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STORMWATER MANAGEMENT DESIGN AND RUNOFF CALCULATIONS REPORT

for

Washington Street Sherborn Homes

0 Washington Street
Sherborn, MA 01770

Report Prepared by:

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February 9, 2024

TABLE OF CONTENTS

APPENDICIES

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SECTION 1

Stormwater Management Report
Narrative and Summary

Washington Street Sherborn Homes
0 Washington Street
Sherborn, MA 01770

DGT Job No.: F25902

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WASHINGTON STREET SHERBORN HOMES
STORMWATER MANAGEMENT
NARRATIVE SUMMARY

This report contains the hydrologic computations and design information relative to the existing and proposed stormwater runoff conditions for the Washington Street Sherborn Homes and associated site improvements at 0 Washington Street in Sherborn, MA. It includes information on the stormwater management system design and assessment of stormwater impacts. There are nearby wetland resource areas, and the project is subject to the Wetlands Protection Act and the Town of Sherborn Wetlands Protection Bylaw and its regulations.

This report includes information demonstrating compliance with the Massachusetts Department of Environmental Protection (MassDEP) Stormwater Management Regulations.

This report includes the following documents as required by various State and Local Regulations:

- MassDEP Stormwater Management Checklist, compliance calculations and Best Management Practices (BMP) design calculations (Section 2).
- The hydrologic models of existing and proposed stormwater runoff conditions for the site are included in Sections 3 and 4 respectively. These sections include the existing and proposed conditions watershed maps.
- Soils Data for the site from on-site soil testing and the Natural Resource Conservation Service (Appendix 1)
- "Long-Term Pollution Prevention Plan" (LTPPP) for the stormwater related management of the site. (Appendix 2)
- "Stormwater Management System Operation and Maintenance Plan" (Appendix 3)

An Erosion and Sediment Control Plan is included in the plans for the project. Because the project will disturb more than 1 acre, it is also subject to the U.S. EPA's Construction General Permit under the NPDES Program. A full Stormwater Pollution Prevention Plan (SWPPP) will need to be prepared and submitted by the General Contractor for approval prior to the start of construction.

Project Description

The proposed project includes construction of a new 14,475± square foot residential building with 40 units. Site improvements include a paved entry driveway, a paved parking lot and associated site landscaping. Other proposed improvements include an on-site sewage disposal system and on-site water supply wells as well as a stormwater management system to meet the current MassDEP Stormwater Management Regulations.

Briefly, the proposed project includes the following:

- Installation of construction period erosion and sedimentation controls.

- Construction of a proposed 14,475 square foot, three-story multi-family residential building.
- Construction of a parking lot containing 62 parking spaces and a dumpster pad.
- Construction of several retaining walls and grading adjustments associated with the proposed building, parking lot and site driveways.
- Construction of an on-site, pressure-dosed, sewage disposal system.
- Construction of several stormwater Best Management Practices (BMPs). The BMP treatment trains are designed to provide water quality improvements and to mitigate groundwater recharge and peak flows as required.
- Installation of a private water service and electric/communications services to the proposed building.

Existing Property Description

The property is known as 0 Washington Street and has an area of 647,122 square feet (14.8559 acres) and is an undeveloped wooded parcel of land (Sherborn Assessor's Map 7, Lot 0, Block 49). The grades vary throughout the site with various on-site wetland resource areas. An existing walking path traverses through the property for use by the public. Stormwater runoff from the subject site flows to either the on-site wetland areas/vernal pool, Washington Street or the abutting property. All existing runoff is untreated and uncontrolled. This project is subject to the Massachusetts Wetlands Protection Act and the Town of Sherborn Wetlands Bylaw and its Regulations.

The property is in Zone "X" (areas determined to be outside the 0.2% annual chance floodplain) as shown on FEMA Flood Insurance Rate Map number 25017C0632E Dated June 2, 2010.

Soils and Groundwater

Five (5) soil test pits were performed by DGT Associates at the site to determine soil characteristics and seasonal high groundwater depths for stormwater management and general project purposes. The testing revealed a fine sandy loam topsoil over a firm sandy loam substratum. For detailed information, refer to Appendix 1 for results from the on-site soil testing by DGT Associates and published NRCS data.

Hydrologic Modeling and Computations

The hydrologic analysis of the existing conditions and proposed watershed is based on the nationally recognized watershed modeling techniques developed by the USDA, Soil Conservation Service (SCS). The techniques and runoff models are described in the following SCS publications:

- "Urban Hydrology for Small Watersheds, Technical Release Number 55", 1986 and Technical Release 20.
- National Engineering Handbook, Hydrology, Section 4, 1972.
- "A Method for Estimating Volume and Rate of Runoff in Small Watersheds, Technical Release No. 149" 1973.
- "Hydrology Handbook for Conservation Commissions" March 2002, Mass. DEP.

The watershed modeling was performed using computer software "HydroCAD" version 10.0 by Applied Microcomputer Systems, which is based on the publications referenced above. Best management practices were designed utilizing the MassDEP "Stormwater Management Standards Handbook," February 2008.

Rainfall depths selected for the hydrologic analysis are per the NOAA Atlas 14 Rainfall Data Server. The 24-hour rainfall depths for the subject property are as follows:

2-Year Storm	3.35 inches
10-Year Storm	5.24 inches
25-Year Storm	6.42 inches
100-Year Storm	8.24 inches

Project Design Points and Analysis Points

There are four (4) main Design Points for this project:

- Design Point #1 is Washington Street.
- Design Point #2 is the abutting property.
- Design Point #3 is an existing on-site vernal pool.
- Design Point #4 is the existing on-site wetland system.

Existing Site Hydrology

- Hydrologic Soil Group:
  The USDA Natural Resources Conservation Service (NRCS) classifies the project site as Hydrologic Soil Group B (HSG=B). Based on observed conditions at the site and soil evaluation, the surface appears to be well draining and HSG=B is appropriate.

- Existing Runoff Flow Patterns and Existing Drainage System:
  The entire site currently flows uncontrolled to each of the four noted design points above.

Existing Conditions Hydrologic Model

The following items are noted:

- Watershed boundaries are shown on the Existing Conditions Watershed Map (WSD-EX) in Section 3 of this report. The boundaries of the watersheds were field checked and all runoff flowing off of the site is included.
- The entire 234,058 square feet (5.3732± acres) analyzed flows uncontrolled to four design points noted above. These areas receive no formal treatment of runoff.
- The summary of the existing peak rates and volumes of runoff for the 2, 10, 25 and 100-year storms to all Design Points are shown on the Summary Tables at the end of this Narrative.

Proposed Conditions Hydrologic Model

The following items are noted:

- Watershed boundaries are shown on the Proposed Conditions Watershed Map (WSD-PR) in Section 4 of this report.

- The total impervious area for this project is 50,050 square feet. This is an increase of 50,050 square feet of impervious surfaces over existing conditions.
- The intent of the current design is to not increase the peak rates of runoff to any of the Design Points for all storms up to the 100-year event. To achieve this, all stormwater runoff from the roadway and parking areas, roof area and upgradient areas is collected, treated and directed to an underground recharge systems.
- Once the minimum recharge volumes are achieved, flow is directed to subsurface detention systems to control the volume of runoff before discharge to the various design points.
- A portion of the new entry driveway is collected, treated and discharges into a surface detention basin before overflow to the abutting property.
- Based on the observed soil conditions during the on-site soil testing, the intent is to meet the MassDEP Stormwater Regulations for recharge (0.35 inches over the impervious surfaces for HSG - B soils) for the new area of impervious surfaces.
- The recharge BMPs have been designed to provide a water quality volume of 1.0 inches from the contributing impervious surfaces.

Stormwater Management System

This project utilizes a variety of Stormwater Management Best Management Practices (BMPs) to meet the Standards of the Massachusetts Stormwater Management Regulations. This project is classified as new construction. The system as designed meets the full recharge and water quality requirements for new construction with no increase in the peak rates of runoff at any discharge point. The drainage patterns for the proposed project are generally maintained. Complete compliance calculations and information is contained in Section 2 of this report. The following provides explanation of the different components of the proposed stormwater management system:

- Pre-Treatment: Deep Sump Catch Basins fitted with an oil and gas trap hood collect runoff from paved surfaces. The runoff is then directed to a Stormwater Treatment Unit (STU). The proposed treatment units will be a CDS Treatment Unit, or approved equal. This unit has been verified by the NJCAT and Certified by the New Jersey DEP to provide at least 50% TSS removal. The units provide the required pre-treatment for the underground recharge systems.

- Recharger #1 & #2 (Underground Recharge Chamber Systems):
  These systems consist of precast concrete chambers bedded on clean stone and surrounded on all sides with clean stone. The bottom of the stone bed is set 2 feet above the seasonal high groundwater level. These will recharge a minimum of 1.0 inches of runoff.

- Detention System #1 & #2 (Underground Chamber Systems):
  These systems consist of precast concrete chambers bedded on clean stone and surrounded on all sides with clean stone with impermeable barrier. These underground basins are utilized to control the volume of runoff prior to discharge to the various design points.

- Detention System #3:
  This is a surface basin used to control the volume of runoff prior to discharge to the abutting property from a small portion of the new entry driveway.

Benefits of the Design

- No increase in the peak rates of runoff to any of the four (4) Design Points for any storm event (2, 10, 25 and 100-year). See the Summary Tables in Section 2.
- No increase in the volume of runoff to any of the four (4) Design Points for any storm event (2, 10, 25 and 100-year). See the Summary Tables in Section 2.
- Provides recharge to meet the MassDEP Stormwater Management Standards for "new construction." See calculations in Section 2.
- The overall system provides greater than 80% TSS removal treatment for stormwater collected from the site.
- The underground recharge systems are considered a Limited Impact Development (LID) Stormwater Management Technique.

Erosion and Sediment Control during Construction

Included with the plans is an Erosion and Sediment Control Plan with performance standards and details that show the practices to be implemented to protect the downstream stormwater system and surrounding areas.

Because the project is subject to the U.S. Environmental Protection Agency NPDES requirements for Construction Activities, a complete Stormwater Pollution Prevention Plan (SWPPP) and a Notice of Intent filing with the EPA is required prior to construction. This will be prepared by the General Contractor as part of the Contract requirements, and it will be subject to review and approval by the project engineer and Town permitting agencies. The Contractor will be responsible to manage the site to protect the downstream drain system and surrounding areas at all times and operate in compliance with the US EPA Construction General Permit.

The Erosion and Sediment Control Plan shows the initial erosion controls, general BMPs and detailed information as to the responsibilities of the Contractor.

The plan presented at this time may be part of the SWPPP but is not to be considered as meeting the full requirements for a SWPPP. All permit conditions set by approving authorities for erosion and sediment controls are also to be incorporated into the Contract Documents and into the SWPPP.

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SECTION 2

COMPLIANCE CALCULATIONS

- MassDEP “Checklist for Stormwater Report”
- Stormwater Standards Compliance Summary
- Illicit Discharge Statement
- Standard 3 – Recharge Calculations & Drawdown Time Calculations
- Standard 4 – Water Quality and TSS Removal Calculations
- Rational Metho Pipe Calculations

Washington Street Sherborn Homes
0 Washington Street
Sherborn, MA 01770

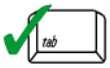
DGT Job No.: F25902

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.

[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.

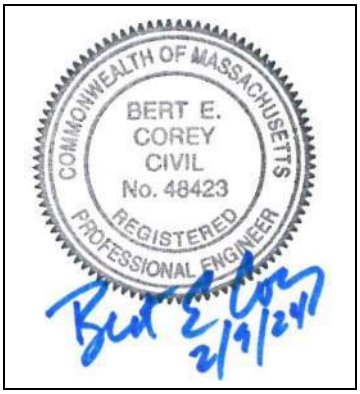
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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



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): Subsurface infiltration

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)

☒ The BMP is sized (and calculations provided) based on:

- ☒ The ½" or 1" Water Quality Volume or
- ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.

☒ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the 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)

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

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

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

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

Standard 9: Operation and Maintenance Plan

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

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

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

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

Standard 10: Prohibition of Illicit Discharges

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

☒ An Illicit Discharge Compliance Statement is attached;

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

STORMWATER STANDARDS COMPLIANCE SUMMARY

Washington Street Sherborn Homes
0 Washington Street
Sherborn, MA

MASSDEP STORMWATER REGULATIONS STANDARDS

Standard 1: (Untreated Discharges)

There are no new stormwater conveyances proposed that discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth. Prior to discharge, stormwater runoff is passed through pretreatment and treatment BMPs as required. Scour calculations are provided in this Section to demonstrate the non-erosive velocities at the outfalls.

Standard 2: (Peak rate control and flood protection)

There will be no increase in the peak rate of discharge over existing conditions from any storm event up to and including the 100-year storm for the project site to Washington Street (Design Point #1), the Abutting Property (Design Point #2), the On-Site Vernal Pool (Design Point #3) and On-Site Wetlands (Design Point #4).

There will be no increase in the volume of runoff over existing conditions from any storm event up to and including the 100-year storm for the project site to the four above noted Design Points.

Computations have been made for the 2, 10, 25 and 100-year storms. The computations for the peak rates of runoff, flood levels and volumes are contained in Section 3 and Section 4 of this report. The summary tables for each Design Point are as follows:

Design Point #1 - Washington Street

Storm Event	24 hr Rainfall	Peak Flow (cfs)		Volume (acre feet)	
		Existing	Proposed	Existing	Proposed
2 Year	3.35 in.	0.13	0.11	0.025	0.018
10 Year	5.24 in.	1.04	0.72	0.093	0.062
25 Year	6.42 in.	1.84	1.23	0.149	0.097
100 Year	8.24 in.	3.25	2.10	0.249	0.159

Design Point #2 - Abutting Property

Storm Event	24 hr Rainfall	Peak Flow (cfs)		Volume (acre feet)	
		Existing	Proposed	Existing	Proposed
2 Year	3.35 in.	0.02	0.02	0.004	0.002
10 Year	5.24 in.	0.16	0.10	0.013	0.007
25 Year	6.42 in.	0.28	0.15	0.021	0.015
100 Year	8.24 in.	0.50	0.25	0.036	0.036

Design Point #3 - On-Site Vernal Pool

Storm Event	24 hr Rainfall	Peak Flow (cfs)		Volume (acre feet)	
		Existing	Proposed	Existing	Proposed
2 Year	3.35 in.	0.23	0.22	0.050	0.040
10 Year	5.24 in.	1.44	1.40	0.186	0.162
25 Year	6.42 in.	2.54	2.42	0.297	0.269
100 Year	8.24 in.	4.49	4.23	0.497	0.475

Design Point #4 - On-Site Wetland System

Storm Event	24 hr Rainfall	Peak Flow (cfs)		Volume (acre feet)	
		Existing	Proposed	Existing	Proposed
2 Year	3.35 in.	0.25	0.19	0.053	0.049
10 Year	5.24 in.	1.60	1.50	0.196	0.159
25 Year	6.42 in.	2.84	2.65	0.314	0.256
100 Year	8.24 in.	5.03	4.68	0.524	0.424

Standard 3: (Recharge to Groundwater)

To meet the current DEP Stormwater Regulations, Standard 3 requires that a minimum 0.60, 0.35, 0.25 & 0.10 inches of runoff from the impervious surfaces must be recharged to the ground for hydrologic soil groups (HSG) A, B, C, & D respectively. The subject site is within HSG B.

Two (2) Stormwater infiltration BMPs are incorporated into the design, which are underground recharge systems.

This project is classified as new construction. The total proposed impervious area for this project is 50,050 square feet. Therefore, the minimum required recharge volume is computed to be 1,774 cubic feet. The proposed infiltration BMP results in a total recharge volume of 11,377 cubic feet. The proposed infiltration BMPs drain within 72 hours.

Detailed calculations demonstrating compliance with this standard are included in this section.

Standard 4: (80% TSS Removal)

This project incorporates several stormwater pretreatment and treatment BMP's. Runoff from paved surfaces is routed through pretreatment BMP's (deep sump catch basins, proprietary stormwater treatment unit to a subsurface recharge treatment BMP).

The Water Quality Volume (WQV) used for the stormwater design is 1.0 inch.

Design calculations for each treatment train and TSS Removal Calculation Worksheets are included in this section. Stormwater runoff is collected from the paved surfaces via deep sump catch basins for pretreatment. The runoff is then directed to proprietary treatment units. The proprietary treatment units provide 50% TSS Removal per the NJTARP. The pretreated stormwater is then routed to recharge BMPs. This results in a minimum TSS Removal of 80%.

The lower portion of the driveway that cannot be routed to a recharge system, is collected in a trench drain and routed to a proprietary treatment unit before finally discharging into Detention Basin #3.

In compliance with Standard 4, a Long-Term Pollution Prevention Plan is included in Appendix 2 and the Stormwater Operation and Maintenance Plan is included in Appendix 3.

Standard 5: (Land Use with Higher Potential Pollutant Load)

This site is not a use with a land use with higher potential pollutant load.

Standard 6: (Critical Areas)

This site does discharge runoff to Critical Areas. As required, the water quality volume used is 1.0 inch.

Standard 7: (Redevelopment)

This project is not considered a Redevelopment Project.

Standard 8: (Erosion, Sediment Control)

Erosion and sediment control BMPs are included in the Erosion and Sediment Control Plan prepared for the initial project setup and includes detailed information regarding the responsibilities for the Contractor in managing the site in compliance with applicable permits. This project is subject to the NPDES requirements for construction sites. Coverage under the NPDES Construction General Permit is required.

As provided by this Standard, a detailed SWPPP will be prepared by the General Contractor who will be responsible for the management of the construction site and compliance with the NPDES Construction General Permit and will file a Notice of Intent with the EPA for coverage under that permit. The SWPPP will also be provided for review and approval prior to the start of work.

Standard 9: (Operation & Maintenance)

A Long-Term Pollution Prevention Plan (LTPPP) for the general management of the site is included in Appendix 2. An Operation and Maintenance Plan for the stormwater system is also included in Appendix 3.

Standard 10: (Illicit Discharges)

The proposed design will be in compliance with state and local building codes. There are no illicit discharges designed or proposed. No illicit discharges are known to exist at the site. An Illicit Discharge Statement is included in Section 2.

DGT Associates
Surveying & Engineering

1071 Worcester Rd.
Framingham, MA 01701
508.879.0030
www.dgtassociates.com

February 9, 2024

F25902

Town of Sherborn
19 Washington Street
Sherborn, MA 01770

RE: Illicit Discharge Compliance Statement

In accordance with Standard 10 of the Massachusetts Stormwater Regulations, the following statements are made regarding the proposed site development for Washington Street Sherborn Homes located at 0 Washington Street in Sherborn, MA:

- The proposed site development design will be in compliance with state and local building codes. There are no illicit discharges designed or proposed.

Please feel free to contact me if you have any questions.

Sincerely yours,
DGT Associates

Bert E. Corey, P.E.
Engineering Group Manager

DGT Associates
Surveying & Engineering

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COMPLIANCE CALCULATIONS

Standard 3: Recharge Calculations & Drawdown Time Calculations

Standard 4: Water Quality & TSS Removal Calculations

Other Calculations: Stormwater Treatment Unit (STU) Design Calculations

Rational Method Pipe Calculations
To include Manning calculations for flow capacity of the pipes in the new drainage system. Flows are for the 25-Year Storm Event.

DGT Associates
Surveying & Engineering

1071 Worcester Rd.
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Stormwater Calculations – Recharge – Standard 3

Washington Street Sherborn Homes
0 Washington Street in Sherborn, MA

Proposed Impervious Area = 50,050 ft^2
Existing Impervious Area = 0 ft^2
Increase in Impervious Area = 50,050 ft^2

Soils HSG: B → Recharge = 0.35 inches of runoff

Minimum Required Recharge for New Construction:
(50,050 sf)(0.35 in ÷ 12) = 1,460 ft^3

Note that the impervious area directed to Infiltration Facilities is 41,848 ft^2. The total impervious area for the project is 50,050 ft^2. This is equivalent to 84% of the total impervious area which is greater than 65%.

Using the capture area adjustment (65% Rule), the adjusted recharge volume is:
(50,055 ÷ 41,848) x (1,460) = 1,746 ft^3.

Recharger #1 is designed to capture 5,335 ft^3 (volume in chambers + surrounding stone)
Recharger #2 is designed to capture 6,042 ft^3 (volume in chambers + surrounding stone)
5,335 ft^3 + 6,042 ft^3 = 11,377 ft^3

11,377 ft^3 > 1,746 ft^3 ← okay

THIS PROJECT MEETS THE REQUIREMENTS OF MASSDEP STANDARD 3

DGT Associates
Surveying & Engineering

Recharge System Sizing Calculations – Static Method

The recharge facilities are designed for at least 1.0 inch capture volume to meet the Water Quality Volume (WQV) requirements.

Recharger #1:
Contributing Impervious Area = 20,717 ft^2
Minimum Capture Volume = 20,717 ft^2 x (1.0 in/12) = 1,727 ft^3

Volume provided below the outlet invert (Elev=210.20) = 5,335 ft^3

5,335 ft^3 > 1,727 ft^3 ← okay

Recharger #2:
Contributing Impervious Area = 21,131 ft^2
Minimum Capture Volume = 21,131 ft^2 x (1.0 in/12) = 1,761 ft^3

Volume provided below the outlet invert (Elev=210.10) = 6,042 ft^3

6,042 ft^3 > 1,761 ft^3 ← okay

Drawdown Calculations

Recharger #1:
Recharger #1 Bottom Area = 2,160 ft^2
Provided Capture Volume = 5,335 ft^3

$Time_{drawdown}$ = Rv ÷ (K)(Bottom Area)
$Time_{drawdown}$ = 5,335 ft^3 ÷ (1.02 in/hr)(2,160 ft^2)(1 ft / 12 in.)
$Time_{drawdown}$ = 29.1 hours

29.1 hours < 72 hours ← okay

Recharger #2:
Recharger #1 Bottom Area = 2,345 ft^2
Provided Capture Volume = 6,042 ft^3

$Time_{drawdown}$ = Rv ÷ (K)(Bottom Area)
$Time_{drawdown}$ = 6,042 ft^3 ÷ (1.02 in/hr)(2,345 ft^2)(1 ft / 12 in.)
$Time_{drawdown}$ = 30.3 hours

30.3 hours < 72 hours ← okay

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Stormwater Calculations – Scour & Erosion – Standard 1

Washington Street Sherborn Homes
0 Washington Street in Sherborn, MA

The peak rate of discharge at all the existing discharge points are the same or less than existing conditions for all storms up to a 100 year event.

Tow (2) new outlets from the proposed stormwater system will discharge to flow overland within the uplands to the wetland resource areas. To control the outflows, rip-rap lined pipe outfalls are designed to spread and distribute the flow at non-erosive velocities over the vegetated terrain. In this case the flows at all storms up to a 100-year event are designed to be less than 1 foot per second. The following calculations provide compliance with Standard 1 for the discharges from the pipe outfalls:

Pipe Outfall #1

10" HDPE
Pipe Outfall Length = 10 feet
Outlet Invert Elevation = 207.00
End of Outfall Elevation = 206.80
Outfall Slope = 0.0200

	2 Year	10 Year	25 Year	100 Year
Maximum Velocity	0.00 ft/sec	0.23 ft/sec	0.28 ft/sec	0.52 ft/sec

Permissible velocity for slopes between 0 – 5% is 5.0 ft/sec

Pipe Outfall #2

10" HDPE
Pipe Outfall Length = 10 feet
Outlet Invert Elevation = 205.00
End of Outfall Elevation = 204.50
Outfall Slope = 0.0500

	2 Year	10 Year	25 Year	100 Year
Maximum Velocity	0.27 ft/sec	0.33 ft/sec	0.39 ft/sec	0.54 ft/sec

Permissible velocity for slopes between 0 – 5% is 5.0 ft/sec

Table from Volume 3, Chapter 1, Page 3 showing permissible velocities to prevent scour and erosion.

Channel Slope	Lining [1]	Permissible Velocity (feet/second)
0 - 5%	Tall fescue Kentucky bluegrass	5
	Grass-legume mixture	4
	Red fescue Redtop Sericea lespedeza Annual lespedeza Small grains	2.5
5 - 10%	Tall fescue Kentucky bluegrass	4
	Grass-legume mixture	3
Greater Than 10%	Tall fescue Kentucky bluegrass	3

Table 2.3.1: Example of Permissible Velocity Table, Modified from Soil and Water Conservation Engineering, 1992, Schwab et al, John Wiley and Sons

INSTRUCTIONS:

Version 1, Automated: Mar. 4, 2008

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

Location: 0 Washington Street in Sherborn, MA

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	**0.25**	**1.00**	**0.25**	**0.75**
Proprietary Treatment Practice	**0.00**	**0.75**	**0.00**	**0.75**
Infiltration Basin	**0.80**	**0.75**	**0.60**	**0.15**
	0.00	**0.15**	**0.00**	**0.15**
	0.00	**0.15**	**0.00**	**0.15**

Total TSS Removal = **85%**

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

Project: **Washington Street Sherborn Homes**

Prepared By: **DGT Associates**

Date: **2-Feb-24**

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

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

1. From MassDEP Stormwater Handbook Vol. 1

Non-automated TSS Calculation Sheet
must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

Project: Washington Street Attainable Housing
Location: Sherborn, MA
Prepared For: DGT Associates

Purpose: To calculate the water quality flow rate (WQF) over a given site area. In this situation the WQF is derived from the first 1" of runoff from the contributing impervious surface.

Reference: Massachusetts Dept. of Environmental Protection Wetlands Program / United States Department of Agriculture Natural Resources Conservation Service TR-55 Manual

Procedure: Determine unit peak discharge using Figure 1 or 2. Figure 2 is in tabular form so is preferred. Using the tc, read the unit peak discharge (qu) from Figure 1 or Table in Figure 2. qu is expressed in the following units: cfs/mi^2/watershed inches (csm/in).

