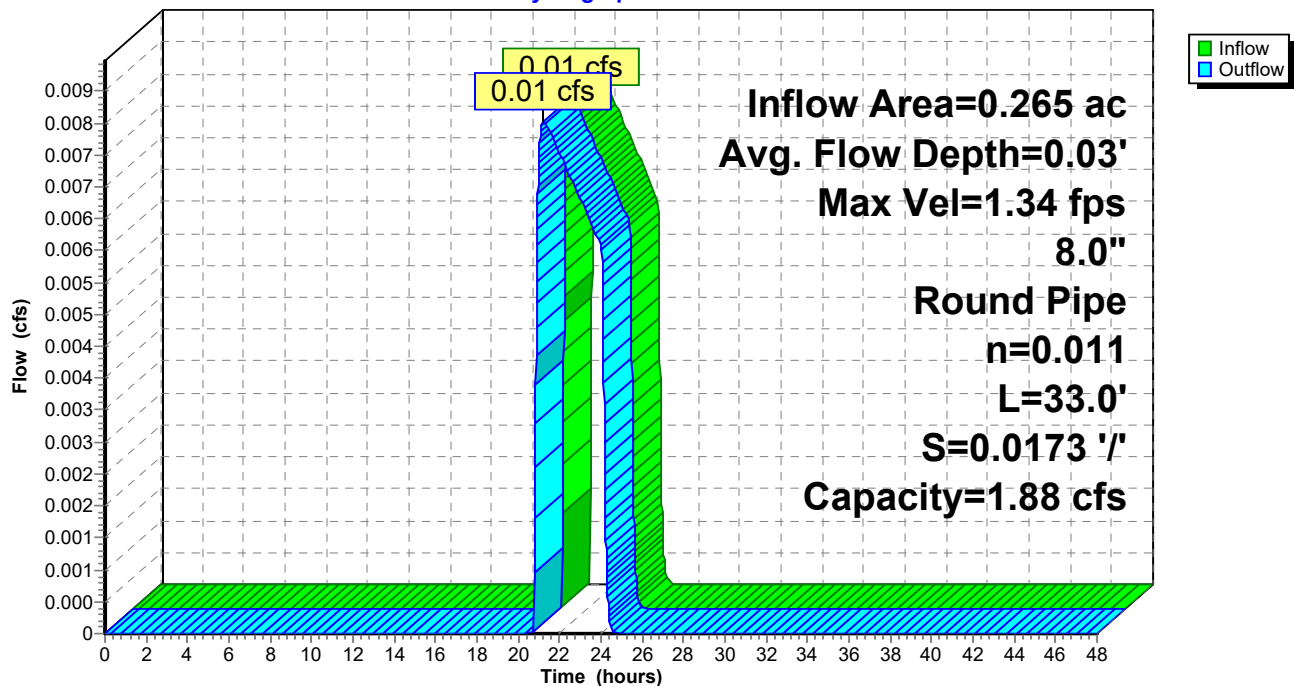
Length= 33.0' Slope= 0.0173 '/'

Inlet Invert= 290.30', Outlet Invert= 289.73'



Reach 14R: (new Reach)

Hydrograph



Summary for Reach 15R: New

[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.043 ac, 62.65% Impervious, Inflow Depth = 1.39" for 10-YR event
 Inflow = 0.04 cfs @ 12.44 hrs, Volume= 0.005 af
 Outflow = 0.04 cfs @ 12.44 hrs, Volume= 0.005 af, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Max. Velocity= 2.18 fps, Min. Travel Time= 0.1 min

Avg. Velocity = 1.07 fps, Avg. Travel Time= 0.3 min

Peak Storage= 0 cf @ 12.44 hrs

Average Depth at Peak Storage= 0.07'

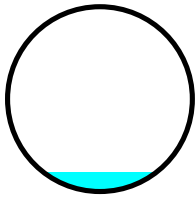
Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 1.84 cfs

8.0" Round Pipe

n= 0.011 Concrete pipe, straight & clean

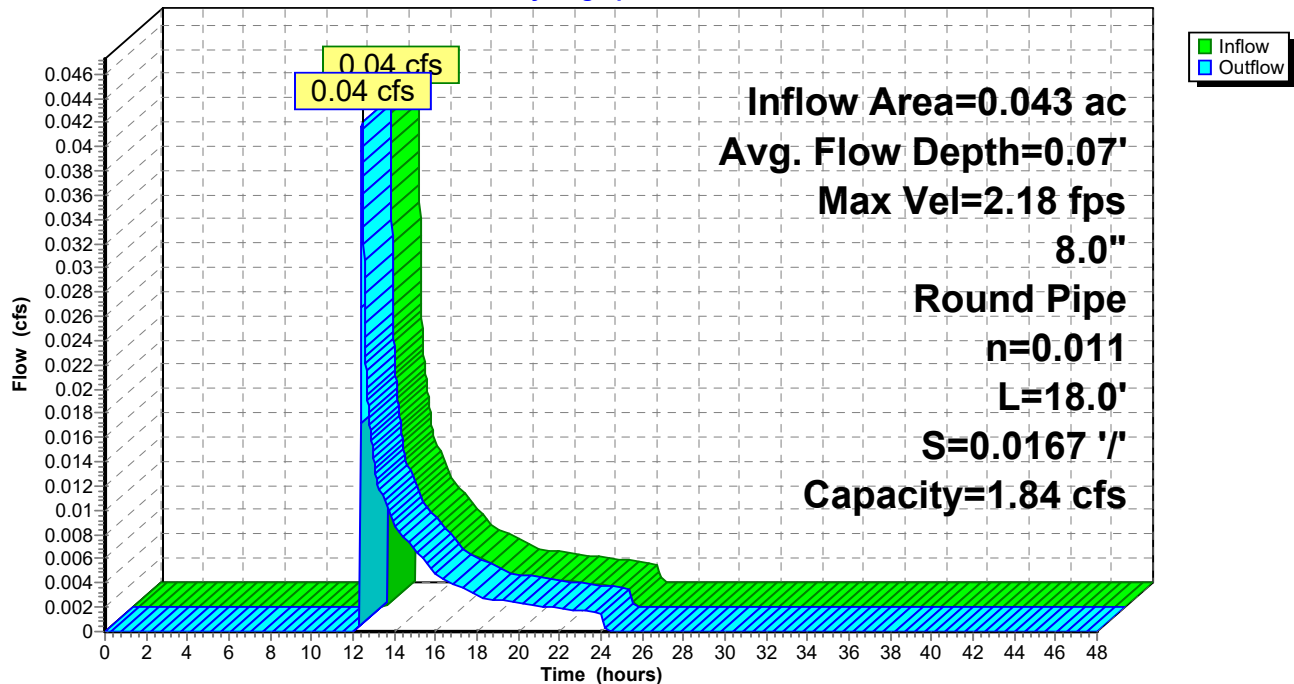
Length= 18.0' Slope= 0.0167 '/'

Inlet Invert= 302.30', Outlet Invert= 302.00'



Reach 15R: New

Hydrograph



Summary for Reach 16R: New

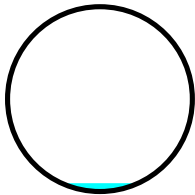
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.091 ac, 45.76% Impervious, Inflow Depth = 0.37" for 10-YR event
 Inflow = 0.01 cfs @ 16.99 hrs, Volume= 0.003 af
 Outflow = 0.01 cfs @ 17.00 hrs, Volume= 0.003 af, Atten= 0%, Lag= 0.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 1.36 fps, Min. Travel Time= 0.4 min
 Avg. Velocity = 1.15 fps, Avg. Travel Time= 0.5 min

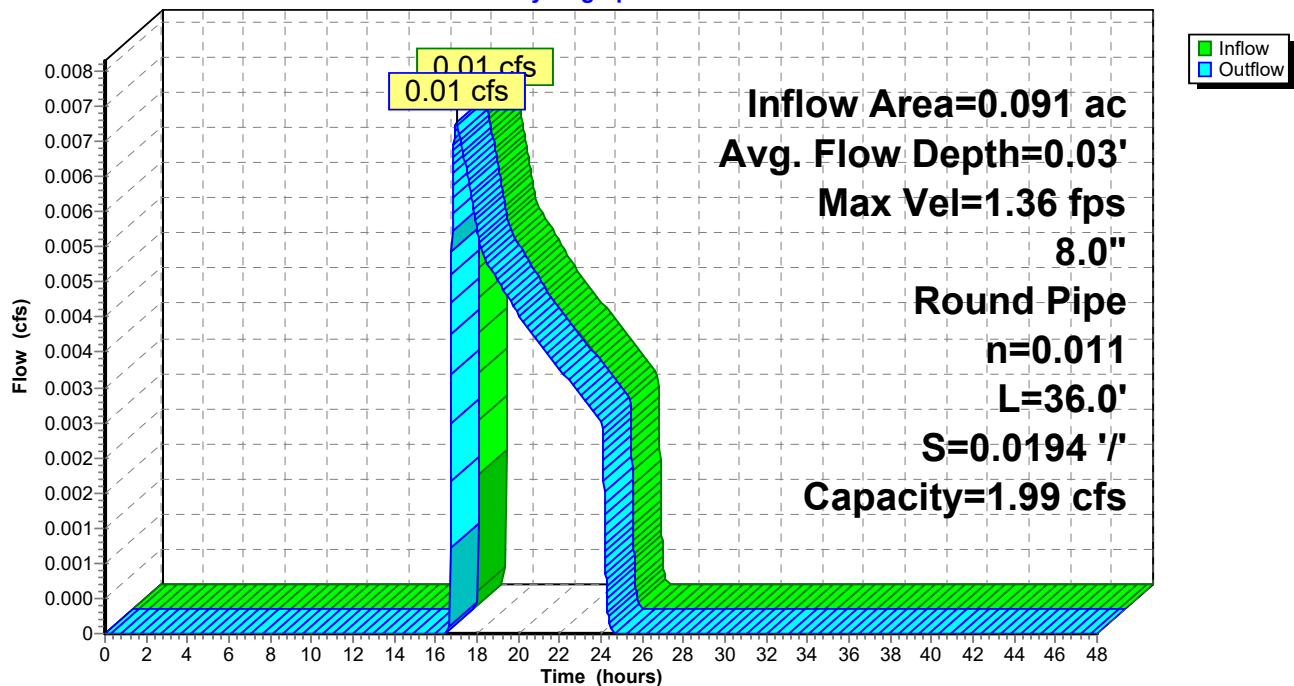
Peak Storage= 0 cf @ 16.99 hrs
 Average Depth at Peak Storage= 0.03'
 Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 1.99 cfs

8.0" Round Pipe
 n= 0.011 Concrete pipe, straight & clean
 Length= 36.0' Slope= 0.0194 '/'
 Inlet Invert= 302.00', Outlet Invert= 301.30'



Reach 16R: New

Hydrograph



Summary for Reach 17R: New

[52] Hint: Inlet/Outlet conditions not evaluated

[55] Hint: Peak inflow is 117% of Manning's capacity

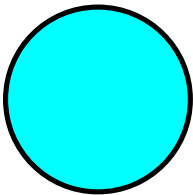
[76] Warning: Detained 0.001 af (Pond w/culvert advised)

Inflow Area = 2.675 ac, 4.94% Impervious, Inflow Depth = 1.17" for 10-YR event
Inflow = 3.04 cfs @ 12.20 hrs, Volume= 0.261 af
Outflow = 2.77 cfs @ 12.18 hrs, Volume= 0.261 af, Atten= 9%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 8.45 fps, Min. Travel Time= 0.1 min
Avg. Velocity= 3.97 fps, Avg. Travel Time= 0.3 min

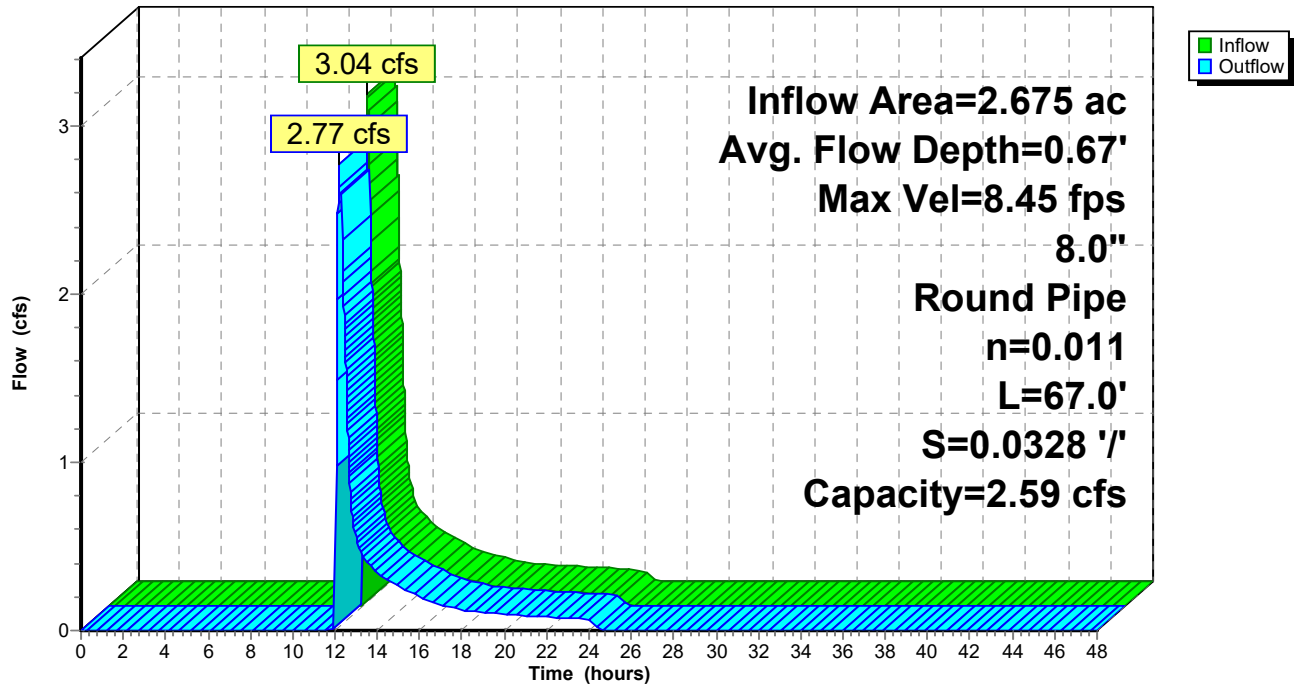
Peak Storage= 23 cf @ 12.19 hrs
Average Depth at Peak Storage= 0.67'
Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 2.59 cfs

8.0" Round Pipe
n= 0.011 Concrete pipe, straight & clean
Length= 67.0' Slope= 0.0328 '/'
Inlet Invert= 298.00', Outlet Invert= 295.80'



Reach 17R: New

Hydrograph



Summary for Reach 18R: New

[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.052 ac, 40.18% Impervious, Inflow Depth = 0.00" for 10-YR event
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min

Avg. Velocity= 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs

Average Depth at Peak Storage= 0.00'

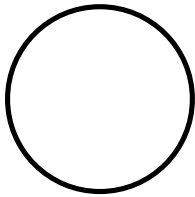
Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 2.02 cfs

8.0" Round Pipe

n= 0.011 Concrete pipe, straight & clean

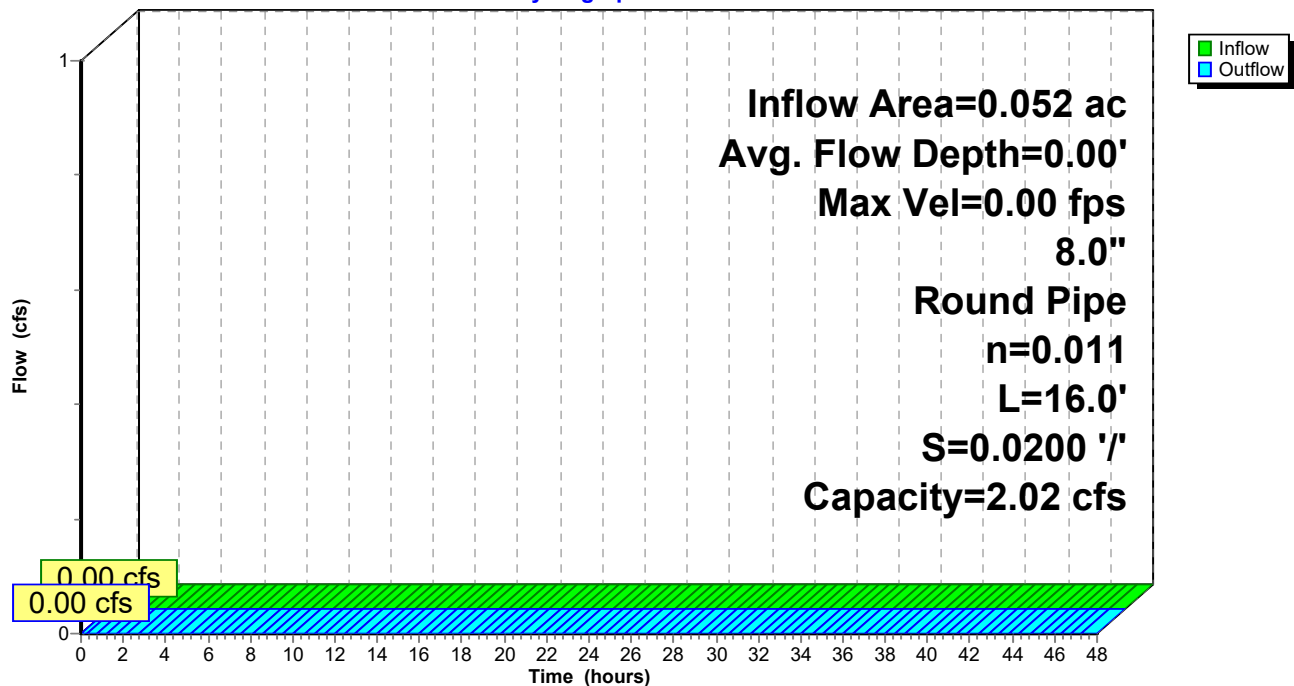
Length= 16.0' Slope= 0.0200 '/'

Inlet Invert= 301.30', Outlet Invert= 300.98'



Reach 18R: New

Hydrograph



Summary for Reach 19R: (new Reach)

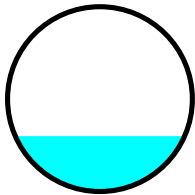
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.228 ac, 67.95% Impervious, Inflow Depth = 2.39" for 10-YR event
 Inflow = 0.78 cfs @ 12.11 hrs, Volume= 0.045 af
 Outflow = 0.77 cfs @ 12.12 hrs, Volume= 0.045 af, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 8.85 fps, Min. Travel Time= 0.1 min
 Avg. Velocity= 3.14 fps, Avg. Travel Time= 0.2 min

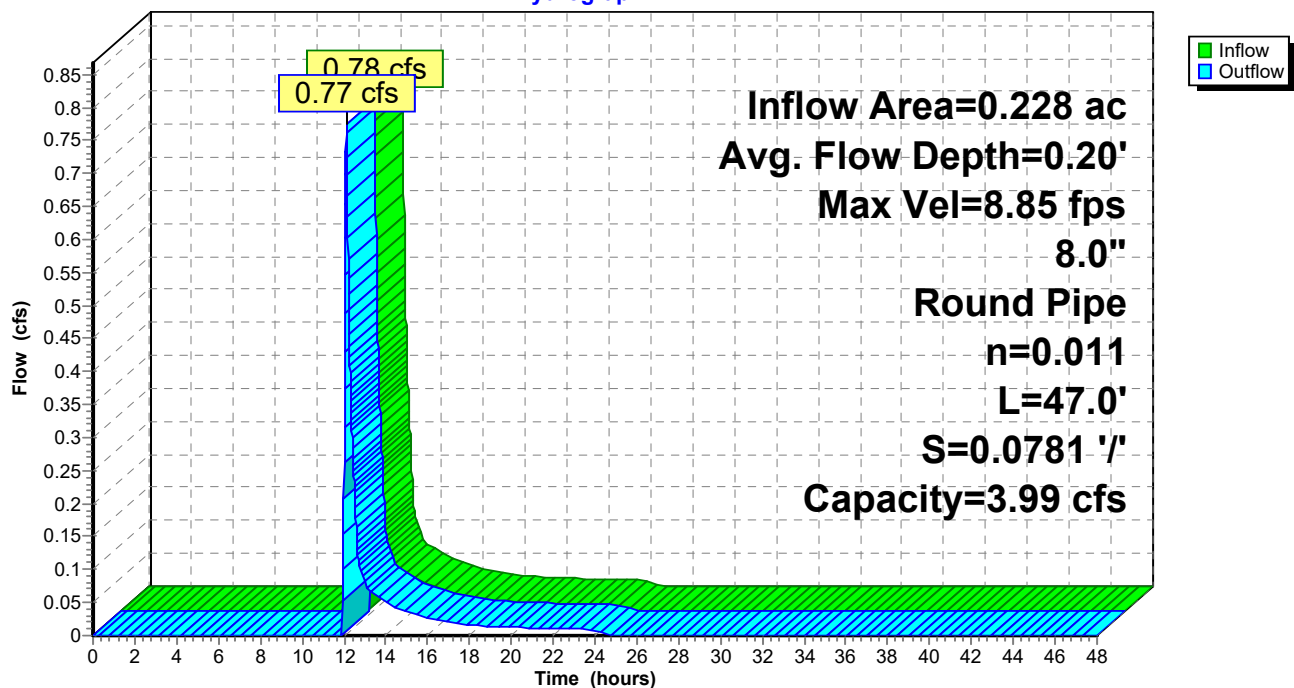
Peak Storage= 4 cf @ 12.12 hrs
 Average Depth at Peak Storage= 0.20'
 Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 3.99 cfs

8.0" Round Pipe
 n= 0.011
 Length= 47.0' Slope= 0.0781 '/
 Inlet Invert= 287.00', Outlet Invert= 283.33'



Reach 19R: (new Reach)

Hydrograph



Summary for Reach 20R: 12" RCP pipe

[52] Hint: Inlet/Outlet conditions not evaluated

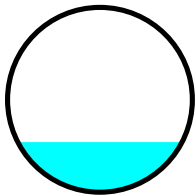
[61] Hint: Exceeded Reach PS9 outlet invert by 0.27' @ 12.11 hrs

Inflow Area = 0.288 ac, 25.48% Impervious, Inflow Depth = 2.55" for 10-YR event
Inflow = 0.86 cfs @ 12.11 hrs, Volume= 0.061 af
Outflow = 0.86 cfs @ 12.11 hrs, Volume= 0.061 af, Atten= 0%, Lag= 0.1 min

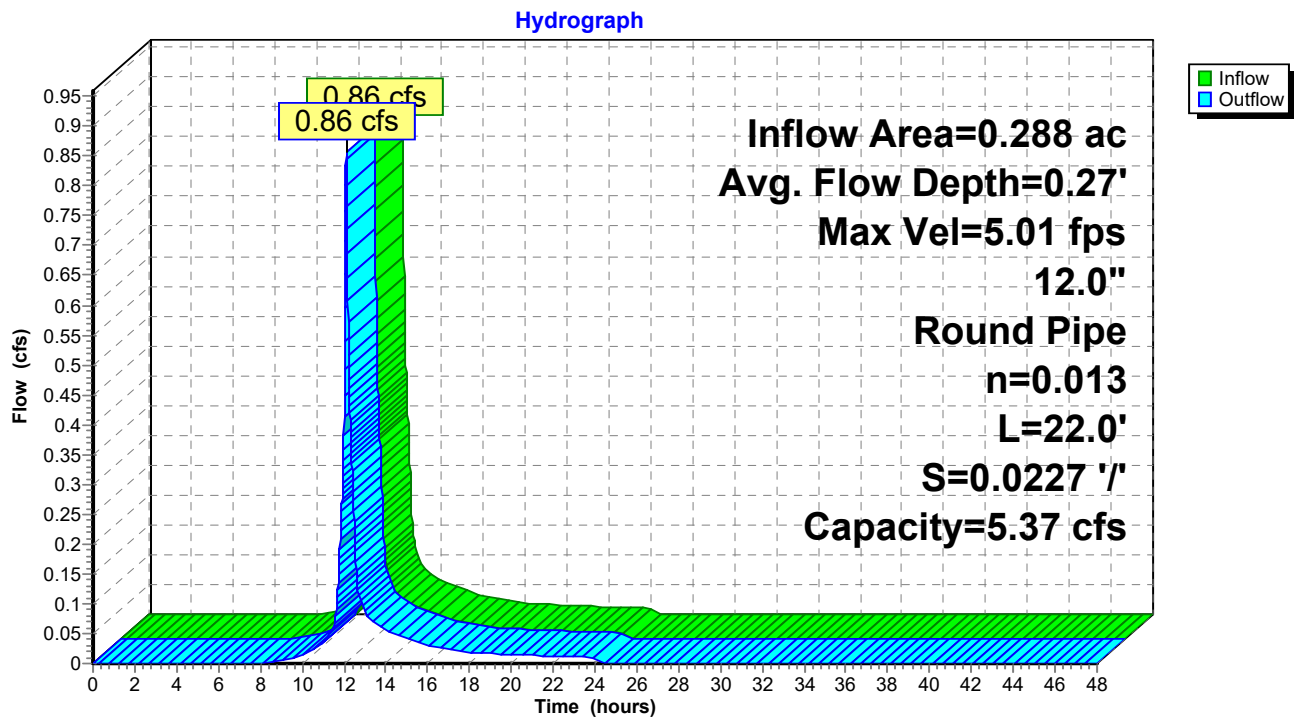
Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.01 fps, Min. Travel Time= 0.1 min
Avg. Velocity= 1.75 fps, Avg. Travel Time= 0.2 min

Peak Storage= 4 cf @ 12.11 hrs
Average Depth at Peak Storage= 0.27'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 5.37 cfs

12.0" Round Pipe
n= 0.013
Length= 22.0' Slope= 0.0227 '/'
Inlet Invert= 257.75', Outlet Invert= 257.25'



Reach 20R: 12" RCP pipe



Summary for Reach 21R: (new Reach)

[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.153 ac, 15.01% Impervious, Inflow Depth = 1.13" for 10-YR event
 Inflow = 0.06 cfs @ 12.67 hrs, Volume= 0.014 af
 Outflow = 0.06 cfs @ 12.69 hrs, Volume= 0.014 af, Atten= 0%, Lag= 0.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Max. Velocity= 1.58 fps, Min. Travel Time= 0.5 min

Avg. Velocity = 0.96 fps, Avg. Travel Time= 0.9 min

Peak Storage= 2 cf @ 12.68 hrs

Average Depth at Peak Storage= 0.11'

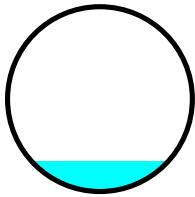
Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 1.01 cfs

8.0" Round Pipe

n= 0.011

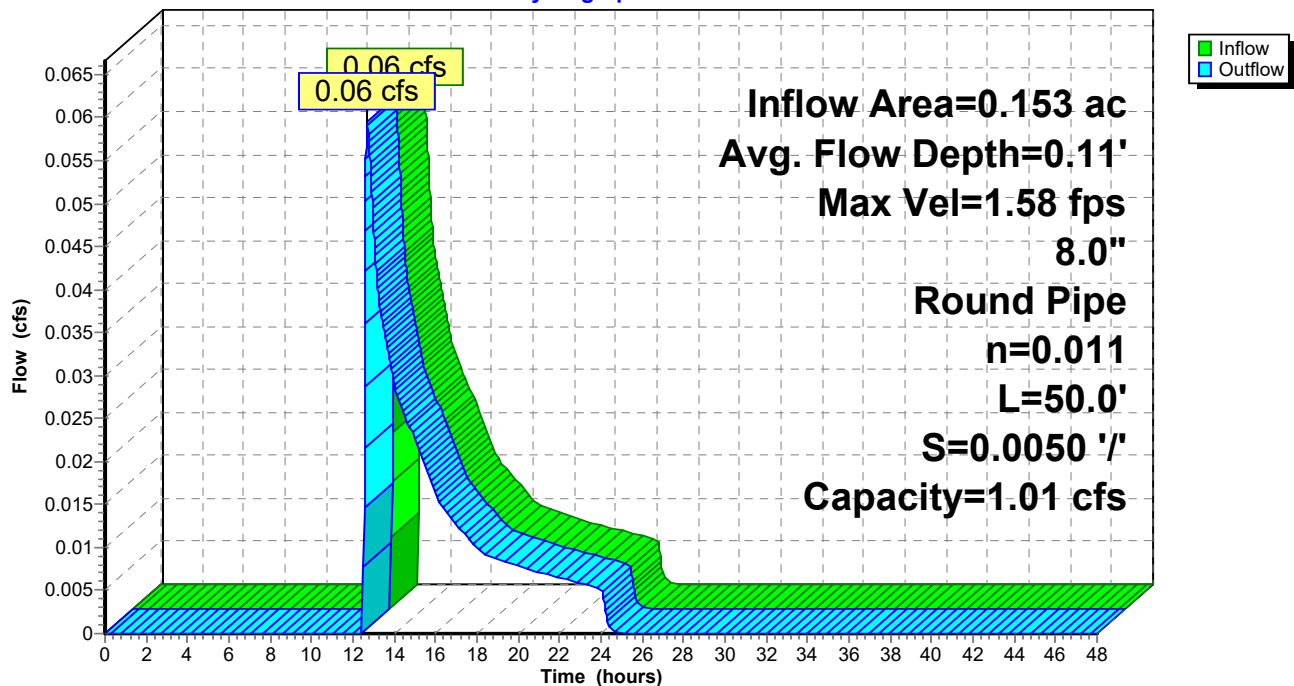
Length= 50.0' Slope= 0.0050 '/'

Inlet Invert= 254.00', Outlet Invert= 253.75'



Reach 21R: (new Reach)

Hydrograph



Summary for Reach CB1: CB1

[52] Hint: Inlet/Outlet conditions not evaluated

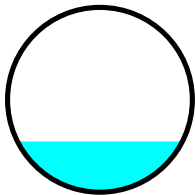
[61] Hint: Exceeded Reach 20R outlet invert by 0.02' @ 12.10 hrs

Inflow Area = 0.395 ac, 45.72% Impervious, Inflow Depth = 3.04" for 10-YR event
Inflow = 1.32 cfs @ 12.10 hrs, Volume= 0.100 af
Outflow = 1.32 cfs @ 12.10 hrs, Volume= 0.100 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 7.60 fps, Min. Travel Time= 0.1 min
Avg. Velocity= 2.34 fps, Avg. Travel Time= 0.2 min

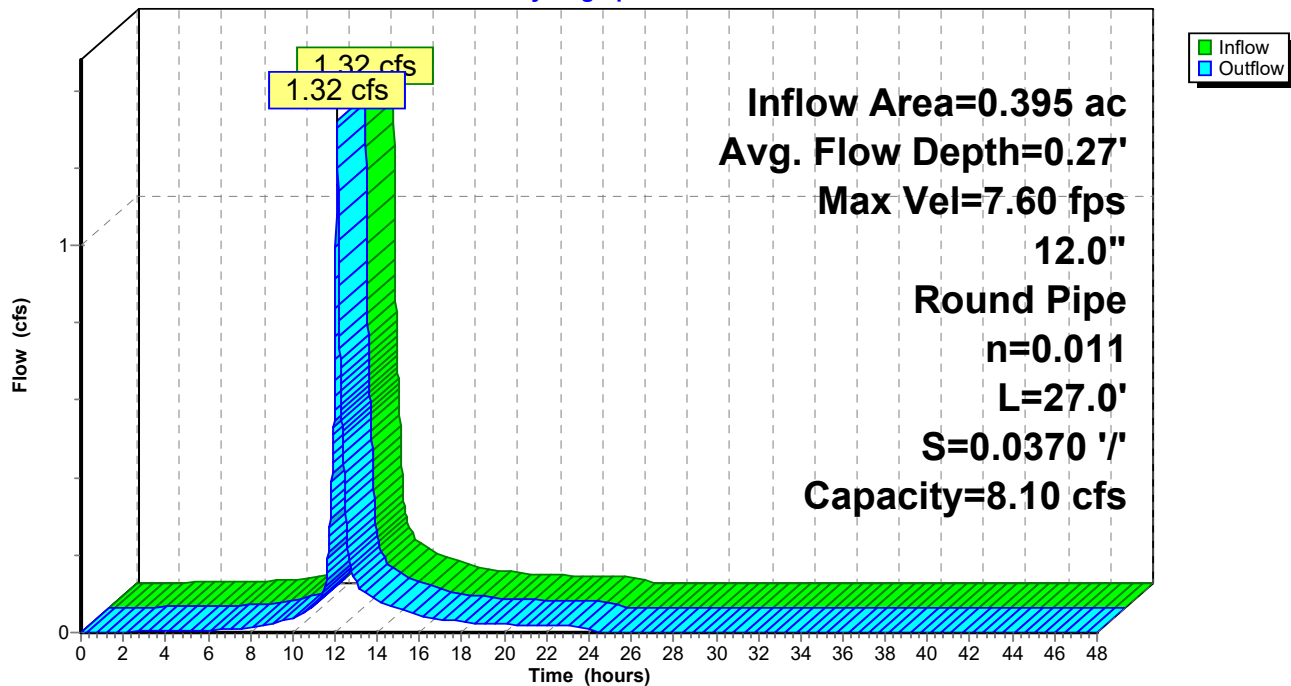
Peak Storage= 5 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.27'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 8.10 cfs

12.0" Round Pipe
n= 0.011
Length= 27.0' Slope= 0.0370 '/'
Inlet Invert= 257.00', Outlet Invert= 256.00'



Reach CB1: CB1

Hydrograph



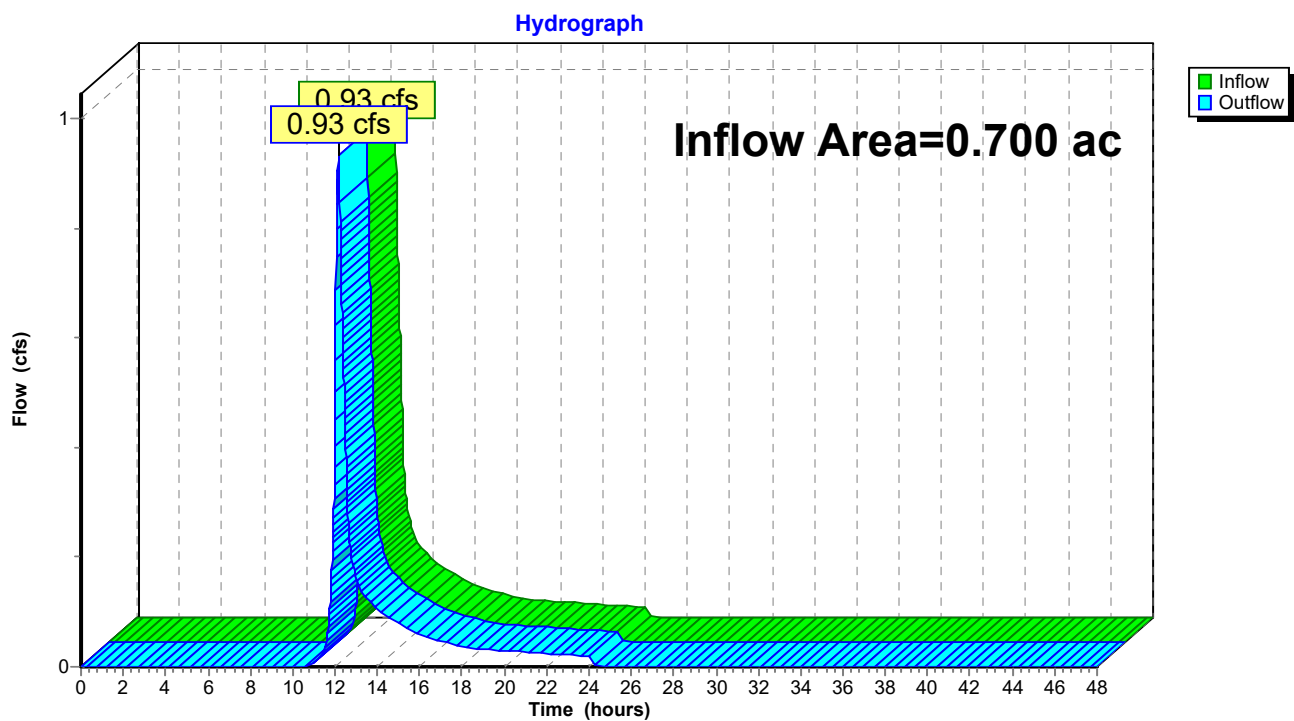
Summary for Reach CP1:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.700 ac, 20.01% Impervious, Inflow Depth = 1.54" for 10-YR event
Inflow = 0.93 cfs @ 12.19 hrs, Volume= 0.090 af
Outflow = 0.93 cfs @ 12.19 hrs, Volume= 0.090 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Reach CP1:



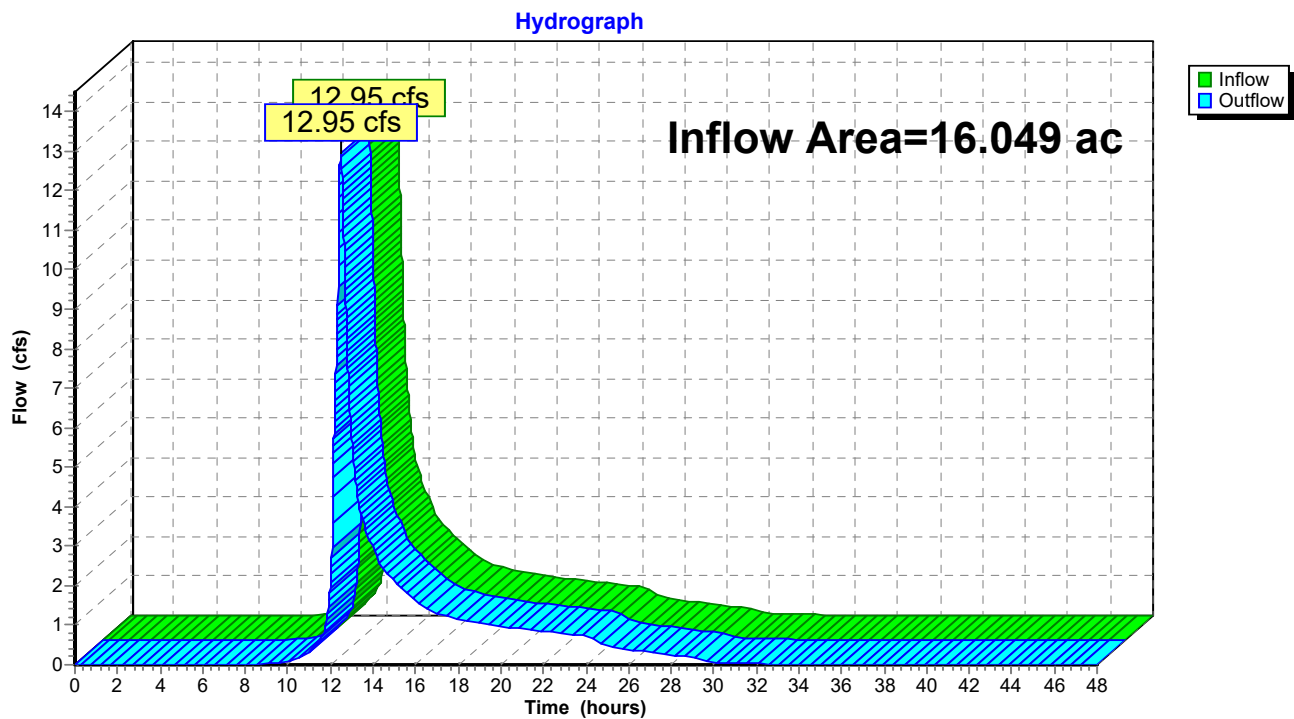
Summary for Reach CP2:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 16.049 ac, 13.07% Impervious, Inflow Depth = 1.71" for 10-YR event
Inflow = 12.95 cfs @ 12.48 hrs, Volume= 2.287 af
Outflow = 12.95 cfs @ 12.48 hrs, Volume= 2.287 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Reach CP2:



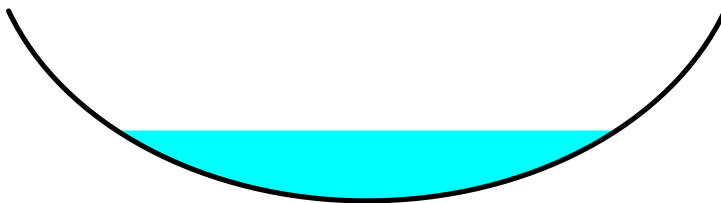
Summary for Reach PS1:

Inflow Area = 2.270 ac, 5.04% Impervious, Inflow Depth = 1.26" for 10-YR event
 Inflow = 2.47 cfs @ 12.19 hrs, Volume= 0.239 af
 Outflow = 2.46 cfs @ 12.21 hrs, Volume= 0.239 af, Atten= 1%, Lag= 1.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 4.12 fps, Min. Travel Time= 0.9 min
 Avg. Velocity = 1.68 fps, Avg. Travel Time= 2.3 min

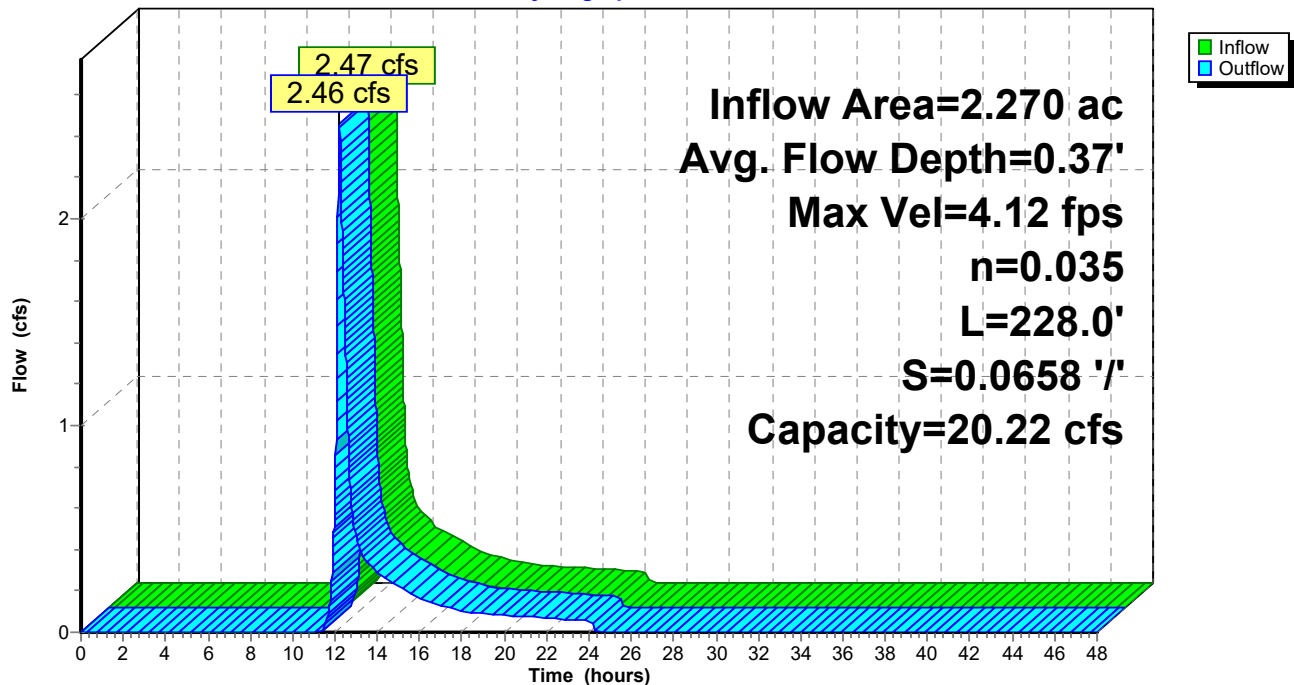
Peak Storage= 136 cf @ 12.20 hrs
 Average Depth at Peak Storage= 0.37'
 Bank-Full Depth= 1.00' Flow Area= 2.7 sf, Capacity= 20.22 cfs

4.00' x 1.00' deep Parabolic Channel, n= 0.035
 Length= 228.0' Slope= 0.0658 '/'
 Inlet Invert= 316.00', Outlet Invert= 301.00'



Reach PS1:

Hydrograph



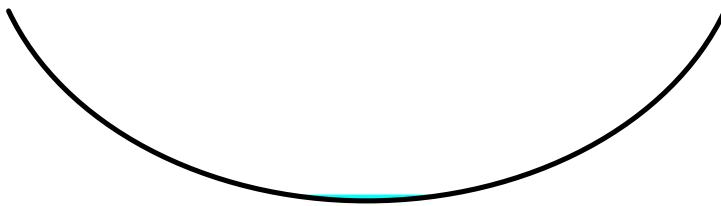
Summary for Reach PS10A:

Inflow Area = 0.035 ac, 96.04% Impervious, Inflow Depth = 4.25" for 10-YR event
 Inflow = 0.16 cfs @ 12.08 hrs, Volume= 0.013 af
 Outflow = 0.16 cfs @ 12.09 hrs, Volume= 0.013 af, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 1.71 fps, Min. Travel Time= 0.2 min
 Avg. Velocity = 0.82 fps, Avg. Travel Time= 0.4 min

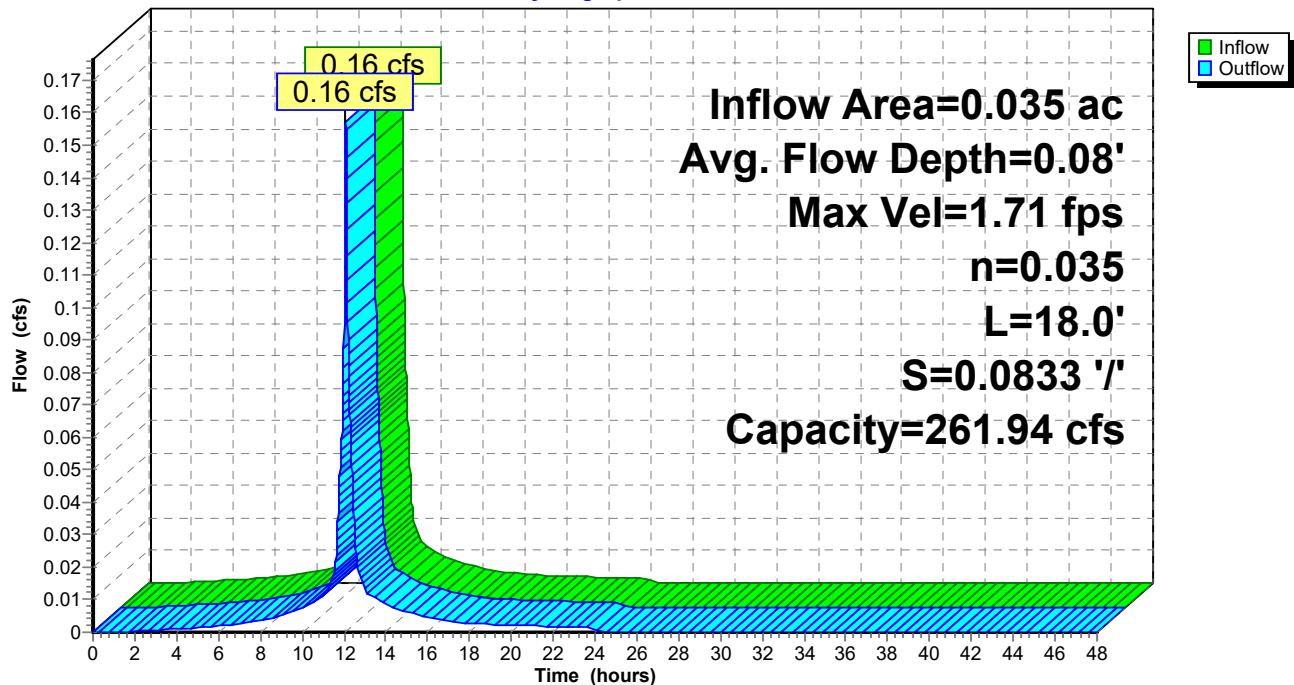
Peak Storage= 2 cf @ 12.09 hrs
 Average Depth at Peak Storage= 0.08'
 Bank-Full Depth= 2.50' Flow Area= 16.7 sf, Capacity= 261.94 cfs

10.00' x 2.50' deep Parabolic Channel, n= 0.035 Short grass
 Length= 18.0' Slope= 0.0833 '/'
 Inlet Invert= 316.50', Outlet Invert= 315.00'



Reach PS10A:

Hydrograph



Summary for Reach PS10B:

[61] Hint: Exceeded Reach 4R outlet invert by 0.08' @ 12.10 hrs

Inflow Area = 0.035 ac, 96.04% Impervious, Inflow Depth = 4.25" for 10-YR event
 Inflow = 0.16 cfs @ 12.09 hrs, Volume= 0.013 af
 Outflow = 0.16 cfs @ 12.10 hrs, Volume= 0.013 af, Atten= 0%, Lag= 0.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Max. Velocity= 1.63 fps, Min. Travel Time= 0.4 min

Avg. Velocity = 0.76 fps, Avg. Travel Time= 0.9 min

Peak Storage= 4 cf @ 12.10 hrs

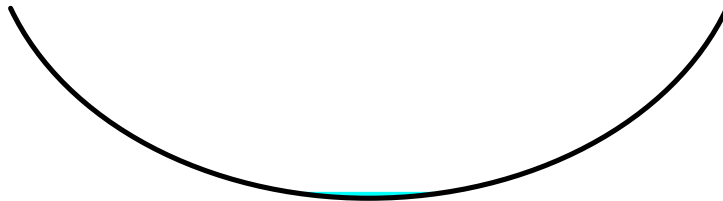
Average Depth at Peak Storage= 0.08'

Bank-Full Depth= 2.50' Flow Area= 16.7 sf, Capacity= 242.51 cfs

10.00' x 2.50' deep Parabolic Channel, n= 0.035 Short grass

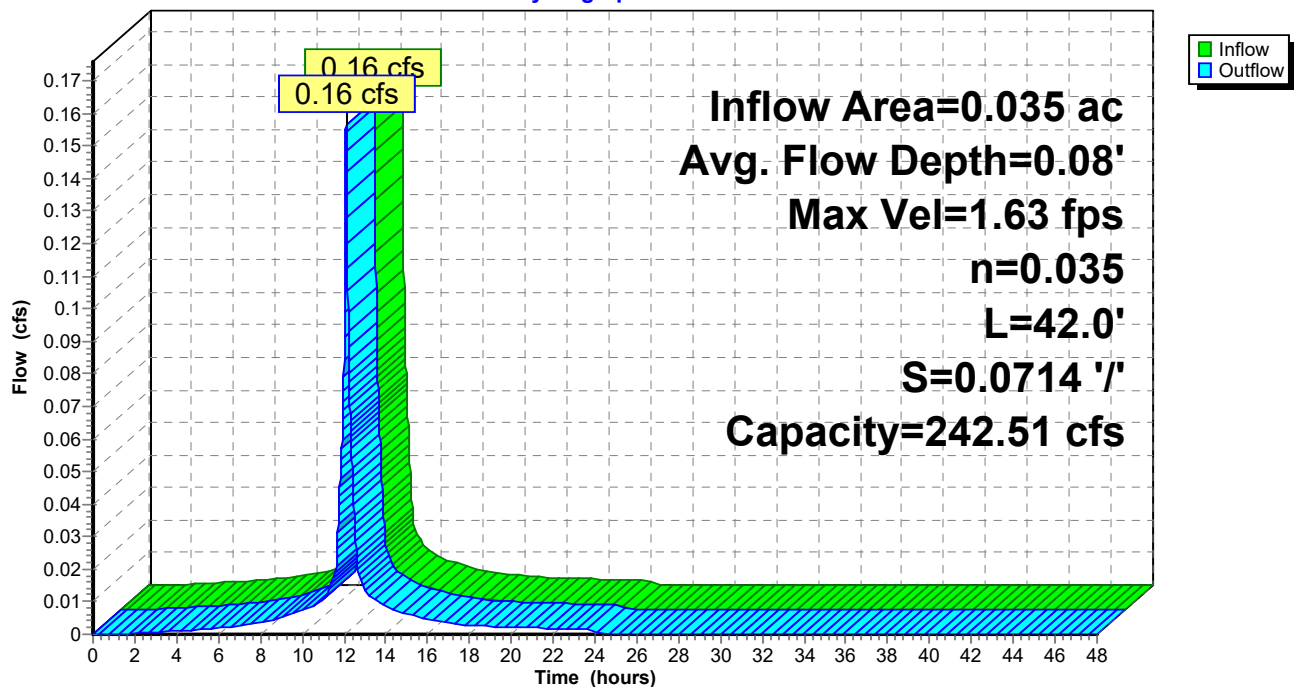
Length= 42.0' Slope= 0.0714 '/'

Inlet Invert= 313.50', Outlet Invert= 310.50'



Reach PS10B:

Hydrograph



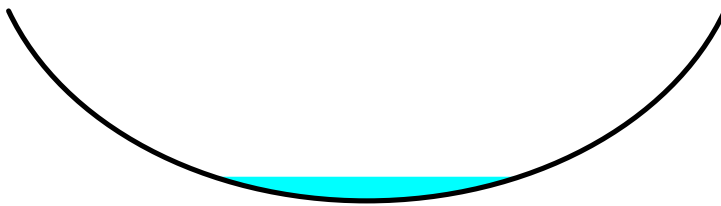
Summary for Reach PS2:

Inflow Area = 0.159 ac, 11.13% Impervious, Inflow Depth = 1.39" for 10-YR event
 Inflow = 0.24 cfs @ 12.10 hrs, Volume= 0.018 af
 Outflow = 0.24 cfs @ 12.10 hrs, Volume= 0.018 af, Atten= 0%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 2.04 fps, Min. Travel Time= 0.3 min
 Avg. Velocity = 0.80 fps, Avg. Travel Time= 0.6 min

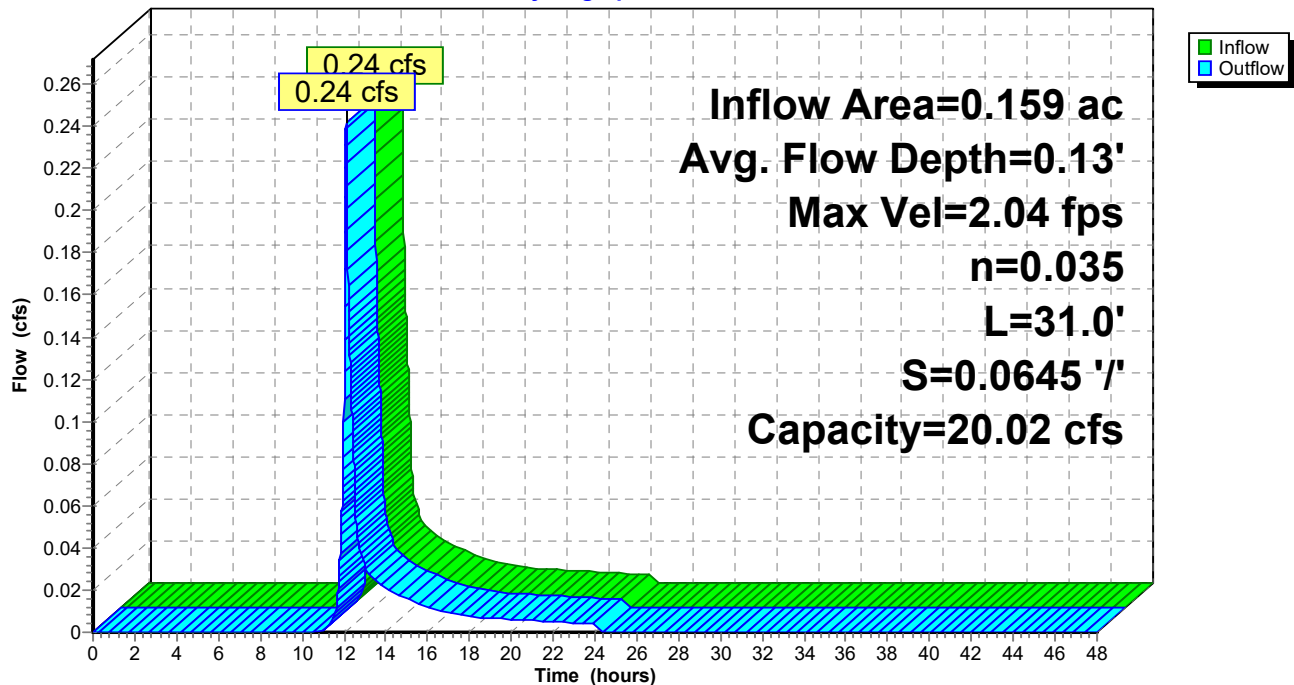
Peak Storage= 4 cf @ 12.10 hrs
 Average Depth at Peak Storage= 0.13'
 Bank-Full Depth= 1.00' Flow Area= 2.7 sf, Capacity= 20.02 cfs

4.00' x 1.00' deep Parabolic Channel, n= 0.035
 Length= 31.0' Slope= 0.0645 '/'
 Inlet Invert= 303.00', Outlet Invert= 301.00'



Reach PS2:

Hydrograph



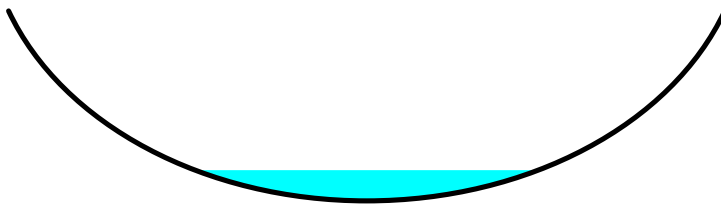
Summary for Reach PS3:

Inflow Area = 0.213 ac, 23.47% Impervious, Inflow Depth = 1.74" for 10-YR event
 Inflow = 0.42 cfs @ 12.09 hrs, Volume= 0.031 af
 Outflow = 0.42 cfs @ 12.10 hrs, Volume= 0.031 af, Atten= 0%, Lag= 0.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 2.47 fps, Min. Travel Time= 0.4 min
 Avg. Velocity = 0.92 fps, Avg. Travel Time= 1.0 min

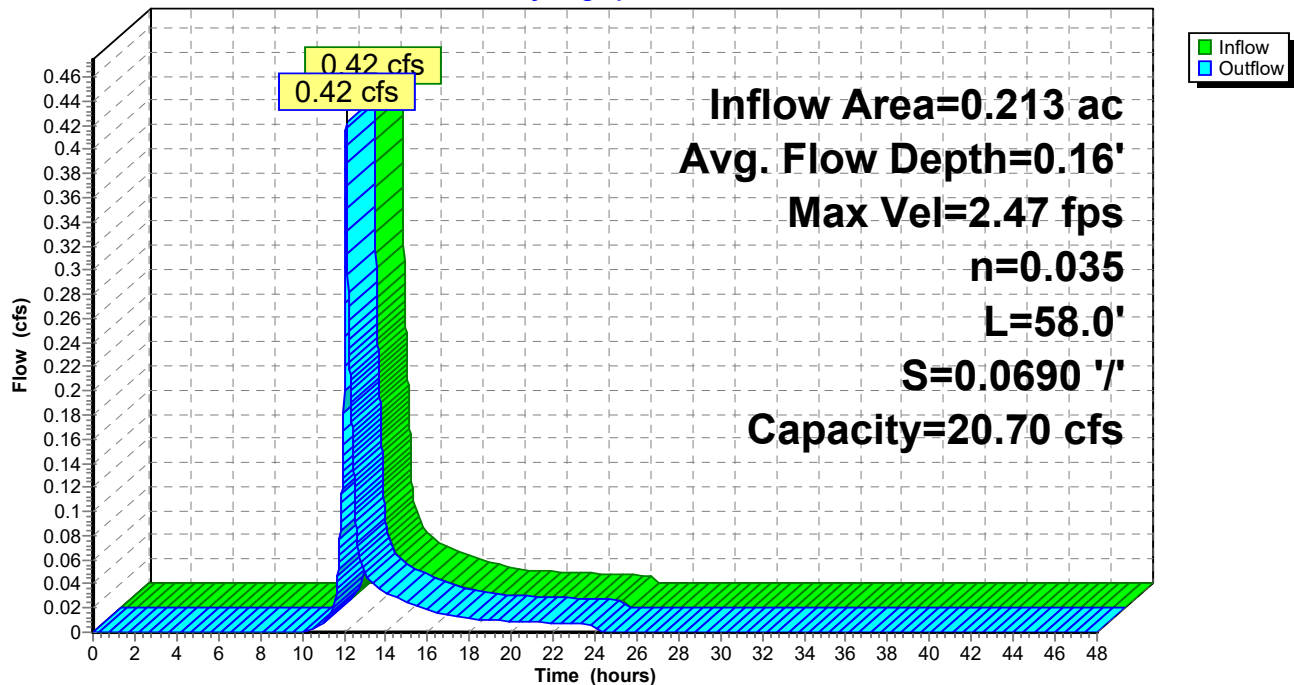
Peak Storage= 10 cf @ 12.10 hrs
 Average Depth at Peak Storage= 0.16'
 Bank-Full Depth= 1.00' Flow Area= 2.7 sf, Capacity= 20.70 cfs

4.00' x 1.00' deep Parabolic Channel, n= 0.035
 Length= 58.0' Slope= 0.0690 '/'
 Inlet Invert= 313.00', Outlet Invert= 309.00'



Reach PS3:

Hydrograph



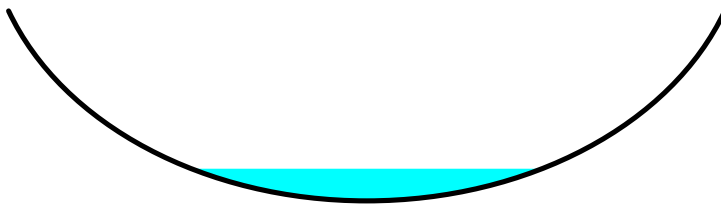
Summary for Reach PS4:

Inflow Area = 0.099 ac, 53.64% Impervious, Inflow Depth = 2.63" for 10-YR event
 Inflow = 0.31 cfs @ 12.09 hrs, Volume= 0.022 af
 Outflow = 0.31 cfs @ 12.10 hrs, Volume= 0.022 af, Atten= 0%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 1.66 fps, Min. Travel Time= 0.3 min
 Avg. Velocity = 0.57 fps, Avg. Travel Time= 1.0 min

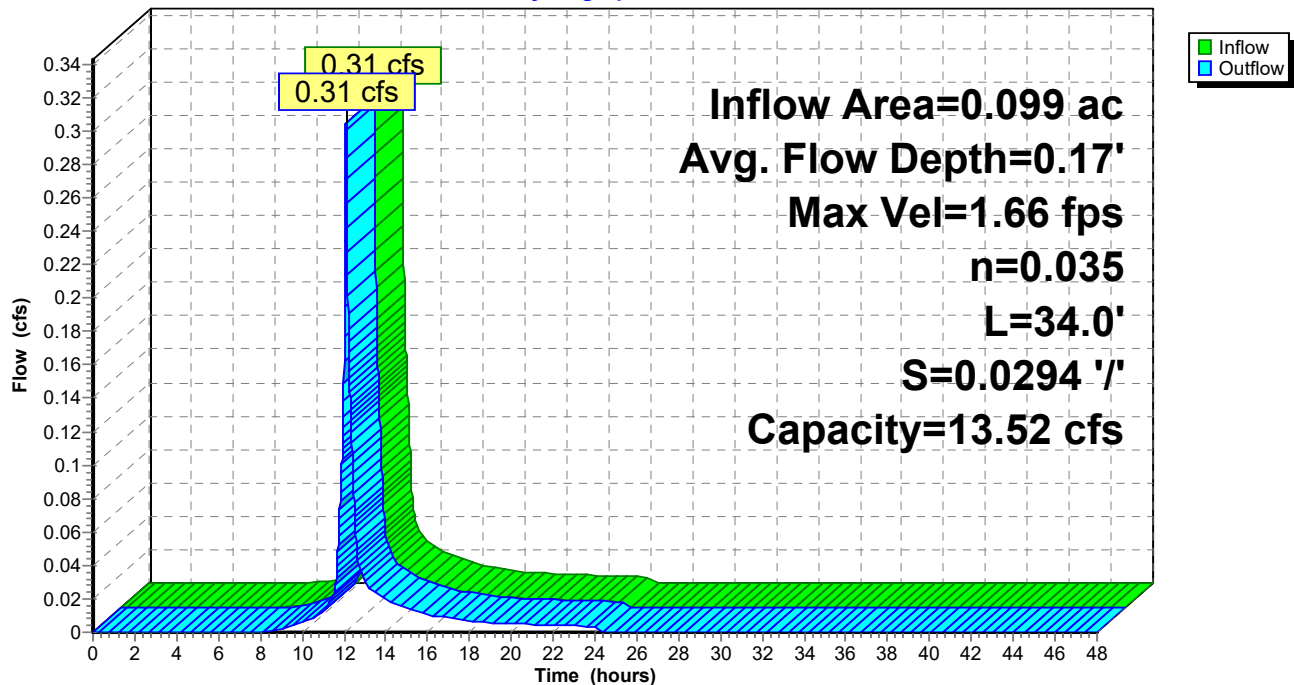
Peak Storage= 6 cf @ 12.09 hrs
 Average Depth at Peak Storage= 0.17'
 Bank-Full Depth= 1.00' Flow Area= 2.7 sf, Capacity= 13.52 cfs

4.00' x 1.00' deep Parabolic Channel, n= 0.035
 Length= 34.0' Slope= 0.0294 '/'
 Inlet Invert= 307.00', Outlet Invert= 306.00'



Reach PS4:

Hydrograph



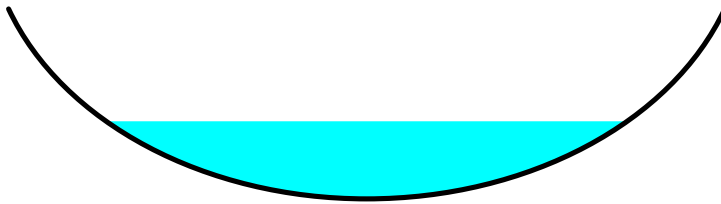
Summary for Reach PS6: (new Reach)

Inflow Area = 0.717 ac, 23.42% Impervious, Inflow Depth = 1.74" for 10-YR event
 Inflow = 1.43 cfs @ 12.09 hrs, Volume= 0.104 af
 Outflow = 1.29 cfs @ 12.19 hrs, Volume= 0.104 af, Atten= 10%, Lag= 5.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 1.86 fps, Min. Travel Time= 3.6 min
 Avg. Velocity = 0.62 fps, Avg. Travel Time= 10.7 min

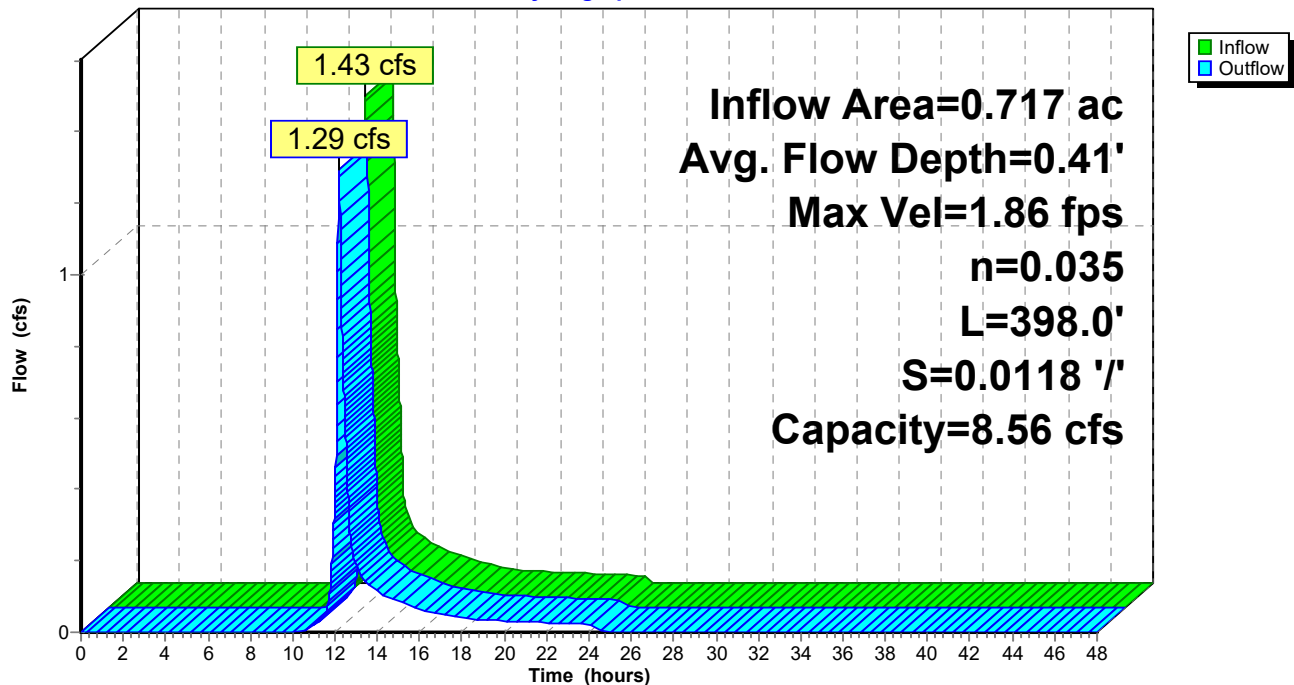
Peak Storage= 276 cf @ 12.13 hrs
 Average Depth at Peak Storage= 0.41'
 Bank-Full Depth= 1.00' Flow Area= 2.7 sf, Capacity= 8.56 cfs

4.00' x 1.00' deep Parabolic Channel, n= 0.035
 Length= 398.0' Slope= 0.0118 '/'
 Inlet Invert= 300.00', Outlet Invert= 295.30'



Reach PS6: (new Reach)

Hydrograph



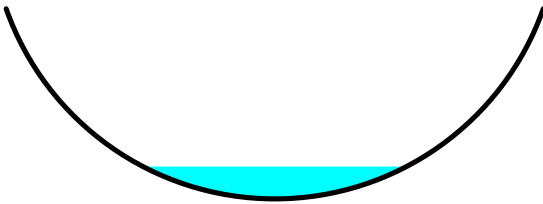
Summary for Reach PS7: (new Reach)

Inflow Area = 0.785 ac, 28.61% Impervious, Inflow Depth = 1.89" for 10-YR event
 Inflow = 2.02 cfs @ 12.03 hrs, Volume= 0.124 af
 Outflow = 1.92 cfs @ 12.07 hrs, Volume= 0.124 af, Atten= 5%, Lag= 2.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 3.49 fps, Min. Travel Time= 1.4 min
 Avg. Velocity = 1.22 fps, Avg. Travel Time= 4.1 min

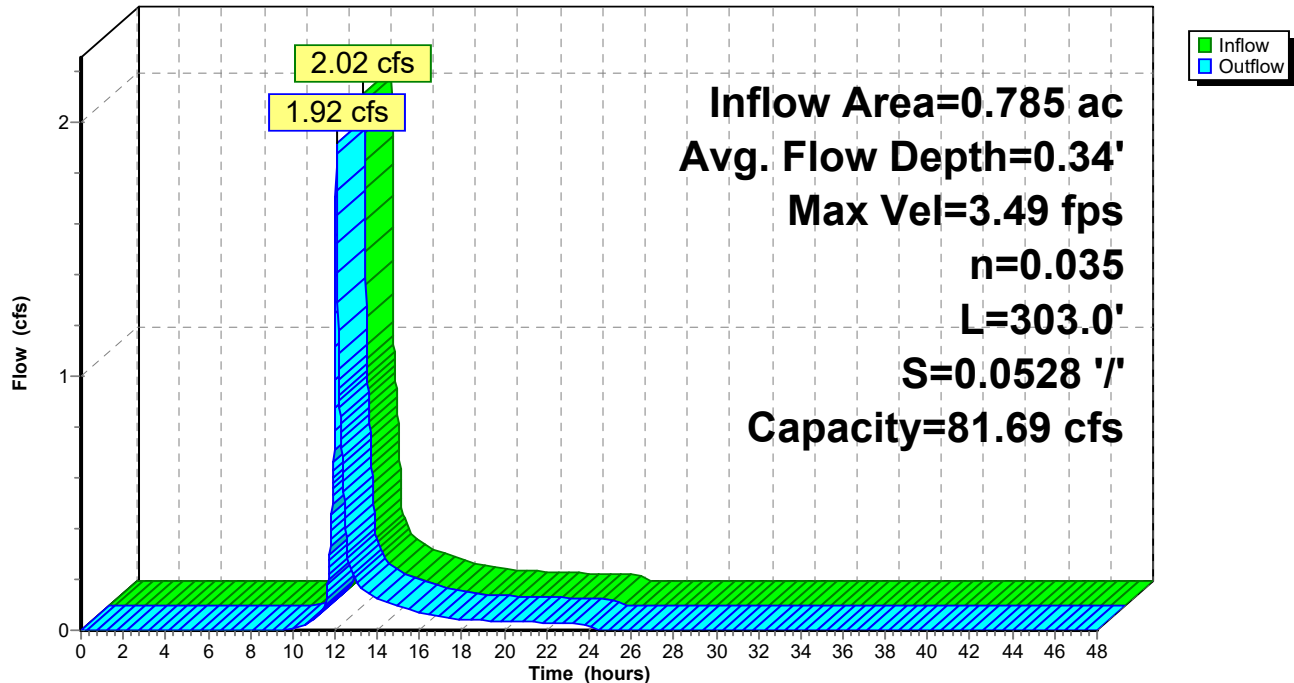
Peak Storage= 167 cf @ 12.04 hrs
 Average Depth at Peak Storage= 0.34'
 Bank-Full Depth= 2.00' Flow Area= 8.0 sf, Capacity= 81.69 cfs

6.00' x 2.00' deep Parabolic Channel, n= 0.035
 Length= 303.0' Slope= 0.0528 '/'
 Inlet Invert= 277.00', Outlet Invert= 261.00'



Reach PS7: (new Reach)

Hydrograph



Summary for Reach PS8: (new Reach)

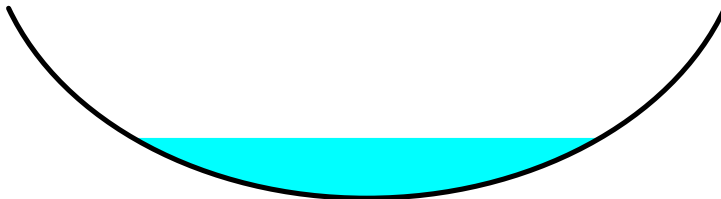
[79] Warning: Submerged Pond MH1 Primary device # 1 INLET by 0.28'

Inflow Area = 6.385 ac, 20.41% Impervious, Inflow Depth = 1.34" for 10-YR event
 Inflow = 7.16 cfs @ 12.14 hrs, Volume= 0.715 af
 Outflow = 7.08 cfs @ 12.15 hrs, Volume= 0.715 af, Atten= 1%, Lag= 0.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 3.73 fps, Min. Travel Time= 0.2 min
 Avg. Velocity = 1.09 fps, Avg. Travel Time= 0.6 min

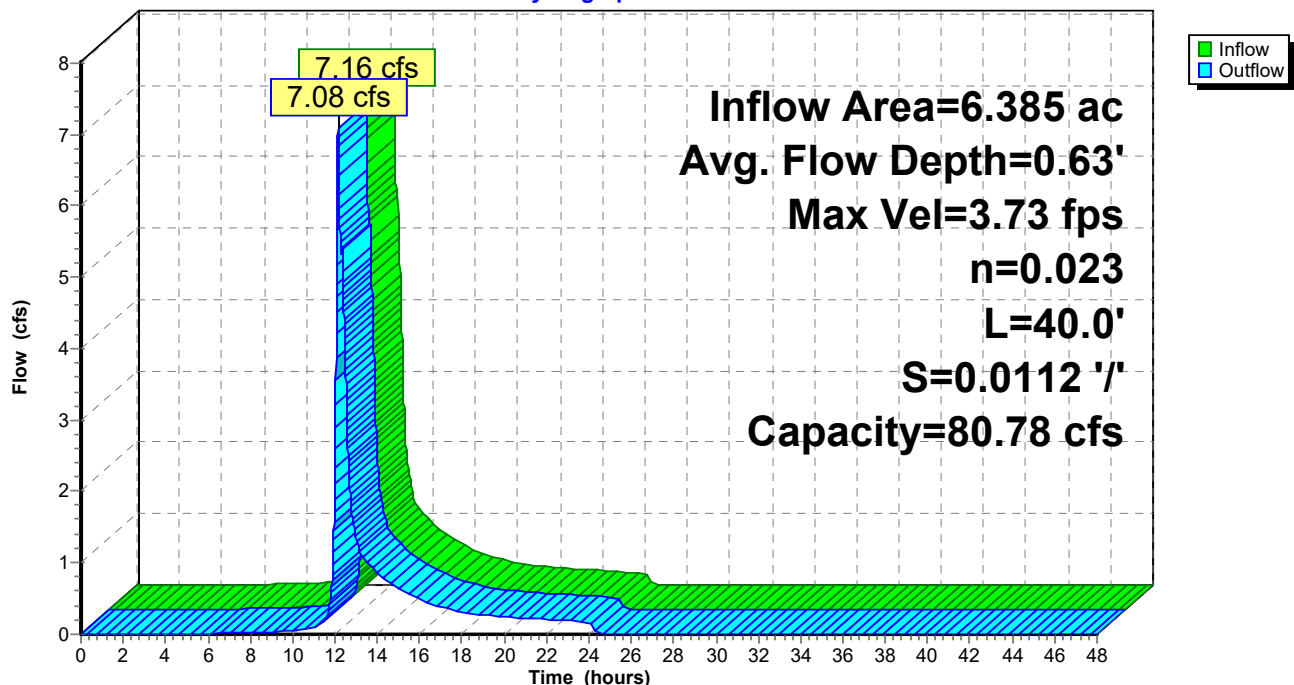
Peak Storage= 76 cf @ 12.15 hrs
 Average Depth at Peak Storage= 0.63'
 Bank-Full Depth= 2.00' Flow Area= 10.7 sf, Capacity= 80.78 cfs

8.00' x 2.00' deep Parabolic Channel, n= 0.023
 Length= 40.0' Slope= 0.0112 '/'
 Inlet Invert= 260.95', Outlet Invert= 260.50'



Reach PS8: (new Reach)

Hydrograph



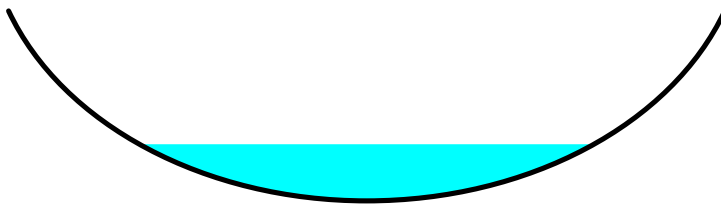
Summary for Reach PS9: (new Reach)

Inflow Area = 0.288 ac, 25.48% Impervious, Inflow Depth = 2.55" for 10-YR event
 Inflow = 0.86 cfs @ 12.09 hrs, Volume= 0.061 af
 Outflow = 0.86 cfs @ 12.11 hrs, Volume= 0.061 af, Atten= 0%, Lag= 1.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 1.98 fps, Min. Travel Time= 0.6 min
 Avg. Velocity = 0.68 fps, Avg. Travel Time= 1.8 min

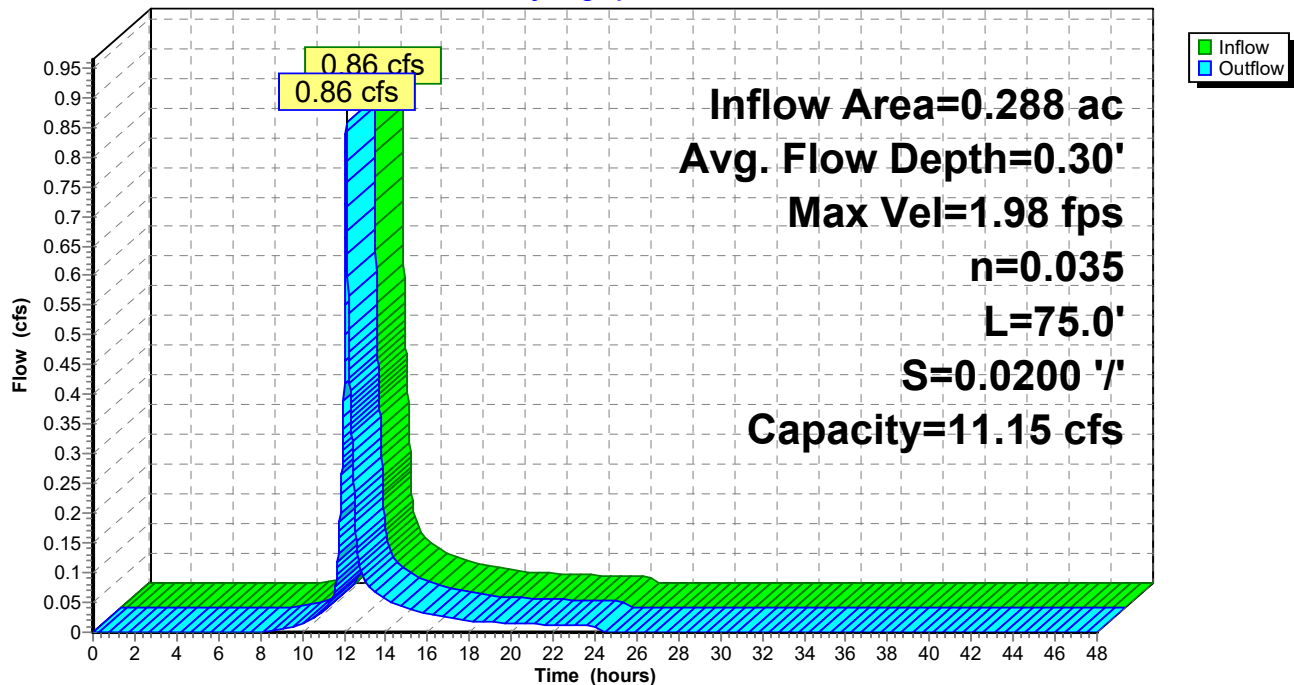
Peak Storage= 32 cf @ 12.10 hrs
 Average Depth at Peak Storage= 0.30'
 Bank-Full Depth= 1.00' Flow Area= 2.7 sf, Capacity= 11.15 cfs

4.00' x 1.00' deep Parabolic Channel, n= 0.035
 Length= 75.0' Slope= 0.0200 '/'
 Inlet Invert= 259.25', Outlet Invert= 257.75'



Reach PS9: (new Reach)

Hydrograph



Summary for Pond 1P: (new Pond)

[57] Hint: Peaked at 301.66' (Flood elevation advised)
 [63] Warning: Exceeded Reach 9R INLET depth by 3.62' @ 12.11 hrs

Inflow Area = 0.366 ac, 37.66% Impervious, Inflow Depth = 1.55" for 10-YR event
 Inflow = 0.51 cfs @ 12.15 hrs, Volume= 0.047 af
 Outflow = 0.51 cfs @ 12.15 hrs, Volume= 0.047 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.51 cfs @ 12.15 hrs, Volume= 0.047 af

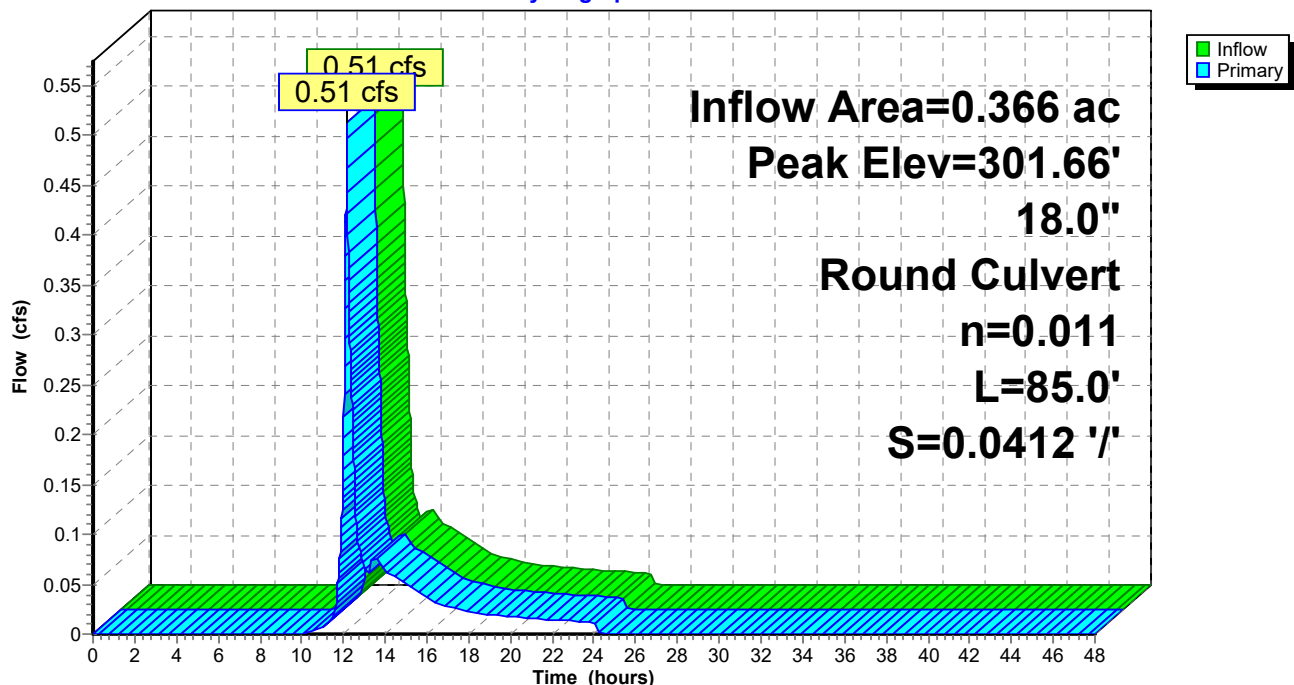
Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 301.66' @ 12.15 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	301.30'	18.0" Round Culvert L= 85.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 301.30' / 297.80' S= 0.0412 '/ Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=0.51 cfs @ 12.15 hrs HW=301.65' (Free Discharge)
 ↑1=Culvert (Inlet Controls 0.51 cfs @ 1.60 fps)

Pond 1P: (new Pond)

Hydrograph



Summary for Pond 2P: (new Pond)

[57] Hint: Peaked at 298.49' (Flood elevation advised)
 [62] Hint: Exceeded Reach 11R OUTLET depth by 0.05' @ 12.16 hrs
 [79] Warning: Submerged Pond 1P Primary device # 1 OUTLET by 0.69'

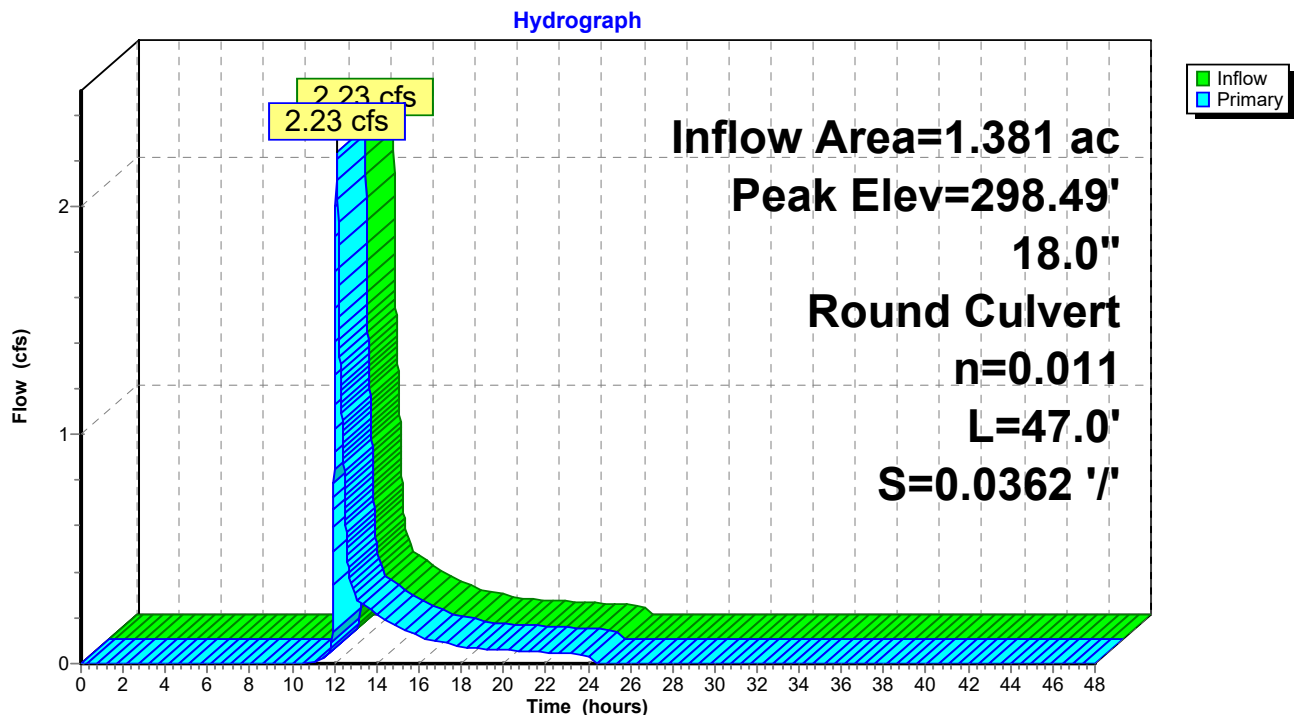
Inflow Area = 1.381 ac, 24.37% Impervious, Inflow Depth = 1.50" for 10-YR event
 Inflow = 2.23 cfs @ 12.11 hrs, Volume= 0.173 af
 Outflow = 2.23 cfs @ 12.11 hrs, Volume= 0.173 af, Atten= 0%, Lag= 0.0 min
 Primary = 2.23 cfs @ 12.11 hrs, Volume= 0.173 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 298.49' @ 12.11 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	297.70'	18.0" Round Culvert L= 47.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 297.70' / 296.00' S= 0.0362 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=2.23 cfs @ 12.11 hrs HW=298.49' (Free Discharge)
 ↑1=Culvert (Inlet Controls 2.23 cfs @ 2.38 fps)

Pond 2P: (new Pond)



Summary for Pond 3P: MH2B

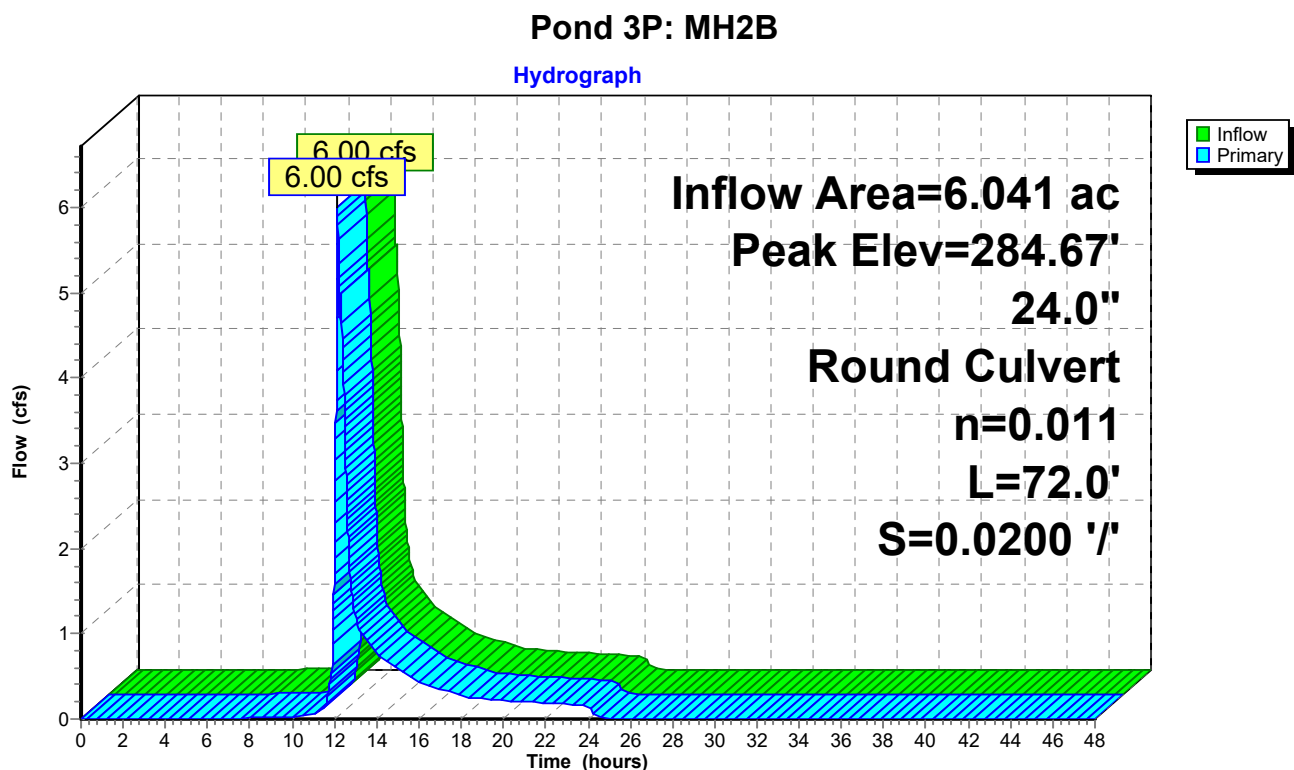
[57] Hint: Peaked at 284.67' (Flood elevation advised)

Inflow Area = 6.041 ac, 17.09% Impervious, Inflow Depth = 1.25" for 10-YR event
 Inflow = 6.00 cfs @ 12.14 hrs, Volume= 0.628 af
 Outflow = 6.00 cfs @ 12.14 hrs, Volume= 0.628 af, Atten= 0%, Lag= 0.0 min
 Primary = 6.00 cfs @ 12.14 hrs, Volume= 0.628 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 284.67' @ 12.14 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	283.44'	24.0" Round 2B L= 72.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 283.44' / 282.00' S= 0.0200 '/ Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=5.95 cfs @ 12.14 hrs HW=284.66' (Free Discharge)
 ↳ **1=2B** (Inlet Controls 5.95 cfs @ 2.97 fps)



Summary for Pond 4P: Constructed Wetland

[62] Hint: Exceeded Reach 1R OUTLET depth by 0.20' @ 12.58 hrs

Inflow Area = 8.295 ac, 21.89% Impervious, Inflow Depth = 1.51" for 10-YR event
 Inflow = 10.15 cfs @ 12.14 hrs, Volume= 1.043 af
 Outflow = 4.60 cfs @ 12.51 hrs, Volume= 1.042 af, Atten= 55%, Lag= 21.9 min
 Primary = 4.60 cfs @ 12.51 hrs, Volume= 1.042 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Starting Elev= 258.30' Surf.Area= 5,072 sf Storage= 7,845 cf
 Peak Elev= 260.48' @ 12.51 hrs Surf.Area= 8,334 sf Storage= 22,660 cf (14,815 cf above start)

Plug-Flow detention time= 357.7 min calculated for 0.861 af (83% of inflow)
 Center-of-Mass det. time= 211.8 min (1,074.0 - 862.2)

Volume	Invert	Avail.Storage	Storage Description
#1	254.00'	37,037 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
254.00	729	0	0
255.00	972	851	851
256.00	1,244	1,108	1,959
257.00	1,541	1,393	3,351
258.00	4,558	3,050	6,401
258.30	5,072	1,445	7,845
259.00	6,345	3,996	11,841
260.00	7,660	7,003	18,843
261.00	9,072	8,366	27,209
262.00	10,584	9,828	37,037

Device	Routing	Invert	Outlet Devices
#1	Primary	258.30'	30.0" Round Culvert L= 30.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 258.30' / 258.00' S= 0.0100 1' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 4.91 sf
#2	Device 1	260.30'	48.0" x 48.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Device 1	258.30'	0.5" Vert. Orifice/Grate X 2.00 columns X 4 rows with 5.0" cc spacing C= 0.600
#4	Device 1	258.30'	4.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#5	Secondary	260.90'	22.0' long x 12.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

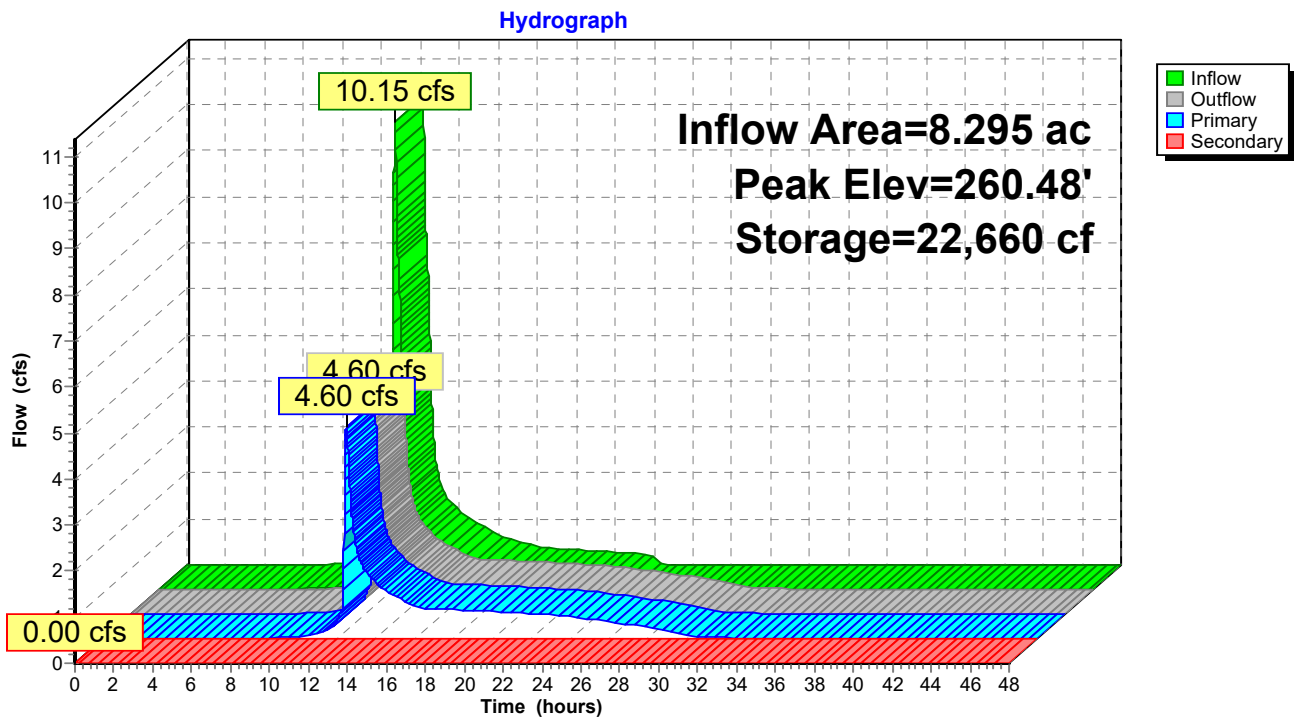
Primary OutFlow Max=4.59 cfs @ 12.51 hrs HW=260.48' (Free Discharge)

- 1=Culvert (Passes 4.59 cfs of 18.03 cfs potential flow)
- 2=Orifice/Grate (Weir Controls 3.90 cfs @ 1.38 fps)
- 3=Orifice/Grate (Orifice Controls 0.06 cfs @ 5.89 fps)
- 4=Orifice/Grate (Orifice Controls 0.62 cfs @ 7.10 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=258.30' (Free Discharge)

- 5=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 4P: Constructed Wetland



Summary for Pond 5P: MH2A

[57] Hint: Peaked at 278.71' (Flood elevation advised)

Inflow Area = 6.269 ac, 18.94% Impervious, Inflow Depth = 1.29" for 10-YR event
 Inflow = 6.74 cfs @ 12.14 hrs, Volume= 0.673 af
 Outflow = 6.74 cfs @ 12.14 hrs, Volume= 0.673 af, Atten= 0%, Lag= 0.0 min
 Primary = 6.74 cfs @ 12.14 hrs, Volume= 0.673 af

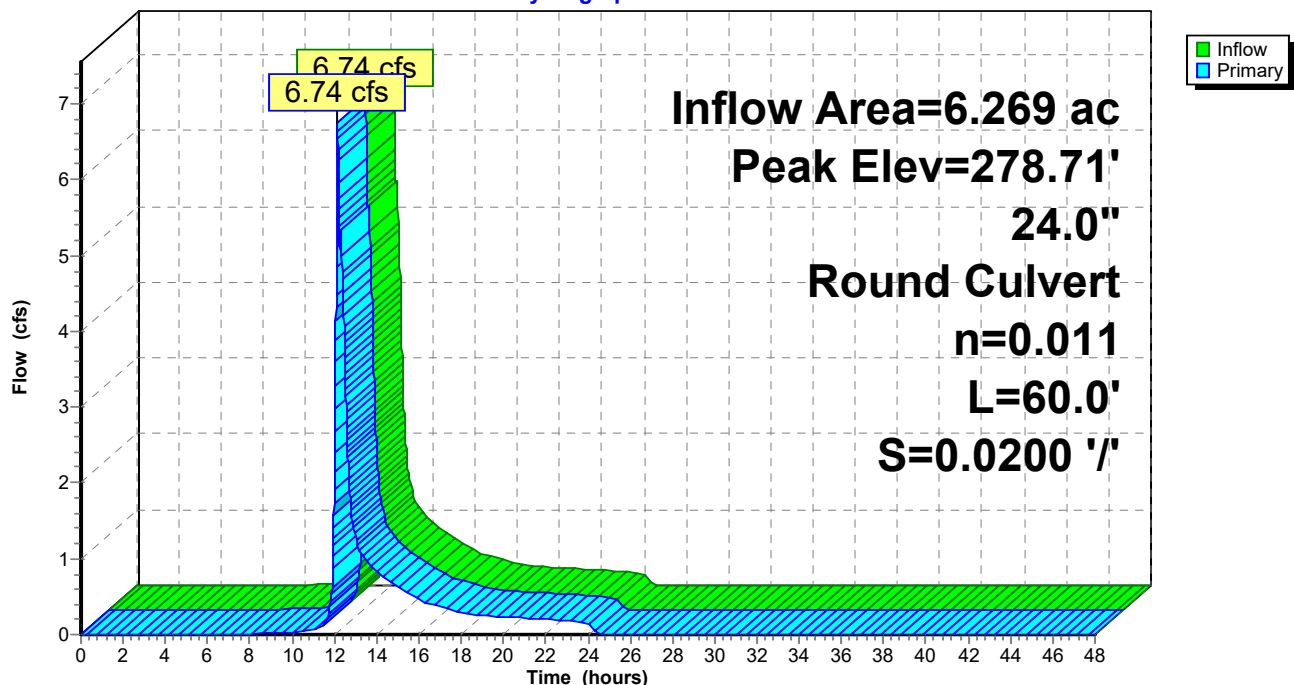
Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 278.71' @ 12.14 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	277.40'	24.0" Round Culvert L= 60.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 277.40' / 276.20' S= 0.0200 '/ Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=6.69 cfs @ 12.14 hrs HW=278.71' (Free Discharge)
 ↳ **1=Culvert** (Inlet Controls 6.69 cfs @ 3.07 fps)

Pond 5P: MH2A

Hydrograph



Summary for Pond 20P: (new Pond)

[57] Hint: Peaked at 265.93' (Flood elevation advised)

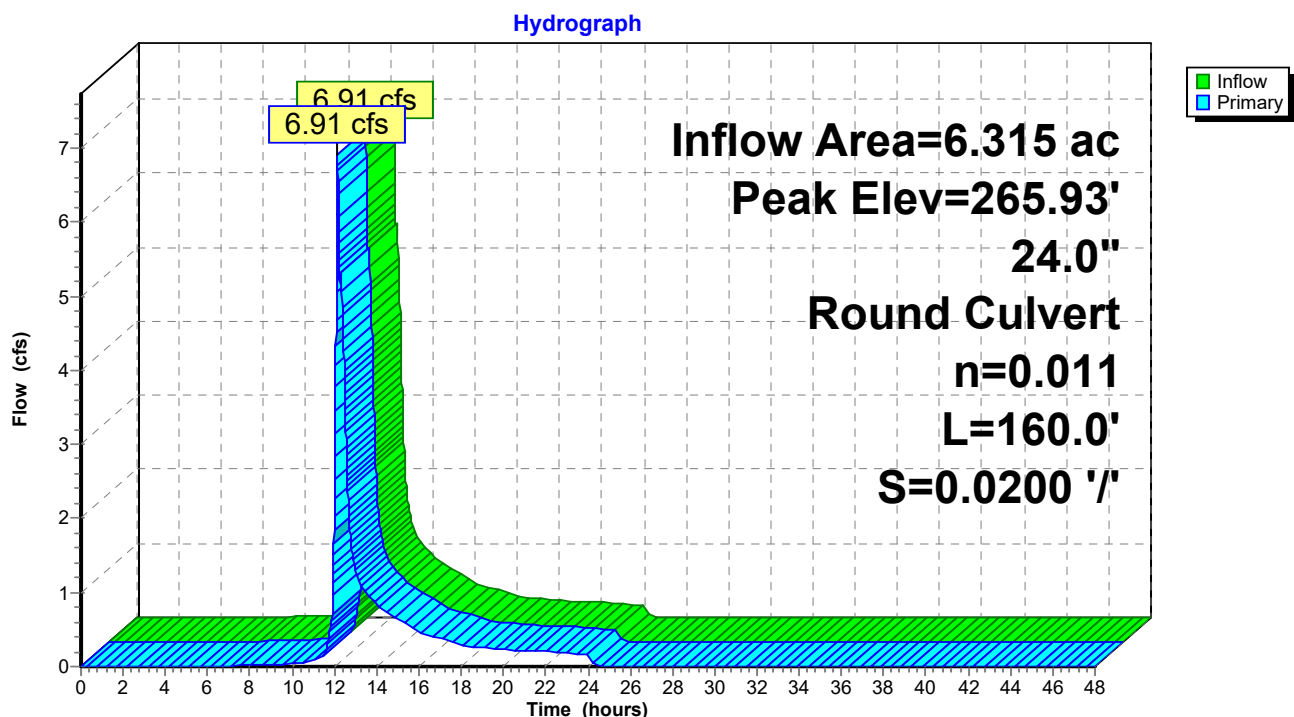
Inflow Area = 6.315 ac, 19.53% Impervious, Inflow Depth = 1.31" for 10-YR event
 Inflow = 6.91 cfs @ 12.14 hrs, Volume= 0.690 af
 Outflow = 6.91 cfs @ 12.14 hrs, Volume= 0.690 af, Atten= 0%, Lag= 0.0 min
 Primary = 6.91 cfs @ 12.14 hrs, Volume= 0.690 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 265.93' @ 12.14 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	264.60'	24.0" Round Culvert L= 160.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 264.60' / 261.40' S= 0.0200 '/ Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=6.86 cfs @ 12.14 hrs HW=265.93' (Free Discharge)
 1=Culvert (Inlet Controls 6.86 cfs @ 3.10 fps)

Pond 20P: (new Pond)



Summary for Pond BS: Bus Station RG

[63] Warning: Exceeded Reach CB1 INLET depth by 0.30' @ 24.70 hrs

Inflow Area = 0.554 ac, 36.99% Impervious, Inflow Depth = 2.85" for 10-YR event
 Inflow = 1.76 cfs @ 12.10 hrs, Volume= 0.132 af
 Outflow = 1.54 cfs @ 12.15 hrs, Volume= 0.088 af, Atten= 12%, Lag= 2.8 min
 Primary = 1.54 cfs @ 12.15 hrs, Volume= 0.088 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 257.51' @ 12.15 hrs Surf.Area= 0 sf Storage= 2,027 cf

Plug-Flow detention time= 176.5 min calculated for 0.088 af (67% of inflow)
 Center-of-Mass det. time= 74.3 min (879.7 - 805.3)

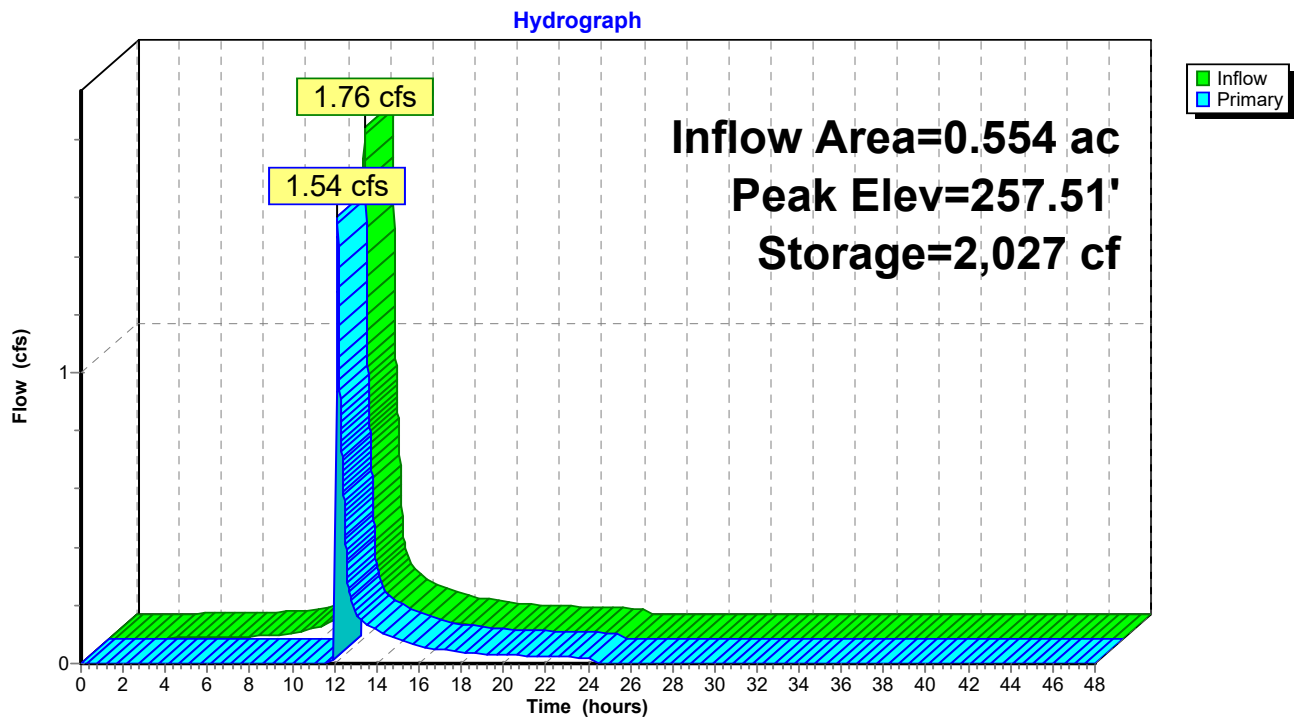
Volume	Invert	Avail.Storage	Storage Description
#1	254.47'	2,201 cf	Custom Stage Data Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
254.47	0	0
254.80	122	122
255.05	92	214
256.05	367	581
256.30	92	673
257.30	1,222	1,895
257.80	306	2,201

Device	Routing	Invert	Outlet Devices
#1	Primary	257.30'	18.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.53 cfs @ 12.15 hrs HW=257.51' (Free Discharge)
 ↑1=Orifice/Grate (Weir Controls 1.53 cfs @ 1.51 fps)

Pond BS: Bus Station RG



Summary for Pond CB2: (new Pond)

[57] Hint: Peaked at 262.32' (Flood elevation advised)

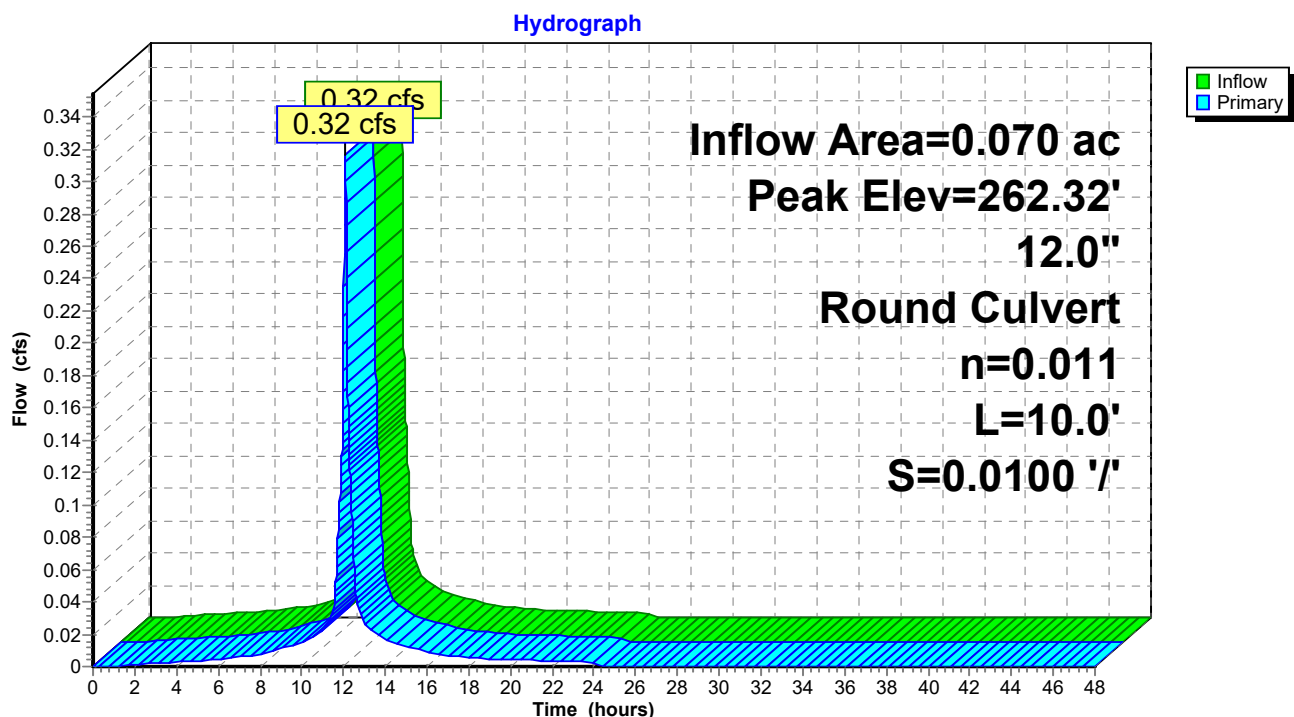
Inflow Area = 0.070 ac, 100.00% Impervious, Inflow Depth = 4.36" for 10-YR event
 Inflow = 0.32 cfs @ 12.08 hrs, Volume= 0.026 af
 Outflow = 0.32 cfs @ 12.08 hrs, Volume= 0.026 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.32 cfs @ 12.08 hrs, Volume= 0.026 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 262.32' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	262.00'	12.0" Round Culvert L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 262.00' / 261.90' S= 0.0100 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.32 cfs @ 12.08 hrs HW=262.32' (Free Discharge)
 ↑1=Culvert (Barrel Controls 0.32 cfs @ 2.20 fps)

Pond CB2: (new Pond)



Summary for Pond CB3: (new Pond)

[57] Hint: Peaked at 277.45' (Flood elevation advised)

Inflow Area = 0.046 ac, 100.00% Impervious, Inflow Depth = 4.36" for 10-YR event
 Inflow = 0.21 cfs @ 12.08 hrs, Volume= 0.017 af
 Outflow = 0.21 cfs @ 12.08 hrs, Volume= 0.017 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.21 cfs @ 12.08 hrs, Volume= 0.017 af

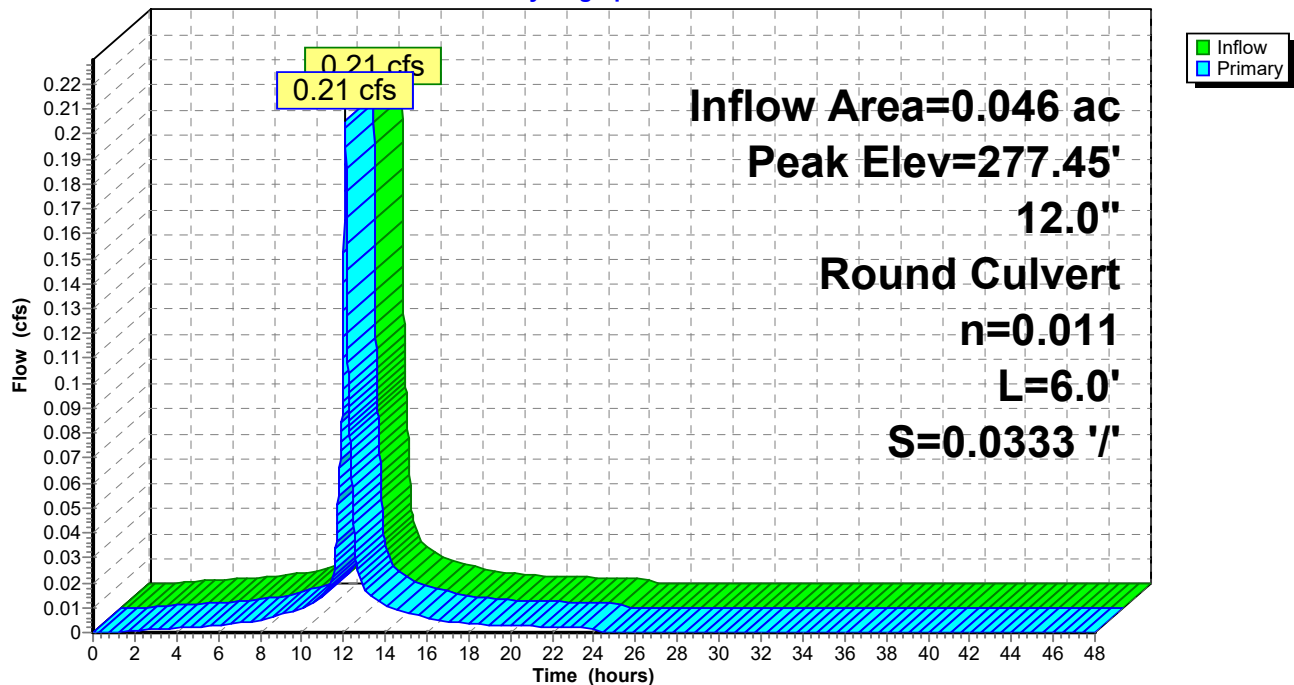
Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 277.45' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	277.20'	12.0" Round Culvert L= 6.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 277.20' / 277.00' S= 0.0333 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.20 cfs @ 12.08 hrs HW=277.45' (Free Discharge)
 ↑1=Culvert (Inlet Controls 0.20 cfs @ 1.34 fps)

Pond CB3: (new Pond)

Hydrograph



Summary for Pond CB4: (new Pond)

[57] Hint: Peaked at 294.14' (Flood elevation advised)

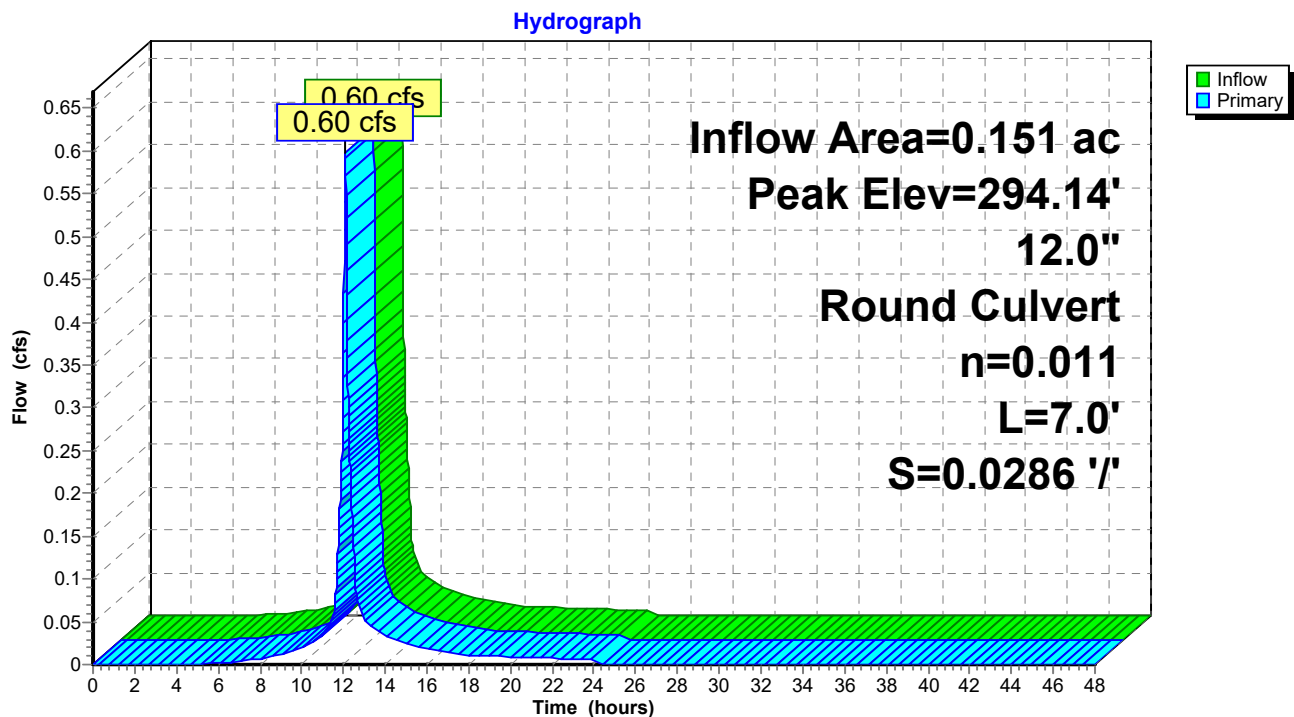
Inflow Area = 0.151 ac, 79.05% Impervious, Inflow Depth = 3.49" for 10-YR event
 Inflow = 0.60 cfs @ 12.09 hrs, Volume= 0.044 af
 Outflow = 0.60 cfs @ 12.09 hrs, Volume= 0.044 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.60 cfs @ 12.09 hrs, Volume= 0.044 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 294.14' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	293.70'	12.0" Round Culvert L= 7.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 293.70' / 293.50' S= 0.0286 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.60 cfs @ 12.09 hrs HW=294.14' (Free Discharge)
 ↑1=Culvert (Inlet Controls 0.60 cfs @ 1.79 fps)

Pond CB4: (new Pond)



Summary for Pond CB5: (new Pond)

[57] Hint: Peaked at 294.42' (Flood elevation advised)

Inflow Area = 0.396 ac, 24.31% Impervious, Inflow Depth = 1.74" for 10-YR event
 Inflow = 0.79 cfs @ 12.09 hrs, Volume= 0.058 af
 Outflow = 0.79 cfs @ 12.09 hrs, Volume= 0.058 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.79 cfs @ 12.09 hrs, Volume= 0.058 af

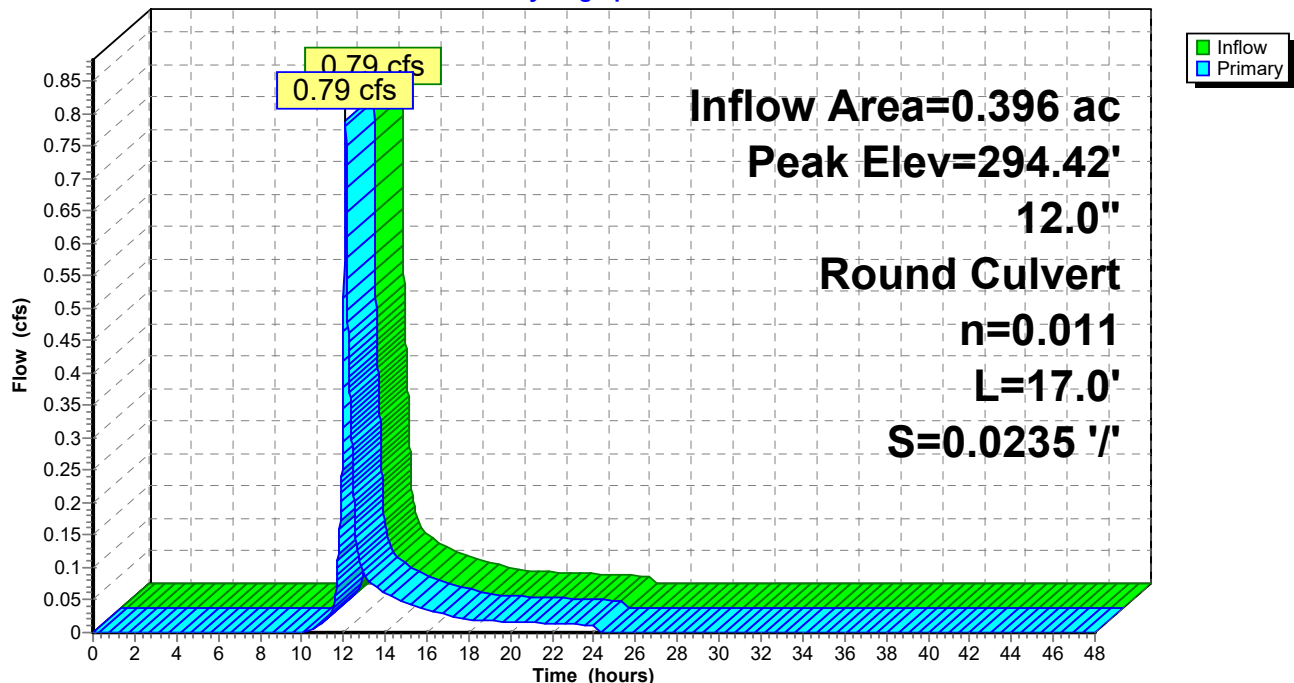
Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 294.42' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	293.90'	12.0" Round Culvert L= 17.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 293.90' / 293.50' S= 0.0235 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.79 cfs @ 12.09 hrs HW=294.42' (Free Discharge)
 ↑1=Culvert (Inlet Controls 0.79 cfs @ 1.93 fps)

