Stormwater Report

Greenmont Commons
Dracut, MA

Prepared for

Riverbank Properties
908 Lawrence Street
Lowell, MA 01852

May 18, 2023

CORNERSTONE
Land Associates, LLC
Civil Engineering - Land Planning

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Forward

This Stormwater Report is required by the Massachusetts Wetland Protection Act (MGL Ch. 131, Sect. 40); provisions of the Mass DEP Stormwater Management Standards per 310 CMR 10.05(6)(k)-(q); and the Town of Dracut General By Laws Chapter 24 and Town of Dracut Stormwater Management Rules and Regulations.

Table of Contents

SECTION 1: SITE & CONTACT DATA

1.1 Project & Site Information

Project/Site Name: Greenmont Commons
Project Street/Location: 135 Greenmont Avenue
City: Dracut State: MA ZIP Code: 01826
County or Similar Subdivision: _____
Applicant Name: Riverbank Properties
Applicant Address: 908 Lawrence Street City: Lowell State: MA ZIP Code: 01852

1.2 Applicant Information

Name: Riverbank Properties
Address: 908 Lawrence Street City: Lowell State: MA ZIP Code: 01852
Contact: Branco Perego Phone: (978) 771-3205

1.3 Preparer Information

Name: Kenneth M. Lania, E.I.T., Cornerstone Land Associates, LLC.
Address: 25 Dean Avenue City: Dracut State: MA ZIP Code: 01826
Registered P.E.: John A. Visniewski, P.E. Email: kmconsultants@comcast.net
Phone: (978) 835-0102 Fax: _____

1.4 Project Type

Scope of Work: Development of an existing vacant lot including retaining walls, drainage, utilities, and parking lot.
Function: ☒ Residential ☐ Commercial ☐ Industrial ☐ Other: _____
☒ New ☐ Redevelopment ☐ Industrial ☐ Mix of New & Redevelopment
Estimated Start Date.: Upon Approvals Estimated Completion Date: September 2024

1.5 Drainage Narrative

The proposed project is to construct 28 Townhouse Rental Units on the 2.45 Acre parcel utilizing the State's Comprehensive Permit Statute (M.G.L. c. 40B, Sections 20-23 enacted as Chapter 774 of the Acts of 1969) known as "Chapter 40B". The property is rectangle in shape with 240 LF of frontage along Greenmont Avenue and a depth of approximately 430 LF from the road. The property contains one single family dwelling located approximately 85 ft from Greenmont Avenue with associated driveway, rear deck and patio, as well as an in-ground pool with

concrete apron. The remainder of the property is a well established lawn with Bordering Vegetated Wetlands (BVW) in the southwestern corner of the property. The BVW was established on the property with flagging and is shown as WF-1 to WF-7. The majority of the property, approximately 2.22 acres, drains from north to south to the existing BVW area with the remainder 0.23 acres draining to Greenmont Avenue.

The proposed conditions utilize Low Impact Development techniques to mimic the existing drainage patterns. Two Detention/Recharge Basins are proposed within the Common Driveway design area to mitigate for stormwater events. The grading design allows stormwater to sheet flow into these basins through swales and forebays for the removal of large pollutant particles. The Basins are designed with a gravel bottom that promotes infiltration of stormwater.

The proposed drainage system mitigates for the Peak Flow and Peak Volume for each storm event, 2 year to 100 year. There is no increase in post-development runoff from pre-development runoff.

SECTION 2: STORMWATER CHECKLIST

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

Checklist for Stormwater Report

A. Introduction

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

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

The Stormwater Report must include:

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

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

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

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

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

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

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

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

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

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

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

Registered Professional Engineer's Certification

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

Registered Professional Engineer Block and Signature

COMMONWEALTH OF MASSACHUSETTS
JOHN A. VISNIEWSKI
CIVIL
No. 29775
REGISTERED PROFESSIONAL ENGINEER

1/5/23

Signature and Date

Checklist

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

☑ New development

☐ Redevelopment

☐ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

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

- ☐ No disturbance to any Wetland Resource Areas
- ☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- ☐ Reduced Impervious Area (Redevelopment Only)
- ☐ Minimizing disturbance to existing trees and shrubs
- ☐ LID Site Design Credit Requested:
  - ☐ Credit 1
  - ☐ Credit 2
  - ☐ Credit 3
- ☑ Use of "country drainage" versus curb and gutter conveyance and pipe
- ☐ Bioretention Cells (includes Rain Gardens)
- ☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
- ☐ Treebox Filter
- ☑ Water Quality Swale
- ☑ Grass Channel
- ☐ Green Roof
- ☐ Other (describe): _____

Standard 1: No New Untreated Discharges

- ☑ No new untreated discharges
- ☑ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth
- ☑ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

- ☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.
- ☐ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.
- ☑ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

- ☑ Soil Analysis provided.
- ☐ Required Recharge Volume calculation provided.
- ☐ Required Recharge volume reduced through use of the LID site Design Credits.
- ☑ Sizing the infiltration, BMPs is based on the following method: Check the method used.
  - ☑ Static ☐ Simple Dynamic ☐ Dynamic Field[1]
- ☐ Runoff from all impervious areas at the site discharging to the infiltration BMP.
- ☑ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.
- ☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.
- ☑ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:
  - ☑ Site is comprised solely of C and D soils and/or bedrock at the land surface
  - ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
  - ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
  - ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.
- ☐ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.
- ☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

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

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

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

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

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

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

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

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

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

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

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

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

- [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.
- [ ] 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)

- [x] 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.
- [x] The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:
  - [x] 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;
- [x] NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.

SECTION 3: LOW IMPACT DEVELOPMENT (LID)

Credits for LID have not been taken since the site does not comply with certain aspects of each credit item required. However, small portions of LID practices have been incorporated into the overall design. These practices are small in nature and include the utilization of Sheet Flow and a combination of multiple Best Management Practices for stormwater treatment of the entire proposed impervious surface up to and including the 100 Year Storm event to promote the use of earth basins and swales for infiltration to groundwater and pollutant removal.

SECTION 4: STORMWATER STANDARDS

4.1 Standard 1: No New Untreated Discharges

New stormwater conveyances (e.g. outfalls) will not discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.

Rip Rap Sizing at Spillways

Stormwater calculations utilizing sheet flow to Grassed Lined Swales, Sediment Forebays and Detention/Recharge Basins throughout the development areas attenuates the Peak Flow and Peak Volume for all storm events 2 yr to 100 yr.

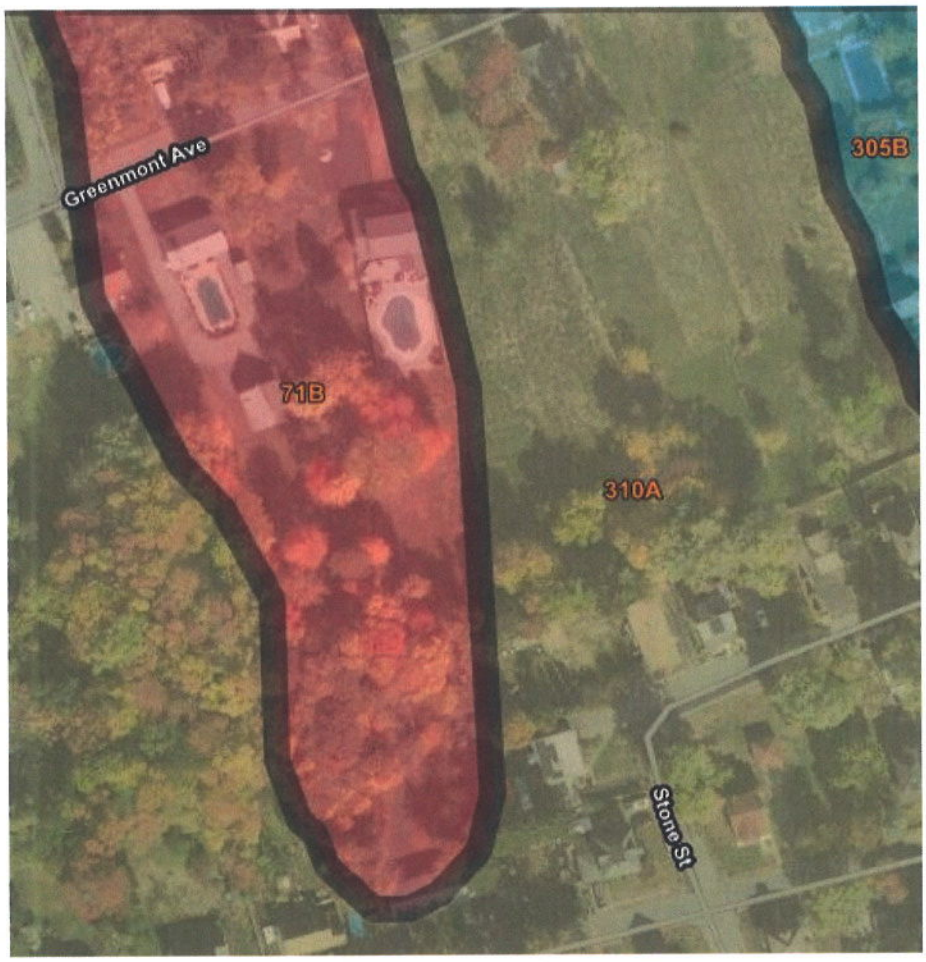
The design utilizes Low Impact Development techniques to promote as much infiltration of runoff back into the ground as possible. Proposed flow in large storm events travels to the two Detention/Recharge basins that utilize stone lined spillways for outlet protection of flow leaving the property.

4.2 Standard 2: Peak Rate Attenuation

Stormwater management systems have been designed so that the post-development peak discharge rates do not exceed pre-development peak discharge rates.

Soils Evaluation

Soils on the site are classified on the USDA Natural Resources Conservation Service (NRCS) Soil Map that is shown below as an overlay on the MASS GIS Aerial Photography with NRCS Soils Overlay Layer. These soil classifications have been further assigned to Hydraulic Soil Groups (HSG) by the NRCS as shown on the map. Hydraulic soil groups range from A, sandy soils, to D, clayey soils.



Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
71B	Ridgebury fine sandy loam, 3 to 8 percent slopes, extremely stony	D	3.5	26.3%
305B	Paxton fine sandy loam, 3 to 8 percent slopes	C	0.5	3.9%
310A	Woodbridge fine sandy loam, 0 to 3 percent slopes	C/D	9.2	69.8%
Totals for Area of Interest			13.2	100.0%

Soils have also been evaluated in the field as shown in the following table; and soil logs are also shown on the Grading & Drainage Plan. The table shows the textural classification in each location according to direct field observation. The Estimated Seasonal High Groundwater (ESHGW) depth was determined by field observation of redoximorphic features (mottles) within the soil profile. The Rawls Rate assigned to various Hydraulic Soil Groups and textural types is used for calculations relative to exfiltration of stormwater into subsurface soils within stormwater storage facilities. In addition, soil samples were taken and sent to a soils laboratory for analysis of particle size and permeability.

Soil Evaluation

ON-SITE SOILS EVALUATION

Deep Hole Number [1.]	Textural Classification [2.]	HSG [3.]	Depth to Refusal (ft)	ESHGW [4.] (in)	Rawls Rate (in/hr) [5.]
DH301	SL	D	n/a	24	0.09
DH302	SL	D	n/a	24	0.09
DH303	SL	D	n/a	24	0.09

[1.] See Site Plan for Deep hole locations
[2.] Laboratory soil analysis; otherwise field observation
[3.] Hydraulic Soil Group; USDA NRCS
[4.] Estimated seasonal high groundwater depth
[5.] DEP Stormwater Handbook, Table 2.3.3.

USDA Soils Description

Map Unit #	Soil Name	HSG
71B	Ridgebury Fine Sandy Loam	D
310A	Woodbridge Fine Sandy Loam	C/D

The following Table shows land areas associated with the hydraulic soil group for each type of ground coverage within each drainage area. Hydraulic Soil Group designations are shown as provided by the NRCS for the soil types found on this site. Curve Number (CN) values have been assigned based on the ground cover type and condition, and HSG. The curve number values are weighted according to NRCS criteria and used in the calculations for peak rate attenuation

provided in Appendix C. The Pre-Development and Post-Development Drainage Maps provided in Appendix C show the relationship between the drainage areas and surface cover types.

Drainage Areas & Curve Numbers

PRE-DEVELOPMENT

Drainage Area 1S - Flows to Eastern Wetlands

	Hydraulic Soils Group (HSG) Area (sf) & Curve Number (CN)							
Surface Description	A	CN	B	CN	C	CN	D	CN
Meadow, Non-Grazed							110,204	71
Subtotal Area							*110,204*	
Total Area							***110,204***	

Drainage Area 2S - Flows to Eastern Wetlands

	Hydraulic Soils Group (HSG) Area (sf) & Curve Number (CN)							
Surface Description	A	CN	B	CN	C	CN	D	CN
Woods, Fair							148,804	73
Subtotal Area							*148,804*	
Total Area							***148,804***	

POST-DEVELOPMENT

Drainage Area 1S - Flows to Eastern Wetlands

	Hydraulic Soils Group (HSG) Area (sf) & Curve Number (CN)							
Surface Description	A	CN	B	CN	C	CN	D	CN
Driveway							15,907	98
Lawn, mulch, stone							54,747	74
Subtotal Area							***54,747***	
Total Area							***54,747***	

Drainage Area 5S - Flows to Eastern Wetlands

	Hydraulic Soils Group (HSG) Area (sf) & Curve Number (CN)							
Surface Description	A	CN	B	CN	C	CN	D	CN
Driveway							10,727	98
Lawn, mulch, stone							12,065	74
Subtotal Area							***22,792***	
Total Area							***22,792***	

Drainage Area 7S - Flows to Eastern Wetlands

Surface Description	Hydraulic Soils Group (HSG) Area (sf) & Curve Number (CN) A	CN	B	CN	C	CN	D	CN
Woods/Grass combo							49,547	72
Subtotal Area							***49,547***	
Total Area							***49,547***	

Drainage Area 8S - Flows to Eastern Wetlands

Surface Description	Hydraulic Soils Group (HSG) Area (sf) & Curve Number (CN) A	CN	B	CN	C	CN	D	CN
Woods/Grass combo							46,076	72
Subtotal Area							***46,076***	
Total Area							***46,076***	

Drainage Area 9S - Flows to Eastern Wetlands

Surface Description	Hydraulic Soils Group (HSG) Area (sf) & Curve Number (CN) A	CN	B	CN	C	CN	D	CN
Roofs							4,611	98
Driveway							8,454	98
Woods/Grass combo							73,485	72
Subtotal Area							***86,550***	
Total Area							***86,550***	

Drainage Area 11S - Flows to Eastern Wetlands

Surface Description	Hydraulic Soils Group (HSG) Area (sf) & Curve Number (CN) A	CN	B	CN	C	CN	D	CN
Woods/Grass combo							8,545	72
Subtotal Area							***8,545***	
Total Area							***8,545***	

Drainage Area 12S - Flows to Lot 6 BioRetention Recharge

Surface Description	Hydraulic Soils Group (HSG) Area (sf) & Curve Number (CN) A	CN	B	CN	C	CN	D	CN
Grass Cover Good							46,955	80
Subtotal Area							***46,955***	
Total								

Area	***46,955***

Peak Flow Rate Attenuation

Once the soils and drainage areas were analyzed and classified, a detailed hydrologic analysis was performed in accordance with the NRCS Technical Release 55 (TR-55) by using the HydroCAD® Stormwater Modeling System. The following tables represent a summary and comparison of the flow and volume between the pre-development and the post-development conditions. The comparison shows that there will be a net decrease in the flow and volume of stormwater runoff from the site after the project is completed. The detailed HydroCAD analysis is provided in Appendix C.

Summary of Pre- and Post-Development Peak Flow Rates

PRE-DEVELOPMENT (Existing Conditions)

Type III Storm Event:	**100-yr**	**25-yr**	**10-yr**	**2-yr**
Rainfall (in/24 hr):	6.4	5.3	4.5	3.0
FLOW TO EASTERN WETLAND AREA				
Flow Rate (cfs):	20.29	14.76	10.93	5.28
Volume (acre-ft):	1.537	1.120	0.835	0.422

POST-DEVELOPMENT (Proposed Conditions)

Type III Storm Event:	**100-yr**	**25-yr**	**10-yr**	**2-yr**
Rainfall (in/24 hr):	6.4	5.3	4.5	3.0
FLOW TO EASTERN WETLAND AREA				
Flow Rate (cfs):	13.70	8.46	5.95	3.11
Volume (acre-ft):	2.137	1.537	1.120	0.494

PRE & POST DEVELOPMENT COMPARISON

Type III Storm Event:	**100-yr**	**25-yr**	**10-yr**	**2-yr**
Rainfall (in/24 hr):	6.4	5.3	4.5	3.0
TOTAL FLOW TO RIVER STREET				
Flow Rate (cfs):	-6.59	-6.30	-4.98	-2.17
Volume (acre-ft):	0.600	0.417	0.285	0.72

4.3 Standard 3: Recharge

Loss of annual recharge to groundwater has been eliminated or minimized by recharging runoff.

Recharge Volume

RECHARGE VOLUME REQUIRED

The following calculations show the required volume of runoff that must be recharged to replenish the groundwater supply.

Required Recharge Volume

Required Recharge Volume, Rv= F x A; where
Target depth factor, F for various NRCS Hydraulic Soil Groups (HSG), is taken from SWM Guidelines, Table 2.3.2 as follows:

HSG	A	B	C	D
F	0.60	0.35	0.25	0.10

Impervious Area, A is from Standard 2

Required Rechage Volume, Rv is tabulated below

Drainage Area #	HSG	F (in)	A (sf)	Rv (cf)	2.5% CIA (sf)	Comment
1S	D	0.10	15,907	133	398	
5S	D	0.10	11,222	94	281	
7S	D	0.10	-	-	0	
8S	D	0.10	-	-	0	
9S	D	0.10	13,065	109	327	
11S	D	0.10	-	-	0	
12S	D	0.10	-	-		0
		Subtotal	*40,194*	*335*		
		Total	***40,194***	***335***		
		Area to be recharged	***40,194***			
		Volume to be recharged		***335***		

RECHARGE VOLUME PROVIDED

The following table shows the total volume of runoff water that will be recharged by the proposed Best Management Practices (BMP's). The total proposed recharge volume exceeds the volume that is required. Detailed design calculations for each BMP are provided in Appendix B.

Proposed Recharge Volume

Drainage Area #	BMP Description	Rv (cf)	Comment
1S	None	-	
5S	None	-	
7S	None	-	
8S	None	-	
9S	None	-	
11S	None	-	
12S	BioRetention Cell	985	
	Subtotal	*985*	
	Total	***985***	; OK>335

4.4 Standard 4: Water Quality

Stormwater management systems must remove 80% of the average annual post-construction load of Total Suspended Solids (TSS).

Water Quality Volume

WATER QUALITY VOLUME REQUIRED

The runoff volume that requires treatment to remove TSS is referred to as the water quality volume.

Required Water Quality Volume

Water Quality Volume required, WQV= d/12 x I; where

Water Quality runoff depth required, d= 0.5 in

Total impervious area, incl. roof tops, I

The required Water Quality Volume, WQV is tabulated below

Drainage Area #	I (sf)	WQV (cf)	Comment
1S	15,907	663	
5S	11,222	468	
9S	13,065	544	
Subtotal	*40,194*	*1,675*	
Total	***40,194***	***1,675***	
Area to be treated	***40,194***		

Proposed Water Quality Volume

Drainage Area #	BMP Description	WQV (cf)	Comment
1S	Extended Detention Wetland Basin #1	2,259	
5S, 7S, 8S	Extended Detention Wetland Basin #2	1,629	

Subtotal	*3,888*	
Total	***3,888***	**OK>1675**

Total Suspended Solids (TSS)

TSS TO BE REMOVED

Stormwater management systems have been designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS) as shown in the Treatment Train Forms Attached.

4.5 Standard 5: Higher Potential Pollutant Loads

Land Uses with Higher Potential Pollution Loads (LUHPPL) will include source controls and pollution prevention Proprietary Best Management Practices (BMPS) to ensure that the discharge of stormwater runoff from the impervious areas are treated to meet the Standard prior to conveyance to Infiltration BMPS. The project does not classify as a LUHPPL.

4.6 Standard 6: Critical Areas

Stormwater discharges to critical areas will utilize source controls, pollution prevention measures and approved Best Management Practices (BMP's). There are no stormwater discharges within the Zone II, Interim Wellhead Protection Areas of a public water supply or near an Outstanding Resource Water (ORW) or cold water fishery

4.7 Standard 7: Redevelopment

The project is proposed as new development due to the separation of the lots. An overall decrease in impervious area is proposed within the developed portion of the two lots.

4.8 Standard 8: Construction Period Controls

A plan to control construction-related impacts including erosion, sedimentation and other pollutant sources during construction has been developed.

Erosion Control Plan

An Erosion Control Plan has been provided within the Site Plan Set

Stormwater Pollution Prevention Plan

A National Pollution Discharge Elimination System (NPDES) Construction General Permit (CGP) is required for this project. CGP applications are required to be developed and submitted by the Owner/Applicant/Contractor seven (7) days prior to the commencement of construction. Due to the complex nature of this project, the Owner/Applicant will coordinate with this office and the selected contractor for the project to complete the application filing. The application, when filed, will contain a Stormwater Pollution Prevention Plan that will be kept on site and reviewed and updated weekly. The application shall be completed and submitted to the Town of Southborough Conservation Commission thirty (30) days prior to the commencement of construction for review.

4.9 Standard 9: Operation & Maintenance

A long term operation and maintenance plan has been developed to insure that the stormwater management systems function as designed.

Operation & Maintenance Manual

An Operation and Maintenance Manual has been provided under separate cover.

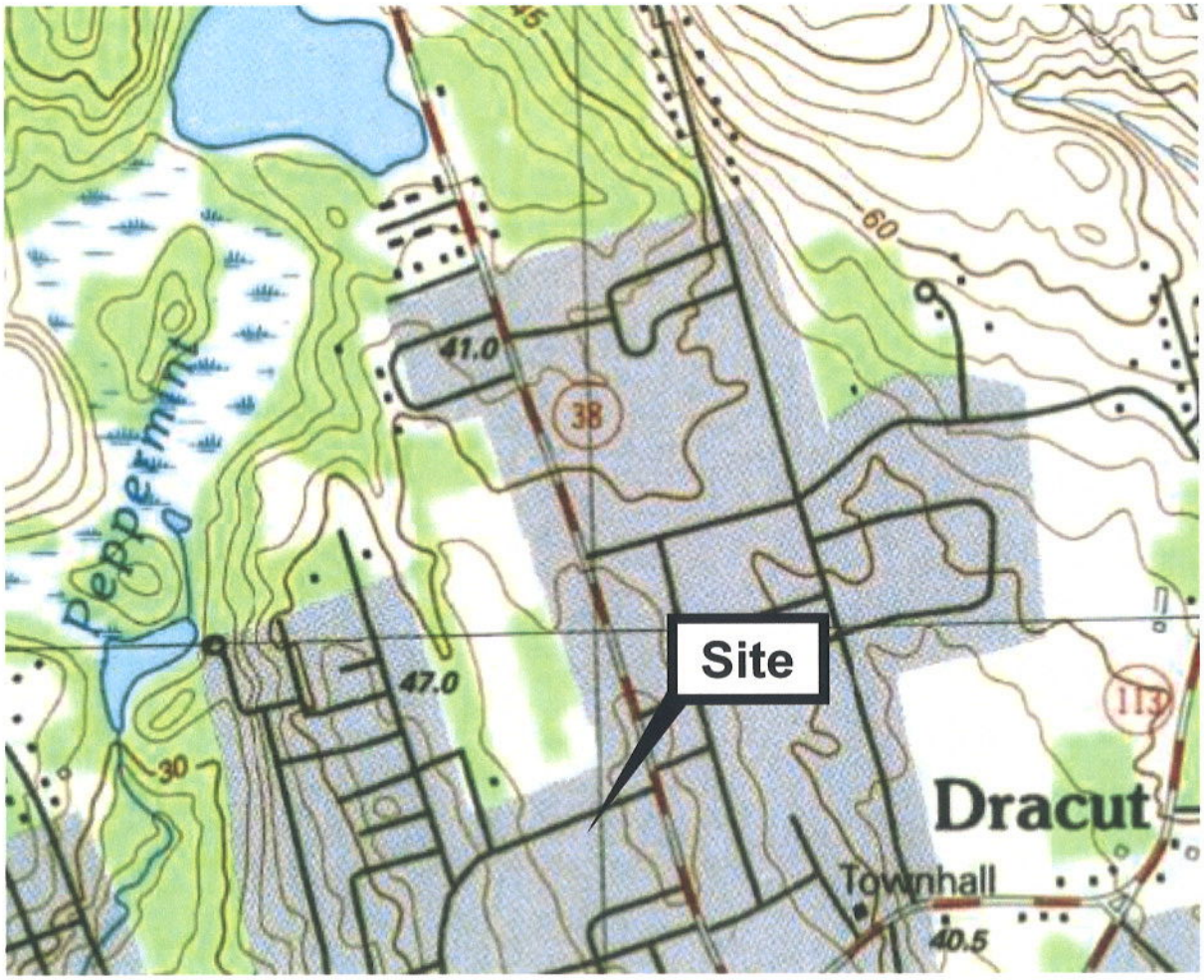
4.10 Standard 10: Illicit Discharges

There are no known current illicit discharges of wastewater, stormwater contaminated with process wastes, raw materials, toxic pollutants, hazardous substances, oil or grease from the site. The discharge of any of these illicit materials is prohibited from the proposed stormwater management system.

APPENDICES

USGS Locus Map

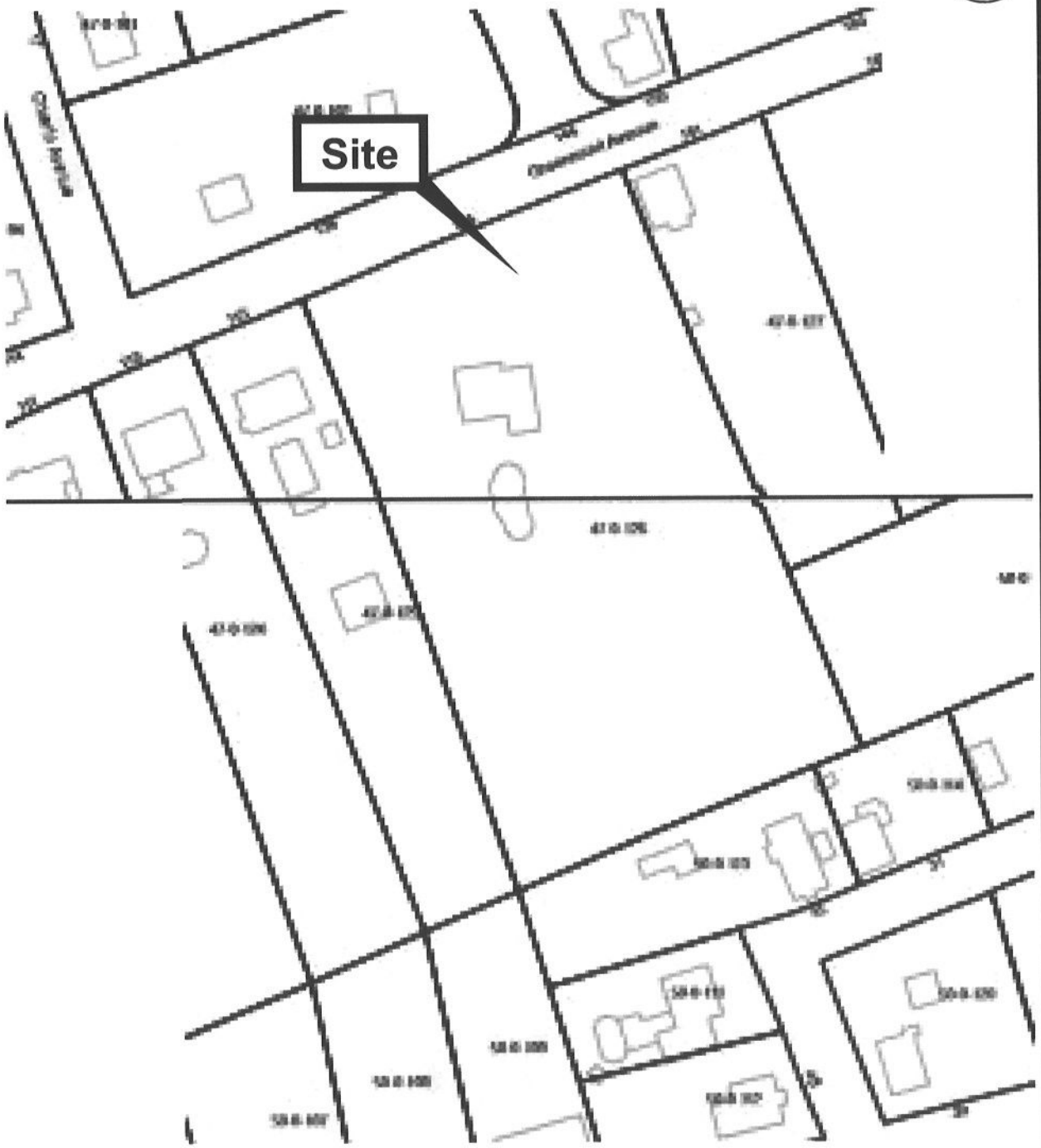
REF.: MassGIS Website



SCALE: Not to Scale

Assessor's Map

REF.: Tyngsborough Official Website



MAP 47 LOT 126

SCALE: 1" = 50 FT

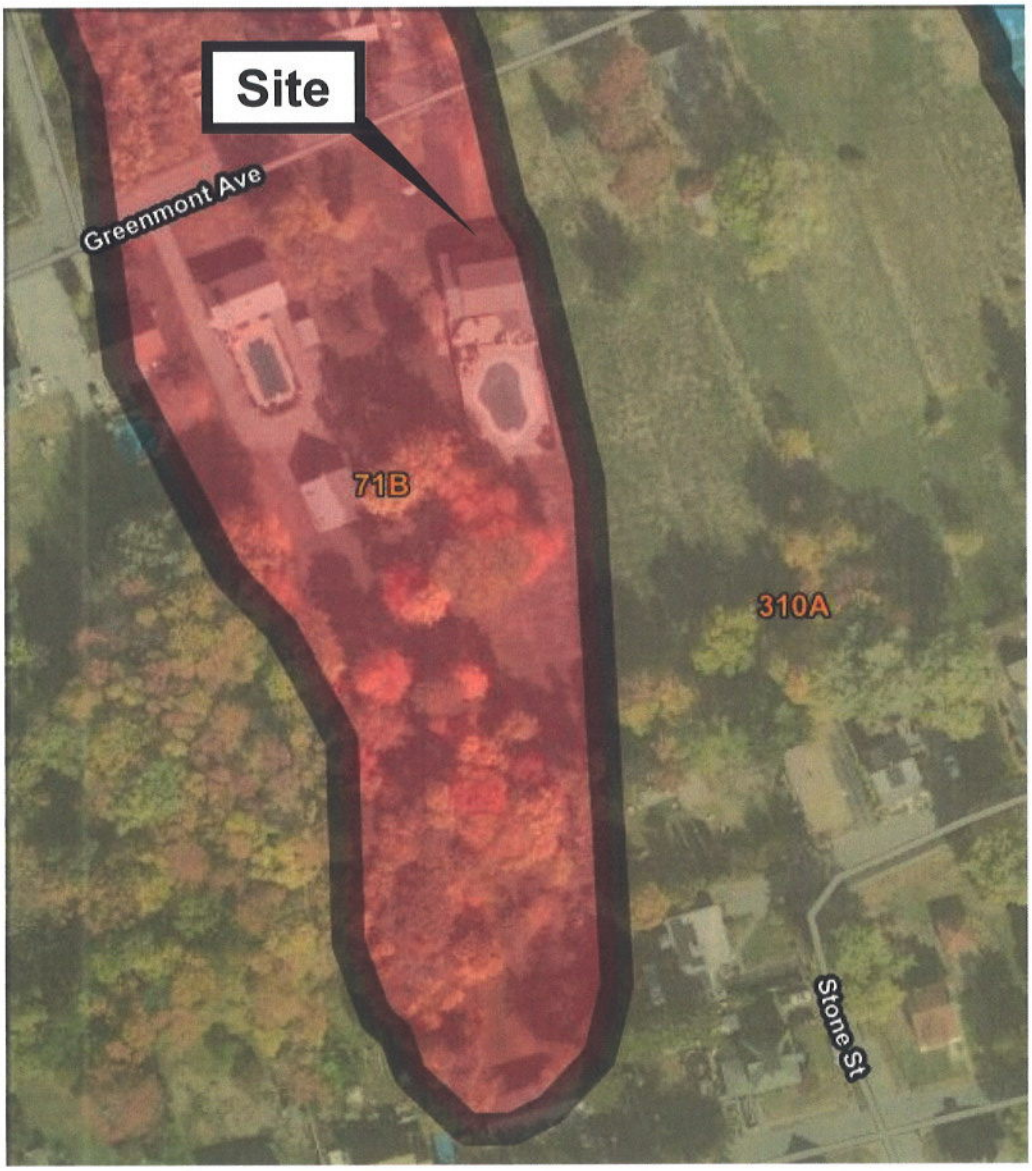
Aerial Photography

REF.: MassGIS Website

SCALE: 1" = 100 FT

NRCS Soil Map

REF.: NRCS Website

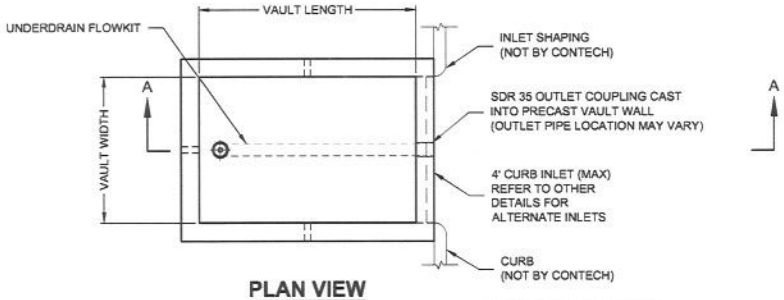


Hydrologic Soil Group

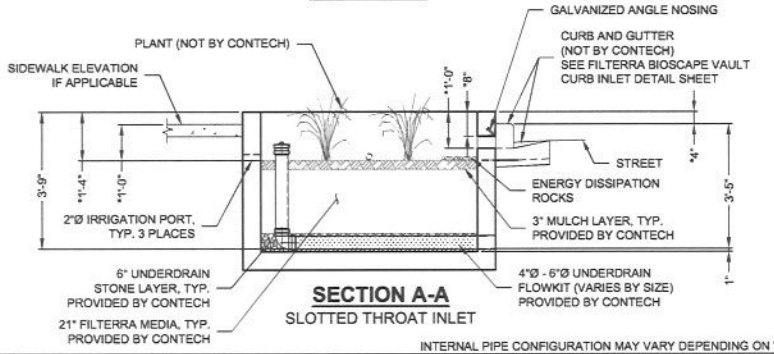
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
71B	Ridgebury fine sandy loam, 3 to 8 percent slopes, extremely stony	D	3.5	26.3%
305B	Paxton fine sandy loam, 3 to 8 percent slopes	C	0.5	3.9%
310A	Woodbridge fine sandy loam, 0 to 3 percent slopes	C/D	9.2	69.8%
Totals for Area of Interest			**13.2**	**100.0%**

SCALE: Not to Scale

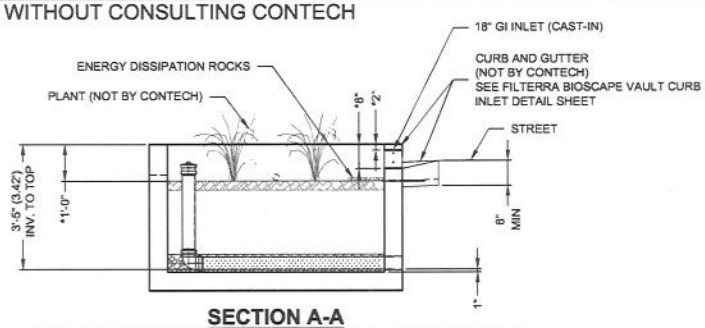
DIMENSIONS PRECEDED BY " * " ARE CRITICAL AND MAY NOT BE MODIFIED WITHOUT CONSULTING CONTECH



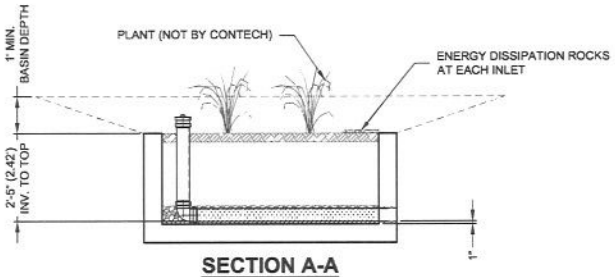
PLAN VIEW



SECTION A-A
SLOTTED THROAT INLET



SECTION A-A
GREEN INFRASTRUCTURE (GI) INLET - TOP FLUSH WITH TOP OF CURB, NOT INTENDED FOR SIDEWALK APPLICATIONS



SECTION A-A
BASIN - CURB INLET OR PIPE INLETS OPTIONAL

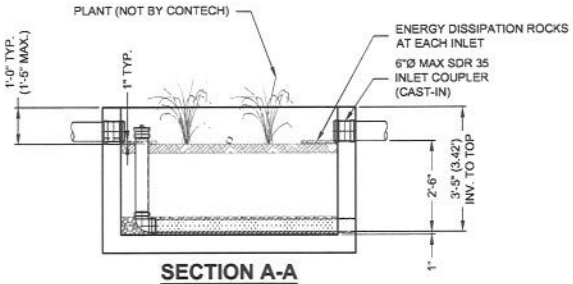
INTERNAL PIPE CONFIGURATION MAY VARY DEPENDING ON VAULT SIZE

FTBSV CONFIGURATION

(OPTIONS: BASIN "-B", GREEN INFRASTRUCTURE INLET "-I", PIPE INLET "-P", SLOTTED THROAT INLET "-T")

VAULT SIZE (L x W)	MEDIA AREA (SF)	LONG SIDE INLET DESIG. / PART NO.	SHORT SIDE INLET DESIG. / PART NO.	AVAILABILITY	OUTLET PIPE DIA	MIN. NO. OF INLET PIPES (-P ONLY)
4 x 4	16	FTBSV0404	FTBSV0404	ALL	4" SDR 35	1
6 x 4	24	FTBSV0604	FTBSV0406	ALL	4" SDR 35	1
8 x 4	32	FTBSV0804	FTBSV0408	ALL (EXCEPT DE,MD,NJ,PA,VA,WV)	4" SDR 35	1
7.83 x 4.5	35	FTBSV078045	FTBSV045078	DE,MD,NJ,PA,VA,WV ONLY	4" SDR 35	1
6 x 6	36	FTBSV0606	FTBSV0606	ALL (EXCEPT CA, TX)	4" SDR 35	1
8 x 6	48	FTBSV0806	FTBSV0608	ALL	4" SDR 35	1
10 x 6	60	FTBSV1006	FTBSV0610	ALL (EXCEPT CA, TX)	6" SDR 35	2
8 x 8	64	FTBSV0808	FTBSV0808	CA, TX ONLY	6" SDR 35	2
12 x 6	72	FTBSV1206	FTBSV0612	ALL (EXCEPT TX)	6" SDR 35	2
10 x 8	80	FTBSV1008	FTBSV0810	CA, TX ONLY	6" SDR 35	2
13 x 7	91	FTBSV1307	FTBSV0713	ALL (EXCEPT CA, TX)	6" SDR 35	2
12 x 8	96	FTBSV1208	FTBSV0812	CA, TX ONLY	6" SDR 35	2
14 x 8	112	FTBSV1408†	N/A	ALL	6" SDR 35	3
16 x 8	128	FTBSV1608†	N/A	ALL (EXCEPT OR,WA)	6" SDR 35	3
15 x 9	135	FTBSV1509†	N/A	OR,WA ONLY	6" SDR 35	3
18 x 8	144	FTBSV1808†	N/A	CALL CONTECH	6" SDR 35	3
20 x 8	160	FTBSV2008†	N/A	CALL CONTECH	6" SDR 35	4
22 x 8	176	FTBSV2208†	N/A	CALL CONTECH	6" SDR 35	4

†UTILIZES (2) CURB OPENINGS WITH MIN 1' SPACING



SECTION A-A
PIPE INLET

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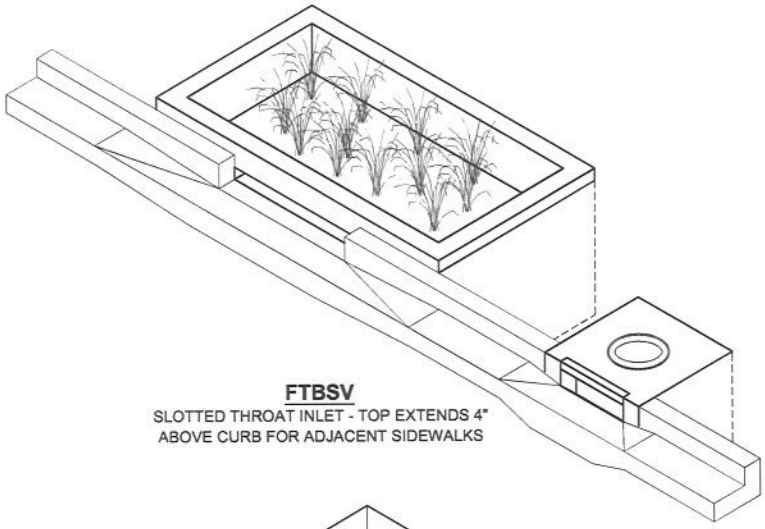
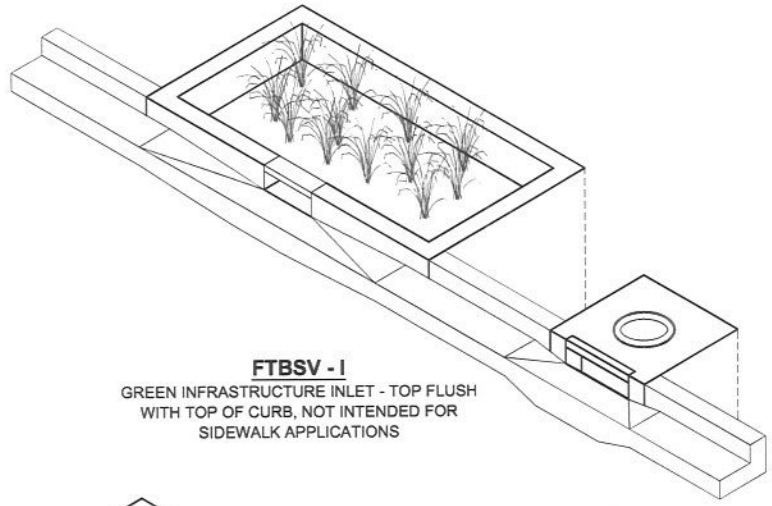
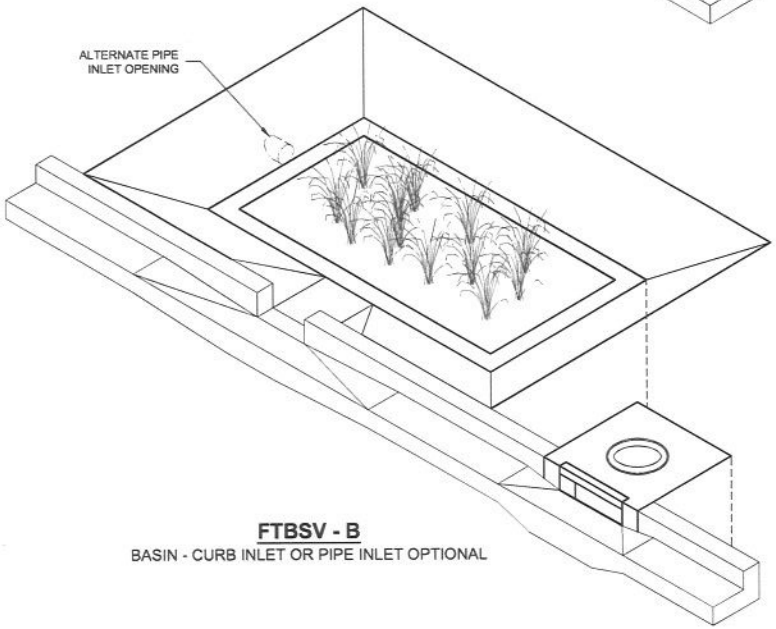
FILTERRA BIOSCAPE VAULT STANDARD OFFLINE (FTBSV) CONFIGURATION DETAIL



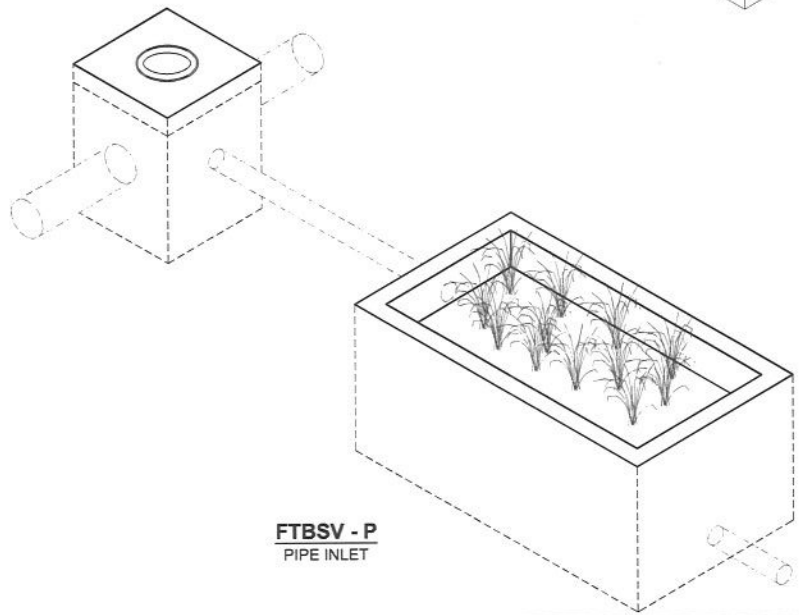
FTBSV
SLOTTED THROAT INLET - TOP EXTENDS 4" ABOVE CURB FOR ADJACENT SIDEWALKS



FTBSV - I
GREEN INFRASTRUCTURE INLET - TOP FLUSH WITH TOP OF CURB, NOT INTENDED FOR SIDEWALK APPLICATIONS



FTBSV - B
BASIN - CURB INLET OR PIPE INLET OPTIONAL



FTBSV - P
PIPE INLET

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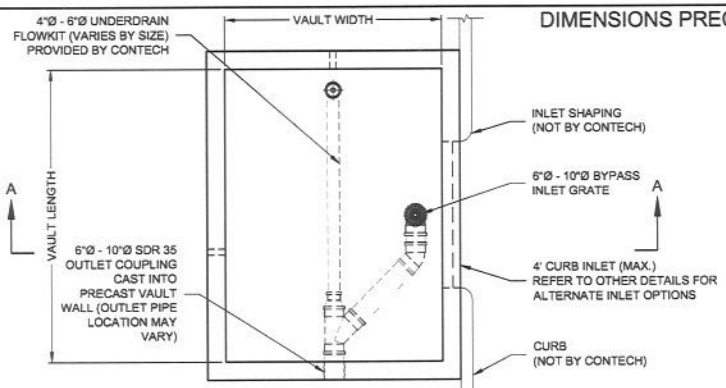
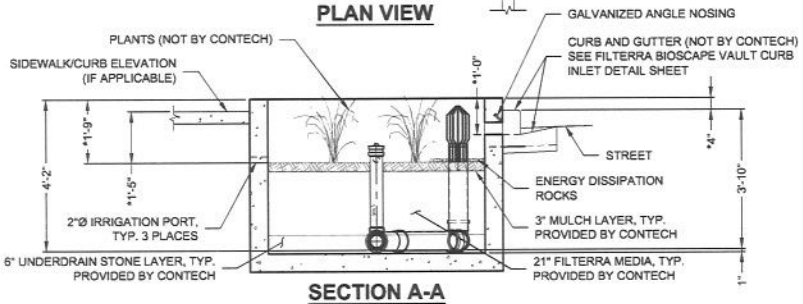
FILTERRA BIOSCAPE VAULT STANDARD OFFLINE (FTBSV)
SITE LAYOUT DETAIL

DIMENSIONS PRECEDED BY " * " ARE CRITICAL AND MAY NOT BE MODIFIED WITHOUT CONSULTING CONTECH

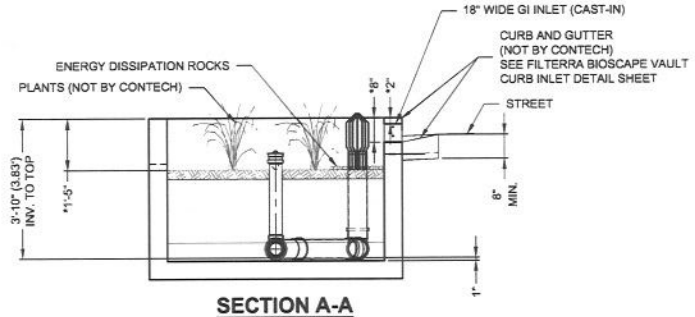


PLAN VIEW



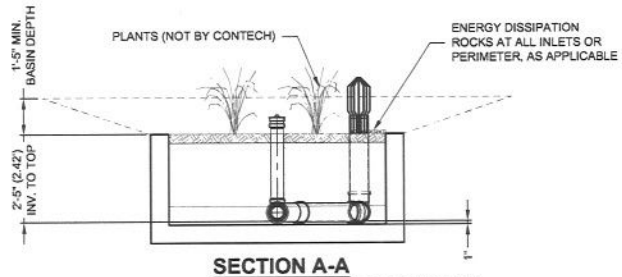
SECTION A-A

SLOTTED THROAT INLET - TOP EXTENDS 4" ABOVE CURB FOR ADJACENT SIDEWALKS (-T)



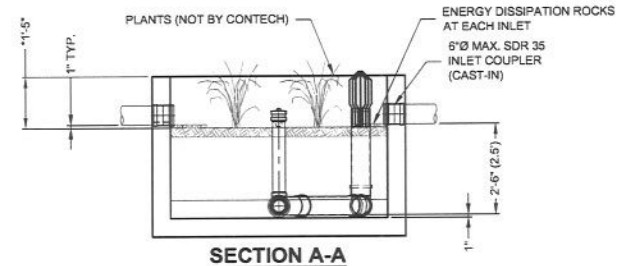
SECTION A-A

GREEN INFRASTRUCTURE INLET - TOP FLUSH WITH TOP OF CURB, NOT INTENDED FOR SIDEWALK APPLICATIONS (-I)



SECTION A-A

BASIN - CURB INLET OR PIPE INLETS OPTIONAL (-B)



SECTION A-A

PIPE INLET (-P)

FTBSVIB CONFIGURATION

(OPTIONS: BASIN "-B", GREEN INFRASTRUCTURE (GI) INLET "-I", PIPE INLET "-P", SLOTTED THROAT INLET "-T")

VAULT SIZE (L x W)	MEDIA AREA (SF)	LONG SIDE INLET DESIG. / PART NO.	SHORT SIDE INLET DESIG. / PART NO.	AVAILABILITY	MAX. OUTLET / BYPASS PIPE DIA.	MAX. BYPASS FLOW (CFS)	UNDER-DRAIN PIPE DIA. (PERF)	MIN. NO. OF INLET PIPES (-P ONLY)
4 x 4	16	FTBSVIB0404	FTBSVIB0404	ALL	6" SDR 35	1.42	4" SDR 35	1
6 x 4	24	FTBSVIB0604	FTBSVIB0406	ALL	8" SDR 35	1.89	4" SDR 35	1
8 x 4	32	FTBSVIB0804	FTBSVIB0408	ALL (EXCEPT DE,MD,NJ,PA,VA,WV)	8" SDR 35	1.89	4" SDR 35	1
7.83 x 4.5	35	FTBSVIB078045	FTBSVIB045078	DE,MD,NJ,PA,VA,WV ONLY	8" SDR 35	1.89	4" SDR 35	1
6 x 6	36	FTBSVIB0606	FTBSVIB0606	ALL (EXCEPT CA, TX)	8" SDR 35	1.89	4" SDR 35	1
8 x 6	48	FTBSVIB0806	FTBSVIB0608	ALL	10" SDR 35	2.37	4" SDR 35	1
10 x 6	60	FTBSVIB1006	FTBSVIB0610	ALL (EXCEPT CA, TX)	10" SDR 35	2.37	6" SDR 35	2
8 x 8	64	FTBSVIB0808	FTBSVIB0808	CA, TX ONLY	10" SDR 35	2.37	6" SDR 35	2
12 x 6	72	FTBSVIB1206	FTBSVIB0612	ALL (EXCEPT TX)	10" SDR 35	2.37	6" SDR 35	2
10 x 8	80	FTBSVIB1008	FTBSVIB0810	CA, TX ONLY	10" SDR 35	2.37	6" SDR 35	2
13 x 7	91	FTBSVIB1307	FTBSVIB0713	ALL (EXCEPT CA, TX)	10" SDR 35	2.37	6" SDR 35	2
12 x 8	96	FTBSVIB1208	FTBSVIB0812	CA, TX ONLY	10" SDR 35	2.37	6" SDR 35	2
14 x 8	112	FTBSVIB1408	N/A	ALL	10" SDR 35	2.37	6" SDR 35	3
16 x 8	128	FTBSVIB1608†	N/A	ALL (EXCEPT OR,WA)	10" SDR 35	2.37	6" SDR 35	3
15 x 9	135	FTBSVIB1509†	N/A	OR,WA ONLY	10" SDR 35	2.37	6" SDR 35	3
18 x 8	144	FTBSVIB1808†	N/A	CALL CONTECH	10" SDR 35	2.37	6" SDR 35	3
20 x 8	160	FTBSVIB2008†	N/A	CALL CONTECH	10" SDR 35	2.37	6" SDR 35	4
22 x 8	176	FTBSVIB2208†	N/A	CALL CONTECH	10" SDR 35	2.37	6" SDR 35	4

†UTILIZES (2) CURB OPENINGS WITH MIN 1' SPACING

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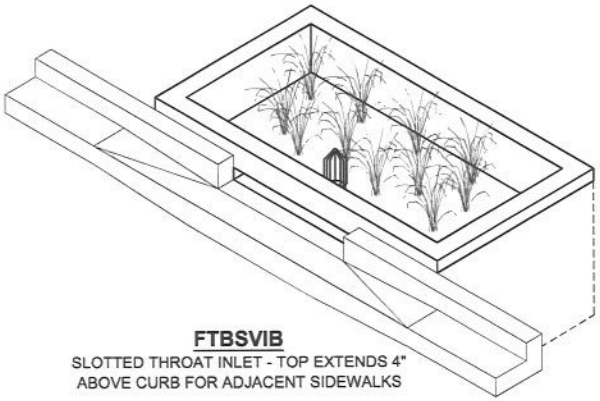
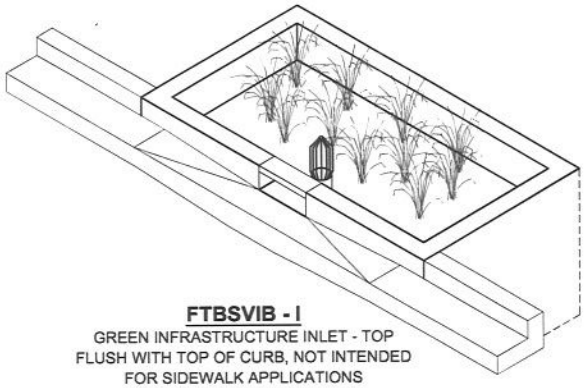
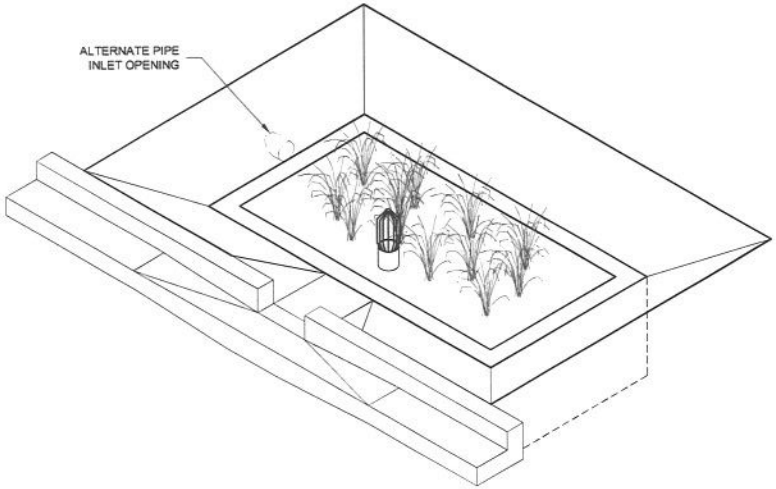
FILTERRA BIOSCAPE VAULT INTERNAL BYPASS (FTBSVIB) CONFIGURATION DETAIL



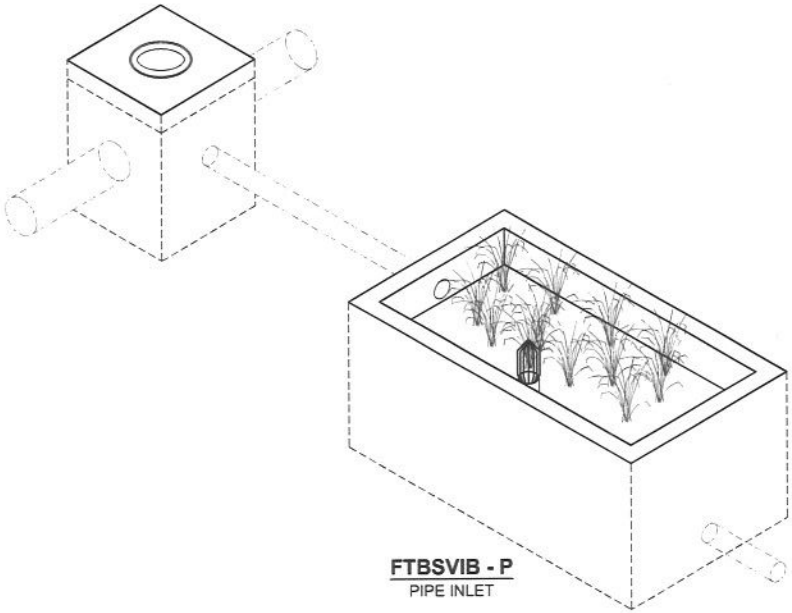
FTBSVIB
SLOTTED THROAT INLET - TOP EXTENDS 4" ABOVE CURB FOR ADJACENT SIDEWALKS



FTBSVIB - I
GREEN INFRASTRUCTURE INLET - TOP FLUSH WITH TOP OF CURB, NOT INTENDED FOR SIDEWALK APPLICATIONS



FTBSVIB - B
BASIN - CURB INLET OR PIPE INLET OPTIONAL



FTBSVIB - P
PIPE INLET

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FILTERRA BIOSCAPE VAULT INTERNAL BYPASS
(FTBSVIB)
SITE LAYOUT DETAIL

C.1: Pre-Development Analysis

[Existing Watershed Plan & HydroCAD calculations]

Routing Diagram for Ex-Conditions
Prepared by Cornerstone Land Associates, LLC, Printed 6/1/2023
HydroCAD® 10.00 s/n 03735 © 2012 HydroCAD Software Solutions LLC

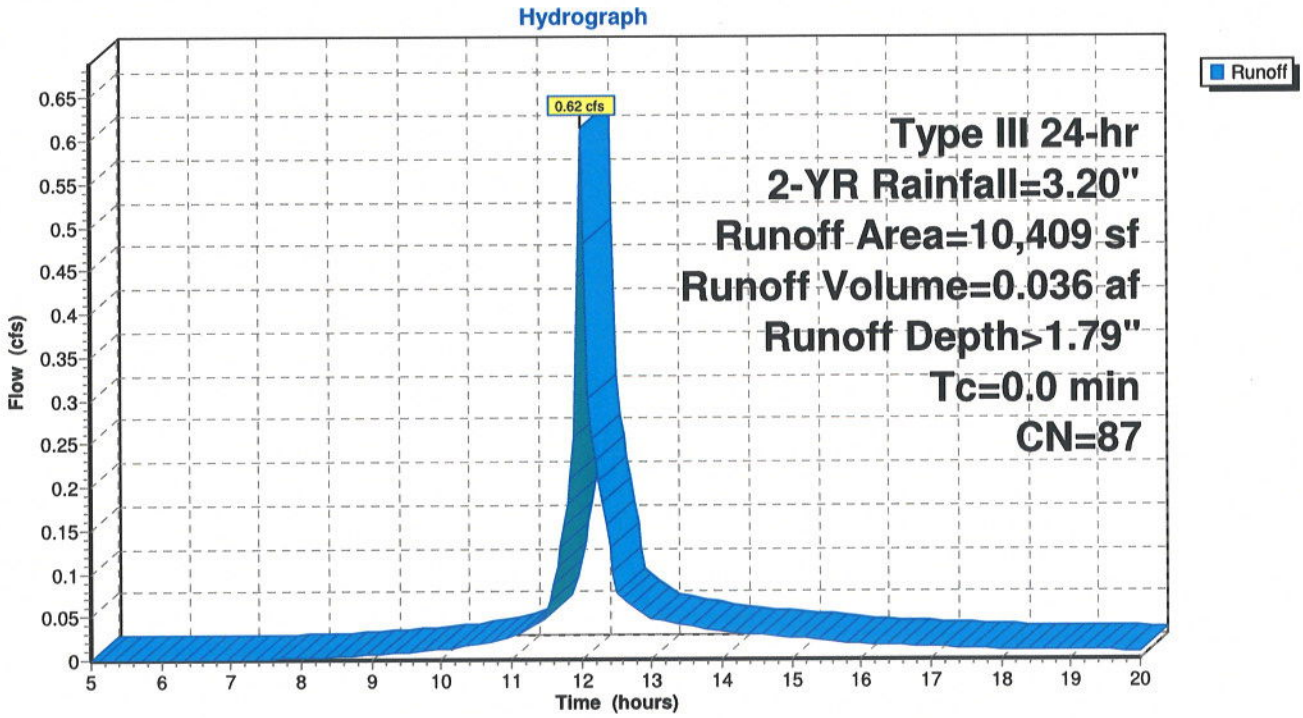
Summary for Subcatchment 1S: DP#1-GREENMONT

Runoff = 0.62 cfs @ 12.00 hrs, Volume= 0.036 af, Depth> 1.79"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.20"

Area (sf)	CN	Description
981	98	Roofs, HSG D
2,843	98	Paved parking, HSG D
6,585	80	>75% Grass cover, Good, HSG D
10,409	87	Weighted Average
6,585		63.26% Pervious Area
3,824		36.74% Impervious Area

Subcatchment 1S: DP#1-GREENMONT



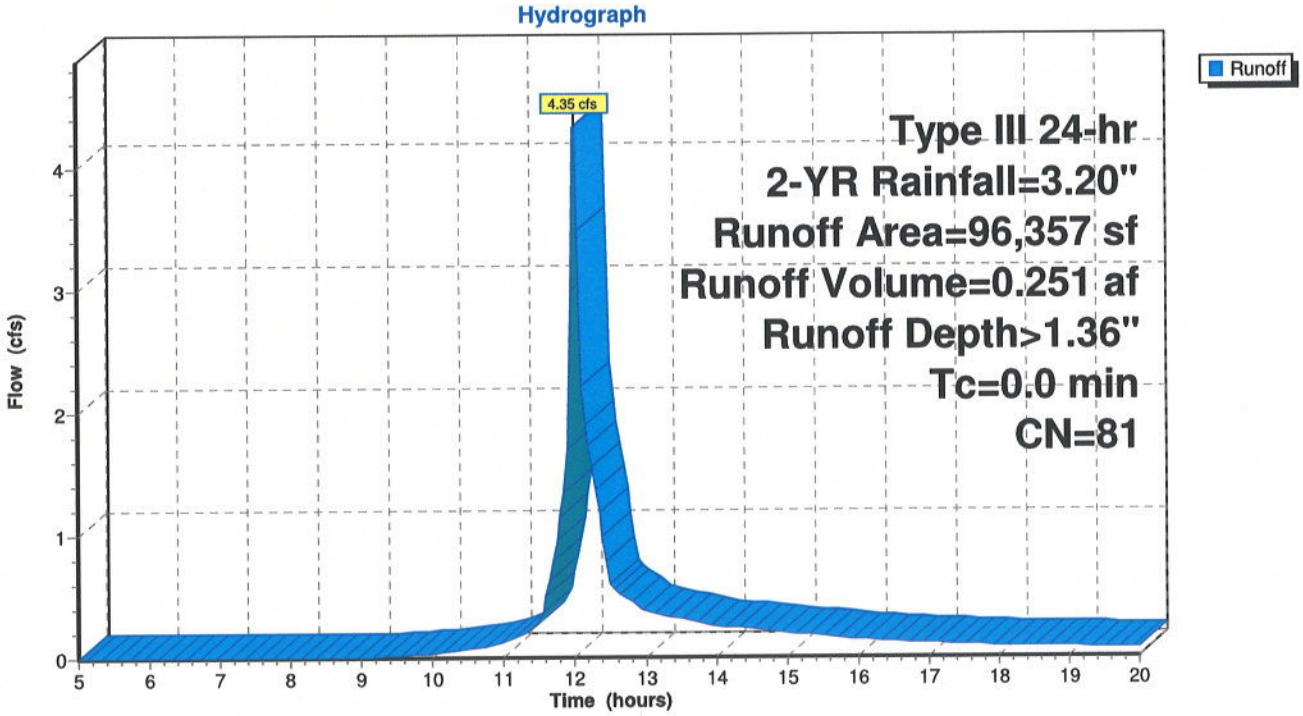
Summary for Subcatchment 2S: DP#2-REAR WETLANDS

Runoff = 4.35 cfs @ 12.01 hrs, Volume= 0.251 af, Depth> 1.36"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.20"

Area (sf)	CN	Description
1,008	98	Roofs, HSG D
4,356	98	Paved parking, HSG D
90,993	80	>75% Grass cover, Good, HSG D
96,357	81	Weighted Average
90,993		94.43% Pervious Area
5,364		5.57% Impervious Area

Subcatchment 2S: DP#2-REAR WETLANDS



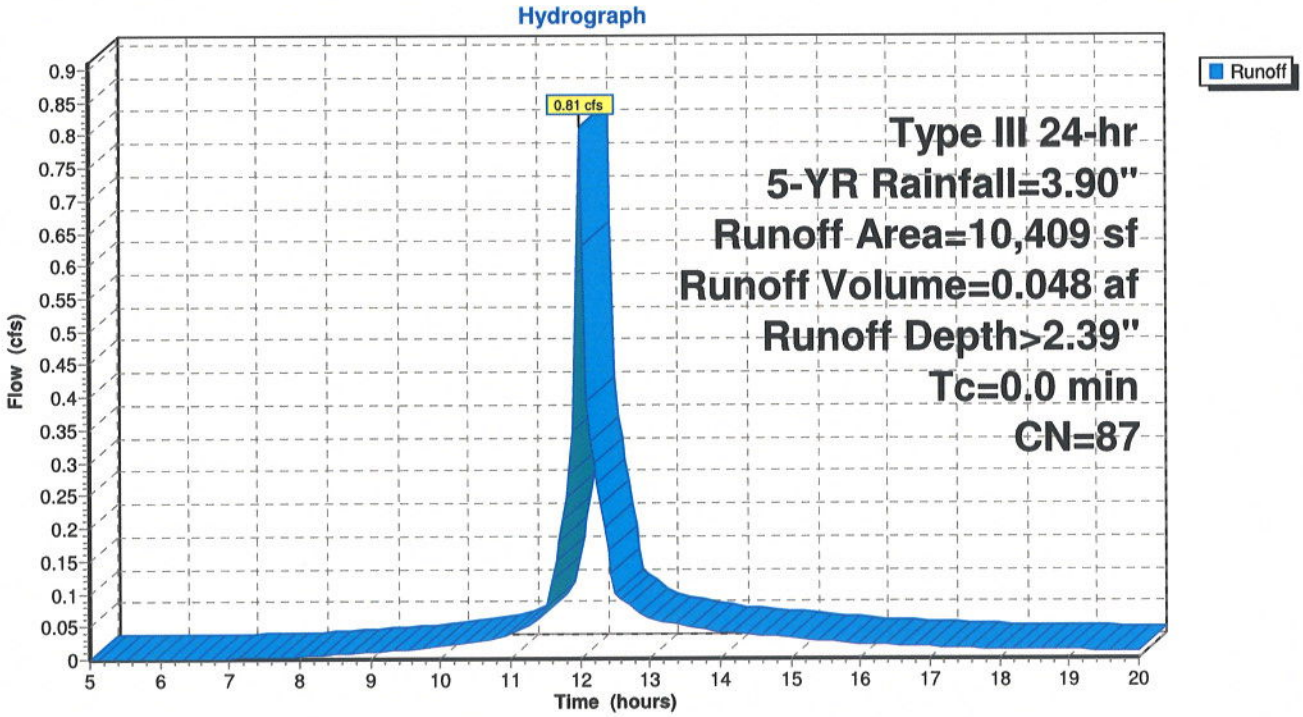
Summary for Subcatchment 1S: DP#1-GREENMONT

Runoff = 0.81 cfs @ 12.00 hrs, Volume= 0.048 af, Depth> 2.39"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-YR Rainfall=3.90"

Area (sf)	CN	Description
981	98	Roofs, HSG D
2,843	98	Paved parking, HSG D
6,585	80	>75% Grass cover, Good, HSG D
10,409	87	Weighted Average
6,585		63.26% Pervious Area
3,824		36.74% Impervious Area