Compute Q Rate using the following equation:

$$Q = (qu)\ (A)\ (WQV)$$

where:

Q = flow rate associated with first 1" of runoff
qu = the unit peak discharge, in csm/in.
A = impervious surface drainage area (in square miles)
WQV = water quality volume in watershed inches (1" in this case)

Structure Name	Impv. (acres)	A (miles^2)	t_c (min)	t_c (hr)	WQV (in)	qu (csm/in.)	Q (cfs)
STU #1	0.36	0.0005594	6.0	0.100	1.00	774.00	0.43
STU #2	0.12	0.0001828	6.0	0.100	1.00	774.00	0.14
STU #3	0.15	0.0002313	6.0	0.100	1.00	774.00	0.18
STU #4	0.10	0.0001609	6.0	0.100	1.00	774.00	0.12
STU #5	0.04	0.0000578	6.0	0.100	1.00	774.00	0.04

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD

WASHINGTON STREET ATTAINABLE HOUSING
SHERBORN, MA

Area	**0.36 ac**	Unit Site Designation	**STU #1**
Weighted C	**0.9**	Rainfall Station #	**69**
t_c	**6 min**		
CDS Model	**1515-3**	CDS Treatment Capacity	**1.0 cfs**

Rainfall Intensity[1] (in/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (cfs)	Treated Flowrate (cfs)	Incremental Removal (%)
0.02	10.2%	10.2%	0.01	0.01	9.8
0.04	9.6%	19.8%	0.01	0.01	9.3
0.06	9.4%	29.3%	0.02	0.02	9.1
0.08	7.7%	37.0%	0.03	0.03	7.4
0.10	8.6%	45.6%	0.03	0.03	8.1
0.12	6.3%	51.9%	0.04	0.04	6.0
0.14	4.7%	56.5%	0.05	0.05	4.4
0.16	4.6%	61.2%	0.05	0.05	4.3
0.18	3.5%	64.7%	0.06	0.06	3.3
0.20	4.3%	69.1%	0.06	0.06	4.0
0.25	8.0%	77.1%	0.08	0.08	7.3
0.30	5.6%	82.7%	0.10	0.10	5.1
0.35	4.4%	87.0%	0.11	0.11	3.9
0.40	2.5%	89.5%	0.13	0.13	2.2
0.45	2.5%	92.1%	0.14	0.14	2.2
0.50	1.4%	93.5%	0.16	0.16	1.2
0.75	5.0%	98.5%	0.24	0.24	4.1
1.00	1.0%	99.5%	0.32	0.32	0.8
1.50	0.0%	99.5%	0.48	0.48	0.0
2.00	0.0%	99.5%	0.64	0.64	0.0
3.00	0.5%	100.0%	0.97	0.97	0.2
					92.7
				Removal Efficiency Adjustment[2] =	6.5%
				Predicted % Annual Rainfall Treated =	93.5%
				Predicted Net Annual Load Removal Efficiency =	**86.2%**

1 - Based on 10 years of hourly precipitation data from NCDC Station 770, Boston WSFO AP, Suffolk County, MA
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD

WASHINGTON STREET ATTAINABLE HOUSING
SHERBORN, MA

Area	**0.12 ac**	Unit Site Designation	**STU #2**
Weighted C	**0.9**	Rainfall Station #	**69**
t_c	**6 min**		
CDS Model	**1515-3**	CDS Treatment Capacity	**1.0 cfs**

Rainfall Intensity[1] (in/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (cfs)	Treated Flowrate (cfs)	Incremental Removal (%)
0.02	10.2%	10.2%	0.00	0.00	9.9
0.04	9.6%	19.8%	0.00	0.00	9.4
0.06	9.4%	29.3%	0.01	0.01	9.1
0.08	7.7%	37.0%	0.01	0.01	7.5
0.10	8.6%	45.6%	0.01	0.01	8.3
0.12	6.3%	51.9%	0.01	0.01	6.1
0.14	4.7%	56.5%	0.01	0.01	4.5
0.16	4.6%	61.2%	0.02	0.02	4.5
0.18	3.5%	64.7%	0.02	0.02	3.4
0.20	4.3%	69.1%	0.02	0.02	4.2
0.25	8.0%	77.1%	0.03	0.03	7.6
0.30	5.6%	82.7%	0.03	0.03	5.3
0.35	4.4%	87.0%	0.04	0.04	4.1
0.40	2.5%	89.5%	0.04	0.04	2.4
0.45	2.5%	92.1%	0.05	0.05	2.4
0.50	1.4%	93.5%	0.05	0.05	1.3
0.75	5.0%	98.5%	0.08	0.08	4.6
1.00	1.0%	99.5%	0.11	0.11	0.9
1.50	0.0%	99.5%	0.16	0.16	0.0
2.00	0.0%	99.5%	0.21	0.21	0.0
3.00	0.5%	100.0%	0.32	0.32	0.4
					95.7
				Removal Efficiency Adjustment[2] =	6.5%
				Predicted % Annual Rainfall Treated =	93.5%
				Predicted Net Annual Load Removal Efficiency =	**89.3%**

1 - Based on 10 years of hourly precipitation data from NCDC Station 770, Boston WSFO AP, Suffolk County, MA
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

CONTECH ENGINEERED SOLUTIONS

CDS TECHNOLOGIES

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION BASED ON THE RATIONAL RAINFALL METHOD

WASHINGTON STREET ATTAINABLE HOUSING
SHERBORN, MA

Area	**0.15 ac**	Unit Site Designation	**STU #3**
Weighted C	**0.9**	Rainfall Station #	**69**
t_c	**6 min**		
CDS Model	**1515-3**	CDS Treatment Capacity	**1.0 cfs**

Rainfall Intensity[1] (in/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (cfs)	Treated Flowrate (cfs)	Incremental Removal (%)
0.02	10.2%	10.2%	0.00	0.00	9.9
0.04	9.6%	19.8%	0.01	0.01	9.3
0.06	9.4%	29.3%	0.01	0.01	9.1
0.08	7.7%	37.0%	0.01	0.01	7.5
0.10	8.6%	45.6%	0.01	0.01	8.3
0.12	6.3%	51.9%	0.02	0.02	6.1
0.14	4.7%	56.5%	0.02	0.02	4.5
0.16	4.6%	61.2%	0.02	0.02	4.4
0.18	3.5%	64.7%	0.02	0.02	3.4
0.20	4.3%	69.1%	0.03	0.03	4.1
0.25	8.0%	77.1%	0.03	0.03	7.6
0.30	5.6%	82.7%	0.04	0.04	5.3
0.35	4.4%	87.0%	0.05	0.05	4.1
0.40	2.5%	89.5%	0.05	0.05	2.4
0.45	2.5%	92.1%	0.06	0.06	2.4
0.50	1.4%	93.5%	0.07	0.07	1.3
0.75	5.0%	98.5%	0.10	0.10	4.6
1.00	1.0%	99.5%	0.13	0.13	0.9
1.50	0.0%	99.5%	0.20	0.20	0.0
2.00	0.0%	99.5%	0.27	0.27	0.0
3.00	0.5%	100.0%	0.40	0.40	0.3
					95.3
				Removal Efficiency Adjustment[2] =	6.5%
				Predicted % Annual Rainfall Treated =	93.5%
				Predicted Net Annual Load Removal Efficiency =	**88.9%**

1 - Based on 10 years of hourly precipitation data from NCDC Station 770, Boston WSFO AP, Suffolk County, MA
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

CONTECH ENGINEERED SOLUTIONS

CDS TECHNOLOGIES

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION BASED ON THE RATIONAL RAINFALL METHOD

WASHINGTON STREET ATTAINABLE HOUSING
SHERBORN, MA

Area	**0.10 ac**	Unit Site Designation	**STU #4**
Weighted C	**0.9**	Rainfall Station #	**69**
t_c	**6 min**		
CDS Model	**1515-3**	CDS Treatment Capacity	**1.0 cfs**

Rainfall Intensity[1] (in/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (cfs)	Treated Flowrate (cfs)	Incremental Removal (%)
0.02	10.2%	10.2%	0.00	0.00	9.9
0.04	9.6%	19.8%	0.00	0.00	9.4
0.06	9.4%	29.3%	0.01	0.01	9.1
0.08	7.7%	37.0%	0.01	0.01	7.5
0.10	8.6%	45.6%	0.01	0.01	8.3
0.12	6.3%	51.9%	0.01	0.01	6.1
0.14	4.7%	56.5%	0.01	0.01	4.5
0.16	4.6%	61.2%	0.01	0.01	4.5
0.18	3.5%	64.7%	0.02	0.02	3.4
0.20	4.3%	69.1%	0.02	0.02	4.2
0.25	8.0%	77.1%	0.02	0.02	7.6
0.30	5.6%	82.7%	0.03	0.03	5.3
0.35	4.4%	87.0%	0.03	0.03	4.1
0.40	2.5%	89.5%	0.04	0.04	2.4
0.45	2.5%	92.1%	0.04	0.04	2.4
0.50	1.4%	93.5%	0.05	0.05	1.3
0.75	5.0%	98.5%	0.07	0.07	4.7
1.00	1.0%	99.5%	0.09	0.09	0.9
1.50	0.0%	99.5%	0.14	0.14	0.0
2.00	0.0%	99.5%	0.19	0.19	0.0
3.00	0.5%	100.0%	0.28	0.28	0.4
					95.9
				Removal Efficiency Adjustment[2] =	6.5%
				Predicted % Annual Rainfall Treated =	93.5%
				Predicted Net Annual Load Removal Efficiency =	**89.5%**

1 - Based on 10 years of hourly precipitation data from NCDC Station 770, Boston WSFO AP, Suffolk County, MA
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

CONTECH ENGINEERED SOLUTIONS

CDS TECHNOLOGIES

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION BASED ON THE RATIONAL RAINFALL METHOD

WASHINGTON STREET ATTAINABLE HOUSING
SHERBORN, MA

Area	**0.04 ac**	Unit Site Designation	**STU #5**
Weighted C	**0.9**	Rainfall Station #	**69**
t_c	**6 min**		
CDS Model	**1515-3**	CDS Treatment Capacity	**1.0 cfs**

Rainfall Intensity[1] (in/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (cfs)	Treated Flowrate (cfs)	Incremental Removal (%)
0.02	10.2%	10.2%	0.00	0.00	9.9
0.04	9.6%	19.8%	0.00	0.00	9.4
0.06	9.4%	29.3%	0.00	0.00	9.2
0.08	7.7%	37.0%	0.00	0.00	7.5
0.10	8.6%	45.6%	0.00	0.00	8.3
0.12	6.3%	51.9%	0.00	0.00	6.1
0.14	4.7%	56.5%	0.00	0.00	4.5
0.16	4.6%	61.2%	0.01	0.01	4.5
0.18	3.5%	64.7%	0.01	0.01	3.4
0.20	4.3%	69.1%	0.01	0.01	4.2
0.25	8.0%	77.1%	0.01	0.01	7.7
0.30	5.6%	82.7%	0.01	0.01	5.4
0.35	4.4%	87.0%	0.01	0.01	4.2
0.40	2.5%	89.5%	0.01	0.01	2.4
0.45	2.5%	92.1%	0.01	0.01	2.4
0.50	1.4%	93.5%	0.02	0.02	1.3
0.75	5.0%	98.5%	0.02	0.02	4.8
1.00	1.0%	99.5%	0.03	0.03	1.0
1.50	0.0%	99.5%	0.05	0.05	0.0
2.00	0.0%	99.5%	0.07	0.07	0.0
3.00	0.5%	100.0%	0.10	0.10	0.4
					96.8
				Removal Efficiency Adjustment[2] =	6.5%
				Predicted % Annual Rainfall Treated =	93.5%
				Predicted Net Annual Load Removal Efficiency =	**90.3%**

1 - Based on 10 years of hourly precipitation data from NCDC Station 770, Boston WSFO AP, Suffolk County, MA
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Bureau of Nonpoint Pollution Control
Division of Water Quality
401-02B
Post Office Box 420
Trenton, New Jersey 08625-0420
609-633-7021 Fax: 609-777-0432
http://www.state.nj.us/dep/dwq/bnpc_home.htm

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

March 21, 2017

Derek M. Berg
Contech Engineered Solutions, LLC
71 US Route 1, Suite F
Scarborough, ME 04074

Re: Revised MTD Lab Certification
Continuous Deflective Separator (CDS®) Stormwater Treatment Device by Contech Engineered Solutions, LLC
On-line Installation

TSS Removal Rate 50%

Dear Mr. Berg:

This revised certification letter supersedes the Department's prior certification dated January 9, 2015. This revision was completed to reflect the updated Manufactured Treatment Device (MTD) scaling methodology as agreed upon by the manufacturers' working group on September 19, 2016. In part, the updated scaling for hydrodynamic MTDs is based on the depth of the reference (tested) MTD from the top of the false floor utilized during removal efficiency testing, not from the physical bottom of the unit. Based on the above decision, Table A-2 of the NJCAT Technology Verification report located at http://www.njcat.org/uploads/newDocs/CDSVerificationReportFinal1.pdf has been revised, and Table 1 noted below has been added.

The Stormwater Management rules under N.J.A.C. 7:8-5.5(b) and 5.7 (c) allow the use of manufactured treatment devices (MTDs) for compliance with the design and performance standards at N.J.A.C. 7:8-5 if the pollutant removal rates have been verified by the New Jersey Corporation for Advanced Technology (NJCAT) and have been certified by the New Jersey Department of Environmental Protection (NJDEP). Contech Engineered Solutions, LLC has requested an MTD Laboratory Certification for the CDS® Stormwater Treatment Device.

The verification is subject to the "Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advance Technology" dated January 25, 2013. The applicable protocol is the "New Jersey Laboratory Testing Protocol to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation Manufactured Treatment Device" dated January 25, 2013.

NJCAT verification documents submitted to the NJDEP indicate that the requirements of the aforementioned protocol have been met or exceeded. The NJCAT letter also included a recommended certification TSS removal rate and the required maintenance plan. The NJCAT Verification Report with the Verification

Appendix dated September 2014 (Revised January 2017) for this device is published online at http://www.njcat.org/verification-process/technology-verification-database.html.

The NJDEP certifies the use of the CDS® Stormwater Treatment Device by Contech Engineered Solutions, LLC at a TSS removal rate of 50% when designed, operated, and maintained in accordance with the information provided in the Verification Appendix and the following conditions:

1. The maximum treatment flow rate (MTFR) for the manufactured treatment device (MTD) is calculated using the New Jersey Water Quality Design Storm (1.25 inches in 2 hrs) in N.J.A.C. 7:8-5.5.

2. The CDS® Stormwater Treatment Device shall be installed using the same configuration reviewed by NJCAT and shall be sized in accordance with the criteria specified in item 6 below.

3. This CDS® Stormwater Treatment Device cannot be used in series with another MTD or a media filter (such as a sand filter) to achieve an enhanced removal rate for total suspended solids (TSS) removal under N.J.A.C. 7:8-5.5.

4. Additional design criteria for MTDs can be found in Chapter 9.6 of the New Jersey Stormwater Best Management Practices (NJ Stormwater BMP) Manual which can be found on-line at www.njstormwater.org.

5. The maintenance plan for a site using this device shall incorporate, at a minimum, the maintenance requirements for the CDS® Stormwater Treatment Device. A copy of the maintenance plan is attached to this certification. However, it is recommended to review the maintenance website at http://www.conteches.com/products/stormwater-management/treatment/cds.aspx#1822141-technical-info for any changes to the maintenance requirements.

6. Sizing Requirements:

   The example below demonstrates the sizing procedure for the CDS®:

   Example: A 0.25-acre impervious site is to be treated to 50% TSS removal using a CDS®. The impervious site runoff (Q) based on the New Jersey Water Quality Design Storm was determined to be 0.79 cfs.

   Maximum Treatment Flow Rate (MTFR) Evaluation:

   The site runoff (Q) was based on the following:
   time of concentration = 10 minutes
   i=3.2 in/hr (page 5-8, Fig. 5-3 of the NJ Stormwater BMP Manual)
   c=0.99 (runoff coefficient for impervious)
   Q=ciA=0.99x3.2x0.25=0.79 cfs

   Given the site runoff is 0.79 cfs and based on Table 1 below, the CDS® Model CDS-4 with an MTFR of 0.93 cfs would be the smallest model approved that could be used for this site that could remove 50% of the TSS from the impervious area without exceeding the MTFR.

The sizing table corresponding to the available system models is noted below. Additional specifications regarding each model can be found in the Verification Appendix under Table A-1 and A-2.

Table 1 CDS Models

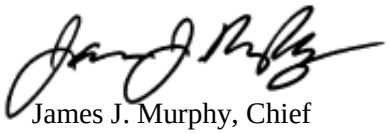
CDS Model	Manhole Diameter (ft.)	Treatment Chamber Depth (ft.)	MTFR (cfs)
CDS-3	3	3.50	0.52
CDS-4	4	3.50	0.93
CDS-5	5	3.75	1.5
CDS-6	6	4.50	2.1
CDS-7	7	5.25	2.8
CDS-8	8	6.00	3.7
CDS-10	10	7.50	5.8
CDS-12	12	9.00	8.4

- Treatment Chamber Depth is defined as the depth below the invert to the top of the false floor installed at 50% sediment depth.

A detailed maintenance plan is mandatory for any project with a Stormwater BMP subject to the Stormwater Management Rules, N.J.A.C. 7:8. The plan must include all of the items identified in the Stormwater Management Rules, N.J.A.C. 7:8-5.8. Such items include, but are not limited to, the list of inspection and maintenance equipment and tools, specific corrective and preventative maintenance tasks, indication of problems in the system, and training of maintenance personnel. Additional information can be found in Chapter 8: Maintenance and Retrofit of Stormwater Management Measures.

If you have any questions regarding the above information, please contact Mr. Shashi Nayak of my office at (609) 633-7021.

Sincerely,



James J. Murphy, Chief
Bureau of Nonpoint Pollution Control

Attachment: Maintenance Plan

c: Chron File
Richard Magee, NJCAT
Vince Mazzei, NJDEP - DLUR
Ravi Patraju, NJDEP - BES
Gabriel Mahon, NJDEP - BNPC
Shashi Nayak, NJDEP – BNPC

Pipe Calculations

To CB #1	area(sf)	=	6,335	c-factor			
	paved	=	4,156	* 0.90	=	3740	
	landscaped	=	2,179	* 0.20	=	436	
						4176	
	weighted C =	0.66		tc < 5min	I=	6.6	in/hr
	A =	0.15	acres	Q25 = CiA		**0.65**	**cfs**
To CB #2	area(sf)	=	5,349	c-factor			
	paved	=	5,349	* 0.90	=	4814	
	landscaped	=	0	* 0.20	=	0	
						4814	
	weighted C =	0.90		tc < 5min	I=	6.6	in/hr
	A =	0.12	acres	Q25 = CiA		**0.71**	**cfs**
To CB #3	area(sf)	=	7,077	c-factor			
	paved	=	5,745	* 0.90	=	5171	
	landscaped	=	1,332	* 0.20	=	266	
						5437	
	weighted C =	0.77		tc < 5min	I=	6.6	in/hr
	A =	0.16	acres	Q25 = CiA		**0.81**	**cfs**
To TD #1	area(sf)	=	1,639	c-factor			
	paved	=	1,639	* 0.90	=	1475	
	landscaped	=	0	* 0.20	=	0	
						1475	
	weighted C =	0.90		tc < 5min	I=	6.6	in/hr
	A =	0.04	acres	Q25 = CiA		**0.24**	**cfs**

Pipe Calculations

CB #1 to DMH #1					L= 41'
Size	10	in. HDPE			
Slope	0.005	ft./ft.			
Manning's coef. n=	0.012				
Area	78.54	$in.^2$	or	0.55	$ft.^2$
Perimeter	31.42	in.		2.62	ft.
R=A/P	0.208	ft.			
$V=1.49/n(R)^{2/3}(S)^{1/2}$	3.09				
Q=VA	**1.68**	**(CAPACITY)**			
Q25=	0.65	(Q=CiA)			

DMH #1 to DMH #2					L= 101'
Size	10	in. HDPE			
Slope	0.006	ft./ft.			
Manning's coef. n=	0.012				
Area	78.54	$in.^2$	or	0.55	$ft.^2$
Perimeter	31.42	in.		2.62	ft.
R=A/P	0.208	ft.			
$V=1.49/n(R)^{2/3}(S)^{1/2}$	3.38				
Q=VA	**1.84**	**(CAPACITY)**			
Q25=	0.65	(Q=CiA)			

CB #2 to DMH #2					L= 14'
Size	10	in. HDPE			
Slope	0.0143	ft./ft.			
Manning's coef. n=	0.012				
Area	78.54	$in.^2$	or	0.55	$ft.^2$
Perimeter	31.42	in.		2.62	ft.
R=A/P	0.208	ft.			
$V=1.49/n(R)^{2/3}(S)^{1/2}$	5.22				
Q=VA	**2.85**	**(CAPACITY)**			
Q25=	0.71	(Q=CiA)			

CB #3 to DMH #2					L= 7'
Size	10	in. HDPE			
Slope	0.0286	ft./ft.			
Manning's coef. n=	0.012				
Area	78.54	$in.^2$	or	0.55	$ft.^2$
Perimeter	31.42	in.		2.62	ft.
R=A/P	0.208	ft.			
$V=1.49/n(R)^{2/3}(S)^{1/2}$	7.38				
Q=VA	**4.02**	**(CAPACITY)**			
Q25=	0.81	(Q=CiA)			

DMH #2 to STU #1					L= 55'
Size	12	in. HDPE			
Slope	0.005	ft./ft.			
Manning's coef. n=	0.012				
Area	113.10	$in.^2$	or	0.79	$ft.^2$
Perimeter	37.70	in.		3.14	ft.
R=A/P	0.250	ft.			
$V=1.49/n(R)^{2/3}(S)^{1/2}$	3.48				
Q=VA	**2.74**	**(CAPACITY)**			
Q25=	2.17	(Calculated)			

STU #1 to Recharger #1					L= 45'
Size	12	in. HDPE			
Slope	0.005	ft./ft.			
Manning's coef. n=	0.012				
Area	113.10	$in.^2$	or	0.79	$ft.^2$
Perimeter	37.70	in.		3.14	ft.
R=A/P	0.250	ft.			
$V=1.49/n(R)^{2/3}(S)^{1/2}$	3.48				
Q=VA	**2.74**	**(CAPACITY)**			
Q25=	2.17	(Calculated)			

CB #4 to STU #2					L= 39'
Size	10	in. HDPE			
Slope	0.01	ft./ft.			
Manning's coef. n=	0.012				
Area	78.54	$in.^2$	or	0.55	$ft.^2$
Perimeter	31.42	in.		2.62	ft.
R=A/P	0.208	ft.			
$V=1.49/n(R)^{2/3}(S)^{1/2}$	4.36				
Q=VA	**2.38**	**(CAPACITY)**			
Q25=	0.92	(HydroCAD)			

STU #2 to Recharger #1					L= 22'
Size	10	in. HDPE			
Slope	0.0182	ft./ft.			
Manning's coef. n=	0.012				
Area	78.54	$in.^2$	or	0.55	$ft.^2$
Perimeter	31.42	in.		2.62	ft.
R=A/P	0.208	ft.			
$V=1.49/n(R)^{2/3}(S)^{1/2}$	5.89				
Q=VA	**3.21**	**(CAPACITY)**			
Q25=	0.92	(HydroCAD)			

Pipe Calculations

CB #5 to STU #3					L= 5'
Size	10	in. HDPE			
Slope	0.02	ft./ft.			
Manning's coef. n=	0.012				
Area	78.54	$in.^2$	or	0.55	$ft.^2$
Perimeter	31.42	in.		2.62	ft.
R=A/P	0.208	ft.			
$V=1.49/n(R)^{2/3}(S)^{1/2}$	6.17				
Q=VA	**3.37**	**(CAPACITY)**			
Q25=	1.17	(HydroCAD)			

STU #3 to Recharger #2					L= 16'
Size	10	in. HDPE			
Slope	0.0188	ft./ft.			
Manning's coef. n=	0.012				
Area	78.54	$in.^2$	or	0.55	$ft.^2$
Perimeter	31.42	in.		2.62	ft.
R=A/P	0.208	ft.			
$V=1.49/n(R)^{2/3}(S)^{1/2}$	5.98				
Q=VA	**3.26**	**(CAPACITY)**			
Q25=	1.17	(HydroCAD)			

CB #6 to STU #4					L= 7'
Size	10	in. HDPE			
Slope	0.0286	ft./ft.			
Manning's coef. n=	0.012				
Area	78.54	$in.^2$	or	0.55	$ft.^2$
Perimeter	31.42	in.		2.62	ft.
R=A/P	0.208	ft.			
$V=1.49/n(R)^{2/3}(S)^{1/2}$	7.38				
Q=VA	**4.02**	**(CAPACITY)**			
Q25=	0.79	(HydroCAD)			

STU #4 to DMH #3					L= 88'
Size	10	in. HDPE			
Slope	0.01	ft./ft.			
Manning's coef. n=	0.012				
Area	78.54	$in.^2$	or	0.55	$ft.^2$
Perimeter	31.42	in.		2.62	ft.
R=A/P	0.208	ft.			
$V=1.49/n(R)^{2/3}(S)^{1/2}$	4.36				
Q=VA	**2.38**	**(CAPACITY)**			
Q25=	0.79	(HydroCAD)			

DMH #3 to Detention #2					L= 83'
Size	10	in. HDPE			
Slope	0.01	ft./ft.			
Manning's coef. n=	0.012				
Area	78.54	$in.^2$	or	0.55	$ft.^2$
Perimeter	31.42	in.		2.62	ft.
R=A/P	0.208	ft.			
$V=1.49/n(R)^{2/3}(S)^{1/2}$	4.36				
Q=VA	**2.38**	**(CAPACITY)**			
Q25=	0.36	(HydroCAD)			

Trench Drain to STU #5					L= 19'
Size	6	in. HDPE			
Slope	0.0263	ft./ft.			
Manning's coef. n=	0.012				
Area	28.27	$in.^2$	or	0.20	$ft.^2$
Perimeter	18.85	in.		1.57	ft.
R=A/P	0.125	ft.			
$V=1.49/n(R)^{2/3}(S)^{1/2}$	5.03				
Q=VA	**0.99**	**(CAPACITY)**			
Q25=	0.24	(Q=CiA)			

STU #5 to Detention #3					L= 33'
Size	6	in. HDPE			
Slope	0.0121	ft./ft.			
Manning's coef. n=	0.012				
Area	28.27	$in.^2$	or	0.20	$ft.^2$
Perimeter	18.85	in.		1.57	ft.
R=A/P	0.125	ft.			
$V=1.49/n(R)^{2/3}(S)^{1/2}$	3.41				
Q=VA	**0.67**	**(CAPACITY)**			
Q25=	0.24	(Q=CiA)			

DGT Associates
Surveying & Engineering

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Framingham, MA 01701
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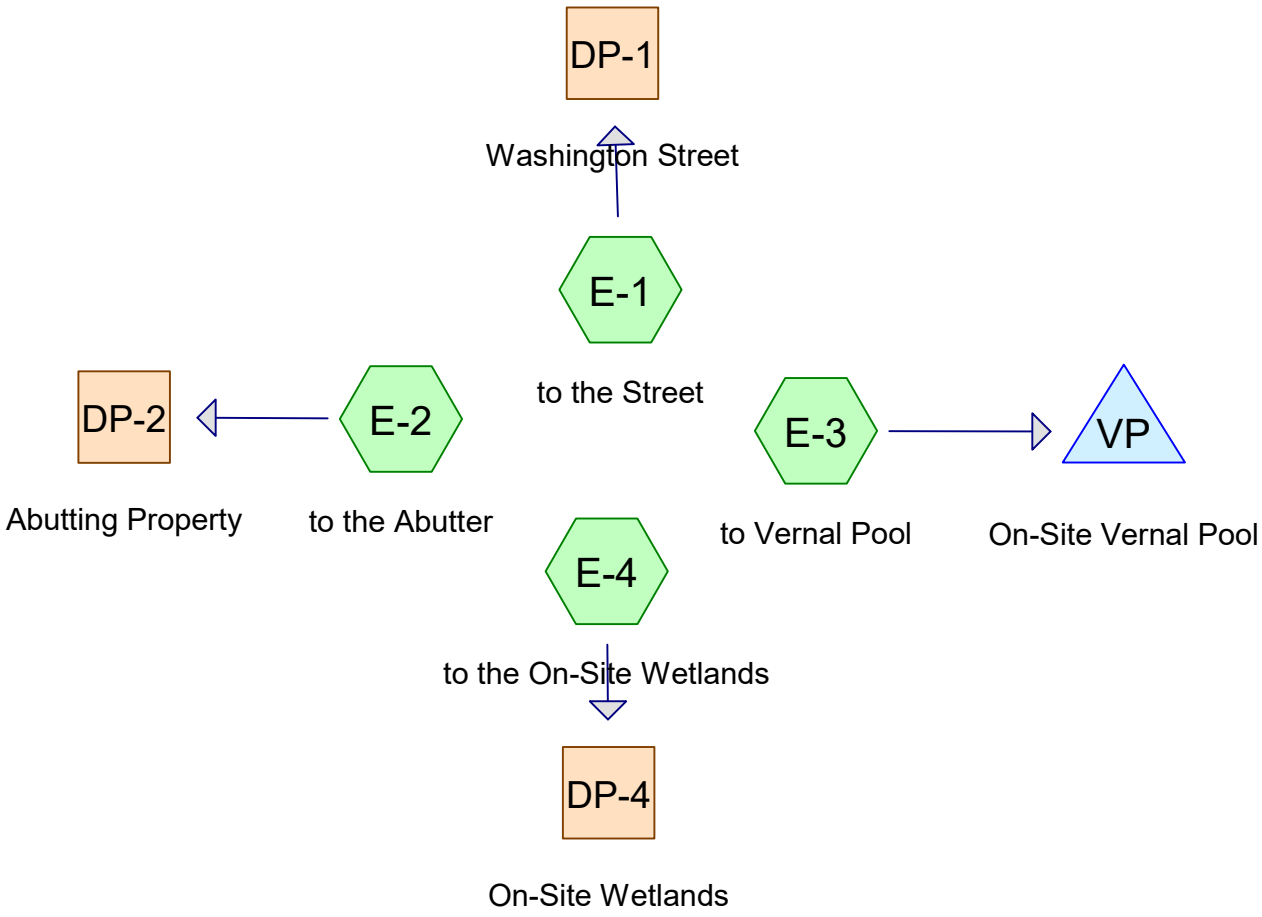
SECTION 3

Existing Conditions Stormwater Model showing Stormwater Flows and Flood Routing Computations using HydroCAD version 10.00

Existing Conditions Watershed Map: WSD-EX

Washington Street Sherborn Homes
0 Washington Street
Sherborn, MA 01770

DGT Job No.: F25902



Subcat Reach Pond Link

Routing Diagram for F25902 Existing Conditions Model
Prepared by DGT Associates, Printed 1/30/2024

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
5.312	55	Woods, Good, HSG B (E-1, E-2, E-3, E-4)
5.312	**55**	**TOTAL AREA**

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E-1: to the Street Runoff Area=44,197 sf 0.00% Impervious Runoff Depth=0.30"
Flow Length=172' Tc=7.1 min CN=55 Runoff=0.13 cfs 0.025 af

Subcatchment E-2: to the Abutter Runoff Area=6,305 sf 0.00% Impervious Runoff Depth=0.30"
Tc=5.0 min CN=55 Runoff=0.02 cfs 0.004 af

Subcatchment E-3: to Vernal Pool Runoff Area=88,018 sf 0.00% Impervious Runoff Depth=0.30"
Flow Length=263' Tc=20.2 min CN=55 Runoff=0.23 cfs 0.050 af

Subcatchment E-4: to the On-Site Wetlands Runoff Area=92,883 sf 0.00% Impervious Runoff Depth=0.30"
Flow Length=211' Tc=17.5 min CN=55 Runoff=0.25 cfs 0.053 af

Reach DP-1: Washington Street Inflow=0.13 cfs 0.025 af
Outflow=0.13 cfs 0.025 af

Reach DP-2: Abutting Property Inflow=0.02 cfs 0.004 af
Outflow=0.02 cfs 0.004 af

Reach DP-4: On-Site Wetlands Inflow=0.25 cfs 0.053 af
Outflow=0.25 cfs 0.053 af

Pond VP: On-Site Vernal Pool Peak Elev=202.58' Storage=2,176 cf Inflow=0.23 cfs 0.050 af
Outflow=0.00 cfs 0.000 af

Total Runoff Area = 5.312 ac Runoff Volume = 0.131 af Average Runoff Depth = 0.30"
100.00% Pervious = 5.312 ac 0.00% Impervious = 0.000 ac

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E-1: to the Street Runoff Area=44,197 sf 0.00% Impervious Runoff Depth=1.10"
Flow Length=172' Tc=7.1 min CN=55 Runoff=1.04 cfs 0.093 af

Subcatchment E-2: to the Abutter Runoff Area=6,305 sf 0.00% Impervious Runoff Depth=1.10"
Tc=5.0 min CN=55 Runoff=0.16 cfs 0.013 af

Subcatchment E-3: to Vernal Pool Runoff Area=88,018 sf 0.00% Impervious Runoff Depth=1.10"
Flow Length=263' Tc=20.2 min CN=55 Runoff=1.44 cfs 0.186 af

Subcatchment E-4: to the On-Site Wetlands Runoff Area=92,883 sf 0.00% Impervious Runoff Depth=1.10"
Flow Length=211' Tc=17.5 min CN=55 Runoff=1.60 cfs 0.196 af

Reach DP-1: Washington Street Inflow=1.04 cfs 0.093 af
Outflow=1.04 cfs 0.093 af

Reach DP-2: Abutting Property Inflow=0.16 cfs 0.013 af
Outflow=0.16 cfs 0.013 af

Reach DP-4: On-Site Wetlands Inflow=1.60 cfs 0.196 af
Outflow=1.60 cfs 0.196 af

Pond VP: On-Site Vernal Pool Peak Elev=204.72' Storage=8,081 cf Inflow=1.44 cfs 0.186 af
Outflow=0.00 cfs 0.000 af

