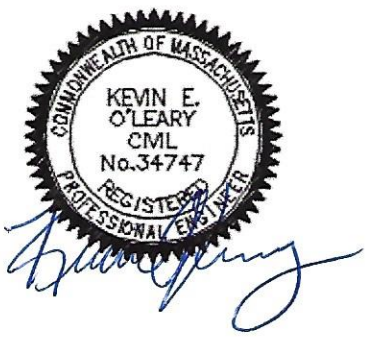
STORMWATER REPORT

Definitive Subdivision Plan
81 West Plain Street
Wayland, Mass.

Prepared By:
Jillson Company, Inc.
32 Fremont St. S-200
Needham Heights, MA 02494

Silver Leaf Homes, LLC
30 West Main Street
Hopkinton, MA 01748

February 5, 2020



SUMMARY

This Stormwater Report has been prepared to document compliance with Massachusetts Stormwater Management Standards and the Town of Wayland Chapter 193 Stormwater Management and Land Disturbance Bylaw. The applicant is proposing to subdivide Assessors Map 51A Lot 071 (2.1 Acres) into two lots. The property is not located in a Flood Plain as shown on Flood Insurance Rate Map Community Panel Number 25017C0528F dated July 7, 2014 and not in a Zone II Aquifer Protection zone.

The property is located at 81 West Plain Street. The property is partially developed with a single family house and garage near West Plain Street . The proposed drainage systems will consist of catch basins, manholes and underground storage chambers. Roof run-off will be discharge to the proposed lawn areas prior to entering the drainage system.

The analysis was prepared to demonstrate that the proposed development complies with Stormwater Management Requirements and Town of Wayland Planning Board Rules and Regulations, and Town of Wayland Chapter 193 Stormwater Management and Land Disturbance Bylaw. This includes removal of at least 80% of Total Suspended Solids and attenuation of stormwater flows for the proposed development. The attenuation of stormwater flows has been achieved by routing runoff from the proposed development to the catch basins, manholes, and underground storage chamber systems..

The analysis has been performed using precipitation rates from the NOAA Atlas 14 and demonstrate that post construction volumes are less than preconstruction volumes.

This analysis is divided into the following sections:

Section I	Compliance with Massachusetts Stormwater Management Regulations	
Section II	Overall Site Analysis- HydroCAD Hydrographs	
Section III	Figures –	Locus Map, Oliver/ZoneII, FEMA/FIRM, Extreme Precipitation, Soils,
Section IV	Pipe Capacity Calculations	
Section VI	Operation & Maintenance	

The calculations have been performed for the 2, 10, 25, and 100-year 24 hour storm event, using the HydroCAD 10.0 Stormwater Modeling System. This computer program is based upon the TR-55 computer models and uses the SCS Curvilinear Unit rainfall distribution.

The following table summarizes runoff for the pre and post-development conditions.

SUMMARY OF STORMWATER FLOWS
(CFS)

Design Storm		Existing Condition	Proposed Condition
		(SA1)	(Post SA1)
2-year	3.16”	0.00	0.00
10-year	4.72”	0.03	0.01
25-year	5.94”	0.08	0.04
100-year	8.43”	0.21	0.13
		(SA2)	(Post SA21 – Infiltrated on site)
2-year	3.16”	0.00	0.00
10-year	4.72”	0.00	0.00
25-year	5.94”	0.02	0.00
100-year	8.43”	0.07	0.00
		(SA3)	(Post SA2)
2-year	3.16”	0.00	0.00
10-year	4.72”	0.04	0.00
25-year	5.94”	0.13	0.02
100-year	8.43”	0.44	0.08
		(SA4)	(Post SA4)
2-year	3.16”	0.00	0.00
10-year	4.72”	0.00	0.00
25-year	5.94”	0.02	0.01
100-year	8.43”	0.14	0.08
		(SA5 Existing depression on site)	
2-year	3.16”	0.00	
10-year	4.72”	0.00	
25-year	5.94”	0.03	
100-year	8.43”	0.28	
		(SA6)	(Post SA6)
2-year	3.16”	0.00	0.00
10-year	4.72”	0.00	0.00
25-year	5.94”	0.02	0.01
100-year	8.43”	0.18	0.06
		(SA7 Existing depression on site)	
2-year	3.16”	0.00	
10-year	4.72”	0.01	
25-year	5.94”	0.04	
100-year	8.43”	0.32	
		(SA8)	(Post SA8)
2-year	3.16”	0.00	0.00
10-year	4.72”	0.00	0.00
25-year	5.94”	0.01	0.01
100-year	8.43”	0.10	0.07

SUMMARY OF STORMWATER VOLUMES

(CF)

Design Storm		Existing Condition	Proposed Condition
		(SA1)	(Post SA1)
2-year	3.16”	50	13
10-year	4.72”	224	120
25-year	5.94”	421	261
100-year	8.43”	934	660
		(SA2)	(Post SA21 – Infiltrated on site)
2-year	3.16”	3	0
10-year	4.72”	40	0
25-year	5.94”	94	0
100-year	8.43”	253	0
		(SA3)	(Post SA2)
2-year	3.16”	54	2
10-year	4.72”	415	48
25-year	5.94”	877	117
100-year	8.43”	2165	326
		(SA4)	(Post SA4)
2-year	3.16”	0	0
10-year	4.72”	68	39
25-year	5.94”	268	105
100-year	8.43”	1001	315
		(SA5 Existing depression on site)	
2-year	3.16”	0	
10-year	4.72”	131	
25-year	5.94”	520	
100-year	8.43”	1940	
		(SA6)	(Post SA6)
2-year	3.16”	0	0
10-year	4.72”	80	33
25-year	5.94”	316	89
100-year	8.43”	1179	267
		(SA7 Existing depression on site)	
2-year	3.16”	0	
10-year	4.72”	141	
25-year	5.94”	559	
100-year	8.43”	2083	
		(SA8)	(Post SA8)
2-year	3.16”	0	0
10-year	4.72”	47	27
25-year	5.94”	186	75
100-year	8.43”	694	223

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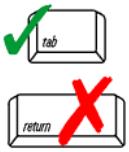
Checklist for Stormwater Report

A. Introduction

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



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

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.[1] This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8[2]
- Operation and Maintenance Plan required by Standard 9

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

[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

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Checklist for Stormwater Report

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.

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.

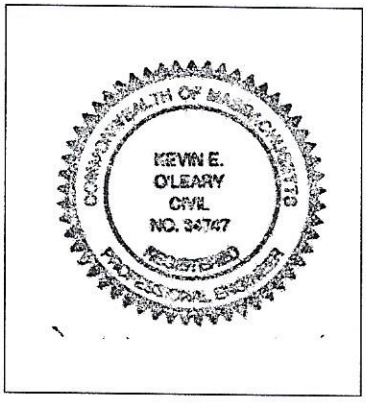
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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



Kevin O'Leary 2/5/20
Signature and Date

Checklist

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

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Checklist for Stormwater Report

☒ New development

☐ Redevelopment

☐ Mix of New Development and Redevelopment

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): _____

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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 (continued)

Standard 2: Peak Rate Attenuation

☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.

☒ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.

☒ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

☐ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

☐ Required Recharge volume reduced through use of the LID site Design Credits.

☒ Sizing the infiltration, BMPs is based on the following method: Check the method used.

☒ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

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

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

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Checklist for Stormwater Report

☒ 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.

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
☒ 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

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;
- Street sweeping schedules;

- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- 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.

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

☐ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.

☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

INSTRUCTIONS:

Version 1, Automated: Mar. 4, 2008

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

Location: 81 West Plain Street, Wayland

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	**0.25**	**1.00**	**0.25**	**0.75**
Deep Sump and Hooded Catch Basin	**0.25**	**0.75**	**0.19**	**0.56**
Subsurface Infiltration Structure	**0.80**	**0.56**	**0.45**	**0.11**
	0.00	**0.11**	**0.00**	**0.11**
	0.00	**0.11**	**0.00**	**0.11**

Total TSS Removal = **89%**

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

Project: 81 West Plain Street, Wayland

Prepared By:

Date: 2/4/2020

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

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1

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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

☐ 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

☐ 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.

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

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☐ 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

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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.

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☐ 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 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:

☐ 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

☐ 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.

☐ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

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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.
☐ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

STANDARD 1. NO UNTREATED DISCHARGES OR EROSION TO WETLANDS
Applicants must demonstrate that there are no new untreated discharges. To demonstrate that all new discharges are adequately treated, applicants may rely on the computations required to demonstrate compliance with Standards 4 through 6. No additional computations are required.

All proposed developed areas are routed through the proposed underground chamber systems as shown on the Site Plan.

STANDARD 2. PEAK RATE ATTENUATION
"Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates."

No increases in post development peak discharge rates are proposed. Calculations demonstrating this are located in Section II. No increase in post development volumes are proposed.

STANDARD 3. STORMWATER RECHARGE
"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, stormwater 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 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."

Based on the Natural Resources Conservation Service and soil evaluation, the soils were determined to consist of Hydrologic Soils Group "Type A", coarse sand with Infiltration Rates of 8.27 Inches/hour. This is considered a "rapid infiltration rate."

TABLE 1
REQUIRED RECHARGE VOLUME AND DRAWDOWN

Subareas	Impervious Area (SF)	Required Recharge Volume (Rv) (CF)	Proposed Recharge Volume (CF)	Bottom Area (SF)	Drawdown (Hrs)
RB#1	2,720	136	996	616	2.4
RB#2	6,107	306	2,032	1,383	2.2
RB#3	5,963	299	1,991	946	3.1
RB#4	4.613	231	1,022	655	2.3
RB#5	0	0	326	196	2.4
RB#6	0	0	293	154	2.8

Impervious area includes buildings
Recharge Volume is the calculated volume for the 100 yr storm

Sample Calculation RB#1

Impervious Area = 2,720 SF
Target Depth Factor (F) = 0.6”

Rv = F x impervious area = 0.6”x2,720 SF x 1’/12”= 136 CF

Sizing Storage Volume

Using the “static method”, the proposed infiltration device must provide sufficient storage capacity to hold the Required Recharge Volume without taking any infiltration into account. Storage Volume calculated using the average end area shown in Table 1 above and the Pond Reports in Section II

The storage volumes for each building and basin are shown in Table 1.

Drawdown Within 72 Hours

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

Where:
Rv = 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 Structure

$$\text{Time} = \frac{996\ CF}{(8.27”)(1’/12”)(616\ SF)} = 2.4\ \text{hours} < 72\ \text{hours}$$

Mounding Analysis

“Mounding analysis is required when the vertical separation from the bottom of an exfiltration system to seasonal high groundwater is less than four (4) feet and the recharge system is proposed to attenuate the peak discharge from a 10-year or higher 24-hour storm (e.g., 10-year, 25-year, 50-year, or 100-year 24-hour storm). In such cases, the mounding analysis must demonstrate that the Required Recharge Volume (e.g., infiltration basin storage) is fully dewatered within 72 hours (so the next storm can be stored for exfiltration). The mounding analysis must also show that the groundwater mound that forms under the recharge system will not break out above the land or water surface of a wetland (e.g., it doesn’t increase the water sheet elevation in a Bordering Vegetated Wetland, Salt Marsh, or Land Under Water within the 72-hour evaluation period).”

“The Hantush[1] or other equivalent method may be used to conduct the mounding analysis. The Hantush method predicts the maximum height of the groundwater mound beneath a rectangular or circular recharge area. It assumes unconfined groundwater flow, and that a linear relation exists between the water table elevation and water table decline rate. It results in a water table recession hydrograph depicting exponential decline. The Hantush method is available in

[1] Hantush 1967 – See Reference for Standard 3.

proprietary software and free on-line calculators on theWeb in automated format. If the analysis indicates the mound will prevent the infiltration BMP from fully draining within the 72-hour period, an iterative process must be employed to determine an alternative design that drains within the 72-hour period."

The bottom of the exfiltration systems RB#1, RB#2, RB#3, RB#4, RB#5, RB#6 are greater than 4 feet and do not require a mounding calculation. A mounding calculation is required for UC#1 as shown below:

STANDARD 4. WATER QUALITY

"Stormwater management systems shall 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) *Structural stormwater best management practices are sized to capture the required water quality volume as determined in accordance with the Massachusetts Stormwater Handbook; and*
c) *Pretreatment is provided in accordance with the Massachusetts Stormwater Handbook.*

This standard applies after the site is stabilized.[2] Since removal efficiency may vary with each storm, 80% TSS removal is not required for each storm. It is the average removal over the year that is required to meet the standard. The required water quality volume, the runoff volume requiring TSS treatment, is calculated as follows:

The required water quality volume equals 1.0 inch of runoff times the total impervious area of the post-development project site for a discharge

- *from a land use with a higher potential pollutant load;*
- *within an area with a rapid infiltration rate (greater than 2.4 inches per hour);*
- *within a Zone II or Interim Wellhead Protection Area;*
- *near or to the following critical areas:*
  - *Outstanding Resource Waters,*
  - *Special Resource Waters,*
  - *bathing beaches,*
  - *shellfish growing areas,*
  - *cold-water fisheries.*

The required water quality volume equals 0.5 inches of runoff times the total impervious area of the post-development site for all other discharges."

The proposed work meets the requirement for removal of total suspended solids (TSS).

Standard 4 requires the development and implementation of suitable practices for source control and pollution prevention. These measures must be identified in a long-term pollution prevention plan. The long-term pollution prevention plan shall include the proper procedures for the following:

- *good housekeeping;*
- *storing materials and waste products inside or under cover;*
- *vehicle washing;*
- *routine inspections and maintenance of stormwater BMPs;*
- *spill prevention and response;*

- *maintenance of lawns, gardens, and other landscaped areas;*
- *storage and use of fertilizers, herbicides, and pesticides;*
- *pet waste management;*
- *operation and management of septic systems; and*
  proper management of deicing chemicals and snow.

The long-term pollution prevention plan shall provide that sand piles be contained and stabilized to prevent the discharge of sand to wetlands or water bodies, and, where feasible, covered. If a Total Maximum Daily Load (TMDL) has been developed that indicates that use of fertilizers containing nutrients must be reduced, the long-term pollution prevention plan shall also include a nutrient management plan. The long-term pollution prevention plan may be prepared as a separate document or combined with the Operation and Maintenance Plan required by Standard 9.

The long-term pollution prevention plan will be combined with the Operation and Maintenance Plan required by Standard 9.

WATER QUALITY TREATMENT VOLUME

V_{WQ} = (D_{WQ}/12 inches/foot) * (A_{IMP} * 43,560 square feet/acre)

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)

The site is located in soils with an infiltration rate greater than 2.4 inches/hour so a Water Quality Depth of one-inch is required.

See Table 1, above, for calculations

TSS REMOVAL PERCENTAGE COMPUTATIONS

The following calculations demonstrates the required 80% removal of total suspended solids (TSS) utilizing CDS Units for the underground drainage systems

STANDARD 5 LAND USES WITH HIGHER POTENTIAL POLLUTANT LOADS

The land use, residential, is not considered a higher potential pollutant load.

STANDARD 6. CRITICAL AREAS

The land use is not located within a critical area.

STANDARD 7. REDEVELOPMENT PROJECT

"A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable: Standard 2, Standard 3, and the pretreatment and structural stormwater best management practice requirements of Standards 4, 5, and 6. Existing stormwater discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Stormwater Management Standards and improve existing conditions."

The project is not a redevelopment project.

STANDARD 8. CONSTRUCTION PERIOD CONTROLS

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) shall be developed and implemented.

The proposed project will disturb more than one acre of land and will obtain coverage under the NPDES Construction General Permit issued by EPA through preparing a Stormwater Pollution Prevention Plan.

STANDARD 9. LONG-TERM OPERATION AND MAINTENANCE (O&M) PLAN

A Long -Term Operation and Maintenance (O&M) Plan shall be developed and implemented to ensure that stormwater management systems function as designed.

The Long-Term Operation and Maintenance Plan shall at a minimum include:

1. *Stormwater management system(s) owners;*
2. *The party or parties responsible for operation and maintenance, including how future property owners will be notified of the presence of the stormwater management system and the requirement for proper operation and maintenance;*
3. *The routine and non-routine maintenance tasks to be undertaken after construction is complete and a schedule for implementing those tasks;*
4. *A plan that is drawn to scale and shows the location of all stormwater BMPs in each treatment train along with the discharge point;*
5. *A description and delineation of public safety features; and*
6. *An estimated operations and maintenance budget.*

STANDARD 10. ILLICIT DISCHARGES PROHIBITED

There are no existing illicit discharges on site. All illicit discharges to the stormwater management system are prohibited.

Illicit Discharge Statement

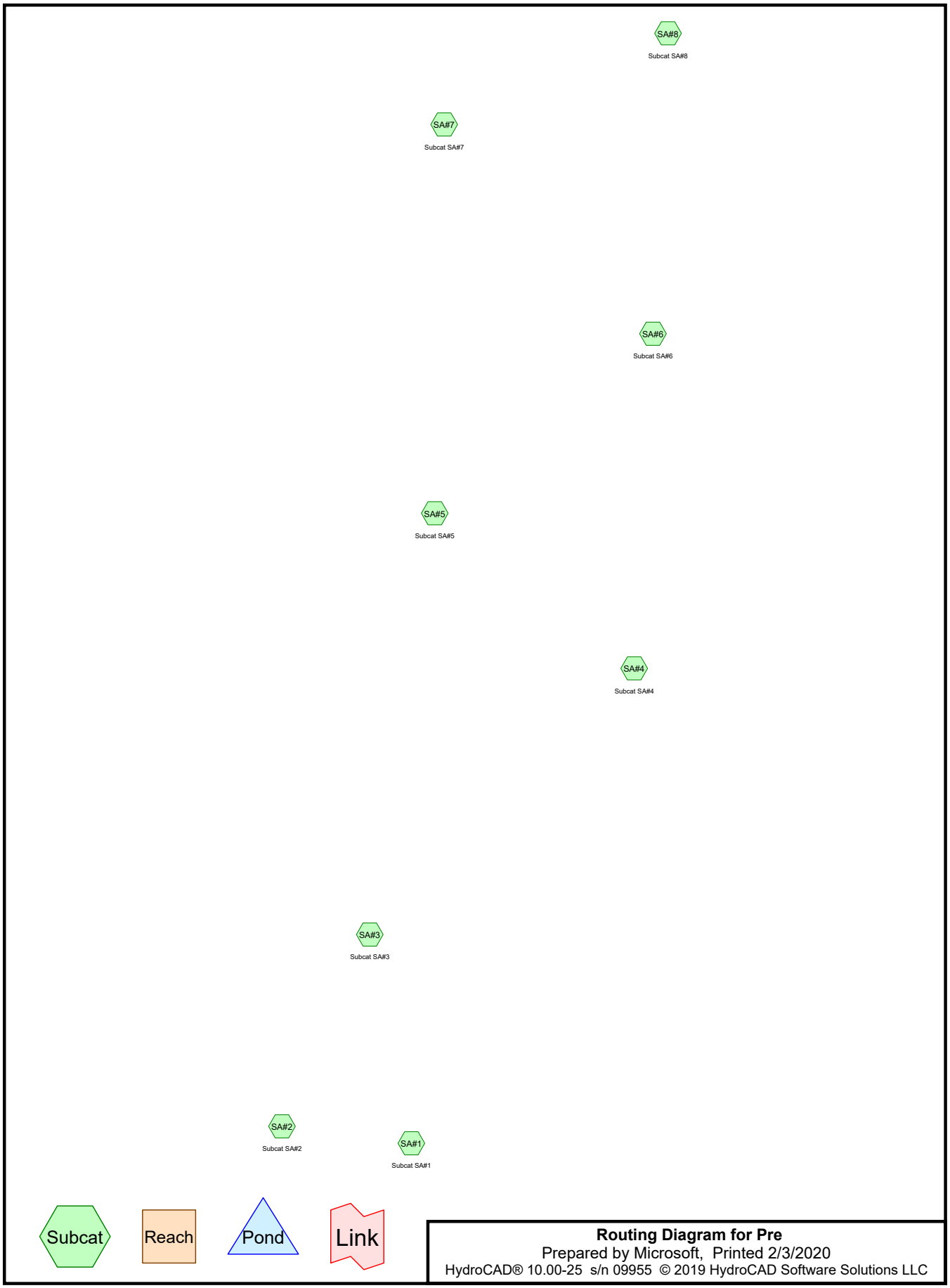
This statement is intended to meet Standard #10 of the Stormwater Management requirements

Illicit discharges to the stormwater management system are discharges that are not entirely comprised of stormwater.

Except for the potential for deliberate criminal act of discharge by an unauthorized entity for which the property owner has no control, there are to be no illicit discharges into the stormwater system.

_____

Silver Leaf Homes, LLC



Routing Diagram for Pre
Prepared by Microsoft, Printed 2/3/2020
HydroCAD® 10.00-25 s/n 09955 © 2019 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
3,841	49	50-75% Grass cover, Fair, HSG A (SA#1, SA#2, SA#3)
1,545	76	Gravel roads, HSG A (SA#1, SA#3)
1,412	98	Roofs, HSG A (SA#1, SA#2, SA#3)
91,096	36	Woods, Fair, HSG A (SA#1, SA#2, SA#3, SA#4, SA#5, SA#6, SA#7, SA#8)
97,894	**38**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
97,894	HSG A	SA#1, SA#2, SA#3, SA#4, SA#5, SA#6, SA#7, SA#8
0	HSG B	
0	HSG C	
0	HSG D	
0	Other	
97,894		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Sub Num
3,841	0	0	0	0	3,841	50-75% Grass cover, Fair	
1,545	0	0	0	0	1,545	Gravel roads	
1,412	0	0	0	0	1,412	Roofs	
91,096	0	0	0	0	91,096	Woods, Fair	
97,894	**0**	**0**	**0**	**0**	**97,894**	**TOTAL AREA**	

Time span=0.50-24.00 hrs, dt=0.02 hrs, 1176 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment SA#1: Subcat SA#1 Runoff Area=4,285 sf 6.71% Impervious Runoff Depth=0.00"
Flow Length=66' Slope=0.0100 '/' Tc=16.0 min CN=51 Runoff=0.00 cfs 0 cf

Subcatchment SA#2: Subcat SA#2 Runoff Area=1,735 sf 8.10% Impervious Runoff Depth=0.00"
Flow Length=32' Tc=3.3 min CN=43 Runoff=0.00 cfs 0 cf

Subcatchment SA#3: Subcat SA#3 Runoff Area=12,581 sf 7.82% Impervious Runoff Depth=0.00"
Flow Length=167' Tc=16.8 min CN=46 Runoff=0.00 cfs 0 cf

Subcatchment SA#4: Subcat SA#4 Runoff Area=11,524 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=120' Slope=0.0100 '/' Tc=16.5 min CN=36 Runoff=0.00 cfs 0 cf

Subcatchment SA#5: Subcat SA#5 Runoff Area=22,311 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=137' Tc=13.3 min CN=36 Runoff=0.00 cfs 0 cf

Subcatchment SA#6: Subcat SA#6 Runoff Area=13,539 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=119' Tc=10.4 min CN=36 Runoff=0.00 cfs 0 cf

Subcatchment SA#7: Subcat SA#7 Runoff Area=23,930 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=150' Tc=11.3 min CN=36 Runoff=0.00 cfs 0 cf

Subcatchment SA#8: Subcat SA#8 Runoff Area=7,989 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=191' Tc=14.4 min CN=36 Runoff=0.00 cfs 0 cf

Total Runoff Area = 97,894 sf Runoff Volume = 0 cf Average Runoff Depth = 0.00"
98.56% Pervious = 96,482 sf 1.44% Impervious = 1,412 sf

Summary for Subcatchment SA#1: Subcat SA#1

[45] Hint: Runoff=Zero

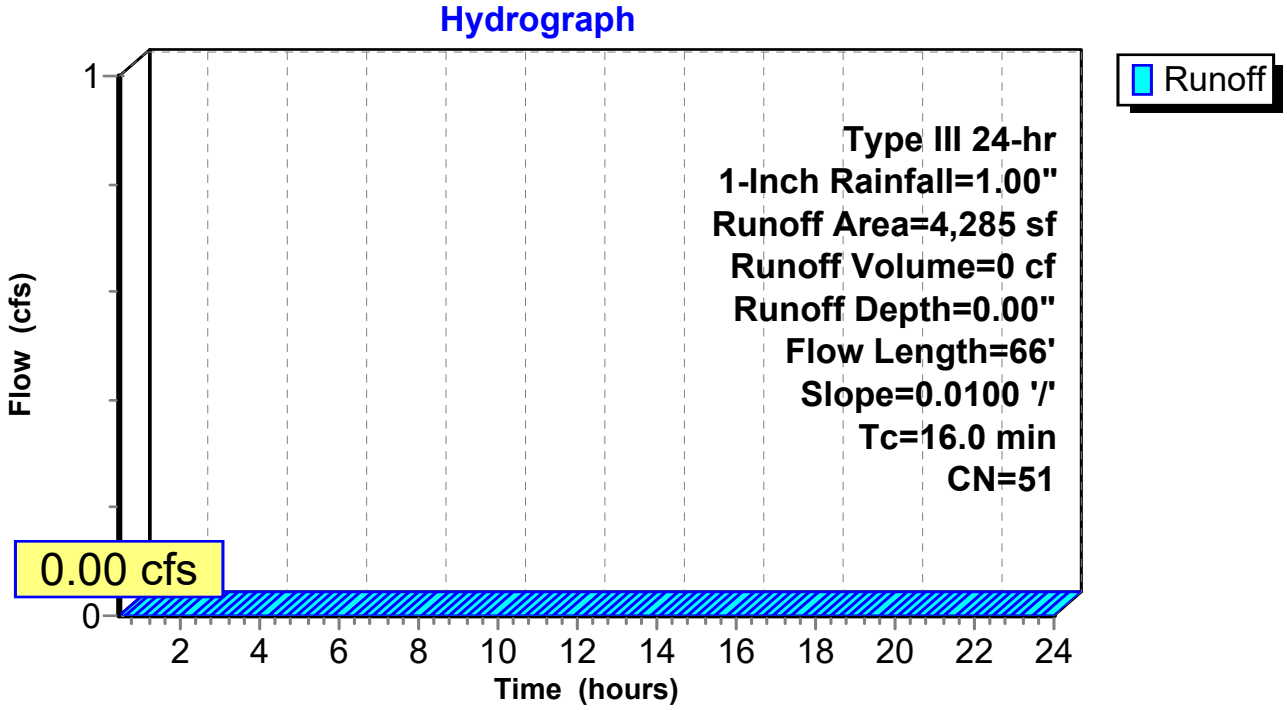
Runoff = 0.00 cfs @ 0.50 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

Area (sf)	CN	Description
746	49	50-75% Grass cover, Fair, HSG A
905	76	Gravel roads, HSG A
288	98	Roofs, HSG A
2,346	36	Woods, Fair, HSG A
4,285	51	Weighted Average
3,997		93.29% Pervious Area
288		6.71% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.8	50	0.0100	0.05		**Sheet Flow, Woods** Woods: Light underbrush n= 0.400 P2= 3.40"
0.2	16	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.0	66	Total			

Subcatchment SA#1: Subcat SA#1



Summary for Subcatchment SA#2: Subcat SA#2

[45] Hint: Runoff=Zero

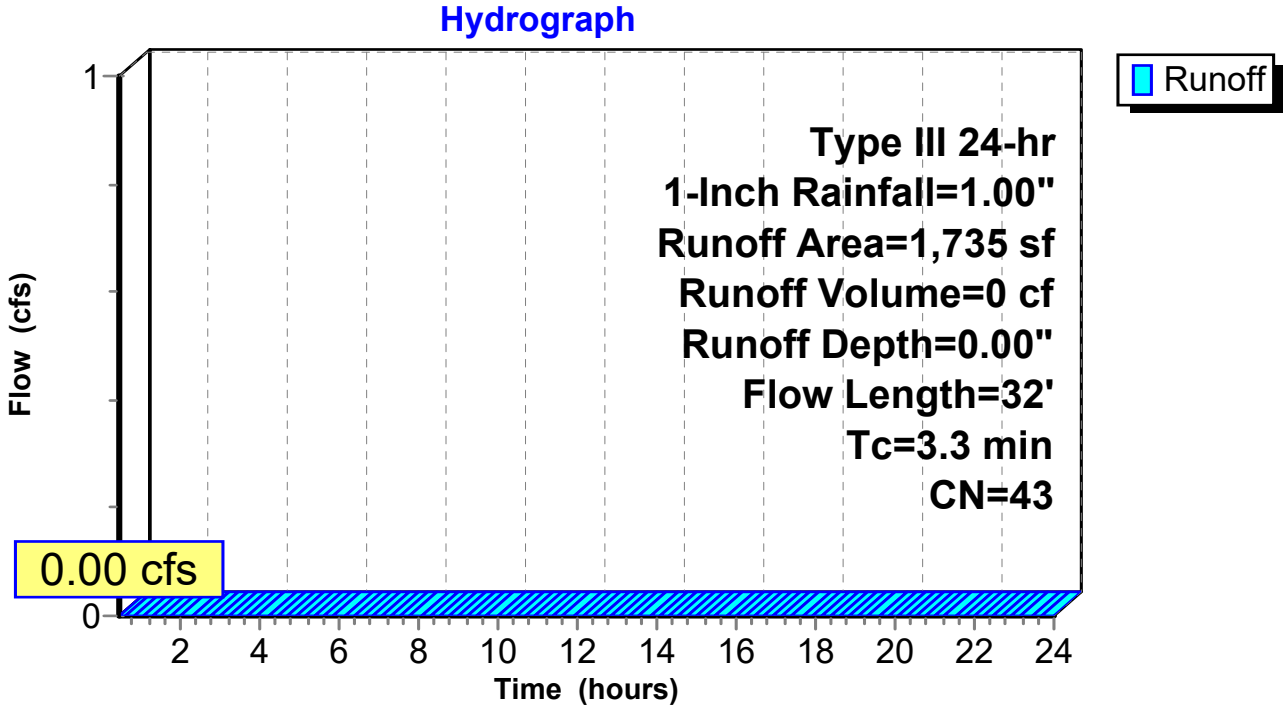
Runoff = 0.00 cfs @ 0.50 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

Area (sf)	CN	Description
321	49	50-75% Grass cover, Fair, HSG A
141	98	Roofs, HSG A
1,273	36	Woods, Fair, HSG A
1,735	43	Weighted Average
1,594		91.90% Pervious Area
141		8.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.2	18	0.0700	0.09		**Sheet Flow, Woods** Woods: Light underbrush n= 0.400 P2= 3.40"
0.1	14	0.0600	3.94		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
3.3	32	Total			

Subcatchment SA#2: Subcat SA#2



Summary for Subcatchment SA#3: Subcat SA#3

[45] Hint: Runoff=Zero

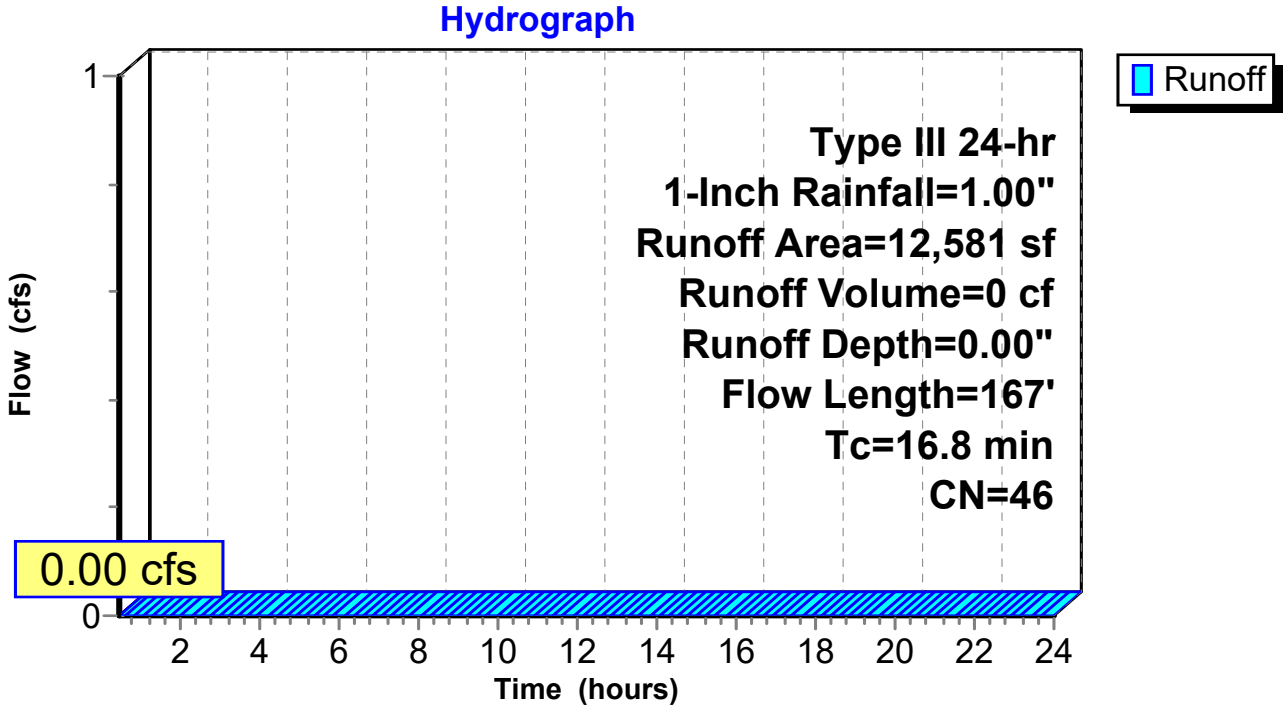
Runoff = 0.00 cfs @ 0.50 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

Area (sf)	CN	Description
2,774	49	50-75% Grass cover, Fair, HSG A
640	76	Gravel roads, HSG A
983	98	Roofs, HSG A
8,184	36	Woods, Fair, HSG A
12,581	46	Weighted Average
11,597		92.18% Pervious Area
983		7.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.8	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
1.0	117	0.0150	1.97		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.8	167	Total			

Subcatchment SA#3: Subcat SA#3



Summary for Subcatchment SA#4: Subcat SA#4

[45] Hint: Runoff=Zero

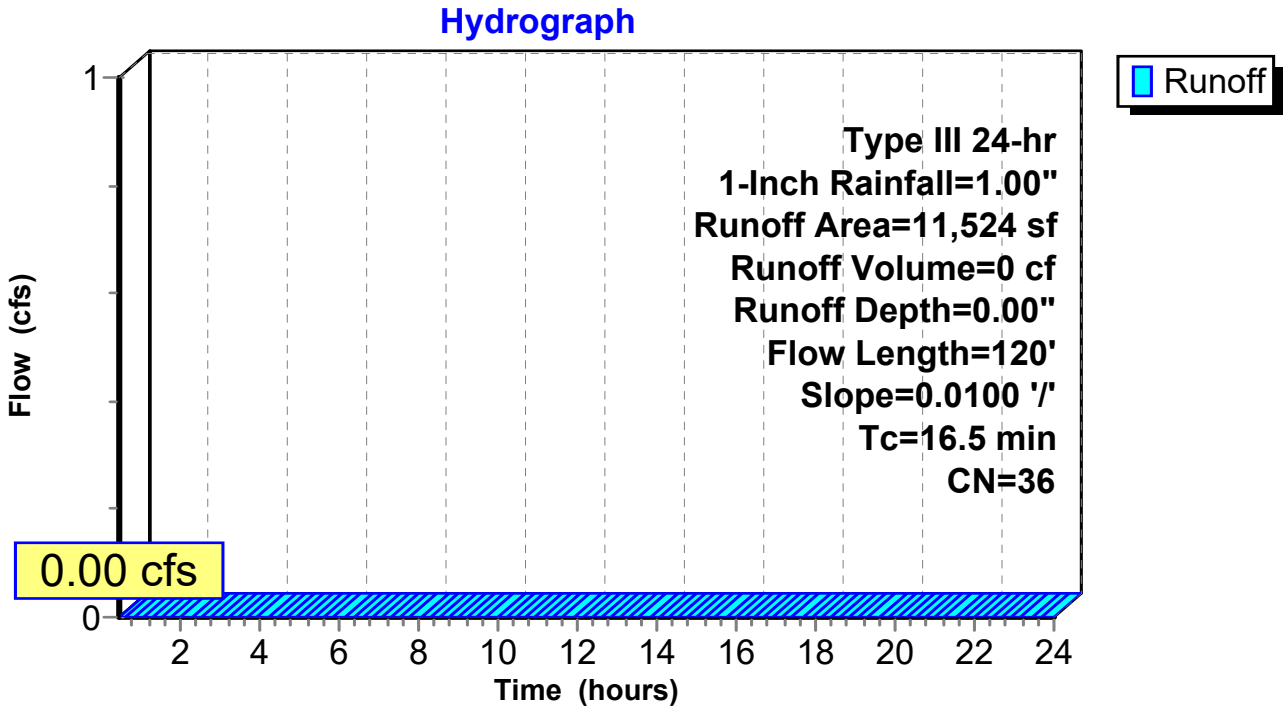
Runoff = 0.00 cfs @ 0.50 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

Area (sf)	CN	Description
11,524	36	Woods, Fair, HSG A
11,524		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.8	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
0.7	70	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.5	120	Total			

Subcatchment SA#4: Subcat SA#4



Summary for Subcatchment SA#5: Subcat SA#5

[45] Hint: Runoff=Zero

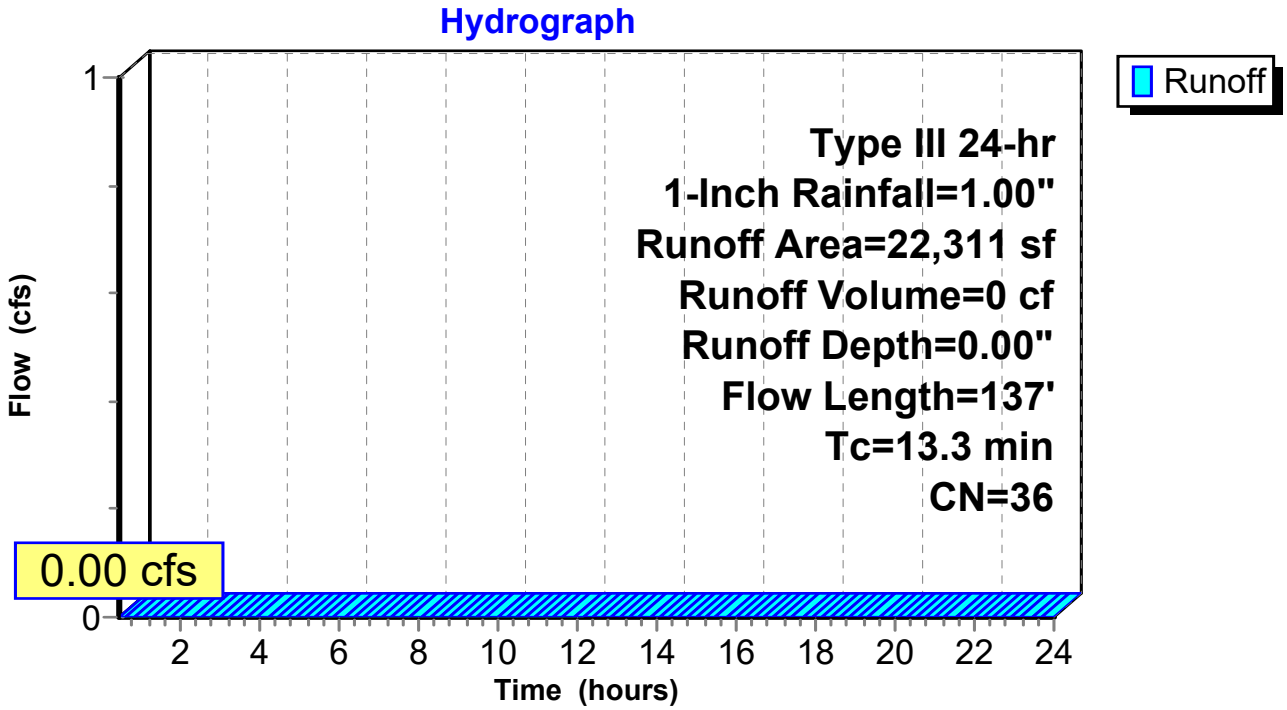
Runoff = 0.00 cfs @ 0.50 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

Area (sf)	CN	Description
22,311	36	Woods, Fair, HSG A
22,311		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0180	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
0.8	87	0.0140	1.90		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
13.3	137	Total			

Subcatchment SA#5: Subcat SA#5



Summary for Subcatchment SA#6: Subcat SA#6

[45] Hint: Runoff=Zero

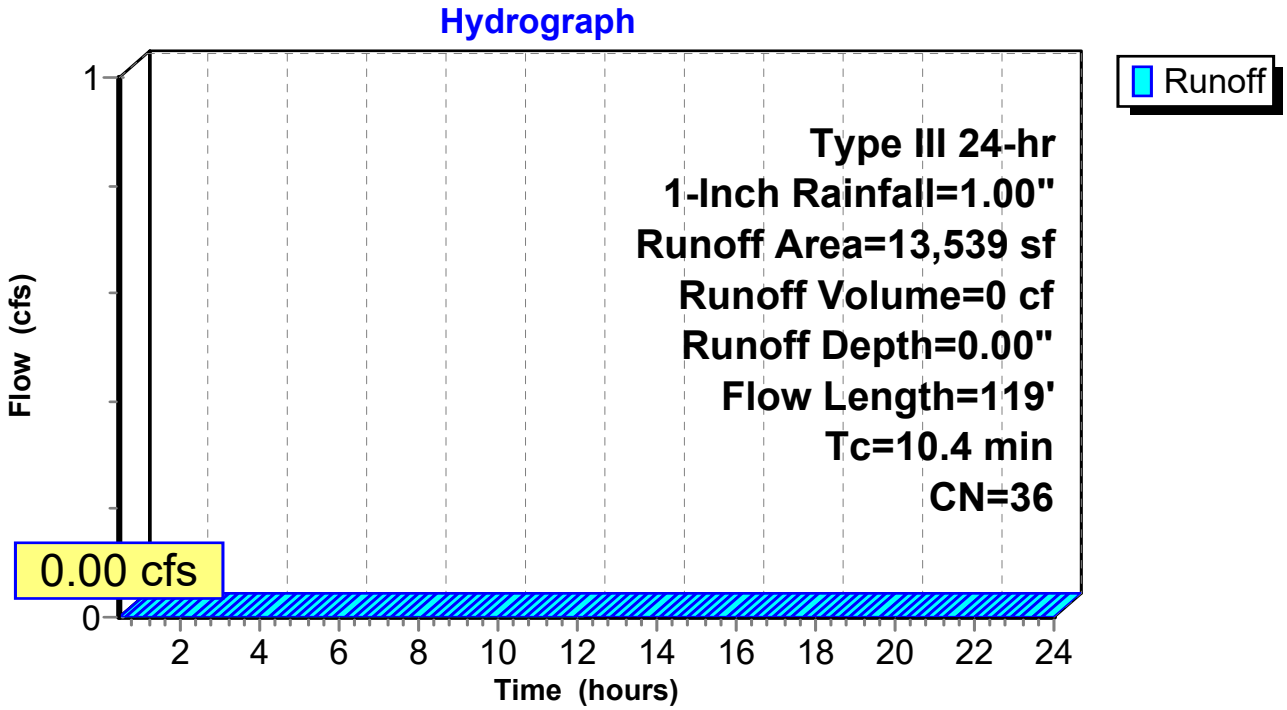
Runoff = 0.00 cfs @ 0.50 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

Area (sf)	CN	Description
13,539	36	Woods, Fair, HSG A
13,539		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.1	50	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
1.3	69	0.0030	0.88		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
10.4	119	Total			

Subcatchment SA#6: Subcat SA#6



Summary for Subcatchment SA#7: Subcat SA#7

[45] Hint: Runoff=Zero

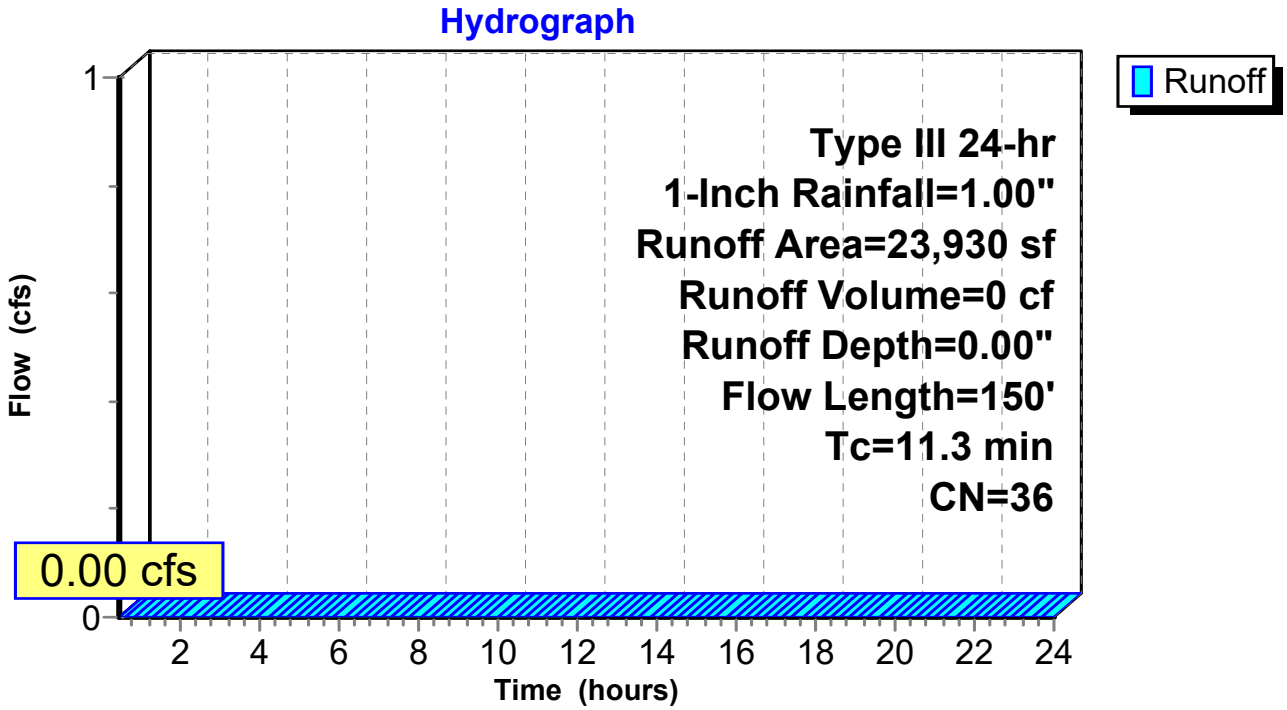
Runoff = 0.00 cfs @ 0.50 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

Area (sf)	CN	Description
23,930	36	Woods, Fair, HSG A
23,930		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0280	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
0.8	100	0.0170	2.10		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.3	150	Total			

Subcatchment SA#7: Subcat SA#7



Summary for Subcatchment SA#8: Subcat SA#8

[45] Hint: Runoff=Zero

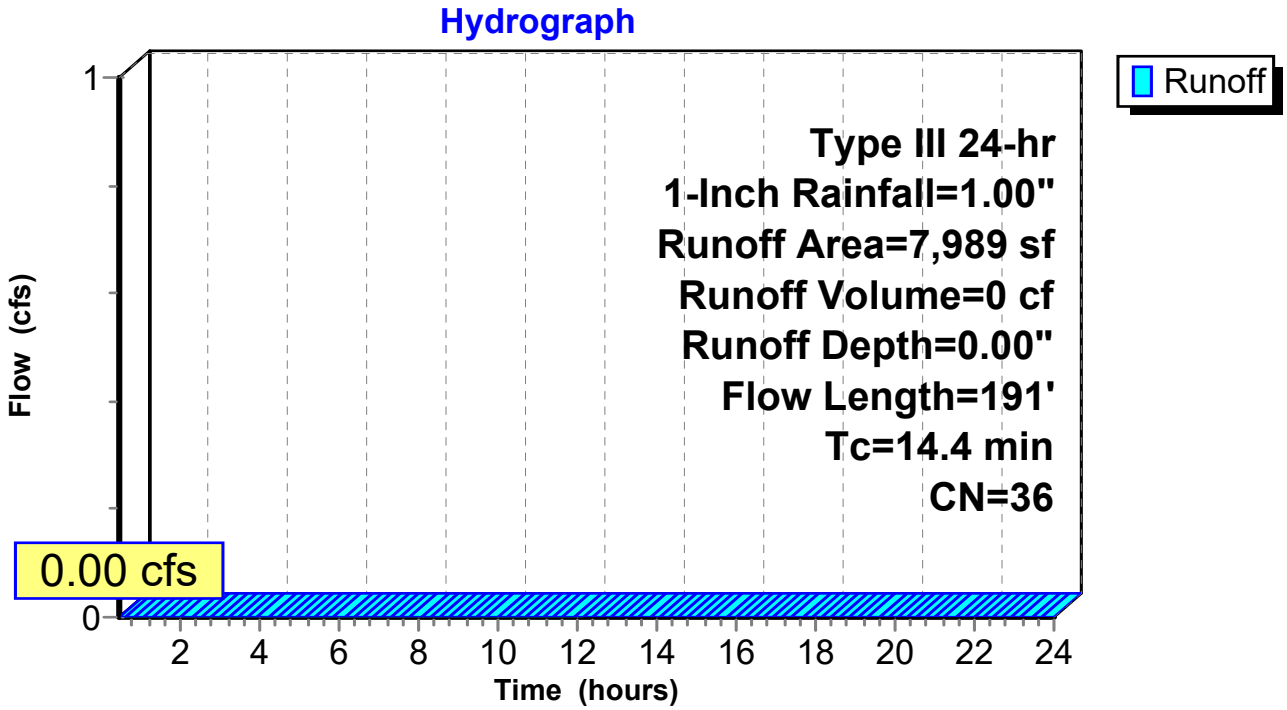
Runoff = 0.00 cfs @ 0.50 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

Area (sf)	CN	Description
7,989	36	Woods, Fair, HSG A
7,989		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0280	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
3.9	141	0.0014	0.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
14.4	191	Total			

Subcatchment SA#8: Subcat SA#8



Time span=0.50-24.00 hrs, dt=0.02 hrs, 1176 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment SA#1: Subcat SA#1 Runoff Area=4,285 sf 6.71% Impervious Runoff Depth>0.14"
Flow Length=66' Slope=0.0100 '/' Tc=16.0 min CN=51 Runoff=0.00 cfs 50 cf

Subcatchment SA#2: Subcat SA#2 Runoff Area=1,735 sf 8.10% Impervious Runoff Depth>0.02"
Flow Length=32' Tc=3.3 min CN=43 Runoff=0.00 cfs 3 cf

Subcatchment SA#3: Subcat SA#3 Runoff Area=12,581 sf 7.82% Impervious Runoff Depth>0.05"
Flow Length=167' Tc=16.8 min CN=46 Runoff=0.00 cfs 54 cf

Subcatchment SA#4: Subcat SA#4 Runoff Area=11,524 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=120' Slope=0.0100 '/' Tc=16.5 min CN=36 Runoff=0.00 cfs 0 cf

Subcatchment SA#5: Subcat SA#5 Runoff Area=22,311 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=137' Tc=13.3 min CN=36 Runoff=0.00 cfs 0 cf

Subcatchment SA#6: Subcat SA#6 Runoff Area=13,539 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=119' Tc=10.4 min CN=36 Runoff=0.00 cfs 0 cf

Subcatchment SA#7: Subcat SA#7 Runoff Area=23,930 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=150' Tc=11.3 min CN=36 Runoff=0.00 cfs 0 cf

Subcatchment SA#8: Subcat SA#8 Runoff Area=7,989 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=191' Tc=14.4 min CN=36 Runoff=0.00 cfs 0 cf

Total Runoff Area = 97,894 sf Runoff Volume = 107 cf Average Runoff Depth = 0.01"
98.56% Pervious = 96,482 sf 1.44% Impervious = 1,412 sf

Summary for Subcatchment SA#1: Subcat SA#1

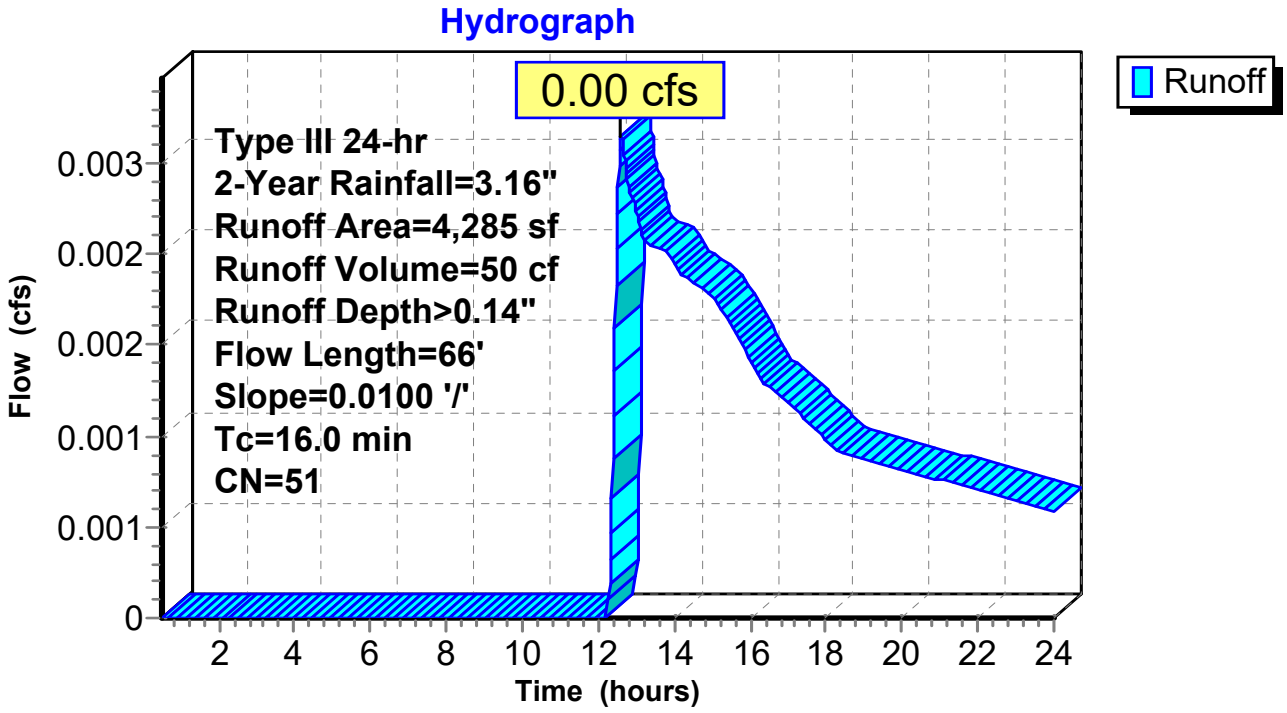
Runoff = 0.00 cfs @ 12.61 hrs, Volume= 50 cf, Depth> 0.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.16"

Area (sf)	CN	Description
746	49	50-75% Grass cover, Fair, HSG A
905	76	Gravel roads, HSG A
288	98	Roofs, HSG A
2,346	36	Woods, Fair, HSG A
4,285	51	Weighted Average
3,997		93.29% Pervious Area
288		6.71% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.8	50	0.0100	0.05		**Sheet Flow, Woods** Woods: Light underbrush n= 0.400 P2= 3.40"
0.2	16	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.0	66	Total			

Subcatchment SA#1: Subcat SA#1



Summary for Subcatchment SA#2: Subcat SA#2

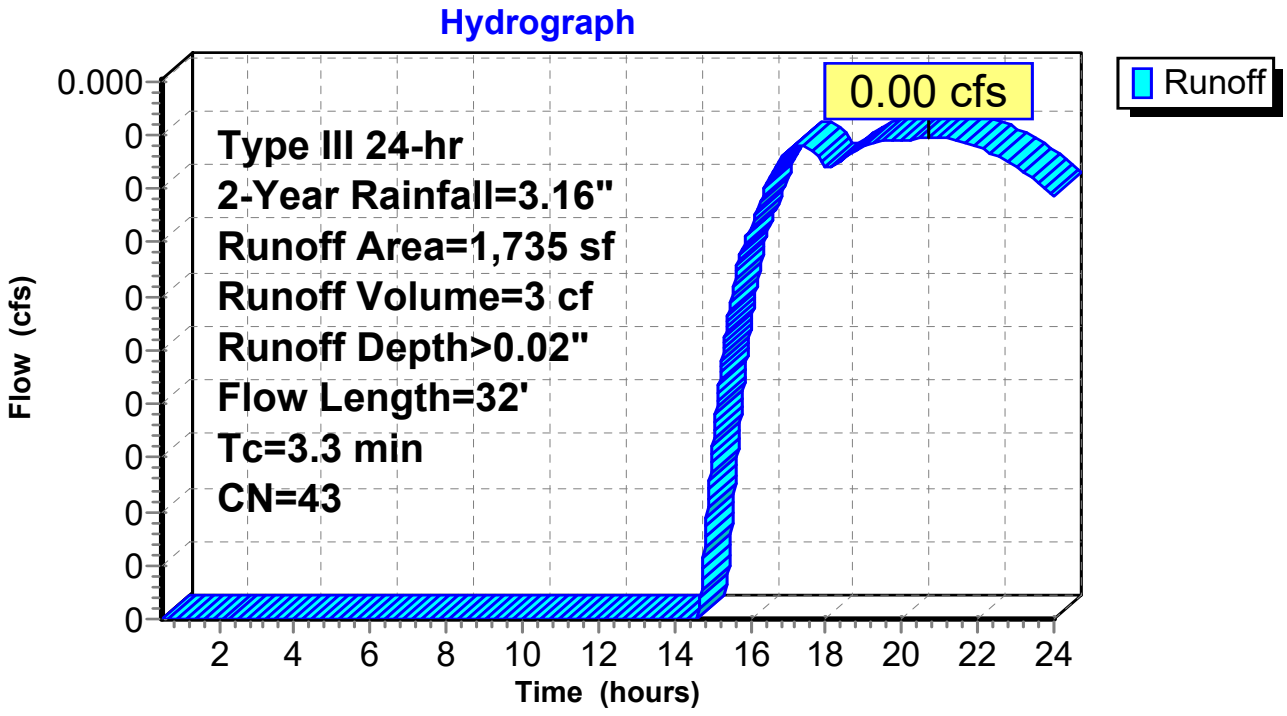
Runoff = 0.00 cfs @ 20.72 hrs, Volume= 3 cf, Depth> 0.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.16"

Area (sf)	CN	Description
321	49	50-75% Grass cover, Fair, HSG A
141	98	Roofs, HSG A
1,273	36	Woods, Fair, HSG A
1,735	43	Weighted Average
1,594		91.90% Pervious Area
141		8.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.2	18	0.0700	0.09		**Sheet Flow, Woods** Woods: Light underbrush n= 0.400 P2= 3.40"
0.1	14	0.0600	3.94		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
3.3	32	Total			

Subcatchment SA#2: Subcat SA#2



Summary for Subcatchment SA#3: Subcat SA#3

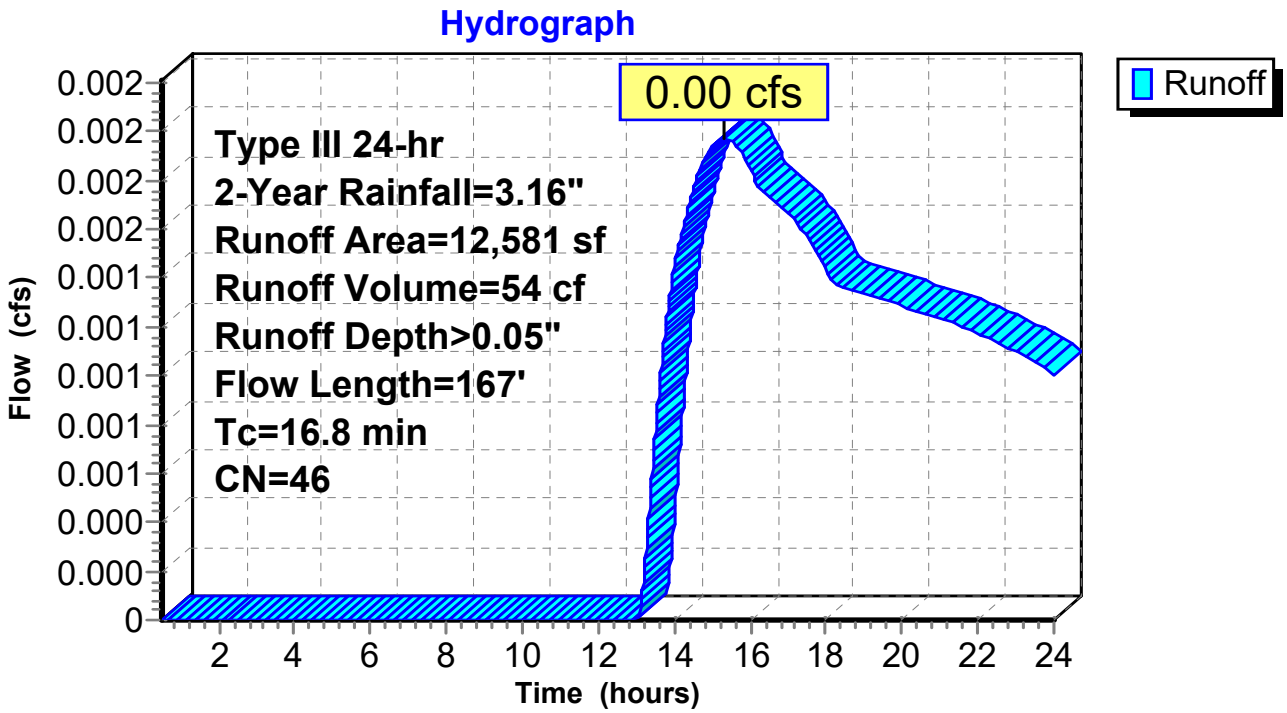
Runoff = 0.00 cfs @ 15.32 hrs, Volume= 54 cf, Depth> 0.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.16"

Area (sf)	CN	Description
2,774	49	50-75% Grass cover, Fair, HSG A
640	76	Gravel roads, HSG A
983	98	Roofs, HSG A
8,184	36	Woods, Fair, HSG A
12,581	46	Weighted Average
11,597		92.18% Pervious Area
983		7.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.8	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
1.0	117	0.0150	1.97		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.8	167	Total			

Subcatchment SA#3: Subcat SA#3



Summary for Subcatchment SA#4: Subcat SA#4

[45] Hint: Runoff=Zero

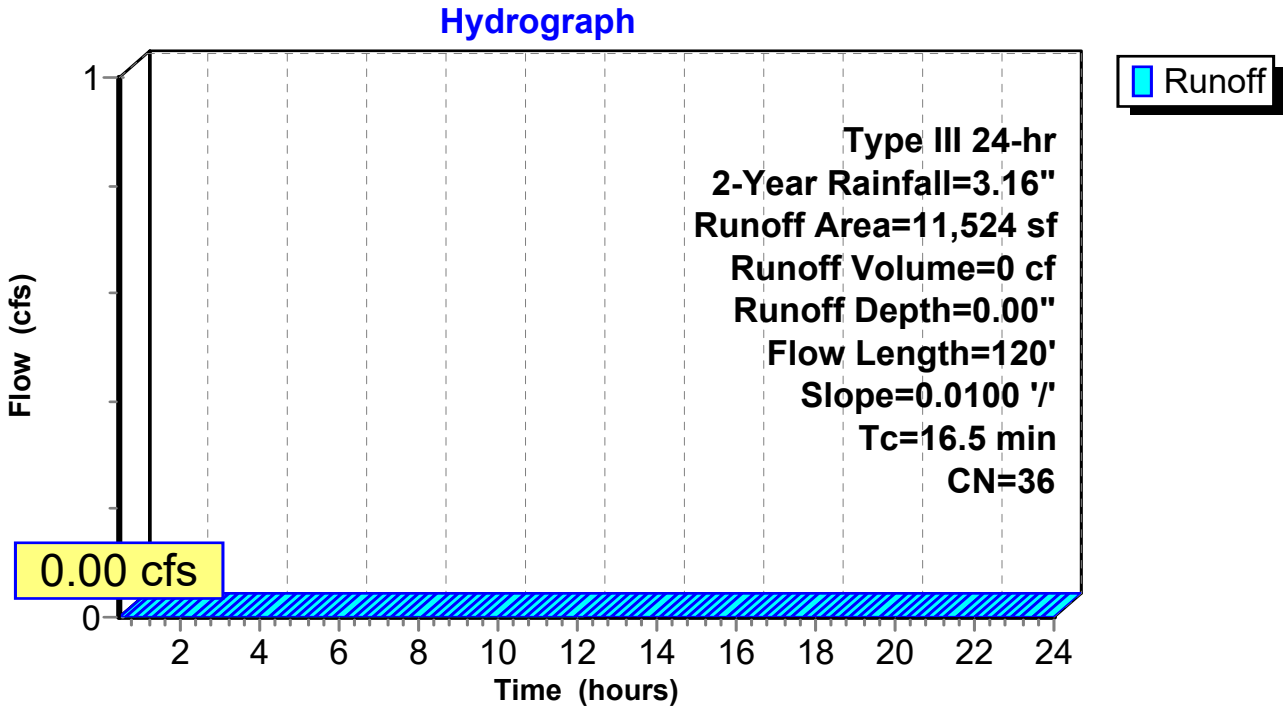
Runoff = 0.00 cfs @ 0.50 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.16"

Area (sf)	CN	Description
11,524	36	Woods, Fair, HSG A
11,524		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.8	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
0.7	70	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.5	120	Total			

Subcatchment SA#4: Subcat SA#4



Summary for Subcatchment SA#5: Subcat SA#5

[45] Hint: Runoff=Zero

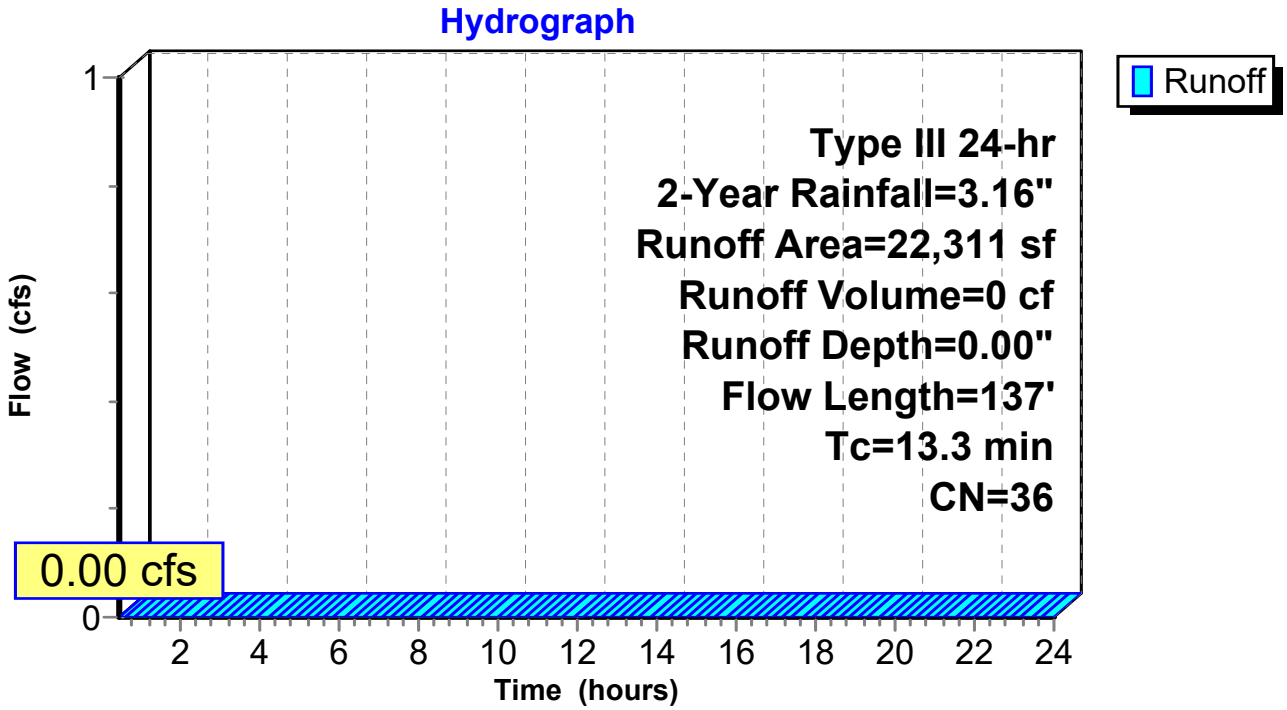
Runoff = 0.00 cfs @ 0.50 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.16"

Area (sf)	CN	Description
22,311	36	Woods, Fair, HSG A
22,311		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0180	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
0.8	87	0.0140	1.90		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
13.3	137	Total			

Subcatchment SA#5: Subcat SA#5



Summary for Subcatchment SA#6: Subcat SA#6

[45] Hint: Runoff=Zero

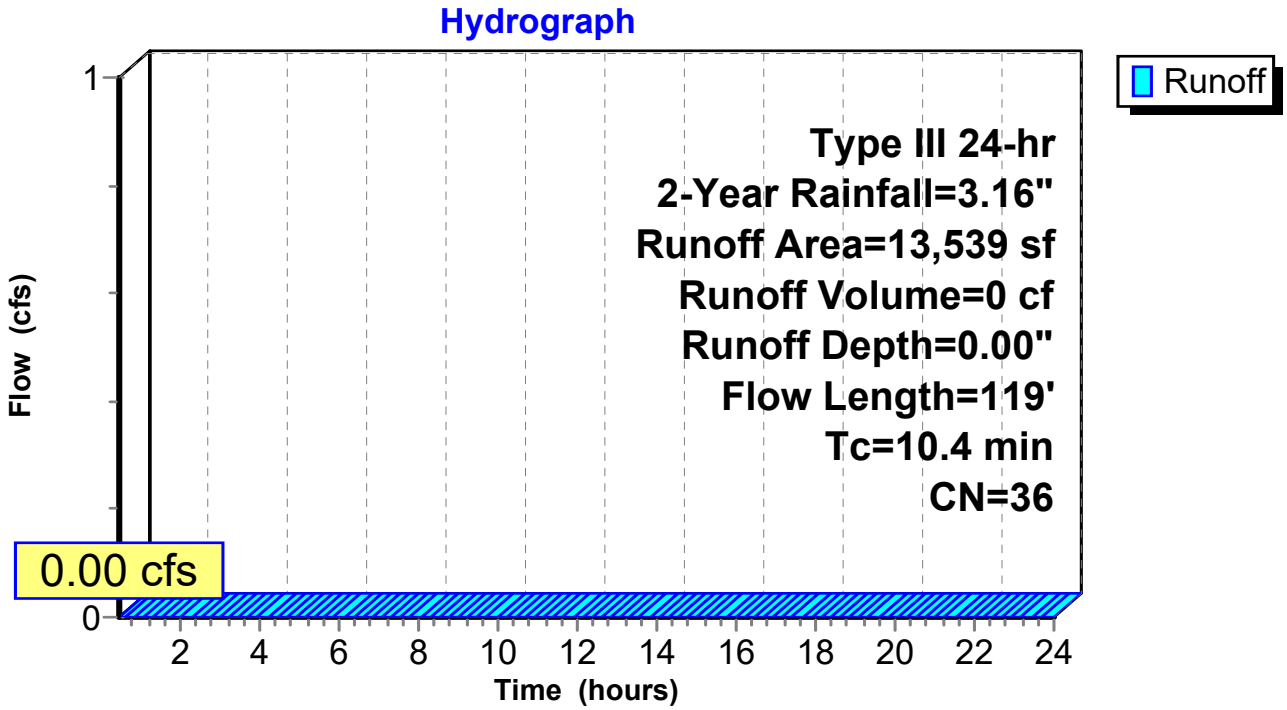
Runoff = 0.00 cfs @ 0.50 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.16"

Area (sf)	CN	Description
13,539	36	Woods, Fair, HSG A
13,539		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.1	50	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
1.3	69	0.0030	0.88		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
10.4	119	Total			

Subcatchment SA#6: Subcat SA#6



Summary for Subcatchment SA#7: Subcat SA#7

[45] Hint: Runoff=Zero

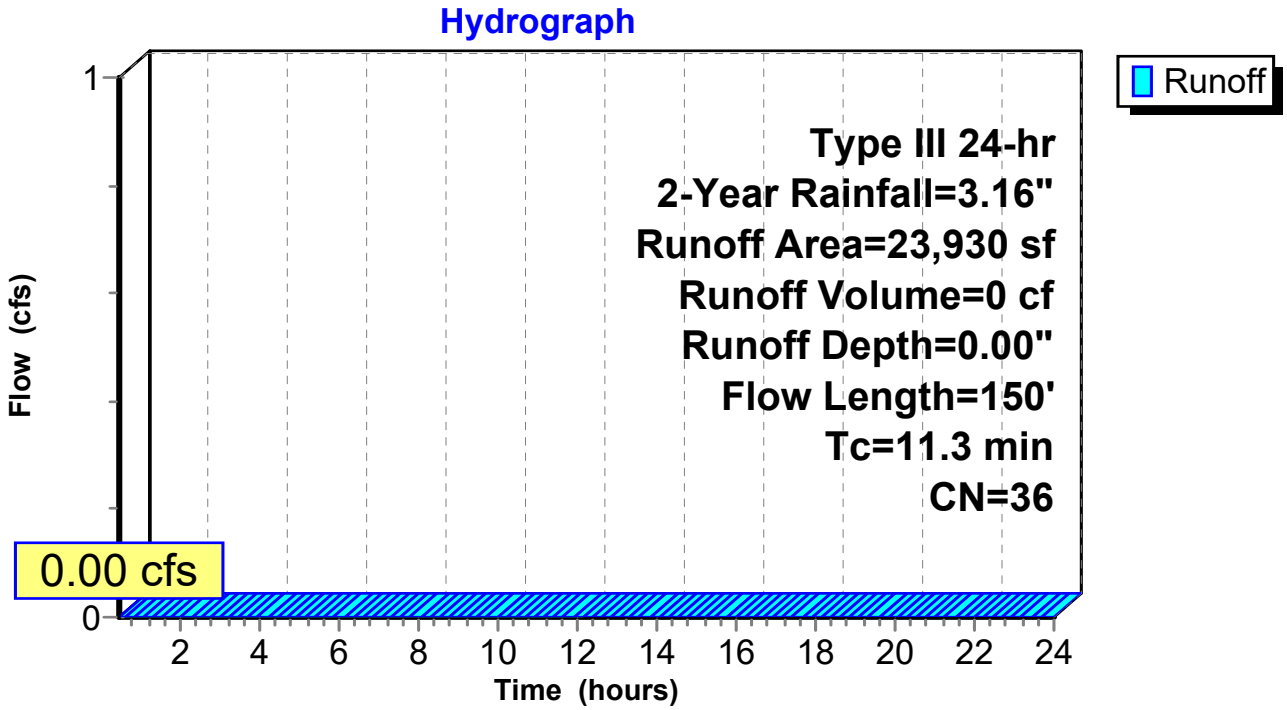
Runoff = 0.00 cfs @ 0.50 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.16"

Area (sf)	CN	Description
23,930	36	Woods, Fair, HSG A
23,930		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0280	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
0.8	100	0.0170	2.10		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.3	150	Total			

Subcatchment SA#7: Subcat SA#7



Summary for Subcatchment SA#8: Subcat SA#8

[45] Hint: Runoff=Zero

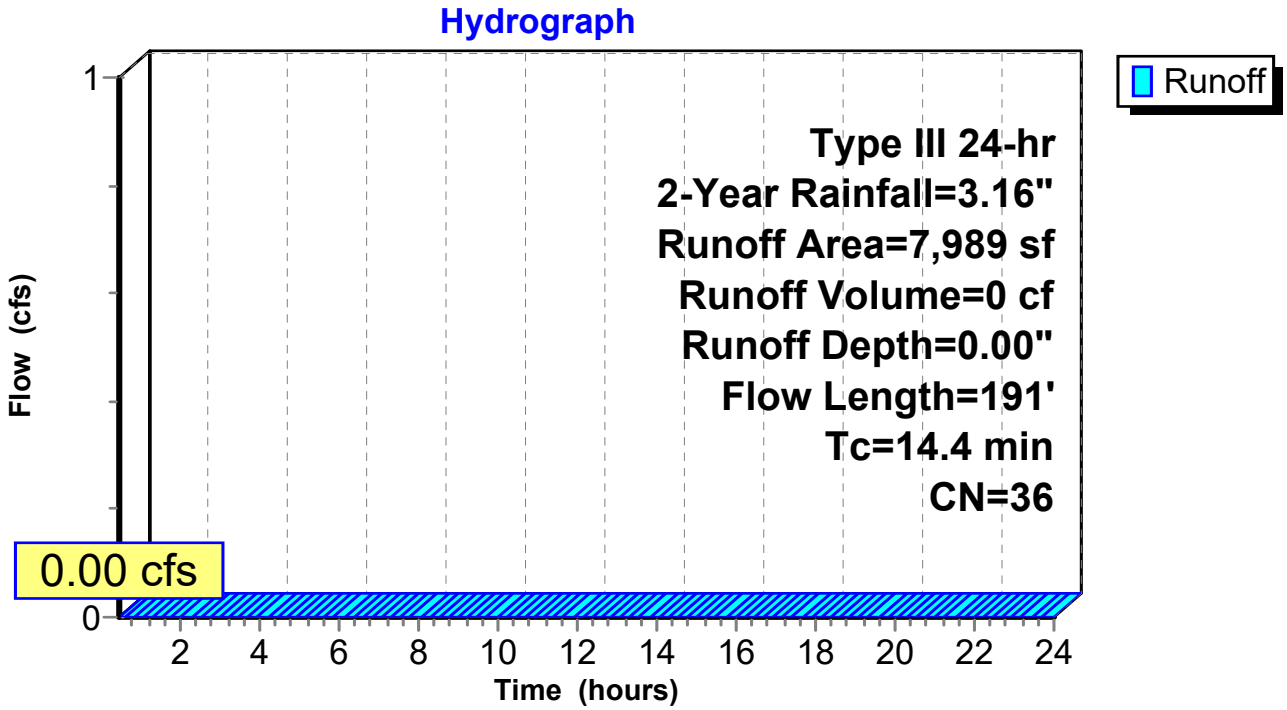
Runoff = 0.00 cfs @ 0.50 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.16"

Area (sf)	CN	Description
7,989	36	Woods, Fair, HSG A
7,989		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0280	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
3.9	141	0.0014	0.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
14.4	191	Total			

Subcatchment SA#8: Subcat SA#8



Time span=0.50-24.00 hrs, dt=0.02 hrs, 1176 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment SA#1: Subcat SA#1 Runoff Area=4,285 sf 6.71% Impervious Runoff Depth>0.63"
Flow Length=66' Slope=0.0100 '/' Tc=16.0 min CN=51 Runoff=0.03 cfs 224 cf

Subcatchment SA#2: Subcat SA#2 Runoff Area=1,735 sf 8.10% Impervious Runoff Depth>0.28"
Flow Length=32' Tc=3.3 min CN=43 Runoff=0.00 cfs 40 cf

Subcatchment SA#3: Subcat SA#3 Runoff Area=12,581 sf 7.82% Impervious Runoff Depth>0.40"
Flow Length=167' Tc=16.8 min CN=46 Runoff=0.04 cfs 415 cf

Subcatchment SA#4: Subcat SA#4 Runoff Area=11,524 sf 0.00% Impervious Runoff Depth>0.07"
Flow Length=120' Slope=0.0100 '/' Tc=16.5 min CN=36 Runoff=0.00 cfs 68 cf

Subcatchment SA#5: Subcat SA#5 Runoff Area=22,311 sf 0.00% Impervious Runoff Depth>0.07"
Flow Length=137' Tc=13.3 min CN=36 Runoff=0.00 cfs 131 cf

Subcatchment SA#6: Subcat SA#6 Runoff Area=13,539 sf 0.00% Impervious Runoff Depth>0.07"
Flow Length=119' Tc=10.4 min CN=36 Runoff=0.00 cfs 80 cf

Subcatchment SA#7: Subcat SA#7 Runoff Area=23,930 sf 0.00% Impervious Runoff Depth>0.07"
Flow Length=150' Tc=11.3 min CN=36 Runoff=0.01 cfs 141 cf

Subcatchment SA#8: Subcat SA#8 Runoff Area=7,989 sf 0.00% Impervious Runoff Depth>0.07"
Flow Length=191' Tc=14.4 min CN=36 Runoff=0.00 cfs 47 cf

Total Runoff Area = 97,894 sf Runoff Volume = 1,146 cf Average Runoff Depth = 0.14"
98.56% Pervious = 96,482 sf 1.44% Impervious = 1,412 sf

Summary for Subcatchment SA#1: Subcat SA#1

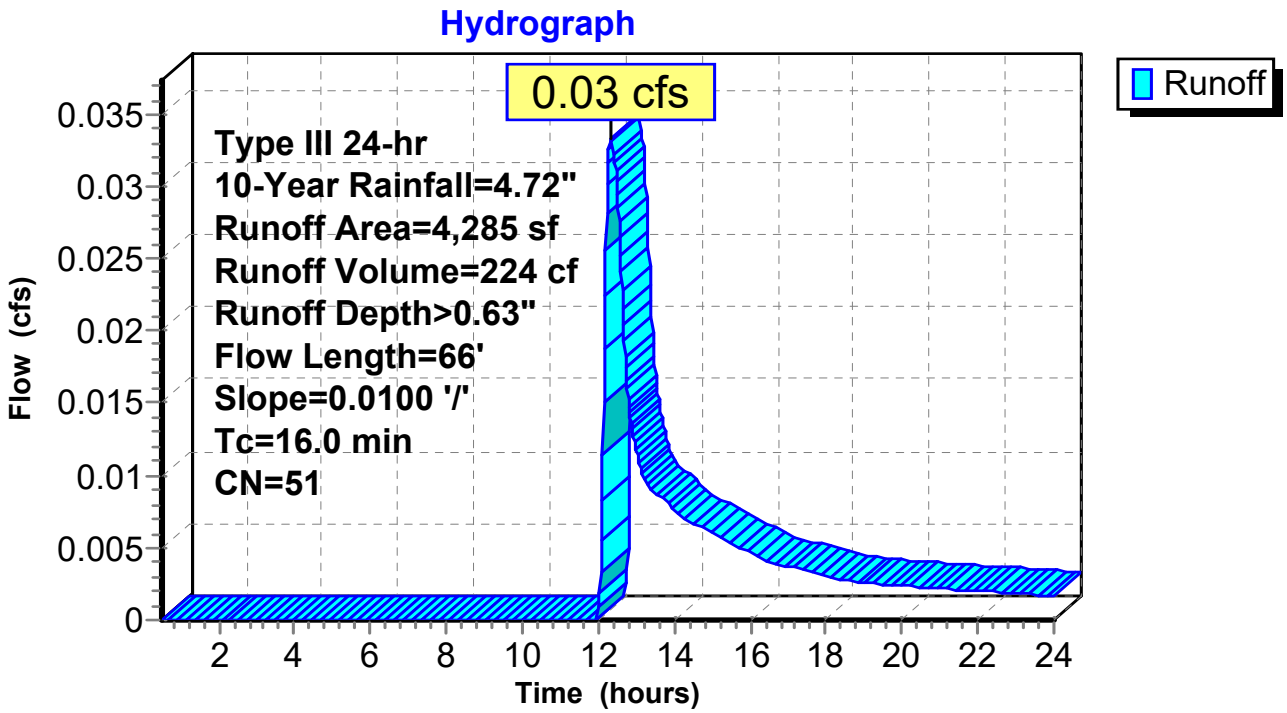
Runoff = 0.03 cfs @ 12.33 hrs, Volume= 224 cf, Depth> 0.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Rainfall=4.72"

Area (sf)	CN	Description
746	49	50-75% Grass cover, Fair, HSG A
905	76	Gravel roads, HSG A
288	98	Roofs, HSG A
2,346	36	Woods, Fair, HSG A
4,285	51	Weighted Average
3,997		93.29% Pervious Area
288		6.71% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.8	50	0.0100	0.05		**Sheet Flow, Woods** Woods: Light underbrush n= 0.400 P2= 3.40"
0.2	16	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.0	66	Total			

Subcatchment SA#1: Subcat SA#1



Summary for Subcatchment SA#2: Subcat SA#2

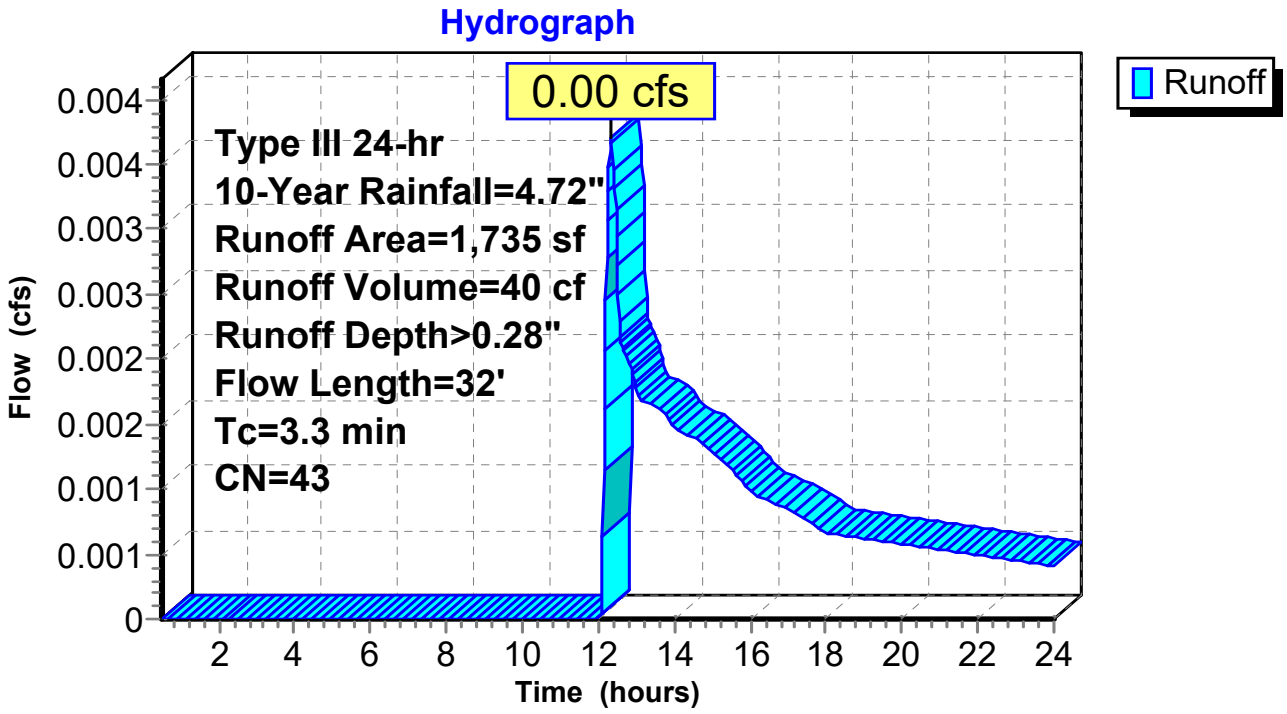
Runoff = 0.00 cfs @ 12.35 hrs, Volume= 40 cf, Depth> 0.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Rainfall=4.72"

Area (sf)	CN	Description
321	49	50-75% Grass cover, Fair, HSG A
141	98	Roofs, HSG A
1,273	36	Woods, Fair, HSG A
1,735	43	Weighted Average
1,594		91.90% Pervious Area
141		8.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.2	18	0.0700	0.09		**Sheet Flow, Woods** Woods: Light underbrush n= 0.400 P2= 3.40"
0.1	14	0.0600	3.94		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
3.3	32	Total			

Subcatchment SA#2: Subcat SA#2



Summary for Subcatchment SA#3: Subcat SA#3

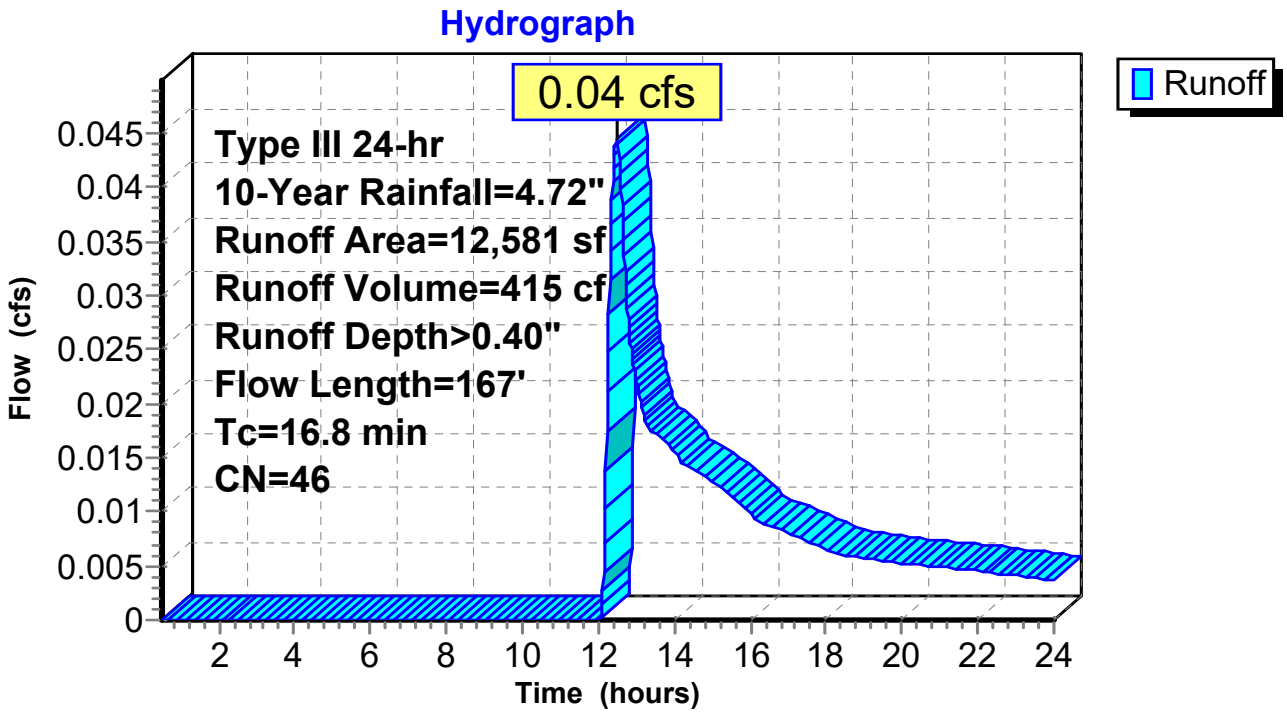
Runoff = 0.04 cfs @ 12.48 hrs, Volume= 415 cf, Depth> 0.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Rainfall=4.72"

Area (sf)	CN	Description
2,774	49	50-75% Grass cover, Fair, HSG A
640	76	Gravel roads, HSG A
983	98	Roofs, HSG A
8,184	36	Woods, Fair, HSG A
12,581	46	Weighted Average
11,597		92.18% Pervious Area
983		7.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.8	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
1.0	117	0.0150	1.97		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.8	167	Total			

Subcatchment SA#3: Subcat SA#3



Summary for Subcatchment SA#4: Subcat SA#4

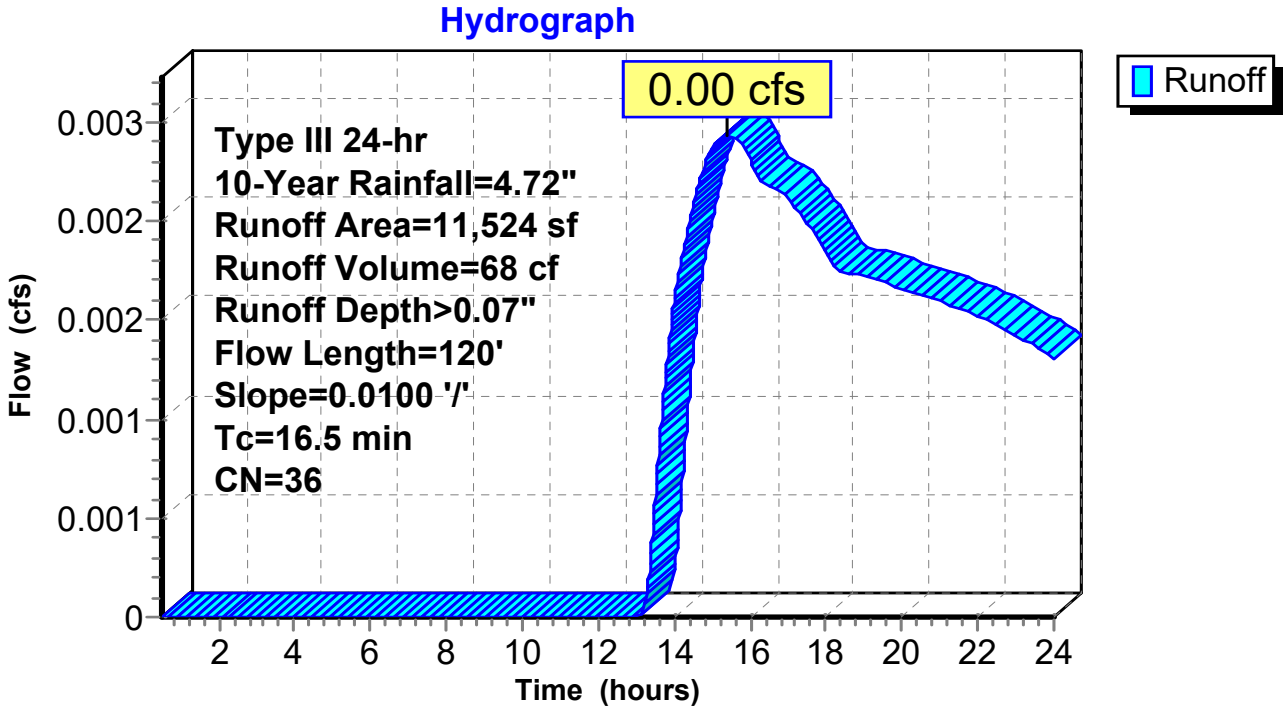
Runoff = 0.00 cfs @ 15.42 hrs, Volume= 68 cf, Depth> 0.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Rainfall=4.72"

Area (sf)	CN	Description
11,524	36	Woods, Fair, HSG A
11,524		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.8	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
0.7	70	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.5	120	Total			

Subcatchment SA#4: Subcat SA#4



Summary for Subcatchment SA#5: Subcat SA#5

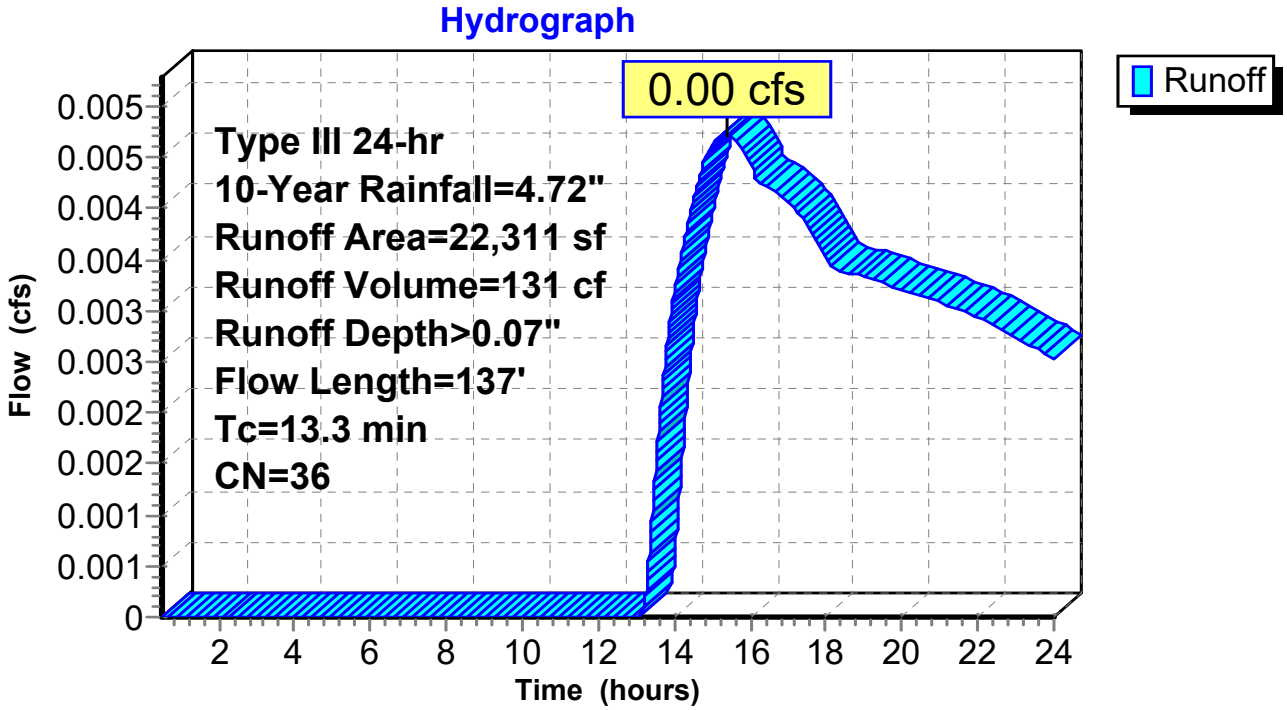
Runoff = 0.00 cfs @ 15.37 hrs, Volume= 131 cf, Depth> 0.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Rainfall=4.72"

Area (sf)	CN	Description
22,311	36	Woods, Fair, HSG A
22,311		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0180	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
0.8	87	0.0140	1.90		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
13.3	137	Total			

Subcatchment SA#5: Subcat SA#5



Summary for Subcatchment SA#6: Subcat SA#6

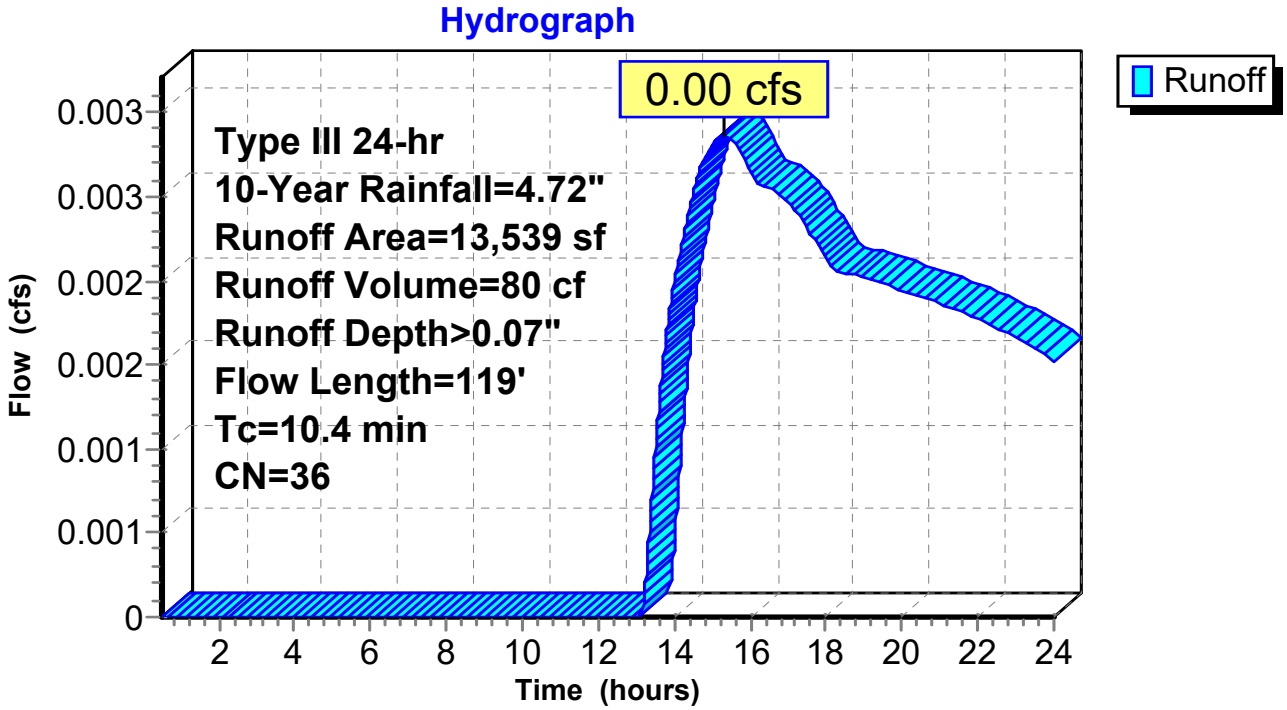
Runoff = 0.00 cfs @ 15.32 hrs, Volume= 80 cf, Depth> 0.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Rainfall=4.72"

Area (sf)	CN	Description
13,539	36	Woods, Fair, HSG A
13,539		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.1	50	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
1.3	69	0.0030	0.88		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
10.4	119	Total			

