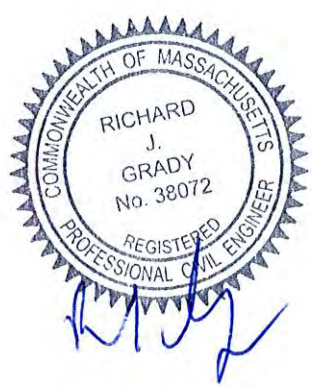
GC GRADY CONSULTING, L.L.C.

Civil Engineers ♦ Land Surveyors ♦ Landscape Architects

STORMWATER REPORT

Proposed Paving and Drainage Improvements
108 Bodwell Street
Avon, Massachusetts



Prepared for:

CJ Shaughnessy Realty LLC
520 Bodwell Street Ext.
Avon, MA 02322

September 14, 2023

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SUMMARY

This Stormwater Report has been prepared to document compliance with Stormwater Management Standards. The applicant is proposing to pave approximately 60,400 sf. of the existing site that portion is currently gravel and install stormwater manage systems.

The proposed drainage system consists of subsurface infiltrations systems to attenuate runoff from the proposed paved areas.

The design as proposed reduces peak runoff rates, improves and promotes infiltration, improves stormwater quality and treatment.

This analysis is divided into the following sections:

Section I   Compliance with Massachusetts Stormwater Management Regulations
Section II   Overall Site Analysis
Section III   Operation and Maintenance Plan

Pre Development -
Catchment (Subcat 1E) consists of existing stormwater runoff to the southwesterly wetland.

Catchment (Subcat 2E) consists of existing stormwater runoff to the Westerly wetland and property line.

Post Development -
Catchment (Subcat 1P) consists of proposed stormwater runoff to the southwesterly wetland.

Catchment (Subcat 2P) consists of proposed stormwater runoff to the Westerly wetland and property line.

Catchment (Subcat 3P) consists of proposed stormwater runoff from proposed pavement to the infiltration system. (10P).

Catchment (Subcat 4P) consists of proposed stormwater runoff from existing roof to the infiltration system. (9P).

Catchment (Subcat 5P) consists of proposed stormwater runoff from proposed pavement to the infiltration system. (7P).

Catchment (Subcat 6P) consists of proposed stormwater runoff from proposed pavement to the infiltration system. (8P).

(11L) consists of the combined proposed stormwater runoff to the southerly wetland to compare to (1E)

(12L) consists of the combined proposed stormwater runoff to the westerly wetland and property line to compare to (2E)

The calculations have been performed for the 2, 10, 25, and 100-year 24 hour storm event, using HydroCAD 10.00 Stormwater Modeling computer program. This computer program is based upon the TR-55 computer models and uses the SCS Curvilinear Unit rainfall distribution. The closed drainage system calculation were performed using the HydroCAD Stormwater Modeling program.

SUMMARY OF STORMWATER FLOWS
(cfs)

Events for Subcatchment 1E: To Southerly Wetland

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2-Year	3.31	1.71	5,360	1.49
10-Year	4.95	3.31	10,270	2.85
25-Year	6.23	4.61	14,379	3.99
100-Year	**8.86**	**7.32**	**23,195**	**6.44**

Events for Subcatchment 2E: To Westerly Wetland/Proper

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2-Year	3.31	3.84	11,942	2.01
10-Year	4.95	6.62	20,888	3.52
25-Year	6.23	8.79	28,112	4.74
100-Year	**8.86**	**13.21**	**43,251**	**7.29**

Events for Subcatchment 1P: To Southerly Wetland

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2-Year	3.31	0.09	530	0.38
10-Year	4.95	0.44	1,588	1.14
25-Year	6.23	0.80	2,647	1.90
100-Year	**8.86**	**1.66**	**5,219**	**3.74**

Events for Subcatchment 5P: Pavement to Infiltration Syst

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2-Year	3.31	1.06	3,384	2.55
10-Year	4.95	1.67	5,503	4.15
25-Year	6.23	2.15	7,176	5.41
100-Year	**8.86**	**3.11**	**10,634**	**8.01**

Events for Subcatchment 6P: Pavement to Infiltration Syst

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2-Year	3.31	0.65	2,197	2.96
10-Year	4.95	0.98	3,406	4.59
25-Year	6.23	1.24	4,351	5.87
100-Year	**8.86**	**1.77**	**6,296**	**8.49**

Events for Subcatchment 2P: To Westerly Wetland

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2-Year	3.31	0.04	339	0.31
10-Year	4.95	0.29	1,093	1.01
25-Year	6.23	0.55	1,867	1.73
100-Year	**8.86**	**1.19**	**3,777**	**3.50**

Events for Subcatchment 4P: Roof to Infiltration System

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2-Year	3.31	1.44	5,015	3.07
10-Year	4.95	2.17	7,682	4.71
25-Year	6.23	2.74	9,766	5.99
100-Year	**8.86**	**3.91**	**14,050**	**8.61**

Events for Subcatchment 3P: Pavement to Infiltration Syst

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2-Year	3.31	2.94	10,235	3.07
10-Year	4.95	4.43	15,677	4.71
25-Year	6.23	5.59	19,929	5.99
100-Year	**8.86**	**7.97**	**28,671**	**8.61**

Events for Link 11L: To Southerly Wetland

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)
2-Year	0.09	0.09	**0.00**
10-Year	1.42	1.42	0.00
25-Year	4.13	4.13	0.00
100-Year	**7.25**	**7.25**	0.00

Events for Link 12L: To Westerly Wetland

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)
2-Year	3.78	3.78	**0.00**
10-Year	6.58	6.58	0.00
25-Year	8.37	8.37	0.00
100-Year	**12.23**	**12.23**	0.00

Events for Pond 7P: Crushed Stone Trench WQ and Galleys System #1

Event	Inflow (cfs)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)	Elevation (feet)	Storage (cubic-feet)
2-Year	1.06	0.03	**0.03**	0.00	238.56	2,217
10-Year	1.67	1.14	0.03	1.12	239.02	2,360
25-Year	2.15	**3.38**	0.03	**3.35**	**239.04**	**2,363**
100-Year	**3.11**	3.24	0.03	3.21	239.04	2,362

Events for Pond 8P: Crushed Stone Trench WQ and Galleys System #2

Event	Inflow (cfs)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)	Elevation (feet)	Storage (cubic-feet)
2-Year	0.65	0.03	**0.03**	0.00	231.29	1,180
10-Year	0.98	0.03	0.03	0.00	232.74	2,094
25-Year	1.24	0.33	0.03	0.30	233.01	2,262
100-Year	**1.77**	**2.72**	0.03	**2.70**	**233.04**	**2,272**

Events for Pond 10P: Crushed Stone Trench WQ and Galleys System #3

Event	Inflow (cfs)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)	Elevation (feet)	Storage (cubic-feet)
2-Year	4.29	3.81	**0.07**	3.73	233.03	6,351
10-Year	6.37	6.37	0.07	6.30	233.04	6,375
25-Year	7.89	7.89	0.07	7.82	233.05	6,389
100-Year	**11.10**	**11.11**	0.07	**11.03**	**233.07**	**6,418**

Section I

Compliance with Massachusetts Stormwater Management Regulations

STANDARD 1. NO NEW STORMWATER CONVEYANCES

The proposed redevelopment proposes no new stormwater conveyances that discharge untreated stormwater off-site or cause down gradient erosion. The proposed redevelopment proposes to pave the existing gravel area located on the southwesterly side of the property. Currently the there is no stormwater treatment for the roof runoff from the existing building or the gravel area. The proposed redevelopment includes a subsurface infiltration systems.

STANDARD 2. PEAK RATE ATTENUATION

The overall site analysis demonstrates that the stormwater management system has been designed so that the post-development peak discharge rates do not exceed the pre-development discharge rate

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, best management practices, and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from the pre-development conditions based on soil type. This Standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusettss Stormwater Handbook.

The redevelopment design meets Standard 3, comparing post-development to pre-development conditions. Currently there is no annual recharge of stormwater on the existing developed site. The annual recharge of the post-developed site exceeds the annual recharge from the pre-developed site.

Based on Plymouth County Soil Survey, and soils testing conducted onsite, it was determined that the site consists of Hydrologic Soils Group "Type B". In addition soils testing was conducted on the site in the vicinity for the proposed septic system confirming soil conditions and groundwater.

TABLE 1
REQUIRED RECHARGE VOLUME AND DRAWDOWN

Impervious Area = 60,400 SF
Target Depth Factor (F) = 0.35"

Rv = F x impervious area = 0.35"x 60,400 SF x 1'/12"= 1,762 CF

Total Required Recharge =1,762 CF

Proposed:
Crushed Stone Infiltration Systems 1-4 (below outlets)
System #1 = 2,308 CF
System #2 =2,506 CF
System #3 = 6,301 CF

Total Recharge Volume Provided = 14,115 CF

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

According to the HydroCAD 72 drawdown calculations the structures will fully drain within the 72 hour requirement.

Infiltration System #1 – 54.10 Hours
Infiltration System #2 – 50.10 Hours
Infiltration System #3 – 52.10 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 proprietary software and free on-line calculators on the Web 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."

A mounding analysis is not required.

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

STANDARD 4. WATER QUALITY

<u>TSS Removal</u>

Currently the existing site does not provide any TSS removal for runoff from the existing building and site. The redevelopment is an improvement of the existing conditions. In addition, pretreatment is not required for roof runoff.

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

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

TSS Removal Calculation Worksheet

Location: 108 Bodwell Street

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Sediment Forebay	**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: 23-303
Prepared By: PS
Date: 9/14/2023

*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

Long-Term Pollution Prevention Plan

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

WATER QUALITY TREATMENT VOLUME

The redevelopment design meets Standard 4, comparing post-development to pre-development conditions. Currently there is no water quality treatment of stormwater on the existing developed site. The proposed water quality treatment of the post-developed site exceeds treatment conditions from the pre-developed site.

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 not located in soils with an infiltration rate greater than 2.4 inches/hour so a Water Quality Depth of 1/2-inch is required.

V_{WQ} = (0.5 inch/12 inches/foot) * (60,400 square feet) = 2,517 CF

Proposed:
Crushed Stone Sediment Forebay Infiltration Systems 1-3 (below outlets)
System #1 = 532 CF
System #2 = 548 CF
System #3 = 1,657 CF

Total Recharge Volume Provided = 2,737 CF > 2,517 CF

STANDARD 5 LAND USES WITH HIGHER POTENTIAL POLLUTANT LOADS

The land use 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 a redevelopment project. The project proposes to pave an existing compacted gravel area. Post development peak rates and volumes have been reduced through the proposed infiltration systems. The proposed redevelopment is an improvement from the pre-developed conditions.

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 not disturb more than one acre of land and is not required to obtain coverage under the NPDES Construction General Permit issued by EPA and prepare a Stormwater Pollution Plan (see attached O&M Plan during construction)

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

"All illicit discharges to the stormwater management system are prohibited."

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

Checklist for Stormwater Report

A. Introduction

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

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

The Stormwater Report must include:

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

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

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

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

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[1] The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

[2] For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

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

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature

COMMONWEALTH OF MASSACHUSETTS
RICHARD J. GRADY
No. 38072
REGISTERED
PROFESSIONAL CIVIL ENGINEER

Richard Grady

Digitally signed by Richard Grady
Date: 2023.09.26 14:39:15 -04'00'

Signature and Date

Checklist

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

☐ New development

☒ Redevelopment

☐ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

- [x] No disturbance to any Wetland Resource Areas
- [ ] Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- [x] Reduced Impervious Area (Redevelopment Only)
- [x] 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
- [x] Other (describe): Crushed stone infiltration trenches

Standard 1: No New Untreated Discharges

- [x] No new untreated discharges
- [ ] Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth
- [x] 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.

☐ 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.

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[1] 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.

Checklist (continued)

Standard 3: Recharge (continued)

☐ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.

☐ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:
- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.

☒ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.

☒ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:

- ☒ is within the Zone II or Interim Wellhead Protection Area
- ☐ is near or to other critical areas
- ☒ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
- ☐ involves runoff from land uses with higher potential pollutant loads.

☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.

☒ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

Checklist (continued)

Standard 4: Water Quality (continued)

- [x] The BMP is sized (and calculations provided) based on:
  - [x] The ½" or 1" Water Quality Volume or
  - [ ] The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.
- [ ] The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.
- [x] A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

- [ ] The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.
- [ ] The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.
- [ ] The NPDES Multi-Sector General Permit does ***not*** cover the land use.
- [ ] LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.
- [ ] All exposure has been eliminated.
- [ ] All exposure has ***not*** been eliminated and all BMPs selected are on MassDEP LUHPPL list.
- [ ] The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

- [ ] The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.
- [ ] Critical areas and BMPs are identified in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

☒ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:

- ☐ Limited Project
- ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
- ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
- ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
- ☐ Bike Path and/or Foot Path
- ☒ Redevelopment Project
- ☐ Redevelopment portion of mix of new and redevelopment.

☒ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.

☐ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

☒ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has ***not*** been included in the Stormwater Report but will be submitted ***before*** land disturbance begins.

☐ The project is ***not*** covered by a NPDES Construction General Permit.

☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.

☐ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- ☒ Name of the stormwater management system owners;
- ☒ Party responsible for operation and maintenance;
- ☒ Schedule for implementation of routine and non-routine maintenance tasks;
- ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
- ☐ Description and delineation of public safety features;
- ☒ Estimated operation and maintenance budget; and
- ☒ Operation and Maintenance Log Form.

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

- ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
- ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

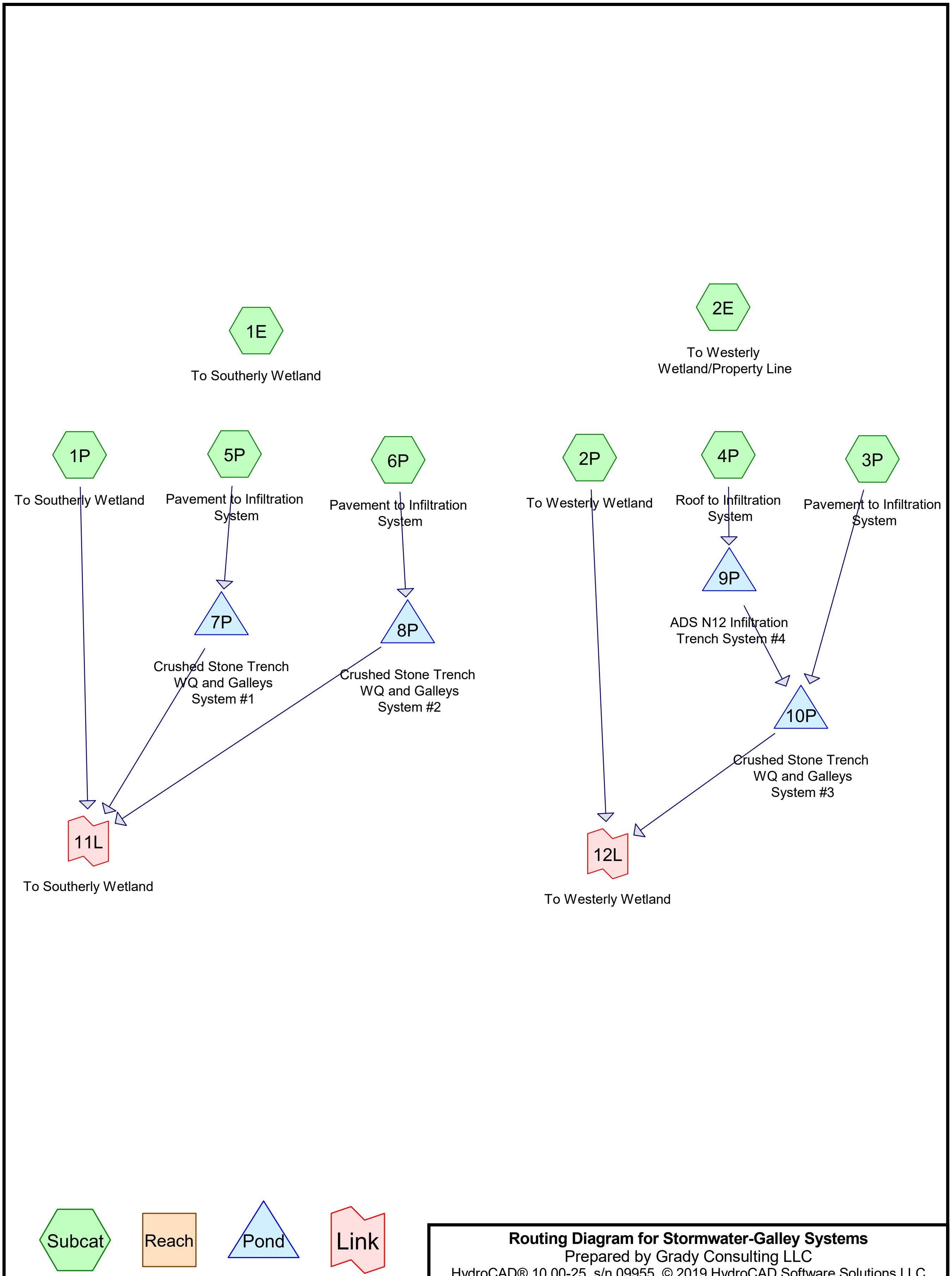
☐ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☒ An Illicit Discharge Compliance Statement is attached;

☐ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.

Section II

Overall Site Analysis



Routing Diagram for Stormwater-Galley Systems
Prepared by Grady Consulting LLC
HydroCAD® 10.00-25 s/n 09955 © 2019 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
27,469	61	>75% Grass cover, Good, HSG B (1E, 1P, 2E, 2P, 5P)
918	85	Crushed Stone, HSG B (5P, 6P)
1,461	85	CrushedStone, HSG B (3P)
43,331	96	Gravel surface, HSG B (1E, 2E)
78,466	98	Paved parking, HSG B (1E, 2E, 3P, 5P, 6P)
19,574	98	Roofs, HSG B (4P)
19,587	98	Unconnected roofs, HSG B (2E)
37,658	55	Woods, Good, HSG B (1E, 1P, 2E, 2P)
228,464	**86**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
228,464	HSG B	1E, 1P, 2E, 2P, 3P, 4P, 5P, 6P
0	HSG C	
0	HSG D	
0	Other	
228,464		**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	Su Nu
0	27,469	0	0	0	27,469	>75% Grass cover, Good	
0	918	0	0	0	918	Crushed Stone	
0	1,461	0	0	0	1,461	CrushedStone	
0	43,331	0	0	0	43,331	Gravel surface	
0	78,466	0	0	0	78,466	Paved parking	
0	19,574	0	0	0	19,574	Roofs	
0	19,587	0	0	0	19,587	Unconnected roofs	
0	37,658	0	0	0	37,658	Woods, Good	
0	**228,464**	**0**	**0**	**0**	**228,464**	**TOTAL AREA**	

Time span=0.10-24.00 hrs, dt=0.02 hrs, 1196 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1E: To Southerly Wetland Runoff Area=43,251 sf 38.57% Impervious Runoff Depth>1.49"
Tc=6.0 min CN=80 Runoff=1.71 cfs 5,353 cf

Subcatchment 1P: To Southerly Wetland Runoff Area=16,727 sf 0.00% Impervious Runoff Depth>0.38"
Tc=6.0 min CN=58 Runoff=0.09 cfs 530 cf

Subcatchment 2E: To Westerly Runoff Area=71,205 sf 29.43% Impervious Runoff Depth>2.01"
Tc=6.0 min UI Adjusted CN=87 Runoff=3.84 cfs 11,929 cf

Subcatchment 2P: To Westerly Wetland Runoff Area=12,938 sf 0.00% Impervious Runoff Depth>0.31"
Tc=6.0 min CN=56 Runoff=0.04 cfs 339 cf

Subcatchment 3P: Pavement to Infiltration Runoff Area=39,943 sf 96.34% Impervious Runoff Depth>3.07"
Tc=6.0 min CN=98 Runoff=2.94 cfs 10,235 cf

Subcatchment 4P: Roof to Infiltration Runoff Area=19,574 sf 100.00% Impervious Runoff Depth>3.07"
Tc=6.0 min CN=98 Runoff=1.44 cfs 5,015 cf

Subcatchment 5P: Pavement to Infiltration Runoff Area=15,930 sf 84.93% Impervious Runoff Depth>2.55"
Tc=6.0 min CN=93 Runoff=1.06 cfs 3,384 cf

Subcatchment 6P: Pavement to Infiltration Runoff Area=8,896 sf 94.49% Impervious Runoff Depth>2.96"
Tc=6.0 min CN=97 Runoff=0.65 cfs 2,197 cf

Pond 7P: Crushed Stone Trench WQ and Peak Elev=238.56' Storage=2,217 cf Inflow=1.06 cfs 3,384 cf
Discarded=0.03 cfs 1,445 cf Primary=0.00 cfs 0 cf Outflow=0.03 cfs 1,445 cf

Pond 8P: Crushed Stone Trench WQ and Peak Elev=231.29' Storage=1,180 cf Inflow=0.65 cfs 2,197 cf
Discarded=0.03 cfs 1,412 cf Primary=0.00 cfs 0 cf Outflow=0.03 cfs 1,412 cf

Pond 9P: ADS N12 Infiltration Trench System Peak Elev=234.95' Storage=153 cf Inflow=1.44 cfs 5,015 cf
Discarded=0.01 cfs 725 cf Primary=1.37 cfs 4,270 cf Outflow=1.38 cfs 4,995 cf

Pond 10P: Crushed Stone Trench WQ and Peak Elev=233.03' Storage=6,351 cf Inflow=4.29 cfs 14,504 cf
Discarded=0.07 cfs 4,625 cf Primary=3.73 cfs 4,178 cf Outflow=3.81 cfs 8,803 cf

Link 11L: To Southerly Wetland Inflow=0.09 cfs 530 cf
Primary=0.09 cfs 530 cf

Link 12L: To Westerly Wetland Inflow=3.78 cfs 4,517 cf
Primary=3.78 cfs 4,517 cf

Total Runoff Area = 228,464 sf Runoff Volume = 38,982 cf Average Runoff Depth = 2.05"
48.51% Pervious = 110,837 sf 51.49% Impervious = 117,627 sf

Summary for Subcatchment 1E: To Southerly Wetland

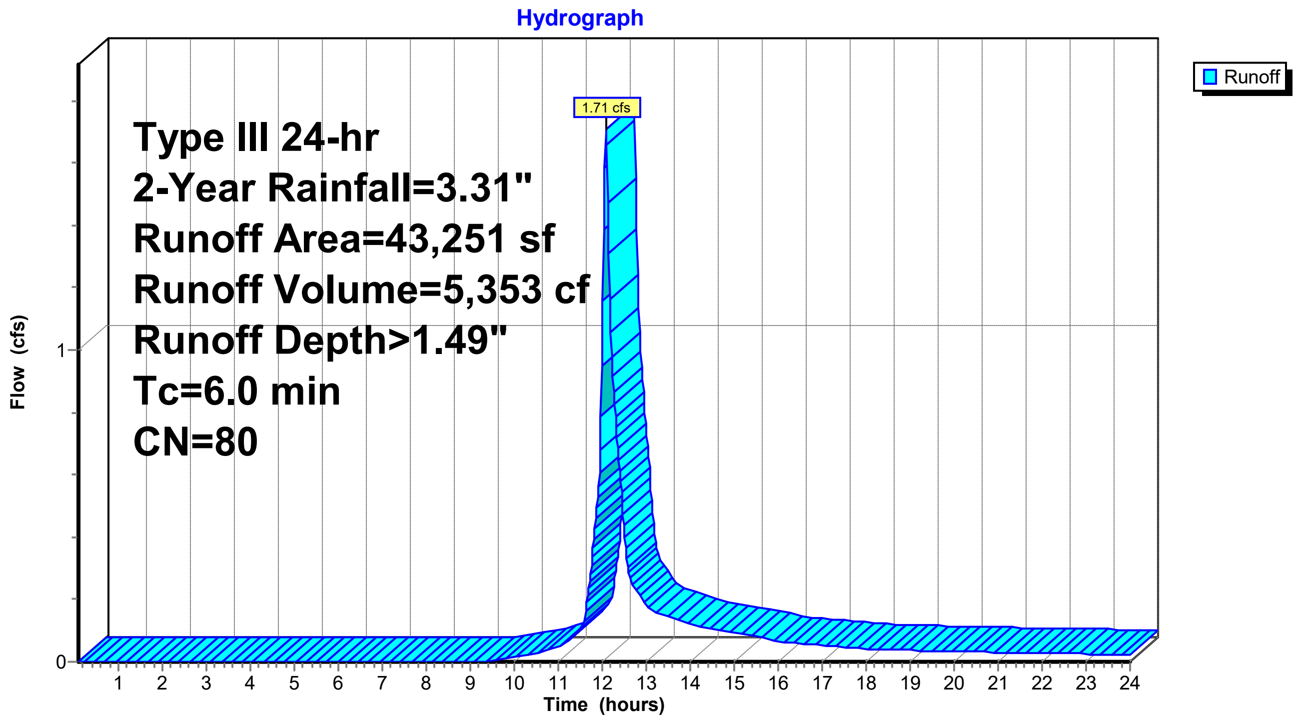
Runoff = 1.71 cfs @ 12.09 hrs, Volume= 5,353 cf, Depth> 1.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.31"

Area (sf)	CN	Description
12,540	61	>75% Grass cover, Good, HSG B
16,680	98	Paved parking, HSG B
7,251	96	Gravel surface, HSG B
6,780	55	Woods, Good, HSG B
43,251	80	Weighted Average
26,571		61.43% Pervious Area
16,680		38.57% Impervious Area

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

Subcatchment 1E: To Southerly Wetland



Summary for Subcatchment 1P: To Southerly Wetland

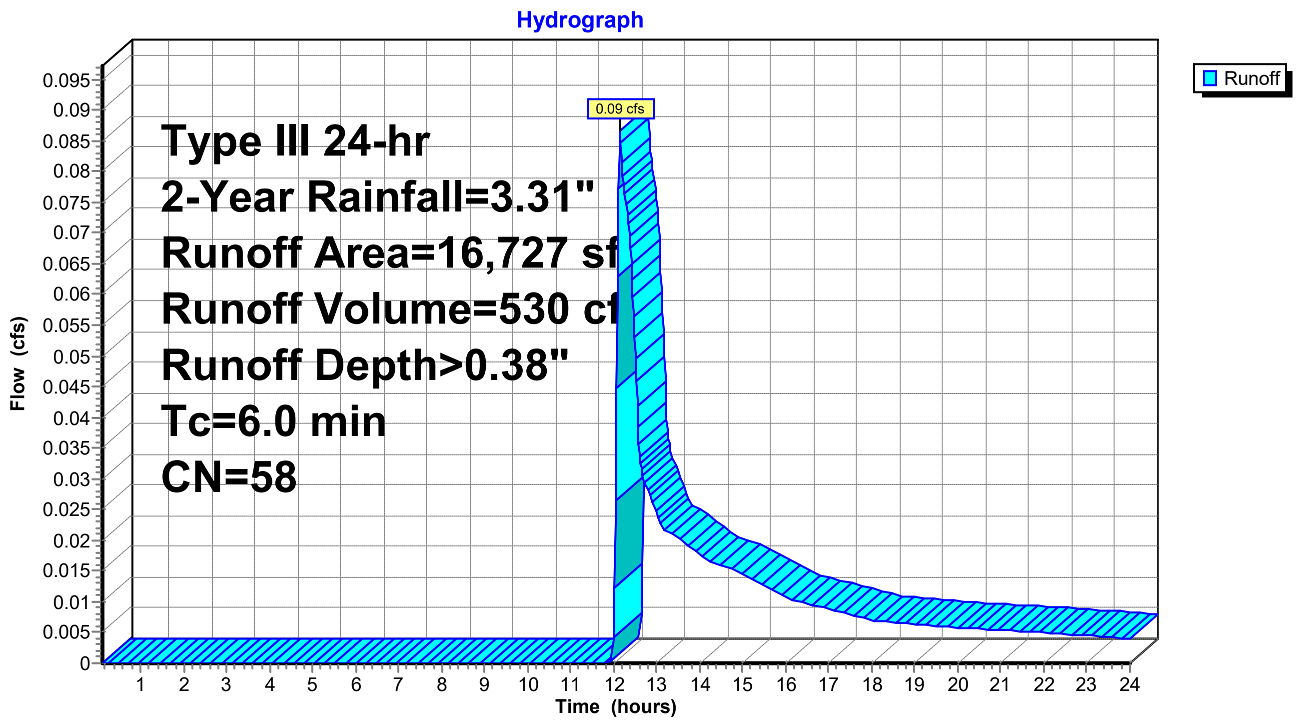
Runoff = 0.09 cfs @ 12.14 hrs, Volume= 530 cf, Depth> 0.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.31"

Area (sf)	CN	Description
9,463	61	>75% Grass cover, Good, HSG B
7,264	55	Woods, Good, HSG B
16,727	58	Weighted Average
16,727		100.00% Pervious Area

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

Subcatchment 1P: To Southerly Wetland



Summary for Subcatchment 2E: To Westerly Wetland/Property Line

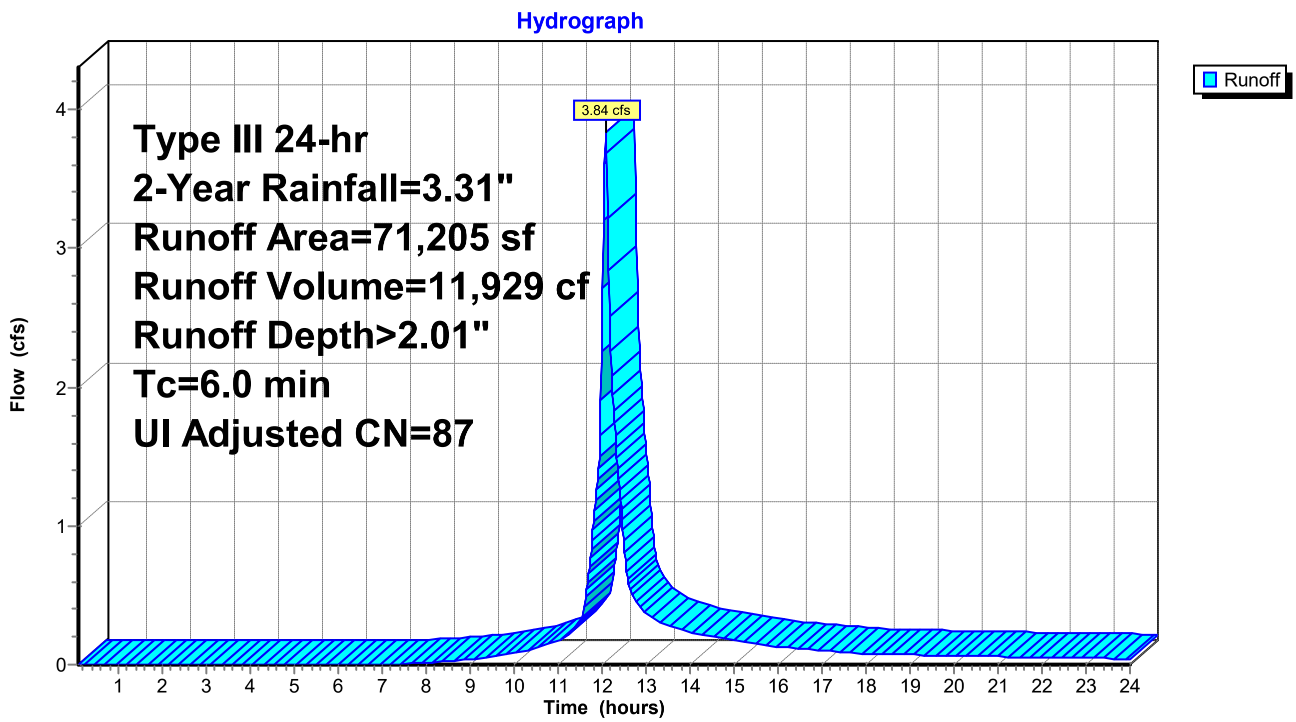
Runoff = 3.84 cfs @ 12.09 hrs, Volume= 11,929 cf, Depth> 2.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.31"

Area (sf)	CN	Adj	Description
1,212	61		>75% Grass cover, Good, HSG B
1,369	98		Paved parking, HSG B
12,957	55		Woods, Good, HSG B
36,080	96		Gravel surface, HSG B
19,587	98		Unconnected roofs, HSG B
71,205	89	87	Weighted Average, UI Adjusted
50,249			70.57% Pervious Area
20,956			29.43% Impervious Area
19,587			93.47% Unconnected

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

Subcatchment 2E: To Westerly Wetland/Property Line



Summary for Subcatchment 2P: To Westerly Wetland

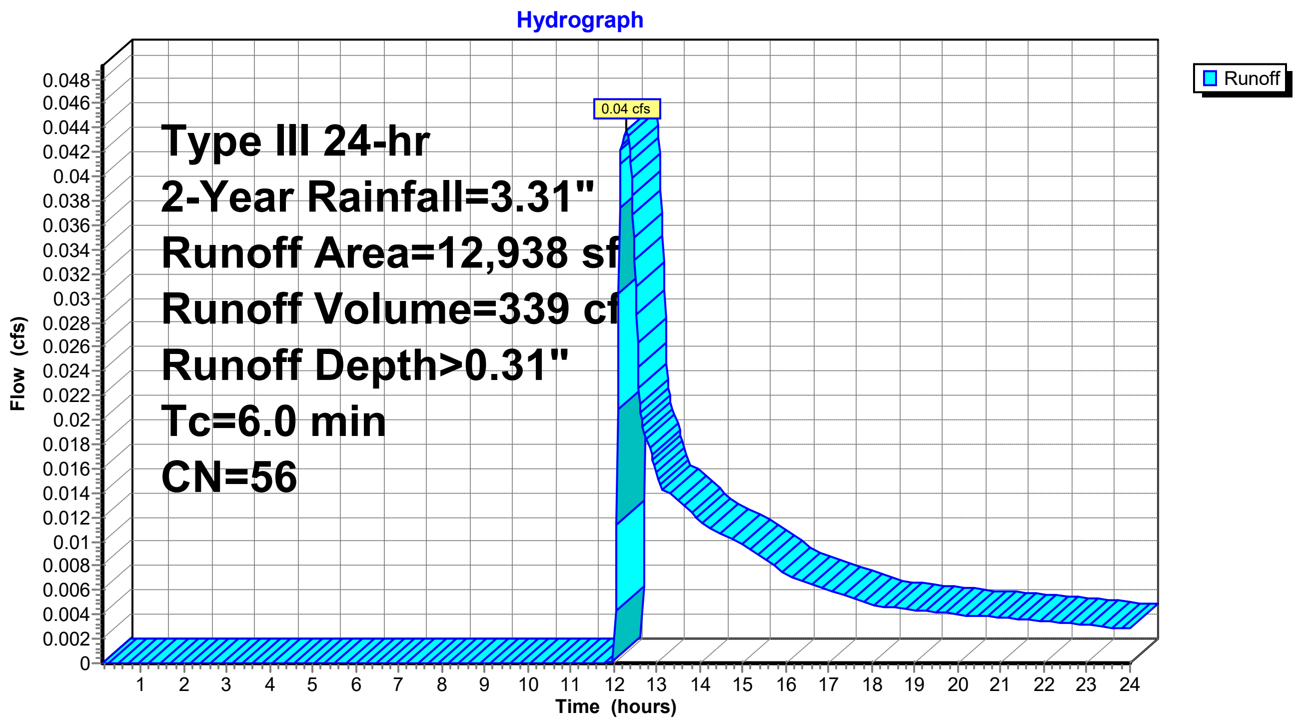
Runoff = 0.04 cfs @ 12.28 hrs, Volume= 339 cf, Depth> 0.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.31"

Area (sf)	CN	Description
2,281	61	>75% Grass cover, Good, HSG B
10,657	55	Woods, Good, HSG B
12,938	56	Weighted Average
12,938		100.00% Pervious Area

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

Subcatchment 2P: To Westerly Wetland



Summary for Subcatchment 3P: Pavement to Infiltration System

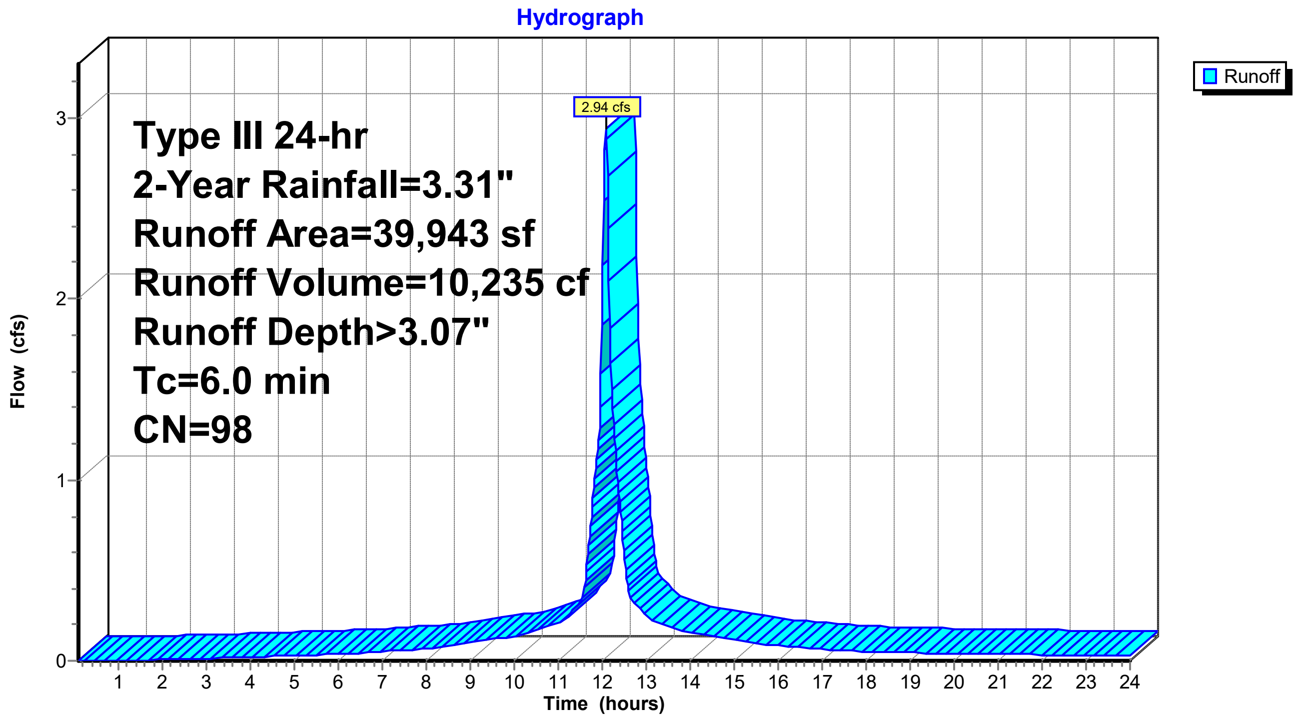
Runoff = 2.94 cfs @ 12.08 hrs, Volume= 10,235 cf, Depth> 3.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.31"

	Area (sf)	CN	Description
	38,482	98	Paved parking, HSG B
*	1,461	85	CrushedStone, HSG B
	39,943	98	Weighted Average
	1,461		3.66% Pervious Area
	38,482		96.34% Impervious Area

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

Subcatchment 3P: Pavement to Infiltration System



Summary for Subcatchment 4P: Roof to Infiltration System

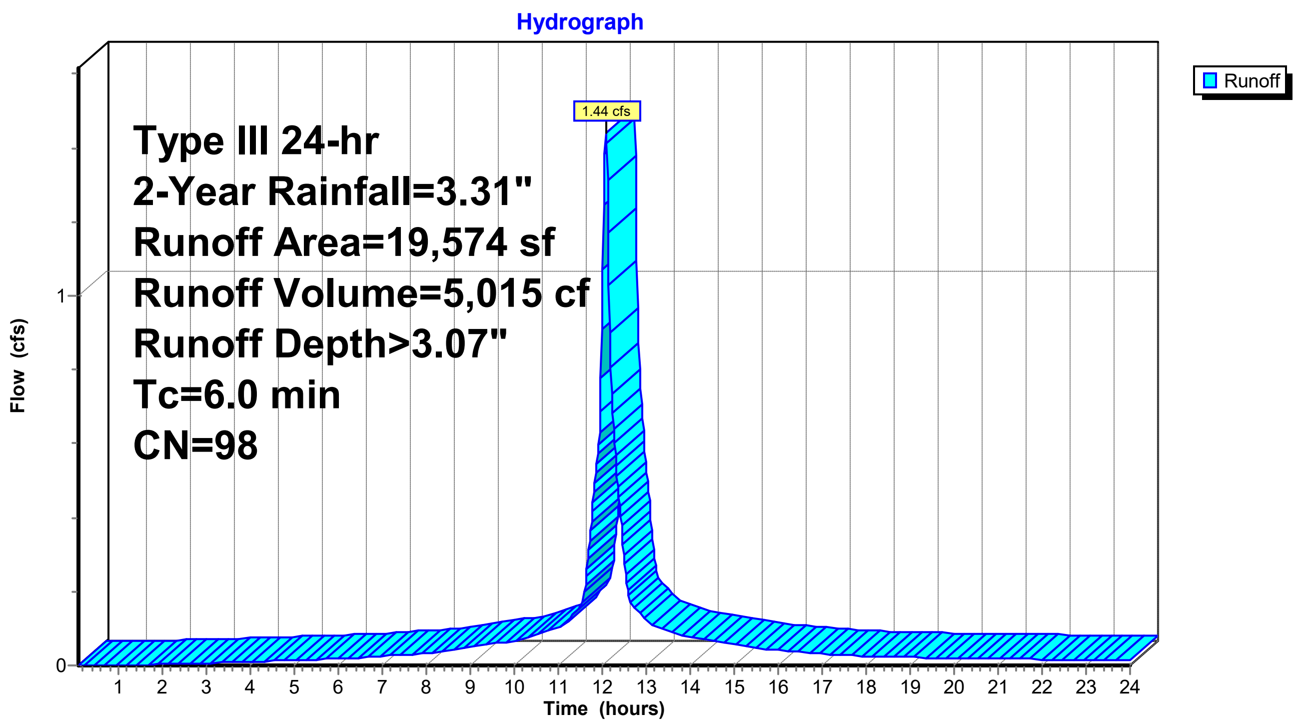
Runoff = 1.44 cfs @ 12.08 hrs, Volume= 5,015 cf, Depth> 3.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.31"

Area (sf)	CN	Description
19,574	98	Roofs, HSG B
19,574		100.00% Impervious Area

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

Subcatchment 4P: Roof to Infiltration System



Summary for Subcatchment 5P: Pavement to Infiltration System

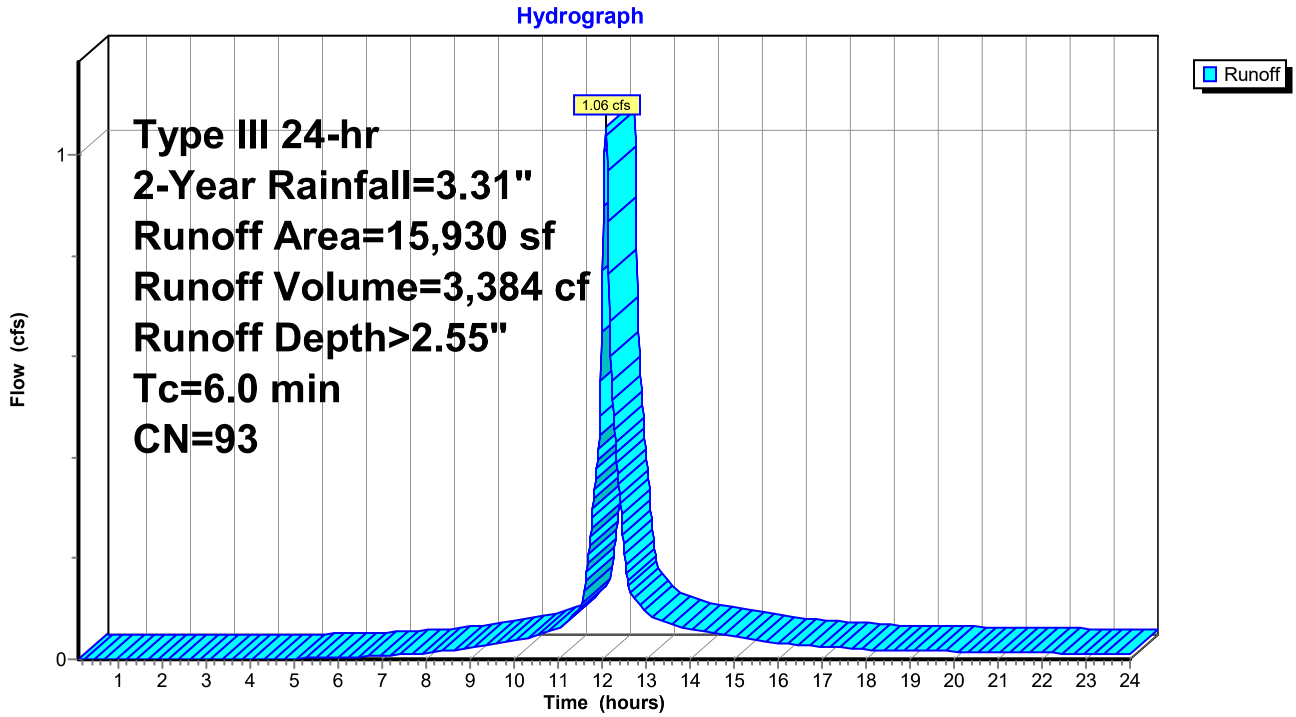
Runoff = 1.06 cfs @ 12.09 hrs, Volume= 3,384 cf, Depth> 2.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.31"

	Area (sf)	CN	Description
	13,529	98	Paved parking, HSG B
	1,973	61	>75% Grass cover, Good, HSG B
*	428	85	Crushed Stone, HSG B
	15,930	93	Weighted Average
	2,401		15.07% Pervious Area
	13,529		84.93% Impervious Area

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

Subcatchment 5P: Pavement to Infiltration System



Summary for Subcatchment 6P: Pavement to Infiltration System

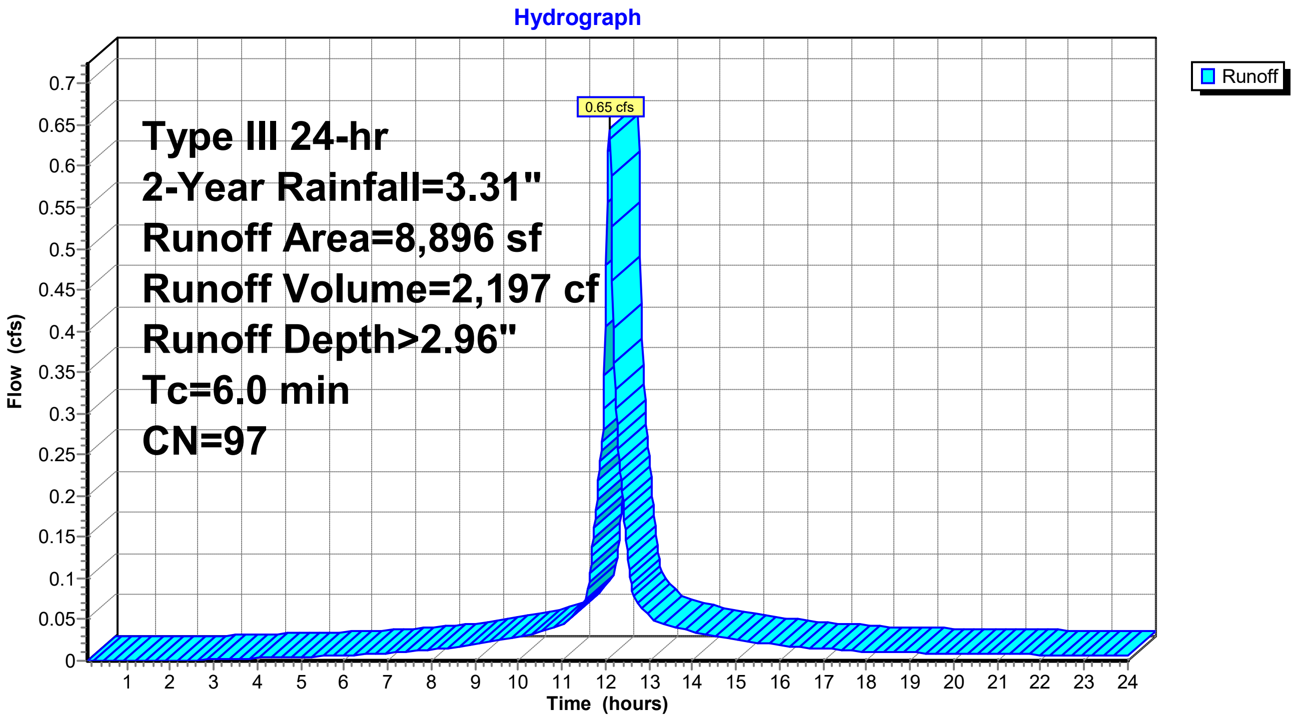
Runoff = 0.65 cfs @ 12.08 hrs, Volume= 2,197 cf, Depth> 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.31"