Total Runoff Area = 5.312 ac Runoff Volume = 0.488 af Average Runoff Depth = 1.10"
100.00% Pervious = 5.312 ac 0.00% Impervious = 0.000 ac

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E-1: to the Street Runoff Area=44,197 sf 0.00% Impervious Runoff Depth=1.76"
Flow Length=172' Tc=7.1 min CN=55 Runoff=1.84 cfs 0.149 af

Subcatchment E-2: to the Abutter Runoff Area=6,305 sf 0.00% Impervious Runoff Depth=1.76"
Tc=5.0 min CN=55 Runoff=0.28 cfs 0.021 af

Subcatchment E-3: to Vernal Pool Runoff Area=88,018 sf 0.00% Impervious Runoff Depth=1.76"
Flow Length=263' Tc=20.2 min CN=55 Runoff=2.54 cfs 0.297 af

Subcatchment E-4: to the On-Site Wetlands Runoff Area=92,883 sf 0.00% Impervious Runoff Depth=1.76"
Flow Length=211' Tc=17.5 min CN=55 Runoff=2.84 cfs 0.314 af

Reach DP-1: Washington Street Inflow=1.84 cfs 0.149 af
Outflow=1.84 cfs 0.149 af

Reach DP-2: Abutting Property Inflow=0.28 cfs 0.021 af
Outflow=0.28 cfs 0.021 af

Reach DP-4: On-Site Wetlands Inflow=2.84 cfs 0.314 af
Outflow=2.84 cfs 0.314 af

Pond VP: On-Site Vernal Pool Peak Elev=205.67' Storage=12,945 cf Inflow=2.54 cfs 0.297 af
Outflow=0.00 cfs 0.000 af

Total Runoff Area = 5.312 ac Runoff Volume = 0.781 af Average Runoff Depth = 1.76"
100.00% Pervious = 5.312 ac 0.00% Impervious = 0.000 ac

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E-1: to the Street Runoff Area=44,197 sf 0.00% Impervious Runoff Depth=2.95"
Flow Length=172' Tc=7.1 min CN=55 Runoff=3.25 cfs 0.249 af

Subcatchment E-2: to the Abutter Runoff Area=6,305 sf 0.00% Impervious Runoff Depth=2.95"
Tc=5.0 min CN=55 Runoff=0.50 cfs 0.036 af

Subcatchment E-3: to Vernal Pool Runoff Area=88,018 sf 0.00% Impervious Runoff Depth=2.95"
Flow Length=263' Tc=20.2 min CN=55 Runoff=4.49 cfs 0.497 af

Subcatchment E-4: to the On-Site Wetlands Runoff Area=92,883 sf 0.00% Impervious Runoff Depth=2.95"
Flow Length=211' Tc=17.5 min CN=55 Runoff=5.03 cfs 0.524 af

Reach DP-1: Washington Street Inflow=3.25 cfs 0.249 af
Outflow=3.25 cfs 0.249 af

Reach DP-2: Abutting Property Inflow=0.50 cfs 0.036 af
Outflow=0.50 cfs 0.036 af

Reach DP-4: On-Site Wetlands Inflow=5.03 cfs 0.524 af
Outflow=5.03 cfs 0.524 af

Pond VP: On-Site Vernal Pool Peak Elev=206.57' Storage=21,628 cf Inflow=4.49 cfs 0.497 af
Outflow=0.00 cfs 0.000 af

Total Runoff Area = 5.312 ac Runoff Volume = 1.306 af Average Runoff Depth = 2.95"
100.00% Pervious = 5.312 ac 0.00% Impervious = 0.000 ac

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E-1: to the Street Runoff Area=44,197 sf 0.00% Impervious Runoff Depth=0.30"
Flow Length=172' Tc=7.1 min CN=55 Runoff=0.13 cfs 0.025 af

Subcatchment E-2: to the Abutter Runoff Area=6,305 sf 0.00% Impervious Runoff Depth=0.30"
Tc=5.0 min CN=55 Runoff=0.02 cfs 0.004 af

Subcatchment E-3: to Vernal Pool Runoff Area=88,018 sf 0.00% Impervious Runoff Depth=0.30"
Flow Length=263' Tc=20.2 min CN=55 Runoff=0.23 cfs 0.050 af

Subcatchment E-4: to the On-Site Wetlands Runoff Area=92,883 sf 0.00% Impervious Runoff Depth=0.30"
Flow Length=211' Tc=17.5 min CN=55 Runoff=0.25 cfs 0.053 af

Reach DP-1: Washington Street Inflow=0.13 cfs 0.025 af
Outflow=0.13 cfs 0.025 af

Reach DP-2: Abutting Property Inflow=0.02 cfs 0.004 af
Outflow=0.02 cfs 0.004 af

Reach DP-4: On-Site Wetlands Inflow=0.25 cfs 0.053 af
Outflow=0.25 cfs 0.053 af

Pond VP: On-Site Vernal Pool Peak Elev=202.58' Storage=2,176 cf Inflow=0.23 cfs 0.050 af
Outflow=0.00 cfs 0.000 af

Total Runoff Area = 5.312 ac Runoff Volume = 0.131 af Average Runoff Depth = 0.30"
100.00% Pervious = 5.312 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment E-1: to the Street

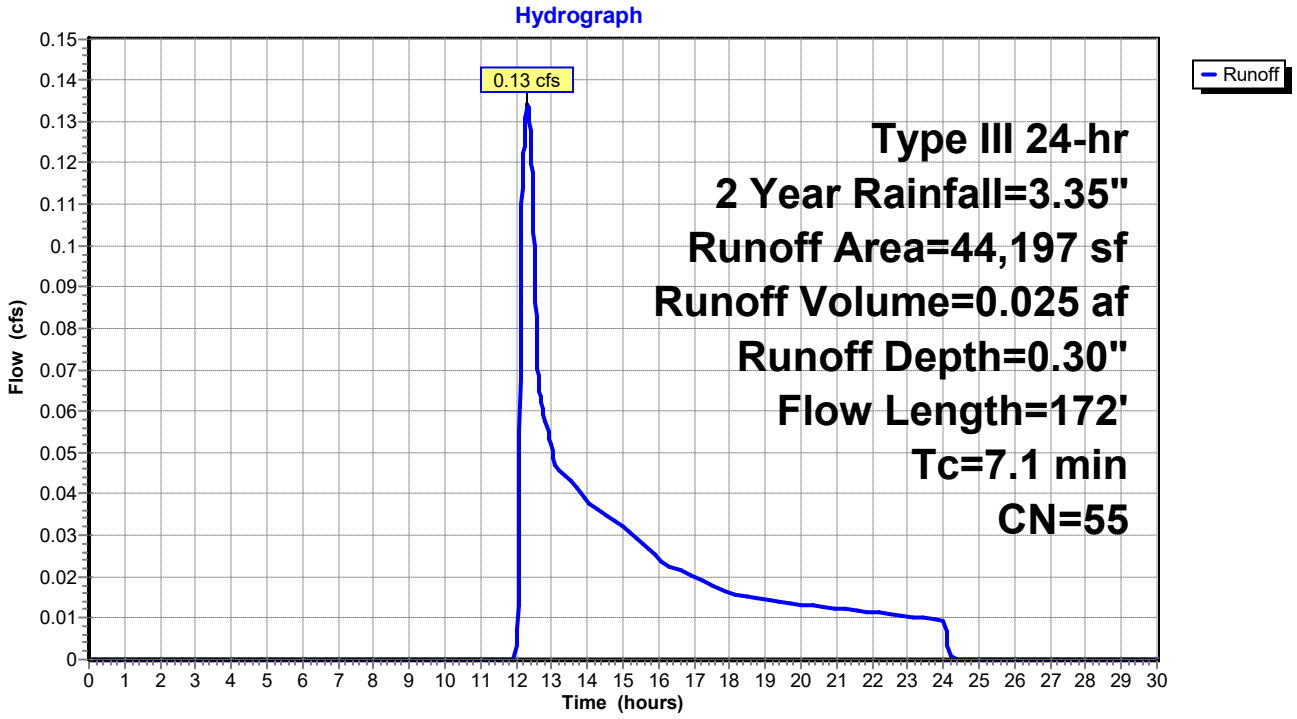
Runoff = 0.13 cfs @ 12.32 hrs, Volume= 0.025 af, Depth= 0.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.35"

Area (sf)	CN	Description
44,197	55	Woods, Good, HSG B
44,197		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	50	0.1740	0.16		**Sheet Flow, Segment 1** Woods: Light underbrush n= 0.400 P2= 3.35"
2.0	122	0.0434	1.04		**Shallow Concentrated Flow, Segment 2** Woodland Kv= 5.0 fps
7.1	172	Total			

Subcatchment E-1: to the Street



Summary for Subcatchment E-2: to the Abutter

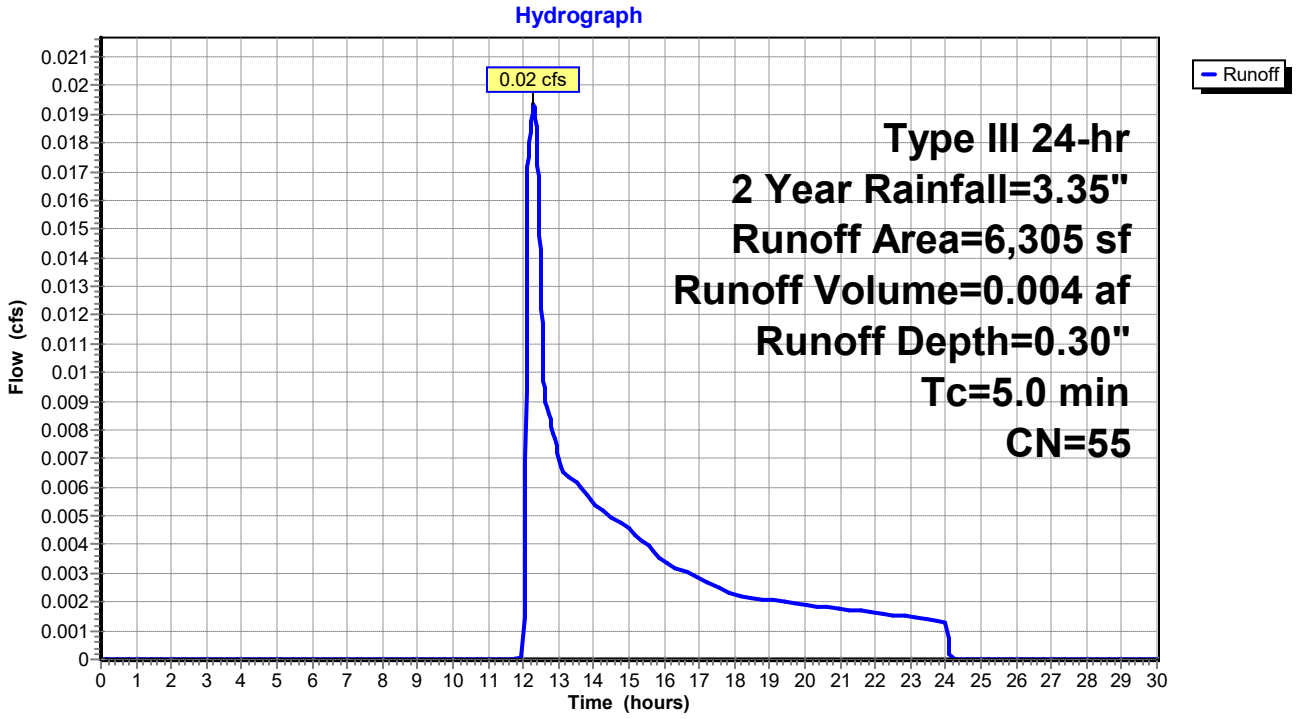
Runoff = 0.02 cfs @ 12.29 hrs, Volume= 0.004 af, Depth= 0.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.35"

Area (sf)	CN	Description
6,305	55	Woods, Good, HSG B
6,305		100.00% Pervious Area

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

Subcatchment E-2: to the Abutter



Summary for Subcatchment E-3: to Vernal Pool

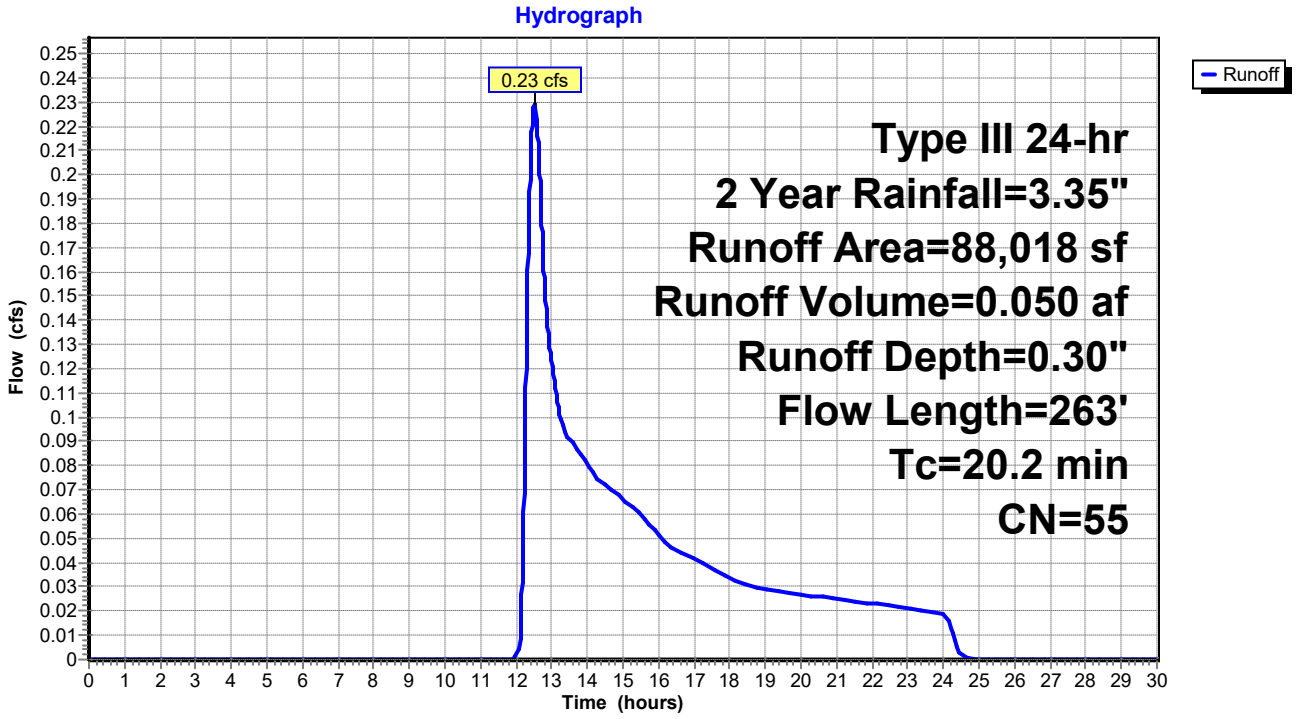
Runoff = 0.23 cfs @ 12.52 hrs, Volume= 0.050 af, Depth= 0.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.35"

Area (sf)	CN	Description
88,018	55	Woods, Good, HSG B
88,018		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.8	50	0.0120	0.06		**Sheet Flow, Segment 1** Woods: Light underbrush n= 0.400 P2= 3.35"
5.4	213	0.0174	0.66		**Shallow Concentrated Flow, Segment 2** Woodland Kv= 5.0 fps
20.2	263	Total			

Subcatchment E-3: to Vernal Pool



Summary for Subcatchment E-4: to the On-Site Wetlands

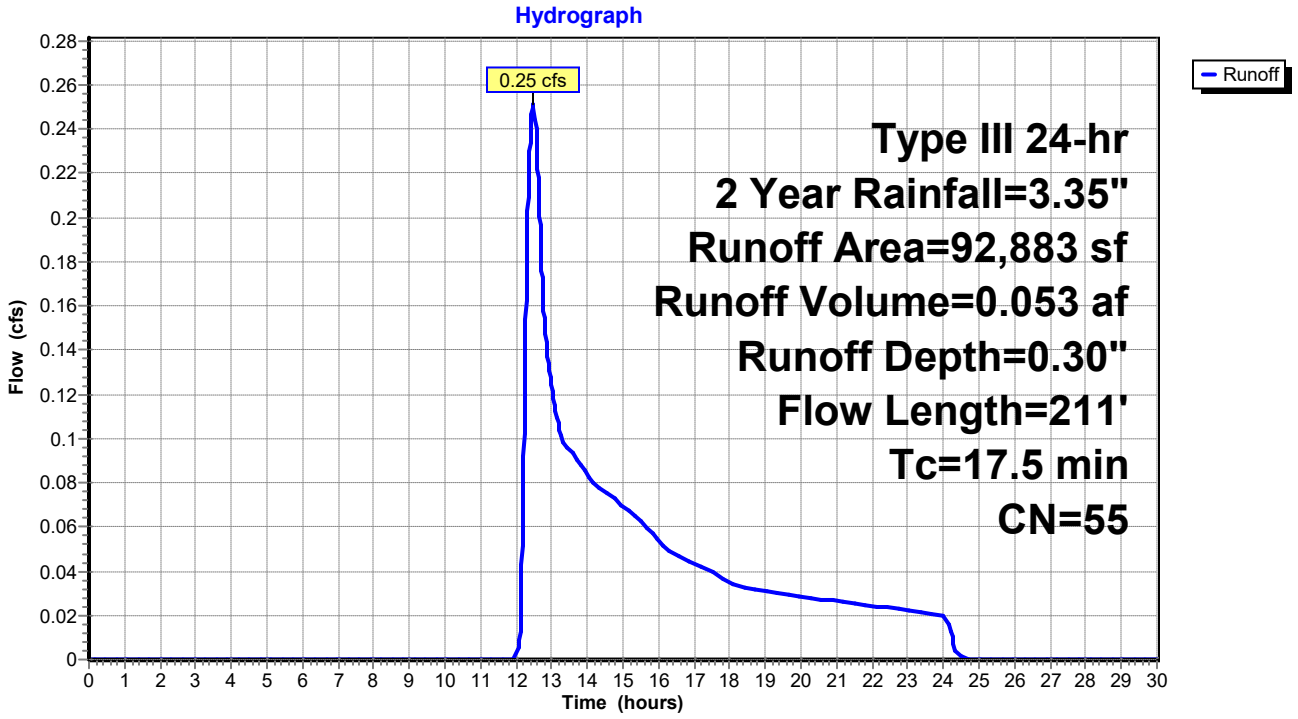
Runoff = 0.25 cfs @ 12.48 hrs, Volume= 0.053 af, Depth= 0.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.35"

Area (sf)	CN	Description
92,883	55	Woods, Good, HSG B
92,883		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.8	50	0.0120	0.06		**Sheet Flow, Segment 1** Woods: Light underbrush n= 0.400 P2= 3.35"
2.7	161	0.0385	0.98		**Shallow Concentrated Flow, Segment 2** Woodland Kv= 5.0 fps
17.5	211	Total			

Subcatchment E-4: to the On-Site Wetlands

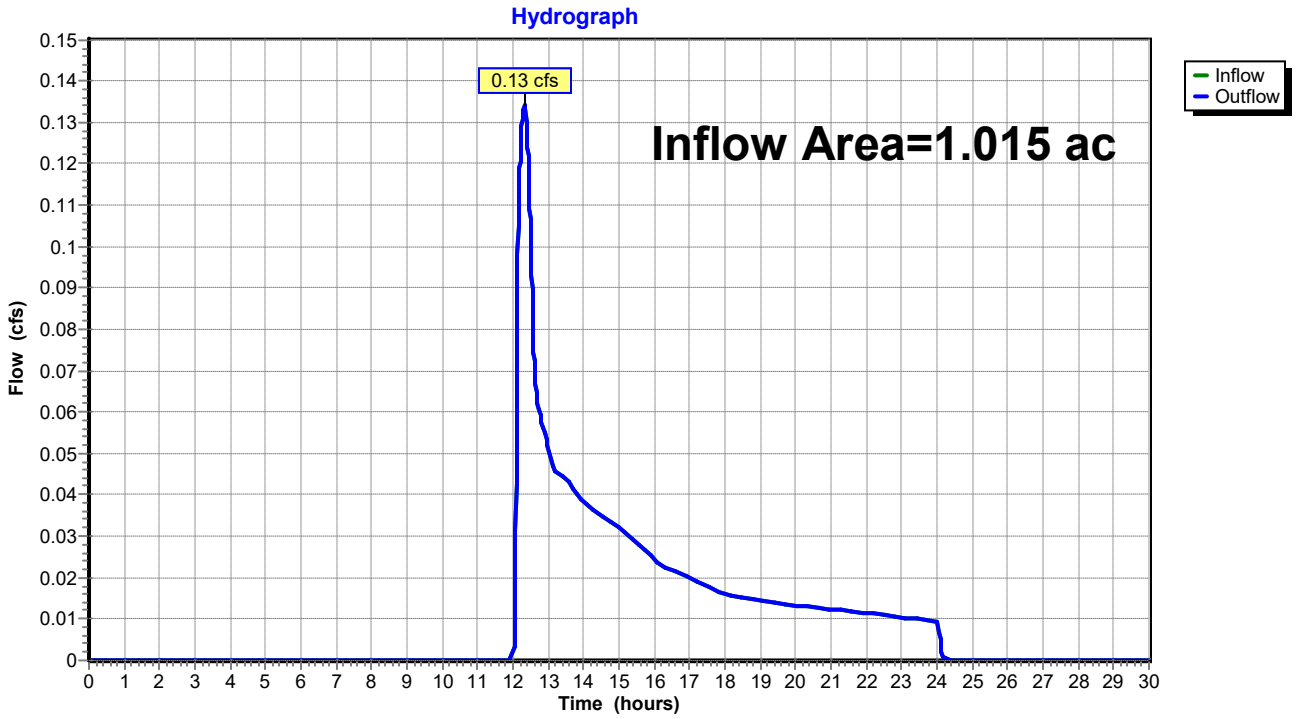


Summary for Reach DP-1: Washington Street

Inflow Area = 1.015 ac, 0.00% Impervious, Inflow Depth = 0.30" for 2 Year event
Inflow = 0.13 cfs @ 12.32 hrs, Volume= 0.025 af
Outflow = 0.13 cfs @ 12.32 hrs, Volume= 0.025 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Reach DP-1: Washington Street

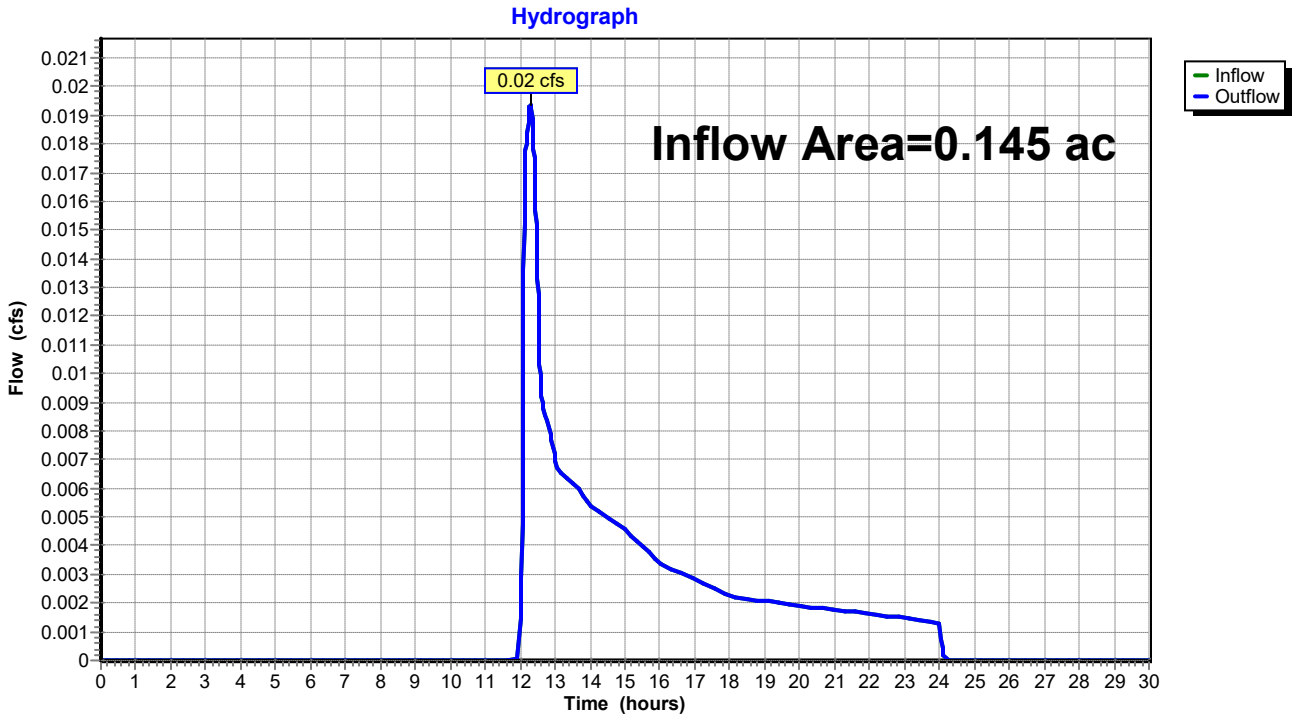


Summary for Reach DP-2: Abutting Property

Inflow Area = 0.145 ac, 0.00% Impervious, Inflow Depth = 0.30" for 2 Year event
Inflow = 0.02 cfs @ 12.29 hrs, Volume= 0.004 af
Outflow = 0.02 cfs @ 12.29 hrs, Volume= 0.004 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Reach DP-2: Abutting Property

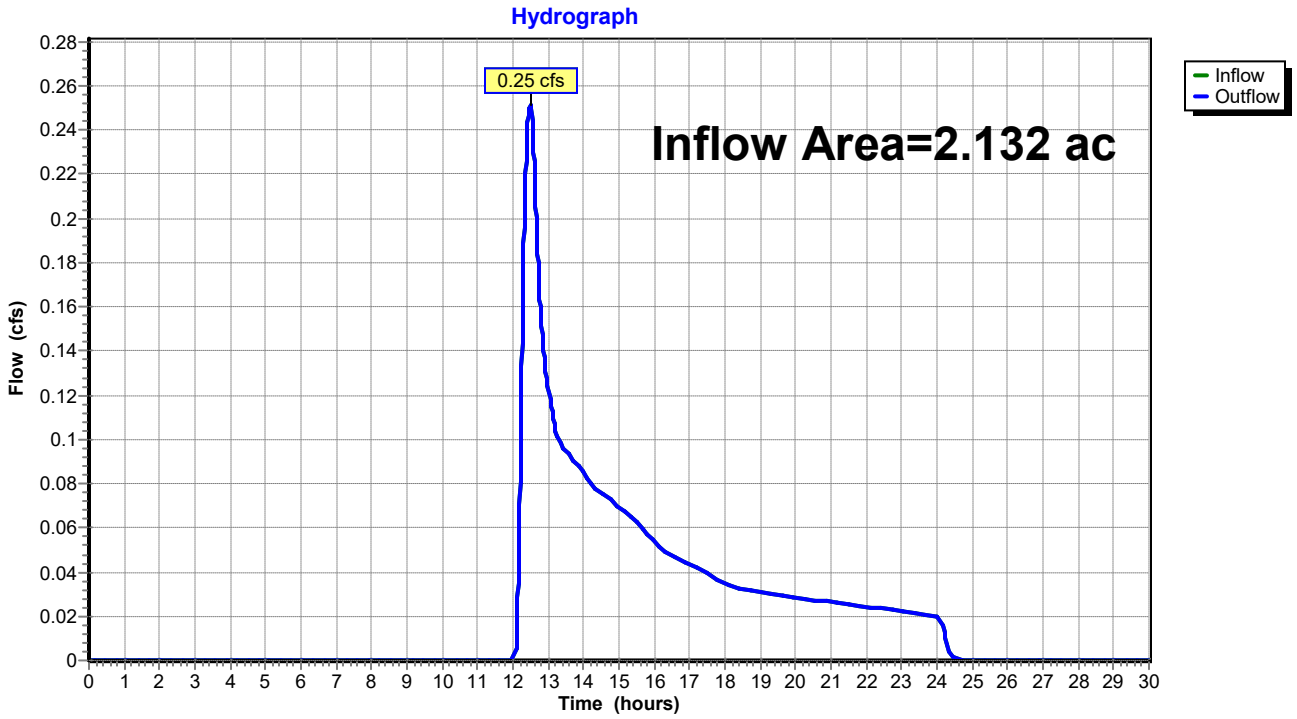


Summary for Reach DP-4: On-Site Wetlands

Inflow Area = 2.132 ac, 0.00% Impervious, Inflow Depth = 0.30" for 2 Year event
Inflow = 0.25 cfs @ 12.48 hrs, Volume= 0.053 af
Outflow = 0.25 cfs @ 12.48 hrs, Volume= 0.053 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Reach DP-4: On-Site Wetlands



Summary for Pond VP: On-Site Vernal Pool

Inflow Area = 2.021 ac, 0.00% Impervious, Inflow Depth = 0.30" for 2 Year event
Inflow = 0.23 cfs @ 12.52 hrs, Volume= 0.050 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min