Subcatchment SA#6: Subcat SA#6



Summary for Subcatchment SA#7: Subcat SA#7

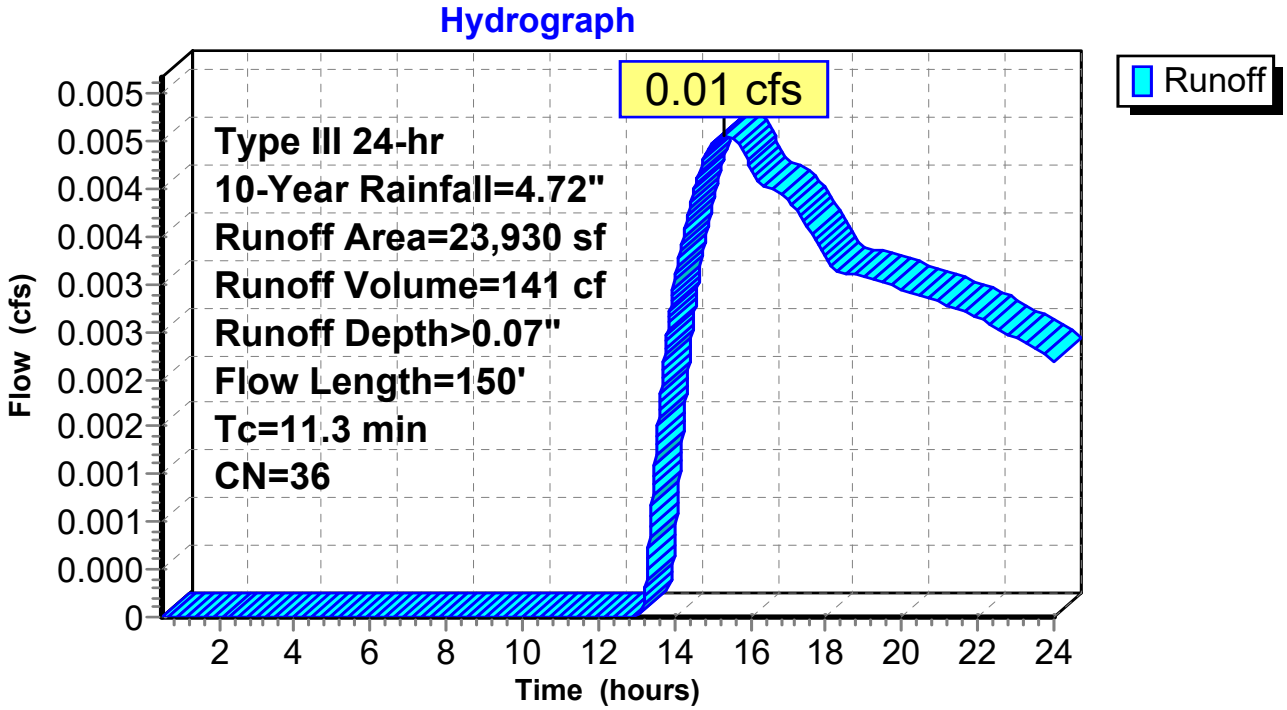
Runoff = 0.01 cfs @ 15.30 hrs, Volume= 141 cf, Depth> 0.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Rainfall=4.72"

Area (sf)	CN	Description
23,930	36	Woods, Fair, HSG A
23,930		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0280	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
0.8	100	0.0170	2.10		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.3	150	Total			

Subcatchment SA#7: Subcat SA#7



Summary for Subcatchment SA#8: Subcat SA#8

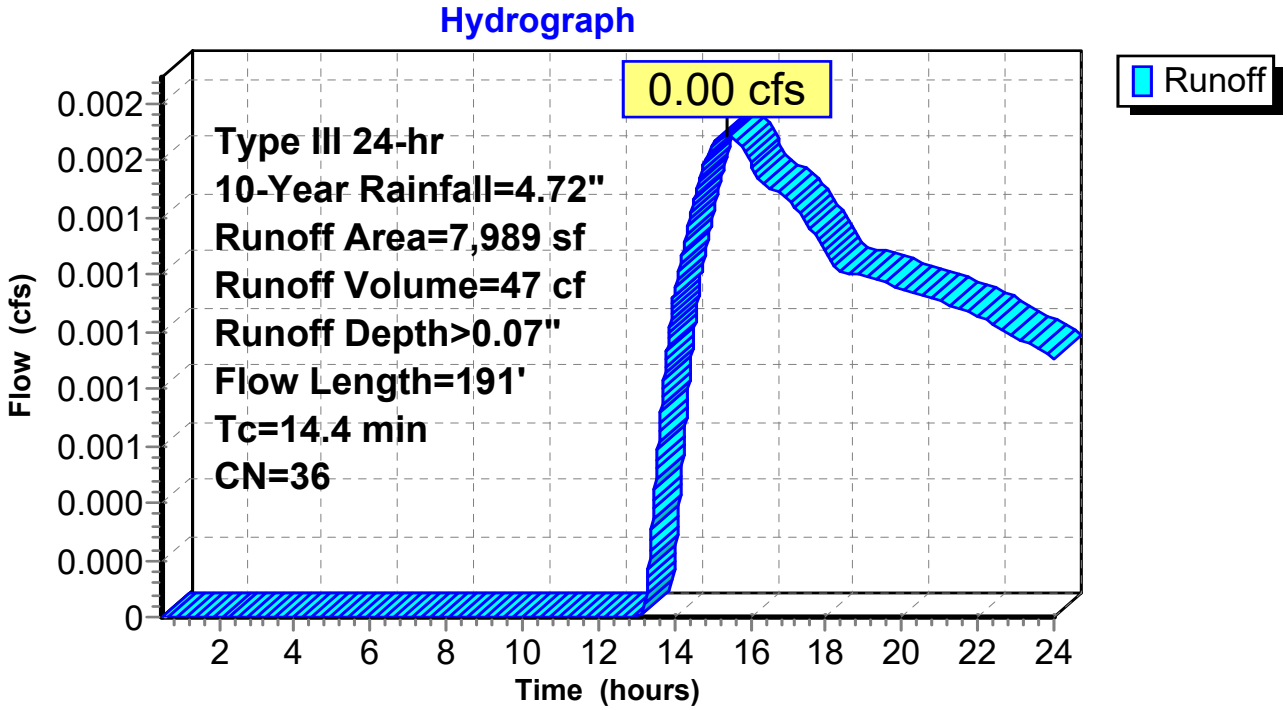
Runoff = 0.00 cfs @ 15.38 hrs, Volume= 47 cf, Depth> 0.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Rainfall=4.72"

Area (sf)	CN	Description
7,989	36	Woods, Fair, HSG A
7,989		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0280	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
3.9	141	0.0014	0.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
14.4	191	Total			

Subcatchment SA#8: Subcat SA#8



Time span=0.50-24.00 hrs, dt=0.02 hrs, 1176 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment SA#1: Subcat SA#1 Runoff Area=4,285 sf 6.71% Impervious Runoff Depth>1.18"
Flow Length=66' Slope=0.0100 '/' Tc=16.0 min CN=51 Runoff=0.08 cfs 421 cf

Subcatchment SA#2: Subcat SA#2 Runoff Area=1,735 sf 8.10% Impervious Runoff Depth>0.65"
Flow Length=32' Tc=3.3 min CN=43 Runoff=0.02 cfs 94 cf

Subcatchment SA#3: Subcat SA#3 Runoff Area=12,581 sf 7.82% Impervious Runoff Depth>0.84"
Flow Length=167' Tc=16.8 min CN=46 Runoff=0.13 cfs 877 cf

Subcatchment SA#4: Subcat SA#4 Runoff Area=11,524 sf 0.00% Impervious Runoff Depth>0.28"
Flow Length=120' Slope=0.0100 '/' Tc=16.5 min CN=36 Runoff=0.02 cfs 268 cf

Subcatchment SA#5: Subcat SA#5 Runoff Area=22,311 sf 0.00% Impervious Runoff Depth>0.28"
Flow Length=137' Tc=13.3 min CN=36 Runoff=0.03 cfs 520 cf

Subcatchment SA#6: Subcat SA#6 Runoff Area=13,539 sf 0.00% Impervious Runoff Depth>0.28"
Flow Length=119' Tc=10.4 min CN=36 Runoff=0.02 cfs 316 cf

Subcatchment SA#7: Subcat SA#7 Runoff Area=23,930 sf 0.00% Impervious Runoff Depth>0.28"
Flow Length=150' Tc=11.3 min CN=36 Runoff=0.04 cfs 559 cf

Subcatchment SA#8: Subcat SA#8 Runoff Area=7,989 sf 0.00% Impervious Runoff Depth>0.28"
Flow Length=191' Tc=14.4 min CN=36 Runoff=0.01 cfs 186 cf

Total Runoff Area = 97,894 sf Runoff Volume = 3,241 cf Average Runoff Depth = 0.40"
98.56% Pervious = 96,482 sf 1.44% Impervious = 1,412 sf

Summary for Subcatchment SA#1: Subcat SA#1

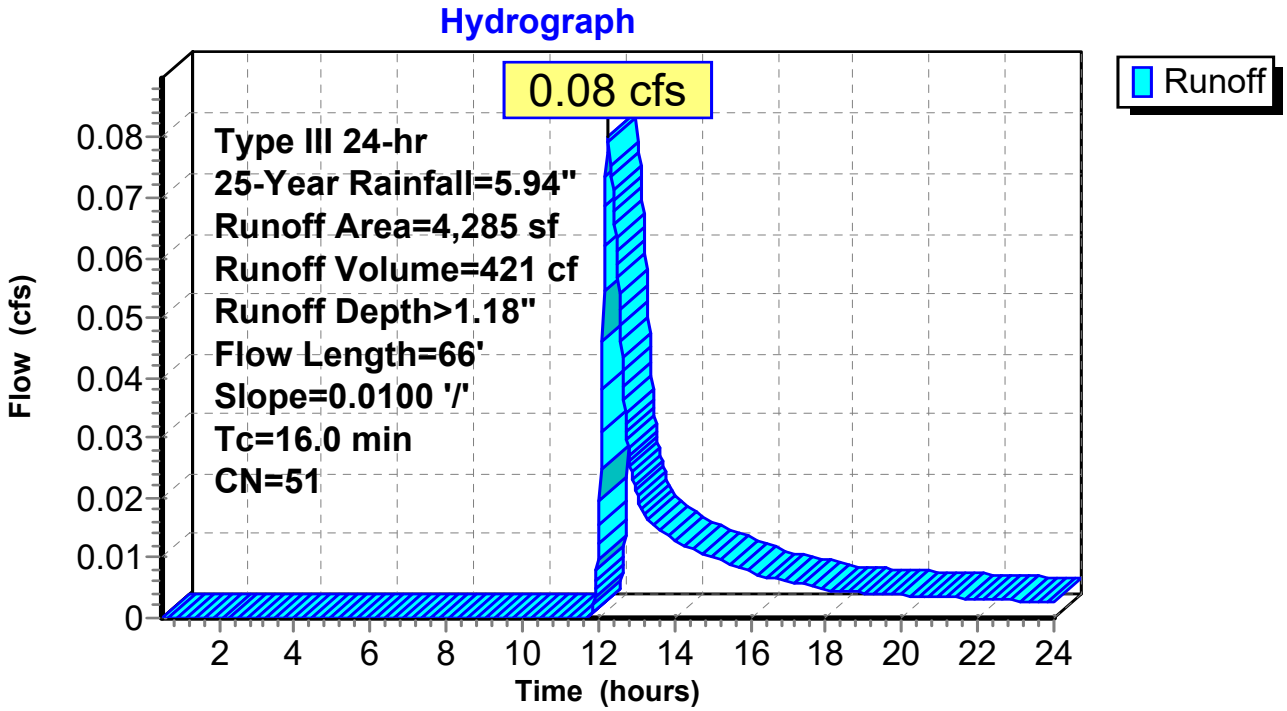
Runoff = 0.08 cfs @ 12.27 hrs, Volume= 421 cf, Depth> 1.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year Rainfall=5.94"

Area (sf)	CN	Description
746	49	50-75% Grass cover, Fair, HSG A
905	76	Gravel roads, HSG A
288	98	Roofs, HSG A
2,346	36	Woods, Fair, HSG A
4,285	51	Weighted Average
3,997		93.29% Pervious Area
288		6.71% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.8	50	0.0100	0.05		**Sheet Flow, Woods** Woods: Light underbrush n= 0.400 P2= 3.40"
0.2	16	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.0	66	Total			

Subcatchment SA#1: Subcat SA#1



Summary for Subcatchment SA#2: Subcat SA#2

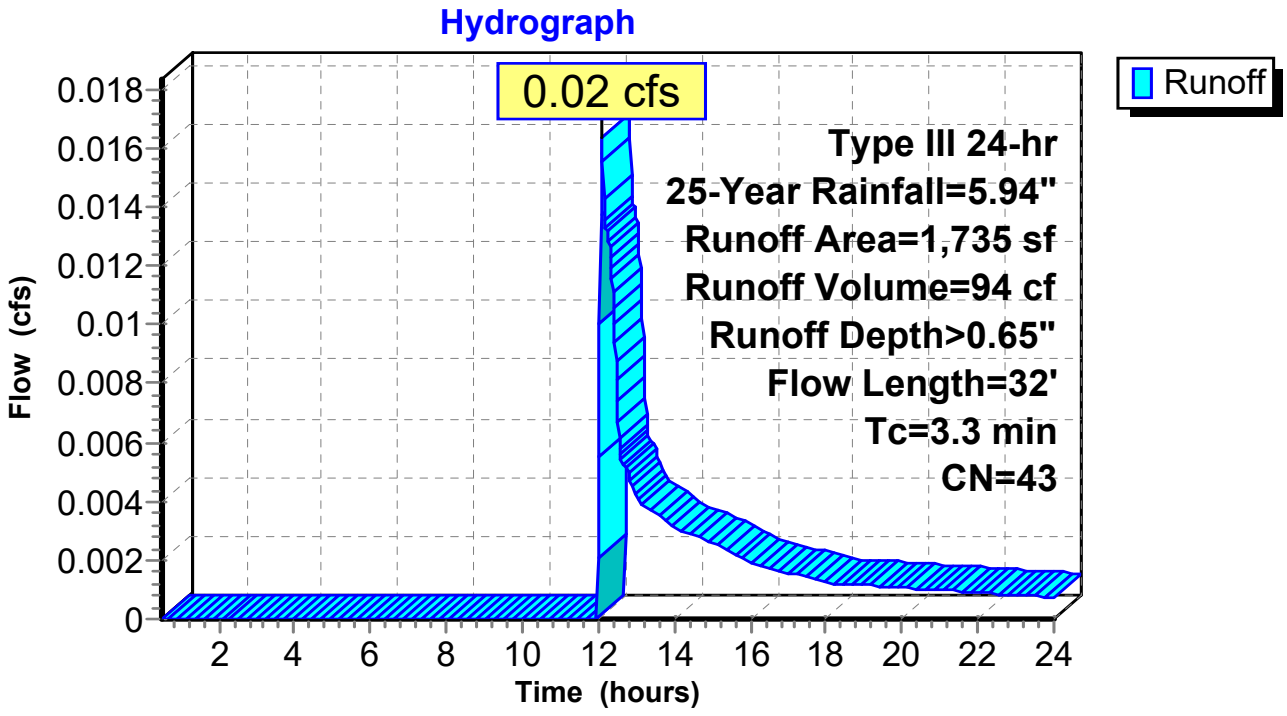
Runoff = 0.02 cfs @ 12.10 hrs, Volume= 94 cf, Depth> 0.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year Rainfall=5.94"

Area (sf)	CN	Description
321	49	50-75% Grass cover, Fair, HSG A
141	98	Roofs, HSG A
1,273	36	Woods, Fair, HSG A
1,735	43	Weighted Average
1,594		91.90% Pervious Area
141		8.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.2	18	0.0700	0.09		**Sheet Flow, Woods** Woods: Light underbrush n= 0.400 P2= 3.40"
0.1	14	0.0600	3.94		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
3.3	32	Total			

Subcatchment SA#2: Subcat SA#2



Summary for Subcatchment SA#3: Subcat SA#3

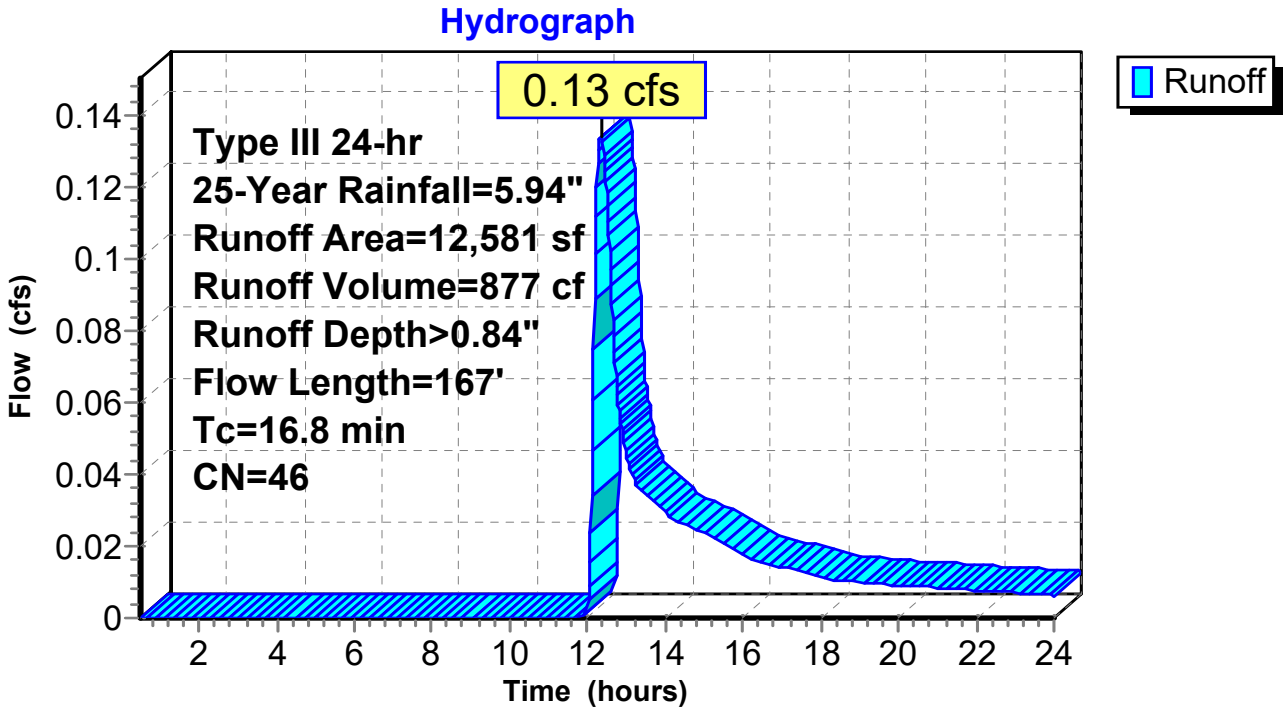
Runoff = 0.13 cfs @ 12.33 hrs, Volume= 877 cf, Depth> 0.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year Rainfall=5.94"

Area (sf)	CN	Description
2,774	49	50-75% Grass cover, Fair, HSG A
640	76	Gravel roads, HSG A
983	98	Roofs, HSG A
8,184	36	Woods, Fair, HSG A
12,581	46	Weighted Average
11,597		92.18% Pervious Area
983		7.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.8	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
1.0	117	0.0150	1.97		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.8	167	Total			

Subcatchment SA#3: Subcat SA#3



Summary for Subcatchment SA#4: Subcat SA#4

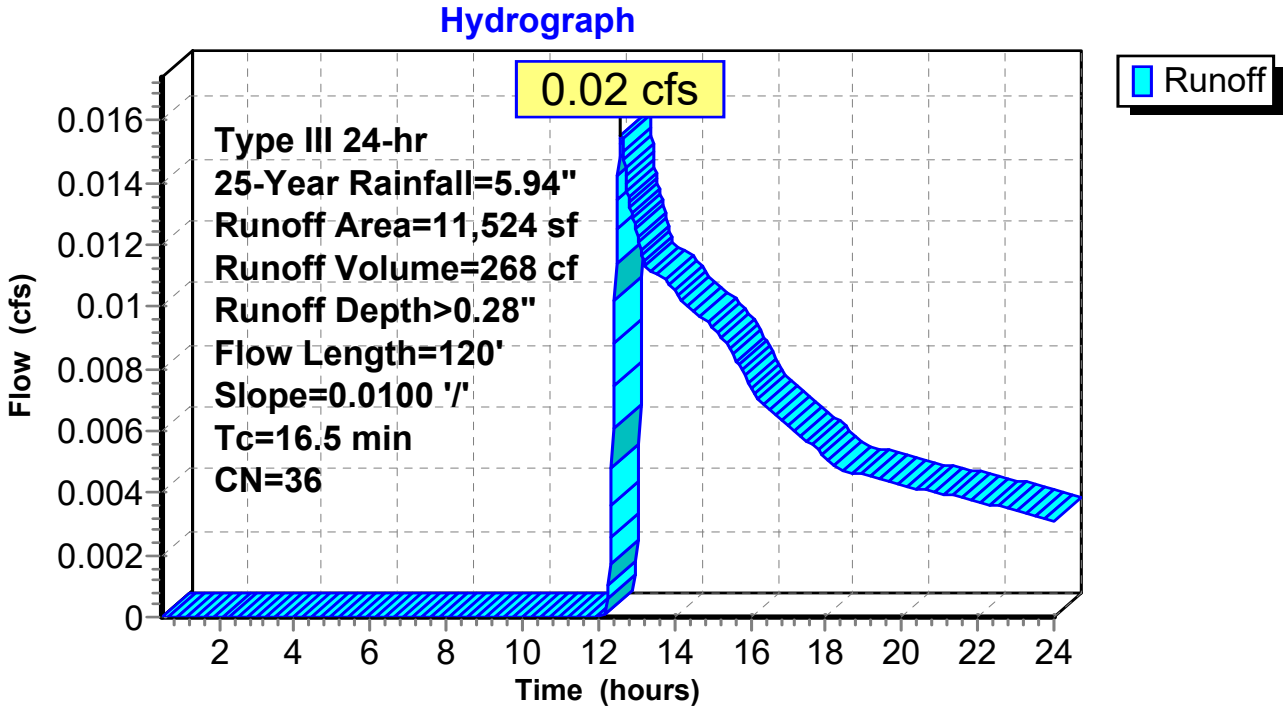
Runoff = 0.02 cfs @ 12.60 hrs, Volume= 268 cf, Depth> 0.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year Rainfall=5.94"

Area (sf)	CN	Description
11,524	36	Woods, Fair, HSG A
11,524		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.8	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
0.7	70	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.5	120	Total			

Subcatchment SA#4: Subcat SA#4



Summary for Subcatchment SA#5: Subcat SA#5

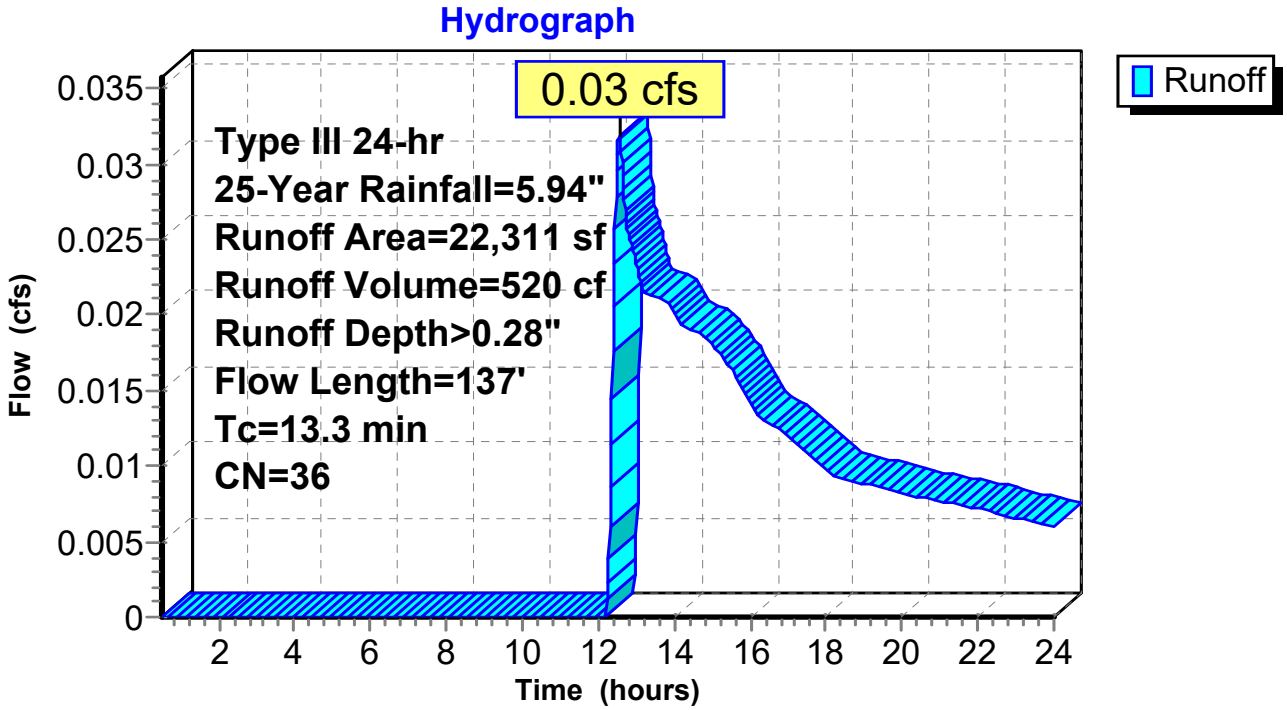
Runoff = 0.03 cfs @ 12.55 hrs, Volume= 520 cf, Depth> 0.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year Rainfall=5.94"

Area (sf)	CN	Description
22,311	36	Woods, Fair, HSG A
22,311		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0180	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
0.8	87	0.0140	1.90		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
13.3	137	Total			

Subcatchment SA#5: Subcat SA#5



Summary for Subcatchment SA#6: Subcat SA#6

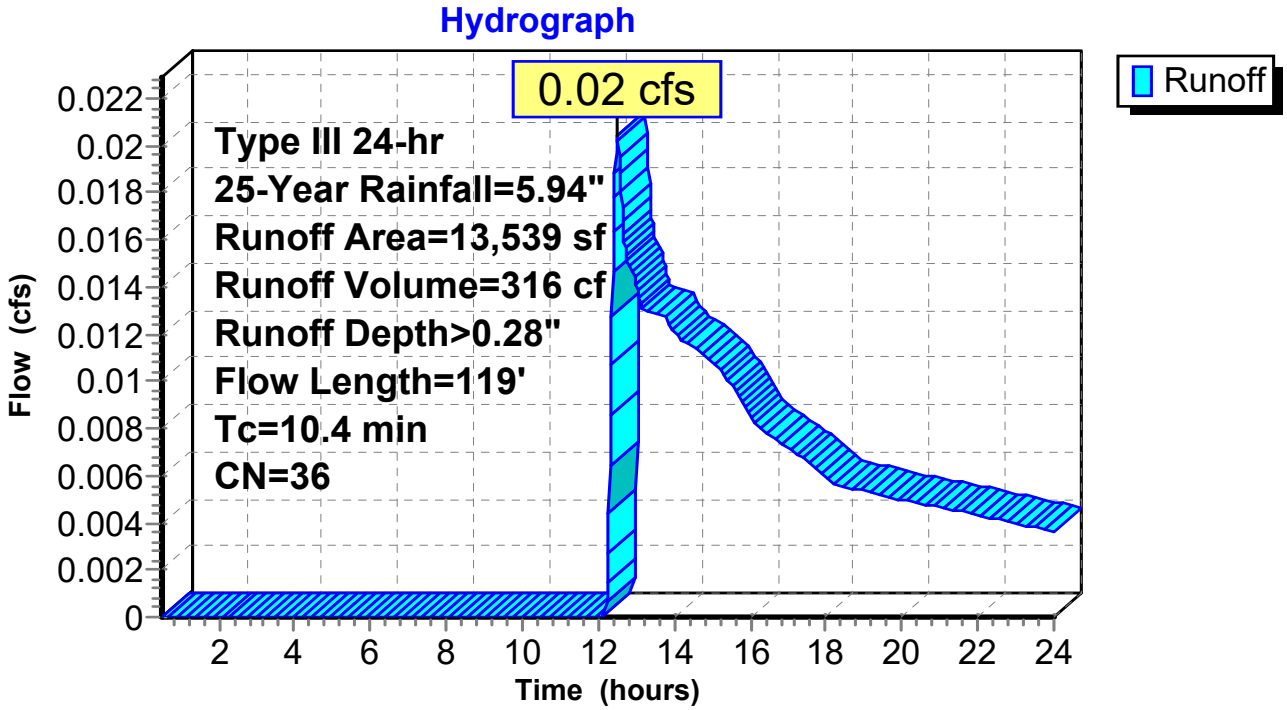
Runoff = 0.02 cfs @ 12.51 hrs, Volume= 316 cf, Depth> 0.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year Rainfall=5.94"

Area (sf)	CN	Description
13,539	36	Woods, Fair, HSG A
13,539		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.1	50	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
1.3	69	0.0030	0.88		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
10.4	119	Total			

Subcatchment SA#6: Subcat SA#6



Summary for Subcatchment SA#7: Subcat SA#7

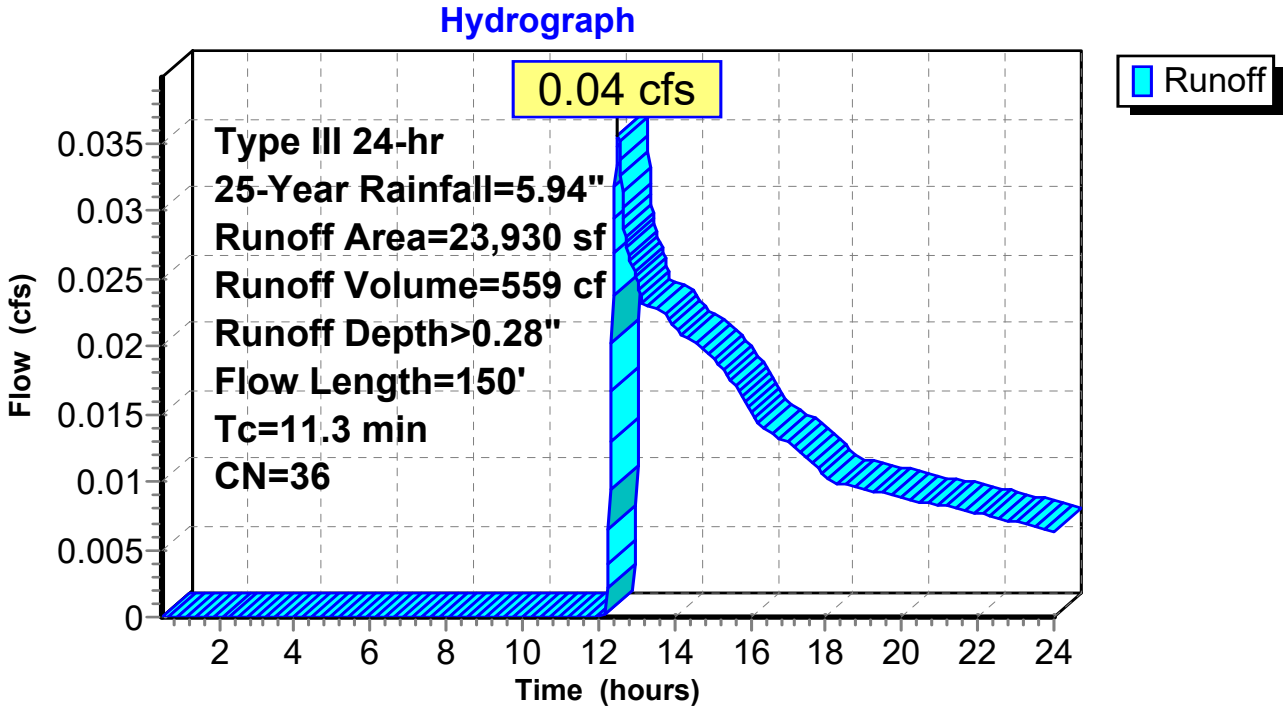
Runoff = 0.04 cfs @ 12.52 hrs, Volume= 559 cf, Depth> 0.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year Rainfall=5.94"

Area (sf)	CN	Description
23,930	36	Woods, Fair, HSG A
23,930		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0280	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
0.8	100	0.0170	2.10		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.3	150	Total			

Subcatchment SA#7: Subcat SA#7



Summary for Subcatchment SA#8: Subcat SA#8

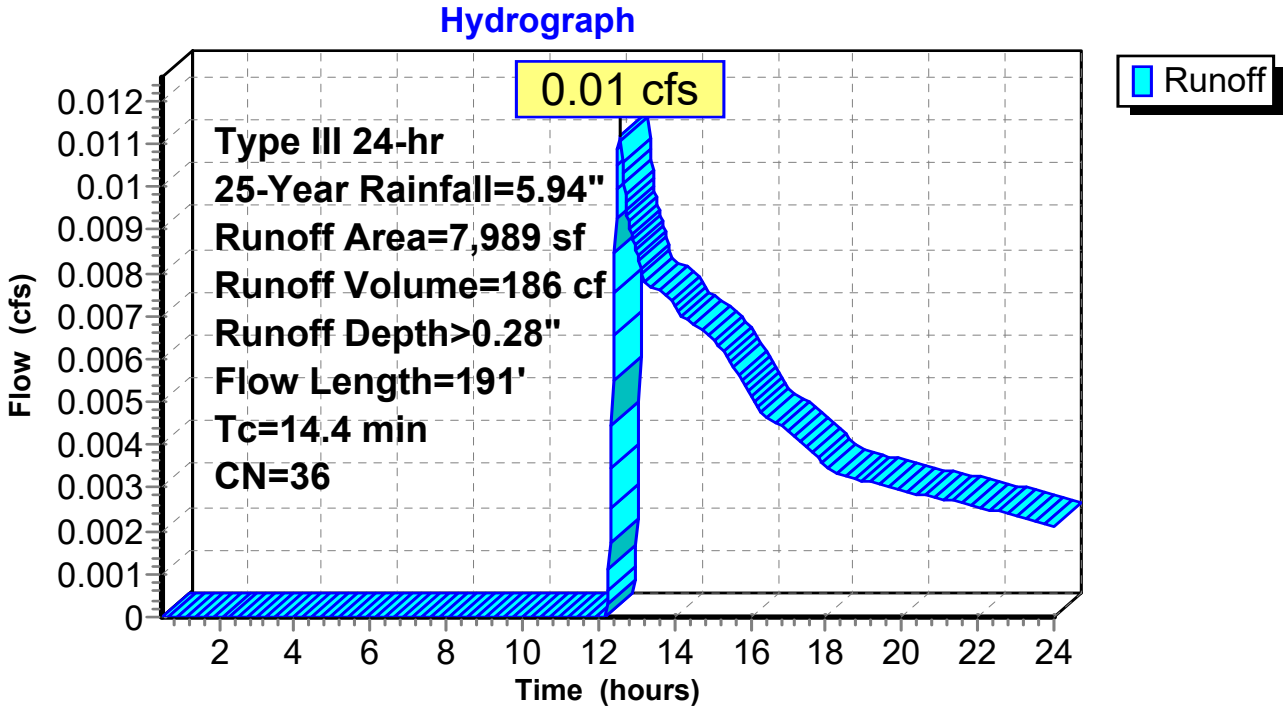
Runoff = 0.01 cfs @ 12.57 hrs, Volume= 186 cf, Depth> 0.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year Rainfall=5.94"

Area (sf)	CN	Description
7,989	36	Woods, Fair, HSG A
7,989		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0280	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
3.9	141	0.0014	0.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
14.4	191	Total			

Subcatchment SA#8: Subcat SA#8



Time span=0.50-24.00 hrs, dt=0.02 hrs, 1176 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment SA#1: Subcat SA#1 Runoff Area=4,285 sf 6.71% Impervious Runoff Depth>2.62"
Flow Length=66' Slope=0.0100 '/' Tc=16.0 min CN=51 Runoff=0.21 cfs 934 cf

Subcatchment SA#2: Subcat SA#2 Runoff Area=1,735 sf 8.10% Impervious Runoff Depth>1.75"
Flow Length=32' Tc=3.3 min CN=43 Runoff=0.07 cfs 253 cf

Subcatchment SA#3: Subcat SA#3 Runoff Area=12,581 sf 7.82% Impervious Runoff Depth>2.07"
Flow Length=167' Tc=16.8 min CN=46 Runoff=0.44 cfs 2,165 cf

Subcatchment SA#4: Subcat SA#4 Runoff Area=11,524 sf 0.00% Impervious Runoff Depth>1.04"
Flow Length=120' Slope=0.0100 '/' Tc=16.5 min CN=36 Runoff=0.14 cfs 1,001 cf

Subcatchment SA#5: Subcat SA#5 Runoff Area=22,311 sf 0.00% Impervious Runoff Depth>1.04"
Flow Length=137' Tc=13.3 min CN=36 Runoff=0.28 cfs 1,940 cf

Subcatchment SA#6: Subcat SA#6 Runoff Area=13,539 sf 0.00% Impervious Runoff Depth>1.04"
Flow Length=119' Tc=10.4 min CN=36 Runoff=0.18 cfs 1,179 cf

Subcatchment SA#7: Subcat SA#7 Runoff Area=23,930 sf 0.00% Impervious Runoff Depth>1.04"
Flow Length=150' Tc=11.3 min CN=36 Runoff=0.32 cfs 2,083 cf

Subcatchment SA#8: Subcat SA#8 Runoff Area=7,989 sf 0.00% Impervious Runoff Depth>1.04"
Flow Length=191' Tc=14.4 min CN=36 Runoff=0.10 cfs 694 cf

Total Runoff Area = 97,894 sf Runoff Volume = 10,250 cf Average Runoff Depth = 1.26"
98.56% Pervious = 96,482 sf 1.44% Impervious = 1,412 sf

Summary for Subcatchment SA#1: Subcat SA#1

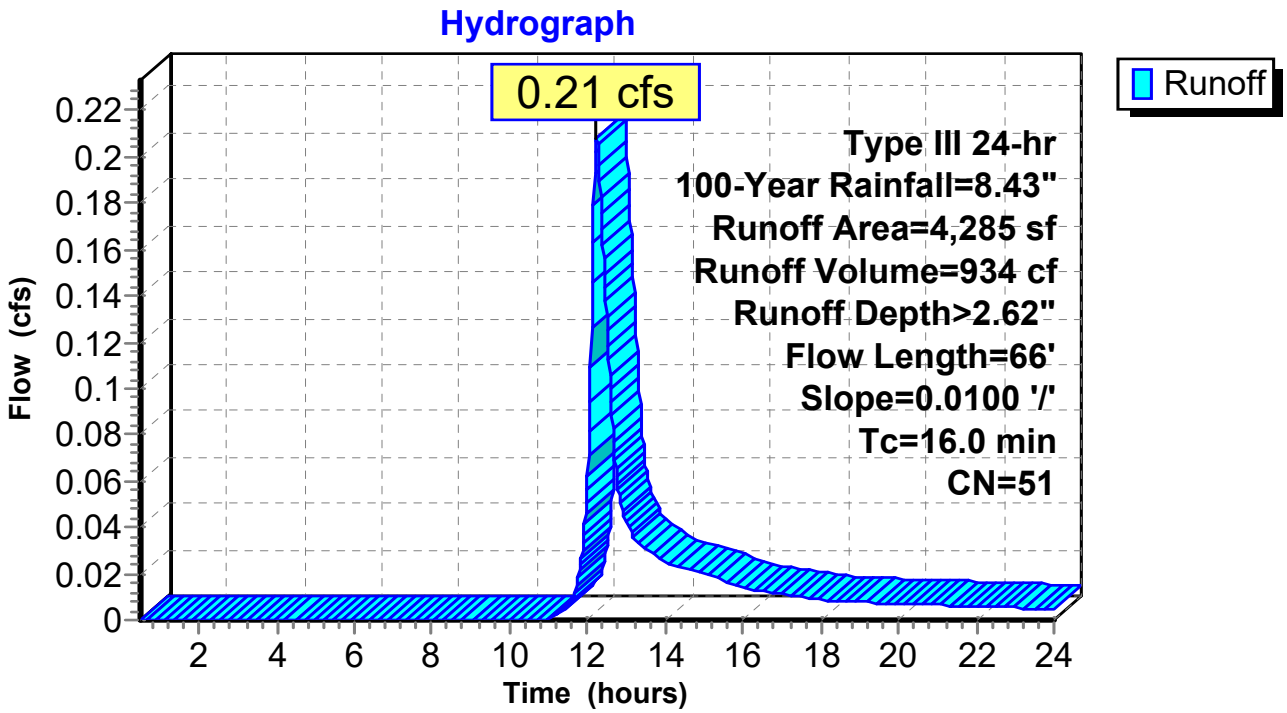
Runoff = 0.21 cfs @ 12.24 hrs, Volume= 934 cf, Depth> 2.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=8.43"

Area (sf)	CN	Description
746	49	50-75% Grass cover, Fair, HSG A
905	76	Gravel roads, HSG A
288	98	Roofs, HSG A
2,346	36	Woods, Fair, HSG A
4,285	51	Weighted Average
3,997		93.29% Pervious Area
288		6.71% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.8	50	0.0100	0.05		**Sheet Flow, Woods** Woods: Light underbrush n= 0.400 P2= 3.40"
0.2	16	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.0	66	Total			

Subcatchment SA#1: Subcat SA#1



Summary for Subcatchment SA#2: Subcat SA#2

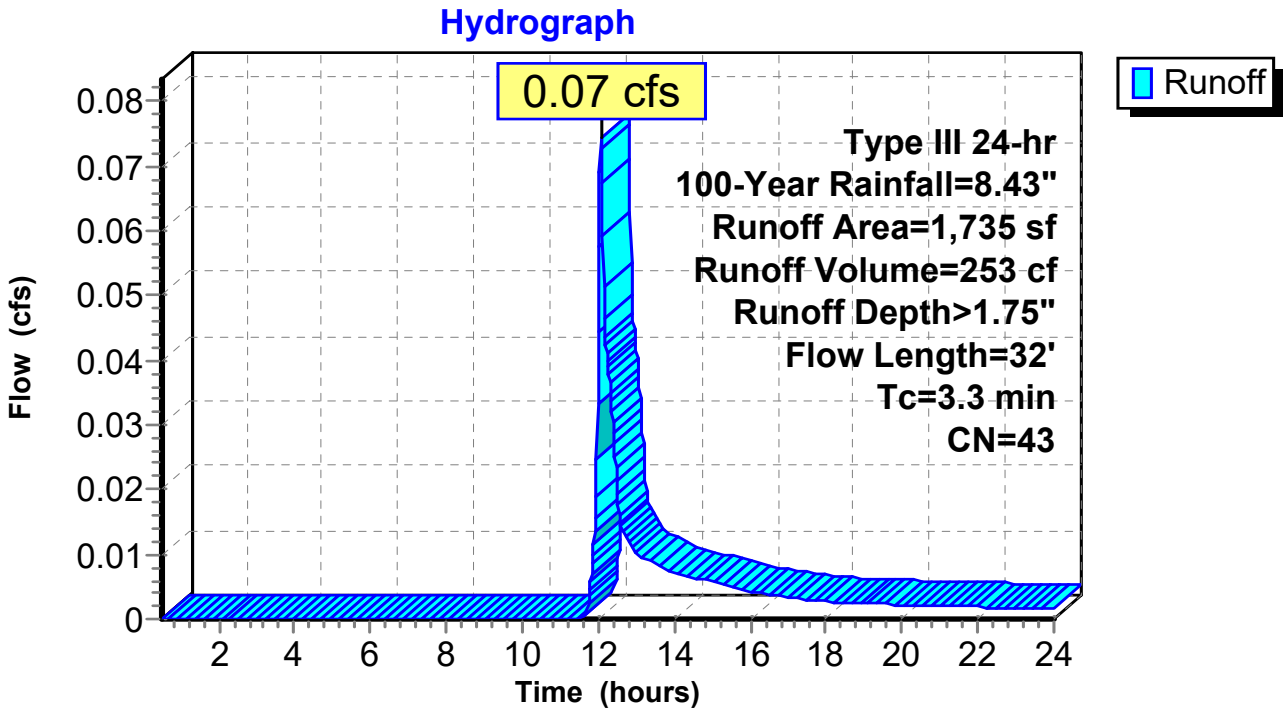
Runoff = 0.07 cfs @ 12.07 hrs, Volume= 253 cf, Depth> 1.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=8.43"

Area (sf)	CN	Description
321	49	50-75% Grass cover, Fair, HSG A
141	98	Roofs, HSG A
1,273	36	Woods, Fair, HSG A
1,735	43	Weighted Average
1,594		91.90% Pervious Area
141		8.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.2	18	0.0700	0.09		**Sheet Flow, Woods** Woods: Light underbrush n= 0.400 P2= 3.40"
0.1	14	0.0600	3.94		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
3.3	32	Total			

Subcatchment SA#2: Subcat SA#2



Summary for Subcatchment SA#3: Subcat SA#3

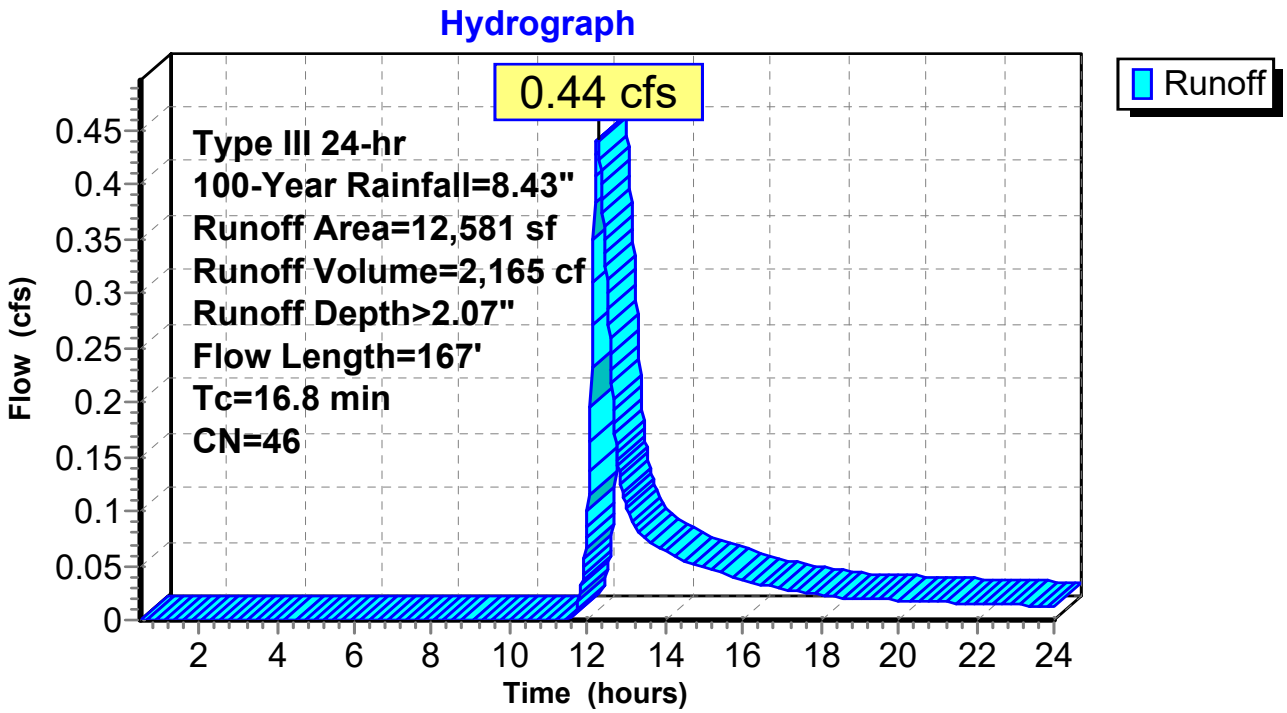
Runoff = 0.44 cfs @ 12.26 hrs, Volume= 2,165 cf, Depth> 2.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=8.43"

Area (sf)	CN	Description
2,774	49	50-75% Grass cover, Fair, HSG A
640	76	Gravel roads, HSG A
983	98	Roofs, HSG A
8,184	36	Woods, Fair, HSG A
12,581	46	Weighted Average
11,597		92.18% Pervious Area
983		7.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.8	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
1.0	117	0.0150	1.97		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.8	167	Total			

Subcatchment SA#3: Subcat SA#3



Summary for Subcatchment SA#4: Subcat SA#4

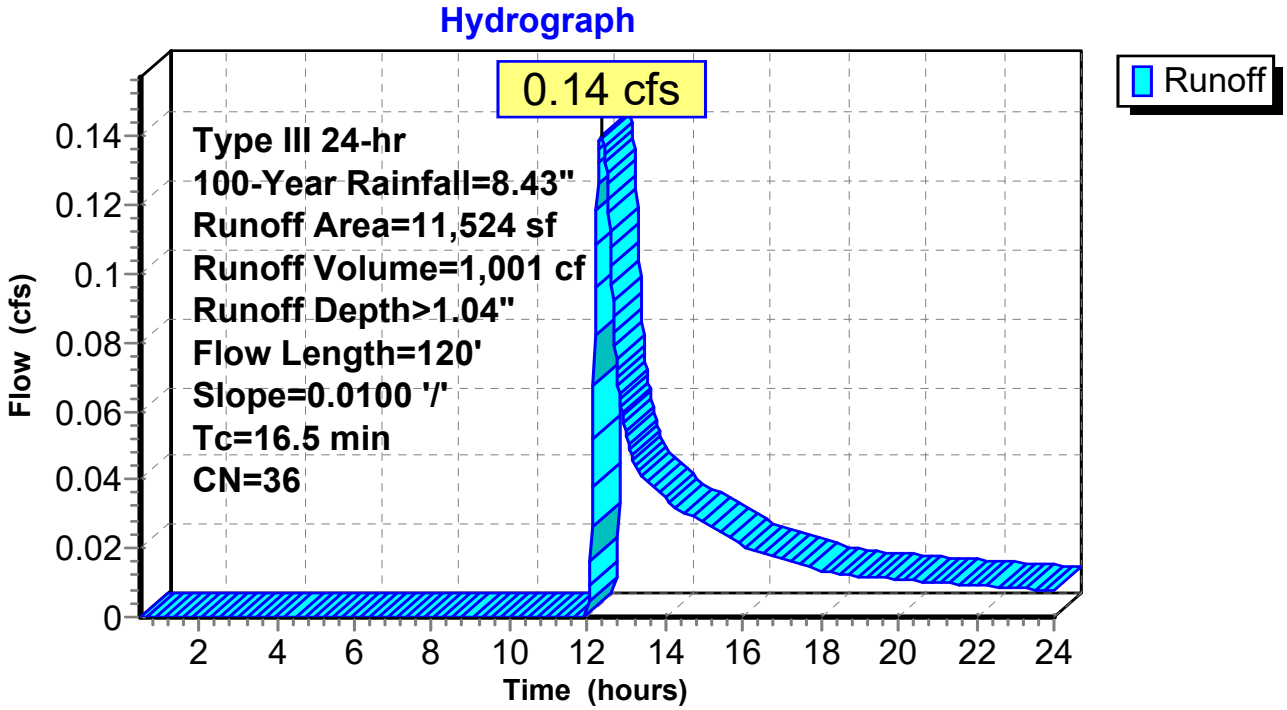
Runoff = 0.14 cfs @ 12.37 hrs, Volume= 1,001 cf, Depth> 1.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=8.43"

Area (sf)	CN	Description
11,524	36	Woods, Fair, HSG A
11,524		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.8	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
0.7	70	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.5	120	Total			

Subcatchment SA#4: Subcat SA#4



Summary for Subcatchment SA#5: Subcat SA#5

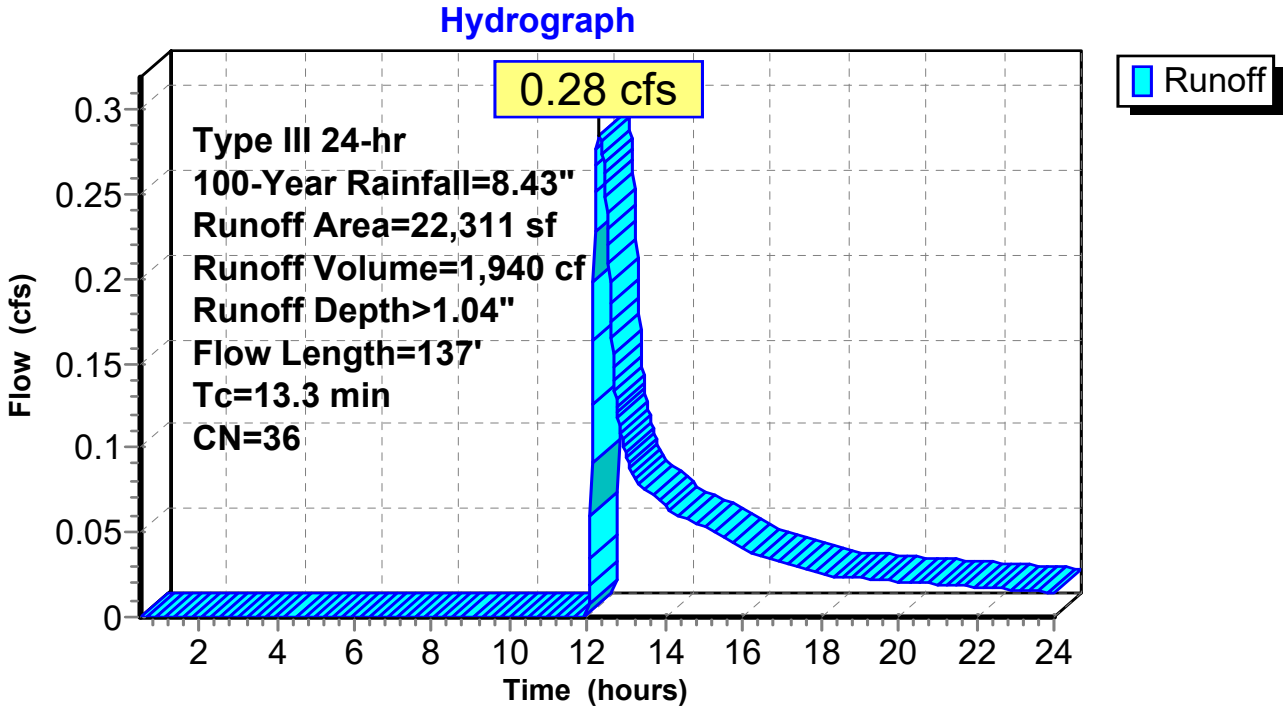
Runoff = 0.28 cfs @ 12.29 hrs, Volume= 1,940 cf, Depth> 1.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=8.43"

Area (sf)	CN	Description
22,311	36	Woods, Fair, HSG A
22,311		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0180	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
0.8	87	0.0140	1.90		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
13.3	137	Total			

Subcatchment SA#5: Subcat SA#5



Summary for Subcatchment SA#6: Subcat SA#6

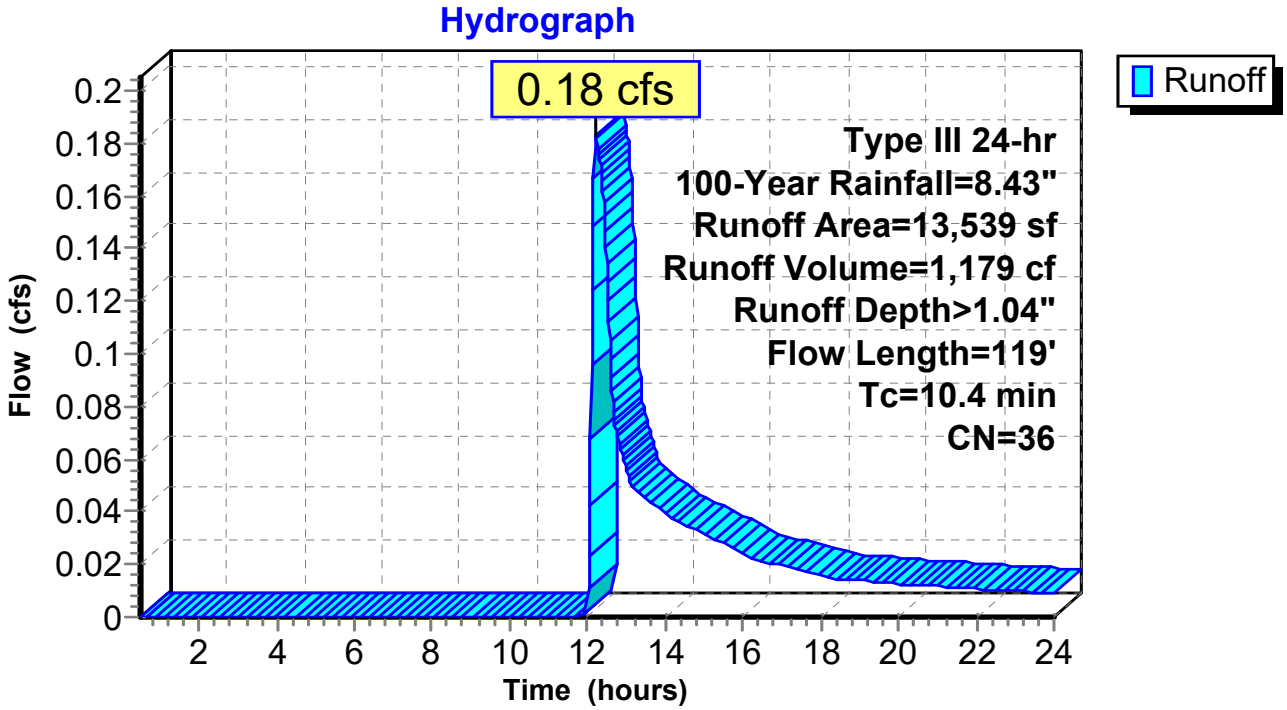
Runoff = 0.18 cfs @ 12.22 hrs, Volume= 1,179 cf, Depth> 1.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=8.43"

Area (sf)	CN	Description
13,539	36	Woods, Fair, HSG A
13,539		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.1	50	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
1.3	69	0.0030	0.88		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
10.4	119	Total			

Subcatchment SA#6: Subcat SA#6



Summary for Subcatchment SA#7: Subcat SA#7

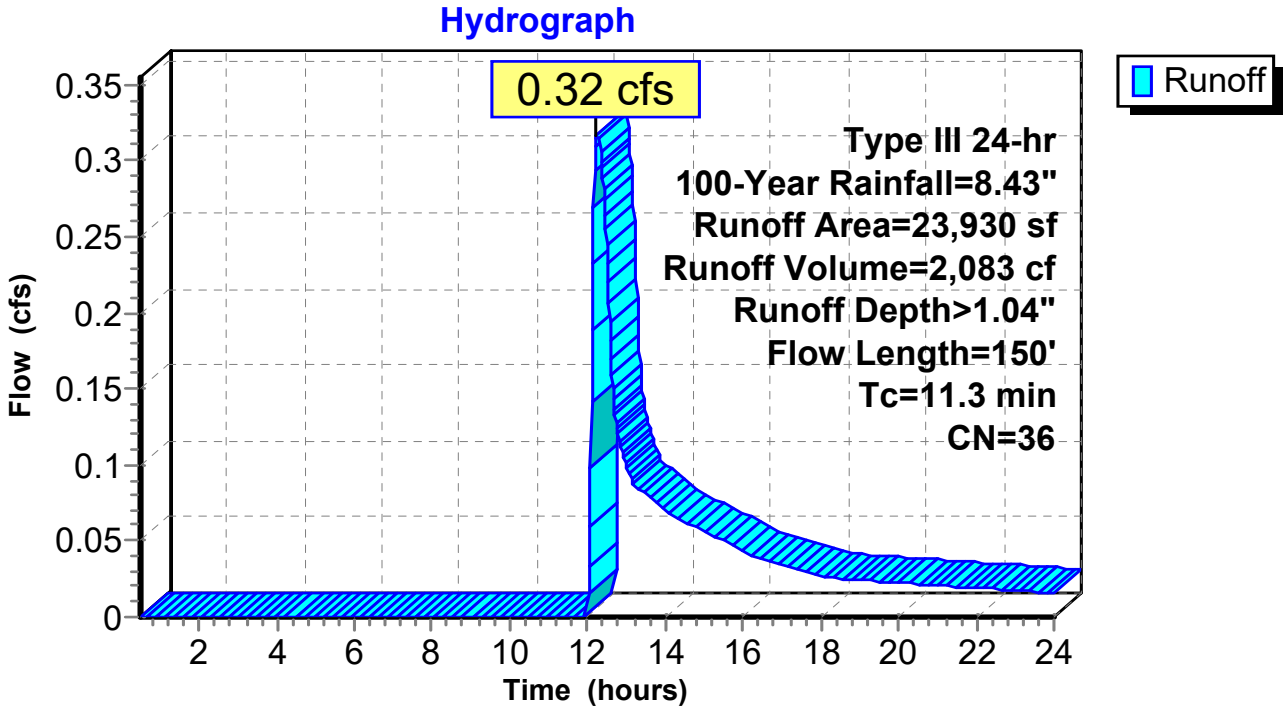
Runoff = 0.32 cfs @ 12.24 hrs, Volume= 2,083 cf, Depth> 1.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=8.43"

Area (sf)	CN	Description
23,930	36	Woods, Fair, HSG A
23,930		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0280	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
0.8	100	0.0170	2.10		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.3	150	Total			

Subcatchment SA#7: Subcat SA#7



Summary for Subcatchment SA#8: Subcat SA#8

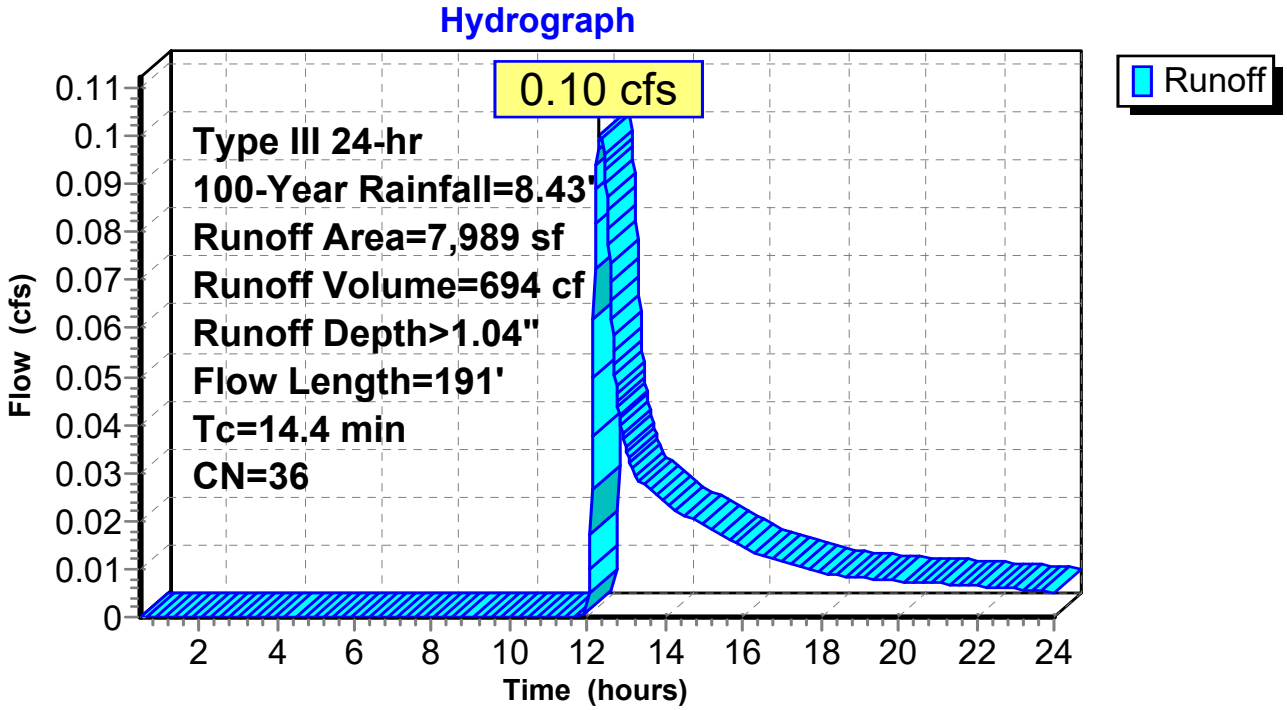
Runoff = 0.10 cfs @ 12.32 hrs, Volume= 694 cf, Depth> 1.04"

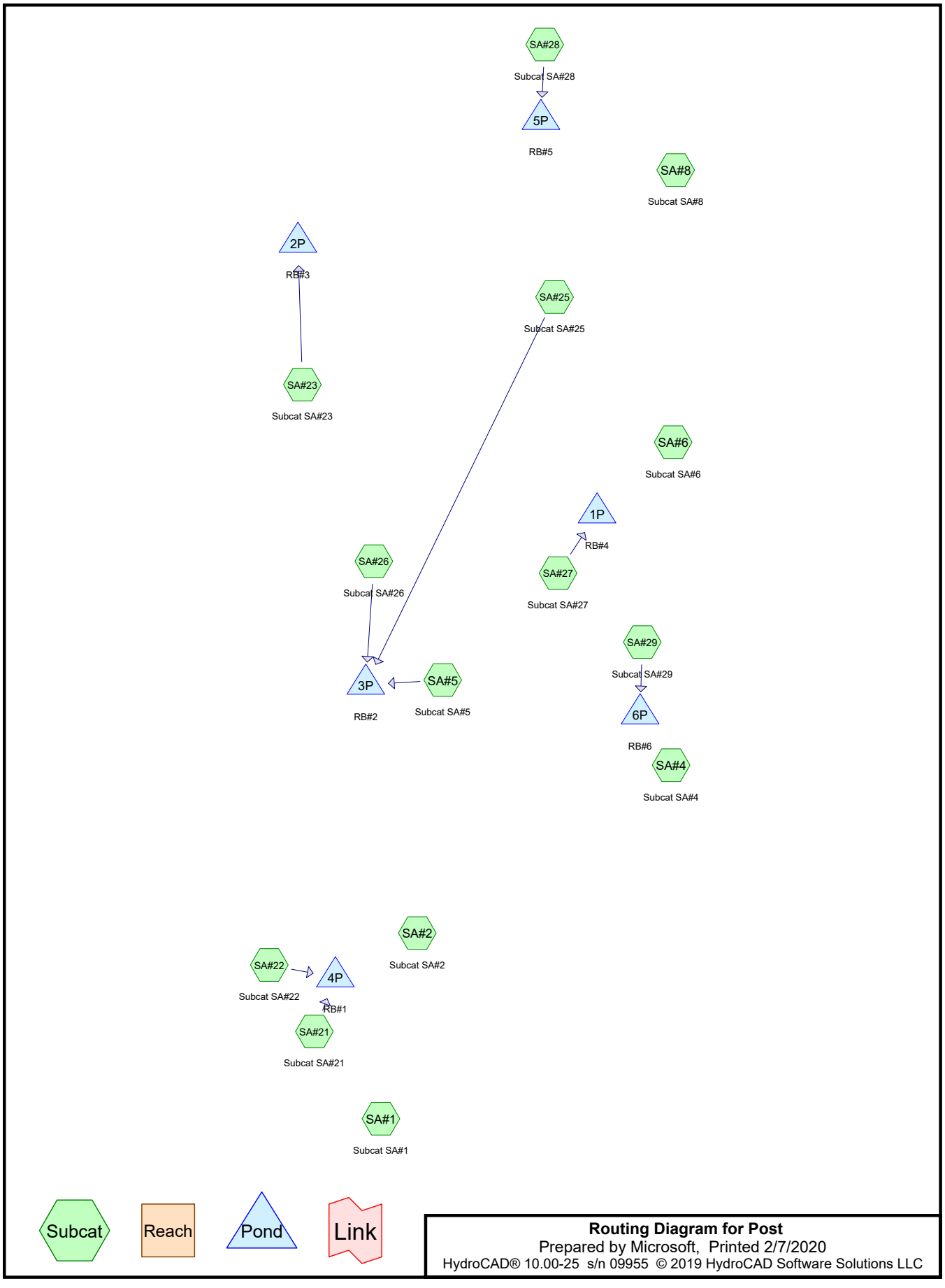
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=8.43"

Area (sf)	CN	Description
7,989	36	Woods, Fair, HSG A
7,989		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0280	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
3.9	141	0.0014	0.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
14.4	191	Total			

Subcatchment SA#8: Subcat SA#8





Routing Diagram for Post
Prepared by Microsoft, Printed 2/7/2020
HydroCAD® 10.00-25 s/n 09955 © 2019 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
59,376	49	50-75% Grass cover, Fair, HSG A (SA#1, SA#2, SA#21, SA#22, SA#24, SA#25, SA#26, SA#27, SA#28, SA#29, SA#4, SA#5, SA#6, SA#8)
12,159	98	Paved roads w/curbs & sewers, HSG A (SA#21, SA#24, SA#26, SA#27)
7,244	98	Roofs, HSG A (SA#24, SA#25, SA#27)
19,115	36	Woods, Fair, HSG A (SA#1, SA#2, SA#22, SA#24, SA#25, SA#26, SA#28, SA#29, SA#4, SA#5, SA#6, SA#8)
97,895	**56**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
97,895	HSG A	SA#1, SA#2, SA#21, SA#22, SA#24, SA#25, SA#26, SA#27, SA#28, SA#29, SA#4, SA#5, SA#6, SA#8
0	HSG B	
0	HSG C	
0	HSG D	
0	Other	
97,895		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover
59,376	0	0	0	0	59,376	50-75% Grass cover, Fair
12,159	0	0	0	0	12,159	Paved roads w/curbs & sewers
7,244	0	0	0	0	7,244	Roofs
19,115	0	0	0	0	19,115	Woods, Fair
97,895	**0**	**0**	**0**	**0**	**97,895**	**TOTAL AREA**

Time span=0.50-28.00 hrs, dt=0.02 hrs, 1376 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment SA#1: Subcat SA#1 Runoff Area=4,048 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=66' Slope=0.0100 '/' Tc=16.0 min CN=45 Runoff=0.00 cfs 0 cf

Subcatchment SA#2: Subcat SA#2 Runoff Area=2,374 sf 0.00% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=42 Runoff=0.00 cfs 0 cf

Subcatchment SA#21: Subcat SA#21 Runoff Area=4,231 sf 64.29% Impervious Runoff Depth=0.10"
Tc=6.0 min CN=81 Runoff=0.00 cfs 35 cf

Subcatchment SA#22: Subcat SA#22 Runoff Area=5,736 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=132' Tc=9.2 min CN=46 Runoff=0.00 cfs 0 cf

Subcatchment SA#24: Subcat SA#24 Runoff Area=15,524 sf 38.40% Impervious Runoff Depth=0.00"
Flow Length=129' Slope=0.0100 '/' Tc=7.2 min CN=65 Runoff=0.00 cfs 0 cf

Subcatchment SA#25: Subcat SA#25 Runoff Area=14,973 sf 0.01% Impervious Runoff Depth=0.00"
Flow Length=70' Tc=6.4 min CN=48 Runoff=0.00 cfs 0 cf

Subcatchment SA#26: Subcat SA#26 Runoff Area=15,195 sf 40.19% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=67 Runoff=0.00 cfs 0 cf

Subcatchment SA#27: Subcat SA#27 Runoff Area=5,882 sf 78.42% Impervious Runoff Depth=0.22"
Tc=6.0 min CN=87 Runoff=0.03 cfs 110 cf

Subcatchment SA#28: Subcat SA#28 Runoff Area=7,495 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=116' Tc=12.3 min CN=43 Runoff=0.00 cfs 0 cf

Subcatchment SA#29: Subcat SA#29 Runoff Area=4,913 sf 0.00% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=47 Runoff=0.00 cfs 0 cf

Subcatchment SA#4: Subcat SA#4 Runoff Area=2,621 sf 0.00% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=40 Runoff=0.00 cfs 0 cf

Subcatchment SA#5: Subcat SA#5 Runoff Area=10,821 sf 0.00% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=48 Runoff=0.00 cfs 0 cf

Subcatchment SA#6: Subcat SA#6 Runoff Area=2,223 sf 0.00% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=40 Runoff=0.00 cfs 0 cf

Subcatchment SA#8: Subcat SA#8 Runoff Area=1,858 sf 0.00% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=40 Runoff=0.00 cfs 0 cf

Pond 1P: RB#4 Peak Elev=176.01' Storage=2 cf Inflow=0.03 cfs 110 cf
Outflow=0.03 cfs 110 cf

Pond 2P: RB#3 Peak Elev=177.50' Storage=0 cf Inflow=0.00 cfs 0 cf
Outflow=0.00 cfs 0 cf

Pond 3P: RB#2 Peak Elev=177.50' Storage=0 cf Inflow=0.00 cfs 0 cf
Outflow=0.00 cfs 0 cf

Pond 4P: RB#1 Peak Elev=177.50' Storage=0 cf Inflow=0.00 cfs 35 cf
Outflow=0.00 cfs 35 cf

Pond 5P: RB#5 Peak Elev=177.00' Storage=0 cf Inflow=0.00 cfs 0 cf
Outflow=0.00 cfs 0 cf

Pond 6P: RB#6 Peak Elev=174.50' Storage=0 cf Inflow=0.00 cfs 0 cf
Outflow=0.00 cfs 0 cf

Total Runoff Area = 97,895 sf Runoff Volume = 144 cf Average Runoff Depth = 0.02"
80.18% Pervious = 78,492 sf 19.82% Impervious = 19,403 sf

Summary for Subcatchment SA#1: Subcat SA#1

[45] Hint: Runoff=Zero

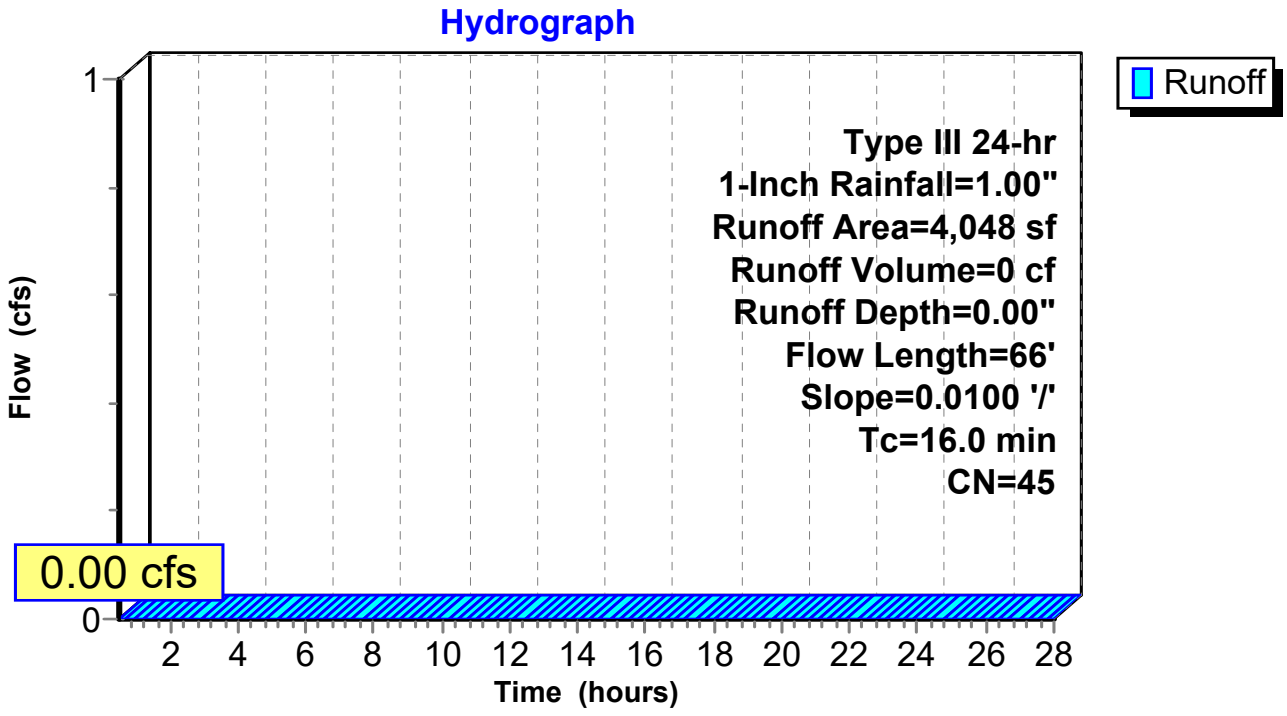
Runoff = 0.00 cfs @ 0.50 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

Area (sf)	CN	Description
2,840	49	50-75% Grass cover, Fair, HSG A
1,207	36	Woods, Fair, HSG A
4,048	45	Weighted Average
4,048		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.8	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
0.2	16	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.0	66	Total			

Subcatchment SA#1: Subcat SA#1



Summary for Subcatchment SA#2: Subcat SA#2

[45] Hint: Runoff=Zero

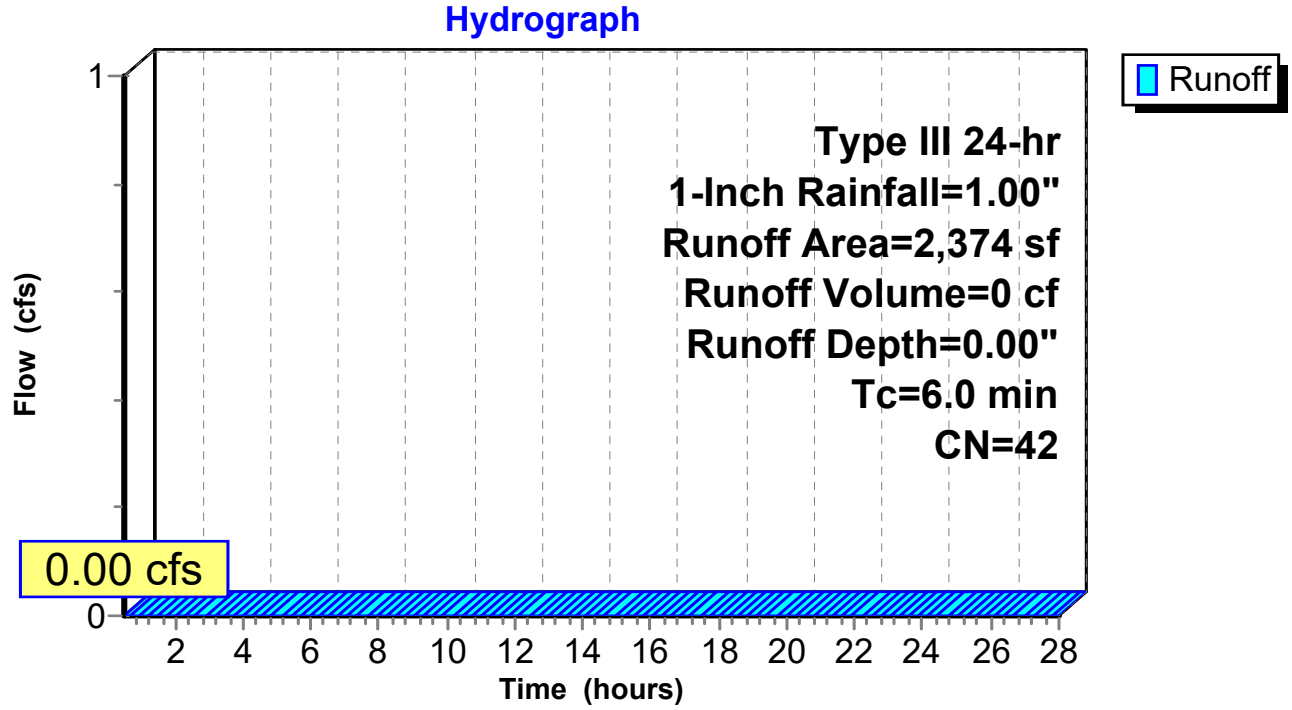
Runoff = 0.00 cfs @ 0.50 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

Area (sf)	CN	Description
1,181	49	50-75% Grass cover, Fair, HSG A
1,193	36	Woods, Fair, HSG A
2,374	42	Weighted Average
2,374		100.00% Pervious Area

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

Subcatchment SA#2: Subcat SA#2



Summary for Subcatchment SA#21: Subcat SA#21

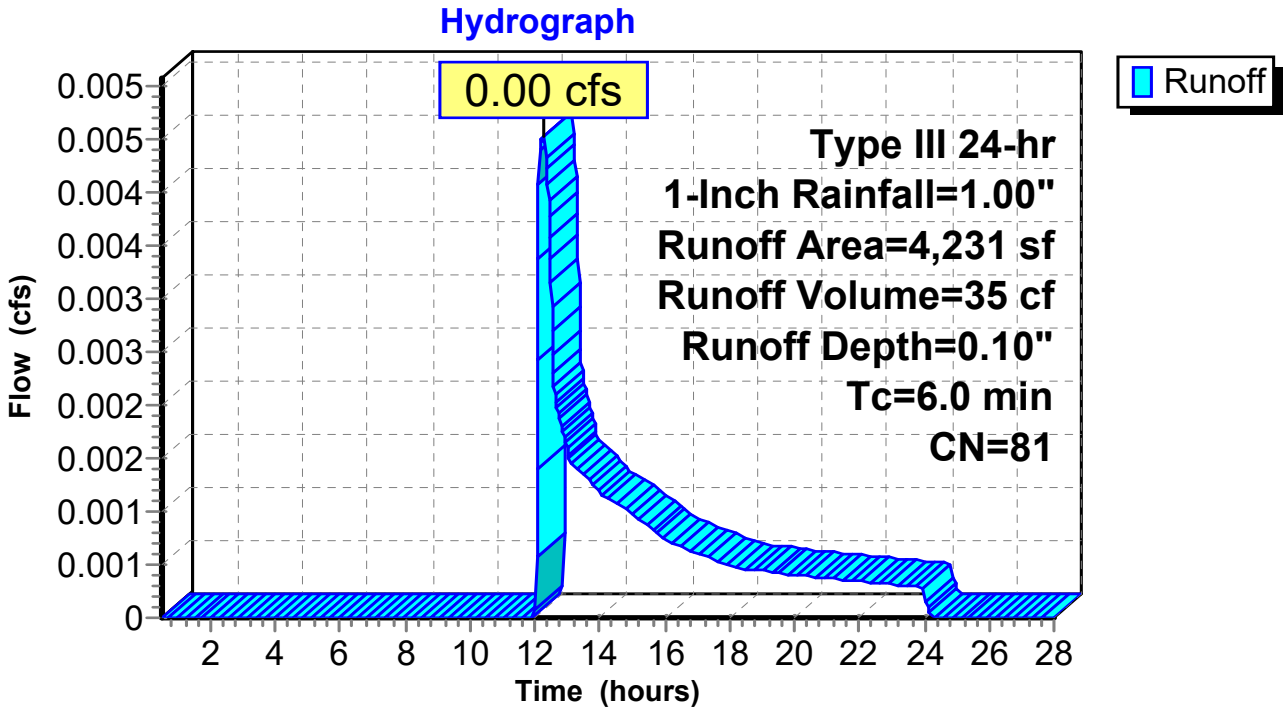
Runoff = 0.00 cfs @ 12.28 hrs, Volume= 35 cf, Depth= 0.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

Area (sf)	CN	Description
1,511	49	50-75% Grass cover, Fair, HSG A
2,720	98	Paved roads w/curbs & sewers, HSG A
4,231	81	Weighted Average
1,511		35.71% Pervious Area
2,720		64.29% Impervious Area

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

Subcatchment SA#21: Subcat SA#21



Summary for Subcatchment SA#22: Subcat SA#22

[45] Hint: Runoff=Zero

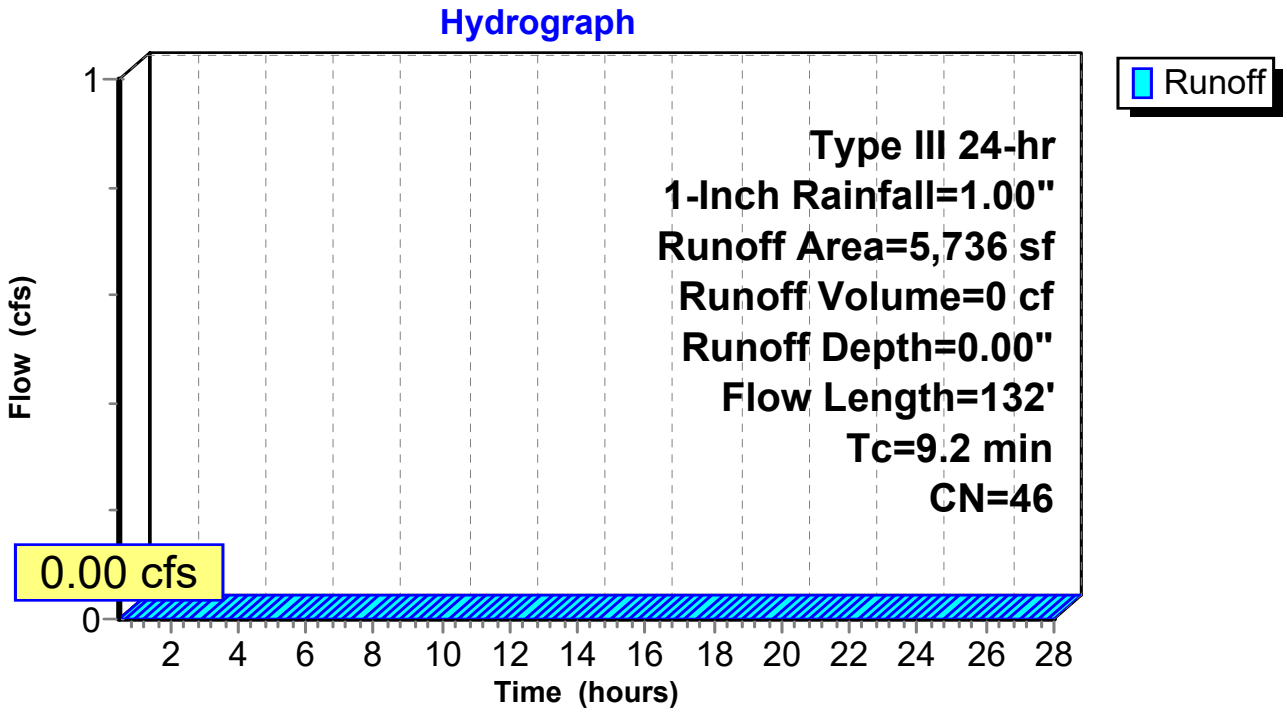
Runoff = 0.00 cfs @ 0.50 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

Area (sf)	CN	Description
4,558	49	50-75% Grass cover, Fair, HSG A
1,178	36	Woods, Fair, HSG A
5,736	46	Weighted Average
5,736		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	23	0.0110	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
1.0	109	0.0120	1.76		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
9.2	132	Total			

Subcatchment SA#22: Subcat SA#22



Summary for Subcatchment SA#24: Subcat SA#24

[45] Hint: Runoff=Zero

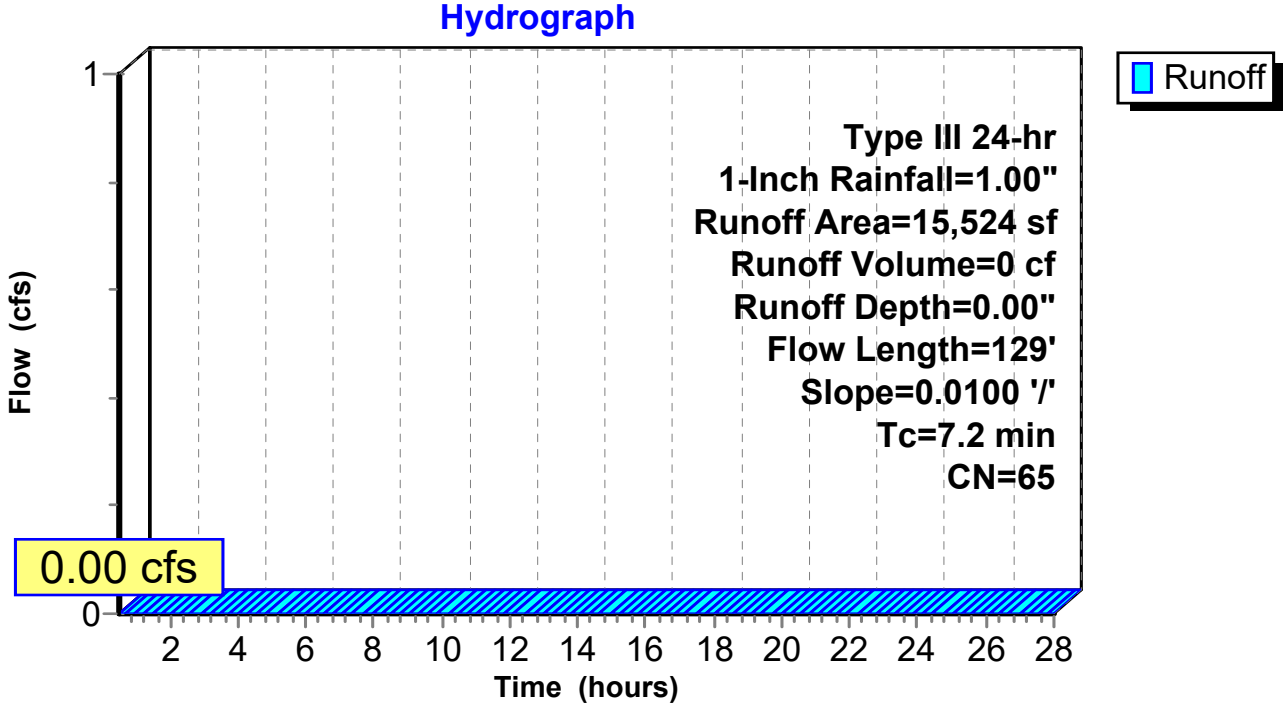
Runoff = 0.00 cfs @ 0.50 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

Area (sf)	CN	Description
6,224	49	50-75% Grass cover, Fair, HSG A
1,948	98	Paved roads w/curbs & sewers, HSG A
4,014	98	Roofs, HSG A
3,338	36	Woods, Fair, HSG A
15,524	65	Weighted Average
9,562		61.60% Pervious Area
5,962		38.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	15	0.0100	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
1.2	114	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
7.2	129	Total			

Subcatchment SA#24: Subcat SA#24



Summary for Subcatchment SA#25: Subcat SA#25

[45] Hint: Runoff=Zero

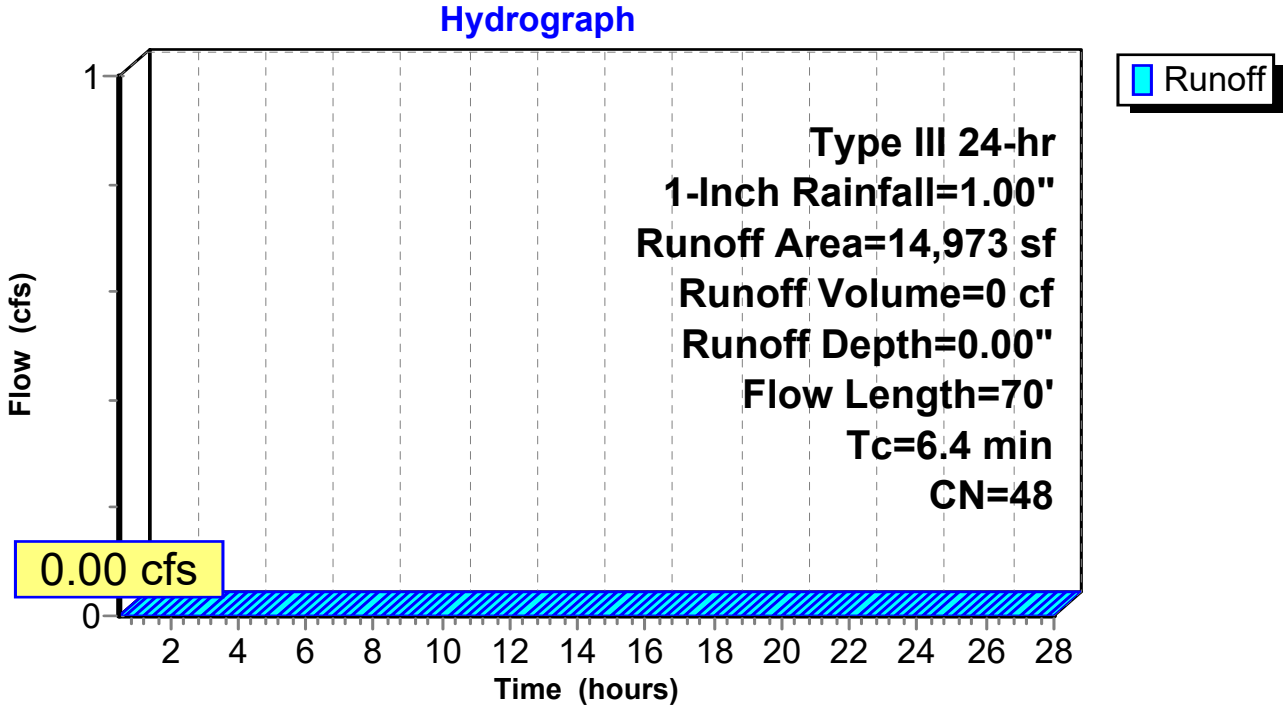
Runoff = 0.00 cfs @ 0.50 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

Area (sf)	CN	Description
14,146	49	50-75% Grass cover, Fair, HSG A
2	98	Roofs, HSG A
826	36	Woods, Fair, HSG A
14,973	48	Weighted Average
14,972		99.99% Pervious Area
2		0.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	50	0.0360	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.40"
0.1	20	0.1000	5.09		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
6.4	70	Total			

Subcatchment SA#25: Subcat SA#25



Summary for Subcatchment SA#26: Subcat SA#26

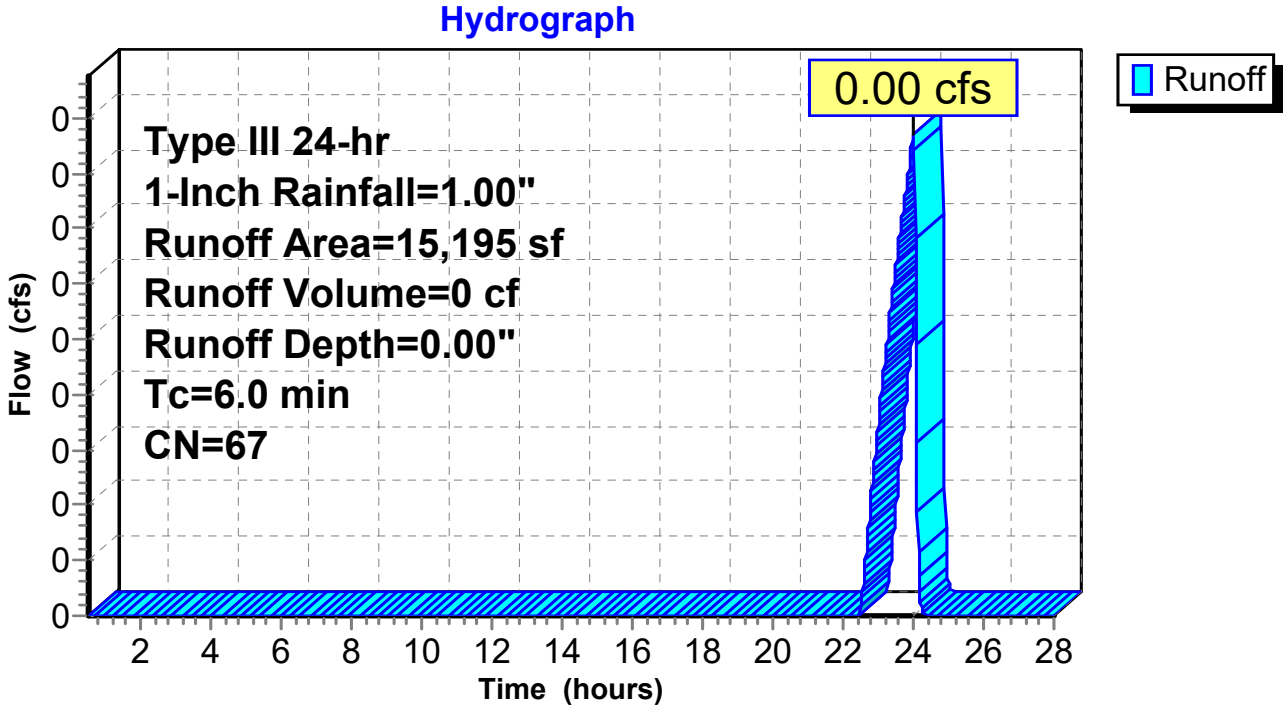
Runoff = 0.00 cfs @ 24.01 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

Area (sf)	CN	Description
7,298	49	50-75% Grass cover, Fair, HSG A
6,107	98	Paved roads w/curbs & sewers, HSG A
1,791	36	Woods, Fair, HSG A
15,195	67	Weighted Average
9,089		59.81% Pervious Area
6,107		40.19% Impervious Area

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

Subcatchment SA#26: Subcat SA#26



Summary for Subcatchment SA#27: Subcat SA#27

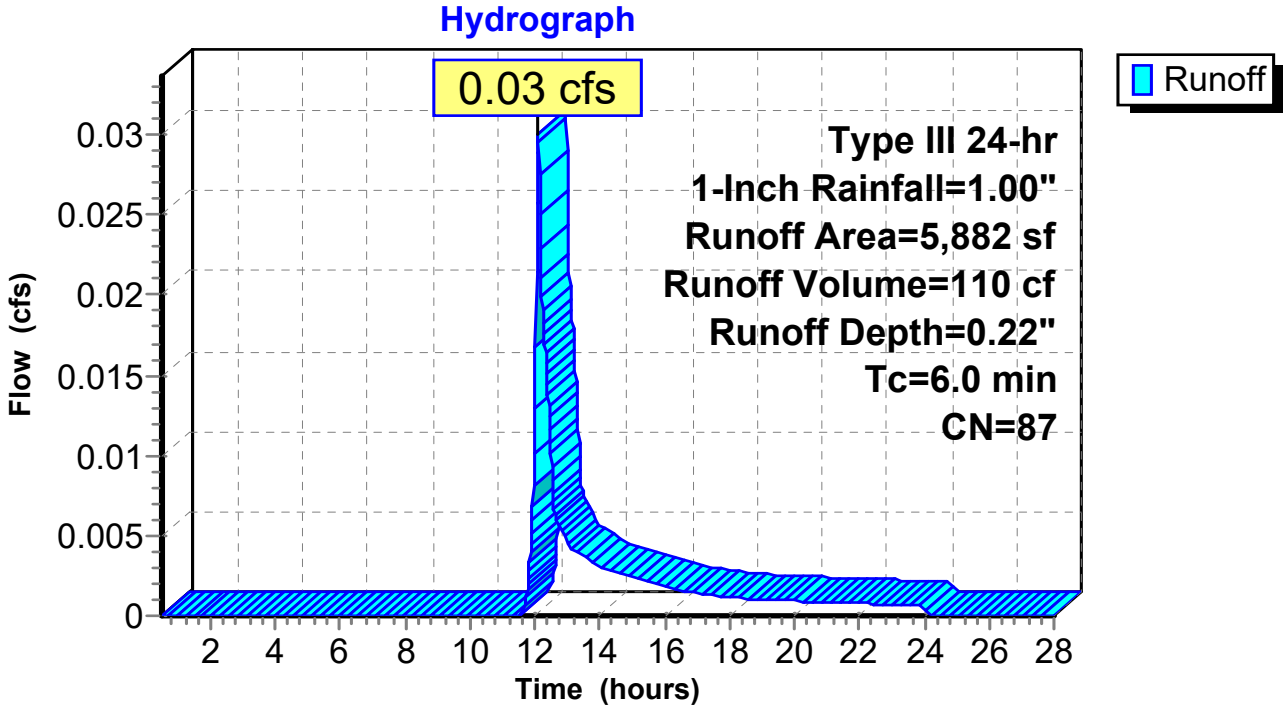
Runoff = 0.03 cfs @ 12.10 hrs, Volume= 110 cf, Depth= 0.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

Area (sf)	CN	Description
1,269	49	50-75% Grass cover, Fair, HSG A
1,384	98	Paved roads w/curbs & sewers, HSG A
3,229	98	Roofs, HSG A
5,882	87	Weighted Average
1,269		21.58% Pervious Area
4,613		78.42% Impervious Area

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

Subcatchment SA#27: Subcat SA#27



Summary for Subcatchment SA#28: Subcat SA#28

[45] Hint: Runoff=Zero

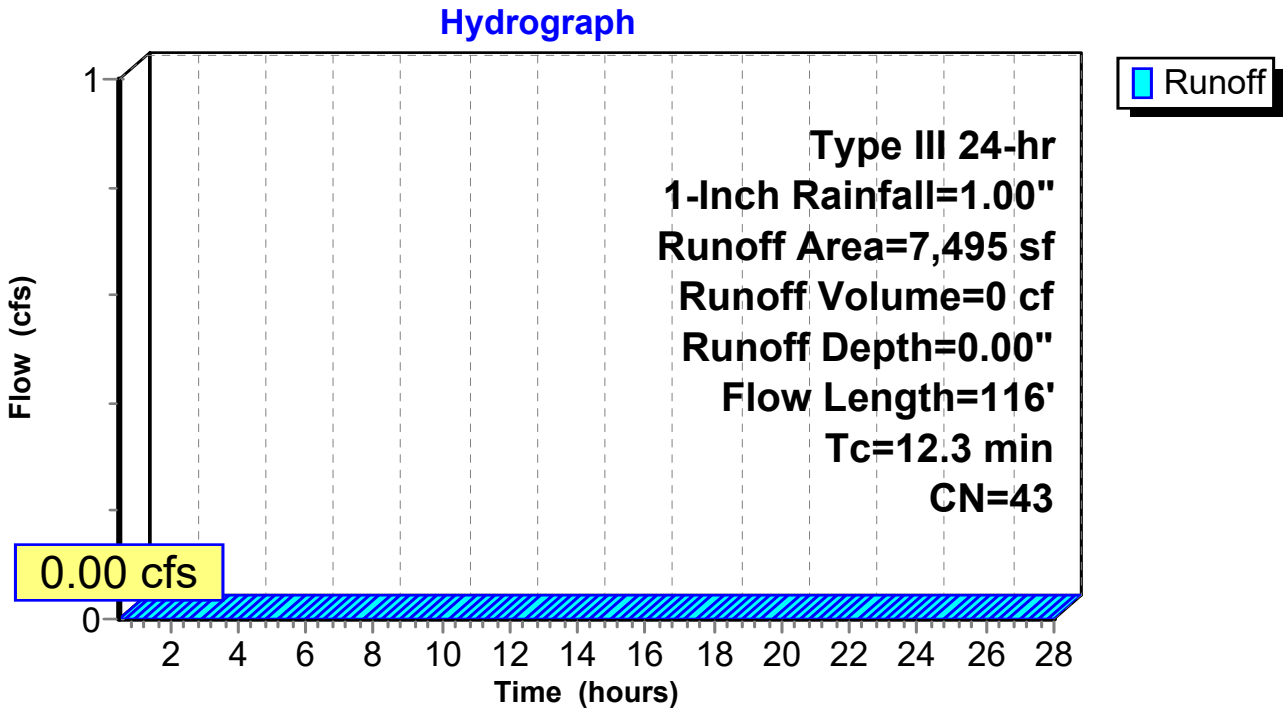
Runoff = 0.00 cfs @ 0.50 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