Pond CB5: (new Pond)

Hydrograph



Summary for Pond CULdeSAC: Cul-de-sac

Inflow Area = 0.243 ac, 29.57% Impervious, Inflow Depth = 1.89" for 10-YR event
 Inflow = 0.53 cfs @ 12.09 hrs, Volume= 0.038 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 299.78' @ 24.34 hrs Surf.Area= 0 sf Storage= 1,672 cf
 Flood Elev= 300.00' Surf.Area= 0 sf Storage= 2,622 cf

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

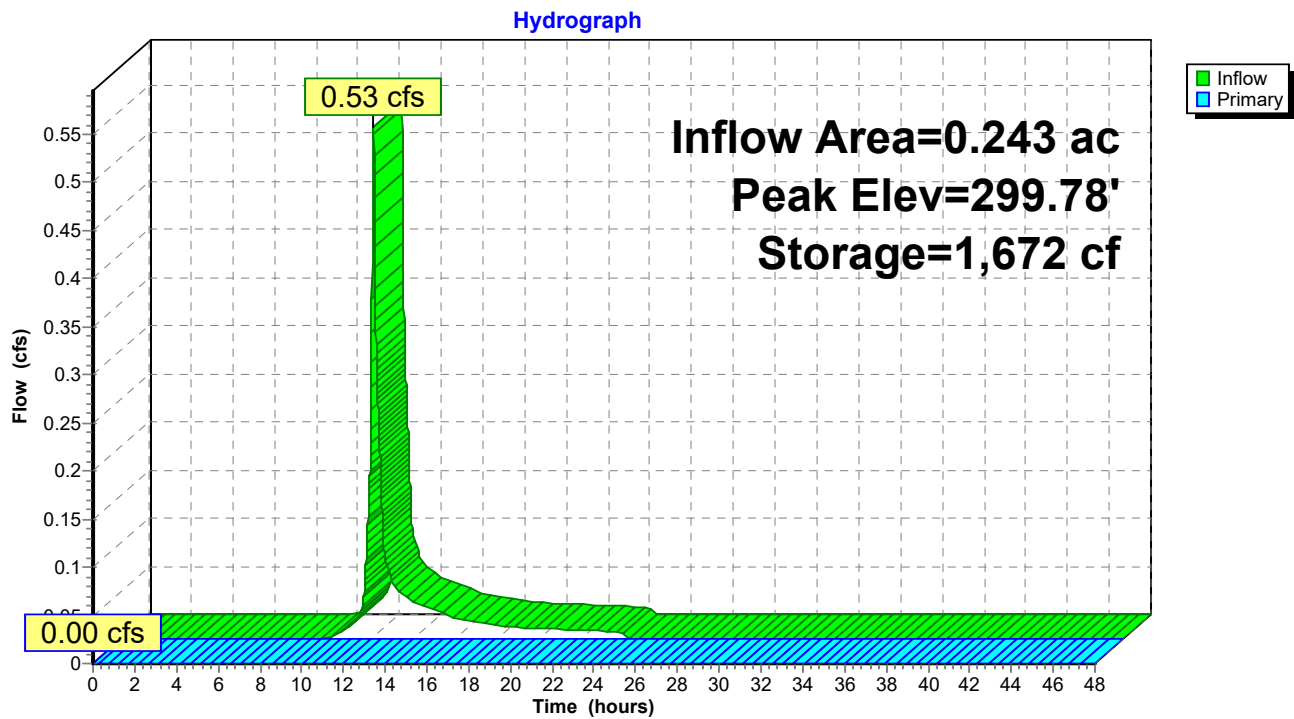
Volume	Invert	Avail.Storage	Storage Description
#1	297.92'	4,394 cf	Custom Stage Data Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
297.92	0	0
298.25	283	283
298.50	213	496
299.50	850	1,346
299.75	213	1,559
300.25	2,126	3,685
300.50	709	4,394

Device	Routing	Invert	Outlet Devices
#1	Primary	300.25'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=297.92' (Free Discharge)
 ↑ **1=Orifice/Grate** (Controls 0.00 cfs)

Pond CULdeSAC: Cul-de-sac



Summary for Pond MH1: (new Pond)

[57] Hint: Peaked at 262.51' (Flood elevation advised)
 [79] Warning: Submerged Pond 20P Primary device # 1 OUTLET by 1.11'
 [81] Warning: Exceeded Pond CB2 by 0.23' @ 12.14 hrs

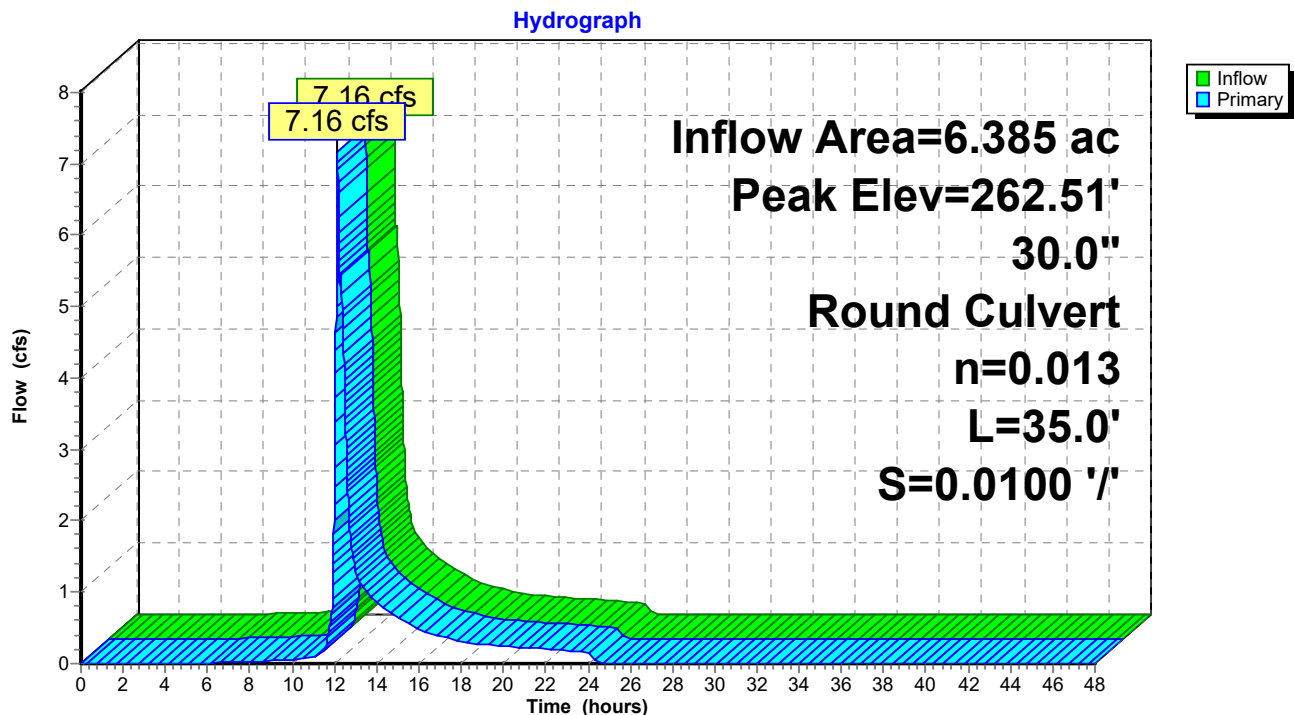
Inflow Area = 6.385 ac, 20.41% Impervious, Inflow Depth = 1.34" for 10-YR event
 Inflow = 7.16 cfs @ 12.14 hrs, Volume= 0.715 af
 Outflow = 7.16 cfs @ 12.14 hrs, Volume= 0.715 af, Atten= 0%, Lag= 0.0 min
 Primary = 7.16 cfs @ 12.14 hrs, Volume= 0.715 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 262.51' @ 12.14 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	261.30'	30.0" Round Culvert L= 35.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 261.30' / 260.95' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 4.91 sf

Primary OutFlow Max=7.12 cfs @ 12.14 hrs HW=262.51' (Free Discharge)
 ↳ **1=Culvert** (Barrel Controls 7.12 cfs @ 4.43 fps)

Pond MH1: (new Pond)



Summary for Pond MH2: (new Pond)

[57] Hint: Peaked at 271.83' (Flood elevation advised)

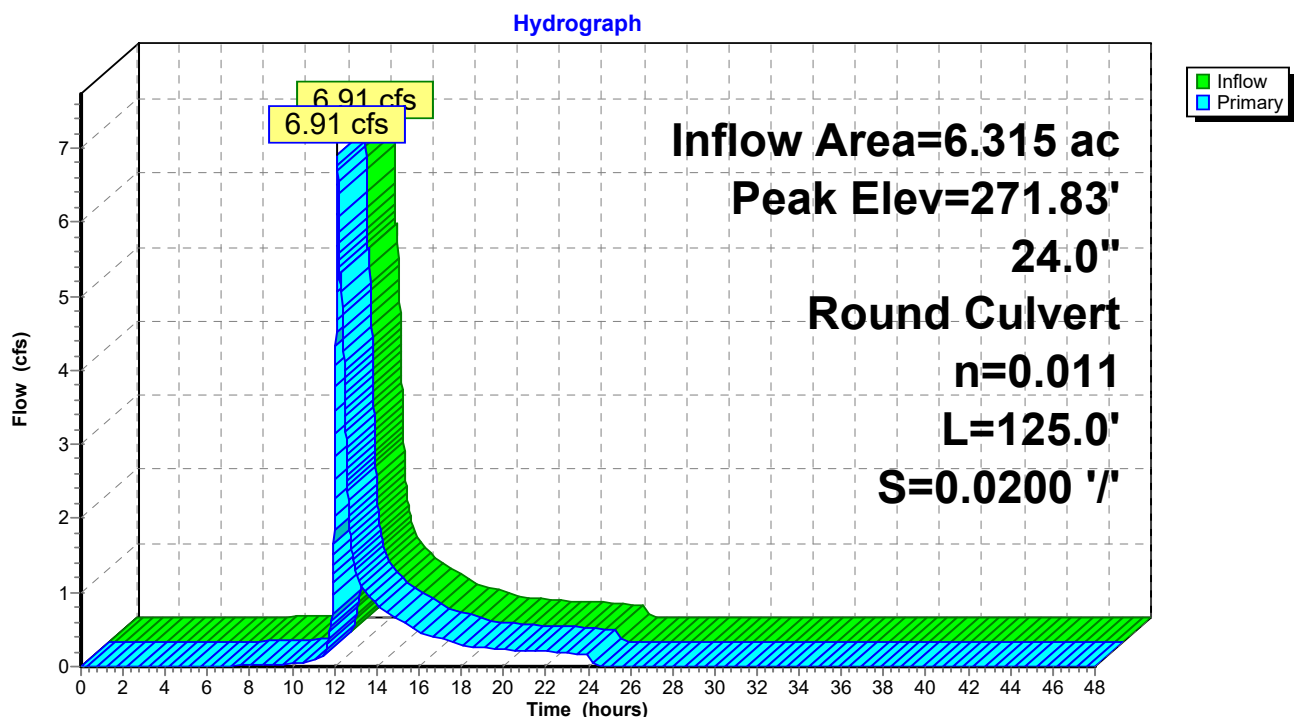
Inflow Area = 6.315 ac, 19.53% Impervious, Inflow Depth = 1.31" for 10-YR event
 Inflow = 6.91 cfs @ 12.14 hrs, Volume= 0.690 af
 Outflow = 6.91 cfs @ 12.14 hrs, Volume= 0.690 af, Atten= 0%, Lag= 0.0 min
 Primary = 6.91 cfs @ 12.14 hrs, Volume= 0.690 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 271.83' @ 12.14 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	270.50'	24.0" Round Culvert L= 125.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 270.50' / 268.00' S= 0.0200 '/ Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=6.86 cfs @ 12.14 hrs HW=271.83' (Free Discharge)
 1=Culvert (Inlet Controls 6.86 cfs @ 3.10 fps)

Pond MH2: (new Pond)



Summary for Pond MH3: (new Pond)

[57] Hint: Peaked at 290.29' (Flood elevation advised)

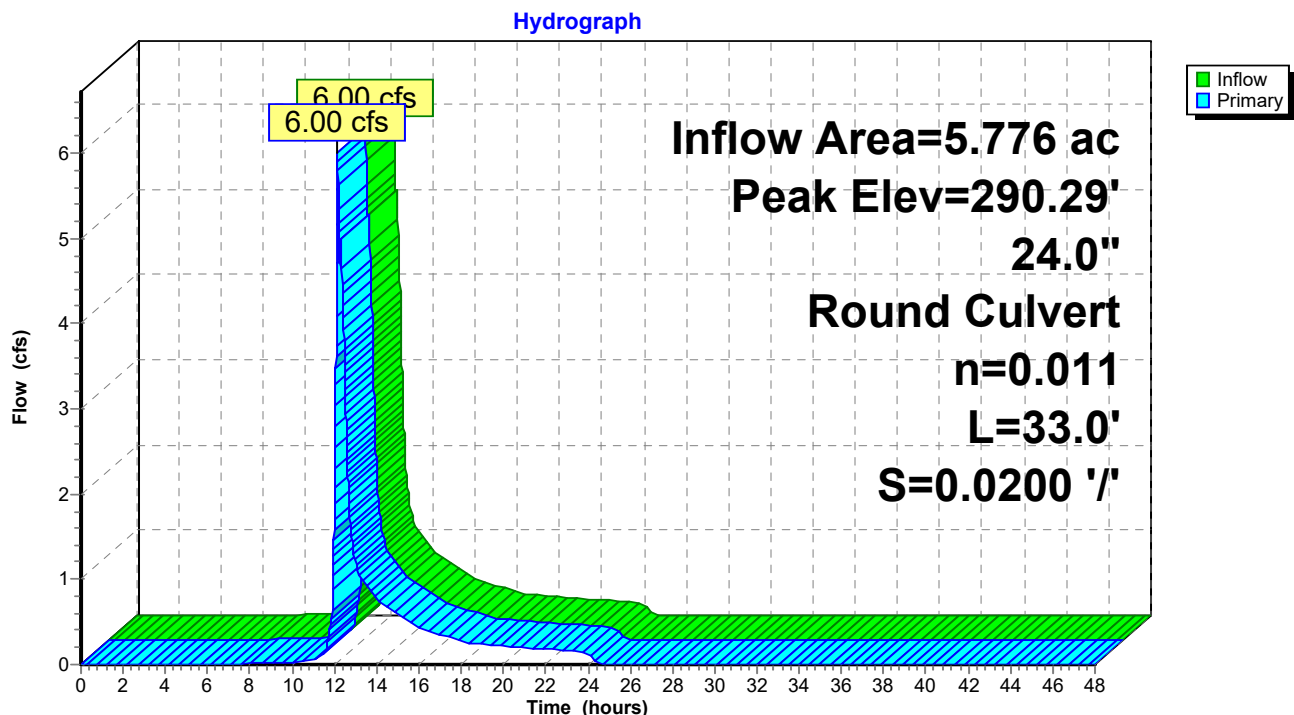
Inflow Area = 5.776 ac, 17.87% Impervious, Inflow Depth = 1.30" for 10-YR event
 Inflow = 6.00 cfs @ 12.14 hrs, Volume= 0.626 af
 Outflow = 6.00 cfs @ 12.14 hrs, Volume= 0.626 af, Atten= 0%, Lag= 0.0 min
 Primary = 6.00 cfs @ 12.14 hrs, Volume= 0.626 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 290.29' @ 12.14 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	289.06'	24.0" Round Culvert L= 33.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 289.06' / 288.40' S= 0.0200 '/ Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf

Primary OutFlow Max=5.95 cfs @ 12.14 hrs HW=290.28' (Free Discharge)
 ↑1=Culvert (Inlet Controls 5.95 cfs @ 2.97 fps)

Pond MH3: (new Pond)



Summary for Pond MH4:

[57] Hint: Peaked at 300.19' (Flood elevation advised)

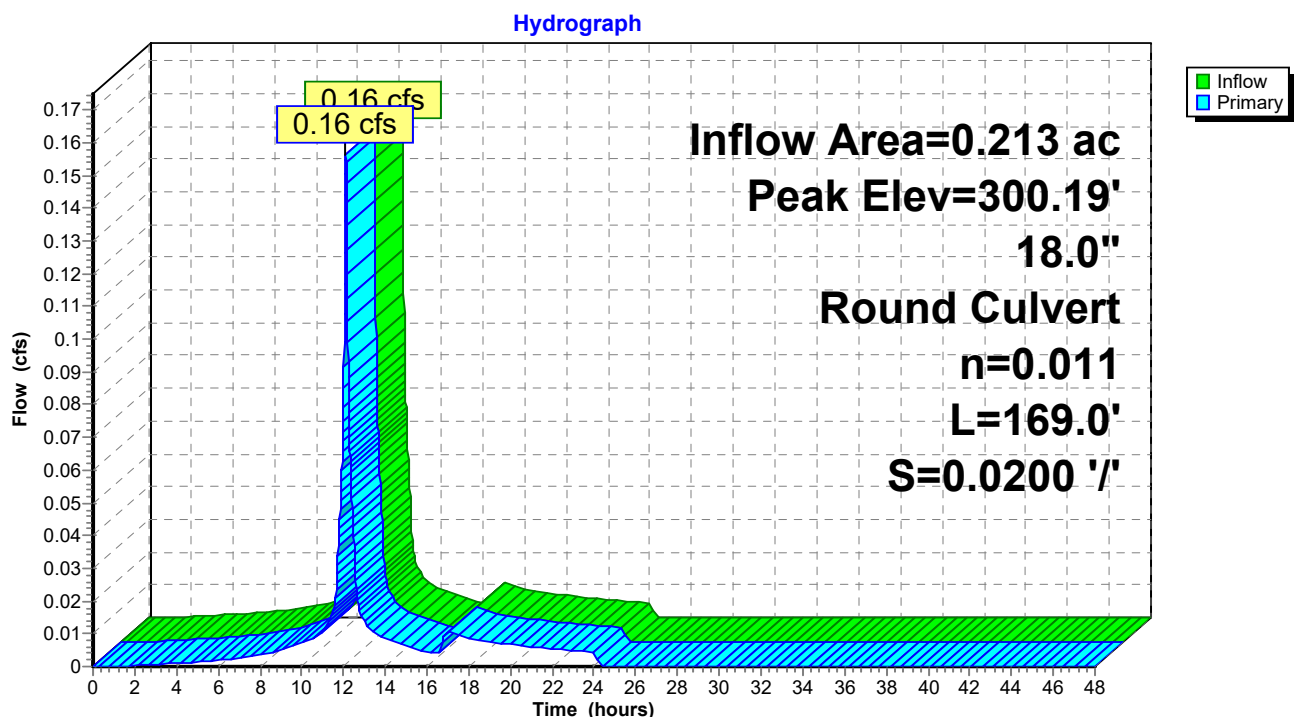
Inflow Area = 0.213 ac, 50.94% Impervious, Inflow Depth = 0.86" for 10-YR event
 Inflow = 0.16 cfs @ 12.11 hrs, Volume= 0.015 af
 Outflow = 0.16 cfs @ 12.11 hrs, Volume= 0.015 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.16 cfs @ 12.11 hrs, Volume= 0.015 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 300.19' @ 12.11 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	300.00'	18.0" Round Culvert L= 169.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 300.00' / 296.62' S= 0.0200 '/ Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=0.16 cfs @ 12.11 hrs HW=300.19' (Free Discharge)
 ↑1=Culvert (Inlet Controls 0.16 cfs @ 1.18 fps)

Pond MH4:



Summary for Pond MH5:

[57] Hint: Peaked at 301.29' (Flood elevation advised)

[62] Hint: Exceeded Reach 13R OUTLET depth by 0.19' @ 12.11 hrs

Inflow Area = 0.071 ac, 65.39% Impervious, Inflow Depth = 2.12" for 10-YR event
 Inflow = 0.16 cfs @ 12.11 hrs, Volume= 0.013 af
 Outflow = 0.16 cfs @ 12.11 hrs, Volume= 0.013 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.16 cfs @ 12.11 hrs, Volume= 0.013 af

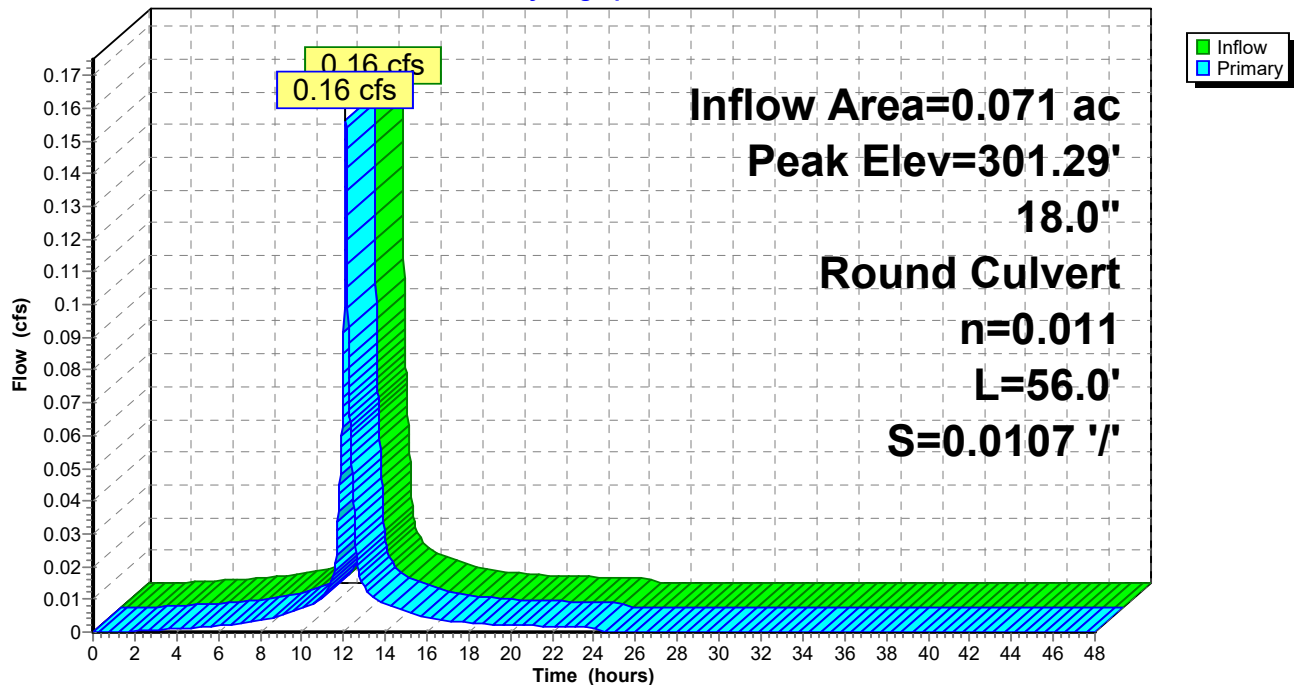
Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 301.29' @ 12.11 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	301.10'	18.0" Round Culvert L= 56.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 301.10' / 300.50' S= 0.0107 '/ Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=0.16 cfs @ 12.11 hrs HW=301.29' (Free Discharge)
 ↑1=Culvert (Inlet Controls 0.16 cfs @ 1.18 fps)

Pond MH5:

Hydrograph



Summary for Pond MH6: CB6

[57] Hint: Peaked at 294.00' (Flood elevation advised)

Inflow Area = 4.513 ac, 14.39% Impervious, Inflow Depth = 1.19" for 10-YR event
 Inflow = 4.80 cfs @ 12.16 hrs, Volume= 0.449 af
 Outflow = 4.80 cfs @ 12.16 hrs, Volume= 0.449 af, Atten= 0%, Lag= 0.0 min
 Primary = 4.80 cfs @ 12.16 hrs, Volume= 0.449 af

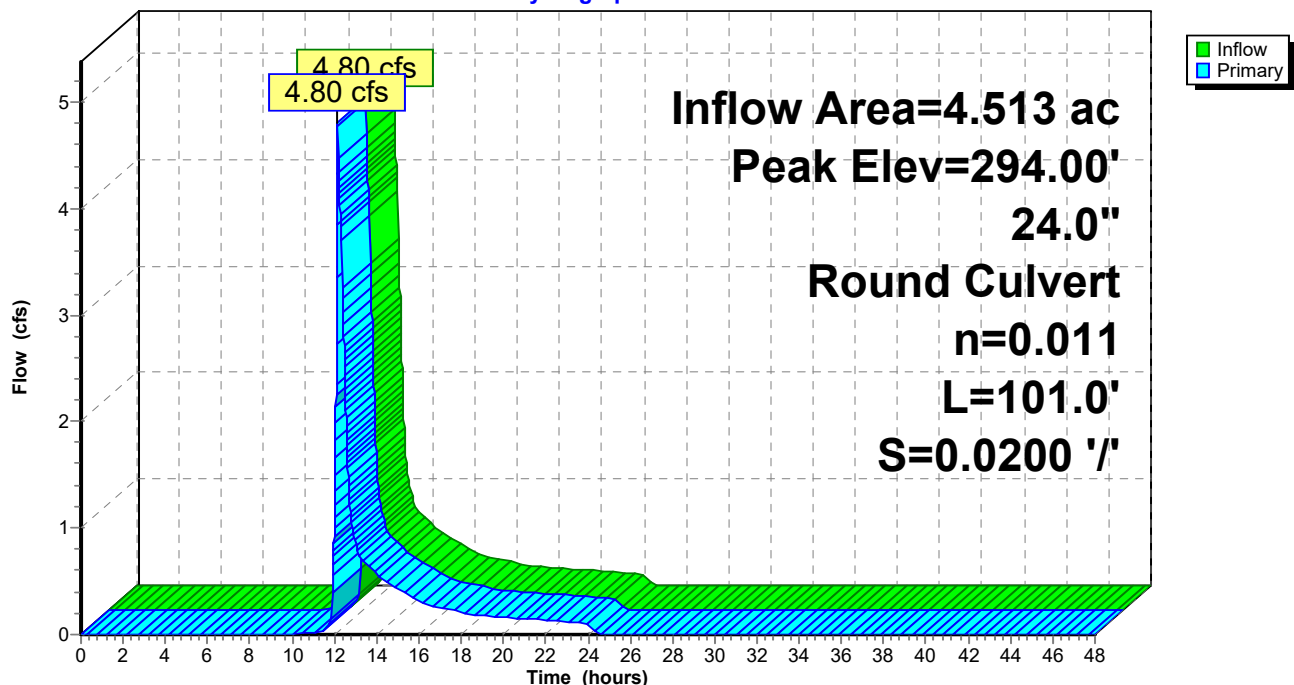
Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 294.00' @ 12.16 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	292.92'	24.0" Round Culvert L= 101.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 292.92' / 290.90' S= 0.0200 '/ Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=4.80 cfs @ 12.16 hrs HW=294.00' (Free Discharge)
 1=Culvert (Inlet Controls 4.80 cfs @ 2.79 fps)

Pond MH6: CB6

Hydrograph



Summary for Pond RG10:

[63] Warning: Exceeded Reach 15R INLET depth by 4.55' @ 24.44 hrs

Inflow Area = 0.091 ac, 45.76% Impervious, Inflow Depth = 1.66" for 10-YR event
 Inflow = 0.11 cfs @ 12.09 hrs, Volume= 0.013 af
 Outflow = 0.01 cfs @ 16.99 hrs, Volume= 0.003 af, Atten= 93%, Lag= 293.6 min
 Primary = 0.01 cfs @ 16.99 hrs, Volume= 0.003 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 306.86' @ 16.99 hrs Surf.Area= 0 sf Storage= 427 cf

Plug-Flow detention time= 480.4 min calculated for 0.003 af (22% of inflow)
 Center-of-Mass det. time= 313.2 min (1,196.2 - 882.9)

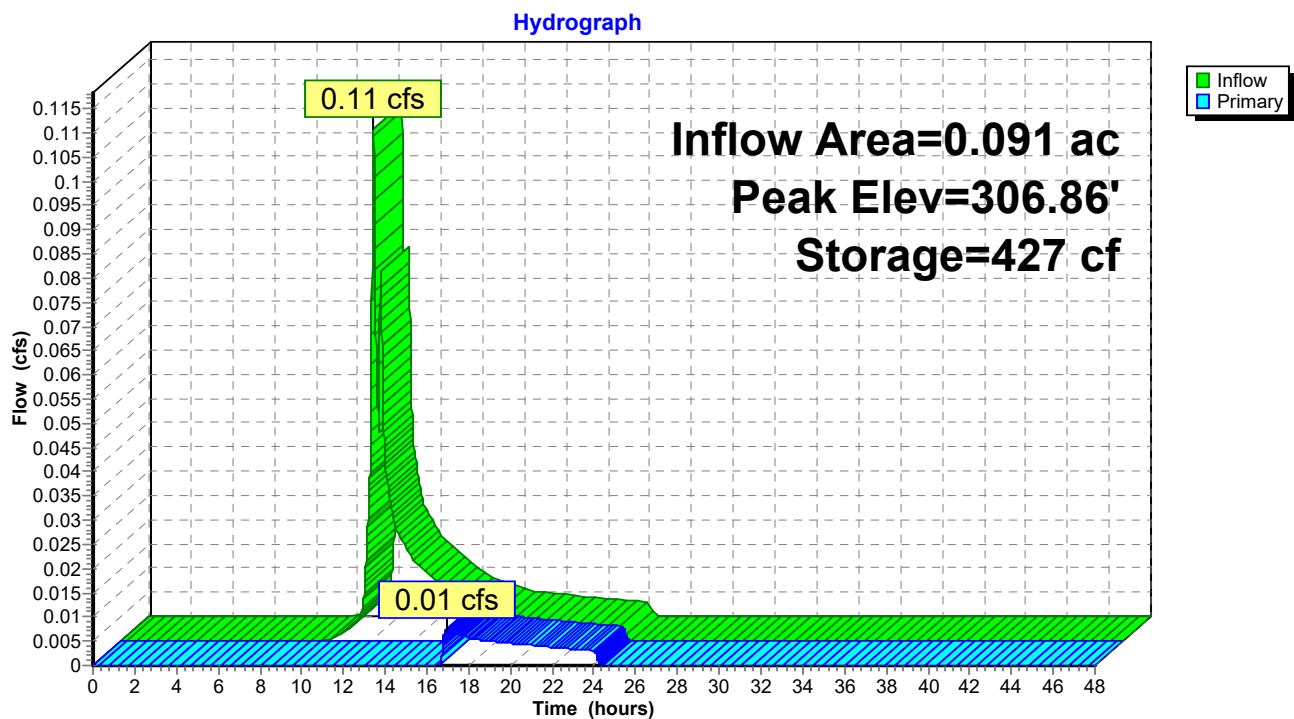
Volume	Invert	Avail.Storage	Storage Description
#1	303.77'	509 cf	Custom Stage Data Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
303.77	0	0
303.85	8	8
304.10	25	33
306.10	200	233
306.35	25	258
306.85	167	425
307.10	84	509

Device	Routing	Invert	Outlet Devices
#1	Primary	306.85'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 16.99 hrs HW=306.86' (Free Discharge)
 ↑ **1=Orifice/Grate** (Weir Controls 0.00 cfs @ 0.24 fps)

Pond RG10:



Summary for Pond RG11:

Inflow Area = 0.043 ac, 62.65% Impervious, Inflow Depth = 2.91" for 10-YR event
 Inflow = 0.14 cfs @ 12.09 hrs, Volume= 0.010 af
 Outflow = 0.04 cfs @ 12.44 hrs, Volume= 0.005 af, Atten= 71%, Lag= 20.9 min
 Primary = 0.04 cfs @ 12.44 hrs, Volume= 0.005 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 306.87' @ 12.44 hrs Surf.Area= 0 sf Storage= 239 cf

Plug-Flow detention time= 239.4 min calculated for 0.005 af (48% of inflow)
 Center-of-Mass det. time= 124.4 min (938.2 - 813.9)

Volume	Invert	Avail.Storage	Storage Description
#1	303.77'	281 cf	Custom Stage Data Listed below

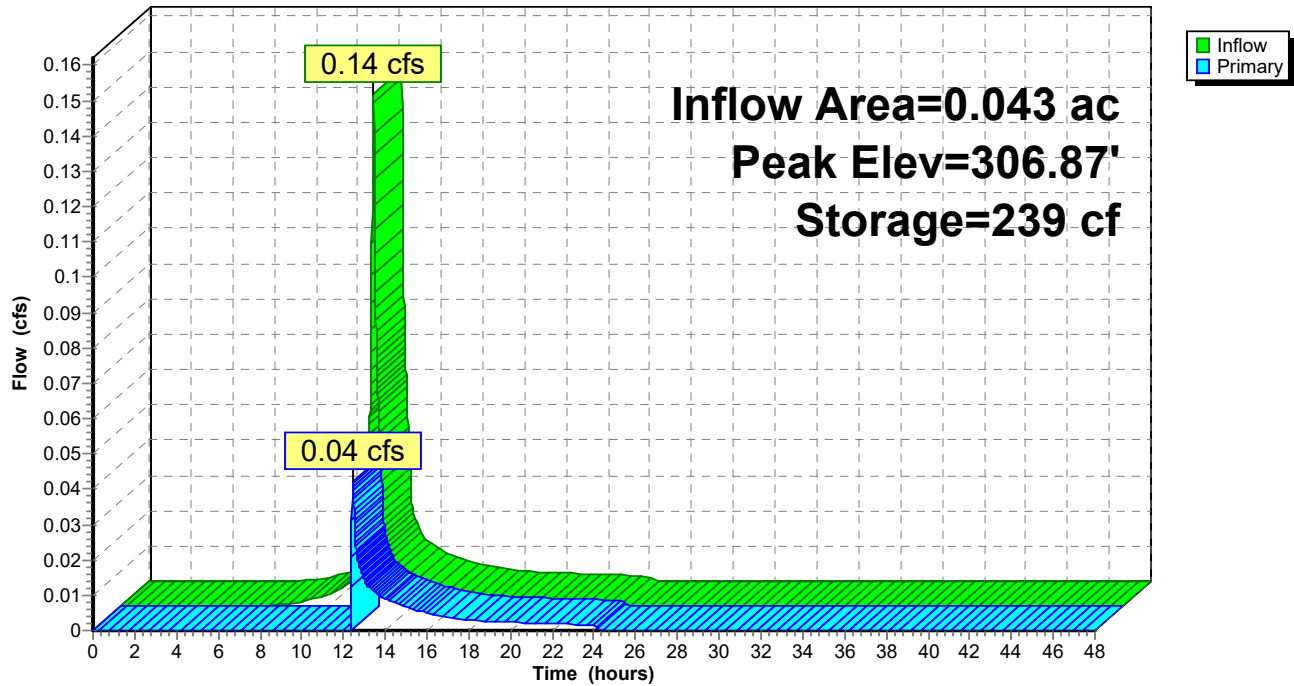
Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
303.77	0	0
303.85	5	5
304.10	14	19
306.10	110	129
306.35	14	143
306.85	92	235
307.10	46	281

Device	Routing	Invert	Outlet Devices
#1	Primary	306.85'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.04 cfs @ 12.44 hrs HW=306.87' (Free Discharge)
 ↑ **1=Orifice/Grate** (Weir Controls 0.04 cfs @ 0.51 fps)

Pond RG11:

Hydrograph



Summary for Pond RG12:

[62] Hint: Exceeded Reach PS3 OUTLET depth by 1.27' @ 0.00 hrs

Inflow Area = 0.213 ac, 23.47% Impervious, Inflow Depth = 1.74" for 10-YR event
 Inflow = 0.42 cfs @ 12.10 hrs, Volume= 0.031 af
 Outflow = 0.42 cfs @ 12.11 hrs, Volume= 0.031 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.42 cfs @ 12.11 hrs, Volume= 0.031 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 310.28' @ 12.11 hrs Surf.Area= 0 sf Storage= 0 cf

Plug-Flow detention time= 0.0 min calculated for 0.031 af (100% of inflow)
 Center-of-Mass det. time= 0.0 min (853.4 - 853.4)

Volume	Invert	Avail.Storage	Storage Description
#1	310.27'	760 cf	Custom Stage Data Listed below

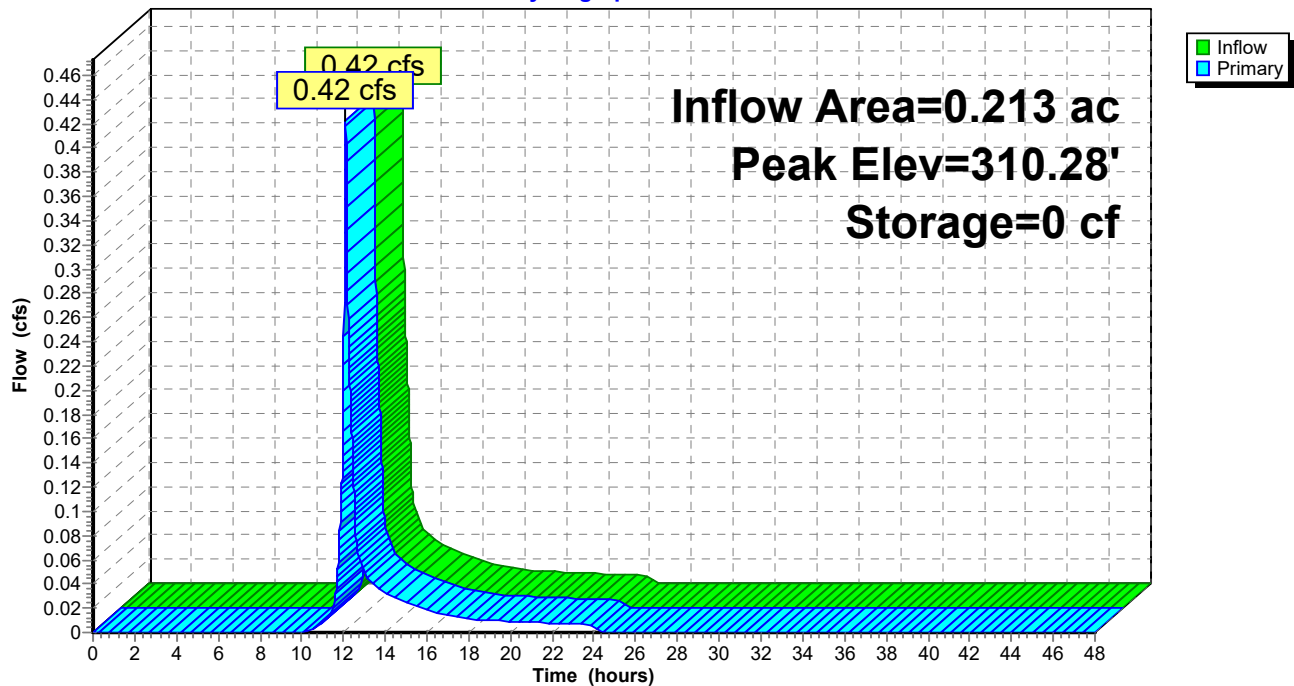
Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
310.27	0	0
310.60	15	15
310.85	44	59
312.10	219	278
312.35	44	322
312.85	292	614
313.10	146	760

Device	Routing	Invert	Outlet Devices
#1	Primary	309.75'	12.0" Horiz. Orifice/Grate X 0.50 C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.37 cfs @ 12.11 hrs HW=310.28' (Free Discharge)
 ↑1=Orifice/Grate (Orifice Controls 1.37 cfs @ 1.75 fps)

Pond RG12:

Hydrograph



Summary for Pond RG13:

[63] Warning: Exceeded Reach PS4 INLET depth by 0.95' @ 24.37 hrs

Inflow Area = 0.099 ac, 53.64% Impervious, Inflow Depth = 2.63" for 10-YR event
 Inflow = 0.31 cfs @ 12.10 hrs, Volume= 0.022 af
 Outflow = 0.02 cfs @ 13.38 hrs, Volume= 0.008 af, Atten= 92%, Lag= 76.9 min
 Primary = 0.02 cfs @ 13.38 hrs, Volume= 0.008 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 307.97' @ 13.38 hrs Surf.Area= 0 sf Storage= 609 cf

Plug-Flow detention time= 312.5 min calculated for 0.008 af (36% of inflow)
 Center-of-Mass det. time= 187.1 min (1,010.8 - 823.7)

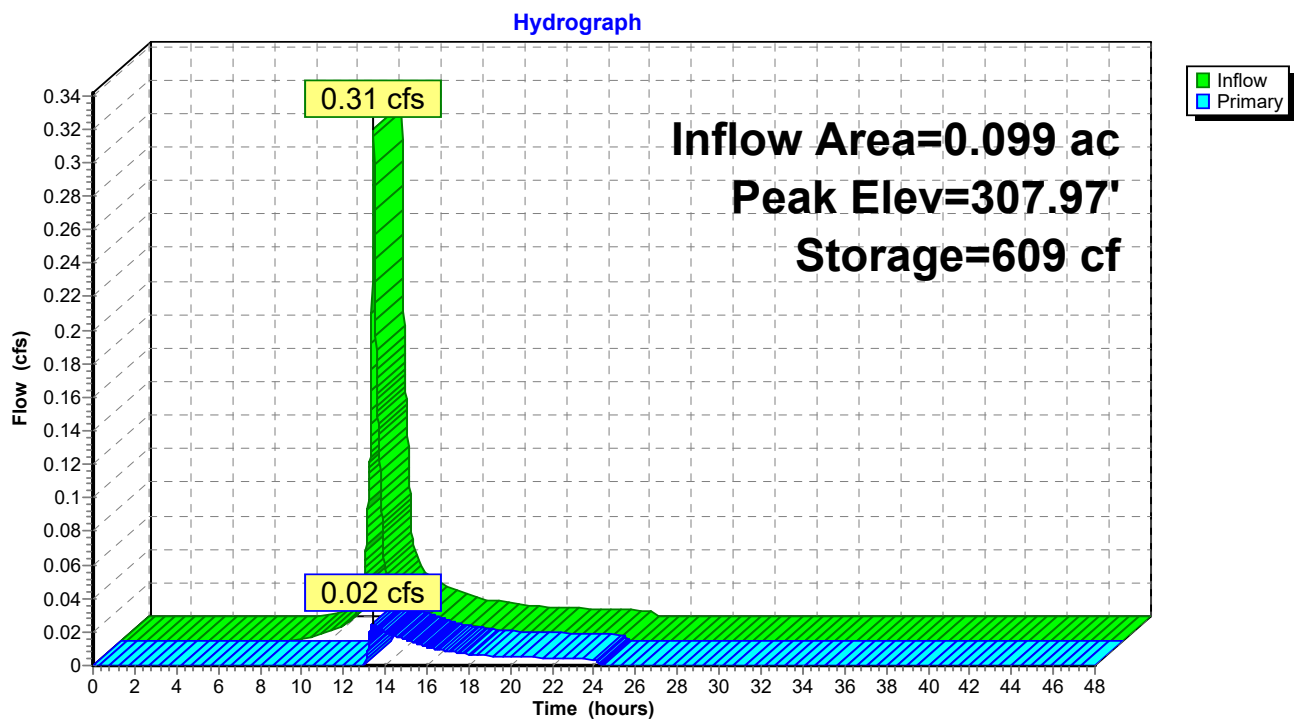
Volume	Invert	Avail.Storage	Storage Description
#1	304.29'	706 cf	Custom Stage Data Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
304.29	0	0
304.62	42	42
304.87	31	73
307.20	290	363
307.45	31	394
307.95	208	602
308.20	104	706

Device	Routing	Invert	Outlet Devices
#1	Primary	307.95'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.02 cfs @ 13.38 hrs HW=307.97' (Free Discharge)
 ↑ **1=Orifice/Grate** (Weir Controls 0.02 cfs @ 0.43 fps)

Pond RG13:



Summary for Pond RG14:

Inflow Area = 0.054 ac, 64.02% Impervious, Inflow Depth = 3.00" for 10-YR event
 Inflow = 0.19 cfs @ 12.09 hrs, Volume= 0.014 af
 Outflow = 0.13 cfs @ 12.17 hrs, Volume= 0.009 af, Atten= 29%, Lag= 4.7 min
 Primary = 0.13 cfs @ 12.17 hrs, Volume= 0.009 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 305.00' @ 12.17 hrs Surf.Area= 0 sf Storage= 231 cf

Plug-Flow detention time= 178.6 min calculated for 0.009 af (63% of inflow)
 Center-of-Mass det. time= 76.3 min (887.1 - 810.8)

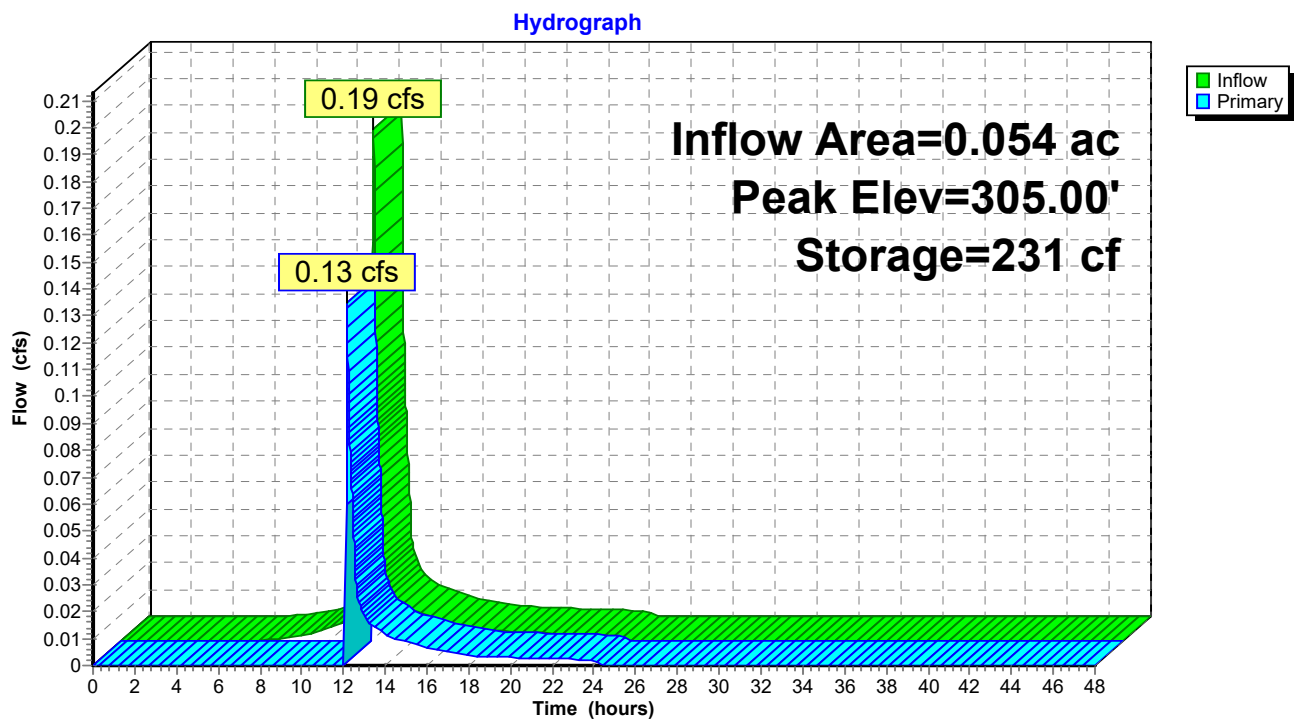
Volume	Invert	Avail.Storage	Storage Description
#1	302.54'	272 cf	Custom Stage Data Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
302.54	0	0
302.62	5	5
302.87	15	20
304.20	82	102
304.45	15	117
304.95	103	220
305.20	52	272

Device	Routing	Invert	Outlet Devices
#1	Primary	304.95'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.13 cfs @ 12.17 hrs HW=305.00' (Free Discharge)
 ↑1=Orifice/Grate (Weir Controls 0.13 cfs @ 0.77 fps)

Pond RG14:



Summary for Pond RG15:

[61] Hint: Exceeded Reach 10R outlet invert by 3.05' @ 12.10 hrs

Inflow Area = 1.015 ac, 19.57% Impervious, Inflow Depth = 1.60" for 10-YR event
 Inflow = 1.83 cfs @ 12.09 hrs, Volume= 0.135 af
 Outflow = 1.82 cfs @ 12.10 hrs, Volume= 0.125 af, Atten= 1%, Lag= 0.6 min
 Primary = 1.82 cfs @ 12.10 hrs, Volume= 0.125 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 300.99' @ 12.10 hrs Surf.Area= 0 sf Storage= 520 cf

Plug-Flow detention time= 51.8 min calculated for 0.125 af (93% of inflow)
 Center-of-Mass det. time= 14.3 min (872.0 - 857.7)

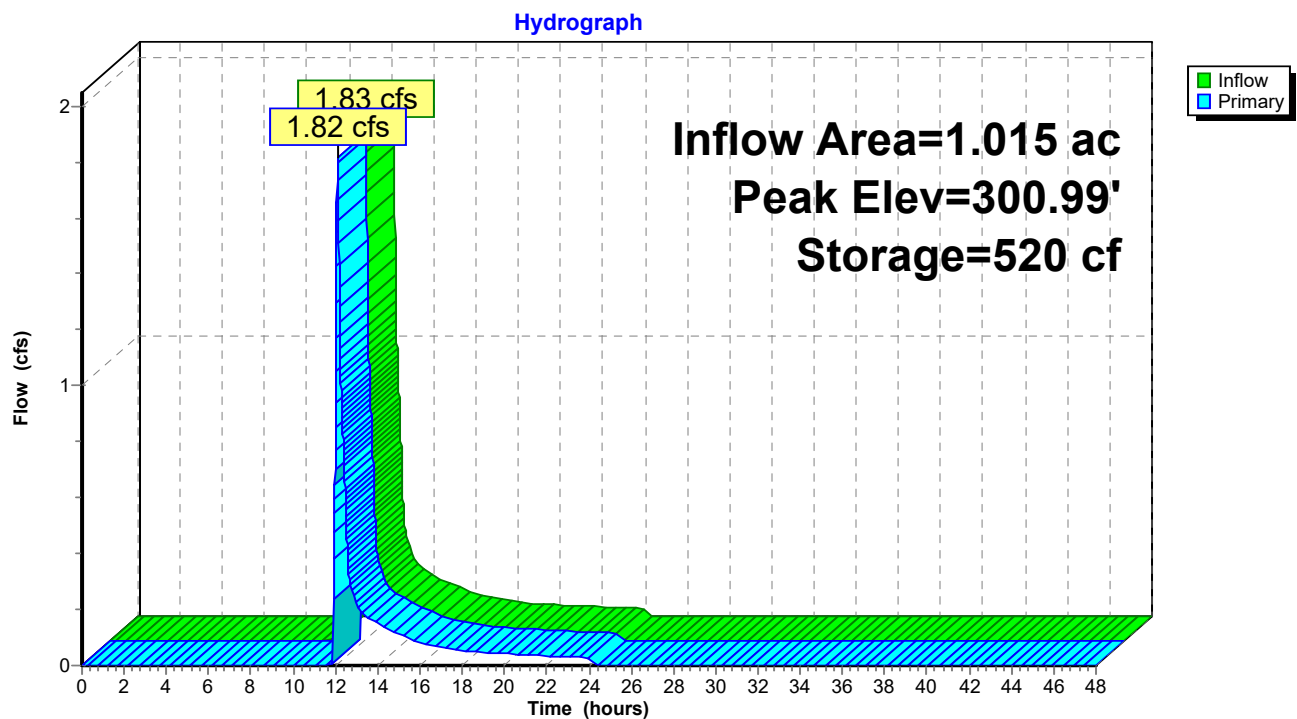
Volume	Invert	Avail.Storage	Storage Description
#1	298.00'	524 cf	Custom Stage Data Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
298.00	0	0
299.00	110	110
300.00	110	220
300.25	28	248
300.75	184	432
301.00	92	524

Device	Routing	Invert	Outlet Devices
#1	Primary	300.75'	18.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.81 cfs @ 12.10 hrs HW=300.99' (Free Discharge)
 ↑1=Orifice/Grate (Weir Controls 1.81 cfs @ 1.60 fps)

Pond RG15:



Summary for Pond RG16:

[93] Warning: Storage range exceeded by 0.09'
 [88] Warning: Qout>Qin may require Finer Routing>1
 [85] Warning: Oscillations may require Finer Routing>1
 [61] Hint: Exceeded Reach PS1 outlet invert by 0.09' @ 12.20 hrs
 [61] Hint: Exceeded Reach PS2 outlet invert by 0.09' @ 12.20 hrs

Inflow Area = 2.675 ac, 4.94% Impervious, Inflow Depth = 1.26" for 10-YR event
 Inflow = 2.84 cfs @ 12.20 hrs, Volume= 0.280 af
 Outflow = 3.04 cfs @ 12.20 hrs, Volume= 0.261 af, Atten= 0%, Lag= 0.0 min
 Primary = 3.04 cfs @ 12.20 hrs, Volume= 0.261 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 301.09' @ 12.20 hrs Surf.Area= 0 sf Storage= 1,017 cf

Plug-Flow detention time= 50.7 min calculated for 0.261 af (93% of inflow)
 Center-of-Mass det. time= 14.6 min (894.3 - 879.7)

Volume	Invert	Avail.Storage	Storage Description
#1	298.00'	1,017 cf	Custom Stage Data Listed below

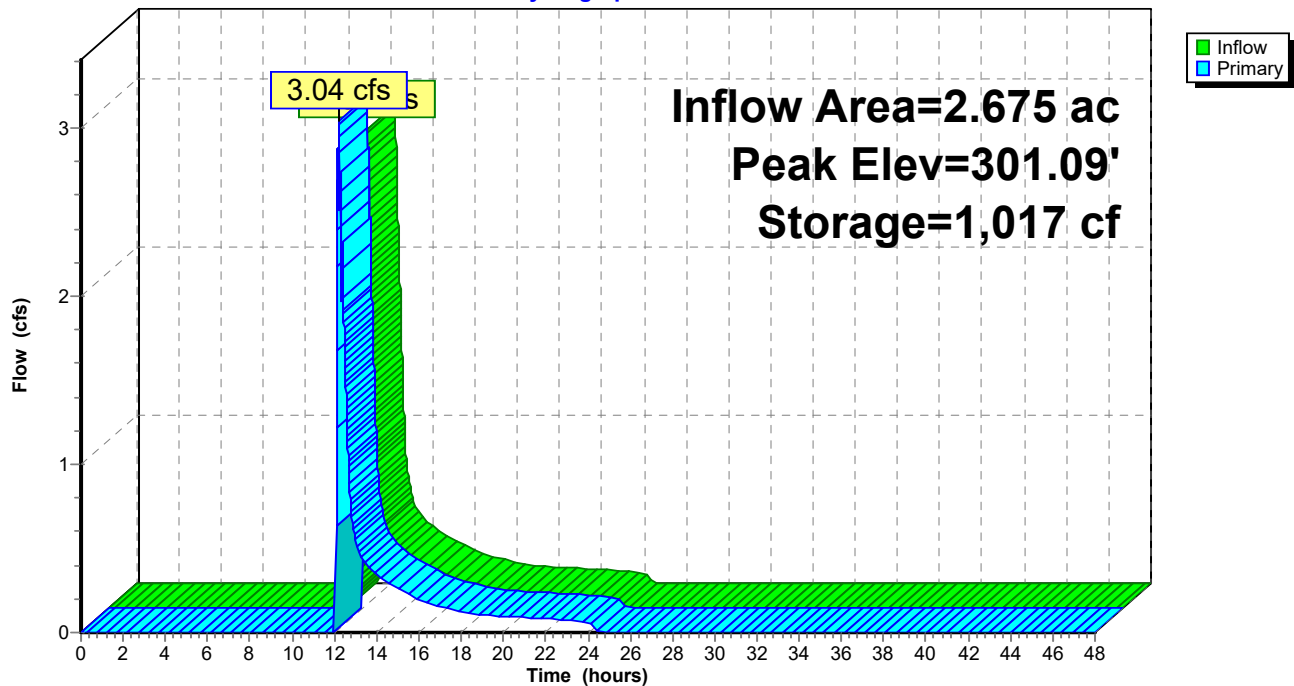
Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
298.00	0	0
299.00	182	182
300.00	182	364
300.25	46	410
300.75	455	865
301.00	152	1,017

Device	Routing	Invert	Outlet Devices
#1	Primary	300.75'	18.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=3.03 cfs @ 12.20 hrs HW=301.09' (Free Discharge)
 ↑ **1=Orifice/Grate** (Weir Controls 3.03 cfs @ 1.90 fps)

Pond RG16:

Hydrograph



Summary for Pond RG19:

[62] Hint: Exceeded Reach PS6 OUTLET depth by 0.45' @ 43.13 hrs

Inflow Area = 0.717 ac, 23.42% Impervious, Inflow Depth = 1.74" for 10-YR event
 Inflow = 1.29 cfs @ 12.19 hrs, Volume= 0.104 af
 Outflow = 0.71 cfs @ 12.40 hrs, Volume= 0.076 af, Atten= 45%, Lag= 12.6 min
 Primary = 0.71 cfs @ 12.40 hrs, Volume= 0.076 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 295.92' @ 12.40 hrs Surf.Area= 0 sf Storage= 1,404 cf

Plug-Flow detention time= 158.2 min calculated for 0.076 af (73% of inflow)
 Center-of-Mass det. time= 59.9 min (922.6 - 862.7)

Volume	Invert	Avail.Storage	Storage Description
#1	293.50'	1,484 cf	Custom Stage Data Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
293.50	0	0
293.75	73	73
295.00	365	438
295.25	73	511
295.75	730	1,241
296.00	243	1,484

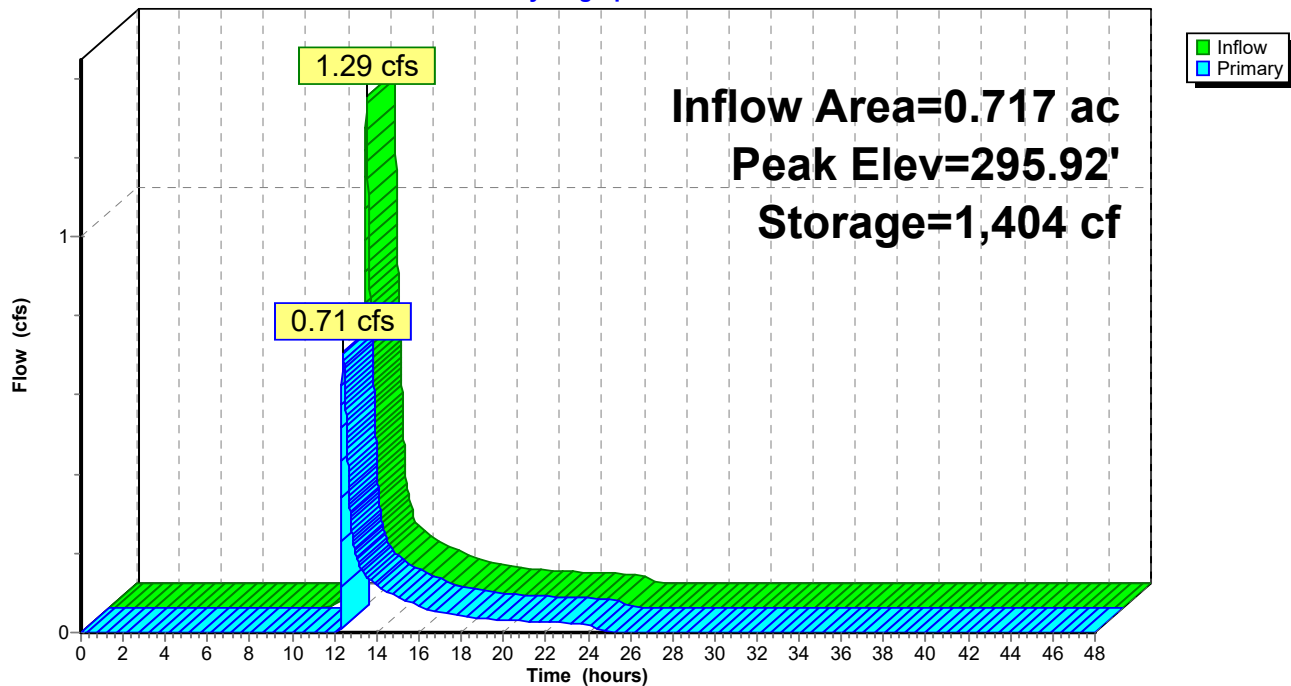
Device	Routing	Invert	Outlet Devices
#1	Primary	292.63'	8.0" Round Culvert L= 39.5' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 292.63' / 292.23' S= 0.0101 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf
#2	Device 1	295.75'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.71 cfs @ 12.40 hrs HW=295.92' (Free Discharge)

↑ **1=Culvert** (Passes 0.71 cfs of 2.28 cfs potential flow)
 ↑ **2=Orifice/Grate** (Weir Controls 0.71 cfs @ 1.34 fps)

Pond RG19:

Hydrograph



Summary for Pond RG20:

Inflow Area = 0.265 ac, 0.00% Impervious, Inflow Depth = 1.14" for 10-YR event
 Inflow = 0.31 cfs @ 12.10 hrs, Volume= 0.025 af
 Outflow = 0.01 cfs @ 21.21 hrs, Volume= 0.002 af, Atten= 97%, Lag= 546.3 min
 Primary = 0.01 cfs @ 21.21 hrs, Volume= 0.002 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 295.05' @ 21.21 hrs Surf.Area= 0 sf Storage= 1,010 cf

Plug-Flow detention time= 631.1 min calculated for 0.002 af (8% of inflow)
 Center-of-Mass det. time= 467.3 min (1,345.9 - 878.6)

Volume	Invert	Avail.Storage	Storage Description
#1	292.47'	1,191 cf	Custom Stage Data Listed below

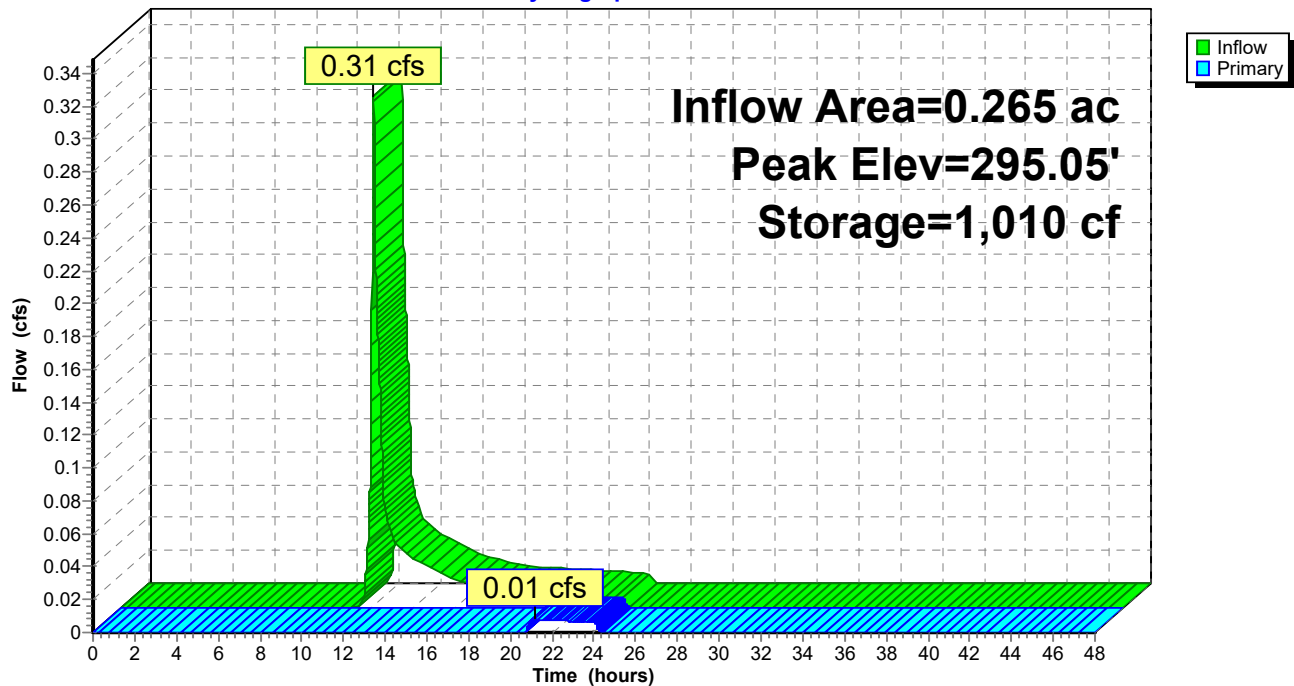
Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
292.47	0	0
292.55	18	18
292.80	55	73
294.30	330	403
294.55	55	458
295.05	550	1,008
295.30	183	1,191

Device	Routing	Invert	Outlet Devices
#1	Primary	295.05'	18.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 21.21 hrs HW=295.05' (Free Discharge)
 ↑ **1=Orifice/Grate** (Weir Controls 0.00 cfs @ 0.19 fps)

Pond RG20:

Hydrograph



Summary for Pond RG21:

Inflow Area = 0.228 ac, 67.95% Impervious, Inflow Depth = 3.10" for 10-YR event
 Inflow = 0.82 cfs @ 12.09 hrs, Volume= 0.059 af
 Outflow = 0.78 cfs @ 12.11 hrs, Volume= 0.045 af, Atten= 5%, Lag= 1.7 min
 Primary = 0.78 cfs @ 12.11 hrs, Volume= 0.045 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 291.73' @ 12.11 hrs Surf.Area= 0 sf Storage= 702 cf

Plug-Flow detention time= 131.8 min calculated for 0.045 af (77% of inflow)
 Center-of-Mass det. time= 49.8 min (857.4 - 807.6)

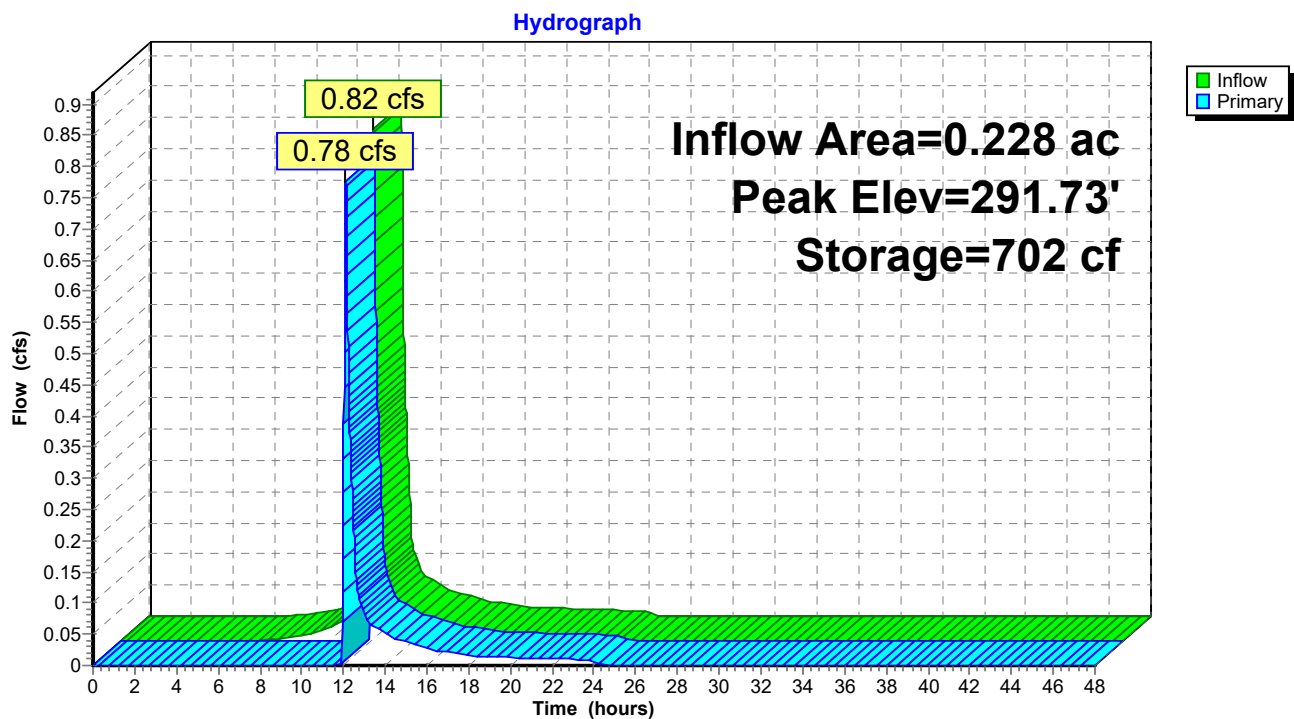
Volume	Invert	Avail.Storage	Storage Description
#1	289.62'	749 cf	Custom Stage Data Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
289.62	0	0
289.95	65	65
290.20	49	114
291.20	195	309
291.45	49	358
291.55	228	586
291.80	163	749

Device	Routing	Invert	Outlet Devices
#1	Primary	291.55'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.77 cfs @ 12.11 hrs HW=291.73' (Free Discharge)
 ↑1=Orifice/Grate (Weir Controls 0.77 cfs @ 1.38 fps)

Pond RG21:



Summary for Pond RG22:

Inflow Area = 0.153 ac, 15.01% Impervious, Inflow Depth = 2.38" for 10-YR event
 Inflow = 0.43 cfs @ 12.09 hrs, Volume= 0.030 af
 Outflow = 0.06 cfs @ 12.67 hrs, Volume= 0.014 af, Atten= 86%, Lag= 35.0 min
 Primary = 0.06 cfs @ 12.67 hrs, Volume= 0.014 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 258.58' @ 12.67 hrs Surf.Area= 0 sf Storage= 709 cf

Plug-Flow detention time= 253.0 min calculated for 0.014 af (48% of inflow)
 Center-of-Mass det. time= 134.3 min (965.2 - 830.9)

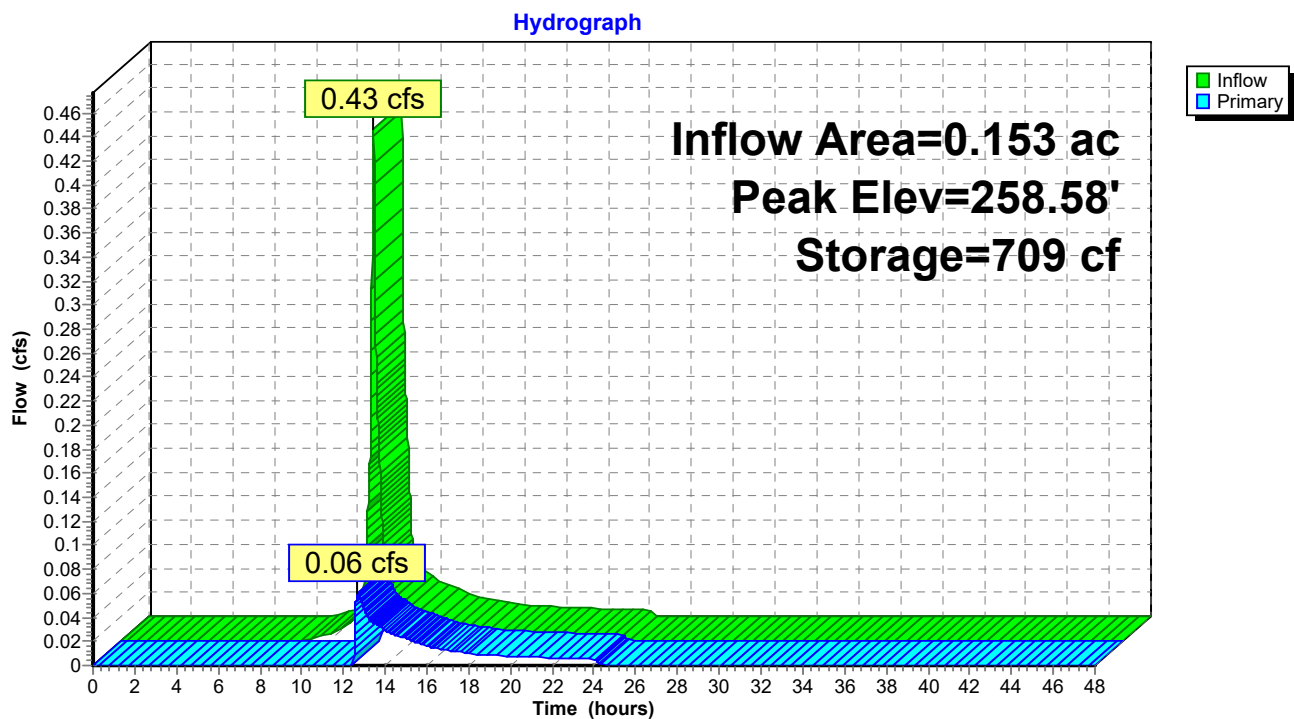
Volume	Invert	Avail.Storage	Storage Description
#1	256.22'	853 cf	Custom Stage Data Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
256.22	0	0
256.55	66	66
256.80	49	115
257.80	197	312
258.05	49	361
258.55	328	689
258.80	164	853

Device	Routing	Invert	Outlet Devices
#1	Primary	258.55'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.06 cfs @ 12.67 hrs HW=258.58' (Free Discharge)
 ↑1=Orifice/Grate (Weir Controls 0.06 cfs @ 0.57 fps)

Pond RG22:



Summary for Pond RG23:

[63] Warning: Exceeded Reach 21R INLET depth by 3.85' @ 27.92 hrs

Inflow Area = 0.183 ac, 16.37% Impervious, Inflow Depth = 1.36" for 10-YR event
 Inflow = 0.09 cfs @ 12.09 hrs, Volume= 0.021 af
 Outflow = 0.03 cfs @ 14.77 hrs, Volume= 0.010 af, Atten= 68%, Lag= 160.8 min
 Primary = 0.03 cfs @ 14.77 hrs, Volume= 0.010 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 257.87' @ 14.77 hrs Surf.Area= 0 sf Storage= 472 cf

Plug-Flow detention time= 319.4 min calculated for 0.010 af (49% of inflow)
 Center-of-Mass det. time= 163.6 min (1,087.2 - 923.6)

Volume	Invert	Avail.Storage	Storage Description
#1	255.27'	568 cf	Custom Stage Data Listed below

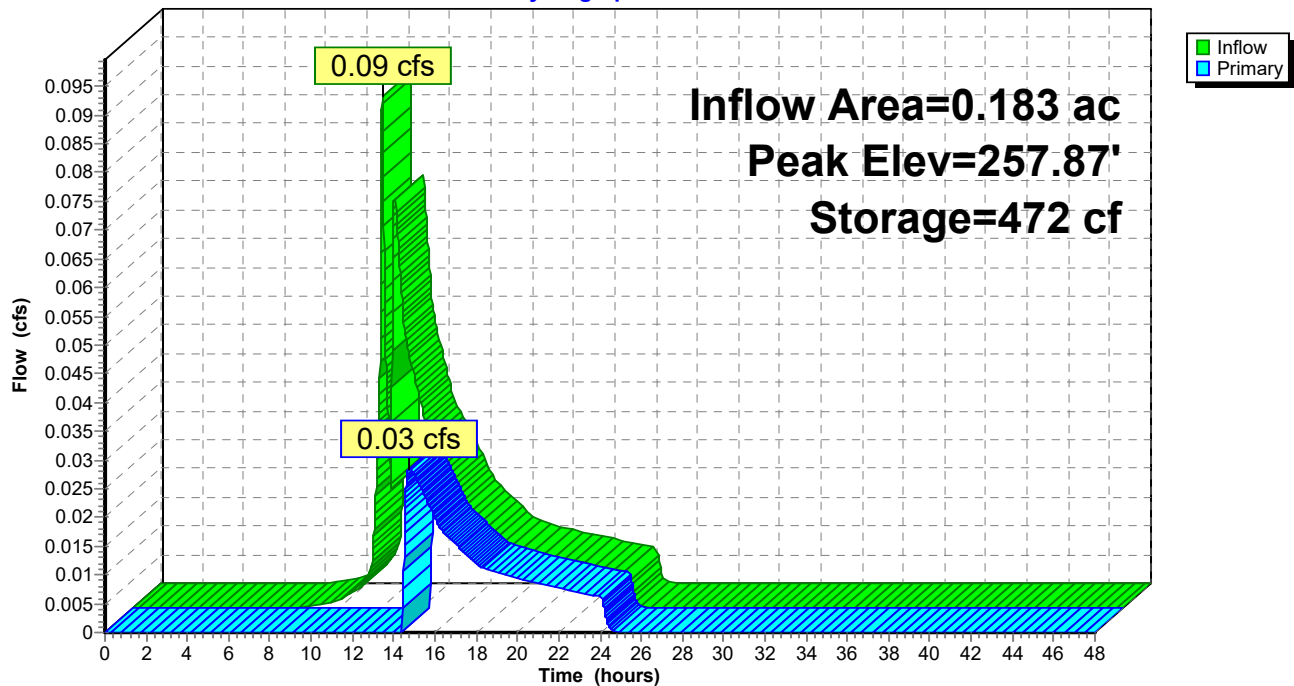
Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
255.27	0	0
255.60	41	41
255.85	31	72
257.10	155	227
257.35	31	258
257.85	207	465
258.10	103	568

Device	Routing	Invert	Outlet Devices
#1	Primary	257.85'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.02 cfs @ 14.77 hrs HW=257.87' (Free Discharge)
 ↑1=Orifice/Grate (Weir Controls 0.02 cfs @ 0.44 fps)

Pond RG23:

Hydrograph



Summary for Pond RG3:

[93] Warning: Storage range exceeded by 0.01'

Inflow Area = 0.150 ac, 46.64% Impervious, Inflow Depth = 2.38" for 10-YR event
 Inflow = 0.35 cfs @ 12.16 hrs, Volume= 0.030 af
 Outflow = 0.34 cfs @ 12.20 hrs, Volume= 0.023 af, Atten= 1%, Lag= 2.2 min
 Primary = 0.34 cfs @ 12.20 hrs, Volume= 0.023 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 311.01' @ 12.20 hrs Surf.Area= 0 sf Storage= 339 cf

Plug-Flow detention time= 130.6 min calculated for 0.023 af (77% of inflow)
 Center-of-Mass det. time= 46.0 min (882.1 - 836.1)

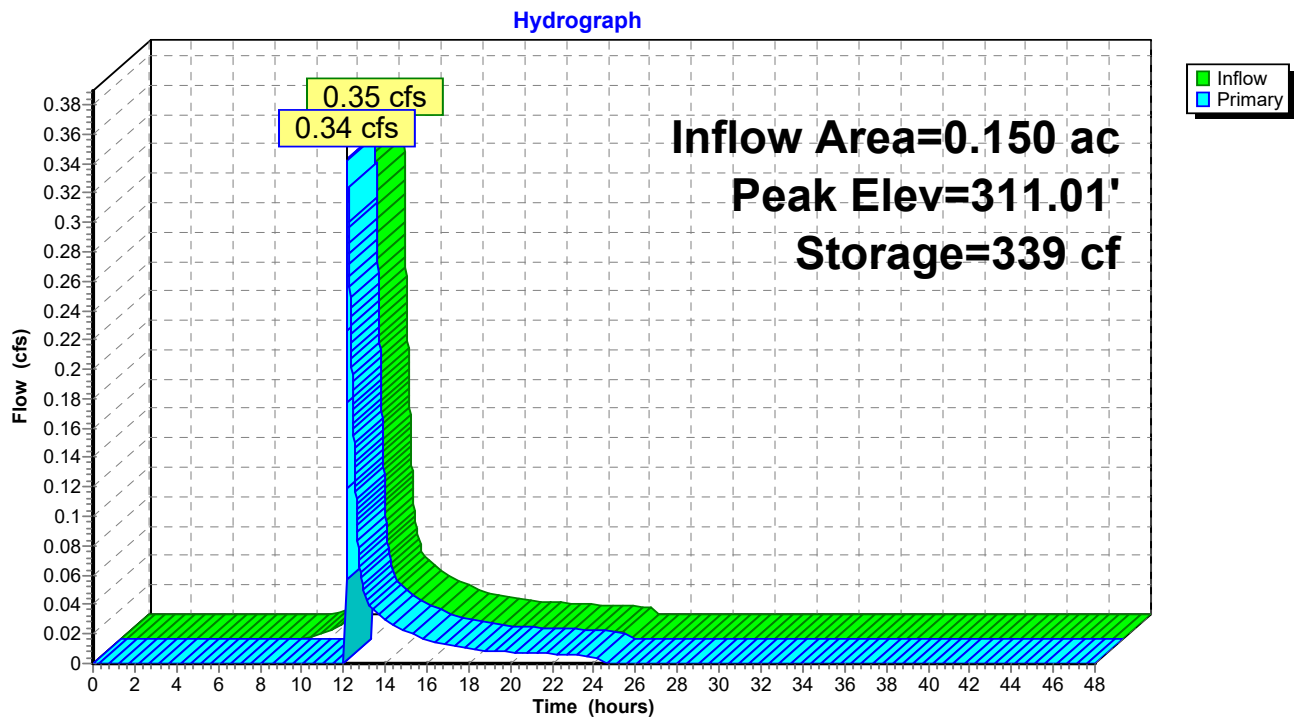
Volume	Invert	Avail.Storage	Storage Description
#1	309.50'	339 cf	Custom Stage Data Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
309.50	0	0
309.75	32	32
310.25	63	95
310.50	32	127
311.00	212	339

Device	Routing	Invert	Outlet Devices
#1	Primary	310.90'	4.0' long x 4.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=0.34 cfs @ 12.20 hrs HW=311.01' (Free Discharge)
 ↑1=**Broad-Crested Rectangular Weir** (Weir Controls 0.34 cfs @ 0.78 fps)

Pond RG3:



Summary for Pond RG4:

Inflow Area = 0.036 ac, 34.97% Impervious, Inflow Depth = 2.05" for 10-YR event
 Inflow = 0.08 cfs @ 12.09 hrs, Volume= 0.006 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 304.68' @ 24.34 hrs Surf.Area= 0 sf Storage= 265 cf

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

Volume	Invert	Avail.Storage	Storage Description
#1	302.42'	743 cf	Custom Stage Data Listed below

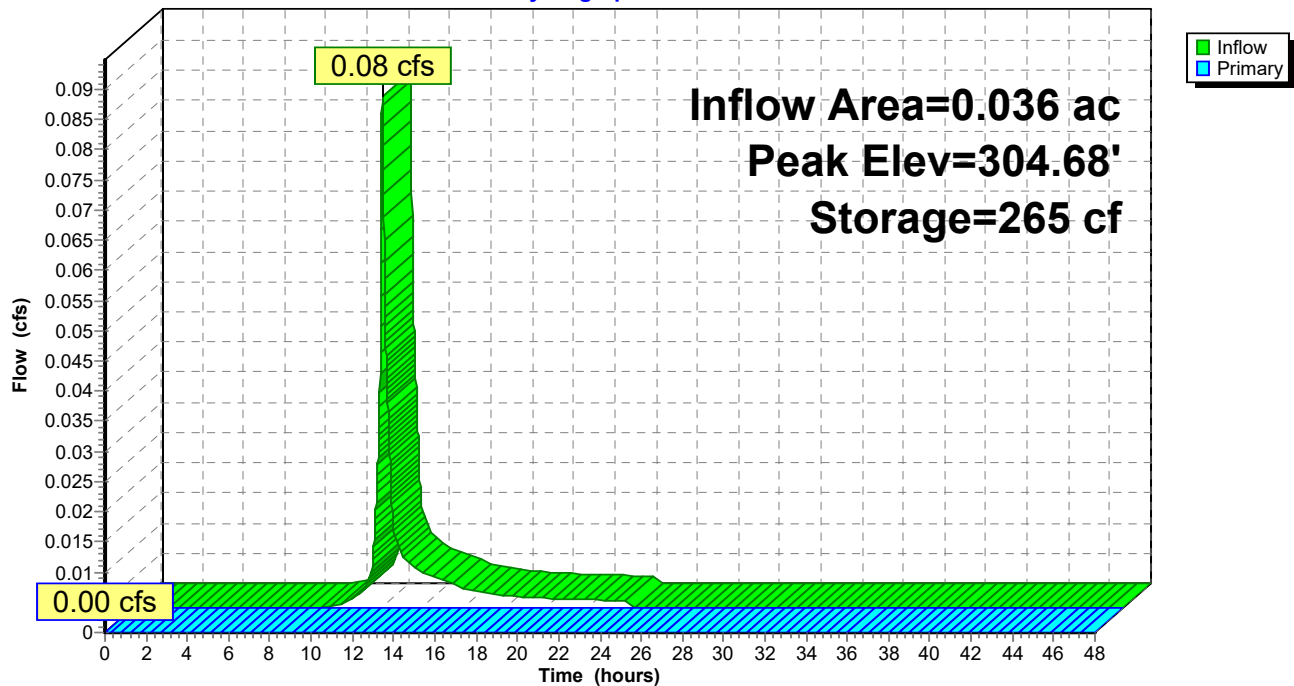
Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
302.42	0	0
302.75	39	39
303.00	29	68
306.00	352	420
306.25	29	449
306.75	196	645
307.00	98	743

Device	Routing	Invert	Outlet Devices
#1	Primary	306.75'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=302.42' (Free Discharge)
 ↑1=Orifice/Grate (Controls 0.00 cfs)

Pond RG4:

Hydrograph



Summary for Pond RG5:

Inflow Area = 0.052 ac, 40.18% Impervious, Inflow Depth = 2.21" for 10-YR event
 Inflow = 0.13 cfs @ 12.09 hrs, Volume= 0.009 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 306.73' @ 24.34 hrs Surf.Area= 0 sf Storage= 413 cf

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

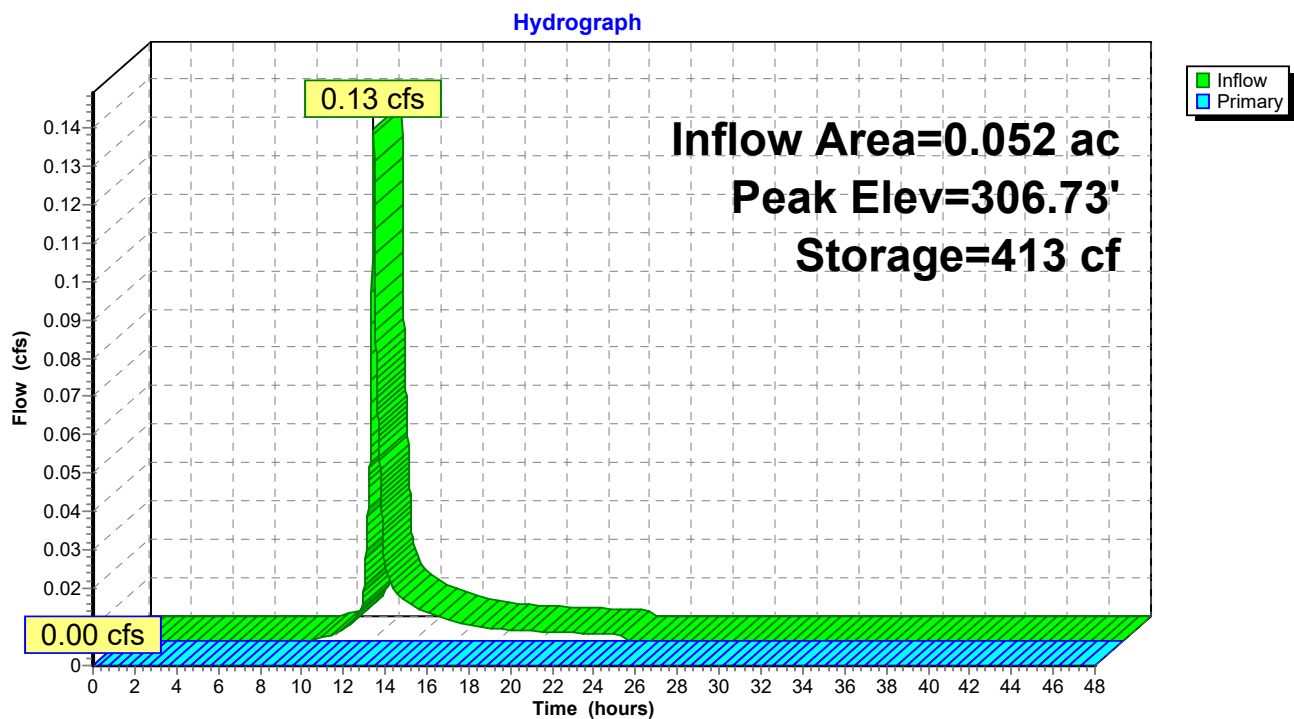
Volume	Invert	Avail.Storage	Storage Description
#1	302.67'	486 cf	Custom Stage Data Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
302.67	0	0
302.75	7	7
303.00	20	27
306.00	239	266
306.25	20	286
306.75	133	419
307.00	67	486

Device	Routing	Invert	Outlet Devices
#1	Primary	306.75'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=302.67' (Free Discharge)
 ↑1=Orifice/Grate (Controls 0.00 cfs)

Pond RG5:



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

Subcatchment1S: (new Subcat)	Runoff Area=6,927 sf 11.13% Impervious Runoff Depth=1.86" Tc=6.0 min CN=65 Runoff=0.33 cfs 0.025 af
Subcatchment2S: Road	Runoff Area=12,547 sf 25.48% Impervious Runoff Depth=3.16" Tc=6.0 min CN=80 Runoff=1.07 cfs 0.076 af
Subcatchment3S: Undeveloped Area	Runoff Area=81,012 sf 0.00% Impervious Runoff Depth=2.18" Flow Length=525' Tc=28.2 min CN=69 Runoff=2.71 cfs 0.338 af
Subcatchment4S:	Runoff Area=87,503 sf 2.36% Impervious Runoff Depth=2.61" Flow Length=525' Tc=14.9 min CN=74 Runoff=4.64 cfs 0.436 af
Subcatchment5S:	Runoff Area=3,065 sf 100.00% Impervious Runoff Depth=5.06" Tc=6.0 min CN=98 Runoff=0.37 cfs 0.030 af
Subcatchment7S: (new Subcat)	Runoff Area=6,557 sf 79.05% Impervious Runoff Depth=4.17" Tc=6.0 min CN=90 Runoff=0.71 cfs 0.052 af
Subcatchment8S: (new Subcat)	Runoff Area=17,230 sf 24.31% Impervious Runoff Depth=2.26" Tc=6.0 min CN=70 Runoff=1.04 cfs 0.075 af
Subcatchment9S:	Runoff Area=1,988 sf 100.00% Impervious Runoff Depth=5.06" Tc=6.0 min CN=98 Runoff=0.24 cfs 0.019 af
Subcatchment10S: (new Subcat)	Runoff Area=25,265 sf 28.62% Impervious Runoff Depth=3.25" Flow Length=128' Tc=1.5 min CN=81 Runoff=2.60 cfs 0.157 af
Subcatchment11S:	Runoff Area=23,740 sf 22.38% Impervious Runoff Depth=2.18" Tc=6.0 min CN=69 Runoff=1.37 cfs 0.099 af
Subcatchment12S:	Runoff Area=36,401 sf 0.00% Impervious Runoff Depth=2.97" Flow Length=485' Slope=0.0350 '/' Tc=8.6 min CN=78 Runoff=2.66 cfs 0.207 af
Subcatchment13S:	Runoff Area=67,075 sf 0.00% Impervious Runoff Depth=2.52" Flow Length=331' Slope=0.0100 '/' Tc=22.1 min CN=73 Runoff=2.92 cfs 0.323 af
Subcatchment14S:	Runoff Area=34,193 sf 28.61% Impervious Runoff Depth=2.43" Flow Length=172' Tc=1.5 min CN=72 Runoff=2.62 cfs 0.159 af
Subcatchment15S:	Runoff Area=33,688 sf 0.00% Impervious Runoff Depth=2.52" Flow Length=1,115' Slope=0.0050 '/' Tc=105.1 min CN=73 Runoff=0.62 cfs 0.162 af
Subcatchment16S:	Runoff Area=4,678 sf 100.00% Impervious Runoff Depth=5.06" Tc=6.0 min CN=98 Runoff=0.56 cfs 0.045 af
SubcatchmentCUL: (new Subcat)	Runoff Area=10,593 sf 29.57% Impervious Runoff Depth=2.43" Tc=6.0 min CN=72 Runoff=0.69 cfs 0.049 af

SubcatchmentP1:	Runoff Area=98,881 sf 5.04% Impervious Runoff Depth=1.70" Flow Length=650' Tc=12.2 min CN=63 Runoff=3.47 cfs 0.322 af
SubcatchmentP2:	Runoff Area=10,702 sf 0.00% Impervious Runoff Depth=1.55" Flow Length=344' Tc=8.6 min CN=61 Runoff=0.38 cfs 0.032 af
SubcatchmentS1:	Runoff Area=1,539 sf 96.04% Impervious Runoff Depth=4.95" Tc=6.0 min CN=97 Runoff=0.18 cfs 0.015 af
SubcatchmentS10:	Runoff Area=2,106 sf 30.86% Impervious Runoff Depth=2.43" Tc=6.0 min CN=72 Runoff=0.14 cfs 0.010 af
SubcatchmentS11:	Runoff Area=1,858 sf 62.65% Impervious Runoff Depth=3.55" Tc=6.0 min CN=84 Runoff=0.18 cfs 0.013 af
SubcatchmentS12:	Runoff Area=9,267 sf 23.47% Impervious Runoff Depth=2.26" Tc=6.0 min CN=70 Runoff=0.56 cfs 0.040 af
SubcatchmentS13:	Runoff Area=4,314 sf 53.64% Impervious Runoff Depth=3.25" Tc=6.0 min CN=81 Runoff=0.38 cfs 0.027 af
SubcatchmentS14:	Runoff Area=2,371 sf 64.02% Impervious Runoff Depth=3.65" Tc=6.0 min CN=85 Runoff=0.23 cfs 0.017 af
SubcatchmentS15:	Runoff Area=44,214 sf 19.57% Impervious Runoff Depth=2.10" Tc=6.0 min CN=68 Runoff=2.44 cfs 0.177 af
SubcatchmentS19:	Runoff Area=31,232 sf 23.42% Impervious Runoff Depth=2.26" Tc=6.0 min CN=70 Runoff=1.88 cfs 0.135 af
SubcatchmentS2:	Runoff Area=0.550 ac 12.73% Impervious Runoff Depth=1.94" Tc=6.0 min CN=66 Runoff=1.21 cfs 0.089 af
SubcatchmentS20:	Runoff Area=11,551 sf 0.00% Impervious Runoff Depth=1.55" Tc=6.0 min CN=61 Runoff=0.45 cfs 0.034 af
SubcatchmentS21:	Runoff Area=9,941 sf 67.95% Impervious Runoff Depth=3.75" Tc=6.0 min CN=86 Runoff=0.99 cfs 0.071 af
SubcatchmentS22: Stow Road South	Runoff Area=6,662 sf 15.01% Impervious Runoff Depth=2.97" Tc=6.0 min CN=78 Runoff=0.53 cfs 0.038 af
SubcatchmentS23: Stow Road South	Runoff Area=1,297 sf 23.36% Impervious Runoff Depth=3.16" Tc=6.0 min CN=80 Runoff=0.11 cfs 0.008 af
SubcatchmentS3:	Runoff Area=6,554 sf 46.64% Impervious Runoff Depth=2.97" Flow Length=426' Tc=11.6 min CN=78 Runoff=0.44 cfs 0.037 af
SubcatchmentS4:	Runoff Area=1,550 sf 34.97% Impervious Runoff Depth=2.61" Tc=6.0 min CN=74 Runoff=0.11 cfs 0.008 af
SubcatchmentS5:	Runoff Area=2,245 sf 40.18% Impervious Runoff Depth=2.78" Tc=6.0 min CN=76 Runoff=0.17 cfs 0.012 af

Subcatchment SBS: Runoff Area=6,892 sf 15.19% Impervious Runoff Depth=2.97"
Tc=6.0 min CN=78 Runoff=0.55 cfs 0.039 af

Reach 1R: (new Reach) Avg. Flow Depth=0.52' Max Vel=6.08 fps Inflow=2.50 cfs 0.159 af
12.0" Round Pipe n=0.011 L=72.0' S=0.0125 '/' Capacity=4.71 cfs Outflow=2.49 cfs 0.159 af

Reach 4R: Avg. Flow Depth=0.09' Max Vel=5.24 fps Inflow=0.18 cfs 0.015 af
12.0" Round Pipe n=0.011 L=22.0' S=0.0682 ' Capacity=10.99 cfs Outflow=0.18 cfs 0.015 af

Reach 5R: Intermittent Stream Avg. Flow Depth=0.82' Max Vel=1.95 fps Inflow=8.49 cfs 0.980 af
n=0.050 L=845.0' S=0.0100 '/' Capacity=11.78 cfs Outflow=7.79 cfs 0.980 af

Reach 6R: new Avg. Flow Depth=0.12' Max Vel=2.33 fps Inflow=0.10 cfs 0.013 af
8.0" Round Pipe n=0.011 L=197.0' S=0.0100 '/' Capacity=1.43 cfs Outflow=0.10 cfs 0.013 af

Reach 7R: Avg. Flow Depth=0.10' Max Vel=4.66 fps Inflow=0.18 cfs 0.015 af
12.0" Round Pipe n=0.014 L=88.0' S=0.0795 '/' Capacity=9.33 cfs Outflow=0.18 cfs 0.015 af

Reach 8R: new Avg. Flow Depth=0.21' Max Vel=6.06 fps Inflow=0.56 cfs 0.040 af
8.0" Round Pipe n=0.011 L=128.0' S=0.0353 '/' Capacity=2.68 cfs Outflow=0.55 cfs 0.040 af

Reach 9R: new Avg. Flow Depth=0.16' Max Vel=3.38 fps Inflow=0.22 cfs 0.011 af
8.0" Round Pipe n=0.011 L=7.0' S=0.0143 '/' Capacity=1.71 cfs Outflow=0.22 cfs 0.011 af

Reach 10R: new Avg. Flow Depth=0.00' Max Vel=0.00 fps
18.0" Round Pipe n=0.011 L=84.0' S=0.0400 '/' Capacity=24.83 cfs Outflow=0.00 cfs 0.000 af

Reach 11R: new Avg. Flow Depth=0.67' Max Vel=5.56 fps Inflow=2.53 cfs 0.167 af
8.0" Round Pipe n=0.011 L=7.0' S=0.0143 '/' Capacity=1.71 cfs Outflow=1.78 cfs 0.167 af

Reach 12R: (new Reach) Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
8.0" Round Pipe n=0.011 L=18.0' S=0.0111 '/' Capacity=1.51 cfs Outflow=0.00 cfs 0.000 af

Reach 13R: New Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
8.0" Round Pipe n=0.011 L=18.0' S=0.0111 '/' Capacity=1.51 cfs Outflow=0.00 cfs 0.000 af

Reach 14R: (new Reach) Avg. Flow Depth=0.06' Max Vel=2.00 fps Inflow=0.03 cfs 0.011 af
8.0" Round Pipe n=0.011 L=33.0' S=0.0173 '/' Capacity=1.88 cfs Outflow=0.03 cfs 0.011 af

Reach 15R: New Avg. Flow Depth=0.10' Max Vel=2.75 fps Inflow=0.09 cfs 0.007 af
8.0" Round Pipe n=0.011 L=18.0' S=0.0167 ' / ' Capacity=1.84 cfs Outflow=0.09 cfs 0.007 af

Reach 16R: New Avg. Flow Depth=0.05' Max Vel=1.88 fps Inflow=0.02 cfs 0.007 af
8.0" Round Pipe n=0.011 L=36.0' S=0.0194 '/' Capacity=1.99 cfs Outflow=0.02 cfs 0.007 af

Reach 17R: New Avg. Flow Depth=0.67' Max Vel=8.44 fps Inflow=4.19 cfs 0.359 af
8.0" Round Pipe n=0.011 L=67.0' S=0.0328 '/' Capacity=2.59 cfs Outflow=2.66 cfs 0.359 af

Reach 18R: New Avg. Flow Depth=0.03' Max Vel=1.31 fps Inflow=0.01 cfs 0.002 af
8.0" Round Pipe n=0.011 L=16.0' S=0.0200 '/' Capacity=2.02 cfs Outflow=0.01 cfs 0.002 af

Reach 19R: (new Reach)	Avg. Flow Depth=0.22'	Max Vel=9.35 fps	Inflow=0.94 cfs	0.058 af
8.0" Round Pipe n=0.011 L=47.0' S=0.0781 '/	Capacity=3.99 cfs	Outflow=0.94 cfs	0.058 af	
Reach 20R: 12" RCP pipe	Avg. Flow Depth=0.30'	Max Vel=5.32 fps	Inflow=1.06 cfs	0.076 af
12.0" Round Pipe n=0.013 L=22.0' S=0.0227 '/	Capacity=5.37 cfs	Outflow=1.06 cfs	0.076 af	
Reach 21R: (new Reach)	Avg. Flow Depth=0.20'	Max Vel=2.27 fps	Inflow=0.20 cfs	0.022 af
8.0" Round Pipe n=0.011 L=50.0' S=0.0050 '/	Capacity=1.01 cfs	Outflow=0.20 cfs	0.022 af	
Reach CB1: CB1	Avg. Flow Depth=0.30'	Max Vel=8.03 fps	Inflow=1.60 cfs	0.121 af
12.0" Round Pipe n=0.011 L=27.0' S=0.0370 '/	Capacity=8.10 cfs	Outflow=1.60 cfs	0.121 af	
Reach CP1:			Inflow=1.61 cfs	0.119 af
			Outflow=1.61 cfs	0.119 af
Reach CP2:			Inflow=20.15 cfs	2.982 af
			Outflow=20.15 cfs	2.982 af
Reach PS1:	Avg. Flow Depth=0.43'	Max Vel=4.55 fps	Inflow=3.47 cfs	0.322 af
n=0.035 L=228.0' S=0.0658 '/	Capacity=20.22 cfs	Outflow=3.46 cfs	0.322 af	
Reach PS10A:	Avg. Flow Depth=0.08'	Max Vel=1.80 fps	Inflow=0.18 cfs	0.015 af
n=0.035 L=18.0' S=0.0833 '/	Capacity=261.94 cfs	Outflow=0.18 cfs	0.015 af	
Reach PS10B:	Avg. Flow Depth=0.09'	Max Vel=1.70 fps	Inflow=0.18 cfs	0.015 af
n=0.035 L=42.0' S=0.0714 '/	Capacity=242.51 cfs	Outflow=0.18 cfs	0.015 af	
Reach PS2:	Avg. Flow Depth=0.15'	Max Vel=2.24 fps	Inflow=0.33 cfs	0.025 af
n=0.035 L=31.0' S=0.0645 '/	Capacity=20.02 cfs	Outflow=0.33 cfs	0.025 af	
Reach PS3:	Avg. Flow Depth=0.18'	Max Vel=2.68 fps	Inflow=0.56 cfs	0.040 af
n=0.035 L=58.0' S=0.0690 '/	Capacity=20.70 cfs	Outflow=0.56 cfs	0.040 af	
Reach PS4:	Avg. Flow Depth=0.19'	Max Vel=1.77 fps	Inflow=0.38 cfs	0.027 af
n=0.035 L=34.0' S=0.0294 '/	Capacity=13.52 cfs	Outflow=0.38 cfs	0.027 af	
Reach PS6: (new Reach)	Avg. Flow Depth=0.47'	Max Vel=2.02 fps	Inflow=1.88 cfs	0.135 af
n=0.035 L=398.0' S=0.0118 '/	Capacity=8.56 cfs	Outflow=1.71 cfs	0.135 af	
Reach PS7: (new Reach)	Avg. Flow Depth=0.38'	Max Vel=3.78 fps	Inflow=2.62 cfs	0.159 af
n=0.035 L=303.0' S=0.0528 '/	Capacity=81.69 cfs	Outflow=2.50 cfs	0.159 af	
Reach PS8: (new Reach)	Avg. Flow Depth=0.69'	Max Vel=3.94 fps	Inflow=8.54 cfs	0.966 af
n=0.023 L=40.0' S=0.0112 '/	Capacity=80.78 cfs	Outflow=8.52 cfs	0.966 af	
Reach PS9: (new Reach)	Avg. Flow Depth=0.33'	Max Vel=2.11 fps	Inflow=1.07 cfs	0.076 af
n=0.035 L=75.0' S=0.0200 '/	Capacity=11.15 cfs	Outflow=1.06 cfs	0.076 af	
Pond 1P: (new Pond)	Peak Elev=301.74'	Inflow=0.78 cfs	0.065 af	
18.0" Round Culvert n=0.011 L=85.0' S=0.0412 '/	Outflow=0.78 cfs	0.065 af		
Pond 2P: (new Pond)	Peak Elev=298.53'	Inflow=2.48 cfs	0.232 af	
18.0" Round Culvert n=0.011 L=47.0' S=0.0362 '/	Outflow=2.48 cfs	0.232 af		

Pond 3P: MH2B	Peak Elev=284.79' Inflow=7.05 cfs 0.859 af 24.0" Round Culvert n=0.011 L=72.0' S=0.0200 '/' Outflow=7.05 cfs 0.859 af
Pond 4P: Constructed Wetland	Peak Elev=260.59' Storage=23,598 cf Inflow=13.82 cfs 1.381 af Primary=8.87 cfs 1.380 af Secondary=0.00 cfs 0.000 af Outflow=8.87 cfs 1.380 af
Pond 5P: MH2A	Peak Elev=278.85' Inflow=7.92 cfs 0.917 af 24.0" Round Culvert n=0.011 L=60.0' S=0.0200 '/' Outflow=7.92 cfs 0.917 af
Pond 20P: (new Pond)	Peak Elev=266.08' Inflow=8.15 cfs 0.936 af 24.0" Round Culvert n=0.011 L=160.0' S=0.0200 '/' Outflow=8.15 cfs 0.936 af
Pond BS: Bus Station RG	Peak Elev=257.57' Storage=2,058 cf Inflow=2.15 cfs 0.160 af Outflow=2.11 cfs 0.117 af
Pond CB2: (new Pond)	Peak Elev=262.35' Inflow=0.37 cfs 0.030 af 12.0" Round Culvert n=0.011 L=10.0' S=0.0100 '/' Outflow=0.37 cfs 0.030 af
Pond CB3: (new Pond)	Peak Elev=277.47' Inflow=0.24 cfs 0.019 af 12.0" Round Culvert n=0.011 L=6.0' S=0.0333 '/' Outflow=0.24 cfs 0.019 af
Pond CB4: (new Pond)	Peak Elev=294.18' Inflow=0.71 cfs 0.052 af 12.0" Round Culvert n=0.011 L=7.0' S=0.0286 '/' Outflow=0.71 cfs 0.052 af
Pond CB5: (new Pond)	Peak Elev=294.50' Inflow=1.04 cfs 0.075 af 12.0" Round Culvert n=0.011 L=17.0' S=0.0235 '/' Outflow=1.04 cfs 0.075 af
Pond CULdeSAC: Cul-de-sac	Peak Elev=299.89' Storage=2,146 cf Inflow=0.69 cfs 0.049 af Outflow=0.00 cfs 0.000 af
Pond MH1: (new Pond)	Peak Elev=262.65' Inflow=8.54 cfs 0.966 af 30.0" Round Culvert n=0.013 L=35.0' S=0.0100 '/' Outflow=8.54 cfs 0.966 af
Pond MH2: (new Pond)	Peak Elev=271.98' Inflow=8.15 cfs 0.936 af 24.0" Round Culvert n=0.011 L=125.0' S=0.0200 '/' Outflow=8.15 cfs 0.936 af
Pond MH3: (new Pond)	Peak Elev=290.41' Inflow=7.05 cfs 0.848 af 24.0" Round Culvert n=0.011 L=33.0' S=0.0200 '/' Outflow=7.05 cfs 0.848 af
Pond MH4:	Peak Elev=300.21' Inflow=0.18 cfs 0.024 af 18.0" Round Culvert n=0.011 L=169.0' S=0.0200 '/' Outflow=0.18 cfs 0.024 af
Pond MH5:	Peak Elev=301.31' Inflow=0.18 cfs 0.015 af 18.0" Round Culvert n=0.011 L=56.0' S=0.0107 '/' Outflow=0.18 cfs 0.015 af
Pond MH6: CB6	Peak Elev=294.05' Inflow=5.26 cfs 0.615 af 24.0" Round Culvert n=0.011 L=101.0' S=0.0200 '/' Outflow=5.26 cfs 0.615 af
Pond RG10:	Peak Elev=306.87' Storage=430 cf Inflow=0.17 cfs 0.017 af Outflow=0.02 cfs 0.007 af

Pond RG11:	Peak Elev=306.89' Storage=243 cf Inflow=0.18 cfs 0.013 af Outflow=0.09 cfs 0.007 af
Pond RG12:	Peak Elev=310.28' Storage=1 cf Inflow=0.56 cfs 0.040 af Outflow=0.56 cfs 0.040 af
Pond RG13:	Peak Elev=307.99' Storage=620 cf Inflow=0.38 cfs 0.027 af Outflow=0.10 cfs 0.013 af
Pond RG14:	Peak Elev=305.03' Storage=236 cf Inflow=0.23 cfs 0.017 af Outflow=0.22 cfs 0.011 af
Pond RG15:	Peak Elev=301.05' Storage=524 cf Inflow=2.44 cfs 0.177 af Outflow=2.53 cfs 0.167 af
Pond RG16:	Peak Elev=301.17' Storage=1,017 cf Inflow=4.00 cfs 0.378 af Outflow=4.19 cfs 0.359 af
Pond RG19:	Peak Elev=296.01' Storage=1,484 cf Inflow=1.71 cfs 0.135 af Outflow=1.40 cfs 0.107 af
Pond RG20:	Peak Elev=295.06' Storage=1,017 cf Inflow=0.45 cfs 0.034 af Outflow=0.03 cfs 0.011 af
Pond RG21:	Peak Elev=291.75' Storage=718 cf Inflow=0.99 cfs 0.071 af Outflow=0.94 cfs 0.058 af
Pond RG22:	Peak Elev=258.62' Storage=737 cf Inflow=0.53 cfs 0.038 af Outflow=0.20 cfs 0.022 af
Pond RG23:	Peak Elev=257.89' Storage=480 cf Inflow=0.25 cfs 0.030 af Outflow=0.07 cfs 0.019 af
Pond RG3:	Peak Elev=311.03' Storage=339 cf Inflow=0.44 cfs 0.037 af Outflow=0.47 cfs 0.030 af
Pond RG4:	Peak Elev=305.29' Storage=337 cf Inflow=0.11 cfs 0.008 af Outflow=0.00 cfs 0.000 af
Pond RG5:	Peak Elev=306.75' Storage=420 cf Inflow=0.17 cfs 0.012 af Outflow=0.01 cfs 0.002 af

Total Runoff Area = 16.749 ac Runoff Volume = 3.374 af Average Runoff Depth = 2.42"
86.64% Pervious = 14.511 ac 13.36% Impervious = 2.238 ac

Summary for Subcatchment 1S: (new Subcat)

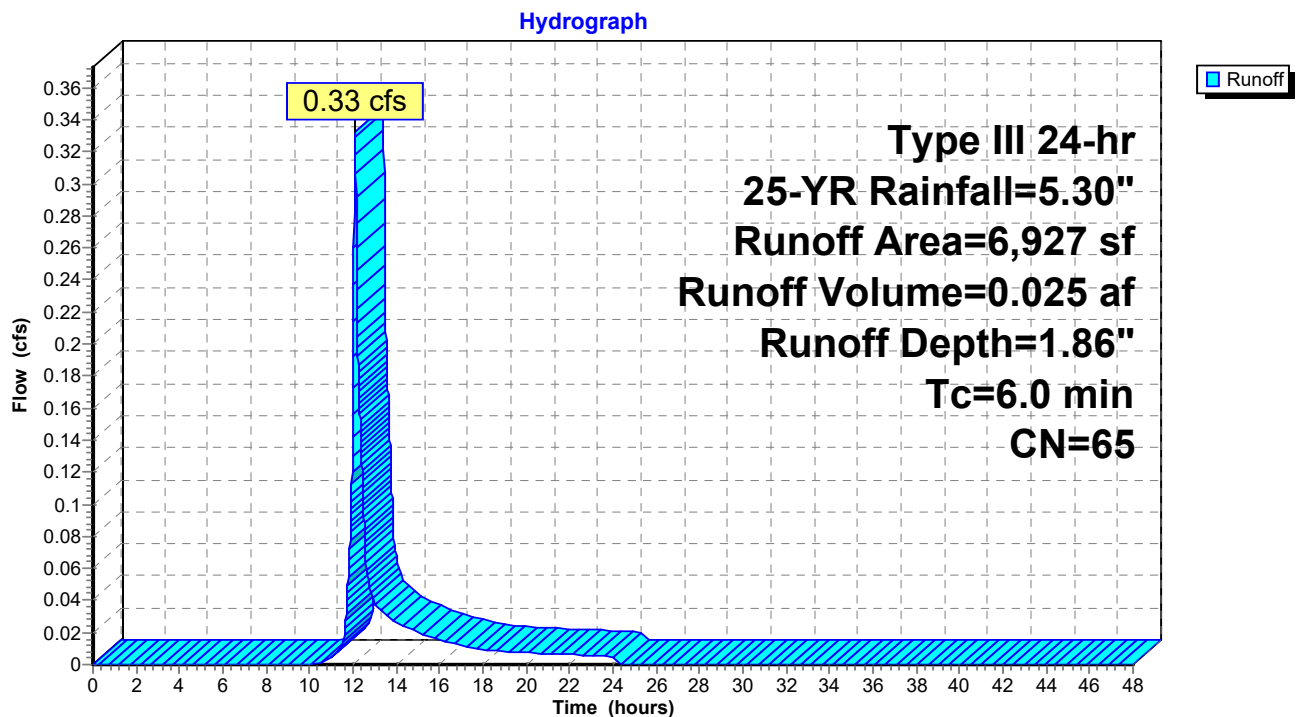
Runoff = 0.33 cfs @ 12.09 hrs, Volume= 0.025 af, Depth= 1.86"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-YR Rainfall=5.30"

Area (sf)	CN	Description
771	98	Paved parking & roofs
6,156	61	>75% Grass cover, Good, HSG B
6,927	65	Weighted Average
6,156		88.87% Pervious Area
771		11.13% Impervious Area

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

Subcatchment 1S: (new Subcat)



Summary for Subcatchment 2S: Road

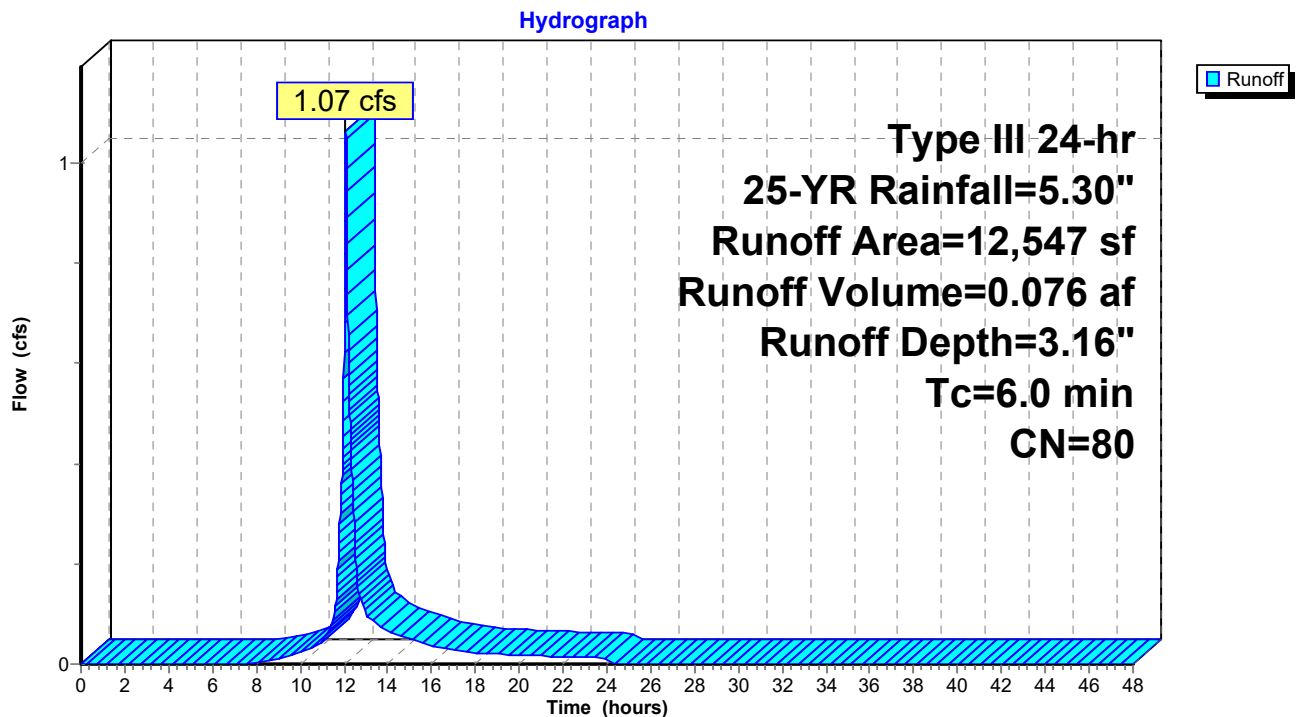
Runoff = 1.07 cfs @ 12.09 hrs, Volume= 0.076 af, Depth= 3.16"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-YR Rainfall=5.30"

	Area (sf)	CN	Description
*	4,975	74	>75% Grass cover, Good, HSG C
*	3,197	98	Impervious
*	4,375	73	Woods, Fair, HSG C
	12,547	80	Weighted Average
	9,350		74.52% Pervious Area
	3,197		25.48% Impervious Area

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

Subcatchment 2S: Road



Summary for Subcatchment 3S: Undeveloped Area

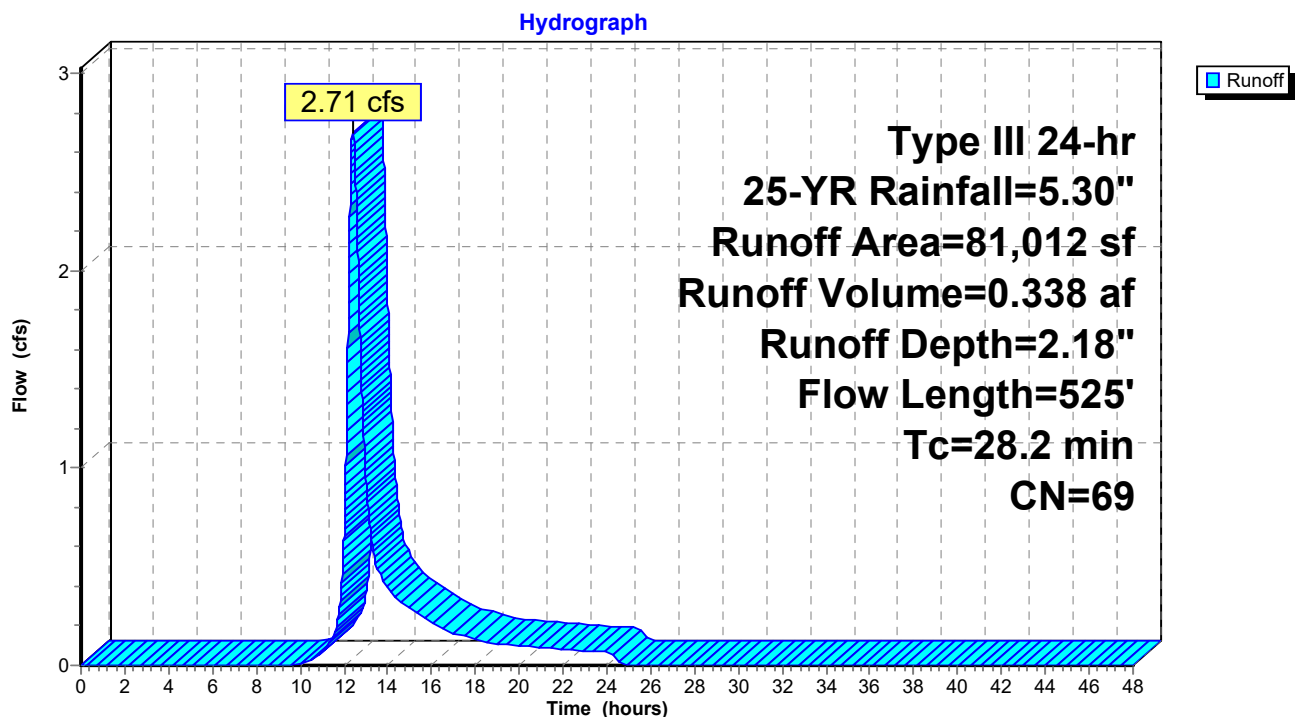
Runoff = 2.71 cfs @ 12.41 hrs, Volume= 0.338 af, Depth= 2.18"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-YR Rainfall=5.30"

Area (sf)	CN	Description
* 26,806	61	>75% grass cover, good, HSG B
54,206	73	Woods, Fair, HSG C
81,012	69	Weighted Average
81,012		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	50	0.0605	0.10		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.00"
20.0	475	0.0250	0.40		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps
28.2	525	Total			

Subcatchment 3S: Undeveloped Area



Summary for Subcatchment 4S:

Runoff = 4.64 cfs @ 12.20 hrs, Volume= 0.436 af, Depth= 2.61"

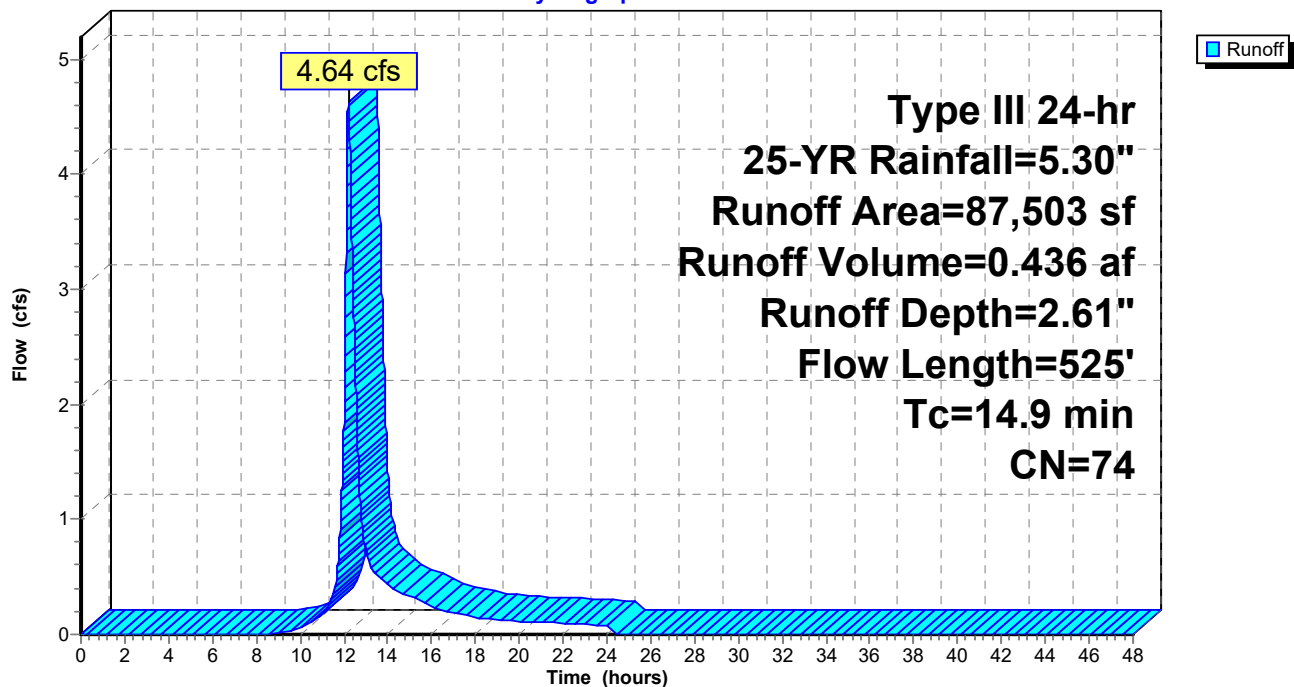
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-YR Rainfall=5.30"

	Area (sf)	CN	Description
*	62,598	73	Woods, Fair, HSG C
	2,061	98	Paved parking & roofs
	22,844	74	>75% Grass cover, Good, HSG C
	87,503	74	Weighted Average
	85,442		97.64% Pervious Area
	2,061		2.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	50	0.0300	0.17		Sheet Flow, Grass: Short n= 0.150 P2= 3.00"
10.0	475	0.0250	0.79		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
14.9	525	Total			

Subcatchment 4S:

Hydrograph



Summary for Subcatchment 5S:

Runoff = 0.37 cfs @ 12.08 hrs, Volume= 0.030 af, Depth= 5.06"