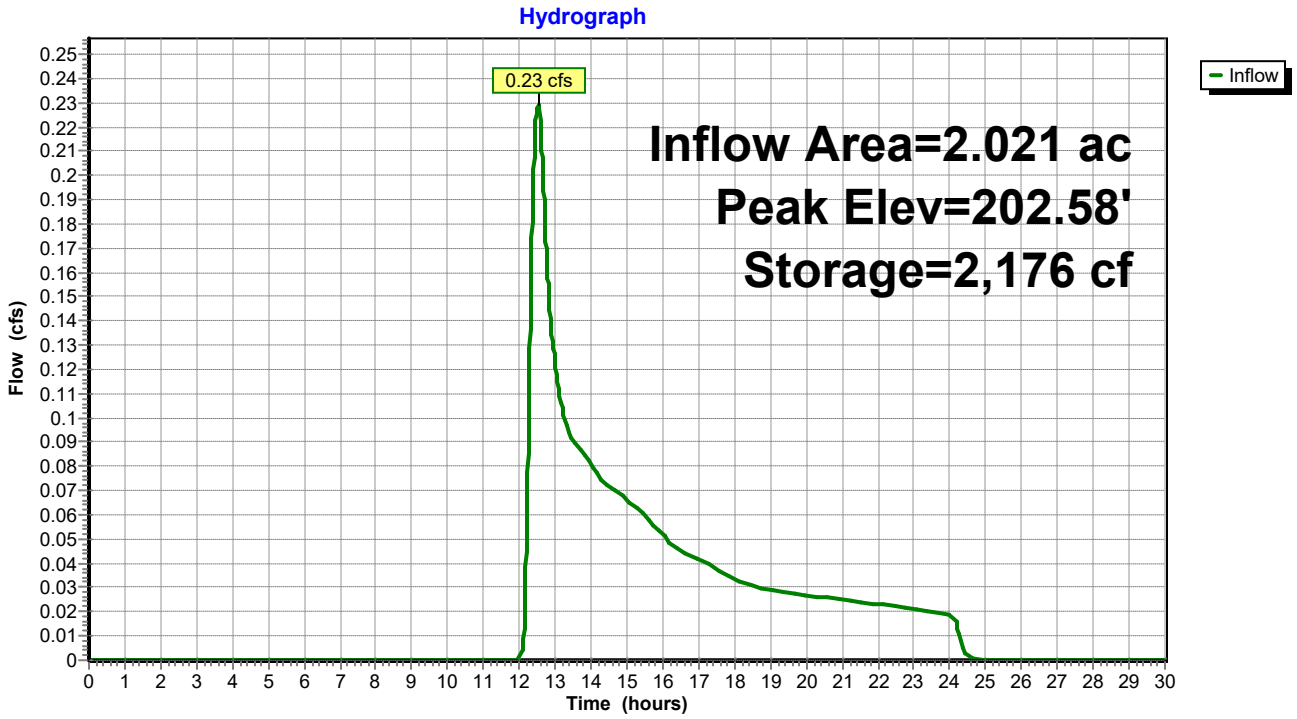
Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 202.58' @ 25.15 hrs Surf.Area= 1,729 sf Storage= 2,176 cf

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

Volume	Invert	Avail.Storage	Storage Description
#1	200.00'	30,113 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)
200.00	96	37.0	0	0	96
201.00	661	92.8	336	336	676
202.00	1,302	129.9	964	1,300	1,343
203.00	2,076	163.4	1,674	2,974	2,138
204.00	3,067	197.8	2,555	5,529	3,144
205.00	4,516	239.6	3,768	9,298	4,615
206.00	7,411	316.4	5,904	15,202	8,024
207.00	23,990	735.5	14,912	30,113	43,110

Pond VP: On-Site Vernal Pool



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E-1: to the Street Runoff Area=44,197 sf 0.00% Impervious Runoff Depth=1.10"
Flow Length=172' Tc=7.1 min CN=55 Runoff=1.04 cfs 0.093 af

Subcatchment E-2: to the Abutter Runoff Area=6,305 sf 0.00% Impervious Runoff Depth=1.10"
Tc=5.0 min CN=55 Runoff=0.16 cfs 0.013 af

Subcatchment E-3: to Vernal Pool Runoff Area=88,018 sf 0.00% Impervious Runoff Depth=1.10"
Flow Length=263' Tc=20.2 min CN=55 Runoff=1.44 cfs 0.186 af

Subcatchment E-4: to the On-Site Wetlands Runoff Area=92,883 sf 0.00% Impervious Runoff Depth=1.10"
Flow Length=211' Tc=17.5 min CN=55 Runoff=1.60 cfs 0.196 af

Reach DP-1: Washington Street Inflow=1.04 cfs 0.093 af
Outflow=1.04 cfs 0.093 af

Reach DP-2: Abutting Property Inflow=0.16 cfs 0.013 af
Outflow=0.16 cfs 0.013 af

Reach DP-4: On-Site Wetlands Inflow=1.60 cfs 0.196 af
Outflow=1.60 cfs 0.196 af

Pond VP: On-Site Vernal Pool Peak Elev=204.72' Storage=8,081 cf Inflow=1.44 cfs 0.186 af
Outflow=0.00 cfs 0.000 af

Total Runoff Area = 5.312 ac Runoff Volume = 0.488 af Average Runoff Depth = 1.10"
100.00% Pervious = 5.312 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment E-1: to the Street

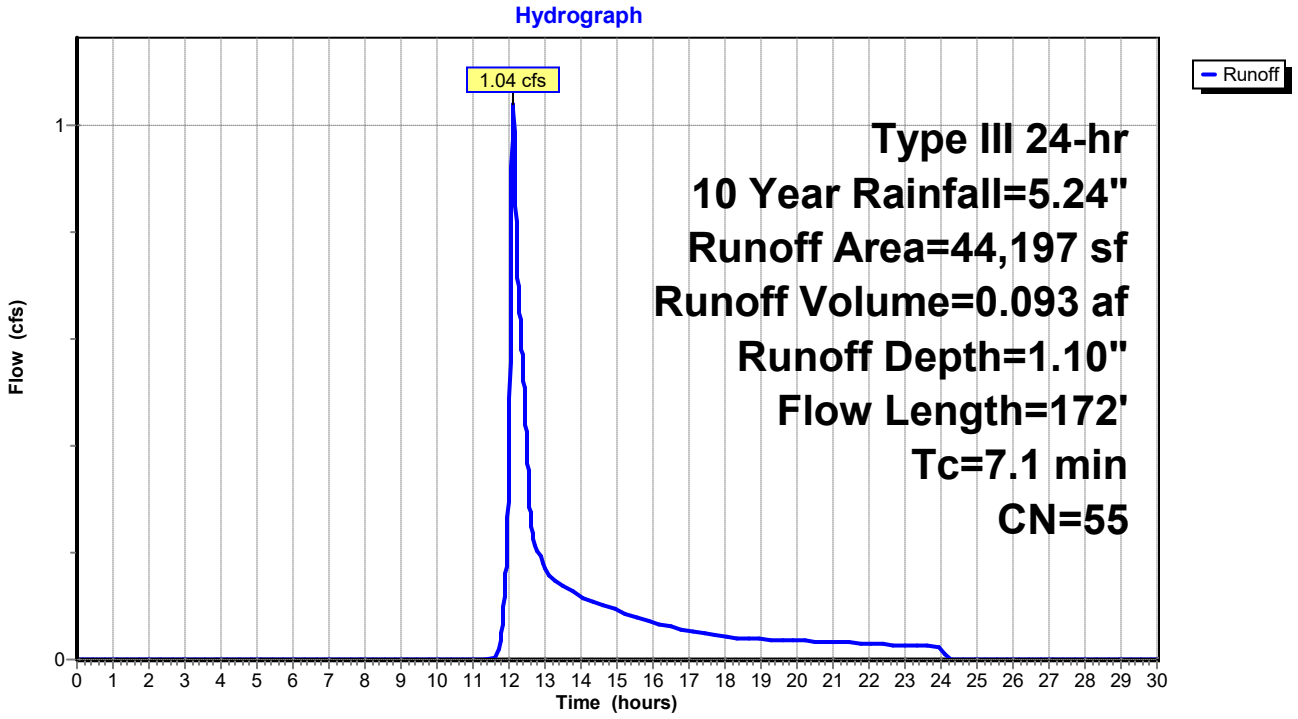
Runoff = 1.04 cfs @ 12.12 hrs, Volume= 0.093 af, Depth= 1.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.24"

Area (sf)	CN	Description
44,197	55	Woods, Good, HSG B
44,197		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	50	0.1740	0.16		**Sheet Flow, Segment 1** Woods: Light underbrush n= 0.400 P2= 3.35"
2.0	122	0.0434	1.04		**Shallow Concentrated Flow, Segment 2** Woodland Kv= 5.0 fps
7.1	172	Total			

Subcatchment E-1: to the Street



Summary for Subcatchment E-2: to the Abutter

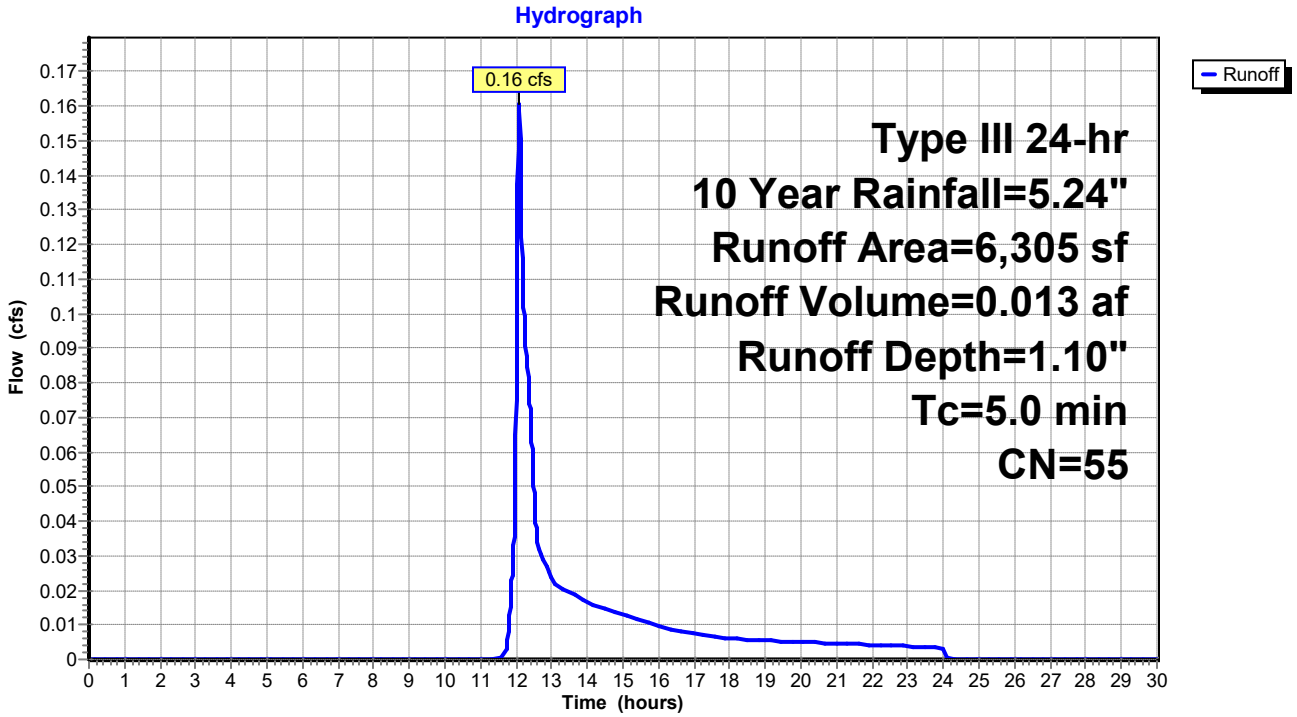
Runoff = 0.16 cfs @ 12.09 hrs, Volume= 0.013 af, Depth= 1.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.24"

Area (sf)	CN	Description
6,305	55	Woods, Good, HSG B
6,305		100.00% Pervious Area

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

Subcatchment E-2: to the Abutter



Summary for Subcatchment E-3: to Vernal Pool

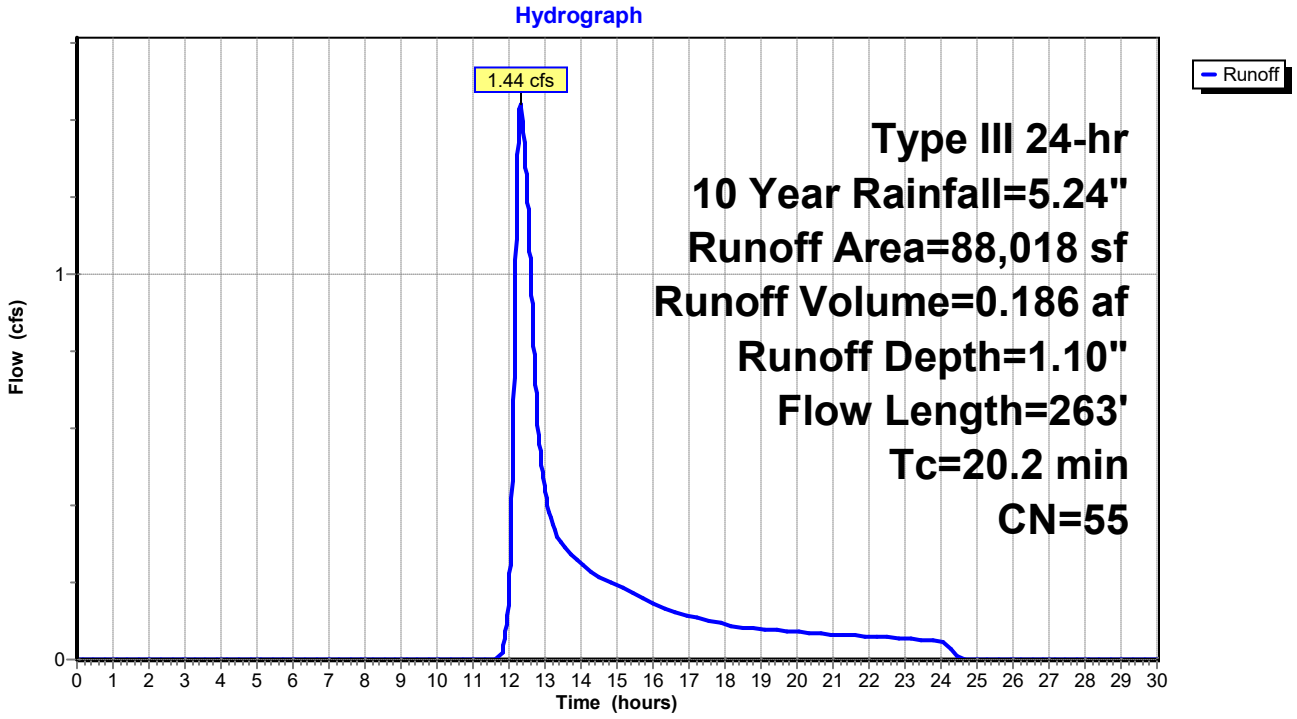
Runoff = 1.44 cfs @ 12.33 hrs, Volume= 0.186 af, Depth= 1.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.24"

Area (sf)	CN	Description
88,018	55	Woods, Good, HSG B
88,018		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.8	50	0.0120	0.06		**Sheet Flow, Segment 1** Woods: Light underbrush n= 0.400 P2= 3.35"
5.4	213	0.0174	0.66		**Shallow Concentrated Flow, Segment 2** Woodland Kv= 5.0 fps
20.2	263	Total			

Subcatchment E-3: to Vernal Pool



Summary for Subcatchment E-4: to the On-Site Wetlands

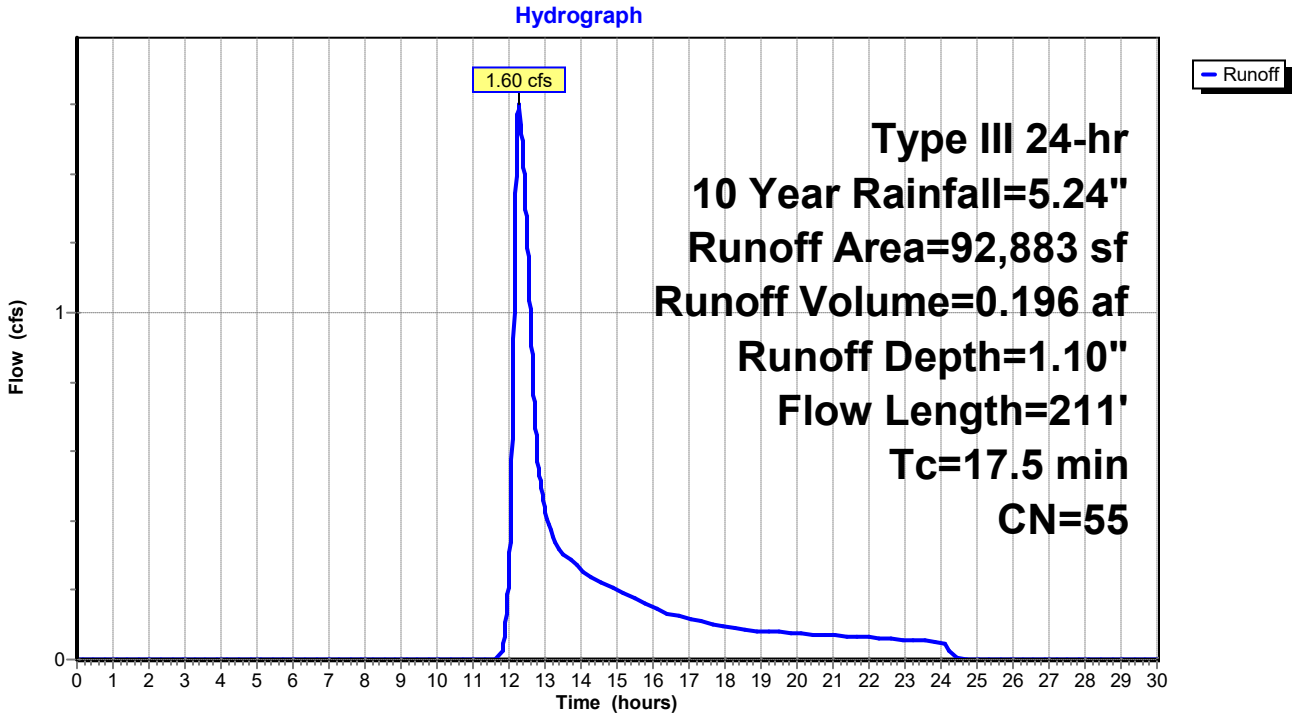
Runoff = 1.60 cfs @ 12.29 hrs, Volume= 0.196 af, Depth= 1.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.24"

Area (sf)	CN	Description
92,883	55	Woods, Good, HSG B
92,883		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.8	50	0.0120	0.06		**Sheet Flow, Segment 1** Woods: Light underbrush n= 0.400 P2= 3.35"
2.7	161	0.0385	0.98		**Shallow Concentrated Flow, Segment 2** Woodland Kv= 5.0 fps
17.5	211	Total			

Subcatchment E-4: to the On-Site Wetlands

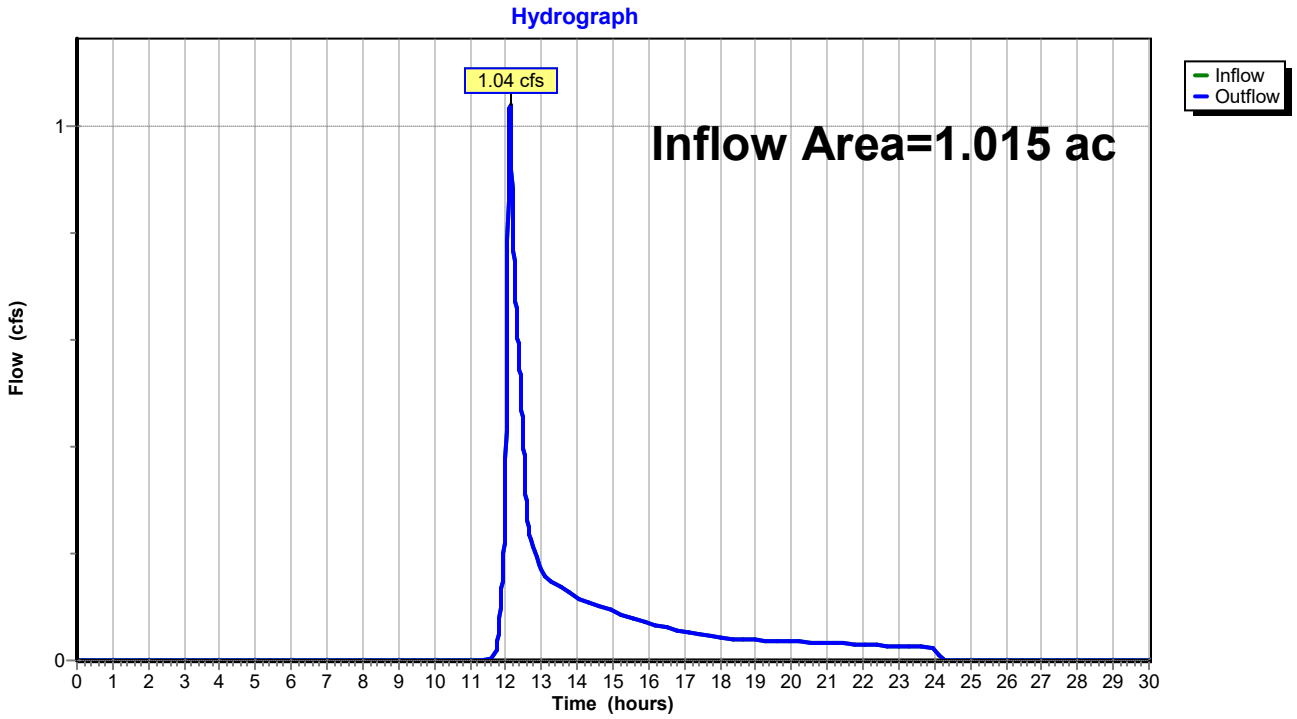


Summary for Reach DP-1: Washington Street

Inflow Area = 1.015 ac, 0.00% Impervious, Inflow Depth = 1.10" for 10 Year event
Inflow = 1.04 cfs @ 12.12 hrs, Volume= 0.093 af
Outflow = 1.04 cfs @ 12.12 hrs, Volume= 0.093 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Reach DP-1: Washington Street

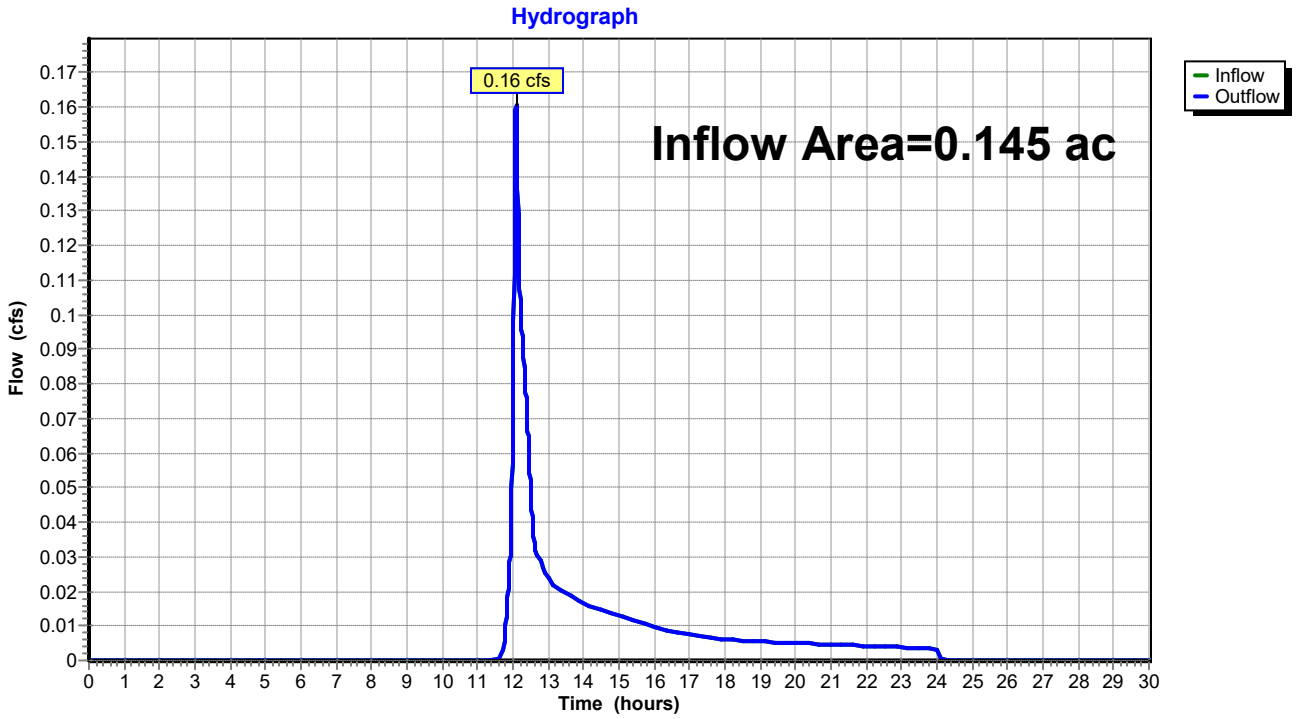


Summary for Reach DP-2: Abutting Property

Inflow Area = 0.145 ac, 0.00% Impervious, Inflow Depth = 1.10" for 10 Year event
Inflow = 0.16 cfs @ 12.09 hrs, Volume= 0.013 af
Outflow = 0.16 cfs @ 12.09 hrs, Volume= 0.013 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Reach DP-2: Abutting Property

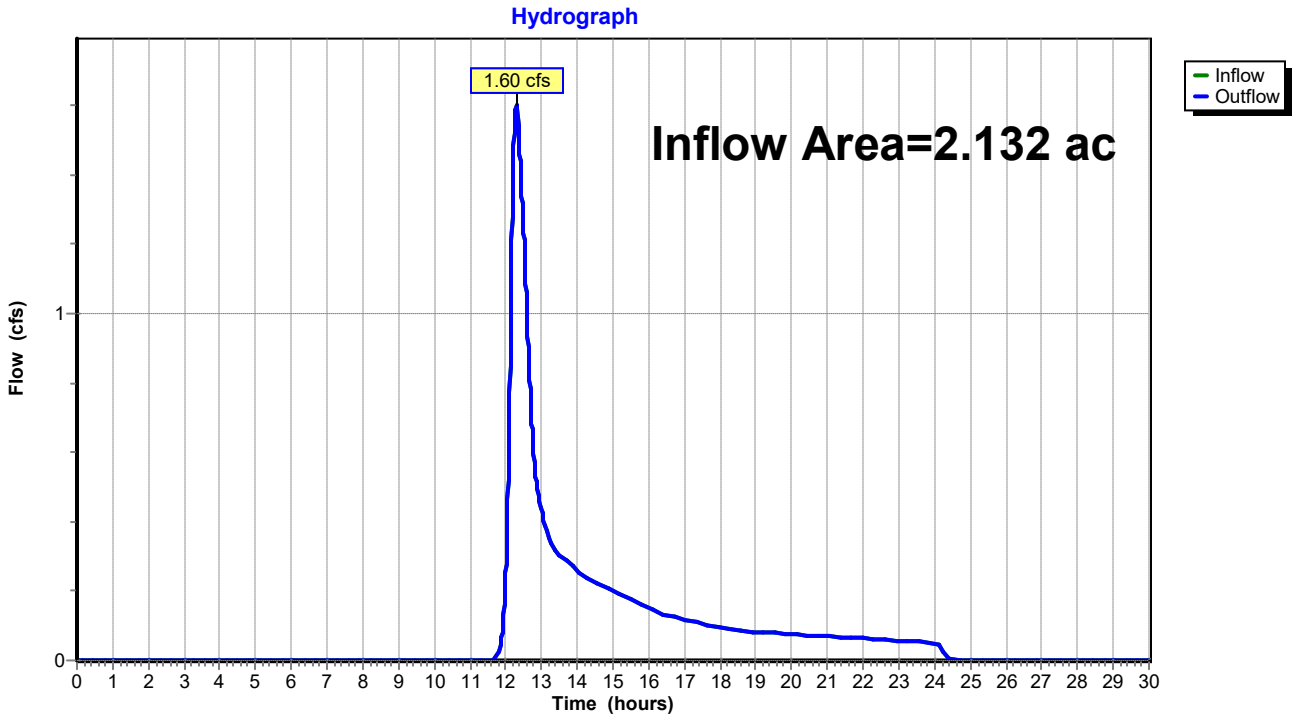


Summary for Reach DP-4: On-Site Wetlands

Inflow Area = 2.132 ac, 0.00% Impervious, Inflow Depth = 1.10" for 10 Year event
Inflow = 1.60 cfs @ 12.29 hrs, Volume= 0.196 af
Outflow = 1.60 cfs @ 12.29 hrs, Volume= 0.196 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Reach DP-4: On-Site Wetlands



Summary for Pond VP: On-Site Vernal Pool

Inflow Area = 2.021 ac, 0.00% Impervious, Inflow Depth = 1.10" for 10 Year event
Inflow = 1.44 cfs @ 12.33 hrs, Volume= 0.186 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min