Area (sf)	CN	Description
3,987	49	50-75% Grass cover, Fair, HSG A
3,508	36	Woods, Fair, HSG A
7,495	43	Weighted Average
7,495		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0280	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
1.8	66	0.0014	0.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
12.3	116	Total			

Subcatchment SA#28: Subcat SA#28



Summary for Subcatchment SA#29: Subcat SA#29

[45] Hint: Runoff=Zero

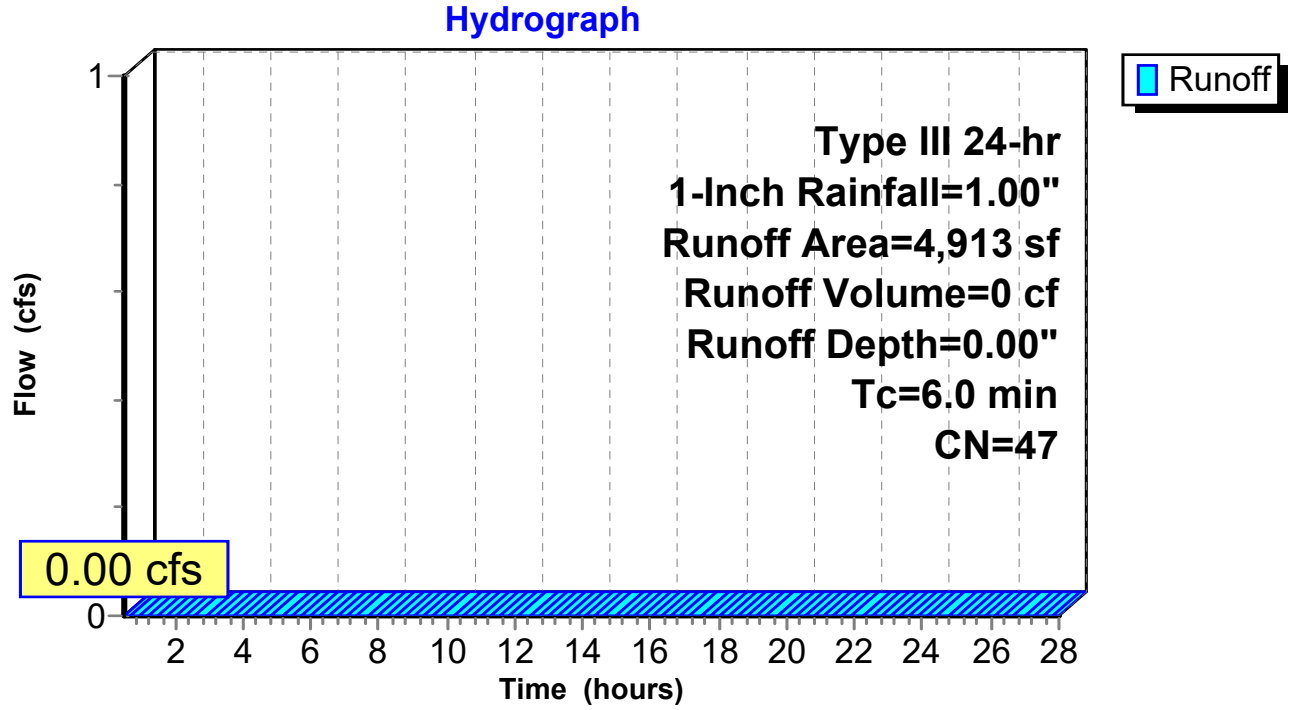
Runoff = 0.00 cfs @ 0.50 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

Area (sf)	CN	Description
4,295	49	50-75% Grass cover, Fair, HSG A
618	36	Woods, Fair, HSG A
4,913	47	Weighted Average
4,913		100.00% Pervious Area

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

Subcatchment SA#29: Subcat SA#29



Summary for Subcatchment SA#4: Subcat SA#4

[45] Hint: Runoff=Zero

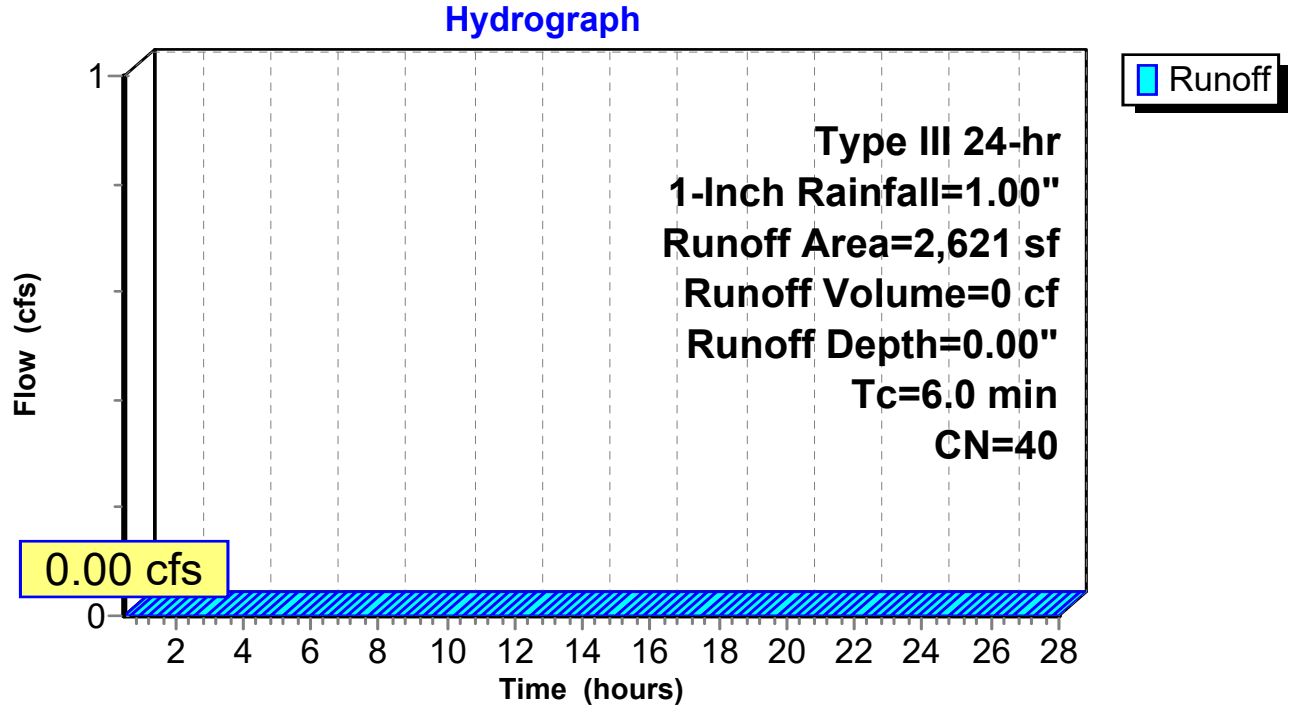
Runoff = 0.00 cfs @ 0.50 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

Area (sf)	CN	Description
827	49	50-75% Grass cover, Fair, HSG A
1,794	36	Woods, Fair, HSG A
2,621	40	Weighted Average
2,621		100.00% Pervious Area

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

Subcatchment SA#4: Subcat SA#4



Summary for Subcatchment SA#5: Subcat SA#5

[45] Hint: Runoff=Zero

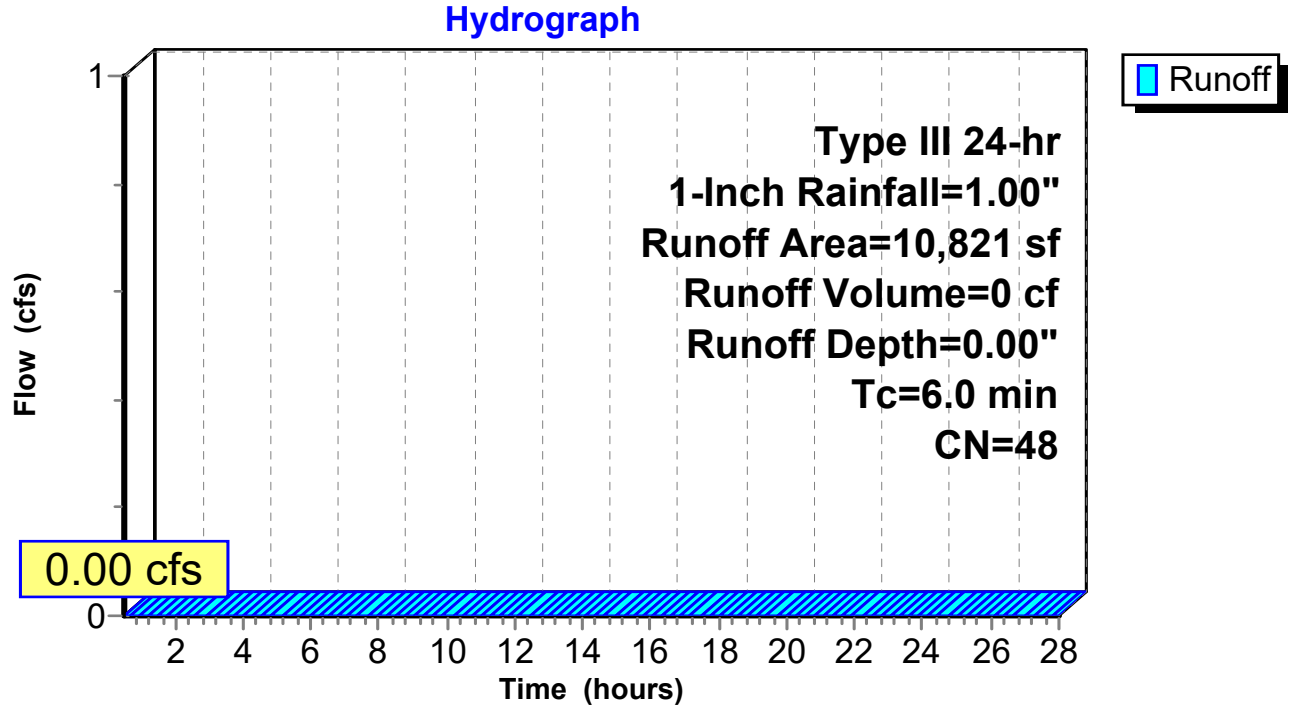
Runoff = 0.00 cfs @ 0.50 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

Area (sf)	CN	Description
9,977	49	50-75% Grass cover, Fair, HSG A
844	36	Woods, Fair, HSG A
10,821	48	Weighted Average
10,821		100.00% Pervious Area

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

Subcatchment SA#5: Subcat SA#5



Summary for Subcatchment SA#6: Subcat SA#6

[45] Hint: Runoff=Zero

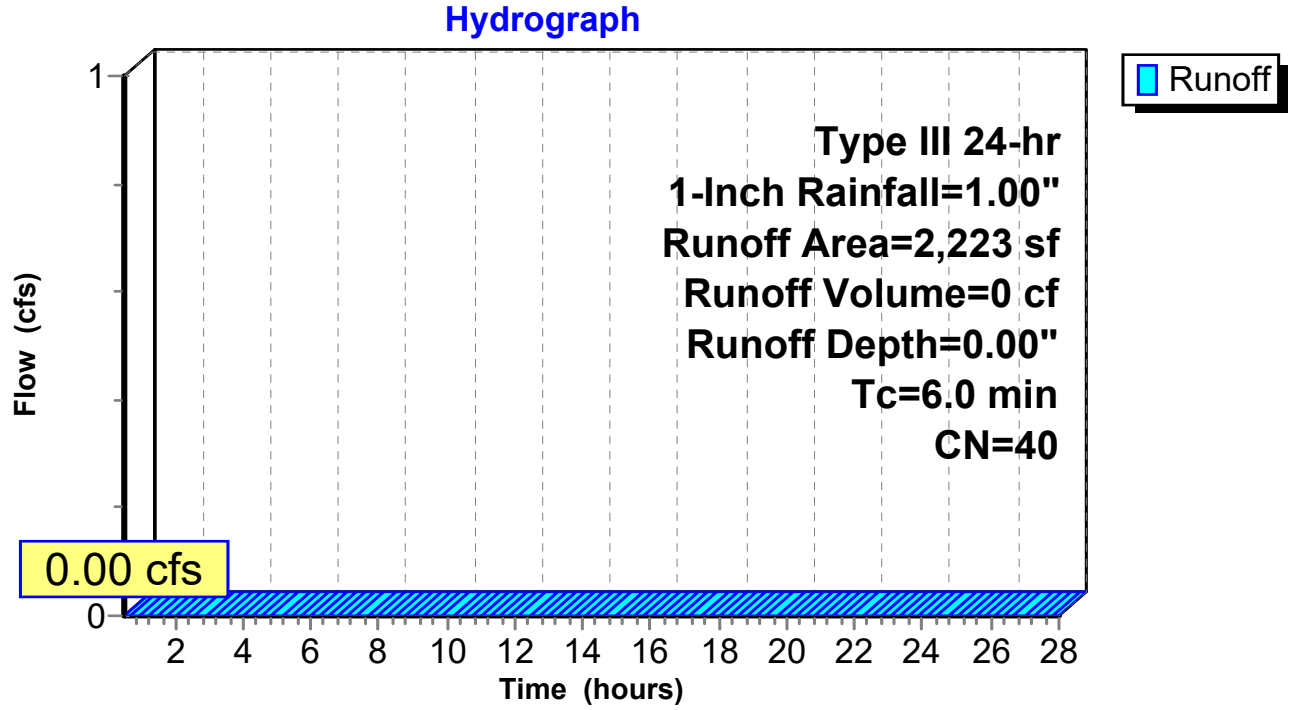
Runoff = 0.00 cfs @ 0.50 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

Area (sf)	CN	Description
697	49	50-75% Grass cover, Fair, HSG A
1,527	36	Woods, Fair, HSG A
2,223	40	Weighted Average
2,223		100.00% Pervious Area

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

Subcatchment SA#6: Subcat SA#6



Summary for Subcatchment SA#8: Subcat SA#8

[45] Hint: Runoff=Zero

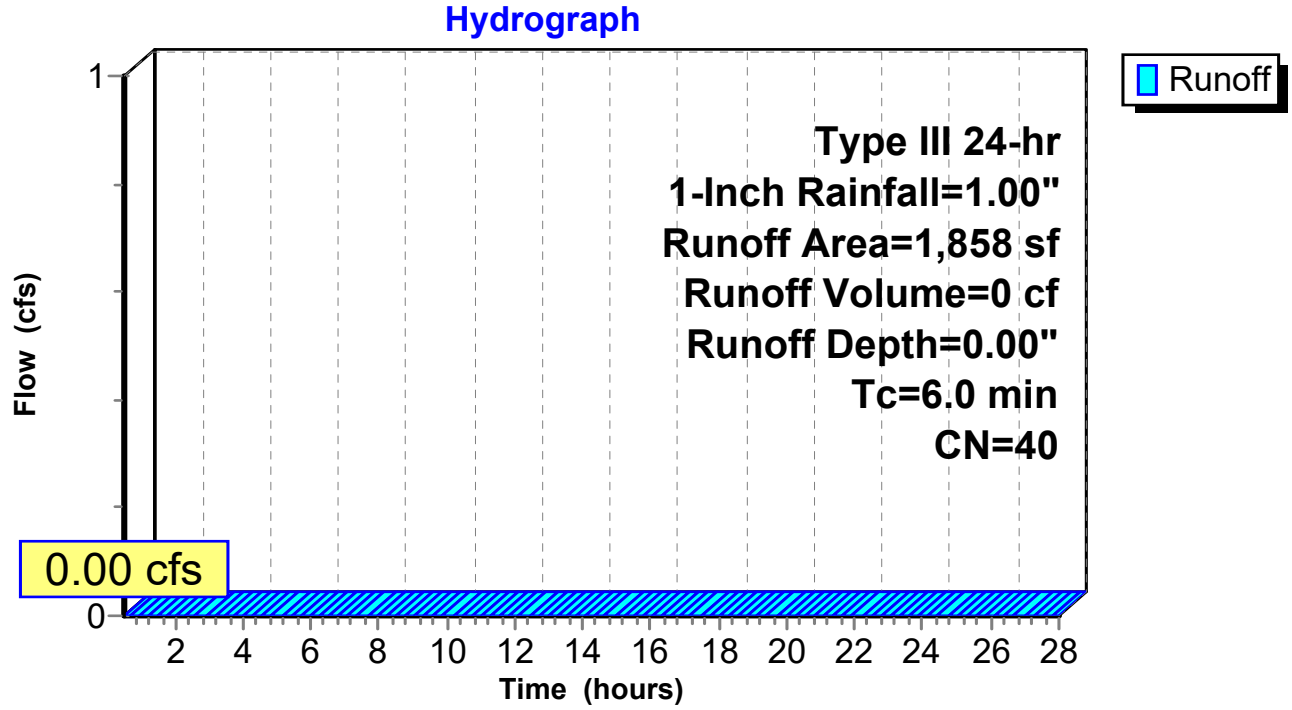
Runoff = 0.00 cfs @ 0.50 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

Area (sf)	CN	Description
568	49	50-75% Grass cover, Fair, HSG A
1,291	36	Woods, Fair, HSG A
1,858	40	Weighted Average
1,858		100.00% Pervious Area

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

Subcatchment SA#8: Subcat SA#8



Summary for Pond 1P: RB#4

Inflow Area = 5,882 sf, 78.42% Impervious, Inflow Depth = 0.22" for 1-Inch event
Inflow = 0.03 cfs @ 12.10 hrs, Volume= 110 cf
Outflow = 0.03 cfs @ 12.12 hrs, Volume= 110 cf, Atten= 3%, Lag= 1.3 min
Discarded = 0.03 cfs @ 12.12 hrs, Volume= 110 cf

Routing by Stor-Ind method, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Peak Elev= 176.01' @ 12.12 hrs Surf.Area= 656 sf Storage= 2 cf

Plug-Flow detention time= 1.2 min calculated for 110 cf (100% of inflow)
Center-of-Mass det. time= 1.2 min (885.7 - 884.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	176.00'	578 cf	**20.83'W x 31.50'L x 3.54'H Field A** 2,324 cf Overall - 879 cf Embedded = 1,445 cf x 40.0% Voids
#2A	176.50'	879 cf	**Cultec R-330XLHD** x 16 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 4 rows
		1,457 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	176.00'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.13 cfs @ 12.12 hrs HW=176.01' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.13 cfs)

Pond 1P: RB#4 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 4 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

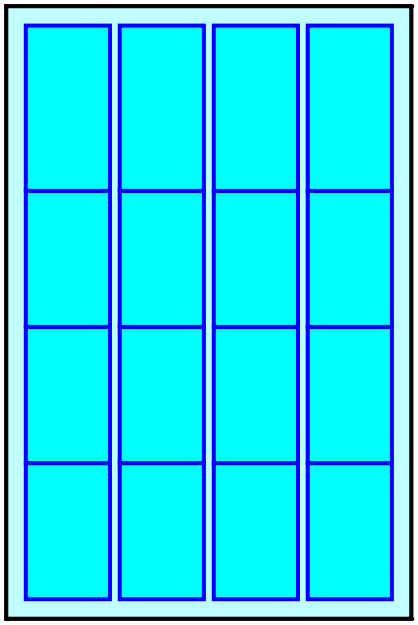
4 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 29.50' Row Length +12.0" End Stone x 2 = 31.50' Base Length
4 Rows x 52.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.83' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

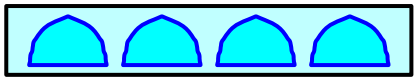
16 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 4 Rows = 879.2 cf Chamber Storage

2,324.2 cf Field - 879.2 cf Chambers = 1,445.0 cf Stone x 40.0% Voids = 578.0 cf Stone Storage

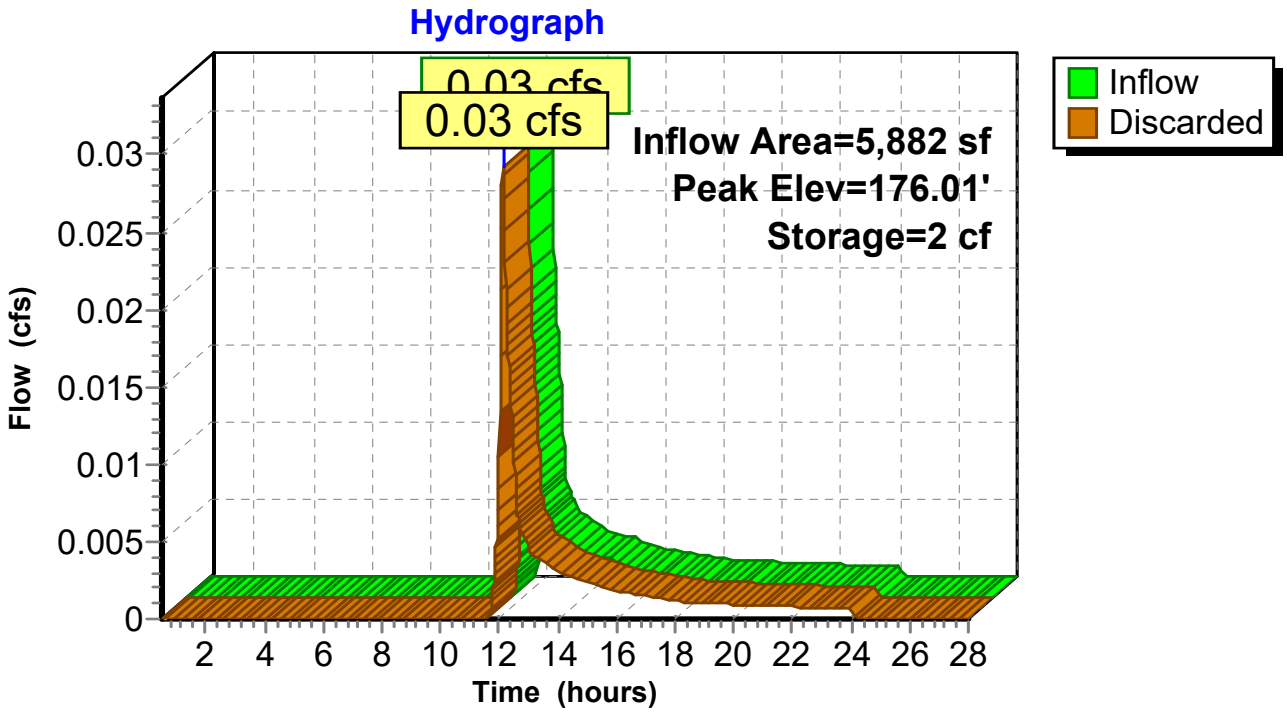
Chamber Storage + Stone Storage = 1,457.2 cf = 0.033 af
Overall Storage Efficiency = 62.7%
Overall System Size = 31.50' x 20.83' x 3.54'

16 Chambers @ $ 300.00 /ea = $ 4,800.00
86.1 cy Field Excavation @ $ 10.00 /cy = $ 860.82
53.5 cy Stone @ $ 30.00 /cy = $ 1,605.56
Total Cost = $ 7,266.38

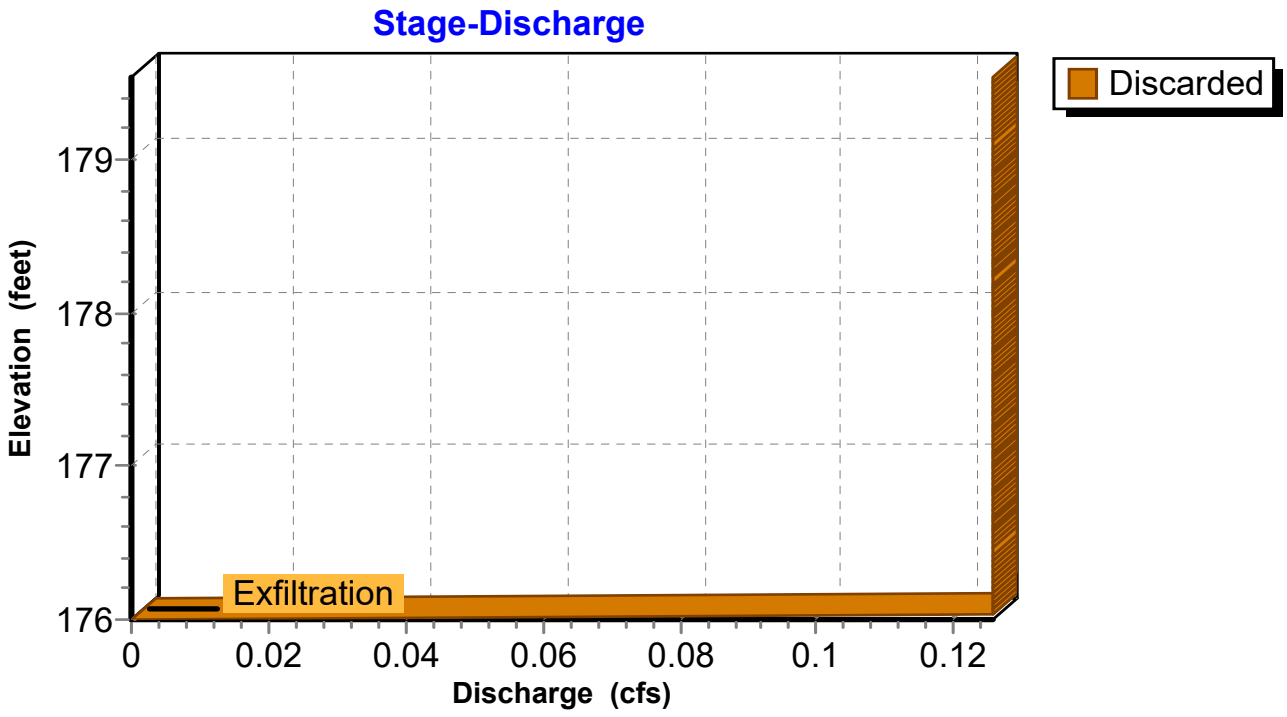




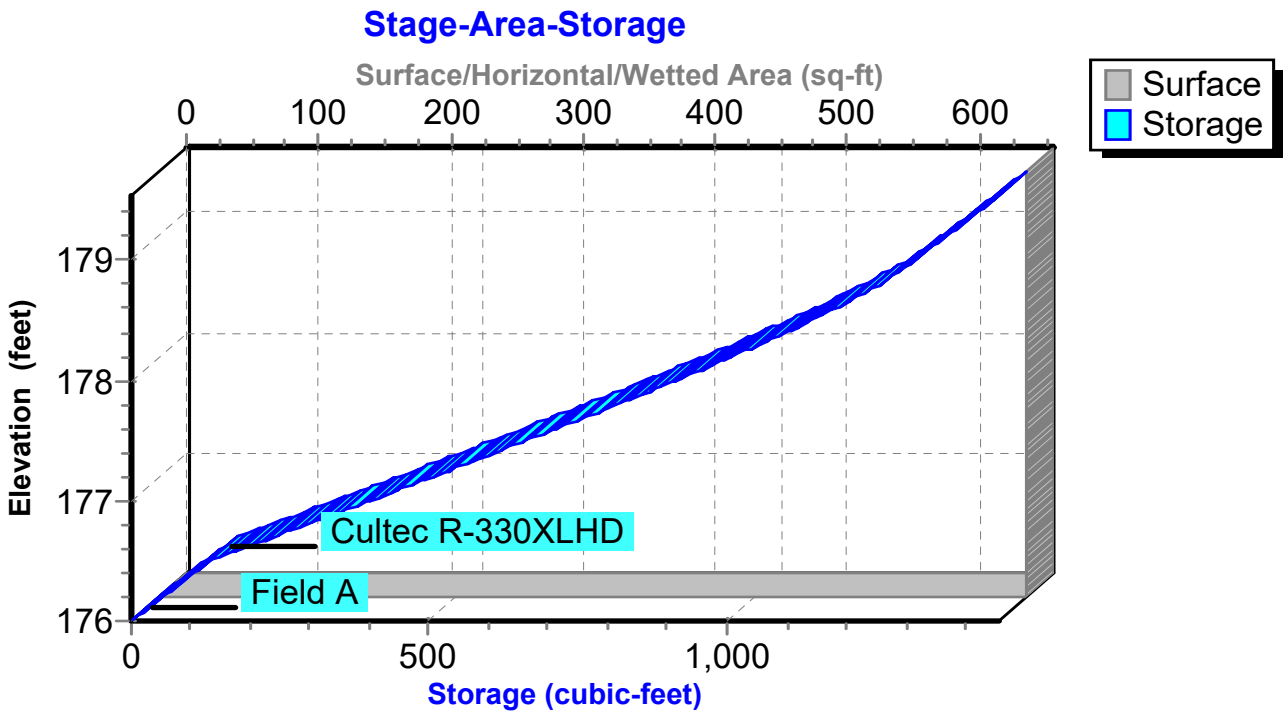
Pond 1P: RB#4



Pond 1P: RB#4



Pond 1P: RB#4


Stage-Area-Storage
Surface/Horizontal/Wetted Area (sq-ft)
0
100
200
300
400
500
600
Surface
Storage
179
178
177
176
Elevation (feet)
Cultec R-330XLHD
Field A
0
500
1,000
Storage (cubic-feet)

Summary for Pond 2P: RB#3

Inflow Area = 15,524 sf, 38.40% Impervious, Inflow Depth = 0.00" for 1-Inch event
Inflow = 0.00 cfs @ 0.50 hrs, Volume= 0 cf
Outflow = 0.00 cfs @ 0.50 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.50 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Peak Elev= 177.50' @ 0.50 hrs Surf.Area= 948 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1A	177.50'	824 cf	**20.83'W x 45.50'L x 3.54'H Field A** 3,357 cf Overall - 1,296 cf Embedded = 2,061 cf x 40.0% Voids
#2A	178.00'	1,296 cf	**Cultec R-330XLHD** x 24 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 4 rows
		2,121 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	177.50'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.00 cfs @ 0.50 hrs HW=177.50' (Free Discharge)
↑**1=Exfiltration** (Passes 0.00 cfs of 0.18 cfs potential flow)

Pond 2P: RB#3 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 4 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

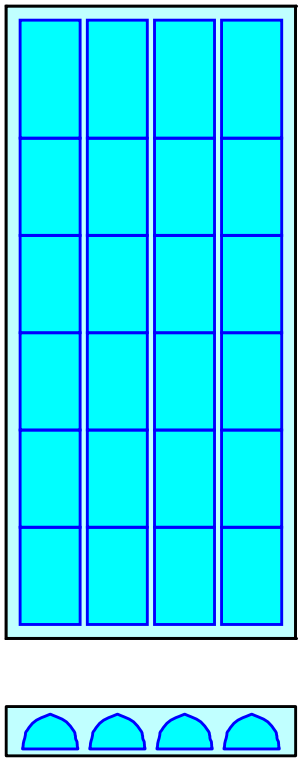
6 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 43.50' Row Length +12.0" End Stone x 2 = 45.50' Base Length
4 Rows x 52.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.83' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

24 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 4 Rows = 1,296.5 cf Chamber Storage

3,357.2 cf Field - 1,296.5 cf Chambers = 2,060.7 cf Stone x 40.0% Voids = 824.3 cf Stone Storage

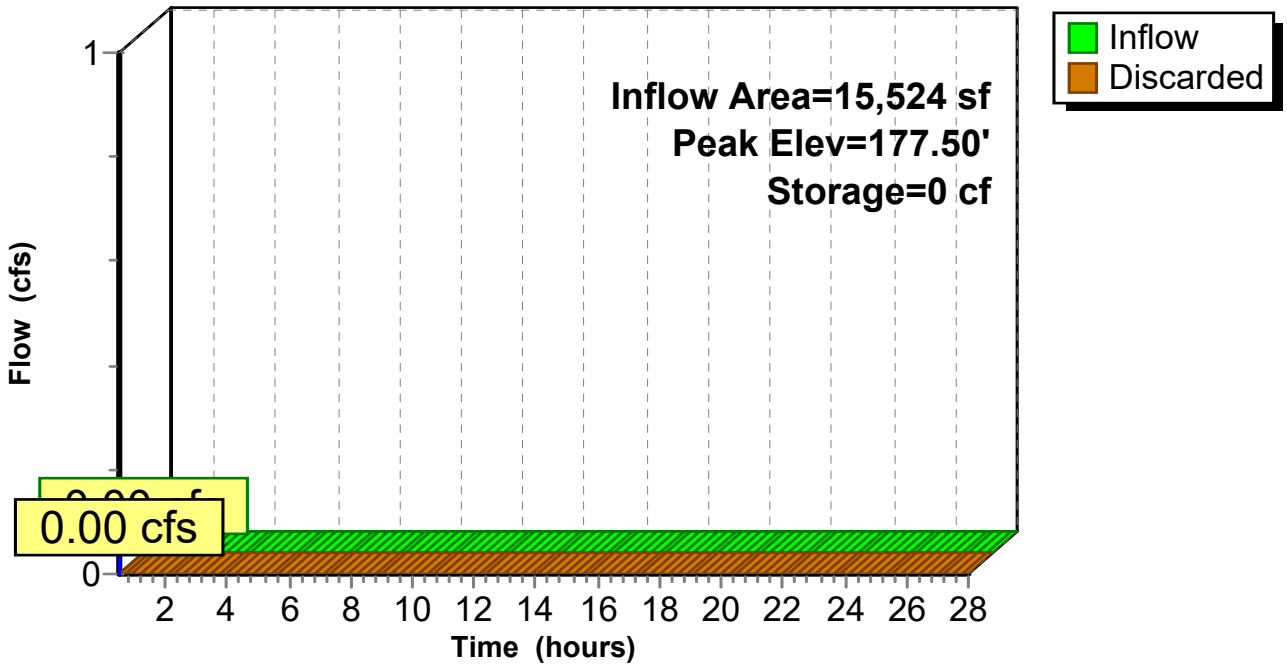
Chamber Storage + Stone Storage = 2,120.8 cf = 0.049 af
Overall Storage Efficiency = 63.2%
Overall System Size = 45.50' x 20.83' x 3.54'

24 Chambers @ $ 300.00 /ea = $ 7,200.00
124.3 cy Field Excavation @ $ 10.00 /cy = $ 1,243.41
76.3 cy Stone @ $ 30.00 /cy = $ 2,289.70
Total Cost = $ 10,733.11



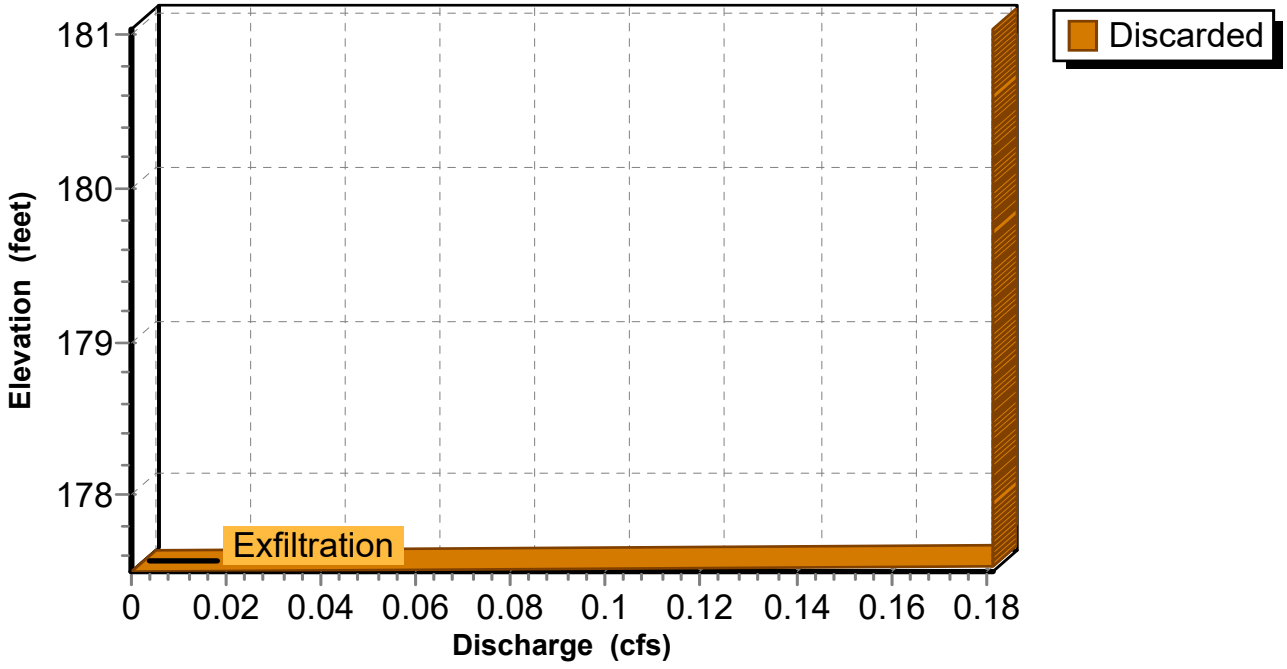
Pond 2P: RB#3

Hydrograph

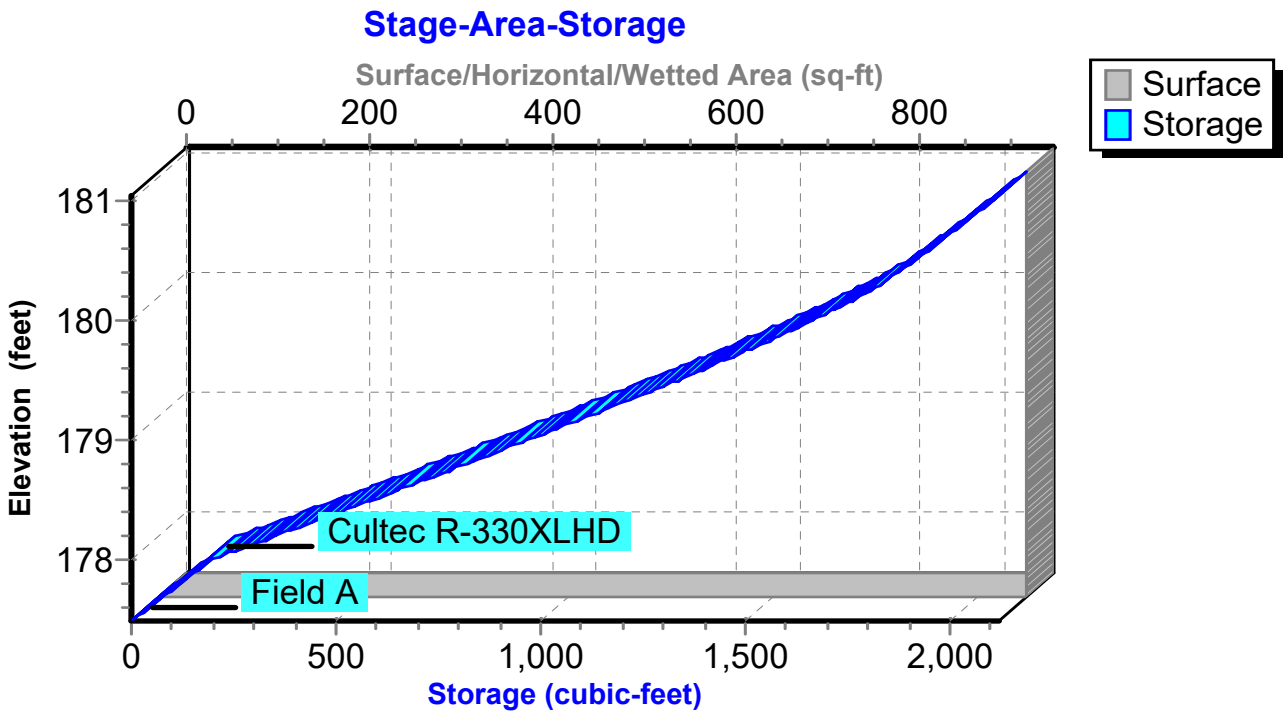


Pond 2P: RB#3

Stage-Discharge



Pond 2P: RB#3


Stage-Area-Storage
Surface/Horizontal/Wetted Area (sq-ft)
0
200
400
600
800
Surface
Storage
181
180
179
178
Elevation (feet)
Cultec R-330XLHD
Field A
0
500
1,000
1,500
2,000
Storage (cubic-feet)

Summary for Pond 3P: RB#2

Inflow Area = 40,990 sf, 14.90% Impervious, Inflow Depth = 0.00" for 1-Inch event
Inflow = 0.00 cfs @ 24.01 hrs, Volume= 0 cf
Outflow = 0.00 cfs @ 24.02 hrs, Volume= 0 cf, Atten= 1%, Lag= 0.4 min
Discarded = 0.00 cfs @ 24.02 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Peak Elev= 177.50' @ 24.02 hrs Surf.Area= 1,707 sf Storage= 0 cf

Plug-Flow detention time= 1.2 min calculated for 0 cf (100% of inflow)
Center-of-Mass det. time= 1.2 min (1,413.5 - 1,412.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	177.50'	1,457 cf	**25.67'W x 66.50'L x 3.54'H Field A** 6,045 cf Overall - 2,403 cf Embedded = 3,642 cf x 40.0% Voids
#2A	178.00'	2,403 cf	**Cultec R-330XLHD** x 45 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 5 rows
		3,860 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	177.50'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.33 cfs @ 24.02 hrs HW=177.50' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.33 cfs)

Pond 3P: RB#2 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 5 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

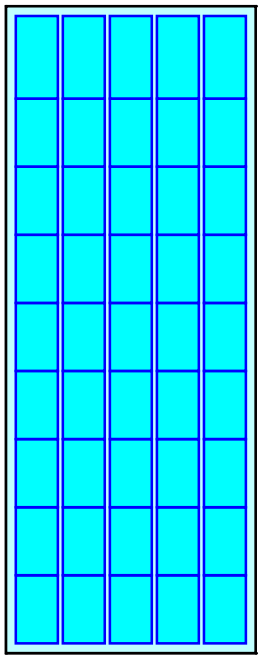
9 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 64.50' Row Length +12.0" End Stone x 2 = 66.50' Base Length
5 Rows x 52.0" Wide + 6.0" Spacing x 4 + 12.0" Side Stone x 2 = 25.67' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

45 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 5 Rows = 2,402.9 cf Chamber Storage

6,045.0 cf Field - 2,402.9 cf Chambers = 3,642.1 cf Stone x 40.0% Voids = 1,456.8 cf Stone Storage

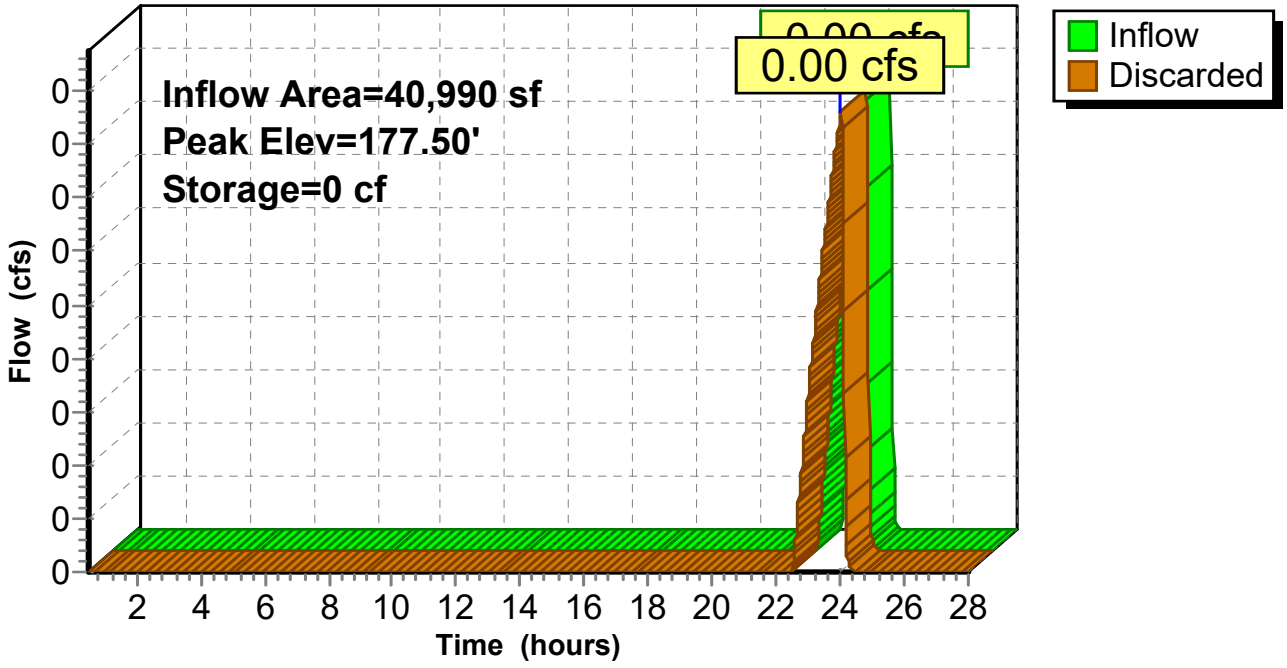
Chamber Storage + Stone Storage = 3,859.8 cf = 0.089 af
Overall Storage Efficiency = 63.9%
Overall System Size = 66.50' x 25.67' x 3.54'

45 Chambers @ $ 300.00 /ea = $ 13,500.00
223.9 cy Field Excavation @ $ 10.00 /cy = $ 2,238.90
134.9 cy Stone @ $ 30.00 /cy = $ 4,046.76
Total Cost = $ 19,785.67



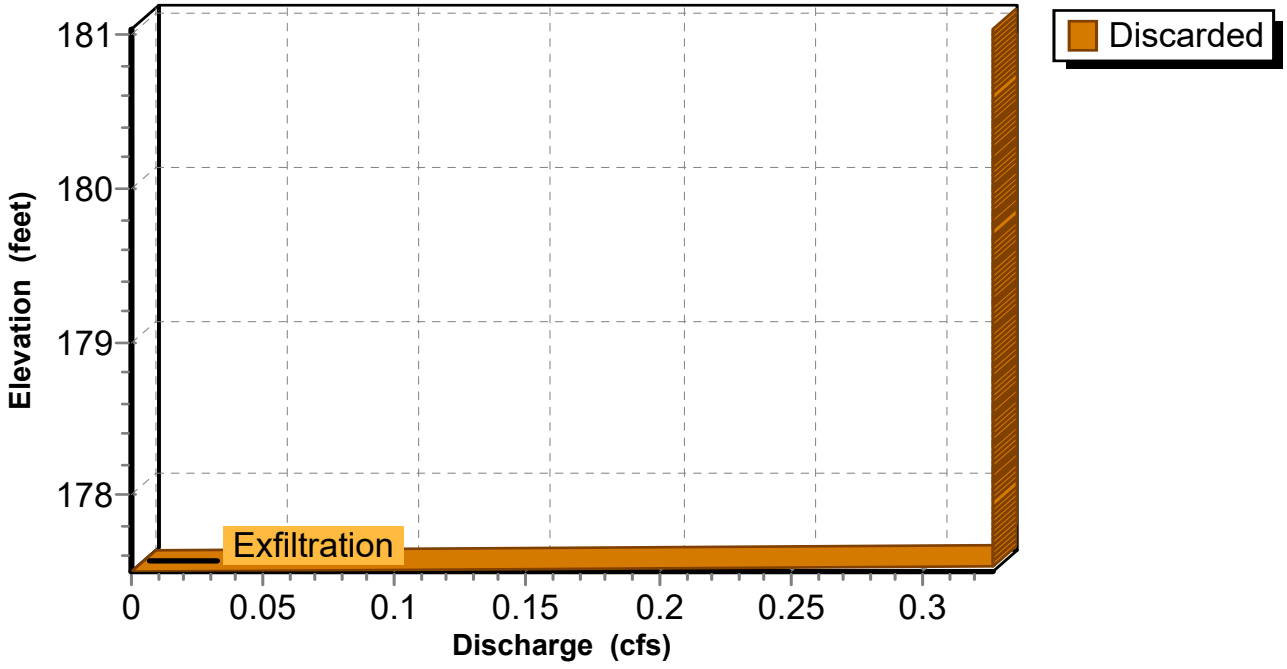
Pond 3P: RB#2

Hydrograph

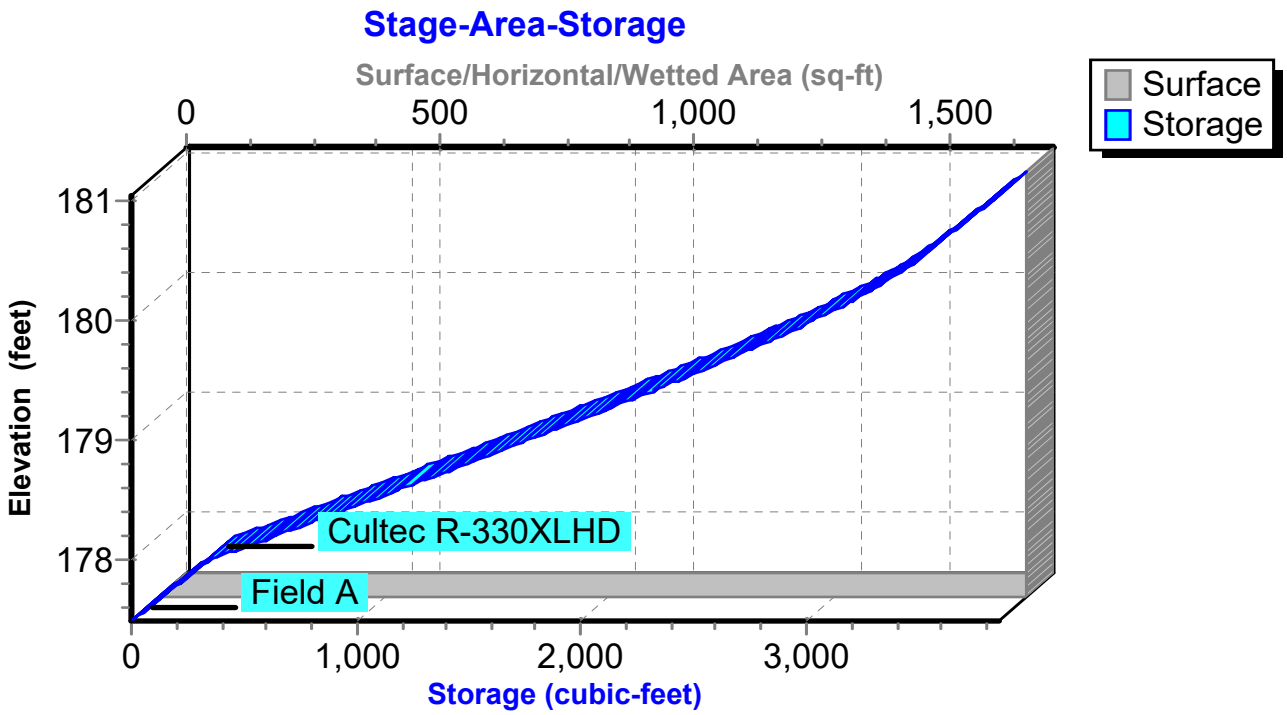


Pond 3P: RB#2

Stage-Discharge



Pond 3P: RB#2


Stage-Area-Storage
Surface/Horizontal/Wetted Area (sq-ft)
0
500
1,000
1,500
Surface
Storage
181
180
179
178
Elevation (feet)
Cultec R-330XLHD
Field A
0
1,000
2,000
3,000
Storage (cubic-feet)

Summary for Pond 4P: RB#1

Inflow Area = 9,967 sf, 27.29% Impervious, Inflow Depth = 0.04" for 1-Inch event
Inflow = 0.00 cfs @ 12.28 hrs, Volume= 35 cf
Outflow = 0.00 cfs @ 12.29 hrs, Volume= 35 cf, Atten= 0%, Lag= 1.0 min
Discarded = 0.00 cfs @ 12.29 hrs, Volume= 35 cf

Routing by Stor-Ind method, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Peak Elev= 177.50' @ 12.29 hrs Surf.Area= 616 sf Storage= 0 cf

Plug-Flow detention time= 1.2 min calculated for 35 cf (100% of inflow)
Center-of-Mass det. time= 1.2 min (940.1 - 938.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	177.50'	546 cf	**16.00'W x 38.50'L x 3.54'H Field A** 2,182 cf Overall - 816 cf Embedded = 1,366 cf x 40.0% Voids
#2A	178.00'	816 cf	**Cultec R-330XLHD** x 15 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 3 rows
		1,362 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	177.50'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.12 cfs @ 12.29 hrs HW=177.50' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.12 cfs)

Pond 4P: RB#1 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 3 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

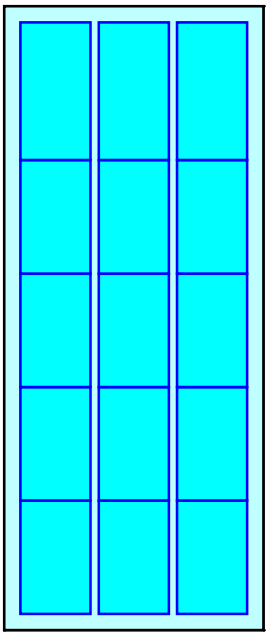
5 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 36.50' Row Length +12.0" End Stone x 2 = 38.50' Base Length
3 Rows x 52.0" Wide + 6.0" Spacing x 2 + 12.0" Side Stone x 2 = 16.00' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

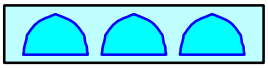
15 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 3 Rows = 815.9 cf Chamber Storage

2,181.7 cf Field - 815.9 cf Chambers = 1,365.8 cf Stone x 40.0% Voids = 546.3 cf Stone Storage

Chamber Storage + Stone Storage = 1,362.2 cf = 0.031 af
Overall Storage Efficiency = 62.4%
Overall System Size = 38.50' x 16.00' x 3.54'

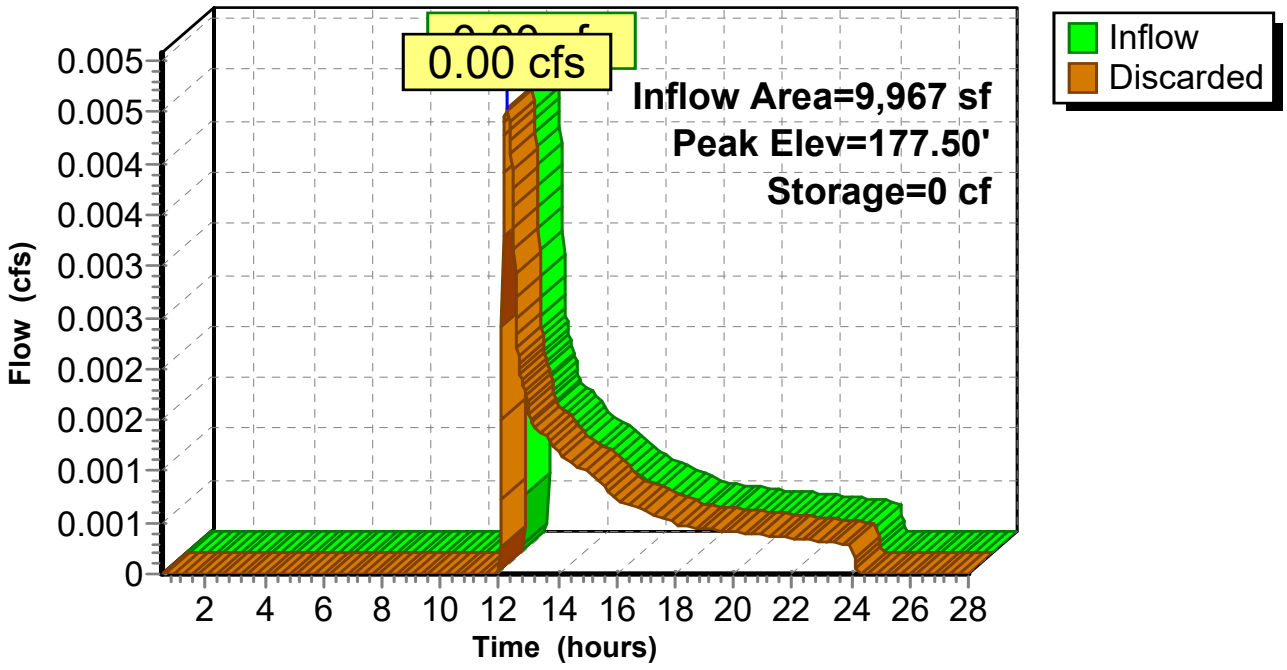
15 Chambers @ $ 300.00 /ea = $ 4,500.00
80.8 cy Field Excavation @ $ 10.00 /cy = $ 808.02
50.6 cy Stone @ $ 30.00 /cy = $ 1,517.54
Total Cost = $ 6,825.56





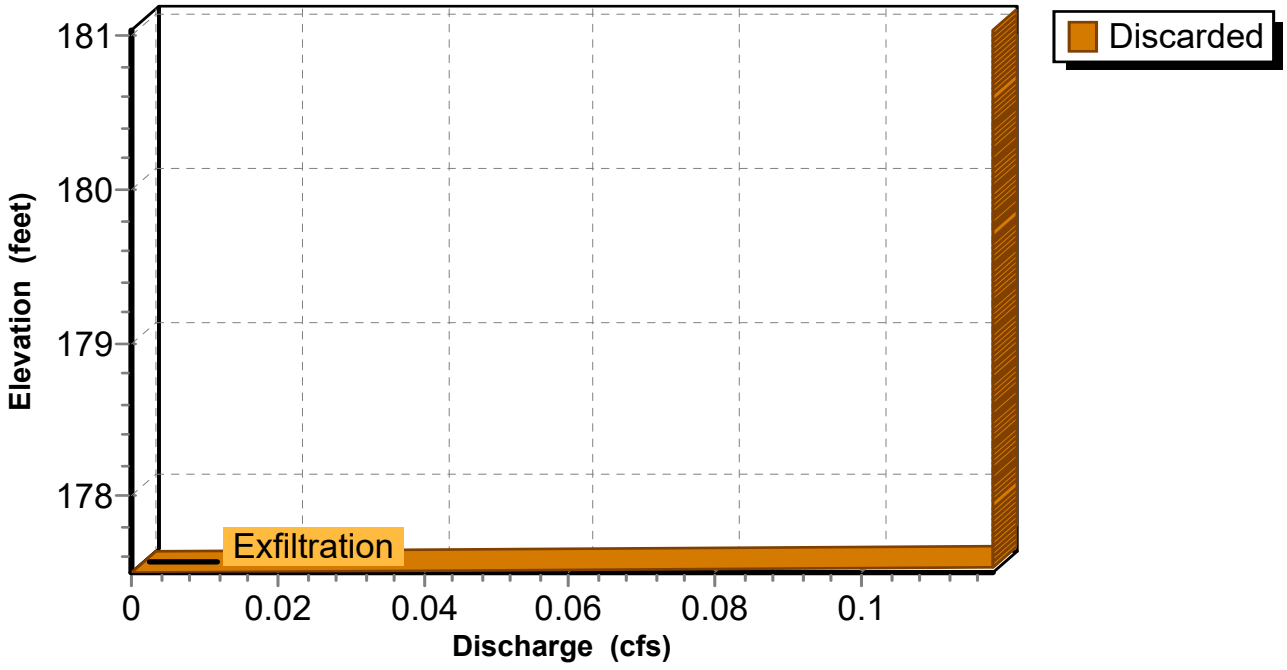
Pond 4P: RB#1

Hydrograph

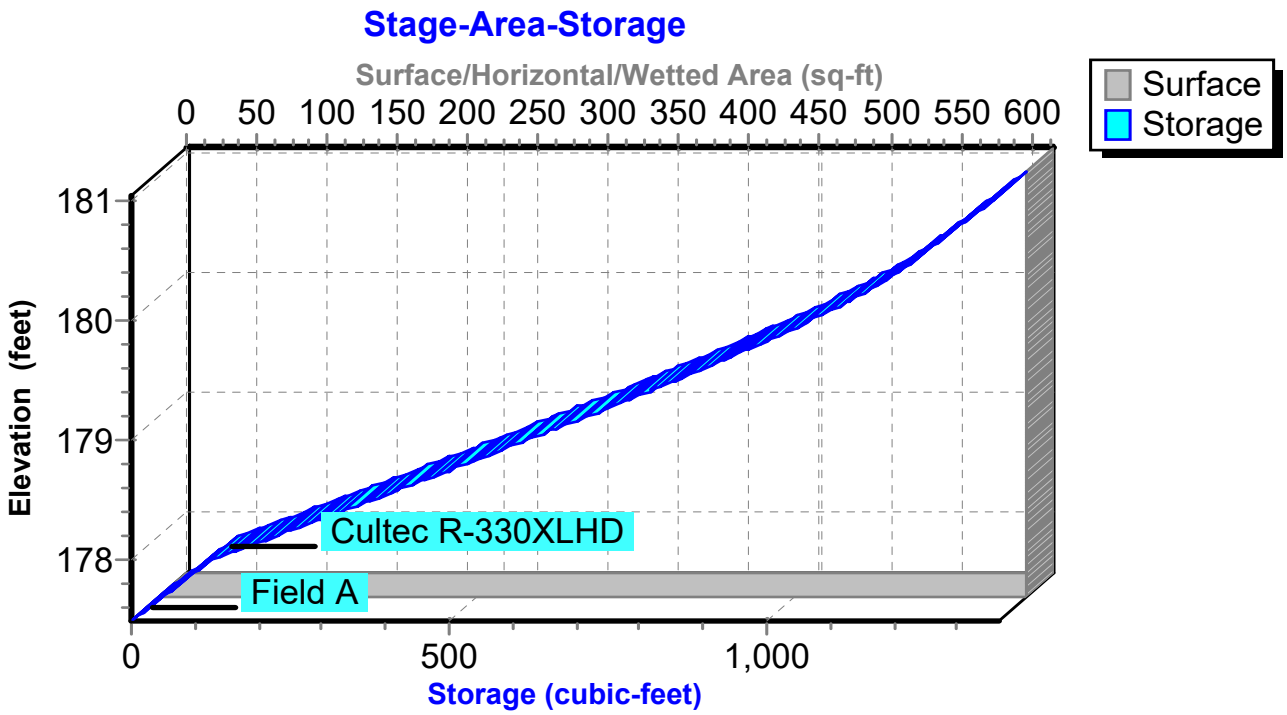


Pond 4P: RB#1

Stage-Discharge



Pond 4P: RB#1


Stage-Area-Storage
Surface/Horizontal/Wetted Area (sq-ft)
0 50 100 150 200 250 300 350 400 450 500 550 600
Surface
Storage
181
180
179
178
Elevation (feet)
Cultec R-330XLHD
Field A
0
500
1,000
Storage (cubic-feet)

Summary for Pond 5P: RB#5

Inflow Area = 7,495 sf, 0.00% Impervious, Inflow Depth = 0.00" for 1-Inch event
Inflow = 0.00 cfs @ 0.50 hrs, Volume= 0 cf
Outflow = 0.00 cfs @ 0.50 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.50 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Peak Elev= 177.00' @ 0.50 hrs Surf.Area= 195 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1A	177.00'	184 cf	**11.17'W x 17.50'L x 3.54'H Field A** 692 cf Overall - 231 cf Embedded = 461 cf x 40.0% Voids
#2A	177.50'	231 cf	**Cultec R-330XLHD** x 4 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 2 rows
		415 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	177.00'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.00 cfs @ 0.50 hrs HW=177.00' (Free Discharge)
↑**1=Exfiltration** (Passes 0.00 cfs of 0.04 cfs potential flow)

Pond 5P: RB#5 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 2 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

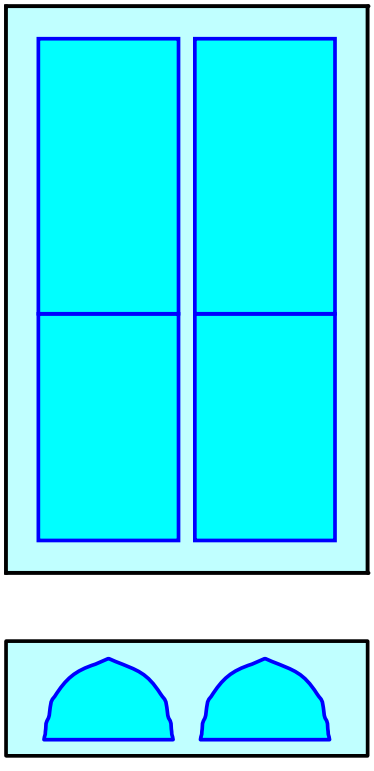
2 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 15.50' Row Length +12.0" End Stone x 2 = 17.50' Base Length
2 Rows x 52.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 11.17' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

4 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 2 Rows = 231.0 cf Chamber Storage

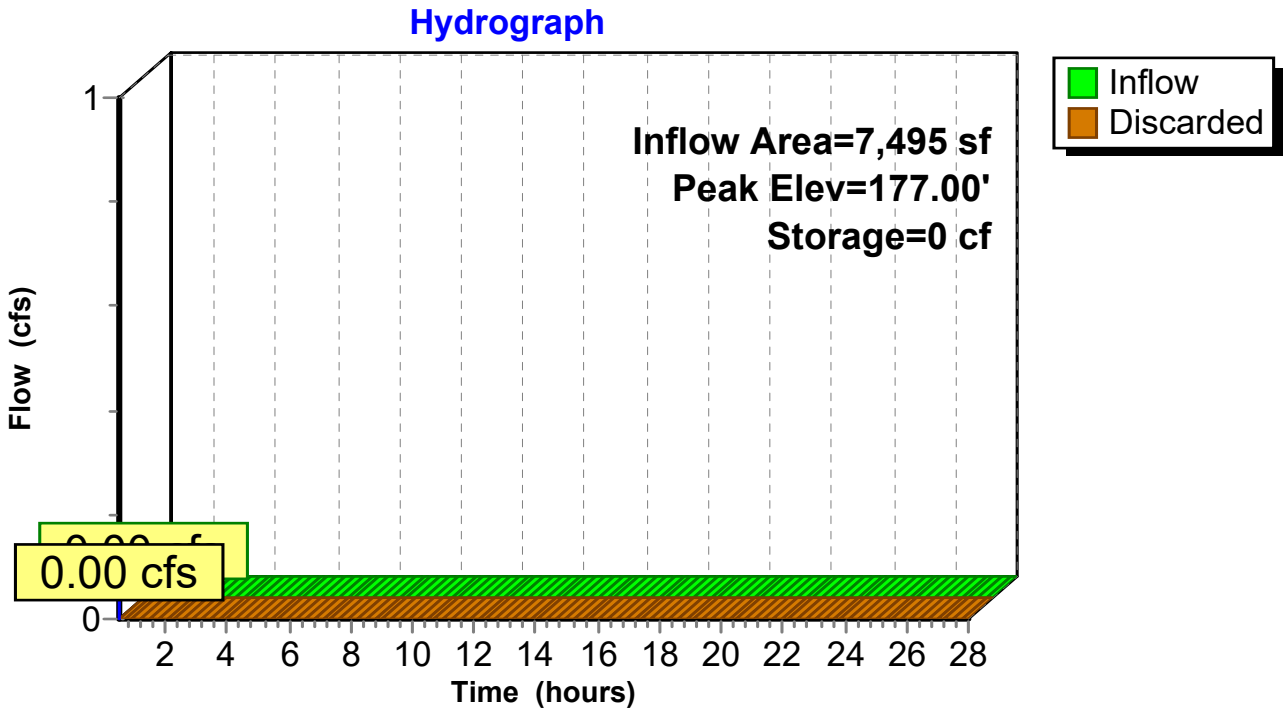
692.1 cf Field - 231.0 cf Chambers = 461.1 cf Stone x 40.0% Voids = 184.4 cf Stone Storage

Chamber Storage + Stone Storage = 415.4 cf = 0.010 af
Overall Storage Efficiency = 60.0%
Overall System Size = 17.50' x 11.17' x 3.54'

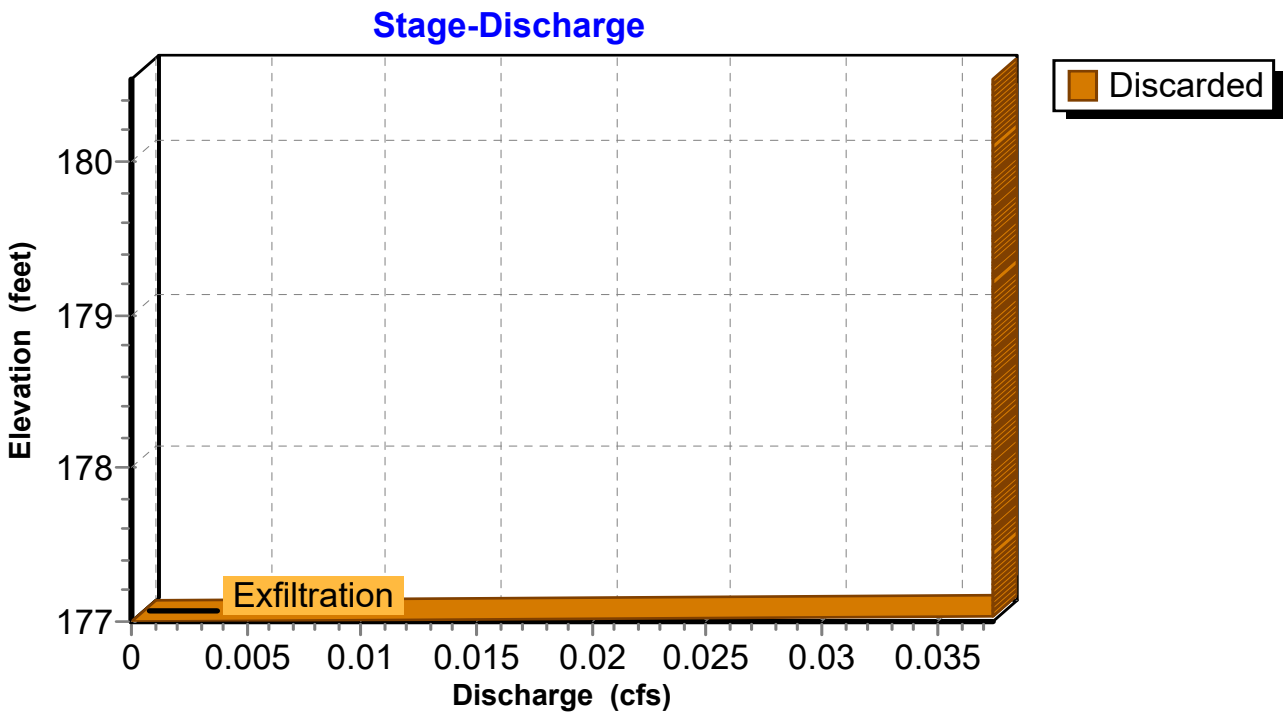
4 Chambers @ $ 300.00 /ea = $ 1,200.00
25.6 cy Field Excavation @ $ 10.00 /cy = $ 256.33
17.1 cy Stone @ $ 30.00 /cy = $ 512.36
Total Cost = $ 1,968.69



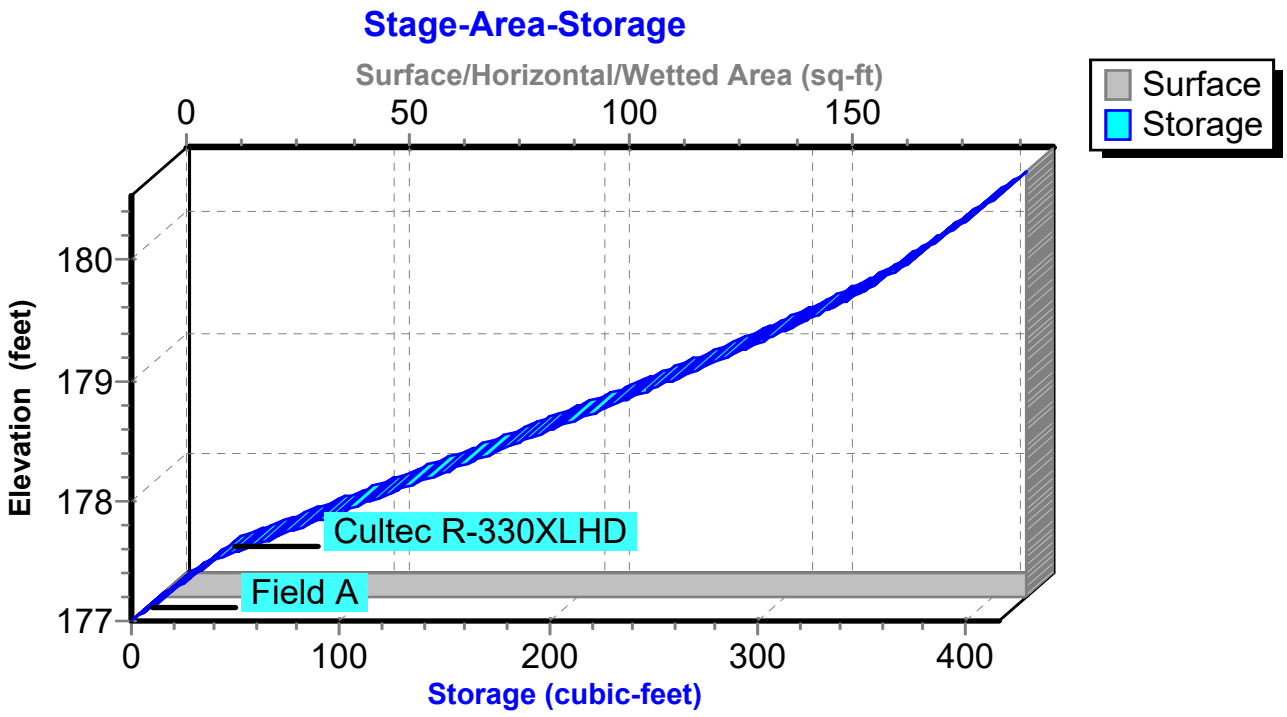
Pond 5P: RB#5



Pond 5P: RB#5



Pond 5P: RB#5


Stage-Area-Storage
Surface/Horizontal/Wetted Area (sq-ft)
0
50
100
150
Surface
Storage
180
179
178
177
Elevation (feet)
Cultec R-330XLHD
Field A
0
100
200
300
400
Storage (cubic-feet)

Summary for Pond 6P: RB#6

Inflow Area = 4,913 sf, 0.00% Impervious, Inflow Depth = 0.00" for 1-Inch event
Inflow = 0.00 cfs @ 0.50 hrs, Volume= 0 cf
Outflow = 0.00 cfs @ 0.50 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.50 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Peak Elev= 174.50' @ 0.50 hrs Surf.Area= 155 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1A	174.50'	153 cf	**6.33'W x 24.50'L x 3.54'H Field A** 550 cf Overall - 168 cf Embedded = 382 cf x 40.0% Voids
#2A	175.00'	168 cf	**Cultec R-330XLHD** x 3 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 1 rows
		320 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	174.50'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.00 cfs @ 0.50 hrs HW=174.50' (Free Discharge)
↑**1=Exfiltration** (Passes 0.00 cfs of 0.03 cfs potential flow)

Pond 6P: RB#6 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 1 rows

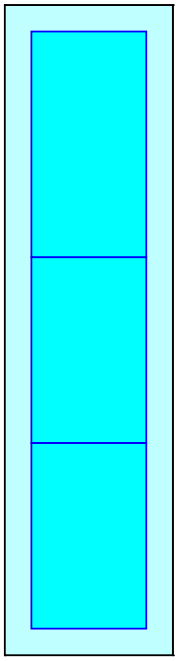
3 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 22.50' Row Length +12.0" End Stone x 2 = 24.50' Base Length
1 Rows x 52.0" Wide + 12.0" Side Stone x 2 = 6.33' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

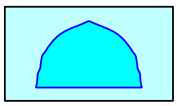
3 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 1 Rows = 167.6 cf Chamber Storage

549.5 cf Field - 167.6 cf Chambers = 381.9 cf Stone x 40.0% Voids = 152.8 cf Stone Storage

Chamber Storage + Stone Storage = 320.4 cf = 0.007 af
Overall Storage Efficiency = 58.3%
Overall System Size = 24.50' x 6.33' x 3.54'

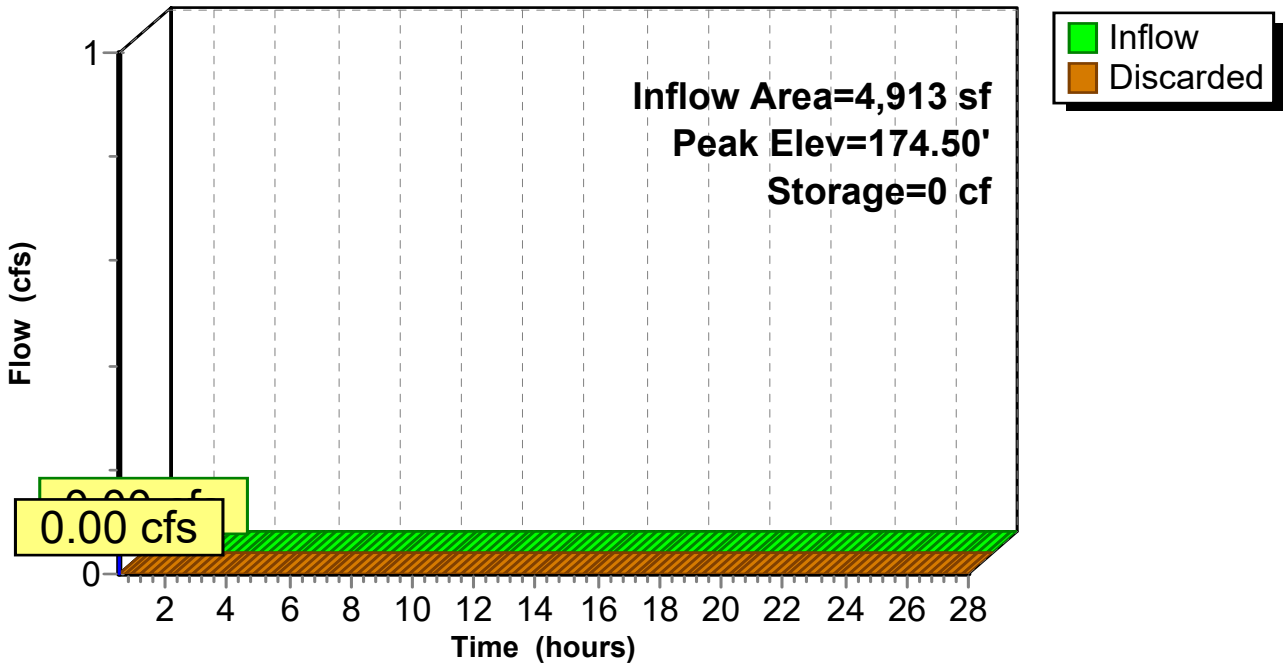
3 Chambers @ $ 300.00 /ea = $ 900.00
20.4 cy Field Excavation @ $ 10.00 /cy = $ 203.54
14.1 cy Stone @ $ 30.00 /cy = $ 424.33
Total Cost = $ 1,527.87





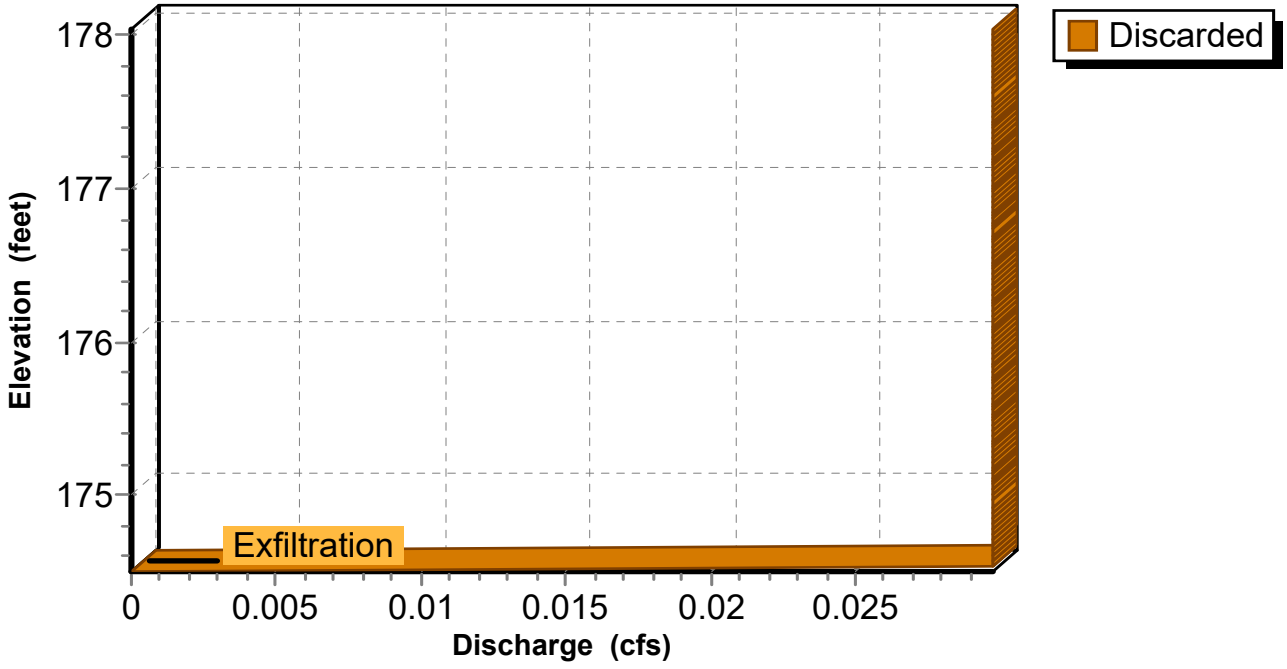
Pond 6P: RB#6

Hydrograph

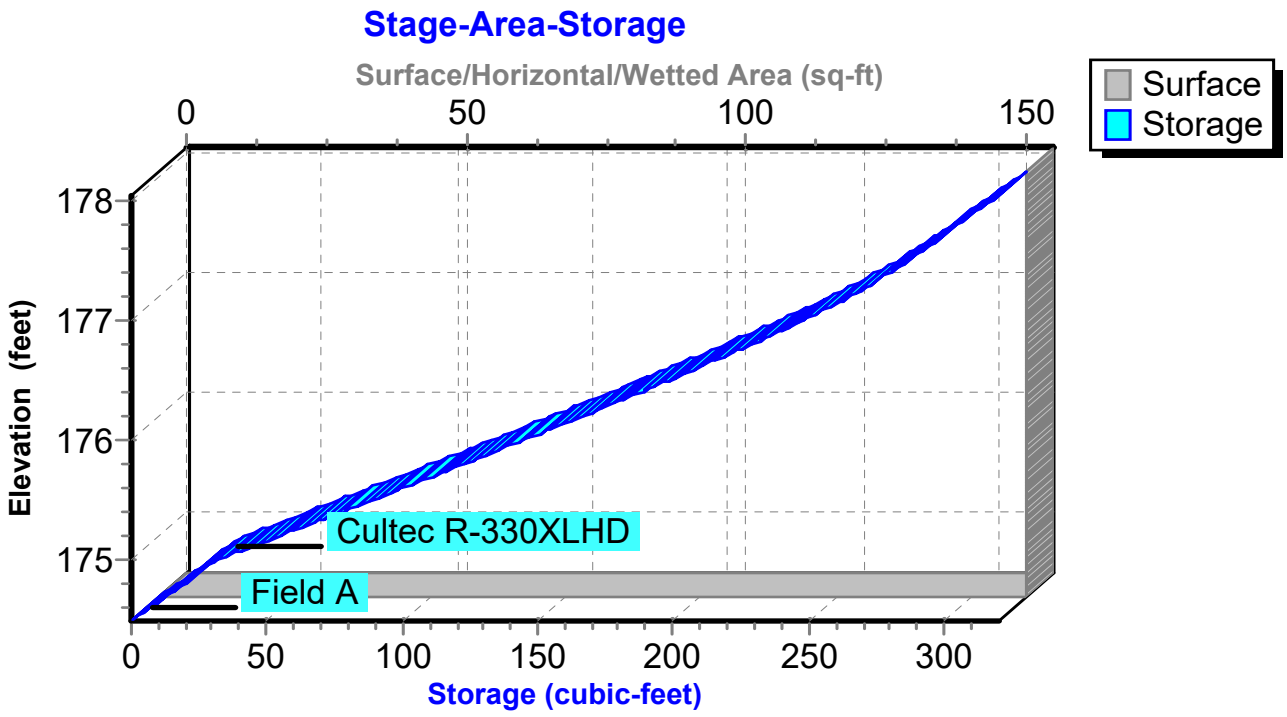


Pond 6P: RB#6

Stage-Discharge



Pond 6P: RB#6


Stage-Area-Storage
Surface/Horizontal/Wetted Area (sq-ft)
0
50
100
150
Surface
Storage
178
177
176
175
Elevation (feet)
Cultec R-330XLHD
Field A
0
50
100
150
200
250
300
Storage (cubic-feet)

Time span=0.50-28.00 hrs, dt=0.02 hrs, 1376 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment SA#1: Subcat SA#1 Runoff Area=4,048 sf 0.00% Impervious Runoff Depth=0.04"
Flow Length=66' Slope=0.0100 '/' Tc=16.0 min CN=45 Runoff=0.00 cfs 13 cf

Subcatchment SA#2: Subcat SA#2 Runoff Area=2,374 sf 0.00% Impervious Runoff Depth=0.01"
Tc=6.0 min CN=42 Runoff=0.00 cfs 2 cf

Subcatchment SA#21: Subcat SA#21 Runoff Area=4,231 sf 64.29% Impervious Runoff Depth=1.44"
Tc=6.0 min CN=81 Runoff=0.16 cfs 507 cf

Subcatchment SA#22: Subcat SA#22 Runoff Area=5,736 sf 0.00% Impervious Runoff Depth=0.05"
Flow Length=132' Tc=9.2 min CN=46 Runoff=0.00 cfs 25 cf

Subcatchment SA#24: Subcat SA#24 Runoff Area=15,524 sf 38.40% Impervious Runoff Depth=0.58"
Flow Length=129' Slope=0.0100 '/' Tc=7.2 min CN=65 Runoff=0.18 cfs 752 cf

Subcatchment SA#25: Subcat SA#25 Runoff Area=14,973 sf 0.01% Impervious Runoff Depth=0.08"
Flow Length=70' Tc=6.4 min CN=48 Runoff=0.00 cfs 104 cf

Subcatchment SA#26: Subcat SA#26 Runoff Area=15,195 sf 40.19% Impervious Runoff Depth=0.67"
Tc=6.0 min CN=67 Runoff=0.23 cfs 844 cf

Subcatchment SA#27: Subcat SA#27 Runoff Area=5,882 sf 78.42% Impervious Runoff Depth=1.88"
Tc=6.0 min CN=87 Runoff=0.30 cfs 921 cf

Subcatchment SA#28: Subcat SA#28 Runoff Area=7,495 sf 0.00% Impervious Runoff Depth=0.02"
Flow Length=116' Tc=12.3 min CN=43 Runoff=0.00 cfs 12 cf

Subcatchment SA#29: Subcat SA#29 Runoff Area=4,913 sf 0.00% Impervious Runoff Depth=0.07"
Tc=6.0 min CN=47 Runoff=0.00 cfs 28 cf

Subcatchment SA#4: Subcat SA#4 Runoff Area=2,621 sf 0.00% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=40 Runoff=0.00 cfs 0 cf

Subcatchment SA#5: Subcat SA#5 Runoff Area=10,821 sf 0.00% Impervious Runoff Depth=0.08"
Tc=6.0 min CN=48 Runoff=0.00 cfs 75 cf

Subcatchment SA#6: Subcat SA#6 Runoff Area=2,223 sf 0.00% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=40 Runoff=0.00 cfs 0 cf

Subcatchment SA#8: Subcat SA#8 Runoff Area=1,858 sf 0.00% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=40 Runoff=0.00 cfs 0 cf

Pond 1P: RB#4 Peak Elev=176.40' Storage=106 cf Inflow=0.30 cfs 921 cf
Outflow=0.13 cfs 921 cf

Pond 2P: RB#3 Peak Elev=177.53' Storage=13 cf Inflow=0.18 cfs 752 cf
Outflow=0.17 cfs 752 cf

Pond 3P: RB#2 Peak Elev=177.52' Storage=16 cf Inflow=0.23 cfs 1,023 cf
Outflow=0.22 cfs 1,023 cf

Pond 4P: RB#1 Peak Elev=177.59' Storage=22 cf Inflow=0.16 cfs 532 cf
Outflow=0.12 cfs 532 cf

Pond 5P: RB#5 Peak Elev=177.00' Storage=0 cf Inflow=0.00 cfs 12 cf
Outflow=0.00 cfs 12 cf

Pond 6P: RB#6 Peak Elev=174.50' Storage=0 cf Inflow=0.00 cfs 28 cf
Outflow=0.00 cfs 28 cf

Total Runoff Area = 97,895 sf Runoff Volume = 3,284 cf Average Runoff Depth = 0.40"
80.18% Pervious = 78,492 sf 19.82% Impervious = 19,403 sf

Summary for Subcatchment SA#1: Subcat SA#1

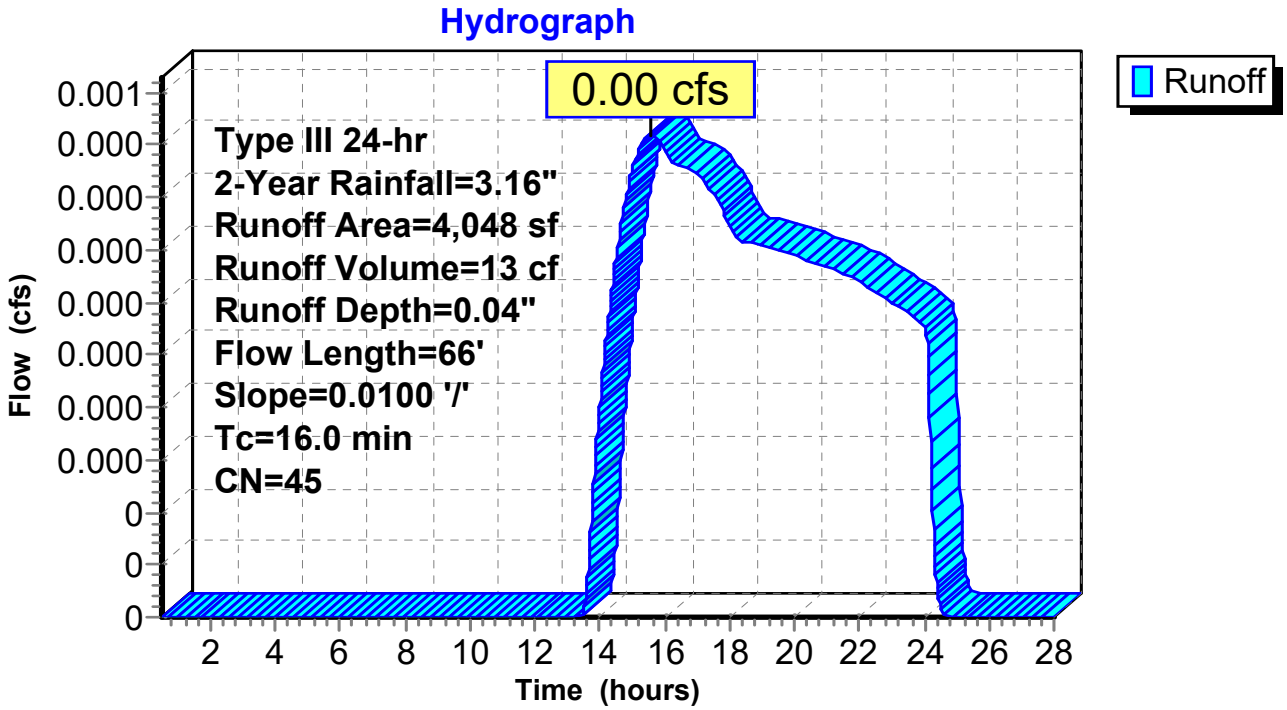
Runoff = 0.00 cfs @ 15.61 hrs, Volume= 13 cf, Depth= 0.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.16"

Area (sf)	CN	Description
2,840	49	50-75% Grass cover, Fair, HSG A
1,207	36	Woods, Fair, HSG A
4,048	45	Weighted Average
4,048		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.8	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
0.2	16	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.0	66	Total			

Subcatchment SA#1: Subcat SA#1



Summary for Subcatchment SA#2: Subcat SA#2

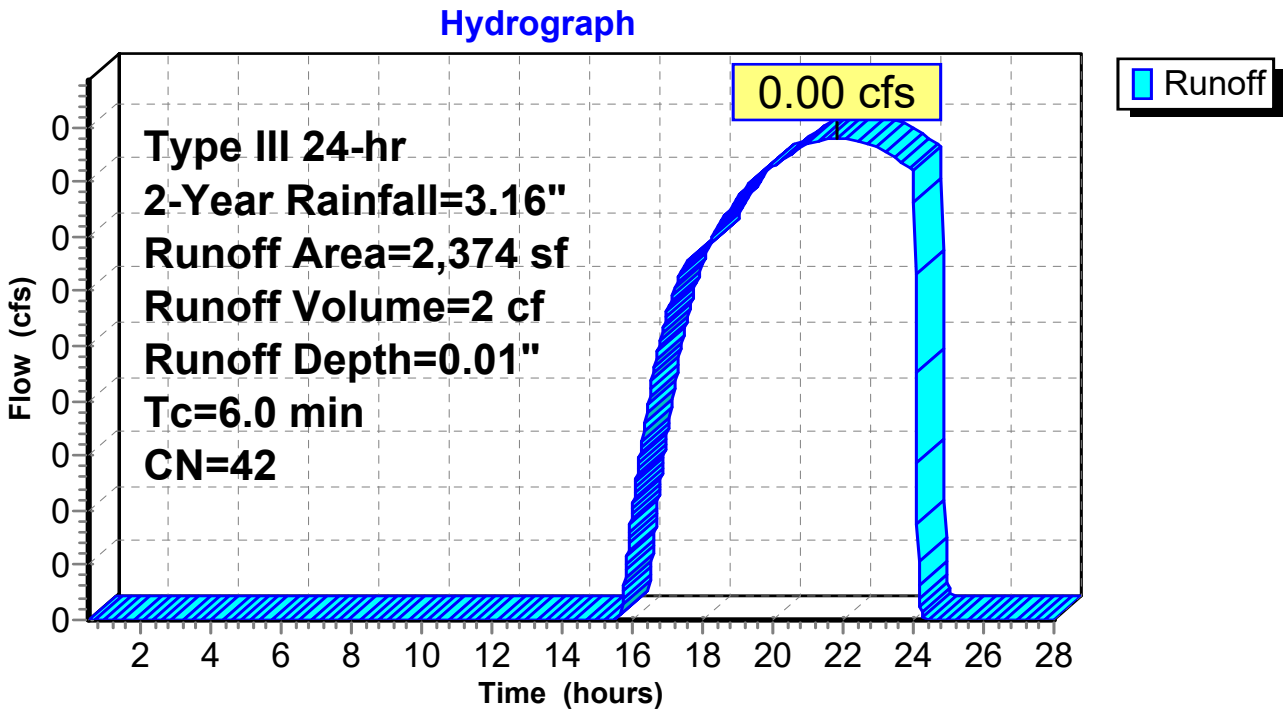
Runoff = 0.00 cfs @ 21.84 hrs, Volume= 2 cf, Depth= 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.16"

Area (sf)	CN	Description
1,181	49	50-75% Grass cover, Fair, HSG A
1,193	36	Woods, Fair, HSG A
2,374	42	Weighted Average
2,374		100.00% Pervious Area

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

Subcatchment SA#2: Subcat SA#2



Summary for Subcatchment SA#21: Subcat SA#21

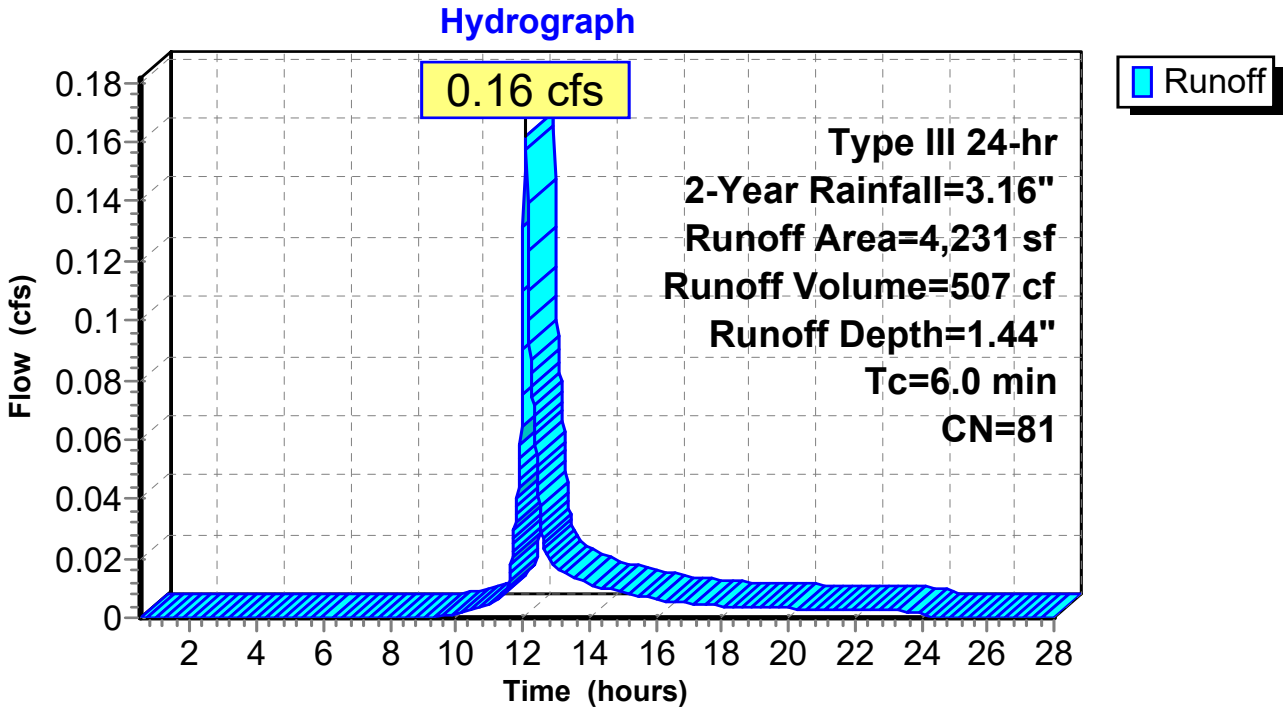
Runoff = 0.16 cfs @ 12.09 hrs, Volume= 507 cf, Depth= 1.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.16"

Area (sf)	CN	Description
1,511	49	50-75% Grass cover, Fair, HSG A
2,720	98	Paved roads w/curbs & sewers, HSG A
4,231	81	Weighted Average
1,511		35.71% Pervious Area
2,720		64.29% Impervious Area

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

Subcatchment SA#21: Subcat SA#21



Summary for Subcatchment SA#22: Subcat SA#22

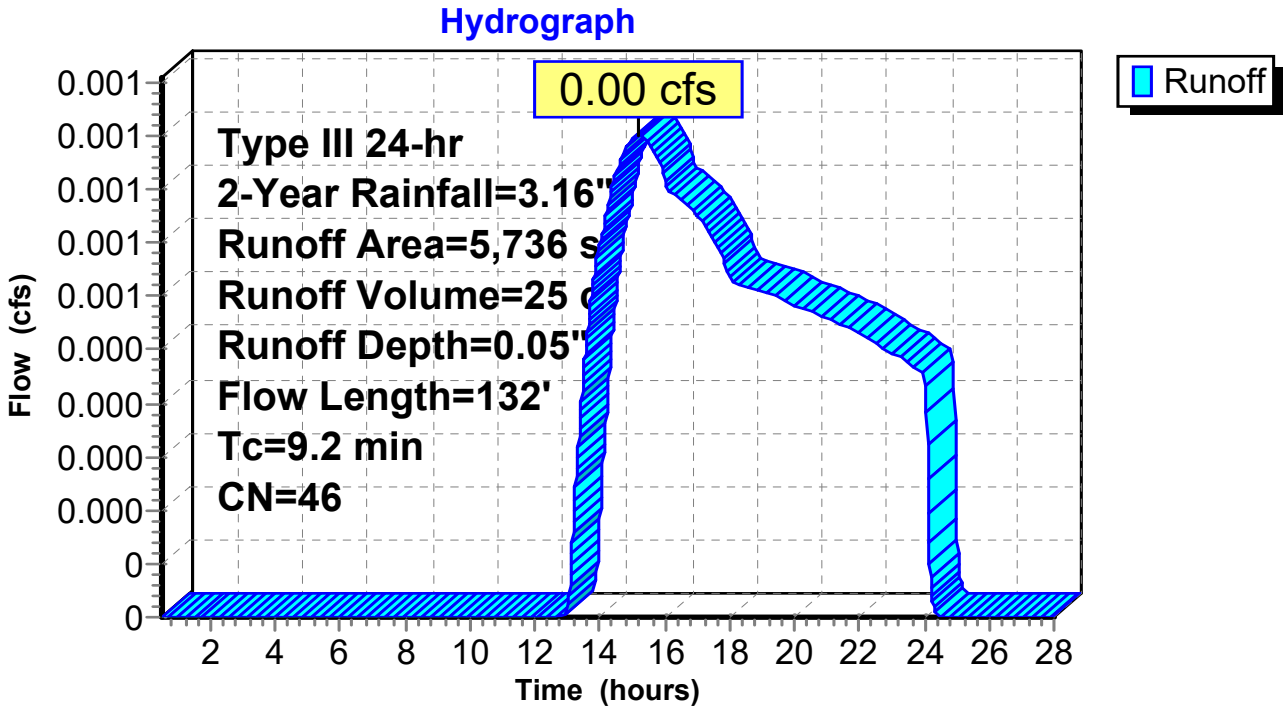
Runoff = 0.00 cfs @ 15.19 hrs, Volume= 25 cf, Depth= 0.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.16"

Area (sf)	CN	Description
4,558	49	50-75% Grass cover, Fair, HSG A
1,178	36	Woods, Fair, HSG A
5,736	46	Weighted Average
5,736		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	23	0.0110	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
1.0	109	0.0120	1.76		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
9.2	132	Total			