Subcatchment 1S: DP#1-GREENMONT



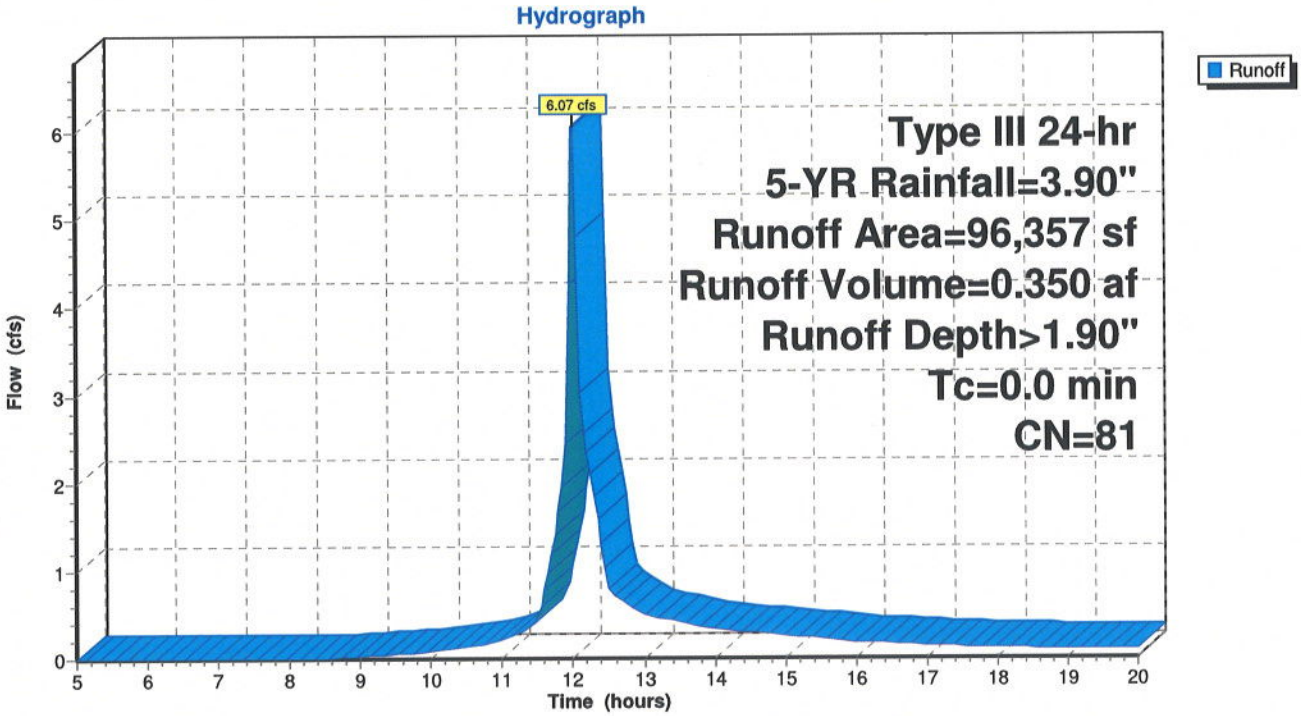
Summary for Subcatchment 2S: DP#2-REAR WETLANDS

Runoff = 6.07 cfs @ 12.00 hrs, Volume= 0.350 af, Depth> 1.90"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-YR Rainfall=3.90"

Area (sf)	CN	Description
1,008	98	Roofs, HSG D
4,356	98	Paved parking, HSG D
90,993	80	>75% Grass cover, Good, HSG D
96,357	81	Weighted Average
90,993		94.43% Pervious Area
5,364		5.57% Impervious Area

Subcatchment 2S: DP#2-REAR WETLANDS



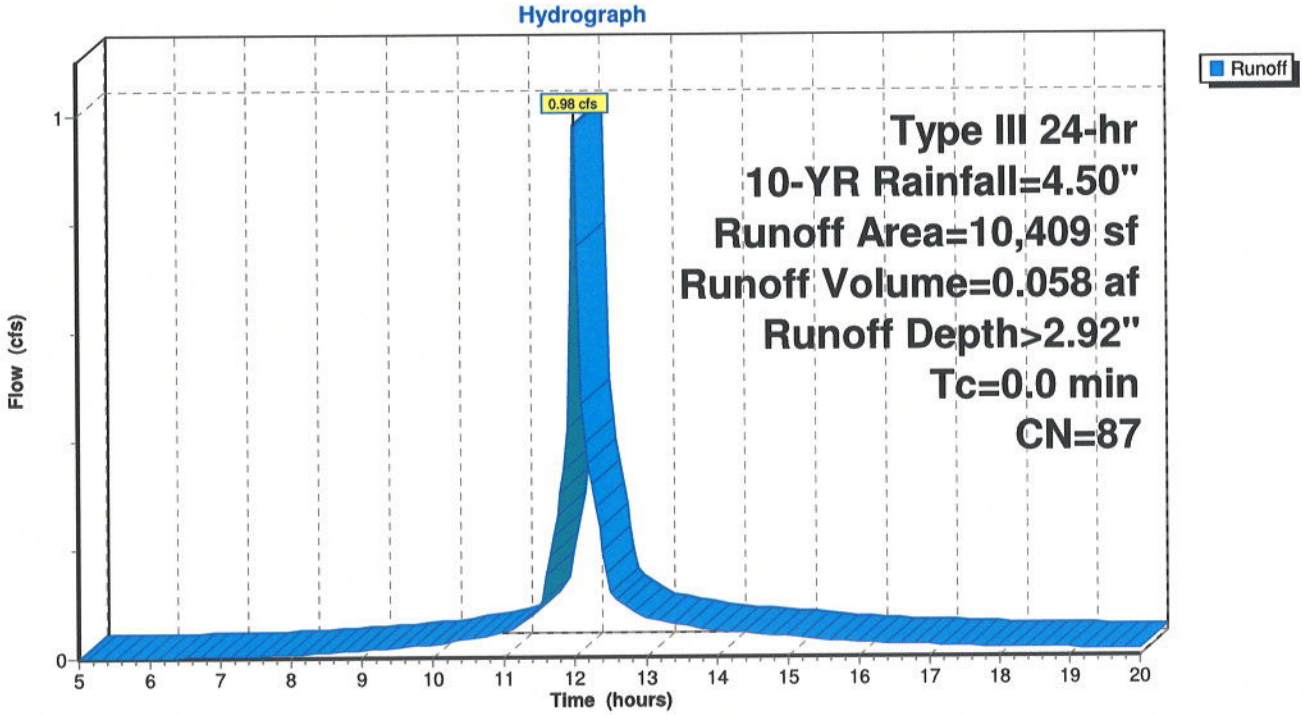
Summary for Subcatchment 1S: DP#1-GREENMONT

Runoff = 0.98 cfs @ 12.00 hrs, Volume= 0.058 af, Depth> 2.92"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=4.50"

Area (sf)	CN	Description
981	98	Roofs, HSG D
2,843	98	Paved parking, HSG D
6,585	80	>75% Grass cover, Good, HSG D
10,409	87	Weighted Average
6,585		63.26% Pervious Area
3,824		36.74% Impervious Area

Subcatchment 1S: DP#1-GREENMONT



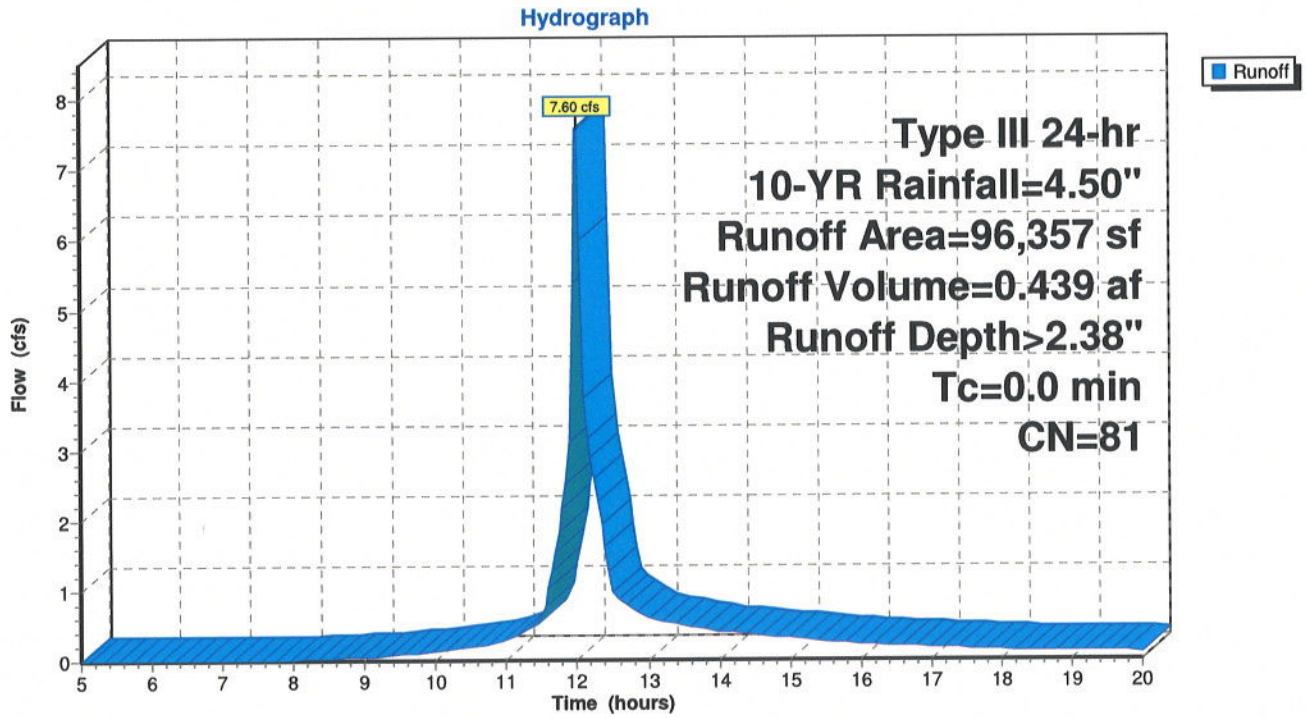
Summary for Subcatchment 2S: DP#2-REAR WETLANDS

Runoff = 7.60 cfs @ 12.00 hrs, Volume= 0.439 af, Depth> 2.38"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=4.50"

Area (sf)	CN	Description
1,008	98	Roofs, HSG D
4,356	98	Paved parking, HSG D
90,993	80	>75% Grass cover, Good, HSG D
96,357	81	Weighted Average
90,993		94.43% Pervious Area
5,364		5.57% Impervious Area

Subcatchment 2S: DP#2-REAR WETLANDS



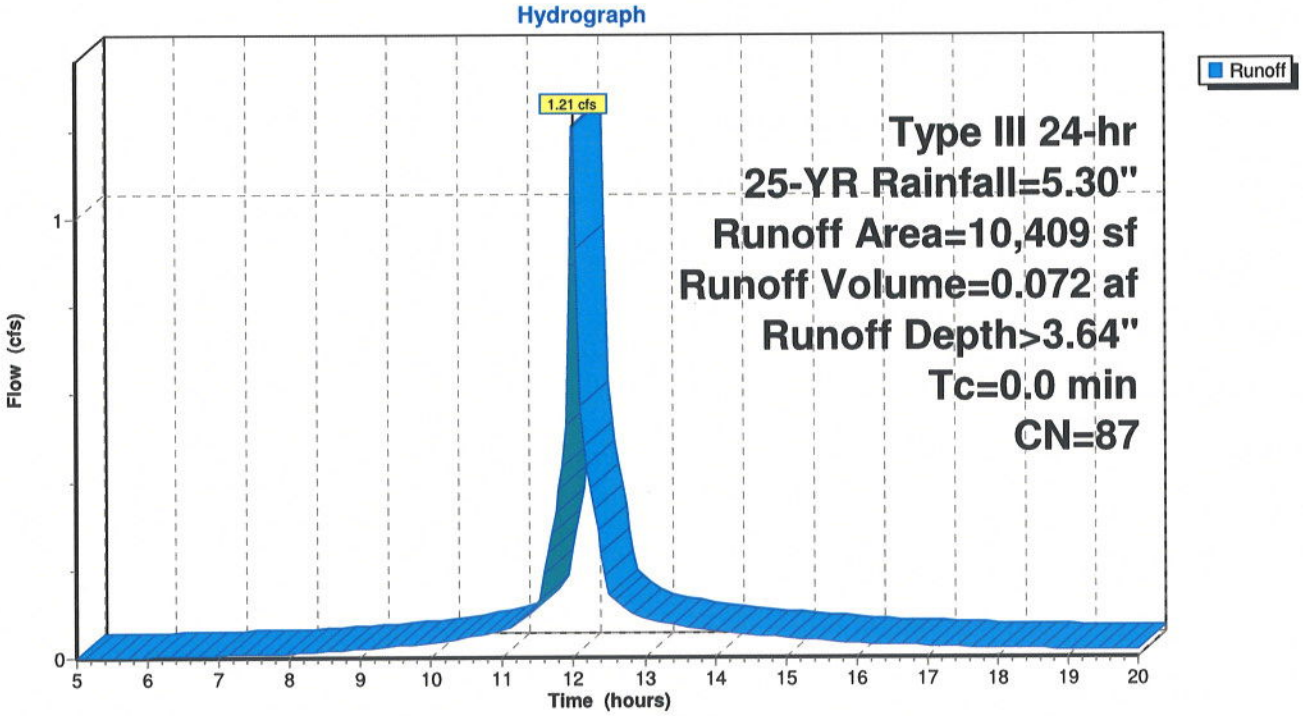
Summary for Subcatchment 1S: DP#1-GREENMONT

Runoff = 1.21 cfs @ 12.00 hrs, Volume= 0.072 af, Depth> 3.64"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=5.30"

Area (sf)	CN	Description
981	98	Roofs, HSG D
2,843	98	Paved parking, HSG D
6,585	80	>75% Grass cover, Good, HSG D
10,409	87	Weighted Average
6,585		63.26% Pervious Area
3,824		36.74% Impervious Area

Subcatchment 1S: DP#1-GREENMONT



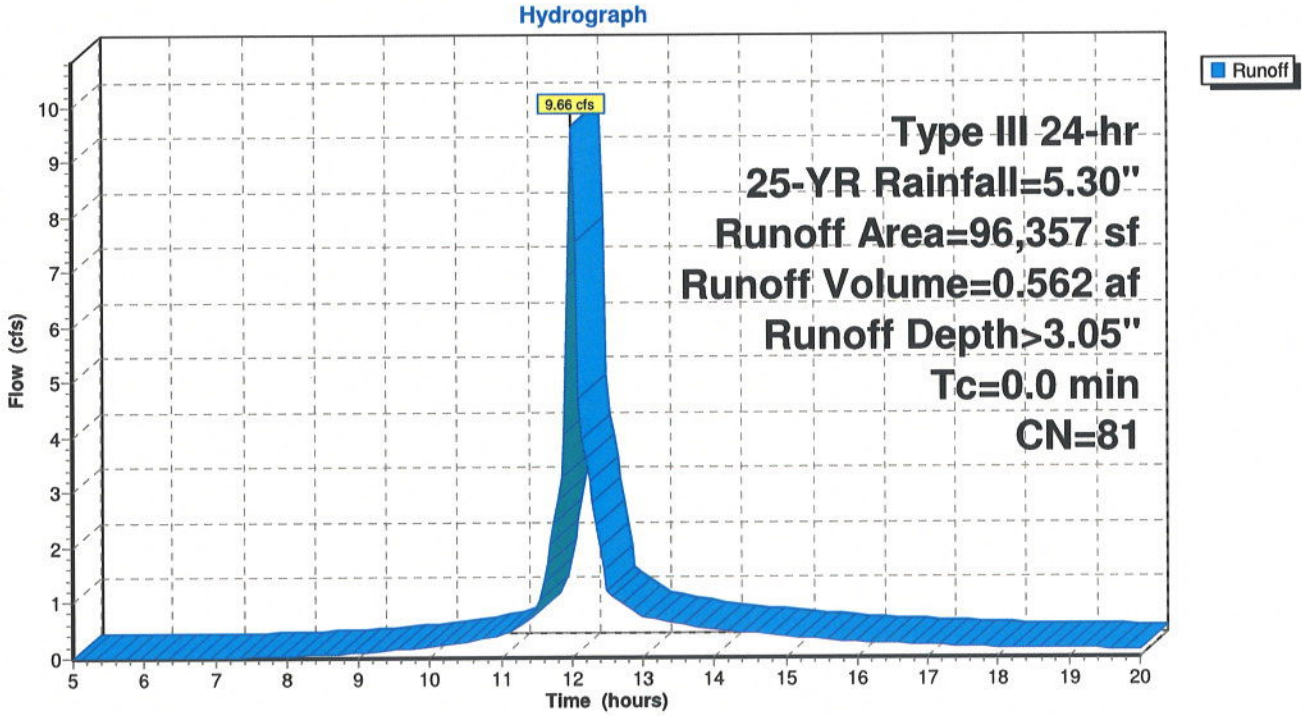
Summary for Subcatchment 2S: DP#2-REAR WETLANDS

Runoff = 9.66 cfs @ 12.00 hrs, Volume= 0.562 af, Depth> 3.05"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=5.30"

Area (sf)	CN	Description
1,008	98	Roofs, HSG D
4,356	98	Paved parking, HSG D
90,993	80	>75% Grass cover, Good, HSG D
96,357	81	Weighted Average
90,993		94.43% Pervious Area
5,364		5.57% Impervious Area

Subcatchment 2S: DP#2-REAR WETLANDS



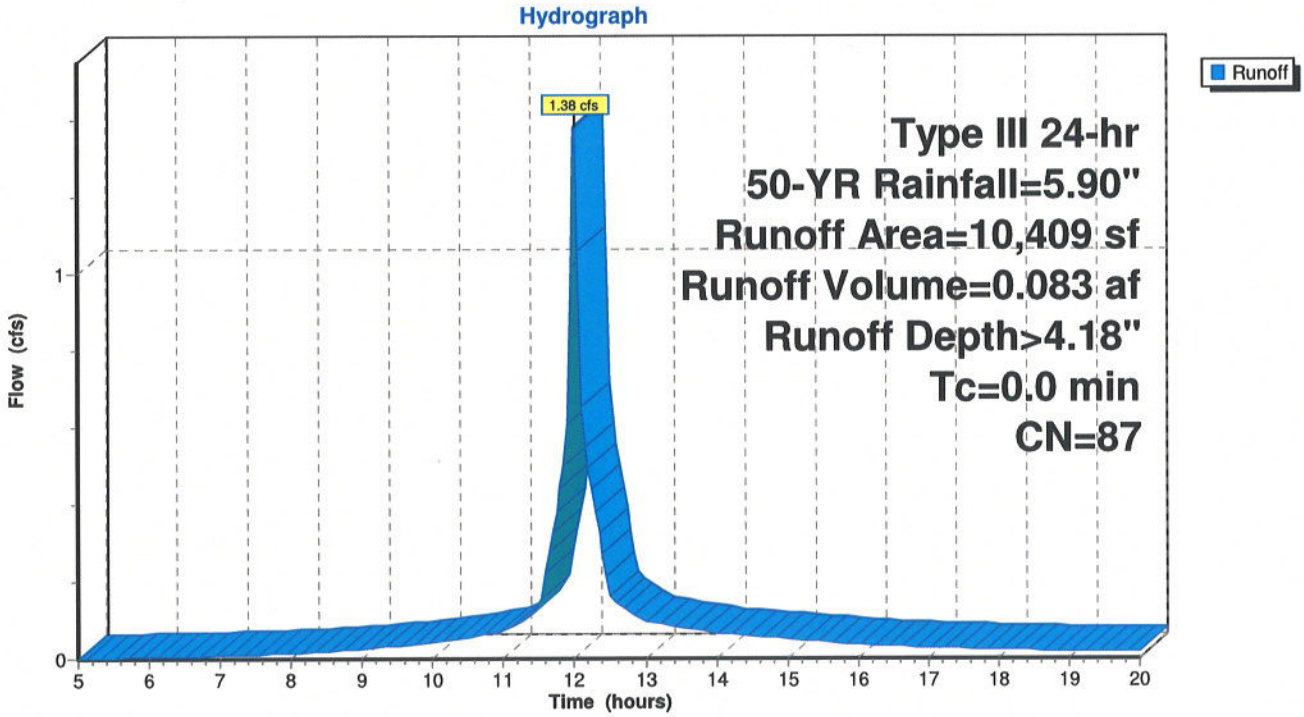
Summary for Subcatchment 1S: DP#1-GREENMONT

Runoff = 1.38 cfs @ 12.00 hrs, Volume= 0.083 af, Depth> 4.18"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-YR Rainfall=5.90"

Area (sf)	CN	Description
981	98	Roofs, HSG D
2,843	98	Paved parking, HSG D
6,585	80	>75% Grass cover, Good, HSG D
10,409	87	Weighted Average
6,585		63.26% Pervious Area
3,824		36.74% Impervious Area

Subcatchment 1S: DP#1-GREENMONT



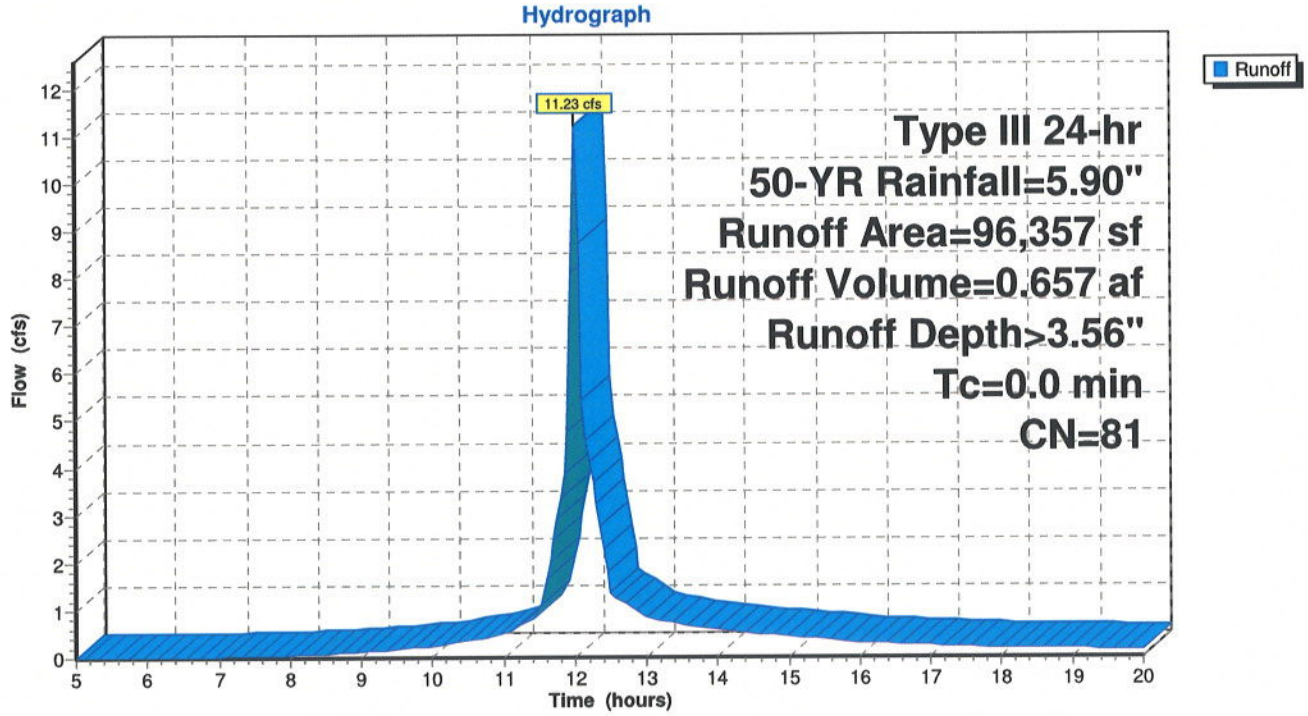
Summary for Subcatchment 2S: DP#2-REAR WETLANDS

Runoff = 11.23 cfs @ 12.00 hrs, Volume= 0.657 af, Depth> 3.56"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-YR Rainfall=5.90"

Area (sf)	CN	Description
1,008	98	Roofs, HSG D
4,356	98	Paved parking, HSG D
90,993	80	>75% Grass cover, Good, HSG D
96,357	81	Weighted Average
90,993		94.43% Pervious Area
5,364		5.57% Impervious Area

Subcatchment 2S: DP#2-REAR WETLANDS



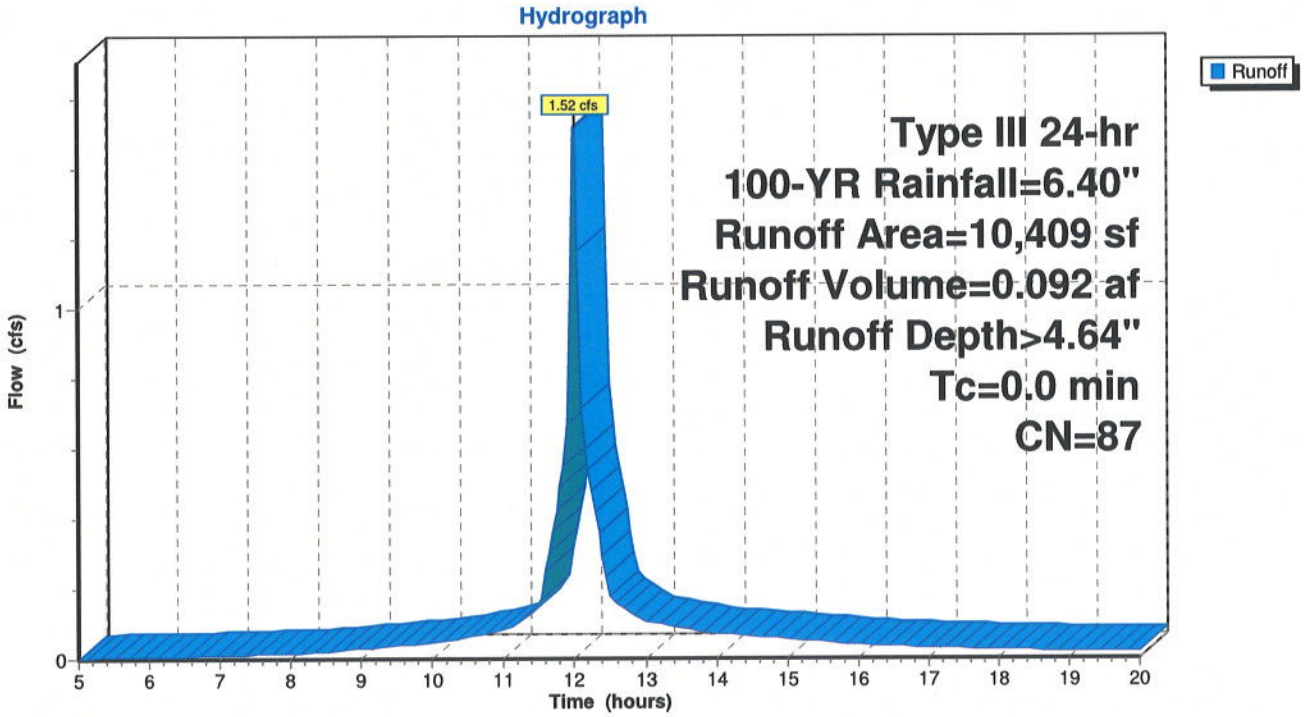
Summary for Subcatchment 1S: DP#1-GREENMONT

Runoff = 1.52 cfs @ 12.00 hrs, Volume= 0.092 af, Depth> 4.64"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=6.40"

Area (sf)	CN	Description
981	98	Roofs, HSG D
2,843	98	Paved parking, HSG D
6,585	80	>75% Grass cover, Good, HSG D
10,409	87	Weighted Average
6,585		63.26% Pervious Area
3,824		36.74% Impervious Area

Subcatchment 1S: DP#1-GREENMONT



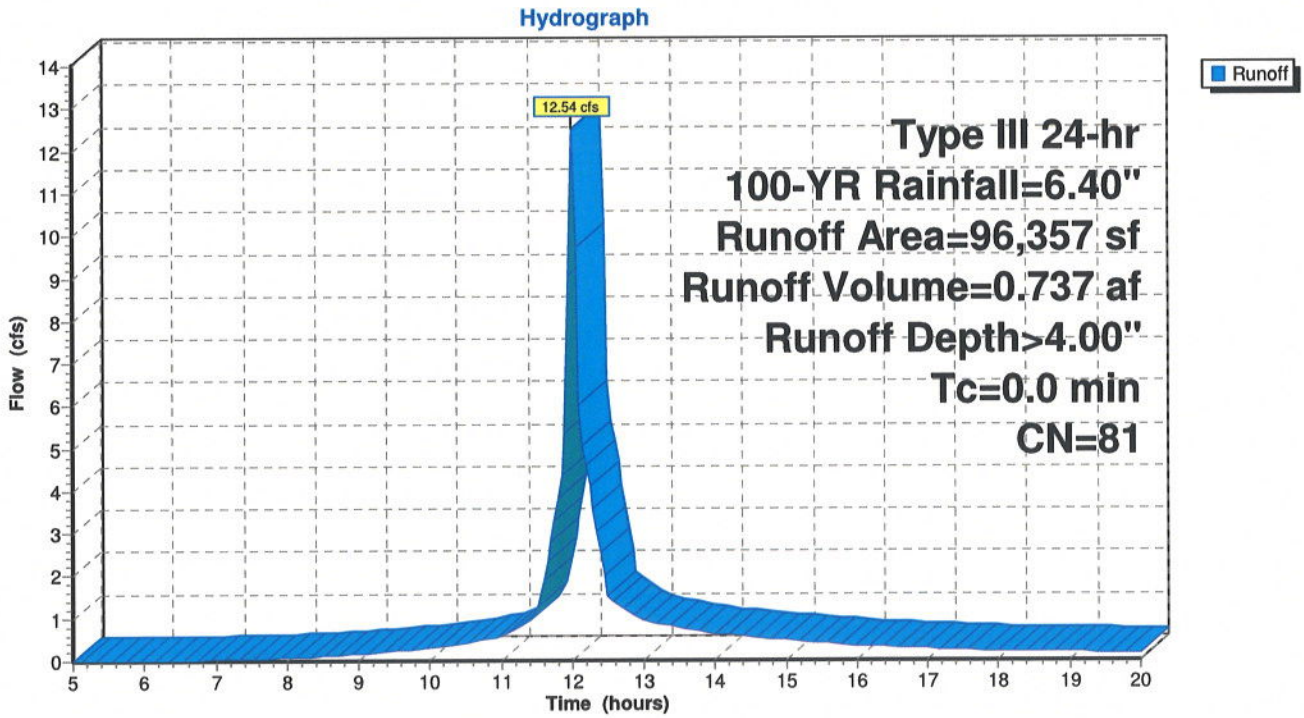
Summary for Subcatchment 2S: DP#2-REAR WETLANDS

Runoff = 12.54 cfs @ 12.00 hrs, Volume= 0.737 af, Depth> 4.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=6.40"

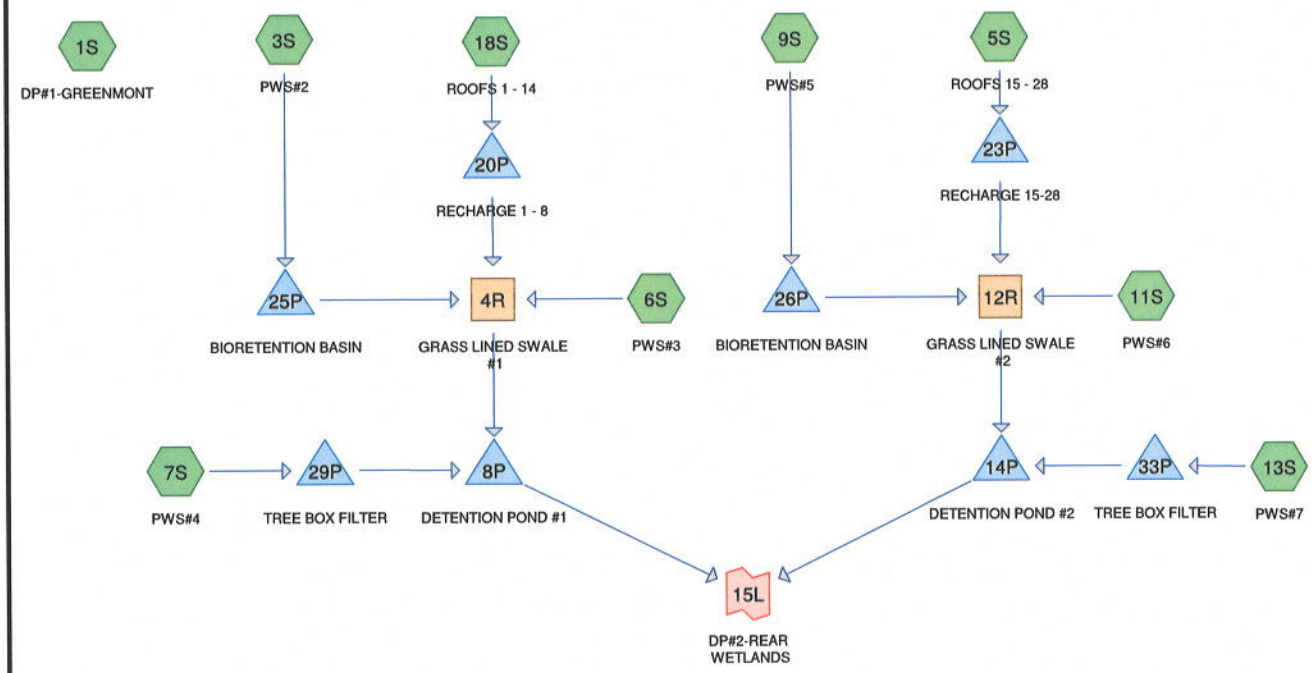
Area (sf)	CN	Description
1,008	98	Roofs, HSG D
4,356	98	Paved parking, HSG D
90,993	80	>75% Grass cover, Good, HSG D
96,357	81	Weighted Average
90,993		94.43% Pervious Area
5,364		5.57% Impervious Area

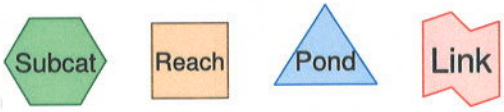
Subcatchment 2S: DP#2-REAR WETLANDS



C.2: Post-Development Analysis

[Proposed Watershed Plan & HydroCAD calculations]





Routing Diagram for Prop-Conditions
Prepared by Cornerstone Land Associates, LLC, Printed 6/1/2023
HydroCAD® 10.00 s/n 03735 © 2012 HydroCAD Software Solutions LLC

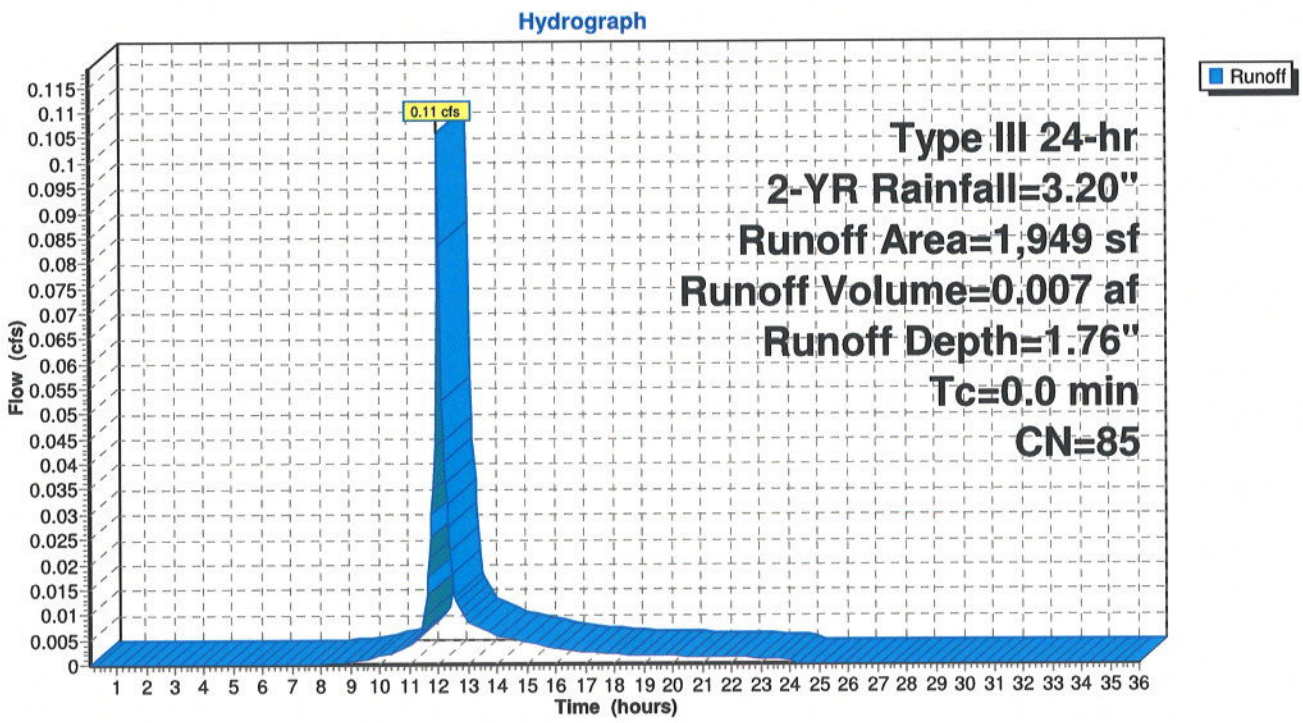
Summary for Subcatchment 1S: DP#1-GREENMONT

Runoff = 0.11 cfs @ 12.00 hrs, Volume= 0.007 af, Depth= 1.76"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.20"

Area (sf)	CN	Description
569	98	Paved parking, HSG D
1,380	80	>75% Grass cover, Good, HSG D
1,949	85	Weighted Average
1,380		70.81% Pervious Area
569		29.19% Impervious Area

Subcatchment 1S: DP#1-GREENMONT



Summary for Subcatchment 3S: PWS#2

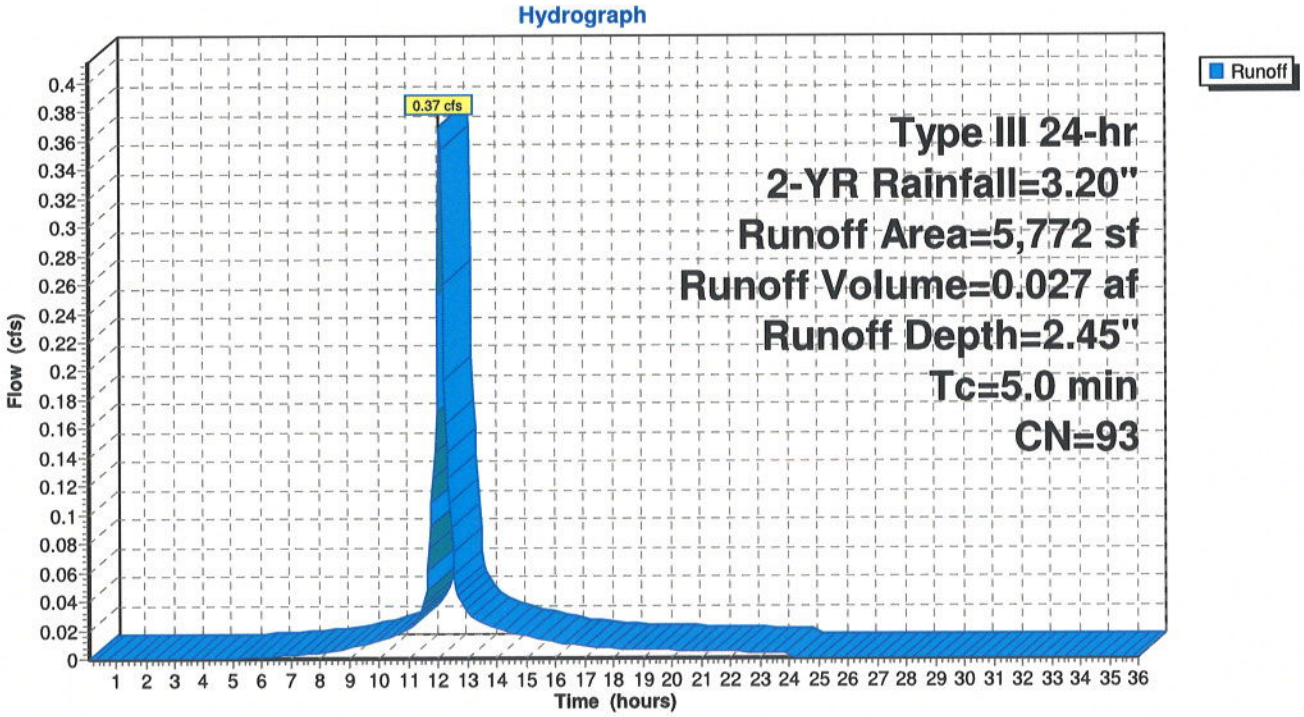
Runoff = 0.37 cfs @ 12.07 hrs, Volume= 0.027 af, Depth= 2.45"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.20"

Area (sf)	CN	Description
4,094	98	Paved parking, HSG D
1,678	80	>75% Grass cover, Good, HSG D
5,772	93	Weighted Average
1,678		29.07% Pervious Area
4,094		70.93% Impervious Area

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

Subcatchment 3S: PWS#2



Summary for Subcatchment 5S: ROOFS 15 - 28

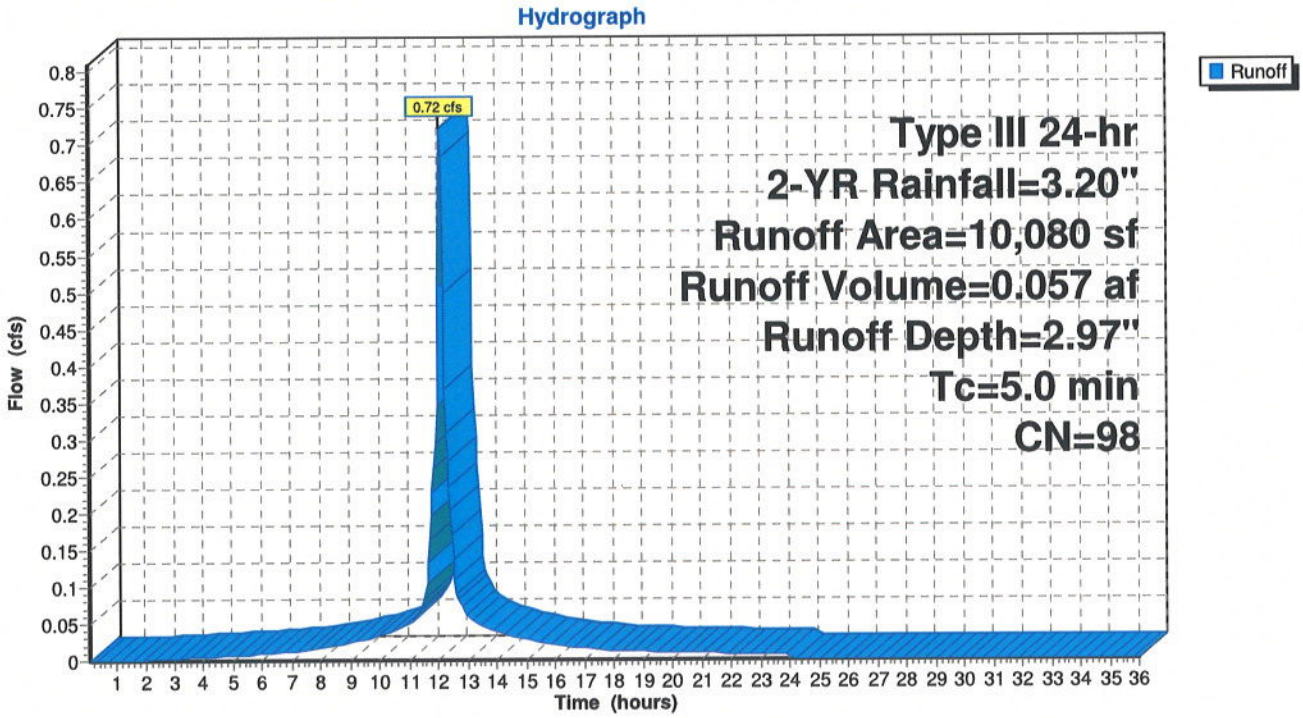
Runoff = 0.72 cfs @ 12.07 hrs, Volume= 0.057 af, Depth= 2.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.20"

Area (sf)	CN	Description
10,080	98	Roofs, HSG D
10,080		100.00% Impervious Area

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

Subcatchment 5S: ROOFS 15 - 28



Summary for Subcatchment 6S: PWS#3

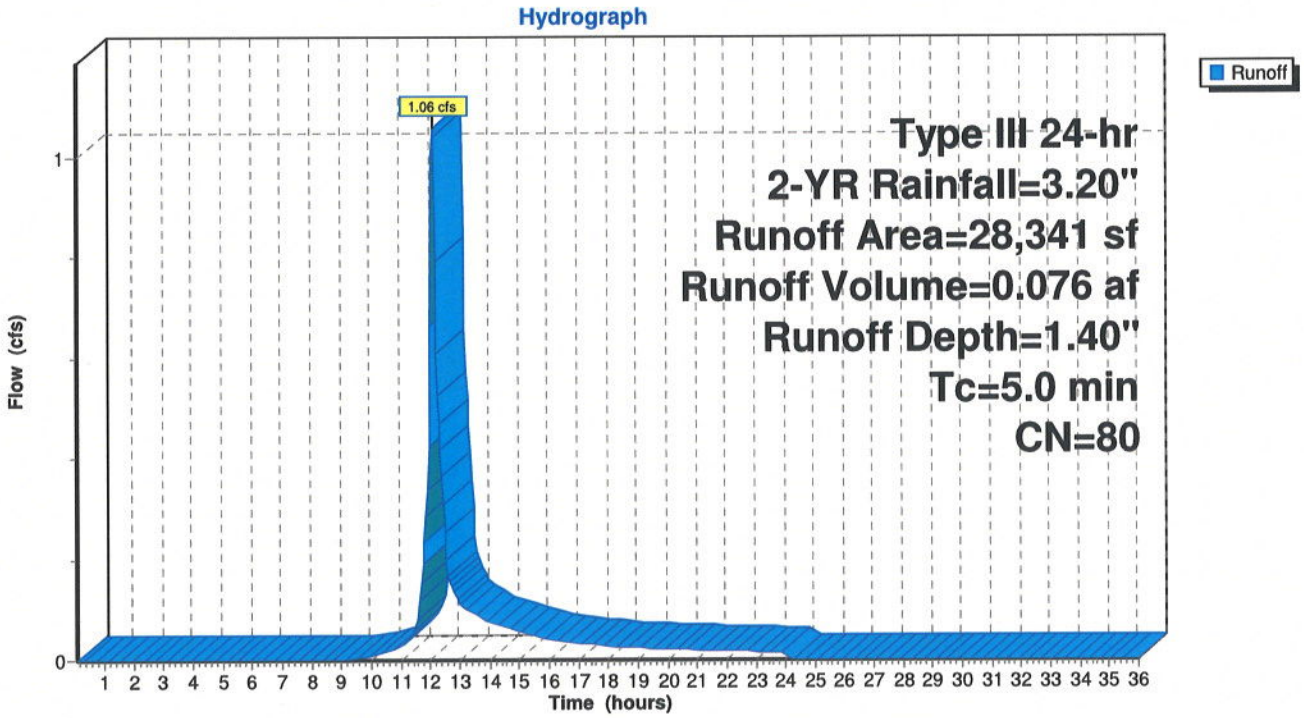
Runoff = 1.06 cfs @ 12.08 hrs, Volume= 0.076 af, Depth= 1.40"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.20"

	Area (sf)	CN	Description
	18,244	80	>75% Grass cover, Good, HSG D
*	10,097	80	
	28,341	80	Weighted Average
	28,341		100.00% Pervious Area

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

Subcatchment 6S: PWS#3



Summary for Subcatchment 7S: PWS#4

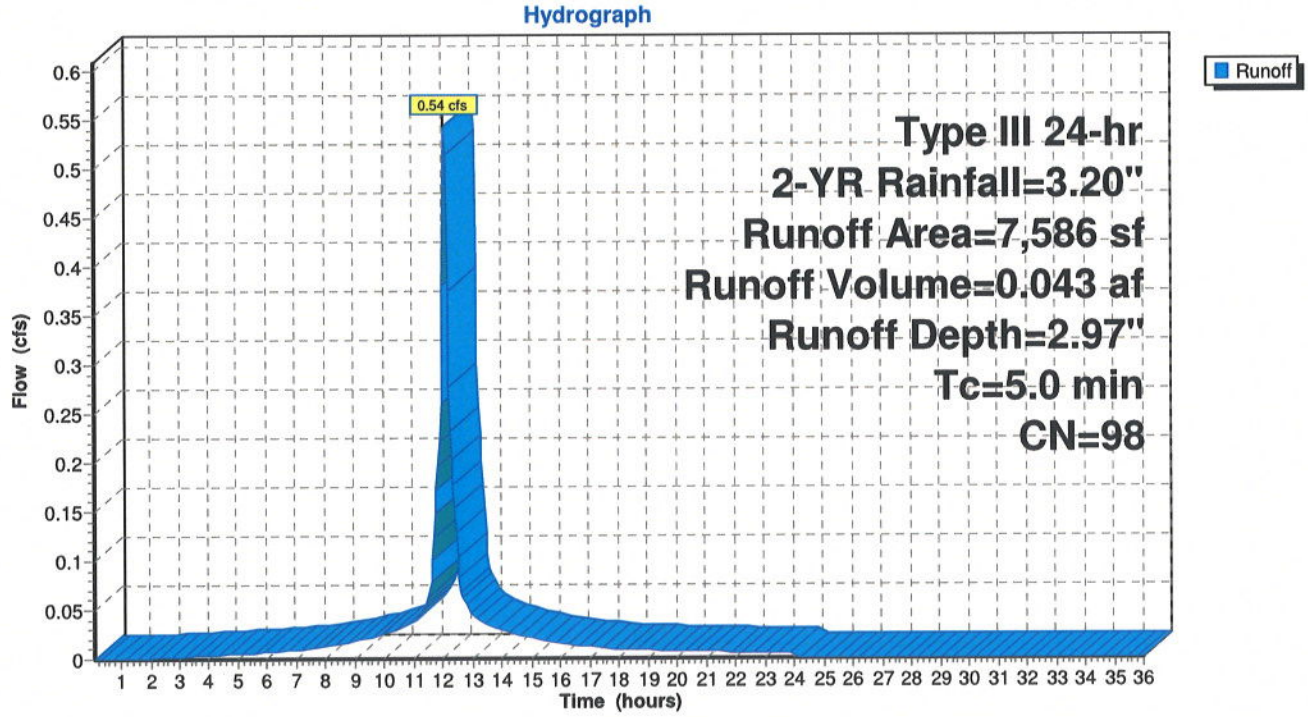
Runoff = 0.54 cfs @ 12.07 hrs, Volume= 0.043 af, Depth= 2.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.20"

Area (sf)	CN	Description
7,586	98	Paved parking, HSG D
7,586		100.00% Impervious Area

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

Subcatchment 7S: PWS#4



Summary for Subcatchment 9S: PWS#5

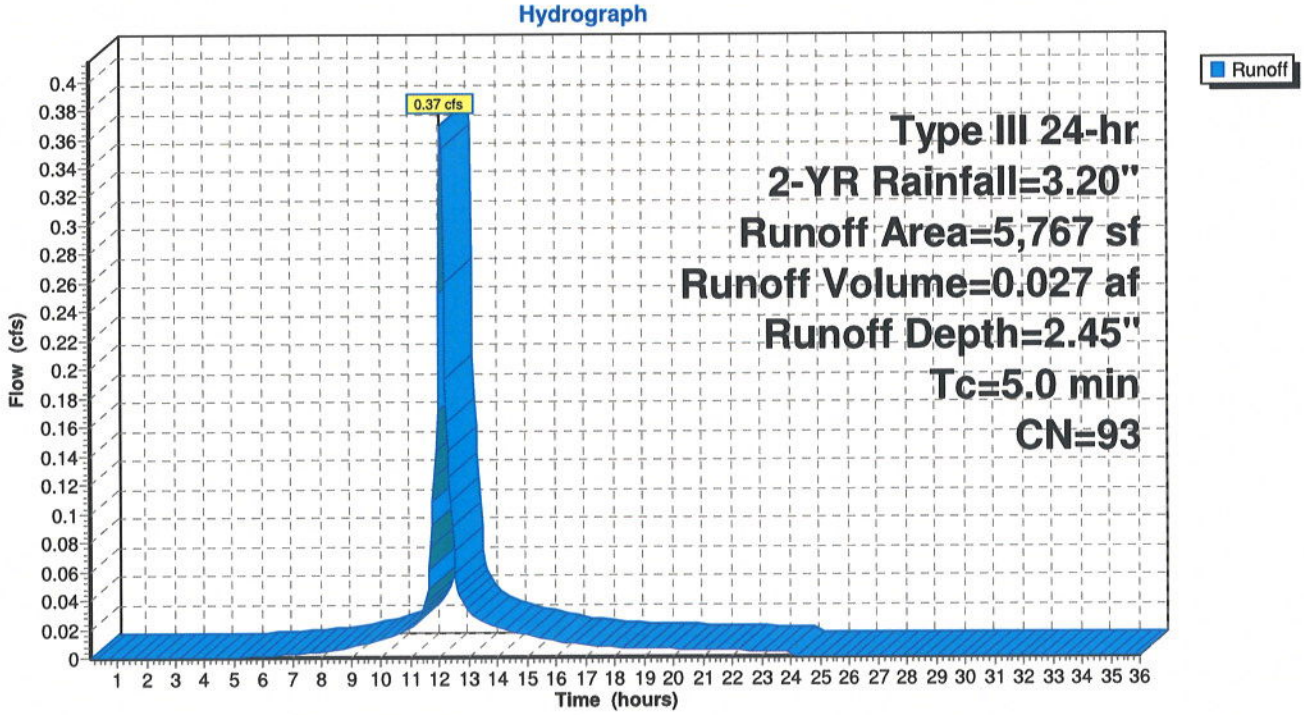
Runoff = 0.37 cfs @ 12.07 hrs, Volume= 0.027 af, Depth= 2.45"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.20"

Area (sf)	CN	Description
4,090	98	Paved parking, HSG D
1,677	80	>75% Grass cover, Good, HSG D
5,767	93	Weighted Average
1,677		29.08% Pervious Area
4,090		70.92% Impervious Area

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

Subcatchment 9S: PWS#5



Summary for Subcatchment 11S: PWS#6

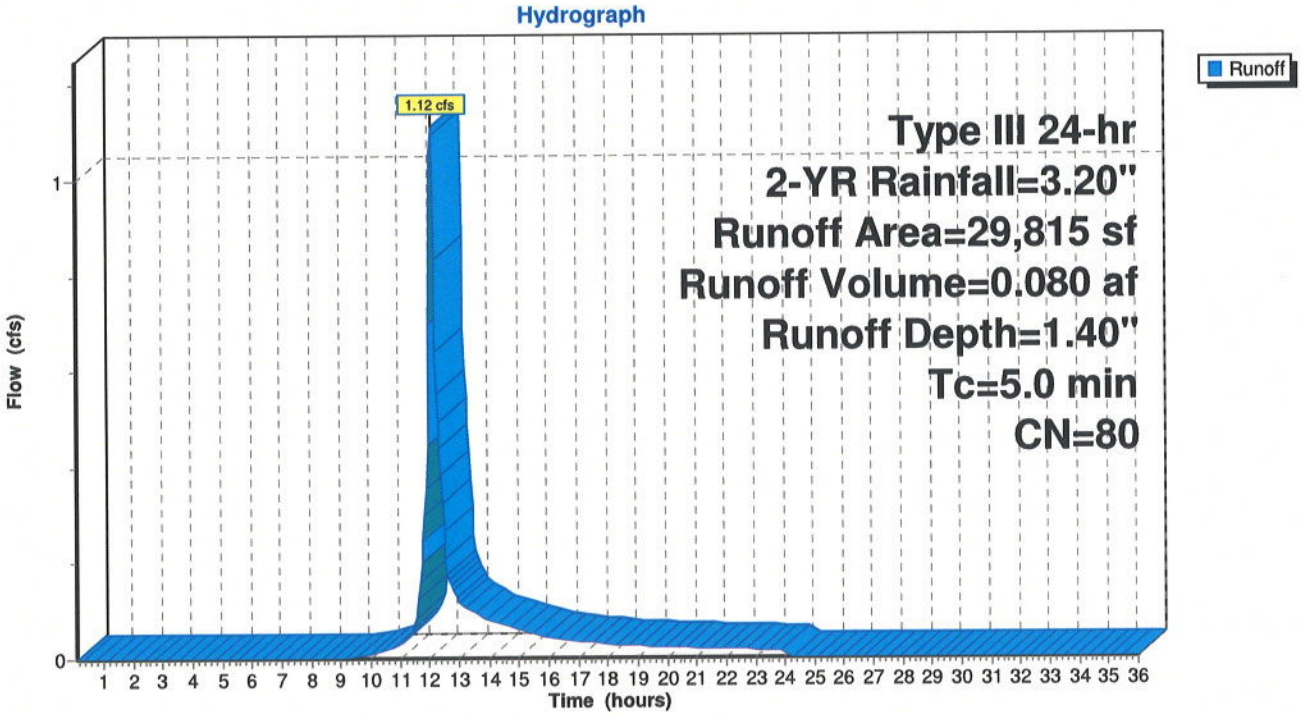
Runoff = 1.12 cfs @ 12.08 hrs, Volume= 0.080 af, Depth= 1.40"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.20"

	Area (sf)	CN	Description
	21,412	80	>75% Grass cover, Good, HSG D
*	8,403	80	
	29,815	80	Weighted Average
	29,815		100.00% Pervious Area

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

Subcatchment 11S: PWS#6



Summary for Subcatchment 13S: PWS#7

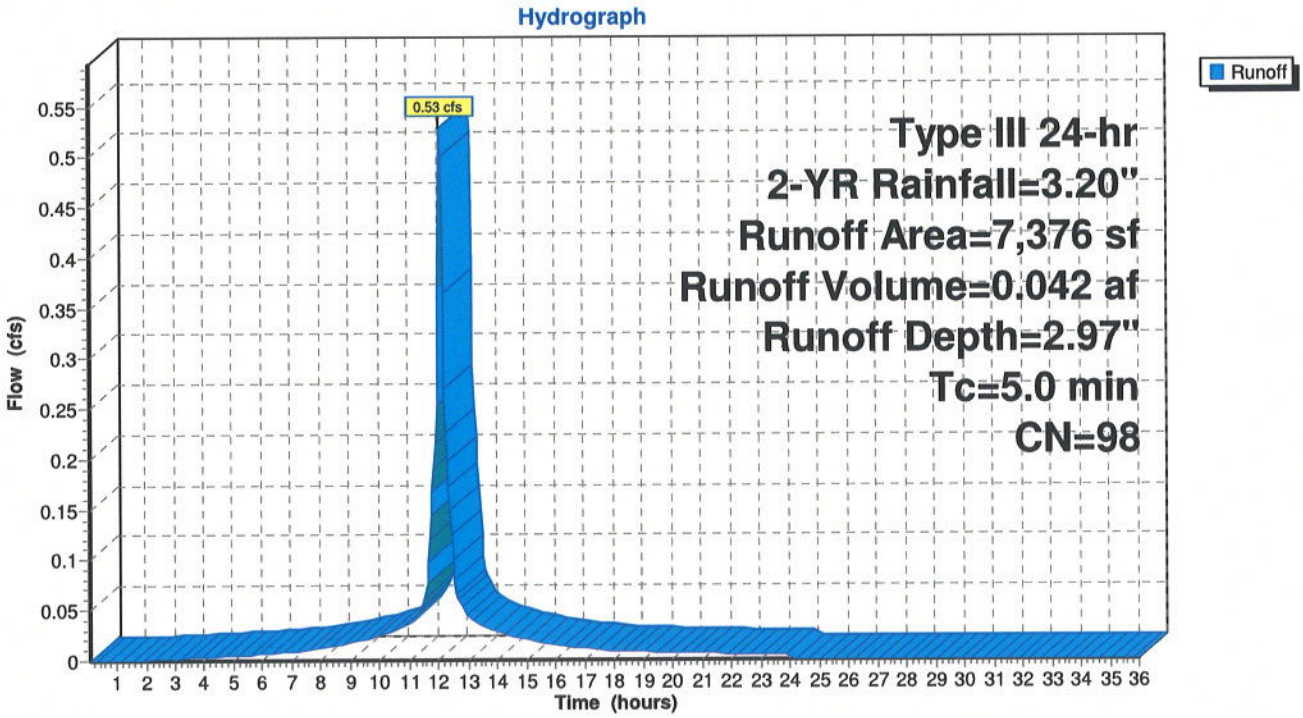
Runoff = 0.53 cfs @ 12.07 hrs, Volume= 0.042 af, Depth= 2.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.20"

Area (sf)	CN	Description
7,376	98	Paved parking, HSG D
7,376		100.00% Impervious Area

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

Subcatchment 13S: PWS#7



Summary for Subcatchment 18S: ROOFS 1 - 14

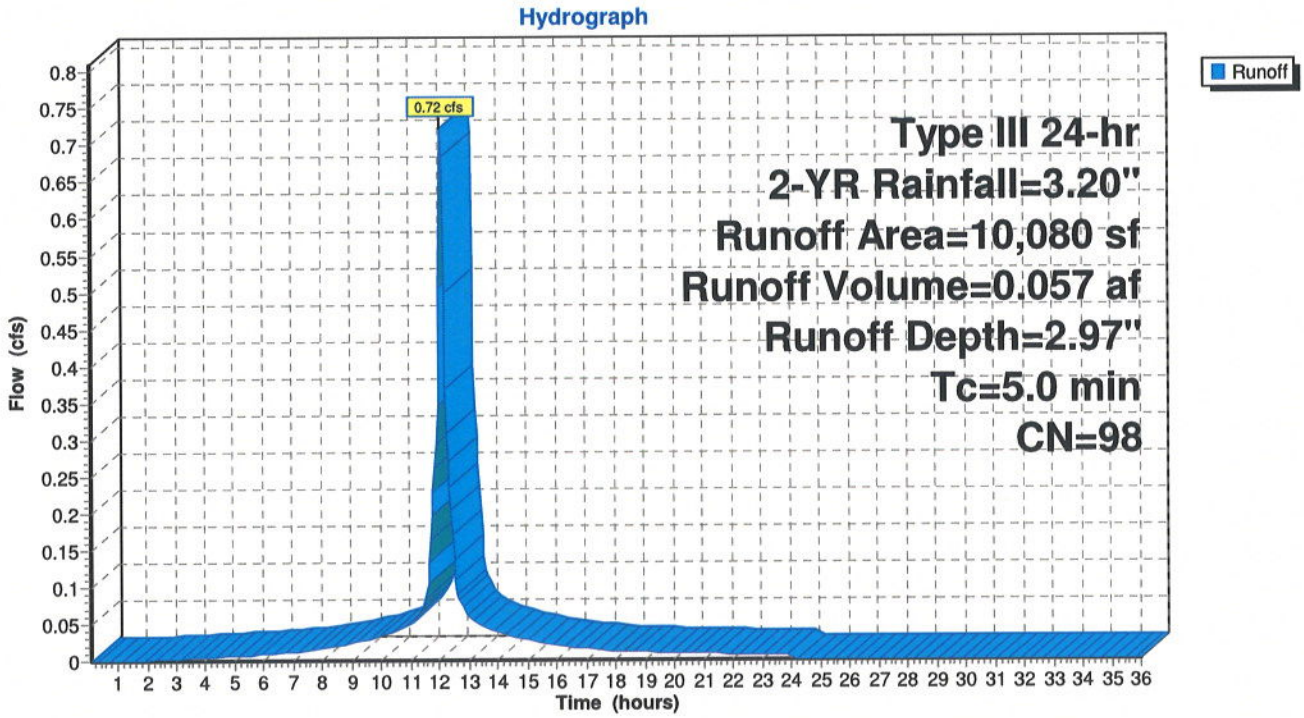
Runoff = 0.72 cfs @ 12.07 hrs, Volume= 0.057 af, Depth= 2.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.20"

Area (sf)	CN	Description
10,080	98	Roofs, HSG D
10,080		100.00% Impervious Area

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

Subcatchment 18S: ROOFS 1 - 14



Summary for Reach 4R: GRASS LINED SWALE #1

Inflow Area = 1.015 ac, 32.07% Impervious, Inflow Depth = 1.22" for 2-YR event
Inflow = 1.54 cfs @ 12.10 hrs, Volume= 0.103 af
Outflow = 1.38 cfs @ 12.21 hrs, Volume= 0.103 af, Atten= 10%, Lag= 6.2 min

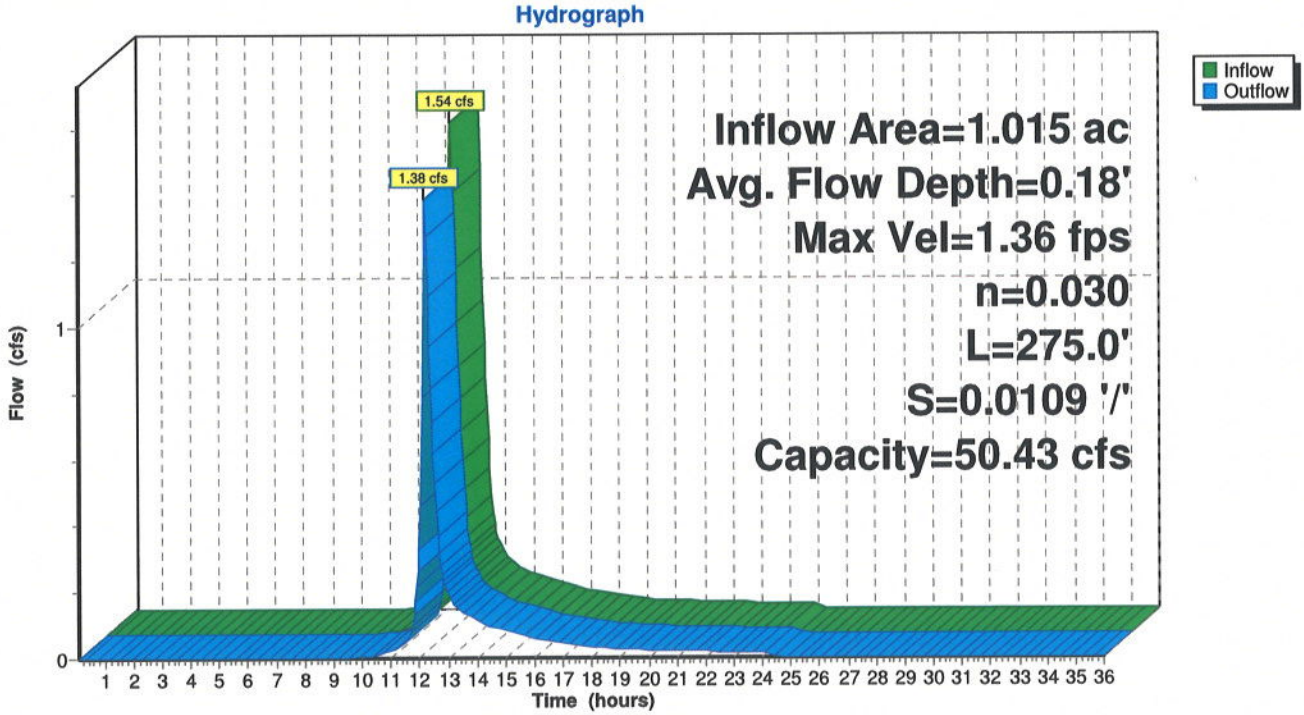
Routing by Stor-Ind+Trans method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.36 fps, Min. Travel Time= 3.4 min
Avg. Velocity = 0.42 fps, Avg. Travel Time= 11.0 min

Peak Storage= 282 cf @ 12.15 hrs
Average Depth at Peak Storage= 0.18'
Bank-Full Depth= 1.00' Flow Area= 14.0 sf, Capacity= 50.43 cfs

4.00' x 1.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 10.0 '/' Top Width= 24.00'
Length= 275.0' Slope= 0.0109 '/'
Inlet Invert= 99.00', Outlet Invert= 96.00'

‡

Reach 4R: GRASS LINED SWALE #1



Summary for Reach 12R: GRASS LINED SWALE #2

Inflow Area = 1.048 ac, 31.03% Impervious, Inflow Depth = 1.23" for 2-YR event
Inflow = 1.60 cfs @ 12.10 hrs, Volume= 0.107 af
Outflow = 1.43 cfs @ 12.20 hrs, Volume= 0.107 af, Atten= 10%, Lag= 6.1 min

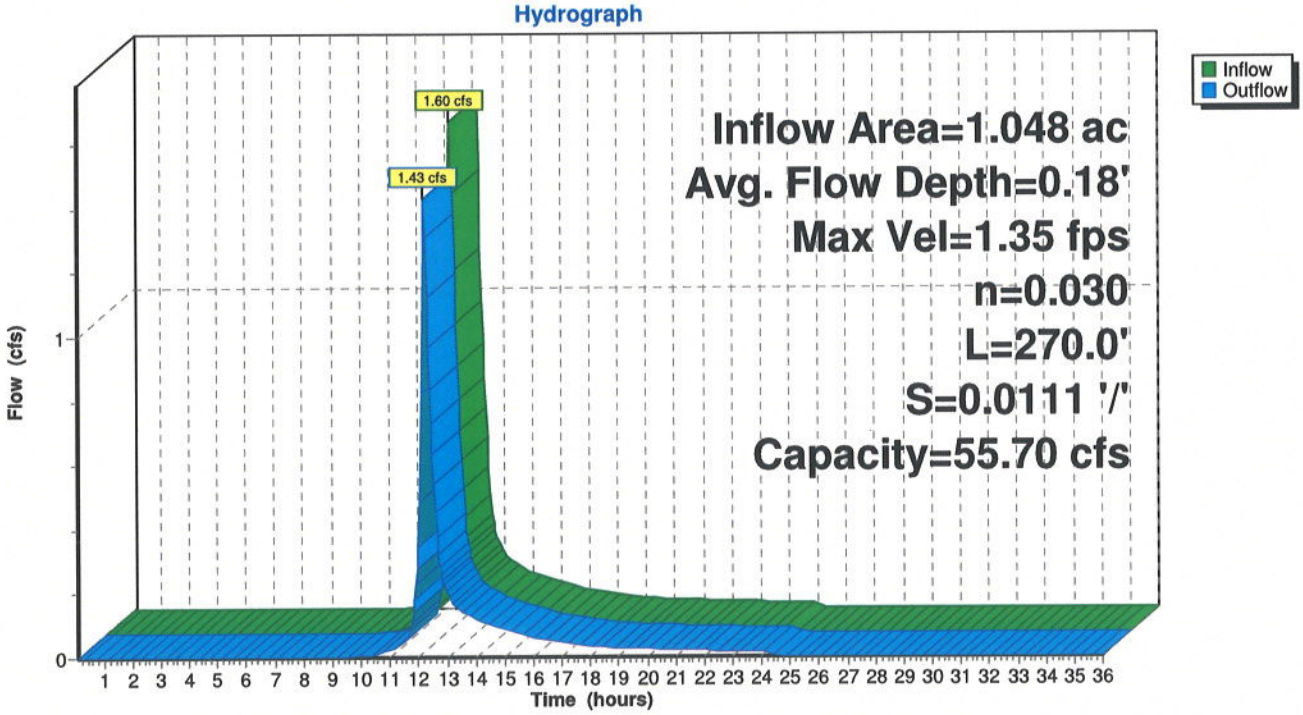
Routing by Stor-Ind+Trans method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.35 fps, Min. Travel Time= 3.3 min
Avg. Velocity = 0.42 fps, Avg. Travel Time= 10.7 min