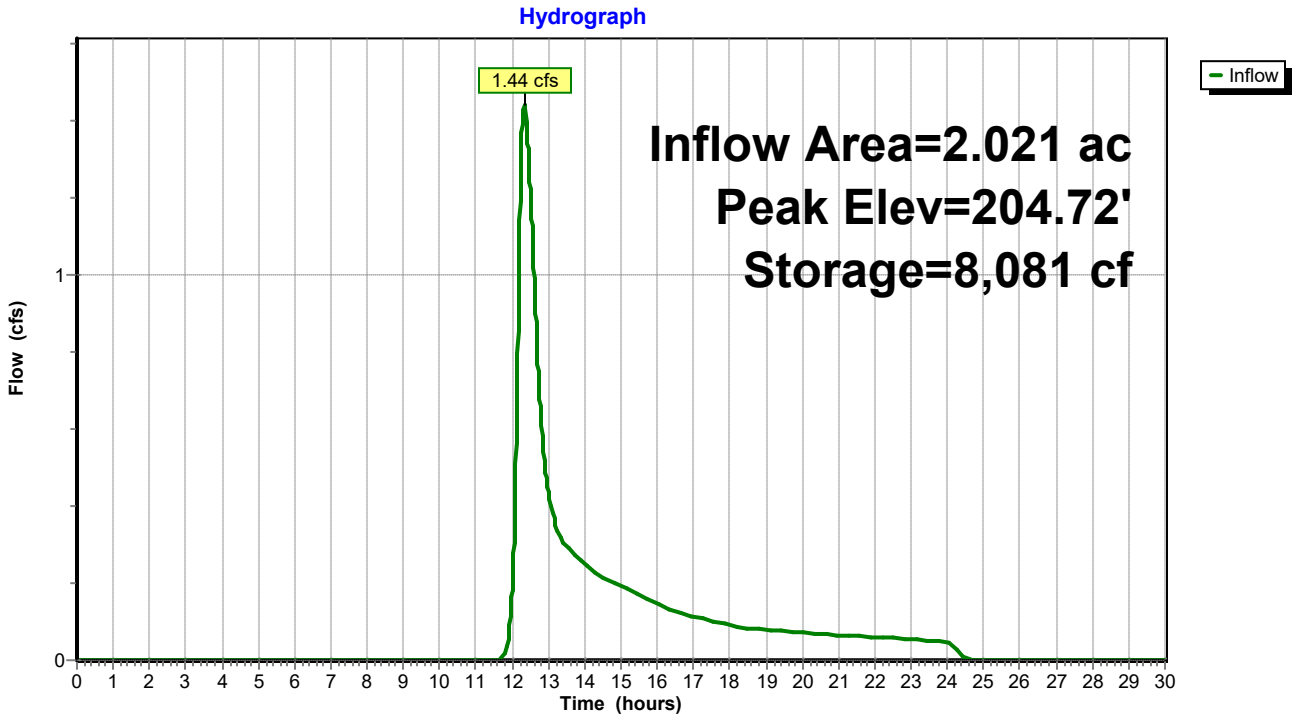
Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 204.72' @ 25.15 hrs Surf.Area= 4,077 sf Storage= 8,081 cf

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

Volume	Invert	Avail.Storage	Storage Description
#1	200.00'	30,113 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)
200.00	96	37.0	0	0	96
201.00	661	92.8	336	336	676
202.00	1,302	129.9	964	1,300	1,343
203.00	2,076	163.4	1,674	2,974	2,138
204.00	3,067	197.8	2,555	5,529	3,144
205.00	4,516	239.6	3,768	9,298	4,615
206.00	7,411	316.4	5,904	15,202	8,024
207.00	23,990	735.5	14,912	30,113	43,110

Pond VP: On-Site Vernal Pool



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E-1: to the Street Runoff Area=44,197 sf 0.00% Impervious Runoff Depth=1.76"
Flow Length=172' Tc=7.1 min CN=55 Runoff=1.84 cfs 0.149 af

Subcatchment E-2: to the Abutter Runoff Area=6,305 sf 0.00% Impervious Runoff Depth=1.76"
Tc=5.0 min CN=55 Runoff=0.28 cfs 0.021 af

Subcatchment E-3: to Vernal Pool Runoff Area=88,018 sf 0.00% Impervious Runoff Depth=1.76"
Flow Length=263' Tc=20.2 min CN=55 Runoff=2.54 cfs 0.297 af

Subcatchment E-4: to the On-Site Wetlands Runoff Area=92,883 sf 0.00% Impervious Runoff Depth=1.76"
Flow Length=211' Tc=17.5 min CN=55 Runoff=2.84 cfs 0.314 af

Reach DP-1: Washington Street Inflow=1.84 cfs 0.149 af
Outflow=1.84 cfs 0.149 af

Reach DP-2: Abutting Property Inflow=0.28 cfs 0.021 af
Outflow=0.28 cfs 0.021 af

Reach DP-4: On-Site Wetlands Inflow=2.84 cfs 0.314 af
Outflow=2.84 cfs 0.314 af

Pond VP: On-Site Vernal Pool Peak Elev=205.67' Storage=12,945 cf Inflow=2.54 cfs 0.297 af
Outflow=0.00 cfs 0.000 af

Total Runoff Area = 5.312 ac Runoff Volume = 0.781 af Average Runoff Depth = 1.76"
100.00% Pervious = 5.312 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment E-1: to the Street

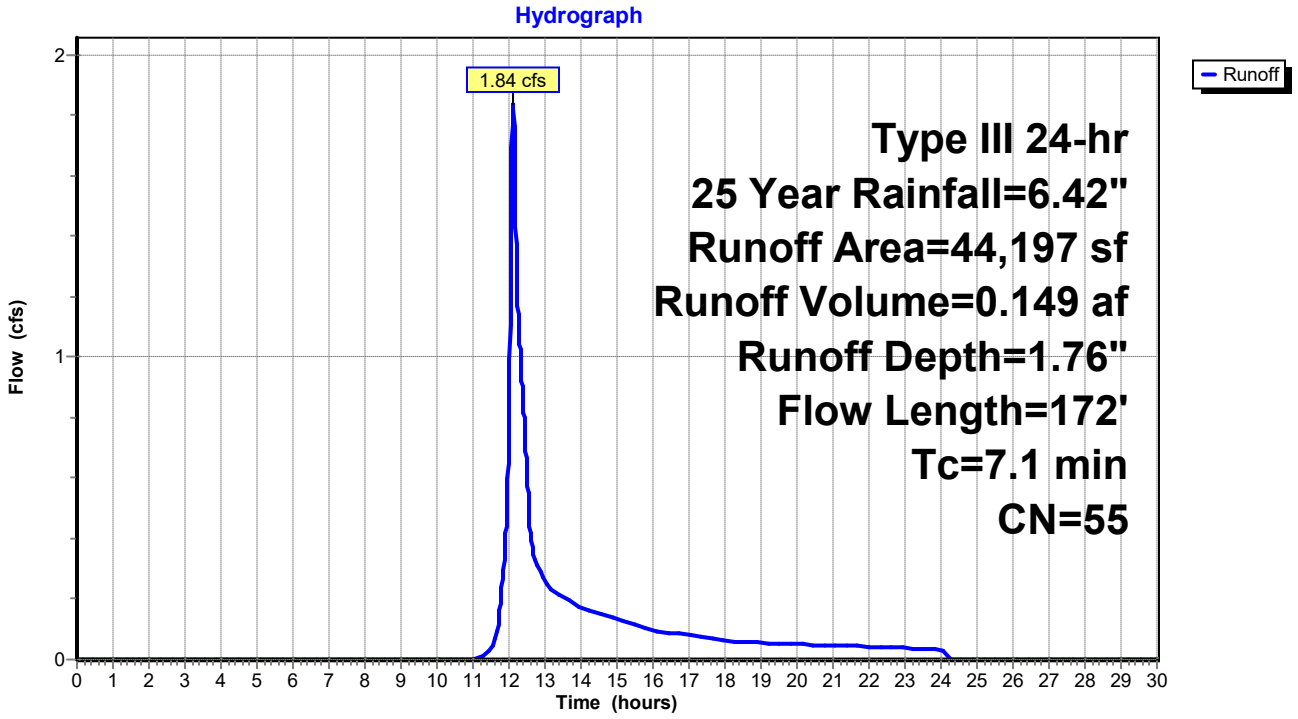
Runoff = 1.84 cfs @ 12.11 hrs, Volume= 0.149 af, Depth= 1.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.42"

Area (sf)	CN	Description
44,197	55	Woods, Good, HSG B
44,197		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	50	0.1740	0.16		**Sheet Flow, Segment 1** Woods: Light underbrush n= 0.400 P2= 3.35"
2.0	122	0.0434	1.04		**Shallow Concentrated Flow, Segment 2** Woodland Kv= 5.0 fps
7.1	172	Total			

Subcatchment E-1: to the Street



Summary for Subcatchment E-2: to the Abutter

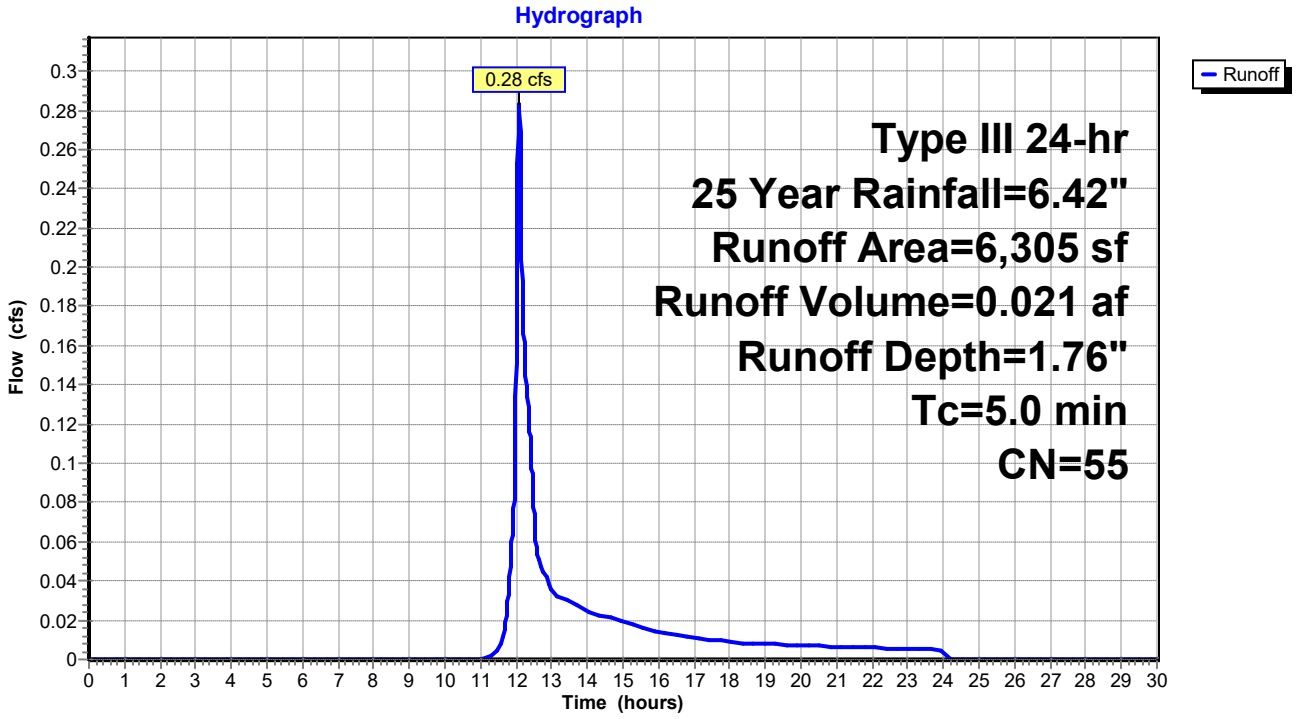
Runoff = 0.28 cfs @ 12.08 hrs, Volume= 0.021 af, Depth= 1.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.42"

Area (sf)	CN	Description
6,305	55	Woods, Good, HSG B
6,305		100.00% Pervious Area

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

Subcatchment E-2: to the Abutter



Summary for Subcatchment E-3: to Vernal Pool

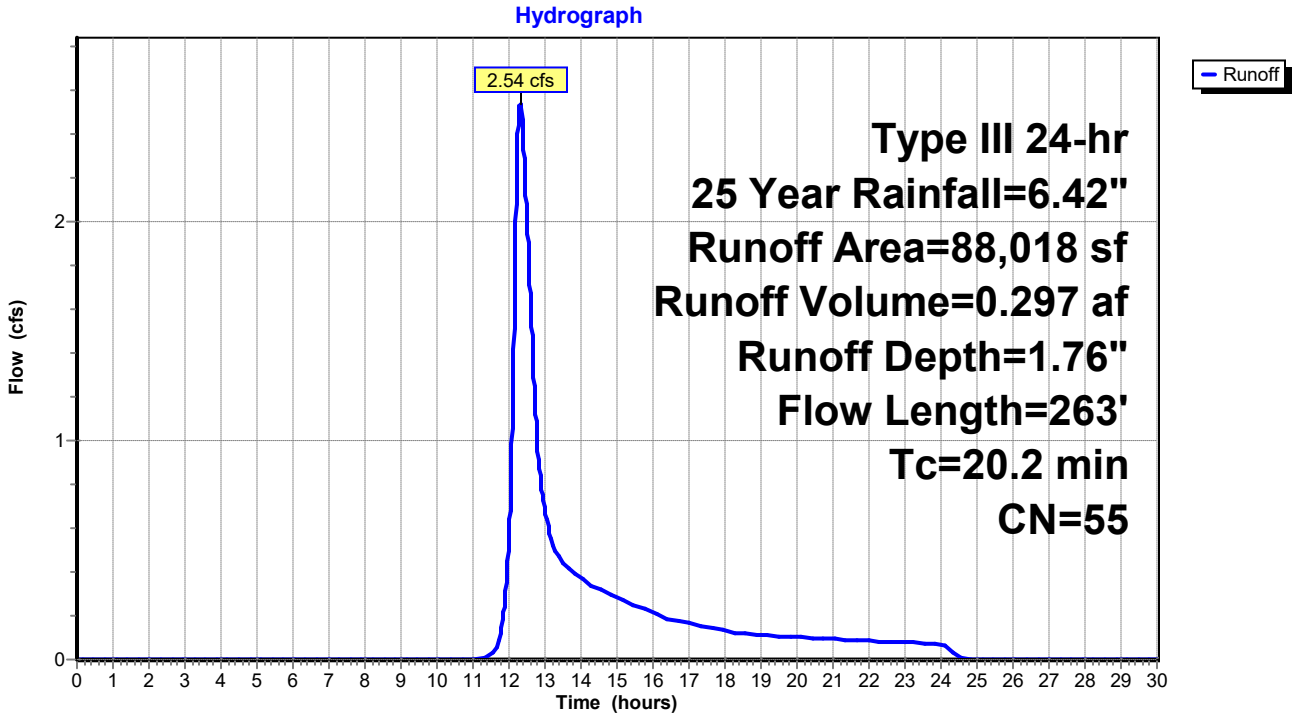
Runoff = 2.54 cfs @ 12.32 hrs, Volume= 0.297 af, Depth= 1.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.42"

Area (sf)	CN	Description
88,018	55	Woods, Good, HSG B
88,018		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.8	50	0.0120	0.06		**Sheet Flow, Segment 1** Woods: Light underbrush n= 0.400 P2= 3.35"
5.4	213	0.0174	0.66		**Shallow Concentrated Flow, Segment 2** Woodland Kv= 5.0 fps
20.2	263	Total			

Subcatchment E-3: to Vernal Pool



Summary for Subcatchment E-4: to the On-Site Wetlands

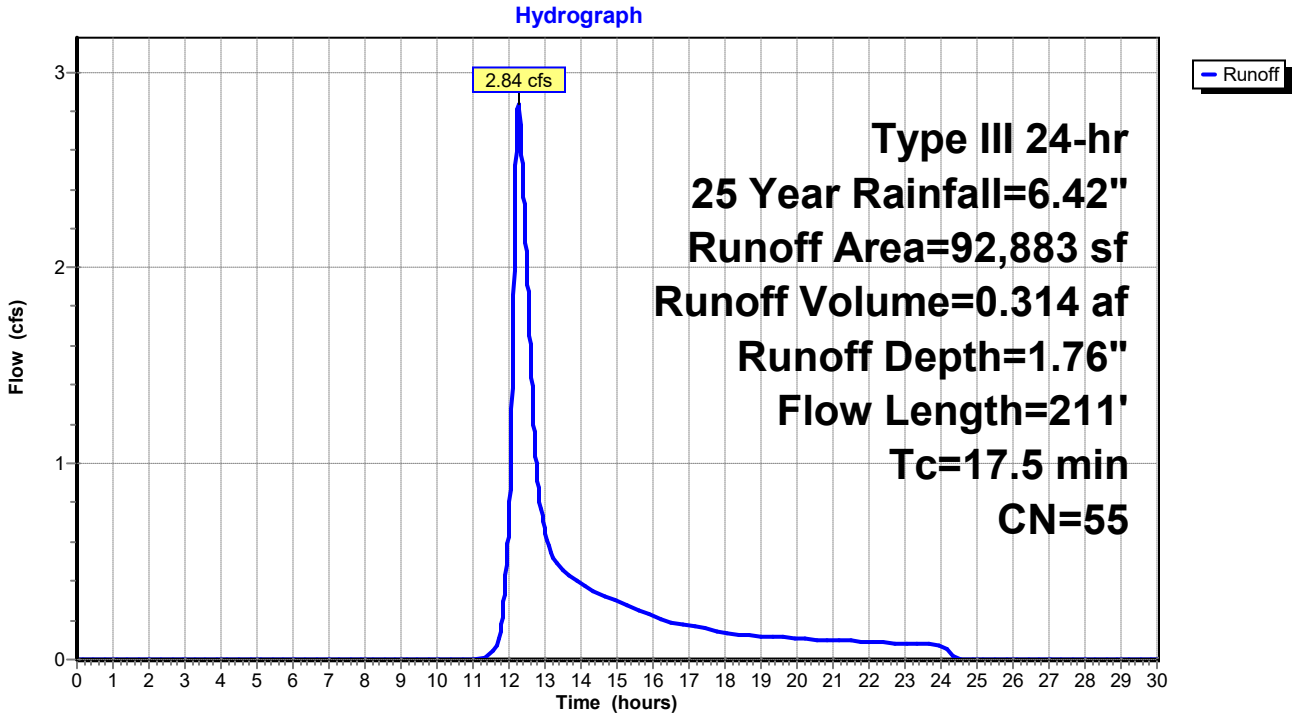
Runoff = 2.84 cfs @ 12.27 hrs, Volume= 0.314 af, Depth= 1.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.42"

Area (sf)	CN	Description
92,883	55	Woods, Good, HSG B
92,883		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.8	50	0.0120	0.06		**Sheet Flow, Segment 1** Woods: Light underbrush n= 0.400 P2= 3.35"
2.7	161	0.0385	0.98		**Shallow Concentrated Flow, Segment 2** Woodland Kv= 5.0 fps
17.5	211	Total			

Subcatchment E-4: to the On-Site Wetlands

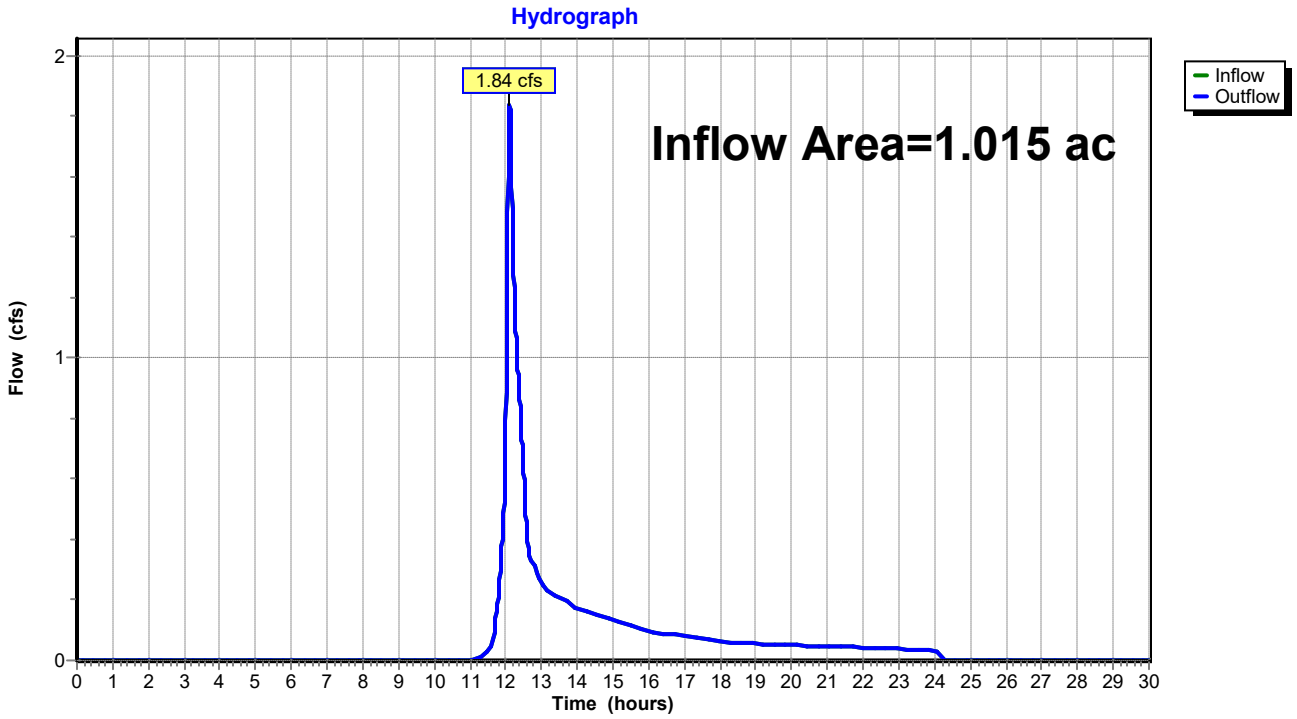


Summary for Reach DP-1: Washington Street

Inflow Area = 1.015 ac, 0.00% Impervious, Inflow Depth = 1.76" for 25 Year event
Inflow = 1.84 cfs @ 12.11 hrs, Volume= 0.149 af
Outflow = 1.84 cfs @ 12.11 hrs, Volume= 0.149 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Reach DP-1: Washington Street

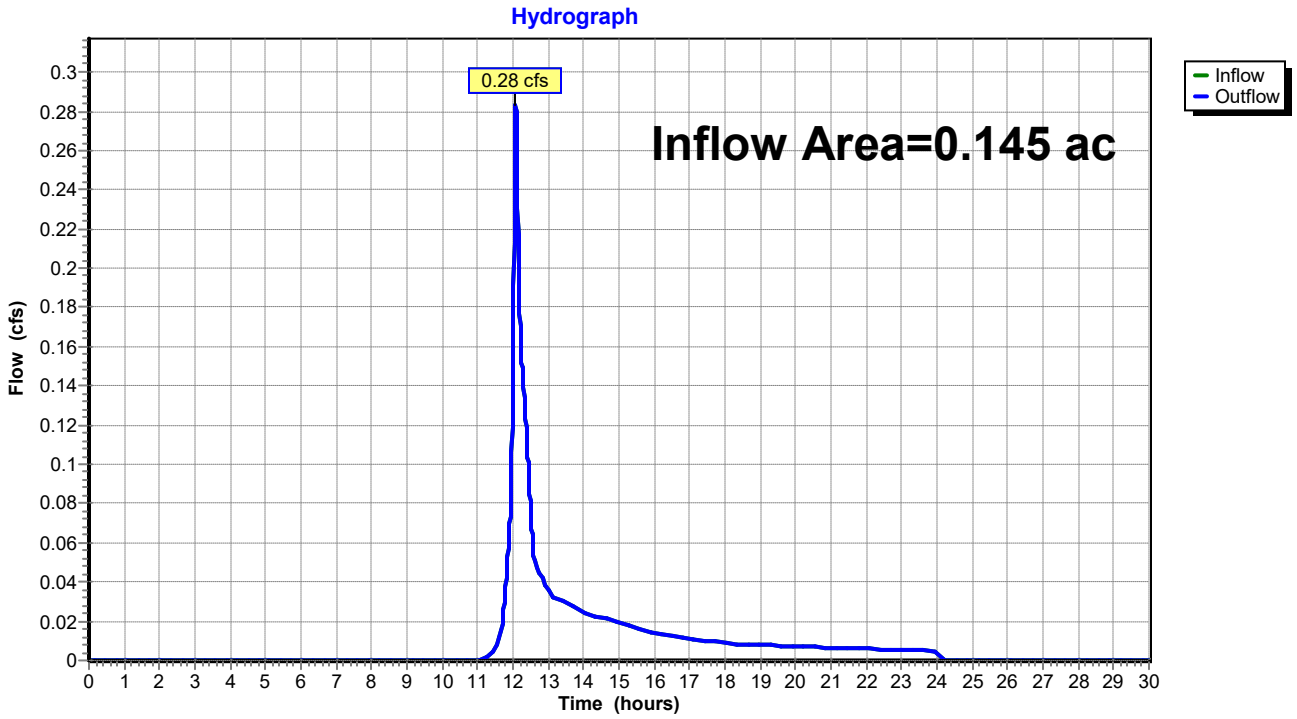


Summary for Reach DP-2: Abutting Property

Inflow Area = 0.145 ac, 0.00% Impervious, Inflow Depth = 1.76" for 25 Year event
Inflow = 0.28 cfs @ 12.08 hrs, Volume= 0.021 af
Outflow = 0.28 cfs @ 12.08 hrs, Volume= 0.021 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Reach DP-2: Abutting Property

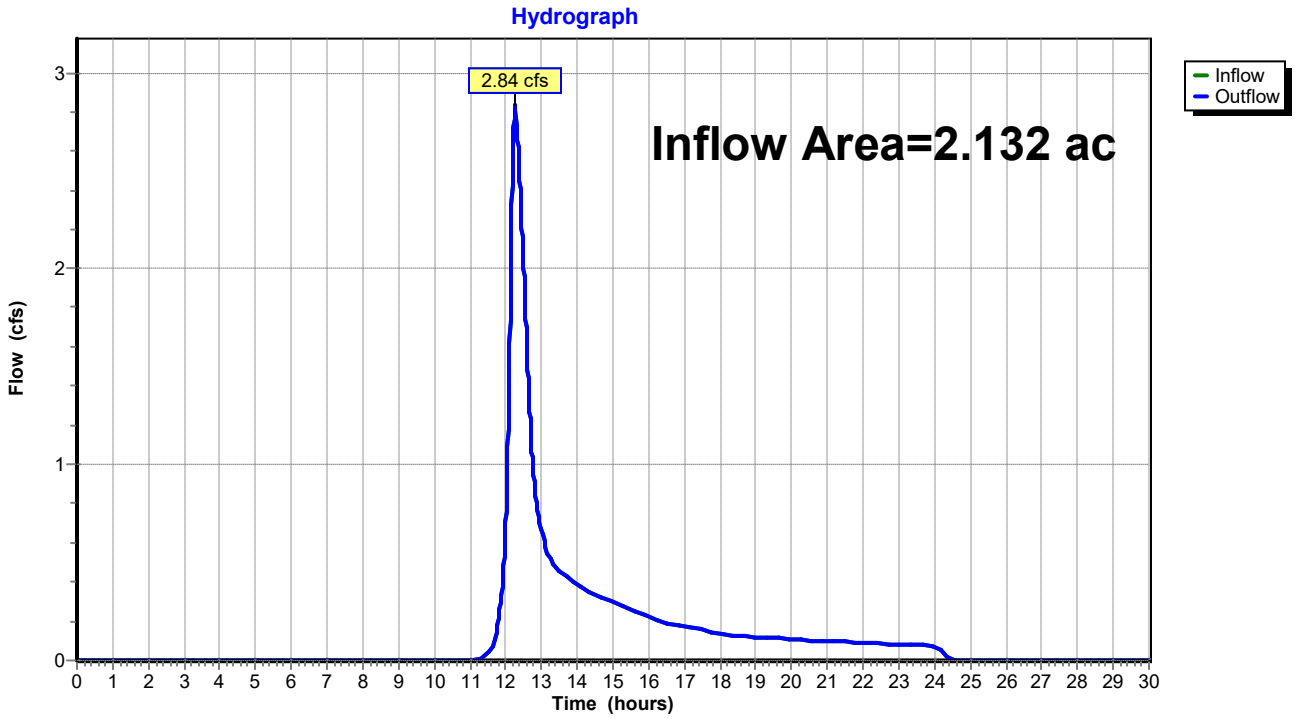


Summary for Reach DP-4: On-Site Wetlands

Inflow Area = 2.132 ac, 0.00% Impervious, Inflow Depth = 1.76" for 25 Year event
Inflow = 2.84 cfs @ 12.27 hrs, Volume= 0.314 af
Outflow = 2.84 cfs @ 12.27 hrs, Volume= 0.314 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Reach DP-4: On-Site Wetlands



Summary for Pond VP: On-Site Vernal Pool

Inflow Area = 2.021 ac, 0.00% Impervious, Inflow Depth = 1.76" for 25 Year event
Inflow = 2.54 cfs @ 12.32 hrs, Volume= 0.297 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min

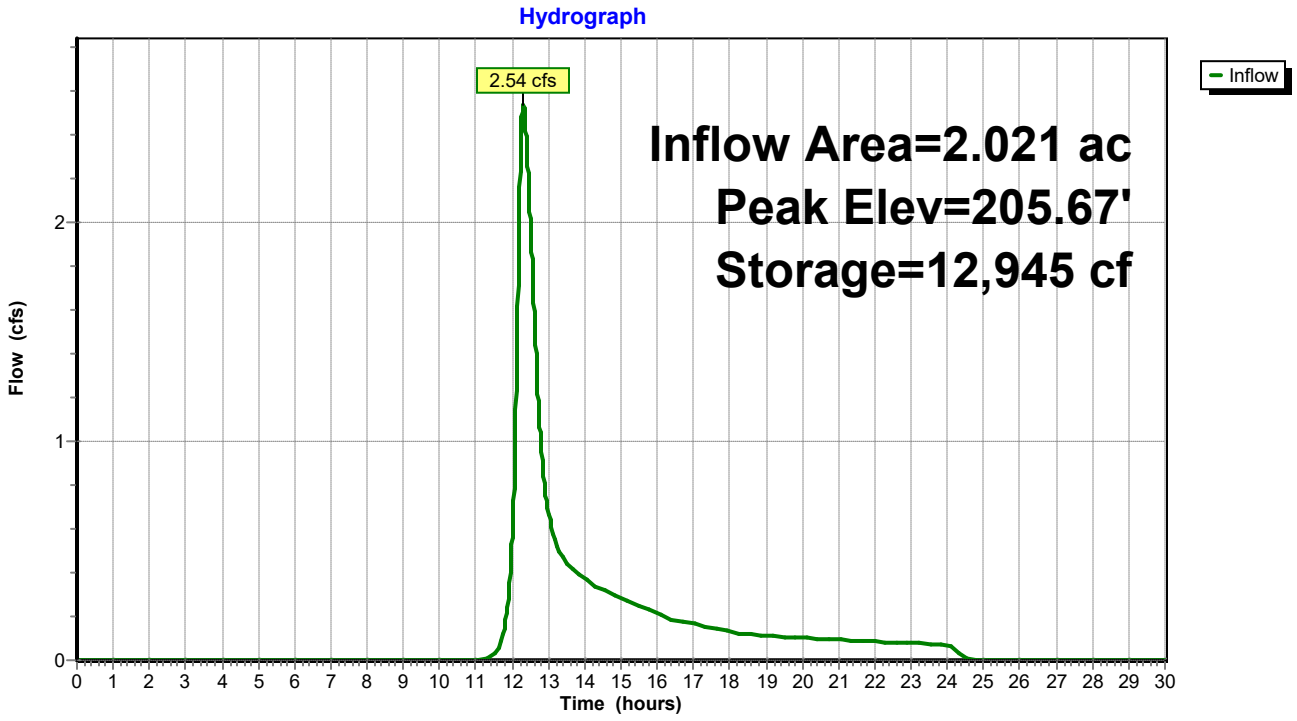
Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 205.67' @ 25.15 hrs Surf.Area= 6,385 sf Storage= 12,945 cf