Subcatchment SA#22: Subcat SA#22



Summary for Subcatchment SA#24: Subcat SA#24

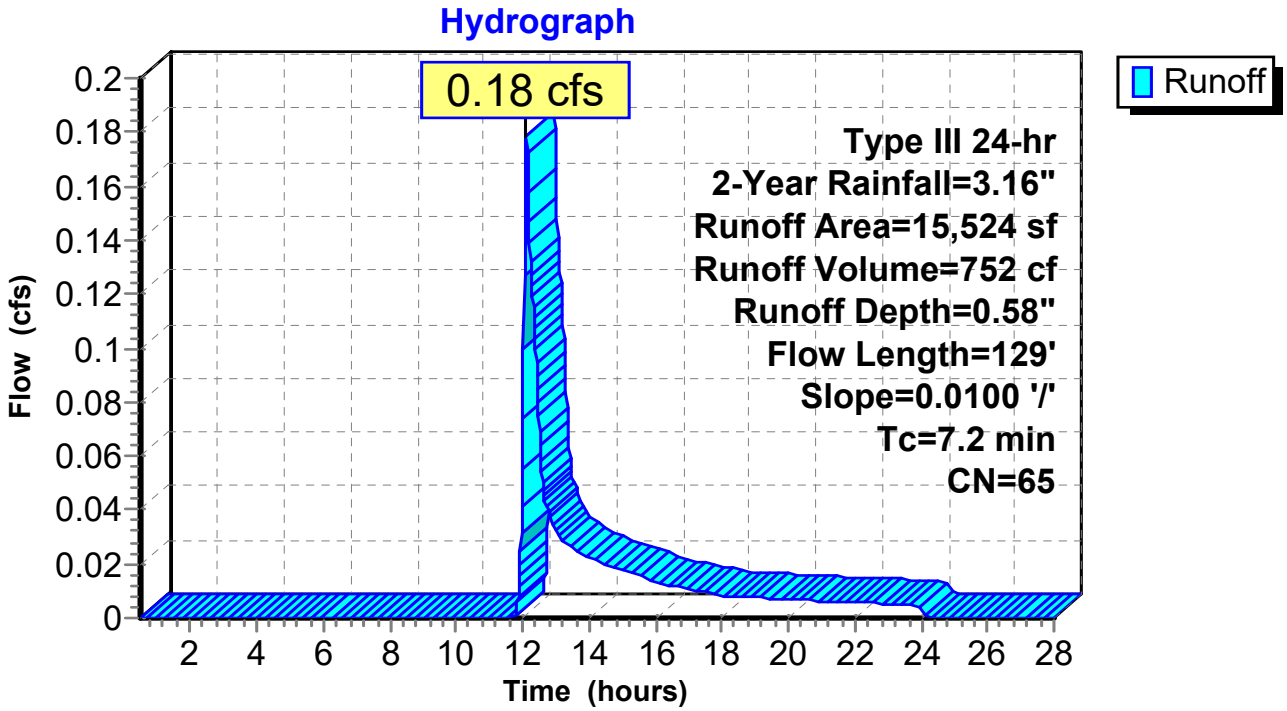
Runoff = 0.18 cfs @ 12.13 hrs, Volume= 752 cf, Depth= 0.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.16"

Area (sf)	CN	Description
6,224	49	50-75% Grass cover, Fair, HSG A
1,948	98	Paved roads w/curbs & sewers, HSG A
4,014	98	Roofs, HSG A
3,338	36	Woods, Fair, HSG A
15,524	65	Weighted Average
9,562		61.60% Pervious Area
5,962		38.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	15	0.0100	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
1.2	114	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
7.2	129	Total			

Subcatchment SA#24: Subcat SA#24



Summary for Subcatchment SA#25: Subcat SA#25

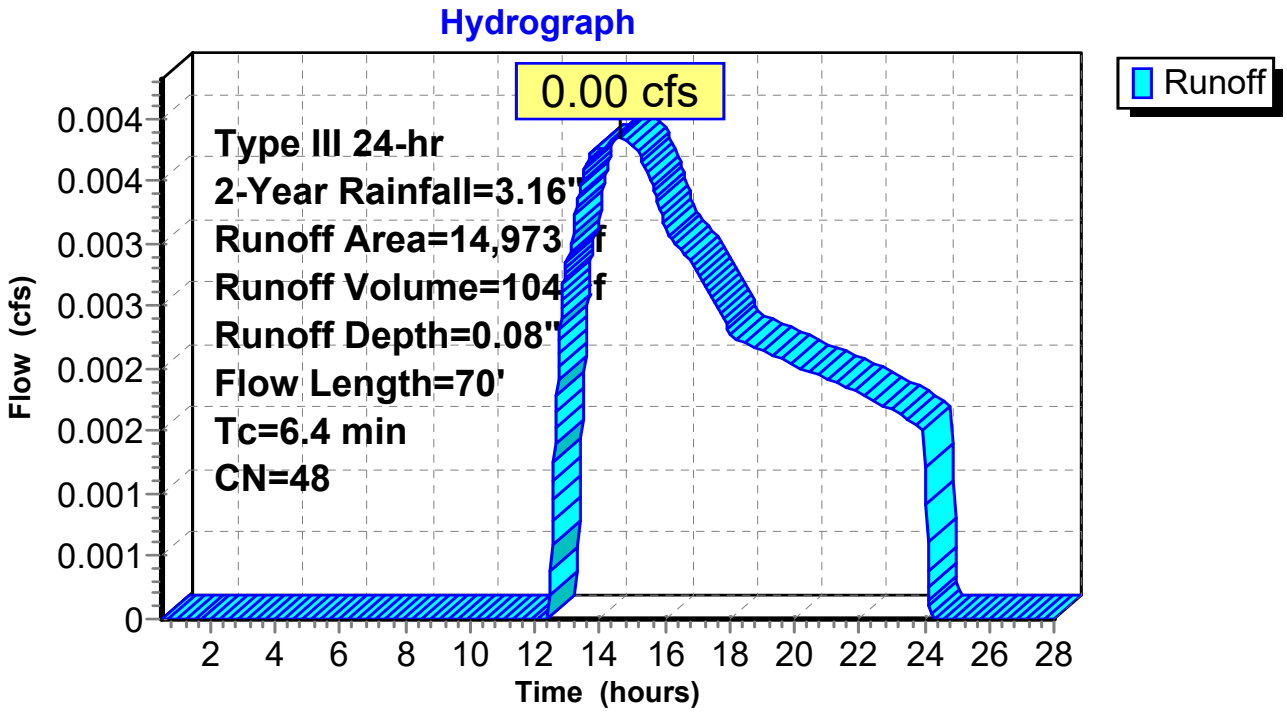
Runoff = 0.00 cfs @ 14.62 hrs, Volume= 104 cf, Depth= 0.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.16"

Area (sf)	CN	Description
14,146	49	50-75% Grass cover, Fair, HSG A
2	98	Roofs, HSG A
826	36	Woods, Fair, HSG A
14,973	48	Weighted Average
14,972		99.99% Pervious Area
2		0.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	50	0.0360	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.40"
0.1	20	0.1000	5.09		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
6.4	70	Total			

Subcatchment SA#25: Subcat SA#25



Summary for Subcatchment SA#26: Subcat SA#26

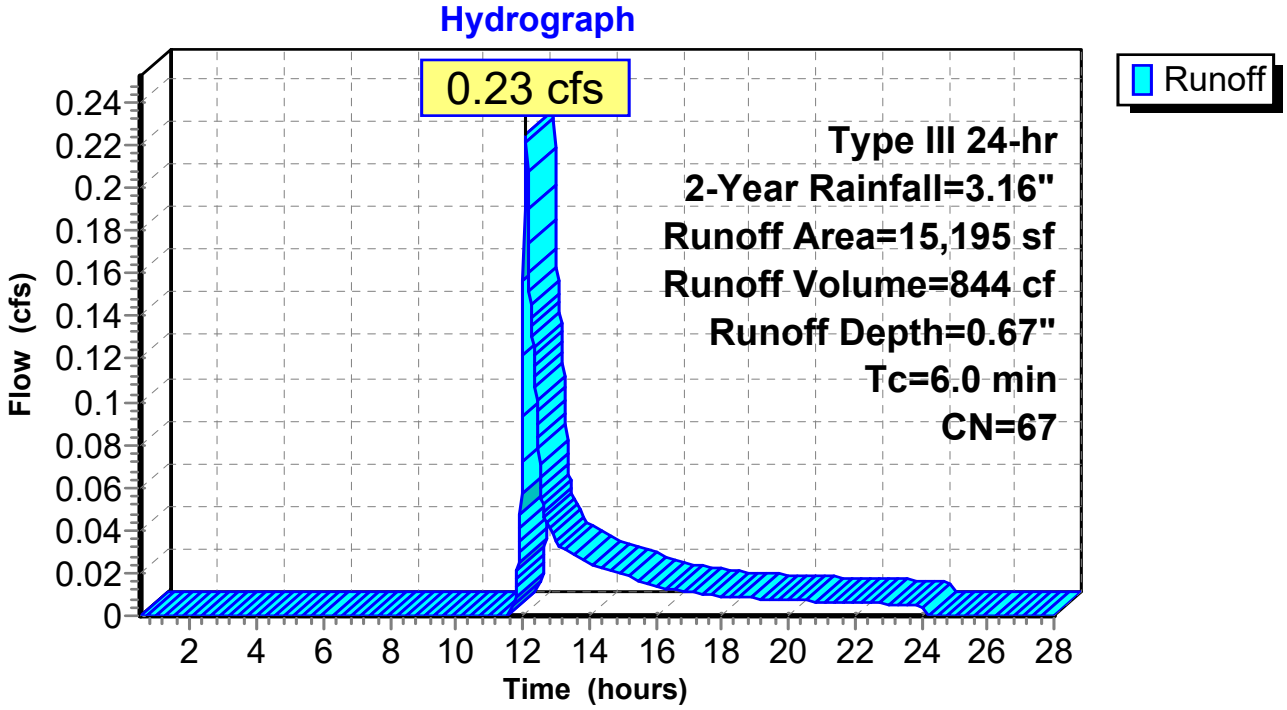
Runoff = 0.23 cfs @ 12.11 hrs, Volume= 844 cf, Depth= 0.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.16"

Area (sf)	CN	Description
7,298	49	50-75% Grass cover, Fair, HSG A
6,107	98	Paved roads w/curbs & sewers, HSG A
1,791	36	Woods, Fair, HSG A
15,195	67	Weighted Average
9,089		59.81% Pervious Area
6,107		40.19% Impervious Area

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

Subcatchment SA#26: Subcat SA#26



Summary for Subcatchment SA#27: Subcat SA#27

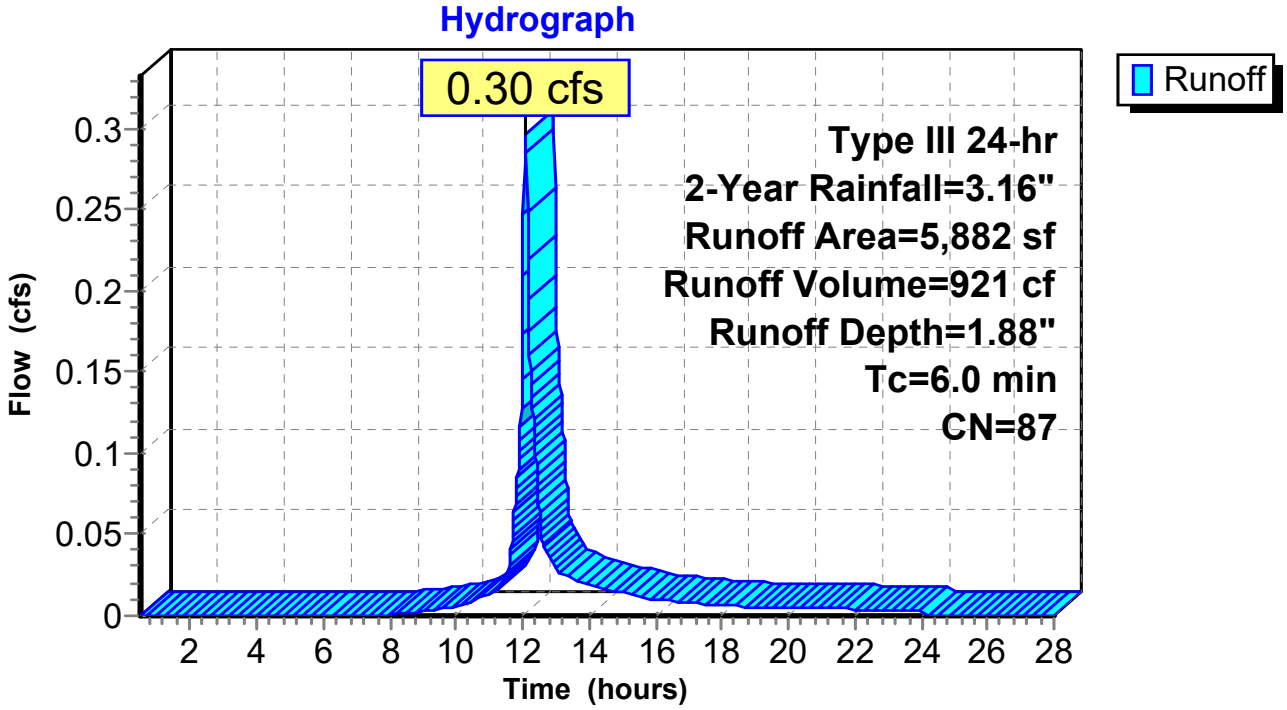
Runoff = 0.30 cfs @ 12.09 hrs, Volume= 921 cf, Depth= 1.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.16"

Area (sf)	CN	Description
1,269	49	50-75% Grass cover, Fair, HSG A
1,384	98	Paved roads w/curbs & sewers, HSG A
3,229	98	Roofs, HSG A
5,882	87	Weighted Average
1,269		21.58% Pervious Area
4,613		78.42% Impervious Area

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

Subcatchment SA#27: Subcat SA#27



Summary for Subcatchment SA#28: Subcat SA#28

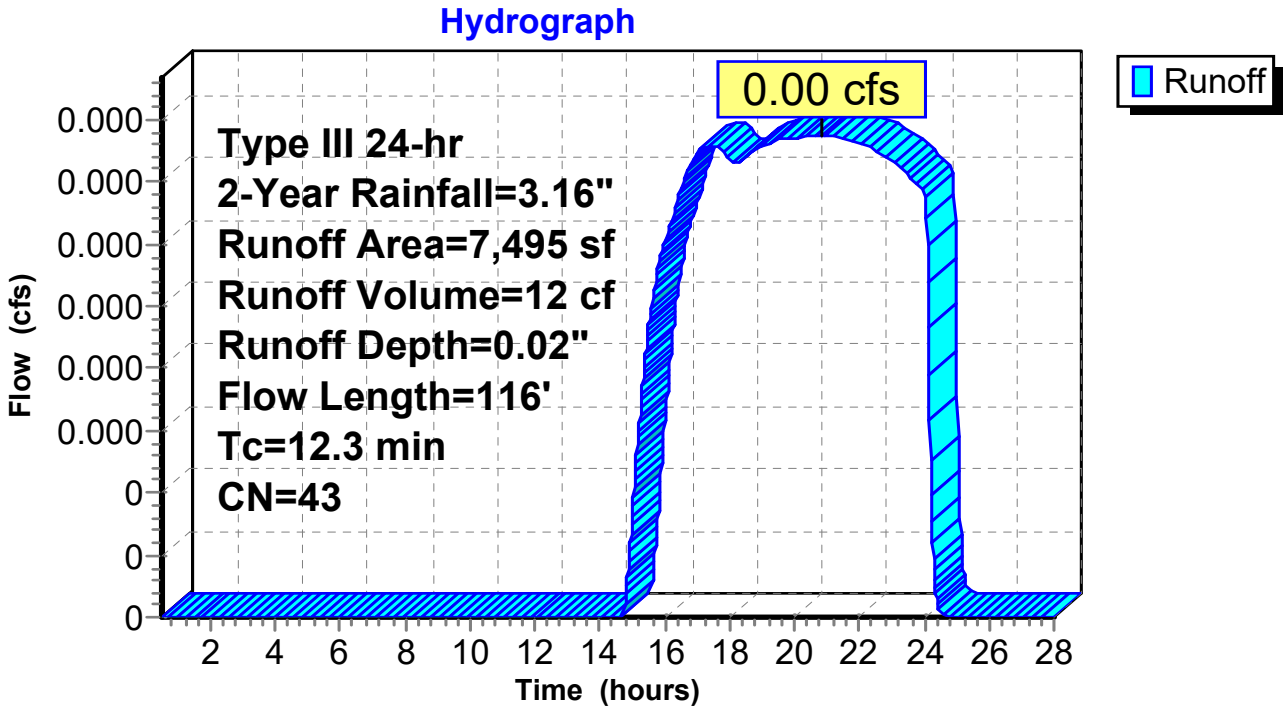
Runoff = 0.00 cfs @ 20.84 hrs, Volume= 12 cf, Depth= 0.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.16"

Area (sf)	CN	Description
3,987	49	50-75% Grass cover, Fair, HSG A
3,508	36	Woods, Fair, HSG A
7,495	43	Weighted Average
7,495		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0280	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
1.8	66	0.0014	0.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
12.3	116	Total			

Subcatchment SA#28: Subcat SA#28



Summary for Subcatchment SA#29: Subcat SA#29

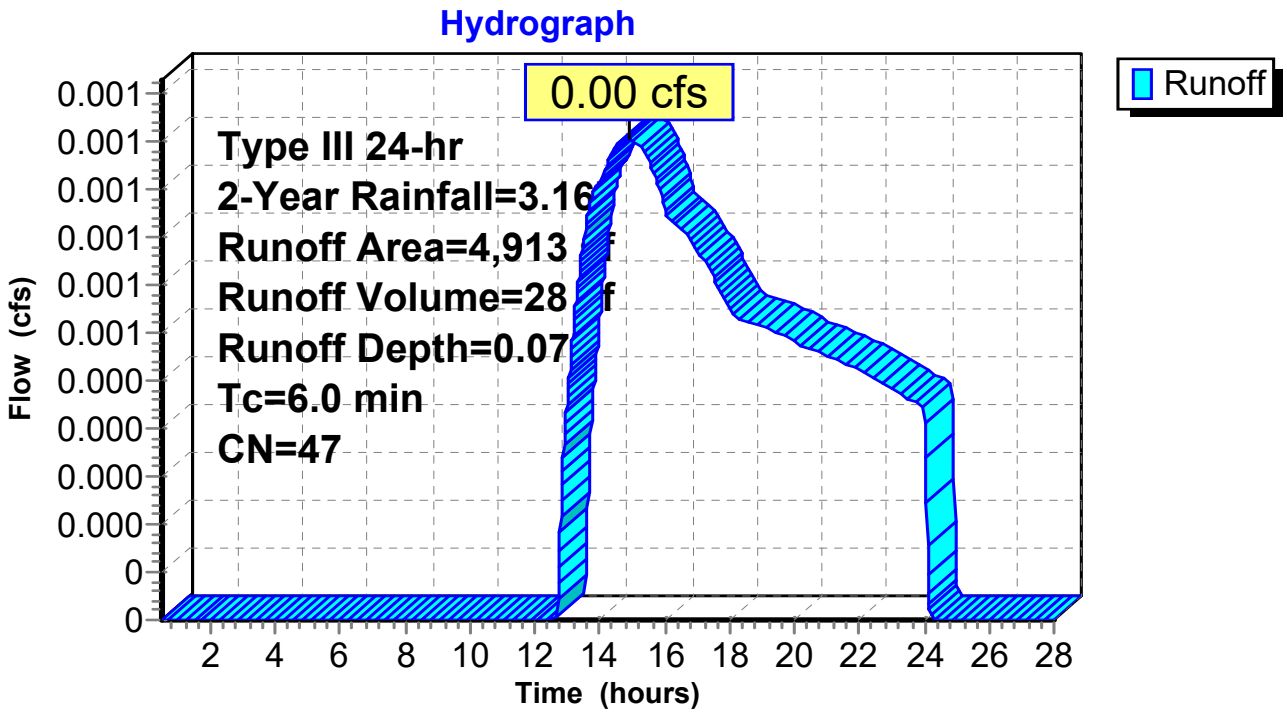
Runoff = 0.00 cfs @ 14.88 hrs, Volume= 28 cf, Depth= 0.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.16"

Area (sf)	CN	Description
4,295	49	50-75% Grass cover, Fair, HSG A
618	36	Woods, Fair, HSG A
4,913	47	Weighted Average
4,913		100.00% Pervious Area

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

Subcatchment SA#29: Subcat SA#29



Summary for Subcatchment SA#4: Subcat SA#4

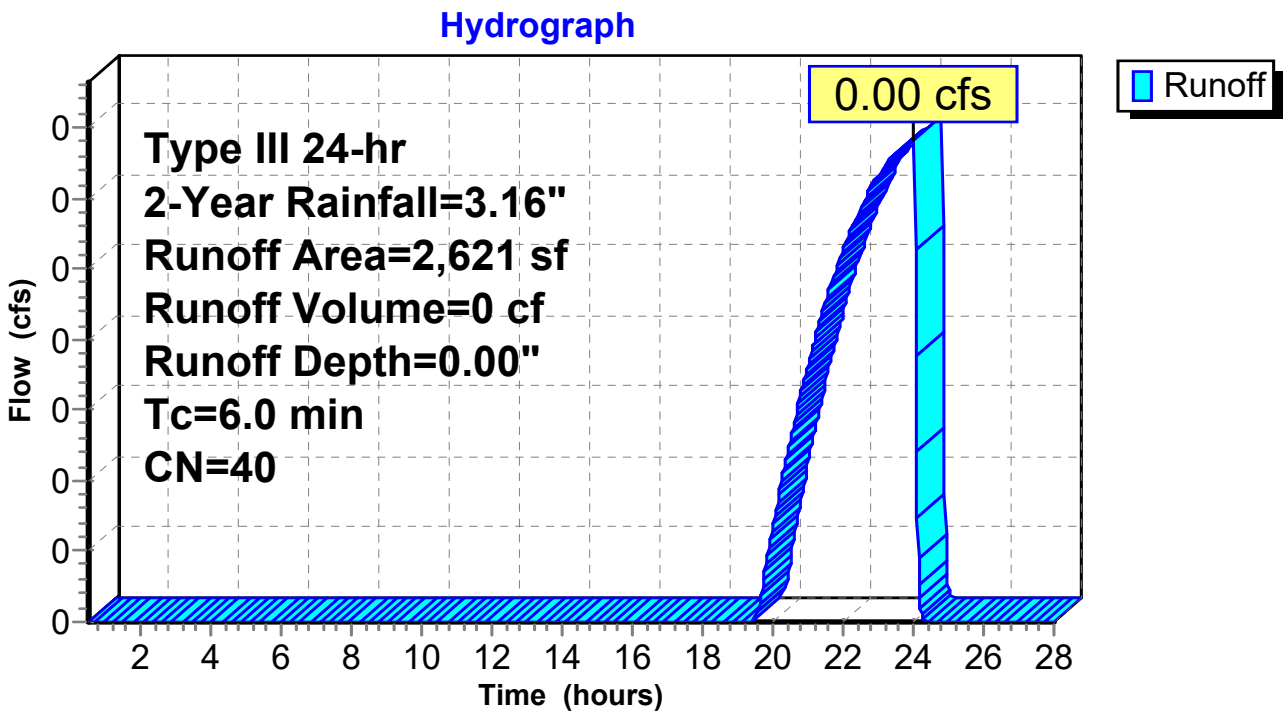
Runoff = 0.00 cfs @ 24.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.16"

Area (sf)	CN	Description
827	49	50-75% Grass cover, Fair, HSG A
1,794	36	Woods, Fair, HSG A
2,621	40	Weighted Average
2,621		100.00% Pervious Area

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

Subcatchment SA#4: Subcat SA#4



Summary for Subcatchment SA#5: Subcat SA#5

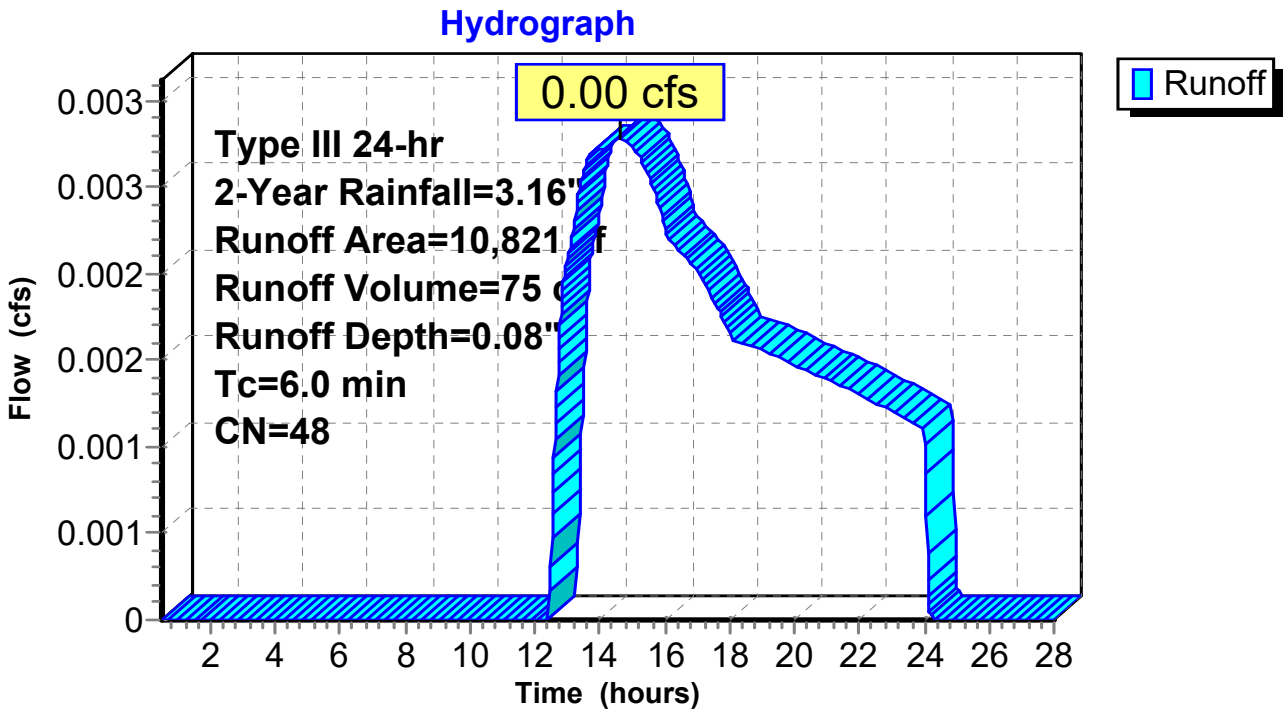
Runoff = 0.00 cfs @ 14.64 hrs, Volume= 75 cf, Depth= 0.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.16"

Area (sf)	CN	Description
9,977	49	50-75% Grass cover, Fair, HSG A
844	36	Woods, Fair, HSG A
10,821	48	Weighted Average
10,821		100.00% Pervious Area

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

Subcatchment SA#5: Subcat SA#5



Summary for Subcatchment SA#6: Subcat SA#6

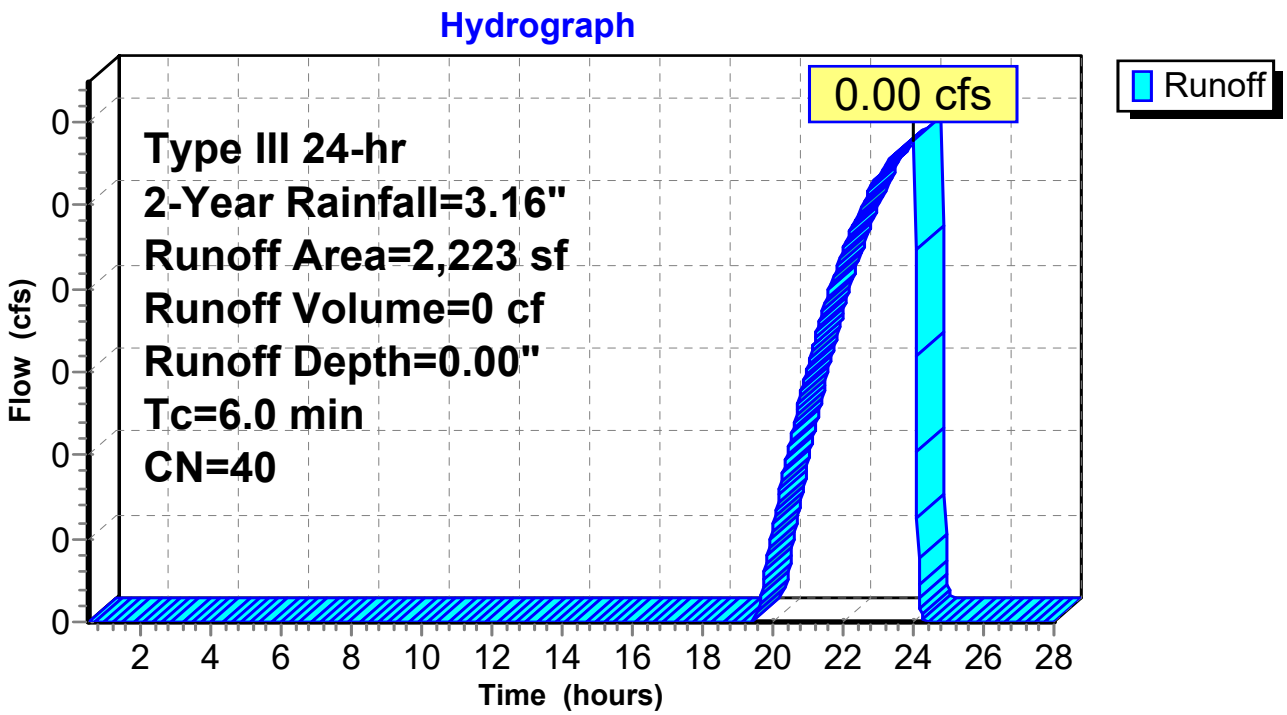
Runoff = 0.00 cfs @ 24.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.16"

Area (sf)	CN	Description
697	49	50-75% Grass cover, Fair, HSG A
1,527	36	Woods, Fair, HSG A
2,223	40	Weighted Average
2,223		100.00% Pervious Area

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

Subcatchment SA#6: Subcat SA#6



Summary for Subcatchment SA#8: Subcat SA#8

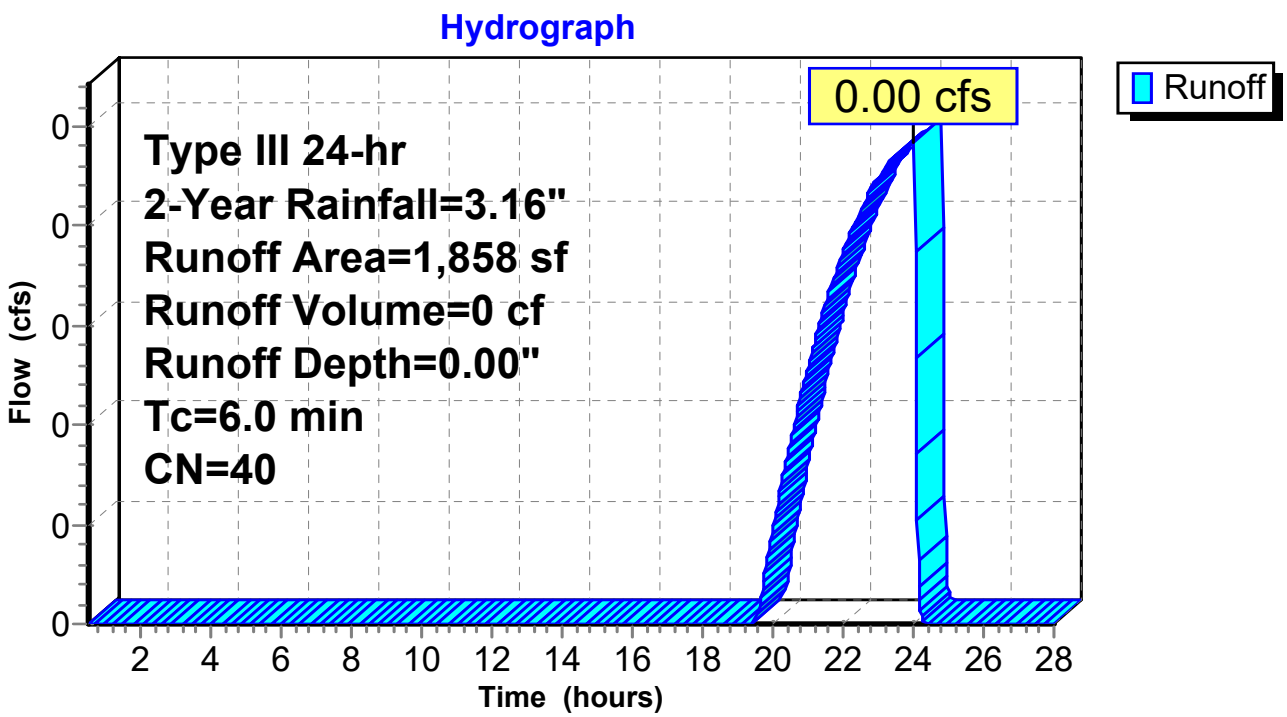
Runoff = 0.00 cfs @ 24.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.16"

Area (sf)	CN	Description
568	49	50-75% Grass cover, Fair, HSG A
1,291	36	Woods, Fair, HSG A
1,858	40	Weighted Average
1,858		100.00% Pervious Area

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

Subcatchment SA#8: Subcat SA#8



Summary for Pond 1P: RB#4

Inflow Area = 5,882 sf, 78.42% Impervious, Inflow Depth = 1.88" for 2-Year event
Inflow = 0.30 cfs @ 12.09 hrs, Volume= 921 cf
Outflow = 0.13 cfs @ 11.98 hrs, Volume= 921 cf, Atten= 58%, Lag= 0.0 min
Discarded = 0.13 cfs @ 11.98 hrs, Volume= 921 cf

Routing by Stor-Ind method, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Peak Elev= 176.40' @ 12.31 hrs Surf.Area= 656 sf Storage= 106 cf

Plug-Flow detention time= 4.3 min calculated for 921 cf (100% of inflow)
Center-of-Mass det. time= 4.3 min (823.7 - 819.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	176.00'	578 cf	**20.83'W x 31.50'L x 3.54'H Field A** 2,324 cf Overall - 879 cf Embedded = 1,445 cf x 40.0% Voids
#2A	176.50'	879 cf	**Cultec R-330XLHD** x 16 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 4 rows
		1,457 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	176.00'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.13 cfs @ 11.98 hrs HW=176.04' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.13 cfs)

Pond 1P: RB#4 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 4 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

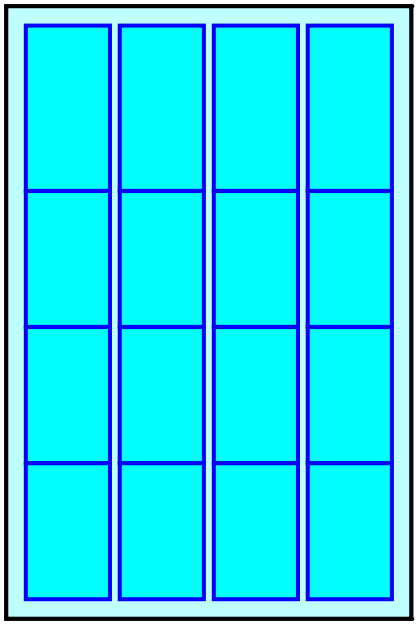
4 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 29.50' Row Length +12.0" End Stone x 2 = 31.50' Base Length
4 Rows x 52.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.83' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

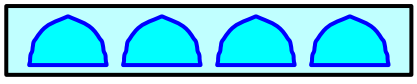
16 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 4 Rows = 879.2 cf Chamber Storage

2,324.2 cf Field - 879.2 cf Chambers = 1,445.0 cf Stone x 40.0% Voids = 578.0 cf Stone Storage

Chamber Storage + Stone Storage = 1,457.2 cf = 0.033 af
Overall Storage Efficiency = 62.7%
Overall System Size = 31.50' x 20.83' x 3.54'

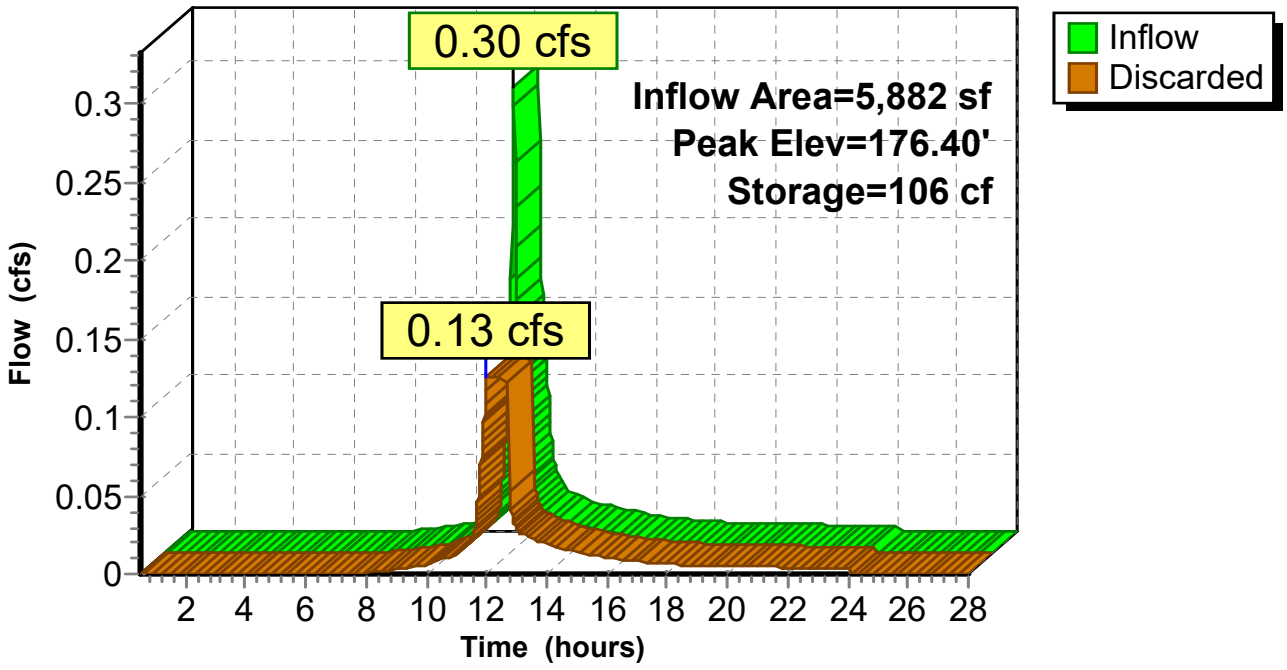
16 Chambers @ $ 300.00 /ea = $ 4,800.00
86.1 cy Field Excavation @ $ 10.00 /cy = $ 860.82
53.5 cy Stone @ $ 30.00 /cy = $ 1,605.56
Total Cost = $ 7,266.38





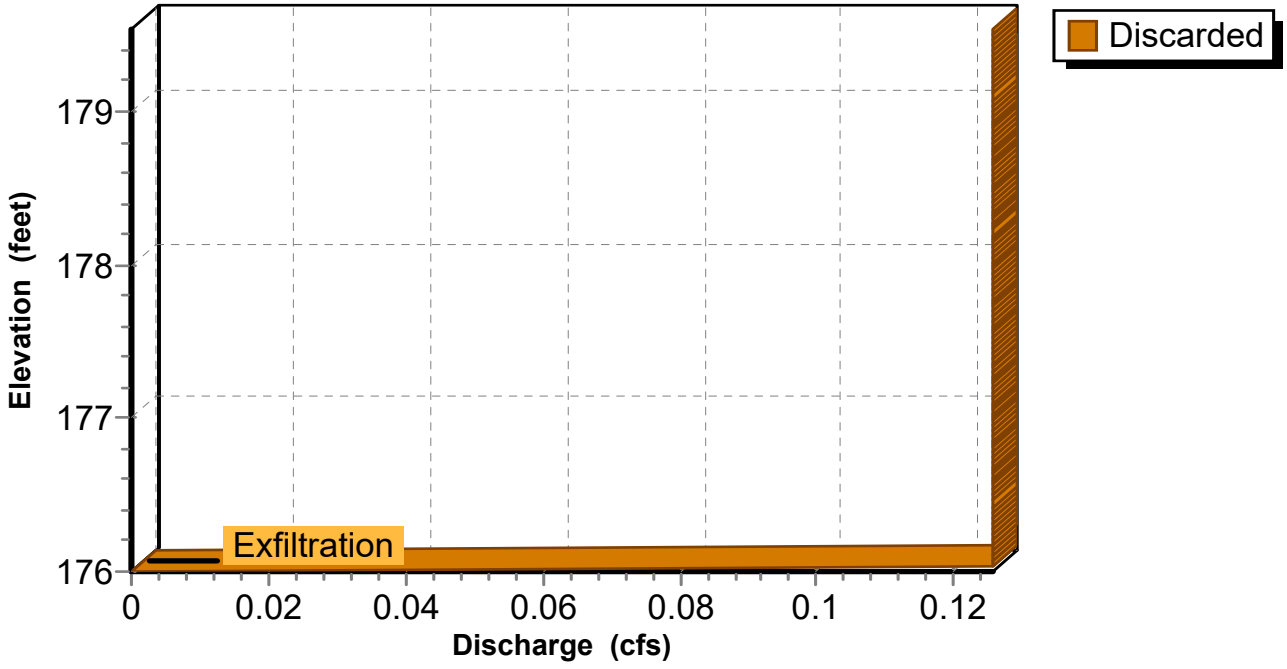
Pond 1P: RB#4

Hydrograph

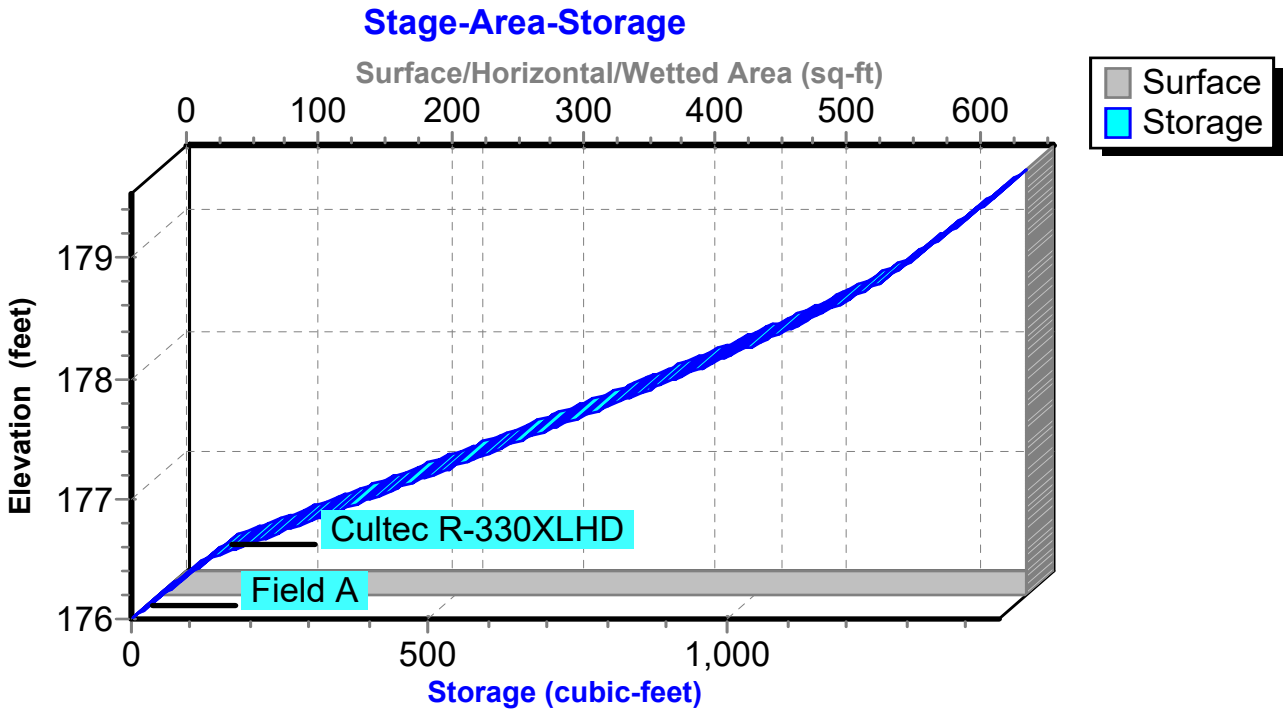


Pond 1P: RB#4

Stage-Discharge



Pond 1P: RB#4


Stage-Area-Storage
Surface/Horizontal/Wetted Area (sq-ft)
0
100
200
300
400
500
600
Surface
Storage
179
178
177
176
Elevation (feet)
Cultec R-330XLHD
Field A
0
500
1,000
Storage (cubic-feet)

Summary for Pond 2P: RB#3

Inflow Area = 15,524 sf, 38.40% Impervious, Inflow Depth = 0.58" for 2-Year event
Inflow = 0.18 cfs @ 12.13 hrs, Volume= 752 cf
Outflow = 0.17 cfs @ 12.15 hrs, Volume= 752 cf, Atten= 3%, Lag= 1.3 min
Discarded = 0.17 cfs @ 12.15 hrs, Volume= 752 cf

Routing by Stor-Ind method, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Peak Elev= 177.53' @ 12.15 hrs Surf.Area= 948 sf Storage= 13 cf

Plug-Flow detention time= 1.2 min calculated for 751 cf (100% of inflow)
Center-of-Mass det. time= 1.2 min (899.0 - 897.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	177.50'	824 cf	**20.83'W x 45.50'L x 3.54'H Field A** 3,357 cf Overall - 1,296 cf Embedded = 2,061 cf x 40.0% Voids
#2A	178.00'	1,296 cf	**Cultec R-330XLHD** x 24 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 4 rows
		2,121 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	177.50'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.18 cfs @ 12.15 hrs HW=177.53' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.18 cfs)

Pond 2P: RB#3 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 4 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

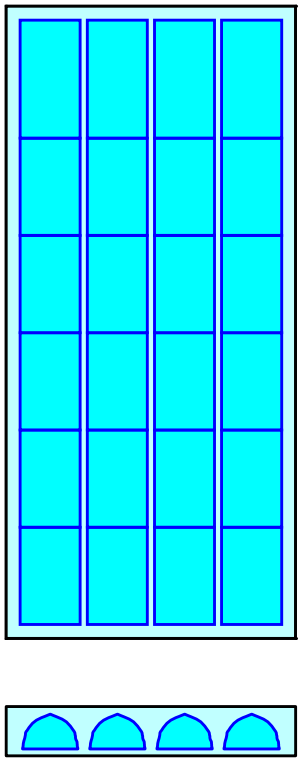
6 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 43.50' Row Length +12.0" End Stone x 2 = 45.50' Base Length
4 Rows x 52.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.83' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

24 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 4 Rows = 1,296.5 cf Chamber Storage

3,357.2 cf Field - 1,296.5 cf Chambers = 2,060.7 cf Stone x 40.0% Voids = 824.3 cf Stone Storage

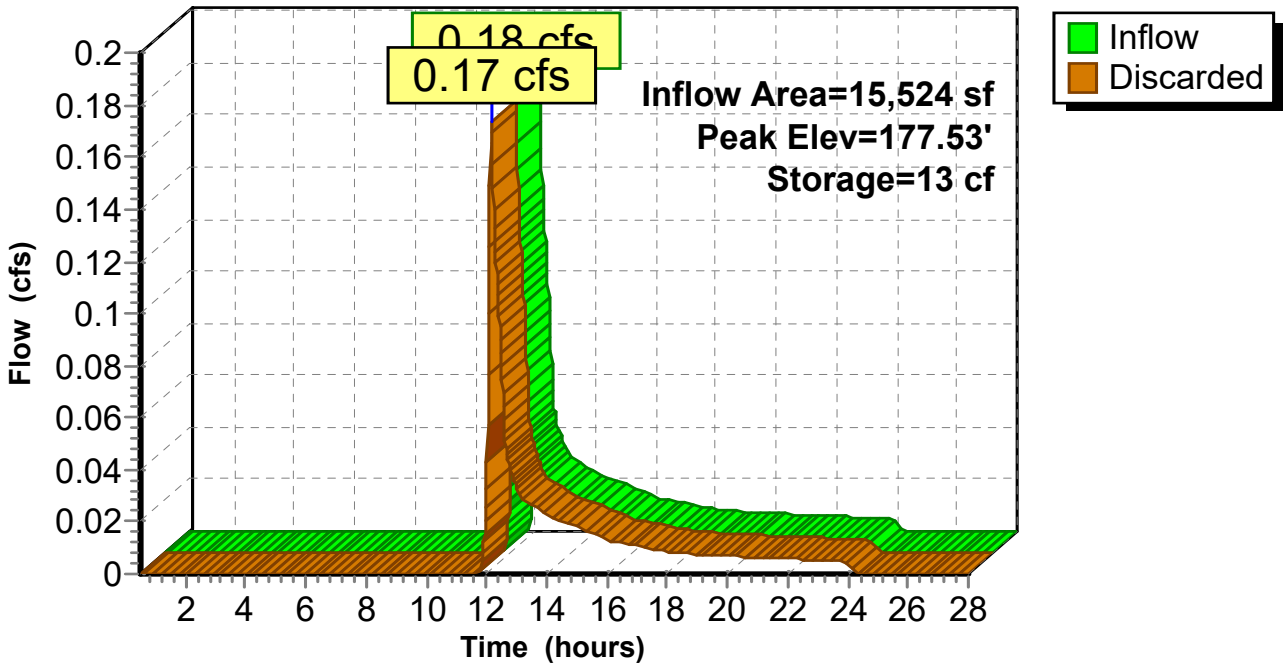
Chamber Storage + Stone Storage = 2,120.8 cf = 0.049 af
Overall Storage Efficiency = 63.2%
Overall System Size = 45.50' x 20.83' x 3.54'

24 Chambers @ $ 300.00 /ea = $ 7,200.00
124.3 cy Field Excavation @ $ 10.00 /cy = $ 1,243.41
76.3 cy Stone @ $ 30.00 /cy = $ 2,289.70
Total Cost = $ 10,733.11



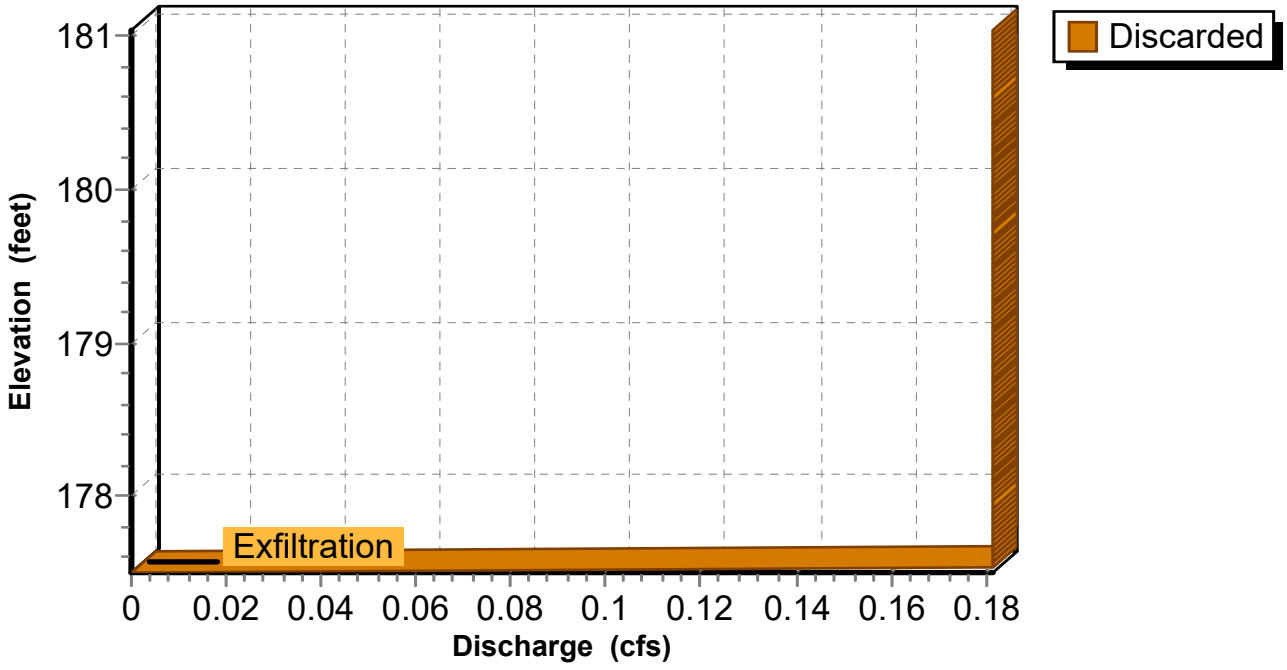
Pond 2P: RB#3

Hydrograph

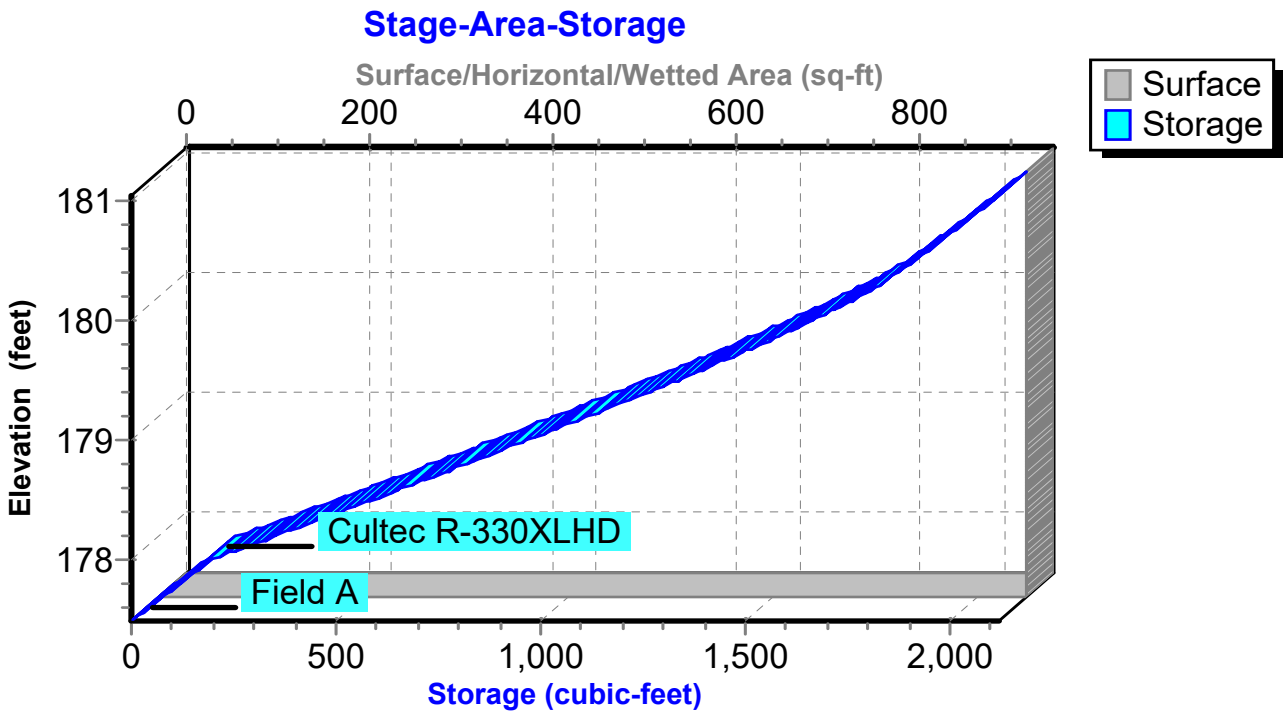


Pond 2P: RB#3

Stage-Discharge



Pond 2P: RB#3


Stage-Area-Storage
Surface/Horizontal/Wetted Area (sq-ft)
0
200
400
600
800
Surface
Storage
181
180
179
178
Elevation (feet)
Cultec R-330XLHD
Field A
0
500
1,000
1,500
2,000
Storage (cubic-feet)

Summary for Pond 3P: RB#2

Inflow Area = 40,990 sf, 14.90% Impervious, Inflow Depth = 0.30" for 2-Year event
Inflow = 0.23 cfs @ 12.11 hrs, Volume= 1,023 cf
Outflow = 0.22 cfs @ 12.13 hrs, Volume= 1,023 cf, Atten= 3%, Lag= 1.3 min
Discarded = 0.22 cfs @ 12.13 hrs, Volume= 1,023 cf

Routing by Stor-Ind method, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Peak Elev= 177.52' @ 12.13 hrs Surf.Area= 1,707 sf Storage= 16 cf

Plug-Flow detention time= 1.2 min calculated for 1,022 cf (100% of inflow)
Center-of-Mass det. time= 1.2 min (917.3 - 916.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	177.50'	1,457 cf	**25.67'W x 66.50'L x 3.54'H Field A** 6,045 cf Overall - 2,403 cf Embedded = 3,642 cf x 40.0% Voids
#2A	178.00'	2,403 cf	**Cultec R-330XLHD** x 45 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 5 rows
		3,860 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	177.50'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.33 cfs @ 12.13 hrs HW=177.52' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.33 cfs)

Pond 3P: RB#2 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 5 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

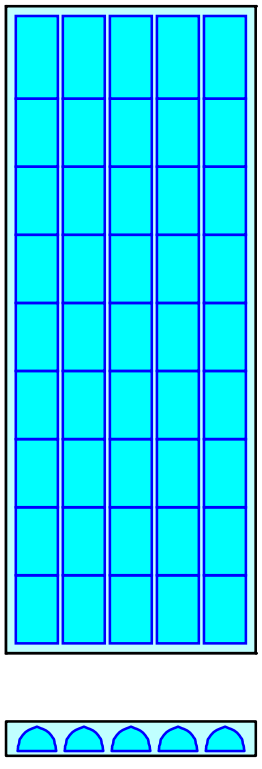
9 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 64.50' Row Length +12.0" End Stone x 2 = 66.50' Base Length
5 Rows x 52.0" Wide + 6.0" Spacing x 4 + 12.0" Side Stone x 2 = 25.67' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

45 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 5 Rows = 2,402.9 cf Chamber Storage

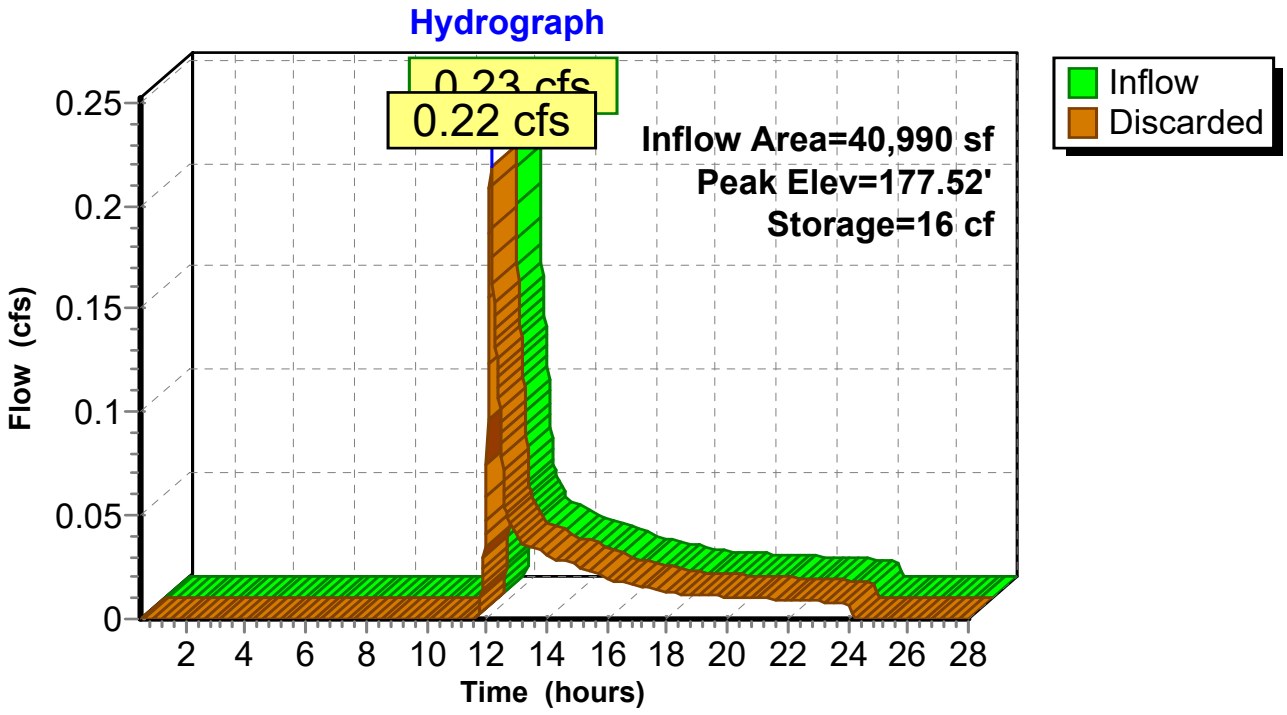
6,045.0 cf Field - 2,402.9 cf Chambers = 3,642.1 cf Stone x 40.0% Voids = 1,456.8 cf Stone Storage

Chamber Storage + Stone Storage = 3,859.8 cf = 0.089 af
Overall Storage Efficiency = 63.9%
Overall System Size = 66.50' x 25.67' x 3.54'

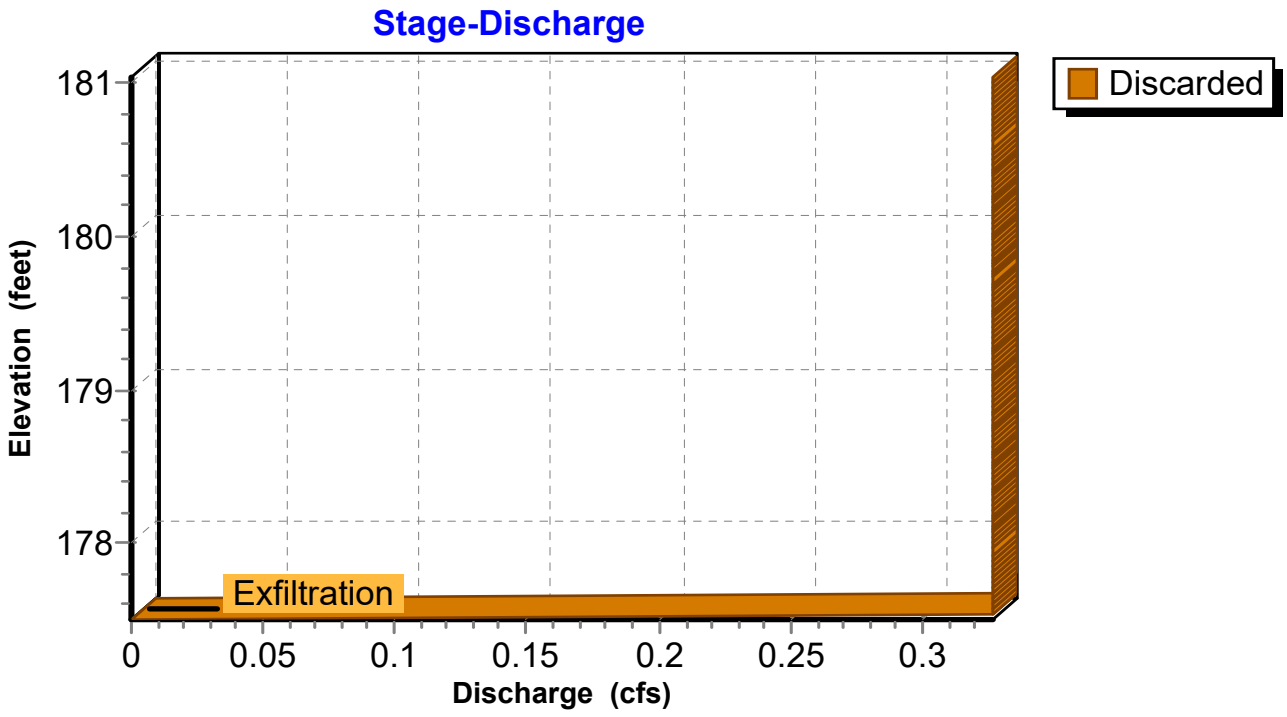
45 Chambers @ $ 300.00 /ea = $ 13,500.00
223.9 cy Field Excavation @ $ 10.00 /cy = $ 2,238.90
134.9 cy Stone @ $ 30.00 /cy = $ 4,046.76
Total Cost = $ 19,785.67



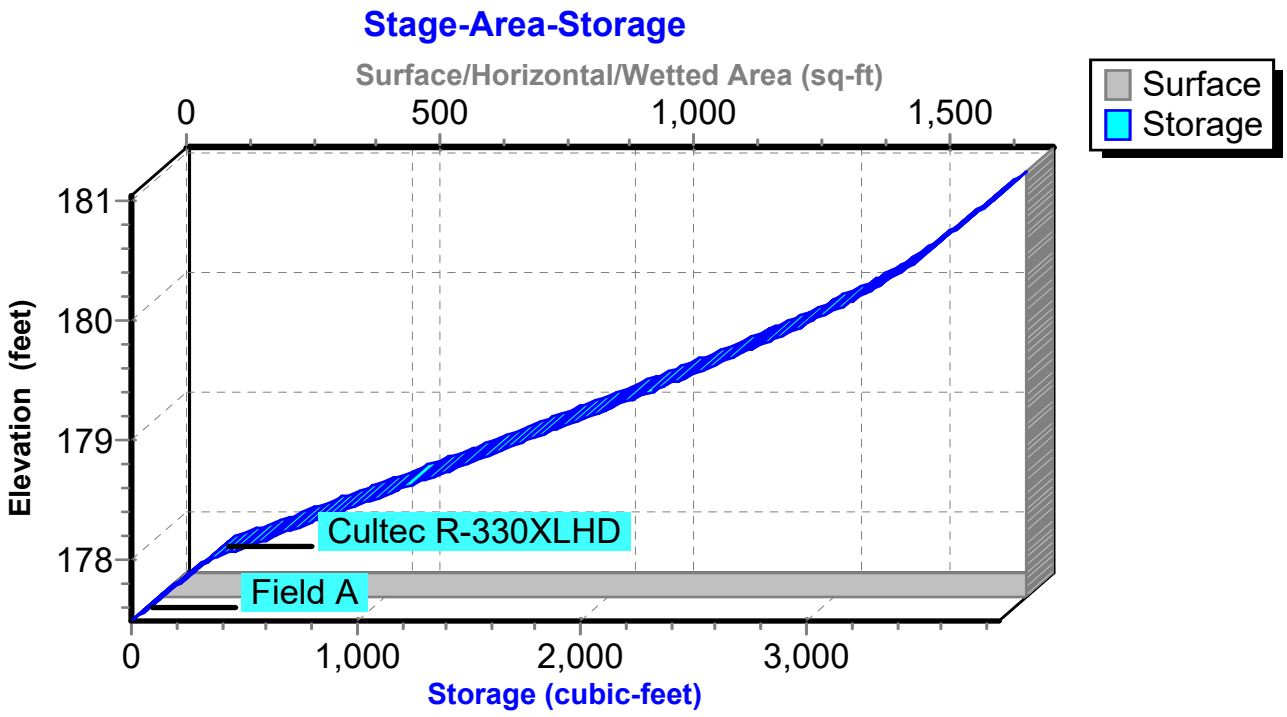
Pond 3P: RB#2



Pond 3P: RB#2



Pond 3P: RB#2


Stage-Area-Storage
Surface/Horizontal/Wetted Area (sq-ft)
0
500
1,000
1,500
Surface
Storage
181
180
179
178
Elevation (feet)
Cultec R-330XLHD
Field A
0
1,000
2,000
3,000
Storage (cubic-feet)

Summary for Pond 4P: RB#1

Inflow Area = 9,967 sf, 27.29% Impervious, Inflow Depth = 0.64" for 2-Year event
Inflow = 0.16 cfs @ 12.09 hrs, Volume= 532 cf
Outflow = 0.12 cfs @ 12.06 hrs, Volume= 532 cf, Atten= 27%, Lag= 0.0 min
Discarded = 0.12 cfs @ 12.06 hrs, Volume= 532 cf

Routing by Stor-Ind method, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Peak Elev= 177.59' @ 12.17 hrs Surf.Area= 616 sf Storage= 22 cf

Plug-Flow detention time= 1.5 min calculated for 532 cf (100% of inflow)
Center-of-Mass det. time= 1.5 min (853.5 - 852.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	177.50'	546 cf	**16.00'W x 38.50'L x 3.54'H Field A** 2,182 cf Overall - 816 cf Embedded = 1,366 cf x 40.0% Voids
#2A	178.00'	816 cf	**Cultec R-330XLHD** x 15 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 3 rows
		1,362 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	177.50'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.12 cfs @ 12.06 hrs HW=177.54' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.12 cfs)

Pond 4P: RB#1 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 3 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

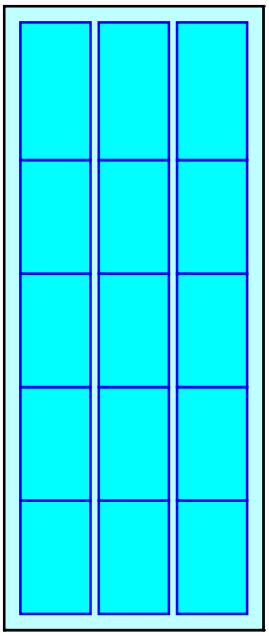
5 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 36.50' Row Length +12.0" End Stone x 2 = 38.50' Base Length
3 Rows x 52.0" Wide + 6.0" Spacing x 2 + 12.0" Side Stone x 2 = 16.00' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

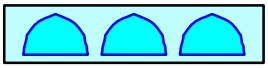
15 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 3 Rows = 815.9 cf Chamber Storage

2,181.7 cf Field - 815.9 cf Chambers = 1,365.8 cf Stone x 40.0% Voids = 546.3 cf Stone Storage

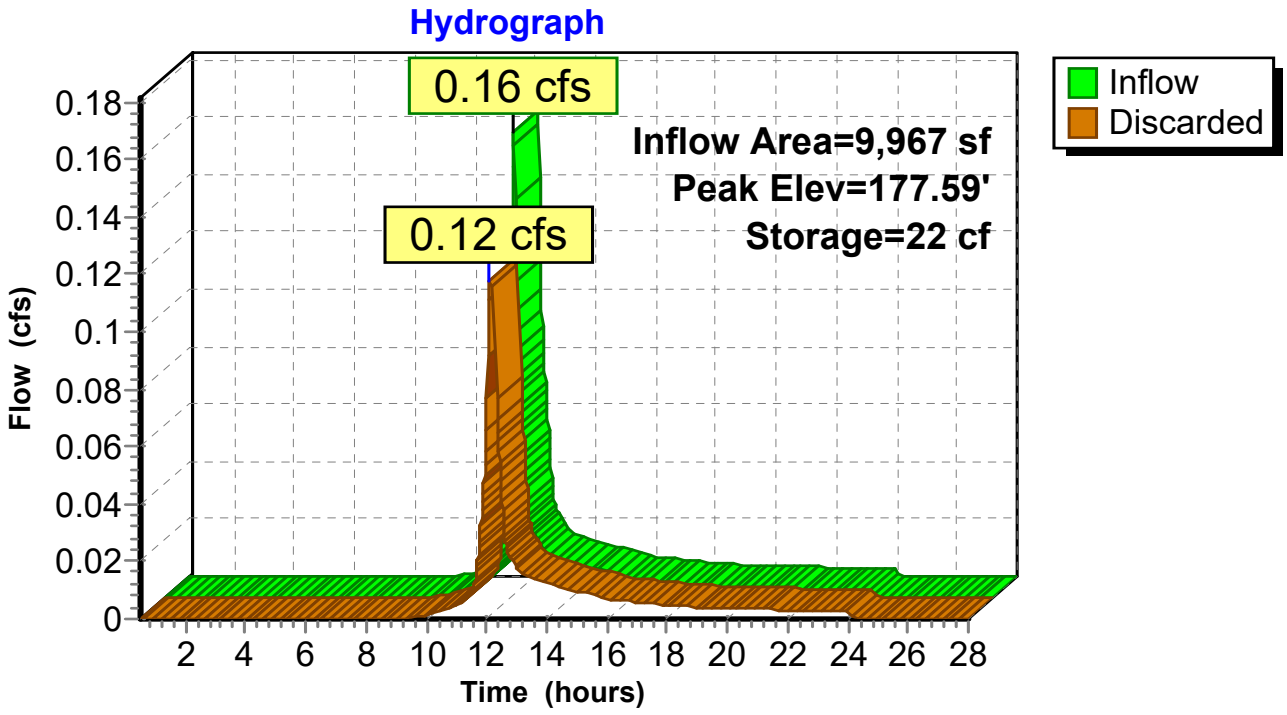
Chamber Storage + Stone Storage = 1,362.2 cf = 0.031 af
Overall Storage Efficiency = 62.4%
Overall System Size = 38.50' x 16.00' x 3.54'

15 Chambers @ $ 300.00 /ea = $ 4,500.00
80.8 cy Field Excavation @ $ 10.00 /cy = $ 808.02
50.6 cy Stone @ $ 30.00 /cy = $ 1,517.54
Total Cost = $ 6,825.56

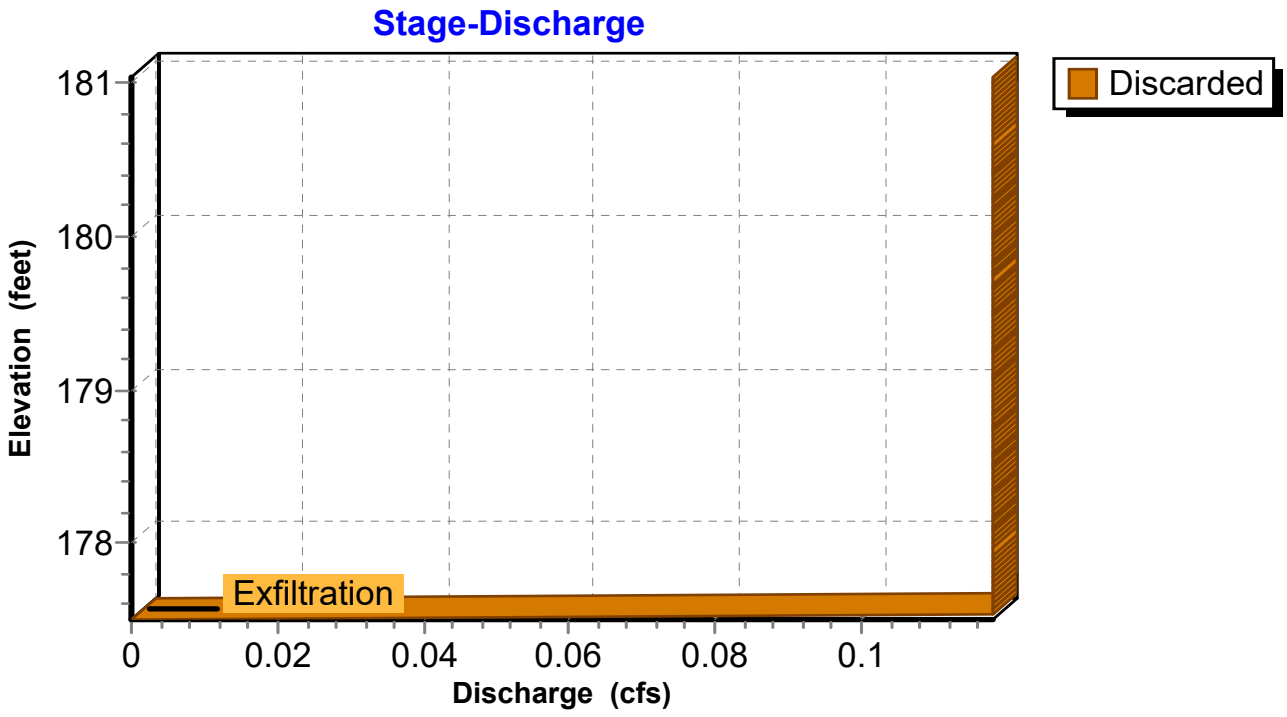




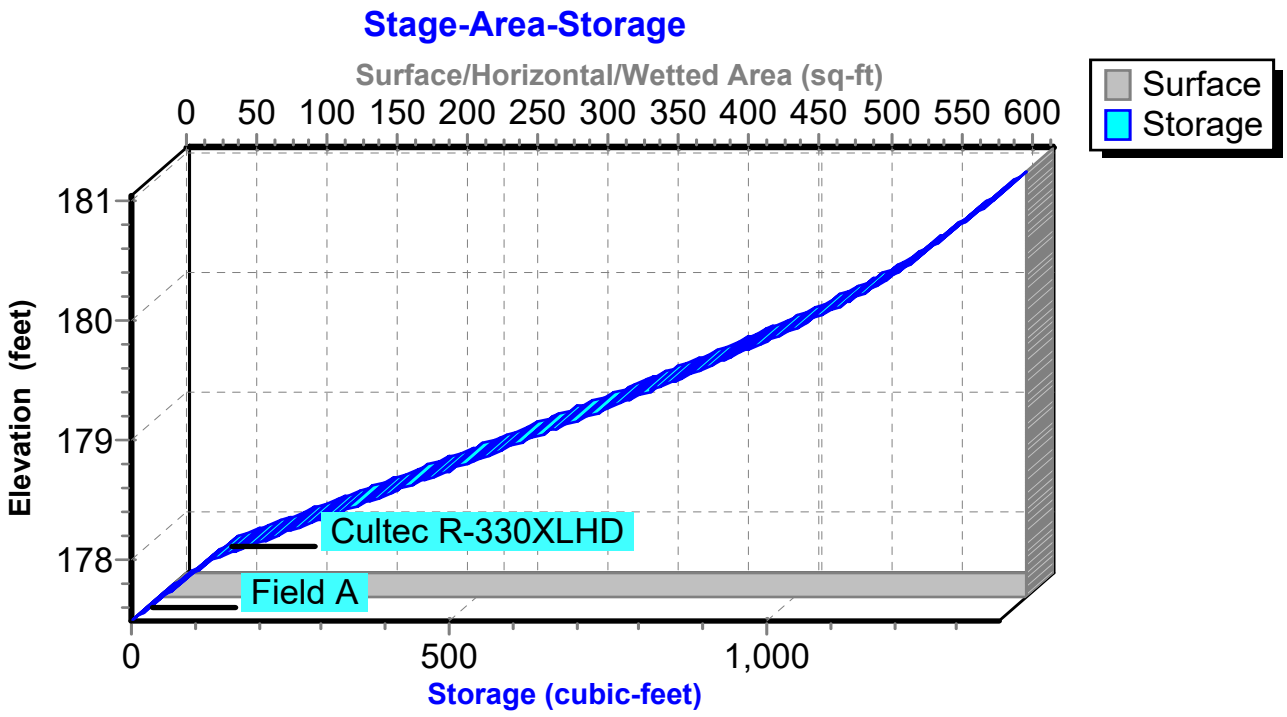
Pond 4P: RB#1



Pond 4P: RB#1



Pond 4P: RB#1


Stage-Area-Storage
Surface/Horizontal/Wetted Area (sq-ft)
0 50 100 150 200 250 300 350 400 450 500 550 600
Surface
Storage
181
180
179
178
Elevation (feet)
Cultec R-330XLHD
Field A
0
500
1,000
Storage (cubic-feet)

Summary for Pond 5P: RB#5

Inflow Area = 7,495 sf, 0.00% Impervious, Inflow Depth = 0.02" for 2-Year event
Inflow = 0.00 cfs @ 20.84 hrs, Volume= 12 cf
Outflow = 0.00 cfs @ 20.92 hrs, Volume= 12 cf, Atten= 0%, Lag= 5.1 min
Discarded = 0.00 cfs @ 20.92 hrs, Volume= 12 cf

Routing by Stor-Ind method, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Peak Elev= 177.00' @ 20.92 hrs Surf.Area= 195 sf Storage= 0 cf

Plug-Flow detention time= 1.2 min calculated for 12 cf (100% of inflow)
Center-of-Mass det. time= 1.2 min (1,188.9 - 1,187.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	177.00'	184 cf	**11.17'W x 17.50'L x 3.54'H Field A** 692 cf Overall - 231 cf Embedded = 461 cf x 40.0% Voids
#2A	177.50'	231 cf	**Cultec R-330XLHD** x 4 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 2 rows
		415 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	177.00'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.04 cfs @ 20.92 hrs HW=177.00' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

Pond 5P: RB#5 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 2 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

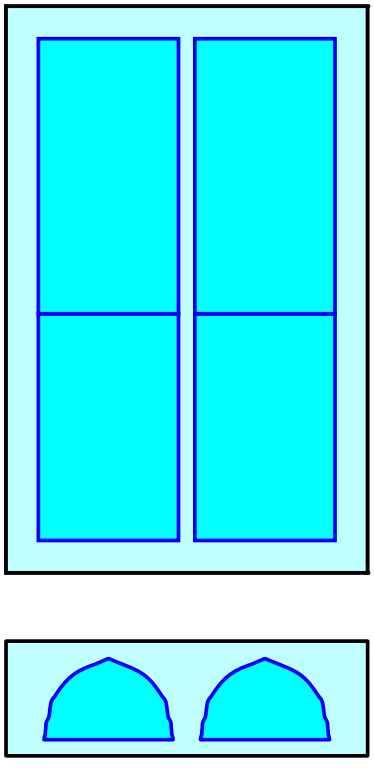
2 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 15.50' Row Length +12.0" End Stone x 2 = 17.50' Base Length
2 Rows x 52.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 11.17' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

4 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 2 Rows = 231.0 cf Chamber Storage

692.1 cf Field - 231.0 cf Chambers = 461.1 cf Stone x 40.0% Voids = 184.4 cf Stone Storage

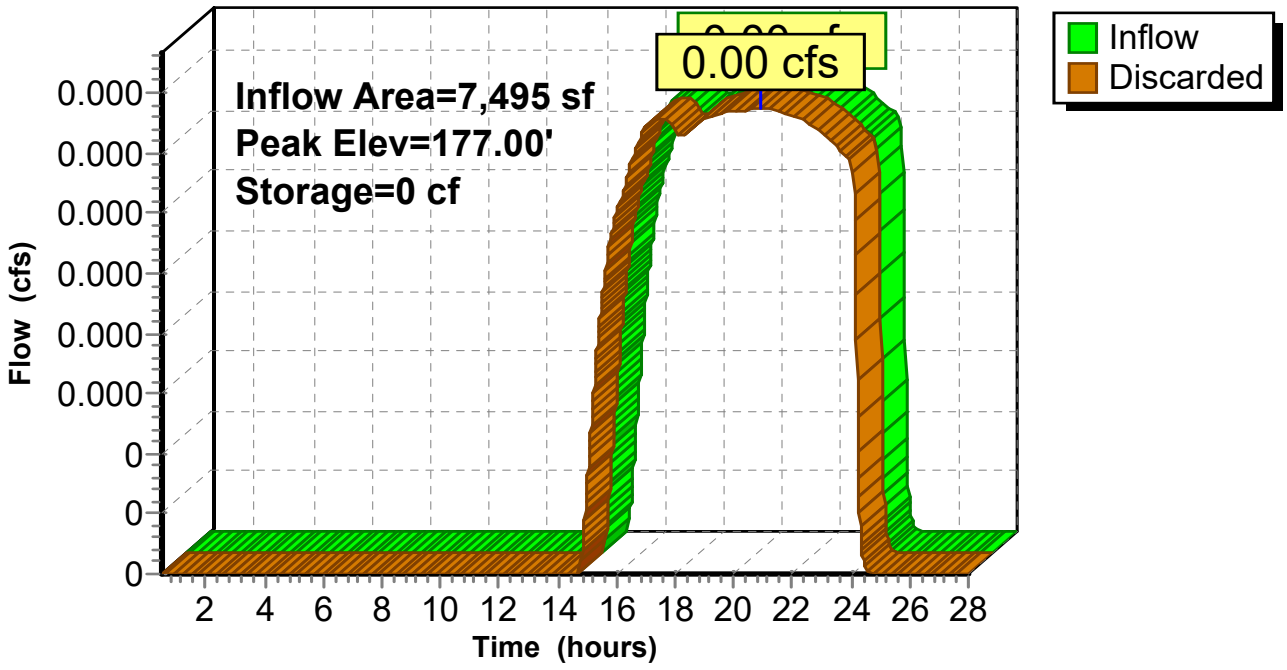
Chamber Storage + Stone Storage = 415.4 cf = 0.010 af
Overall Storage Efficiency = 60.0%
Overall System Size = 17.50' x 11.17' x 3.54'

4 Chambers @ $ 300.00 /ea = $ 1,200.00
25.6 cy Field Excavation @ $ 10.00 /cy = $ 256.33
17.1 cy Stone @ $ 30.00 /cy = $ 512.36
Total Cost = $ 1,968.69



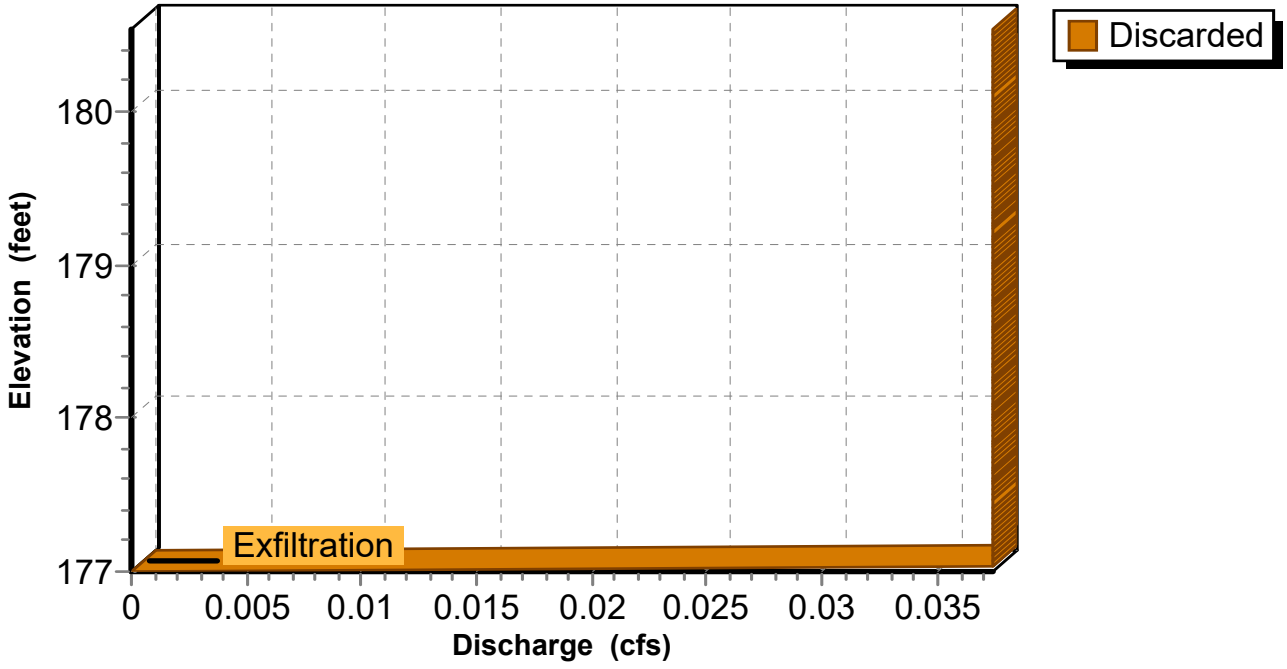
Pond 5P: RB#5

Hydrograph

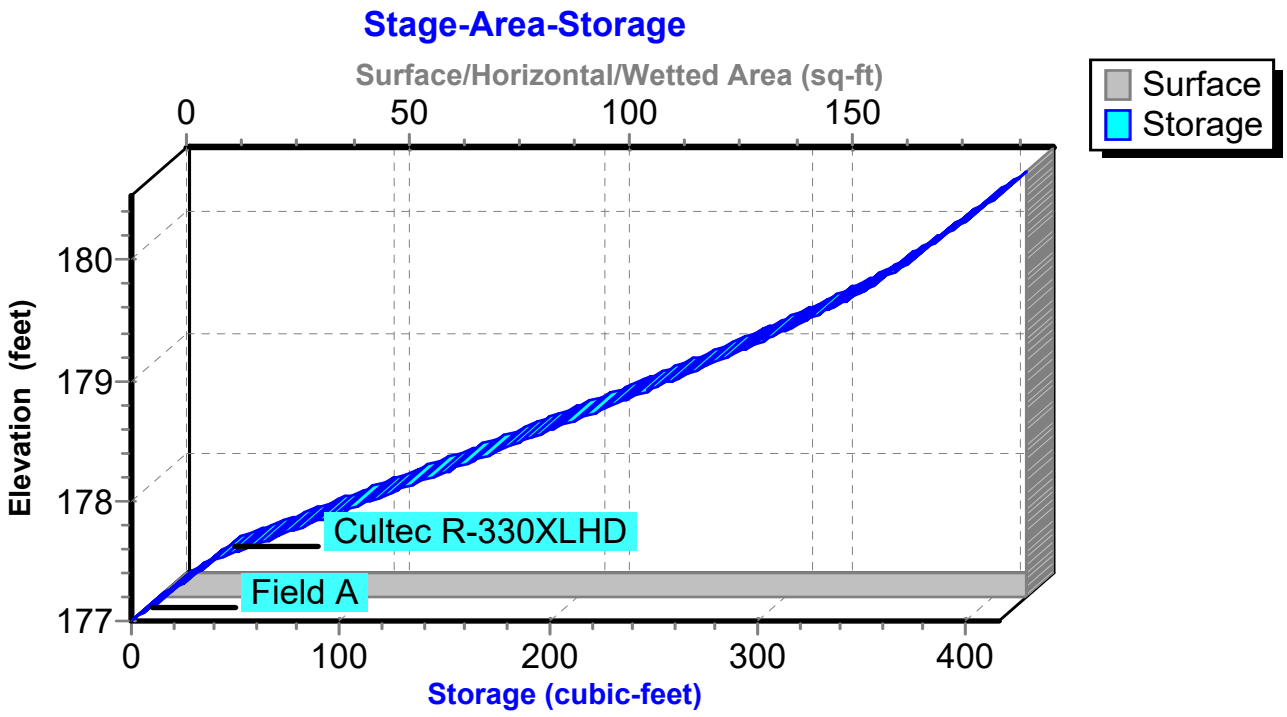


Pond 5P: RB#5

Stage-Discharge



Pond 5P: RB#5


Stage-Area-Storage
Surface/Horizontal/Wetted Area (sq-ft)
0
50
100
150
Surface
Storage
180
179
178
177
Elevation (feet)
Cultec R-330XLHD
Field A
0
100
200
300
400
Storage (cubic-feet)

Summary for Pond 6P: RB#6

Inflow Area = 4,913 sf, 0.00% Impervious, Inflow Depth = 0.07" for 2-Year event
Inflow = 0.00 cfs @ 14.88 hrs, Volume= 28 cf
Outflow = 0.00 cfs @ 14.89 hrs, Volume= 28 cf, Atten= 0%, Lag= 0.9 min
Discarded = 0.00 cfs @ 14.89 hrs, Volume= 28 cf

Routing by Stor-Ind method, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Peak Elev= 174.50' @ 14.89 hrs Surf.Area= 155 sf Storage= 0 cf

Plug-Flow detention time= 1.2 min calculated for 27 cf (100% of inflow)
Center-of-Mass det. time= 1.2 min (1,068.3 - 1,067.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	174.50'	153 cf	**6.33'W x 24.50'L x 3.54'H Field A** 550 cf Overall - 168 cf Embedded = 382 cf x 40.0% Voids
#2A	175.00'	168 cf	**Cultec R-330XLHD** x 3 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 1 rows
		320 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	174.50'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.03 cfs @ 14.89 hrs HW=174.50' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Pond 6P: RB#6 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 1 rows

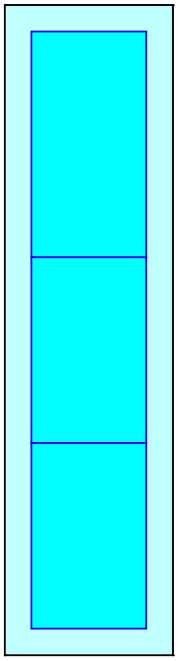
3 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 22.50' Row Length +12.0" End Stone x 2 = 24.50' Base Length
1 Rows x 52.0" Wide + 12.0" Side Stone x 2 = 6.33' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

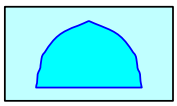
3 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 1 Rows = 167.6 cf Chamber Storage

549.5 cf Field - 167.6 cf Chambers = 381.9 cf Stone x 40.0% Voids = 152.8 cf Stone Storage

Chamber Storage + Stone Storage = 320.4 cf = 0.007 af
Overall Storage Efficiency = 58.3%
Overall System Size = 24.50' x 6.33' x 3.54'

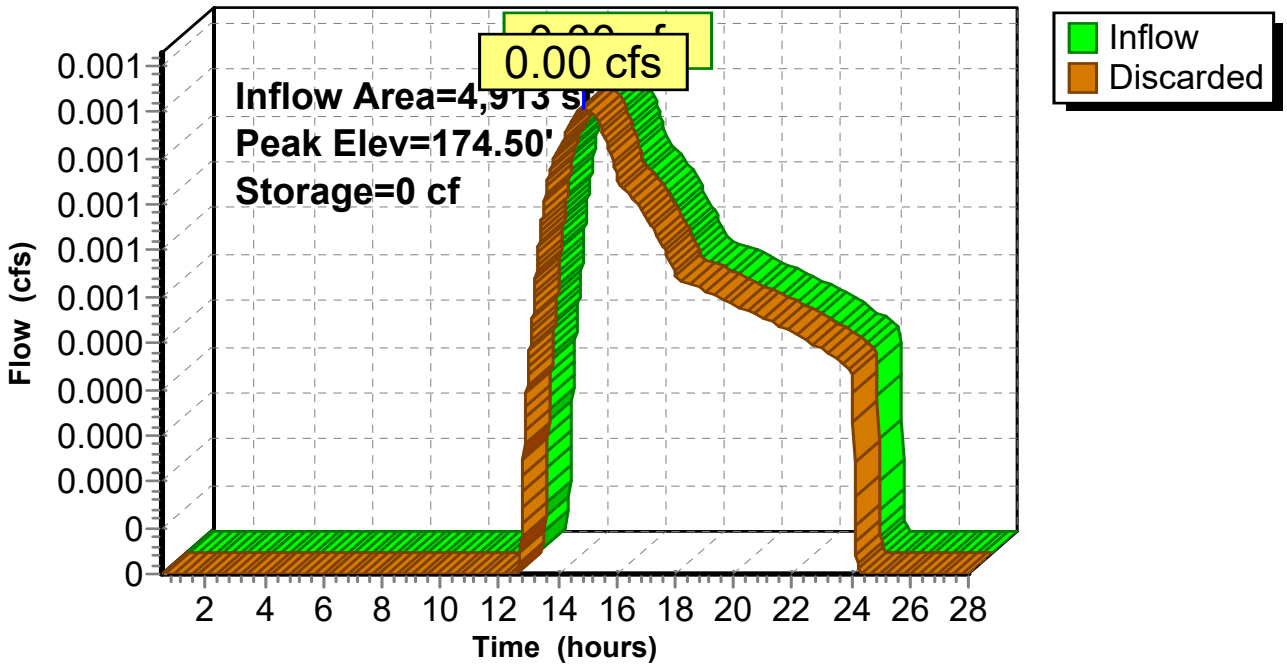
3 Chambers @ $ 300.00 /ea = $ 900.00
20.4 cy Field Excavation @ $ 10.00 /cy = $ 203.54
14.1 cy Stone @ $ 30.00 /cy = $ 424.33
Total Cost = $ 1,527.87





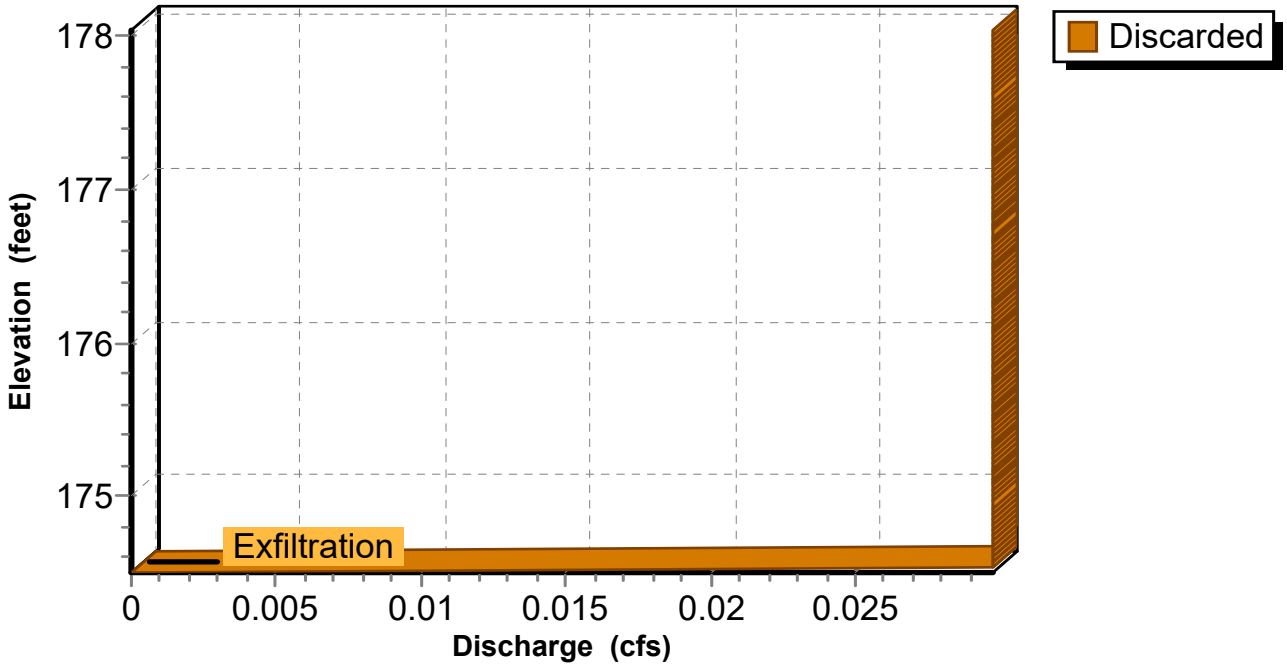
Pond 6P: RB#6

Hydrograph

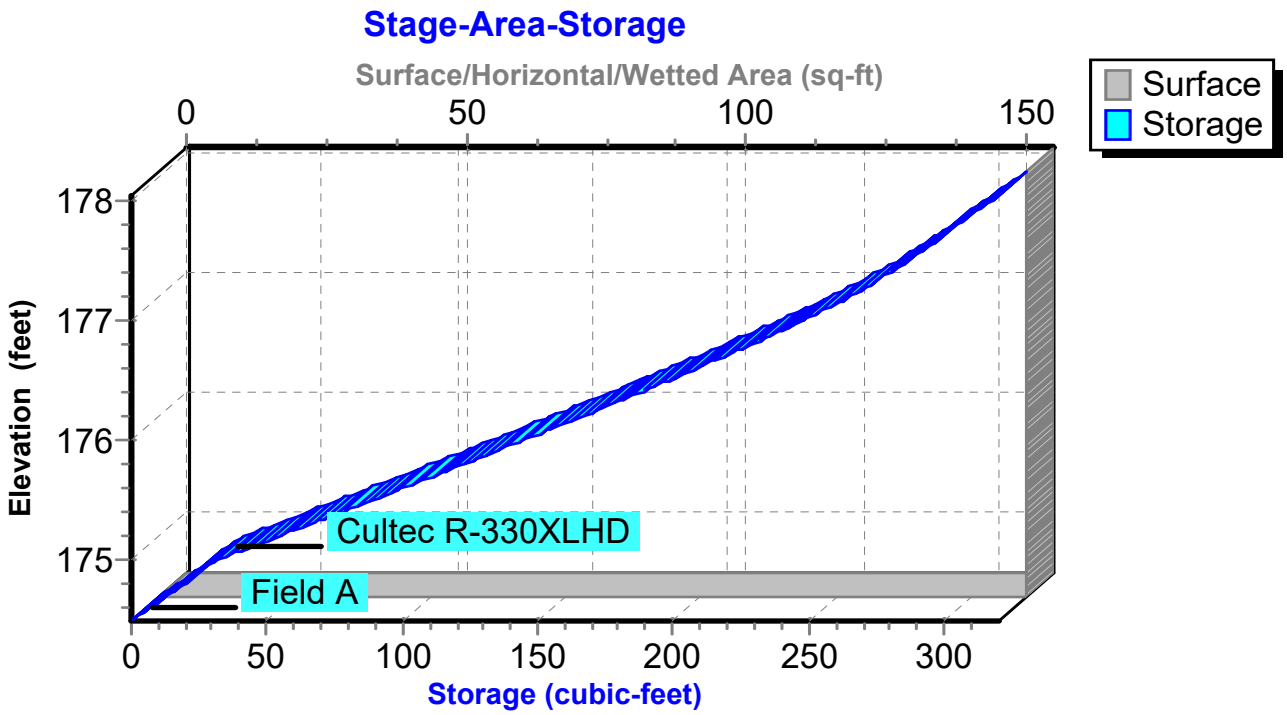


Pond 6P: RB#6

Stage-Discharge



Pond 6P: RB#6


Stage-Area-Storage
Surface/Horizontal/Wetted Area (sq-ft)
0
50
100
150
Surface
Storage
178
177
176
175
Elevation (feet)
Cultec R-330XLHD
Field A
0
50
100
150
200
250
300
Storage (cubic-feet)

Time span=0.50-28.00 hrs, dt=0.02 hrs, 1376 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment SA#1: Subcat SA#1 Runoff Area=4,048 sf 0.00% Impervious Runoff Depth=0.36"
Flow Length=66' Slope=0.0100 '/' Tc=16.0 min CN=45 Runoff=0.01 cfs 120 cf