Peak Storage= 289 cf @ 12.15 hrs
Average Depth at Peak Storage= 0.18'
Bank-Full Depth= 1.00' Flow Area= 15.5 sf, Capacity= 55.70 cfs

4.00' x 1.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 4.0 19.0 '/' Top Width= 27.00'
Length= 270.0' Slope= 0.0111 '/'
Inlet Invert= 99.00', Outlet Invert= 96.00'

‡

Reach 12R: GRASS LINED SWALE #2



Summary for Pond 8P: DETENTION POND #1

Inflow Area =	1.189 ac, 42.02% Impervious, Inflow Depth = 1.47" for 2-YR event			
Inflow =	1.68 cfs @ 12.19 hrs, Volume=	0.145 af		
Outflow =	0.09 cfs @ 15.64 hrs, Volume=	0.142 af, Atten= 95%, Lag= 207.3 min		
Discarded =	0.09 cfs @ 15.64 hrs, Volume=	0.142 af		
Primary =	0.00 cfs @ 0.10 hrs, Volume=	0.000 af		

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Peak Elev= 94.62' @ 15.64 hrs Surf.Area= 3,002 sf Storage= 3,700 cf

Plug-Flow detention time= 498.3 min calculated for 0.142 af (98% of inflow)
Center-of-Mass det. time= 486.1 min (1,306.0 - 820.0)

Volume	Invert	Avail.Storage	Storage Description
#1	93.00'	8,773 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

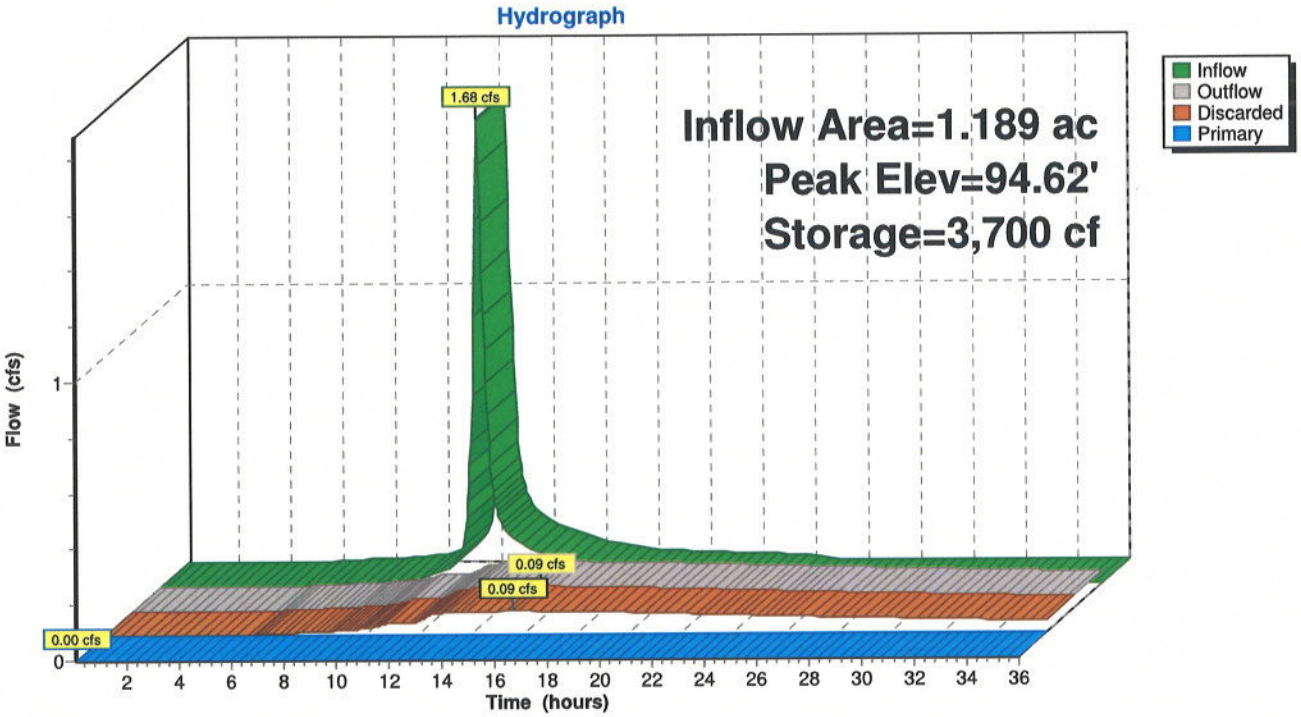
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
93.00	1,640	257.0	0	0	1,640
94.00	2,440	276.0	2,027	2,027	2,489
95.00	3,381	308.0	2,898	4,925	4,004
96.00	4,335	329.0	3,848	8,773	5,115

Device	Routing	Invert	Outlet Devices
#1	Primary	95.50'	**6.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32
#2	Primary	94.75'	**6.0" Vert. Orifice/Grate** C= 0.600
#3	Discarded	93.00'	**1.080 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.09 cfs @ 15.64 hrs HW=94.62' (Free Discharge)
└─**3=Exfiltration** (Exfiltration Controls 0.09 cfs)

Primary OutFlow Max=0.00 cfs @ 0.10 hrs HW=93.00' (Free Discharge)
├─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└─**2=Orifice/Grate** (Controls 0.00 cfs)

Pond 8P: DETENTION POND #1



Summary for Pond 14P: DETENTION POND #2

Inflow Area =	1.218 ac, 40.62% Impervious, Inflow Depth = 1.46" for 2-YR event				
Inflow =	1.72 cfs @	12.19 hrs,	Volume=	0.148 af	
Outflow =	0.43 cfs @	12.66 hrs,	Volume=	0.095 af,	Atten= 75%, Lag= 28.6 min
Discarded =	0.01 cfs @	12.66 hrs,	Volume=	0.012 af	
Primary =	0.43 cfs @	12.66 hrs,	Volume=	0.083 af	

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Peak Elev= 95.07' @ 12.66 hrs Surf.Area= 2,281 sf Storage= 3,170 cf

Plug-Flow detention time= 257.3 min calculated for 0.095 af (64% of inflow)
Center-of-Mass det. time= 157.4 min (978.6 - 821.2)

Volume	Invert	Avail.Storage	Storage Description
#1	93.00'	5,654 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

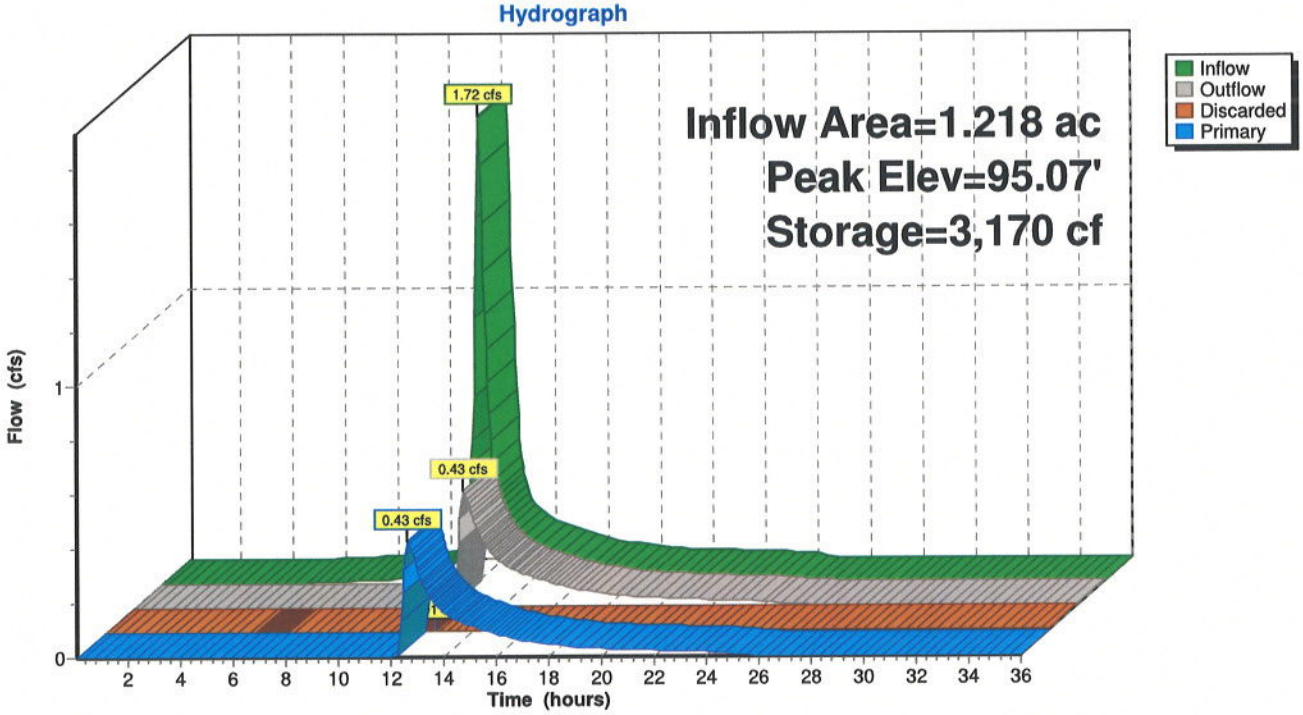
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
93.00	933	130.0	0	0	933
94.00	1,451	245.0	1,183	1,183	4,370
95.00	2,221	267.0	1,822	3,005	5,302
96.00	3,102	296.0	2,649	5,654	6,632

Device	Routing	Invert	Outlet Devices
#1	Primary	94.75'	**12.0" Vert. Orifice/Grate** C= 0.600
#2	Discarded	93.00'	**0.110 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 12.66 hrs HW=95.07' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.42 cfs @ 12.66 hrs HW=95.07' (Free Discharge)
↑—**1=Orifice/Grate** (Orifice Controls 0.42 cfs @ 1.93 fps)

Pond 14P: DETENTION POND #2



Summary for Pond 20P: RECHARGE 1 - 8

Inflow Area =	0.231 ac,100.00% Impervious, Inflow Depth = 2.97" for 2-YR event			
Inflow =	0.72 cfs @ 12.07 hrs, Volume=	0.057 af		
Outflow =	0.55 cfs @ 12.15 hrs, Volume=	0.047 af, Atten= 24%, Lag= 4.5 min		
Discarded =	0.01 cfs @ 12.15 hrs, Volume=	0.020 af		
Primary =	0.54 cfs @ 12.15 hrs, Volume=	0.027 af		

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Peak Elev= 99.33' @ 12.15 hrs Surf.Area= 540 sf Storage= 933 cf

Plug-Flow detention time= 286.7 min calculated for 0.047 af (83% of inflow)
Center-of-Mass det. time= 216.6 min (972.1 - 755.5)

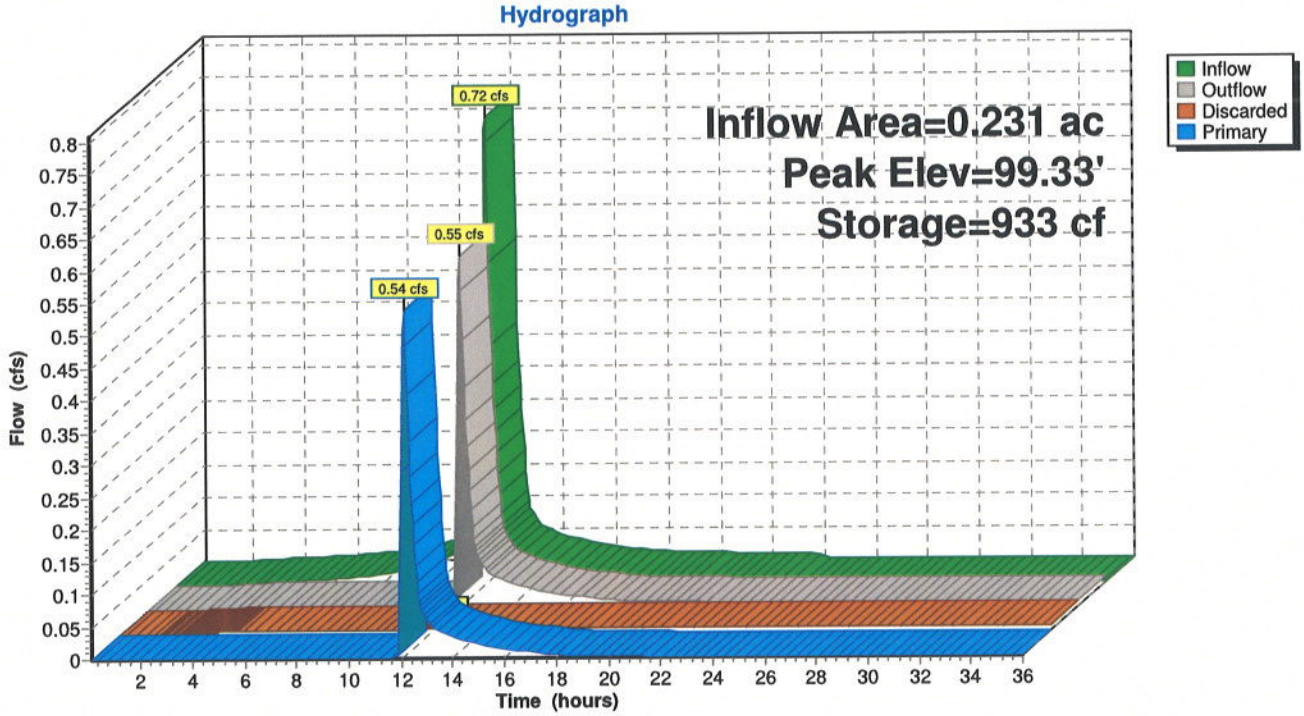
Volume	Invert	Avail.Storage	Storage Description
#1	96.50'	646 cf	**12.00'W x 45.00'L x 4.00'H Prismatoid** 2,160 cf Overall - 544 cf Embedded = 1,616 cf x 40.0% Voids
#2	97.00'	544 cf	**Cultec R-330XL** x 10 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 2 rows
		1,190 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	98.75'	**6.0" Vert. Orifice/Grate** C= 0.600
#2	Discarded	96.50'	**0.440 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.01 cfs @ 12.15 hrs HW=99.32' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.54 cfs @ 12.15 hrs HW=99.32' (Free Discharge)
└**1=Orifice/Grate** (Orifice Controls 0.54 cfs @ 2.73 fps)

Pond 20P: RECHARGE 1 - 8



Summary for Pond 23P: RECHARGE 15-28

Inflow Area =	0.231 ac,100.00% Impervious, Inflow Depth = 2.97" for 2-YR event			
Inflow =	0.72 cfs @ 12.07 hrs, Volume=	0.057 af		
Outflow =	0.55 cfs @ 12.15 hrs, Volume=	0.047 af, Atten= 24%, Lag= 4.5 min		
Discarded =	0.01 cfs @ 12.15 hrs, Volume=	0.020 af		
Primary =	0.54 cfs @ 12.15 hrs, Volume=	0.027 af		

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Peak Elev= 99.33' @ 12.15 hrs Surf.Area= 540 sf Storage= 933 cf

Plug-Flow detention time= 286.7 min calculated for 0.047 af (83% of inflow)
Center-of-Mass det. time= 216.6 min (972.1 - 755.5)

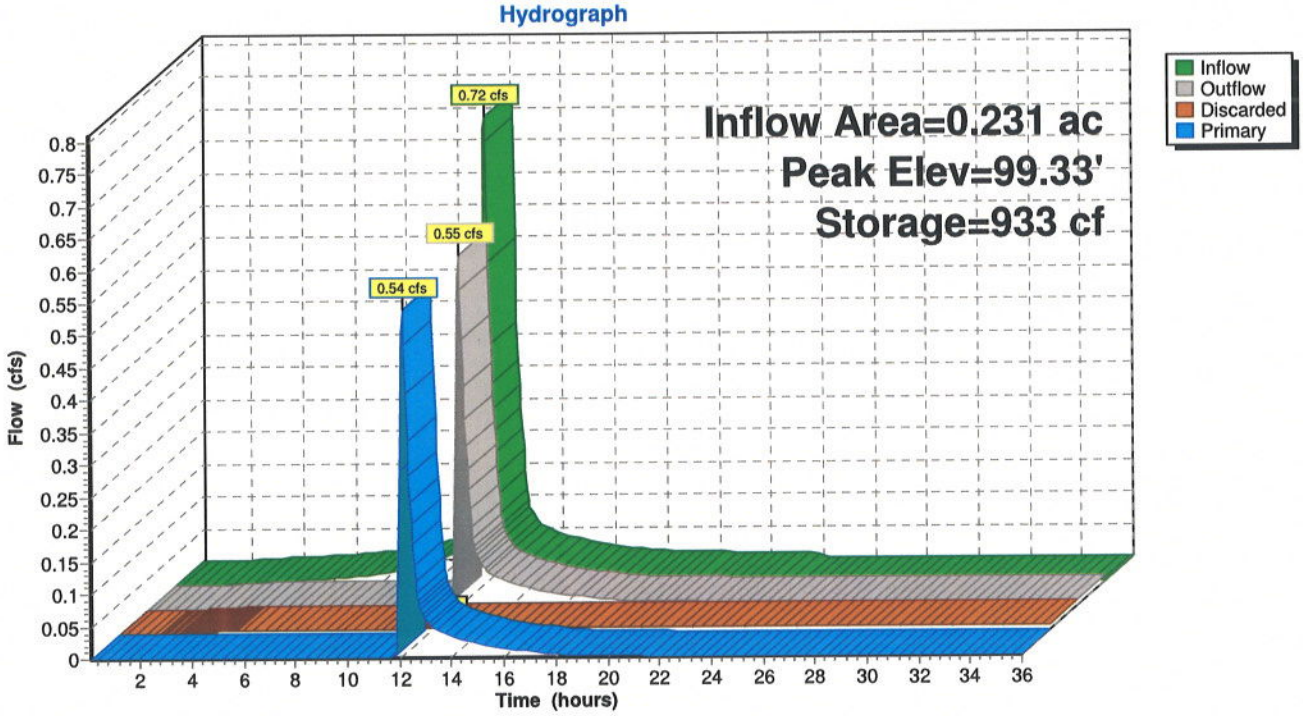
Volume	Invert	Avail.Storage	Storage Description
#1	96.50'	646 cf	**12.00'W x 45.00'L x 4.00'H Prismatoid** 2,160 cf Overall - 544 cf Embedded = 1,616 cf x 40.0% Voids
#2	97.00'	544 cf	**Cultec R-330XL** x 10 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 2 rows
		1,190 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	98.75'	**6.0" Vert. Orifice/Grate** C= 0.600
#2	Discarded	96.50'	**0.440 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.01 cfs @ 12.15 hrs HW=99.32' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.54 cfs @ 12.15 hrs HW=99.32' (Free Discharge)
└**1=Orifice/Grate** (Orifice Controls 0.54 cfs @ 2.73 fps)

Pond 23P: RECHARGE 15-28



Summary for Pond 25P: BIORETENTION BASIN

Inflow Area =	0.133 ac, 70.93% Impervious, Inflow Depth = 2.45" for 2-YR event				
Inflow =	0.37 cfs @	12.07 hrs,	Volume=	0.027 af	
Outflow =	0.00 cfs @	8.65 hrs,	Volume=	0.007 af,	Atten= 99%, Lag= 0.0 min
Discarded =	0.00 cfs @	8.65 hrs,	Volume=	0.007 af	
Primary =	0.00 cfs @	0.10 hrs,	Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Peak Elev= 98.78' @ 24.03 hrs Surf.Area= 302 sf Storage= 991 cf

Plug-Flow detention time= 659.2 min calculated for 0.007 af (27% of inflow)
Center-of-Mass det. time= 507.3 min (1,299.0 - 791.7)

Volume	Invert	Avail.Storage	Storage Description
#1	95.50'	1,538 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

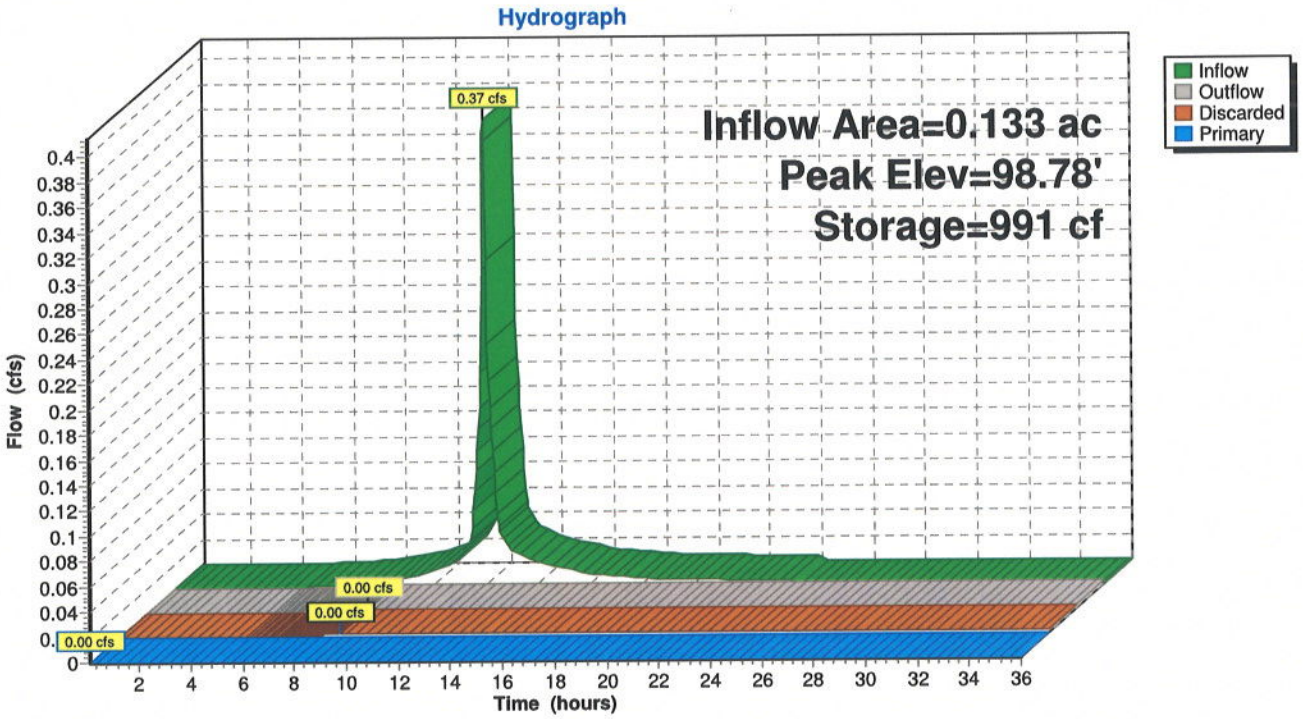
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
95.50	302	122.0	0	0	302
96.00	302	122.0	151	151	363
98.75	302	122.0	831	982	699
99.00	302	122.0	76	1,057	729
100.00	685	146.0	481	1,538	1,258

Device	Routing	Invert	Outlet Devices
#1	Primary	99.75'	**2.0' long x 2.00' rise Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.7' Crest Height
#2	Discarded	95.50'	**0.440 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.00 cfs @ 8.65 hrs HW=95.56' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.00 cfs @ 0.10 hrs HW=95.50' (Free Discharge)
└**1=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 25P: BIORETENTION BASIN



Summary for Pond 26P: BIORETENTION BASIN

Inflow Area =	0.132 ac, 70.92% Impervious, Inflow Depth = 2.45" for 2-YR event			
Inflow =	0.37 cfs @ 12.07 hrs, Volume=	0.027 af		
Outflow =	0.01 cfs @ 17.60 hrs, Volume=	0.014 af, Atten= 98%, Lag= 331.7 min		
Discarded =	0.01 cfs @ 17.60 hrs, Volume=	0.014 af		
Primary =	0.00 cfs @ 0.10 hrs, Volume=	0.000 af		

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Peak Elev= 99.53' @ 17.60 hrs Surf.Area= 736 sf Storage= 844 cf

Plug-Flow detention time= 612.0 min calculated for 0.014 af (53% of inflow)
Center-of-Mass det. time= 502.3 min (1,294.0 - 791.7)

Volume	Invert	Avail.Storage	Storage Description
#1	95.50'	2,456 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

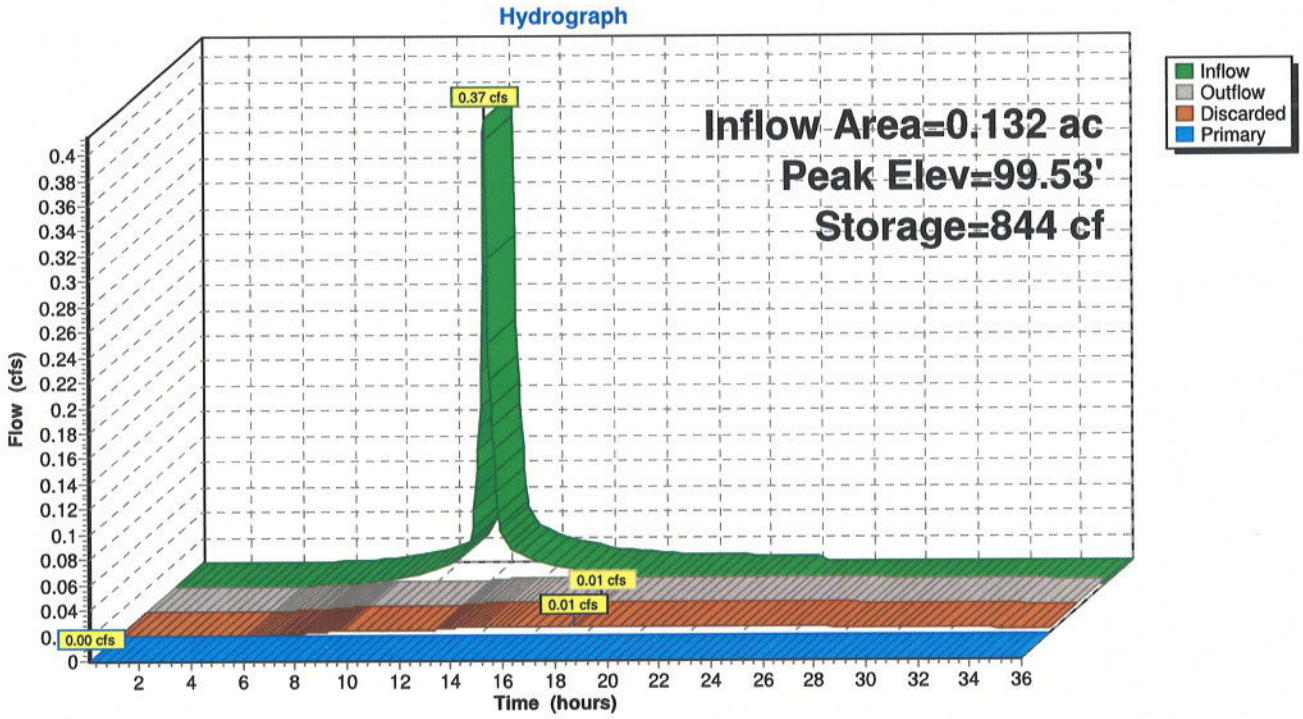
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
95.50	425	167.0	0.0	0	0	425
96.00	425	167.0	40.0	85	85	509
98.75	425	167.0	30.0	351	436	968
99.00	425	167.0	100.0	106	542	1,010
100.00	1,088	213.0	100.0	731	1,273	2,413
101.00	1,281	181.0	100.0	1,183	2,456	3,436

Device	Routing	Invert	Outlet Devices
#1	Primary	99.75'	**2.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Discarded	95.50'	**0.440 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 17.60 hrs HW=99.53' (Free Discharge)
↑└**2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.00 cfs @ 0.10 hrs HW=95.50' (Free Discharge)
↑└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 26P: BIORETENTION BASIN



Summary for Pond 29P: TREE BOX FILTER

Inflow Area =	0.174 ac,100.00% Impervious, Inflow Depth = 2.97" for 2-YR event			
Inflow =	0.54 cfs @ 12.07 hrs, Volume=	0.043 af		
Outflow =	0.54 cfs @ 12.08 hrs, Volume=	0.042 af, Atten= 1%, Lag= 0.7 min		
Primary =	0.54 cfs @ 12.08 hrs, Volume=	0.042 af		

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Peak Elev= 97.84' @ 12.08 hrs Surf.Area= 60 sf Storage= 69 cf

Plug-Flow detention time= 30.4 min calculated for 0.042 af (97% of inflow)
Center-of-Mass det. time= 14.6 min (770.1 - 755.5)

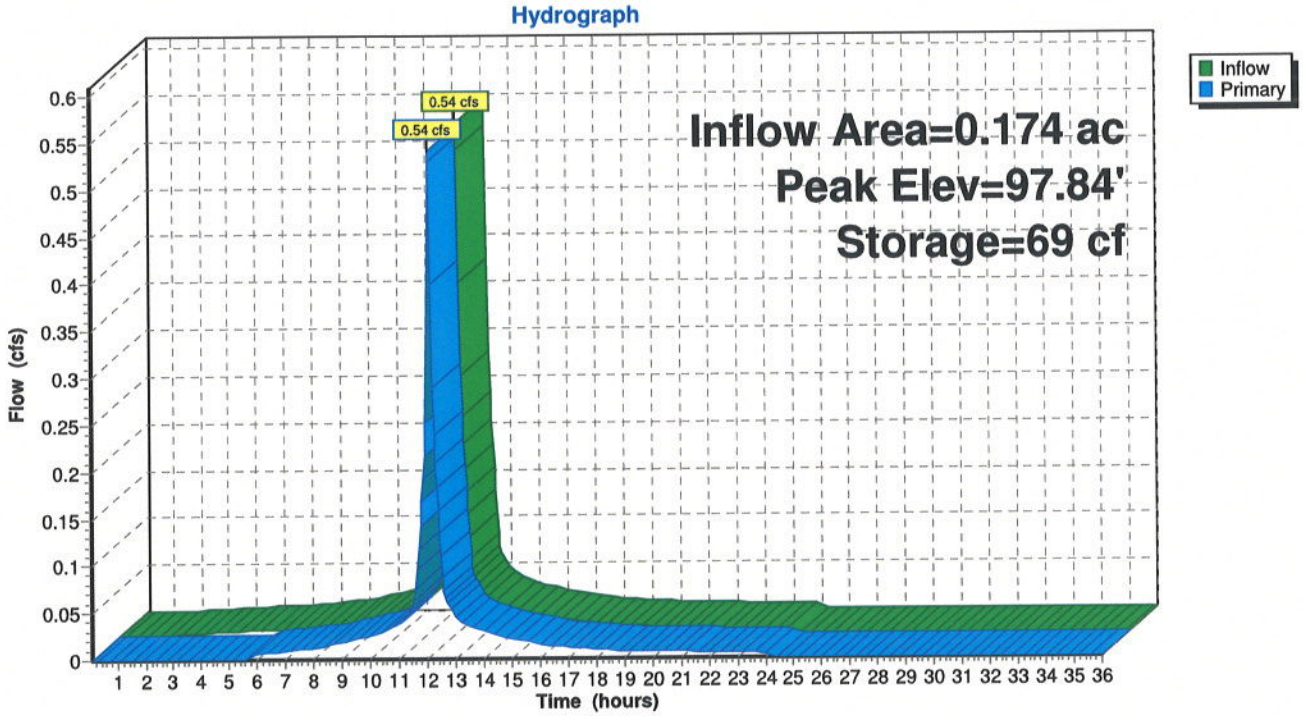
Volume	Invert	Avail.Storage	Storage Description
#1	95.00'	93 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
95.00	60	0.0	0	0
95.50	60	40.0	12	12
97.50	60	30.0	36	48
98.25	60	100.0	45	93

Device	Routing	Invert	Outlet Devices
#1	Device 2	95.00'	**6.0" Vert. Orifice/Grate** C= 0.600
#2	Primary	97.50'	**1.0" W x 18.0" H Vert. Orifice/Grate X 10.00** C= 0.600

Primary OutFlow Max=0.52 cfs @ 12.08 hrs HW=97.84' (Free Discharge)
└─**2=Orifice/Grate** (Orifice Controls 0.52 cfs @ 1.86 fps)
  └─**1=Orifice/Grate** (Passes 0.52 cfs of 0.55 cfs potential flow)

Pond 29P: TREE BOX FILTER



Summary for Pond 33P: TREE BOX FILTER

Inflow Area = 0.169 ac,100.00% Impervious, Inflow Depth = 2.97" for 2-YR event
Inflow = 0.53 cfs @ 12.07 hrs, Volume= 0.042 af
Outflow = 0.53 cfs @ 12.08 hrs, Volume= 0.041 af, Atten= 1%, Lag= 0.7 min
Primary = 0.53 cfs @ 12.08 hrs, Volume= 0.041 af

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Peak Elev= 97.84' @ 12.08 hrs Surf.Area= 60 sf Storage= 68 cf

Plug-Flow detention time= 31.4 min calculated for 0.041 af (97% of inflow)
Center-of-Mass det. time= 15.0 min (770.4 - 755.5)

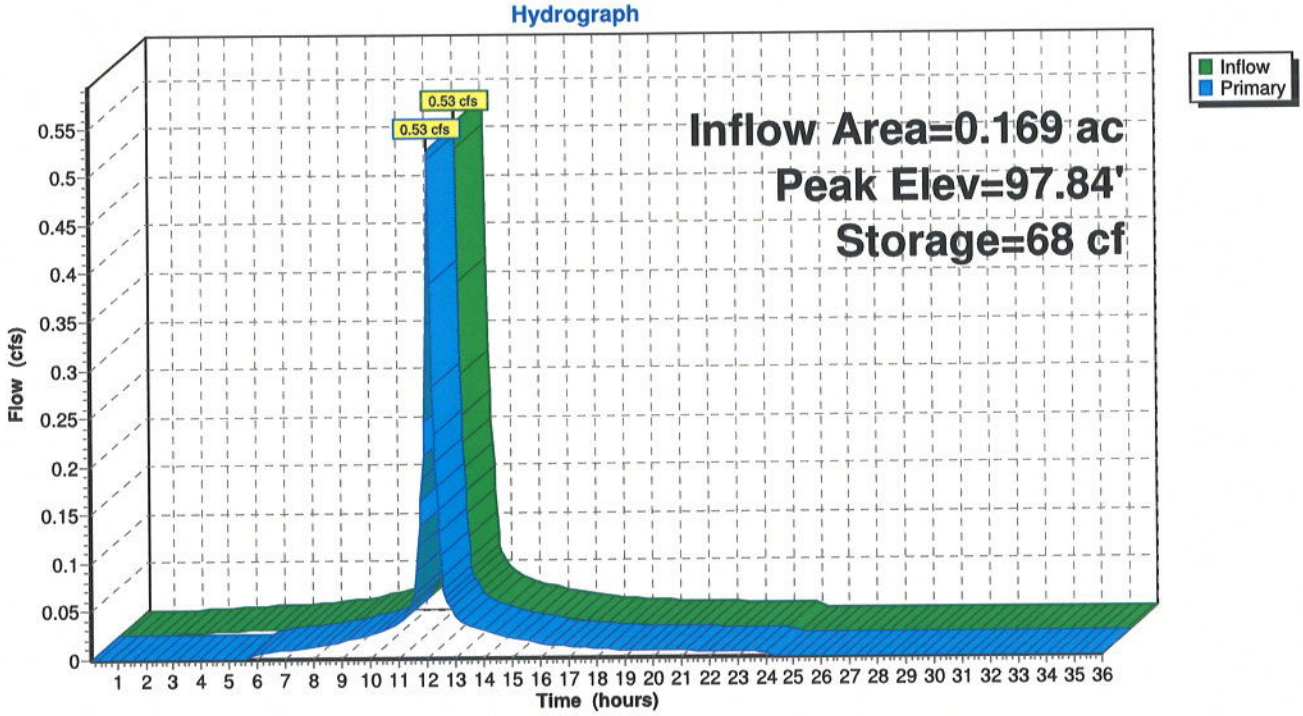
Volume	Invert	Avail.Storage	Storage Description
#1	95.00'	93 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
95.00	60	0.0	0	0
95.50	60	40.0	12	12
97.50	60	30.0	36	48
98.25	60	100.0	45	93

Device	Routing	Invert	Outlet Devices
#1	Device 2	95.00'	**6.0" Vert. Orifice/Grate** C= 0.600
#2	Primary	97.50'	**1.0" W x 18.0" H Vert. Orifice/Grate X 10.00** C= 0.600

Primary OutFlow Max=0.51 cfs @ 12.08 hrs HW=97.83' (Free Discharge)
└─**2=Orifice/Grate** (Orifice Controls 0.51 cfs @ 1.85 fps)
  └─**1=Orifice/Grate** (Passes 0.51 cfs of 0.54 cfs potential flow)

Pond 33P: TREE BOX FILTER

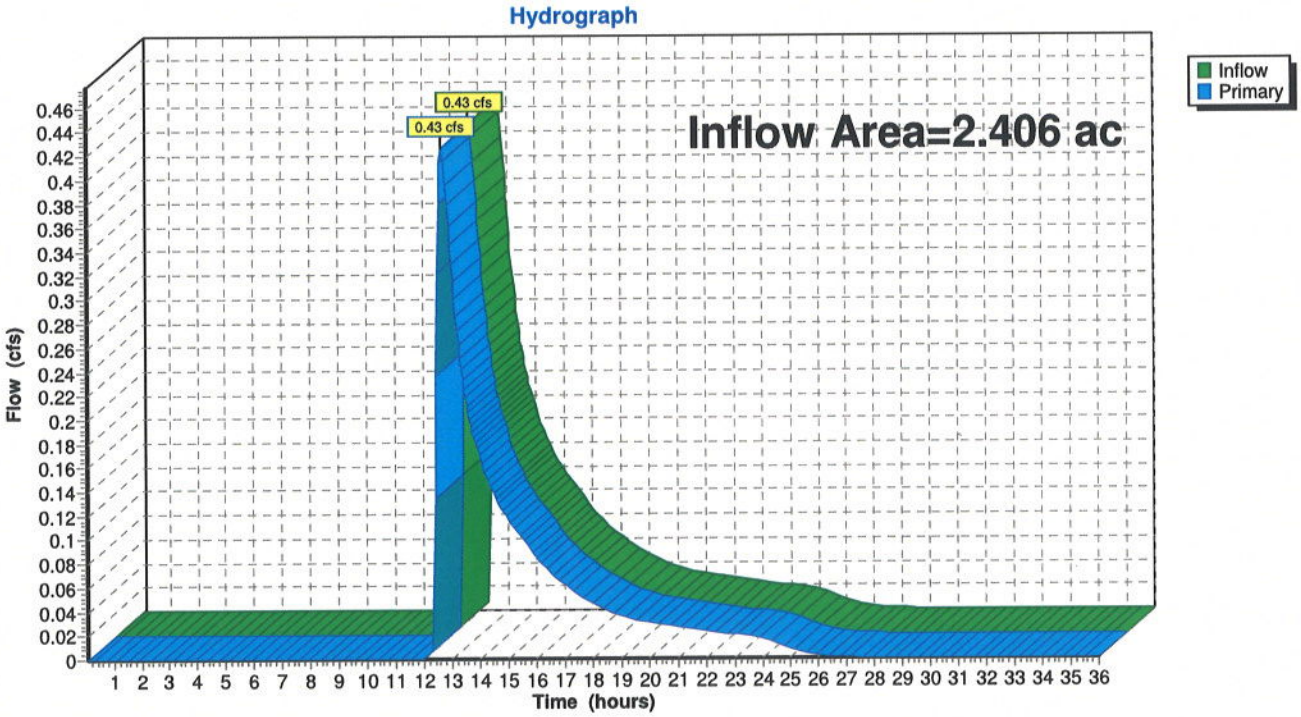


Summary for Link 15L: DP#2-REAR WETLANDS

Inflow Area =	2.406 ac, 41.32% Impervious, Inflow Depth = 0.41" for 2-YR event				
Inflow =	0.43 cfs @ 12.66 hrs, Volume=	0.083 af			
Primary =	0.43 cfs @ 12.66 hrs, Volume=	0.083 af, Atten= 0%, Lag= 0.0 min			

Primary outflow = Inflow, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs

Link 15L: DP#2-REAR WETLANDS



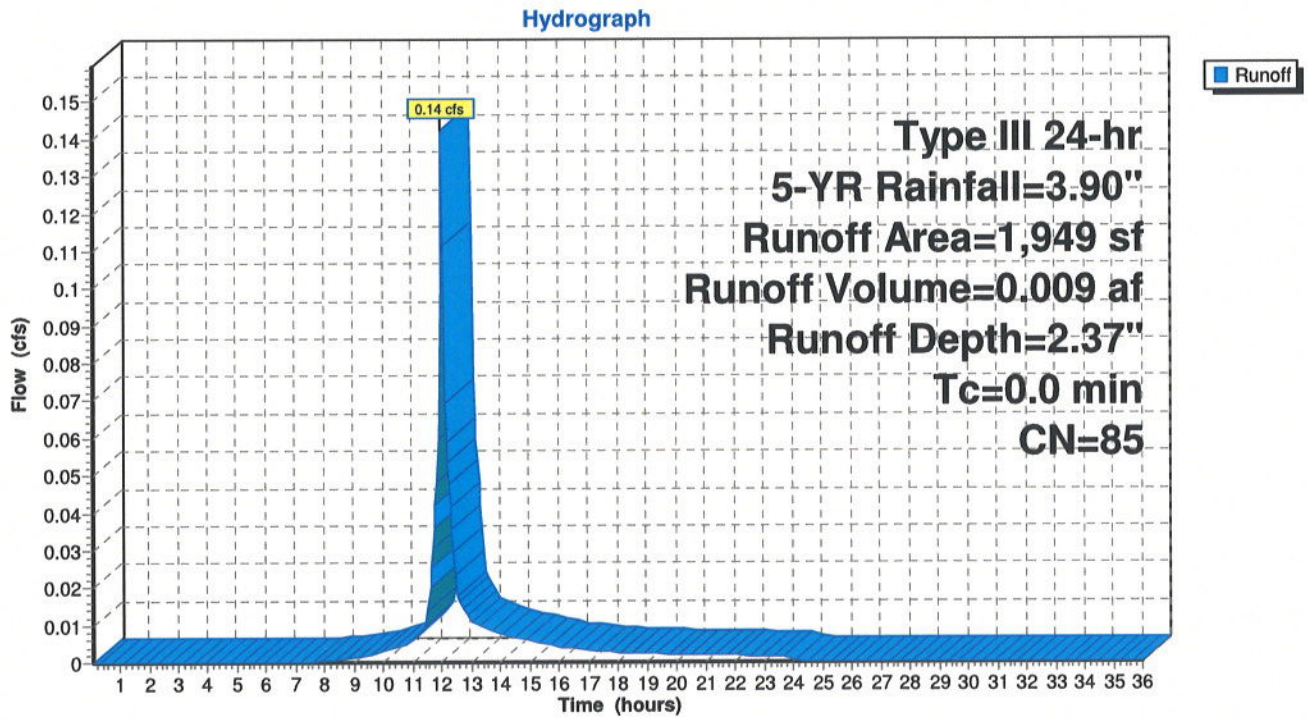
Summary for Subcatchment 1S: DP#1-GREENMONT

Runoff = 0.14 cfs @ 12.00 hrs, Volume= 0.009 af, Depth= 2.37"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-YR Rainfall=3.90"

Area (sf)	CN	Description
569	98	Paved parking, HSG D
1,380	80	>75% Grass cover, Good, HSG D
1,949	85	Weighted Average
1,380		70.81% Pervious Area
569		29.19% Impervious Area

Subcatchment 1S: DP#1-GREENMONT



Summary for Subcatchment 3S: PWS#2

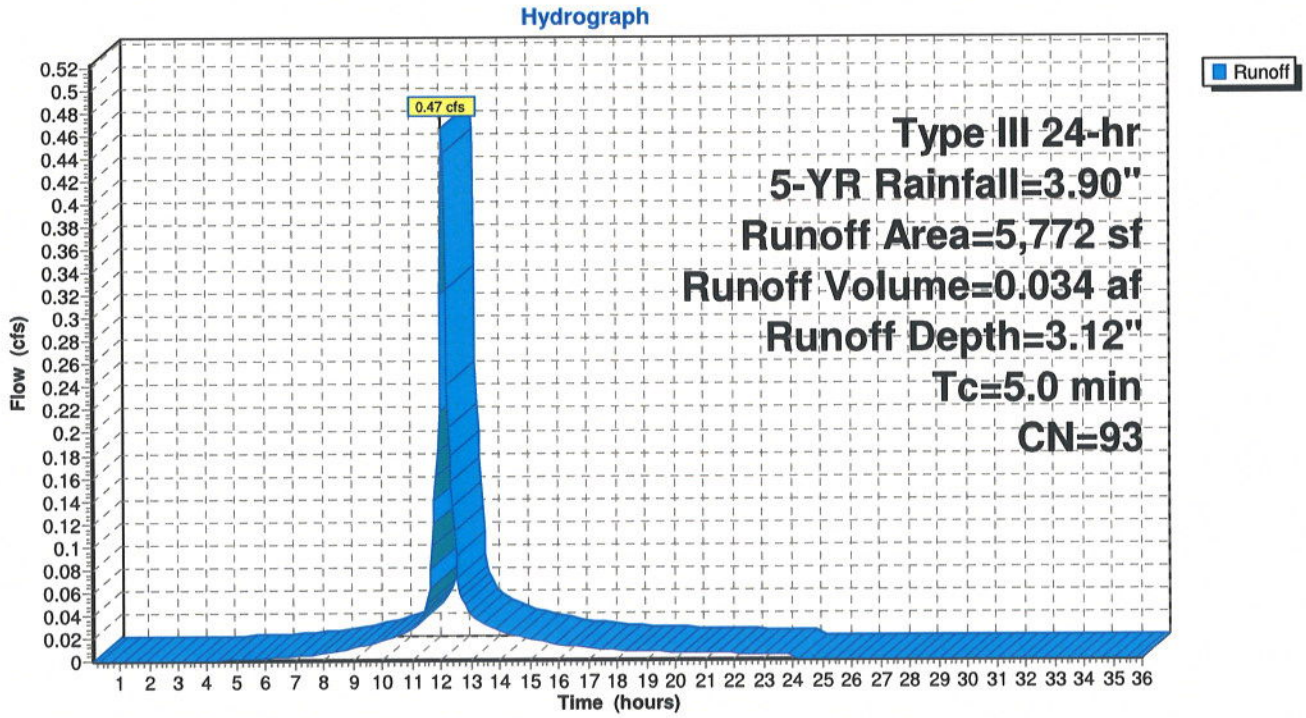
Runoff = 0.47 cfs @ 12.07 hrs, Volume= 0.034 af, Depth= 3.12"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-YR Rainfall=3.90"

Area (sf)	CN	Description
4,094	98	Paved parking, HSG D
1,678	80	>75% Grass cover, Good, HSG D
5,772	93	Weighted Average
1,678		29.07% Pervious Area
4,094		70.93% Impervious Area

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

Subcatchment 3S: PWS#2



Summary for Subcatchment 5S: ROOFS 15 - 28

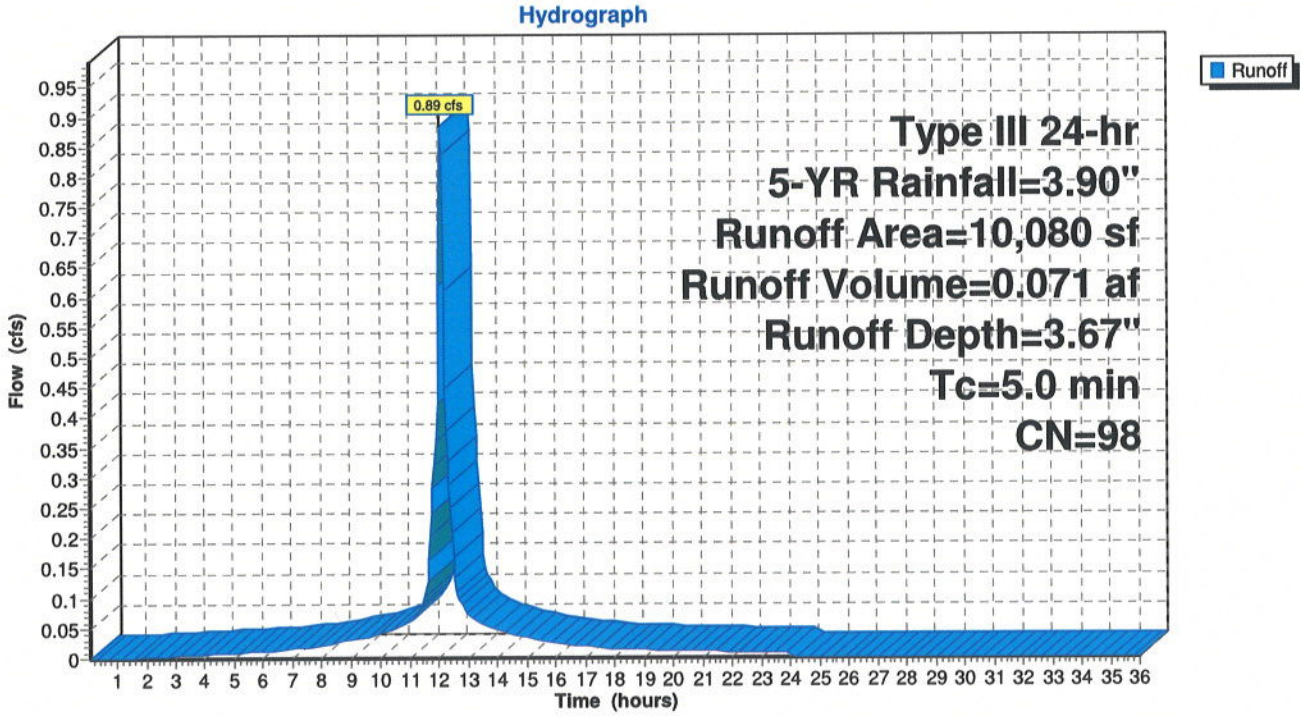
Runoff = 0.89 cfs @ 12.07 hrs, Volume= 0.071 af, Depth= 3.67"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-YR Rainfall=3.90"

Area (sf)	CN	Description
10,080	98	Roofs, HSG D
10,080		100.00% Impervious Area

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

Subcatchment 5S: ROOFS 15 - 28



Summary for Subcatchment 6S: PWS#3

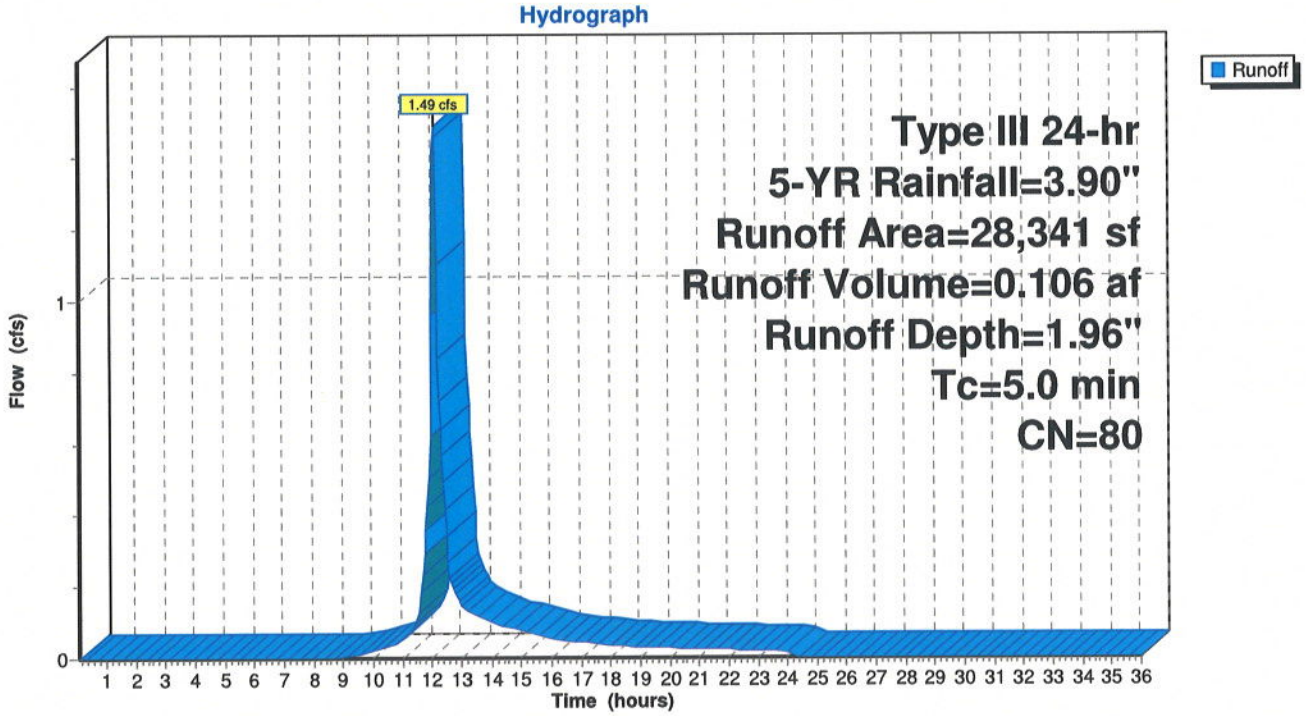
Runoff = 1.49 cfs @ 12.08 hrs, Volume= 0.106 af, Depth= 1.96"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-YR Rainfall=3.90"

	Area (sf)	CN	Description
	18,244	80	>75% Grass cover, Good, HSG D
*	10,097	80	
	28,341	80	Weighted Average
	28,341		100.00% Pervious Area

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

Subcatchment 6S: PWS#3



Summary for Subcatchment 7S: PWS#4

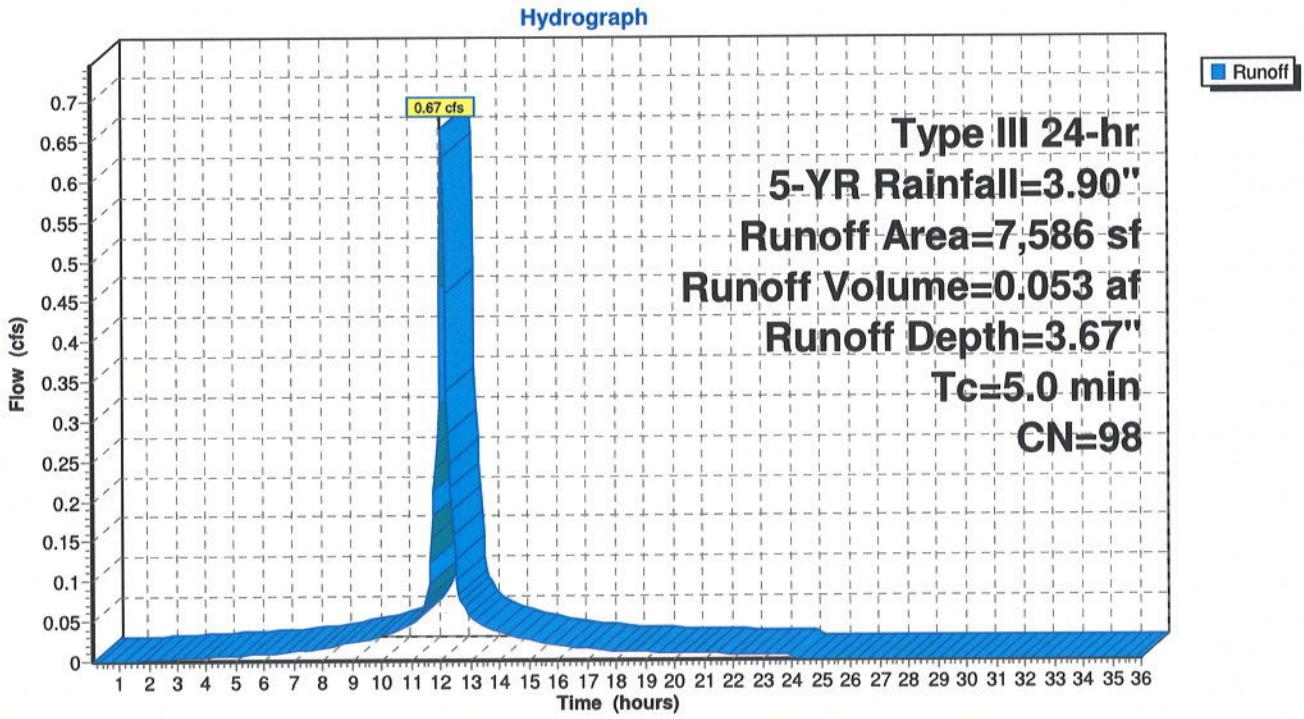
Runoff = 0.67 cfs @ 12.07 hrs, Volume= 0.053 af, Depth= 3.67"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-YR Rainfall=3.90"

Area (sf)	CN	Description
7,586	98	Paved parking, HSG D
7,586		100.00% Impervious Area

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

Subcatchment 7S: PWS#4



Summary for Subcatchment 9S: PWS#5

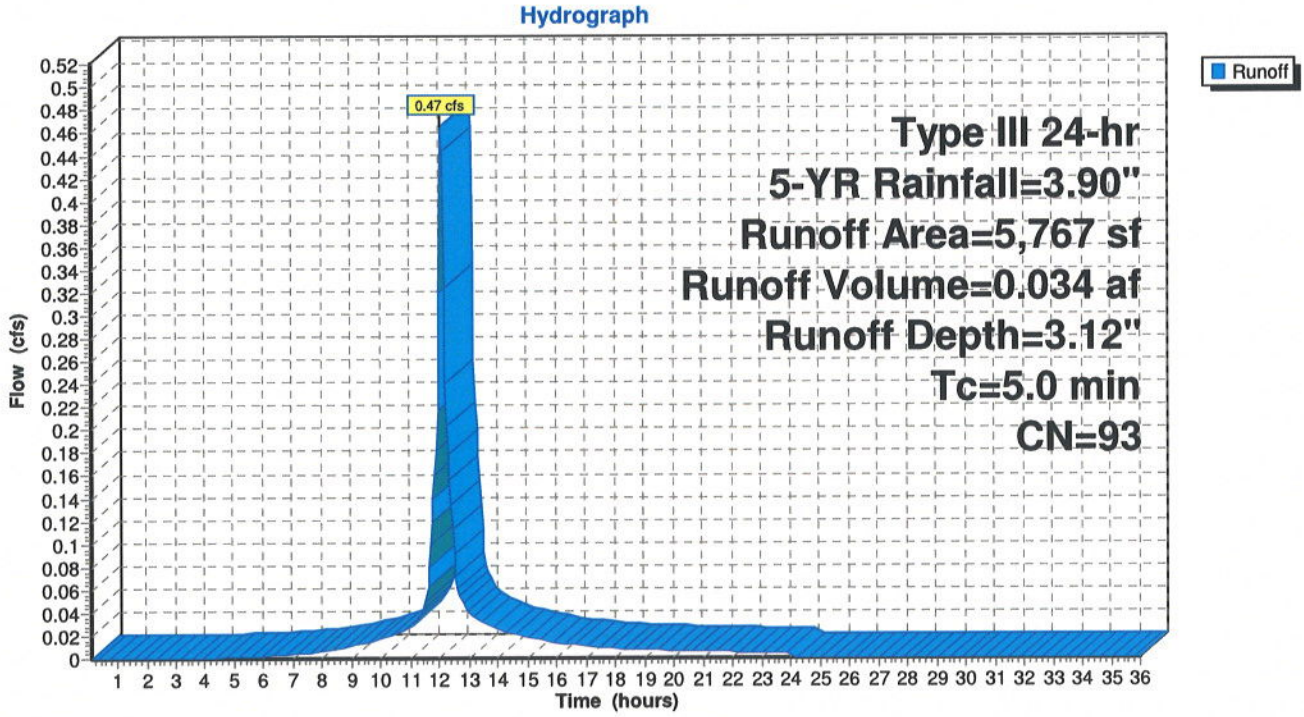
Runoff = 0.47 cfs @ 12.07 hrs, Volume= 0.034 af, Depth= 3.12"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-YR Rainfall=3.90"

Area (sf)	CN	Description
4,090	98	Paved parking, HSG D
1,677	80	>75% Grass cover, Good, HSG D
5,767	93	Weighted Average
1,677		29.08% Pervious Area
4,090		70.92% Impervious Area

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

Subcatchment 9S: PWS#5



Summary for Subcatchment 11S: PWS#6

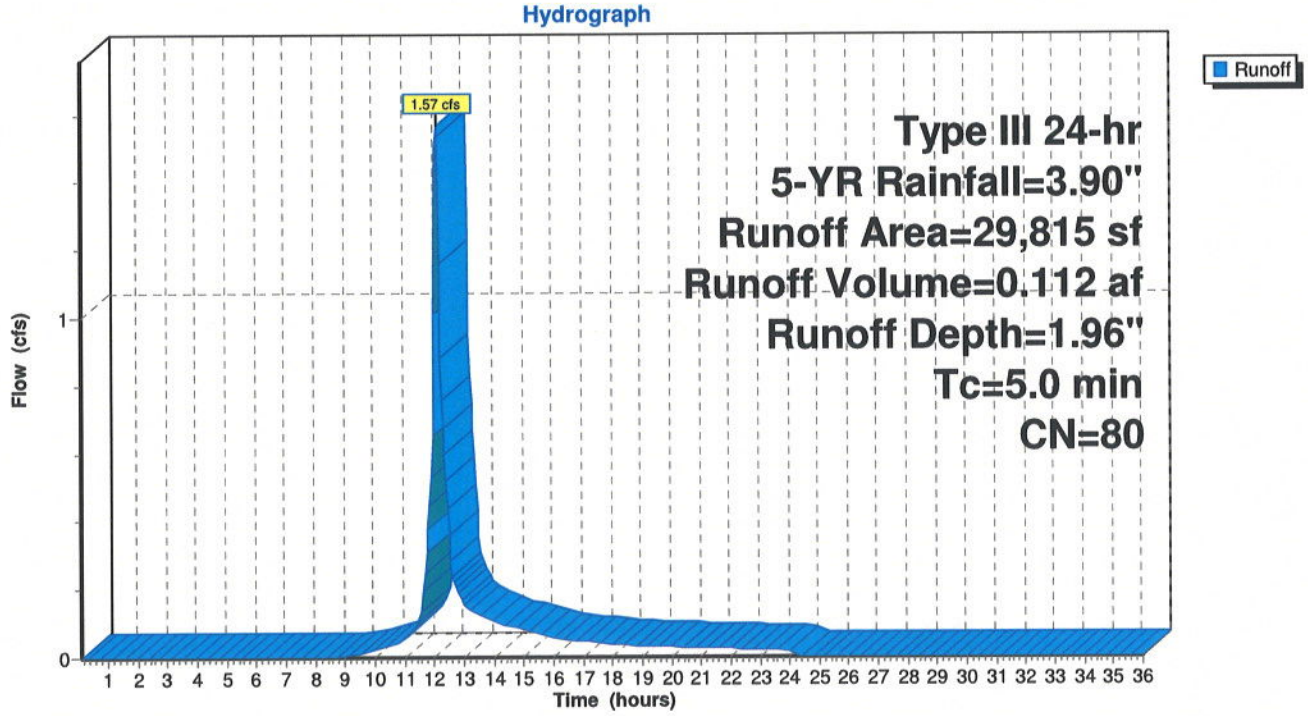
Runoff = 1.57 cfs @ 12.08 hrs, Volume= 0.112 af, Depth= 1.96"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-YR Rainfall=3.90"

	Area (sf)	CN	Description
	21,412	80	>75% Grass cover, Good, HSG D
*	8,403	80	
	29,815	80	Weighted Average
	29,815		100.00% Pervious Area

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

Subcatchment 11S: PWS#6



Summary for Subcatchment 13S: PWS#7

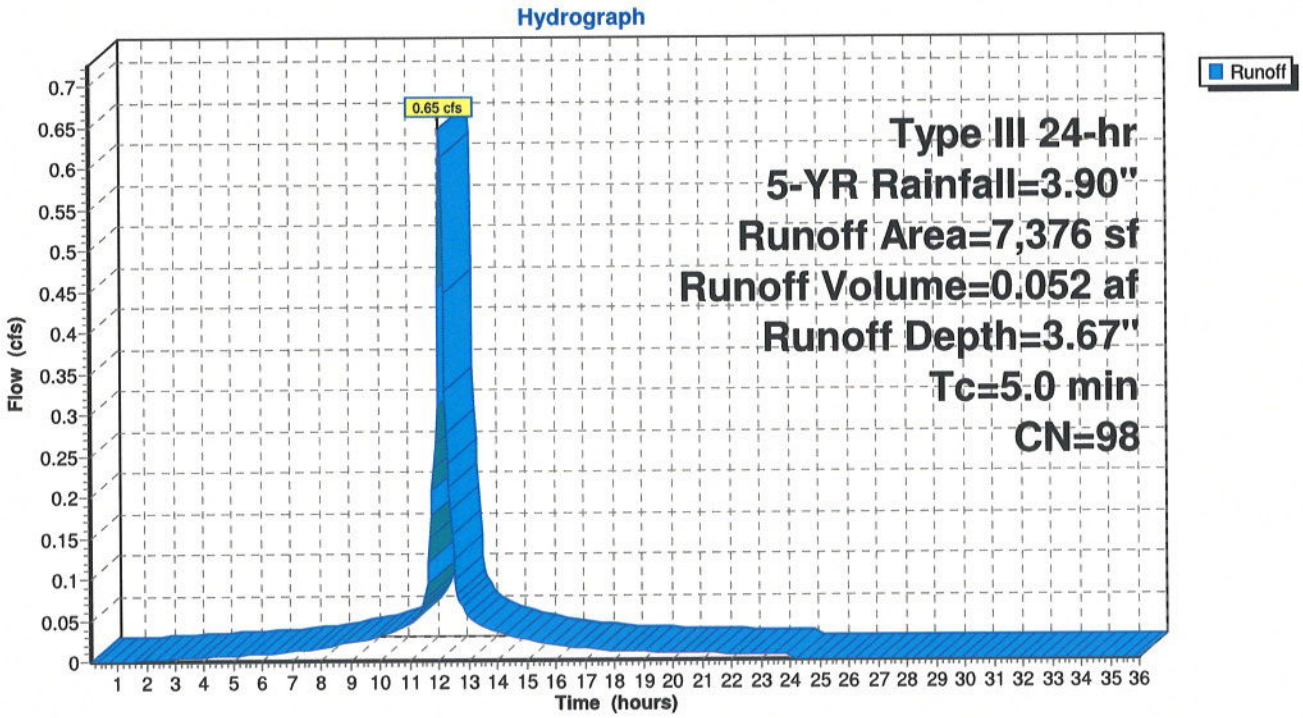
Runoff = 0.65 cfs @ 12.07 hrs, Volume= 0.052 af, Depth= 3.67"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-YR Rainfall=3.90"

Area (sf)	CN	Description
7,376	98	Paved parking, HSG D
7,376		100.00% Impervious Area

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

Subcatchment 13S: PWS#7



Summary for Subcatchment 18S: ROOFS 1 - 14

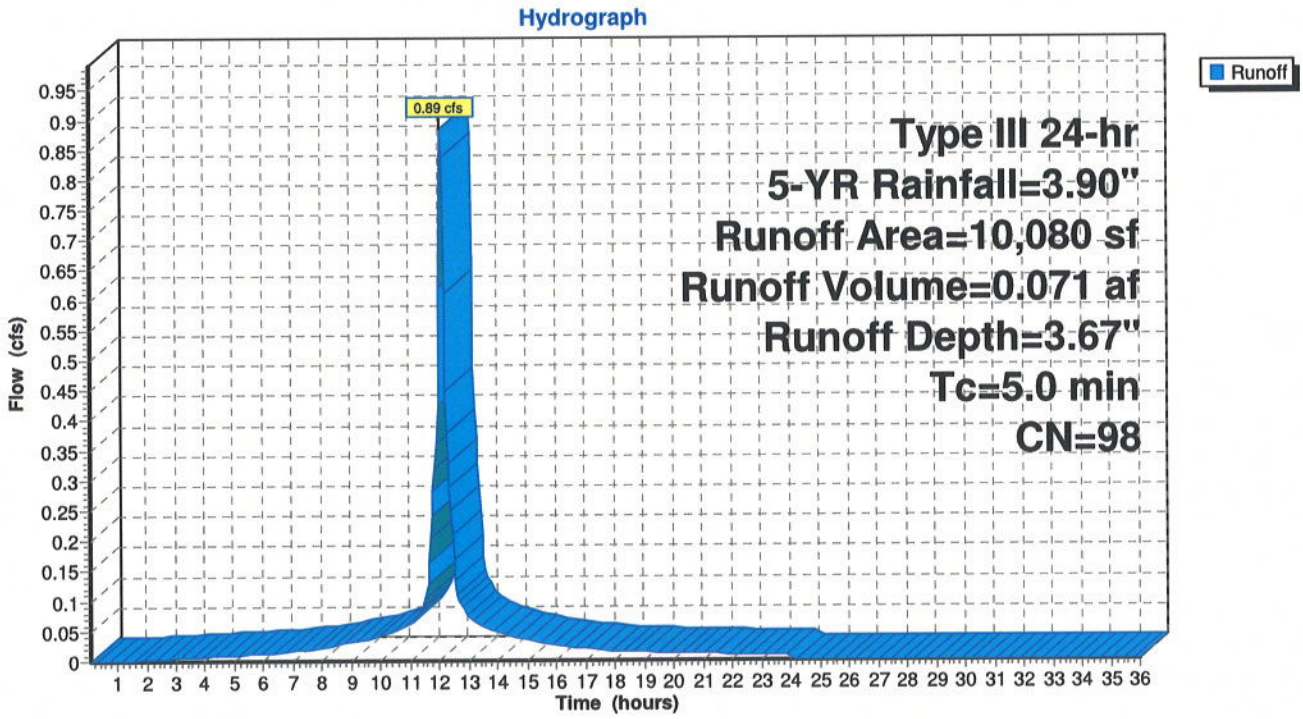
Runoff = 0.89 cfs @ 12.07 hrs, Volume= 0.071 af, Depth= 3.67"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-YR Rainfall=3.90"

Area (sf)	CN	Description
10,080	98	Roofs, HSG D
10,080		100.00% Impervious Area

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

Subcatchment 18S: ROOFS 1 - 14



Summary for Reach 4R: GRASS LINED SWALE #1

Inflow Area = 1.015 ac, 32.07% Impervious, Inflow Depth = 1.73" for 5-YR event
Inflow = 2.16 cfs @ 12.09 hrs, Volume= 0.146 af
Outflow = 2.00 cfs @ 12.18 hrs, Volume= 0.146 af, Atten= 7%, Lag= 5.2 min