	Area (sf)	CN	Description
	8,406	98	Paved parking, HSG B
*	490	85	Crushed Stone, HSG B
	8,896	97	Weighted Average
	490		5.51% Pervious Area
	8,406		94.49% Impervious Area

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

Subcatchment 6P: Pavement to Infiltration System



Summary for Pond 7P: Crushed Stone Trench WQ and Galleys System #1

Inflow Area =	15,930 sf,	84.93% Impervious,	Inflow Depth > 2.55"	for 2-Year event	
Inflow =	1.06 cfs @	12.09 hrs, Volume=	3,384 cf		
Outflow =	0.03 cfs @	12.00 hrs, Volume=	1,445 cf,	Atten= 98%,	Lag= 0.0 min
Discarded =	0.03 cfs @	12.00 hrs, Volume=	1,445 cf		
Primary =	0.00 cfs @	0.10 hrs, Volume=	0 cf		

Routing by Stor-Ind method, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs
Peak Elev= 238.56' @ 16.78 hrs Surf.Area= 1,115 sf Storage= 2,217 cf

Plug-Flow detention time= 302.8 min calculated for 1,445 cf (43% of inflow)
Center-of-Mass det. time= 181.2 min (972.1 - 790.9)

Volume	Invert	Avail.Storage	Storage Description
#1	236.00'	532 cf	**3.50'W x 95.00'L x 4.00'H Prismatoid**
			1,330 cf Overall x 40.0% Voids
#2A	234.25'	937 cf	**8.50'W x 92.00'L x 4.75'H Field A**
			3,715 cf Overall - 1,371 cf Embedded = 2,343 cf x 40.0% Voids
#3A	234.75'	1,020 cf	**Concrete Galley 4x4x4.25** x 22 Inside #2
			Inside= 42.2"W x 45.0"H => 13.25 sf x 3.50'L = 46.4 cf
			Outside= 54.0"W x 51.0"H => 15.58 sf x 4.00'L = 62.3 cf
		2,490 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	239.00'	**95.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Discarded	234.25'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.03 cfs @ 12.00 hrs HW=236.00' (Free Discharge)
└─**2=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 0.10 hrs HW=234.25' (Free Discharge)
└─**1=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 7P: Crushed Stone Trench WQ and Galleys System #1 - Chamber Wizard Field A

Chamber Model = Concrete Galley 4x4x4.25 (Concrete Galley, Shea LE-EGH, LE-CGH or equivalent)
Inside= 42.2"W x 45.0"H => 13.25 sf x 3.50'L = 46.4 cf
Outside= 54.0"W x 51.0"H => 15.58 sf x 4.00'L = 62.3 cf

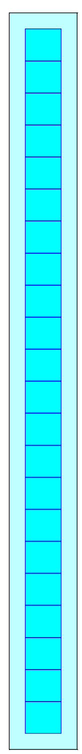
22 Chambers/Row x 4.00' Long = 88.00' Row Length +24.0" End Stone x 2 = 92.00' Base Length
1 Rows x 54.0" Wide + 24.0" Side Stone x 2 = 8.50' Base Width
6.0" Base + 51.0" Chamber Height = 4.75' Field Height

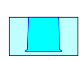
22 Chambers x 46.4 cf = 1,020.4 cf Chamber Storage
22 Chambers x 62.3 cf = 1,371.3 cf Displacement

3,714.5 cf Field - 1,371.3 cf Chambers = 2,343.2 cf Stone x 40.0% Voids = 937.3 cf Stone Storage

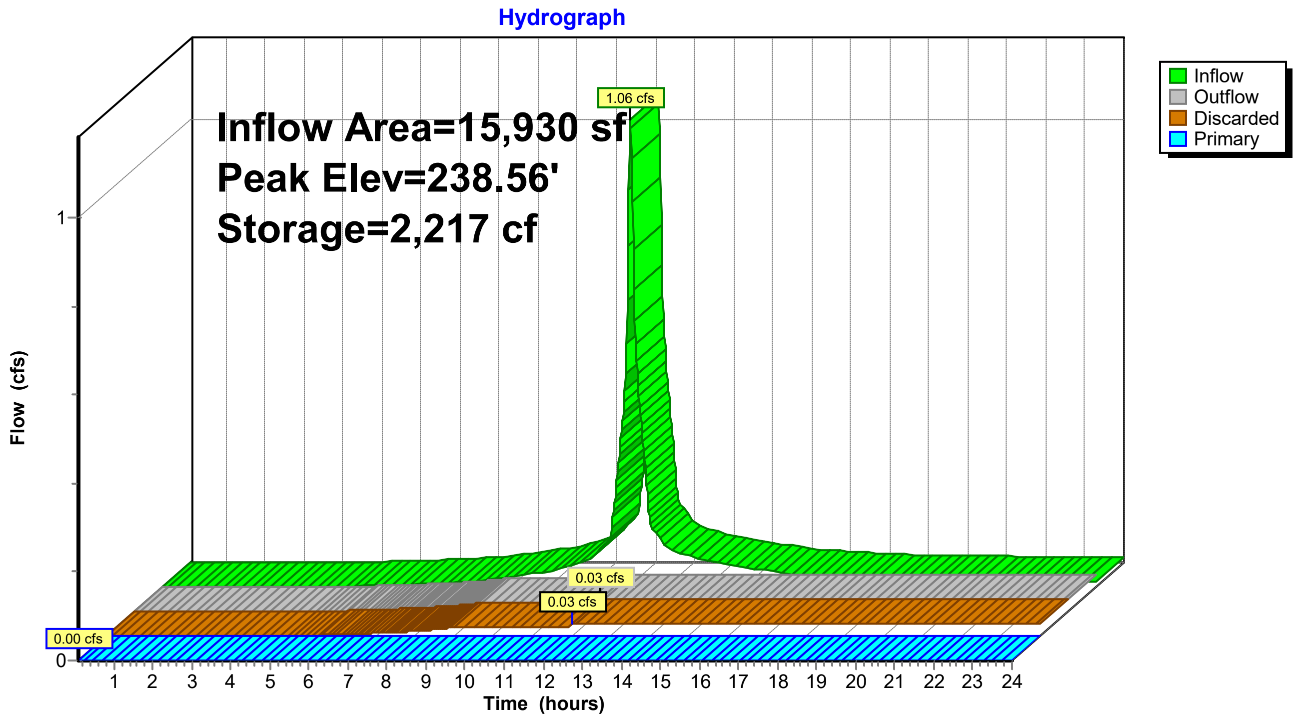
Chamber Storage + Stone Storage = 1,957.7 cf = 0.045 af
Overall Storage Efficiency = 52.7%
Overall System Size = 92.00' x 8.50' x 4.75'

22 Chambers @ $ 0.00 /ea = $ 0.00
137.6 cy Field Excavation @ $ 10.00 /cy = $ 1,375.74
86.8 cy Stone @ $ 30.00 /cy = $ 2,603.57
Total Cost = $ 3,979.31

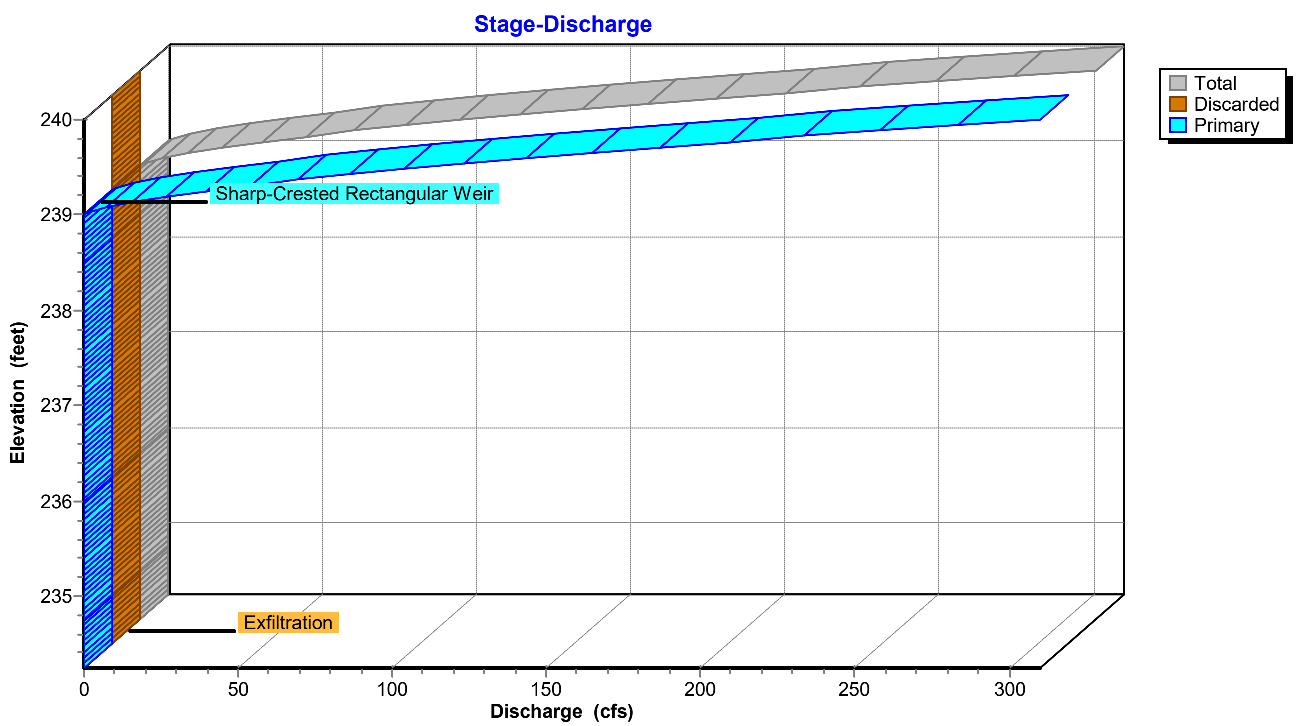




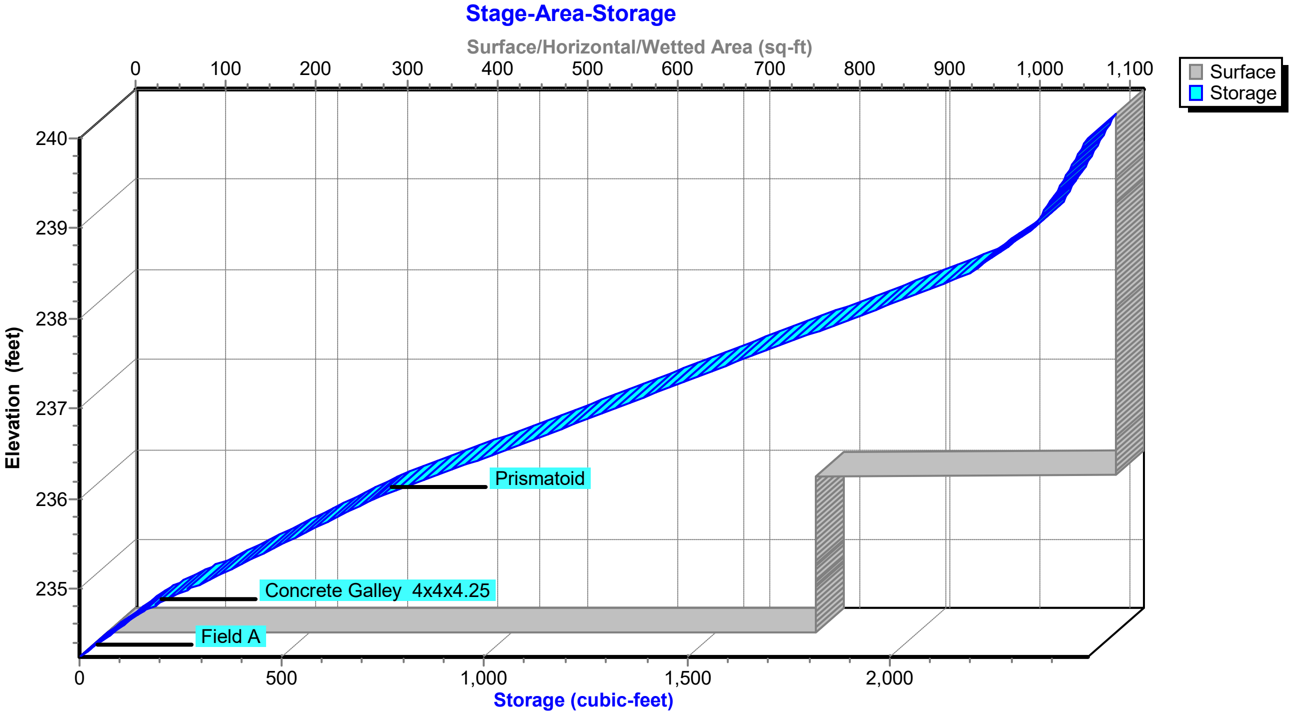
Pond 7P: Crushed Stone Trench WQ and Galleys System #1



Pond 7P: Crushed Stone Trench WQ and Galleys System #1



Pond 7P: Crushed Stone Trench WQ and Galleys System #1



Summary for Pond 8P: Crushed Stone Trench WQ and Galleys System #2

Inflow Area = 8,896 sf, 94.49% Impervious, Inflow Depth > 2.96" for 2-Year event
Inflow = 0.65 cfs @ 12.08 hrs, Volume= 2,197 cf
Outflow = 0.03 cfs @ 12.42 hrs, Volume= 1,412 cf, Atten= 96%, Lag= 20.2 min
Discarded = 0.03 cfs @ 12.42 hrs, Volume= 1,412 cf
Primary = 0.00 cfs @ 0.10 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs
Peak Elev= 231.29' @ 14.68 hrs Surf.Area= 1,208 sf Storage= 1,180 cf

Plug-Flow detention time= 255.1 min calculated for 1,412 cf (64% of inflow)
Center-of-Mass det. time= 155.2 min (919.9 - 764.6)

Volume	Invert	Avail.Storage	Storage Description
#1	231.00'	549 cf	**4.00'W x 98.00'L x 3.50'H Prismatoid**
			1,372 cf Overall x 40.0% Voids
#2A	228.75'	977 cf	**8.50'W x 96.00'L x 4.75'H Field A**
			3,876 cf Overall - 1,434 cf Embedded = 2,442 cf x 40.0% Voids
#3A	229.25'	1,067 cf	**Concrete Galley 4x4x4.25** x 23 Inside #2
			Inside= 42.2"W x 45.0"H => 13.25 sf x 3.50'L = 46.4 cf
			Outside= 54.0"W x 51.0"H => 15.58 sf x 4.00'L = 62.3 cf
		2,593 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	233.00'	**98.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Discarded	228.75'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.03 cfs @ 12.42 hrs HW=231.00' (Free Discharge)
└─**2=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 0.10 hrs HW=228.75' (Free Discharge)
└─**1=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 8P: Crushed Stone Trench WQ and Galleys System #2 - Chamber Wizard Field A

Chamber Model = Concrete Galley 4x4x4.25 (Concrete Galley, Shea LE-EGH, LE-CGH or equivalent)
Inside= 42.2"W x 45.0"H => 13.25 sf x 3.50'L = 46.4 cf
Outside= 54.0"W x 51.0"H => 15.58 sf x 4.00'L = 62.3 cf

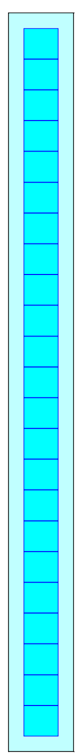
23 Chambers/Row x 4.00' Long = 92.00' Row Length +24.0" End Stone x 2 = 96.00' Base Length
1 Rows x 54.0" Wide + 24.0" Side Stone x 2 = 8.50' Base Width
6.0" Base + 51.0" Chamber Height = 4.75' Field Height

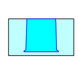
23 Chambers x 46.4 cf = 1,066.8 cf Chamber Storage
23 Chambers x 62.3 cf = 1,433.6 cf Displacement

3,876.0 cf Field - 1,433.6 cf Chambers = 2,442.4 cf Stone x 40.0% Voids = 977.0 cf Stone Storage

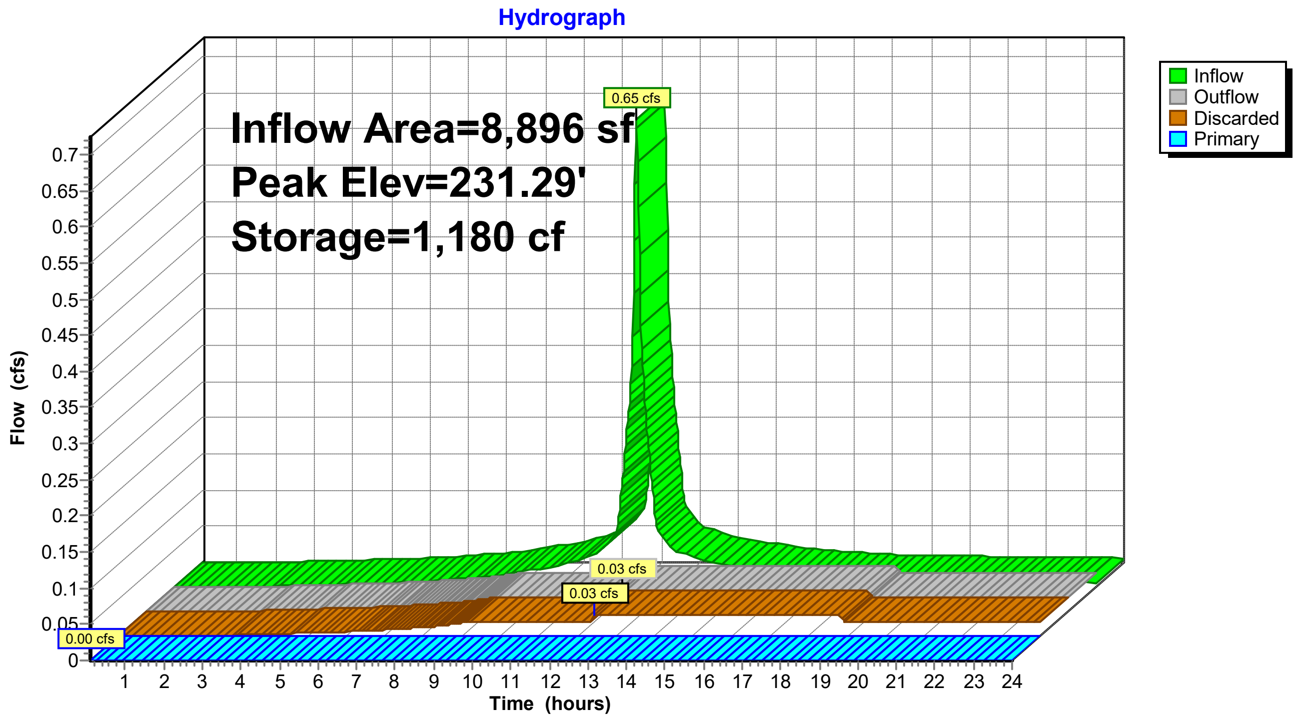
Chamber Storage + Stone Storage = 2,043.7 cf = 0.047 af
Overall Storage Efficiency = 52.7%
Overall System Size = 96.00' x 8.50' x 4.75'

23 Chambers @ $ 0.00 /ea = $ 0.00
143.6 cy Field Excavation @ $ 10.00 /cy = $ 1,435.56
90.5 cy Stone @ $ 30.00 /cy = $ 2,713.75
Total Cost = $ 4,149.31

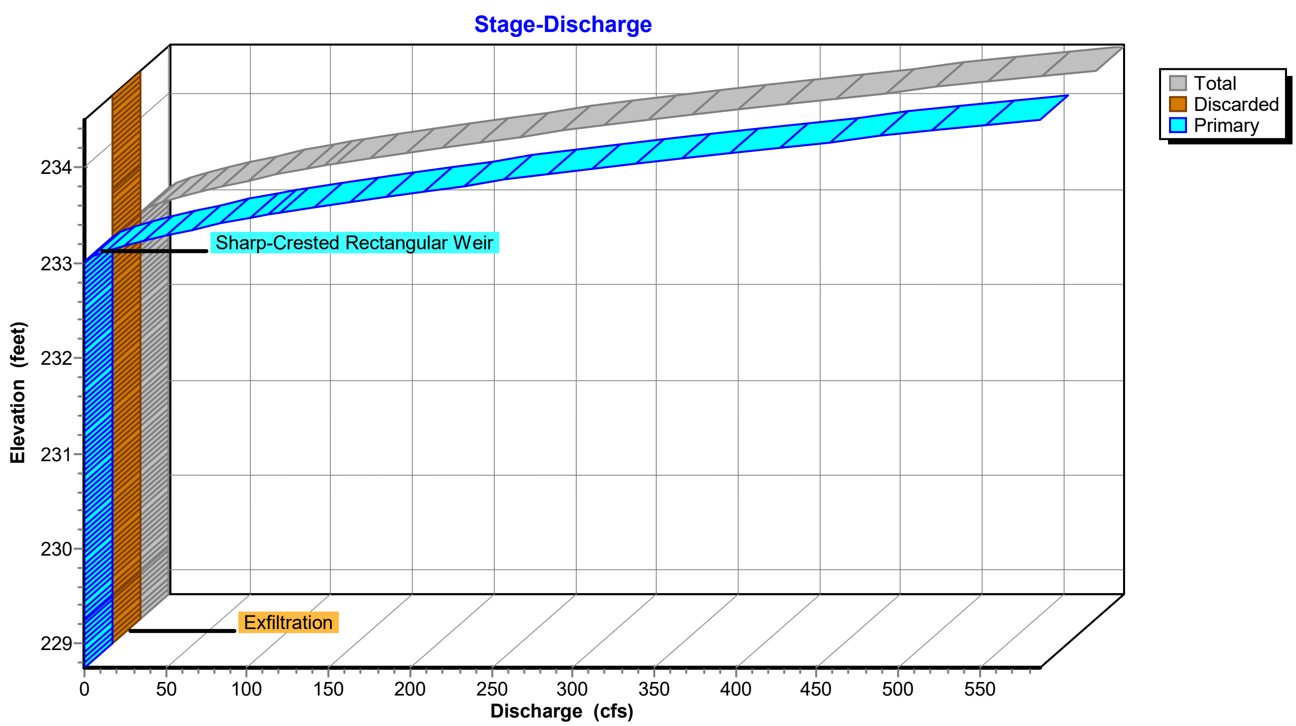




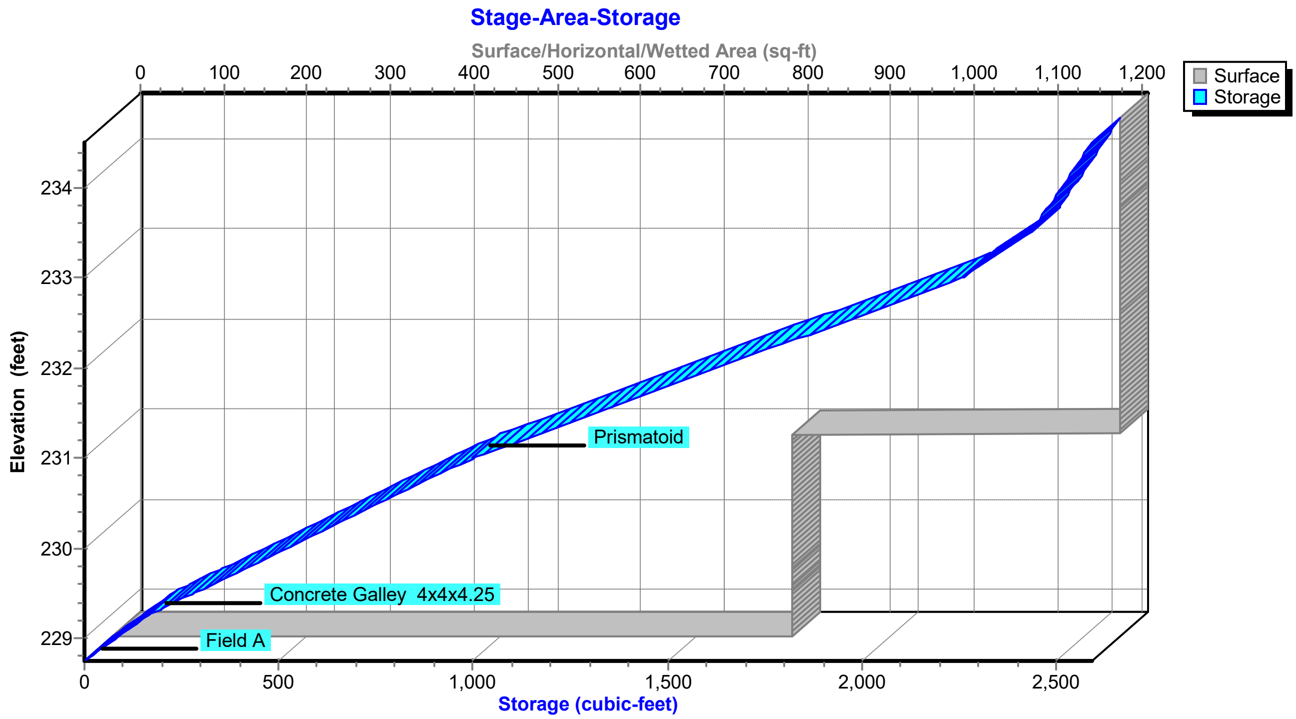
Pond 8P: Crushed Stone Trench WQ and Galleys System #2



Pond 8P: Crushed Stone Trench WQ and Galleys System #2



Pond 8P: Crushed Stone Trench WQ and Galleys System #2



Summary for Pond 9P: ADS N12 Infiltration Trench System #4

Inflow Area = 19,574 sf,100.00% Impervious, Inflow Depth > 3.07" for 2-Year event
Inflow = 1.44 cfs @ 12.08 hrs, Volume= 5,015 cf
Outflow = 1.38 cfs @ 12.11 hrs, Volume= 4,995 cf, Atten= 4%, Lag= 1.4 min
Discarded = 0.01 cfs @ 3.92 hrs, Volume= 725 cf
Primary = 1.37 cfs @ 12.11 hrs, Volume= 4,270 cf

Routing by Stor-Ind method, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs
Peak Elev= 234.95' @ 12.11 hrs Surf.Area= 400 sf Storage= 153 cf

Plug-Flow detention time= 7.8 min calculated for 4,995 cf (100% of inflow)
Center-of-Mass det. time= 5.0 min (760.2 - 755.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	234.00'	608 cf	**4.21'W x 95.00'L x 4.04'H Field A** 1,616 cf Overall - 97 cf Embedded = 1,519 cf x 40.0% Voids
#2A	235.17'	75 cf	**ADS N-12 12"** x 4 Inside #1 Inside= 12.2"W x 12.2"H => 0.81 sf x 20.00'L = 16.2 cf Outside= 14.5"W x 14.5"H => 1.05 sf x 20.00'L = 20.9 cf Row Length Adjustment= +13.00' x 0.81 sf x 1 rows
		683 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	234.00'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	234.10'	**10.0" Round Culvert** L= 155.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 234.10' / 232.00' S= 0.0135 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.55 sf

Discarded OutFlow Max=0.01 cfs @ 3.92 hrs HW=234.04' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=1.37 cfs @ 12.11 hrs HW=234.95' (Free Discharge)
└─**2=Culvert** (Inlet Controls 1.37 cfs @ 2.50 fps)

Pond 9P: ADS N12 Infiltration Trench System #4 - Chamber Wizard Field A

Chamber Model = ADS N-12 12" (ADS N-12® Pipe)
Inside= 12.2"W x 12.2"H => 0.81 sf x 20.00'L = 16.2 cf
Outside= 14.5"W x 14.5"H => 1.05 sf x 20.00'L = 20.9 cf
Row Length Adjustment= +13.00' x 0.81 sf x 1 rows

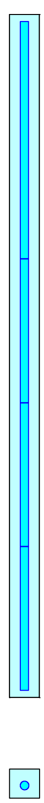
4 Chambers/Row x 20.00' Long +13.00' Row Adjustment = 93.00' Row Length +12.0" End Stone x 2 = 95.00' Base Length
1 Rows x 14.5" Wide + 18.0" Side Stone x 2 = 4.21' Base Width
14.0" Base + 14.5" Chamber Height + 20.0" Cover = 4.04' Field Height

4 Chambers x 16.2 cf +13.00' Row Adjustment x 0.81 sf x 1 Rows = 75.3 cf Chamber Storage
4 Chambers x 20.9 cf +13.00' Row Adjustment x 1.05 sf x 1 Rows = 97.3 cf Displacement

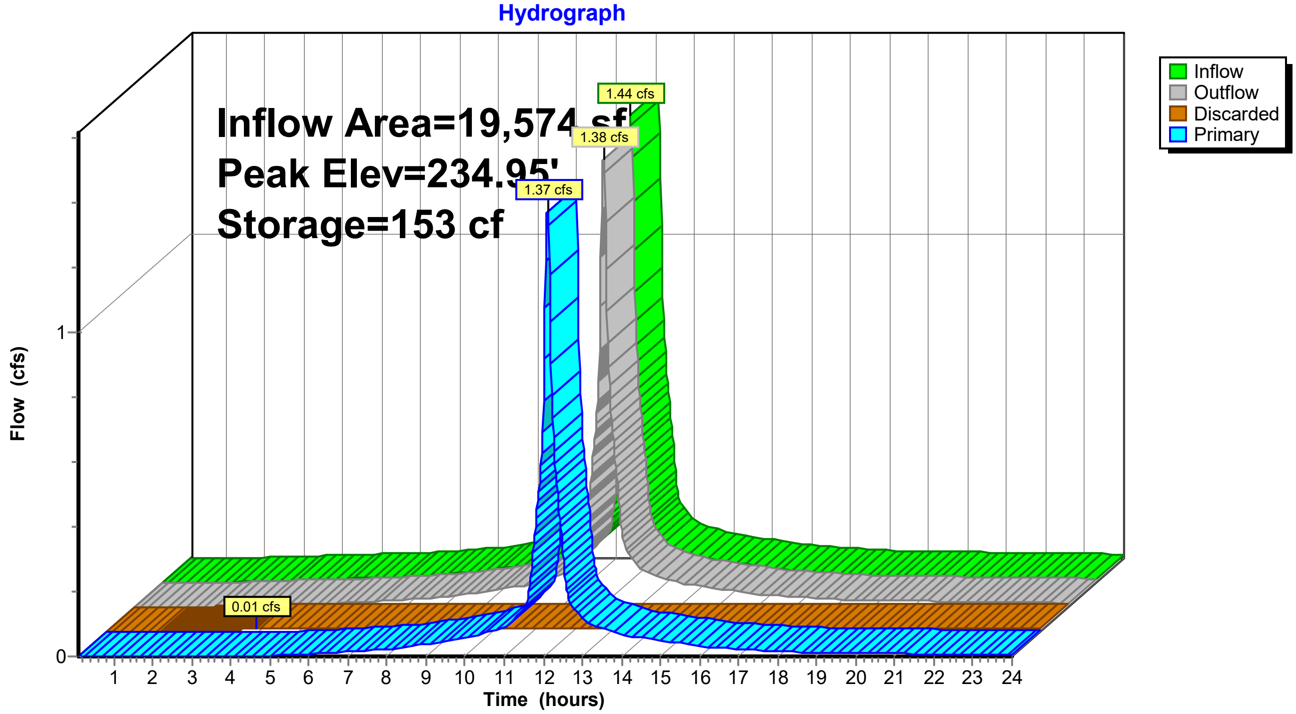
1,616.2 cf Field - 97.3 cf Chambers = 1,518.9 cf Stone x 40.0% Voids = 607.6 cf Stone Storage

Chamber Storage + Stone Storage = 682.9 cf = 0.016 af
Overall Storage Efficiency = 42.3%
Overall System Size = 95.00' x 4.21' x 4.04'

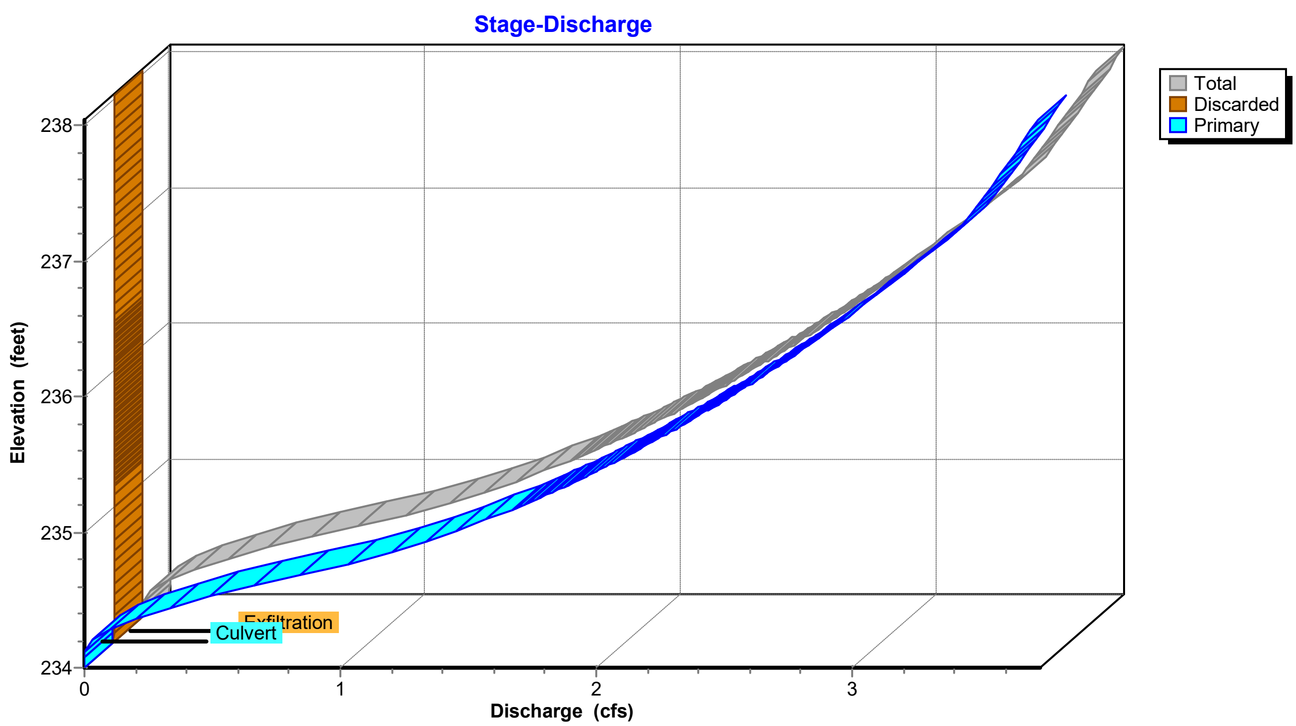
4 Chambers @ $ 0.00 /ea = $ 0.00
59.9 cy Field Excavation @ $ 10.00 /cy = $ 598.61
56.3 cy Stone @ $ 30.00 /cy = $ 1,687.67
Total Cost = $ 2,286.28



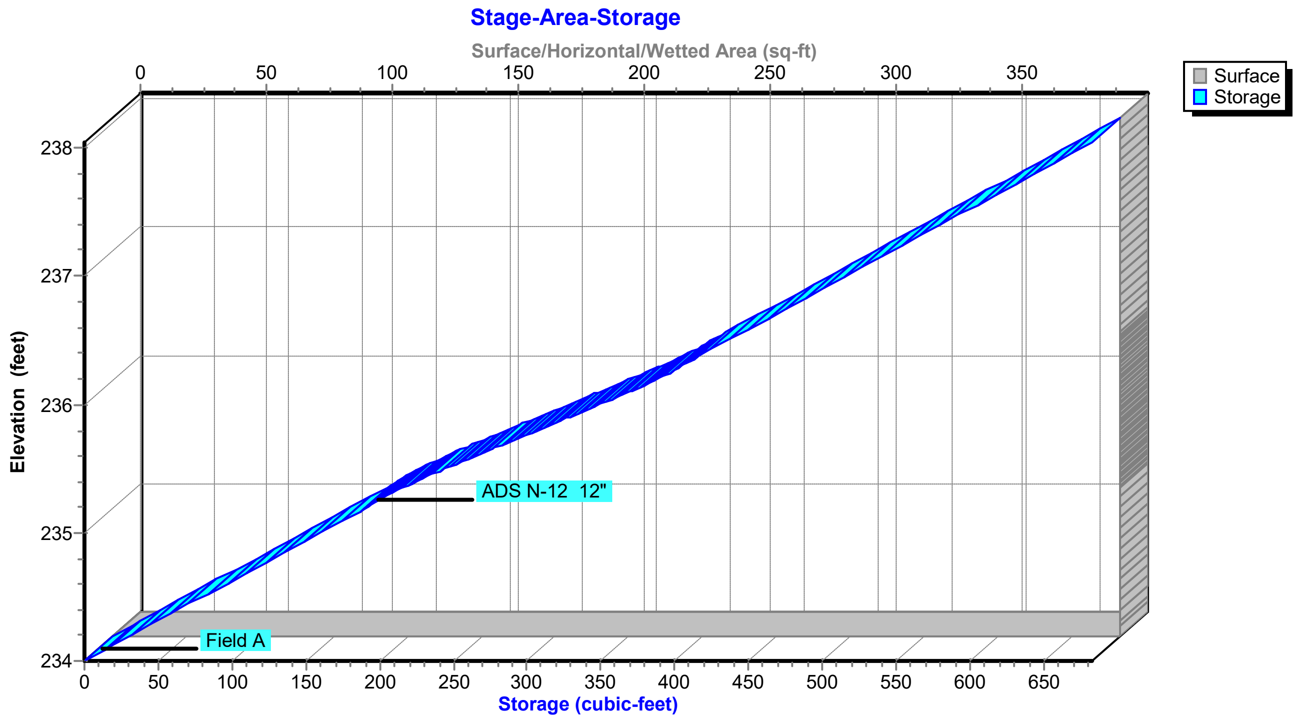
Pond 9P: ADS N12 Infiltration Trench System #4



Pond 9P: ADS N12 Infiltration Trench System #4



Pond 9P: ADS N12 Infiltration Trench System #4



Summary for Pond 10P: Crushed Stone Trench WQ and Galleys System #3

Inflow Area = 59,517 sf, 97.55% Impervious, Inflow Depth > 2.92" for 2-Year event
Inflow = 4.29 cfs @ 12.09 hrs, Volume= 14,504 cf
Outflow = 3.81 cfs @ 12.20 hrs, Volume= 8,803 cf, Atten= 11%, Lag= 6.8 min
Discarded = 0.07 cfs @ 10.98 hrs, Volume= 4,625 cf
Primary = 3.73 cfs @ 12.20 hrs, Volume= 4,178 cf

Routing by Stor-Ind method, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs
Peak Elev= 233.03' @ 12.20 hrs Surf.Area= 3,107 sf Storage= 6,351 cf

Plug-Flow detention time= 188.3 min calculated for 8,803 cf (61% of inflow)
Center-of-Mass det. time= 90.1 min (844.8 - 754.7)

Volume	Invert	Avail.Storage	Storage Description
#1	230.25'	1,658 cf	**5.00'W x 195.00'L x 4.25'H Prismatoid**
			4,144 cf Overall x 40.0% Voids
#2A	229.00'	2,056 cf	**13.00'W x 164.00'L x 4.75'H Field A**
			10,127 cf Overall - 4,987 cf Embedded = 5,140 cf x 40.0% Voids
#3A	229.50'	3,710 cf	**Concrete Galley 4x4x4.25** x 80 Inside #2
			Inside= 42.2"W x 45.0"H => 13.25 sf x 3.50'L = 46.4 cf
			Outside= 54.0"W x 51.0"H => 15.58 sf x 4.00'L = 62.3 cf
			80 Chambers in 2 Rows
		7,424 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	233.00'	**190.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Discarded	229.00'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.07 cfs @ 10.98 hrs HW=230.25' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=2.83 cfs @ 12.20 hrs HW=233.03' (Free Discharge)
↑—**1=Sharp-Crested Rectangular Weir** (Weir Controls 2.83 cfs @ 0.54 fps)

Pond 10P: Crushed Stone Trench WQ and Galleys System #3 - Chamber Wizard Field A

Chamber Model = Concrete Galley 4x4x4.25 (Concrete Galley, Shea LE-EGH, LE-CGH or equivalent)
Inside= 42.2"W x 45.0"H => 13.25 sf x 3.50'L = 46.4 cf
Outside= 54.0"W x 51.0"H => 15.58 sf x 4.00'L = 62.3 cf

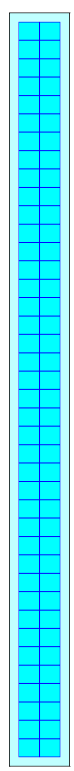
40 Chambers/Row x 4.00' Long = 160.00' Row Length +24.0" End Stone x 2 = 164.00' Base Length
2 Rows x 54.0" Wide + 24.0" Side Stone x 2 = 13.00' Base Width
6.0" Base + 51.0" Chamber Height = 4.75' Field Height

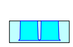
80 Chambers x 46.4 cf = 3,710.5 cf Chamber Storage
80 Chambers x 62.3 cf = 4,986.5 cf Displacement

10,127.0 cf Field - 4,986.5 cf Chambers = 5,140.5 cf Stone x 40.0% Voids = 2,056.2 cf Stone Storage

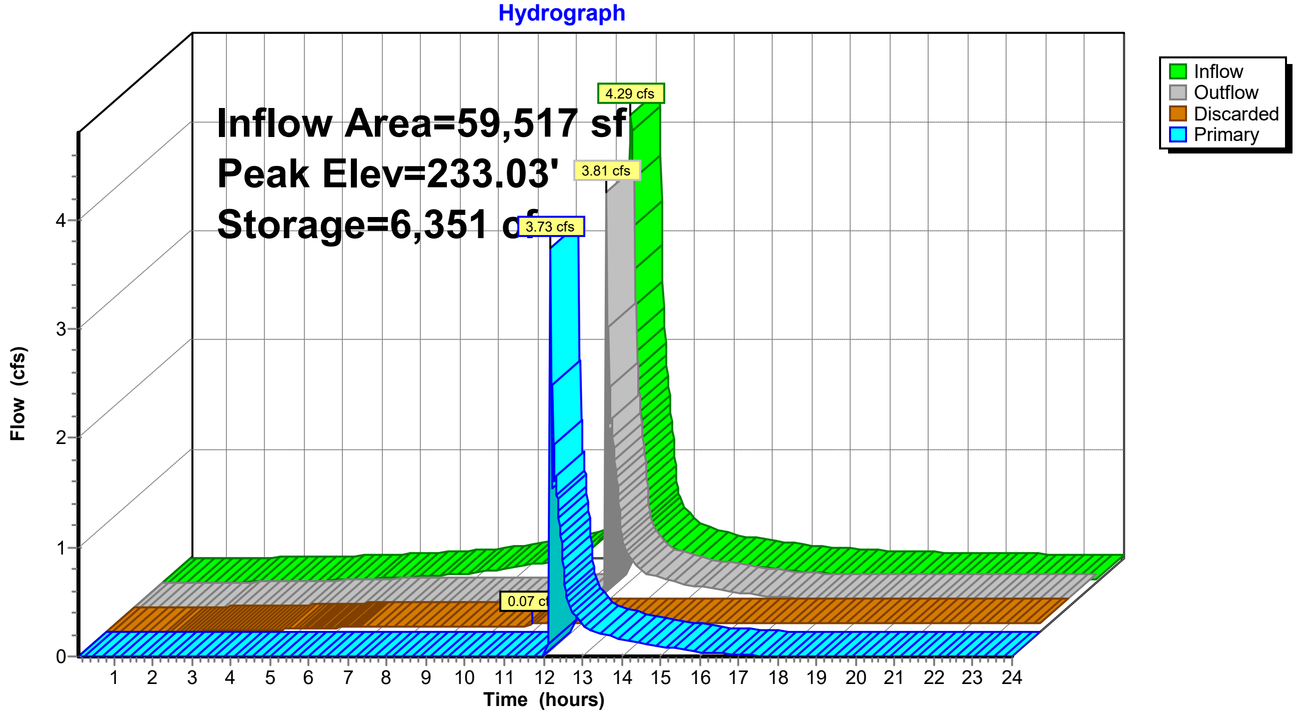
Chamber Storage + Stone Storage = 5,766.7 cf = 0.132 af
Overall Storage Efficiency = 56.9%
Overall System Size = 164.00' x 13.00' x 4.75'

80 Chambers @ $ 0.00 /ea = $ 0.00
375.1 cy Field Excavation @ $ 10.00 /cy = $ 3,750.74
190.4 cy Stone @ $ 30.00 /cy = $ 5,711.65
Total Cost = $ 9,462.39

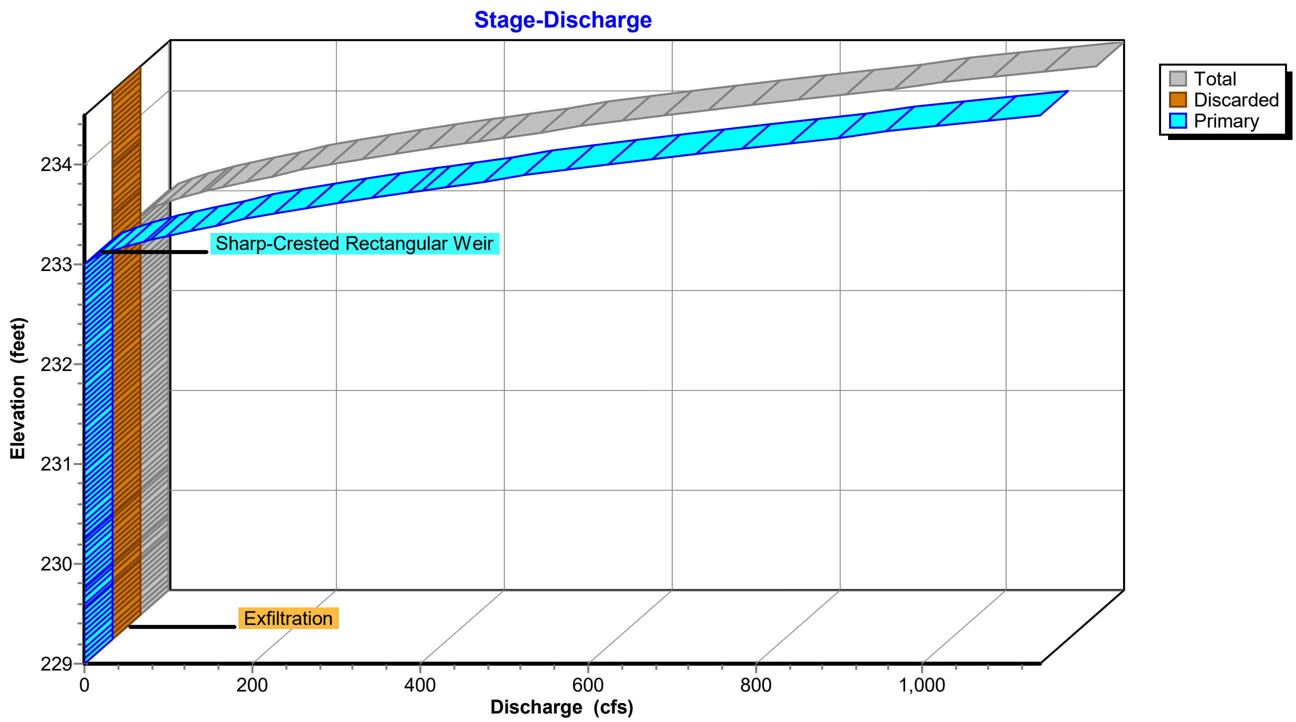




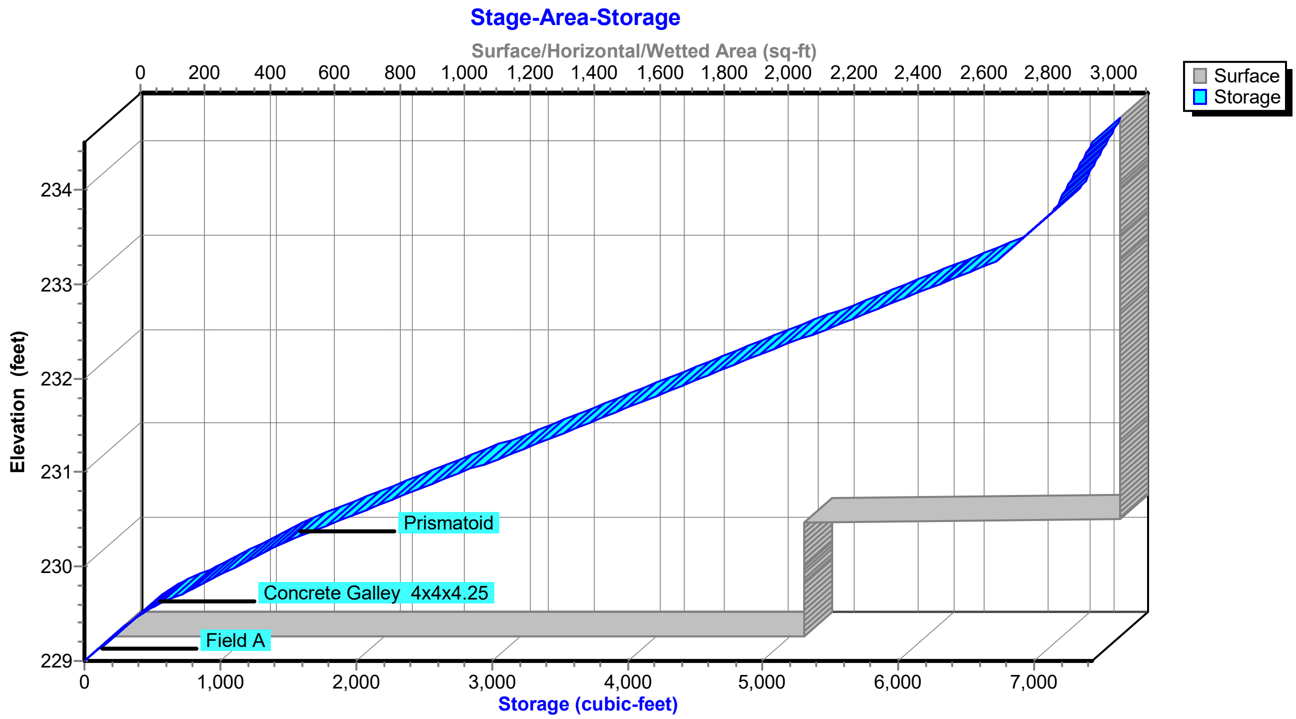
Pond 10P: Crushed Stone Trench WQ and Galleys System #3