Subcatchment SA#2: Subcat SA#2 Runoff Area=2,374 sf 0.00% Impervious Runoff Depth=0.24"
Tc=6.0 min CN=42 Runoff=0.00 cfs 48 cf

Subcatchment SA#21: Subcat SA#21 Runoff Area=4,231 sf 64.29% Impervious Runoff Depth=2.74"
Tc=6.0 min CN=81 Runoff=0.31 cfs 966 cf

Subcatchment SA#22: Subcat SA#22 Runoff Area=5,736 sf 0.00% Impervious Runoff Depth=0.40"
Flow Length=132' Tc=9.2 min CN=46 Runoff=0.02 cfs 191 cf

Subcatchment SA#24: Subcat SA#24 Runoff Area=15,524 sf 38.40% Impervious Runoff Depth=1.47"
Flow Length=129' Slope=0.0100 '/' Tc=7.2 min CN=65 Runoff=0.55 cfs 1,902 cf

Subcatchment SA#25: Subcat SA#25 Runoff Area=14,973 sf 0.01% Impervious Runoff Depth=0.49"
Flow Length=70' Tc=6.4 min CN=48 Runoff=0.08 cfs 608 cf

Subcatchment SA#26: Subcat SA#26 Runoff Area=15,195 sf 40.19% Impervious Runoff Depth=1.61"
Tc=6.0 min CN=67 Runoff=0.63 cfs 2,040 cf

Subcatchment SA#27: Subcat SA#27 Runoff Area=5,882 sf 78.42% Impervious Runoff Depth=3.30"
Tc=6.0 min CN=87 Runoff=0.51 cfs 1,620 cf

Subcatchment SA#28: Subcat SA#28 Runoff Area=7,495 sf 0.00% Impervious Runoff Depth=0.28"
Flow Length=116' Tc=12.3 min CN=43 Runoff=0.01 cfs 174 cf

Subcatchment SA#29: Subcat SA#29 Runoff Area=4,913 sf 0.00% Impervious Runoff Depth=0.44"
Tc=6.0 min CN=47 Runoff=0.02 cfs 181 cf

Subcatchment SA#4: Subcat SA#4 Runoff Area=2,621 sf 0.00% Impervious Runoff Depth=0.18"
Tc=6.0 min CN=40 Runoff=0.00 cfs 39 cf

Subcatchment SA#5: Subcat SA#5 Runoff Area=10,821 sf 0.00% Impervious Runoff Depth=0.49"
Tc=6.0 min CN=48 Runoff=0.06 cfs 439 cf

Subcatchment SA#6: Subcat SA#6 Runoff Area=2,223 sf 0.00% Impervious Runoff Depth=0.18"
Tc=6.0 min CN=40 Runoff=0.00 cfs 33 cf

Subcatchment SA#8: Subcat SA#8 Runoff Area=1,858 sf 0.00% Impervious Runoff Depth=0.18"
Tc=6.0 min CN=40 Runoff=0.00 cfs 27 cf

Pond 1P: RB#4 Peak Elev=176.90' Storage=347 cf Inflow=0.51 cfs 1,620 cf
Outflow=0.13 cfs 1,620 cf

Pond 2P: RB#3 Peak Elev=178.16' Storage=318 cf Inflow=0.55 cfs 1,902 cf
Outflow=0.18 cfs 1,902 cf

Pond 3P: RB#2 Peak Elev=177.97' Storage=320 cf Inflow=0.75 cfs 3,087 cf
Outflow=0.33 cfs 3,087 cf

Pond 4P: RB#1 Peak Elev=178.05' Storage=148 cf Inflow=0.31 cfs 1,156 cf
Outflow=0.12 cfs 1,156 cf

Pond 5P: RB#5 Peak Elev=177.01' Storage=1 cf Inflow=0.01 cfs 174 cf
Outflow=0.01 cfs 174 cf

Pond 6P: RB#6 Peak Elev=174.53' Storage=2 cf Inflow=0.02 cfs 181 cf
Outflow=0.02 cfs 181 cf

Total Runoff Area = 97,895 sf Runoff Volume = 8,387 cf Average Runoff Depth = 1.03"
80.18% Pervious = 78,492 sf 19.82% Impervious = 19,403 sf

Summary for Subcatchment SA#1: Subcat SA#1

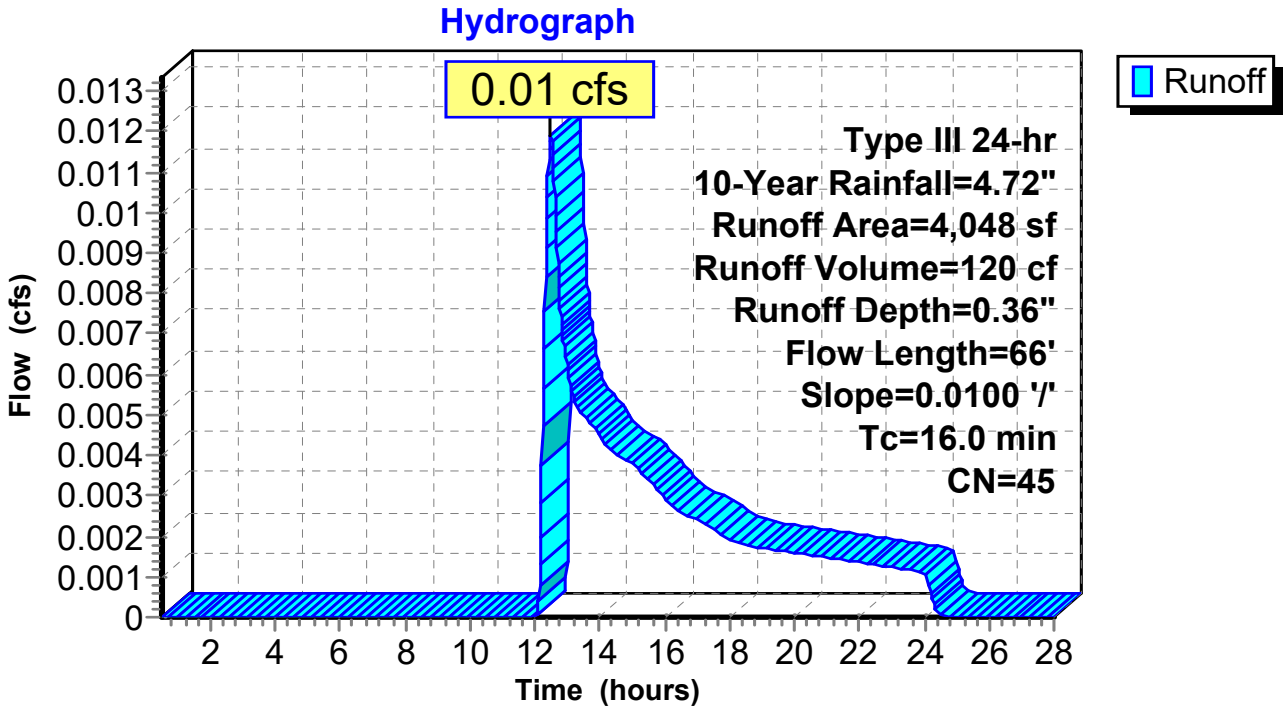
Runoff = 0.01 cfs @ 12.49 hrs, Volume= 120 cf, Depth= 0.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Rainfall=4.72"

Area (sf)	CN	Description
2,840	49	50-75% Grass cover, Fair, HSG A
1,207	36	Woods, Fair, HSG A
4,048	45	Weighted Average
4,048		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.8	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
0.2	16	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.0	66	Total			

Subcatchment SA#1: Subcat SA#1



Summary for Subcatchment SA#2: Subcat SA#2

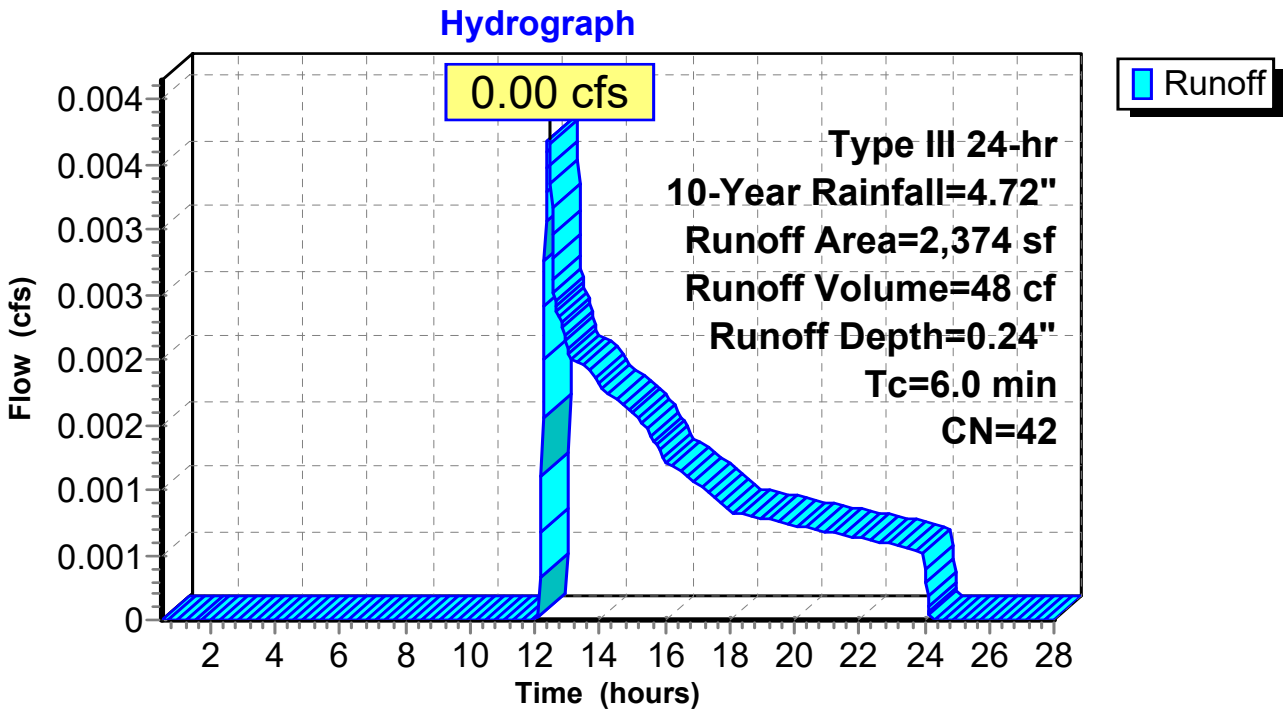
Runoff = 0.00 cfs @ 12.42 hrs, Volume= 48 cf, Depth= 0.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Rainfall=4.72"

Area (sf)	CN	Description
1,181	49	50-75% Grass cover, Fair, HSG A
1,193	36	Woods, Fair, HSG A
2,374	42	Weighted Average
2,374		100.00% Pervious Area

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

Subcatchment SA#2: Subcat SA#2



Summary for Subcatchment SA#21: Subcat SA#21

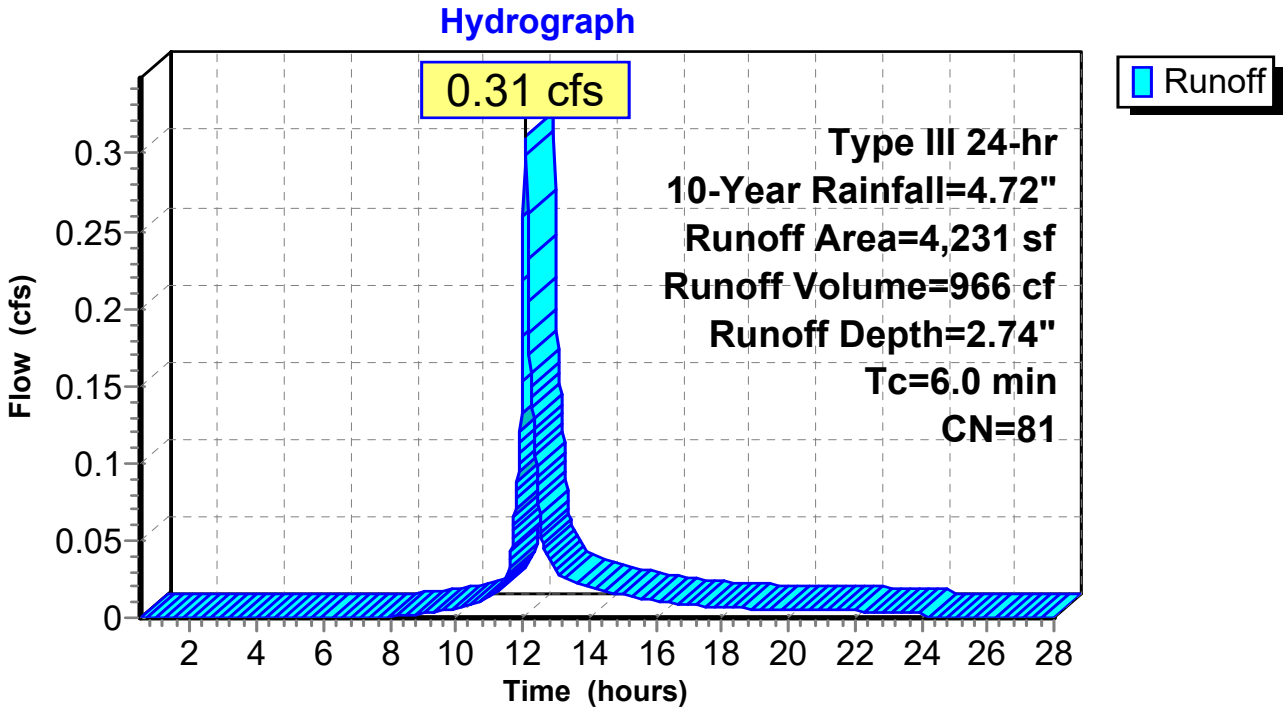
Runoff = 0.31 cfs @ 12.09 hrs, Volume= 966 cf, Depth= 2.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Rainfall=4.72"

Area (sf)	CN	Description
1,511	49	50-75% Grass cover, Fair, HSG A
2,720	98	Paved roads w/curbs & sewers, HSG A
4,231	81	Weighted Average
1,511		35.71% Pervious Area
2,720		64.29% Impervious Area

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

Subcatchment SA#21: Subcat SA#21



Summary for Subcatchment SA#22: Subcat SA#22

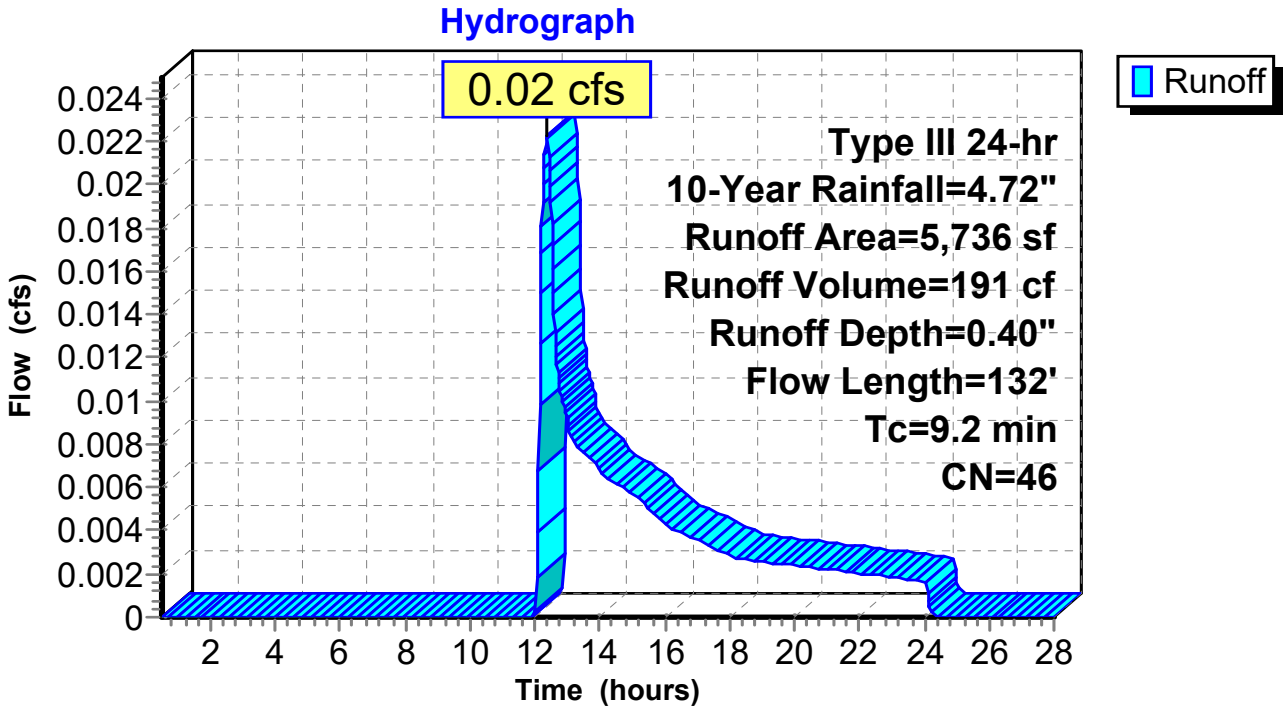
Runoff = 0.02 cfs @ 12.37 hrs, Volume= 191 cf, Depth= 0.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Rainfall=4.72"

Area (sf)	CN	Description
4,558	49	50-75% Grass cover, Fair, HSG A
1,178	36	Woods, Fair, HSG A
5,736	46	Weighted Average
5,736		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	23	0.0110	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
1.0	109	0.0120	1.76		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
9.2	132	Total			

Subcatchment SA#22: Subcat SA#22



Summary for Subcatchment SA#24: Subcat SA#24

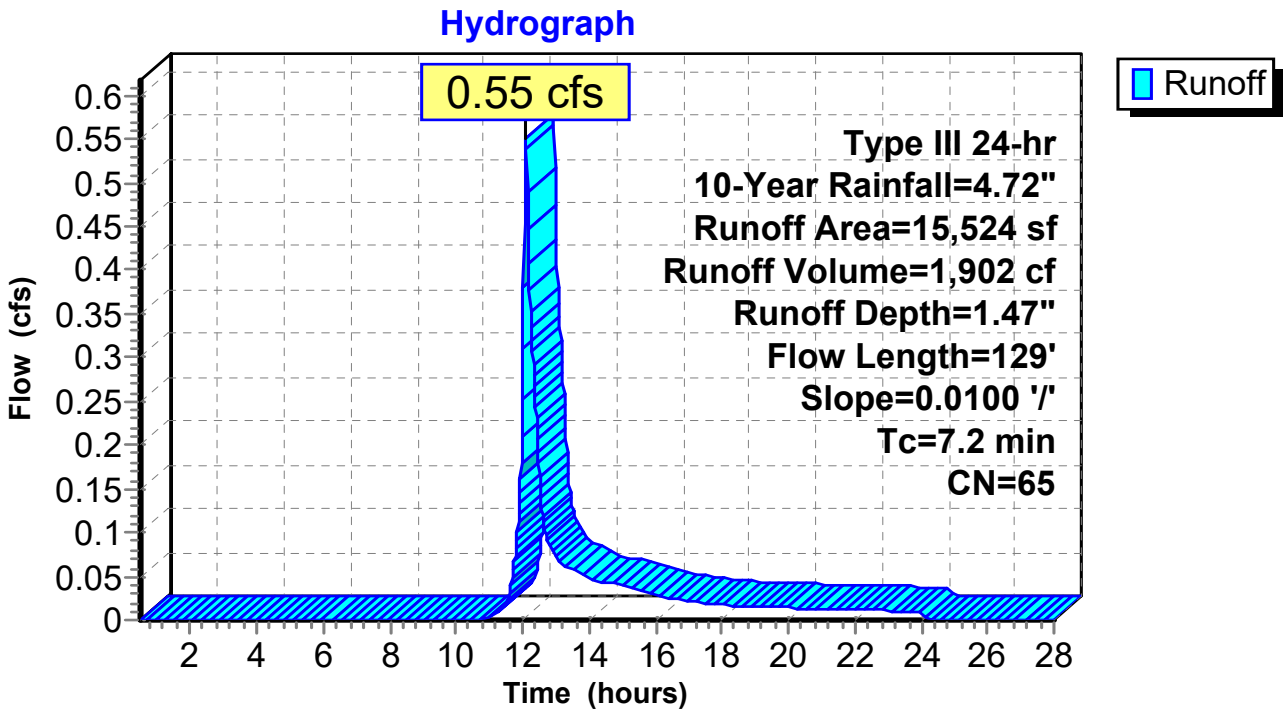
Runoff = 0.55 cfs @ 12.11 hrs, Volume= 1,902 cf, Depth= 1.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Rainfall=4.72"

Area (sf)	CN	Description
6,224	49	50-75% Grass cover, Fair, HSG A
1,948	98	Paved roads w/curbs & sewers, HSG A
4,014	98	Roofs, HSG A
3,338	36	Woods, Fair, HSG A
15,524	65	Weighted Average
9,562		61.60% Pervious Area
5,962		38.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	15	0.0100	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
1.2	114	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
7.2	129	Total			

Subcatchment SA#24: Subcat SA#24



Summary for Subcatchment SA#25: Subcat SA#25

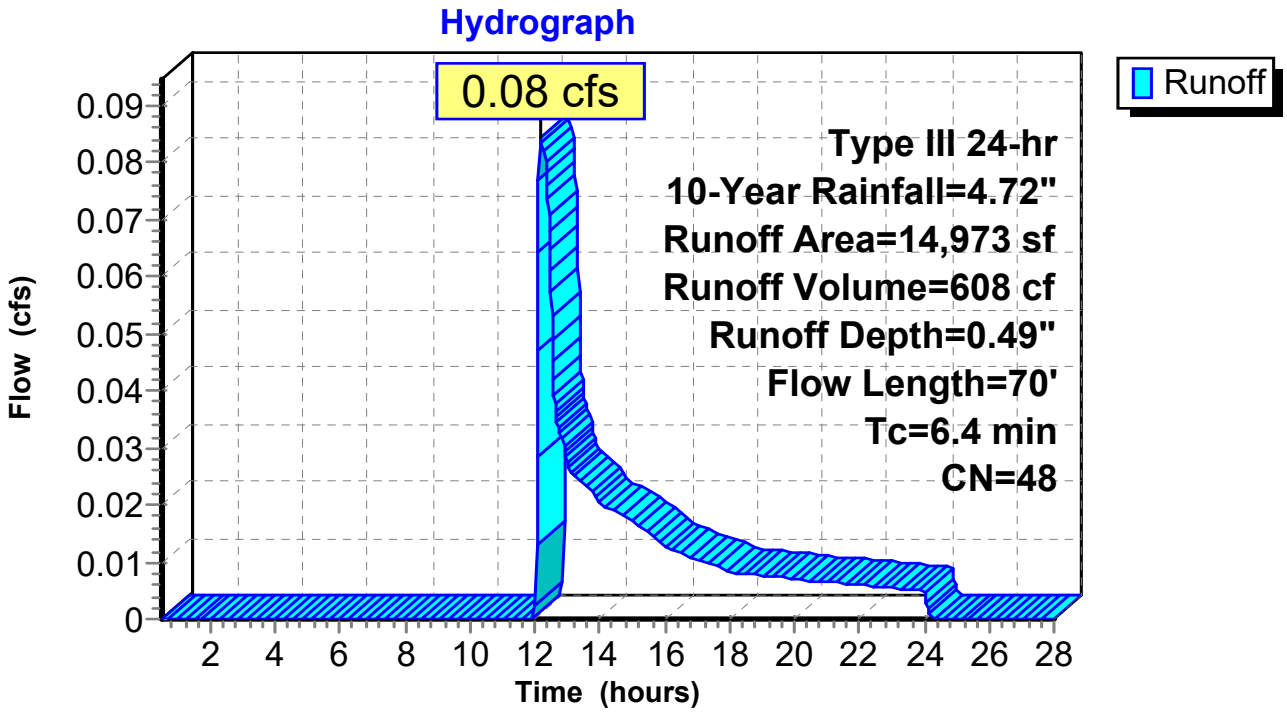
Runoff = 0.08 cfs @ 12.16 hrs, Volume= 608 cf, Depth= 0.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Rainfall=4.72"

Area (sf)	CN	Description
14,146	49	50-75% Grass cover, Fair, HSG A
2	98	Roofs, HSG A
826	36	Woods, Fair, HSG A
14,973	48	Weighted Average
14,972		99.99% Pervious Area
2		0.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	50	0.0360	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.40"
0.1	20	0.1000	5.09		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
6.4	70	Total			

Subcatchment SA#25: Subcat SA#25



Summary for Subcatchment SA#26: Subcat SA#26

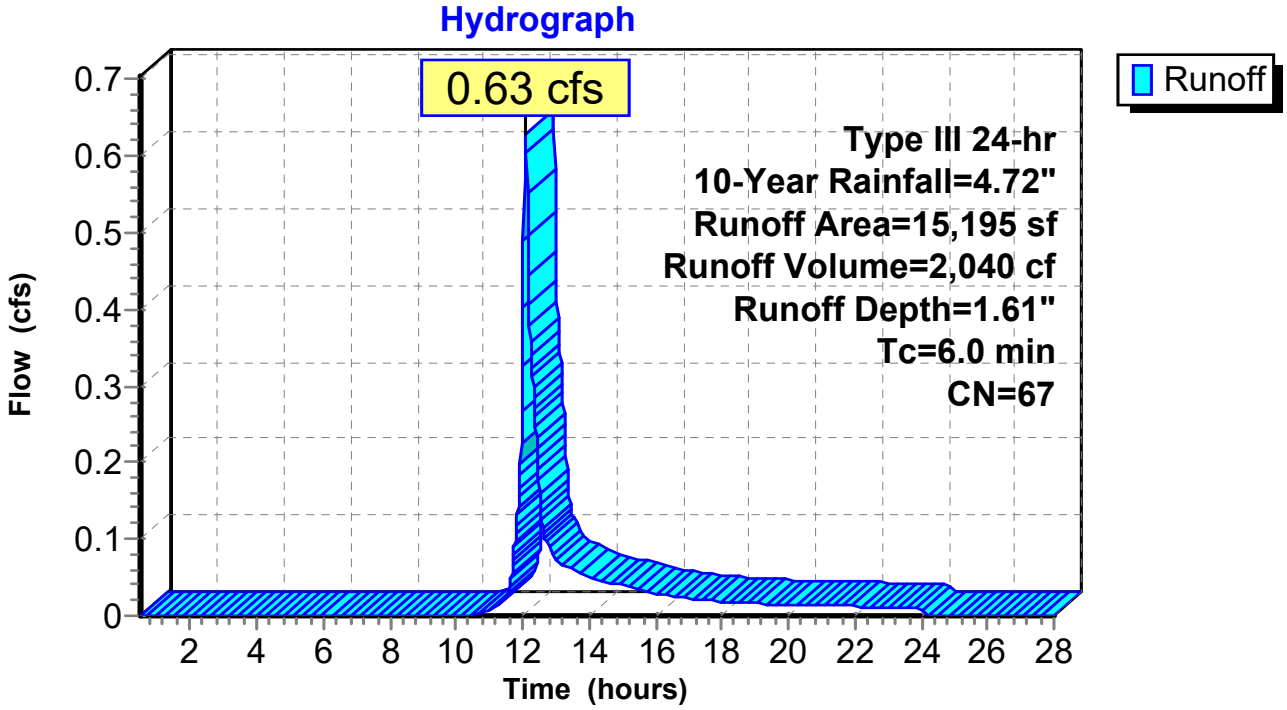
Runoff = 0.63 cfs @ 12.10 hrs, Volume= 2,040 cf, Depth= 1.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Rainfall=4.72"

Area (sf)	CN	Description
7,298	49	50-75% Grass cover, Fair, HSG A
6,107	98	Paved roads w/curbs & sewers, HSG A
1,791	36	Woods, Fair, HSG A
15,195	67	Weighted Average
9,089		59.81% Pervious Area
6,107		40.19% Impervious Area

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

Subcatchment SA#26: Subcat SA#26



Summary for Subcatchment SA#27: Subcat SA#27

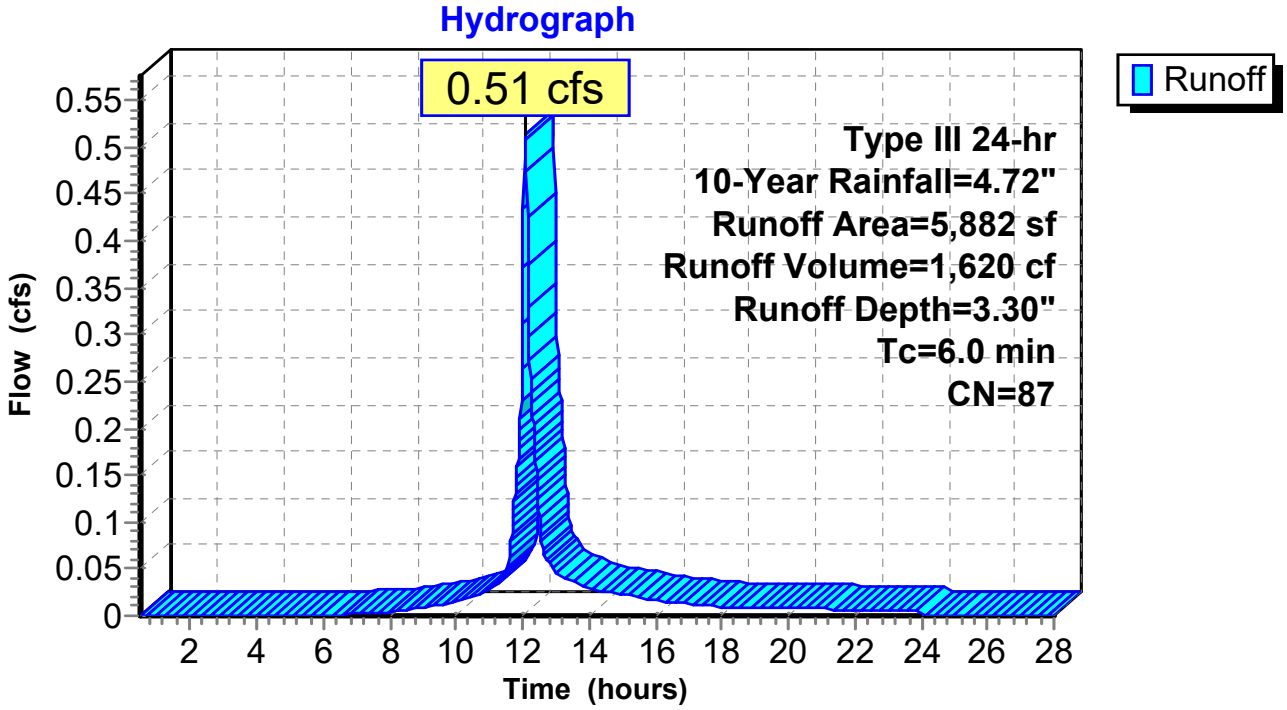
Runoff = 0.51 cfs @ 12.09 hrs, Volume= 1,620 cf, Depth= 3.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Rainfall=4.72"

Area (sf)	CN	Description
1,269	49	50-75% Grass cover, Fair, HSG A
1,384	98	Paved roads w/curbs & sewers, HSG A
3,229	98	Roofs, HSG A
5,882	87	Weighted Average
1,269		21.58% Pervious Area
4,613		78.42% Impervious Area

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

Subcatchment SA#27: Subcat SA#27



Summary for Subcatchment SA#28: Subcat SA#28

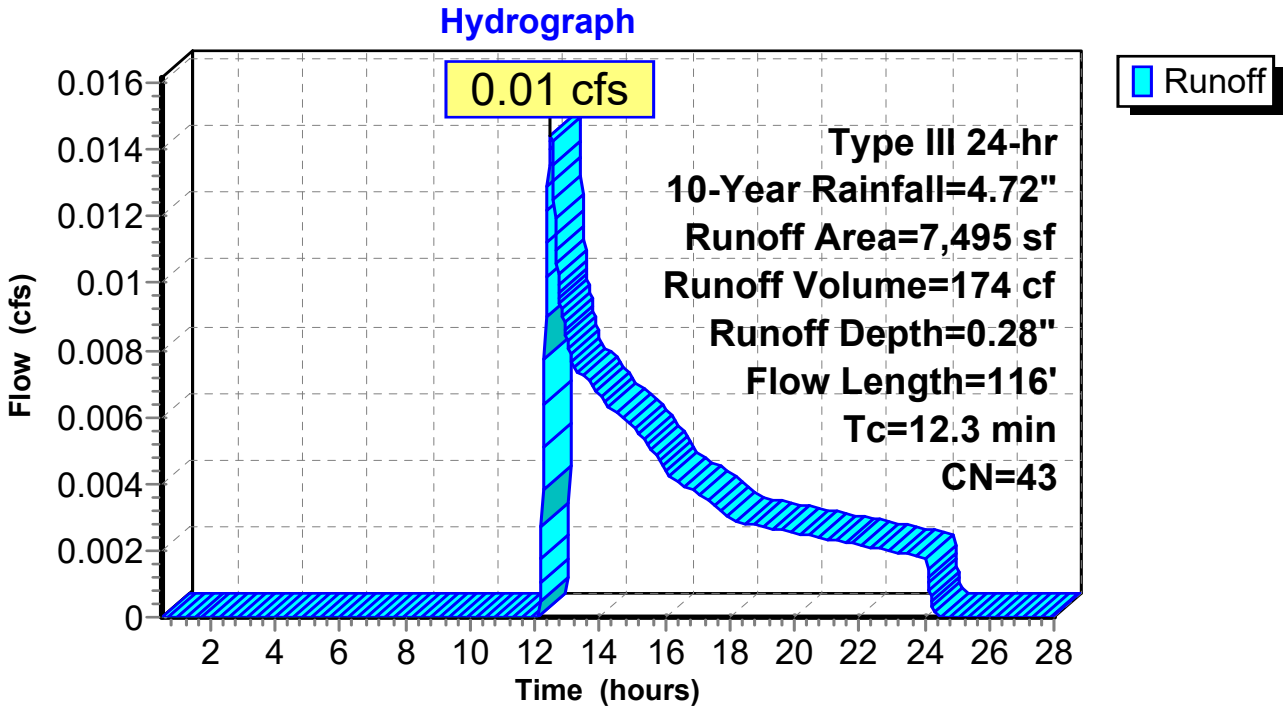
Runoff = 0.01 cfs @ 12.49 hrs, Volume= 174 cf, Depth= 0.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Rainfall=4.72"

Area (sf)	CN	Description
3,987	49	50-75% Grass cover, Fair, HSG A
3,508	36	Woods, Fair, HSG A
7,495	43	Weighted Average
7,495		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0280	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
1.8	66	0.0014	0.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
12.3	116	Total			

Subcatchment SA#28: Subcat SA#28



Summary for Subcatchment SA#29: Subcat SA#29

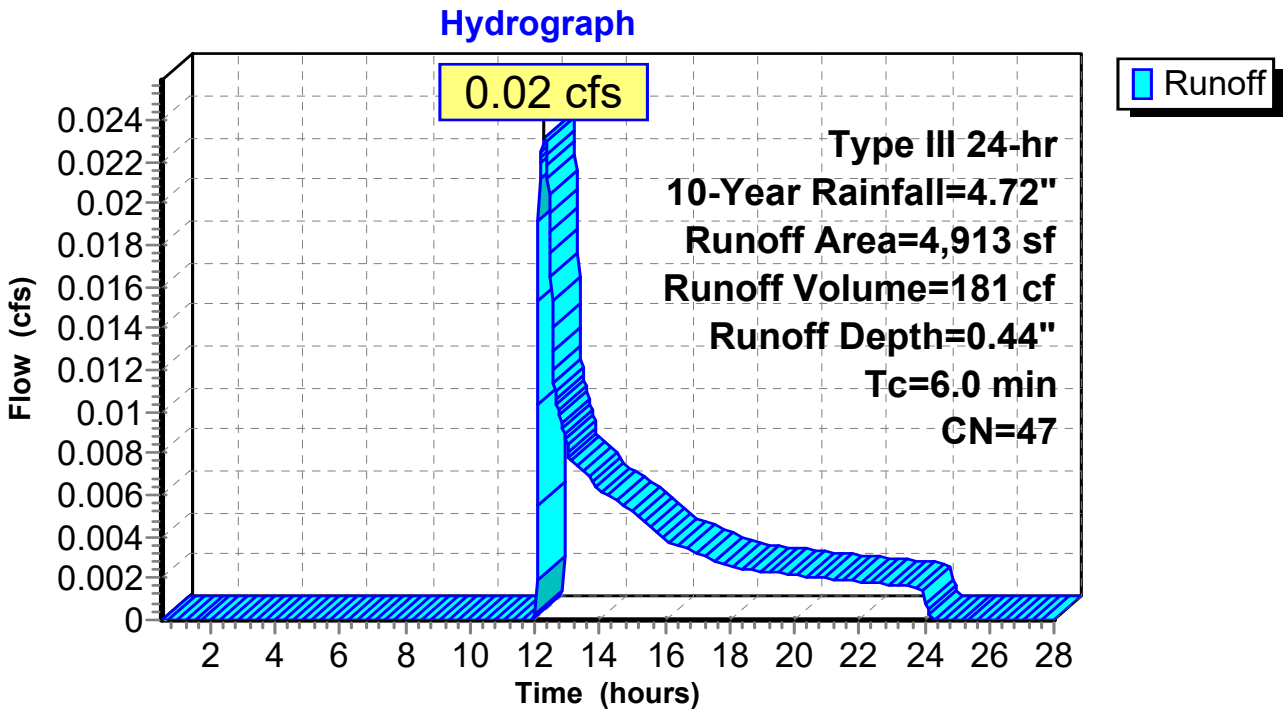
Runoff = 0.02 cfs @ 12.29 hrs, Volume= 181 cf, Depth= 0.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Rainfall=4.72"

Area (sf)	CN	Description
4,295	49	50-75% Grass cover, Fair, HSG A
618	36	Woods, Fair, HSG A
4,913	47	Weighted Average
4,913		100.00% Pervious Area

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

Subcatchment SA#29: Subcat SA#29



Summary for Subcatchment SA#4: Subcat SA#4

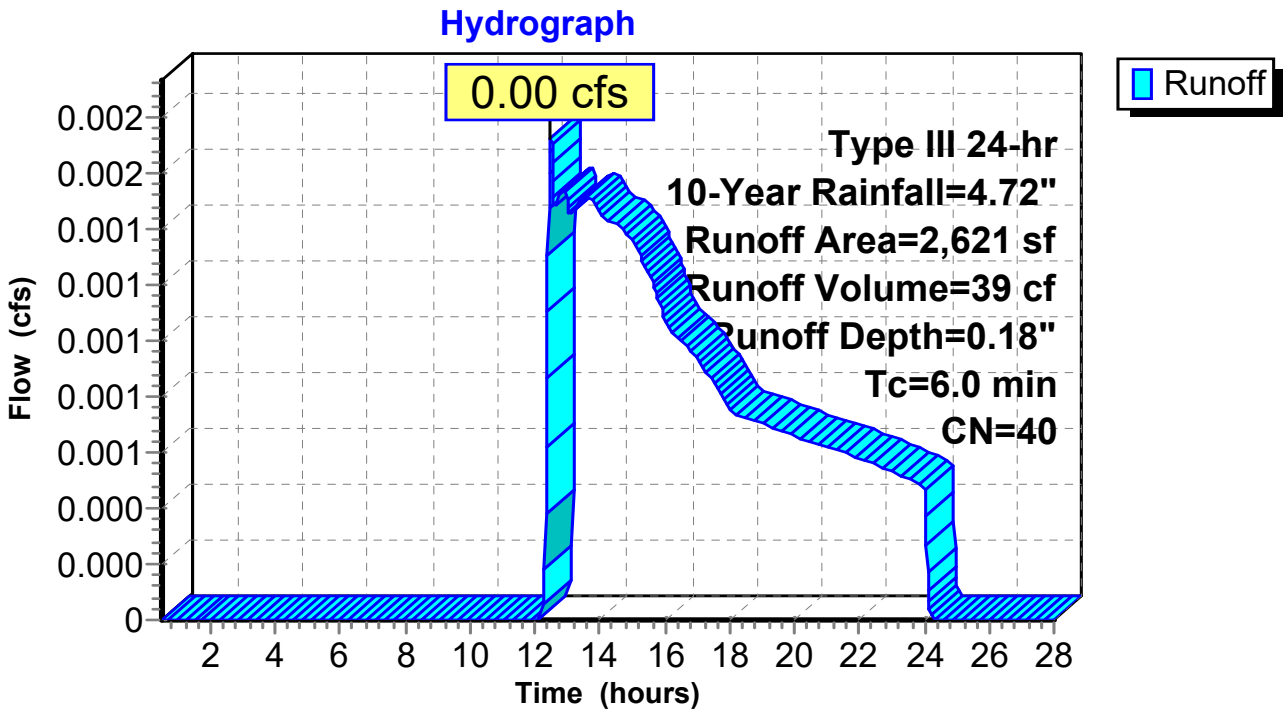
Runoff = 0.00 cfs @ 12.49 hrs, Volume= 39 cf, Depth= 0.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Rainfall=4.72"

Area (sf)	CN	Description
827	49	50-75% Grass cover, Fair, HSG A
1,794	36	Woods, Fair, HSG A
2,621	40	Weighted Average
2,621		100.00% Pervious Area

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

Subcatchment SA#4: Subcat SA#4



Summary for Subcatchment SA#5: Subcat SA#5

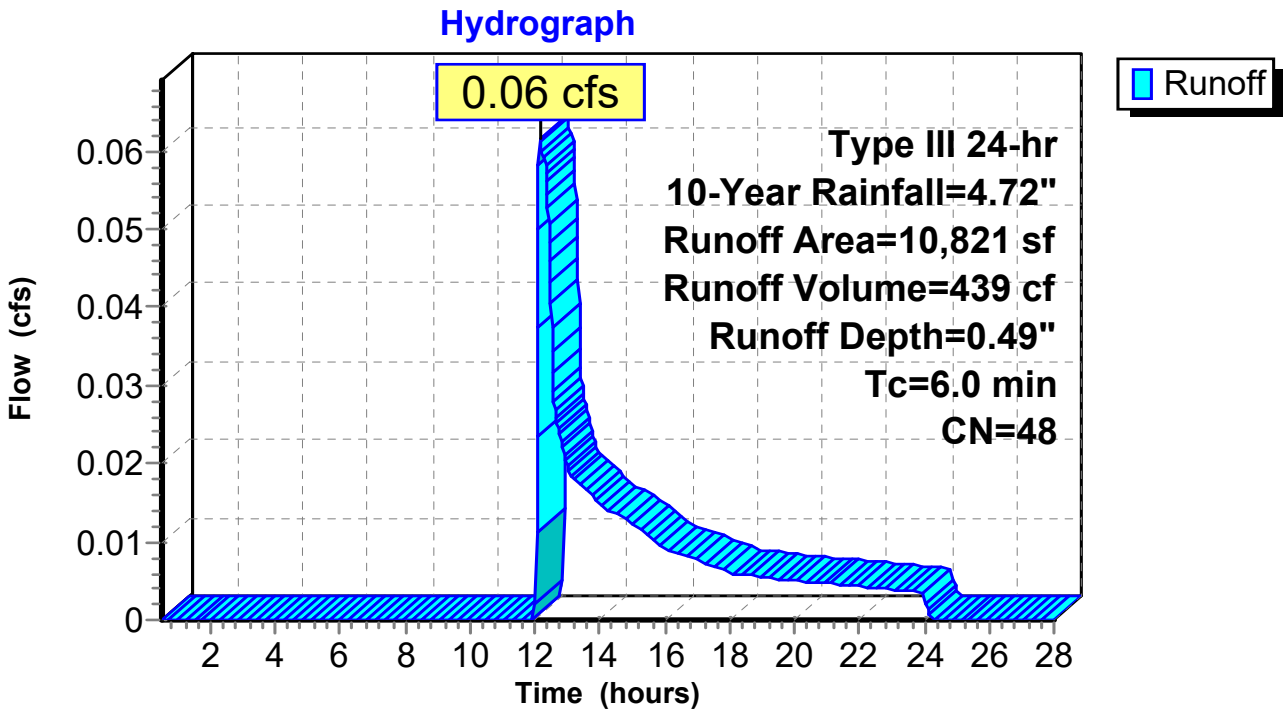
Runoff = 0.06 cfs @ 12.15 hrs, Volume= 439 cf, Depth= 0.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Rainfall=4.72"

Area (sf)	CN	Description
9,977	49	50-75% Grass cover, Fair, HSG A
844	36	Woods, Fair, HSG A
10,821	48	Weighted Average
10,821		100.00% Pervious Area

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

Subcatchment SA#5: Subcat SA#5



Summary for Subcatchment SA#6: Subcat SA#6

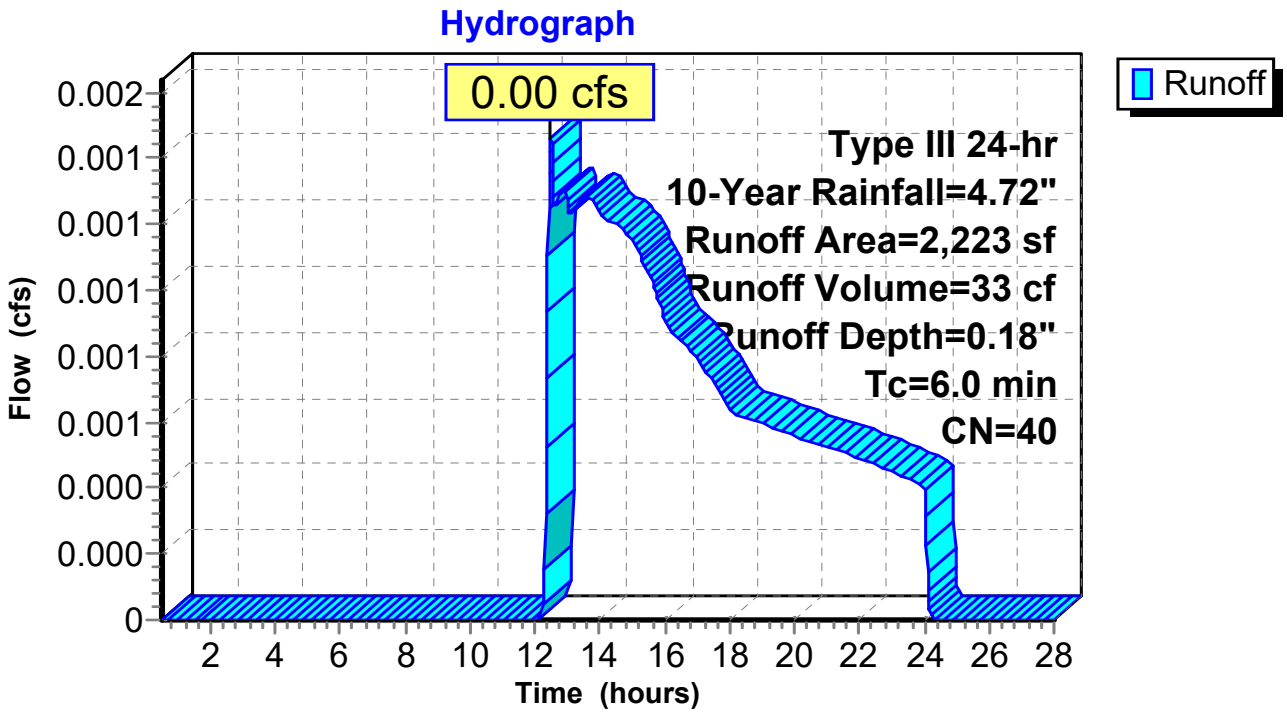
Runoff = 0.00 cfs @ 12.49 hrs, Volume= 33 cf, Depth= 0.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Rainfall=4.72"

Area (sf)	CN	Description
697	49	50-75% Grass cover, Fair, HSG A
1,527	36	Woods, Fair, HSG A
2,223	40	Weighted Average
2,223		100.00% Pervious Area

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

Subcatchment SA#6: Subcat SA#6



Summary for Subcatchment SA#8: Subcat SA#8

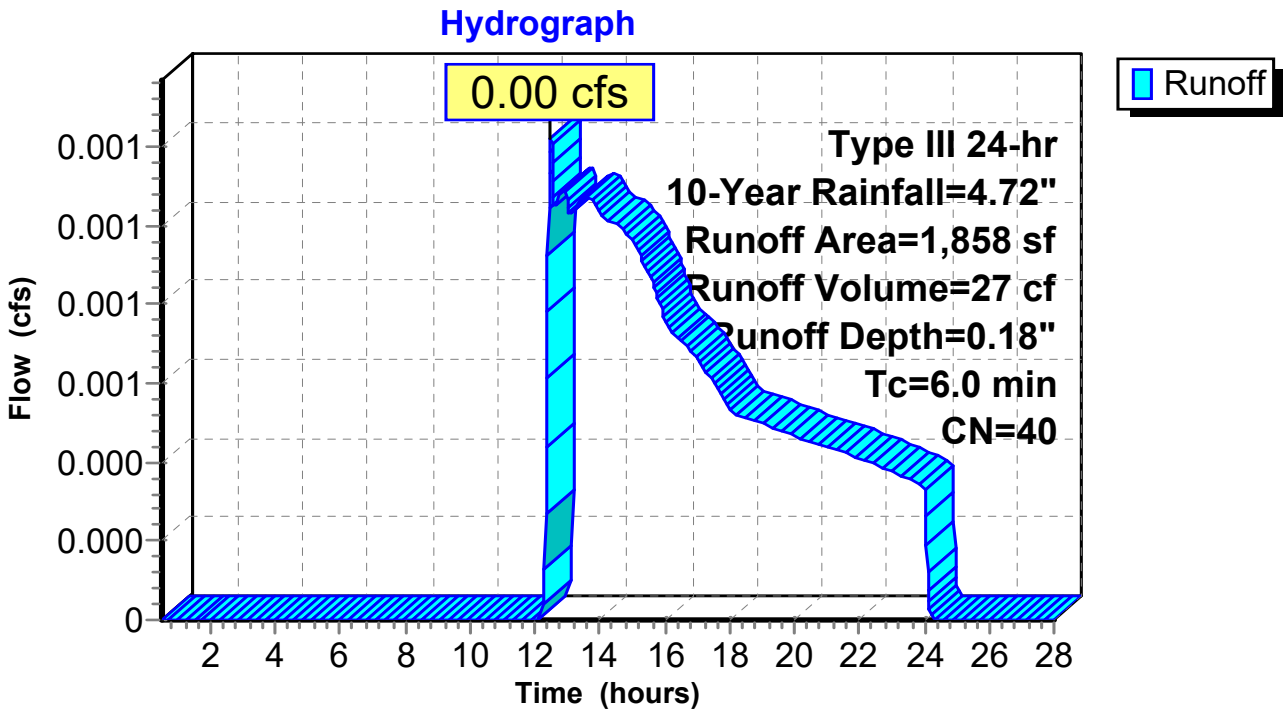
Runoff = 0.00 cfs @ 12.49 hrs, Volume= 27 cf, Depth= 0.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Rainfall=4.72"

Area (sf)	CN	Description
568	49	50-75% Grass cover, Fair, HSG A
1,291	36	Woods, Fair, HSG A
1,858	40	Weighted Average
1,858		100.00% Pervious Area

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

Subcatchment SA#8: Subcat SA#8



Summary for Pond 1P: RB#4

Inflow Area = 5,882 sf, 78.42% Impervious, Inflow Depth = 3.30" for 10-Year event
Inflow = 0.51 cfs @ 12.09 hrs, Volume= 1,620 cf
Outflow = 0.13 cfs @ 11.80 hrs, Volume= 1,620 cf, Atten= 76%, Lag= 0.0 min
Discarded = 0.13 cfs @ 11.80 hrs, Volume= 1,620 cf

Routing by Stor-Ind method, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Peak Elev= 176.90' @ 12.48 hrs Surf.Area= 656 sf Storage= 347 cf

Plug-Flow detention time= 14.6 min calculated for 1,620 cf (100% of inflow)
Center-of-Mass det. time= 14.6 min (817.9 - 803.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	176.00'	578 cf	**20.83'W x 31.50'L x 3.54'H Field A** 2,324 cf Overall - 879 cf Embedded = 1,445 cf x 40.0% Voids
#2A	176.50'	879 cf	**Cultec R-330XLHD** x 16 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 4 rows
		1,457 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	176.00'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.13 cfs @ 11.80 hrs HW=176.04' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.13 cfs)

Pond 1P: RB#4 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 4 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

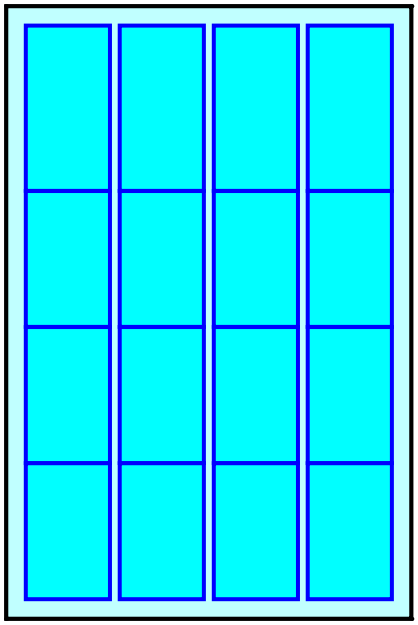
4 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 29.50' Row Length +12.0" End Stone x 2 = 31.50' Base Length
4 Rows x 52.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.83' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

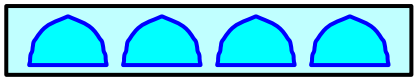
16 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 4 Rows = 879.2 cf Chamber Storage

2,324.2 cf Field - 879.2 cf Chambers = 1,445.0 cf Stone x 40.0% Voids = 578.0 cf Stone Storage

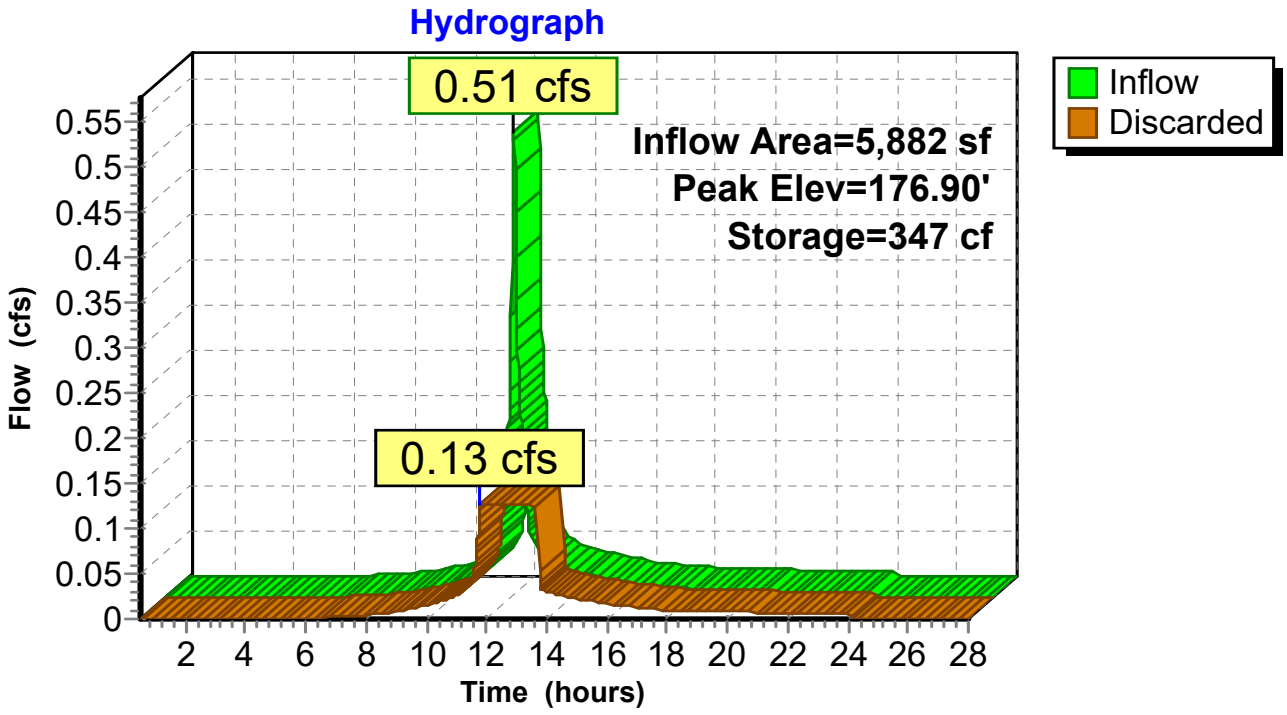
Chamber Storage + Stone Storage = 1,457.2 cf = 0.033 af
Overall Storage Efficiency = 62.7%
Overall System Size = 31.50' x 20.83' x 3.54'

16 Chambers @ $ 300.00 /ea = $ 4,800.00
86.1 cy Field Excavation @ $ 10.00 /cy = $ 860.82
53.5 cy Stone @ $ 30.00 /cy = $ 1,605.56
Total Cost = $ 7,266.38

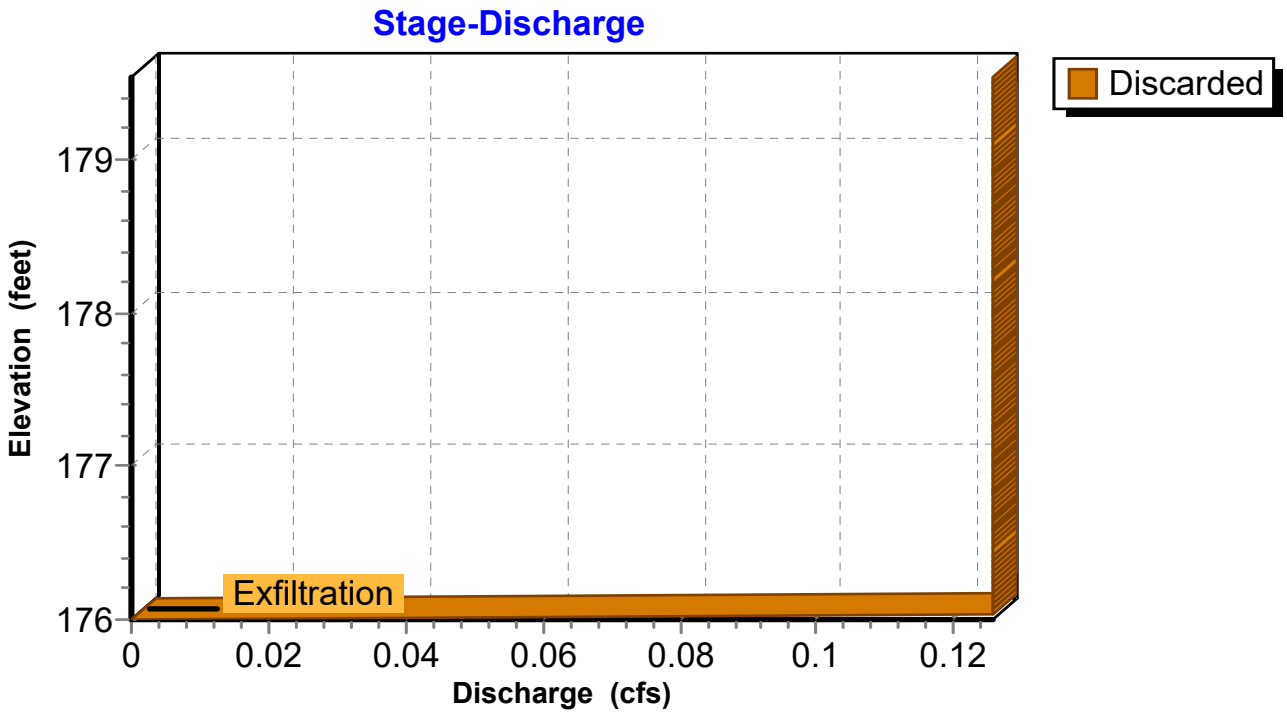




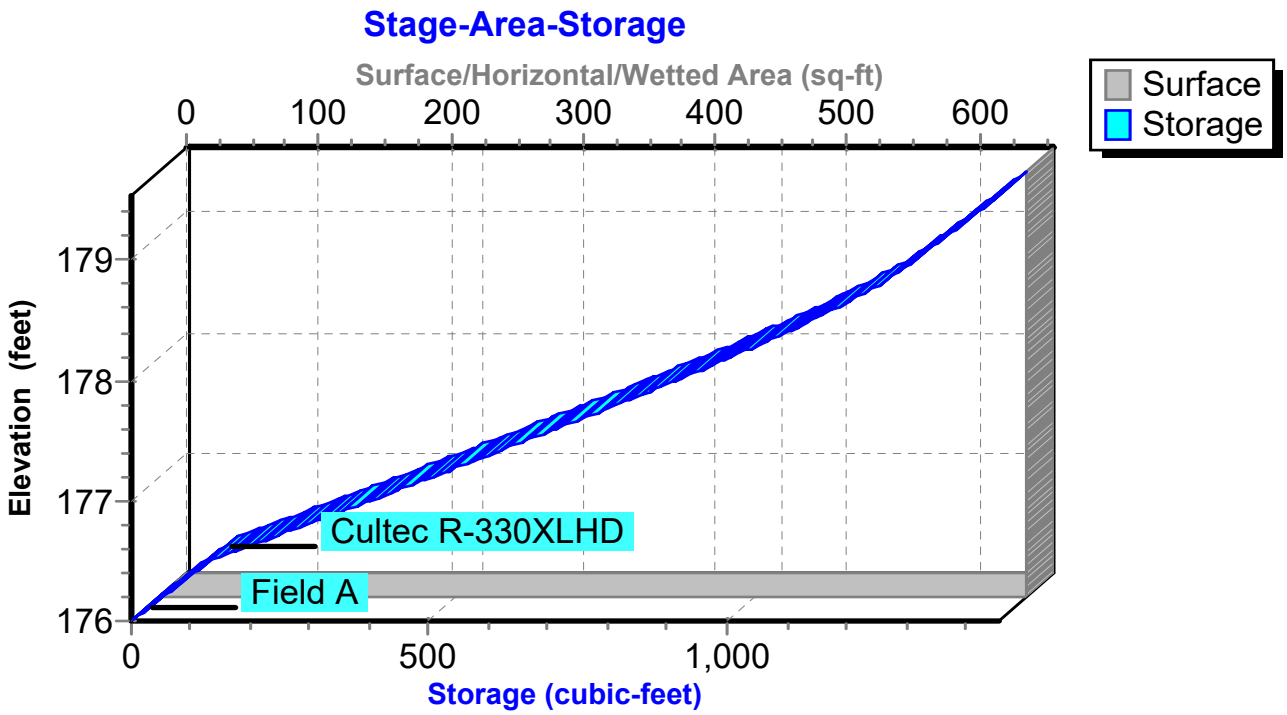
Pond 1P: RB#4



Pond 1P: RB#4



Pond 1P: RB#4


Stage-Area-Storage
Surface/Horizontal/Wetted Area (sq-ft)
0
100
200
300
400
500
600
Surface
Storage
179
178
177
176
Elevation (feet)
Cultec R-330XLHD
Field A
0
500
1,000
Storage (cubic-feet)

Summary for Pond 2P: RB#3

Inflow Area = 15,524 sf, 38.40% Impervious, Inflow Depth = 1.47" for 10-Year event
Inflow = 0.55 cfs @ 12.11 hrs, Volume= 1,902 cf
Outflow = 0.18 cfs @ 11.98 hrs, Volume= 1,902 cf, Atten= 67%, Lag= 0.0 min
Discarded = 0.18 cfs @ 11.98 hrs, Volume= 1,902 cf

Routing by Stor-Ind method, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Peak Elev= 178.16' @ 12.50 hrs Surf.Area= 948 sf Storage= 318 cf

Plug-Flow detention time= 9.2 min calculated for 1,902 cf (100% of inflow)
Center-of-Mass det. time= 9.2 min (874.9 - 865.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	177.50'	824 cf	**20.83'W x 45.50'L x 3.54'H Field A** 3,357 cf Overall - 1,296 cf Embedded = 2,061 cf x 40.0% Voids
#2A	178.00'	1,296 cf	**Cultec R-330XLHD** x 24 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 4 rows
		2,121 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	177.50'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.18 cfs @ 11.98 hrs HW=177.54' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.18 cfs)

Pond 2P: RB#3 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 4 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

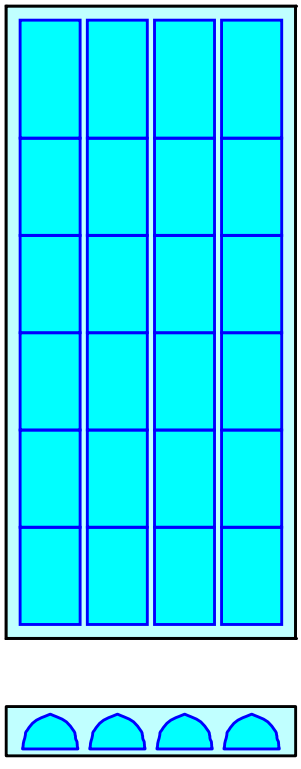
6 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 43.50' Row Length +12.0" End Stone x 2 = 45.50' Base Length
4 Rows x 52.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.83' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

24 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 4 Rows = 1,296.5 cf Chamber Storage

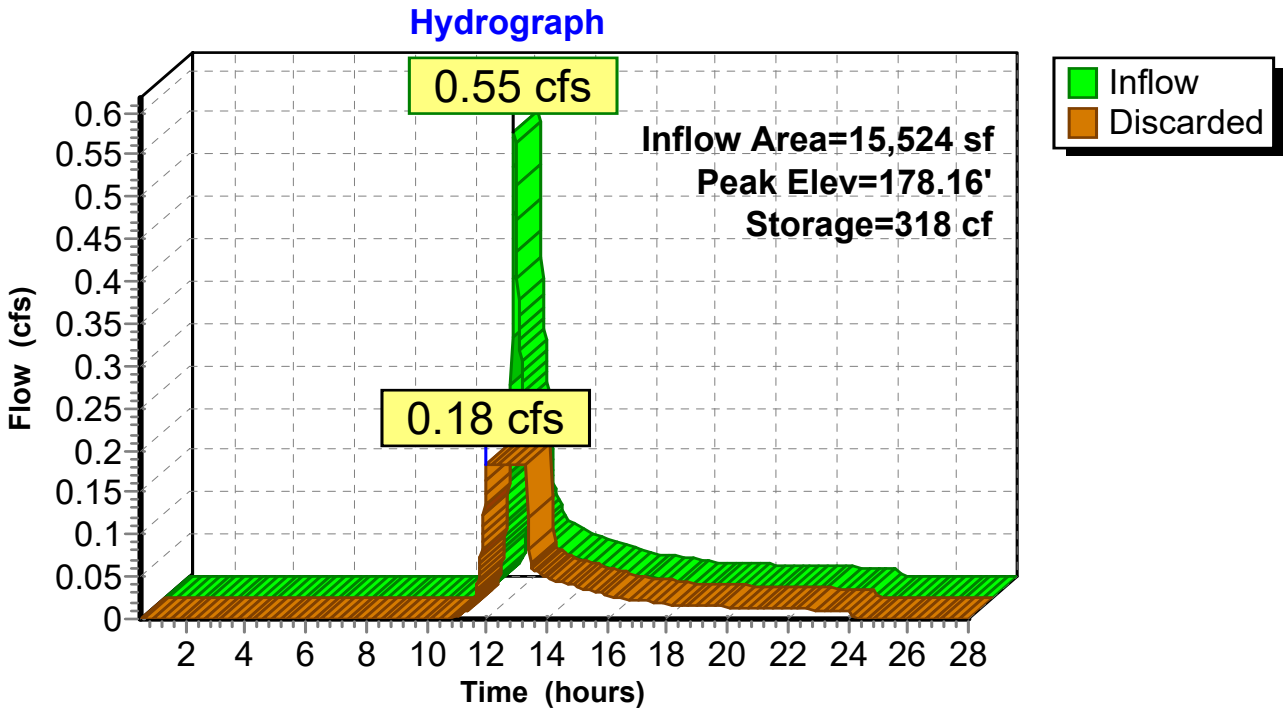
3,357.2 cf Field - 1,296.5 cf Chambers = 2,060.7 cf Stone x 40.0% Voids = 824.3 cf Stone Storage

Chamber Storage + Stone Storage = 2,120.8 cf = 0.049 af
Overall Storage Efficiency = 63.2%
Overall System Size = 45.50' x 20.83' x 3.54'

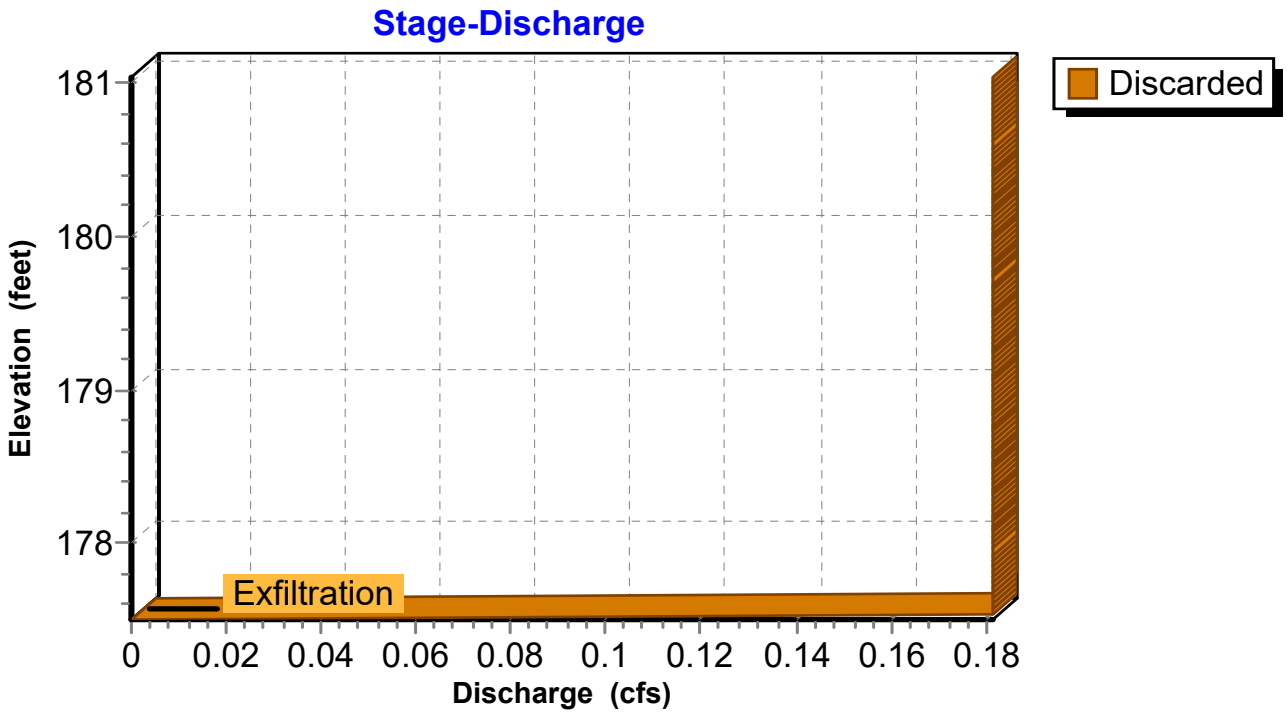
24 Chambers @ $ 300.00 /ea = $ 7,200.00
124.3 cy Field Excavation @ $ 10.00 /cy = $ 1,243.41
76.3 cy Stone @ $ 30.00 /cy = $ 2,289.70
Total Cost = $ 10,733.11



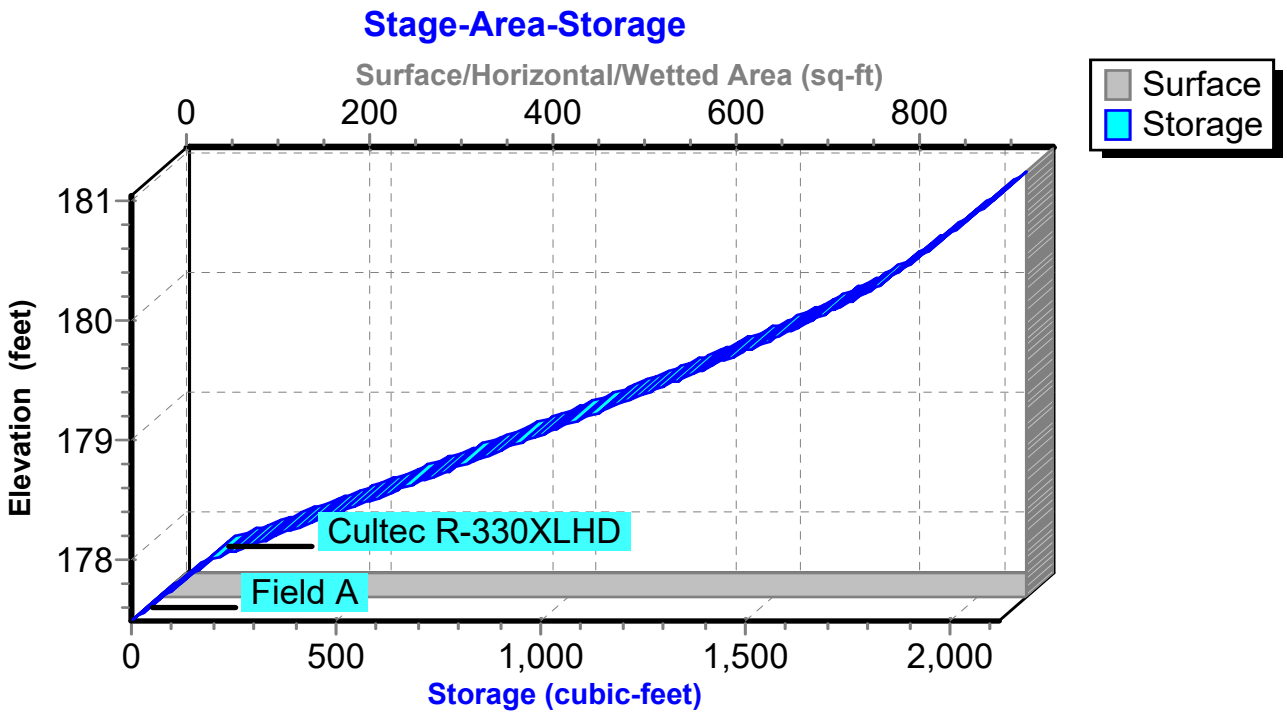
Pond 2P: RB#3



Pond 2P: RB#3



Pond 2P: RB#3


Stage-Area-Storage
Surface/Horizontal/Wetted Area (sq-ft)
0
200
400
600
800
Surface
Storage
181
180
179
178
Elevation (feet)
Cultec R-330XLHD
Field A
0
500
1,000
1,500
2,000
Storage (cubic-feet)

Summary for Pond 3P: RB#2

Inflow Area = 40,990 sf, 14.90% Impervious, Inflow Depth = 0.90" for 10-Year event
Inflow = 0.75 cfs @ 12.11 hrs, Volume= 3,087 cf
Outflow = 0.33 cfs @ 12.02 hrs, Volume= 3,087 cf, Atten= 56%, Lag= 0.0 min
Discarded = 0.33 cfs @ 12.02 hrs, Volume= 3,087 cf

Routing by Stor-Ind method, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Peak Elev= 177.97' @ 12.45 hrs Surf.Area= 1,707 sf Storage= 320 cf

Plug-Flow detention time= 4.7 min calculated for 3,084 cf (100% of inflow)
Center-of-Mass det. time= 4.7 min (889.5 - 884.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	177.50'	1,457 cf	**25.67'W x 66.50'L x 3.54'H Field A** 6,045 cf Overall - 2,403 cf Embedded = 3,642 cf x 40.0% Voids
#2A	178.00'	2,403 cf	**Cultec R-330XLHD** x 45 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 5 rows
		3,860 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	177.50'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.33 cfs @ 12.02 hrs HW=177.54' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.33 cfs)

Pond 3P: RB#2 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 5 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

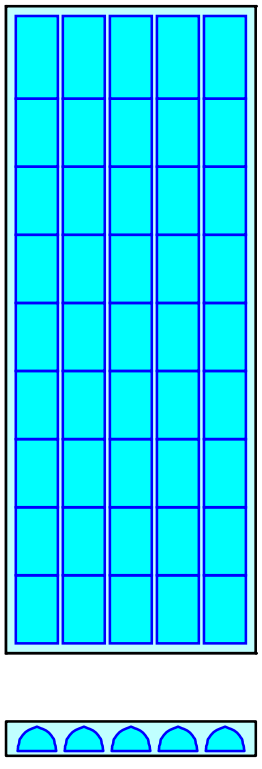
9 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 64.50' Row Length +12.0" End Stone x 2 = 66.50' Base Length
5 Rows x 52.0" Wide + 6.0" Spacing x 4 + 12.0" Side Stone x 2 = 25.67' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

45 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 5 Rows = 2,402.9 cf Chamber Storage

6,045.0 cf Field - 2,402.9 cf Chambers = 3,642.1 cf Stone x 40.0% Voids = 1,456.8 cf Stone Storage

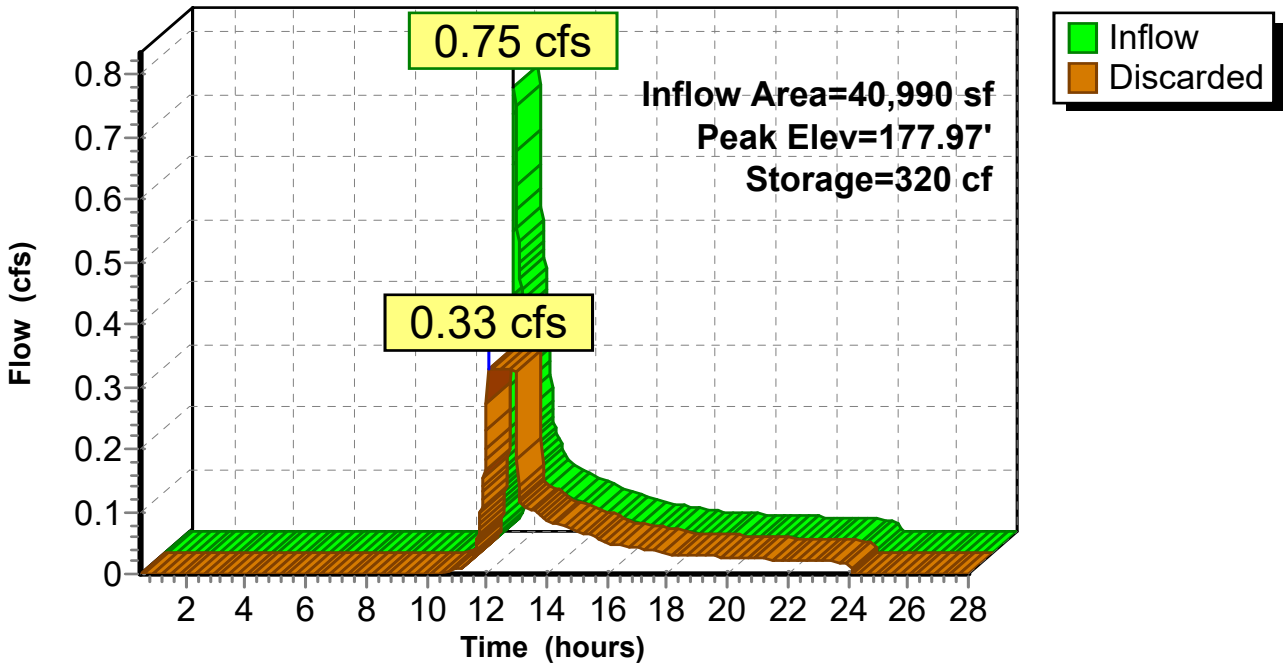
Chamber Storage + Stone Storage = 3,859.8 cf = 0.089 af
Overall Storage Efficiency = 63.9%
Overall System Size = 66.50' x 25.67' x 3.54'

45 Chambers @ $ 300.00 /ea = $ 13,500.00
223.9 cy Field Excavation @ $ 10.00 /cy = $ 2,238.90
134.9 cy Stone @ $ 30.00 /cy = $ 4,046.76
Total Cost = $ 19,785.67



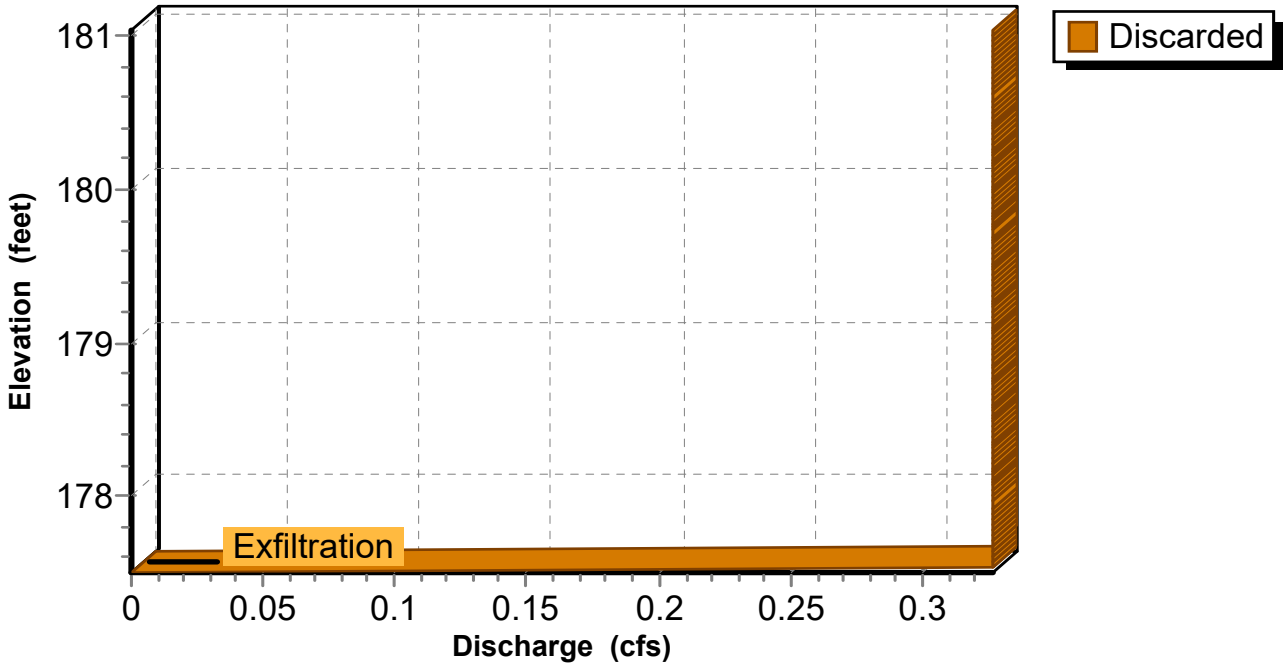
Pond 3P: RB#2

Hydrograph

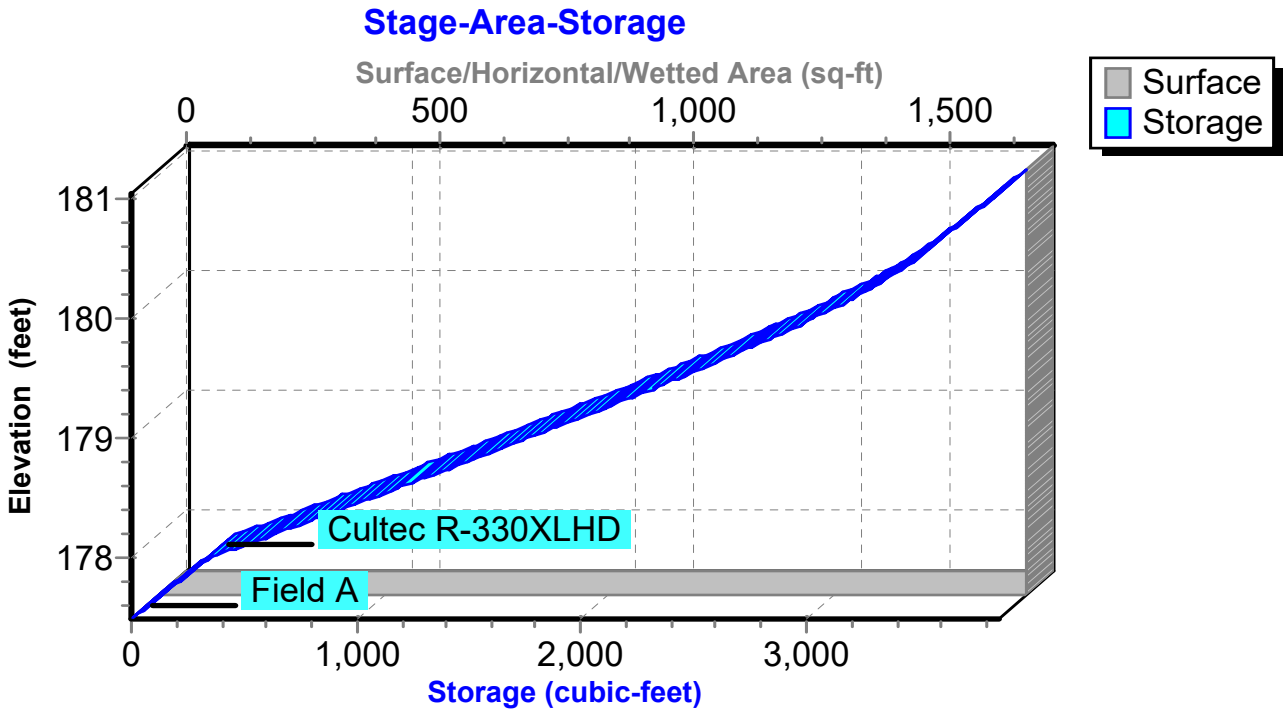


Pond 3P: RB#2

Stage-Discharge



Pond 3P: RB#2


Stage-Area-Storage
Surface/Horizontal/Wetted Area (sq-ft)
0
500
1,000
1,500
Surface
Storage
181
180
179
178
Elevation (feet)
Cultec R-330XLHD
Field A
0
1,000
2,000
3,000
Storage (cubic-feet)

Summary for Pond 4P: RB#1

Inflow Area = 9,967 sf, 27.29% Impervious, Inflow Depth = 1.39" for 10-Year event
Inflow = 0.31 cfs @ 12.09 hrs, Volume= 1,156 cf
Outflow = 0.12 cfs @ 11.96 hrs, Volume= 1,156 cf, Atten= 62%, Lag= 0.0 min
Discarded = 0.12 cfs @ 11.96 hrs, Volume= 1,156 cf

Routing by Stor-Ind method, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Peak Elev= 178.05' @ 12.43 hrs Surf.Area= 616 sf Storage= 148 cf

Plug-Flow detention time= 6.1 min calculated for 1,156 cf (100% of inflow)
Center-of-Mass det. time= 6.1 min (849.2 - 843.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	177.50'	546 cf	**16.00'W x 38.50'L x 3.54'H Field A** 2,182 cf Overall - 816 cf Embedded = 1,366 cf x 40.0% Voids
#2A	178.00'	816 cf	**Cultec R-330XLHD** x 15 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 3 rows
		1,362 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	177.50'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.12 cfs @ 11.96 hrs HW=177.54' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.12 cfs)

Pond 4P: RB#1 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 3 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

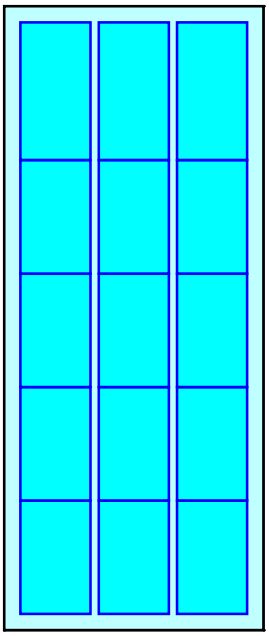
5 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 36.50' Row Length +12.0" End Stone x 2 = 38.50' Base Length
3 Rows x 52.0" Wide + 6.0" Spacing x 2 + 12.0" Side Stone x 2 = 16.00' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

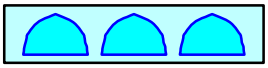
15 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 3 Rows = 815.9 cf Chamber Storage

2,181.7 cf Field - 815.9 cf Chambers = 1,365.8 cf Stone x 40.0% Voids = 546.3 cf Stone Storage

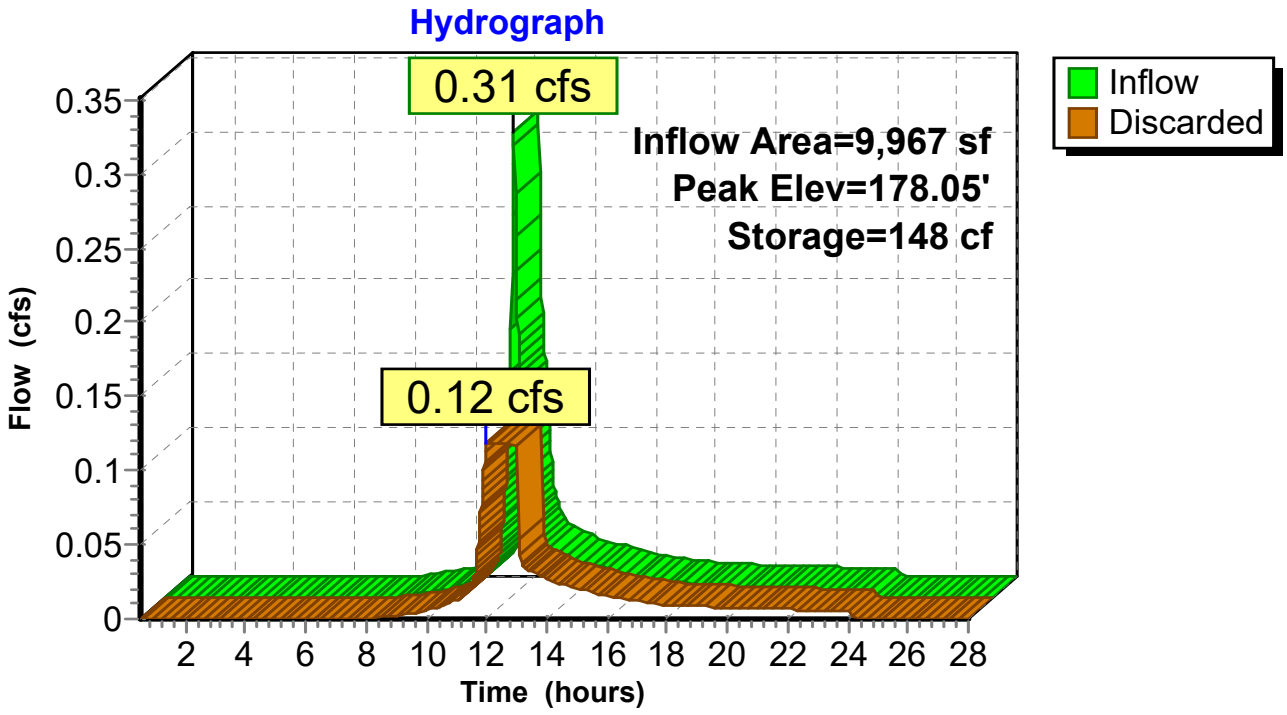
Chamber Storage + Stone Storage = 1,362.2 cf = 0.031 af
Overall Storage Efficiency = 62.4%
Overall System Size = 38.50' x 16.00' x 3.54'

15 Chambers @ $ 300.00 /ea = $ 4,500.00
80.8 cy Field Excavation @ $ 10.00 /cy = $ 808.02
50.6 cy Stone @ $ 30.00 /cy = $ 1,517.54
Total Cost = $ 6,825.56

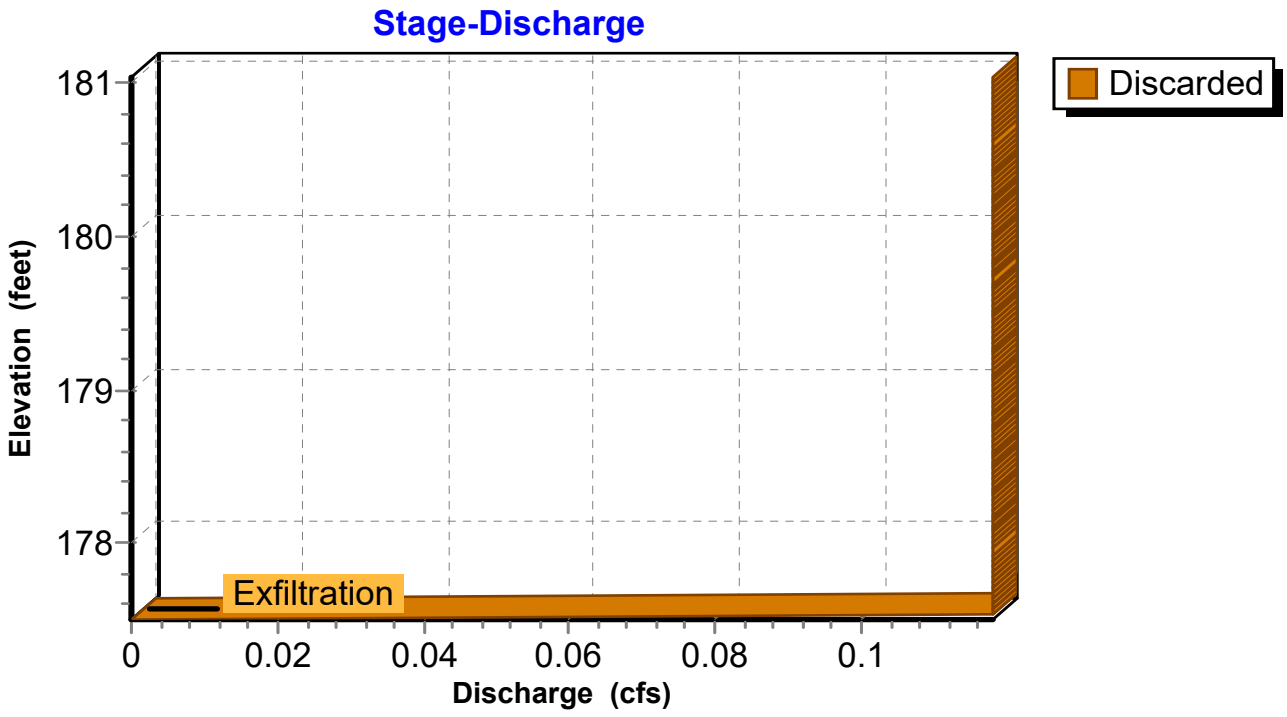




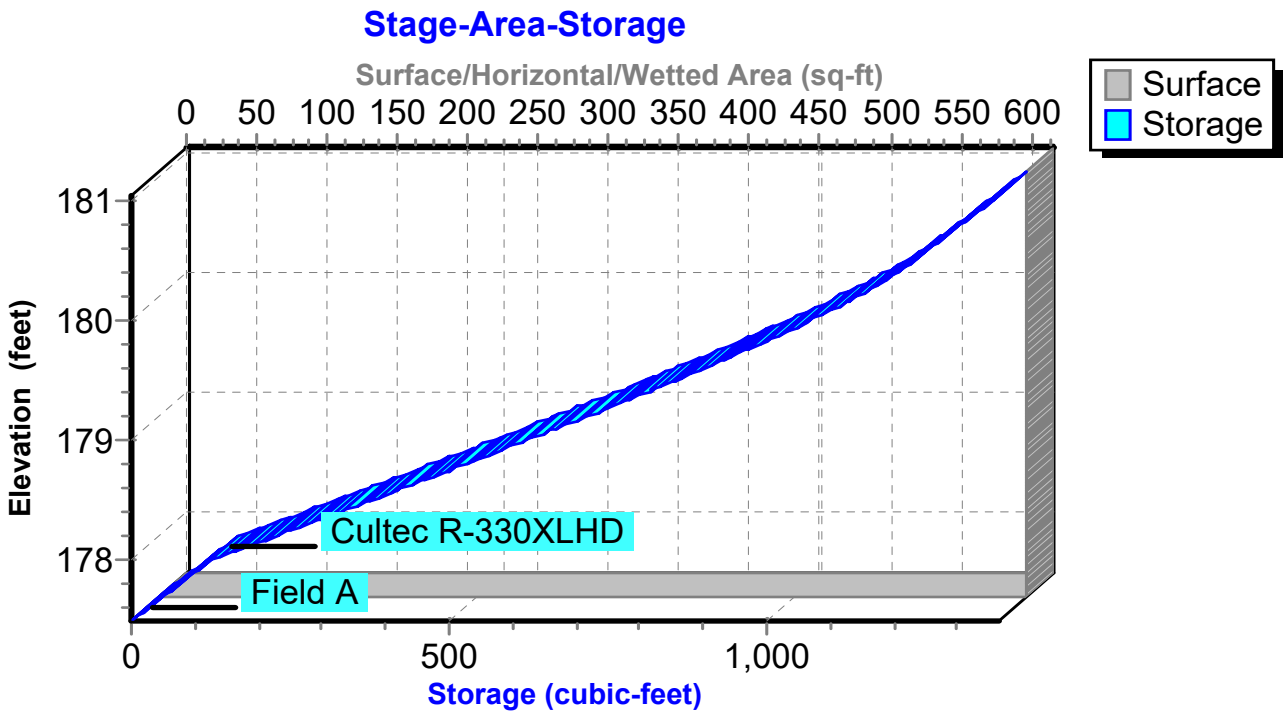
Pond 4P: RB#1



Pond 4P: RB#1



Pond 4P: RB#1


Stage-Area-Storage
Surface/Horizontal/Wetted Area (sq-ft)
0 50 100 150 200 250 300 350 400 450 500 550 600
Surface
Storage
181
180
179
178
Elevation (feet)
Cultec R-330XLHD
Field A
0
500
1,000
Storage (cubic-feet)

Summary for Pond 5P: RB#5

Inflow Area = 7,495 sf, 0.00% Impervious, Inflow Depth = 0.28" for 10-Year event
Inflow = 0.01 cfs @ 12.49 hrs, Volume= 174 cf
Outflow = 0.01 cfs @ 12.51 hrs, Volume= 174 cf, Atten= 1%, Lag= 1.2 min
Discarded = 0.01 cfs @ 12.51 hrs, Volume= 174 cf

Routing by Stor-Ind method, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Peak Elev= 177.01' @ 12.51 hrs Surf.Area= 195 sf Storage= 1 cf

Plug-Flow detention time= 1.2 min calculated for 174 cf (100% of inflow)
Center-of-Mass det. time= 1.2 min (984.6 - 983.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	177.00'	184 cf	**11.17'W x 17.50'L x 3.54'H Field A** 692 cf Overall - 231 cf Embedded = 461 cf x 40.0% Voids
#2A	177.50'	231 cf	**Cultec R-330XLHD** x 4 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 2 rows
		415 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	177.00'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.04 cfs @ 12.51 hrs HW=177.01' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

Pond 5P: RB#5 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 2 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

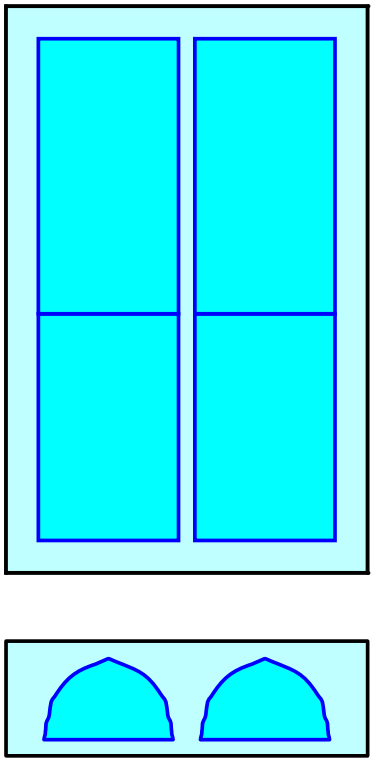
2 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 15.50' Row Length +12.0" End Stone x 2 = 17.50' Base Length
2 Rows x 52.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 11.17' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

4 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 2 Rows = 231.0 cf Chamber Storage

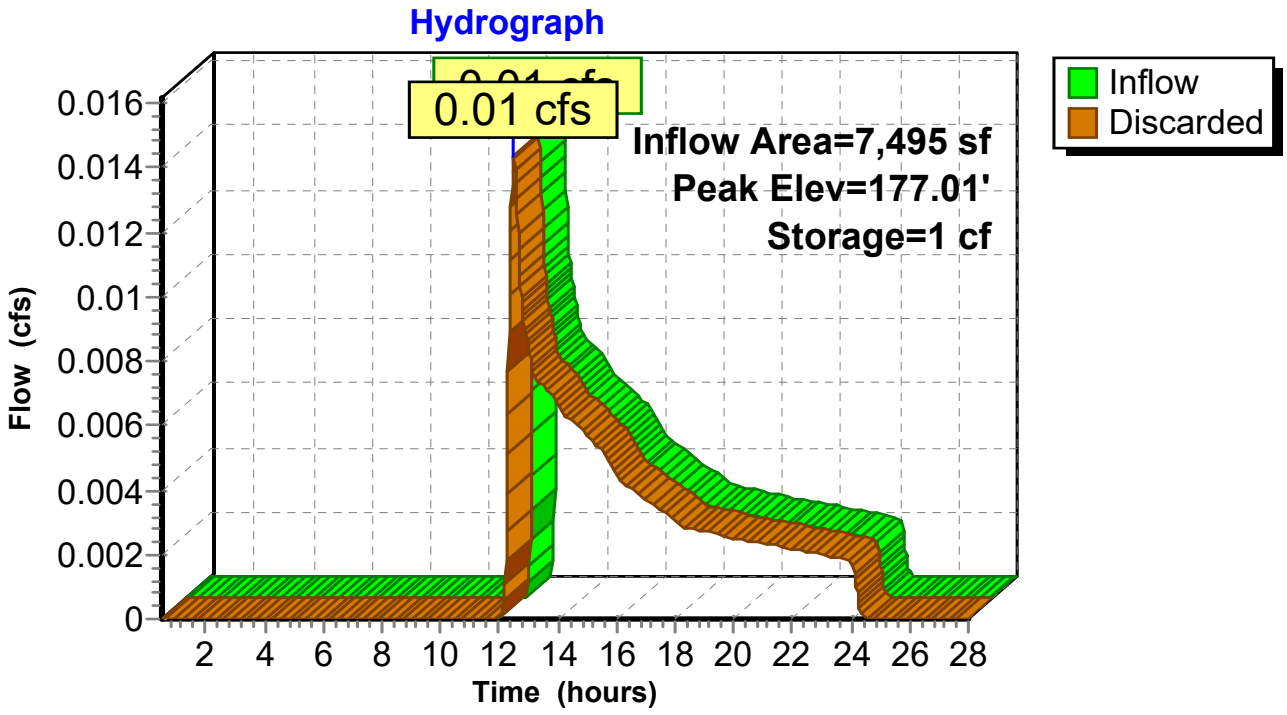
692.1 cf Field - 231.0 cf Chambers = 461.1 cf Stone x 40.0% Voids = 184.4 cf Stone Storage