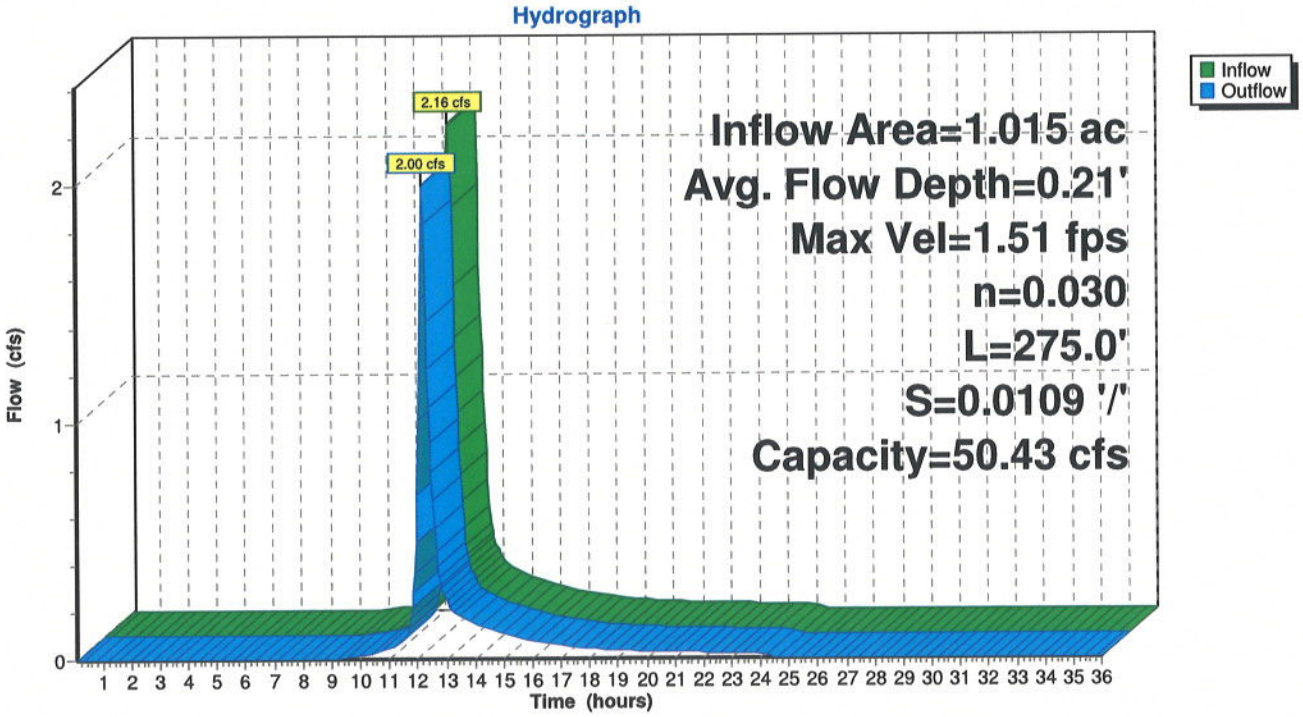
Routing by Stor-Ind+Trans method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.51 fps, Min. Travel Time= 3.0 min
Avg. Velocity = 0.45 fps, Avg. Travel Time= 10.1 min

Peak Storage= 363 cf @ 12.13 hrs
Average Depth at Peak Storage= 0.21'
Bank-Full Depth= 1.00' Flow Area= 14.0 sf, Capacity= 50.43 cfs

4.00' x 1.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 10.0 '/' Top Width= 24.00'
Length= 275.0' Slope= 0.0109 '/'
Inlet Invert= 99.00', Outlet Invert= 96.00'

‡

Reach 4R: GRASS LINED SWALE #1



Summary for Reach 12R: GRASS LINED SWALE #2

Inflow Area = 1.048 ac, 31.03% Impervious, Inflow Depth = 1.76" for 5-YR event
Inflow = 2.23 cfs @ 12.09 hrs, Volume= 0.153 af
Outflow = 2.07 cfs @ 12.18 hrs, Volume= 0.153 af, Atten= 7%, Lag= 5.1 min

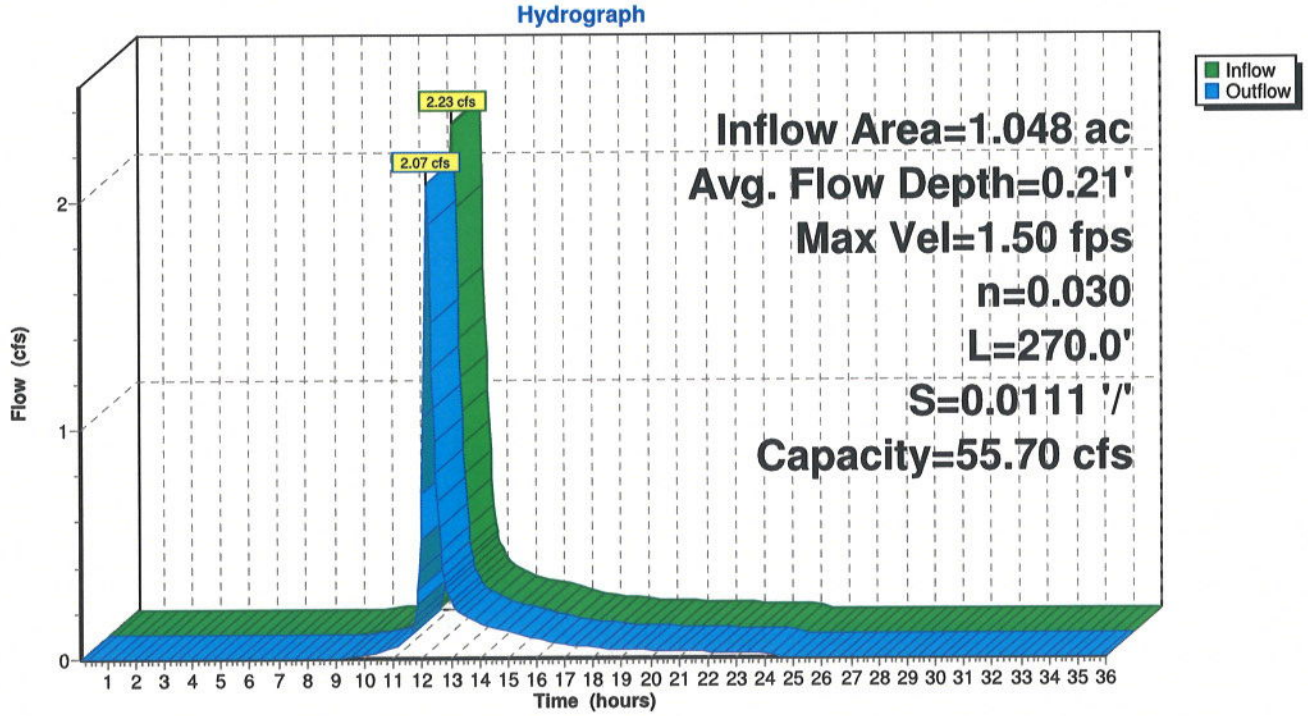
Routing by Stor-Ind+Trans method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.50 fps, Min. Travel Time= 3.0 min
Avg. Velocity = 0.46 fps, Avg. Travel Time= 9.8 min

Peak Storage= 373 cf @ 12.13 hrs
Average Depth at Peak Storage= 0.21'
Bank-Full Depth= 1.00' Flow Area= 15.5 sf, Capacity= 55.70 cfs

4.00' x 1.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 4.0 19.0 '/' Top Width= 27.00'
Length= 270.0' Slope= 0.0111 '/'
Inlet Invert= 99.00', Outlet Invert= 96.00'

‡

Reach 12R: GRASS LINED SWALE #2



Summary for Pond 8P: DETENTION POND #1

Inflow Area =	1.189 ac, 42.02% Impervious, Inflow Depth = 2.00" for 5-YR event				
Inflow =	2.49 cfs @	12.16 hrs,	Volume=	0.199 af	
Outflow =	0.20 cfs @	13.81 hrs,	Volume=	0.185 af,	Atten= 92%, Lag= 99.2 min
Discarded =	0.10 cfs @	13.81 hrs,	Volume=	0.162 af	
Primary =	0.10 cfs @	13.81 hrs,	Volume=	0.023 af	

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Peak Elev= 94.94' @ 13.81 hrs Surf.Area= 3,319 sf Storage= 4,720 cf

Plug-Flow detention time= 460.3 min calculated for 0.185 af (93% of inflow)
Center-of-Mass det. time= 426.5 min (1,240.4 - 813.9)

Volume	Invert	Avail.Storage	Storage Description
#1	93.00'	8,773 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

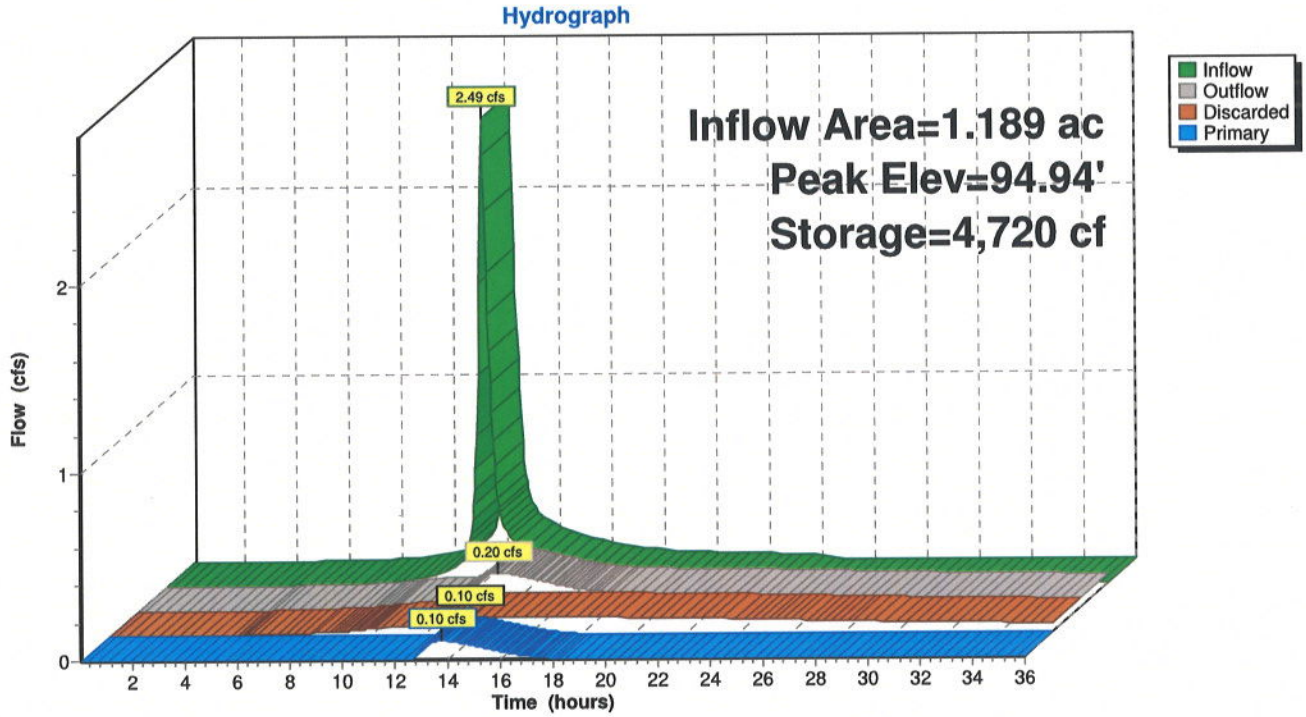
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
93.00	1,640	257.0	0	0	1,640
94.00	2,440	276.0	2,027	2,027	2,489
95.00	3,381	308.0	2,898	4,925	4,004
96.00	4,335	329.0	3,848	8,773	5,115

Device	Routing	Invert	Outlet Devices
#1	Primary	95.50'	**6.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32
#2	Primary	94.75'	**6.0" Vert. Orifice/Grate** C= 0.600
#3	Discarded	93.00'	**1.080 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.10 cfs @ 13.81 hrs HW=94.94' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.10 cfs)

Primary OutFlow Max=0.10 cfs @ 13.81 hrs HW=94.94' (Free Discharge)
├**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└**2=Orifice/Grate** (Orifice Controls 0.10 cfs @ 1.48 fps)

Pond 8P: DETENTION POND #1



Summary for Pond 14P: DETENTION POND #2

Inflow Area =	1.218 ac, 40.62% Impervious, Inflow Depth = 2.01" for 5-YR event				
Inflow =	2.55 cfs @	12.16 hrs,	Volume=	0.204 af	
Outflow =	1.09 cfs @	12.46 hrs,	Volume=	0.150 af,	Atten= 57%, Lag= 18.0 min
Discarded =	0.01 cfs @	12.46 hrs,	Volume=	0.012 af	
Primary =	1.09 cfs @	12.46 hrs,	Volume=	0.139 af	

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Peak Elev= 95.29' @ 12.46 hrs Surf.Area= 2,462 sf Storage= 3,686 cf

Plug-Flow detention time= 197.1 min calculated for 0.150 af (74% of inflow)
Center-of-Mass det. time= 111.4 min (927.3 - 815.9)

Volume	Invert	Avail.Storage	Storage Description
#1	93.00'	5,654 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

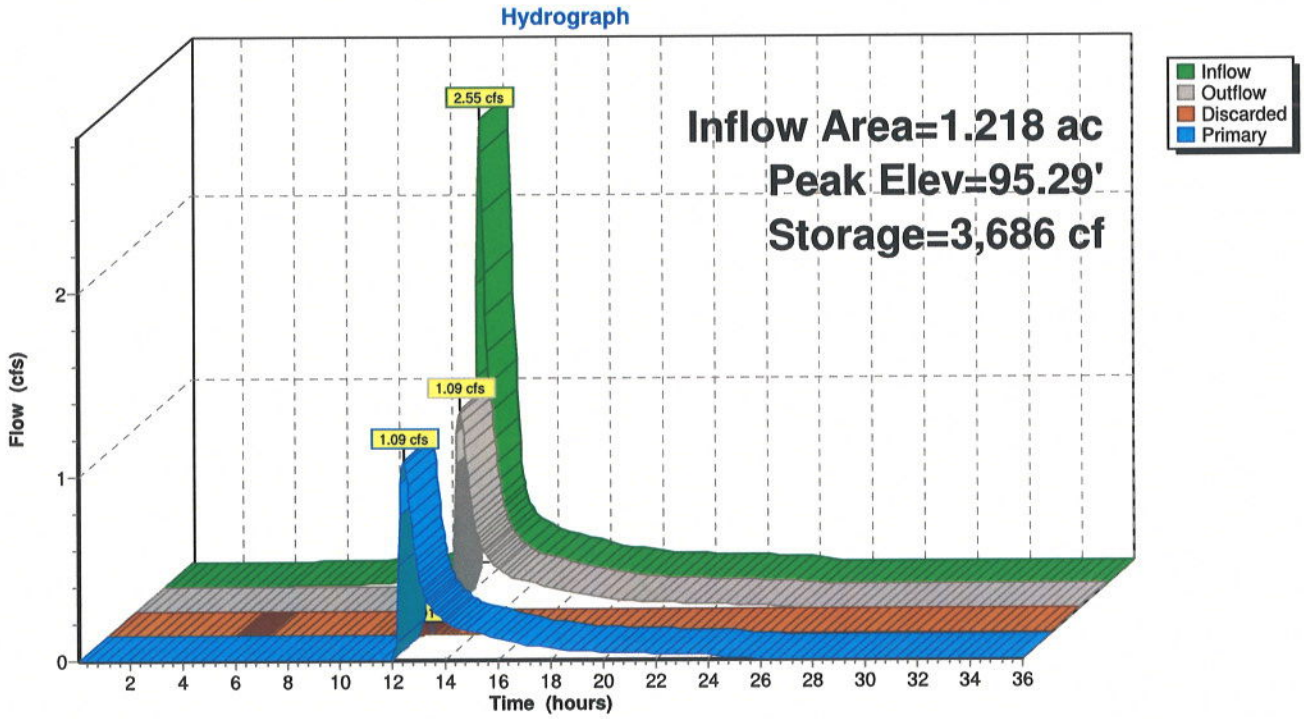
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
93.00	933	130.0	0	0	933
94.00	1,451	245.0	1,183	1,183	4,370
95.00	2,221	267.0	1,822	3,005	5,302
96.00	3,102	296.0	2,649	5,654	6,632

Device	Routing	Invert	Outlet Devices
#1	Primary	94.75'	**12.0" Vert. Orifice/Grate** C= 0.600
#2	Discarded	93.00'	**0.110 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 12.46 hrs HW=95.29' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=1.08 cfs @ 12.46 hrs HW=95.29' (Free Discharge)
↑—**1=Orifice/Grate** (Orifice Controls 1.08 cfs @ 2.50 fps)

Pond 14P: DETENTION POND #2



Summary for Pond 20P: RECHARGE 1 - 8

Inflow Area =	0.231 ac,100.00% Impervious, Inflow Depth = 3.67" for 5-YR event			
Inflow =	0.89 cfs @ 12.07 hrs, Volume=	0.071 af		
Outflow =	0.71 cfs @ 12.13 hrs, Volume=	0.061 af, Atten= 19%, Lag= 3.7 min		
Discarded =	0.01 cfs @ 12.13 hrs, Volume=	0.020 af		
Primary =	0.70 cfs @ 12.13 hrs, Volume=	0.040 af		

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Peak Elev= 99.55' @ 12.13 hrs Surf.Area= 540 sf Storage= 986 cf

Plug-Flow detention time= 240.1 min calculated for 0.061 af (86% of inflow)
Center-of-Mass det. time= 178.9 min (930.5 - 751.5)

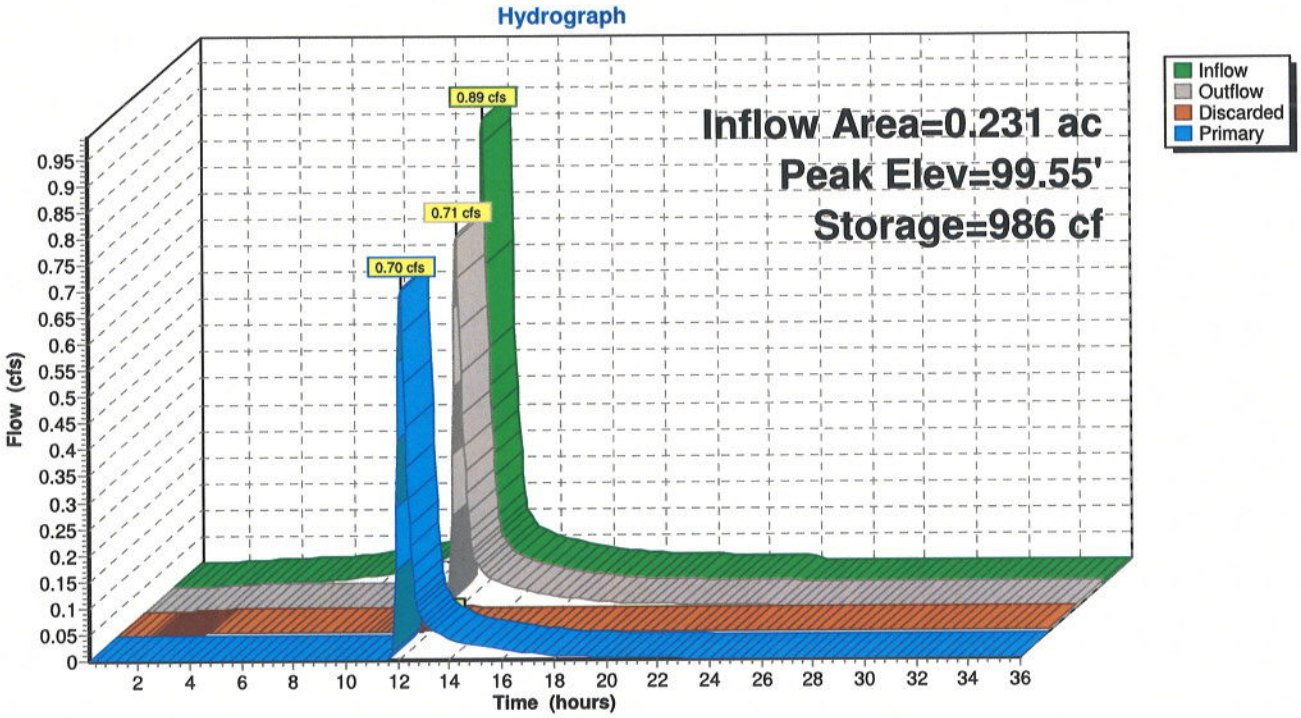
Volume	Invert	Avail.Storage	Storage Description
#1	96.50'	646 cf	**12.00'W x 45.00'L x 4.00'H Prismatoid** 2,160 cf Overall - 544 cf Embedded = 1,616 cf x 40.0% Voids
#2	97.00'	544 cf	**Cultec R-330XL** x 10 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 2 rows
		1,190 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	98.75'	**6.0" Vert. Orifice/Grate** C= 0.600
#2	Discarded	96.50'	**0.440 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.01 cfs @ 12.13 hrs HW=99.54' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.69 cfs @ 12.13 hrs HW=99.54' (Free Discharge)
└**1=Orifice/Grate** (Orifice Controls 0.69 cfs @ 3.54 fps)

Pond 20P: RECHARGE 1 - 8



Summary for Pond 23P: RECHARGE 15-28

Inflow Area =	0.231 ac,100.00% Impervious, Inflow Depth = 3.67" for 5-YR event			
Inflow =	0.89 cfs @ 12.07 hrs, Volume=	0.071 af		
Outflow =	0.71 cfs @ 12.13 hrs, Volume=	0.061 af, Atten= 19%, Lag= 3.7 min		
Discarded =	0.01 cfs @ 12.13 hrs, Volume=	0.020 af		
Primary =	0.70 cfs @ 12.13 hrs, Volume=	0.040 af		

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Peak Elev= 99.55' @ 12.13 hrs Surf.Area= 540 sf Storage= 986 cf

Plug-Flow detention time= 240.1 min calculated for 0.061 af (86% of inflow)
Center-of-Mass det. time= 178.9 min (930.5 - 751.5)

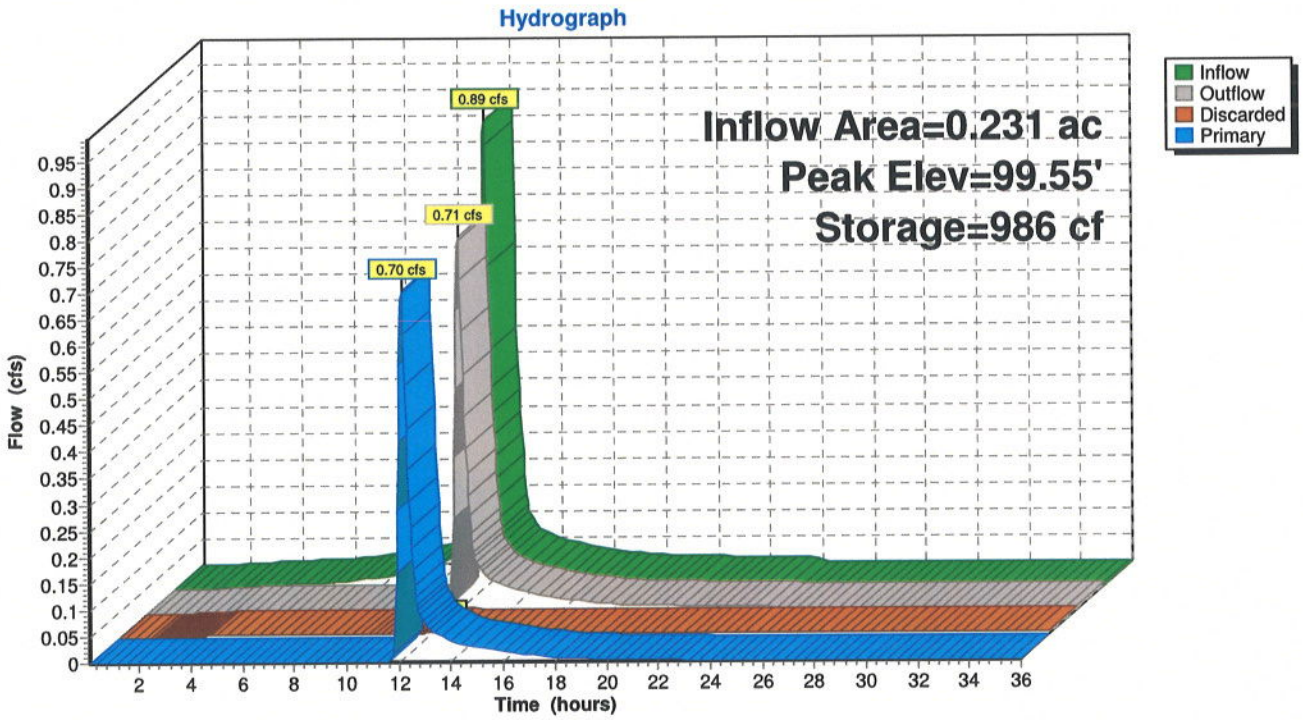
Volume	Invert	Avail.Storage	Storage Description
#1	96.50'	646 cf	**12.00'W x 45.00'L x 4.00'H Prismatoid** 2,160 cf Overall - 544 cf Embedded = 1,616 cf x 40.0% Voids
#2	97.00'	544 cf	**Cultec R-330XL** x 10 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 2 rows
		1,190 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	98.75'	**6.0" Vert. Orifice/Grate** C= 0.600
#2	Discarded	96.50'	**0.440 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.01 cfs @ 12.13 hrs HW=99.54' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.69 cfs @ 12.13 hrs HW=99.54' (Free Discharge)
└**1=Orifice/Grate** (Orifice Controls 0.69 cfs @ 3.54 fps)

Pond 23P: RECHARGE 15-28



Summary for Pond 25P: BIORETENTION BASIN

Inflow Area =	0.133 ac, 70.93% Impervious, Inflow Depth = 3.12" for 5-YR event				
Inflow =	0.47 cfs @	12.07 hrs,	Volume=	0.034 af	
Outflow =	0.00 cfs @	23.08 hrs,	Volume=	0.010 af,	Atten= 99%, Lag= 660.4 min
Discarded =	0.00 cfs @	23.08 hrs,	Volume=	0.010 af	
Primary =	0.00 cfs @	0.10 hrs,	Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Peak Elev= 99.51' @ 23.08 hrs Surf.Area= 478 sf Storage= 1,255 cf

Plug-Flow detention time= 674.6 min calculated for 0.010 af (28% of inflow)
Center-of-Mass det. time= 520.7 min (1,305.8 - 785.1)

Volume	Invert	Avail.Storage	Storage Description
#1	95.50'	1,538 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

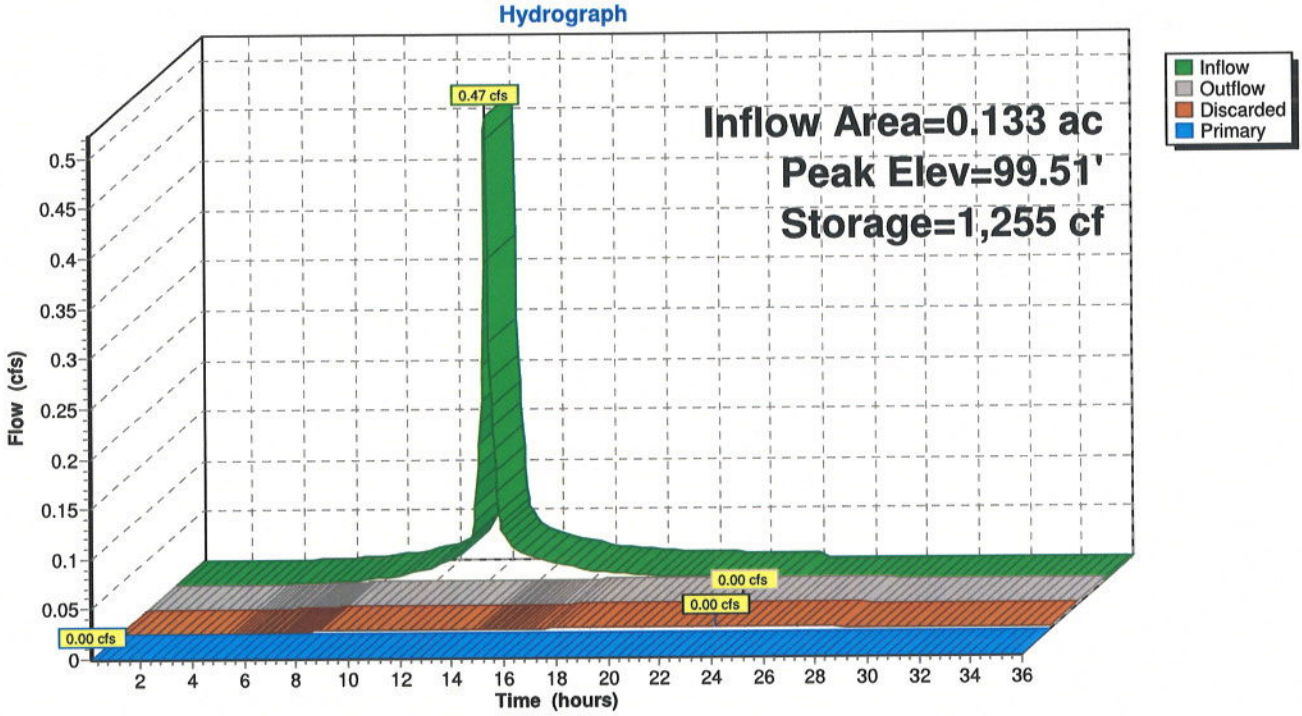
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
95.50	302	122.0	0	0	302
96.00	302	122.0	151	151	363
98.75	302	122.0	831	982	699
99.00	302	122.0	76	1,057	729
100.00	685	146.0	481	1,538	1,258

Device	Routing	Invert	Outlet Devices
#1	Primary	99.75'	**2.0' long x 2.00' rise Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.7' Crest Height
#2	Discarded	95.50'	**0.440 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.00 cfs @ 23.08 hrs HW=99.51' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.00 cfs @ 0.10 hrs HW=95.50' (Free Discharge)
└**1=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 25P: BIORETENTION BASIN



Summary for Pond 26P: BIORETENTION BASIN

Inflow Area =	0.132 ac, 70.92% Impervious, Inflow Depth = 3.12" for 5-YR event				
Inflow =	0.47 cfs @	12.07 hrs,	Volume=	0.034 af	
Outflow =	0.02 cfs @	14.95 hrs,	Volume=	0.019 af,	Atten= 96%, Lag= 172.7 min
Discarded =	0.01 cfs @	14.95 hrs,	Volume=	0.018 af	
Primary =	0.01 cfs @	14.95 hrs,	Volume=	0.002 af	

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Peak Elev= 99.76' @ 14.95 hrs Surf.Area= 901 sf Storage= 1,035 cf

Plug-Flow detention time= 589.9 min calculated for 0.019 af (56% of inflow)
Center-of-Mass det. time= 482.5 min (1,267.7 - 785.1)

Volume	Invert	Avail.Storage	Storage Description
#1	95.50'	2,456 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

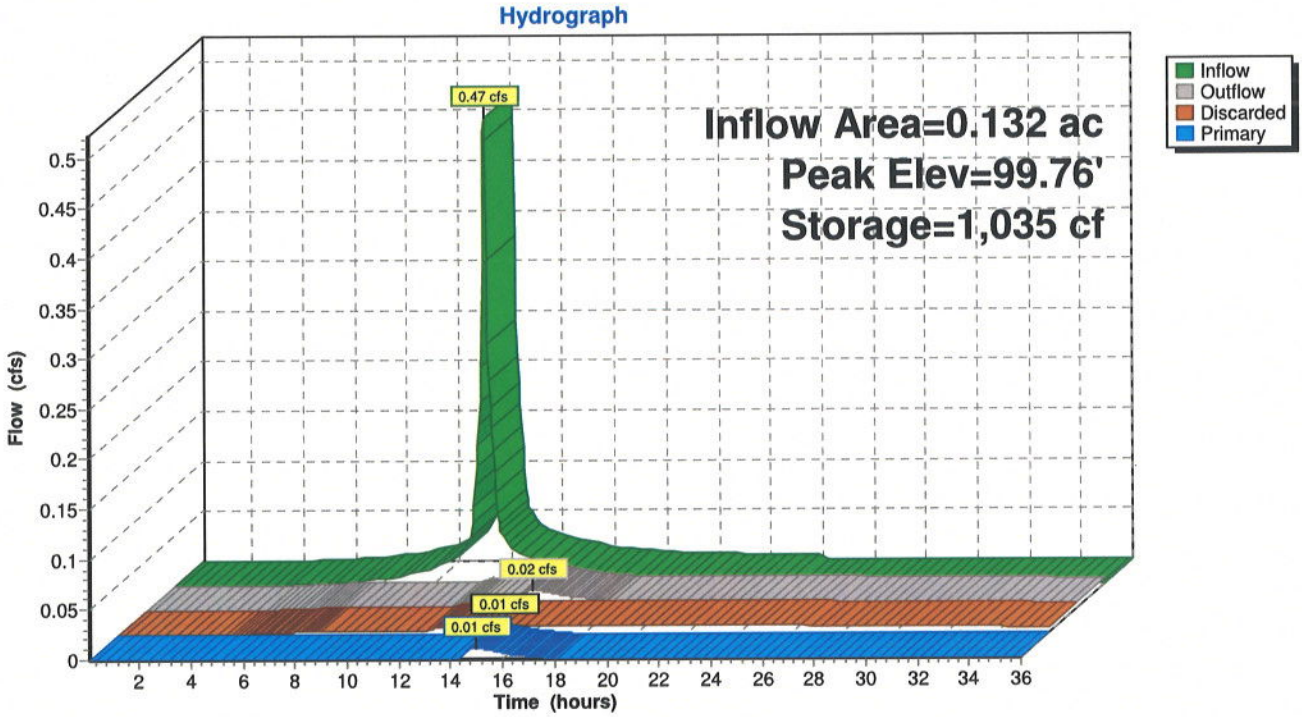
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
95.50	425	167.0	0.0	0	0	425
96.00	425	167.0	40.0	85	85	509
98.75	425	167.0	30.0	351	436	968
99.00	425	167.0	100.0	106	542	1,010
100.00	1,088	213.0	100.0	731	1,273	2,413
101.00	1,281	181.0	100.0	1,183	2,456	3,436

Device	Routing	Invert	Outlet Devices
#1	Primary	99.75'	**2.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Discarded	95.50'	**0.440 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 14.95 hrs HW=99.76' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.01 cfs @ 14.95 hrs HW=99.76' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Weir Controls 0.01 cfs @ 0.26 fps)

Pond 26P: BIORETENTION BASIN



Summary for Pond 29P: TREE BOX FILTER

Inflow Area =	0.174 ac,100.00% Impervious, Inflow Depth = 3.67" for 5-YR event				
Inflow =	0.67 cfs @ 12.07 hrs, Volume=	0.053 af			
Outflow =	0.65 cfs @ 12.09 hrs, Volume=	0.052 af, Atten= 3%, Lag= 1.0 min			
Primary =	0.65 cfs @ 12.09 hrs, Volume=	0.052 af			

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Peak Elev= 97.96' @ 12.09 hrs Surf.Area= 60 sf Storage= 76 cf

Plug-Flow detention time= 25.8 min calculated for 0.052 af (98% of inflow)
Center-of-Mass det. time= 12.7 min (764.2 - 751.5)

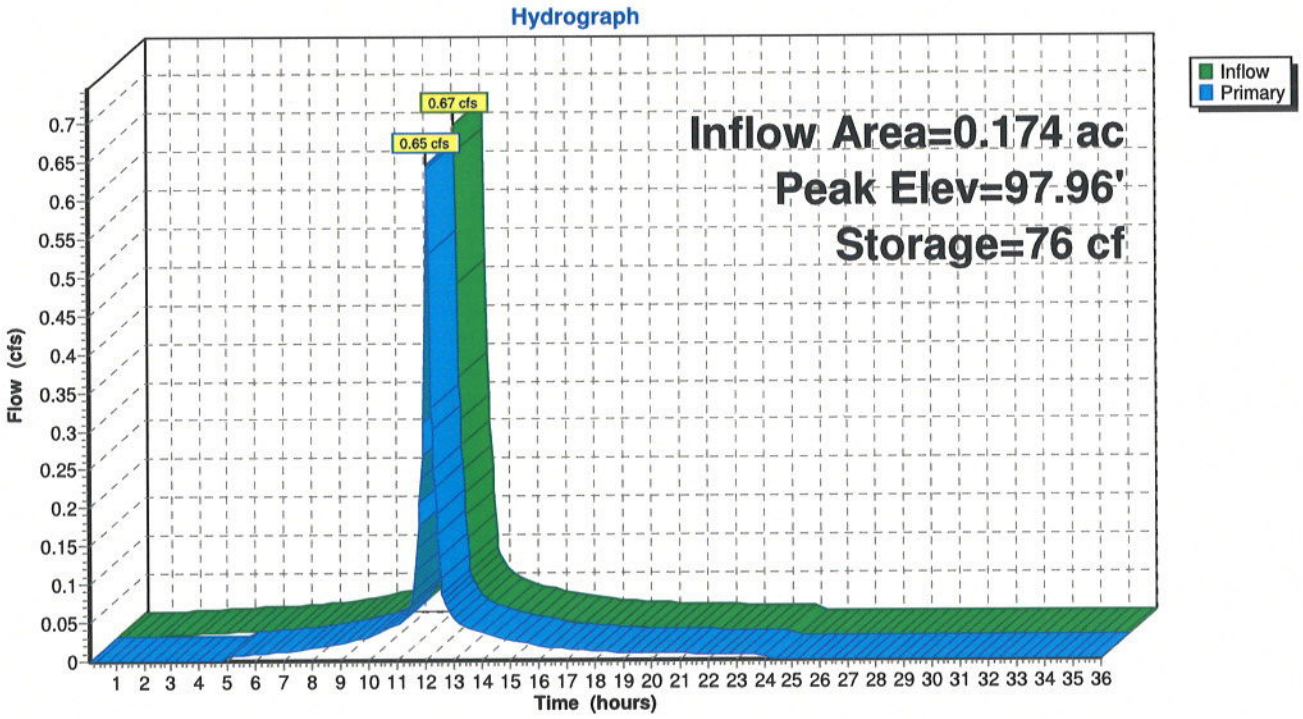
Volume	Invert	Avail.Storage	Storage Description
#1	95.00'	93 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
95.00	60	0.0	0	0
95.50	60	40.0	12	12
97.50	60	30.0	36	48
98.25	60	100.0	45	93

Device	Routing	Invert	Outlet Devices
#1	Device 2	95.00'	**6.0" Vert. Orifice/Grate** C= 0.600
#2	Primary	97.50'	**1.0" W x 18.0" H Vert. Orifice/Grate X 10.00** C= 0.600

Primary OutFlow Max=0.63 cfs @ 12.09 hrs HW=97.95' (Free Discharge)
└─**2=Orifice/Grate** (Passes 0.63 cfs of 0.80 cfs potential flow)
  └─**1=Orifice/Grate** (Orifice Controls 0.63 cfs @ 3.22 fps)

Pond 29P: TREE BOX FILTER



Summary for Pond 33P: TREE BOX FILTER

Inflow Area = 0.169 ac,100.00% Impervious, Inflow Depth = 3.67" for 5-YR event
Inflow = 0.65 cfs @ 12.07 hrs, Volume= 0.052 af
Outflow = 0.63 cfs @ 12.09 hrs, Volume= 0.051 af, Atten= 3%, Lag= 0.9 min
Primary = 0.63 cfs @ 12.09 hrs, Volume= 0.051 af

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Peak Elev= 97.94' @ 12.09 hrs Surf.Area= 60 sf Storage= 74 cf

Plug-Flow detention time= 26.6 min calculated for 0.051 af (98% of inflow)
Center-of-Mass det. time= 13.0 min (764.5 - 751.5)

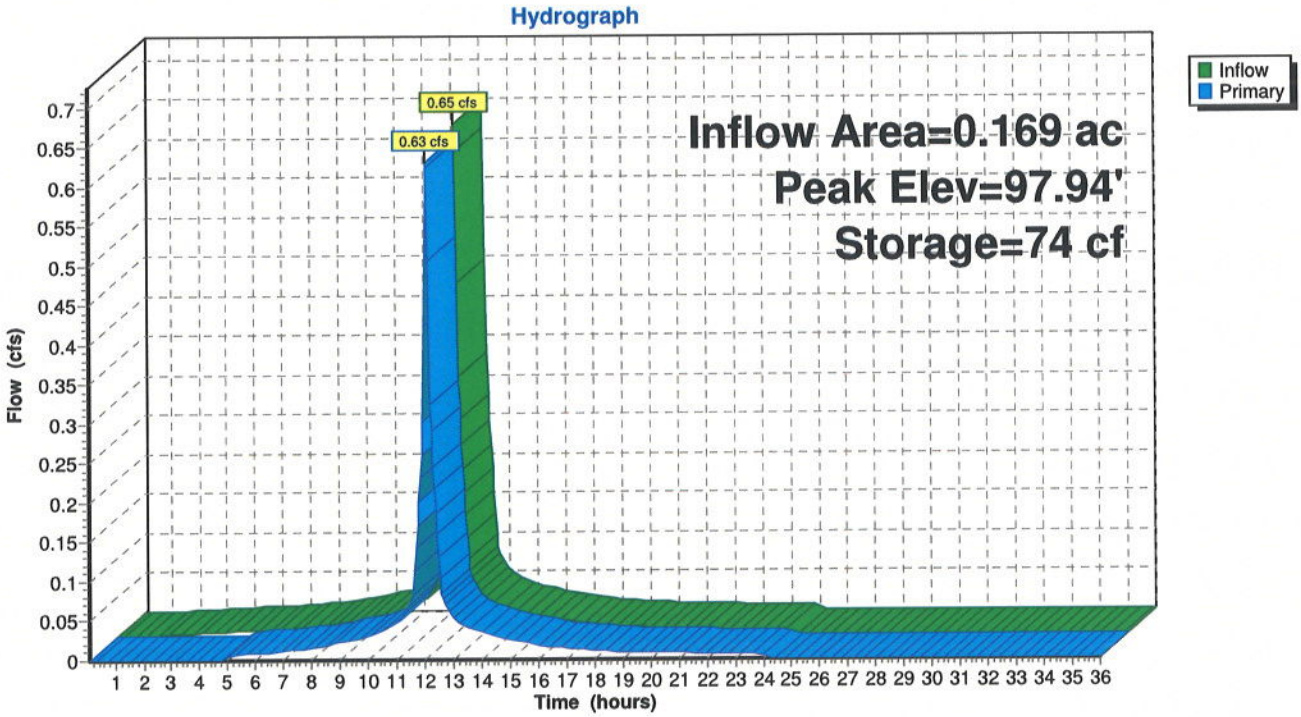
Volume	Invert	Avail.Storage	Storage Description
#1	95.00'	93 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
95.00	60	0.0	0	0
95.50	60	40.0	12	12
97.50	60	30.0	36	48
98.25	60	100.0	45	93

Device	Routing	Invert	Outlet Devices
#1	Device 2	95.00'	**6.0" Vert. Orifice/Grate** C= 0.600
#2	Primary	97.50'	**1.0" W x 18.0" H Vert. Orifice/Grate X 10.00** C= 0.600

Primary OutFlow Max=0.62 cfs @ 12.09 hrs HW=97.92' (Free Discharge)
└─**2=Orifice/Grate** (Passes 0.62 cfs of 0.74 cfs potential flow)
└─**1=Orifice/Grate** (Orifice Controls 0.62 cfs @ 3.13 fps)

Pond 33P: TREE BOX FILTER

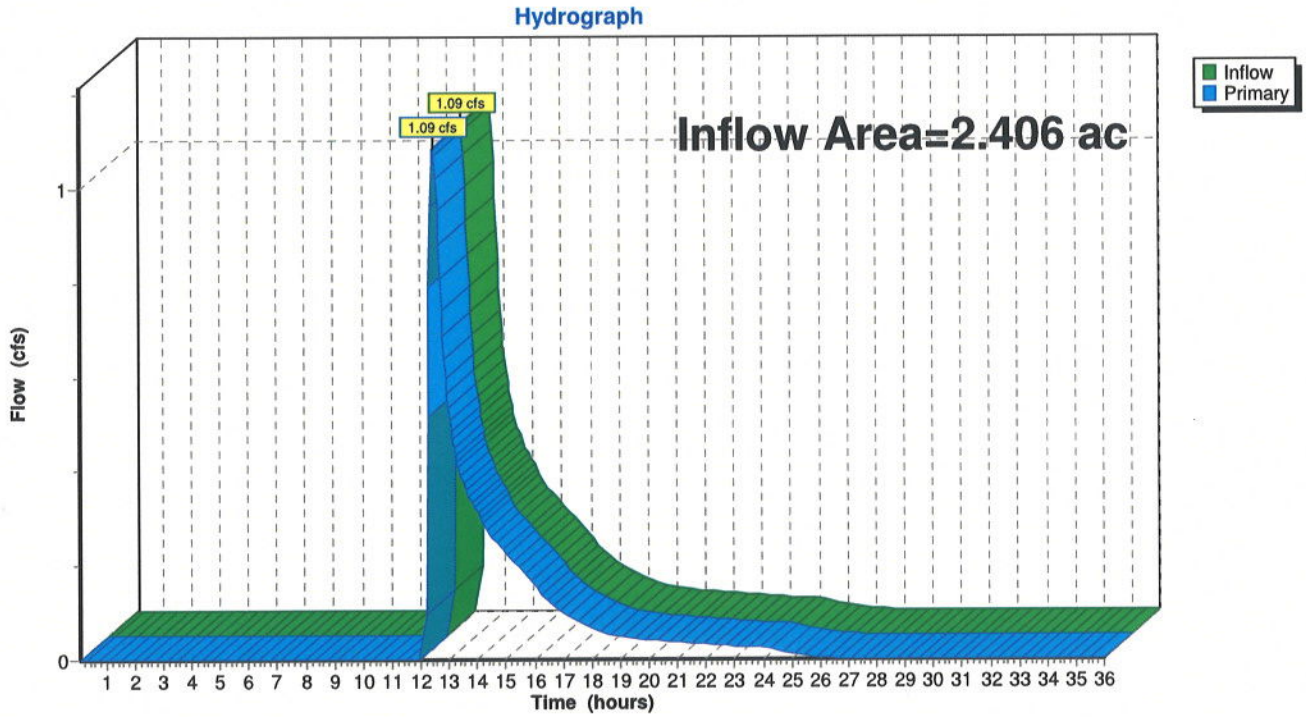


Summary for Link 15L: DP#2-REAR WETLANDS

Inflow Area =	2.406 ac,	41.32% Impervious,	Inflow Depth =	0.81"	for 5-YR event
Inflow =	1.09 cfs @	12.46 hrs, Volume=	0.162 af		
Primary =	1.09 cfs @	12.46 hrs, Volume=	0.162 af,	Atten= 0%,	Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs

Link 15L: DP#2-REAR WETLANDS



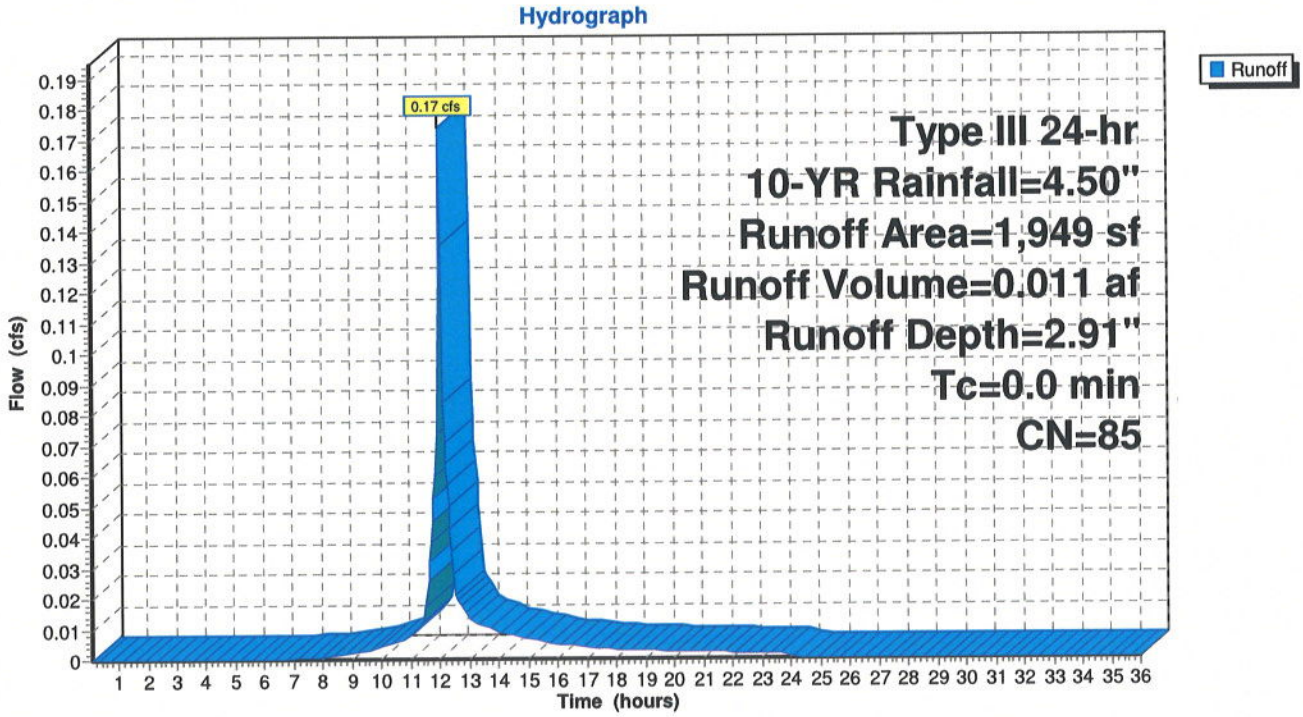
Summary for Subcatchment 1S: DP#1-GREENMONT

Runoff = 0.17 cfs @ 12.00 hrs, Volume= 0.011 af, Depth= 2.91"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=4.50"

Area (sf)	CN	Description
569	98	Paved parking, HSG D
1,380	80	>75% Grass cover, Good, HSG D
1,949	85	Weighted Average
1,380		70.81% Pervious Area
569		29.19% Impervious Area

Subcatchment 1S: DP#1-GREENMONT



Summary for Subcatchment 3S: PWS#2

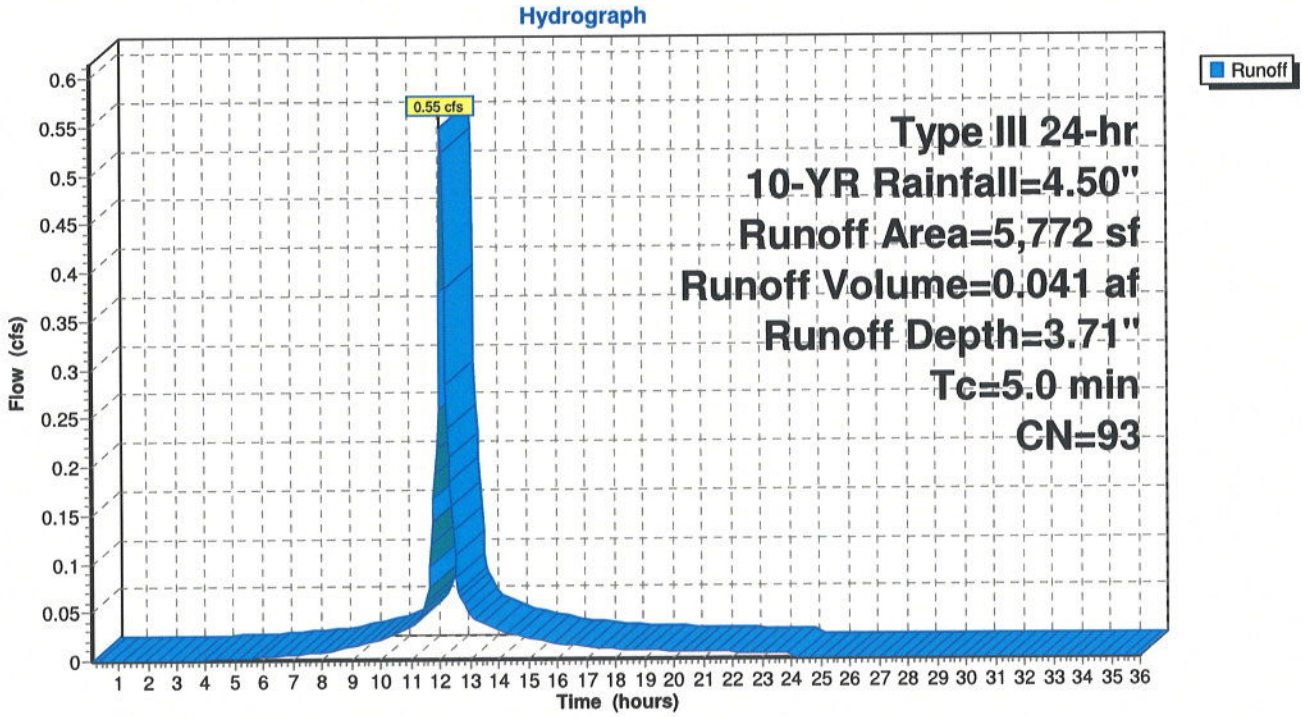
Runoff = 0.55 cfs @ 12.07 hrs, Volume= 0.041 af, Depth= 3.71"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=4.50"

Area (sf)	CN	Description
4,094	98	Paved parking, HSG D
1,678	80	>75% Grass cover, Good, HSG D
5,772	93	Weighted Average
1,678		29.07% Pervious Area
4,094		70.93% Impervious Area

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

Subcatchment 3S: PWS#2



Summary for Subcatchment 5S: ROOFS 15 - 28

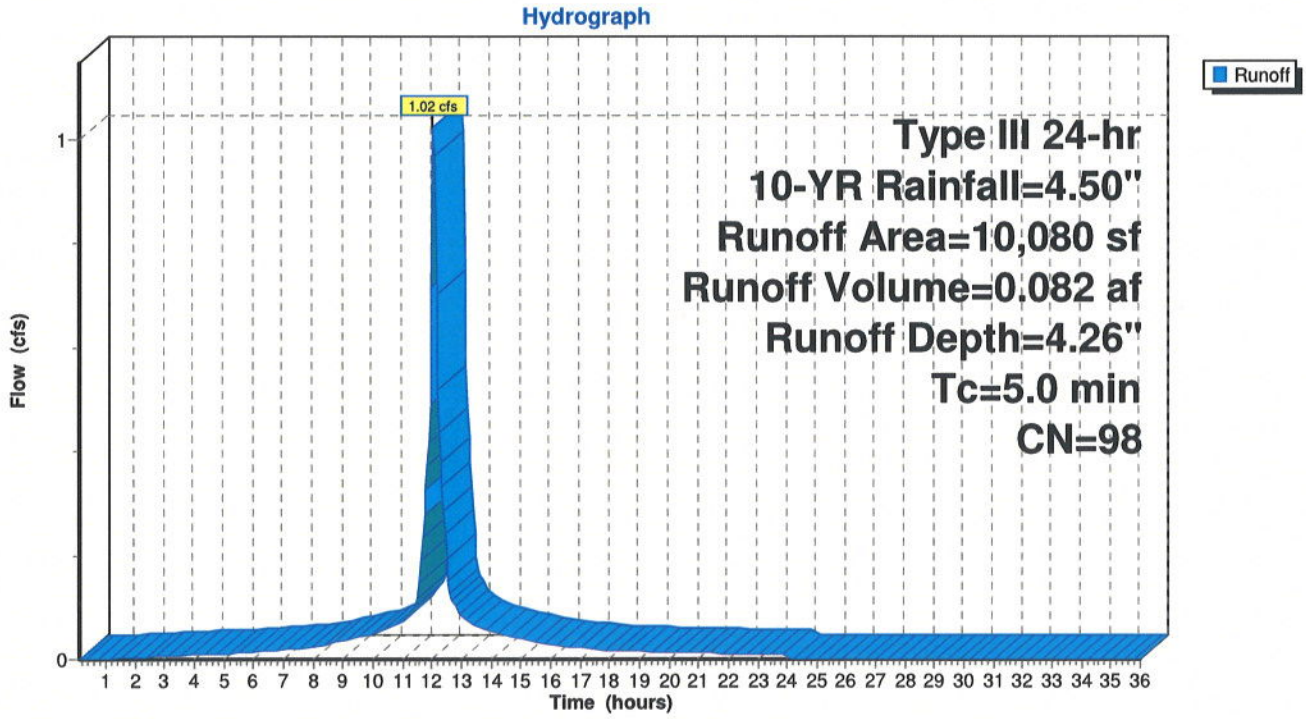
Runoff = 1.02 cfs @ 12.07 hrs, Volume= 0.082 af, Depth= 4.26"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=4.50"

Area (sf)	CN	Description
10,080	98	Roofs, HSG D
10,080		100.00% Impervious Area

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

Subcatchment 5S: ROOFS 15 - 28



Summary for Subcatchment 6S: PWS#3

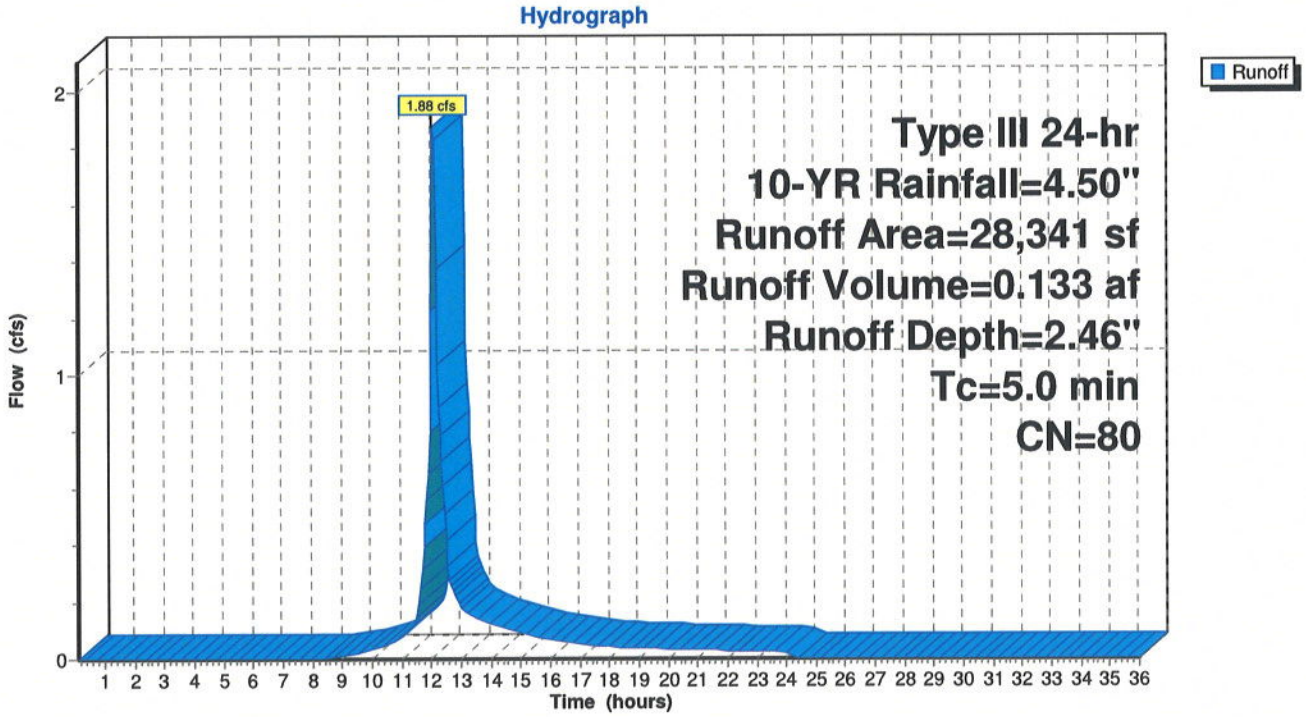
Runoff = 1.88 cfs @ 12.08 hrs, Volume= 0.133 af, Depth= 2.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=4.50"

	Area (sf)	CN	Description
	18,244	80	>75% Grass cover, Good, HSG D
*	10,097	80	
	28,341	80	Weighted Average
	28,341		100.00% Pervious Area

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

Subcatchment 6S: PWS#3



Summary for Subcatchment 7S: PWS#4

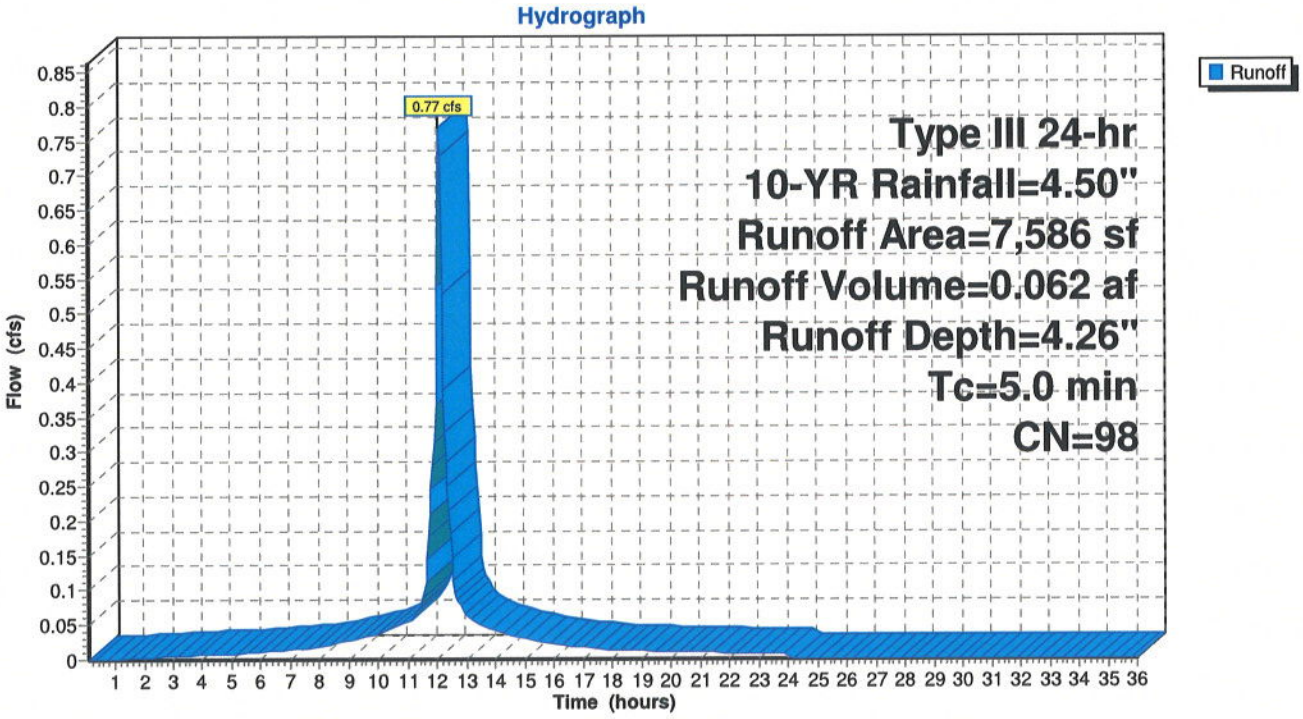
Runoff = 0.77 cfs @ 12.07 hrs, Volume= 0.062 af, Depth= 4.26"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=4.50"

Area (sf)	CN	Description
7,586	98	Paved parking, HSG D
7,586		100.00% Impervious Area

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

Subcatchment 7S: PWS#4



Summary for Subcatchment 9S: PWS#5

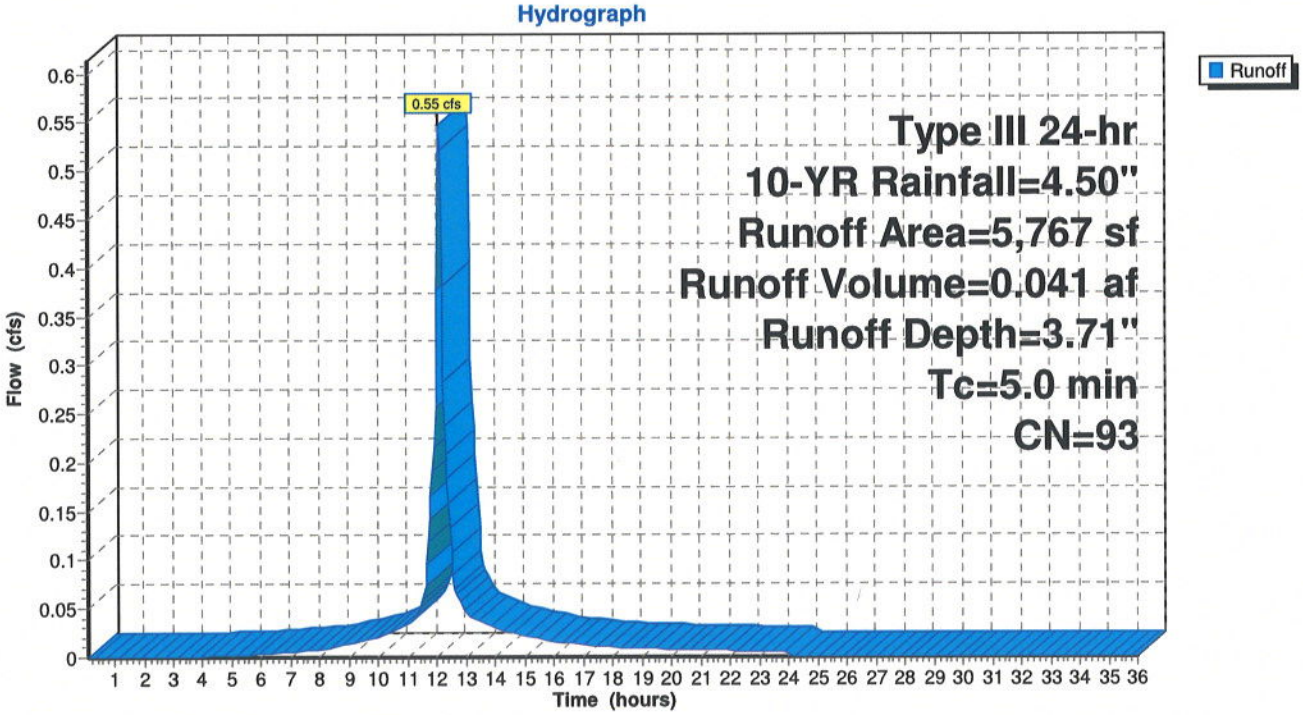
Runoff = 0.55 cfs @ 12.07 hrs, Volume= 0.041 af, Depth= 3.71"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=4.50"

Area (sf)	CN	Description
4,090	98	Paved parking, HSG D
1,677	80	>75% Grass cover, Good, HSG D
5,767	93	Weighted Average
1,677		29.08% Pervious Area
4,090		70.92% Impervious Area

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

Subcatchment 9S: PWS#5



Summary for Subcatchment 11S: PWS#6

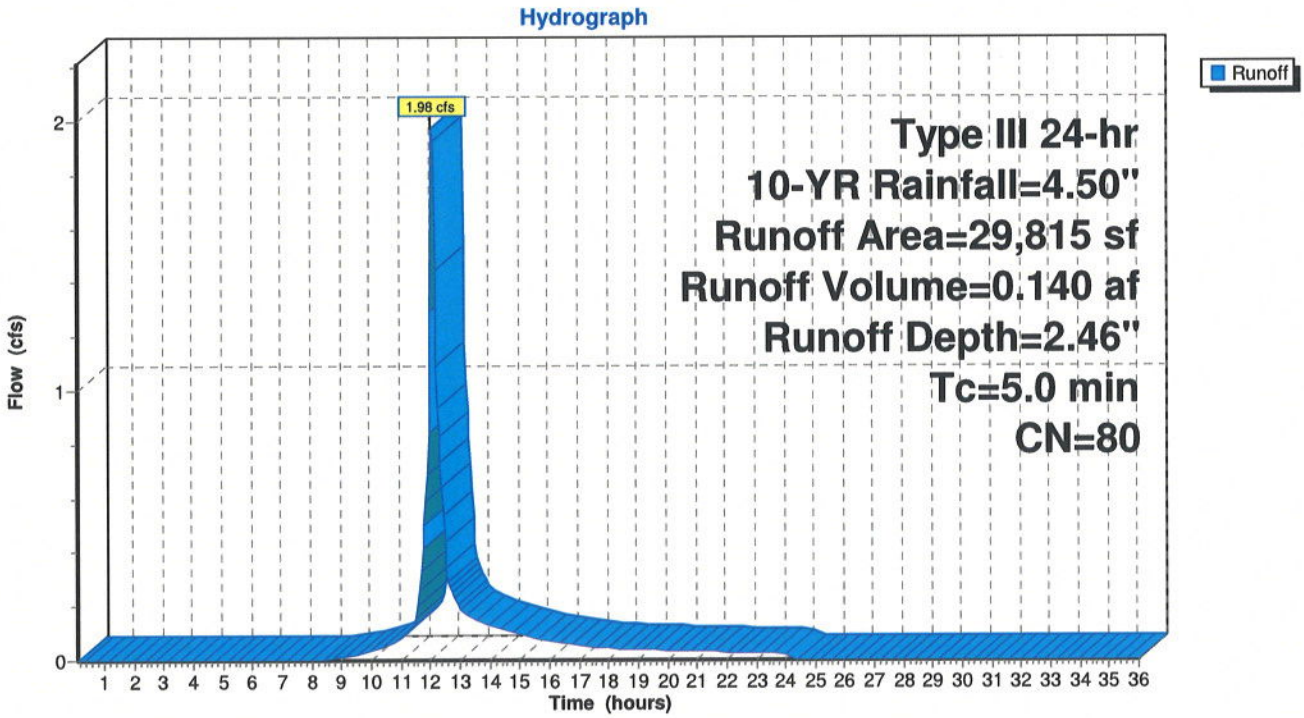
Runoff = 1.98 cfs @ 12.08 hrs, Volume= 0.140 af, Depth= 2.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=4.50"

	Area (sf)	CN	Description
	21,412	80	>75% Grass cover, Good, HSG D
*	8,403	80	
	29,815	80	Weighted Average
	29,815		100.00% Pervious Area