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

Volume	Invert	Avail.Storage	Storage Description
#1	200.00'	30,113 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)
200.00	96	37.0	0	0	96
201.00	661	92.8	336	336	676
202.00	1,302	129.9	964	1,300	1,343
203.00	2,076	163.4	1,674	2,974	2,138
204.00	3,067	197.8	2,555	5,529	3,144
205.00	4,516	239.6	3,768	9,298	4,615
206.00	7,411	316.4	5,904	15,202	8,024
207.00	23,990	735.5	14,912	30,113	43,110

Pond VP: On-Site Vernal Pool



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E-1: to the Street Runoff Area=44,197 sf 0.00% Impervious Runoff Depth=2.95"
Flow Length=172' Tc=7.1 min CN=55 Runoff=3.25 cfs 0.249 af

Subcatchment E-2: to the Abutter Runoff Area=6,305 sf 0.00% Impervious Runoff Depth=2.95"
Tc=5.0 min CN=55 Runoff=0.50 cfs 0.036 af

Subcatchment E-3: to Vernal Pool Runoff Area=88,018 sf 0.00% Impervious Runoff Depth=2.95"
Flow Length=263' Tc=20.2 min CN=55 Runoff=4.49 cfs 0.497 af

Subcatchment E-4: to the On-Site Wetlands Runoff Area=92,883 sf 0.00% Impervious Runoff Depth=2.95"
Flow Length=211' Tc=17.5 min CN=55 Runoff=5.03 cfs 0.524 af

Reach DP-1: Washington Street Inflow=3.25 cfs 0.249 af
Outflow=3.25 cfs 0.249 af

Reach DP-2: Abutting Property Inflow=0.50 cfs 0.036 af
Outflow=0.50 cfs 0.036 af

Reach DP-4: On-Site Wetlands Inflow=5.03 cfs 0.524 af
Outflow=5.03 cfs 0.524 af

Pond VP: On-Site Vernal Pool Peak Elev=206.57' Storage=21,628 cf Inflow=4.49 cfs 0.497 af
Outflow=0.00 cfs 0.000 af

Total Runoff Area = 5.312 ac Runoff Volume = 1.306 af Average Runoff Depth = 2.95"
100.00% Pervious = 5.312 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment E-1: to the Street

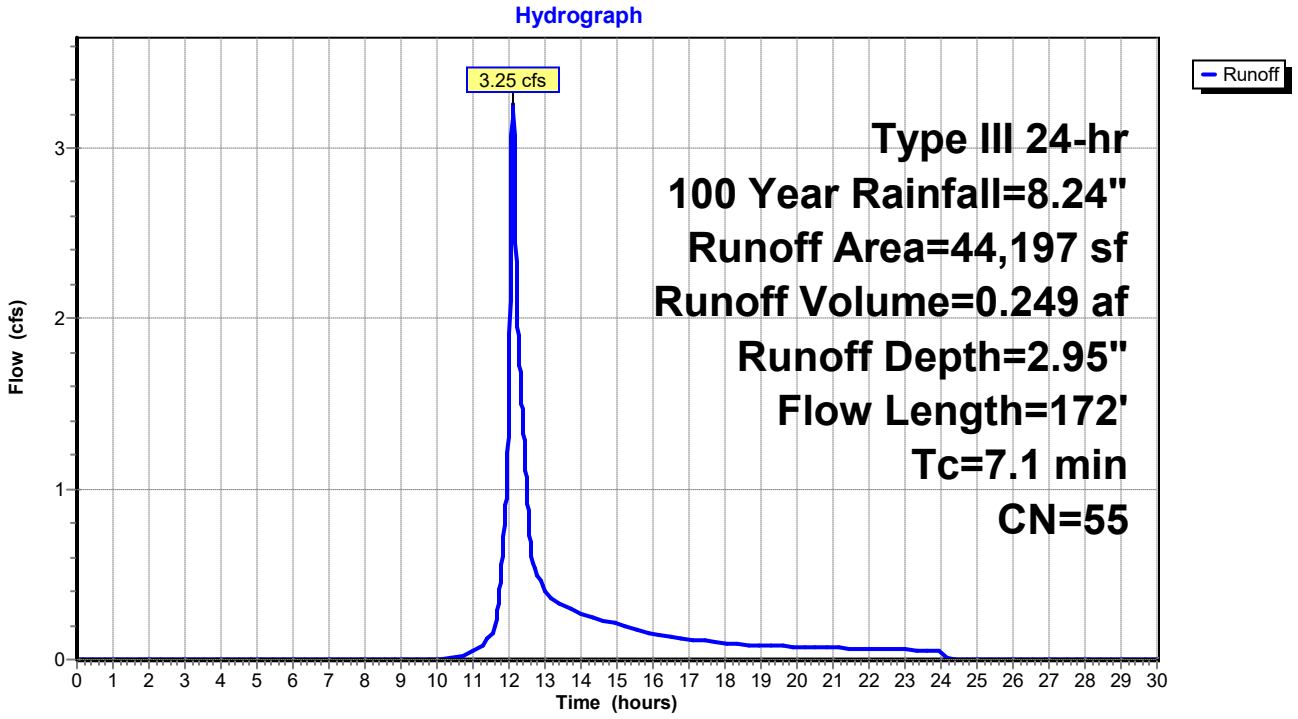
Runoff = 3.25 cfs @ 12.11 hrs, Volume= 0.249 af, Depth= 2.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.24"

Area (sf)	CN	Description
44,197	55	Woods, Good, HSG B
44,197		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	50	0.1740	0.16		**Sheet Flow, Segment 1** Woods: Light underbrush n= 0.400 P2= 3.35"
2.0	122	0.0434	1.04		**Shallow Concentrated Flow, Segment 2** Woodland Kv= 5.0 fps
7.1	172	Total			

Subcatchment E-1: to the Street



Summary for Subcatchment E-2: to the Abutter

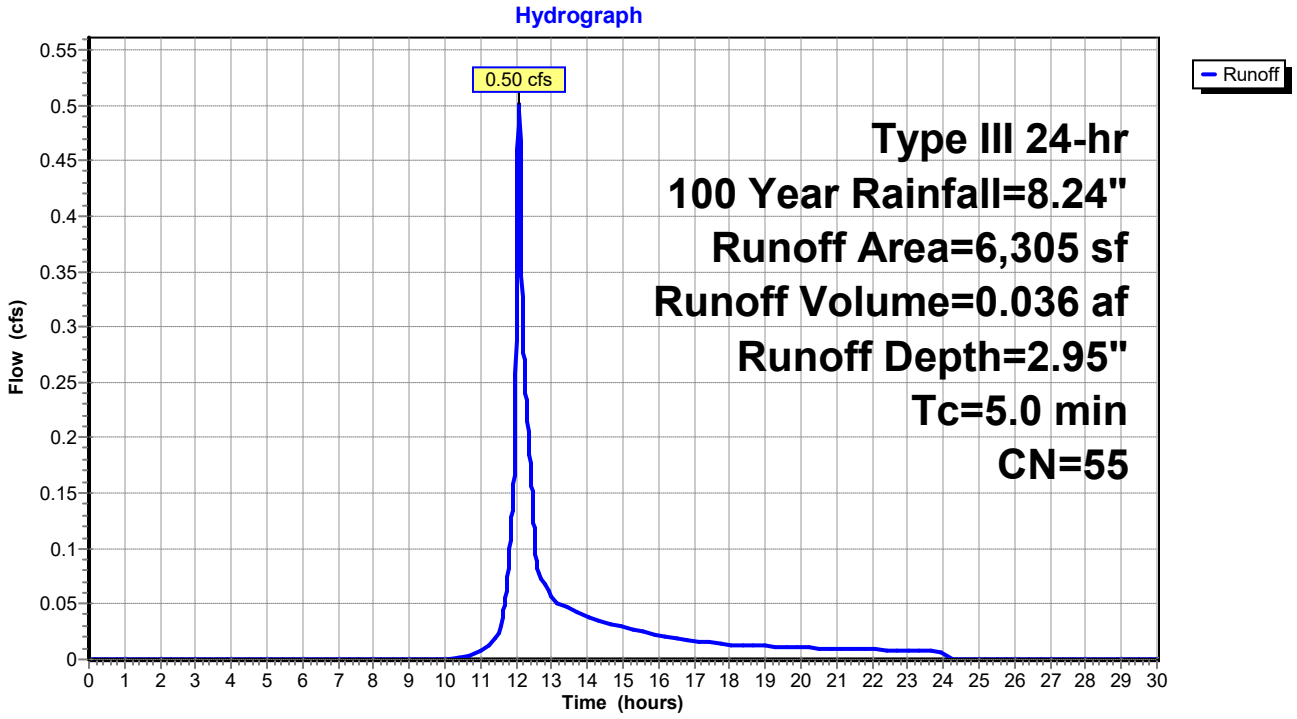
Runoff = 0.50 cfs @ 12.08 hrs, Volume= 0.036 af, Depth= 2.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.24"

Area (sf)	CN	Description
6,305	55	Woods, Good, HSG B
6,305		100.00% Pervious Area

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

Subcatchment E-2: to the Abutter



Summary for Subcatchment E-3: to Vernal Pool

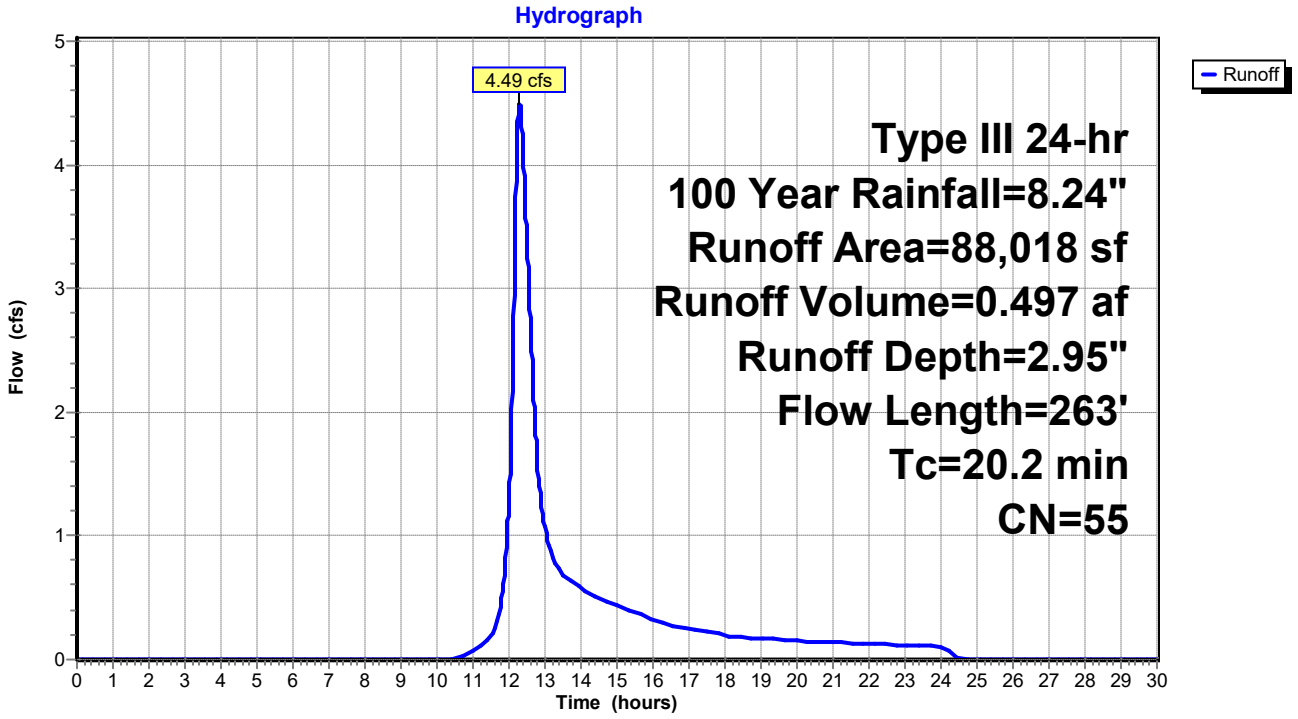
Runoff = 4.49 cfs @ 12.30 hrs, Volume= 0.497 af, Depth= 2.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.24"

Area (sf)	CN	Description
88,018	55	Woods, Good, HSG B
88,018		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.8	50	0.0120	0.06		**Sheet Flow, Segment 1** Woods: Light underbrush n= 0.400 P2= 3.35"
5.4	213	0.0174	0.66		**Shallow Concentrated Flow, Segment 2** Woodland Kv= 5.0 fps
20.2	263	Total			

Subcatchment E-3: to Vernal Pool



Summary for Subcatchment E-4: to the On-Site Wetlands

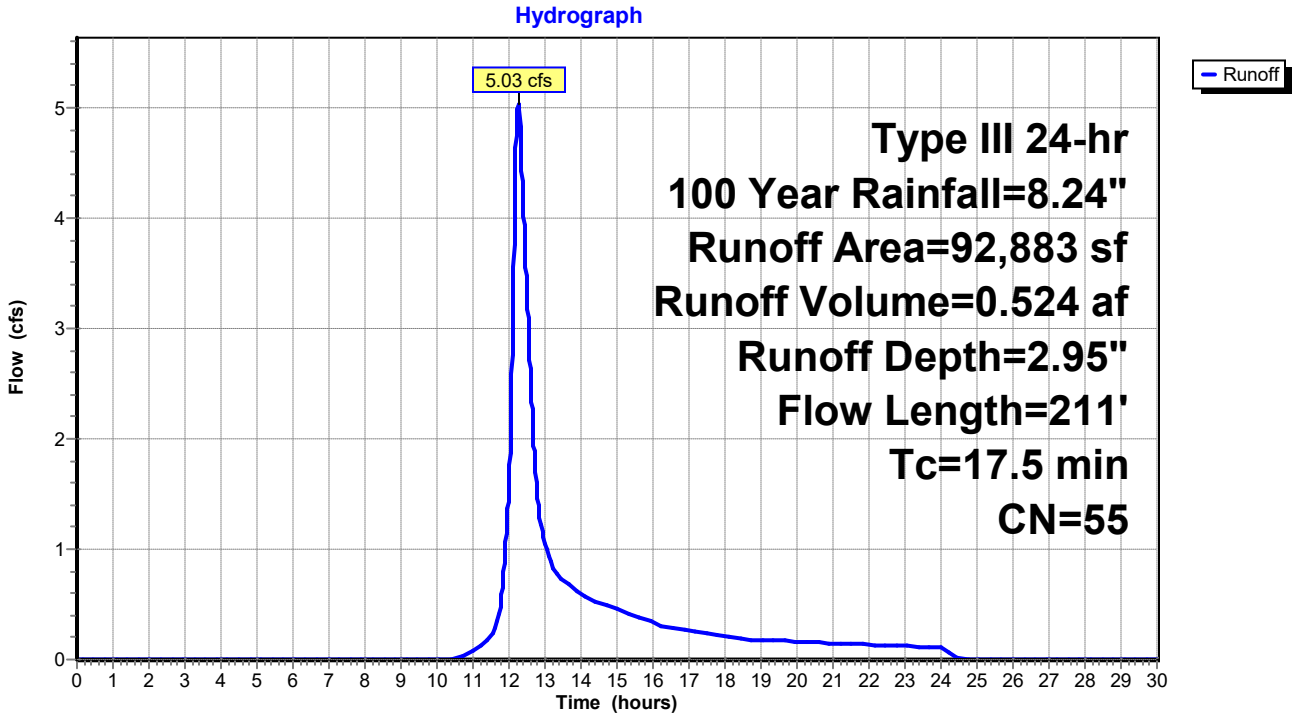
Runoff = 5.03 cfs @ 12.26 hrs, Volume= 0.524 af, Depth= 2.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.24"

Area (sf)	CN	Description
92,883	55	Woods, Good, HSG B
92,883		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.8	50	0.0120	0.06		**Sheet Flow, Segment 1** Woods: Light underbrush n= 0.400 P2= 3.35"
2.7	161	0.0385	0.98		**Shallow Concentrated Flow, Segment 2** Woodland Kv= 5.0 fps
17.5	211	Total			

Subcatchment E-4: to the On-Site Wetlands

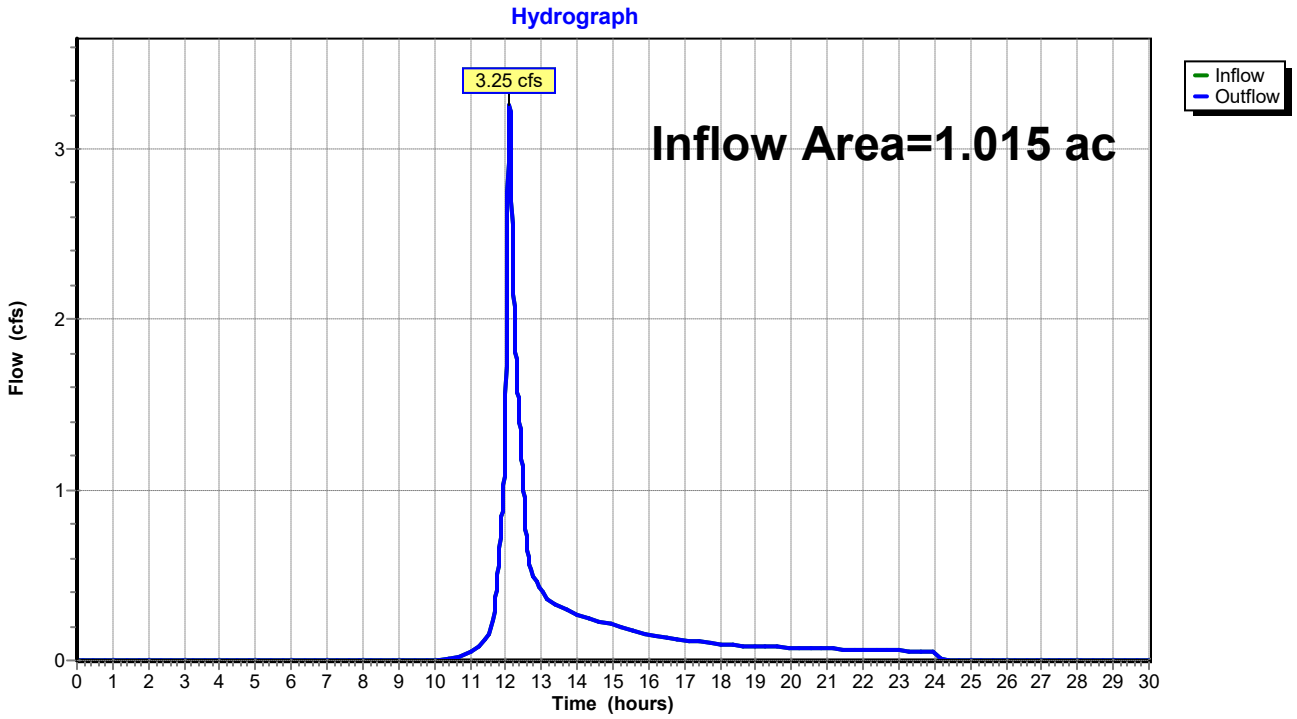


Summary for Reach DP-1: Washington Street

Inflow Area = 1.015 ac, 0.00% Impervious, Inflow Depth = 2.95" for 100 Year event
Inflow = 3.25 cfs @ 12.11 hrs, Volume= 0.249 af
Outflow = 3.25 cfs @ 12.11 hrs, Volume= 0.249 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Reach DP-1: Washington Street

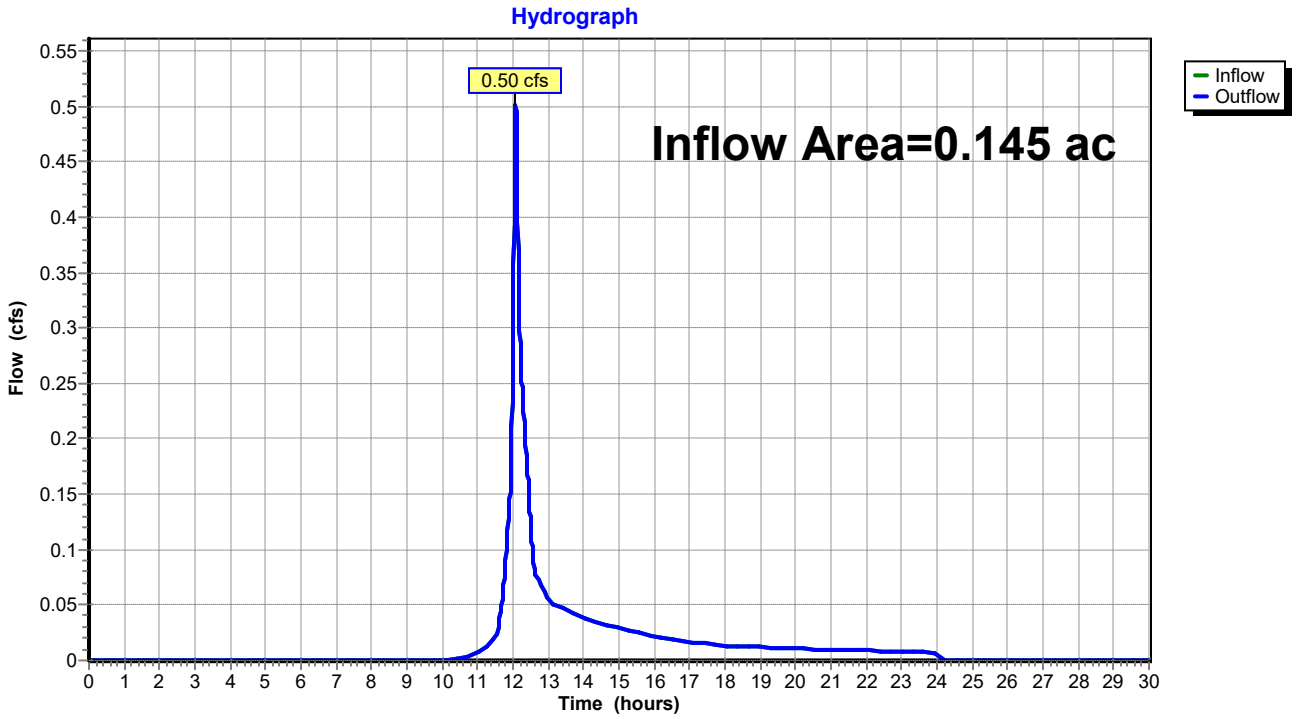


Summary for Reach DP-2: Abutting Property

Inflow Area = 0.145 ac, 0.00% Impervious, Inflow Depth = 2.95" for 100 Year event
Inflow = 0.50 cfs @ 12.08 hrs, Volume= 0.036 af
Outflow = 0.50 cfs @ 12.08 hrs, Volume= 0.036 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Reach DP-2: Abutting Property

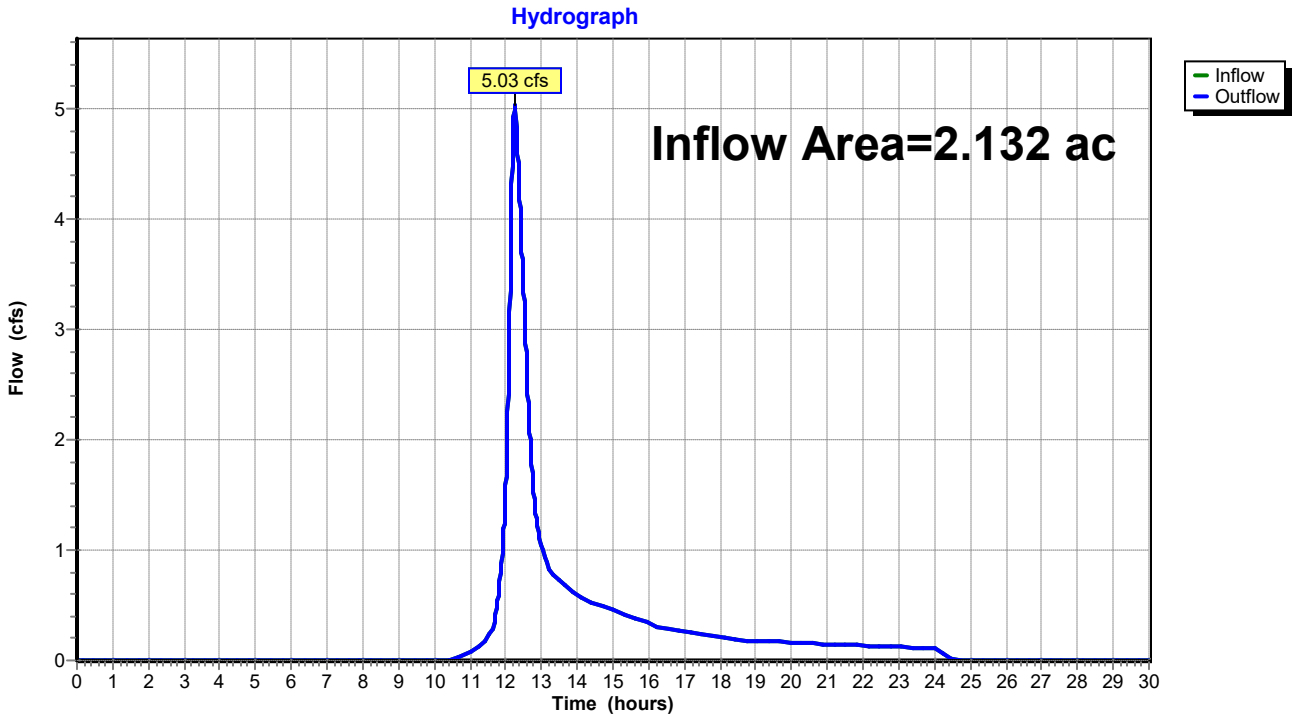


Summary for Reach DP-4: On-Site Wetlands

Inflow Area = 2.132 ac, 0.00% Impervious, Inflow Depth = 2.95" for 100 Year event
Inflow = 5.03 cfs @ 12.26 hrs, Volume= 0.524 af
Outflow = 5.03 cfs @ 12.26 hrs, Volume= 0.524 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Reach DP-4: On-Site Wetlands



Summary for Pond VP: On-Site Vernal Pool

Inflow Area = 2.021 ac, 0.00% Impervious, Inflow Depth = 2.95" for 100 Year event
Inflow = 4.49 cfs @ 12.30 hrs, Volume= 0.497 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min

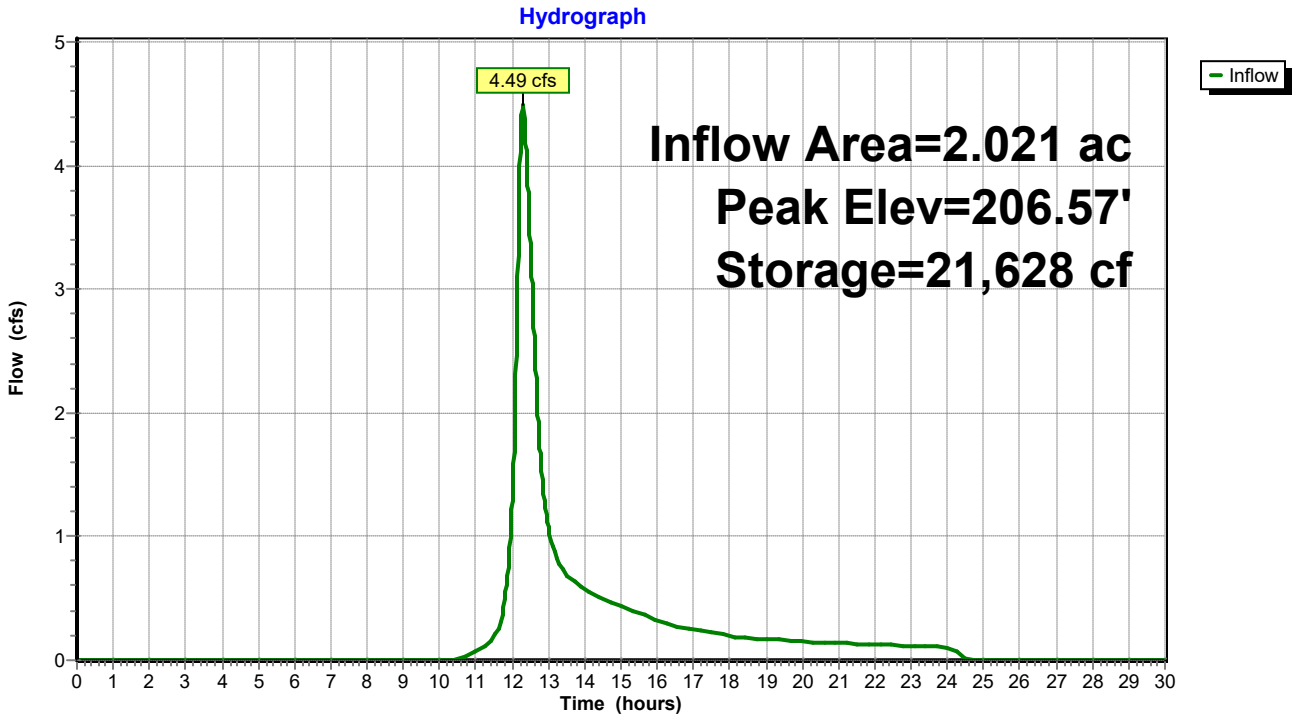
Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 206.57' @ 25.15 hrs Surf.Area= 15,685 sf Storage= 21,628 cf

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

Volume	Invert	Avail.Storage	Storage Description
#1	200.00'	30,113 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)
200.00	96	37.0	0	0	96
201.00	661	92.8	336	336	676
202.00	1,302	129.9	964	1,300	1,343
203.00	2,076	163.4	1,674	2,974	2,138
204.00	3,067	197.8	2,555	5,529	3,144
205.00	4,516	239.6	3,768	9,298	4,615
206.00	7,411	316.4	5,904	15,202	8,024
207.00	23,990	735.5	14,912	30,113	43,110

Pond VP: On-Site Vernal Pool



PROJECT BENCHMARK:
NAIL IN UTILITY POLE #18-60
ELEVATION=207.21'

DP-1
DESIGN POINT #1
"WASHINGTON STREET"

APPROXIMATE
10' WIDE
TRAIL EASEMENT
(PLAN 1158 OF 2005)

NAD83
NAVD88

APPROXIMATE
PROPERTY LINES
(PLAN 1131 OF 2005)

DP-2
DESIGN POINT #2
"ABUTTING PROPERTY"

DP-3
DESIGN POINT #3
"ON-SITE WETLAND"

DP-4
DESIGN POINT #4
"ON-SITE WETLAND SYSTEM"

E-1
E-2
E-3
E-4

FLOWPATH

50' No Alteration Line

100' Wetland Buffer

Isolated Vegetated Wetlands

Bordering Vegetated Wetlands

TH 23-01
TH 23-02
TH 23-03
TH 23-04
TH 23-05
PERM 23-02
PERM 23-04

LEGEND
(EXISTING CONDITIONS WATERSHED MAP)

- SUBCATCHMENT BOUNDARY
- FLOWPATH LINE
- E-1 EXISTING SUBCATCHMENT DESIGNATION
- DP-1 DESIGN POINT DESIGNATION

30 0 15 30 60 120
SCALE: 1" = 30'

DGT Associates
Surveying & Engineering

Framingham
Boston ● Worcester ● Preston, CT

1071 Worcester Road
Framingham, MA 01701
508-879-0030

www.DGTassociates.com

PLAN INTENT:

THE INTENT OF THIS PLAN IS FOR PERMITTING PURPOSES ONLY AND SHALL NOT BE USED FOR CONSTRUCTION PURPOSES.