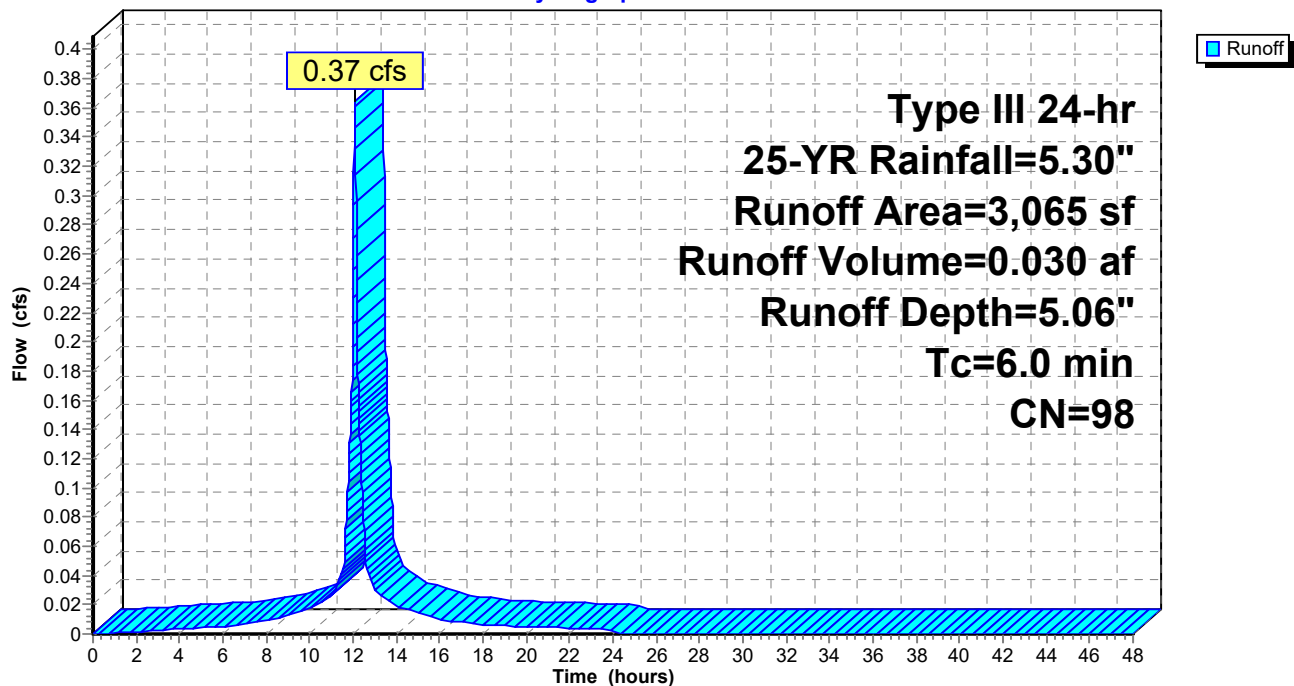
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-YR Rainfall=5.30"

Area (sf)	CN	Description
3,065	98	Paved parking & roofs
3,065		100.00% Impervious Area

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

Subcatchment 5S:

Hydrograph



Summary for Subcatchment 7S: (new Subcat)

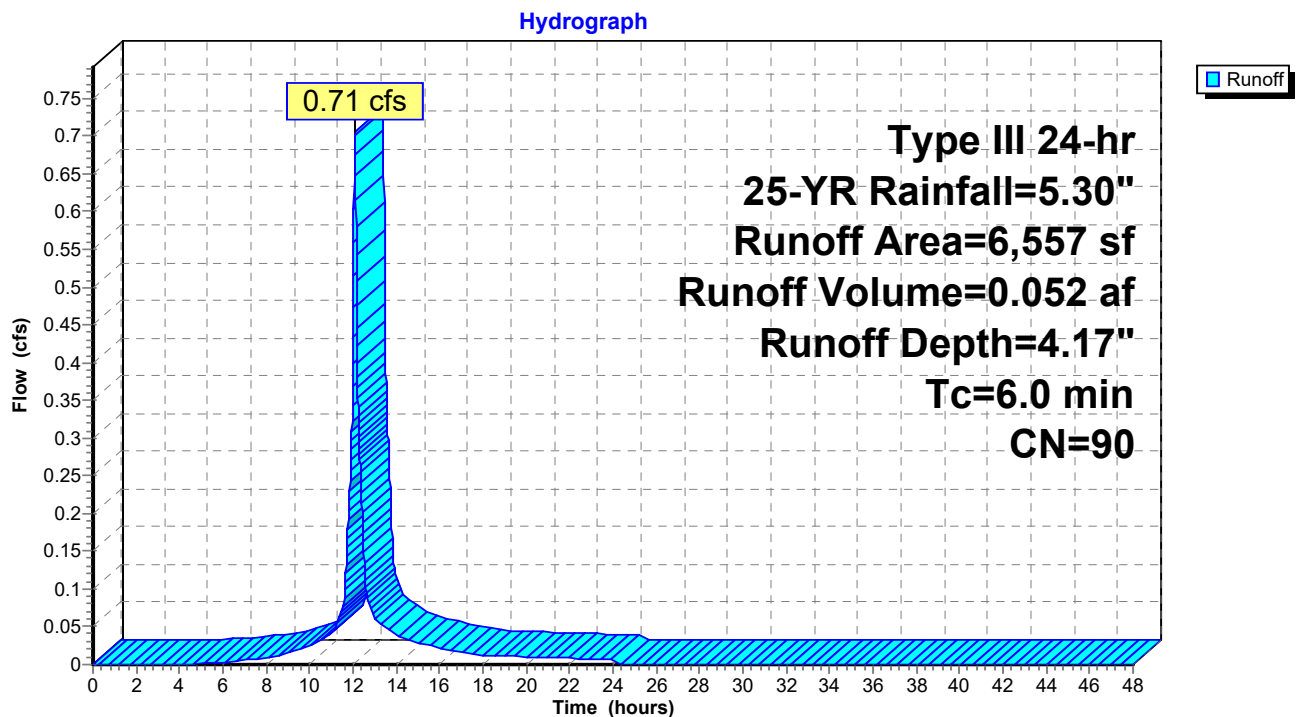
Runoff = 0.71 cfs @ 12.08 hrs, Volume= 0.052 af, Depth= 4.17"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-YR Rainfall=5.30"

	Area (sf)	CN	Description
*	5,183	98	Impervious
*	1,374	61	>75% grass cover, good, HSG B
	6,557	90	Weighted Average
	1,374		20.95% Pervious Area
	5,183		79.05% Impervious Area

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

Subcatchment 7S: (new Subcat)



Summary for Subcatchment 8S: (new Subcat)

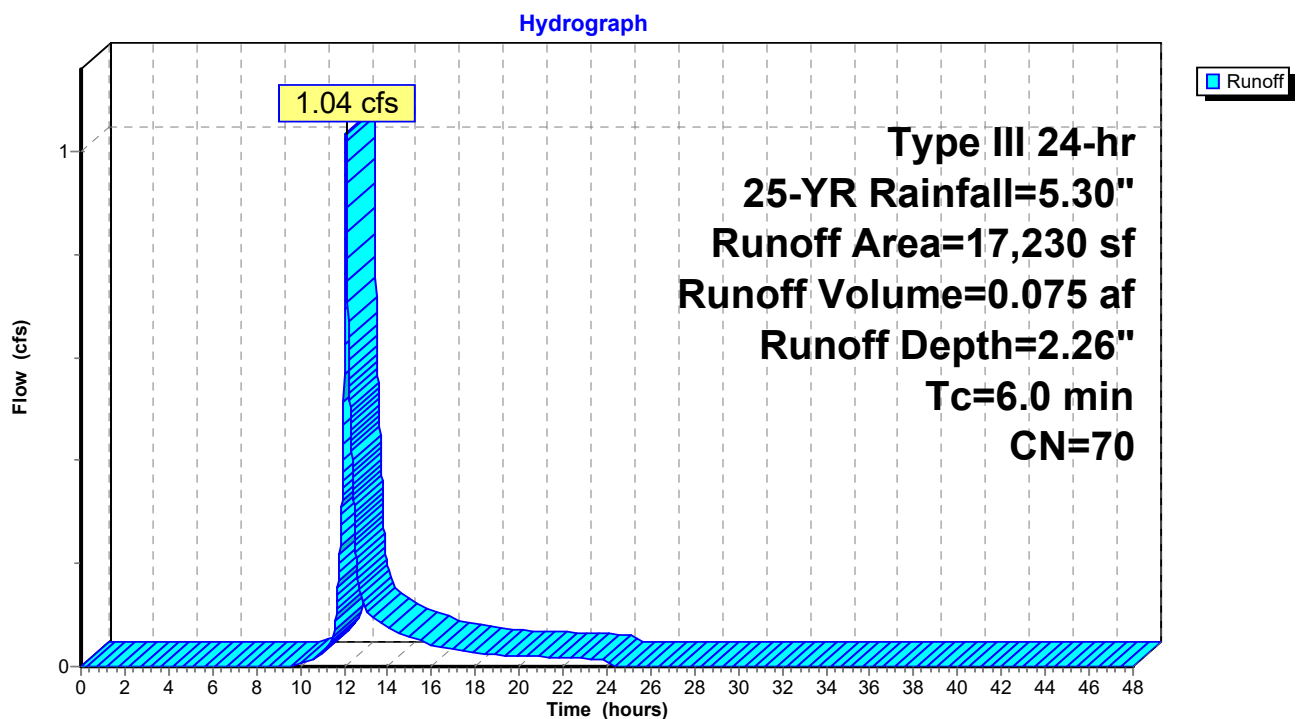
Runoff = 1.04 cfs @ 12.09 hrs, Volume= 0.075 af, Depth= 2.26"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-YR Rainfall=5.30"

	Area (sf)	CN	Description
*	4,188	98	Impervious
*	13,042	61	>75% grass cover, good, HSG B
	17,230	70	Weighted Average
	13,042		75.69% Pervious Area
	4,188		24.31% Impervious Area

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

Subcatchment 8S: (new Subcat)



Summary for Subcatchment 9S:

Runoff = 0.24 cfs @ 12.08 hrs, Volume= 0.019 af, Depth= 5.06"

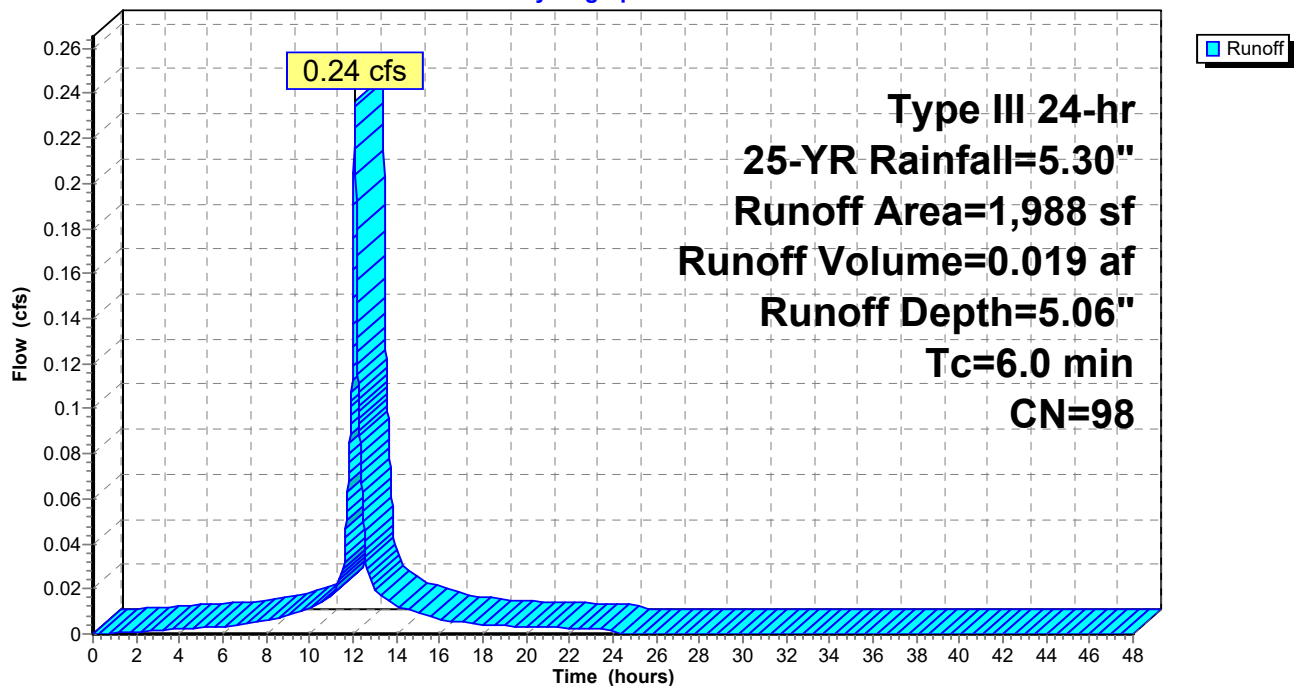
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-YR Rainfall=5.30"

Area (sf)	CN	Description
* 1,988	98	
1,988		100.00% Impervious Area

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

Subcatchment 9S:

Hydrograph



Summary for Subcatchment 10S: (new Subcat)

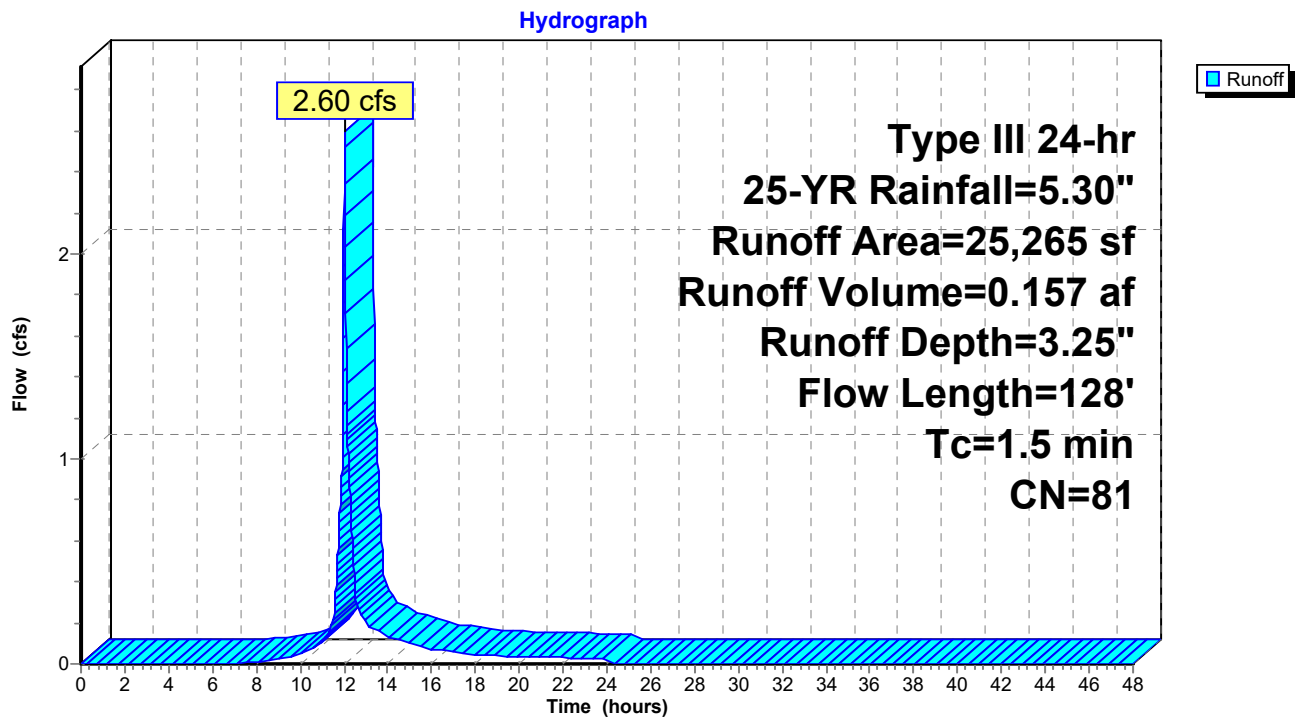
Runoff = 2.60 cfs @ 12.02 hrs, Volume= 0.157 af, Depth= 3.25"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-YR Rainfall=5.30"

Area (sf)	CN	Description
7,231	98	Paved parking & roofs
18,034	74	>75% Grass cover, Good, HSG C
25,265	81	Weighted Average
18,034		71.38% Pervious Area
7,231		28.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.16		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
0.8	78	0.0500	1.57		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.5	128	Total			

Subcatchment 10S: (new Subcat)



Summary for Subcatchment 11S:

Runoff = 1.37 cfs @ 12.09 hrs, Volume= 0.099 af, Depth= 2.18"

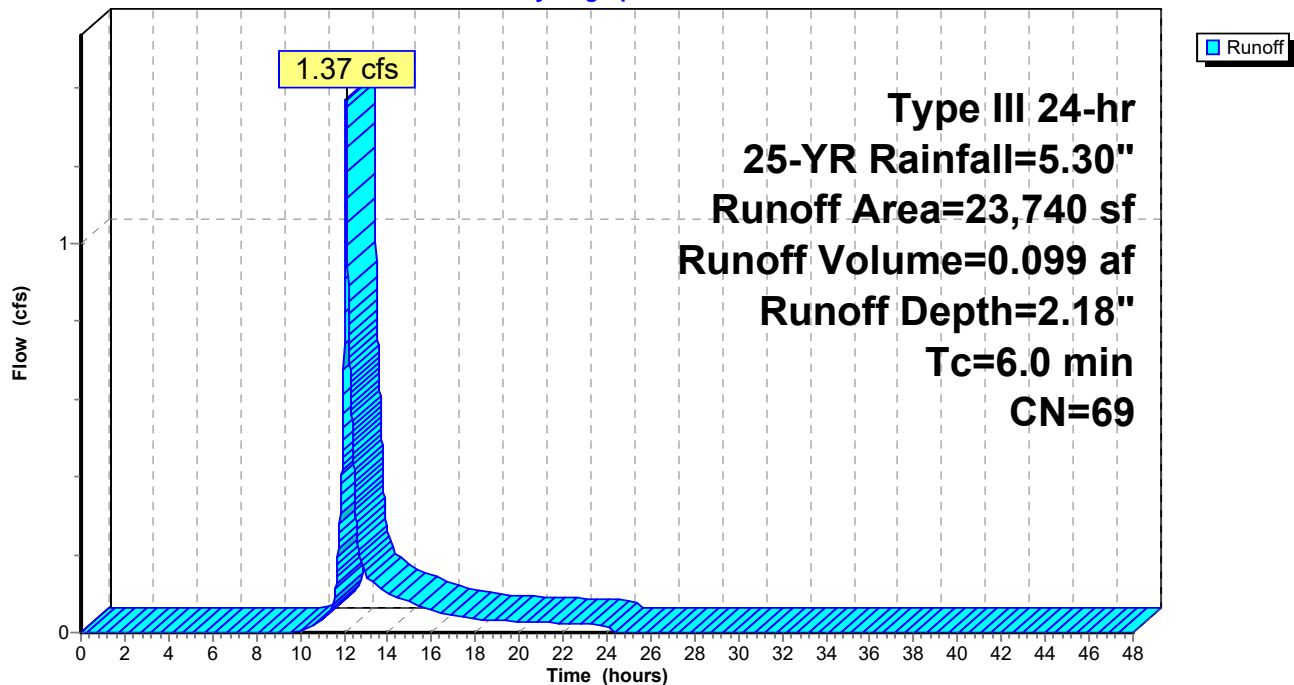
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-YR Rainfall=5.30"

	Area (sf)	CN	Description
*	18,426	61	G+RG: >75% Grass cover, Good, HSG B
*	5,314	98	
	23,740	69	Weighted Average
	18,426		77.62% Pervious Area
	5,314		22.38% Impervious Area

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

Subcatchment 11S:

Hydrograph



Summary for Subcatchment 12S:

Runoff = 2.66 cfs @ 12.12 hrs, Volume= 0.207 af, Depth= 2.97"

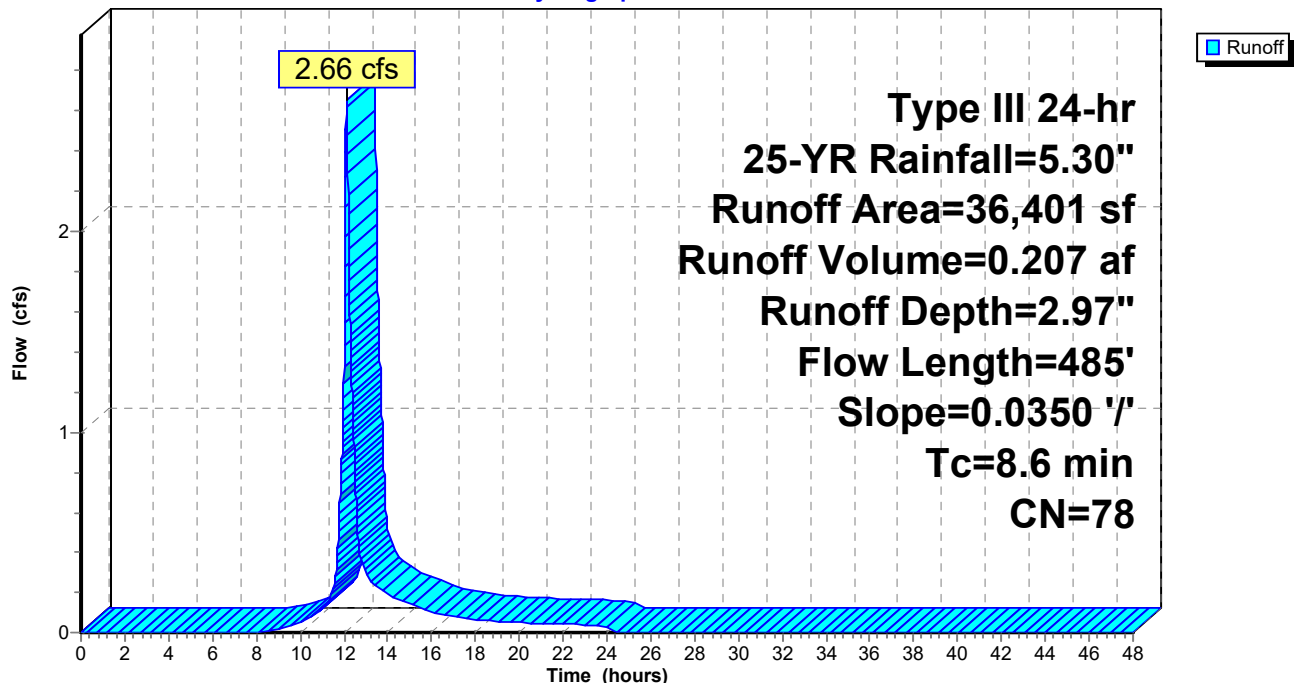
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-YR Rainfall=5.30"

	Area (sf)	CN	Description
*	5,171	74	>75% grass cover, good, HSG C
*	31,230	79	woods, fair, HSG D
	36,401	78	Weighted Average
	36,401		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.6	485	0.0350	0.94		Shallow Concentrated Flow, Woodland Kv= 5.0 fps

Subcatchment 12S:

Hydrograph



Summary for Subcatchment 13S:

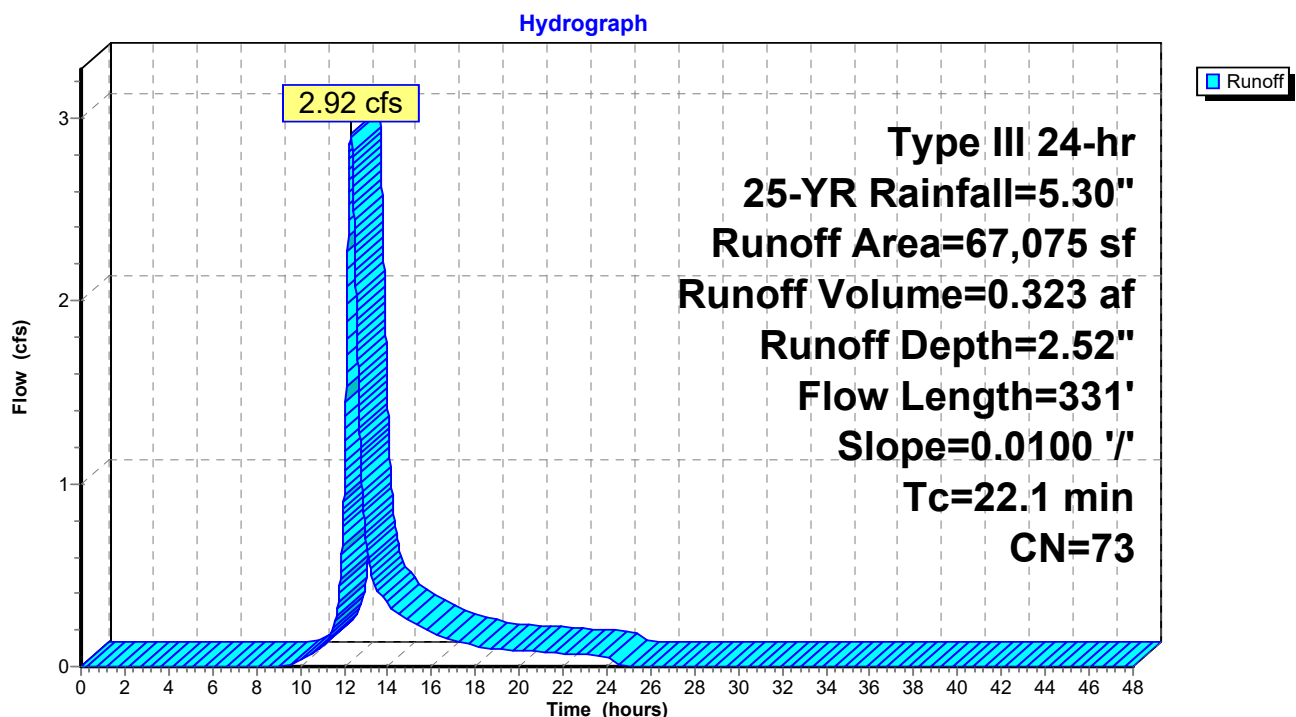
Runoff = 2.92 cfs @ 12.31 hrs, Volume= 0.323 af, Depth= 2.52"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-YR Rainfall=5.30"

	Area (sf)	CN	Description
*	56,685	73	woods, fair, HSG C
*	10,390	74	>75% grass cover, good, HSG C
	67,075	73	Weighted Average
	67,075		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.1	331	0.0100	0.25		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps

Subcatchment 13S:



Summary for Subcatchment 14S:

Runoff = 2.62 cfs @ 12.02 hrs, Volume= 0.159 af, Depth= 2.43"

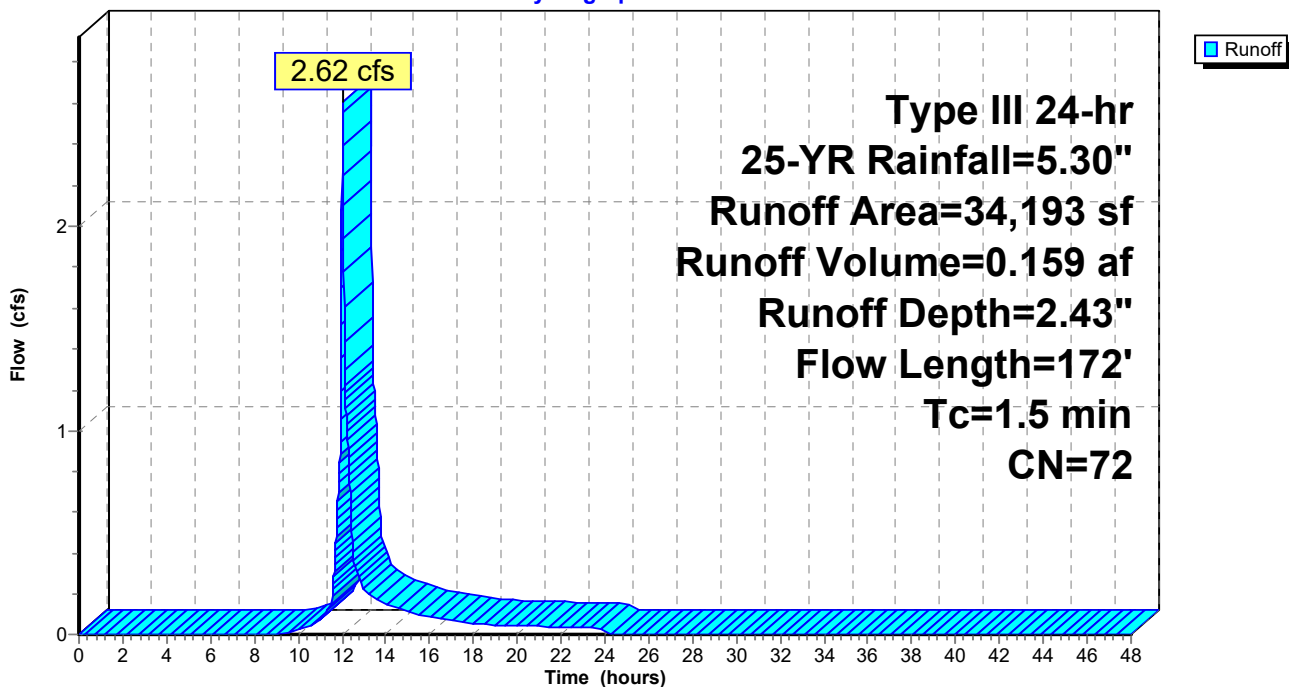
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-YR Rainfall=5.30"

	Area (sf)	CN	Description
*	23,718	61	>75% grass cover, good, HSG B
*	9,784	98	
*	691	60	woods, fair, HSG B
	34,193	72	Weighted Average
	24,409		71.39% Pervious Area
	9,784		28.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	47	0.1000	2.18		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
1.1	125	0.0700	1.85		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.5	172	Total			

Subcatchment 14S:

Hydrograph



Summary for Subcatchment 15S:

Runoff = 0.62 cfs @ 13.43 hrs, Volume= 0.162 af, Depth= 2.52"

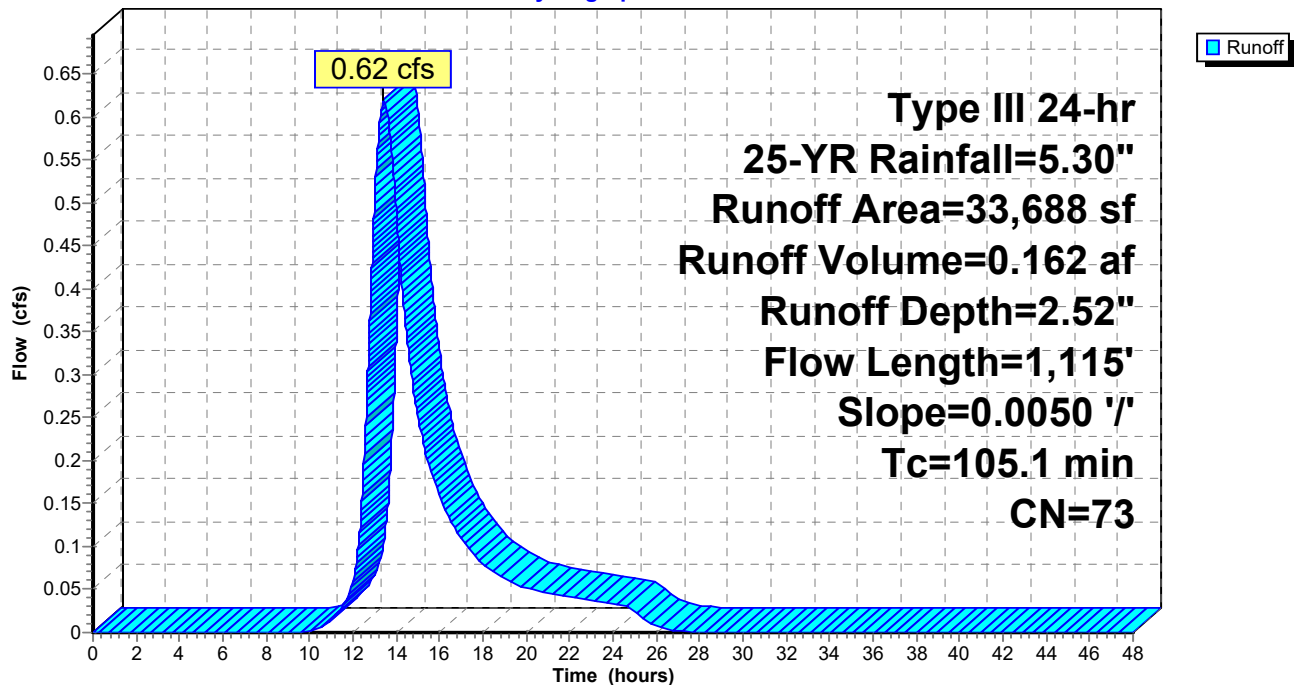
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-YR Rainfall=5.30"

	Area (sf)	CN	Description
*	30,286	73	woods, fair, HSG C
*	3,402	74	>75% grass cover, good, HSG C
	33,688	73	Weighted Average
	33,688		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
105.1	1,115	0.0050	0.18		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps

Subcatchment 15S:

Hydrograph



Summary for Subcatchment 16S:

Runoff = 0.56 cfs @ 12.08 hrs, Volume= 0.045 af, Depth= 5.06"

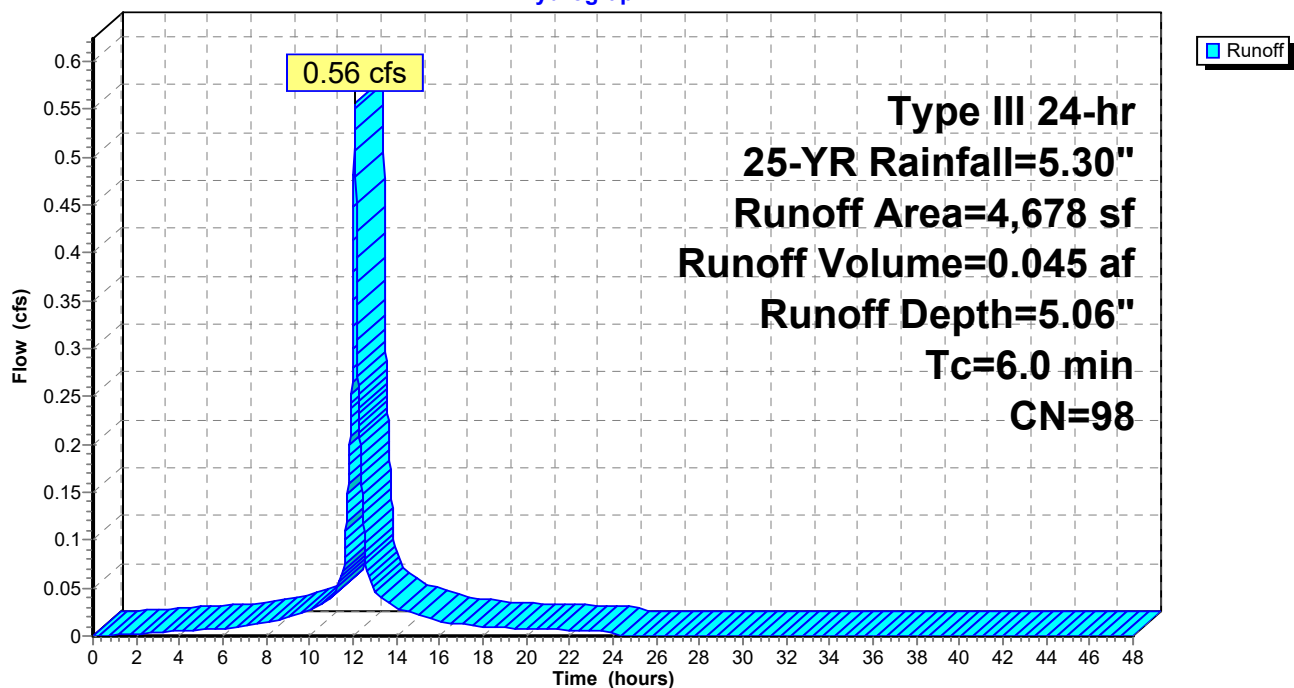
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-YR Rainfall=5.30"

Area (sf)	CN	Description
* 4,678	98	
4,678		100.00% Impervious Area

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

Subcatchment 16S:

Hydrograph



Summary for Subcatchment CUL: (new Subcat)

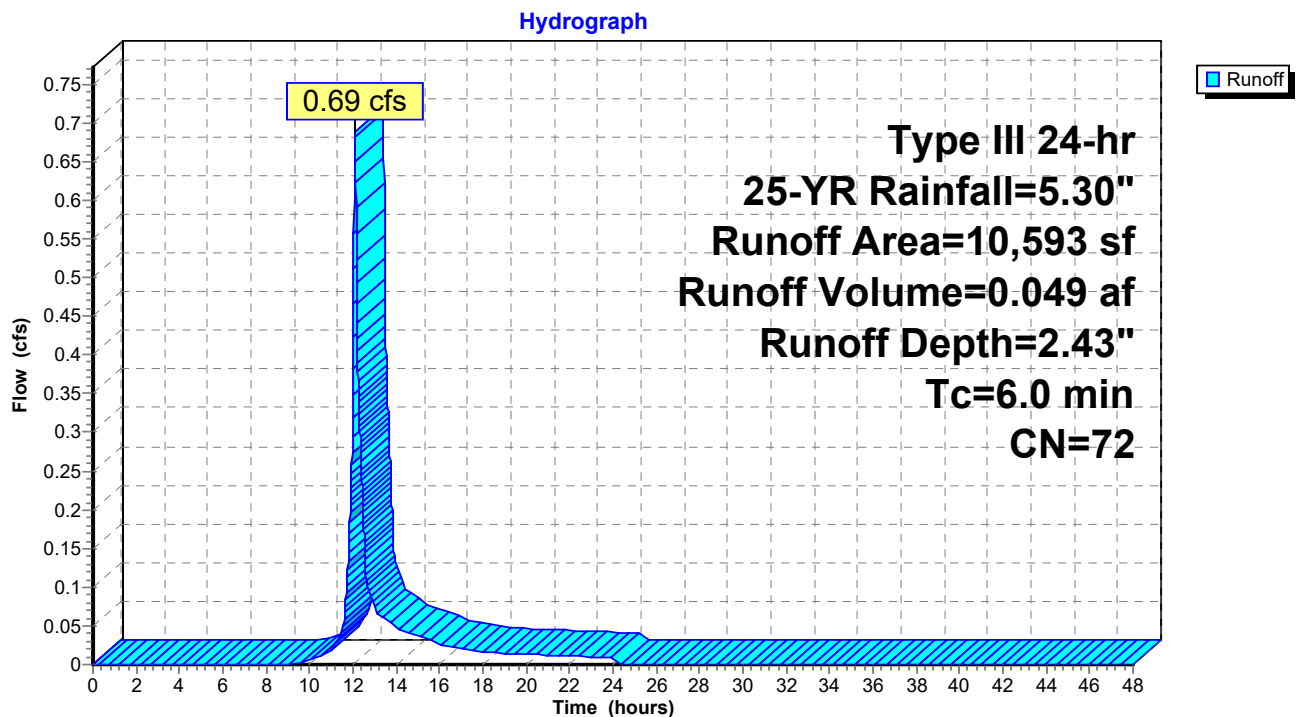
Runoff = 0.69 cfs @ 12.09 hrs, Volume= 0.049 af, Depth= 2.43"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-YR Rainfall=5.30"

	Area (sf)	CN	Description
*	3,132	98	
*	7,461	61	G+RG: >75% grass cover, good, HSG B
	10,593	72	Weighted Average
	7,461		70.43% Pervious Area
	3,132		29.57% Impervious Area

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

Subcatchment CUL: (new Subcat)



Summary for Subcatchment P1:

Runoff = 3.47 cfs @ 12.18 hrs, Volume= 0.322 af, Depth= 1.70"

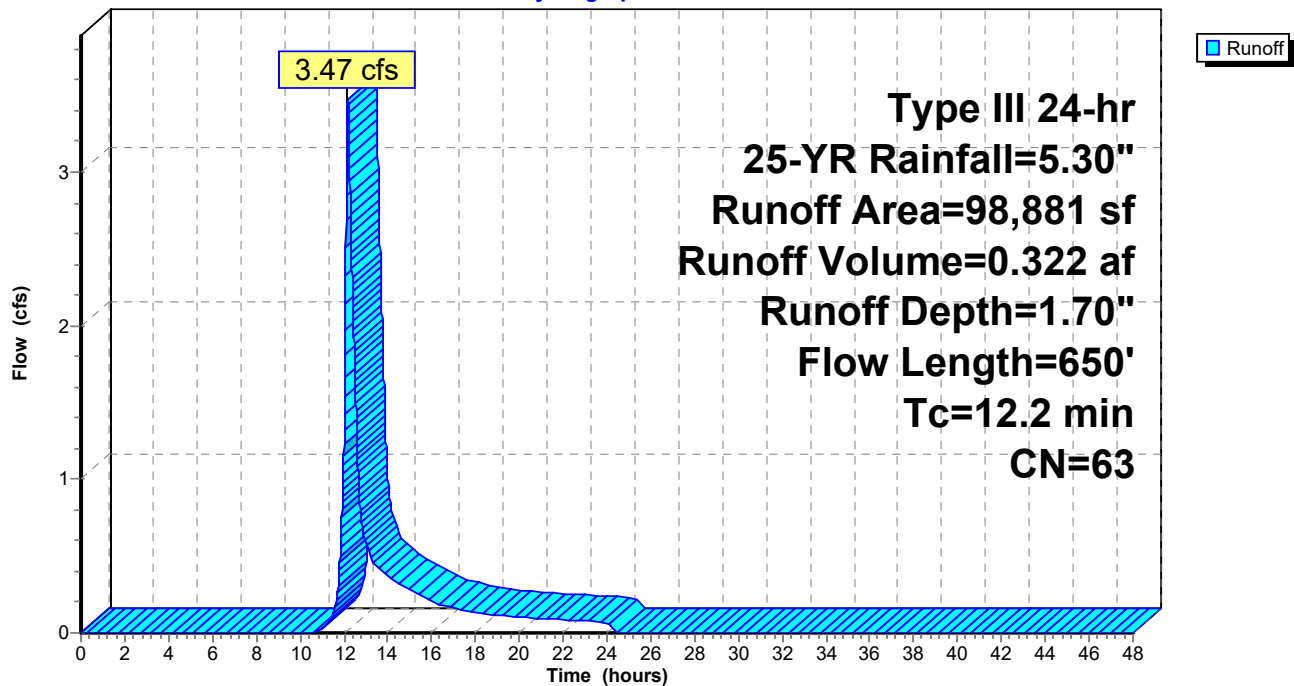
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-YR Rainfall=5.30"

Area (sf)	CN	Description
93,901	61	>75% Grass cover, Good, HSG B
* 4,980	98	impervious
98,881	63	Weighted Average
93,901		94.96% Pervious Area
4,980		5.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	50	0.0700	0.11		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.00"
4.5	600	0.1010	2.22		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
12.2	650	Total			

Subcatchment P1:

Hydrograph



Summary for Subcatchment P2:

Runoff = 0.38 cfs @ 12.13 hrs, Volume= 0.032 af, Depth= 1.55"

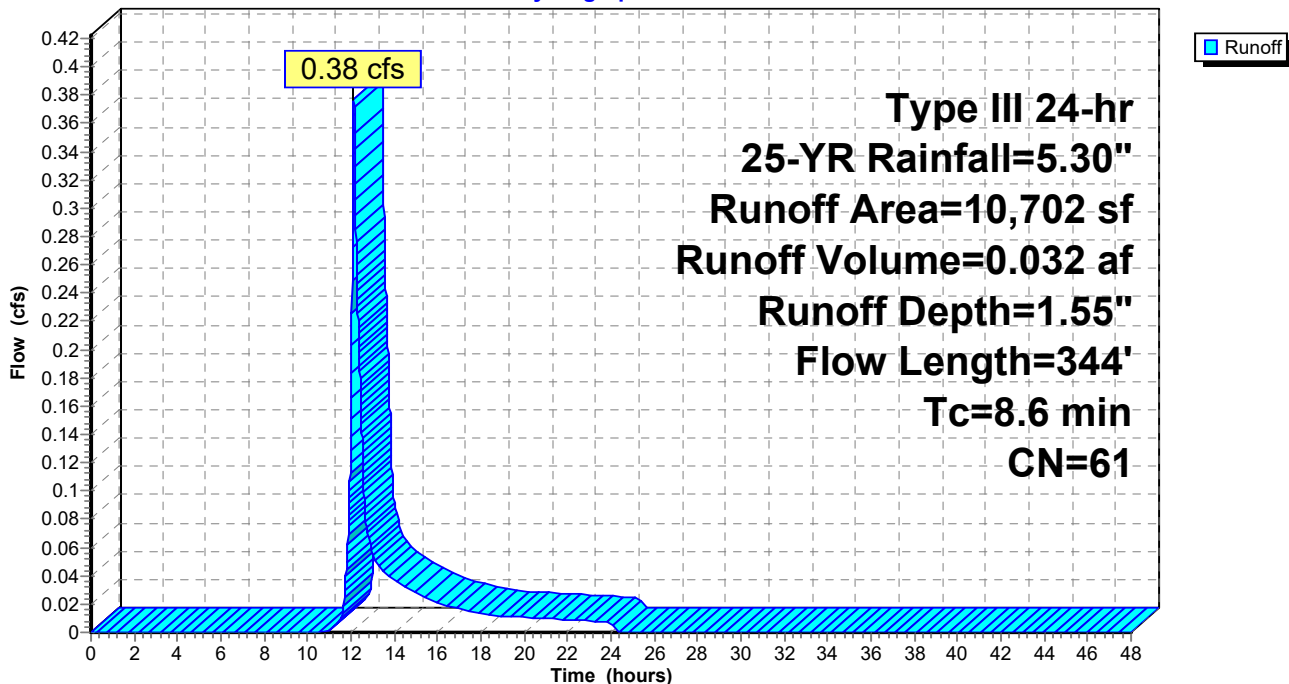
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-YR Rainfall=5.30"

Area (sf)	CN	Description
* 10,702	61	G+RG: >75% Grass cover, Good, HSG B
10,702		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	50	0.1000	0.12		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.00"
1.0	138	0.2200	2.35		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.9	156	0.1700	2.89		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
8.6	344	Total			

Subcatchment P2:

Hydrograph



Summary for Subcatchment S1:

Runoff = 0.18 cfs @ 12.08 hrs, Volume= 0.015 af, Depth= 4.95"

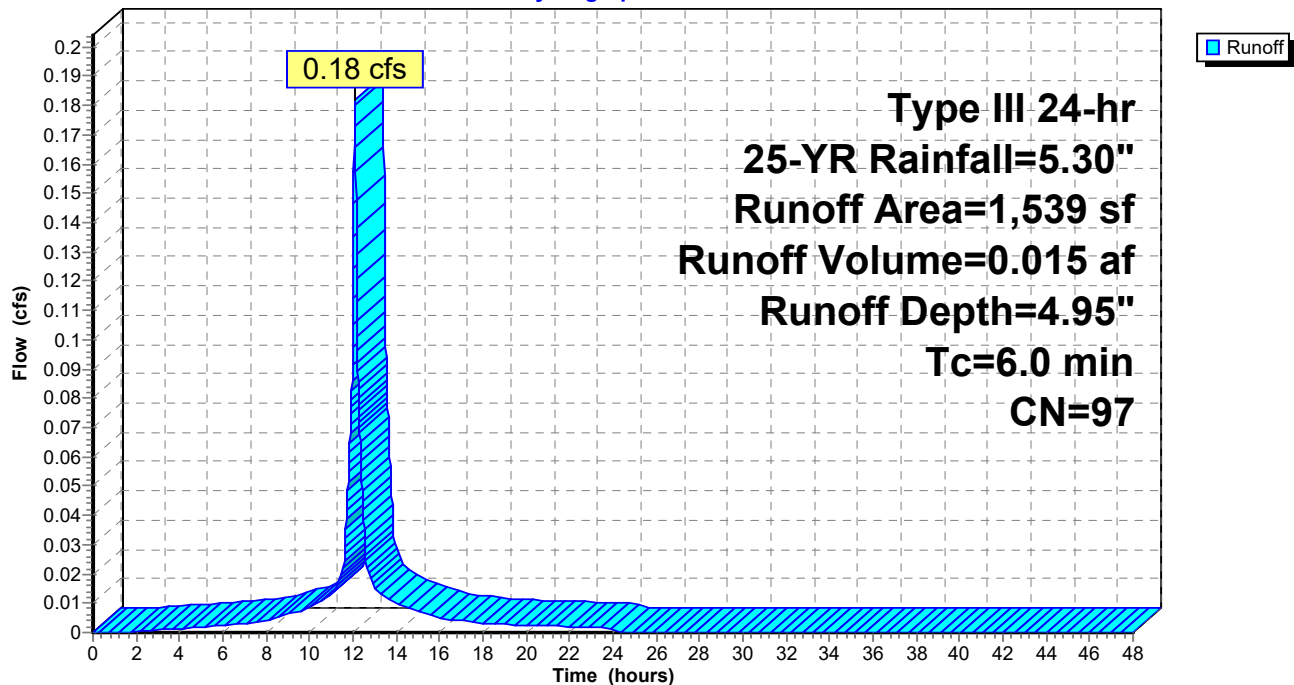
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-YR Rainfall=5.30"

Area (sf)	CN	Description
61	61	>75% Grass cover, Good, HSG B
* 1,478	98	
1,539	97	Weighted Average
61		3.96% Pervious Area
1,478		96.04% Impervious Area

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

Subcatchment S1:

Hydrograph



Summary for Subcatchment S10:

Runoff = 0.14 cfs @ 12.09 hrs, Volume= 0.010 af, Depth= 2.43"

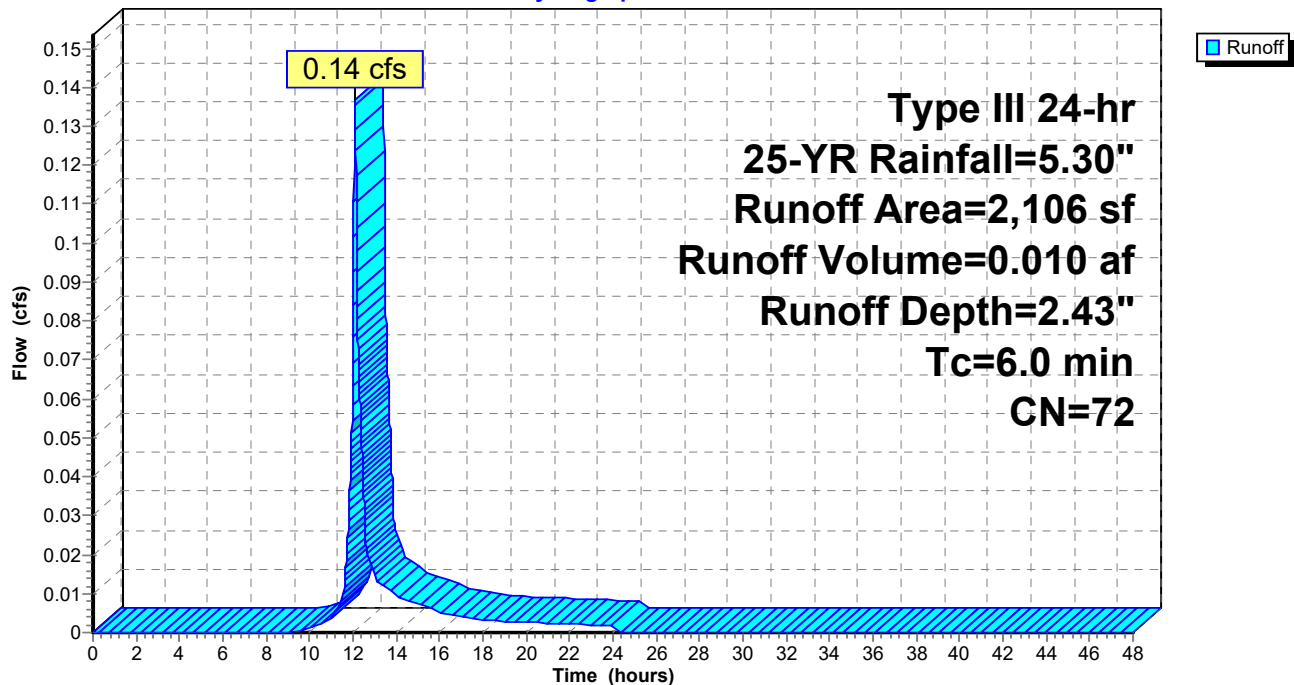
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-YR Rainfall=5.30"

	Area (sf)	CN	Description
*	1,456	61	G+RG: >75% Grass cover, Good, HSG B
*	650	98	
	2,106	72	Weighted Average
	1,456		69.14% Pervious Area
	650		30.86% Impervious Area

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

Subcatchment S10:

Hydrograph



Summary for Subcatchment S11:

Runoff = 0.18 cfs @ 12.09 hrs, Volume= 0.013 af, Depth= 3.55"

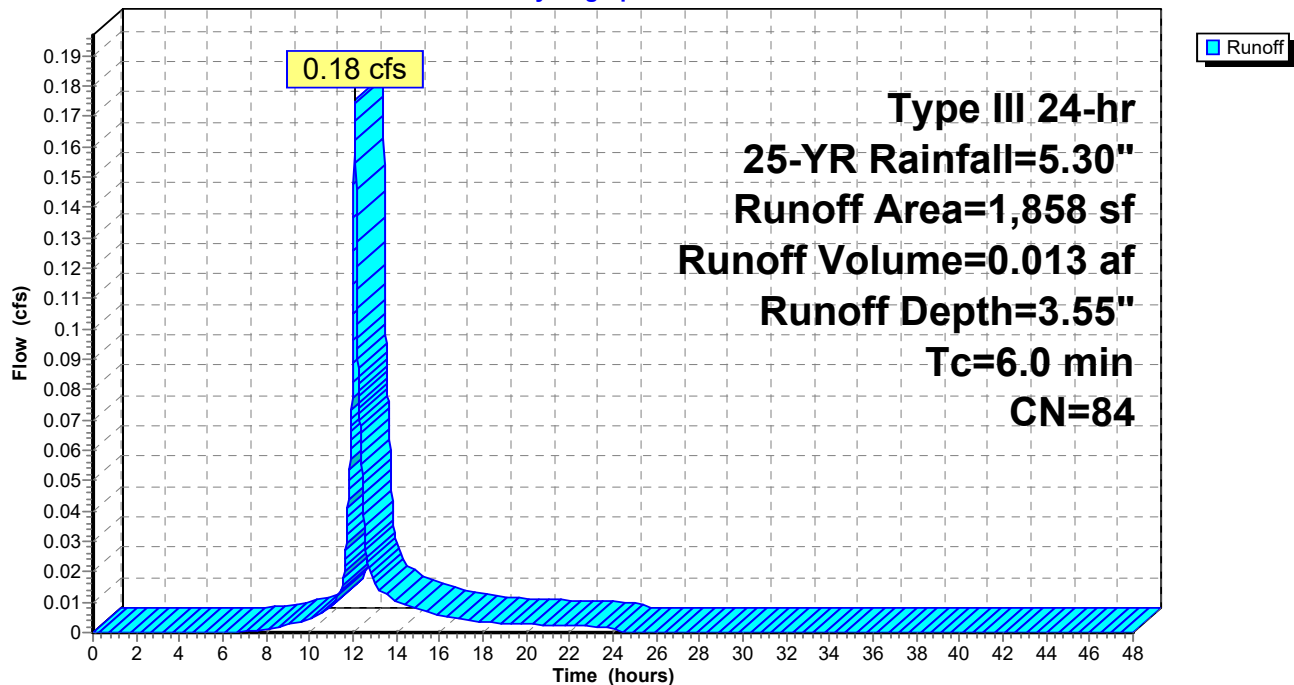
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-YR Rainfall=5.30"

	Area (sf)	CN	Description
*	694	61	G+RG: >75% Grass cover, Good, HSG B
*	1,164	98	
	1,858	84	Weighted Average
	694		37.35% Pervious Area
	1,164		62.65% Impervious Area

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

Subcatchment S11:

Hydrograph



Summary for Subcatchment S12:

Runoff = 0.56 cfs @ 12.09 hrs, Volume= 0.040 af, Depth= 2.26"

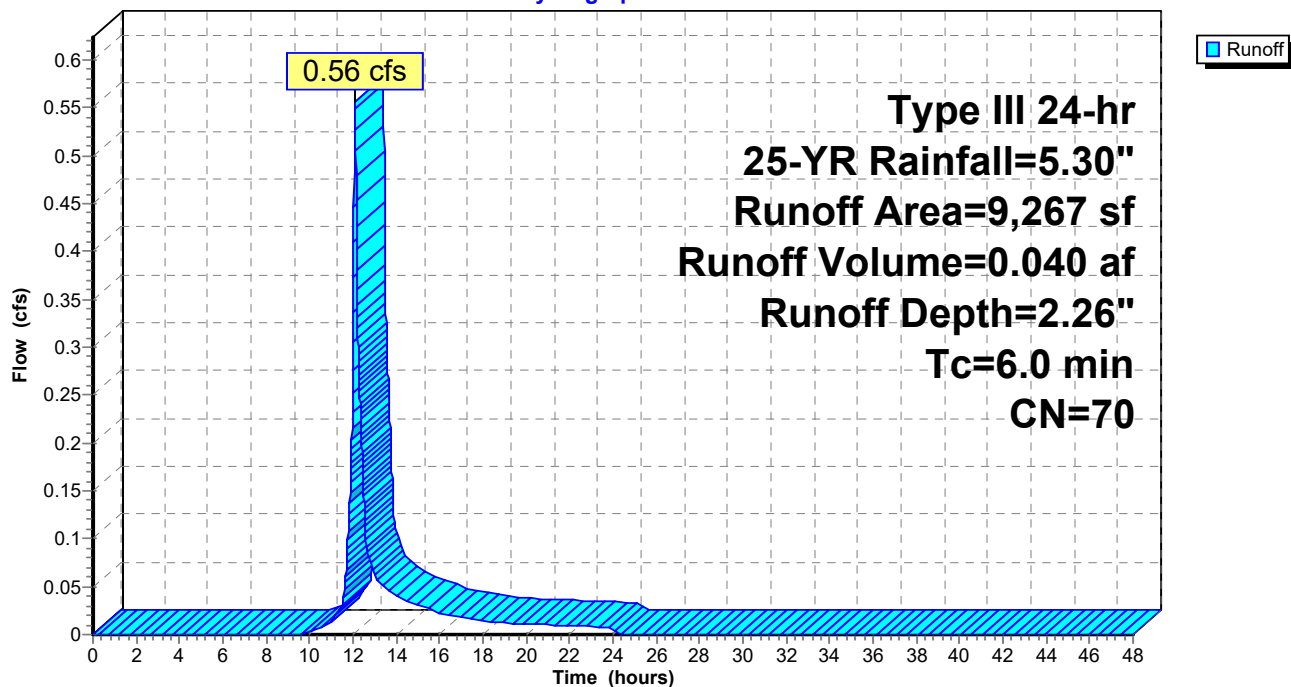
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-YR Rainfall=5.30"

	Area (sf)	CN	Description
*	2,175	98	
*	7,092	61	G+RG: >75% Grass cover, Good, HSG B
	9,267	70	Weighted Average
	7,092		76.53% Pervious Area
	2,175		23.47% Impervious Area

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

Subcatchment S12:

Hydrograph



Summary for Subcatchment S13:

Runoff = 0.38 cfs @ 12.09 hrs, Volume= 0.027 af, Depth= 3.25"

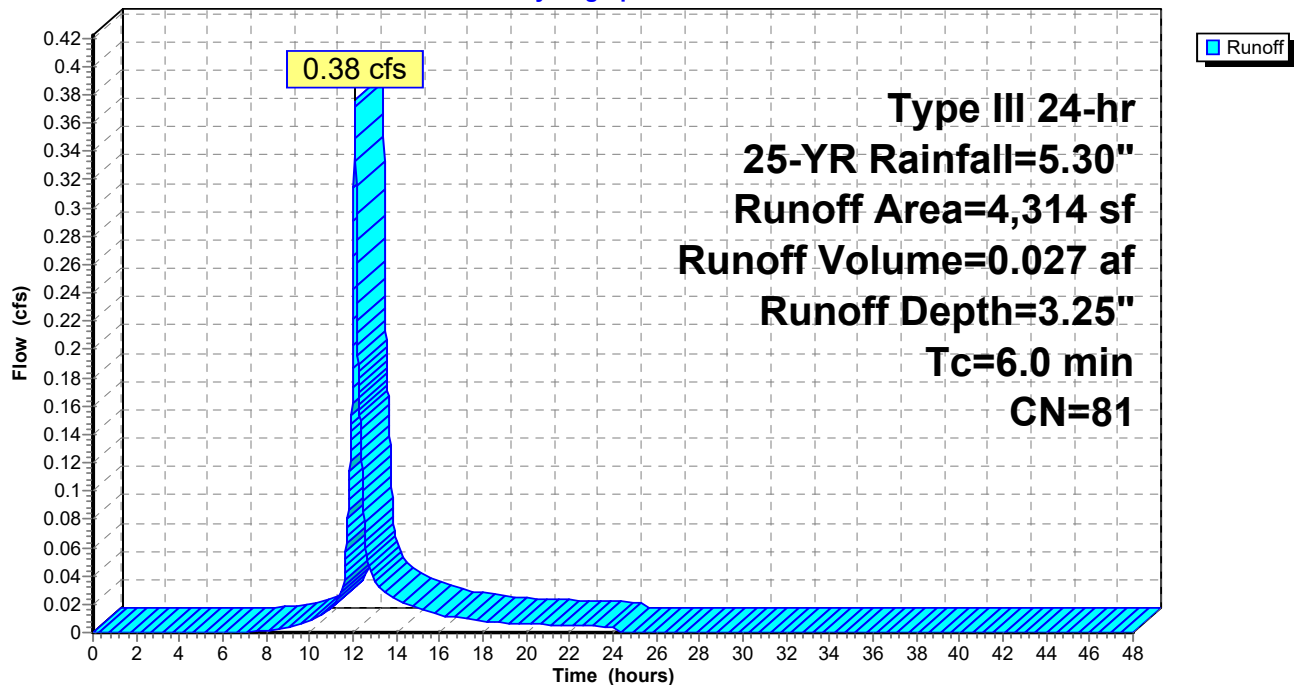
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-YR Rainfall=5.30"

	Area (sf)	CN	Description
*	2,314	98	
	2,000	61	>75% Grass cover, Good, HSG B
	4,314	81	Weighted Average
	2,000		46.36% Pervious Area
	2,314		53.64% Impervious Area

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

Subcatchment S13:

Hydrograph



Summary for Subcatchment S14:

Runoff = 0.23 cfs @ 12.09 hrs, Volume= 0.017 af, Depth= 3.65"

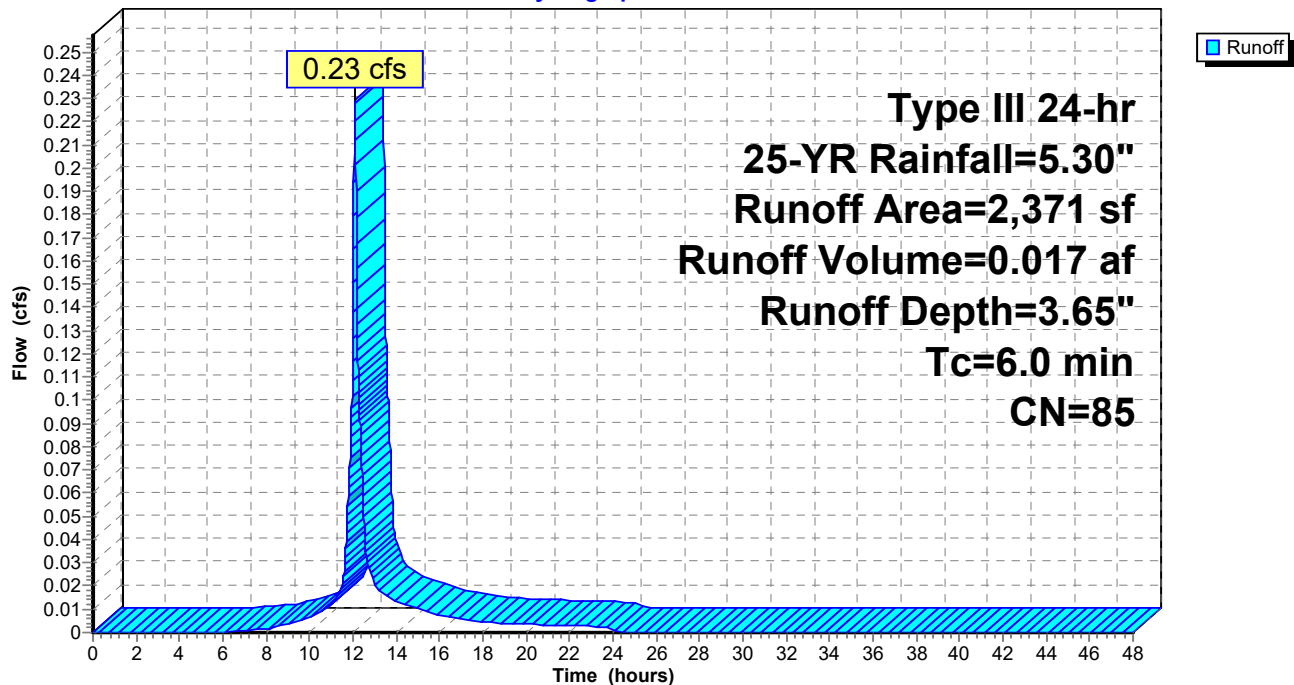
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-YR Rainfall=5.30"

	Area (sf)	CN	Description
*	1,518	98	
*	853	61	G+RG: >75% Grass cover, Good, HSG B
	2,371	85	Weighted Average
	853		35.98% Pervious Area
	1,518		64.02% Impervious Area

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

Subcatchment S14:

Hydrograph



Summary for Subcatchment S15:

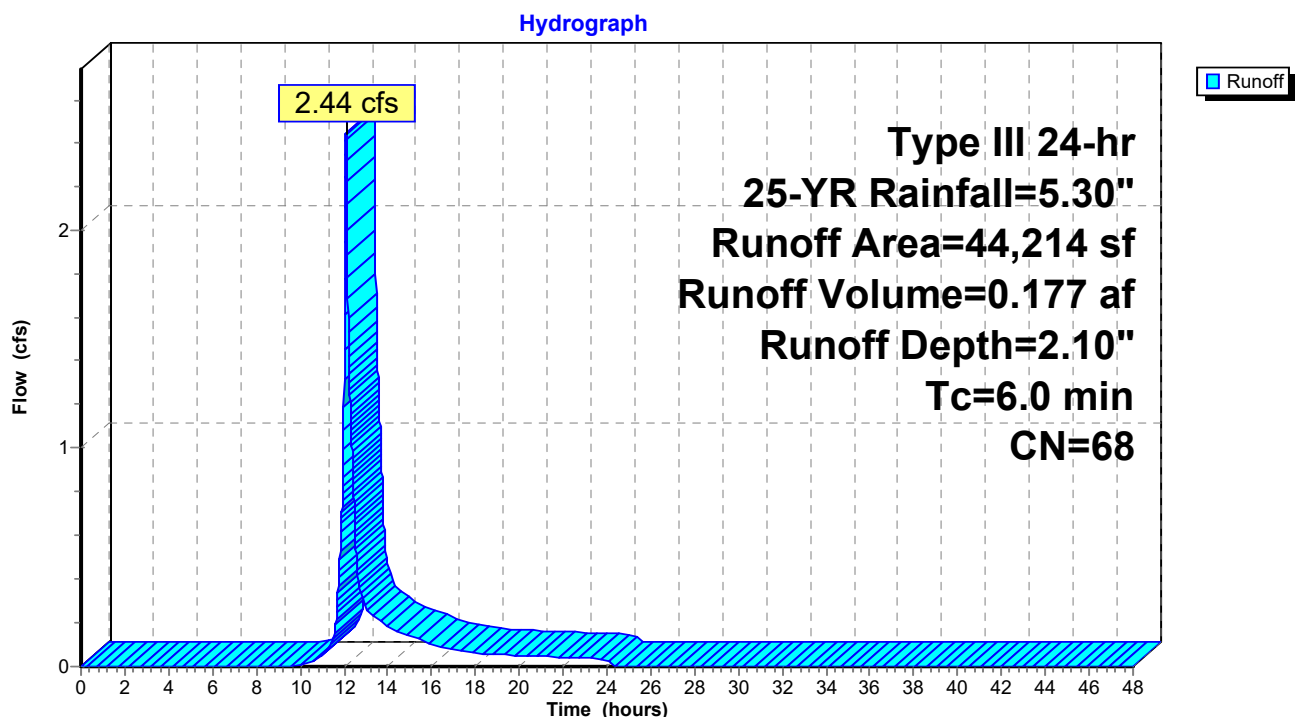
Runoff = 2.44 cfs @ 12.09 hrs, Volume= 0.177 af, Depth= 2.10"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-YR Rainfall=5.30"

	Area (sf)	CN	Description
*	8,653	98	
*	35,561	61	G+RG: >75% Grass cover, Good, HSG B
	44,214	68	Weighted Average
	35,561		80.43% Pervious Area
	8,653		19.57% Impervious Area

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

Subcatchment S15:



Summary for Subcatchment S19:

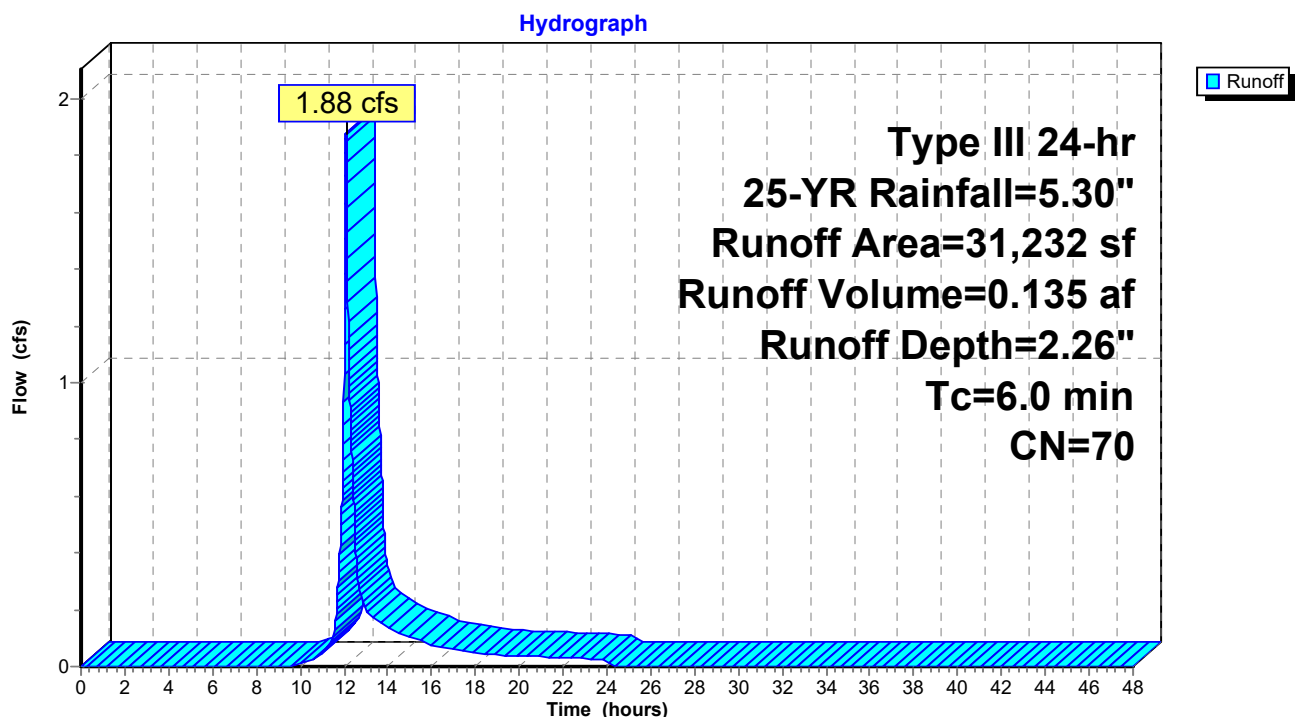
Runoff = 1.88 cfs @ 12.09 hrs, Volume= 0.135 af, Depth= 2.26"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-YR Rainfall=5.30"

	Area (sf)	CN	Description
*	7,316	98	
	23,916	61	>75% Grass cover, Good, HSG B
	31,232	70	Weighted Average
	23,916		76.58% Pervious Area
	7,316		23.42% Impervious Area

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

Subcatchment S19:



Summary for Subcatchment S2:

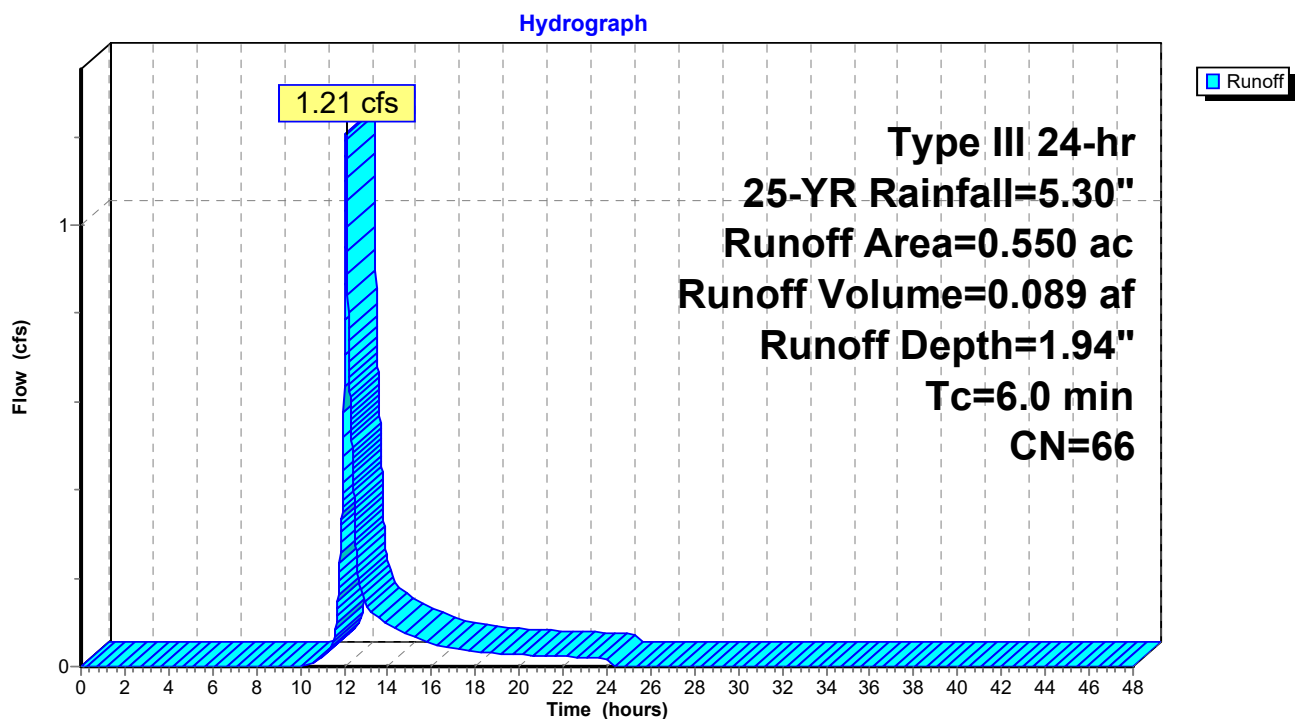
Runoff = 1.21 cfs @ 12.09 hrs, Volume= 0.089 af, Depth= 1.94"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-YR Rainfall=5.30"

Area (ac)	CN	Description
0.480	61	>75% Grass cover, Good, HSG B
0.070	98	
0.550	66	Weighted Average
0.480		87.27% Pervious Area
0.070		12.73% Impervious Area

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

Subcatchment S2:



Summary for Subcatchment S20:

Runoff = 0.45 cfs @ 12.10 hrs, Volume= 0.034 af, Depth= 1.55"

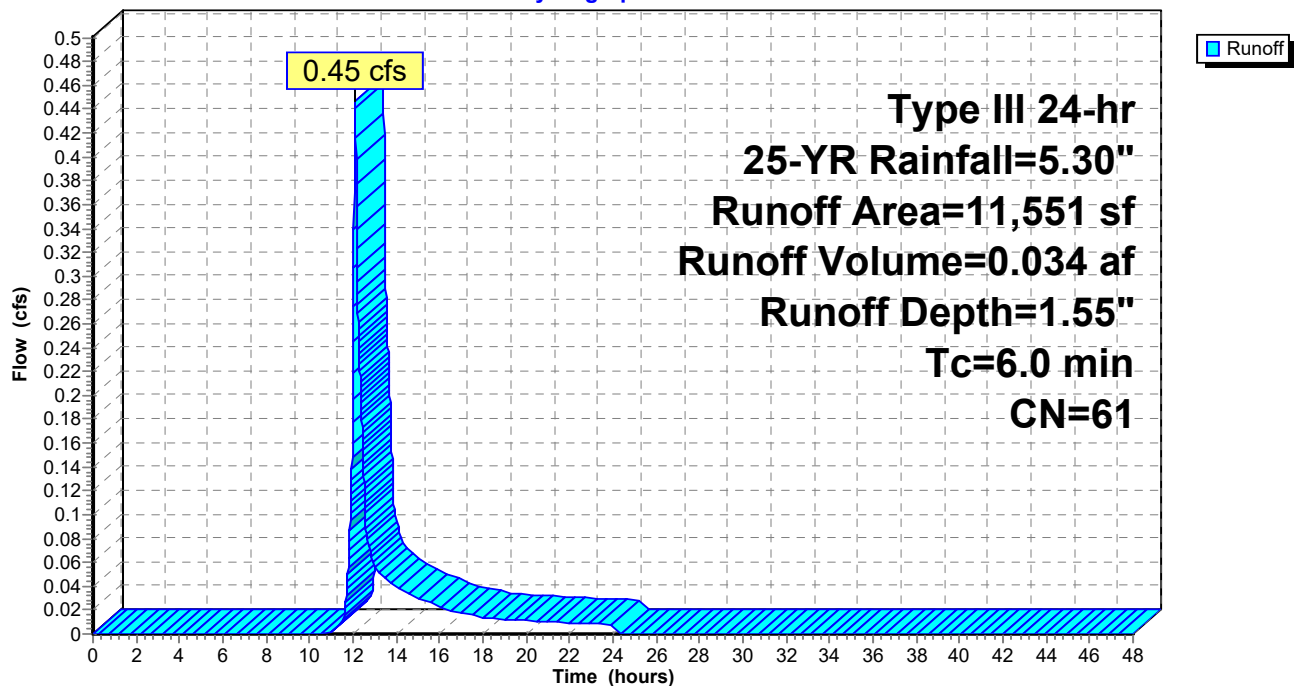
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-YR Rainfall=5.30"

Area (sf)	CN	Description
* 11,551	61	G+RG: >75% Grass cover, Good, HSG B
11,551		100.00% Pervious Area

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

Subcatchment S20:

Hydrograph



Summary for Subcatchment S21:

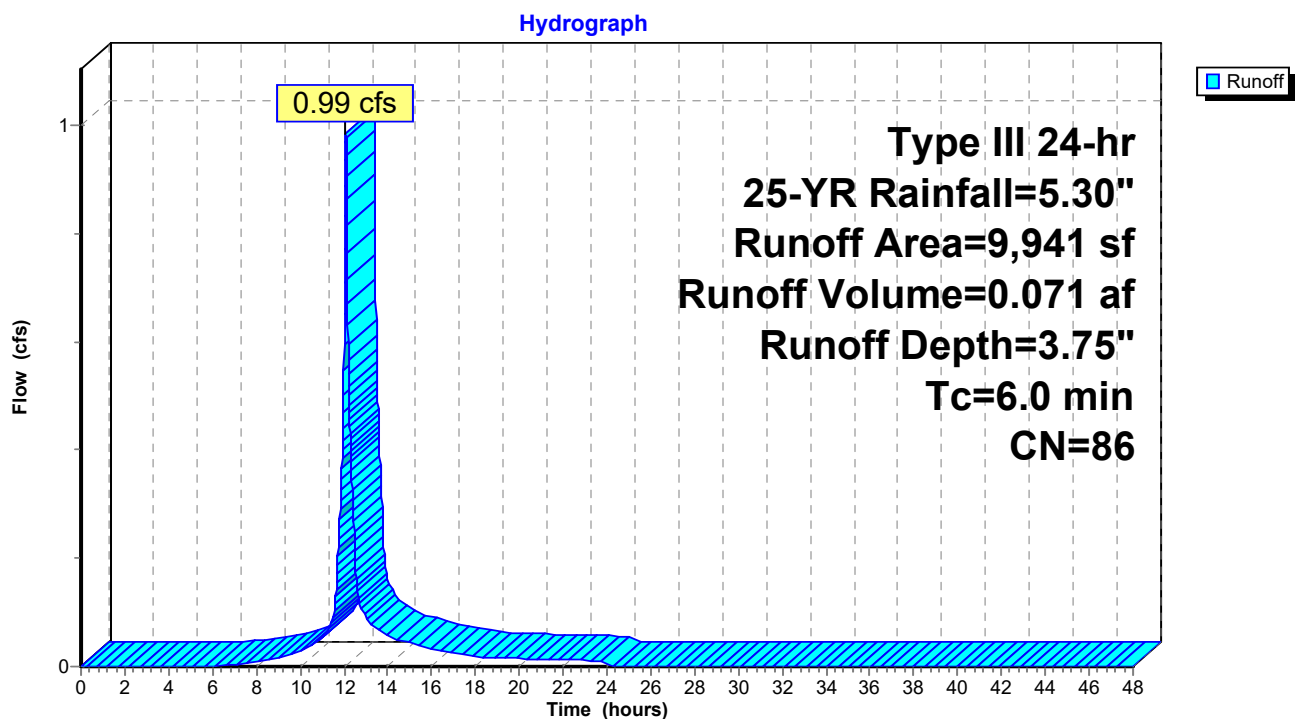
Runoff = 0.99 cfs @ 12.09 hrs, Volume= 0.071 af, Depth= 3.75"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-YR Rainfall=5.30"

	Area (sf)	CN	Description
*	6,755	98	
*	3,186	61	G+RG: >75% Grass cover, Good, HSG B
	9,941	86	Weighted Average
	3,186		32.05% Pervious Area
	6,755		67.95% Impervious Area

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

Subcatchment S21:



Summary for Subcatchment S22: Stow Road South

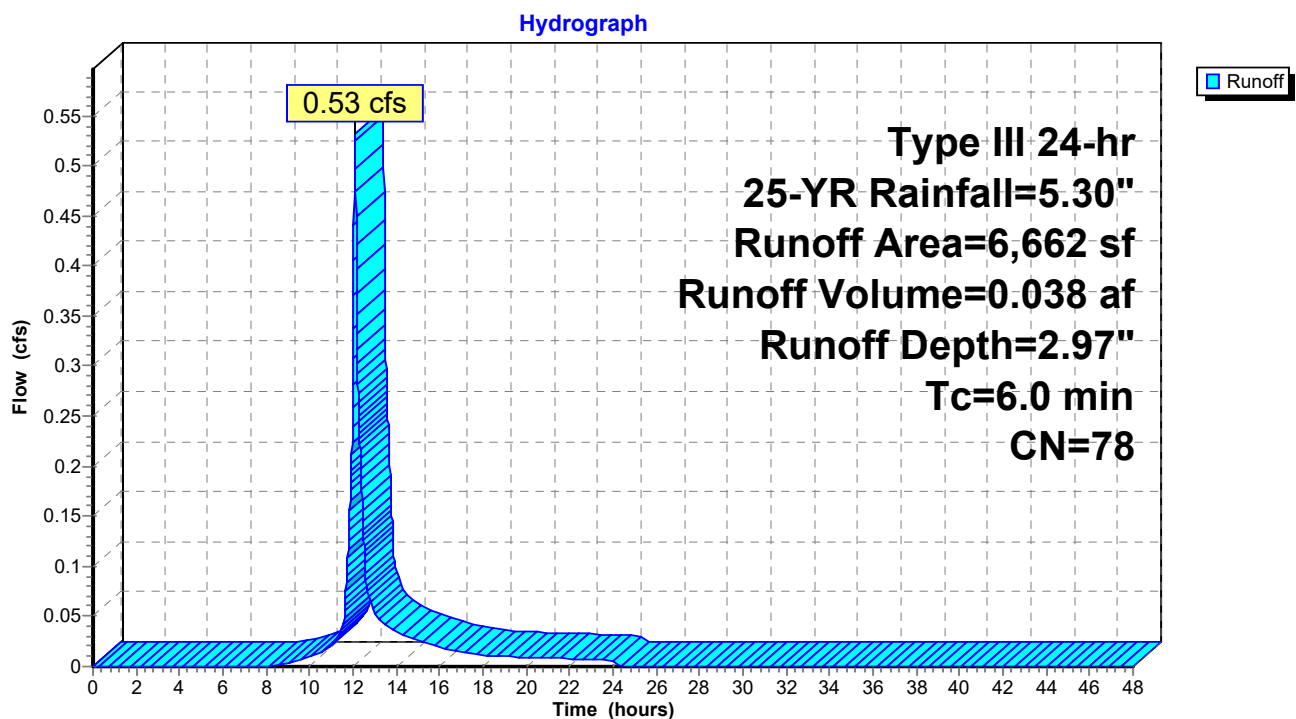
Runoff = 0.53 cfs @ 12.09 hrs, Volume= 0.038 af, Depth= 2.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-YR Rainfall=5.30"

	Area (sf)	CN	Description
*	5,662	74	G+RG: >75% Grass cover, Good, HSG C
*	1,000	98	
	6,662	78	Weighted Average
	5,662		84.99% Pervious Area
	1,000		15.01% Impervious Area

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

Subcatchment S22: Stow Road South



Summary for Subcatchment S23: Stow Road South

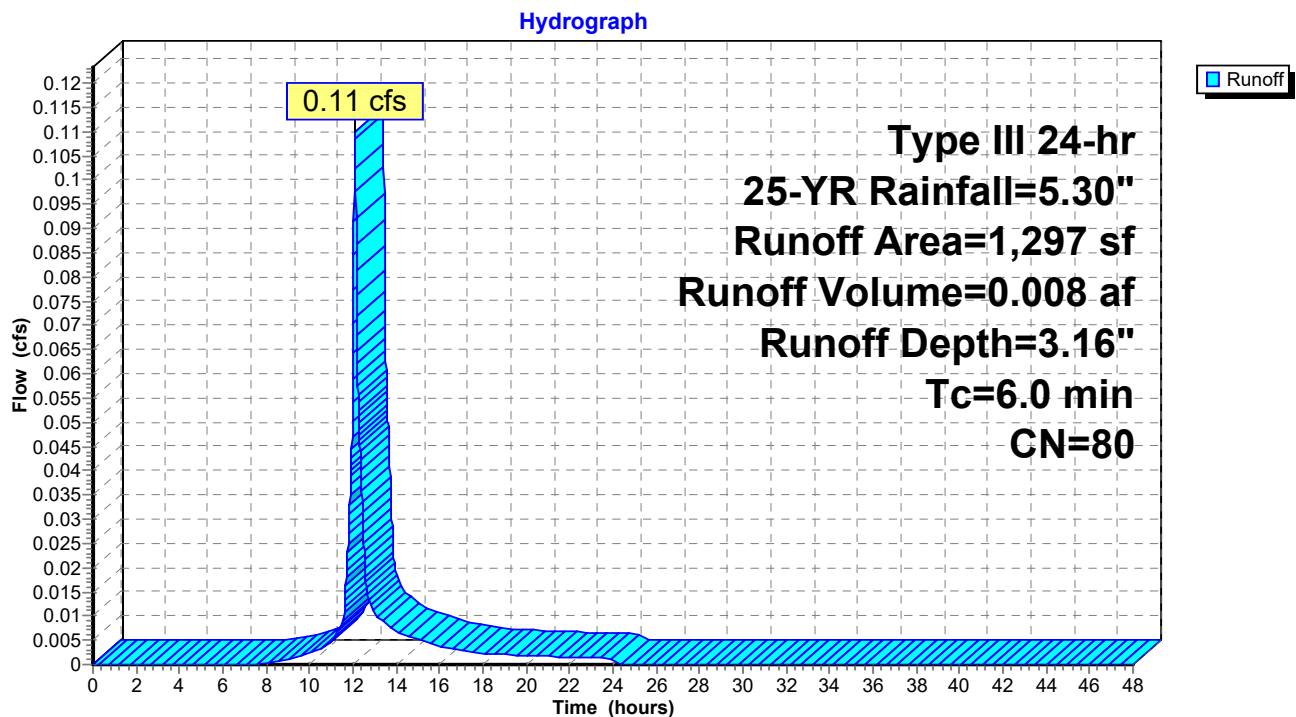
Runoff = 0.11 cfs @ 12.09 hrs, Volume= 0.008 af, Depth= 3.16"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-YR Rainfall=5.30"

	Area (sf)	CN	Description
*	994	74	G+RG: >75% Grass cover, Good, HSG C
*	303	98	
	1,297	80	Weighted Average
	994		76.64% Pervious Area
	303		23.36% Impervious Area

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

Subcatchment S23: Stow Road South



Summary for Subcatchment S3:

Runoff = 0.44 cfs @ 12.16 hrs, Volume= 0.037 af, Depth= 2.97"

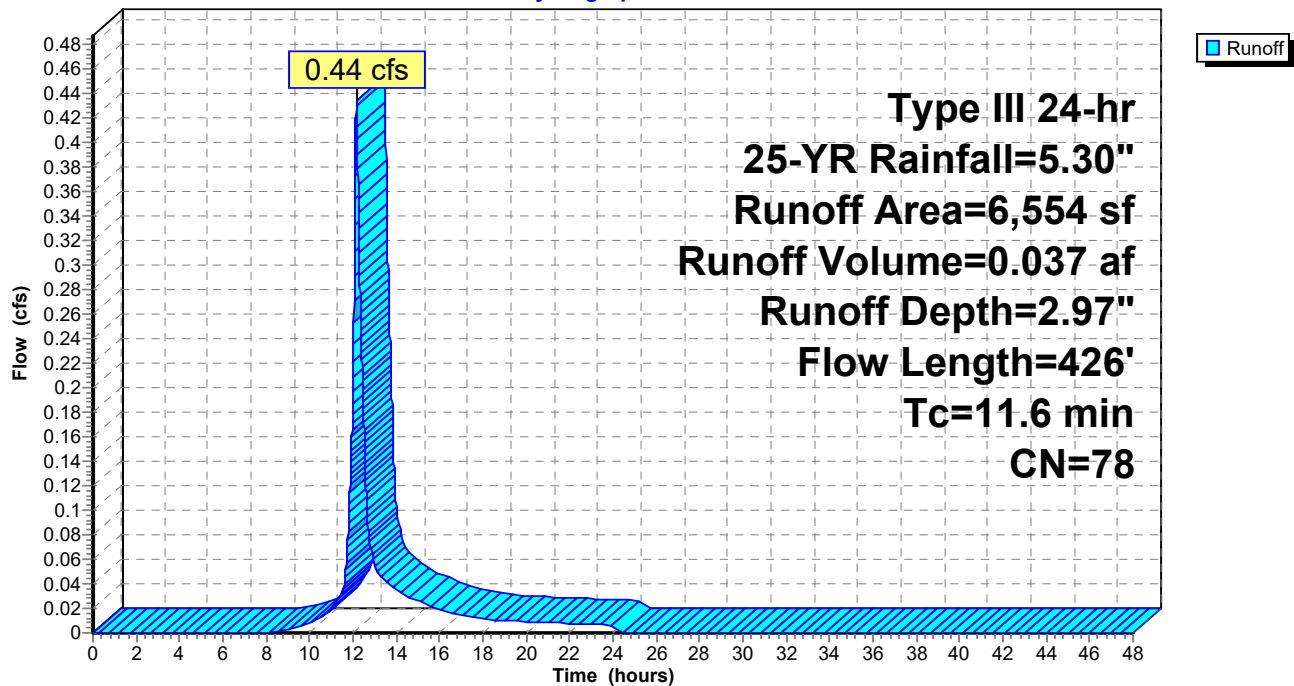
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-YR Rainfall=5.30"

	Area (sf)	CN	Description
*	3,497	61	G+RG: >75% Grass cover, Good, HSG B
*	3,057	98	
	6,554	78	Weighted Average
	3,497		53.36% Pervious Area
	3,057		46.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	50	0.0600	0.22		Sheet Flow, Grass: Short n= 0.150 P2= 3.00"
7.9	376	0.0130	0.80		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
11.6	426	Total			

Subcatchment S3:

Hydrograph



Summary for Subcatchment S4:

Runoff = 0.11 cfs @ 12.09 hrs, Volume= 0.008 af, Depth= 2.61"

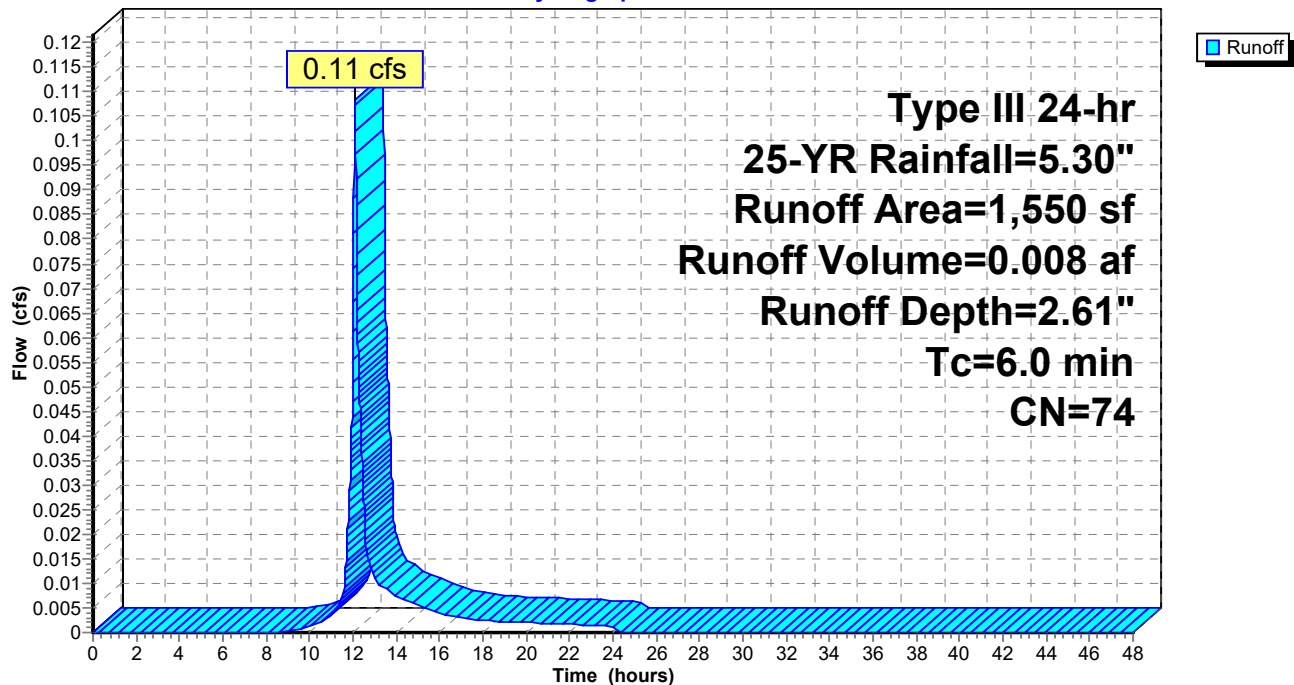
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-YR Rainfall=5.30"

Area (sf)	CN	Description
1,008	61	>75% Grass cover, Good, HSG B
* 542	98	
1,550	74	Weighted Average
1,008		65.03% Pervious Area
542		34.97% Impervious Area

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

Subcatchment S4:

Hydrograph



Summary for Subcatchment S5:

Runoff = 0.17 cfs @ 12.09 hrs, Volume= 0.012 af, Depth= 2.78"

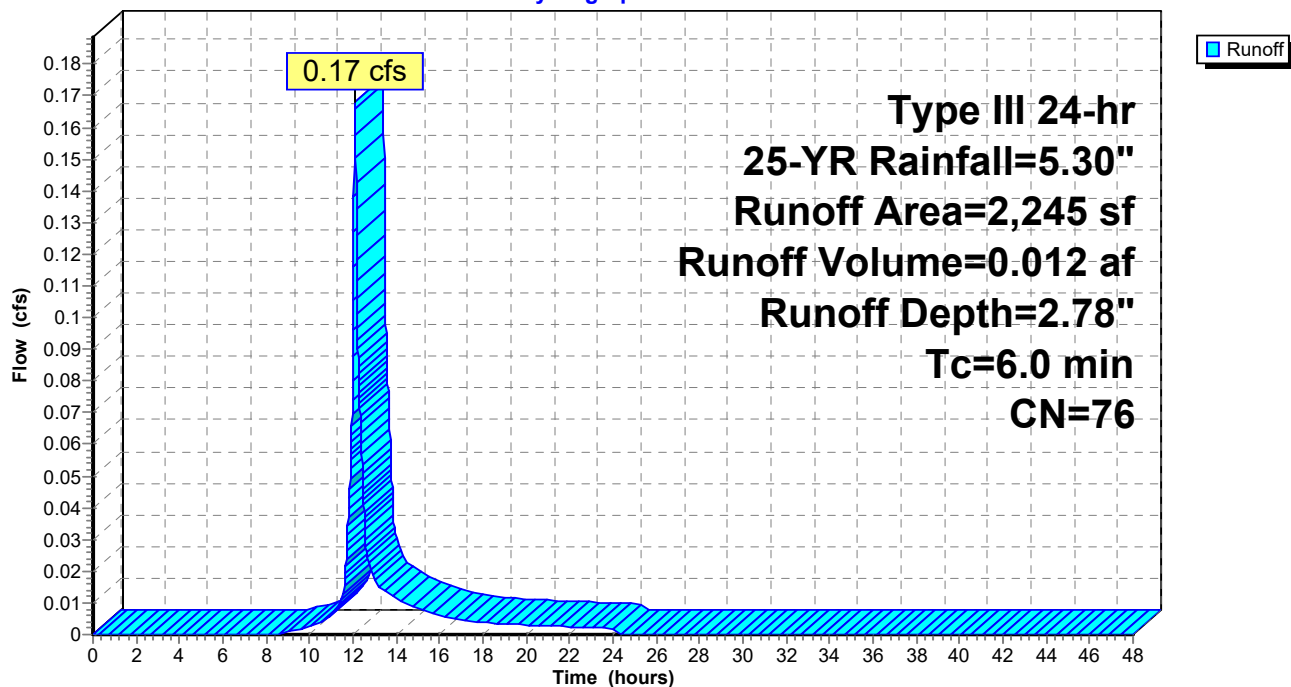
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-YR Rainfall=5.30"

	Area (sf)	CN	Description
*	1,343	61	G+RG: >75% Grass cover, Good, HSG B
*	902	98	
	2,245	76	Weighted Average
	1,343		59.82% Pervious Area
	902		40.18% Impervious Area

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

Subcatchment S5:

Hydrograph



Summary for Subcatchment SBS:

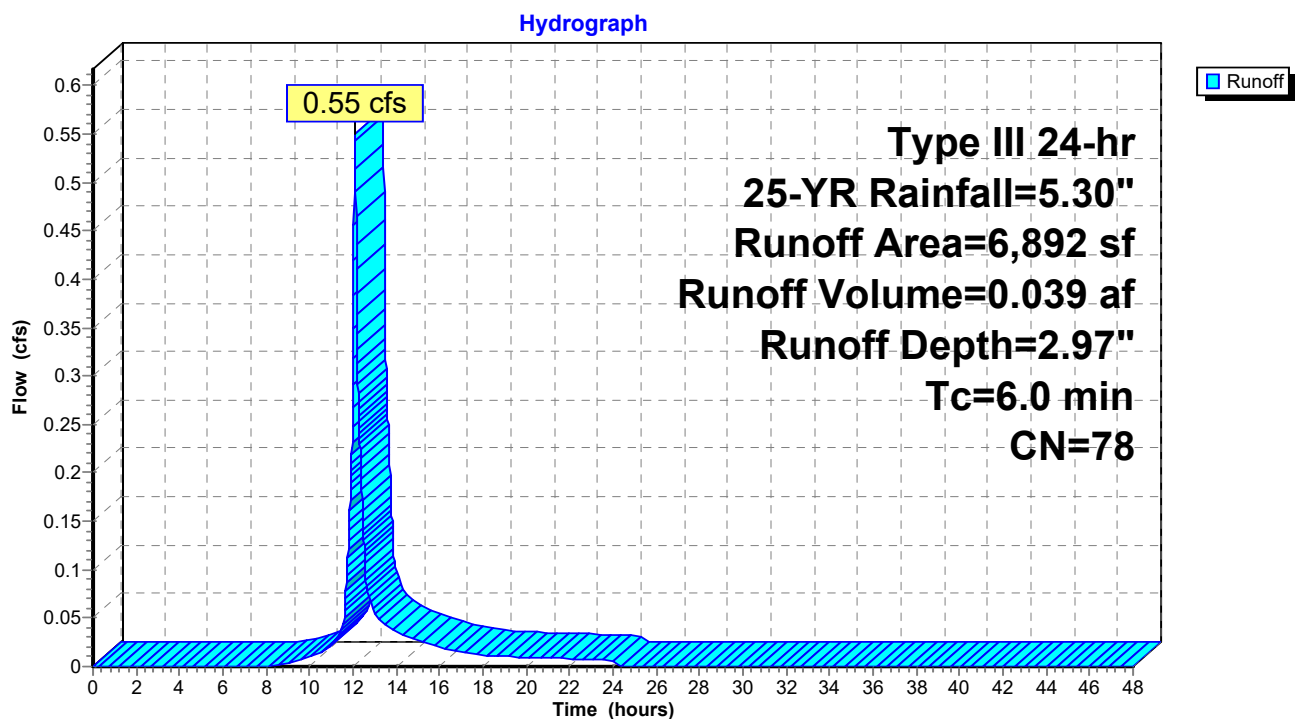
Runoff = 0.55 cfs @ 12.09 hrs, Volume= 0.039 af, Depth= 2.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-YR Rainfall=5.30"

Area (sf)	CN	Description
5,845	74	>75% Grass cover, Good, HSG C
* 1,047	98	
6,892	78	Weighted Average
5,845		84.81% Pervious Area
1,047		15.19% Impervious Area

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

Subcatchment SBS:



Summary for Reach 1R: (new Reach)

[52] Hint: Inlet/Outlet conditions not evaluated

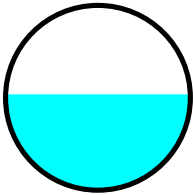
[62] Hint: Exceeded Reach PS7 OUTLET depth by 0.16' @ 12.08 hrs

Inflow Area = 0.785 ac, 28.61% Impervious, Inflow Depth = 2.43" for 25-YR event
Inflow = 2.50 cfs @ 12.06 hrs, Volume= 0.159 af
Outflow = 2.49 cfs @ 12.07 hrs, Volume= 0.159 af, Atten= 0%, Lag= 0.4 min

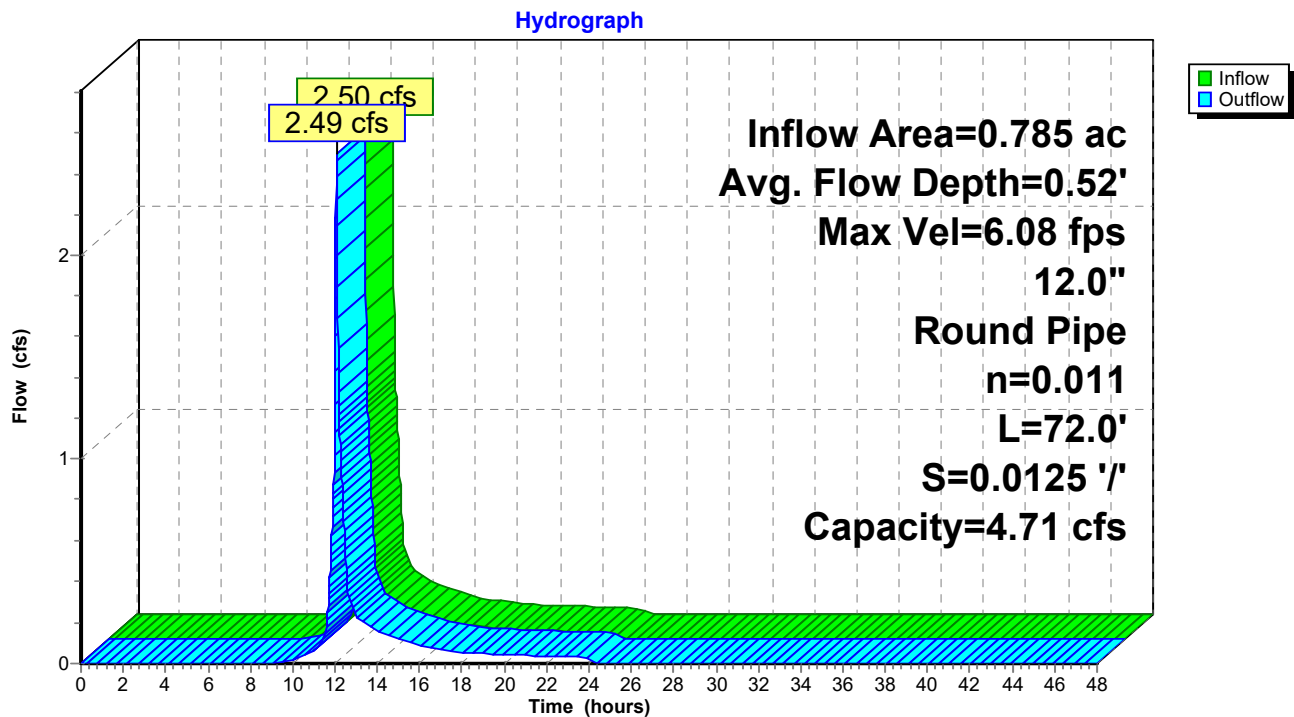
Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 6.08 fps, Min. Travel Time= 0.2 min
Avg. Velocity= 2.15 fps, Avg. Travel Time= 0.6 min

Peak Storage= 30 cf @ 12.07 hrs
Average Depth at Peak Storage= 0.52'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 4.71 cfs

12.0" Round Pipe
n= 0.011 Concrete pipe, straight & clean
Length= 72.0' Slope= 0.0125 '/'
Inlet Invert= 261.00', Outlet Invert= 260.10'



Reach 1R: (new Reach)



Summary for Reach 4R:

[52] Hint: Inlet/Outlet conditions not evaluated

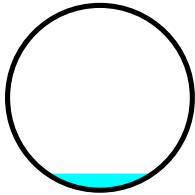
[62] Hint: Exceeded Reach PS10A OUTLET depth by 0.01' @ 23.84 hrs

Inflow Area = 0.035 ac, 96.04% Impervious, Inflow Depth = 4.95" for 25-YR event
Inflow = 0.18 cfs @ 12.09 hrs, Volume= 0.015 af
Outflow = 0.18 cfs @ 12.09 hrs, Volume= 0.015 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.24 fps, Min. Travel Time= 0.1 min
Avg. Velocity= 1.76 fps, Avg. Travel Time= 0.2 min

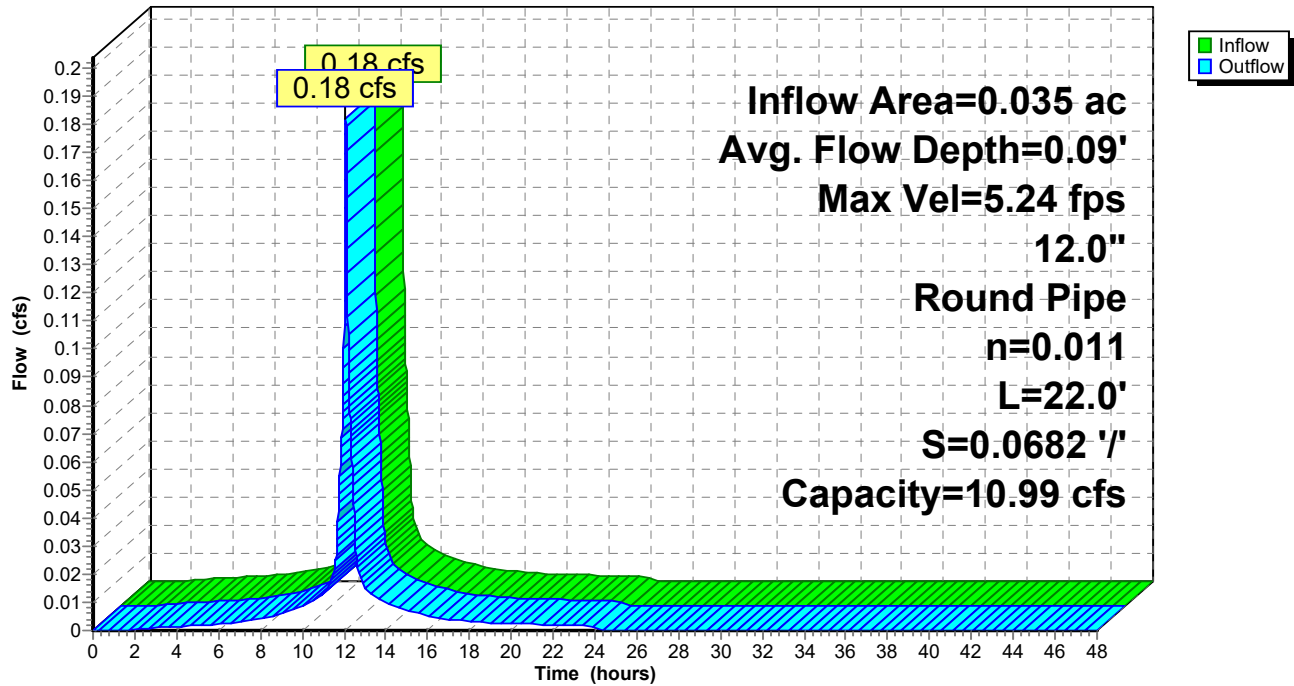
Peak Storage= 1 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.09'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 10.99 cfs

12.0" Round Pipe
n= 0.011
Length= 22.0' Slope= 0.0682 '/'
Inlet Invert= 315.00', Outlet Invert= 313.50'



Reach 4R:

Hydrograph



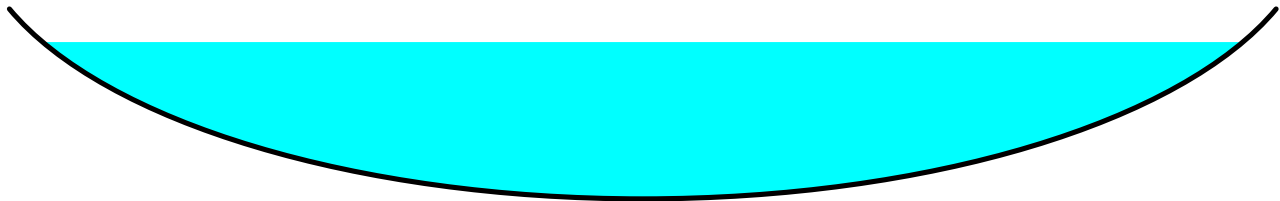
Summary for Reach 5R: Intermittent Stream

Inflow Area = 4.704 ac, 1.01% Impervious, Inflow Depth = 2.50" for 25-YR event
 Inflow = 8.49 cfs @ 12.20 hrs, Volume= 0.980 af
 Outflow = 7.79 cfs @ 12.43 hrs, Volume= 0.980 af, Atten= 8%, Lag= 13.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 1.95 fps, Min. Travel Time= 7.2 min
 Avg. Velocity = 0.50 fps, Avg. Travel Time= 28.1 min

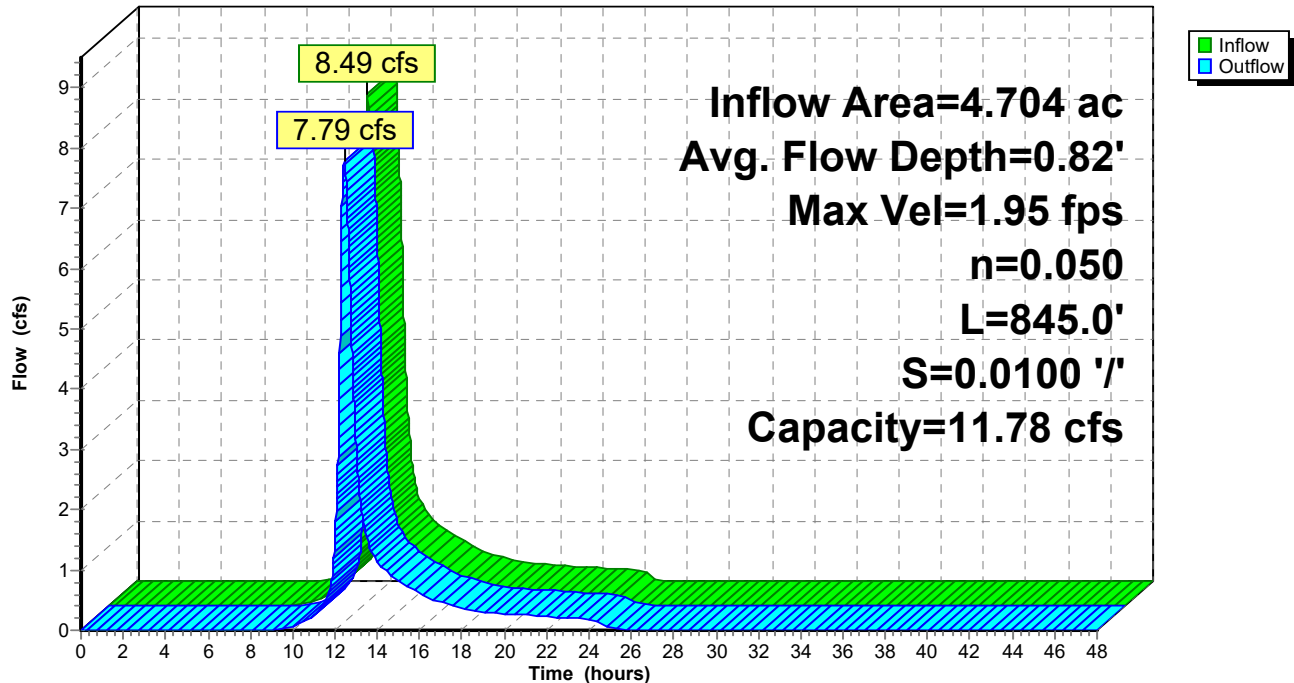
Peak Storage= 3,373 cf @ 12.31 hrs
 Average Depth at Peak Storage= 0.82'
 Bank-Full Depth= 1.00' Flow Area= 5.3 sf, Capacity= 11.78 cfs

8.00' x 1.00' deep Parabolic Channel, n= 0.050 High grass
 Length= 845.0' Slope= 0.0100 '/
 Inlet Invert= 260.00', Outlet Invert= 251.55'



Reach 5R: Intermittent Stream

Hydrograph



Summary for Reach 6R: new

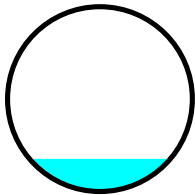
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.099 ac, 53.64% Impervious, Inflow Depth = 1.58" for 25-YR event
 Inflow = 0.10 cfs @ 12.48 hrs, Volume= 0.013 af
 Outflow = 0.10 cfs @ 12.53 hrs, Volume= 0.013 af, Atten= 2%, Lag= 2.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 2.33 fps, Min. Travel Time= 1.4 min
 Avg. Velocity = 1.16 fps, Avg. Travel Time= 2.8 min

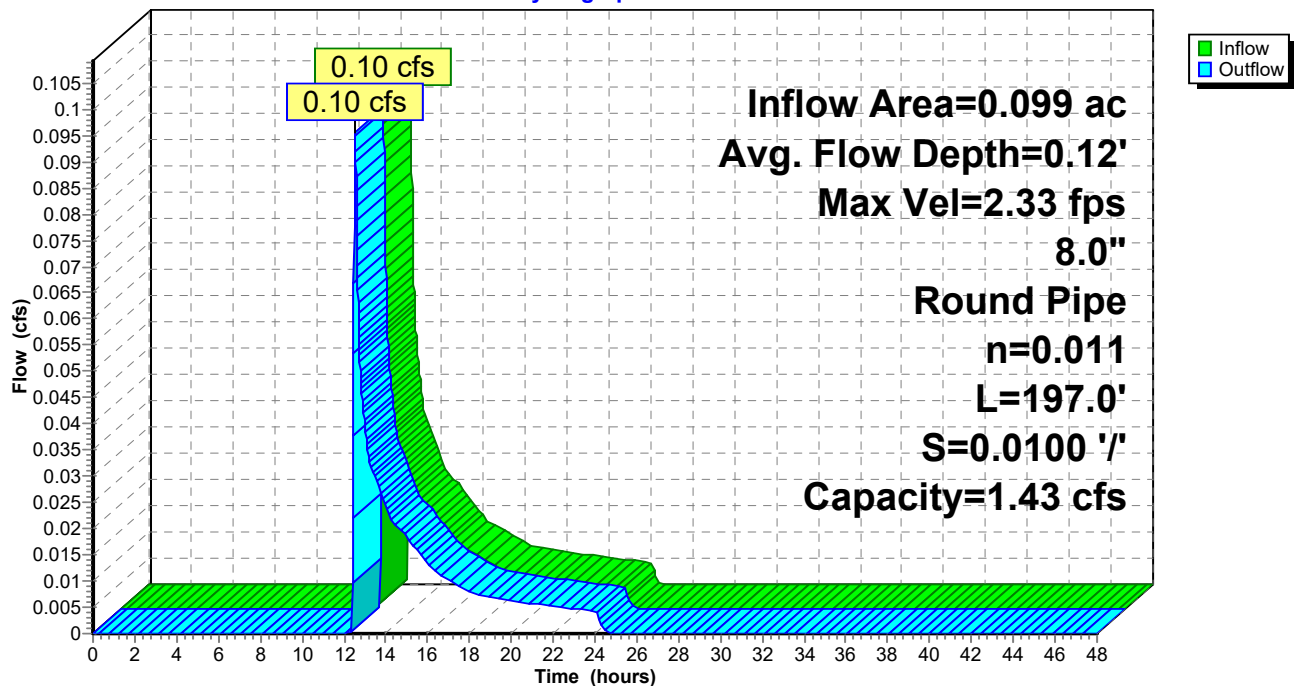
Peak Storage= 8 cf @ 12.50 hrs
 Average Depth at Peak Storage= 0.12'
 Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 1.43 cfs

8.0" Round Pipe
 n= 0.011 Concrete pipe, straight & clean
 Length= 197.0' Slope= 0.0100 '/'
 Inlet Invert= 304.20', Outlet Invert= 302.23'



Reach 6R: new

Hydrograph



Summary for Reach 7R:

[52] Hint: Inlet/Outlet conditions not evaluated

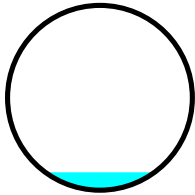
[62] Hint: Exceeded Reach PS10B OUTLET depth by 0.01' @ 12.14 hrs

Inflow Area = 0.035 ac, 96.04% Impervious, Inflow Depth = 4.95" for 25-YR event
Inflow = 0.18 cfs @ 12.10 hrs, Volume= 0.015 af
Outflow = 0.18 cfs @ 12.11 hrs, Volume= 0.015 af, Atten= 0%, Lag= 0.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 4.66 fps, Min. Travel Time= 0.3 min
Avg. Velocity= 1.57 fps, Avg. Travel Time= 0.9 min

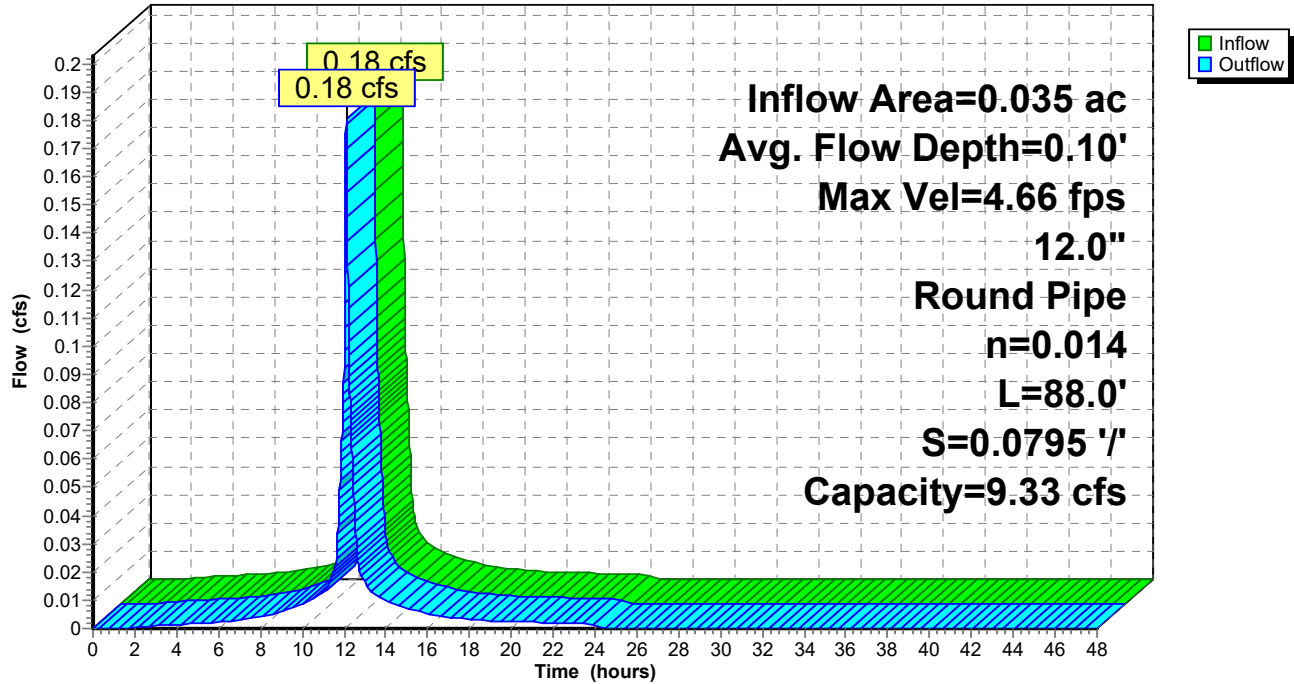
Peak Storage= 3 cf @ 12.11 hrs
Average Depth at Peak Storage= 0.10'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 9.33 cfs

12.0" Round Pipe
n= 0.014 Concrete pipe, finished
Length= 88.0' Slope= 0.0795 '/'
Inlet Invert= 310.50', Outlet Invert= 303.50'



Reach 7R:

Hydrograph



Summary for Reach 8R: new

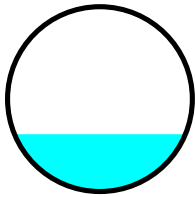
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.213 ac, 23.47% Impervious, Inflow Depth = 2.26" for 25-YR event
 Inflow = 0.56 cfs @ 12.10 hrs, Volume= 0.040 af
 Outflow = 0.55 cfs @ 12.11 hrs, Volume= 0.040 af, Atten= 0%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 6.06 fps, Min. Travel Time= 0.4 min
 Avg. Velocity = 2.24 fps, Avg. Travel Time= 1.0 min

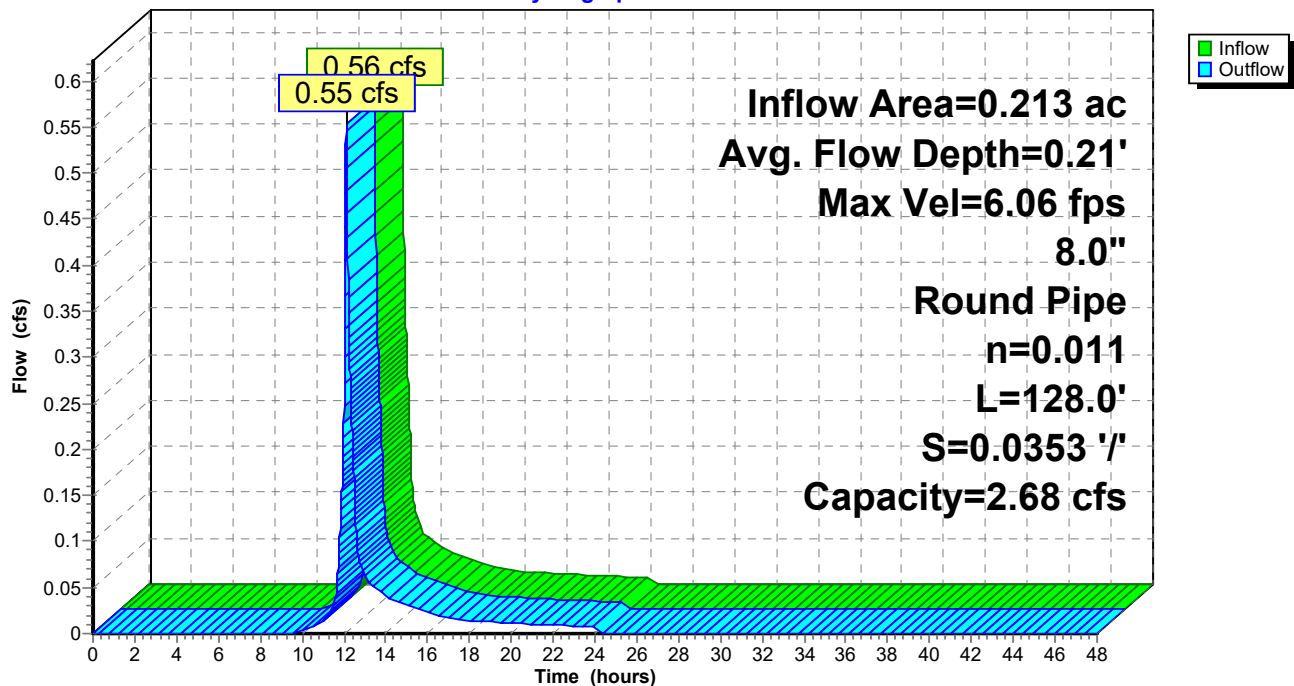
Peak Storage= 12 cf @ 12.11 hrs
 Average Depth at Peak Storage= 0.21'
 Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 2.68 cfs

8.0" Round Pipe
 n= 0.011 Concrete pipe, straight & clean
 Length= 128.0' Slope= 0.0353 '/
 Inlet Invert= 306.75', Outlet Invert= 302.23'