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

Subcatchment 11S: PWS#6



Summary for Subcatchment 13S: PWS#7

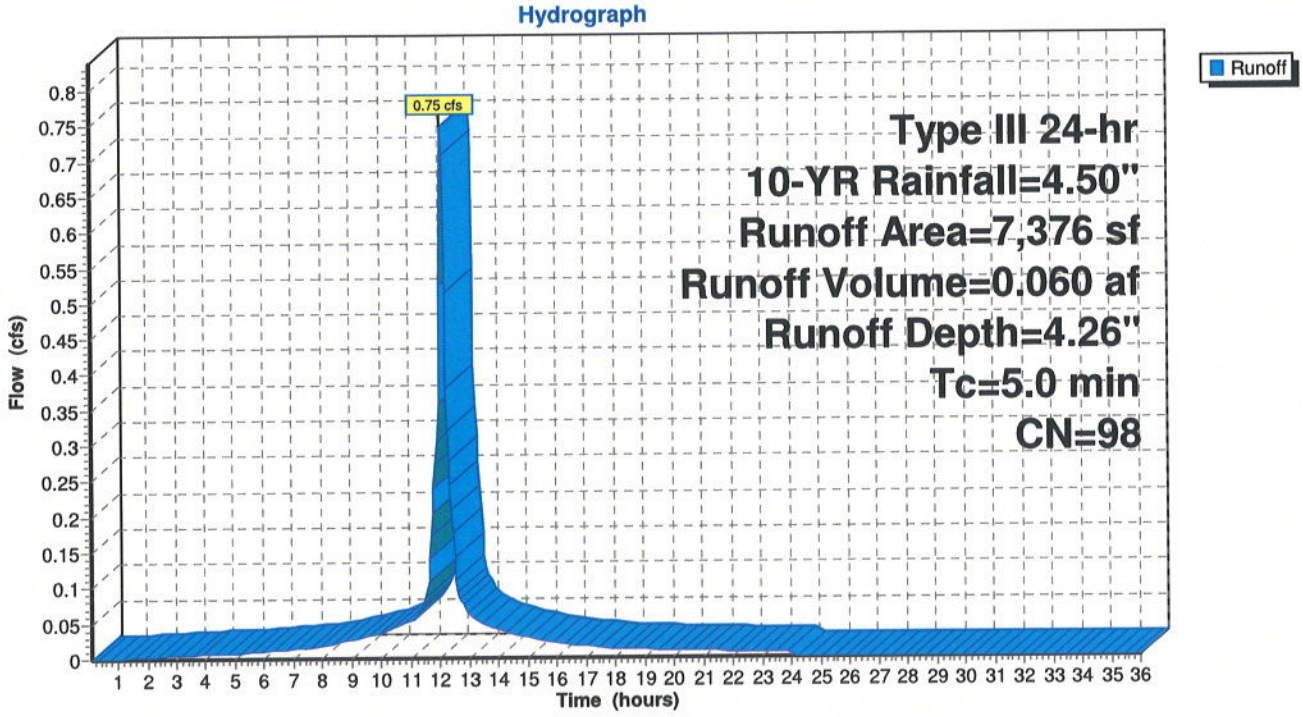
Runoff = 0.75 cfs @ 12.07 hrs, Volume= 0.060 af, Depth= 4.26"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=4.50"

Area (sf)	CN	Description
7,376	98	Paved parking, HSG D
7,376		100.00% Impervious Area

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

Subcatchment 13S: PWS#7



Summary for Subcatchment 18S: ROOFS 1 - 14

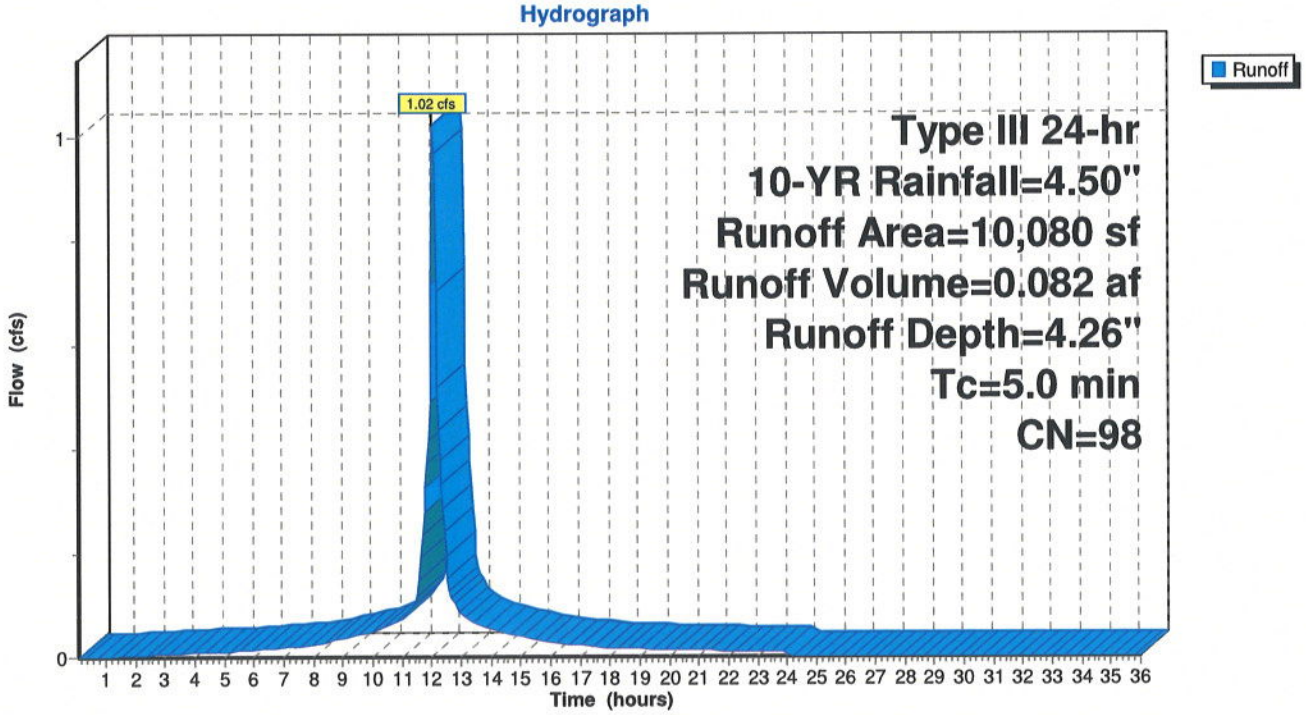
Runoff = 1.02 cfs @ 12.07 hrs, Volume= 0.082 af, Depth= 4.26"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=4.50"

Area (sf)	CN	Description
10,080	98	Roofs, HSG D
10,080		100.00% Impervious Area

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

Subcatchment 18S: ROOFS 1 - 14



Summary for Reach 4R: GRASS LINED SWALE #1

Inflow Area = 1.015 ac, 32.07% Impervious, Inflow Depth = 2.21" for 10-YR event
Inflow = 2.63 cfs @ 12.09 hrs, Volume= 0.187 af
Outflow = 2.48 cfs @ 12.17 hrs, Volume= 0.187 af, Atten= 6%, Lag= 4.9 min

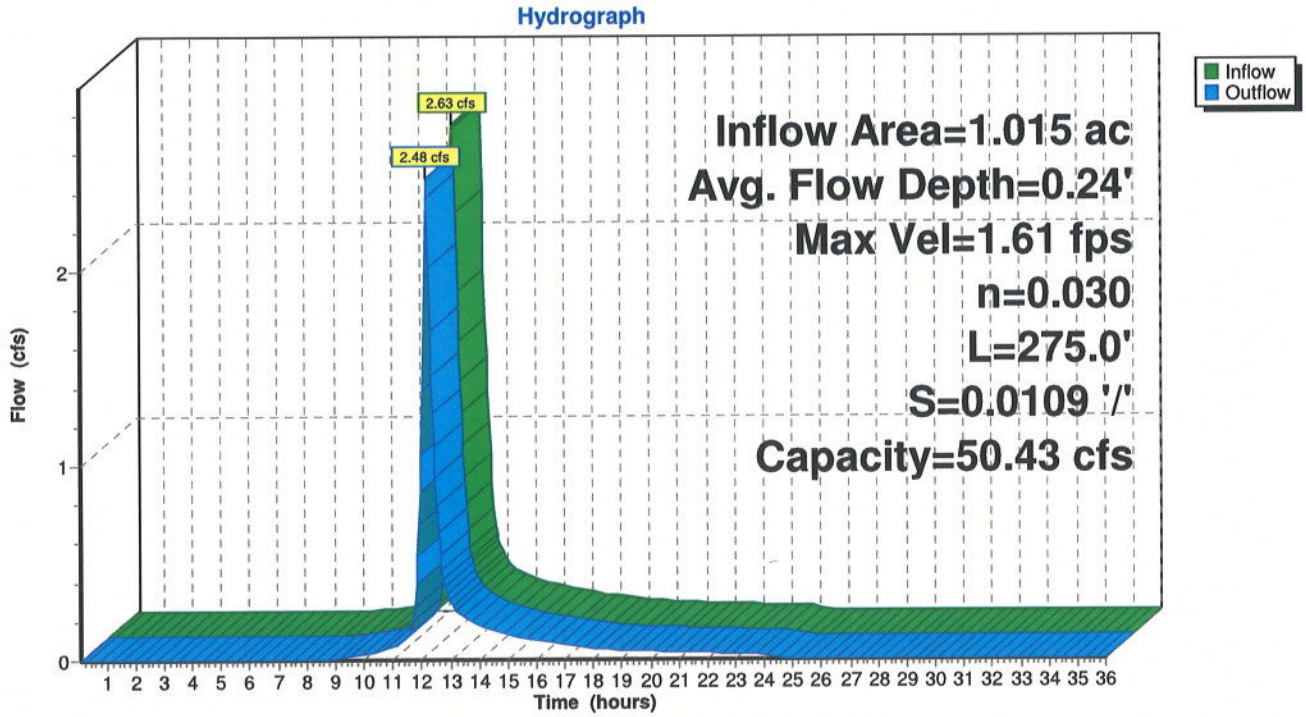
Routing by Stor-Ind+Trans method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.61 fps, Min. Travel Time= 2.9 min
Avg. Velocity = 0.49 fps, Avg. Travel Time= 9.4 min

Peak Storage= 424 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.24'
Bank-Full Depth= 1.00' Flow Area= 14.0 sf, Capacity= 50.43 cfs

4.00' x 1.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 10.0 '/' Top Width= 24.00'
Length= 275.0' Slope= 0.0109 '/'
Inlet Invert= 99.00', Outlet Invert= 96.00'

‡

Reach 4R: GRASS LINED SWALE #1



Summary for Reach 12R: GRASS LINED SWALE #2

Inflow Area = 1.048 ac, 31.03% Impervious, Inflow Depth = 2.28" for 10-YR event
Inflow = 2.73 cfs @ 12.09 hrs, Volume= 0.199 af
Outflow = 2.57 cfs @ 12.17 hrs, Volume= 0.199 af, Atten= 6%, Lag= 4.9 min

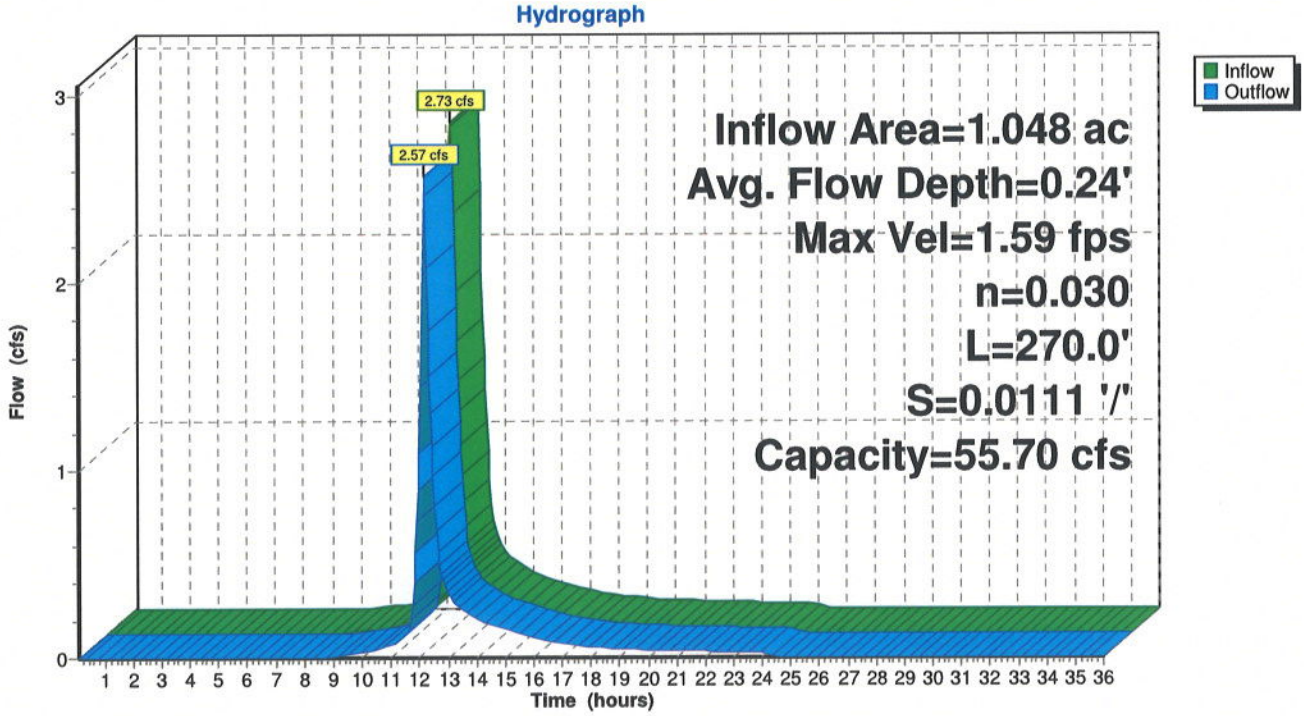
Routing by Stor-Ind+Trans method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.59 fps, Min. Travel Time= 2.8 min
Avg. Velocity = 0.49 fps, Avg. Travel Time= 9.1 min

Peak Storage= 436 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.24'
Bank-Full Depth= 1.00' Flow Area= 15.5 sf, Capacity= 55.70 cfs

4.00' x 1.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 4.0 19.0 '/' Top Width= 27.00'
Length= 270.0' Slope= 0.0111 '/'
Inlet Invert= 99.00', Outlet Invert= 96.00'

‡

Reach 12R: GRASS LINED SWALE #2



Summary for Pond 8P: DETENTION POND #1

Inflow Area =	1.189 ac, 42.02% Impervious, Inflow Depth = 2.50" for 10-YR event				
Inflow =	3.07 cfs @	12.15 hrs, Volume=	0.248 af		
Outflow =	0.42 cfs @	12.87 hrs, Volume=	0.231 af, Atten= 86%, Lag= 43.0 min		
Discarded =	0.10 cfs @	12.87 hrs, Volume=	0.169 af		
Primary =	0.32 cfs @	12.87 hrs, Volume=	0.062 af		

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Peak Elev= 95.12' @ 12.87 hrs Surf.Area= 3,487 sf Storage= 5,327 cf

Plug-Flow detention time= 389.9 min calculated for 0.231 af (93% of inflow)
Center-of-Mass det. time= 355.8 min (1,167.7 - 812.0)

Volume	Invert	Avail.Storage	Storage Description
#1	93.00'	8,773 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

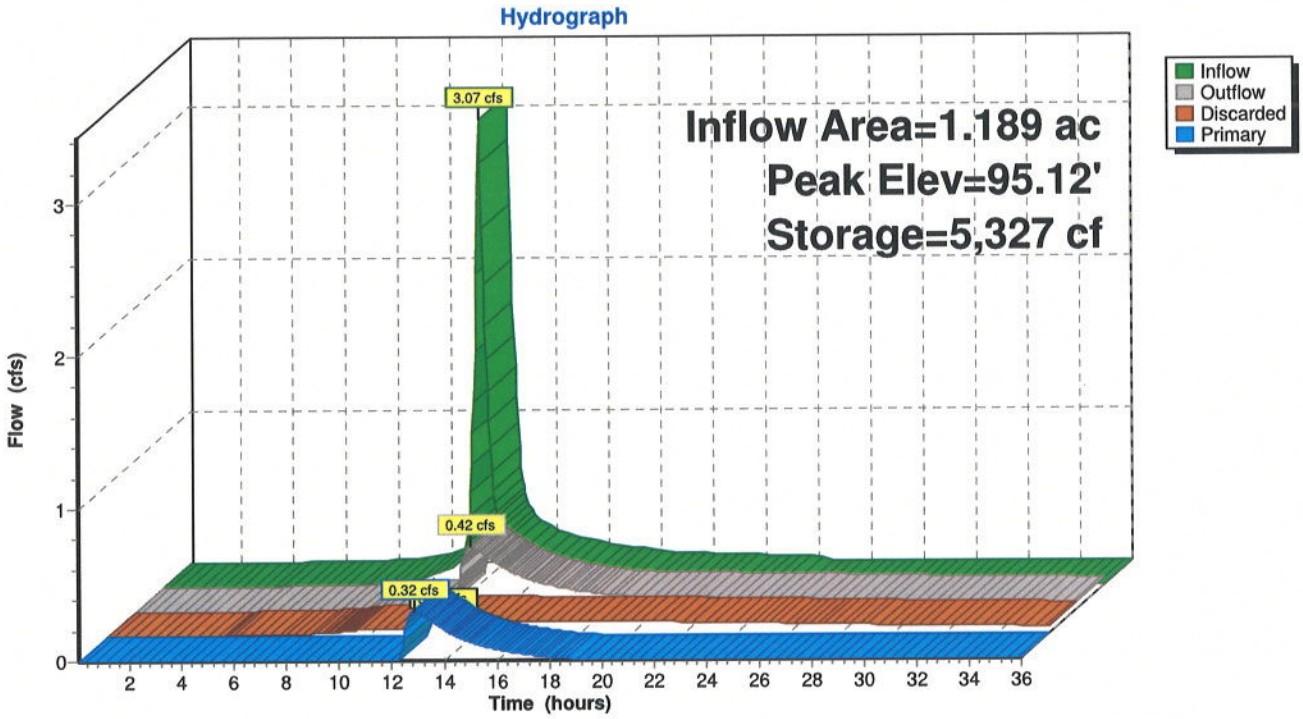
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
93.00	1,640	257.0	0	0	1,640
94.00	2,440	276.0	2,027	2,027	2,489
95.00	3,381	308.0	2,898	4,925	4,004
96.00	4,335	329.0	3,848	8,773	5,115

Device	Routing	Invert	Outlet Devices
#1	Primary	95.50'	**6.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32
#2	Primary	94.75'	**6.0" Vert. Orifice/Grate** C= 0.600
#3	Discarded	93.00'	**1.080 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.10 cfs @ 12.87 hrs HW=95.12' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.10 cfs)

Primary OutFlow Max=0.32 cfs @ 12.87 hrs HW=95.12' (Free Discharge)
├**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└**2=Orifice/Grate** (Orifice Controls 0.32 cfs @ 2.06 fps)

Pond 8P: DETENTION POND #1



Summary for Pond 14P: DETENTION POND #2

Inflow Area =	1.218 ac, 40.62% Impervious, Inflow Depth = 2.54" for 10-YR event				
Inflow =	3.14 cfs @	12.15 hrs, Volume=	0.258 af		
Outflow =	1.70 cfs @	12.37 hrs, Volume=	0.204 af, Atten= 46%, Lag= 12.8 min		
Discarded =	0.01 cfs @	12.37 hrs, Volume=	0.012 af		
Primary =	1.69 cfs @	12.37 hrs, Volume=	0.192 af		

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Peak Elev= 95.45' @ 12.37 hrs Surf.Area= 2,603 sf Storage= 4,100 cf

Plug-Flow detention time= 164.6 min calculated for 0.204 af (79% of inflow)
Center-of-Mass det. time= 90.2 min (902.2 - 812.0)

Volume	Invert	Avail.Storage	Storage Description
#1	93.00'	5,654 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

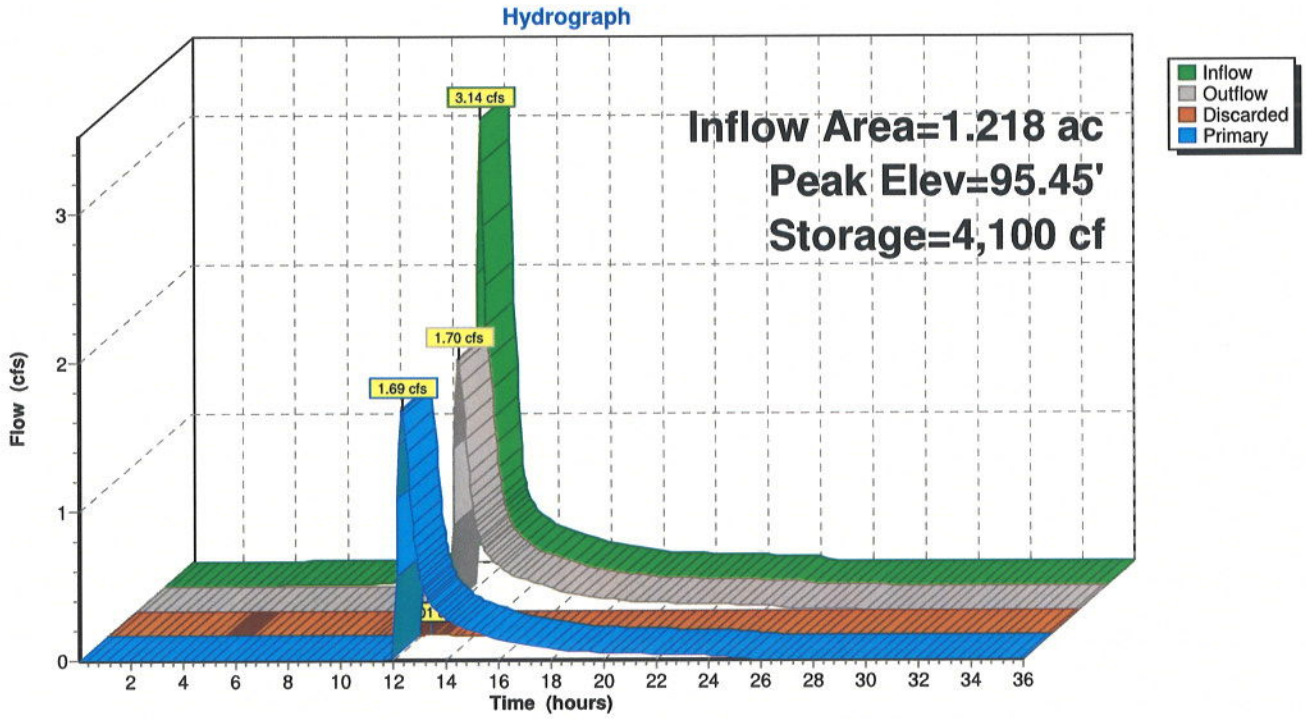
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
93.00	933	130.0	0	0	933
94.00	1,451	245.0	1,183	1,183	4,370
95.00	2,221	267.0	1,822	3,005	5,302
96.00	3,102	296.0	2,649	5,654	6,632

Device	Routing	Invert	Outlet Devices
#1	Primary	94.75'	**12.0" Vert. Orifice/Grate** C= 0.600
#2	Discarded	93.00'	**0.110 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 12.37 hrs HW=95.45' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=1.68 cfs @ 12.37 hrs HW=95.45' (Free Discharge)
└**1=Orifice/Grate** (Orifice Controls 1.68 cfs @ 2.85 fps)

Pond 14P: DETENTION POND #2



Summary for Pond 20P: RECHARGE 1 - 8

Inflow Area =	0.231 ac,100.00% Impervious, Inflow Depth = 4.26" for 10-YR event			
Inflow =	1.02 cfs @ 12.07 hrs, Volume=	0.082 af		
Outflow =	0.82 cfs @ 12.13 hrs, Volume=	0.072 af, Atten= 20%, Lag= 3.8 min		
Discarded =	0.01 cfs @ 12.13 hrs, Volume=	0.021 af		
Primary =	0.81 cfs @ 12.13 hrs, Volume=	0.051 af		

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Peak Elev= 99.73' @ 12.13 hrs Surf.Area= 540 sf Storage= 1,024 cf

Plug-Flow detention time= 215.4 min calculated for 0.072 af (88% of inflow)
Center-of-Mass det. time= 158.1 min (907.0 - 748.9)

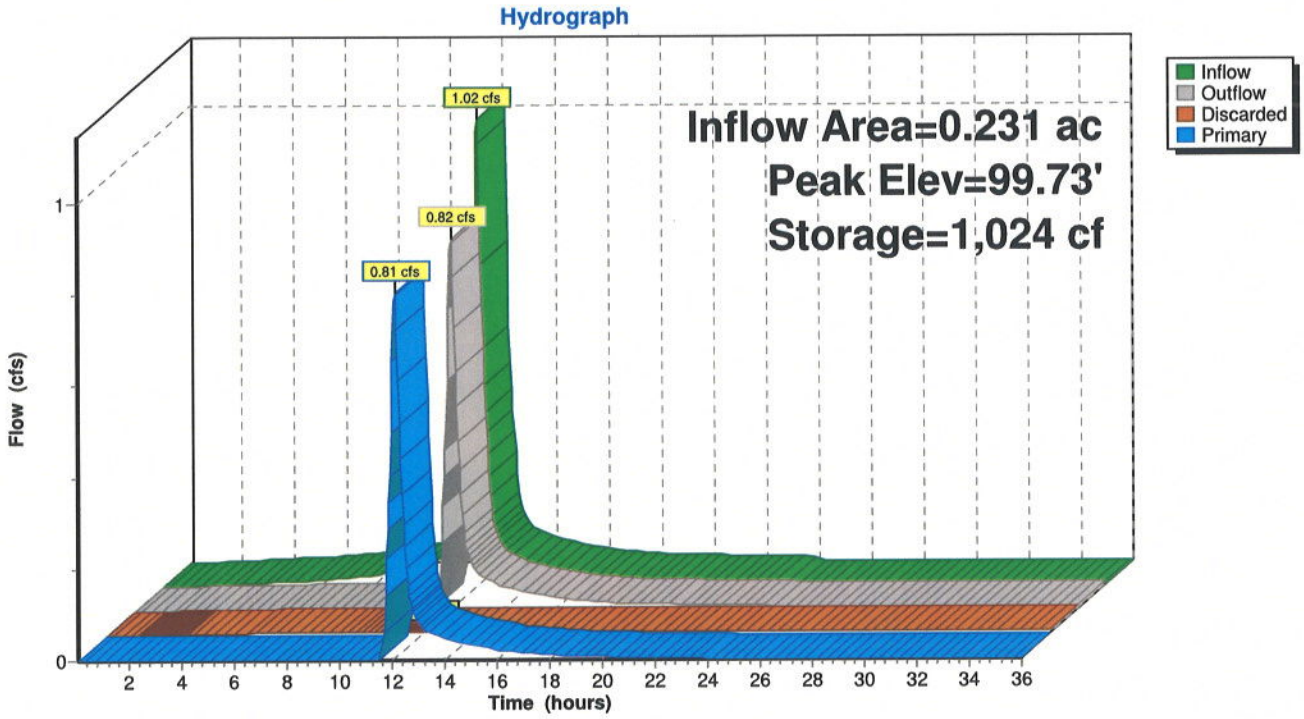
Volume	Invert	Avail.Storage	Storage Description
#1	96.50'	646 cf	**12.00'W x 45.00'L x 4.00'H Prismatoid** 2,160 cf Overall - 544 cf Embedded = 1,616 cf x 40.0% Voids
#2	97.00'	544 cf	**Cultec R-330XL** x 10 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 2 rows
		1,190 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	98.75'	**6.0" Vert. Orifice/Grate** C= 0.600
#2	Discarded	96.50'	**0.440 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.01 cfs @ 12.13 hrs HW=99.71' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.80 cfs @ 12.13 hrs HW=99.71' (Free Discharge)
└**1=Orifice/Grate** (Orifice Controls 0.80 cfs @ 4.06 fps)

Pond 20P: RECHARGE 1 - 8



Summary for Pond 23P: RECHARGE 15-28

Inflow Area =	0.231 ac,100.00% Impervious, Inflow Depth = 4.26" for 10-YR event			
Inflow =	1.02 cfs @ 12.07 hrs, Volume=	0.082 af		
Outflow =	0.82 cfs @ 12.13 hrs, Volume=	0.072 af, Atten= 20%, Lag= 3.8 min		
Discarded =	0.01 cfs @ 12.13 hrs, Volume=	0.021 af		
Primary =	0.81 cfs @ 12.13 hrs, Volume=	0.051 af		

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Peak Elev= 99.73' @ 12.13 hrs Surf.Area= 540 sf Storage= 1,024 cf

Plug-Flow detention time= 215.4 min calculated for 0.072 af (88% of inflow)
Center-of-Mass det. time= 158.1 min (907.0 - 748.9)

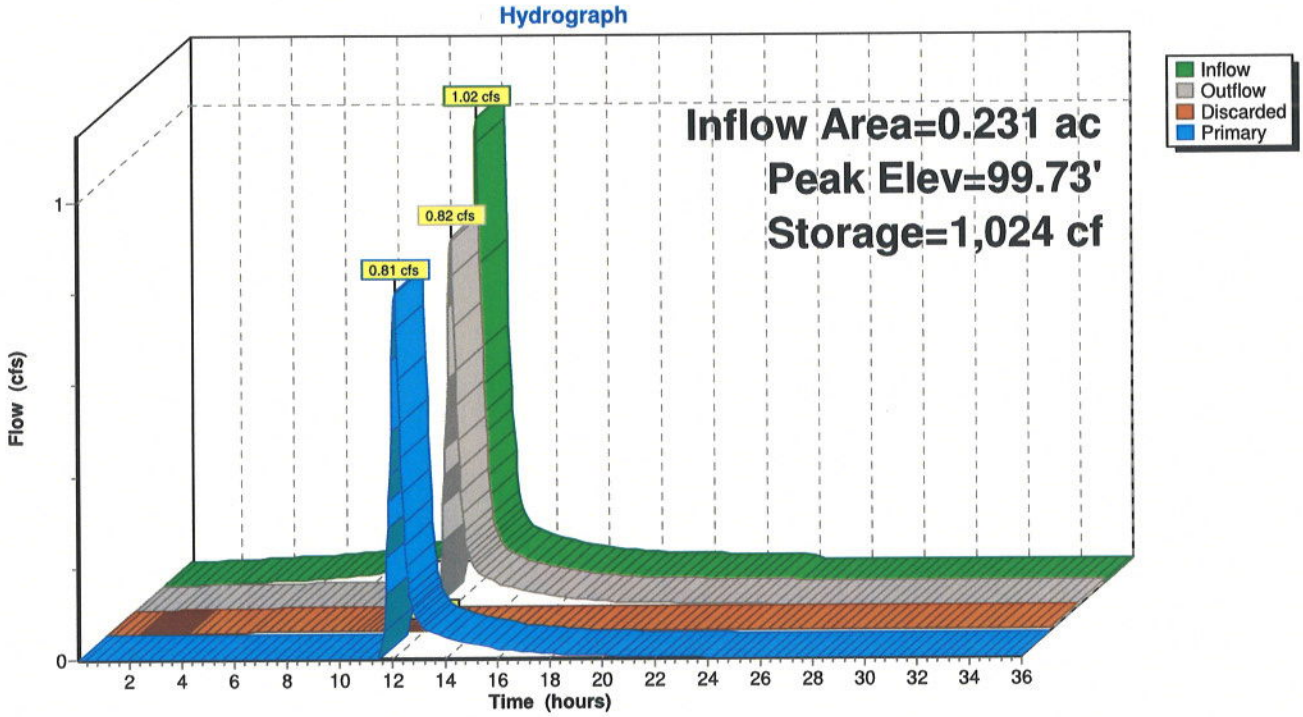
Volume	Invert	Avail.Storage	Storage Description
#1	96.50'	646 cf	**12.00'W x 45.00'L x 4.00'H Prismatoid** 2,160 cf Overall - 544 cf Embedded = 1,616 cf x 40.0% Voids
#2	97.00'	544 cf	**Cultec R-330XL** x 10 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 2 rows
		1,190 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	98.75'	**6.0" Vert. Orifice/Grate** C= 0.600
#2	Discarded	96.50'	**0.440 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.01 cfs @ 12.13 hrs HW=99.71' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.80 cfs @ 12.13 hrs HW=99.71' (Free Discharge)
└**1=Orifice/Grate** (Orifice Controls 0.80 cfs @ 4.06 fps)

Pond 23P: RECHARGE 15-28



Summary for Pond 25P: BIORETENTION BASIN

Inflow Area =	0.133 ac, 70.93% Impervious, Inflow Depth = 3.71" for 10-YR event			
Inflow =	0.55 cfs @ 12.07 hrs, Volume=	0.041 af		
Outflow =	0.02 cfs @ 15.80 hrs, Volume=	0.014 af, Atten= 97%, Lag= 223.9 min		
Discarded =	0.01 cfs @ 15.80 hrs, Volume=	0.012 af		
Primary =	0.01 cfs @ 15.80 hrs, Volume=	0.002 af		

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Peak Elev= 99.76' @ 15.80 hrs Surf.Area= 578 sf Storage= 1,384 cf

Plug-Flow detention time= 626.0 min calculated for 0.014 af (35% of inflow)
Center-of-Mass det. time= 484.4 min (1,265.0 - 780.6)

Volume	Invert	Avail.Storage	Storage Description
#1	95.50'	1,538 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

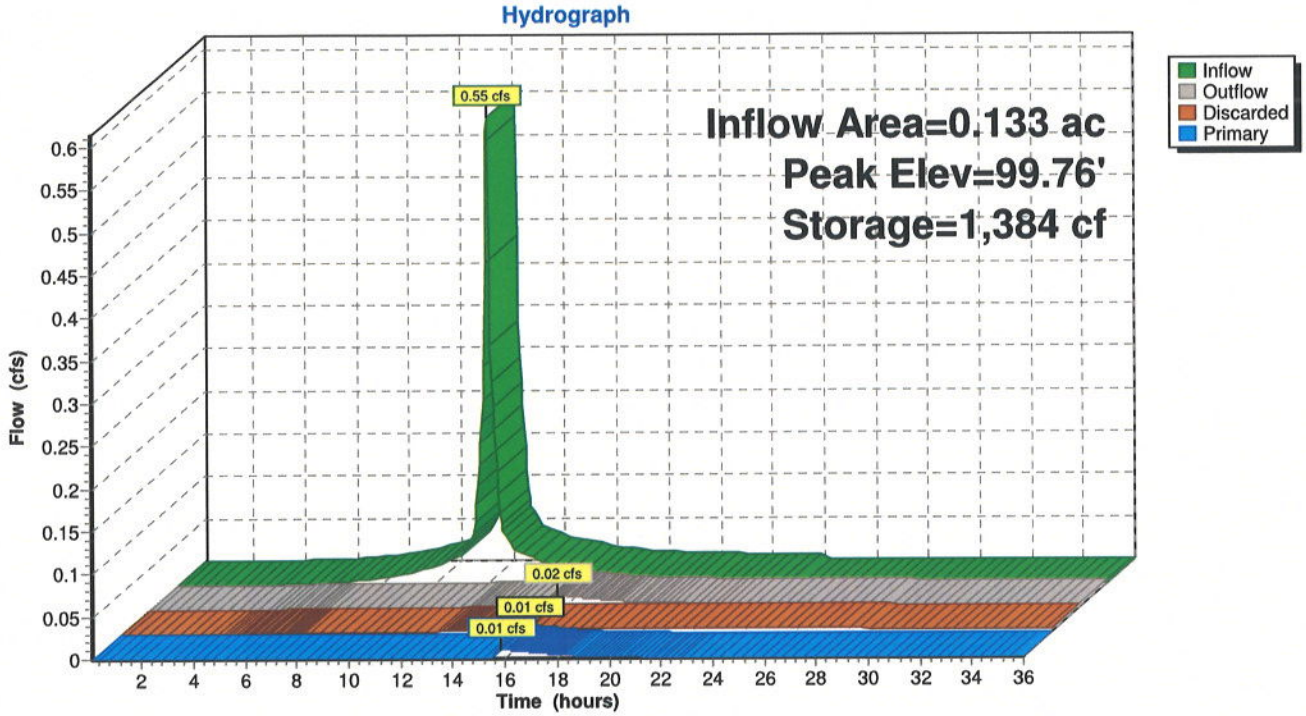
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
95.50	302	122.0	0	0	302
96.00	302	122.0	151	151	363
98.75	302	122.0	831	982	699
99.00	302	122.0	76	1,057	729
100.00	685	146.0	481	1,538	1,258

Device	Routing	Invert	Outlet Devices
#1	Primary	99.75'	**2.0' long x 2.00' rise Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.7' Crest Height
#2	Discarded	95.50'	**0.440 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 15.80 hrs HW=99.76' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.00 cfs @ 15.80 hrs HW=99.76' (Free Discharge)
└**1=Sharp-Crested Rectangular Weir** (Weir Controls 0.00 cfs @ 0.27 fps)

Pond 25P: BIORETENTION BASIN



Summary for Pond 26P: BIORETENTION BASIN

Inflow Area =	0.132 ac, 70.92% Impervious, Inflow Depth = 3.71" for 10-YR event				
Inflow =	0.55 cfs @	12.07 hrs, Volume=	0.041 af		
Outflow =	0.05 cfs @	12.94 hrs, Volume=	0.025 af, Atten= 91%, Lag= 52.1 min		
Discarded =	0.01 cfs @	12.94 hrs, Volume=	0.018 af		
Primary =	0.04 cfs @	12.94 hrs, Volume=	0.007 af		

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Peak Elev= 99.79' @ 12.94 hrs Surf.Area= 923 sf Storage= 1,062 cf

Plug-Flow detention time= 484.1 min calculated for 0.025 af (62% of inflow)
Center-of-Mass det. time= 383.0 min (1,163.6 - 780.6)

Volume	Invert	Avail.Storage	Storage Description
#1	95.50'	2,456 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

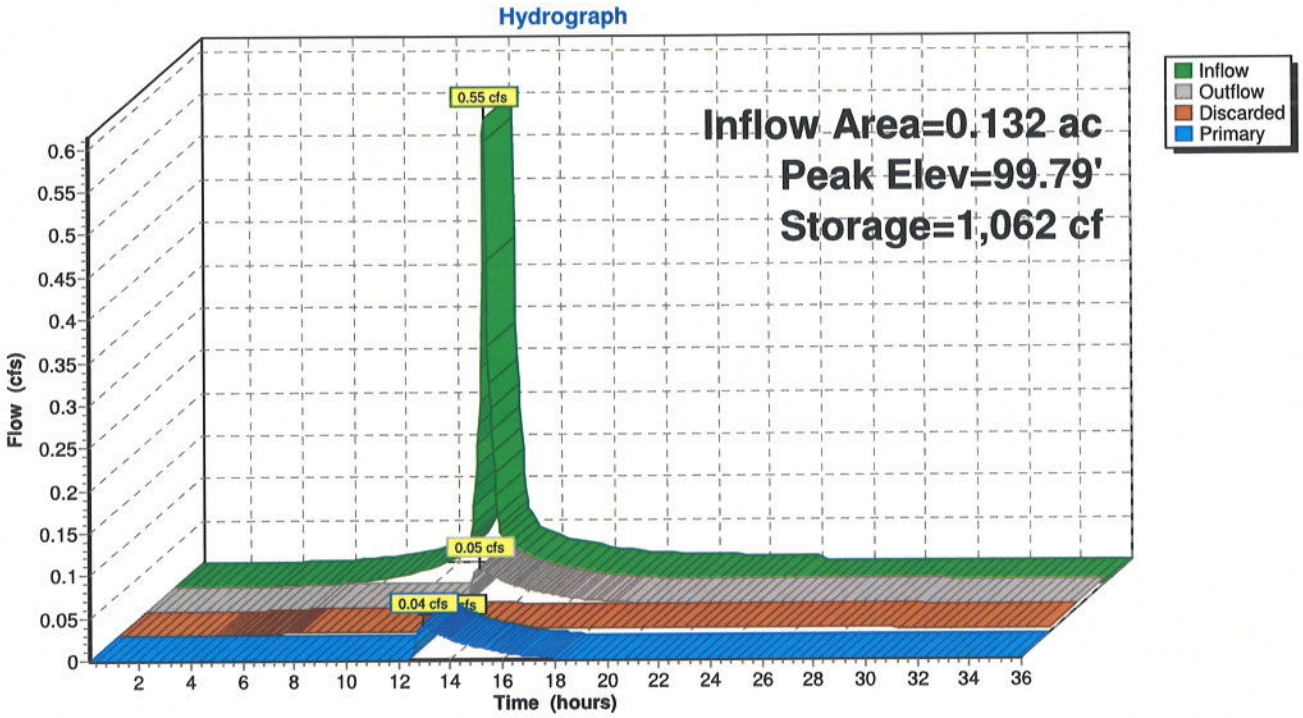
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
95.50	425	167.0	0.0	0	0	425
96.00	425	167.0	40.0	85	85	509
98.75	425	167.0	30.0	351	436	968
99.00	425	167.0	100.0	106	542	1,010
100.00	1,088	213.0	100.0	731	1,273	2,413
101.00	1,281	181.0	100.0	1,183	2,456	3,436

Device	Routing	Invert	Outlet Devices
#1	Primary	99.75'	**2.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Discarded	95.50'	**0.440 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 12.94 hrs HW=99.79' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.04 cfs @ 12.94 hrs HW=99.79' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Weir Controls 0.04 cfs @ 0.51 fps)

Pond 26P: BIORETENTION BASIN



Summary for Pond 29P: TREE BOX FILTER

Inflow Area = 0.174 ac,100.00% Impervious, Inflow Depth = 4.26" for 10-YR event
Inflow = 0.77 cfs @ 12.07 hrs, Volume= 0.062 af
Outflow = 0.74 cfs @ 12.09 hrs, Volume= 0.061 af, Atten= 4%, Lag= 1.5 min
Primary = 0.74 cfs @ 12.09 hrs, Volume= 0.061 af

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Peak Elev= 98.11' @ 12.09 hrs Surf.Area= 60 sf Storage= 85 cf

Plug-Flow detention time= 22.8 min calculated for 0.061 af (98% of inflow)
Center-of-Mass det. time= 11.4 min (760.3 - 748.9)

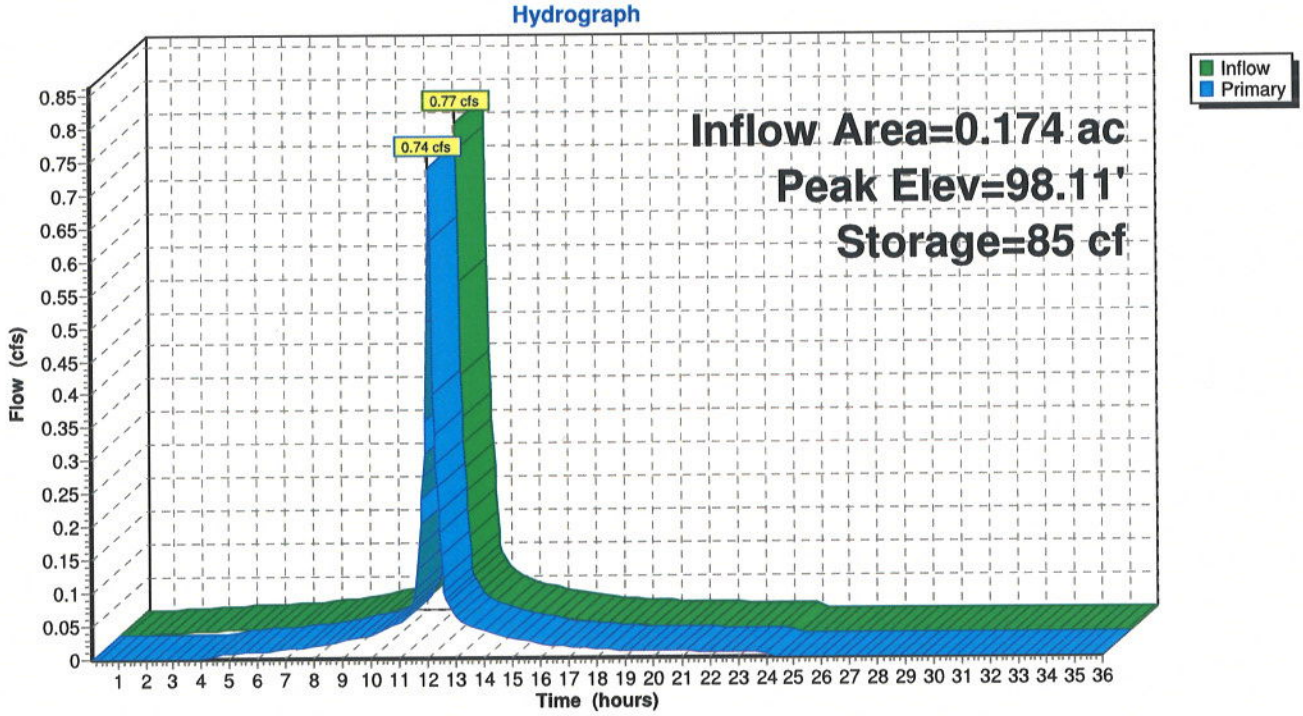
Volume	Invert	Avail.Storage	Storage Description
#1	95.00'	93 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
95.00	60	0.0	0	0
95.50	60	40.0	12	12
97.50	60	30.0	36	48
98.25	60	100.0	45	93

Device	Routing	Invert	Outlet Devices
#1	Device 2	95.00'	**6.0" Vert. Orifice/Grate** C= 0.600
#2	Primary	97.50'	**1.0" W x 18.0" H Vert. Orifice/Grate X 10.00** C= 0.600

Primary OutFlow Max=0.73 cfs @ 12.09 hrs HW=98.10' (Free Discharge)
└─**2=Orifice/Grate** (Passes 0.73 cfs of 1.24 cfs potential flow)
  └─**1=Orifice/Grate** (Orifice Controls 0.73 cfs @ 3.73 fps)

Pond 29P: TREE BOX FILTER



Summary for Pond 33P: TREE BOX FILTER

Inflow Area =	0.169 ac,100.00% Impervious, Inflow Depth = 4.26" for 10-YR event				
Inflow =	0.75 cfs @ 12.07 hrs, Volume=	0.060 af			
Outflow =	0.72 cfs @ 12.09 hrs, Volume=	0.059 af, Atten= 4%, Lag= 1.4 min			
Primary =	0.72 cfs @ 12.09 hrs, Volume=	0.059 af			

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Peak Elev= 98.08' @ 12.09 hrs Surf.Area= 60 sf Storage= 83 cf

Plug-Flow detention time= 23.5 min calculated for 0.059 af (98% of inflow)
Center-of-Mass det. time= 11.7 min (760.6 - 748.9)

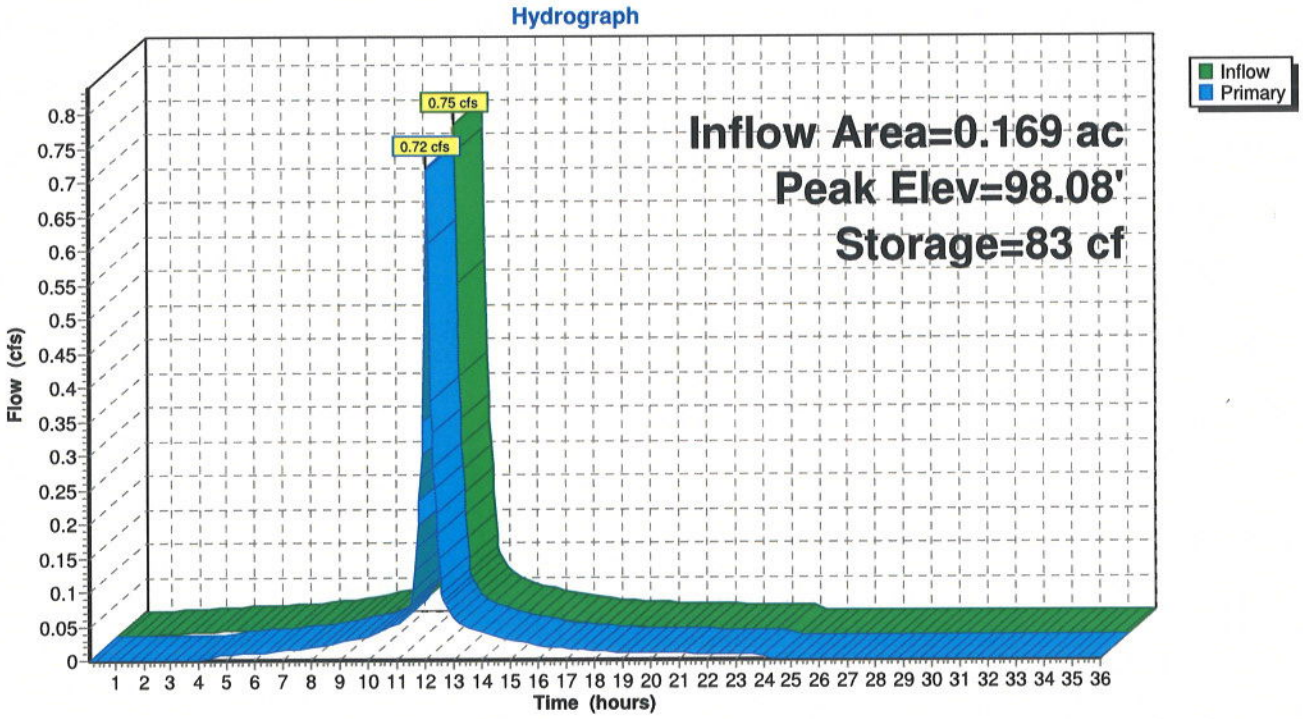
Volume	Invert	Avail.Storage	Storage Description
#1	95.00'	93 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
95.00	60	0.0	0	0
95.50	60	40.0	12	12
97.50	60	30.0	36	48
98.25	60	100.0	45	93

Device	Routing	Invert	Outlet Devices
#1	Device 2	95.00'	**6.0" Vert. Orifice/Grate** C= 0.600
#2	Primary	97.50'	**1.0" W x 18.0" H Vert. Orifice/Grate X 10.00** C= 0.600

Primary OutFlow Max=0.71 cfs @ 12.09 hrs HW=98.07' (Free Discharge)
└─**2=Orifice/Grate** (Passes 0.71 cfs of 1.14 cfs potential flow)
  └─**1=Orifice/Grate** (Orifice Controls 0.71 cfs @ 3.62 fps)

Pond 33P: TREE BOX FILTER

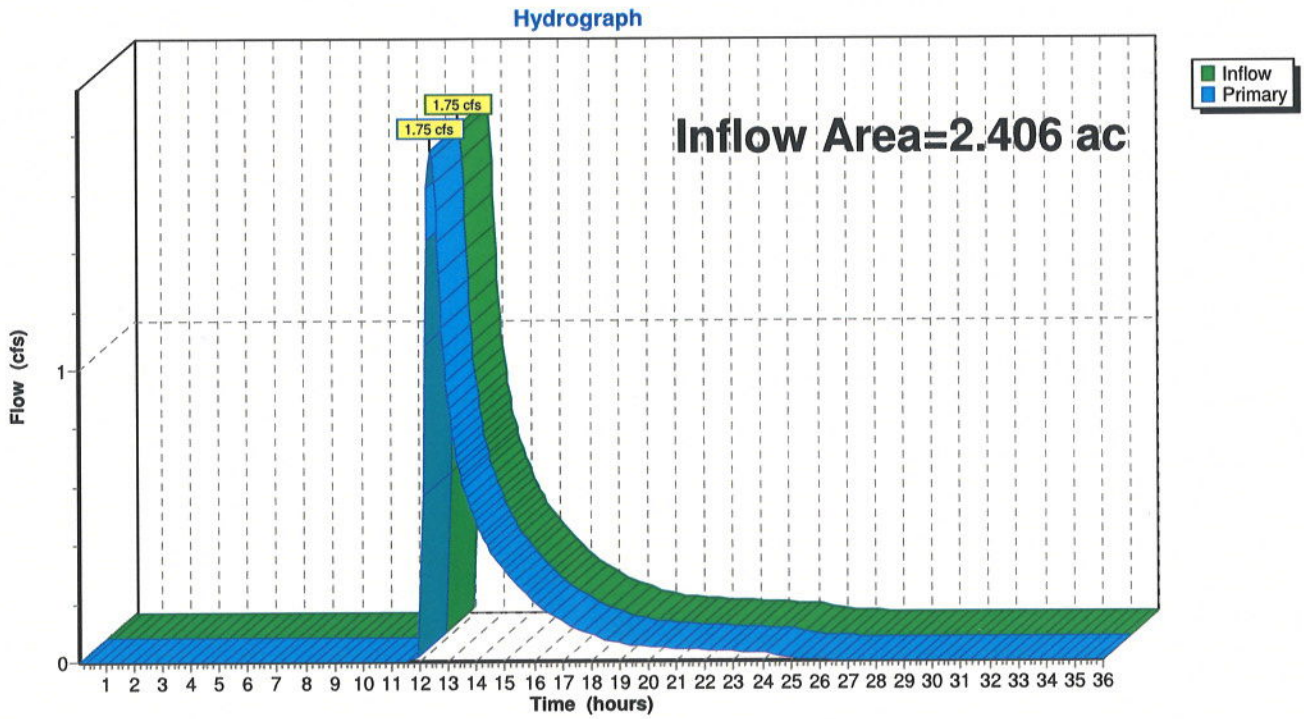


Summary for Link 15L: DP#2-REAR WETLANDS

Inflow Area =	2.406 ac, 41.32% Impervious, Inflow Depth = 1.27" for 10-YR event				
Inflow =	1.75 cfs @ 12.43 hrs, Volume=	0.254 af			
Primary =	1.75 cfs @ 12.43 hrs, Volume=	0.254 af, Atten= 0%, Lag= 0.0 min			

Primary outflow = Inflow, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs

Link 15L: DP#2-REAR WETLANDS



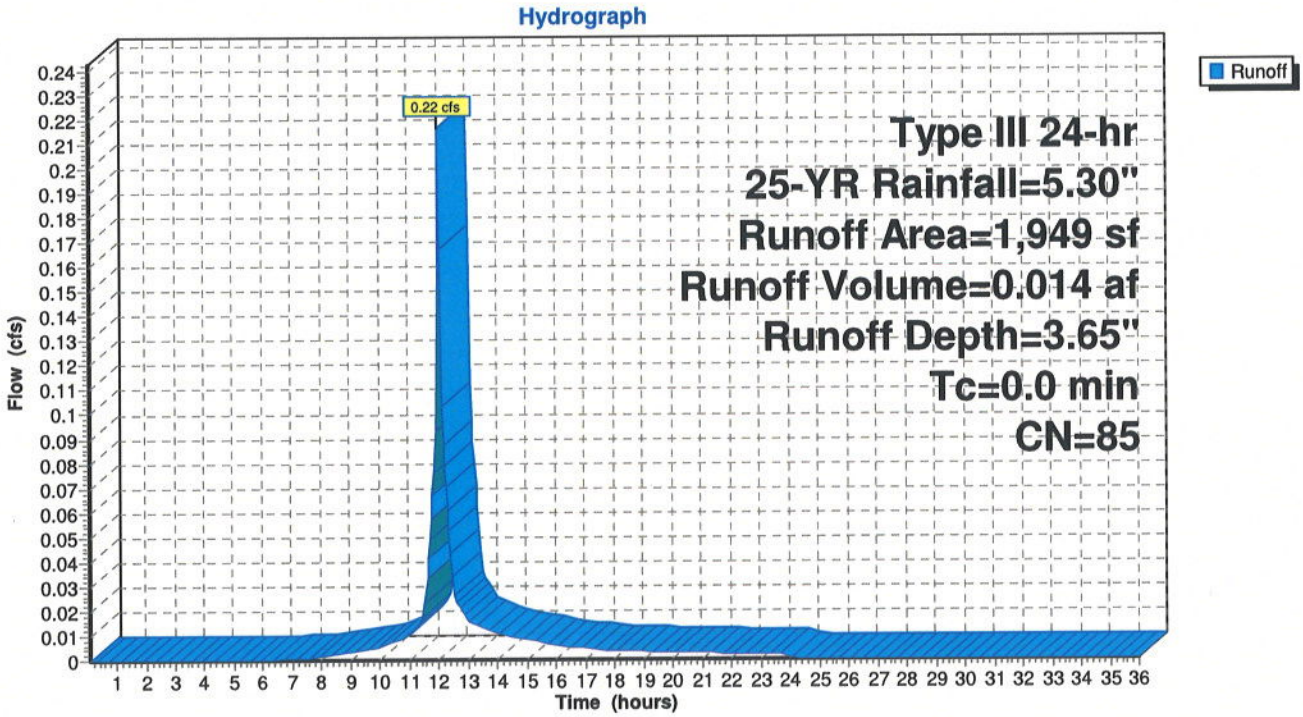
Summary for Subcatchment 1S: DP#1-GREENMONT

Runoff = 0.22 cfs @ 12.00 hrs, Volume= 0.014 af, Depth= 3.65"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=5.30"

Area (sf)	CN	Description
569	98	Paved parking, HSG D
1,380	80	>75% Grass cover, Good, HSG D
1,949	85	Weighted Average
1,380		70.81% Pervious Area
569		29.19% Impervious Area

Subcatchment 1S: DP#1-GREENMONT



Summary for Subcatchment 3S: PWS#2

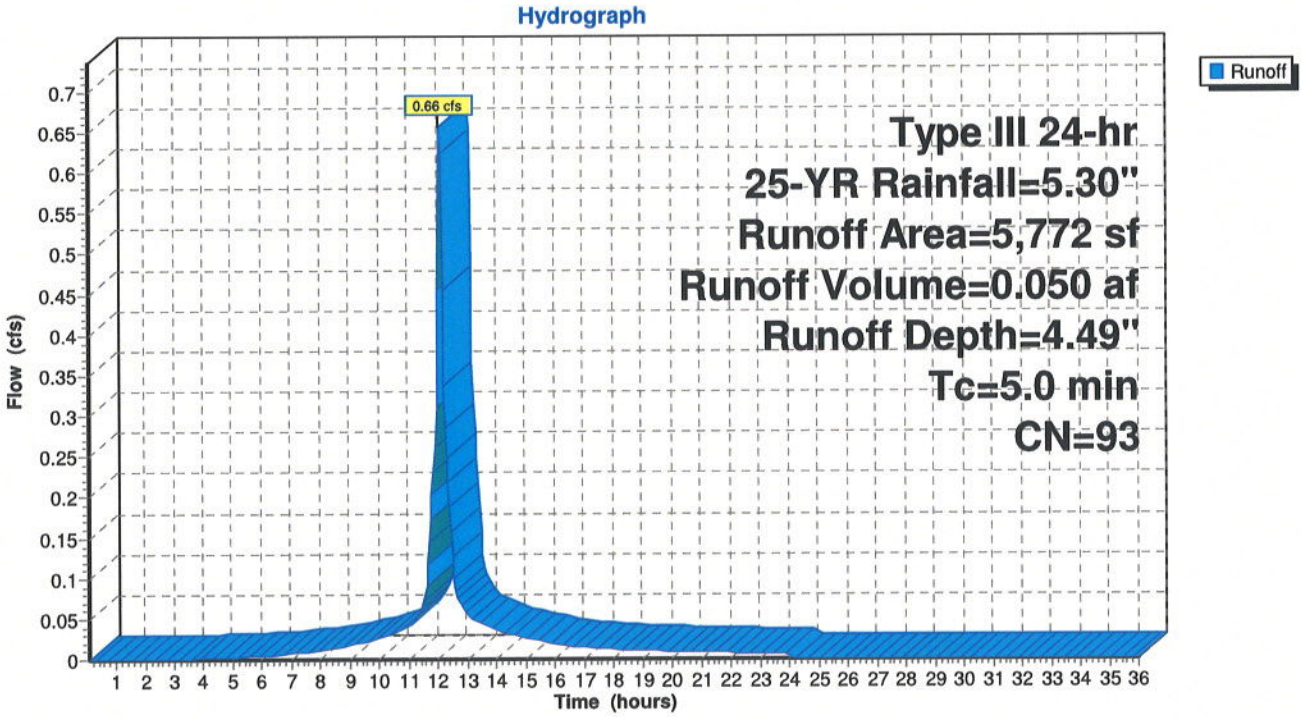
Runoff = 0.66 cfs @ 12.07 hrs, Volume= 0.050 af, Depth= 4.49"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=5.30"

Area (sf)	CN	Description
4,094	98	Paved parking, HSG D
1,678	80	>75% Grass cover, Good, HSG D
5,772	93	Weighted Average
1,678		29.07% Pervious Area
4,094		70.93% Impervious Area

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

Subcatchment 3S: PWS#2



Summary for Subcatchment 5S: ROOFS 15 - 28

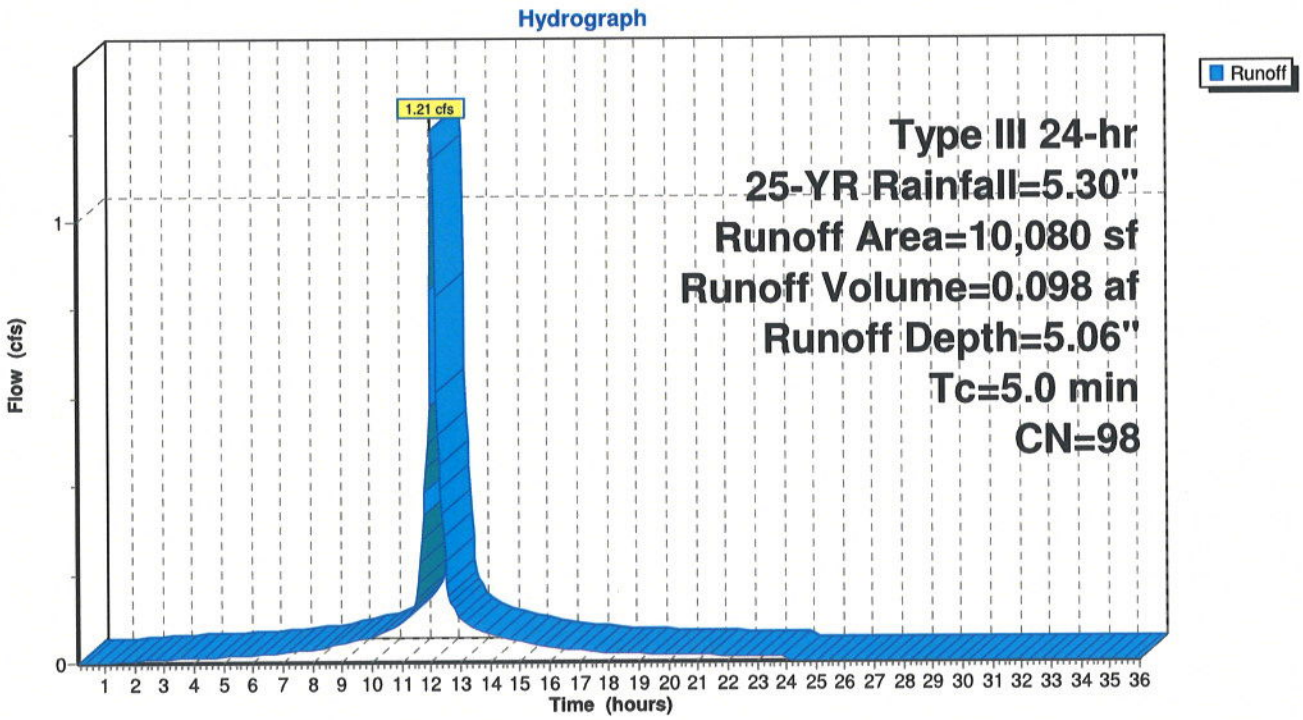
Runoff = 1.21 cfs @ 12.07 hrs, Volume= 0.098 af, Depth= 5.06"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=5.30"

Area (sf)	CN	Description
10,080	98	Roofs, HSG D
10,080		100.00% Impervious Area

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

Subcatchment 5S: ROOFS 15 - 28



Summary for Subcatchment 6S: PWS#3

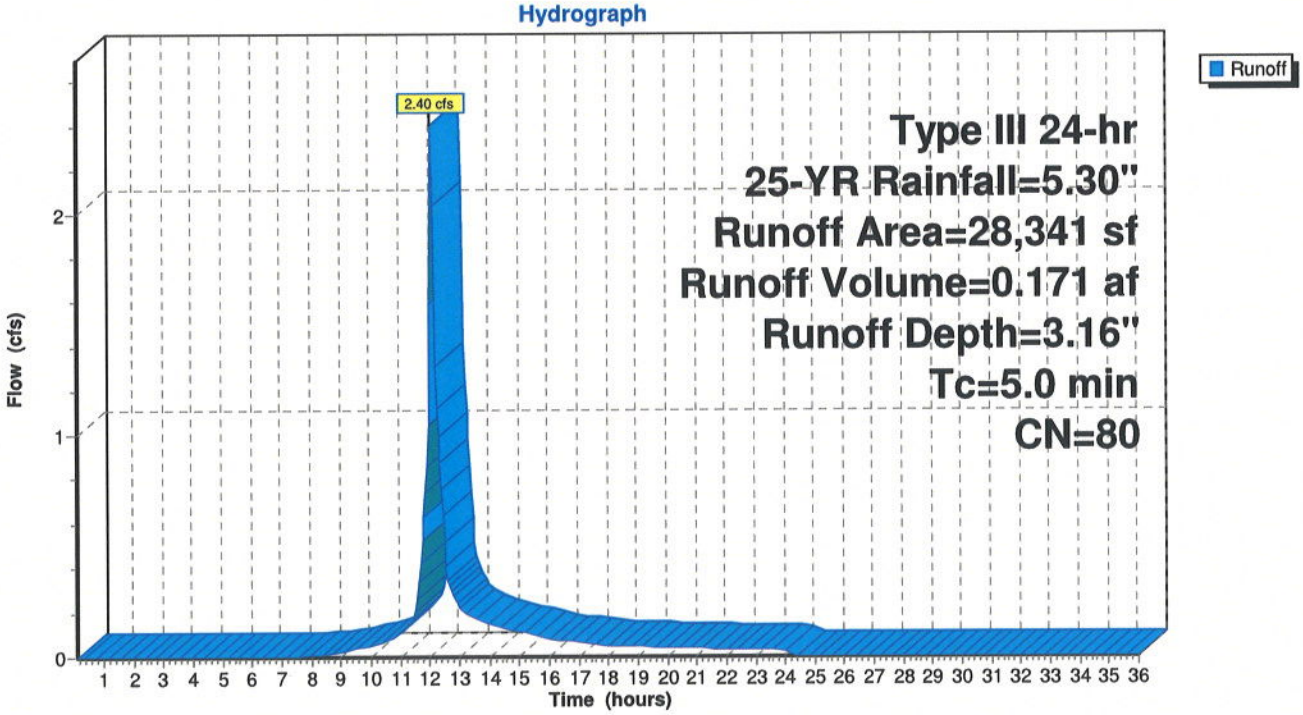
Runoff = 2.40 cfs @ 12.08 hrs, Volume= 0.171 af, Depth= 3.16"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=5.30"

	Area (sf)	CN	Description
	18,244	80	>75% Grass cover, Good, HSG D
*	10,097	80	
	28,341	80	Weighted Average
	28,341		100.00% Pervious Area

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

Subcatchment 6S: PWS#3



Summary for Subcatchment 7S: PWS#4

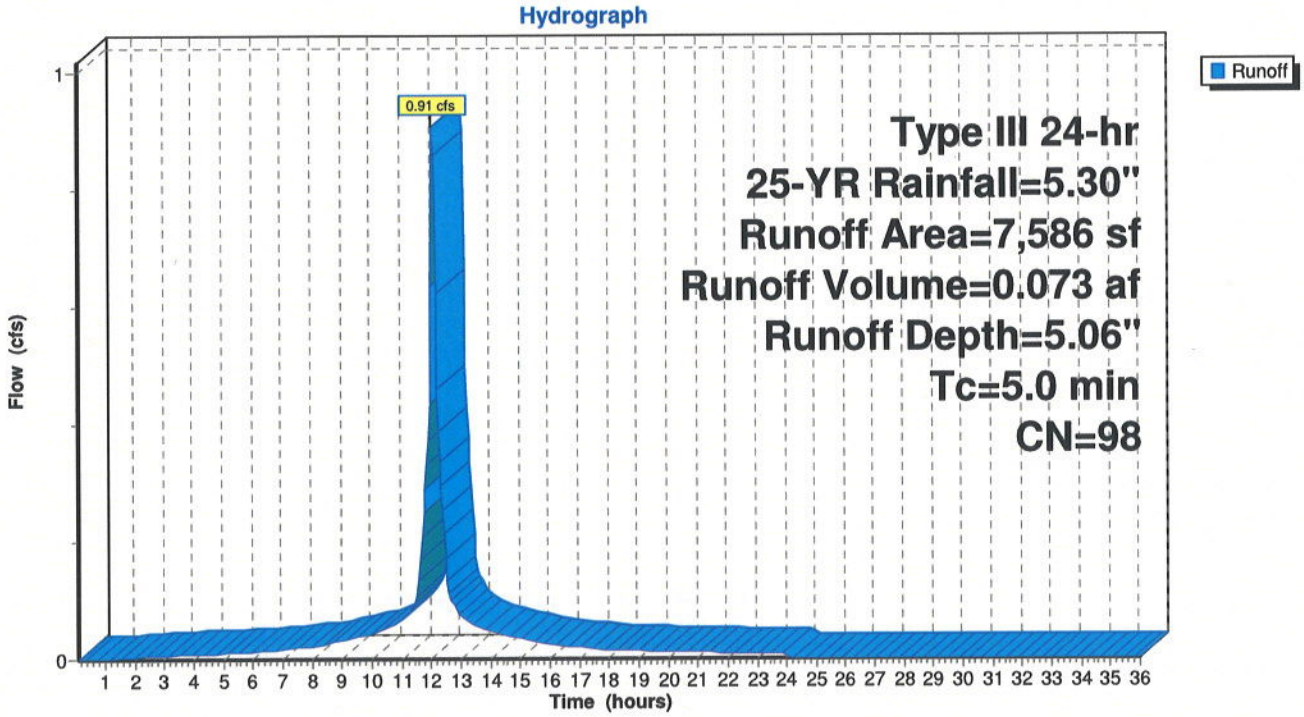
Runoff = 0.91 cfs @ 12.07 hrs, Volume= 0.073 af, Depth= 5.06"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=5.30"

Area (sf)	CN	Description
7,586	98	Paved parking, HSG D
7,586		100.00% Impervious Area