PARCEL ID:

MAP 7, LOT 0, BLOCK 49

ISSUED FOR:

PERMITTING

NO.	APP	DATE	DESCRIPTION

DATE: **FEBRUARY 9, 2024**

SCALE: **1" = 30'**

DESIGN:	DRAFTED:	CHECKED:
KMR	**KMR**	**BEC**

PROJECT TITLE:

WASHINGTON STREET ATTAINABLE HOUSING

0 WASHINGTON STREET
SHERBORN, MASSACHUSETTS 01770

SHEET TITLE:

EXISTING CONDITIONS WATERSHED MAP

SHEET: **1 OF 1**

PROJECT NO.: **F25902**

WSD-EX

F:\F-25902\F-25902 Murchison Washington St Sherborn\F-25902_Master\Dwg\F25902 Eng Wsh.dwg

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Surveying & Engineering

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Framingham, MA 01701
508.879.0030
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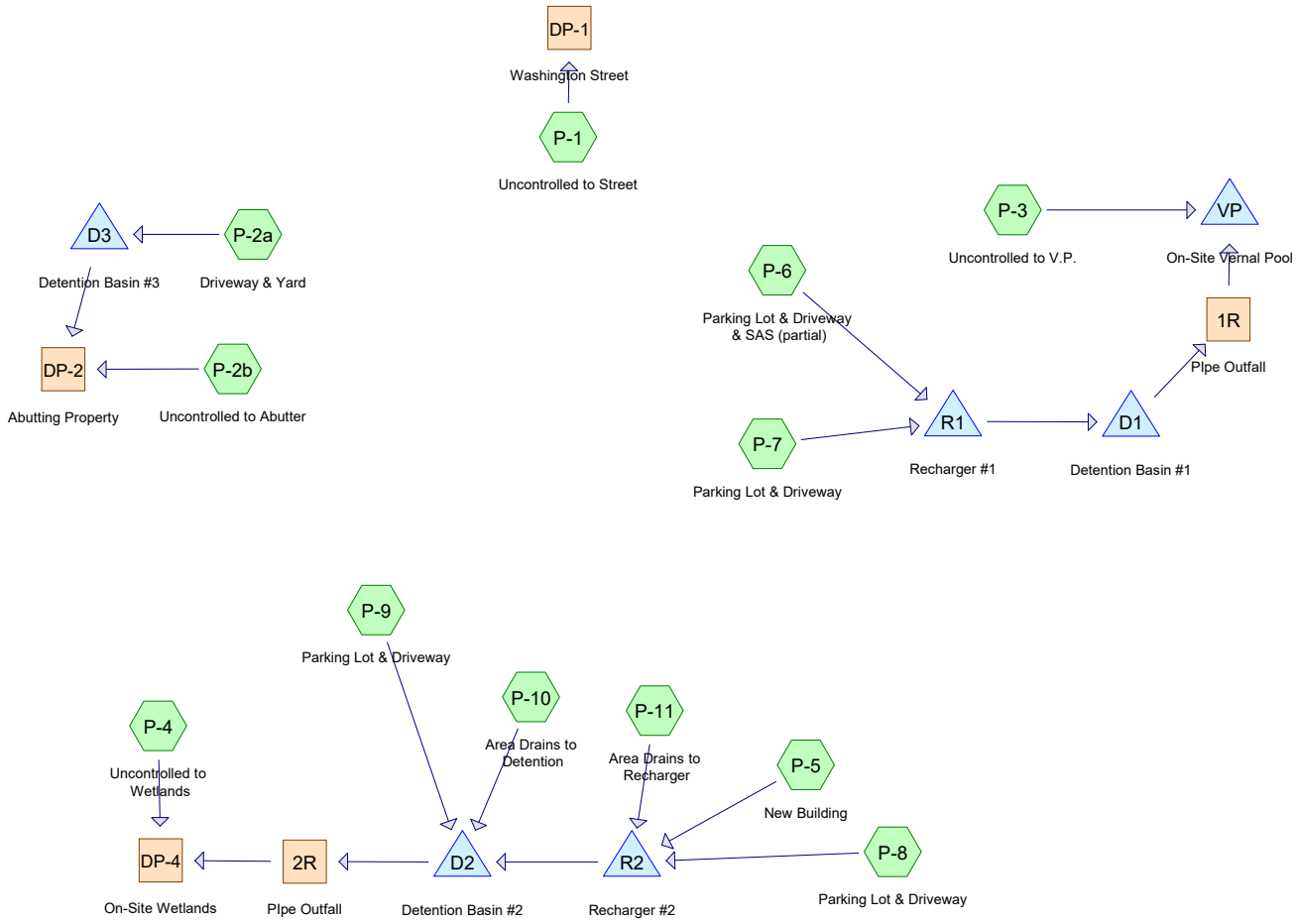
SECTION 4

Proposed Conditions Stormwater Model showing Stormwater Flows and Flood Routing Computations using HydroCAD version 10.00

Proposed Conditions Watershed Map: WSD-PR

Washington Street Sherborn Homes
0 Washington Street
Sherborn, MA 01770

DGT Job No.: F25902



Routing Diagram for F25902 Proposed Conditions Model
Prepared by DGT Associates, Printed 2/9/2024

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.290	61	>75% Grass cover, Good, HSG B (P-1, P-10, P-11, P-2a, P-2b, P-3, P-4, P-6, P-7, P-8, P-9)
0.808	98	Paved parking, HSG B (P-1, P-10, P-11, P-2a, P-6, P-7, P-8, P-9)
0.332	98	Roofs, HSG B (P-5)
0.009	98	Unconnected pavement, HSG B (P-4)
2.934	55	Woods, Good, HSG B (P-1, P-3, P-4)
5.373	**66**	**TOTAL AREA**

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment P-1: Uncontrolled to Street Runoff Area=26,230 sf 2.74% Impervious Runoff Depth=0.36"
Flow Length=172' Tc=7.1 min CN=57 Runoff=0.11 cfs 0.018 af

Subcatchment P-10: Area Drains to Runoff Area=6,664 sf 14.44% Impervious Runoff Depth=0.72"
Tc=5.0 min CN=66 Runoff=0.11 cfs 0.009 af

Subcatchment P-11: Area Drains to Runoff Area=4,217 sf 4.81% Impervious Runoff Depth=0.59"
Tc=5.0 min CN=63 Runoff=0.05 cfs 0.005 af

Subcatchment P-2a: Driveway & Yard Runoff Area=4,906 sf 33.41% Impervious Runoff Depth=1.08"
Tc=5.0 min CN=73 Runoff=0.14 cfs 0.010 af

Subcatchment P-2b: Uncontrolled to Abutter Runoff Area=2,453 sf 0.00% Impervious Runoff Depth=0.51"
Tc=5.0 min CN=61 Runoff=0.02 cfs 0.002 af

Subcatchment P-3: Uncontrolled to V.P. Runoff Area=63,411 sf 0.00% Impervious Runoff Depth=0.33"
Flow Length=201' Tc=11.3 min CN=56 Runoff=0.22 cfs 0.040 af

Subcatchment P-4: Uncontrolled to Runoff Area=60,751 sf 0.64% Impervious Runoff Depth=0.30"
Flow Length=148' Tc=6.0 min UI Adjusted CN=55 Runoff=0.19 cfs 0.034 af

Subcatchment P-5: New Building Runoff Area=14,475 sf 100.00% Impervious Runoff Depth=3.12"
Tc=5.0 min CN=98 Runoff=1.12 cfs 0.086 af

Subcatchment P-6: Parking Lot & Runoff Area=30,194 sf 51.70% Impervious Runoff Depth=1.52"
Tc=5.0 min CN=80 Runoff=1.27 cfs 0.088 af

Subcatchment P-7: Parking Lot & Driveway Runoff Area=6,609 sf 77.27% Impervious Runoff Depth=2.31"
Tc=5.0 min CN=90 Runoff=0.42 cfs 0.029 af

Subcatchment P-8: Parking Lot & Driveway Runoff Area=8,515 sf 75.78% Impervious Runoff Depth=2.22"
Tc=5.0 min CN=89 Runoff=0.52 cfs 0.036 af

Subcatchment P-9: Parking Lot & Driveway Runoff Area=5,624 sf 79.94% Impervious Runoff Depth=2.40"
Tc=5.0 min CN=91 Runoff=0.37 cfs 0.026 af

Reach 1R: Plpe Outfall Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.069 L=10.0' S=0.0200 '/' Capacity=1.06 cfs Outflow=0.00 cfs 0.000 af

Reach 2R: Plpe Outfall Avg. Flow Depth=0.02' Max Vel=0.27 fps Inflow=0.01 cfs 0.015 af
n=0.069 L=10.0' S=0.0500 '/' Capacity=1.67 cfs Outflow=0.01 cfs 0.015 af

Reach DP-1: Washington Street Inflow=0.11 cfs 0.018 af
Outflow=0.11 cfs 0.018 af

Reach DP-2: Abutting Property Inflow=0.02 cfs 0.002 af
Outflow=0.02 cfs 0.002 af

Reach DP-4: On-Site Wetlands Inflow=0.19 cfs 0.049 af
Outflow=0.19 cfs 0.049 af

Pond D1: Detention Basin #1 Peak Elev=207.00' Storage=0 cf Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Pond D2: Detention Basin #2 Peak Elev=205.74' Storage=1,135 cf Inflow=0.48 cfs 0.035 af
Outflow=0.01 cfs 0.015 af

Pond D3: Detention Basin #3 Peak Elev=206.47' Storage=442 cf Inflow=0.14 cfs 0.010 af
Outflow=0.00 cfs 0.000 af

Pond R1: Recharger #1 Peak Elev=208.89' Storage=3,066 cf Inflow=1.69 cfs 0.117 af
Discarded=0.05 cfs 0.084 af Primary=0.00 cfs 0.000 af Outflow=0.05 cfs 0.084 af

Pond R2: Recharger #2 Peak Elev=208.54' Storage=2,983 cf Inflow=1.69 cfs 0.127 af
Discarded=0.06 cfs 0.108 af Primary=0.00 cfs 0.000 af Outflow=0.06 cfs 0.108 af

Pond VP: On-Site Vernal Pool Peak Elev=202.31' Storage=1,735 cf Inflow=0.22 cfs 0.040 af
Outflow=0.00 cfs 0.000 af

Total Runoff Area = 5.373 ac Runoff Volume = 0.384 af Average Runoff Depth = 0.86"
78.61% Pervious = 4.224 ac 21.39% Impervious = 1.149 ac

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment P-1: Uncontrolled to Street Runoff Area=26,230 sf 2.74% Impervious Runoff Depth=1.23"
Flow Length=172' Tc=7.1 min CN=57 Runoff=0.72 cfs 0.062 af

Subcatchment P-10: Area Drains to Runoff Area=6,664 sf 14.44% Impervious Runoff Depth=1.89"
Tc=5.0 min CN=66 Runoff=0.34 cfs 0.024 af

Subcatchment P-11: Area Drains to Runoff Area=4,217 sf 4.81% Impervious Runoff Depth=1.66"
Tc=5.0 min CN=63 Runoff=0.18 cfs 0.013 af

Subcatchment P-2a: Driveway & Yard Runoff Area=4,906 sf 33.41% Impervious Runoff Depth=2.47"
Tc=5.0 min CN=73 Runoff=0.34 cfs 0.023 af

Subcatchment P-2b: Uncontrolled to Abutter Runoff Area=2,453 sf 0.00% Impervious Runoff Depth=1.52"
Tc=5.0 min CN=61 Runoff=0.10 cfs 0.007 af

Subcatchment P-3: Uncontrolled to V.P. Runoff Area=63,411 sf 0.00% Impervious Runoff Depth=1.17"
Flow Length=201' Tc=11.3 min CN=56 Runoff=1.40 cfs 0.142 af

Subcatchment P-4: Uncontrolled to Runoff Area=60,751 sf 0.64% Impervious Runoff Depth=1.10"
Flow Length=148' Tc=6.0 min UI Adjusted CN=55 Runoff=1.49 cfs 0.128 af

Subcatchment P-5: New Building Runoff Area=14,475 sf 100.00% Impervious Runoff Depth=5.00"
Tc=5.0 min CN=98 Runoff=1.77 cfs 0.139 af

Subcatchment P-6: Parking Lot & Runoff Area=30,194 sf 51.70% Impervious Runoff Depth=3.10"
Tc=5.0 min CN=80 Runoff=2.61 cfs 0.179 af

Subcatchment P-7: Parking Lot & Driveway Runoff Area=6,609 sf 77.27% Impervious Runoff Depth=4.11"
Tc=5.0 min CN=90 Runoff=0.73 cfs 0.052 af

Subcatchment P-8: Parking Lot & Driveway Runoff Area=8,515 sf 75.78% Impervious Runoff Depth=4.00"
Tc=5.0 min CN=89 Runoff=0.92 cfs 0.065 af

Subcatchment P-9: Parking Lot & Driveway Runoff Area=5,624 sf 79.94% Impervious Runoff Depth=4.22"
Tc=5.0 min CN=91 Runoff=0.63 cfs 0.045 af

Reach 1R: Pipe Outfall Avg. Flow Depth=0.03' Max Vel=0.23 fps Inflow=0.02 cfs 0.020 af
n=0.069 L=10.0' S=0.0200 '/' Capacity=1.06 cfs Outflow=0.02 cfs 0.020 af

Reach 2R: Pipe Outfall Avg. Flow Depth=0.03' Max Vel=0.33 fps Inflow=0.02 cfs 0.031 af
n=0.069 L=10.0' S=0.0500 '/' Capacity=1.67 cfs Outflow=0.02 cfs 0.031 af

Reach DP-1: Washington Street Inflow=0.72 cfs 0.062 af
Outflow=0.72 cfs 0.062 af

Reach DP-2: Abutting Property Inflow=0.10 cfs 0.007 af
Outflow=0.10 cfs 0.007 af

Reach DP-4: On-Site Wetlands Inflow=1.50 cfs 0.159 af
Outflow=1.50 cfs 0.159 af

Pond D1: Detention Basin #1 Peak Elev=208.02' Storage=1,583 cf Inflow=0.17 cfs 0.044 af
Outflow=0.02 cfs 0.020 af

Pond D2: Detention Basin #2 Peak Elev=206.27' Storage=2,266 cf Inflow=0.97 cfs 0.070 af
Outflow=0.02 cfs 0.031 af

Pond D3: Detention Basin #3 Peak Elev=207.17' Storage=1,010 cf Inflow=0.34 cfs 0.023 af
Outflow=0.00 cfs 0.000 af

Pond R1: Recharger #1 Peak Elev=210.43' Storage=5,739 cf Inflow=3.34 cfs 0.231 af
Discarded=0.05 cfs 0.091 af Primary=0.17 cfs 0.044 af Outflow=0.23 cfs 0.135 af

Pond R2: Recharger #2 Peak Elev=210.12' Storage=6,081 cf Inflow=2.87 cfs 0.217 af
Discarded=0.06 cfs 0.116 af Primary=0.00 cfs 0.000 af Outflow=0.06 cfs 0.117 af

Pond VP: On-Site Vernal Pool Peak Elev=204.45' Storage=7,053 cf Inflow=1.40 cfs 0.162 af
Outflow=0.00 cfs 0.000 af

Total Runoff Area = 5.373 ac Runoff Volume = 0.880 af Average Runoff Depth = 1.96"
78.61% Pervious = 4.224 ac 21.39% Impervious = 1.149 ac

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment P-1: Uncontrolled to Street Runoff Area=26,230 sf 2.74% Impervious Runoff Depth=1.94"
Flow Length=172' Tc=7.1 min CN=57 Runoff=1.23 cfs 0.097 af

Subcatchment P-10: Area Drains to Runoff Area=6,664 sf 14.44% Impervious Runoff Depth=2.76"
Tc=5.0 min CN=66 Runoff=0.51 cfs 0.035 af

Subcatchment P-11: Area Drains to Runoff Area=4,217 sf 4.81% Impervious Runoff Depth=2.47"
Tc=5.0 min CN=63 Runoff=0.28 cfs 0.020 af

Subcatchment P-2a: Driveway & Yard Runoff Area=4,906 sf 33.41% Impervious Runoff Depth=3.44"
Tc=5.0 min CN=73 Runoff=0.47 cfs 0.032 af

Subcatchment P-2b: Uncontrolled to Abutter Runoff Area=2,453 sf 0.00% Impervious Runoff Depth=2.29"
Tc=5.0 min CN=61 Runoff=0.15 cfs 0.011 af

Subcatchment P-3: Uncontrolled to V.P. Runoff Area=63,411 sf 0.00% Impervious Runoff Depth=1.85"
Flow Length=201' Tc=11.3 min CN=56 Runoff=2.42 cfs 0.224 af

Subcatchment P-4: Uncontrolled to Runoff Area=60,751 sf 0.64% Impervious Runoff Depth=1.76"
Flow Length=148' Tc=6.0 min UI Adjusted CN=55 Runoff=2.63 cfs 0.205 af

Subcatchment P-5: New Building Runoff Area=14,475 sf 100.00% Impervious Runoff Depth=6.18"
Tc=5.0 min CN=98 Runoff=2.17 cfs 0.171 af

Subcatchment P-6: Parking Lot & Runoff Area=30,194 sf 51.70% Impervious Runoff Depth=4.16"
Tc=5.0 min CN=80 Runoff=3.48 cfs 0.240 af

Subcatchment P-7: Parking Lot & Driveway Runoff Area=6,609 sf 77.27% Impervious Runoff Depth=5.26"
Tc=5.0 min CN=90 Runoff=0.92 cfs 0.066 af

Subcatchment P-8: Parking Lot & Driveway Runoff Area=8,515 sf 75.78% Impervious Runoff Depth=5.14"
Tc=5.0 min CN=89 Runoff=1.17 cfs 0.084 af

Subcatchment P-9: Parking Lot & Driveway Runoff Area=5,624 sf 79.94% Impervious Runoff Depth=5.37"
Tc=5.0 min CN=91 Runoff=0.79 cfs 0.058 af

Reach 1R: Pipe Outfall Avg. Flow Depth=0.04' Max Vel=0.28 fps Inflow=0.03 cfs 0.044 af
n=0.069 L=10.0' S=0.0200 '/' Capacity=1.06 cfs Outflow=0.03 cfs 0.044 af

Reach 2R: Pipe Outfall Avg. Flow Depth=0.03' Max Vel=0.39 fps Inflow=0.04 cfs 0.051 af
n=0.069 L=10.0' S=0.0500 '/' Capacity=1.67 cfs Outflow=0.04 cfs 0.051 af

Reach DP-1: Washington Street Inflow=1.23 cfs 0.097 af
Outflow=1.23 cfs 0.097 af

Reach DP-2: Abutting Property Inflow=0.15 cfs 0.015 af
Outflow=0.15 cfs 0.015 af

Reach DP-4: On-Site Wetlands Inflow=2.64 cfs 0.256 af
Outflow=2.64 cfs 0.256 af

Pond D1: Detention Basin #1 Peak Elev=209.20' Storage=4,050 cf Inflow=0.84 cfs 0.114 af
Outflow=0.03 cfs 0.044 af

Pond D2: Detention Basin #2 Peak Elev=207.53' Storage=4,949 cf Inflow=1.30 cfs 0.141 af
Outflow=0.04 cfs 0.051 af

Pond D3: Detention Basin #3 Peak Elev=207.40' Storage=1,243 cf Inflow=0.47 cfs 0.032 af
Outflow=0.01 cfs 0.004 af

Pond R1: Recharger #1 Peak Elev=210.81' Storage=6,394 cf Inflow=4.40 cfs 0.307 af
Discarded=0.05 cfs 0.094 af Primary=0.84 cfs 0.114 af Outflow=0.89 cfs 0.209 af

Pond R2: Recharger #2 Peak Elev=210.39' Storage=6,612 cf Inflow=3.62 cfs 0.275 af
Discarded=0.06 cfs 0.121 af Primary=0.19 cfs 0.048 af Outflow=0.25 cfs 0.169 af

Pond VP: On-Site Vernal Pool Peak Elev=205.47' Storage=11,712 cf Inflow=2.42 cfs 0.269 af
Outflow=0.00 cfs 0.000 af

Total Runoff Area = 5.373 ac Runoff Volume = 1.244 af Average Runoff Depth = 2.78"
78.61% Pervious = 4.224 ac 21.39% Impervious = 1.149 ac

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment P-1: Uncontrolled to Street Runoff Area=26,230 sf 2.74% Impervious Runoff Depth=3.17"
Flow Length=172' Tc=7.1 min CN=57 Runoff=2.10 cfs 0.159 af

Subcatchment P-10: Area Drains to Runoff Area=6,664 sf 14.44% Impervious Runoff Depth=4.21"
Tc=5.0 min CN=66 Runoff=0.78 cfs 0.054 af

Subcatchment P-11: Area Drains to Runoff Area=4,217 sf 4.81% Impervious Runoff Depth=3.86"
Tc=5.0 min CN=63 Runoff=0.45 cfs 0.031 af

Subcatchment P-2a: Driveway & Yard Runoff Area=4,906 sf 33.41% Impervious Runoff Depth=5.02"
Tc=5.0 min CN=73 Runoff=0.69 cfs 0.047 af

Subcatchment P-2b: Uncontrolled to Abutter Runoff Area=2,453 sf 0.00% Impervious Runoff Depth=3.63"
Tc=5.0 min CN=61 Runoff=0.25 cfs 0.017 af

Subcatchment P-3: Uncontrolled to V.P. Runoff Area=63,411 sf 0.00% Impervious Runoff Depth=3.06"
Flow Length=201' Tc=11.3 min CN=56 Runoff=4.23 cfs 0.371 af

Subcatchment P-4: Uncontrolled to Runoff Area=60,751 sf 0.64% Impervious Runoff Depth=2.95"
Flow Length=148' Tc=6.0 min UI Adjusted CN=55 Runoff=4.65 cfs 0.343 af

Subcatchment P-5: New Building Runoff Area=14,475 sf 100.00% Impervious Runoff Depth=8.00"
Tc=5.0 min CN=98 Runoff=2.79 cfs 0.222 af

Subcatchment P-6: Parking Lot & Runoff Area=30,194 sf 51.70% Impervious Runoff Depth=5.85"
Tc=5.0 min CN=80 Runoff=4.84 cfs 0.338 af

Subcatchment P-7: Parking Lot & Driveway Runoff Area=6,609 sf 77.27% Impervious Runoff Depth=7.04"
Tc=5.0 min CN=90 Runoff=1.21 cfs 0.089 af

Subcatchment P-8: Parking Lot & Driveway Runoff Area=8,515 sf 75.78% Impervious Runoff Depth=6.92"
Tc=5.0 min CN=89 Runoff=1.54 cfs 0.113 af

Subcatchment P-9: Parking Lot & Driveway Runoff Area=5,624 sf 79.94% Impervious Runoff Depth=7.16"
Tc=5.0 min CN=91 Runoff=1.04 cfs 0.077 af

Reach 1R: Pipe Outfall Avg. Flow Depth=0.11' Max Vel=0.52 fps Inflow=0.27 cfs 0.104 af
n=0.069 L=10.0' S=0.0200 '/' Capacity=1.06 cfs Outflow=0.27 cfs 0.104 af

Reach 2R: Pipe Outfall Avg. Flow Depth=0.06' Max Vel=0.54 fps Inflow=0.11 cfs 0.081 af
n=0.069 L=10.0' S=0.0500 '/' Capacity=1.67 cfs Outflow=0.11 cfs 0.081 af

Reach DP-1: Washington Street Inflow=2.10 cfs 0.159 af
Outflow=2.10 cfs 0.159 af

Reach DP-2: Abutting Property Inflow=0.25 cfs 0.036 af
Outflow=0.25 cfs 0.036 af

Reach DP-4: On-Site Wetlands Inflow=4.68 cfs 0.424 af
Outflow=4.68 cfs 0.424 af

Pond D1: Detention Basin #1 Peak Elev=210.47' Storage=6,718 cf Inflow=1.79 cfs 0.229 af
Outflow=0.27 cfs 0.104 af

Pond D2: Detention Basin #2 Peak Elev=209.53' Storage=9,231 cf Inflow=1.82 cfs 0.260 af
Outflow=0.11 cfs 0.081 af

Pond D3: Detention Basin #3 Peak Elev=207.40' Storage=1,247 cf Inflow=0.69 cfs 0.047 af
Outflow=0.08 cfs 0.019 af

Pond R1: Recharger #1 Peak Elev=211.67' Storage=7,874 cf Inflow=6.05 cfs 0.427 af
Discarded=0.05 cfs 0.099 af Primary=1.79 cfs 0.229 af Outflow=1.84 cfs 0.327 af

Pond R2: Recharger #2 Peak Elev=211.03' Storage=7,867 cf Inflow=4.78 cfs 0.365 af
Discarded=0.06 cfs 0.126 af Primary=0.72 cfs 0.129 af Outflow=0.77 cfs 0.255 af

Pond VP: On-Site Vernal Pool Peak Elev=206.51' Storage=20,697 cf Inflow=4.23 cfs 0.475 af
Outflow=0.00 cfs 0.000 af

Total Runoff Area = 5.373 ac Runoff Volume = 1.861 af Average Runoff Depth = 4.16"
78.61% Pervious = 4.224 ac 21.39% Impervious = 1.149 ac

Summary for Subcatchment P-1: Uncontrolled to Street

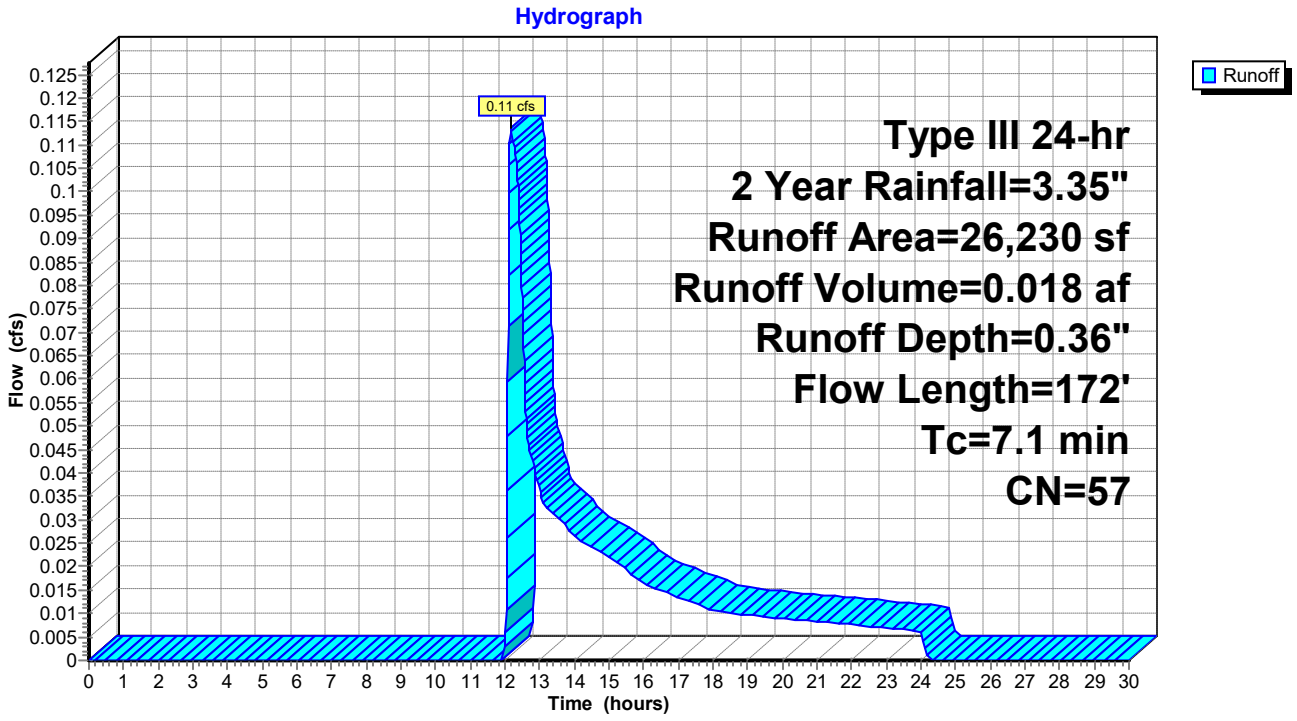
Runoff = 0.11 cfs @ 12.17 hrs, Volume= 0.018 af, Depth= 0.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.35"