Reach 8R: new

Hydrograph



Summary for Reach 9R: new

[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.054 ac, 64.02% Impervious, Inflow Depth = 2.53" for 25-YR event
 Inflow = 0.22 cfs @ 12.11 hrs, Volume= 0.011 af
 Outflow = 0.22 cfs @ 12.11 hrs, Volume= 0.011 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Max. Velocity= 3.38 fps, Min. Travel Time= 0.0 min

Avg. Velocity = 1.19 fps, Avg. Travel Time= 0.1 min

Peak Storage= 0 cf @ 12.11 hrs

Average Depth at Peak Storage= 0.16'

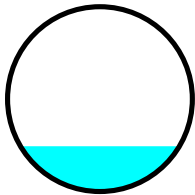
Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 1.71 cfs

8.0" Round Pipe

n= 0.011 Concrete pipe, straight & clean

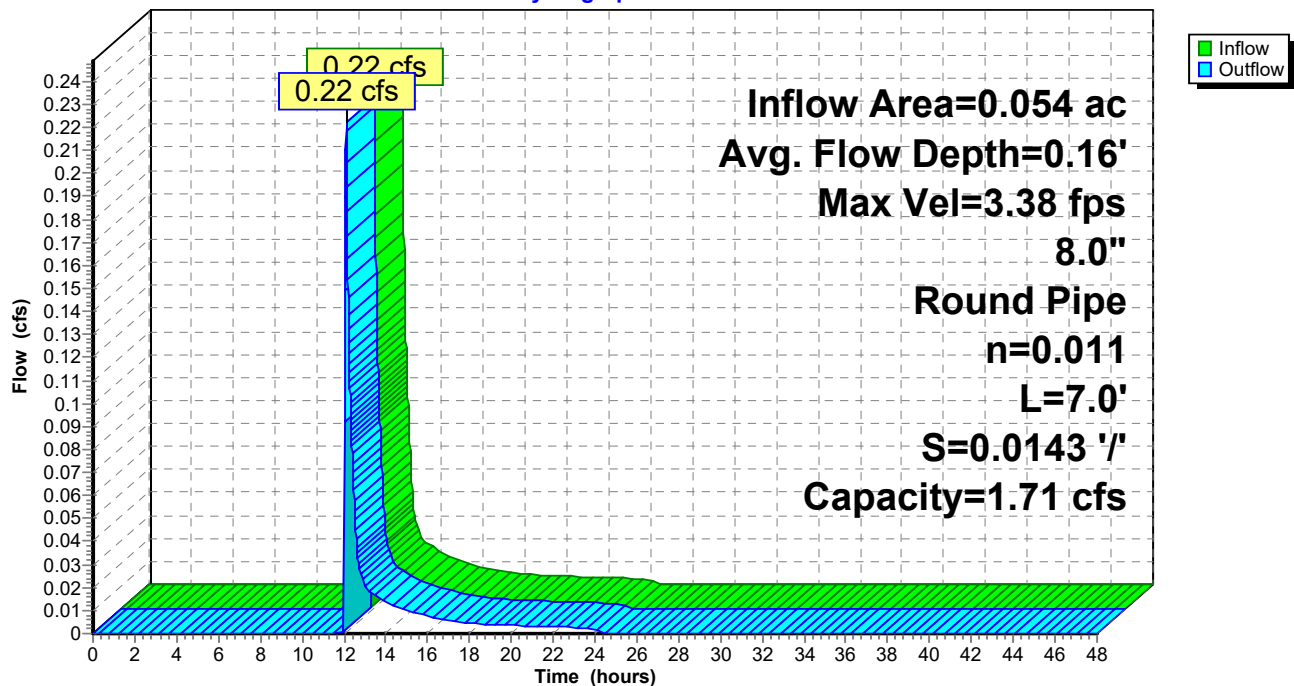
Length= 7.0' Slope= 0.0143 '/'

Inlet Invert= 298.00', Outlet Invert= 297.90'



Reach 9R: new

Hydrograph



Summary for Reach 10R: new

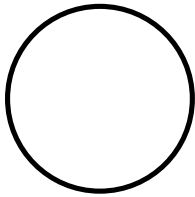
[43] Hint: Has no inflow (Outflow=Zero)

Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
 Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

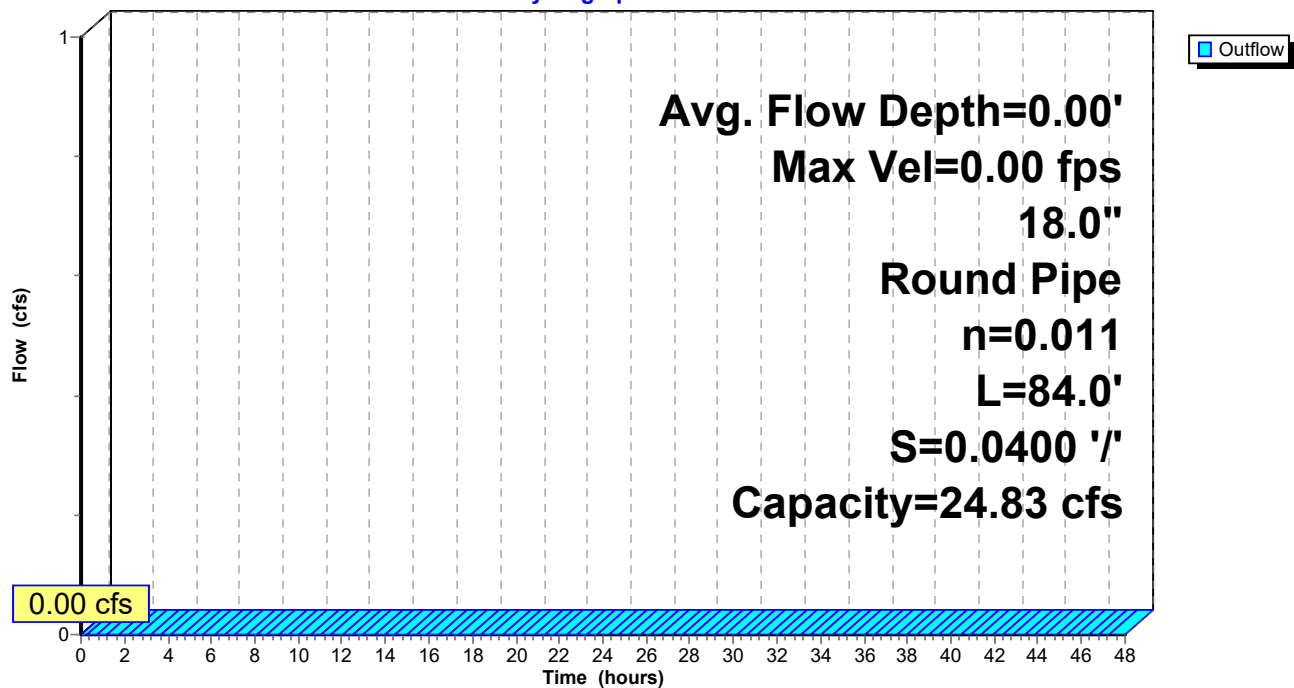
Peak Storage= 0 cf @ 0.00 hrs
 Average Depth at Peak Storage= 0.00'
 Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 24.83 cfs

18.0" Round Pipe
 n= 0.011 Concrete pipe, straight & clean
 Length= 84.0' Slope= 0.0400 '/
 Inlet Invert= 301.30', Outlet Invert= 297.94'



Reach 10R: new

Hydrograph



Summary for Reach 11R: new

[52] Hint: Inlet/Outlet conditions not evaluated

[55] Hint: Peak inflow is 148% of Manning's capacity

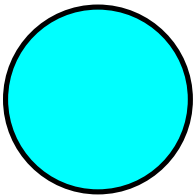
[76] Warning: Detained 0.005 af (Pond w/culvert advised)

Inflow Area = 1.015 ac, 19.57% Impervious, Inflow Depth = 1.98" for 25-YR event
Inflow = 2.53 cfs @ 12.10 hrs, Volume= 0.167 af
Outflow = 1.78 cfs @ 12.04 hrs, Volume= 0.167 af, Atten= 30%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.56 fps, Min. Travel Time= 0.0 min
Avg. Velocity= 2.59 fps, Avg. Travel Time= 0.0 min

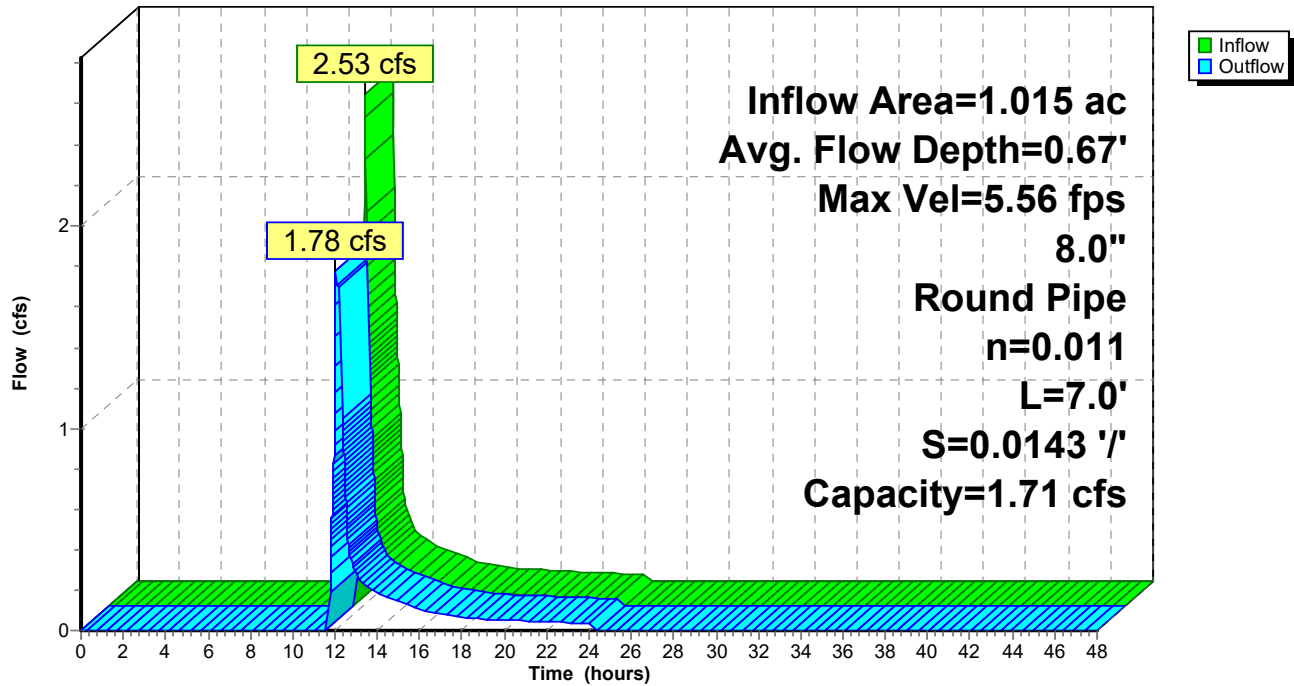
Peak Storage= 2 cf @ 12.05 hrs
Average Depth at Peak Storage= 0.67'
Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 1.71 cfs

8.0" Round Pipe
n= 0.011 Concrete pipe, straight & clean
Length= 7.0' Slope= 0.0143 '/'
Inlet Invert= 298.00', Outlet Invert= 297.90'



Reach 11R: new

Hydrograph



Summary for Reach 12R: (new Reach)

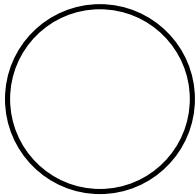
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.243 ac, 29.57% Impervious, Inflow Depth = 0.00" for 25-YR event
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
 Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

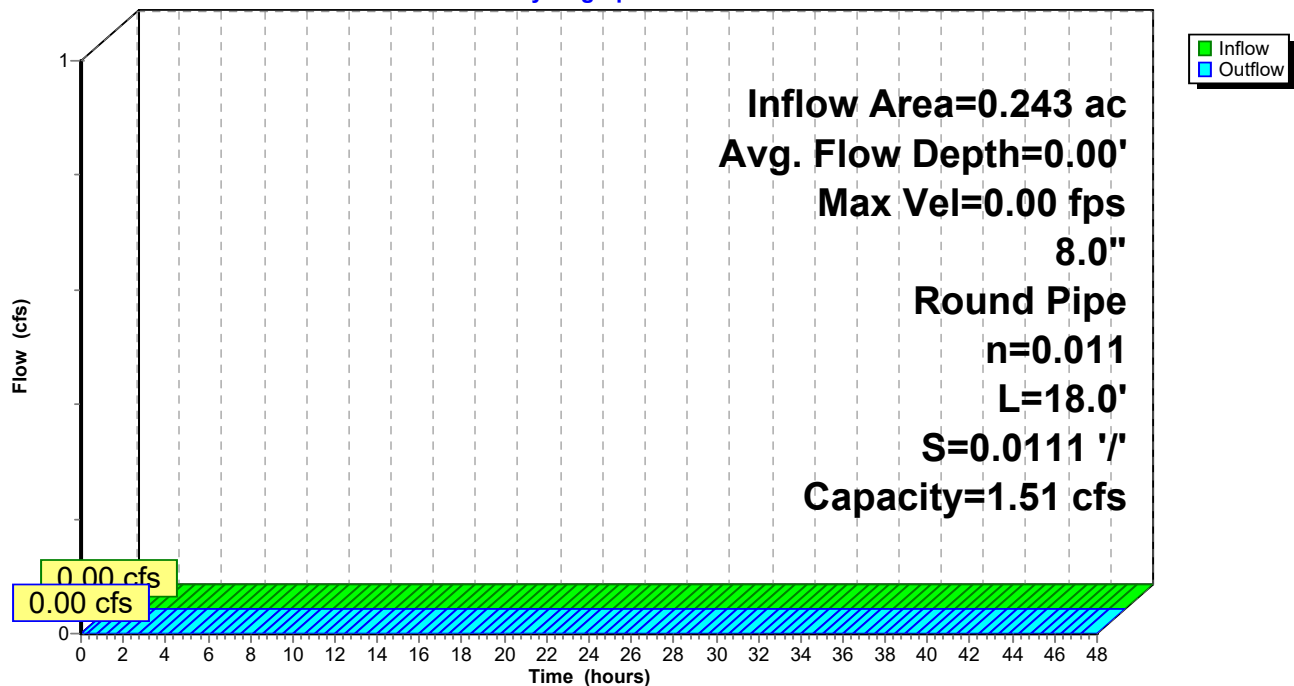
Peak Storage= 0 cf @ 0.00 hrs
 Average Depth at Peak Storage= 0.00'
 Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 1.51 cfs

8.0" Round Pipe
 n= 0.011
 Length= 18.0' Slope= 0.0111 '/'
 Inlet Invert= 297.30', Outlet Invert= 297.10'



Reach 12R: (new Reach)

Hydrograph



Summary for Reach 13R: New

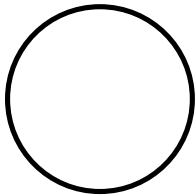
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.036 ac, 34.97% Impervious, Inflow Depth = 0.00" for 25-YR event
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
 Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

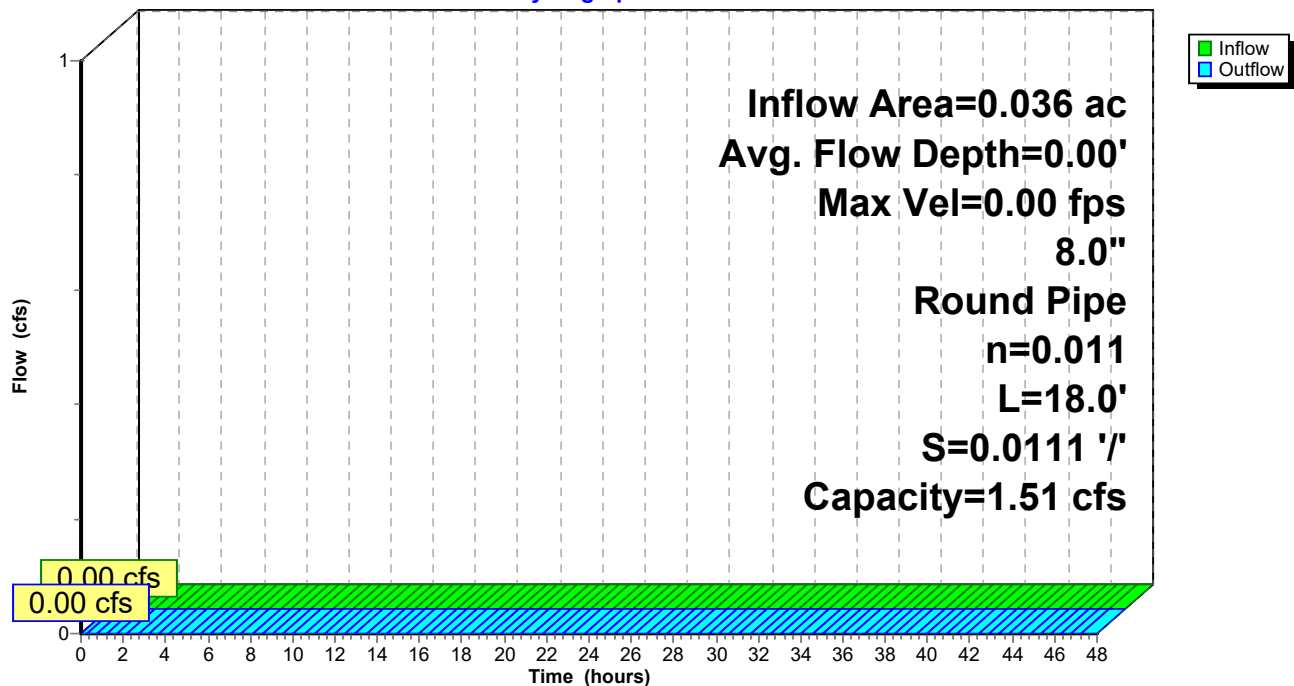
Peak Storage= 0 cf @ 0.00 hrs
 Average Depth at Peak Storage= 0.00'
 Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 1.51 cfs

8.0" Round Pipe
 n= 0.011
 Length= 18.0' Slope= 0.0111 '/'
 Inlet Invert= 301.30', Outlet Invert= 301.10'



Reach 13R: New

Hydrograph



Summary for Reach 14R: (new Reach)

[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.265 ac, 0.00% Impervious, Inflow Depth = 0.51" for 25-YR event
 Inflow = 0.03 cfs @ 15.02 hrs, Volume= 0.011 af
 Outflow = 0.03 cfs @ 15.03 hrs, Volume= 0.011 af, Atten= 0%, Lag= 0.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Max. Velocity= 2.00 fps, Min. Travel Time= 0.3 min

Avg. Velocity= 1.52 fps, Avg. Travel Time= 0.4 min

Peak Storage= 1 cf @ 15.03 hrs

Average Depth at Peak Storage= 0.06'

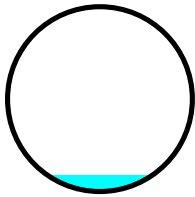
Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 1.88 cfs

8.0" Round Pipe

n= 0.011

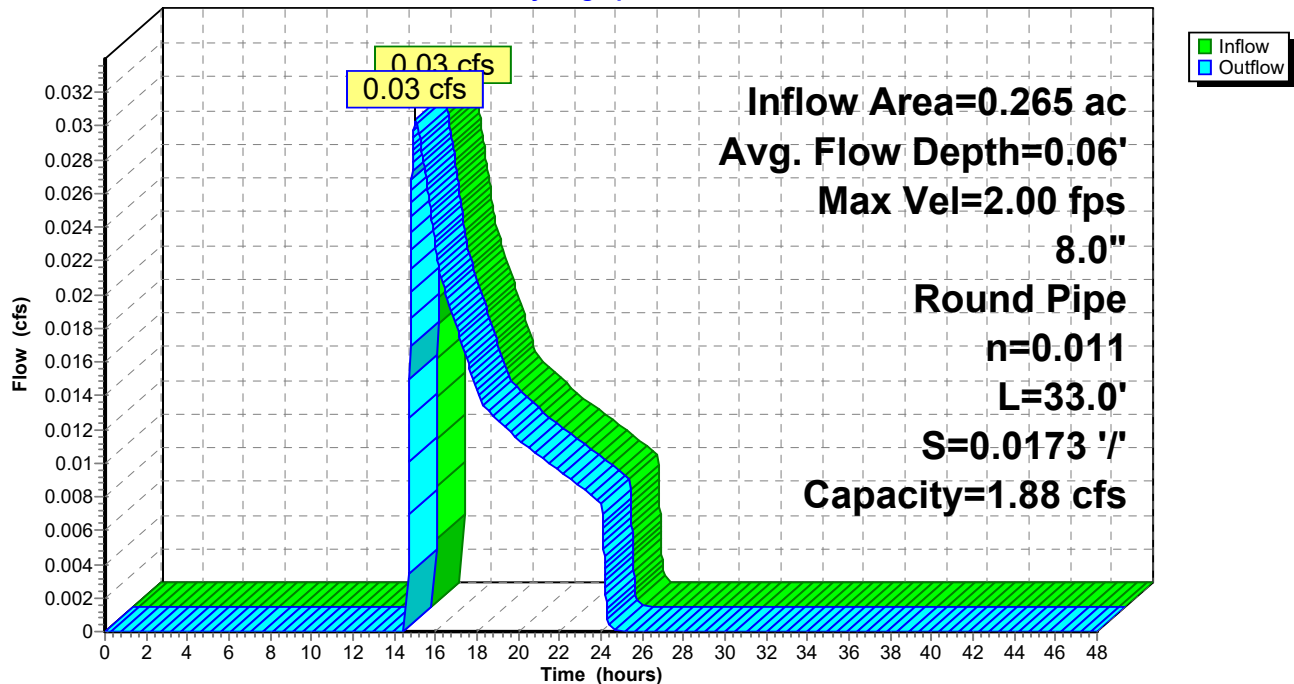
Length= 33.0' Slope= 0.0173 '/'

Inlet Invert= 290.30', Outlet Invert= 289.73'



Reach 14R: (new Reach)

Hydrograph



Summary for Reach 15R: New

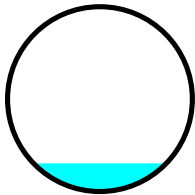
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.043 ac, 62.65% Impervious, Inflow Depth = 2.03" for 25-YR event
 Inflow = 0.09 cfs @ 12.23 hrs, Volume= 0.007 af
 Outflow = 0.09 cfs @ 12.23 hrs, Volume= 0.007 af, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 2.75 fps, Min. Travel Time= 0.1 min
 Avg. Velocity = 1.15 fps, Avg. Travel Time= 0.3 min

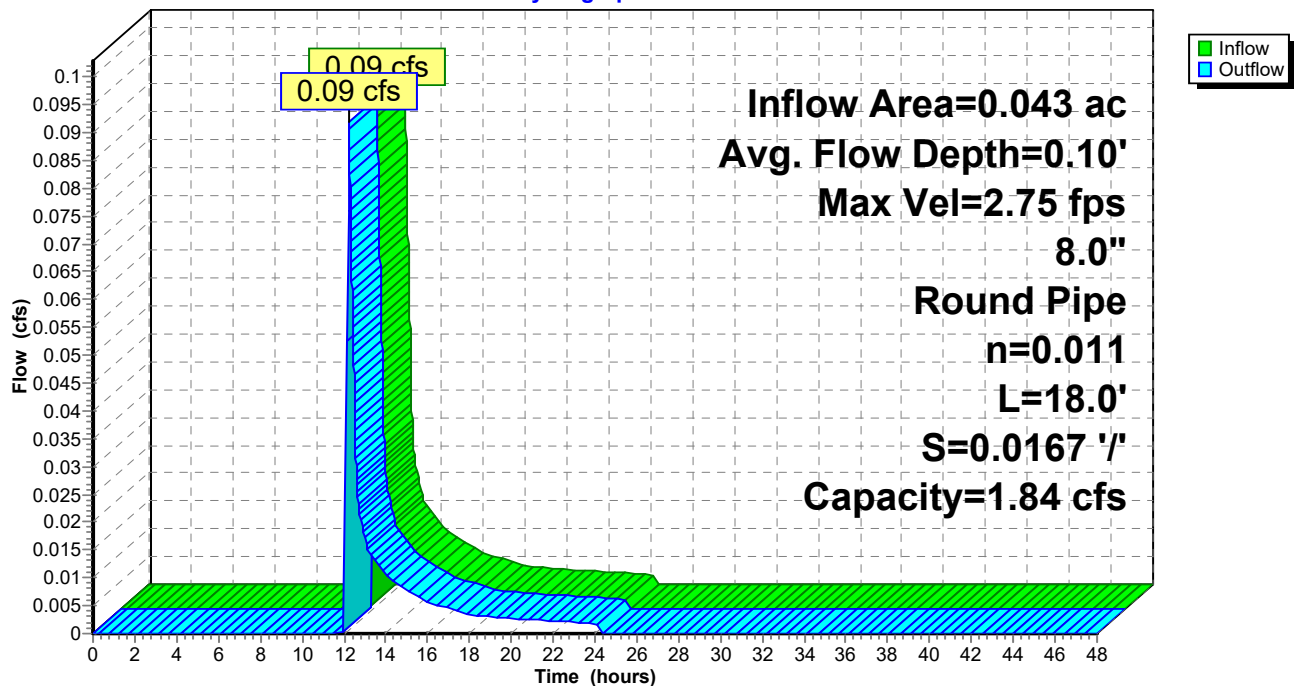
Peak Storage= 1 cf @ 12.23 hrs
 Average Depth at Peak Storage= 0.10'
 Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 1.84 cfs

8.0" Round Pipe
 n= 0.011 Concrete pipe, straight & clean
 Length= 18.0' Slope= 0.0167 '/'
 Inlet Invert= 302.30', Outlet Invert= 302.00'



Reach 15R: New

Hydrograph



Summary for Reach 16R: New

[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.091 ac, 45.76% Impervious, Inflow Depth = 0.96" for 25-YR event
 Inflow = 0.02 cfs @ 13.84 hrs, Volume= 0.007 af
 Outflow = 0.02 cfs @ 13.85 hrs, Volume= 0.007 af, Atten= 0%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Max. Velocity= 1.88 fps, Min. Travel Time= 0.3 min

Avg. Velocity= 1.34 fps, Avg. Travel Time= 0.4 min

Peak Storage= 0 cf @ 13.84 hrs

Average Depth at Peak Storage= 0.05'

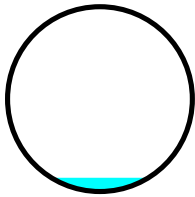
Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 1.99 cfs

8.0" Round Pipe

n= 0.011 Concrete pipe, straight & clean

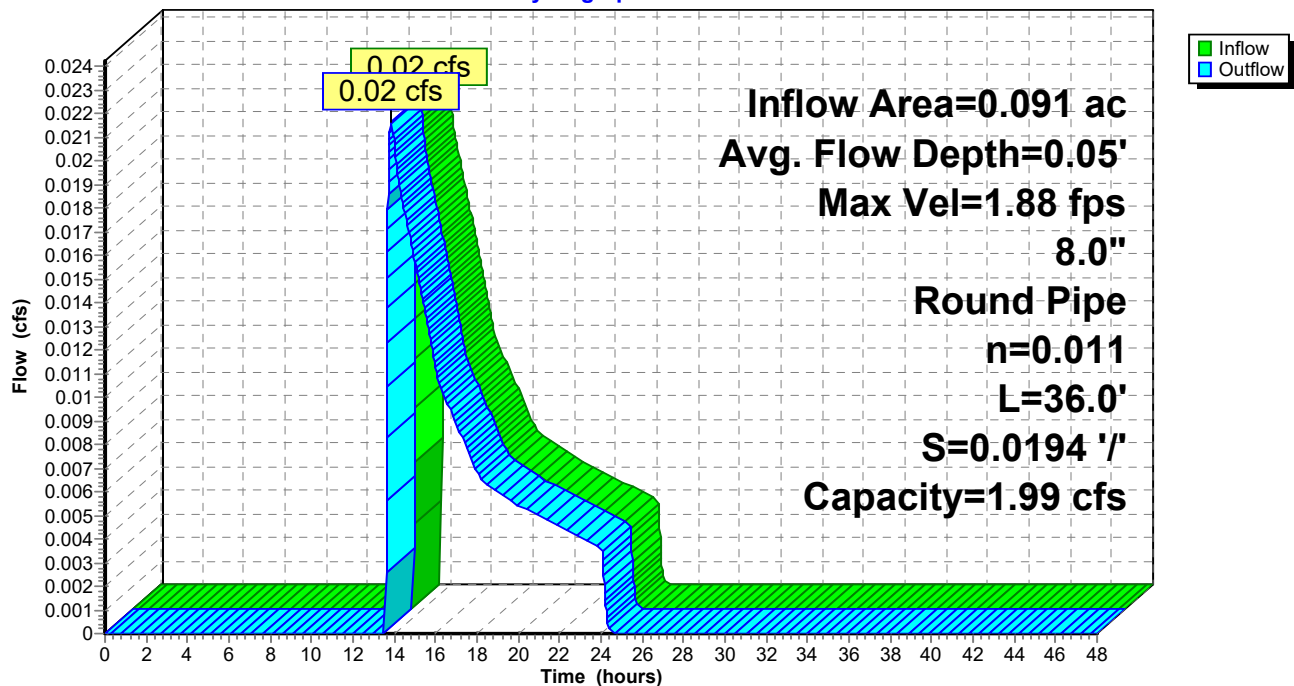
Length= 36.0' Slope= 0.0194 '/'

Inlet Invert= 302.00', Outlet Invert= 301.30'



Reach 16R: New

Hydrograph



Summary for Reach 17R: New

[52] Hint: Inlet/Outlet conditions not evaluated

[55] Hint: Peak inflow is 162% of Manning's capacity

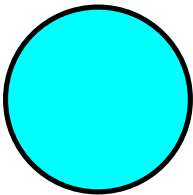
[76] Warning: Detained 0.021 af (Pond w/culvert advised)

Inflow Area = 2.675 ac, 4.94% Impervious, Inflow Depth = 1.61" for 25-YR event
Inflow = 4.19 cfs @ 12.19 hrs, Volume= 0.359 af
Outflow = 2.66 cfs @ 12.09 hrs, Volume= 0.359 af, Atten= 37%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 8.44 fps, Min. Travel Time= 0.1 min
Avg. Velocity= 4.24 fps, Avg. Travel Time= 0.3 min

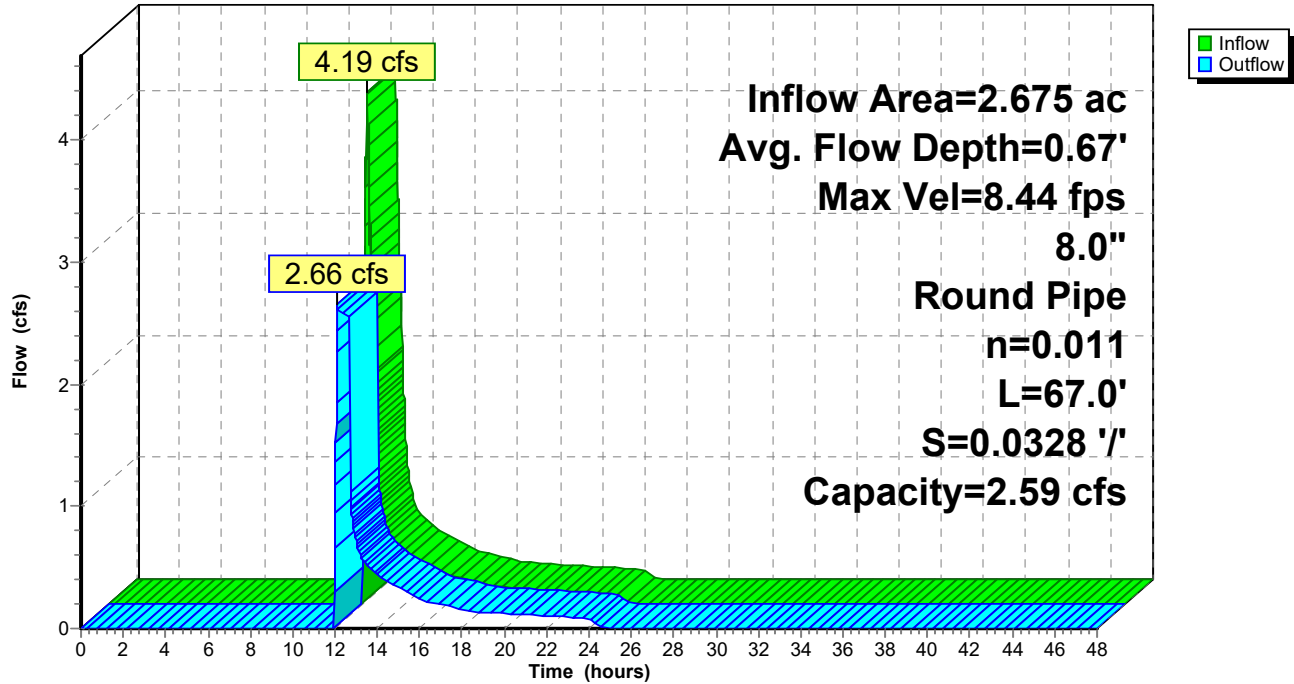
Peak Storage= 23 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.67'
Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 2.59 cfs

8.0" Round Pipe
n= 0.011 Concrete pipe, straight & clean
Length= 67.0' Slope= 0.0328 '/'
Inlet Invert= 298.00', Outlet Invert= 295.80'



Reach 17R: New

Hydrograph



Summary for Reach 18R: New

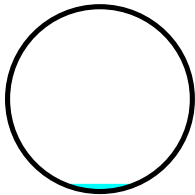
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.052 ac, 40.18% Impervious, Inflow Depth = 0.55" for 25-YR event
 Inflow = 0.01 cfs @ 15.87 hrs, Volume= 0.002 af
 Outflow = 0.01 cfs @ 15.87 hrs, Volume= 0.002 af, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 1.31 fps, Min. Travel Time= 0.2 min
 Avg. Velocity = 1.06 fps, Avg. Travel Time= 0.3 min

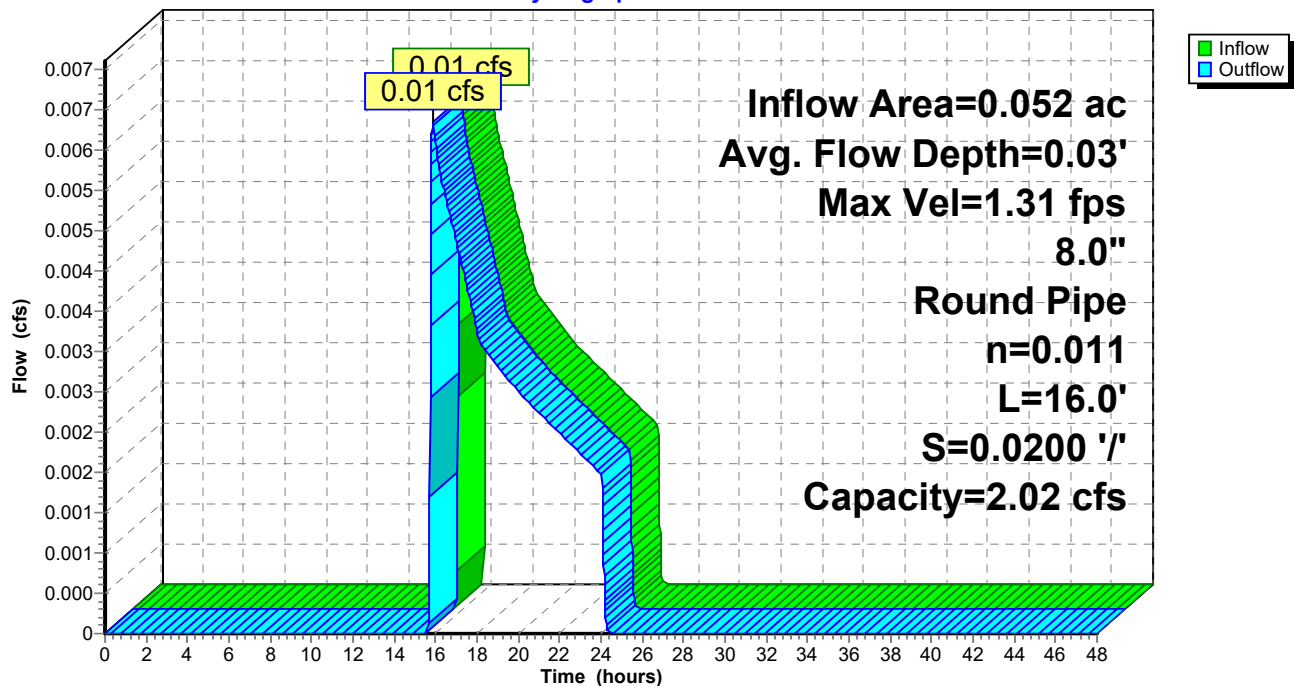
Peak Storage= 0 cf @ 15.87 hrs
 Average Depth at Peak Storage= 0.03'
 Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 2.02 cfs

8.0" Round Pipe
 n= 0.011 Concrete pipe, straight & clean
 Length= 16.0' Slope= 0.0200 '/
 Inlet Invert= 301.30', Outlet Invert= 300.98'



Reach 18R: New

Hydrograph



Summary for Reach 19R: (new Reach)

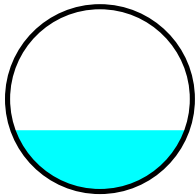
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.228 ac, 67.95% Impervious, Inflow Depth = 3.04" for 25-YR event
 Inflow = 0.94 cfs @ 12.11 hrs, Volume= 0.058 af
 Outflow = 0.94 cfs @ 12.11 hrs, Volume= 0.058 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 9.35 fps, Min. Travel Time= 0.1 min
 Avg. Velocity= 3.32 fps, Avg. Travel Time= 0.2 min

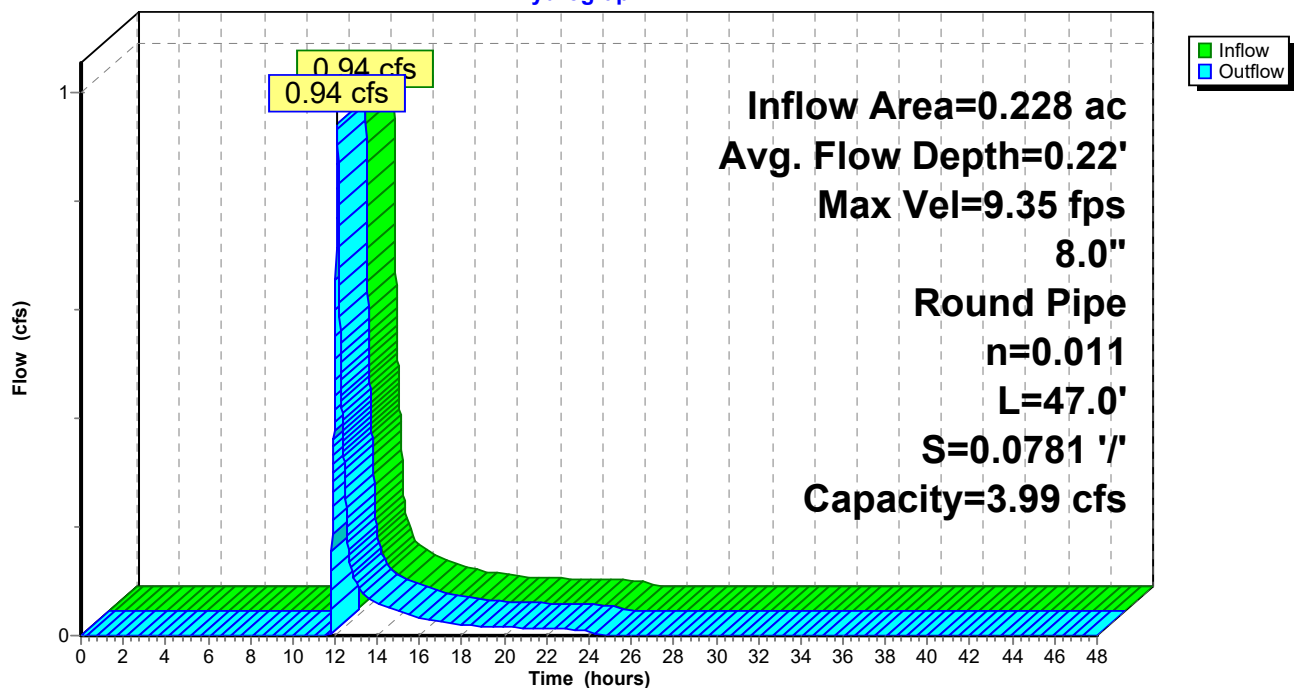
Peak Storage= 5 cf @ 12.11 hrs
 Average Depth at Peak Storage= 0.22'
 Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 3.99 cfs

8.0" Round Pipe
 n= 0.011
 Length= 47.0' Slope= 0.0781 '/'
 Inlet Invert= 287.00', Outlet Invert= 283.33'



Reach 19R: (new Reach)

Hydrograph



Summary for Reach 20R: 12" RCP pipe

[52] Hint: Inlet/Outlet conditions not evaluated

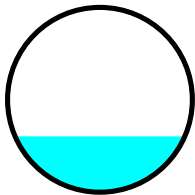
[61] Hint: Exceeded Reach PS9 outlet invert by 0.30' @ 12.11 hrs

Inflow Area = 0.288 ac, 25.48% Impervious, Inflow Depth = 3.16" for 25-YR event
Inflow = 1.06 cfs @ 12.10 hrs, Volume= 0.076 af
Outflow = 1.06 cfs @ 12.11 hrs, Volume= 0.076 af, Atten= 0%, Lag= 0.1 min

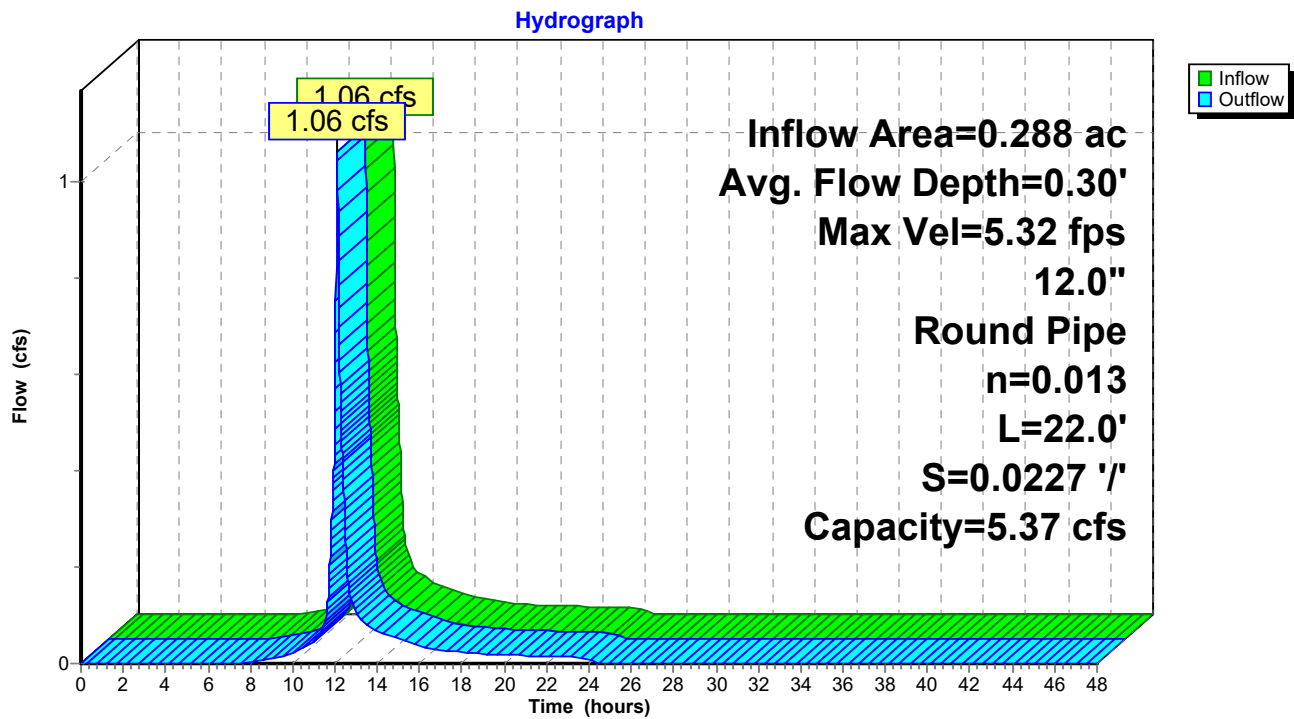
Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.32 fps, Min. Travel Time= 0.1 min
Avg. Velocity= 1.84 fps, Avg. Travel Time= 0.2 min

Peak Storage= 4 cf @ 12.11 hrs
Average Depth at Peak Storage= 0.30'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 5.37 cfs

12.0" Round Pipe
n= 0.013
Length= 22.0' Slope= 0.0227 '/'
Inlet Invert= 257.75', Outlet Invert= 257.25'



Reach 20R: 12" RCP pipe



Summary for Reach 21R: (new Reach)

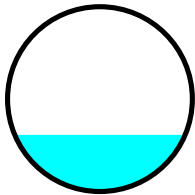
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.153 ac, 15.01% Impervious, Inflow Depth = 1.73" for 25-YR event
 Inflow = 0.20 cfs @ 12.35 hrs, Volume= 0.022 af
 Outflow = 0.20 cfs @ 12.36 hrs, Volume= 0.022 af, Atten= 0%, Lag= 0.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 2.27 fps, Min. Travel Time= 0.4 min
 Avg. Velocity = 1.04 fps, Avg. Travel Time= 0.8 min

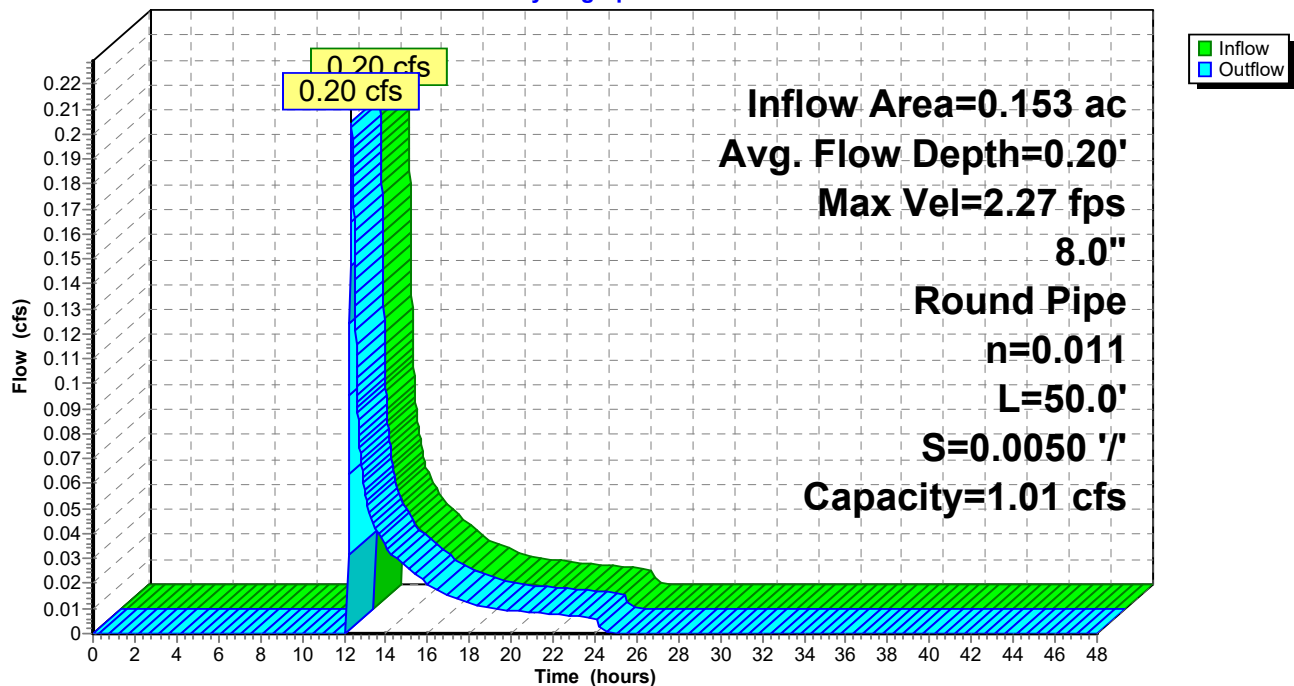
Peak Storage= 5 cf @ 12.36 hrs
 Average Depth at Peak Storage= 0.20'
 Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 1.01 cfs

8.0" Round Pipe
 n= 0.011
 Length= 50.0' Slope= 0.0050 '/'
 Inlet Invert= 254.00', Outlet Invert= 253.75'



Reach 21R: (new Reach)

Hydrograph



Summary for Reach CB1: CB1

[52] Hint: Inlet/Outlet conditions not evaluated

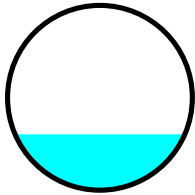
[61] Hint: Exceeded Reach 20R outlet invert by 0.05' @ 12.10 hrs

Inflow Area = 0.395 ac, 45.72% Impervious, Inflow Depth = 3.67" for 25-YR event
Inflow = 1.60 cfs @ 12.10 hrs, Volume= 0.121 af
Outflow = 1.60 cfs @ 12.10 hrs, Volume= 0.121 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 8.03 fps, Min. Travel Time= 0.1 min
Avg. Velocity= 2.47 fps, Avg. Travel Time= 0.2 min

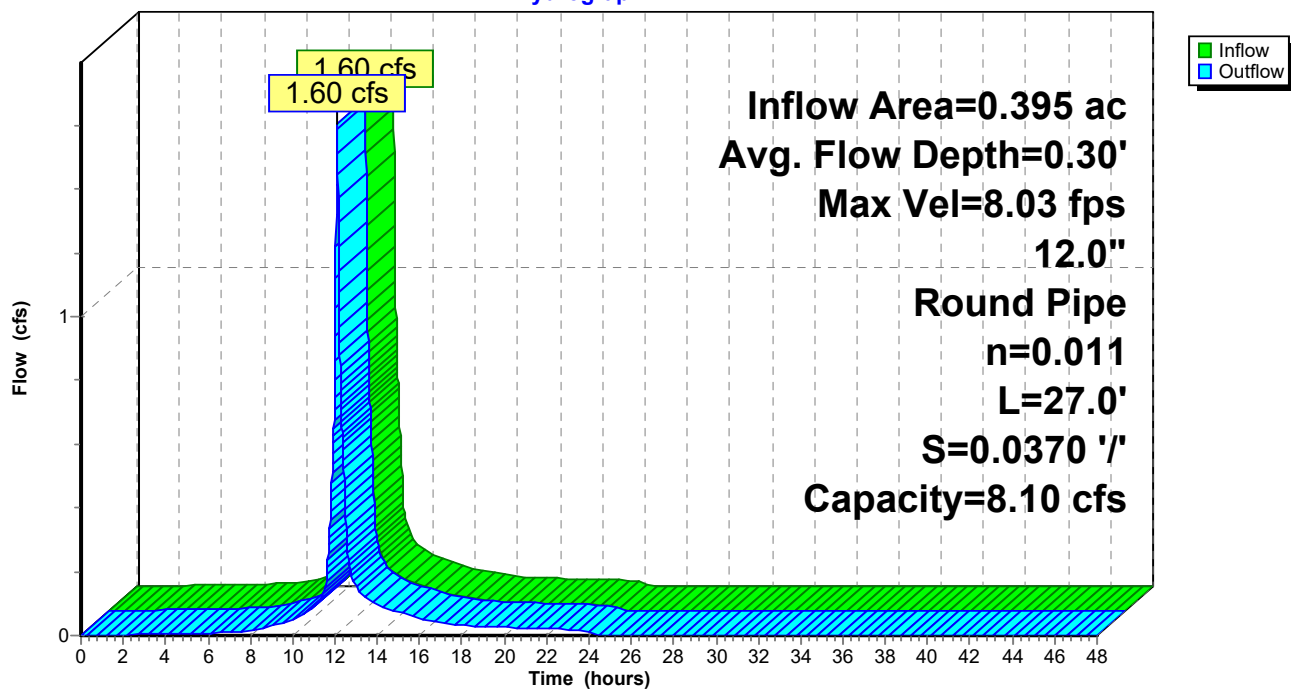
Peak Storage= 5 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.30'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 8.10 cfs

12.0" Round Pipe
n= 0.011
Length= 27.0' Slope= 0.0370 '/'
Inlet Invert= 257.00', Outlet Invert= 256.00'



Reach CB1: CB1

Hydrograph



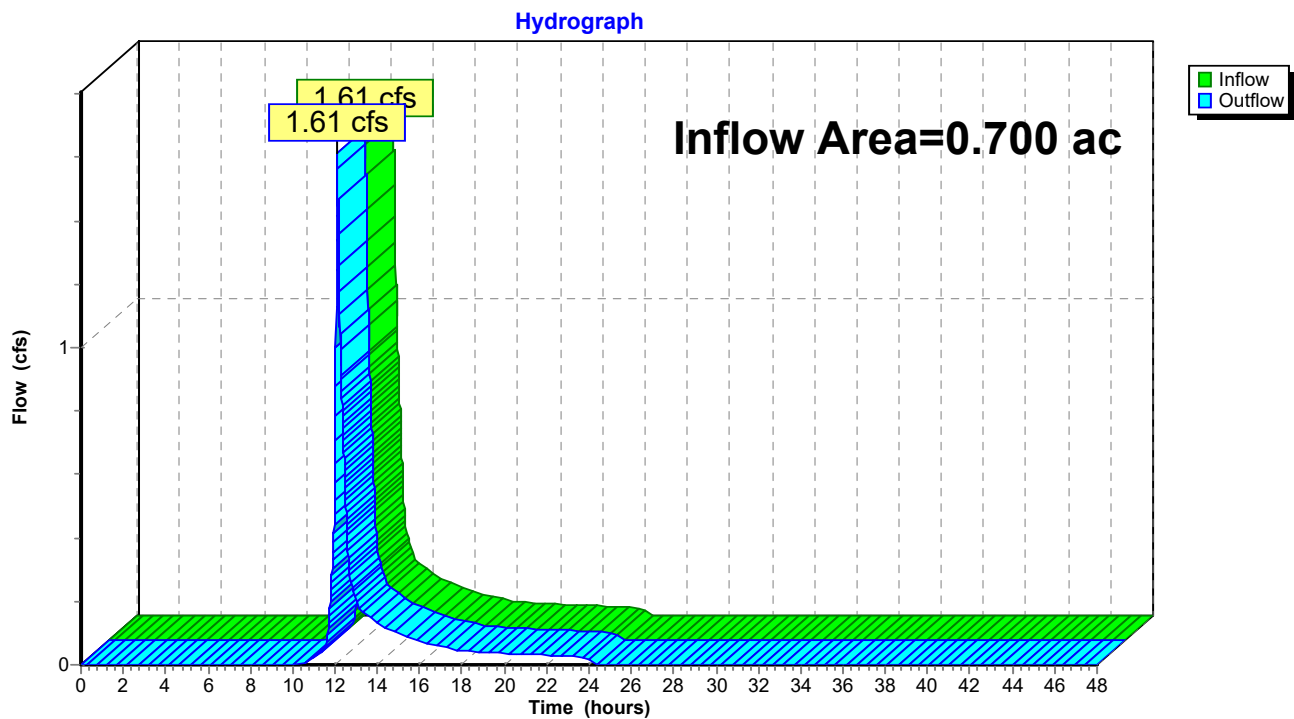
Summary for Reach CP1:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.700 ac, 20.01% Impervious, Inflow Depth = 2.04" for 25-YR event
Inflow = 1.61 cfs @ 12.11 hrs, Volume= 0.119 af
Outflow = 1.61 cfs @ 12.11 hrs, Volume= 0.119 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Reach CP1:



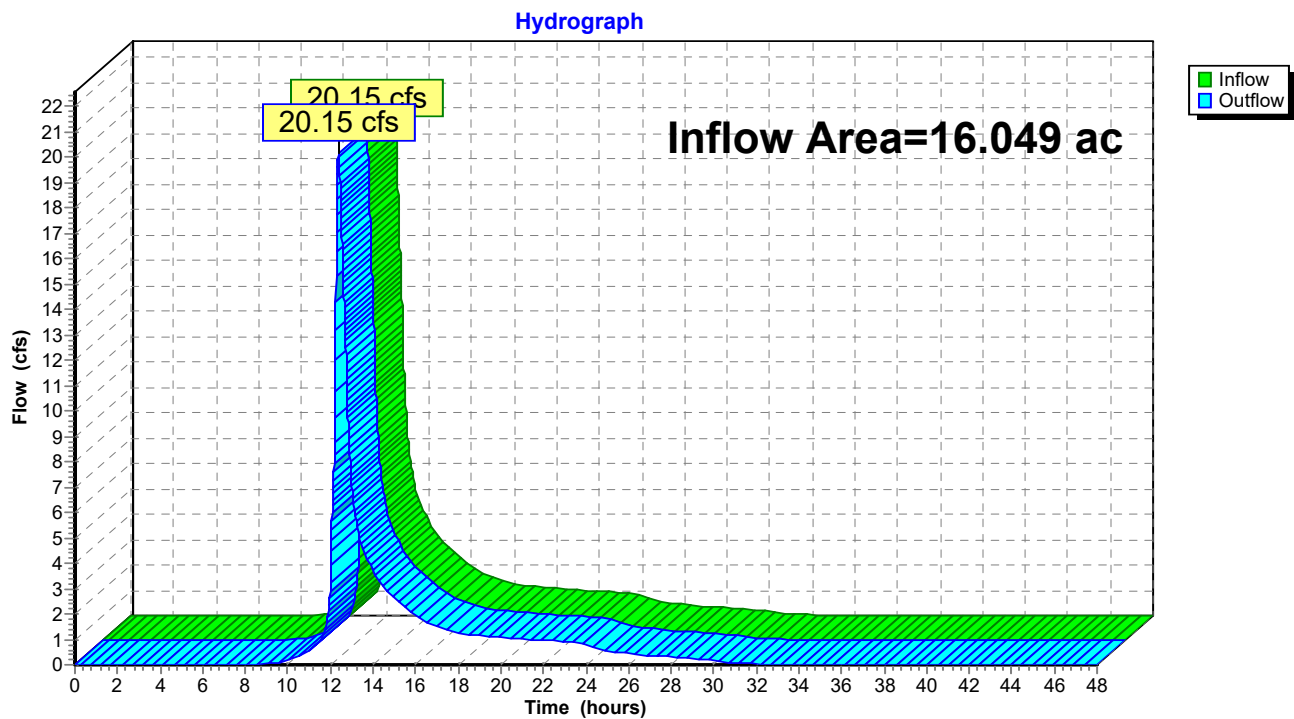
Summary for Reach CP2:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 16.049 ac, 13.07% Impervious, Inflow Depth = 2.23" for 25-YR event
Inflow = 20.15 cfs @ 12.36 hrs, Volume= 2.982 af
Outflow = 20.15 cfs @ 12.36 hrs, Volume= 2.982 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Reach CP2:



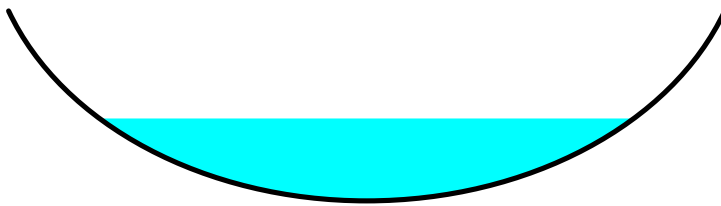
Summary for Reach PS1:

Inflow Area = 2.270 ac, 5.04% Impervious, Inflow Depth = 1.70" for 25-YR event
 Inflow = 3.47 cfs @ 12.18 hrs, Volume= 0.322 af
 Outflow = 3.46 cfs @ 12.20 hrs, Volume= 0.322 af, Atten= 0%, Lag= 1.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 4.55 fps, Min. Travel Time= 0.8 min
 Avg. Velocity = 1.80 fps, Avg. Travel Time= 2.1 min

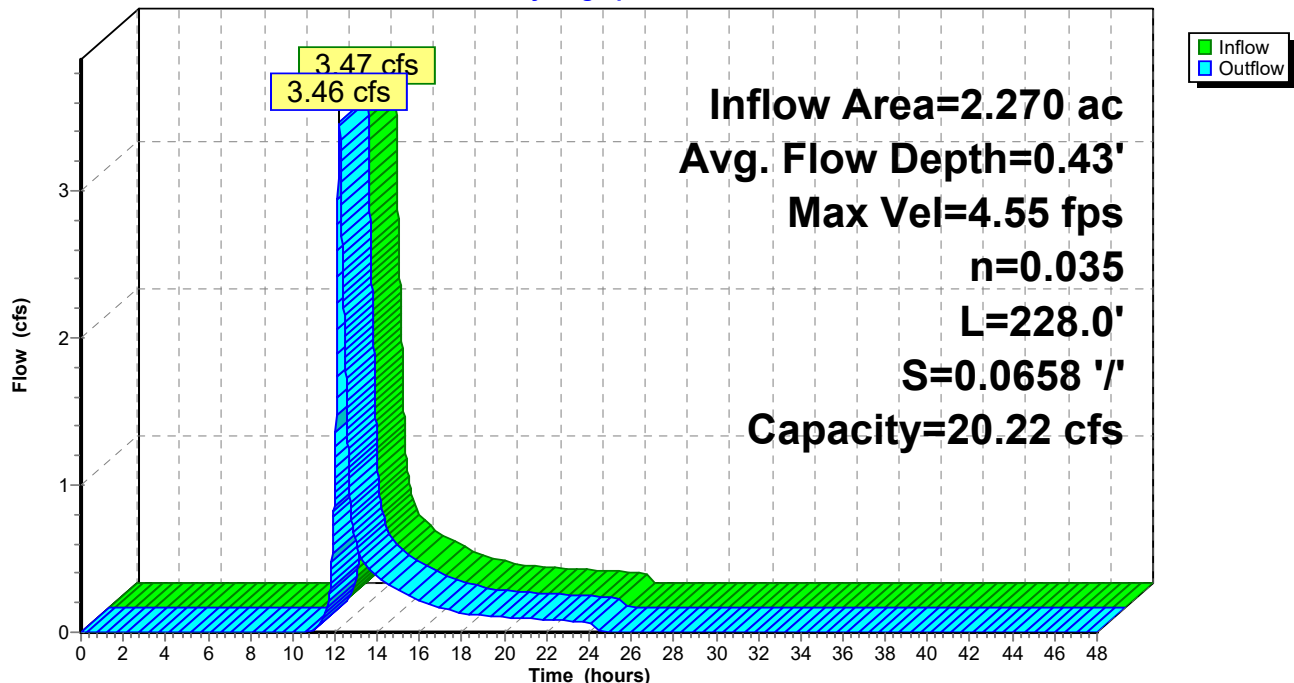
Peak Storage= 173 cf @ 12.19 hrs
 Average Depth at Peak Storage= 0.43'
 Bank-Full Depth= 1.00' Flow Area= 2.7 sf, Capacity= 20.22 cfs

4.00' x 1.00' deep Parabolic Channel, n= 0.035
 Length= 228.0' Slope= 0.0658 '/'
 Inlet Invert= 316.00', Outlet Invert= 301.00'



Reach PS1:

Hydrograph



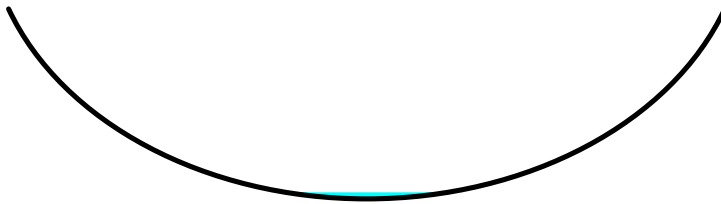
Summary for Reach PS10A:

Inflow Area = 0.035 ac, 96.04% Impervious, Inflow Depth = 4.95" for 25-YR event
 Inflow = 0.18 cfs @ 12.08 hrs, Volume= 0.015 af
 Outflow = 0.18 cfs @ 12.09 hrs, Volume= 0.015 af, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 1.80 fps, Min. Travel Time= 0.2 min
 Avg. Velocity = 0.83 fps, Avg. Travel Time= 0.4 min

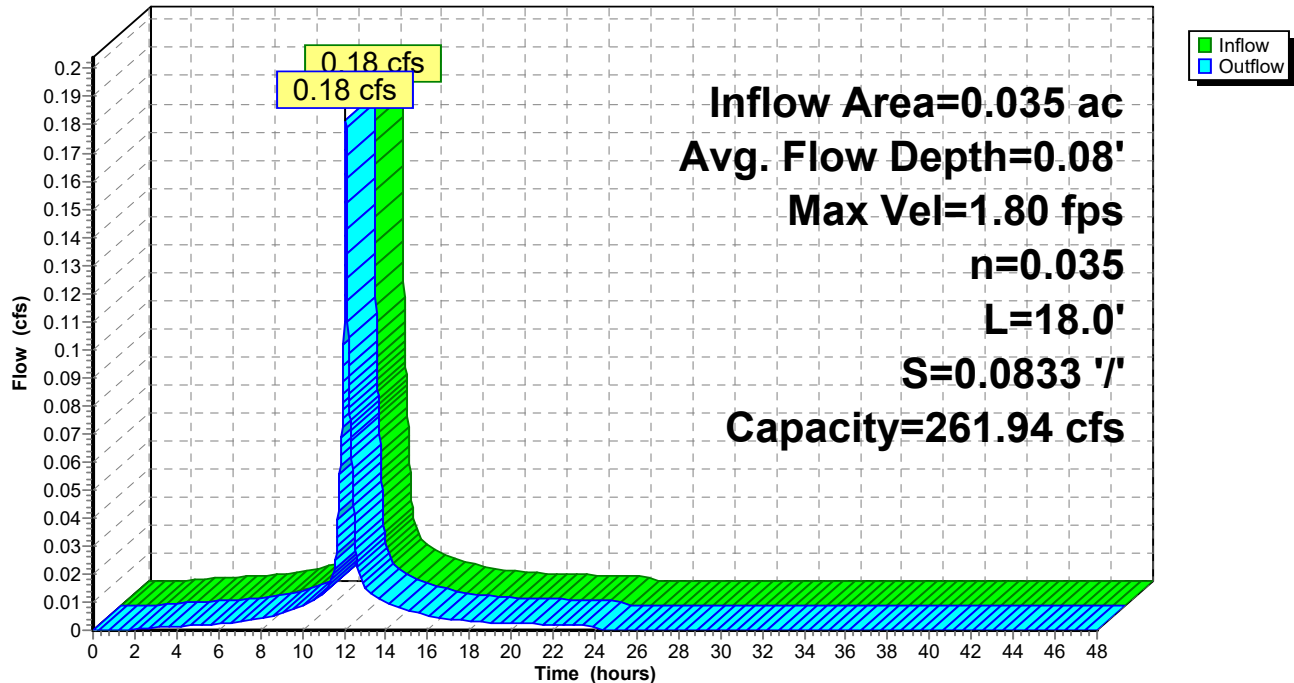
Peak Storage= 2 cf @ 12.09 hrs
 Average Depth at Peak Storage= 0.08'
 Bank-Full Depth= 2.50' Flow Area= 16.7 sf, Capacity= 261.94 cfs

10.00' x 2.50' deep Parabolic Channel, n= 0.035 Short grass
 Length= 18.0' Slope= 0.0833 '/'
 Inlet Invert= 316.50', Outlet Invert= 315.00'



Reach PS10A:

Hydrograph



Summary for Reach PS10B:

[61] Hint: Exceeded Reach 4R outlet invert by 0.09' @ 12.09 hrs

Inflow Area = 0.035 ac, 96.04% Impervious, Inflow Depth = 4.95" for 25-YR event
 Inflow = 0.18 cfs @ 12.09 hrs, Volume= 0.015 af
 Outflow = 0.18 cfs @ 12.10 hrs, Volume= 0.015 af, Atten= 0%, Lag= 0.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Max. Velocity= 1.70 fps, Min. Travel Time= 0.4 min

Avg. Velocity = 0.77 fps, Avg. Travel Time= 0.9 min

Peak Storage= 4 cf @ 12.09 hrs

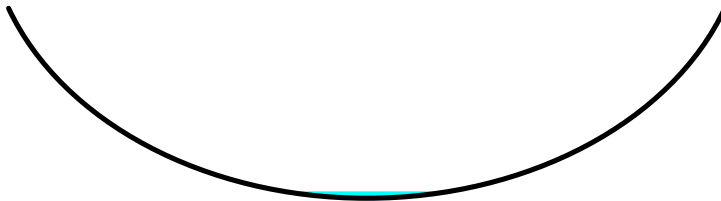
Average Depth at Peak Storage= 0.09'

Bank-Full Depth= 2.50' Flow Area= 16.7 sf, Capacity= 242.51 cfs

10.00' x 2.50' deep Parabolic Channel, n= 0.035 Short grass

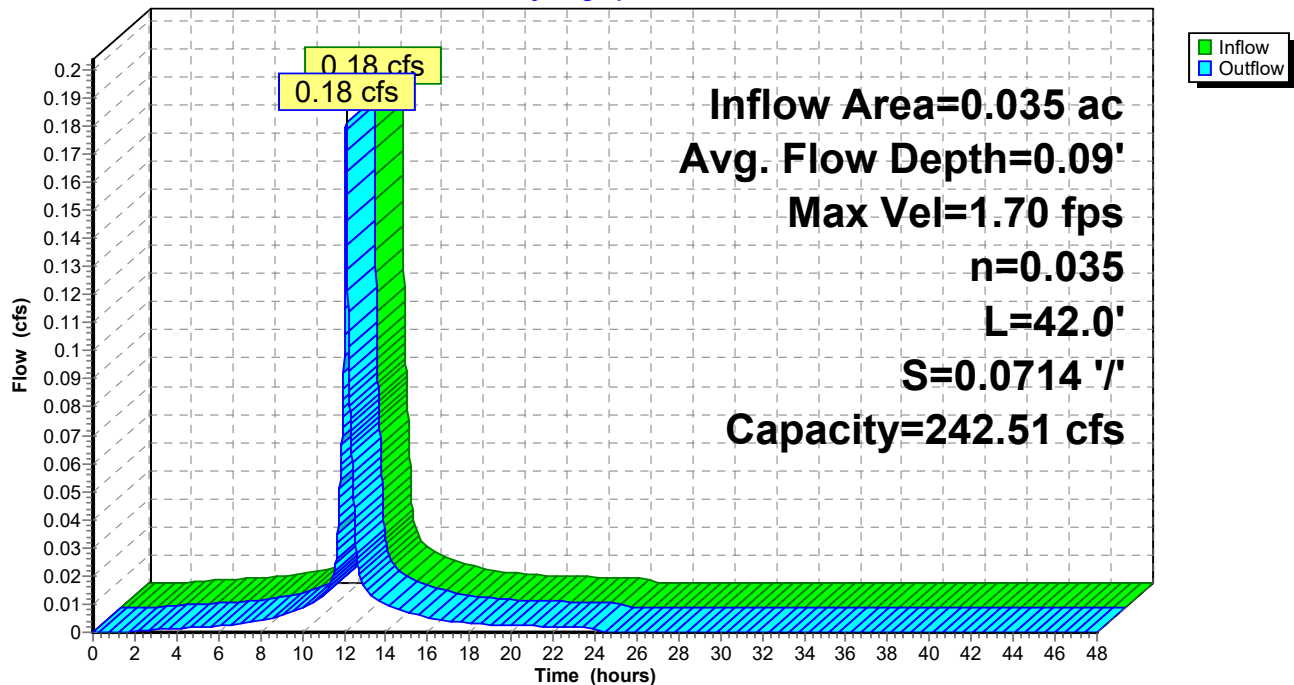
Length= 42.0' Slope= 0.0714 '/'

Inlet Invert= 313.50', Outlet Invert= 310.50'



Reach PS10B:

Hydrograph



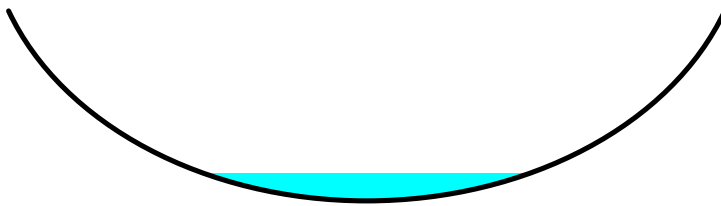
Summary for Reach PS2:

Inflow Area = 0.159 ac, 11.13% Impervious, Inflow Depth = 1.86" for 25-YR event
Inflow = 0.33 cfs @ 12.09 hrs, Volume= 0.025 af
Outflow = 0.33 cfs @ 12.10 hrs, Volume= 0.025 af, Atten= 0%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.24 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 0.85 fps, Avg. Travel Time= 0.6 min

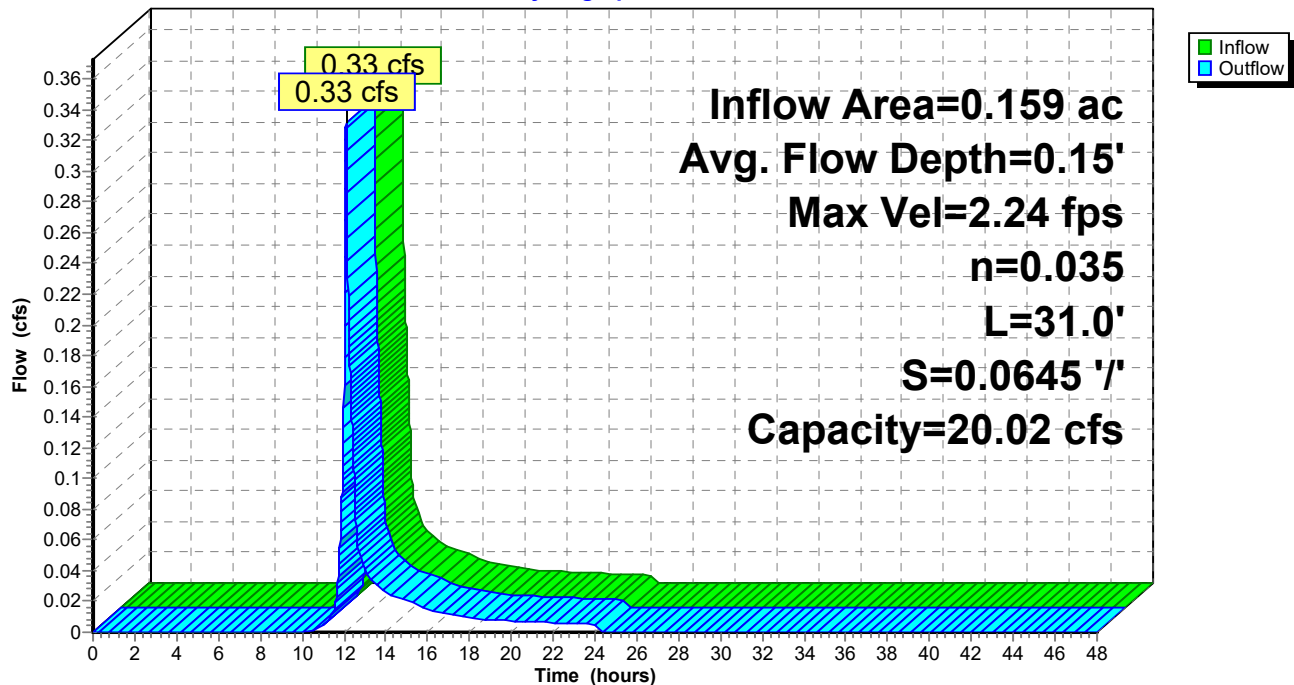
Peak Storage= 5 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.15'
Bank-Full Depth= 1.00' Flow Area= 2.7 sf, Capacity= 20.02 cfs

4.00' x 1.00' deep Parabolic Channel, n= 0.035
Length= 31.0' Slope= 0.0645 '/'
Inlet Invert= 303.00', Outlet Invert= 301.00'



Reach PS2:

Hydrograph



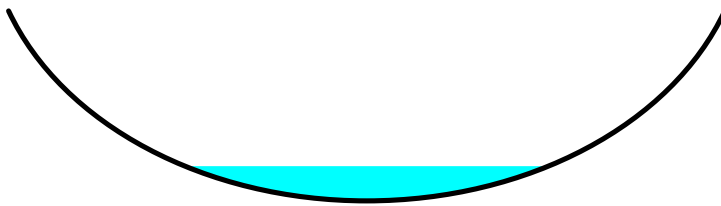
Summary for Reach PS3:

Inflow Area = 0.213 ac, 23.47% Impervious, Inflow Depth = 2.26" for 25-YR event
Inflow = 0.56 cfs @ 12.09 hrs, Volume= 0.040 af
Outflow = 0.56 cfs @ 12.10 hrs, Volume= 0.040 af, Atten= 0%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.68 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 0.98 fps, Avg. Travel Time= 1.0 min

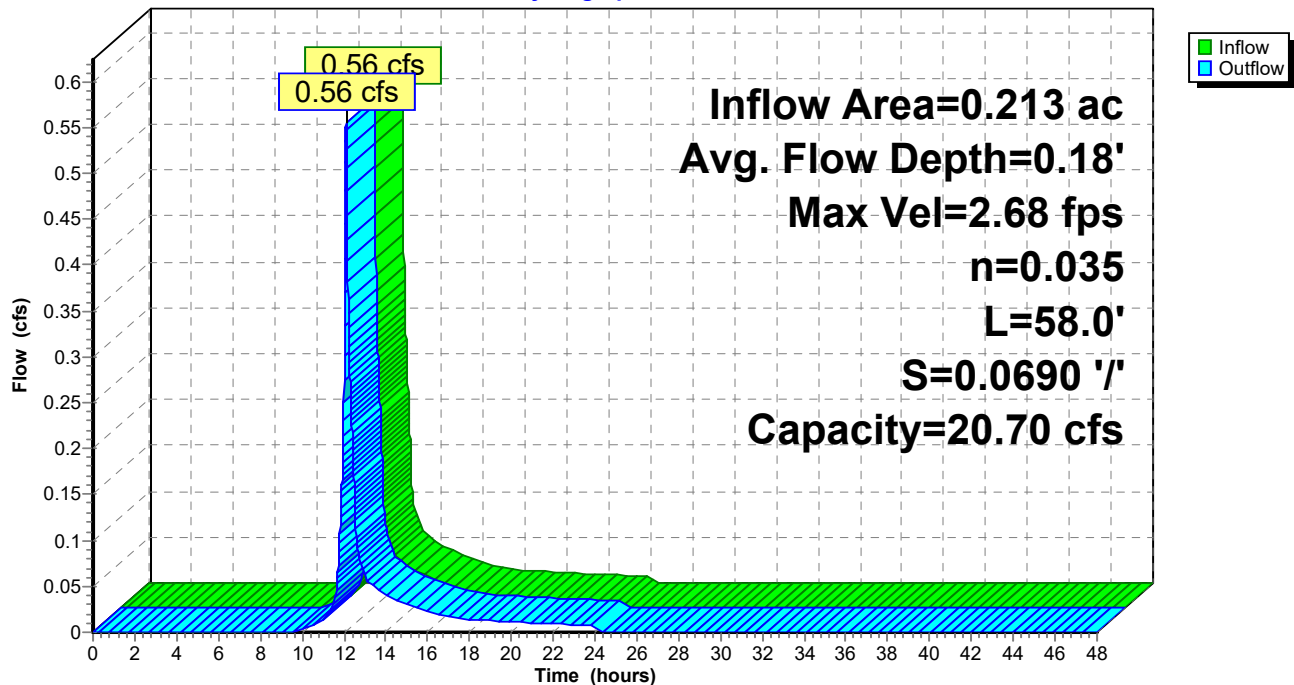
Peak Storage= 12 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.18'
Bank-Full Depth= 1.00' Flow Area= 2.7 sf, Capacity= 20.70 cfs

4.00' x 1.00' deep Parabolic Channel, n= 0.035
Length= 58.0' Slope= 0.0690 '/'
Inlet Invert= 313.00', Outlet Invert= 309.00'



Reach PS3:

Hydrograph



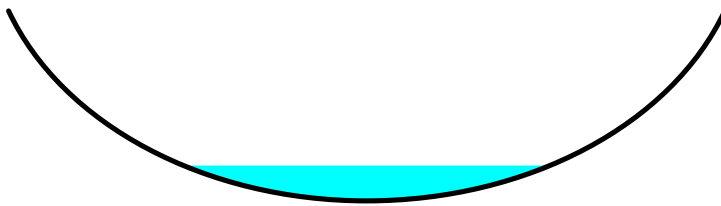
Summary for Reach PS4:

Inflow Area = 0.099 ac, 53.64% Impervious, Inflow Depth = 3.25" for 25-YR event
 Inflow = 0.38 cfs @ 12.09 hrs, Volume= 0.027 af
 Outflow = 0.38 cfs @ 12.10 hrs, Volume= 0.027 af, Atten= 0%, Lag= 0.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 1.77 fps, Min. Travel Time= 0.3 min
 Avg. Velocity = 0.60 fps, Avg. Travel Time= 0.9 min

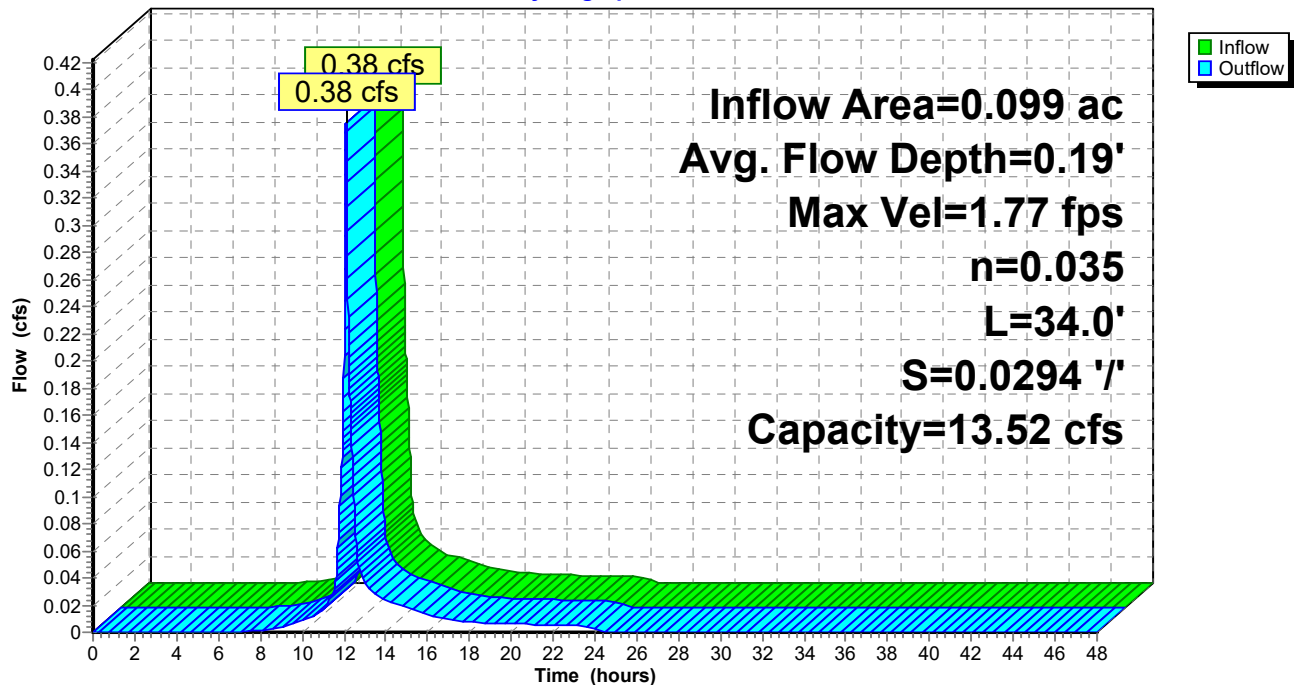
Peak Storage= 7 cf @ 12.09 hrs
 Average Depth at Peak Storage= 0.19'
 Bank-Full Depth= 1.00' Flow Area= 2.7 sf, Capacity= 13.52 cfs

4.00' x 1.00' deep Parabolic Channel, n= 0.035
 Length= 34.0' Slope= 0.0294 '/'
 Inlet Invert= 307.00', Outlet Invert= 306.00'



Reach PS4:

Hydrograph



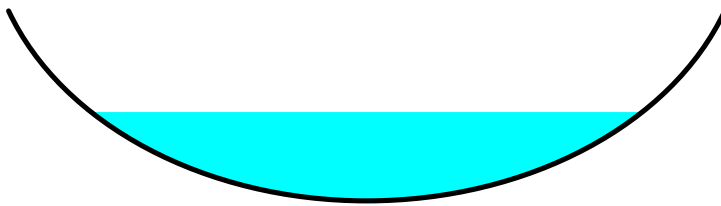
Summary for Reach PS6: (new Reach)

Inflow Area = 0.717 ac, 23.42% Impervious, Inflow Depth = 2.26" for 25-YR event
 Inflow = 1.88 cfs @ 12.09 hrs, Volume= 0.135 af
 Outflow = 1.71 cfs @ 12.18 hrs, Volume= 0.135 af, Atten= 9%, Lag= 5.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 2.02 fps, Min. Travel Time= 3.3 min
 Avg. Velocity = 0.66 fps, Avg. Travel Time= 10.0 min

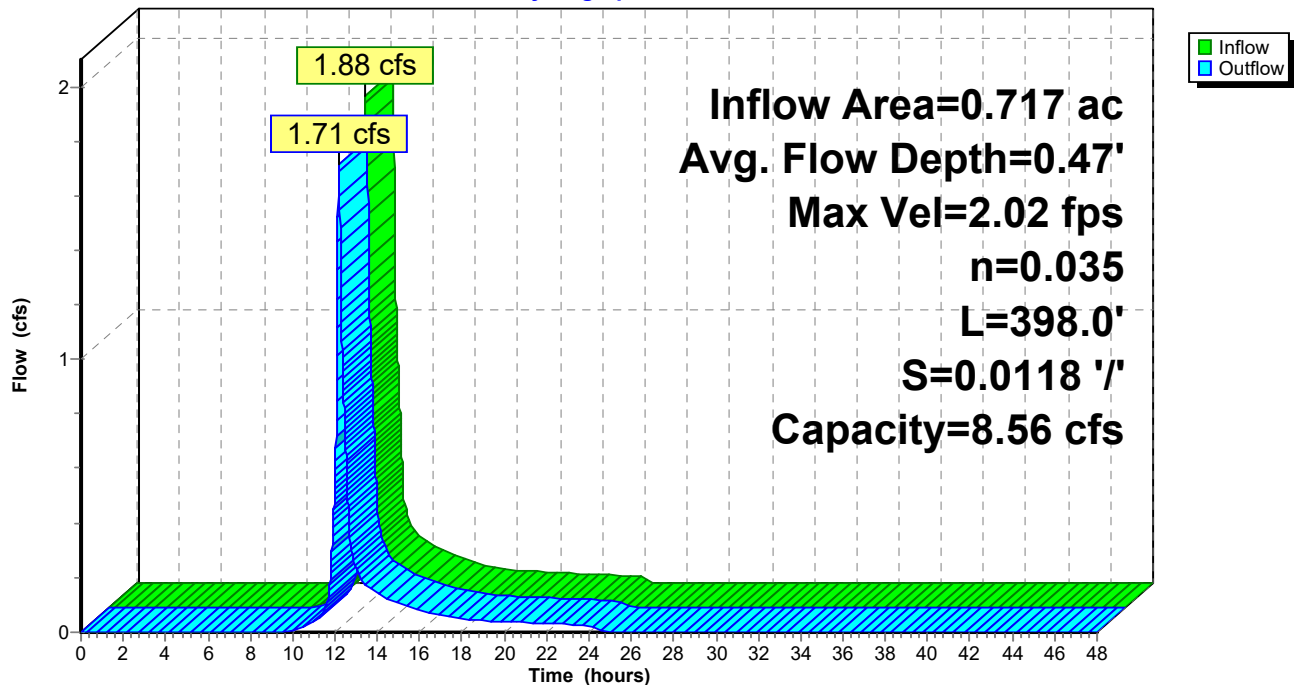
Peak Storage= 338 cf @ 12.13 hrs
 Average Depth at Peak Storage= 0.47'
 Bank-Full Depth= 1.00' Flow Area= 2.7 sf, Capacity= 8.56 cfs

4.00' x 1.00' deep Parabolic Channel, n= 0.035
 Length= 398.0' Slope= 0.0118 '/'
 Inlet Invert= 300.00', Outlet Invert= 295.30'



Reach PS6: (new Reach)

Hydrograph



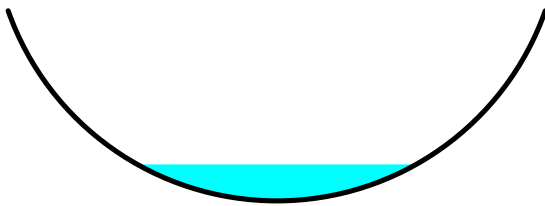
Summary for Reach PS7: (new Reach)

Inflow Area = 0.785 ac, 28.61% Impervious, Inflow Depth = 2.43" for 25-YR event
 Inflow = 2.62 cfs @ 12.02 hrs, Volume= 0.159 af
 Outflow = 2.50 cfs @ 12.06 hrs, Volume= 0.159 af, Atten= 4%, Lag= 2.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 3.78 fps, Min. Travel Time= 1.3 min
 Avg. Velocity = 1.29 fps, Avg. Travel Time= 3.9 min

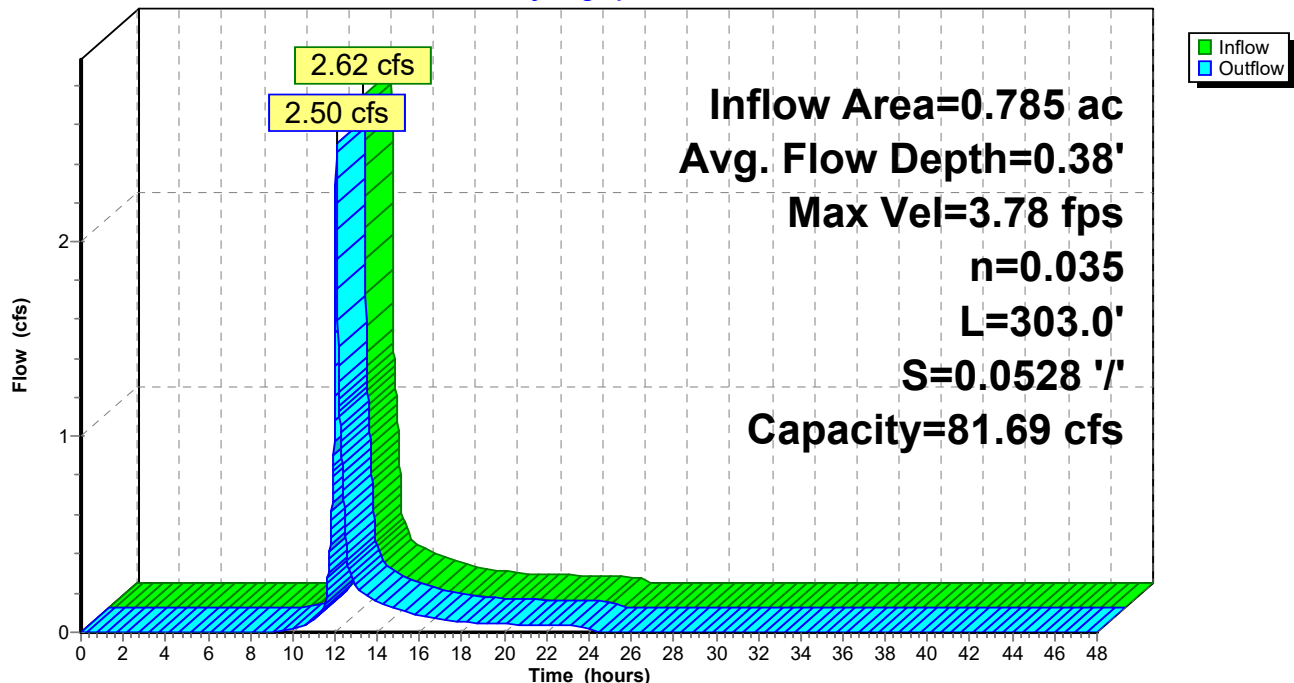
Peak Storage= 201 cf @ 12.04 hrs
 Average Depth at Peak Storage= 0.38'
 Bank-Full Depth= 2.00' Flow Area= 8.0 sf, Capacity= 81.69 cfs

6.00' x 2.00' deep Parabolic Channel, n= 0.035
 Length= 303.0' Slope= 0.0528 '/'
 Inlet Invert= 277.00', Outlet Invert= 261.00'



Reach PS7: (new Reach)

Hydrograph



Summary for Reach PS8: (new Reach)

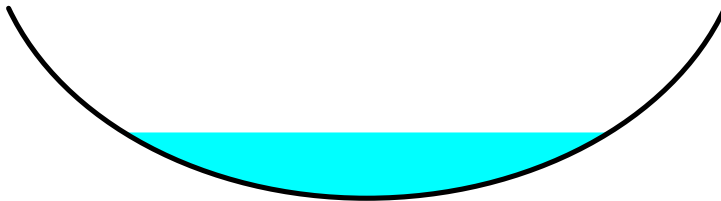
[79] Warning: Submerged Pond MH1 Primary device # 1 INLET by 0.34'

Inflow Area = 6.385 ac, 20.41% Impervious, Inflow Depth = 1.82" for 25-YR event
 Inflow = 8.54 cfs @ 12.09 hrs, Volume= 0.966 af
 Outflow = 8.52 cfs @ 12.10 hrs, Volume= 0.966 af, Atten= 0%, Lag= 0.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 3.94 fps, Min. Travel Time= 0.2 min
 Avg. Velocity = 1.17 fps, Avg. Travel Time= 0.6 min

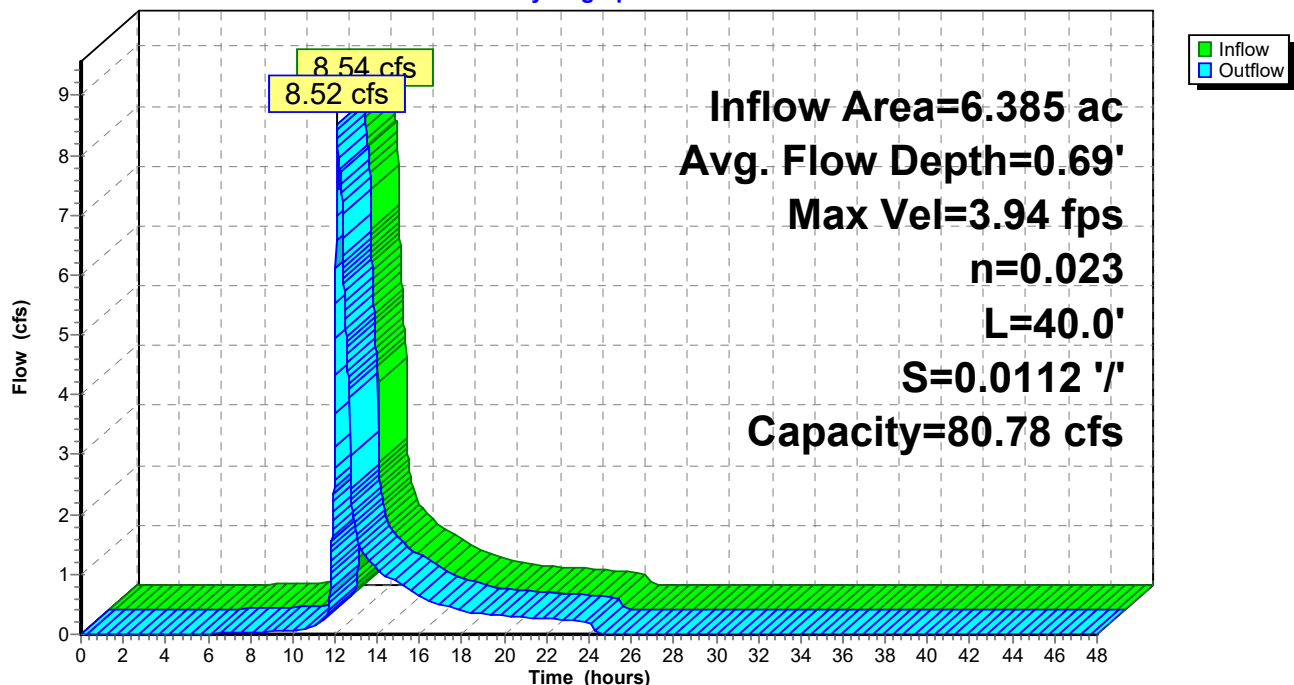
Peak Storage= 87 cf @ 12.10 hrs
 Average Depth at Peak Storage= 0.69'
 Bank-Full Depth= 2.00' Flow Area= 10.7 sf, Capacity= 80.78 cfs

8.00' x 2.00' deep Parabolic Channel, n= 0.023
 Length= 40.0' Slope= 0.0112 '/'
 Inlet Invert= 260.95', Outlet Invert= 260.50'



Reach PS8: (new Reach)

Hydrograph



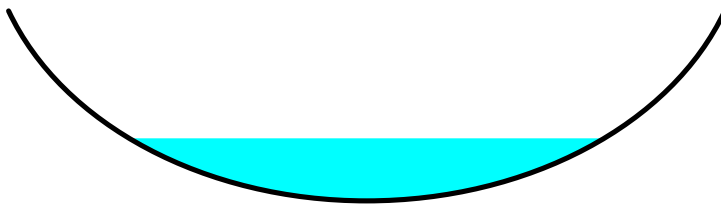
Summary for Reach PS9: (new Reach)

Inflow Area = 0.288 ac, 25.48% Impervious, Inflow Depth = 3.16" for 25-YR event
 Inflow = 1.07 cfs @ 12.09 hrs, Volume= 0.076 af
 Outflow = 1.06 cfs @ 12.10 hrs, Volume= 0.076 af, Atten= 0%, Lag= 1.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 2.11 fps, Min. Travel Time= 0.6 min
 Avg. Velocity = 0.71 fps, Avg. Travel Time= 1.8 min

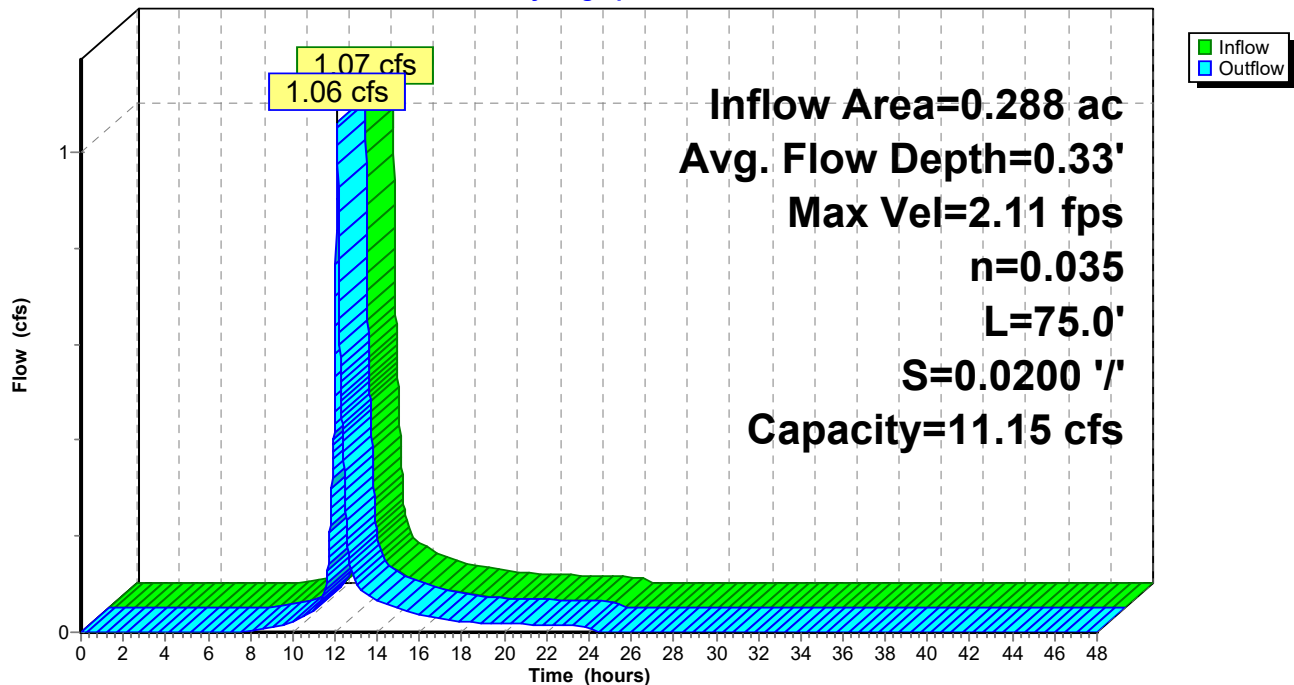
Peak Storage= 38 cf @ 12.10 hrs
 Average Depth at Peak Storage= 0.33'
 Bank-Full Depth= 1.00' Flow Area= 2.7 sf, Capacity= 11.15 cfs

4.00' x 1.00' deep Parabolic Channel, n= 0.035
 Length= 75.0' Slope= 0.0200 '/
 Inlet Invert= 259.25', Outlet Invert= 257.75'



Reach PS9: (new Reach)

Hydrograph



Summary for Pond 1P: (new Pond)

[57] Hint: Peaked at 301.74' (Flood elevation advised)

[63] Warning: Exceeded Reach 9R INLET depth by 3.60' @ 12.04 hrs

Inflow Area = 0.366 ac, 37.66% Impervious, Inflow Depth = 2.12" for 25-YR event
 Inflow = 0.78 cfs @ 12.11 hrs, Volume= 0.065 af
 Outflow = 0.78 cfs @ 12.11 hrs, Volume= 0.065 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.78 cfs @ 12.11 hrs, Volume= 0.065 af

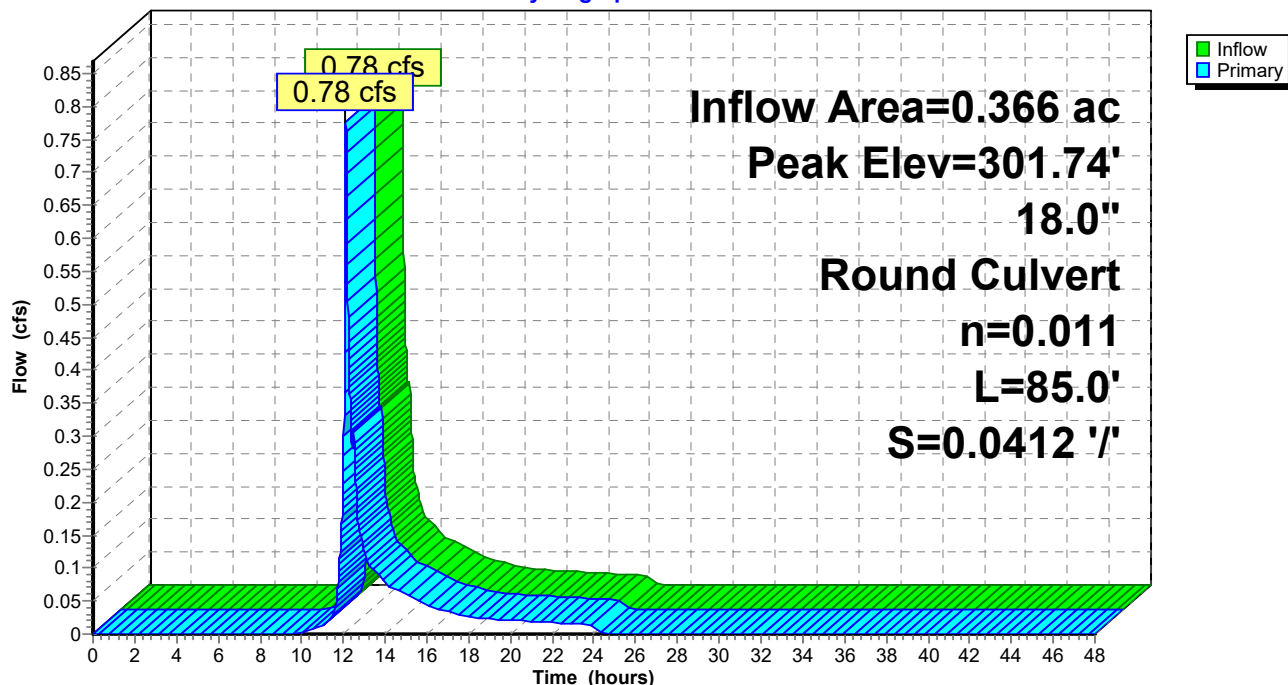
Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 301.74' @ 12.11 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	301.30'	18.0" Round Culvert L= 85.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 301.30' / 297.80' S= 0.0412 '/ Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=0.77 cfs @ 12.11 hrs HW=301.74' (Free Discharge)
 ↳ **1=Culvert** (Inlet Controls 0.77 cfs @ 1.79 fps)

Pond 1P: (new Pond)

Hydrograph



Summary for Pond 2P: (new Pond)

[57] Hint: Peaked at 298.53' (Flood elevation advised)
 [62] Hint: Exceeded Reach 11R OUTLET depth by 0.03' @ 12.36 hrs
 [79] Warning: Submerged Pond 1P Primary device # 1 OUTLET by 0.73'

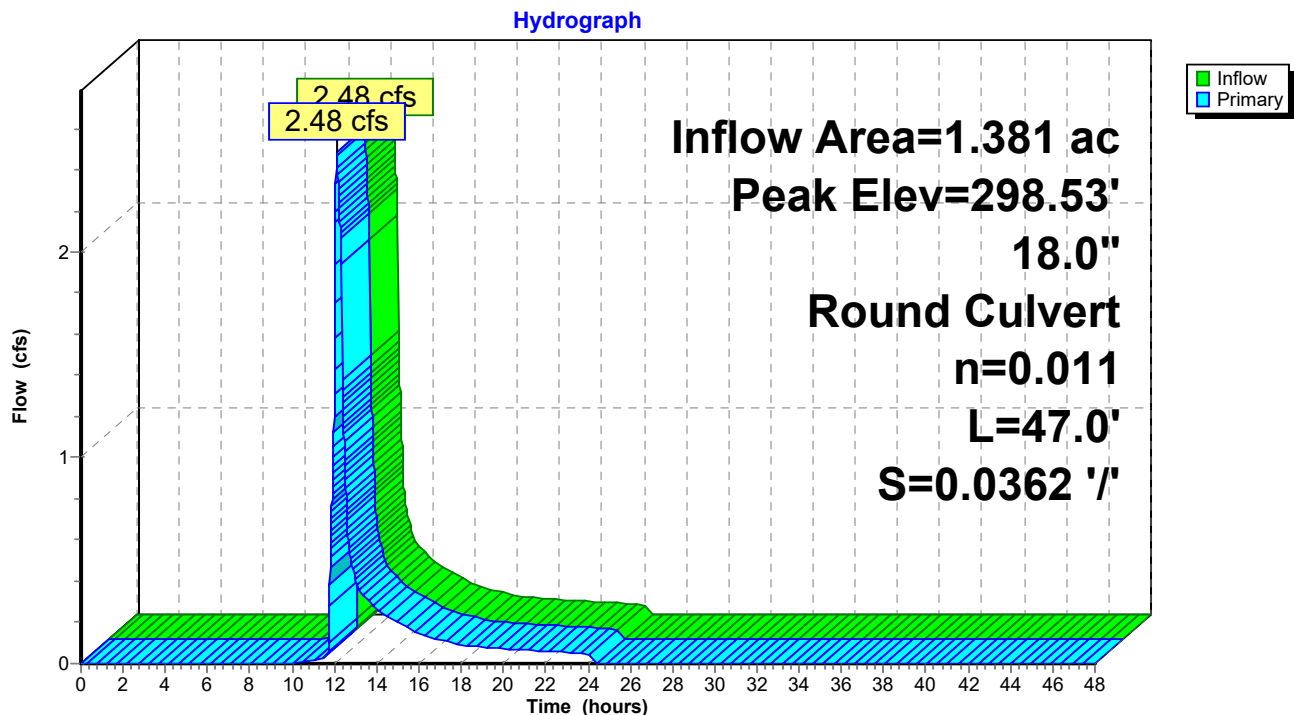
Inflow Area = 1.381 ac, 24.37% Impervious, Inflow Depth = 2.02" for 25-YR event
 Inflow = 2.48 cfs @ 12.11 hrs, Volume= 0.232 af
 Outflow = 2.48 cfs @ 12.11 hrs, Volume= 0.232 af, Atten= 0%, Lag= 0.0 min
 Primary = 2.48 cfs @ 12.11 hrs, Volume= 0.232 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 298.53' @ 12.11 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	297.70'	18.0" Round Culvert L= 47.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 297.70' / 296.00' S= 0.0362 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=2.48 cfs @ 12.11 hrs HW=298.53' (Free Discharge)
 ↑1=Culvert (Inlet Controls 2.48 cfs @ 2.46 fps)

Pond 2P: (new Pond)



Summary for Pond 3P: MH2B

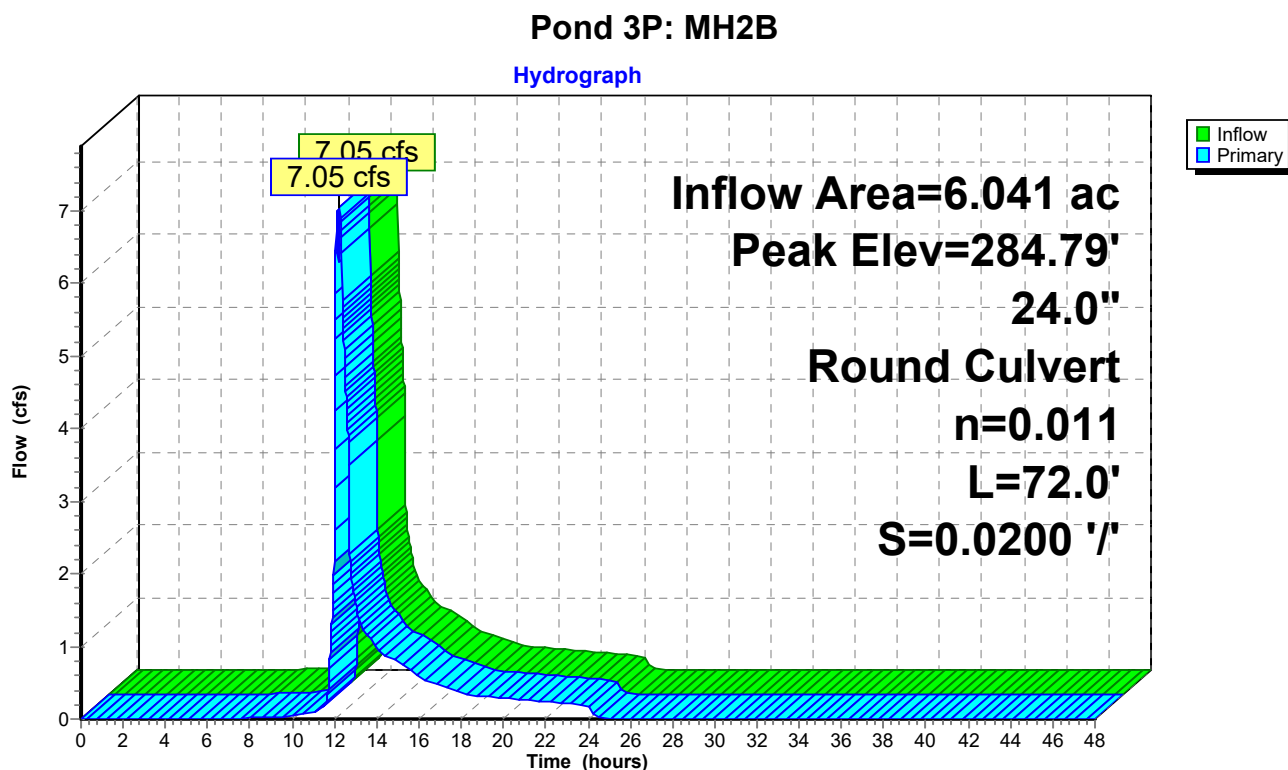
[57] Hint: Peaked at 284.79' (Flood elevation advised)

Inflow Area = 6.041 ac, 17.09% Impervious, Inflow Depth = 1.71" for 25-YR event
 Inflow = 7.05 cfs @ 12.26 hrs, Volume= 0.859 af
 Outflow = 7.05 cfs @ 12.26 hrs, Volume= 0.859 af, Atten= 0%, Lag= 0.0 min
 Primary = 7.05 cfs @ 12.26 hrs, Volume= 0.859 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 284.79' @ 12.26 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	283.44'	24.0" Round 2B L= 72.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 283.44' / 282.00' S= 0.0200 '/ Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=7.04 cfs @ 12.26 hrs HW=284.79' (Free Discharge)
 ↳ **1=2B** (Inlet Controls 7.04 cfs @ 3.12 fps)



Summary for Pond 4P: Constructed Wetland

[62] Hint: Exceeded Reach 1R OUTLET depth by 0.24' @ 12.57 hrs

[61] Hint: Exceeded Reach PS8 outlet invert by 0.09' @ 12.36 hrs

Inflow Area = 8.295 ac, 21.89% Impervious, Inflow Depth = 2.00" for 25-YR event
 Inflow = 13.82 cfs @ 12.09 hrs, Volume= 1.381 af
 Outflow = 8.87 cfs @ 12.36 hrs, Volume= 1.380 af, Atten= 36%, Lag= 16.0 min
 Primary = 8.87 cfs @ 12.36 hrs, Volume= 1.380 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Starting Elev= 258.30' Surf.Area= 5,072 sf Storage= 7,845 cf
 Peak Elev= 260.59' @ 12.36 hrs Surf.Area= 8,491 sf Storage= 23,598 cf (15,753 cf above start)

Plug-Flow detention time= 286.0 min calculated for 1.200 af (87% of inflow)
 Center-of-Mass det. time= 178.0 min (1,033.4 - 855.4)

Volume	Invert	Avail.Storage	Storage Description
#1	254.00'	37,037 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
254.00	729	0	0
255.00	972	851	851
256.00	1,244	1,108	1,959
257.00	1,541	1,393	3,351
258.00	4,558	3,050	6,401
258.30	5,072	1,445	7,845
259.00	6,345	3,996	11,841
260.00	7,660	7,003	18,843
261.00	9,072	8,366	27,209
262.00	10,584	9,828	37,037

Device	Routing	Invert	Outlet Devices
#1	Primary	258.30'	30.0" Round Culvert L= 30.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 258.30' / 258.00' S= 0.0100 1' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 4.91 sf
#2	Device 1	260.30'	48.0" x 48.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Device 1	258.30'	0.5" Vert. Orifice/Grate X 2.00 columns X 4 rows with 5.0" cc spacing C= 0.600
#4	Device 1	258.30'	4.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#5	Secondary	260.90'	22.0' long x 12.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

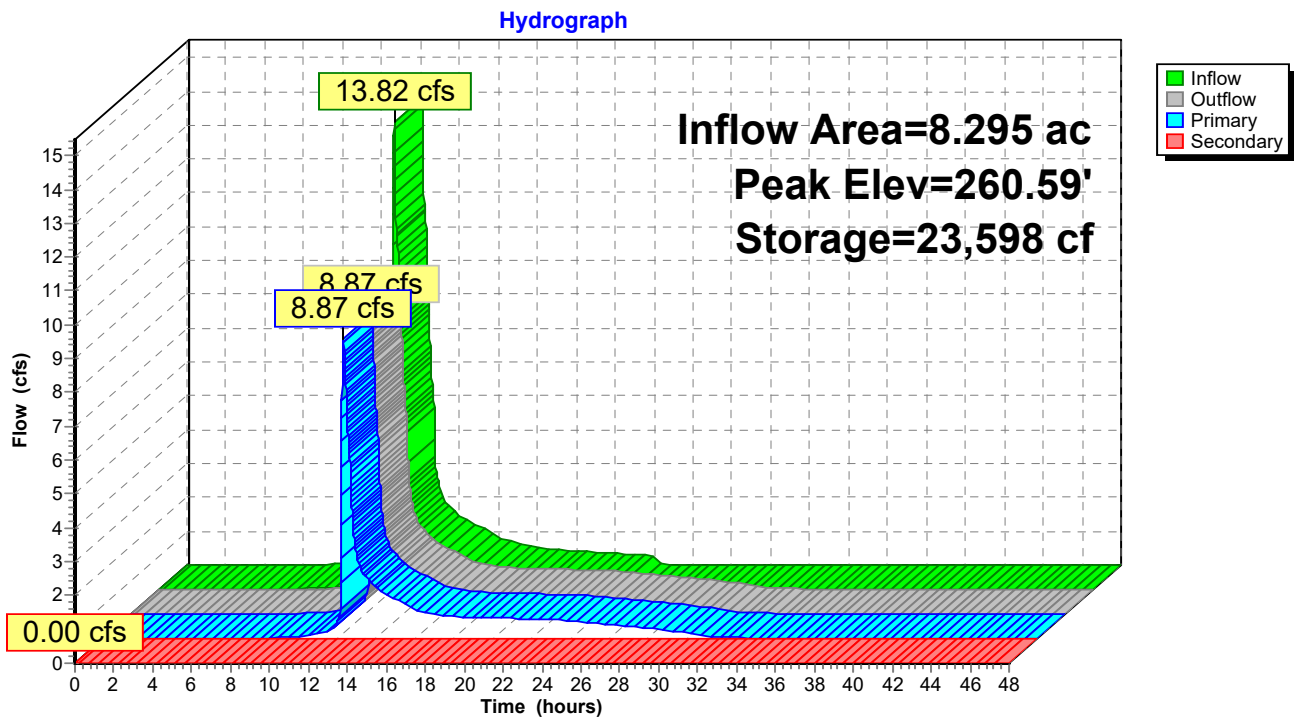
Primary OutFlow Max=8.81 cfs @ 12.36 hrs HW=260.59' (Free Discharge)

- 1=Culvert (Passes 8.81 cfs of 19.41 cfs potential flow)
- 2=Orifice/Grate (Weir Controls 8.11 cfs @ 1.76 fps)
- 3=Orifice/Grate (Orifice Controls 0.07 cfs @ 6.11 fps)
- 4=Orifice/Grate (Orifice Controls 0.64 cfs @ 7.28 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=258.30' (Free Discharge)

- 5=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 4P: Constructed Wetland



Summary for Pond 5P: MH2A

[57] Hint: Peaked at 278.85' (Flood elevation advised)

Inflow Area = 6.269 ac, 18.94% Impervious, Inflow Depth = 1.76" for 25-YR event
 Inflow = 7.92 cfs @ 12.10 hrs, Volume= 0.917 af
 Outflow = 7.92 cfs @ 12.10 hrs, Volume= 0.917 af, Atten= 0%, Lag= 0.0 min
 Primary = 7.92 cfs @ 12.10 hrs, Volume= 0.917 af

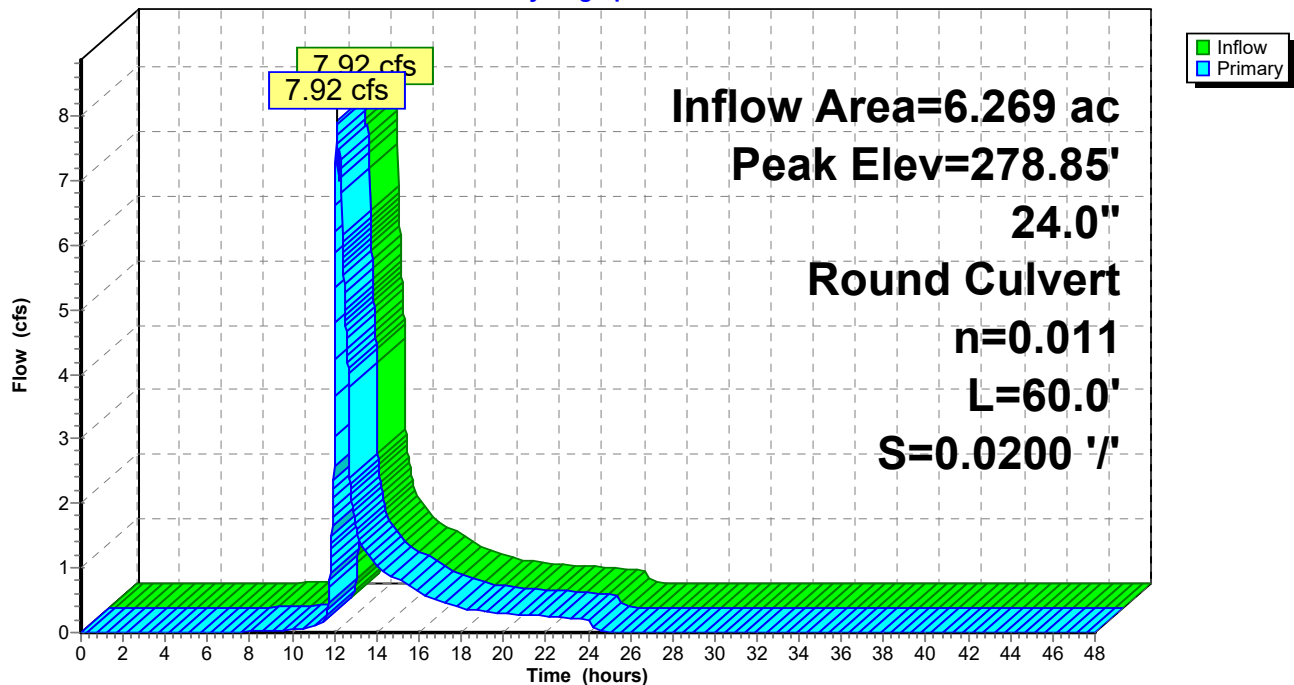
Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 278.85' @ 12.10 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	277.40'	24.0" Round Culvert L= 60.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 277.40' / 276.20' S= 0.0200 '/ Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=7.91 cfs @ 12.10 hrs HW=278.85' (Free Discharge)
 ↑1=Culvert (Inlet Controls 7.91 cfs @ 3.24 fps)

Pond 5P: MH2A

Hydrograph



Summary for Pond 20P: (new Pond)

[57] Hint: Peaked at 266.08' (Flood elevation advised)

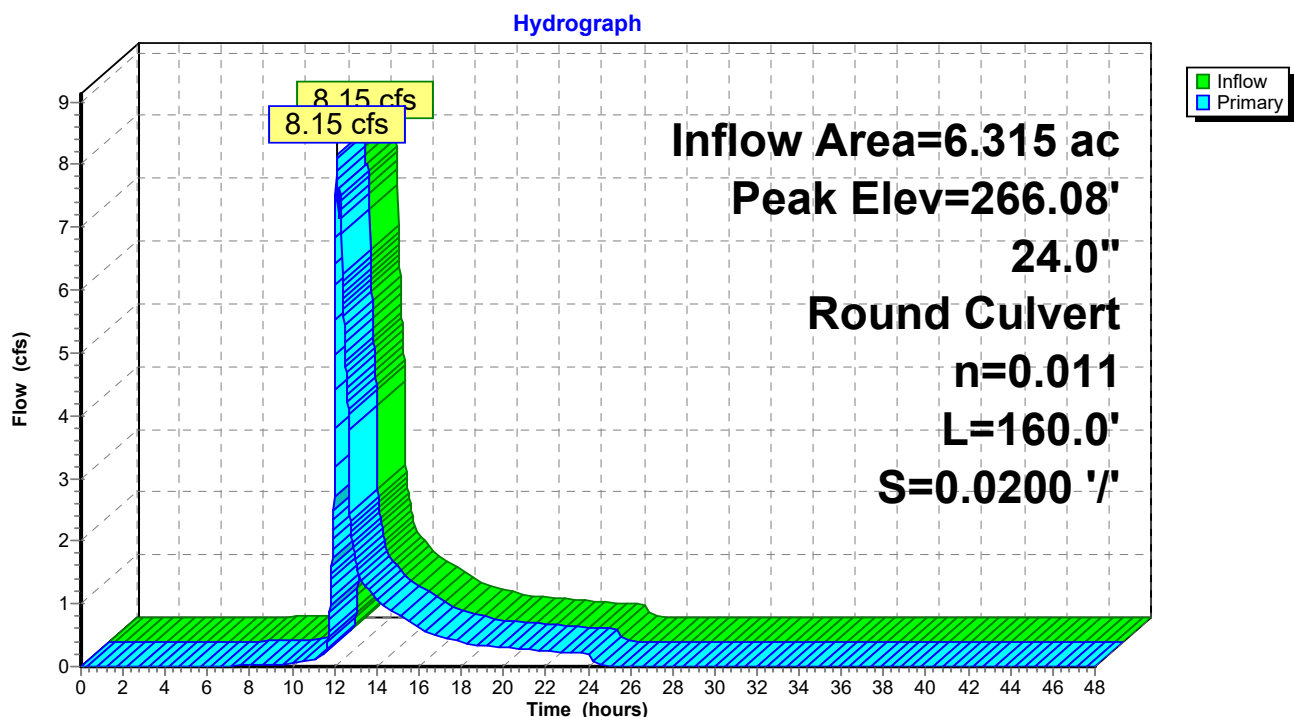
Inflow Area = 6.315 ac, 19.53% Impervious, Inflow Depth = 1.78" for 25-YR event
 Inflow = 8.15 cfs @ 12.10 hrs, Volume= 0.936 af
 Outflow = 8.15 cfs @ 12.10 hrs, Volume= 0.936 af, Atten= 0%, Lag= 0.0 min
 Primary = 8.15 cfs @ 12.10 hrs, Volume= 0.936 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 266.08' @ 12.10 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	264.60'	24.0" Round Culvert L= 160.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 264.60' / 261.40' S= 0.0200 '/ Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=8.15 cfs @ 12.10 hrs HW=266.08' (Free Discharge)
 ↑1=Culvert (Inlet Controls 8.15 cfs @ 3.27 fps)