Pond 10P: Crushed Stone Trench WQ and Galleys System #3



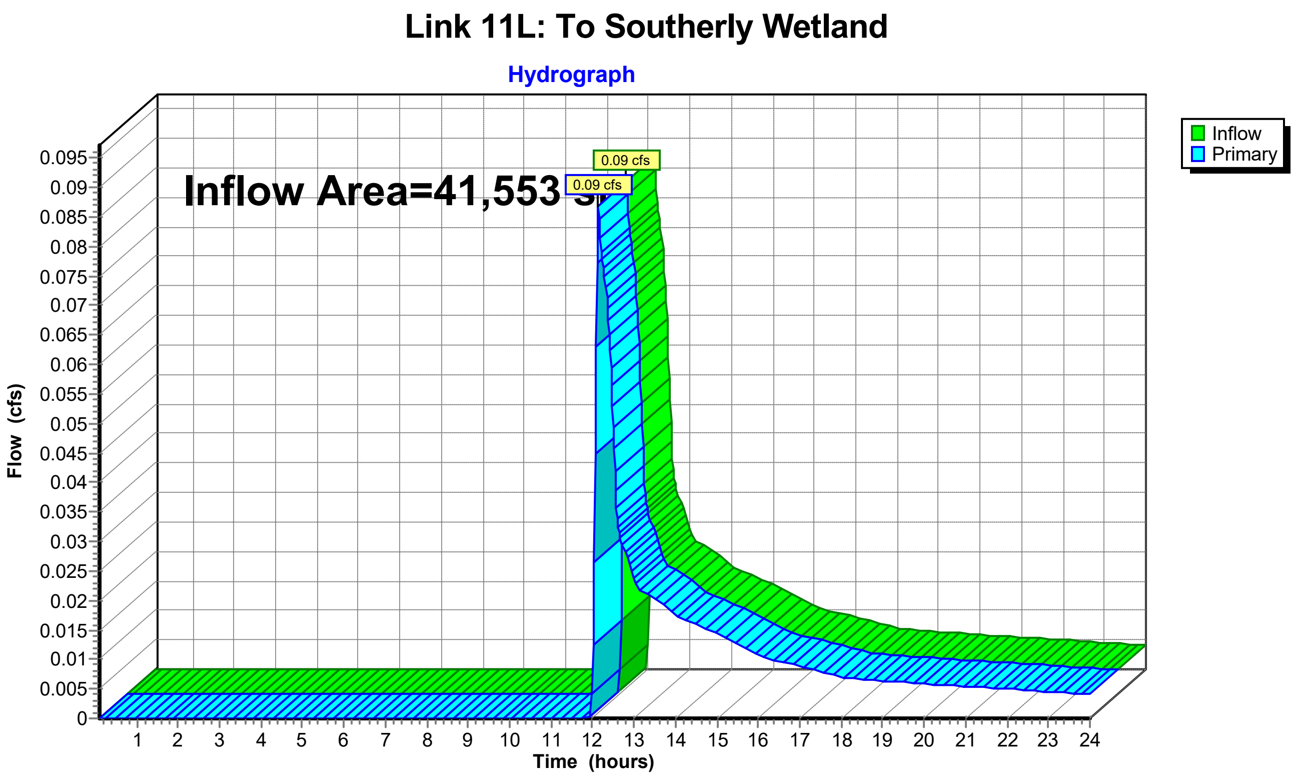
Pond 10P: Crushed Stone Trench WQ and Galleys System #3



Summary for Link 11L: To Southerly Wetland

Inflow Area = 41,553 sf, 52.79% Impervious, Inflow Depth > 0.15" for 2-Year event
Inflow = 0.09 cfs @ 12.14 hrs, Volume= 530 cf
Primary = 0.09 cfs @ 12.14 hrs, Volume= 530 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs

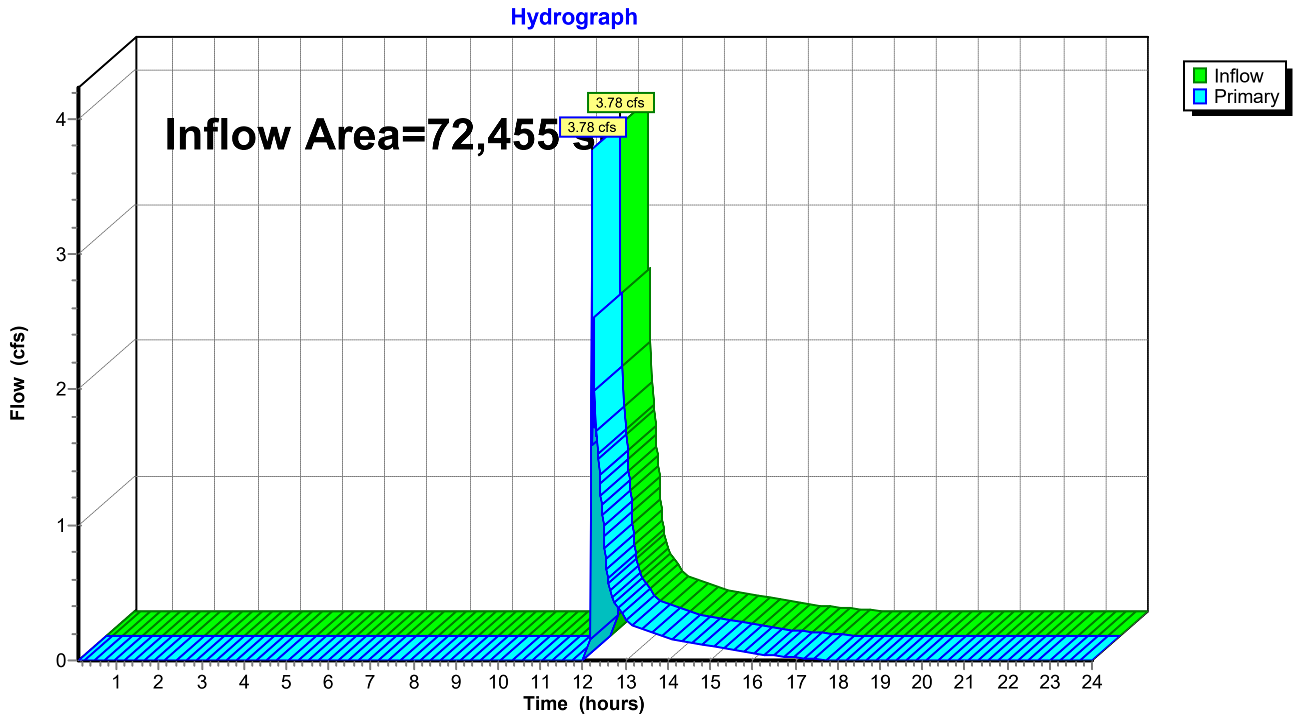


Summary for Link 12L: To Westerly Wetland

Inflow Area = 72,455 sf, 80.13% Impervious, Inflow Depth > 0.75" for 2-Year event
Inflow = 3.78 cfs @ 12.20 hrs, Volume= 4,517 cf
Primary = 3.78 cfs @ 12.20 hrs, Volume= 4,517 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs

Link 12L: To Westerly Wetland



Time span=0.10-24.00 hrs, dt=0.02 hrs, 1196 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1E: To Southerly Wetland Runoff Area=43,251 sf 38.57% Impervious Runoff Depth>2.85"
Tc=6.0 min CN=80 Runoff=3.31 cfs 10,259 cf

Subcatchment 1P: To Southerly Wetland Runoff Area=16,727 sf 0.00% Impervious Runoff Depth>1.14"
Tc=6.0 min CN=58 Runoff=0.44 cfs 1,588 cf

Subcatchment 2E: To Westerly Runoff Area=71,205 sf 29.43% Impervious Runoff Depth>3.52"
Tc=6.0 min UI Adjusted CN=87 Runoff=6.62 cfs 20,869 cf

Subcatchment 2P: To Westerly Wetland Runoff Area=12,938 sf 0.00% Impervious Runoff Depth>1.01"
Tc=6.0 min CN=56 Runoff=0.29 cfs 1,093 cf

Subcatchment 3P: Pavement to Infiltration Runoff Area=39,943 sf 96.34% Impervious Runoff Depth>4.71"
Tc=6.0 min CN=98 Runoff=4.43 cfs 15,677 cf

Subcatchment 4P: Roof to Infiltration Runoff Area=19,574 sf 100.00% Impervious Runoff Depth>4.71"
Tc=6.0 min CN=98 Runoff=2.17 cfs 7,682 cf

Subcatchment 5P: Pavement to Infiltration Runoff Area=15,930 sf 84.93% Impervious Runoff Depth>4.15"
Tc=6.0 min CN=93 Runoff=1.67 cfs 5,503 cf

Subcatchment 6P: Pavement to Infiltration Runoff Area=8,896 sf 94.49% Impervious Runoff Depth>4.59"
Tc=6.0 min CN=97 Runoff=0.98 cfs 3,406 cf

Pond 7P: Crushed Stone Trench WQ and Peak Elev=239.02' Storage=2,360 cf Inflow=1.67 cfs 5,503 cf
Discarded=0.03 cfs 1,571 cf Primary=1.12 cfs 1,680 cf Outflow=1.14 cfs 3,251 cf

Pond 8P: Crushed Stone Trench WQ and Peak Elev=232.74' Storage=2,094 cf Inflow=0.98 cfs 3,406 cf
Discarded=0.03 cfs 1,711 cf Primary=0.00 cfs 0 cf Outflow=0.03 cfs 1,711 cf

Pond 9P: ADS N12 Infiltration Trench System Peak Elev=235.45' Storage=234 cf Inflow=2.17 cfs 7,682 cf
Discarded=0.01 cfs 760 cf Primary=2.00 cfs 6,898 cf Outflow=2.01 cfs 7,658 cf

Pond 10P: Crushed Stone Trench WQ and Peak Elev=233.04' Storage=6,375 cf Inflow=6.37 cfs 22,575 cf
Discarded=0.07 cfs 5,052 cf Primary=6.30 cfs 11,358 cf Outflow=6.37 cfs 16,410 cf

Link 11L: To Southerly Wetland Inflow=1.42 cfs 3,269 cf
Primary=1.42 cfs 3,269 cf

Link 12L: To Westerly Wetland Inflow=6.58 cfs 12,452 cf
Primary=6.58 cfs 12,452 cf

Total Runoff Area = 228,464 sf Runoff Volume = 66,077 cf Average Runoff Depth = 3.47"
48.51% Pervious = 110,837 sf 51.49% Impervious = 117,627 sf

Summary for Subcatchment 1E: To Southerly Wetland

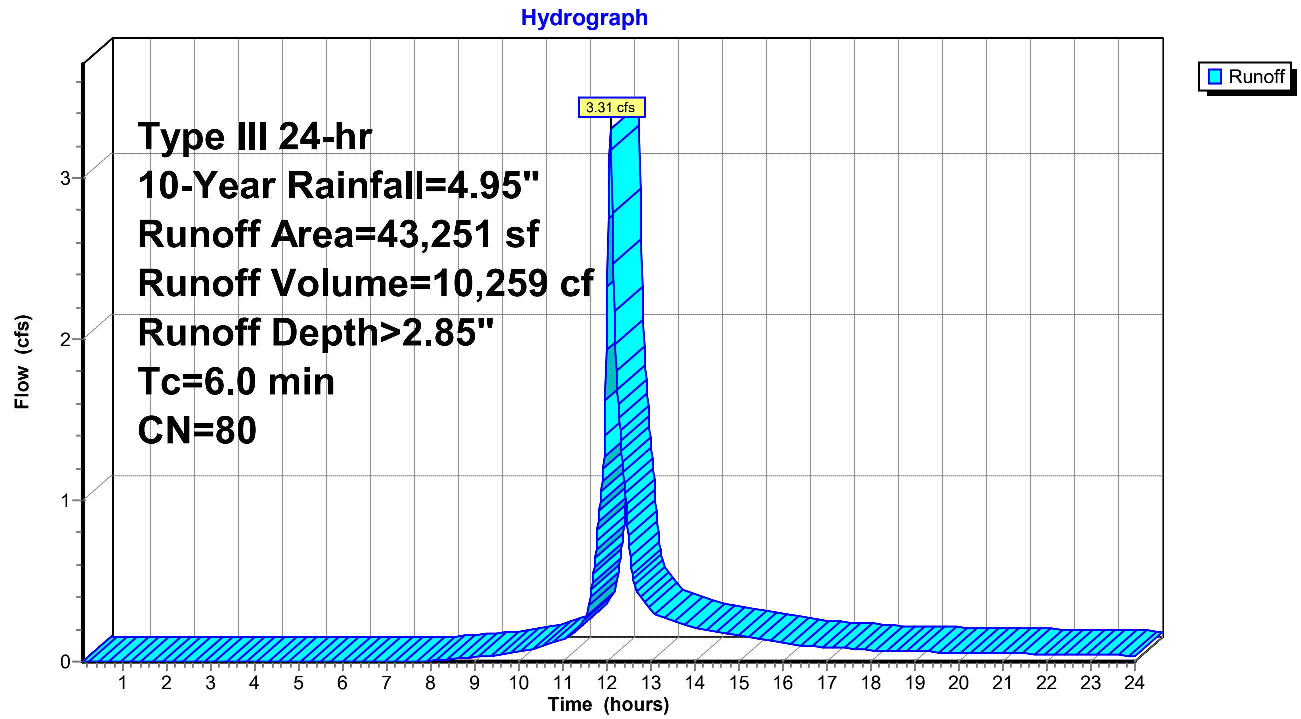
Runoff = 3.31 cfs @ 12.09 hrs, Volume= 10,259 cf, Depth> 2.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Rainfall=4.95"

Area (sf)	CN	Description
12,540	61	>75% Grass cover, Good, HSG B
16,680	98	Paved parking, HSG B
7,251	96	Gravel surface, HSG B
6,780	55	Woods, Good, HSG B
43,251	80	Weighted Average
26,571		61.43% Pervious Area
16,680		38.57% Impervious Area

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

Subcatchment 1E: To Southerly Wetland



Summary for Subcatchment 1P: To Southerly Wetland

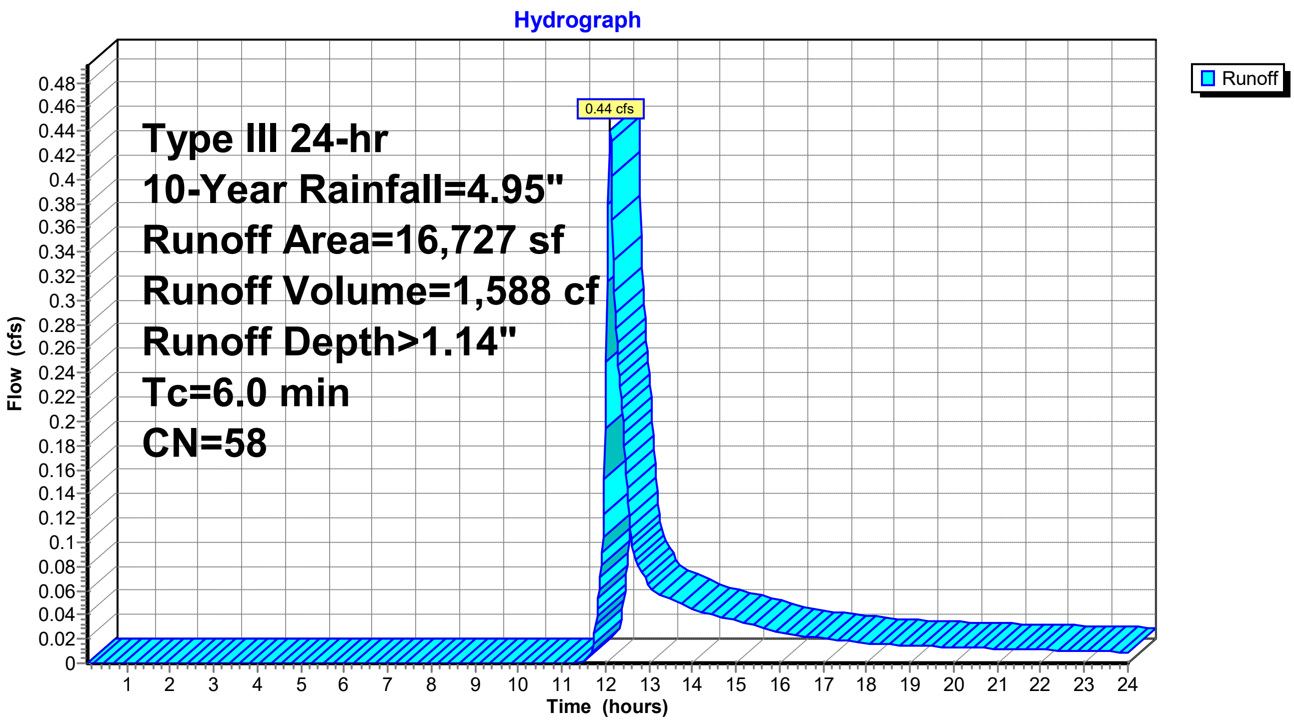
Runoff = 0.44 cfs @ 12.10 hrs, Volume= 1,588 cf, Depth> 1.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Rainfall=4.95"

Area (sf)	CN	Description
9,463	61	>75% Grass cover, Good, HSG B
7,264	55	Woods, Good, HSG B
16,727	58	Weighted Average
16,727		100.00% Pervious Area

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

Subcatchment 1P: To Southerly Wetland



Summary for Subcatchment 2E: To Westerly Wetland/Property Line

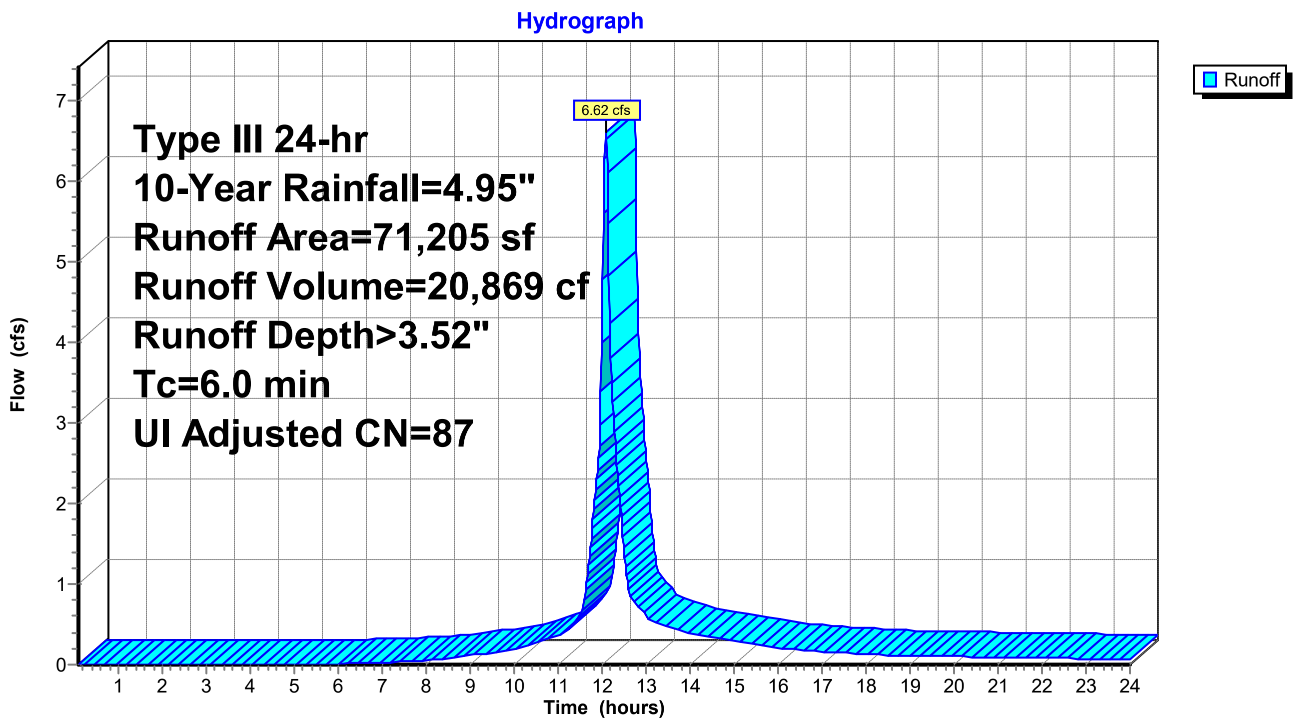
Runoff = 6.62 cfs @ 12.09 hrs, Volume= 20,869 cf, Depth> 3.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Rainfall=4.95"

Area (sf)	CN	Adj	Description
1,212	61		>75% Grass cover, Good, HSG B
1,369	98		Paved parking, HSG B
12,957	55		Woods, Good, HSG B
36,080	96		Gravel surface, HSG B
19,587	98		Unconnected roofs, HSG B
71,205	89	87	Weighted Average, UI Adjusted
50,249			70.57% Pervious Area
20,956			29.43% Impervious Area
19,587			93.47% Unconnected

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

Subcatchment 2E: To Westerly Wetland/Property Line



Summary for Subcatchment 2P: To Westerly Wetland

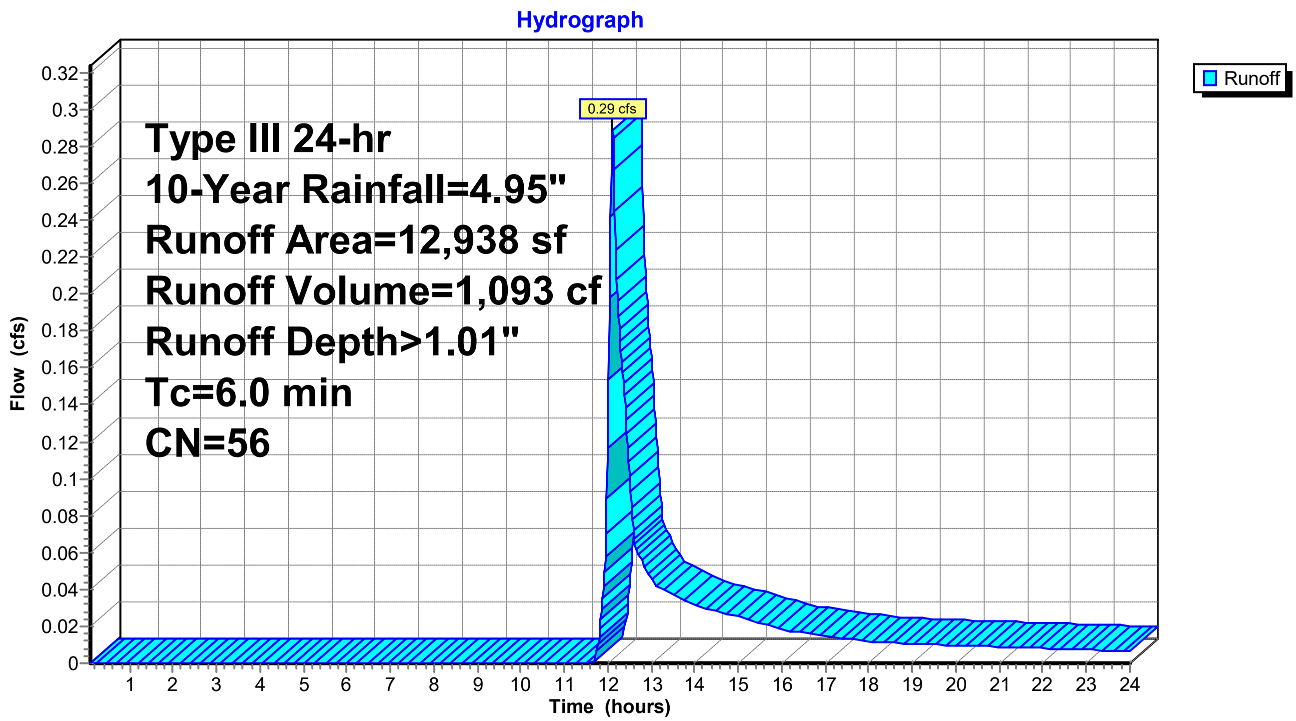
Runoff = 0.29 cfs @ 12.11 hrs, Volume= 1,093 cf, Depth> 1.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Rainfall=4.95"

Area (sf)	CN	Description
2,281	61	>75% Grass cover, Good, HSG B
10,657	55	Woods, Good, HSG B
12,938	56	Weighted Average
12,938		100.00% Pervious Area

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

Subcatchment 2P: To Westerly Wetland



Summary for Subcatchment 3P: Pavement to Infiltration System

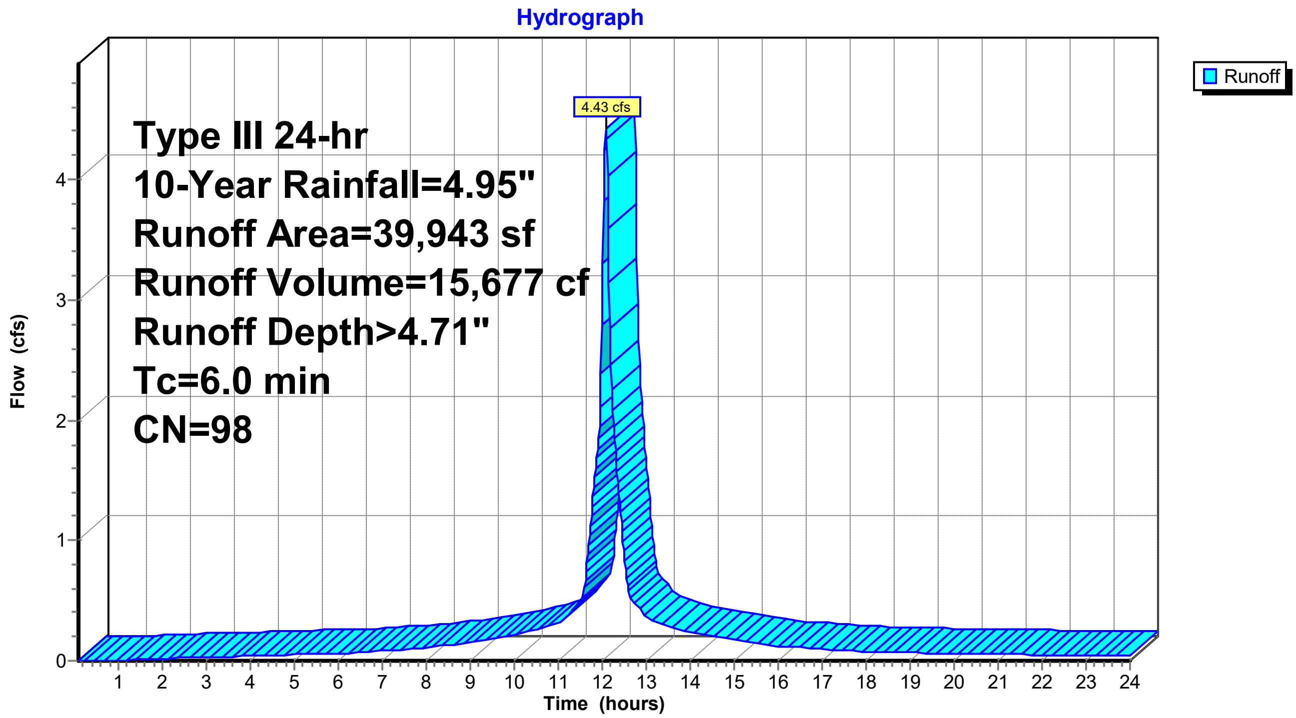
Runoff = 4.43 cfs @ 12.08 hrs, Volume= 15,677 cf, Depth> 4.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Rainfall=4.95"

	Area (sf)	CN	Description
	38,482	98	Paved parking, HSG B
*	1,461	85	CrushedStone, HSG B
	39,943	98	Weighted Average
	1,461		3.66% Pervious Area
	38,482		96.34% Impervious Area

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

Subcatchment 3P: Pavement to Infiltration System



Summary for Subcatchment 4P: Roof to Infiltration System

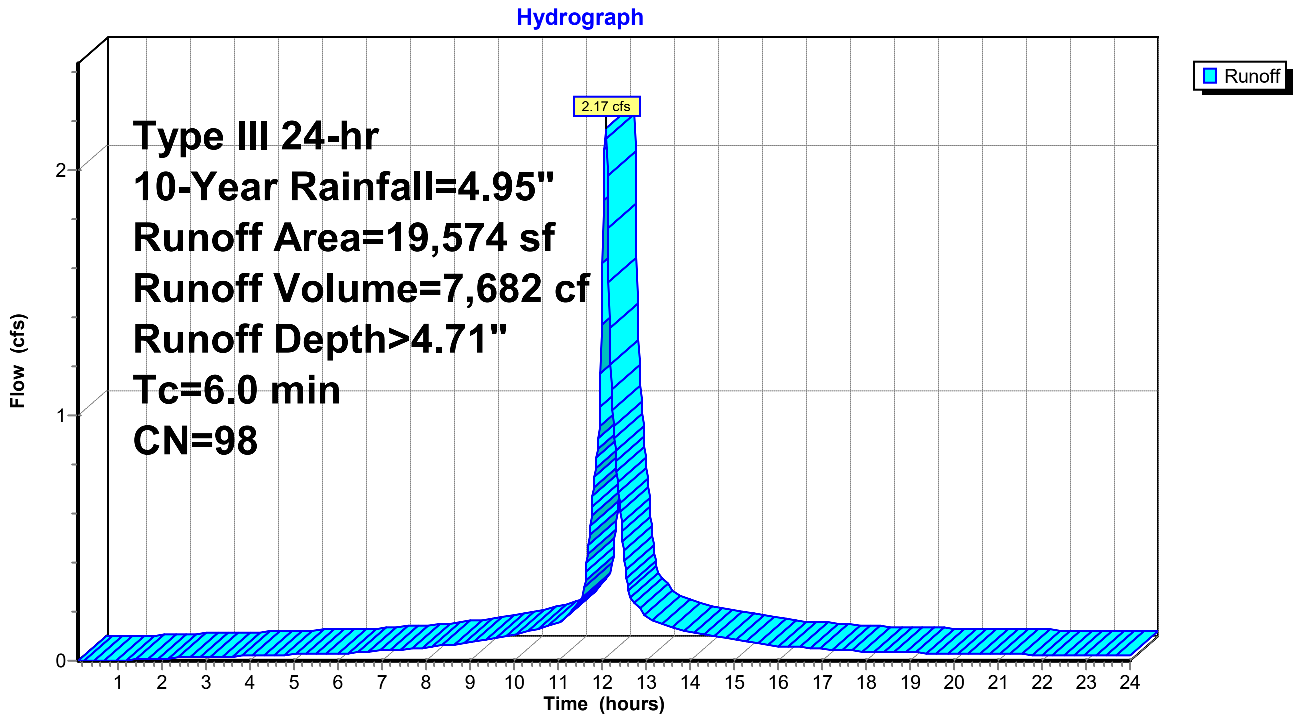
Runoff = 2.17 cfs @ 12.08 hrs, Volume= 7,682 cf, Depth> 4.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Rainfall=4.95"

Area (sf)	CN	Description
19,574	98	Roofs, HSG B
19,574		100.00% Impervious Area

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

Subcatchment 4P: Roof to Infiltration System



Summary for Subcatchment 5P: Pavement to Infiltration System

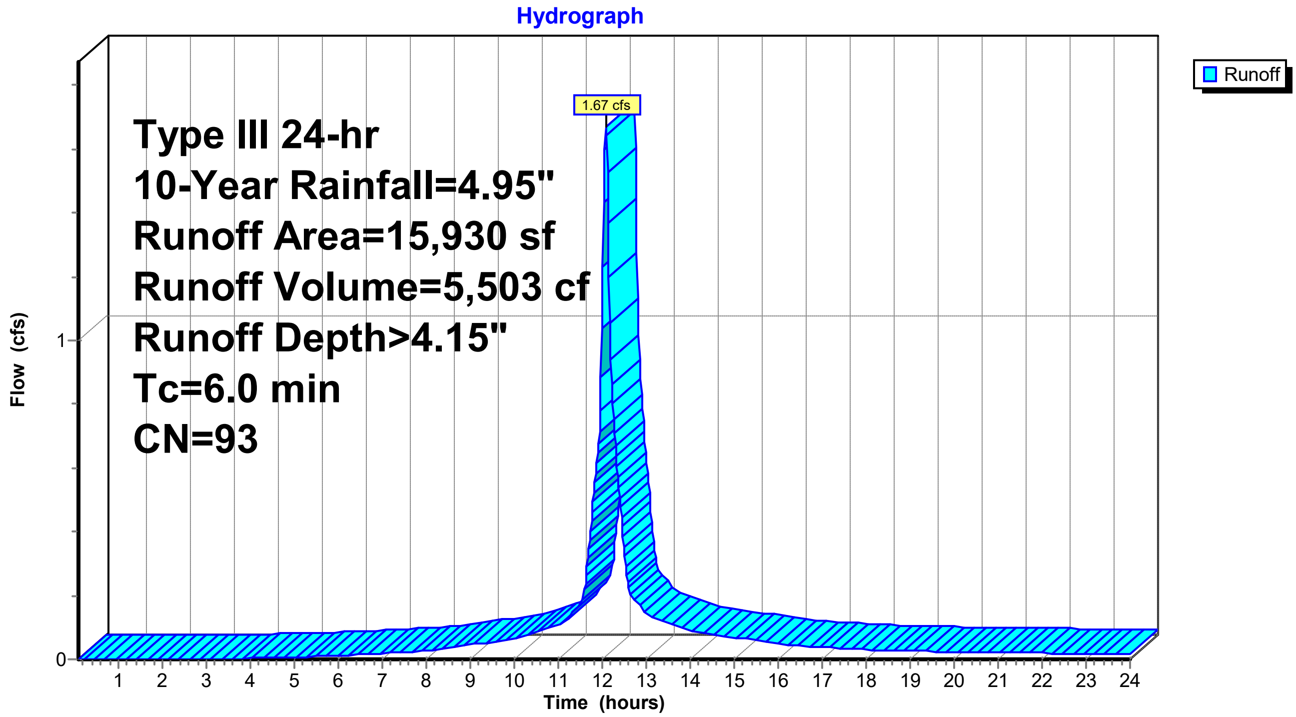
Runoff = 1.67 cfs @ 12.08 hrs, Volume= 5,503 cf, Depth> 4.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Rainfall=4.95"

	Area (sf)	CN	Description
	13,529	98	Paved parking, HSG B
	1,973	61	>75% Grass cover, Good, HSG B
*	428	85	Crushed Stone, HSG B
	15,930	93	Weighted Average
	2,401		15.07% Pervious Area
	13,529		84.93% Impervious Area

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

Subcatchment 5P: Pavement to Infiltration System



Summary for Subcatchment 6P: Pavement to Infiltration System

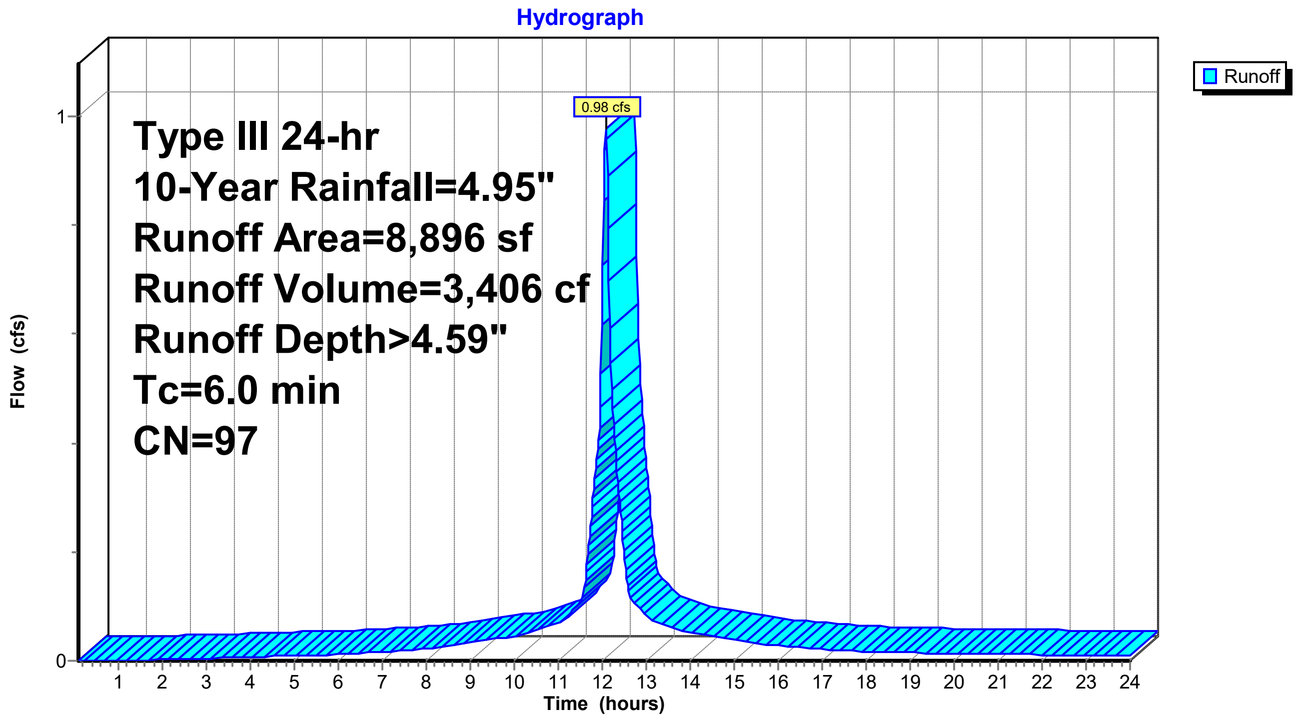
Runoff = 0.98 cfs @ 12.08 hrs, Volume= 3,406 cf, Depth> 4.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Rainfall=4.95"

	Area (sf)	CN	Description
	8,406	98	Paved parking, HSG B
*	490	85	Crushed Stone, HSG B
	8,896	97	Weighted Average
	490		5.51% Pervious Area
	8,406		94.49% Impervious Area

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

Subcatchment 6P: Pavement to Infiltration System



Summary for Pond 7P: Crushed Stone Trench WQ and Galleys System #1

Inflow Area =	15,930 sf, 84.93% Impervious,	Inflow Depth > 4.15"	for 10-Year event
Inflow =	1.67 cfs @ 12.08 hrs, Volume=	5,503 cf	
Outflow =	1.14 cfs @ 12.20 hrs, Volume=	3,251 cf,	Atten= 32%, Lag= 7.2 min
Discarded =	0.03 cfs @ 11.60 hrs, Volume=	1,571 cf	
Primary =	1.12 cfs @ 12.20 hrs, Volume=	1,680 cf	

Routing by Stor-Ind method, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs
Peak Elev= 239.02' @ 12.20 hrs Surf.Area= 1,115 sf Storage= 2,360 cf

Plug-Flow detention time= 186.9 min calculated for 3,248 cf (59% of inflow)
Center-of-Mass det. time= 83.0 min (861.0 - 778.0)

Volume	Invert	Avail.Storage	Storage Description
#1	236.00'	532 cf	**3.50'W x 95.00'L x 4.00'H Prismatoid** 1,330 cf Overall x 40.0% Voids
#2A	234.25'	937 cf	**8.50'W x 92.00'L x 4.75'H Field A** 3,715 cf Overall - 1,371 cf Embedded = 2,343 cf x 40.0% Voids
#3A	234.75'	1,020 cf	**Concrete Galley 4x4x4.25** x 22 Inside #2 Inside= 42.2"W x 45.0"H => 13.25 sf x 3.50'L = 46.4 cf Outside= 54.0"W x 51.0"H => 15.58 sf x 4.00'L = 62.3 cf
		2,490 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	239.00'	**95.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Discarded	234.25'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.03 cfs @ 11.60 hrs HW=236.01' (Free Discharge)
└─**2=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.94 cfs @ 12.20 hrs HW=239.02' (Free Discharge)
└─**1=Sharp-Crested Rectangular Weir** (Weir Controls 0.94 cfs @ 0.47 fps)

Pond 7P: Crushed Stone Trench WQ and Galleys System #1 - Chamber Wizard Field A

Chamber Model = Concrete Galley 4x4x4.25 (Concrete Galley, Shea LE-EGH, LE-CGH or equivalent)
Inside= 42.2"W x 45.0"H => 13.25 sf x 3.50'L = 46.4 cf
Outside= 54.0"W x 51.0"H => 15.58 sf x 4.00'L = 62.3 cf

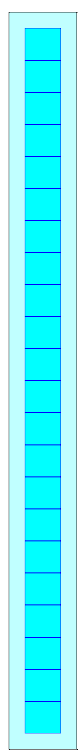
22 Chambers/Row x 4.00' Long = 88.00' Row Length +24.0" End Stone x 2 = 92.00' Base Length
1 Rows x 54.0" Wide + 24.0" Side Stone x 2 = 8.50' Base Width
6.0" Base + 51.0" Chamber Height = 4.75' Field Height

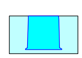
22 Chambers x 46.4 cf = 1,020.4 cf Chamber Storage
22 Chambers x 62.3 cf = 1,371.3 cf Displacement

3,714.5 cf Field - 1,371.3 cf Chambers = 2,343.2 cf Stone x 40.0% Voids = 937.3 cf Stone Storage

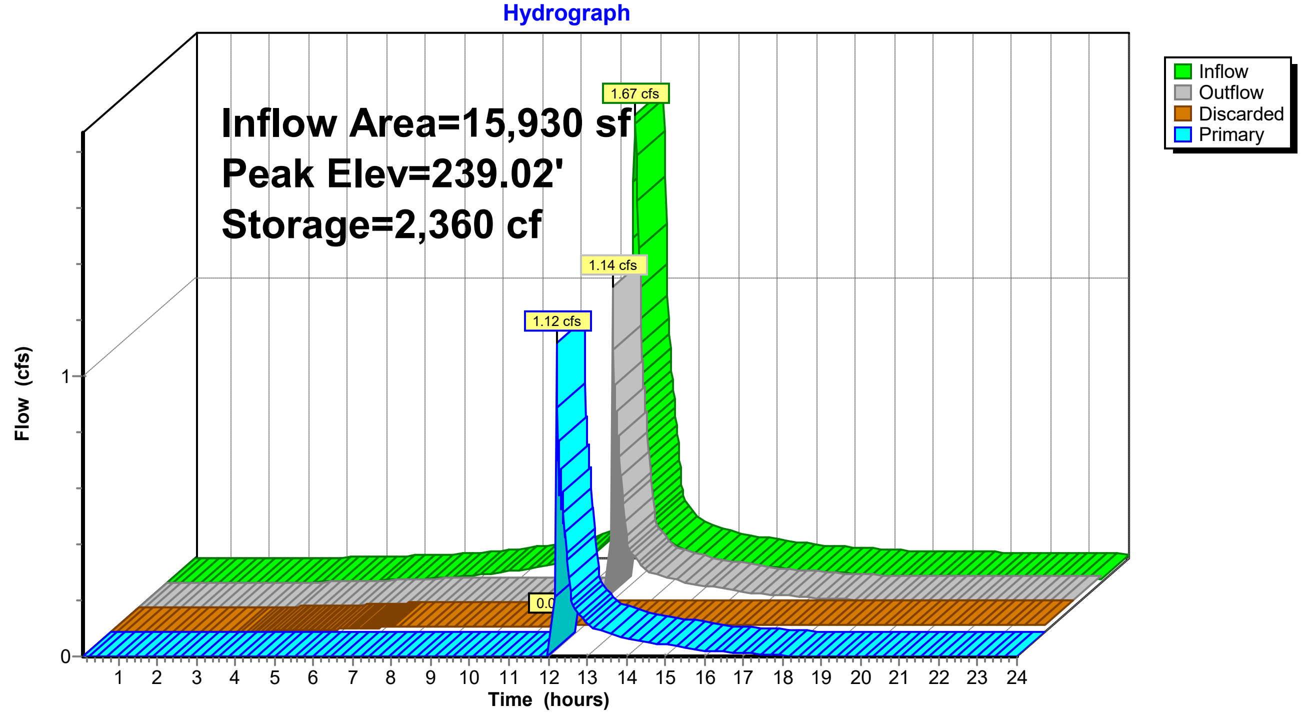
Chamber Storage + Stone Storage = 1,957.7 cf = 0.045 af
Overall Storage Efficiency = 52.7%
Overall System Size = 92.00' x 8.50' x 4.75'

22 Chambers @ $ 0.00 /ea = $ 0.00
137.6 cy Field Excavation @ $ 10.00 /cy = $ 1,375.74
86.8 cy Stone @ $ 30.00 /cy = $ 2,603.57
Total Cost = $ 3,979.31