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

Subcatchment 7S: PWS#4



Summary for Subcatchment 9S: PWS#5

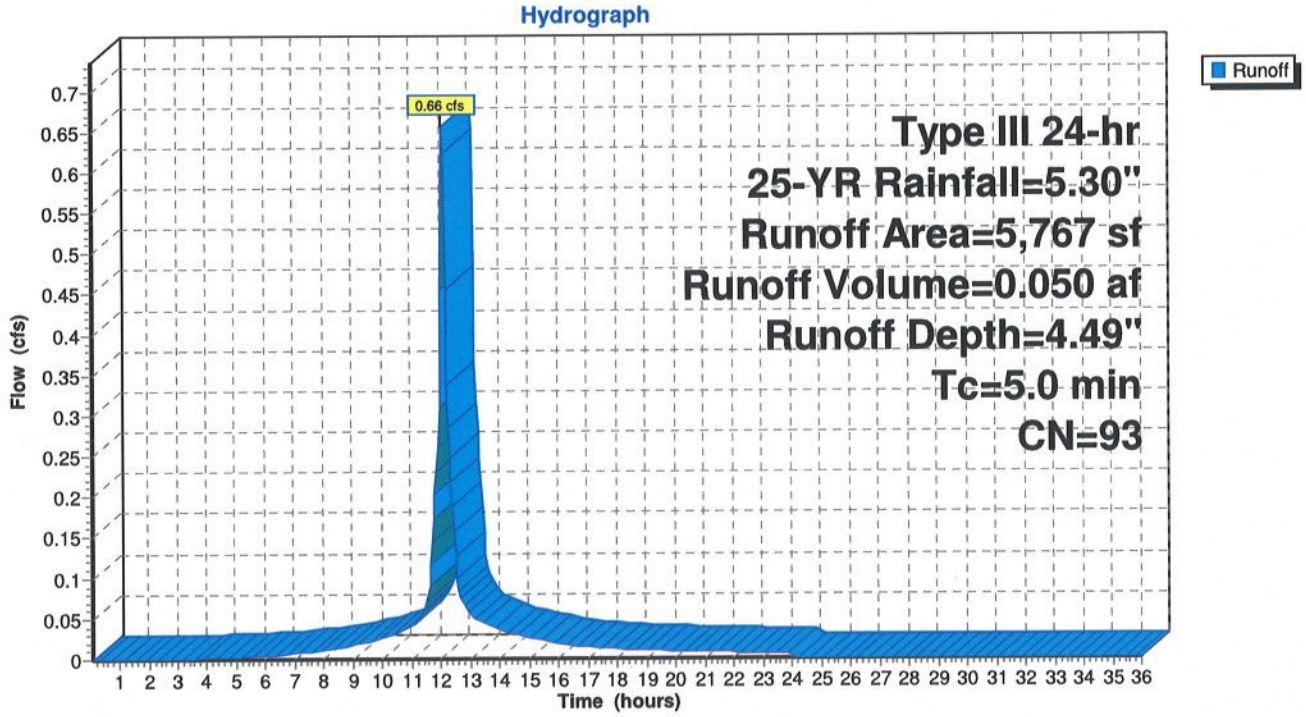
Runoff = 0.66 cfs @ 12.07 hrs, Volume= 0.050 af, Depth= 4.49"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=5.30"

Area (sf)	CN	Description
4,090	98	Paved parking, HSG D
1,677	80	>75% Grass cover, Good, HSG D
5,767	93	Weighted Average
1,677		29.08% Pervious Area
4,090		70.92% Impervious Area

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

Subcatchment 9S: PWS#5



Summary for Subcatchment 11S: PWS#6

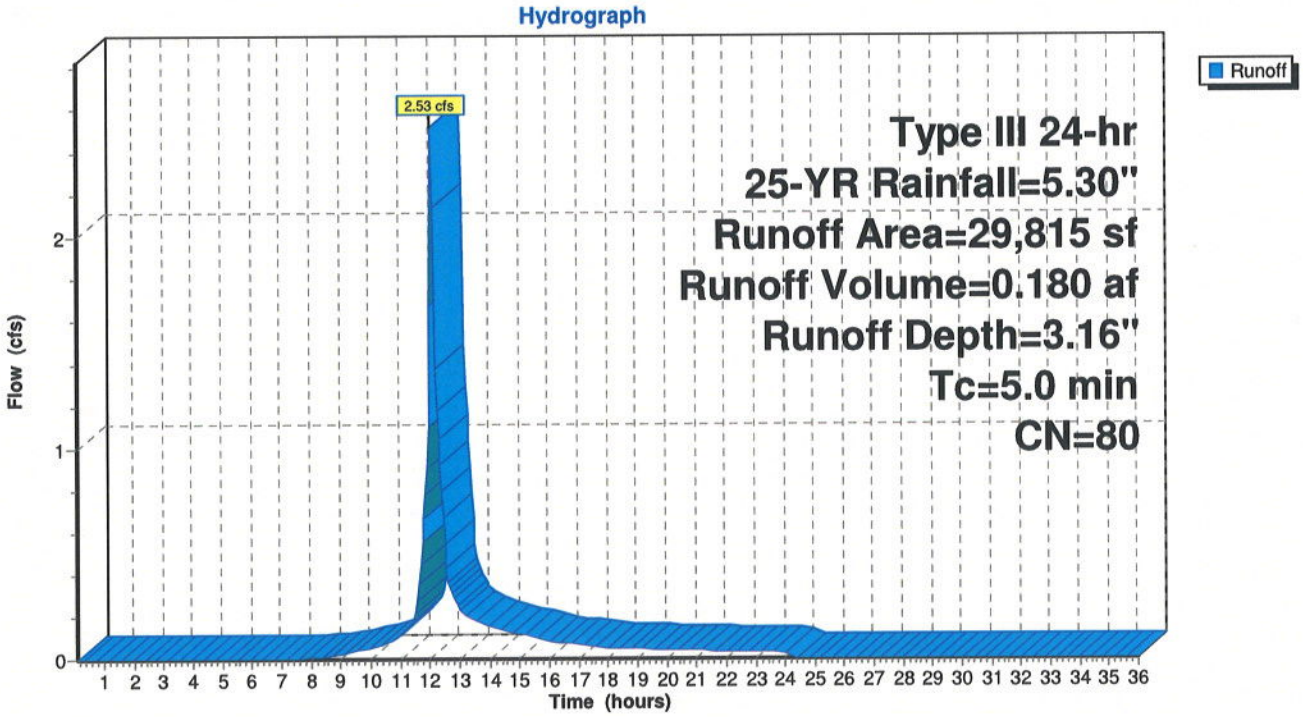
Runoff = 2.53 cfs @ 12.08 hrs, Volume= 0.180 af, Depth= 3.16"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=5.30"

	Area (sf)	CN	Description
	21,412	80	>75% Grass cover, Good, HSG D
*	8,403	80	
	29,815	80	Weighted Average
	29,815		100.00% Pervious Area

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

Subcatchment 11S: PWS#6



Summary for Subcatchment 13S: PWS#7

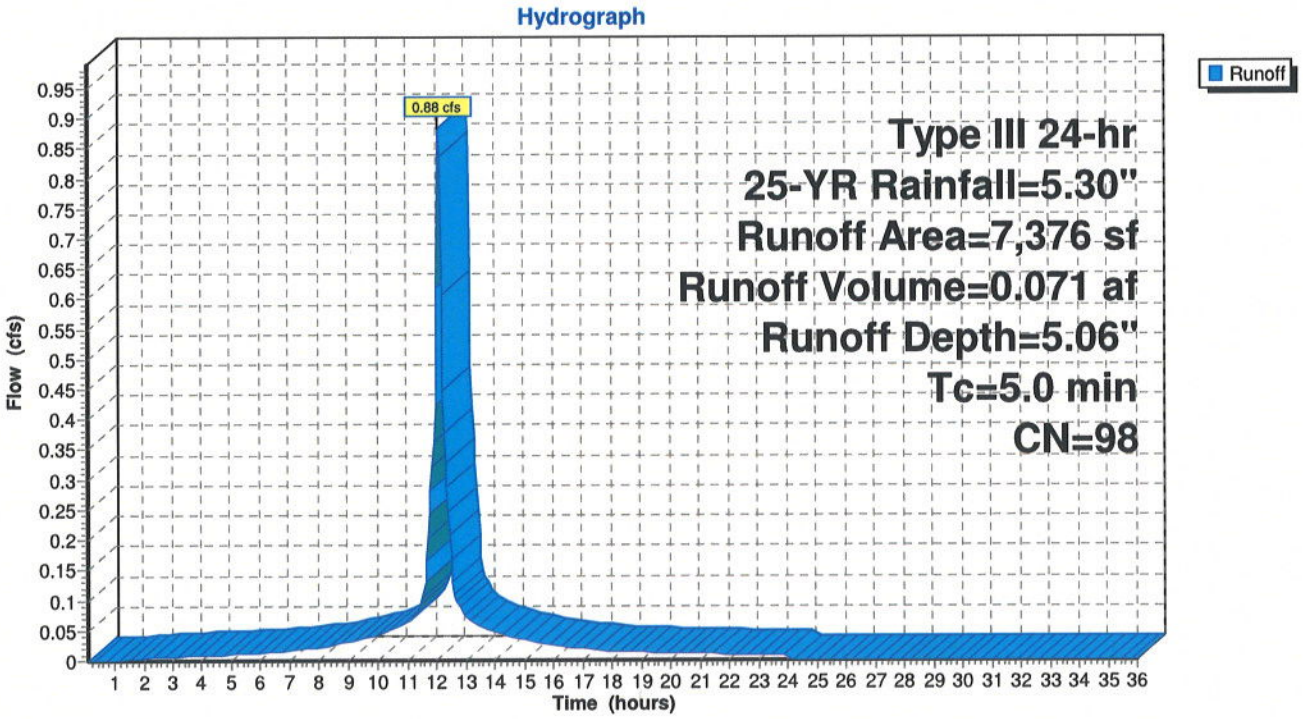
Runoff = 0.88 cfs @ 12.07 hrs, Volume= 0.071 af, Depth= 5.06"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=5.30"

Area (sf)	CN	Description
7,376	98	Paved parking, HSG D
7,376		100.00% Impervious Area

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

Subcatchment 13S: PWS#7



Summary for Subcatchment 18S: ROOFS 1 - 14

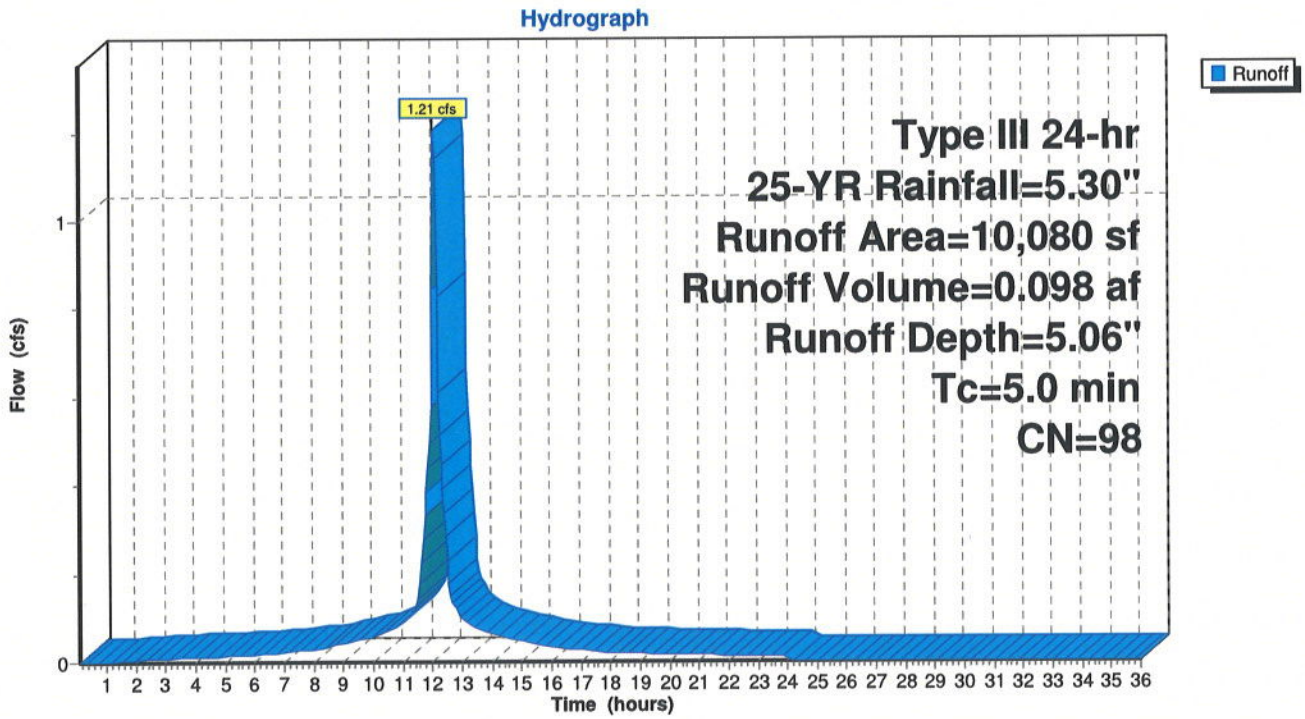
Runoff = 1.21 cfs @ 12.07 hrs, Volume= 0.098 af, Depth= 5.06"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=5.30"

Area (sf)	CN	Description
10,080	98	Roofs, HSG D
10,080		100.00% Impervious Area

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

Subcatchment 18S: ROOFS 1 - 14



Summary for Reach 4R: GRASS LINED SWALE #1

Inflow Area = 1.015 ac, 32.07% Impervious, Inflow Depth = 2.93" for 25-YR event
Inflow = 3.27 cfs @ 12.09 hrs, Volume= 0.248 af
Outflow = 3.08 cfs @ 12.16 hrs, Volume= 0.248 af, Atten= 6%, Lag= 4.7 min

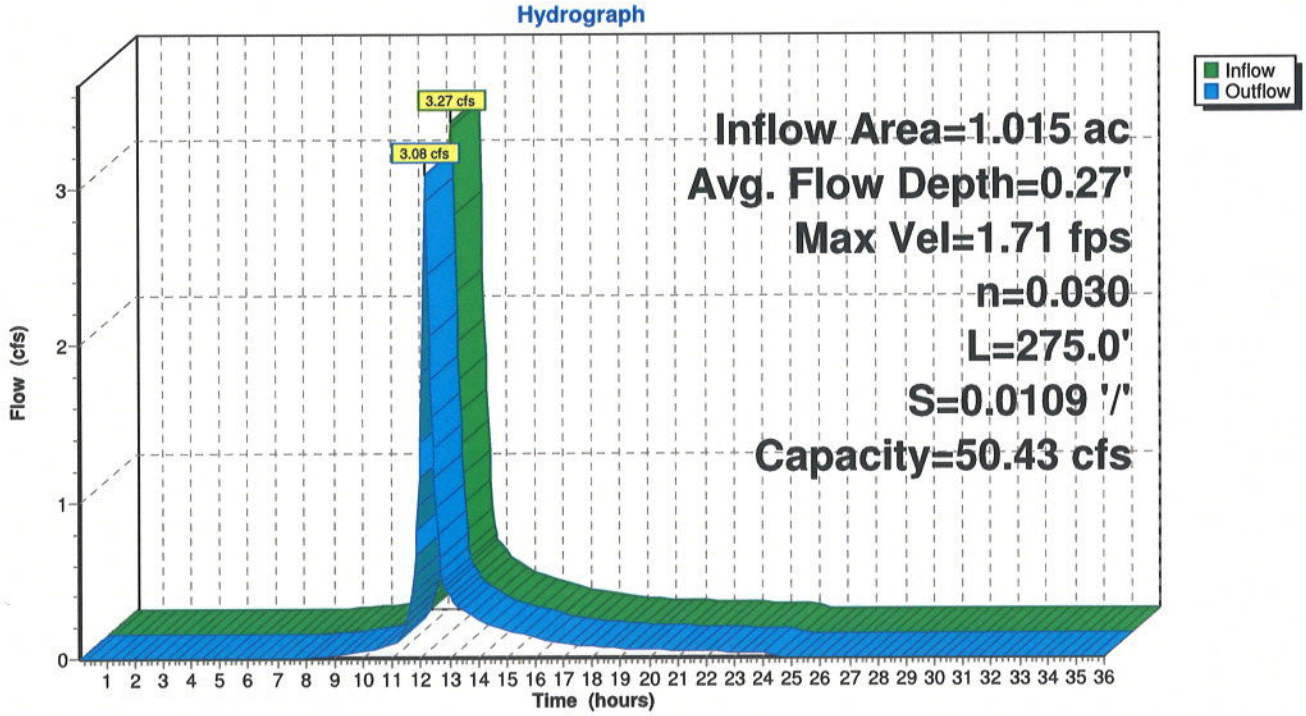
Routing by Stor-Ind+Trans method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.71 fps, Min. Travel Time= 2.7 min
Avg. Velocity = 0.52 fps, Avg. Travel Time= 8.7 min

Peak Storage= 497 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.27'
Bank-Full Depth= 1.00' Flow Area= 14.0 sf, Capacity= 50.43 cfs

4.00' x 1.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 10.0 '/' Top Width= 24.00'
Length= 275.0' Slope= 0.0109 '/'
Inlet Invert= 99.00', Outlet Invert= 96.00'

‡

Reach 4R: GRASS LINED SWALE #1



Summary for Reach 12R: GRASS LINED SWALE #2

Inflow Area =	1.048 ac, 31.03% Impervious, Inflow Depth = 2.99" for 25-YR event				
Inflow =	3.39 cfs @ 12.09 hrs, Volume=	0.261 af			
Outflow =	3.20 cfs @ 12.16 hrs, Volume=	0.261 af, Atten= 6%, Lag= 4.7 min			

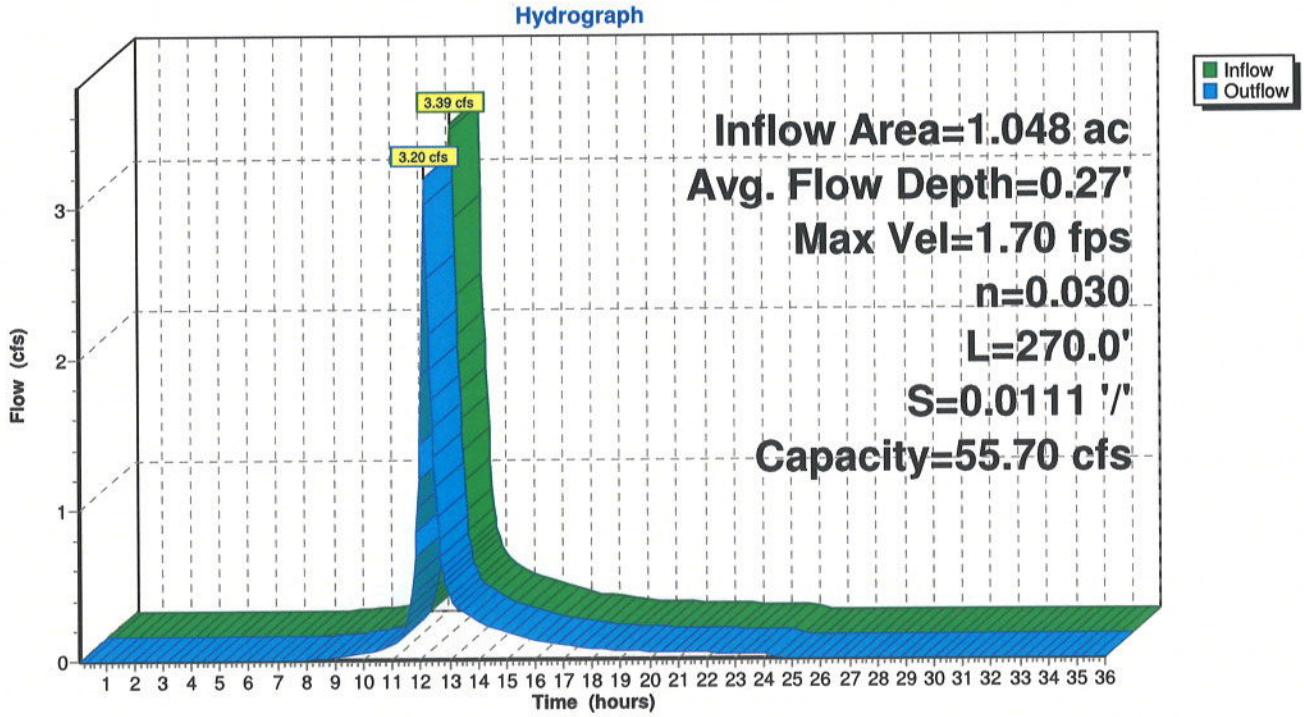
Routing by Stor-Ind+Trans method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.70 fps, Min. Travel Time= 2.7 min
Avg. Velocity = 0.53 fps, Avg. Travel Time= 8.5 min

Peak Storage= 513 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.27'
Bank-Full Depth= 1.00' Flow Area= 15.5 sf, Capacity= 55.70 cfs

4.00' x 1.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 4.0 19.0 '/' Top Width= 27.00'
Length= 270.0' Slope= 0.0111 '/'
Inlet Invert= 99.00', Outlet Invert= 96.00'

‡

Reach 12R: GRASS LINED SWALE #2



Summary for Pond 8P: DETENTION POND #1

Inflow Area =	1.189 ac, 42.02% Impervious, Inflow Depth = 3.23" for 25-YR event				
Inflow =	3.76 cfs @	12.15 hrs, Volume=	0.320 af		
Outflow =	0.72 cfs @	12.67 hrs, Volume=	0.300 af, Atten= 81%, Lag= 31.2 min		
Discarded =	0.11 cfs @	12.67 hrs, Volume=	0.178 af		
Primary =	0.61 cfs @	12.67 hrs, Volume=	0.123 af		

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Peak Elev= 95.42' @ 12.67 hrs Surf.Area= 3,764 sf Storage= 6,413 cf

Plug-Flow detention time= 321.0 min calculated for 0.300 af (94% of inflow)
Center-of-Mass det. time= 287.9 min (1,096.7 - 808.8)

Volume	Invert	Avail.Storage	Storage Description
#1	93.00'	8,773 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

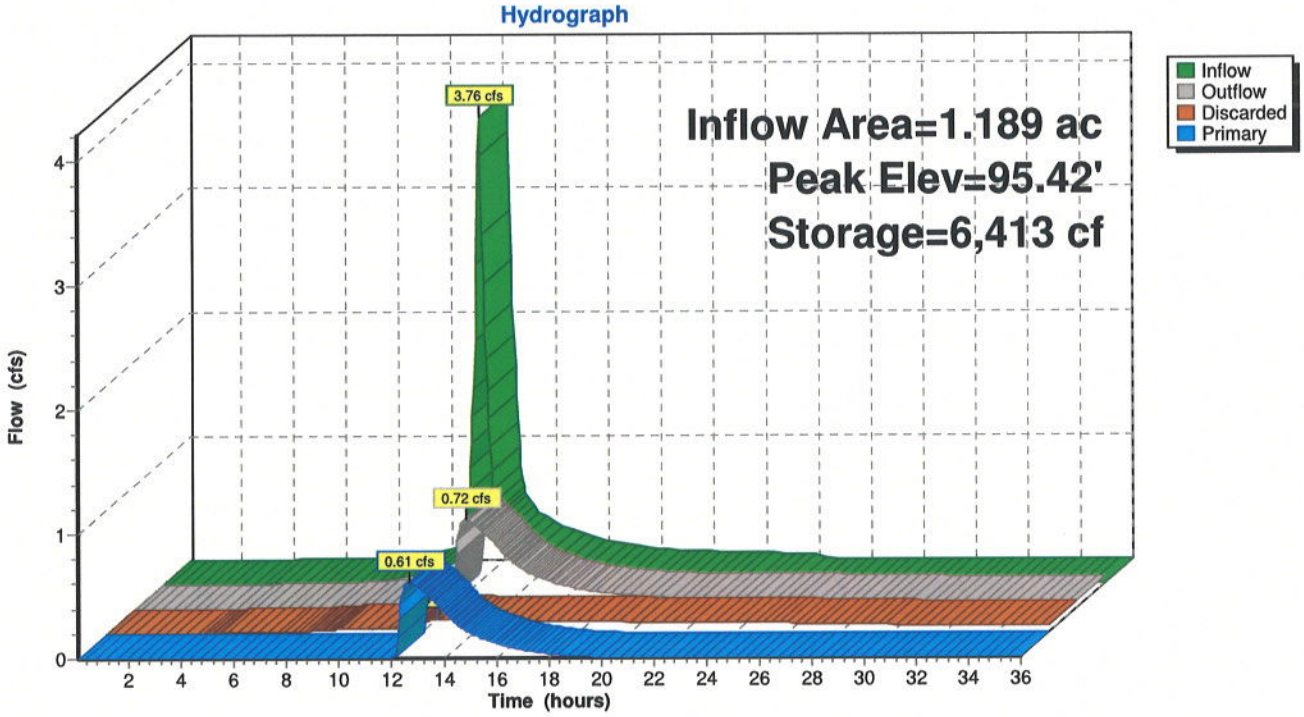
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
93.00	1,640	257.0	0	0	1,640
94.00	2,440	276.0	2,027	2,027	2,489
95.00	3,381	308.0	2,898	4,925	4,004
96.00	4,335	329.0	3,848	8,773	5,115

Device	Routing	Invert	Outlet Devices
#1	Primary	95.50'	**6.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32
#2	Primary	94.75'	**6.0" Vert. Orifice/Grate** C= 0.600
#3	Discarded	93.00'	**1.080 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.11 cfs @ 12.67 hrs HW=95.42' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.11 cfs)

Primary OutFlow Max=0.61 cfs @ 12.67 hrs HW=95.42' (Free Discharge)
├**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└**2=Orifice/Grate** (Orifice Controls 0.61 cfs @ 3.11 fps)

Pond 8P: DETENTION POND #1



Summary for Pond 14P: DETENTION POND #2

Inflow Area =	1.218 ac, 40.62% Impervious, Inflow Depth = 3.27" for 25-YR event				
Inflow =	3.88 cfs @	12.15 hrs,	Volume=	0.332 af	
Outflow =	2.44 cfs @	12.32 hrs,	Volume=	0.278 af,	Atten= 37%, Lag= 9.9 min
Discarded =	0.01 cfs @	12.32 hrs,	Volume=	0.012 af	
Primary =	2.43 cfs @	12.32 hrs,	Volume=	0.265 af	

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Peak Elev= 95.66' @ 12.32 hrs Surf.Area= 2,785 sf Storage= 4,652 cf

Plug-Flow detention time= 137.0 min calculated for 0.277 af (84% of inflow)
Center-of-Mass det. time= 74.5 min (881.3 - 806.8)

Volume	Invert	Avail.Storage	Storage Description
#1	93.00'	5,654 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

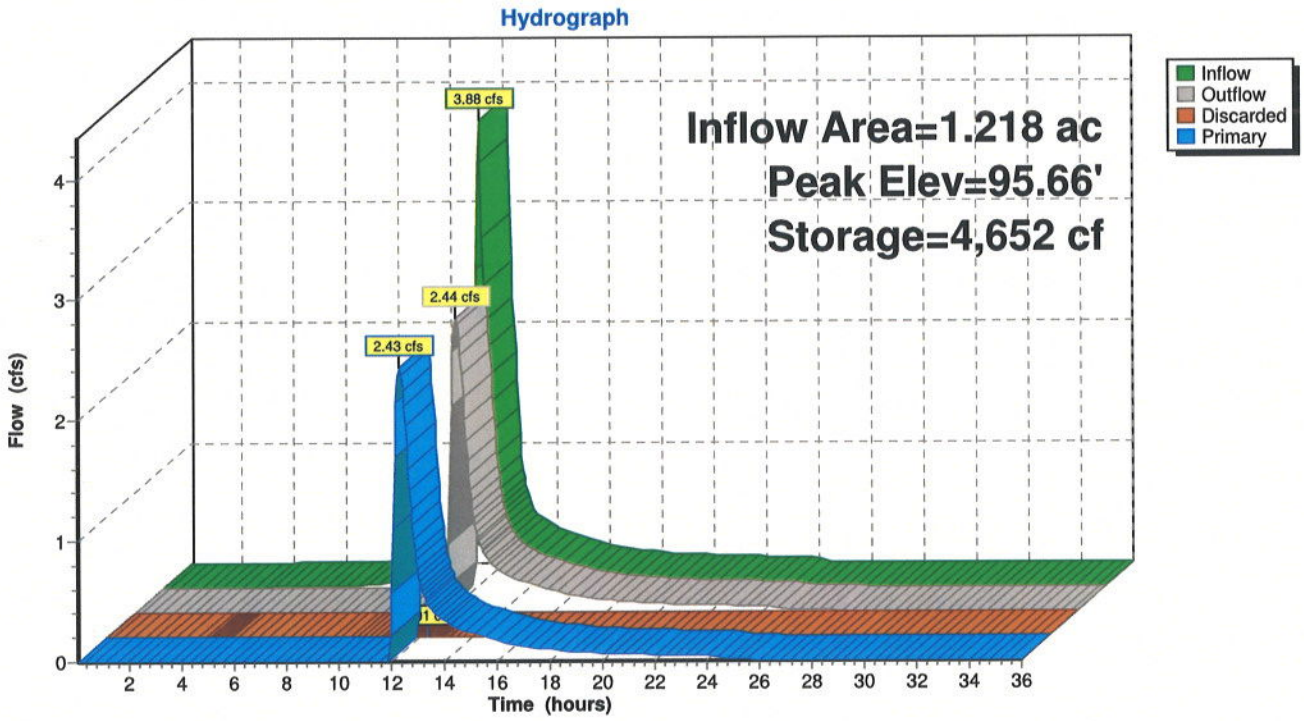
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
93.00	933	130.0	0	0	933
94.00	1,451	245.0	1,183	1,183	4,370
95.00	2,221	267.0	1,822	3,005	5,302
96.00	3,102	296.0	2,649	5,654	6,632

Device	Routing	Invert	Outlet Devices
#1	Primary	94.75'	**12.0" Vert. Orifice/Grate** C= 0.600
#2	Discarded	93.00'	**0.110 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 12.32 hrs HW=95.66' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=2.43 cfs @ 12.32 hrs HW=95.66' (Free Discharge)
└**1=Orifice/Grate** (Orifice Controls 2.43 cfs @ 3.24 fps)

Pond 14P: DETENTION POND #2



Summary for Pond 20P: RECHARGE 1 - 8

Inflow Area =	0.231 ac,100.00% Impervious, Inflow Depth = 5.06" for 25-YR event			
Inflow =	1.21 cfs @ 12.07 hrs, Volume=	0.098 af		
Outflow =	0.94 cfs @ 12.14 hrs, Volume=	0.088 af, Atten= 22%, Lag= 4.0 min		
Discarded =	0.01 cfs @ 12.14 hrs, Volume=	0.021 af		
Primary =	0.93 cfs @ 12.14 hrs, Volume=	0.066 af		

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Peak Elev= 99.97' @ 12.14 hrs Surf.Area= 540 sf Storage= 1,076 cf

Plug-Flow detention time= 190.2 min calculated for 0.088 af (90% of inflow)
Center-of-Mass det. time= 138.9 min (885.0 - 746.1)

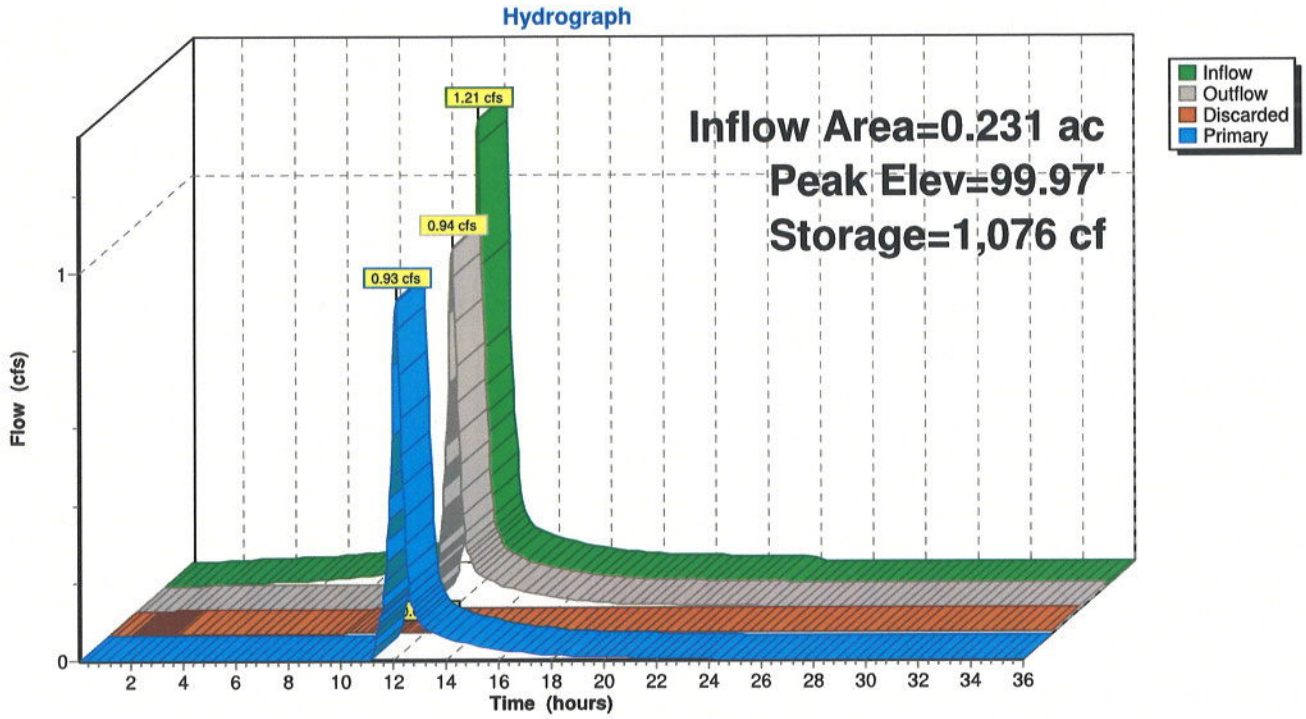
Volume	Invert	Avail.Storage	Storage Description
#1	96.50'	646 cf	**12.00'W x 45.00'L x 4.00'H Prismatoid** 2,160 cf Overall - 544 cf Embedded = 1,616 cf x 40.0% Voids
#2	97.00'	544 cf	**Cultec R-330XL** x 10 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 2 rows
		1,190 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	98.75'	**6.0" Vert. Orifice/Grate** C= 0.600
#2	Discarded	96.50'	**0.440 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.01 cfs @ 12.14 hrs HW=99.95' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.92 cfs @ 12.14 hrs HW=99.95' (Free Discharge)
└**1=Orifice/Grate** (Orifice Controls 0.92 cfs @ 4.70 fps)

Pond 20P: RECHARGE 1 - 8



Summary for Pond 23P: RECHARGE 15-28

Inflow Area =	0.231 ac,100.00% Impervious, Inflow Depth = 5.06" for 25-YR event				
Inflow =	1.21 cfs @	12.07 hrs,	Volume=	0.098 af	
Outflow =	0.94 cfs @	12.14 hrs,	Volume=	0.088 af,	Atten= 22%, Lag= 4.0 min
Discarded =	0.01 cfs @	12.14 hrs,	Volume=	0.021 af	
Primary =	0.93 cfs @	12.14 hrs,	Volume=	0.066 af	

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Peak Elev= 99.97' @ 12.14 hrs Surf.Area= 540 sf Storage= 1,076 cf

Plug-Flow detention time= 190.2 min calculated for 0.088 af (90% of inflow)
Center-of-Mass det. time= 138.9 min (885.0 - 746.1)

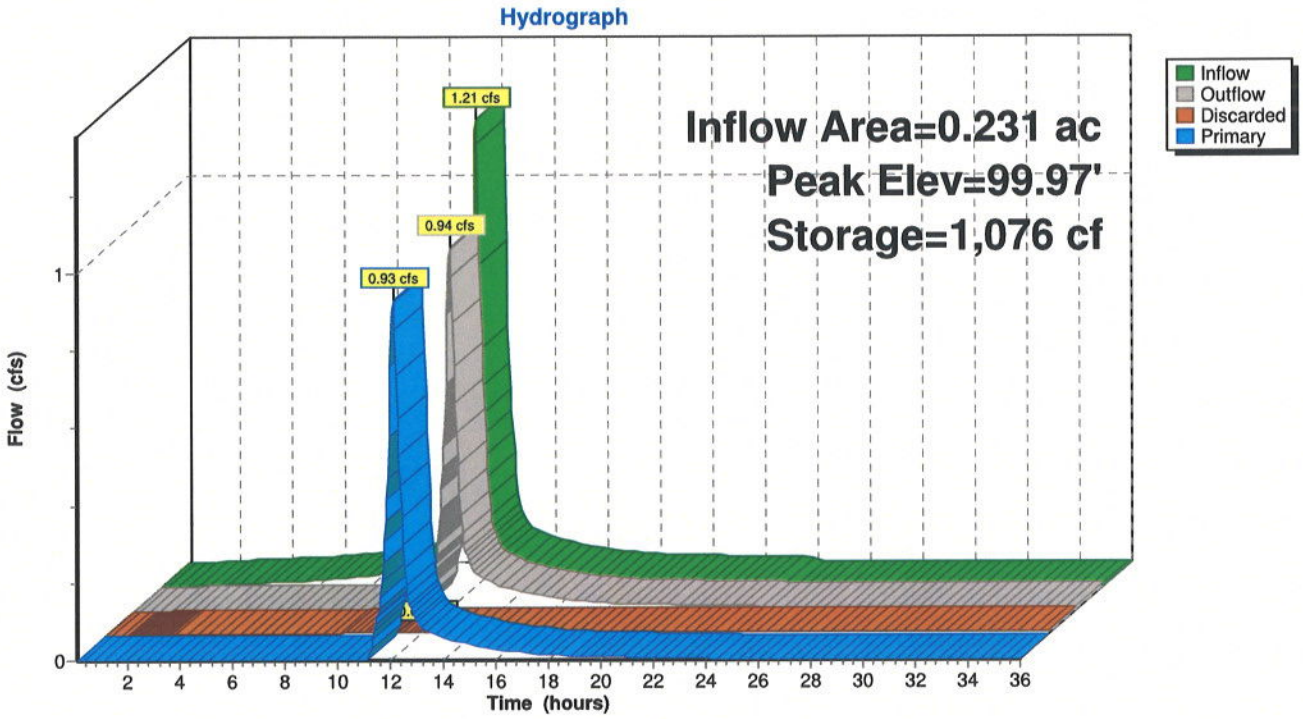
Volume	Invert	Avail.Storage	Storage Description
#1	96.50'	646 cf	**12.00'W x 45.00'L x 4.00'H Prismatoid** 2,160 cf Overall - 544 cf Embedded = 1,616 cf x 40.0% Voids
#2	97.00'	544 cf	**Cultec R-330XL** x 10 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 2 rows
		1,190 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	98.75'	**6.0" Vert. Orifice/Grate** C= 0.600
#2	Discarded	96.50'	**0.440 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.01 cfs @ 12.14 hrs HW=99.95' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.92 cfs @ 12.14 hrs HW=99.95' (Free Discharge)
└**1=Orifice/Grate** (Orifice Controls 0.92 cfs @ 4.70 fps)

Pond 23P: RECHARGE 15-28



Summary for Pond 25P: BIORETENTION BASIN

Inflow Area =	0.133 ac, 70.93% Impervious, Inflow Depth = 4.49" for 25-YR event				
Inflow =	0.66 cfs @	12.07 hrs, Volume=	0.050 af		
Outflow =	0.06 cfs @	13.01 hrs, Volume=	0.023 af, Atten= 92%, Lag= 56.1 min		
Discarded =	0.01 cfs @	13.01 hrs, Volume=	0.012 af		
Primary =	0.05 cfs @	13.01 hrs, Volume=	0.010 af		

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Peak Elev= 99.78' @ 13.01 hrs Surf.Area= 587 sf Storage= 1,398 cf

Plug-Flow detention time= 460.7 min calculated for 0.023 af (46% of inflow)
Center-of-Mass det. time= 338.2 min (1,113.8 - 775.6)

Volume	Invert	Avail.Storage	Storage Description
#1	95.50'	1,538 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

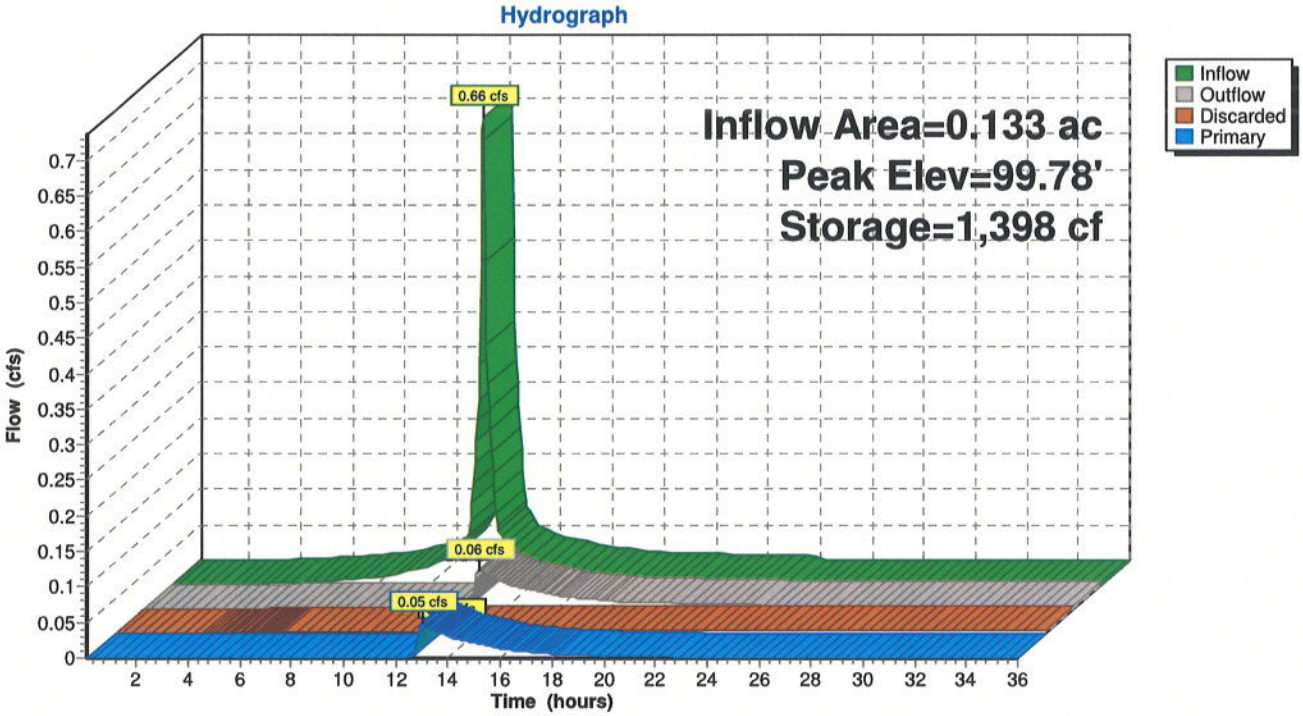
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
95.50	302	122.0	0	0	302
96.00	302	122.0	151	151	363
98.75	302	122.0	831	982	699
99.00	302	122.0	76	1,057	729
100.00	685	146.0	481	1,538	1,258

Device	Routing	Invert	Outlet Devices
#1	Primary	99.75'	**2.0' long x 2.00' rise Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.7' Crest Height
#2	Discarded	95.50'	**0.440 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 13.01 hrs HW=99.78' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.03 cfs @ 13.01 hrs HW=99.78' (Free Discharge)
↑—**1=Sharp-Crested Rectangular Weir** (Weir Controls 0.03 cfs @ 0.57 fps)

Pond 25P: BIORETENTION BASIN



Summary for Pond 26P: BIORETENTION BASIN

Inflow Area =	0.132 ac, 70.92% Impervious, Inflow Depth = 4.49" for 25-YR event				
Inflow =	0.66 cfs @	12.07 hrs, Volume=	0.050 af		
Outflow =	0.19 cfs @	12.41 hrs, Volume=	0.034 af, Atten= 72%, Lag= 20.4 min		
Discarded =	0.01 cfs @	12.41 hrs, Volume=	0.019 af		
Primary =	0.18 cfs @	12.41 hrs, Volume=	0.015 af		

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Peak Elev= 99.85' @ 12.41 hrs Surf.Area= 973 sf Storage= 1,123 cf

Plug-Flow detention time= 391.9 min calculated for 0.034 af (68% of inflow)
Center-of-Mass det. time= 297.6 min (1,073.2 - 775.6)

Volume	Invert	Avail.Storage	Storage Description
#1	95.50'	2,456 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

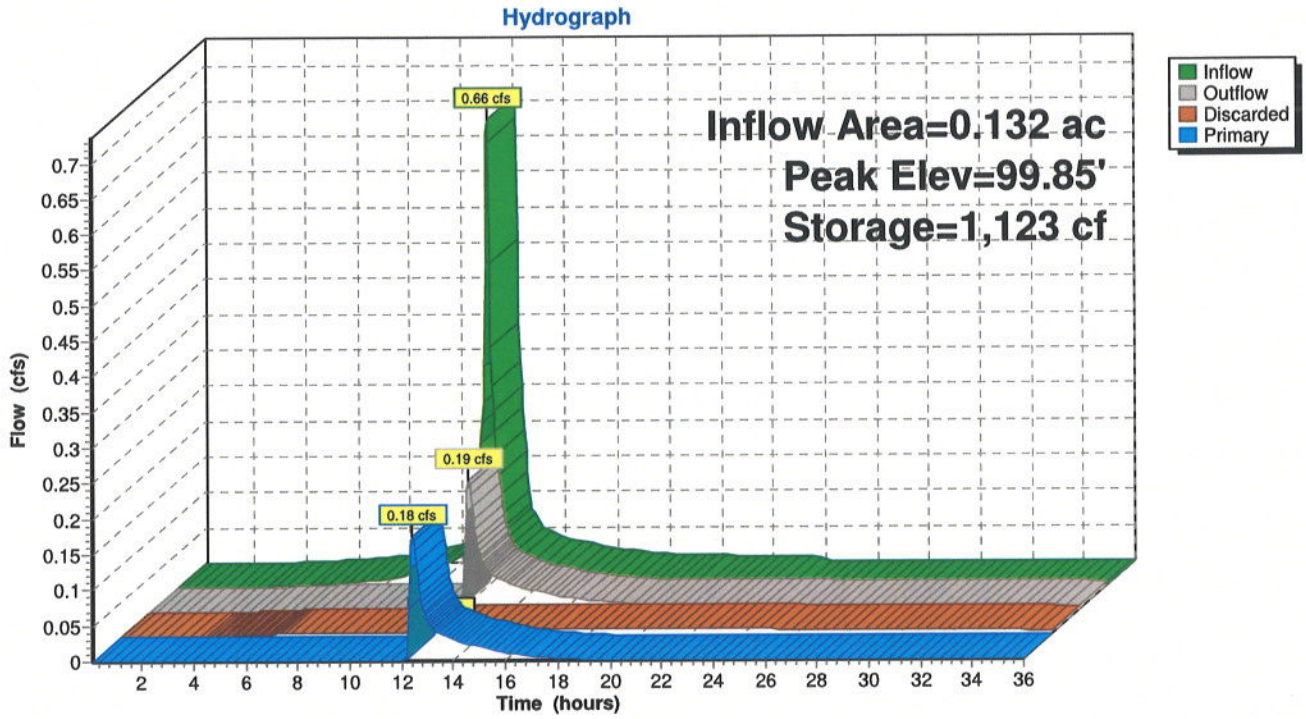
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
95.50	425	167.0	0.0	0	0	425
96.00	425	167.0	40.0	85	85	509
98.75	425	167.0	30.0	351	436	968
99.00	425	167.0	100.0	106	542	1,010
100.00	1,088	213.0	100.0	731	1,273	2,413
101.00	1,281	181.0	100.0	1,183	2,456	3,436

Device	Routing	Invert	Outlet Devices
#1	Primary	99.75'	**2.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Discarded	95.50'	**0.440 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 12.41 hrs HW=99.85' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.17 cfs @ 12.41 hrs HW=99.85' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Weir Controls 0.17 cfs @ 0.82 fps)

Pond 26P: BIORETENTION BASIN



Summary for Pond 29P: TREE BOX FILTER

Inflow Area =	0.174 ac,100.00% Impervious,	Inflow Depth =	5.06"	for 25-YR event	
Inflow =	0.91 cfs @ 12.07 hrs,	Volume=	0.073 af		
Outflow =	0.92 cfs @ 12.10 hrs,	Volume=	0.072 af,	Atten= 0%,	Lag= 1.5 min
Primary =	0.92 cfs @ 12.10 hrs,	Volume=	0.072 af		

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Peak Elev= 98.45' @ 12.10 hrs Surf.Area= 60 sf Storage= 93 cf

Plug-Flow detention time= 19.8 min calculated for 0.072 af (98% of inflow)
Center-of-Mass det. time= 10.1 min (756.2 - 746.1)

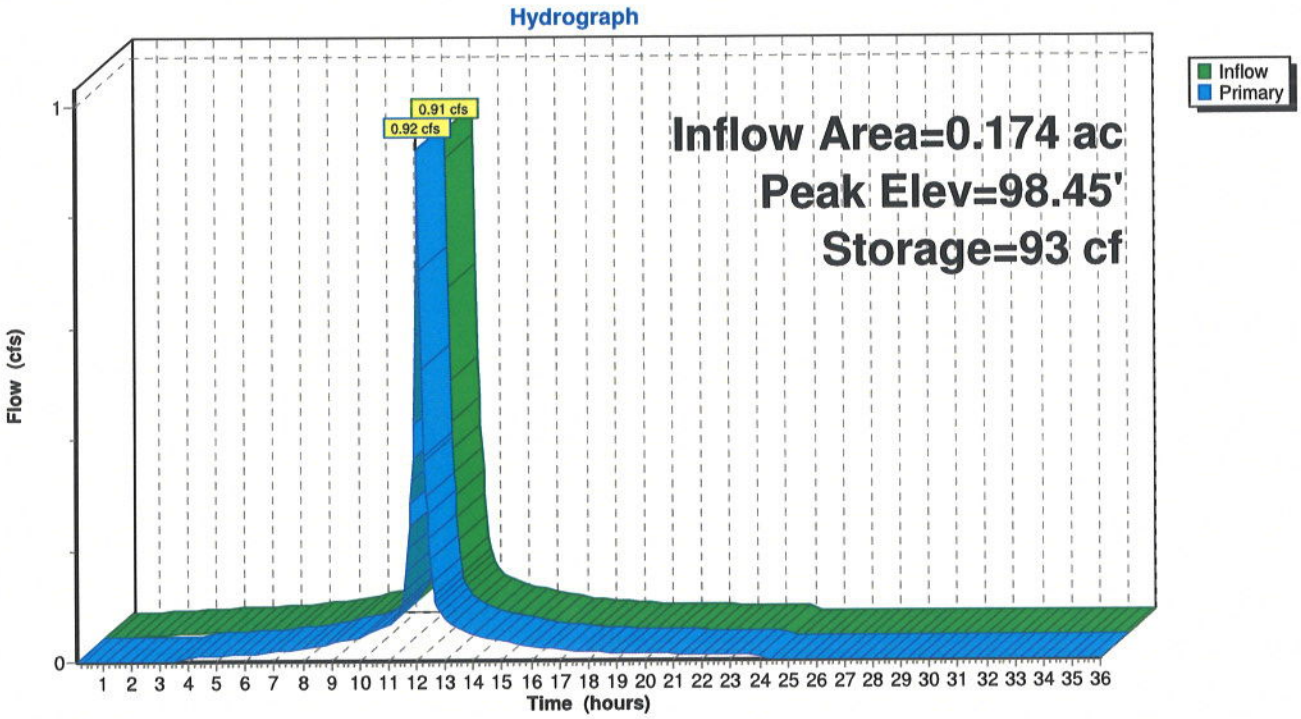
Volume	Invert	Avail.Storage	Storage Description
#1	95.00'	93 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
95.00	60	0.0	0	0
95.50	60	40.0	12	12
97.50	60	30.0	36	48
98.25	60	100.0	45	93

Device	Routing	Invert	Outlet Devices
#1	Device 2	95.00'	**6.0" Vert. Orifice/Grate** C= 0.600
#2	Primary	97.50'	**1.0" W x 18.0" H Vert. Orifice/Grate X 10.00** C= 0.600

Primary OutFlow Max=0.91 cfs @ 12.10 hrs HW=98.42' (Free Discharge)
└─**2=Orifice/Grate** (Passes 0.91 cfs of 2.36 cfs potential flow)
  └─**1=Orifice/Grate** (Orifice Controls 0.91 cfs @ 4.62 fps)

Pond 29P: TREE BOX FILTER



Summary for Pond 33P: TREE BOX FILTER

Inflow Area =	0.169 ac,100.00% Impervious, Inflow Depth = 5.06" for 25-YR event				
Inflow =	0.88 cfs @ 12.07 hrs, Volume=	0.071 af			
Outflow =	0.87 cfs @ 12.10 hrs, Volume=	0.070 af, Atten= 2%, Lag= 1.6 min			
Primary =	0.87 cfs @ 12.10 hrs, Volume=	0.070 af			

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Peak Elev= 98.34' @ 12.10 hrs Surf.Area= 60 sf Storage= 93 cf

Plug-Flow detention time= 20.4 min calculated for 0.070 af (98% of inflow)
Center-of-Mass det. time= 10.3 min (756.5 - 746.1)

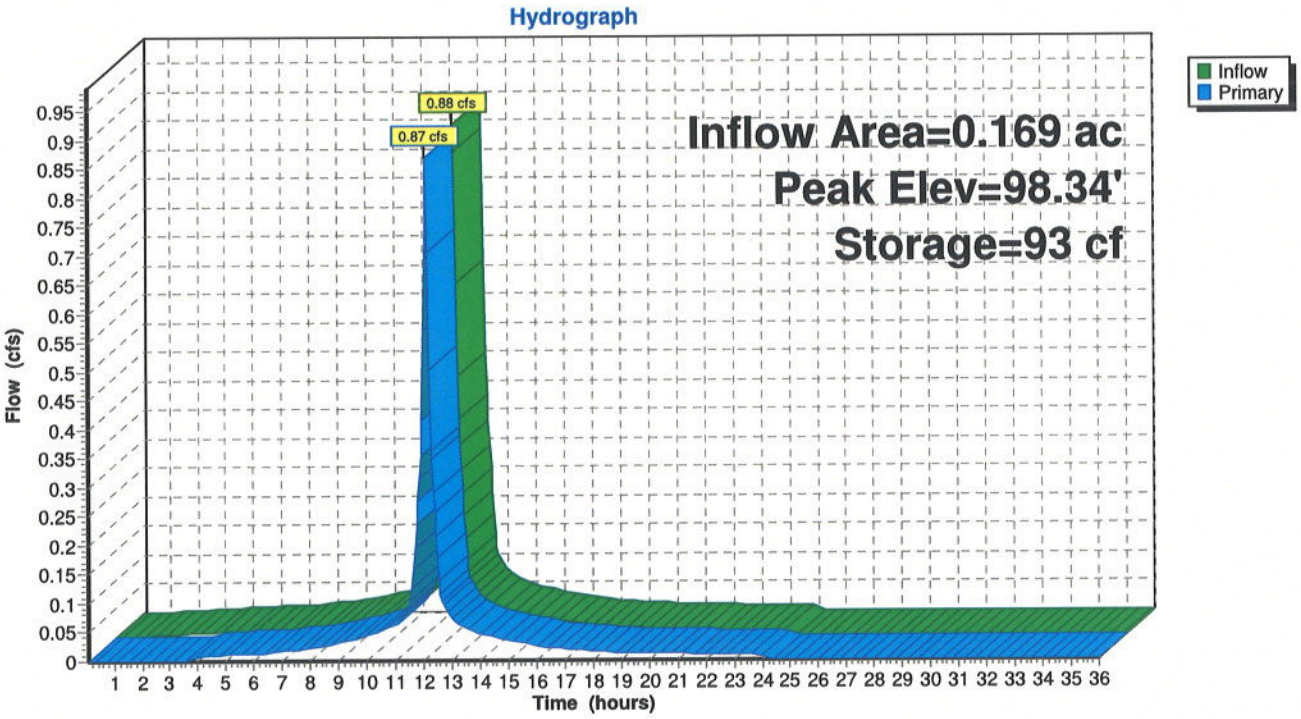
Volume	Invert	Avail.Storage	Storage Description
#1	95.00'	93 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
95.00	60	0.0	0	0
95.50	60	40.0	12	12
97.50	60	30.0	36	48
98.25	60	100.0	45	93

Device	Routing	Invert	Outlet Devices
#1	Device 2	95.00'	**6.0" Vert. Orifice/Grate** C= 0.600
#2	Primary	97.50'	**1.0" W x 18.0" H Vert. Orifice/Grate X 10.00** C= 0.600

Primary OutFlow Max=0.86 cfs @ 12.10 hrs HW=98.33' (Free Discharge)
└─**2=Orifice/Grate** (Passes 0.86 cfs of 2.01 cfs potential flow)
  └─**1=Orifice/Grate** (Orifice Controls 0.86 cfs @ 4.38 fps)

Pond 33P: TREE BOX FILTER

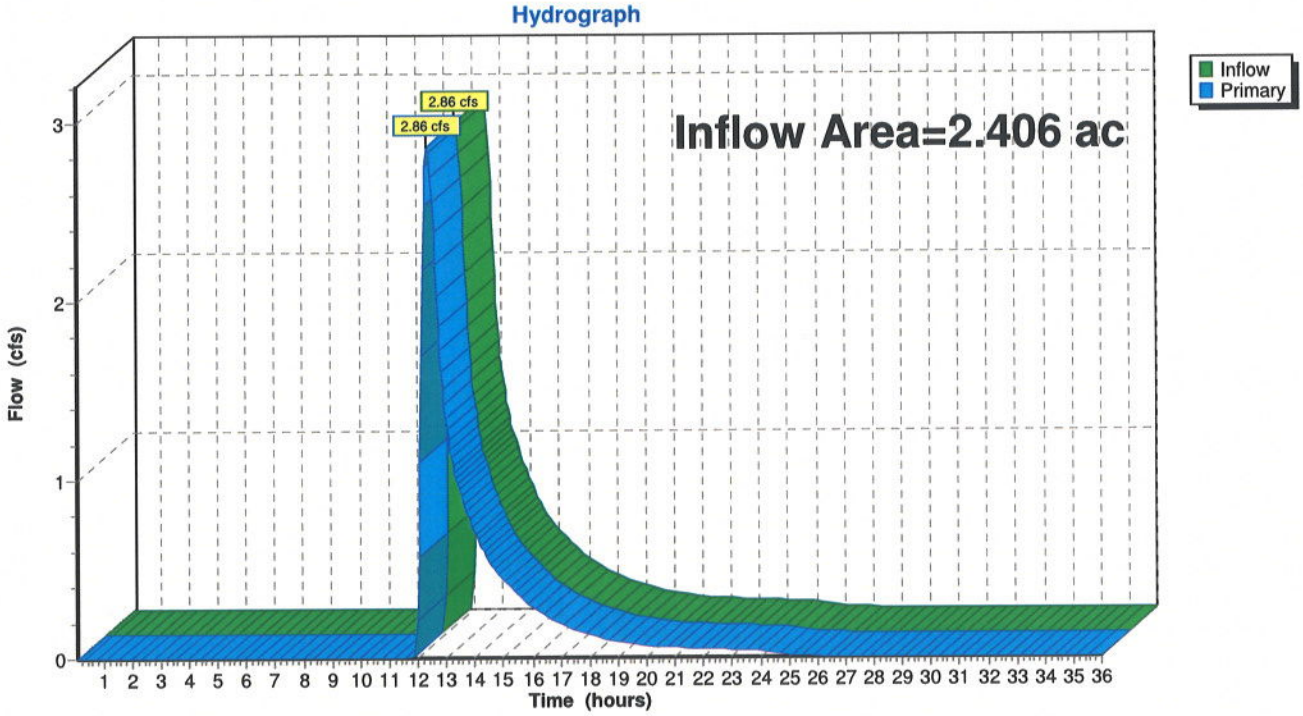


Summary for Link 15L: DP#2-REAR WETLANDS

Inflow Area =	2.406 ac, 41.32% Impervious, Inflow Depth = 1.94" for 25-YR event				
Inflow =	2.86 cfs @ 12.38 hrs, Volume=	0.388 af			
Primary =	2.86 cfs @ 12.38 hrs, Volume=	0.388 af, Atten= 0%, Lag= 0.0 min			

Primary outflow = Inflow, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs

Link 15L: DP#2-REAR WETLANDS



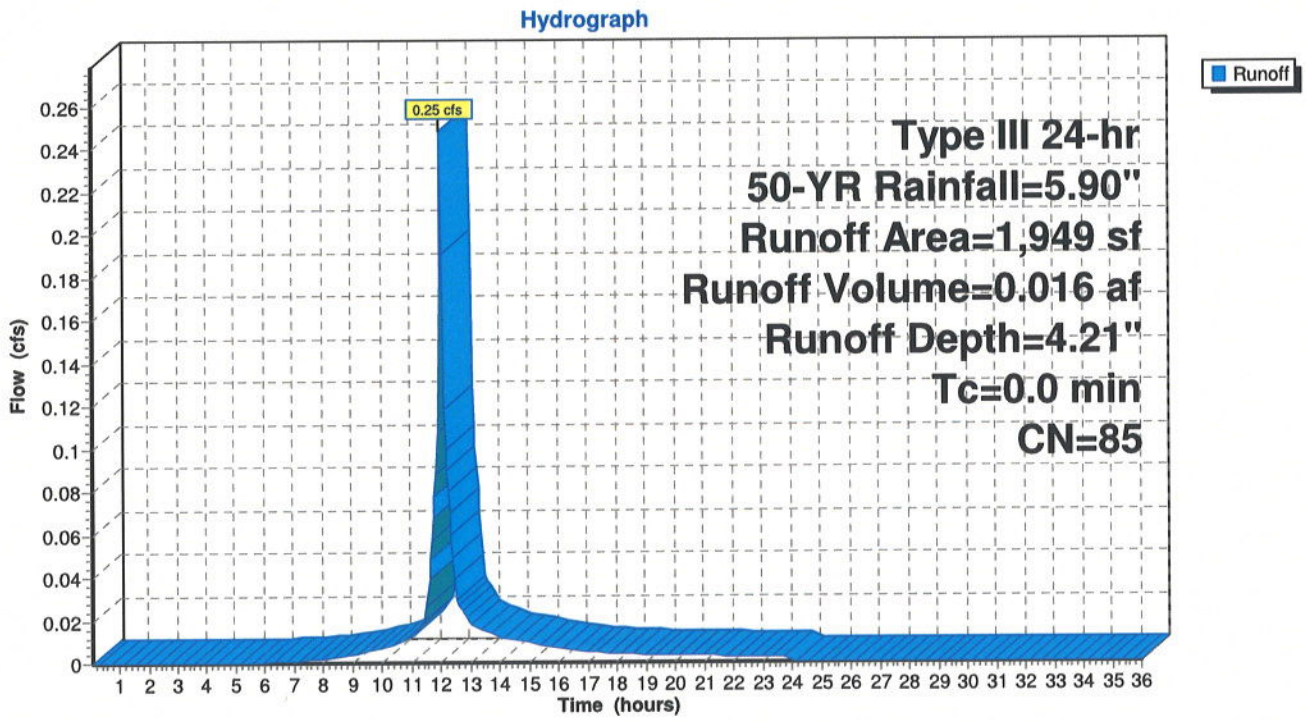
Summary for Subcatchment 1S: DP#1-GREENMONT

Runoff = 0.25 cfs @ 12.00 hrs, Volume= 0.016 af, Depth= 4.21"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-YR Rainfall=5.90"

Area (sf)	CN	Description
569	98	Paved parking, HSG D
1,380	80	>75% Grass cover, Good, HSG D
1,949	85	Weighted Average
1,380		70.81% Pervious Area
569		29.19% Impervious Area

Subcatchment 1S: DP#1-GREENMONT



Summary for Subcatchment 3S: PWS#2

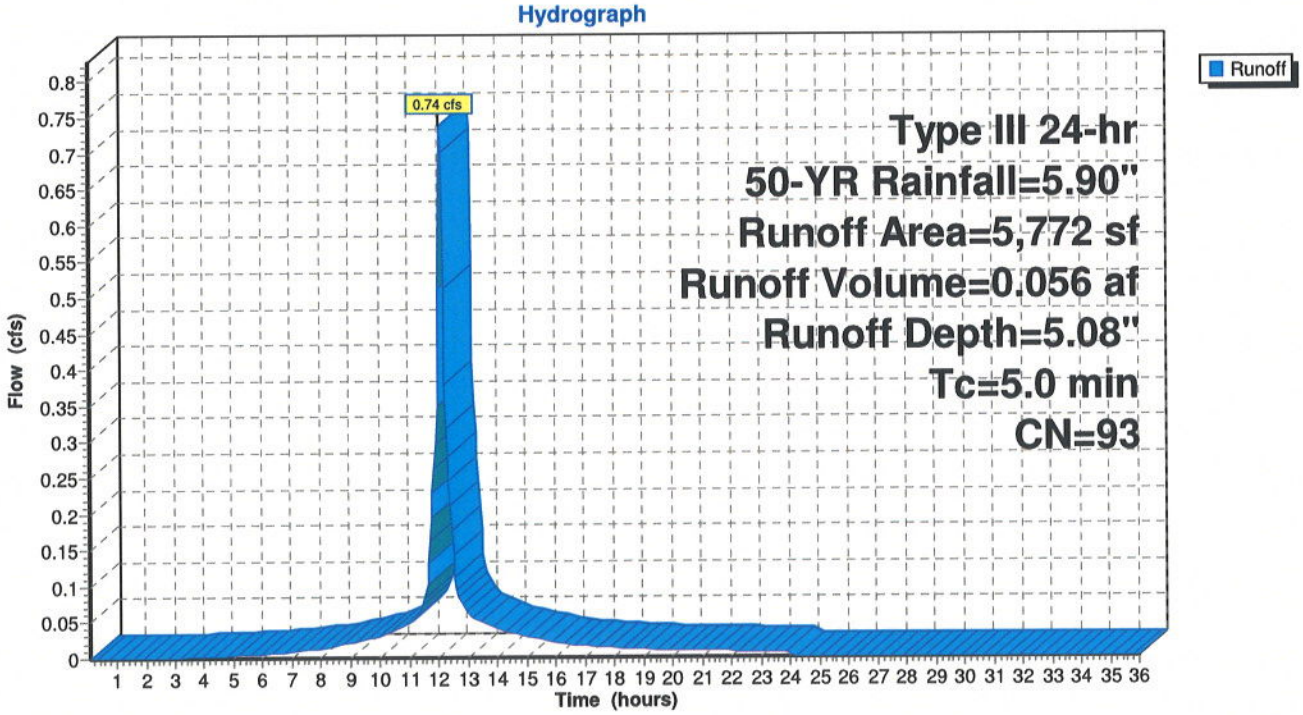
Runoff = 0.74 cfs @ 12.07 hrs, Volume= 0.056 af, Depth= 5.08"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-YR Rainfall=5.90"

Area (sf)	CN	Description
4,094	98	Paved parking, HSG D
1,678	80	>75% Grass cover, Good, HSG D
5,772	93	Weighted Average
1,678		29.07% Pervious Area
4,094		70.93% Impervious Area

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

Subcatchment 3S: PWS#2



Summary for Subcatchment 5S: ROOFS 15 - 28

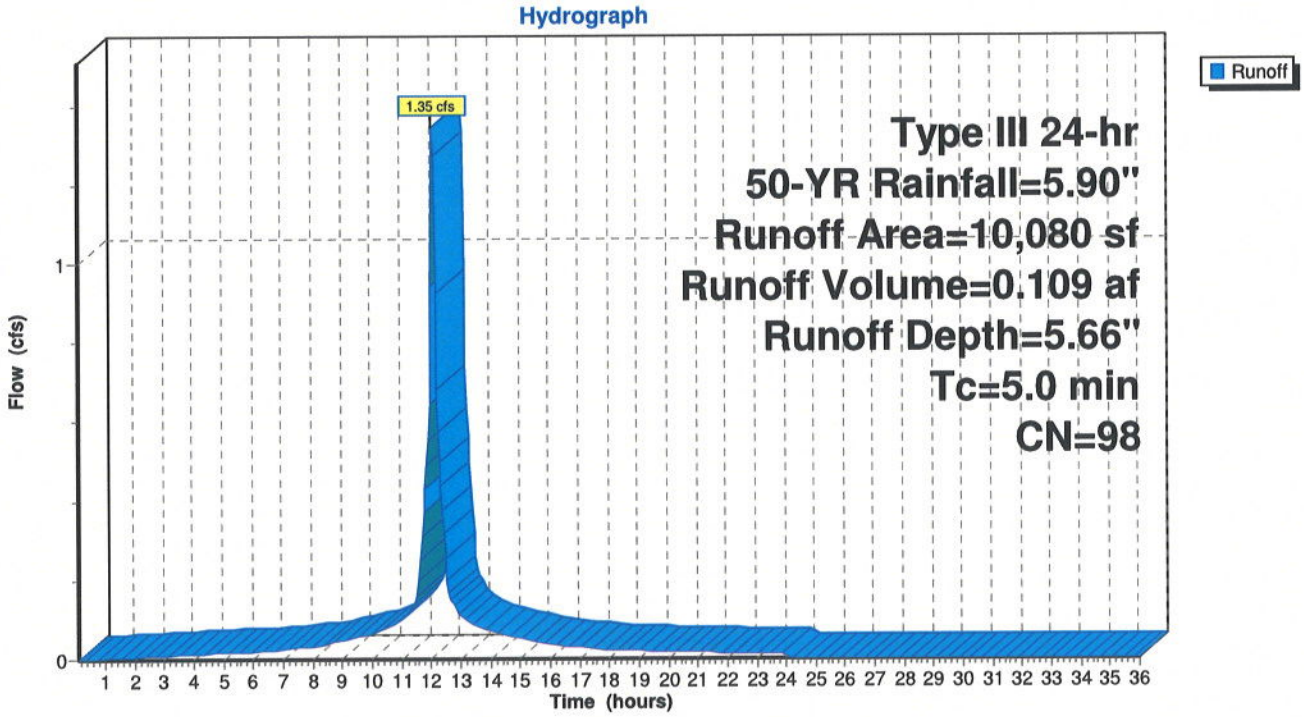
Runoff = 1.35 cfs @ 12.07 hrs, Volume= 0.109 af, Depth= 5.66"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-YR Rainfall=5.90"