Pond 20P: (new Pond)



Summary for Pond BS: Bus Station RG

[63] Warning: Exceeded Reach CB1 INLET depth by 0.30' @ 24.71 hrs

Inflow Area = 0.554 ac, 36.99% Impervious, Inflow Depth = 3.47" for 25-YR event
 Inflow = 2.15 cfs @ 12.10 hrs, Volume= 0.160 af
 Outflow = 2.11 cfs @ 12.11 hrs, Volume= 0.117 af, Atten= 2%, Lag= 0.9 min
 Primary = 2.11 cfs @ 12.11 hrs, Volume= 0.117 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 257.57' @ 12.11 hrs Surf.Area= 0 sf Storage= 2,058 cf

Plug-Flow detention time= 154.1 min calculated for 0.117 af (73% of inflow)
 Center-of-Mass det. time= 61.9 min (863.1 - 801.2)

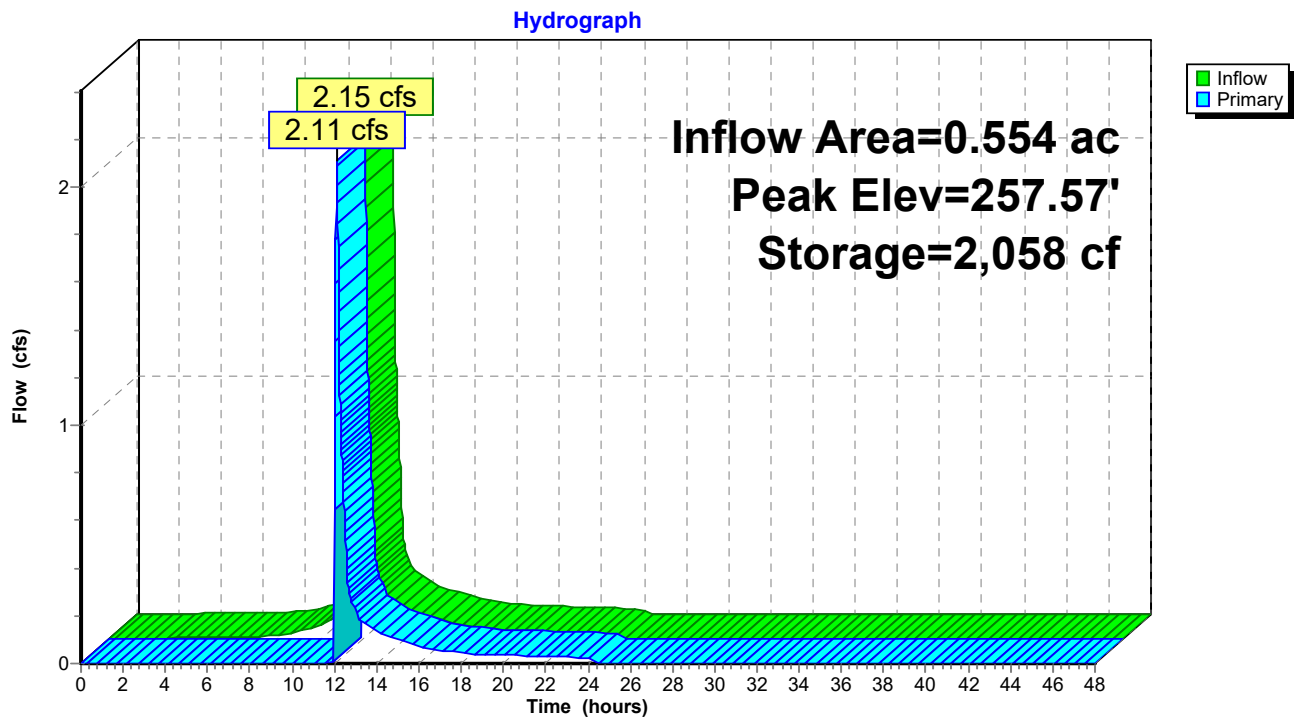
Volume	Invert	Avail.Storage	Storage Description
#1	254.47'	2,201 cf	Custom Stage Data Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
254.47	0	0
254.80	122	122
255.05	92	214
256.05	367	581
256.30	92	673
257.30	1,222	1,895
257.80	306	2,201

Device	Routing	Invert	Outlet Devices
#1	Primary	257.30'	18.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=2.11 cfs @ 12.11 hrs HW=257.57' (Free Discharge)
 ↑1=Orifice/Grate (Weir Controls 2.11 cfs @ 1.68 fps)

Pond BS: Bus Station RG



Summary for Pond CB2: (new Pond)

[57] Hint: Peaked at 262.35' (Flood elevation advised)

Inflow Area = 0.070 ac, 100.00% Impervious, Inflow Depth = 5.06" for 25-YR event
 Inflow = 0.37 cfs @ 12.08 hrs, Volume= 0.030 af
 Outflow = 0.37 cfs @ 12.08 hrs, Volume= 0.030 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.37 cfs @ 12.08 hrs, Volume= 0.030 af

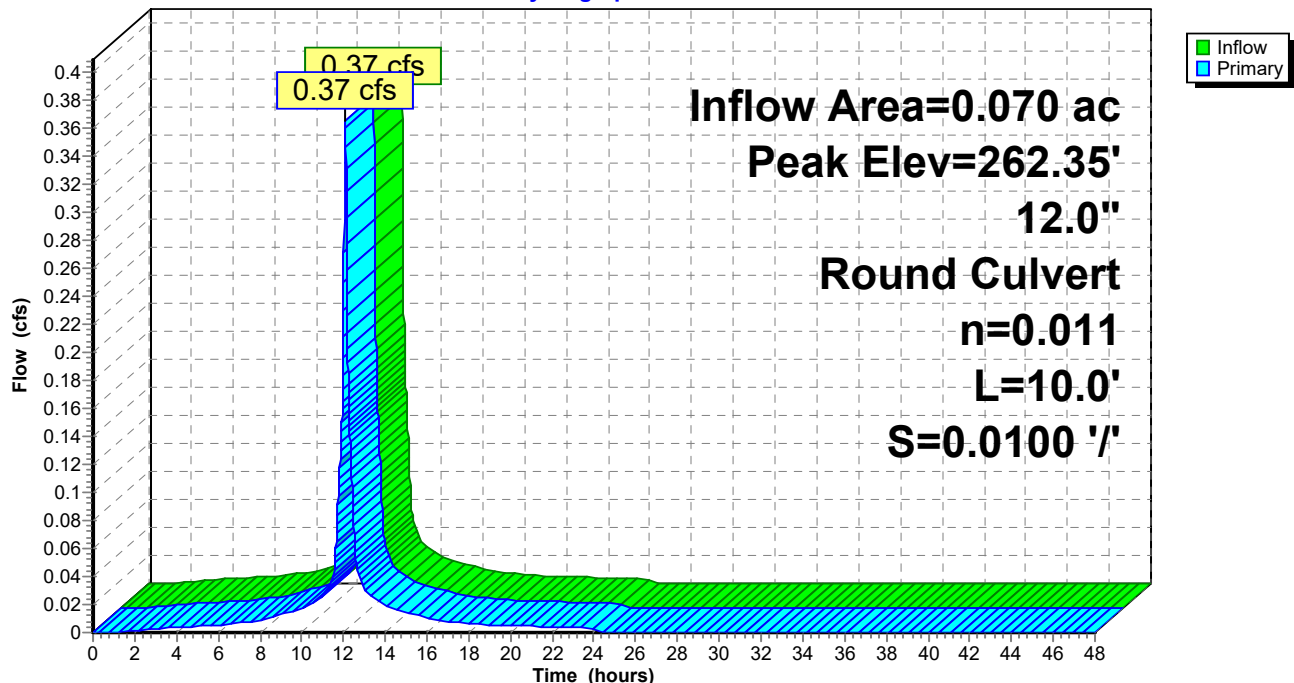
Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 262.35' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	262.00'	12.0" Round Culvert L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 262.00' / 261.90' S= 0.0100 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.36 cfs @ 12.08 hrs HW=262.34' (Free Discharge)
 ↑1=Culvert (Barrel Controls 0.36 cfs @ 2.26 fps)

Pond CB2: (new Pond)

Hydrograph



Summary for Pond CB3: (new Pond)

[57] Hint: Peaked at 277.47' (Flood elevation advised)

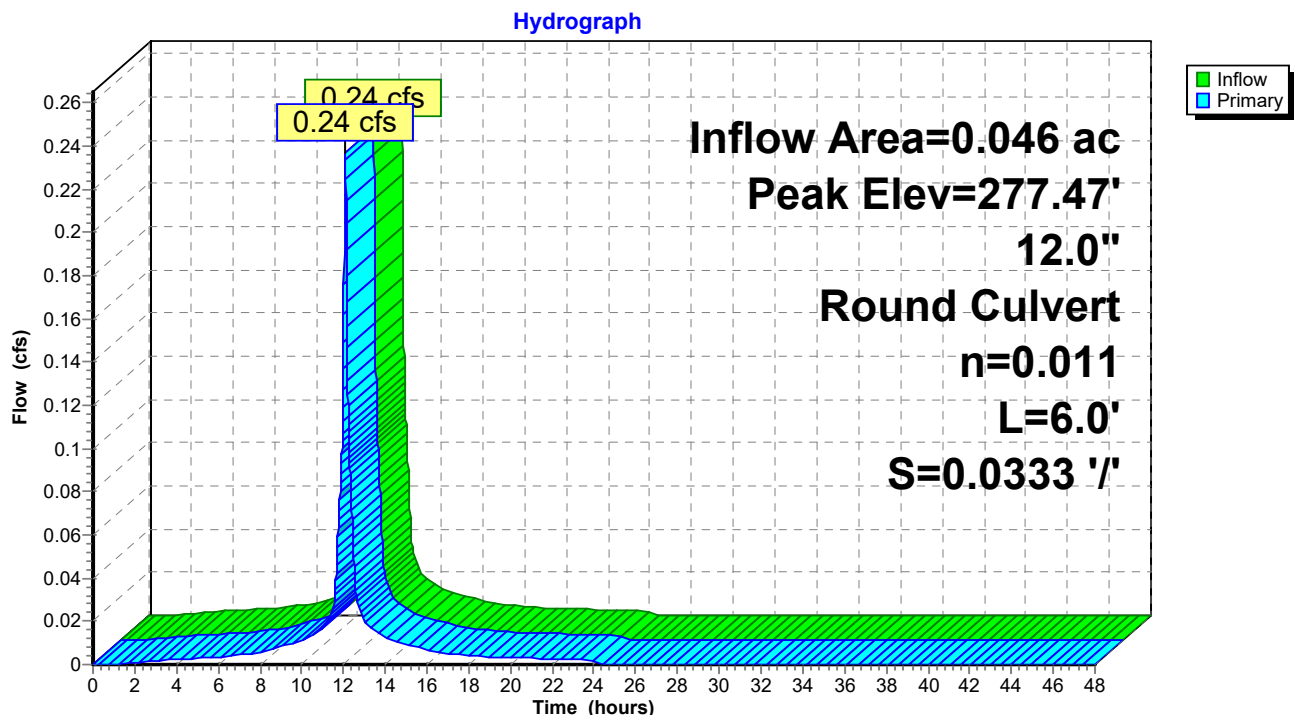
Inflow Area = 0.046 ac, 100.00% Impervious, Inflow Depth = 5.06" for 25-YR event
 Inflow = 0.24 cfs @ 12.08 hrs, Volume= 0.019 af
 Outflow = 0.24 cfs @ 12.08 hrs, Volume= 0.019 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.24 cfs @ 12.08 hrs, Volume= 0.019 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 277.47' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	277.20'	12.0" Round Culvert L= 6.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 277.20' / 277.00' S= 0.0333 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.24 cfs @ 12.08 hrs HW=277.47' (Free Discharge)
 ↑ **1=Culvert** (Inlet Controls 0.24 cfs @ 1.39 fps)

Pond CB3: (new Pond)



Summary for Pond CB4: (new Pond)

[57] Hint: Peaked at 294.18' (Flood elevation advised)

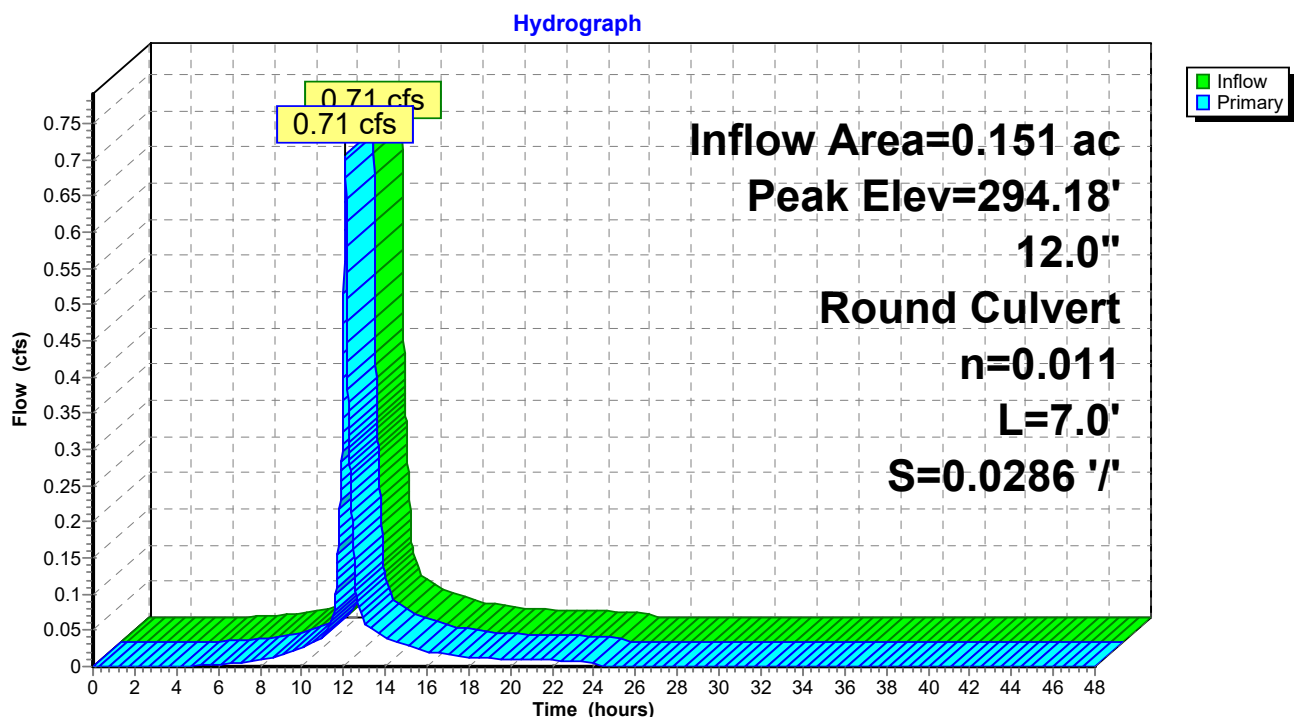
Inflow Area = 0.151 ac, 79.05% Impervious, Inflow Depth = 4.17" for 25-YR event
 Inflow = 0.71 cfs @ 12.08 hrs, Volume= 0.052 af
 Outflow = 0.71 cfs @ 12.08 hrs, Volume= 0.052 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.71 cfs @ 12.08 hrs, Volume= 0.052 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 294.18' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	293.70'	12.0" Round Culvert L= 7.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 293.70' / 293.50' S= 0.0286 '/ S= 0.0286 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.71 cfs @ 12.08 hrs HW=294.18' (Free Discharge)
 ↑1=Culvert (Inlet Controls 0.71 cfs @ 1.87 fps)

Pond CB4: (new Pond)



Summary for Pond CB5: (new Pond)

[57] Hint: Peaked at 294.50' (Flood elevation advised)

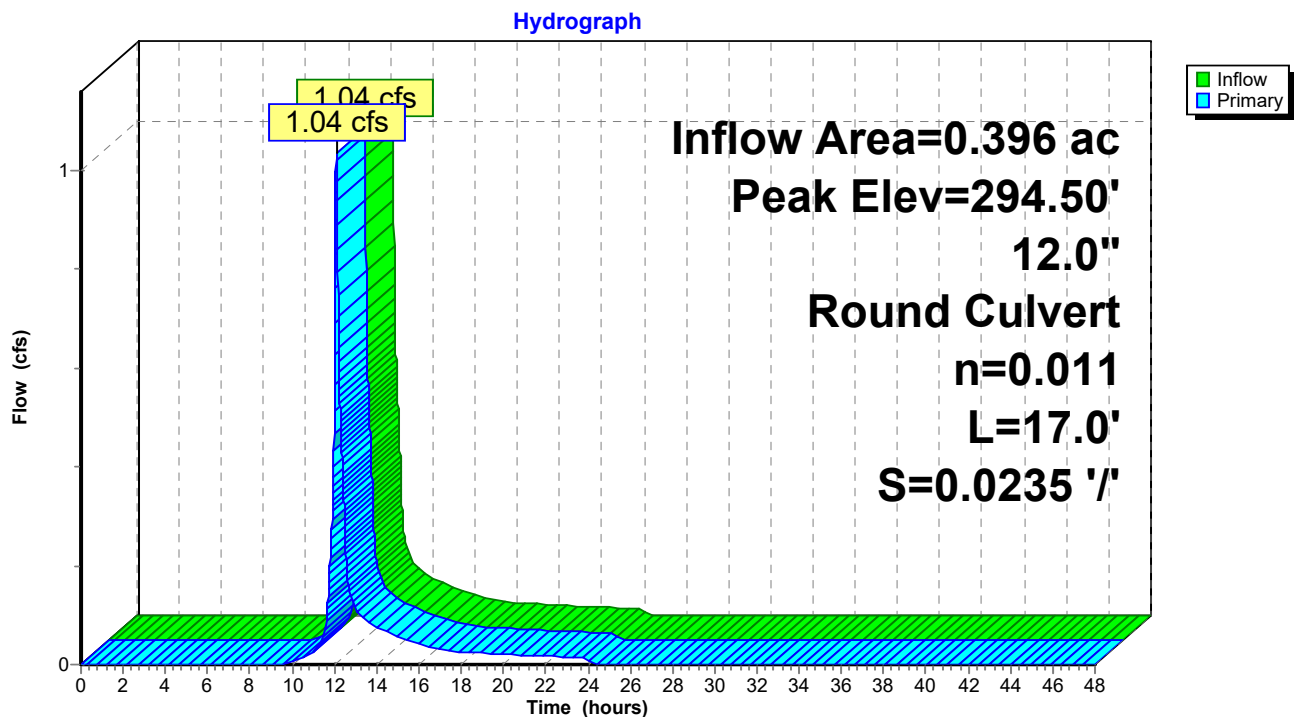
Inflow Area = 0.396 ac, 24.31% Impervious, Inflow Depth = 2.26" for 25-YR event
 Inflow = 1.04 cfs @ 12.09 hrs, Volume= 0.075 af
 Outflow = 1.04 cfs @ 12.09 hrs, Volume= 0.075 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.04 cfs @ 12.09 hrs, Volume= 0.075 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 294.50' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	293.90'	12.0" Round Culvert L= 17.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 293.90' / 293.50' S= 0.0235 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.03 cfs @ 12.09 hrs HW=294.50' (Free Discharge)
 ↑1=Culvert (Inlet Controls 1.03 cfs @ 2.09 fps)

Pond CB5: (new Pond)



Summary for Pond CULdeSAC: Cul-de-sac

Inflow Area = 0.243 ac, 29.57% Impervious, Inflow Depth = 2.43" for 25-YR event
 Inflow = 0.69 cfs @ 12.09 hrs, Volume= 0.049 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 299.89' @ 24.34 hrs Surf.Area= 0 sf Storage= 2,146 cf
 Flood Elev= 300.00' Surf.Area= 0 sf Storage= 2,622 cf

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

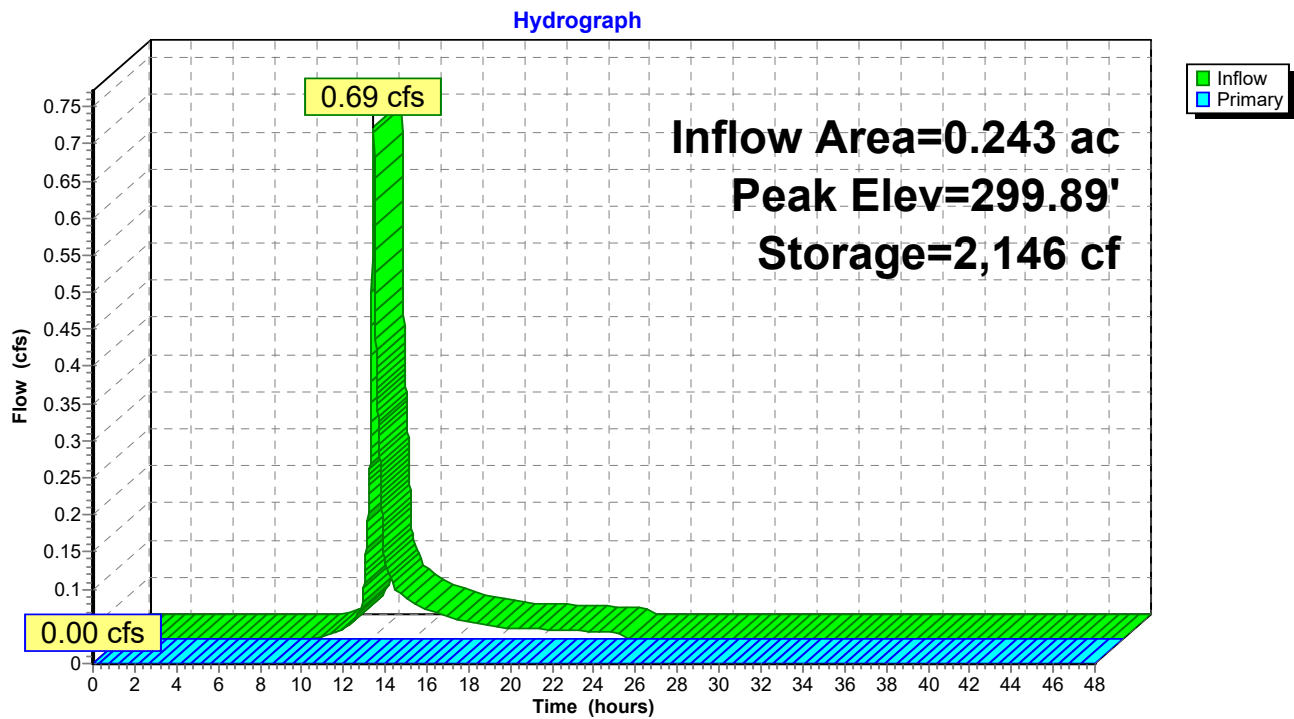
Volume	Invert	Avail.Storage	Storage Description
#1	297.92'	4,394 cf	Custom Stage Data Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
297.92	0	0
298.25	283	283
298.50	213	496
299.50	850	1,346
299.75	213	1,559
300.25	2,126	3,685
300.50	709	4,394

Device	Routing	Invert	Outlet Devices
#1	Primary	300.25'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=297.92' (Free Discharge)
 ↑ **1=Orifice/Grate** (Controls 0.00 cfs)

Pond CULdeSAC: Cul-de-sac



Summary for Pond MH1: (new Pond)

[57] Hint: Peaked at 262.65' (Flood elevation advised)
 [79] Warning: Submerged Pond 20P Primary device # 1 OUTLET by 1.24'
 [81] Warning: Exceeded Pond CB2 by 0.36' @ 12.26 hrs

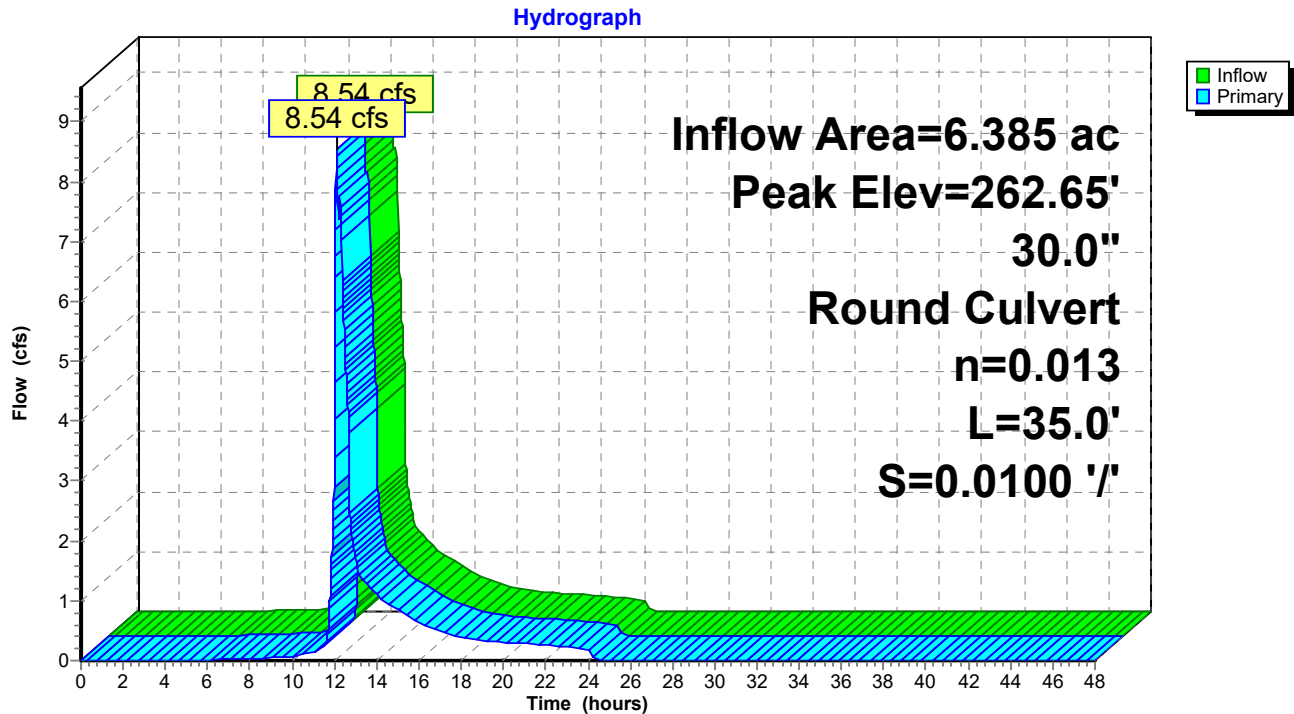
Inflow Area = 6.385 ac, 20.41% Impervious, Inflow Depth = 1.82" for 25-YR event
 Inflow = 8.54 cfs @ 12.09 hrs, Volume= 0.966 af
 Outflow = 8.54 cfs @ 12.09 hrs, Volume= 0.966 af, Atten= 0%, Lag= 0.0 min
 Primary = 8.54 cfs @ 12.09 hrs, Volume= 0.966 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 262.65' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	261.30'	30.0" Round Culvert L= 35.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 261.30' / 260.95' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 4.91 sf

Primary OutFlow Max=8.51 cfs @ 12.09 hrs HW=262.64' (Free Discharge)
 ↳ **1=Culvert** (Barrel Controls 8.51 cfs @ 4.59 fps)

Pond MH1: (new Pond)



Summary for Pond MH2: (new Pond)

[57] Hint: Peaked at 271.98' (Flood elevation advised)

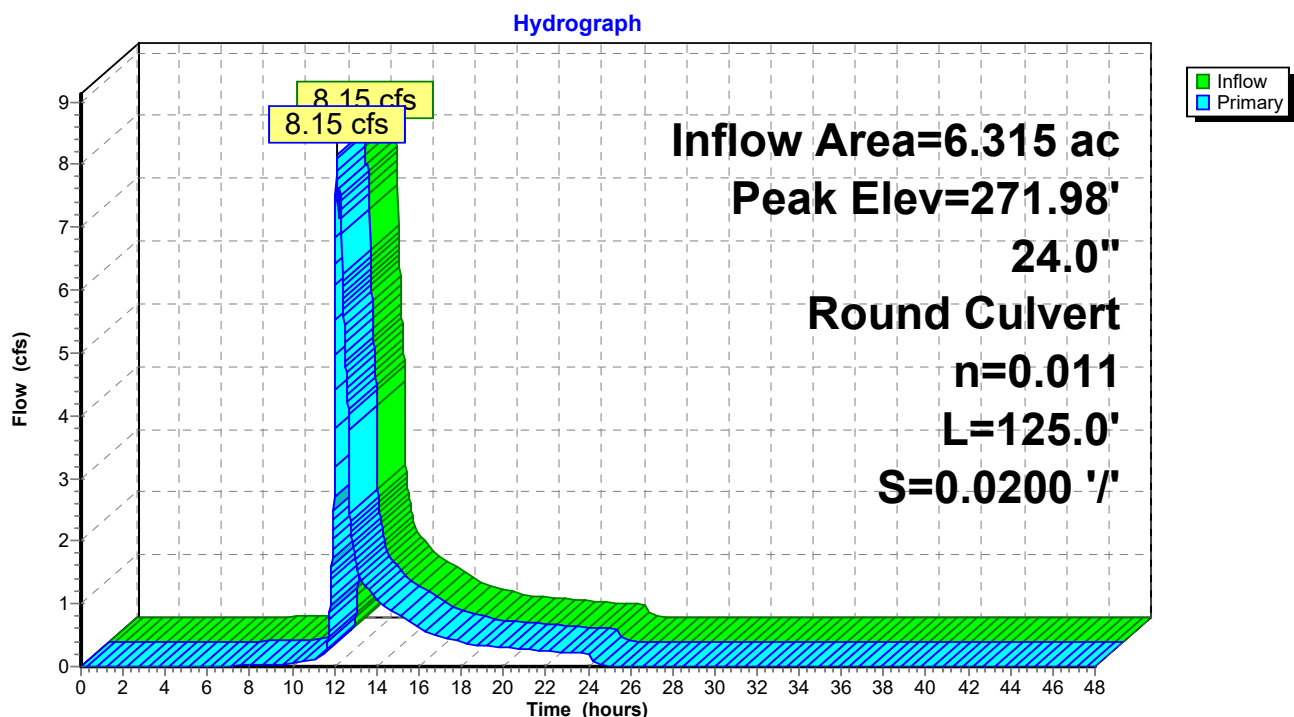
Inflow Area = 6.315 ac, 19.53% Impervious, Inflow Depth = 1.78" for 25-YR event
 Inflow = 8.15 cfs @ 12.10 hrs, Volume= 0.936 af
 Outflow = 8.15 cfs @ 12.10 hrs, Volume= 0.936 af, Atten= 0%, Lag= 0.0 min
 Primary = 8.15 cfs @ 12.10 hrs, Volume= 0.936 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 271.98' @ 12.10 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	270.50'	24.0" Round Culvert L= 125.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 270.50' / 268.00' S= 0.0200 '/ Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=8.15 cfs @ 12.10 hrs HW=271.98' (Free Discharge)
 ↑1=Culvert (Inlet Controls 8.15 cfs @ 3.27 fps)

Pond MH2: (new Pond)



Summary for Pond MH3: (new Pond)

[57] Hint: Peaked at 290.41' (Flood elevation advised)

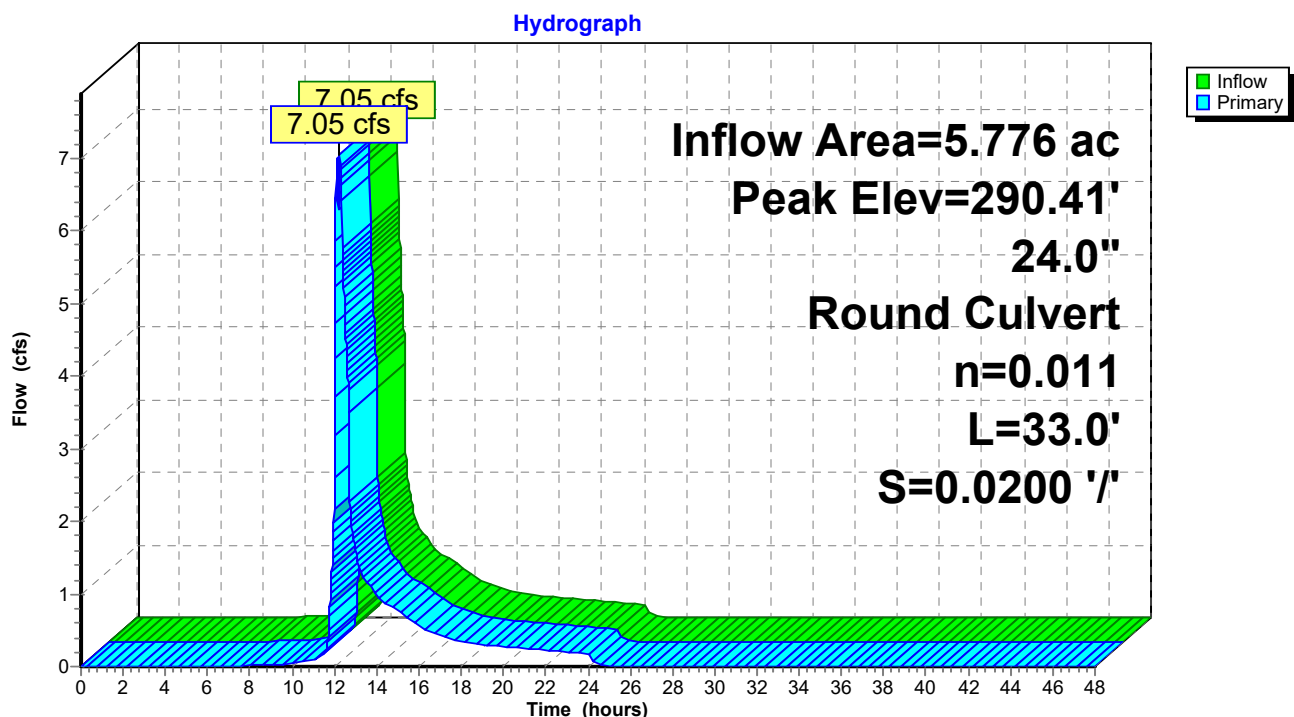
Inflow Area = 5.776 ac, 17.87% Impervious, Inflow Depth = 1.76" for 25-YR event
 Inflow = 7.05 cfs @ 12.26 hrs, Volume= 0.848 af
 Outflow = 7.05 cfs @ 12.26 hrs, Volume= 0.848 af, Atten= 0%, Lag= 0.0 min
 Primary = 7.05 cfs @ 12.26 hrs, Volume= 0.848 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 290.41' @ 12.26 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	289.06'	24.0" Round Culvert L= 33.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 289.06' / 288.40' S= 0.0200 '/ Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf

Primary OutFlow Max=7.04 cfs @ 12.26 hrs HW=290.41' (Free Discharge)
 1=Culvert (Inlet Controls 7.04 cfs @ 3.12 fps)

Pond MH3: (new Pond)



Summary for Pond MH4:

[57] Hint: Peaked at 300.21' (Flood elevation advised)

Inflow Area = 0.213 ac, 50.94% Impervious, Inflow Depth = 1.36" for 25-YR event
 Inflow = 0.18 cfs @ 12.11 hrs, Volume= 0.024 af
 Outflow = 0.18 cfs @ 12.11 hrs, Volume= 0.024 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.18 cfs @ 12.11 hrs, Volume= 0.024 af

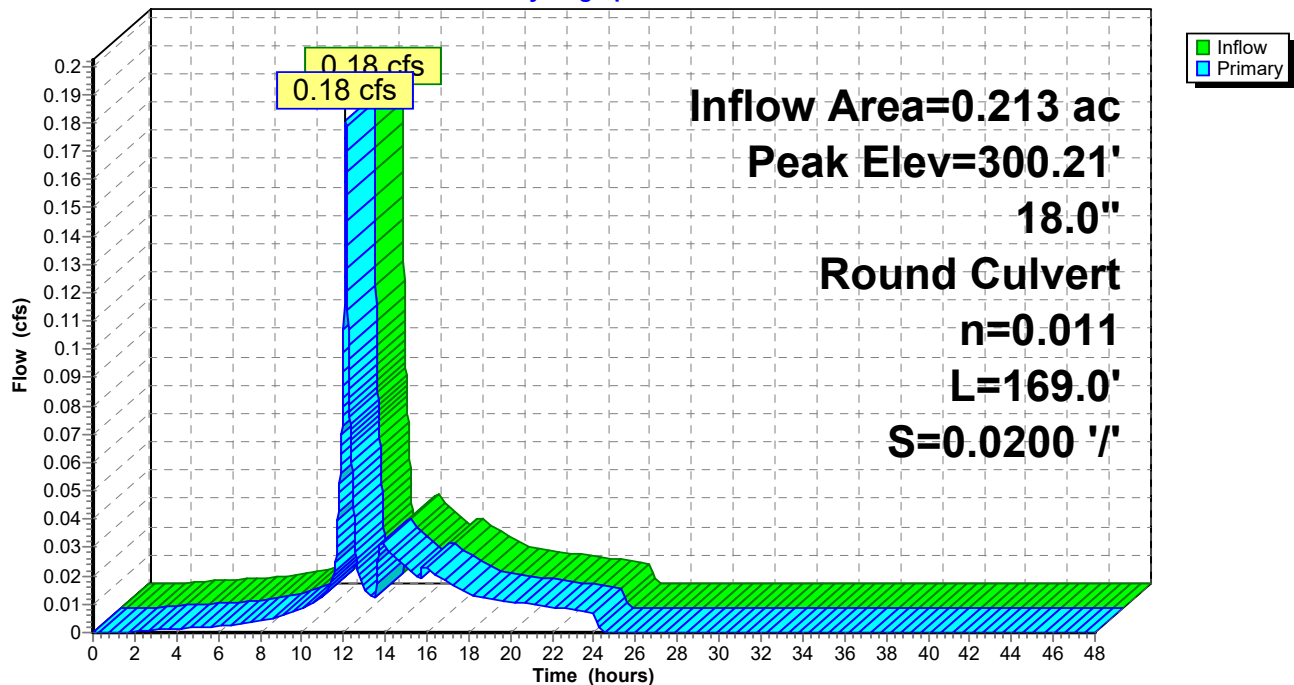
Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 300.21' @ 12.11 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	300.00'	18.0" Round Culvert L= 169.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 300.00' / 296.62' S= 0.0200 '/ Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=0.18 cfs @ 12.11 hrs HW=300.21' (Free Discharge)
 ↑1=Culvert (Inlet Controls 0.18 cfs @ 1.22 fps)

Pond MH4:

Hydrograph



Summary for Pond MH5:

[57] Hint: Peaked at 301.31' (Flood elevation advised)
 [63] Warning: Exceeded Reach 13R INLET depth by 0.01' @ 12.11 hrs

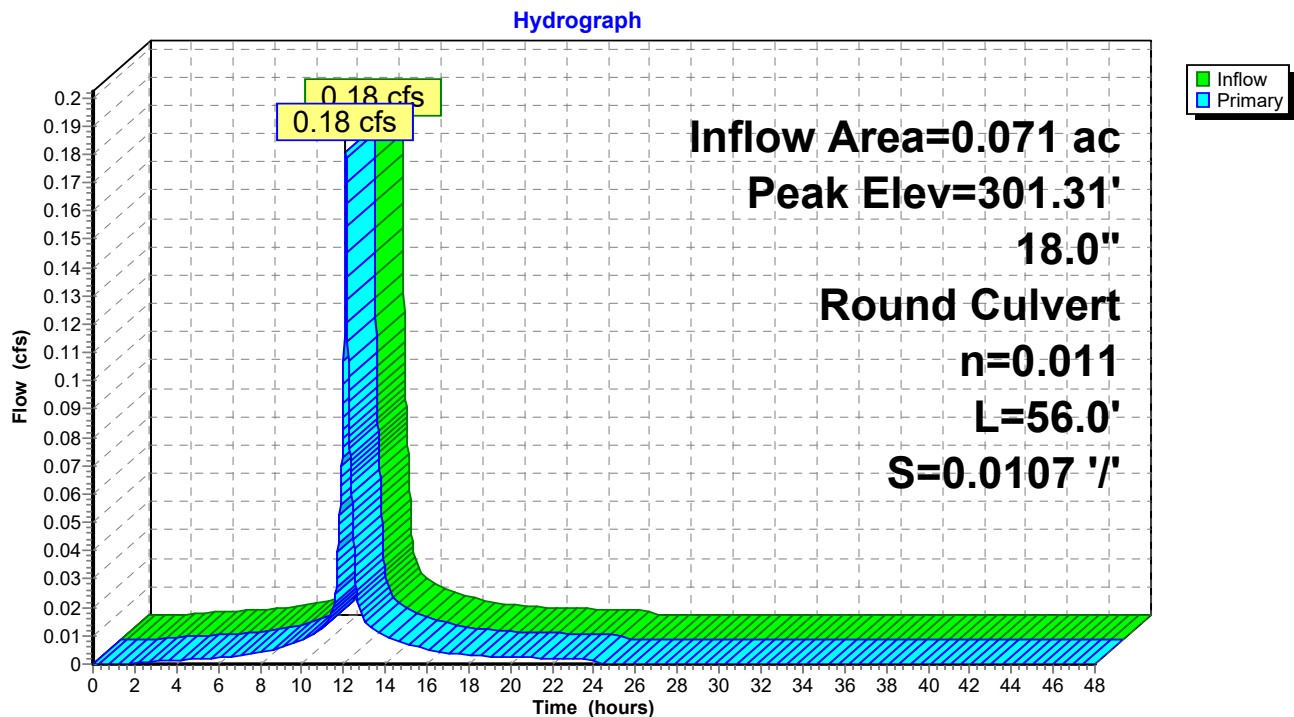
Inflow Area = 0.071 ac, 65.39% Impervious, Inflow Depth = 2.46" for 25-YR event
 Inflow = 0.18 cfs @ 12.11 hrs, Volume= 0.015 af
 Outflow = 0.18 cfs @ 12.11 hrs, Volume= 0.015 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.18 cfs @ 12.11 hrs, Volume= 0.015 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 301.31' @ 12.11 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	301.10'	18.0" Round Culvert L= 56.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 301.10' / 300.50' S= 0.0107 '/ Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=0.18 cfs @ 12.11 hrs HW=301.31' (Free Discharge)
 ↑1=Culvert (Inlet Controls 0.18 cfs @ 1.22 fps)

Pond MH5:



Summary for Pond MH6: CB6

[57] Hint: Peaked at 294.05' (Flood elevation advised)

Inflow Area = 4.513 ac, 14.39% Impervious, Inflow Depth = 1.63" for 25-YR event
 Inflow = 5.26 cfs @ 12.10 hrs, Volume= 0.615 af
 Outflow = 5.26 cfs @ 12.10 hrs, Volume= 0.615 af, Atten= 0%, Lag= 0.0 min
 Primary = 5.26 cfs @ 12.10 hrs, Volume= 0.615 af

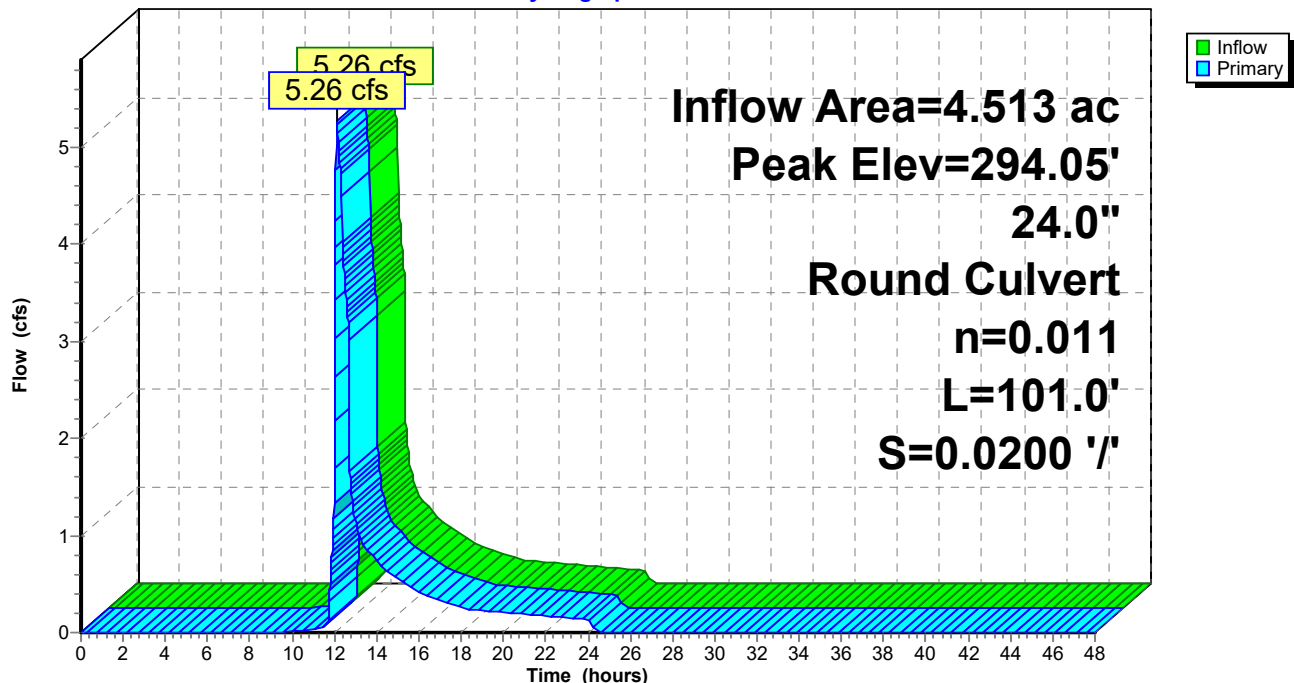
Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 294.05' @ 12.10 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	292.92'	24.0" Round Culvert L= 101.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 292.92' / 290.90' S= 0.0200 '/ Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=5.26 cfs @ 12.10 hrs HW=294.05' (Free Discharge)
 ↑1=Culvert (Inlet Controls 5.26 cfs @ 2.86 fps)

Pond MH6: CB6

Hydrograph



Summary for Pond RG10:

[63] Warning: Exceeded Reach 15R INLET depth by 4.55' @ 24.44 hrs

Inflow Area = 0.091 ac, 45.76% Impervious, Inflow Depth = 2.24" for 25-YR event
 Inflow = 0.17 cfs @ 12.22 hrs, Volume= 0.017 af
 Outflow = 0.02 cfs @ 13.84 hrs, Volume= 0.007 af, Atten= 87%, Lag= 97.0 min
 Primary = 0.02 cfs @ 13.84 hrs, Volume= 0.007 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 306.87' @ 13.84 hrs Surf.Area= 0 sf Storage= 430 cf

Plug-Flow detention time= 309.6 min calculated for 0.007 af (43% of inflow)
 Center-of-Mass det. time= 171.3 min (1,036.4 - 865.1)

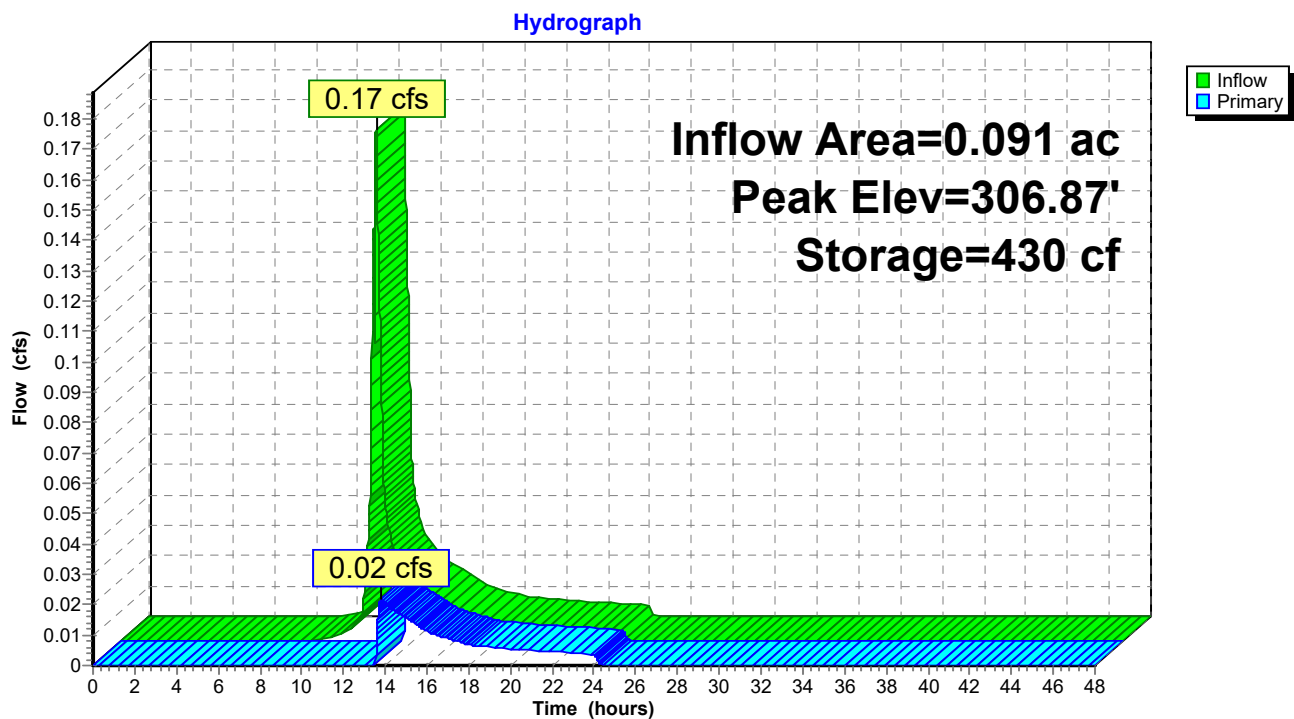
Volume	Invert	Avail.Storage	Storage Description
#1	303.77'	509 cf	Custom Stage Data Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
303.77	0	0
303.85	8	8
304.10	25	33
306.10	200	233
306.35	25	258
306.85	167	425
307.10	84	509

Device	Routing	Invert	Outlet Devices
#1	Primary	306.85'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.02 cfs @ 13.84 hrs HW=306.87' (Free Discharge)
 ↑ **1=Orifice/Grate** (Weir Controls 0.02 cfs @ 0.42 fps)

Pond RG10:



Summary for Pond RG11:

Inflow Area = 0.043 ac, 62.65% Impervious, Inflow Depth = 3.55" for 25-YR event
 Inflow = 0.18 cfs @ 12.09 hrs, Volume= 0.013 af
 Outflow = 0.09 cfs @ 12.23 hrs, Volume= 0.007 af, Atten= 48%, Lag= 8.3 min
 Primary = 0.09 cfs @ 12.23 hrs, Volume= 0.007 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 306.89' @ 12.23 hrs Surf.Area= 0 sf Storage= 243 cf

Plug-Flow detention time= 198.2 min calculated for 0.007 af (57% of inflow)
 Center-of-Mass det. time= 91.3 min (899.6 - 808.2)

Volume	Invert	Avail.Storage	Storage Description
#1	303.77'	281 cf	Custom Stage Data Listed below

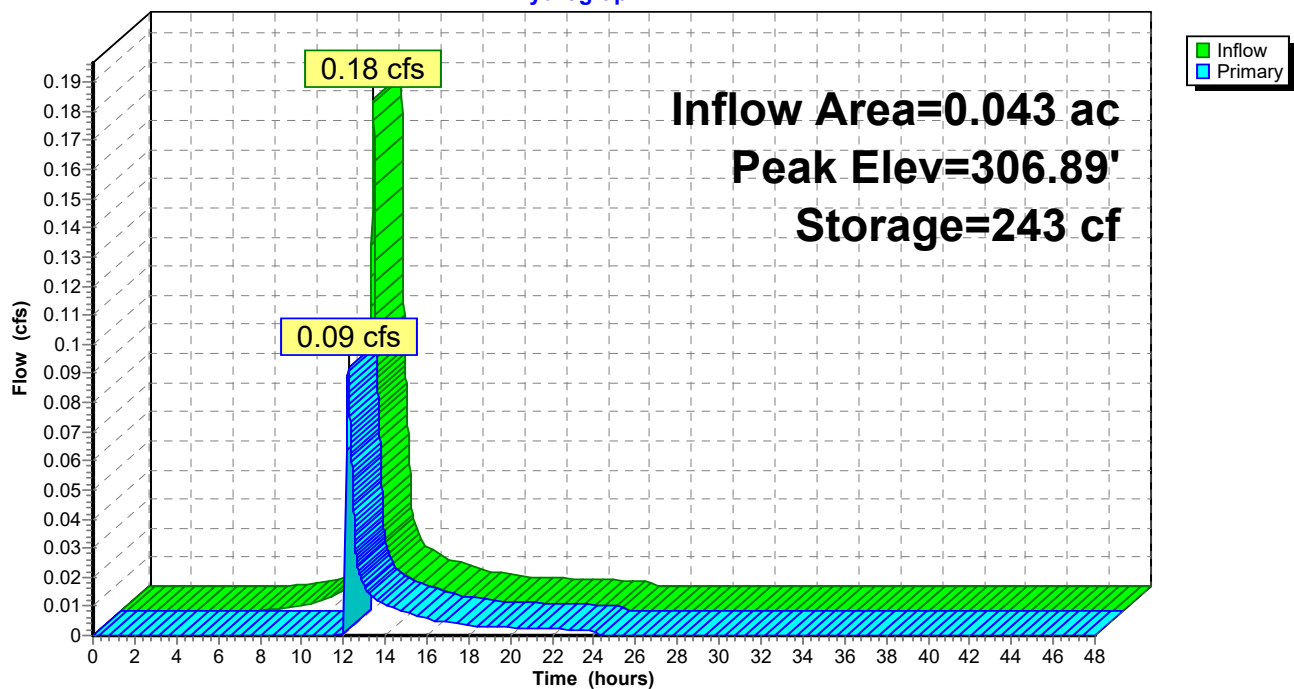
Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
303.77	0	0
303.85	5	5
304.10	14	19
306.10	110	129
306.35	14	143
306.85	92	235
307.10	46	281

Device	Routing	Invert	Outlet Devices
#1	Primary	306.85'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.09 cfs @ 12.23 hrs HW=306.89' (Free Discharge)
 ↑1=Orifice/Grate (Weir Controls 0.09 cfs @ 0.67 fps)

Pond RG11:

Hydrograph



Summary for Pond RG12:

[62] Hint: Exceeded Reach PS3 OUTLET depth by 1.27' @ 0.00 hrs

Inflow Area = 0.213 ac, 23.47% Impervious, Inflow Depth = 2.26" for 25-YR event
 Inflow = 0.56 cfs @ 12.10 hrs, Volume= 0.040 af
 Outflow = 0.56 cfs @ 12.10 hrs, Volume= 0.040 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.56 cfs @ 12.10 hrs, Volume= 0.040 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 310.28' @ 12.10 hrs Surf.Area= 0 sf Storage= 1 cf

Plug-Flow detention time= 0.0 min calculated for 0.040 af (100% of inflow)
 Center-of-Mass det. time= 0.0 min (845.6 - 845.6)

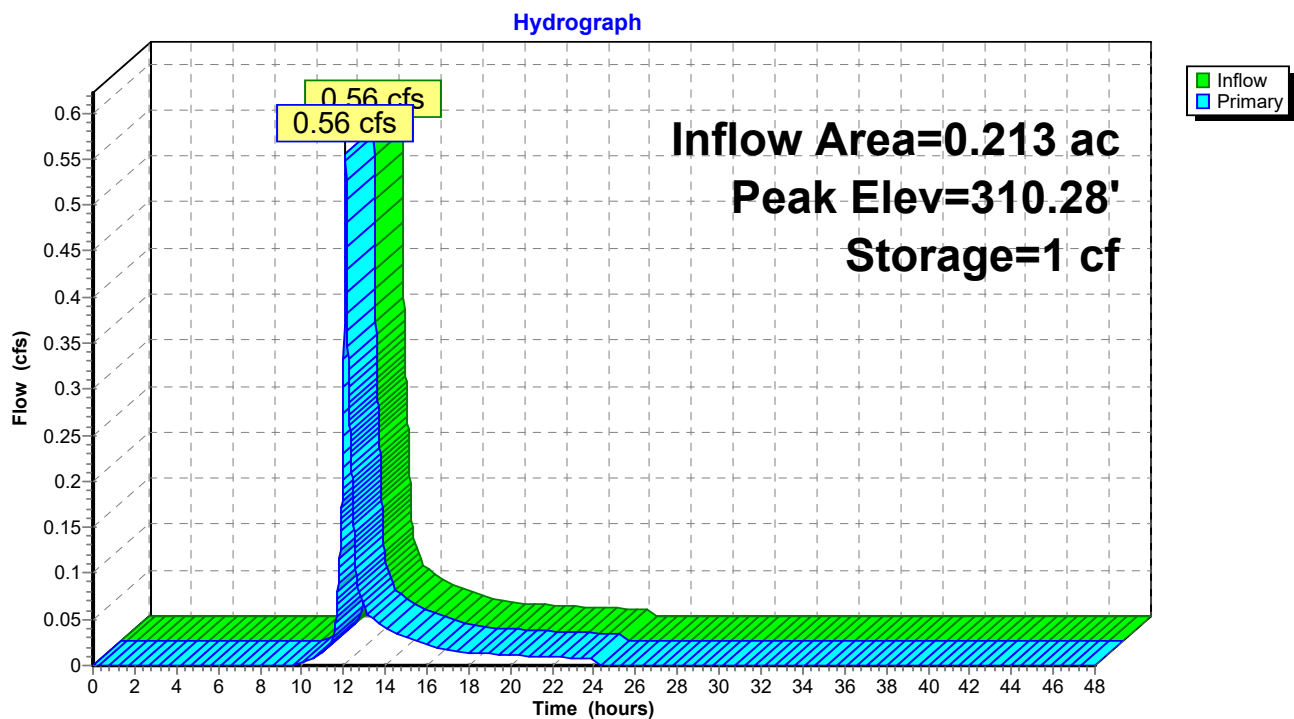
Volume	Invert	Avail.Storage	Storage Description
#1	310.27'	760 cf	Custom Stage Data Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
310.27	0	0
310.60	15	15
310.85	44	59
312.10	219	278
312.35	44	322
312.85	292	614
313.10	146	760

Device	Routing	Invert	Outlet Devices
#1	Primary	309.75'	12.0" Horiz. Orifice/Grate X 0.50 C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.38 cfs @ 12.10 hrs HW=310.28' (Free Discharge)
 ↑ **1=Orifice/Grate** (Orifice Controls 1.38 cfs @ 1.75 fps)

Pond RG12:



Summary for Pond RG13:

[63] Warning: Exceeded Reach PS4 INLET depth by 0.95' @ 24.37 hrs

Inflow Area = 0.099 ac, 53.64% Impervious, Inflow Depth = 3.25" for 25-YR event
 Inflow = 0.38 cfs @ 12.10 hrs, Volume= 0.027 af
 Outflow = 0.10 cfs @ 12.48 hrs, Volume= 0.013 af, Atten= 74%, Lag= 23.2 min
 Primary = 0.10 cfs @ 12.48 hrs, Volume= 0.013 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 307.99' @ 12.48 hrs Surf.Area= 0 sf Storage= 620 cf

Plug-Flow detention time= 239.7 min calculated for 0.013 af (48% of inflow)
 Center-of-Mass det. time= 124.7 min (942.3 - 817.6)

Volume	Invert	Avail.Storage	Storage Description
#1	304.29'	706 cf	Custom Stage Data Listed below

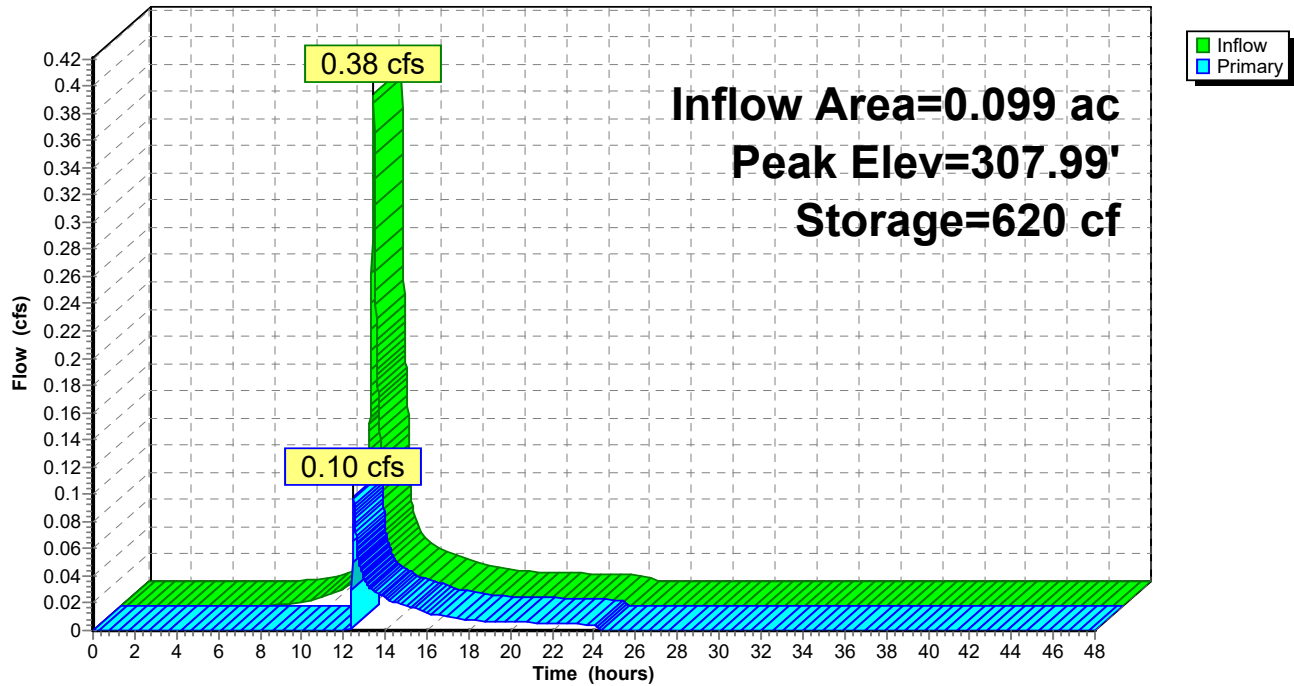
Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
304.29	0	0
304.62	42	42
304.87	31	73
307.20	290	363
307.45	31	394
307.95	208	602
308.20	104	706

Device	Routing	Invert	Outlet Devices
#1	Primary	307.95'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.09 cfs @ 12.48 hrs HW=307.99' (Free Discharge)
 ↑1=Orifice/Grate (Weir Controls 0.09 cfs @ 0.68 fps)

Pond RG13:

Hydrograph



Summary for Pond RG14:

Inflow Area = 0.054 ac, 64.02% Impervious, Inflow Depth = 3.65" for 25-YR event
 Inflow = 0.23 cfs @ 12.09 hrs, Volume= 0.017 af
 Outflow = 0.22 cfs @ 12.11 hrs, Volume= 0.011 af, Atten= 3%, Lag= 1.3 min
 Primary = 0.22 cfs @ 12.11 hrs, Volume= 0.011 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 305.03' @ 12.11 hrs Surf.Area= 0 sf Storage= 236 cf

Plug-Flow detention time= 155.9 min calculated for 0.011 af (69% of inflow)
 Center-of-Mass det. time= 62.0 min (867.2 - 805.3)

Volume	Invert	Avail.Storage	Storage Description
#1	302.54'	272 cf	Custom Stage Data Listed below

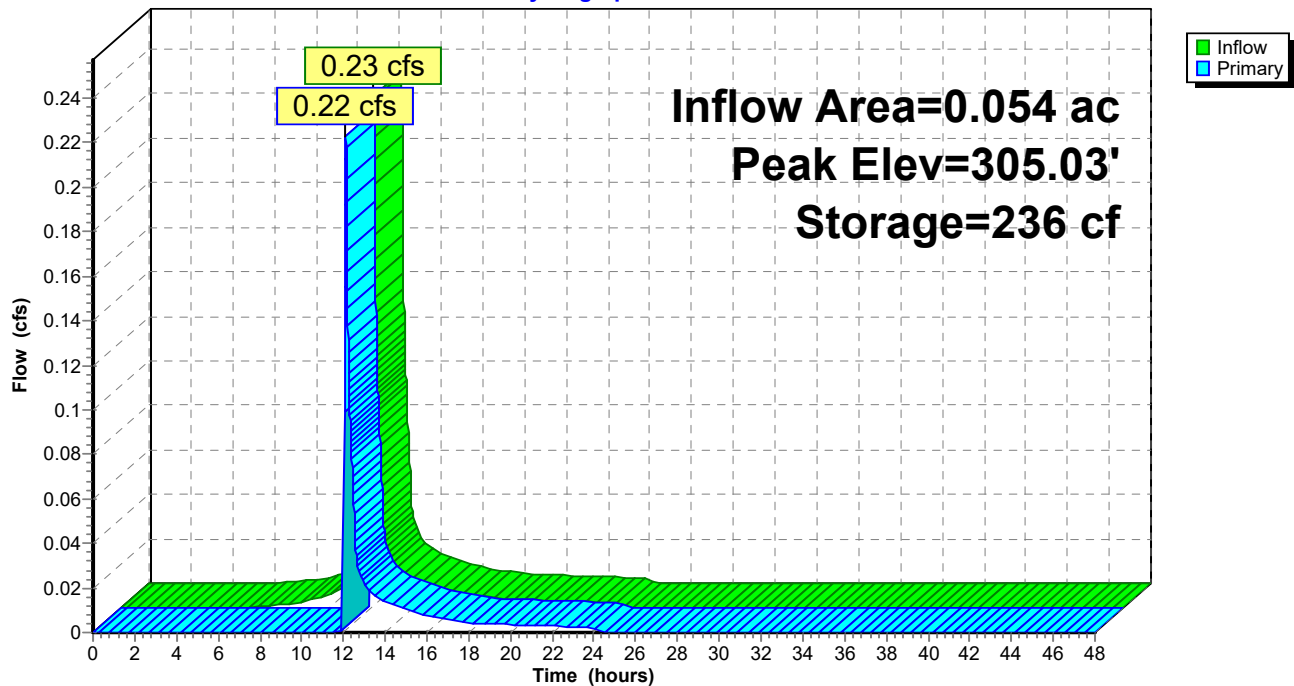
Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
302.54	0	0
302.62	5	5
302.87	15	20
304.20	82	102
304.45	15	117
304.95	103	220
305.20	52	272

Device	Routing	Invert	Outlet Devices
#1	Primary	304.95'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.22 cfs @ 12.11 hrs HW=305.03' (Free Discharge)
 ↑1=Orifice/Grate (Weir Controls 0.22 cfs @ 0.91 fps)

Pond RG14:

Hydrograph



Summary for Pond RG15:

[93] Warning: Storage range exceeded by 0.05'
 [88] Warning: Qout>Qin may require Finer Routing>1
 [85] Warning: Oscillations may require Finer Routing>1
 [61] Hint: Exceeded Reach 10R outlet invert by 3.11' @ 12.10 hrs

Inflow Area = 1.015 ac, 19.57% Impervious, Inflow Depth = 2.10" for 25-YR event
 Inflow = 2.44 cfs @ 12.09 hrs, Volume= 0.177 af
 Outflow = 2.53 cfs @ 12.10 hrs, Volume= 0.167 af, Atten= 0%, Lag= 0.4 min
 Primary = 2.53 cfs @ 12.10 hrs, Volume= 0.167 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 301.05' @ 12.10 hrs Surf.Area= 0 sf Storage= 524 cf

Plug-Flow detention time= 41.3 min calculated for 0.167 af (94% of inflow)
 Center-of-Mass det. time= 11.6 min (861.1 - 849.6)

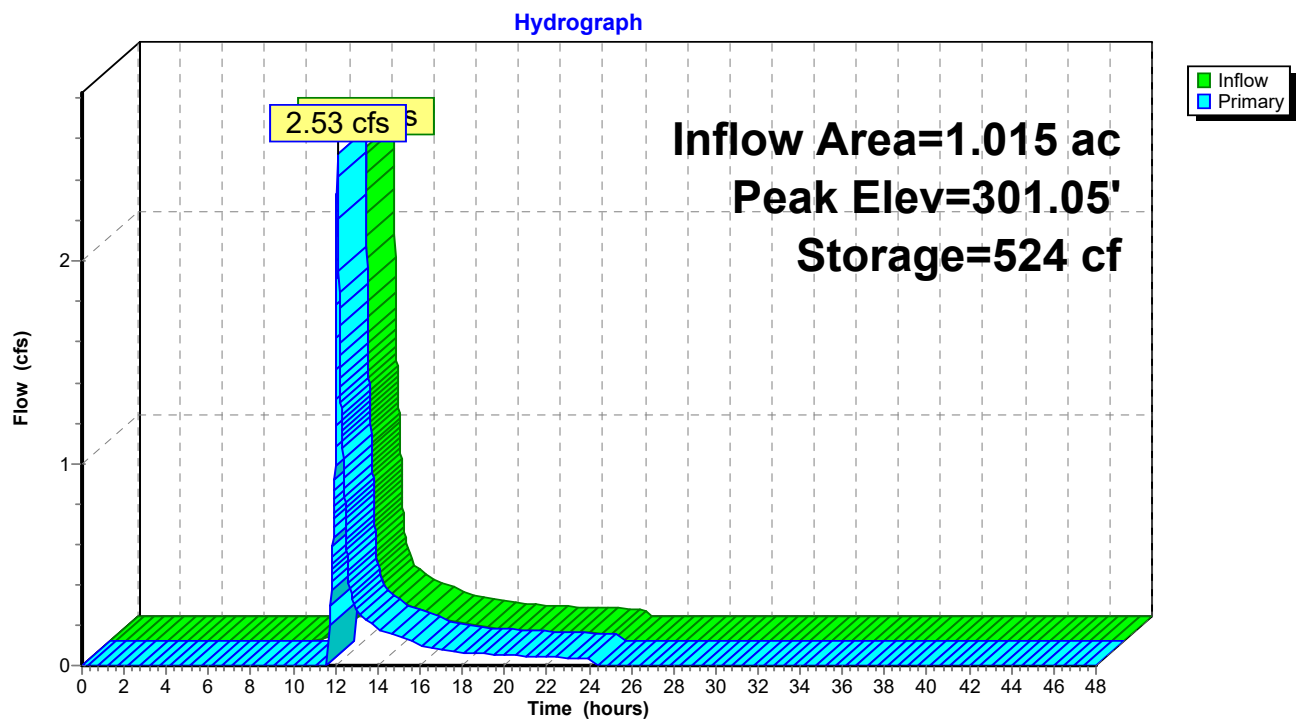
Volume	Invert	Avail.Storage	Storage Description
#1	298.00'	524 cf	Custom Stage Data Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
298.00	0	0
299.00	110	110
300.00	110	220
300.25	28	248
300.75	184	432
301.00	92	524

Device	Routing	Invert	Outlet Devices
#1	Primary	300.75'	18.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=2.52 cfs @ 12.10 hrs HW=301.05' (Free Discharge)
 ↑ **1=Orifice/Grate** (Weir Controls 2.52 cfs @ 1.79 fps)

Pond RG15:



Summary for Pond RG16:

[93] Warning: Storage range exceeded by 0.17'
 [88] Warning: Qout>Qin may require Finer Routing>1
 [85] Warning: Oscillations may require Finer Routing>1
 [61] Hint: Exceeded Reach PS1 outlet invert by 0.17' @ 12.19 hrs
 [62] Hint: Exceeded Reach PS2 OUTLET depth by 0.05' @ 12.21 hrs

Inflow Area = 2.675 ac, 4.94% Impervious, Inflow Depth = 1.70" for 25-YR event
 Inflow = 4.00 cfs @ 12.20 hrs, Volume= 0.378 af
 Outflow = 4.19 cfs @ 12.19 hrs, Volume= 0.359 af, Atten= 0%, Lag= 0.0 min
 Primary = 4.19 cfs @ 12.19 hrs, Volume= 0.359 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 301.17' @ 12.19 hrs Surf.Area= 0 sf Storage= 1,017 cf

Plug-Flow detention time= 38.9 min calculated for 0.359 af (95% of inflow)
 Center-of-Mass det. time= 11.0 min (881.0 - 869.9)

Volume	Invert	Avail.Storage	Storage Description
#1	298.00'	1,017 cf	Custom Stage Data Listed below

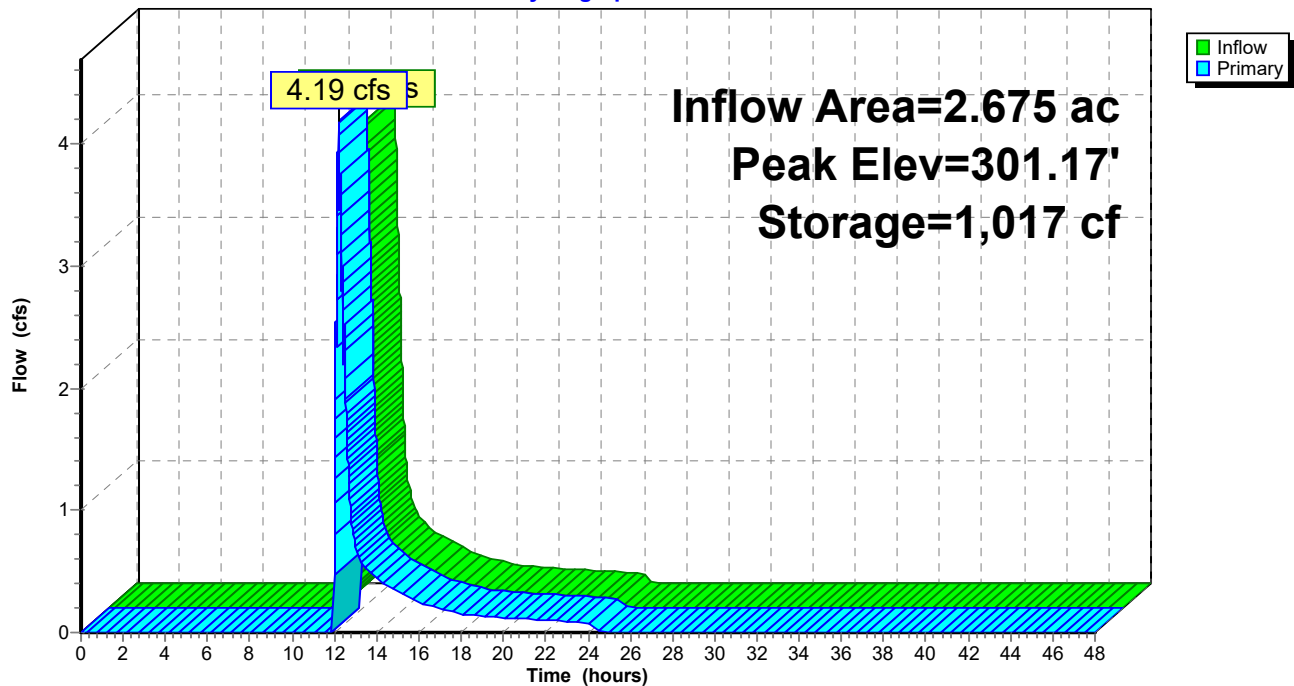
Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
298.00	0	0
299.00	182	182
300.00	182	364
300.25	46	410
300.75	455	865
301.00	152	1,017

Device	Routing	Invert	Outlet Devices
#1	Primary	300.75'	18.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=4.18 cfs @ 12.19 hrs HW=301.17' (Free Discharge)
 ↑ **1=Orifice/Grate** (Weir Controls 4.18 cfs @ 2.12 fps)

Pond RG16:

Hydrograph



Summary for Pond RG19:

[93] Warning: Storage range exceeded by 0.01'

[62] Hint: Exceeded Reach PS6 OUTLET depth by 0.45' @ 43.16 hrs

Inflow Area = 0.717 ac, 23.42% Impervious, Inflow Depth = 2.26" for 25-YR event
 Inflow = 1.71 cfs @ 12.18 hrs, Volume= 0.135 af
 Outflow = 1.40 cfs @ 12.26 hrs, Volume= 0.107 af, Atten= 19%, Lag= 4.7 min
 Primary = 1.40 cfs @ 12.26 hrs, Volume= 0.107 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 296.01' @ 12.26 hrs Surf.Area= 0 sf Storage= 1,484 cf

Plug-Flow detention time= 127.7 min calculated for 0.107 af (79% of inflow)
 Center-of-Mass det. time= 44.2 min (898.4 - 854.2)

Volume	Invert	Avail.Storage	Storage Description
#1	293.50'	1,484 cf	Custom Stage Data Listed below

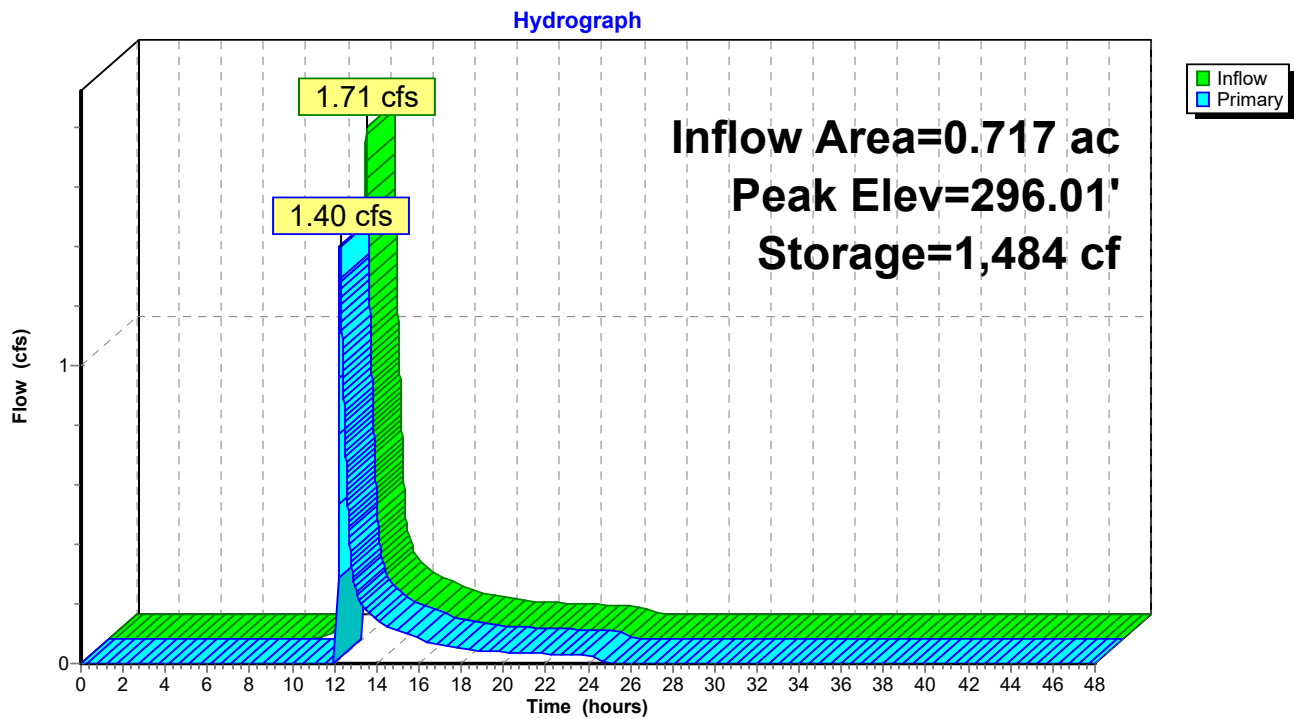
Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
293.50	0	0
293.75	73	73
295.00	365	438
295.25	73	511
295.75	730	1,241
296.00	243	1,484

Device	Routing	Invert	Outlet Devices
#1	Primary	292.63'	8.0" Round Culvert L= 39.5' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 292.63' / 292.23' S= 0.0101 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf
#2	Device 1	295.75'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.39 cfs @ 12.26 hrs HW=296.01' (Free Discharge)

↑ **1=Culvert** (Passes 1.39 cfs of 2.32 cfs potential flow)
 ↑ **2=Orifice/Grate** (Weir Controls 1.39 cfs @ 1.68 fps)

Pond RG19:



Summary for Pond RG20:

Inflow Area = 0.265 ac, 0.00% Impervious, Inflow Depth = 1.55" for 25-YR event
 Inflow = 0.45 cfs @ 12.10 hrs, Volume= 0.034 af
 Outflow = 0.03 cfs @ 15.02 hrs, Volume= 0.011 af, Atten= 93%, Lag= 175.5 min
 Primary = 0.03 cfs @ 15.02 hrs, Volume= 0.011 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 295.06' @ 15.02 hrs Surf.Area= 0 sf Storage= 1,017 cf

Plug-Flow detention time= 378.6 min calculated for 0.011 af (33% of inflow)
 Center-of-Mass det. time= 234.1 min (1,102.4 - 868.3)

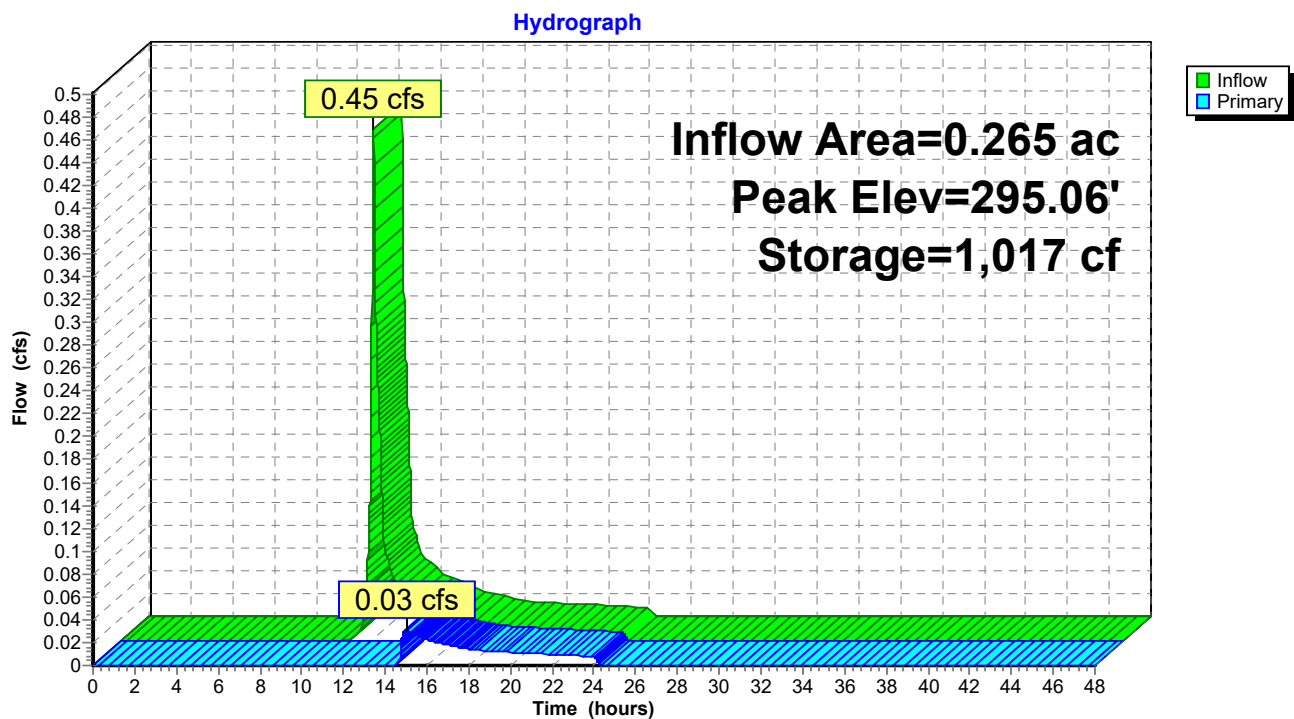
Volume	Invert	Avail.Storage	Storage Description
#1	292.47'	1,191 cf	Custom Stage Data Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
292.47	0	0
292.55	18	18
292.80	55	73
294.30	330	403
294.55	55	458
295.05	550	1,008
295.30	183	1,191

Device	Routing	Invert	Outlet Devices
#1	Primary	295.05'	18.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.02 cfs @ 15.02 hrs HW=295.06' (Free Discharge)
 ↑ **1=Orifice/Grate** (Weir Controls 0.02 cfs @ 0.37 fps)

Pond RG20:



Summary for Pond RG21:

Inflow Area = 0.228 ac, 67.95% Impervious, Inflow Depth = 3.75" for 25-YR event
 Inflow = 0.99 cfs @ 12.09 hrs, Volume= 0.071 af
 Outflow = 0.94 cfs @ 12.11 hrs, Volume= 0.058 af, Atten= 5%, Lag= 1.5 min
 Primary = 0.94 cfs @ 12.11 hrs, Volume= 0.058 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 291.75' @ 12.11 hrs Surf.Area= 0 sf Storage= 718 cf

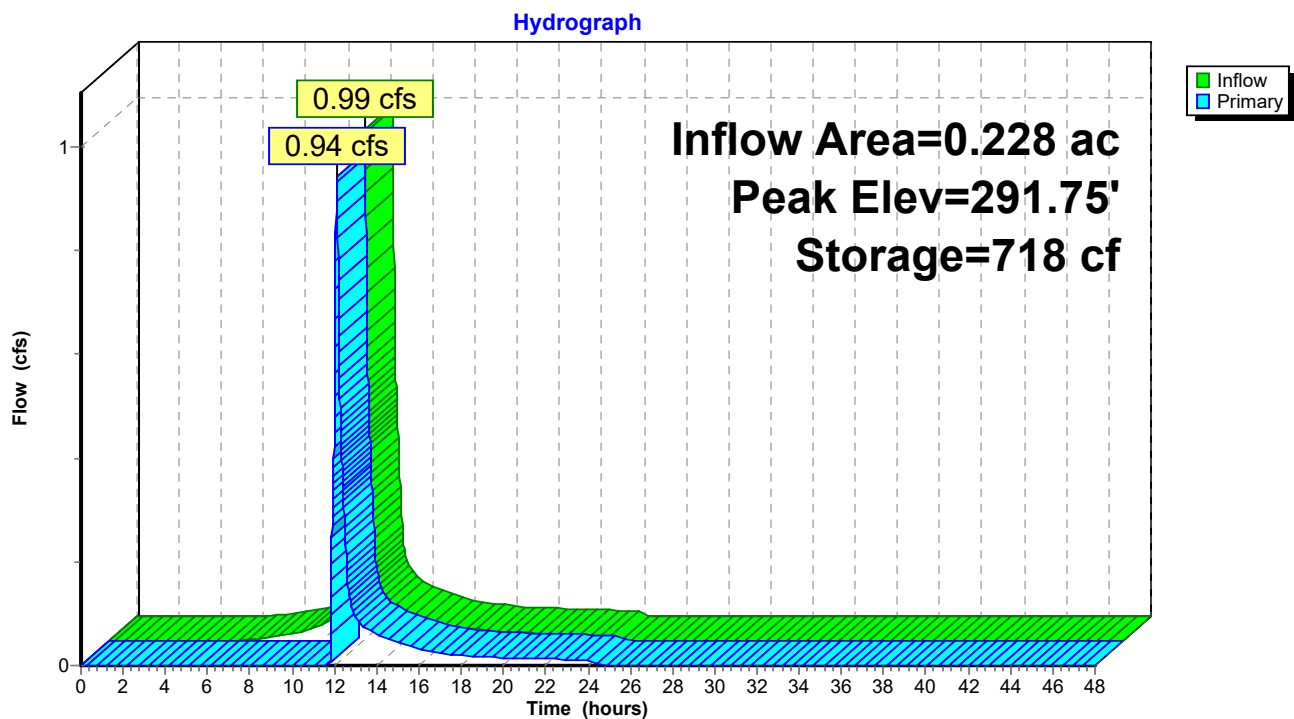
Plug-Flow detention time= 117.3 min calculated for 0.058 af (81% of inflow)
 Center-of-Mass det. time= 44.0 min (846.3 - 802.2)

Volume	Invert	Avail.Storage	Storage Description
#1	289.62'	749 cf	Custom Stage Data Listed below
Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	
289.62	0	0	
289.95	65	65	
290.20	49	114	
291.20	195	309	
291.45	49	358	
291.55	228	586	
291.80	163	749	

Device	Routing	Invert	Outlet Devices
#1	Primary	291.55'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.94 cfs @ 12.11 hrs HW=291.75' (Free Discharge)
 ↑1=Orifice/Grate (Weir Controls 0.94 cfs @ 1.47 fps)

Pond RG21:



Summary for Pond RG22:

Inflow Area = 0.153 ac, 15.01% Impervious, Inflow Depth = 2.97" for 25-YR event
 Inflow = 0.53 cfs @ 12.09 hrs, Volume= 0.038 af
 Outflow = 0.20 cfs @ 12.35 hrs, Volume= 0.022 af, Atten= 62%, Lag= 15.8 min
 Primary = 0.20 cfs @ 12.35 hrs, Volume= 0.022 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 258.62' @ 12.35 hrs Surf.Area= 0 sf Storage= 737 cf

Plug-Flow detention time= 203.1 min calculated for 0.022 af (58% of inflow)
 Center-of-Mass det. time= 93.6 min (918.2 - 824.5)

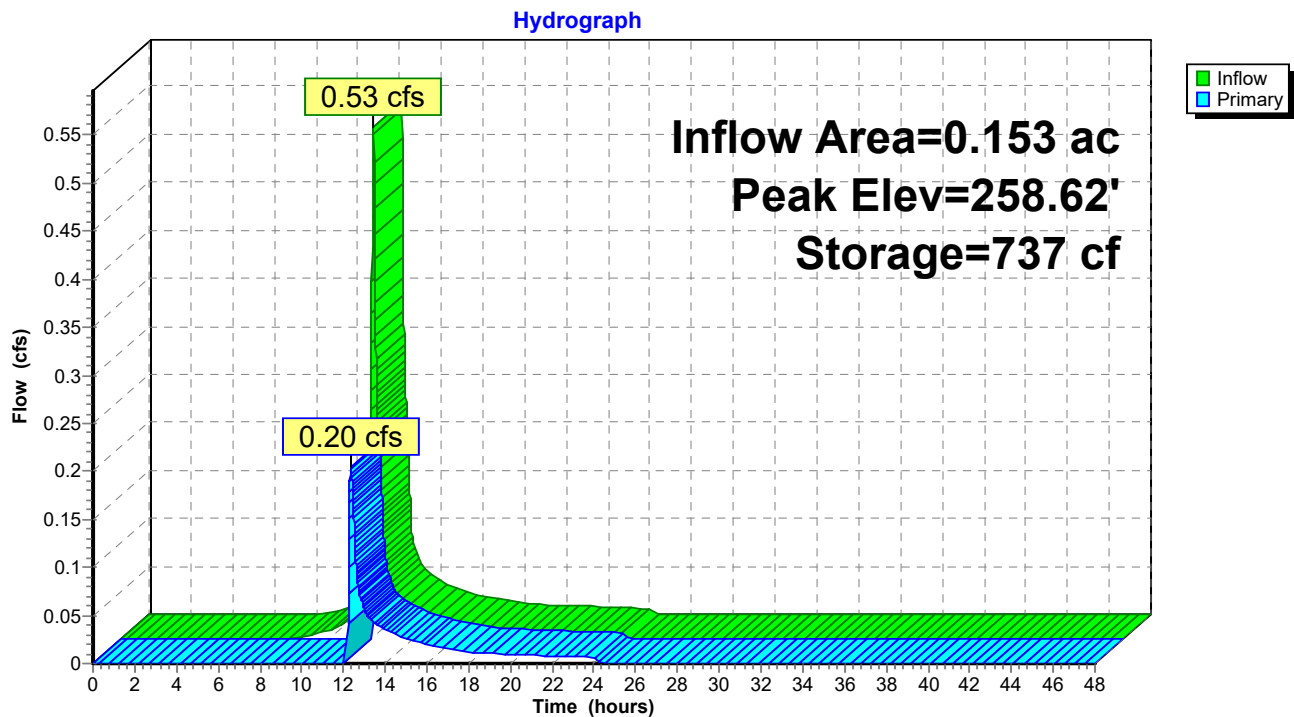
Volume	Invert	Avail.Storage	Storage Description
#1	256.22'	853 cf	Custom Stage Data Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
256.22	0	0
256.55	66	66
256.80	49	115
257.80	197	312
258.05	49	361
258.55	328	689
258.80	164	853

Device	Routing	Invert	Outlet Devices
#1	Primary	258.55'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.20 cfs @ 12.35 hrs HW=258.62' (Free Discharge)
 ↑1=Orifice/Grate (Weir Controls 0.20 cfs @ 0.88 fps)

Pond RG22:



Summary for Pond RG23:

[63] Warning: Exceeded Reach 21R INLET depth by 3.85' @ 27.94 hrs

Inflow Area = 0.183 ac, 16.37% Impervious, Inflow Depth = 1.96" for 25-YR event
 Inflow = 0.25 cfs @ 12.35 hrs, Volume= 0.030 af
 Outflow = 0.07 cfs @ 12.94 hrs, Volume= 0.019 af, Atten= 70%, Lag= 35.1 min
 Primary = 0.07 cfs @ 12.94 hrs, Volume= 0.019 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 257.89' @ 12.94 hrs Surf.Area= 0 sf Storage= 480 cf

Plug-Flow detention time= 213.7 min calculated for 0.019 af (64% of inflow)
 Center-of-Mass det. time= 93.3 min (986.3 - 893.0)

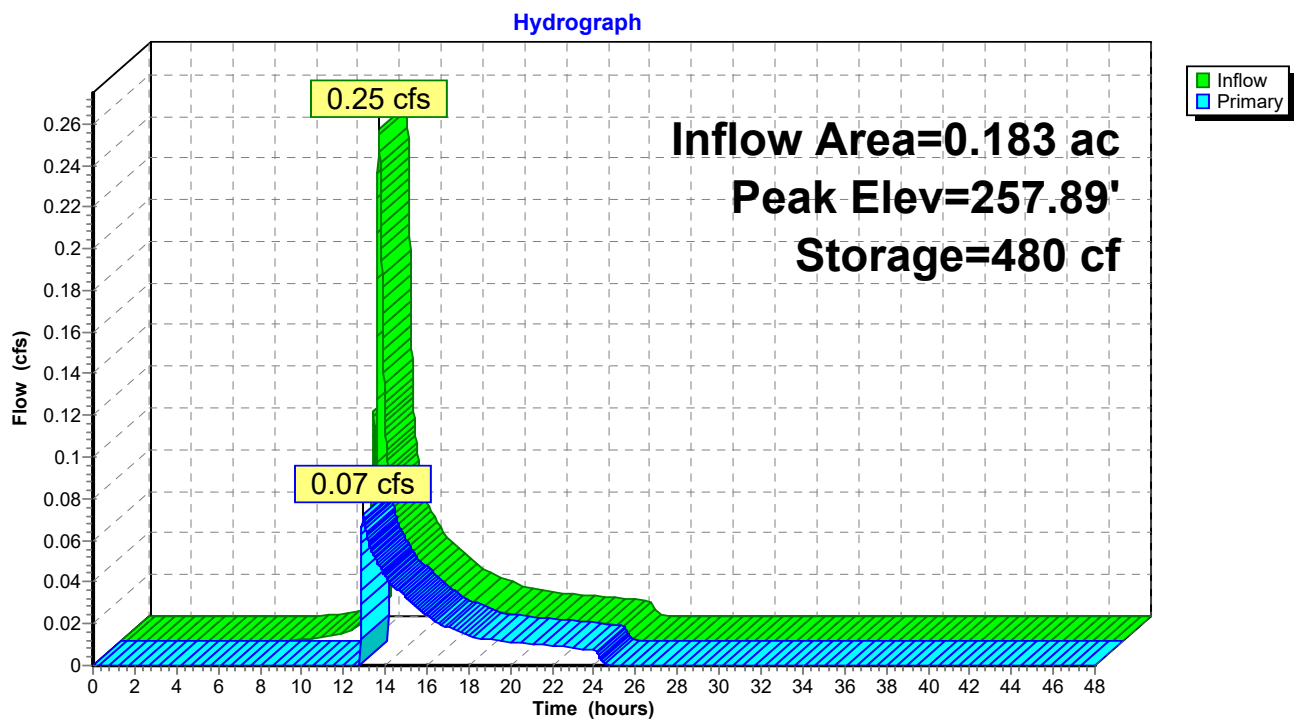
Volume	Invert	Avail.Storage	Storage Description
#1	255.27'	568 cf	Custom Stage Data Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
255.27	0	0
255.60	41	41
255.85	31	72
257.10	155	227
257.35	31	258
257.85	207	465
258.10	103	568

Device	Routing	Invert	Outlet Devices
#1	Primary	257.85'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.07 cfs @ 12.94 hrs HW=257.89' (Free Discharge)
 ↑ **1=Orifice/Grate** (Weir Controls 0.07 cfs @ 0.62 fps)

Pond RG23:



Summary for Pond RG3:

[93] Warning: Storage range exceeded by 0.03'
 [88] Warning: Qout>Qin may require Finer Routing>1
 [85] Warning: Oscillations may require Finer Routing>1

Inflow Area = 0.150 ac, 46.64% Impervious, Inflow Depth = 2.97" for 25-YR event
 Inflow = 0.44 cfs @ 12.16 hrs, Volume= 0.037 af
 Outflow = 0.47 cfs @ 12.17 hrs, Volume= 0.030 af, Atten= 0%, Lag= 0.6 min
 Primary = 0.47 cfs @ 12.17 hrs, Volume= 0.030 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 311.03' @ 12.17 hrs Surf.Area= 0 sf Storage= 339 cf

Plug-Flow detention time= 111.3 min calculated for 0.030 af (82% of inflow)
 Center-of-Mass det. time= 37.7 min (867.4 - 829.7)

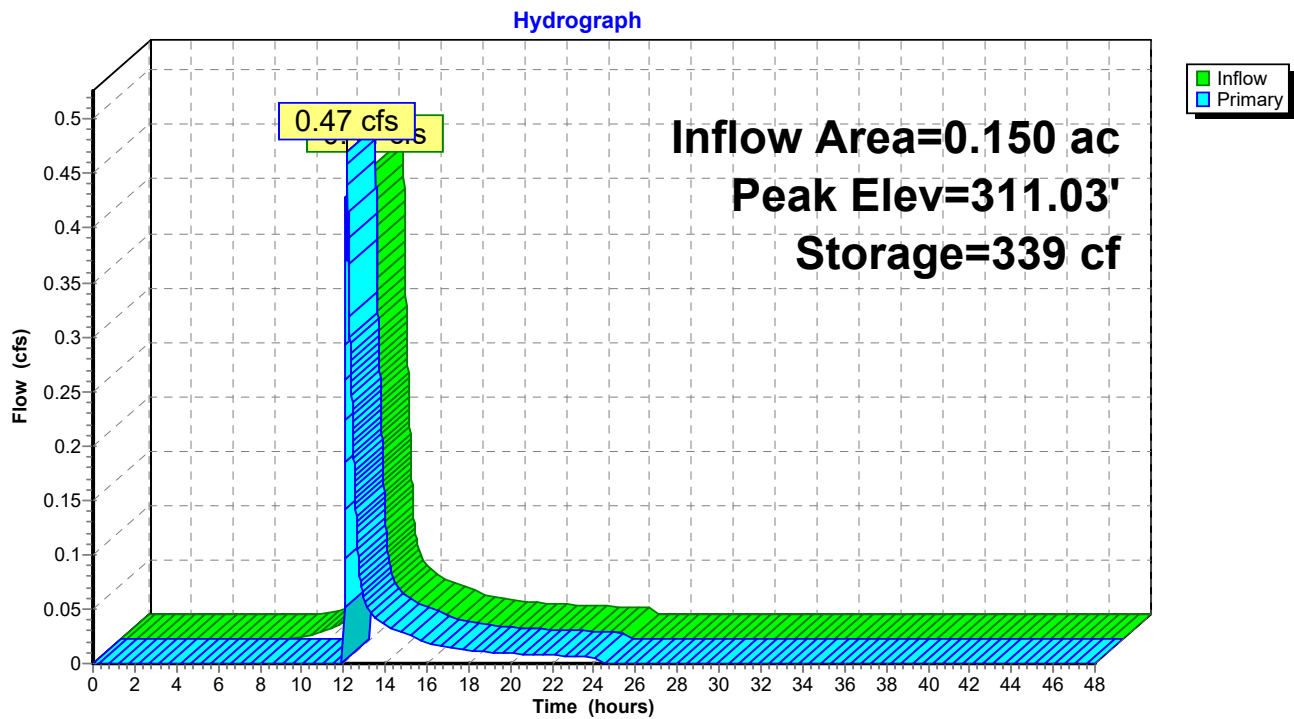
Volume	Invert	Avail.Storage	Storage Description
#1	309.50'	339 cf	Custom Stage Data Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
309.50	0	0
309.75	32	32
310.25	63	95
310.50	32	127
311.00	212	339

Device	Routing	Invert	Outlet Devices
#1	Primary	310.90'	4.0' long x 4.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=0.47 cfs @ 12.17 hrs HW=311.03' (Free Discharge)
 ↑1=Broad-Crested Rectangular Weir (Weir Controls 0.47 cfs @ 0.87 fps)

Pond RG3:



Summary for Pond RG4:

Inflow Area = 0.036 ac, 34.97% Impervious, Inflow Depth = 2.61" for 25-YR event
 Inflow = 0.11 cfs @ 12.09 hrs, Volume= 0.008 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 305.29' @ 24.34 hrs Surf.Area= 0 sf Storage= 337 cf

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

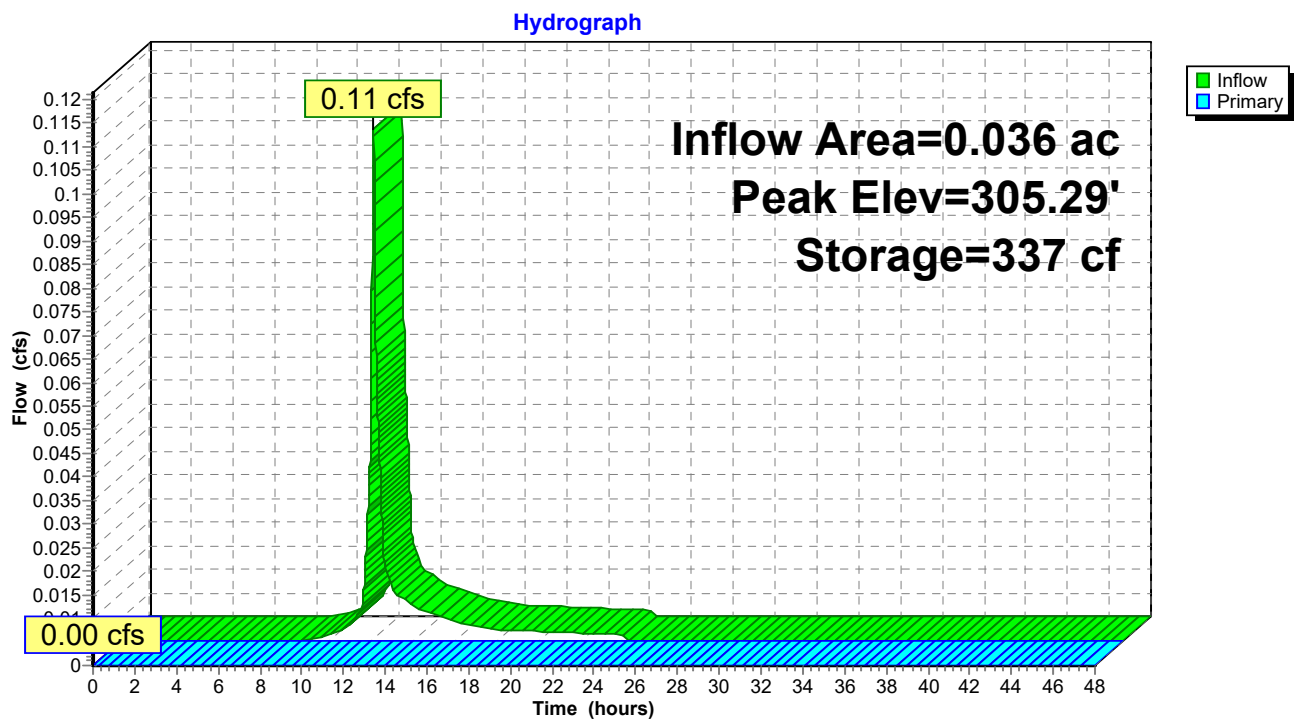
Volume	Invert	Avail.Storage	Storage Description
#1	302.42'	743 cf	Custom Stage Data Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
302.42	0	0
302.75	39	39
303.00	29	68
306.00	352	420
306.25	29	449
306.75	196	645
307.00	98	743

Device	Routing	Invert	Outlet Devices
#1	Primary	306.75'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=302.42' (Free Discharge)
 ↑1=Orifice/Grate (Controls 0.00 cfs)

Pond RG4:



Summary for Pond RG5:

Inflow Area = 0.052 ac, 40.18% Impervious, Inflow Depth = 2.78" for 25-YR event
 Inflow = 0.17 cfs @ 12.09 hrs, Volume= 0.012 af
 Outflow = 0.01 cfs @ 15.87 hrs, Volume= 0.002 af, Atten= 96%, Lag= 226.7 min
 Primary = 0.01 cfs @ 15.87 hrs, Volume= 0.002 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 306.75' @ 15.87 hrs Surf.Area= 0 sf Storage= 420 cf

Plug-Flow detention time= 464.3 min calculated for 0.002 af (20% of inflow)
 Center-of-Mass det. time= 319.5 min (1,149.1 - 829.6)

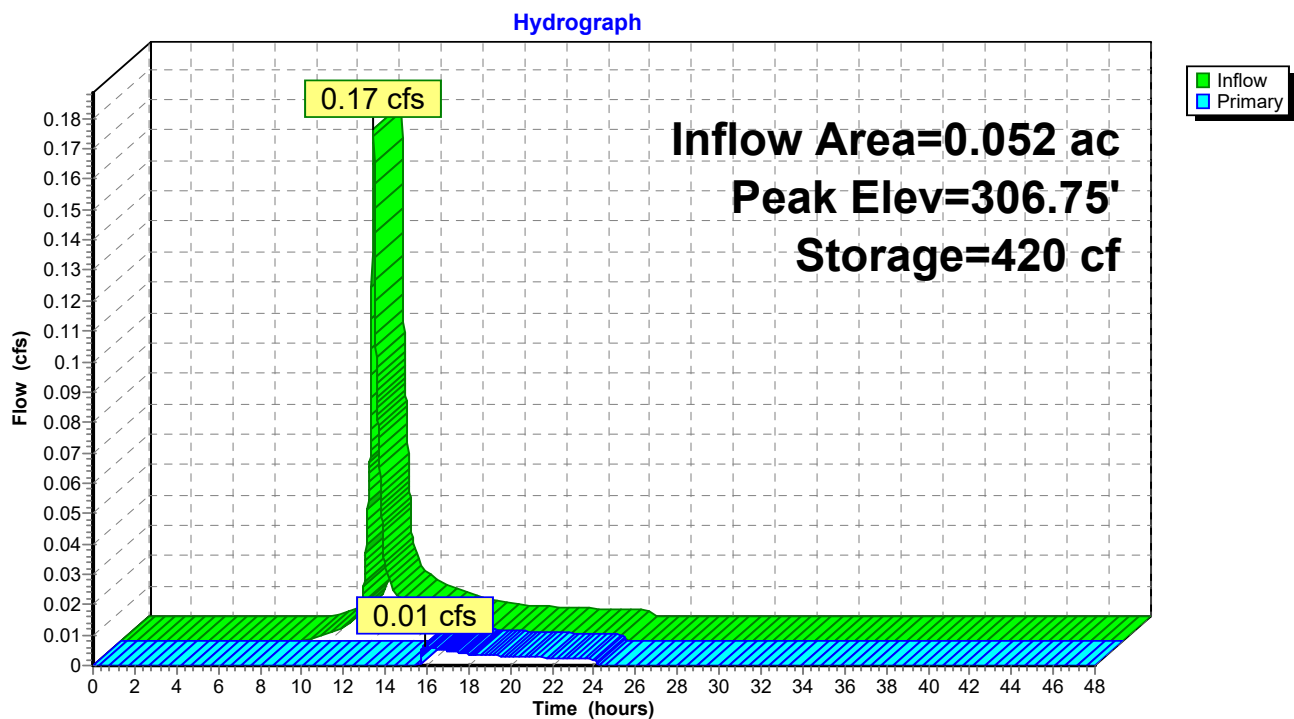
Volume	Invert	Avail.Storage	Storage Description
#1	302.67'	486 cf	Custom Stage Data Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
302.67	0	0
302.75	7	7
303.00	20	27
306.00	239	266
306.25	20	286
306.75	133	419
307.00	67	486

Device	Routing	Invert	Outlet Devices
#1	Primary	306.75'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 15.87 hrs HW=306.75' (Free Discharge)
 ↑ **1=Orifice/Grate** (Weir Controls 0.00 cfs @ 0.19 fps)

Pond RG5:



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

Subcatchment1S: (new Subcat)	Runoff Area=6,927 sf 11.13% Impervious Runoff Depth=2.95" Tc=6.0 min CN=65 Runoff=0.54 cfs 0.039 af
Subcatchment2S: Road	Runoff Area=12,547 sf 25.48% Impervious Runoff Depth=4.51" Tc=6.0 min CN=80 Runoff=1.51 cfs 0.108 af
Subcatchment3S: Undeveloped Area	Runoff Area=81,012 sf 0.00% Impervious Runoff Depth=3.35" Flow Length=525' Tc=28.2 min CN=69 Runoff=4.23 cfs 0.519 af
Subcatchment4S:	Runoff Area=87,503 sf 2.36% Impervious Runoff Depth=3.87" Flow Length=525' Tc=14.9 min CN=74 Runoff=6.92 cfs 0.648 af
Subcatchment5S:	Runoff Area=3,065 sf 100.00% Impervious Runoff Depth=6.56" Tc=6.0 min CN=98 Runoff=0.47 cfs 0.038 af
Subcatchment7S: (new Subcat)	Runoff Area=6,557 sf 79.05% Impervious Runoff Depth=5.63" Tc=6.0 min CN=90 Runoff=0.94 cfs 0.071 af
Subcatchment8S: (new Subcat)	Runoff Area=17,230 sf 24.31% Impervious Runoff Depth=3.45" Tc=6.0 min CN=70 Runoff=1.60 cfs 0.114 af
Subcatchment9S:	Runoff Area=1,988 sf 100.00% Impervious Runoff Depth=6.56" Tc=6.0 min CN=98 Runoff=0.30 cfs 0.025 af
Subcatchment10S: (new Subcat)	Runoff Area=25,265 sf 28.62% Impervious Runoff Depth=4.62" Flow Length=128' Tc=1.5 min CN=81 Runoff=3.65 cfs 0.223 af
Subcatchment11S:	Runoff Area=23,740 sf 22.38% Impervious Runoff Depth=3.35" Tc=6.0 min CN=69 Runoff=2.14 cfs 0.152 af
Subcatchment12S:	Runoff Area=36,401 sf 0.00% Impervious Runoff Depth=4.29" Flow Length=485' Slope=0.0350 '/' Tc=8.6 min CN=78 Runoff=3.83 cfs 0.299 af
Subcatchment13S:	Runoff Area=67,075 sf 0.00% Impervious Runoff Depth=3.76" Flow Length=331' Slope=0.0100 '/' Tc=22.1 min CN=73 Runoff=4.40 cfs 0.483 af
Subcatchment14S:	Runoff Area=34,193 sf 28.61% Impervious Runoff Depth=3.66" Flow Length=172' Tc=1.5 min CN=72 Runoff=3.97 cfs 0.239 af
Subcatchment15S:	Runoff Area=33,688 sf 0.00% Impervious Runoff Depth=3.76" Flow Length=1,115' Slope=0.0050 '/' Tc=105.1 min CN=73 Runoff=0.94 cfs 0.243 af
Subcatchment16S:	Runoff Area=4,678 sf 100.00% Impervious Runoff Depth=6.56" Tc=6.0 min CN=98 Runoff=0.72 cfs 0.059 af
SubcatchmentCUL: (new Subcat)	Runoff Area=10,593 sf 29.57% Impervious Runoff Depth=3.66" Tc=6.0 min CN=72 Runoff=1.04 cfs 0.074 af

SubcatchmentP1:	Runoff Area=98,881 sf 5.04% Impervious Runoff Depth=2.75" Flow Length=650' Tc=12.2 min CN=63 Runoff=5.85 cfs 0.521 af
SubcatchmentP2:	Runoff Area=10,702 sf 0.00% Impervious Runoff Depth=2.56" Flow Length=344' Tc=8.6 min CN=61 Runoff=0.65 cfs 0.052 af
SubcatchmentS1:	Runoff Area=1,539 sf 96.04% Impervious Runoff Depth=6.44" Tc=6.0 min CN=97 Runoff=0.23 cfs 0.019 af
SubcatchmentS10:	Runoff Area=2,106 sf 30.86% Impervious Runoff Depth=3.66" Tc=6.0 min CN=72 Runoff=0.21 cfs 0.015 af
SubcatchmentS11:	Runoff Area=1,858 sf 62.65% Impervious Runoff Depth=4.95" Tc=6.0 min CN=84 Runoff=0.24 cfs 0.018 af
SubcatchmentS12:	Runoff Area=9,267 sf 23.47% Impervious Runoff Depth=3.45" Tc=6.0 min CN=70 Runoff=0.86 cfs 0.061 af
SubcatchmentS13:	Runoff Area=4,314 sf 53.64% Impervious Runoff Depth=4.62" Tc=6.0 min CN=81 Runoff=0.53 cfs 0.038 af
SubcatchmentS14:	Runoff Area=2,371 sf 64.02% Impervious Runoff Depth=5.06" Tc=6.0 min CN=85 Runoff=0.31 cfs 0.023 af
SubcatchmentS15:	Runoff Area=44,214 sf 19.57% Impervious Runoff Depth=3.25" Tc=6.0 min CN=68 Runoff=3.85 cfs 0.275 af
SubcatchmentS19:	Runoff Area=31,232 sf 23.42% Impervious Runoff Depth=3.45" Tc=6.0 min CN=70 Runoff=2.90 cfs 0.206 af
SubcatchmentS2:	Runoff Area=0.550 ac 12.73% Impervious Runoff Depth=3.05" Tc=6.0 min CN=66 Runoff=1.95 cfs 0.140 af
SubcatchmentS20:	Runoff Area=11,551 sf 0.00% Impervious Runoff Depth=2.56" Tc=6.0 min CN=61 Runoff=0.77 cfs 0.057 af
SubcatchmentS21:	Runoff Area=9,941 sf 67.95% Impervious Runoff Depth=5.17" Tc=6.0 min CN=86 Runoff=1.34 cfs 0.098 af
SubcatchmentS22: Stow Road South	Runoff Area=6,662 sf 15.01% Impervious Runoff Depth=4.29" Tc=6.0 min CN=78 Runoff=0.77 cfs 0.055 af
SubcatchmentS23: Stow Road South	Runoff Area=1,297 sf 23.36% Impervious Runoff Depth=4.51" Tc=6.0 min CN=80 Runoff=0.16 cfs 0.011 af
SubcatchmentS3:	Runoff Area=6,554 sf 46.64% Impervious Runoff Depth=4.29" Flow Length=426' Tc=11.6 min CN=78 Runoff=0.63 cfs 0.054 af
SubcatchmentS4:	Runoff Area=1,550 sf 34.97% Impervious Runoff Depth=3.87" Tc=6.0 min CN=74 Runoff=0.16 cfs 0.011 af
SubcatchmentS5:	Runoff Area=2,245 sf 40.18% Impervious Runoff Depth=4.08" Tc=6.0 min CN=76 Runoff=0.25 cfs 0.018 af

Subcatchment SBS:	Runoff Area=6,892 sf 15.19% Impervious Runoff Depth=4.29" Tc=6.0 min CN=78 Runoff=0.79 cfs 0.057 af
Reach 1R: (new Reach)	Avg. Flow Depth=0.68' Max Vel=6.68 fps Inflow=3.83 cfs 0.239 af 12.0" Round Pipe n=0.011 L=72.0' S=0.0125 '/' Capacity=4.71 cfs Outflow=3.81 cfs 0.239 af
Reach 4R:	Avg. Flow Depth=0.10' Max Vel=5.65 fps Inflow=0.23 cfs 0.019 af 12.0" Round Pipe n=0.011 L=22.0' S=0.0682 '/' Capacity=10.99 cfs Outflow=0.23 cfs 0.019 af
Reach 5R: Intermittent Stream	Avg. Flow Depth=1.01' Max Vel=2.22 fps Inflow=12.78 cfs 1.466 af n=0.050 L=845.0' S=0.0100 '/' Capacity=11.78 cfs Outflow=11.91 cfs 1.466 af
Reach 6R: new	Avg. Flow Depth=0.23' Max Vel=3.44 fps Inflow=0.38 cfs 0.024 af 8.0" Round Pipe n=0.011 L=197.0' S=0.0100 '/' Capacity=1.43 cfs Outflow=0.37 cfs 0.024 af
Reach 7R:	Avg. Flow Depth=0.11' Max Vel=5.03 fps Inflow=0.23 cfs 0.019 af 12.0" Round Pipe n=0.014 L=88.0' S=0.0795 '/' Capacity=9.33 cfs Outflow=0.23 cfs 0.019 af
Reach 8R: new	Avg. Flow Depth=0.26' Max Vel=6.83 fps Inflow=0.86 cfs 0.061 af 8.0" Round Pipe n=0.011 L=128.0' S=0.0353 '/' Capacity=2.68 cfs Outflow=0.86 cfs 0.061 af
Reach 9R: new	Avg. Flow Depth=0.19' Max Vel=3.72 fps Inflow=0.31 cfs 0.018 af 8.0" Round Pipe n=0.011 L=7.0' S=0.0143 '/' Capacity=1.71 cfs Outflow=0.31 cfs 0.018 af
Reach 10R: new	Avg. Flow Depth=0.00' Max Vel=0.00 fps 18.0" Round Pipe n=0.011 L=84.0' S=0.0400 '/' Capacity=24.83 cfs Outflow=0.00 cfs 0.000 af
Reach 11R: new	Avg. Flow Depth=0.67' Max Vel=5.57 fps Inflow=3.90 cfs 0.265 af 8.0" Round Pipe n=0.011 L=7.0' S=0.0143 '/' Capacity=1.71 cfs Outflow=1.81 cfs 0.265 af
Reach 12R: (new Reach)	Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af 8.0" Round Pipe n=0.011 L=18.0' S=0.0111 '/' Capacity=1.51 cfs Outflow=0.00 cfs 0.000 af
Reach 13R: New	Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af 8.0" Round Pipe n=0.011 L=18.0' S=0.0111 '/' Capacity=1.51 cfs Outflow=0.00 cfs 0.000 af
Reach 14R: (new Reach)	Avg. Flow Depth=0.16' Max Vel=3.65 fps Inflow=0.23 cfs 0.033 af 8.0" Round Pipe n=0.011 L=33.0' S=0.0173 '/' Capacity=1.88 cfs Outflow=0.23 cfs 0.033 af
Reach 15R: New	Avg. Flow Depth=0.16' Max Vel=3.64 fps Inflow=0.24 cfs 0.012 af 8.0" Round Pipe n=0.011 L=18.0' S=0.0167 '/' Capacity=1.84 cfs Outflow=0.24 cfs 0.012 af
Reach 16R: New	Avg. Flow Depth=0.13' Max Vel=3.51 fps Inflow=0.17 cfs 0.017 af 8.0" Round Pipe n=0.011 L=36.0' S=0.0194 '/' Capacity=1.99 cfs Outflow=0.17 cfs 0.017 af
Reach 17R: New	Avg. Flow Depth=0.67' Max Vel=8.45 fps Inflow=6.80 cfs 0.592 af 8.0" Round Pipe n=0.011 L=67.0' S=0.0328 '/' Capacity=2.59 cfs Outflow=2.72 cfs 0.592 af
Reach 18R: New	Avg. Flow Depth=0.07' Max Vel=2.34 fps Inflow=0.04 cfs 0.008 af 8.0" Round Pipe n=0.011 L=16.0' S=0.0200 '/' Capacity=2.02 cfs Outflow=0.04 cfs 0.008 af

Reach 19R: (new Reach)	Avg. Flow Depth=0.26'	Max Vel=10.25 fps	Inflow=1.32 cfs	0.085 af
8.0" Round Pipe n=0.011 L=47.0' S=0.0781 '/'	Capacity=3.99 cfs	Outflow=1.31 cfs	0.085 af	
Reach 20R: 12" RCP pipe	Avg. Flow Depth=0.36'	Max Vel=5.87 fps	Inflow=1.50 cfs	0.108 af
12.0" Round Pipe n=0.013 L=22.0' S=0.0227 '/'	Capacity=5.37 cfs	Outflow=1.50 cfs	0.108 af	
Reach 21R: (new Reach)	Avg. Flow Depth=0.39'	Max Vel=3.06 fps	Inflow=0.64 cfs	0.039 af
8.0" Round Pipe n=0.011 L=50.0' S=0.0050 '/'	Capacity=1.01 cfs	Outflow=0.64 cfs	0.039 af	
Reach CB1: CB1	Avg. Flow Depth=0.36'	Max Vel=8.78 fps	Inflow=2.20 cfs	0.167 af
12.0" Round Pipe n=0.011 L=27.0' S=0.0370 '/'	Capacity=8.10 cfs	Outflow=2.20 cfs	0.167 af	
Reach CP1:			Inflow=2.51 cfs	0.187 af
			Outflow=2.51 cfs	0.187 af
Reach CP2:			Inflow=30.78 cfs	4.573 af
			Outflow=30.78 cfs	4.573 af
Reach PS1:	Avg. Flow Depth=0.55'	Max Vel=5.30 fps	Inflow=5.85 cfs	0.521 af
n=0.035 L=228.0' S=0.0658 '/'	Capacity=20.22 cfs	Outflow=5.83 cfs	0.521 af	
Reach PS10A:	Avg. Flow Depth=0.09'	Max Vel=1.94 fps	Inflow=0.23 cfs	0.019 af
n=0.035 L=18.0' S=0.0833 '/'	Capacity=261.94 cfs	Outflow=0.23 cfs	0.019 af	
Reach PS10B:	Avg. Flow Depth=0.10'	Max Vel=1.83 fps	Inflow=0.23 cfs	0.019 af
n=0.035 L=42.0' S=0.0714 '/'	Capacity=242.51 cfs	Outflow=0.23 cfs	0.019 af	
Reach PS2:	Avg. Flow Depth=0.18'	Max Vel=2.60 fps	Inflow=0.54 cfs	0.039 af
n=0.035 L=31.0' S=0.0645 '/'	Capacity=20.02 cfs	Outflow=0.54 cfs	0.039 af	
Reach PS3:	Avg. Flow Depth=0.22'	Max Vel=3.06 fps	Inflow=0.86 cfs	0.061 af
n=0.035 L=58.0' S=0.0690 '/'	Capacity=20.70 cfs	Outflow=0.86 cfs	0.061 af	
Reach PS4:	Avg. Flow Depth=0.22'	Max Vel=1.96 fps	Inflow=0.53 cfs	0.038 af
n=0.035 L=34.0' S=0.0294 '/'	Capacity=13.52 cfs	Outflow=0.53 cfs	0.038 af	
Reach PS6: (new Reach)	Avg. Flow Depth=0.58'	Max Vel=2.31 fps	Inflow=2.90 cfs	0.206 af
n=0.035 L=398.0' S=0.0118 '/'	Capacity=8.56 cfs	Outflow=2.70 cfs	0.206 af	
Reach PS7: (new Reach)	Avg. Flow Depth=0.46'	Max Vel=4.28 fps	Inflow=3.97 cfs	0.239 af
n=0.035 L=303.0' S=0.0528 '/'	Capacity=81.69 cfs	Outflow=3.83 cfs	0.239 af	
Reach PS8: (new Reach)	Avg. Flow Depth=0.82'	Max Vel=4.40 fps	Inflow=12.38 cfs	1.549 af
n=0.023 L=40.0' S=0.0112 '/'	Capacity=80.78 cfs	Outflow=12.30 cfs	1.549 af	
Reach PS9: (new Reach)	Avg. Flow Depth=0.39'	Max Vel=2.34 fps	Inflow=1.51 cfs	0.108 af
n=0.035 L=75.0' S=0.0200 '/'	Capacity=11.15 cfs	Outflow=1.50 cfs	0.108 af	
Pond 1P: (new Pond)	Peak Elev=301.86'	Inflow=1.19 cfs	0.103 af	
18.0" Round Culvert n=0.011 L=85.0' S=0.0412 '/'	Outflow=1.19 cfs	0.103 af		
Pond 2P: (new Pond)	Peak Elev=298.61'	Inflow=2.90 cfs	0.368 af	
18.0" Round Culvert n=0.011 L=47.0' S=0.0362 '/'	Outflow=2.90 cfs	0.368 af		

Pond 3P: MH2B Peak Elev=285.19' Inflow=10.39 cfs 1.400 af
 24.0" Round Culvert n=0.011 L=72.0' S=0.0200 '/' Outflow=10.39 cfs 1.400 af

Pond 4P: Constructed Wetland Peak Elev=260.75' Storage=24,971 cf Inflow=19.47 cfs 2.163 af
 Primary=16.48 cfs 2.162 af Secondary=0.00 cfs 0.000 af Outflow=16.48 cfs 2.162 af

Pond 5P: MH2A Peak Elev=279.34' Inflow=11.68 cfs 1.485 af
 24.0" Round Culvert n=0.011 L=60.0' S=0.0200 '/' Outflow=11.68 cfs 1.485 af

Pond 20P: (new Pond) Peak Elev=266.60' Inflow=11.95 cfs 1.510 af
 24.0" Round Culvert n=0.011 L=160.0' S=0.0200 '/' Outflow=11.95 cfs 1.510 af

Pond BS: Bus Station RG Peak Elev=257.63' Storage=2,098 cf Inflow=2.99 cfs 0.224 af
 Outflow=2.95 cfs 0.180 af