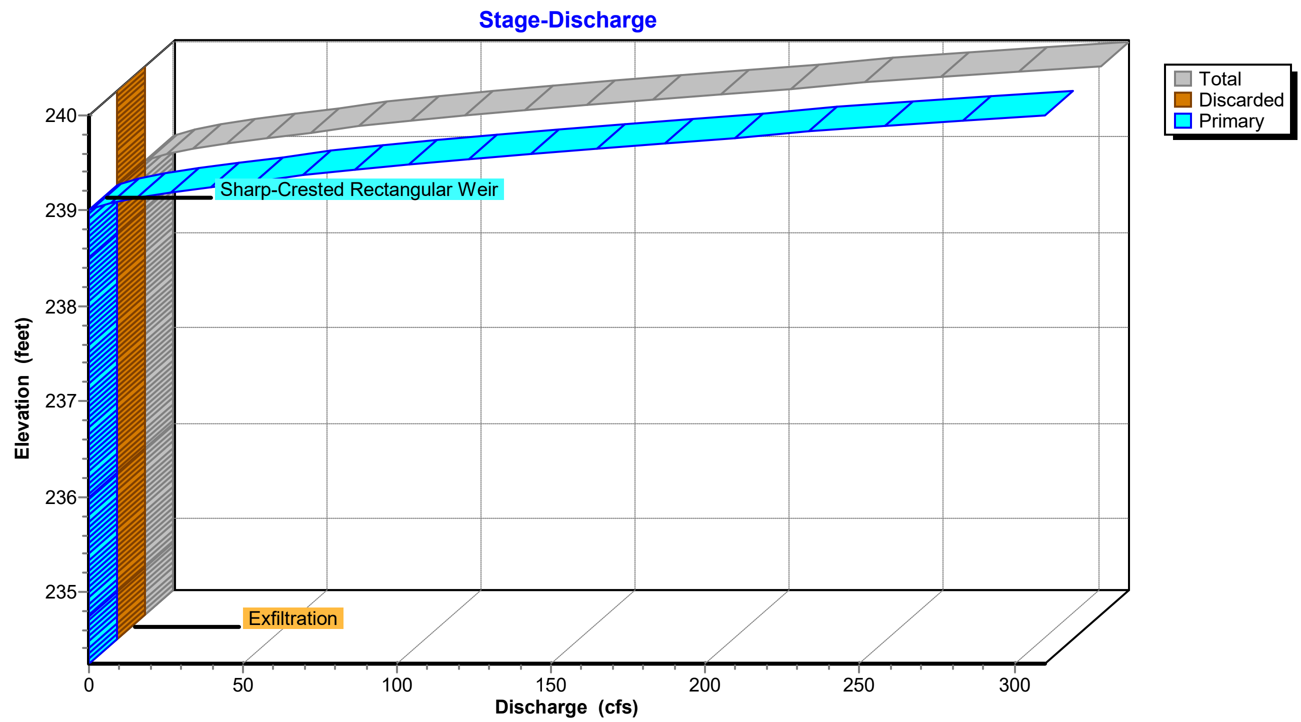




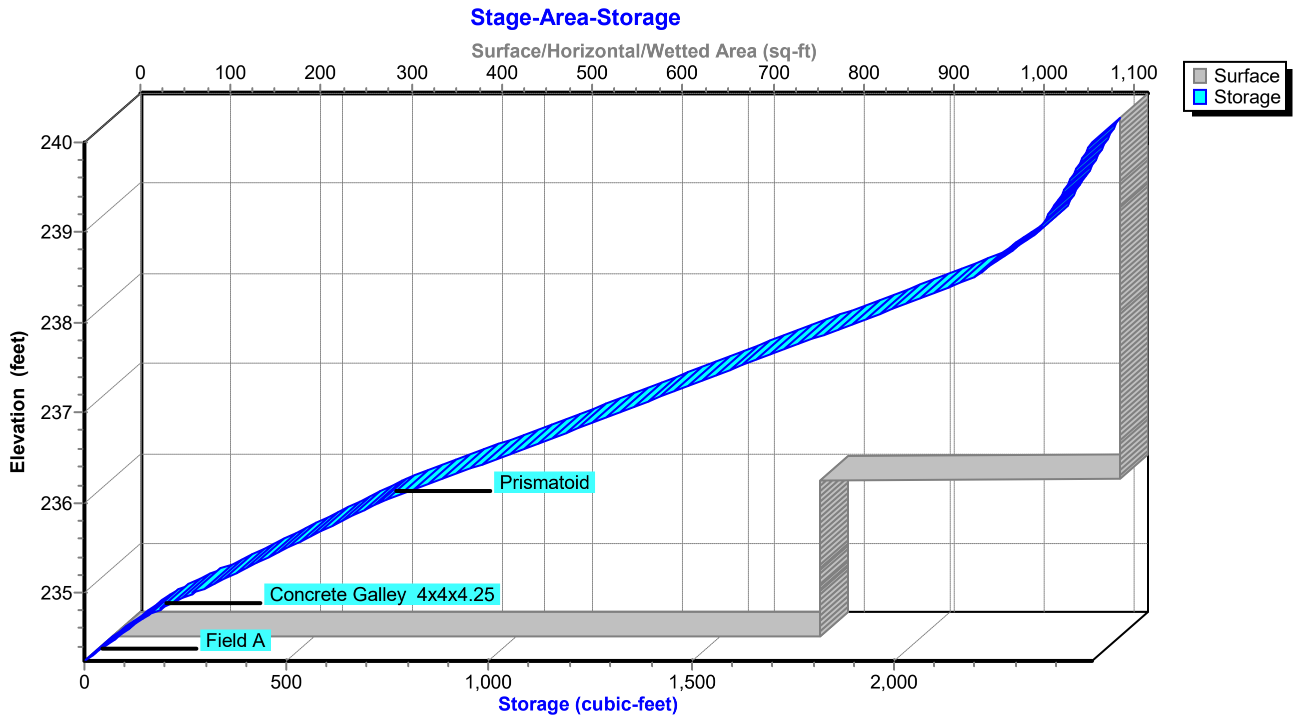
Pond 7P: Crushed Stone Trench WQ and Galleys System #1



Pond 7P: Crushed Stone Trench WQ and Galleys System #1



Pond 7P: Crushed Stone Trench WQ and Galleys System #1



Summary for Pond 8P: Crushed Stone Trench WQ and Galleys System #2

Inflow Area = 8,896 sf, 94.49% Impervious, Inflow Depth > 4.59" for 10-Year event
Inflow = 0.98 cfs @ 12.08 hrs, Volume= 3,406 cf
Outflow = 0.03 cfs @ 12.08 hrs, Volume= 1,711 cf, Atten= 97%, Lag= 0.0 min
Discarded = 0.03 cfs @ 12.08 hrs, Volume= 1,711 cf
Primary = 0.00 cfs @ 0.10 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs
Peak Elev= 232.74' @ 15.91 hrs Surf.Area= 1,208 sf Storage= 2,094 cf

Plug-Flow detention time= 286.0 min calculated for 1,711 cf (50% of inflow)
Center-of-Mass det. time= 161.7 min (917.1 - 755.4)

Volume	Invert	Avail.Storage	Storage Description
#1	231.00'	549 cf	**4.00'W x 98.00'L x 3.50'H Prismatoid**
			1,372 cf Overall x 40.0% Voids
#2A	228.75'	977 cf	**8.50'W x 96.00'L x 4.75'H Field A**
			3,876 cf Overall - 1,434 cf Embedded = 2,442 cf x 40.0% Voids
#3A	229.25'	1,067 cf	**Concrete Galley 4x4x4.25** x 23 Inside #2
			Inside= 42.2"W x 45.0"H => 13.25 sf x 3.50'L = 46.4 cf
			Outside= 54.0"W x 51.0"H => 15.58 sf x 4.00'L = 62.3 cf
		2,593 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	233.00'	**98.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Discarded	228.75'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.03 cfs @ 12.08 hrs HW=231.10' (Free Discharge)
└─**2=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 0.10 hrs HW=228.75' (Free Discharge)
└─**1=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 8P: Crushed Stone Trench WQ and Galleys System #2 - Chamber Wizard Field A

Chamber Model = Concrete Galley 4x4x4.25 (Concrete Galley, Shea LE-EGH, LE-CGH or equivalent)
Inside= 42.2"W x 45.0"H => 13.25 sf x 3.50'L = 46.4 cf
Outside= 54.0"W x 51.0"H => 15.58 sf x 4.00'L = 62.3 cf

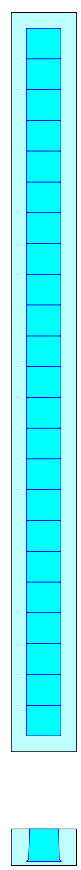
23 Chambers/Row x 4.00' Long = 92.00' Row Length +24.0" End Stone x 2 = 96.00' Base Length
1 Rows x 54.0" Wide + 24.0" Side Stone x 2 = 8.50' Base Width
6.0" Base + 51.0" Chamber Height = 4.75' Field Height

23 Chambers x 46.4 cf = 1,066.8 cf Chamber Storage
23 Chambers x 62.3 cf = 1,433.6 cf Displacement

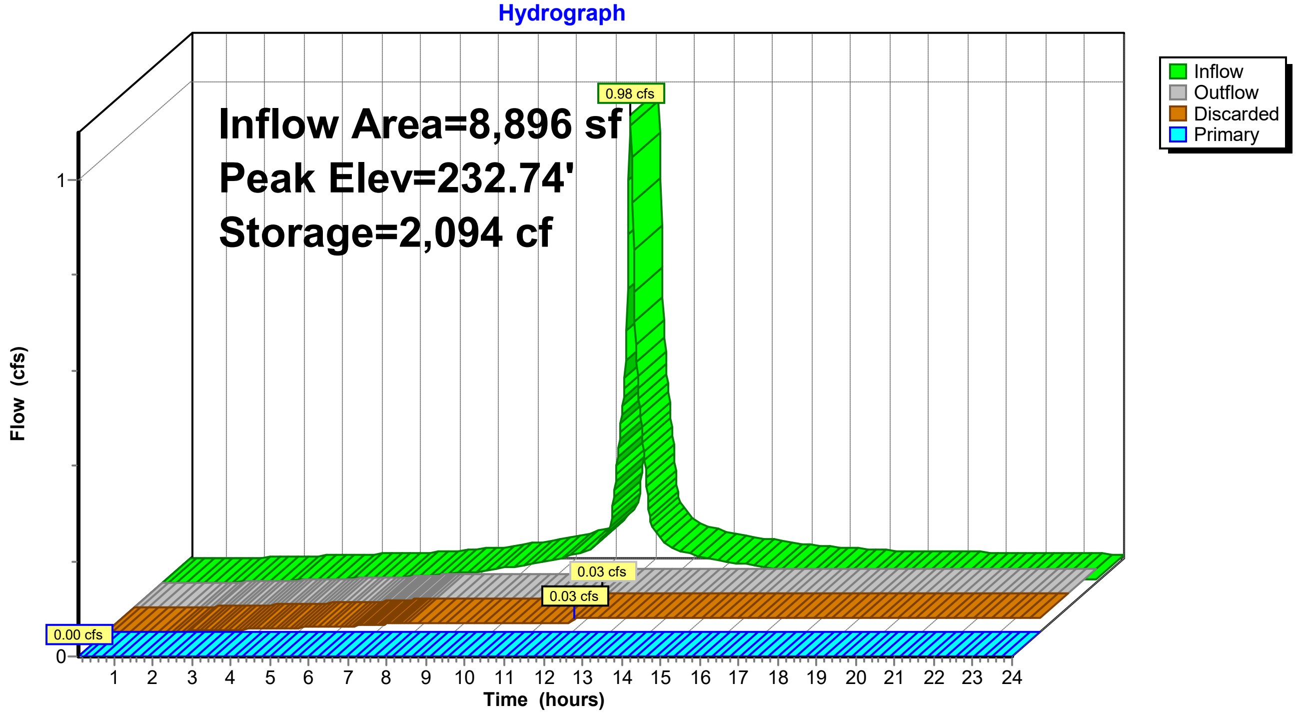
3,876.0 cf Field - 1,433.6 cf Chambers = 2,442.4 cf Stone x 40.0% Voids = 977.0 cf Stone Storage

Chamber Storage + Stone Storage = 2,043.7 cf = 0.047 af
Overall Storage Efficiency = 52.7%
Overall System Size = 96.00' x 8.50' x 4.75'

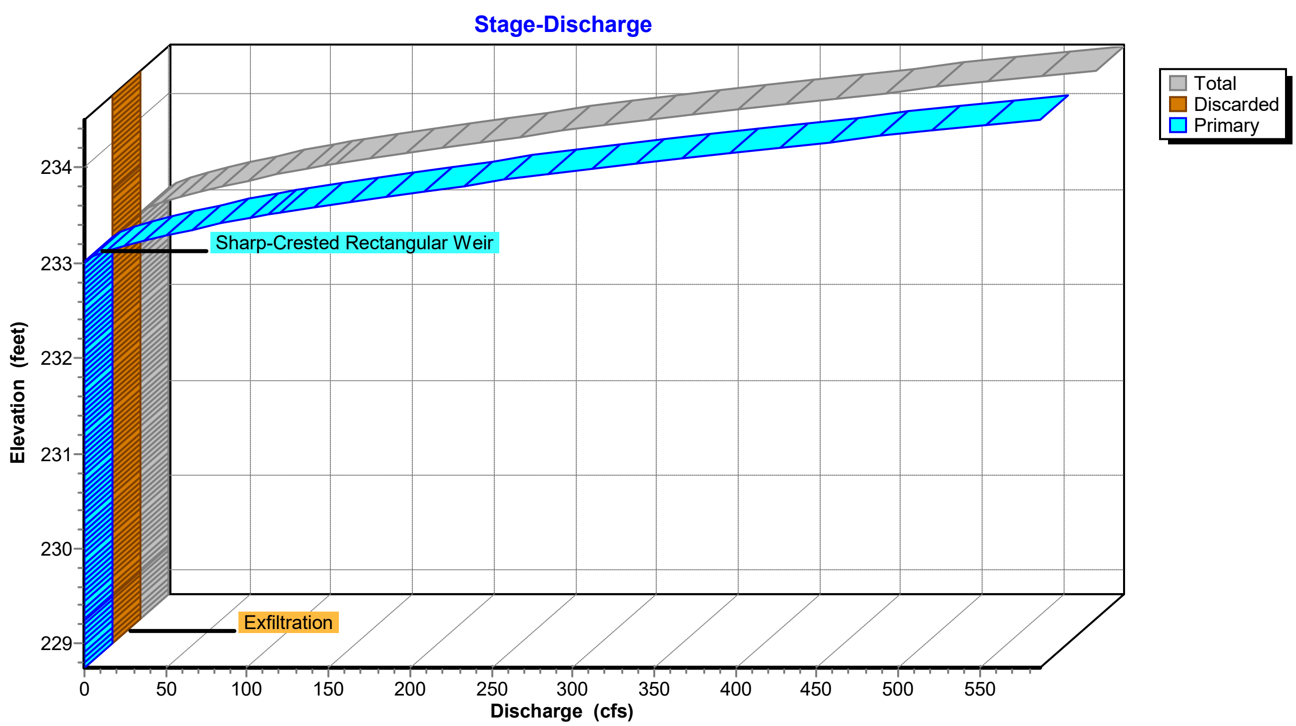
23 Chambers @ $ 0.00 /ea = $ 0.00
143.6 cy Field Excavation @ $ 10.00 /cy = $ 1,435.56
90.5 cy Stone @ $ 30.00 /cy = $ 2,713.75
Total Cost = $ 4,149.31



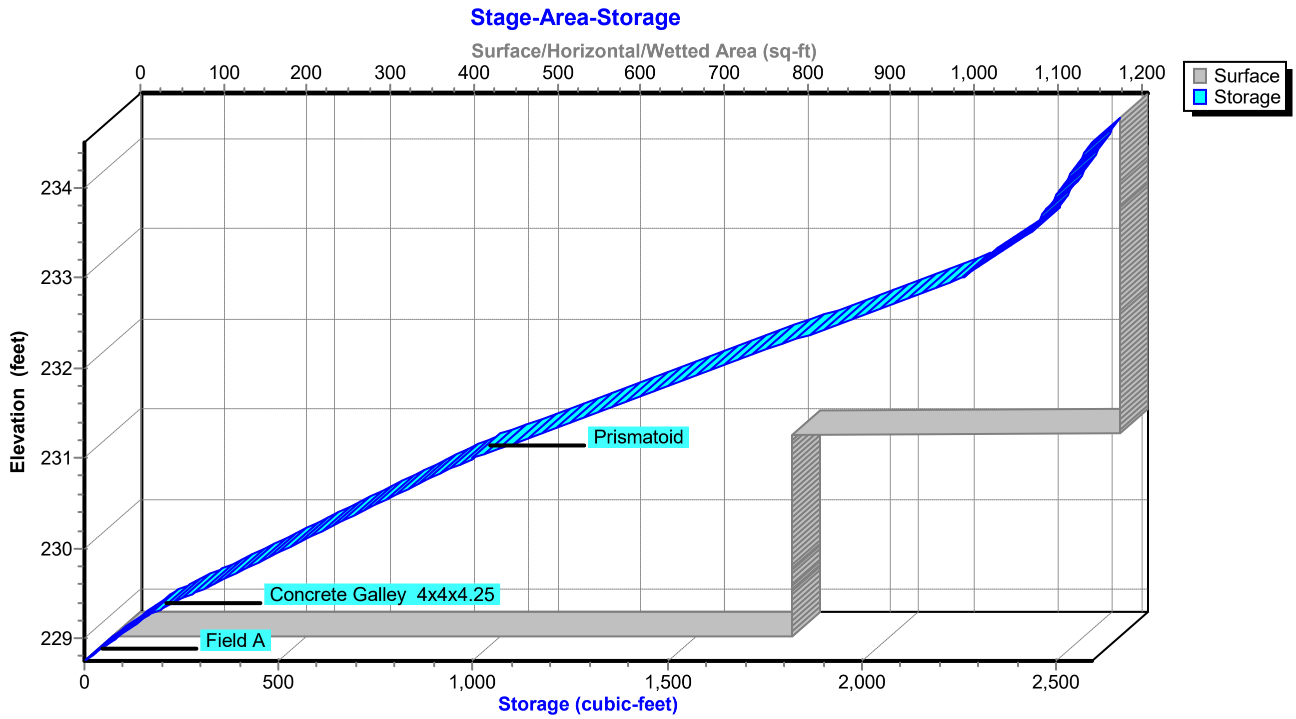
Pond 8P: Crushed Stone Trench WQ and Galleys System #2



Pond 8P: Crushed Stone Trench WQ and Galleys System #2



Pond 8P: Crushed Stone Trench WQ and Galleys System #2



Summary for Pond 9P: ADS N12 Infiltration Trench System #4

Inflow Area = 19,574 sf,100.00% Impervious, Inflow Depth > 4.71" for 10-Year event
Inflow = 2.17 cfs @ 12.08 hrs, Volume= 7,682 cf
Outflow = 2.01 cfs @ 12.12 hrs, Volume= 7,658 cf, Atten= 7%, Lag= 2.0 min
Discarded = 0.01 cfs @ 2.38 hrs, Volume= 760 cf
Primary = 2.00 cfs @ 12.12 hrs, Volume= 6,898 cf

Routing by Stor-Ind method, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs
Peak Elev= 235.45' @ 12.12 hrs Surf.Area= 400 sf Storage= 234 cf

Plug-Flow detention time= 6.3 min calculated for 7,658 cf (100% of inflow)
Center-of-Mass det. time= 4.1 min (751.8 - 747.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	234.00'	608 cf	**4.21'W x 95.00'L x 4.04'H Field A** 1,616 cf Overall - 97 cf Embedded = 1,519 cf x 40.0% Voids
#2A	235.17'	75 cf	**ADS N-12 12"** x 4 Inside #1 Inside= 12.2"W x 12.2"H => 0.81 sf x 20.00'L = 16.2 cf Outside= 14.5"W x 14.5"H => 1.05 sf x 20.00'L = 20.9 cf Row Length Adjustment= +13.00' x 0.81 sf x 1 rows
		683 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	234.00'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	234.10'	**10.0" Round Culvert** L= 155.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 234.10' / 232.00' S= 0.0135 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.55 sf

Discarded OutFlow Max=0.01 cfs @ 2.38 hrs HW=234.04' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=2.00 cfs @ 12.12 hrs HW=235.44' (Free Discharge)
└─**2=Culvert** (Inlet Controls 2.00 cfs @ 3.66 fps)

Pond 9P: ADS N12 Infiltration Trench System #4 - Chamber Wizard Field A

Chamber Model = ADS N-12 12" (ADS N-12® Pipe)
Inside= 12.2"W x 12.2"H => 0.81 sf x 20.00'L = 16.2 cf
Outside= 14.5"W x 14.5"H => 1.05 sf x 20.00'L = 20.9 cf
Row Length Adjustment= +13.00' x 0.81 sf x 1 rows

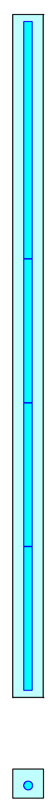
4 Chambers/Row x 20.00' Long +13.00' Row Adjustment = 93.00' Row Length +12.0" End Stone x 2 = 95.00' Base Length
1 Rows x 14.5" Wide + 18.0" Side Stone x 2 = 4.21' Base Width
14.0" Base + 14.5" Chamber Height + 20.0" Cover = 4.04' Field Height

4 Chambers x 16.2 cf +13.00' Row Adjustment x 0.81 sf x 1 Rows = 75.3 cf Chamber Storage
4 Chambers x 20.9 cf +13.00' Row Adjustment x 1.05 sf x 1 Rows = 97.3 cf Displacement

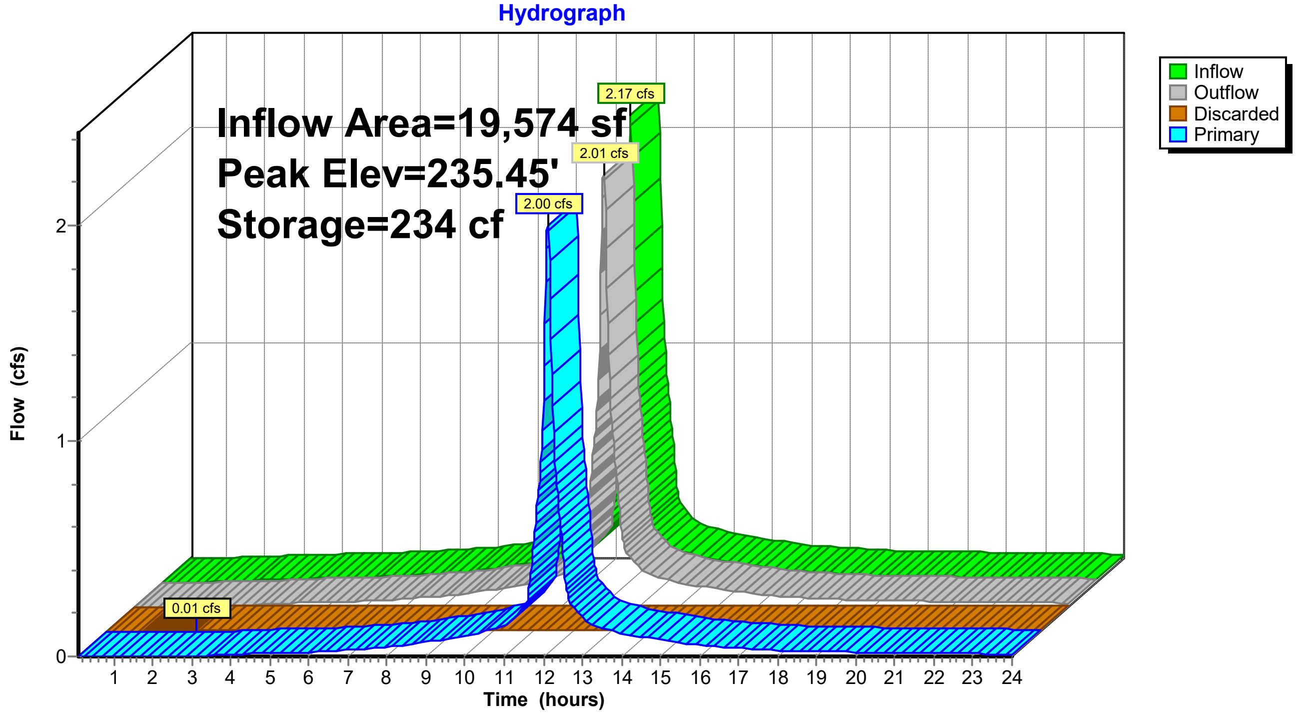
1,616.2 cf Field - 97.3 cf Chambers = 1,518.9 cf Stone x 40.0% Voids = 607.6 cf Stone Storage

Chamber Storage + Stone Storage = 682.9 cf = 0.016 af
Overall Storage Efficiency = 42.3%
Overall System Size = 95.00' x 4.21' x 4.04'

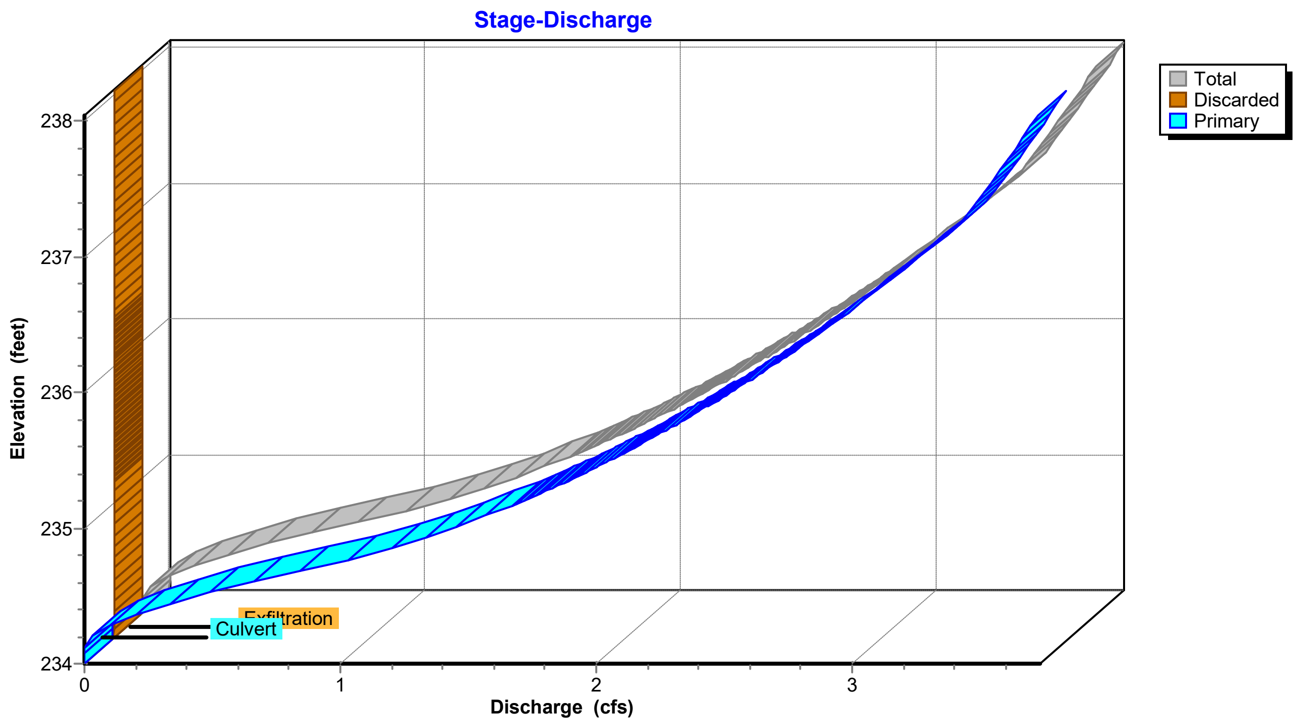
4 Chambers @ $ 0.00 /ea = $ 0.00
59.9 cy Field Excavation @ $ 10.00 /cy = $ 598.61
56.3 cy Stone @ $ 30.00 /cy = $ 1,687.67
Total Cost = $ 2,286.28



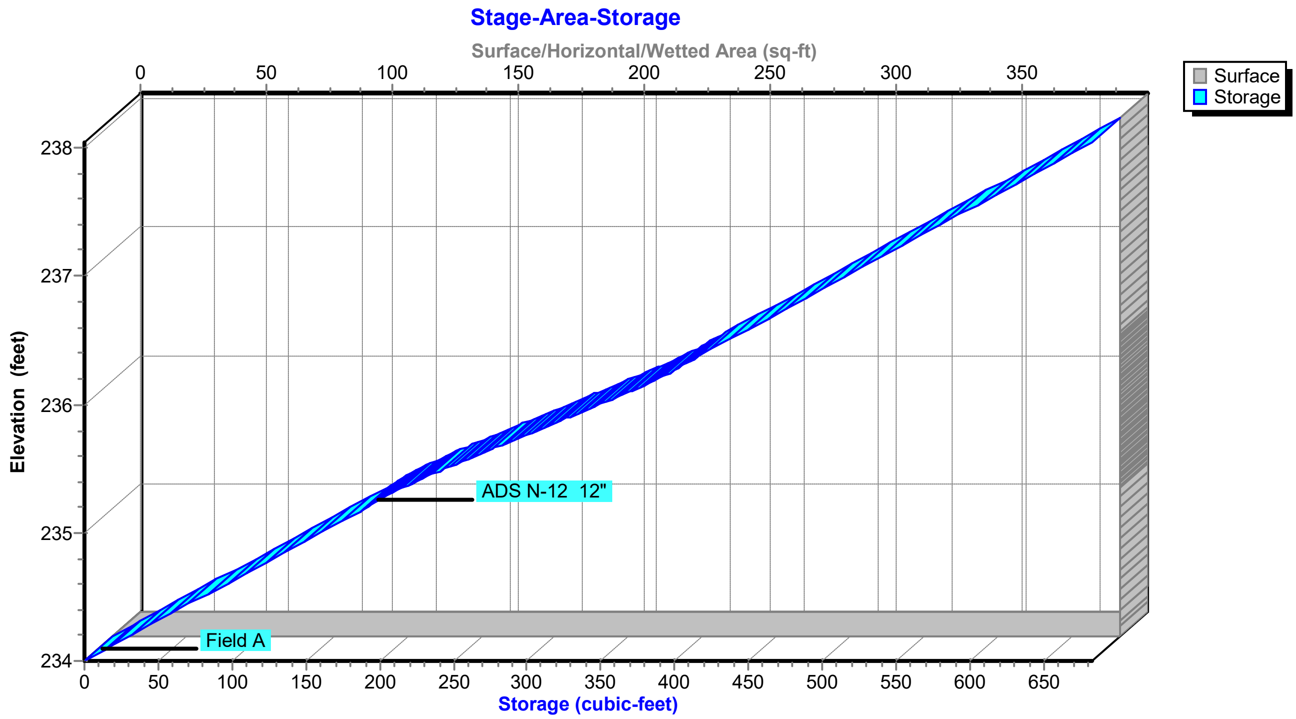
Pond 9P: ADS N12 Infiltration Trench System #4



Pond 9P: ADS N12 Infiltration Trench System #4



Pond 9P: ADS N12 Infiltration Trench System #4



Summary for Pond 10P: Crushed Stone Trench WQ and Galleys System #3

Inflow Area = 59,517 sf, 97.55% Impervious, Inflow Depth > 4.55" for 10-Year event
Inflow = 6.37 cfs @ 12.09 hrs, Volume= 22,575 cf
Outflow = 6.37 cfs @ 12.09 hrs, Volume= 16,410 cf, Atten= 0%, Lag= 0.3 min
Discarded = 0.07 cfs @ 9.52 hrs, Volume= 5,052 cf
Primary = 6.30 cfs @ 12.09 hrs, Volume= 11,358 cf

Routing by Stor-Ind method, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs
Peak Elev= 233.04' @ 12.09 hrs Surf.Area= 3,107 sf Storage= 6,375 cf

Plug-Flow detention time= 136.9 min calculated for 16,396 cf (73% of inflow)
Center-of-Mass det. time= 51.6 min (799.9 - 748.3)

Volume	Invert	Avail.Storage	Storage Description
#1	230.25'	1,658 cf	**5.00'W x 195.00'L x 4.25'H Prismatoid** 4,144 cf Overall x 40.0% Voids
#2A	229.00'	2,056 cf	**13.00'W x 164.00'L x 4.75'H Field A** 10,127 cf Overall - 4,987 cf Embedded = 5,140 cf x 40.0% Voids
#3A	229.50'	3,710 cf	**Concrete Galley 4x4x4.25** x 80 Inside #2 Inside= 42.2"W x 45.0"H => 13.25 sf x 3.50'L = 46.4 cf Outside= 54.0"W x 51.0"H => 15.58 sf x 4.00'L = 62.3 cf 80 Chambers in 2 Rows
		7,424 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	233.00'	**190.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Discarded	229.00'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.07 cfs @ 9.52 hrs HW=230.25' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=5.38 cfs @ 12.09 hrs HW=233.04' (Free Discharge)
↑—**1=Sharp-Crested Rectangular Weir** (Weir Controls 5.38 cfs @ 0.67 fps)

Pond 10P: Crushed Stone Trench WQ and Galleys System #3 - Chamber Wizard Field A

Chamber Model = Concrete Galley 4x4x4.25 (Concrete Galley, Shea LE-EGH, LE-CGH or equivalent)
Inside= 42.2"W x 45.0"H => 13.25 sf x 3.50'L = 46.4 cf
Outside= 54.0"W x 51.0"H => 15.58 sf x 4.00'L = 62.3 cf

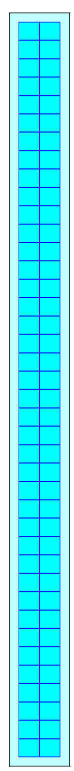
40 Chambers/Row x 4.00' Long = 160.00' Row Length +24.0" End Stone x 2 = 164.00' Base Length
2 Rows x 54.0" Wide + 24.0" Side Stone x 2 = 13.00' Base Width
6.0" Base + 51.0" Chamber Height = 4.75' Field Height

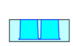
80 Chambers x 46.4 cf = 3,710.5 cf Chamber Storage
80 Chambers x 62.3 cf = 4,986.5 cf Displacement

10,127.0 cf Field - 4,986.5 cf Chambers = 5,140.5 cf Stone x 40.0% Voids = 2,056.2 cf Stone Storage

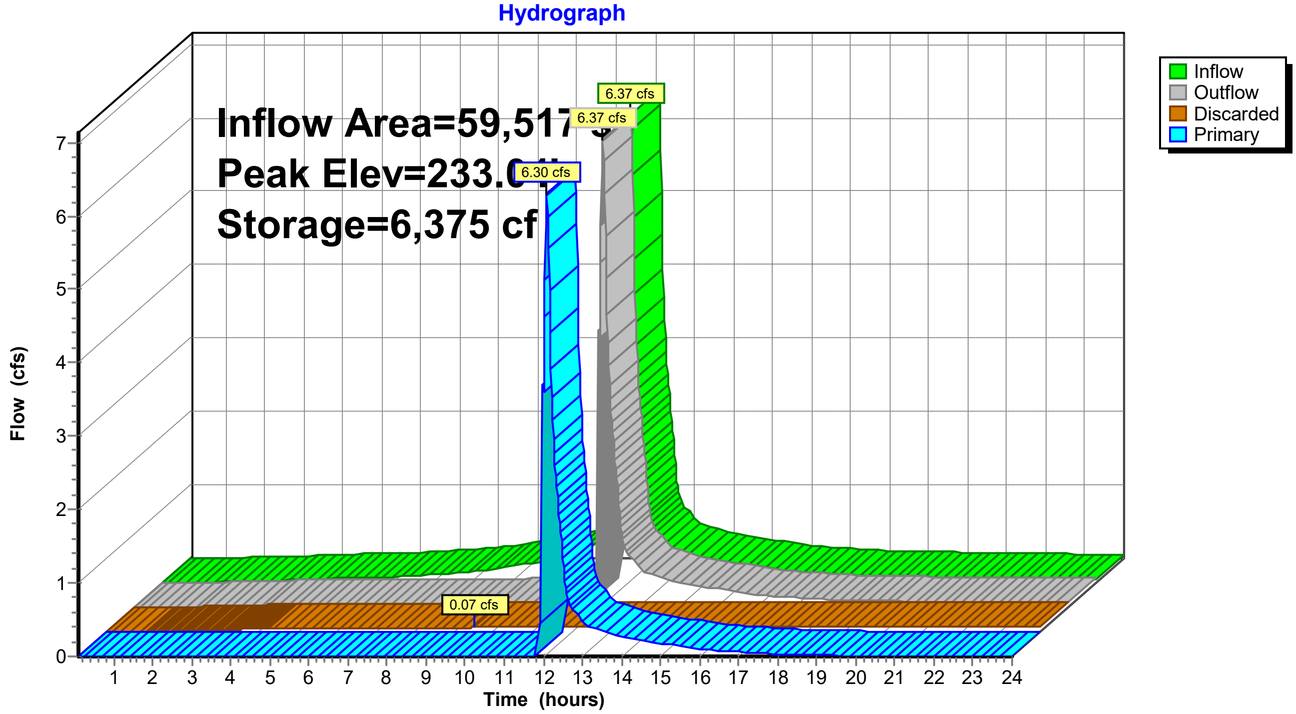
Chamber Storage + Stone Storage = 5,766.7 cf = 0.132 af
Overall Storage Efficiency = 56.9%
Overall System Size = 164.00' x 13.00' x 4.75'

80 Chambers @ $ 0.00 /ea = $ 0.00
375.1 cy Field Excavation @ $ 10.00 /cy = $ 3,750.74
190.4 cy Stone @ $ 30.00 /cy = $ 5,711.65
Total Cost = $ 9,462.39

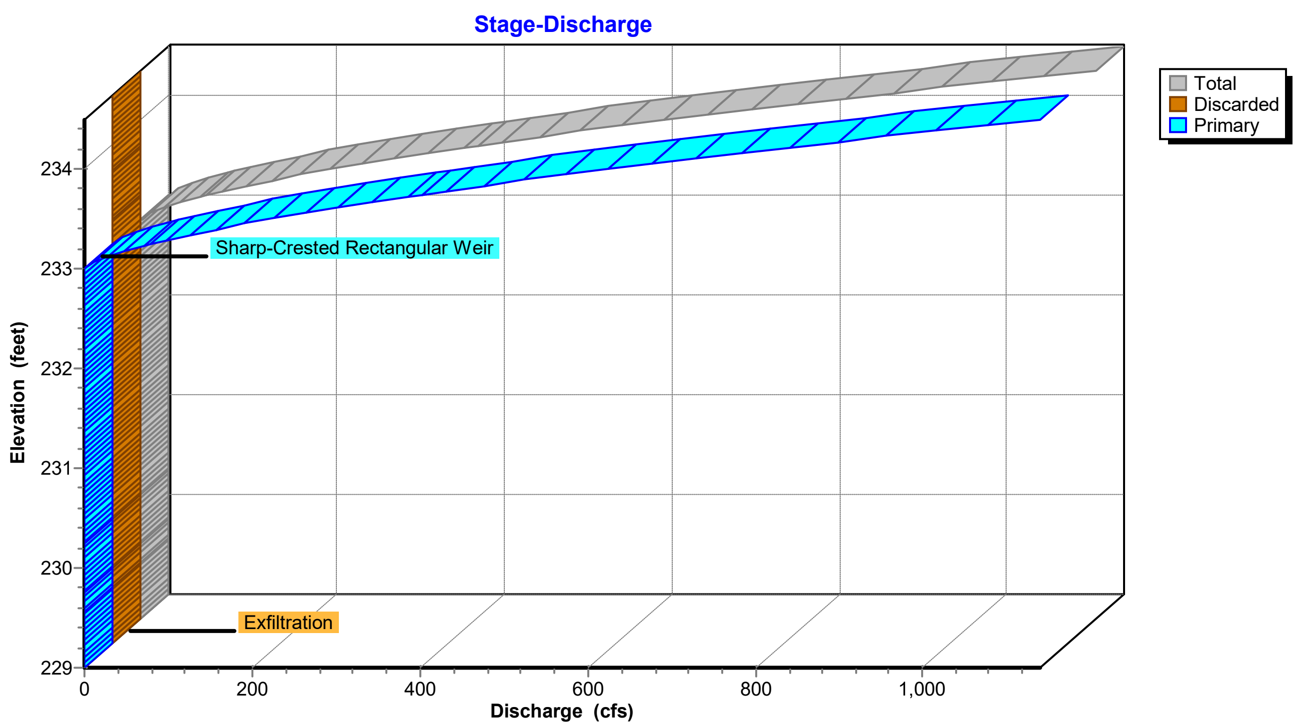




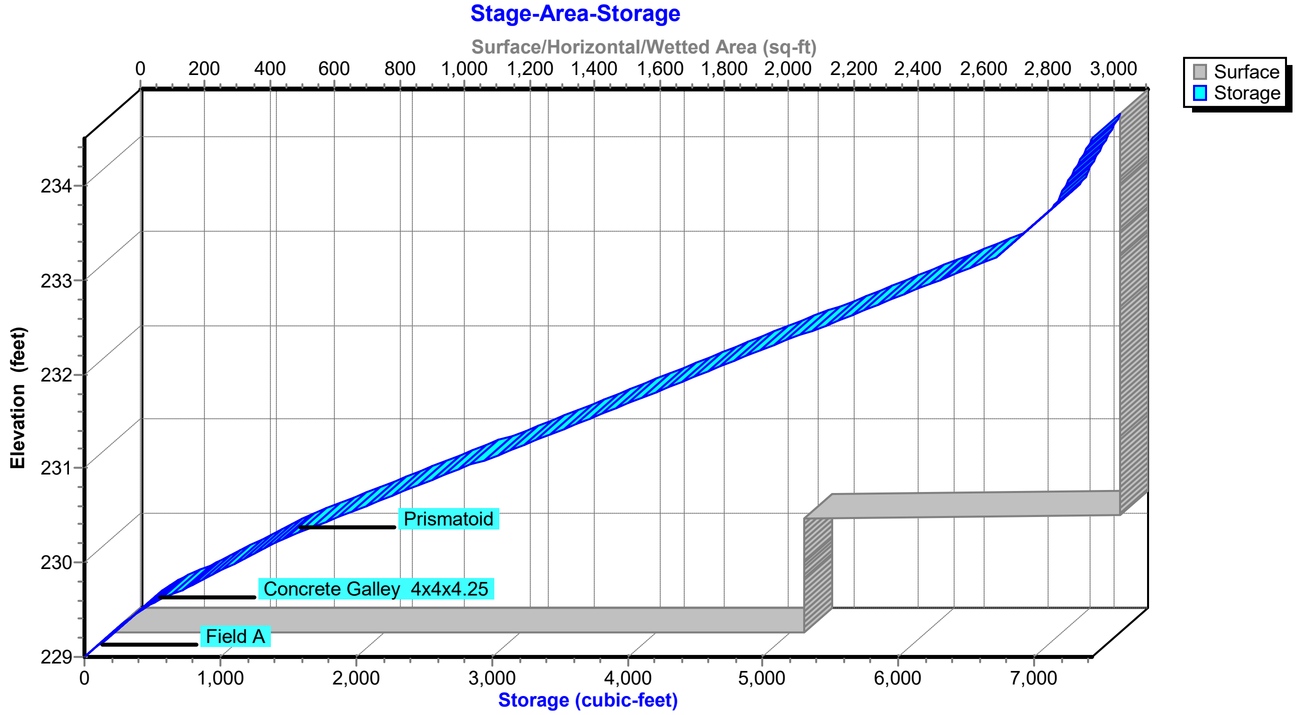
Pond 10P: Crushed Stone Trench WQ and Galleys System #3



Pond 10P: Crushed Stone Trench WQ and Galleys System #3



Pond 10P: Crushed Stone Trench WQ and Galleys System #3

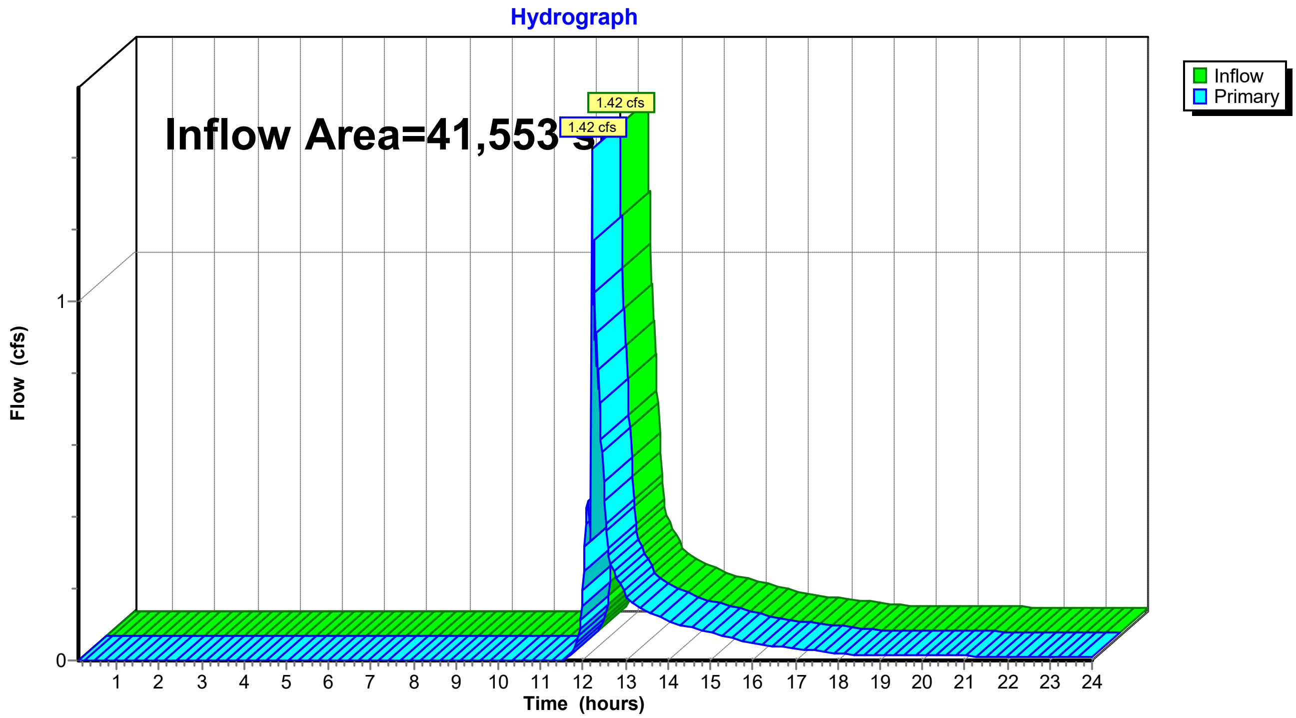


Summary for Link 11L: To Southerly Wetland

Inflow Area = 41,553 sf, 52.79% Impervious, Inflow Depth > 0.94" for 10-Year event
Inflow = 1.42 cfs @ 12.20 hrs, Volume= 3,269 cf
Primary = 1.42 cfs @ 12.20 hrs, Volume= 3,269 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs

Link 11L: To Southerly Wetland

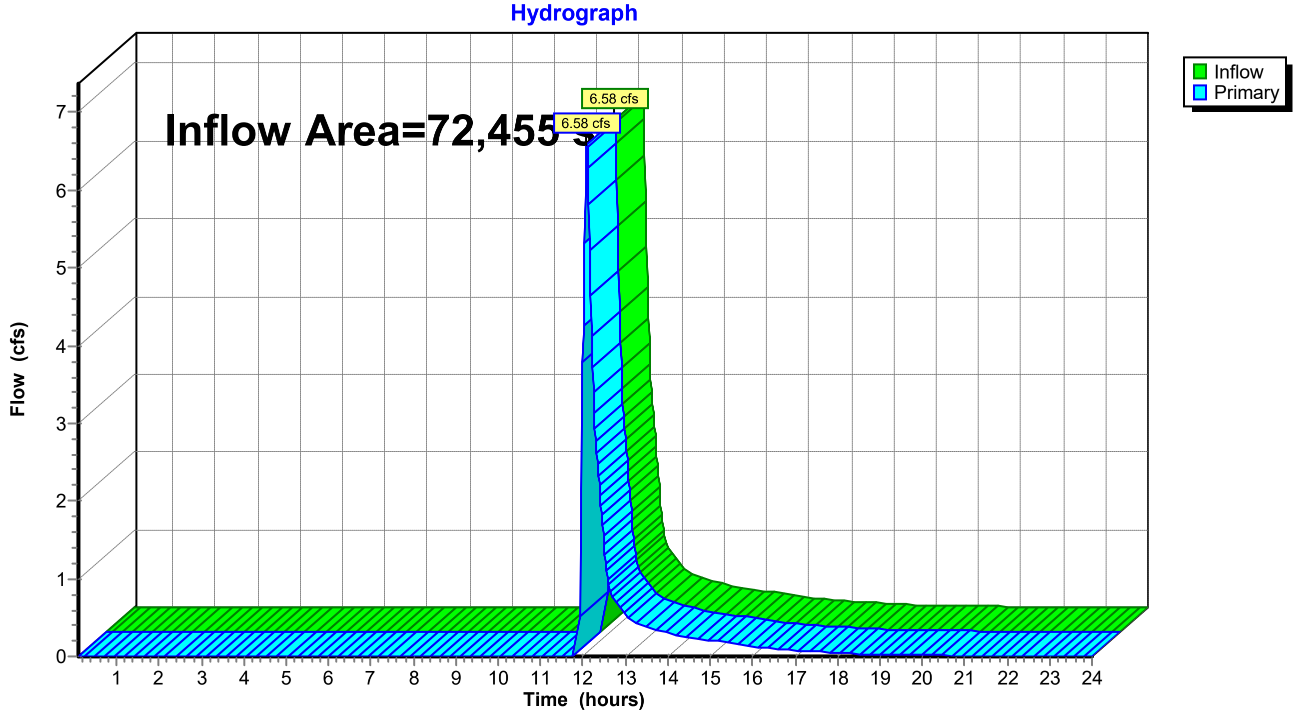


Summary for Link 12L: To Westerly Wetland

Inflow Area =	72,455 sf,	80.13% Impervious,	Inflow Depth > 2.06"	for 10-Year event	
Inflow =	6.58 cfs @	12.10 hrs, Volume=	12,452 cf		
Primary =	6.58 cfs @	12.10 hrs, Volume=	12,452 cf,	Atten= 0%,	Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs

Link 12L: To Westerly Wetland



Time span=0.10-24.00 hrs, dt=0.02 hrs, 1196 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1E: To Southerly Wetland Runoff Area=43,251 sf 38.57% Impervious Runoff Depth>3.99"
Tc=6.0 min CN=80 Runoff=4.61 cfs 14,364 cf

Subcatchment 1P: To Southerly Wetland Runoff Area=16,727 sf 0.00% Impervious Runoff Depth>1.90"
Tc=6.0 min CN=58 Runoff=0.80 cfs 2,647 cf

Subcatchment 2E: To Westerly Runoff Area=71,205 sf 29.43% Impervious Runoff Depth>4.73"
Tc=6.0 min UI Adjusted CN=87 Runoff=8.79 cfs 28,087 cf

Subcatchment 2P: To Westerly Wetland Runoff Area=12,938 sf 0.00% Impervious Runoff Depth>1.73"
Tc=6.0 min CN=56 Runoff=0.55 cfs 1,867 cf

Subcatchment 3P: Pavement to Infiltration Runoff Area=39,943 sf 96.34% Impervious Runoff Depth>5.99"
Tc=6.0 min CN=98 Runoff=5.59 cfs 19,929 cf

Subcatchment 4P: Roof to Infiltration Runoff Area=19,574 sf 100.00% Impervious Runoff Depth>5.99"
Tc=6.0 min CN=98 Runoff=2.74 cfs 9,766 cf