Area (sf)	CN	Description
10,080	98	Roofs, HSG D
10,080		100.00% Impervious Area

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

Subcatchment 5S: ROOFS 15 - 28



Summary for Subcatchment 6S: PWS#3

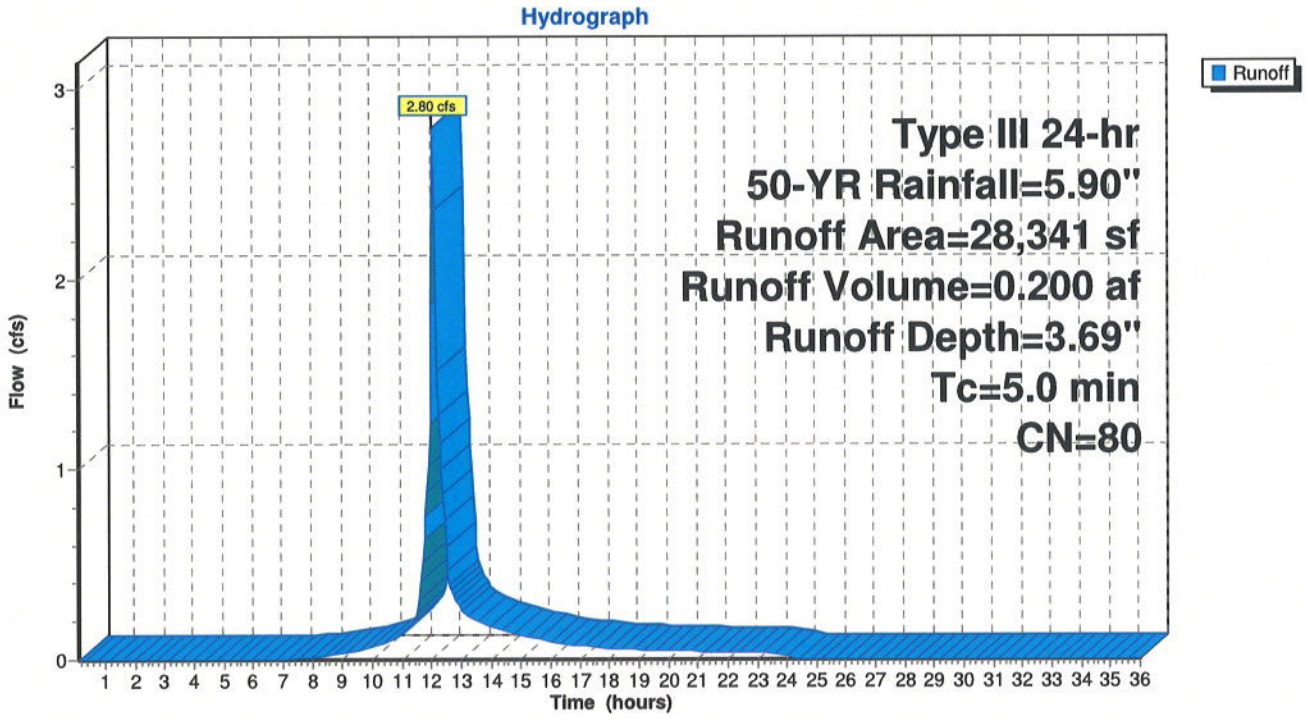
Runoff = 2.80 cfs @ 12.08 hrs, Volume= 0.200 af, Depth= 3.69"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-YR Rainfall=5.90"

	Area (sf)	CN	Description
	18,244	80	>75% Grass cover, Good, HSG D
*	10,097	80	
	28,341	80	Weighted Average
	28,341		100.00% Pervious Area

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

Subcatchment 6S: PWS#3



Summary for Subcatchment 7S: PWS#4

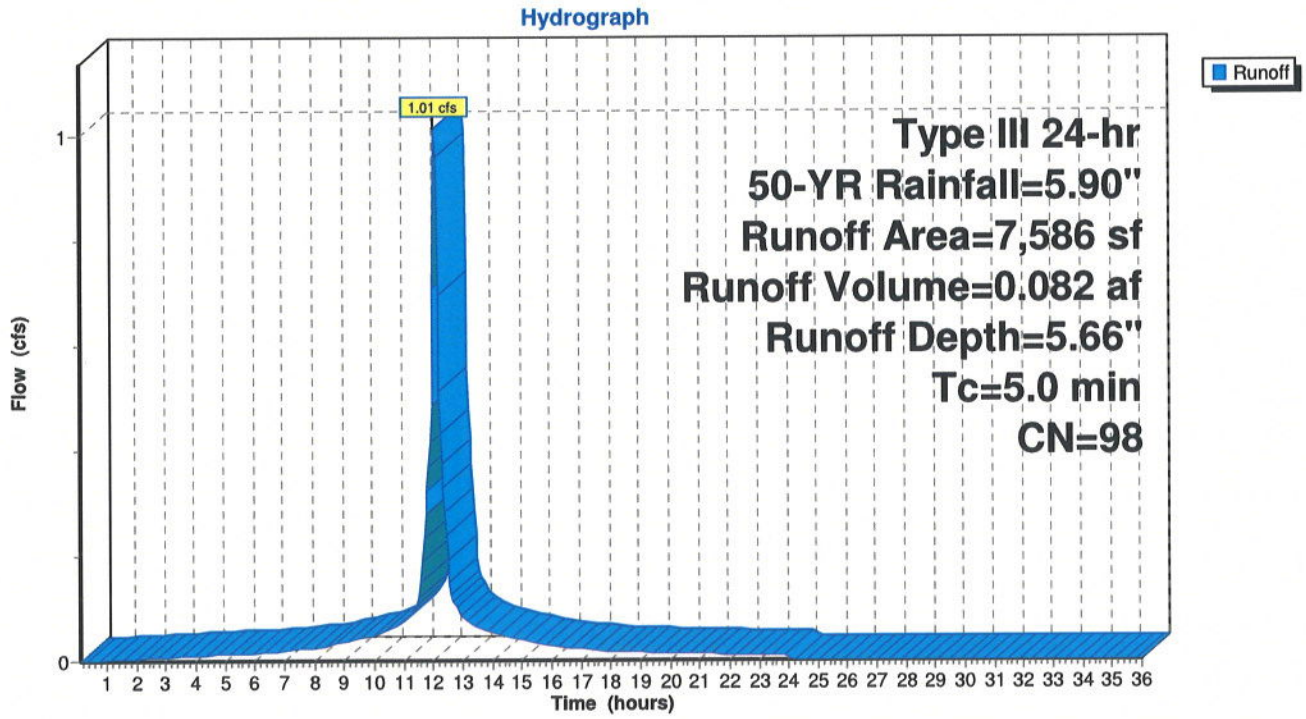
Runoff = 1.01 cfs @ 12.07 hrs, Volume= 0.082 af, Depth= 5.66"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-YR Rainfall=5.90"

Area (sf)	CN	Description
7,586	98	Paved parking, HSG D
7,586		100.00% Impervious Area

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

Subcatchment 7S: PWS#4



Summary for Subcatchment 9S: PWS#5

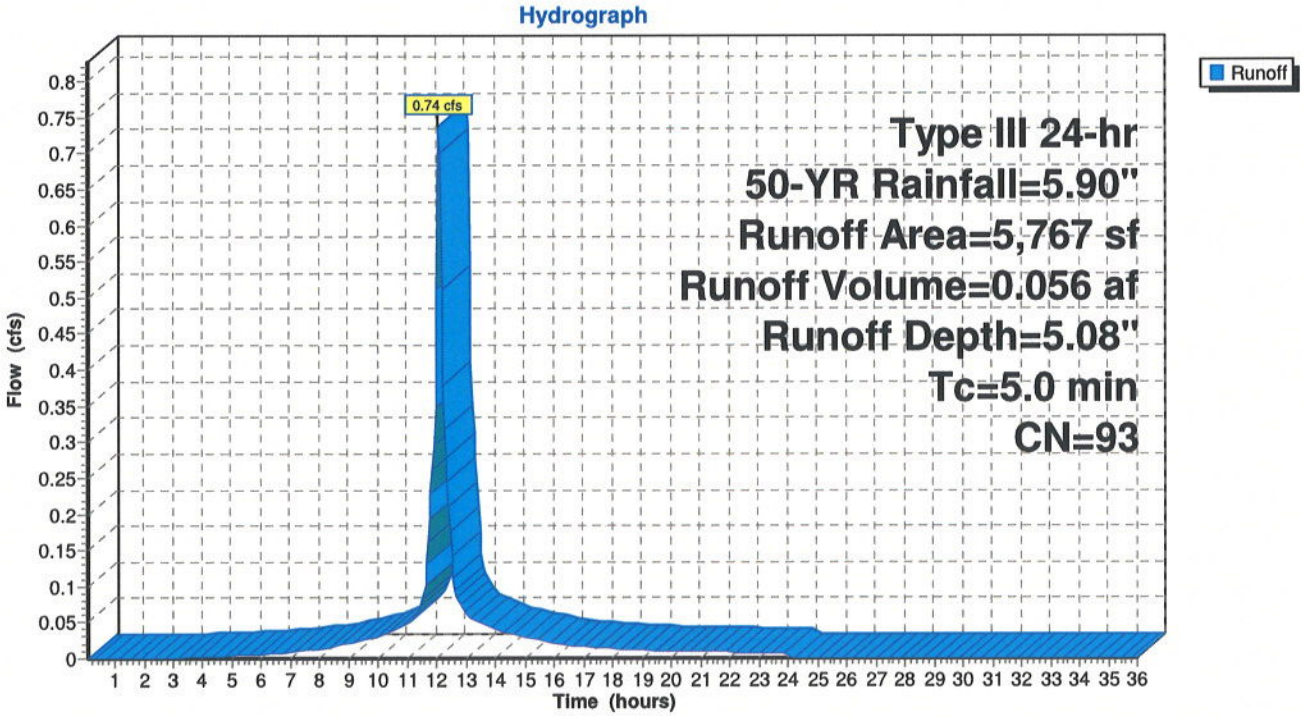
Runoff = 0.74 cfs @ 12.07 hrs, Volume= 0.056 af, Depth= 5.08"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-YR Rainfall=5.90"

Area (sf)	CN	Description
4,090	98	Paved parking, HSG D
1,677	80	>75% Grass cover, Good, HSG D
5,767	93	Weighted Average
1,677		29.08% Pervious Area
4,090		70.92% Impervious Area

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

Subcatchment 9S: PWS#5



Summary for Subcatchment 11S: PWS#6

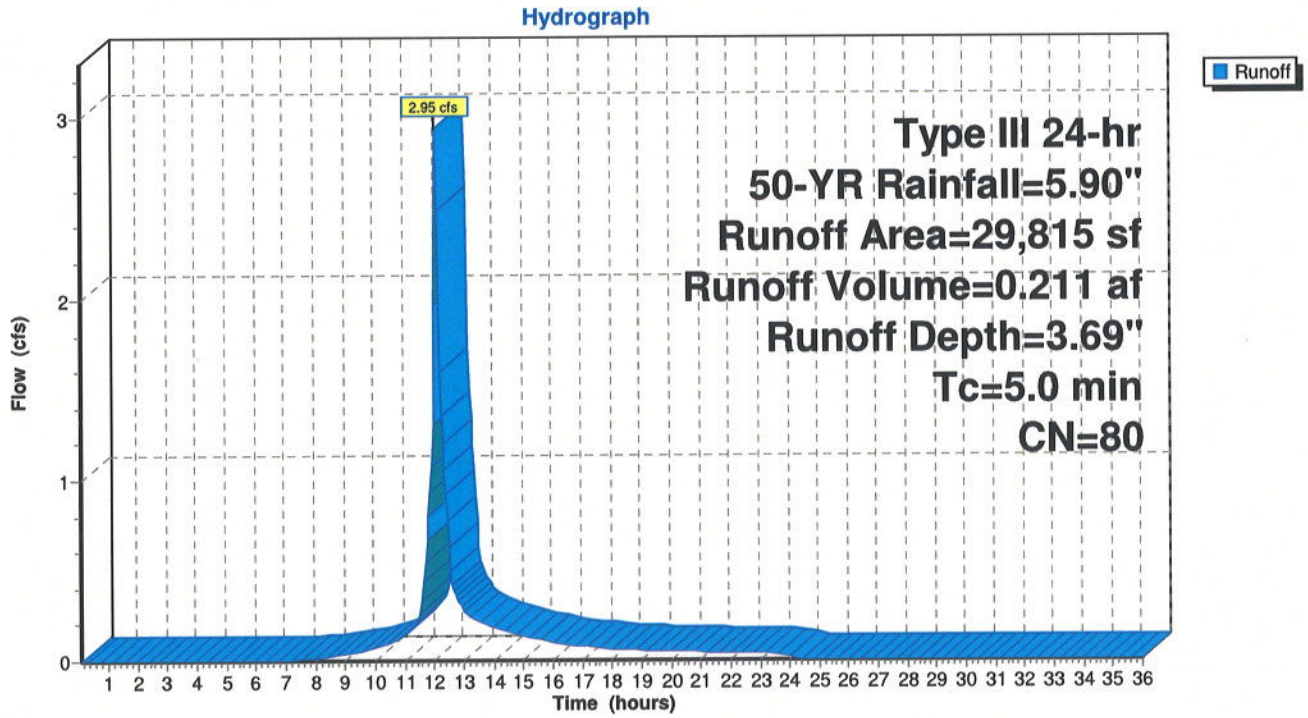
Runoff = 2.95 cfs @ 12.08 hrs, Volume= 0.211 af, Depth= 3.69"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-YR Rainfall=5.90"

	Area (sf)	CN	Description
	21,412	80	>75% Grass cover, Good, HSG D
*	8,403	80	
	29,815	80	Weighted Average
	29,815		100.00% Pervious Area

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

Subcatchment 11S: PWS#6



Summary for Subcatchment 13S: PWS#7

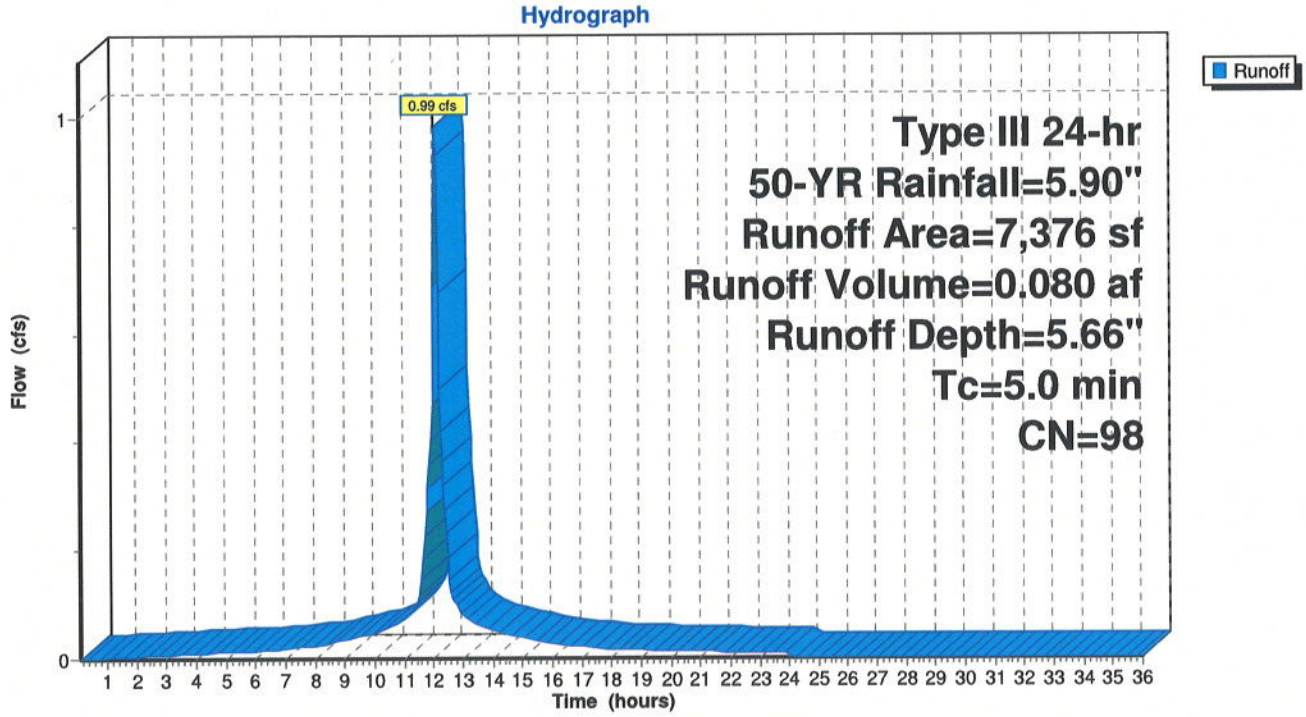
Runoff = 0.99 cfs @ 12.07 hrs, Volume= 0.080 af, Depth= 5.66"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-YR Rainfall=5.90"

Area (sf)	CN	Description
7,376	98	Paved parking, HSG D
7,376		100.00% Impervious Area

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

Subcatchment 13S: PWS#7



Summary for Subcatchment 18S: ROOFS 1 - 14

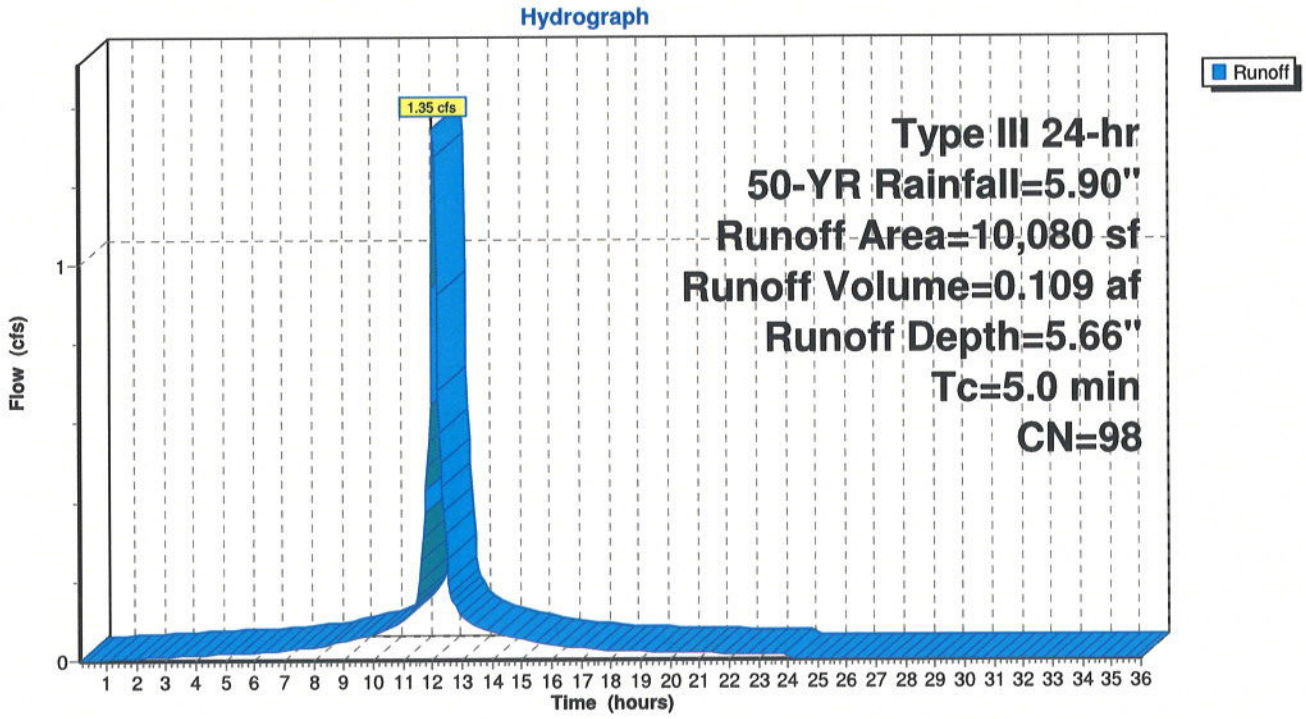
Runoff = 1.35 cfs @ 12.07 hrs, Volume= 0.109 af, Depth= 5.66"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-YR Rainfall=5.90"

Area (sf)	CN	Description
10,080	98	Roofs, HSG D
10,080		100.00% Impervious Area

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

Subcatchment 18S: ROOFS 1 - 14



Summary for Reach 4R: GRASS LINED SWALE #1

Inflow Area = 1.015 ac, 32.07% Impervious, Inflow Depth = 3.48" for 50-YR event
Inflow = 3.74 cfs @ 12.08 hrs, Volume= 0.295 af
Outflow = 3.54 cfs @ 12.16 hrs, Volume= 0.295 af, Atten= 6%, Lag= 4.6 min

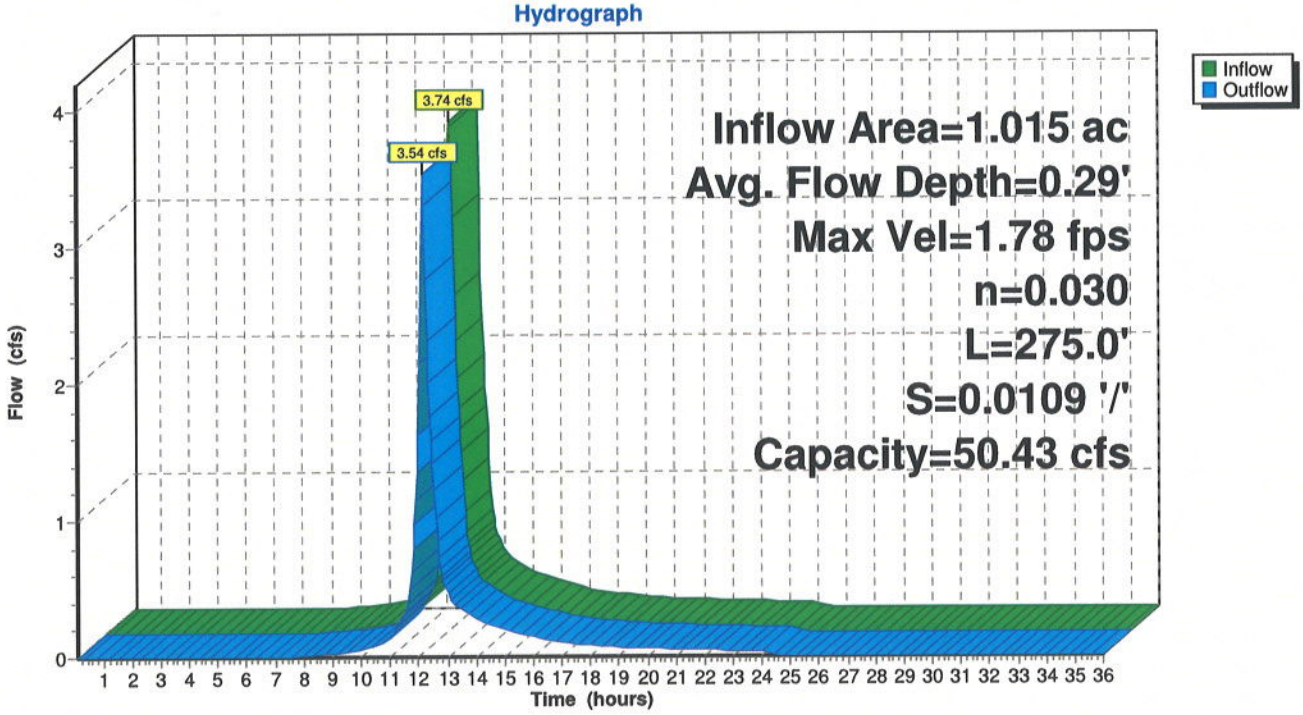
Routing by Stor-Ind+Trans method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.78 fps, Min. Travel Time= 2.6 min
Avg. Velocity = 0.55 fps, Avg. Travel Time= 8.3 min

Peak Storage= 550 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.29'
Bank-Full Depth= 1.00' Flow Area= 14.0 sf, Capacity= 50.43 cfs

4.00' x 1.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 10.0 '/' Top Width= 24.00'
Length= 275.0' Slope= 0.0109 '/'
Inlet Invert= 99.00', Outlet Invert= 96.00'

‡

Reach 4R: GRASS LINED SWALE #1



Summary for Reach 12R: GRASS LINED SWALE #2

Inflow Area = 1.048 ac, 31.03% Impervious, Inflow Depth = 3.54" for 50-YR event
Inflow = 3.88 cfs @ 12.09 hrs, Volume= 0.309 af
Outflow = 3.69 cfs @ 12.16 hrs, Volume= 0.309 af, Atten= 5%, Lag= 4.7 min

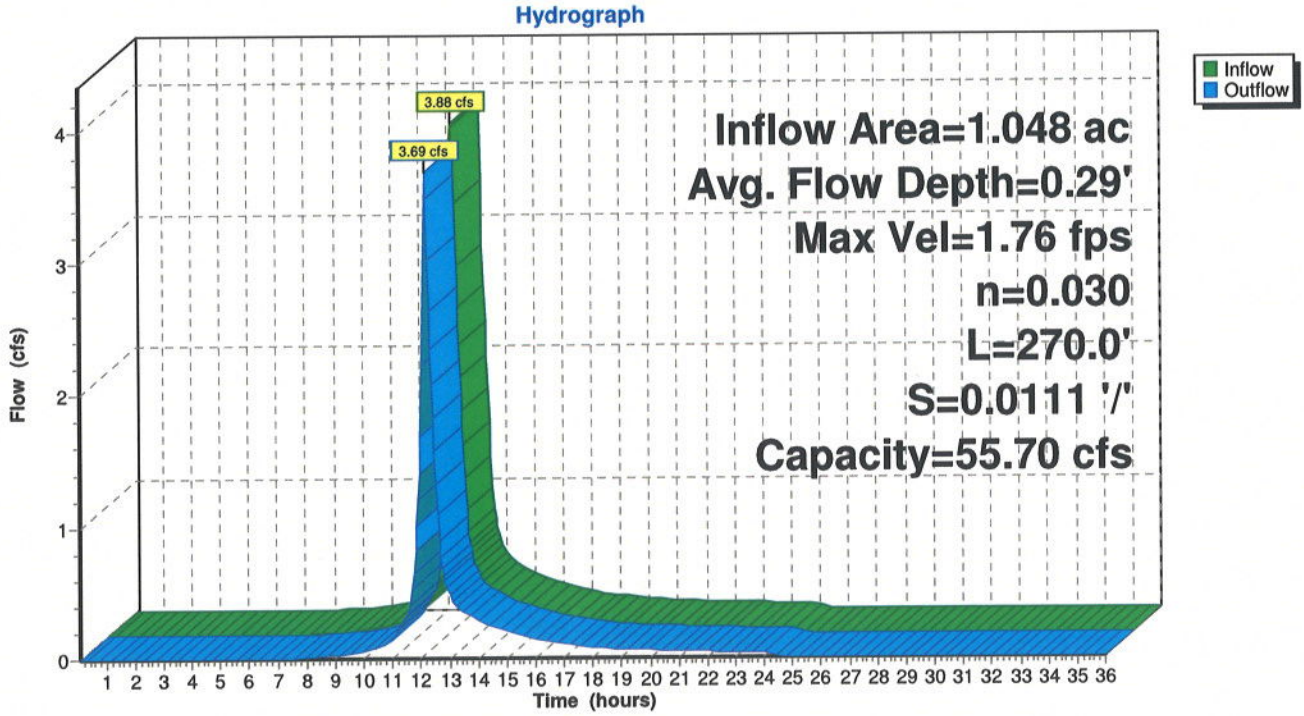
Routing by Stor-Ind+Trans method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.76 fps, Min. Travel Time= 2.6 min
Avg. Velocity = 0.55 fps, Avg. Travel Time= 8.2 min

Peak Storage= 569 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.29'
Bank-Full Depth= 1.00' Flow Area= 15.5 sf, Capacity= 55.70 cfs

4.00' x 1.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 4.0 19.0 '/' Top Width= 27.00'
Length= 270.0' Slope= 0.0111 '/'
Inlet Invert= 99.00', Outlet Invert= 96.00'

‡

Reach 12R: GRASS LINED SWALE #2



Summary for Pond 8P: DETENTION POND #1

Inflow Area =	1.189 ac, 42.02% Impervious, Inflow Depth = 3.79" for 50-YR event				
Inflow =	4.23 cfs @	12.14 hrs,	Volume=	0.376 af	
Outflow =	1.37 cfs @	12.56 hrs,	Volume=	0.353 af,	Atten= 68%, Lag= 25.0 min
Discarded =	0.12 cfs @	12.56 hrs,	Volume=	0.183 af	
Primary =	1.25 cfs @	12.56 hrs,	Volume=	0.171 af	

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Peak Elev= 95.61' @ 12.56 hrs Surf.Area= 3,946 sf Storage= 7,147 cf

Plug-Flow detention time= 283.3 min calculated for 0.353 af (94% of inflow)
Center-of-Mass det. time= 252.6 min (1,058.2 - 805.6)

Volume	Invert	Avail.Storage	Storage Description
#1	93.00'	8,773 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

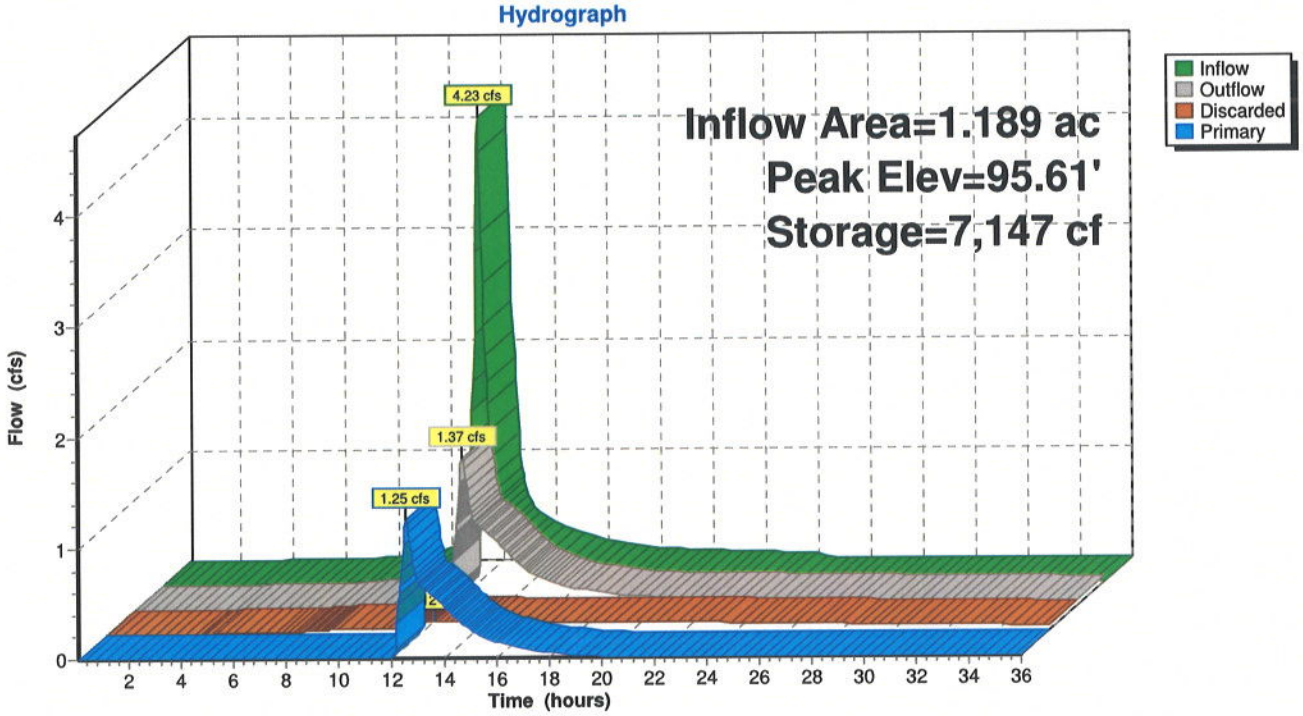
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
93.00	1,640	257.0	0	0	1,640
94.00	2,440	276.0	2,027	2,027	2,489
95.00	3,381	308.0	2,898	4,925	4,004
96.00	4,335	329.0	3,848	8,773	5,115

Device	Routing	Invert	Outlet Devices
#1	Primary	95.50'	**6.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32
#2	Primary	94.75'	**6.0" Vert. Orifice/Grate** C= 0.600
#3	Discarded	93.00'	**1.080 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.12 cfs @ 12.56 hrs HW=95.61' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.12 cfs)

Primary OutFlow Max=1.24 cfs @ 12.56 hrs HW=95.61' (Free Discharge)
├**1=Broad-Crested Rectangular Weir** (Weir Controls 0.51 cfs @ 0.80 fps)
└**2=Orifice/Grate** (Orifice Controls 0.74 cfs @ 3.75 fps)

Pond 8P: DETENTION POND #1



Summary for Pond 14P: DETENTION POND #2

Inflow Area =	1.218 ac, 40.62% Impervious, Inflow Depth = 3.82" for 50-YR event				
Inflow =	4.35 cfs @	12.15 hrs, Volume=	0.388 af		
Outflow =	2.87 cfs @	12.32 hrs, Volume=	0.334 af, Atten= 34%, Lag= 10.7 min		
Discarded =	0.01 cfs @	12.32 hrs, Volume=	0.013 af		
Primary =	2.87 cfs @	12.32 hrs, Volume=	0.322 af		

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Peak Elev= 95.82' @ 12.32 hrs Surf.Area= 2,937 sf Storage= 5,125 cf

Plug-Flow detention time= 124.2 min calculated for 0.334 af (86% of inflow)
Center-of-Mass det. time= 67.5 min (871.1 - 803.5)

Volume	Invert	Avail.Storage	Storage Description
#1	93.00'	5,654 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

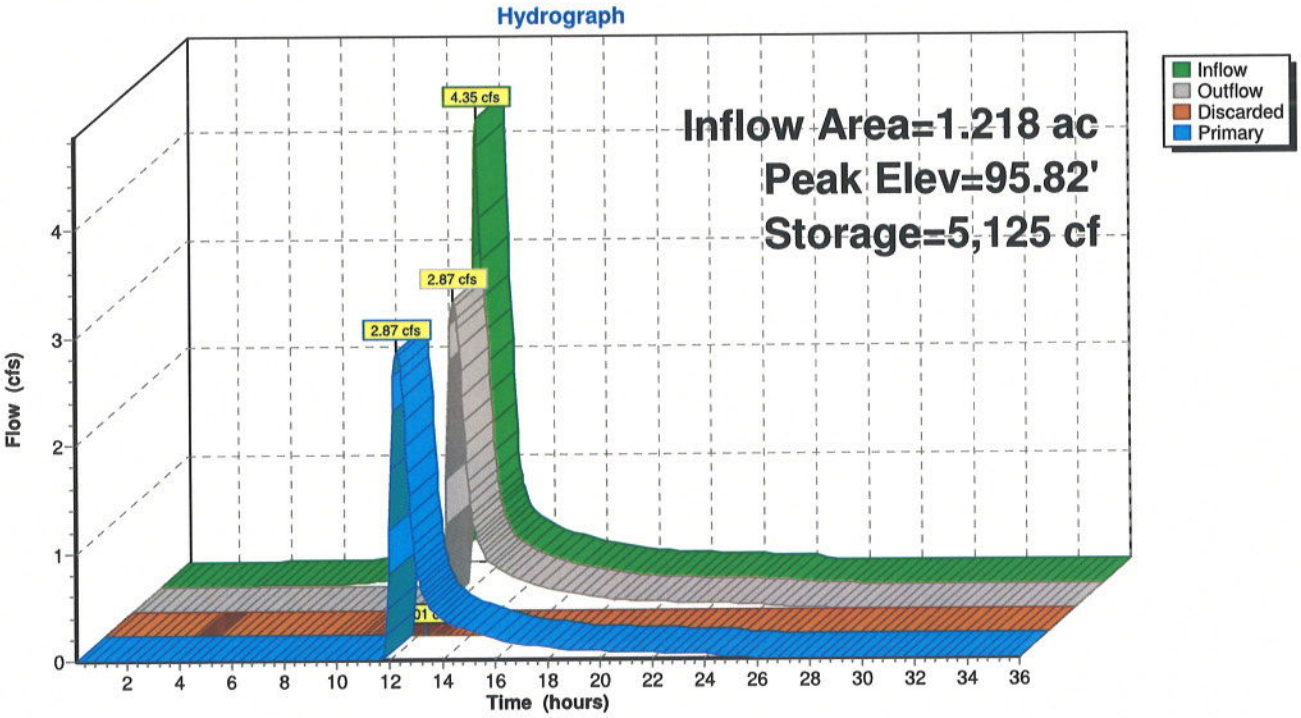
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
93.00	933	130.0	0	0	933
94.00	1,451	245.0	1,183	1,183	4,370
95.00	2,221	267.0	1,822	3,005	5,302
96.00	3,102	296.0	2,649	5,654	6,632

Device	Routing	Invert	Outlet Devices
#1	Primary	94.75'	**12.0" Vert. Orifice/Grate** C= 0.600
#2	Discarded	93.00'	**0.110 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 12.32 hrs HW=95.82' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=2.86 cfs @ 12.32 hrs HW=95.82' (Free Discharge)
↑—**1=Orifice/Grate** (Orifice Controls 2.86 cfs @ 3.64 fps)

Pond 14P: DETENTION POND #2



Summary for Pond 20P: RECHARGE 1 - 8

Inflow Area =	0.231 ac,100.00% Impervious, Inflow Depth = 5.66" for 50-YR event			
Inflow =	1.35 cfs @ 12.07 hrs, Volume=	0.109 af		
Outflow =	1.03 cfs @ 12.14 hrs, Volume=	0.099 af, Atten= 23%, Lag= 4.2 min		
Discarded =	0.01 cfs @ 12.14 hrs, Volume=	0.021 af		
Primary =	1.02 cfs @ 12.14 hrs, Volume=	0.078 af		

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Peak Elev= 100.16' @ 12.14 hrs Surf.Area= 540 sf Storage= 1,118 cf

Plug-Flow detention time= 175.7 min calculated for 0.099 af (91% of inflow)
Center-of-Mass det. time= 128.1 min (872.6 - 744.5)

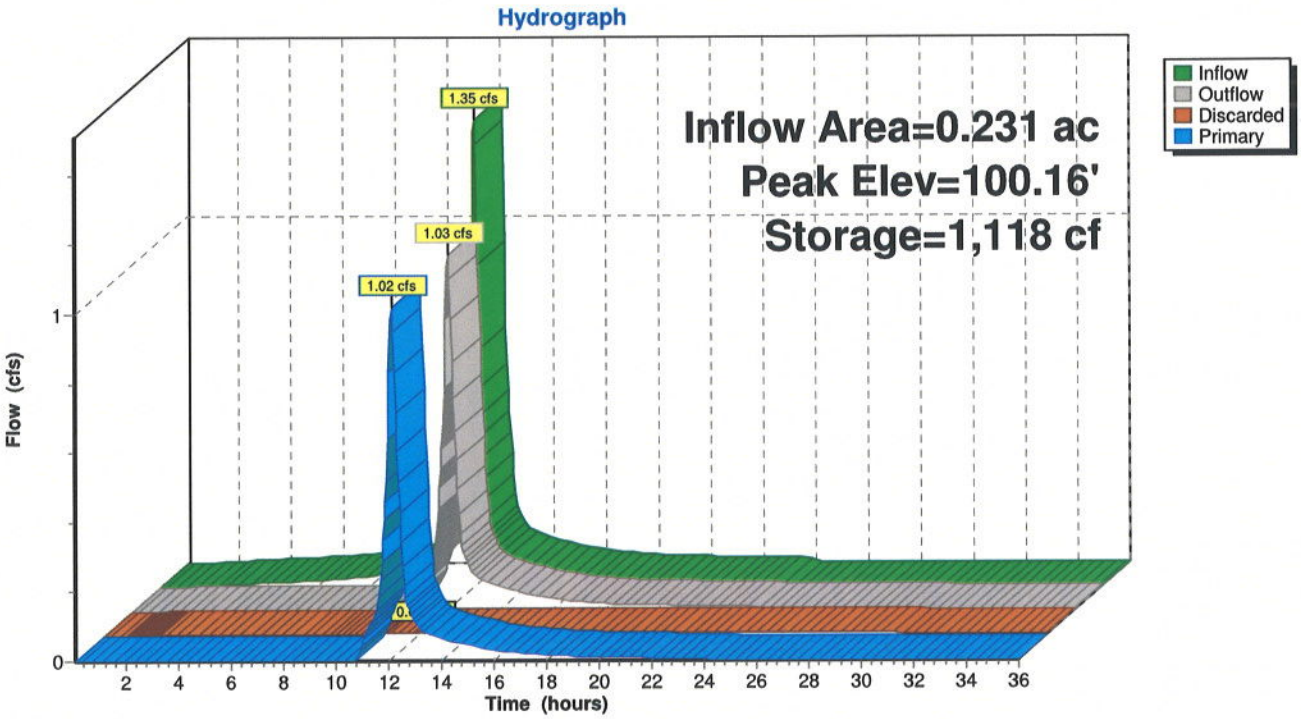
Volume	Invert	Avail.Storage	Storage Description
#1	96.50'	646 cf	**12.00'W x 45.00'L x 4.00'H Prismatoid** 2,160 cf Overall - 544 cf Embedded = 1,616 cf x 40.0% Voids
#2	97.00'	544 cf	**Cultec R-330XL** x 10 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 2 rows
		1,190 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	98.75'	**6.0" Vert. Orifice/Grate** C= 0.600
#2	Discarded	96.50'	**0.440 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.01 cfs @ 12.14 hrs HW=100.15' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=1.01 cfs @ 12.14 hrs HW=100.15' (Free Discharge)
└**1=Orifice/Grate** (Orifice Controls 1.01 cfs @ 5.16 fps)

Pond 20P: RECHARGE 1 - 8



Summary for Pond 23P: RECHARGE 15-28

Inflow Area =	0.231 ac,100.00% Impervious, Inflow Depth = 5.66" for 50-YR event				
Inflow =	1.35 cfs @	12.07 hrs,	Volume=	0.109 af	
Outflow =	1.03 cfs @	12.14 hrs,	Volume=	0.099 af,	Atten= 23%, Lag= 4.2 min
Discarded =	0.01 cfs @	12.14 hrs,	Volume=	0.021 af	
Primary =	1.02 cfs @	12.14 hrs,	Volume=	0.078 af	

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Peak Elev= 100.16' @ 12.14 hrs Surf.Area= 540 sf Storage= 1,118 cf

Plug-Flow detention time= 175.7 min calculated for 0.099 af (91% of inflow)
Center-of-Mass det. time= 128.1 min (872.6 - 744.5)

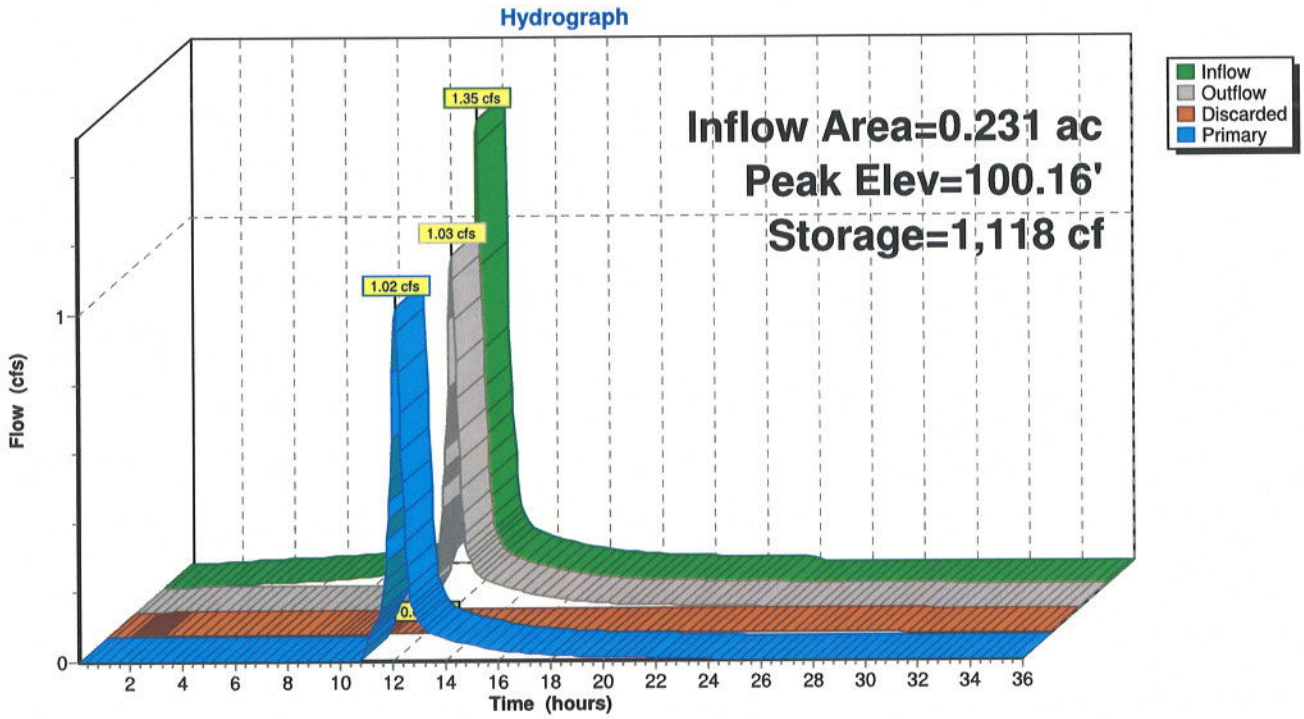
Volume	Invert	Avail.Storage	Storage Description
#1	96.50'	646 cf	**12.00'W x 45.00'L x 4.00'H Prismatoid** 2,160 cf Overall - 544 cf Embedded = 1,616 cf x 40.0% Voids
#2	97.00'	544 cf	**Cultec R-330XL** x 10 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 2 rows
		1,190 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	98.75'	**6.0" Vert. Orifice/Grate** C= 0.600
#2	Discarded	96.50'	**0.440 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.01 cfs @ 12.14 hrs HW=100.15' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=1.01 cfs @ 12.14 hrs HW=100.15' (Free Discharge)
└**1=Orifice/Grate** (Orifice Controls 1.01 cfs @ 5.16 fps)

Pond 23P: RECHARGE 15-28



Summary for Pond 25P: BIORETENTION BASIN

Inflow Area =	0.133 ac, 70.93% Impervious, Inflow Depth = 5.08" for 50-YR event				
Inflow =	0.74 cfs @ 12.07 hrs, Volume=	0.056 af			
Outflow =	0.16 cfs @ 12.48 hrs, Volume=	0.029 af, Atten= 78%, Lag= 24.3 min			
Discarded =	0.01 cfs @ 12.48 hrs, Volume=	0.013 af			
Primary =	0.16 cfs @ 12.48 hrs, Volume=	0.017 af			

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Peak Elev= 99.83' @ 12.48 hrs Surf.Area= 609 sf Storage= 1,428 cf

Plug-Flow detention time= 388.5 min calculated for 0.029 af (52% of inflow)
Center-of-Mass det. time= 274.2 min (1,046.8 - 772.5)

Volume	Invert	Avail.Storage	Storage Description
#1	95.50'	1,538 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

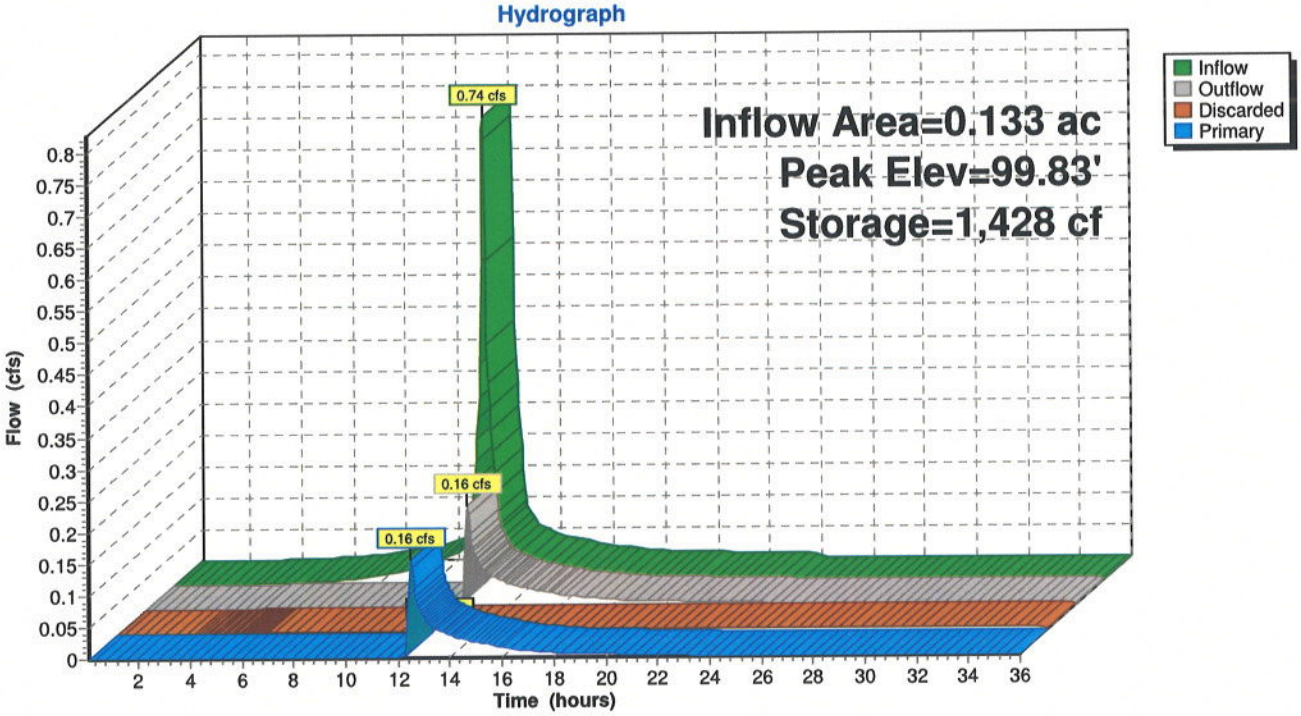
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
95.50	302	122.0	0	0	302
96.00	302	122.0	151	151	363
98.75	302	122.0	831	982	699
99.00	302	122.0	76	1,057	729
100.00	685	146.0	481	1,538	1,258

Device	Routing	Invert	Outlet Devices
#1	Primary	99.75'	**2.0' long x 2.00' rise Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.7' Crest Height
#2	Discarded	95.50'	**0.440 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 12.48 hrs HW=99.83' (Free Discharge)
↑└**2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.15 cfs @ 12.48 hrs HW=99.83' (Free Discharge)
↑└**1=Sharp-Crested Rectangular Weir** (Weir Controls 0.15 cfs @ 0.93 fps)

Pond 25P: BIORETENTION BASIN



Summary for Pond 26P: BIORETENTION BASIN

Inflow Area =	0.132 ac, 70.92% Impervious, Inflow Depth = 5.08" for 50-YR event				
Inflow =	0.74 cfs @	12.07 hrs,	Volume=	0.056 af	
Outflow =	0.29 cfs @	12.29 hrs,	Volume=	0.040 af,	Atten= 61%, Lag= 13.3 min
Discarded =	0.01 cfs @	12.29 hrs,	Volume=	0.019 af	
Primary =	0.28 cfs @	12.29 hrs,	Volume=	0.021 af	

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Peak Elev= 99.89' @ 12.29 hrs Surf.Area= 1,003 sf Storage= 1,162 cf

Plug-Flow detention time= 344.5 min calculated for 0.040 af (72% of inflow)
Center-of-Mass det. time= 256.1 min (1,028.6 - 772.5)

Volume	Invert	Avail.Storage	Storage Description
#1	95.50'	2,456 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

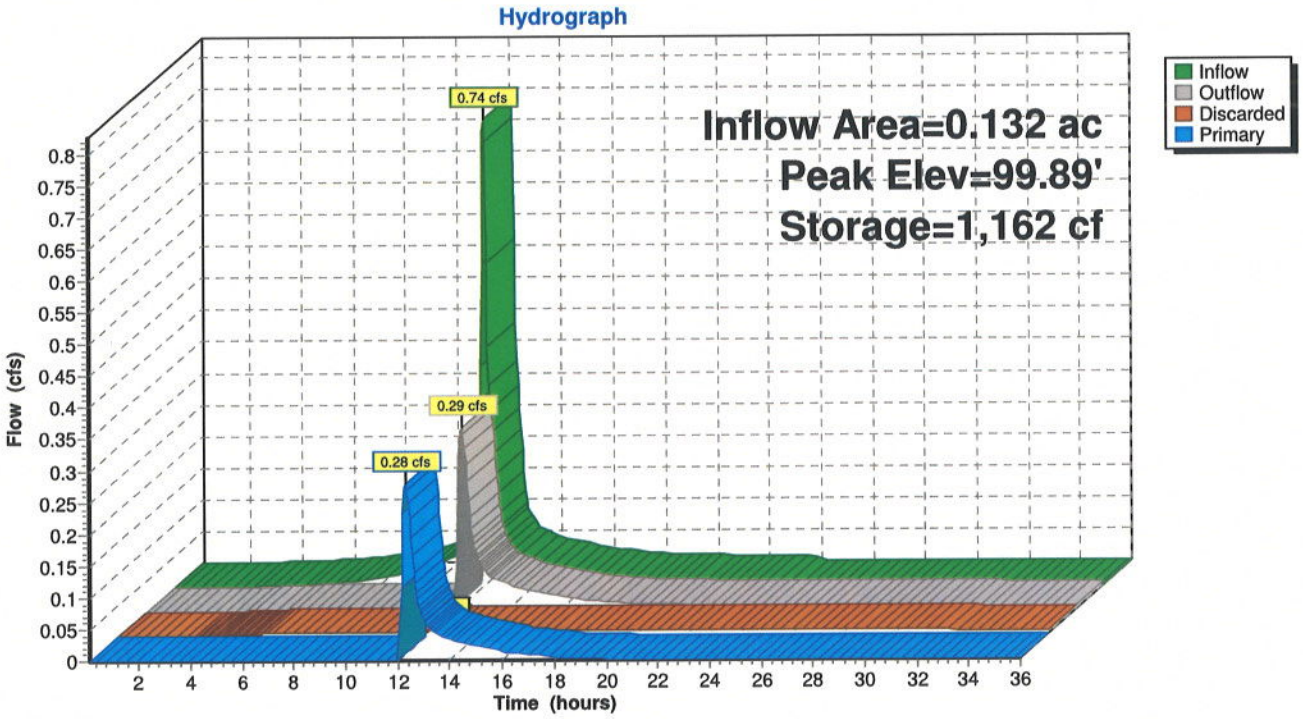
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
95.50	425	167.0	0.0	0	0	425
96.00	425	167.0	40.0	85	85	509
98.75	425	167.0	30.0	351	436	968
99.00	425	167.0	100.0	106	542	1,010
100.00	1,088	213.0	100.0	731	1,273	2,413
101.00	1,281	181.0	100.0	1,183	2,456	3,436

Device	Routing	Invert	Outlet Devices
#1	Primary	99.75'	**2.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Discarded	95.50'	**0.440 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 12.29 hrs HW=99.89' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.28 cfs @ 12.29 hrs HW=99.89' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Weir Controls 0.28 cfs @ 0.96 fps)

Pond 26P: BIORETENTION BASIN



Summary for Pond 29P: TREE BOX FILTER

Inflow Area = 0.174 ac,100.00% Impervious, Inflow Depth = 5.66" for 50-YR event
Inflow = 1.01 cfs @ 12.07 hrs, Volume= 0.082 af
Outflow = 1.09 cfs @ 12.09 hrs, Volume= 0.081 af, Atten= 0%, Lag= 1.4 min
Primary = 1.09 cfs @ 12.09 hrs, Volume= 0.081 af

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Peak Elev= 98.82' @ 12.09 hrs Surf.Area= 60 sf Storage= 93 cf

Plug-Flow detention time= 18.0 min calculated for 0.081 af (99% of inflow)
Center-of-Mass det. time= 9.3 min (753.8 - 744.5)

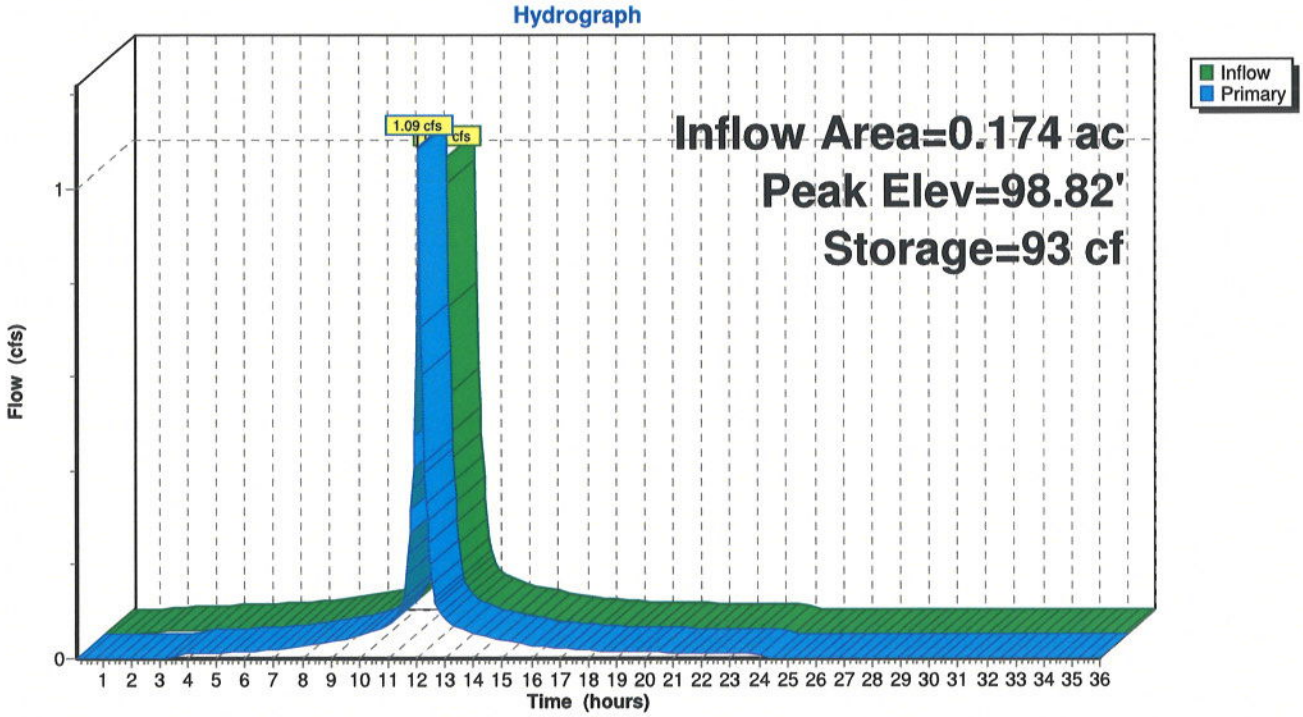
Volume	Invert	Avail.Storage	Storage Description
#1	95.00'	93 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
95.00	60	0.0	0	0
95.50	60	40.0	12	12
97.50	60	30.0	36	48
98.25	60	100.0	45	93

Device	Routing	Invert	Outlet Devices
#1	Device 2	95.00'	**6.0" Vert. Orifice/Grate** C= 0.600
#2	Primary	97.50'	**1.0" W x 18.0" H Vert. Orifice/Grate X 10.00** C= 0.600

Primary OutFlow Max=1.06 cfs @ 12.09 hrs HW=98.75' (Free Discharge)
└─**2=Orifice/Grate** (Passes 1.06 cfs of 3.74 cfs potential flow)
└─**1=Orifice/Grate** (Orifice Controls 1.06 cfs @ 5.38 fps)

Pond 29P: TREE BOX FILTER



Summary for Pond 33P: TREE BOX FILTER

Inflow Area = 0.169 ac,100.00% Impervious, Inflow Depth = 5.66" for 50-YR event
Inflow = 0.99 cfs @ 12.07 hrs, Volume= 0.080 af
Outflow = 1.08 cfs @ 12.09 hrs, Volume= 0.079 af, Atten= 0%, Lag= 1.5 min
Primary = 1.08 cfs @ 12.09 hrs, Volume= 0.079 af

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Peak Elev= 98.80' @ 12.10 hrs Surf.Area= 60 sf Storage= 93 cf

Plug-Flow detention time= 18.6 min calculated for 0.079 af (99% of inflow)
Center-of-Mass det. time= 9.5 min (754.0 - 744.5)

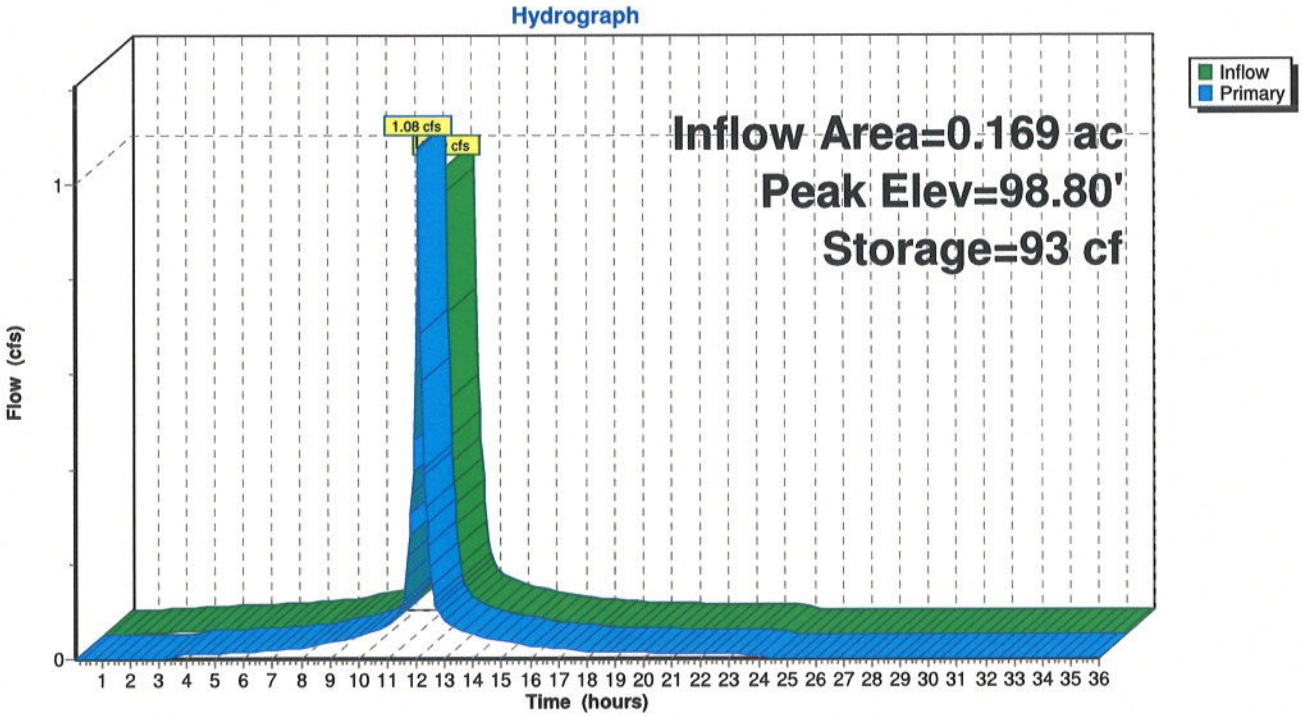
Volume	Invert	Avail.Storage	Storage Description
#1	95.00'	93 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
95.00	60	0.0	0	0
95.50	60	40.0	12	12
97.50	60	30.0	36	48
98.25	60	100.0	45	93

Device	Routing	Invert	Outlet Devices
#1	Device 2	95.00'	**6.0" Vert. Orifice/Grate** C= 0.600
#2	Primary	97.50'	**1.0" W x 18.0" H Vert. Orifice/Grate X 10.00** C= 0.600

Primary OutFlow Max=1.05 cfs @ 12.09 hrs HW=98.74' (Free Discharge)
└─**2=Orifice/Grate** (Passes 1.05 cfs of 3.67 cfs potential flow)
└─**1=Orifice/Grate** (Orifice Controls 1.05 cfs @ 5.35 fps)

Pond 33P: TREE BOX FILTER

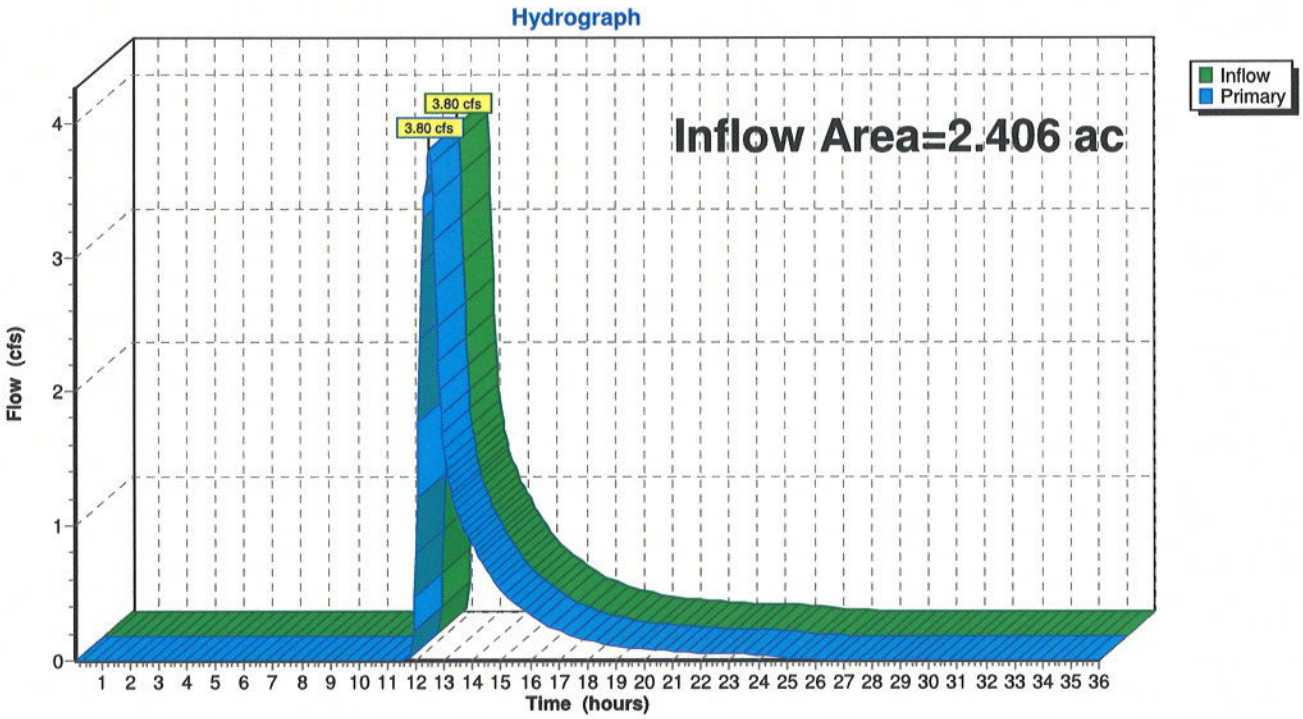


Summary for Link 15L: DP#2-REAR WETLANDS

Inflow Area =	2.406 ac, 41.32% Impervious, Inflow Depth = 2.45" for 50-YR event			
Inflow =	3.80 cfs @ 12.49 hrs, Volume=	0.492 af		
Primary =	3.80 cfs @ 12.49 hrs, Volume=	0.492 af, Atten= 0%, Lag= 0.0 min		

Primary outflow = Inflow, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs

Link 15L: DP#2-REAR WETLANDS



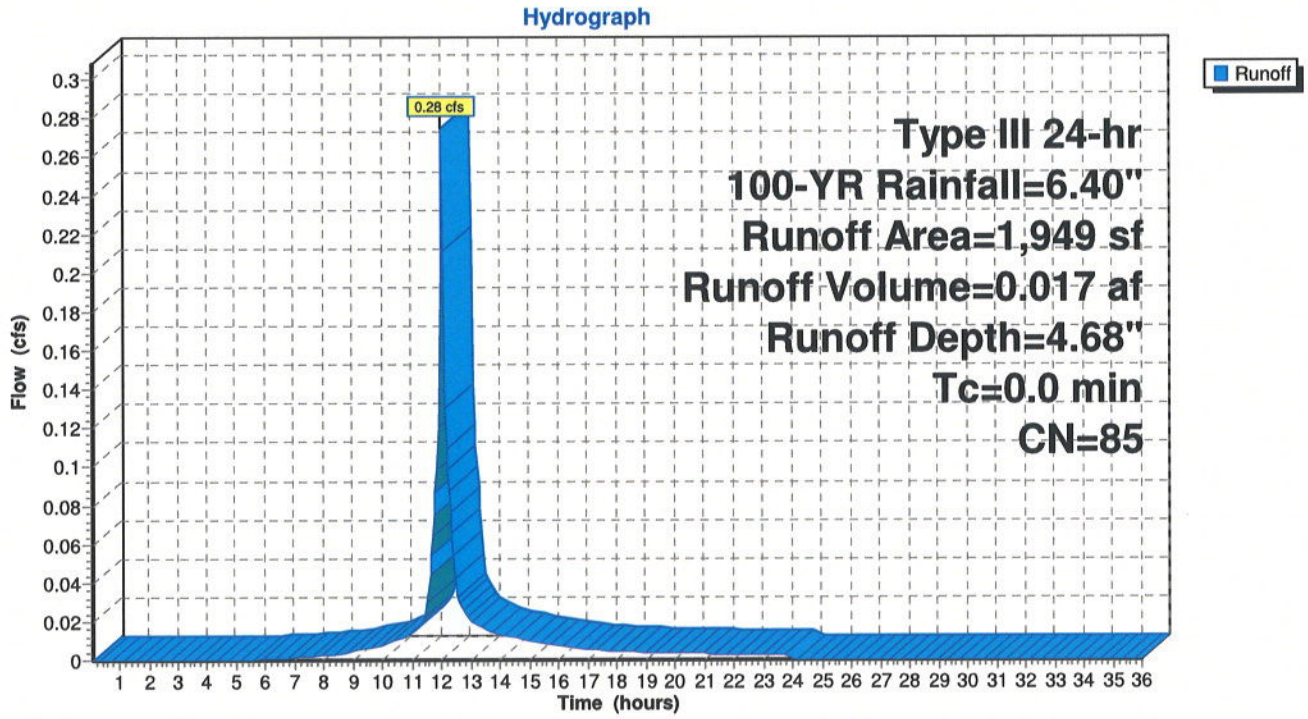
Summary for Subcatchment 1S: DP#1-GREENMONT

Runoff = 0.28 cfs @ 12.00 hrs, Volume= 0.017 af, Depth= 4.68"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=6.40"

Area (sf)	CN	Description
569	98	Paved parking, HSG D
1,380	80	>75% Grass cover, Good, HSG D
1,949	85	Weighted Average
1,380		70.81% Pervious Area
569		29.19% Impervious Area