Pond CB2: (new Pond) Peak Elev=262.40' Inflow=0.47 cfs 0.038 af
 12.0" Round Culvert n=0.011 L=10.0' S=0.0100 '/' Outflow=0.47 cfs 0.038 af

Pond CB3: (new Pond) Peak Elev=277.51' Inflow=0.30 cfs 0.025 af
 12.0" Round Culvert n=0.011 L=6.0' S=0.0333 '/' Outflow=0.30 cfs 0.025 af

Pond CB4: (new Pond) Peak Elev=294.27' Inflow=0.94 cfs 0.071 af
 12.0" Round Culvert n=0.011 L=7.0' S=0.0286 '/' Outflow=0.94 cfs 0.071 af

Pond CB5: (new Pond) Peak Elev=294.69' Inflow=1.60 cfs 0.114 af
 12.0" Round Culvert n=0.011 L=17.0' S=0.0235 '/' Outflow=1.60 cfs 0.114 af

Pond CULdeSAC: Cul-de-sac Peak Elev=300.14' Storage=3,230 cf Inflow=1.04 cfs 0.074 af
 Outflow=0.00 cfs 0.000 af

Pond MH1: (new Pond) Peak Elev=262.99' Inflow=12.38 cfs 1.549 af
 30.0" Round Culvert n=0.013 L=35.0' S=0.0100 '/' Outflow=12.38 cfs 1.549 af

Pond MH2: (new Pond) Peak Elev=272.50' Inflow=11.95 cfs 1.510 af
 24.0" Round Culvert n=0.011 L=125.0' S=0.0200 '/' Outflow=11.95 cfs 1.510 af

Pond MH3: (new Pond) Peak Elev=290.81' Inflow=10.39 cfs 1.367 af
 24.0" Round Culvert n=0.011 L=33.0' S=0.0200 '/' Outflow=10.39 cfs 1.367 af

Pond MH4: Peak Elev=300.25' Inflow=0.26 cfs 0.044 af
 18.0" Round Culvert n=0.011 L=169.0' S=0.0200 '/' Outflow=0.26 cfs 0.044 af

Pond MH5: Peak Elev=301.34' Inflow=0.23 cfs 0.019 af
 18.0" Round Culvert n=0.011 L=56.0' S=0.0107 '/' Outflow=0.23 cfs 0.019 af

Pond MH6: CB6 Peak Elev=294.11' Inflow=5.69 cfs 1.005 af
 24.0" Round Culvert n=0.011 L=101.0' S=0.0200 '/' Outflow=5.69 cfs 1.005 af

Pond RG10: Peak Elev=306.92' Storage=447 cf Inflow=0.44 cfs 0.027 af
 Outflow=0.17 cfs 0.017 af

Pond RG11:	Peak Elev=306.93' Storage=250 cf Inflow=0.24 cfs 0.018 af Outflow=0.24 cfs 0.012 af
Pond RG12:	Peak Elev=310.29' Storage=1 cf Inflow=0.86 cfs 0.061 af Outflow=0.86 cfs 0.061 af
Pond RG13:	Peak Elev=308.06' Storage=648 cf Inflow=0.53 cfs 0.038 af Outflow=0.38 cfs 0.024 af
Pond RG14:	Peak Elev=305.05' Storage=240 cf Inflow=0.31 cfs 0.023 af Outflow=0.31 cfs 0.018 af
Pond RG15:	Peak Elev=301.15' Storage=524 cf Inflow=3.85 cfs 0.275 af Outflow=3.90 cfs 0.265 af
Pond RG16:	Peak Elev=301.39' Storage=1,017 cf Inflow=6.75 cfs 0.612 af Outflow=6.80 cfs 0.592 af
Pond RG19:	Peak Elev=297.28' Storage=1,484 cf Inflow=2.70 cfs 0.206 af Outflow=2.76 cfs 0.178 af
Pond RG20:	Peak Elev=295.11' Storage=1,052 cf Inflow=0.77 cfs 0.057 af Outflow=0.23 cfs 0.033 af
Pond RG21:	Peak Elev=291.80' Storage=749 cf Inflow=1.34 cfs 0.098 af Outflow=1.32 cfs 0.085 af
Pond RG22:	Peak Elev=258.71' Storage=792 cf Inflow=0.77 cfs 0.055 af Outflow=0.64 cfs 0.039 af
Pond RG23:	Peak Elev=257.98' Storage=518 cf Inflow=0.76 cfs 0.050 af Outflow=0.48 cfs 0.039 af
Pond RG3:	Peak Elev=311.07' Storage=339 cf Inflow=0.63 cfs 0.054 af Outflow=0.65 cfs 0.047 af
Pond RG4:	Peak Elev=306.38' Storage=500 cf Inflow=0.16 cfs 0.011 af Outflow=0.00 cfs 0.000 af
Pond RG5:	Peak Elev=306.77' Storage=425 cf Inflow=0.25 cfs 0.018 af Outflow=0.04 cfs 0.008 af

Total Runoff Area = 16.749 ac Runoff Volume = 5.062 af Average Runoff Depth = 3.63"
86.64% Pervious = 14.511 ac 13.36% Impervious = 2.238 ac

Summary for Subcatchment 1S: (new Subcat)

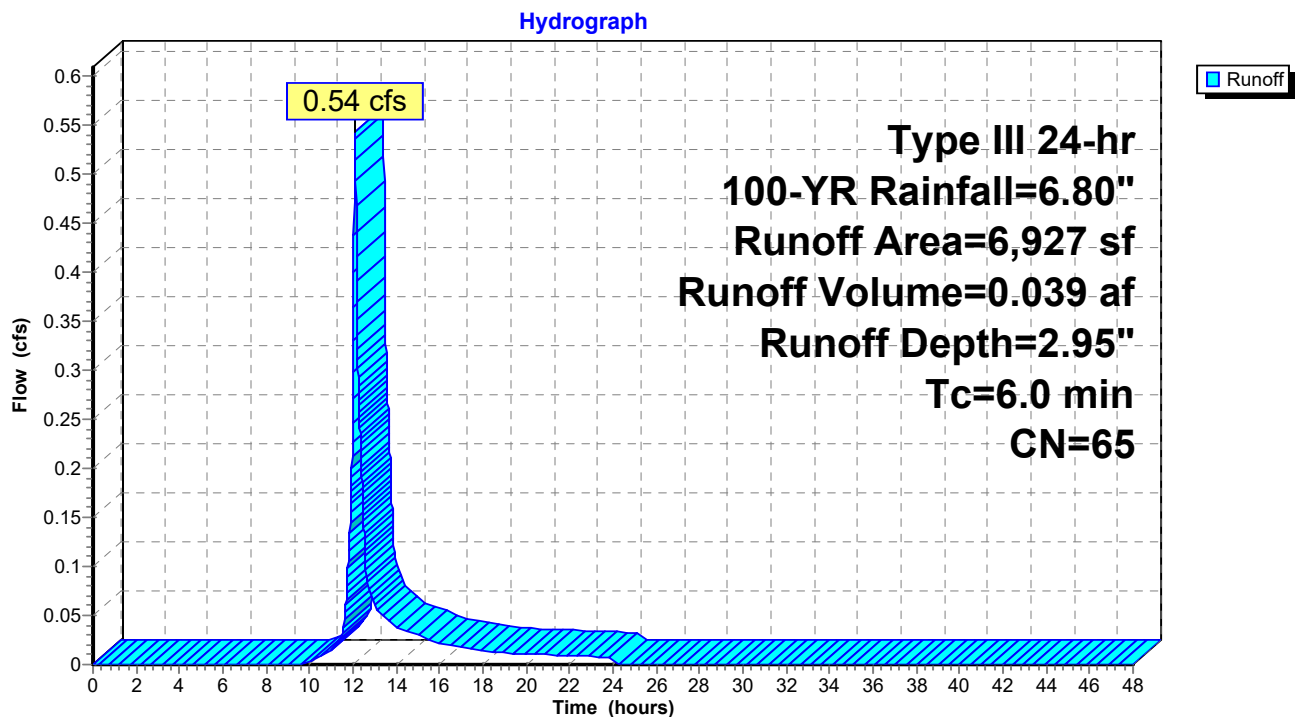
Runoff = 0.54 cfs @ 12.09 hrs, Volume= 0.039 af, Depth= 2.95"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-YR Rainfall=6.80"

Area (sf)	CN	Description
771	98	Paved parking & roofs
6,156	61	>75% Grass cover, Good, HSG B
6,927	65	Weighted Average
6,156		88.87% Pervious Area
771		11.13% Impervious Area

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

Subcatchment 1S: (new Subcat)



Summary for Subcatchment 2S: Road

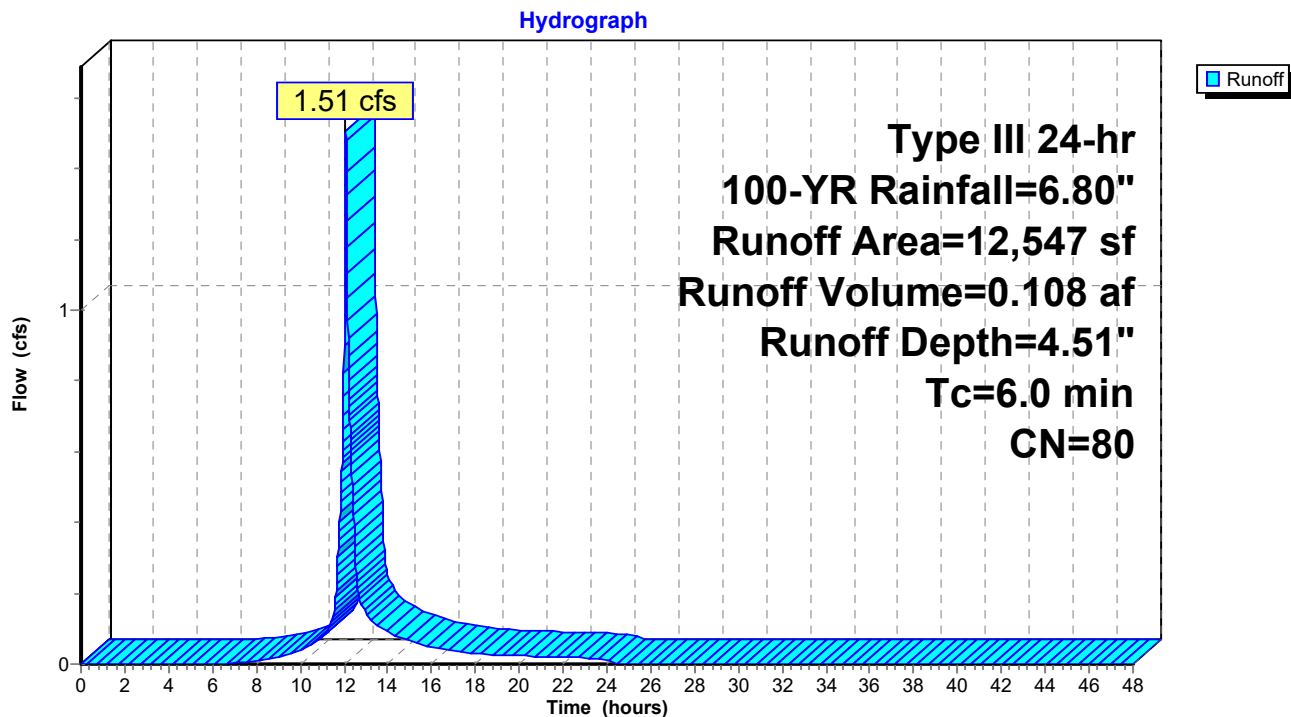
Runoff = 1.51 cfs @ 12.09 hrs, Volume= 0.108 af, Depth= 4.51"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-YR Rainfall=6.80"

	Area (sf)	CN	Description
*	4,975	74	>75% Grass cover, Good, HSG C
*	3,197	98	Impervious
*	4,375	73	Woods, Fair, HSG C
	12,547	80	Weighted Average
	9,350		74.52% Pervious Area
	3,197		25.48% Impervious Area

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

Subcatchment 2S: Road



Summary for Subcatchment 3S: Undeveloped Area

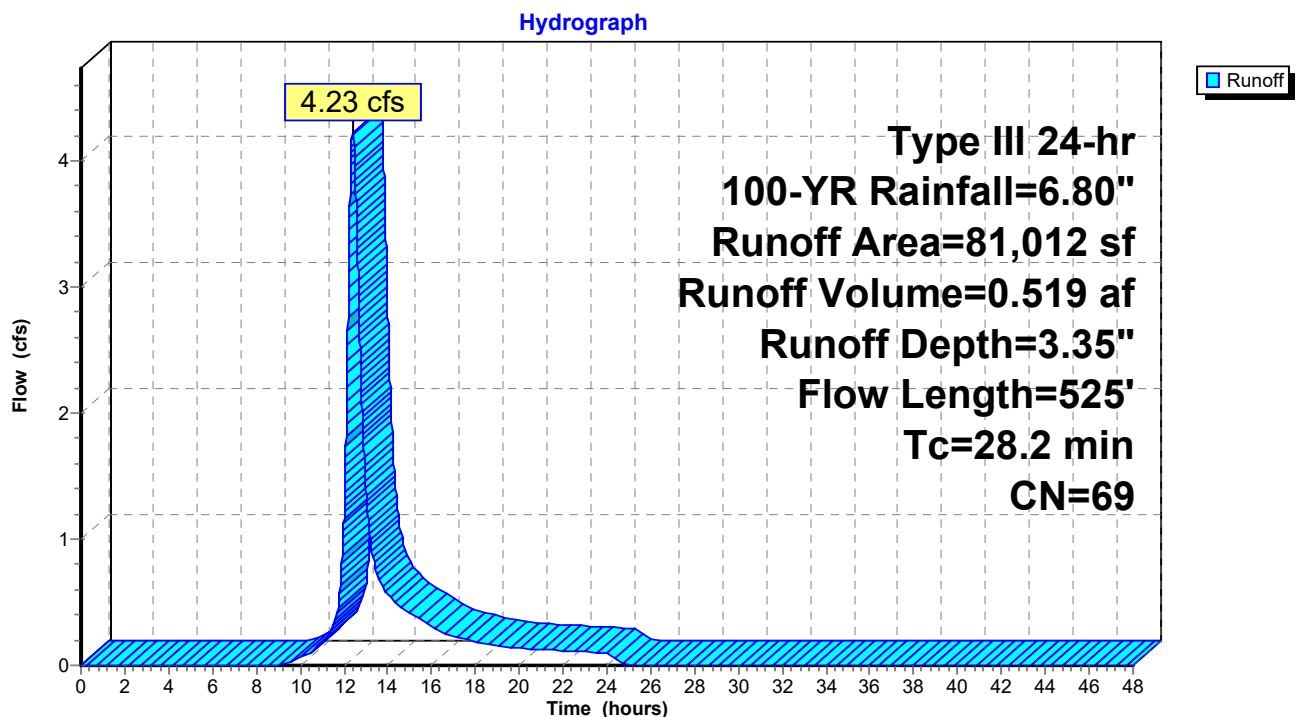
Runoff = 4.23 cfs @ 12.40 hrs, Volume= 0.519 af, Depth= 3.35"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-YR Rainfall=6.80"

Area (sf)	CN	Description
* 26,806	61	>75% grass cover, good, HSG B
54,206	73	Woods, Fair, HSG C
81,012	69	Weighted Average
81,012		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	50	0.0605	0.10		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.00"
20.0	475	0.0250	0.40		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps
28.2	525	Total			

Subcatchment 3S: Undeveloped Area



Summary for Subcatchment 4S:

Runoff = 6.92 cfs @ 12.20 hrs, Volume= 0.648 af, Depth= 3.87"

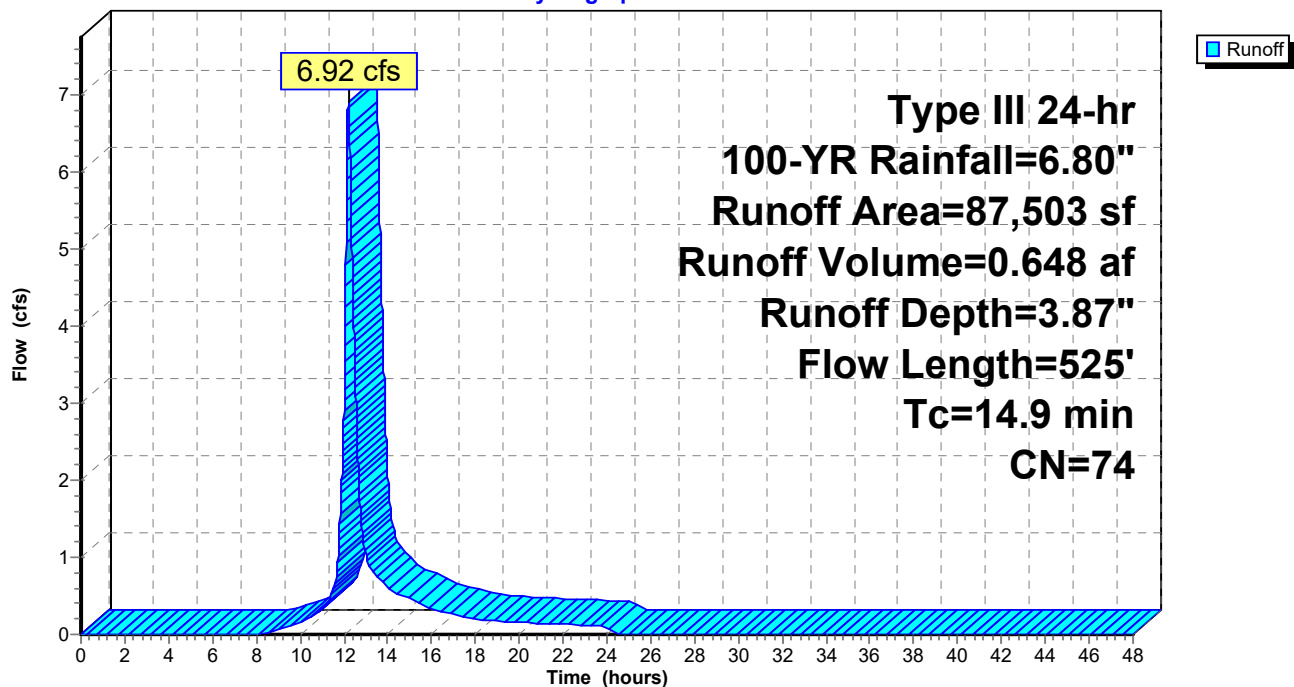
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-YR Rainfall=6.80"

	Area (sf)	CN	Description
*	62,598	73	Woods, Fair, HSG C
	2,061	98	Paved parking & roofs
	22,844	74	>75% Grass cover, Good, HSG C
	87,503	74	Weighted Average
	85,442		97.64% Pervious Area
	2,061		2.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	50	0.0300	0.17		Sheet Flow, Grass: Short n= 0.150 P2= 3.00"
10.0	475	0.0250	0.79		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
14.9	525	Total			

Subcatchment 4S:

Hydrograph



Summary for Subcatchment 5S:

Runoff = 0.47 cfs @ 12.08 hrs, Volume= 0.038 af, Depth= 6.56"

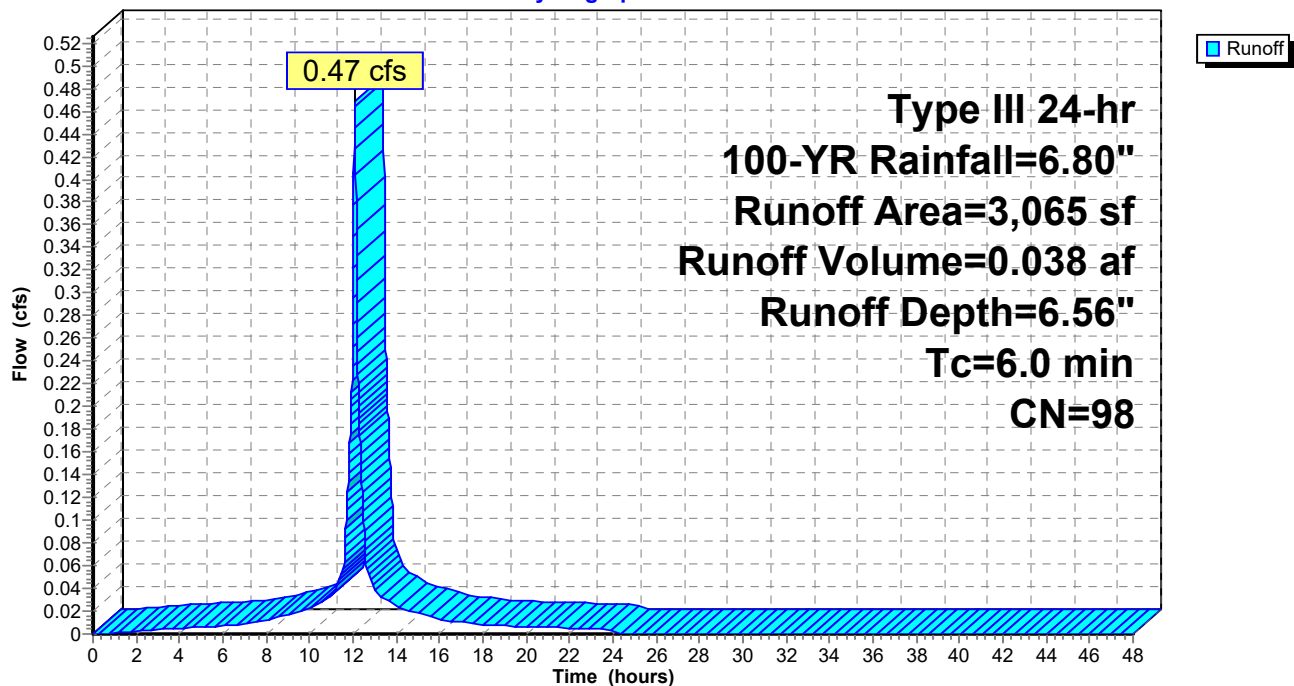
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-YR Rainfall=6.80"

Area (sf)	CN	Description
3,065	98	Paved parking & roofs
3,065		100.00% Impervious Area

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

Subcatchment 5S:

Hydrograph



Summary for Subcatchment 7S: (new Subcat)

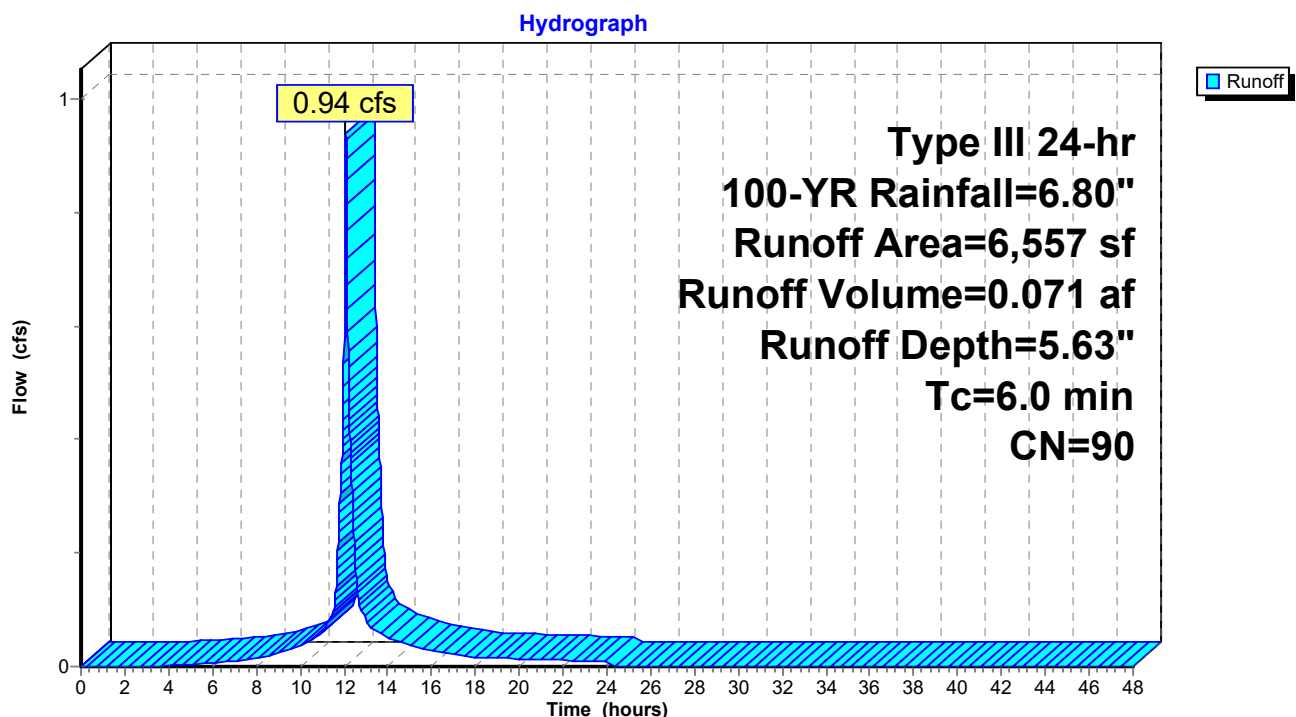
Runoff = 0.94 cfs @ 12.08 hrs, Volume= 0.071 af, Depth= 5.63"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-YR Rainfall=6.80"

	Area (sf)	CN	Description
*	5,183	98	Impervious
*	1,374	61	>75% grass cover, good, HSG B
	6,557	90	Weighted Average
	1,374		20.95% Pervious Area
	5,183		79.05% Impervious Area

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

Subcatchment 7S: (new Subcat)



Summary for Subcatchment 8S: (new Subcat)

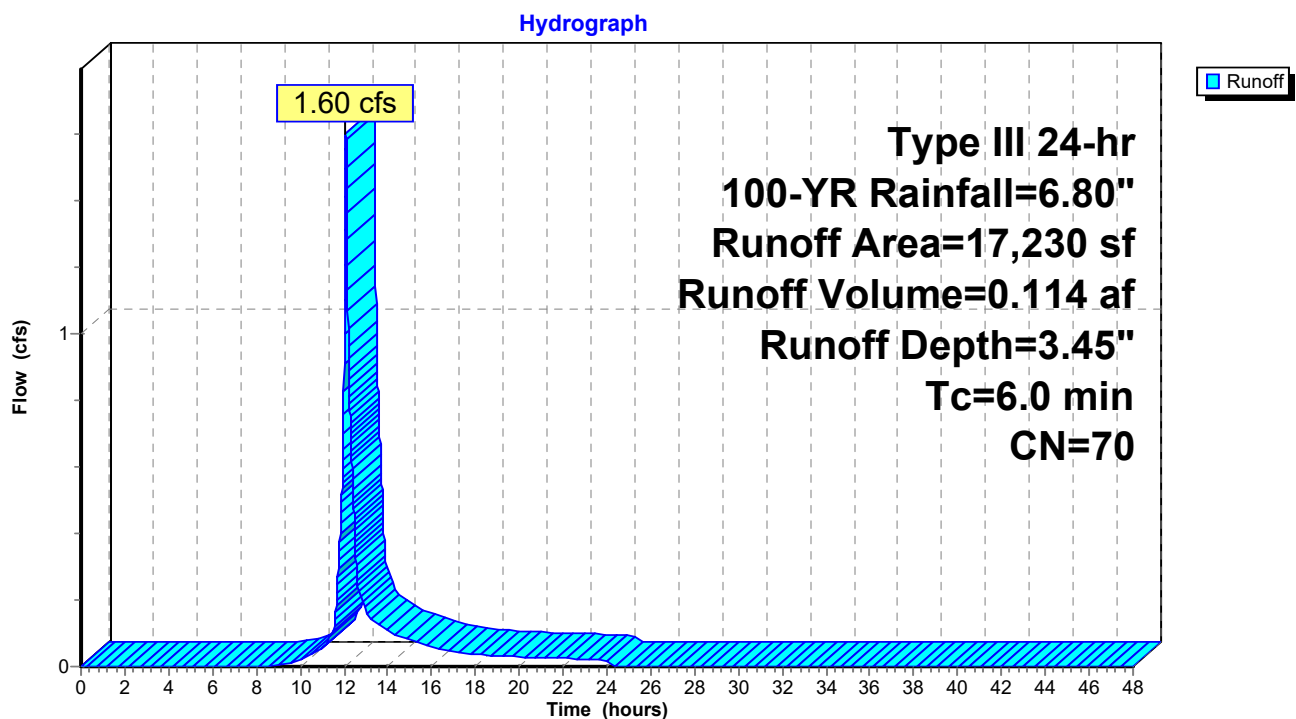
Runoff = 1.60 cfs @ 12.09 hrs, Volume= 0.114 af, Depth= 3.45"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-YR Rainfall=6.80"

	Area (sf)	CN	Description
*	4,188	98	Impervious
*	13,042	61	>75% grass cover, good, HSG B
	17,230	70	Weighted Average
	13,042		75.69% Pervious Area
	4,188		24.31% Impervious Area

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

Subcatchment 8S: (new Subcat)



Summary for Subcatchment 9S:

Runoff = 0.30 cfs @ 12.08 hrs, Volume= 0.025 af, Depth= 6.56"

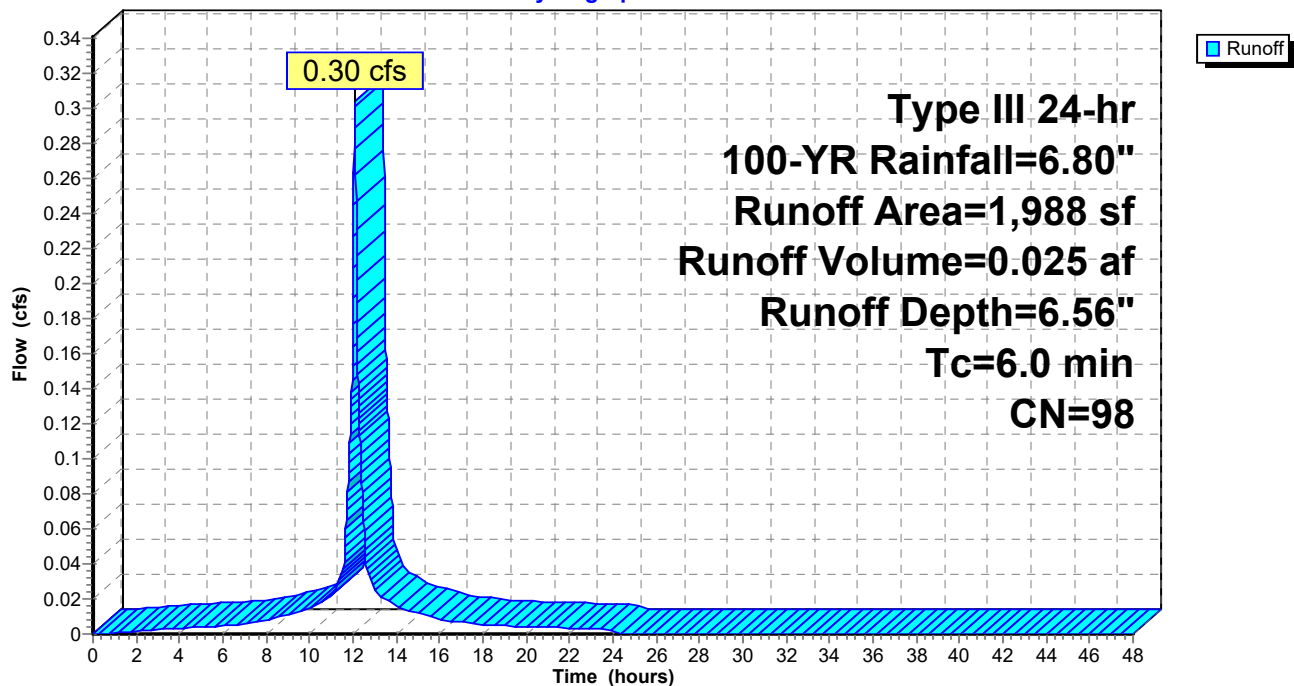
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-YR Rainfall=6.80"

	Area (sf)	CN	Description
*	1,988	98	
	1,988		100.00% Impervious Area

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

Subcatchment 9S:

Hydrograph



Summary for Subcatchment 10S: (new Subcat)

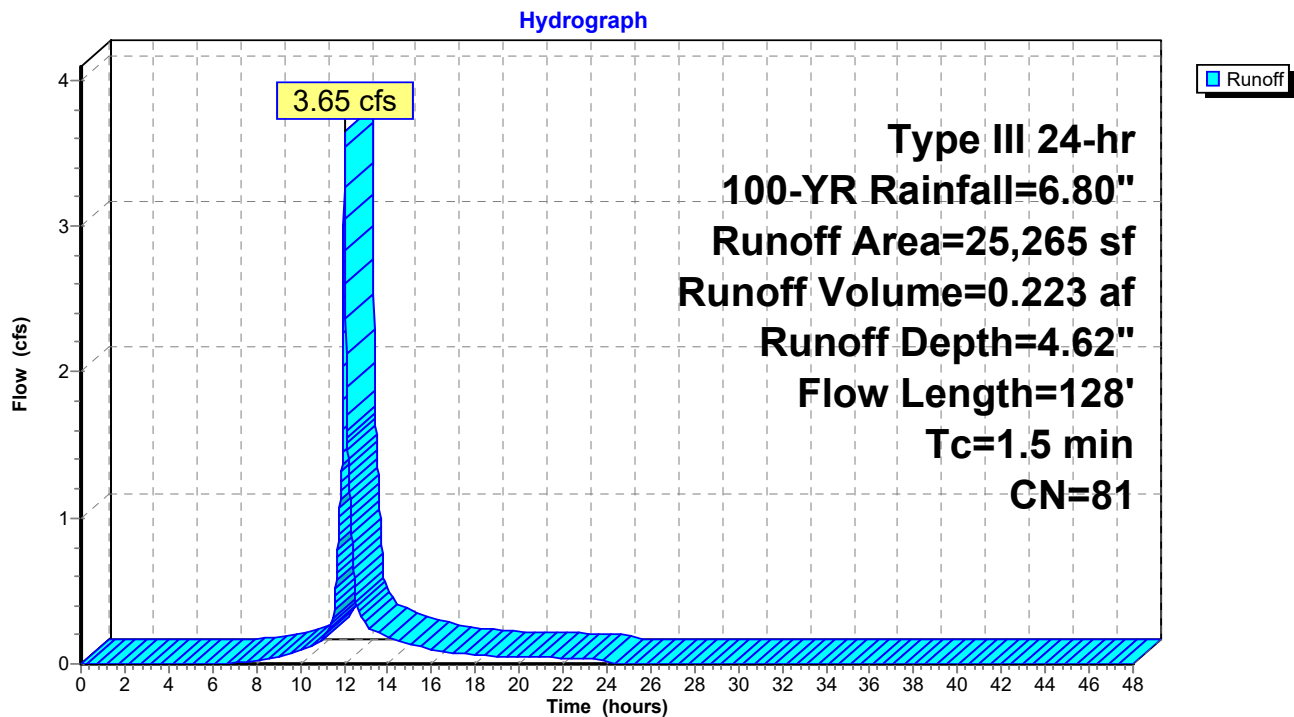
Runoff = 3.65 cfs @ 12.02 hrs, Volume= 0.223 af, Depth= 4.62"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-YR Rainfall=6.80"

Area (sf)	CN	Description
7,231	98	Paved parking & roofs
18,034	74	>75% Grass cover, Good, HSG C
25,265	81	Weighted Average
18,034		71.38% Pervious Area
7,231		28.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.16		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
0.8	78	0.0500	1.57		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.5	128	Total			

Subcatchment 10S: (new Subcat)



Summary for Subcatchment 11S:

Runoff = 2.14 cfs @ 12.09 hrs, Volume= 0.152 af, Depth= 3.35"

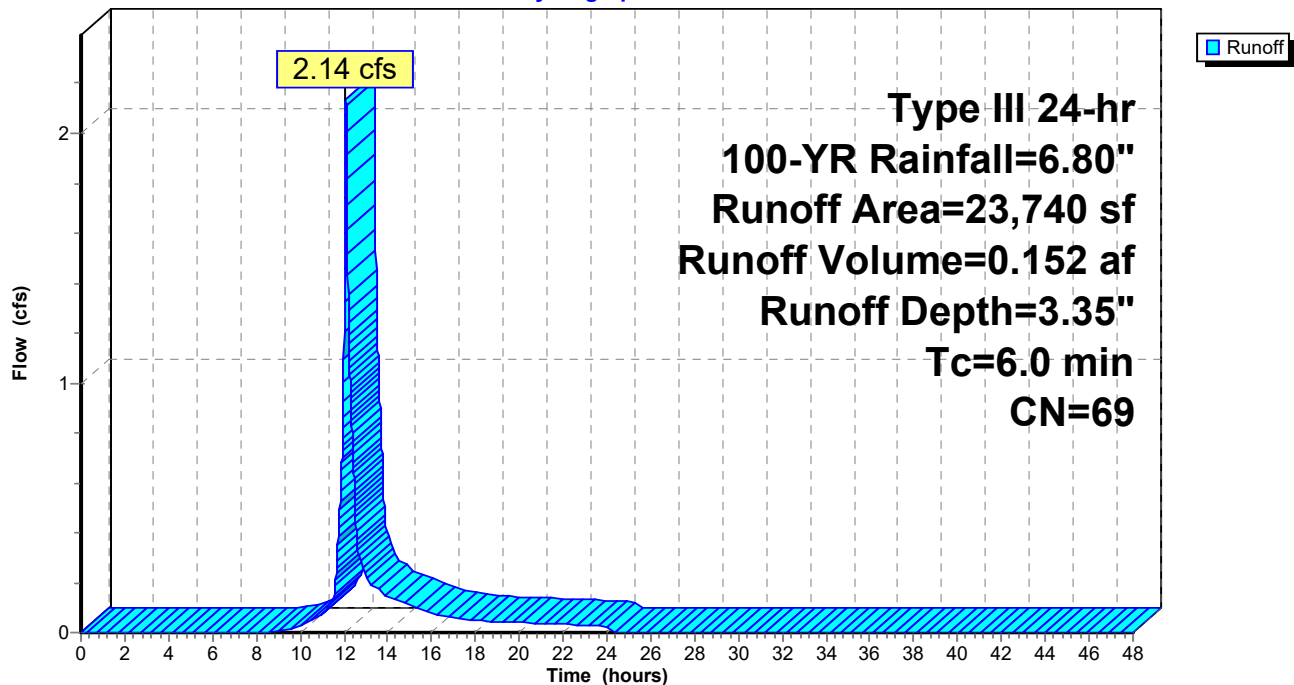
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-YR Rainfall=6.80"

	Area (sf)	CN	Description
*	18,426	61	G+RG: >75% Grass cover, Good, HSG B
*	5,314	98	
	23,740	69	Weighted Average
	18,426		77.62% Pervious Area
	5,314		22.38% Impervious Area

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

Subcatchment 11S:

Hydrograph



Summary for Subcatchment 12S:

Runoff = 3.83 cfs @ 12.12 hrs, Volume= 0.299 af, Depth= 4.29"

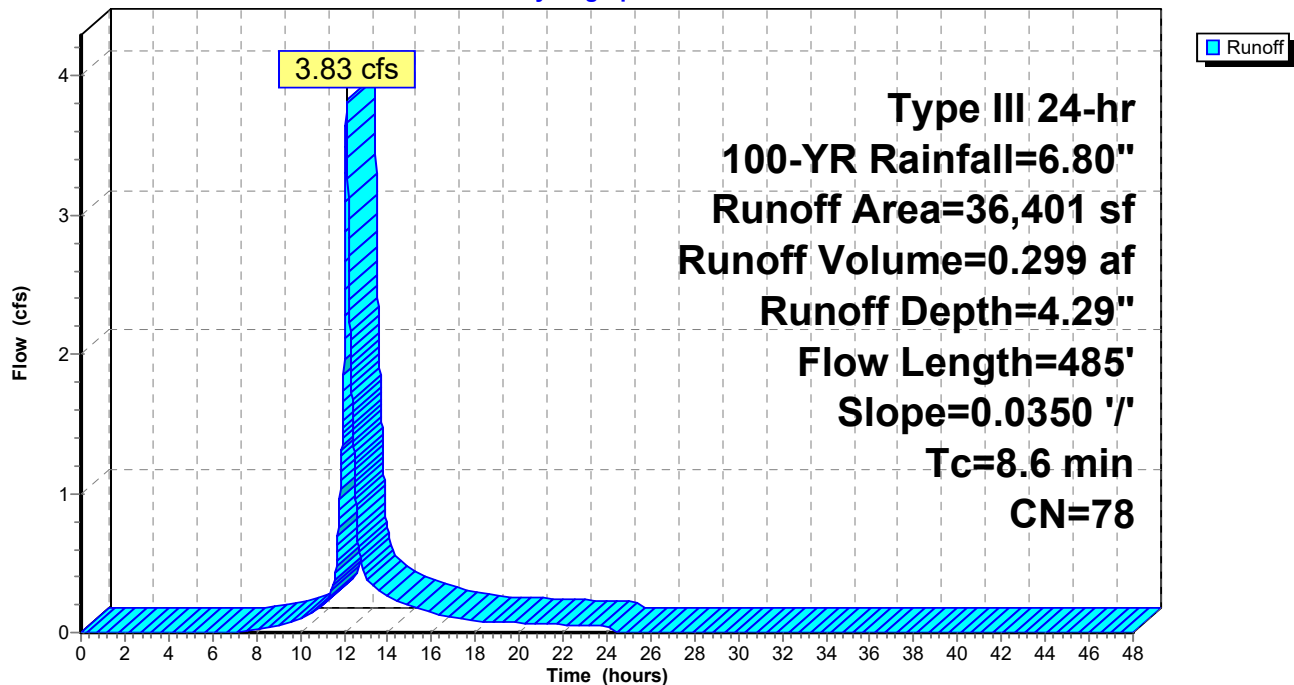
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-YR Rainfall=6.80"

	Area (sf)	CN	Description
*	5,171	74	>75% grass cover, good, HSG C
*	31,230	79	woods, fair, HSG D
	36,401	78	Weighted Average
	36,401		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.6	485	0.0350	0.94		Shallow Concentrated Flow, Woodland Kv= 5.0 fps

Subcatchment 12S:

Hydrograph



Summary for Subcatchment 13S:

Runoff = 4.40 cfs @ 12.30 hrs, Volume= 0.483 af, Depth= 3.76"

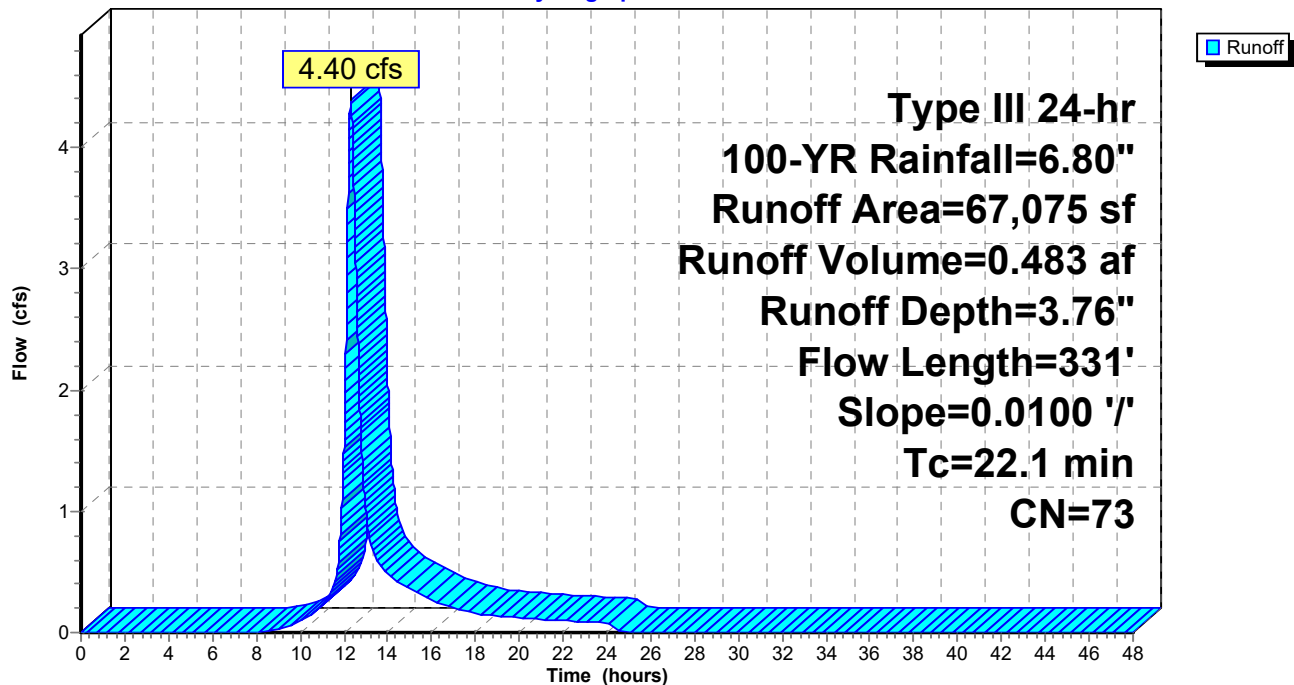
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-YR Rainfall=6.80"

	Area (sf)	CN	Description
*	56,685	73	woods, fair, HSG C
*	10,390	74	>75% grass cover, good, HSG C
	67,075	73	Weighted Average
	67,075		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.1	331	0.0100	0.25		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps

Subcatchment 13S:

Hydrograph



Summary for Subcatchment 14S:

Runoff = 3.97 cfs @ 12.02 hrs, Volume= 0.239 af, Depth= 3.66"

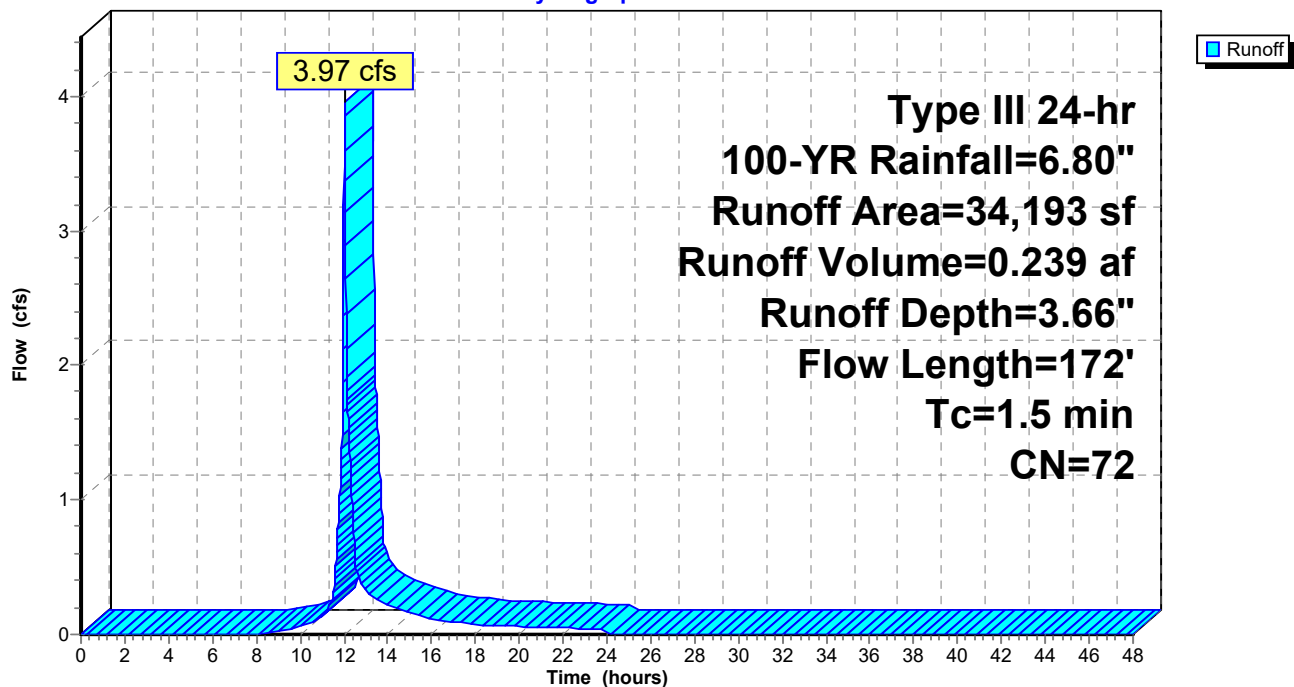
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-YR Rainfall=6.80"

	Area (sf)	CN	Description
*	23,718	61	>75% grass cover, good, HSG B
*	9,784	98	
*	691	60	woods, fair, HSG B
	34,193	72	Weighted Average
	24,409		71.39% Pervious Area
	9,784		28.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	47	0.1000	2.18		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.00"
1.1	125	0.0700	1.85		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.5	172	Total			

Subcatchment 14S:

Hydrograph



Summary for Subcatchment 15S:

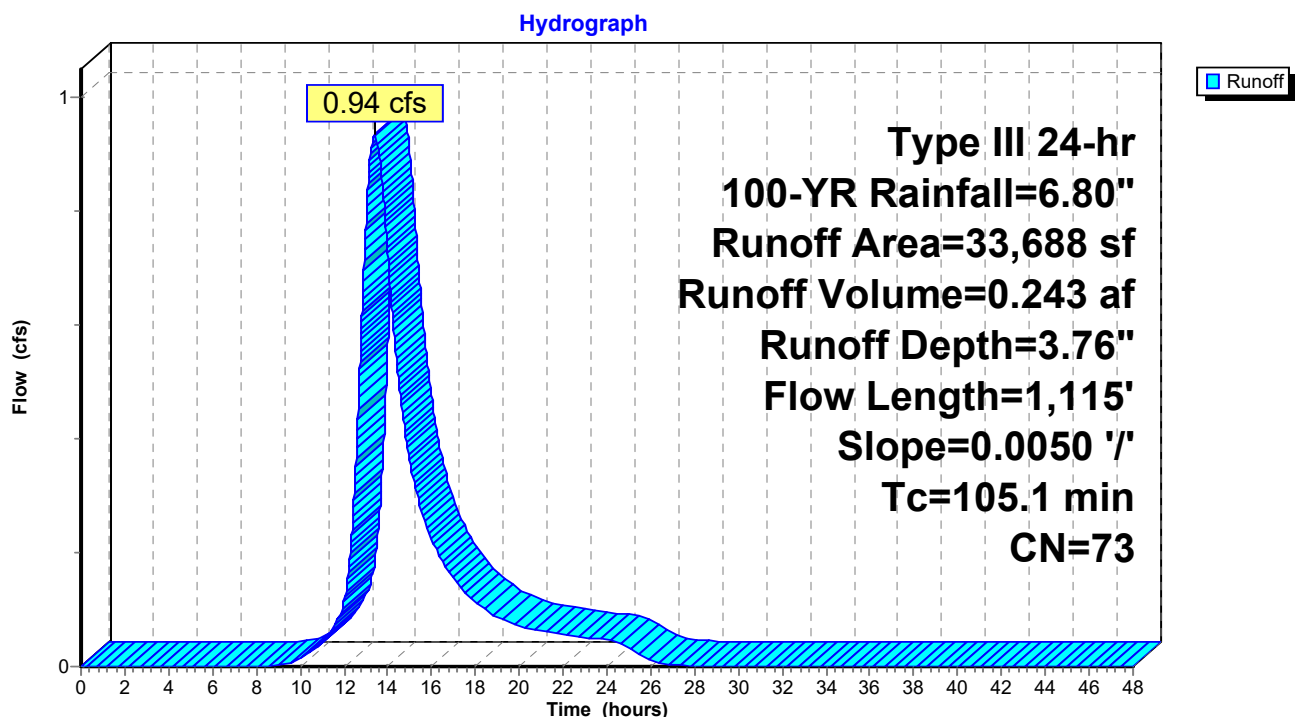
Runoff = 0.94 cfs @ 13.43 hrs, Volume= 0.243 af, Depth= 3.76"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-YR Rainfall=6.80"

	Area (sf)	CN	Description
*	30,286	73	woods, fair, HSG C
*	3,402	74	>75% grass cover, good, HSG C
	33,688	73	Weighted Average
	33,688		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
105.1	1,115	0.0050	0.18		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps

Subcatchment 15S:



Summary for Subcatchment 16S:

Runoff = 0.72 cfs @ 12.08 hrs, Volume= 0.059 af, Depth= 6.56"

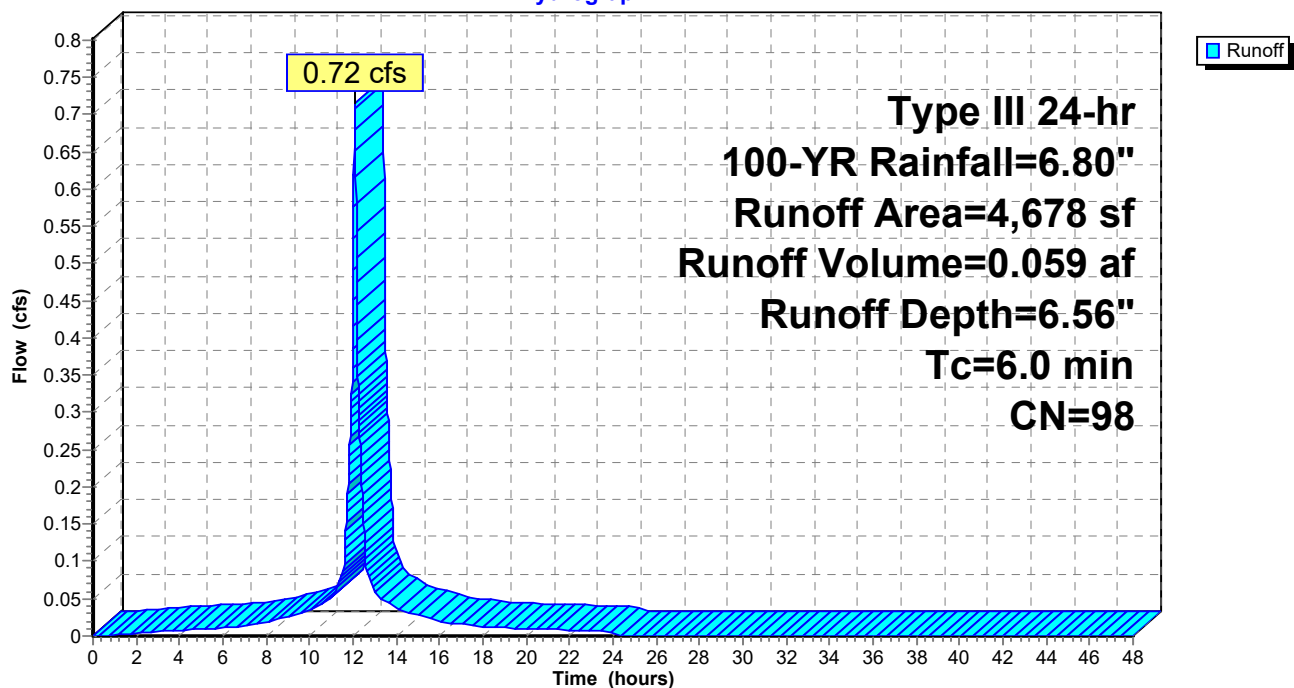
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-YR Rainfall=6.80"

Area (sf)	CN	Description
* 4,678	98	
4,678		100.00% Impervious Area

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

Subcatchment 16S:

Hydrograph



Summary for Subcatchment CUL: (new Subcat)

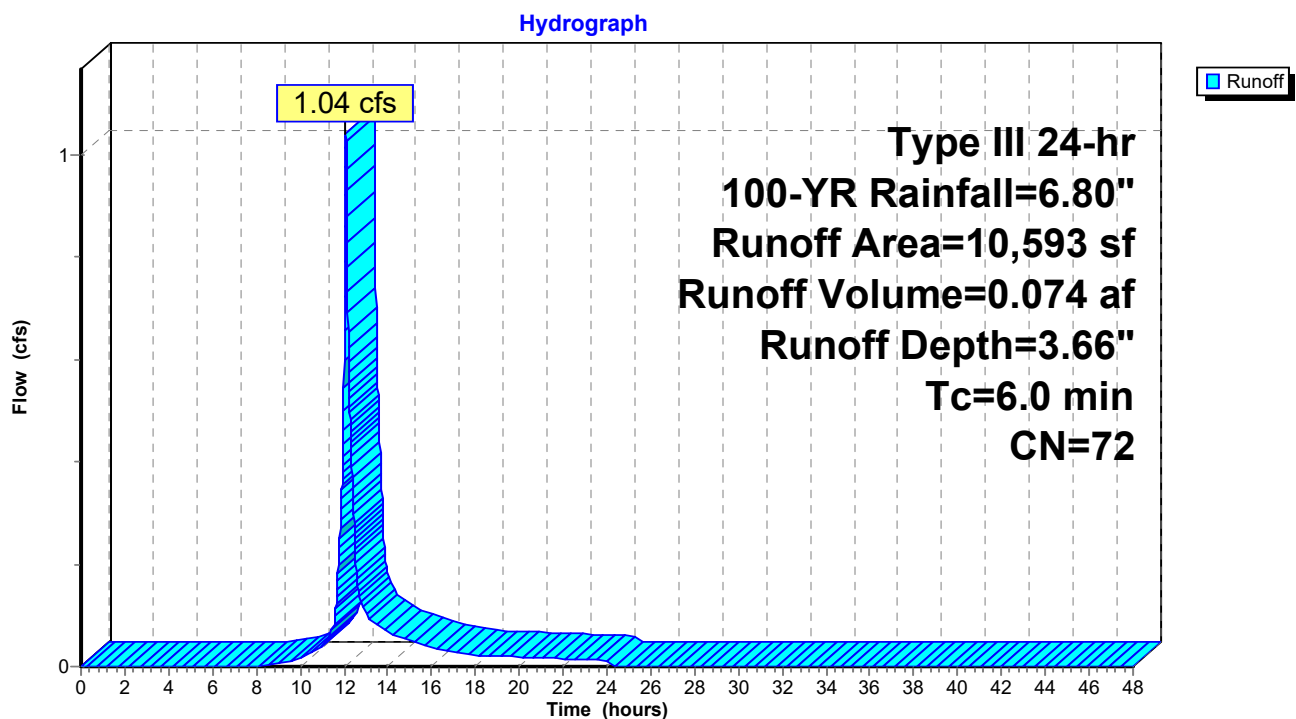
Runoff = 1.04 cfs @ 12.09 hrs, Volume= 0.074 af, Depth= 3.66"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-YR Rainfall=6.80"

	Area (sf)	CN	Description
*	3,132	98	
*	7,461	61	G+RG: >75% grass cover, good, HSG B
	10,593	72	Weighted Average
	7,461		70.43% Pervious Area
	3,132		29.57% Impervious Area

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

Subcatchment CUL: (new Subcat)



Summary for Subcatchment P1:

Runoff = 5.85 cfs @ 12.18 hrs, Volume= 0.521 af, Depth= 2.75"

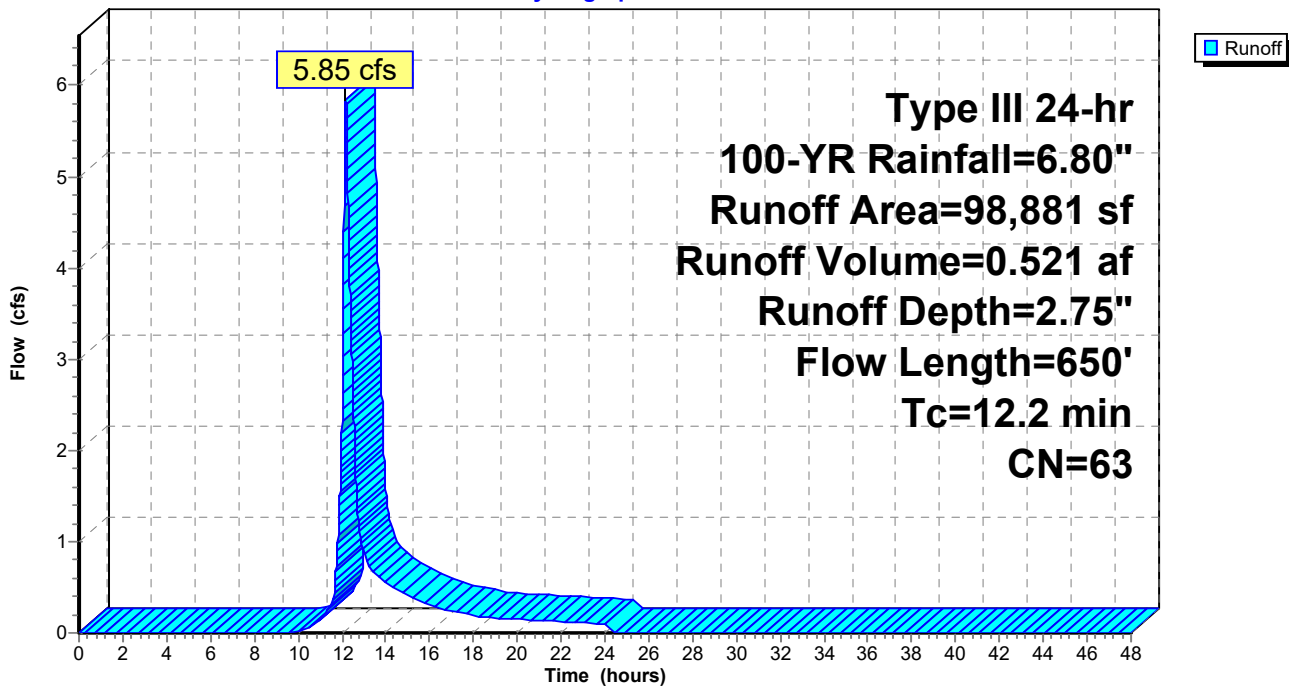
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-YR Rainfall=6.80"

Area (sf)	CN	Description
93,901	61	>75% Grass cover, Good, HSG B
* 4,980	98	impervious
98,881	63	Weighted Average
93,901		94.96% Pervious Area
4,980		5.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	50	0.0700	0.11		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.00"
4.5	600	0.1010	2.22		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
12.2	650	Total			

Subcatchment P1:

Hydrograph



Summary for Subcatchment P2:

Runoff = 0.65 cfs @ 12.13 hrs, Volume= 0.052 af, Depth= 2.56"

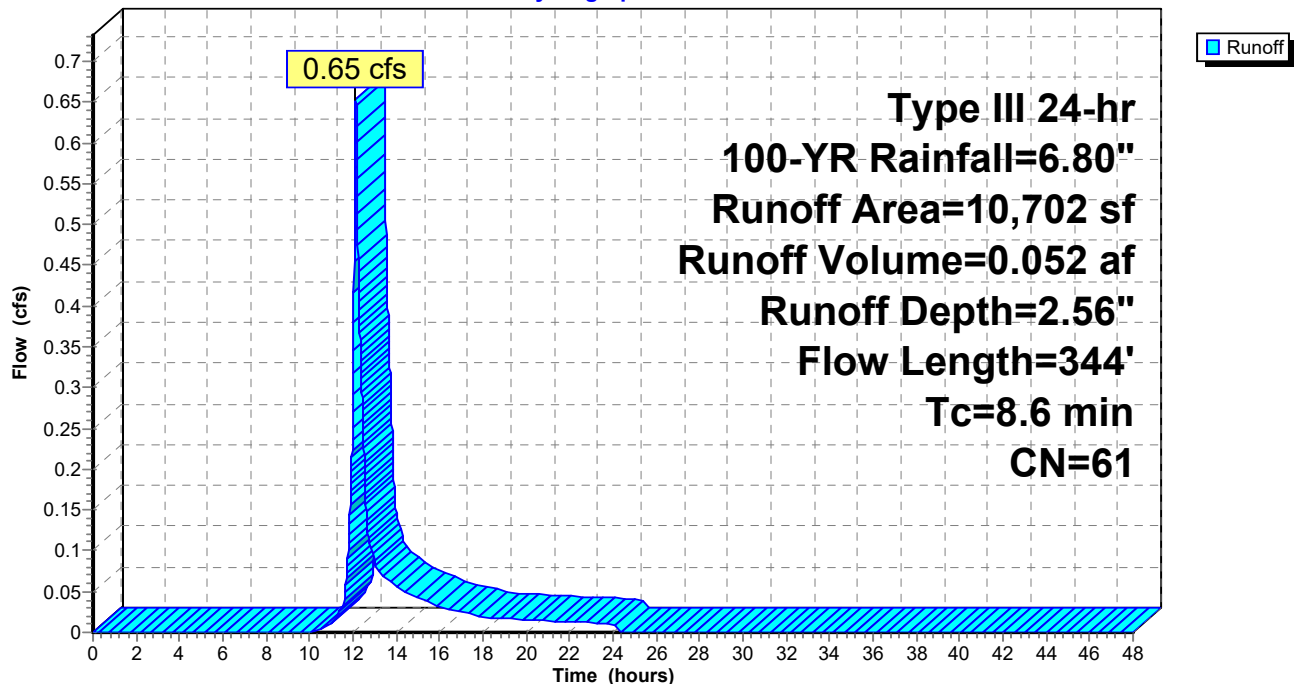
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-YR Rainfall=6.80"

Area (sf)	CN	Description
* 10,702	61	G+RG: >75% Grass cover, Good, HSG B
10,702		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	50	0.1000	0.12		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.00"
1.0	138	0.2200	2.35		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.9	156	0.1700	2.89		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
8.6	344	Total			

Subcatchment P2:

Hydrograph



Summary for Subcatchment S1:

Runoff = 0.23 cfs @ 12.08 hrs, Volume= 0.019 af, Depth= 6.44"

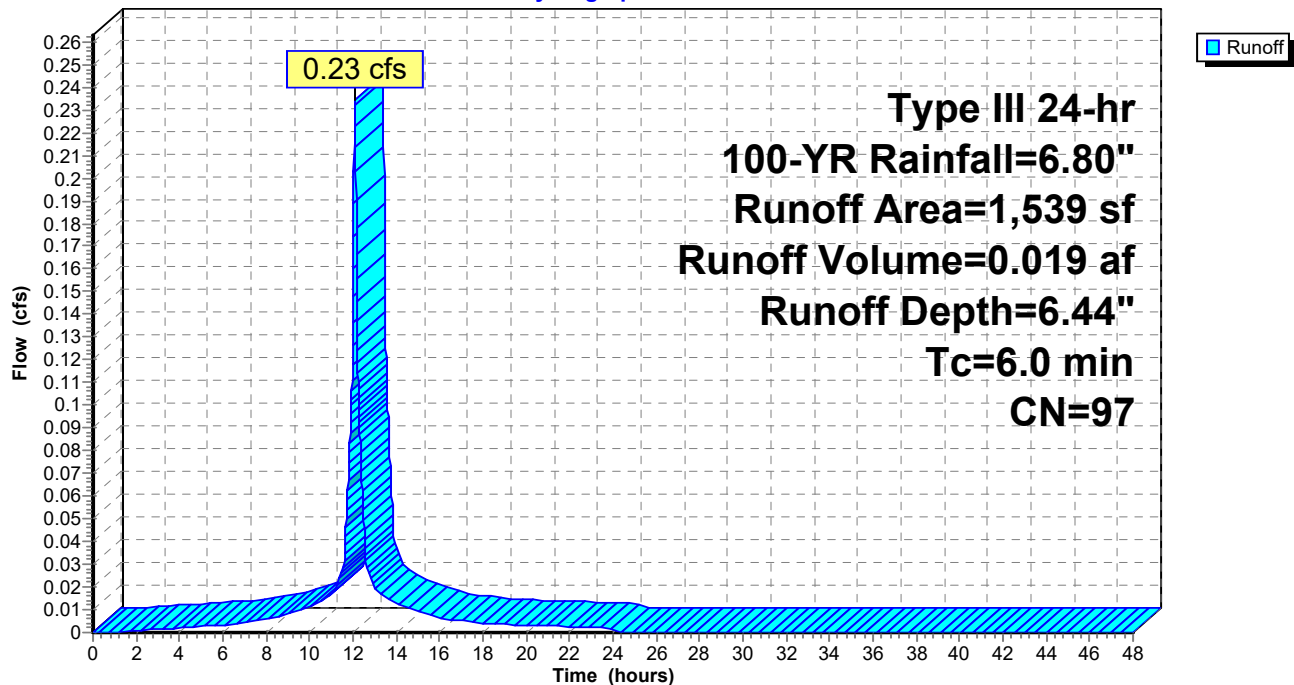
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-YR Rainfall=6.80"

Area (sf)	CN	Description
61	61	>75% Grass cover, Good, HSG B
* 1,478	98	
1,539	97	Weighted Average
61		3.96% Pervious Area
1,478		96.04% Impervious Area

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

Subcatchment S1:

Hydrograph



Summary for Subcatchment S10:

Runoff = 0.21 cfs @ 12.09 hrs, Volume= 0.015 af, Depth= 3.66"

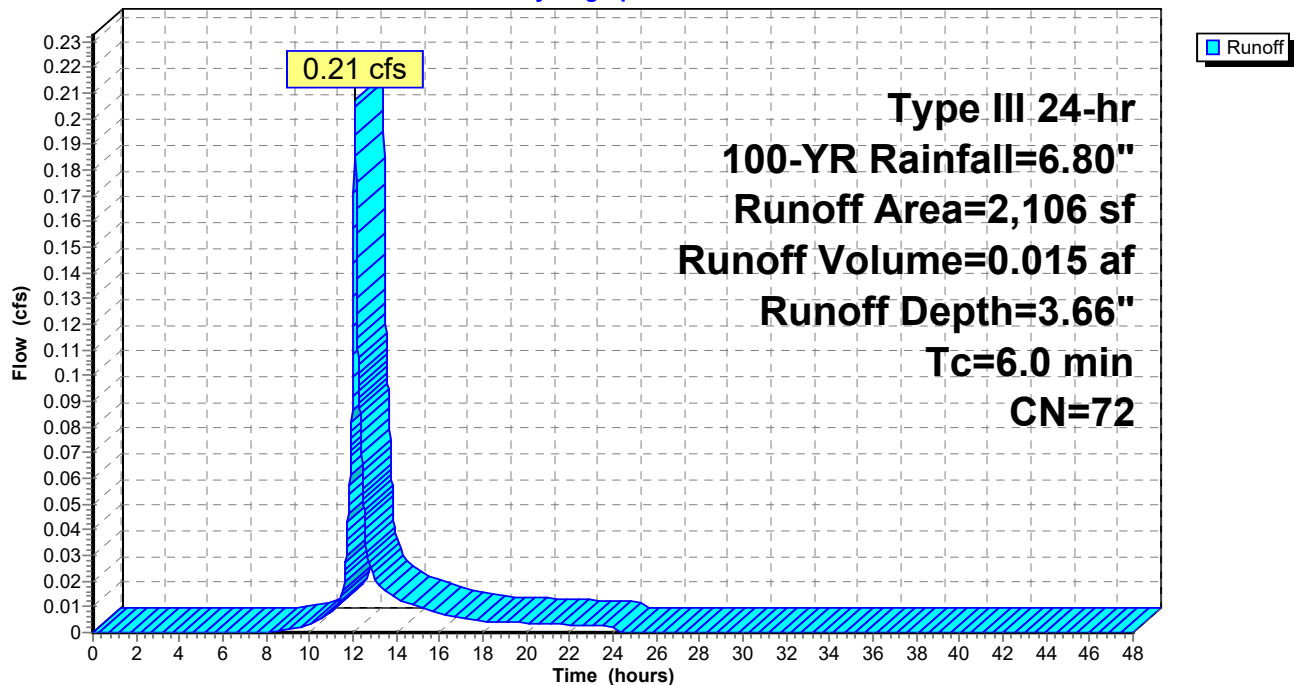
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-YR Rainfall=6.80"

	Area (sf)	CN	Description
*	1,456	61	G+RG: >75% Grass cover, Good, HSG B
*	650	98	
	2,106	72	Weighted Average
	1,456		69.14% Pervious Area
	650		30.86% Impervious Area

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

Subcatchment S10:

Hydrograph



Summary for Subcatchment S11:

Runoff = 0.24 cfs @ 12.09 hrs, Volume= 0.018 af, Depth= 4.95"

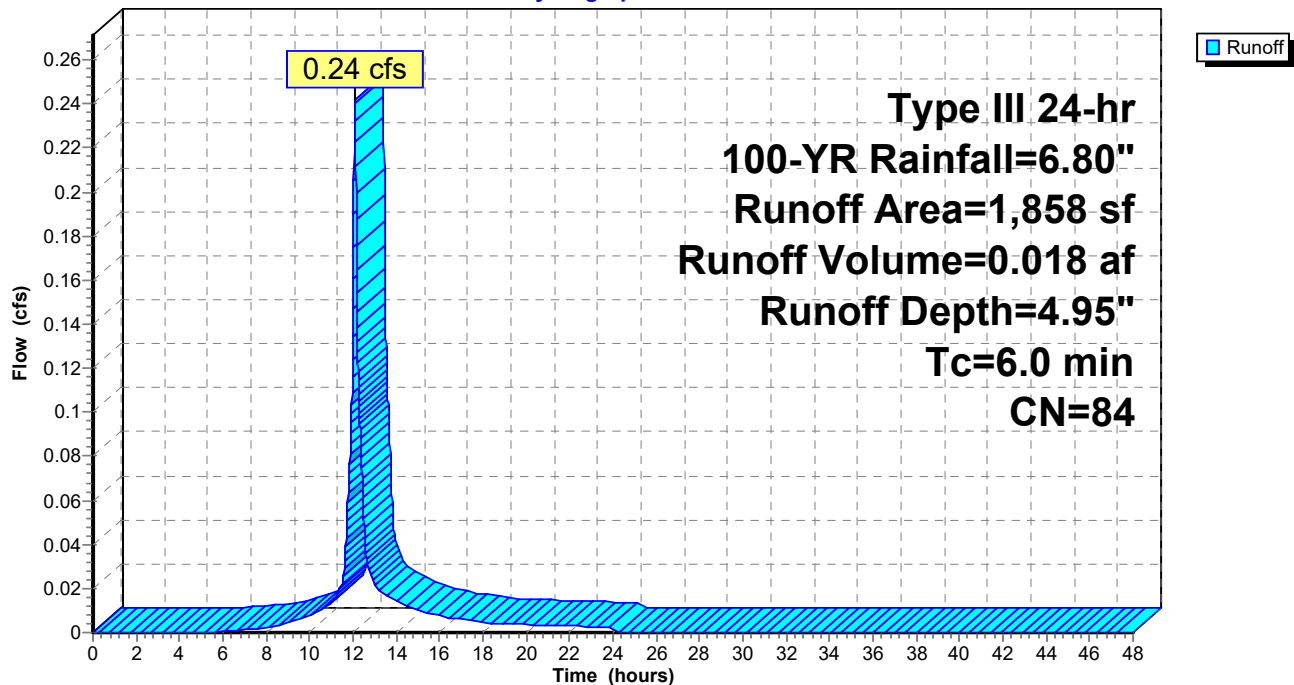
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-YR Rainfall=6.80"

	Area (sf)	CN	Description
*	694	61	G+RG: >75% Grass cover, Good, HSG B
*	1,164	98	
	1,858	84	Weighted Average
	694		37.35% Pervious Area
	1,164		62.65% Impervious Area

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

Subcatchment S11:

Hydrograph



Summary for Subcatchment S12:

Runoff = 0.86 cfs @ 12.09 hrs, Volume= 0.061 af, Depth= 3.45"

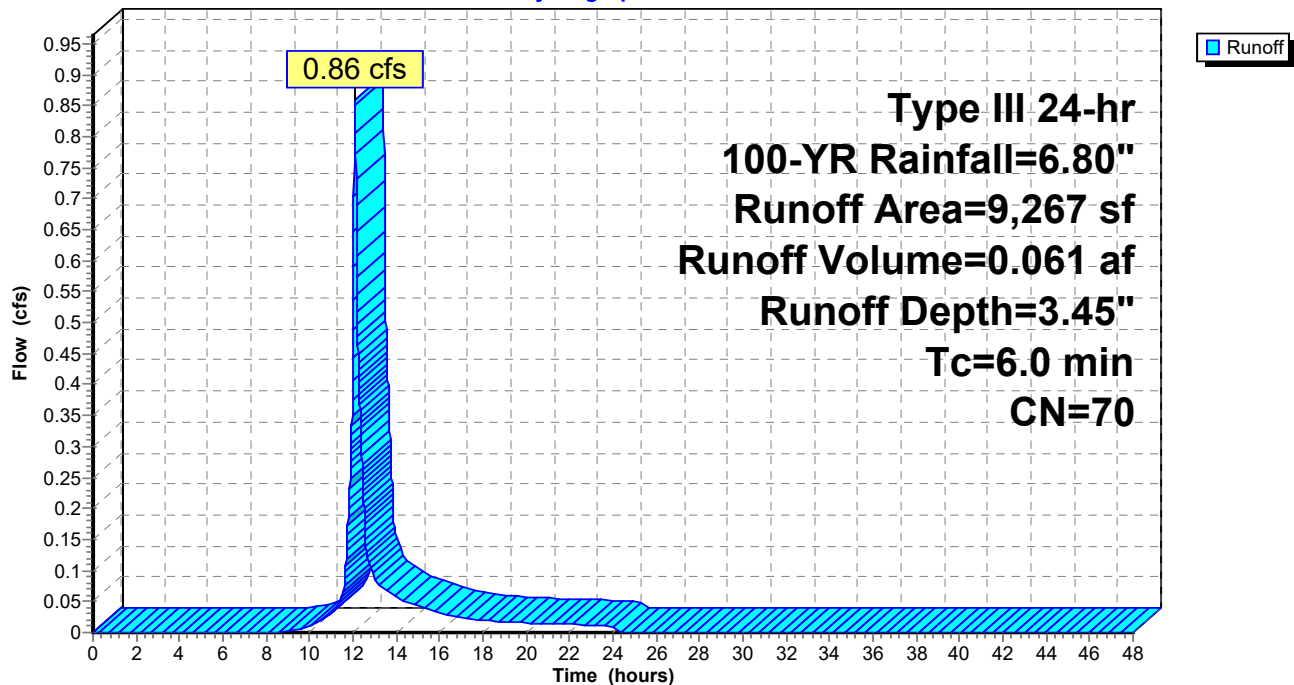
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-YR Rainfall=6.80"

	Area (sf)	CN	Description
*	2,175	98	
*	7,092	61	G+RG: >75% Grass cover, Good, HSG B
	9,267	70	Weighted Average
	7,092		76.53% Pervious Area
	2,175		23.47% Impervious Area

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

Subcatchment S12:

Hydrograph



Summary for Subcatchment S13:

Runoff = 0.53 cfs @ 12.09 hrs, Volume= 0.038 af, Depth= 4.62"

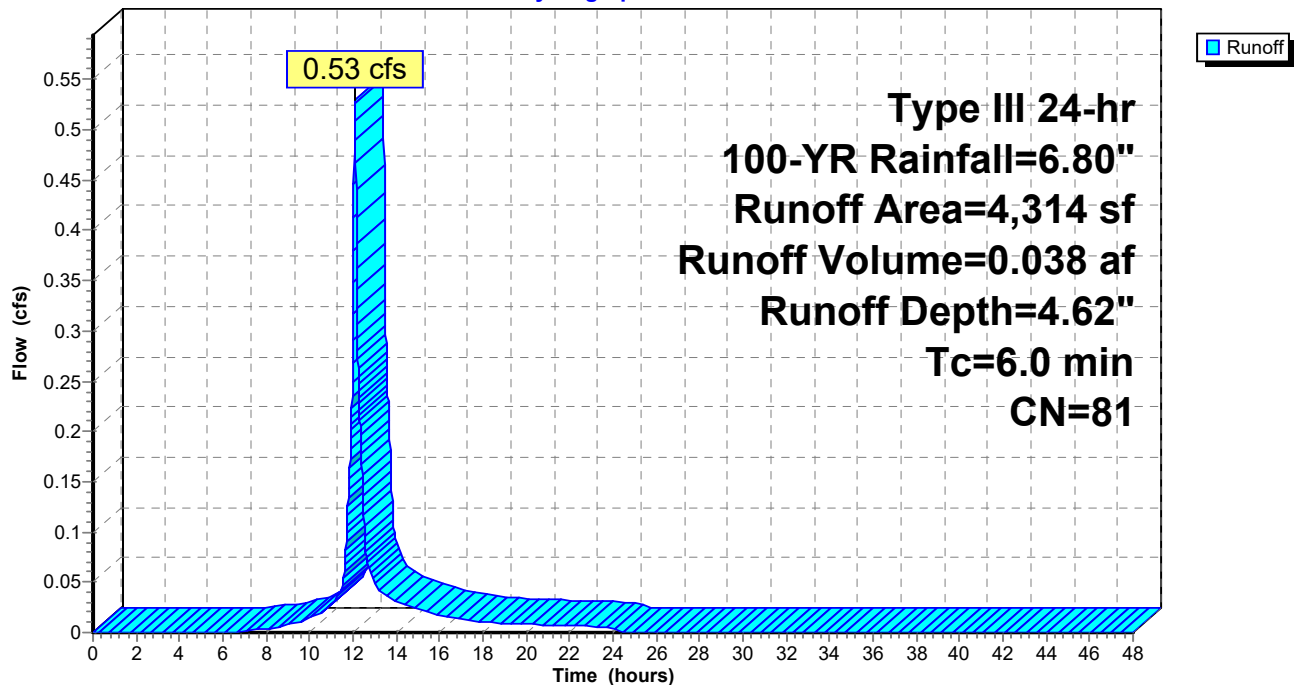
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-YR Rainfall=6.80"

	Area (sf)	CN	Description
*	2,314	98	
	2,000	61	>75% Grass cover, Good, HSG B
	4,314	81	Weighted Average
	2,000		46.36% Pervious Area
	2,314		53.64% Impervious Area

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

Subcatchment S13:

Hydrograph



Summary for Subcatchment S14:

Runoff = 0.31 cfs @ 12.09 hrs, Volume= 0.023 af, Depth= 5.06"

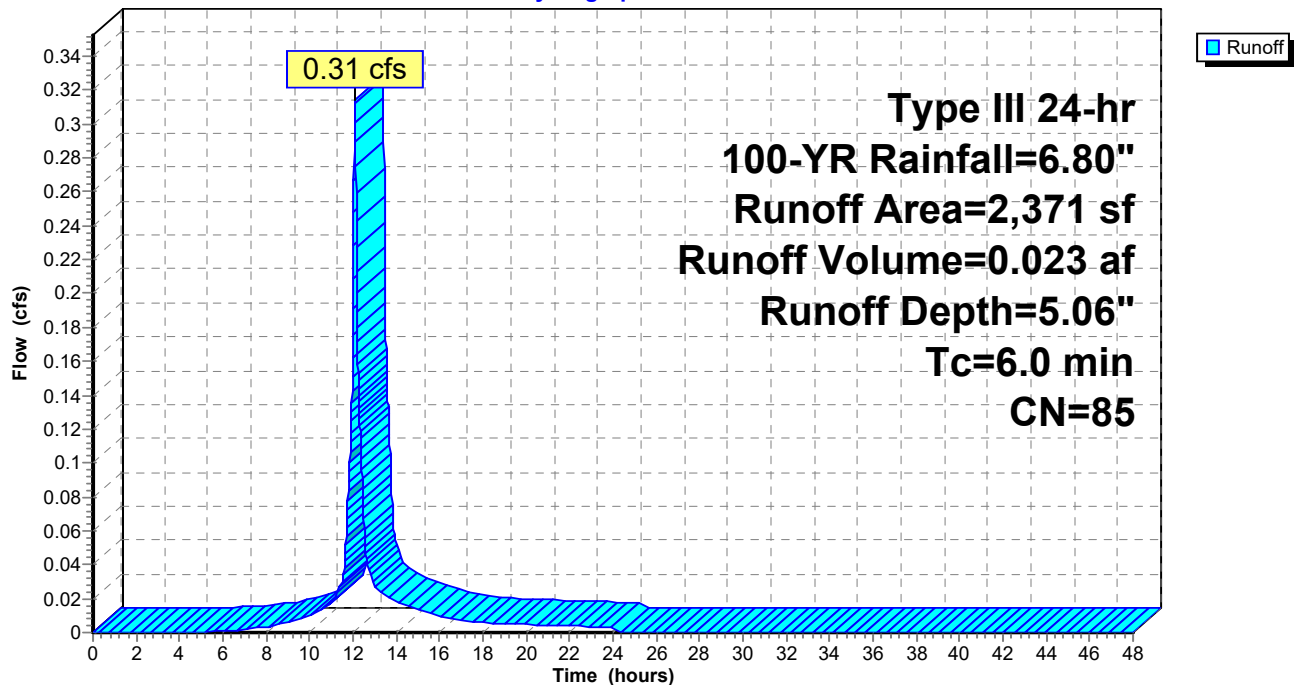
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-YR Rainfall=6.80"

	Area (sf)	CN	Description
*	1,518	98	
*	853	61	G+RG: >75% Grass cover, Good, HSG B
	2,371	85	Weighted Average
	853		35.98% Pervious Area
	1,518		64.02% Impervious Area

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

Subcatchment S14:

Hydrograph



Summary for Subcatchment S15:

Runoff = 3.85 cfs @ 12.09 hrs, Volume= 0.275 af, Depth= 3.25"

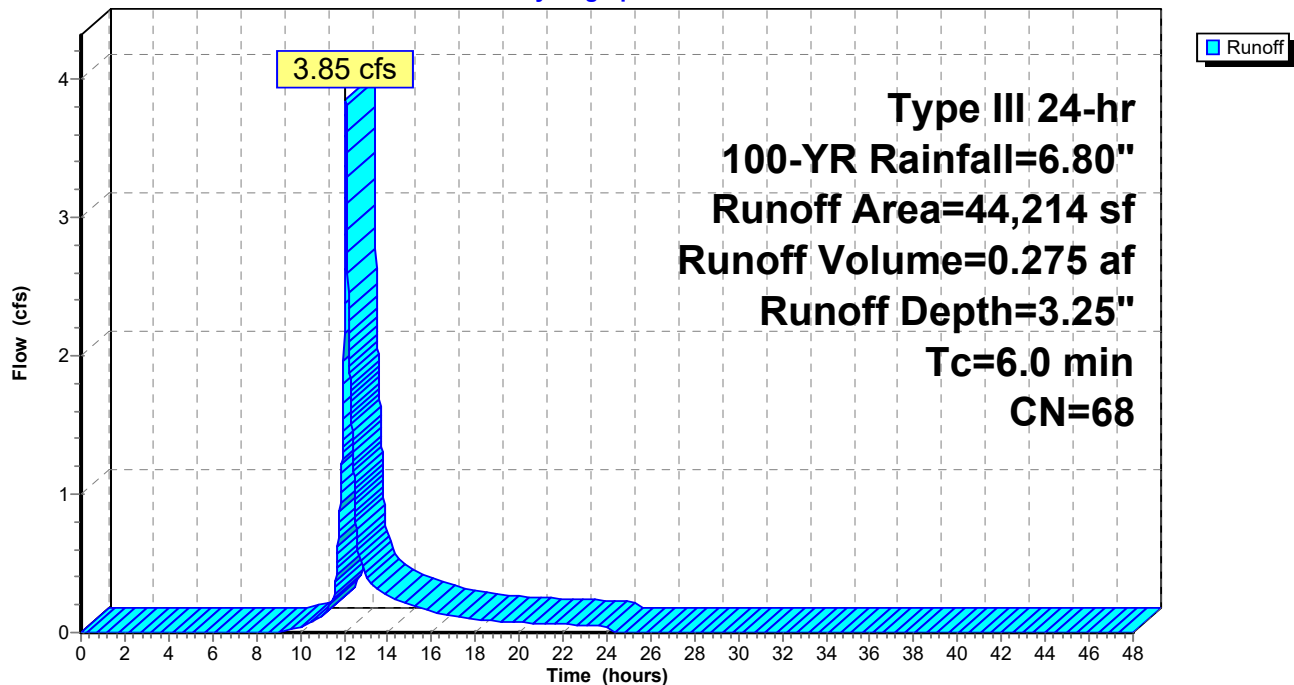
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-YR Rainfall=6.80"

	Area (sf)	CN	Description
*	8,653	98	
*	35,561	61	G+RG: >75% Grass cover, Good, HSG B
	44,214	68	Weighted Average
	35,561		80.43% Pervious Area
	8,653		19.57% Impervious Area

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

Subcatchment S15:

Hydrograph



Summary for Subcatchment S19:

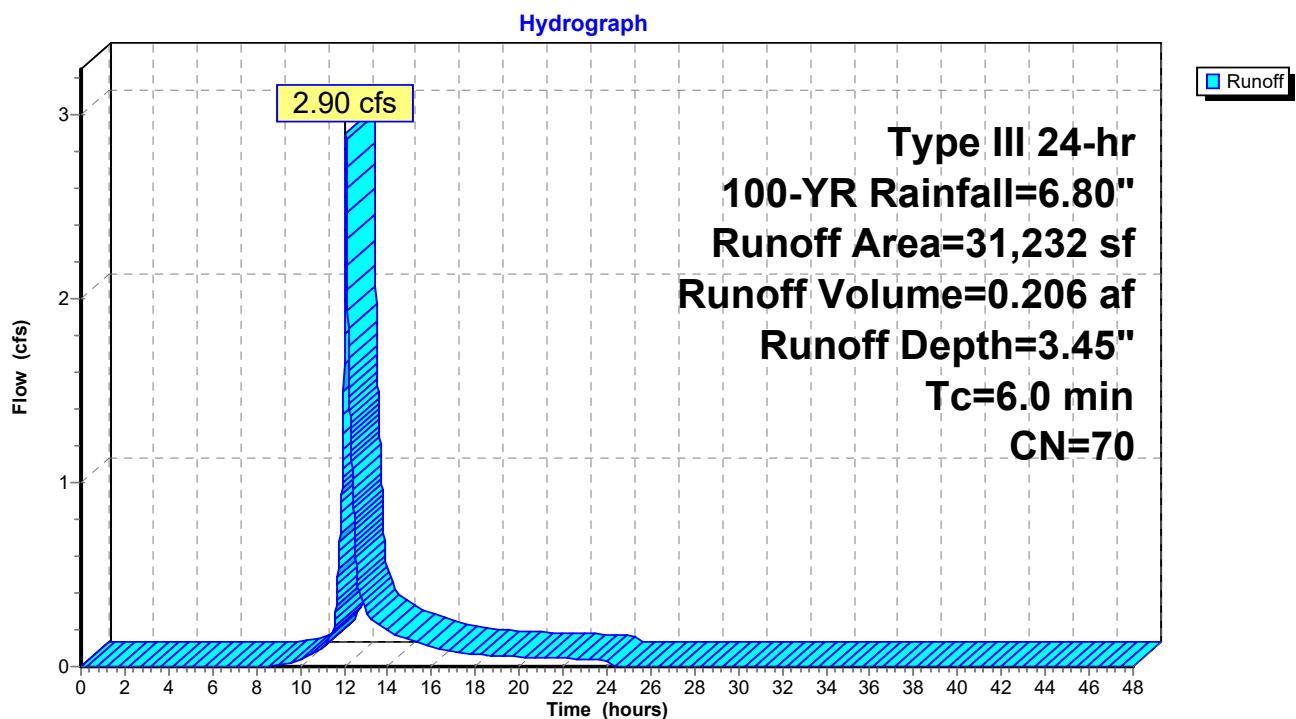
Runoff = 2.90 cfs @ 12.09 hrs, Volume= 0.206 af, Depth= 3.45"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-YR Rainfall=6.80"

	Area (sf)	CN	Description
*	7,316	98	
	23,916	61	>75% Grass cover, Good, HSG B
	31,232	70	Weighted Average
	23,916		76.58% Pervious Area
	7,316		23.42% Impervious Area

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

Subcatchment S19:



Summary for Subcatchment S2:

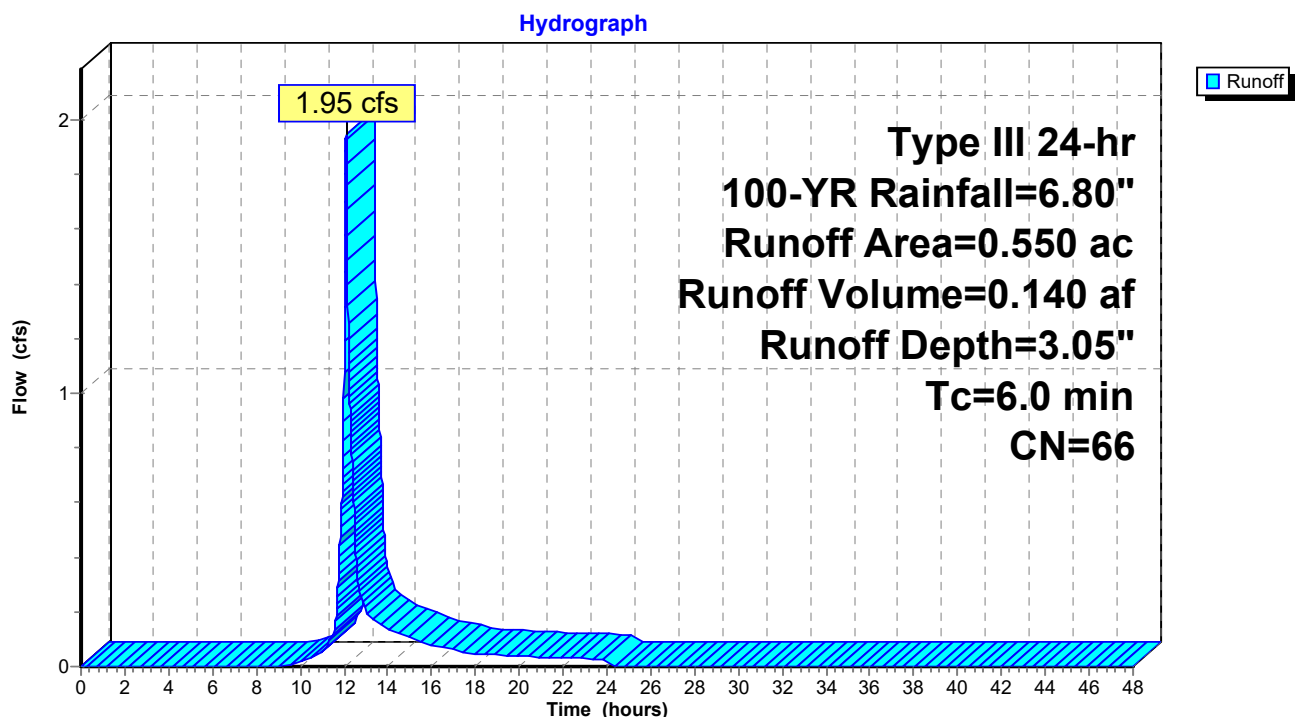
Runoff = 1.95 cfs @ 12.09 hrs, Volume= 0.140 af, Depth= 3.05"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-YR Rainfall=6.80"

Area (ac)	CN	Description
0.480	61	>75% Grass cover, Good, HSG B
0.070	98	
0.550	66	Weighted Average
0.480		87.27% Pervious Area
0.070		12.73% Impervious Area

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

Subcatchment S2:



Summary for Subcatchment S20:

Runoff = 0.77 cfs @ 12.09 hrs, Volume= 0.057 af, Depth= 2.56"

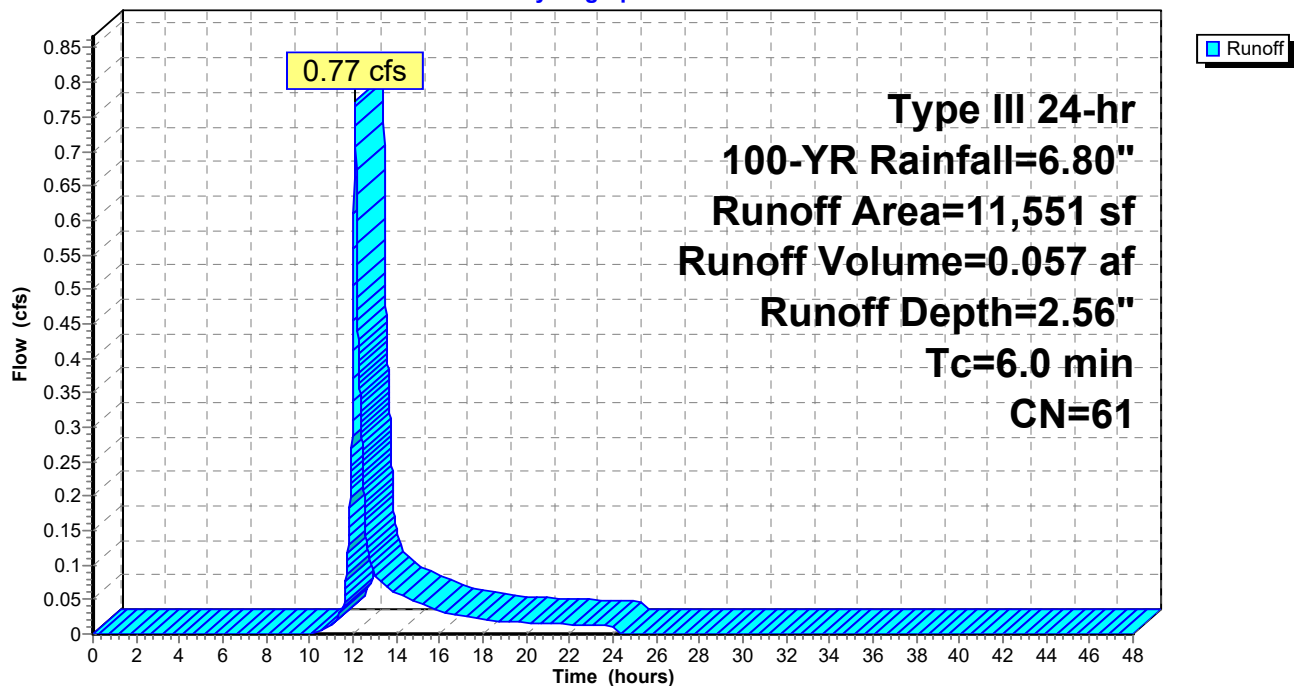
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-YR Rainfall=6.80"

Area (sf)	CN	Description
* 11,551	61	G+RG: >75% Grass cover, Good, HSG B
11,551		100.00% Pervious Area

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

Subcatchment S20:

Hydrograph



Summary for Subcatchment S21:

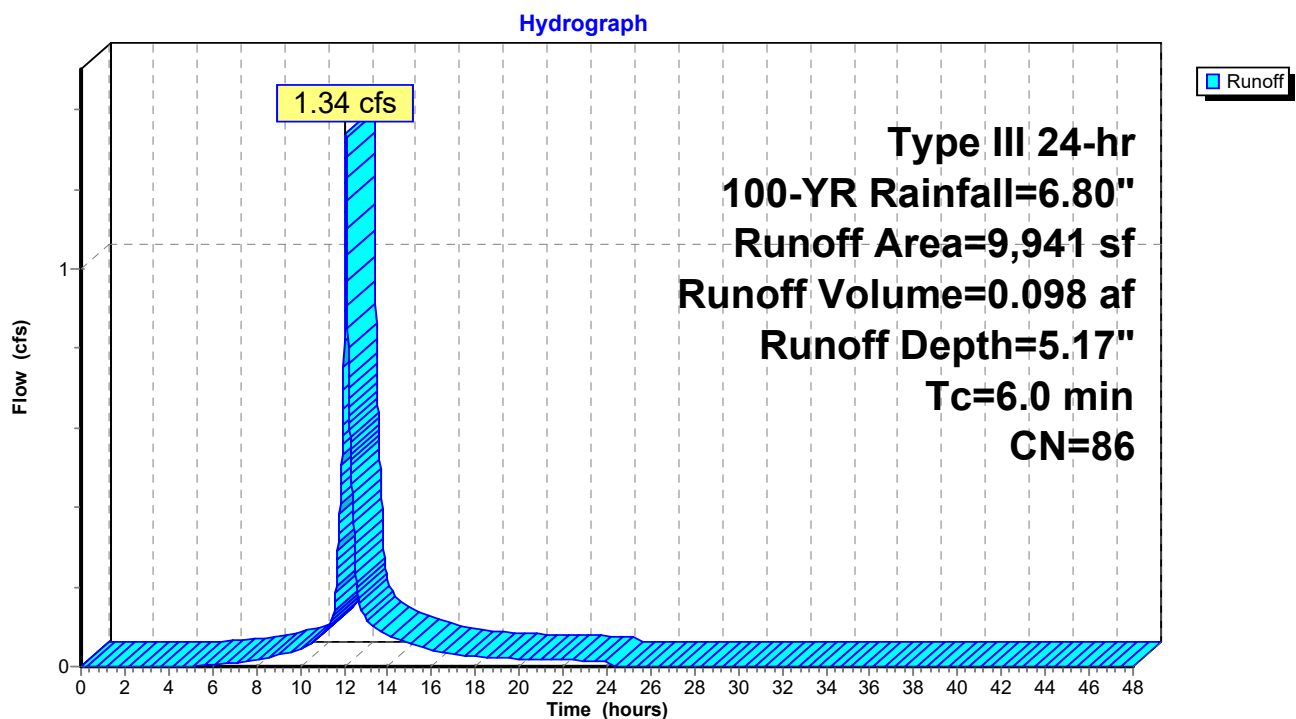
Runoff = 1.34 cfs @ 12.09 hrs, Volume= 0.098 af, Depth= 5.17"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-YR Rainfall=6.80"

	Area (sf)	CN	Description
*	6,755	98	
*	3,186	61	G+RG: >75% Grass cover, Good, HSG B
	9,941	86	Weighted Average
	3,186		32.05% Pervious Area
	6,755		67.95% Impervious Area

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

Subcatchment S21:



Summary for Subcatchment S22: Stow Road South

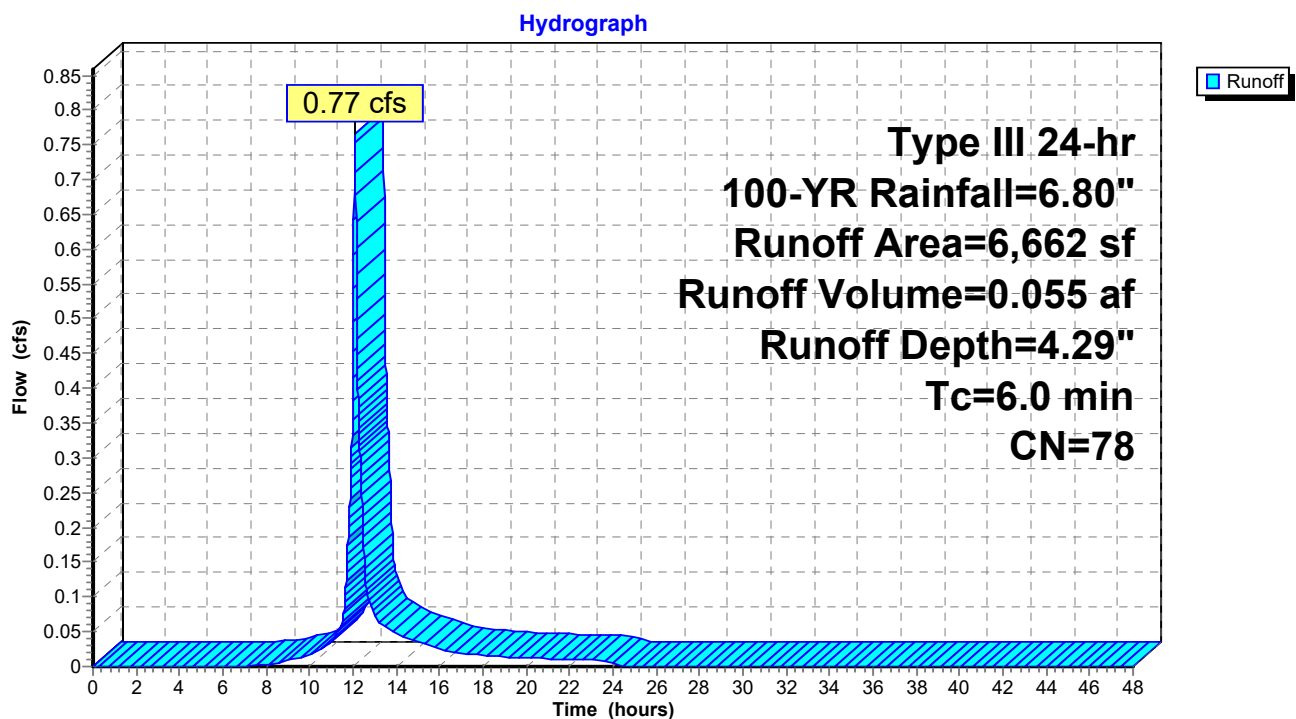
Runoff = 0.77 cfs @ 12.09 hrs, Volume= 0.055 af, Depth= 4.29"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-YR Rainfall=6.80"

	Area (sf)	CN	Description
*	5,662	74	G+RG: >75% Grass cover, Good, HSG C
*	1,000	98	
	6,662	78	Weighted Average
	5,662		84.99% Pervious Area
	1,000		15.01% Impervious Area

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

Subcatchment S22: Stow Road South



Summary for Subcatchment S23: Stow Road South

Runoff = 0.16 cfs @ 12.09 hrs, Volume= 0.011 af, Depth= 4.51"

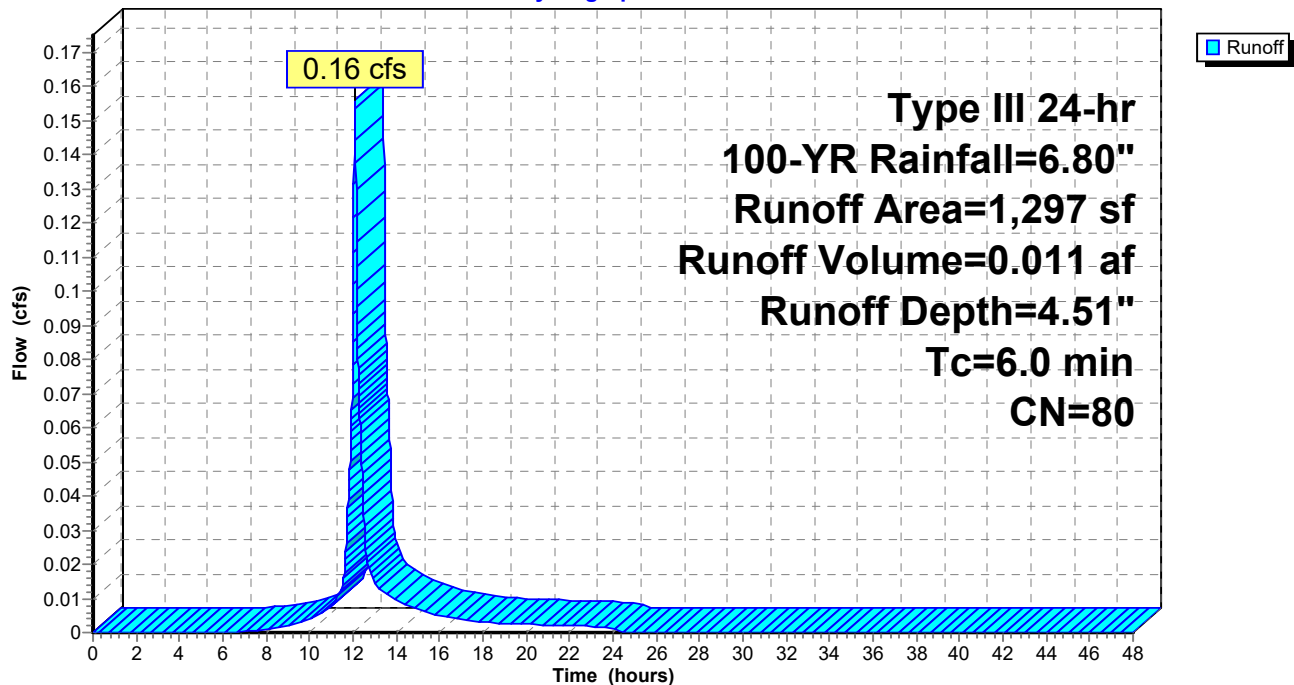
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-YR Rainfall=6.80"

	Area (sf)	CN	Description
*	994	74	G+RG: >75% Grass cover, Good, HSG C
*	303	98	
	1,297	80	Weighted Average
	994		76.64% Pervious Area
	303		23.36% Impervious Area

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

Subcatchment S23: Stow Road South

Hydrograph



Summary for Subcatchment S3:

Runoff = 0.63 cfs @ 12.16 hrs, Volume= 0.054 af, Depth= 4.29"

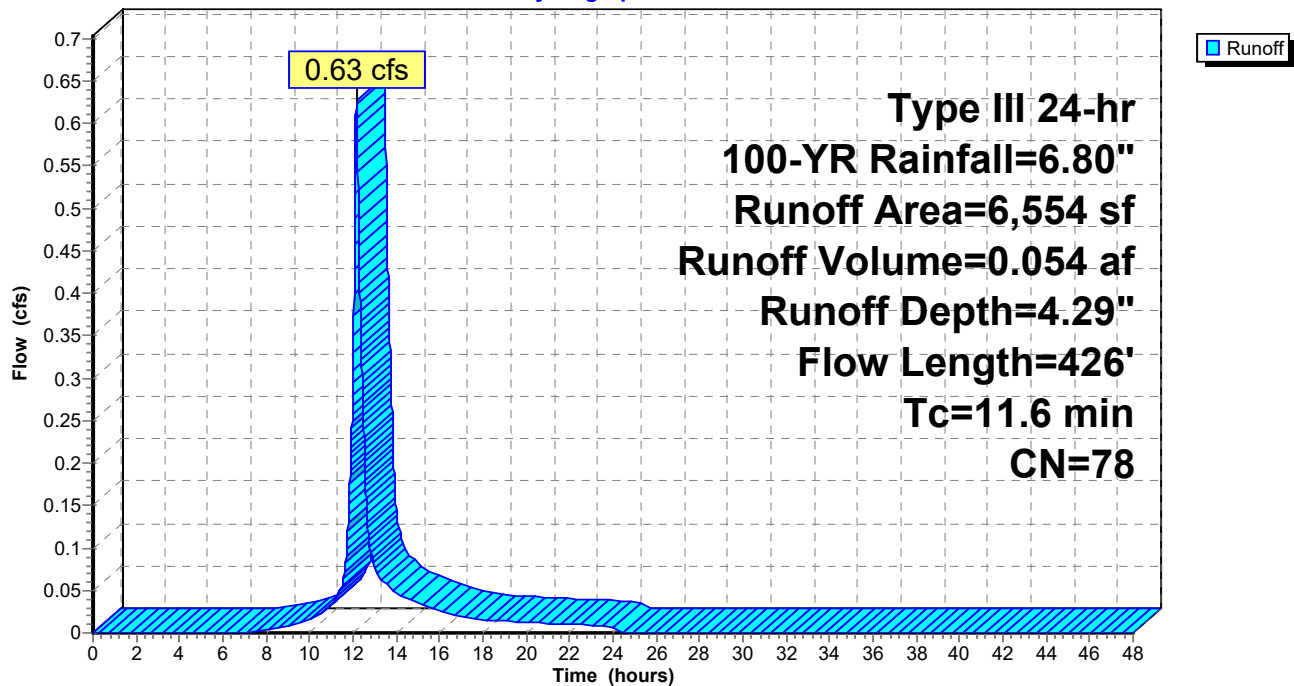
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-YR Rainfall=6.80"

	Area (sf)	CN	Description
*	3,497	61	G+RG: >75% Grass cover, Good, HSG B
*	3,057	98	
	6,554	78	Weighted Average
	3,497		53.36% Pervious Area
	3,057		46.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	50	0.0600	0.22		Sheet Flow, Grass: Short n= 0.150 P2= 3.00"
7.9	376	0.0130	0.80		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
11.6	426	Total			

Subcatchment S3:

Hydrograph



Summary for Subcatchment S4:

Runoff = 0.16 cfs @ 12.09 hrs, Volume= 0.011 af, Depth= 3.87"

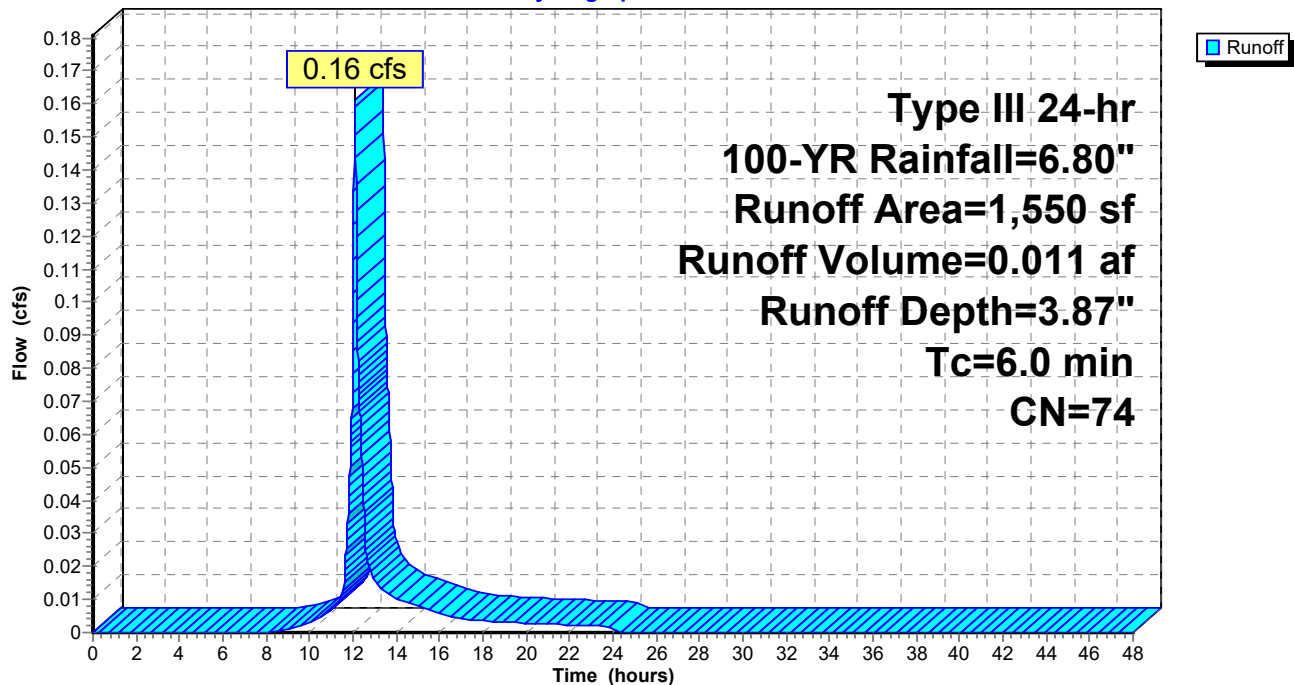
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-YR Rainfall=6.80"

Area (sf)	CN	Description
1,008	61	>75% Grass cover, Good, HSG B
* 542	98	
1,550	74	Weighted Average
1,008		65.03% Pervious Area
542		34.97% Impervious Area

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

Subcatchment S4:

Hydrograph



Summary for Subcatchment S5:

Runoff = 0.25 cfs @ 12.09 hrs, Volume= 0.018 af, Depth= 4.08"

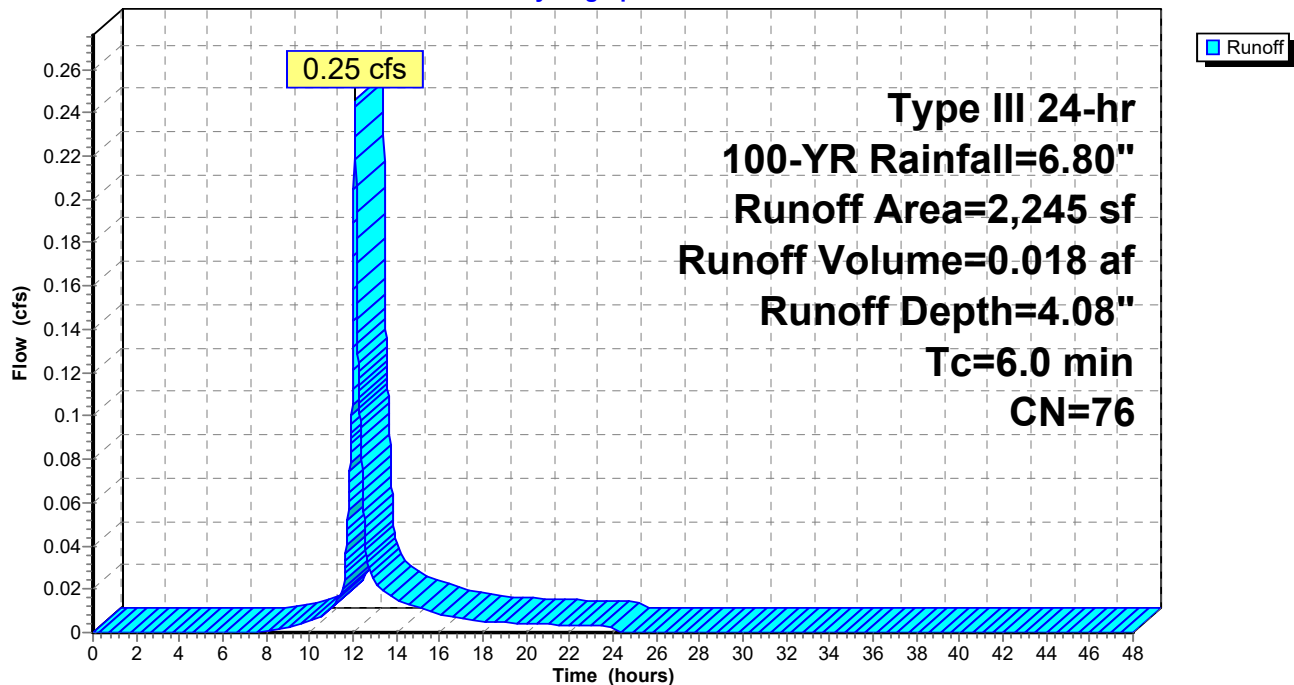
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-YR Rainfall=6.80"

	Area (sf)	CN	Description
*	1,343	61	G+RG: >75% Grass cover, Good, HSG B
*	902	98	
	2,245	76	Weighted Average
	1,343		59.82% Pervious Area
	902		40.18% Impervious Area

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

Subcatchment S5:

Hydrograph



Summary for Subcatchment SBS:

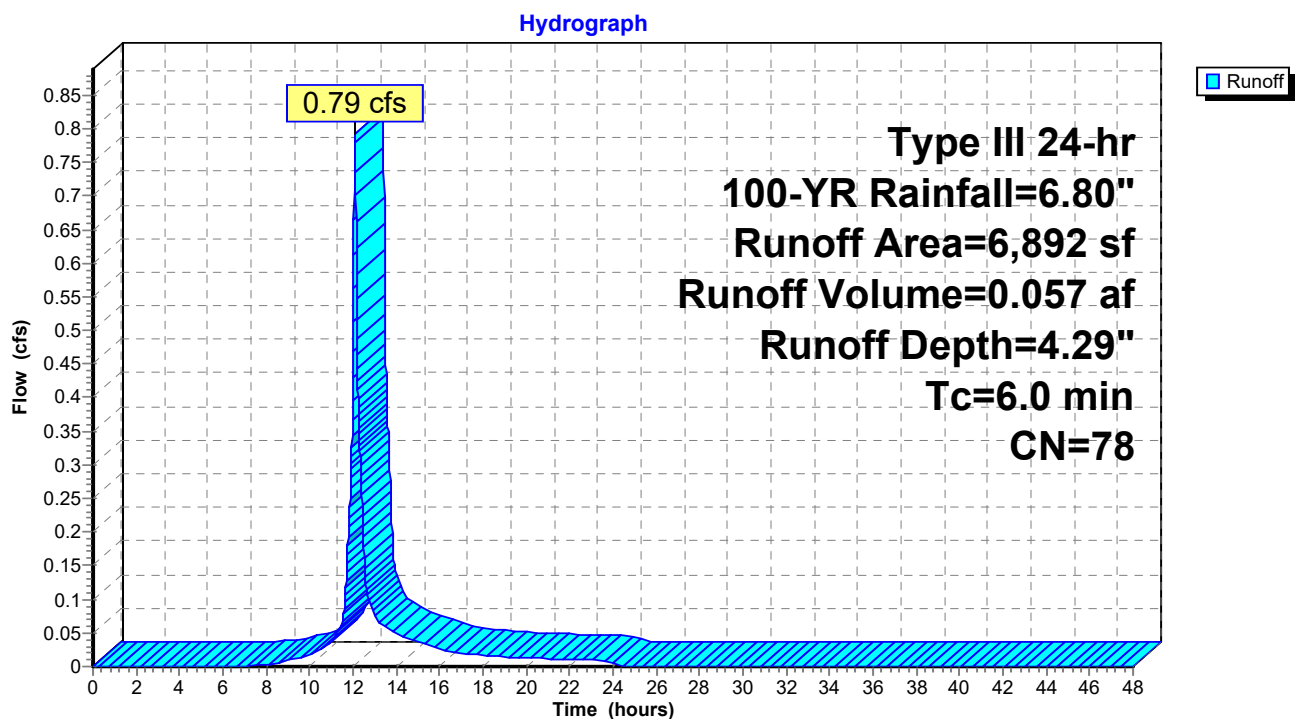
Runoff = 0.79 cfs @ 12.09 hrs, Volume= 0.057 af, Depth= 4.29"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-YR Rainfall=6.80"

Area (sf)	CN	Description
5,845	74	>75% Grass cover, Good, HSG C
* 1,047	98	
6,892	78	Weighted Average
5,845		84.81% Pervious Area
1,047		15.19% Impervious Area

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

Subcatchment SBS:



Summary for Reach 1R: (new Reach)

[52] Hint: Inlet/Outlet conditions not evaluated

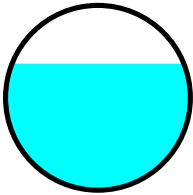
[62] Hint: Exceeded Reach PS7 OUTLET depth by 0.24' @ 12.07 hrs

Inflow Area = 0.785 ac, 28.61% Impervious, Inflow Depth = 3.66" for 100-YR event
Inflow = 3.83 cfs @ 12.06 hrs, Volume= 0.239 af
Outflow = 3.81 cfs @ 12.06 hrs, Volume= 0.239 af, Atten= 0%, Lag= 0.3 min

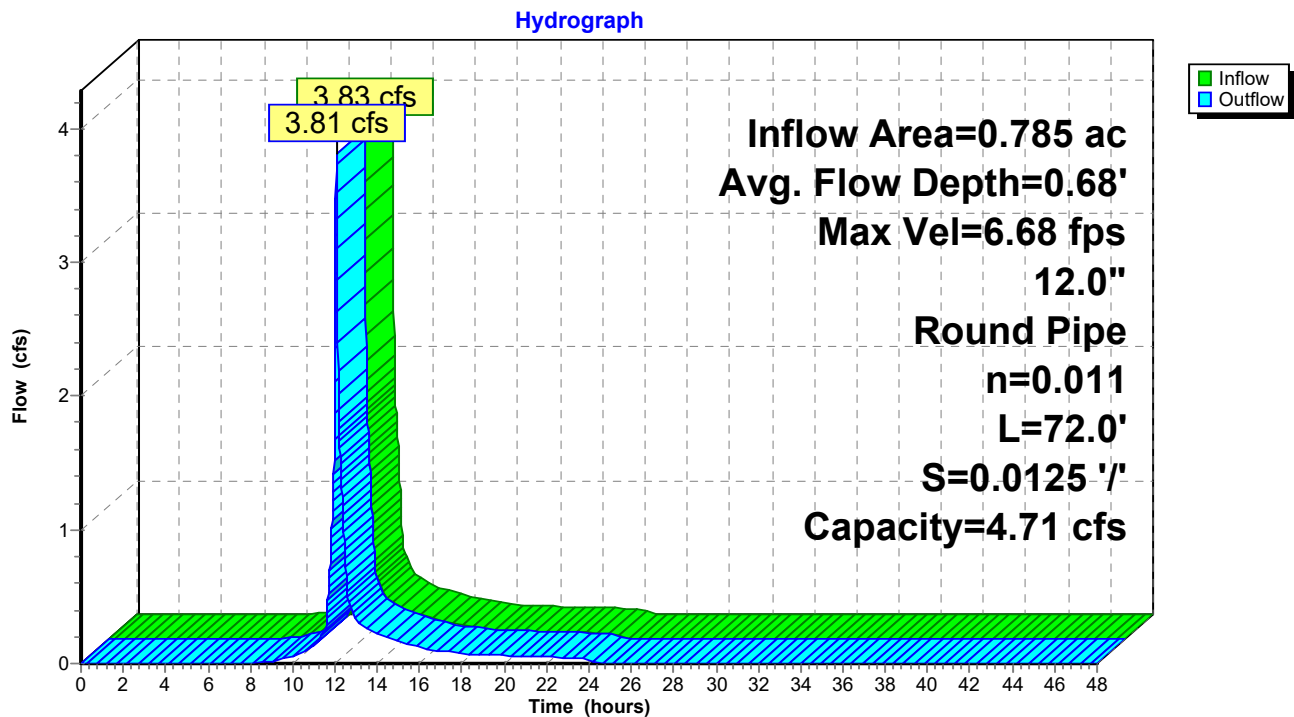
Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 6.68 fps, Min. Travel Time= 0.2 min
Avg. Velocity= 2.35 fps, Avg. Travel Time= 0.5 min

Peak Storage= 41 cf @ 12.06 hrs
Average Depth at Peak Storage= 0.68'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 4.71 cfs

12.0" Round Pipe
n= 0.011 Concrete pipe, straight & clean
Length= 72.0' Slope= 0.0125 '/'
Inlet Invert= 261.00', Outlet Invert= 260.10'



Reach 1R: (new Reach)



Summary for Reach 4R:

[52] Hint: Inlet/Outlet conditions not evaluated

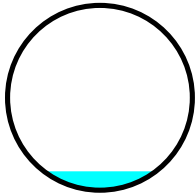
[62] Hint: Exceeded Reach PS10A OUTLET depth by 0.01' @ 12.12 hrs