Subcatchment 5P: Pavement to Infiltration Runoff Area=15,930 sf 84.93% Impervious Runoff Depth>5.41"
Tc=6.0 min CN=93 Runoff=2.15 cfs 7,176 cf

Subcatchment 6P: Pavement to Infiltration Runoff Area=8,896 sf 94.49% Impervious Runoff Depth>5.87"
Tc=6.0 min CN=97 Runoff=1.24 cfs 4,351 cf

Pond 7P: Crushed Stone Trench WQ and Peak Elev=239.04' Storage=2,363 cf Inflow=2.15 cfs 7,176 cf
Discarded=0.03 cfs 1,655 cf Primary=3.35 cfs 3,196 cf Outflow=3.38 cfs 4,852 cf

Pond 8P: Crushed Stone Trench WQ and Peak Elev=233.01' Storage=2,262 cf Inflow=1.24 cfs 4,351 cf
Discarded=0.03 cfs 1,784 cf Primary=0.30 cfs 605 cf Outflow=0.33 cfs 2,389 cf

Pond 9P: ADS N12 Infiltration Trench System Peak Elev=235.89' Storage=327 cf Inflow=2.74 cfs 9,766 cf
Discarded=0.01 cfs 774 cf Primary=2.43 cfs 8,966 cf Outflow=2.44 cfs 9,739 cf

Pond 10P: Crushed Stone Trench WQ and Peak Elev=233.05' Storage=6,389 cf Inflow=7.89 cfs 28,895 cf
Discarded=0.07 cfs 5,261 cf Primary=7.82 cfs 17,348 cf Outflow=7.89 cfs 22,609 cf

Link 11L: To Southerly Wetland Inflow=4.13 cfs 6,448 cf
Primary=4.13 cfs 6,448 cf

Link 12L: To Westerly Wetland Inflow=8.37 cfs 19,215 cf
Primary=8.37 cfs 19,215 cf

Total Runoff Area = 228,464 sf Runoff Volume = 88,186 cf Average Runoff Depth = 4.63"
48.51% Pervious = 110,837 sf 51.49% Impervious = 117,627 sf

Summary for Subcatchment 1E: To Southerly Wetland

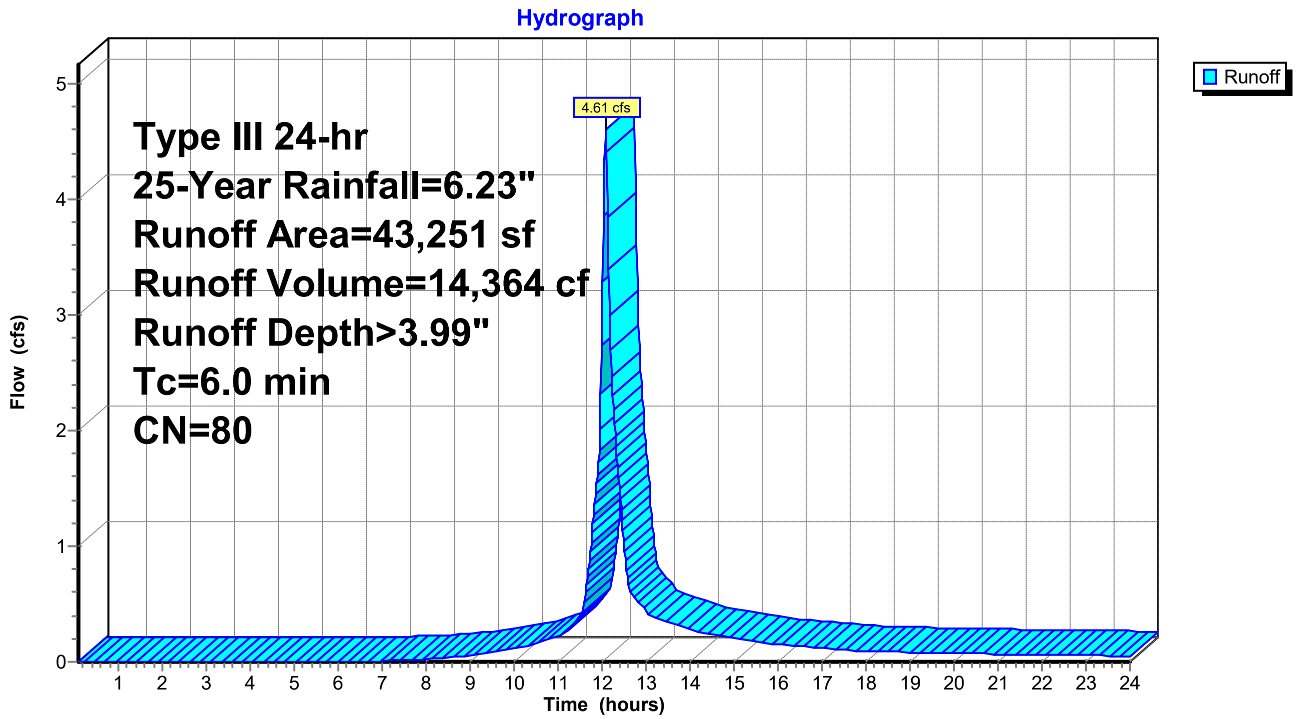
Runoff = 4.61 cfs @ 12.09 hrs, Volume= 14,364 cf, Depth> 3.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year Rainfall=6.23"

Area (sf)	CN	Description
12,540	61	>75% Grass cover, Good, HSG B
16,680	98	Paved parking, HSG B
7,251	96	Gravel surface, HSG B
6,780	55	Woods, Good, HSG B
43,251	80	Weighted Average
26,571		61.43% Pervious Area
16,680		38.57% Impervious Area

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

Subcatchment 1E: To Southerly Wetland



Summary for Subcatchment 1P: To Southerly Wetland

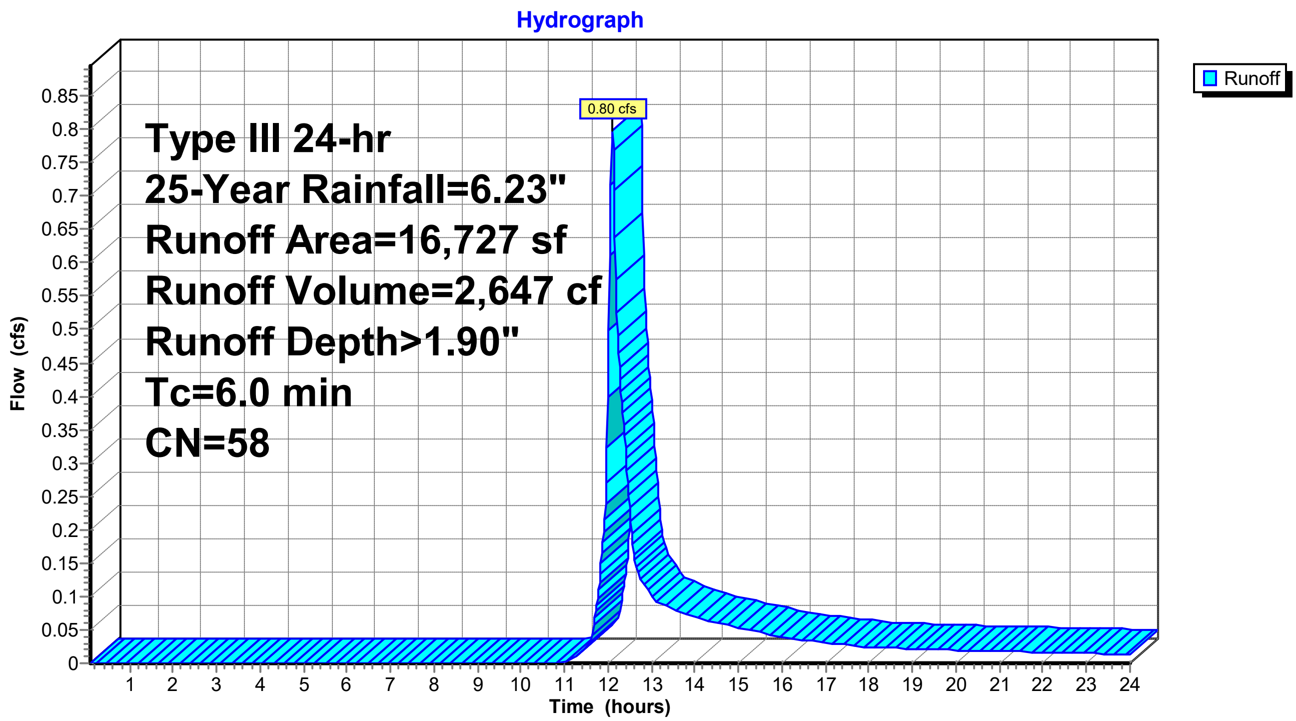
Runoff = 0.80 cfs @ 12.10 hrs, Volume= 2,647 cf, Depth> 1.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year Rainfall=6.23"

Area (sf)	CN	Description
9,463	61	>75% Grass cover, Good, HSG B
7,264	55	Woods, Good, HSG B
16,727	58	Weighted Average
16,727		100.00% Pervious Area

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

Subcatchment 1P: To Southerly Wetland



Summary for Subcatchment 2E: To Westerly Wetland/Property Line

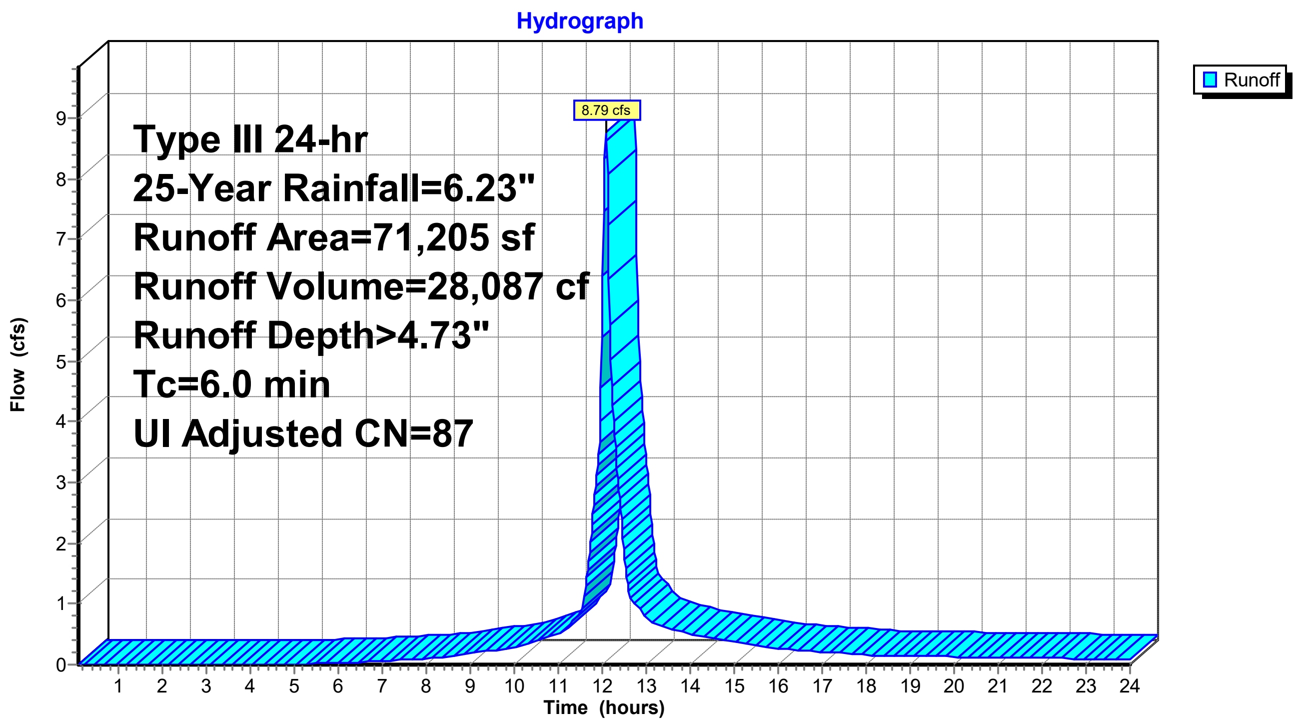
Runoff = 8.79 cfs @ 12.09 hrs, Volume= 28,087 cf, Depth> 4.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year Rainfall=6.23"

Area (sf)	CN	Adj	Description
1,212	61		>75% Grass cover, Good, HSG B
1,369	98		Paved parking, HSG B
12,957	55		Woods, Good, HSG B
36,080	96		Gravel surface, HSG B
19,587	98		Unconnected roofs, HSG B
71,205	89	87	Weighted Average, UI Adjusted
50,249			70.57% Pervious Area
20,956			29.43% Impervious Area
19,587			93.47% Unconnected

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

Subcatchment 2E: To Westerly Wetland/Property Line



Summary for Subcatchment 2P: To Westerly Wetland

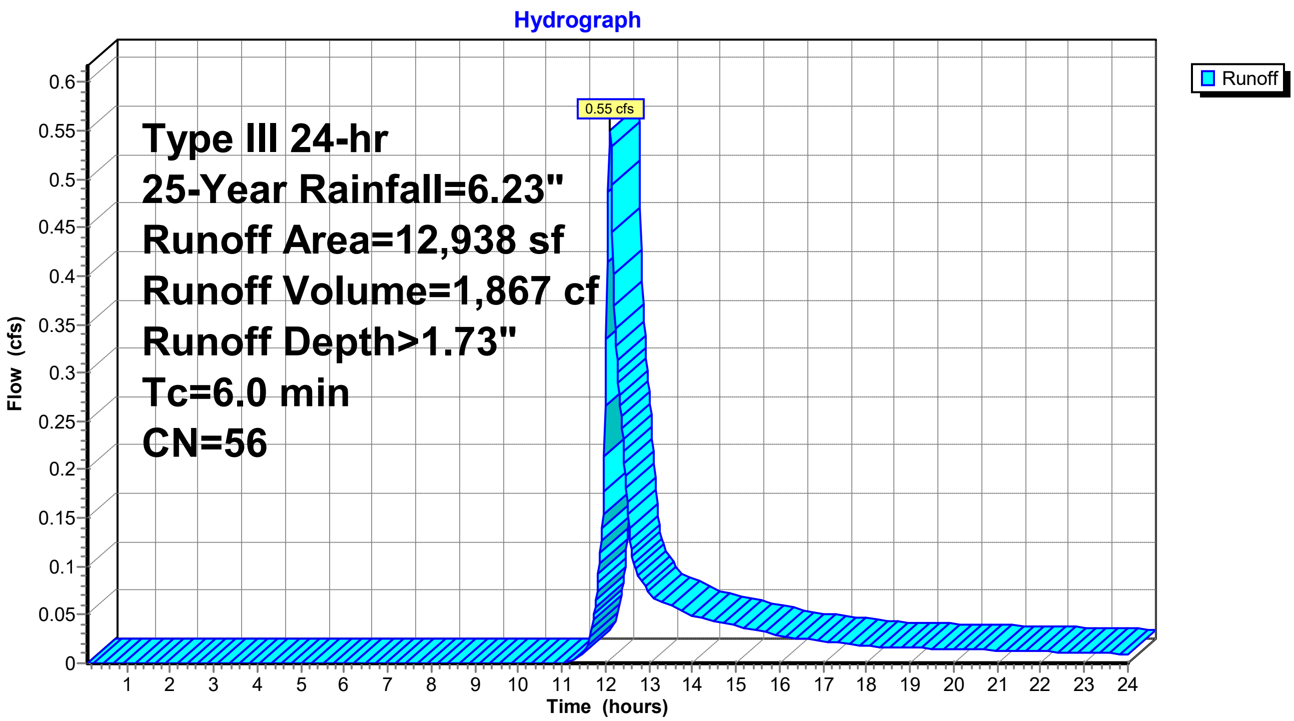
Runoff = 0.55 cfs @ 12.10 hrs, Volume= 1,867 cf, Depth> 1.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year Rainfall=6.23"

Area (sf)	CN	Description
2,281	61	>75% Grass cover, Good, HSG B
10,657	55	Woods, Good, HSG B
12,938	56	Weighted Average
12,938		100.00% Pervious Area

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

Subcatchment 2P: To Westerly Wetland



Summary for Subcatchment 3P: Pavement to Infiltration System

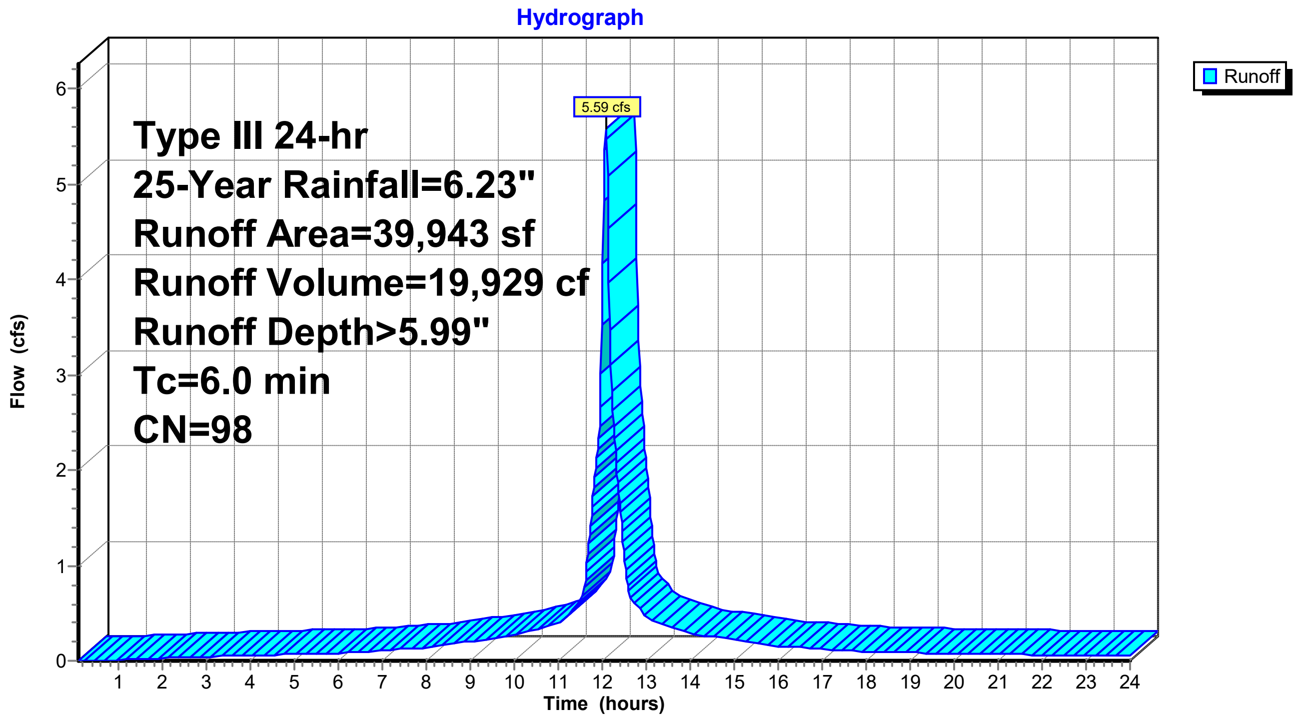
Runoff = 5.59 cfs @ 12.08 hrs, Volume= 19,929 cf, Depth> 5.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year Rainfall=6.23"

	Area (sf)	CN	Description
	38,482	98	Paved parking, HSG B
*	1,461	85	CrushedStone, HSG B
	39,943	98	Weighted Average
	1,461		3.66% Pervious Area
	38,482		96.34% Impervious Area

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

Subcatchment 3P: Pavement to Infiltration System



Summary for Subcatchment 4P: Roof to Infiltration System

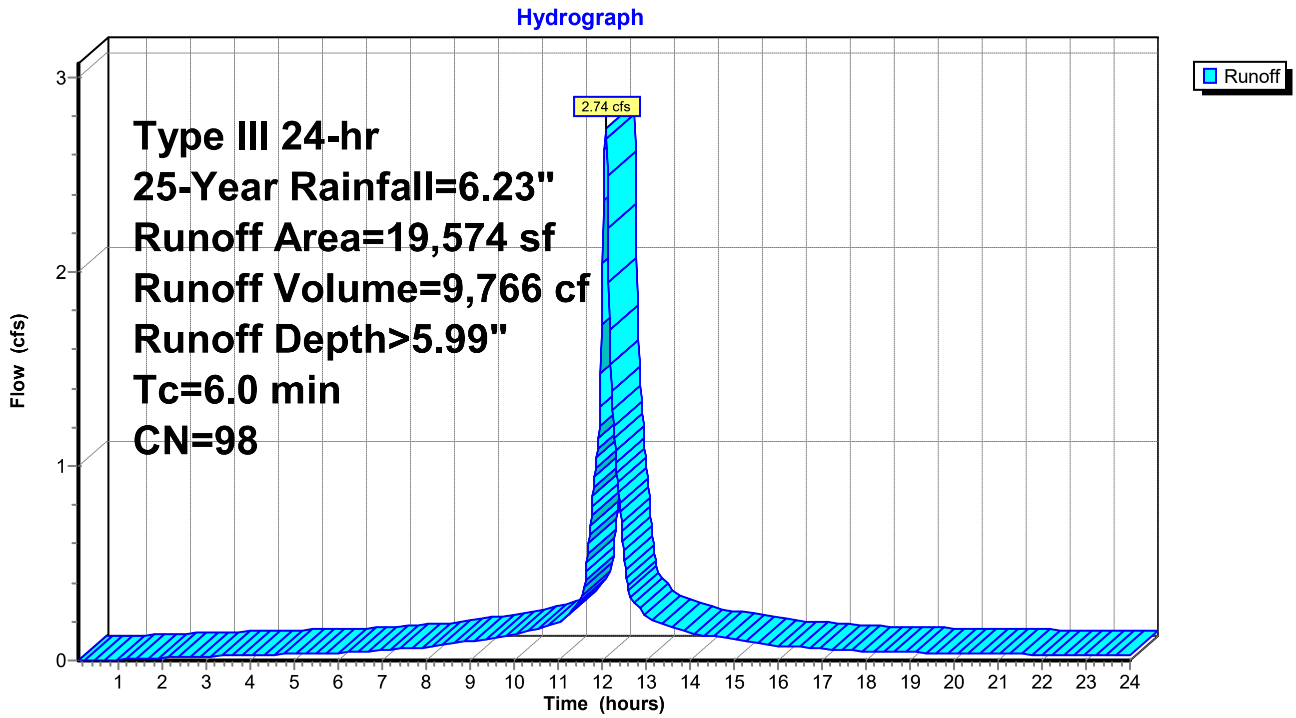
Runoff = 2.74 cfs @ 12.08 hrs, Volume= 9,766 cf, Depth> 5.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year Rainfall=6.23"

Area (sf)	CN	Description
19,574	98	Roofs, HSG B
19,574		100.00% Impervious Area

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

Subcatchment 4P: Roof to Infiltration System



Summary for Subcatchment 5P: Pavement to Infiltration System

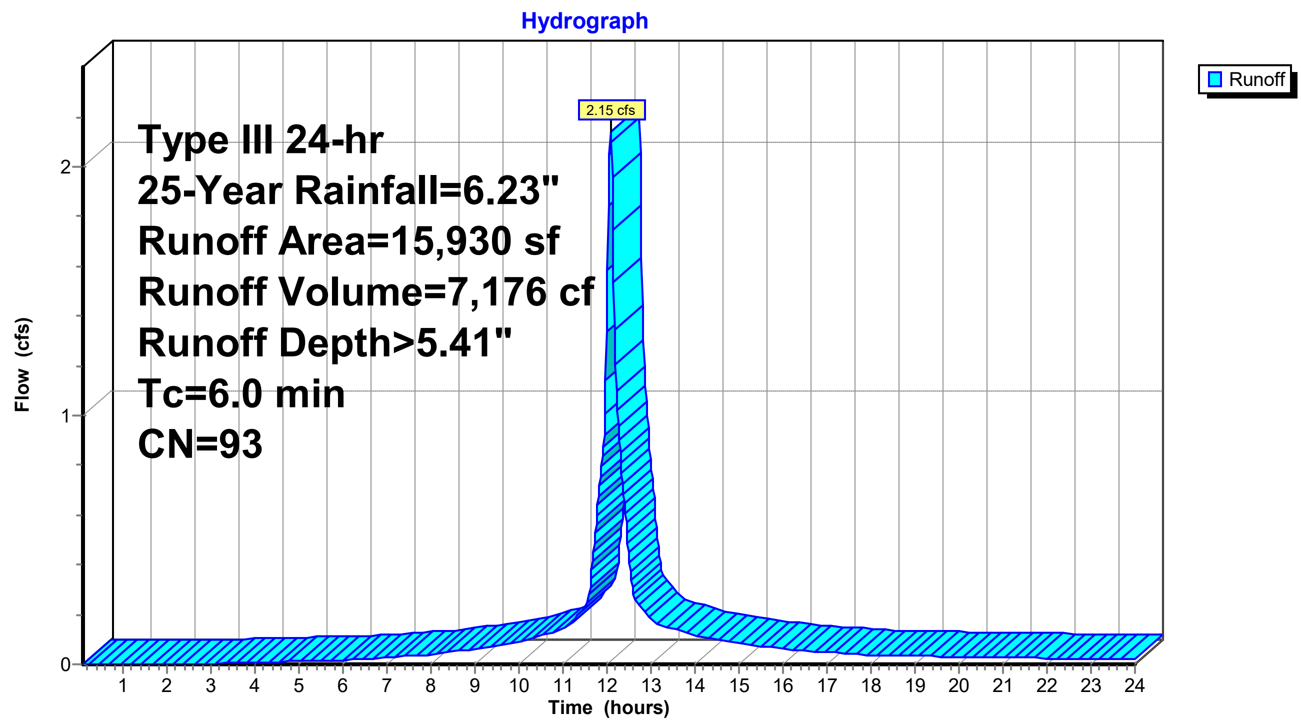
Runoff = 2.15 cfs @ 12.08 hrs, Volume= 7,176 cf, Depth> 5.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year Rainfall=6.23"

	Area (sf)	CN	Description
	13,529	98	Paved parking, HSG B
	1,973	61	>75% Grass cover, Good, HSG B
*	428	85	Crushed Stone, HSG B
	15,930	93	Weighted Average
	2,401		15.07% Pervious Area
	13,529		84.93% Impervious Area

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

Subcatchment 5P: Pavement to Infiltration System



Summary for Subcatchment 6P: Pavement to Infiltration System

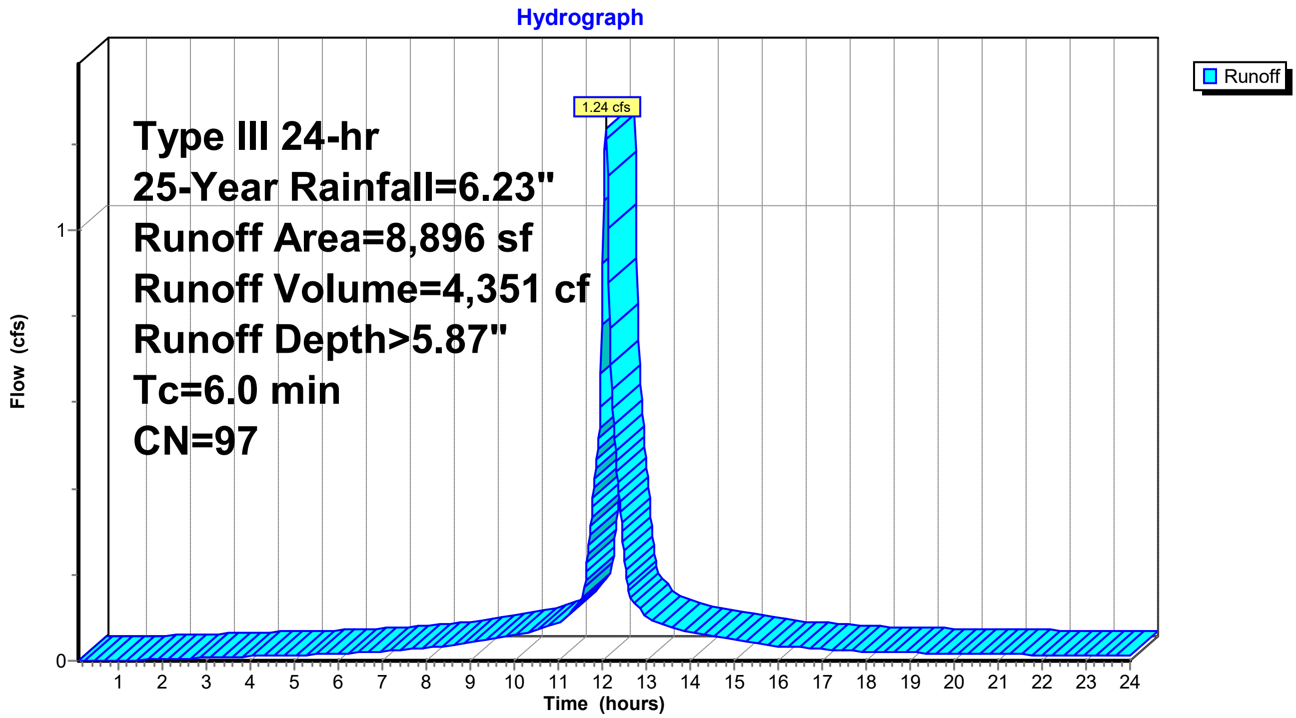
Runoff = 1.24 cfs @ 12.08 hrs, Volume= 4,351 cf, Depth> 5.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year Rainfall=6.23"

	Area (sf)	CN	Description
	8,406	98	Paved parking, HSG B
*	490	85	Crushed Stone, HSG B
	8,896	97	Weighted Average
	490		5.51% Pervious Area
	8,406		94.49% Impervious Area

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

Subcatchment 6P: Pavement to Infiltration System



Summary for Pond 7P: Crushed Stone Trench WQ and Galleys System #1

Inflow Area =	15,930 sf, 84.93% Impervious,	Inflow Depth > 5.41"	for 25-Year event
Inflow =	2.15 cfs @ 12.08 hrs, Volume=	7,176 cf	
Outflow =	3.38 cfs @ 12.08 hrs, Volume=	4,852 cf,	Atten= 0%, Lag= 0.0 min
Discarded =	0.03 cfs @ 10.96 hrs, Volume=	1,655 cf	
Primary =	3.35 cfs @ 12.08 hrs, Volume=	3,196 cf	

Routing by Stor-Ind method, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs
Peak Elev= 239.04' @ 12.08 hrs Surf.Area= 1,115 sf Storage= 2,363 cf

Plug-Flow detention time= 150.8 min calculated for 4,848 cf (68% of inflow)
Center-of-Mass det. time= 56.3 min (827.7 - 771.4)

Volume	Invert	Avail.Storage	Storage Description
#1	236.00'	532 cf	**3.50'W x 95.00'L x 4.00'H Prismatoid**
			1,330 cf Overall x 40.0% Voids
#2A	234.25'	937 cf	**8.50'W x 92.00'L x 4.75'H Field A**
			3,715 cf Overall - 1,371 cf Embedded = 2,343 cf x 40.0% Voids
#3A	234.75'	1,020 cf	**Concrete Galley 4x4x4.25** x 22 Inside #2
			Inside= 42.2"W x 45.0"H => 13.25 sf x 3.50'L = 46.4 cf
			Outside= 54.0"W x 51.0"H => 15.58 sf x 4.00'L = 62.3 cf
		2,490 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	239.00'	**95.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Discarded	234.25'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.03 cfs @ 10.96 hrs HW=236.00' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=2.87 cfs @ 12.08 hrs HW=239.04' (Free Discharge)
↑—**1=Sharp-Crested Rectangular Weir** (Weir Controls 2.87 cfs @ 0.69 fps)

Pond 7P: Crushed Stone Trench WQ and Galleys System #1 - Chamber Wizard Field A

Chamber Model = Concrete Galley 4x4x4.25 (Concrete Galley, Shea LE-EGH, LE-CGH or equivalent)
Inside= 42.2"W x 45.0"H => 13.25 sf x 3.50'L = 46.4 cf
Outside= 54.0"W x 51.0"H => 15.58 sf x 4.00'L = 62.3 cf

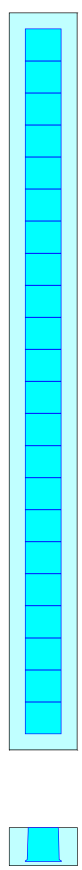
22 Chambers/Row x 4.00' Long = 88.00' Row Length +24.0" End Stone x 2 = 92.00' Base Length
1 Rows x 54.0" Wide + 24.0" Side Stone x 2 = 8.50' Base Width
6.0" Base + 51.0" Chamber Height = 4.75' Field Height

22 Chambers x 46.4 cf = 1,020.4 cf Chamber Storage
22 Chambers x 62.3 cf = 1,371.3 cf Displacement

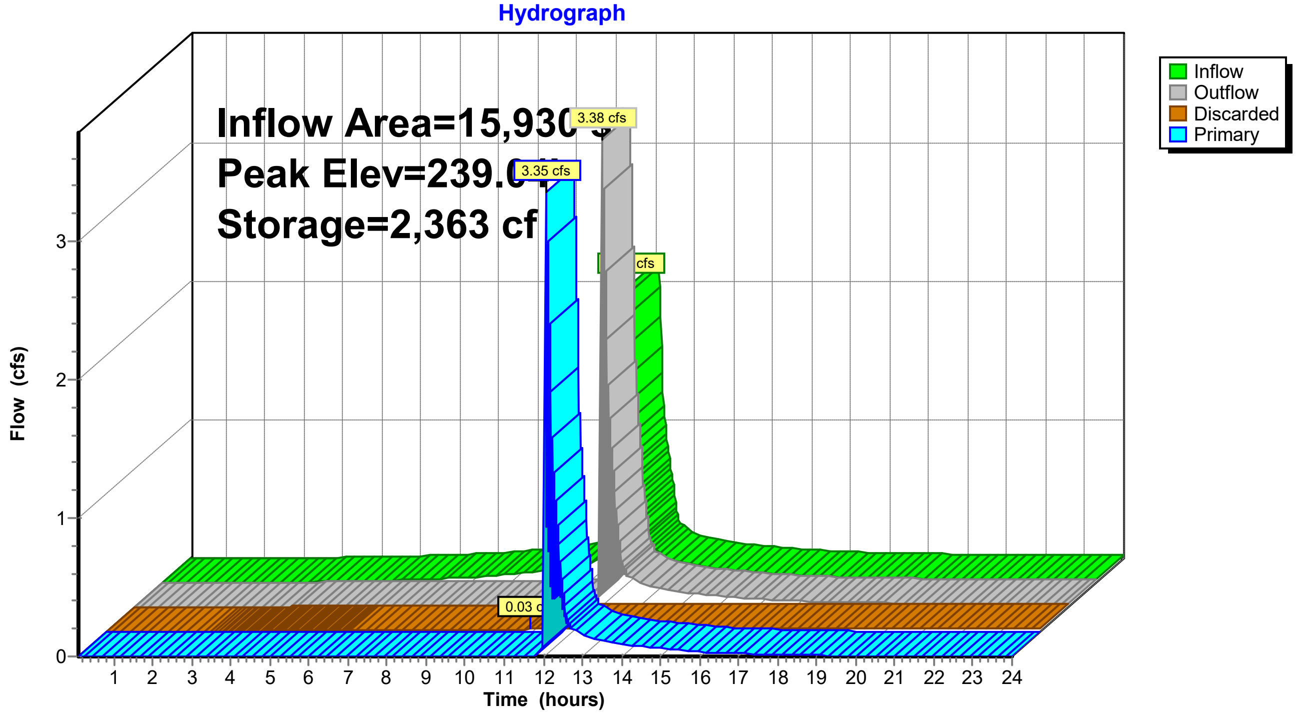
3,714.5 cf Field - 1,371.3 cf Chambers = 2,343.2 cf Stone x 40.0% Voids = 937.3 cf Stone Storage

Chamber Storage + Stone Storage = 1,957.7 cf = 0.045 af
Overall Storage Efficiency = 52.7%
Overall System Size = 92.00' x 8.50' x 4.75'

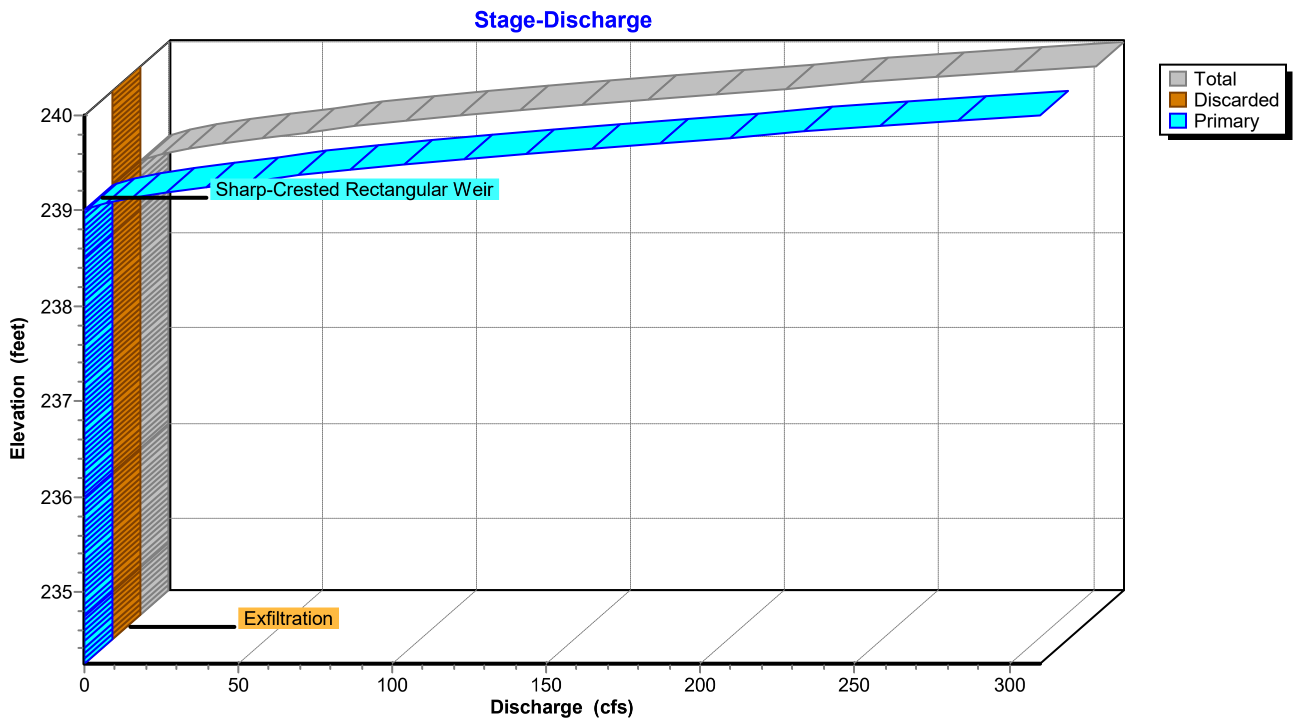
22 Chambers @ $ 0.00 /ea = $ 0.00
137.6 cy Field Excavation @ $ 10.00 /cy = $ 1,375.74
86.8 cy Stone @ $ 30.00 /cy = $ 2,603.57
Total Cost = $ 3,979.31



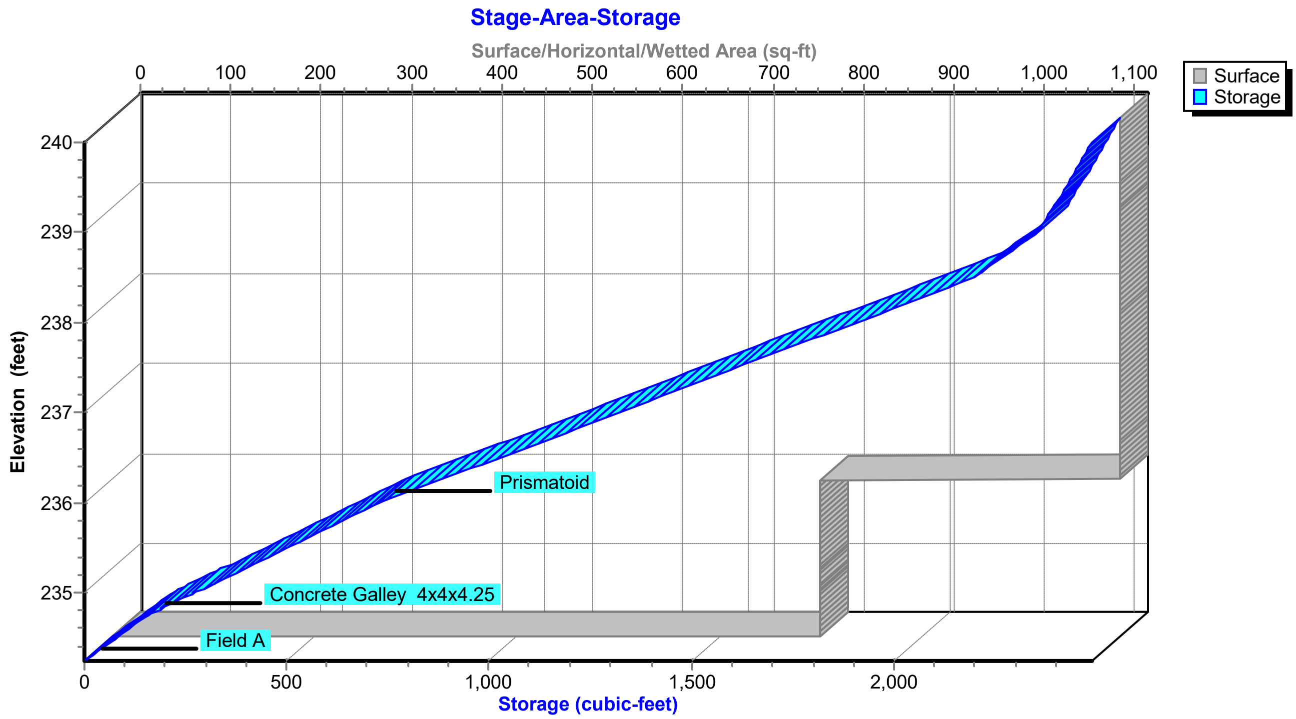
Pond 7P: Crushed Stone Trench WQ and Galleys System #1



Pond 7P: Crushed Stone Trench WQ and Galleys System #1



Pond 7P: Crushed Stone Trench WQ and Galleys System #1



Summary for Pond 8P: Crushed Stone Trench WQ and Galleys System #2

Inflow Area = 8,896 sf, 94.49% Impervious, Inflow Depth > 5.87" for 25-Year event
Inflow = 1.24 cfs @ 12.08 hrs, Volume= 4,351 cf
Outflow = 0.33 cfs @ 12.47 hrs, Volume= 2,389 cf, Atten= 73%, Lag= 23.1 min
Discarded = 0.03 cfs @ 11.94 hrs, Volume= 1,784 cf
Primary = 0.30 cfs @ 12.47 hrs, Volume= 605 cf

Routing by Stor-Ind method, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs
Peak Elev= 233.01' @ 12.46 hrs Surf.Area= 1,208 sf Storage= 2,262 cf

Plug-Flow detention time= 238.3 min calculated for 2,389 cf (55% of inflow)
Center-of-Mass det. time= 120.5 min (871.5 - 750.9)

Volume	Invert	Avail.Storage	Storage Description
#1	231.00'	549 cf	**4.00'W x 98.00'L x 3.50'H Prismatoid**
			1,372 cf Overall x 40.0% Voids
#2A	228.75'	977 cf	**8.50'W x 96.00'L x 4.75'H Field A**
			3,876 cf Overall - 1,434 cf Embedded = 2,442 cf x 40.0% Voids
#3A	229.25'	1,067 cf	**Concrete Galley 4x4x4.25** x 23 Inside #2
			Inside= 42.2"W x 45.0"H => 13.25 sf x 3.50'L = 46.4 cf
			Outside= 54.0"W x 51.0"H => 15.58 sf x 4.00'L = 62.3 cf
		2,593 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	233.00'	**98.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Discarded	228.75'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.03 cfs @ 11.94 hrs HW=231.04' (Free Discharge)
└─**2=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.18 cfs @ 12.47 hrs HW=233.01' (Free Discharge)
└─**1=Sharp-Crested Rectangular Weir** (Weir Controls 0.18 cfs @ 0.27 fps)

Pond 8P: Crushed Stone Trench WQ and Galleys System #2 - Chamber Wizard Field A

Chamber Model = Concrete Galley 4x4x4.25 (Concrete Galley, Shea LE-EGH, LE-CGH or equivalent)
Inside= 42.2"W x 45.0"H => 13.25 sf x 3.50'L = 46.4 cf
Outside= 54.0"W x 51.0"H => 15.58 sf x 4.00'L = 62.3 cf

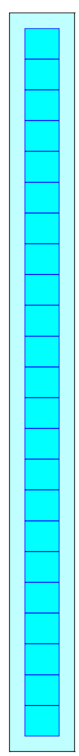
23 Chambers/Row x 4.00' Long = 92.00' Row Length +24.0" End Stone x 2 = 96.00' Base Length
1 Rows x 54.0" Wide + 24.0" Side Stone x 2 = 8.50' Base Width
6.0" Base + 51.0" Chamber Height = 4.75' Field Height

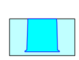
23 Chambers x 46.4 cf = 1,066.8 cf Chamber Storage
23 Chambers x 62.3 cf = 1,433.6 cf Displacement

3,876.0 cf Field - 1,433.6 cf Chambers = 2,442.4 cf Stone x 40.0% Voids = 977.0 cf Stone Storage

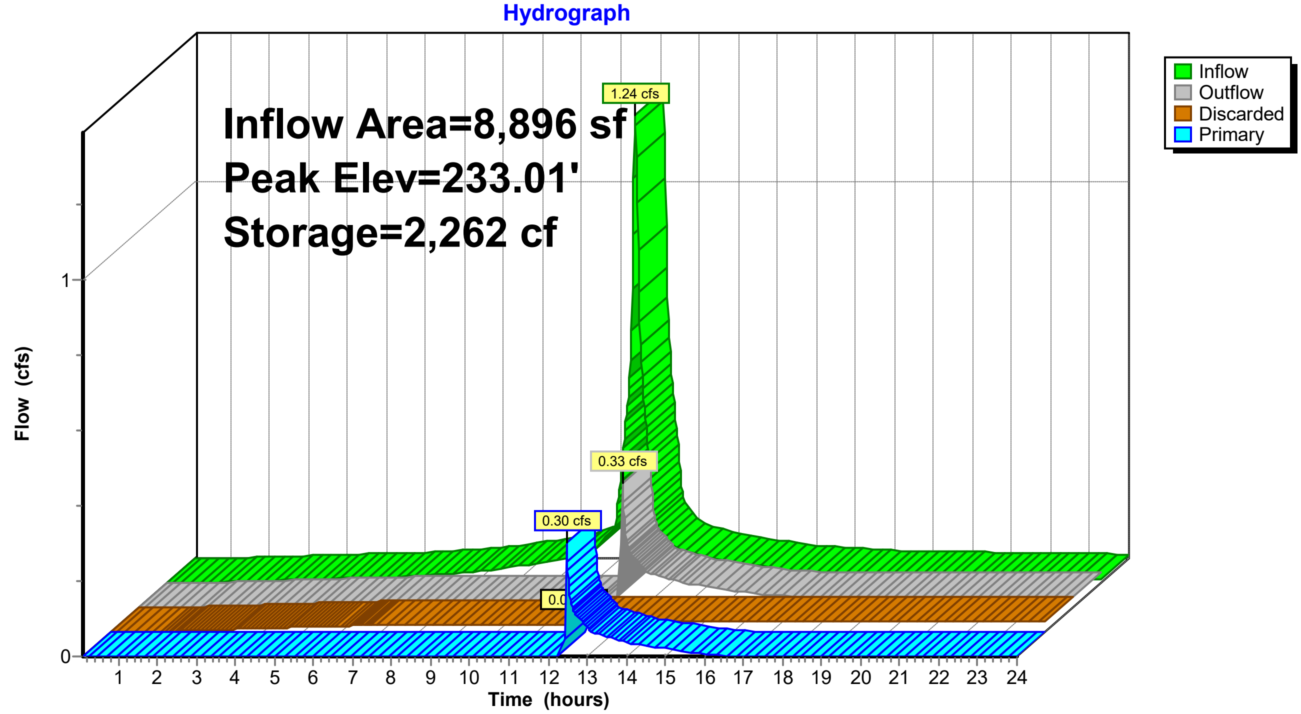
Chamber Storage + Stone Storage = 2,043.7 cf = 0.047 af
Overall Storage Efficiency = 52.7%
Overall System Size = 96.00' x 8.50' x 4.75'

23 Chambers @ $ 0.00 /ea = $ 0.00
143.6 cy Field Excavation @ $ 10.00 /cy = $ 1,435.56
90.5 cy Stone @ $ 30.00 /cy = $ 2,713.75
Total Cost = $ 4,149.31