Chamber Storage + Stone Storage = 415.4 cf = 0.010 af
Overall Storage Efficiency = 60.0%
Overall System Size = 17.50' x 11.17' x 3.54'

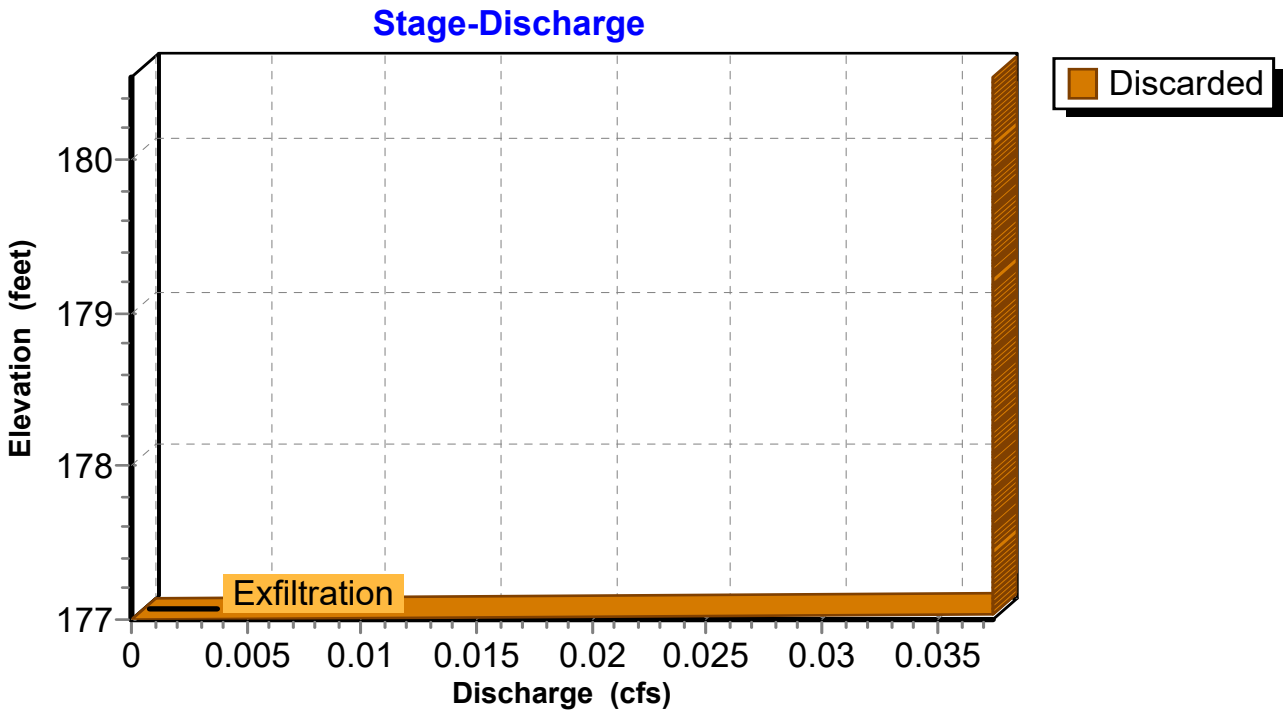
4 Chambers @ $ 300.00 /ea = $ 1,200.00
25.6 cy Field Excavation @ $ 10.00 /cy = $ 256.33
17.1 cy Stone @ $ 30.00 /cy = $ 512.36
Total Cost = $ 1,968.69



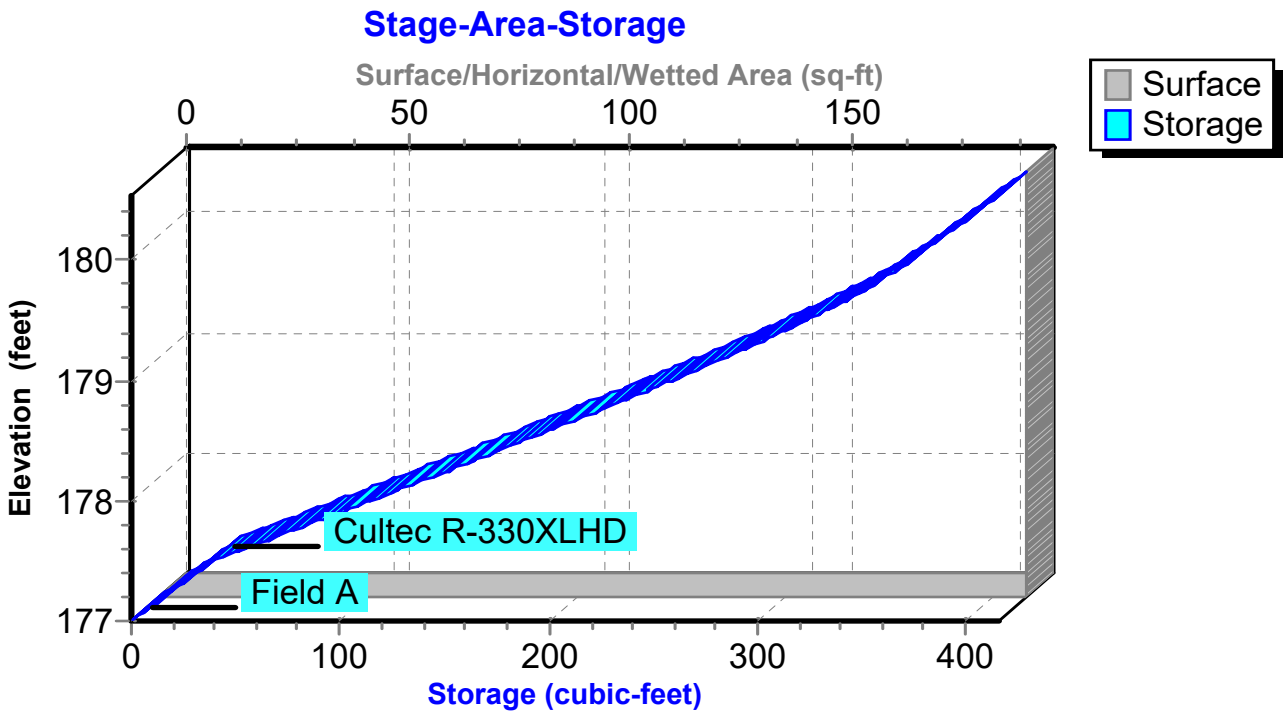
Pond 5P: RB#5



Pond 5P: RB#5



Pond 5P: RB#5


Stage-Area-Storage
Surface/Horizontal/Wetted Area (sq-ft)
0
50
100
150
Surface
Storage
180
179
178
177
Elevation (feet)
Cultec R-330XLHD
Field A
0
100
200
300
400
Storage (cubic-feet)

Summary for Pond 6P: RB#6

Inflow Area = 4,913 sf, 0.00% Impervious, Inflow Depth = 0.44" for 10-Year event
Inflow = 0.02 cfs @ 12.29 hrs, Volume= 181 cf
Outflow = 0.02 cfs @ 12.31 hrs, Volume= 181 cf, Atten= 0%, Lag= 1.2 min
Discarded = 0.02 cfs @ 12.31 hrs, Volume= 181 cf

Routing by Stor-Ind method, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Peak Elev= 174.53' @ 12.31 hrs Surf.Area= 155 sf Storage= 2 cf

Plug-Flow detention time= 1.2 min calculated for 181 cf (100% of inflow)
Center-of-Mass det. time= 1.2 min (943.4 - 942.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	174.50'	153 cf	**6.33'W x 24.50'L x 3.54'H Field A** 550 cf Overall - 168 cf Embedded = 382 cf x 40.0% Voids
#2A	175.00'	168 cf	**Cultec R-330XLHD** x 3 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 1 rows
		320 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	174.50'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.03 cfs @ 12.31 hrs HW=174.53' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Pond 6P: RB#6 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 1 rows

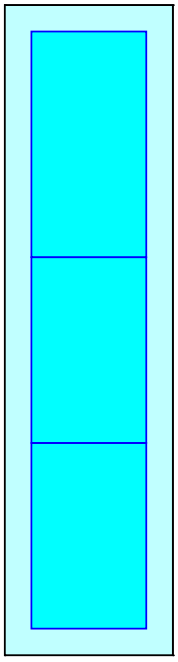
3 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 22.50' Row Length +12.0" End Stone x 2 = 24.50' Base Length
1 Rows x 52.0" Wide + 12.0" Side Stone x 2 = 6.33' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

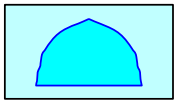
3 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 1 Rows = 167.6 cf Chamber Storage

549.5 cf Field - 167.6 cf Chambers = 381.9 cf Stone x 40.0% Voids = 152.8 cf Stone Storage

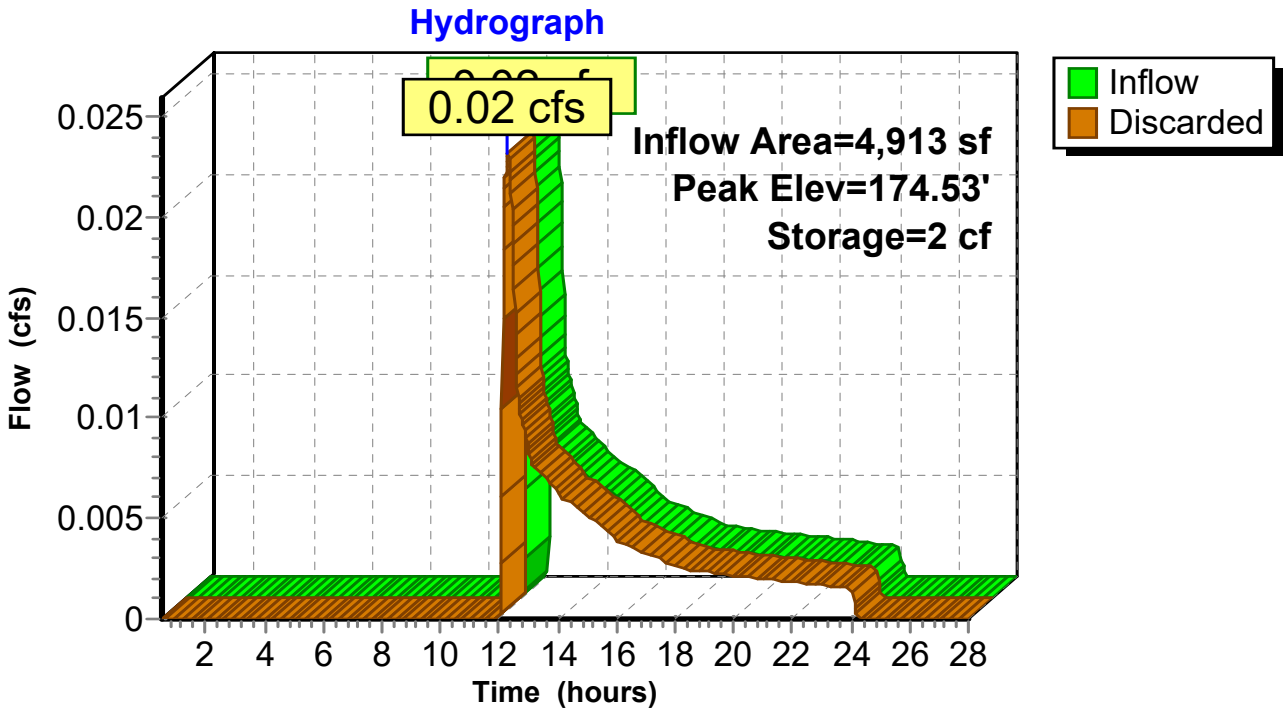
Chamber Storage + Stone Storage = 320.4 cf = 0.007 af
Overall Storage Efficiency = 58.3%
Overall System Size = 24.50' x 6.33' x 3.54'

3 Chambers @ $ 300.00 /ea = $ 900.00
20.4 cy Field Excavation @ $ 10.00 /cy = $ 203.54
14.1 cy Stone @ $ 30.00 /cy = $ 424.33
Total Cost = $ 1,527.87

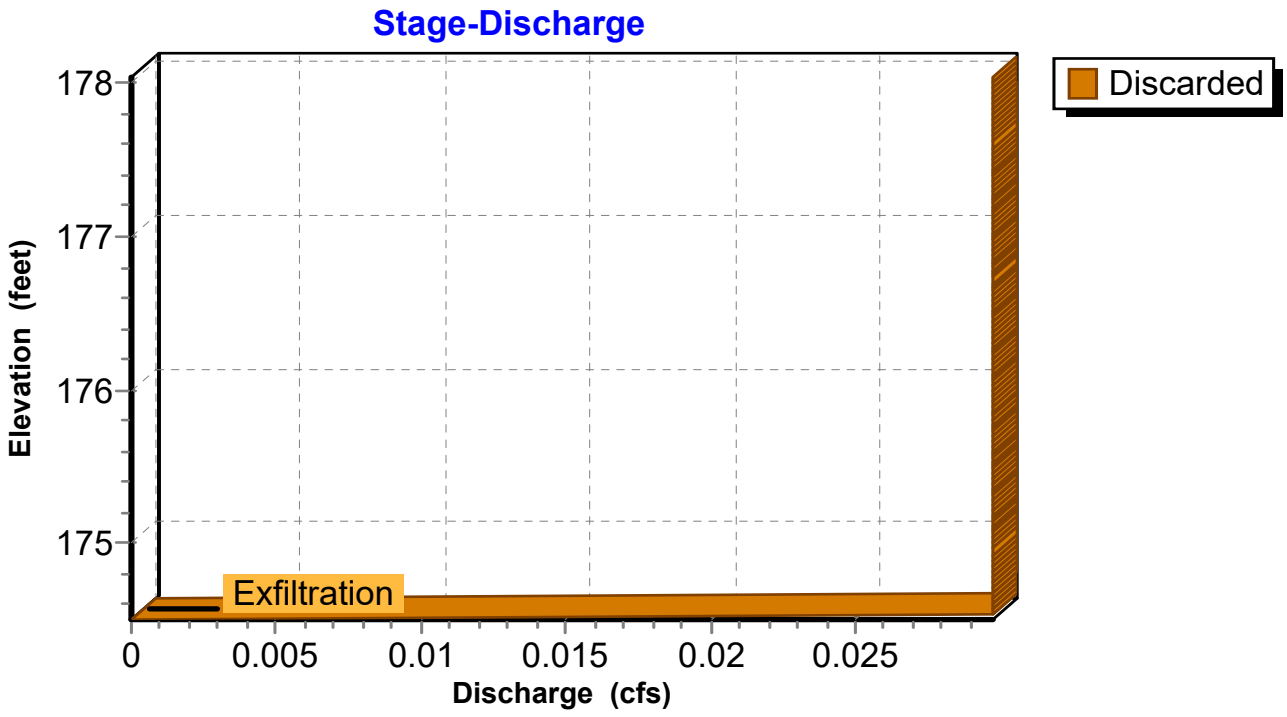




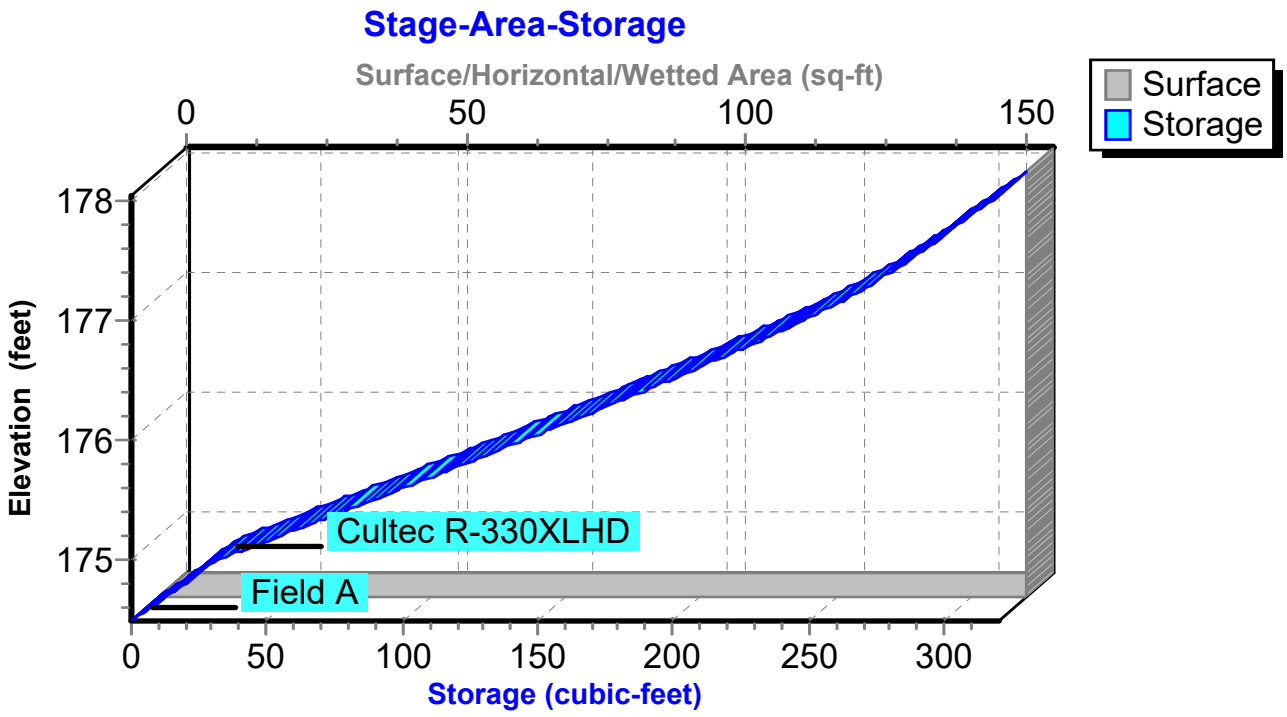
Pond 6P: RB#6



Pond 6P: RB#6



Pond 6P: RB#6


Stage-Area-Storage
Surface/Horizontal/Wetted Area (sq-ft)
0
50
100
150
Surface
Storage
178
177
176
175
Elevation (feet)
Cultec R-330XLHD
Field A
0
50
100
150
200
250
300
Storage (cubic-feet)

Time span=0.50-28.00 hrs, dt=0.02 hrs, 1376 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment SA#1: Subcat SA#1 Runoff Area=4,048 sf 0.00% Impervious Runoff Depth=0.78"
Flow Length=66' Slope=0.0100 '/' Tc=16.0 min CN=45 Runoff=0.04 cfs 262 cf

Subcatchment SA#2: Subcat SA#2 Runoff Area=2,374 sf 0.00% Impervious Runoff Depth=0.59"
Tc=6.0 min CN=42 Runoff=0.02 cfs 118 cf

Subcatchment SA#21: Subcat SA#21 Runoff Area=4,231 sf 64.29% Impervious Runoff Depth=3.83"
Tc=6.0 min CN=81 Runoff=0.43 cfs 1,350 cf

Subcatchment SA#22: Subcat SA#22 Runoff Area=5,736 sf 0.00% Impervious Runoff Depth=0.84"
Flow Length=132' Tc=9.2 min CN=46 Runoff=0.07 cfs 402 cf

Subcatchment SA#24: Subcat SA#24 Runoff Area=15,524 sf 38.40% Impervious Runoff Depth=2.31"
Flow Length=129' Slope=0.0100 '/' Tc=7.2 min CN=65 Runoff=0.90 cfs 2,985 cf

Subcatchment SA#25: Subcat SA#25 Runoff Area=14,973 sf 0.01% Impervious Runoff Depth=0.97"
Flow Length=70' Tc=6.4 min CN=48 Runoff=0.28 cfs 1,216 cf

Subcatchment SA#26: Subcat SA#26 Runoff Area=15,195 sf 40.19% Impervious Runoff Depth=2.48"
Tc=6.0 min CN=67 Runoff=1.00 cfs 3,147 cf

Subcatchment SA#27: Subcat SA#27 Runoff Area=5,882 sf 78.42% Impervious Runoff Depth=4.46"
Tc=6.0 min CN=87 Runoff=0.69 cfs 2,186 cf

Subcatchment SA#28: Subcat SA#28 Runoff Area=7,495 sf 0.00% Impervious Runoff Depth=0.65"
Flow Length=116' Tc=12.3 min CN=43 Runoff=0.06 cfs 408 cf

Subcatchment SA#29: Subcat SA#29 Runoff Area=4,913 sf 0.00% Impervious Runoff Depth=0.91"
Tc=6.0 min CN=47 Runoff=0.08 cfs 372 cf

Subcatchment SA#4: Subcat SA#4 Runoff Area=2,621 sf 0.00% Impervious Runoff Depth=0.48"
Tc=6.0 min CN=40 Runoff=0.01 cfs 105 cf

Subcatchment SA#5: Subcat SA#5 Runoff Area=10,821 sf 0.00% Impervious Runoff Depth=0.97"
Tc=6.0 min CN=48 Runoff=0.20 cfs 879 cf

Subcatchment SA#6: Subcat SA#6 Runoff Area=2,223 sf 0.00% Impervious Runoff Depth=0.48"
Tc=6.0 min CN=40 Runoff=0.01 cfs 89 cf

Subcatchment SA#8: Subcat SA#8 Runoff Area=1,858 sf 0.00% Impervious Runoff Depth=0.48"
Tc=6.0 min CN=40 Runoff=0.01 cfs 75 cf

Pond 1P: RB#4 Peak Elev=177.33' Storage=577 cf Inflow=0.69 cfs 2,186 cf
Outflow=0.13 cfs 2,186 cf

Pond 2P: RB#3 Peak Elev=178.73' Storage=762 cf Inflow=0.90 cfs 2,985 cf
Outflow=0.18 cfs 2,985 cf

Pond 3P: RB#2 Peak Elev=178.55' Storage=1,131 cf Inflow=1.46 cfs 5,242 cf
Outflow=0.33 cfs 5,242 cf

Pond 4P: RB#1 Peak Elev=178.47' Storage=361 cf Inflow=0.48 cfs 1,752 cf
Outflow=0.12 cfs 1,752 cf

Pond 5P: RB#5 Peak Elev=177.28' Storage=22 cf Inflow=0.06 cfs 408 cf
Outflow=0.04 cfs 408 cf

Pond 6P: RB#6 Peak Elev=175.16' Storage=50 cf Inflow=0.08 cfs 372 cf
Outflow=0.03 cfs 372 cf

Total Runoff Area = 97,895 sf Runoff Volume = 13,595 cf Average Runoff Depth = 1.67"
80.18% Pervious = 78,492 sf 19.82% Impervious = 19,403 sf

Summary for Subcatchment SA#1: Subcat SA#1

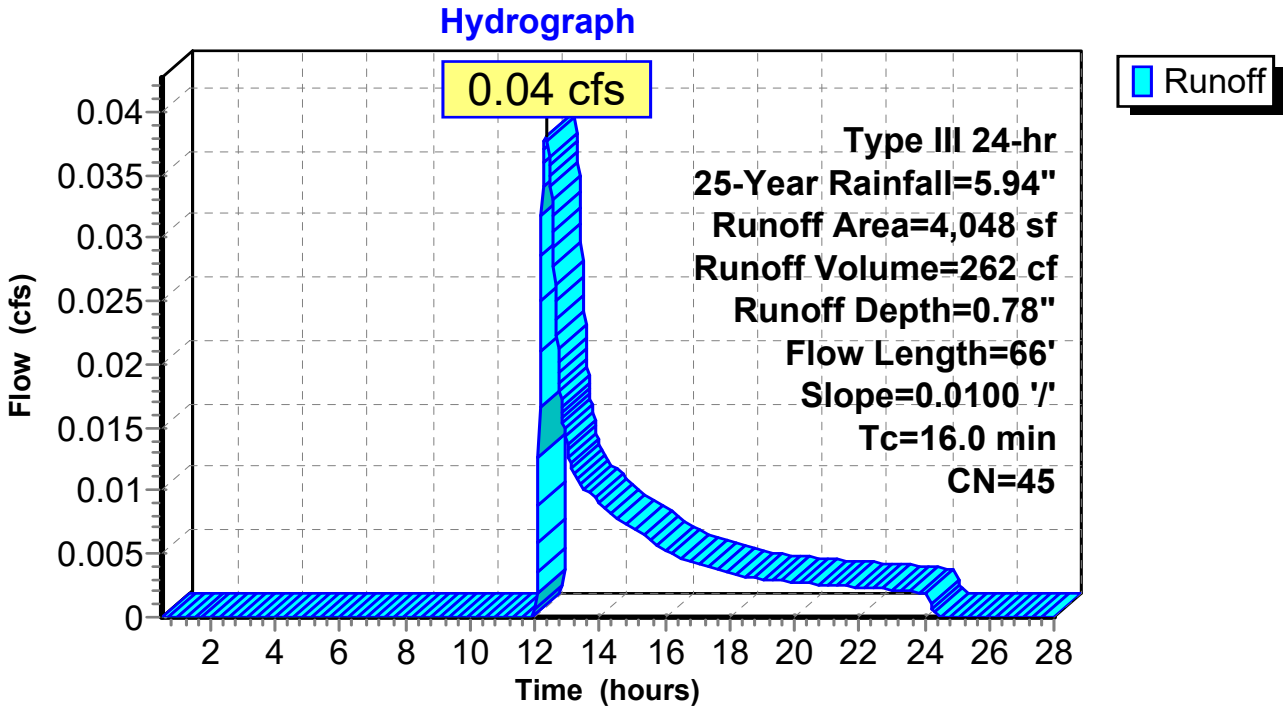
Runoff = 0.04 cfs @ 12.34 hrs, Volume= 262 cf, Depth= 0.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year Rainfall=5.94"

Area (sf)	CN	Description
2,840	49	50-75% Grass cover, Fair, HSG A
1,207	36	Woods, Fair, HSG A
4,048	45	Weighted Average
4,048		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.8	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
0.2	16	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.0	66	Total			

Subcatchment SA#1: Subcat SA#1



Summary for Subcatchment SA#2: Subcat SA#2

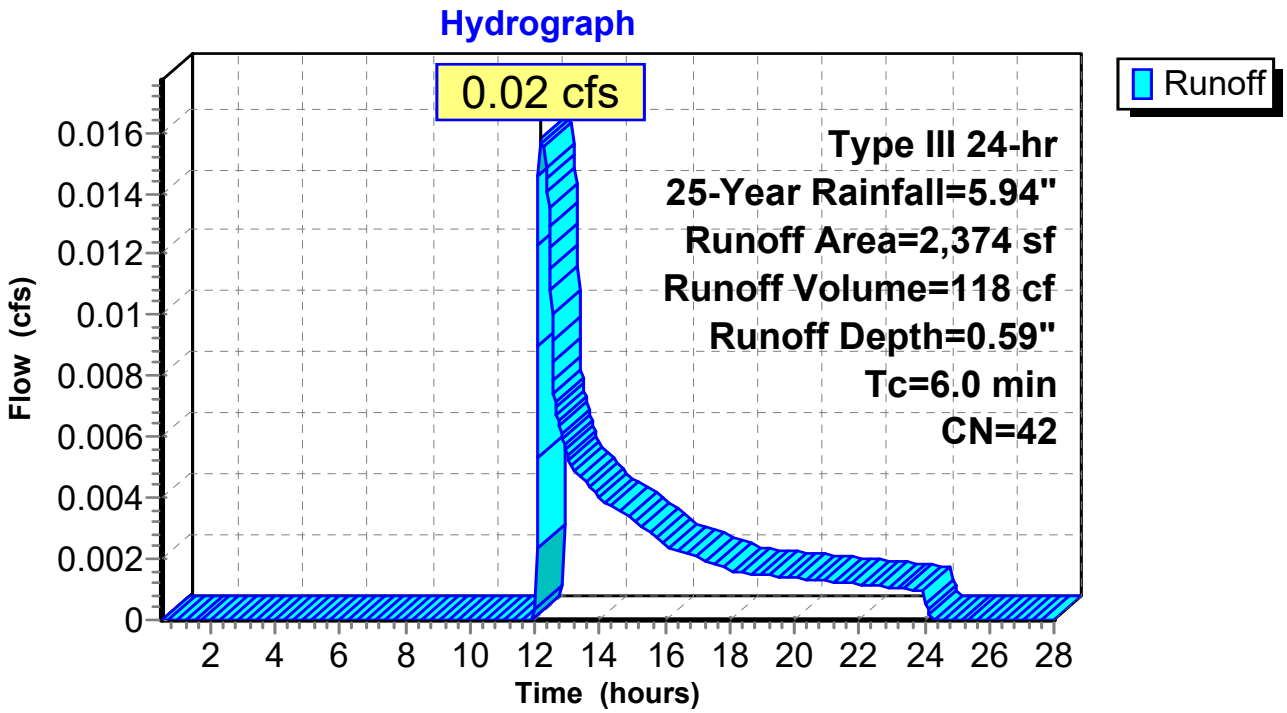
Runoff = 0.02 cfs @ 12.16 hrs, Volume= 118 cf, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year Rainfall=5.94"

Area (sf)	CN	Description
1,181	49	50-75% Grass cover, Fair, HSG A
1,193	36	Woods, Fair, HSG A
2,374	42	Weighted Average
2,374		100.00% Pervious Area

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

Subcatchment SA#2: Subcat SA#2



Summary for Subcatchment SA#21: Subcat SA#21

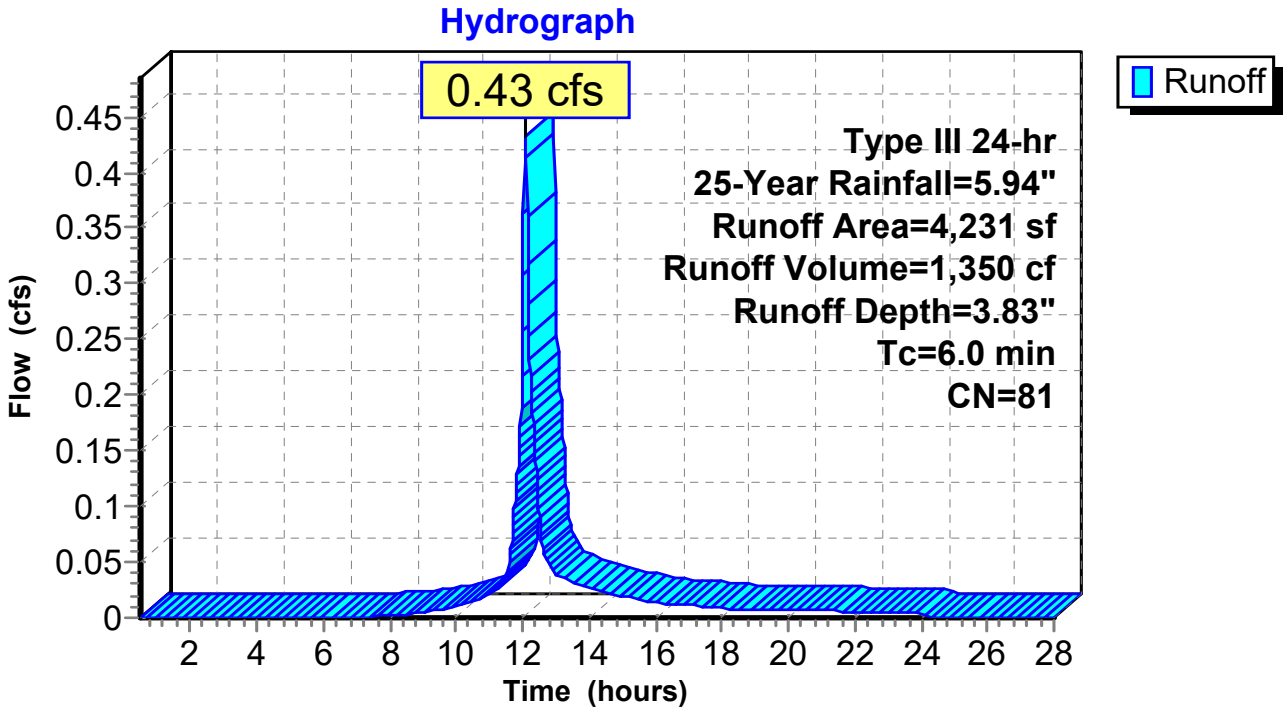
Runoff = 0.43 cfs @ 12.09 hrs, Volume= 1,350 cf, Depth= 3.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year Rainfall=5.94"

Area (sf)	CN	Description
1,511	49	50-75% Grass cover, Fair, HSG A
2,720	98	Paved roads w/curbs & sewers, HSG A
4,231	81	Weighted Average
1,511		35.71% Pervious Area
2,720		64.29% Impervious Area

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

Subcatchment SA#21: Subcat SA#21



Summary for Subcatchment SA#22: Subcat SA#22

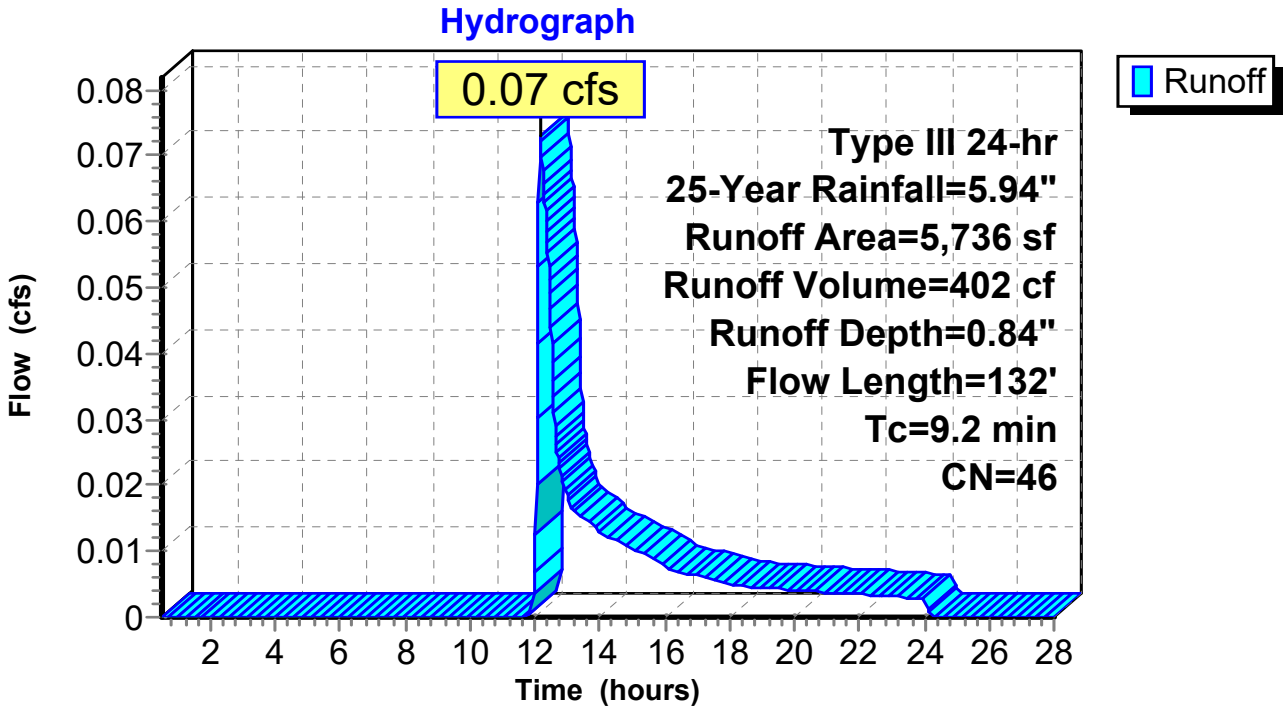
Runoff = 0.07 cfs @ 12.17 hrs, Volume= 402 cf, Depth= 0.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year Rainfall=5.94"

Area (sf)	CN	Description
4,558	49	50-75% Grass cover, Fair, HSG A
1,178	36	Woods, Fair, HSG A
5,736	46	Weighted Average
5,736		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	23	0.0110	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
1.0	109	0.0120	1.76		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
9.2	132	Total			

Subcatchment SA#22: Subcat SA#22



Summary for Subcatchment SA#24: Subcat SA#24

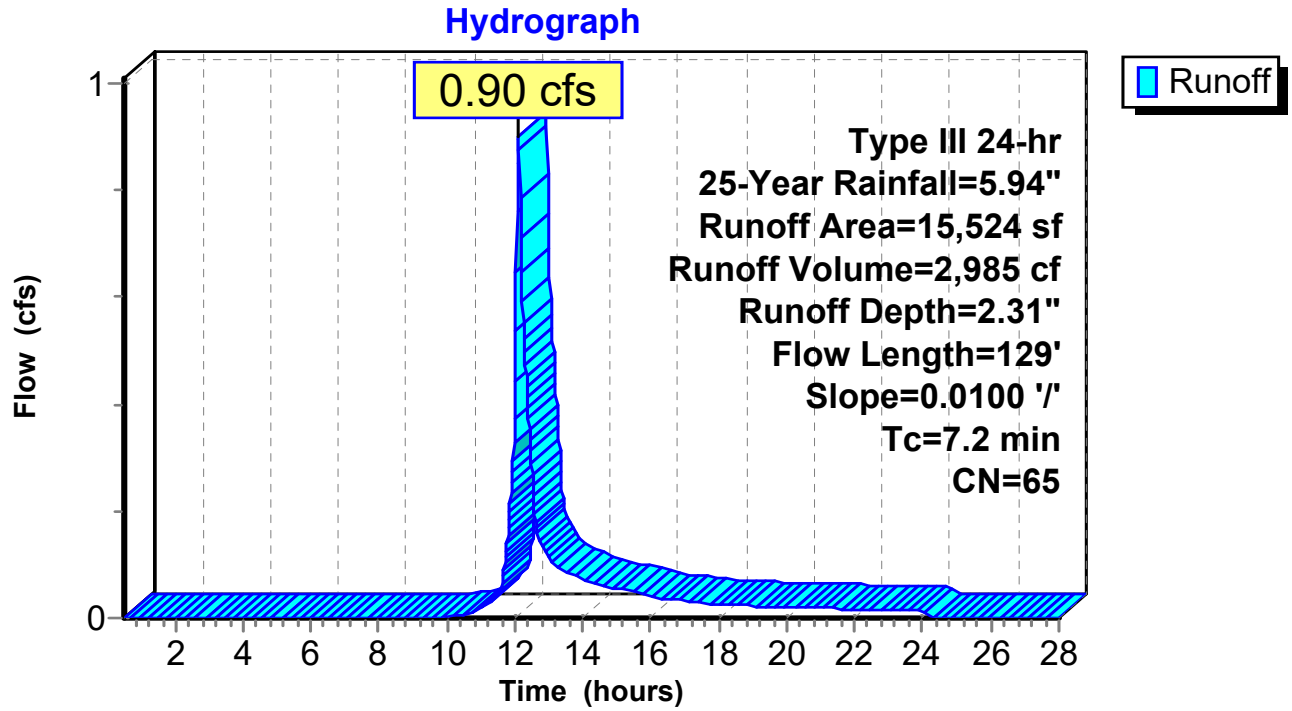
Runoff = 0.90 cfs @ 12.11 hrs, Volume= 2,985 cf, Depth= 2.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year Rainfall=5.94"

Area (sf)	CN	Description
6,224	49	50-75% Grass cover, Fair, HSG A
1,948	98	Paved roads w/curbs & sewers, HSG A
4,014	98	Roofs, HSG A
3,338	36	Woods, Fair, HSG A
15,524	65	Weighted Average
9,562		61.60% Pervious Area
5,962		38.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	15	0.0100	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
1.2	114	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
7.2	129	Total			

Subcatchment SA#24: Subcat SA#24



Summary for Subcatchment SA#25: Subcat SA#25

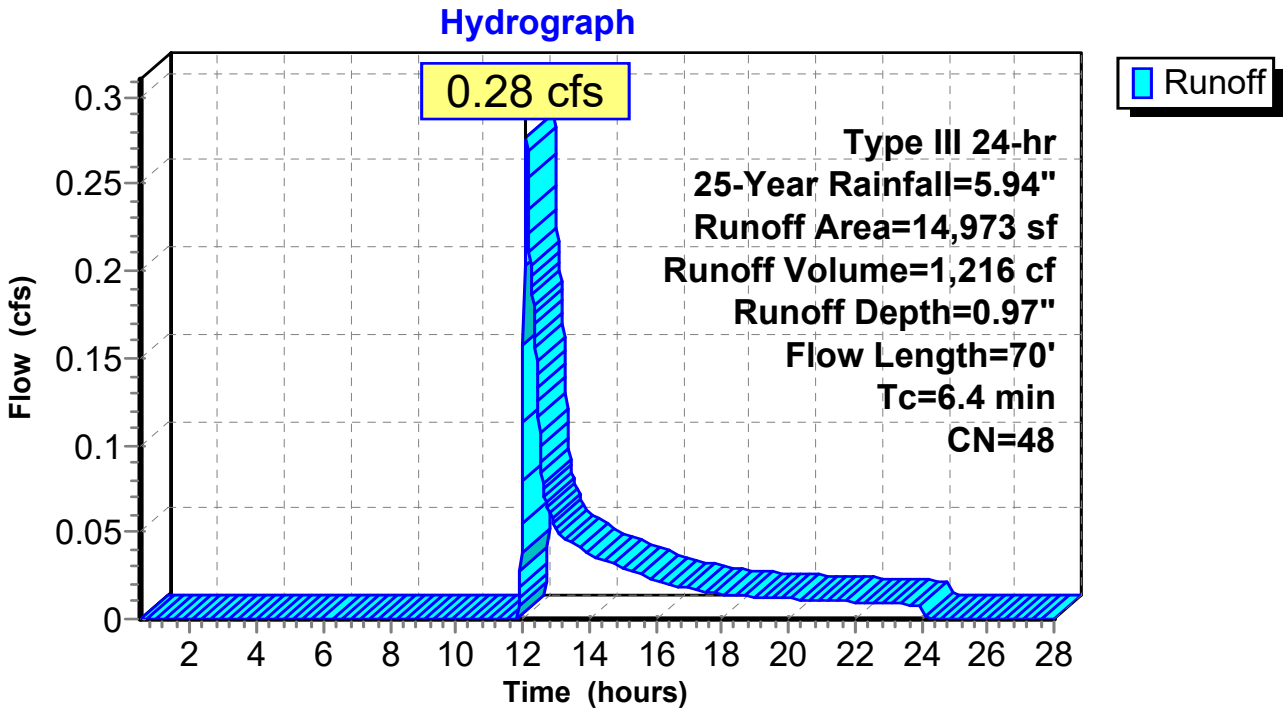
Runoff = 0.28 cfs @ 12.12 hrs, Volume= 1,216 cf, Depth= 0.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year Rainfall=5.94"

Area (sf)	CN	Description
14,146	49	50-75% Grass cover, Fair, HSG A
2	98	Roofs, HSG A
826	36	Woods, Fair, HSG A
14,973	48	Weighted Average
14,972		99.99% Pervious Area
2		0.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	50	0.0360	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.40"
0.1	20	0.1000	5.09		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
6.4	70	Total			

Subcatchment SA#25: Subcat SA#25



Summary for Subcatchment SA#26: Subcat SA#26

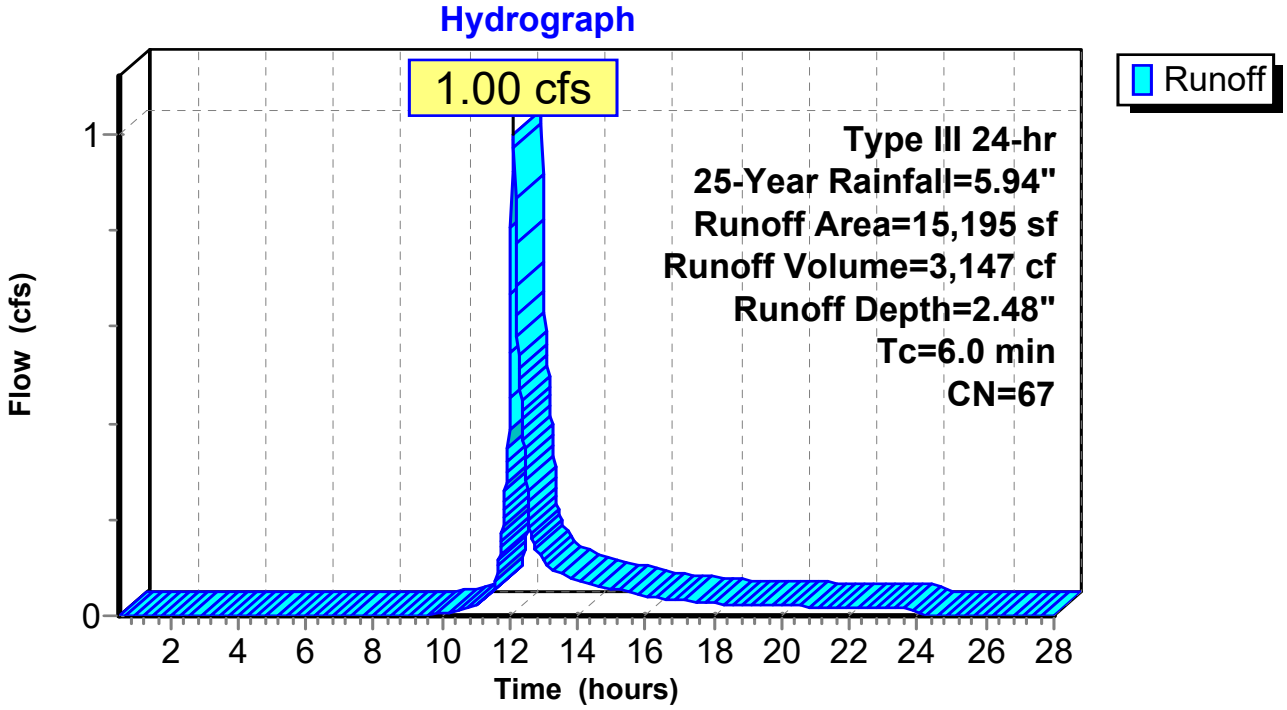
Runoff = 1.00 cfs @ 12.09 hrs, Volume= 3,147 cf, Depth= 2.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year Rainfall=5.94"

Area (sf)	CN	Description
7,298	49	50-75% Grass cover, Fair, HSG A
6,107	98	Paved roads w/curbs & sewers, HSG A
1,791	36	Woods, Fair, HSG A
15,195	67	Weighted Average
9,089		59.81% Pervious Area
6,107		40.19% Impervious Area

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

Subcatchment SA#26: Subcat SA#26



Summary for Subcatchment SA#27: Subcat SA#27

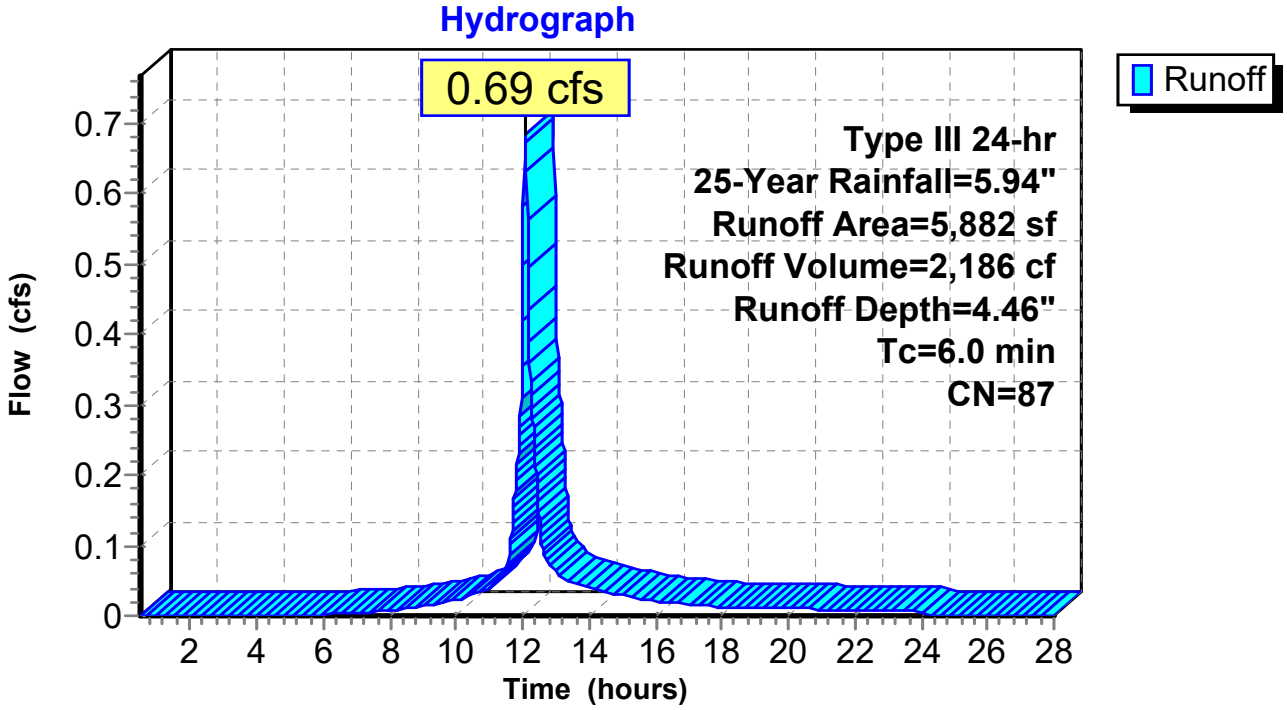
Runoff = 0.69 cfs @ 12.09 hrs, Volume= 2,186 cf, Depth= 4.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year Rainfall=5.94"

Area (sf)	CN	Description
1,269	49	50-75% Grass cover, Fair, HSG A
1,384	98	Paved roads w/curbs & sewers, HSG A
3,229	98	Roofs, HSG A
5,882	87	Weighted Average
1,269		21.58% Pervious Area
4,613		78.42% Impervious Area

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

Subcatchment SA#27: Subcat SA#27



Summary for Subcatchment SA#28: Subcat SA#28

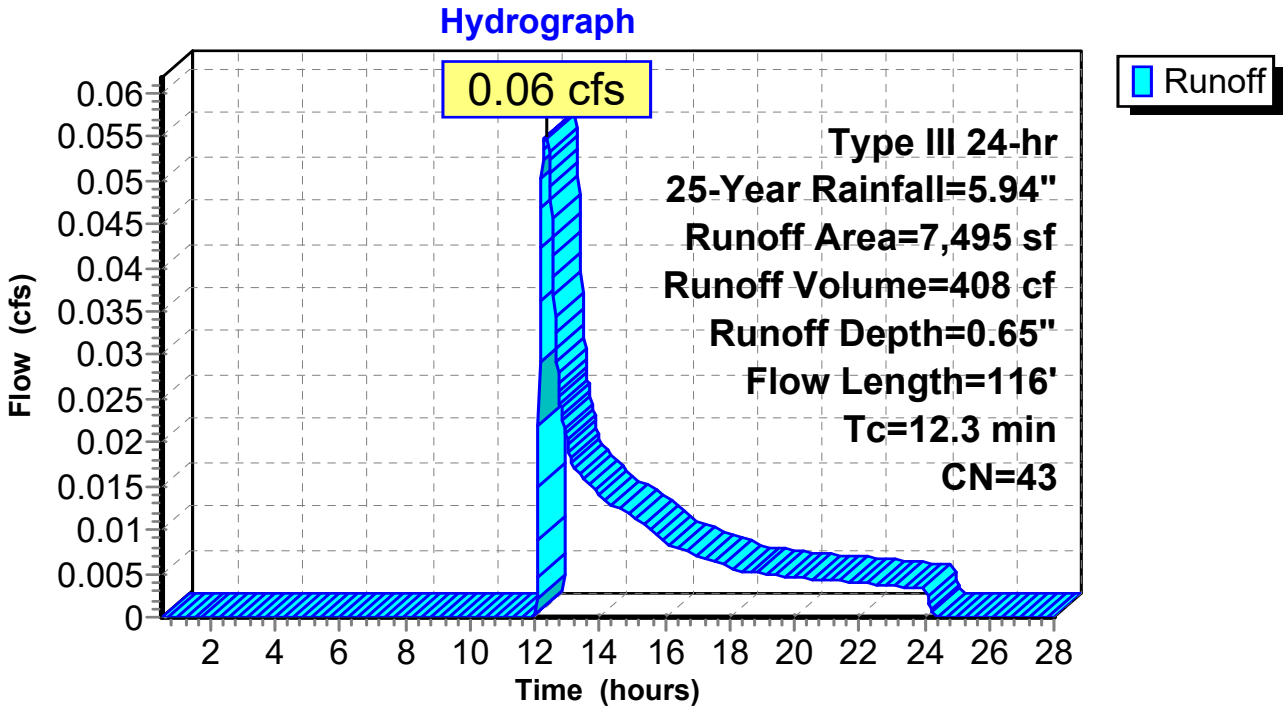
Runoff = 0.06 cfs @ 12.34 hrs, Volume= 408 cf, Depth= 0.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year Rainfall=5.94"

Area (sf)	CN	Description
3,987	49	50-75% Grass cover, Fair, HSG A
3,508	36	Woods, Fair, HSG A
7,495	43	Weighted Average
7,495		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0280	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
1.8	66	0.0014	0.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
12.3	116	Total			

Subcatchment SA#28: Subcat SA#28



Summary for Subcatchment SA#29: Subcat SA#29

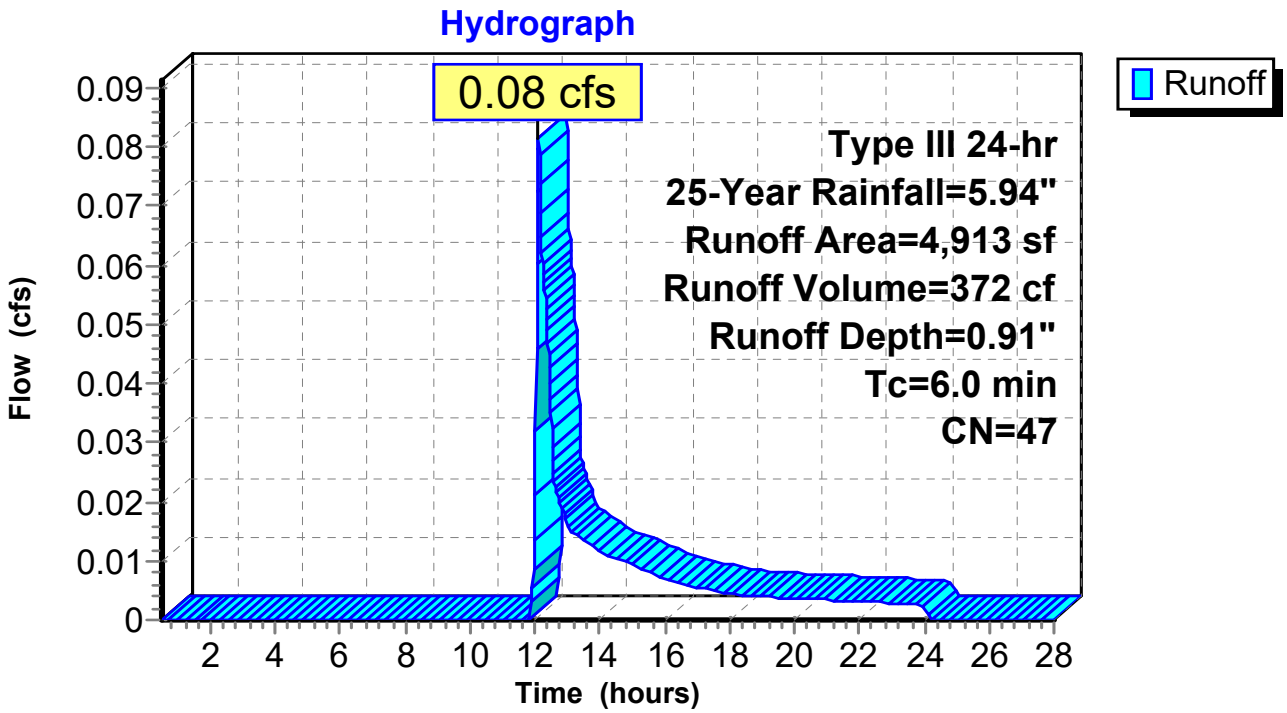
Runoff = 0.08 cfs @ 12.12 hrs, Volume= 372 cf, Depth= 0.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year Rainfall=5.94"

Area (sf)	CN	Description
4,295	49	50-75% Grass cover, Fair, HSG A
618	36	Woods, Fair, HSG A
4,913	47	Weighted Average
4,913		100.00% Pervious Area

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

Subcatchment SA#29: Subcat SA#29



Summary for Subcatchment SA#4: Subcat SA#4

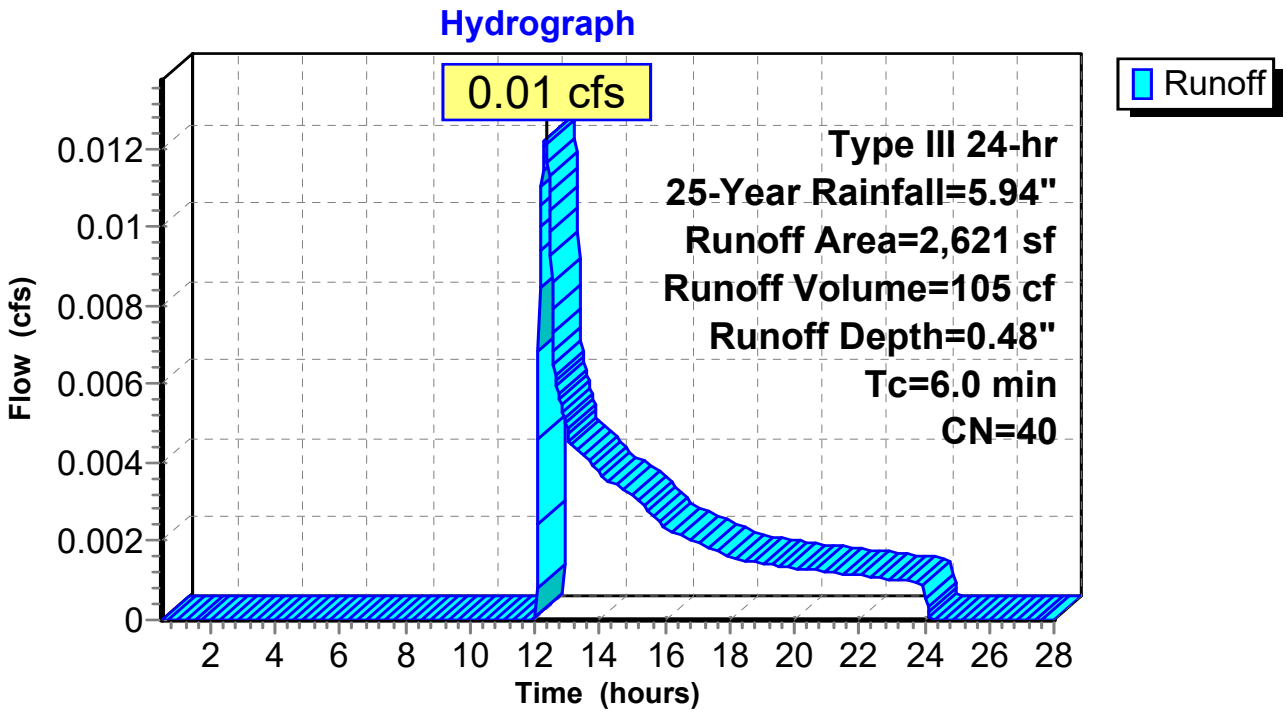
Runoff = 0.01 cfs @ 12.32 hrs, Volume= 105 cf, Depth= 0.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year Rainfall=5.94"

Area (sf)	CN	Description
827	49	50-75% Grass cover, Fair, HSG A
1,794	36	Woods, Fair, HSG A
2,621	40	Weighted Average
2,621		100.00% Pervious Area

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

Subcatchment SA#4: Subcat SA#4



Summary for Subcatchment SA#5: Subcat SA#5

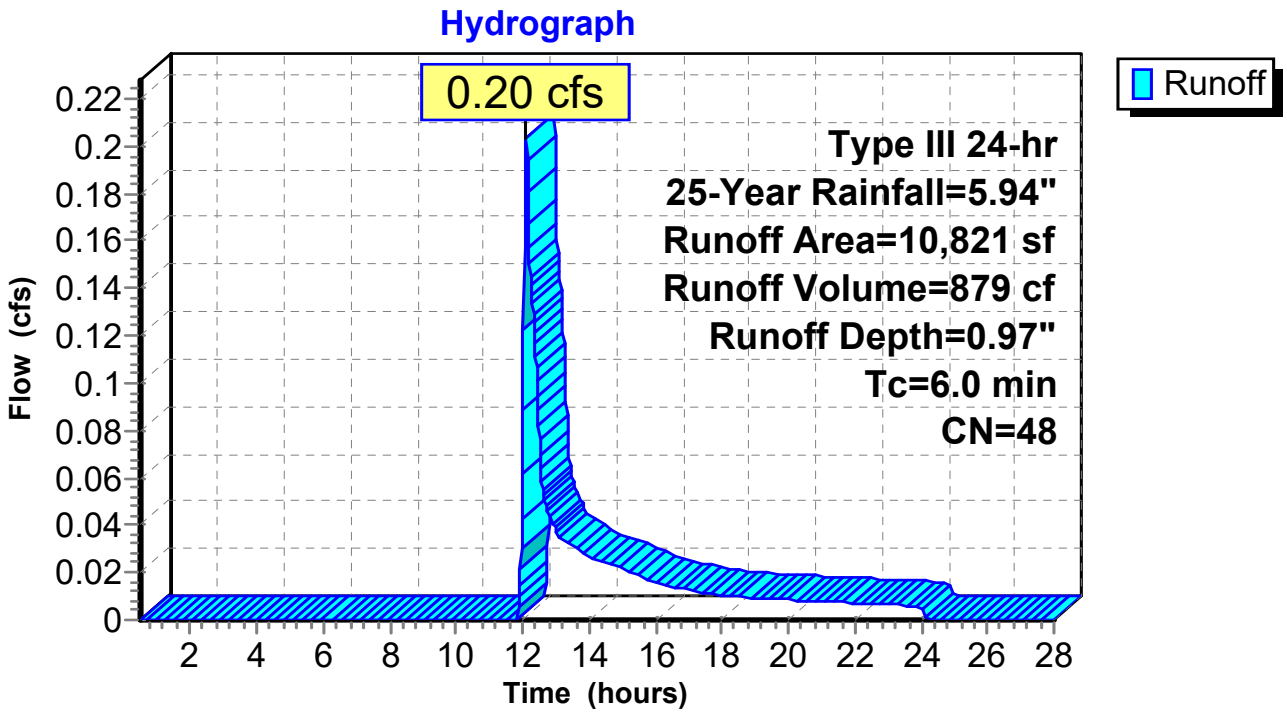
Runoff = 0.20 cfs @ 12.11 hrs, Volume= 879 cf, Depth= 0.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year Rainfall=5.94"

Area (sf)	CN	Description
9,977	49	50-75% Grass cover, Fair, HSG A
844	36	Woods, Fair, HSG A
10,821	48	Weighted Average
10,821		100.00% Pervious Area

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

Subcatchment SA#5: Subcat SA#5



Summary for Subcatchment SA#6: Subcat SA#6

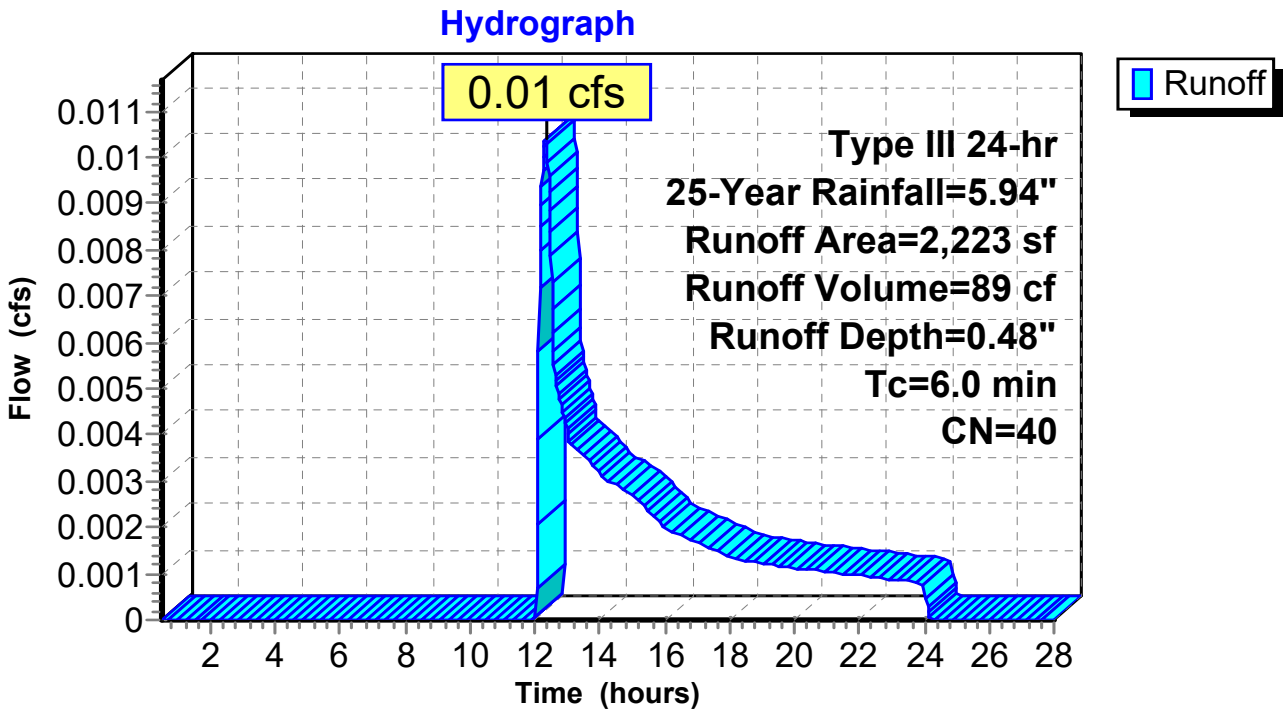
Runoff = 0.01 cfs @ 12.32 hrs, Volume= 89 cf, Depth= 0.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year Rainfall=5.94"

Area (sf)	CN	Description
697	49	50-75% Grass cover, Fair, HSG A
1,527	36	Woods, Fair, HSG A
2,223	40	Weighted Average
2,223		100.00% Pervious Area

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

Subcatchment SA#6: Subcat SA#6



Summary for Subcatchment SA#8: Subcat SA#8

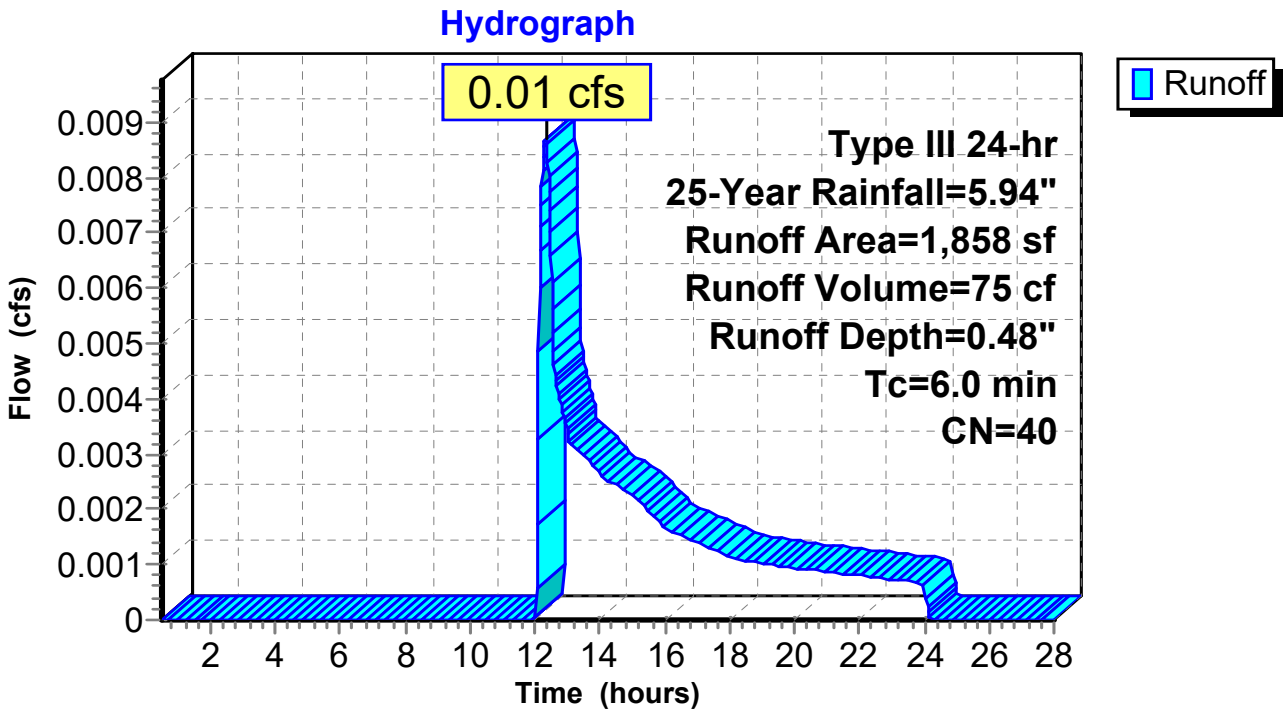
Runoff = 0.01 cfs @ 12.32 hrs, Volume= 75 cf, Depth= 0.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year Rainfall=5.94"

Area (sf)	CN	Description
568	49	50-75% Grass cover, Fair, HSG A
1,291	36	Woods, Fair, HSG A
1,858	40	Weighted Average
1,858		100.00% Pervious Area

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

Subcatchment SA#8: Subcat SA#8



Summary for Pond 1P: RB#4

Inflow Area = 5,882 sf, 78.42% Impervious, Inflow Depth = 4.46" for 25-Year event
Inflow = 0.69 cfs @ 12.09 hrs, Volume= 2,186 cf
Outflow = 0.13 cfs @ 11.72 hrs, Volume= 2,186 cf, Atten= 82%, Lag= 0.0 min
Discarded = 0.13 cfs @ 11.72 hrs, Volume= 2,186 cf

Routing by Stor-Ind method, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Peak Elev= 177.33' @ 12.54 hrs Surf.Area= 656 sf Storage= 577 cf

Plug-Flow detention time= 26.5 min calculated for 2,185 cf (100% of inflow)
Center-of-Mass det. time= 26.5 min (821.5 - 795.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	176.00'	578 cf	**20.83'W x 31.50'L x 3.54'H Field A** 2,324 cf Overall - 879 cf Embedded = 1,445 cf x 40.0% Voids
#2A	176.50'	879 cf	**Cultec R-330XLHD** x 16 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 4 rows
		1,457 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	176.00'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.13 cfs @ 11.72 hrs HW=176.04' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.13 cfs)

Pond 1P: RB#4 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 4 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

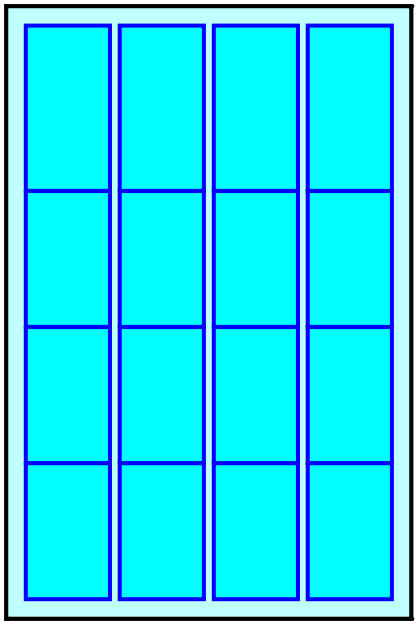
4 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 29.50' Row Length +12.0" End Stone x 2 = 31.50' Base Length
4 Rows x 52.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.83' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

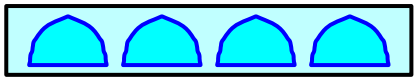
16 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 4 Rows = 879.2 cf Chamber Storage

2,324.2 cf Field - 879.2 cf Chambers = 1,445.0 cf Stone x 40.0% Voids = 578.0 cf Stone Storage

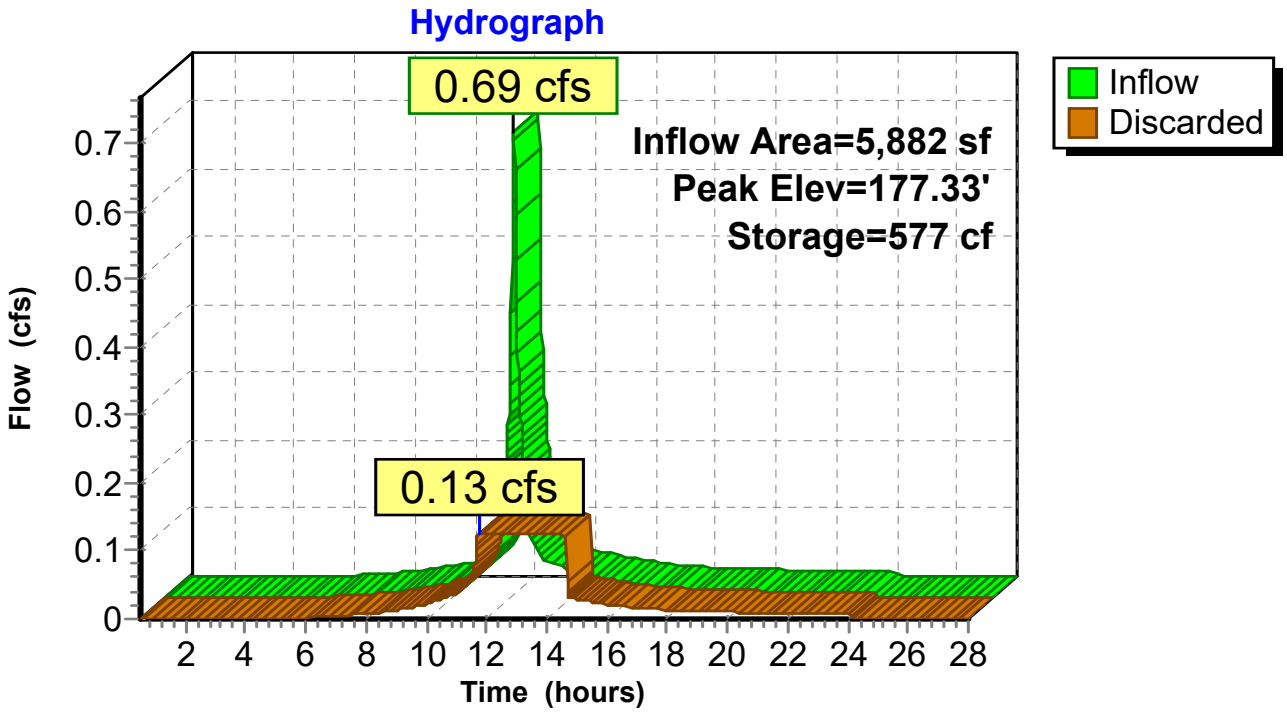
Chamber Storage + Stone Storage = 1,457.2 cf = 0.033 af
Overall Storage Efficiency = 62.7%
Overall System Size = 31.50' x 20.83' x 3.54'

16 Chambers @ $ 300.00 /ea = $ 4,800.00
86.1 cy Field Excavation @ $ 10.00 /cy = $ 860.82
53.5 cy Stone @ $ 30.00 /cy = $ 1,605.56
Total Cost = $ 7,266.38

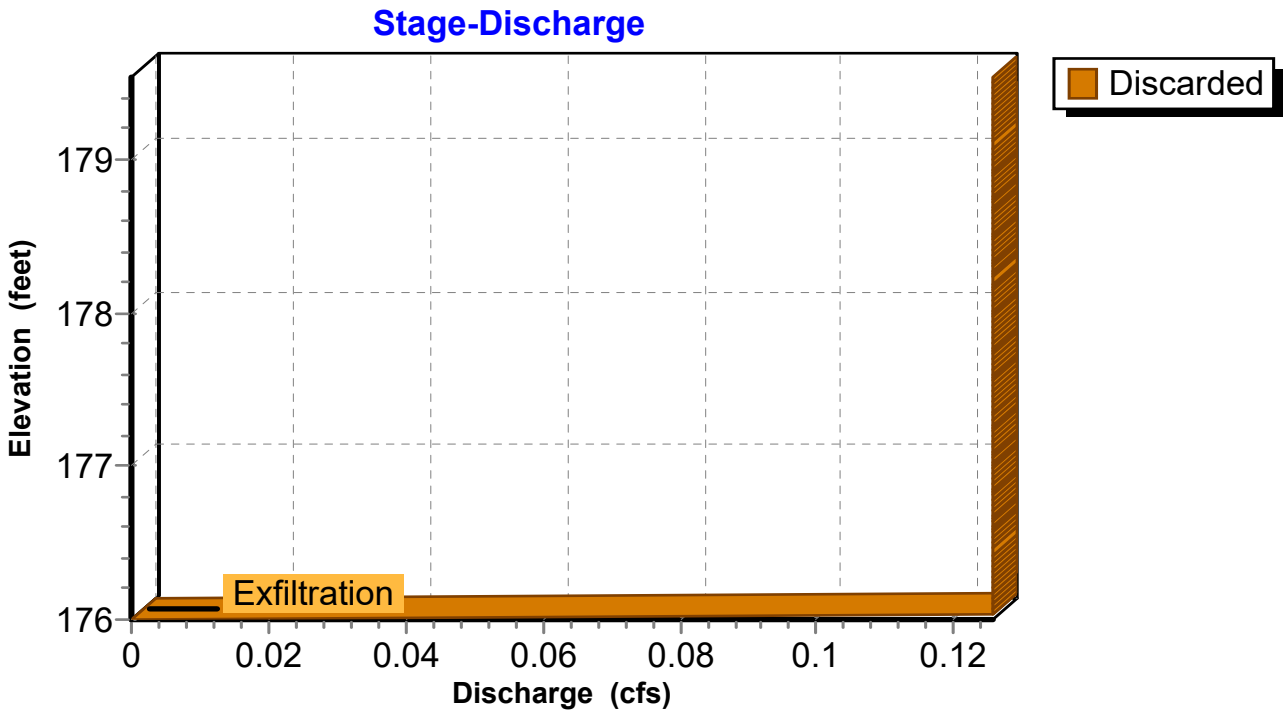




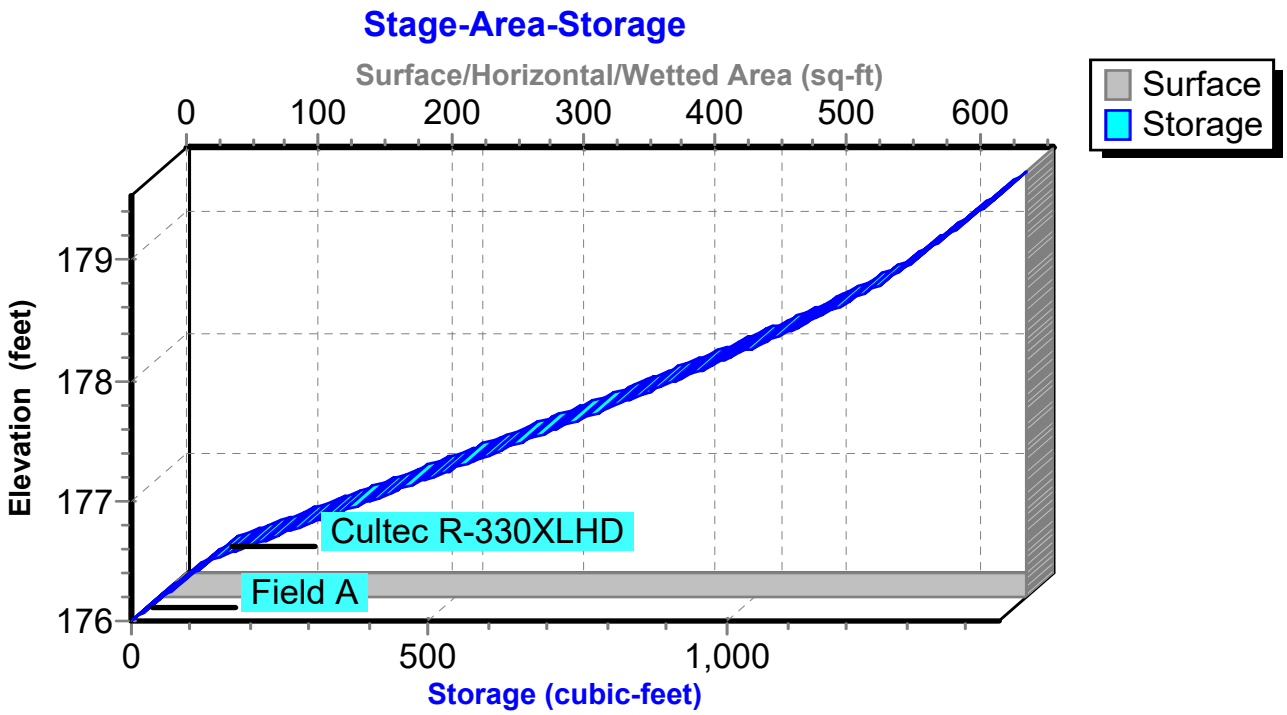
Pond 1P: RB#4



Pond 1P: RB#4



Pond 1P: RB#4


Stage-Area-Storage
Surface/Horizontal/Wetted Area (sq-ft)
0
100
200
300
400
500
600
Surface
Storage
179
178
177
176
Elevation (feet)
Cultec R-330XLHD
Field A
0
500
1,000
Storage (cubic-feet)

Summary for Pond 2P: RB#3

Inflow Area = 15,524 sf, 38.40% Impervious, Inflow Depth = 2.31" for 25-Year event
Inflow = 0.90 cfs @ 12.11 hrs, Volume= 2,985 cf
Outflow = 0.18 cfs @ 11.84 hrs, Volume= 2,985 cf, Atten= 80%, Lag= 0.0 min
Discarded = 0.18 cfs @ 11.84 hrs, Volume= 2,985 cf

Routing by Stor-Ind method, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Peak Elev= 178.73' @ 12.60 hrs Surf.Area= 948 sf Storage= 762 cf

Plug-Flow detention time= 26.7 min calculated for 2,985 cf (100% of inflow)
Center-of-Mass det. time= 26.7 min (878.5 - 851.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	177.50'	824 cf	**20.83'W x 45.50'L x 3.54'H Field A** 3,357 cf Overall - 1,296 cf Embedded = 2,061 cf x 40.0% Voids
#2A	178.00'	1,296 cf	**Cultec R-330XLHD** x 24 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 4 rows
		2,121 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	177.50'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.18 cfs @ 11.84 hrs HW=177.54' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.18 cfs)

Pond 2P: RB#3 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 4 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

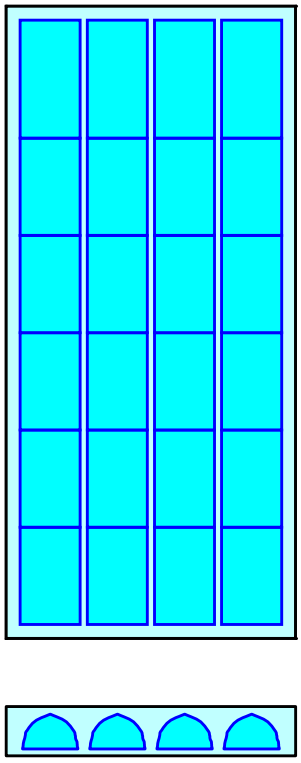
6 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 43.50' Row Length +12.0" End Stone x 2 = 45.50' Base Length
4 Rows x 52.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.83' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

24 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 4 Rows = 1,296.5 cf Chamber Storage

3,357.2 cf Field - 1,296.5 cf Chambers = 2,060.7 cf Stone x 40.0% Voids = 824.3 cf Stone Storage

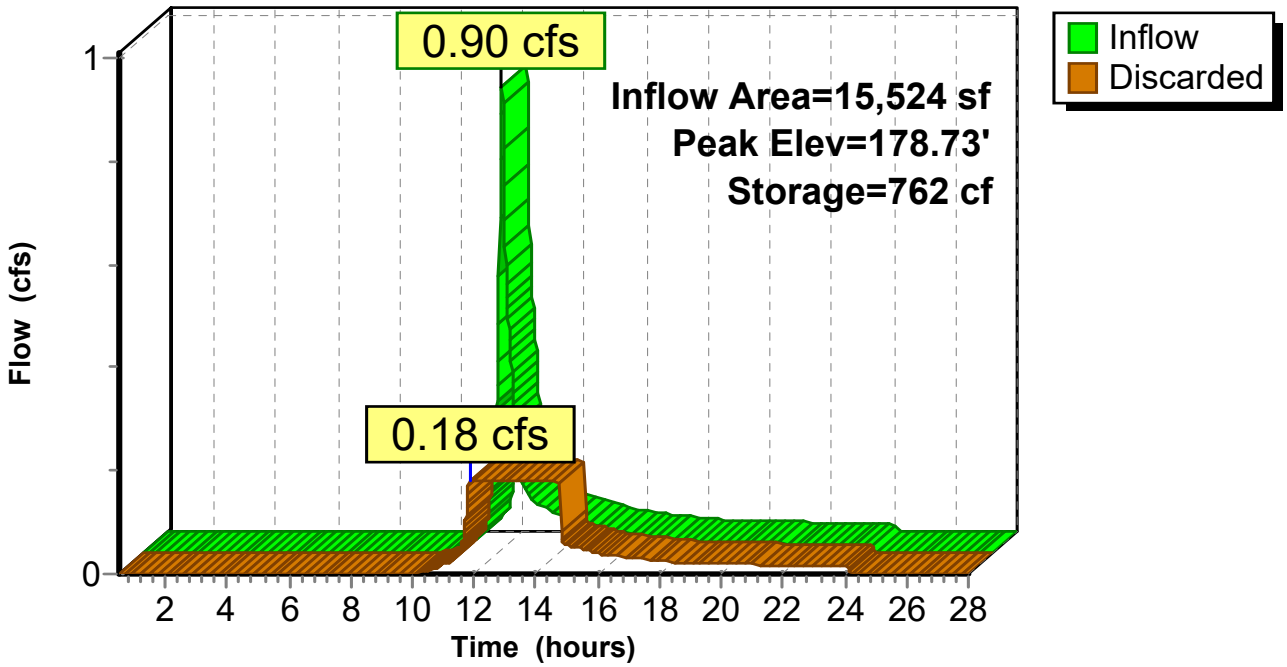
Chamber Storage + Stone Storage = 2,120.8 cf = 0.049 af
Overall Storage Efficiency = 63.2%
Overall System Size = 45.50' x 20.83' x 3.54'

24 Chambers @ $ 300.00 /ea = $ 7,200.00
124.3 cy Field Excavation @ $ 10.00 /cy = $ 1,243.41
76.3 cy Stone @ $ 30.00 /cy = $ 2,289.70
Total Cost = $ 10,733.11



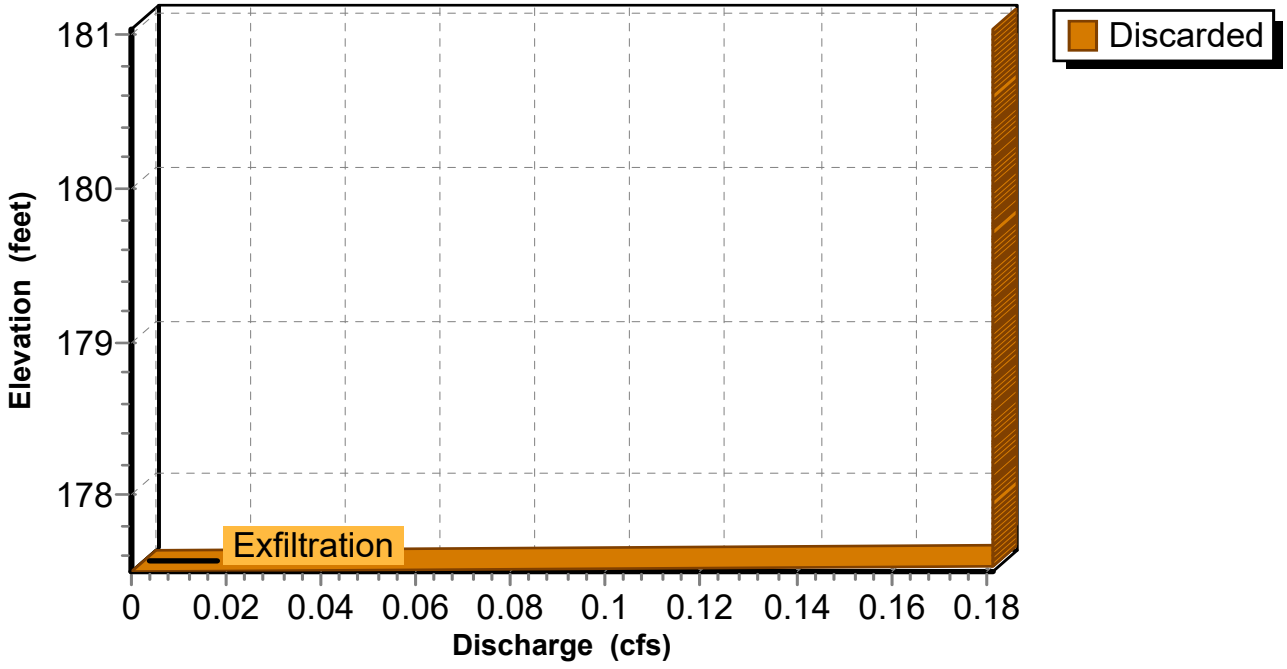
Pond 2P: RB#3

Hydrograph

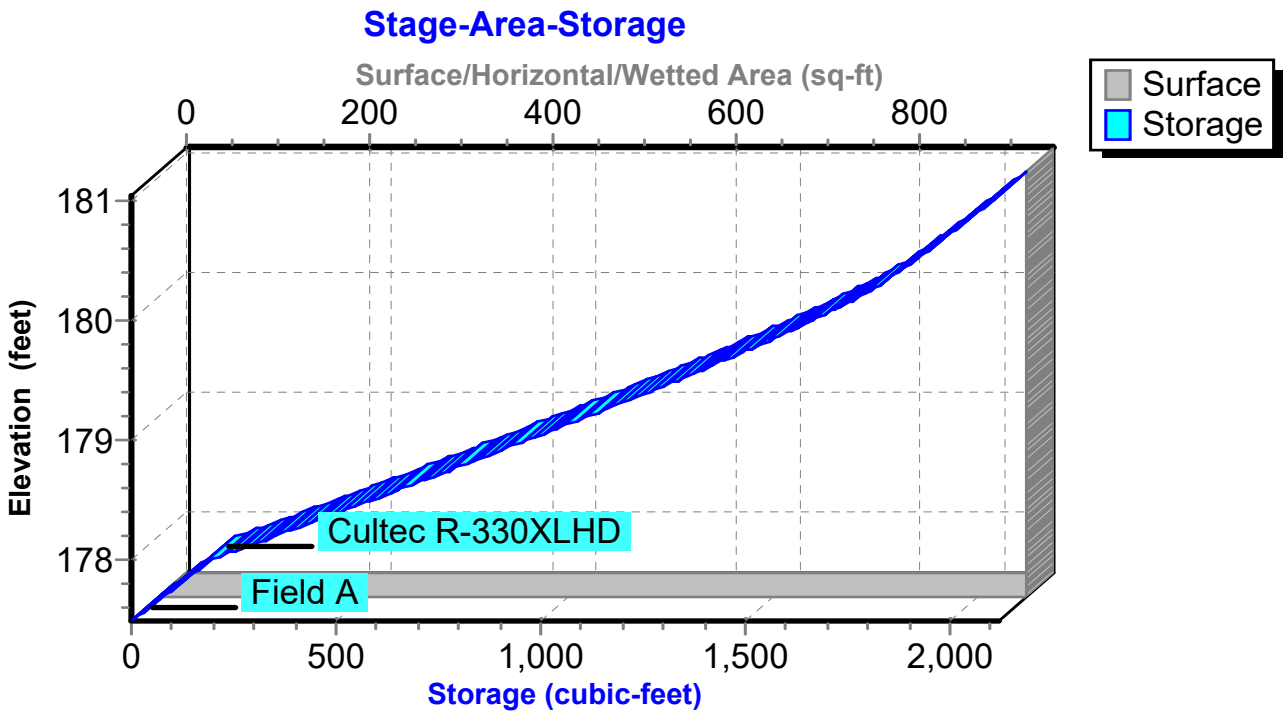


Pond 2P: RB#3

Stage-Discharge



Pond 2P: RB#3


Stage-Area-Storage
Surface/Horizontal/Wetted Area (sq-ft)
0
200
400
600
800
Surface
Storage
181
180
179
178
Elevation (feet)
Cultec R-330XLHD
Field A
0
500
1,000
1,500
2,000
Storage (cubic-feet)

Summary for Pond 3P: RB#2

Inflow Area = 40,990 sf, 14.90% Impervious, Inflow Depth = 1.53" for 25-Year event
Inflow = 1.46 cfs @ 12.10 hrs, Volume= 5,242 cf
Outflow = 0.33 cfs @ 11.94 hrs, Volume= 5,242 cf, Atten= 78%, Lag= 0.0 min
Discarded = 0.33 cfs @ 11.94 hrs, Volume= 5,242 cf

Routing by Stor-Ind method, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Peak Elev= 178.55' @ 12.58 hrs Surf.Area= 1,707 sf Storage= 1,131 cf

Plug-Flow detention time= 20.8 min calculated for 5,238 cf (100% of inflow)
Center-of-Mass det. time= 20.7 min (889.9 - 869.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	177.50'	1,457 cf	**25.67'W x 66.50'L x 3.54'H Field A** 6,045 cf Overall - 2,403 cf Embedded = 3,642 cf x 40.0% Voids
#2A	178.00'	2,403 cf	**Cultec R-330XLHD** x 45 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 5 rows
		3,860 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	177.50'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.33 cfs @ 11.94 hrs HW=177.54' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.33 cfs)

Pond 3P: RB#2 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 5 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

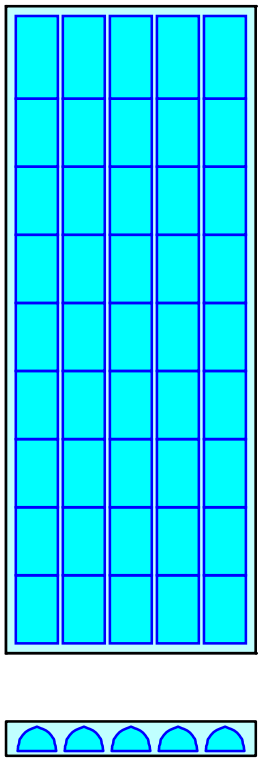
9 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 64.50' Row Length +12.0" End Stone x 2 = 66.50' Base Length
5 Rows x 52.0" Wide + 6.0" Spacing x 4 + 12.0" Side Stone x 2 = 25.67' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

45 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 5 Rows = 2,402.9 cf Chamber Storage

6,045.0 cf Field - 2,402.9 cf Chambers = 3,642.1 cf Stone x 40.0% Voids = 1,456.8 cf Stone Storage

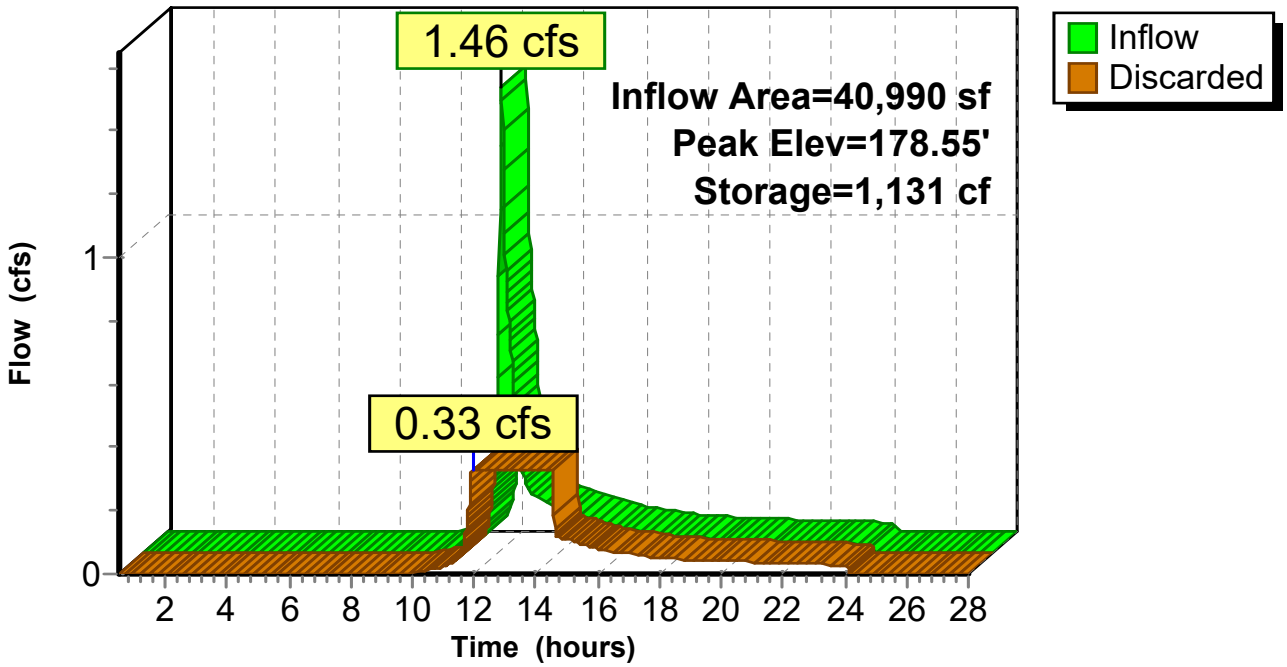
Chamber Storage + Stone Storage = 3,859.8 cf = 0.089 af
Overall Storage Efficiency = 63.9%
Overall System Size = 66.50' x 25.67' x 3.54'

45 Chambers @ $ 300.00 /ea = $ 13,500.00
223.9 cy Field Excavation @ $ 10.00 /cy = $ 2,238.90
134.9 cy Stone @ $ 30.00 /cy = $ 4,046.76
Total Cost = $ 19,785.67



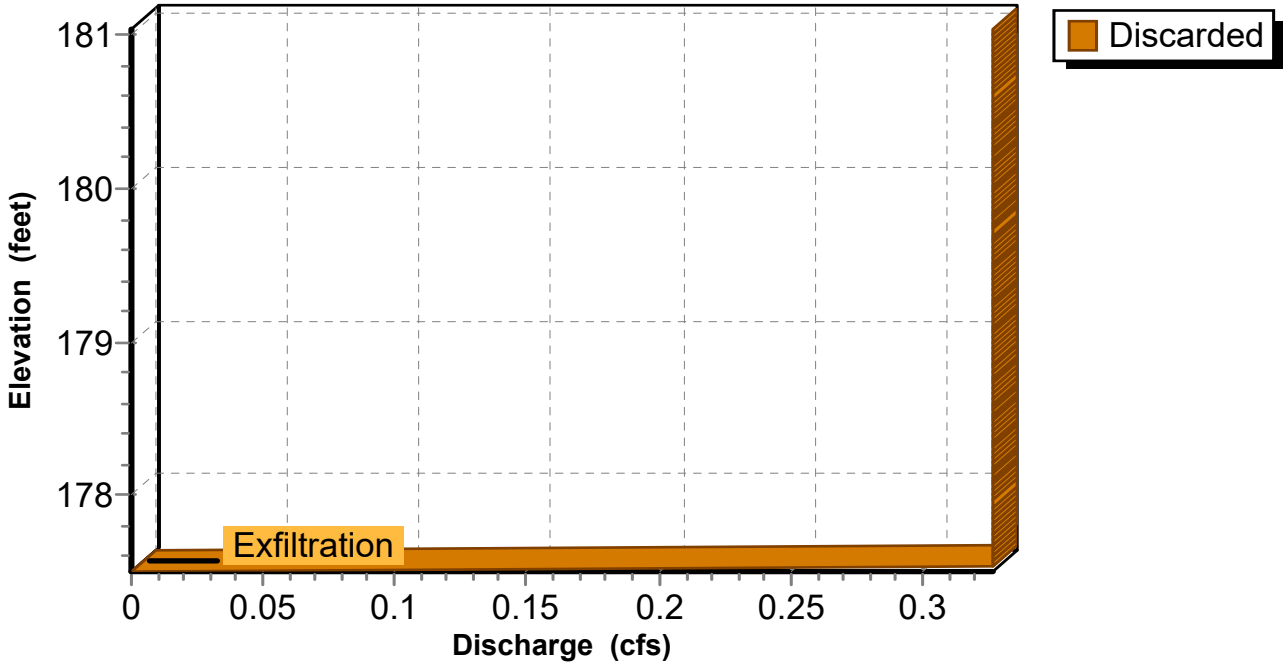
Pond 3P: RB#2

Hydrograph

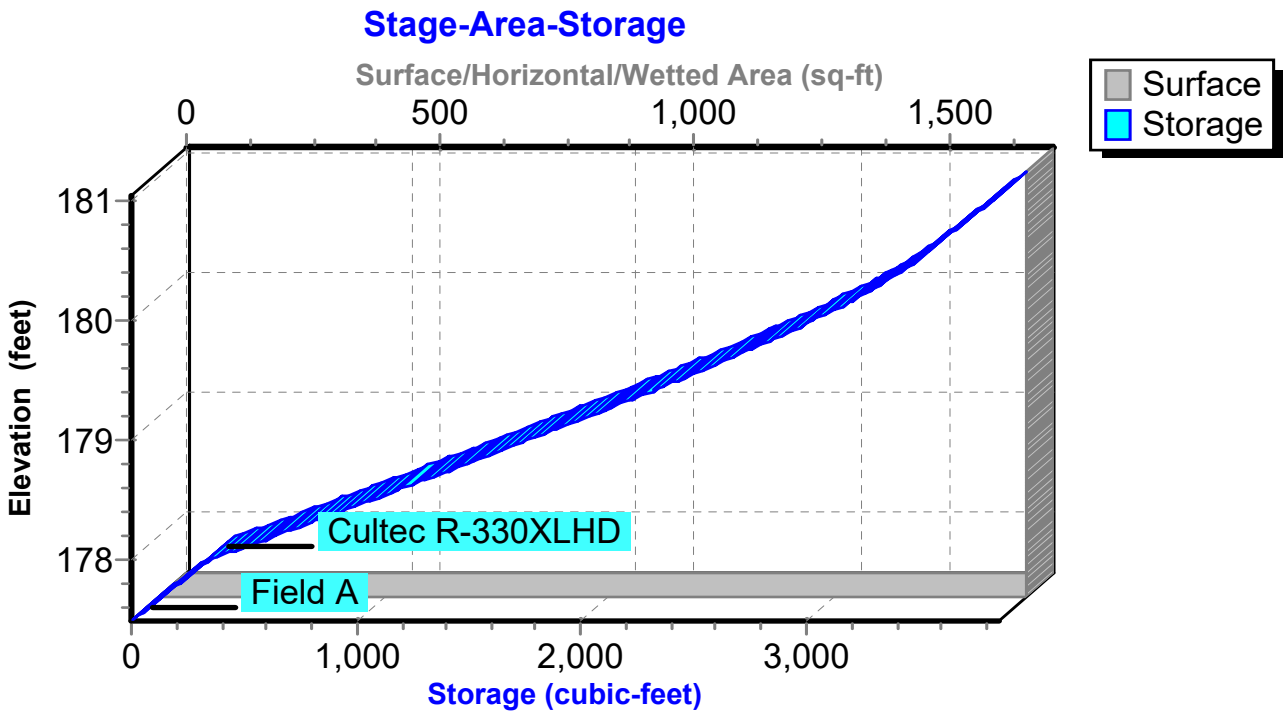


Pond 3P: RB#2

Stage-Discharge



Pond 3P: RB#2


Stage-Area-Storage
Surface/Horizontal/Wetted Area (sq-ft)
0
500
1,000
1,500
Surface
Storage
181
180
179
178
Elevation (feet)
Cultec R-330XLHD
Field A
0
1,000
2,000
3,000
Storage (cubic-feet)