Subcatchment 1S: DP#1-GREENMONT



Summary for Subcatchment 3S: PWS#2

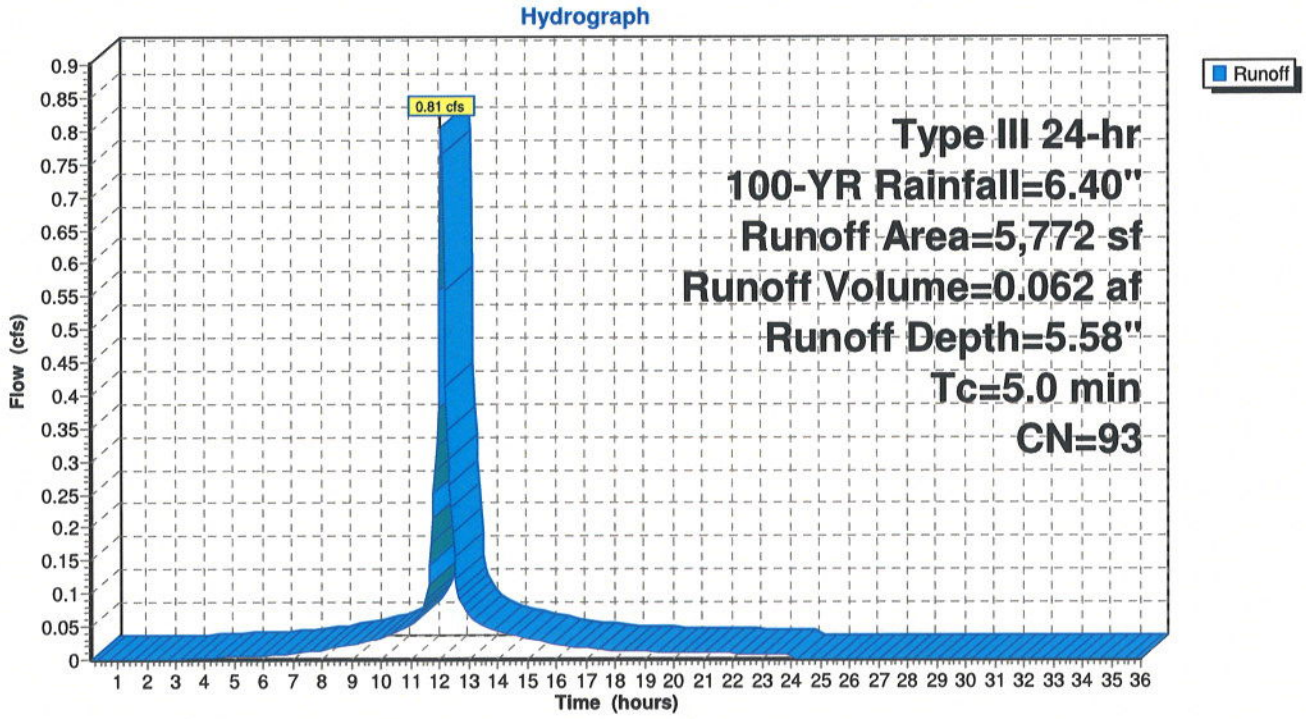
Runoff = 0.81 cfs @ 12.07 hrs, Volume= 0.062 af, Depth= 5.58"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=6.40"

Area (sf)	CN	Description
4,094	98	Paved parking, HSG D
1,678	80	>75% Grass cover, Good, HSG D
5,772	93	Weighted Average
1,678		29.07% Pervious Area
4,094		70.93% Impervious Area

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

Subcatchment 3S: PWS#2



Summary for Subcatchment 5S: ROOFS 15 - 28

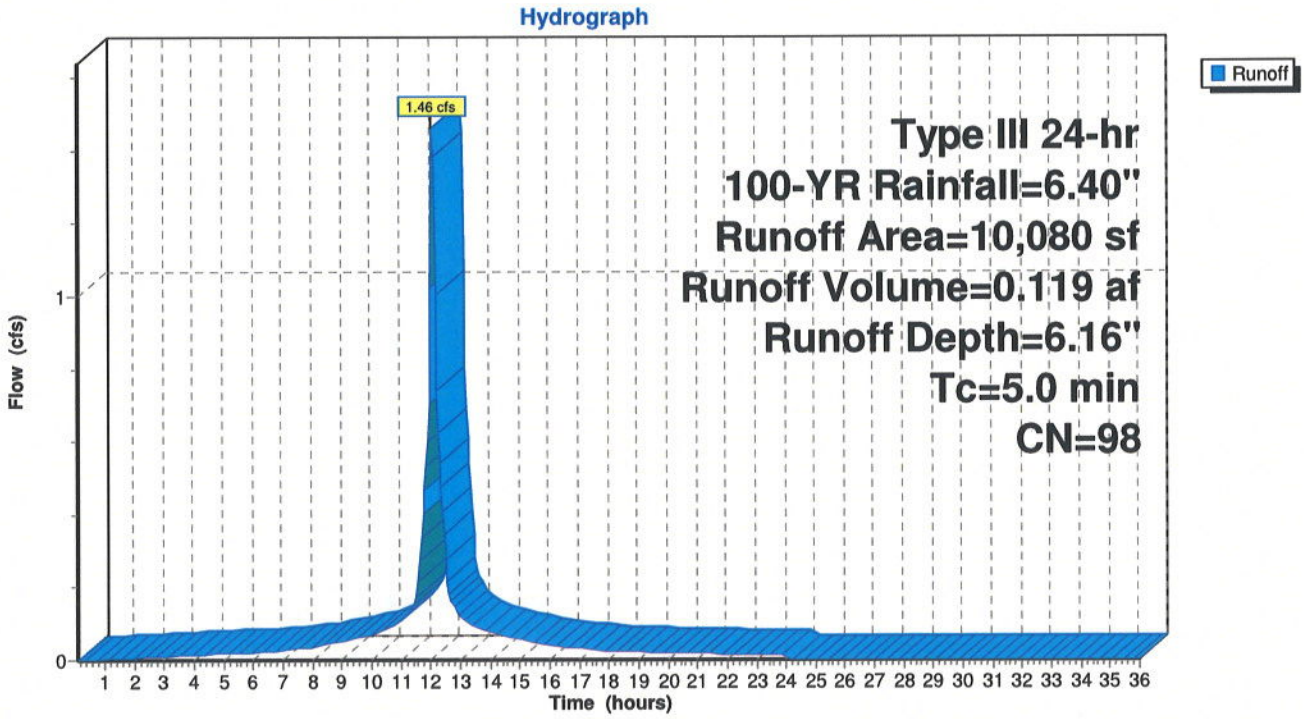
Runoff = 1.46 cfs @ 12.07 hrs, Volume= 0.119 af, Depth= 6.16"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=6.40"

Area (sf)	CN	Description
10,080	98	Roofs, HSG D
10,080		100.00% Impervious Area

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

Subcatchment 5S: ROOFS 15 - 28



Summary for Subcatchment 6S: PWS#3

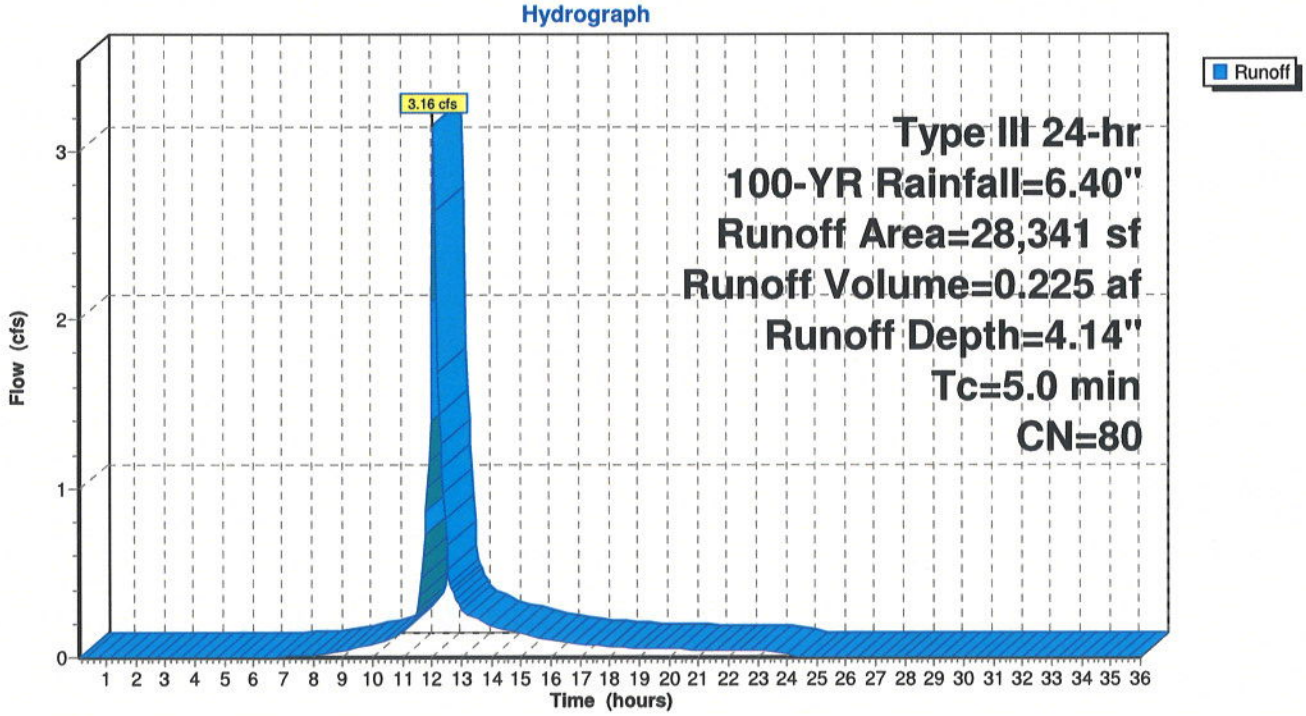
Runoff = 3.16 cfs @ 12.07 hrs, Volume= 0.225 af, Depth= 4.14"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=6.40"

	Area (sf)	CN	Description
	18,244	80	>75% Grass cover, Good, HSG D
*	10,097	80	
	28,341	80	Weighted Average
	28,341		100.00% Pervious Area

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

Subcatchment 6S: PWS#3



Summary for Subcatchment 7S: PWS#4

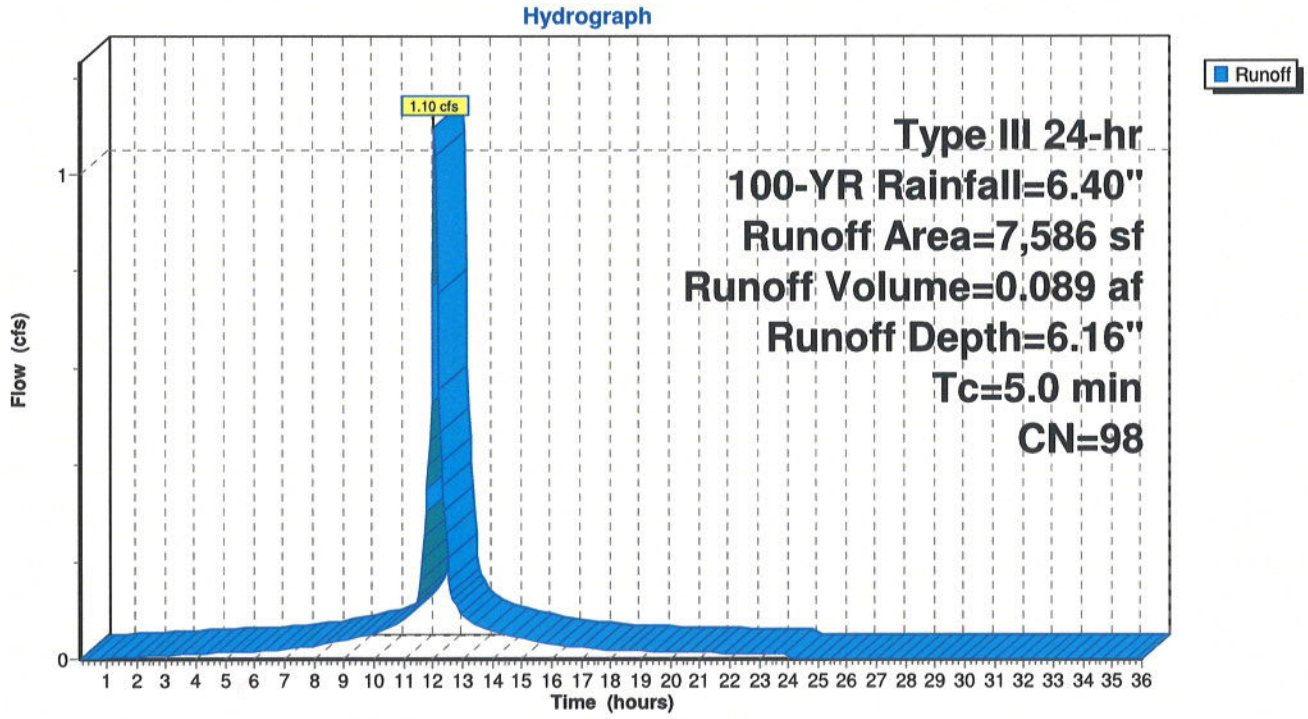
Runoff = 1.10 cfs @ 12.07 hrs, Volume= 0.089 af, Depth= 6.16"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=6.40"

Area (sf)	CN	Description
7,586	98	Paved parking, HSG D
7,586		100.00% Impervious Area

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

Subcatchment 7S: PWS#4



Summary for Subcatchment 9S: PWS#5

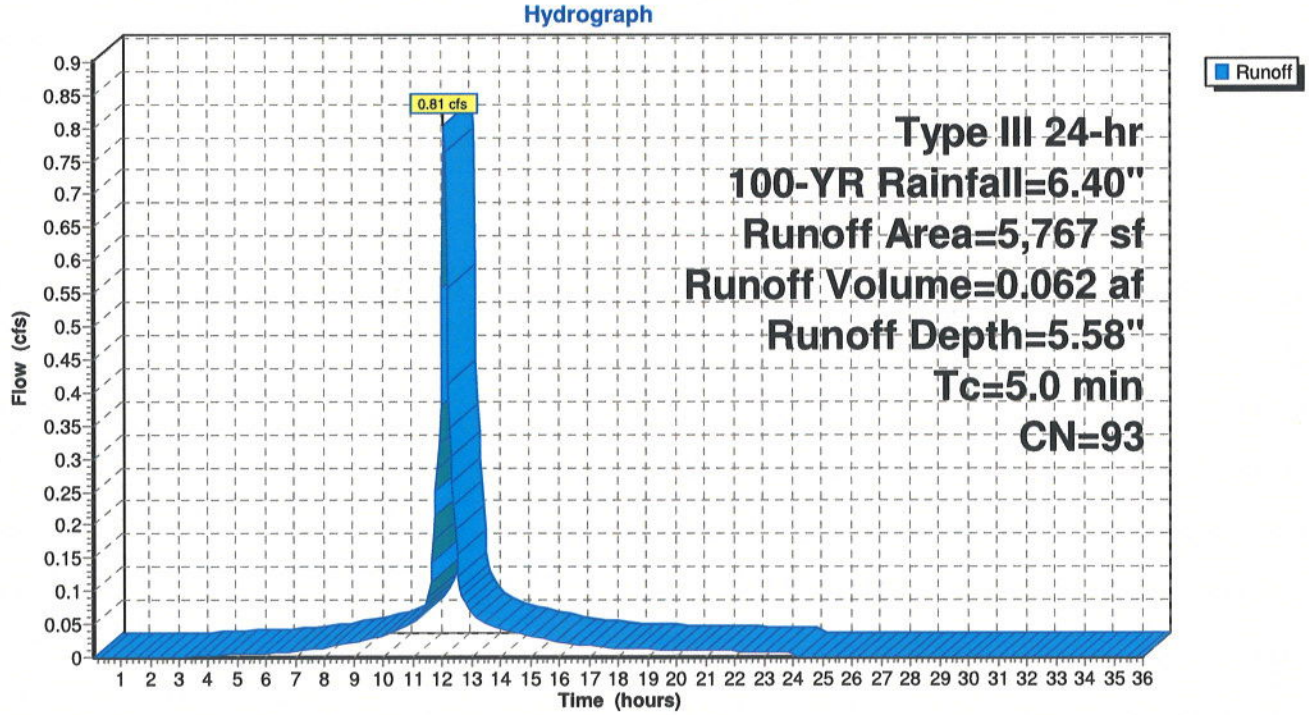
Runoff = 0.81 cfs @ 12.07 hrs, Volume= 0.062 af, Depth= 5.58"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=6.40"

Area (sf)	CN	Description
4,090	98	Paved parking, HSG D
1,677	80	>75% Grass cover, Good, HSG D
5,767	93	Weighted Average
1,677		29.08% Pervious Area
4,090		70.92% Impervious Area

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

Subcatchment 9S: PWS#5



Summary for Subcatchment 11S: PWS#6

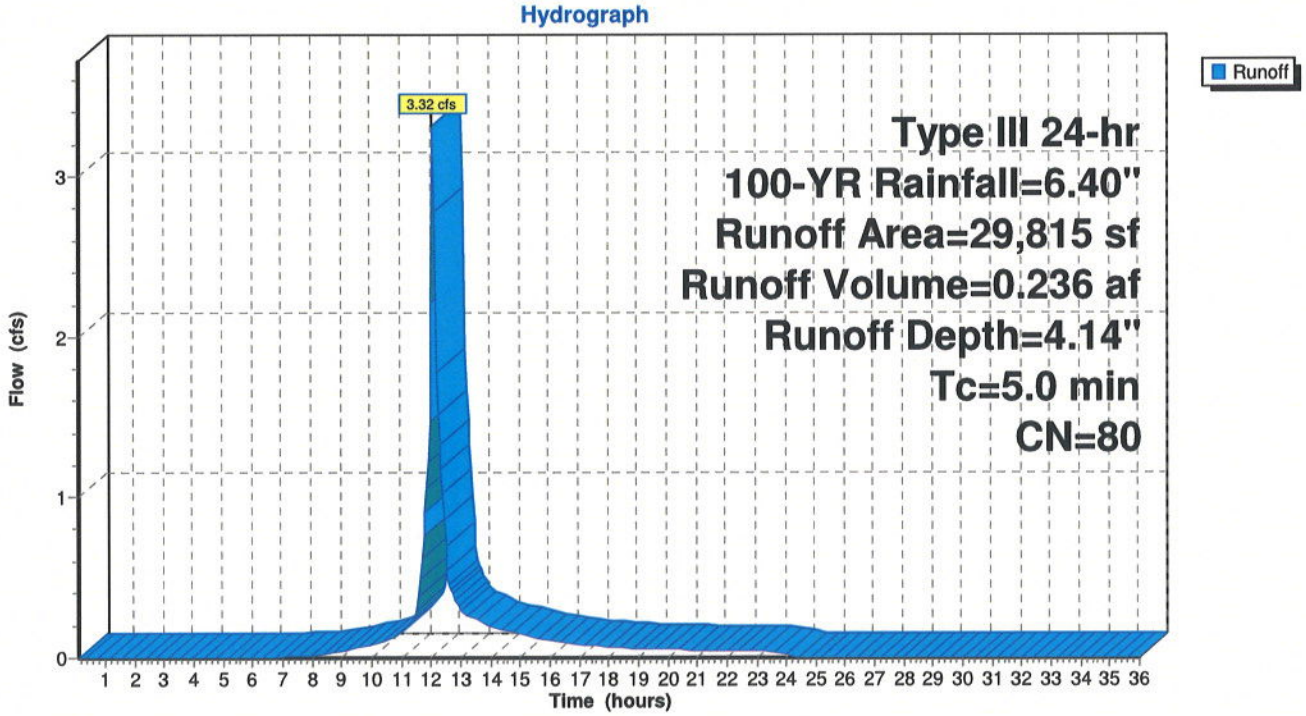
Runoff = 3.32 cfs @ 12.07 hrs, Volume= 0.236 af, Depth= 4.14"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=6.40"

	Area (sf)	CN	Description
	21,412	80	>75% Grass cover, Good, HSG D
*	8,403	80	
	29,815	80	Weighted Average
	29,815		100.00% Pervious Area

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

Subcatchment 11S: PWS#6



Summary for Subcatchment 13S: PWS#7

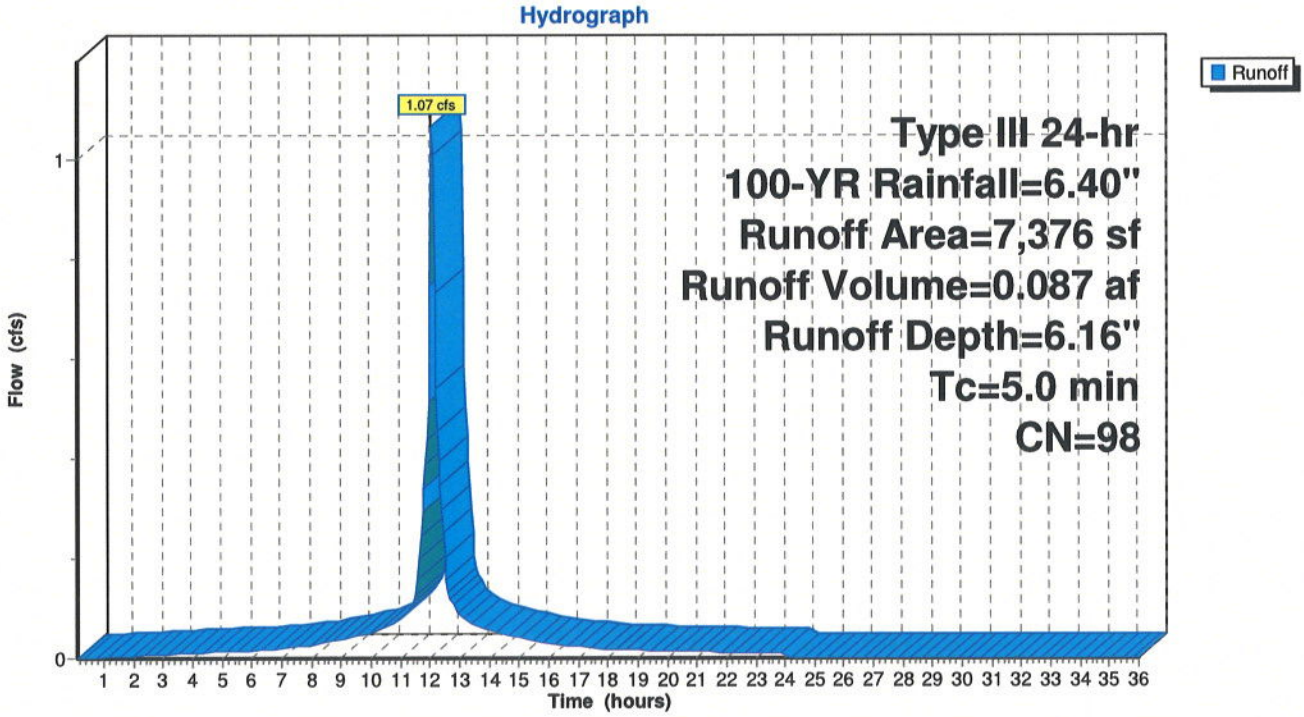
Runoff = 1.07 cfs @ 12.07 hrs, Volume= 0.087 af, Depth= 6.16"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=6.40"

Area (sf)	CN	Description
7,376	98	Paved parking, HSG D
7,376		100.00% Impervious Area

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

Subcatchment 13S: PWS#7



Summary for Subcatchment 18S: ROOFS 1 - 14

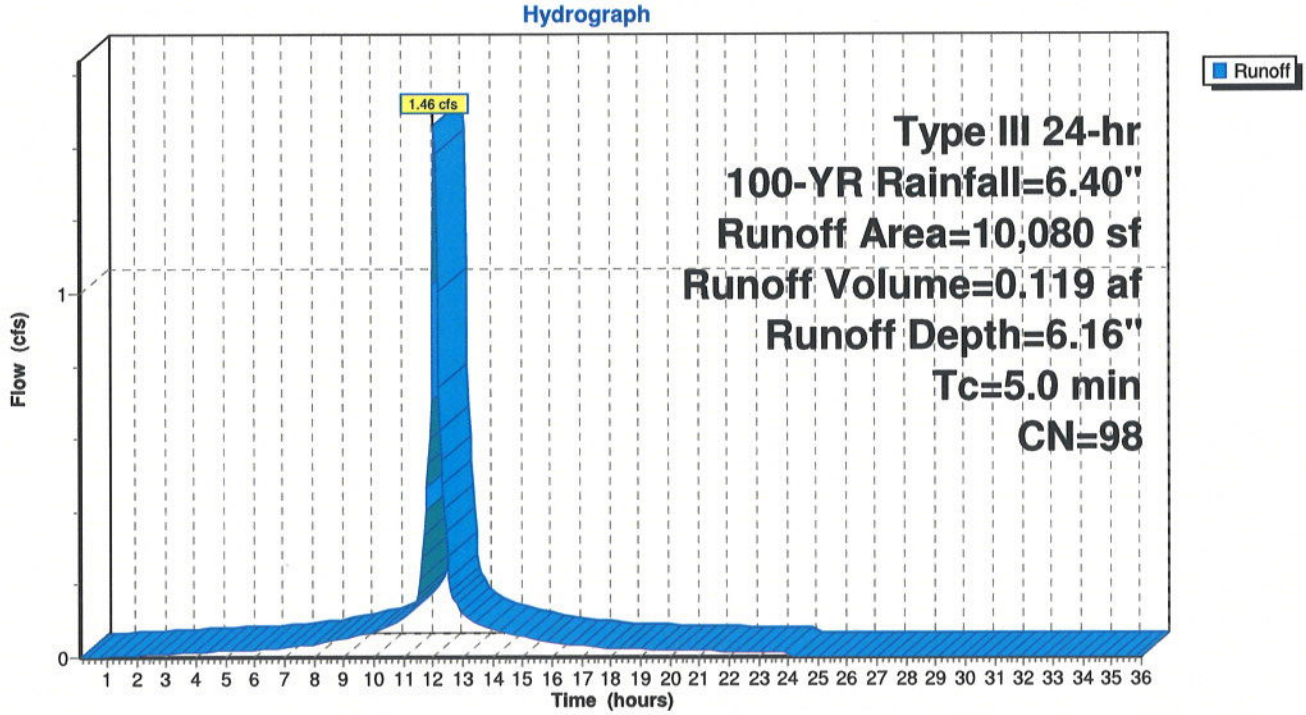
Runoff = 1.46 cfs @ 12.07 hrs, Volume= 0.119 af, Depth= 6.16"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=6.40"

Area (sf)	CN	Description
10,080	98	Roofs, HSG D
10,080		100.00% Impervious Area

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

Subcatchment 18S: ROOFS 1 - 14



Summary for Reach 4R: GRASS LINED SWALE #1

Inflow Area = 1.015 ac, 32.07% Impervious, Inflow Depth = 3.95" for 100-YR event
Inflow = 4.14 cfs @ 12.08 hrs, Volume= 0.334 af
Outflow = 3.91 cfs @ 12.16 hrs, Volume= 0.334 af, Atten= 6%, Lag= 4.5 min

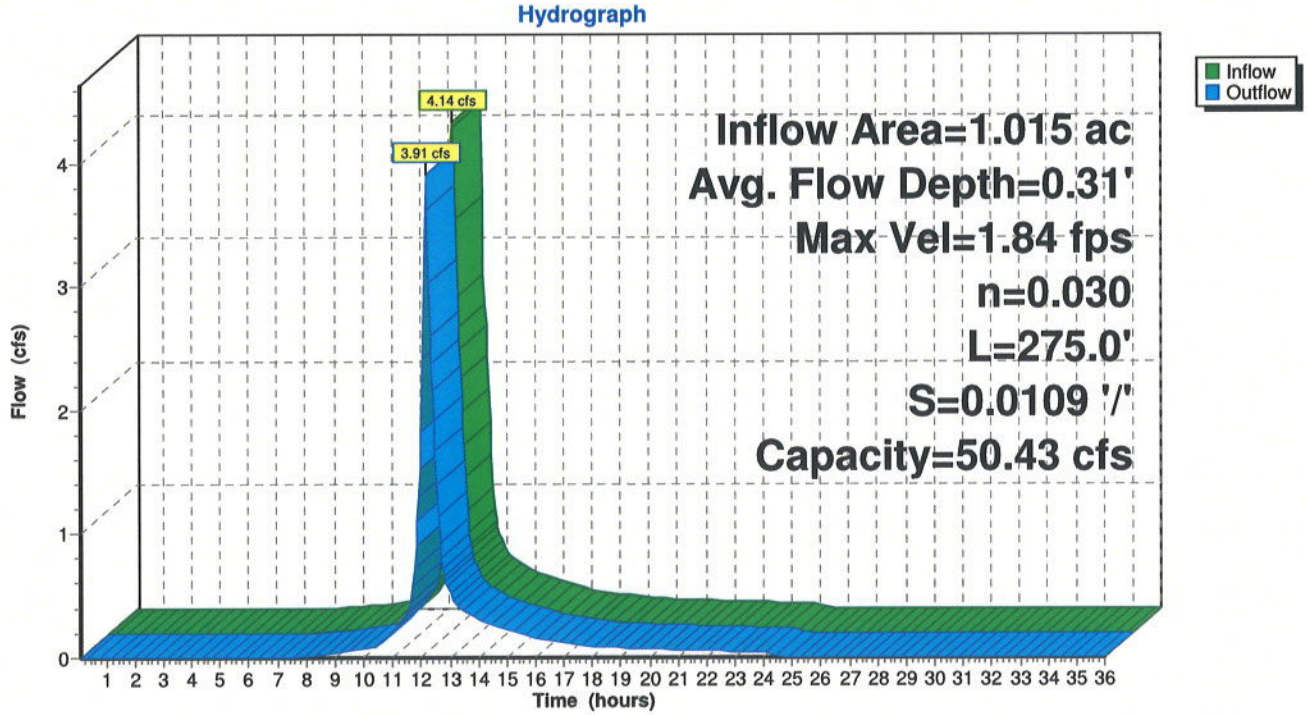
Routing by Stor-Ind+Trans method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.84 fps, Min. Travel Time= 2.5 min
Avg. Velocity = 0.57 fps, Avg. Travel Time= 8.1 min

Peak Storage= 593 cf @ 12.11 hrs
Average Depth at Peak Storage= 0.31'
Bank-Full Depth= 1.00' Flow Area= 14.0 sf, Capacity= 50.43 cfs

4.00' x 1.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 10.0 '/' Top Width= 24.00'
Length= 275.0' Slope= 0.0109 '/'
Inlet Invert= 99.00', Outlet Invert= 96.00'

‡

Reach 4R: GRASS LINED SWALE #1



Summary for Reach 12R: GRASS LINED SWALE #2

Inflow Area = 1.048 ac, 31.03% Impervious, Inflow Depth = 4.00" for 100-YR event
Inflow = 4.39 cfs @ 12.09 hrs, Volume= 0.350 af
Outflow = 4.18 cfs @ 12.17 hrs, Volume= 0.350 af, Atten= 5%, Lag= 4.5 min

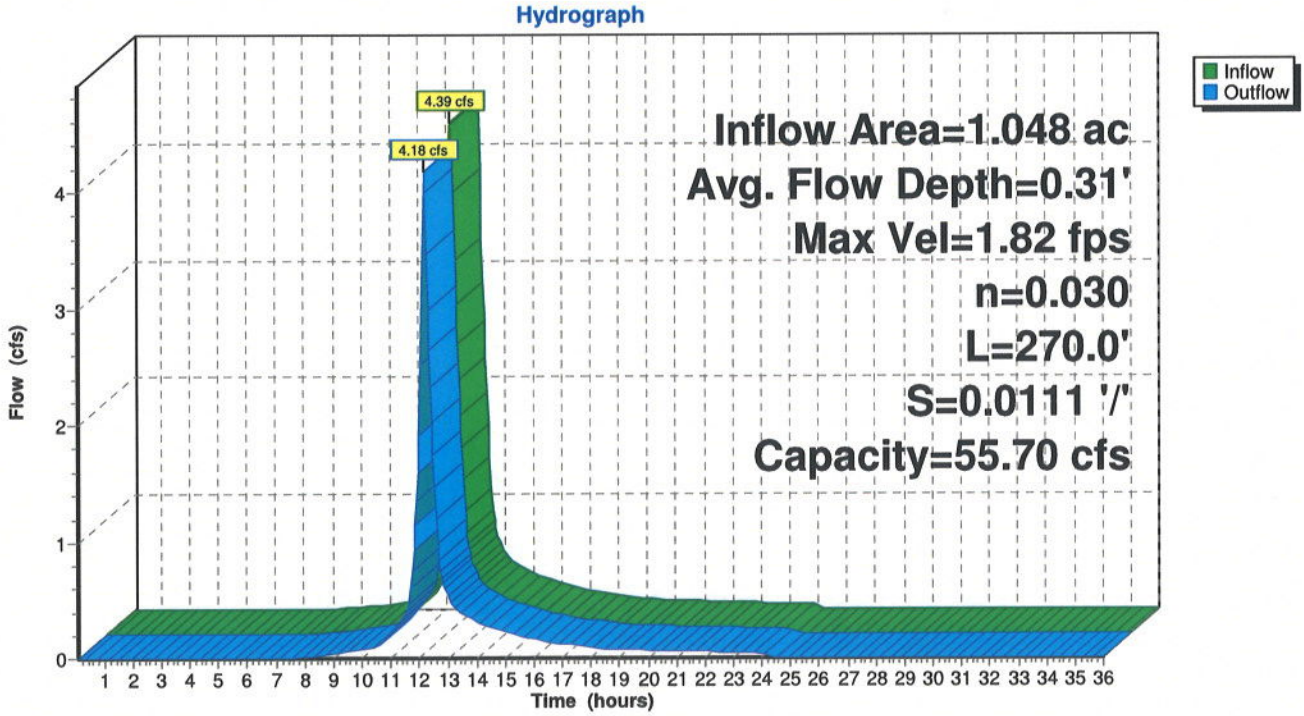
Routing by Stor-Ind+Trans method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.82 fps, Min. Travel Time= 2.5 min
Avg. Velocity = 0.57 fps, Avg. Travel Time= 7.9 min

Peak Storage= 623 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.31'
Bank-Full Depth= 1.00' Flow Area= 15.5 sf, Capacity= 55.70 cfs

4.00' x 1.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 4.0 19.0 '/' Top Width= 27.00'
Length= 270.0' Slope= 0.0111 '/'
Inlet Invert= 99.00', Outlet Invert= 96.00'

‡

Reach 12R: GRASS LINED SWALE #2



Summary for Pond 8P: DETENTION POND #1

Inflow Area =	1.189 ac, 42.02% Impervious, Inflow Depth = 4.26" for 100-YR event				
Inflow =	4.66 cfs @	12.14 hrs, Volume=	0.422 af		
Outflow =	2.15 cfs @	12.46 hrs, Volume=	0.398 af, Atten= 54%, Lag= 19.2 min		
Discarded =	0.12 cfs @	12.46 hrs, Volume=	0.186 af		
Primary =	2.03 cfs @	12.46 hrs, Volume=	0.212 af		

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Peak Elev= 95.69' @ 12.46 hrs Surf.Area= 4,029 sf Storage= 7,488 cf

Plug-Flow detention time= 257.6 min calculated for 0.398 af (94% of inflow)
Center-of-Mass det. time= 228.1 min (1,031.2 - 803.1)

Volume	Invert	Avail.Storage	Storage Description
#1	93.00'	8,773 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

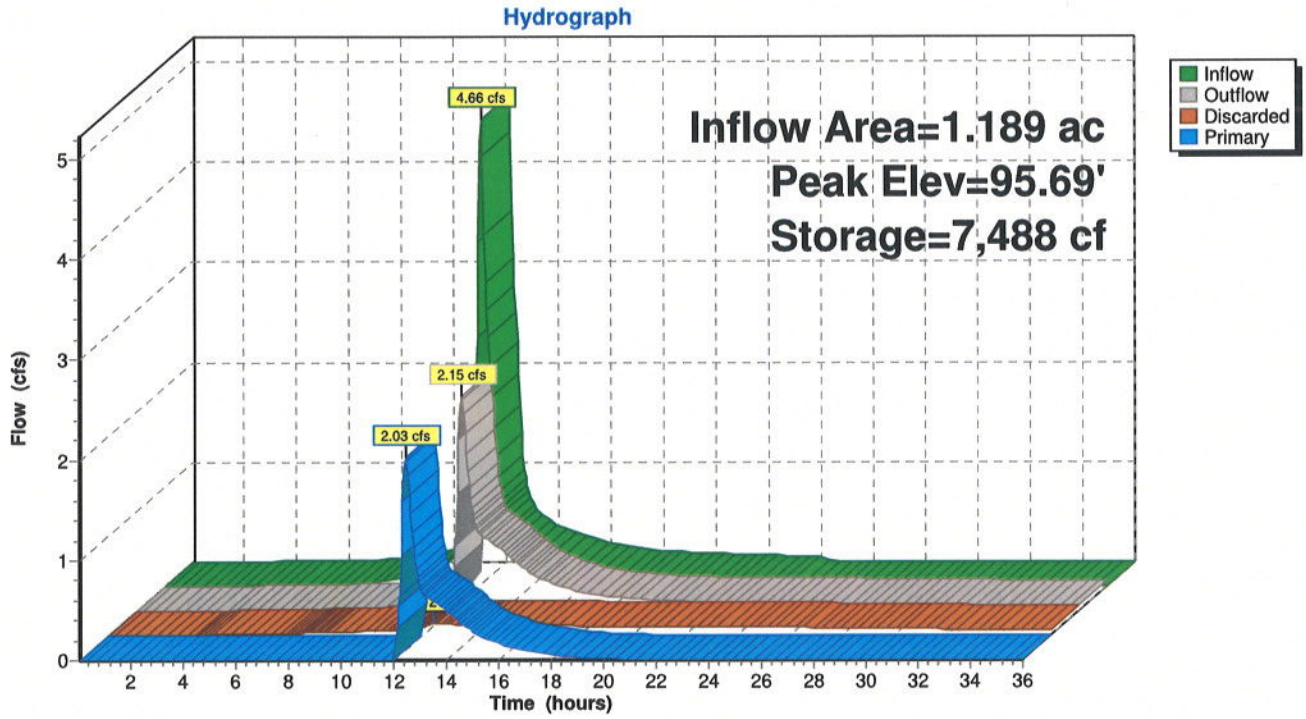
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
93.00	1,640	257.0	0	0	1,640
94.00	2,440	276.0	2,027	2,027	2,489
95.00	3,381	308.0	2,898	4,925	4,004
96.00	4,335	329.0	3,848	8,773	5,115

Device	Routing	Invert	Outlet Devices
#1	Primary	95.50'	**6.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32
#2	Primary	94.75'	**6.0" Vert. Orifice/Grate** C= 0.600
#3	Discarded	93.00'	**1.080 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.12 cfs @ 12.46 hrs HW=95.69' (Free Discharge)
└─**3=Exfiltration** (Exfiltration Controls 0.12 cfs)

Primary OutFlow Max=2.01 cfs @ 12.46 hrs HW=95.69' (Free Discharge)
├─**1=Broad-Crested Rectangular Weir** (Weir Controls 1.23 cfs @ 1.07 fps)
└─**2=Orifice/Grate** (Orifice Controls 0.79 cfs @ 4.00 fps)

Pond 8P: DETENTION POND #1



Summary for Pond 14P: DETENTION POND #2

Inflow Area =	1.218 ac, 40.62% Impervious, Inflow Depth = 4.29" for 100-YR event				
Inflow =	4.88 cfs @	12.15 hrs,	Volume=	0.435 af	
Outflow =	3.20 cfs @	12.33 hrs,	Volume=	0.382 af,	Atten= 34%, Lag= 10.4 min
Discarded =	0.01 cfs @	12.33 hrs,	Volume=	0.013 af	
Primary =	3.19 cfs @	12.33 hrs,	Volume=	0.369 af	

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Peak Elev= 95.96' @ 12.33 hrs Surf.Area= 3,067 sf Storage= 5,540 cf

Plug-Flow detention time= 117.5 min calculated for 0.382 af (88% of inflow)
Center-of-Mass det. time= 63.5 min (864.6 - 801.1)

Volume	Invert	Avail.Storage	Storage Description
#1	93.00'	5,654 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

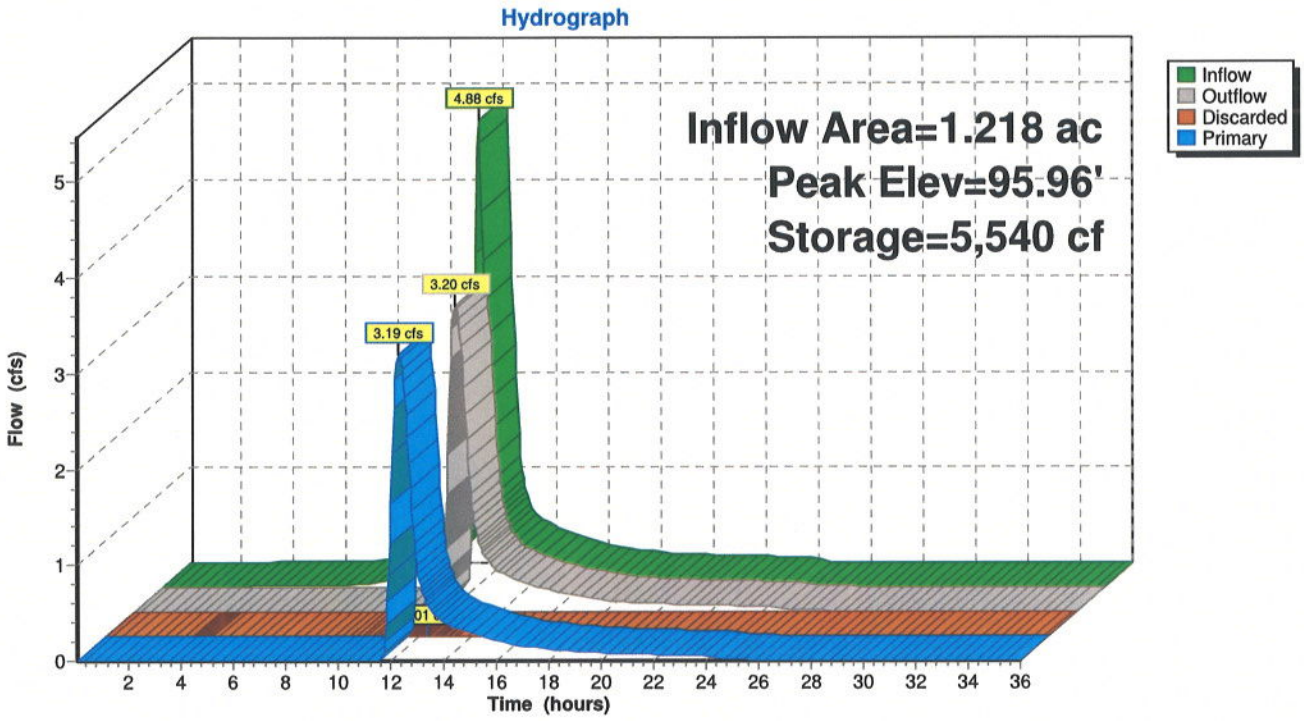
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
93.00	933	130.0	0	0	933
94.00	1,451	245.0	1,183	1,183	4,370
95.00	2,221	267.0	1,822	3,005	5,302
96.00	3,102	296.0	2,649	5,654	6,632

Device	Routing	Invert	Outlet Devices
#1	Primary	94.75'	**12.0" Vert. Orifice/Grate** C= 0.600
#2	Discarded	93.00'	**0.110 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 12.33 hrs HW=95.96' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=3.19 cfs @ 12.33 hrs HW=95.96' (Free Discharge)
└**1=Orifice/Grate** (Orifice Controls 3.19 cfs @ 4.06 fps)

Pond 14P: DETENTION POND #2



Summary for Pond 20P: RECHARGE 1 - 8

Inflow Area =	0.231 ac,100.00% Impervious, Inflow Depth = 6.16" for 100-YR event				
Inflow =	1.46 cfs @	12.07 hrs,	Volume=	0.119 af	
Outflow =	1.10 cfs @	12.14 hrs,	Volume=	0.109 af,	Atten= 25%, Lag= 4.4 min
Discarded =	0.01 cfs @	12.14 hrs,	Volume=	0.022 af	
Primary =	1.09 cfs @	12.14 hrs,	Volume=	0.087 af	

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Peak Elev= 100.34' @ 12.14 hrs Surf.Area= 540 sf Storage= 1,155 cf

Plug-Flow detention time= 164.2 min calculated for 0.109 af (91% of inflow)
Center-of-Mass det. time= 120.6 min (863.9 - 743.3)

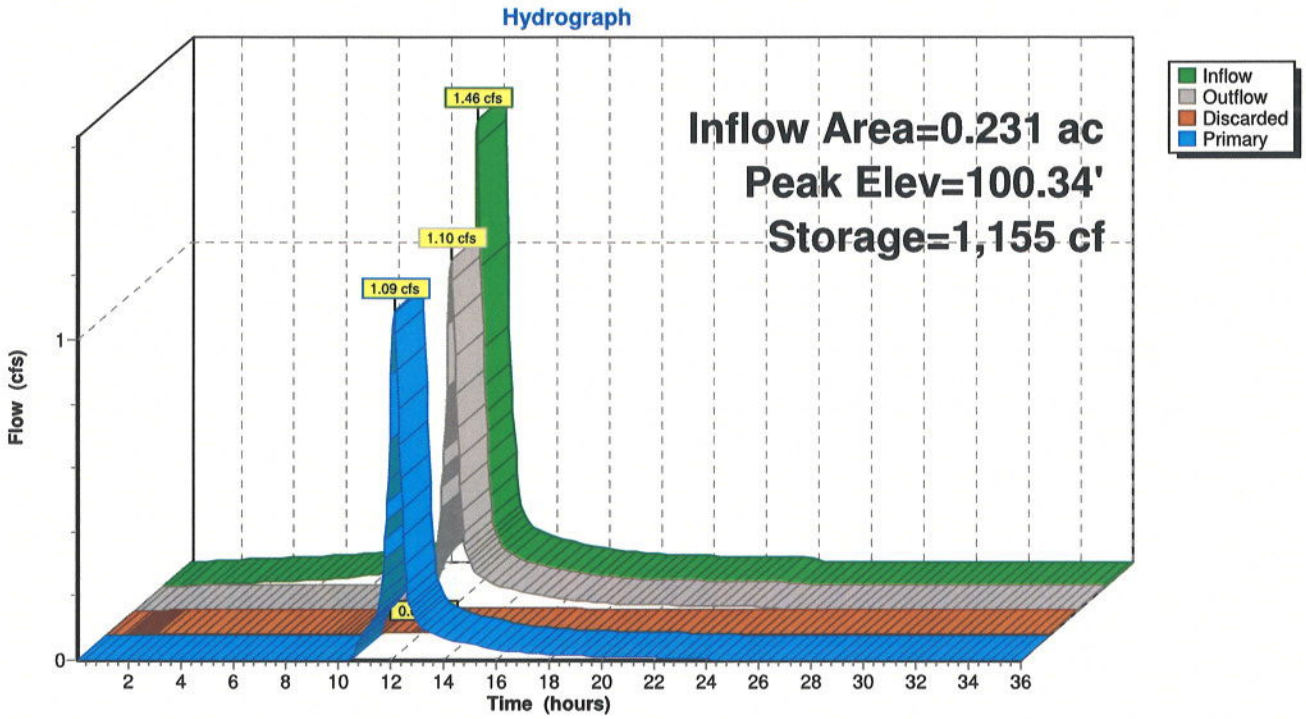
Volume	Invert	Avail.Storage	Storage Description
#1	96.50'	646 cf	**12.00'W x 45.00'L x 4.00'H Prismatoid** 2,160 cf Overall - 544 cf Embedded = 1,616 cf x 40.0% Voids
#2	97.00'	544 cf	**Cultec R-330XL** x 10 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 2 rows
		1,190 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	98.75'	**6.0" Vert. Orifice/Grate** C= 0.600
#2	Discarded	96.50'	**0.440 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.01 cfs @ 12.14 hrs HW=100.32' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=1.09 cfs @ 12.14 hrs HW=100.32' (Free Discharge)
└**1=Orifice/Grate** (Orifice Controls 1.09 cfs @ 5.53 fps)

Pond 20P: RECHARGE 1 - 8



Summary for Pond 23P: RECHARGE 15-28

Inflow Area =	0.231 ac,100.00% Impervious, Inflow Depth = 6.16" for 100-YR event			
Inflow =	1.46 cfs @ 12.07 hrs, Volume=	0.119 af		
Outflow =	1.10 cfs @ 12.14 hrs, Volume=	0.109 af, Atten= 25%, Lag= 4.4 min		
Discarded =	0.01 cfs @ 12.14 hrs, Volume=	0.022 af		
Primary =	1.09 cfs @ 12.14 hrs, Volume=	0.087 af		

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Peak Elev= 100.34' @ 12.14 hrs Surf.Area= 540 sf Storage= 1,155 cf

Plug-Flow detention time= 164.2 min calculated for 0.109 af (91% of inflow)
Center-of-Mass det. time= 120.6 min (863.9 - 743.3)

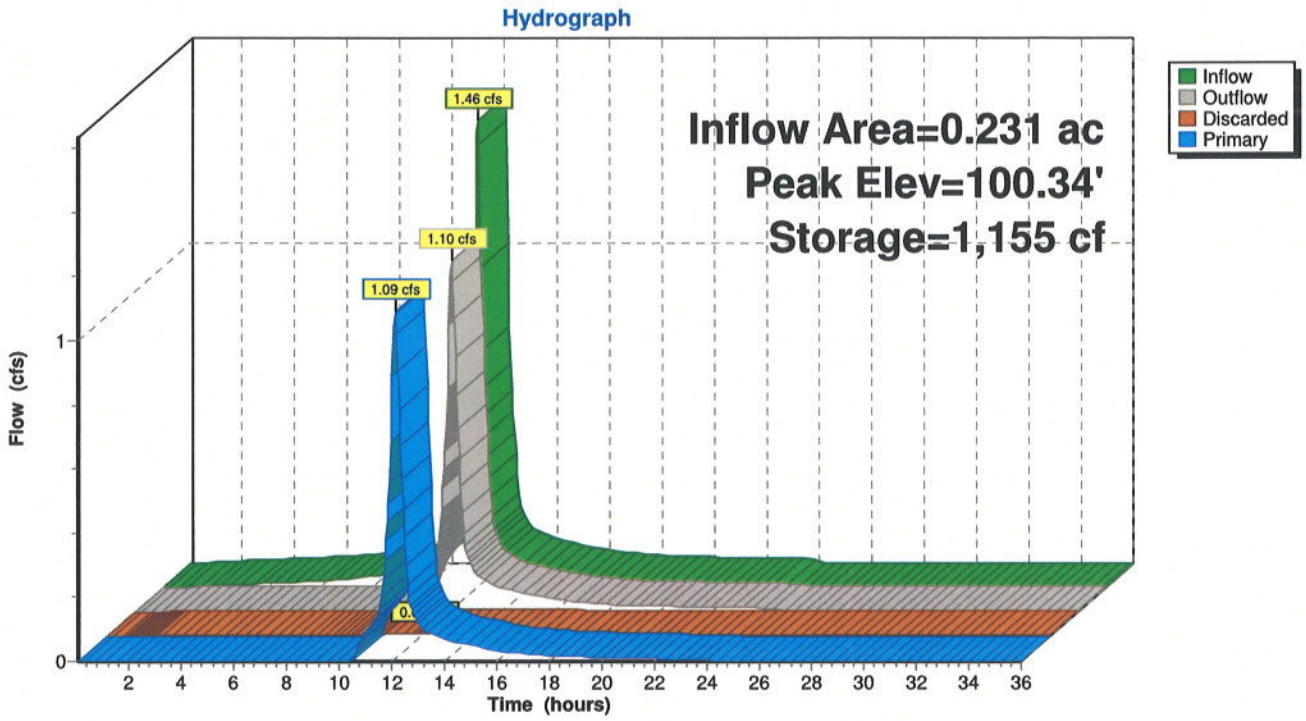
Volume	Invert	Avail.Storage	Storage Description
#1	96.50'	646 cf	**12.00'W x 45.00'L x 4.00'H Prismatoid** 2,160 cf Overall - 544 cf Embedded = 1,616 cf x 40.0% Voids
#2	97.00'	544 cf	**Cultec R-330XL** x 10 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 2 rows
		1,190 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	98.75'	**6.0" Vert. Orifice/Grate** C= 0.600
#2	Discarded	96.50'	**0.440 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.01 cfs @ 12.14 hrs HW=100.32' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=1.09 cfs @ 12.14 hrs HW=100.32' (Free Discharge)
└**1=Orifice/Grate** (Orifice Controls 1.09 cfs @ 5.53 fps)

Pond 23P: RECHARGE 15-28



Summary for Pond 25P: BIORETENTION BASIN

Inflow Area =	0.133 ac, 70.93% Impervious, Inflow Depth = 5.58" for 100-YR event				
Inflow =	0.81 cfs @	12.07 hrs,	Volume=	0.062 af	
Outflow =	0.27 cfs @	12.36 hrs,	Volume=	0.035 af,	Atten= 66%, Lag= 17.1 min
Discarded =	0.01 cfs @	12.36 hrs,	Volume=	0.013 af	
Primary =	0.26 cfs @	12.36 hrs,	Volume=	0.022 af	

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Peak Elev= 99.87' @ 12.36 hrs Surf.Area= 625 sf Storage= 1,450 cf

Plug-Flow detention time= 346.1 min calculated for 0.035 af (56% of inflow)
Center-of-Mass det. time= 238.4 min (1,008.6 - 770.3)

Volume	Invert	Avail.Storage	Storage Description
#1	95.50'	1,538 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

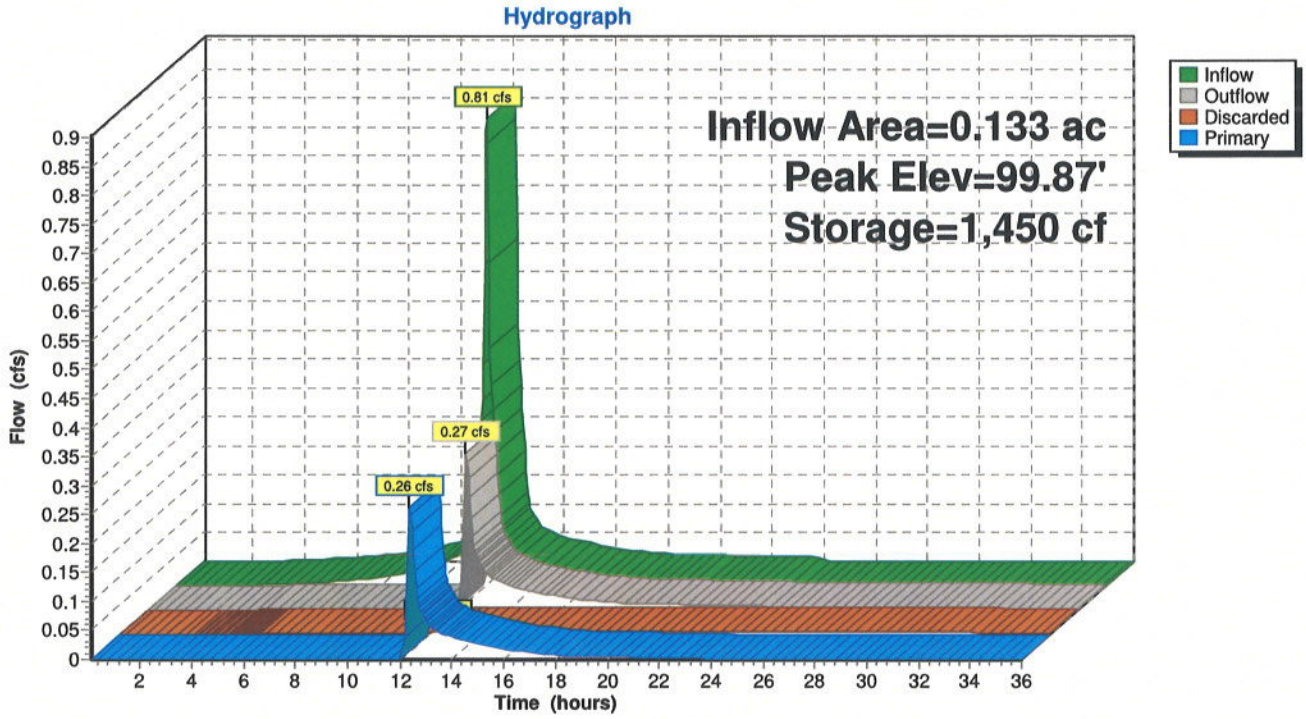
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
95.50	302	122.0	0	0	302
96.00	302	122.0	151	151	363
98.75	302	122.0	831	982	699
99.00	302	122.0	76	1,057	729
100.00	685	146.0	481	1,538	1,258

Device	Routing	Invert	Outlet Devices
#1	Primary	99.75'	**2.0' long x 2.00' rise Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.7' Crest Height
#2	Discarded	95.50'	**0.440 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 12.36 hrs HW=99.87' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.26 cfs @ 12.36 hrs HW=99.87' (Free Discharge)
└**1=Sharp-Crested Rectangular Weir** (Weir Controls 0.26 cfs @ 1.13 fps)

Pond 25P: BIORETENTION BASIN



Summary for Pond 26P: BIORETENTION BASIN

Inflow Area =	0.132 ac, 70.92% Impervious, Inflow Depth = 5.58" for 100-YR event				
Inflow =	0.81 cfs @ 12.07 hrs, Volume=	0.062 af			
Outflow =	0.41 cfs @ 12.22 hrs, Volume=	0.046 af, Atten= 49%, Lag= 8.8 min			
Discarded =	0.01 cfs @ 12.22 hrs, Volume=	0.019 af			
Primary =	0.40 cfs @ 12.22 hrs, Volume=	0.026 af			

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Peak Elev= 99.93' @ 12.22 hrs Surf.Area= 1,033 sf Storage= 1,201 cf

Plug-Flow detention time= 315.4 min calculated for 0.045 af (74% of inflow)
Center-of-Mass det. time= 230.5 min (1,000.7 - 770.3)

Volume	Invert	Avail.Storage	Storage Description
#1	95.50'	2,456 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

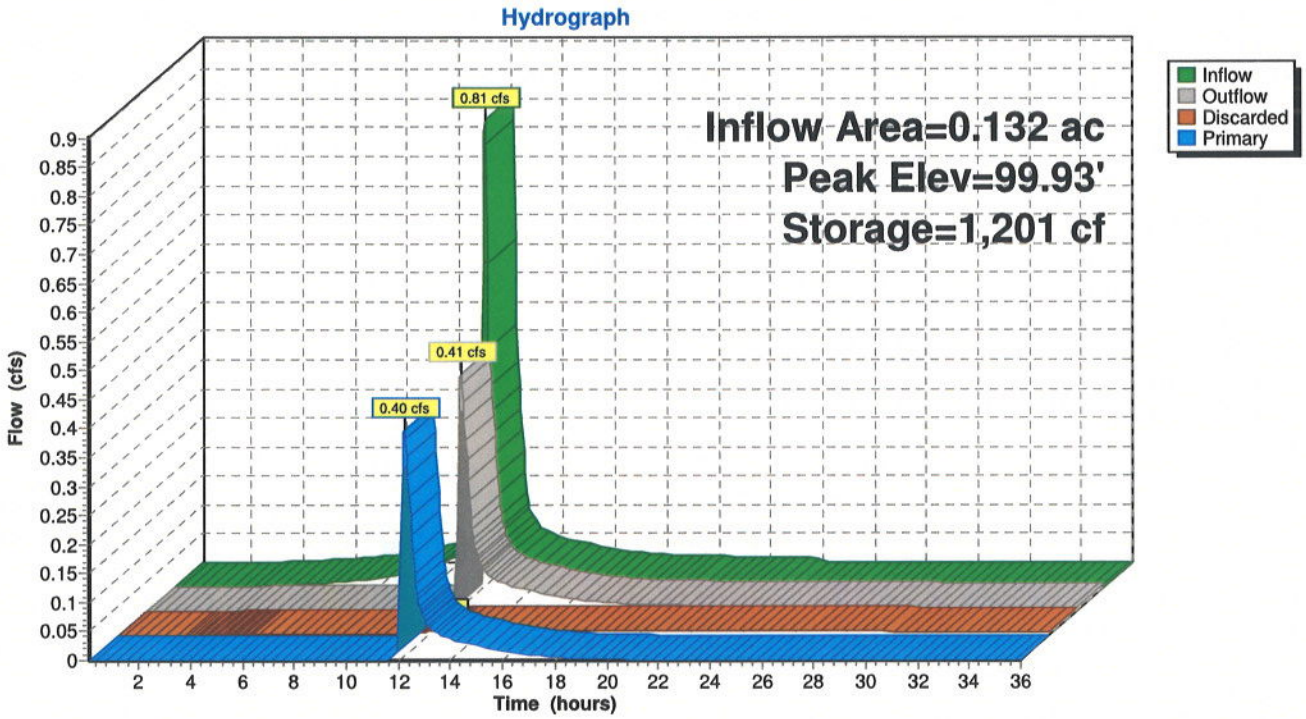
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
95.50	425	167.0	0.0	0	0	425
96.00	425	167.0	40.0	85	85	509
98.75	425	167.0	30.0	351	436	968
99.00	425	167.0	100.0	106	542	1,010
100.00	1,088	213.0	100.0	731	1,273	2,413
101.00	1,281	181.0	100.0	1,183	2,456	3,436

Device	Routing	Invert	Outlet Devices
#1	Primary	99.75'	**2.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Discarded	95.50'	**0.440 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 12.22 hrs HW=99.93' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.39 cfs @ 12.22 hrs HW=99.93' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Weir Controls 0.39 cfs @ 1.08 fps)

Pond 26P: BIORETENTION BASIN



Summary for Pond 29P: TREE BOX FILTER

Inflow Area = 0.174 ac,100.00% Impervious, Inflow Depth = 6.16" for 100-YR event
Inflow = 1.10 cfs @ 12.07 hrs, Volume= 0.089 af
Outflow = 1.12 cfs @ 12.09 hrs, Volume= 0.088 af, Atten= 0%, Lag= 0.9 min
Primary = 1.12 cfs @ 12.09 hrs, Volume= 0.088 af

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Peak Elev= 98.90' @ 12.09 hrs Surf.Area= 60 sf Storage= 93 cf

Plug-Flow detention time= 16.8 min calculated for 0.088 af (99% of inflow)
Center-of-Mass det. time= 8.7 min (752.0 - 743.3)

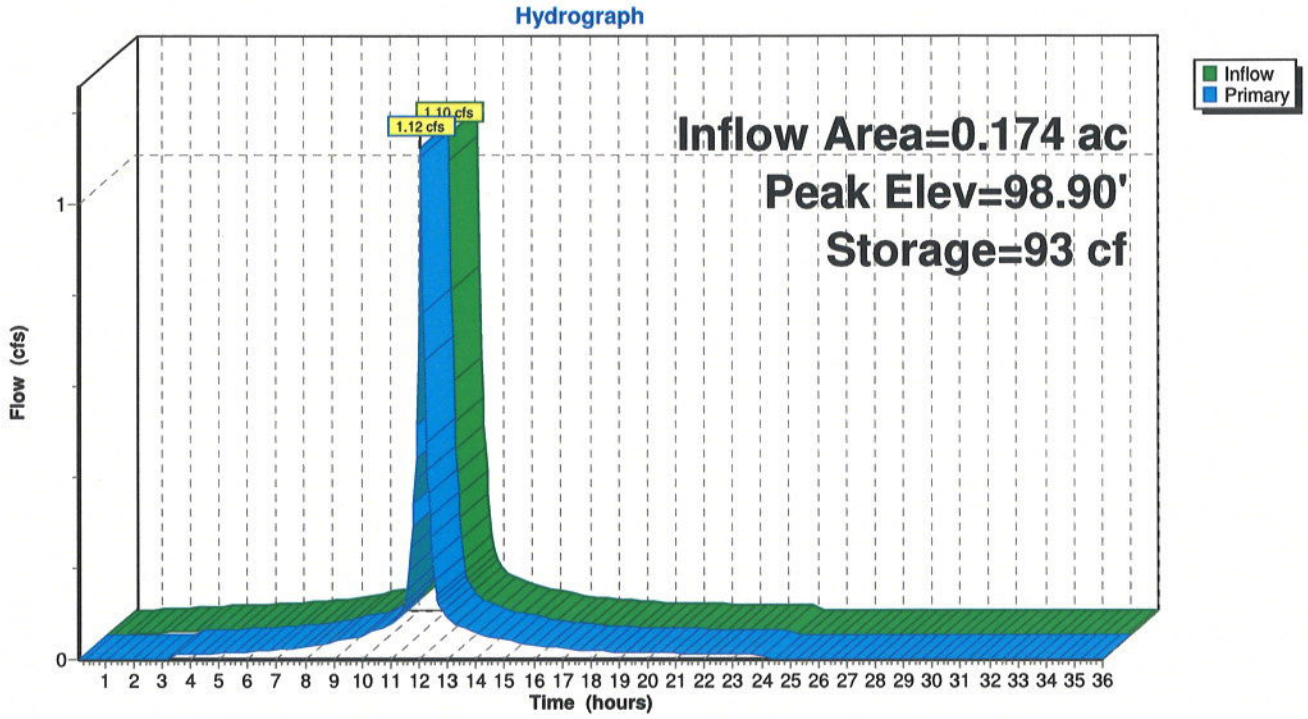
Volume	Invert	Avail.Storage	Storage Description
#1	95.00'	93 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
95.00	60	0.0	0	0
95.50	60	40.0	12	12
97.50	60	30.0	36	48
98.25	60	100.0	45	93

Device	Routing	Invert	Outlet Devices
#1	Device 2	95.00'	**6.0" Vert. Orifice/Grate** C= 0.600
#2	Primary	97.50'	**1.0" W x 18.0" H Vert. Orifice/Grate X 10.00** C= 0.600

Primary OutFlow Max=1.08 cfs @ 12.09 hrs HW=98.80' (Free Discharge)
└─**2=Orifice/Grate** (Passes 1.08 cfs of 3.98 cfs potential flow)
└─**1=Orifice/Grate** (Orifice Controls 1.08 cfs @ 5.50 fps)

Pond 29P: TREE BOX FILTER



Summary for Pond 33P: TREE BOX FILTER

Inflow Area = 0.169 ac,100.00% Impervious, Inflow Depth = 6.16" for 100-YR event
Inflow = 1.07 cfs @ 12.07 hrs, Volume= 0.087 af
Outflow = 1.11 cfs @ 12.09 hrs, Volume= 0.086 af, Atten= 0%, Lag= 1.1 min
Primary = 1.11 cfs @ 12.09 hrs, Volume= 0.086 af

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Peak Elev= 98.87' @ 12.09 hrs Surf.Area= 60 sf Storage= 93 cf

Plug-Flow detention time= 17.4 min calculated for 0.086 af (99% of inflow)
Center-of-Mass det. time= 8.9 min (752.2 - 743.3)

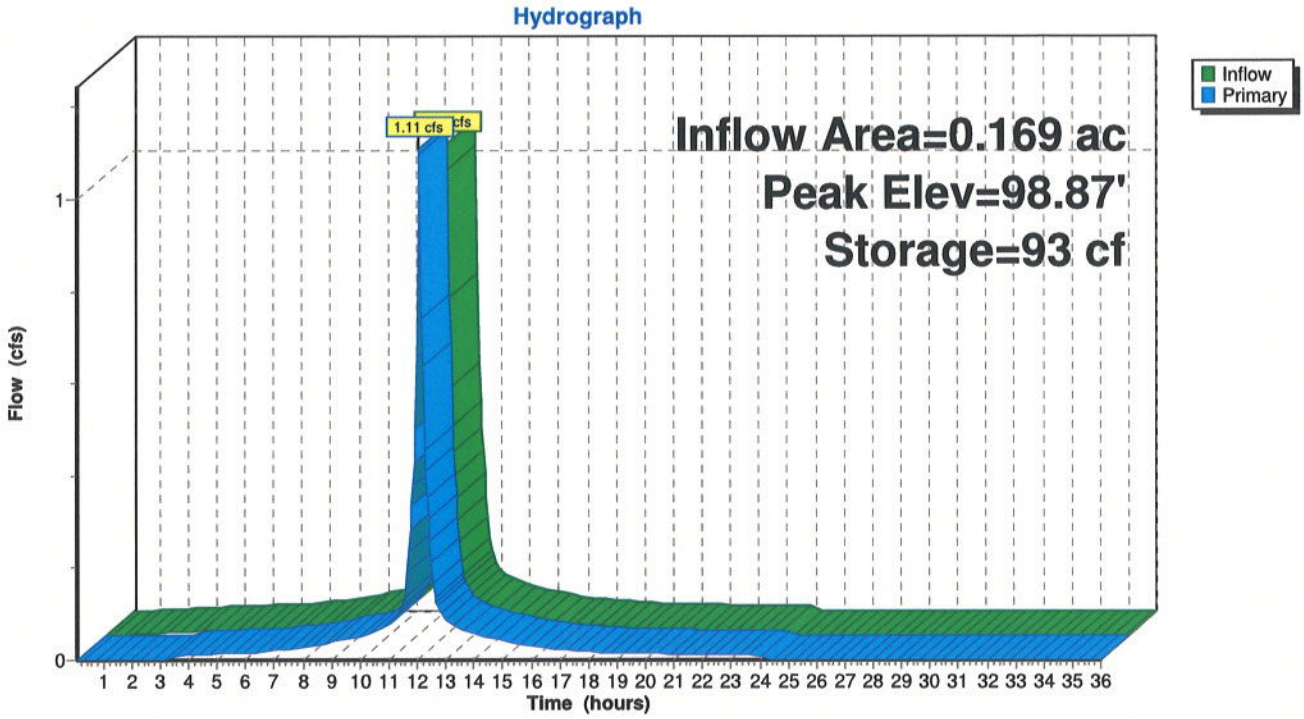
Volume	Invert	Avail.Storage	Storage Description
#1	95.00'	93 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
95.00	60	0.0	0	0
95.50	60	40.0	12	12
97.50	60	30.0	36	48
98.25	60	100.0	45	93

Device	Routing	Invert	Outlet Devices
#1	Device 2	95.00'	**6.0" Vert. Orifice/Grate** C= 0.600
#2	Primary	97.50'	**1.0" W x 18.0" H Vert. Orifice/Grate X 10.00** C= 0.600

Primary OutFlow Max=1.07 cfs @ 12.09 hrs HW=98.78' (Free Discharge)
└─**2=Orifice/Grate** (Passes 1.07 cfs of 3.87 cfs potential flow)
  └─**1=Orifice/Grate** (Orifice Controls 1.07 cfs @ 5.44 fps)

Pond 33P: TREE BOX FILTER



Summary for Link 15L: DP#2-REAR WETLANDS

Inflow Area = 2.406 ac, 41.32% Impervious, Inflow Depth = 2.90" for 100-YR event
Inflow = 5.09 cfs @ 12.43 hrs, Volume= 0.581 af
Primary = 5.09 cfs @ 12.43 hrs, Volume= 0.581 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs

Link 15L: DP#2-REAR WETLANDS