Inflow Area = 0.035 ac, 96.04% Impervious, Inflow Depth = 6.44" for 100-YR event
Inflow = 0.23 cfs @ 12.09 hrs, Volume= 0.019 af
Outflow = 0.23 cfs @ 12.09 hrs, Volume= 0.019 af, Atten= 0%, Lag= 0.1 min

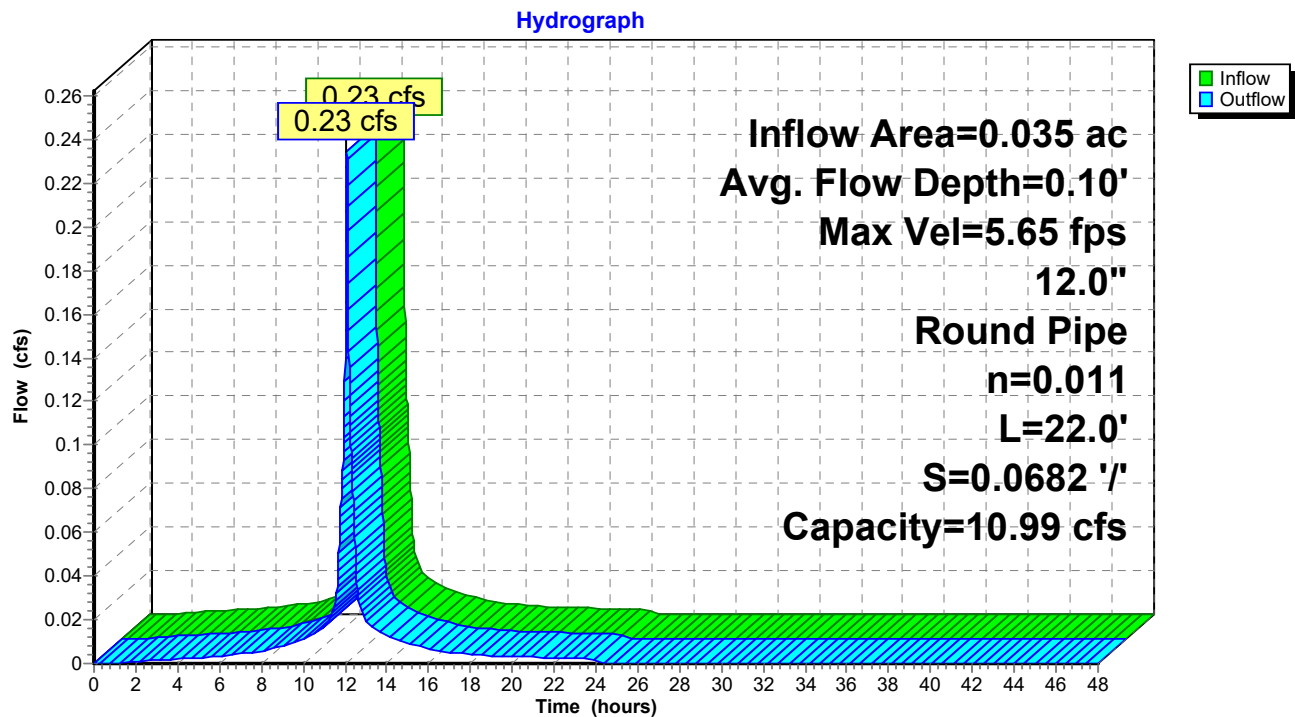
Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.65 fps, Min. Travel Time= 0.1 min
Avg. Velocity= 1.90 fps, Avg. Travel Time= 0.2 min

Peak Storage= 1 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.10'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 10.99 cfs

12.0" Round Pipe
n= 0.011
Length= 22.0' Slope= 0.0682 '/
Inlet Invert= 315.00', Outlet Invert= 313.50'



Reach 4R:



Summary for Reach 5R: Intermittent Stream

[91] Warning: Storage range exceeded by 0.01'

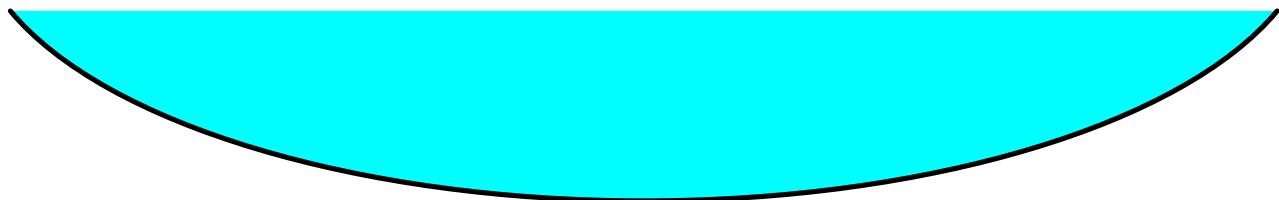
[55] Hint: Peak inflow is 108% of Manning's capacity

Inflow Area = 4.704 ac, 1.01% Impervious, Inflow Depth = 3.74" for 100-YR event
 Inflow = 12.78 cfs @ 12.20 hrs, Volume= 1.466 af
 Outflow = 11.91 cfs @ 12.40 hrs, Volume= 1.466 af, Atten= 7%, Lag= 12.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 2.22 fps, Min. Travel Time= 6.4 min
 Avg. Velocity = 0.55 fps, Avg. Travel Time= 25.4 min

Peak Storage= 4,542 cf @ 12.29 hrs
 Average Depth at Peak Storage= 1.01'
 Bank-Full Depth= 1.00' Flow Area= 5.3 sf, Capacity= 11.78 cfs

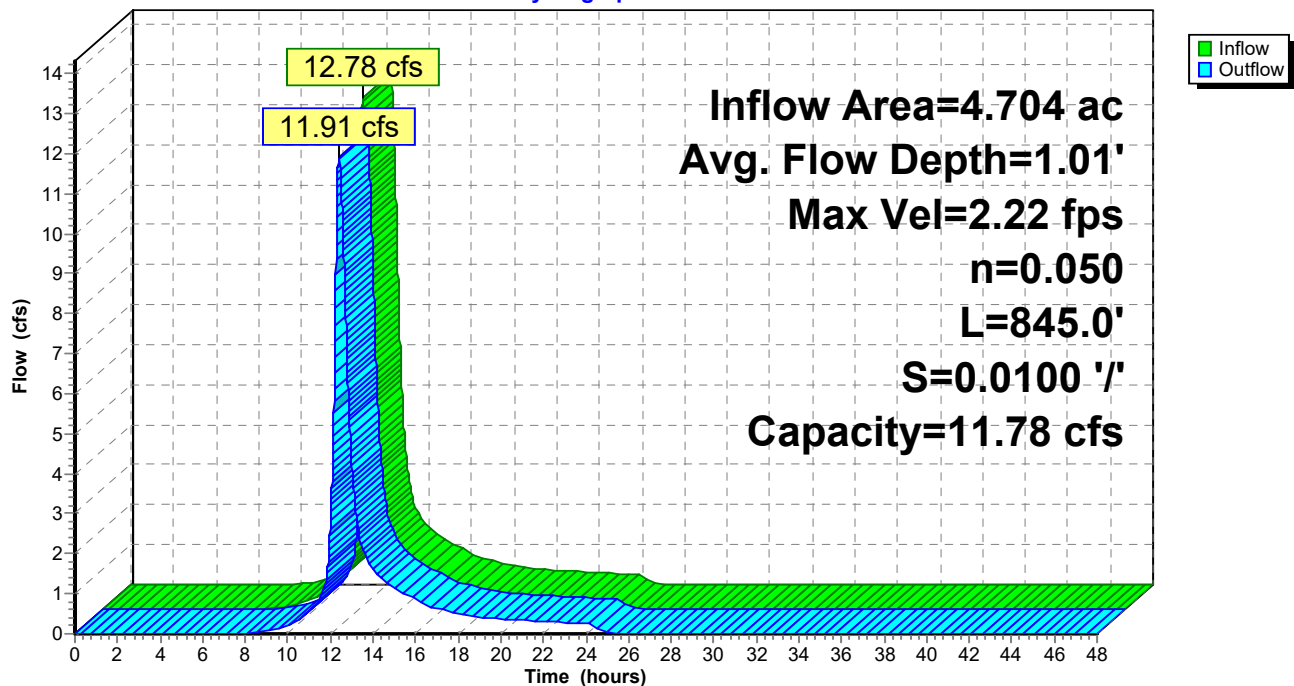
8.00' x 1.00' deep Parabolic Channel, n= 0.050 High grass
 Length= 845.0' Slope= 0.0100 '/'
 Inlet Invert= 260.00', Outlet Invert= 251.55'



‡

Reach 5R: Intermittent Stream

Hydrograph



Summary for Reach 6R: new

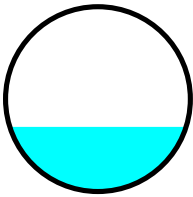
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.099 ac, 53.64% Impervious, Inflow Depth = 2.94" for 100-YR event
 Inflow = 0.38 cfs @ 12.17 hrs, Volume= 0.024 af
 Outflow = 0.37 cfs @ 12.20 hrs, Volume= 0.024 af, Atten= 3%, Lag= 2.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 3.44 fps, Min. Travel Time= 1.0 min
 Avg. Velocity = 1.31 fps, Avg. Travel Time= 2.5 min

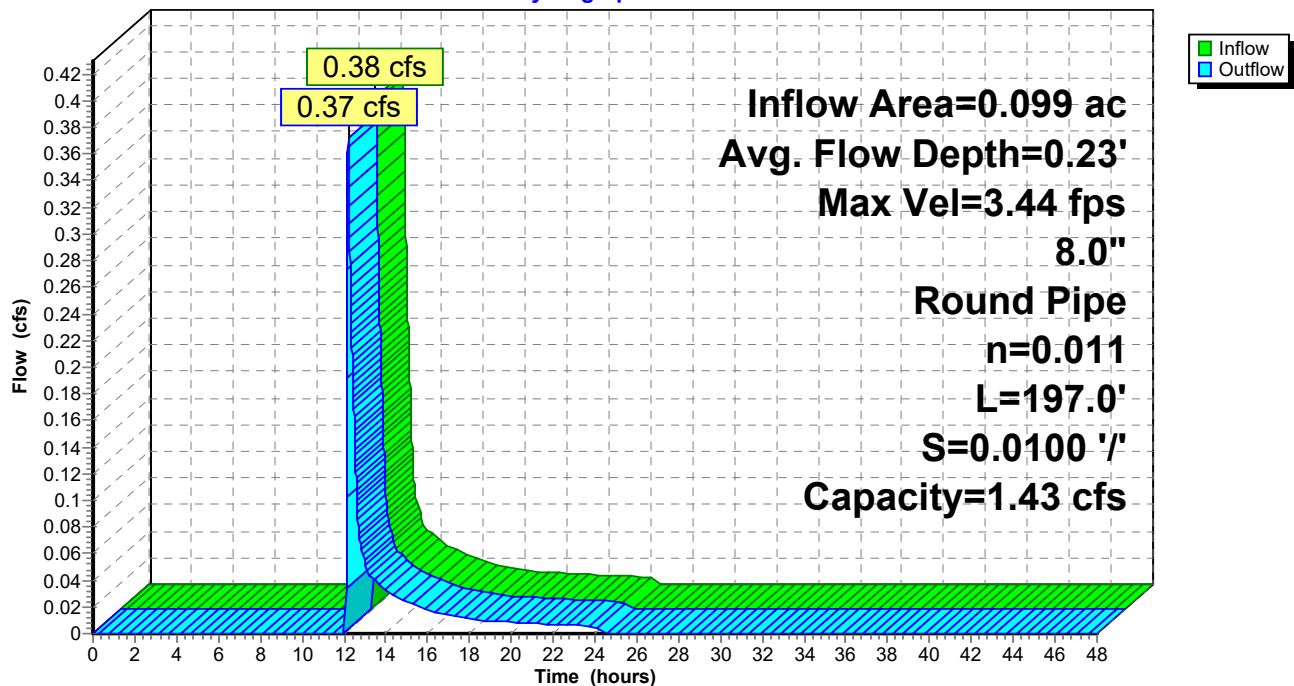
Peak Storage= 21 cf @ 12.19 hrs
 Average Depth at Peak Storage= 0.23'
 Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 1.43 cfs

8.0" Round Pipe
 n= 0.011 Concrete pipe, straight & clean
 Length= 197.0' Slope= 0.0100 '/
 Inlet Invert= 304.20', Outlet Invert= 302.23'



Reach 6R: new

Hydrograph



Summary for Reach 7R:

[52] Hint: Inlet/Outlet conditions not evaluated

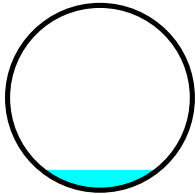
[62] Hint: Exceeded Reach PS10B OUTLET depth by 0.01' @ 12.15 hrs

Inflow Area = 0.035 ac, 96.04% Impervious, Inflow Depth = 6.44" for 100-YR event
Inflow = 0.23 cfs @ 12.10 hrs, Volume= 0.019 af
Outflow = 0.23 cfs @ 12.11 hrs, Volume= 0.019 af, Atten= 0%, Lag= 0.5 min

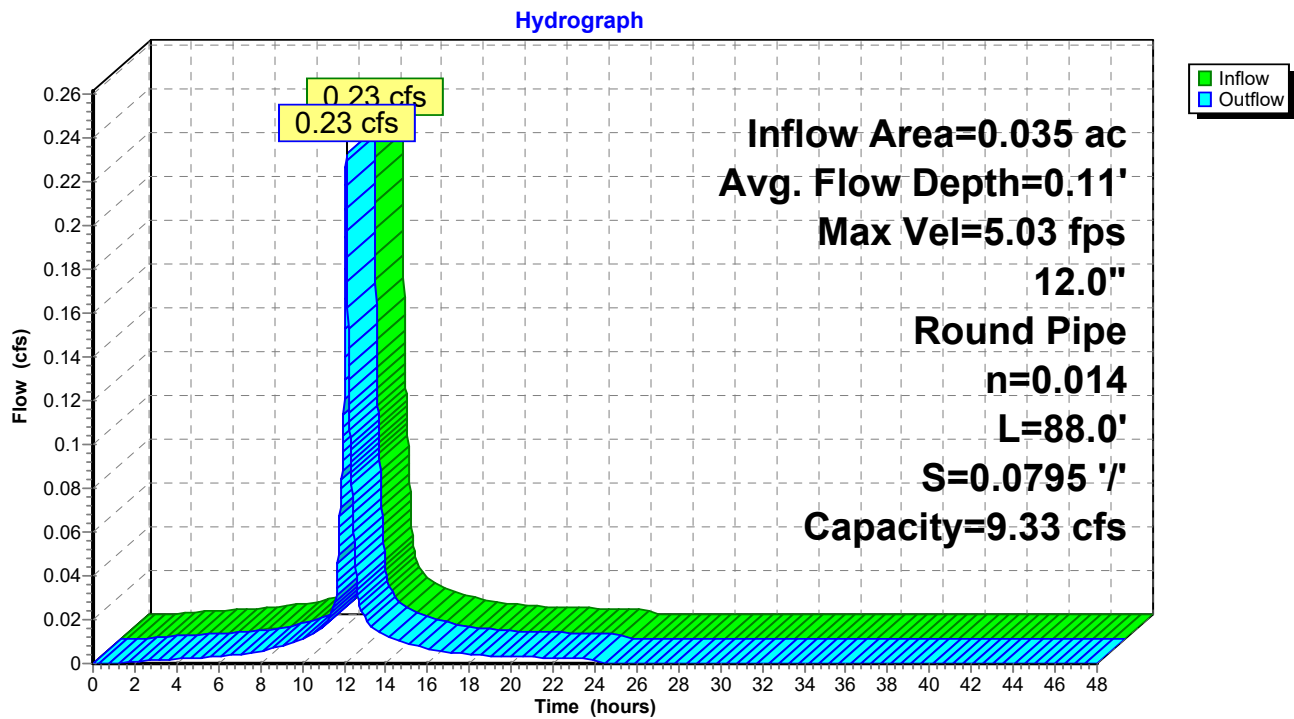
Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.03 fps, Min. Travel Time= 0.3 min
Avg. Velocity= 1.68 fps, Avg. Travel Time= 0.9 min

Peak Storage= 4 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.11'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 9.33 cfs

12.0" Round Pipe
n= 0.014 Concrete pipe, finished
Length= 88.0' Slope= 0.0795 '/'
Inlet Invert= 310.50', Outlet Invert= 303.50'



Reach 7R:



Summary for Reach 8R: new

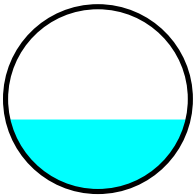
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.213 ac, 23.47% Impervious, Inflow Depth = 3.45" for 100-YR event
 Inflow = 0.86 cfs @ 12.10 hrs, Volume= 0.061 af
 Outflow = 0.86 cfs @ 12.11 hrs, Volume= 0.061 af, Atten= 0%, Lag= 0.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 6.83 fps, Min. Travel Time= 0.3 min
 Avg. Velocity = 2.47 fps, Avg. Travel Time= 0.9 min

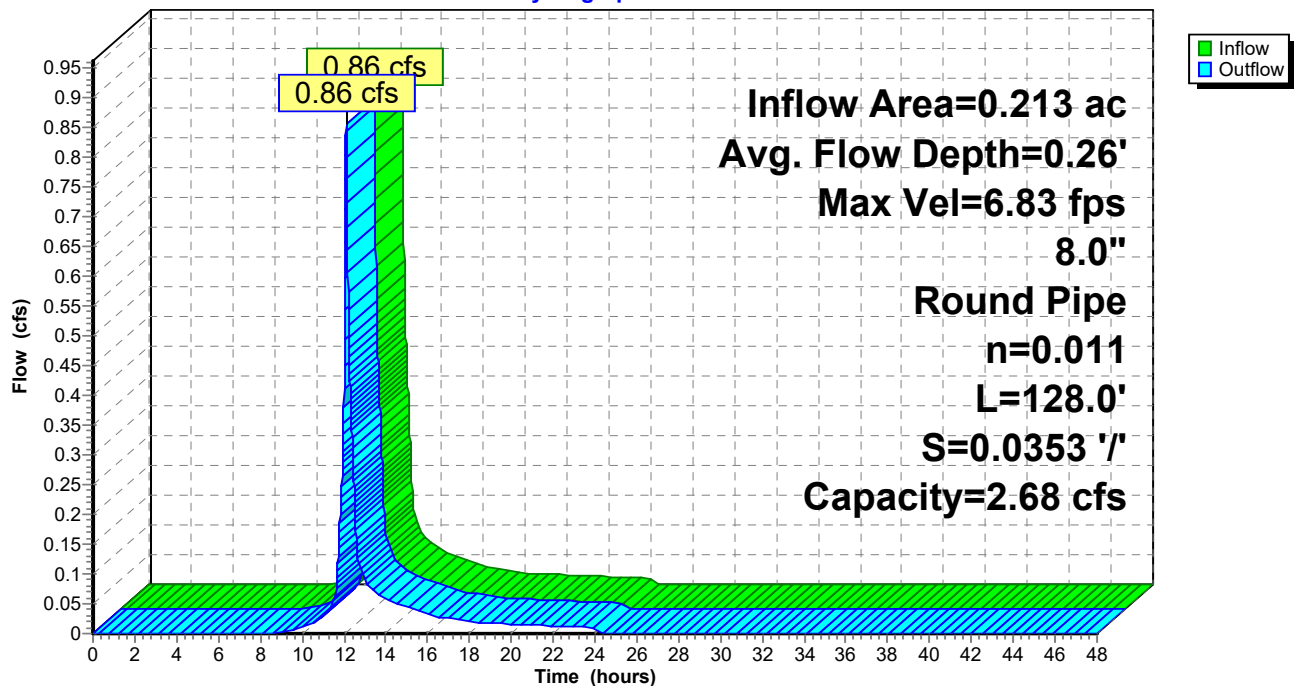
Peak Storage= 16 cf @ 12.10 hrs
 Average Depth at Peak Storage= 0.26'
 Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 2.68 cfs

8.0" Round Pipe
 n= 0.011 Concrete pipe, straight & clean
 Length= 128.0' Slope= 0.0353 '/
 Inlet Invert= 306.75', Outlet Invert= 302.23'



Reach 8R: new

Hydrograph



Summary for Reach 9R: new

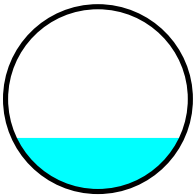
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.054 ac, 64.02% Impervious, Inflow Depth = 3.95" for 100-YR event
 Inflow = 0.31 cfs @ 12.10 hrs, Volume= 0.018 af
 Outflow = 0.31 cfs @ 12.10 hrs, Volume= 0.018 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 3.72 fps, Min. Travel Time= 0.0 min
 Avg. Velocity= 1.32 fps, Avg. Travel Time= 0.1 min

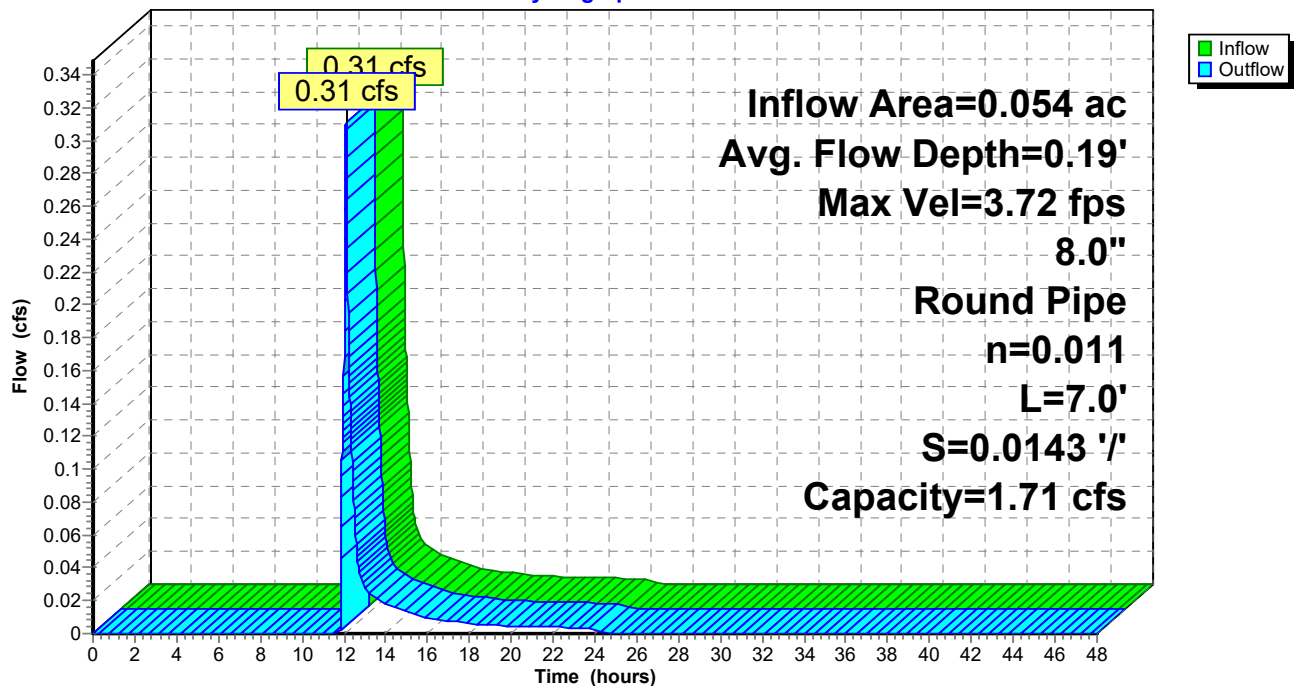
Peak Storage= 1 cf @ 12.10 hrs
 Average Depth at Peak Storage= 0.19'
 Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 1.71 cfs

8.0" Round Pipe
 n= 0.011 Concrete pipe, straight & clean
 Length= 7.0' Slope= 0.0143 '/'
 Inlet Invert= 298.00', Outlet Invert= 297.90'



Reach 9R: new

Hydrograph



Summary for Reach 10R: new

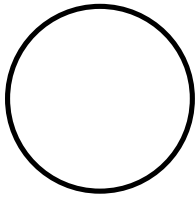
[43] Hint: Has no inflow (Outflow=Zero)

Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

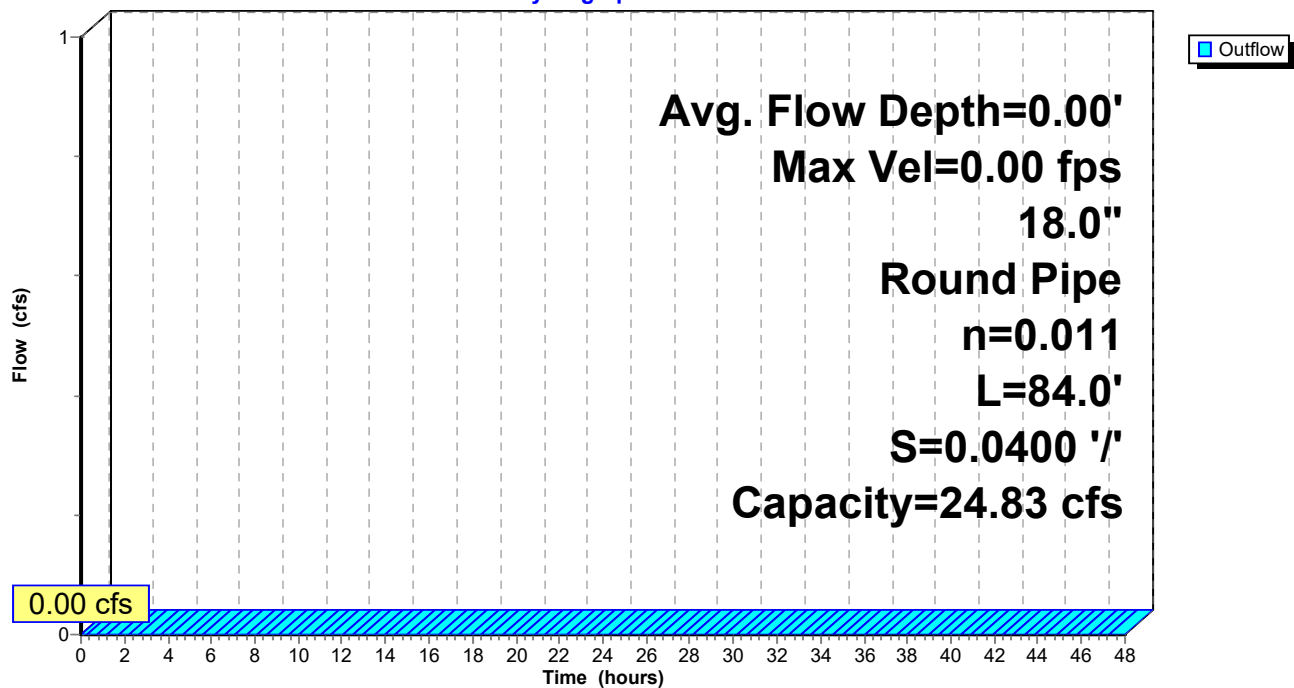
Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 24.83 cfs

18.0" Round Pipe
n= 0.011 Concrete pipe, straight & clean
Length= 84.0' Slope= 0.0400 '/
Inlet Invert= 301.30', Outlet Invert= 297.94'



Reach 10R: new

Hydrograph



Summary for Reach 11R: new

[52] Hint: Inlet/Outlet conditions not evaluated

[55] Hint: Peak inflow is 229% of Manning's capacity

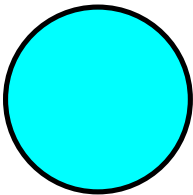
[76] Warning: Detained 0.027 af (Pond w/culvert advised)

Inflow Area = 1.015 ac, 19.57% Impervious, Inflow Depth = 3.13" for 100-YR event
Inflow = 3.90 cfs @ 12.09 hrs, Volume= 0.265 af
Outflow = 1.81 cfs @ 11.99 hrs, Volume= 0.265 af, Atten= 54%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.57 fps, Min. Travel Time= 0.0 min
Avg. Velocity= 2.89 fps, Avg. Travel Time= 0.0 min

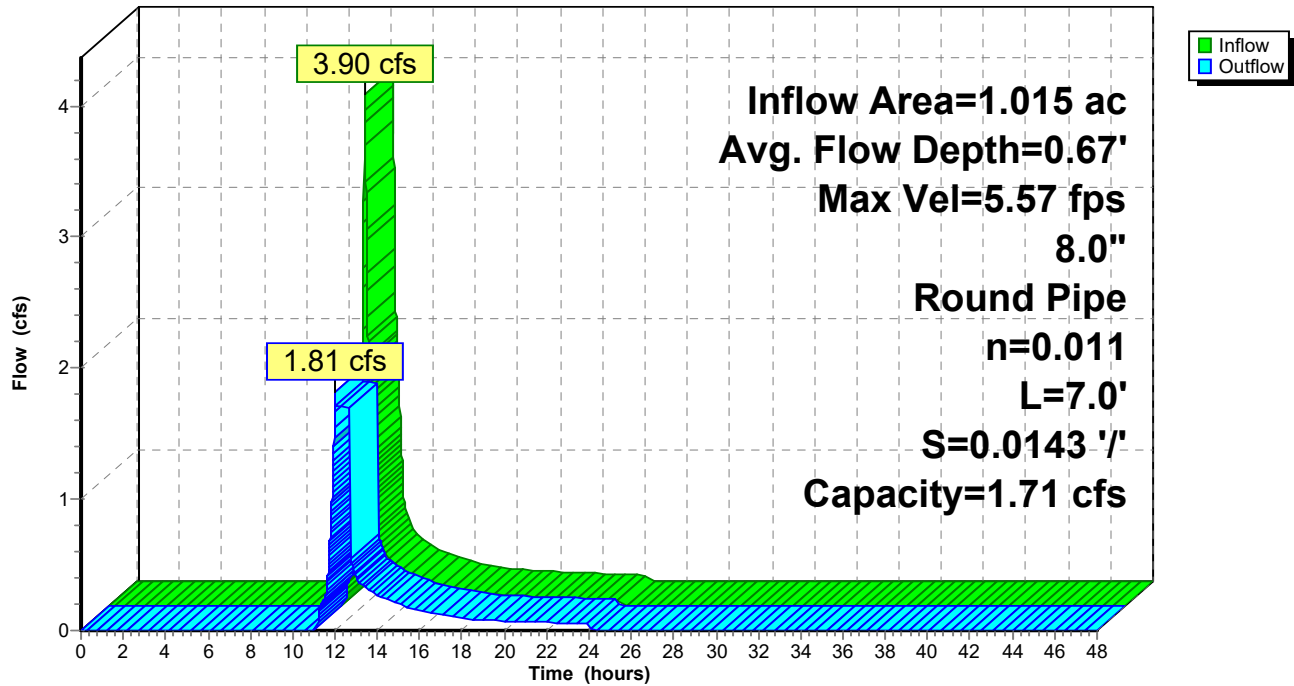
Peak Storage= 2 cf @ 12.00 hrs
Average Depth at Peak Storage= 0.67'
Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 1.71 cfs

8.0" Round Pipe
n= 0.011 Concrete pipe, straight & clean
Length= 7.0' Slope= 0.0143 '/'
Inlet Invert= 298.00', Outlet Invert= 297.90'



Reach 11R: new

Hydrograph



Summary for Reach 12R: (new Reach)

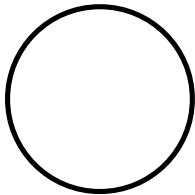
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.243 ac, 29.57% Impervious, Inflow Depth = 0.00" for 100-YR event
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
 Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

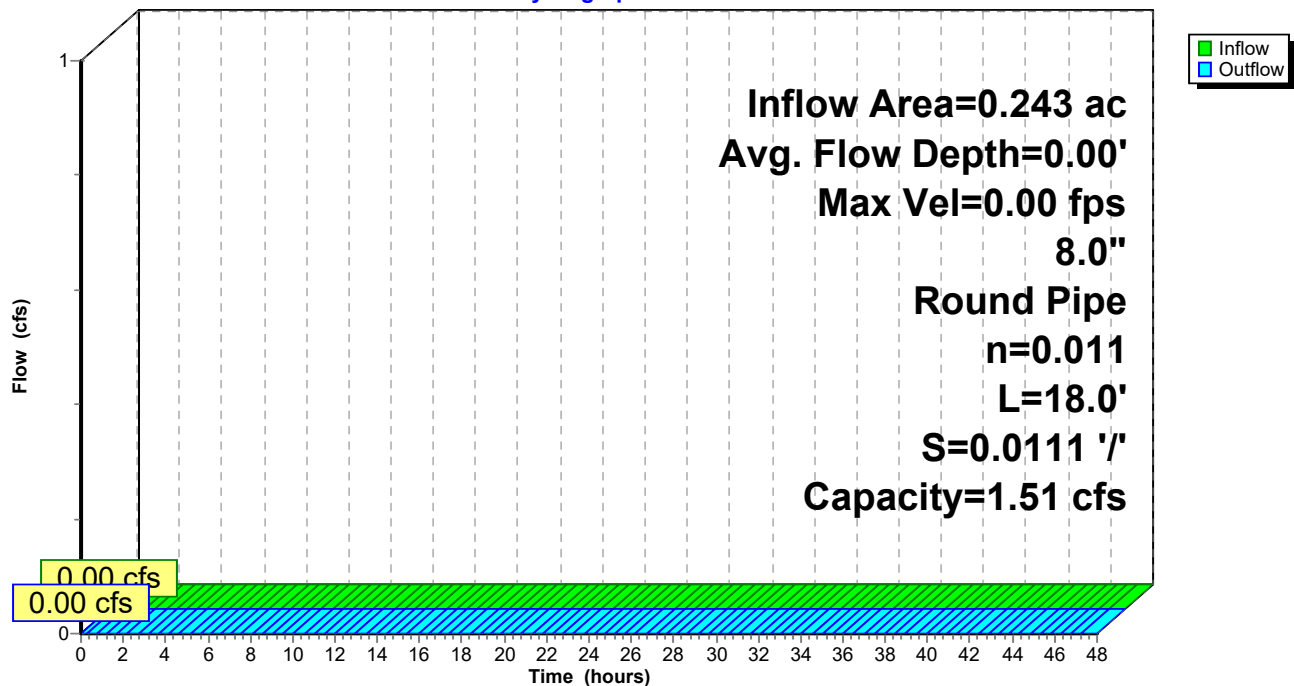
Peak Storage= 0 cf @ 0.00 hrs
 Average Depth at Peak Storage= 0.00'
 Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 1.51 cfs

8.0" Round Pipe
 n= 0.011
 Length= 18.0' Slope= 0.0111 '/'
 Inlet Invert= 297.30', Outlet Invert= 297.10'



Reach 12R: (new Reach)

Hydrograph



Summary for Reach 13R: New

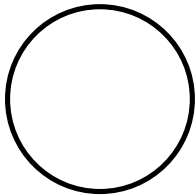
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.036 ac, 34.97% Impervious, Inflow Depth = 0.00" for 100-YR event
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
 Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

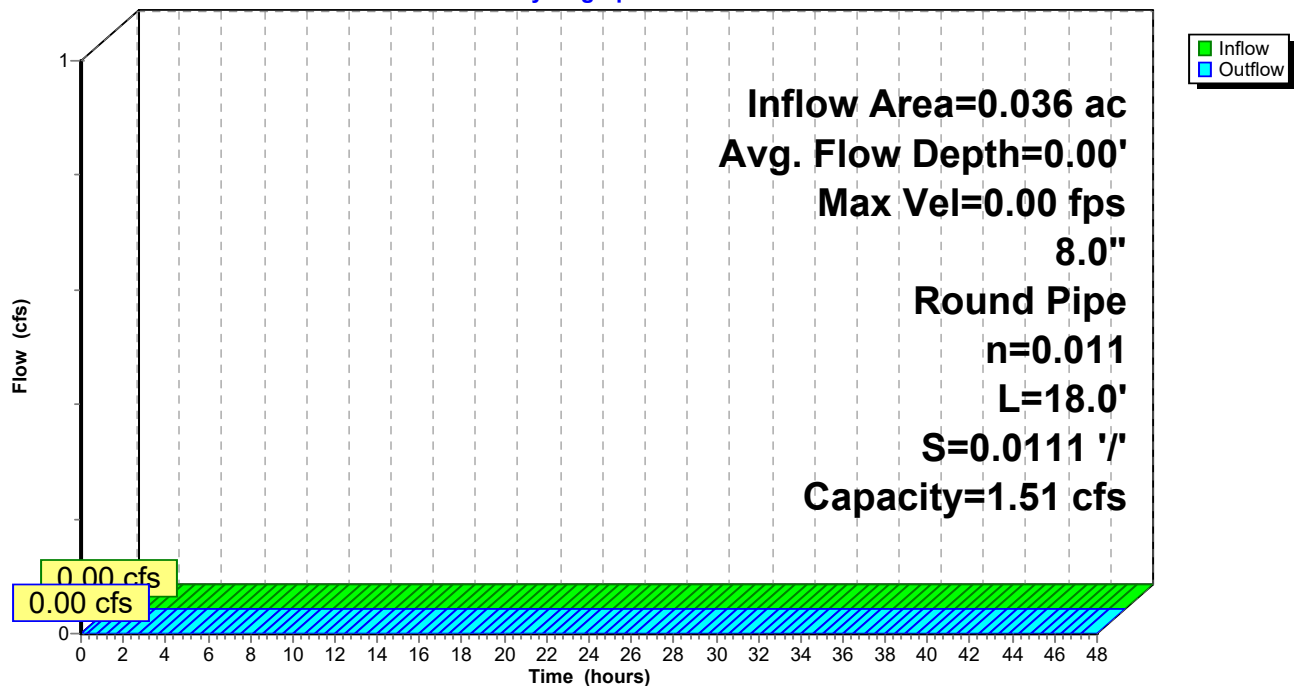
Peak Storage= 0 cf @ 0.00 hrs
 Average Depth at Peak Storage= 0.00'
 Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 1.51 cfs

8.0" Round Pipe
 n= 0.011
 Length= 18.0' Slope= 0.0111 '/'
 Inlet Invert= 301.30', Outlet Invert= 301.10'



Reach 13R: New

Hydrograph



Summary for Reach 14R: (new Reach)

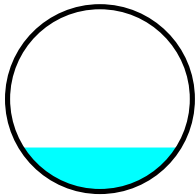
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.265 ac, 0.00% Impervious, Inflow Depth = 1.51" for 100-YR event
 Inflow = 0.23 cfs @ 12.47 hrs, Volume= 0.033 af
 Outflow = 0.23 cfs @ 12.48 hrs, Volume= 0.033 af, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 3.65 fps, Min. Travel Time= 0.2 min
 Avg. Velocity= 1.90 fps, Avg. Travel Time= 0.3 min

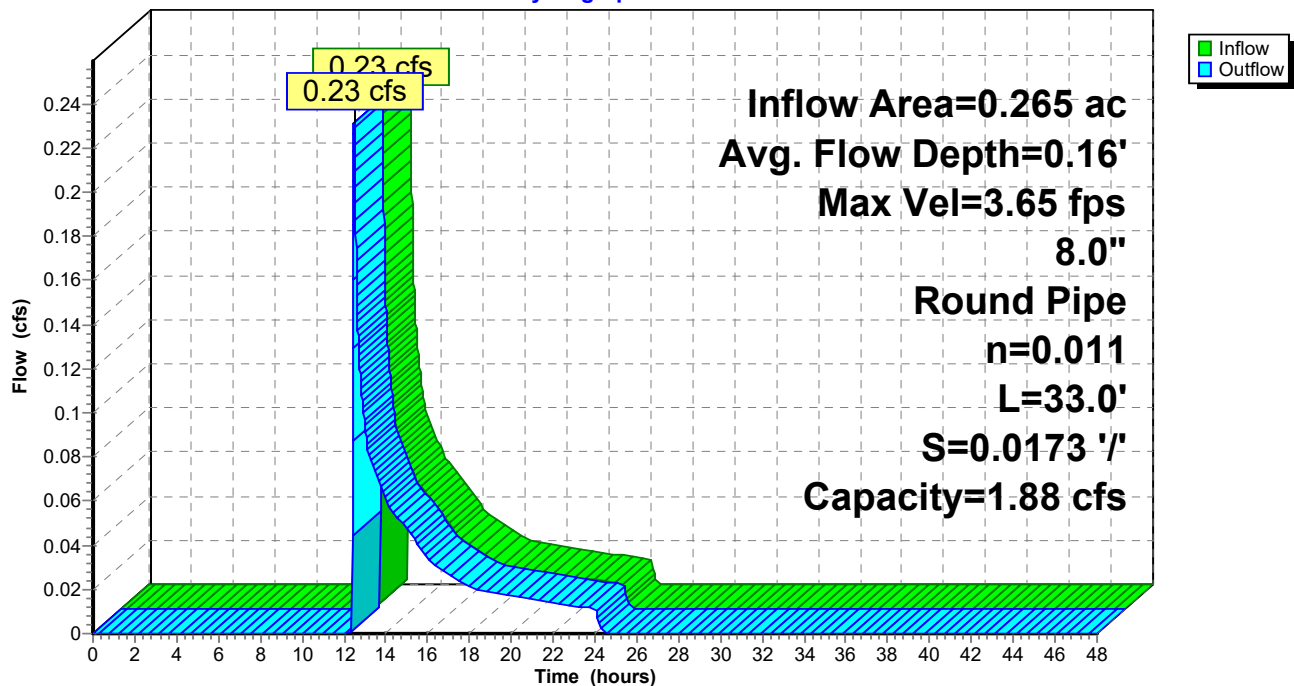
Peak Storage= 2 cf @ 12.48 hrs
 Average Depth at Peak Storage= 0.16'
 Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 1.88 cfs

8.0" Round Pipe
 n= 0.011
 Length= 33.0' Slope= 0.0173 '/
 Inlet Invert= 290.30', Outlet Invert= 289.73'



Reach 14R: (new Reach)

Hydrograph



Summary for Reach 15R: New

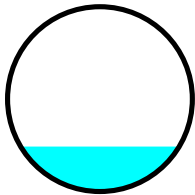
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.043 ac, 62.65% Impervious, Inflow Depth = 3.43" for 100-YR event
 Inflow = 0.24 cfs @ 12.10 hrs, Volume= 0.012 af
 Outflow = 0.24 cfs @ 12.10 hrs, Volume= 0.012 af, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 3.64 fps, Min. Travel Time= 0.1 min
 Avg. Velocity = 1.27 fps, Avg. Travel Time= 0.2 min

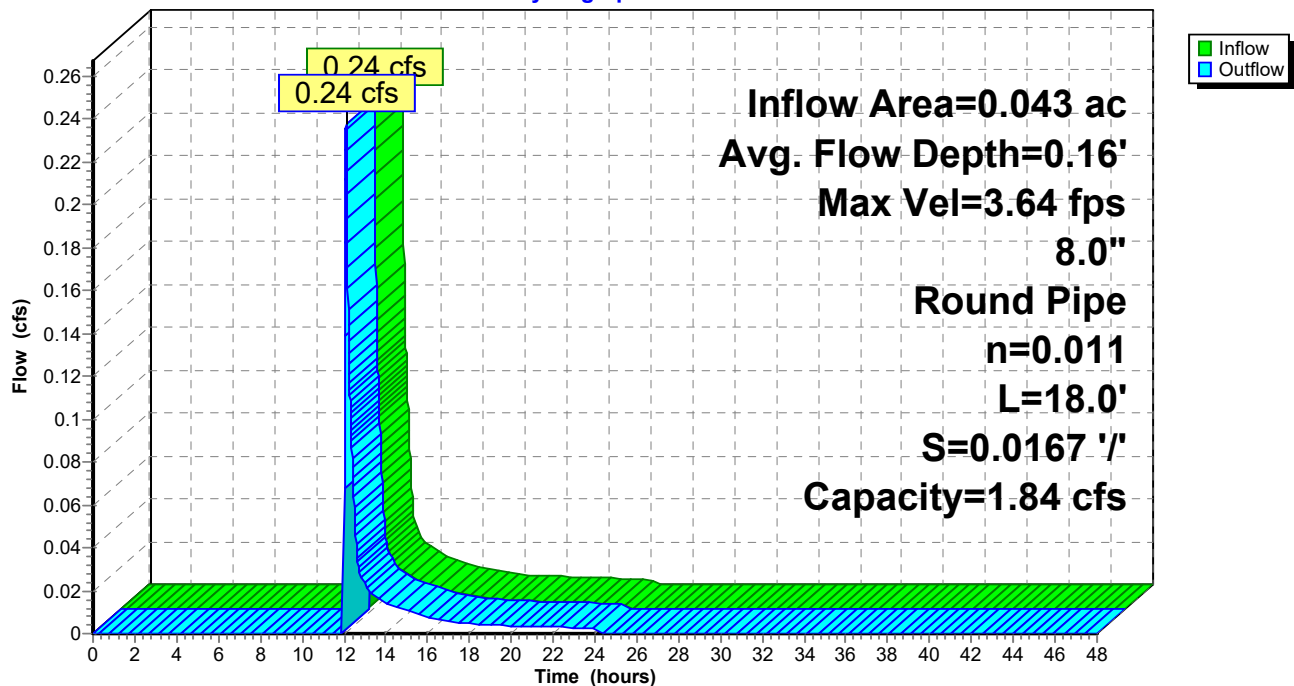
Peak Storage= 1 cf @ 12.10 hrs
 Average Depth at Peak Storage= 0.16'
 Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 1.84 cfs

8.0" Round Pipe
 n= 0.011 Concrete pipe, straight & clean
 Length= 18.0' Slope= 0.0167 '/'
 Inlet Invert= 302.30', Outlet Invert= 302.00'



Reach 15R: New

Hydrograph



Summary for Reach 16R: New

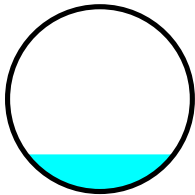
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.091 ac, 45.76% Impervious, Inflow Depth = 2.27" for 100-YR event
 Inflow = 0.17 cfs @ 12.35 hrs, Volume= 0.017 af
 Outflow = 0.17 cfs @ 12.35 hrs, Volume= 0.017 af, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 3.51 fps, Min. Travel Time= 0.2 min
 Avg. Velocity= 1.59 fps, Avg. Travel Time= 0.4 min

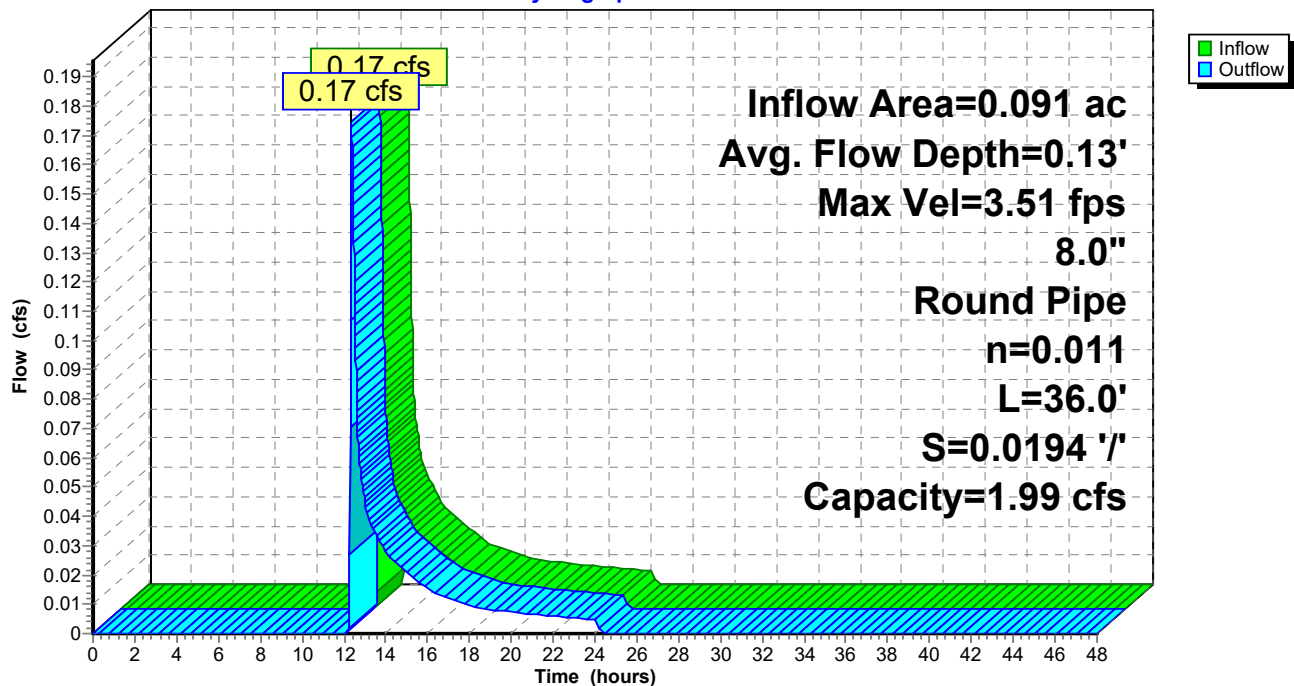
Peak Storage= 2 cf @ 12.35 hrs
 Average Depth at Peak Storage= 0.13'
 Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 1.99 cfs

8.0" Round Pipe
 n= 0.011 Concrete pipe, straight & clean
 Length= 36.0' Slope= 0.0194 '/
 Inlet Invert= 302.00', Outlet Invert= 301.30'



Reach 16R: New

Hydrograph



Summary for Reach 17R: New

[52] Hint: Inlet/Outlet conditions not evaluated

[55] Hint: Peak inflow is 263% of Manning's capacity

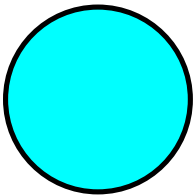
[76] Warning: Detained 0.097 af (Pond w/culvert advised)

Inflow Area = 2.675 ac, 4.94% Impervious, Inflow Depth = 2.66" for 100-YR event
Inflow = 6.80 cfs @ 12.18 hrs, Volume= 0.592 af
Outflow = 2.72 cfs @ 12.01 hrs, Volume= 0.592 af, Atten= 60%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 8.45 fps, Min. Travel Time= 0.1 min
Avg. Velocity= 4.76 fps, Avg. Travel Time= 0.2 min

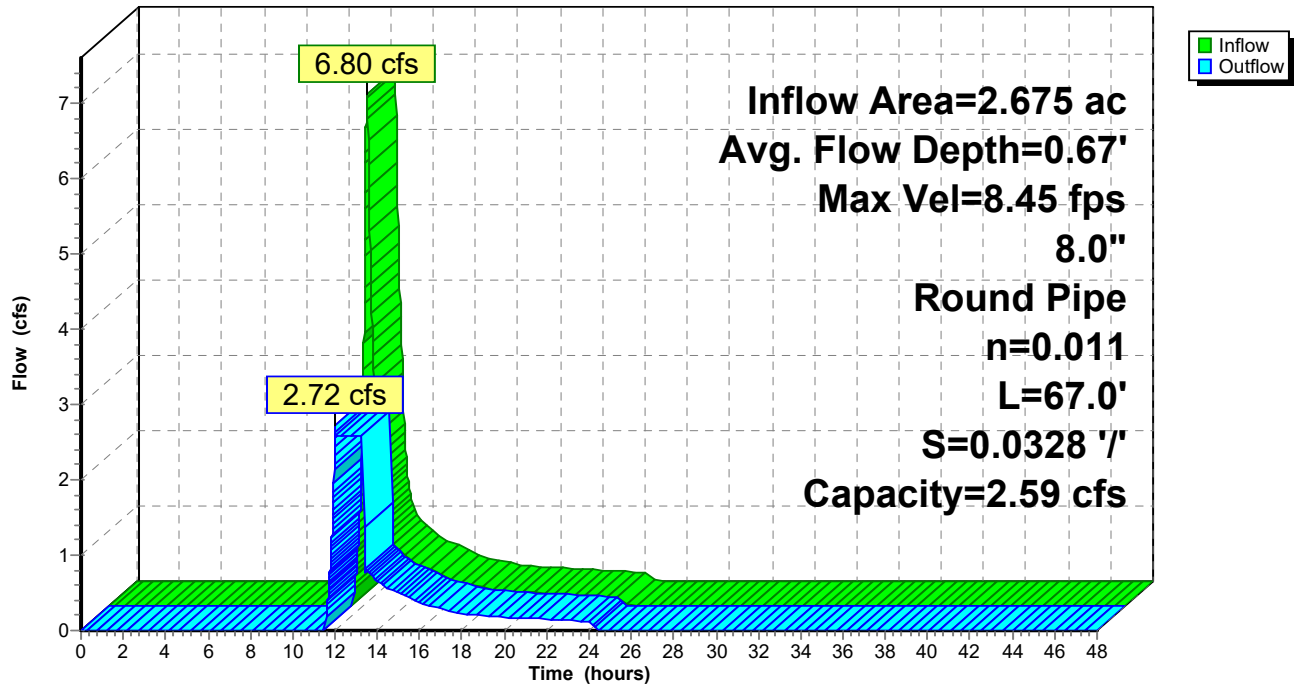
Peak Storage= 23 cf @ 12.02 hrs
Average Depth at Peak Storage= 0.67'
Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 2.59 cfs

8.0" Round Pipe
n= 0.011 Concrete pipe, straight & clean
Length= 67.0' Slope= 0.0328 '/
Inlet Invert= 298.00', Outlet Invert= 295.80'



Reach 17R: New

Hydrograph



Summary for Reach 18R: New

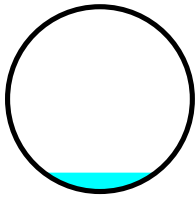
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.052 ac, 40.18% Impervious, Inflow Depth = 1.84" for 100-YR event
 Inflow = 0.04 cfs @ 12.56 hrs, Volume= 0.008 af
 Outflow = 0.04 cfs @ 12.56 hrs, Volume= 0.008 af, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 2.34 fps, Min. Travel Time= 0.1 min
 Avg. Velocity = 1.33 fps, Avg. Travel Time= 0.2 min

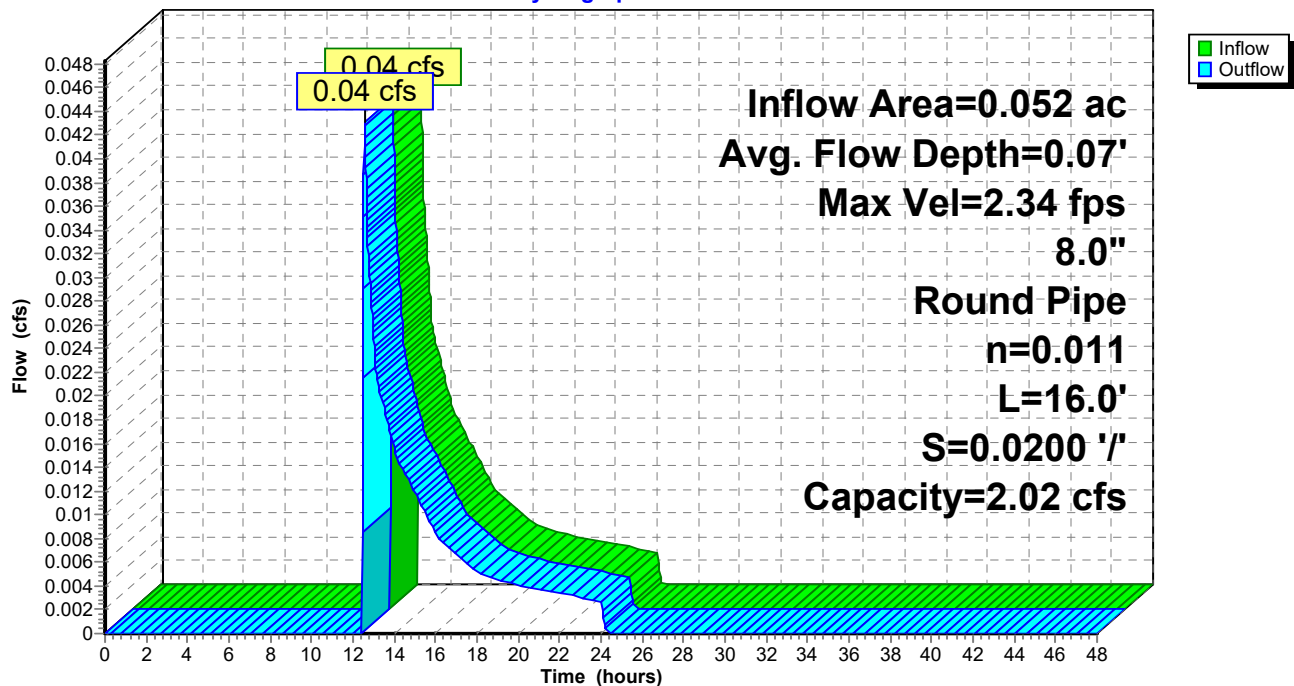
Peak Storage= 0 cf @ 12.56 hrs
 Average Depth at Peak Storage= 0.07'
 Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 2.02 cfs

8.0" Round Pipe
 n= 0.011 Concrete pipe, straight & clean
 Length= 16.0' Slope= 0.0200 '/'
 Inlet Invert= 301.30', Outlet Invert= 300.98'



Reach 18R: New

Hydrograph



Summary for Reach 19R: (new Reach)

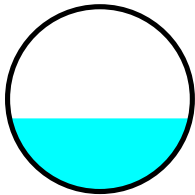
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.228 ac, 67.95% Impervious, Inflow Depth = 4.47" for 100-YR event
 Inflow = 1.32 cfs @ 12.11 hrs, Volume= 0.085 af
 Outflow = 1.31 cfs @ 12.11 hrs, Volume= 0.085 af, Atten= 1%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 10.25 fps, Min. Travel Time= 0.1 min
 Avg. Velocity = 3.67 fps, Avg. Travel Time= 0.2 min

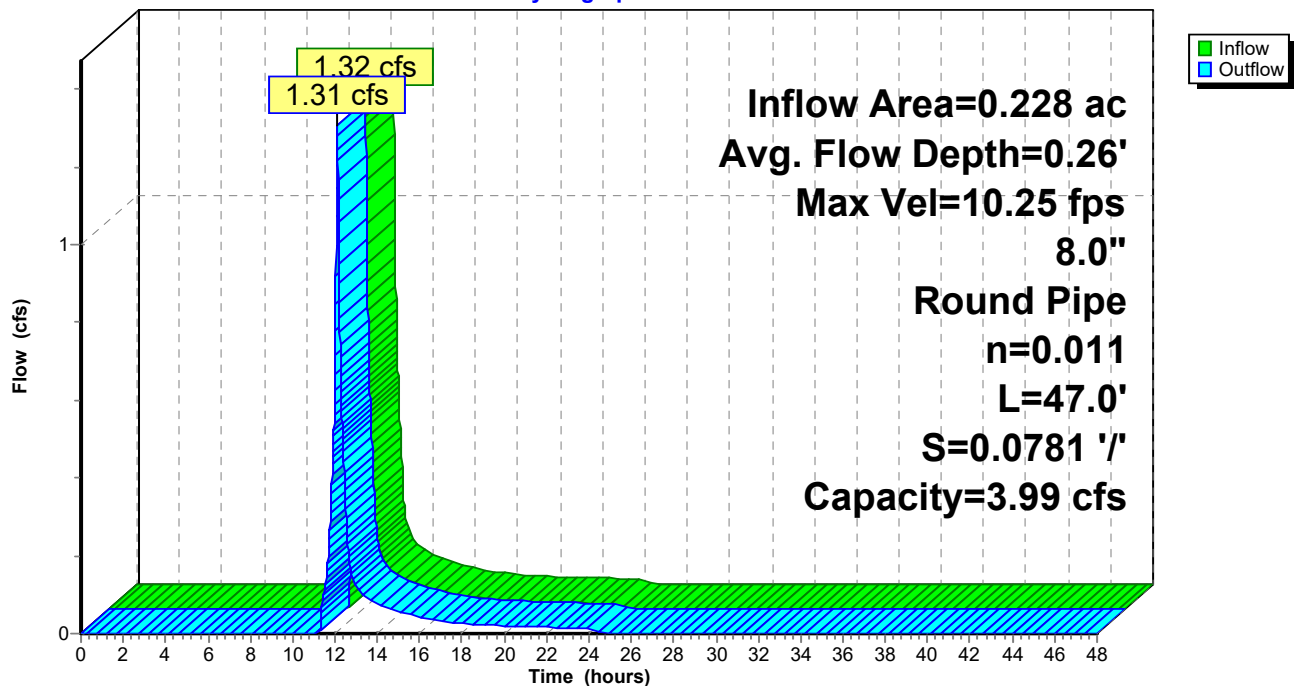
Peak Storage= 6 cf @ 12.11 hrs
 Average Depth at Peak Storage= 0.26'
 Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 3.99 cfs

8.0" Round Pipe
 n= 0.011
 Length= 47.0' Slope= 0.0781 '/
 Inlet Invert= 287.00', Outlet Invert= 283.33'



Reach 19R: (new Reach)

Hydrograph



Summary for Reach 20R: 12" RCP pipe

[52] Hint: Inlet/Outlet conditions not evaluated

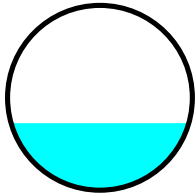
[61] Hint: Exceeded Reach PS9 outlet invert by 0.36' @ 12.10 hrs

Inflow Area = 0.288 ac, 25.48% Impervious, Inflow Depth = 4.51" for 100-YR event
Inflow = 1.50 cfs @ 12.10 hrs, Volume= 0.108 af
Outflow = 1.50 cfs @ 12.10 hrs, Volume= 0.108 af, Atten= 0%, Lag= 0.1 min

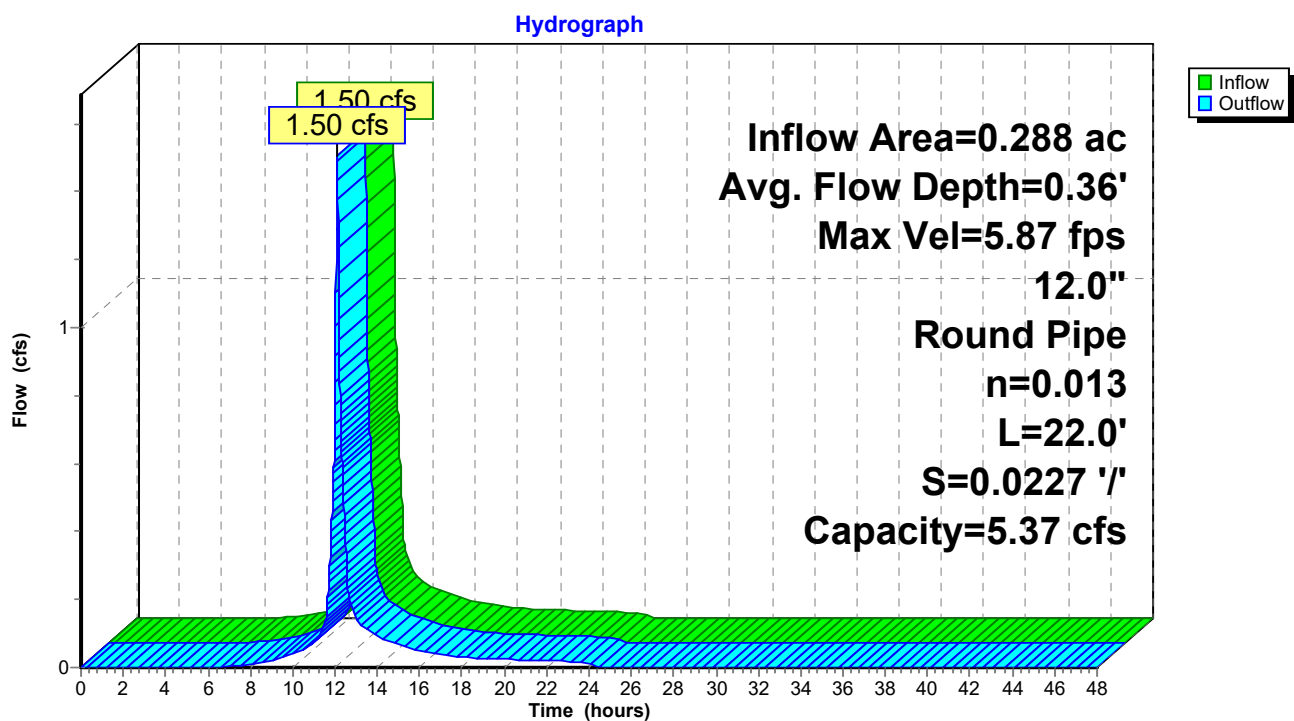
Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.87 fps, Min. Travel Time= 0.1 min
Avg. Velocity= 1.99 fps, Avg. Travel Time= 0.2 min

Peak Storage= 6 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.36'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 5.37 cfs

12.0" Round Pipe
n= 0.013
Length= 22.0' Slope= 0.0227 '/
Inlet Invert= 257.75', Outlet Invert= 257.25'



Reach 20R: 12" RCP pipe



Summary for Reach 21R: (new Reach)

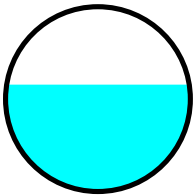
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.153 ac, 15.01% Impervious, Inflow Depth = 3.05" for 100-YR event
 Inflow = 0.64 cfs @ 12.14 hrs, Volume= 0.039 af
 Outflow = 0.64 cfs @ 12.15 hrs, Volume= 0.039 af, Atten= 0%, Lag= 0.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 3.06 fps, Min. Travel Time= 0.3 min
 Avg. Velocity = 1.16 fps, Avg. Travel Time= 0.7 min

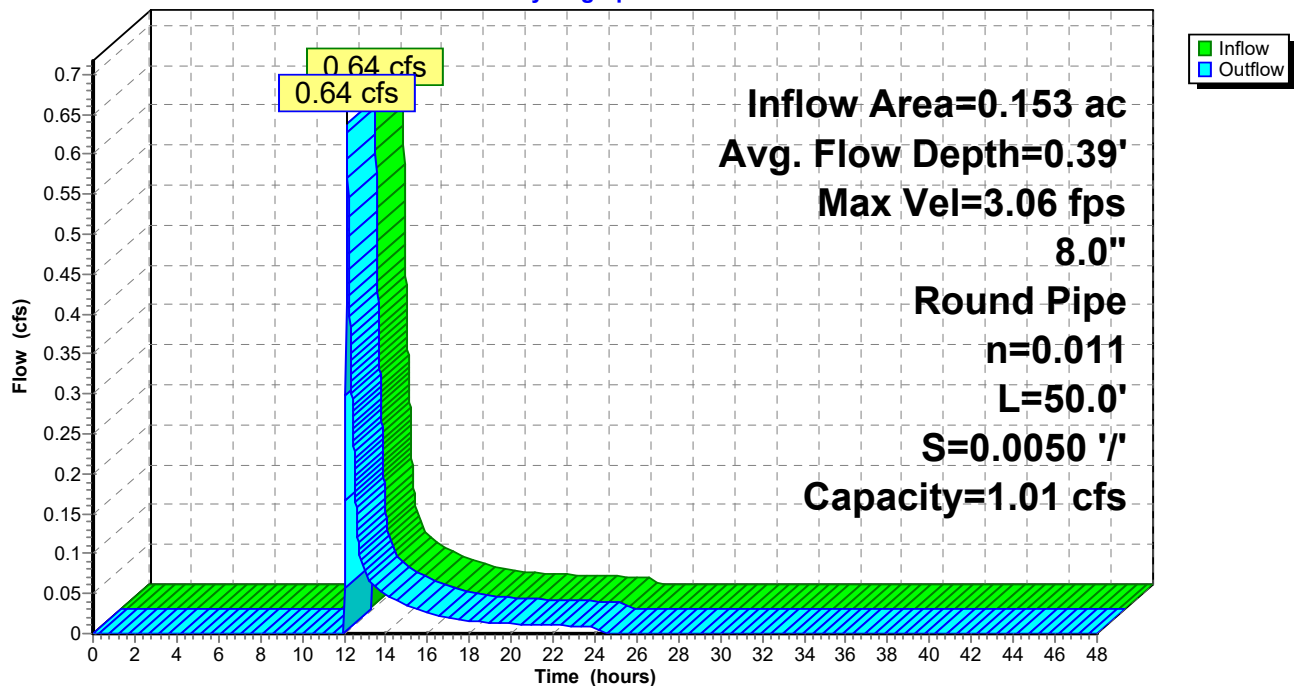
Peak Storage= 10 cf @ 12.14 hrs
 Average Depth at Peak Storage= 0.39'
 Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 1.01 cfs

8.0" Round Pipe
 n= 0.011
 Length= 50.0' Slope= 0.0050 '/
 Inlet Invert= 254.00', Outlet Invert= 253.75'



Reach 21R: (new Reach)

Hydrograph



Summary for Reach CB1: CB1

[52] Hint: Inlet/Outlet conditions not evaluated

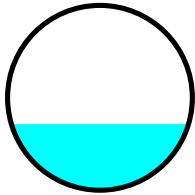
[61] Hint: Exceeded Reach 20R outlet invert by 0.11' @ 12.10 hrs

Inflow Area = 0.395 ac, 45.72% Impervious, Inflow Depth = 5.07" for 100-YR event
Inflow = 2.20 cfs @ 12.10 hrs, Volume= 0.167 af
Outflow = 2.20 cfs @ 12.10 hrs, Volume= 0.167 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 8.78 fps, Min. Travel Time= 0.1 min
Avg. Velocity= 2.71 fps, Avg. Travel Time= 0.2 min

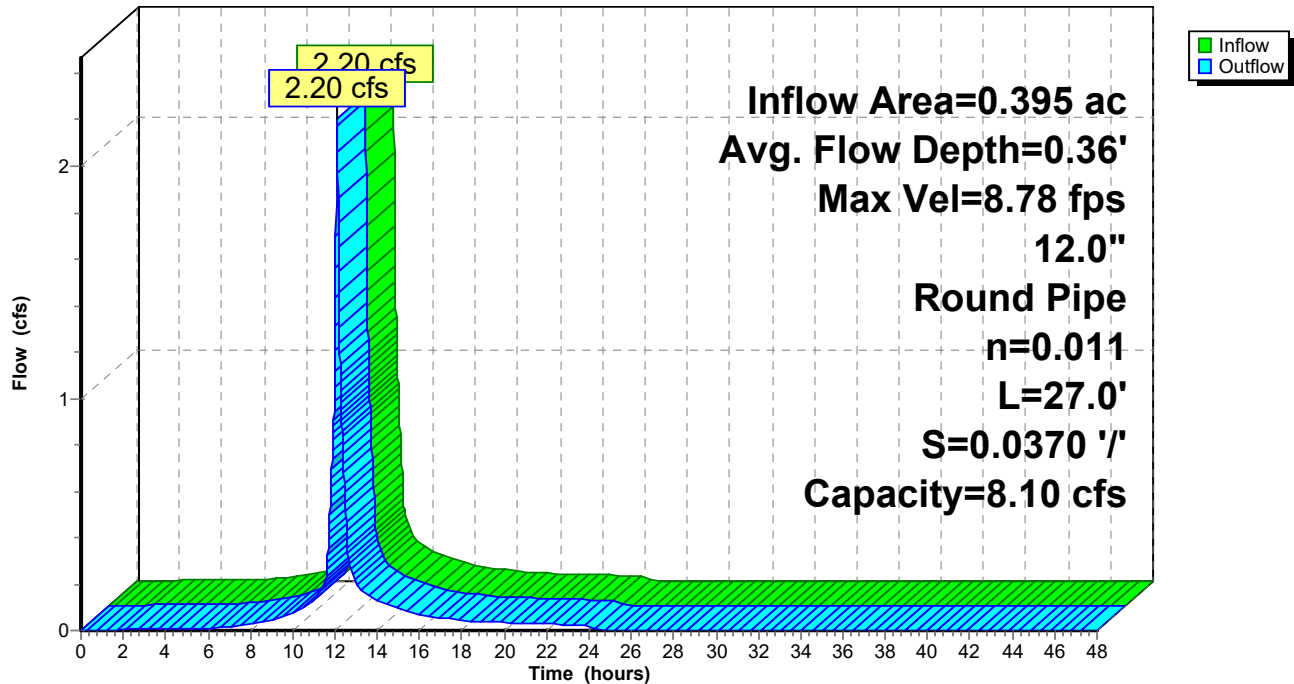
Peak Storage= 7 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.36'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 8.10 cfs

12.0" Round Pipe
n= 0.011
Length= 27.0' Slope= 0.0370 '/'
Inlet Invert= 257.00', Outlet Invert= 256.00'



Reach CB1: CB1

Hydrograph



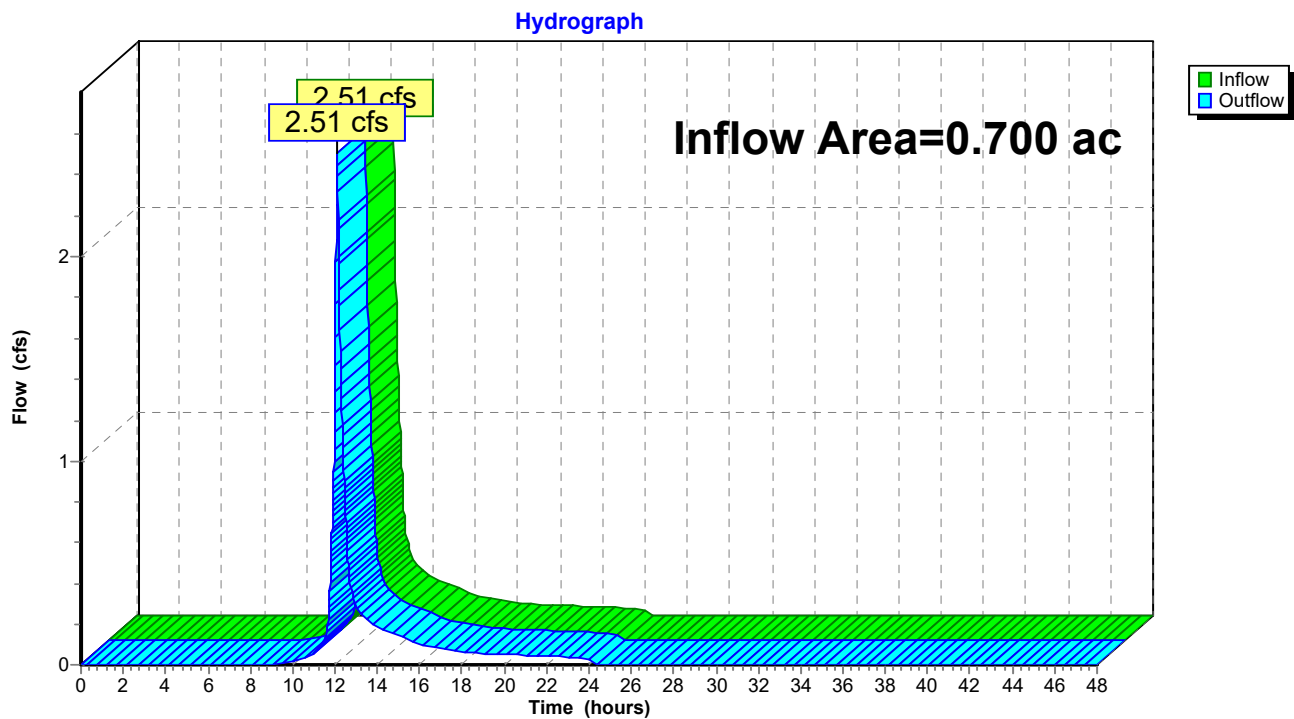
Summary for Reach CP1:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.700 ac, 20.01% Impervious, Inflow Depth = 3.20" for 100-YR event
Inflow = 2.51 cfs @ 12.10 hrs, Volume= 0.187 af
Outflow = 2.51 cfs @ 12.10 hrs, Volume= 0.187 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Reach CP1:



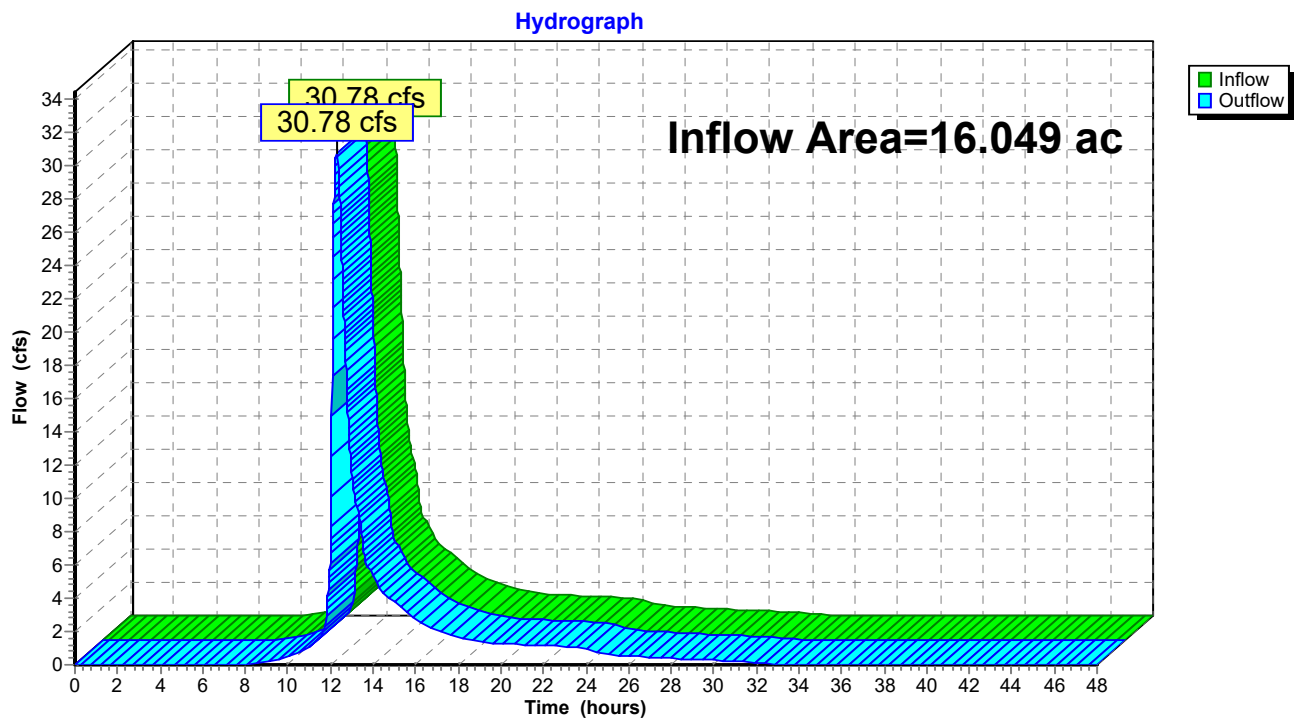
Summary for Reach CP2:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 16.049 ac, 13.07% Impervious, Inflow Depth = 3.42" for 100-YR event
Inflow = 30.78 cfs @ 12.30 hrs, Volume= 4.573 af
Outflow = 30.78 cfs @ 12.30 hrs, Volume= 4.573 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Reach CP2:



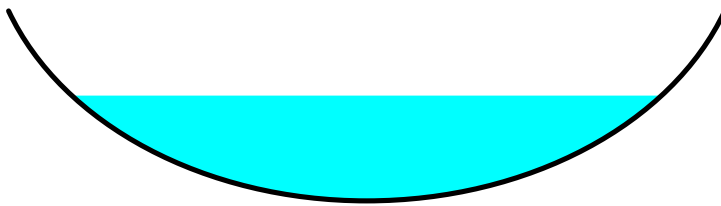
Summary for Reach PS1:

Inflow Area = 2.270 ac, 5.04% Impervious, Inflow Depth = 2.75" for 100-YR event
 Inflow = 5.85 cfs @ 12.18 hrs, Volume= 0.521 af
 Outflow = 5.83 cfs @ 12.20 hrs, Volume= 0.521 af, Atten= 0%, Lag= 1.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 5.30 fps, Min. Travel Time= 0.7 min
 Avg. Velocity = 2.01 fps, Avg. Travel Time= 1.9 min

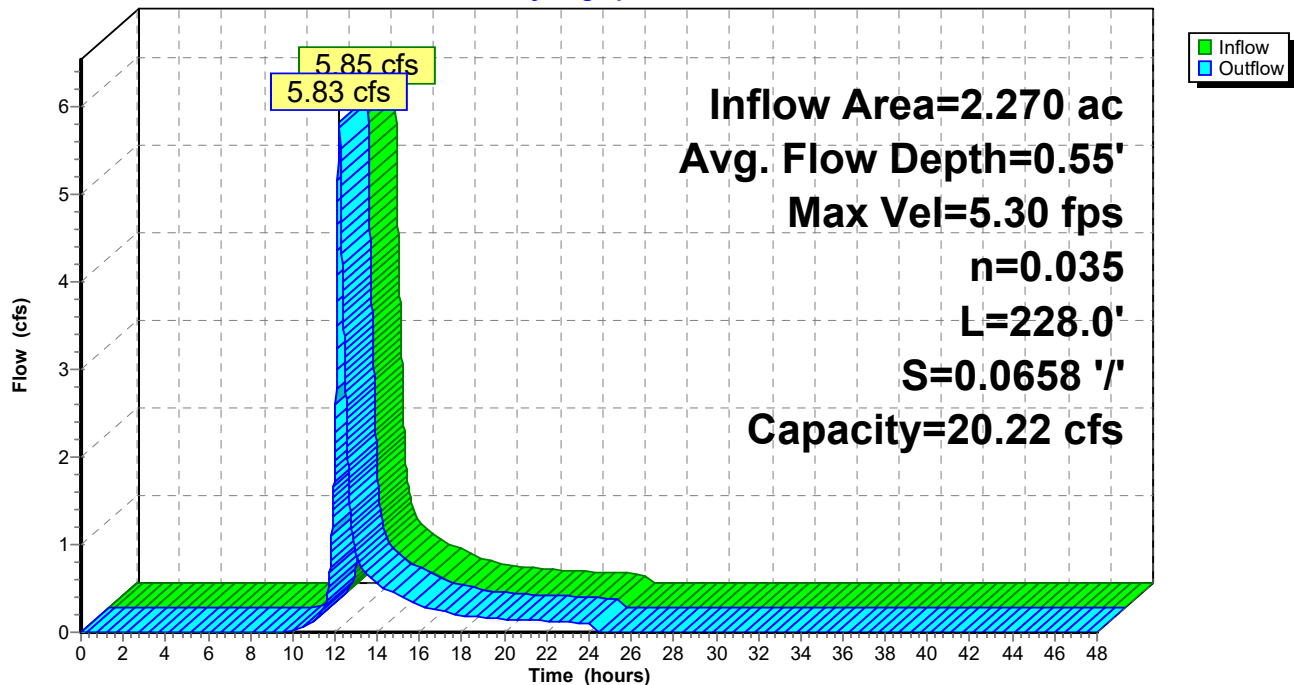
Peak Storage= 251 cf @ 12.18 hrs
 Average Depth at Peak Storage= 0.55'
 Bank-Full Depth= 1.00' Flow Area= 2.7 sf, Capacity= 20.22 cfs

4.00' x 1.00' deep Parabolic Channel, n= 0.035
 Length= 228.0' Slope= 0.0658 '/'
 Inlet Invert= 316.00', Outlet Invert= 301.00'



Reach PS1:

Hydrograph



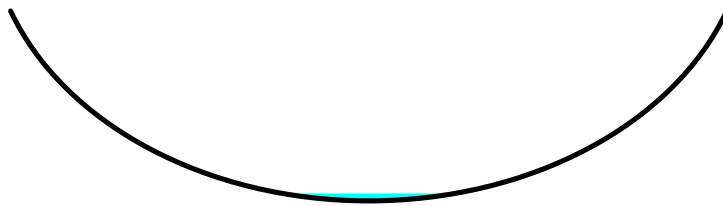
Summary for Reach PS10A:

Inflow Area = 0.035 ac, 96.04% Impervious, Inflow Depth = 6.44" for 100-YR event
 Inflow = 0.23 cfs @ 12.08 hrs, Volume= 0.019 af
 Outflow = 0.23 cfs @ 12.09 hrs, Volume= 0.019 af, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 1.94 fps, Min. Travel Time= 0.2 min
 Avg. Velocity = 0.84 fps, Avg. Travel Time= 0.4 min

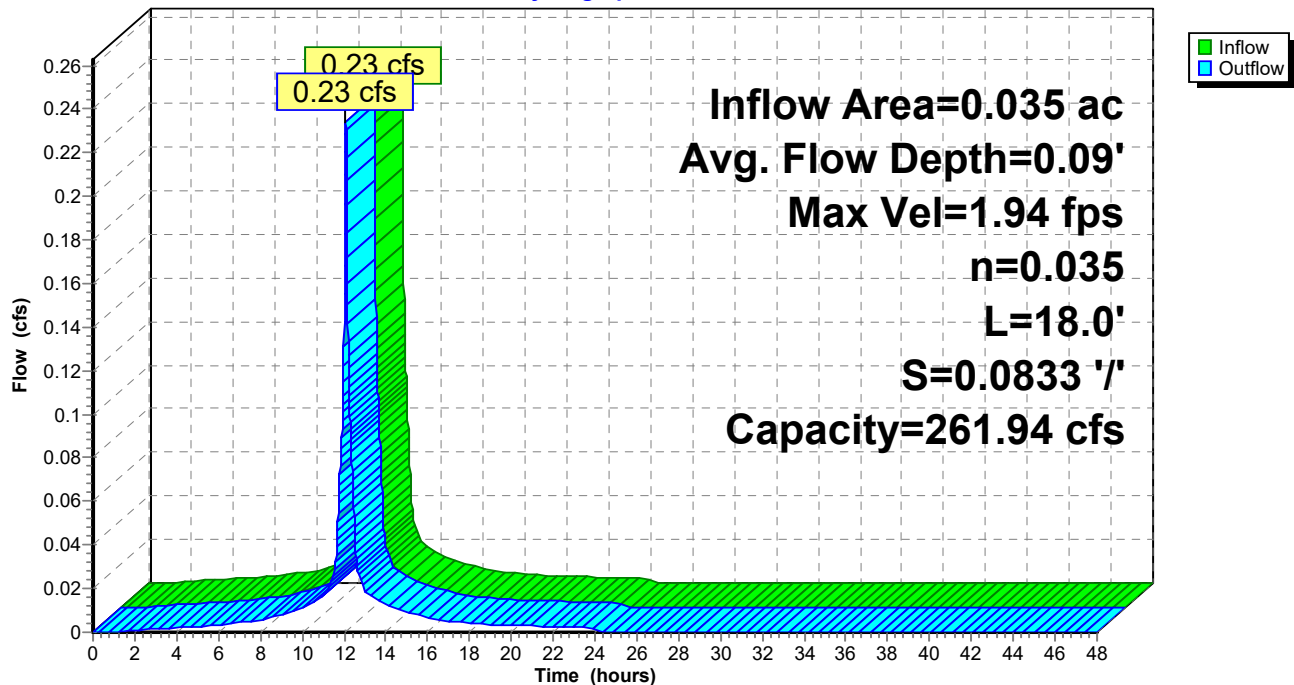
Peak Storage= 2 cf @ 12.09 hrs
 Average Depth at Peak Storage= 0.09'
 Bank-Full Depth= 2.50' Flow Area= 16.7 sf, Capacity= 261.94 cfs

10.00' x 2.50' deep Parabolic Channel, n= 0.035 Short grass
 Length= 18.0' Slope= 0.0833 '/'
 Inlet Invert= 316.50', Outlet Invert= 315.00'



Reach PS10A:

Hydrograph



Summary for Reach PS10B:

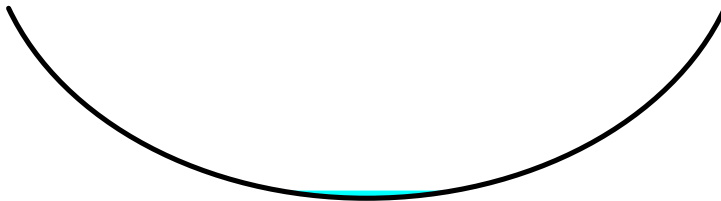
[61] Hint: Exceeded Reach 4R outlet invert by 0.10' @ 12.09 hrs

Inflow Area = 0.035 ac, 96.04% Impervious, Inflow Depth = 6.44" for 100-YR event
 Inflow = 0.23 cfs @ 12.09 hrs, Volume= 0.019 af
 Outflow = 0.23 cfs @ 12.10 hrs, Volume= 0.019 af, Atten= 0%, Lag= 0.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 1.83 fps, Min. Travel Time= 0.4 min
 Avg. Velocity = 0.78 fps, Avg. Travel Time= 0.9 min

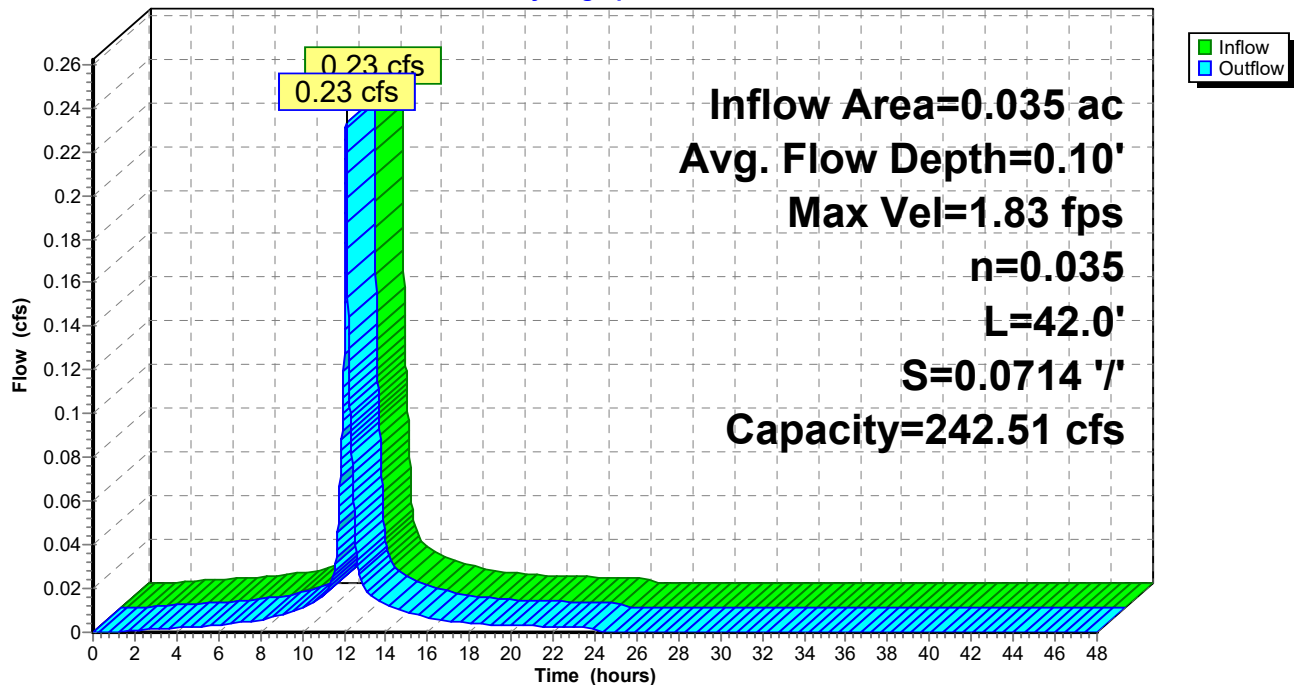
Peak Storage= 5 cf @ 12.09 hrs
 Average Depth at Peak Storage= 0.10'
 Bank-Full Depth= 2.50' Flow Area= 16.7 sf, Capacity= 242.51 cfs

10.00' x 2.50' deep Parabolic Channel, n= 0.035 Short grass
 Length= 42.0' Slope= 0.0714 '/'
 Inlet Invert= 313.50', Outlet Invert= 310.50'



Reach PS10B:

Hydrograph



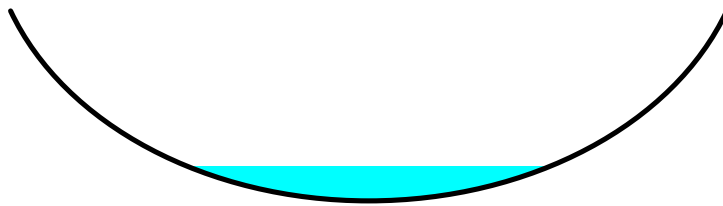
Summary for Reach PS2:

Inflow Area = 0.159 ac, 11.13% Impervious, Inflow Depth = 2.95" for 100-YR event
Inflow = 0.54 cfs @ 12.09 hrs, Volume= 0.039 af
Outflow = 0.54 cfs @ 12.10 hrs, Volume= 0.039 af, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.60 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 0.94 fps, Avg. Travel Time= 0.5 min

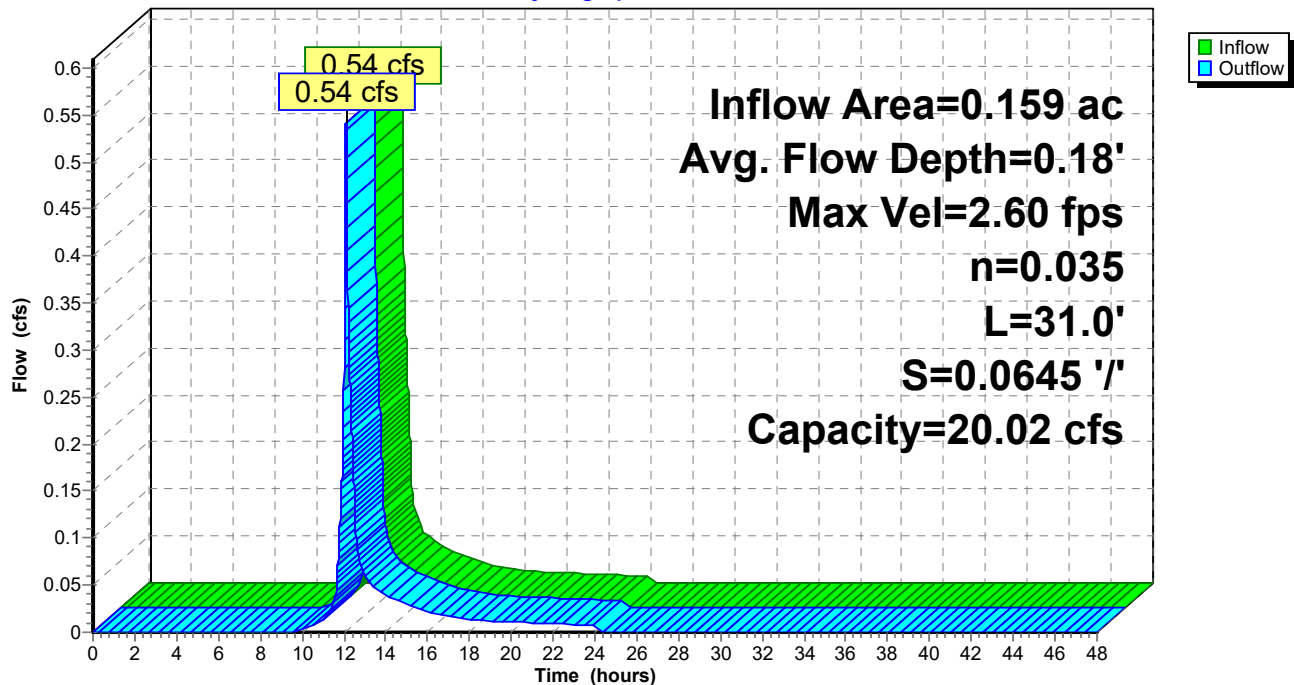
Peak Storage= 6 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.18'
Bank-Full Depth= 1.00' Flow Area= 2.7 sf, Capacity= 20.02 cfs

4.00' x 1.00' deep Parabolic Channel, n= 0.035
Length= 31.0' Slope= 0.0645 '/'
Inlet Invert= 303.00', Outlet Invert= 301.00'



Reach PS2:

Hydrograph



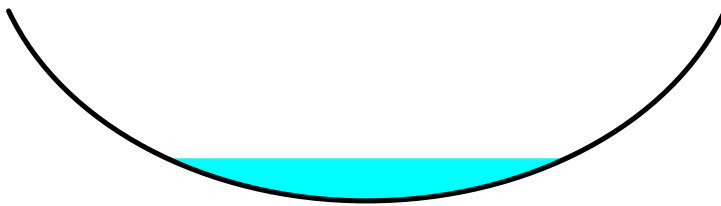
Summary for Reach PS3:

Inflow Area = 0.213 ac, 23.47% Impervious, Inflow Depth = 3.45" for 100-YR event
 Inflow = 0.86 cfs @ 12.09 hrs, Volume= 0.061 af
 Outflow = 0.86 cfs @ 12.10 hrs, Volume= 0.061 af, Atten= 0%, Lag= 0.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 3.06 fps, Min. Travel Time= 0.3 min
 Avg. Velocity = 1.07 fps, Avg. Travel Time= 0.9 min

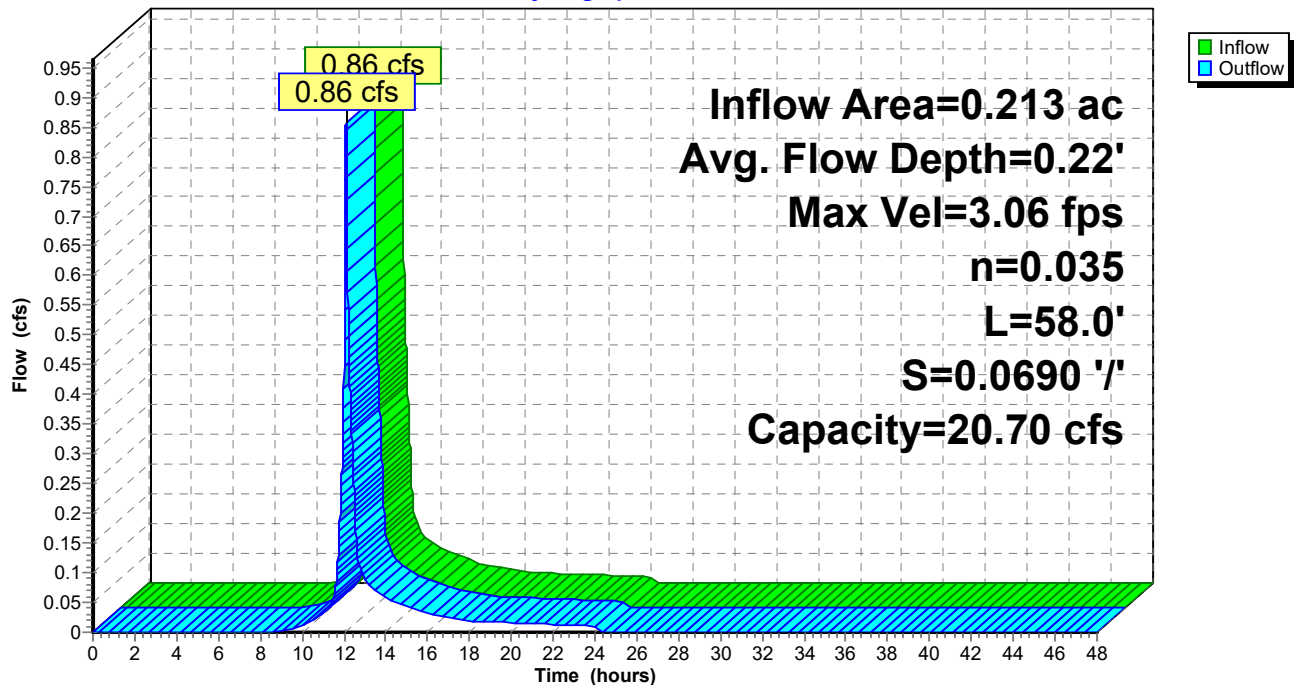
Peak Storage= 16 cf @ 12.09 hrs
 Average Depth at Peak Storage= 0.22'
 Bank-Full Depth= 1.00' Flow Area= 2.7 sf, Capacity= 20.70 cfs

4.00' x 1.00' deep Parabolic Channel, n= 0.035
 Length= 58.0' Slope= 0.0690 '/'
 Inlet Invert= 313.00', Outlet Invert= 309.00'



Reach PS3:

Hydrograph



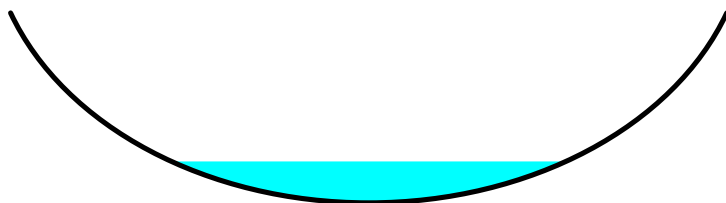
Summary for Reach PS4:

Inflow Area = 0.099 ac, 53.64% Impervious, Inflow Depth = 4.62" for 100-YR event
 Inflow = 0.53 cfs @ 12.09 hrs, Volume= 0.038 af
 Outflow = 0.53 cfs @ 12.09 hrs, Volume= 0.038 af, Atten= 0%, Lag= 0.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 1.96 fps, Min. Travel Time= 0.3 min
 Avg. Velocity = 0.65 fps, Avg. Travel Time= 0.9 min

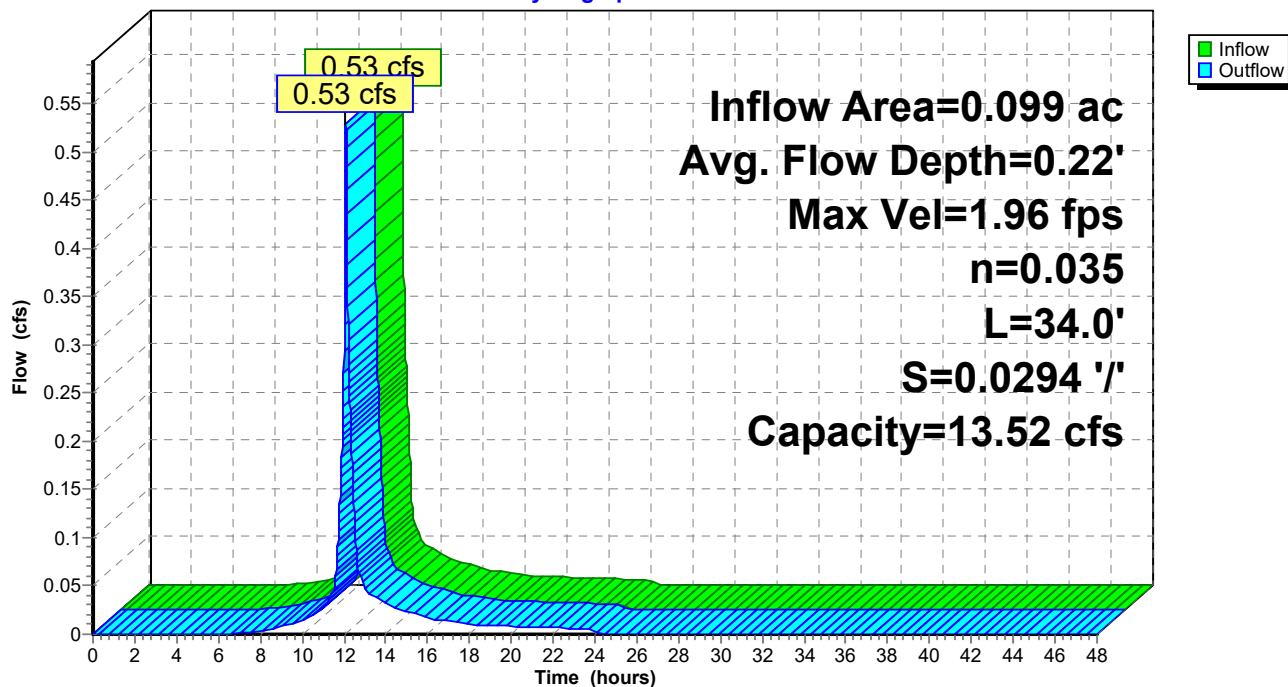
Peak Storage= 9 cf @ 12.09 hrs
 Average Depth at Peak Storage= 0.22'
 Bank-Full Depth= 1.00' Flow Area= 2.7 sf, Capacity= 13.52 cfs

4.00' x 1.00' deep Parabolic Channel, n= 0.035
 Length= 34.0' Slope= 0.0294 '/'
 Inlet Invert= 307.00', Outlet Invert= 306.00'



Reach PS4:

Hydrograph



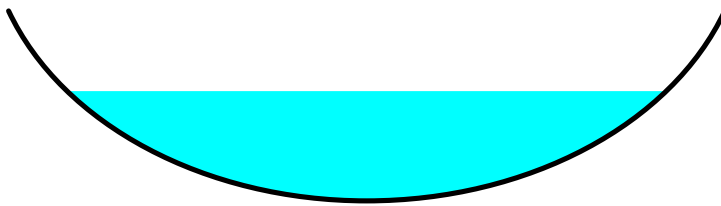
Summary for Reach PS6: (new Reach)

Inflow Area = 0.717 ac, 23.42% Impervious, Inflow Depth = 3.45" for 100-YR event
 Inflow = 2.90 cfs @ 12.09 hrs, Volume= 0.206 af
 Outflow = 2.70 cfs @ 12.17 hrs, Volume= 0.206 af, Atten= 7%, Lag= 4.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 2.31 fps, Min. Travel Time= 2.9 min
 Avg. Velocity = 0.73 fps, Avg. Travel Time= 9.1 min

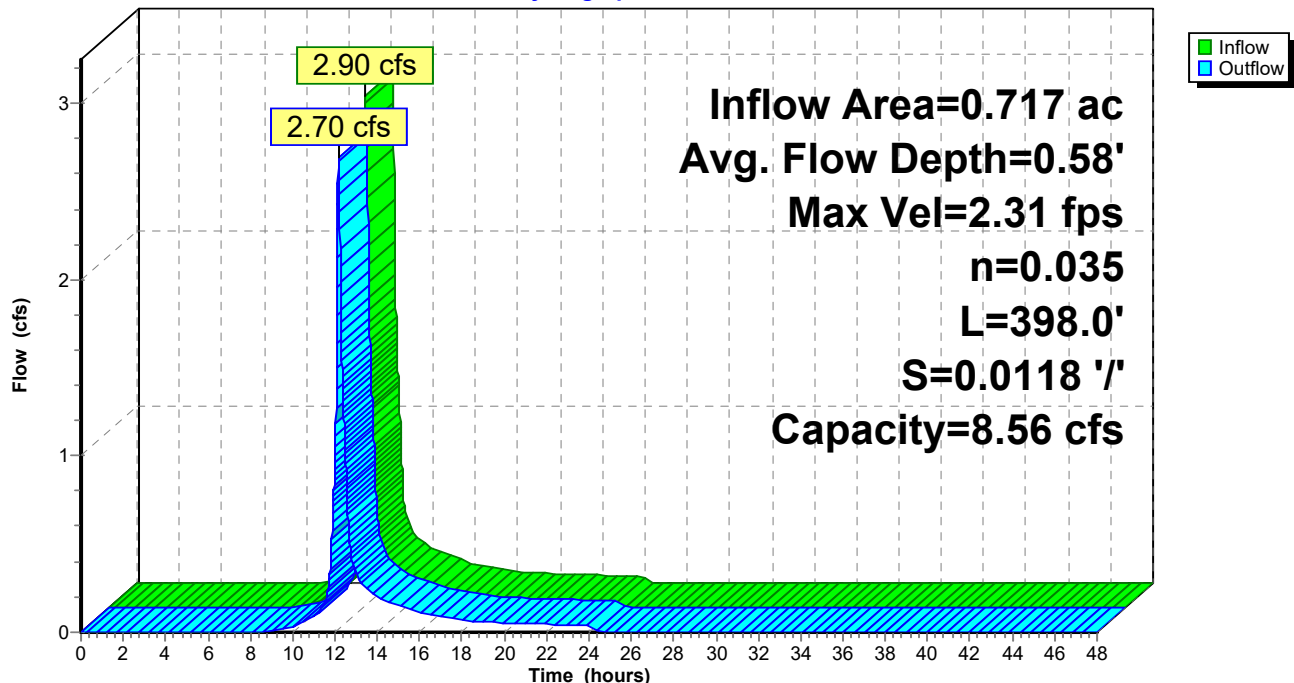
Peak Storage= 466 cf @ 12.12 hrs
 Average Depth at Peak Storage= 0.58'
 Bank-Full Depth= 1.00' Flow Area= 2.7 sf, Capacity= 8.56 cfs

4.00' x 1.00' deep Parabolic Channel, n= 0.035
 Length= 398.0' Slope= 0.0118 '/'
 Inlet Invert= 300.00', Outlet Invert= 295.30'



Reach PS6: (new Reach)

Hydrograph



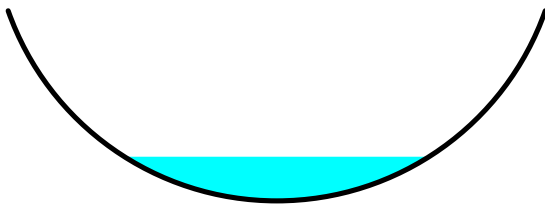
Summary for Reach PS7: (new Reach)

Inflow Area = 0.785 ac, 28.61% Impervious, Inflow Depth = 3.66" for 100-YR event
 Inflow = 3.97 cfs @ 12.02 hrs, Volume= 0.239 af
 Outflow = 3.83 cfs @ 12.06 hrs, Volume= 0.239 af, Atten= 4%, Lag= 2.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 4.28 fps, Min. Travel Time= 1.2 min
 Avg. Velocity = 1.41 fps, Avg. Travel Time= 3.6 min

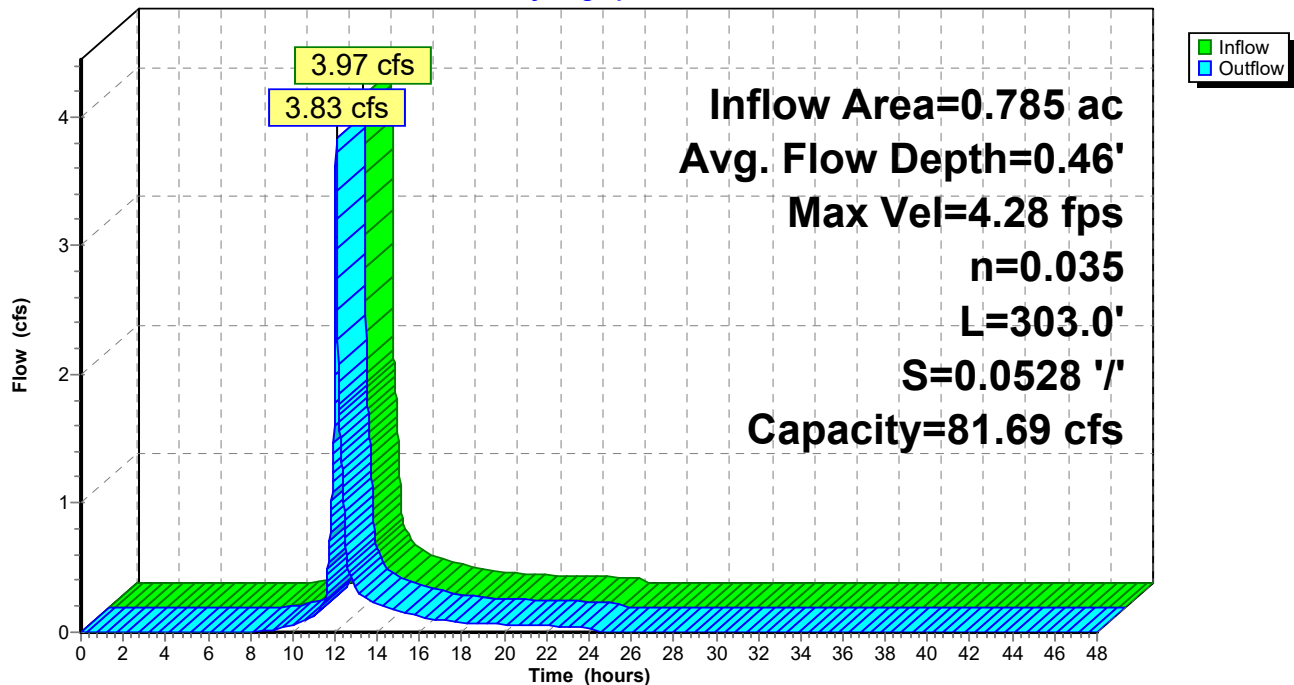
Peak Storage= 271 cf @ 12.04 hrs
 Average Depth at Peak Storage= 0.46'
 Bank-Full Depth= 2.00' Flow Area= 8.0 sf, Capacity= 81.69 cfs

6.00' x 2.00' deep Parabolic Channel, n= 0.035
 Length= 303.0' Slope= 0.0528 '/'
 Inlet Invert= 277.00', Outlet Invert= 261.00'



Reach PS7: (new Reach)

Hydrograph



Summary for Reach PS8: (new Reach)

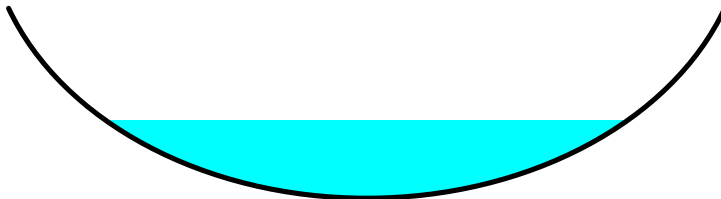
[79] Warning: Submerged Pond MH1 Primary device # 1 INLET by 0.47'

Inflow Area = 6.385 ac, 20.41% Impervious, Inflow Depth = 2.91" for 100-YR event
 Inflow = 12.38 cfs @ 12.12 hrs, Volume= 1.549 af
 Outflow = 12.30 cfs @ 12.12 hrs, Volume= 1.549 af, Atten= 1%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 4.40 fps, Min. Travel Time= 0.2 min
 Avg. Velocity = 1.32 fps, Avg. Travel Time= 0.5 min

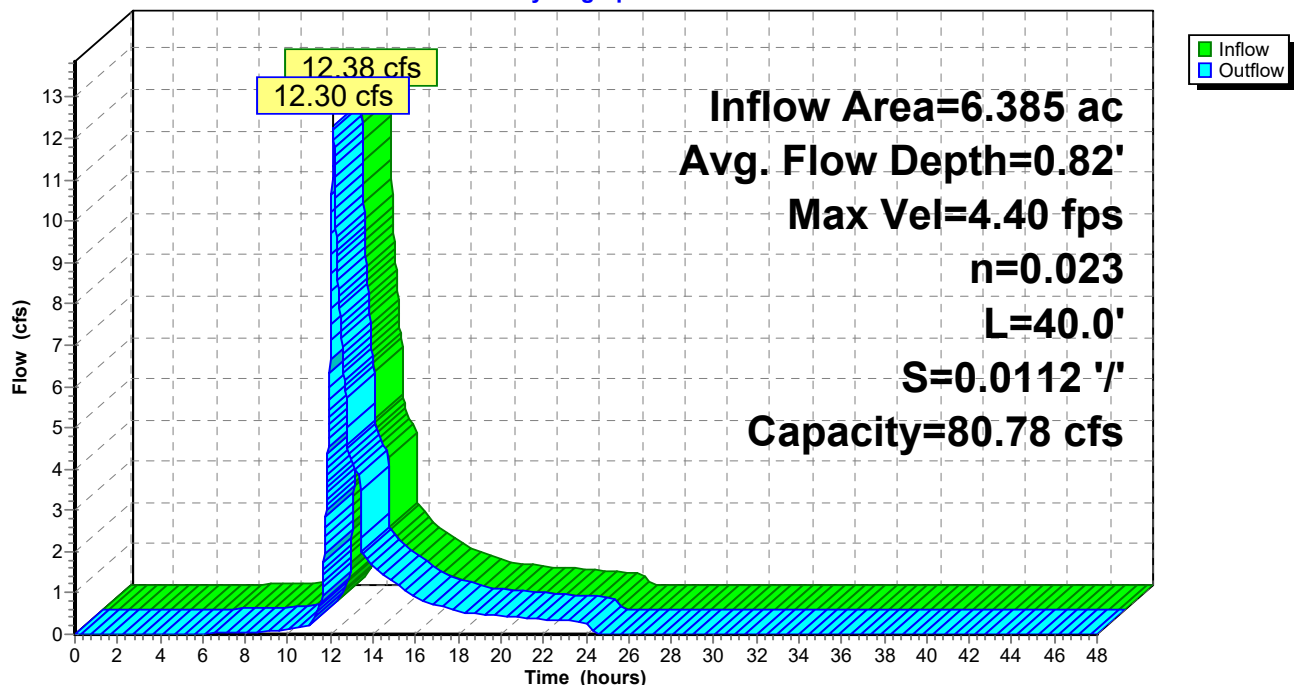
Peak Storage= 112 cf @ 12.11 hrs
 Average Depth at Peak Storage= 0.82'
 Bank-Full Depth= 2.00' Flow Area= 10.7 sf, Capacity= 80.78 cfs

8.00' x 2.00' deep Parabolic Channel, n= 0.023
 Length= 40.0' Slope= 0.0112 '/'
 Inlet Invert= 260.95', Outlet Invert= 260.50'



Reach PS8: (new Reach)

Hydrograph



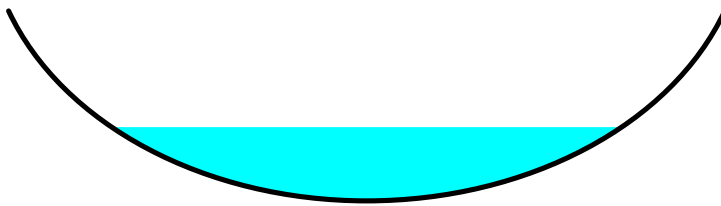
Summary for Reach PS9: (new Reach)

Inflow Area = 0.288 ac, 25.48% Impervious, Inflow Depth = 4.51" for 100-YR event
 Inflow = 1.51 cfs @ 12.09 hrs, Volume= 0.108 af
 Outflow = 1.50 cfs @ 12.10 hrs, Volume= 0.108 af, Atten= 0%, Lag= 0.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 2.34 fps, Min. Travel Time= 0.5 min
 Avg. Velocity = 0.77 fps, Avg. Travel Time= 1.6 min

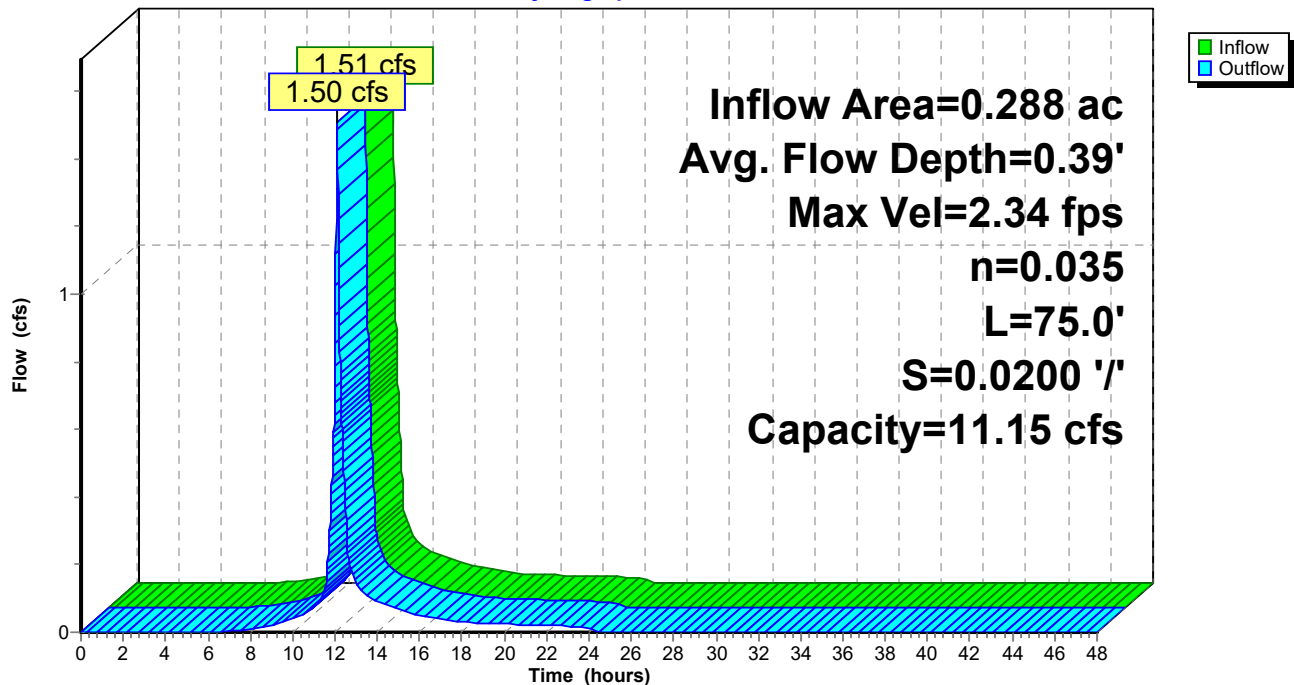
Peak Storage= 48 cf @ 12.09 hrs
 Average Depth at Peak Storage= 0.39'
 Bank-Full Depth= 1.00' Flow Area= 2.7 sf, Capacity= 11.15 cfs

4.00' x 1.00' deep Parabolic Channel, n= 0.035
 Length= 75.0' Slope= 0.0200 '/
 Inlet Invert= 259.25', Outlet Invert= 257.75'



Reach PS9: (new Reach)

Hydrograph



Summary for Pond 1P: (new Pond)

[57] Hint: Peaked at 301.86' (Flood elevation advised)

[63] Warning: Exceeded Reach 9R INLET depth by 3.69' @ 12.18 hrs

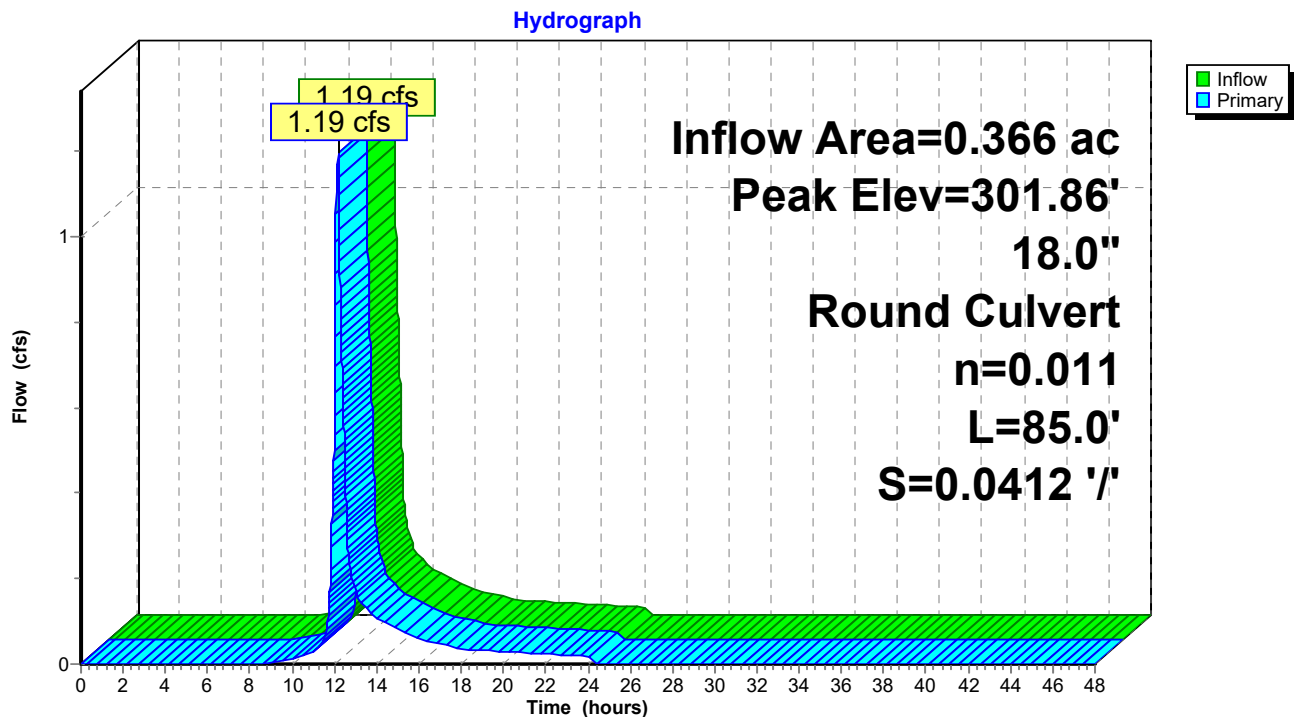
Inflow Area = 0.366 ac, 37.66% Impervious, Inflow Depth = 3.39" for 100-YR event
 Inflow = 1.19 cfs @ 12.18 hrs, Volume= 0.103 af
 Outflow = 1.19 cfs @ 12.18 hrs, Volume= 0.103 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.19 cfs @ 12.18 hrs, Volume= 0.103 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 301.86' @ 12.18 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	301.30'	18.0" Round Culvert L= 85.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 301.30' / 297.80' S= 0.0412 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=1.19 cfs @ 12.18 hrs HW=301.86' (Free Discharge)
 ↑1=Culvert (Inlet Controls 1.19 cfs @ 2.00 fps)

Pond 1P: (new Pond)



Summary for Pond 2P: (new Pond)

[57] Hint: Peaked at 298.61' (Flood elevation advised)
 [62] Hint: Exceeded Reach 11R OUTLET depth by 0.05' @ 12.18 hrs
 [79] Warning: Submerged Pond 1P Primary device # 1 OUTLET by 0.81'