Summary for Pond 4P: RB#1

Inflow Area = 9,967 sf, 27.29% Impervious, Inflow Depth = 2.11" for 25-Year event
Inflow = 0.48 cfs @ 12.10 hrs, Volume= 1,752 cf
Outflow = 0.12 cfs @ 11.84 hrs, Volume= 1,752 cf, Atten= 75%, Lag= 0.0 min
Discarded = 0.12 cfs @ 11.84 hrs, Volume= 1,752 cf

Routing by Stor-Ind method, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Peak Elev= 178.47' @ 12.55 hrs Surf.Area= 616 sf Storage= 361 cf

Plug-Flow detention time= 16.6 min calculated for 1,751 cf (100% of inflow)
Center-of-Mass det. time= 16.6 min (852.5 - 835.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	177.50'	546 cf	**16.00'W x 38.50'L x 3.54'H Field A** 2,182 cf Overall - 816 cf Embedded = 1,366 cf x 40.0% Voids
#2A	178.00'	816 cf	**Cultec R-330XLHD** x 15 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 3 rows
		1,362 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	177.50'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.12 cfs @ 11.84 hrs HW=177.54' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.12 cfs)

Pond 4P: RB#1 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 3 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

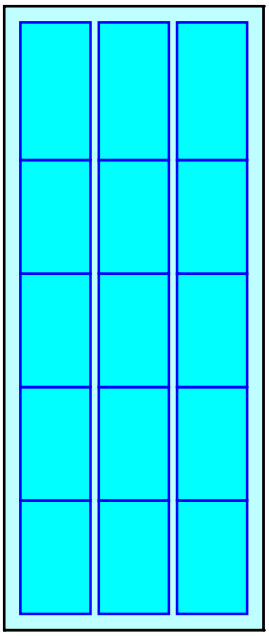
5 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 36.50' Row Length +12.0" End Stone x 2 = 38.50' Base Length
3 Rows x 52.0" Wide + 6.0" Spacing x 2 + 12.0" Side Stone x 2 = 16.00' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

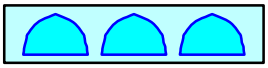
15 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 3 Rows = 815.9 cf Chamber Storage

2,181.7 cf Field - 815.9 cf Chambers = 1,365.8 cf Stone x 40.0% Voids = 546.3 cf Stone Storage

Chamber Storage + Stone Storage = 1,362.2 cf = 0.031 af
Overall Storage Efficiency = 62.4%
Overall System Size = 38.50' x 16.00' x 3.54'

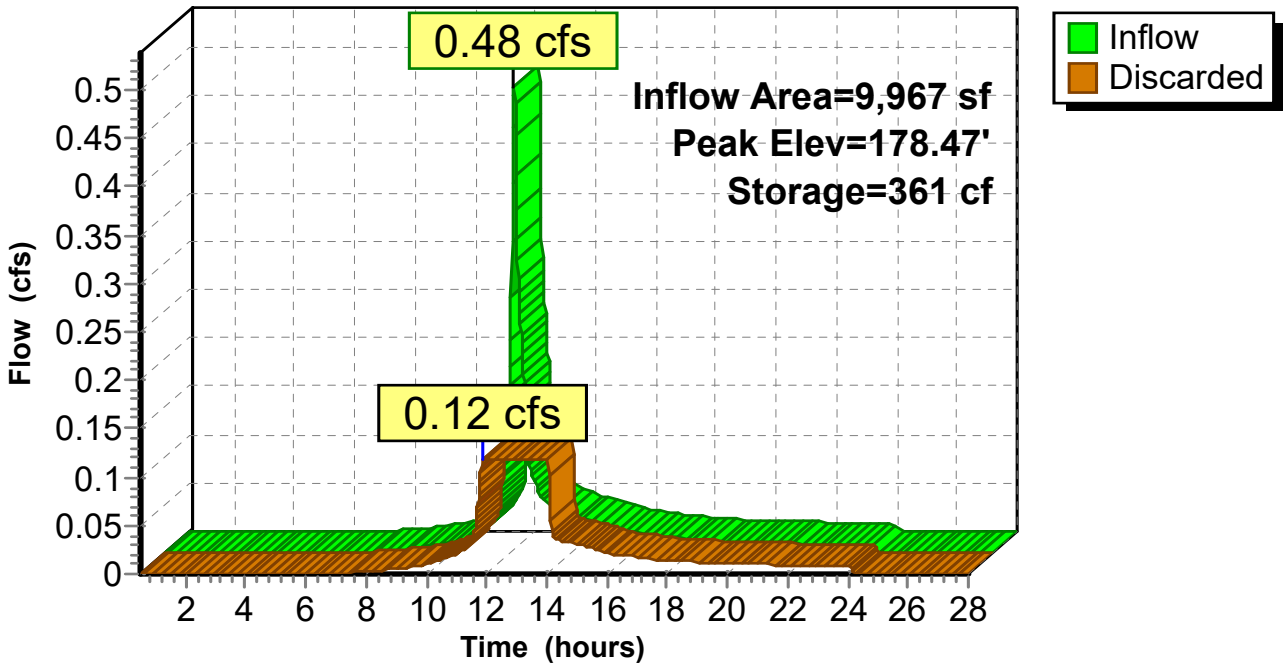
15 Chambers @ $ 300.00 /ea = $ 4,500.00
80.8 cy Field Excavation @ $ 10.00 /cy = $ 808.02
50.6 cy Stone @ $ 30.00 /cy = $ 1,517.54
Total Cost = $ 6,825.56





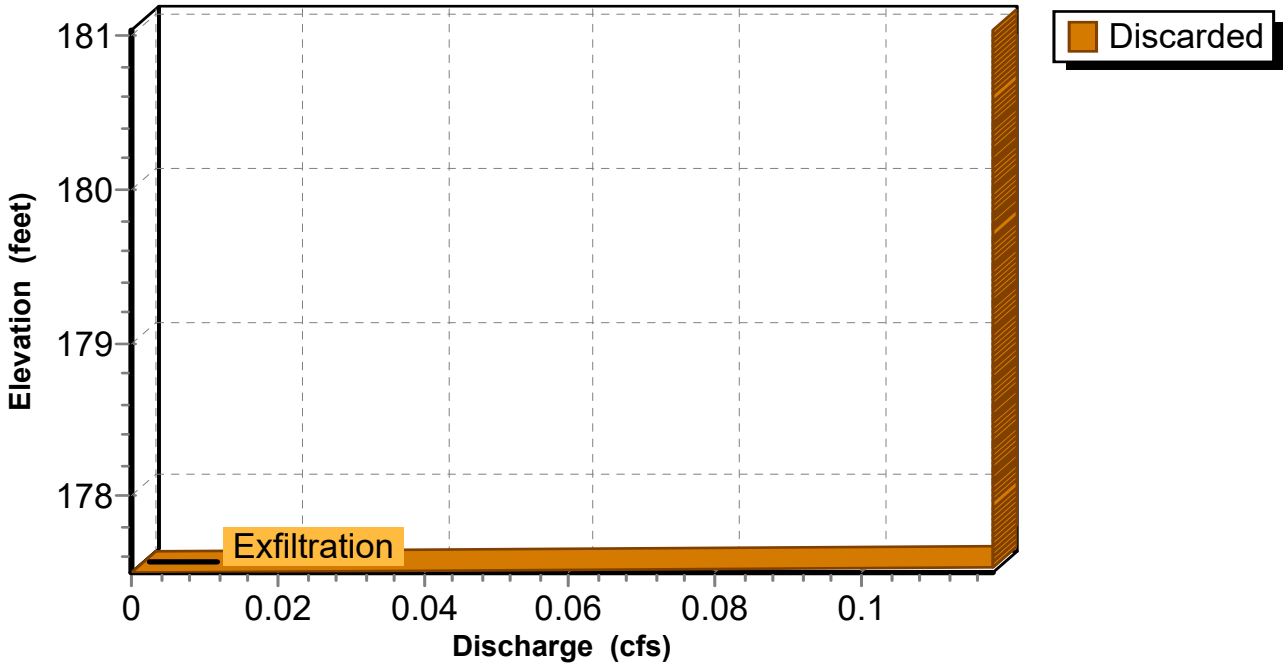
Pond 4P: RB#1

Hydrograph

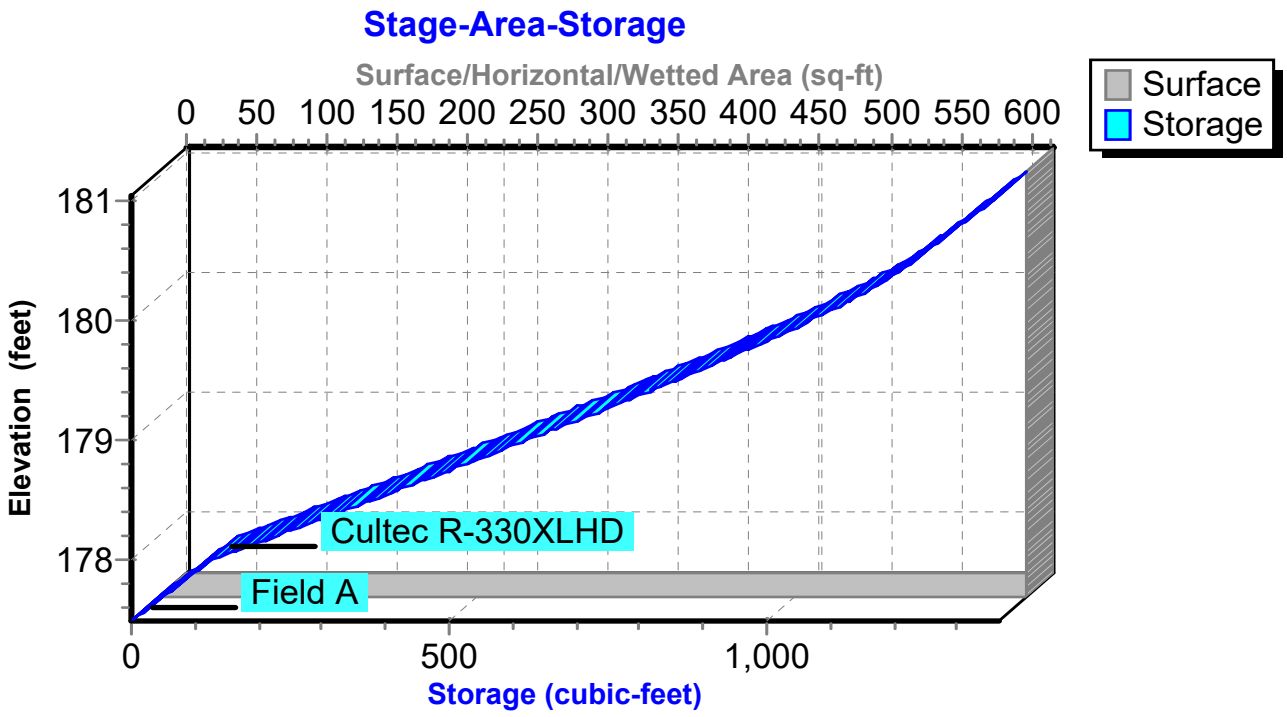


Pond 4P: RB#1

Stage-Discharge



Pond 4P: RB#1


Stage-Area-Storage
Surface/Horizontal/Wetted Area (sq-ft)
0 50 100 150 200 250 300 350 400 450 500 550 600
Surface
Storage
181
180
179
178
Elevation (feet)
Cultec R-330XLHD
Field A
0
500
1,000
Storage (cubic-feet)

Summary for Pond 5P: RB#5

Inflow Area = 7,495 sf, 0.00% Impervious, Inflow Depth = 0.65" for 25-Year event
Inflow = 0.06 cfs @ 12.34 hrs, Volume= 408 cf
Outflow = 0.04 cfs @ 12.20 hrs, Volume= 408 cf, Atten= 32%, Lag= 0.0 min
Discarded = 0.04 cfs @ 12.20 hrs, Volume= 408 cf

Routing by Stor-Ind method, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Peak Elev= 177.28' @ 12.59 hrs Surf.Area= 195 sf Storage= 22 cf

Plug-Flow detention time= 2.6 min calculated for 408 cf (100% of inflow)
Center-of-Mass det. time= 2.6 min (939.0 - 936.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	177.00'	184 cf	**11.17'W x 17.50'L x 3.54'H Field A** 692 cf Overall - 231 cf Embedded = 461 cf x 40.0% Voids
#2A	177.50'	231 cf	**Cultec R-330XLHD** x 4 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 2 rows
		415 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	177.00'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.04 cfs @ 12.20 hrs HW=177.04' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

Pond 5P: RB#5 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 2 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

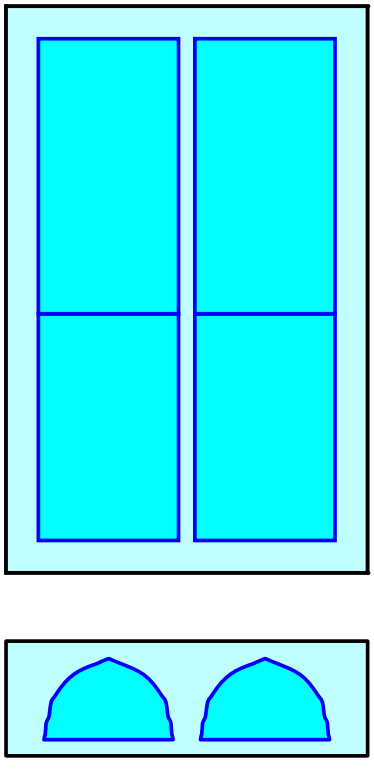
2 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 15.50' Row Length +12.0" End Stone x 2 = 17.50' Base Length
2 Rows x 52.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 11.17' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

4 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 2 Rows = 231.0 cf Chamber Storage

692.1 cf Field - 231.0 cf Chambers = 461.1 cf Stone x 40.0% Voids = 184.4 cf Stone Storage

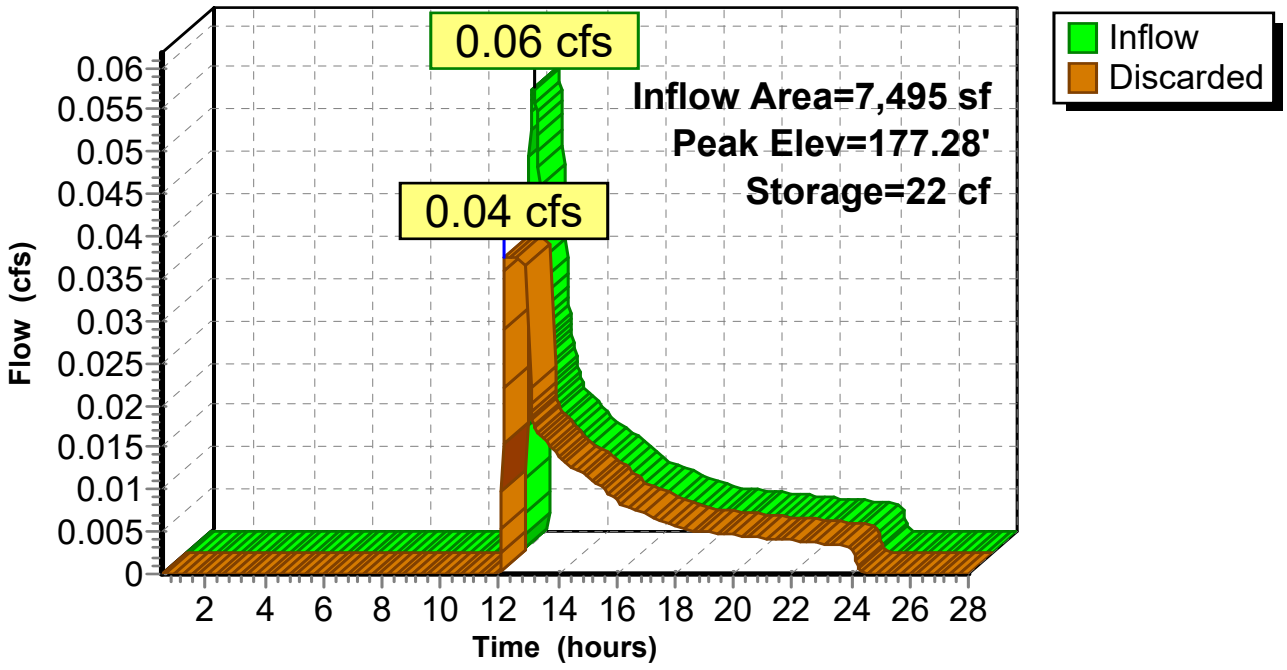
Chamber Storage + Stone Storage = 415.4 cf = 0.010 af
Overall Storage Efficiency = 60.0%
Overall System Size = 17.50' x 11.17' x 3.54'

4 Chambers @ $ 300.00 /ea = $ 1,200.00
25.6 cy Field Excavation @ $ 10.00 /cy = $ 256.33
17.1 cy Stone @ $ 30.00 /cy = $ 512.36
Total Cost = $ 1,968.69



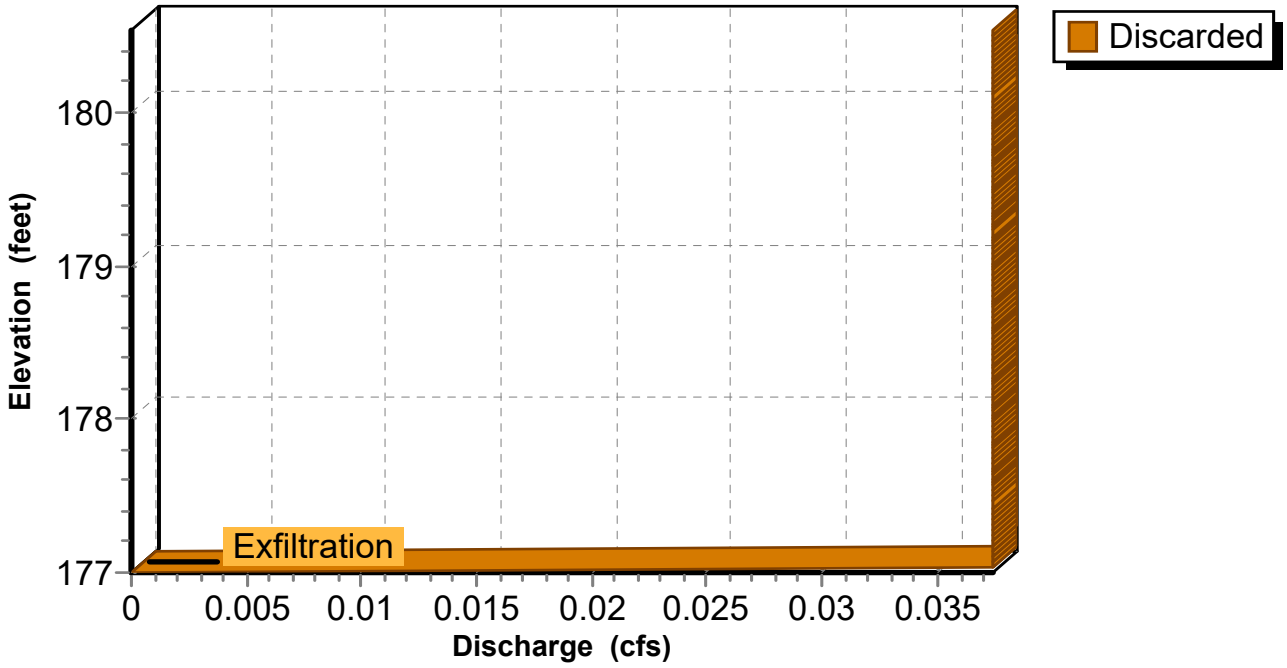
Pond 5P: RB#5

Hydrograph

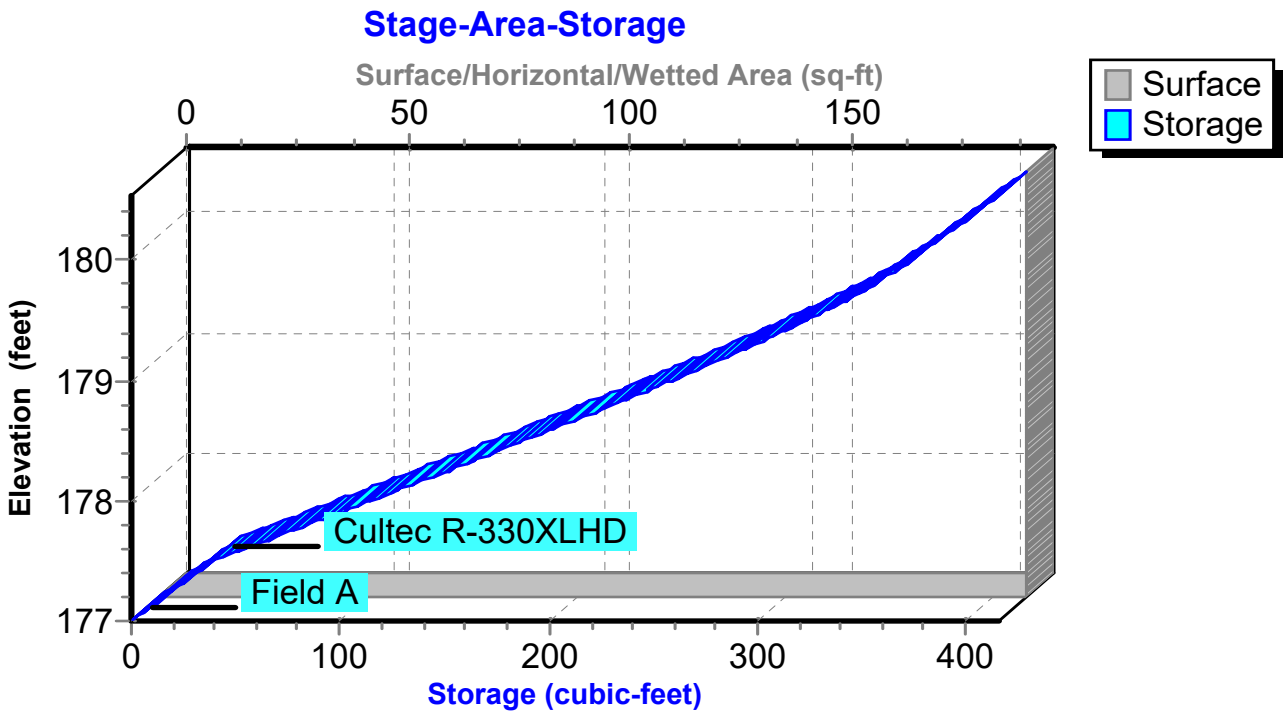


Pond 5P: RB#5

Stage-Discharge



Pond 5P: RB#5


Stage-Area-Storage
Surface/Horizontal/Wetted Area (sq-ft)
0
50
100
150
Surface
Storage
180
179
178
177
Elevation (feet)
Cultec R-330XLHD
Field A
0
100
200
300
400
Storage (cubic-feet)

Summary for Pond 6P: RB#6

Inflow Area = 4,913 sf, 0.00% Impervious, Inflow Depth = 0.91" for 25-Year event
Inflow = 0.08 cfs @ 12.12 hrs, Volume= 372 cf
Outflow = 0.03 cfs @ 12.04 hrs, Volume= 372 cf, Atten= 64%, Lag= 0.0 min
Discarded = 0.03 cfs @ 12.04 hrs, Volume= 372 cf

Routing by Stor-Ind method, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Peak Elev= 175.16' @ 12.54 hrs Surf.Area= 155 sf Storage= 50 cf

Plug-Flow detention time= 8.2 min calculated for 371 cf (100% of inflow)
Center-of-Mass det. time= 8.2 min (916.7 - 908.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	174.50'	153 cf	**6.33'W x 24.50'L x 3.54'H Field A** 550 cf Overall - 168 cf Embedded = 382 cf x 40.0% Voids
#2A	175.00'	168 cf	**Cultec R-330XLHD** x 3 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 1 rows
		320 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	174.50'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.03 cfs @ 12.04 hrs HW=174.54' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Pond 6P: RB#6 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 1 rows

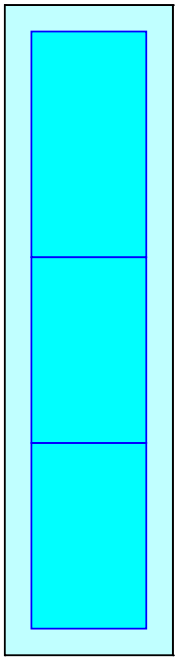
3 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 22.50' Row Length +12.0" End Stone x 2 = 24.50' Base Length
1 Rows x 52.0" Wide + 12.0" Side Stone x 2 = 6.33' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

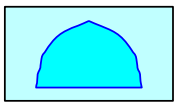
3 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 1 Rows = 167.6 cf Chamber Storage

549.5 cf Field - 167.6 cf Chambers = 381.9 cf Stone x 40.0% Voids = 152.8 cf Stone Storage

Chamber Storage + Stone Storage = 320.4 cf = 0.007 af
Overall Storage Efficiency = 58.3%
Overall System Size = 24.50' x 6.33' x 3.54'

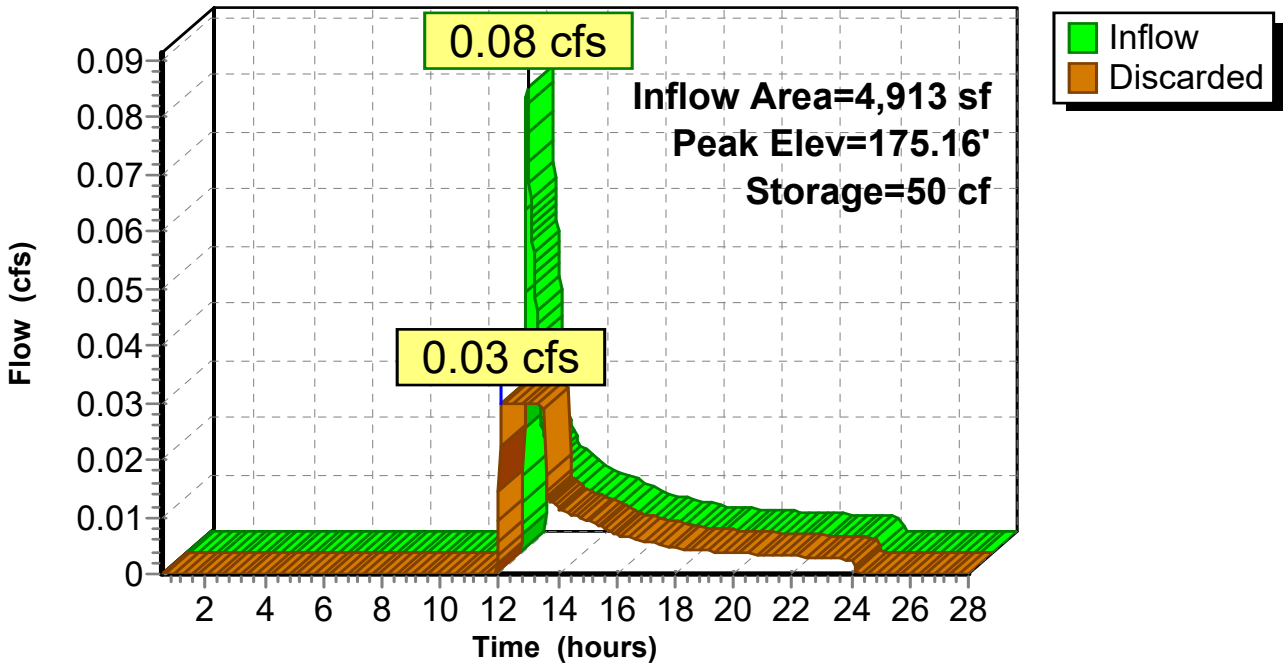
3 Chambers @ $ 300.00 /ea = $ 900.00
20.4 cy Field Excavation @ $ 10.00 /cy = $ 203.54
14.1 cy Stone @ $ 30.00 /cy = $ 424.33
Total Cost = $ 1,527.87





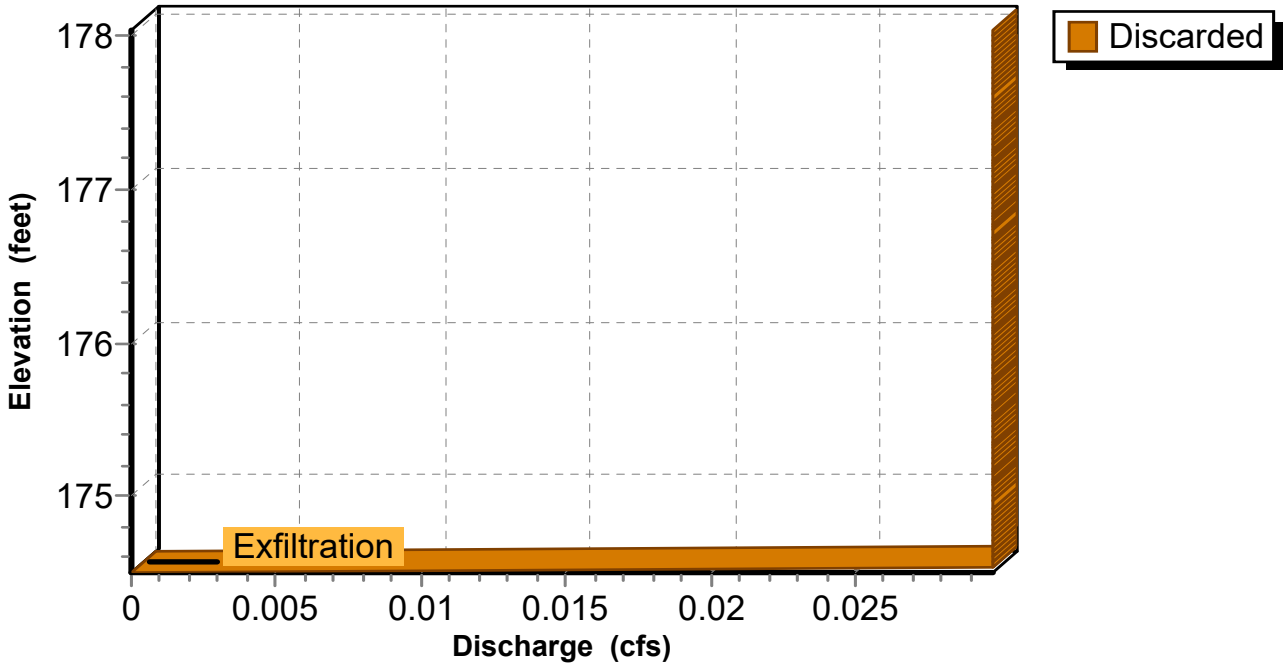
Pond 6P: RB#6

Hydrograph

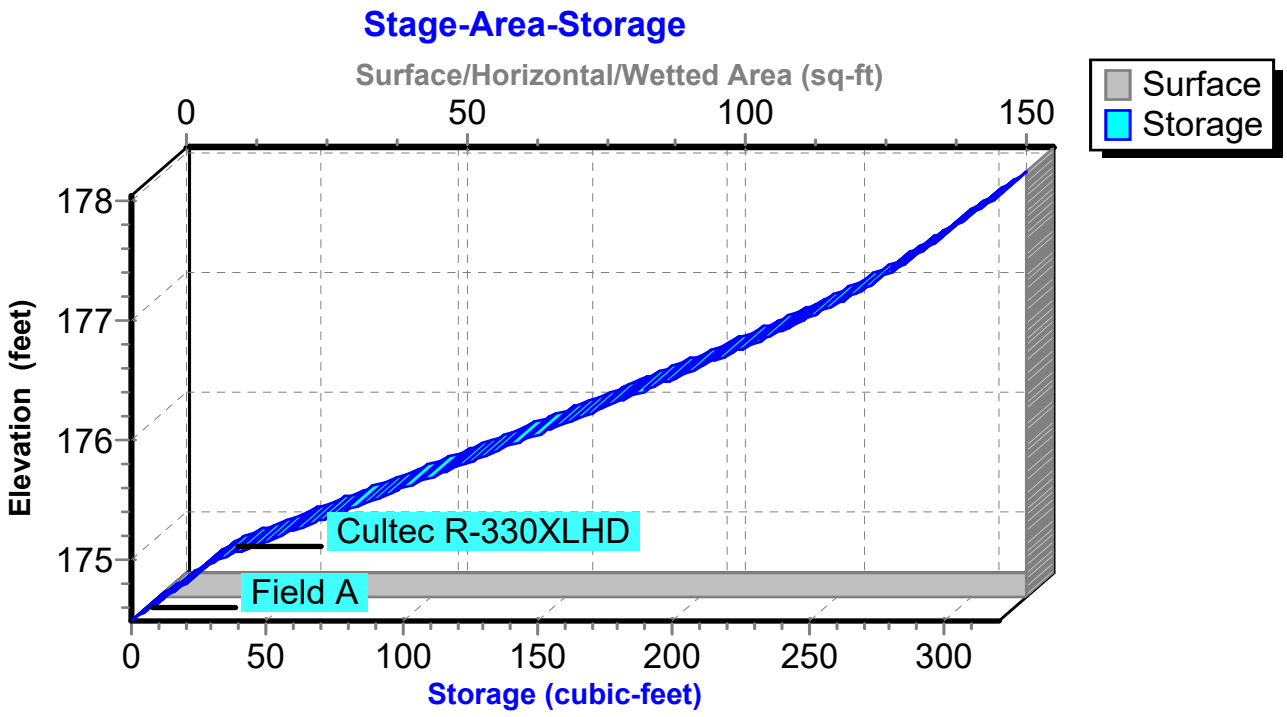


Pond 6P: RB#6

Stage-Discharge



Pond 6P: RB#6


Stage-Area-Storage
Surface/Horizontal/Wetted Area (sq-ft)
0
50
100
150
Surface
Storage
178
177
176
175
Elevation (feet)
Cultec R-330XLHD
Field A
0
50
100
150
200
250
300
Storage (cubic-feet)

Time span=0.50-28.00 hrs, dt=0.02 hrs, 1376 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment SA#1: Subcat SA#1 Runoff Area=4,048 sf 0.00% Impervious Runoff Depth=1.97"
Flow Length=66' Slope=0.0100 '/' Tc=16.0 min CN=45 Runoff=0.13 cfs 664 cf

Subcatchment SA#2: Subcat SA#2 Runoff Area=2,374 sf 0.00% Impervious Runoff Depth=1.65"
Tc=6.0 min CN=42 Runoff=0.08 cfs 326 cf

Subcatchment SA#21: Subcat SA#21 Runoff Area=4,231 sf 64.29% Impervious Runoff Depth=6.15"
Tc=6.0 min CN=81 Runoff=0.68 cfs 2,168 cf

Subcatchment SA#22: Subcat SA#22 Runoff Area=5,736 sf 0.00% Impervious Runoff Depth=2.08"
Flow Length=132' Tc=9.2 min CN=46 Runoff=0.25 cfs 992 cf

Subcatchment SA#24: Subcat SA#24 Runoff Area=15,524 sf 38.40% Impervious Runoff Depth=4.24"
Flow Length=129' Slope=0.0100 '/' Tc=7.2 min CN=65 Runoff=1.70 cfs 5,491 cf

Subcatchment SA#25: Subcat SA#25 Runoff Area=14,973 sf 0.01% Impervious Runoff Depth=2.29"
Flow Length=70' Tc=6.4 min CN=48 Runoff=0.83 cfs 2,863 cf

Subcatchment SA#26: Subcat SA#26 Runoff Area=15,195 sf 40.19% Impervious Runoff Depth=4.48"
Tc=6.0 min CN=67 Runoff=1.83 cfs 5,674 cf

Subcatchment SA#27: Subcat SA#27 Runoff Area=5,882 sf 78.42% Impervious Runoff Depth=6.87"
Tc=6.0 min CN=87 Runoff=1.03 cfs 3,367 cf

Subcatchment SA#28: Subcat SA#28 Runoff Area=7,495 sf 0.00% Impervious Runoff Depth=1.75"
Flow Length=116' Tc=12.3 min CN=43 Runoff=0.23 cfs 1,096 cf

Subcatchment SA#29: Subcat SA#29 Runoff Area=4,913 sf 0.00% Impervious Runoff Depth=2.18"
Tc=6.0 min CN=47 Runoff=0.26 cfs 894 cf

Subcatchment SA#4: Subcat SA#4 Runoff Area=2,621 sf 0.00% Impervious Runoff Depth=1.44"
Tc=6.0 min CN=40 Runoff=0.08 cfs 315 cf

Subcatchment SA#5: Subcat SA#5 Runoff Area=10,821 sf 0.00% Impervious Runoff Depth=2.29"
Tc=6.0 min CN=48 Runoff=0.61 cfs 2,069 cf

Subcatchment SA#6: Subcat SA#6 Runoff Area=2,223 sf 0.00% Impervious Runoff Depth=1.44"
Tc=6.0 min CN=40 Runoff=0.06 cfs 267 cf

Subcatchment SA#8: Subcat SA#8 Runoff Area=1,858 sf 0.00% Impervious Runoff Depth=1.44"
Tc=6.0 min CN=40 Runoff=0.05 cfs 223 cf

Pond 1P: RB#4 Peak Elev=178.36' Storage=1,083 cf Inflow=1.03 cfs 3,367 cf
Outflow=0.13 cfs 3,367 cf

Pond 2P: RB#3 Peak Elev=180.70' Storage=1,991 cf Inflow=1.70 cfs 5,491 cf
Outflow=0.18 cfs 5,491 cf

Pond 3P: RB#2 Peak Elev=180.94' Storage=3,789 cf Inflow=3.25 cfs 10,606 cf
Outflow=0.33 cfs 10,606 cf

Pond 4P: RB#1 Peak Elev=179.83' Storage=996 cf Inflow=0.90 cfs 3,160 cf
Outflow=0.12 cfs 3,160 cf

Pond 5P: RB#5 Peak Elev=179.52' Storage=326 cf Inflow=0.23 cfs 1,096 cf
Outflow=0.04 cfs 1,096 cf

Pond 6P: RB#6 Peak Elev=177.59' Storage=293 cf Inflow=0.26 cfs 894 cf
Outflow=0.03 cfs 894 cf

Total Runoff Area = 97,895 sf Runoff Volume = 26,411 cf Average Runoff Depth = 3.24"
80.18% Pervious = 78,492 sf 19.82% Impervious = 19,403 sf

Summary for Subcatchment SA#1: Subcat SA#1

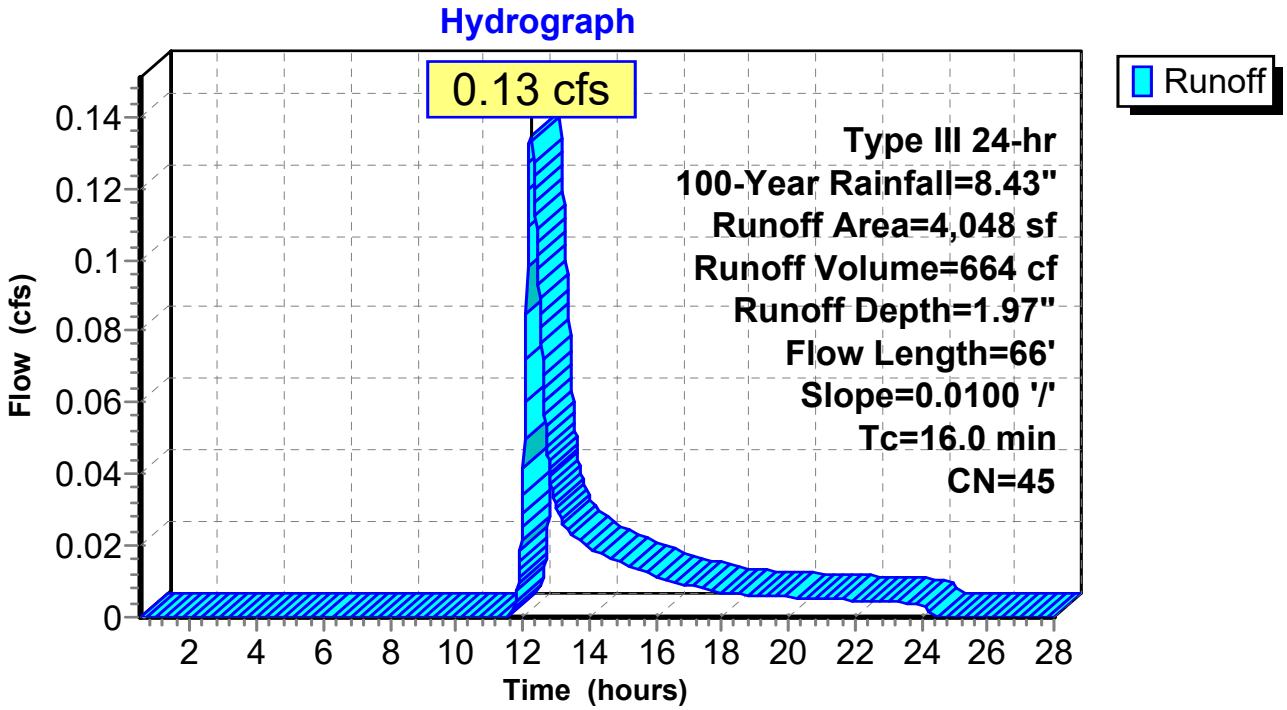
Runoff = 0.13 cfs @ 12.25 hrs, Volume= 664 cf, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=8.43"

Area (sf)	CN	Description
2,840	49	50-75% Grass cover, Fair, HSG A
1,207	36	Woods, Fair, HSG A
4,048	45	Weighted Average
4,048		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.8	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
0.2	16	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.0	66	Total			

Subcatchment SA#1: Subcat SA#1



Summary for Subcatchment SA#2: Subcat SA#2

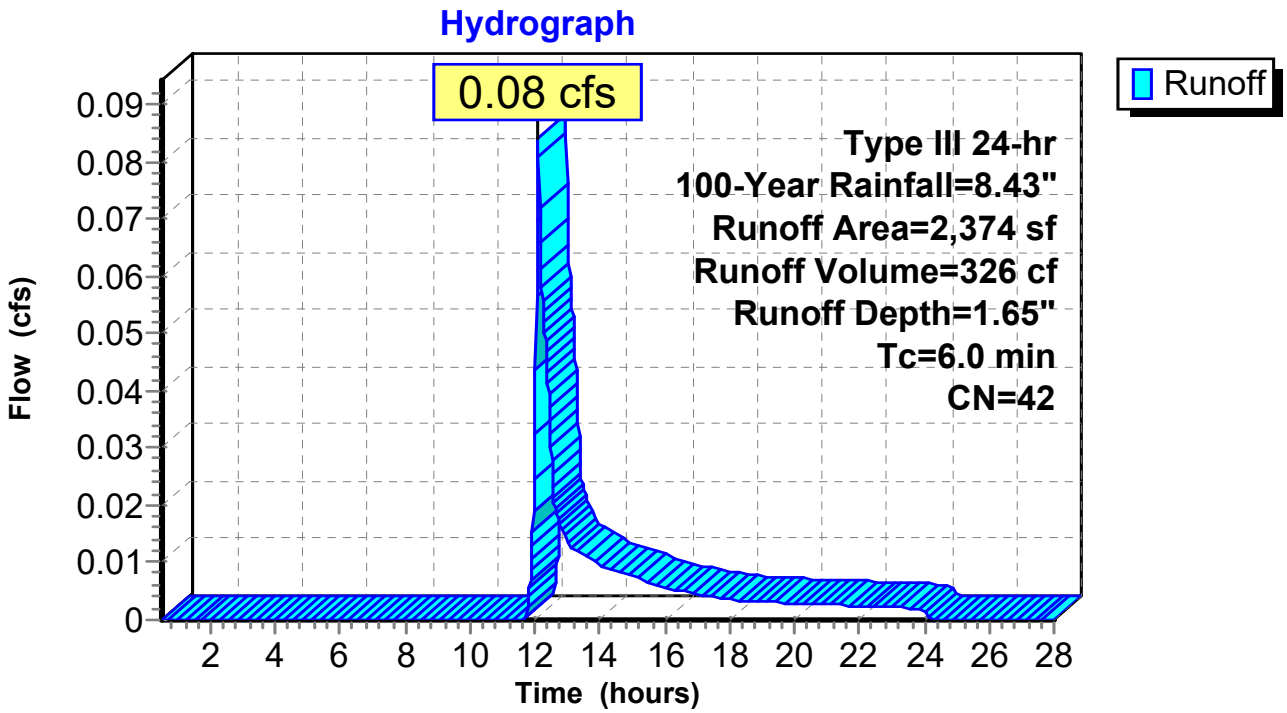
Runoff = 0.08 cfs @ 12.11 hrs, Volume= 326 cf, Depth= 1.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=8.43"

Area (sf)	CN	Description
1,181	49	50-75% Grass cover, Fair, HSG A
1,193	36	Woods, Fair, HSG A
2,374	42	Weighted Average
2,374		100.00% Pervious Area

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

Subcatchment SA#2: Subcat SA#2



Summary for Subcatchment SA#21: Subcat SA#21

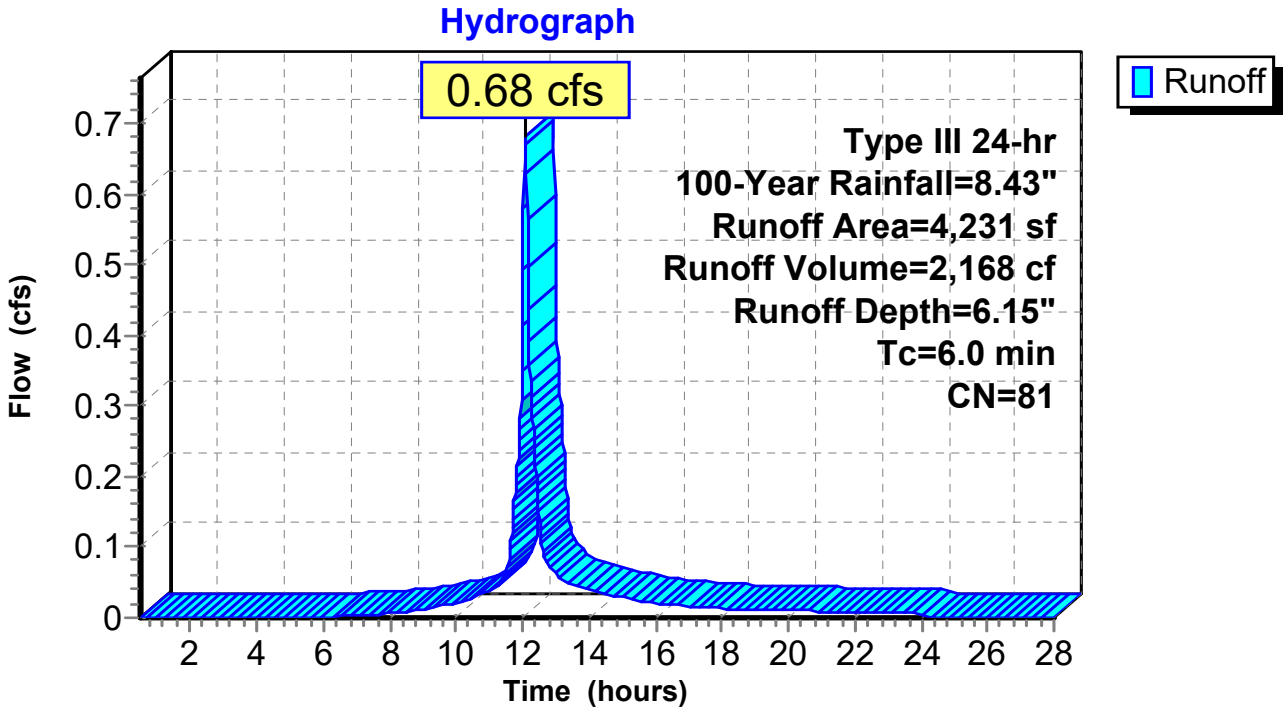
Runoff = 0.68 cfs @ 12.09 hrs, Volume= 2,168 cf, Depth= 6.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=8.43"

Area (sf)	CN	Description
1,511	49	50-75% Grass cover, Fair, HSG A
2,720	98	Paved roads w/curbs & sewers, HSG A
4,231	81	Weighted Average
1,511		35.71% Pervious Area
2,720		64.29% Impervious Area

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

Subcatchment SA#21: Subcat SA#21



Summary for Subcatchment SA#22: Subcat SA#22

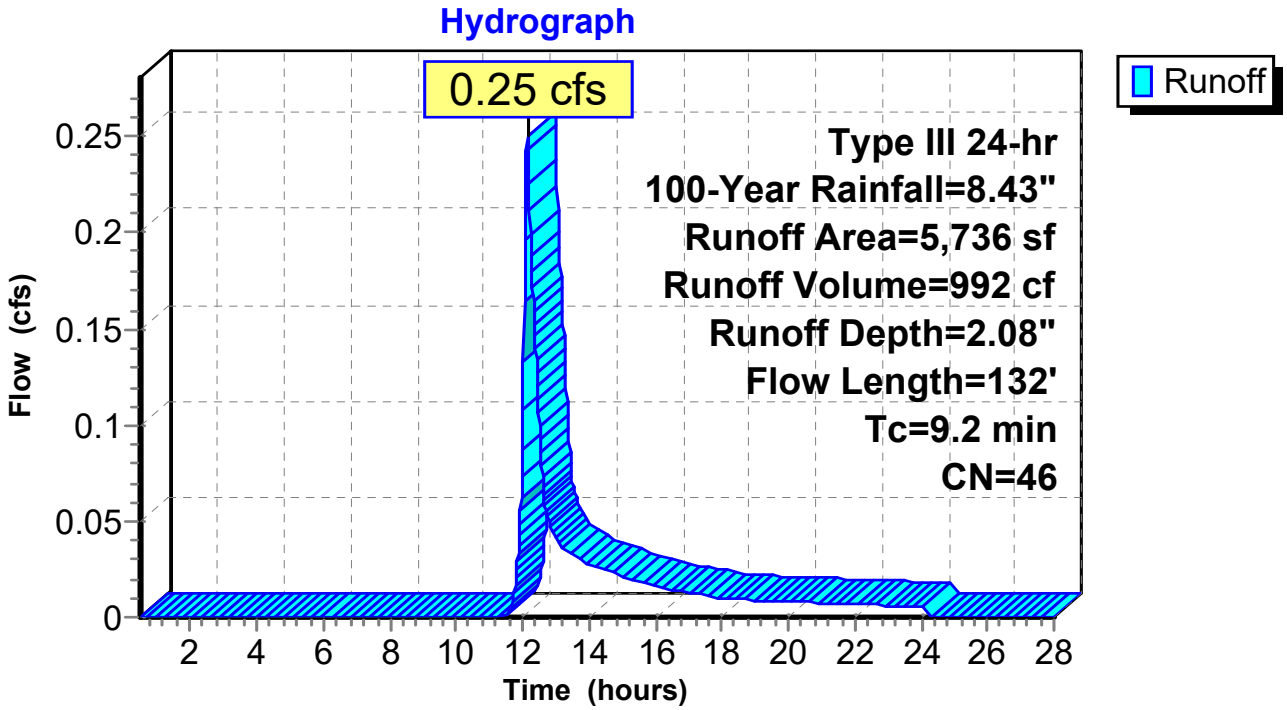
Runoff = 0.25 cfs @ 12.15 hrs, Volume= 992 cf, Depth= 2.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=8.43"

Area (sf)	CN	Description
4,558	49	50-75% Grass cover, Fair, HSG A
1,178	36	Woods, Fair, HSG A
5,736	46	Weighted Average
5,736		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	23	0.0110	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
1.0	109	0.0120	1.76		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
9.2	132	Total			

Subcatchment SA#22: Subcat SA#22



Summary for Subcatchment SA#24: Subcat SA#24

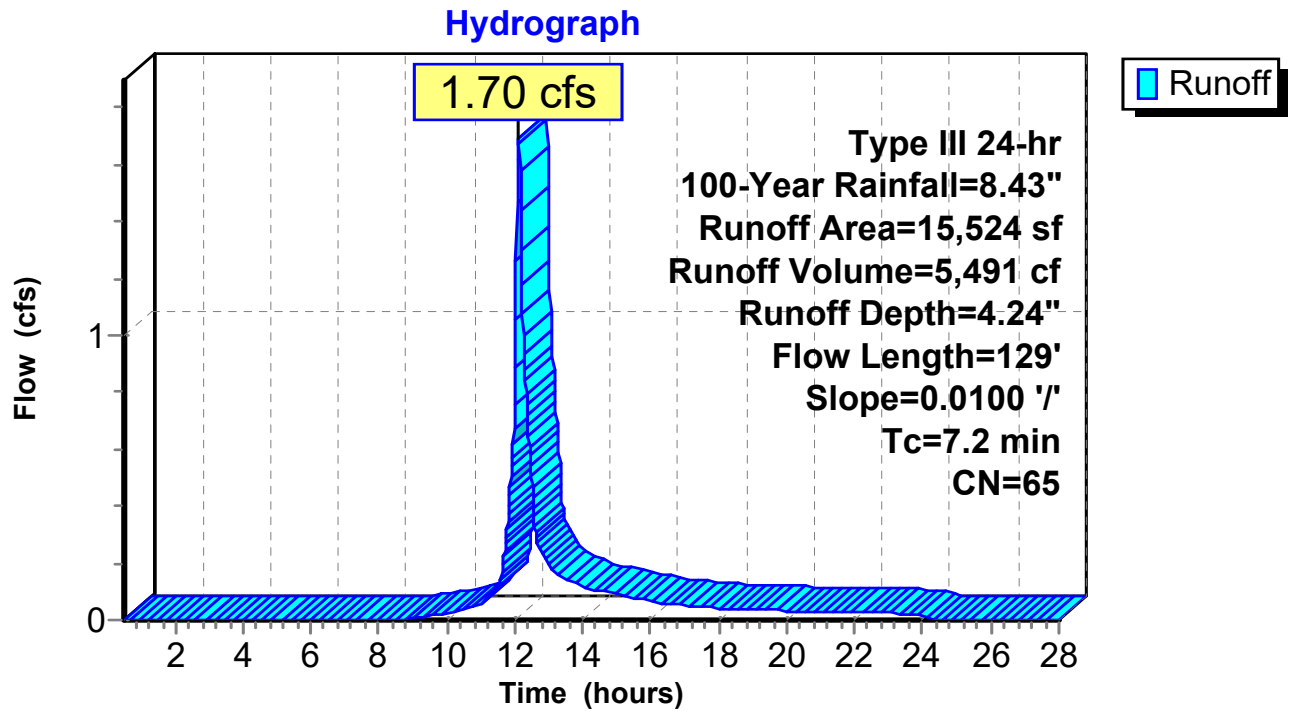
Runoff = 1.70 cfs @ 12.11 hrs, Volume= 5,491 cf, Depth= 4.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=8.43"

Area (sf)	CN	Description
6,224	49	50-75% Grass cover, Fair, HSG A
1,948	98	Paved roads w/curbs & sewers, HSG A
4,014	98	Roofs, HSG A
3,338	36	Woods, Fair, HSG A
15,524	65	Weighted Average
9,562		61.60% Pervious Area
5,962		38.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	15	0.0100	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
1.2	114	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
7.2	129	Total			

Subcatchment SA#24: Subcat SA#24



Summary for Subcatchment SA#25: Subcat SA#25

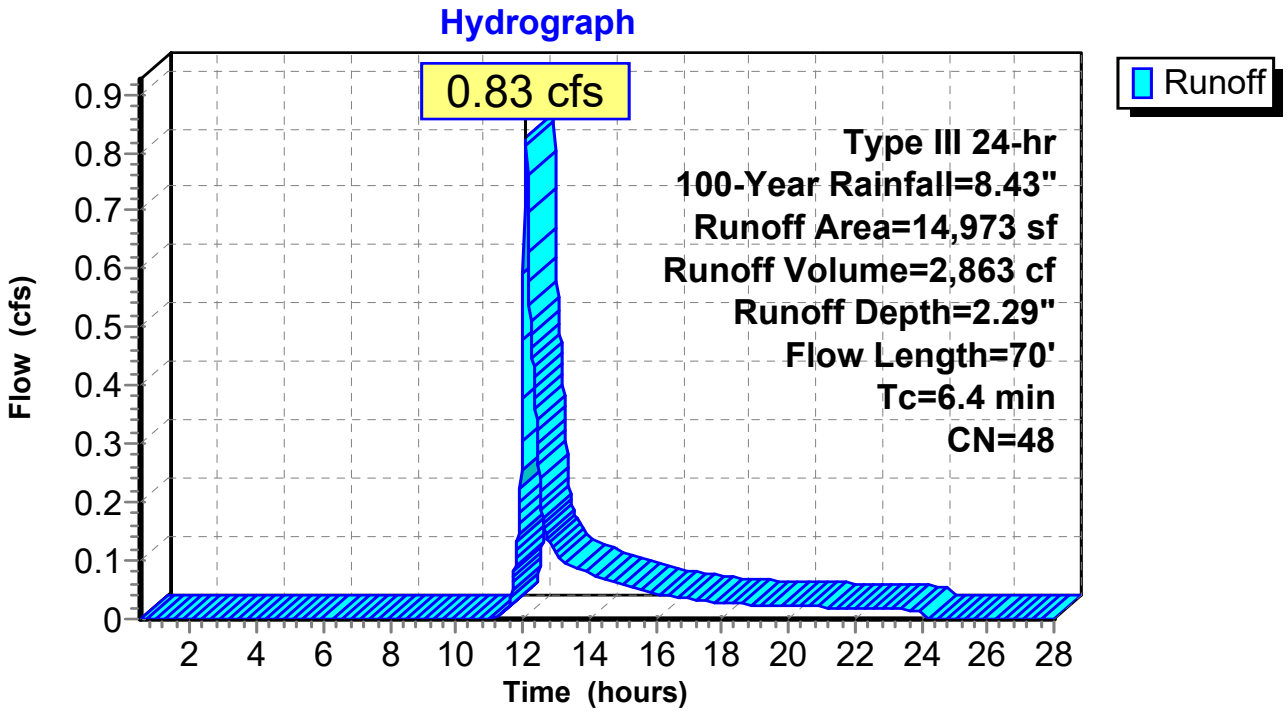
Runoff = 0.83 cfs @ 12.10 hrs, Volume= 2,863 cf, Depth= 2.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=8.43"

Area (sf)	CN	Description
14,146	49	50-75% Grass cover, Fair, HSG A
2	98	Roofs, HSG A
826	36	Woods, Fair, HSG A
14,973	48	Weighted Average
14,972		99.99% Pervious Area
2		0.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	50	0.0360	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.40"
0.1	20	0.1000	5.09		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
6.4	70	Total			

Subcatchment SA#25: Subcat SA#25



Summary for Subcatchment SA#26: Subcat SA#26

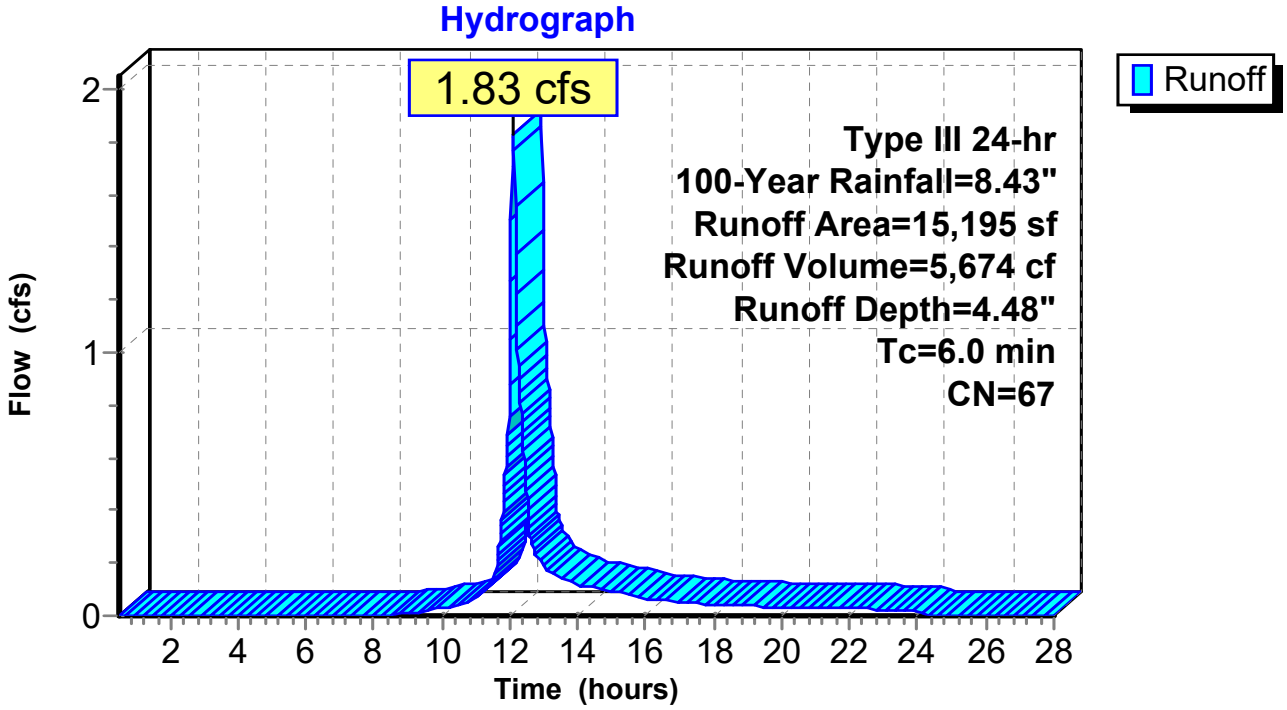
Runoff = 1.83 cfs @ 12.09 hrs, Volume= 5,674 cf, Depth= 4.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=8.43"

Area (sf)	CN	Description
7,298	49	50-75% Grass cover, Fair, HSG A
6,107	98	Paved roads w/curbs & sewers, HSG A
1,791	36	Woods, Fair, HSG A
15,195	67	Weighted Average
9,089		59.81% Pervious Area
6,107		40.19% Impervious Area

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

Subcatchment SA#26: Subcat SA#26



Summary for Subcatchment SA#27: Subcat SA#27

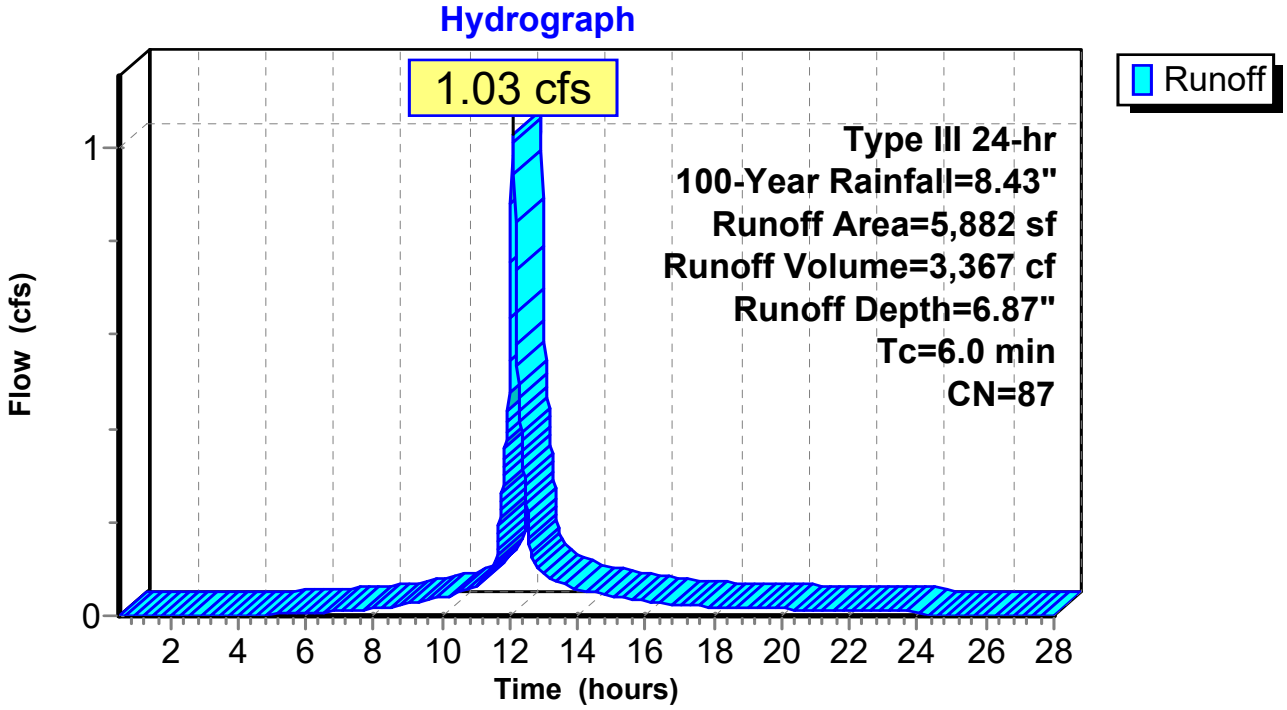
Runoff = 1.03 cfs @ 12.08 hrs, Volume= 3,367 cf, Depth= 6.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=8.43"

Area (sf)	CN	Description
1,269	49	50-75% Grass cover, Fair, HSG A
1,384	98	Paved roads w/curbs & sewers, HSG A
3,229	98	Roofs, HSG A
5,882	87	Weighted Average
1,269		21.58% Pervious Area
4,613		78.42% Impervious Area

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

Subcatchment SA#27: Subcat SA#27



Summary for Subcatchment SA#28: Subcat SA#28

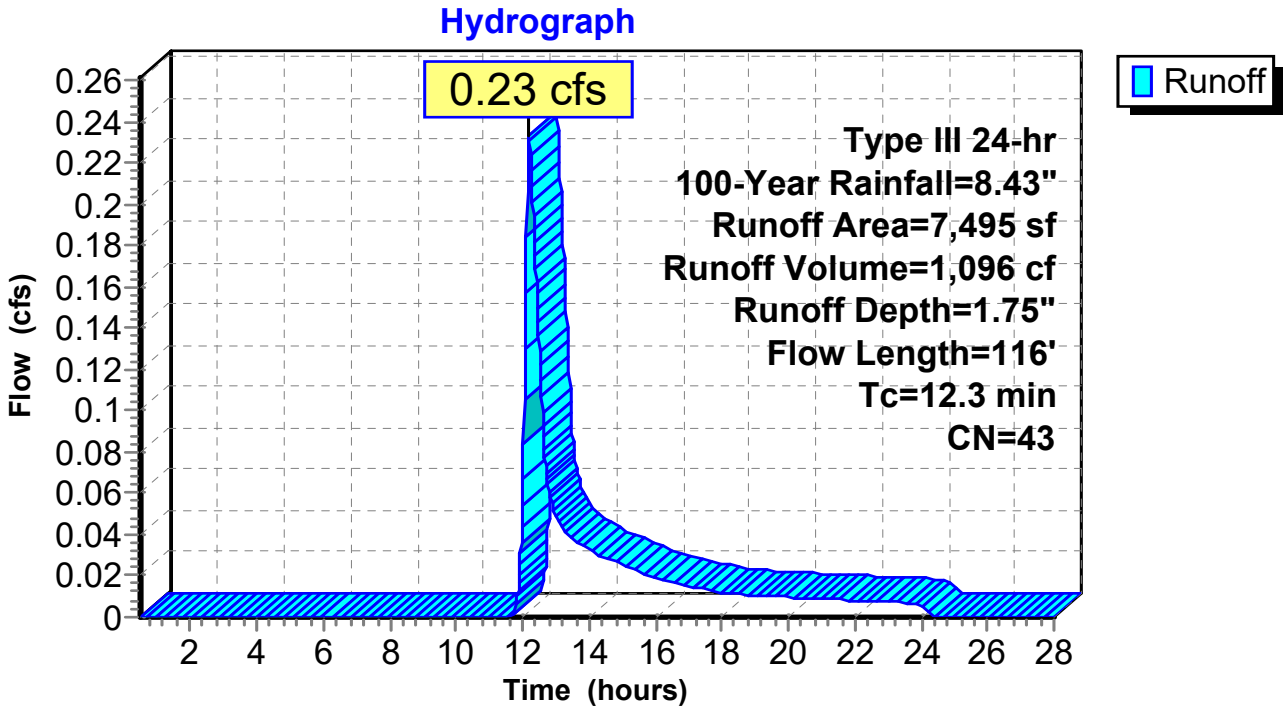
Runoff = 0.23 cfs @ 12.20 hrs, Volume= 1,096 cf, Depth= 1.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=8.43"

Area (sf)	CN	Description
3,987	49	50-75% Grass cover, Fair, HSG A
3,508	36	Woods, Fair, HSG A
7,495	43	Weighted Average
7,495		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0280	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
1.8	66	0.0014	0.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
12.3	116	Total			

Subcatchment SA#28: Subcat SA#28



Summary for Subcatchment SA#29: Subcat SA#29

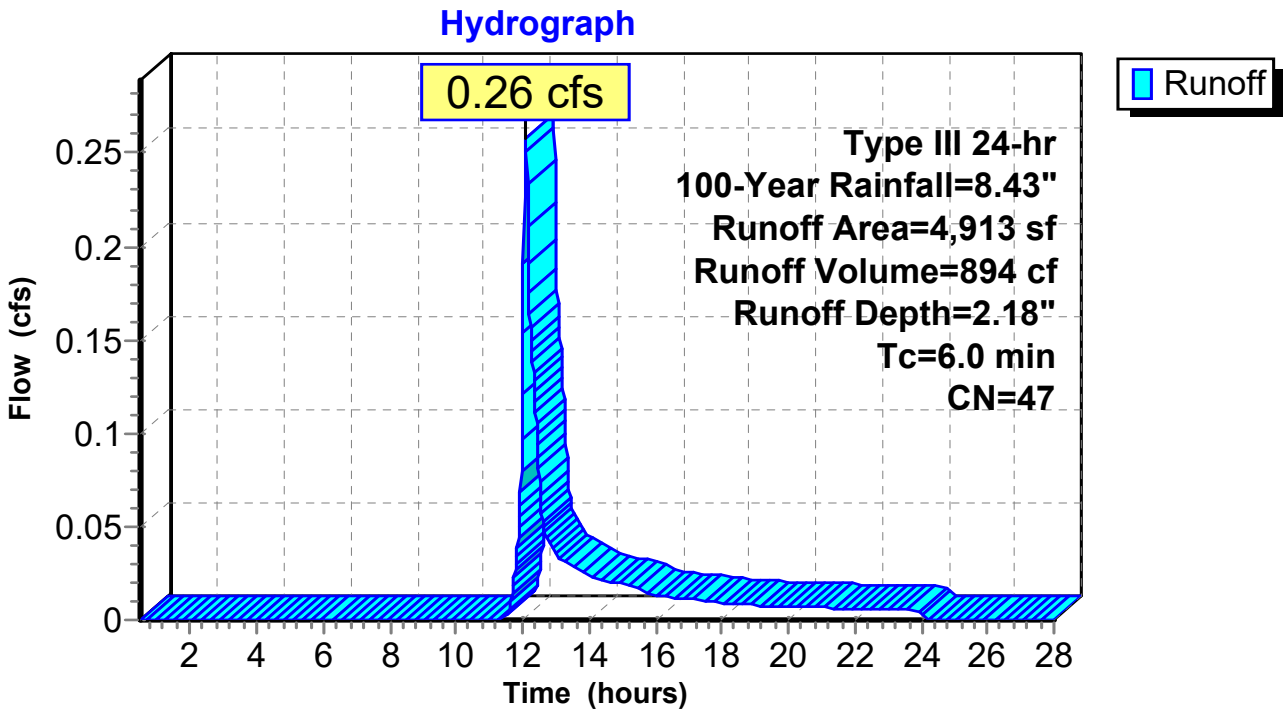
Runoff = 0.26 cfs @ 12.10 hrs, Volume= 894 cf, Depth= 2.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=8.43"

Area (sf)	CN	Description
4,295	49	50-75% Grass cover, Fair, HSG A
618	36	Woods, Fair, HSG A
4,913	47	Weighted Average
4,913		100.00% Pervious Area

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

Subcatchment SA#29: Subcat SA#29



Summary for Subcatchment SA#4: Subcat SA#4

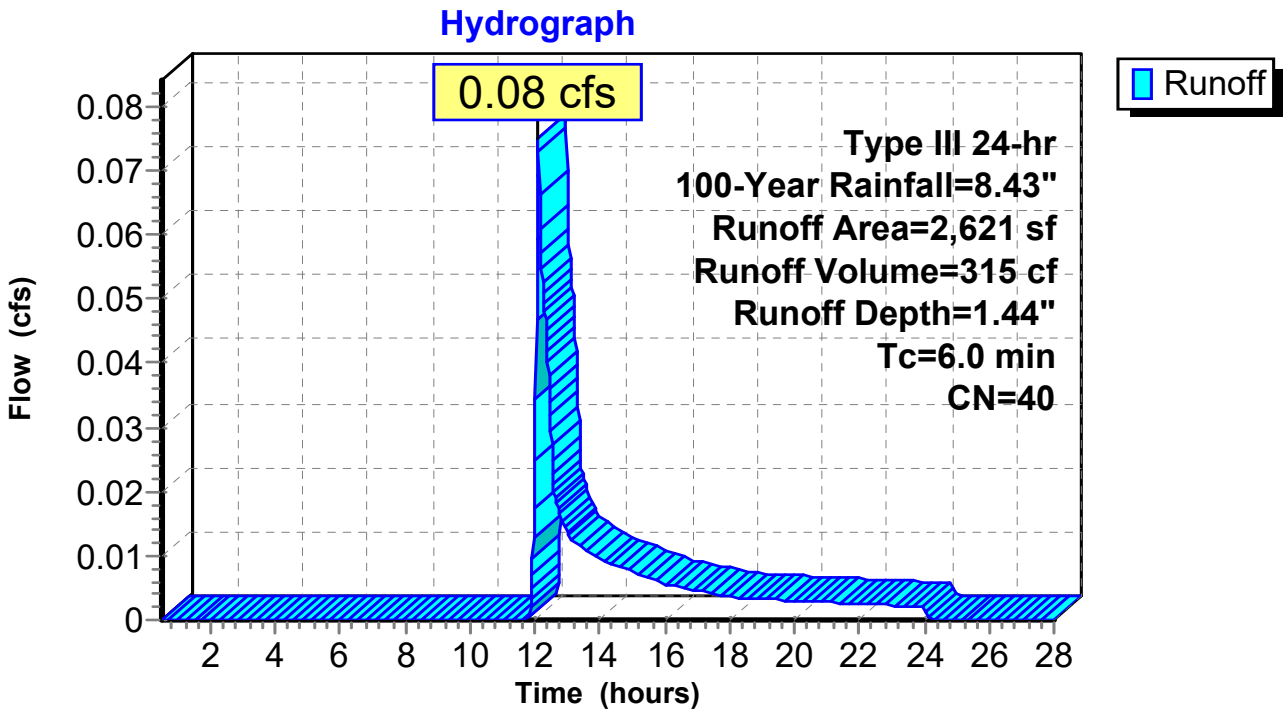
Runoff = 0.08 cfs @ 12.11 hrs, Volume= 315 cf, Depth= 1.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=8.43"

Area (sf)	CN	Description
827	49	50-75% Grass cover, Fair, HSG A
1,794	36	Woods, Fair, HSG A
2,621	40	Weighted Average
2,621		100.00% Pervious Area

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

Subcatchment SA#4: Subcat SA#4



Summary for Subcatchment SA#5: Subcat SA#5

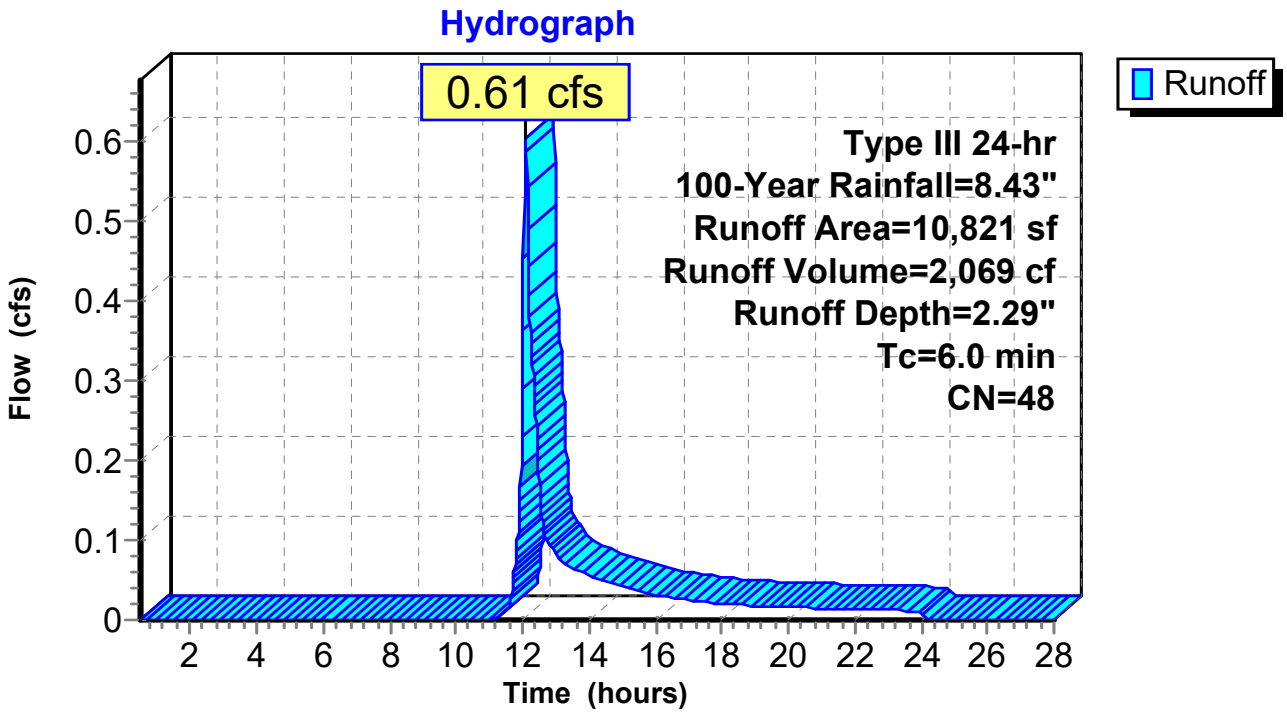
Runoff = 0.61 cfs @ 12.10 hrs, Volume= 2,069 cf, Depth= 2.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=8.43"

Area (sf)	CN	Description
9,977	49	50-75% Grass cover, Fair, HSG A
844	36	Woods, Fair, HSG A
10,821	48	Weighted Average
10,821		100.00% Pervious Area

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

Subcatchment SA#5: Subcat SA#5



Summary for Subcatchment SA#6: Subcat SA#6

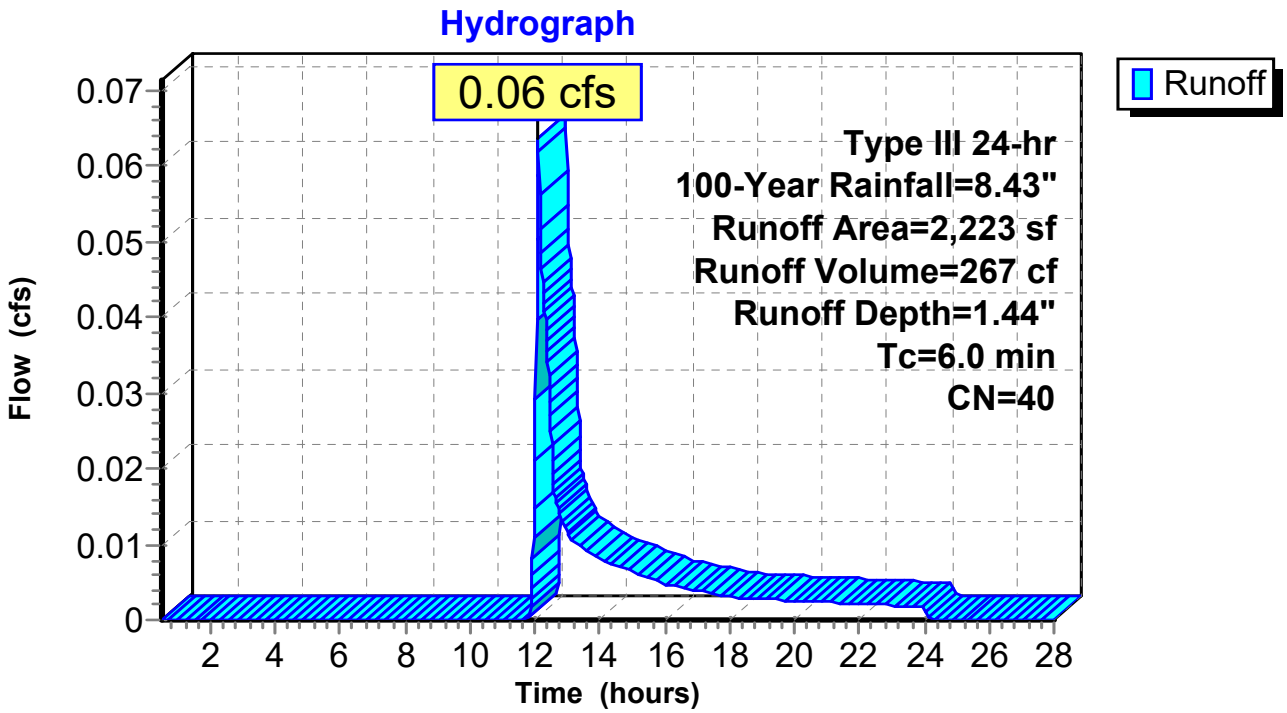
Runoff = 0.06 cfs @ 12.11 hrs, Volume= 267 cf, Depth= 1.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=8.43"

Area (sf)	CN	Description
697	49	50-75% Grass cover, Fair, HSG A
1,527	36	Woods, Fair, HSG A
2,223	40	Weighted Average
2,223		100.00% Pervious Area

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

Subcatchment SA#6: Subcat SA#6



Summary for Subcatchment SA#8: Subcat SA#8

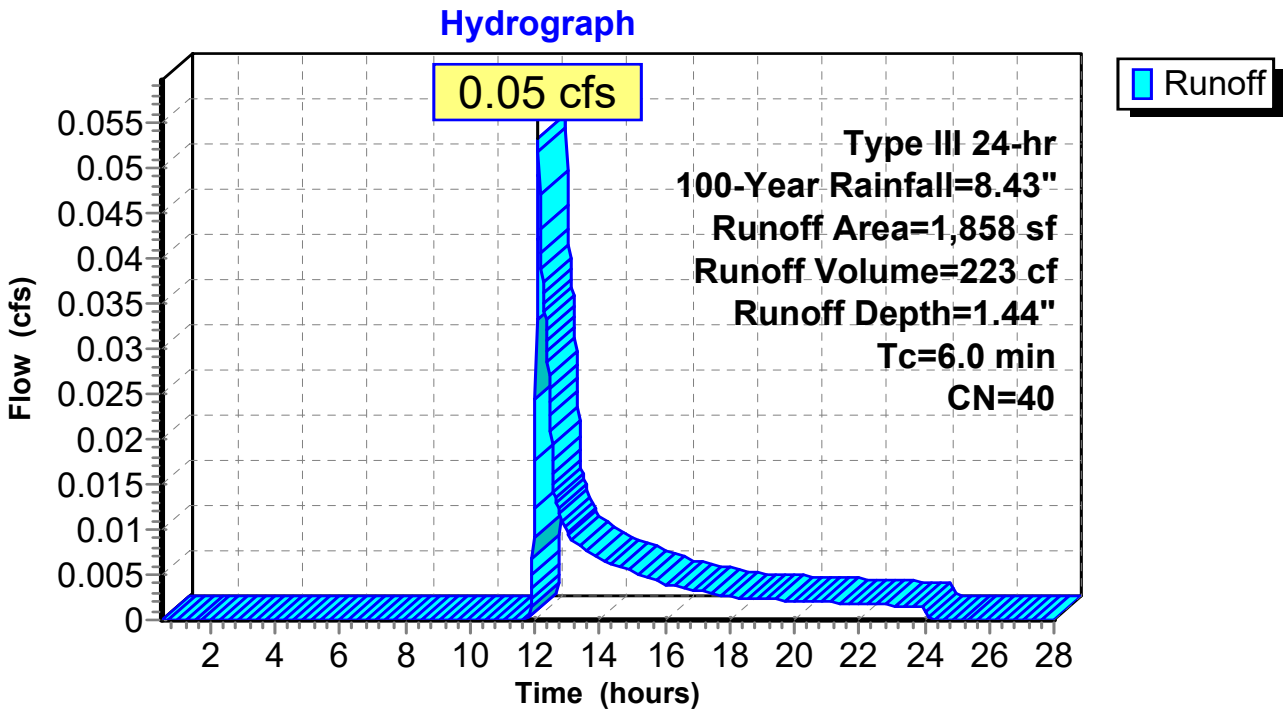
Runoff = 0.05 cfs @ 12.11 hrs, Volume= 223 cf, Depth= 1.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=8.43"

Area (sf)	CN	Description
568	49	50-75% Grass cover, Fair, HSG A
1,291	36	Woods, Fair, HSG A
1,858	40	Weighted Average
1,858		100.00% Pervious Area

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

Subcatchment SA#8: Subcat SA#8



Summary for Pond 1P: RB#4

Inflow Area = 5,882 sf, 78.42% Impervious, Inflow Depth = 6.87" for 100-Year event
Inflow = 1.03 cfs @ 12.08 hrs, Volume= 3,367 cf
Outflow = 0.13 cfs @ 11.62 hrs, Volume= 3,367 cf, Atten= 88%, Lag= 0.0 min
Discarded = 0.13 cfs @ 11.62 hrs, Volume= 3,367 cf

Routing by Stor-Ind method, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Peak Elev= 178.36' @ 12.67 hrs Surf.Area= 656 sf Storage= 1,083 cf

Plug-Flow detention time= 57.4 min calculated for 3,365 cf (100% of inflow)
Center-of-Mass det. time= 57.4 min (840.7 - 783.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	176.00'	578 cf	**20.83'W x 31.50'L x 3.54'H Field A** 2,324 cf Overall - 879 cf Embedded = 1,445 cf x 40.0% Voids
#2A	176.50'	879 cf	**Cultec R-330XLHD** x 16 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 4 rows
		1,457 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	176.00'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.13 cfs @ 11.62 hrs HW=176.04' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.13 cfs)

Pond 1P: RB#4 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 4 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

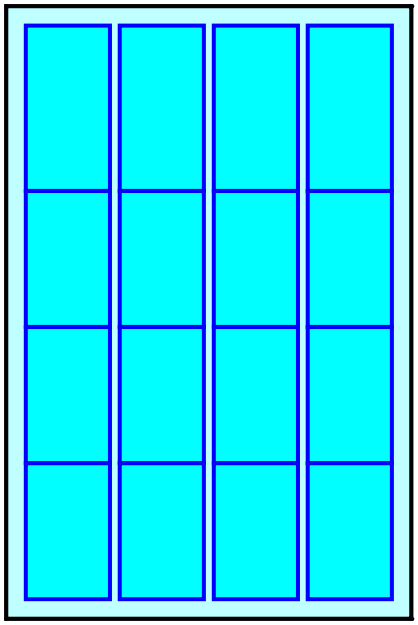
4 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 29.50' Row Length +12.0" End Stone x 2 = 31.50' Base Length
4 Rows x 52.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.83' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

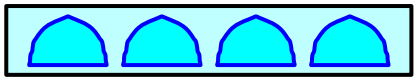
16 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 4 Rows = 879.2 cf Chamber Storage

2,324.2 cf Field - 879.2 cf Chambers = 1,445.0 cf Stone x 40.0% Voids = 578.0 cf Stone Storage

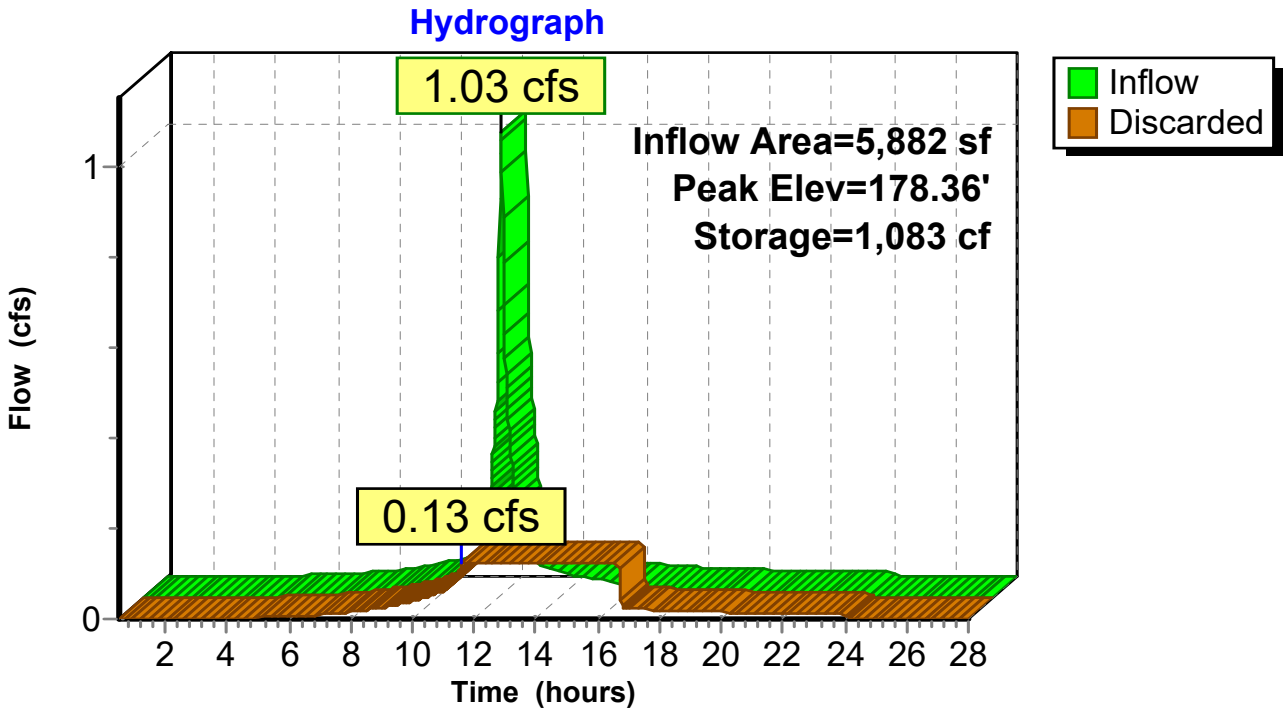
Chamber Storage + Stone Storage = 1,457.2 cf = 0.033 af
Overall Storage Efficiency = 62.7%
Overall System Size = 31.50' x 20.83' x 3.54'

16 Chambers @ $ 300.00 /ea = $ 4,800.00
86.1 cy Field Excavation @ $ 10.00 /cy = $ 860.82
53.5 cy Stone @ $ 30.00 /cy = $ 1,605.56
Total Cost = $ 7,266.38

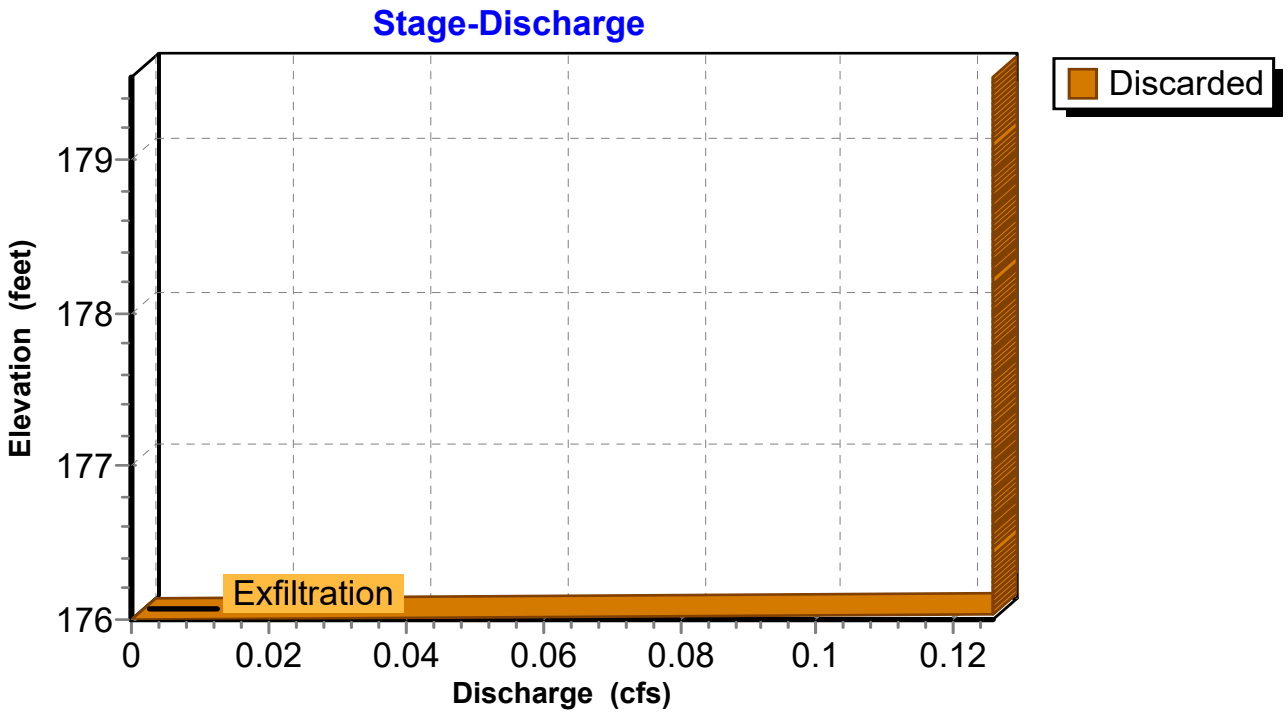




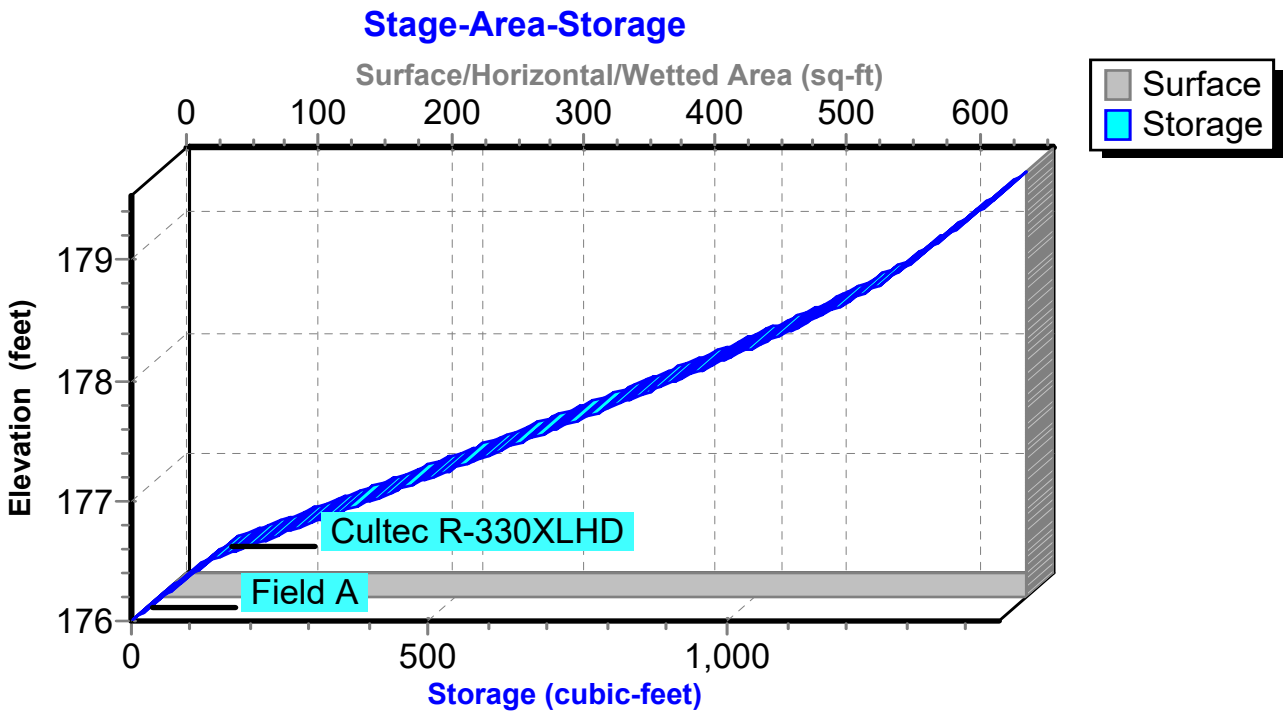
Pond 1P: RB#4



Pond 1P: RB#4



Pond 1P: RB#4


Stage-Area-Storage
Surface/Horizontal/Wetted Area (sq-ft)
0
100
200
300
400
500
600
Surface
Storage
179
178
177
176
Elevation (feet)
Cultec R-330XLHD
Field A
0
500
1,000
Storage (cubic-feet)

Summary for Pond 2P: RB#3

Inflow Area = 15,524 sf, 38.40% Impervious, Inflow Depth = 4.24" for 100-Year event
Inflow = 1.70 cfs @ 12.11 hrs, Volume= 5,491 cf
Outflow = 0.18 cfs @ 11.68 hrs, Volume= 5,491 cf, Atten= 89%, Lag= 0.0 min
Discarded = 0.18 cfs @ 11.68 hrs, Volume= 5,491 cf

Routing by Stor-Ind method, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Peak Elev= 180.70' @ 13.03 hrs Surf.Area= 948 sf Storage= 1,991 cf

Plug-Flow detention time= 91.4 min calculated for 5,491 cf (100% of inflow)
Center-of-Mass det. time= 91.4 min (925.3 - 834.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	177.50'	824 cf	**20.83'W x 45.50'L x 3.54'H Field A** 3,357 cf Overall - 1,296 cf Embedded = 2,061 cf x 40.0% Voids
#2A	178.00'	1,296 cf	**Cultec R-330XLHD** x 24 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 4 rows
		2,121 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	177.50'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.18 cfs @ 11.68 hrs HW=177.54' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.18 cfs)

Pond 2P: RB#3 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 4 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

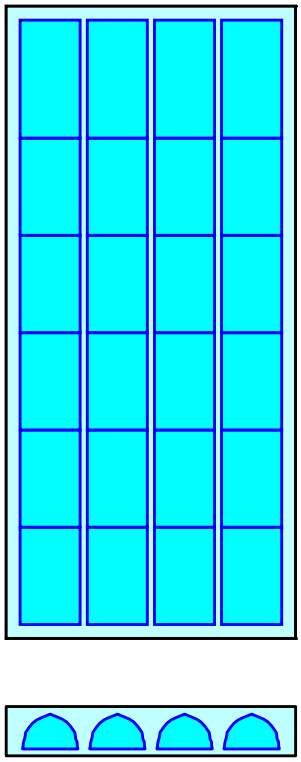
6 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 43.50' Row Length +12.0" End Stone x 2 = 45.50' Base Length
4 Rows x 52.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.83' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

24 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 4 Rows = 1,296.5 cf Chamber Storage

3,357.2 cf Field - 1,296.5 cf Chambers = 2,060.7 cf Stone x 40.0% Voids = 824.3 cf Stone Storage

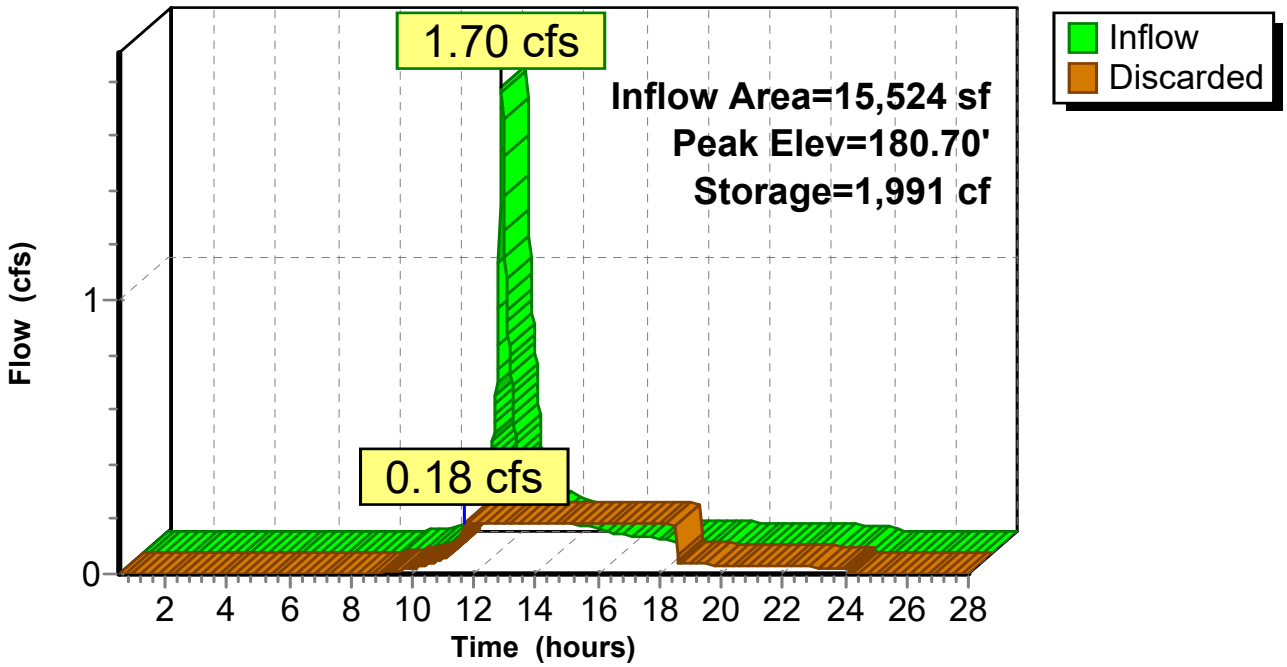
Chamber Storage + Stone Storage = 2,120.8 cf = 0.049 af
Overall Storage Efficiency = 63.2%
Overall System Size = 45.50' x 20.83' x 3.54'

24 Chambers @ $ 300.00 /ea = $ 7,200.00
124.3 cy Field Excavation @ $ 10.00 /cy = $ 1,243.41
76.3 cy Stone @ $ 30.00 /cy = $ 2,289.70
Total Cost = $ 10,733.11



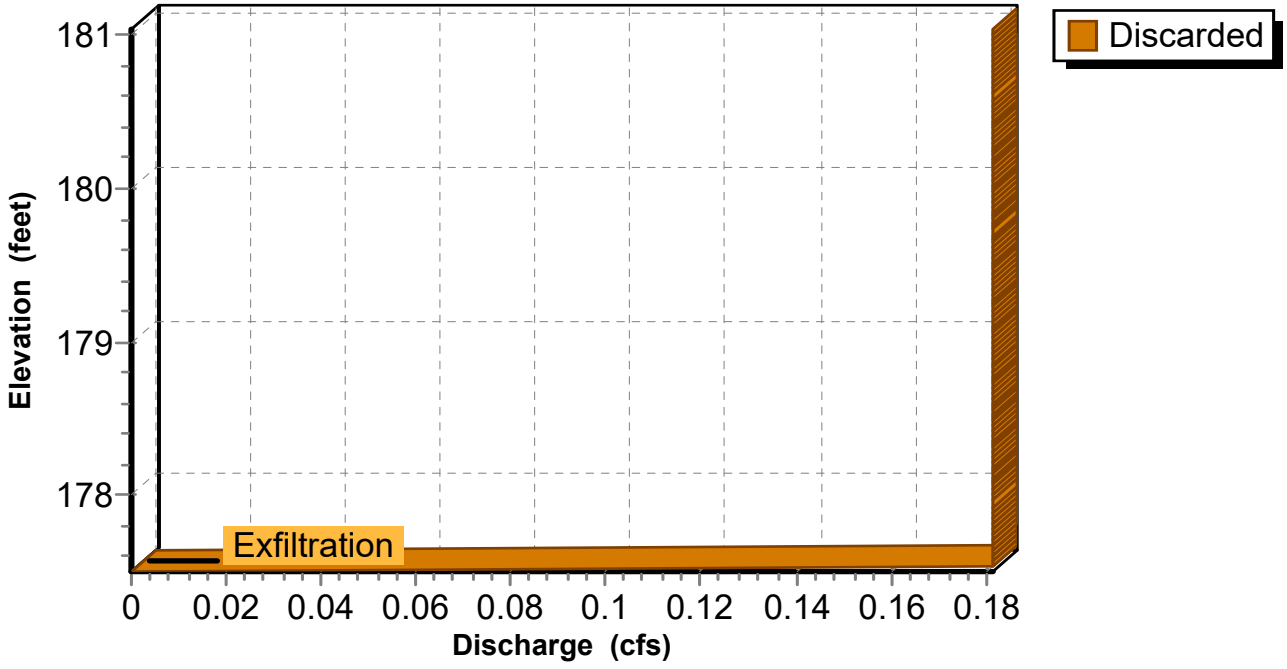
Pond 2P: RB#3

Hydrograph

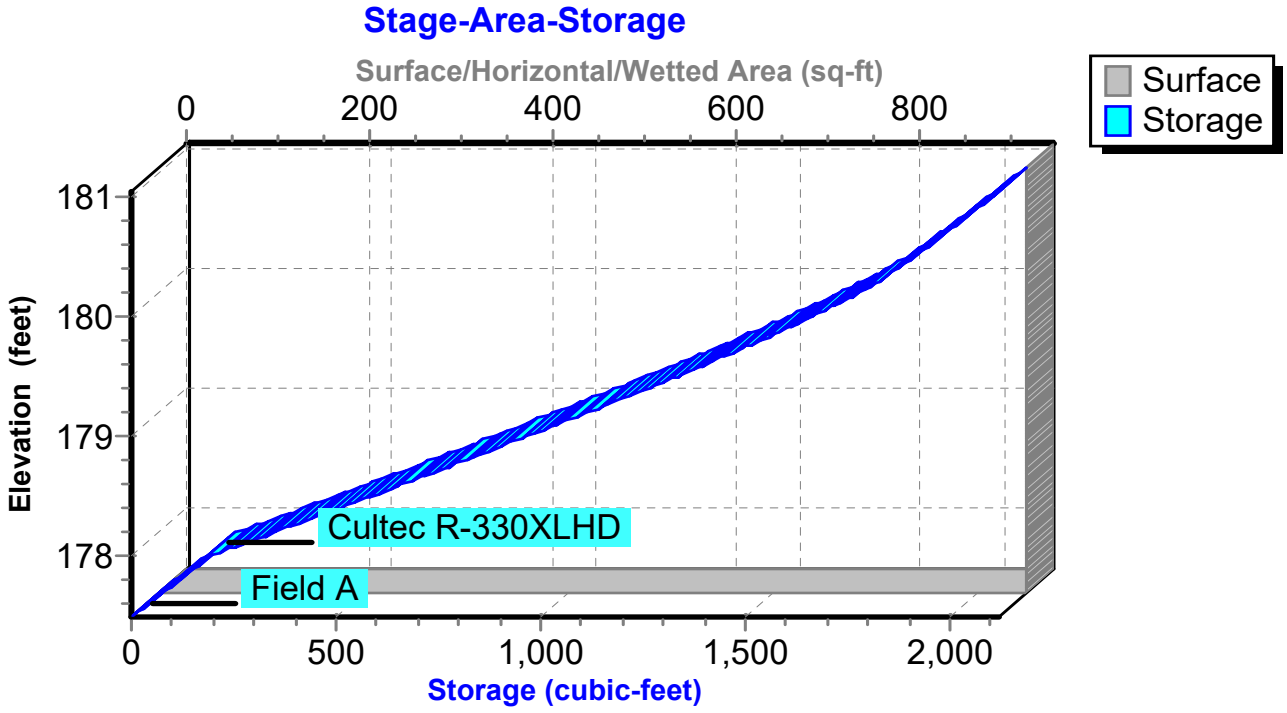


Pond 2P: RB#3

Stage-Discharge



Pond 2P: RB#3


Stage-Area-Storage
Surface/Horizontal/Wetted Area (sq-ft)
0
200
400
600
800
Surface
Storage
181
180
179
178
Elevation (feet)
Cultec R-330XLHD
Field A
0
500
1,000
1,500
2,000
Storage (cubic-feet)

Summary for Pond 3P: RB#2

Inflow Area = 40,990 sf, 14.90% Impervious, Inflow Depth = 3.10" for 100-Year event
Inflow = 3.25 cfs @ 12.10 hrs, Volume= 10,606 cf
Outflow = 0.33 cfs @ 11.70 hrs, Volume= 10,606 cf, Atten= 90%, Lag= 0.0 min
Discarded = 0.33 cfs @ 11.70 hrs, Volume= 10,606 cf

Routing by Stor-Ind method, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Peak Elev= 180.94' @ 13.26 hrs Surf.Area= 1,707 sf Storage= 3,789 cf

Plug-Flow detention time= 103.1 min calculated for 10,598 cf (100% of inflow)
Center-of-Mass det. time= 103.0 min (952.3 - 849.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	177.50'	1,457 cf	**25.67'W x 66.50'L x 3.54'H Field A** 6,045 cf Overall - 2,403 cf Embedded = 3,642 cf x 40.0% Voids
#2A	178.00'	2,403 cf	**Cultec R-330XLHD** x 45 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 5 rows
		3,860 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	177.50'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.33 cfs @ 11.70 hrs HW=177.54' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.33 cfs)

Pond 3P: RB#2 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 5 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

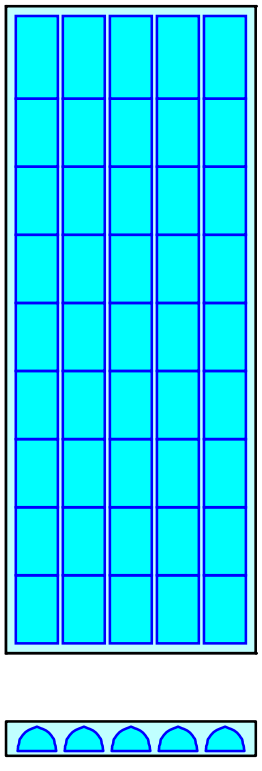
9 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 64.50' Row Length +12.0" End Stone x 2 = 66.50' Base Length
5 Rows x 52.0" Wide + 6.0" Spacing x 4 + 12.0" Side Stone x 2 = 25.67' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

45 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 5 Rows = 2,402.9 cf Chamber Storage

6,045.0 cf Field - 2,402.9 cf Chambers = 3,642.1 cf Stone x 40.0% Voids = 1,456.8 cf Stone Storage

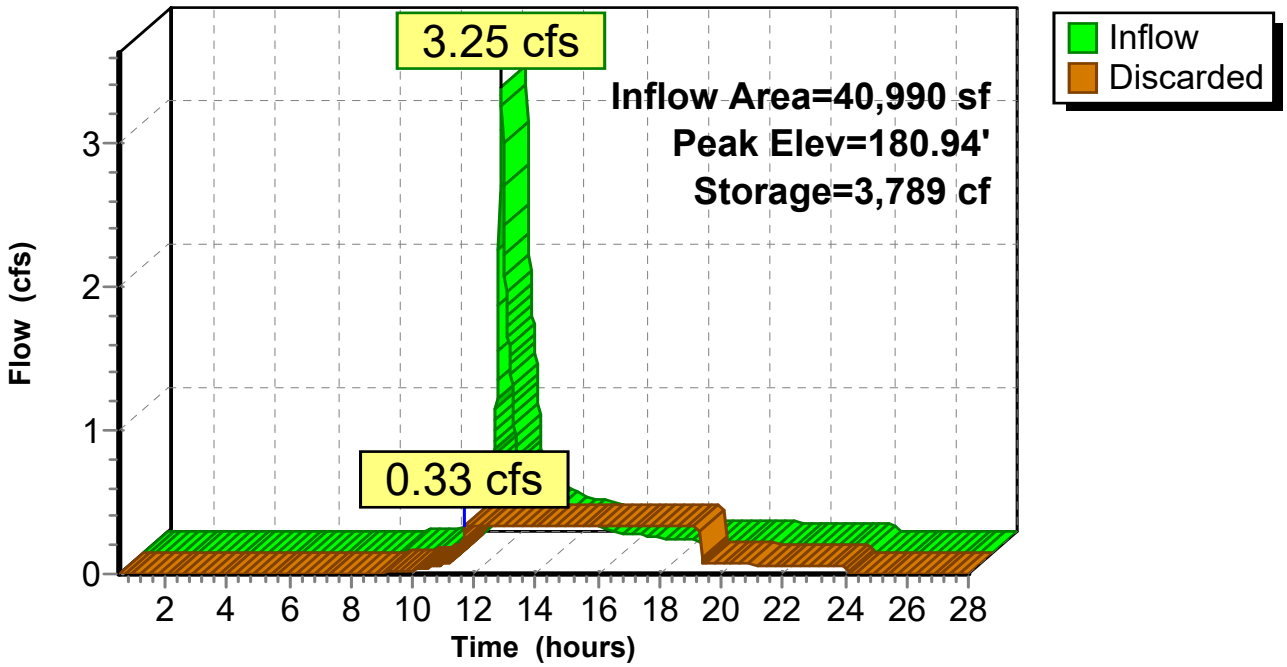
Chamber Storage + Stone Storage = 3,859.8 cf = 0.089 af
Overall Storage Efficiency = 63.9%
Overall System Size = 66.50' x 25.67' x 3.54'

45 Chambers @ $ 300.00 /ea = $ 13,500.00
223.9 cy Field Excavation @ $ 10.00 /cy = $ 2,238.90
134.9 cy Stone @ $ 30.00 /cy = $ 4,046.76
Total Cost = $ 19,785.67



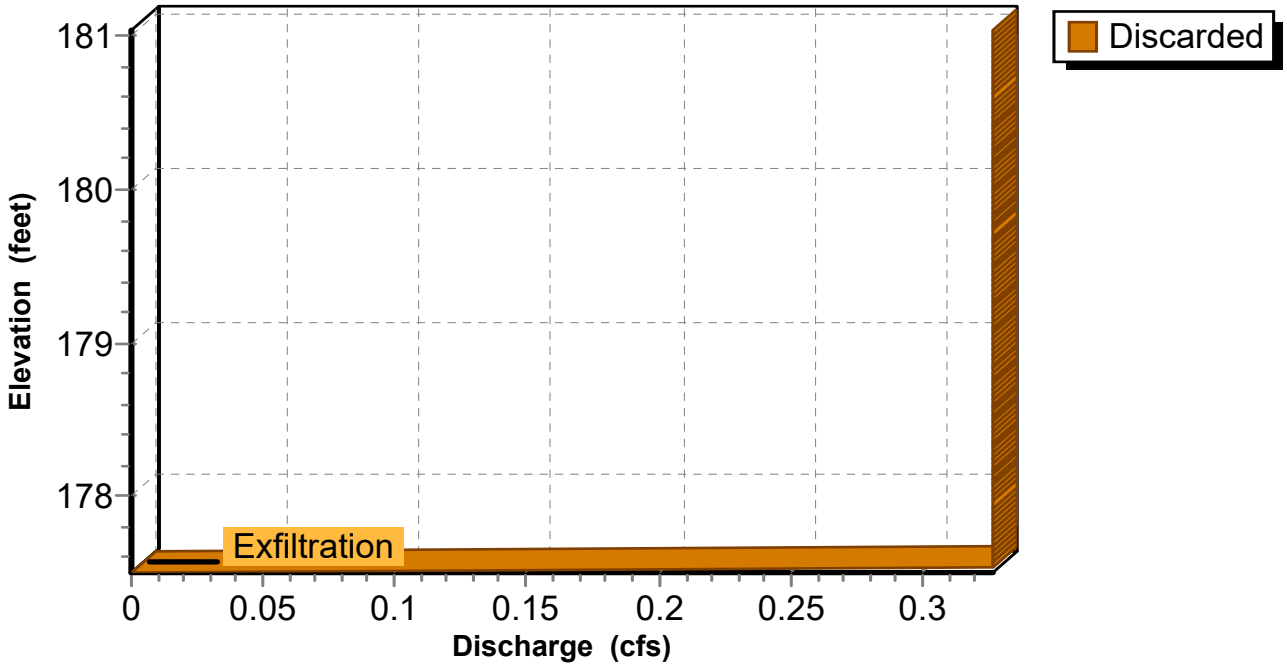
Pond 3P: RB#2

Hydrograph

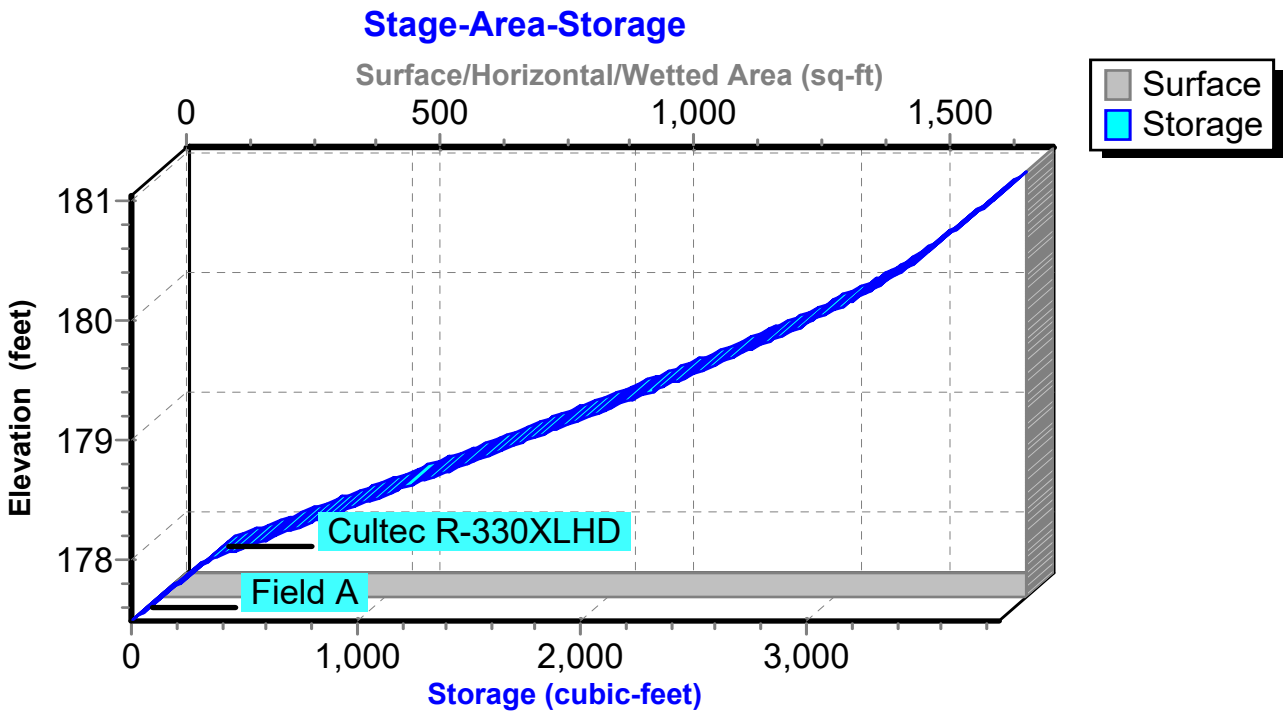


Pond 3P: RB#2

Stage-Discharge



Pond 3P: RB#2


Stage-Area-Storage
Surface/Horizontal/Wetted Area (sq-ft)
0
500
1,000
1,500
Surface
Storage
181
180
179
178
Elevation (feet)
Cultec R-330XLHD
Field A
0
1,000
2,000
3,000
Storage (cubic-feet)

Summary for Pond 4P: RB#1

Inflow Area = 9,967 sf, 27.29% Impervious, Inflow Depth = 3.80" for 100-Year event
Inflow = 0.90 cfs @ 12.10 hrs, Volume= 3,160 cf
Outflow = 0.12 cfs @ 11.70 hrs, Volume= 3,160 cf, Atten= 87%, Lag= 0.0 min
Discarded = 0.12 cfs @ 11.70 hrs, Volume= 3,160 cf

Routing by Stor-Ind method, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Peak Elev= 179.83' @ 12.87 hrs Surf.Area= 616 sf Storage= 996 cf

Plug-Flow detention time= 62.9 min calculated for 3,158 cf (100% of inflow)
Center-of-Mass det. time= 62.8 min (887.5 - 824.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	177.50'	546 cf	**16.00'W x 38.50'L x 3.54'H Field A** 2,182 cf Overall - 816 cf Embedded = 1,366 cf x 40.0% Voids
#2A	178.00'	816 cf	**Cultec R-330XLHD** x 15 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 3 rows
		1,362 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	177.50'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.12 cfs @ 11.70 hrs HW=177.54' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.12 cfs)

Pond 4P: RB#1 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 3 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

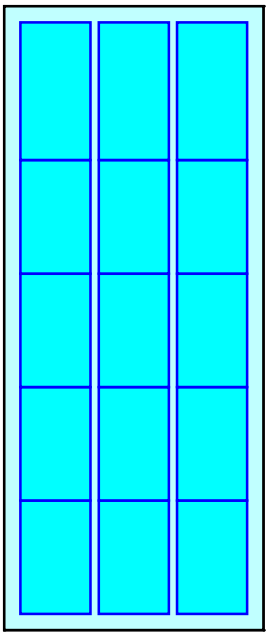
5 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 36.50' Row Length +12.0" End Stone x 2 = 38.50' Base Length
3 Rows x 52.0" Wide + 6.0" Spacing x 2 + 12.0" Side Stone x 2 = 16.00' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

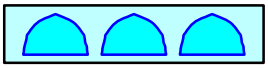
15 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 3 Rows = 815.9 cf Chamber Storage

2,181.7 cf Field - 815.9 cf Chambers = 1,365.8 cf Stone x 40.0% Voids = 546.3 cf Stone Storage

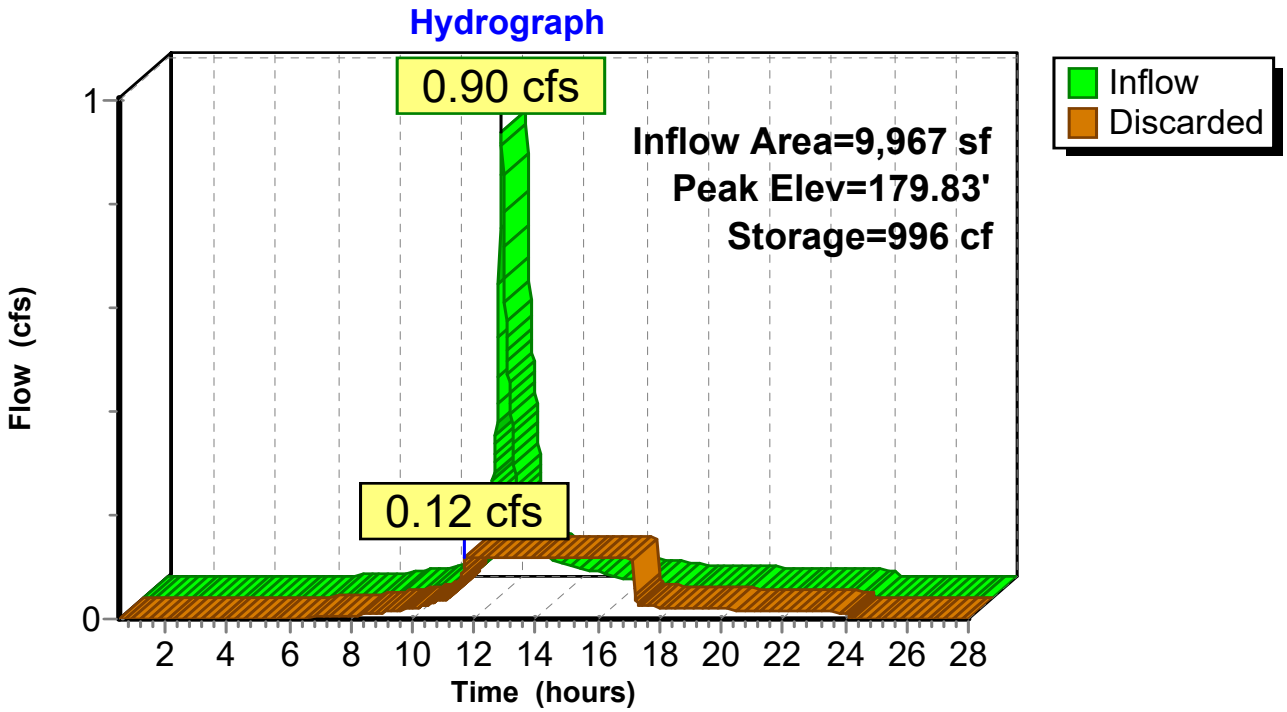
Chamber Storage + Stone Storage = 1,362.2 cf = 0.031 af
Overall Storage Efficiency = 62.4%
Overall System Size = 38.50' x 16.00' x 3.54'

15 Chambers @ $ 300.00 /ea = $ 4,500.00
80.8 cy Field Excavation @ $ 10.00 /cy = $ 808.02
50.6 cy Stone @ $ 30.00 /cy = $ 1,517.54
Total Cost = $ 6,825.56

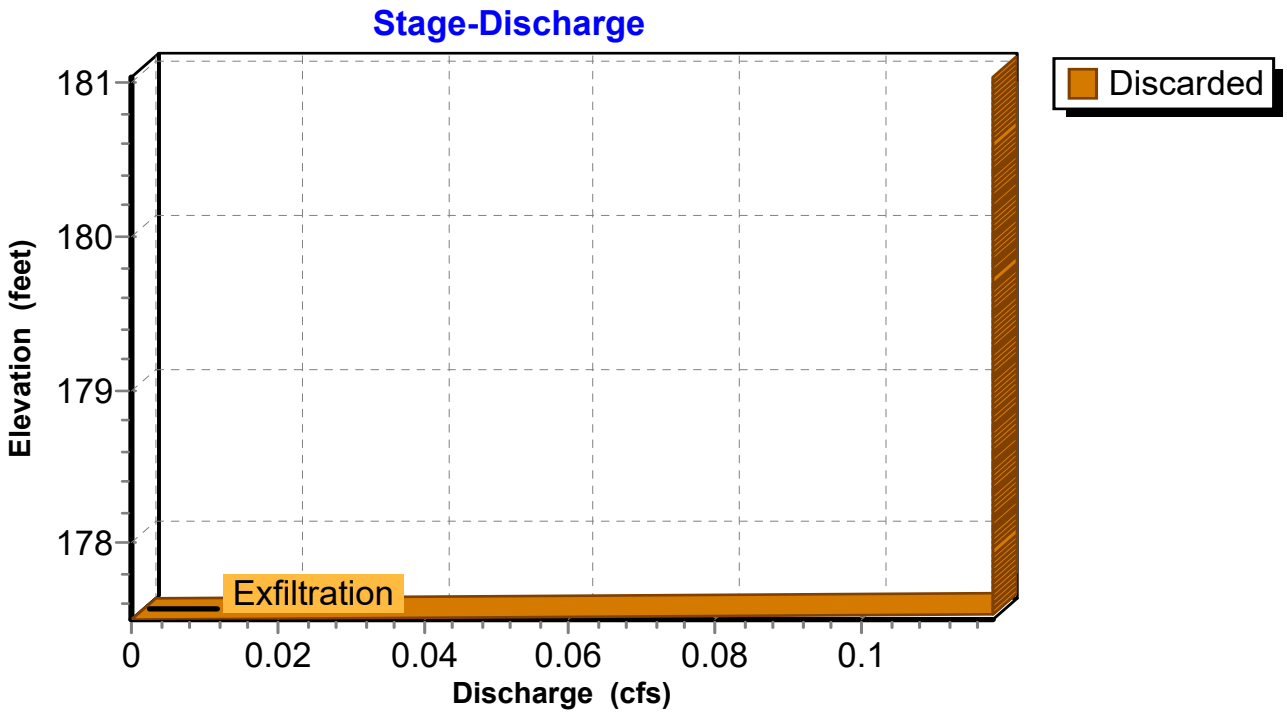




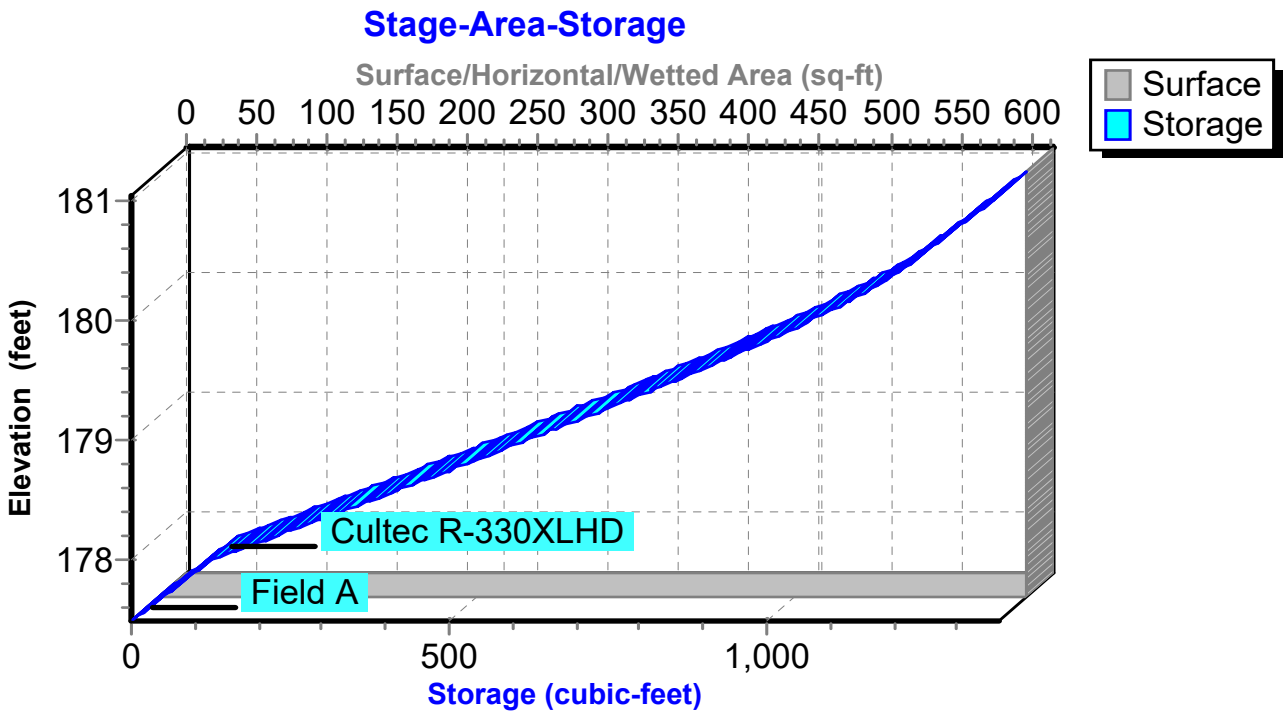
Pond 4P: RB#1



Pond 4P: RB#1



Pond 4P: RB#1


Stage-Area-Storage
Surface/Horizontal/Wetted Area (sq-ft)
0 50 100 150 200 250 300 350 400 450 500 550 600
Surface
Storage
181
180
179
178
Elevation (feet)
Cultec R-330XLHD
Field A
0
500
1,000
Storage (cubic-feet)

Summary for Pond 5P: RB#5

Inflow Area = 7,495 sf, 0.00% Impervious, Inflow Depth = 1.75" for 100-Year event
Inflow = 0.23 cfs @ 12.20 hrs, Volume= 1,096 cf
Outflow = 0.04 cfs @ 12.00 hrs, Volume= 1,096 cf, Atten= 84%, Lag= 0.0 min
Discarded = 0.04 cfs @ 12.00 hrs, Volume= 1,096 cf

Routing by Stor-Ind method, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Peak Elev= 179.52' @ 13.59 hrs Surf.Area= 195 sf Storage= 326 cf

Plug-Flow detention time= 80.1 min calculated for 1,095 cf (100% of inflow)
Center-of-Mass det. time= 80.0 min (974.8 - 894.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	177.00'	184 cf	**11.17'W x 17.50'L x 3.54'H Field A** 692 cf Overall - 231 cf Embedded = 461 cf x 40.0% Voids
#2A	177.50'	231 cf	**Cultec R-330XLHD** x 4 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 2 rows
		415 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	177.00'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.04 cfs @ 12.00 hrs HW=177.05' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

Pond 5P: RB#5 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 2 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

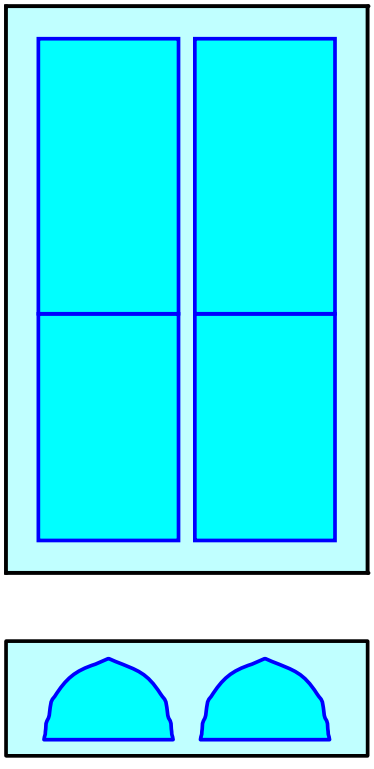
2 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 15.50' Row Length +12.0" End Stone x 2 = 17.50' Base Length
2 Rows x 52.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 11.17' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

4 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 2 Rows = 231.0 cf Chamber Storage

692.1 cf Field - 231.0 cf Chambers = 461.1 cf Stone x 40.0% Voids = 184.4 cf Stone Storage

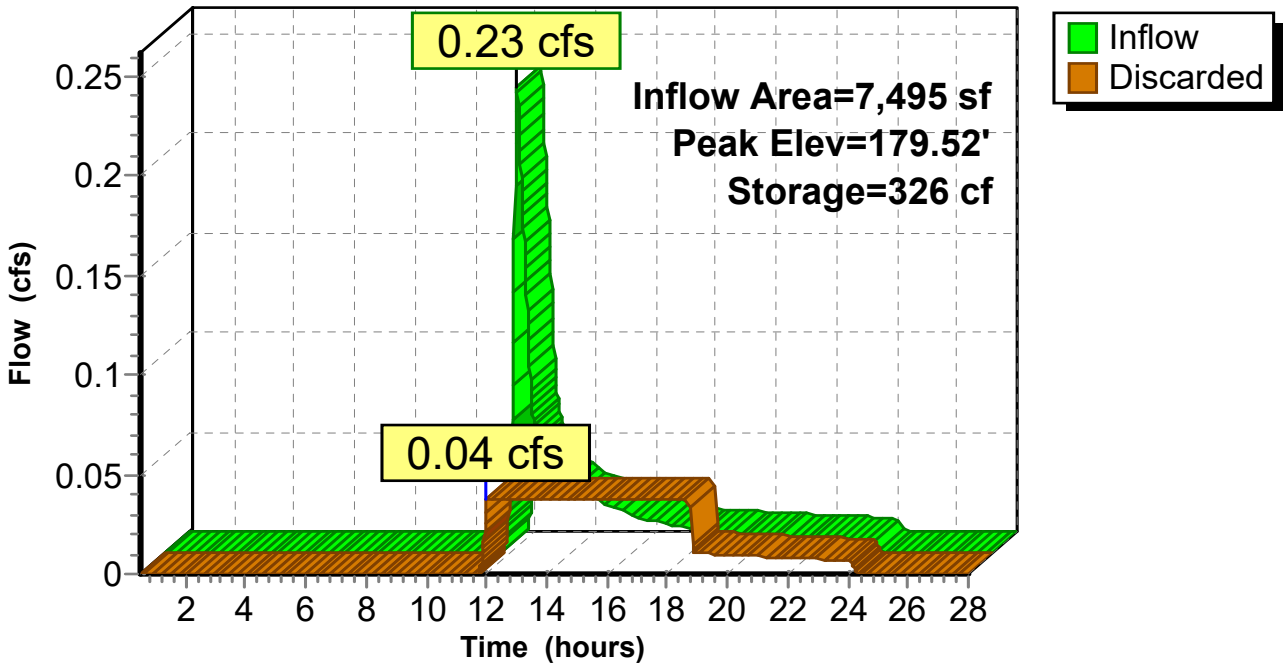
Chamber Storage + Stone Storage = 415.4 cf = 0.010 af
Overall Storage Efficiency = 60.0%
Overall System Size = 17.50' x 11.17' x 3.54'

4 Chambers @ $ 300.00 /ea = $ 1,200.00
25.6 cy Field Excavation @ $ 10.00 /cy = $ 256.33
17.1 cy Stone @ $ 30.00 /cy = $ 512.36
Total Cost = $ 1,968.69



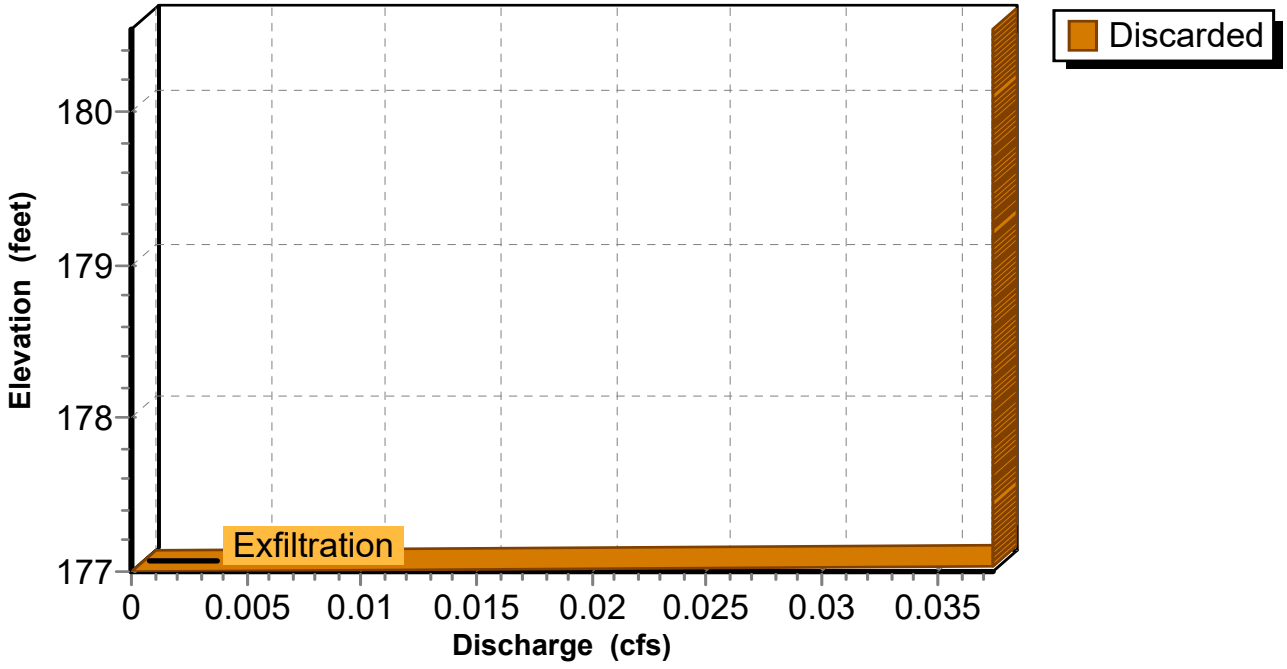
Pond 5P: RB#5

Hydrograph

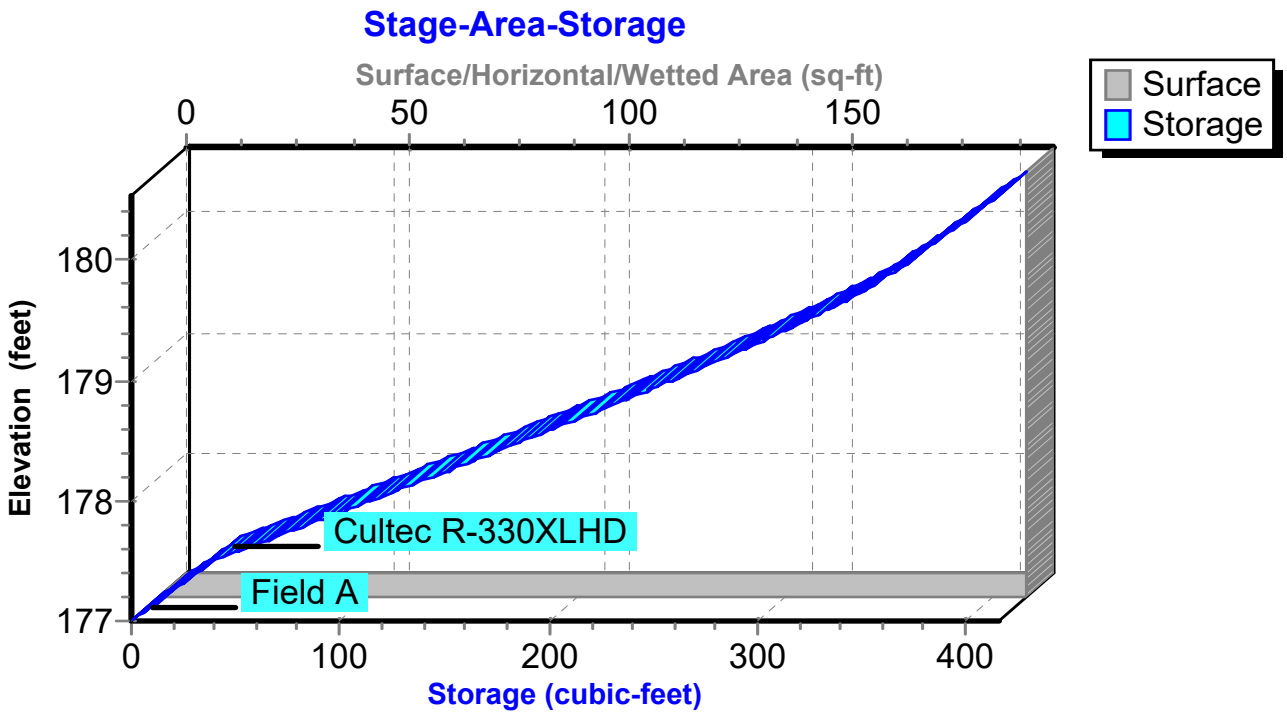


Pond 5P: RB#5

Stage-Discharge



Pond 5P: RB#5


Stage-Area-Storage
Surface/Horizontal/Wetted Area (sq-ft)
0
50
100
150
Surface
Storage
180
179
178
177
Elevation (feet)
Cultec R-330XLHD
Field A
0
100
200
300
400
Storage (cubic-feet)

Summary for Pond 6P: RB#6

Inflow Area = 4,913 sf, 0.00% Impervious, Inflow Depth = 2.18" for 100-Year event
Inflow = 0.26 cfs @ 12.10 hrs, Volume= 894 cf
Outflow = 0.03 cfs @ 11.82 hrs, Volume= 894 cf, Atten= 88%, Lag= 0.0 min
Discarded = 0.03 cfs @ 11.82 hrs, Volume= 894 cf

Routing by Stor-Ind method, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Peak Elev= 177.59' @ 13.40 hrs Surf.Area= 155 sf Storage= 293 cf

Plug-Flow detention time= 90.7 min calculated for 894 cf (100% of inflow)
Center-of-Mass det. time= 90.7 min (966.3 - 875.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	174.50'	153 cf	**6.33'W x 24.50'L x 3.54'H Field A** 550 cf Overall - 168 cf Embedded = 382 cf x 40.0% Voids
#2A	175.00'	168 cf	**Cultec R-330XLHD** x 3 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 1 rows
		320 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	174.50'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.03 cfs @ 11.82 hrs HW=174.54' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Pond 6P: RB#6 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 1 rows

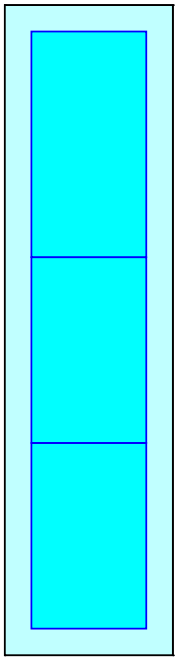
3 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 22.50' Row Length +12.0" End Stone x 2 = 24.50' Base Length
1 Rows x 52.0" Wide + 12.0" Side Stone x 2 = 6.33' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

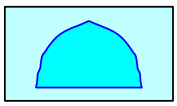
3 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 1 Rows = 167.6 cf Chamber Storage

549.5 cf Field - 167.6 cf Chambers = 381.9 cf Stone x 40.0% Voids = 152.8 cf Stone Storage

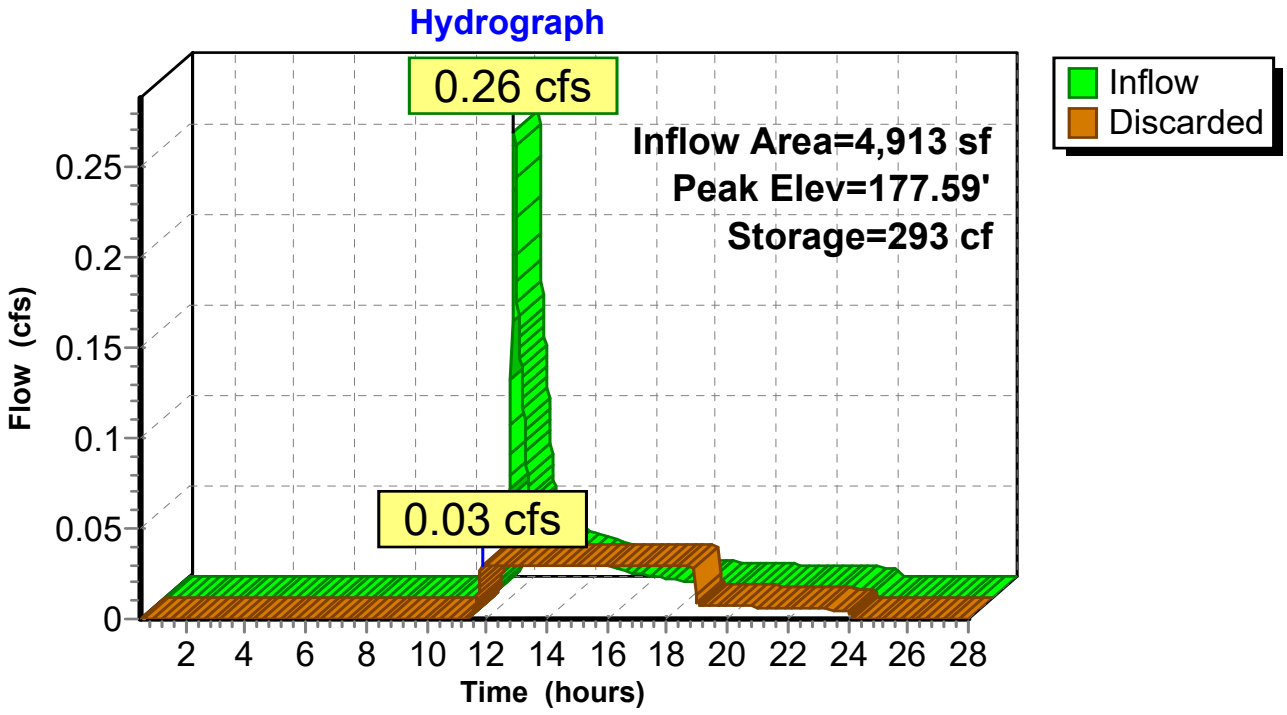
Chamber Storage + Stone Storage = 320.4 cf = 0.007 af
Overall Storage Efficiency = 58.3%
Overall System Size = 24.50' x 6.33' x 3.54'

3 Chambers @ $ 300.00 /ea = $ 900.00
20.4 cy Field Excavation @ $ 10.00 /cy = $ 203.54
14.1 cy Stone @ $ 30.00 /cy = $ 424.33
Total Cost = $ 1,527.87

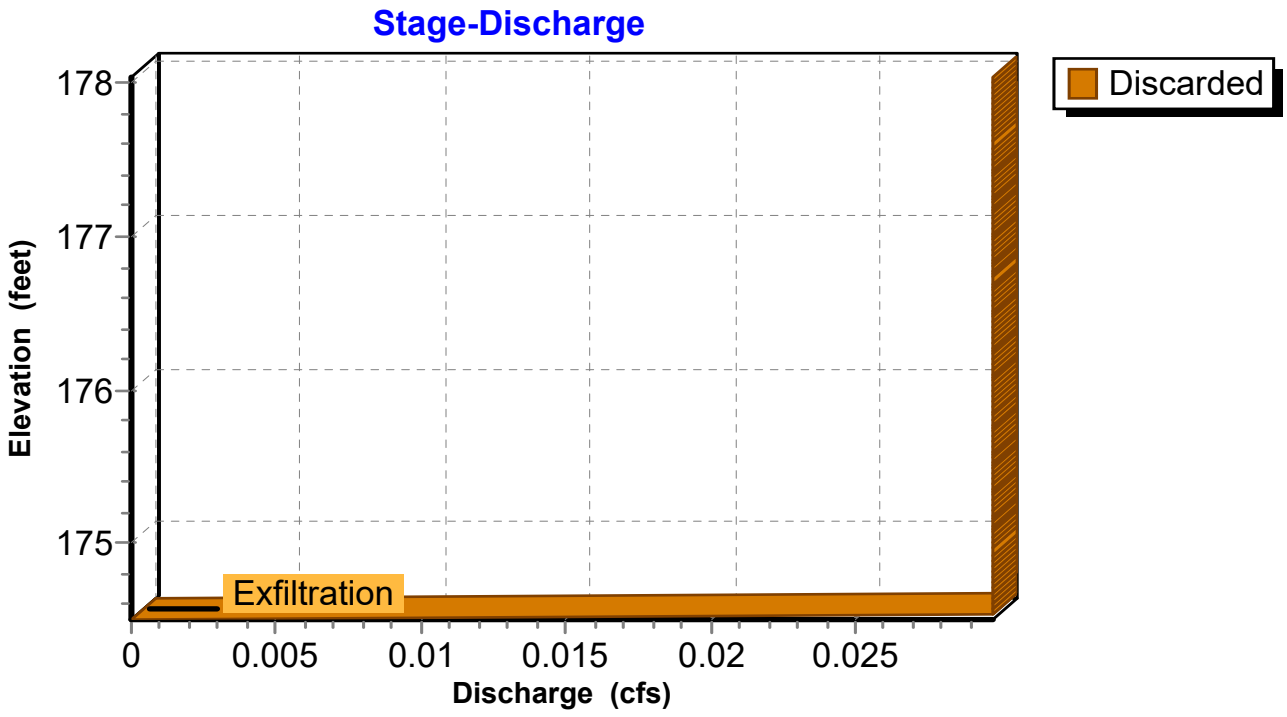




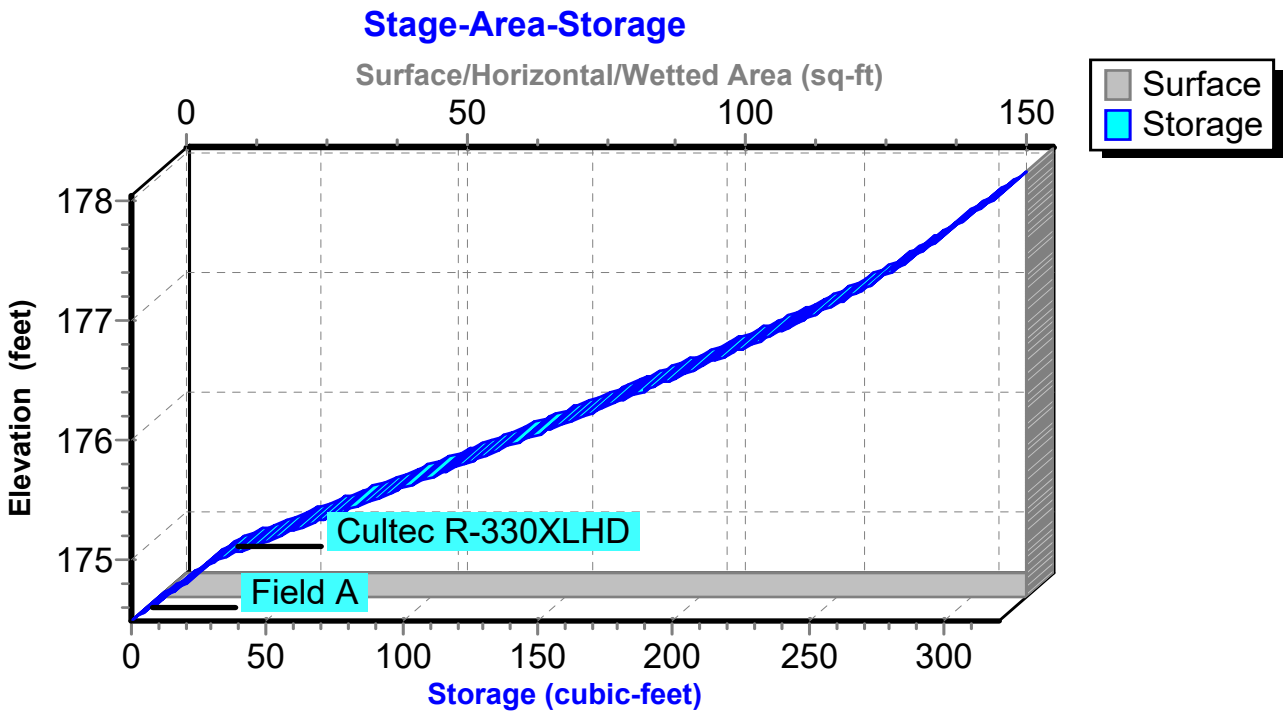
Pond 6P: RB#6



Pond 6P: RB#6



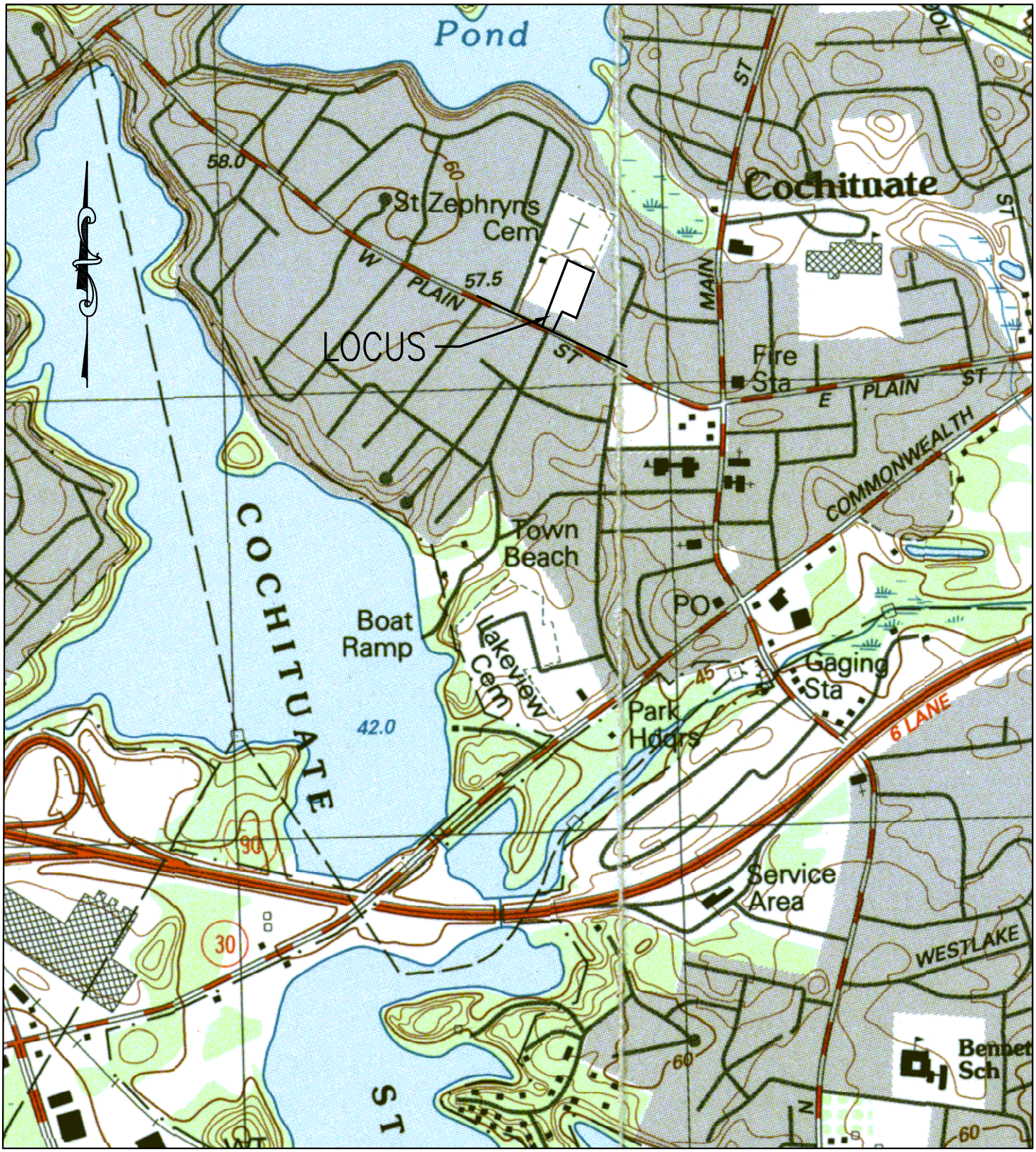
Pond 6P: RB#6


Stage-Area-Storage
Surface/Horizontal/Wetted Area (sq-ft)
0
50
100
150
Surface
Storage
178
177
176
175
Elevation (feet)
Cultec R-330XLHD
Field A
0
50
100
150
200
250
300
Storage (cubic-feet)

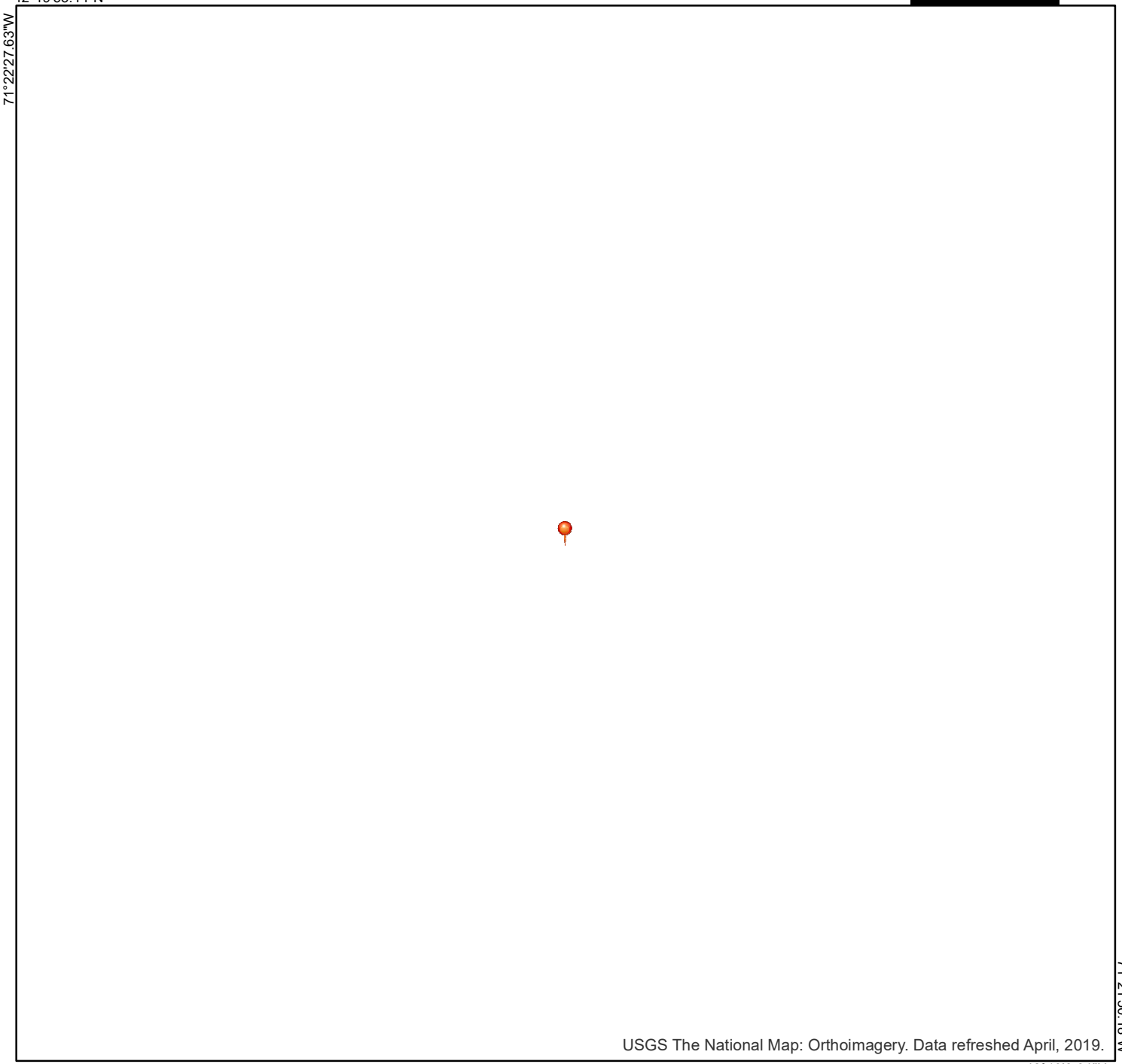
Section III: Figures

LOCUS MAP

81 WEST PLAIN STREET, WAYLAND



National Flood Hazard Layer FIRMette



Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance / Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

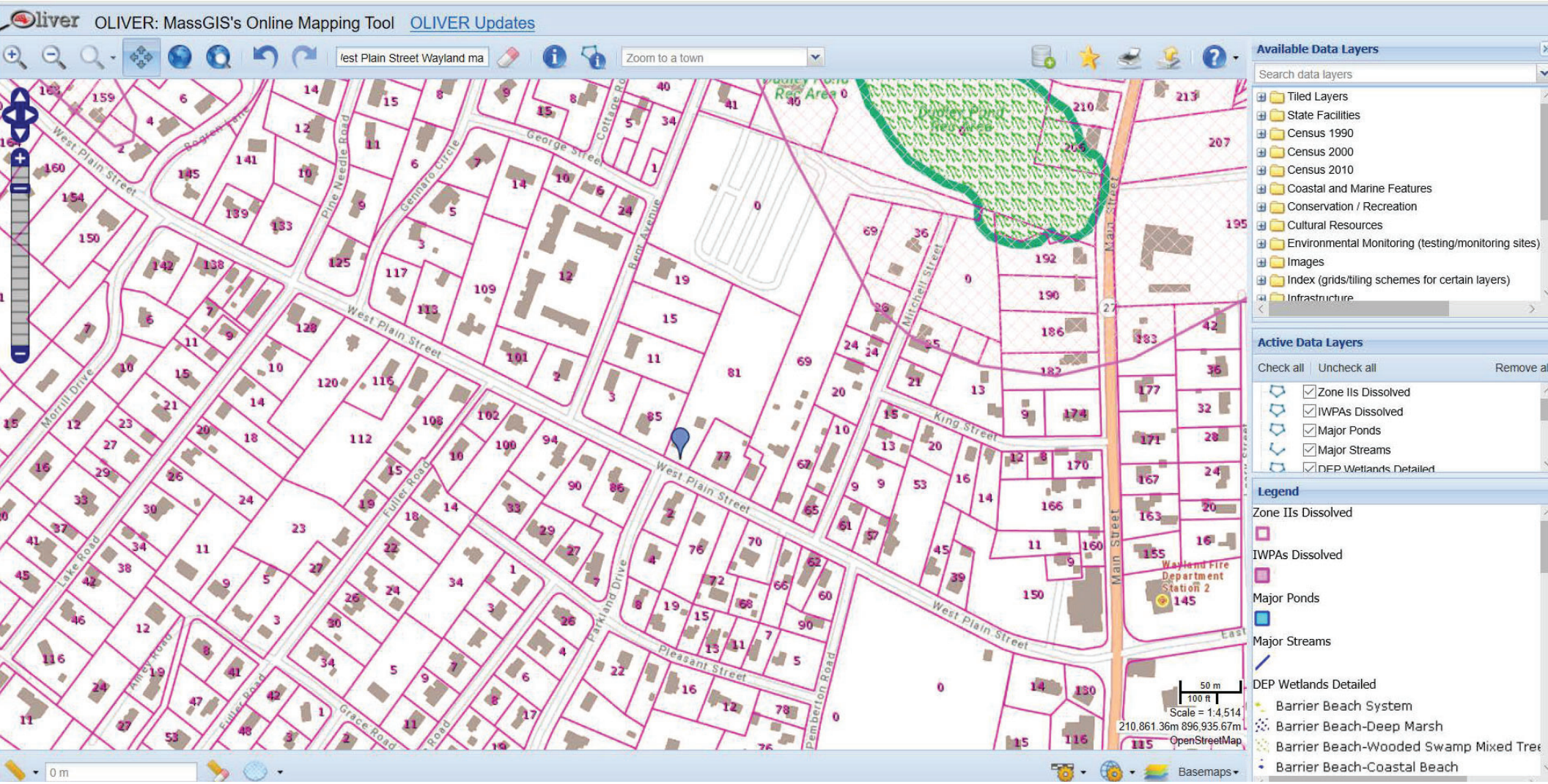
N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 1/25/2020 at 9:40:53 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.


OLIVER: MassGIS's Online Mapping Tool
OLIVER Updates
Zoom to a town
Available Data Layers
Search data layers
Tiled Layers
State Facilities
Census 1990
Census 2000
Census 2010
Coastal and Marine Features
Conservation / Recreation
Cultural Resources
Environmental Monitoring (testing/monitoring sites)
Images
Index (grids/tiling schemes for certain layers)
Infrastructure
Active Data Layers
Check all
Uncheck all
Zone IIs Dissolved
IWPAs Dissolved
Major Ponds
Major Streams
Legend
Zone IIs Dissolved
IWPAs Dissolved
Major Ponds
Major Streams
DEP Wetlands Detailed
Barrier Beach System
Barrier Beach-Deep Marsh
Barrier Beach-Wooded Swamp Mixed Tree
Barrier Beach-Coastal Beach
West Plain Street
George Street
Pine Needle Road
Gennaro Circle
Bent Avenue
Mitchell Street
King Street
Main Street
Morrill Drive
Lake Road
Fuller Road
Parkland Drive
Pleasant Street
Pemberton Road
Grace Road
Wayland Fire Department Station 2
50 m
100 ft
Scale = 1:4,514
210,861.36m 896,935.67m
OpenStreetMap
Basemaps
0 m

Extreme Precipitation Tables

Northeast Regional Climate Center

Data represents point estimates calculated from partial duration series. All precipitation amounts are displayed in inches.

Smoothing	Yes
State	Massachusetts
Location	
Longitude	71.369 degrees West
Latitude	42.323 degrees North
Elevation	0 feet
Date/Time	Tue, 28 Jan 2020 12:35:43 -0500

Extreme Precipitation Estimates

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.28	0.43	0.54	0.71	0.88	1.11	**1yr**	0.76	1.05	1.29	1.63	2.07	2.63	2.85	**1yr**	2.33	2.74	3.22	3.88	4.54	**1yr**
2yr	0.35	0.54	0.67	0.88	1.11	1.40	**2yr**	0.96	1.28	1.61	2.02	2.53	3.16	3.48	**2yr**	2.80	3.34	3.85	4.58	5.21	**2yr**
5yr	0.42	0.65	0.81	1.09	1.39	1.76	**5yr**	1.20	1.60	2.05	2.56	3.19	3.97	4.43	**5yr**	3.51	4.26	4.89	5.81	6.49	**5yr**
10yr	0.47	0.74	0.93	1.27	1.65	2.11	**10yr**	1.42	1.90	2.45	3.07	3.82	4.72	5.32	**10yr**	4.18	5.11	5.86	6.95	7.68	**10yr**
25yr	0.55	0.88	1.12	1.55	2.07	2.67	**25yr**	1.78	2.37	3.12	3.91	4.84	5.94	6.78	**25yr**	5.26	6.52	7.46	8.80	9.58	**25yr**
50yr	0.63	1.01	1.30	1.83	2.46	3.20	**50yr**	2.12	2.81	3.74	4.69	5.79	7.07	8.15	**50yr**	6.26	7.84	8.96	10.54	11.34	**50yr**
100yr	0.72	1.17	1.51	2.14	2.93	3.84	**100yr**	2.53	3.33	4.49	5.62	6.92	8.43	9.81	**100yr**	7.46	9.43	10.76	12.62	13.42	**100yr**
200yr	0.84	1.36	1.77	2.53	3.49	4.59	**200yr**	3.01	3.95	5.38	6.73	8.27	10.04	11.81	**200yr**	8.89	11.35	12.93	15.11	15.89	**200yr**
500yr	1.01	1.67	2.17	3.15	4.40	5.82	**500yr**	3.80	4.96	6.84	8.55	10.48	12.67	15.10	**500yr**	11.22	14.52	16.49	19.19	19.87	**500yr**

Lower Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.22	0.34	0.42	0.56	0.69	0.84	**1yr**	0.60	0.82	1.00	1.43	1.78	2.41	2.60	**1yr**	2.13	2.50	2.97	3.40	3.93	**1yr**
2yr	0.33	0.52	0.63	0.86	1.06	1.26	**2yr**	0.91	1.23	1.43	1.89	2.42	3.07	3.36	**2yr**	2.71	3.23	3.72	4.46	5.08	**2yr**
5yr	0.38	0.58	0.72	0.99	1.26	1.49	**5yr**	1.09	1.45	1.72	2.24	2.86	3.66	4.03	**5yr**	3.24	3.88	4.47	5.42	6.08	**5yr**
10yr	0.42	0.64	0.80	1.11	1.44	1.68	**10yr**	1.24	1.64	1.87	2.52	3.22	4.17	4.62	**10yr**	3.69	4.44	5.10	6.30	6.96	**10yr**
25yr	0.47	0.72	0.90	1.28	1.68	1.97	**25yr**	1.45	1.92	2.18	2.97	3.79	4.96	5.53	**25yr**	4.39	5.31	6.03	7.69	8.33	**25yr**
50yr	0.51	0.78	0.97	1.40	1.88	2.22	**50yr**	1.62	2.17	2.44	3.36	4.27	5.66	6.29	**50yr**	5.01	6.05	6.81	8.95	9.56	**50yr**
100yr	0.55	0.84	1.05	1.51	2.07	2.50	**100yr**	1.79	2.45	2.73	3.40	4.83	6.46	7.15	**100yr**	5.72	6.88	7.69	10.43	10.98	**100yr**
200yr	0.59	0.89	1.13	1.64	2.29	2.82	**200yr**	1.98	2.76	3.06	3.77	5.47	7.38	8.10	**200yr**	6.53	7.79	8.67	12.17	12.61	**200yr**
500yr	0.65	0.97	1.25	1.82	2.59	3.31	**500yr**	2.23	3.23	3.54	4.30	6.47	8.82	9.53	**500yr**	7.80	9.16	10.07	14.98	15.16	**500yr**

Upper Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.32	0.49	0.60	0.81	1.00	1.20	**1yr**	0.86	1.18	1.36	1.82	2.29	2.82	3.10	**1yr**	2.50	2.98	3.48	4.15	4.90	**1yr**
2yr	0.37	0.57	0.71	0.96	1.18	1.37	**2yr**	1.02	1.34	1.58	2.08	2.66	3.29	3.63	**2yr**	2.91	3.49	4.03	4.73	5.38	**2yr**
5yr	0.46	0.71	0.88	1.20	1.53	1.81	**5yr**	1.32	1.77	2.04	2.63	3.33	4.34	4.83	**5yr**	3.84	4.65	5.28	6.23	6.94	**5yr**
10yr	0.55	0.84	1.05	1.46	1.89	2.26	**10yr**	1.63	2.21	2.59	3.18	3.99	5.35	6.04	**10yr**	4.74	5.81	6.54	7.71	8.42	**10yr**
25yr	0.71	1.08	1.34	1.91	2.52	3.00	**25yr**	2.17	2.93	3.45	4.10	5.09	7.08	8.13	**25yr**	6.26	7.82	8.69	10.16	10.90	**25yr**
50yr	0.86	1.30	1.62	2.33	3.14	3.73	**50yr**	2.71	3.64	4.29	4.97	6.12	8.74	10.20	**50yr**	7.74	9.81	10.82	12.52	13.26	**50yr**
100yr	1.04	1.58	1.97	2.85	3.91	4.64	**100yr**	3.37	4.54	5.34	6.70	7.35	10.81	12.81	**100yr**	9.56	12.32	13.48	15.44	16.13	**100yr**
200yr	1.27	1.91	2.42	3.50	4.88	5.77	**200yr**	4.21	5.64	6.66	8.27	8.82	13.36	16.09	**200yr**	11.83	15.47	16.81	19.01	19.59	**200yr**
500yr	1.66	2.47	3.18	4.62	6.57	7.65	**500yr**	5.67	7.48	8.90	10.94	11.24	17.71	21.75	**500yr**	15.67	20.92	22.55	25.05	25.36	**500yr**

Powered by ACIS
Northeast Regional Climate Center

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 Middlesex County, Massachusetts

81 West Plain Street, Wayland

January 25, 2020

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://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

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 Web Soil Survey, the site for official soil survey information.

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PERCOLATION TEST DATA

TESTING DATE: 10/22/19

PERC. TEST	PT #100*	PT #101*	PT #102*	PT #103*
DEPTH OF PERC	3.8'–4.8'	3.6'–4.6'	4.1'–5.1'	3.8'–4.8'
RATE (MPI)	<2 MPI	<2 MPI	<2 MPI	<2 MPI

DEEP TEST HOLE DATA

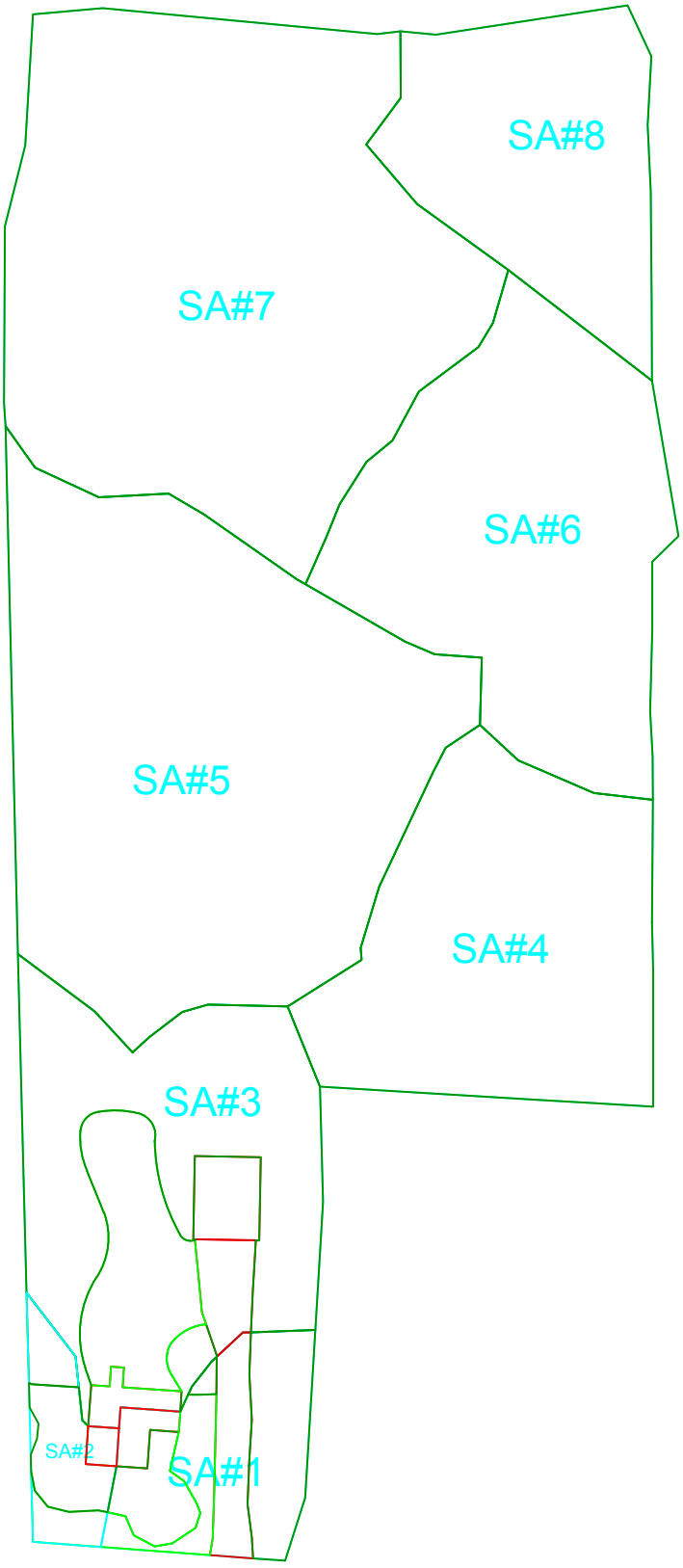
TESTING DATE: 10/22/19

DEEP TEST HOLE	DTH #100*	DTH #101*	DTH #102*	DTH #103*
A	0.0'–0.5' LOAM 10 YR 3/6	0.0'–0.8' LOAM 10 YR 3/6	0.0'–1.0' LOAM 10 YR 3/6	0.0'–1.0' LOAM 10 YR 3/6
B	0.5'–2.0' LOAMY SAND 10 YR 4/6	0.8'–2.0' LOAMY SAND 10 YR 4/6	1.0'–2.5' SANDY LOAM 10 YR 3/6	1.0'–2.5' SANDY LOAM 10 YR 4/6
C_1	2.0'–7.5' COARSE SAND 10 YR 4/4	2.0'–11.5' FINE SAND COARSE SAND 10 YR 3/6	2.5'–11.5' FINE SAND COARSE SAND 10 YR 3/6	2.5'–11.5' COARSE SAND 10 YR 4/4
C_2	7.5'–11.5' FINE SAND 2.5 Y 5/3	——	——	——
PARENT MATERIAL	SAND & GRAVEL	SAND & GRAVEL	SAND & GRAVEL	SAND & GRAVEL
GROUNDWATER	N/A (DRY HOLE)	N/A (DRY HOLE)	N/A (DRY HOLE)	N/A (DRY HOLE)
DEEP TEST HOLE	DTH #103*	DTH #104*	DTH #105**	DTH #106**
A	0.0'–1.0' LOAM 10 YR 3/6	0.0'–1.0' LOAM 10 YR 3/6	0.0'–1.0' LOAM 10 YR 3/6	0.0'–1.2' LOAM 10 YR 3/6
B	1.0'–2.5' SANDY LOAM 10 YR 4/6	1.0'–2.5' LOAMY SAND 10 YR 4/6	1.0'–2.5' LOAMY SAND 10 YR 4/6	1.2'–2.5' LOAMY SAND 10 YR 4/6
C_1	2.5'–11.5' COARSE SAND 10 YR 4/4	3.2'–4.4' FINE SAND COARSE SAND 10 YR 4/4	2.5'–11.5' COARSE SAND 10 YR 4/4	2.5'–11.5' COARSE SAND 10 YR 4/4
C_2	——	——	——	——
PARENT MATERIAL	SAND & GRAVEL	SAND & GRAVEL	SAND & GRAVEL	SAND & GRAVEL
GROUNDWATER	N/A (DRY HOLE)	N/A (DRY HOLE)	N/A (DRY HOLE)	N/A (DRY HOLE)

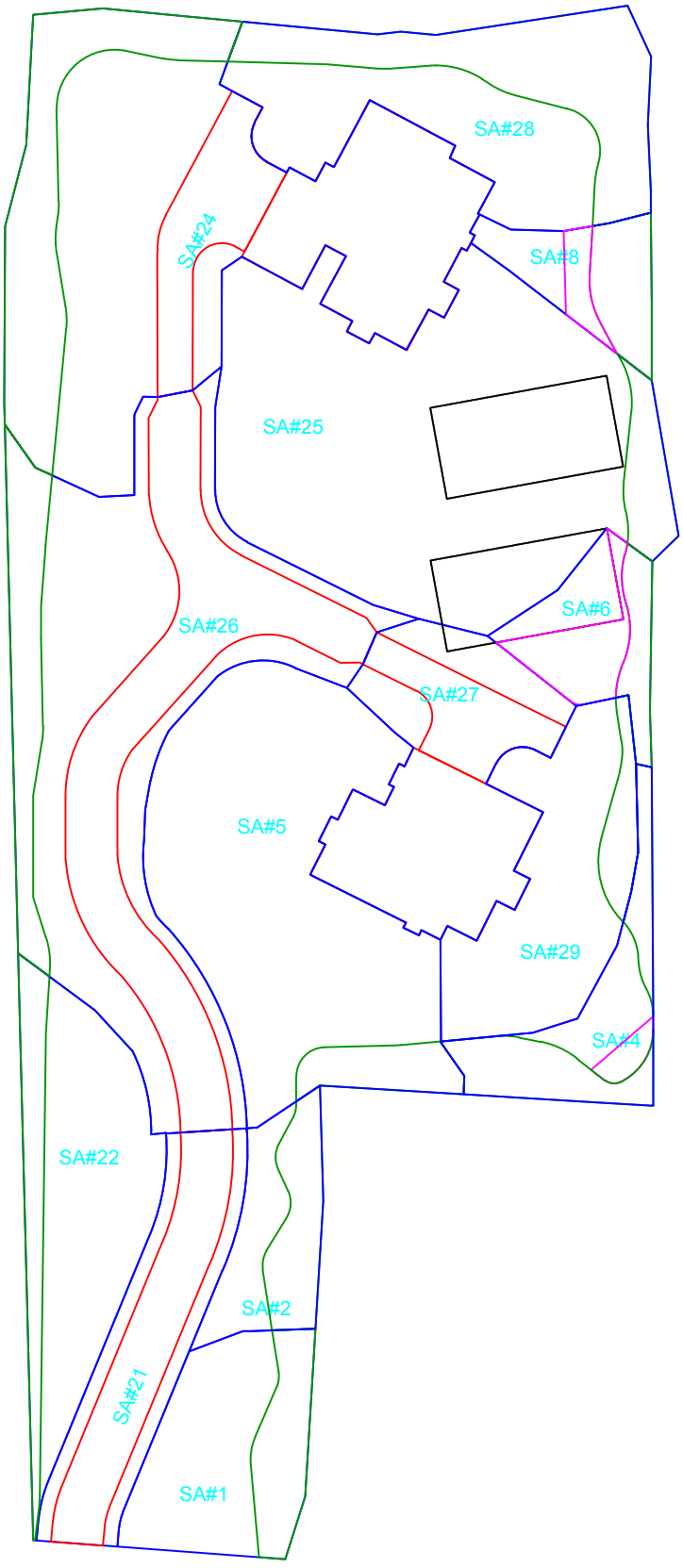
* WITNESSED BY WAYLAND BOARD OF HEALTH AGENT

** NOT WITNESSED BY WAYLAND BOARD OF HEALTH AGENT

PRE-DEVELOPMENT WATERSHEDS



POST DEVELOPMENT WATERSHEDS



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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.

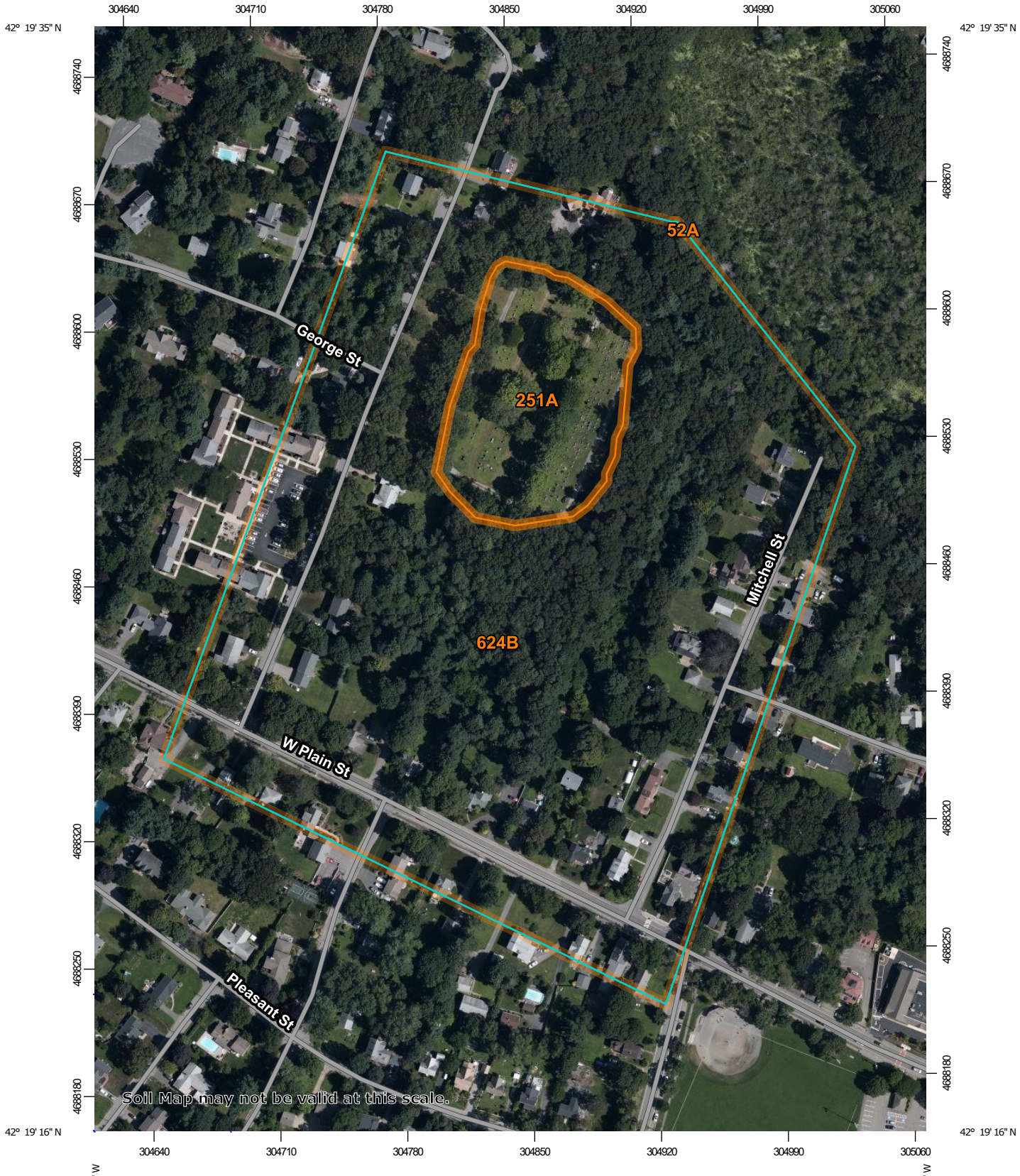
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

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 (81 West Plain Street, Wayland)



Map Scale: 1:2,960 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 40 80 160 240

Feet: 0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

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

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

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

Soil Survey Area: Middlesex County, Massachusetts
Survey Area Data: Version 19, Sep 12, 2019

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

Date(s) aerial images were photographed: Jul 28, 2019—Aug 15, 2019

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

Map Unit Legend (81 West Plain Street, Wayland)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
52A	Freetown muck, 0 to 1 percent slopes	0.0	0.0%
251A	Haven silt loam, 0 to 3 percent slopes	2.9	10.4%
624B	Haven-Urban land complex, 0 to 8 percent slopes	24.6	89.6%
Totals for Area of Interest		**27.4**	**100.0%**

Map Unit Descriptions (81 West Plain Street, Wayland)

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.

Middlesex County, Massachusetts

52A—Freetown muck, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2t2q9
Elevation: 0 to 1,110 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Freetown and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Freetown

Setting

Landform: Kettles, depressions, depressions, bogs, marshes, swamps
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Highly decomposed organic material

Typical profile

Oe - 0 to 2 inches: mucky peat
Oa - 2 to 79 inches: muck

Properties and qualities

Slope: 0 to 1 percent
Percent of area covered with surface fragments: 0.0 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: Rare
Frequency of ponding: Frequent
Available water storage in profile: Very high (about 19.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: B/D
Hydric soil rating: Yes

Minor Components

Swansea

Percent of map unit: 5 percent
Landform: Kettles, depressions, depressions, marshes, bogs, swamps
Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Scarboro

Percent of map unit: 5 percent
Landform: Depressions, drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope, tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Whitman

Percent of map unit: 5 percent
Landform: Depressions, drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

251A—Haven silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: vqpb
Elevation: 100 to 1,000 feet
Mean annual precipitation: 45 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 145 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Haven and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Haven

Setting

Landform: Plains, terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, rise
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Friable loamy eolian deposits over loose sandy glaciofluvial deposits

Typical profile

H1 - 0 to 2 inches: silt loam

H2 - 2 to 20 inches: silt loam
H3 - 20 to 32 inches: very fine sandy loam
H4 - 32 to 65 inches: stratified coarse sand to sand to fine sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 18 to 36 inches to strongly contrasting textural stratification
Natural 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 storage in profile: Low (about 4.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 1
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Merrimac

Percent of map unit: 9 percent
Landform: Plains, terraces
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Tread, rise
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Scio

Percent of map unit: 5 percent
Landform: Depressions, terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: No

Unnamed

Percent of map unit: 1 percent

624B—Haven-Urban land complex, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9956
Elevation: 0 to 1,000 feet
Mean annual precipitation: 45 to 54 inches

Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Haven and similar soils: 40 percent
Urban land: 40 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Haven

Setting

Landform: Terraces, plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, rise
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Friable loamy eolian deposits over loose sandy glaciofluvial deposits

Typical profile

H1 - 0 to 2 inches: silt loam
H2 - 2 to 20 inches: silt loam
H3 - 20 to 32 inches: very fine sandy loam
H4 - 32 to 65 inches: stratified coarse sand to sand to fine sand

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: 18 to 36 inches to strongly contrasting textural stratification
Natural 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 storage in profile: Low (about 4.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: A
Hydric soil rating: No

Description of Urban Land

Setting

Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Excavated and filled land

Minor Components

Tisbury

Percent of map unit: 10 percent
Landform: Terraces, plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: No

Hinckley

Percent of map unit: 5 percent
Landform: Eskers, terraces, ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

Merrimac

Percent of map unit: 5 percent
Landform: Terraces, plains
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Tread, rise
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

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Section IV: Pipe Capacity Calculations

Pipe Capacity

RB#1

Q=CiA

A (pavement)	2720	0.9	2448
A (grass)	6069	0.5	3034.5
A (trees)	1178	0.2	235.6
A_{Total}	9967	0.57	5718

C=	0.57	
A=	9,967	(square feet)
A=	0.23	(acres)
i_{25}	5.94	(25 yr-24hr)
i_{100}	7.32	(100 yr-24hr)

Q_{25}=	0.78	cfs
Q_{100}=	0.96	cfs

Pipe Capacity

Q=1.486/n (A) ($R^{2/3}$) ($S^{1/2}$) (7.48) (60)

Pipe Dia=	8	Inches
n=	0.013	
S=	0.012	ft/ft
A= ∏ r^2	0.349	sf

Q = 1.486 /(0.013) (0.349) (0.166666666666667 ^2/3) (0.

Q=	1.33	cfs

Pipe Capacity

RB#2

Q=CiA

A (pavement)	6107	0.9	5496.3
A (grass)	19589	0.5	9794.5
A (trees)	847	0.2	169.4
A_{Total}	26543	0.58	15460

C=	0.58	
A=	26,543	(square feet)
A=	0.61	(acres)
i_{25}	6.09	(25 yr-5min)
i_{100}	7.32	(100 yr-5min)

Q_{25}=	2.16	cfs
Q_{100}=	2.60	cfs

Pipe Capacity

Q=1.486/n (A) ($R^{2/3}$) ($S^{1/2}$) (7.48) (60)

Pipe Dia=	8	Inches
n=	0.013	
S=	0.036	ft/ft
A= ∏ r^2	0.349	sf

Q = 1.486 /(0.013) (0.349) (0.166666666666667 ^2/3) (0.

Q= 2.30 cfs

Pipe Capacity

RB#3

Q=CiA

A (pavement)	1948	0.9	1753.2
A (grass)	1056	0.5	528
A (trees)	0	0.2	0
A_{Total}	3004	0.76	2281

C=	0.76	
A=	3,004	(square feet)
A=	0.07	(acres)
i_{25}	6.09	(25 yr-5min)
i_{100}	7.32	(100 yr-5min)
Q_{25}=	0.32	cfs
Q_{100}=	0.38	cfs

Pipe Capacity

$Q=1.486/n\ (A)\ (R^{2/3})\ (S^{1/2})\ (7.48)\ (60)$

Pipe Dia=	6	Inches
n=	0.013	
S=	0.004	ft/ft
A= $\prod r^2$	0.196	sf

Q = 1.486 /(0.013) (0.196) (0.125 ^2/3) (0.004 ^1/2)

Q=	0.36	cfs

Pipe Capacity

RB#4

Q=CiA

A (pavement)	1384	0.9	1245.6
A (grass)	800	0.5	400
A (trees)	0	0.2	0
A_{Total}	2184	0.75	1646

C=	0.75	
A=	2,184	(square feet)
A=	0.05	(acres)
i_{25}	6.09	(25 yr-5min)
i_{100}	7.32	(100 yr-5min)

Q_{25}=	0.23	cfs
Q_{100}=	0.28	cfs

Pipe Capacity

$Q=1.486/n\ (A)\ (R^{2/3})\ (S^{1/2})\ (7.48)\ (60)$

Pipe Dia=	6	Inches
n=	0.013	
S=	0.004	ft/ft
$A= \prod r^2$	0.196	sf

Q = 1.486 /(0.013) (0.196) (0.125 ^2/3) (0.004 ^1/2)

Q=	0.36	cfs

Section V: Operation & Maintenance

OPERATION AND MAINTENANCE PLAN
PROPOSED DRAINAGE SYSTEM – DURING CONSTRUCTION
81 West Plain Street
Wayland, MA 01778

Owner:

Party Responsible for Operation and Maintenance:

Silver Leaf Homes
30 West Main Street
Hopkinton, MA 01748
Contact:britton.bradford@gmail.com

Source of Funding:

Operation and Maintenance of this stormwater management system will be the responsibility of the property owner to include its successor and/or assigns, as the same may appear on record with the appropriate register of deeds.

During Construction:

Construction activities shall follow the Construction Sequence shown on the approved plan. During periods of active construction the stormwater management system shall be inspected on a weekly basis and within 24 hours of a storm event of greater than ½". Maintenance tasks shall be performed monthly or after significant rainfall events of 1" of rain or greater. During construction, silt-laden runoff shall be prevented from entering the drainage system and off-site properties. Temporary swales shall be constructed as needed during construction to direct runoff to sediment traps.Infiltration systems shall not be placed in service until after the installation of base course pavement and vegetative stabilization of the areas contributing to the systems.

During dewatering operations, all water pumped from the dewatering shall be directed to a "dirt bag" pumped sediment removal system (or approved equal) as manufactured by ACF Environmental. The unit shall be placed on a crushed stone blanket. Disposal of such "dirt bag" shall occur when the device is full and can no longer effectively filter sediment or allow water to pass at a reasonable flow rate. Disposal of this unit shall be the responsibility of the contractor and shall be as directed by the owner in accordance with applicable local, state, and federal guidelines and regulations.

Stabilized construction entrances shall be placed at the entrances and shall consist of 1½" to 2" stone and be constructed as shown on the approved plans. The construction entrances shall be inspected daily or as needed.

All erosion and sedimentation control measures shall be in place prior to the commencement of any site work or earthwork operations, shall be maintained during construction, and shall remain in place until all site work is complete and ground cover is established.

Heavy equipment shall not be used on the bottoms of the chamber system beds.

All exposed soils not to be paved shall be stabilized as soon as practical. Seed mixes shall only be applied during appropriate periods as recommended by the seed supplier, typically May 1 to October 15. Any exposed soils that cannot be stabilized by vegetation during these dates shall be stabilized with hay bales, hay mulch, check dams, jute netting or other acceptable means.

Once each structure is in place, it should be maintained in accordance with the procedures described in the post-construction Operations and Maintenance Plan.

During dry periods where dust is created by construction activities the following control measures should be implemented.

- Sprinkling – The contractor may sprinkle the ground along haul roads and traffic areas until moist.
- Vegetative cover – Areas that are not expected to be disturbed regularly may be stabilized with vegetative cover.
- Mulch – Mulching can be used as a quick and effective means of dust control in recently disturbed areas.
- Spray on chemical soil treatments may be utilized. Application rates shall conform to manufacturers recommendations.
- Water cannon spray may be used along haul roads and traffic areas until moist.

Inspections

The Owner shall be responsible to secure the services of a Professional Engineer to perform inspections as required. Inspections during periods of active construction shall be weekly and within 24 hours of a storm event of greater than ½ “. The Professional Engineer shall perform inspections to insure that the approved plan is being followed with particular attention to the Planning Board Approval and the Construction Sequencing. The Engineer shall be responsible for inspecting the roadway construction and the construction of the stormwater management system. The Engineer shall prepare and submit to the Planning Board, the Inspection Schedule and Evaluation Checklist (see attached) and, if necessary, request the required maintenance and/or repair of the necessary items. This form shall be stamped by the Engineer and the Owner shall be notified that specific changes and/or repairs are necessary.

For additional information, refer to Performance, Standards and Guidelines for Stormwater Management in Massachusetts, published by the Department of Environmental Protection.

STORMWATER MANAGEMENT
BEST MANAGEMENT PRACTICES
INSPECTION SCHEDULE AND EVALUATION CHECKLIST – CONSTRUCTION PHASE

PROJECT LOCATION: 81 West Plain Street – Wayland, MA Latest Revision: 02/04/20

Stormwater Control Manager: _____ **Stamp**

Best Management Practice	Inspection Frequency (1)	Date Inspected	Inspector	Minimum Maintenance and Key Items to Check	Cleaning/ Repair Needed yes/no List items	Date of Cleaning/Repair	Performed By	Water Level in Detention System
Silt fence & silt traps	After every major storm event							
Deep Sump Catch Basins	Weekly or after major storm event.							
Deep Sump Manholes	Weekly or after major storm event.							
Subsurface Infiltration System(s)	Weekly or after major storm event.							
Dewatering Operations	Daily-during actual dewatering							
Temporary Construction Entrance	Daily or as needed.							

(1) Refer to the Massachusetts Stormwater Management, Volume Two: Stormwater Technical Handbook for recommendations regarding frequency for inspection and maintenance of specific BMPs.

Limited or no use of sodium chloride salts, fertilizers or pesticides recommended. Slow release fertilizer recommended.
Other notes:(Include deviations from: Con Com Order of Conditions, PB Approval, Construction Sequence and Approved Plan)

OPERATION AND MAINTENANCE PLAN
PROPOSED DRAINAGE SYSTEM – POST CONSTRUCTION
81 West Plain Street
Wayland, MA 01778

Owner:

Party Responsible for Operation and Maintenance:

Silver Leaf Homes
30 West Main Street
Hopkinton, MA 01748
Contact:britton.bradford@gmail.com

Source of Funding:
Operation and Maintenance of this stormwater management system will be the responsibility of the owner and shall include its successor and/or assigns or future homeowners association, as the same may appear on record with the appropriate registry of deeds

Post Construction Inspection and Maintenance:

Street Sweeping

Streets shall be swept at least two times per year. Sweeping shall be completed during the early spring, no later than May 1st, and before sediment from construction yard operations is washed into the drainage system. Disposal of the accumulated sediment shall be in accordance with applicable local, state, and federal guidelines and regulations.

Deep Sump Catch Basins

Deep sump catch basins shall become part of the roadway system and shall be inspected after every major storm event during construction and cleaned when sediment exceeds 18" depth.

Subsurface Structures

Responsibility for maintenance: Owner

After construction, the subsurface structures shall be inspected for proper function and stabilization after every major storm event until the lot is completely developed and stabilized. Inspect each subsurface structure at least twice per year or if lack of performance is observed and perform necessary corrective measures to maintain infiltration capacity; as required by the Stormwater Management Policy.

Lawn Fertilization

Lawn fertilizer shall be slow release and limited to 3 lbs per 1000 s.f. per year.

Snow Management

Snow shall be collected and stored adjacent to the road and driveway as shown on the plans. The party responsible for snow plowing is the party listed at the beginning of the Operation and Maintenance Plan.

Records

Records of inspection and maintenance shall be kept up to date and available for review and inspection by the Town's official, if requested.

Estimated Annual Budget

TOTAL:	$750 - $1,500

This estimated O&M ANNUAL BUDGET has been formulated by the Declarant. It does not include items that are unknown or unlikely to occur. Actual annual costs to comply with the Approved O&M Plan requirements will be determined annually and billed to each unit owner based upon each unit owners interest in the Condominium.

STORMWATER MANAGEMENT
BEST MANAGEMENT PRACTICES

INSPECTION SCHEDULE AND EVALUATION CHECKLIST – POST CONSTRUCTION PHASE

PROJECT LOCATION: 81 West Plain Street –Wayland, MA Latest Revision: 02/04/20

Best Management Practice	Inspection Frequency (1)	Date Inspected	Inspector	Minimum Maintenance and Key Items to Check	Cleaning/ Repair Needed yes/no List items	Date of Cleaning/Repair	Performed By	Water Level in Detention System
Deep Sump Catch Basins	Four times per year							
CDS 2015-4C	Twice per year							
CDS 1515-3C	Twice per year							
Subsurface Infiltration System(s)	Twice per year							

(1) Refer to the Massachusetts Stormwater Management, Volume Two: Stormwater Technical Handbook for recommendations regarding frequency for inspection and maintenance of specific BMPs.

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Stormwater Control Manager: **Stamp**