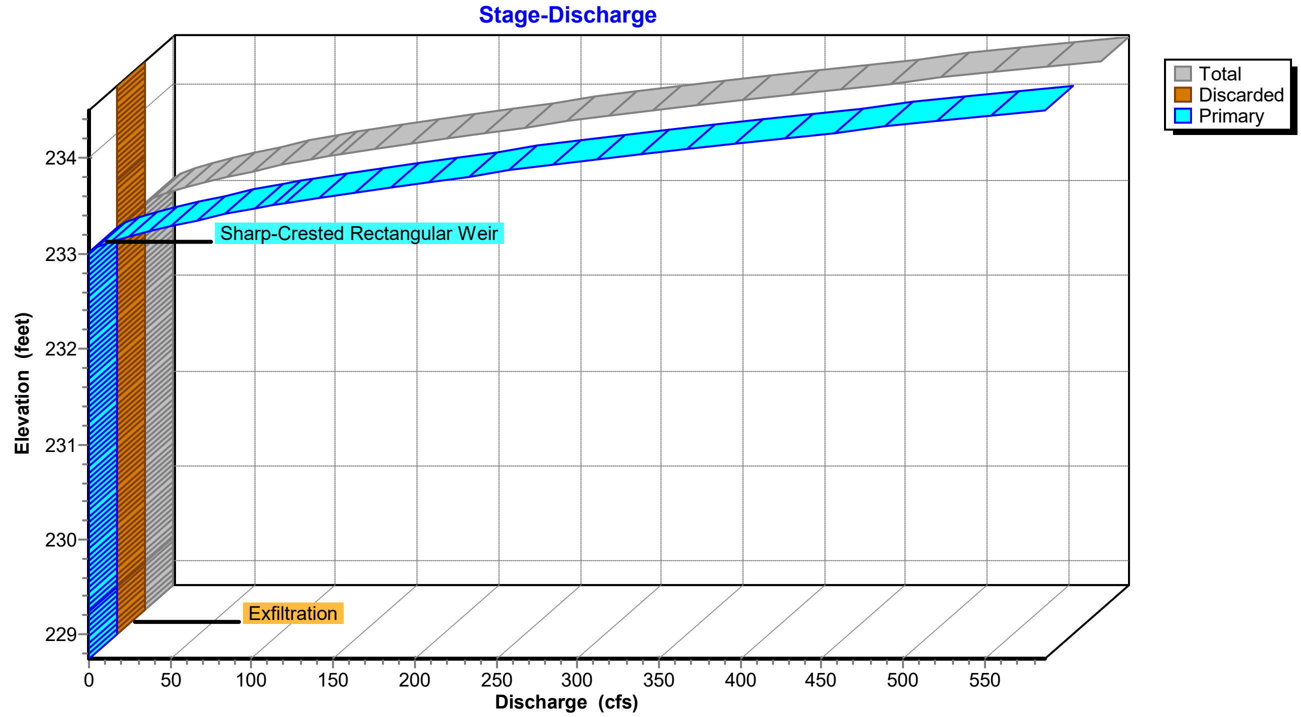




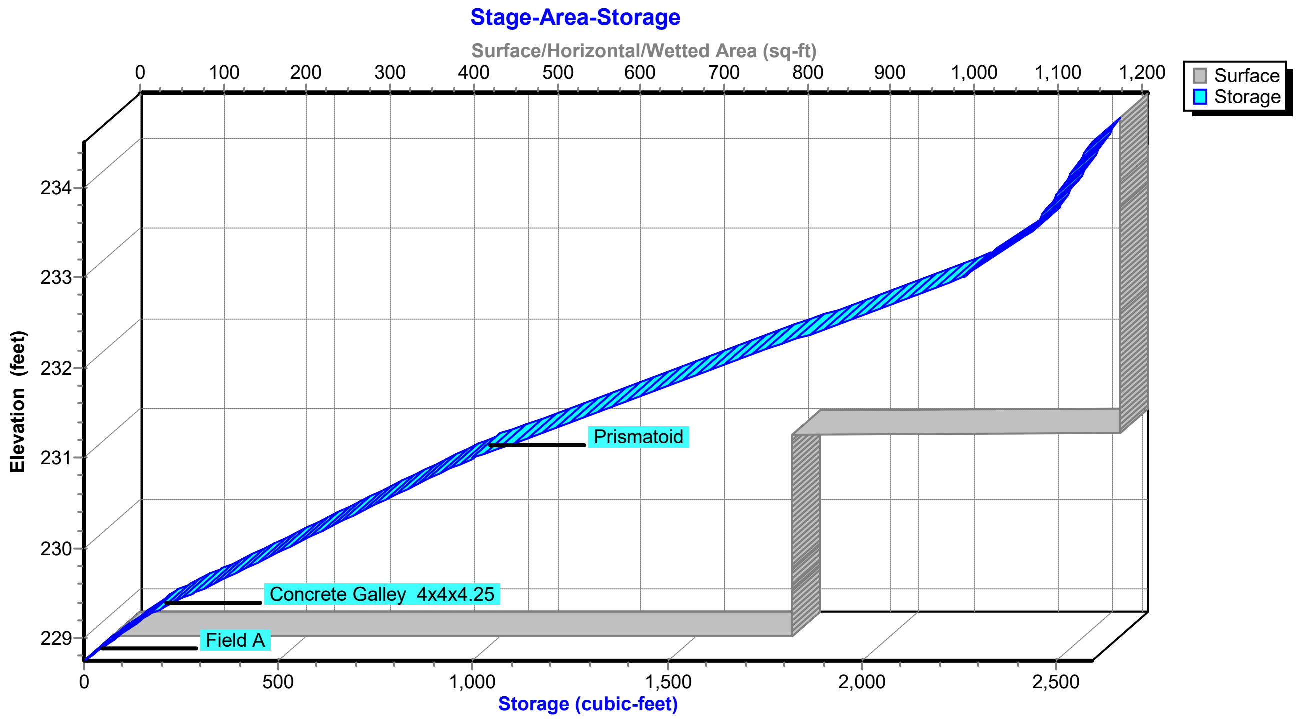
Pond 8P: Crushed Stone Trench WQ and Galleys System #2



Pond 8P: Crushed Stone Trench WQ and Galleys System #2



Pond 8P: Crushed Stone Trench WQ and Galleys System #2



Summary for Pond 9P: ADS N12 Infiltration Trench System #4

Inflow Area = 19,574 sf,100.00% Impervious, Inflow Depth > 5.99" for 25-Year event
Inflow = 2.74 cfs @ 12.08 hrs, Volume= 9,766 cf
Outflow = 2.44 cfs @ 12.12 hrs, Volume= 9,739 cf, Atten= 11%, Lag= 2.5 min
Discarded = 0.01 cfs @ 1.70 hrs, Volume= 774 cf
Primary = 2.43 cfs @ 12.12 hrs, Volume= 8,966 cf

Routing by Stor-Ind method, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs
Peak Elev= 235.89' @ 12.12 hrs Surf.Area= 400 sf Storage= 327 cf

Plug-Flow detention time= 5.6 min calculated for 9,731 cf (100% of inflow)
Center-of-Mass det. time= 3.8 min (747.8 - 744.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	234.00'	608 cf	**4.21'W x 95.00'L x 4.04'H Field A** 1,616 cf Overall - 97 cf Embedded = 1,519 cf x 40.0% Voids
#2A	235.17'	75 cf	**ADS N-12 12"** x 4 Inside #1 Inside= 12.2"W x 12.2"H => 0.81 sf x 20.00'L = 16.2 cf Outside= 14.5"W x 14.5"H => 1.05 sf x 20.00'L = 20.9 cf Row Length Adjustment= +13.00' x 0.81 sf x 1 rows
		683 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	234.00'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	234.10'	**10.0" Round Culvert** L= 155.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 234.10' / 232.00' S= 0.0135 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.55 sf

Discarded OutFlow Max=0.01 cfs @ 1.70 hrs HW=234.04' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=2.43 cfs @ 12.12 hrs HW=235.89' (Free Discharge)
└─**2=Culvert** (Inlet Controls 2.43 cfs @ 4.45 fps)

Pond 9P: ADS N12 Infiltration Trench System #4 - Chamber Wizard Field A

Chamber Model = ADS N-12 12" (ADS N-12® Pipe)
Inside= 12.2"W x 12.2"H => 0.81 sf x 20.00'L = 16.2 cf
Outside= 14.5"W x 14.5"H => 1.05 sf x 20.00'L = 20.9 cf
Row Length Adjustment= +13.00' x 0.81 sf x 1 rows

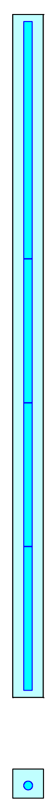
4 Chambers/Row x 20.00' Long +13.00' Row Adjustment = 93.00' Row Length +12.0" End Stone x 2 = 95.00' Base Length
1 Rows x 14.5" Wide + 18.0" Side Stone x 2 = 4.21' Base Width
14.0" Base + 14.5" Chamber Height + 20.0" Cover = 4.04' Field Height

4 Chambers x 16.2 cf +13.00' Row Adjustment x 0.81 sf x 1 Rows = 75.3 cf Chamber Storage
4 Chambers x 20.9 cf +13.00' Row Adjustment x 1.05 sf x 1 Rows = 97.3 cf Displacement

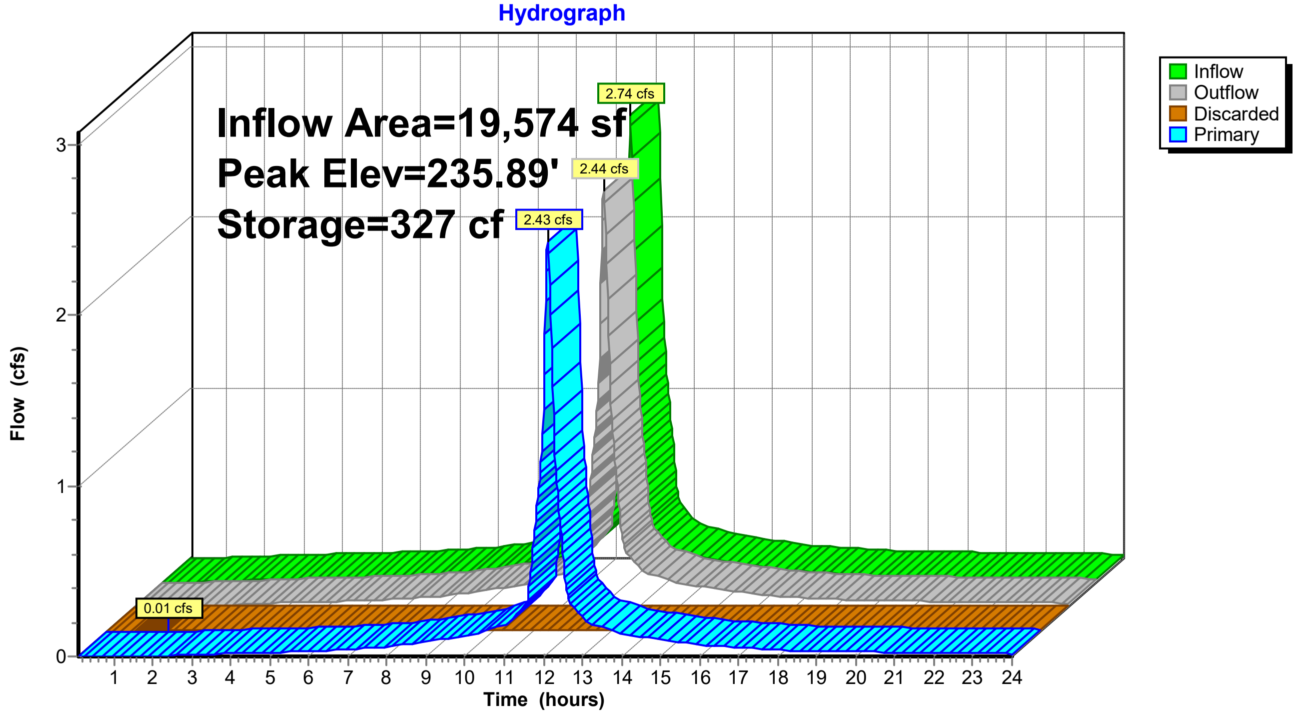
1,616.2 cf Field - 97.3 cf Chambers = 1,518.9 cf Stone x 40.0% Voids = 607.6 cf Stone Storage

Chamber Storage + Stone Storage = 682.9 cf = 0.016 af
Overall Storage Efficiency = 42.3%
Overall System Size = 95.00' x 4.21' x 4.04'

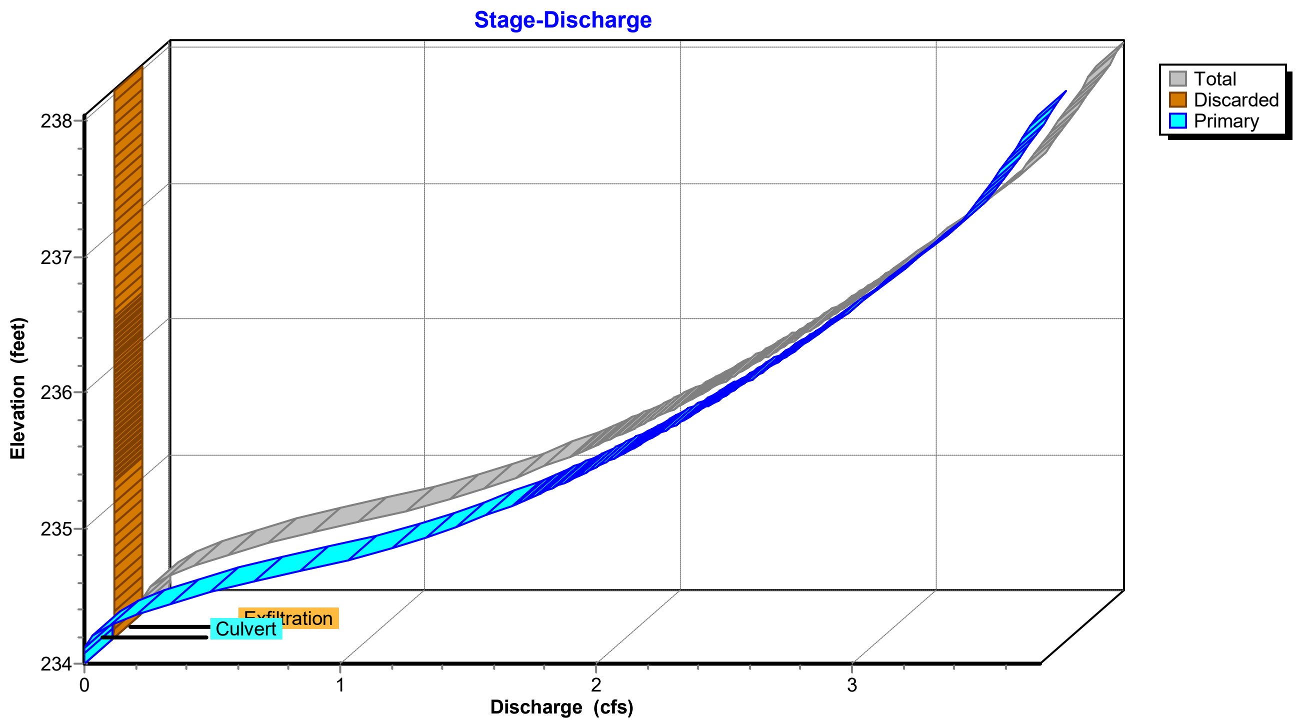
4 Chambers @ $ 0.00 /ea = $ 0.00
59.9 cy Field Excavation @ $ 10.00 /cy = $ 598.61
56.3 cy Stone @ $ 30.00 /cy = $ 1,687.67
Total Cost = $ 2,286.28



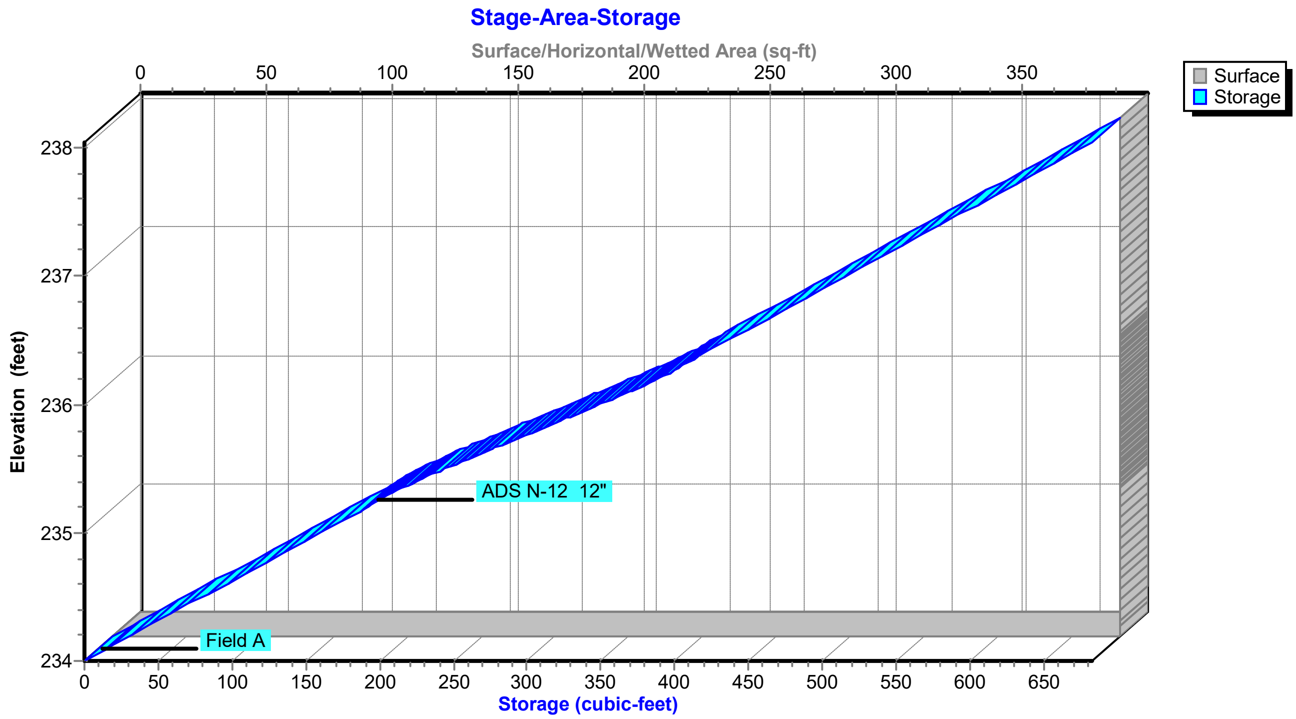
Pond 9P: ADS N12 Infiltration Trench System #4



Pond 9P: ADS N12 Infiltration Trench System #4



Pond 9P: ADS N12 Infiltration Trench System #4



Summary for Pond 10P: Crushed Stone Trench WQ and Galleys System #3

Inflow Area = 59,517 sf, 97.55% Impervious, Inflow Depth > 5.83" for 25-Year event
Inflow = 7.89 cfs @ 12.09 hrs, Volume= 28,895 cf
Outflow = 7.89 cfs @ 12.09 hrs, Volume= 22,609 cf, Atten= 0%, Lag= 0.2 min
Discarded = 0.07 cfs @ 8.56 hrs, Volume= 5,261 cf
Primary = 7.82 cfs @ 12.09 hrs, Volume= 17,348 cf

Routing by Stor-Ind method, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs
Peak Elev= 233.05' @ 12.09 hrs Surf.Area= 3,107 sf Storage= 6,389 cf

Plug-Flow detention time= 123.7 min calculated for 22,609 cf (78% of inflow)
Center-of-Mass det. time= 46.1 min (791.0 - 745.0)

Volume	Invert	Avail.Storage	Storage Description
#1	230.25'	1,658 cf	**5.00'W x 195.00'L x 4.25'H Prismatoid** 4,144 cf Overall x 40.0% Voids
#2A	229.00'	2,056 cf	**13.00'W x 164.00'L x 4.75'H Field A** 10,127 cf Overall - 4,987 cf Embedded = 5,140 cf x 40.0% Voids
#3A	229.50'	3,710 cf	**Concrete Galley 4x4x4.25** x 80 Inside #2 Inside= 42.2"W x 45.0"H => 13.25 sf x 3.50'L = 46.4 cf Outside= 54.0"W x 51.0"H => 15.58 sf x 4.00'L = 62.3 cf 80 Chambers in 2 Rows
		7,424 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	233.00'	**190.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Discarded	229.00'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.07 cfs @ 8.56 hrs HW=230.26' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=6.99 cfs @ 12.09 hrs HW=233.05' (Free Discharge)
↑—**1=Sharp-Crested Rectangular Weir** (Weir Controls 6.99 cfs @ 0.73 fps)

Pond 10P: Crushed Stone Trench WQ and Galleys System #3 - Chamber Wizard Field A

Chamber Model = Concrete Galley 4x4x4.25 (Concrete Galley, Shea LE-EGH, LE-CGH or equivalent)
Inside= 42.2"W x 45.0"H => 13.25 sf x 3.50'L = 46.4 cf
Outside= 54.0"W x 51.0"H => 15.58 sf x 4.00'L = 62.3 cf

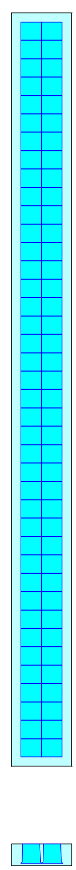
40 Chambers/Row x 4.00' Long = 160.00' Row Length +24.0" End Stone x 2 = 164.00' Base Length
2 Rows x 54.0" Wide + 24.0" Side Stone x 2 = 13.00' Base Width
6.0" Base + 51.0" Chamber Height = 4.75' Field Height

80 Chambers x 46.4 cf = 3,710.5 cf Chamber Storage
80 Chambers x 62.3 cf = 4,986.5 cf Displacement

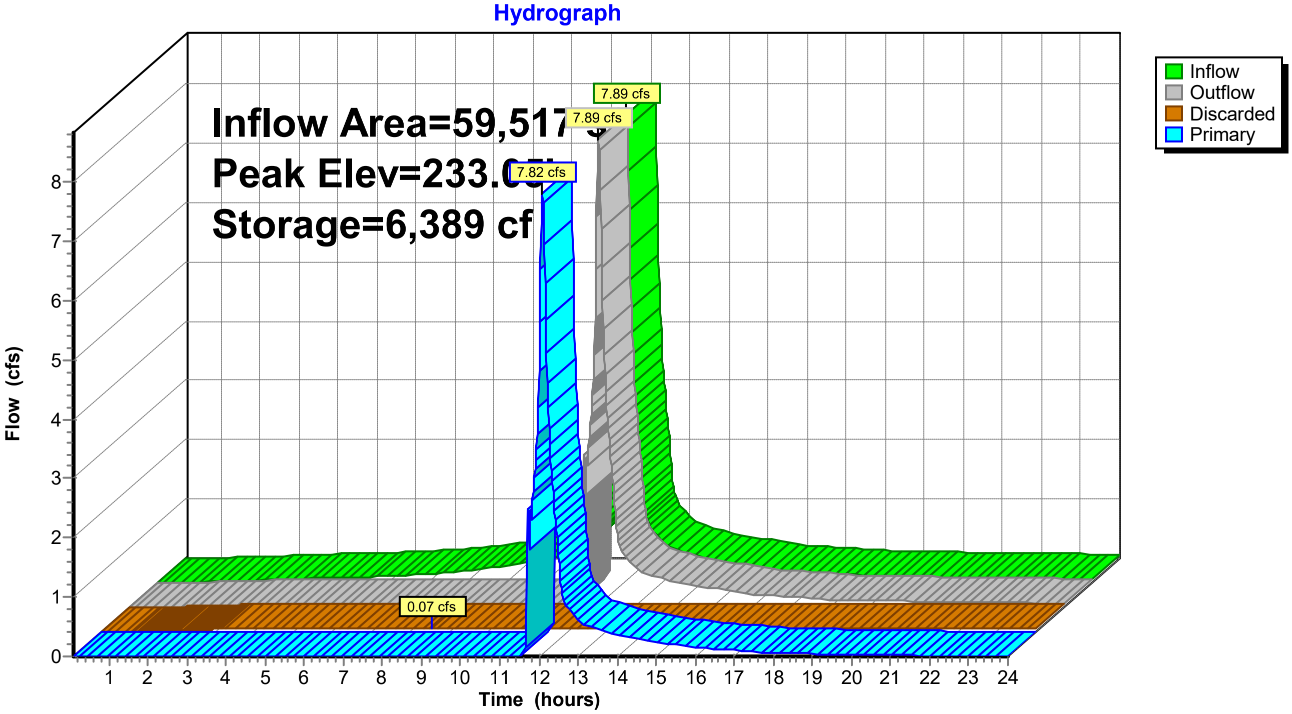
10,127.0 cf Field - 4,986.5 cf Chambers = 5,140.5 cf Stone x 40.0% Voids = 2,056.2 cf Stone Storage

Chamber Storage + Stone Storage = 5,766.7 cf = 0.132 af
Overall Storage Efficiency = 56.9%
Overall System Size = 164.00' x 13.00' x 4.75'

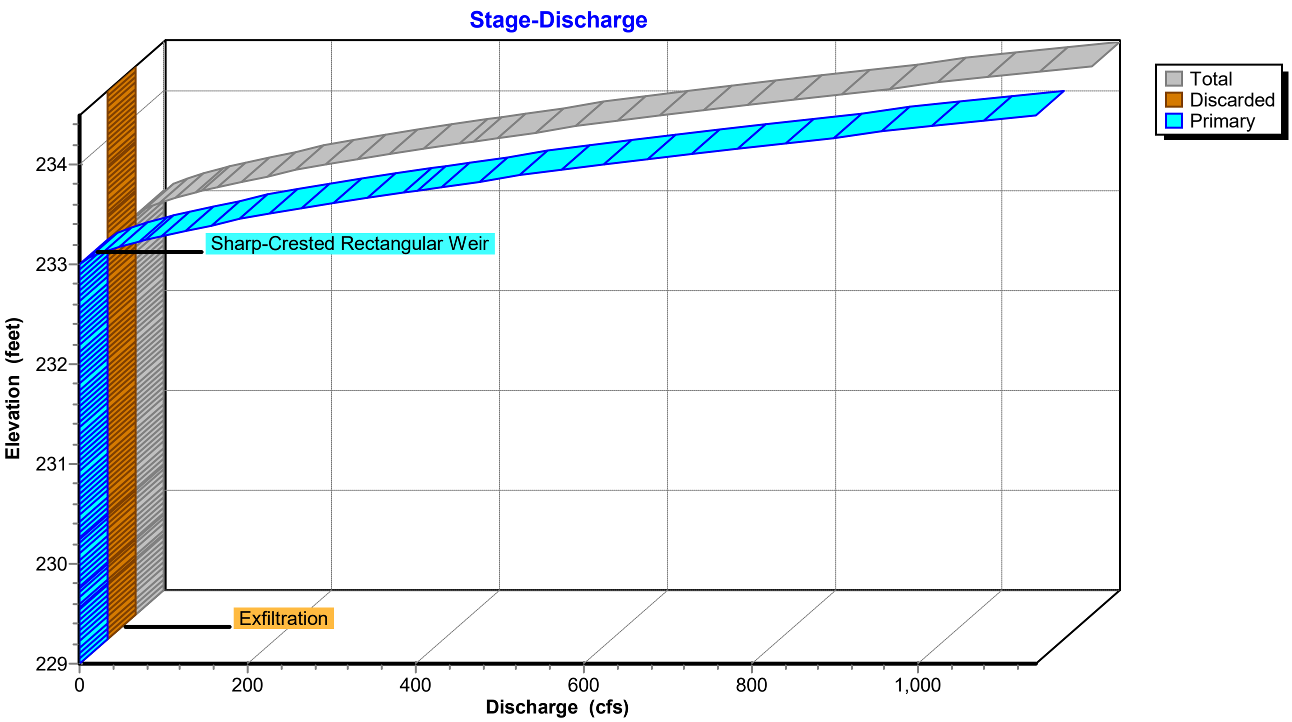
80 Chambers @ $ 0.00 /ea = $ 0.00
375.1 cy Field Excavation @ $ 10.00 /cy = $ 3,750.74
190.4 cy Stone @ $ 30.00 /cy = $ 5,711.65
Total Cost = $ 9,462.39



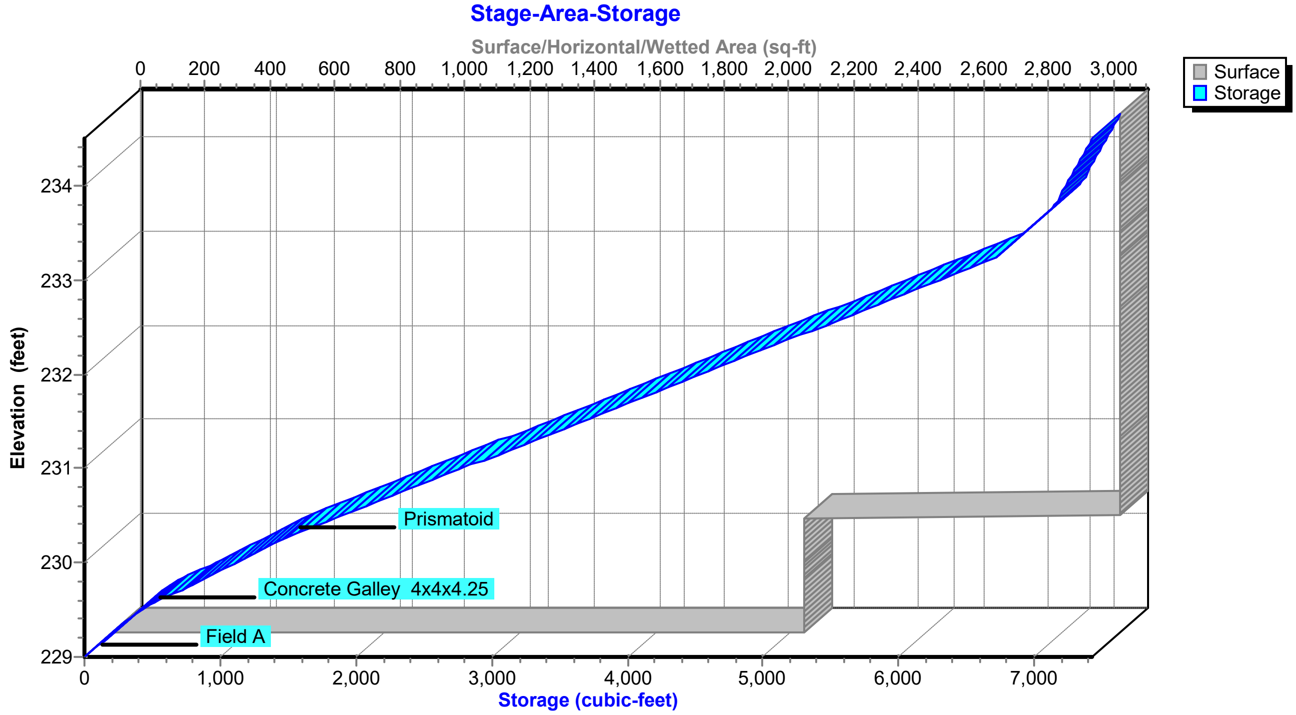
Pond 10P: Crushed Stone Trench WQ and Galleys System #3



Pond 10P: Crushed Stone Trench WQ and Galleys System #3



Pond 10P: Crushed Stone Trench WQ and Galleys System #3

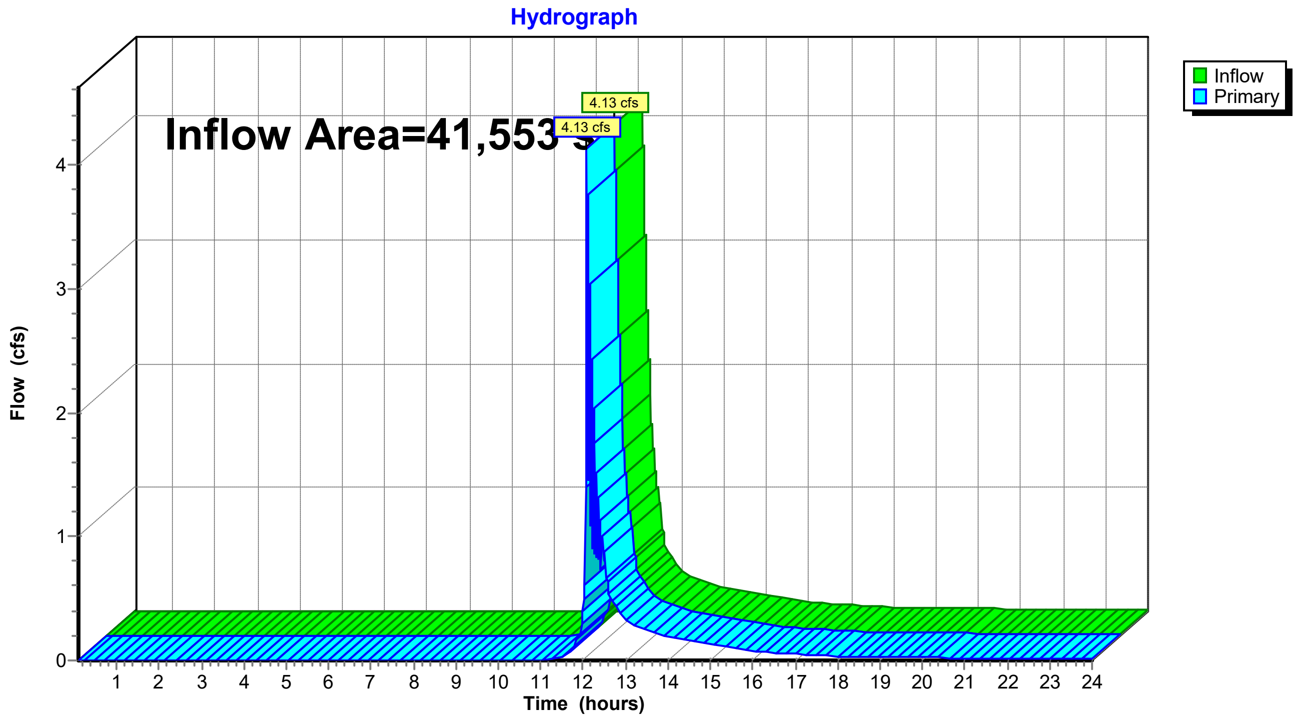


Summary for Link 11L: To Southerly Wetland

Inflow Area = 41,553 sf, 52.79% Impervious, Inflow Depth > 1.86" for 25-Year event
Inflow = 4.13 cfs @ 12.08 hrs, Volume= 6,448 cf
Primary = 4.13 cfs @ 12.08 hrs, Volume= 6,448 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs

Link 11L: To Southerly Wetland

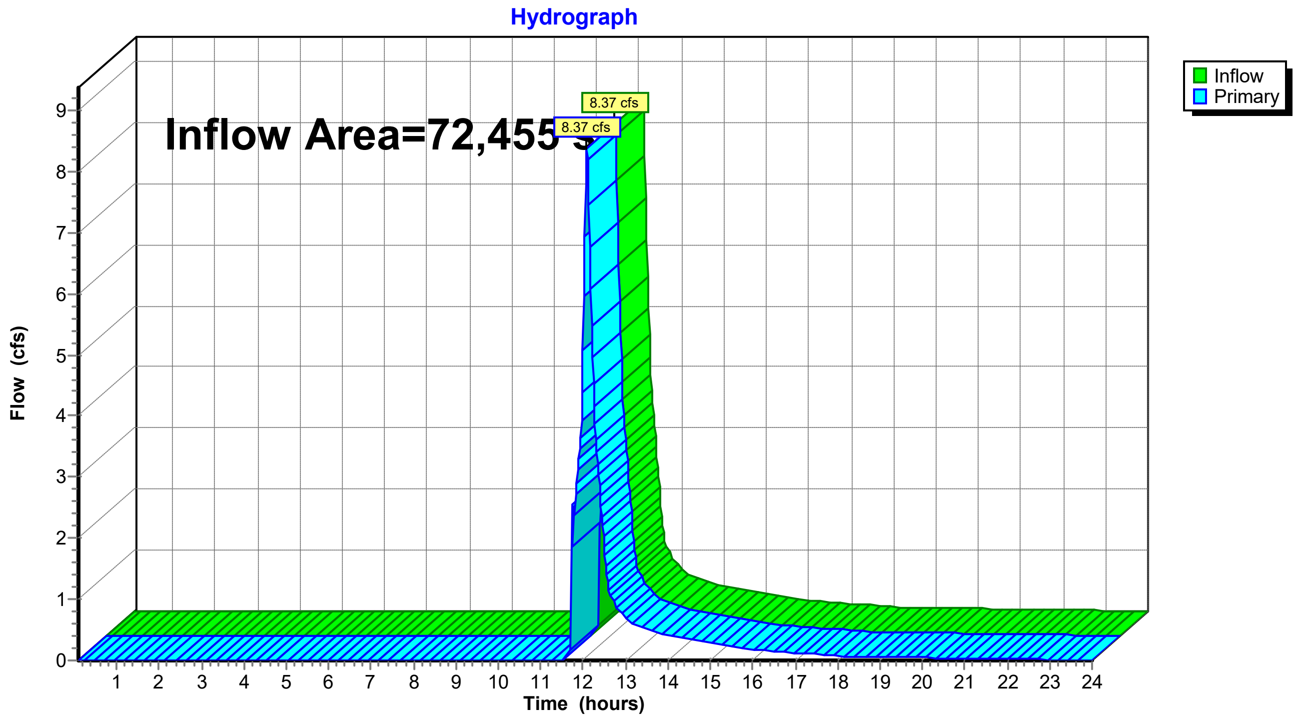


Summary for Link 12L: To Westerly Wetland

Inflow Area = 72,455 sf, 80.13% Impervious, Inflow Depth > 3.18" for 25-Year event
Inflow = 8.37 cfs @ 12.09 hrs, Volume= 19,215 cf
Primary = 8.37 cfs @ 12.09 hrs, Volume= 19,215 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs

Link 12L: To Westerly Wetland



Time span=0.10-24.00 hrs, dt=0.02 hrs, 1196 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1E: To Southerly Wetland Runoff Area=43,251 sf 38.57% Impervious Runoff Depth>6.43"
Tc=6.0 min CN=80 Runoff=7.32 cfs 23,174 cf

Subcatchment 1P: To Southerly Wetland Runoff Area=16,727 sf 0.00% Impervious Runoff Depth>3.74"
Tc=6.0 min CN=58 Runoff=1.66 cfs 5,219 cf

Subcatchment 2E: To Westerly Runoff Area=71,205 sf 29.43% Impervious Runoff Depth>7.28"
Tc=6.0 min UI Adjusted CN=87 Runoff=13.21 cfs 43,214 cf

Subcatchment 2P: To Westerly Wetland Runoff Area=12,938 sf 0.00% Impervious Runoff Depth>3.50"
Tc=6.0 min CN=56 Runoff=1.19 cfs 3,777 cf

Subcatchment 3P: Pavement to Infiltration Runoff Area=39,943 sf 96.34% Impervious Runoff Depth>8.61"
Tc=6.0 min CN=98 Runoff=7.97 cfs 28,671 cf

Subcatchment 4P: Roof to Infiltration Runoff Area=19,574 sf 100.00% Impervious Runoff Depth>8.61"
Tc=6.0 min CN=98 Runoff=3.91 cfs 14,050 cf

Subcatchment 5P: Pavement to Infiltration Runoff Area=15,930 sf 84.93% Impervious Runoff Depth>8.01"
Tc=6.0 min CN=93 Runoff=3.11 cfs 10,634 cf

Subcatchment 6P: Pavement to Infiltration Runoff Area=8,896 sf 94.49% Impervious Runoff Depth>8.49"
Tc=6.0 min CN=97 Runoff=1.77 cfs 6,296 cf

Pond 7P: Crushed Stone Trench WQ and Peak Elev=239.04' Storage=2,362 cf Inflow=3.11 cfs 10,634 cf
Discarded=0.03 cfs 1,784 cf Primary=3.21 cfs 6,493 cf Outflow=3.24 cfs 8,277 cf

Pond 8P: Crushed Stone Trench WQ and Peak Elev=233.04' Storage=2,272 cf Inflow=1.77 cfs 6,296 cf
Discarded=0.03 cfs 1,901 cf Primary=2.70 cfs 2,276 cf Outflow=2.72 cfs 4,177 cf

Pond 9P: ADS N12 Infiltration Trench System Peak Elev=237.18' Storage=545 cf Inflow=3.91 cfs 14,050 cf
Discarded=0.01 cfs 787 cf Primary=3.38 cfs 13,233 cf Outflow=3.39 cfs 14,020 cf

Pond 10P: Crushed Stone Trench WQ and Peak Elev=233.07' Storage=6,418 cf Inflow=11.10 cfs 41,903 cf
Discarded=0.07 cfs 5,551 cf Primary=11.03 cfs 30,051 cf Outflow=11.11 cfs 35,602 cf

Link 11L: To Southerly Wetland Inflow=7.25 cfs 13,988 cf
Primary=7.25 cfs 13,988 cf

Link 12L: To Westerly Wetland Inflow=12.23 cfs 33,828 cf
Primary=12.23 cfs 33,828 cf

Total Runoff Area = 228,464 sf Runoff Volume = 135,035 cf Average Runoff Depth = 7.09"
48.51% Pervious = 110,837 sf 51.49% Impervious = 117,627 sf

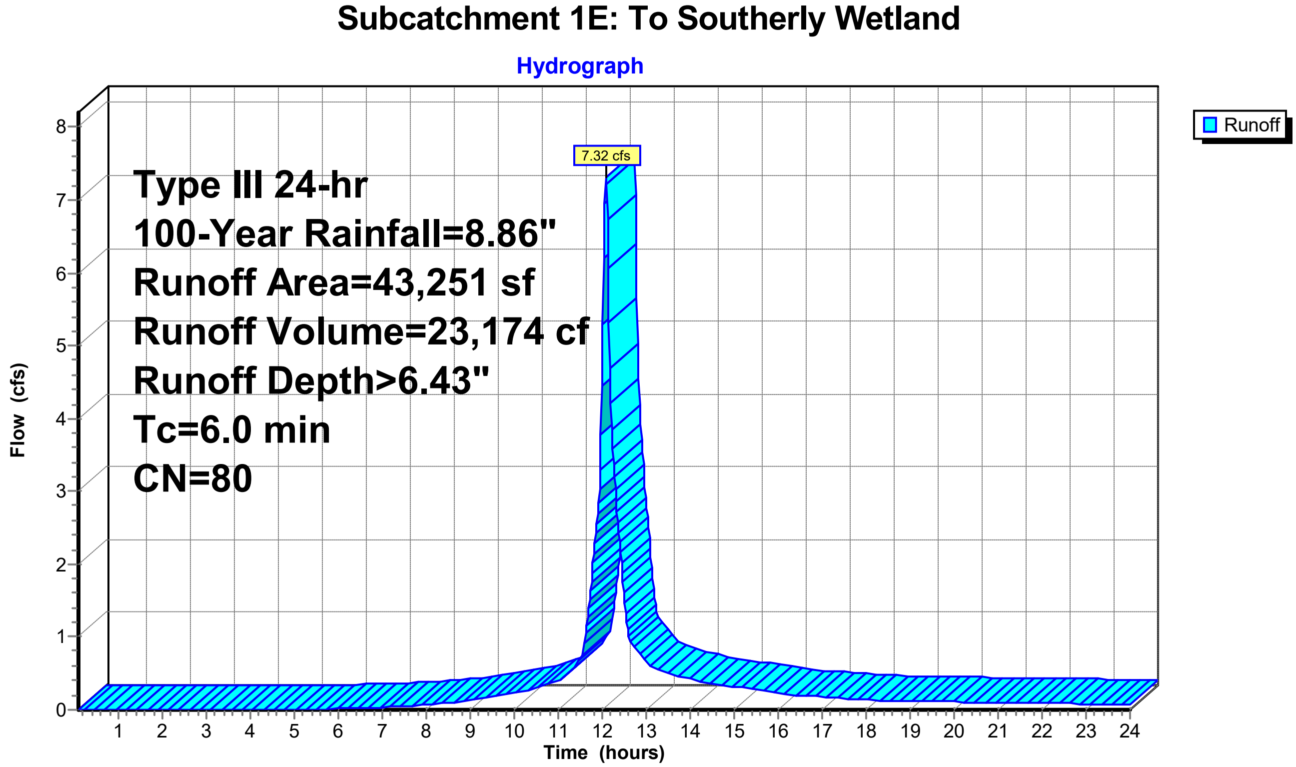
Summary for Subcatchment 1E: To Southerly Wetland

Runoff = 7.32 cfs @ 12.09 hrs, Volume= 23,174 cf, Depth> 6.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=8.86"

Area (sf)	CN	Description
12,540	61	>75% Grass cover, Good, HSG B
16,680	98	Paved parking, HSG B
7,251	96	Gravel surface, HSG B
6,780	55	Woods, Good, HSG B
43,251	80	Weighted Average
26,571		61.43% Pervious Area
16,680		38.57% Impervious Area

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



Summary for Subcatchment 1P: To Southerly Wetland

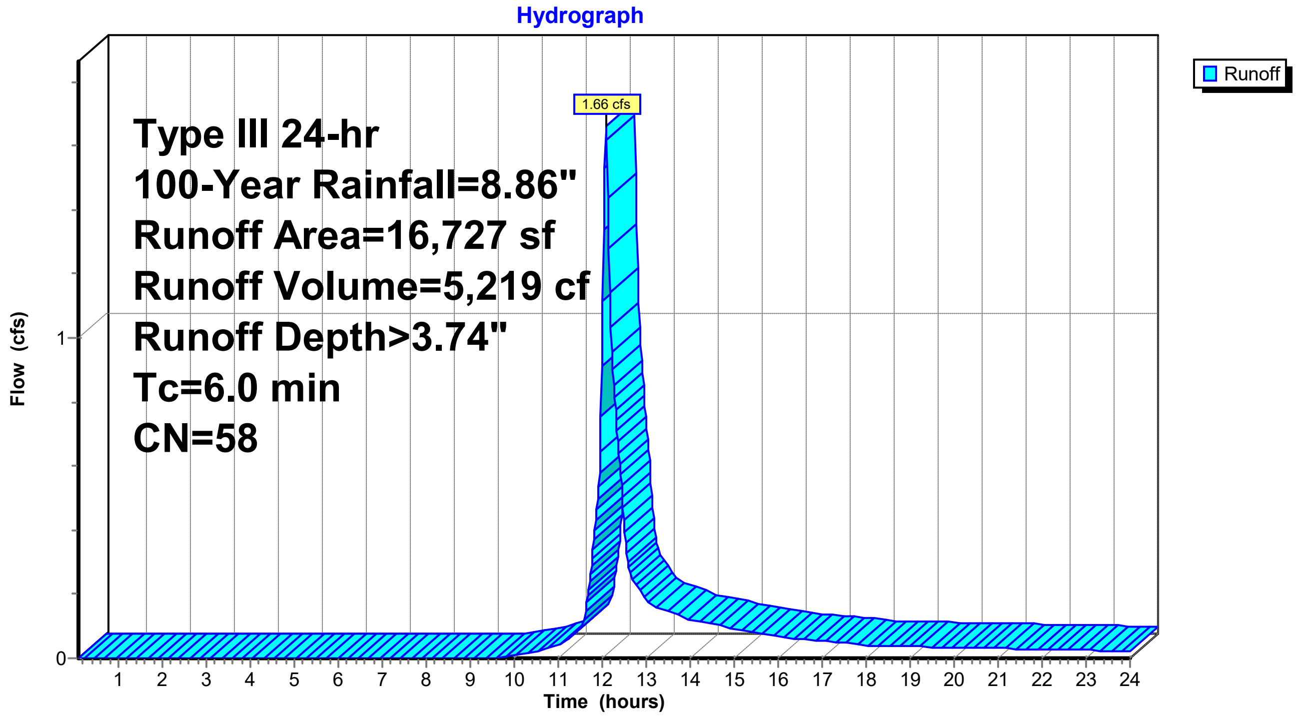
Runoff = 1.66 cfs @ 12.09 hrs, Volume= 5,219 cf, Depth> 3.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=8.86"

Area (sf)	CN	Description
9,463	61	>75% Grass cover, Good, HSG B
7,264	55	Woods, Good, HSG B
16,727	58	Weighted Average
16,727		100.00% Pervious Area