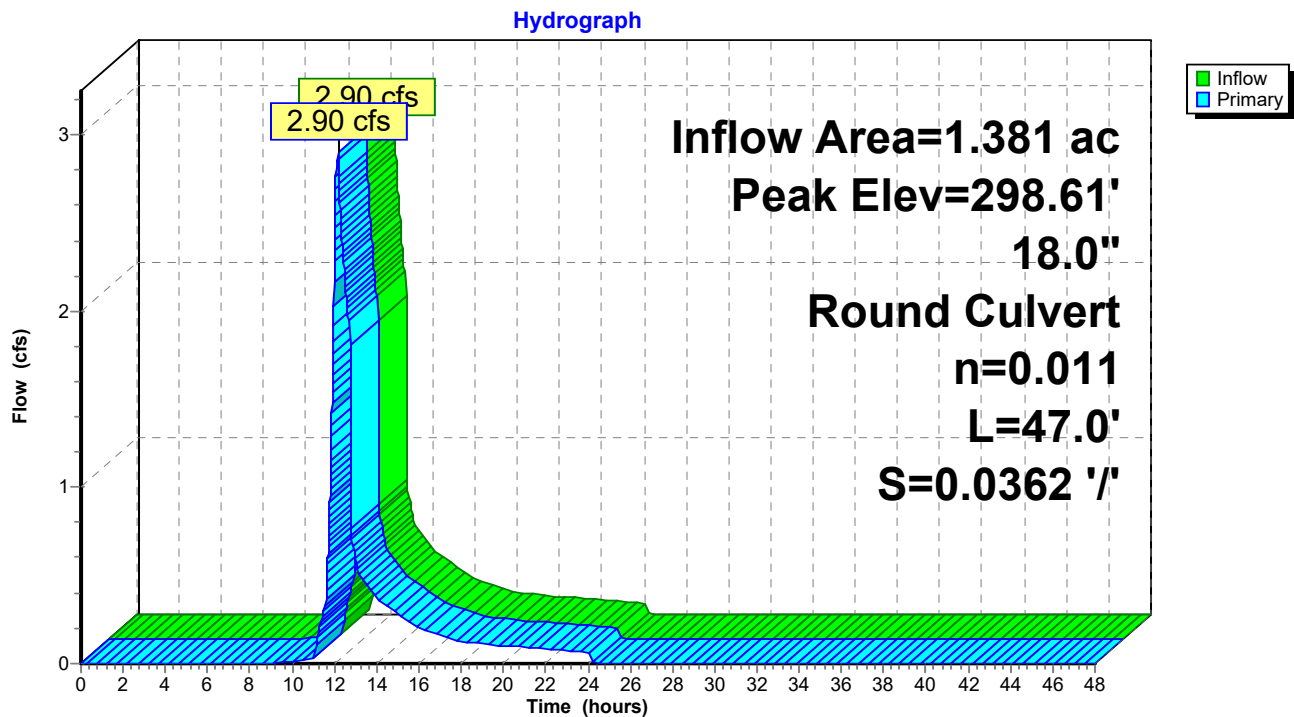
Inflow Area = 1.381 ac, 24.37% Impervious, Inflow Depth = 3.20" for 100-YR event
 Inflow = 2.90 cfs @ 12.18 hrs, Volume= 0.368 af
 Outflow = 2.90 cfs @ 12.18 hrs, Volume= 0.368 af, Atten= 0%, Lag= 0.0 min
 Primary = 2.90 cfs @ 12.18 hrs, Volume= 0.368 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 298.61' @ 12.18 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	297.70'	18.0" Round Culvert L= 47.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 297.70' / 296.00' S= 0.0362 '/ Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=2.90 cfs @ 12.18 hrs HW=298.61' (Free Discharge)
 ↑1=Culvert (Inlet Controls 2.90 cfs @ 2.57 fps)

Pond 2P: (new Pond)



Summary for Pond 3P: MH2B

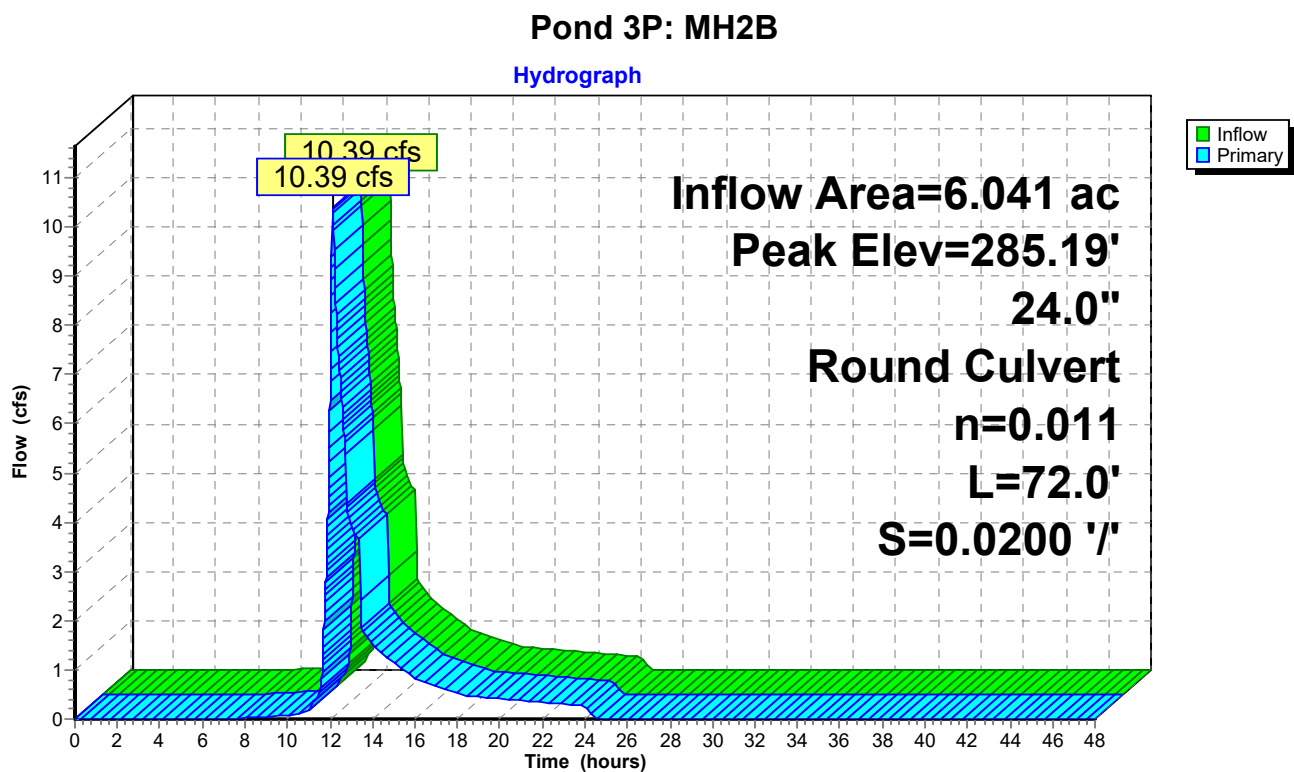
[57] Hint: Peaked at 285.19' (Flood elevation advised)

Inflow Area = 6.041 ac, 17.09% Impervious, Inflow Depth = 2.78" for 100-YR event
 Inflow = 10.39 cfs @ 12.12 hrs, Volume= 1.400 af
 Outflow = 10.39 cfs @ 12.12 hrs, Volume= 1.400 af, Atten= 0%, Lag= 0.0 min
 Primary = 10.39 cfs @ 12.12 hrs, Volume= 1.400 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 285.19' @ 12.12 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	283.44'	24.0" Round 2B L= 72.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 283.44' / 282.00' S= 0.0200 '/ Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=10.38 cfs @ 12.12 hrs HW=285.19' (Free Discharge)
 ↳ **1=2B** (Inlet Controls 10.38 cfs @ 3.56 fps)



Summary for Pond 4P: Constructed Wetland

[62] Hint: Exceeded Reach 1R OUTLET depth by 0.27' @ 12.57 hrs

[61] Hint: Exceeded Reach PS8 outlet invert by 0.25' @ 12.17 hrs

Inflow Area = 8.295 ac, 21.89% Impervious, Inflow Depth = 3.13" for 100-YR event
 Inflow = 19.47 cfs @ 12.10 hrs, Volume= 2.163 af
 Outflow = 16.48 cfs @ 12.17 hrs, Volume= 2.162 af, Atten= 15%, Lag= 4.5 min
 Primary = 16.48 cfs @ 12.17 hrs, Volume= 2.162 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Starting Elev= 258.30' Surf.Area= 5,072 sf Storage= 7,845 cf
 Peak Elev= 260.75' @ 12.17 hrs Surf.Area= 8,717 sf Storage= 24,971 cf (17,126 cf above start)

Plug-Flow detention time= 199.9 min calculated for 1.982 af (92% of inflow)
 Center-of-Mass det. time= 132.0 min (975.6 - 843.7)

Volume	Invert	Avail.Storage	Storage Description
#1	254.00'	37,037 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
254.00	729	0	0
255.00	972	851	851
256.00	1,244	1,108	1,959
257.00	1,541	1,393	3,351
258.00	4,558	3,050	6,401
258.30	5,072	1,445	7,845
259.00	6,345	3,996	11,841
260.00	7,660	7,003	18,843
261.00	9,072	8,366	27,209
262.00	10,584	9,828	37,037

Device	Routing	Invert	Outlet Devices
#1	Primary	258.30'	30.0" Round Culvert L= 30.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 258.30' / 258.00' S= 0.0100 1' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 4.91 sf
#2	Device 1	260.30'	48.0" x 48.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Device 1	258.30'	0.5" Vert. Orifice/Grate X 2.00 columns X 4 rows with 5.0" cc spacing C= 0.600
#4	Device 1	258.30'	4.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#5	Secondary	260.90'	22.0' long x 12.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

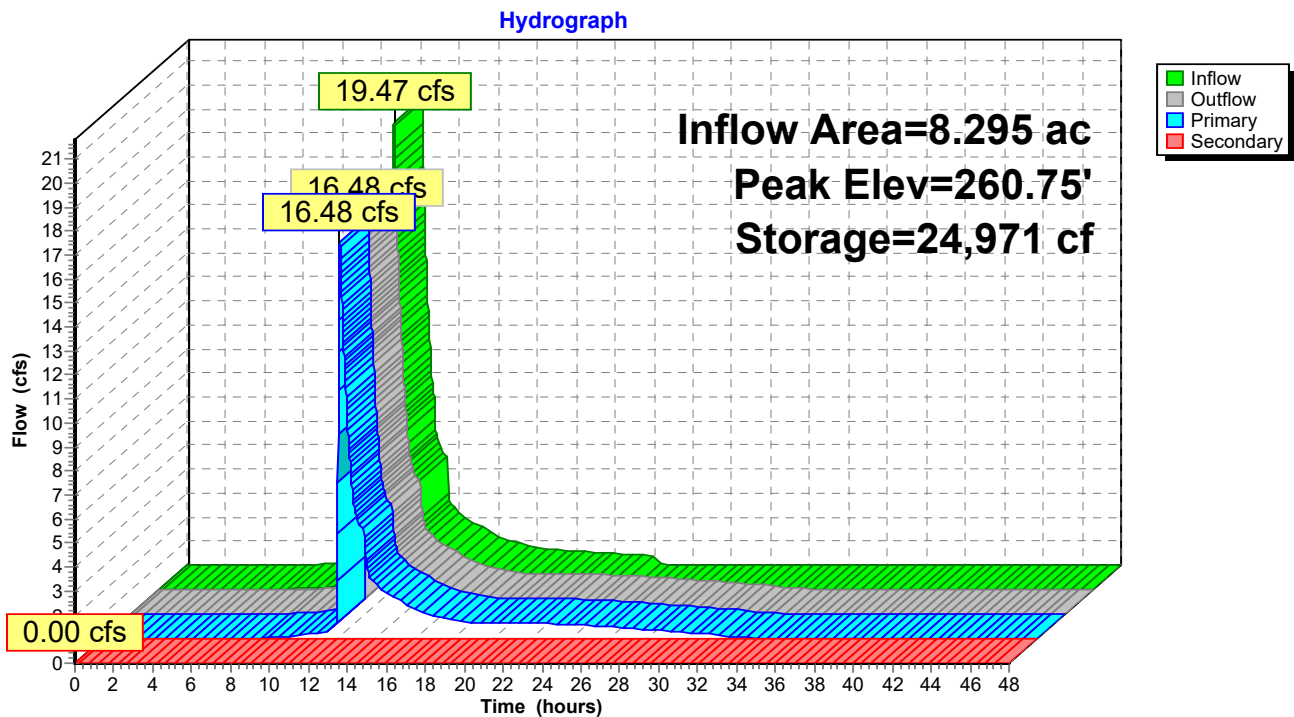
Primary OutFlow Max=16.42 cfs @ 12.17 hrs HW=260.75' (Free Discharge)

- 1=Culvert (Passes 16.42 cfs of 21.38 cfs potential flow)
- 2=Orifice/Grate (Weir Controls 15.69 cfs @ 2.19 fps)
- 3=Orifice/Grate (Orifice Controls 0.07 cfs @ 6.41 fps)
- 4=Orifice/Grate (Orifice Controls 0.66 cfs @ 7.53 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=258.30' (Free Discharge)

- 5=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 4P: Constructed Wetland



Summary for Pond 5P: MH2A

[57] Hint: Peaked at 279.34' (Flood elevation advised)

Inflow Area = 6.269 ac, 18.94% Impervious, Inflow Depth = 2.84" for 100-YR event
 Inflow = 11.68 cfs @ 12.12 hrs, Volume= 1.485 af
 Outflow = 11.68 cfs @ 12.12 hrs, Volume= 1.485 af, Atten= 0%, Lag= 0.0 min
 Primary = 11.68 cfs @ 12.12 hrs, Volume= 1.485 af

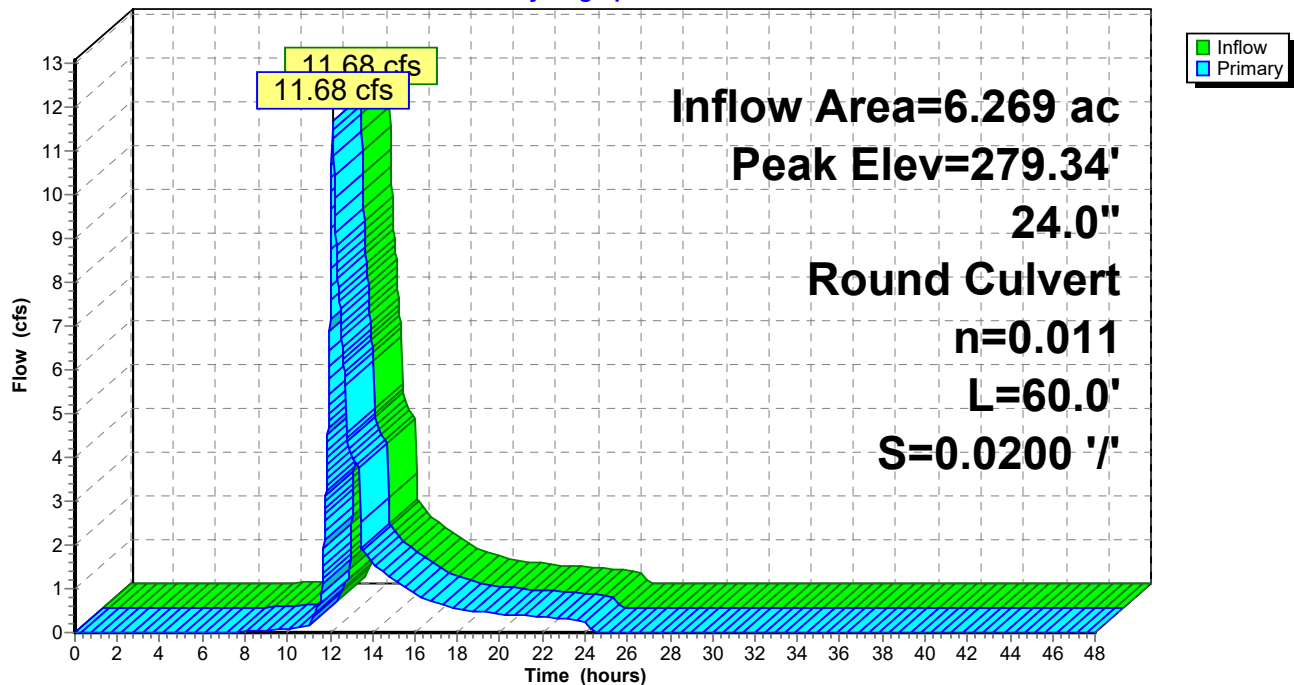
Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 279.34' @ 12.12 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	277.40'	24.0" Round Culvert L= 60.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 277.40' / 276.20' S= 0.0200 '/ Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=11.67 cfs @ 12.12 hrs HW=279.34' (Free Discharge)
 ↑1=Culvert (Inlet Controls 11.67 cfs @ 3.75 fps)

Pond 5P: MH2A

Hydrograph



Summary for Pond 20P: (new Pond)

[57] Hint: Peaked at 266.60' (Flood elevation advised)

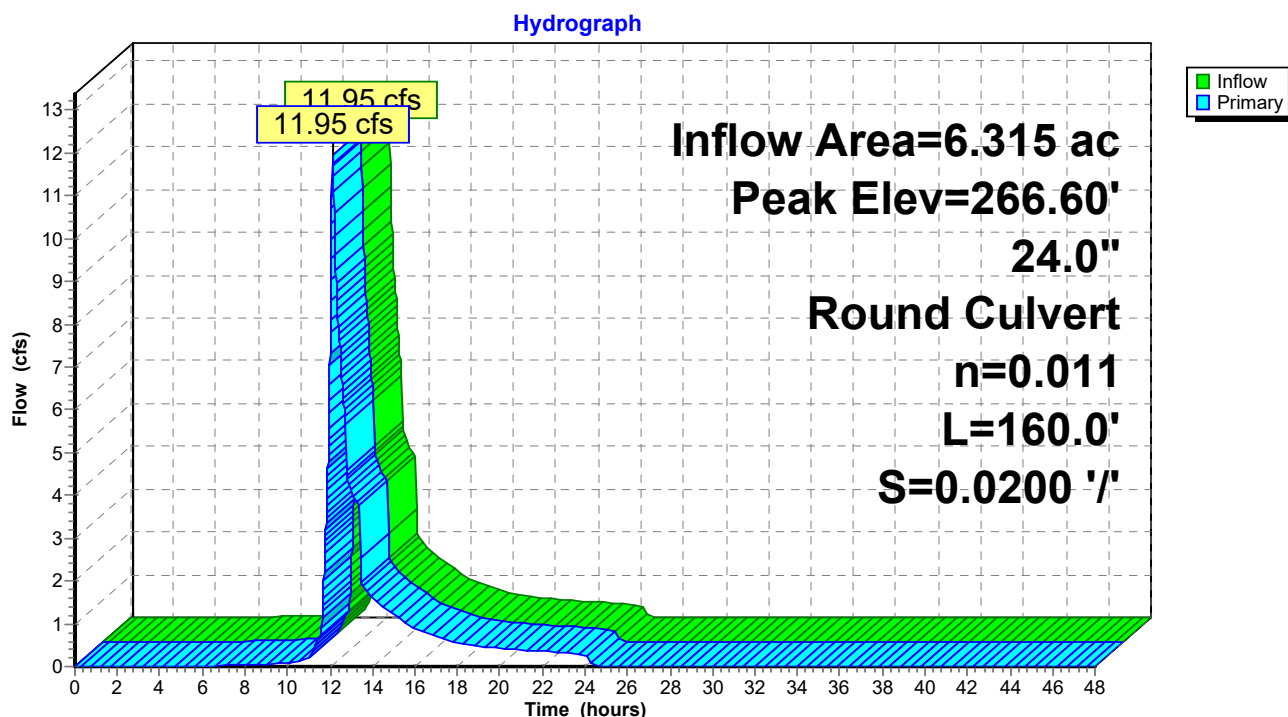
Inflow Area = 6.315 ac, 19.53% Impervious, Inflow Depth = 2.87" for 100-YR event
 Inflow = 11.95 cfs @ 12.12 hrs, Volume= 1.510 af
 Outflow = 11.95 cfs @ 12.12 hrs, Volume= 1.510 af, Atten= 0%, Lag= 0.0 min
 Primary = 11.95 cfs @ 12.12 hrs, Volume= 1.510 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 266.60' @ 12.12 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	264.60'	24.0" Round Culvert L= 160.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 264.60' / 261.40' S= 0.0200 '/ Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=11.94 cfs @ 12.12 hrs HW=266.60' (Free Discharge)
 1=Culvert (Inlet Controls 11.94 cfs @ 3.80 fps)

Pond 20P: (new Pond)



Summary for Pond BS: Bus Station RG

[63] Warning: Exceeded Reach CB1 INLET depth by 0.30' @ 24.72 hrs

Inflow Area = 0.554 ac, 36.99% Impervious, Inflow Depth = 4.85" for 100-YR event
 Inflow = 2.99 cfs @ 12.10 hrs, Volume= 0.224 af
 Outflow = 2.95 cfs @ 12.11 hrs, Volume= 0.180 af, Atten= 1%, Lag= 0.8 min
 Primary = 2.95 cfs @ 12.11 hrs, Volume= 0.180 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 257.63' @ 12.11 hrs Surf.Area= 0 sf Storage= 2,098 cf

Plug-Flow detention time= 125.1 min calculated for 0.180 af (81% of inflow)
 Center-of-Mass det. time= 49.1 min (843.1 - 794.1)

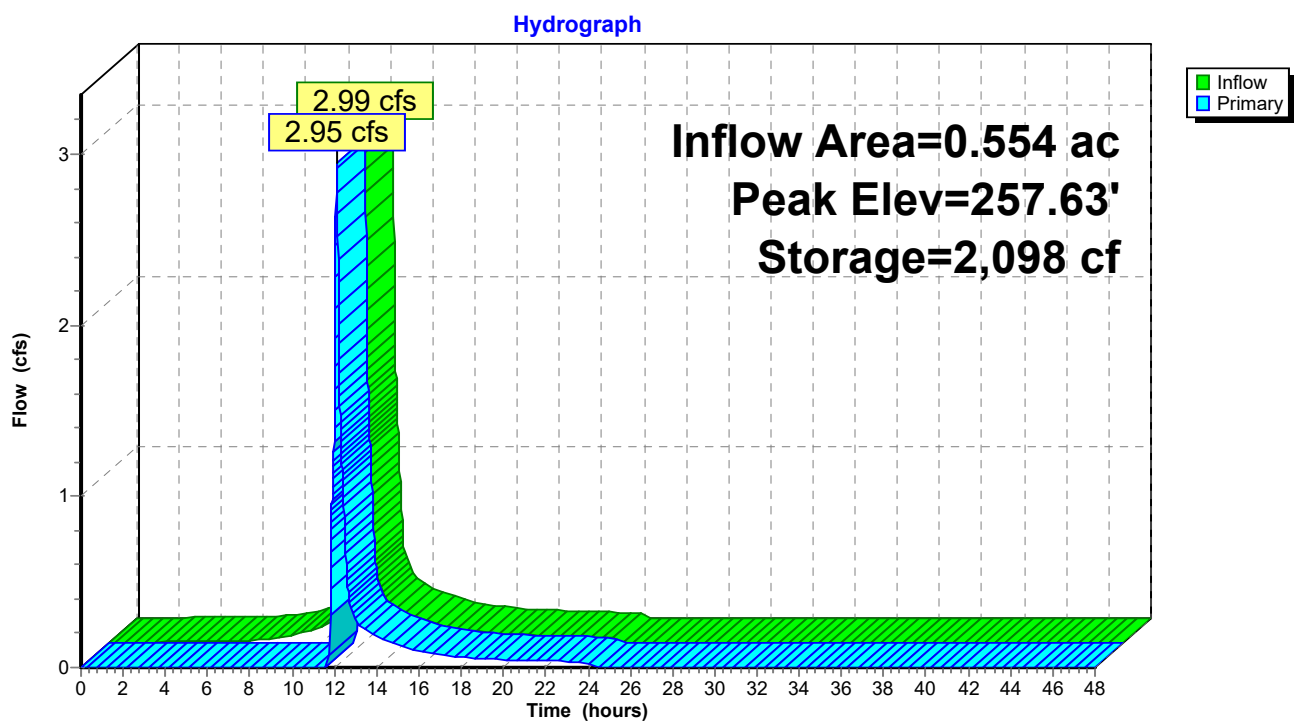
Volume	Invert	Avail.Storage	Storage Description
#1	254.47'	2,201 cf	Custom Stage Data Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
254.47	0	0
254.80	122	122
255.05	92	214
256.05	367	581
256.30	92	673
257.30	1,222	1,895
257.80	306	2,201

Device	Routing	Invert	Outlet Devices
#1	Primary	257.30'	18.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=2.95 cfs @ 12.11 hrs HW=257.63' (Free Discharge)
 ↑1=Orifice/Grate (Weir Controls 2.95 cfs @ 1.88 fps)

Pond BS: Bus Station RG



Summary for Pond CB2: (new Pond)

[57] Hint: Peaked at 262.40' (Flood elevation advised)

Inflow Area = 0.070 ac, 100.00% Impervious, Inflow Depth = 6.56" for 100-YR event
 Inflow = 0.47 cfs @ 12.08 hrs, Volume= 0.038 af
 Outflow = 0.47 cfs @ 12.08 hrs, Volume= 0.038 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.47 cfs @ 12.08 hrs, Volume= 0.038 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 262.40' @ 12.08 hrs

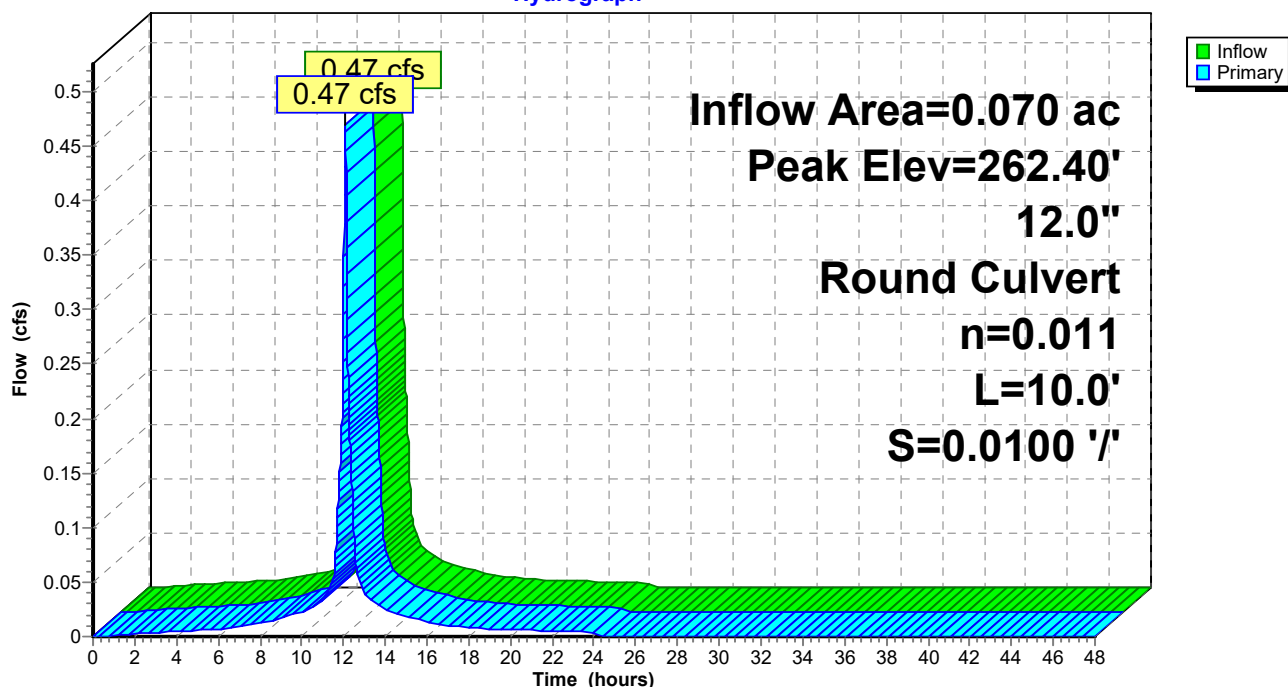
Device	Routing	Invert	Outlet Devices
#1	Primary	262.00'	12.0" Round Culvert L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 262.00' / 261.90' S= 0.0100 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.47 cfs @ 12.08 hrs HW=262.40' (Free Discharge)

↑1=Culvert (Barrel Controls 0.47 cfs @ 2.38 fps)

Pond CB2: (new Pond)

Hydrograph



Summary for Pond CB3: (new Pond)

[57] Hint: Peaked at 277.51' (Flood elevation advised)

Inflow Area = 0.046 ac, 100.00% Impervious, Inflow Depth = 6.56" for 100-YR event
 Inflow = 0.30 cfs @ 12.08 hrs, Volume= 0.025 af
 Outflow = 0.30 cfs @ 12.08 hrs, Volume= 0.025 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.30 cfs @ 12.08 hrs, Volume= 0.025 af

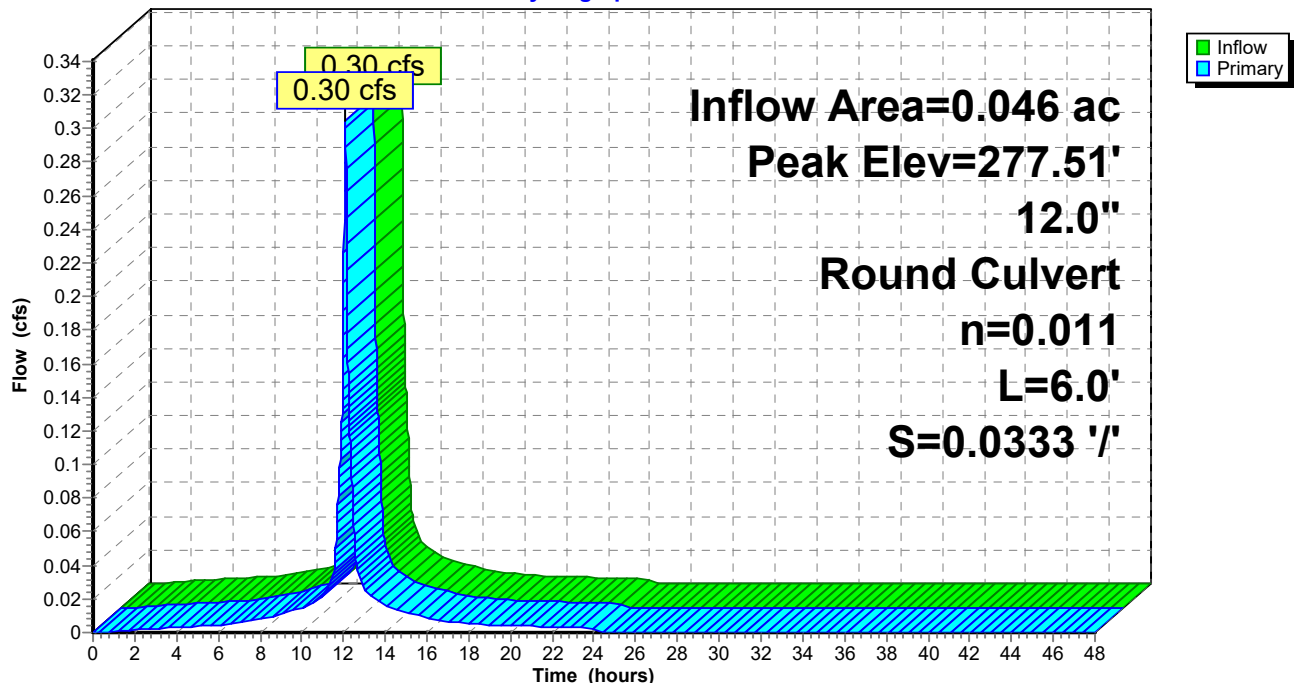
Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 277.51' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	277.20'	12.0" Round Culvert L= 6.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 277.20' / 277.00' S= 0.0333 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.30 cfs @ 12.08 hrs HW=277.51' (Free Discharge)
 ↑1=Culvert (Inlet Controls 0.30 cfs @ 1.49 fps)

Pond CB3: (new Pond)

Hydrograph



Summary for Pond CB4: (new Pond)

[57] Hint: Peaked at 294.27' (Flood elevation advised)

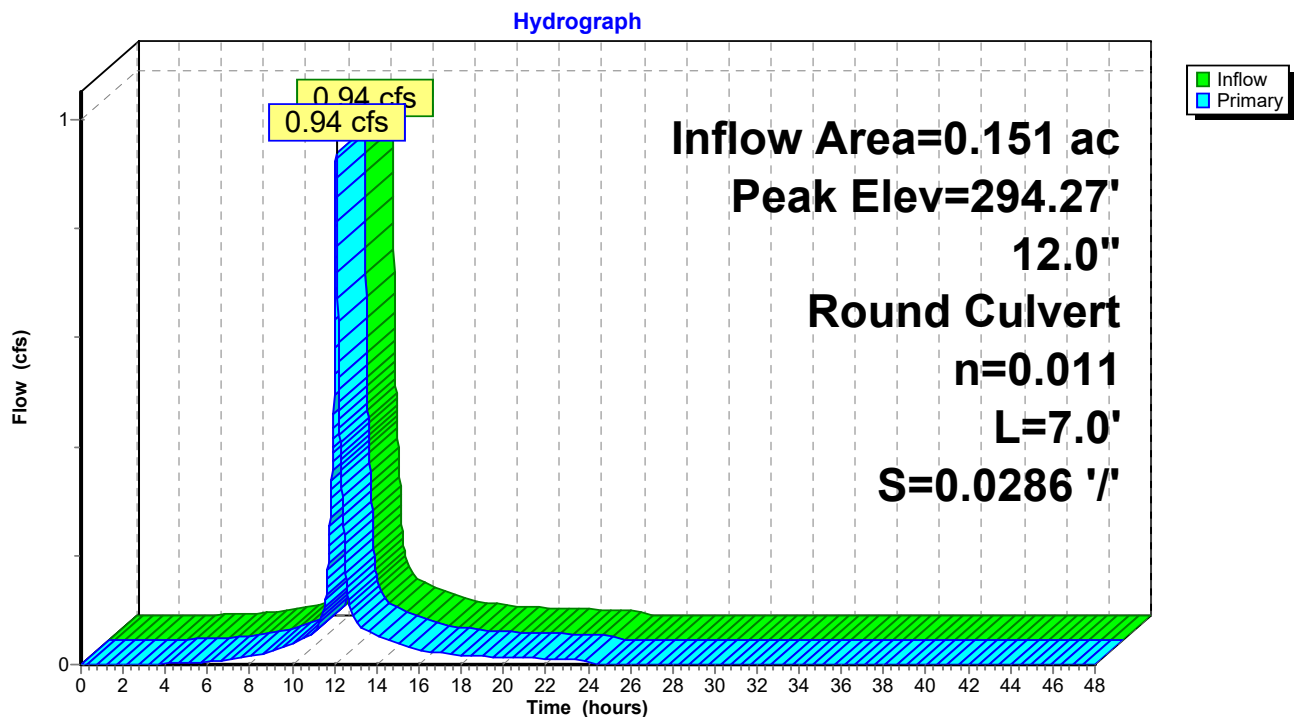
Inflow Area = 0.151 ac, 79.05% Impervious, Inflow Depth = 5.63" for 100-YR event
 Inflow = 0.94 cfs @ 12.08 hrs, Volume= 0.071 af
 Outflow = 0.94 cfs @ 12.08 hrs, Volume= 0.071 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.94 cfs @ 12.08 hrs, Volume= 0.071 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 294.27' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	293.70'	12.0" Round Culvert L= 7.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 293.70' / 293.50' S= 0.0286 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=0.94 cfs @ 12.08 hrs HW=294.27' (Free Discharge)
 ↑1=Culvert (Inlet Controls 0.94 cfs @ 2.03 fps)

Pond CB4: (new Pond)



Summary for Pond CB5: (new Pond)

[57] Hint: Peaked at 294.69' (Flood elevation advised)

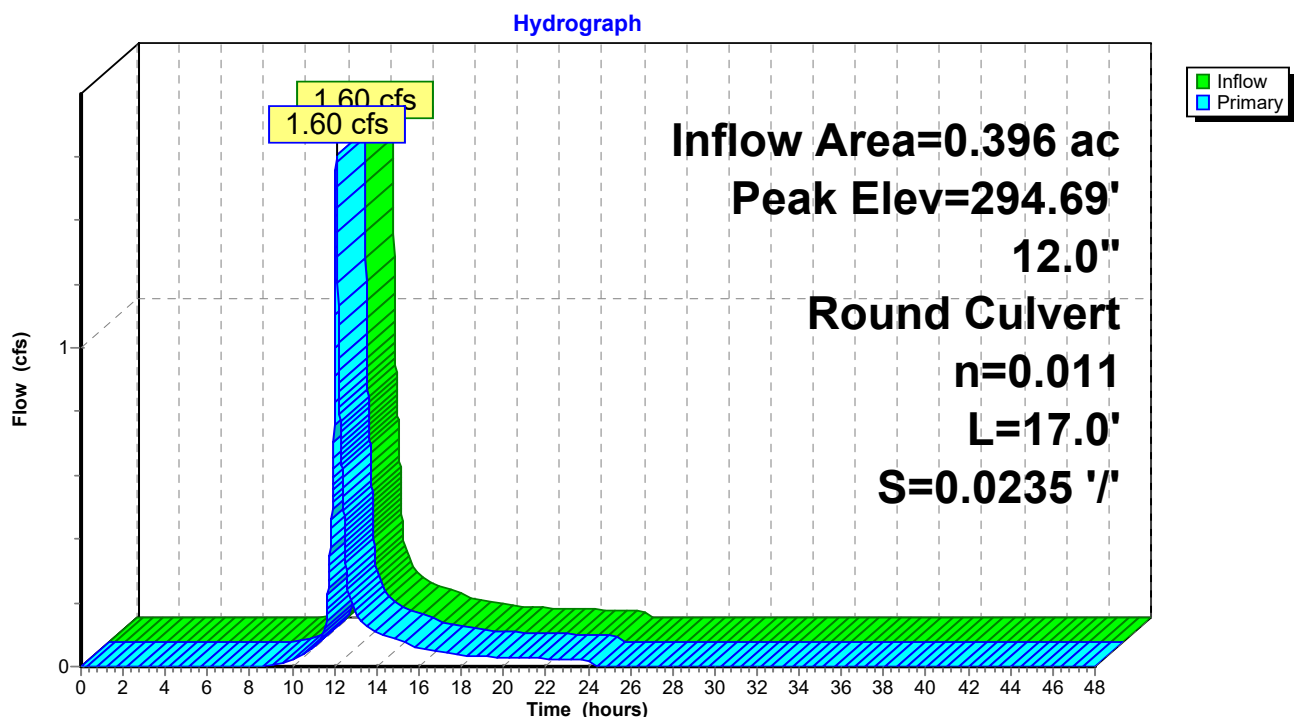
Inflow Area = 0.396 ac, 24.31% Impervious, Inflow Depth = 3.45" for 100-YR event
 Inflow = 1.60 cfs @ 12.09 hrs, Volume= 0.114 af
 Outflow = 1.60 cfs @ 12.09 hrs, Volume= 0.114 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.60 cfs @ 12.09 hrs, Volume= 0.114 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 294.69' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	293.90'	12.0" Round Culvert L= 17.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 293.90' / 293.50' S= 0.0235 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf

Primary OutFlow Max=1.60 cfs @ 12.09 hrs HW=294.69' (Free Discharge)
 1=Culvert (Inlet Controls 1.60 cfs @ 2.39 fps)

Pond CB5: (new Pond)



Summary for Pond CULdeSAC: Cul-de-sac

[58] Hint: Peaked 0.14' above defined flood level

Inflow Area = 0.243 ac, 29.57% Impervious, Inflow Depth = 3.66" for 100-YR event
 Inflow = 1.04 cfs @ 12.09 hrs, Volume= 0.074 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 300.14' @ 24.34 hrs Surf.Area= 0 sf Storage= 3,230 cf
 Flood Elev= 300.00' Surf.Area= 0 sf Storage= 2,622 cf

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

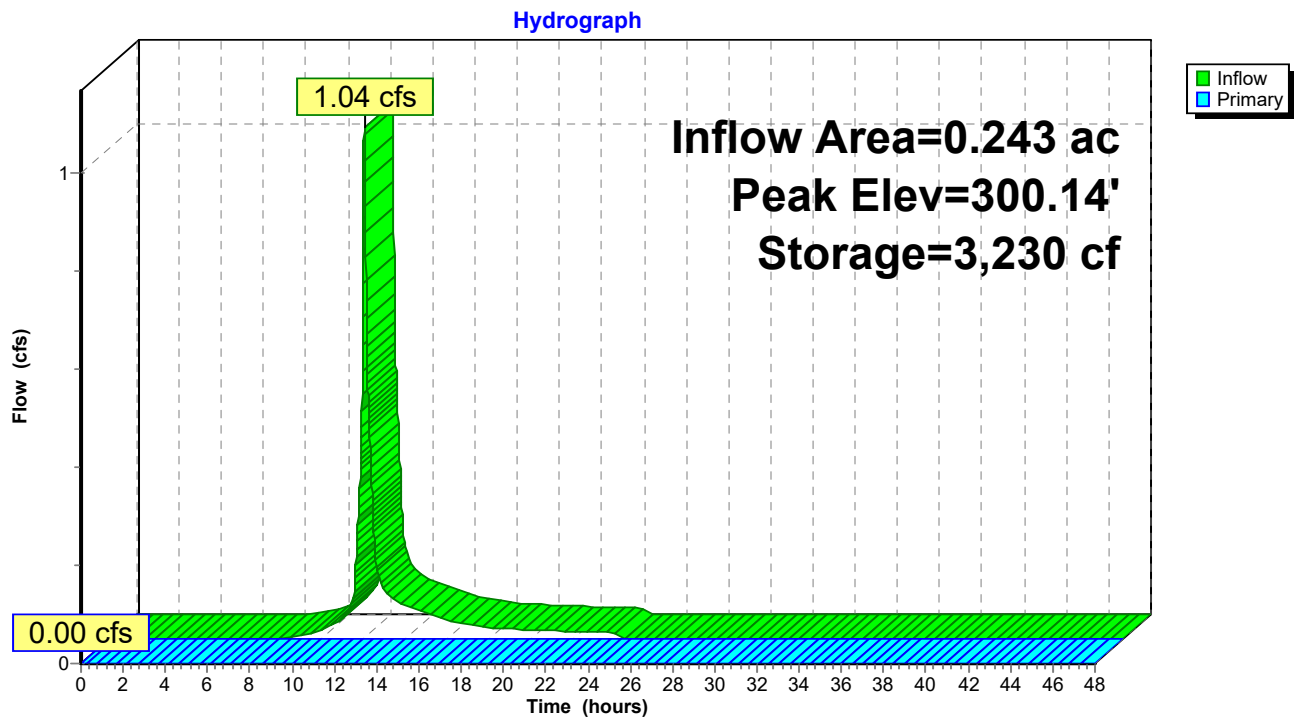
Volume	Invert	Avail.Storage	Storage Description
#1	297.92'	4,394 cf	Custom Stage Data Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
297.92	0	0
298.25	283	283
298.50	213	496
299.50	850	1,346
299.75	213	1,559
300.25	2,126	3,685
300.50	709	4,394

Device	Routing	Invert	Outlet Devices
#1	Primary	300.25'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=297.92' (Free Discharge)
 ↑1=Orifice/Grate (Controls 0.00 cfs)

Pond CULdeSAC: Cul-de-sac



Summary for Pond MH1: (new Pond)

[57] Hint: Peaked at 262.99' (Flood elevation advised)
 [79] Warning: Submerged Pond 20P Primary device # 1 OUTLET by 1.59'
 [81] Warning: Exceeded Pond CB2 by 0.63' @ 12.16 hrs

Inflow Area = 6.385 ac, 20.41% Impervious, Inflow Depth = 2.91" for 100-YR event
 Inflow = 12.38 cfs @ 12.12 hrs, Volume= 1.549 af
 Outflow = 12.38 cfs @ 12.12 hrs, Volume= 1.549 af, Atten= 0%, Lag= 0.0 min
 Primary = 12.38 cfs @ 12.12 hrs, Volume= 1.549 af

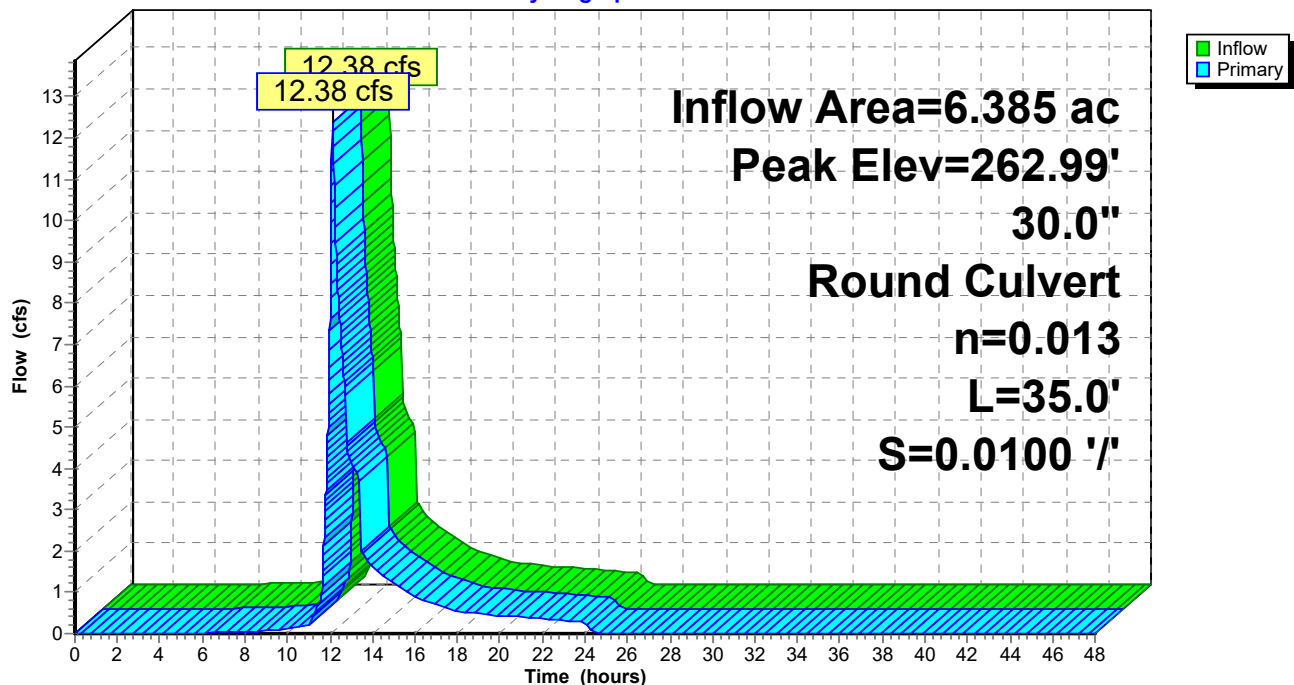
Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 262.99' @ 12.12 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	261.30'	30.0" Round Culvert L= 35.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 261.30' / 260.95' S= 0.0100 '/ Cc= 0.900 n= 0.013, Flow Area= 4.91 sf

Primary OutFlow Max=12.36 cfs @ 12.12 hrs HW=262.99' (Free Discharge)
 1=Culvert (Barrel Controls 12.36 cfs @ 4.96 fps)

Pond MH1: (new Pond)

Hydrograph



Summary for Pond MH2: (new Pond)

[57] Hint: Peaked at 272.50' (Flood elevation advised)

Inflow Area = 6.315 ac, 19.53% Impervious, Inflow Depth = 2.87" for 100-YR event
 Inflow = 11.95 cfs @ 12.12 hrs, Volume= 1.510 af
 Outflow = 11.95 cfs @ 12.12 hrs, Volume= 1.510 af, Atten= 0%, Lag= 0.0 min
 Primary = 11.95 cfs @ 12.12 hrs, Volume= 1.510 af

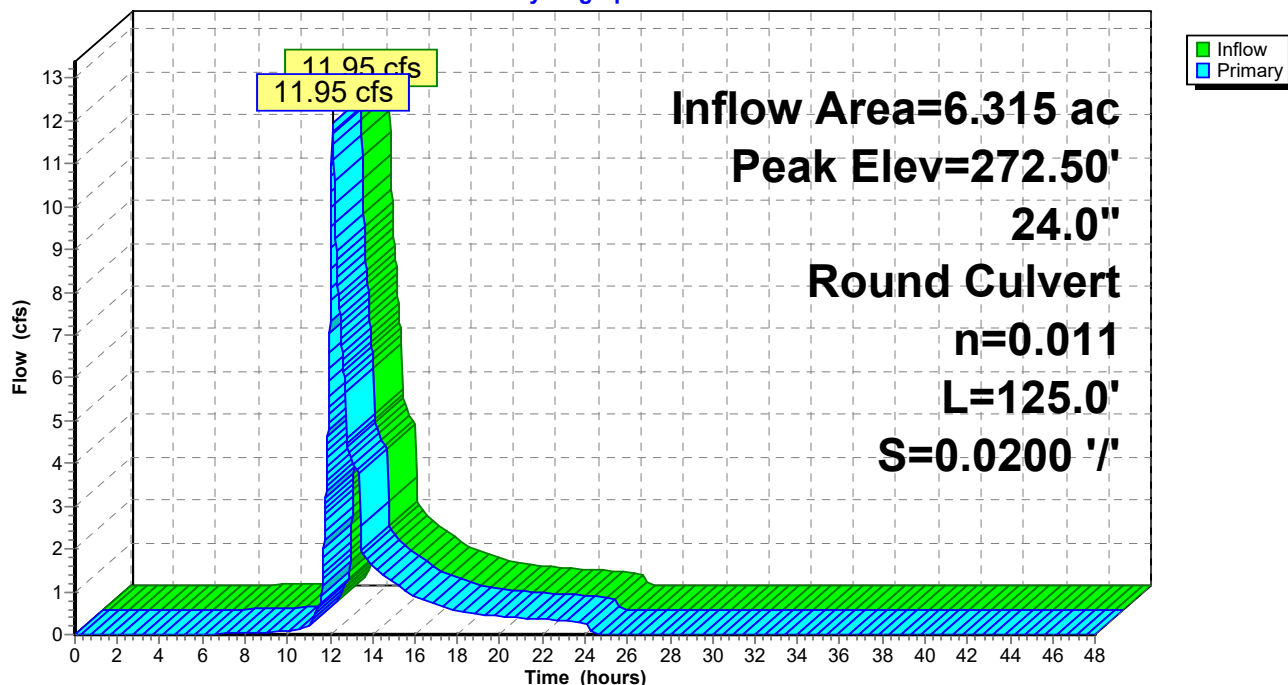
Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 272.50' @ 12.12 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	270.50'	24.0" Round Culvert L= 125.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 270.50' / 268.00' S= 0.0200 '/ Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=11.94 cfs @ 12.12 hrs HW=272.50' (Free Discharge)
 1=Culvert (Inlet Controls 11.94 cfs @ 3.80 fps)

Pond MH2: (new Pond)

Hydrograph



Summary for Pond MH3: (new Pond)

[57] Hint: Peaked at 290.81' (Flood elevation advised)

Inflow Area = 5.776 ac, 17.87% Impervious, Inflow Depth = 2.84" for 100-YR event
 Inflow = 10.39 cfs @ 12.12 hrs, Volume= 1.367 af
 Outflow = 10.39 cfs @ 12.12 hrs, Volume= 1.367 af, Atten= 0%, Lag= 0.0 min
 Primary = 10.39 cfs @ 12.12 hrs, Volume= 1.367 af

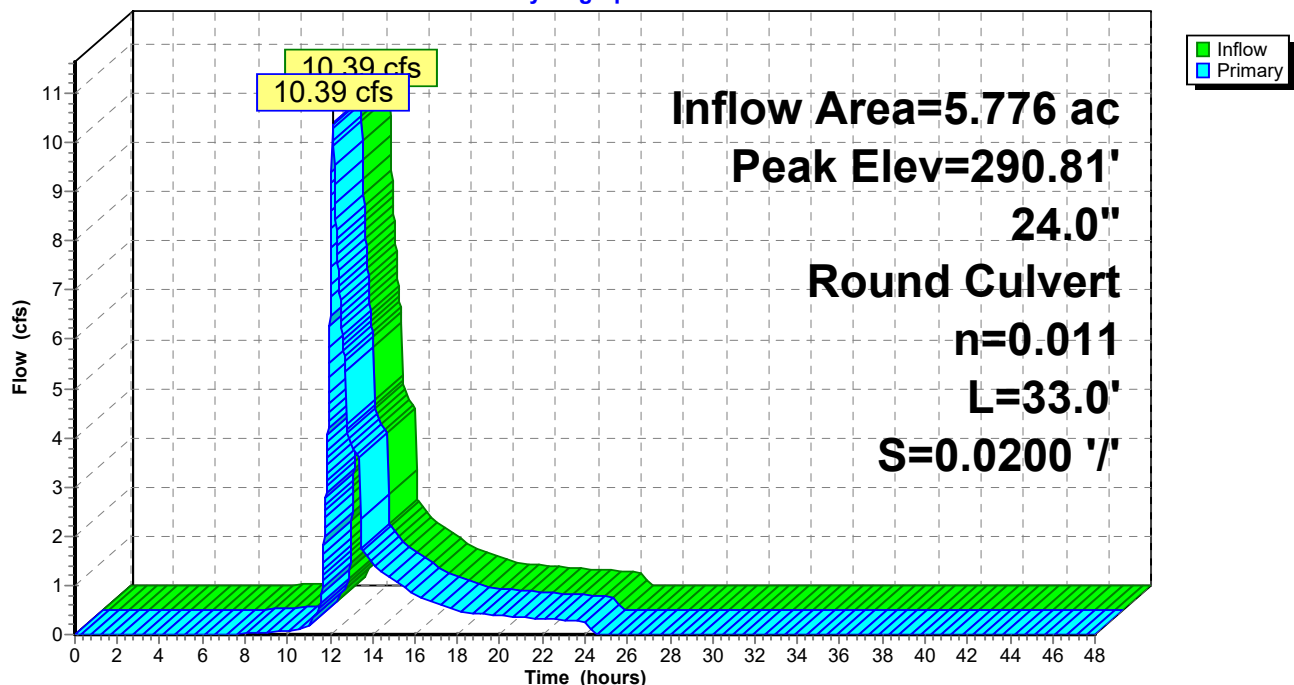
Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 290.81' @ 12.12 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	289.06'	24.0" Round Culvert L= 33.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 289.06' / 288.40' S= 0.0200 '/ Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf

Primary OutFlow Max=10.38 cfs @ 12.12 hrs HW=290.81' (Free Discharge)
 ↑1=Culvert (Inlet Controls 10.38 cfs @ 3.56 fps)

Pond MH3: (new Pond)

Hydrograph



Summary for Pond MH4:

[57] Hint: Peaked at 300.25' (Flood elevation advised)

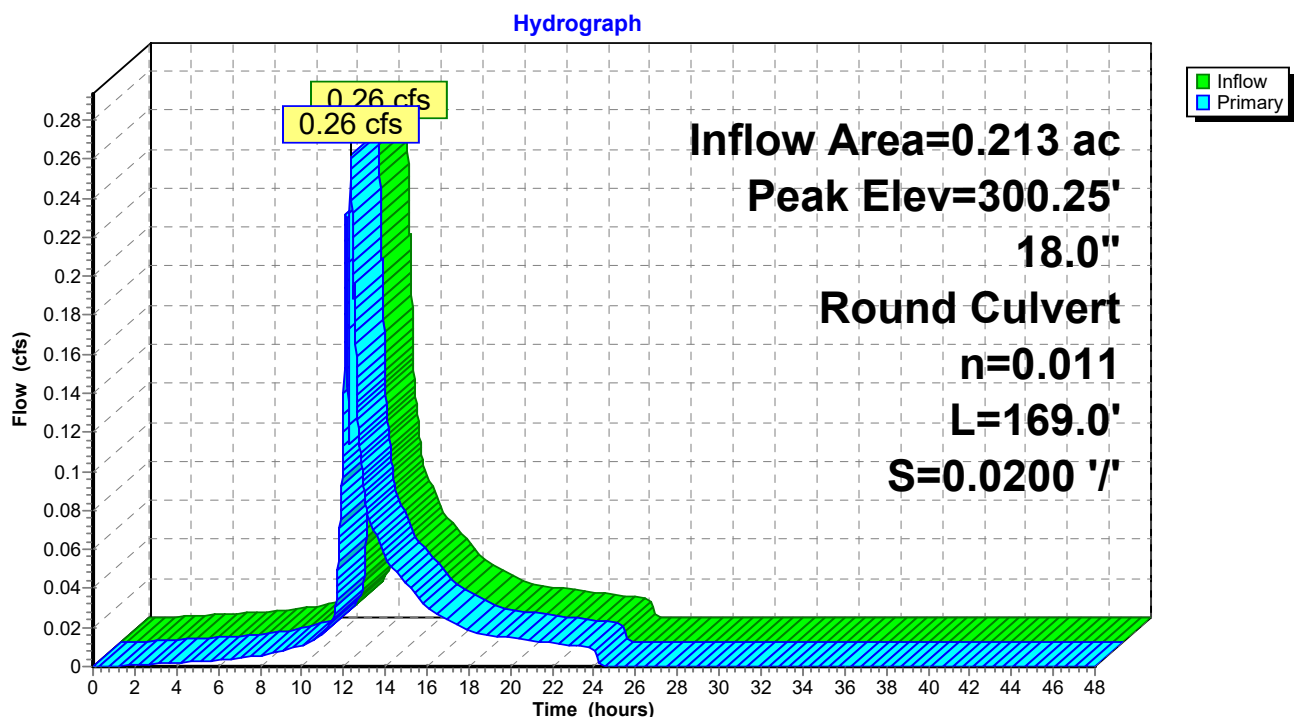
Inflow Area = 0.213 ac, 50.94% Impervious, Inflow Depth = 2.48" for 100-YR event
 Inflow = 0.26 cfs @ 12.34 hrs, Volume= 0.044 af
 Outflow = 0.26 cfs @ 12.34 hrs, Volume= 0.044 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.26 cfs @ 12.34 hrs, Volume= 0.044 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 300.25' @ 12.34 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	300.00'	18.0" Round Culvert L= 169.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 300.00' / 296.62' S= 0.0200 '/ Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=0.26 cfs @ 12.34 hrs HW=300.25' (Free Discharge)
 ↑1=Culvert (Inlet Controls 0.26 cfs @ 1.35 fps)

Pond MH4:



Summary for Pond MH5:

[57] Hint: Peaked at 301.34' (Flood elevation advised)

[63] Warning: Exceeded Reach 13R INLET depth by 0.04' @ 12.11 hrs

Inflow Area = 0.071 ac, 65.39% Impervious, Inflow Depth = 3.21" for 100-YR event
 Inflow = 0.23 cfs @ 12.11 hrs, Volume= 0.019 af
 Outflow = 0.23 cfs @ 12.11 hrs, Volume= 0.019 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.23 cfs @ 12.11 hrs, Volume= 0.019 af

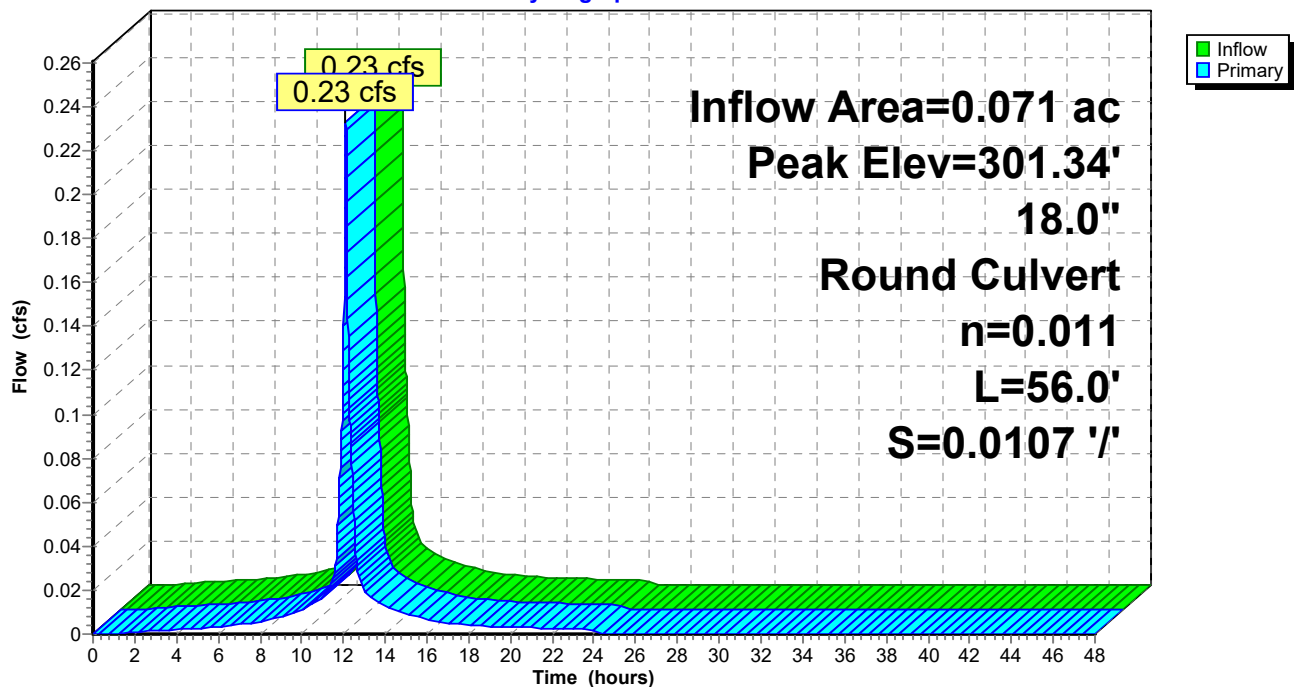
Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 301.34' @ 12.11 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	301.10'	18.0" Round Culvert L= 56.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 301.10' / 300.50' S= 0.0107 '/ Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=0.23 cfs @ 12.11 hrs HW=301.34' (Free Discharge)
 1=Culvert (Inlet Controls 0.23 cfs @ 1.31 fps)

Pond MH5:

Hydrograph



Summary for Pond MH6: CB6

[57] Hint: Peaked at 294.11' (Flood elevation advised)

Inflow Area = 4.513 ac, 14.39% Impervious, Inflow Depth = 2.67" for 100-YR event
 Inflow = 5.69 cfs @ 12.11 hrs, Volume= 1.005 af
 Outflow = 5.69 cfs @ 12.11 hrs, Volume= 1.005 af, Atten= 0%, Lag= 0.0 min
 Primary = 5.69 cfs @ 12.11 hrs, Volume= 1.005 af

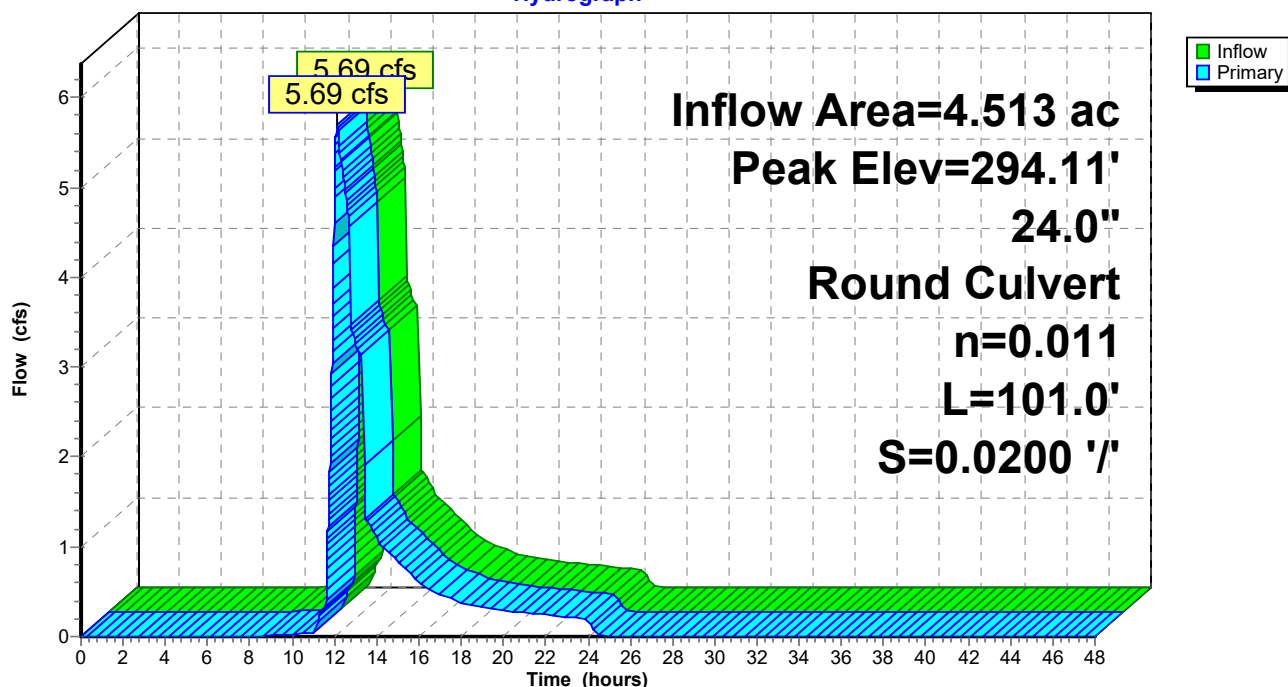
Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 294.11' @ 12.11 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	292.92'	24.0" Round Culvert L= 101.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 292.92' / 290.90' S= 0.0200 '/ Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=5.69 cfs @ 12.11 hrs HW=294.11' (Free Discharge)
 1=Culvert (Inlet Controls 5.69 cfs @ 2.93 fps)

Pond MH6: CB6

Hydrograph



Summary for Pond RG10:

[63] Warning: Exceeded Reach 15R INLET depth by 4.55' @ 24.44 hrs

Inflow Area = 0.091 ac, 45.76% Impervious, Inflow Depth = 3.55" for 100-YR event
 Inflow = 0.44 cfs @ 12.10 hrs, Volume= 0.027 af
 Outflow = 0.17 cfs @ 12.35 hrs, Volume= 0.017 af, Atten= 61%, Lag= 15.1 min
 Primary = 0.17 cfs @ 12.35 hrs, Volume= 0.017 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 306.92' @ 12.35 hrs Surf.Area= 0 sf Storage= 447 cf

Plug-Flow detention time= 184.7 min calculated for 0.017 af (64% of inflow)
 Center-of-Mass det. time= 76.7 min (920.1 - 843.4)

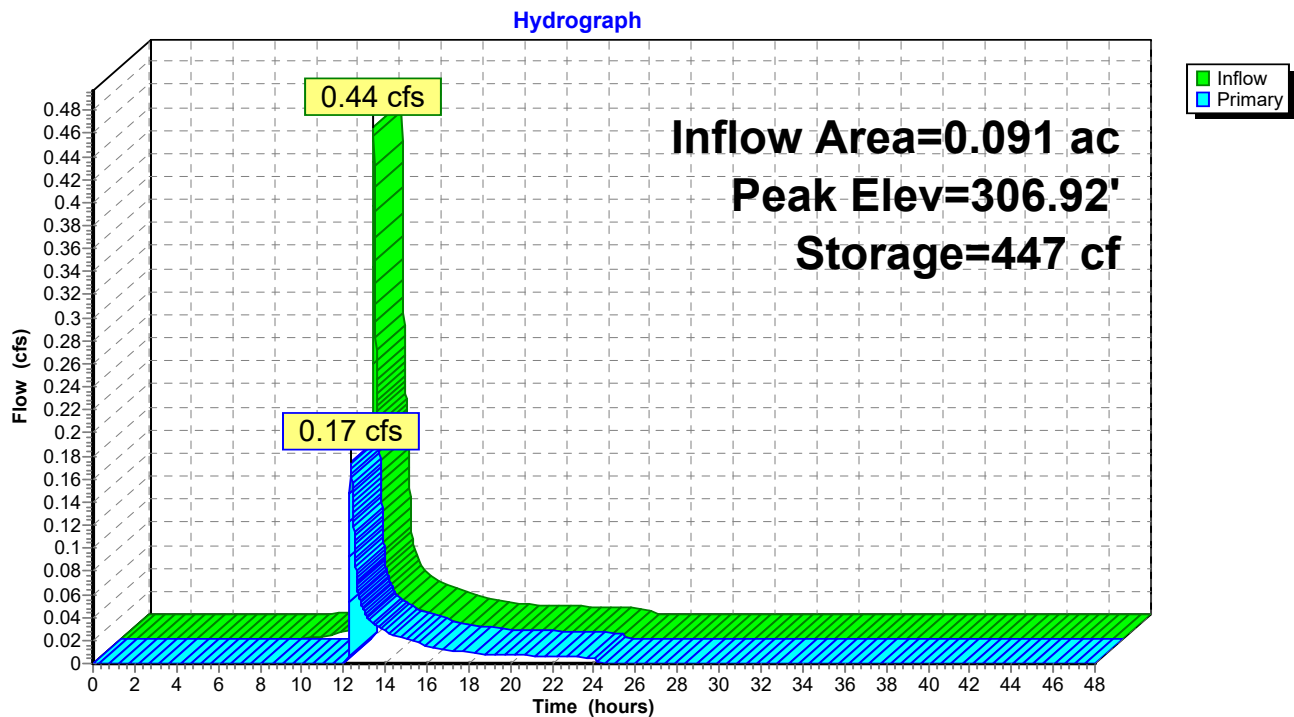
Volume	Invert	Avail.Storage	Storage Description
#1	303.77'	509 cf	Custom Stage Data Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
303.77	0	0
303.85	8	8
304.10	25	33
306.10	200	233
306.35	25	258
306.85	167	425
307.10	84	509

Device	Routing	Invert	Outlet Devices
#1	Primary	306.85'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.17 cfs @ 12.35 hrs HW=306.92' (Free Discharge)
 ↑1=Orifice/Grate (Weir Controls 0.17 cfs @ 0.83 fps)

Pond RG10:



Summary for Pond RG11:

Inflow Area = 0.043 ac, 62.65% Impervious, Inflow Depth = 4.95" for 100-YR event
 Inflow = 0.24 cfs @ 12.09 hrs, Volume= 0.018 af
 Outflow = 0.24 cfs @ 12.10 hrs, Volume= 0.012 af, Atten= 2%, Lag= 0.9 min
 Primary = 0.24 cfs @ 12.10 hrs, Volume= 0.012 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 306.93' @ 12.10 hrs Surf.Area= 0 sf Storage= 250 cf

Plug-Flow detention time= 156.5 min calculated for 0.012 af (69% of inflow)
 Center-of-Mass det. time= 63.2 min (862.0 - 798.9)

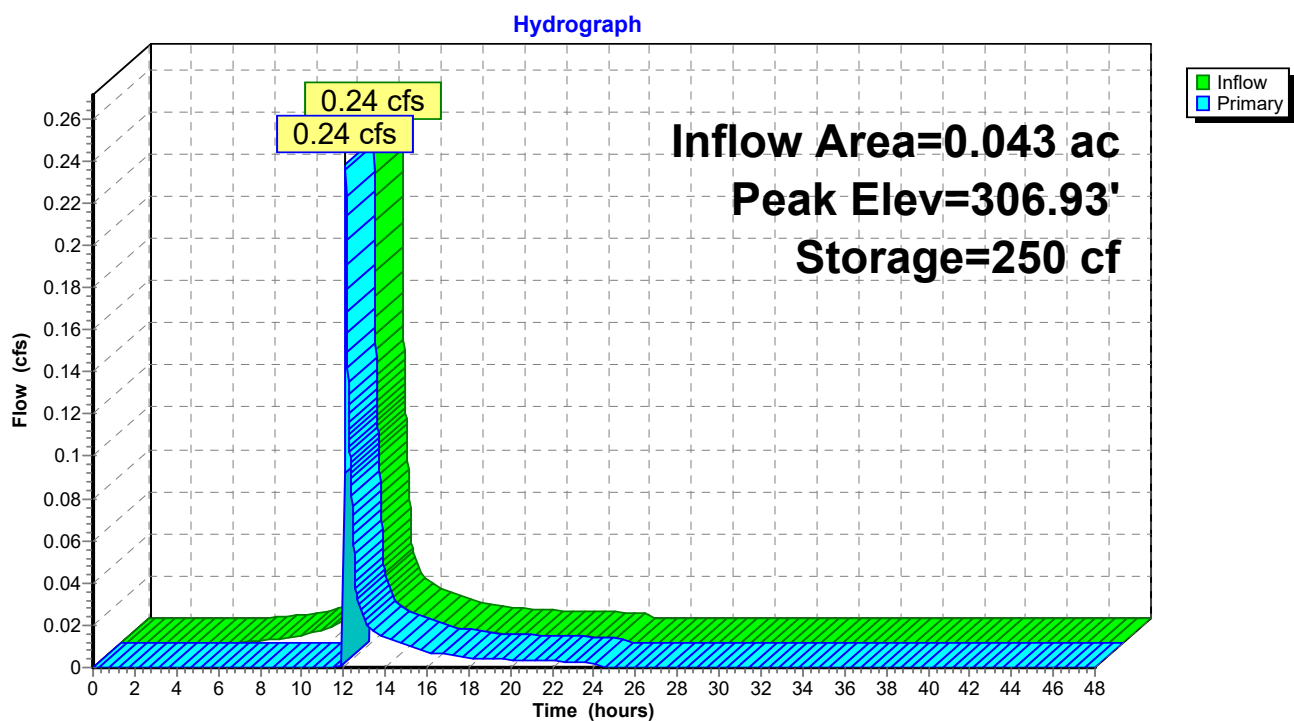
Volume	Invert	Avail.Storage	Storage Description
#1	303.77'	281 cf	Custom Stage Data Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
303.77	0	0
303.85	5	5
304.10	14	19
306.10	110	129
306.35	14	143
306.85	92	235
307.10	46	281

Device	Routing	Invert	Outlet Devices
#1	Primary	306.85'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.24 cfs @ 12.10 hrs HW=306.93' (Free Discharge)
 ↑1=Orifice/Grate (Weir Controls 0.24 cfs @ 0.93 fps)

Pond RG11:



Summary for Pond RG12:

[62] Hint: Exceeded Reach PS3 OUTLET depth by 1.27' @ 0.00 hrs

Inflow Area = 0.213 ac, 23.47% Impervious, Inflow Depth = 3.45" for 100-YR event
 Inflow = 0.86 cfs @ 12.10 hrs, Volume= 0.061 af
 Outflow = 0.86 cfs @ 12.10 hrs, Volume= 0.061 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.86 cfs @ 12.10 hrs, Volume= 0.061 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 310.29' @ 12.10 hrs Surf.Area= 0 sf Storage= 1 cf

Plug-Flow detention time= 0.0 min calculated for 0.061 af (100% of inflow)
 Center-of-Mass det. time= 0.0 min (833.2 - 833.2)

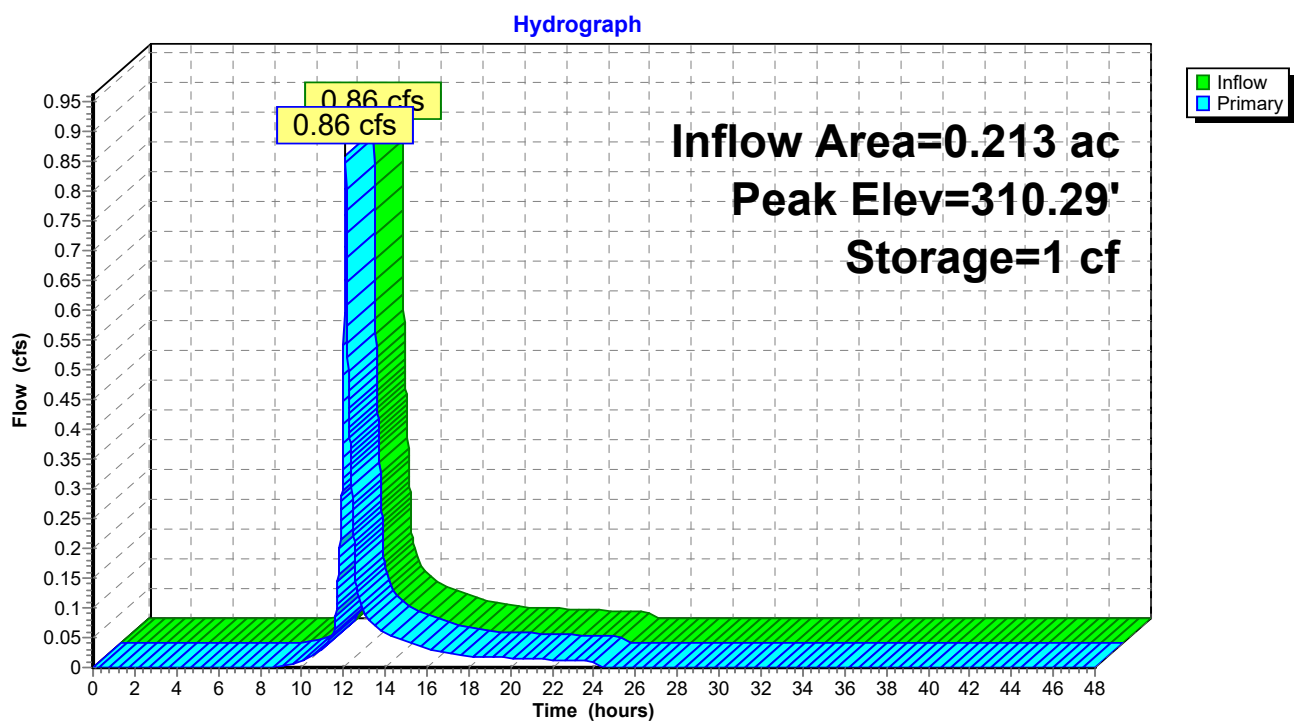
Volume	Invert	Avail.Storage	Storage Description
#1	310.27'	760 cf	Custom Stage Data Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
310.27	0	0
310.60	15	15
310.85	44	59
312.10	219	278
312.35	44	322
312.85	292	614
313.10	146	760

Device	Routing	Invert	Outlet Devices
#1	Primary	309.75'	12.0" Horiz. Orifice/Grate X 0.50 C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.39 cfs @ 12.10 hrs HW=310.29' (Free Discharge)
 ↑1=Orifice/Grate (Orifice Controls 1.39 cfs @ 1.76 fps)

Pond RG12:



Summary for Pond RG13:

[63] Warning: Exceeded Reach PS4 INLET depth by 0.95' @ 24.37 hrs

Inflow Area = 0.099 ac, 53.64% Impervious, Inflow Depth = 4.62" for 100-YR event
 Inflow = 0.53 cfs @ 12.09 hrs, Volume= 0.038 af
 Outflow = 0.38 cfs @ 12.17 hrs, Volume= 0.024 af, Atten= 27%, Lag= 4.6 min
 Primary = 0.38 cfs @ 12.17 hrs, Volume= 0.024 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 308.06' @ 12.17 hrs Surf.Area= 0 sf Storage= 648 cf

Plug-Flow detention time= 177.0 min calculated for 0.024 af (64% of inflow)
 Center-of-Mass det. time= 75.9 min (883.5 - 807.5)

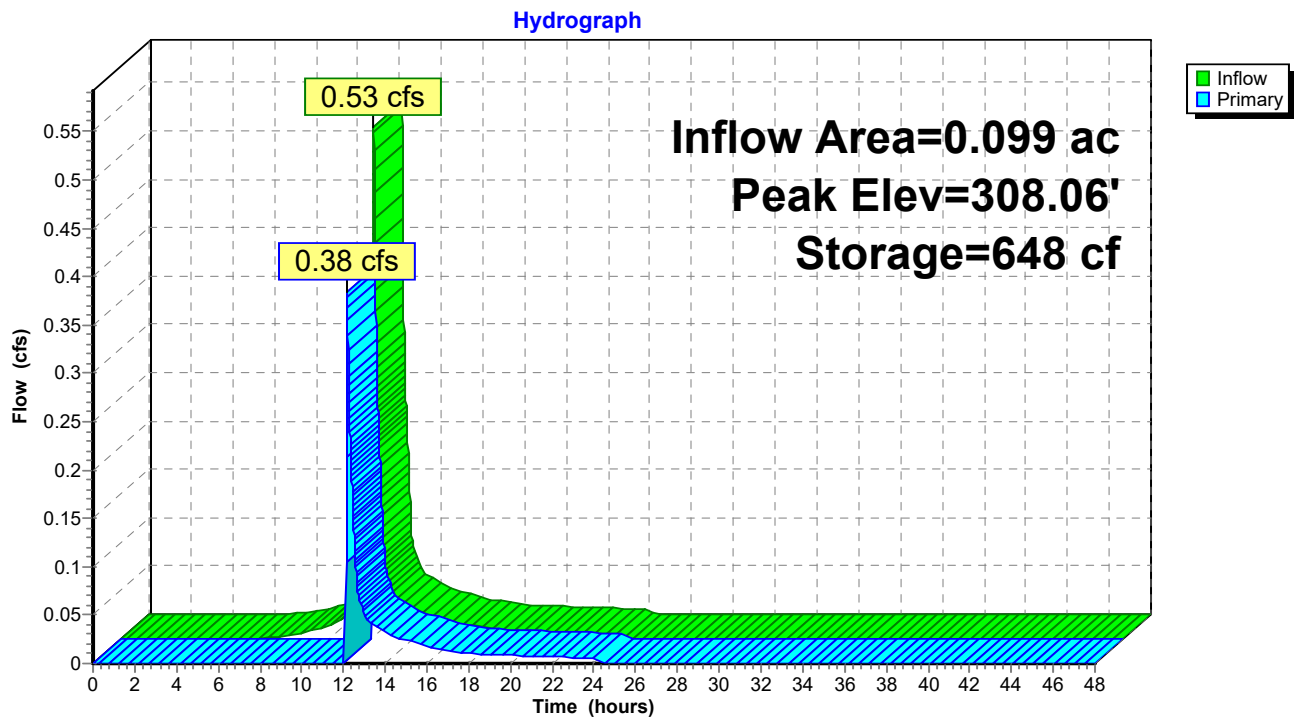
Volume	Invert	Avail.Storage	Storage Description
#1	304.29'	706 cf	Custom Stage Data Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
304.29	0	0
304.62	42	42
304.87	31	73
307.20	290	363
307.45	31	394
307.95	208	602
308.20	104	706

Device	Routing	Invert	Outlet Devices
#1	Primary	307.95'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.38 cfs @ 12.17 hrs HW=308.06' (Free Discharge)
 ↑1=Orifice/Grate (Weir Controls 0.38 cfs @ 1.09 fps)

Pond RG13:



Summary for Pond RG14:

Inflow Area = 0.054 ac, 64.02% Impervious, Inflow Depth = 5.06" for 100-YR event
 Inflow = 0.31 cfs @ 12.09 hrs, Volume= 0.023 af
 Outflow = 0.31 cfs @ 12.10 hrs, Volume= 0.018 af, Atten= 1%, Lag= 0.7 min
 Primary = 0.31 cfs @ 12.10 hrs, Volume= 0.018 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 305.05' @ 12.10 hrs Surf.Area= 0 sf Storage= 240 cf

Plug-Flow detention time= 128.0 min calculated for 0.018 af (78% of inflow)
 Center-of-Mass det. time= 48.4 min (844.5 - 796.1)

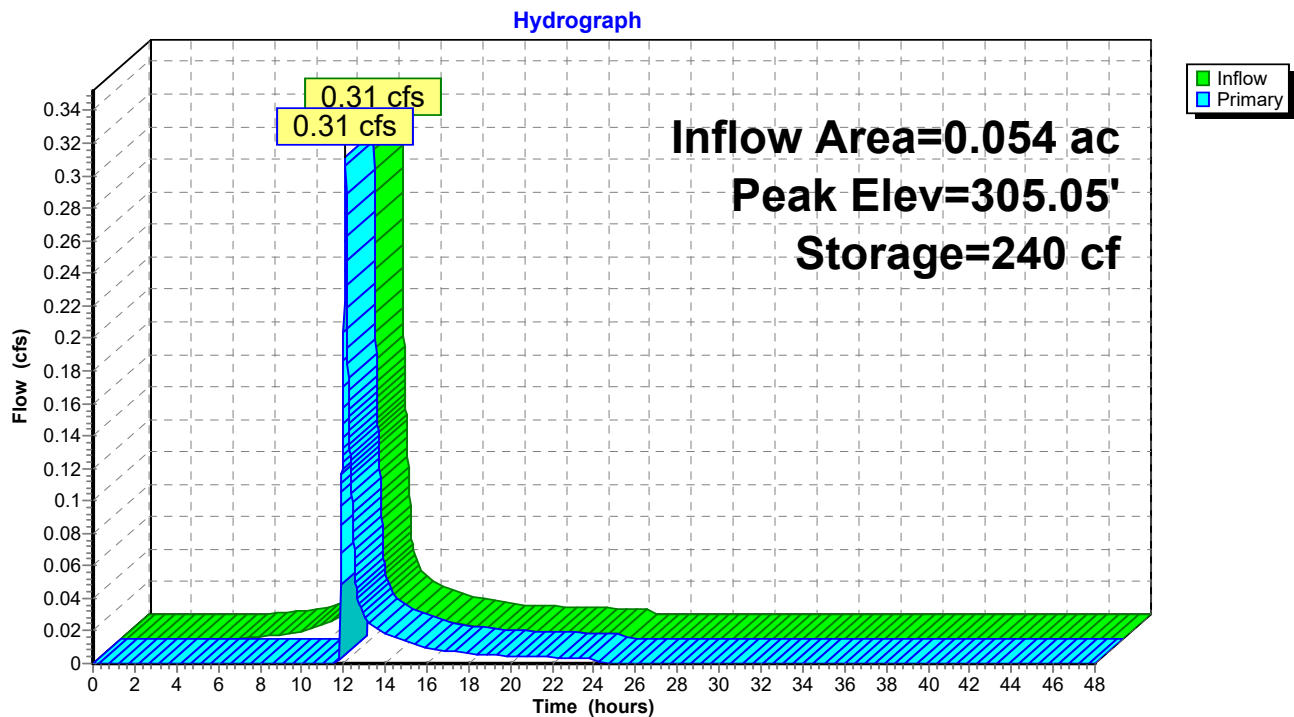
Volume	Invert	Avail.Storage	Storage Description
#1	302.54'	272 cf	Custom Stage Data Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
302.54	0	0
302.62	5	5
302.87	15	20
304.20	82	102
304.45	15	117
304.95	103	220
305.20	52	272

Device	Routing	Invert	Outlet Devices
#1	Primary	304.95'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.31 cfs @ 12.10 hrs HW=305.05' (Free Discharge)
 ↑1=Orifice/Grate (Weir Controls 0.31 cfs @ 1.02 fps)

Pond RG14:



Summary for Pond RG15:

[93] Warning: Storage range exceeded by 0.15'
 [88] Warning: Qout>Qin may require Finer Routing>1
 [61] Hint: Exceeded Reach 10R outlet invert by 3.21' @ 12.09 hrs

Inflow Area = 1.015 ac, 19.57% Impervious, Inflow Depth = 3.25" for 100-YR event
 Inflow = 3.85 cfs @ 12.09 hrs, Volume= 0.275 af
 Outflow = 3.90 cfs @ 12.09 hrs, Volume= 0.265 af, Atten= 0%, Lag= 0.0 min
 Primary = 3.90 cfs @ 12.09 hrs, Volume= 0.265 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 301.15' @ 12.09 hrs Surf.Area= 0 sf Storage= 524 cf

Plug-Flow detention time= 29.1 min calculated for 0.265 af (96% of inflow)
 Center-of-Mass det. time= 8.9 min (845.6 - 836.7)

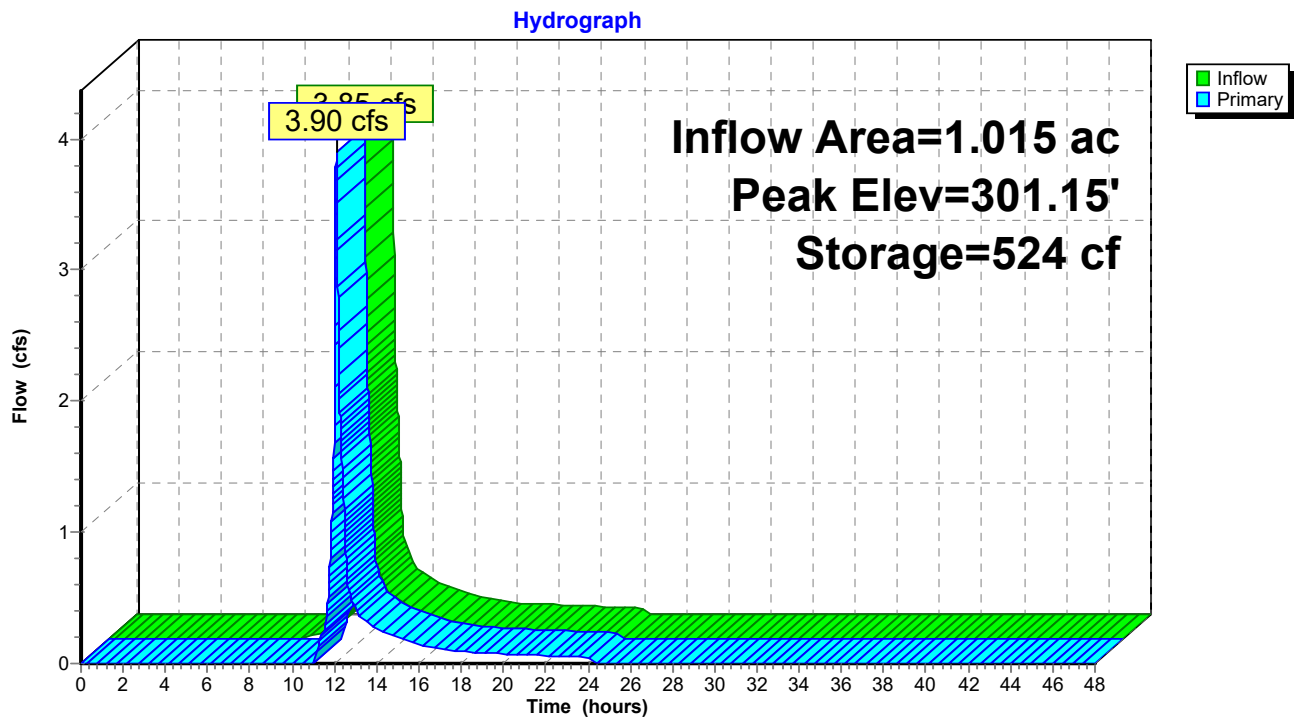
Volume	Invert	Avail.Storage	Storage Description
#1	298.00'	524 cf	Custom Stage Data Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
298.00	0	0
299.00	110	110
300.00	110	220
300.25	28	248
300.75	184	432
301.00	92	524

Device	Routing	Invert	Outlet Devices
#1	Primary	300.75'	18.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=3.90 cfs @ 12.09 hrs HW=301.15' (Free Discharge)
 ↑1=Orifice/Grate (Weir Controls 3.90 cfs @ 2.07 fps)

Pond RG15:



Summary for Pond RG16:

[93] Warning: Storage range exceeded by 0.39'
 [88] Warning: Qout>Qin may require Finer Routing>1
 [61] Hint: Exceeded Reach PS1 outlet invert by 0.39' @ 12.18 hrs
 [62] Hint: Exceeded Reach PS2 OUTLET depth by 0.23' @ 12.20 hrs

Inflow Area = 2.675 ac, 4.94% Impervious, Inflow Depth = 2.75" for 100-YR event
 Inflow = 6.75 cfs @ 12.18 hrs, Volume= 0.612 af
 Outflow = 6.80 cfs @ 12.18 hrs, Volume= 0.592 af, Atten= 0%, Lag= 0.0 min
 Primary = 6.80 cfs @ 12.18 hrs, Volume= 0.592 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 301.39' @ 12.18 hrs Surf.Area= 0 sf Storage= 1,017 cf

Plug-Flow detention time= 25.9 min calculated for 0.592 af (97% of inflow)
 Center-of-Mass det. time= 7.8 min (862.8 - 855.0)

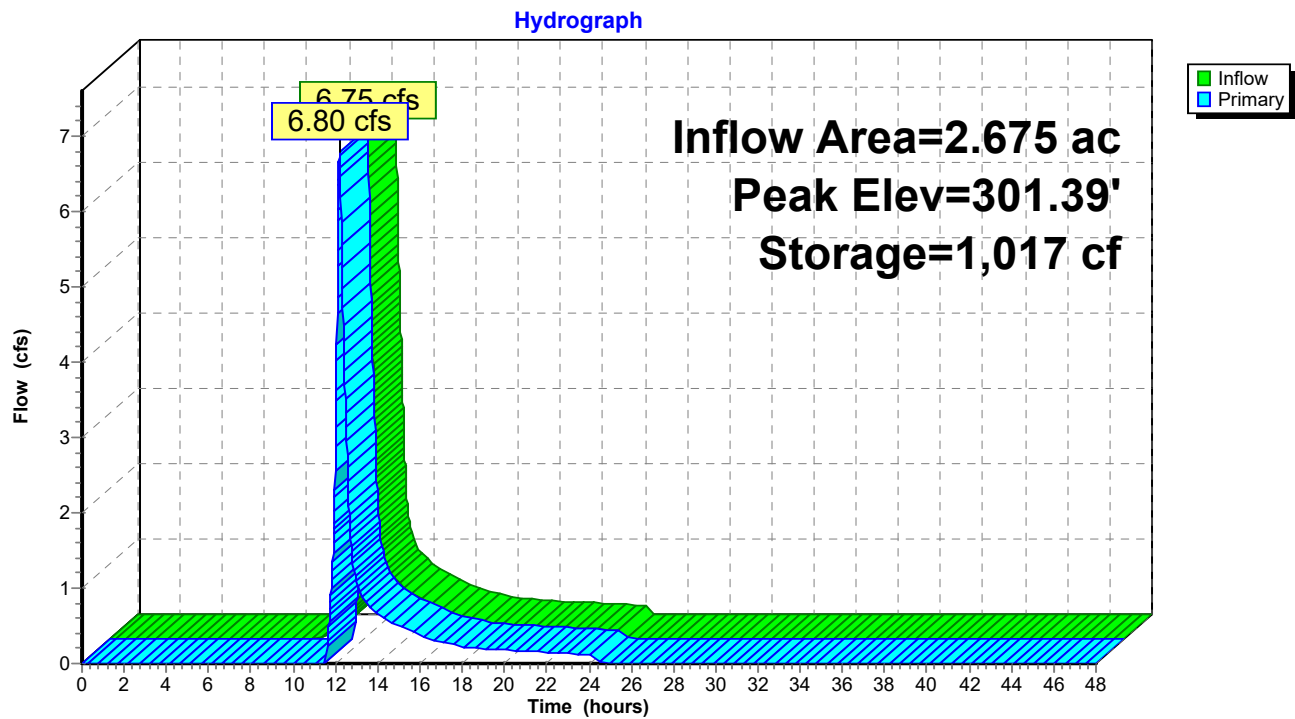
Volume	Invert	Avail.Storage	Storage Description
#1	298.00'	1,017 cf	Custom Stage Data Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
298.00	0	0
299.00	182	182
300.00	182	364
300.25	46	410
300.75	455	865
301.00	152	1,017

Device	Routing	Invert	Outlet Devices
#1	Primary	300.75'	18.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=6.79 cfs @ 12.18 hrs HW=301.39' (Free Discharge)
 ↑1=Orifice/Grate (Orifice Controls 6.79 cfs @ 3.84 fps)

Pond RG16:



Summary for Pond RG19:

[93] Warning: Storage range exceeded by 1.28'
 [88] Warning: Qout>Qin may require Finer Routing>1
 [85] Warning: Oscillations may require Finer Routing>1
 [62] Hint: Exceeded Reach PS6 OUTLET depth by 1.44' @ 12.18 hrs

Inflow Area = 0.717 ac, 23.42% Impervious, Inflow Depth = 3.45" for 100-YR event
 Inflow = 2.70 cfs @ 12.17 hrs, Volume= 0.206 af
 Outflow = 2.76 cfs @ 12.16 hrs, Volume= 0.178 af, Atten= 0%, Lag= 0.0 min
 Primary = 2.76 cfs @ 12.16 hrs, Volume= 0.178 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 297.28' @ 12.16 hrs Surf.Area= 0 sf Storage= 1,484 cf

Plug-Flow detention time= 92.1 min calculated for 0.178 af (86% of inflow)
 Center-of-Mass det. time= 29.9 min (870.6 - 840.7)

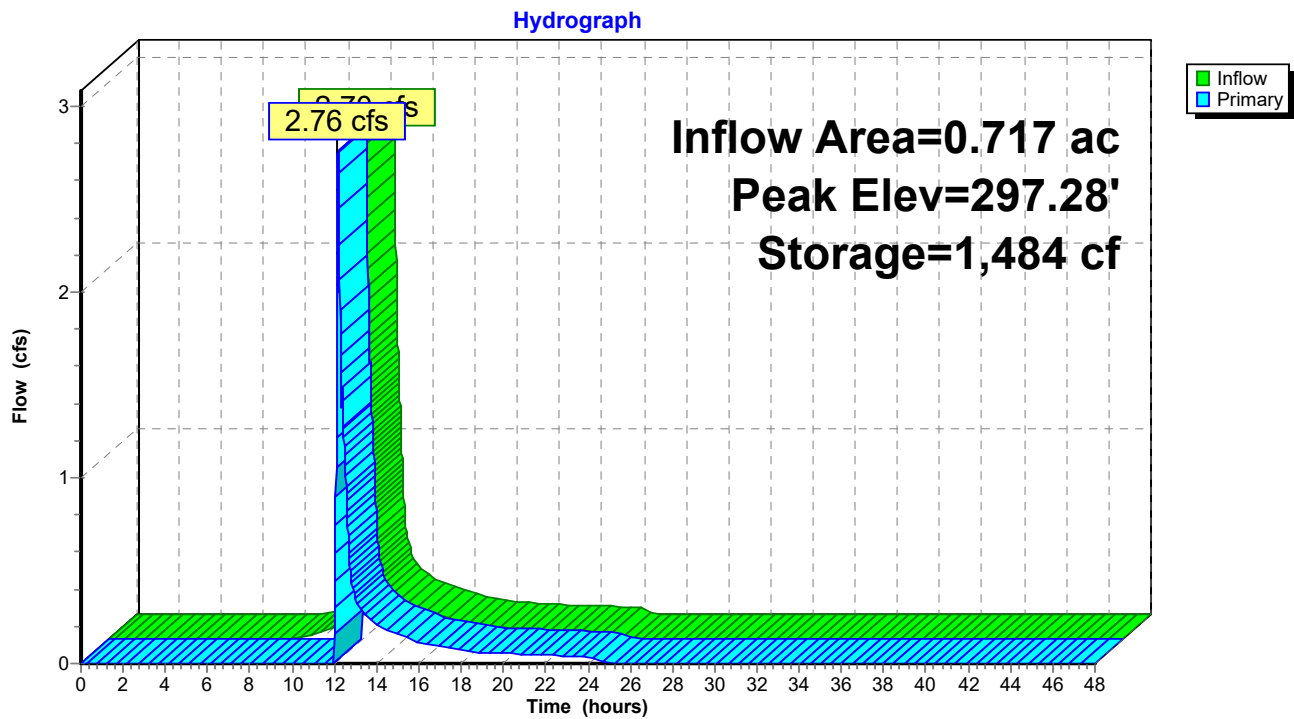
Volume	Invert	Avail.Storage	Storage Description
#1	293.50'	1,484 cf	Custom Stage Data Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
293.50	0	0
293.75	73	73
295.00	365	438
295.25	73	511
295.75	730	1,241
296.00	243	1,484

Device	Routing	Invert	Outlet Devices
#1	Primary	292.63'	8.0" Round Culvert L= 39.5' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 292.63' / 292.23' S= 0.0101 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf
#2	Device 1	295.75'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=2.76 cfs @ 12.16 hrs HW=297.28' (Free Discharge)
 1=Culvert (Inlet Controls 2.76 cfs @ 7.90 fps)
 2=Orifice/Grate (Passes 2.76 cfs of 4.68 cfs potential flow)

Pond RG19:



Summary for Pond RG20:

Inflow Area = 0.265 ac, 0.00% Impervious, Inflow Depth = 2.56" for 100-YR event
 Inflow = 0.77 cfs @ 12.09 hrs, Volume= 0.057 af
 Outflow = 0.23 cfs @ 12.47 hrs, Volume= 0.033 af, Atten= 70%, Lag= 22.8 min
 Primary = 0.23 cfs @ 12.47 hrs, Volume= 0.033 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 295.11' @ 12.47 hrs Surf.Area= 0 sf Storage= 1,052 cf

Plug-Flow detention time= 214.2 min calculated for 0.033 af (59% of inflow)
 Center-of-Mass det. time= 96.0 min (948.8 - 852.8)

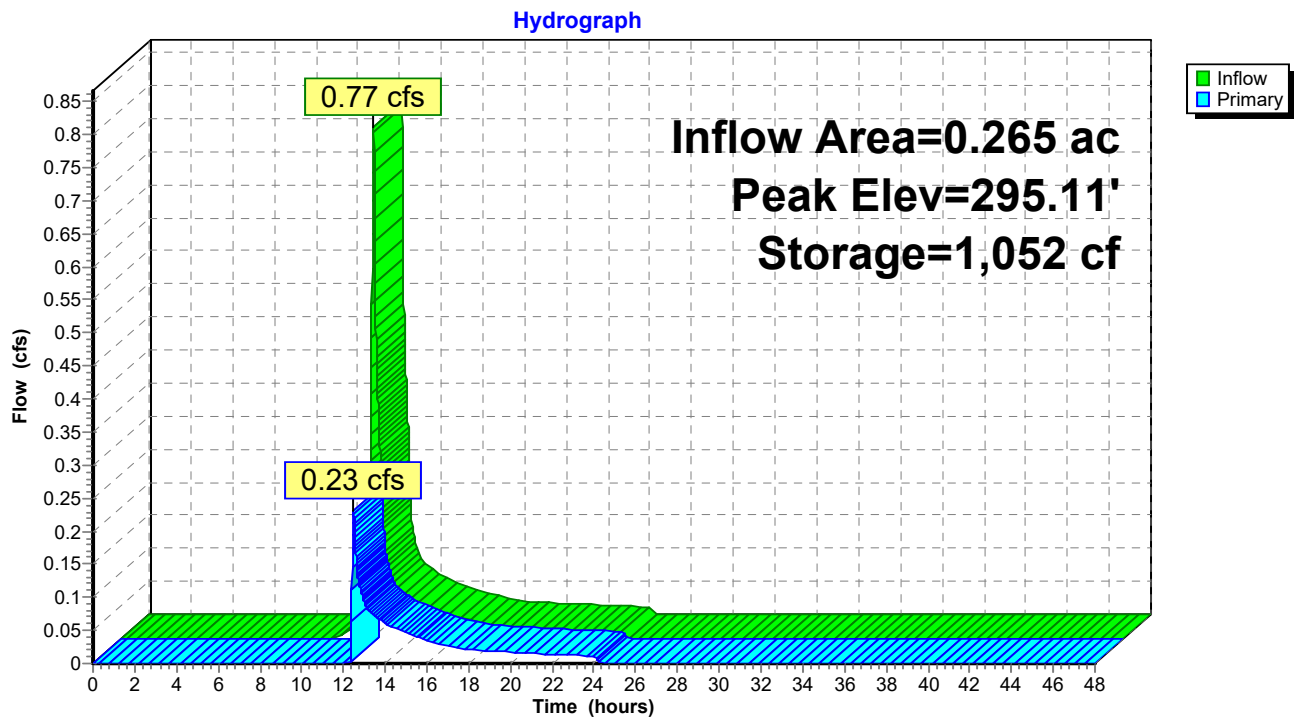
Volume	Invert	Avail.Storage	Storage Description
#1	292.47'	1,191 cf	Custom Stage Data Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
292.47	0	0
292.55	18	18
292.80	55	73
294.30	330	403
294.55	55	458
295.05	550	1,008
295.30	183	1,191

Device	Routing	Invert	Outlet Devices
#1	Primary	295.05'	18.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.23 cfs @ 12.47 hrs HW=295.11' (Free Discharge)
 ↑1=Orifice/Grate (Weir Controls 0.23 cfs @ 0.80 fps)

Pond RG20:



Summary for Pond RG21:

Inflow Area = 0.228 ac, 67.95% Impervious, Inflow Depth = 5.17" for 100-YR event
 Inflow = 1.34 cfs @ 12.09 hrs, Volume= 0.098 af
 Outflow = 1.32 cfs @ 12.11 hrs, Volume= 0.085 af, Atten= 2%, Lag= 1.4 min
 Primary = 1.32 cfs @ 12.11 hrs, Volume= 0.085 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 291.80' @ 12.11 hrs Surf.Area= 0 sf Storage= 749 cf

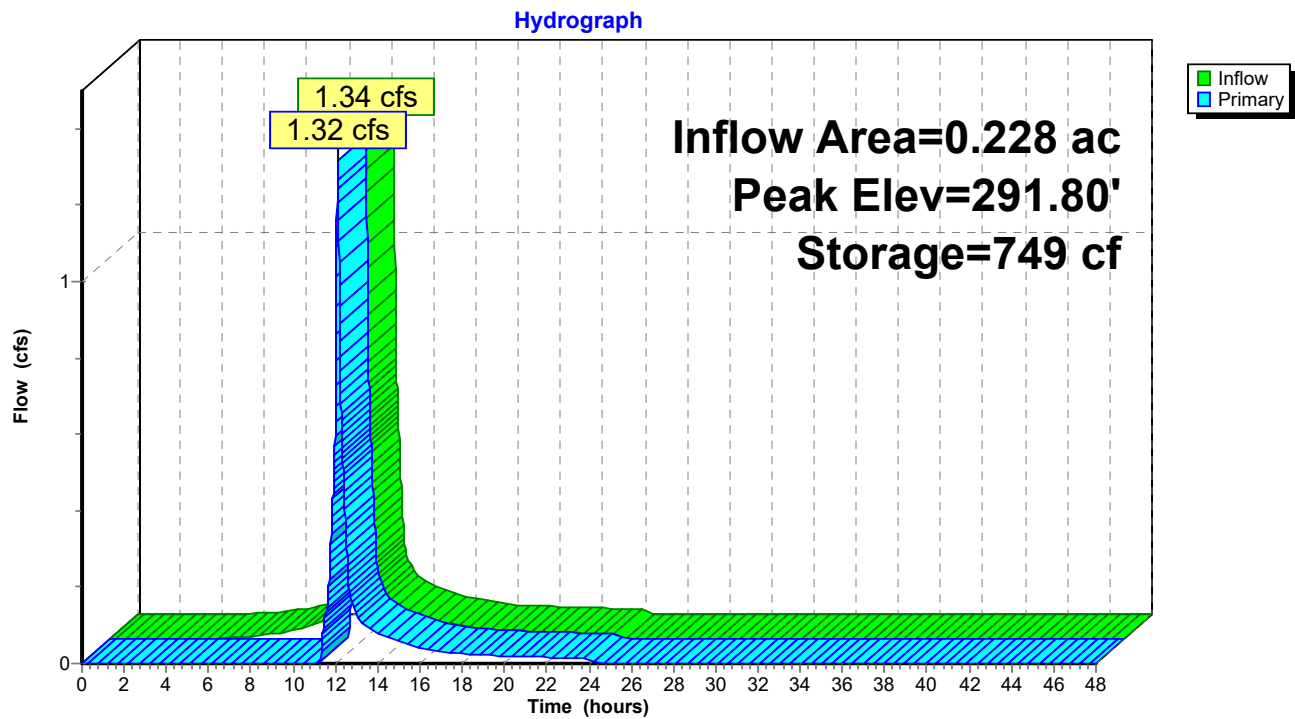
Plug-Flow detention time= 97.9 min calculated for 0.085 af (86% of inflow)
 Center-of-Mass det. time= 37.7 min (831.0 - 793.3)

Volume	Invert	Avail.Storage	Storage Description
#1	289.62'	749 cf	Custom Stage Data Listed below
Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	
289.62	0	0	
289.95	65	65	
290.20	49	114	
291.20	195	309	
291.45	49	358	
291.55	228	586	
291.80	163	749	

Device	Routing	Invert	Outlet Devices
#1	Primary	291.55'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.31 cfs @ 12.11 hrs HW=291.80' (Free Discharge)
 ↑1=Orifice/Grate (Weir Controls 1.31 cfs @ 1.65 fps)

Pond RG21:



Summary for Pond RG22:

Inflow Area = 0.153 ac, 15.01% Impervious, Inflow Depth = 4.29" for 100-YR event
 Inflow = 0.77 cfs @ 12.09 hrs, Volume= 0.055 af
 Outflow = 0.64 cfs @ 12.14 hrs, Volume= 0.039 af, Atten= 17%, Lag= 3.2 min
 Primary = 0.64 cfs @ 12.14 hrs, Volume= 0.039 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 258.71' @ 12.14 hrs Surf.Area= 0 sf Storage= 792 cf

Plug-Flow detention time= 153.1 min calculated for 0.039 af (71% of inflow)
 Center-of-Mass det. time= 60.2 min (874.1 - 814.0)

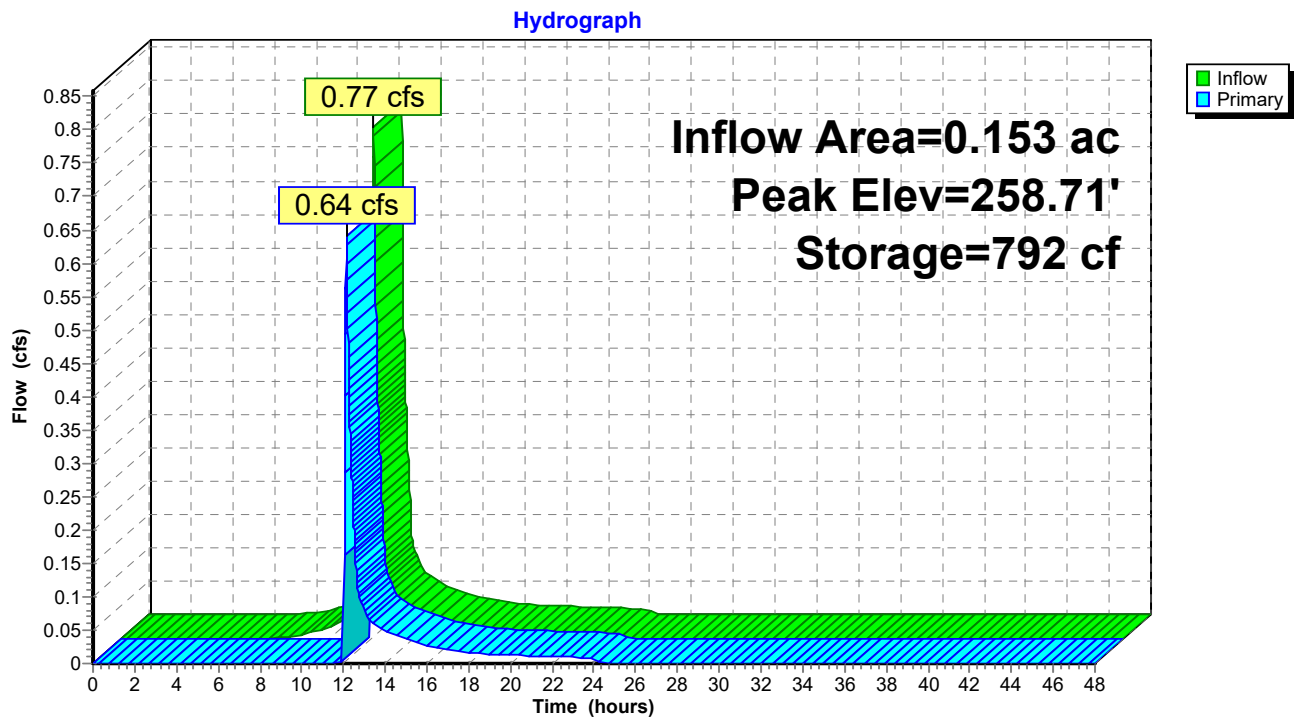
Volume	Invert	Avail.Storage	Storage Description
#1	256.22'	853 cf	Custom Stage Data Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
256.22	0	0
256.55	66	66
256.80	49	115
257.80	197	312
258.05	49	361
258.55	328	689
258.80	164	853

Device	Routing	Invert	Outlet Devices
#1	Primary	258.55'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.64 cfs @ 12.14 hrs HW=258.71' (Free Discharge)
 ↑1=Orifice/Grate (Weir Controls 0.64 cfs @ 1.30 fps)

Pond RG22:



Summary for Pond RG23:

[63] Warning: Exceeded Reach 21R INLET depth by 3.85' @ 27.98 hrs

Inflow Area = 0.183 ac, 16.37% Impervious, Inflow Depth = 3.29" for 100-YR event
 Inflow = 0.76 cfs @ 12.14 hrs, Volume= 0.050 af
 Outflow = 0.48 cfs @ 12.27 hrs, Volume= 0.039 af, Atten= 38%, Lag= 7.8 min
 Primary = 0.48 cfs @ 12.27 hrs, Volume= 0.039 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 257.98' @ 12.27 hrs Surf.Area= 0 sf Storage= 518 cf

Plug-Flow detention time= 127.6 min calculated for 0.039 af (79% of inflow)
 Center-of-Mass det. time= 43.7 min (903.9 - 860.2)

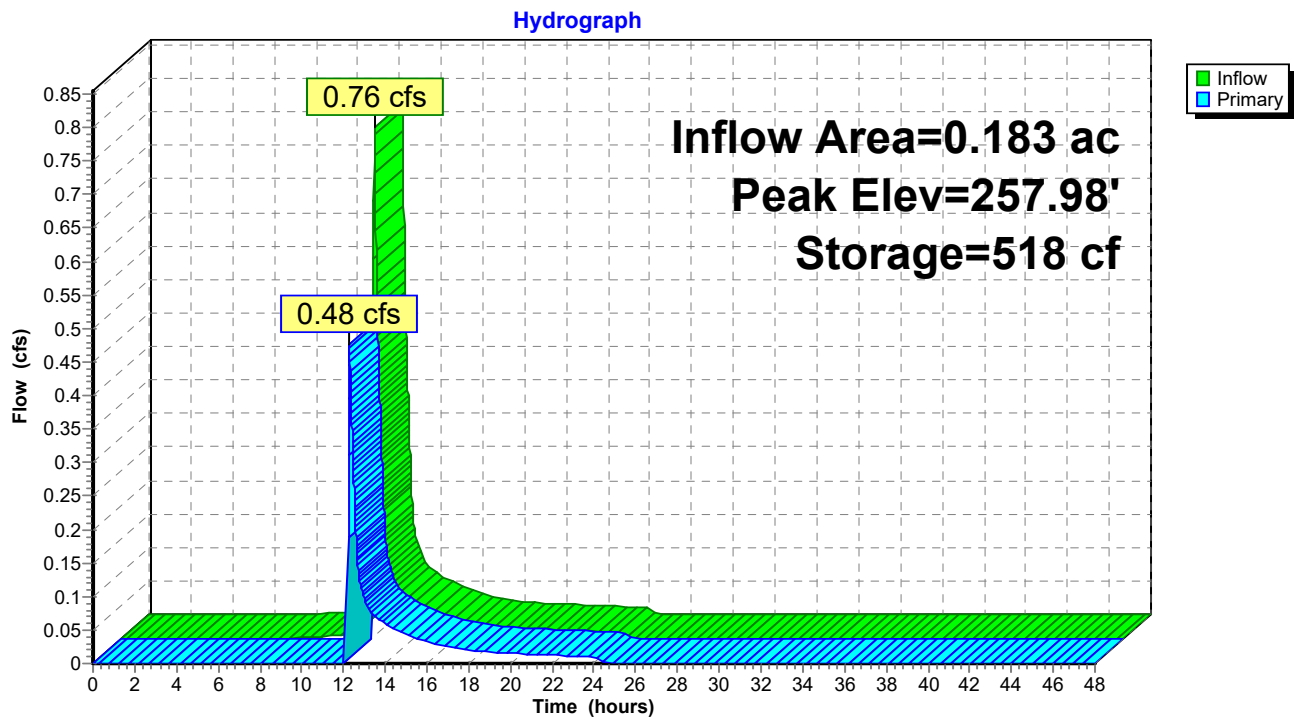
Volume	Invert	Avail.Storage	Storage Description
#1	255.27'	568 cf	Custom Stage Data Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
255.27	0	0
255.60	41	41
255.85	31	72
257.10	155	227
257.35	31	258
257.85	207	465
258.10	103	568

Device	Routing	Invert	Outlet Devices
#1	Primary	257.85'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.47 cfs @ 12.27 hrs HW=257.98' (Free Discharge)
 ↑1=Orifice/Grate (Weir Controls 0.47 cfs @ 1.17 fps)

Pond RG23:



Summary for Pond RG3:

[93] Warning: Storage range exceeded by 0.07'
 [88] Warning: Qout>Qin may require Finer Routing>1
 [85] Warning: Oscillations may require Finer Routing>1

Inflow Area = 0.150 ac, 46.64% Impervious, Inflow Depth = 4.29" for 100-YR event
 Inflow = 0.63 cfs @ 12.16 hrs, Volume= 0.054 af
 Outflow = 0.65 cfs @ 12.16 hrs, Volume= 0.047 af, Atten= 0%, Lag= 0.1 min
 Primary = 0.65 cfs @ 12.16 hrs, Volume= 0.047 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 311.07' @ 12.16 hrs Surf.Area= 0 sf Storage= 339 cf

Plug-Flow detention time= 87.0 min calculated for 0.047 af (87% of inflow)
 Center-of-Mass det. time= 29.6 min (848.7 - 819.1)

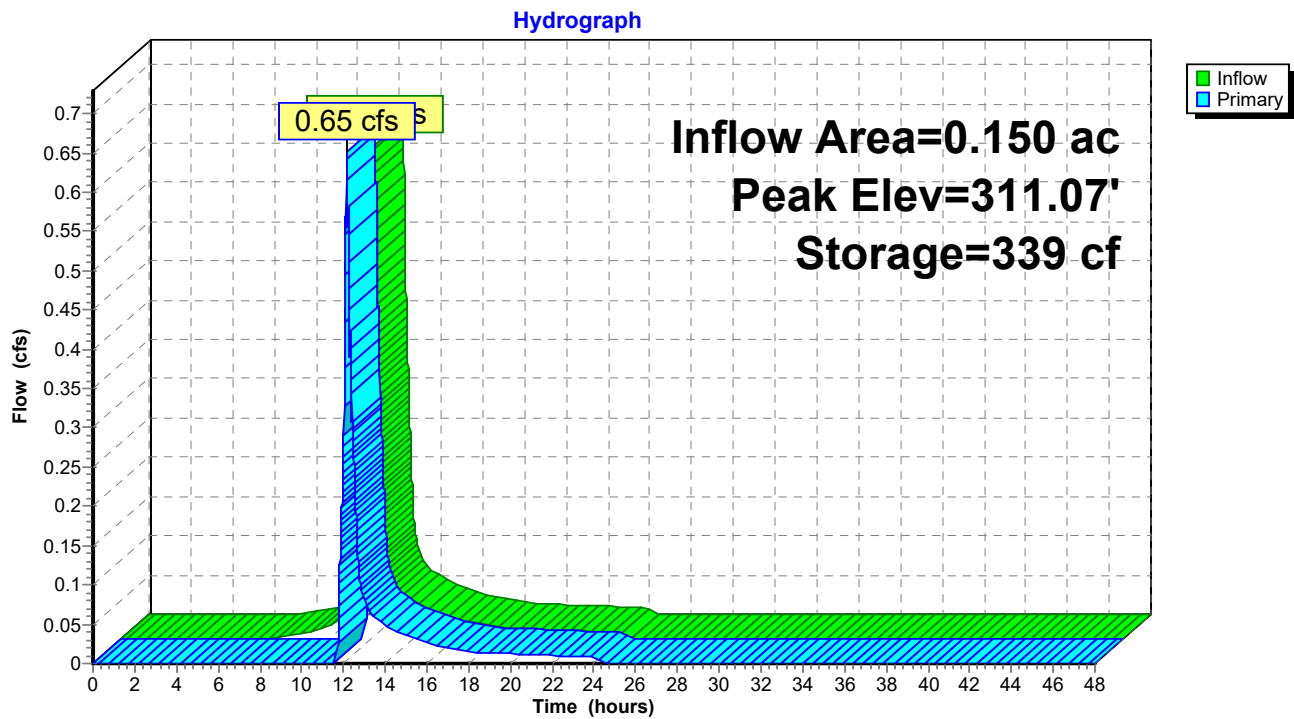
Volume	Invert	Avail.Storage	Storage Description
#1	309.50'	339 cf	Custom Stage Data Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
309.50	0	0
309.75	32	32
310.25	63	95
310.50	32	127
311.00	212	339

Device	Routing	Invert	Outlet Devices
#1	Primary	310.90'	4.0' long x 4.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=0.65 cfs @ 12.16 hrs HW=311.07' (Free Discharge)
 ↑1=Broad-Crested Rectangular Weir (Weir Controls 0.65 cfs @ 0.97 fps)

Pond RG3:



Summary for Pond RG4:

Inflow Area = 0.036 ac, 34.97% Impervious, Inflow Depth = 3.87" for 100-YR event
 Inflow = 0.16 cfs @ 12.09 hrs, Volume= 0.011 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 306.38' @ 24.34 hrs Surf.Area= 0 sf Storage= 500 cf

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

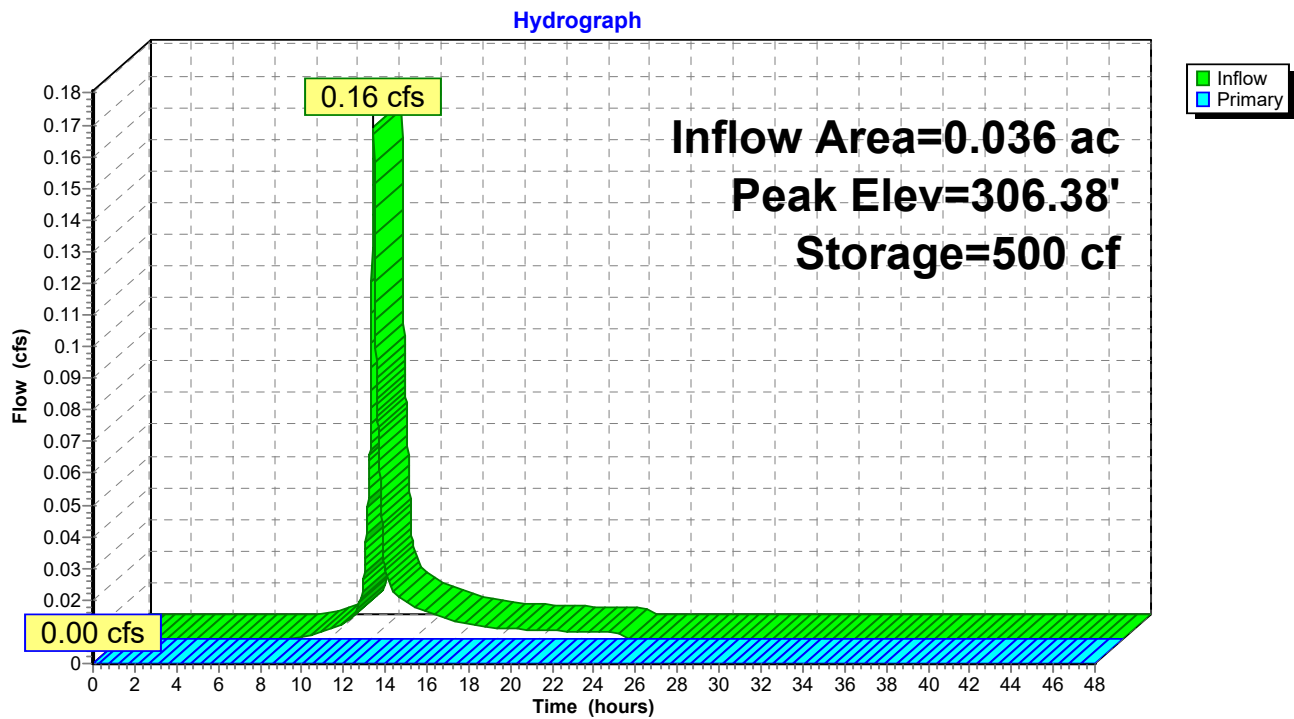
Volume	Invert	Avail.Storage	Storage Description
#1	302.42'	743 cf	Custom Stage Data Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
302.42	0	0
302.75	39	39
303.00	29	68
306.00	352	420
306.25	29	449
306.75	196	645
307.00	98	743

Device	Routing	Invert	Outlet Devices
#1	Primary	306.75'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=302.42' (Free Discharge)
 ↑1=Orifice/Grate (Controls 0.00 cfs)

Pond RG4:



Summary for Pond RG5:

Inflow Area = 0.052 ac, 40.18% Impervious, Inflow Depth = 4.08" for 100-YR event
 Inflow = 0.25 cfs @ 12.09 hrs, Volume= 0.018 af
 Outflow = 0.04 cfs @ 12.56 hrs, Volume= 0.008 af, Atten= 83%, Lag= 28.4 min
 Primary = 0.04 cfs @ 12.56 hrs, Volume= 0.008 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 306.77' @ 12.56 hrs Surf.Area= 0 sf Storage= 425 cf

Plug-Flow detention time= 254.8 min calculated for 0.008 af (45% of inflow)
 Center-of-Mass det. time= 137.1 min (955.7 - 818.6)

Volume	Invert	Avail.Storage	Storage Description
#1	302.67'	486 cf	Custom Stage Data Listed below

Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
302.67	0	0
302.75	7	7
303.00	20	27
306.00	239	266
306.25	20	286
306.75	133	419
307.00	67	486

Device	Routing	Invert	Outlet Devices
#1	Primary	306.75'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.04 cfs @ 12.56 hrs HW=306.77' (Free Discharge)
 ↑ **1=Orifice/Grate** (Weir Controls 0.04 cfs @ 0.49 fps)

Pond RG5:

