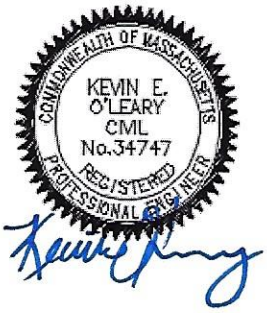
STORMWATER REPORT

Definitive Subdivision Plan
81 West Plain Street
Wayland, Mass.



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

February 4, 2020
Revised May 12, 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 revised to use precipitation rates from the Town of Wayland Subdivision Regulations Section V B 5 b ii 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 5, 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 to RB#2, fully infiltrated)
5-year	4.0”	0.02	0.00
10-year	4.5”	0.03	0.00
25-year	5.5”	0.06	0.00
100-year	7.0”	0.13	0.00
		(SA2)	(Post SA2)
5-year	4.0”	0.00	0.00
10-year	4.5”	0.00	0.00
25-year	5.5”	0.01	0.01
100-year	7.0”	0.04	0.04
		(SA3)	(Post SA3 to RB#1, fully infiltrated)
5-year	4.0”	0.01	0.00
10-year	4.5”	0.03	0.00
25-year	5.5”	0.10	0.00
100-year	7.0”	0.25	0.00
			(Post SA3A Discharged on site)
5-year	4.0”		0.02
10-year	4.5”		0.04
25-year	5.5”		0.12
100-year	7.0”		0.26
		(SA4)	(Post SA4 Discharged on site)
5-year	4.0”	0.00	0.00
10-year	4.72”	0.00	0.00
25-year	5.5”	0.01	0.00
100-year	7.0”	0.06	0.00
		(SA5 Existing depression on site)	
5-year	4.0”	0.00	
10-year	4.5”	0.00	
25-year	5.5”	0.01	
100-year	7.0”	0.11	
		(SA6)	(Post SA6 Discharged on site)
5-year	4.0”	0.00	0.00
10-year	4.5”	0.00	0.00
25-year	5.5”	0.01	0.00
100-year	7.0”	0.07	0.00
		(SA7 Existing depression on site)	
5-year	4.0”	0.00	
10-year	4.5”	0.00	
25-year	5.5”	0.01	

100-year	7.0”	0.12	
		(SA8)	(Post SA8 Discharged on site)
5-year	4.0”	0.00	0.00
10-year	4.5”	0.00	0.00
25-year	5.5”	0.00	0.00
100-year	7.0”	0.04	0.00

SUMMARY OF STORMWATER VOLUMES

(CF)

Design Storm		Existing Condition	Proposed Condition
		(SA1)	(Post SA1)
5-year	4.0”	131	0
10-year	4.5”	194	0
25-year	5.5”	345	0
100-year	7.0”	624	0
		(SA2)	(Post SA2)
5-year	4.0”	22	22
10-year	4.5”	38	38
25-year	5.5”	80	80
100-year	7.0”	167	167
		(SA3)	(Post SA3)
5-year	4.0”	212	0
10-year	4.5”	347	0
25-year	5.5”	695	0
100-year	7.0”	1,377	0
			(Post SA3A, Discharged on site)
5-year	4.0”		186
10-year	4.5”		279
25-year	5.5”		505
100-year	7.0”		928
		(SA4)	(Post SA4 Discharged on site)
5-year	4.0”	10	0
10-year	4.5”	45	0
25-year	5.5”	182	0
100-year	7.0”	533	0
		(SA5 Existing depression on site)	
5-year	4.0”	20	
10-year	4.5”	87	
25-year	5.5”	353	
100-year	7.0”	1033	
		(SA6)	(Post SA6 Discharged on site)
5-year	4.0”	12	0
10-year	4.5”	53	0
25-year	5.5”	215	0
100-year	7.0”	628	0
		(SA7 Existing depression on site)	
5-year	4.0”	21	
10-year	4.5”	94	
25-year	5.5”	379	
100-year	7.0”	1,109	

		(SA8)	(Post SA8 Discharged on site)
5-year	4.0”	7	0
10-year	4.5”	31	0
25-year	5.5”	126	0
100-year	7.0”	370	0

Compliance with Massachusetts Stormwater Management Regulations

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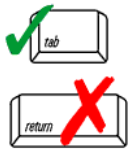
Checklist for Stormwater Report

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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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.

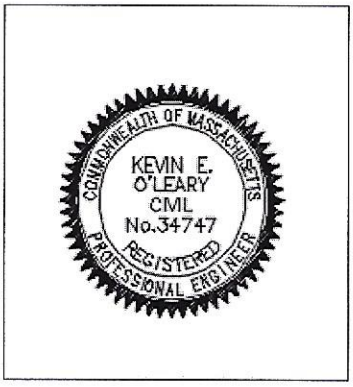
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the 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 5/12/20
Signature and Date

Checklist

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

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☒ 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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☒ 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;

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- 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.

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Checklist for Stormwater Report

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

☐ 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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☐ 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

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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Checklist for Stormwater Report

☐ 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:

☐ 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 or discharged on site 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(1) (CF)	Bottom Area (SF)	Drawdown (Hrs)
RB#1	4,981	249	6,762	1,058	9.3
RB#2	3,534	177	2,363	431	8.0
RB#3	5,186	259	2,922	504	8.4
RB#4	4,510	226	2,535	384	9.6

Impervious area includes buildings
(1)Proposed Recharge Volume is the calculated volume for the 100 yr storm

Sample Calculation RB#1

Impervious Area = 4,981 SF
Target Depth Factor (F) = 0.6”

Rv = F x impervious area = 0.6”x 4,981 SF x 1’/12”= 249 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

$$\text{Time} = \frac{6{,}762\ \text{CF}}{(8.27\text{”})(1\text{’}/12\text{”})(1{,}058\ \text{SF})} = 9.3\ \text{hours} < 72\ \text{hours}$$

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, are greater than 4 feet and do not require a mounding calculation.

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, Proposed Recharge Volume (100 year storm volume) above, for calculations

TSS REMOVAL PERCENTAGE COMPUTATIONS

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

v

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

Version 1, Automated: Mar. 4, 2008

Location: 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
Subsurface Infiltration Structure	0.80	0.75	0.60	0.15
	0.00	0.15	0.00	0.15
	0.00	0.15	0.00	0.15
	0.00	0.15	0.00	0.15

Total TSS Removal = 85%

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

Project: 81 West Plain Street, Wayland
Prepared By:
Date: 5/9/2020

*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

Mass. Dept. of Environmental Protection

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.

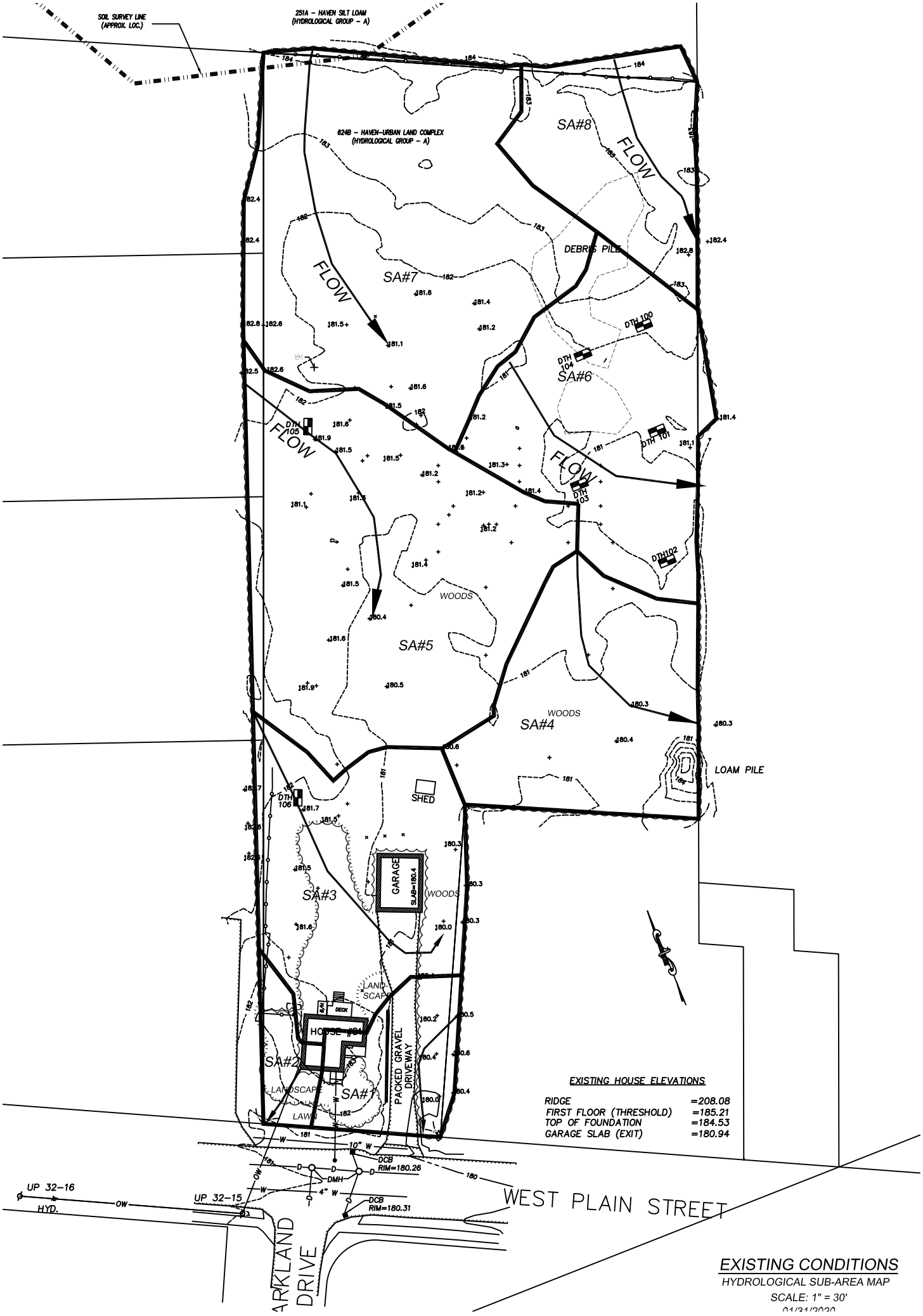
_____

Silver Leaf Homes, LLC

Section II

Overall Site Analysis

Existing Conditions



EXISTING HOUSE ELEVATIONS

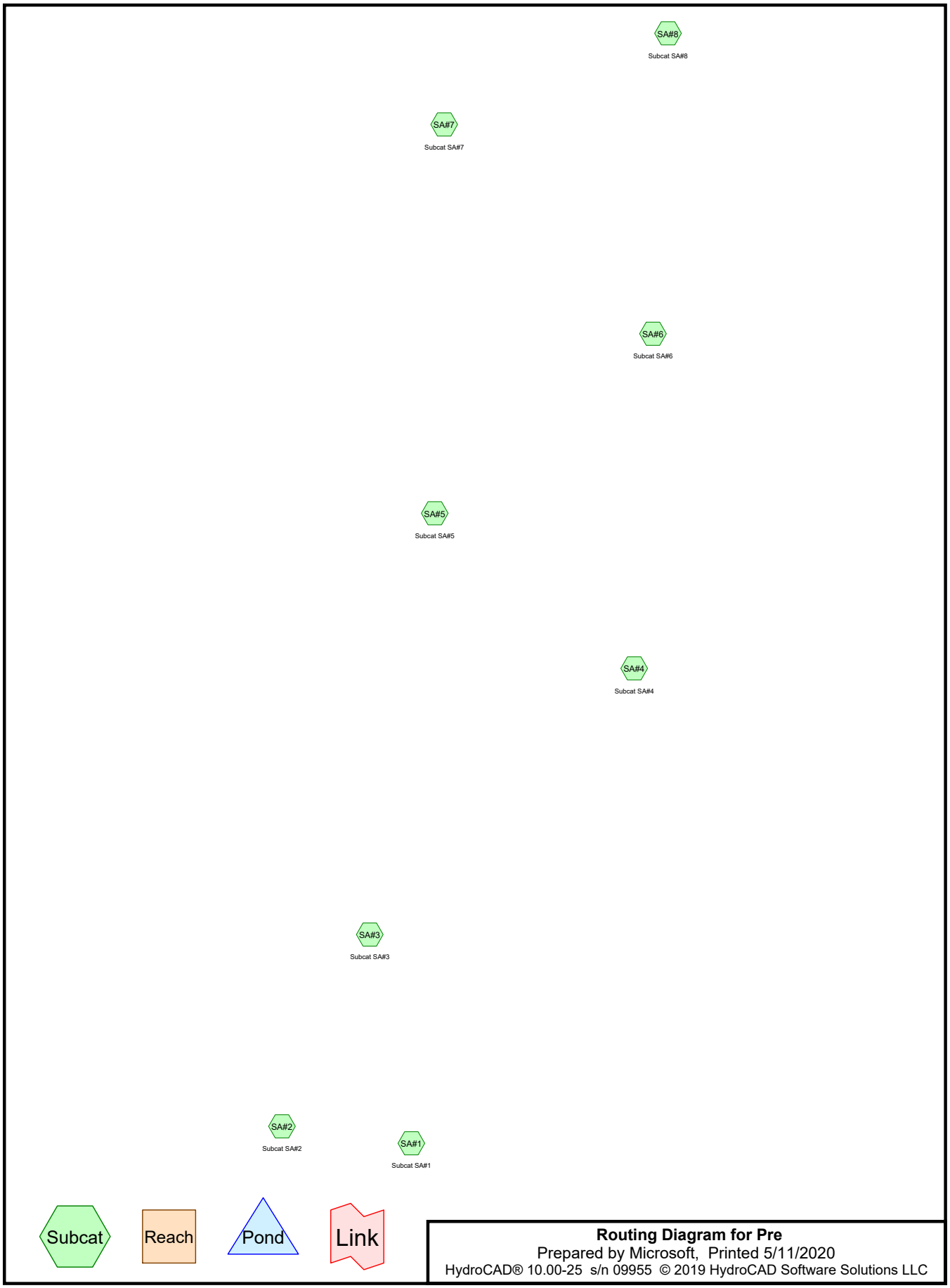
RIDGE	=208.08
FIRST FLOOR (THRESHOLD)	=185.21
TOP OF FOUNDATION	=184.53
GARAGE SLAB (EXIT)	=180.94

EXISTING CONDITIONS

HYDROLOGICAL SUB-AREA MAP

SCALE: 1" = 30'

01/31/2020



Routing Diagram for Pre

Prepared by Microsoft, Printed 5/11/2020

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
3,869	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)
91,068	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 Nur
3,869	0	0	0	0	3,869	50-75% Grass cover, Fair	
1,545	0	0	0	0	1,545	Gravel roads	
1,412	0	0	0	0	1,412	Roofs	
91,068	0	0	0	0	91,068	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>0.37"
Flow Length=68' Slope=0.0100 '/' Tc=16.0 min CN=51 Runoff=0.02 cfs 131 cf

Subcatchment SA#2: Subcat SA#2 Runoff Area=1,735 sf 8.10% Impervious Runoff Depth>0.15"
Tc=6.0 min CN=44 Runoff=0.00 cfs 21 cf

Subcatchment SA#3: Subcat SA#3 Runoff Area=12,581 sf 7.82% Impervious Runoff Depth>0.20"
Flow Length=167' Tc=16.8 min CN=46 Runoff=0.01 cfs 212 cf

Subcatchment SA#4: Subcat SA#4 Runoff Area=11,524 sf 0.00% Impervious Runoff Depth>0.01"
Flow Length=120' Slope=0.0100 '/' Tc=16.5 min CN=36 Runoff=0.00 cfs 10 cf

Subcatchment SA#5: Subcat SA#5 Runoff Area=22,311 sf 0.00% Impervious Runoff Depth>0.01"
Flow Length=137' Tc=13.3 min CN=36 Runoff=0.00 cfs 20 cf

Subcatchment SA#6: Subcat SA#6 Runoff Area=13,539 sf 0.00% Impervious Runoff Depth>0.01"
Flow Length=119' Tc=10.4 min CN=36 Runoff=0.00 cfs 12 cf

Subcatchment SA#7: Subcat SA#7 Runoff Area=23,930 sf 0.00% Impervious Runoff Depth>0.01"
Flow Length=150' Tc=11.3 min CN=36 Runoff=0.00 cfs 21 cf

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

Total Runoff Area = 97,894 sf Runoff Volume = 434 cf Average Runoff Depth = 0.05"
98.56% Pervious = 96,482 sf 1.44% Impervious = 1,412 sf

Summary for Subcatchment SA#1: Subcat SA#1

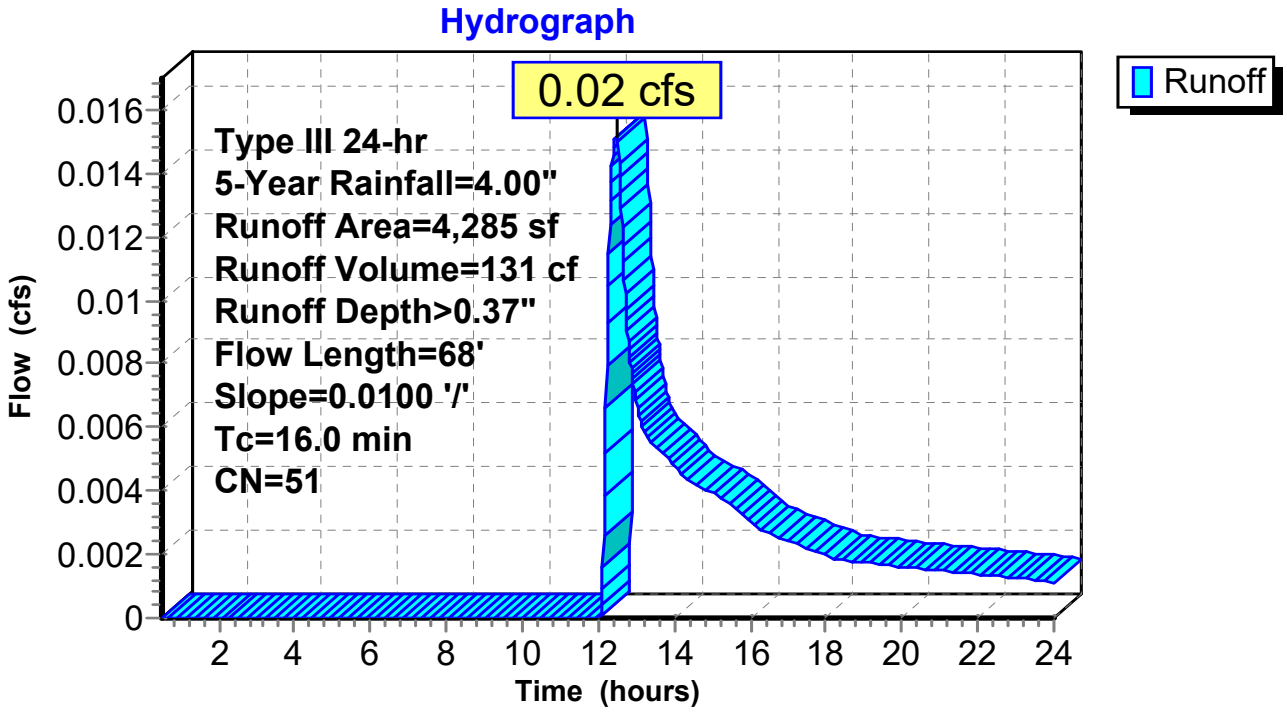
Runoff = 0.02 cfs @ 12.45 hrs, Volume= 131 cf, Depth> 0.37"

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 5-Year Rainfall=4.00"

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: Light underbrush n= 0.400 P2= 3.40"
0.2	18	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.0	68	Total			

Subcatchment SA#1: Subcat SA#1



Summary for Subcatchment SA#2: Subcat SA#2

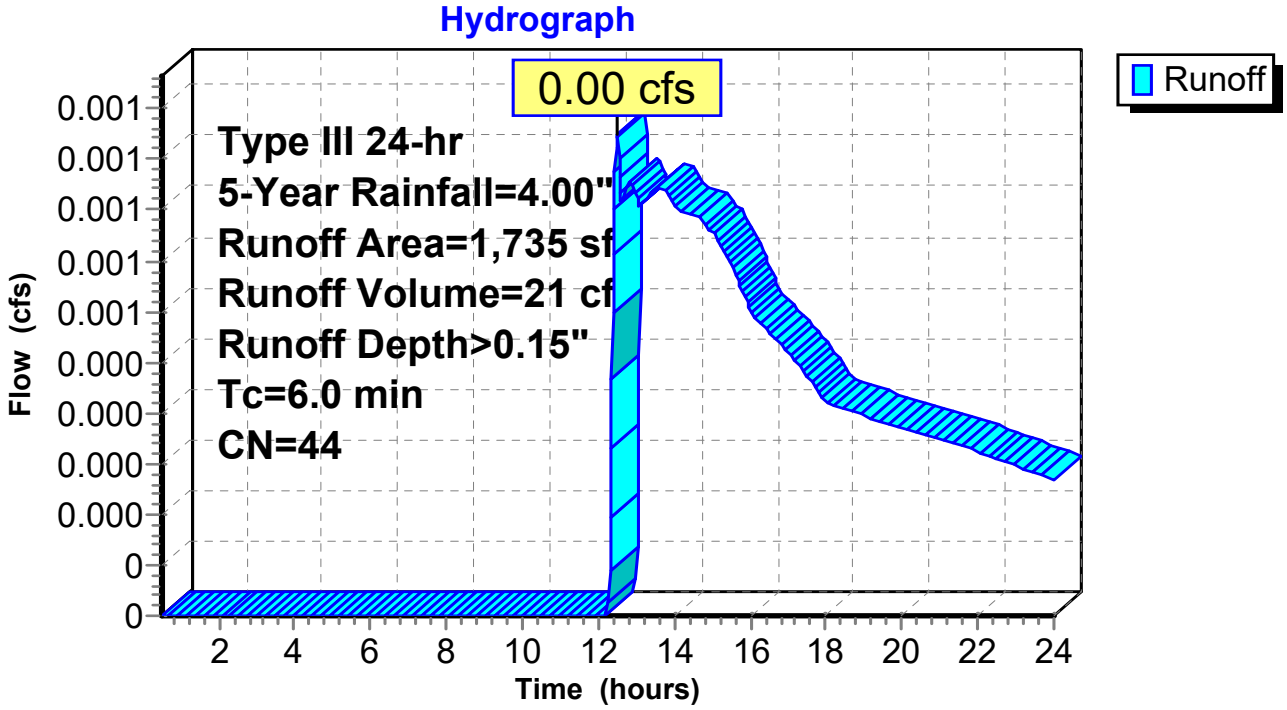
Runoff = 0.00 cfs @ 12.49 hrs, Volume= 21 cf, Depth> 0.15"

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 5-Year Rainfall=4.00"

Area (sf)	CN	Description
350	49	50-75% Grass cover, Fair, HSG A
141	98	Roofs, HSG A
1,245	36	Woods, Fair, HSG A
1,735	44	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
6.0					**Direct Entry,**

Subcatchment SA#2: Subcat SA#2



Summary for Subcatchment SA#3: Subcat SA#3

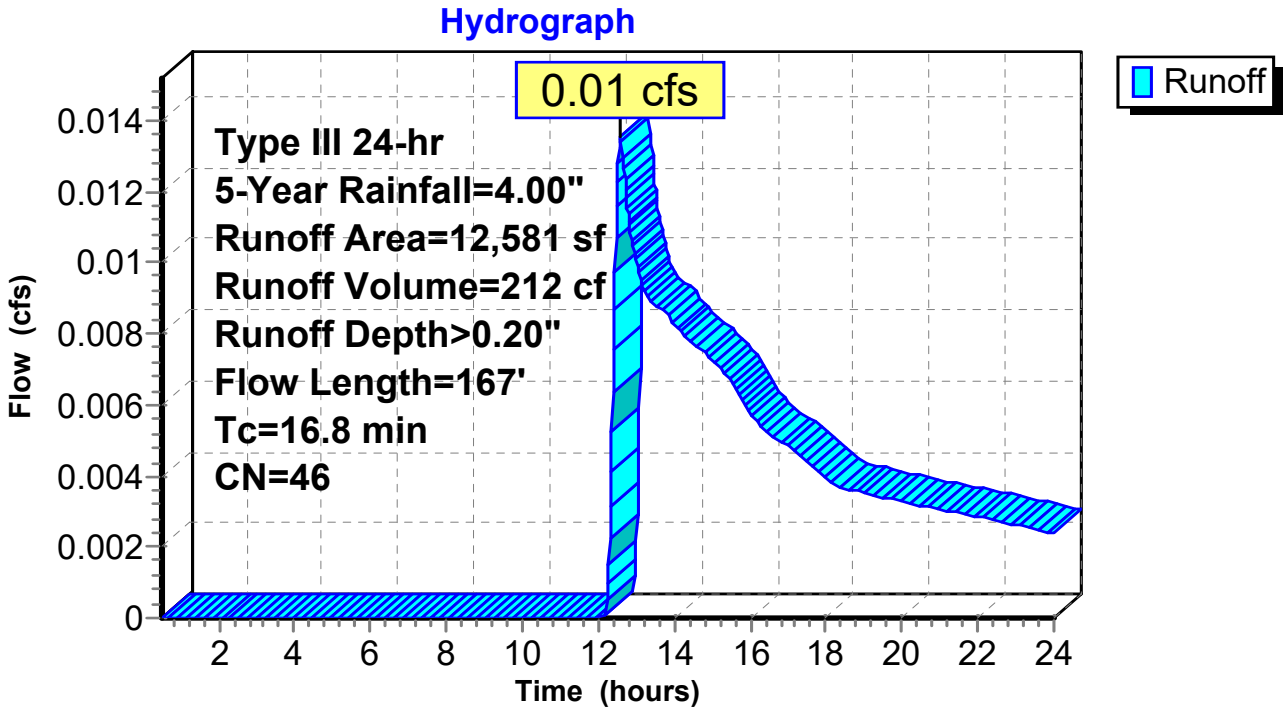
Runoff = 0.01 cfs @ 12.59 hrs, Volume= 212 cf, Depth> 0.20"

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 5-Year Rainfall=4.00"

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

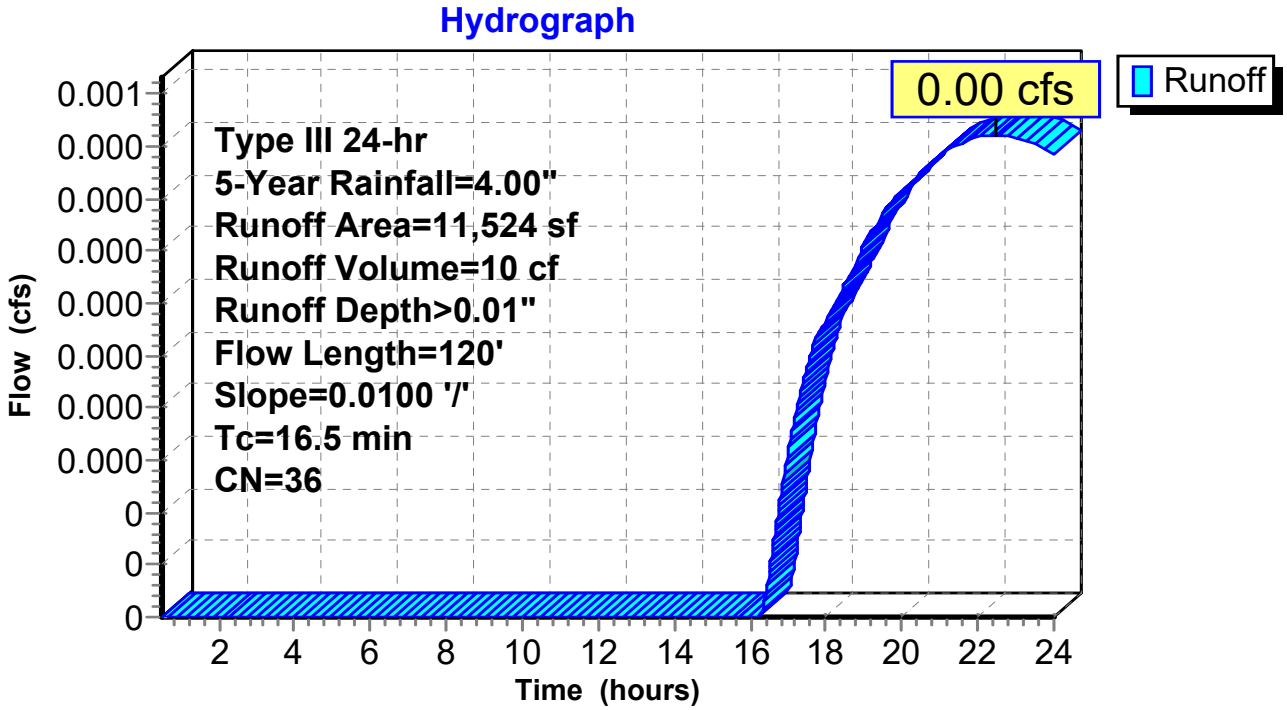
Runoff = 0.00 cfs @ 22.46 hrs, Volume= 10 cf, Depth> 0.01"

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 5-Year Rainfall=4.00"

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

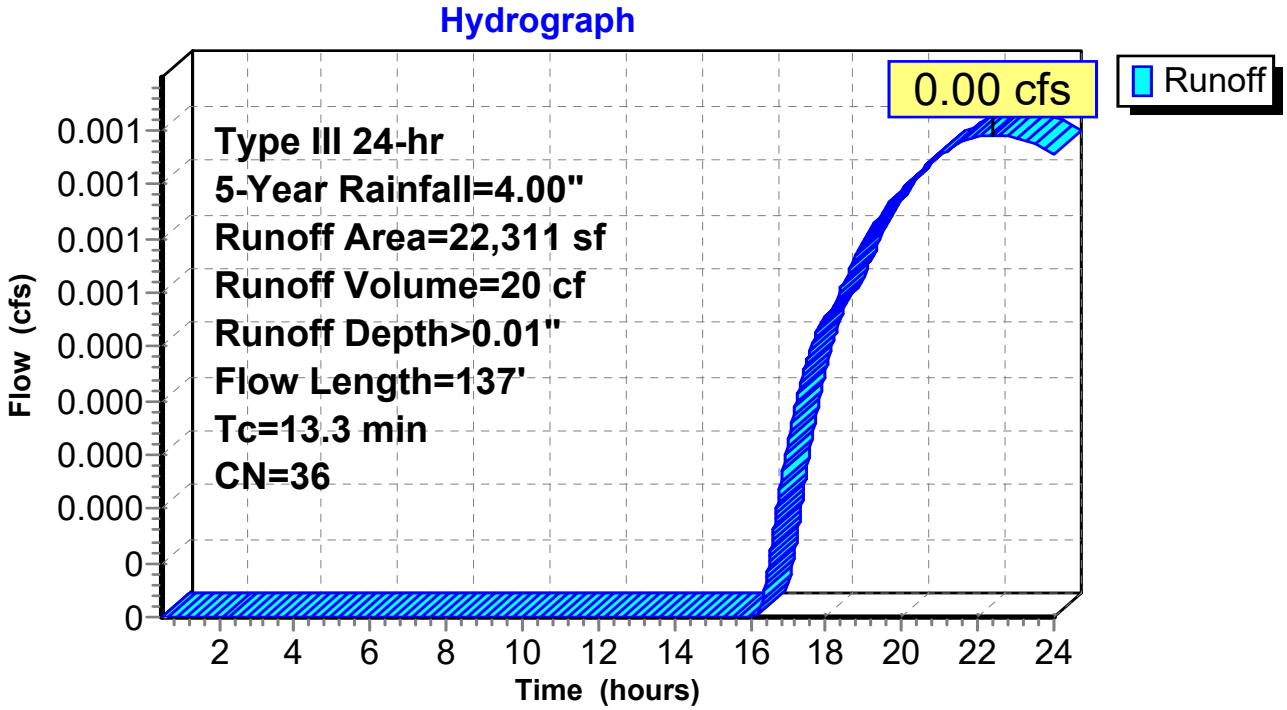
Runoff = 0.00 cfs @ 22.42 hrs, Volume= 20 cf, Depth> 0.01"

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 5-Year Rainfall=4.00"

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

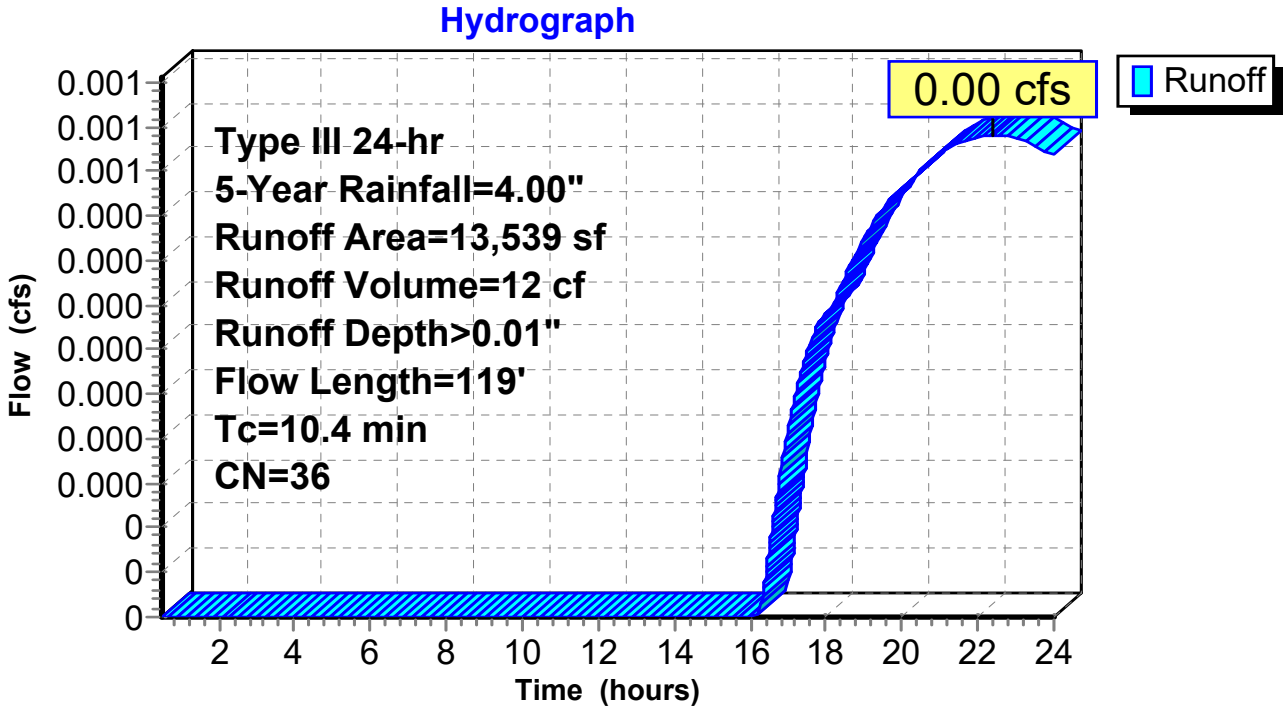
Runoff = 0.00 cfs @ 22.37 hrs, Volume= 12 cf, Depth> 0.01"

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 5-Year Rainfall=4.00"

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

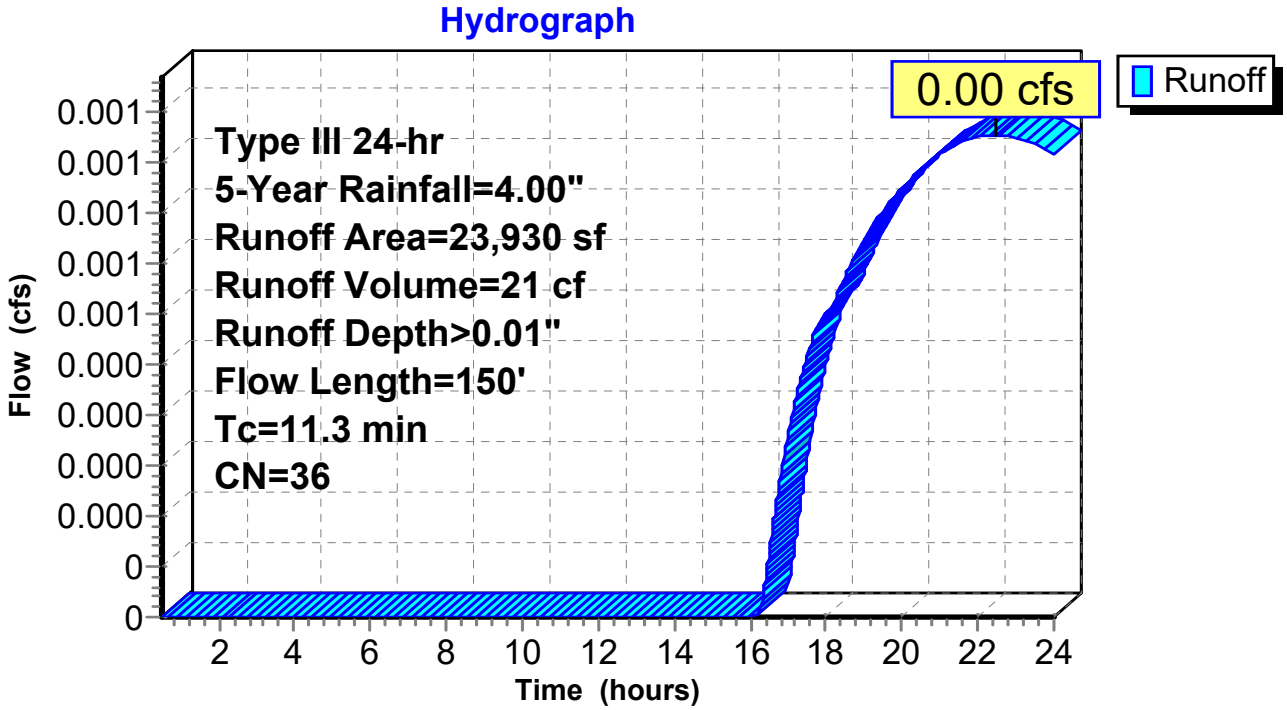
Runoff = 0.00 cfs @ 22.45 hrs, Volume= 21 cf, Depth> 0.01"

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 5-Year Rainfall=4.00"

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

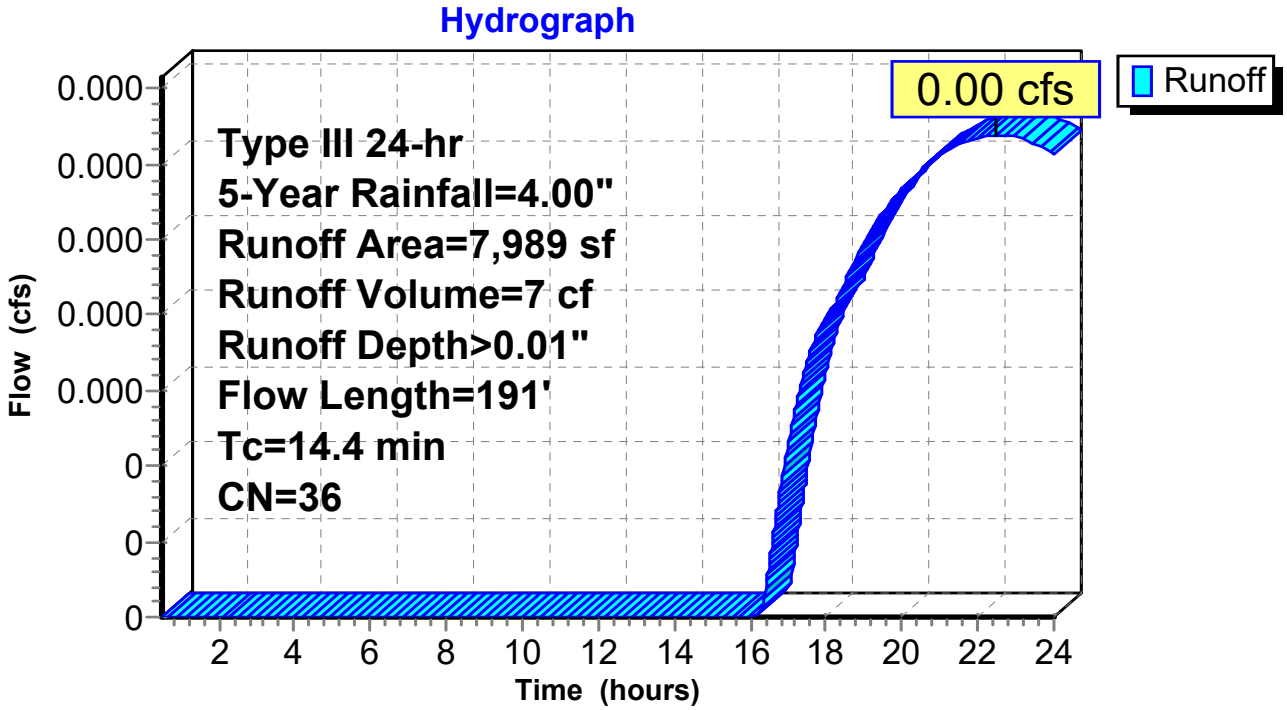
Runoff = 0.00 cfs @ 22.48 hrs, Volume= 7 cf, Depth> 0.01"

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 5-Year Rainfall=4.00"

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>0.54"
Flow Length=68' Slope=0.0100 '/' Tc=16.0 min CN=51 Runoff=0.03 cfs 194 cf

Subcatchment SA#2: Subcat SA#2 Runoff Area=1,735 sf 8.10% Impervious Runoff Depth>0.26"
Tc=6.0 min CN=44 Runoff=0.00 cfs 38 cf

Subcatchment SA#3: Subcat SA#3 Runoff Area=12,581 sf 7.82% Impervious Runoff Depth>0.33"
Flow Length=167' Tc=16.8 min CN=46 Runoff=0.03 cfs 347 cf

Subcatchment SA#4: Subcat SA#4 Runoff Area=11,524 sf 0.00% Impervious Runoff Depth>0.05"
Flow Length=120' Slope=0.0100 '/' Tc=16.5 min CN=36 Runoff=0.00 cfs 45 cf

Subcatchment SA#5: Subcat SA#5 Runoff Area=22,311 sf 0.00% Impervious Runoff Depth>0.05"
Flow Length=137' Tc=13.3 min CN=36 Runoff=0.00 cfs 87 cf

Subcatchment SA#6: Subcat SA#6 Runoff Area=13,539 sf 0.00% Impervious Runoff Depth>0.05"
Flow Length=119' Tc=10.4 min CN=36 Runoff=0.00 cfs 53 cf

Subcatchment SA#7: Subcat SA#7 Runoff Area=23,930 sf 0.00% Impervious Runoff Depth>0.05"
Flow Length=150' Tc=11.3 min CN=36 Runoff=0.00 cfs 94 cf

Subcatchment SA#8: Subcat SA#8 Runoff Area=7,989 sf 0.00% Impervious Runoff Depth>0.05"
Flow Length=191' Tc=14.4 min CN=36 Runoff=0.00 cfs 31 cf

Total Runoff Area = 97,894 sf Runoff Volume = 888 cf Average Runoff Depth = 0.11"
98.56% Pervious = 96,482 sf 1.44% Impervious = 1,412 sf

Summary for Subcatchment SA#1: Subcat SA#1

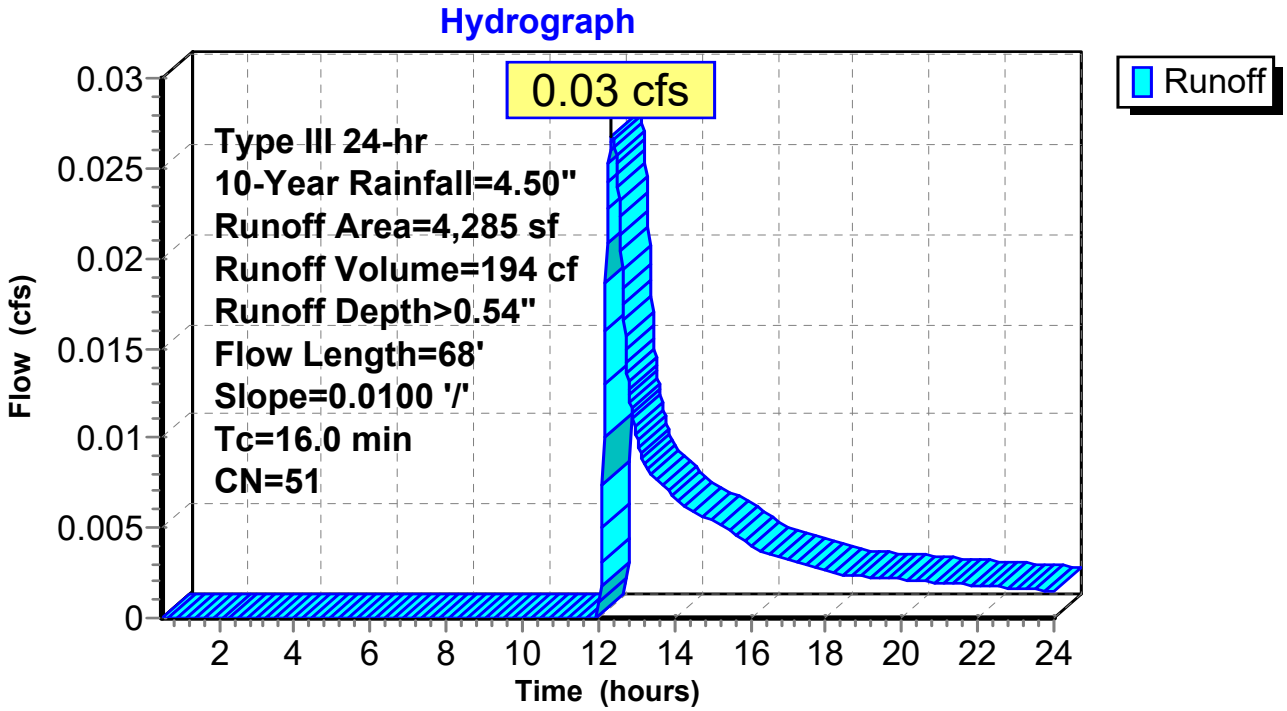
Runoff = 0.03 cfs @ 12.37 hrs, Volume= 194 cf, Depth> 0.54"

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=4.50"

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: Light underbrush n= 0.400 P2= 3.40"
0.2	18	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.0	68	Total			

Subcatchment SA#1: Subcat SA#1



Summary for Subcatchment SA#2: Subcat SA#2

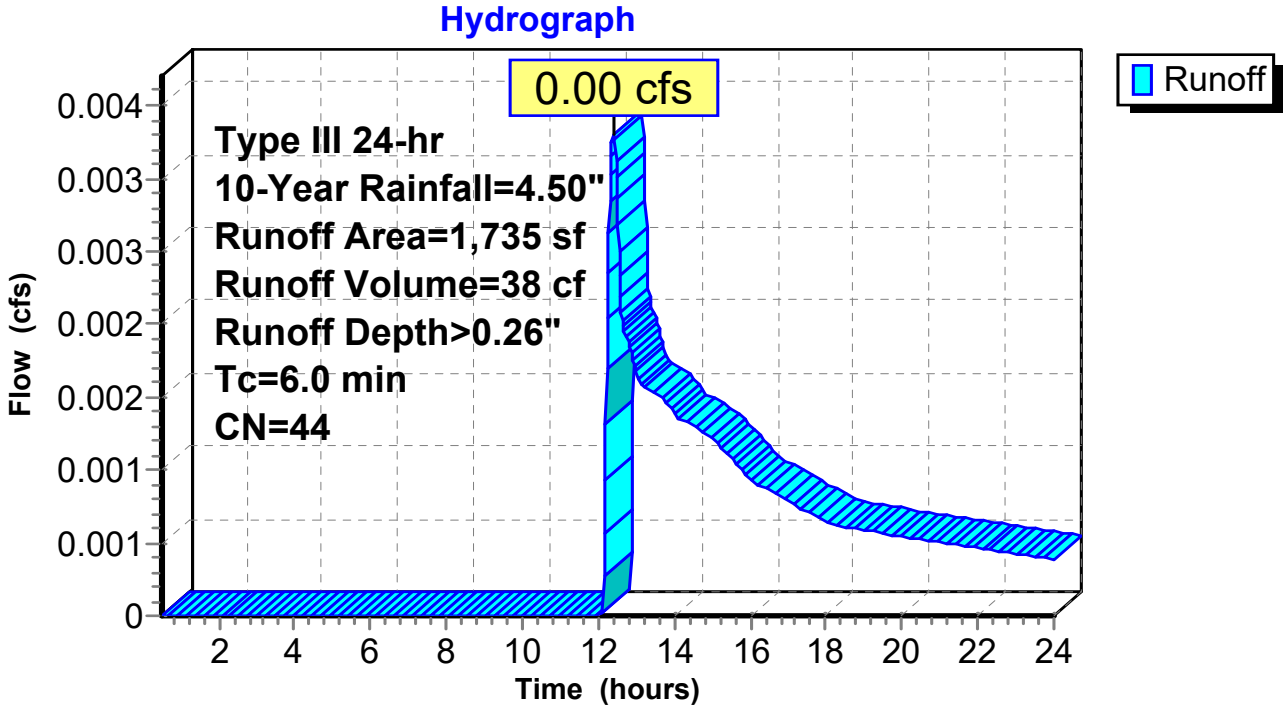
Runoff = 0.00 cfs @ 12.40 hrs, Volume= 38 cf, Depth> 0.26"

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=4.50"

Area (sf)	CN	Description
350	49	50-75% Grass cover, Fair, HSG A
141	98	Roofs, HSG A
1,245	36	Woods, Fair, HSG A
1,735	44	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
6.0					**Direct Entry,**

Subcatchment SA#2: Subcat SA#2



Summary for Subcatchment SA#3: Subcat SA#3

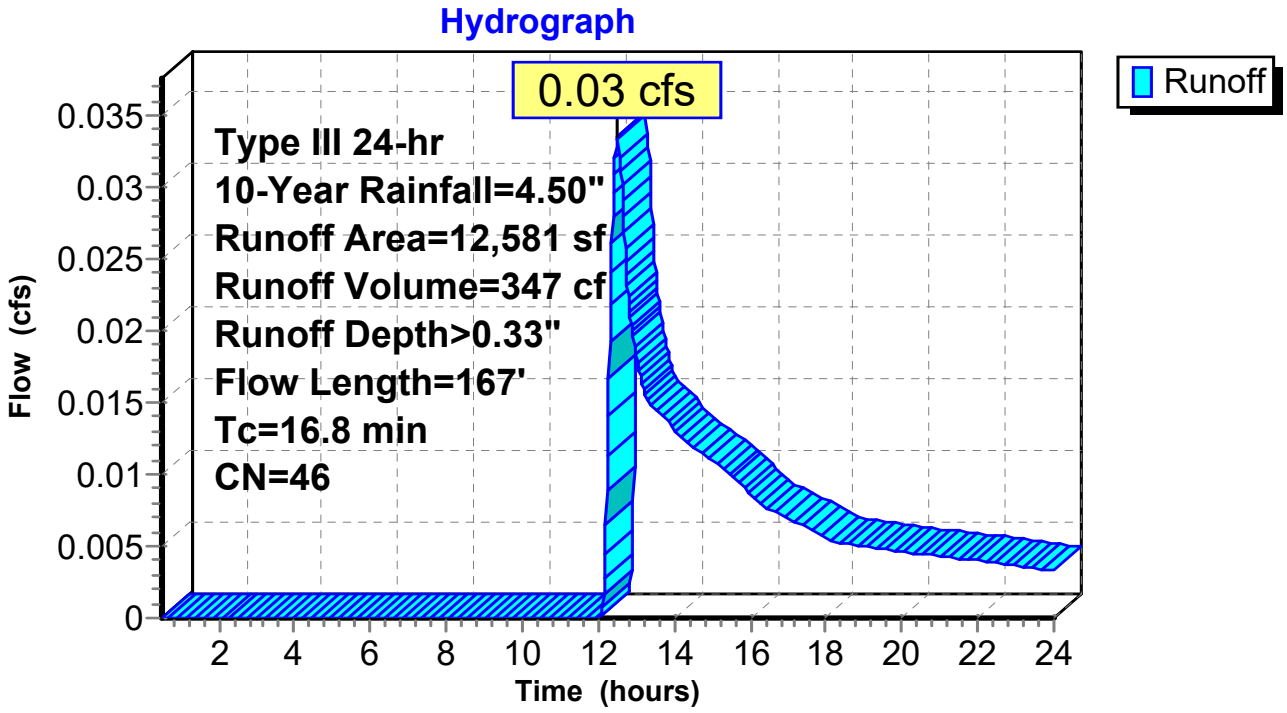
Runoff = 0.03 cfs @ 12.51 hrs, Volume= 347 cf, Depth> 0.33"

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=4.50"

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

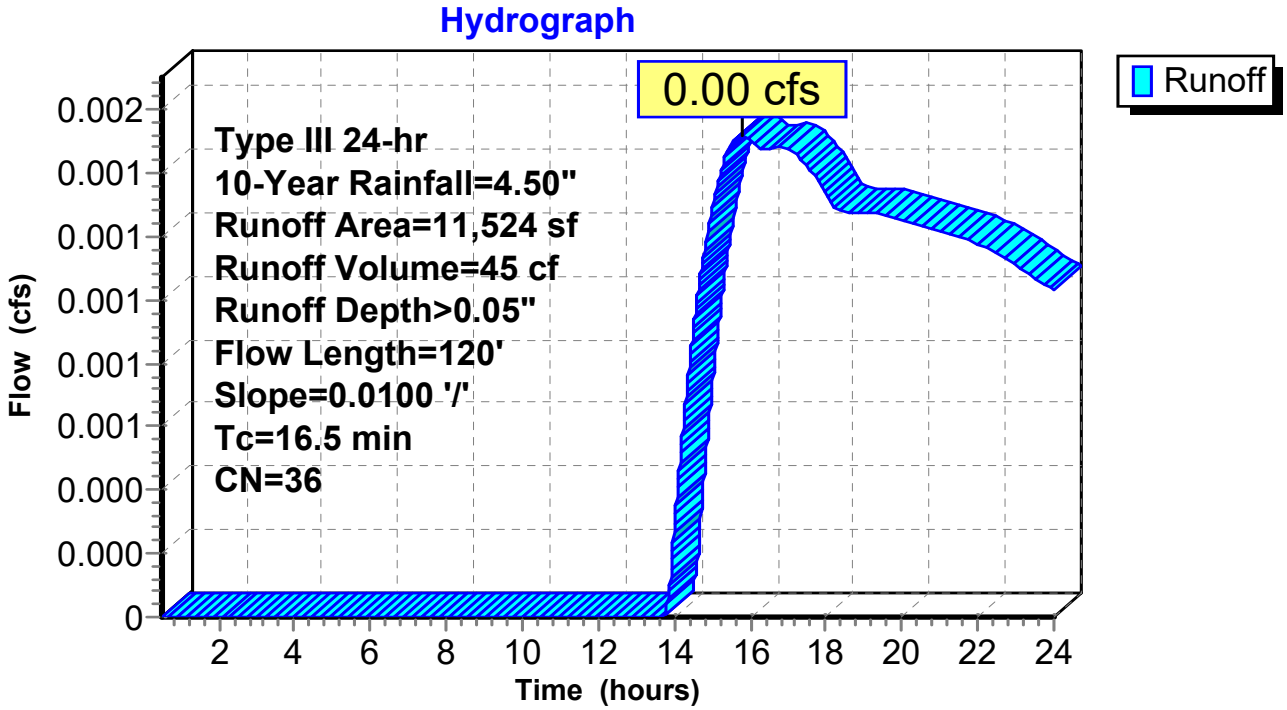
Runoff = 0.00 cfs @ 15.82 hrs, Volume= 45 cf, Depth> 0.05"

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 10-Year Rainfall=4.50"

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

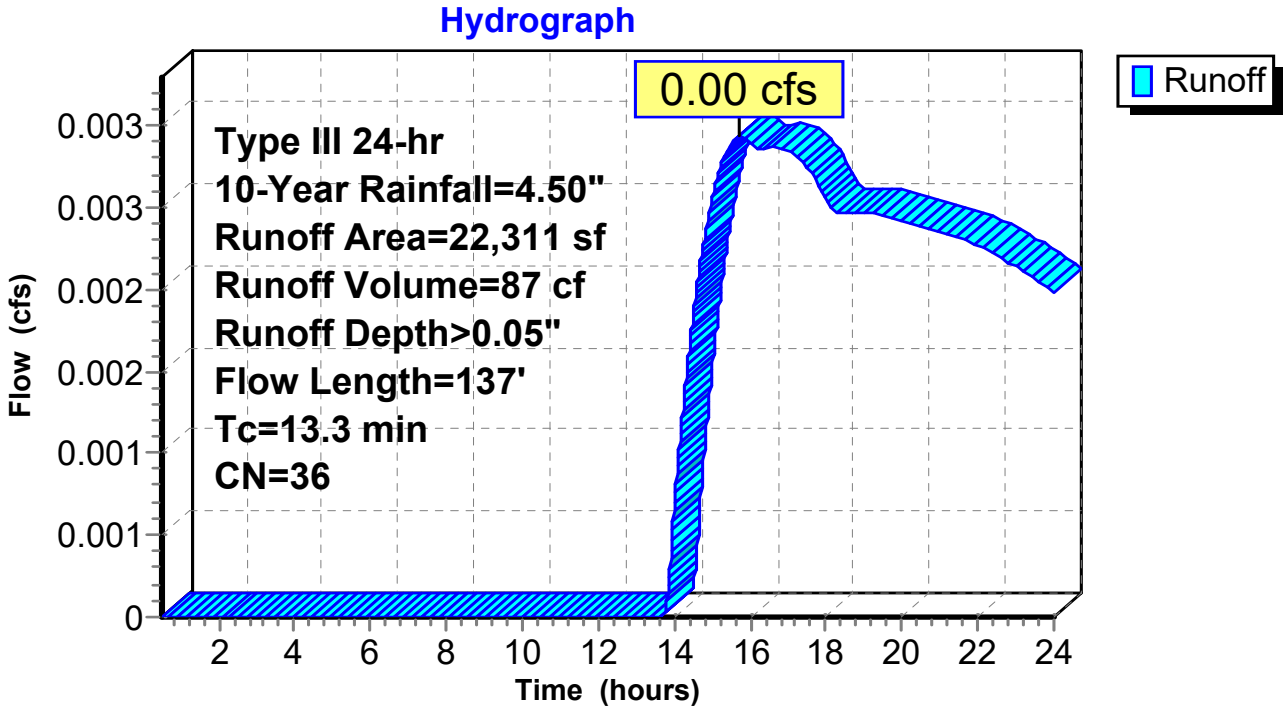
Runoff = 0.00 cfs @ 15.74 hrs, Volume= 87 cf, Depth> 0.05"

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 10-Year Rainfall=4.50"

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

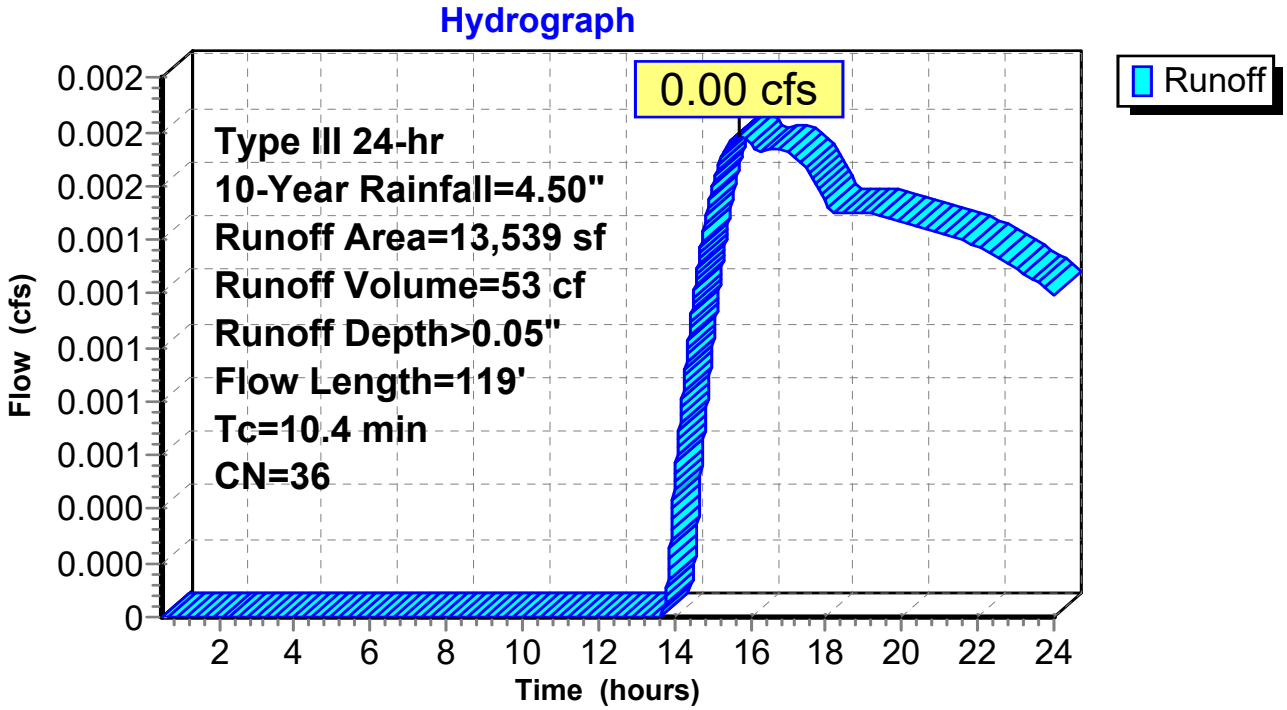
Runoff = 0.00 cfs @ 15.69 hrs, Volume= 53 cf, Depth> 0.05"

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 10-Year Rainfall=4.50"

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

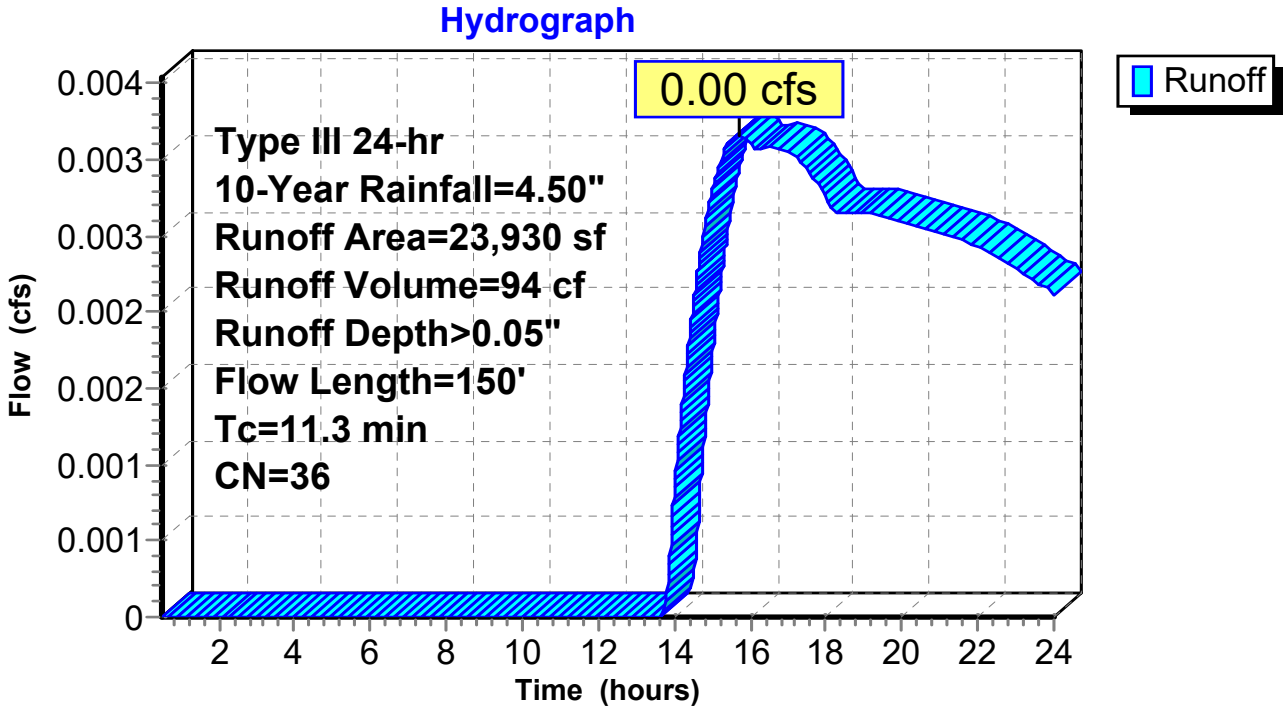
Runoff = 0.00 cfs @ 15.69 hrs, Volume= 94 cf, Depth> 0.05"

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 10-Year Rainfall=4.50"

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

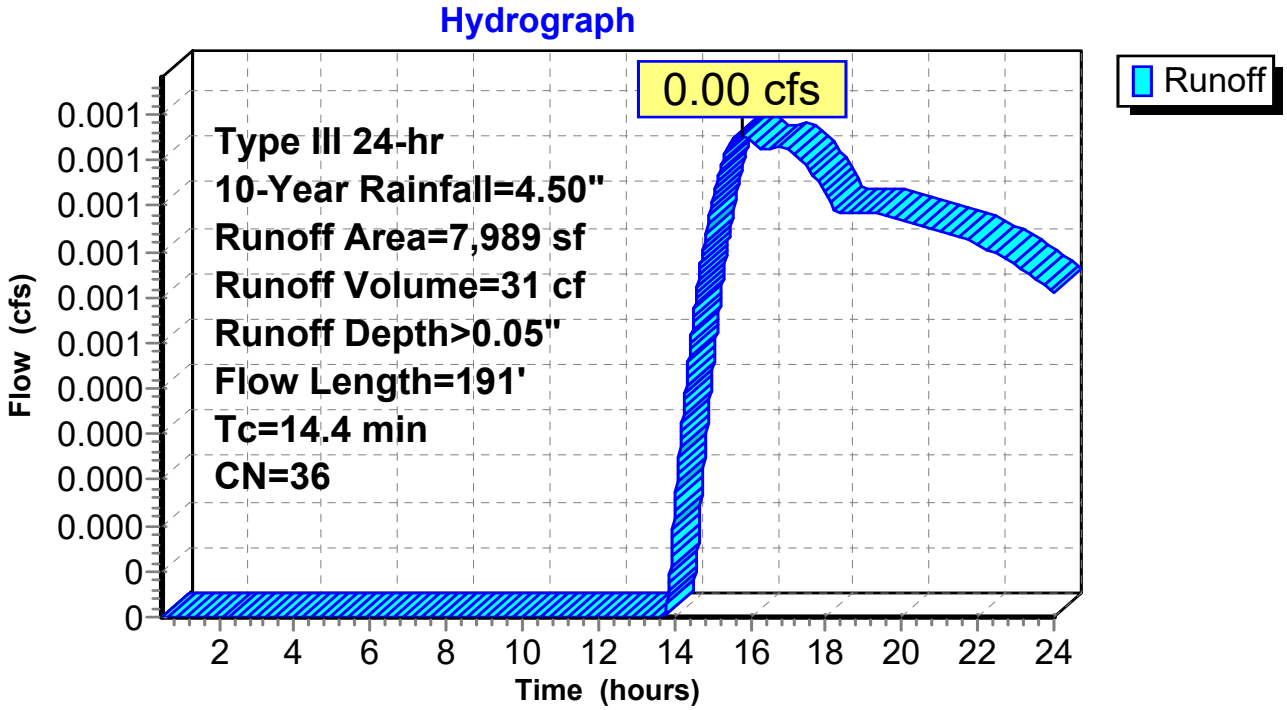
Runoff = 0.00 cfs @ 15.76 hrs, Volume= 31 cf, Depth> 0.05"

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 10-Year Rainfall=4.50"

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>0.97"
Flow Length=68' Slope=0.0100 '/' Tc=16.0 min CN=51 Runoff=0.06 cfs 345 cf

Subcatchment SA#2: Subcat SA#2 Runoff Area=1,735 sf 8.10% Impervious Runoff Depth>0.56"
Tc=6.0 min CN=44 Runoff=0.01 cfs 80 cf

Subcatchment SA#3: Subcat SA#3 Runoff Area=12,581 sf 7.82% Impervious Runoff Depth>0.66"
Flow Length=167' Tc=16.8 min CN=46 Runoff=0.10 cfs 695 cf

Subcatchment SA#4: Subcat SA#4 Runoff Area=11,524 sf 0.00% Impervious Runoff Depth>0.19"
Flow Length=120' Slope=0.0100 '/' Tc=16.5 min CN=36 Runoff=0.01 cfs 182 cf

Subcatchment SA#5: Subcat SA#5 Runoff Area=22,311 sf 0.00% Impervious Runoff Depth>0.19"
Flow Length=137' Tc=13.3 min CN=36 Runoff=0.01 cfs 353 cf

Subcatchment SA#6: Subcat SA#6 Runoff Area=13,539 sf 0.00% Impervious Runoff Depth>0.19"
Flow Length=119' Tc=10.4 min CN=36 Runoff=0.01 cfs 215 cf

Subcatchment SA#7: Subcat SA#7 Runoff Area=23,930 sf 0.00% Impervious Runoff Depth>0.19"
Flow Length=150' Tc=11.3 min CN=36 Runoff=0.01 cfs 379 cf

Subcatchment SA#8: Subcat SA#8 Runoff Area=7,989 sf 0.00% Impervious Runoff Depth>0.19"
Flow Length=191' Tc=14.4 min CN=36 Runoff=0.00 cfs 126 cf

Total Runoff Area = 97,894 sf Runoff Volume = 2,376 cf Average Runoff Depth = 0.29"
98.56% Pervious = 96,482 sf 1.44% Impervious = 1,412 sf

Summary for Subcatchment SA#1: Subcat SA#1

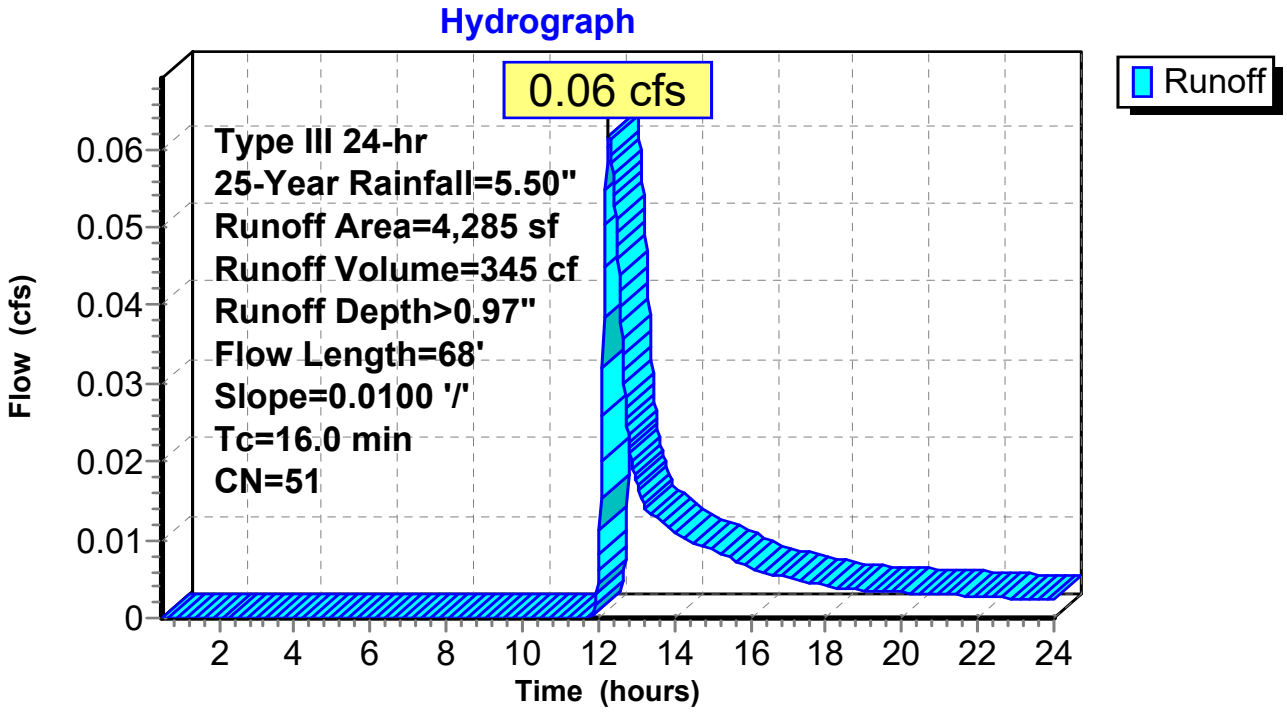
Runoff = 0.06 cfs @ 12.28 hrs, Volume= 345 cf, Depth> 0.97"

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=5.50"

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: Light underbrush n= 0.400 P2= 3.40"
0.2	18	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.0	68	Total			

Subcatchment SA#1: Subcat SA#1



Summary for Subcatchment SA#2: Subcat SA#2

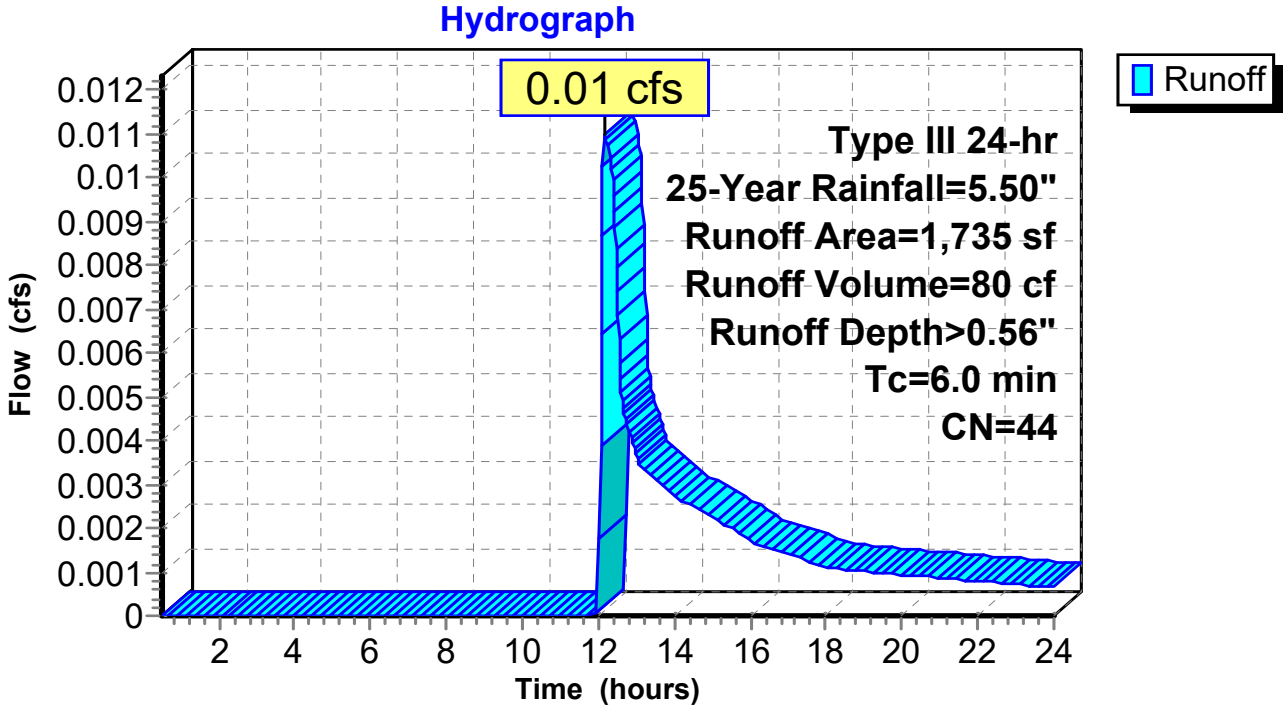
Runoff = 0.01 cfs @ 12.16 hrs, Volume= 80 cf, Depth> 0.56"

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=5.50"

Area (sf)	CN	Description
350	49	50-75% Grass cover, Fair, HSG A
141	98	Roofs, HSG A
1,245	36	Woods, Fair, HSG A
1,735	44	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
6.0					**Direct Entry,**

Subcatchment SA#2: Subcat SA#2



Summary for Subcatchment SA#3: Subcat SA#3

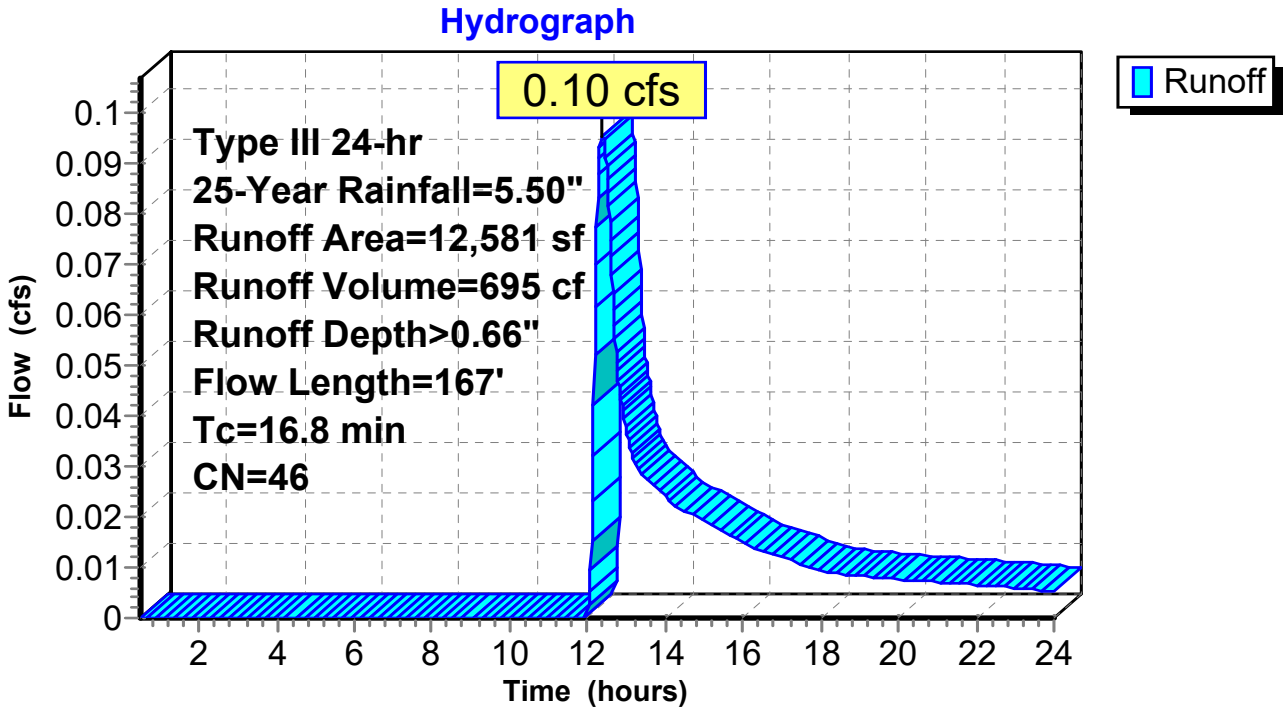
Runoff = 0.10 cfs @ 12.38 hrs, Volume= 695 cf, Depth> 0.66"

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=5.50"

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

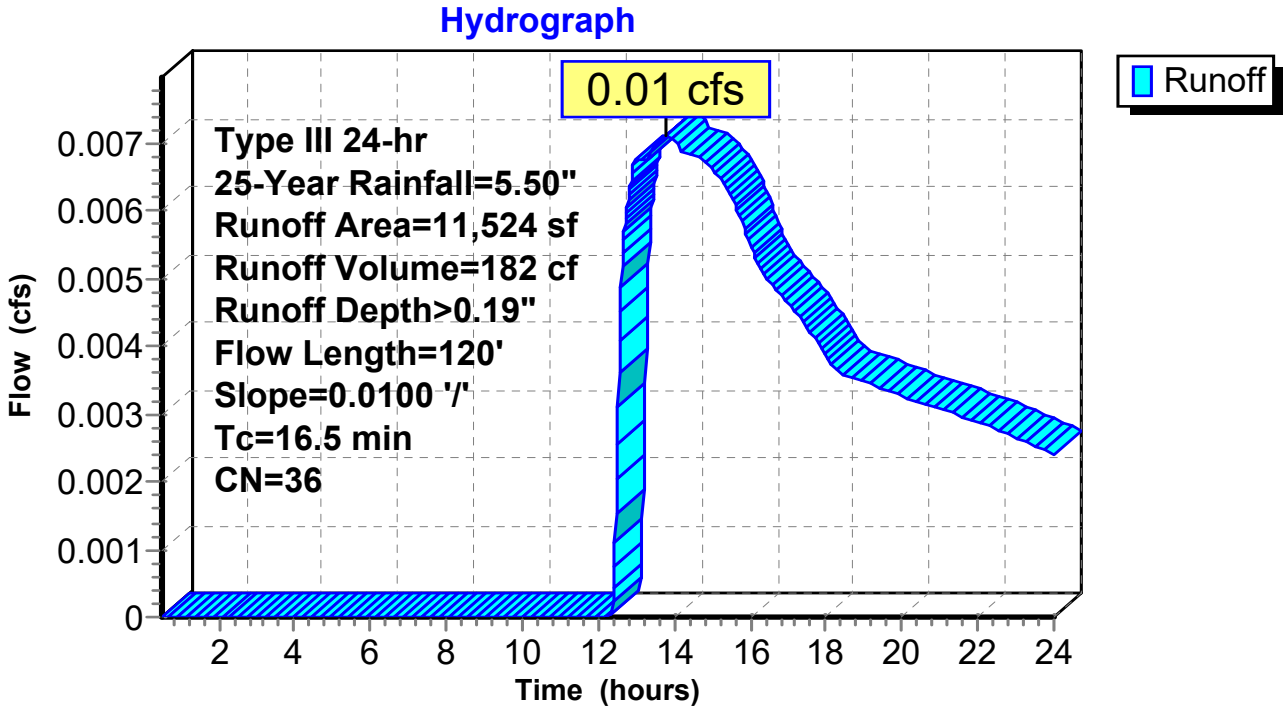
Runoff = 0.01 cfs @ 13.80 hrs, Volume= 182 cf, Depth> 0.19"

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=5.50"

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

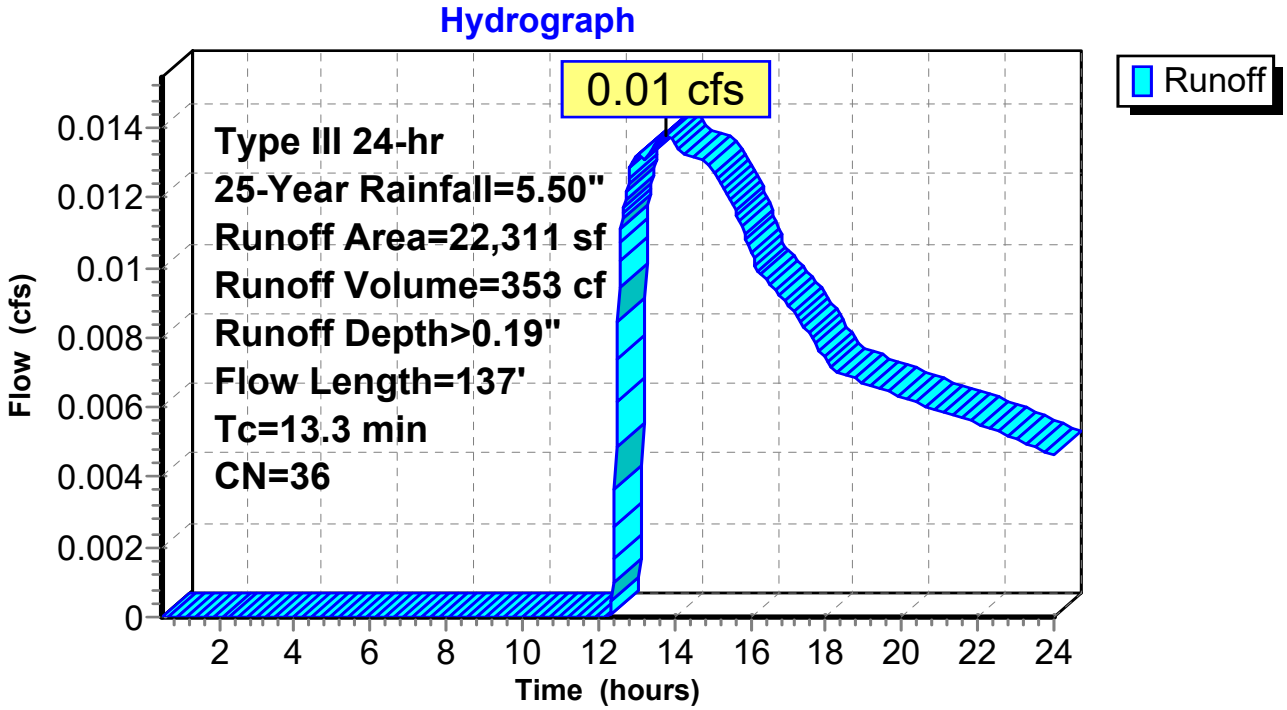
Runoff = 0.01 cfs @ 13.76 hrs, Volume= 353 cf, Depth> 0.19"

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=5.50"

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

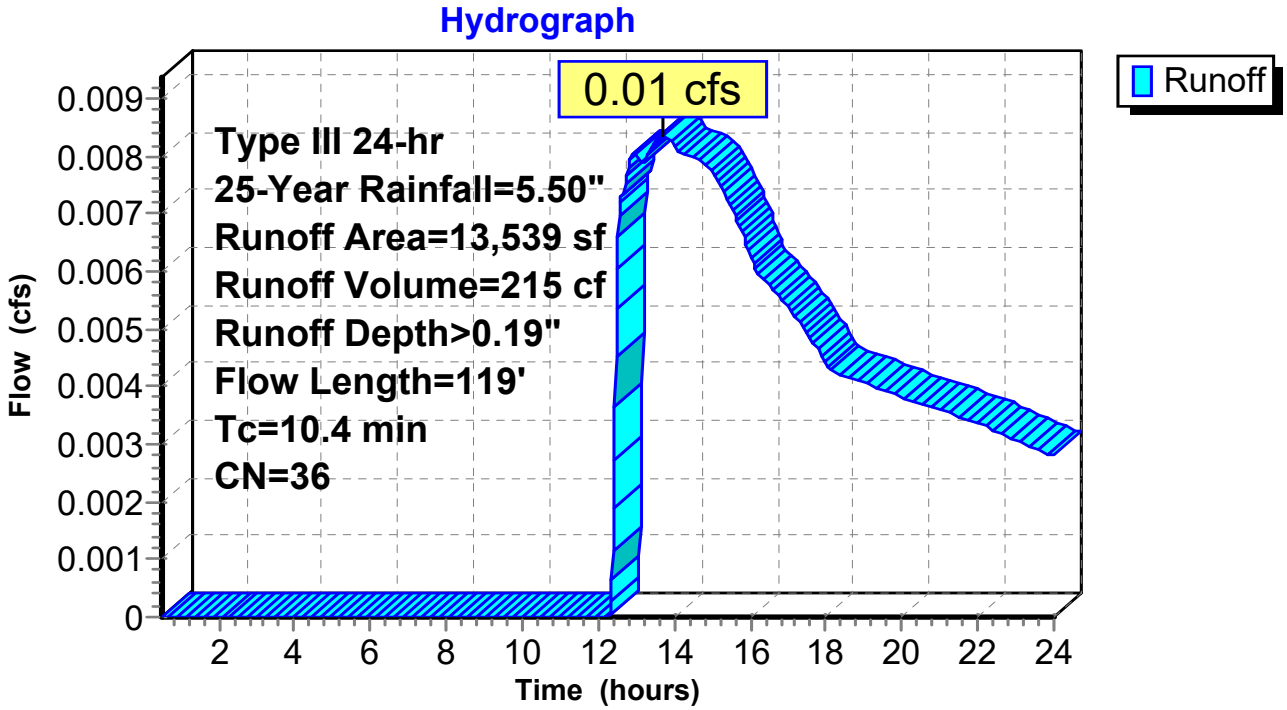
Runoff = 0.01 cfs @ 13.72 hrs, Volume= 215 cf, Depth> 0.19"

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=5.50"

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

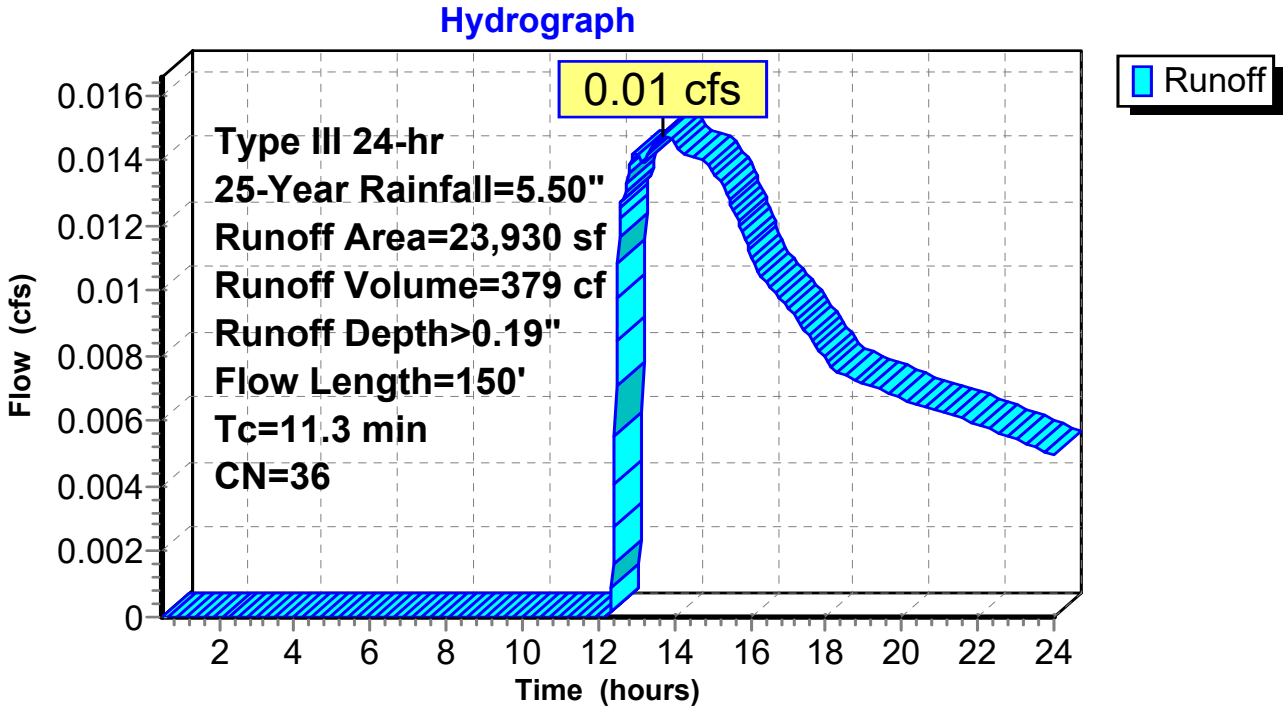
Runoff = 0.01 cfs @ 13.72 hrs, Volume= 379 cf, Depth> 0.19"

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=5.50"

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

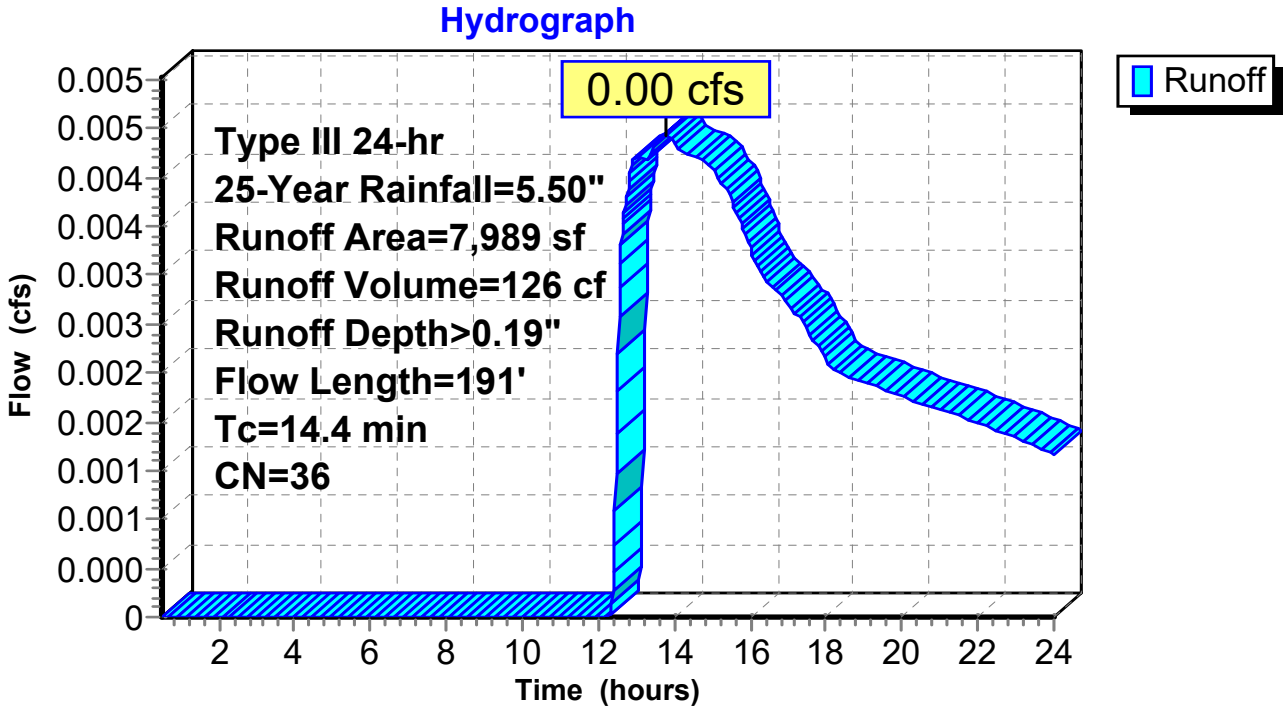
Runoff = 0.00 cfs @ 13.78 hrs, Volume= 126 cf, Depth> 0.19"

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=5.50"

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>1.75"
Flow Length=68' Slope=0.0100 '/' Tc=16.0 min CN=51 Runoff=0.13 cfs 624 cf

Subcatchment SA#2: Subcat SA#2 Runoff Area=1,735 sf 8.10% Impervious Runoff Depth>1.15"
Tc=6.0 min CN=44 Runoff=0.04 cfs 167 cf

Subcatchment SA#3: Subcat SA#3 Runoff Area=12,581 sf 7.82% Impervious Runoff Depth>1.31"
Flow Length=167' Tc=16.8 min CN=46 Runoff=0.25 cfs 1,377 cf

Subcatchment SA#4: Subcat SA#4 Runoff Area=11,524 sf 0.00% Impervious Runoff Depth>0.55"
Flow Length=120' Slope=0.0100 '/' Tc=16.5 min CN=36 Runoff=0.06 cfs 533 cf

Subcatchment SA#5: Subcat SA#5 Runoff Area=22,311 sf 0.00% Impervious Runoff Depth>0.56"
Flow Length=137' Tc=13.3 min CN=36 Runoff=0.11 cfs 1,033 cf

Subcatchment SA#6: Subcat SA#6 Runoff Area=13,539 sf 0.00% Impervious Runoff Depth>0.56"
Flow Length=119' Tc=10.4 min CN=36 Runoff=0.07 cfs 628 cf

Subcatchment SA#7: Subcat SA#7 Runoff Area=23,930 sf 0.00% Impervious Runoff Depth>0.56"
Flow Length=150' Tc=11.3 min CN=36 Runoff=0.12 cfs 1,109 cf

Subcatchment SA#8: Subcat SA#8 Runoff Area=7,989 sf 0.00% Impervious Runoff Depth>0.56"
Flow Length=191' Tc=14.4 min CN=36 Runoff=0.04 cfs 370 cf

Total Runoff Area = 97,894 sf Runoff Volume = 5,839 cf Average Runoff Depth = 0.72"
98.56% Pervious = 96,482 sf 1.44% Impervious = 1,412 sf

Summary for Subcatchment SA#1: Subcat SA#1

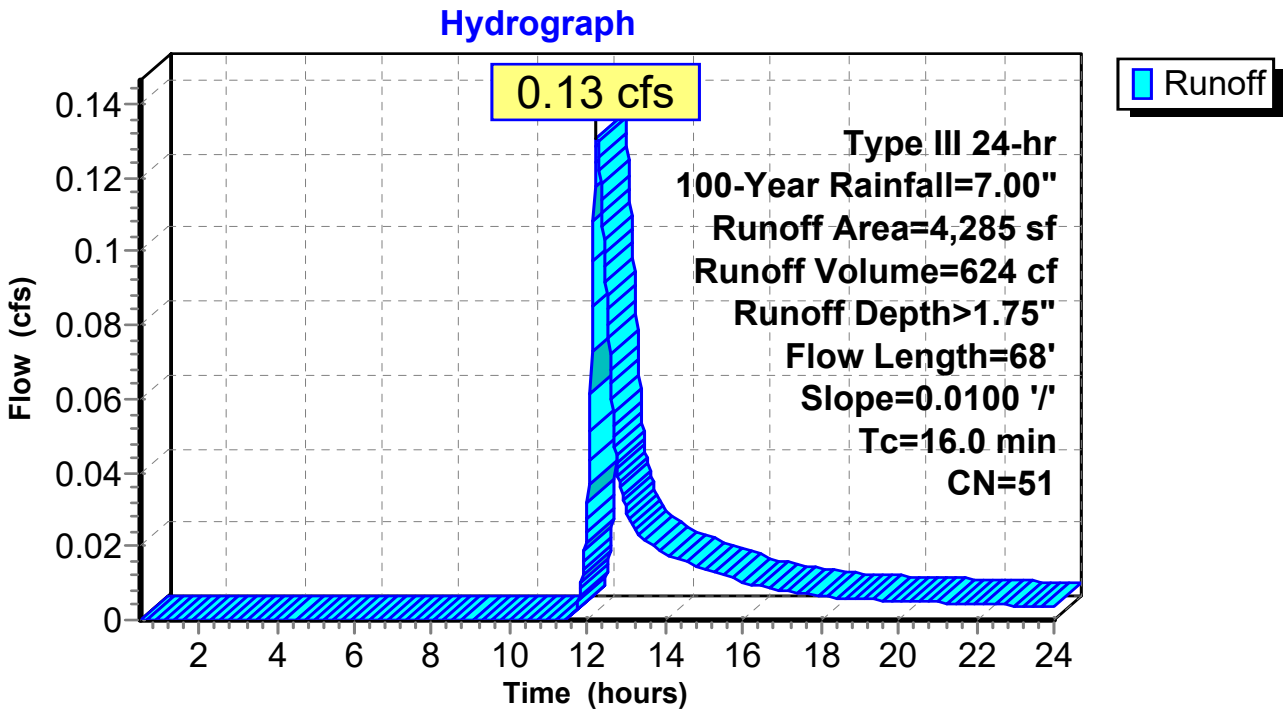
Runoff = 0.13 cfs @ 12.25 hrs, Volume= 624 cf, Depth> 1.75"

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=7.00"

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: Light underbrush n= 0.400 P2= 3.40"
0.2	18	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.0	68	Total			

Subcatchment SA#1: Subcat SA#1



Summary for Subcatchment SA#2: Subcat SA#2

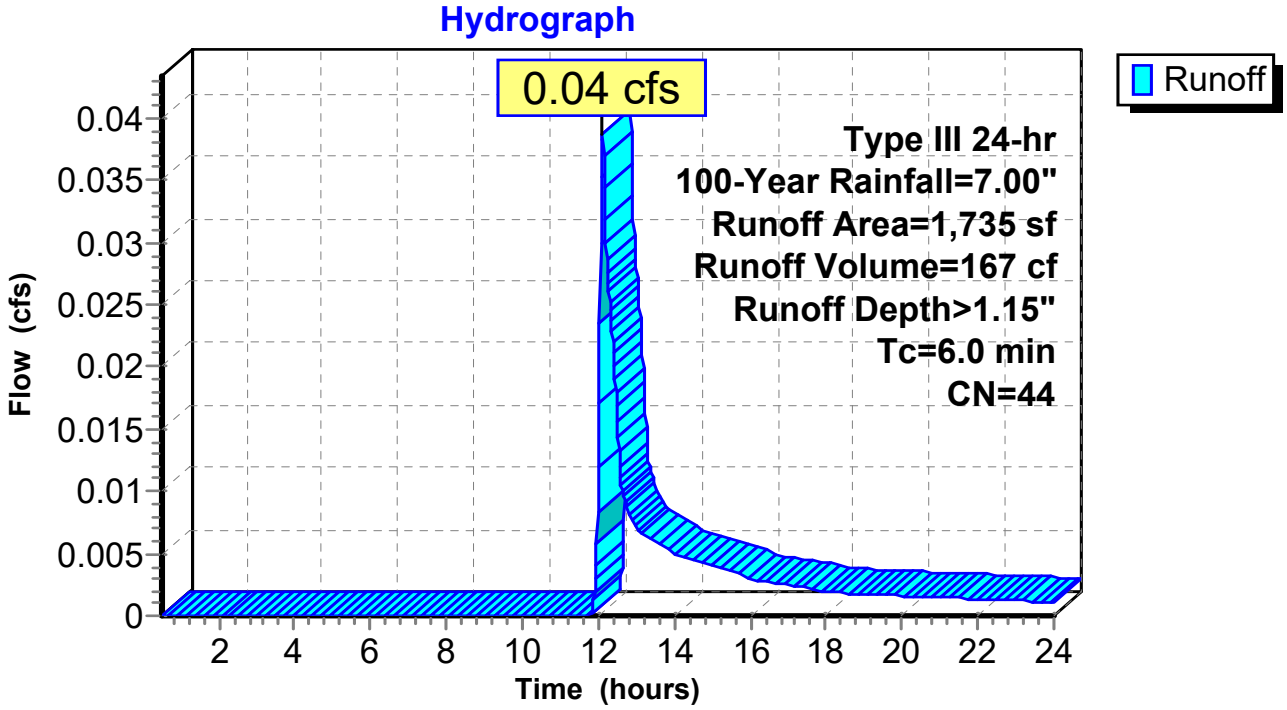
Runoff = 0.04 cfs @ 12.11 hrs, Volume= 167 cf, Depth> 1.15"

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=7.00"

Area (sf)	CN	Description
350	49	50-75% Grass cover, Fair, HSG A
141	98	Roofs, HSG A
1,245	36	Woods, Fair, HSG A
1,735	44	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
6.0					**Direct Entry,**

Subcatchment SA#2: Subcat SA#2



Summary for Subcatchment SA#3: Subcat SA#3

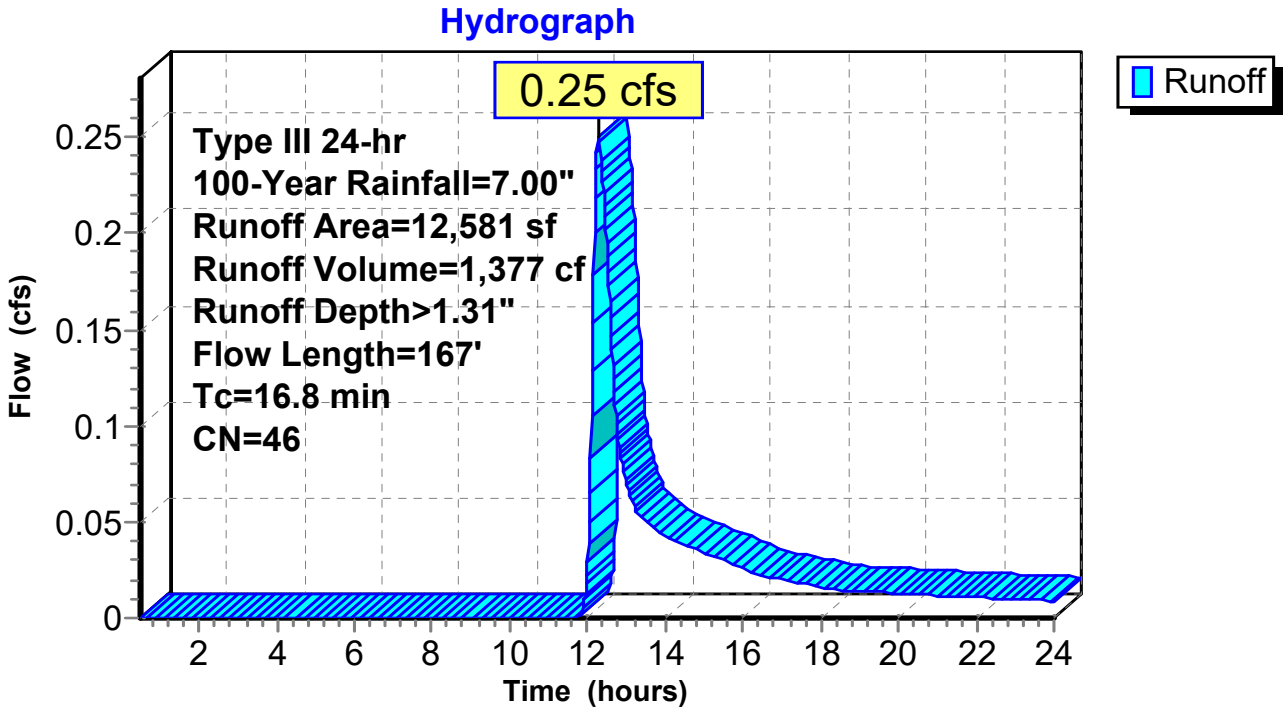
Runoff = 0.25 cfs @ 12.29 hrs, Volume= 1,377 cf, Depth> 1.31"

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=7.00"

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

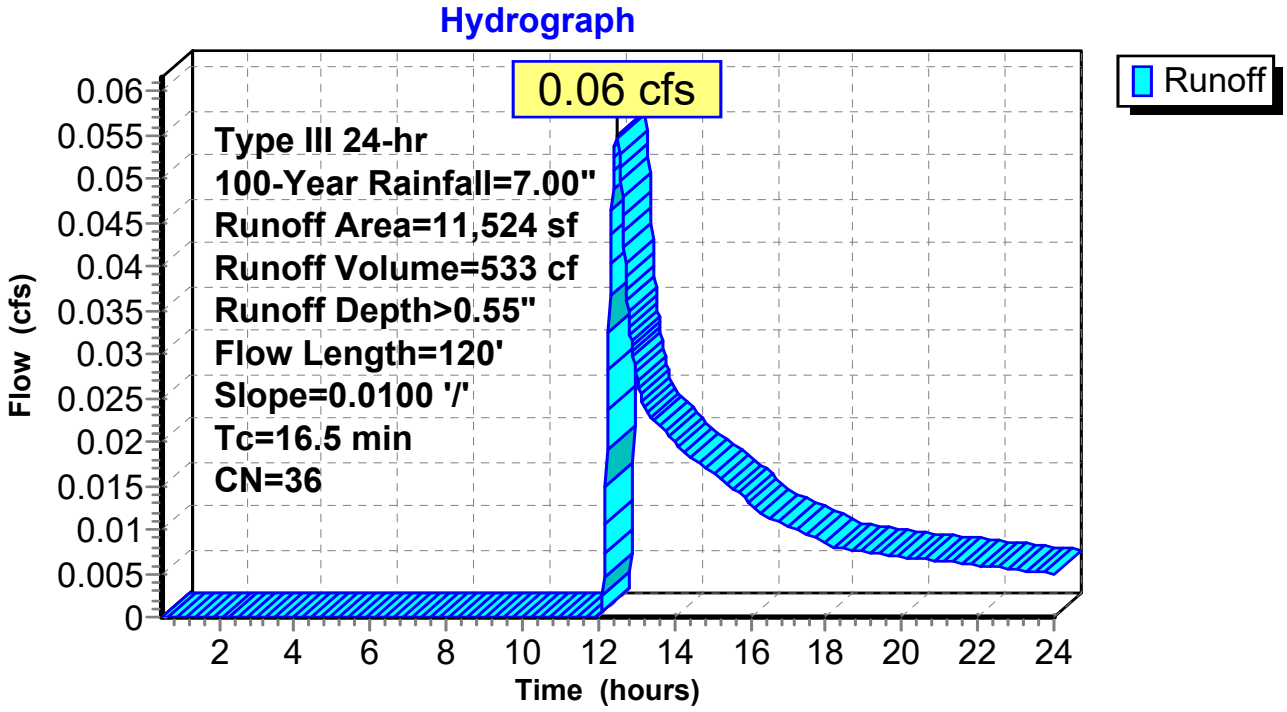
Runoff = 0.06 cfs @ 12.49 hrs, Volume= 533 cf, Depth> 0.55"

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=7.00"

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

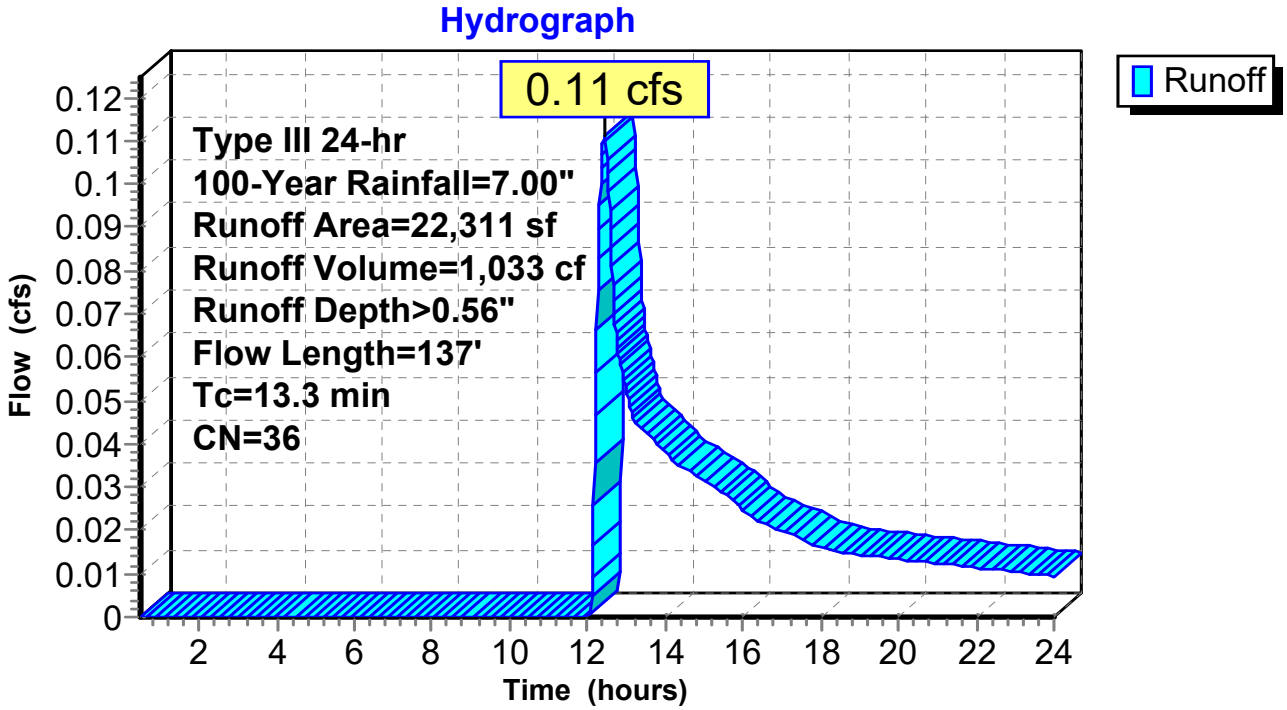
Runoff = 0.11 cfs @ 12.44 hrs, Volume= 1,033 cf, Depth> 0.56"

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=7.00"

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

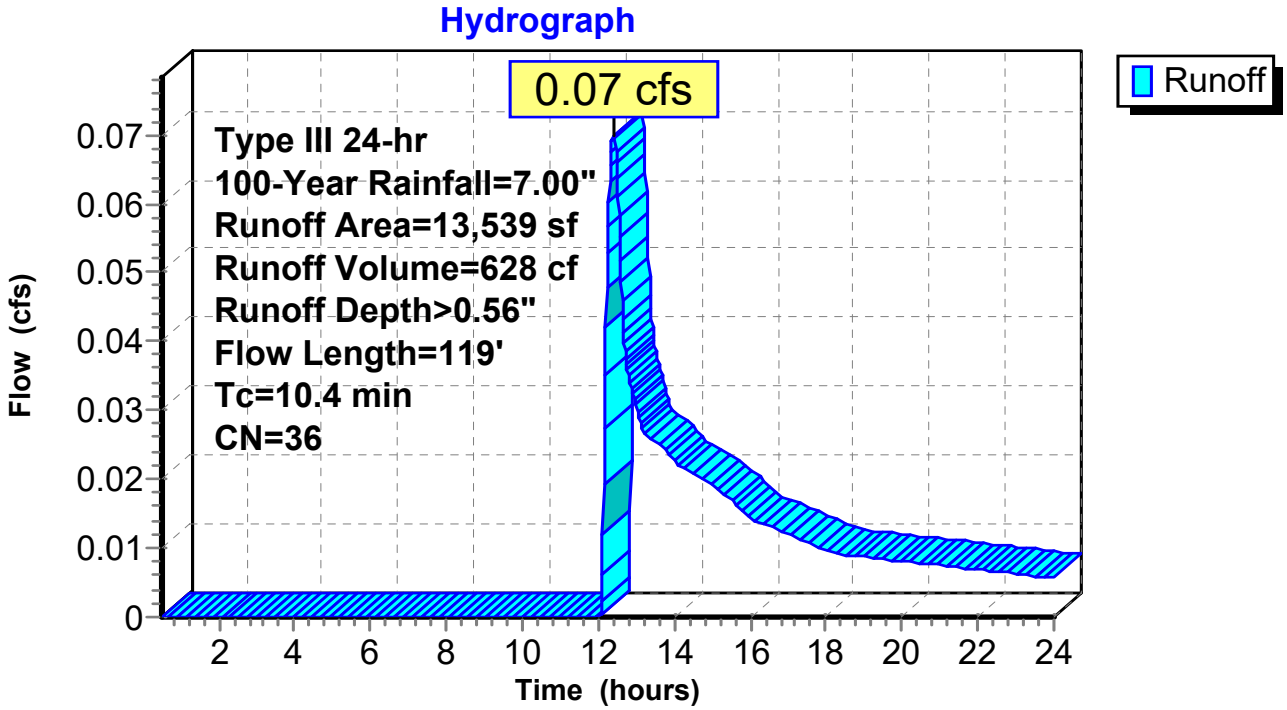
Runoff = 0.07 cfs @ 12.40 hrs, Volume= 628 cf, Depth> 0.56"

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=7.00"

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

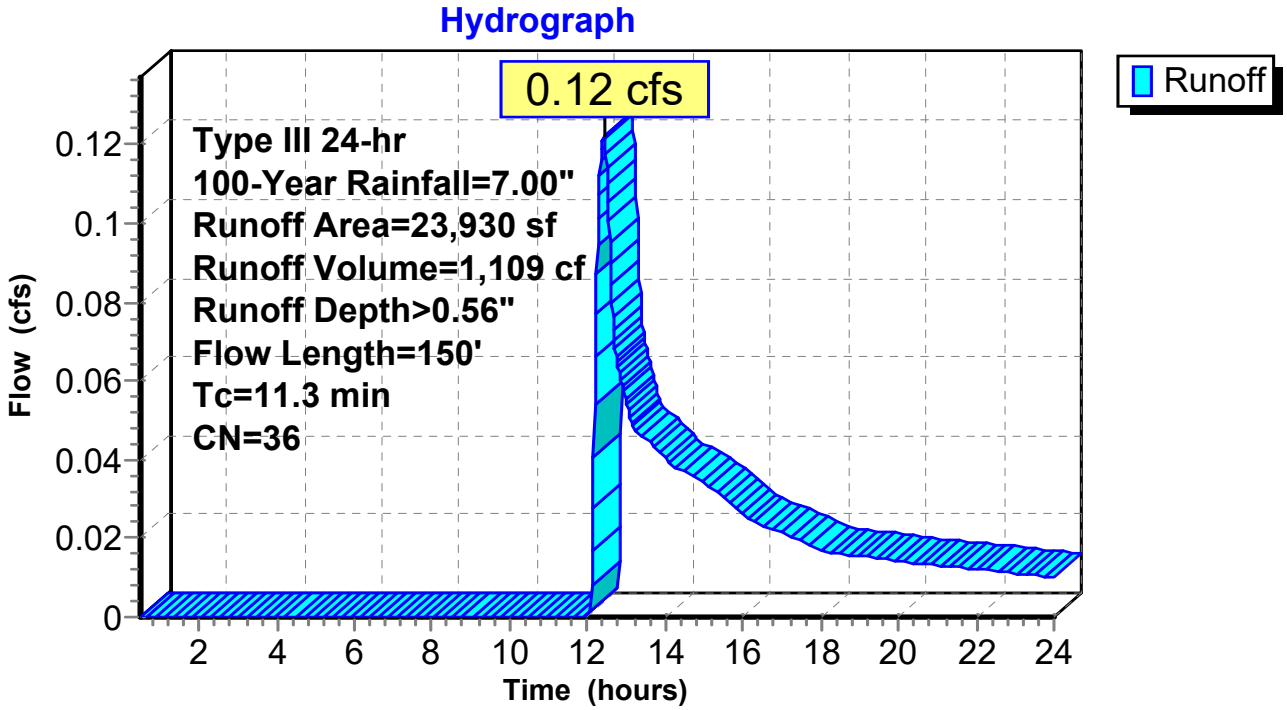
Runoff = 0.12 cfs @ 12.41 hrs, Volume= 1,109 cf, Depth> 0.56"

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=7.00"

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

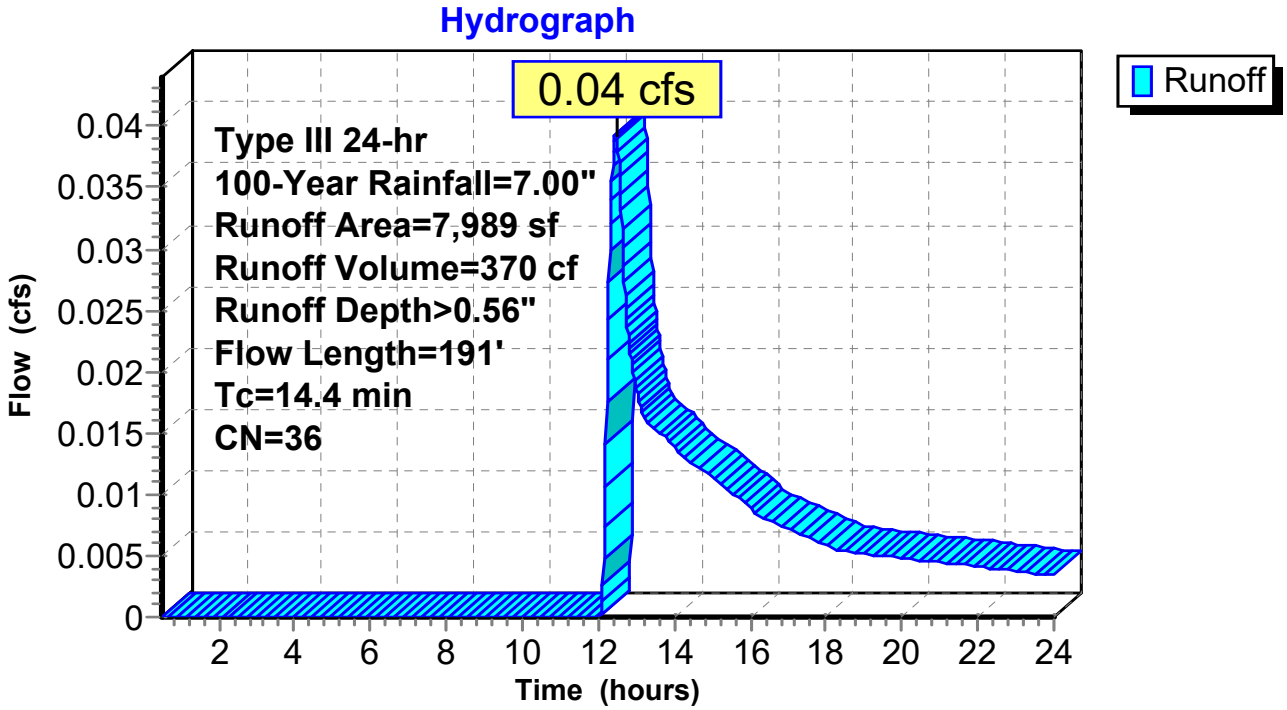
Runoff = 0.04 cfs @ 12.46 hrs, Volume= 370 cf, Depth> 0.56"

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=7.00"

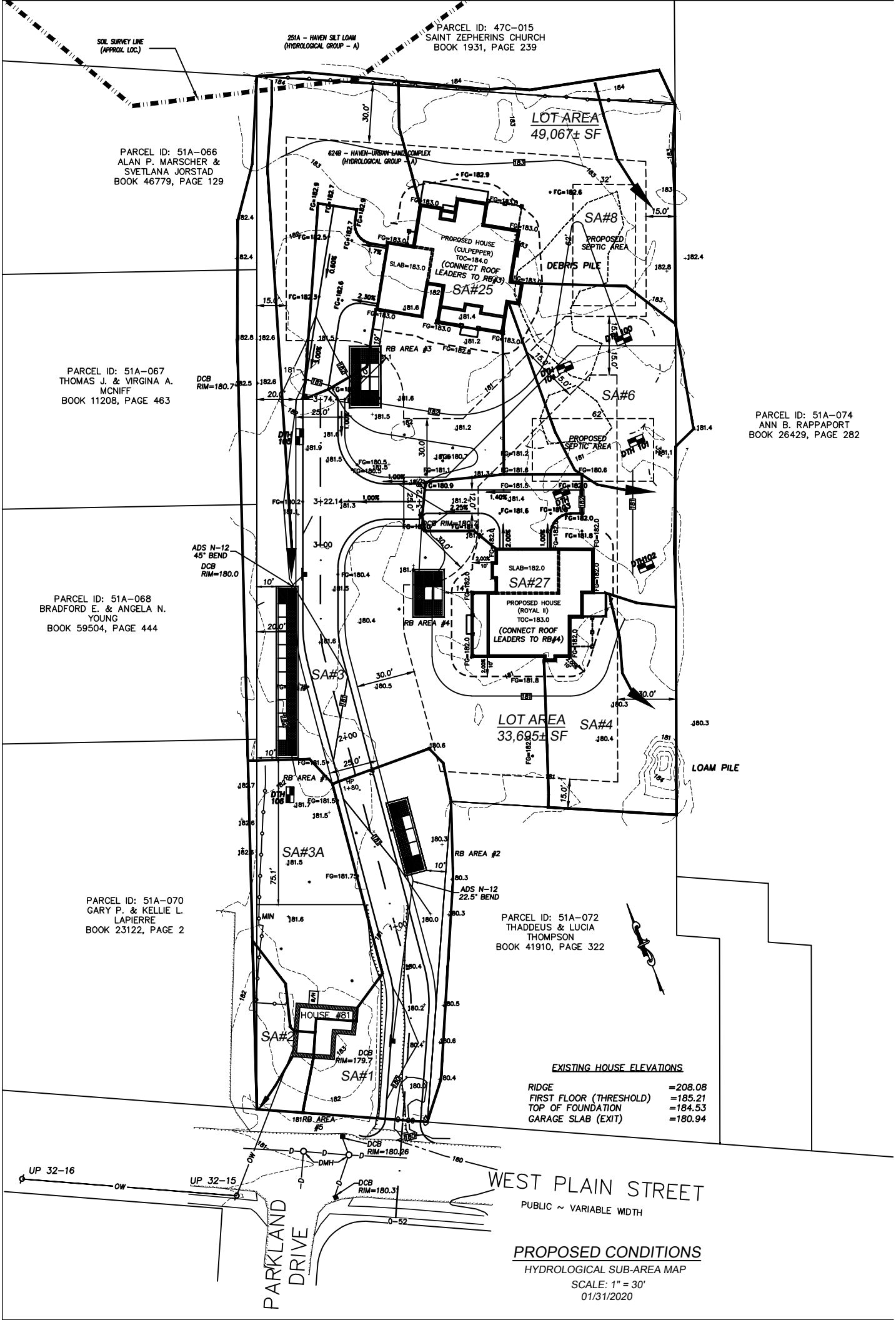
Area (sf)	CN	Description
7,989	36	Woods, Fair, HSG A
7,989		100.00% Pervious Area

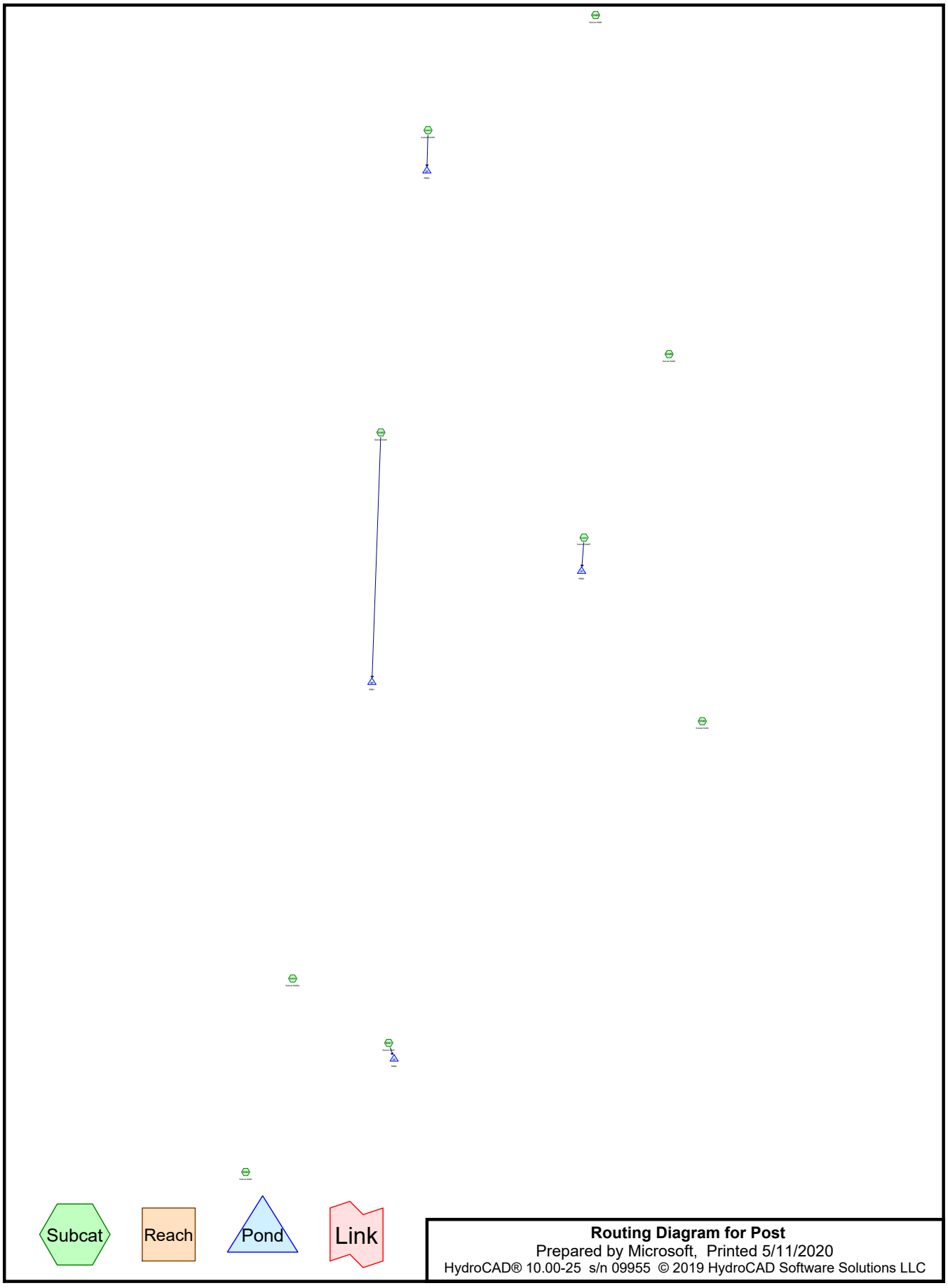
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0280	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
3.9	141	0.0014	0.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
14.4	191	Total			

Subcatchment SA#8: Subcat SA#8



Proposed Conditions


SOIL SURVEY LINE (APPROX. LOC.)
251A – HAVEN SILT LOAM (HYDROLOGICAL GROUP – A)
PARCEL ID: 47C–015
SAINT ZEPHERINS CHURCH
BOOK 1931, PAGE 239
PARCEL ID: 51A–066
ALAN P. MARSCHER &
SVETLANA JORSTAD
BOOK 46779, PAGE 129
6249 – HAVEN-URBAN-LAND COMPLEX (HYDROLOGICAL GROUP – A)
LOT AREA
49,067± SF
PROPOSED HOUSE
(CULPEPPER)
TOC=184.0
(CONNECT ROOF
LEADERS TO RB#3)
SLAB=183.0
SA#25
SA#8
PROPOSED
SEPTIC AREA
DEBRIS PILE
RB AREA #3
PARCEL ID: 51A–067
THOMAS J. & VIRGINA A.
MCNIFF
BOOK 11208, PAGE 463
DCB
RIM=180.7
SA#6
PROPOSED
SEPTIC AREA
PARCEL ID: 51A–074
ANN B. RAPPAPORT
BOOK 26429, PAGE 282
ADS N–12
45° BEND
DCB
RIM=180.0
PARCEL ID: 51A–068
BRADFORD E. & ANGELA N.
YOUNG
BOOK 59504, PAGE 444
SLAB=182.0
SA#27
PROPOSED HOUSE
(ROYAL II)
TOC=183.0
(CONNECT ROOF
LEADERS TO RB#4)
RB AREA #4
SA#3
LOT AREA
33,695± SF
SA#4
LOAM PILE
RB AREA #1
SA#3A
RB AREA #2
ADS N–12
22.5° BEND
PARCEL ID: 51A–070
GARY P. & KELLIE L.
LAPIERRE
BOOK 23122, PAGE 2
PARCEL ID: 51A–072
THADDEUS & LUCIA
THOMPSON
BOOK 41910, PAGE 322
HOUSE #51
SA#2
SA#1
DCB
RIM=179.7
RB AREA #5
DCB
RIM=180.26
DMH
DCB
RIM=180.3
UP 32–16
UP 32–15
OW
WEST PLAIN STREET
PUBLIC ~ VARIABLE WIDTH
PARKLAND DRIVE
EXISTING HOUSE ELEVATIONS
RIDGE =208.08
FIRST FLOOR (THRESHOLD) =185.21
TOP OF FOUNDATION =184.53
GARAGE SLAB (EXIT) =180.94
PROPOSED CONDITIONS
HYDROLOGICAL SUB-AREA MAP
SCALE: 1" = 30'
01/31/2020



Routing Diagram for Post
Prepared by Microsoft, Printed 5/11/2020

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
51,545	49	50-75% Grass cover, Fair, HSG A (SA#1, SA#2, SA#27, SA#3, SA#3A, SA#4, SA#6, SA#8)
11,385	98	Paved roads w/curbs & sewers, HSG A (SA#1, SA#25, SA#27, SA#3, SA#8)
7,257	98	Roofs, HSG A (SA#1, SA#2, SA#25, SA#27, SA#3A)
27,706	36	Woods, Fair, HSG A (SA#1, SA#2, SA#27, SA#3, SA#3A, SA#4, SA#6, SA#8)
97,894	**55**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
97,894	HSG A	SA#1, SA#2, SA#25, SA#27, SA#3, SA#3A, SA#4, SA#6, 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
51,545	0	0	0	0	51,545	50-75% Grass cover, Fair
11,385	0	0	0	0	11,385	Paved roads w/curbs & sewers
7,257	0	0	0	0	7,257	Roofs
27,706	0	0	0	0	27,706	Woods, Fair
97,894	**0**	**0**	**0**	**0**	**97,894**	**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=9,447 sf 37.40% Impervious Runoff Depth=0.97"
Tc=6.0 min CN=64 Runoff=0.22 cfs 766 cf

Subcatchment SA#2: Subcat SA#2 Runoff Area=1,735 sf 8.10% Impervious Runoff Depth=0.15"
Tc=6.0 min CN=44 Runoff=0.00 cfs 22 cf

Subcatchment SA#25: Subcat SA#25 Runoff Area=5,186 sf 100.00% Impervious Runoff Depth=3.77"
Flow Length=70' Tc=6.4 min CN=98 Runoff=0.46 cfs 1,627 cf

Subcatchment SA#27: Subcat SA#27 Runoff Area=4,748 sf 94.85% Impervious Runoff Depth=3.43"
Tc=6.0 min CN=95 Runoff=0.41 cfs 1,358 cf

Subcatchment SA#3: Subcat SA#3 Runoff Area=39,520 sf 11.77% Impervious Runoff Depth=0.37"
Flow Length=240' Tc=12.9 min CN=51 Runoff=0.15 cfs 1,217 cf

Subcatchment SA#3A: Subcat SA#3A Runoff Area=6,684 sf 4.92% Impervious Runoff Depth=0.33"
Tc=6.0 min CN=50 Runoff=0.02 cfs 186 cf

Subcatchment SA#4: Subcat SA#4 Runoff Area=6,600 sf 0.00% Impervious Runoff Depth=0.12"
Tc=6.0 min CN=43 Runoff=0.00 cfs 69 cf

Subcatchment SA#6: Subcat SA#6 Runoff Area=11,721 sf 0.00% Impervious Runoff Depth=0.20"
Tc=6.0 min CN=46 Runoff=0.02 cfs 199 cf

Subcatchment SA#8: Subcat SA#8 Runoff Area=12,253 sf 2.44% Impervious Runoff Depth=0.15"
Tc=6.0 min CN=44 Runoff=0.01 cfs 152 cf

Pond 1P: RB#4 Peak Elev=177.35' Storage=345 cf Inflow=0.41 cfs 1,358 cf
Outflow=0.08 cfs 1,358 cf

Pond 2P: RB#3 Peak Elev=178.14' Storage=361 cf Inflow=0.46 cfs 1,627 cf
Outflow=0.10 cfs 1,627 cf

Pond 3P: RB#1 Peak Elev=176.43' Storage=11 cf Inflow=0.15 cfs 1,217 cf
Outflow=0.14 cfs 1,217 cf

Pond 7P: RB#2 Peak Elev=176.05' Storage=102 cf Inflow=0.22 cfs 766 cf
Outflow=0.08 cfs 766 cf

Total Runoff Area = 97,894 sf Runoff Volume = 5,595 cf Average Runoff Depth = 0.69"
80.96% Pervious = 79,252 sf 19.04% Impervious = 18,642 sf

Summary for Subcatchment SA#1: Subcat SA#1

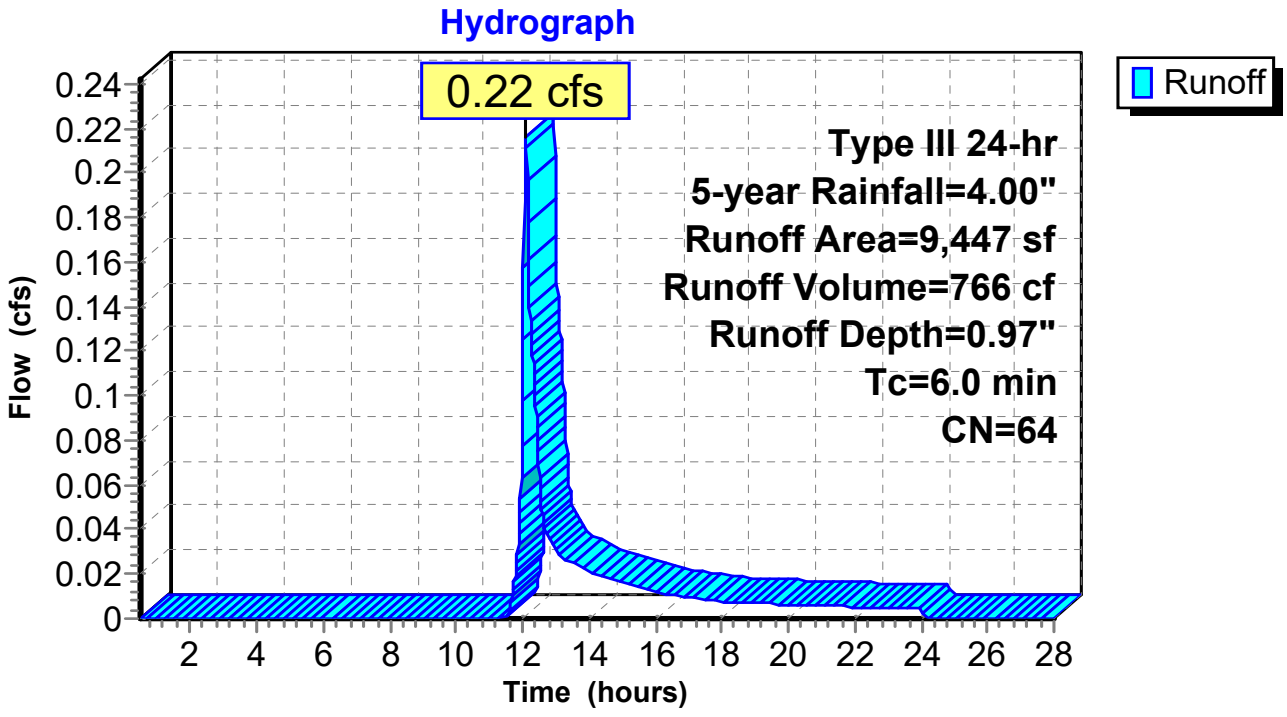
Runoff = 0.22 cfs @ 12.10 hrs, Volume= 766 cf, Depth= 0.97"

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 5-year Rainfall=4.00"

Area (sf)	CN	Description
3,692	49	50-75% Grass cover, Fair, HSG A
3,246	98	Paved roads w/curbs & sewers, HSG A
288	98	Roofs, HSG A
2,222	36	Woods, Fair, HSG A
9,447	64	Weighted Average
5,914		62.60% Pervious Area
3,533		37.40% Impervious Area

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

Subcatchment SA#1: Subcat SA#1



Summary for Subcatchment SA#2: Subcat SA#2

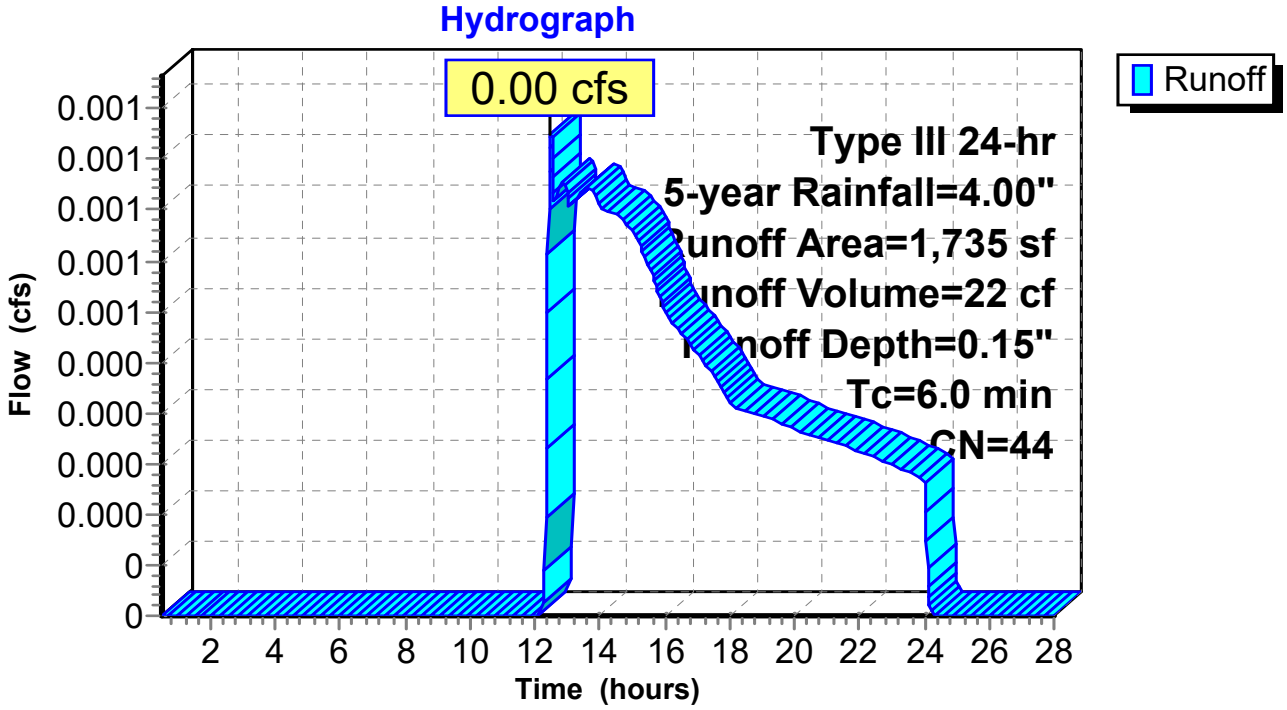
Runoff = 0.00 cfs @ 12.49 hrs, Volume= 22 cf, Depth= 0.15"

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 5-year Rainfall=4.00"

Area (sf)	CN	Description
350	49	50-75% Grass cover, Fair, HSG A
141	98	Roofs, HSG A
1,244	36	Woods, Fair, HSG A
1,735	44	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
6.0					**Direct Entry,**

Subcatchment SA#2: Subcat SA#2



Summary for Subcatchment SA#25: Subcat SA#25

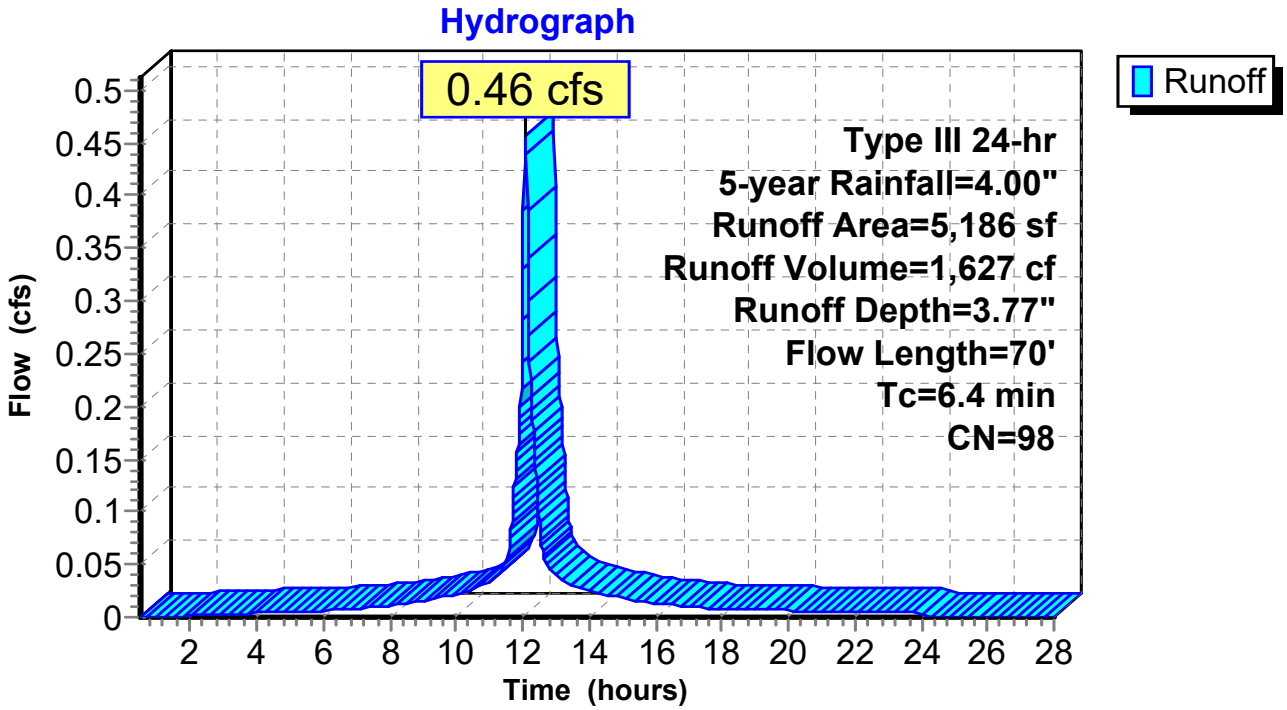
Runoff = 0.46 cfs @ 12.09 hrs, Volume= 1,627 cf, Depth= 3.77"

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 5-year Rainfall=4.00"

Area (sf)	CN	Description
1,719	98	Paved roads w/curbs & sewers, HSG A
3,467	98	Roofs, HSG A
5,186	98	Weighted Average
5,186		100.00% 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#27: Subcat SA#27

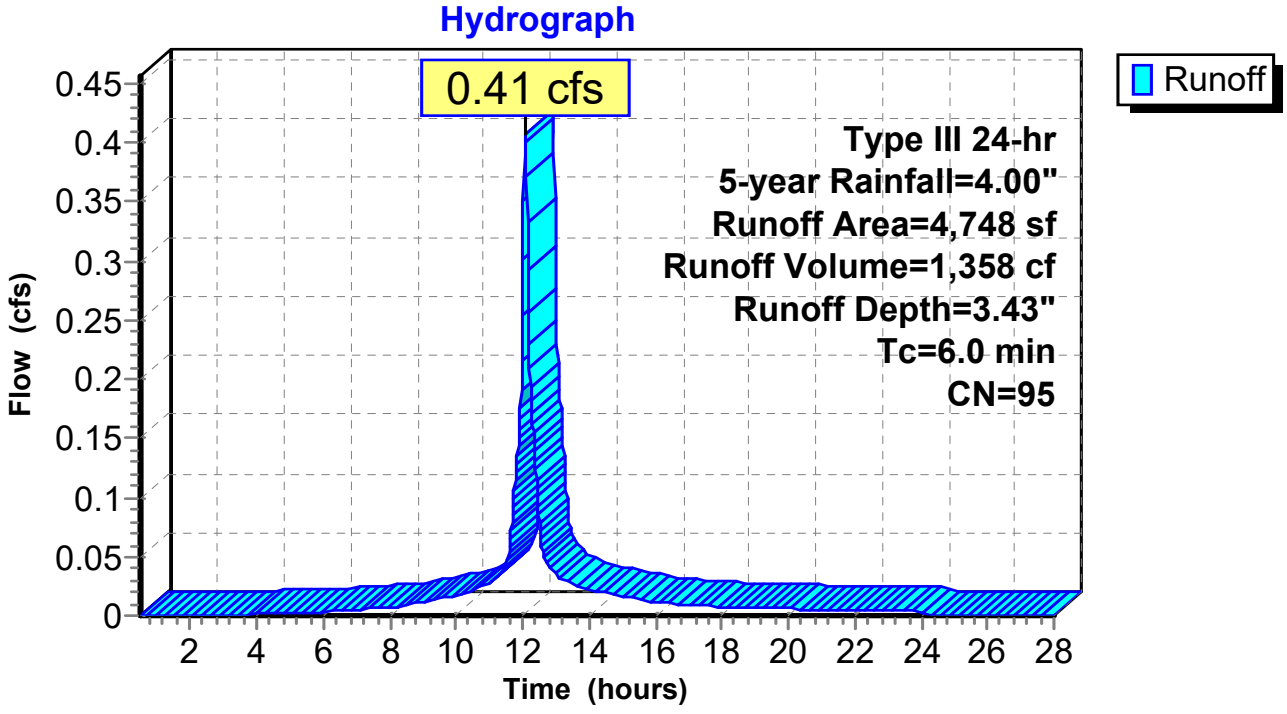
Runoff = 0.41 cfs @ 12.08 hrs, Volume= 1,358 cf, Depth= 3.43"

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 5-year Rainfall=4.00"

Area (sf)	CN	Description
155	49	50-75% Grass cover, Fair, HSG A
1,470	98	Paved roads w/curbs & sewers, HSG A
3,034	98	Roofs, HSG A
89	36	Woods, Fair, HSG A
4,748	95	Weighted Average
245		5.15% Pervious Area
4,504		94.85% 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#3: Subcat SA#3

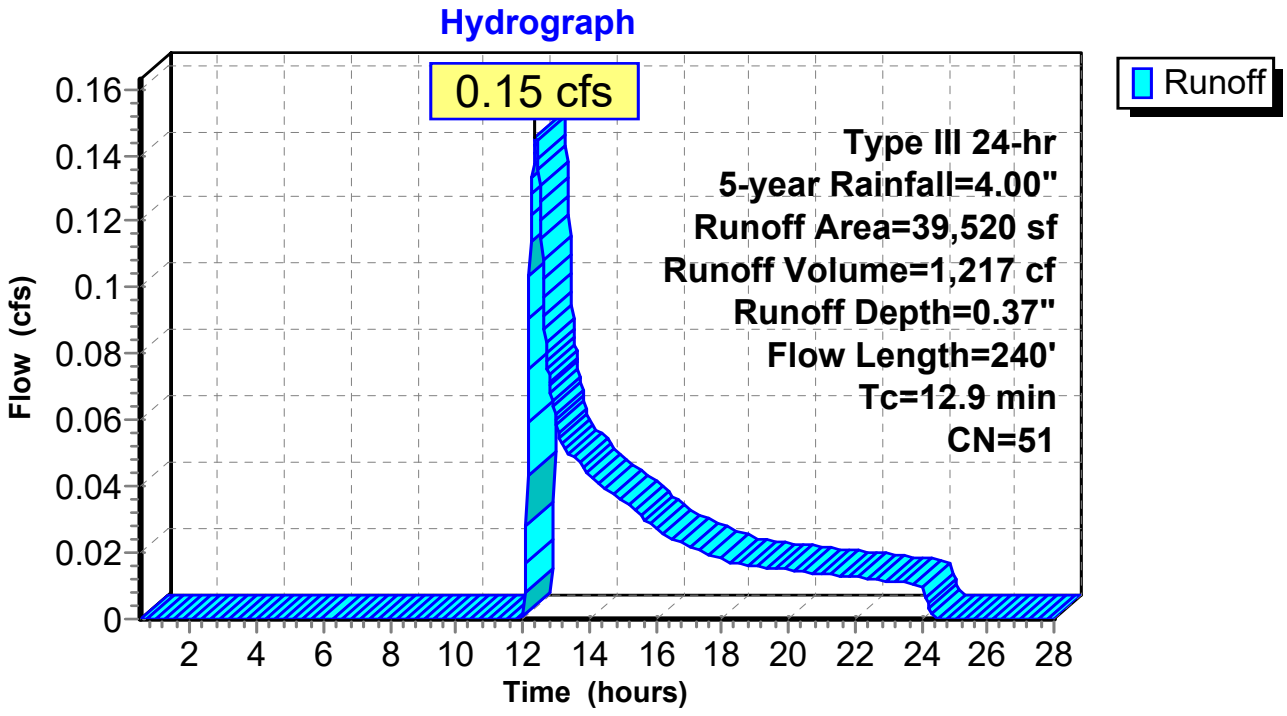
Runoff = 0.15 cfs @ 12.40 hrs, Volume= 1,217 cf, Depth= 0.37"

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 5-year Rainfall=4.00"

Area (sf)	CN	Description
22,441	49	50-75% Grass cover, Fair, HSG A
4,652	98	Paved roads w/curbs & sewers, HSG A
12,426	36	Woods, Fair, HSG A
39,520	51	Weighted Average
34,868		88.23% Pervious Area
4,652		11.77% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.1	50	0.0240	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
1.8	190	0.0120	1.76		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
12.9	240	Total			

Subcatchment SA#3: Subcat SA#3



Summary for Subcatchment SA#3A: Subcat SA#3A

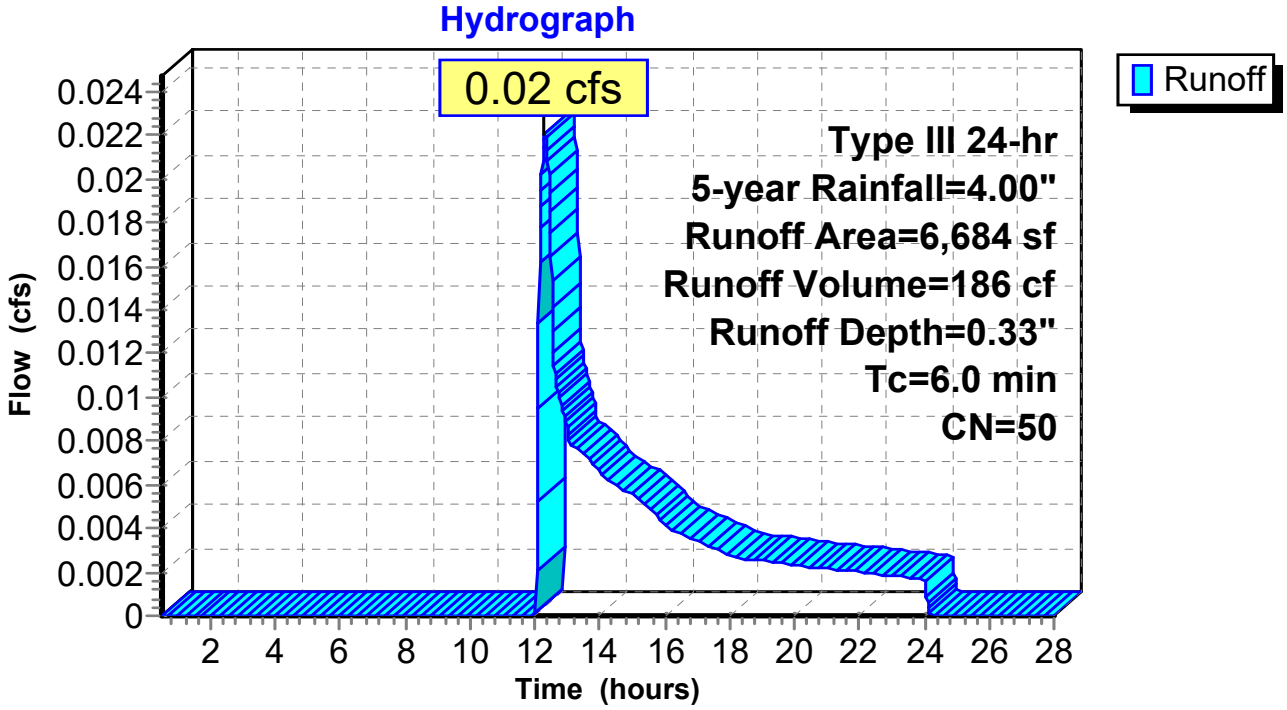
Runoff = 0.02 cfs @ 12.32 hrs, Volume= 186 cf, Depth= 0.33"

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 5-year Rainfall=4.00"

Area (sf)	CN	Description
5,678	49	50-75% Grass cover, Fair, HSG A
329	98	Roofs, HSG A
678	36	Woods, Fair, HSG A
6,684	50	Weighted Average
6,356		95.08% Pervious Area
329		4.92% Impervious Area

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

Subcatchment SA#3A: Subcat SA#3A



Summary for Subcatchment SA#4: Subcat SA#4

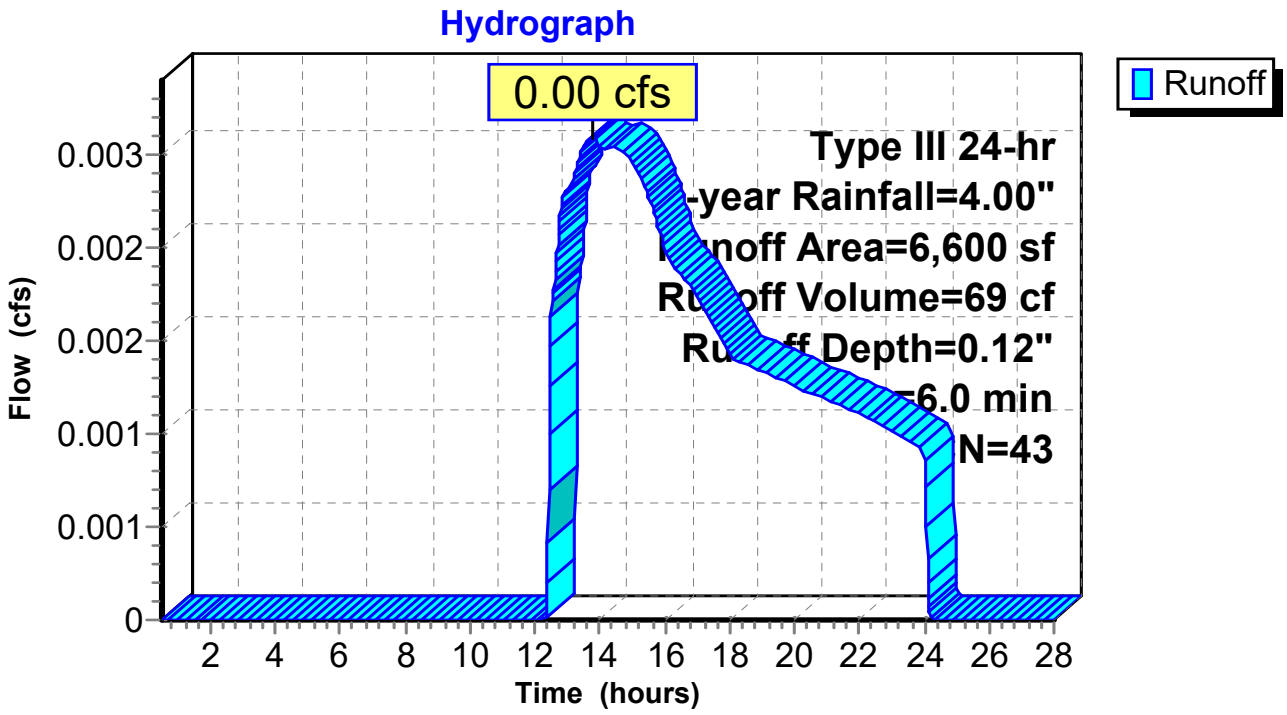
Runoff = 0.00 cfs @ 13.76 hrs, Volume= 69 cf, Depth= 0.12"

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 5-year Rainfall=4.00"

Area (sf)	CN	Description
3,773	49	50-75% Grass cover, Fair, HSG A
2,827	36	Woods, Fair, HSG A
6,600	43	Weighted Average
6,600		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#6: Subcat SA#6

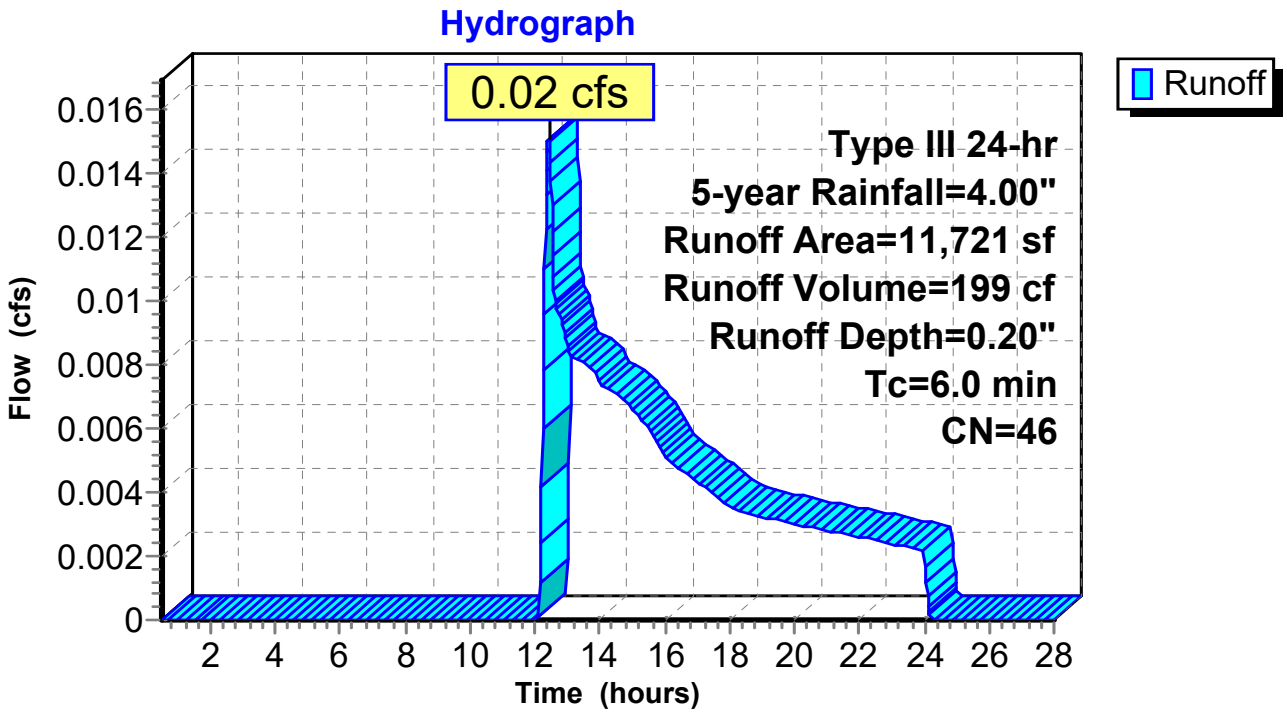
Runoff = 0.02 cfs @ 12.42 hrs, Volume= 199 cf, Depth= 0.20"

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 5-year Rainfall=4.00"

Area (sf)	CN	Description
9,325	49	50-75% Grass cover, Fair, HSG A
2,397	36	Woods, Fair, HSG A
11,721	46	Weighted Average
11,721		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

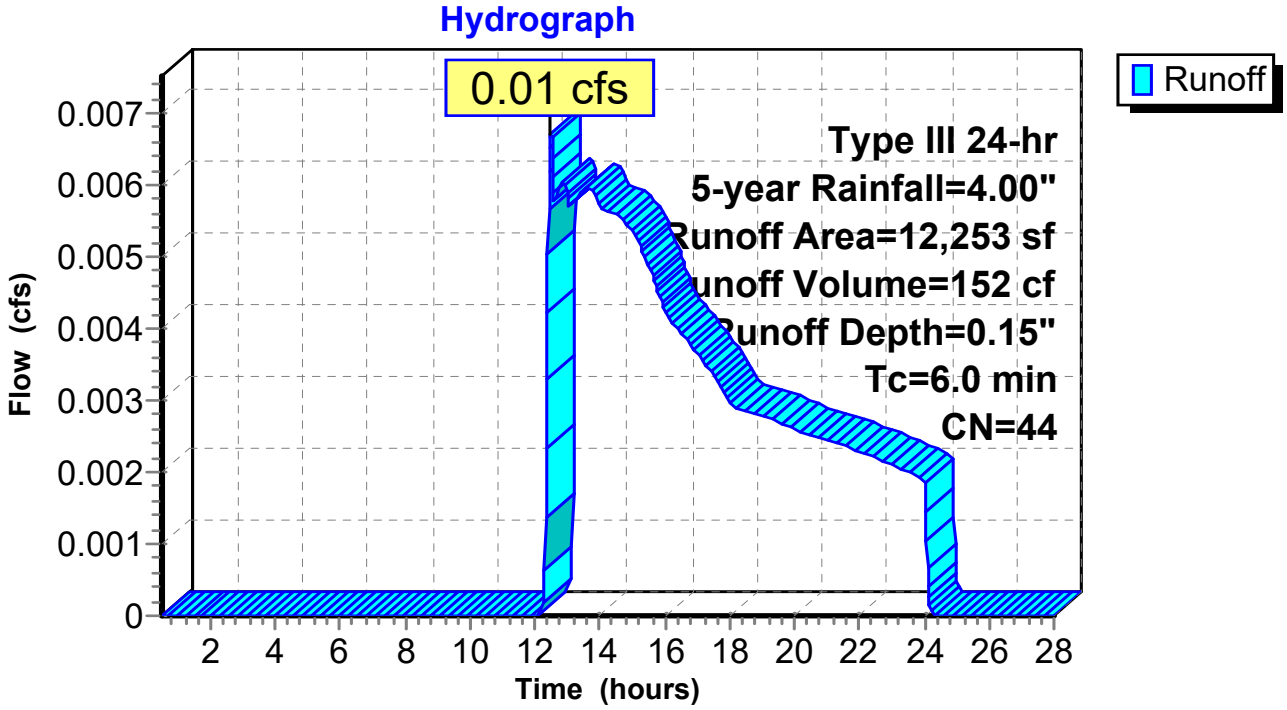
Runoff = 0.01 cfs @ 12.49 hrs, Volume= 152 cf, Depth= 0.15"

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 5-year Rainfall=4.00"

Area (sf)	CN	Description
6,131	49	50-75% Grass cover, Fair, HSG A
299	98	Paved roads w/curbs & sewers, HSG A
5,823	36	Woods, Fair, HSG A
12,253	44	Weighted Average
11,954		97.56% Pervious Area
299		2.44% Impervious 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 = 4,748 sf, 94.85% Impervious, Inflow Depth = 3.43" for 5-year event
Inflow = 0.41 cfs @ 12.08 hrs, Volume= 1,358 cf
Outflow = 0.08 cfs @ 11.70 hrs, Volume= 1,358 cf, Atten= 82%, Lag= 0.0 min
Discarded = 0.08 cfs @ 11.70 hrs, Volume= 1,358 cf

Routing by Stor-Ind method, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Peak Elev= 177.35' @ 12.53 hrs Surf.Area= 392 sf Storage= 345 cf

Plug-Flow detention time= 25.1 min calculated for 1,357 cf (100% of inflow)
Center-of-Mass det. time= 25.1 min (799.5 - 774.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	176.00'	354 cf	**16.00'W x 24.50'L x 3.54'H Field A** 1,388 cf Overall - 503 cf Embedded = 885 cf x 40.0% Voids
#2A	176.50'	503 cf	**Cultec R-330XLHD** x 9 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
		857 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=0.08 cfs @ 11.70 hrs HW=176.04' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.08 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 3 rows

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

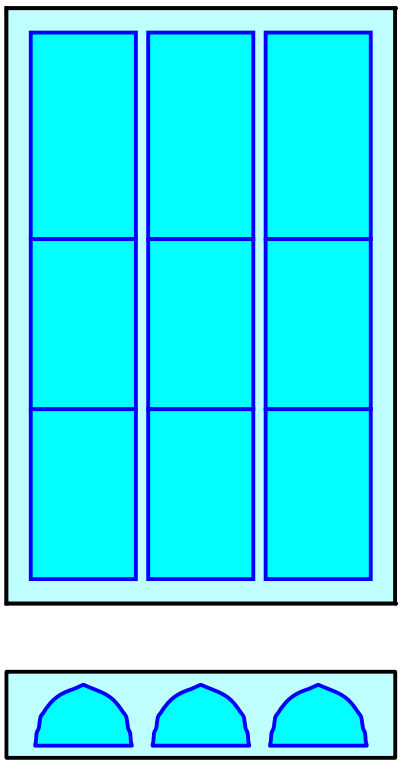
3 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 22.50' Row Length +12.0" End Stone x 2 = 24.50' Base Length
3 Rows x 52.0" Wide + 6.0" Spacing x 2 + 12.0" Side Stone x 2 = 16.00' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

9 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 3 Rows = 502.9 cf Chamber Storage

1,388.3 cf Field - 502.9 cf Chambers = 885.4 cf Stone x 40.0% Voids = 354.2 cf Stone Storage

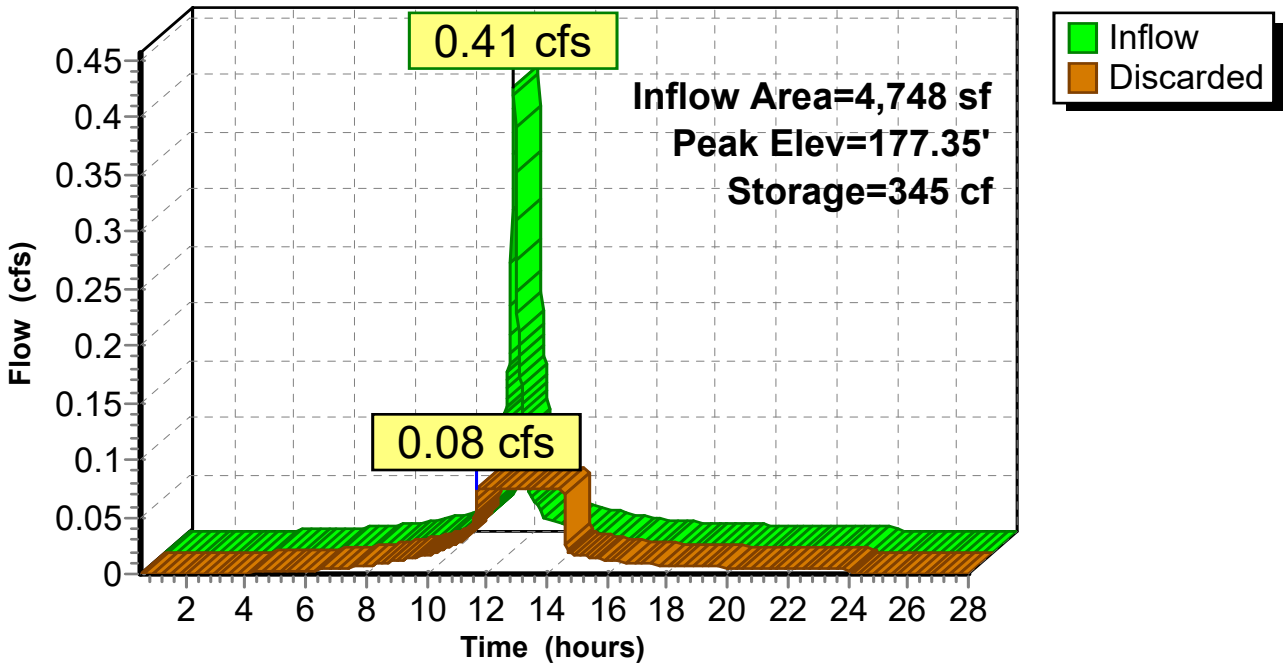
Chamber Storage + Stone Storage = 857.1 cf = 0.020 af
Overall Storage Efficiency = 61.7%
Overall System Size = 24.50' x 16.00' x 3.54'

9 Chambers @ $ 300.00 /ea = $ 2,700.00
51.4 cy Field Excavation @ $ 10.00 /cy = $ 514.20
32.8 cy Stone @ $ 30.00 /cy = $ 983.77
Total Cost = $ 4,197.97



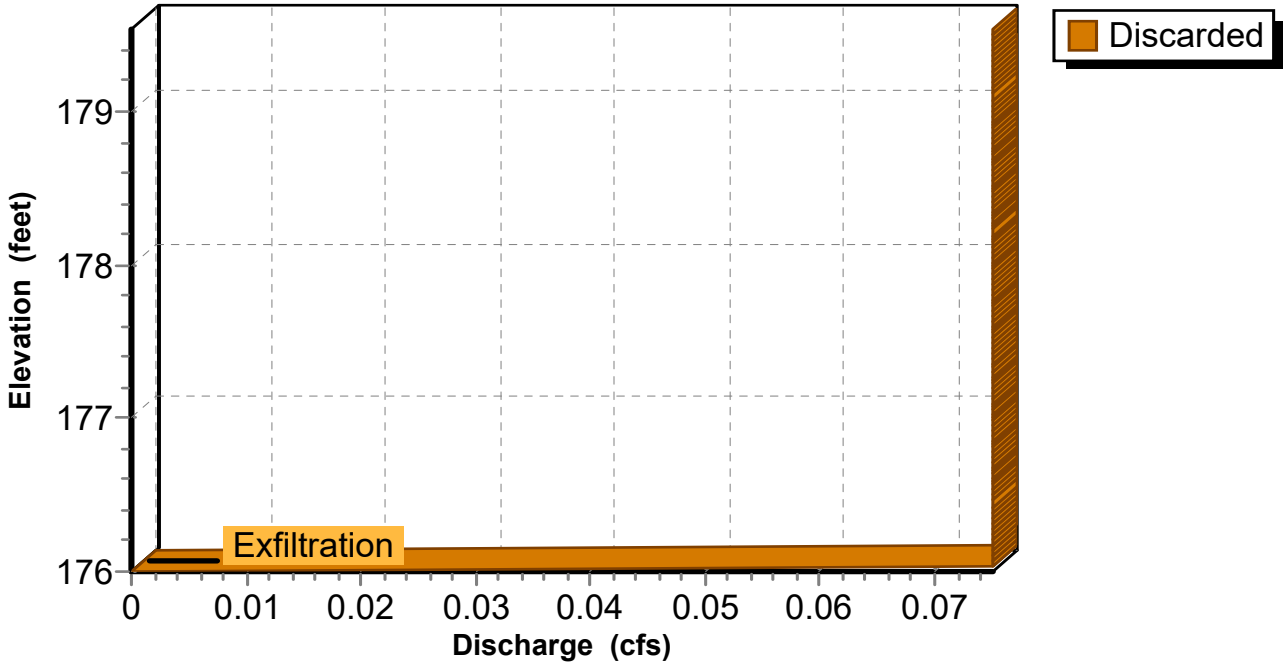
Pond 1P: RB#4

Hydrograph

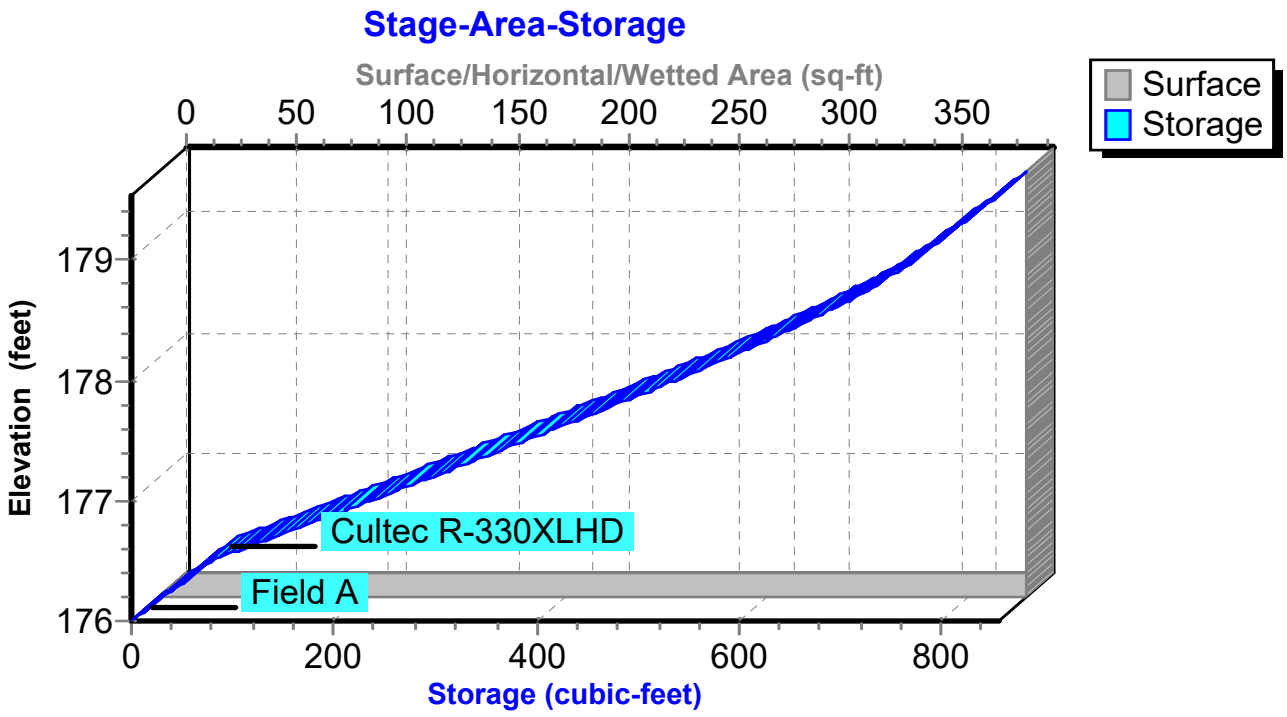


Pond 1P: RB#4

Stage-Discharge



Pond 1P: RB#4


Stage-Area-Storage
Surface/Horizontal/Wetted Area (sq-ft)
0
50
100
150
200
250
300
350
Surface
Storage
179
178
177
176
Elevation (feet)
Cultec R-330XLHD
Field A
0
200
400
600
800
Storage (cubic-feet)

Summary for Pond 2P: RB#3

Inflow Area = 5,186 sf,100.00% Impervious, Inflow Depth = 3.77" for 5-year event
Inflow = 0.46 cfs @ 12.09 hrs, Volume= 1,627 cf
Outflow = 0.10 cfs @ 11.72 hrs, Volume= 1,627 cf, Atten= 79%, Lag= 0.0 min
Discarded = 0.10 cfs @ 11.72 hrs, Volume= 1,627 cf

Routing by Stor-Ind method, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Peak Elev= 178.14' @ 12.50 hrs Surf.Area= 504 sf Storage= 361 cf

Plug-Flow detention time= 18.6 min calculated for 1,627 cf (100% of inflow)
Center-of-Mass det. time= 18.6 min (770.9 - 752.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	177.00'	450 cf	**16.00'W x 31.50'L x 3.54'H Field A** 1,785 cf Overall - 659 cf Embedded = 1,126 cf x 40.0% Voids
#2A	177.50'	659 cf	**Cultec R-330XLHD** x 12 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
		1,110 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=0.10 cfs @ 11.72 hrs HW=177.04' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.10 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 3 rows

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

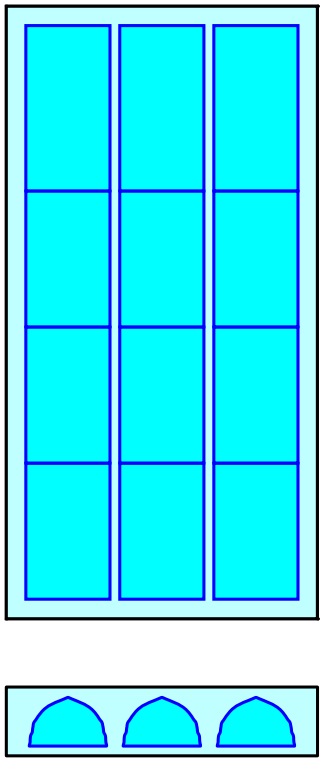
4 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 29.50' Row Length +12.0" End Stone x 2 = 31.50' Base Length
3 Rows x 52.0" Wide + 6.0" Spacing x 2 + 12.0" Side Stone x 2 = 16.00' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

12 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 3 Rows = 659.4 cf Chamber Storage

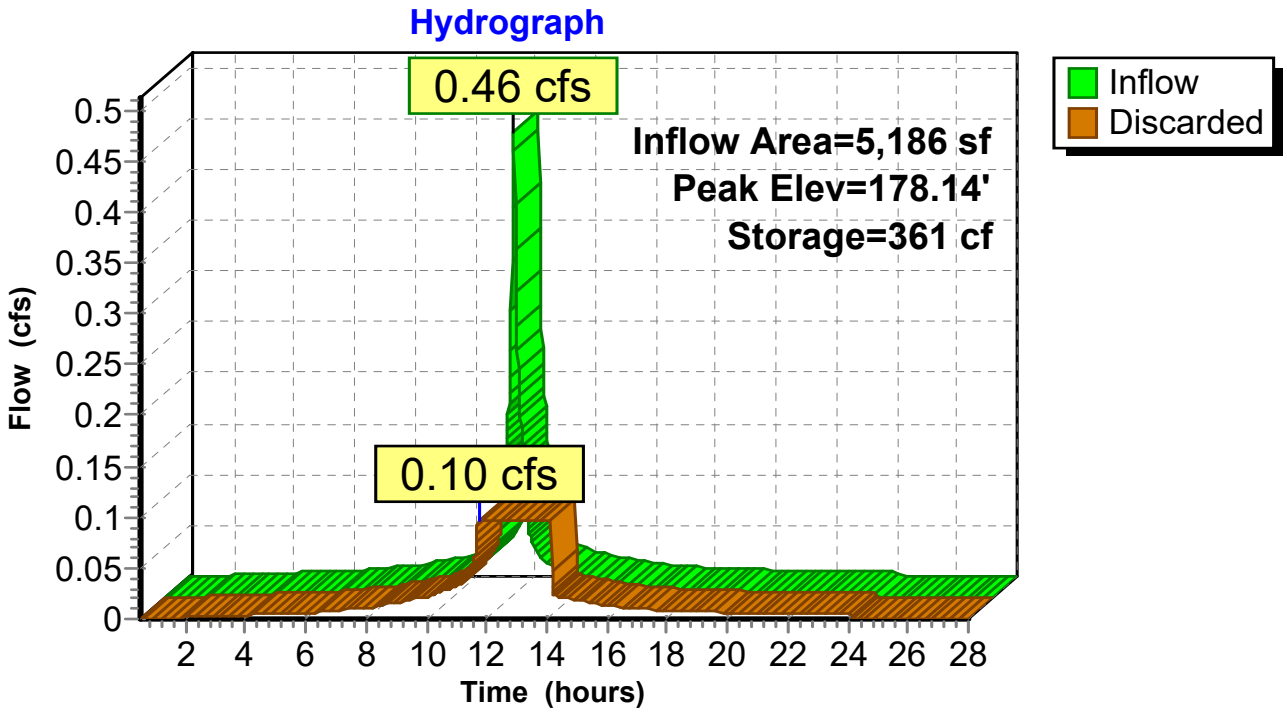
1,785.0 cf Field - 659.4 cf Chambers = 1,125.6 cf Stone x 40.0% Voids = 450.2 cf Stone Storage

Chamber Storage + Stone Storage = 1,109.6 cf = 0.025 af
Overall Storage Efficiency = 62.2%
Overall System Size = 31.50' x 16.00' x 3.54'

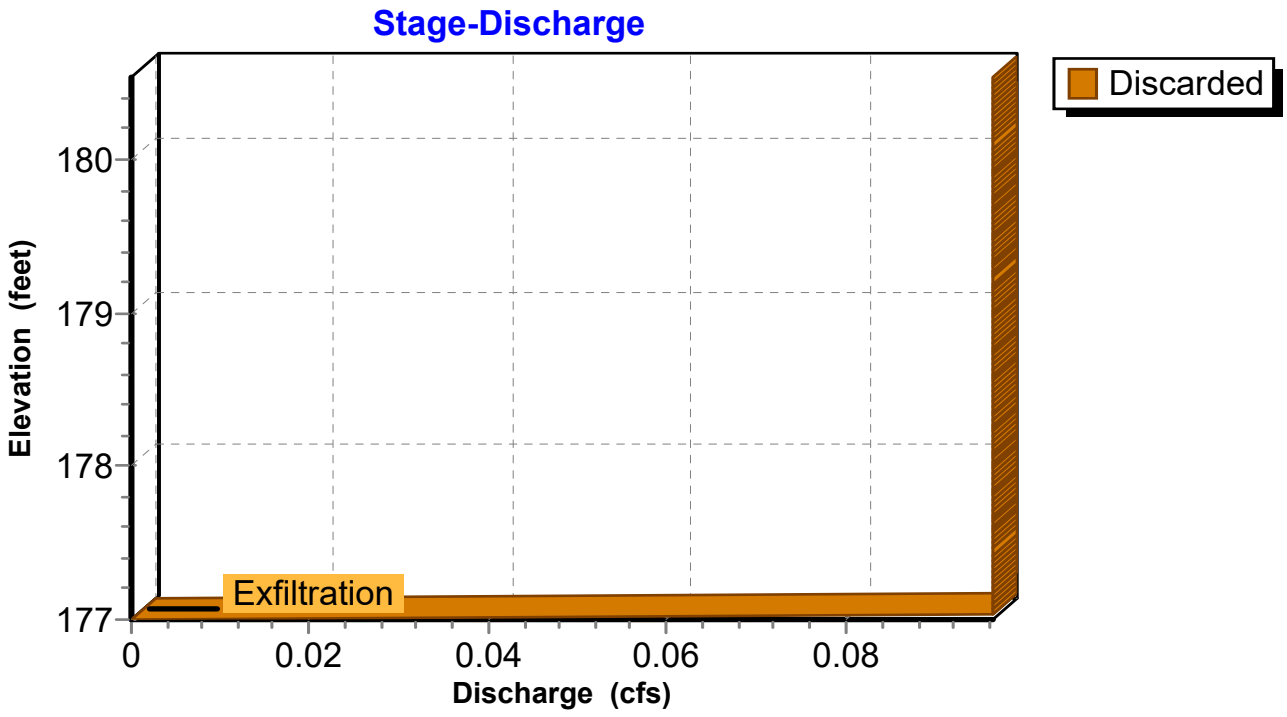
12 Chambers @ $ 300.00 /ea = $ 3,600.00
66.1 cy Field Excavation @ $ 10.00 /cy = $ 661.11
41.7 cy Stone @ $ 30.00 /cy = $ 1,250.65
Total Cost = $ 5,511.76



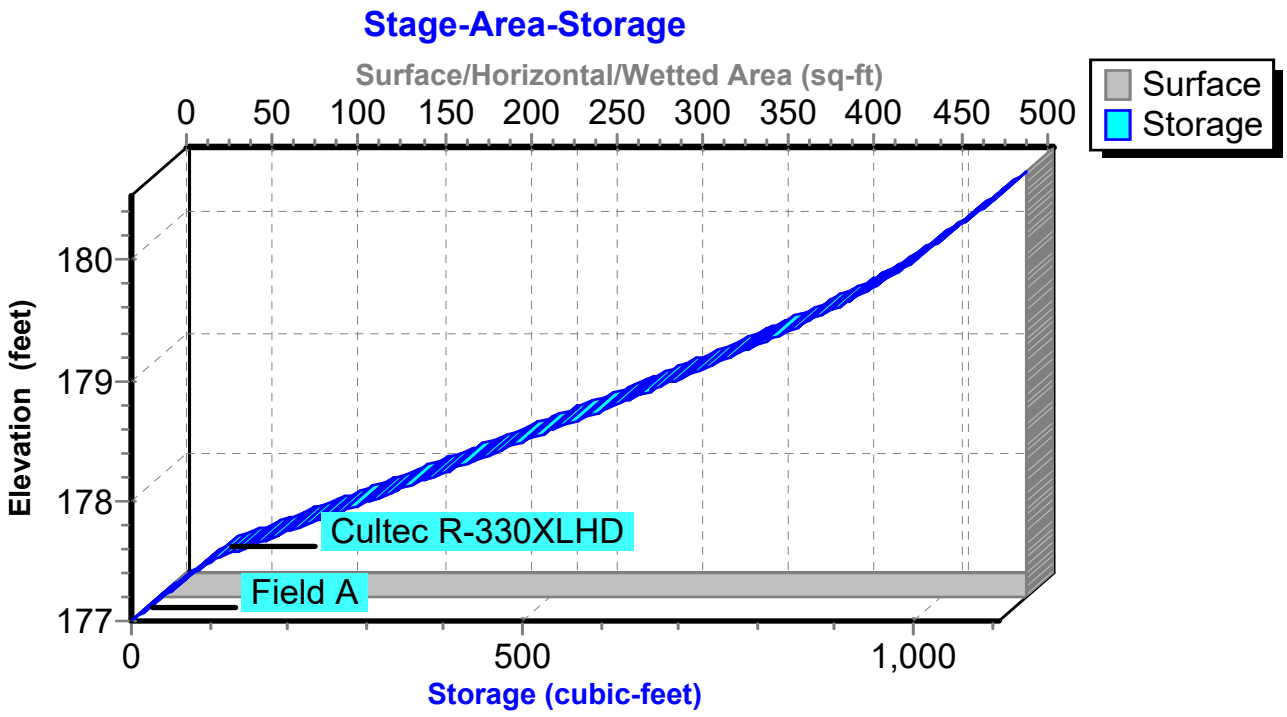
Pond 2P: RB#3



Pond 2P: RB#3



Pond 2P: RB#3


Stage-Area-Storage
Surface/Horizontal/Wetted Area (sq-ft)
0
50
100
150
200
250
300
350
400
450
500
Surface
Storage
180
179
178
177
Elevation (feet)
Cultec R-330XLHD
Field A
0
500
1,000
Storage (cubic-feet)

Summary for Pond 3P: RB#1

Inflow Area = 39,520 sf, 11.77% Impervious, Inflow Depth = 0.37" for 5-year event
Inflow = 0.15 cfs @ 12.40 hrs, Volume= 1,217 cf
Outflow = 0.14 cfs @ 12.42 hrs, Volume= 1,217 cf, Atten= 0%, Lag= 1.2 min
Discarded = 0.14 cfs @ 12.42 hrs, Volume= 1,217 cf

Routing by Stor-Ind method, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Peak Elev= 176.43' @ 12.42 hrs Surf.Area= 977 sf Storage= 11 cf

Plug-Flow detention time= 1.2 min calculated for 1,217 cf (100% of inflow)
Center-of-Mass det. time= 1.2 min (950.7 - 949.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	176.40'	875 cf	**11.17'W x 87.50'L x 3.54'H Field A** 3,461 cf Overall - 1,274 cf Embedded = 2,186 cf x 40.0% Voids
#2A	176.90'	1,274 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 2 rows
		2,149 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	176.40'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.19 cfs @ 12.42 hrs HW=176.43' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.19 cfs)

Pond 3P: 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 2 rows

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

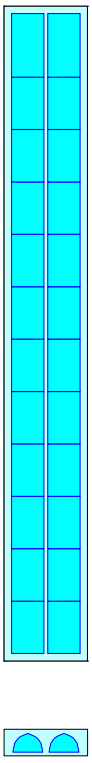
12 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 85.50' Row Length +12.0" End Stone x 2 = 87.50' Base Length
2 Rows x 52.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 11.17' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

24 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 2 Rows = 1,274.1 cf Chamber Storage

3,460.5 cf Field - 1,274.1 cf Chambers = 2,186.4 cf Stone x 40.0% Voids = 874.6 cf Stone Storage

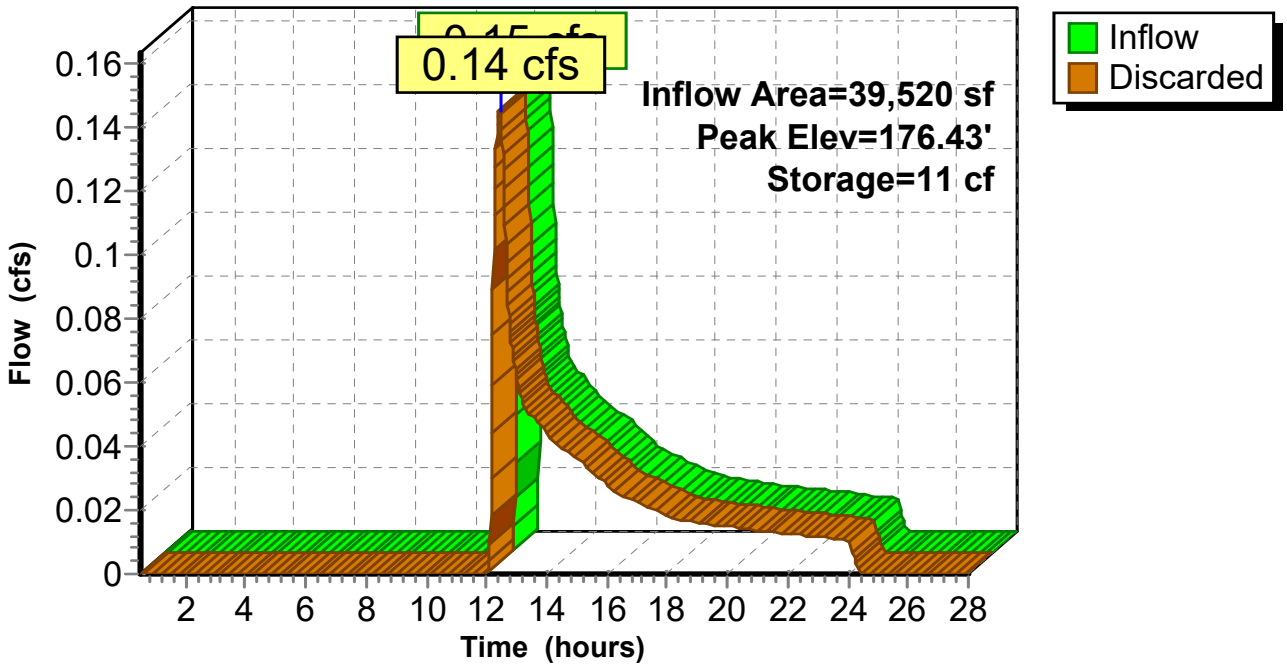
Chamber Storage + Stone Storage = 2,148.7 cf = 0.049 af
Overall Storage Efficiency = 62.1%
Overall System Size = 87.50' x 11.17' x 3.54'

24 Chambers @ $ 300.00 /ea = $ 7,200.00
128.2 cy Field Excavation @ $ 10.00 /cy = $ 1,281.67
81.0 cy Stone @ $ 30.00 /cy = $ 2,429.31
Total Cost = $ 10,910.98



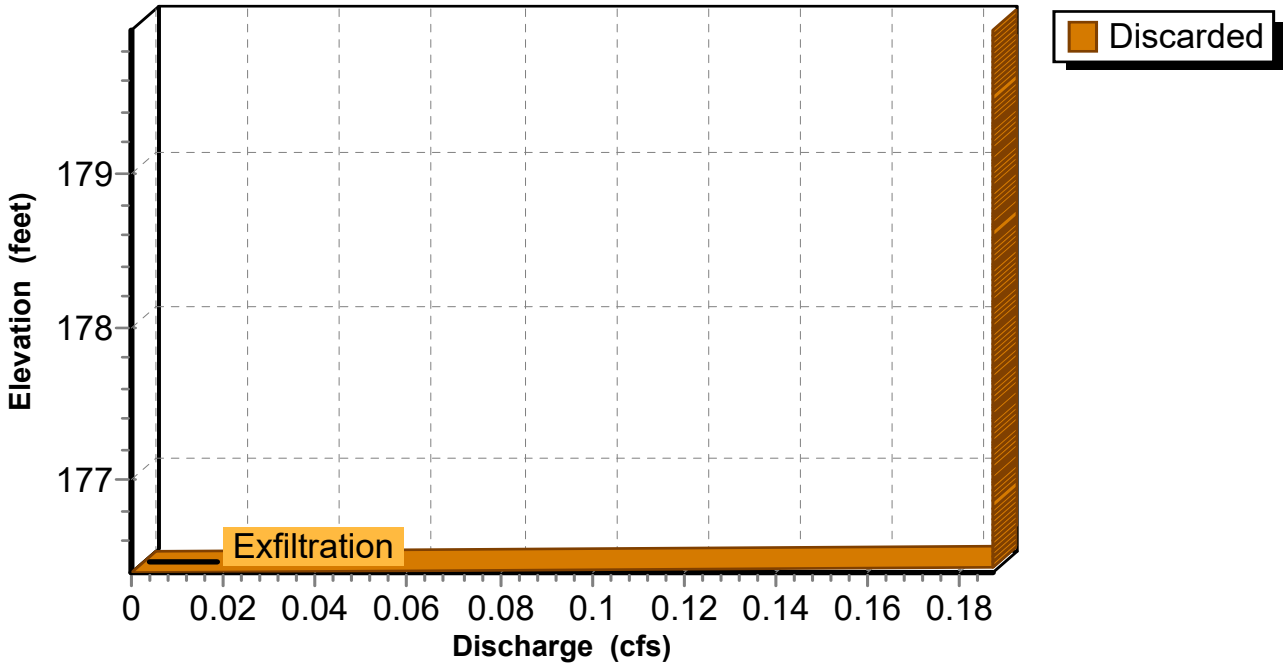
Pond 3P: RB#1

Hydrograph

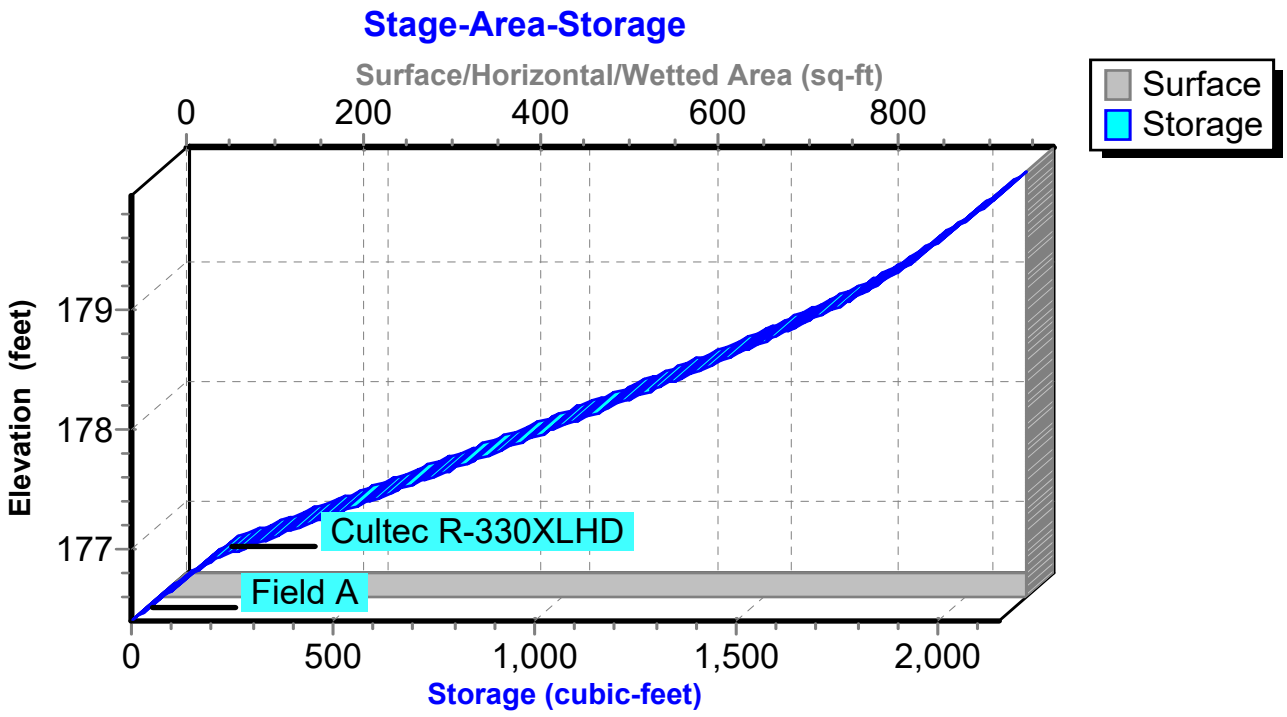


Pond 3P: RB#1

Stage-Discharge



Pond 3P: RB#1


Stage-Area-Storage
Surface/Horizontal/Wetted Area (sq-ft)
0
200
400
600
800
Surface
Storage
Elevation (feet)
179
178
177
Cultec R-330XLHD
Field A
0
500
1,000
1,500
2,000
Storage (cubic-feet)

Summary for Pond 7P: RB#2

Inflow Area = 9,447 sf, 37.40% Impervious, Inflow Depth = 0.97" for 5-year event
Inflow = 0.22 cfs @ 12.10 hrs, Volume= 766 cf
Outflow = 0.08 cfs @ 12.02 hrs, Volume= 766 cf, Atten= 62%, Lag= 0.0 min
Discarded = 0.08 cfs @ 12.02 hrs, Volume= 766 cf

Routing by Stor-Ind method, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Peak Elev= 176.05' @ 12.45 hrs Surf.Area= 430 sf Storage= 102 cf

Plug-Flow detention time= 6.3 min calculated for 765 cf (100% of inflow)
Center-of-Mass det. time= 6.3 min (885.8 - 879.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	175.50'	391 cf	**11.17'W x 38.50'L x 3.54'H Field A** 1,523 cf Overall - 544 cf Embedded = 979 cf x 40.0% Voids
#2A	176.00'	544 cf	**Cultec R-330XLHD** x 10 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
		935 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	175.50'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.08 cfs @ 12.02 hrs HW=175.55' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.08 cfs)

Pond 7P: 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 2 rows

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

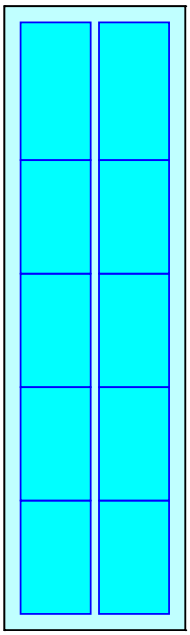
5 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 36.50' Row Length +12.0" End Stone x 2 = 38.50' Base Length
2 Rows x 52.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 11.17' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

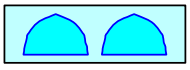
10 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 2 Rows = 543.9 cf Chamber Storage

1,522.6 cf Field - 543.9 cf Chambers = 978.7 cf Stone x 40.0% Voids = 391.5 cf Stone Storage

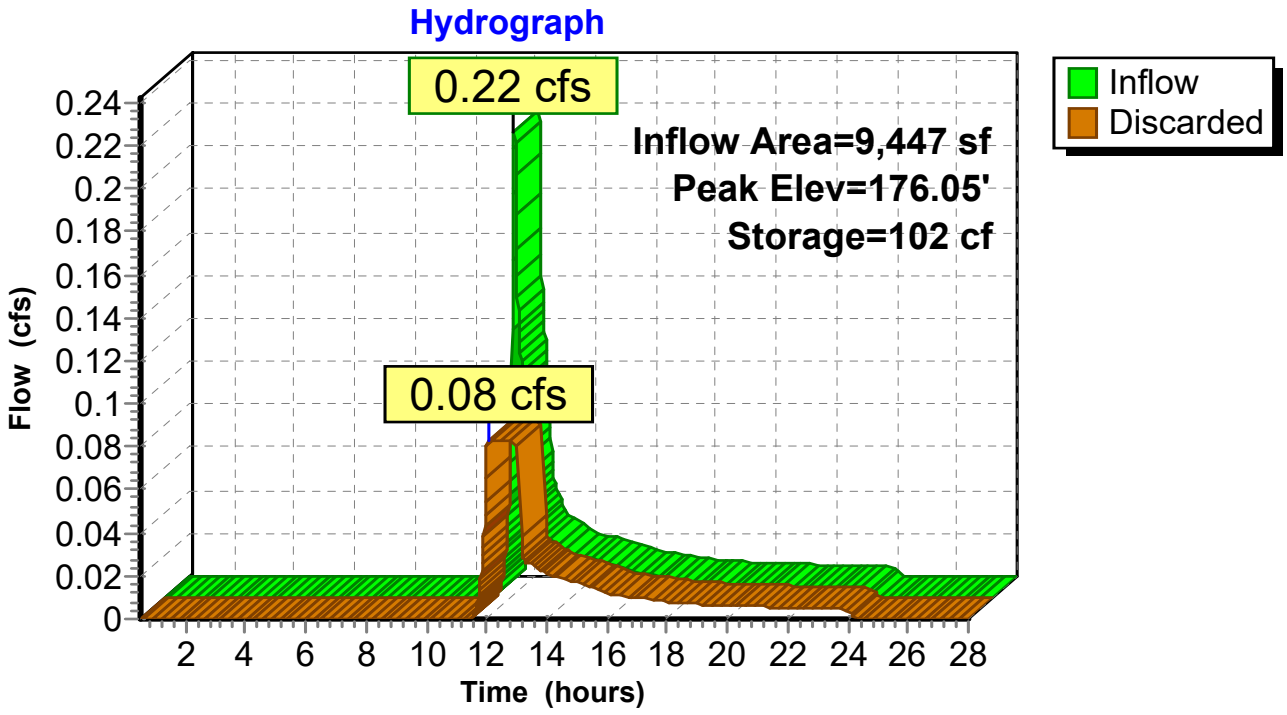
Chamber Storage + Stone Storage = 935.4 cf = 0.021 af
Overall Storage Efficiency = 61.4%
Overall System Size = 38.50' x 11.17' x 3.54'

10 Chambers @ $ 300.00 /ea = $ 3,000.00
56.4 cy Field Excavation @ $ 10.00 /cy = $ 563.93
36.2 cy Stone @ $ 30.00 /cy = $ 1,087.44
Total Cost = $ 4,651.38

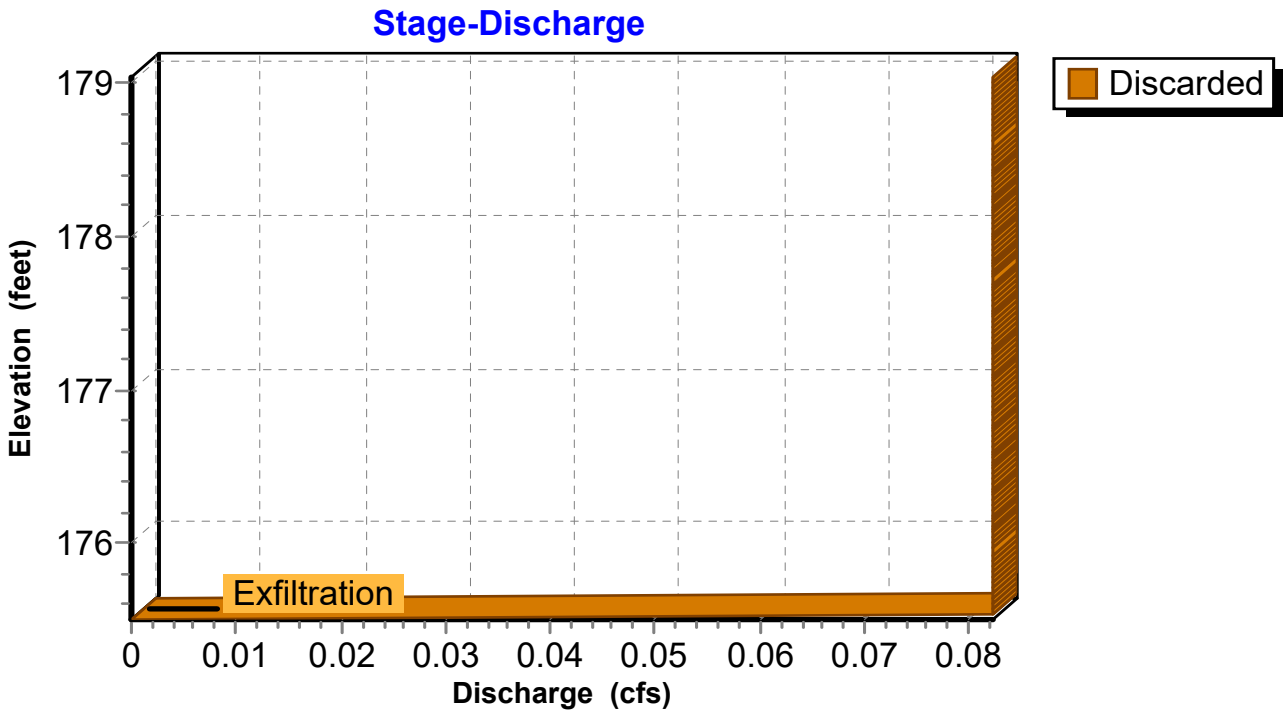




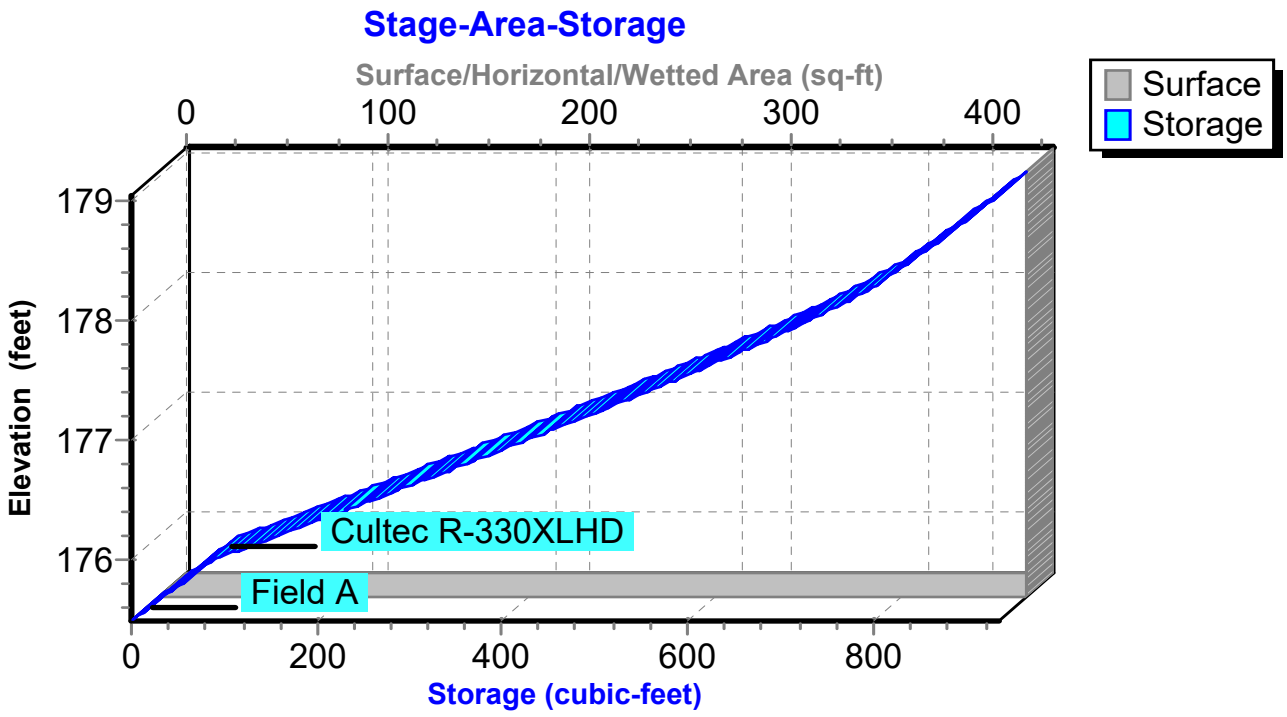
Pond 7P: RB#2



Pond 7P: RB#2



Pond 7P: RB#2


Stage-Area-Storage
Surface/Horizontal/Wetted Area (sq-ft)
0
100
200
300
400
Surface
Storage
179
178
177
176
Elevation (feet)
Cultec R-330XLHD
Field A
0
200
400
600
800
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=9,447 sf 37.40% Impervious Runoff Depth=1.27"
Tc=6.0 min CN=64 Runoff=0.29 cfs 996 cf

Subcatchment SA#2: Subcat SA#2 Runoff Area=1,735 sf 8.10% Impervious Runoff Depth=0.26"
Tc=6.0 min CN=44 Runoff=0.00 cfs 38 cf

Subcatchment SA#25: Subcat SA#25 Runoff Area=5,186 sf 100.00% Impervious Runoff Depth=4.26"
Flow Length=70' Tc=6.4 min CN=98 Runoff=0.52 cfs 1,843 cf

Subcatchment SA#27: Subcat SA#27 Runoff Area=4,748 sf 94.85% Impervious Runoff Depth=3.92"
Tc=6.0 min CN=95 Runoff=0.46 cfs 1,553 cf

Subcatchment SA#3: Subcat SA#3 Runoff Area=39,520 sf 11.77% Impervious Runoff Depth=0.55"
Flow Length=240' Tc=12.9 min CN=51 Runoff=0.26 cfs 1,797 cf

Subcatchment SA#3A: Subcat SA#3A Runoff Area=6,684 sf 4.92% Impervious Runoff Depth=0.50"
Tc=6.0 min CN=50 Runoff=0.04 cfs 279 cf

Subcatchment SA#4: Subcat SA#4 Runoff Area=6,600 sf 0.00% Impervious Runoff Depth=0.23"
Tc=6.0 min CN=43 Runoff=0.01 cfs 124 cf

Subcatchment SA#6: Subcat SA#6 Runoff Area=11,721 sf 0.00% Impervious Runoff Depth=0.33"
Tc=6.0 min CN=46 Runoff=0.04 cfs 326 cf

Subcatchment SA#8: Subcat SA#8 Runoff Area=12,253 sf 2.44% Impervious Runoff Depth=0.26"
Tc=6.0 min CN=44 Runoff=0.02 cfs 266 cf

Pond 1P: RB#4 Peak Elev=177.61' Storage=423 cf Inflow=0.46 cfs 1,553 cf
Outflow=0.08 cfs 1,553 cf

Pond 2P: RB#3 Peak Elev=178.34' Storage=443 cf Inflow=0.52 cfs 1,843 cf
Outflow=0.10 cfs 1,843 cf

Pond 3P: RB#1 Peak Elev=176.61' Storage=84 cf Inflow=0.26 cfs 1,797 cf
Outflow=0.19 cfs 1,797 cf

Pond 7P: RB#2 Peak Elev=176.29' Storage=187 cf Inflow=0.29 cfs 996 cf
Outflow=0.08 cfs 996 cf

Total Runoff Area = 97,894 sf Runoff Volume = 7,221 cf Average Runoff Depth = 0.89"
80.96% Pervious = 79,252 sf 19.04% Impervious = 18,642 sf

Summary for Subcatchment SA#1: Subcat SA#1

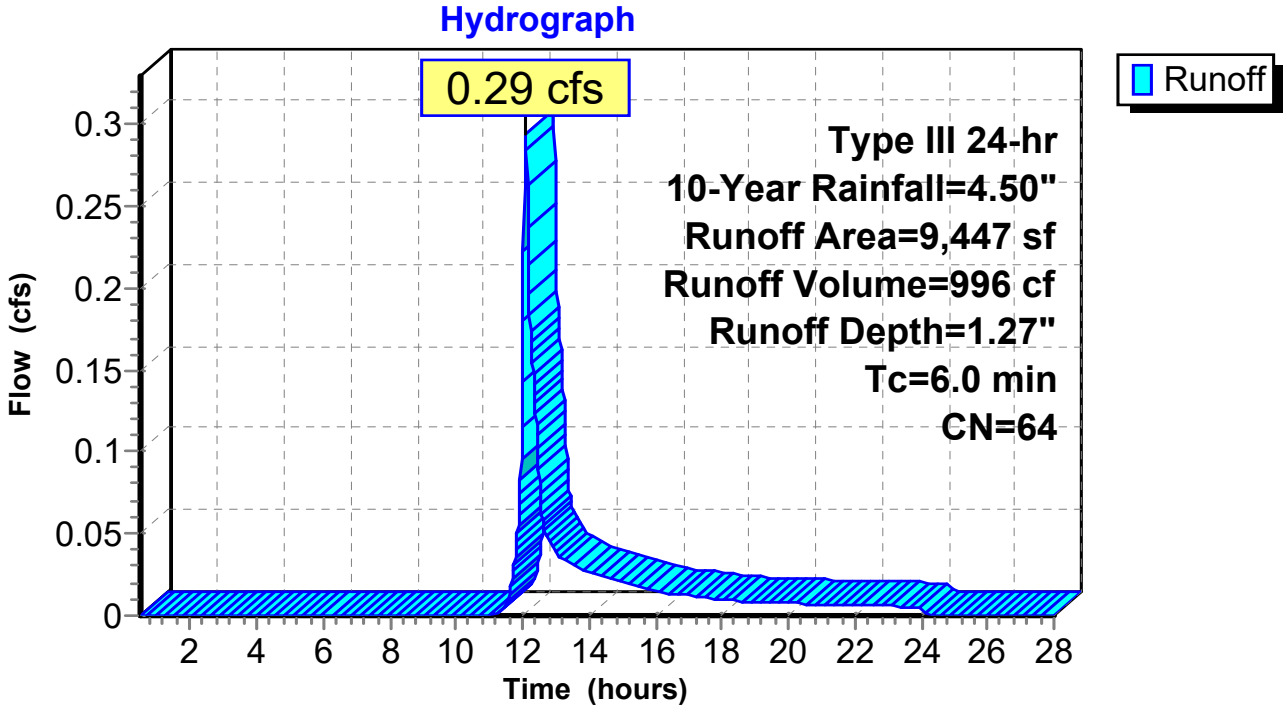
Runoff = 0.29 cfs @ 12.10 hrs, Volume= 996 cf, Depth= 1.27"

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=4.50"

Area (sf)	CN	Description
3,692	49	50-75% Grass cover, Fair, HSG A
3,246	98	Paved roads w/curbs & sewers, HSG A
288	98	Roofs, HSG A
2,222	36	Woods, Fair, HSG A
9,447	64	Weighted Average
5,914		62.60% Pervious Area
3,533		37.40% Impervious Area

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

Subcatchment SA#1: Subcat SA#1



Summary for Subcatchment SA#2: Subcat SA#2

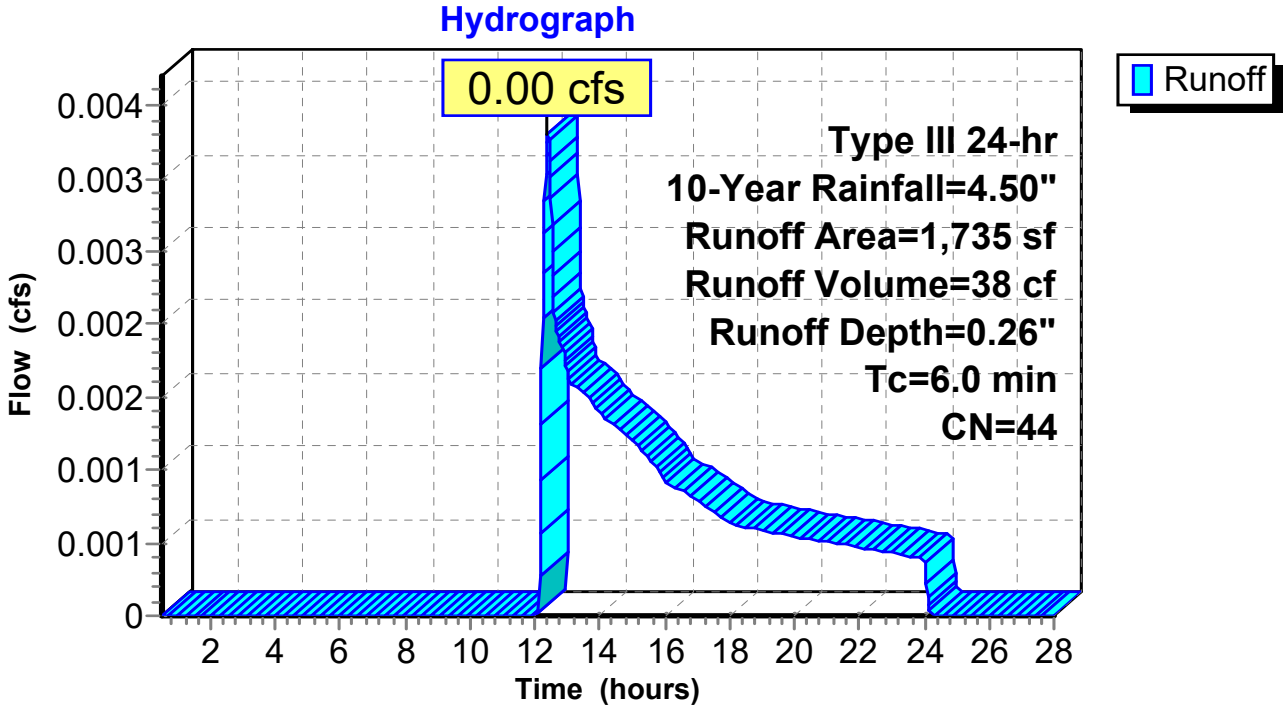
Runoff = 0.00 cfs @ 12.40 hrs, Volume= 38 cf, Depth= 0.26"

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=4.50"

Area (sf)	CN	Description
350	49	50-75% Grass cover, Fair, HSG A
141	98	Roofs, HSG A
1,244	36	Woods, Fair, HSG A
1,735	44	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
6.0					**Direct Entry,**

Subcatchment SA#2: Subcat SA#2



Summary for Subcatchment SA#25: Subcat SA#25

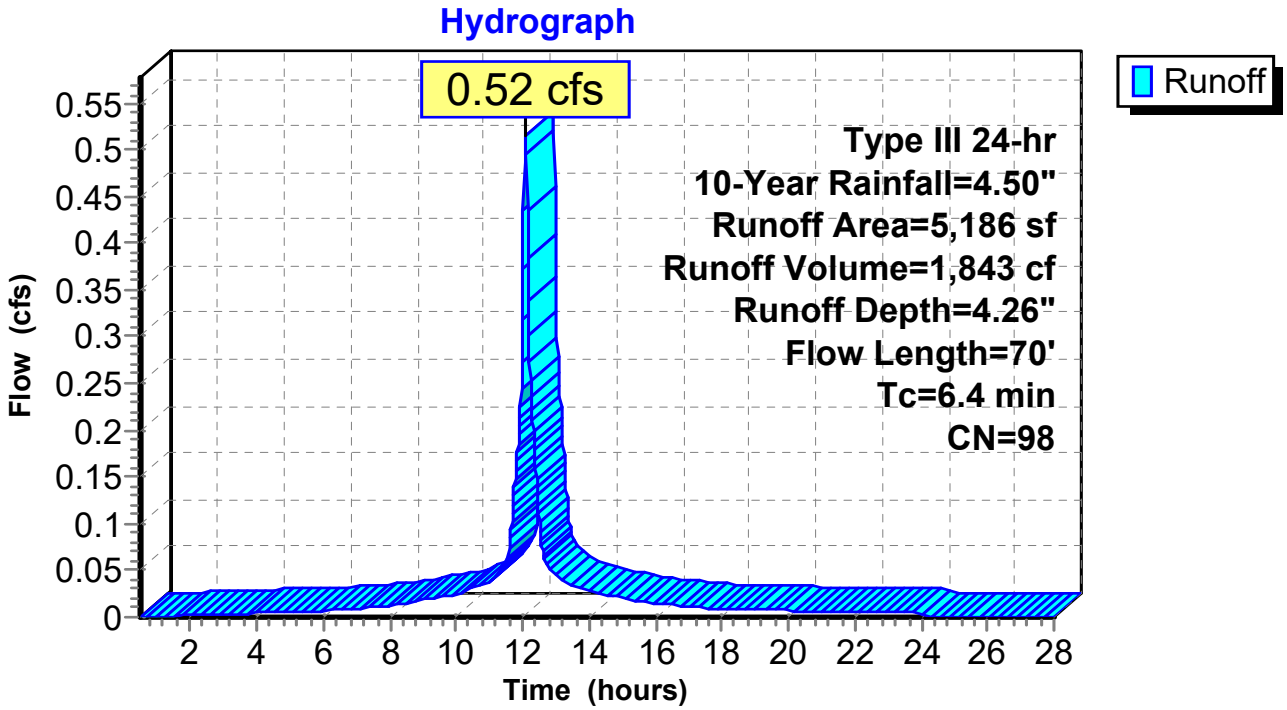
Runoff = 0.52 cfs @ 12.09 hrs, Volume= 1,843 cf, Depth= 4.26"

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=4.50"

Area (sf)	CN	Description
1,719	98	Paved roads w/curbs & sewers, HSG A
3,467	98	Roofs, HSG A
5,186	98	Weighted Average
5,186		100.00% 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#27: Subcat SA#27

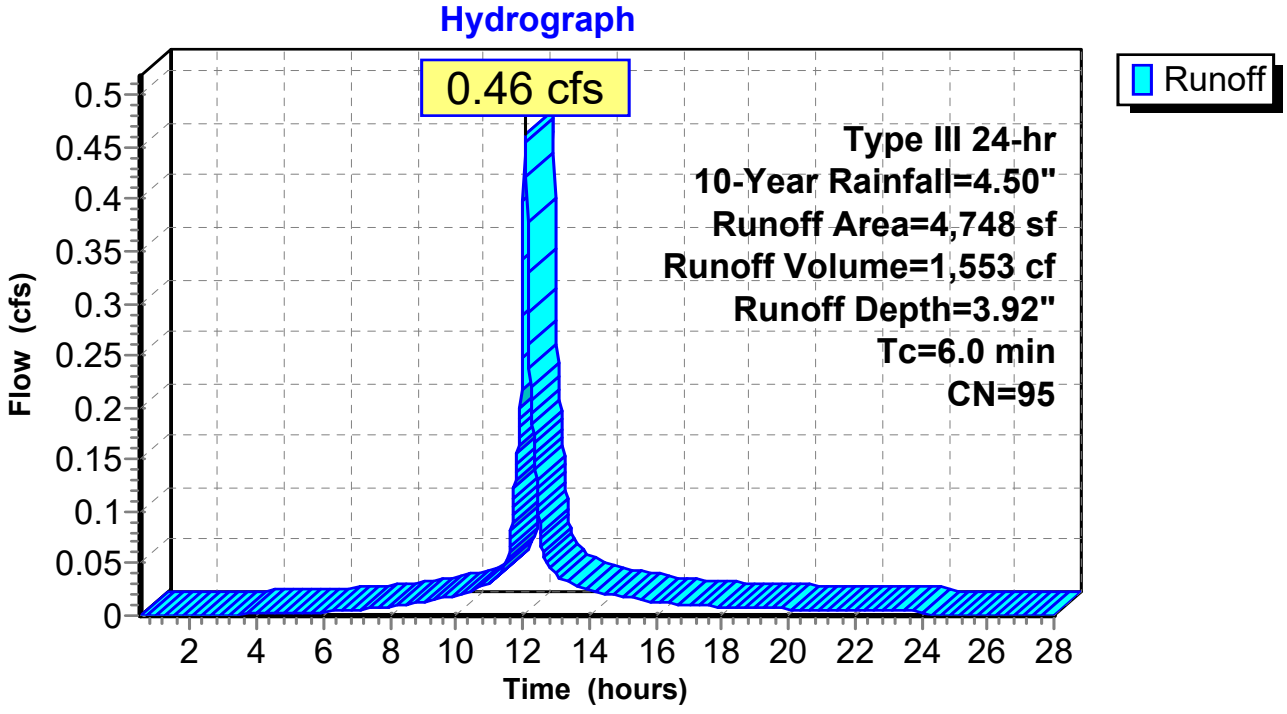
Runoff = 0.46 cfs @ 12.08 hrs, Volume= 1,553 cf, Depth= 3.92"

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=4.50"

Area (sf)	CN	Description
155	49	50-75% Grass cover, Fair, HSG A
1,470	98	Paved roads w/curbs & sewers, HSG A
3,034	98	Roofs, HSG A
89	36	Woods, Fair, HSG A
4,748	95	Weighted Average
245		5.15% Pervious Area
4,504		94.85% 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#3: Subcat SA#3

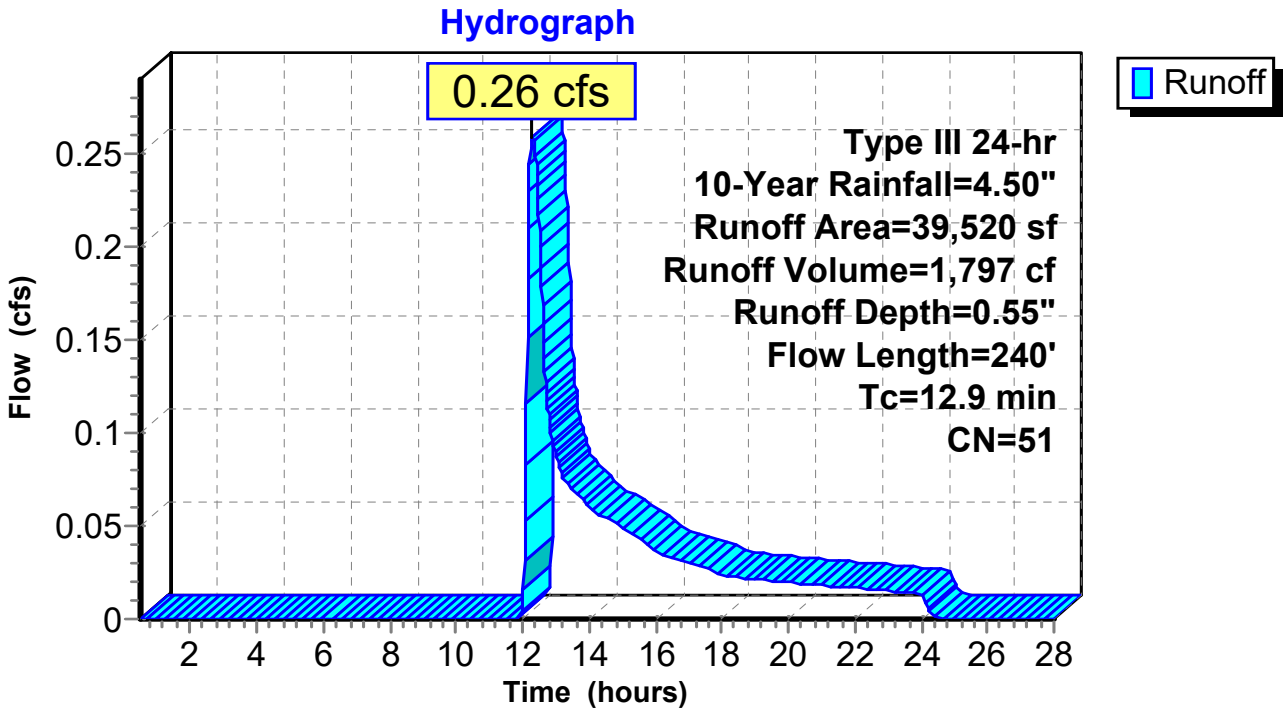
Runoff = 0.26 cfs @ 12.29 hrs, Volume= 1,797 cf, Depth= 0.55"

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=4.50"

Area (sf)	CN	Description
22,441	49	50-75% Grass cover, Fair, HSG A
4,652	98	Paved roads w/curbs & sewers, HSG A
12,426	36	Woods, Fair, HSG A
39,520	51	Weighted Average
34,868		88.23% Pervious Area
4,652		11.77% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.1	50	0.0240	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
1.8	190	0.0120	1.76		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
12.9	240	Total			

Subcatchment SA#3: Subcat SA#3



Summary for Subcatchment SA#3A: Subcat SA#3A

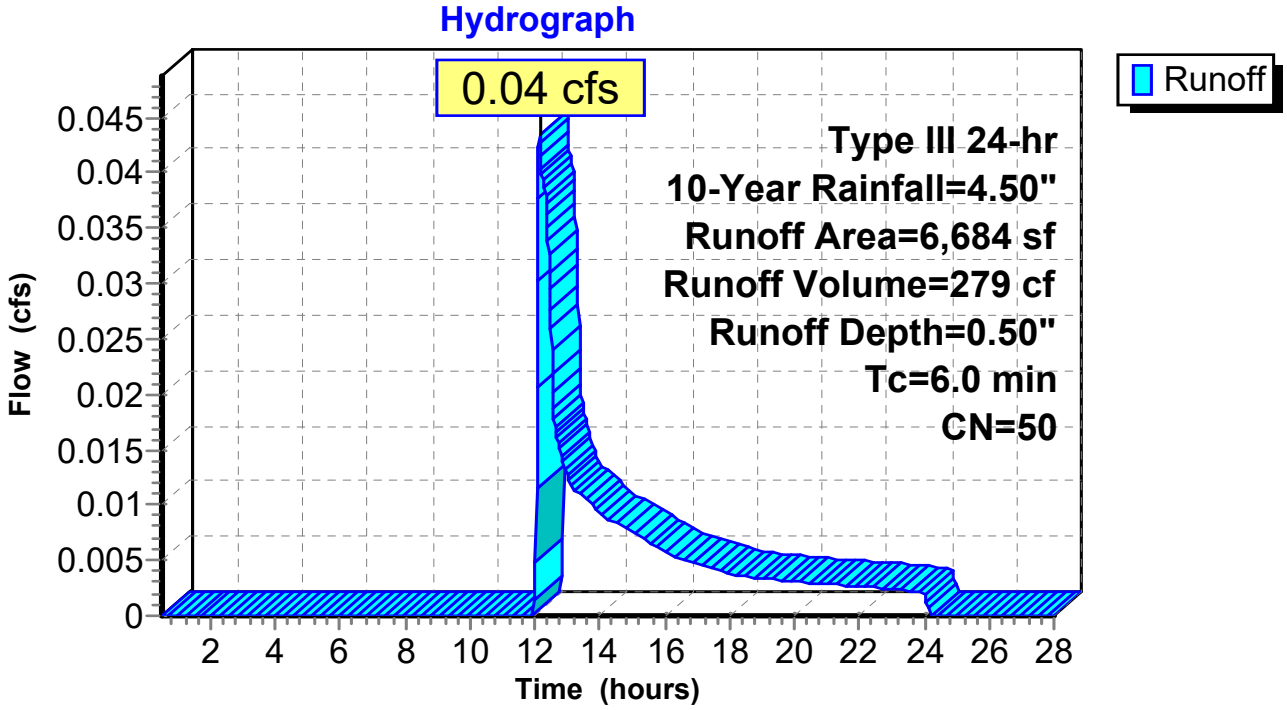
Runoff = 0.04 cfs @ 12.14 hrs, Volume= 279 cf, Depth= 0.50"

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=4.50"

Area (sf)	CN	Description
5,678	49	50-75% Grass cover, Fair, HSG A
329	98	Roofs, HSG A
678	36	Woods, Fair, HSG A
6,684	50	Weighted Average
6,356		95.08% Pervious Area
329		4.92% Impervious Area

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

Subcatchment SA#3A: Subcat SA#3A



Summary for Subcatchment SA#4: Subcat SA#4

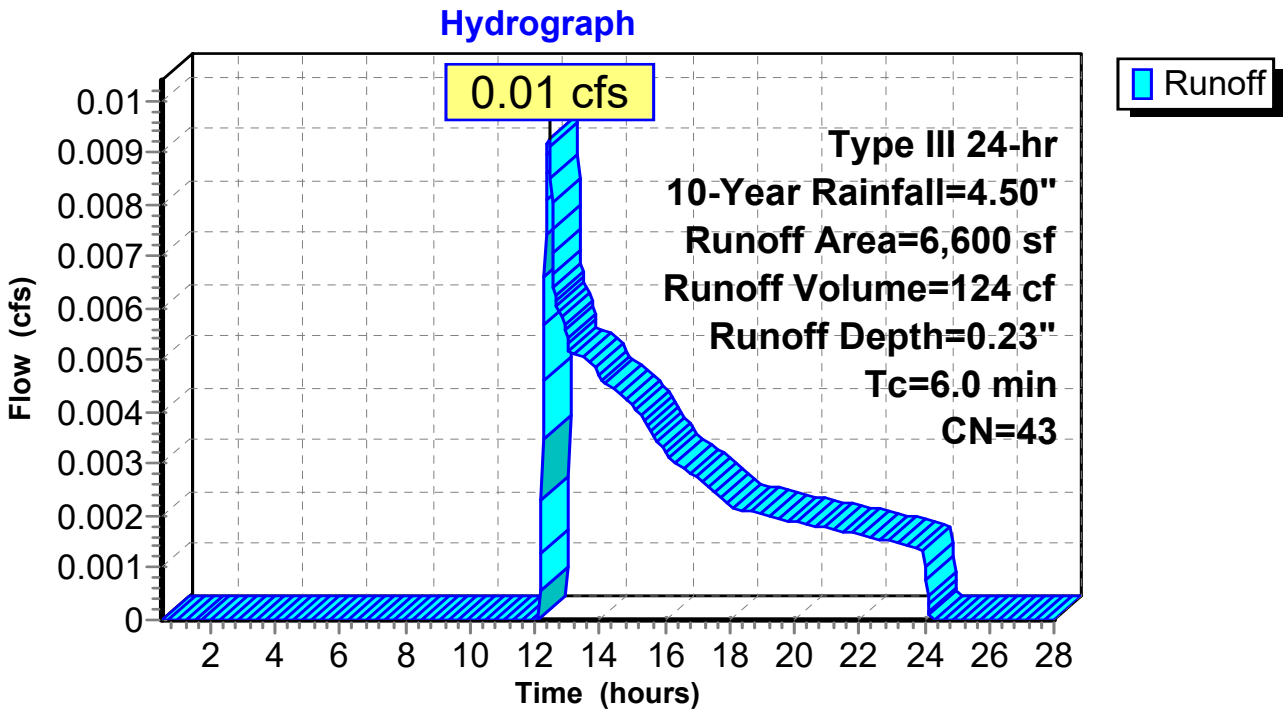
Runoff = 0.01 cfs @ 12.43 hrs, Volume= 124 cf, Depth= 0.23"

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=4.50"

Area (sf)	CN	Description
3,773	49	50-75% Grass cover, Fair, HSG A
2,827	36	Woods, Fair, HSG A
6,600	43	Weighted Average
6,600		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#6: Subcat SA#6

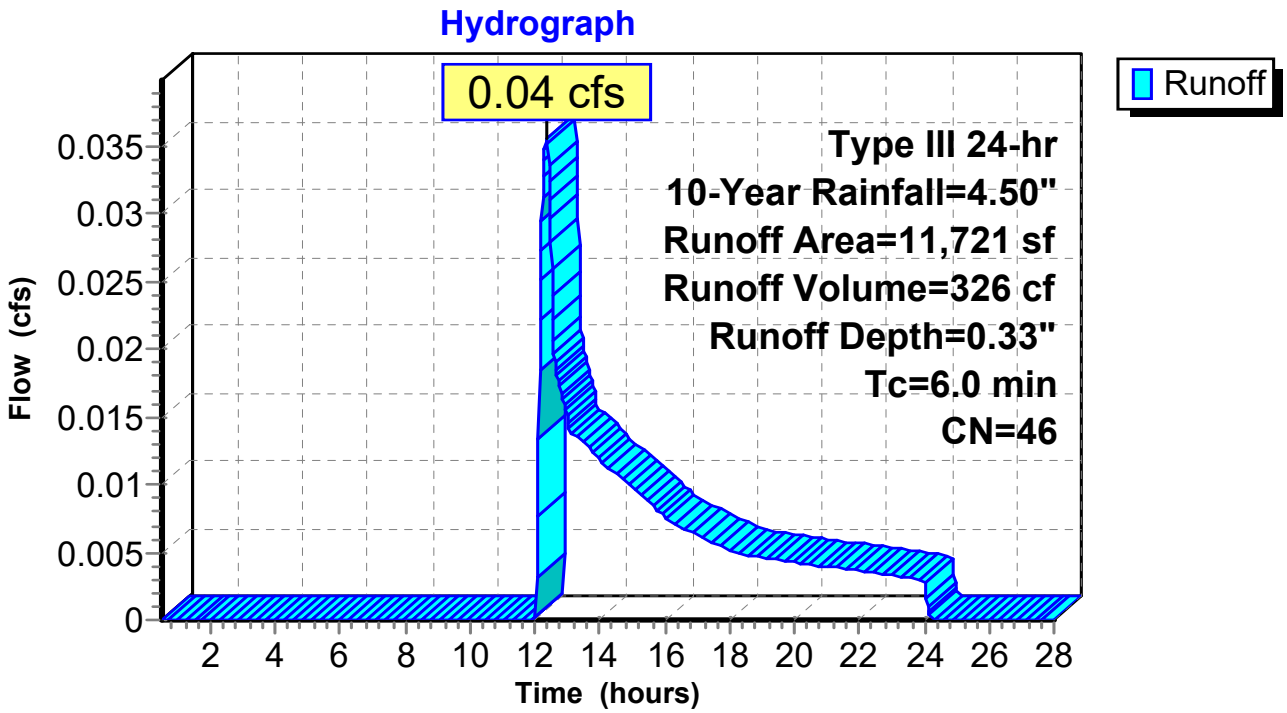
Runoff = 0.04 cfs @ 12.34 hrs, Volume= 326 cf, Depth= 0.33"

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=4.50"

Area (sf)	CN	Description
9,325	49	50-75% Grass cover, Fair, HSG A
2,397	36	Woods, Fair, HSG A
11,721	46	Weighted Average
11,721		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

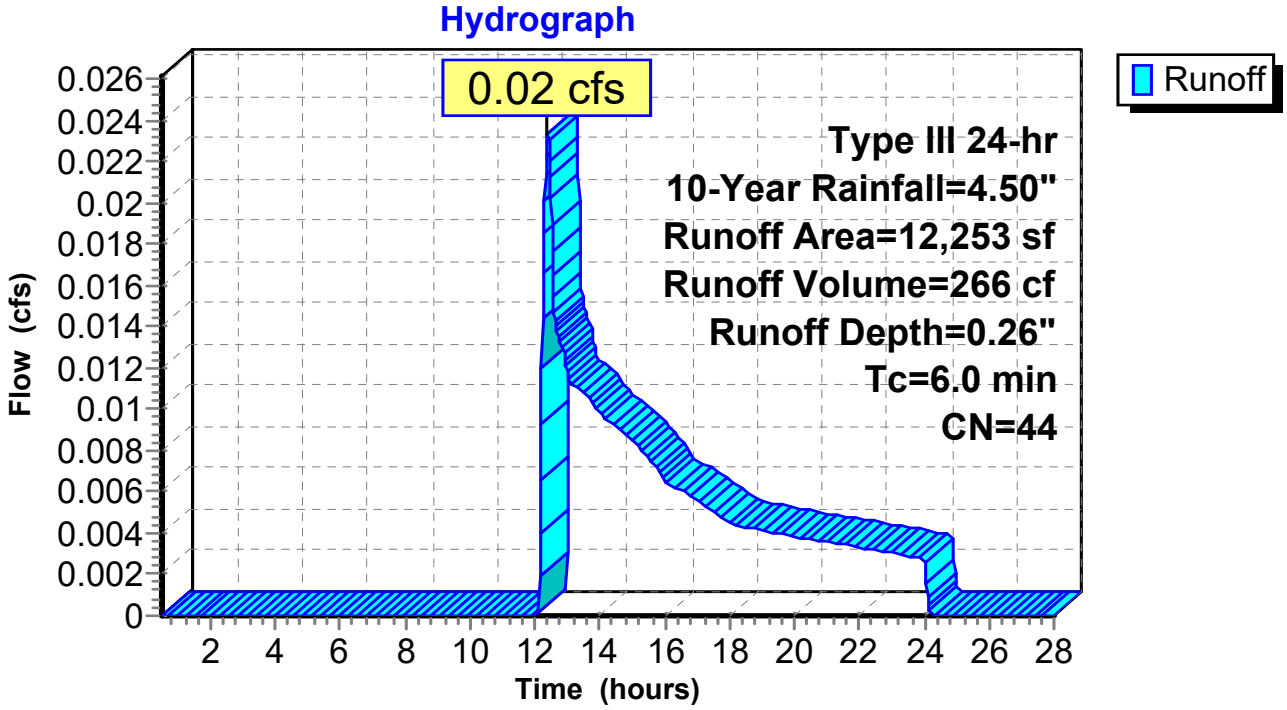
Runoff = 0.02 cfs @ 12.40 hrs, Volume= 266 cf, Depth= 0.26"

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=4.50"

Area (sf)	CN	Description
6,131	49	50-75% Grass cover, Fair, HSG A
299	98	Paved roads w/curbs & sewers, HSG A
5,823	36	Woods, Fair, HSG A
12,253	44	Weighted Average
11,954		97.56% Pervious Area
299		2.44% Impervious 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 = 4,748 sf, 94.85% Impervious, Inflow Depth = 3.92" for 10-Year event
Inflow = 0.46 cfs @ 12.08 hrs, Volume= 1,553 cf
Outflow = 0.08 cfs @ 11.68 hrs, Volume= 1,553 cf, Atten= 84%, Lag= 0.0 min
Discarded = 0.08 cfs @ 11.68 hrs, Volume= 1,553 cf

Routing by Stor-Ind method, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Peak Elev= 177.61' @ 12.55 hrs Surf.Area= 392 sf Storage= 423 cf

Plug-Flow detention time= 32.2 min calculated for 1,552 cf (100% of inflow)
Center-of-Mass det. time= 32.2 min (803.2 - 771.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	176.00'	354 cf	**16.00'W x 24.50'L x 3.54'H Field A** 1,388 cf Overall - 503 cf Embedded = 885 cf x 40.0% Voids
#2A	176.50'	503 cf	**Cultec R-330XLHD** x 9 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
		857 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=0.08 cfs @ 11.68 hrs HW=176.04' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.08 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 3 rows

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

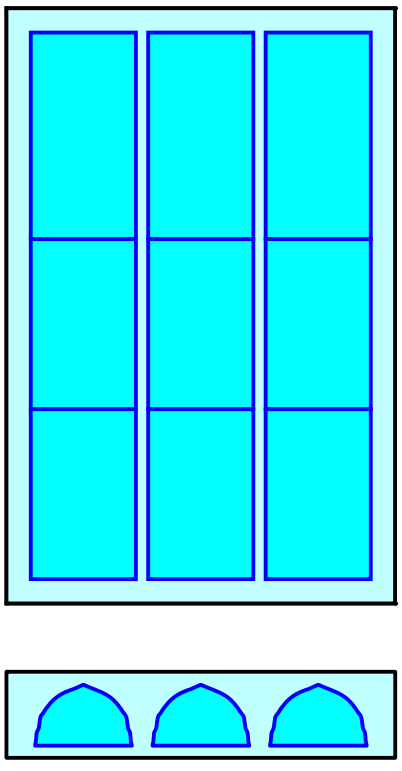
3 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 22.50' Row Length +12.0" End Stone x 2 = 24.50' Base Length
3 Rows x 52.0" Wide + 6.0" Spacing x 2 + 12.0" Side Stone x 2 = 16.00' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

9 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 3 Rows = 502.9 cf Chamber Storage

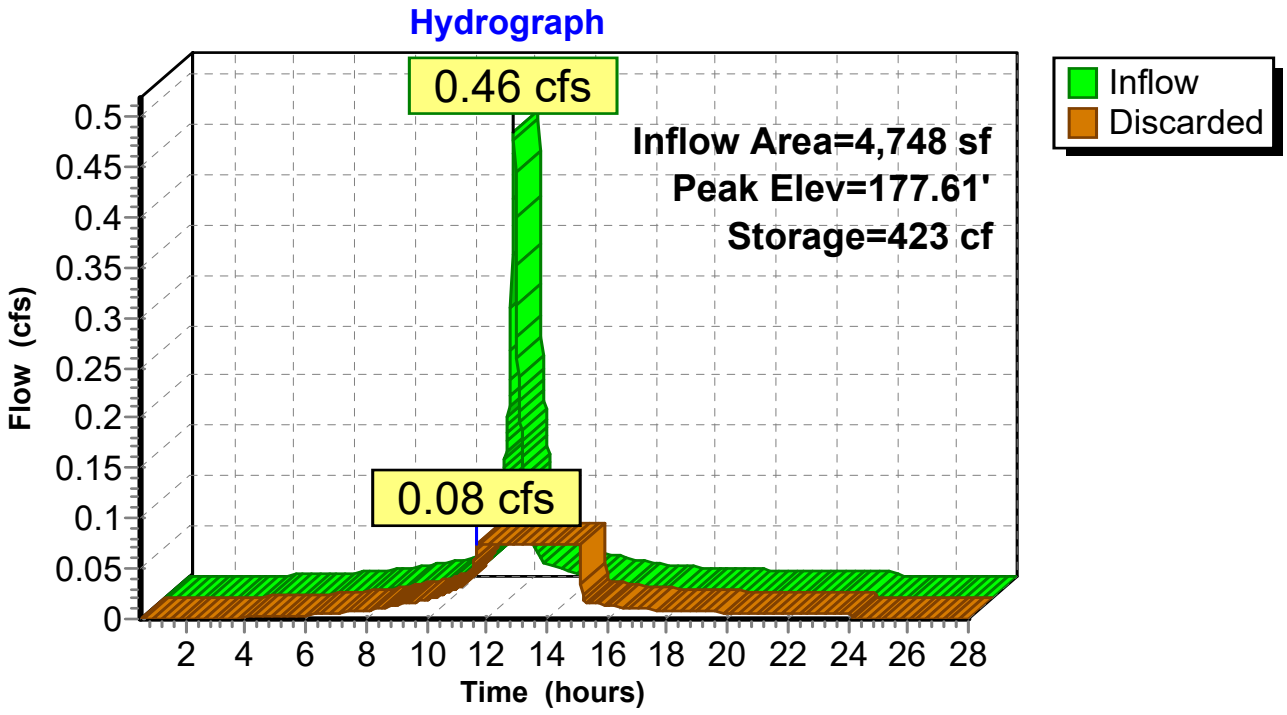
1,388.3 cf Field - 502.9 cf Chambers = 885.4 cf Stone x 40.0% Voids = 354.2 cf Stone Storage

Chamber Storage + Stone Storage = 857.1 cf = 0.020 af
Overall Storage Efficiency = 61.7%
Overall System Size = 24.50' x 16.00' x 3.54'

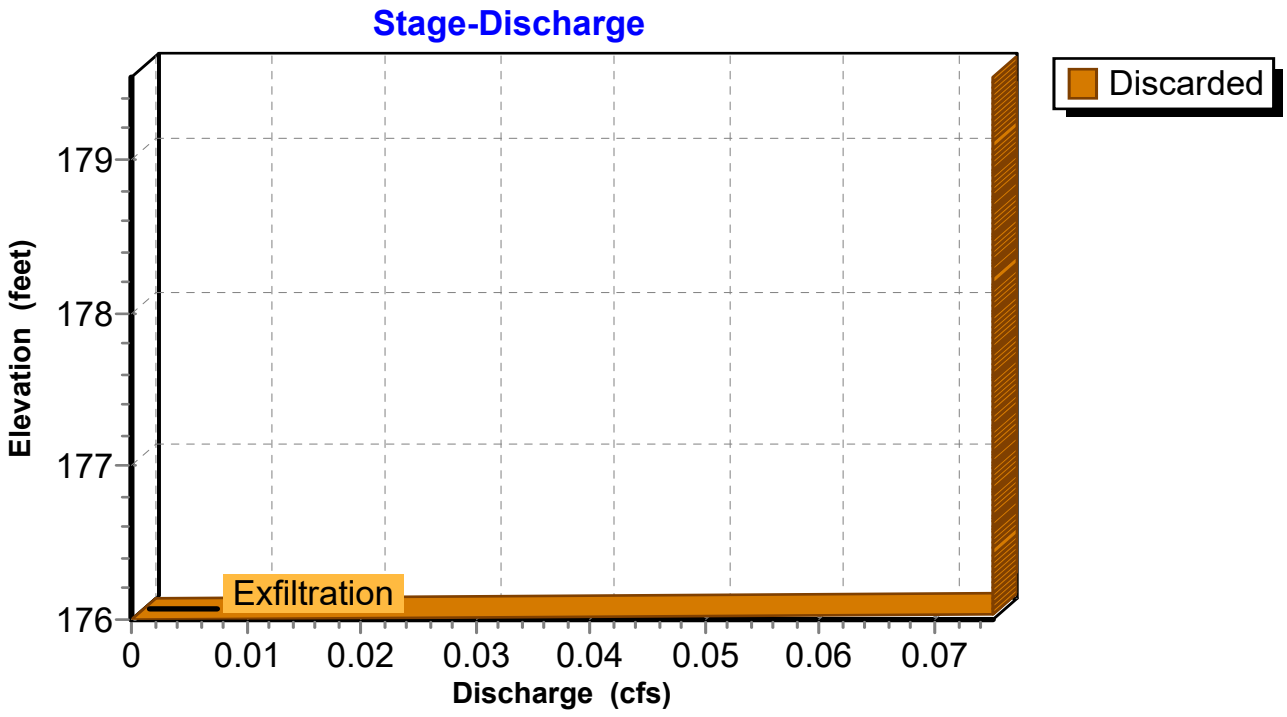
9 Chambers @ $ 300.00 /ea = $ 2,700.00
51.4 cy Field Excavation @ $ 10.00 /cy = $ 514.20
32.8 cy Stone @ $ 30.00 /cy = $ 983.77
Total Cost = $ 4,197.97



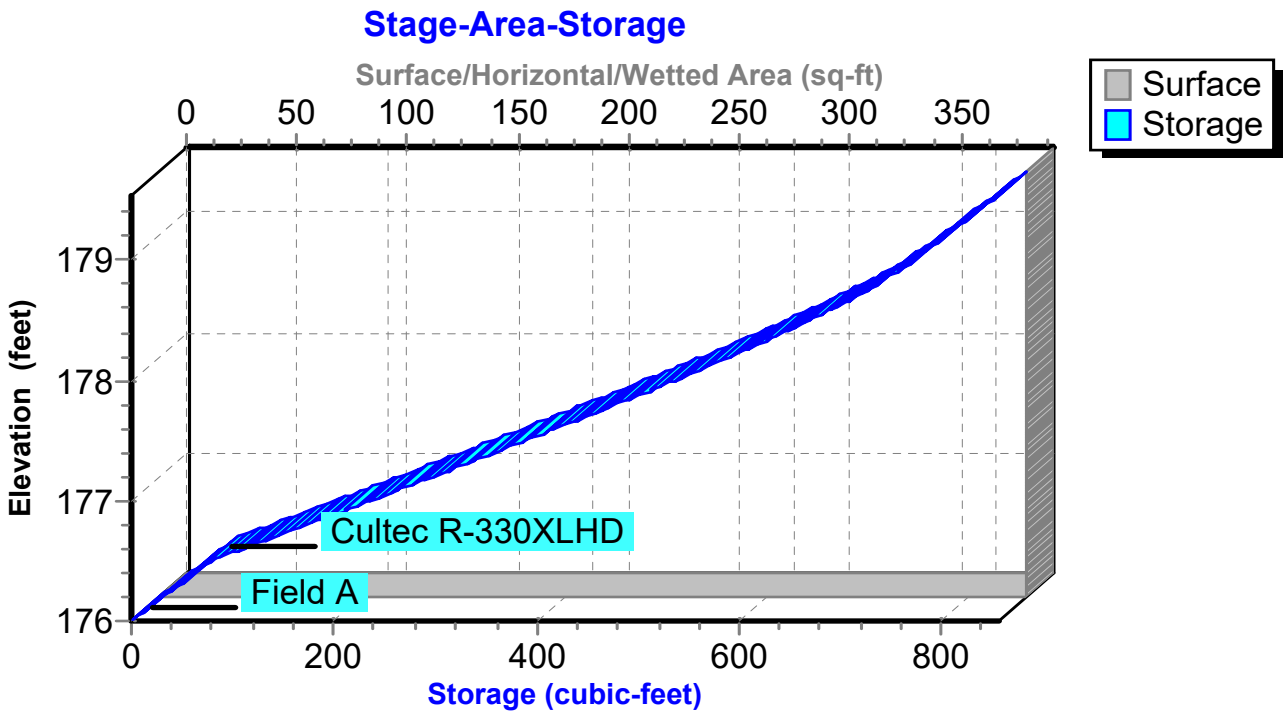
Pond 1P: RB#4



Pond 1P: RB#4



Pond 1P: RB#4


Stage-Area-Storage
Surface/Horizontal/Wetted Area (sq-ft)
0
50
100
150
200
250
300
350
Surface
Storage
179
178
177
176
Elevation (feet)
Cultec R-330XLHD
Field A
0
200
400
600
800
Storage (cubic-feet)

Summary for Pond 2P: RB#3

Inflow Area = 5,186 sf,100.00% Impervious, Inflow Depth = 4.26" for 10-Year event
Inflow = 0.52 cfs @ 12.09 hrs, Volume= 1,843 cf
Outflow = 0.10 cfs @ 11.70 hrs, Volume= 1,843 cf, Atten= 81%, Lag= 0.0 min
Discarded = 0.10 cfs @ 11.70 hrs, Volume= 1,843 cf

Routing by Stor-Ind method, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Peak Elev= 178.34' @ 12.53 hrs Surf.Area= 504 sf Storage= 443 cf

Plug-Flow detention time= 23.7 min calculated for 1,841 cf (100% of inflow)
Center-of-Mass det. time= 23.7 min (773.9 - 750.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	177.00'	450 cf	**16.00'W x 31.50'L x 3.54'H Field A** 1,785 cf Overall - 659 cf Embedded = 1,126 cf x 40.0% Voids
#2A	177.50'	659 cf	**Cultec R-330XLHD** x 12 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
		1,110 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=0.10 cfs @ 11.70 hrs HW=177.04' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.10 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 3 rows

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

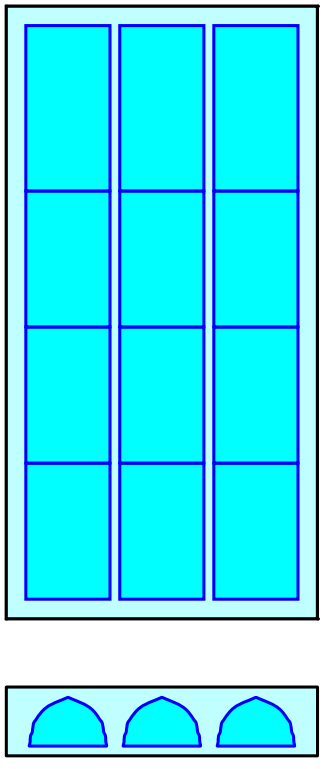
4 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 29.50' Row Length +12.0" End Stone x 2 = 31.50' Base Length
3 Rows x 52.0" Wide + 6.0" Spacing x 2 + 12.0" Side Stone x 2 = 16.00' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

12 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 3 Rows = 659.4 cf Chamber Storage

1,785.0 cf Field - 659.4 cf Chambers = 1,125.6 cf Stone x 40.0% Voids = 450.2 cf Stone Storage

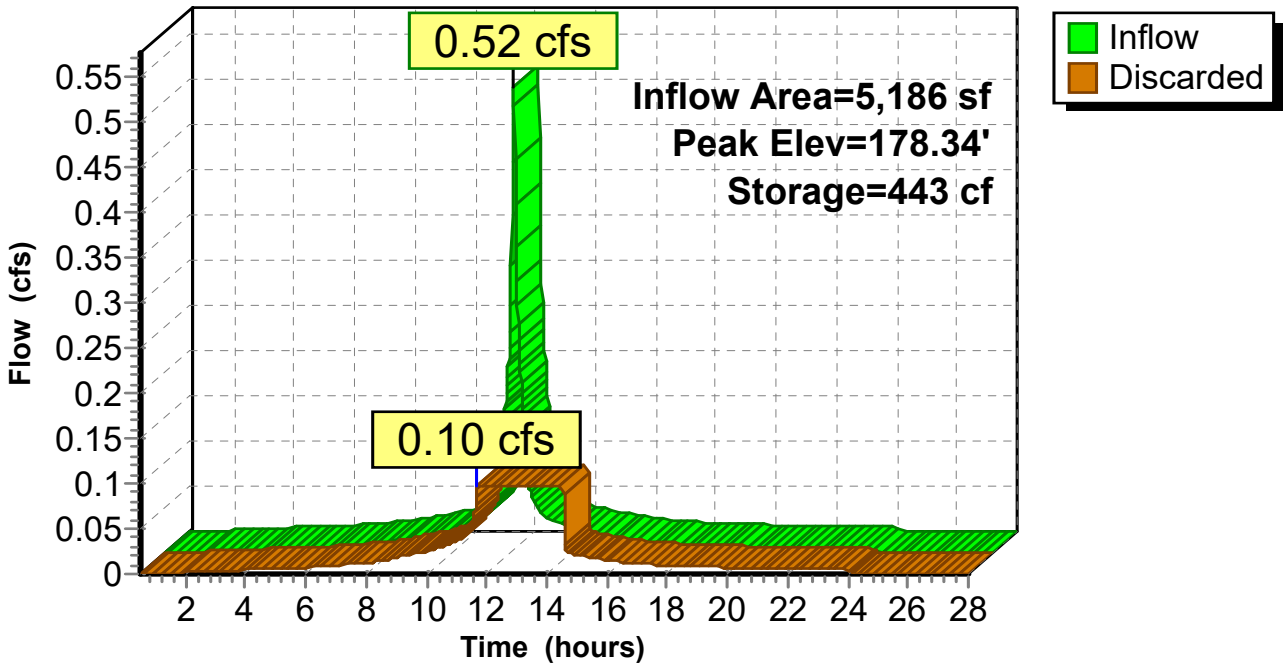
Chamber Storage + Stone Storage = 1,109.6 cf = 0.025 af
Overall Storage Efficiency = 62.2%
Overall System Size = 31.50' x 16.00' x 3.54'

12 Chambers @ $ 300.00 /ea = $ 3,600.00
66.1 cy Field Excavation @ $ 10.00 /cy = $ 661.11
41.7 cy Stone @ $ 30.00 /cy = $ 1,250.65
Total Cost = $ 5,511.76



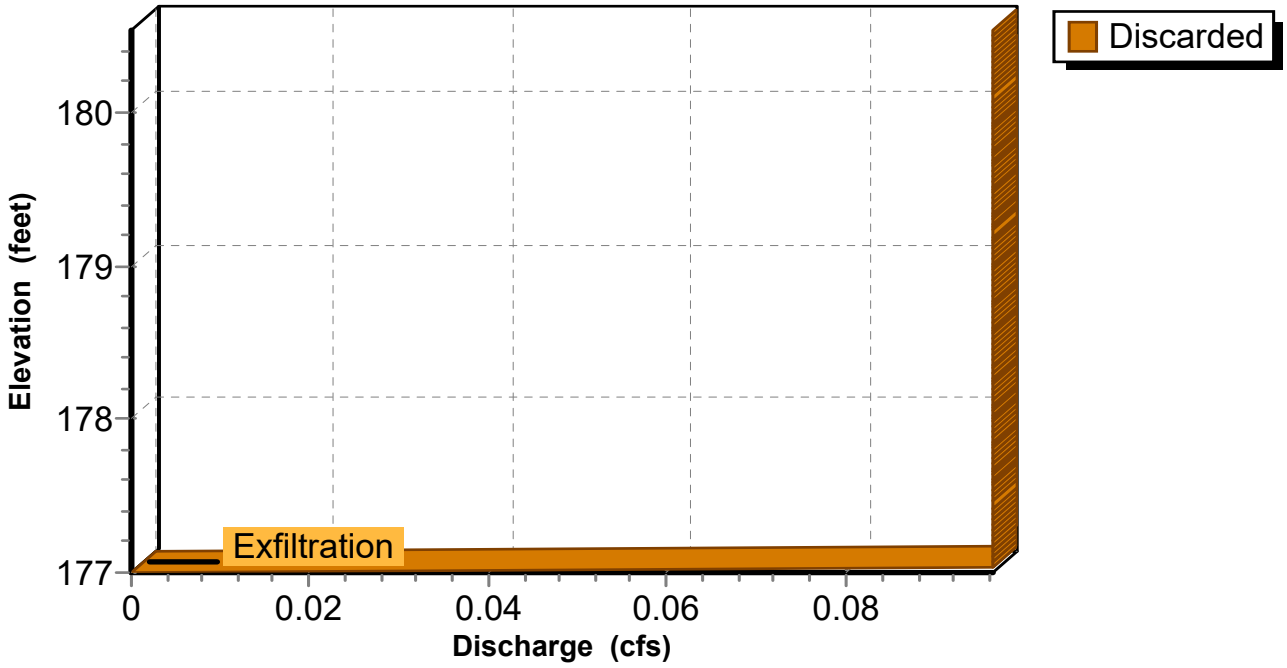
Pond 2P: RB#3

Hydrograph

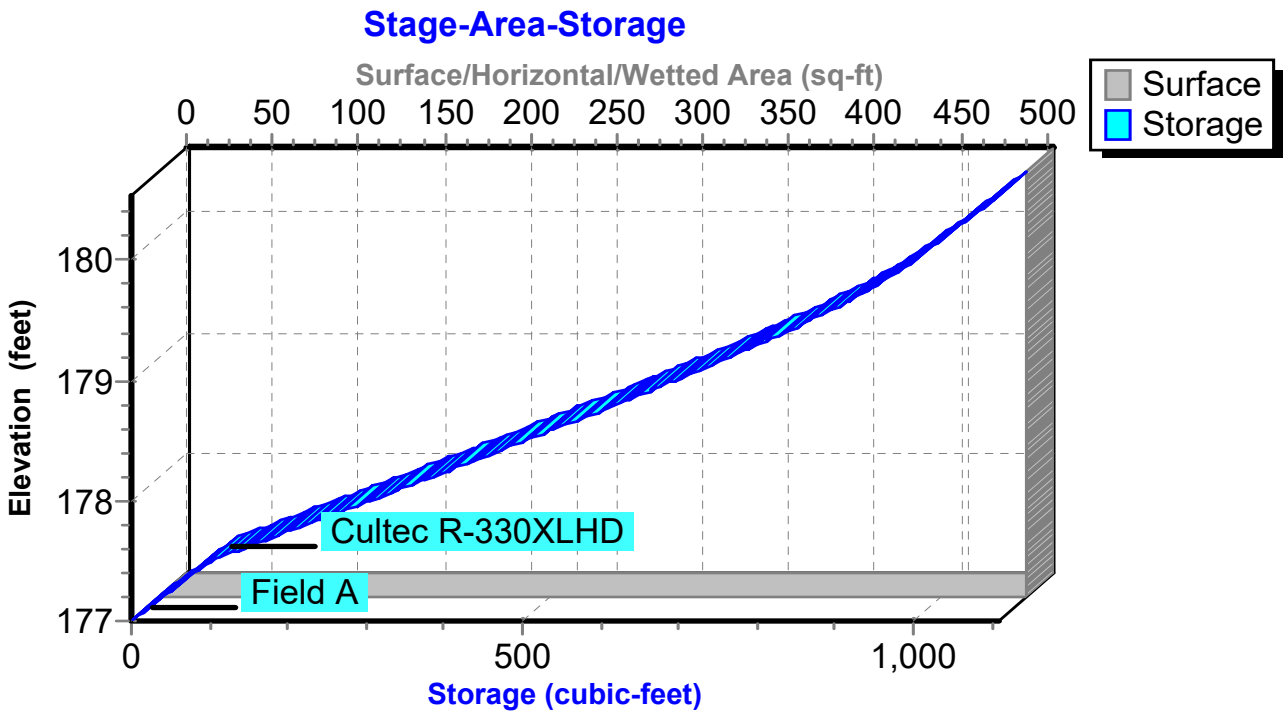


Pond 2P: RB#3

Stage-Discharge



Pond 2P: RB#3


Stage-Area-Storage
Surface/Horizontal/Wetted Area (sq-ft)
0
50
100
150
200
250
300
350
400
450
500
Surface
Storage
180
179
178
177
Elevation (feet)
Cultec R-330XLHD
Field A
0
500
1,000
Storage (cubic-feet)

Summary for Pond 3P: RB#1

Inflow Area = 39,520 sf, 11.77% Impervious, Inflow Depth = 0.55" for 10-Year event
Inflow = 0.26 cfs @ 12.29 hrs, Volume= 1,797 cf
Outflow = 0.19 cfs @ 12.20 hrs, Volume= 1,797 cf, Atten= 28%, Lag= 0.0 min
Discarded = 0.19 cfs @ 12.20 hrs, Volume= 1,797 cf

Routing by Stor-Ind method, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Peak Elev= 176.61' @ 12.56 hrs Surf.Area= 977 sf Storage= 84 cf

Plug-Flow detention time= 2.2 min calculated for 1,795 cf (100% of inflow)
Center-of-Mass det. time= 2.2 min (932.5 - 930.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	176.40'	875 cf	**11.17'W x 87.50'L x 3.54'H Field A** 3,461 cf Overall - 1,274 cf Embedded = 2,186 cf x 40.0% Voids
#2A	176.90'	1,274 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 2 rows
		2,149 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	176.40'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.19 cfs @ 12.20 hrs HW=176.44' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.19 cfs)

Pond 3P: 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 2 rows

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

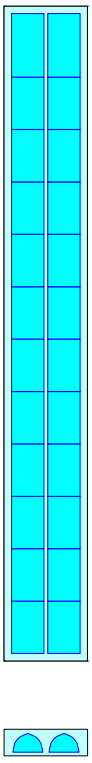
12 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 85.50' Row Length +12.0" End Stone x 2 = 87.50' Base Length
2 Rows x 52.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 11.17' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

24 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 2 Rows = 1,274.1 cf Chamber Storage

3,460.5 cf Field - 1,274.1 cf Chambers = 2,186.4 cf Stone x 40.0% Voids = 874.6 cf Stone Storage

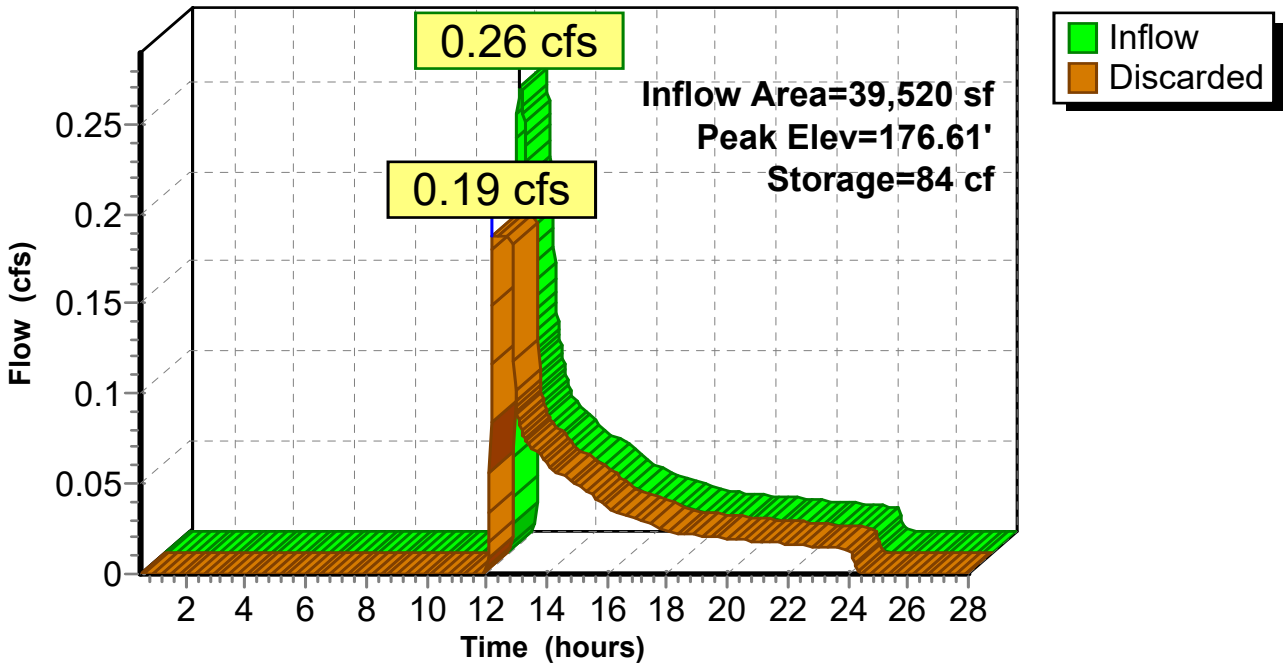
Chamber Storage + Stone Storage = 2,148.7 cf = 0.049 af
Overall Storage Efficiency = 62.1%
Overall System Size = 87.50' x 11.17' x 3.54'

24 Chambers @ $ 300.00 /ea = $ 7,200.00
128.2 cy Field Excavation @ $ 10.00 /cy = $ 1,281.67
81.0 cy Stone @ $ 30.00 /cy = $ 2,429.31
Total Cost = $ 10,910.98



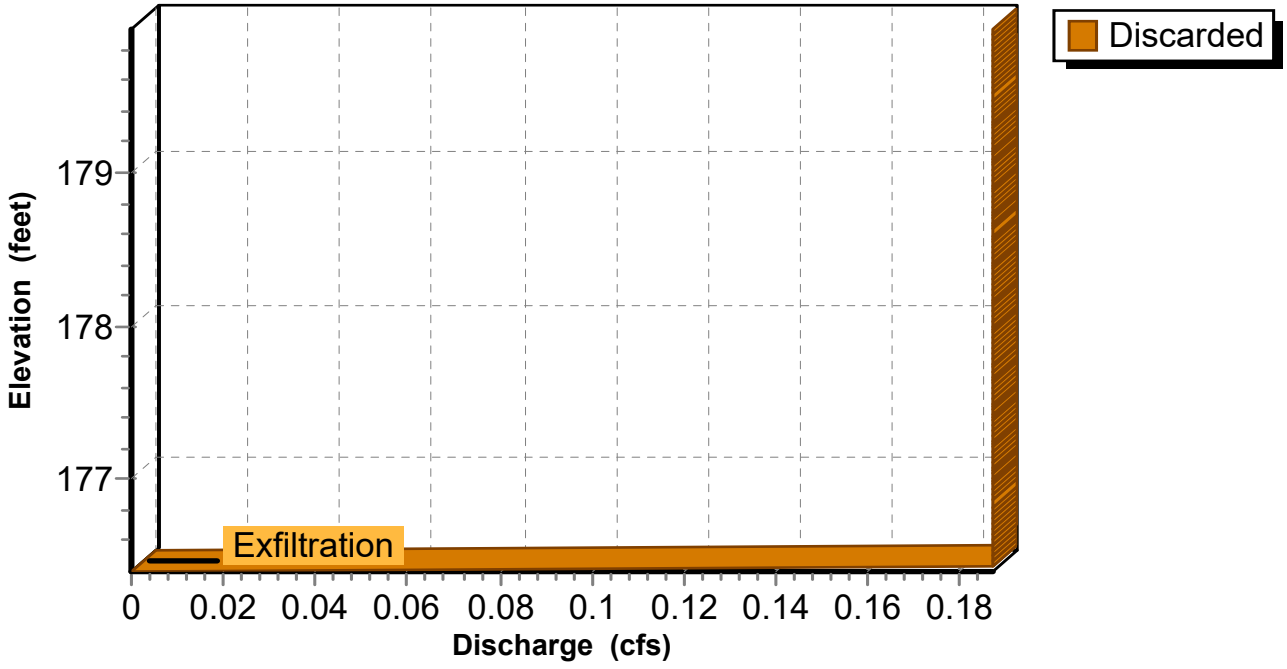
Pond 3P: RB#1

Hydrograph

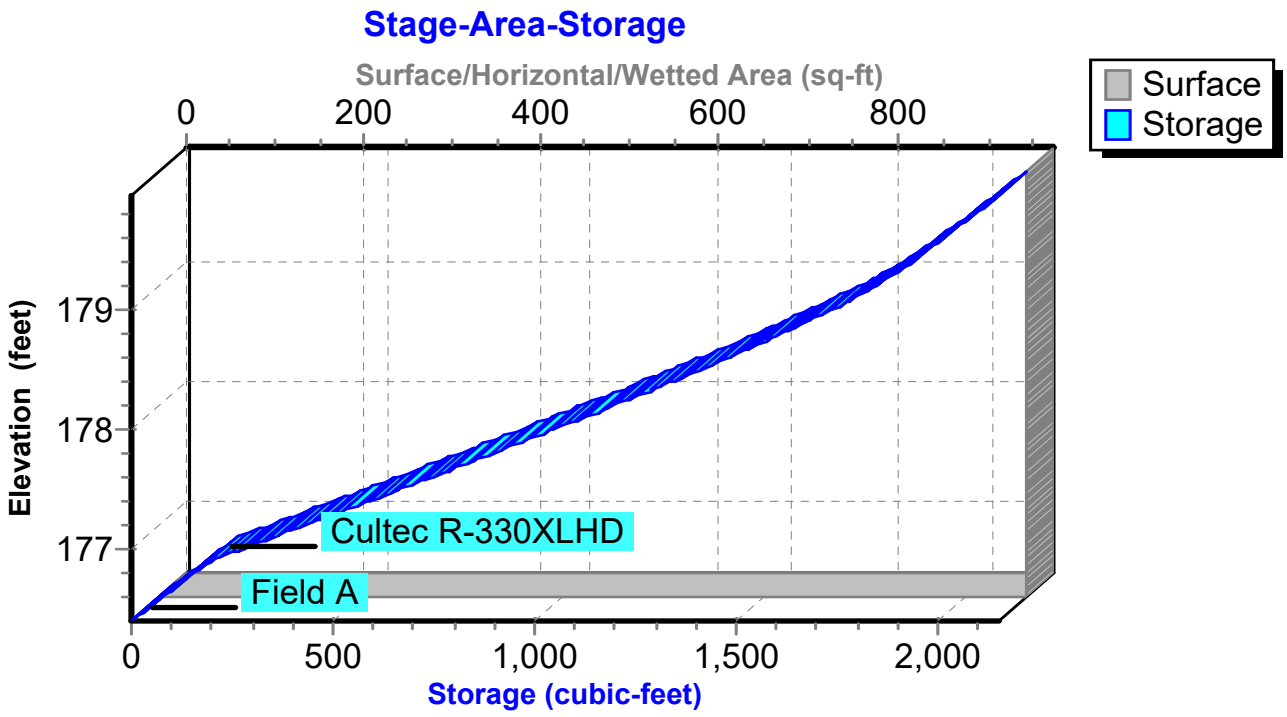


Pond 3P: RB#1

Stage-Discharge



Pond 3P: RB#1


Stage-Area-Storage
Surface/Horizontal/Wetted Area (sq-ft)
0
200
400
600
800
Surface
Storage
Elevation (feet)
179
178
177
Cultec R-330XLHD
Field A
0
500
1,000
1,500
2,000
Storage (cubic-feet)

Summary for Pond 7P: RB#2

Inflow Area = 9,447 sf, 37.40% Impervious, Inflow Depth = 1.27" for 10-Year event
Inflow = 0.29 cfs @ 12.10 hrs, Volume= 996 cf
Outflow = 0.08 cfs @ 11.96 hrs, Volume= 996 cf, Atten= 72%, Lag= 0.0 min
Discarded = 0.08 cfs @ 11.96 hrs, Volume= 996 cf

Routing by Stor-Ind method, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Peak Elev= 176.29' @ 12.52 hrs Surf.Area= 430 sf Storage= 187 cf

Plug-Flow detention time= 12.4 min calculated for 996 cf (100% of inflow)
Center-of-Mass det. time= 12.4 min (883.1 - 870.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	175.50'	391 cf	**11.17'W x 38.50'L x 3.54'H Field A** 1,523 cf Overall - 544 cf Embedded = 979 cf x 40.0% Voids
#2A	176.00'	544 cf	**Cultec R-330XLHD** x 10 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
		935 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	175.50'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.08 cfs @ 11.96 hrs HW=175.54' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.08 cfs)

Pond 7P: 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 2 rows

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

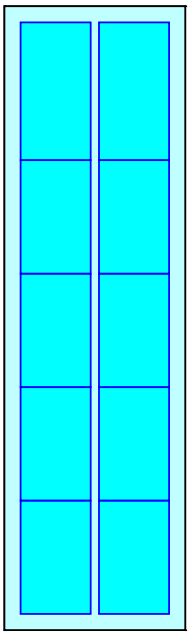
5 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 36.50' Row Length +12.0" End Stone x 2 = 38.50' Base Length
2 Rows x 52.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 11.17' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

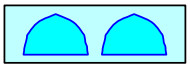
10 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 2 Rows = 543.9 cf Chamber Storage

1,522.6 cf Field - 543.9 cf Chambers = 978.7 cf Stone x 40.0% Voids = 391.5 cf Stone Storage

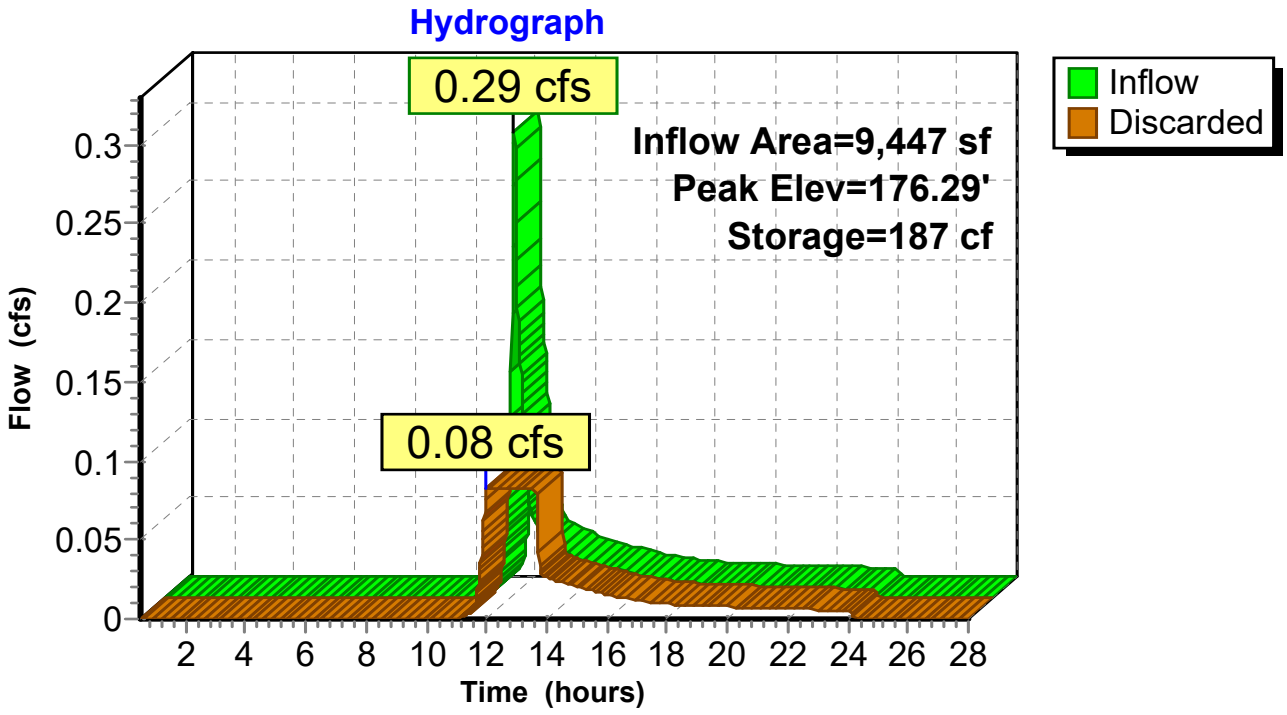
Chamber Storage + Stone Storage = 935.4 cf = 0.021 af
Overall Storage Efficiency = 61.4%
Overall System Size = 38.50' x 11.17' x 3.54'

10 Chambers @ $ 300.00 /ea = $ 3,000.00
56.4 cy Field Excavation @ $ 10.00 /cy = $ 563.93
36.2 cy Stone @ $ 30.00 /cy = $ 1,087.44
Total Cost = $ 4,651.38

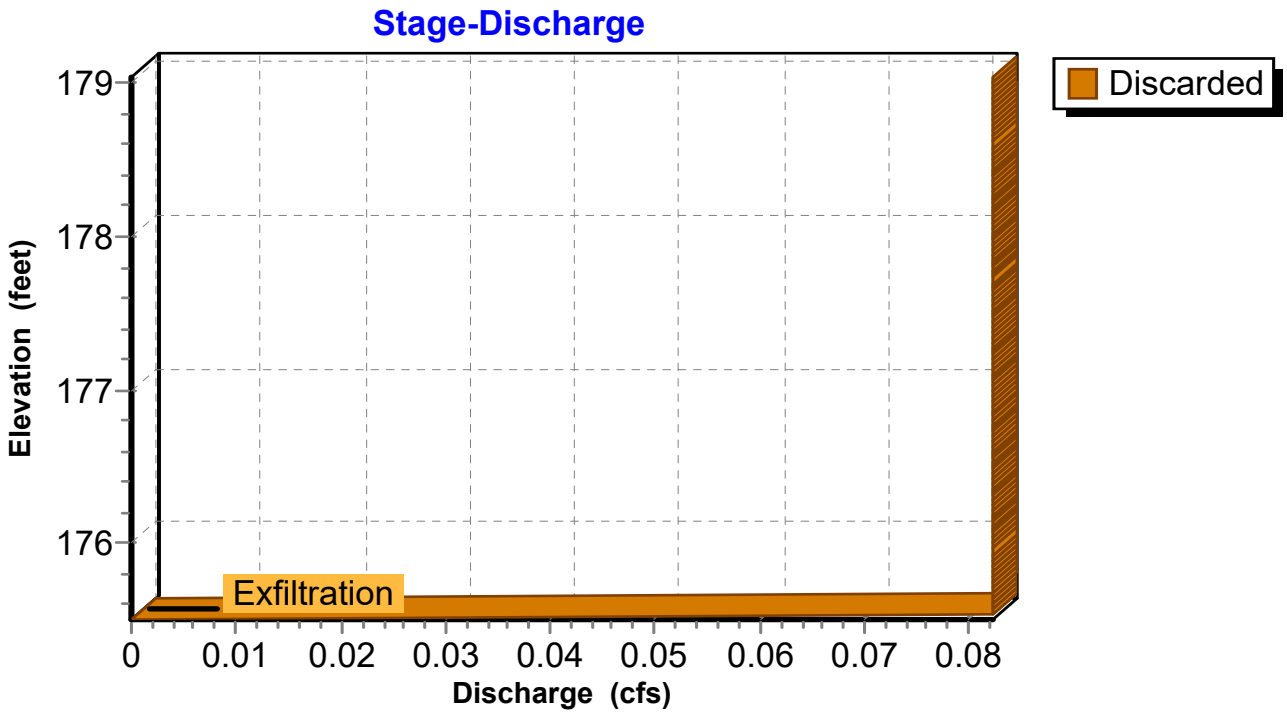




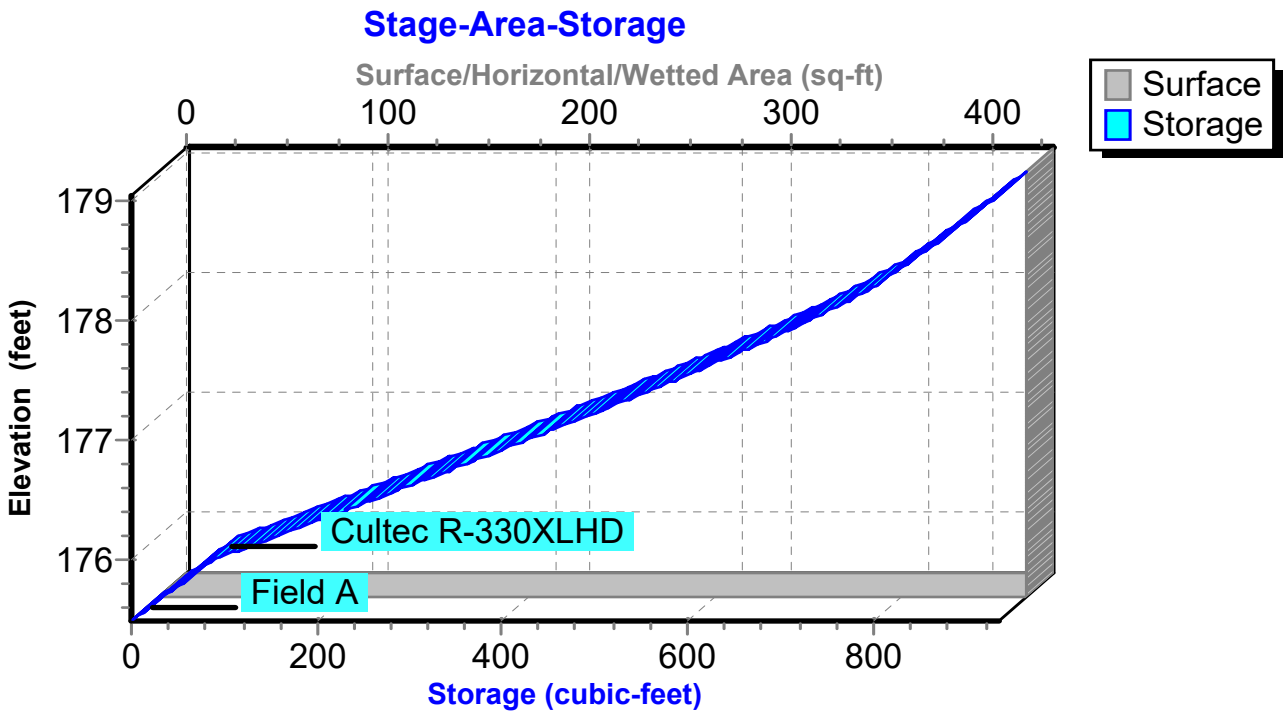
Pond 7P: RB#2



Pond 7P: RB#2



Pond 7P: RB#2


Stage-Area-Storage
Surface/Horizontal/Wetted Area (sq-ft)
0
100
200
300
400
Surface
Storage
179
178
177
176
Elevation (feet)
Cultec R-330XLHD
Field A
0
200
400
600
800
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=9,447 sf 37.40% Impervious Runoff Depth=1.91"
Tc=6.0 min CN=64 Runoff=0.47 cfs 1,507 cf

Subcatchment SA#2: Subcat SA#2 Runoff Area=1,735 sf 8.10% Impervious Runoff Depth=0.56"
Tc=6.0 min CN=44 Runoff=0.01 cfs 80 cf

Subcatchment SA#25: Subcat SA#25 Runoff Area=5,186 sf 100.00% Impervious Runoff Depth=5.26"
Flow Length=70' Tc=6.4 min CN=98 Runoff=0.63 cfs 2,274 cf

Subcatchment SA#27: Subcat SA#27 Runoff Area=4,748 sf 94.85% Impervious Runoff Depth=4.92"
Tc=6.0 min CN=95 Runoff=0.57 cfs 1,945 cf

Subcatchment SA#3: Subcat SA#3 Runoff Area=39,520 sf 11.77% Impervious Runoff Depth=0.97"
Flow Length=240' Tc=12.9 min CN=51 Runoff=0.61 cfs 3,198 cf

Subcatchment SA#3A: Subcat SA#3A Runoff Area=6,684 sf 4.92% Impervious Runoff Depth=0.91"
Tc=6.0 min CN=50 Runoff=0.12 cfs 505 cf

Subcatchment SA#4: Subcat SA#4 Runoff Area=6,600 sf 0.00% Impervious Runoff Depth=0.50"
Tc=6.0 min CN=43 Runoff=0.03 cfs 277 cf

Subcatchment SA#6: Subcat SA#6 Runoff Area=11,721 sf 0.00% Impervious Runoff Depth=0.67"
Tc=6.0 min CN=46 Runoff=0.11 cfs 652 cf

Subcatchment SA#8: Subcat SA#8 Runoff Area=12,253 sf 2.44% Impervious Runoff Depth=0.56"
Tc=6.0 min CN=44 Runoff=0.08 cfs 568 cf

Pond 1P: RB#4 Peak Elev=178.17' Storage=585 cf Inflow=0.57 cfs 1,945 cf
Outflow=0.08 cfs 1,945 cf

Pond 2P: RB#3 Peak Elev=178.78' Storage=612 cf Inflow=0.63 cfs 2,274 cf
Outflow=0.10 cfs 2,274 cf

Pond 3P: RB#1 Peak Elev=177.41' Storage=598 cf Inflow=0.61 cfs 3,198 cf
Outflow=0.19 cfs 3,198 cf

Pond 7P: RB#2 Peak Elev=176.94' Storage=403 cf Inflow=0.47 cfs 1,507 cf
Outflow=0.08 cfs 1,507 cf

Total Runoff Area = 97,894 sf Runoff Volume = 11,007 cf Average Runoff Depth = 1.35"
80.96% Pervious = 79,252 sf 19.04% Impervious = 18,642 sf

Summary for Subcatchment SA#1: Subcat SA#1

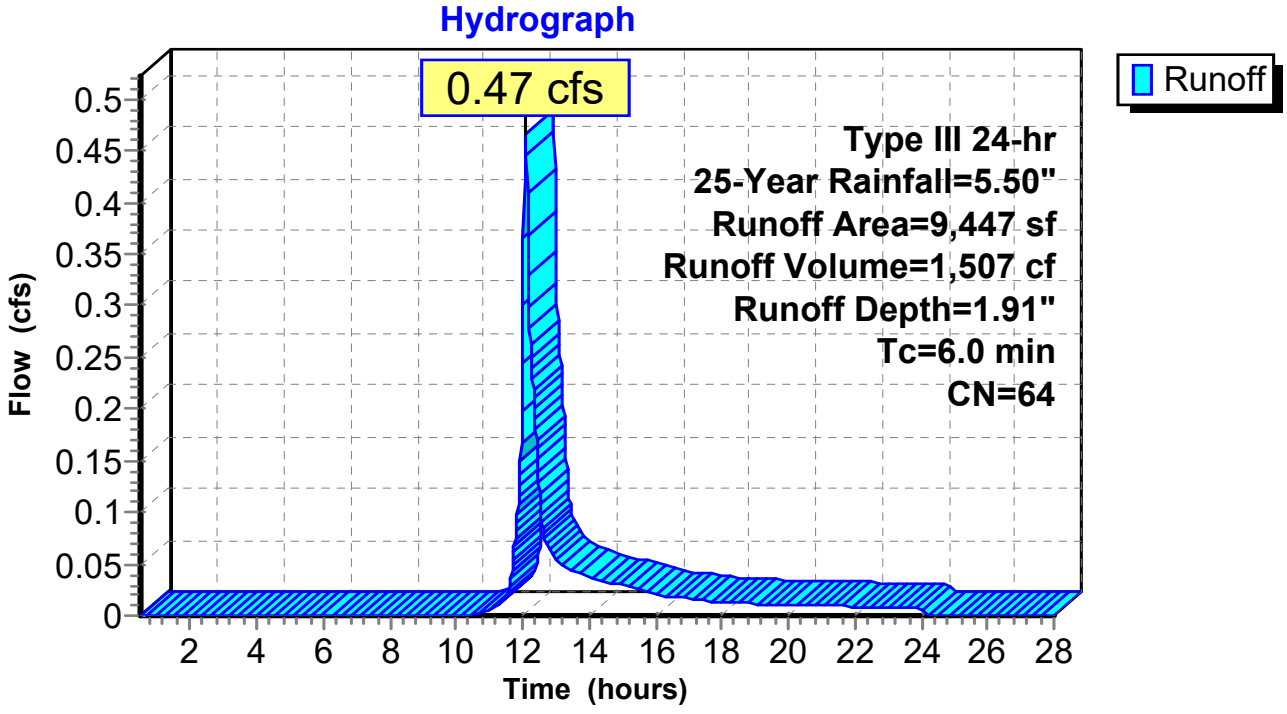
Runoff = 0.47 cfs @ 12.10 hrs, Volume= 1,507 cf, Depth= 1.91"

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=5.50"

Area (sf)	CN	Description
3,692	49	50-75% Grass cover, Fair, HSG A
3,246	98	Paved roads w/curbs & sewers, HSG A
288	98	Roofs, HSG A
2,222	36	Woods, Fair, HSG A
9,447	64	Weighted Average
5,914		62.60% Pervious Area
3,533		37.40% Impervious Area

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

Subcatchment SA#1: Subcat SA#1



Summary for Subcatchment SA#2: Subcat SA#2

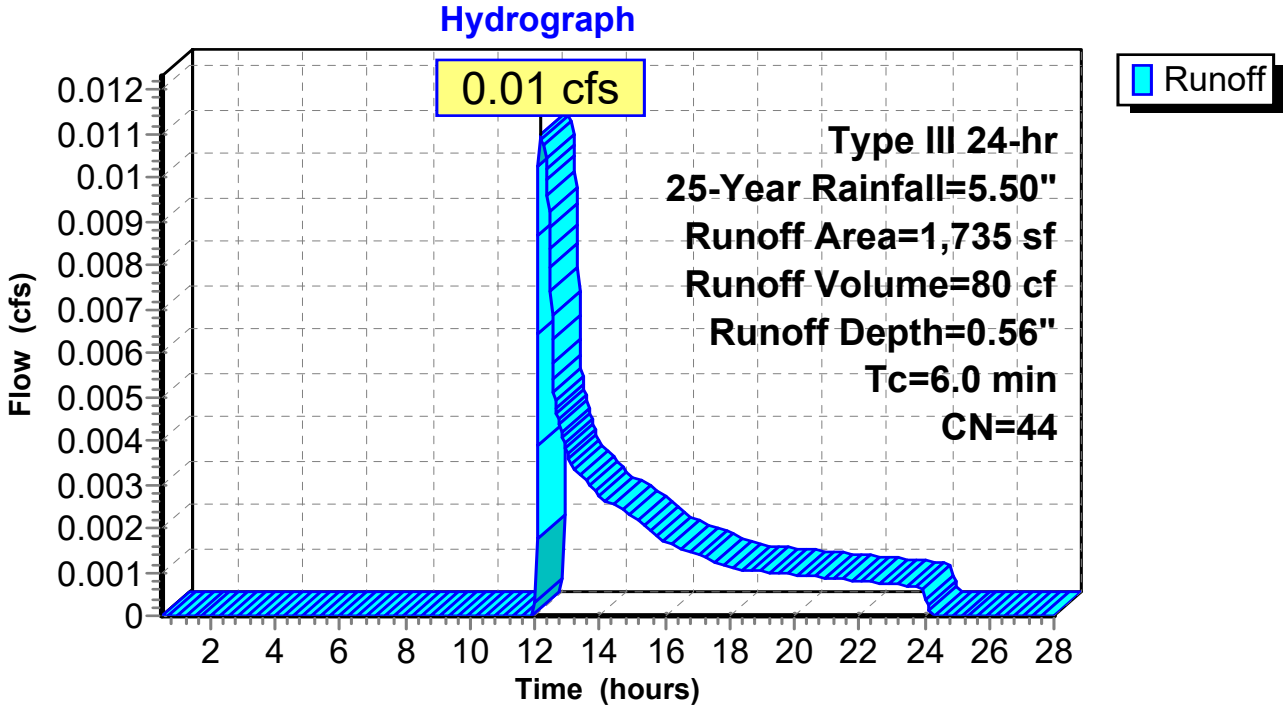
Runoff = 0.01 cfs @ 12.16 hrs, Volume= 80 cf, Depth= 0.56"

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=5.50"

Area (sf)	CN	Description
350	49	50-75% Grass cover, Fair, HSG A
141	98	Roofs, HSG A
1,244	36	Woods, Fair, HSG A
1,735	44	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
6.0					**Direct Entry,**

Subcatchment SA#2: Subcat SA#2



Summary for Subcatchment SA#25: Subcat SA#25

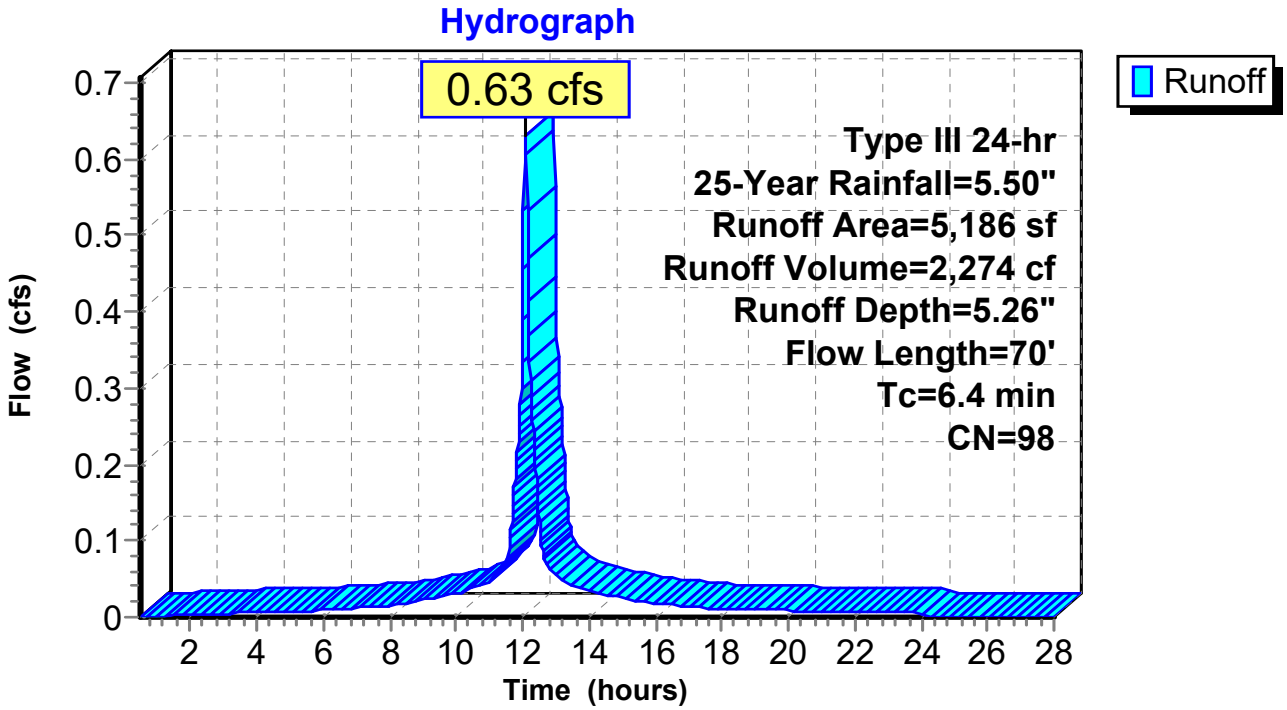
Runoff = 0.63 cfs @ 12.09 hrs, Volume= 2,274 cf, Depth= 5.26"

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=5.50"

Area (sf)	CN	Description
1,719	98	Paved roads w/curbs & sewers, HSG A
3,467	98	Roofs, HSG A
5,186	98	Weighted Average
5,186		100.00% 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#27: Subcat SA#27

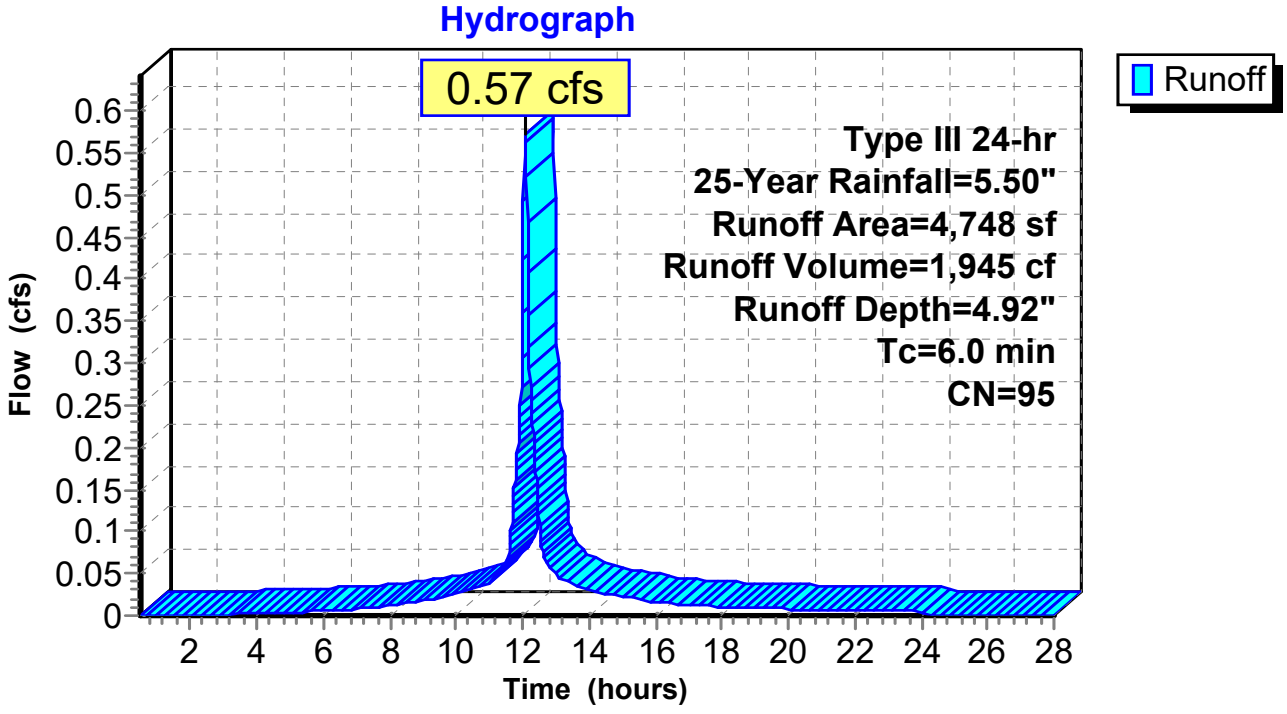
Runoff = 0.57 cfs @ 12.08 hrs, Volume= 1,945 cf, Depth= 4.92"

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=5.50"

Area (sf)	CN	Description
155	49	50-75% Grass cover, Fair, HSG A
1,470	98	Paved roads w/curbs & sewers, HSG A
3,034	98	Roofs, HSG A
89	36	Woods, Fair, HSG A
4,748	95	Weighted Average
245		5.15% Pervious Area
4,504		94.85% 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#3: Subcat SA#3

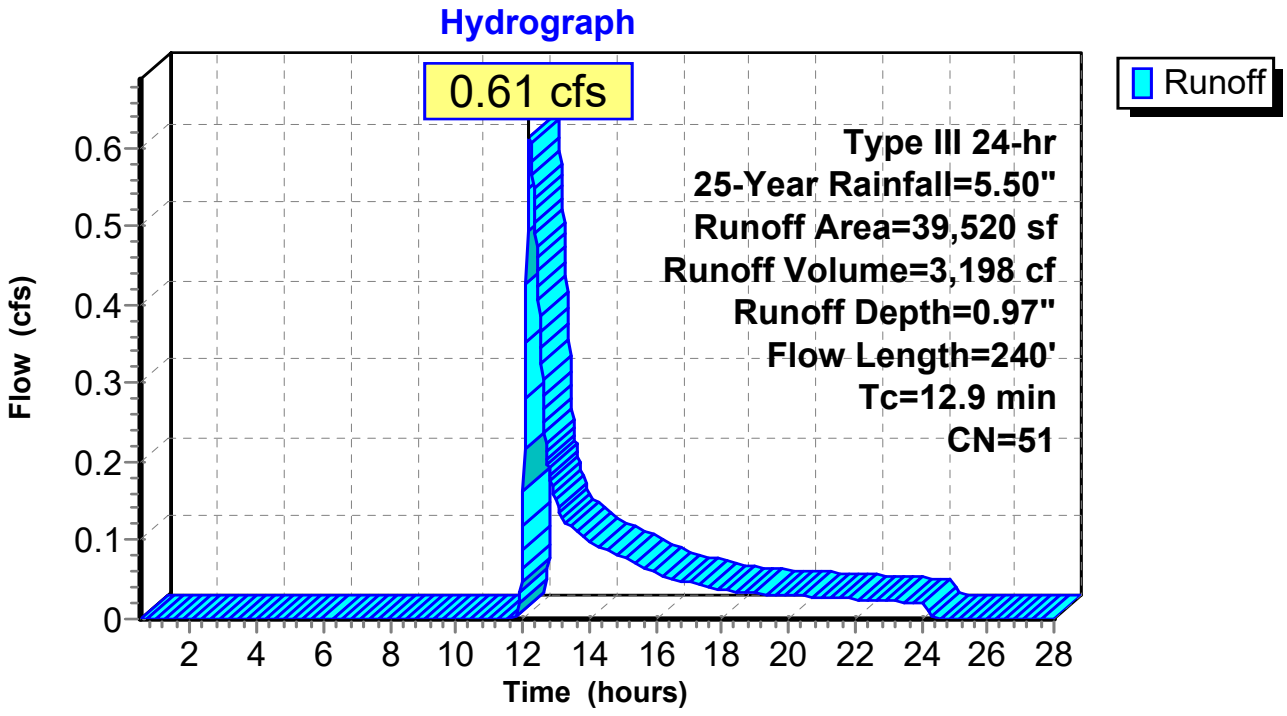
Runoff = 0.61 cfs @ 12.22 hrs, Volume= 3,198 cf, Depth= 0.97"

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=5.50"

Area (sf)	CN	Description
22,441	49	50-75% Grass cover, Fair, HSG A
4,652	98	Paved roads w/curbs & sewers, HSG A
12,426	36	Woods, Fair, HSG A
39,520	51	Weighted Average
34,868		88.23% Pervious Area
4,652		11.77% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.1	50	0.0240	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
1.8	190	0.0120	1.76		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
12.9	240	Total			

Subcatchment SA#3: Subcat SA#3



Summary for Subcatchment SA#3A: Subcat SA#3A

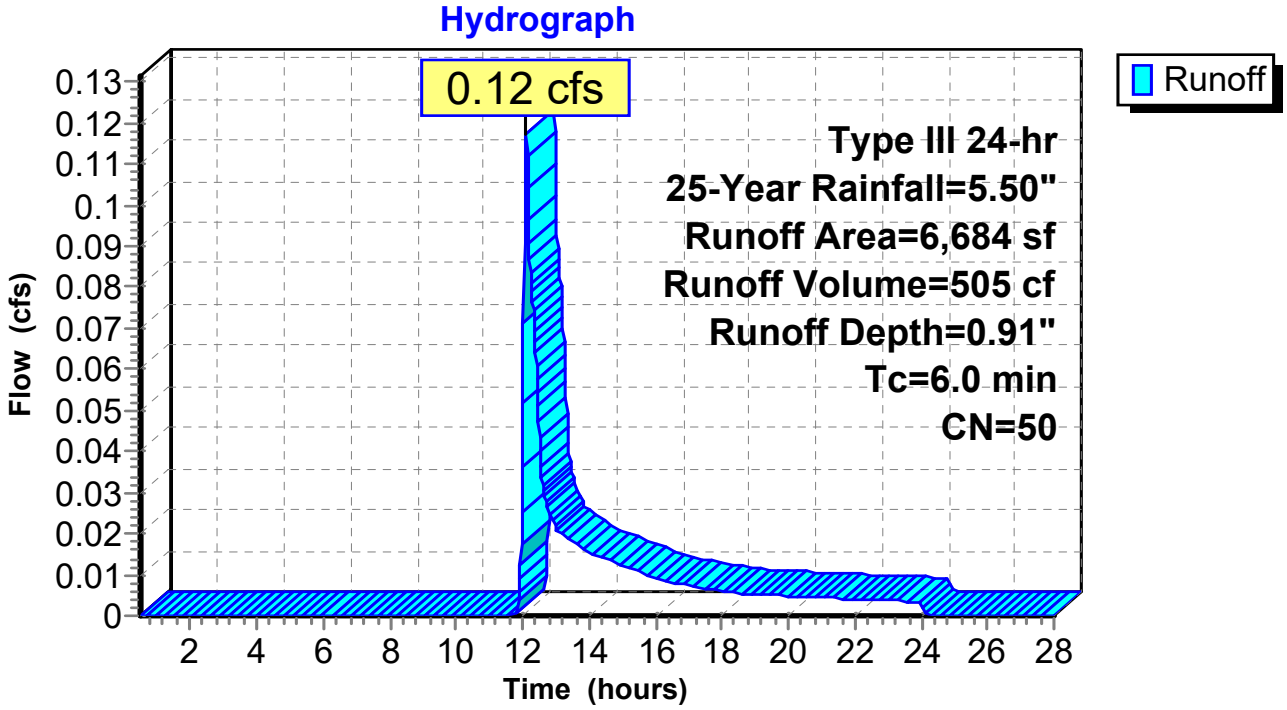
Runoff = 0.12 cfs @ 12.11 hrs, Volume= 505 cf, Depth= 0.91"

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=5.50"

Area (sf)	CN	Description
5,678	49	50-75% Grass cover, Fair, HSG A
329	98	Roofs, HSG A
678	36	Woods, Fair, HSG A
6,684	50	Weighted Average
6,356		95.08% Pervious Area
329		4.92% Impervious Area

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

Subcatchment SA#3A: Subcat SA#3A



Summary for Subcatchment SA#4: Subcat SA#4

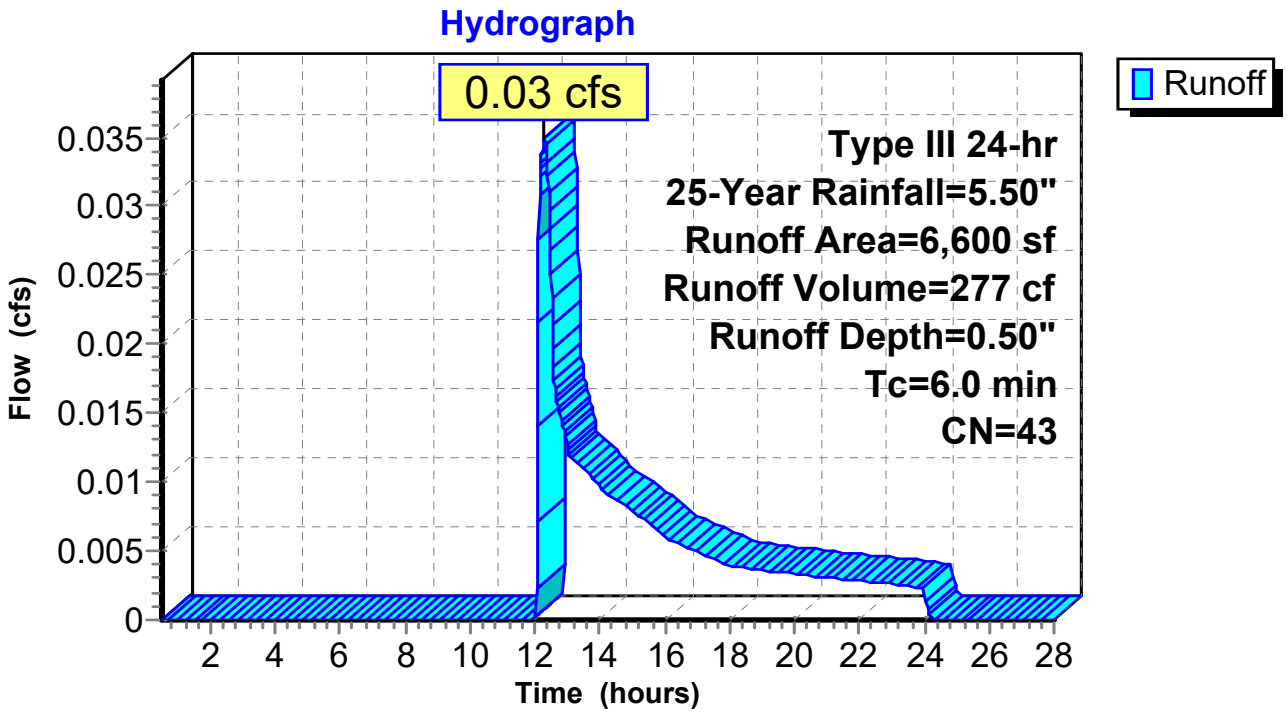
Runoff = 0.03 cfs @ 12.30 hrs, Volume= 277 cf, Depth= 0.50"

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=5.50"

Area (sf)	CN	Description
3,773	49	50-75% Grass cover, Fair, HSG A
2,827	36	Woods, Fair, HSG A
6,600	43	Weighted Average
6,600		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#6: Subcat SA#6

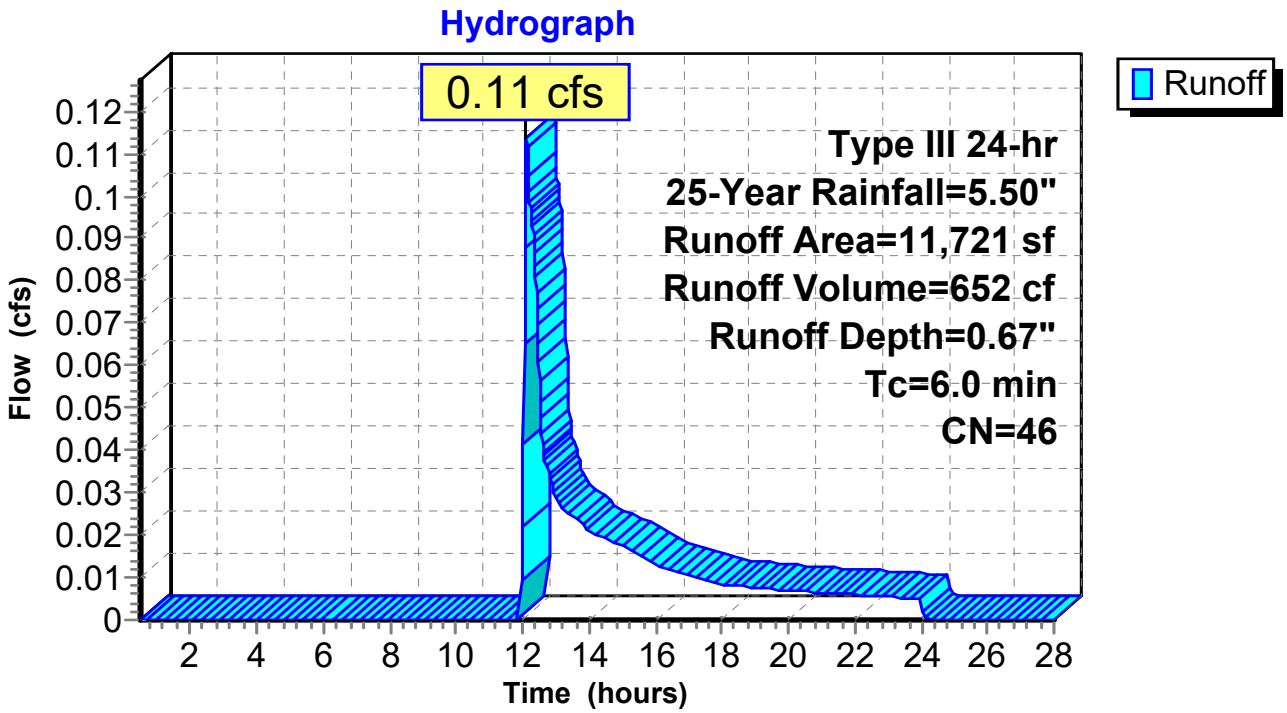
Runoff = 0.11 cfs @ 12.13 hrs, Volume= 652 cf, Depth= 0.67"

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 25-Year Rainfall=5.50"

Area (sf)	CN	Description
9,325	49	50-75% Grass cover, Fair, HSG A
2,397	36	Woods, Fair, HSG A
11,721	46	Weighted Average
11,721		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

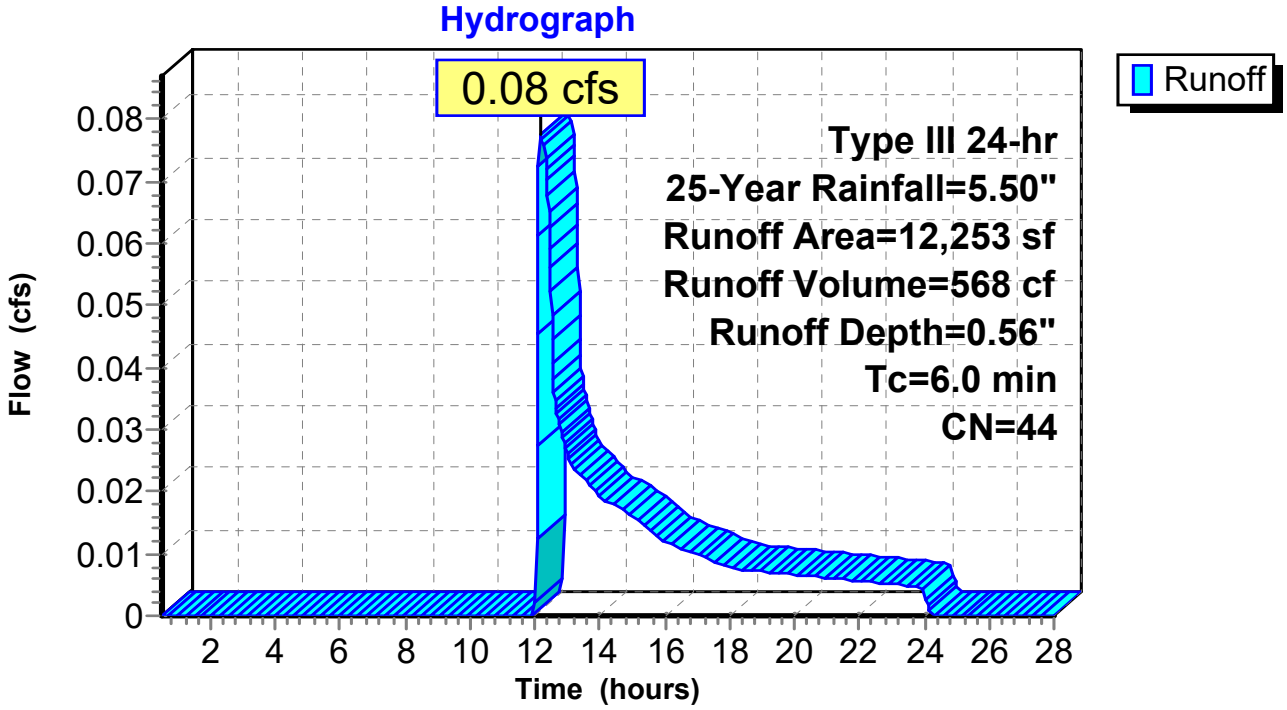
Runoff = 0.08 cfs @ 12.16 hrs, Volume= 568 cf, Depth= 0.56"

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=5.50"

Area (sf)	CN	Description
6,131	49	50-75% Grass cover, Fair, HSG A
299	98	Paved roads w/curbs & sewers, HSG A
5,823	36	Woods, Fair, HSG A
12,253	44	Weighted Average
11,954		97.56% Pervious Area
299		2.44% Impervious 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 = 4,748 sf, 94.85% Impervious, Inflow Depth = 4.92" for 25-Year event
Inflow = 0.57 cfs @ 12.08 hrs, Volume= 1,945 cf
Outflow = 0.08 cfs @ 11.62 hrs, Volume= 1,945 cf, Atten= 87%, Lag= 0.0 min
Discarded = 0.08 cfs @ 11.62 hrs, Volume= 1,945 cf

Routing by Stor-Ind method, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Peak Elev= 178.17' @ 12.61 hrs Surf.Area= 392 sf Storage= 585 cf

Plug-Flow detention time= 47.9 min calculated for 1,945 cf (100% of inflow)
Center-of-Mass det. time= 47.9 min (813.7 - 765.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	176.00'	354 cf	**16.00'W x 24.50'L x 3.54'H Field A** 1,388 cf Overall - 503 cf Embedded = 885 cf x 40.0% Voids
#2A	176.50'	503 cf	**Cultec R-330XLHD** x 9 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
		857 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=0.08 cfs @ 11.62 hrs HW=176.04' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.08 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 3 rows

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

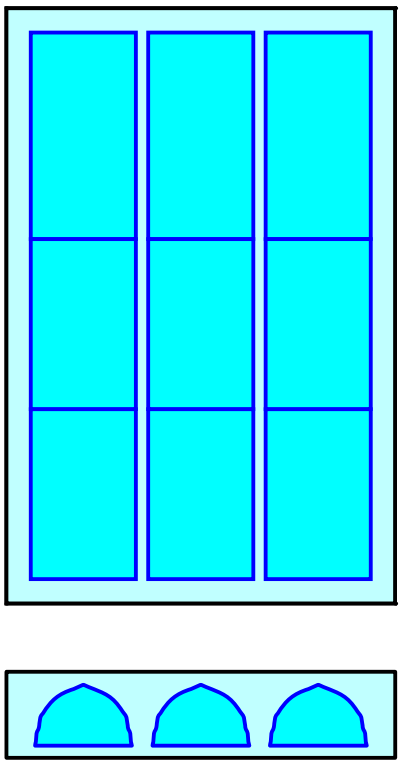
3 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 22.50' Row Length +12.0" End Stone x 2 = 24.50' Base Length
3 Rows x 52.0" Wide + 6.0" Spacing x 2 + 12.0" Side Stone x 2 = 16.00' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

9 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 3 Rows = 502.9 cf Chamber Storage

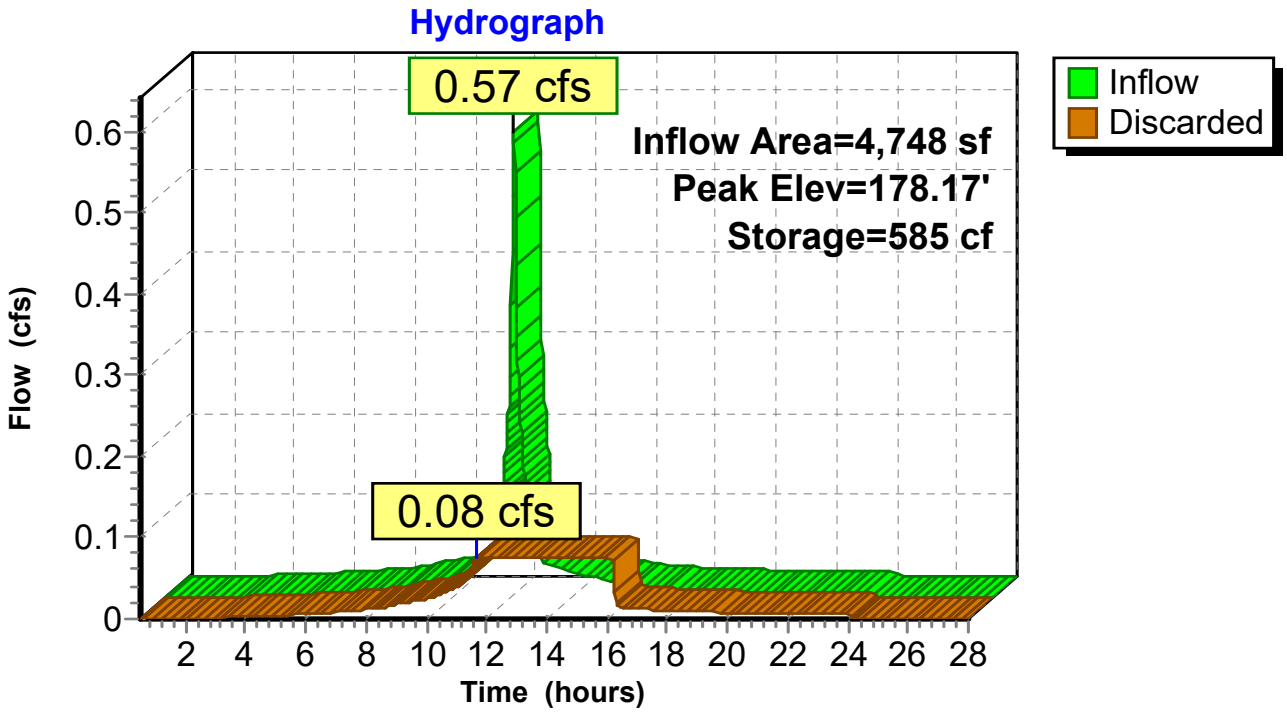
1,388.3 cf Field - 502.9 cf Chambers = 885.4 cf Stone x 40.0% Voids = 354.2 cf Stone Storage

Chamber Storage + Stone Storage = 857.1 cf = 0.020 af
Overall Storage Efficiency = 61.7%
Overall System Size = 24.50' x 16.00' x 3.54'

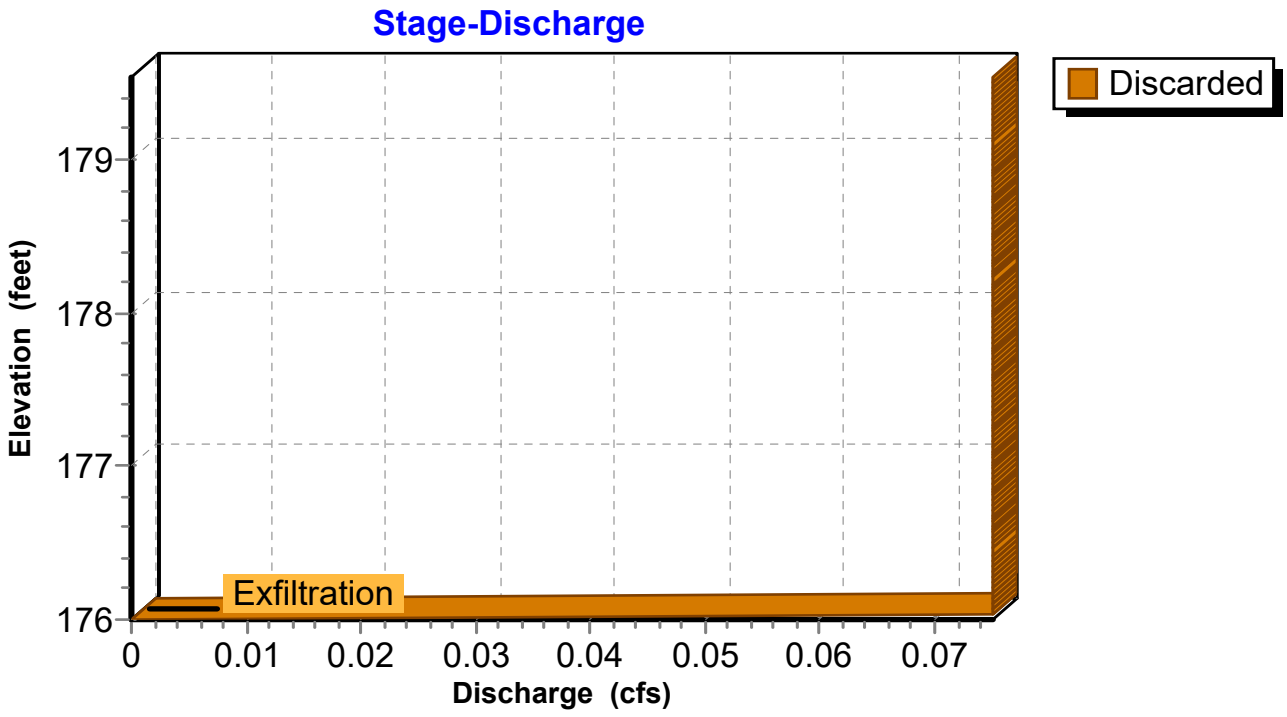
9 Chambers @ $ 300.00 /ea = $ 2,700.00
51.4 cy Field Excavation @ $ 10.00 /cy = $ 514.20
32.8 cy Stone @ $ 30.00 /cy = $ 983.77
Total Cost = $ 4,197.97



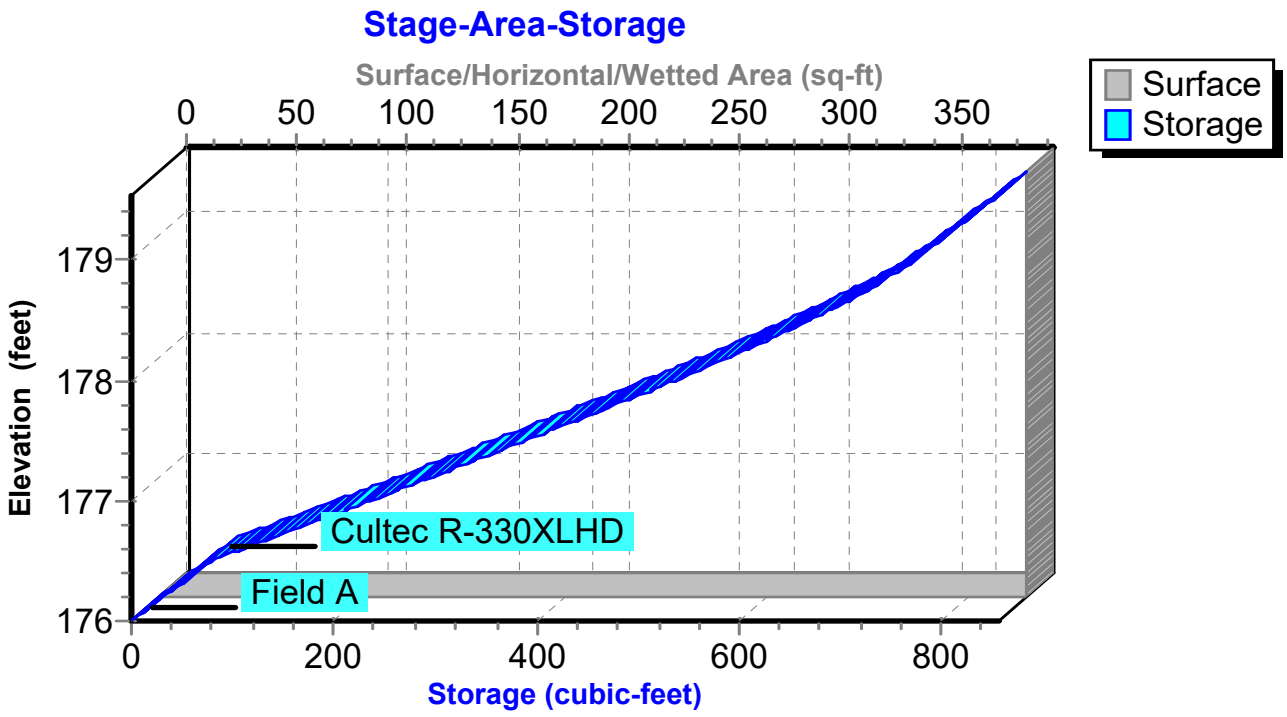
Pond 1P: RB#4



Pond 1P: RB#4



Pond 1P: RB#4


Stage-Area-Storage
Surface/Horizontal/Wetted Area (sq-ft)
0
50
100
150
200
250
300
350
Surface
Storage
179
178
177
176
Elevation (feet)
Cultec R-330XLHD
Field A
0
200
400
600
800
Storage (cubic-feet)

Summary for Pond 2P: RB#3

Inflow Area = 5,186 sf,100.00% Impervious, Inflow Depth = 5.26" for 25-Year event
Inflow = 0.63 cfs @ 12.09 hrs, Volume= 2,274 cf
Outflow = 0.10 cfs @ 11.66 hrs, Volume= 2,274 cf, Atten= 85%, Lag= 0.0 min
Discarded = 0.10 cfs @ 11.66 hrs, Volume= 2,274 cf

Routing by Stor-Ind method, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Peak Elev= 178.78' @ 12.57 hrs Surf.Area= 504 sf Storage= 612 cf

Plug-Flow detention time= 35.2 min calculated for 2,272 cf (100% of inflow)
Center-of-Mass det. time= 35.1 min (782.0 - 746.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	177.00'	450 cf	**16.00'W x 31.50'L x 3.54'H Field A** 1,785 cf Overall - 659 cf Embedded = 1,126 cf x 40.0% Voids
#2A	177.50'	659 cf	**Cultec R-330XLHD** x 12 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
		1,110 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=0.10 cfs @ 11.66 hrs HW=177.04' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.10 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 3 rows

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

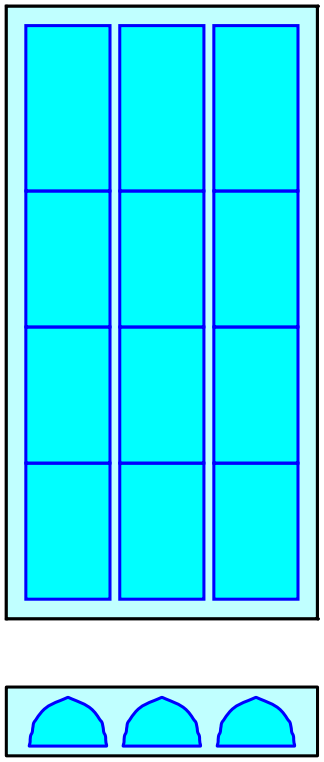
4 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 29.50' Row Length +12.0" End Stone x 2 = 31.50' Base Length
3 Rows x 52.0" Wide + 6.0" Spacing x 2 + 12.0" Side Stone x 2 = 16.00' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

12 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 3 Rows = 659.4 cf Chamber Storage

1,785.0 cf Field - 659.4 cf Chambers = 1,125.6 cf Stone x 40.0% Voids = 450.2 cf Stone Storage

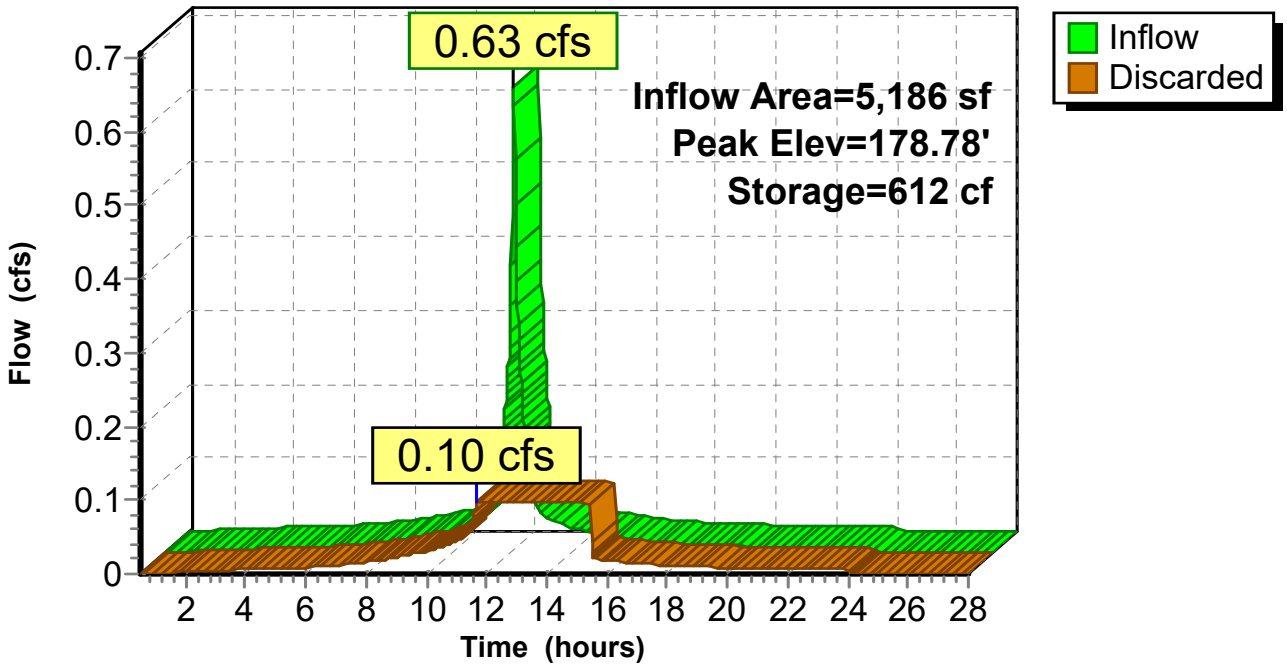
Chamber Storage + Stone Storage = 1,109.6 cf = 0.025 af
Overall Storage Efficiency = 62.2%
Overall System Size = 31.50' x 16.00' x 3.54'

12 Chambers @ $ 300.00 /ea = $ 3,600.00
66.1 cy Field Excavation @ $ 10.00 /cy = $ 661.11
41.7 cy Stone @ $ 30.00 /cy = $ 1,250.65
Total Cost = $ 5,511.76



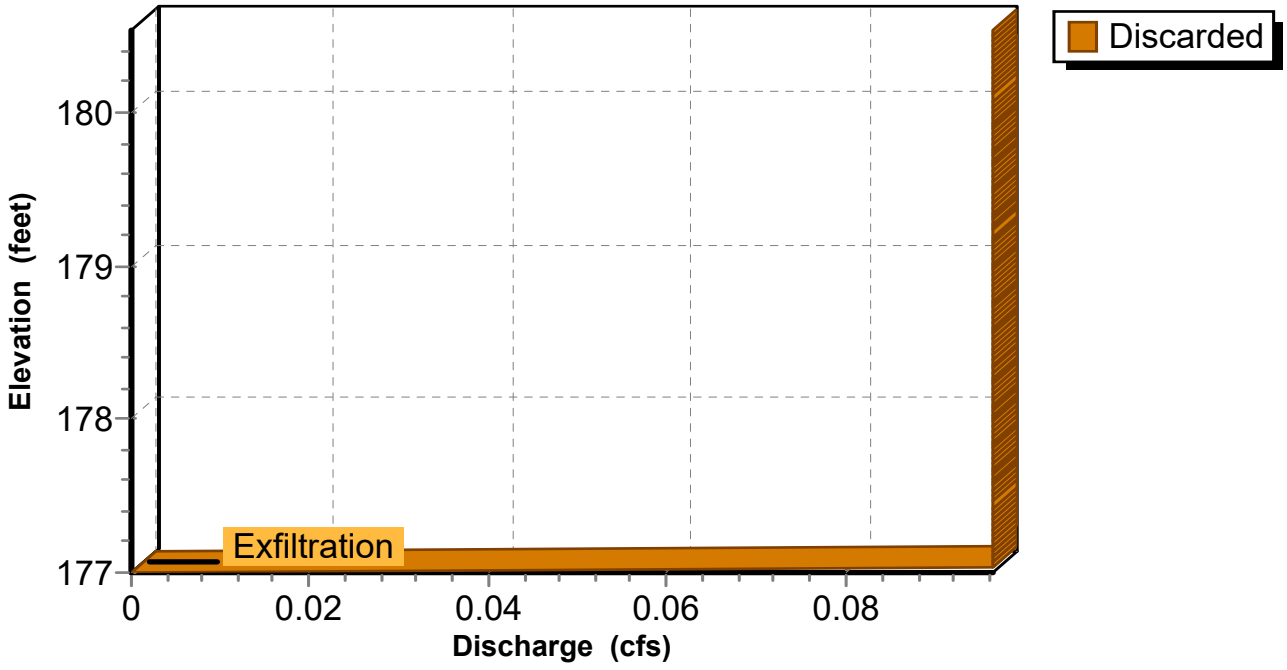
Pond 2P: RB#3

Hydrograph

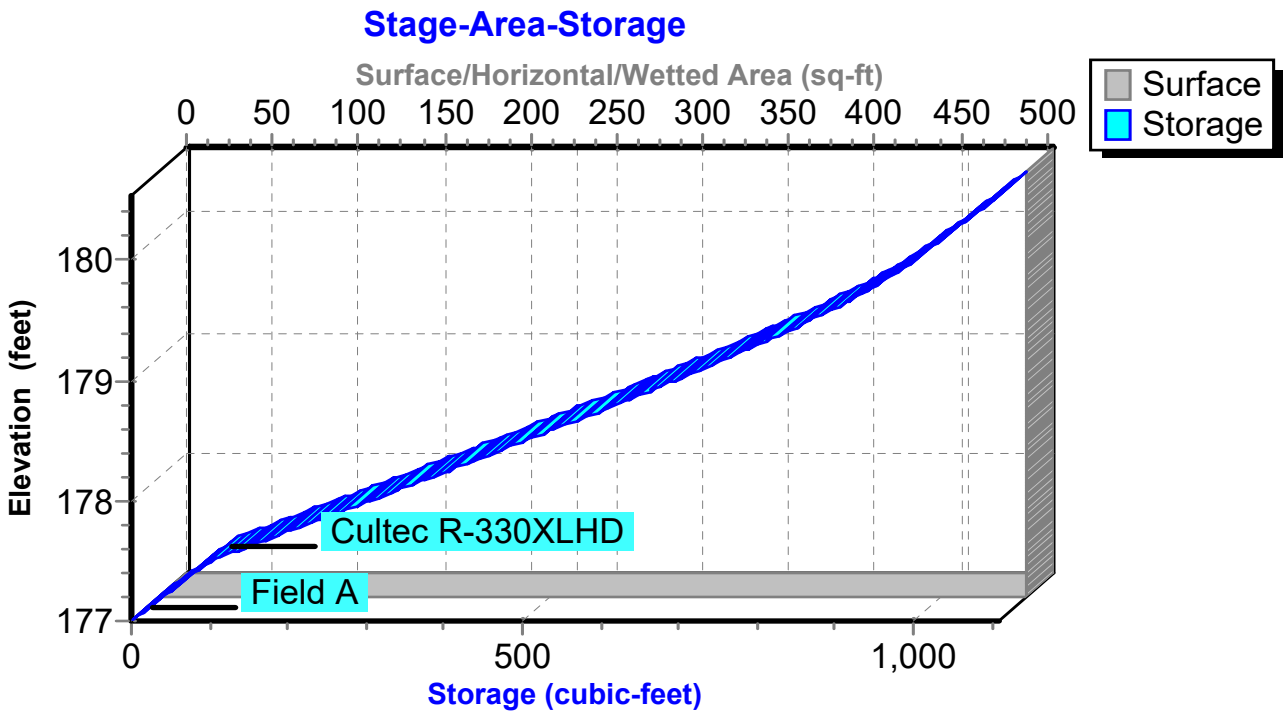


Pond 2P: RB#3

Stage-Discharge



Pond 2P: RB#3


Stage-Area-Storage
Surface/Horizontal/Wetted Area (sq-ft)
0
50
100
150
200
250
300
350
400
450
500
Surface
Storage
180
179
178
177
Elevation (feet)
Cultec R-330XLHD
Field A
0
500
1,000
Storage (cubic-feet)

Summary for Pond 3P: RB#1

Inflow Area = 39,520 sf, 11.77% Impervious, Inflow Depth = 0.97" for 25-Year event
Inflow = 0.61 cfs @ 12.22 hrs, Volume= 3,198 cf
Outflow = 0.19 cfs @ 12.08 hrs, Volume= 3,198 cf, Atten= 69%, Lag= 0.0 min
Discarded = 0.19 cfs @ 12.08 hrs, Volume= 3,198 cf

Routing by Stor-Ind method, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Peak Elev= 177.41' @ 12.80 hrs Surf.Area= 977 sf Storage= 598 cf

Plug-Flow detention time= 20.0 min calculated for 3,196 cf (100% of inflow)
Center-of-Mass det. time= 20.0 min (925.5 - 905.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	176.40'	875 cf	**11.17'W x 87.50'L x 3.54'H Field A** 3,461 cf Overall - 1,274 cf Embedded = 2,186 cf x 40.0% Voids
#2A	176.90'	1,274 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 2 rows
		2,149 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	176.40'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.19 cfs @ 12.08 hrs HW=176.44' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.19 cfs)

Pond 3P: 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 2 rows

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

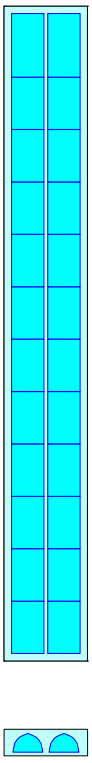
12 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 85.50' Row Length +12.0" End Stone x 2 = 87.50' Base Length
2 Rows x 52.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 11.17' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

24 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 2 Rows = 1,274.1 cf Chamber Storage

3,460.5 cf Field - 1,274.1 cf Chambers = 2,186.4 cf Stone x 40.0% Voids = 874.6 cf Stone Storage

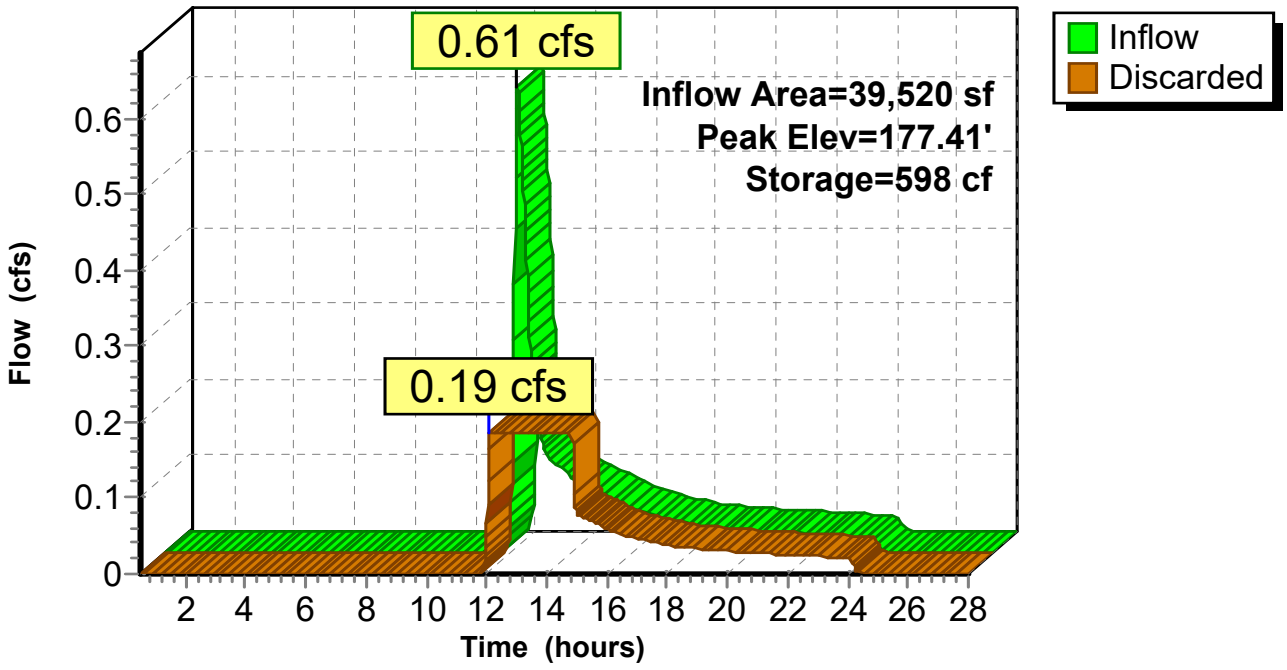
Chamber Storage + Stone Storage = 2,148.7 cf = 0.049 af
Overall Storage Efficiency = 62.1%
Overall System Size = 87.50' x 11.17' x 3.54'

24 Chambers @ $ 300.00 /ea = $ 7,200.00
128.2 cy Field Excavation @ $ 10.00 /cy = $ 1,281.67
81.0 cy Stone @ $ 30.00 /cy = $ 2,429.31
Total Cost = $ 10,910.98



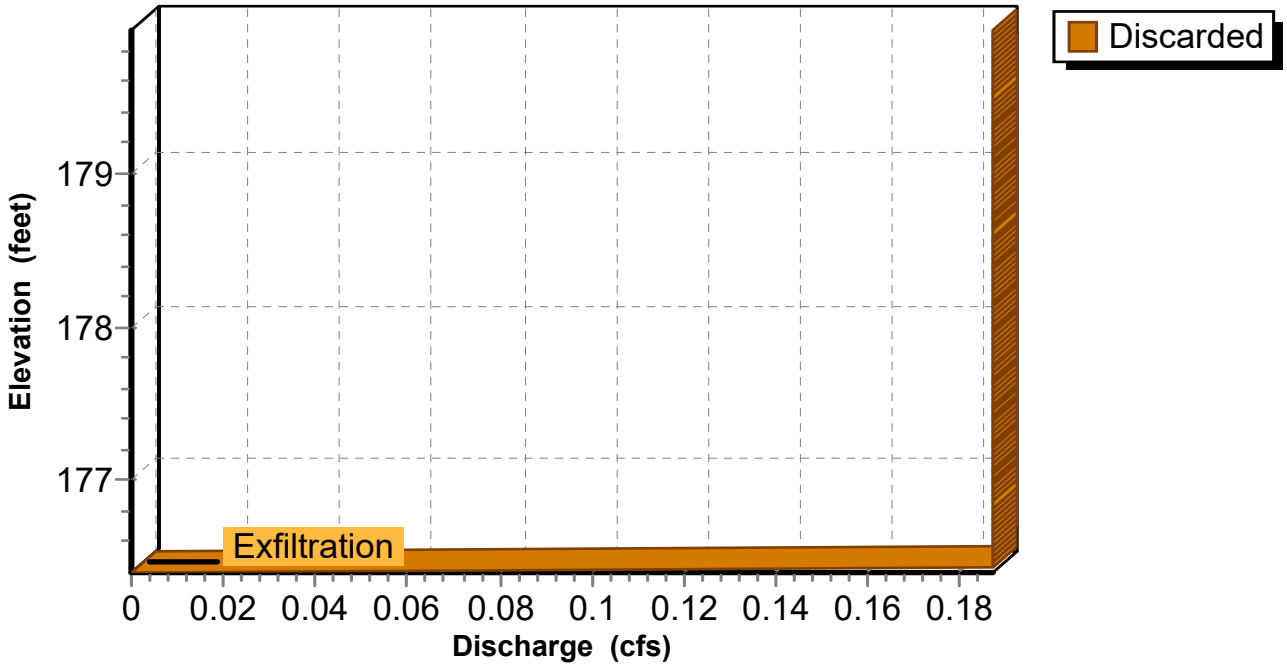
Pond 3P: RB#1

Hydrograph

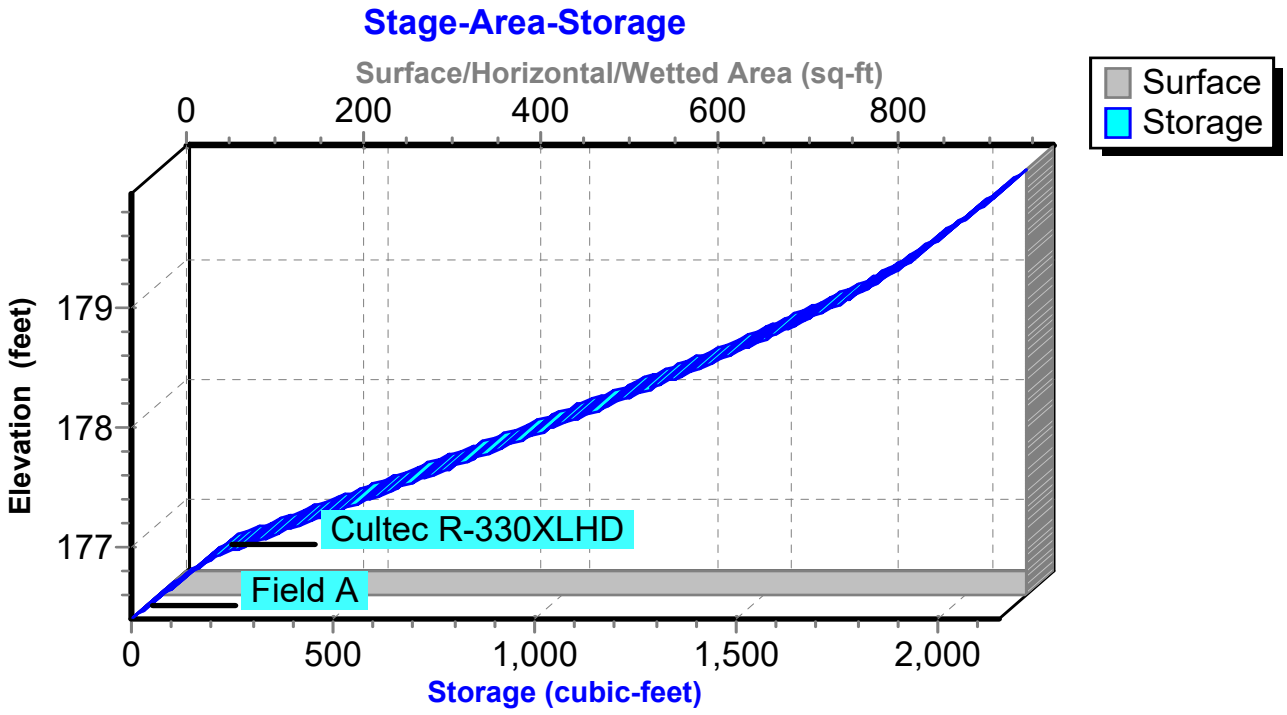


Pond 3P: RB#1

Stage-Discharge



Pond 3P: RB#1


Stage-Area-Storage
Surface/Horizontal/Wetted Area (sq-ft)
0
200
400
600
800
Surface
Storage
Elevation (feet)
179
178
177
Cultec R-330XLHD
Field A
0
500
1,000
1,500
2,000
Storage (cubic-feet)

Summary for Pond 7P: RB#2

Inflow Area = 9,447 sf, 37.40% Impervious, Inflow Depth = 1.91" for 25-Year event
Inflow = 0.47 cfs @ 12.10 hrs, Volume= 1,507 cf
Outflow = 0.08 cfs @ 11.84 hrs, Volume= 1,507 cf, Atten= 82%, Lag= 0.0 min
Discarded = 0.08 cfs @ 11.84 hrs, Volume= 1,507 cf

Routing by Stor-Ind method, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Peak Elev= 176.94' @ 12.62 hrs Surf.Area= 430 sf Storage= 403 cf

Plug-Flow detention time= 33.3 min calculated for 1,507 cf (100% of inflow)
Center-of-Mass det. time= 33.3 min (891.0 - 857.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	175.50'	391 cf	**11.17'W x 38.50'L x 3.54'H Field A** 1,523 cf Overall - 544 cf Embedded = 979 cf x 40.0% Voids
#2A	176.00'	544 cf	**Cultec R-330XLHD** x 10 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
		935 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	175.50'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.08 cfs @ 11.84 hrs HW=175.54' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.08 cfs)

Pond 7P: 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 2 rows

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

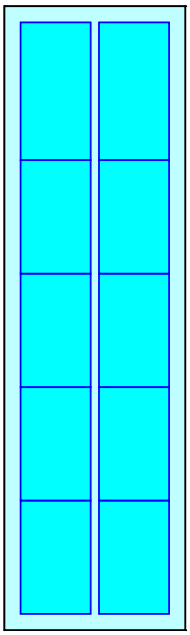
5 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 36.50' Row Length +12.0" End Stone x 2 = 38.50' Base Length
2 Rows x 52.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 11.17' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

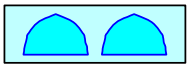
10 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 2 Rows = 543.9 cf Chamber Storage

1,522.6 cf Field - 543.9 cf Chambers = 978.7 cf Stone x 40.0% Voids = 391.5 cf Stone Storage

Chamber Storage + Stone Storage = 935.4 cf = 0.021 af
Overall Storage Efficiency = 61.4%
Overall System Size = 38.50' x 11.17' x 3.54'

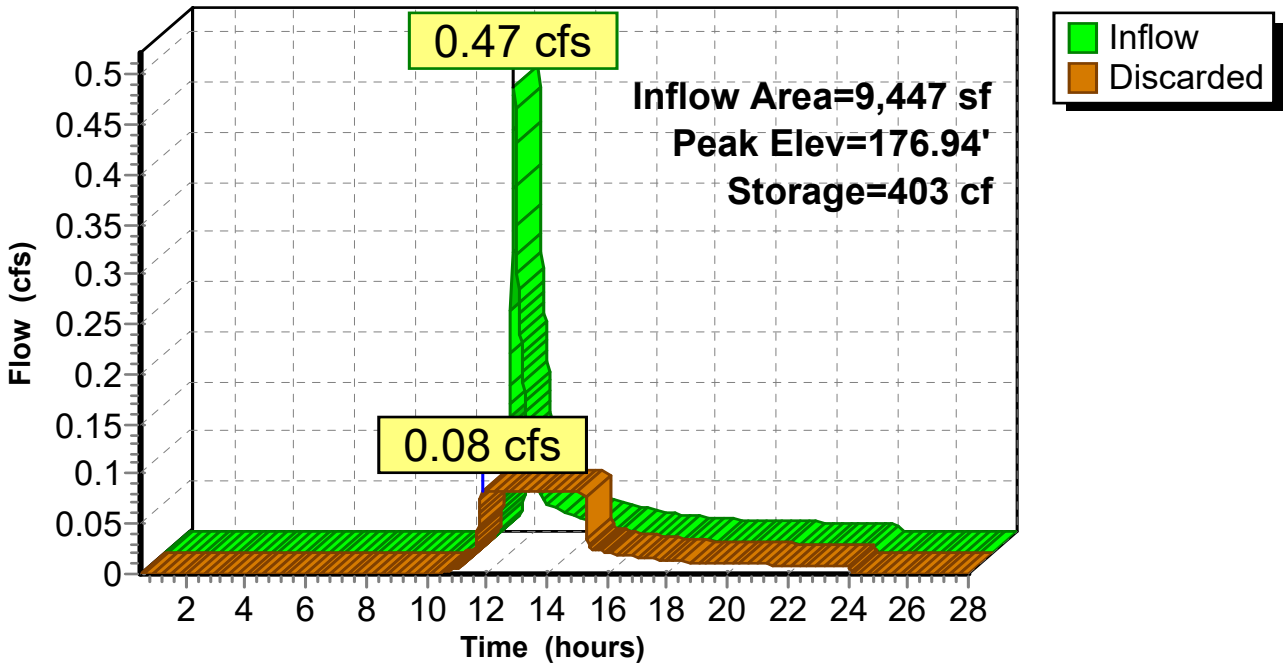
10 Chambers @ $ 300.00 /ea = $ 3,000.00
56.4 cy Field Excavation @ $ 10.00 /cy = $ 563.93
36.2 cy Stone @ $ 30.00 /cy = $ 1,087.44
Total Cost = $ 4,651.38





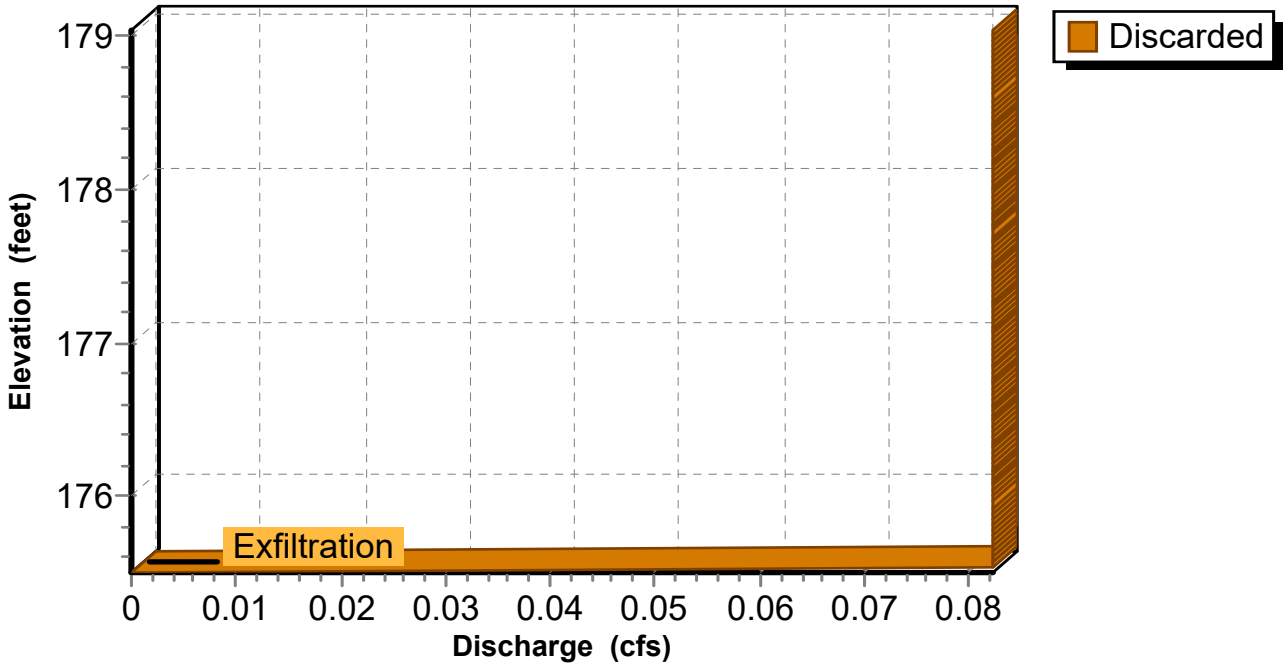
Pond 7P: RB#2

Hydrograph

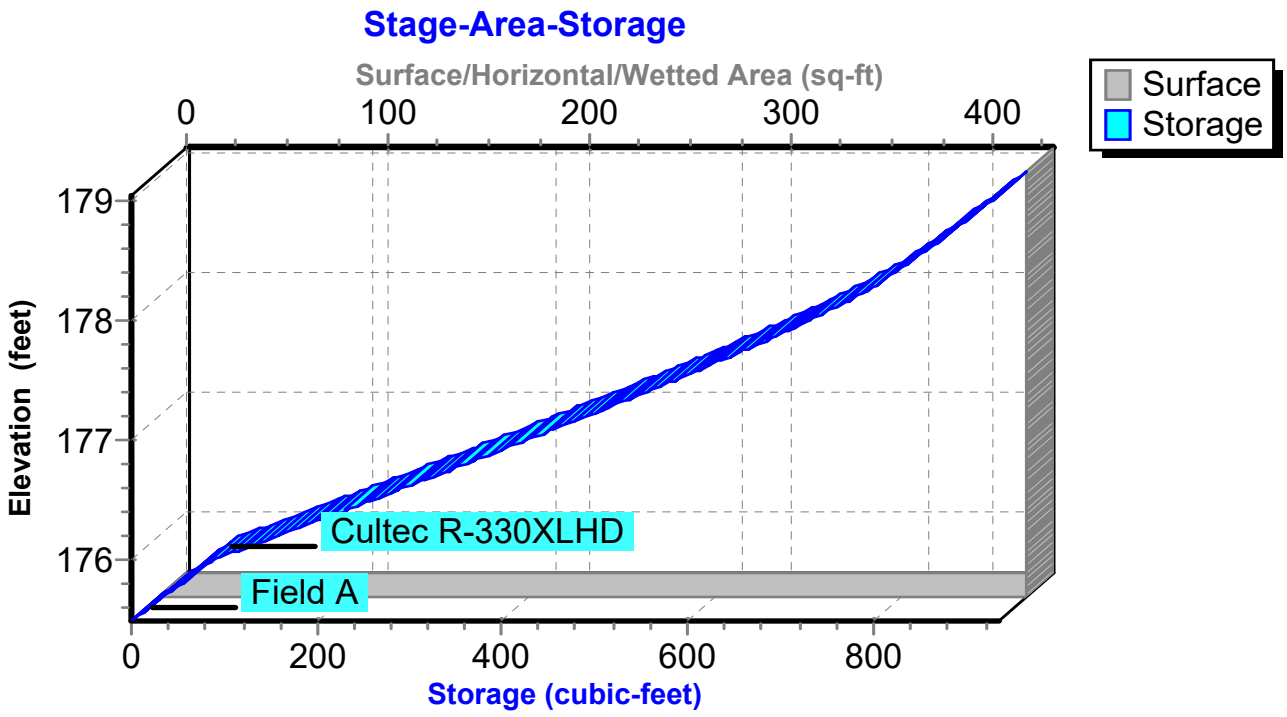


Pond 7P: RB#2

Stage-Discharge



Pond 7P: RB#2


Stage-Area-Storage
Surface/Horizontal/Wetted Area (sq-ft)
0
100
200
300
400
Surface
Storage
179
178
177
176
Elevation (feet)
Cultec R-330XLHD
Field A
0
200
400
600
800
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=9,447 sf 37.40% Impervious Runoff Depth=3.00"
Tc=6.0 min CN=64 Runoff=0.75 cfs 2,363 cf

Subcatchment SA#2: Subcat SA#2 Runoff Area=1,735 sf 8.10% Impervious Runoff Depth=1.15"
Tc=6.0 min CN=44 Runoff=0.04 cfs 167 cf

Subcatchment SA#25: Subcat SA#25 Runoff Area=5,186 sf 100.00% Impervious Runoff Depth=6.76"
Flow Length=70' Tc=6.4 min CN=98 Runoff=0.81 cfs 2,922 cf

Subcatchment SA#27: Subcat SA#27 Runoff Area=4,748 sf 94.85% Impervious Runoff Depth=6.41"
Tc=6.0 min CN=95 Runoff=0.74 cfs 2,535 cf

Subcatchment SA#3: Subcat SA#3 Runoff Area=39,520 sf 11.77% Impervious Runoff Depth=1.76"
Flow Length=240' Tc=12.9 min CN=51 Runoff=1.31 cfs 5,783 cf

Subcatchment SA#3A: Subcat SA#3A Runoff Area=6,684 sf 4.92% Impervious Runoff Depth=1.67"
Tc=6.0 min CN=50 Runoff=0.26 cfs 928 cf

Subcatchment SA#4: Subcat SA#4 Runoff Area=6,600 sf 0.00% Impervious Runoff Depth=1.07"
Tc=6.0 min CN=43 Runoff=0.13 cfs 591 cf

Subcatchment SA#6: Subcat SA#6 Runoff Area=11,721 sf 0.00% Impervious Runoff Depth=1.32"
Tc=6.0 min CN=46 Runoff=0.33 cfs 1,290 cf

Subcatchment SA#8: Subcat SA#8 Runoff Area=12,253 sf 2.44% Impervious Runoff Depth=1.15"
Tc=6.0 min CN=44 Runoff=0.27 cfs 1,179 cf

Pond 1P: RB#4 Peak Elev=179.44' Storage=841 cf Inflow=0.74 cfs 2,535 cf
Outflow=0.08 cfs 2,535 cf

Pond 2P: RB#3 Peak Elev=179.53' Storage=877 cf Inflow=0.81 cfs 2,922 cf
Outflow=0.10 cfs 2,922 cf

Pond 3P: RB#1 Peak Elev=179.29' Storage=1,890 cf Inflow=1.31 cfs 5,783 cf
Outflow=0.19 cfs 5,783 cf

Pond 7P: RB#2 Peak Elev=178.43' Storage=829 cf Inflow=0.75 cfs 2,363 cf
Outflow=0.08 cfs 2,363 cf

Total Runoff Area = 97,894 sf Runoff Volume = 17,758 cf Average Runoff Depth = 2.18"
80.96% Pervious = 79,252 sf 19.04% Impervious = 18,642 sf

Summary for Subcatchment SA#1: Subcat SA#1

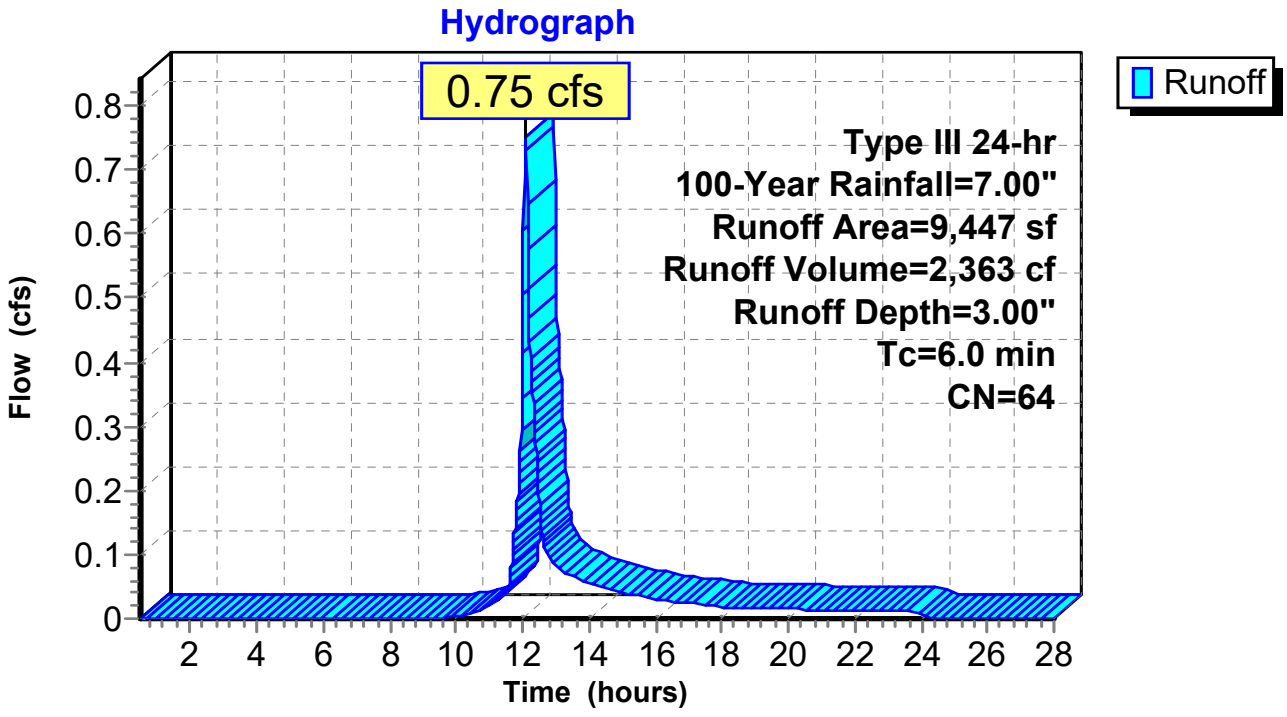
Runoff = 0.75 cfs @ 12.09 hrs, Volume= 2,363 cf, Depth= 3.00"

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 100-Year Rainfall=7.00"

Area (sf)	CN	Description
3,692	49	50-75% Grass cover, Fair, HSG A
3,246	98	Paved roads w/curbs & sewers, HSG A
288	98	Roofs, HSG A
2,222	36	Woods, Fair, HSG A
9,447	64	Weighted Average
5,914		62.60% Pervious Area
3,533		37.40% Impervious Area

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

Subcatchment SA#1: Subcat SA#1



Summary for Subcatchment SA#2: Subcat SA#2

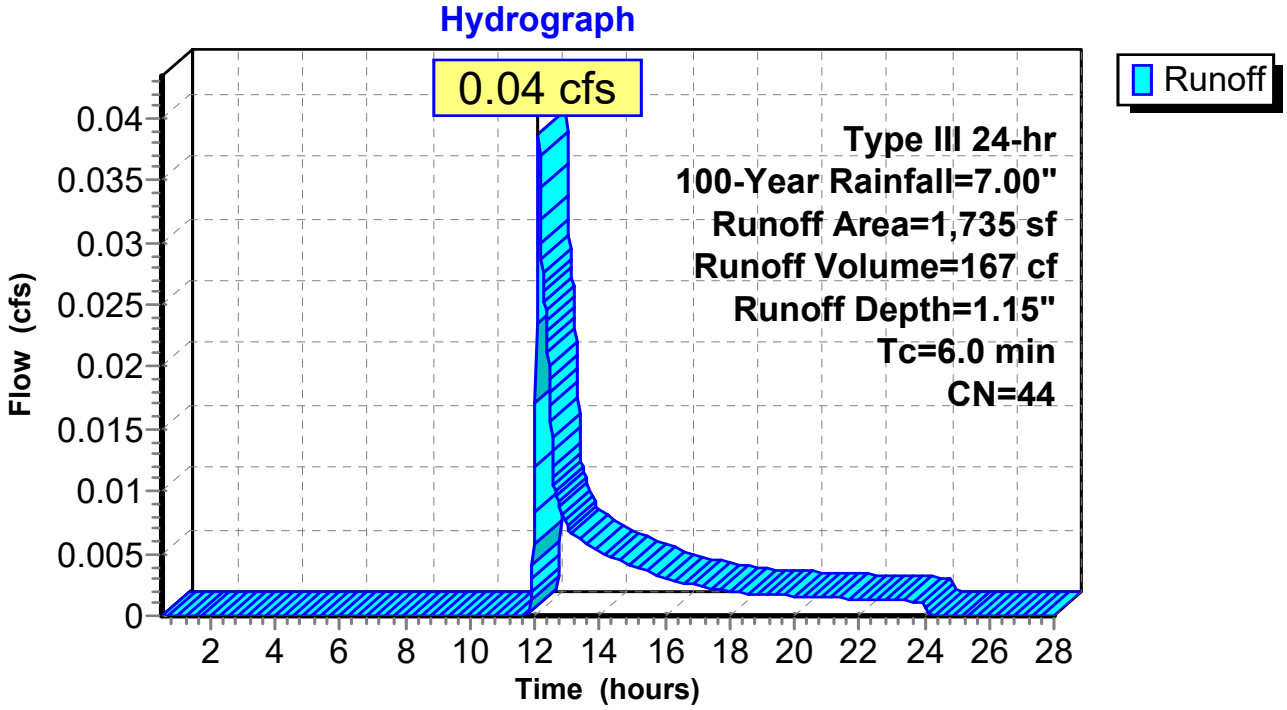
Runoff = 0.04 cfs @ 12.11 hrs, Volume= 167 cf, Depth= 1.15"

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=7.00"

Area (sf)	CN	Description
350	49	50-75% Grass cover, Fair, HSG A
141	98	Roofs, HSG A
1,244	36	Woods, Fair, HSG A
1,735	44	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
6.0					**Direct Entry,**

Subcatchment SA#2: Subcat SA#2



Summary for Subcatchment SA#25: Subcat SA#25

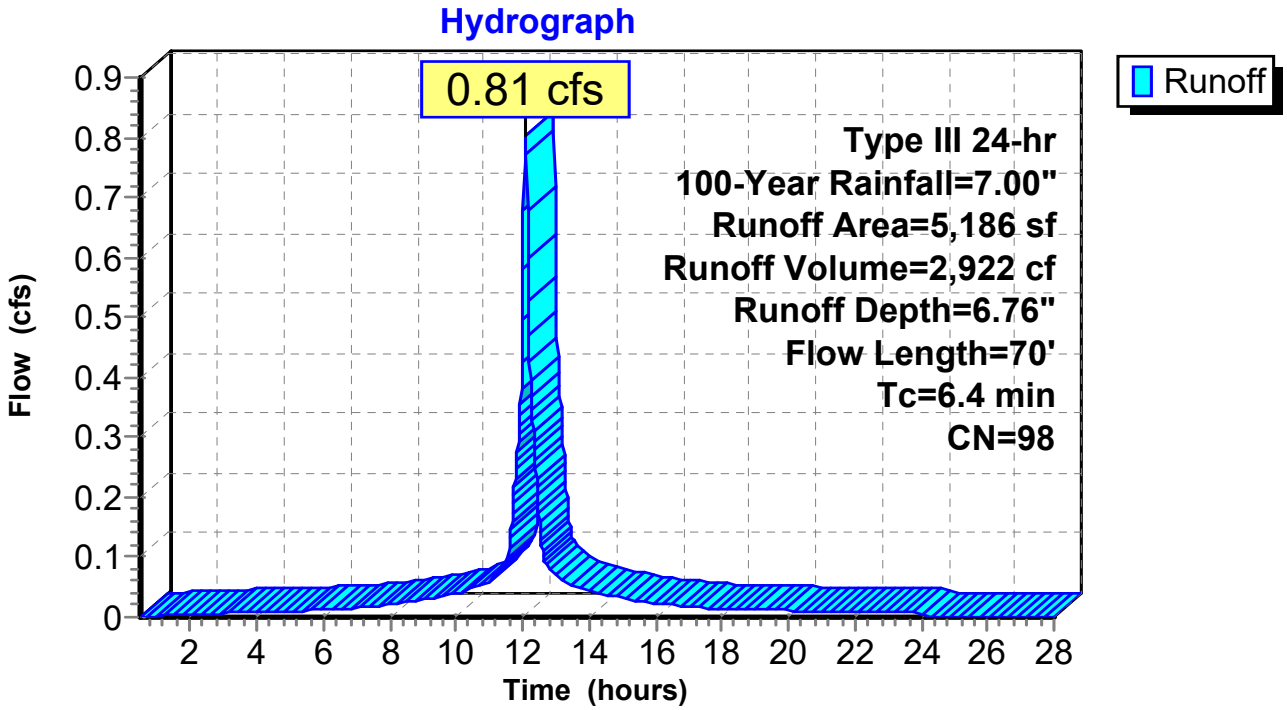
Runoff = 0.81 cfs @ 12.09 hrs, Volume= 2,922 cf, Depth= 6.76"

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=7.00"

Area (sf)	CN	Description
1,719	98	Paved roads w/curbs & sewers, HSG A
3,467	98	Roofs, HSG A
5,186	98	Weighted Average
5,186		100.00% 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#27: Subcat SA#27

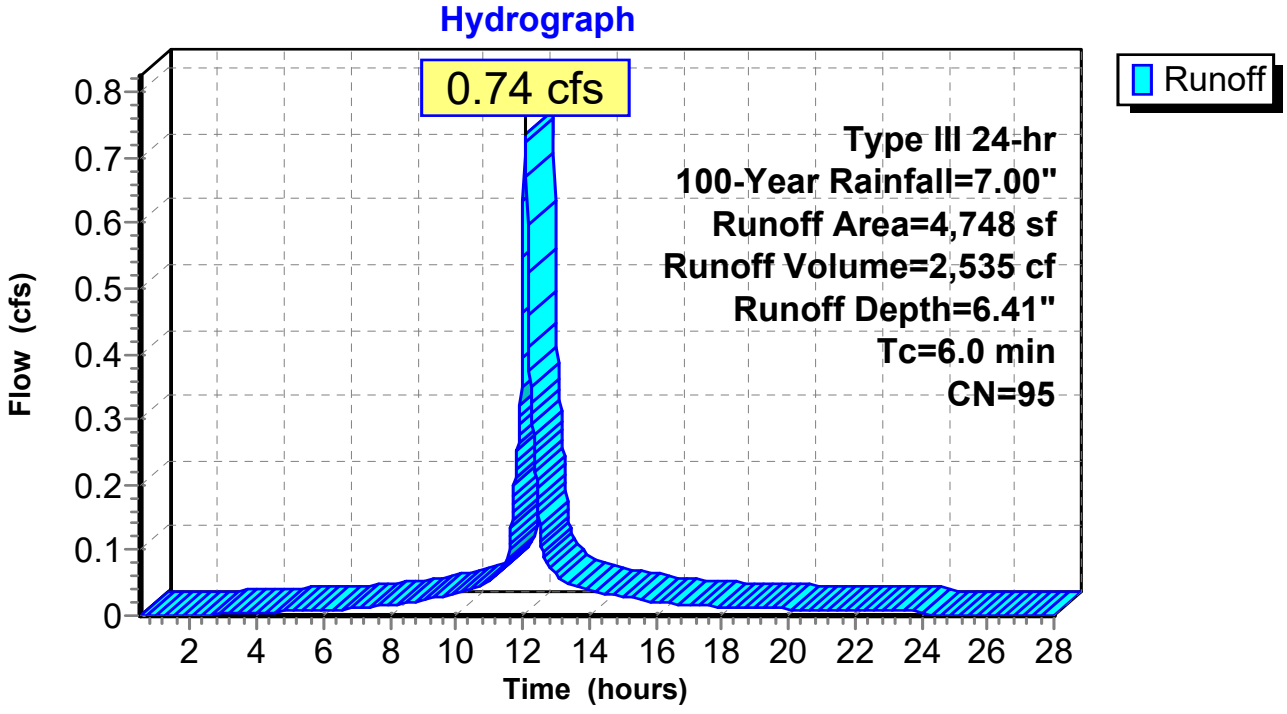
Runoff = 0.74 cfs @ 12.08 hrs, Volume= 2,535 cf, Depth= 6.41"

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=7.00"

Area (sf)	CN	Description
155	49	50-75% Grass cover, Fair, HSG A
1,470	98	Paved roads w/curbs & sewers, HSG A
3,034	98	Roofs, HSG A
89	36	Woods, Fair, HSG A
4,748	95	Weighted Average
245		5.15% Pervious Area
4,504		94.85% 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#3: Subcat SA#3

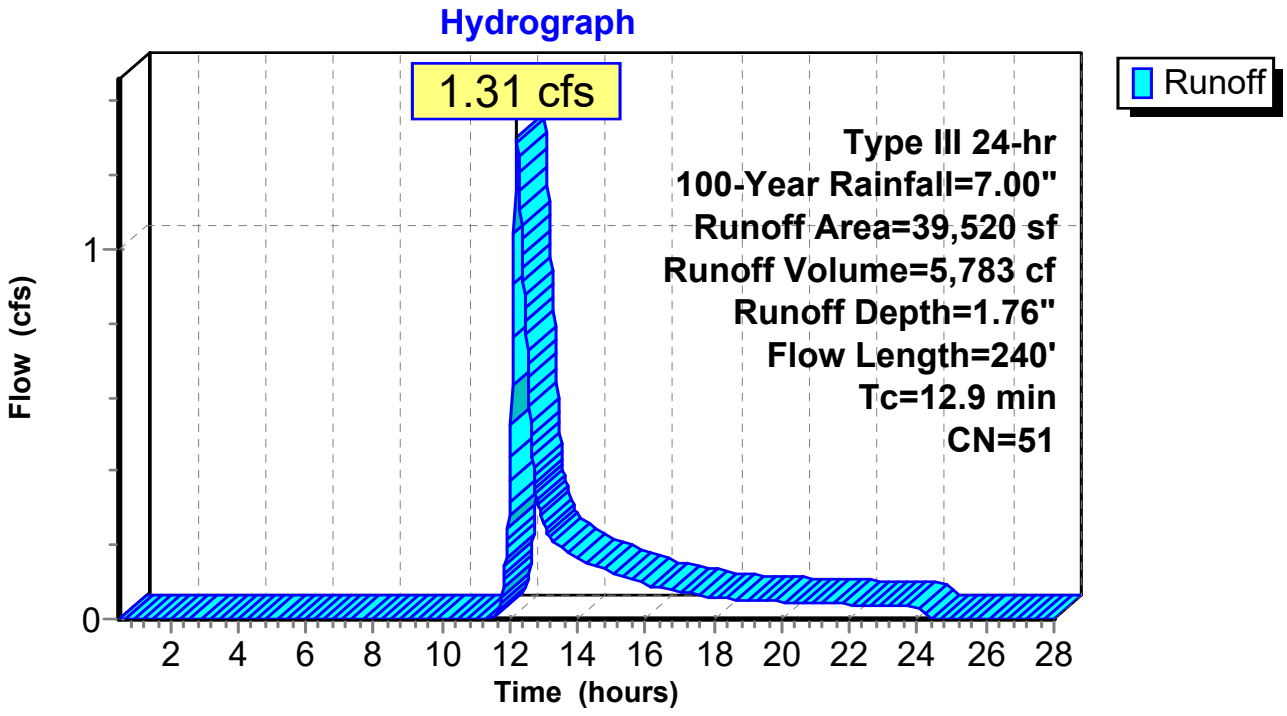
Runoff = 1.31 cfs @ 12.20 hrs, Volume= 5,783 cf, Depth= 1.76"

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=7.00"

Area (sf)	CN	Description
22,441	49	50-75% Grass cover, Fair, HSG A
4,652	98	Paved roads w/curbs & sewers, HSG A
12,426	36	Woods, Fair, HSG A
39,520	51	Weighted Average
34,868		88.23% Pervious Area
4,652		11.77% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.1	50	0.0240	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
1.8	190	0.0120	1.76		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
12.9	240	Total			

Subcatchment SA#3: Subcat SA#3



Summary for Subcatchment SA#3A: Subcat SA#3A

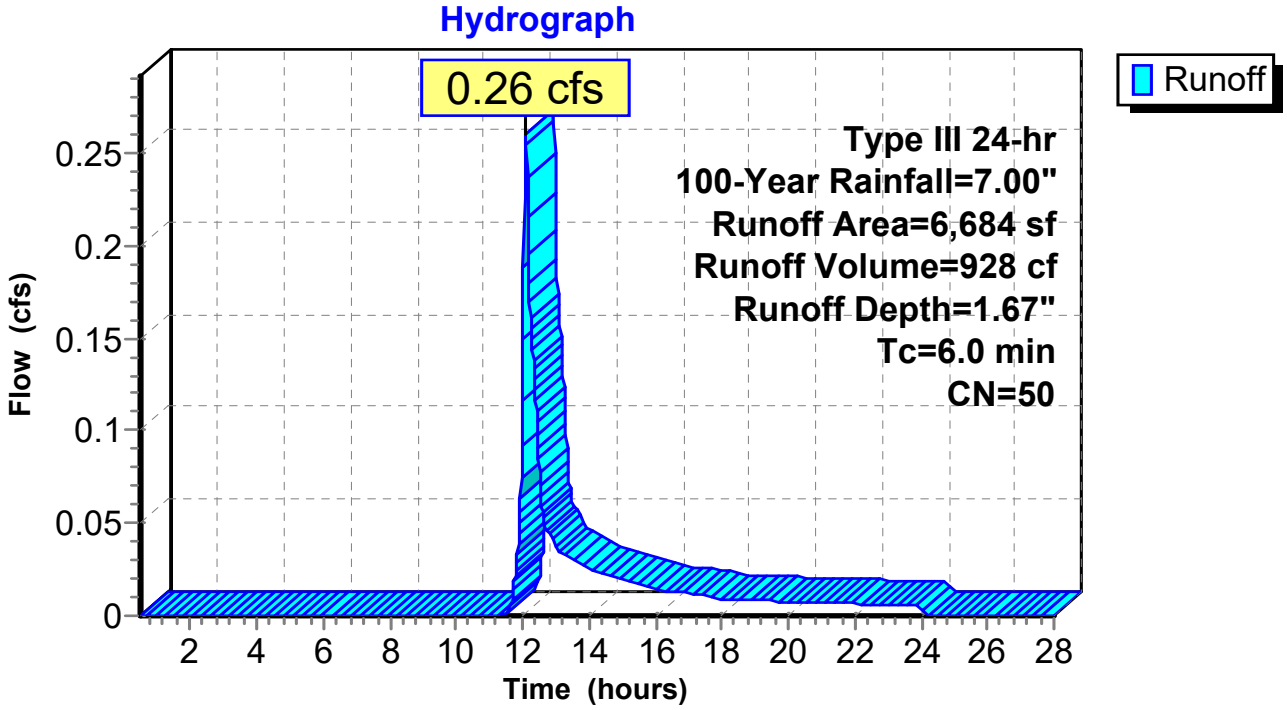
Runoff = 0.26 cfs @ 12.10 hrs, Volume= 928 cf, Depth= 1.67"

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 100-Year Rainfall=7.00"

Area (sf)	CN	Description
5,678	49	50-75% Grass cover, Fair, HSG A
329	98	Roofs, HSG A
678	36	Woods, Fair, HSG A
6,684	50	Weighted Average
6,356		95.08% Pervious Area
329		4.92% Impervious Area

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

Subcatchment SA#3A: Subcat SA#3A



Summary for Subcatchment SA#4: Subcat SA#4

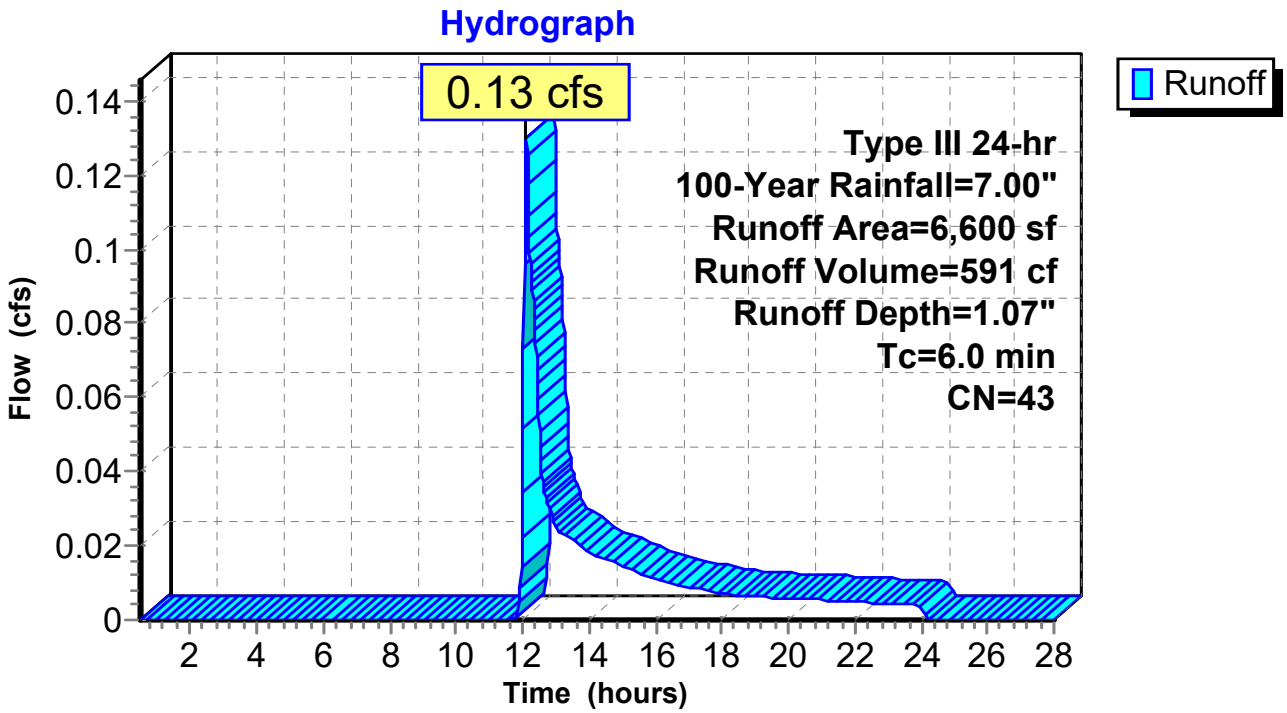
Runoff = 0.13 cfs @ 12.12 hrs, Volume= 591 cf, Depth= 1.07"

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 100-Year Rainfall=7.00"

Area (sf)	CN	Description
3,773	49	50-75% Grass cover, Fair, HSG A
2,827	36	Woods, Fair, HSG A
6,600	43	Weighted Average
6,600		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#6: Subcat SA#6

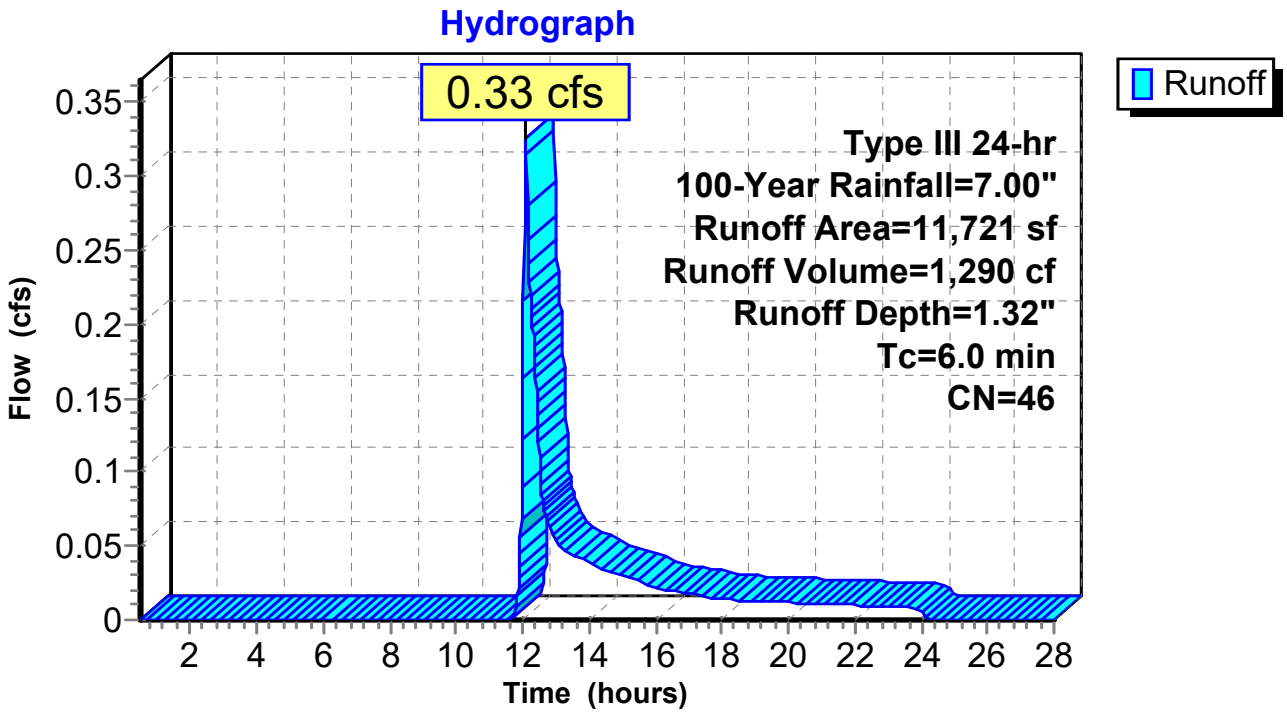
Runoff = 0.33 cfs @ 12.11 hrs, Volume= 1,290 cf, Depth= 1.32"

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=7.00"

Area (sf)	CN	Description
9,325	49	50-75% Grass cover, Fair, HSG A
2,397	36	Woods, Fair, HSG A
11,721	46	Weighted Average
11,721		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

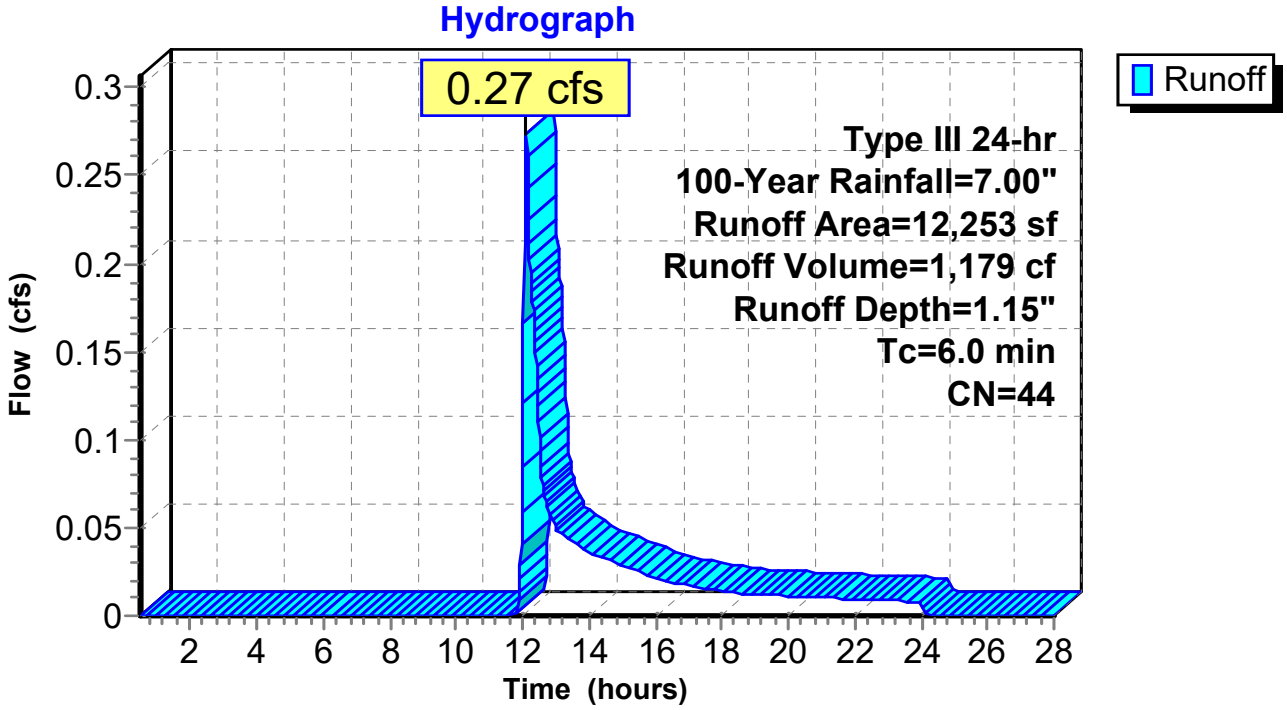
Runoff = 0.27 cfs @ 12.11 hrs, Volume= 1,179 cf, Depth= 1.15"

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=7.00"

Area (sf)	CN	Description
6,131	49	50-75% Grass cover, Fair, HSG A
299	98	Paved roads w/curbs & sewers, HSG A
5,823	36	Woods, Fair, HSG A
12,253	44	Weighted Average
11,954		97.56% Pervious Area
299		2.44% Impervious 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 = 4,748 sf, 94.85% Impervious, Inflow Depth = 6.41" for 100-Year event
Inflow = 0.74 cfs @ 12.08 hrs, Volume= 2,535 cf
Outflow = 0.08 cfs @ 11.44 hrs, Volume= 2,535 cf, Atten= 90%, Lag= 0.0 min
Discarded = 0.08 cfs @ 11.44 hrs, Volume= 2,535 cf

Routing by Stor-Ind method, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Peak Elev= 179.44' @ 12.82 hrs Surf.Area= 392 sf Storage= 841 cf

Plug-Flow detention time= 74.9 min calculated for 2,533 cf (100% of inflow)
Center-of-Mass det. time= 74.9 min (834.9 - 760.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	176.00'	354 cf	**16.00'W x 24.50'L x 3.54'H Field A** 1,388 cf Overall - 503 cf Embedded = 885 cf x 40.0% Voids
#2A	176.50'	503 cf	**Cultec R-330XLHD** x 9 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
		857 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=0.08 cfs @ 11.44 hrs HW=176.04' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.08 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 3 rows

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

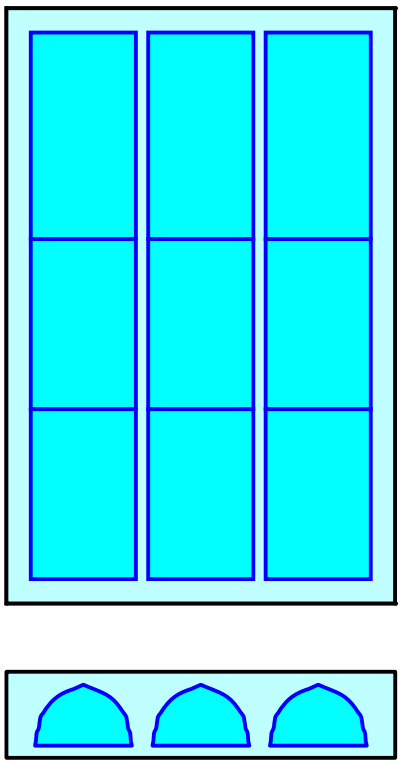
3 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 22.50' Row Length +12.0" End Stone x 2 = 24.50' Base Length
3 Rows x 52.0" Wide + 6.0" Spacing x 2 + 12.0" Side Stone x 2 = 16.00' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

9 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 3 Rows = 502.9 cf Chamber Storage

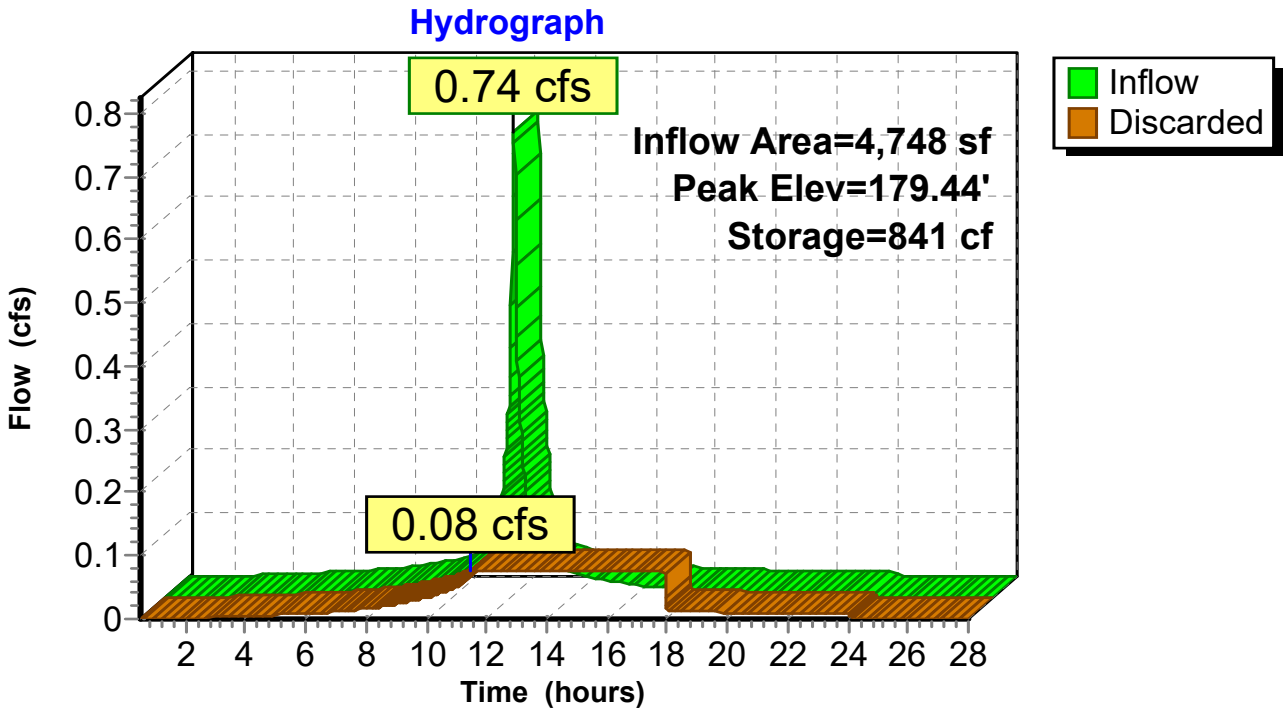
1,388.3 cf Field - 502.9 cf Chambers = 885.4 cf Stone x 40.0% Voids = 354.2 cf Stone Storage

Chamber Storage + Stone Storage = 857.1 cf = 0.020 af
Overall Storage Efficiency = 61.7%
Overall System Size = 24.50' x 16.00' x 3.54'

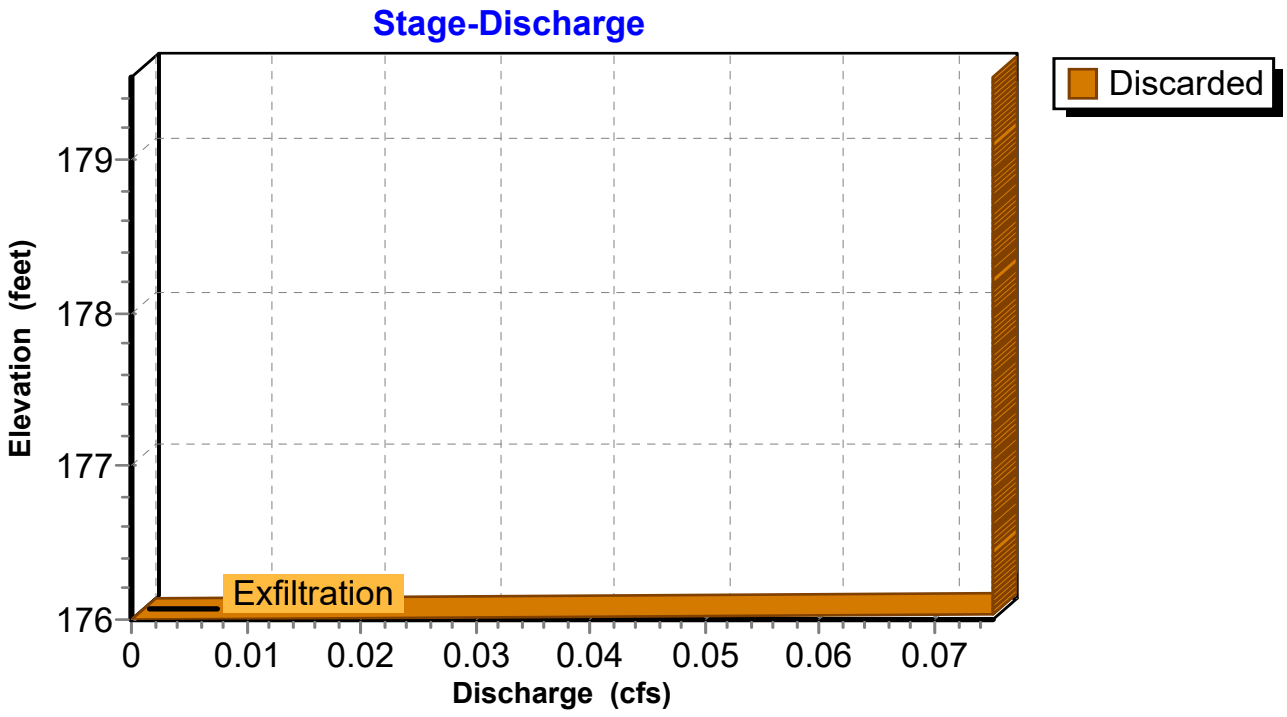
9 Chambers @ $ 300.00 /ea = $ 2,700.00
51.4 cy Field Excavation @ $ 10.00 /cy = $ 514.20
32.8 cy Stone @ $ 30.00 /cy = $ 983.77
Total Cost = $ 4,197.97



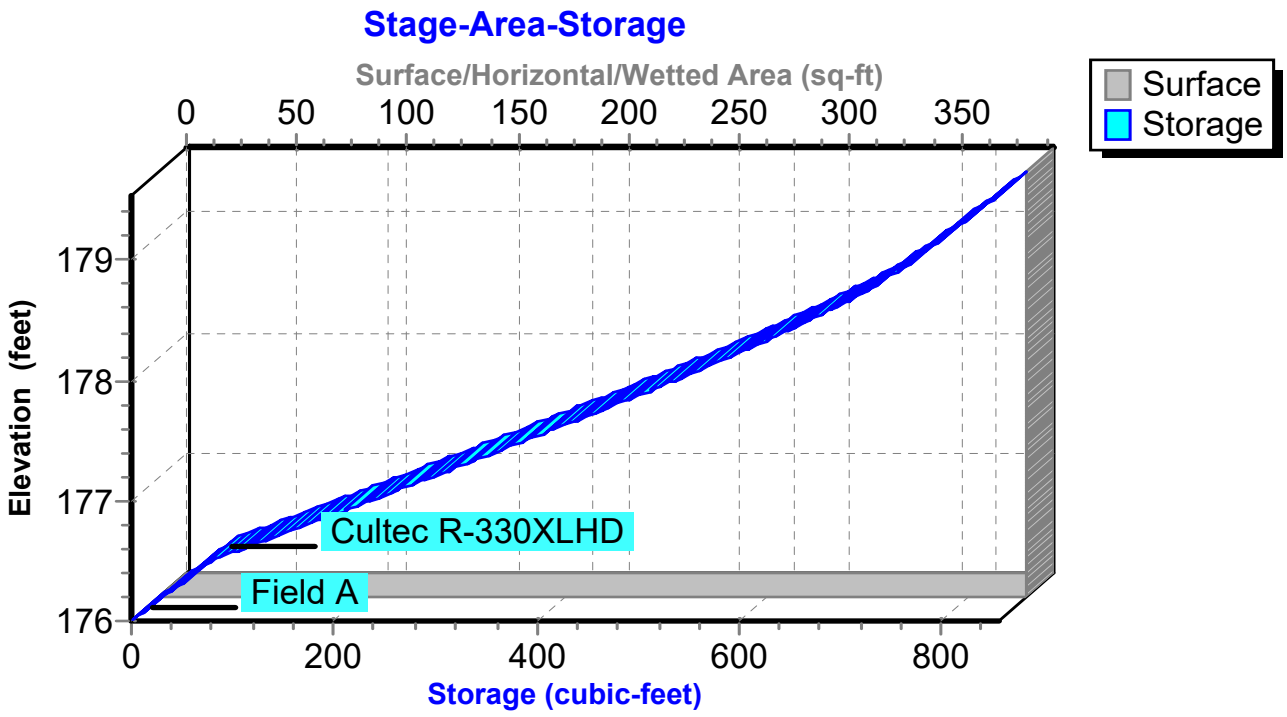
Pond 1P: RB#4



Pond 1P: RB#4



Pond 1P: RB#4


Stage-Area-Storage
Surface/Horizontal/Wetted Area (sq-ft)
0
50
100
150
200
250
300
350
Surface
Storage
179
178
177
176
Elevation (feet)
Cultec R-330XLHD
Field A
0
200
400
600
800
Storage (cubic-feet)

Summary for Pond 2P: RB#3

Inflow Area = 5,186 sf,100.00% Impervious, Inflow Depth = 6.76" for 100-Year event
Inflow = 0.81 cfs @ 12.09 hrs, Volume= 2,922 cf
Outflow = 0.10 cfs @ 11.58 hrs, Volume= 2,922 cf, Atten= 88%, Lag= 0.0 min
Discarded = 0.10 cfs @ 11.58 hrs, Volume= 2,922 cf

Routing by Stor-Ind method, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Peak Elev= 179.53' @ 12.67 hrs Surf.Area= 504 sf Storage= 877 cf

Plug-Flow detention time= 55.1 min calculated for 2,920 cf (100% of inflow)
Center-of-Mass det. time= 55.1 min (798.4 - 743.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	177.00'	450 cf	**16.00'W x 31.50'L x 3.54'H Field A** 1,785 cf Overall - 659 cf Embedded = 1,126 cf x 40.0% Voids
#2A	177.50'	659 cf	**Cultec R-330XLHD** x 12 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
		1,110 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=0.10 cfs @ 11.58 hrs HW=177.04' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.10 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 3 rows

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

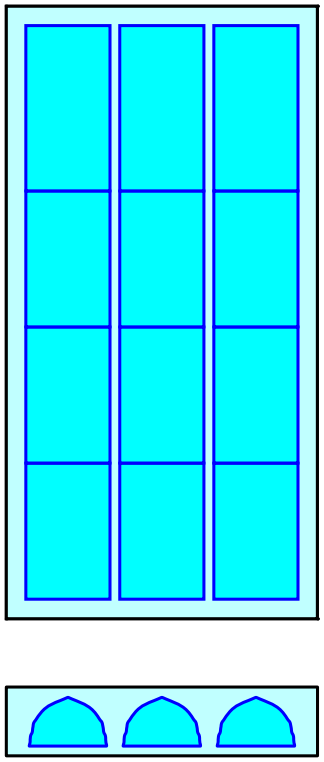
4 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 29.50' Row Length +12.0" End Stone x 2 = 31.50' Base Length
3 Rows x 52.0" Wide + 6.0" Spacing x 2 + 12.0" Side Stone x 2 = 16.00' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

12 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 3 Rows = 659.4 cf Chamber Storage

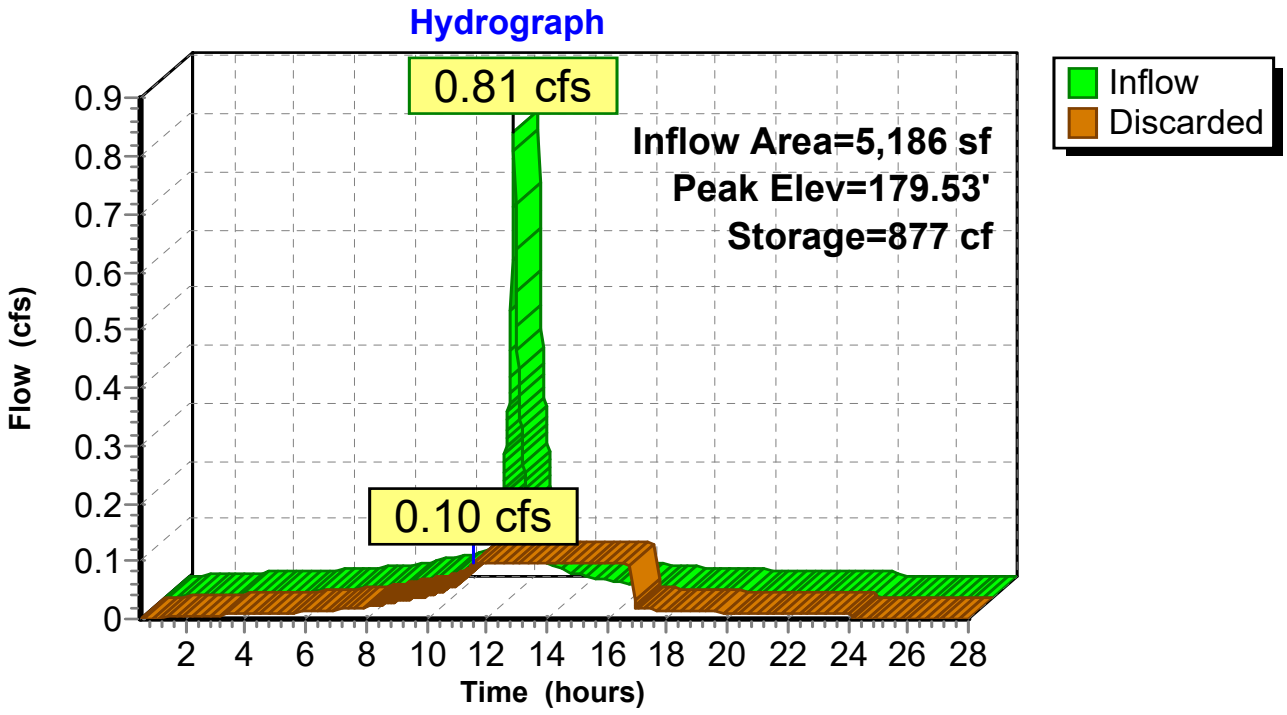
1,785.0 cf Field - 659.4 cf Chambers = 1,125.6 cf Stone x 40.0% Voids = 450.2 cf Stone Storage

Chamber Storage + Stone Storage = 1,109.6 cf = 0.025 af
Overall Storage Efficiency = 62.2%
Overall System Size = 31.50' x 16.00' x 3.54'

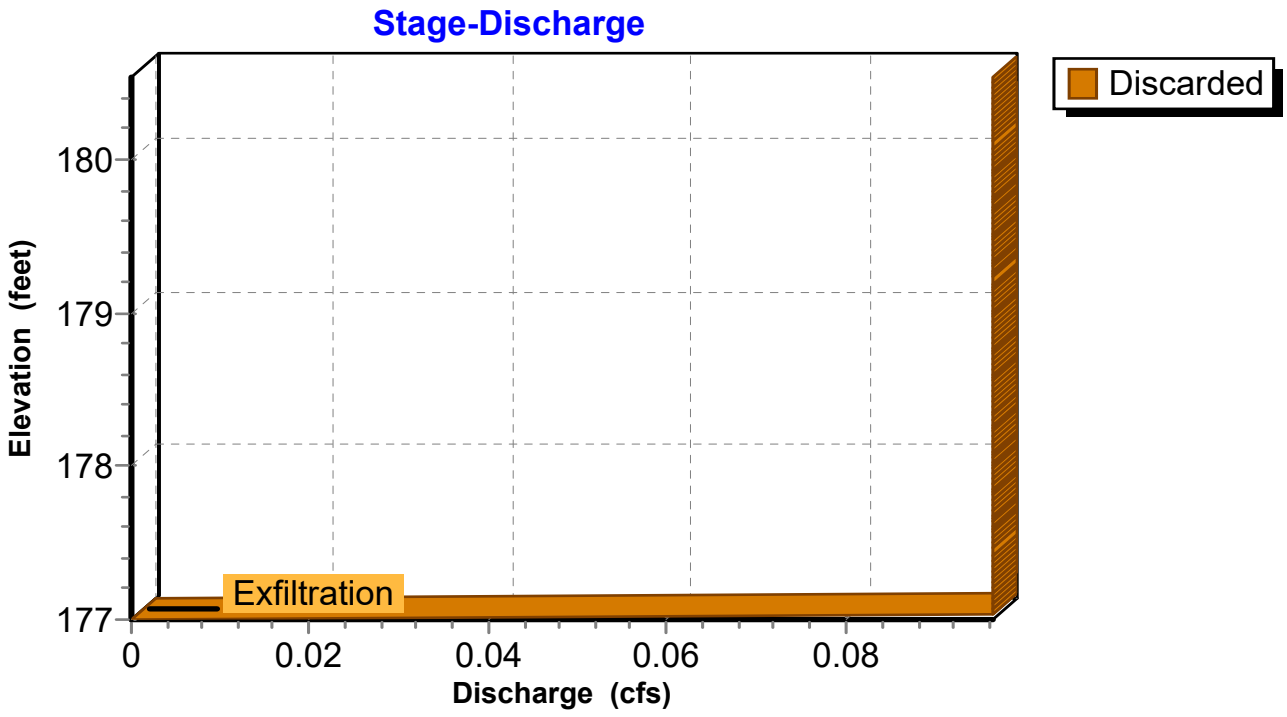
12 Chambers @ $ 300.00 /ea = $ 3,600.00
66.1 cy Field Excavation @ $ 10.00 /cy = $ 661.11
41.7 cy Stone @ $ 30.00 /cy = $ 1,250.65
Total Cost = $ 5,511.76



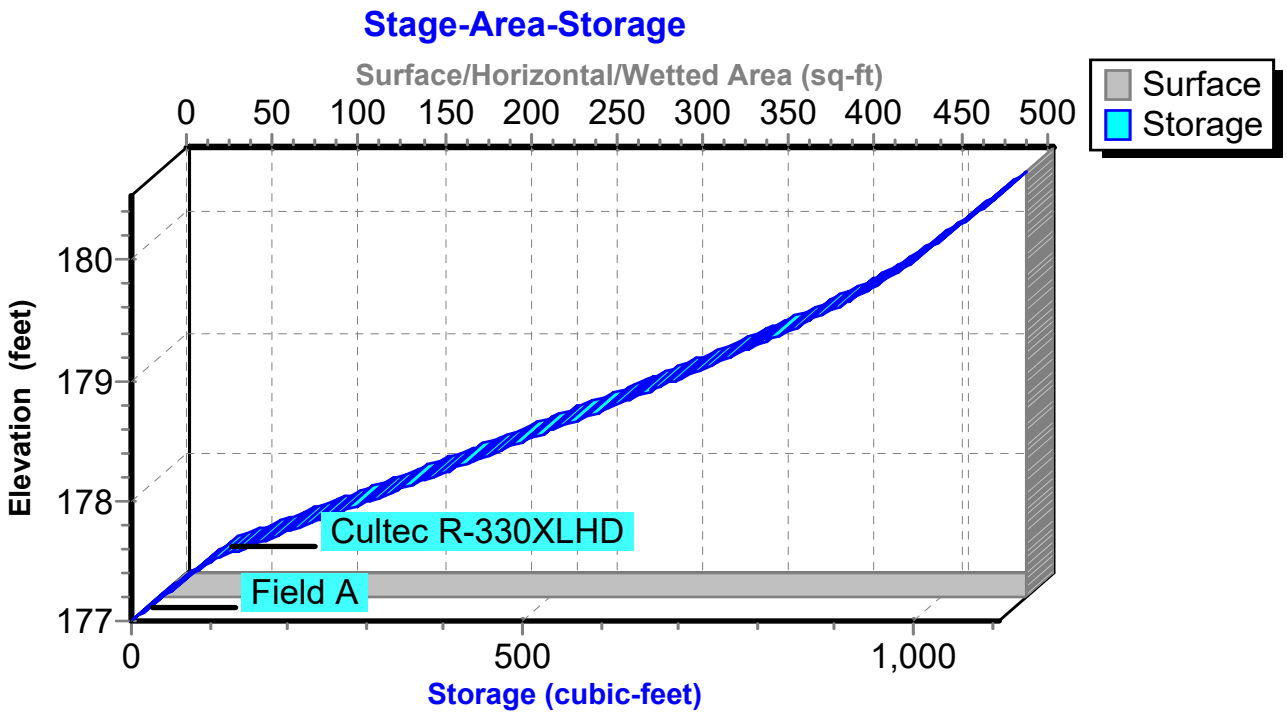
Pond 2P: RB#3



Pond 2P: RB#3



Pond 2P: RB#3


Stage-Area-Storage
Surface/Horizontal/Wetted Area (sq-ft)
0
50
100
150
200
250
300
350
400
450
500
Surface
Storage
Elevation (feet)
180
179
178
177
Cultec R-330XLHD
Field A
0
500
1,000
Storage (cubic-feet)

Summary for Pond 3P: RB#1

Inflow Area = 39,520 sf, 11.77% Impervious, Inflow Depth = 1.76" for 100-Year event
Inflow = 1.31 cfs @ 12.20 hrs, Volume= 5,783 cf
Outflow = 0.19 cfs @ 11.92 hrs, Volume= 5,783 cf, Atten= 86%, Lag= 0.0 min
Discarded = 0.19 cfs @ 11.92 hrs, Volume= 5,783 cf

Routing by Stor-Ind method, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Peak Elev= 179.29' @ 13.62 hrs Surf.Area= 977 sf Storage= 1,890 cf

Plug-Flow detention time= 94.1 min calculated for 5,783 cf (100% of inflow)
Center-of-Mass det. time= 94.1 min (978.1 - 884.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	176.40'	875 cf	**11.17'W x 87.50'L x 3.54'H Field A** 3,461 cf Overall - 1,274 cf Embedded = 2,186 cf x 40.0% Voids
#2A	176.90'	1,274 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 2 rows
		2,149 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	176.40'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.19 cfs @ 11.92 hrs HW=176.44' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.19 cfs)

Pond 3P: 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 2 rows

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

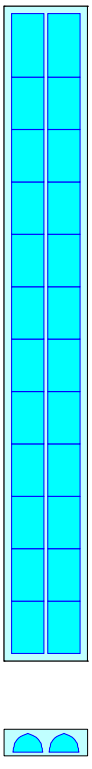
12 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 85.50' Row Length +12.0" End Stone x 2 = 87.50' Base Length
2 Rows x 52.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 11.17' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

24 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 2 Rows = 1,274.1 cf Chamber Storage

3,460.5 cf Field - 1,274.1 cf Chambers = 2,186.4 cf Stone x 40.0% Voids = 874.6 cf Stone Storage

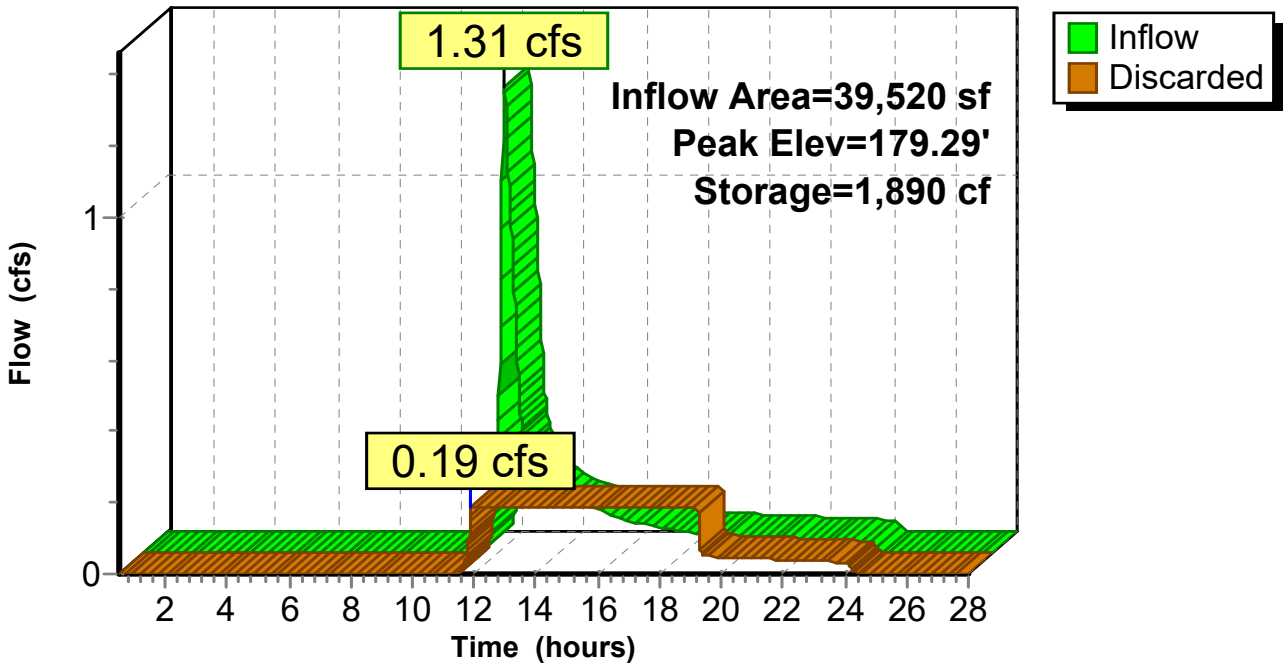
Chamber Storage + Stone Storage = 2,148.7 cf = 0.049 af
Overall Storage Efficiency = 62.1%
Overall System Size = 87.50' x 11.17' x 3.54'

24 Chambers @ $ 300.00 /ea = $ 7,200.00
128.2 cy Field Excavation @ $ 10.00 /cy = $ 1,281.67
81.0 cy Stone @ $ 30.00 /cy = $ 2,429.31
Total Cost = $ 10,910.98



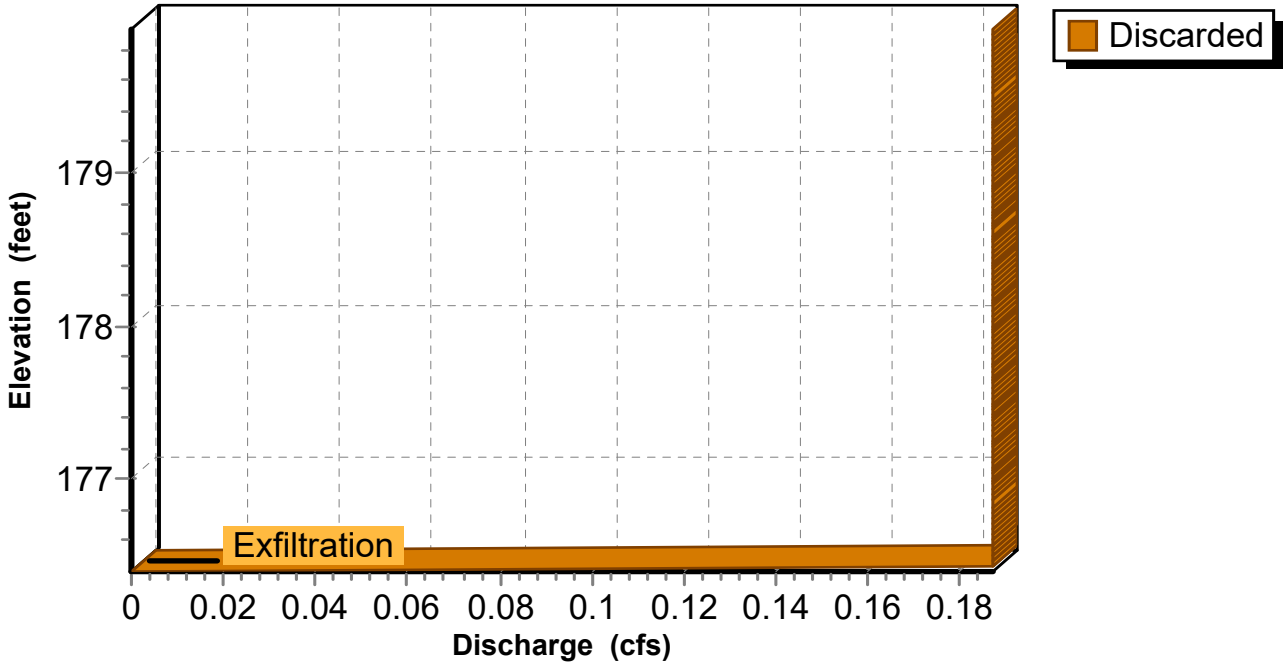
Pond 3P: RB#1

Hydrograph

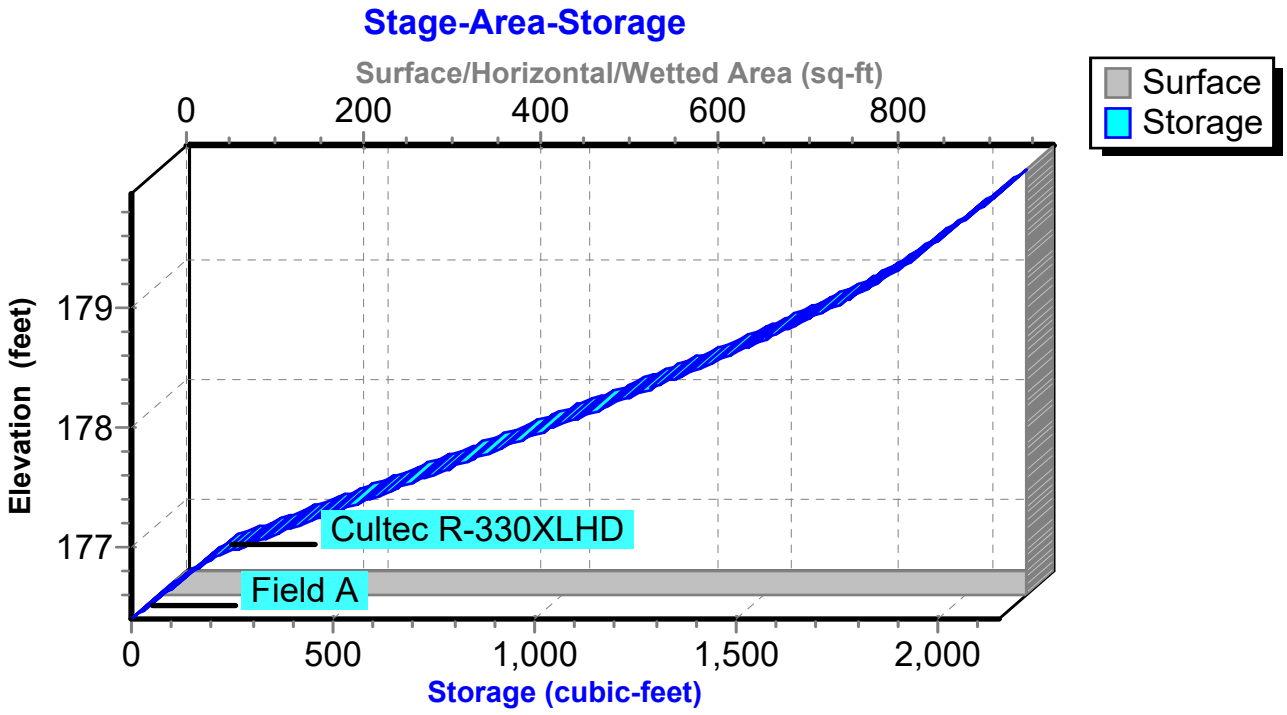


Pond 3P: RB#1

Stage-Discharge



Pond 3P: RB#1


Stage-Area-Storage
Surface/Horizontal/Wetted Area (sq-ft)
0
200
400
600
800
Surface
Storage
Elevation (feet)
179
178
177
Cultec R-330XLHD
Field A
0
500
1,000
1,500
2,000
Storage (cubic-feet)

Summary for Pond 7P: RB#2

Inflow Area = 9,447 sf, 37.40% Impervious, Inflow Depth = 3.00" for 100-Year event
Inflow = 0.75 cfs @ 12.09 hrs, Volume= 2,363 cf
Outflow = 0.08 cfs @ 11.70 hrs, Volume= 2,363 cf, Atten= 89%, Lag= 0.0 min
Discarded = 0.08 cfs @ 11.70 hrs, Volume= 2,363 cf

Routing by Stor-Ind method, Time Span= 0.50-28.00 hrs, dt= 0.02 hrs
Peak Elev= 178.43' @ 13.01 hrs Surf.Area= 430 sf Storage= 829 cf

Plug-Flow detention time= 84.9 min calculated for 2,361 cf (100% of inflow)
Center-of-Mass det. time= 84.8 min (929.1 - 844.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	175.50'	391 cf	**11.17'W x 38.50'L x 3.54'H Field A** 1,523 cf Overall - 544 cf Embedded = 979 cf x 40.0% Voids
#2A	176.00'	544 cf	**Cultec R-330XLHD** x 10 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
		935 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	175.50'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.08 cfs @ 11.70 hrs HW=175.54' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.08 cfs)

Pond 7P: 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 2 rows

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

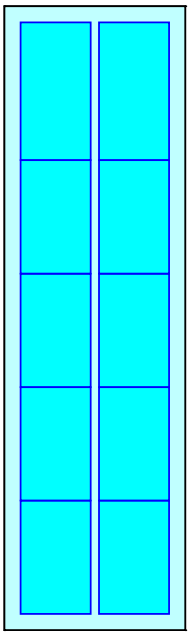
5 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 36.50' Row Length +12.0" End Stone x 2 = 38.50' Base Length
2 Rows x 52.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 11.17' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

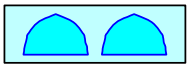
10 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 2 Rows = 543.9 cf Chamber Storage

1,522.6 cf Field - 543.9 cf Chambers = 978.7 cf Stone x 40.0% Voids = 391.5 cf Stone Storage

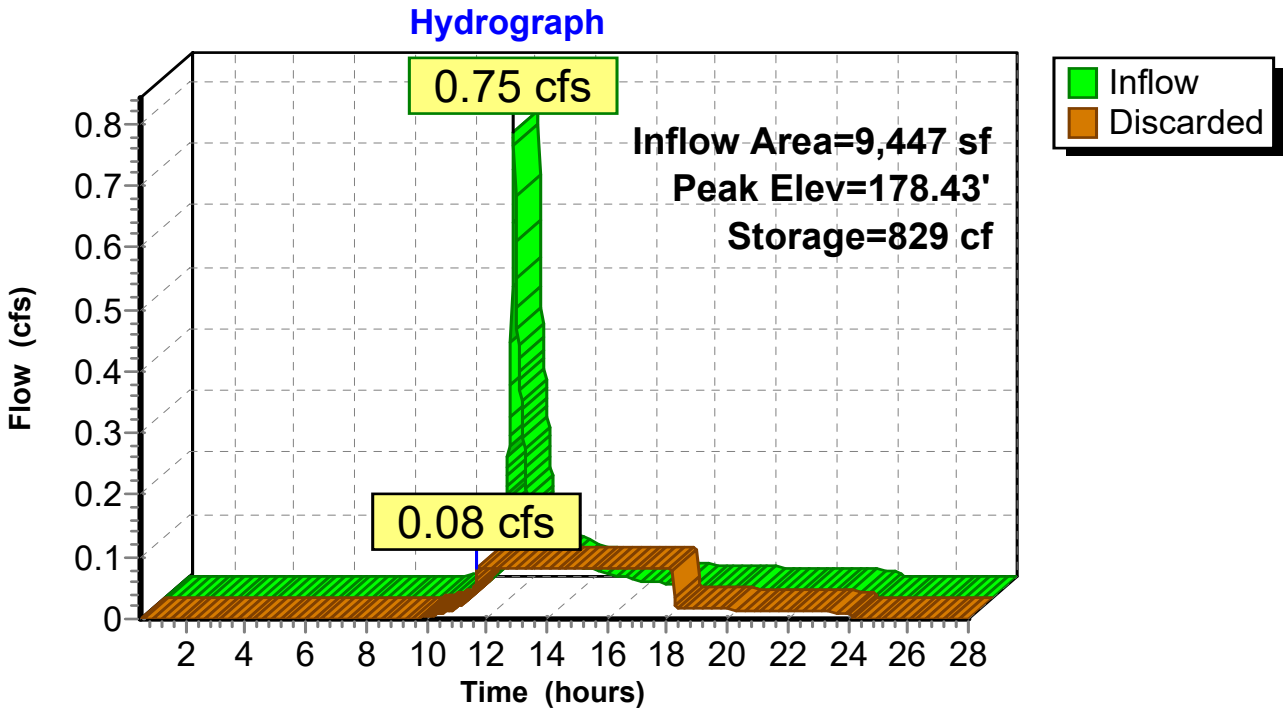
Chamber Storage + Stone Storage = 935.4 cf = 0.021 af
Overall Storage Efficiency = 61.4%
Overall System Size = 38.50' x 11.17' x 3.54'

10 Chambers @ $ 300.00 /ea = $ 3,000.00
56.4 cy Field Excavation @ $ 10.00 /cy = $ 563.93
36.2 cy Stone @ $ 30.00 /cy = $ 1,087.44
Total Cost = $ 4,651.38

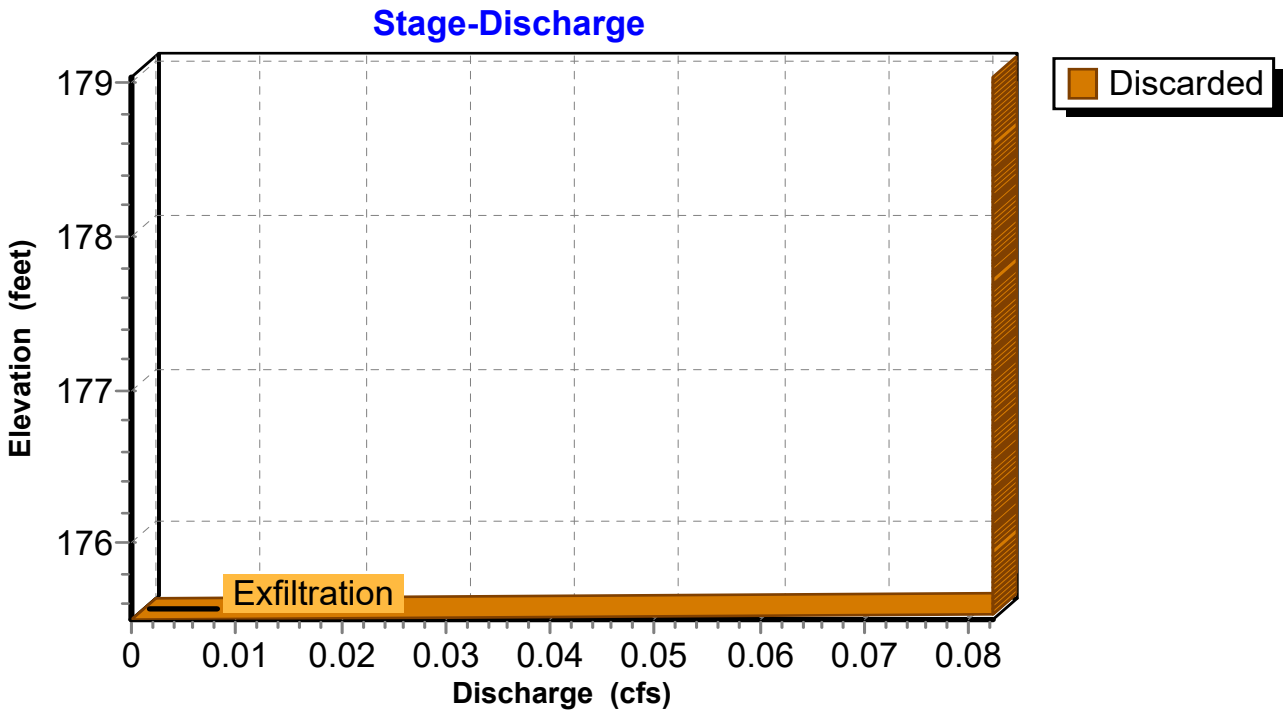




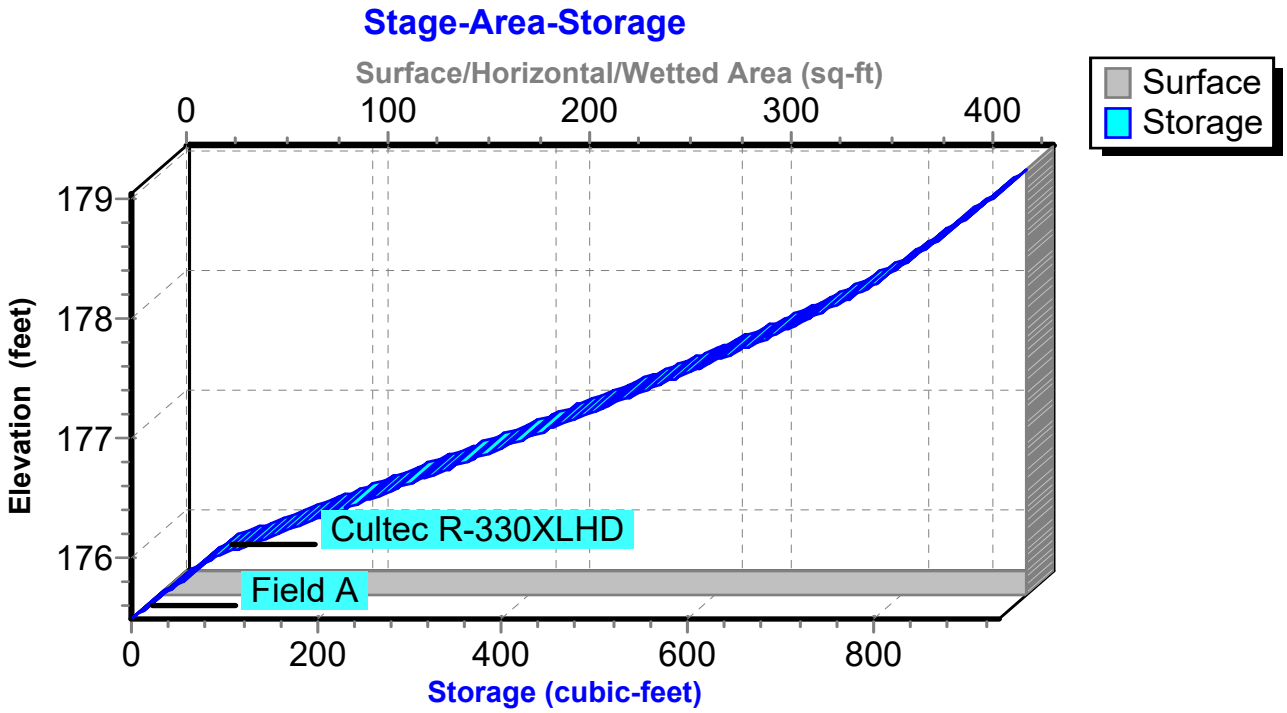
Pond 7P: RB#2



Pond 7P: RB#2



Pond 7P: RB#2

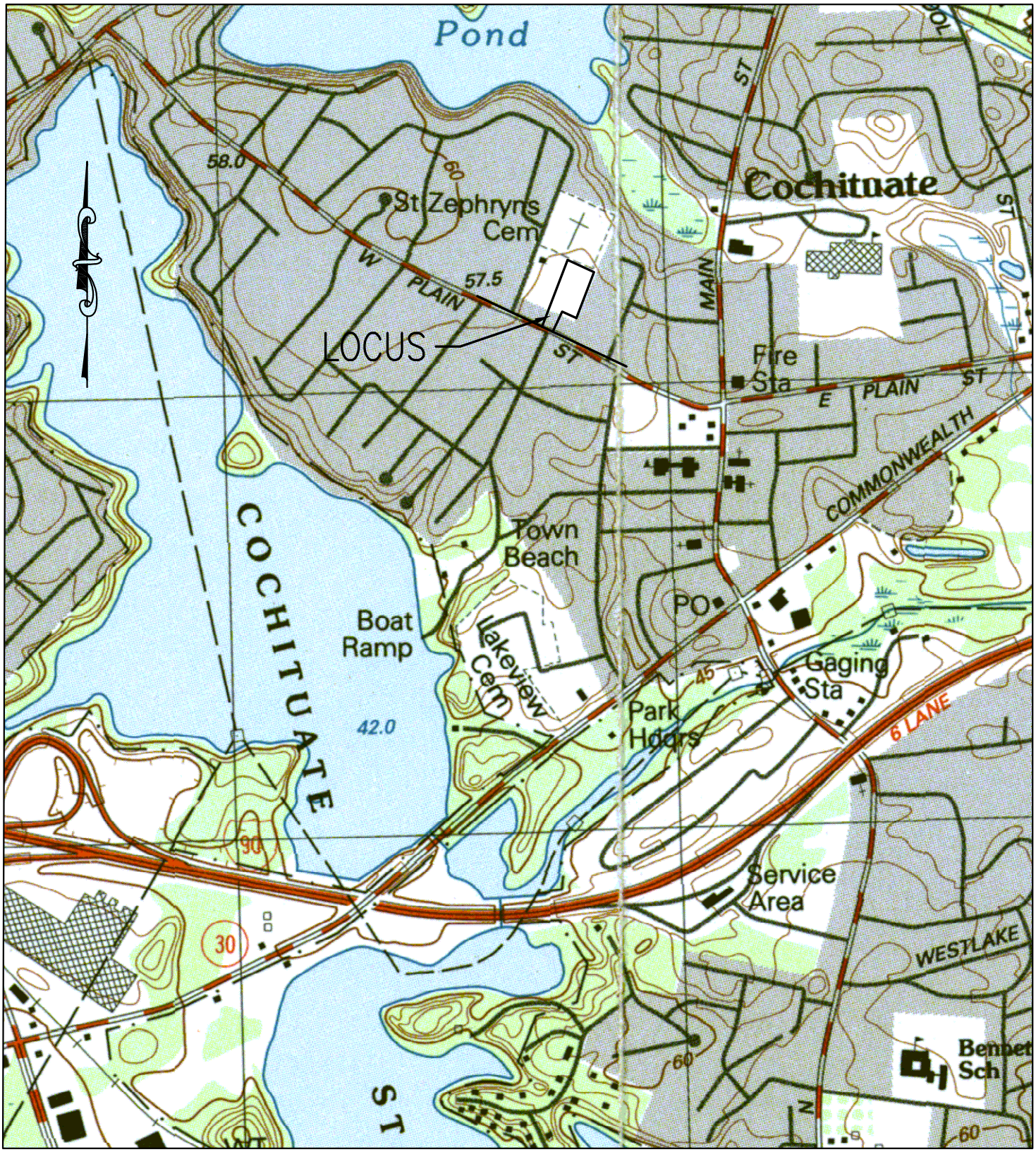

Stage-Area-Storage
Surface/Horizontal/Wetted Area (sq-ft)
0
100
200
300
400
Surface
Storage
179
178
177
176
Elevation (feet)
Cultec R-330XLHD
Field A
0
200
400
600
800
Storage (cubic-feet)

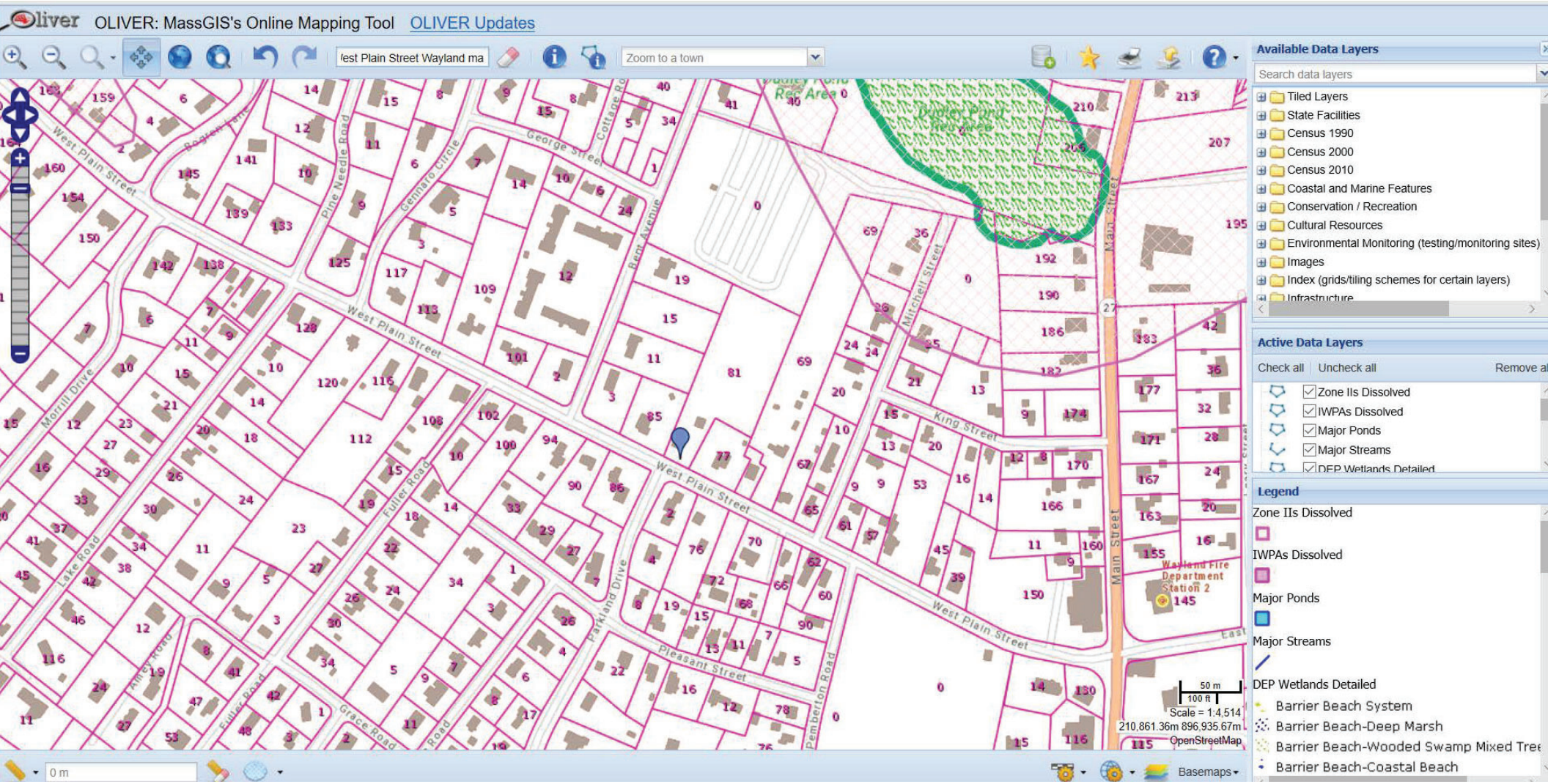
Section III

Figures

LOCUS MAP

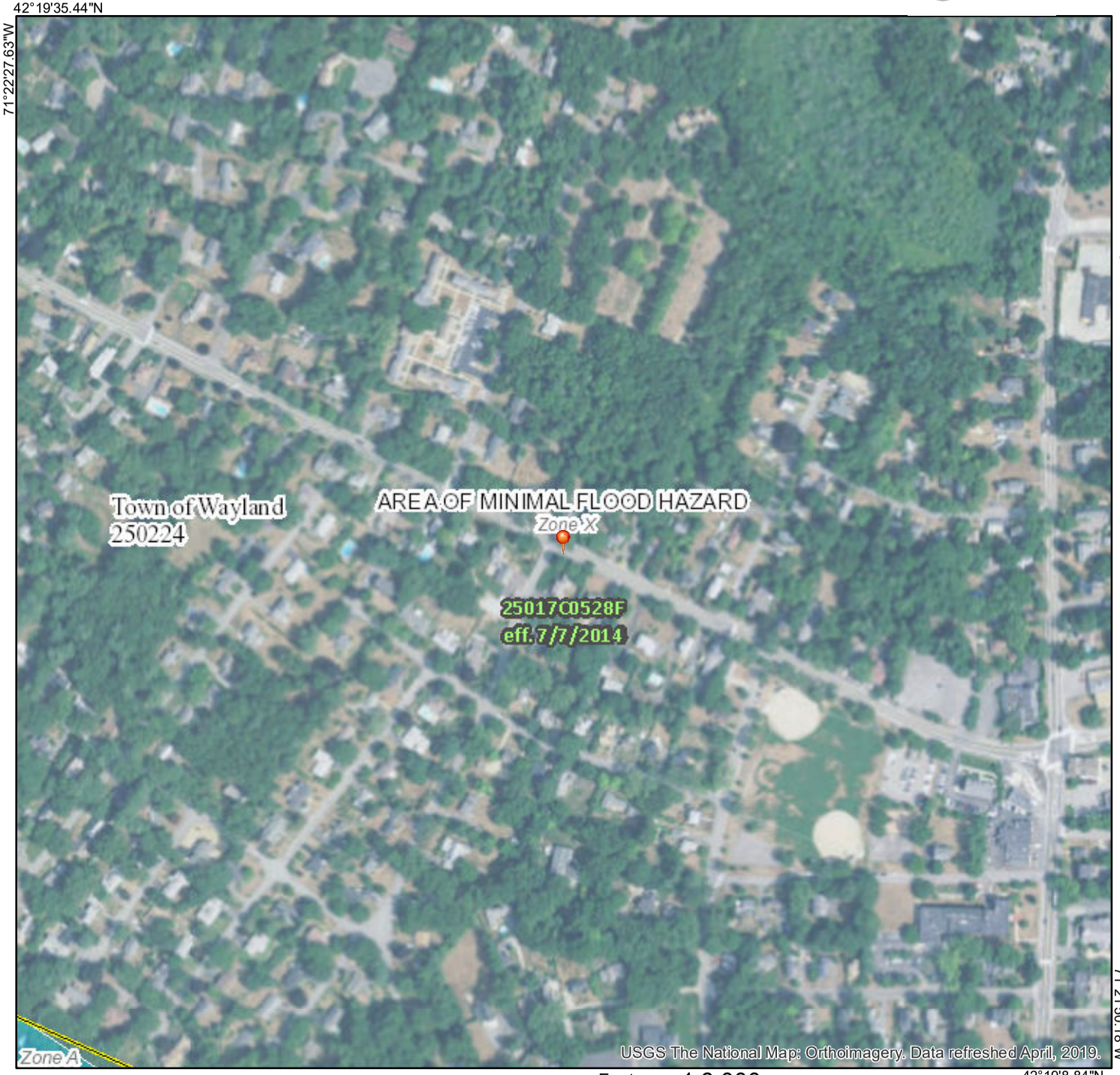
81 WEST PLAIN STREET, WAYLAND




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)
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
Main Street
King Street
Pleasant Street
Mitchell Street
Parkland Drive
Pemberton Road
Fuller Road
Morrill Drive
Lake Road
Pine Needle Road
Gennaro Circle
George Street
Cottage Road
Rena Avenue
Roger Drive
Grace Road
Wayland Fire Department Station 2
Scale = 1:4,514
210,861.36m 896,935.67m
OpenStreetMap
Basemaps

National Flood Hazard Layer FIRMette

FEMA



0 250 500 1,000 1,500 2,000 Feet

1:6,000

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
- 513 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.

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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Contents

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.

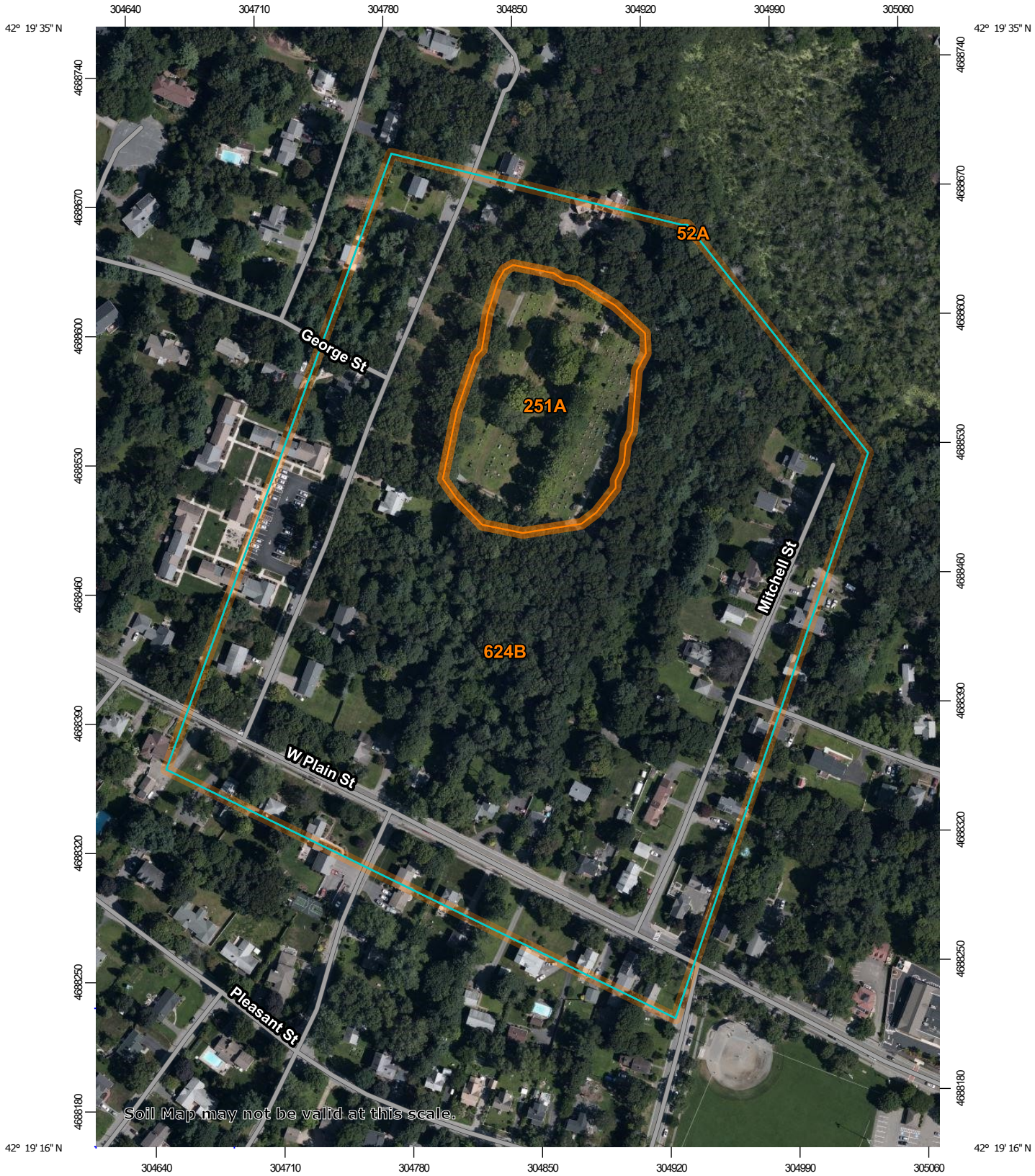
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

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)	4652	0.9	4186.8
A (grass)	22441	0.5	11220.5
A (trees)	12426	0.2	2485.2
A_{Total}	39519	0.45	17893

C=	0.45	
A=	39,519	(square feet)
A=	0.91	(acres)
i_{25}	5.94	(25 yr-24hr)
i_{100}	7.32	(100 yr-24hr)

Q_{25}=	2.44	cfs
Q_{100}=	3.01	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=	0.122	ft/ft
A= ∏ r^2	0.349	sf

Q = 1.486 /(0.013) (0.349) (0.166666666666667 ^2/3) (0.

Q=	4.23	cfs

Pipe Capacity

RB#2

Q=CiA

A (pavement)	3246	0.9	2921.4
A (grass)	3692	0.5	1846
A (trees)	2222	0.2	444.4
A_{Total}	9160	0.57	5212

C=	0.57	
A=	9,160	(square feet)
A=	0.21	(acres)
i_{25}	6.09	(25 yr-5min)
i_{100}	7.32	(100 yr-5min)

Q_{25}=	0.73	cfs
Q_{100}=	0.88	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=	0.020	ft/ft
A= $\prod r^2$	0.349	sf

Q = 1.486 /(0.013) (0.349) (0.166666666666667 ^2/3) (0.

Q=	1.71	cfs

Pipe Capacity

RB#3

Q=CiA

A (pavement)	1719	0.9	1547.1
A (grass)	0	0.5	0
A (trees)	0	0.2	0
A_{Total}	1719	0.90	1547

C=	0.90	
A=	1,719	(square feet)
A=	0.04	(acres)
i_{25}	6.09	(25 yr-5min)
i_{100}	7.32	(100 yr-5min)
Q_{25}=	0.22	cfs
Q_{100}=	0.26	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=	0.052	ft/ft
A= $\prod r^2$	0.196	sf

Q = 1.486 /(0.013) (0.196) (0.125 ^2/3) (0.052 ^1/2)

Q=	1.28	cfs

Pipe Capacity

RB#4

Q=CiA

A (pavement)	1470	0.9	1323
A (grass)	155	0.5	77.5
A (trees)	89	0.2	17.8
A_{Total}	1714	0.83	1418

C=	0.83	
A=	1,714	(square feet)
A=	0.04	(acres)
i_{25}	6.09	(25 yr-5min)
i_{100}	7.32	(100 yr-5min)

Q_{25}=	0.20	cfs
Q_{100}=	0.24	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=	0.076	ft/ft
A= $\prod r^2$	0.196	sf

Q = 1.486 /(0.013) (0.196) (0.125 ^2/3) (0.076 ^1/2)

Q=	1.55	cfs

Section V

Operation & Maintenance

OPERATION AND MAINTENANCE PLAN
PROPOSED DRAINAGE SYSTEM – DURING CONSTRUCTION
81 West Plain Street
Wayland, MA 01778

Owner:

Silver Leaf Homes
30 West Main Street
Hopkinton, MA 01748
Contact: XXXXXXXX (xxx) xxx-xxxx

Party Responsible for Operation and Maintenance:

Silver Leaf Homes
30 West Main Street
Hopkinton, MA 01748
Contact: XXXXXXXX (xxx) xxx-xxxx

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, where needed, 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 or on the top of the chamber systems after backfill.

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: 05/09/20

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.							
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:

Silver Leaf Homes
30 West Main Street
Hopkinton, MA 01748
Contact: XXXXXXXX (xxx) xxx-xxxx

Party Responsible for Operation and Maintenance:

Silver Leaf Homes
30 West Main Street
Hopkinton, MA 01748
Contact: XXXXXXXX (xxx) xxx-xxxx

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:	$1,500 - $4,000

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: 05/09/20

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							
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**