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

Subcatchment 1P: To Southerly Wetland



Summary for Subcatchment 2E: To Westerly Wetland/Property Line

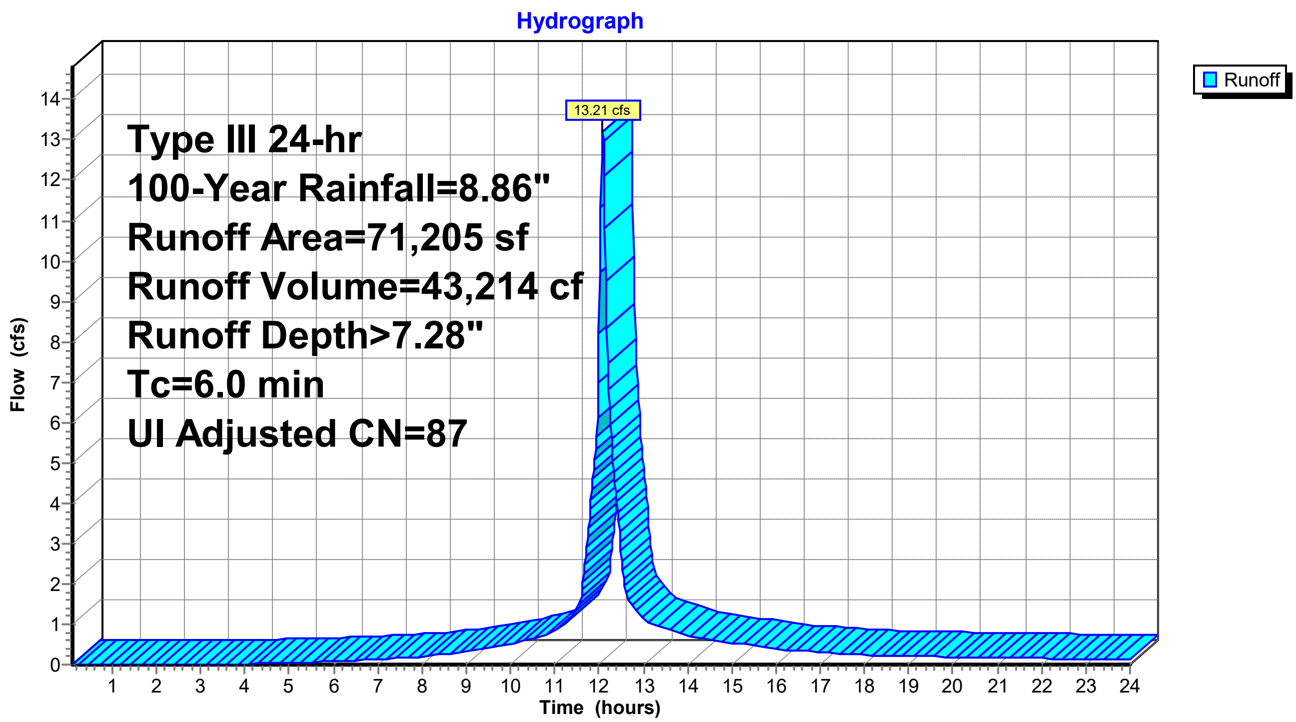
Runoff = 13.21 cfs @ 12.08 hrs, Volume= 43,214 cf, Depth> 7.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=8.86"

Area (sf)	CN	Adj	Description
1,212	61		>75% Grass cover, Good, HSG B
1,369	98		Paved parking, HSG B
12,957	55		Woods, Good, HSG B
36,080	96		Gravel surface, HSG B
19,587	98		Unconnected roofs, HSG B
71,205	89	87	Weighted Average, UI Adjusted
50,249			70.57% Pervious Area
20,956			29.43% Impervious Area
19,587			93.47% Unconnected

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

Subcatchment 2E: To Westerly Wetland/Property Line



Summary for Subcatchment 2P: To Westerly Wetland

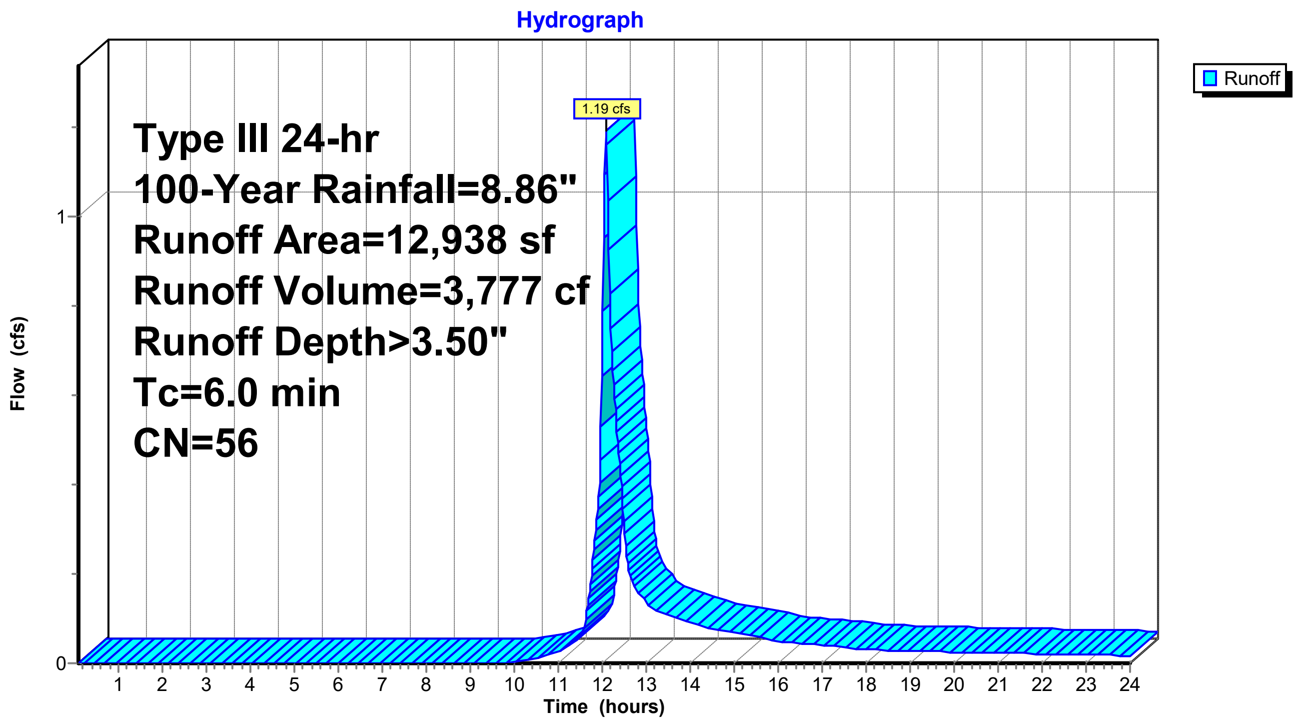
Runoff = 1.19 cfs @ 12.09 hrs, Volume= 3,777 cf, Depth> 3.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=8.86"

Area (sf)	CN	Description
2,281	61	>75% Grass cover, Good, HSG B
10,657	55	Woods, Good, HSG B
12,938	56	Weighted Average
12,938		100.00% Pervious Area

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

Subcatchment 2P: To Westerly Wetland



Summary for Subcatchment 3P: Pavement to Infiltration System

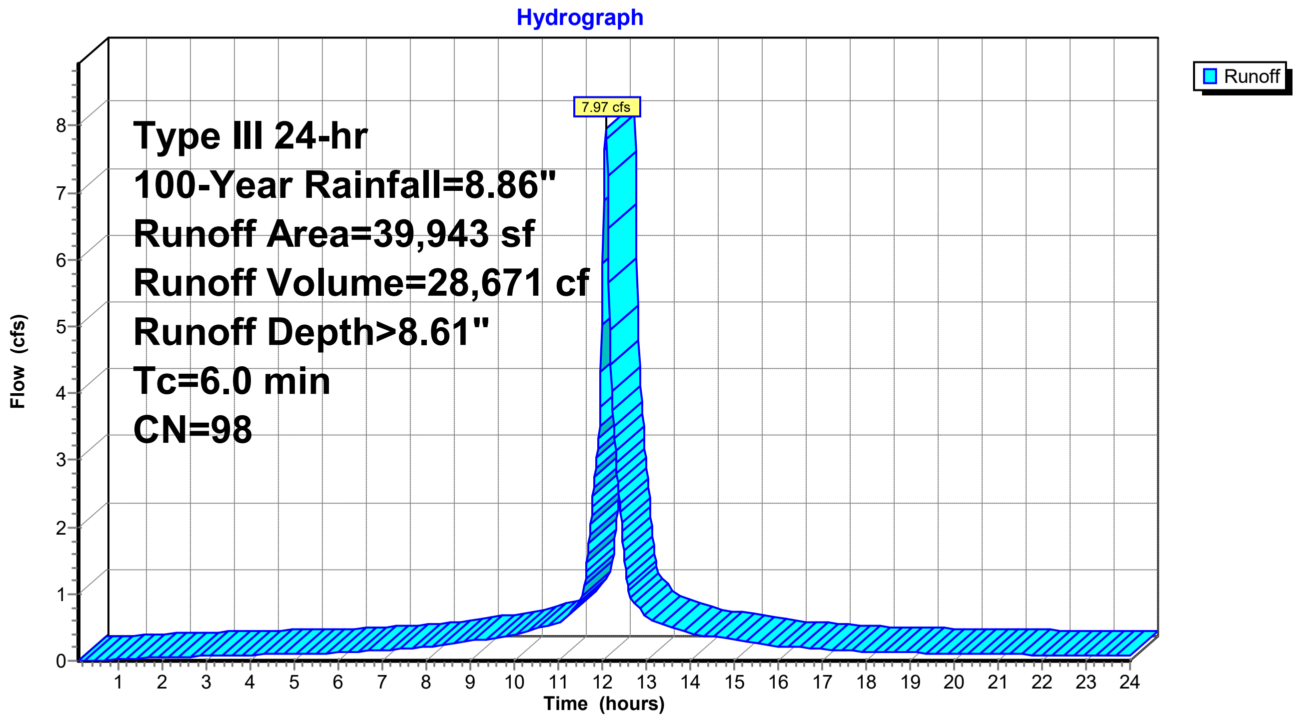
Runoff = 7.97 cfs @ 12.08 hrs, Volume= 28,671 cf, Depth> 8.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=8.86"

	Area (sf)	CN	Description
	38,482	98	Paved parking, HSG B
*	1,461	85	CrushedStone, HSG B
	39,943	98	Weighted Average
	1,461		3.66% Pervious Area
	38,482		96.34% Impervious Area

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

Subcatchment 3P: Pavement to Infiltration System



Summary for Subcatchment 4P: Roof to Infiltration System

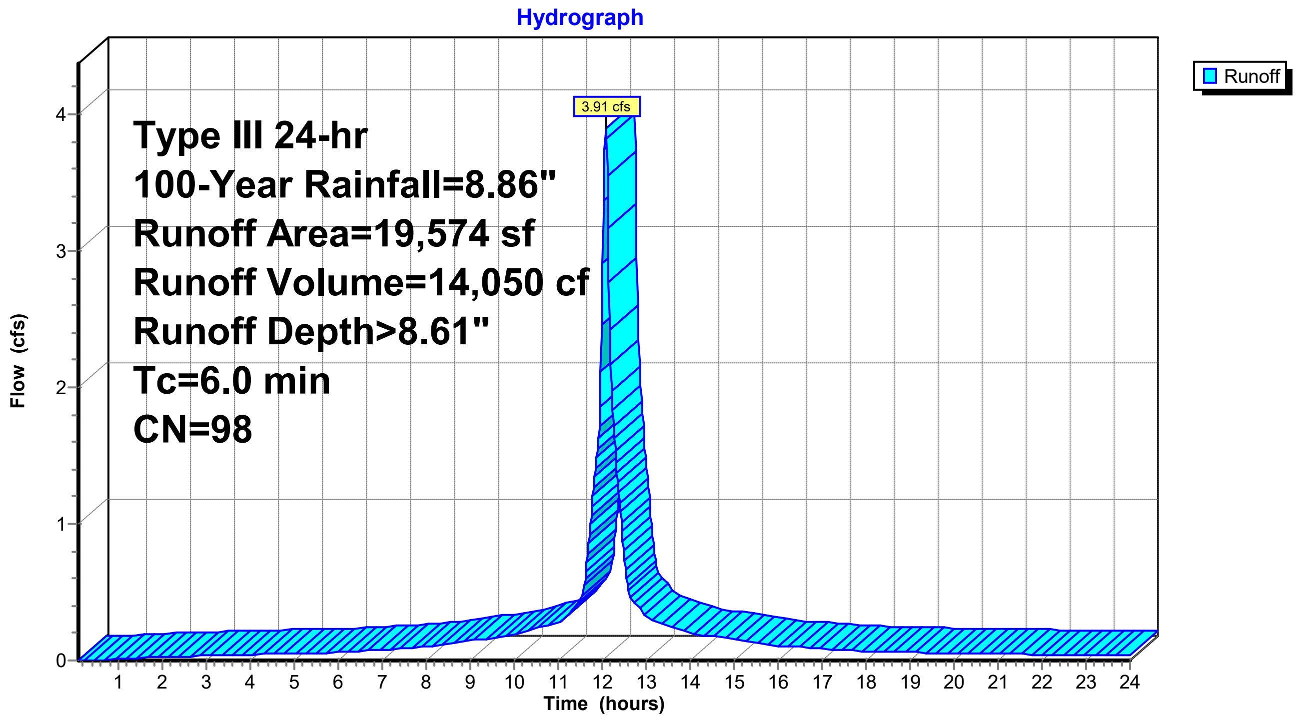
Runoff = 3.91 cfs @ 12.08 hrs, Volume= 14,050 cf, Depth> 8.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=8.86"

Area (sf)	CN	Description
19,574	98	Roofs, HSG B
19,574		100.00% Impervious Area

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

Subcatchment 4P: Roof to Infiltration System



Summary for Subcatchment 5P: Pavement to Infiltration System

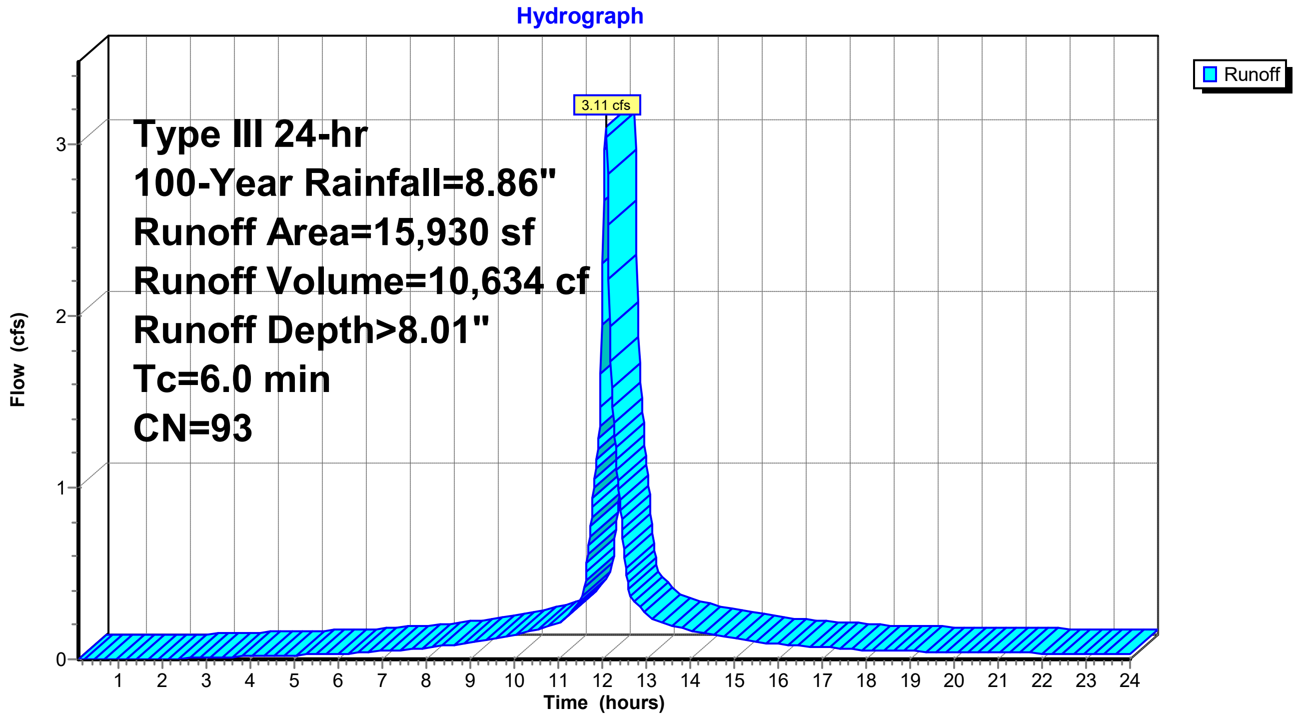
Runoff = 3.11 cfs @ 12.08 hrs, Volume= 10,634 cf, Depth> 8.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=8.86"

	Area (sf)	CN	Description
	13,529	98	Paved parking, HSG B
	1,973	61	>75% Grass cover, Good, HSG B
*	428	85	Crushed Stone, HSG B
	15,930	93	Weighted Average
	2,401		15.07% Pervious Area
	13,529		84.93% Impervious Area

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

Subcatchment 5P: Pavement to Infiltration System



Summary for Subcatchment 6P: Pavement to Infiltration System

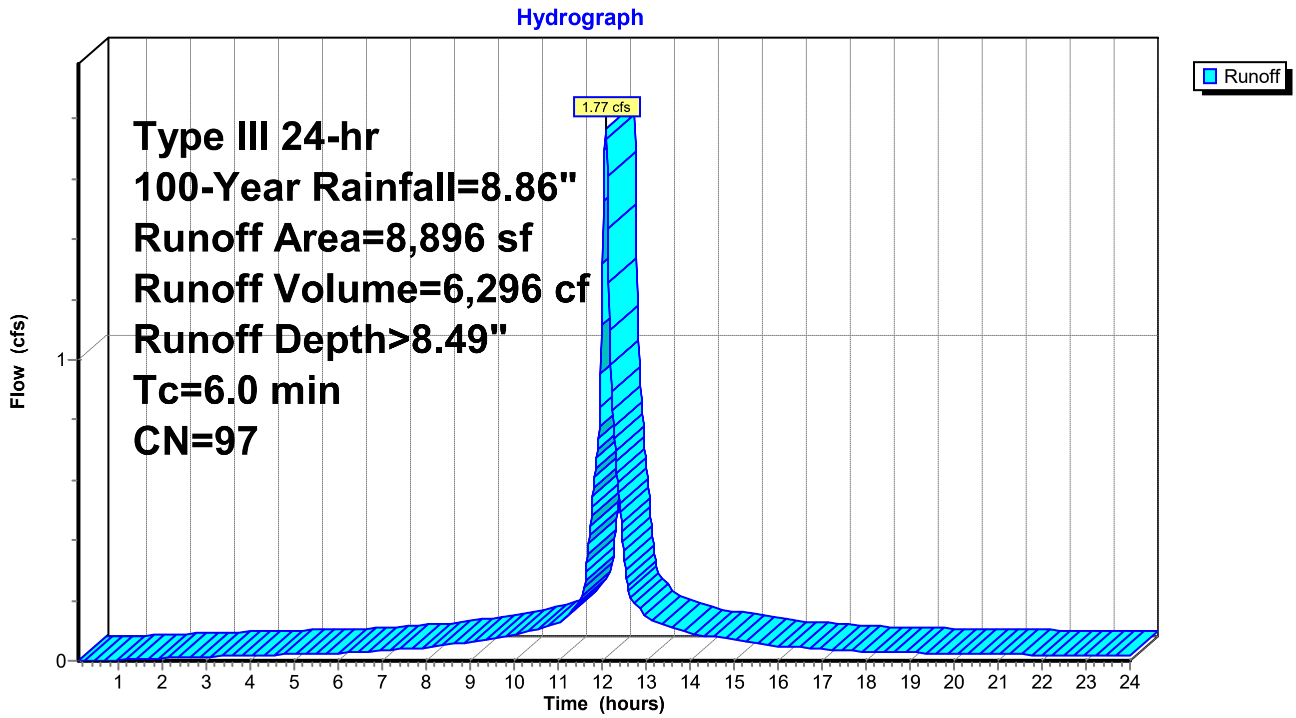
Runoff = 1.77 cfs @ 12.08 hrs, Volume= 6,296 cf, Depth> 8.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=8.86"

	Area (sf)	CN	Description
	8,406	98	Paved parking, HSG B
*	490	85	Crushed Stone, HSG B
	8,896	97	Weighted Average
	490		5.51% Pervious Area
	8,406		94.49% Impervious Area

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

Subcatchment 6P: Pavement to Infiltration System



Summary for Pond 7P: Crushed Stone Trench WQ and Galleys System #1

Inflow Area =	15,930 sf,	84.93% Impervious,	Inflow Depth > 8.01"	for 100-Year event	
Inflow =	3.11 cfs @	12.08 hrs,	Volume=	10,634 cf	
Outflow =	3.24 cfs @	12.08 hrs,	Volume=	8,277 cf,	Atten= 0%, Lag= 0.0 min
Discarded =	0.03 cfs @	9.70 hrs,	Volume=	1,784 cf	
Primary =	3.21 cfs @	12.08 hrs,	Volume=	6,493 cf	

Routing by Stor-Ind method, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs
Peak Elev= 239.04' @ 12.08 hrs Surf.Area= 1,115 sf Storage= 2,362 cf

Plug-Flow detention time= 123.3 min calculated for 8,270 cf (78% of inflow)
Center-of-Mass det. time= 43.9 min (806.2 - 762.3)

Volume	Invert	Avail.Storage	Storage Description
#1	236.00'	532 cf	**3.50'W x 95.00'L x 4.00'H Prismatoid** 1,330 cf Overall x 40.0% Voids
#2A	234.25'	937 cf	**8.50'W x 92.00'L x 4.75'H Field A** 3,715 cf Overall - 1,371 cf Embedded = 2,343 cf x 40.0% Voids
#3A	234.75'	1,020 cf	**Concrete Galley 4x4x4.25** x 22 Inside #2 Inside= 42.2"W x 45.0"H => 13.25 sf x 3.50'L = 46.4 cf Outside= 54.0"W x 51.0"H => 15.58 sf x 4.00'L = 62.3 cf
		2,490 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	239.00'	**95.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Discarded	234.25'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.03 cfs @ 9.70 hrs HW=236.01' (Free Discharge)
└─**2=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=2.78 cfs @ 12.08 hrs HW=239.04' (Free Discharge)
└─**1=Sharp-Crested Rectangular Weir** (Weir Controls 2.78 cfs @ 0.68 fps)

Pond 7P: Crushed Stone Trench WQ and Galleys System #1 - Chamber Wizard Field A

Chamber Model = Concrete Galley 4x4x4.25 (Concrete Galley, Shea LE-EGH, LE-CGH or equivalent)
Inside= 42.2"W x 45.0"H => 13.25 sf x 3.50'L = 46.4 cf
Outside= 54.0"W x 51.0"H => 15.58 sf x 4.00'L = 62.3 cf

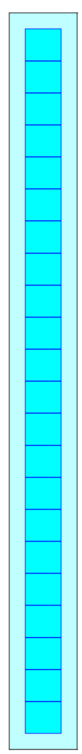
22 Chambers/Row x 4.00' Long = 88.00' Row Length +24.0" End Stone x 2 = 92.00' Base Length
1 Rows x 54.0" Wide + 24.0" Side Stone x 2 = 8.50' Base Width
6.0" Base + 51.0" Chamber Height = 4.75' Field Height

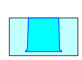
22 Chambers x 46.4 cf = 1,020.4 cf Chamber Storage
22 Chambers x 62.3 cf = 1,371.3 cf Displacement

3,714.5 cf Field - 1,371.3 cf Chambers = 2,343.2 cf Stone x 40.0% Voids = 937.3 cf Stone Storage

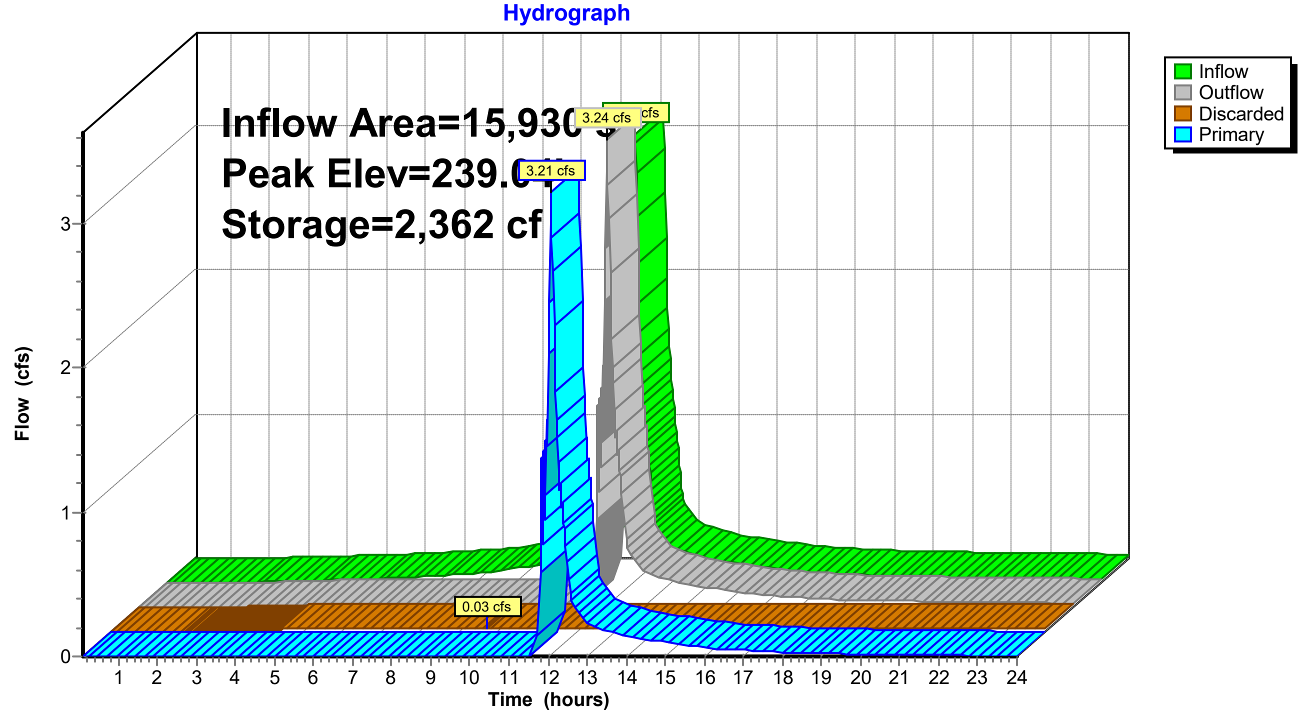
Chamber Storage + Stone Storage = 1,957.7 cf = 0.045 af
Overall Storage Efficiency = 52.7%
Overall System Size = 92.00' x 8.50' x 4.75'

22 Chambers @ $ 0.00 /ea = $ 0.00
137.6 cy Field Excavation @ $ 10.00 /cy = $ 1,375.74
86.8 cy Stone @ $ 30.00 /cy = $ 2,603.57
Total Cost = $ 3,979.31

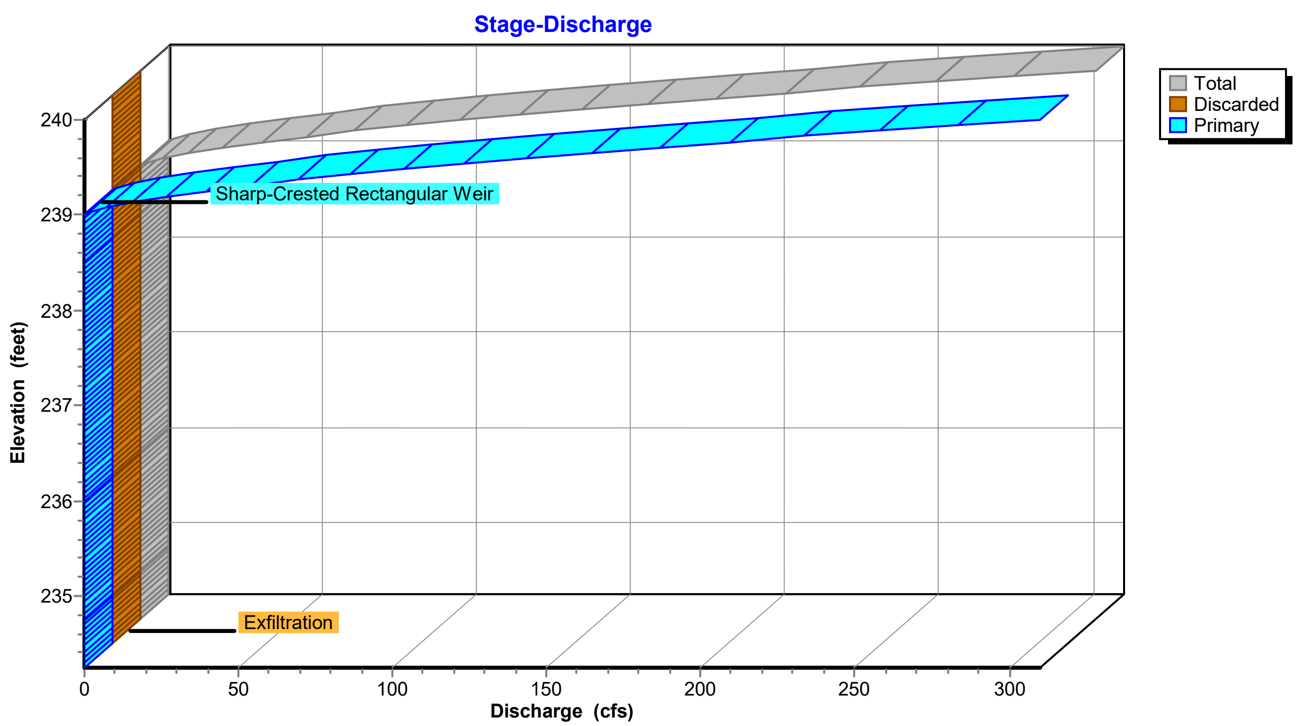




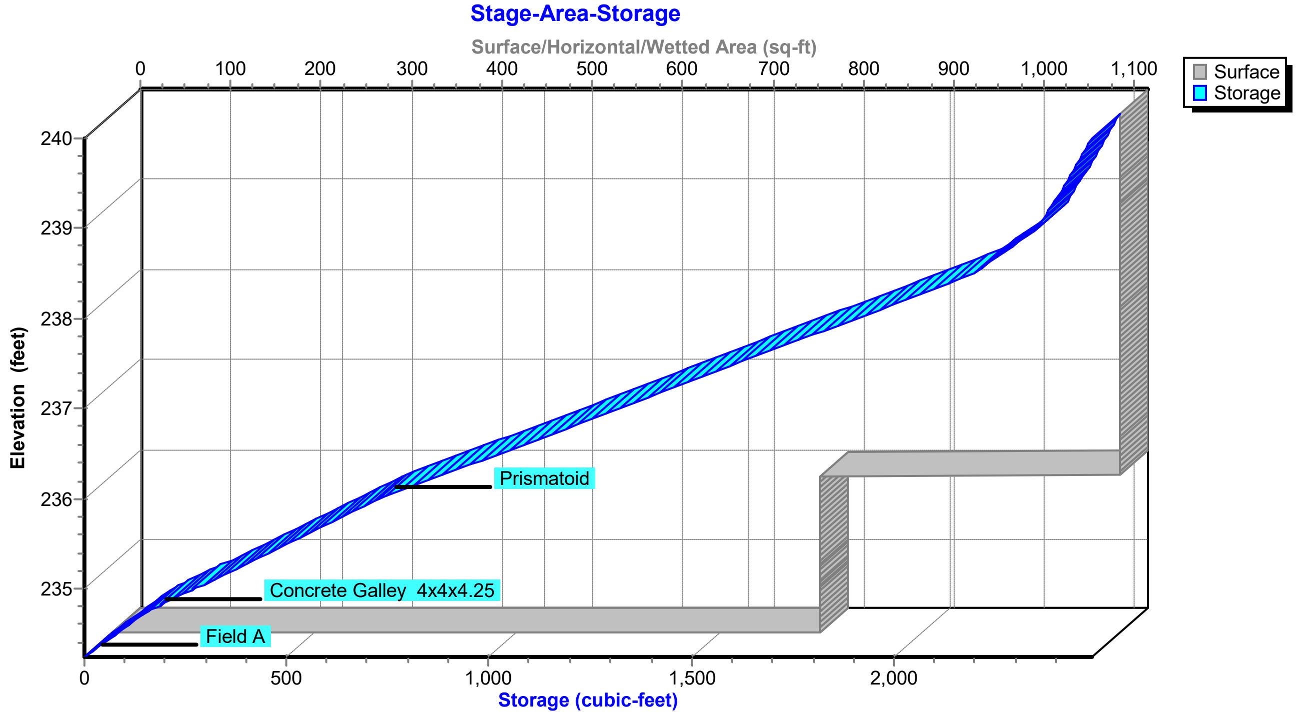
Pond 7P: Crushed Stone Trench WQ and Galleys System #1



Pond 7P: Crushed Stone Trench WQ and Galleys System #1



Pond 7P: Crushed Stone Trench WQ and Galleys System #1



Summary for Pond 8P: Crushed Stone Trench WQ and Galleys System #2

```
Inflow Area =       8,896 sf, 94.49% Impervious,  Inflow Depth >  8.49"   for 100-Year event
Inflow      =    1.77 cfs @  12.08 hrs,  Volume=        6,296 cf
Outflow     =    2.72 cfs @  12.10 hrs,  Volume=        4,177 cf,  Atten= 0%,  Lag= 1.0 min
Discarded   =    0.03 cfs @  11.48 hrs,  Volume=        1,901 cf
Primary     =    2.70 cfs @  12.10 hrs,  Volume=        2,276 cf
```

Routing by Stor-Ind method, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs
Peak Elev= 233.04' @ 12.10 hrs Surf.Area= 1,208 sf Storage= 2,272 cf

Plug-Flow detention time= 169.1 min calculated for 4,174 cf (66% of inflow)
Center-of-Mass det. time= 68.6 min (813.6 - 745.0)

Volume	Invert	Avail.Storage	Storage Description
#1	231.00'	549 cf	**4.00'W x 98.00'L x 3.50'H Prismatoid**
			1,372 cf Overall x 40.0% Voids
#2A	228.75'	977 cf	**8.50'W x 96.00'L x 4.75'H Field A**
			3,876 cf Overall - 1,434 cf Embedded = 2,442 cf x 40.0% Voids
#3A	229.25'	1,067 cf	**Concrete Galley 4x4x4.25** x 23 Inside #2
			Inside= 42.2"W x 45.0"H => 13.25 sf x 3.50'L = 46.4 cf
			Outside= 54.0"W x 51.0"H => 15.58 sf x 4.00'L = 62.3 cf
		2,593 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	233.00'	**98.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Discarded	228.75'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.03 cfs @ 11.48 hrs HW=231.02' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=2.05 cfs @ 12.10 hrs HW=233.03' (Free Discharge)
↑—**1=Sharp-Crested Rectangular Weir** (Weir Controls 2.05 cfs @ 0.61 fps)

Pond 8P: Crushed Stone Trench WQ and Galleys System #2 - Chamber Wizard Field A

Chamber Model = Concrete Galley 4x4x4.25 (Concrete Galley, Shea LE-EGH, LE-CGH or equivalent)
Inside= 42.2"W x 45.0"H => 13.25 sf x 3.50'L = 46.4 cf
Outside= 54.0"W x 51.0"H => 15.58 sf x 4.00'L = 62.3 cf

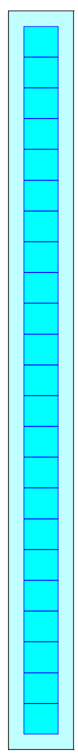
23 Chambers/Row x 4.00' Long = 92.00' Row Length +24.0" End Stone x 2 = 96.00' Base Length
1 Rows x 54.0" Wide + 24.0" Side Stone x 2 = 8.50' Base Width
6.0" Base + 51.0" Chamber Height = 4.75' Field Height

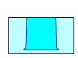
23 Chambers x 46.4 cf = 1,066.8 cf Chamber Storage
23 Chambers x 62.3 cf = 1,433.6 cf Displacement

3,876.0 cf Field - 1,433.6 cf Chambers = 2,442.4 cf Stone x 40.0% Voids = 977.0 cf Stone Storage

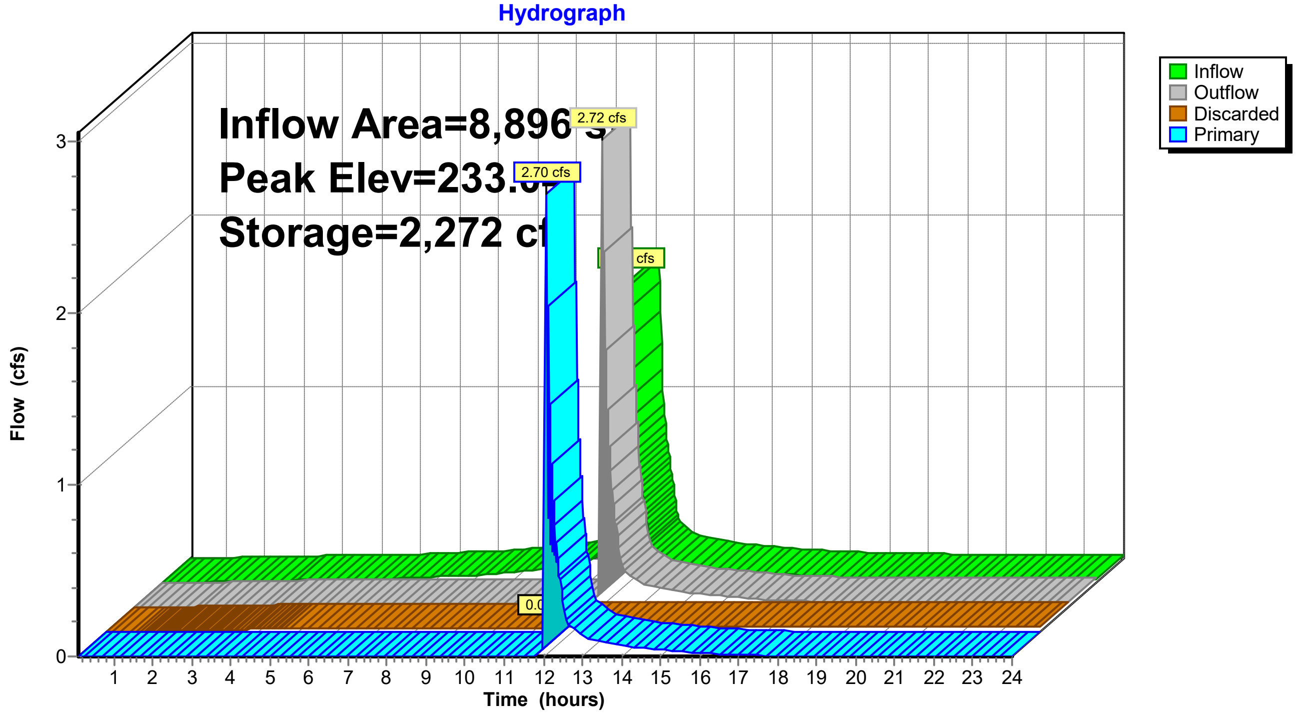
Chamber Storage + Stone Storage = 2,043.7 cf = 0.047 af
Overall Storage Efficiency = 52.7%
Overall System Size = 96.00' x 8.50' x 4.75'

23 Chambers @ $ 0.00 /ea = $ 0.00
143.6 cy Field Excavation @ $ 10.00 /cy = $ 1,435.56
90.5 cy Stone @ $ 30.00 /cy = $ 2,713.75
Total Cost = $ 4,149.31

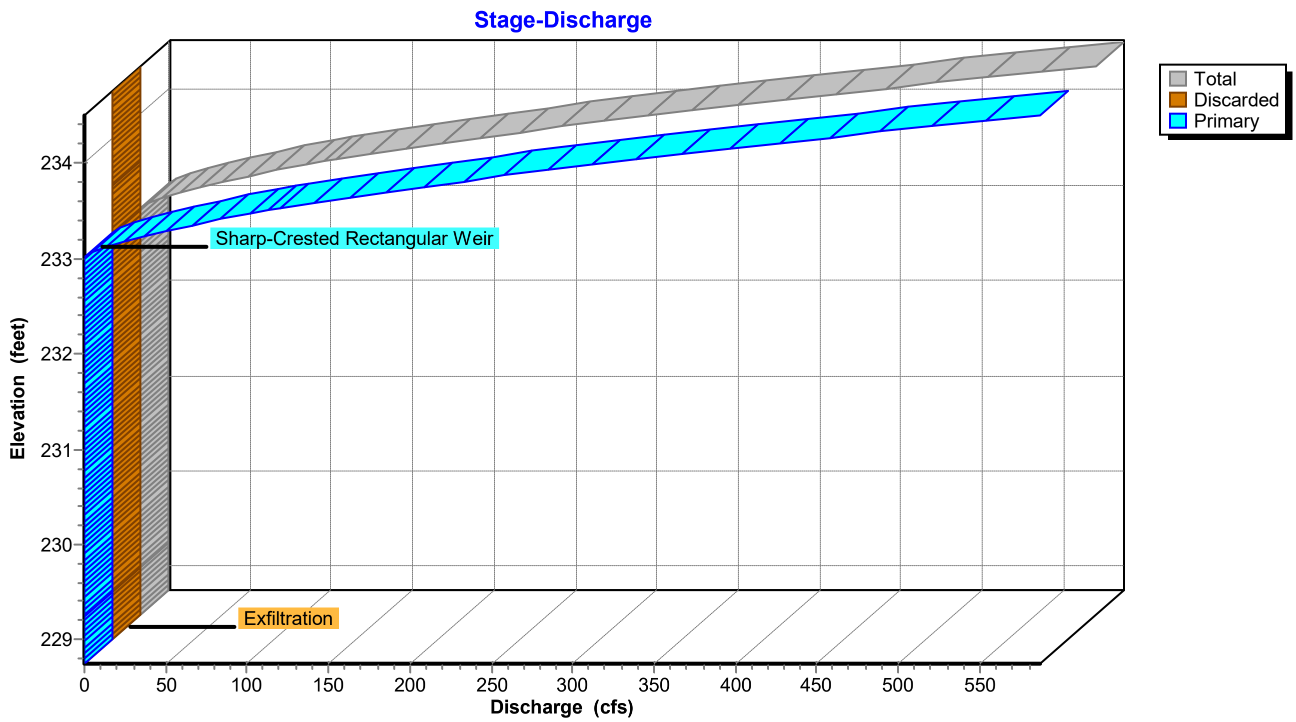




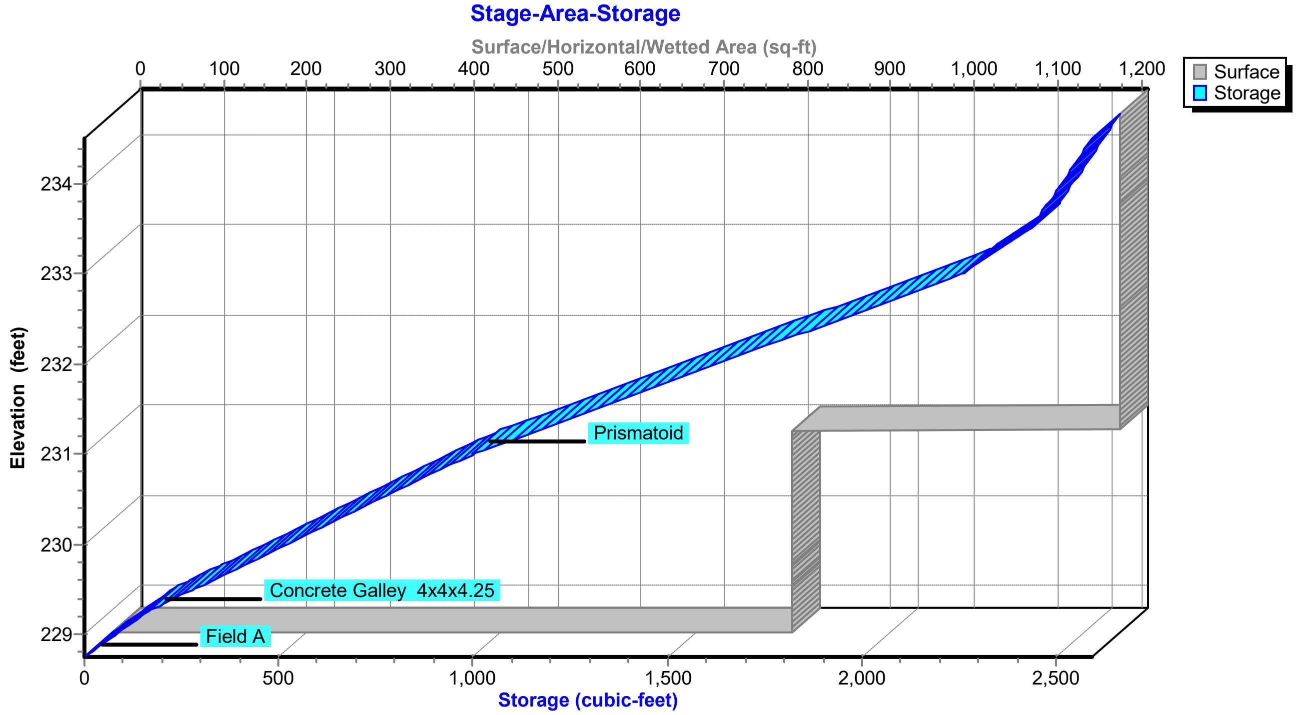
Pond 8P: Crushed Stone Trench WQ and Galleys System #2



Pond 8P: Crushed Stone Trench WQ and Galleys System #2



Pond 8P: Crushed Stone Trench WQ and Galleys System #2



Summary for Pond 9P: ADS N12 Infiltration Trench System #4

Inflow Area = 19,574 sf,100.00% Impervious, Inflow Depth > 8.61" for 100-Year event
Inflow = 3.91 cfs @ 12.08 hrs, Volume= 14,050 cf
Outflow = 3.39 cfs @ 12.13 hrs, Volume= 14,020 cf, Atten= 13%, Lag= 2.7 min
Discarded = 0.01 cfs @ 1.08 hrs, Volume= 787 cf
Primary = 3.38 cfs @ 12.13 hrs, Volume= 13,233 cf

Routing by Stor-Ind method, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs
Peak Elev= 237.18' @ 12.13 hrs Surf.Area= 400 sf Storage= 545 cf

Plug-Flow detention time= 4.8 min calculated for 14,008 cf (100% of inflow)
Center-of-Mass det. time= 3.3 min (742.8 - 739.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	234.00'	608 cf	**4.21'W x 95.00'L x 4.04'H Field A** 1,616 cf Overall - 97 cf Embedded = 1,519 cf x 40.0% Voids
#2A	235.17'	75 cf	**ADS N-12 12"** x 4 Inside #1 Inside= 12.2"W x 12.2"H => 0.81 sf x 20.00'L = 16.2 cf Outside= 14.5"W x 14.5"H => 1.05 sf x 20.00'L = 20.9 cf Row Length Adjustment= +13.00' x 0.81 sf x 1 rows
		683 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	234.00'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	234.10'	**10.0" Round Culvert** L= 155.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 234.10' / 232.00' S= 0.0135 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.55 sf

Discarded OutFlow Max=0.01 cfs @ 1.08 hrs HW=234.04' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=3.37 cfs @ 12.13 hrs HW=237.16' (Free Discharge)
↑—**2=Culvert** (Inlet Controls 3.37 cfs @ 6.18 fps)

Pond 9P: ADS N12 Infiltration Trench System #4 - Chamber Wizard Field A

Chamber Model = ADS N-12 12" (ADS N-12® Pipe)
Inside= 12.2"W x 12.2"H => 0.81 sf x 20.00'L = 16.2 cf
Outside= 14.5"W x 14.5"H => 1.05 sf x 20.00'L = 20.9 cf
Row Length Adjustment= +13.00' x 0.81 sf x 1 rows

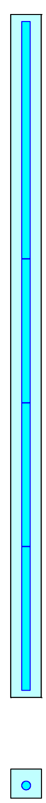
4 Chambers/Row x 20.00' Long +13.00' Row Adjustment = 93.00' Row Length +12.0" End Stone x 2 = 95.00' Base Length
1 Rows x 14.5" Wide + 18.0" Side Stone x 2 = 4.21' Base Width
14.0" Base + 14.5" Chamber Height + 20.0" Cover = 4.04' Field Height

4 Chambers x 16.2 cf +13.00' Row Adjustment x 0.81 sf x 1 Rows = 75.3 cf Chamber Storage
4 Chambers x 20.9 cf +13.00' Row Adjustment x 1.05 sf x 1 Rows = 97.3 cf Displacement

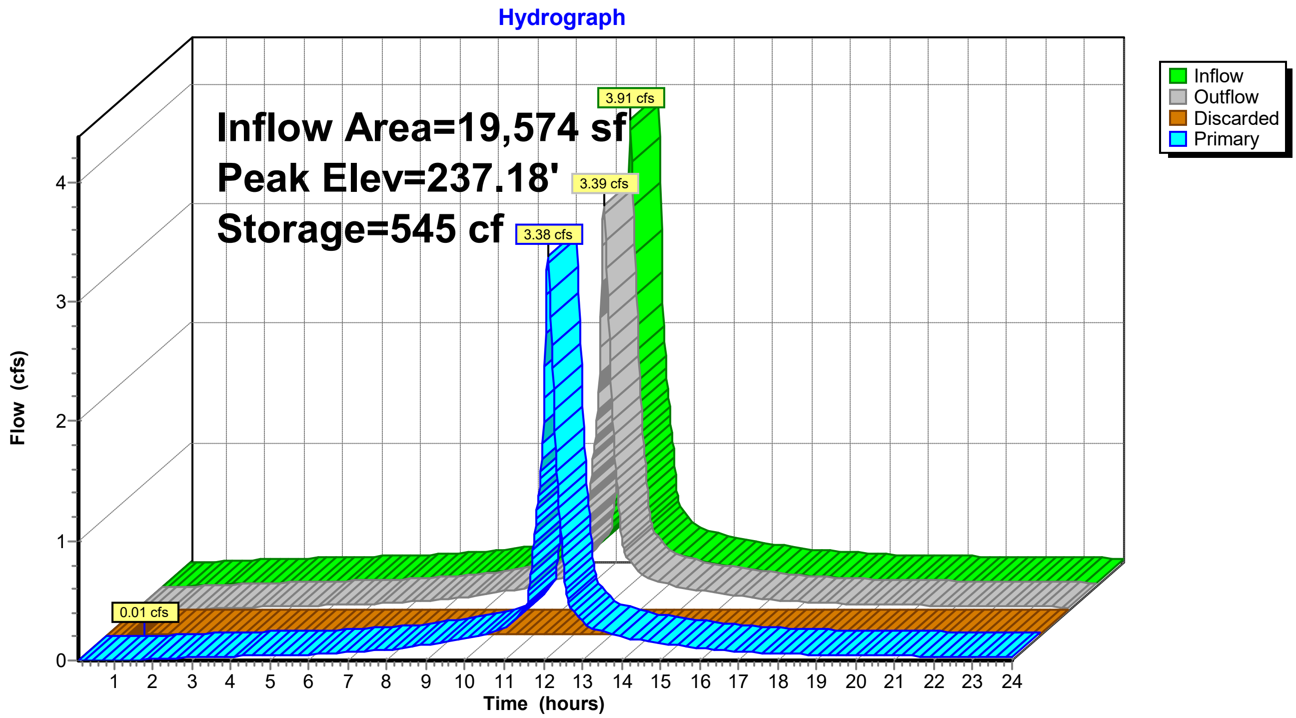
1,616.2 cf Field - 97.3 cf Chambers = 1,518.9 cf Stone x 40.0% Voids = 607.6 cf Stone Storage

Chamber Storage + Stone Storage = 682.9 cf = 0.016 af
Overall Storage Efficiency = 42.3%
Overall System Size = 95.00' x 4.21' x 4.04'

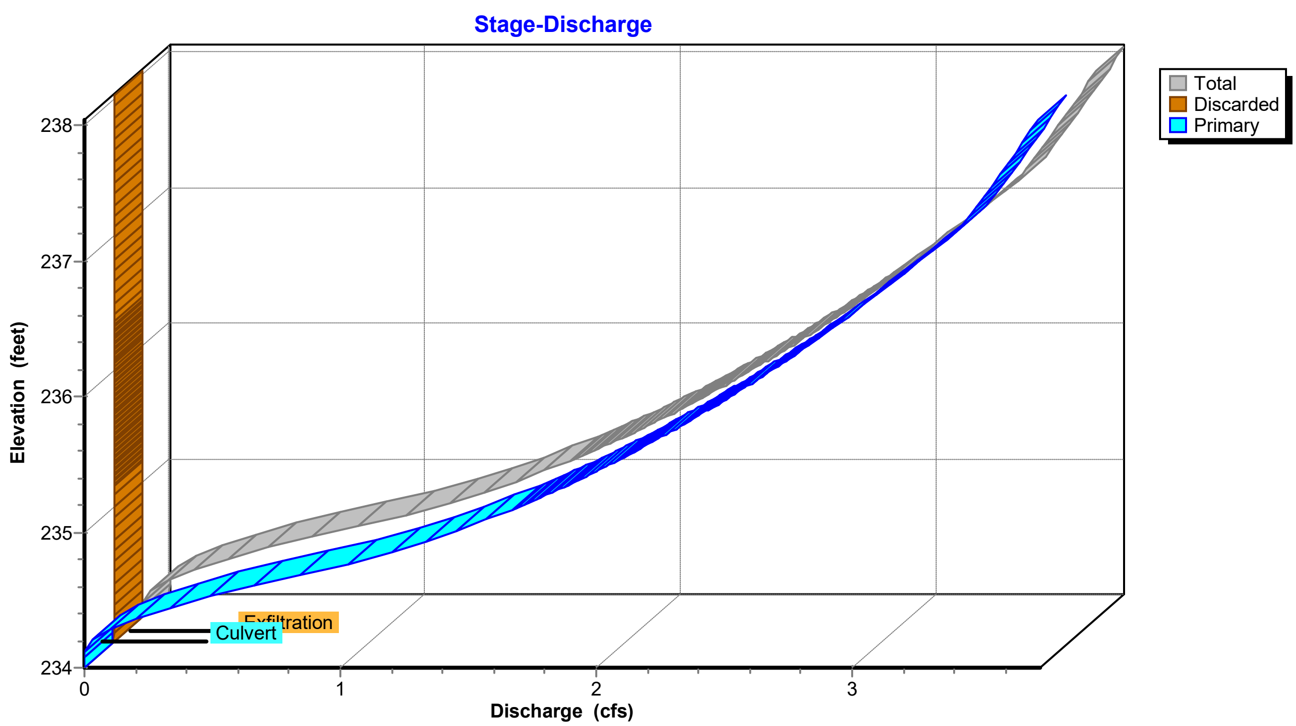
4 Chambers @ $ 0.00 /ea = $ 0.00
59.9 cy Field Excavation @ $ 10.00 /cy = $ 598.61
56.3 cy Stone @ $ 30.00 /cy = $ 1,687.67
Total Cost = $ 2,286.28



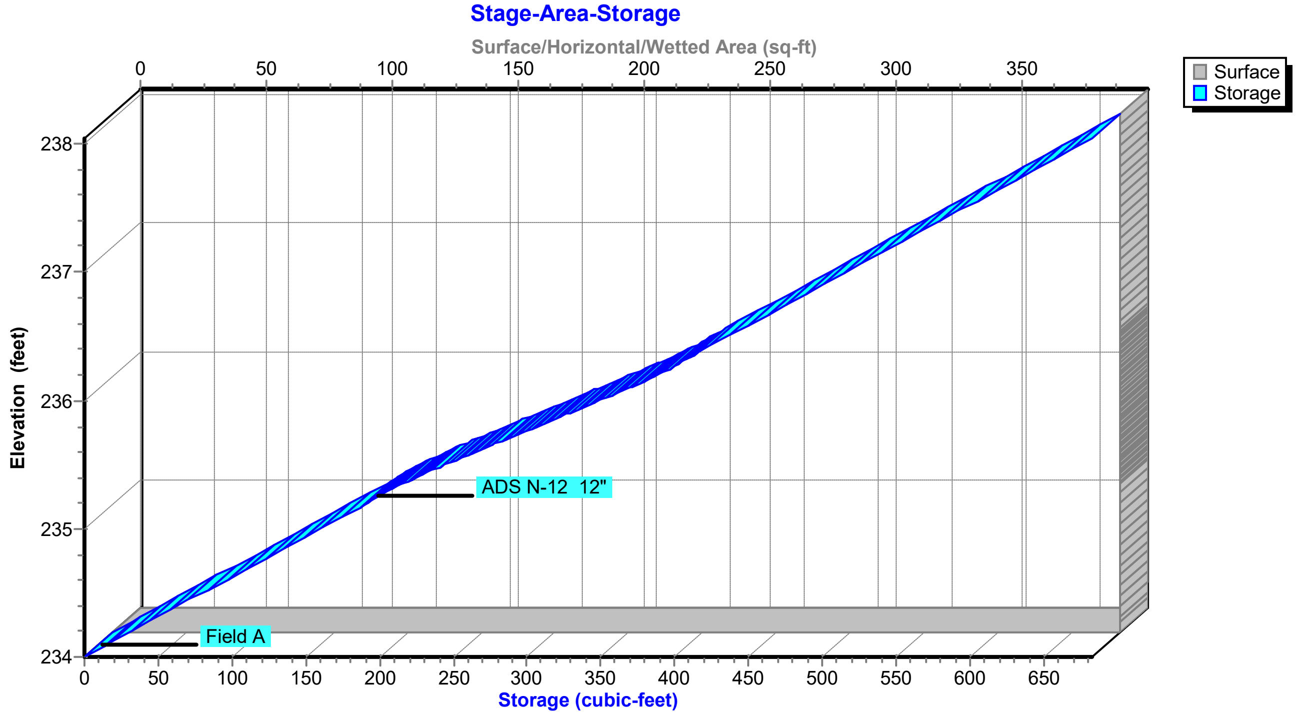
Pond 9P: ADS N12 Infiltration Trench System #4



Pond 9P: ADS N12 Infiltration Trench System #4



Pond 9P: ADS N12 Infiltration Trench System #4



Summary for Pond 10P: Crushed Stone Trench WQ and Galleys System #3

Inflow Area = 59,517 sf, 97.55% Impervious, Inflow Depth > 8.45" for 100-Year event
Inflow = 11.10 cfs @ 12.09 hrs, Volume= 41,903 cf
Outflow = 11.11 cfs @ 12.10 hrs, Volume= 35,602 cf, Atten= 0%, Lag= 0.2 min
Discarded = 0.07 cfs @ 6.76 hrs, Volume= 5,551 cf
Primary = 11.03 cfs @ 12.10 hrs, Volume= 30,051 cf

Routing by Stor-Ind method, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs
Peak Elev= 233.07' @ 12.10 hrs Surf.Area= 3,107 sf Storage= 6,418 cf

Plug-Flow detention time= 107.5 min calculated for 35,573 cf (85% of inflow)
Center-of-Mass det. time= 43.9 min (784.4 - 740.5)

Volume	Invert	Avail.Storage	Storage Description
#1	230.25'	1,658 cf	**5.00'W x 195.00'L x 4.25'H Prismatoid** 4,144 cf Overall x 40.0% Voids
#2A	229.00'	2,056 cf	**13.00'W x 164.00'L x 4.75'H Field A** 10,127 cf Overall - 4,987 cf Embedded = 5,140 cf x 40.0% Voids
#3A	229.50'	3,710 cf	**Concrete Galley 4x4x4.25** x 80 Inside #2 Inside= 42.2"W x 45.0"H => 13.25 sf x 3.50'L = 46.4 cf Outside= 54.0"W x 51.0"H => 15.58 sf x 4.00'L = 62.3 cf 80 Chambers in 2 Rows
		7,424 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	233.00'	**190.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Discarded	229.00'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.07 cfs @ 6.76 hrs HW=230.25' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=10.83 cfs @ 12.10 hrs HW=233.07' (Free Discharge)
↑—**1=Sharp-Crested Rectangular Weir** (Weir Controls 10.83 cfs @ 0.85 fps)

Pond 10P: Crushed Stone Trench WQ and Galleys System #3 - Chamber Wizard Field A

Chamber Model = Concrete Galley 4x4x4.25 (Concrete Galley, Shea LE-EGH, LE-CGH or equivalent)
Inside= 42.2"W x 45.0"H => 13.25 sf x 3.50'L = 46.4 cf
Outside= 54.0"W x 51.0"H => 15.58 sf x 4.00'L = 62.3 cf

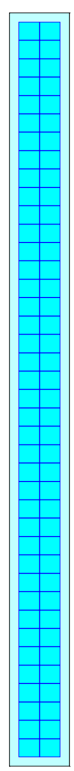
40 Chambers/Row x 4.00' Long = 160.00' Row Length +24.0" End Stone x 2 = 164.00' Base Length
2 Rows x 54.0" Wide + 24.0" Side Stone x 2 = 13.00' Base Width
6.0" Base + 51.0" Chamber Height = 4.75' Field Height

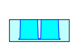
80 Chambers x 46.4 cf = 3,710.5 cf Chamber Storage
80 Chambers x 62.3 cf = 4,986.5 cf Displacement

10,127.0 cf Field - 4,986.5 cf Chambers = 5,140.5 cf Stone x 40.0% Voids = 2,056.2 cf Stone Storage

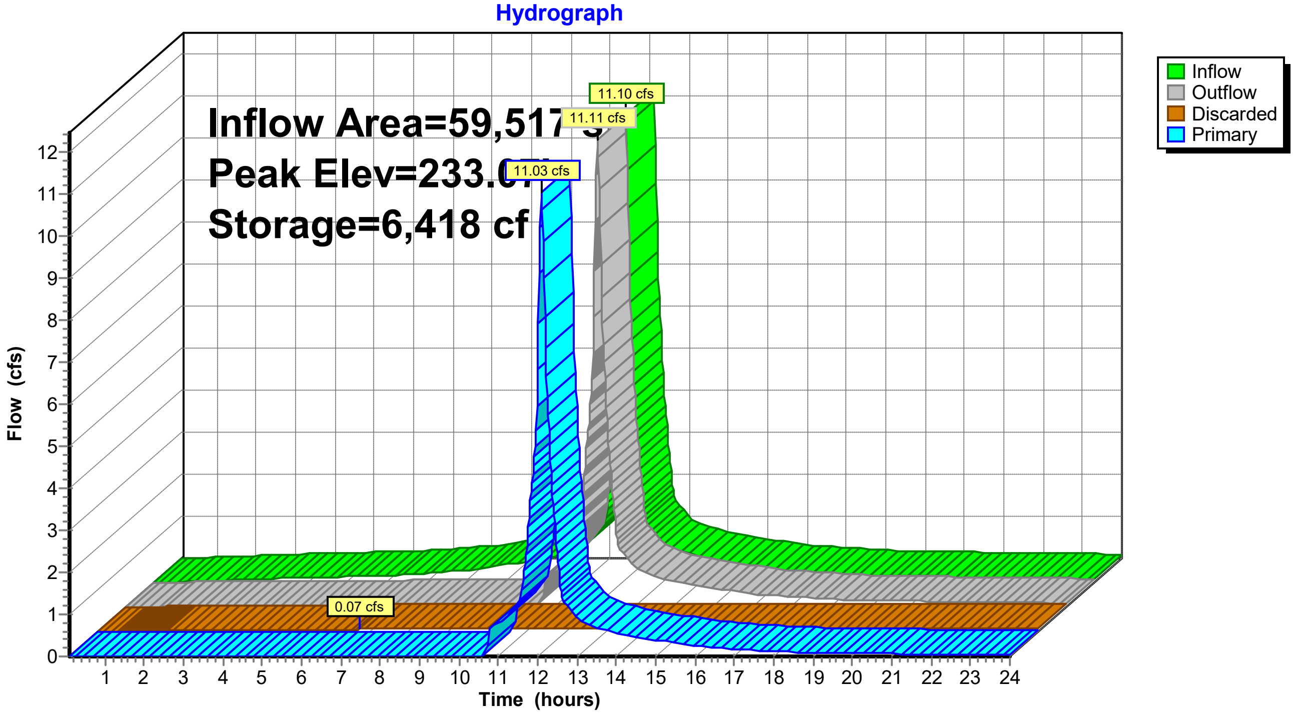
Chamber Storage + Stone Storage = 5,766.7 cf = 0.132 af
Overall Storage Efficiency = 56.9%
Overall System Size = 164.00' x 13.00' x 4.75'

80 Chambers @ $ 0.00 /ea = $ 0.00
375.1 cy Field Excavation @ $ 10.00 /cy = $ 3,750.74
190.4 cy Stone @ $ 30.00 /cy = $ 5,711.65
Total Cost = $ 9,462.39

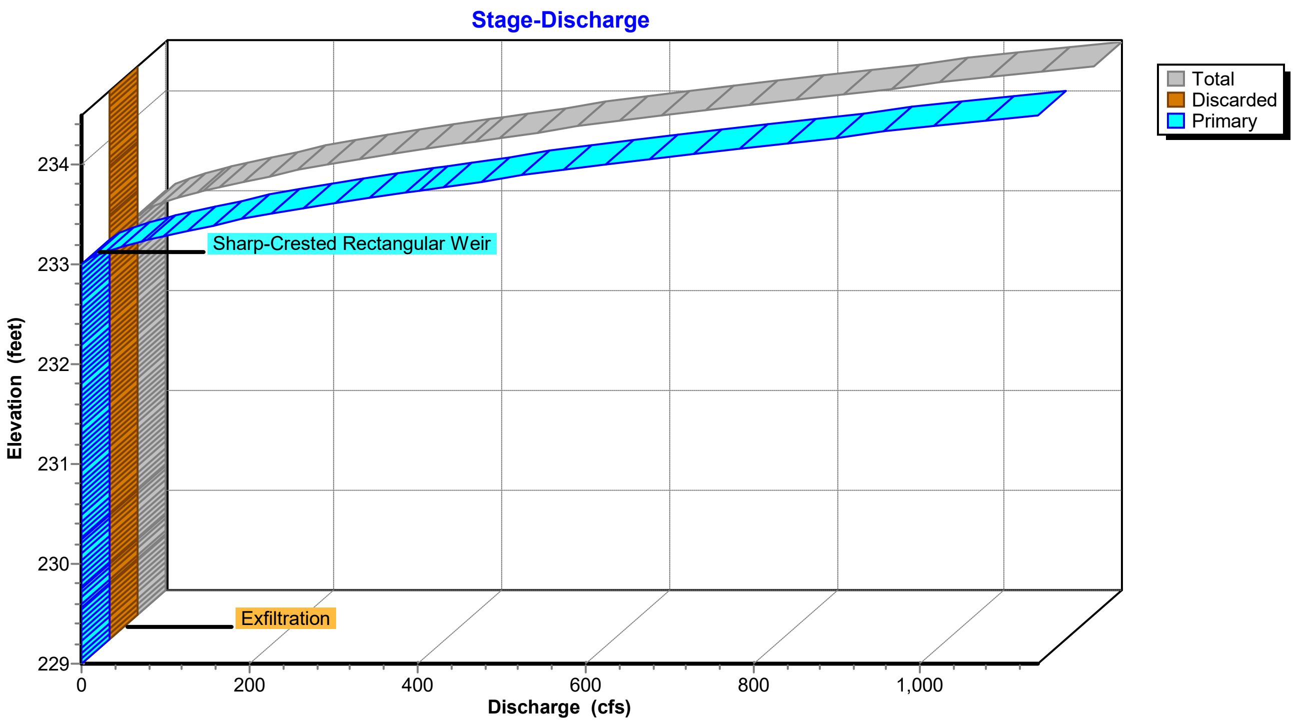




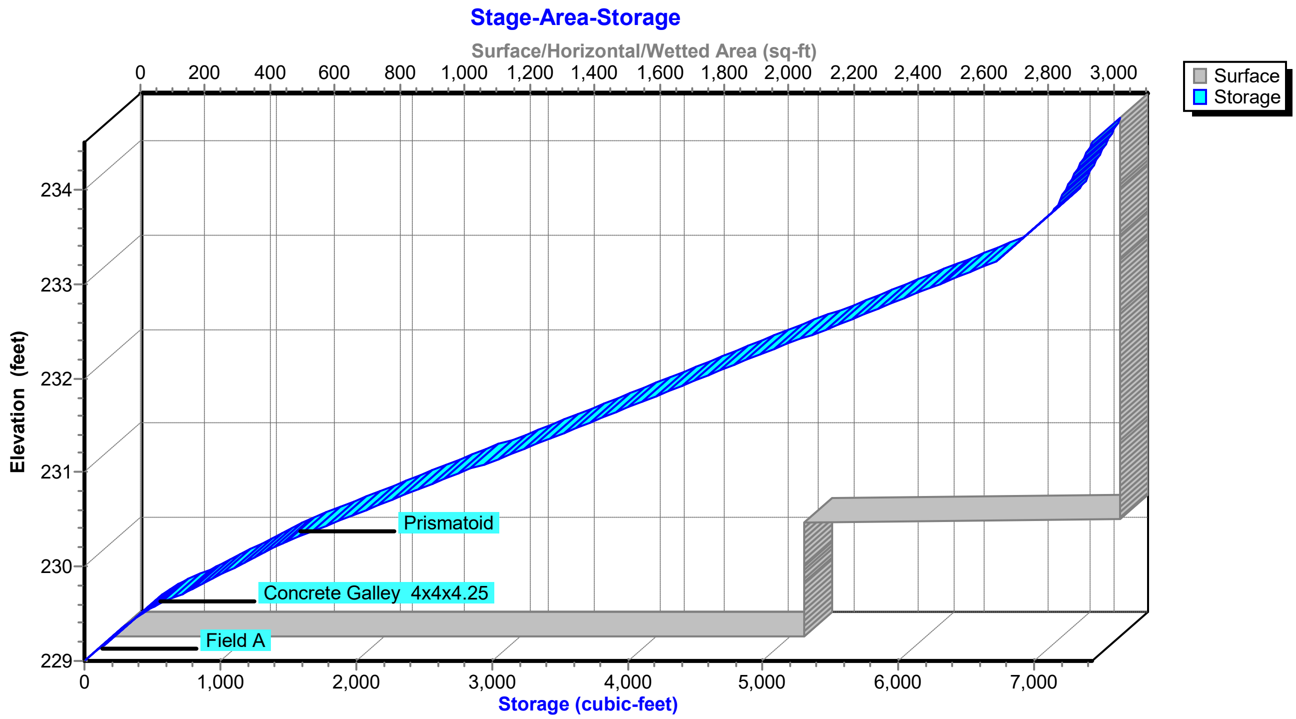
Pond 10P: Crushed Stone Trench WQ and Galleys System #3



Pond 10P: Crushed Stone Trench WQ and Galleys System #3



Pond 10P: Crushed Stone Trench WQ and Galleys System #3

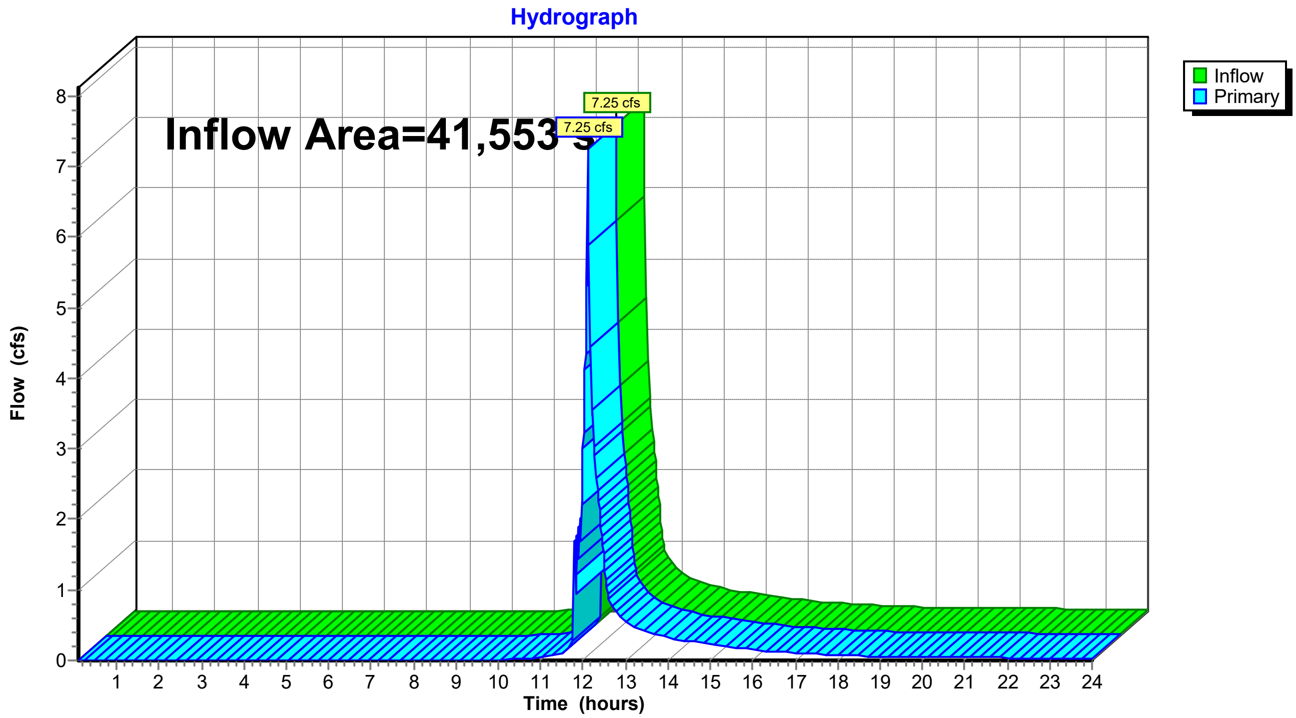


Summary for Link 11L: To Southerly Wetland

Inflow Area = 41,553 sf, 52.79% Impervious, Inflow Depth > 4.04" for 100-Year event
Inflow = 7.25 cfs @ 12.10 hrs, Volume= 13,988 cf
Primary = 7.25 cfs @ 12.10 hrs, Volume= 13,988 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs

Link 11L: To Southerly Wetland

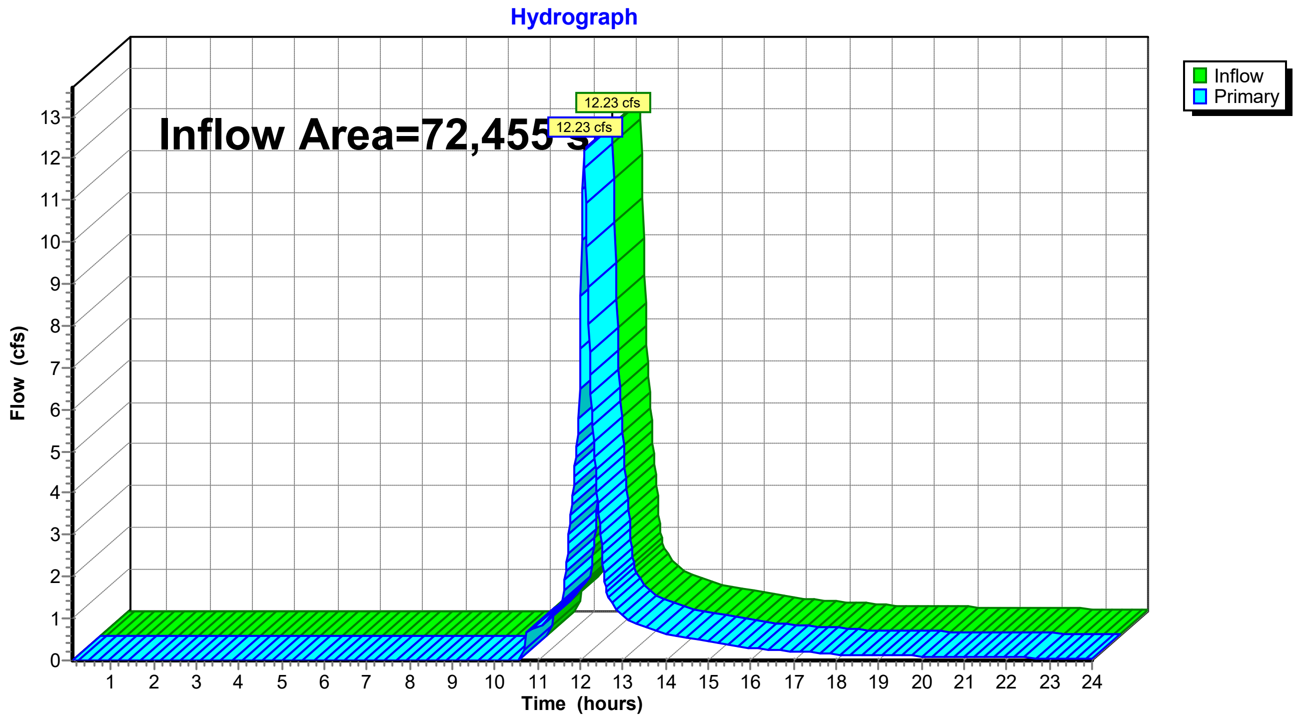


Summary for Link 12L: To Westerly Wetland

Inflow Area = 72,455 sf, 80.13% Impervious, Inflow Depth > 5.60" for 100-Year event
Inflow = 12.23 cfs @ 12.09 hrs, Volume= 33,828 cf
Primary = 12.23 cfs @ 12.09 hrs, Volume= 33,828 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.10-24.00 hrs, dt= 0.02 hrs

Link 12L: To Westerly Wetland



Section III

OPERATION AND MAINTENANCE PLAN

OPERATION AND MAINTENANCE PLAN
DURING CONSTRUCTION
108 Bodwell Street
Avon, MA 02359

Owner: CJ Shaughnessy Realty LLC
520 Bodwell Street Ext.
Avon, MA 02322
Contact: Chris Shaughnessy (781-315-5321)

Party Responsible for Operation and Maintenance:

CJ Shaughnessy Realty LLC
520 Bodwell Street Ext.
Avon, MA 02322
Contact: Chris Shaughnessy (781-315-5321)

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.

If dewatering operations are necessary, 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.

All erosion and sedimentation control measures shall be in place prior to the commencement of any site work or earthwork operations, shall be maintained during construction, and shall remain in place until all site work is complete and ground cover is established.

Heavy equipment shall not be used on basin bottoms.

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 can not 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.

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: 108 Bodwell Street – Avon, MA O
Latest Revision: 9/13/23

Stormwater Control Manager: _____ **Stamp**

Best Management Practice	Inspection Frequency (1)	Date Inspec ted	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 & swales and silt traps	After every major storm event							
Temporary Constructio n Entrance	Daily or as needed.							
Outlet control structure + Flow dissipator	After every major storm event							

(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
108 Bodwell Street
Avon, MA 02359

Owner:

CJ Shaughnessy Realty LLC
520 Bodwell Street Ext.
Avon, MA 02322
Contact: Chris Shaughnessy (781-315-5321)

Party Responsible for Operation and Maintenance:

CJ Shaughnessy Realty LLC
520 Bodwell Street Ext.
Avon, MA 02322
Contact: Chris Shaughnessy (781-315-5321)

Source of Funding:
Operation and Maintenance of this stormwater management system will be the responsibility of the owners and funding for operation and maintenance of the stormwater management system will be the responsibility of the Department of Public Works.

Post Construction Inspection and Maintenance:

Crushed Stone Infiltration Systems
After construction, the infiltration systems shall be inspected for proper function and stabilization after every major storm event until the lot is completely developed and stabilized. Inspection and routine maintenance of the paved area such as vacuum and street sweeping is required to prevent sediment from entering the infiltration system. Inspection shall be done four times per year. If sediment begins to occur within the system perform corrective measures such as vacuum cleaning. Evaluate the system to determine the source of sediment in order to maintain infiltration capacity; as required by the Stormwater Management Policy.

Roof Drains
Gutters shall be inspected and cleaned twice per year of any debris. Roof drain downspouts shall be inspected four times per year for signs of backup and clogging. Roof drain cleanouts shall be inspected and cleaned yearly of any debris.

Lawn Fertilization

Lawn fertilizer shall be slow release and limited to 3 lbs per 1000 s.f. per year.

Definition of Major Storm Event

For the purposes of this operation and maintenance plan a major storm event should be defined as a rainfall of such intensity or duration that causes observable movement of sediment on the roadway or site. It is the intent of this plan to prevent this sediment from entering the drainage system. Prior to stabilization of the site this may occur more frequently with less intense storms. As the site is stabilized with ground cover the movement of sediment will only occur during more severe storms. 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 – POST CONSTRUCTION PHASE

PROJECT LOCATION: 108 Bodwell Street – Avon, MA
Latest Revision: 9/14/23

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
Roof Drains	Four times per year							
Crushed Stone Infiltration System	Four times 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.

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)

Stormwater Control Manager: _____ **Stamp**

Commonwealth of Massachusetts

Avon, Massachusetts

Soil Suitability Assessment for On-site Sewage Disposal

Performed by: Kevin Grady
GRADY CONSULTING, L.L.C.
71 Evergreen Street, Suite 1
Kingston, MA 02364
Phone: (781) 585-2300 Fax: (781) 585-2378

Date: 8/29/23

Witnessed by: Kathleen Waldron

Location Address or Lot #: 108 Bodwell Street

*Owner's Name *Address & *Telephone #: EPRO LLC, 108 Bodwell Street, Avon MA 02322, 617-697-8328

New Construction ___ Repair X Title V Inspection ___

Office Review

Published Soil Survey Available: No X Yes___
Year Published: ______ Publication Scale: ______ Soil Map Unit: ______
Drainage Class: ______ Soil Limitations: ______

Surficial Geology Report Available: No X Yes ___
Year Published: ______ Publication Scale: ______
Geologic Material (Map Unit): ______
Landform: ______

Flood Insurance Rate Map:
Above 500 year flood boundary: **No** ___ **Yes** X
Within 500 year flood boundary **No** X **Yes** ___
Within 100 year flood boundary **No** X **Yes** ___

Wetland Area:
National Wetland Inventory Map (map unit): N/A
Wetlands Conservancy Program Map (map unit): ______

Current Water Resource Conditions (USGS): **Month:** August
Range: **Above Normal** ___ **Normal** X **Below Normal** ___

Other References Reviewed:

______

Depth of Naturally Occurring Pervious Material

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

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

Certification

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

Signature: [signature] Date: 8/29/23

TITLE 5 ON-SITE REVIEW

eep Hole # 1 Date 8/29/23 Time 9:00 Weather cloudy 70°

ocation(identify on Site Plan) ____

and Use Commercial Slope(%) 0-2 Surface Stones none

egetation Gravel Landform ____

istances from: Open Water Body — ft. Possible Wet Area 200 ft. Drinking Water Well — ft.

Drainageway — ft. Propertyline 40 ft Other ____

DEEP OBSERVATION HOLE LOG

epth From Surface Inches)	Soil Horizon (USDA	Soil Texture (Munsell)	Soil Color	Soil Mottling	Other: Structures, Stones, Boulders, Consistency, %Gravel
0-60"		Fill			
60-144"	C1	Loamy Sand	2.5Y5/4	none	5%-10% gravel Several Cobbles [illegible]

Parent Material (geologic) Glacial Till Depth to Bedrock ____

Depth to Groundwater: Standing Water in Hole: none Weeping from Pit Face none

Estimated Seasonal High Groundwater 12'-0" assumed none encountered

DETERMINATION FOR SEASONAL HIGH WATER TABLE

Method Used:

___ Depth observed standing in observation hole: ____ inches ____ Depth to soil mottles: ____ inches

___ Depth to weeping from side of observation hole: ____ inches ____ Groundwater adjustment ____ ft

Index Well # ____ Reading Date ____ Index well level ____ Adj.factor ____ Adj.Groundwater level ____

PERCOLATION TEST

Date ____ Time ____

Observation Hole #			Time at 9"	10:09	
Depth of Perc	66-84		Time at 6"	10:19	
Start Presoak	9:46		Time (9"-6")	10 min	
End Presoak	10:01		Rate Min/Inch	4 min/in	

Site Suitability Assessment: Site Passed X Site Failed ____ Additional Testing Needed:

Performed By Kevin Grady Certification # ____

Witnessed By Kathleen Waldron

Comments:

TITLE 5 ON-SITE REVIEW

eep Hole # 2 Date 8/23/23 Time 11:00 Weather cloudy 75°

ocation(identify on Site Plan) ____

and Use Commercial Slope(%) 0 - 2 Surface Stones –

egetation Gravel Landform ____

istances from: Open Water Body – ft. Possible Wet Area 200 ft. Drinking Water Well – ft.

Drainageway – ft. Propertyline 40 ft Other ____

DEEP OBSERVATION HOLE LOG

epth From Surface Inches)	Soil Horizon (USDA	Soil Texture (Munsell)	Soil Color	Soil Mottling	Other: Structures, Stones, Boulders, Consistency,%Gravel
0"-72"		Fill			
72-132"	C1	Loamy Sand	2.5Y 5/2	none	few Boulders

Parent Material (geologic) Glacial Depth to Bedrock None

Depth to Groundwater: Standing Water in Hole: none Weeping from Pit Face none

Estimated Seasonal High Groundwater 11'-0" assumed no water

DETERMINATION FOR SEASONAL HIGH WATER TABLE

Method Used:

___ Depth observed standing in observation hole: ____inches ____Depth to soil mottles:______ inches

___ Depth to weeping from side of observation hole:____inches ____ Groundwater adjustment____ft

Index Well #_____ Reading Date_____ Index well level_____ Adj.factor_____ Adj.Groundwater level_____

PERCOLATION TEST

Date ____ Time ____

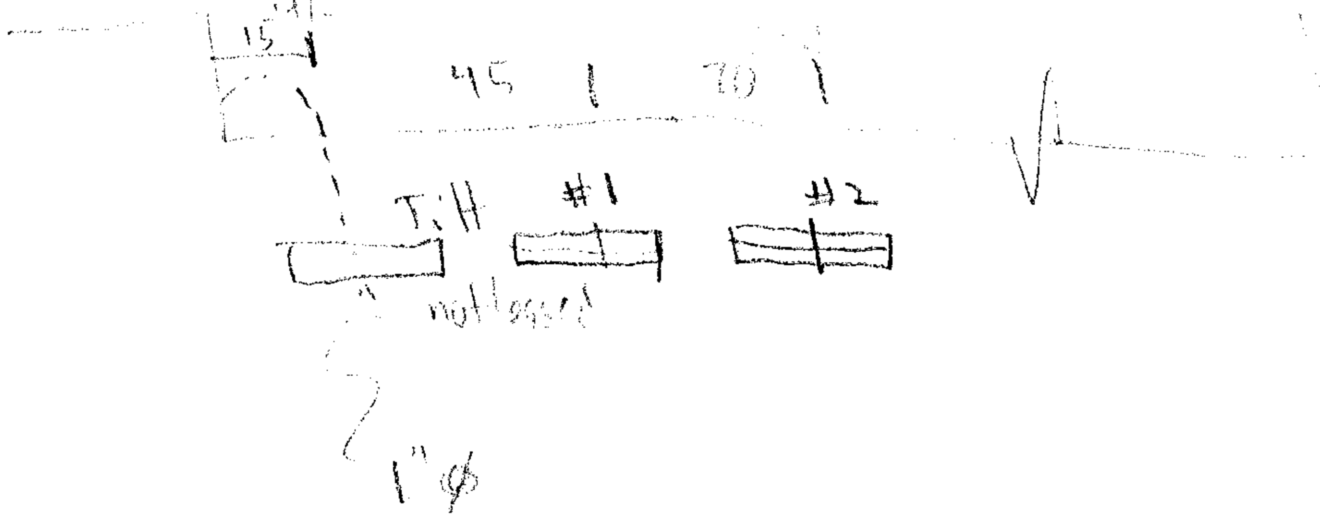
Observation Hole #			Time at 9"		
Depth of Perc			Time at 6"		
Start Presoak			Time (9"-6")		
End Presoak			Rate Min/Inch		

Site Suitability Assessment: Site Passed_____ Site Failed_____ Additional Testing Needed:

Performed By ____ Certification # ____

Witnessed By ____

Comments: SMH to Inv ~31" New Cover(s)+



To [illegible]

United States Department of Agriculture

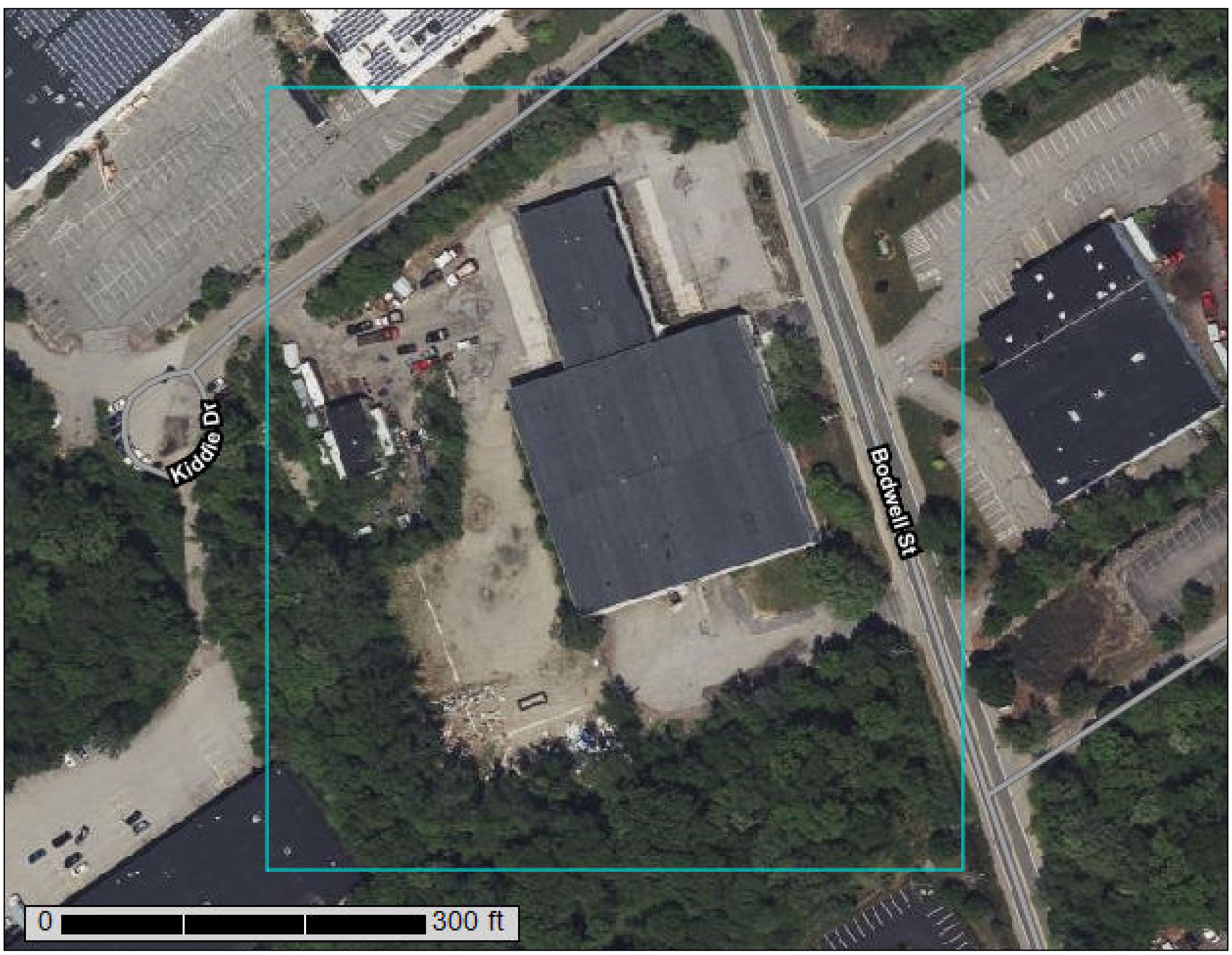
NRCS

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

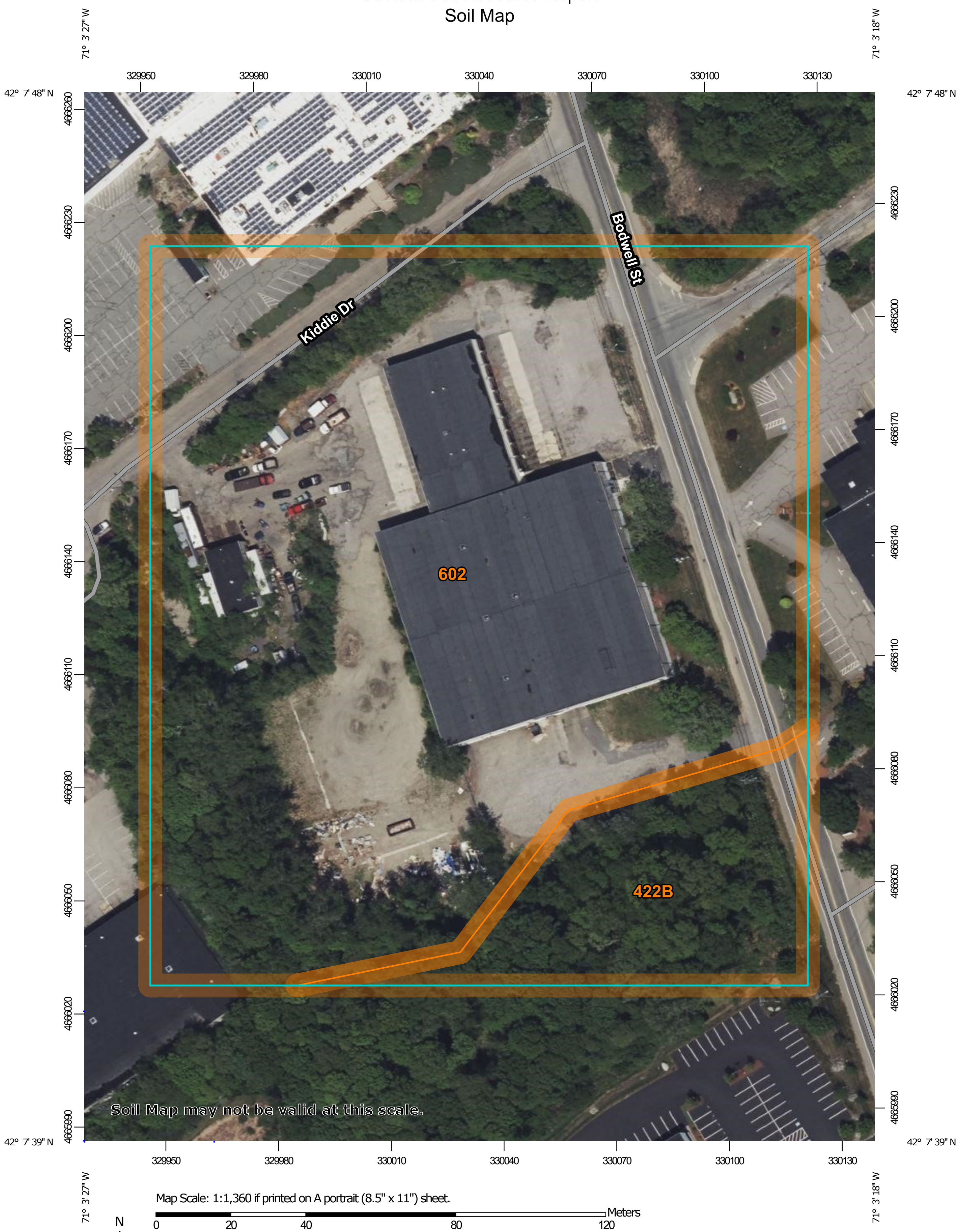
Norfolk and Suffolk Counties, Massachusetts



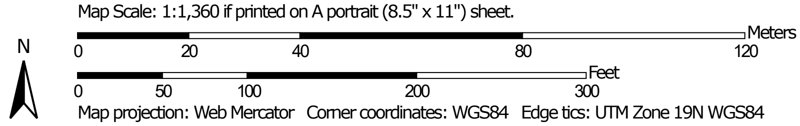
September 8, 2023

Contents

Custom Soil Resource Report
Soil Map



Map Scale: 1:1,360 if printed on A portrait (8.5" x 11") sheet.



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: Norfolk and Suffolk Counties, Massachusetts
Survey Area Data: Version 18, Sep 9, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 22, 2022—Jun 5, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
422B	Canton fine sandy loam, 0 to 8 percent slopes, extremely stony	1.1	13.3%
602	Urban land, 0 to 15 percent slopes	7.4	86.7%
Totals for Area of Interest		**8.5**	**100.0%**

Map Unit Descriptions

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

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

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

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

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

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

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

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

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

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

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

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

Norfolk and Suffolk Counties, Massachusetts

422B—Canton fine sandy loam, 0 to 8 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: 2w818
Elevation: 0 to 1,180 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Canton, extremely stony, and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Canton, Extremely Stony

Setting

Landform: Moraines, hills, ridges
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex
Parent material: Coarse-loamy over sandy melt-out till derived from gneiss, granite, and/or schist

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 5 inches: fine sandy loam
Bw1 - 5 to 16 inches: fine sandy loam
Bw2 - 16 to 22 inches: gravelly fine sandy loam
2C - 22 to 67 inches: gravelly loamy sand

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 19 to 39 inches to strongly contrasting textural stratification
Drainage class: Well drained
Runoff class: Low
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: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands

Hydric soil rating: No

Minor Components

Scituate, extremely stony

Percent of map unit: 6 percent
Landform: Hills, ground moraines, drumlins
Landform position (two-dimensional): Summit, backslope, footslope
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Charlton, extremely stony

Percent of map unit: 6 percent
Landform: Ridges, ground moraines, hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Montauk, extremely stony

Percent of map unit: 4 percent
Landform: Recessionial moraines, ground moraines, hills, drumlins
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Swansea

Percent of map unit: 4 percent
Landform: Marshes, depressions, bogs, swamps, kettles
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

602—Urban land, 0 to 15 percent slopes

Map Unit Setting

National map unit symbol: vkyj
Mean annual precipitation: 32 to 50 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 120 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 99 percent
Minor components: 1 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Setting

Parent material: Excavated and filled land

Minor Components

Rock outcrops

Percent of map unit: 1 percent
Hydric soil rating: Unranked