Area (sf)	CN	Description
720	98	Paved parking, HSG B
5,287	61	>75% Grass cover, Good, HSG B
20,223	55	Woods, Good, HSG B
26,230	57	Weighted Average
25,510		97.26% Pervious Area
720		2.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	50	0.1740	0.16		**Sheet Flow, Segment 1** Woods: Light underbrush n= 0.400 P2= 3.35"
2.0	122	0.0434	1.04		**Shallow Concentrated Flow, Segment 2** Woodland Kv= 5.0 fps
7.1	172	Total			

Subcatchment P-1: Uncontrolled to Street



Summary for Subcatchment P-10: Area Drains to Detention

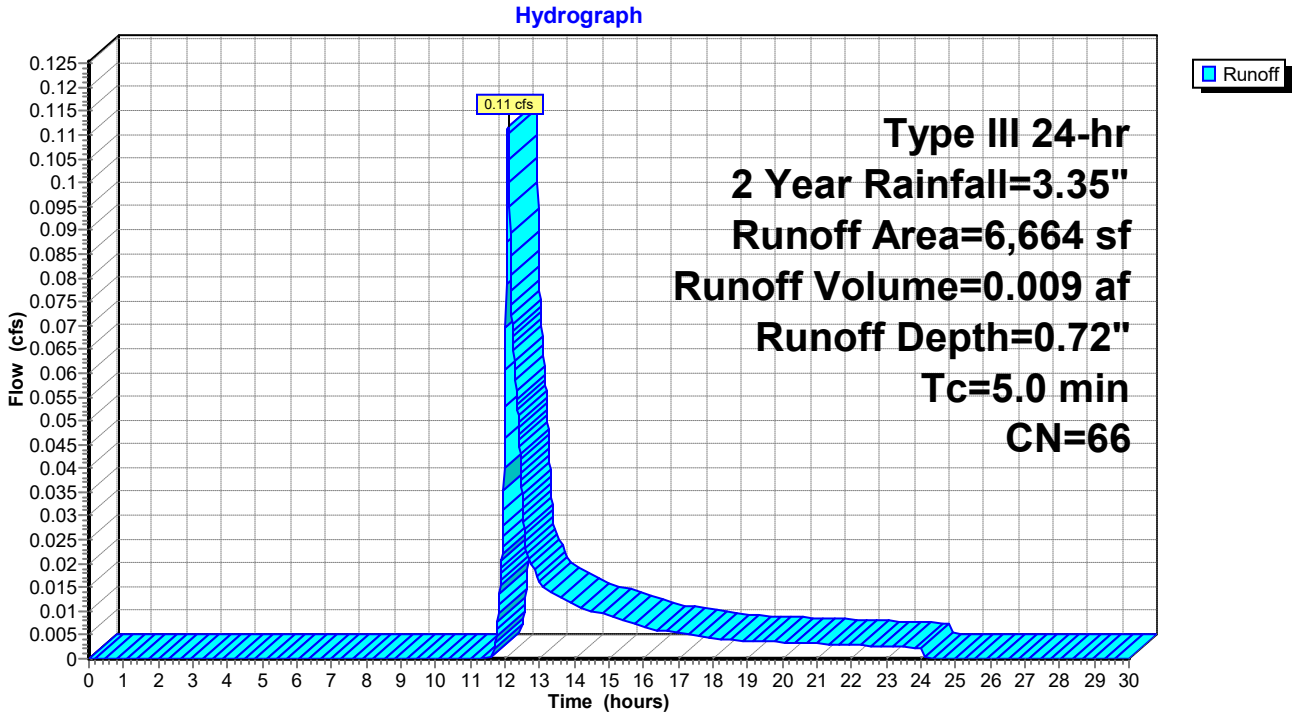
Runoff = 0.11 cfs @ 12.09 hrs, Volume= 0.009 af, Depth= 0.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.35"

Area (sf)	CN	Description
962	98	Paved parking, HSG B
5,702	61	>75% Grass cover, Good, HSG B
6,664	66	Weighted Average
5,702		85.56% Pervious Area
962		14.44% Impervious Area

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

Subcatchment P-10: Area Drains to Detention



Summary for Subcatchment P-11: Area Drains to Recharger

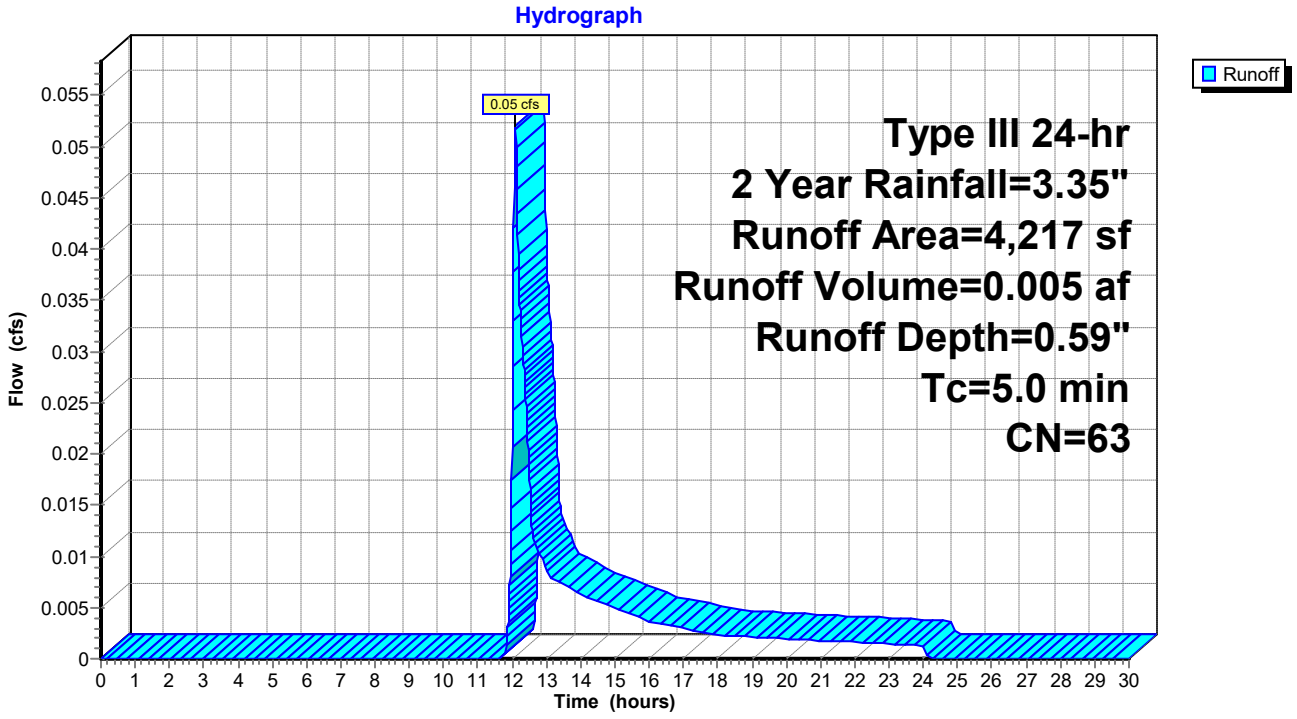
Runoff = 0.05 cfs @ 12.10 hrs, Volume= 0.005 af, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.35"

Area (sf)	CN	Description
203	98	Paved parking, HSG B
4,014	61	>75% Grass cover, Good, HSG B
4,217	63	Weighted Average
4,014		95.19% Pervious Area
203		4.81% Impervious Area

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

Subcatchment P-11: Area Drains to Recharger



Summary for Subcatchment P-2a: Driveway & Yard

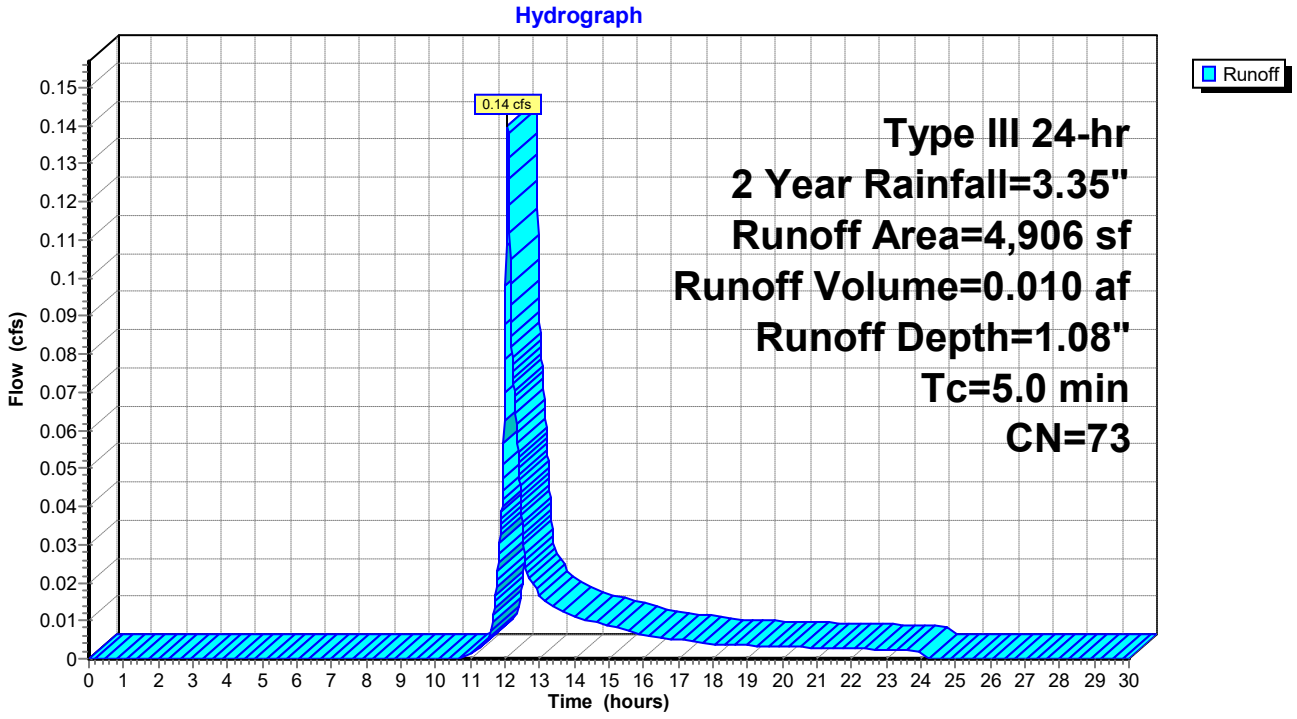
Runoff = 0.14 cfs @ 12.08 hrs, Volume= 0.010 af, Depth= 1.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.35"

Area (sf)	CN	Description
1,639	98	Paved parking, HSG B
3,267	61	>75% Grass cover, Good, HSG B
4,906	73	Weighted Average
3,267		66.59% Pervious Area
1,639		33.41% Impervious Area

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

Subcatchment P-2a: Driveway & Yard



Summary for Subcatchment P-2b: Uncontrolled to Abutter

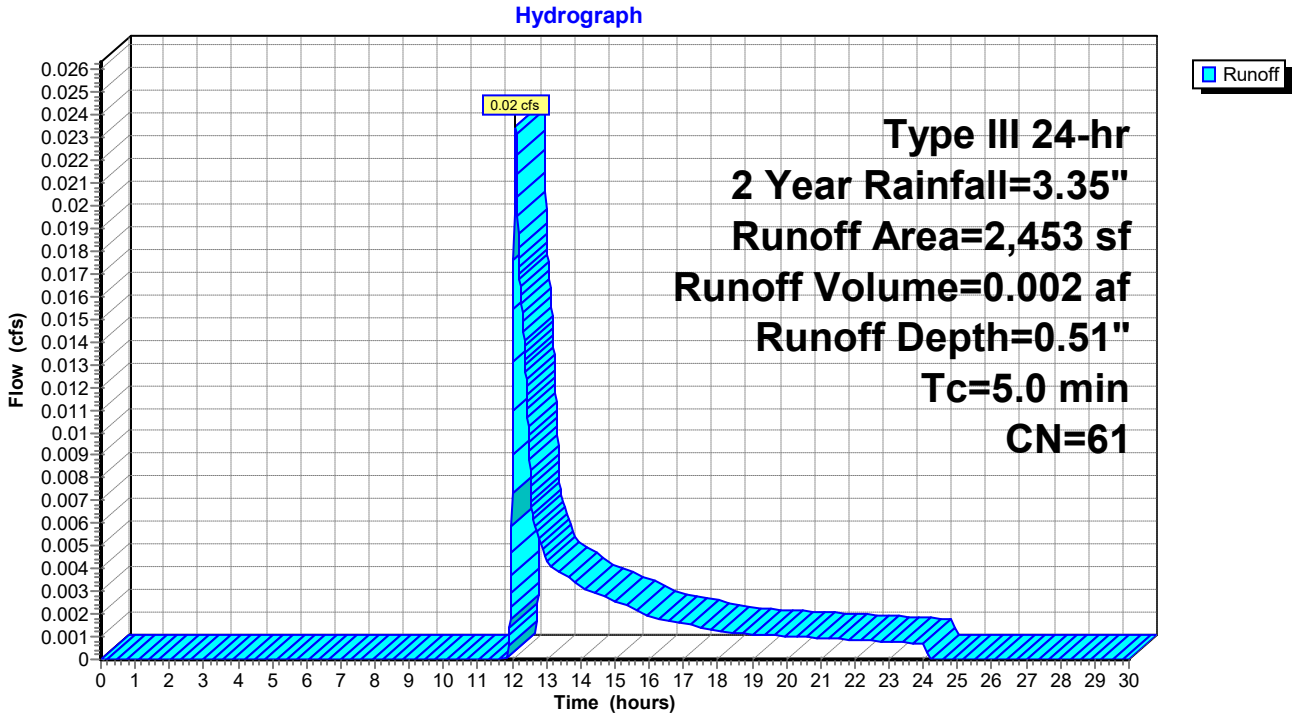
Runoff = 0.02 cfs @ 12.10 hrs, Volume= 0.002 af, Depth= 0.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.35"

Area (sf)	CN	Description
2,453	61	>75% Grass cover, Good, HSG B
2,453		100.00% Pervious Area

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

Subcatchment P-2b: Uncontrolled to Abutter



Summary for Subcatchment P-3: Uncontrolled to V.P.

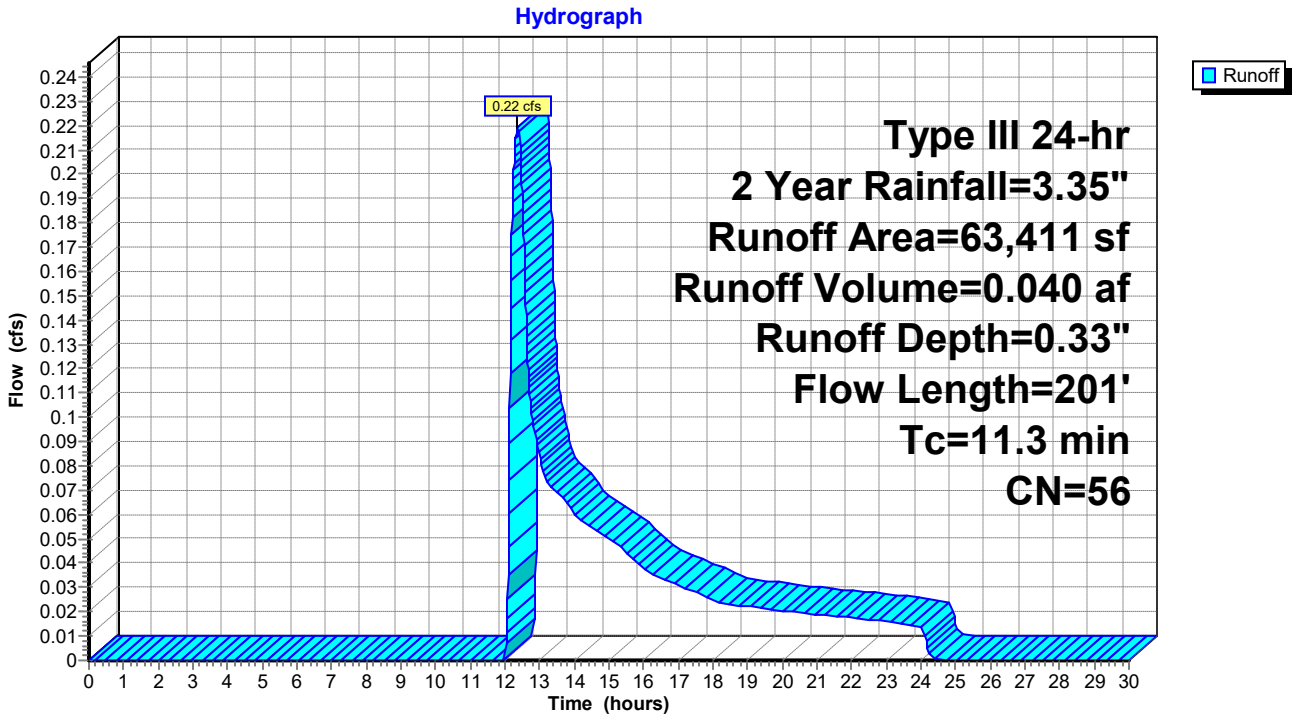
Runoff = 0.22 cfs @ 12.37 hrs, Volume= 0.040 af, Depth= 0.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.35"

Area (sf)	CN	Description
13,614	61	>75% Grass cover, Good, HSG B
49,797	55	Woods, Good, HSG B
63,411	56	Weighted Average
63,411		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.1	50	0.0400	0.09		**Sheet Flow, Segment 1** Woods: Light underbrush n= 0.400 P2= 3.35"
0.8	73	0.0507	1.58		**Shallow Concentrated Flow, Segment 2** Short Grass Pasture Kv= 7.0 fps
1.4	78	0.0359	0.95		**Shallow Concentrated Flow, Segment 3** Woodland Kv= 5.0 fps
11.3	201	Total			

Subcatchment P-3: Uncontrolled to V.P.



Summary for Subcatchment P-4: Uncontrolled to Wetlands

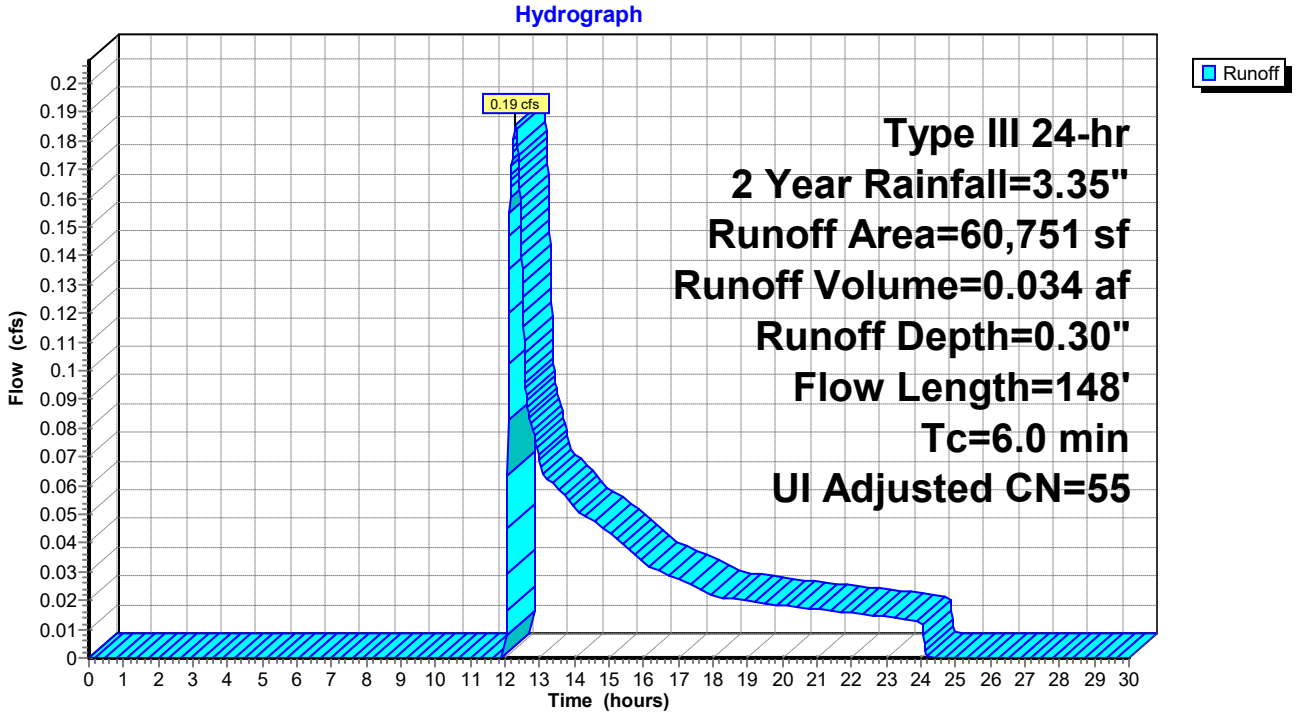
Runoff = 0.19 cfs @ 12.30 hrs, Volume= 0.034 af, Depth= 0.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.35"

Area (sf)	CN	Adj	Description
387	98		Unconnected pavement, HSG B
2,570	61		>75% Grass cover, Good, HSG B
57,794	55		Woods, Good, HSG B
60,751	56	55	Weighted Average, UI Adjusted
60,364			99.36% Pervious Area
387			0.64% Impervious Area
387			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.7	50	0.2100	0.18		**Sheet Flow, Segment 1** Woods: Light underbrush n= 0.400 P2= 3.35"
1.3	98	0.0663	1.29		**Shallow Concentrated Flow, Segment 2** Woodland Kv= 5.0 fps
6.0	148	Total			

Subcatchment P-4: Uncontrolled to Wetlands



Summary for Subcatchment P-5: New Building

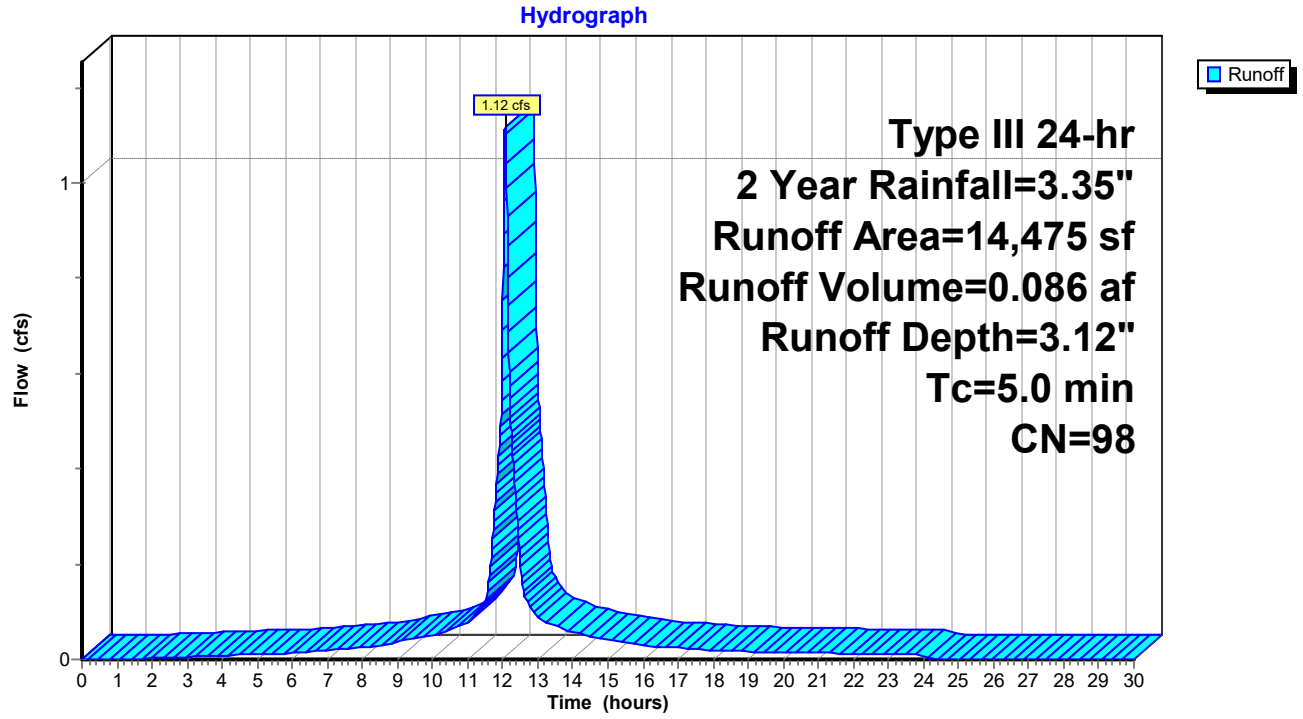
Runoff = 1.12 cfs @ 12.07 hrs, Volume= 0.086 af, Depth= 3.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.35"

Area (sf)	CN	Description
14,475	98	Roofs, HSG B
14,475		100.00% Impervious Area

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

Subcatchment P-5: New Building



Summary for Subcatchment P-6: Parking Lot & Driveway & SAS (partial)

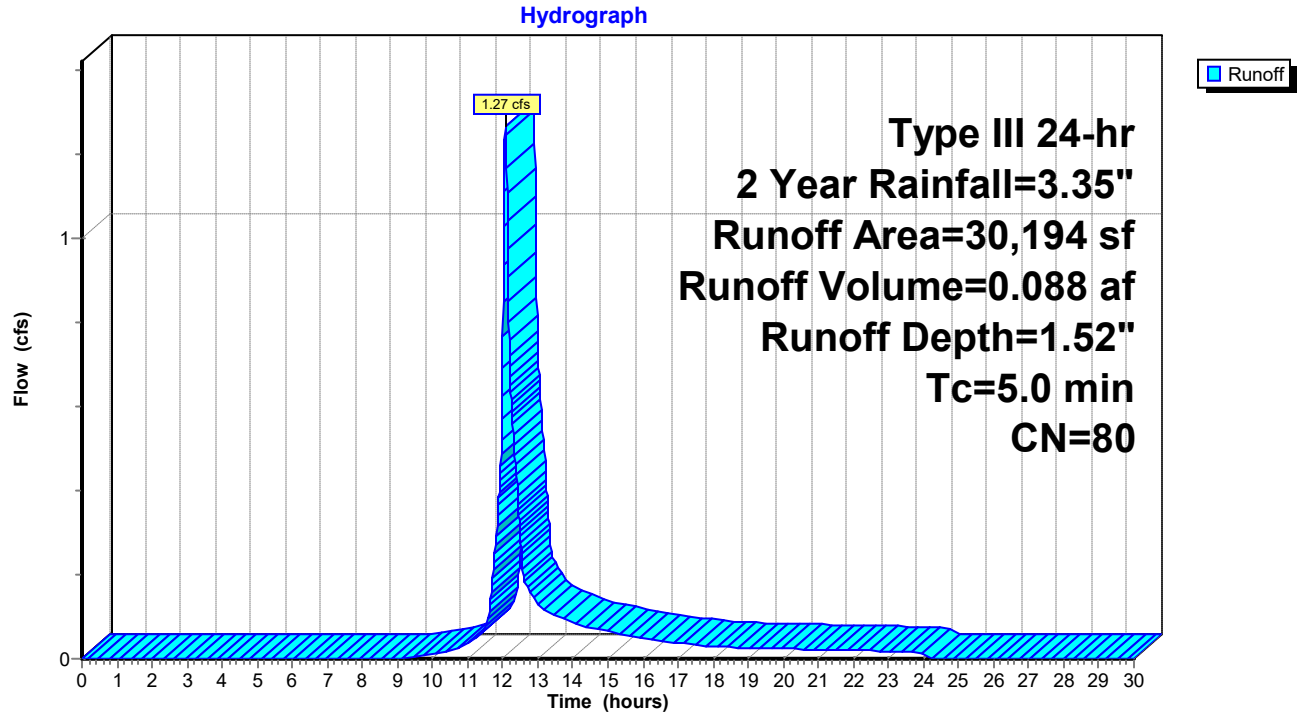
Runoff = 1.27 cfs @ 12.08 hrs, Volume= 0.088 af, Depth= 1.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.35"

Area (sf)	CN	Description
15,610	98	Paved parking, HSG B
14,584	61	>75% Grass cover, Good, HSG B
30,194	80	Weighted Average
14,584		48.30% Pervious Area
15,610		51.70% Impervious Area

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

Subcatchment P-6: Parking Lot & Driveway & SAS (partial)



Summary for Subcatchment P-7: Parking Lot & Driveway

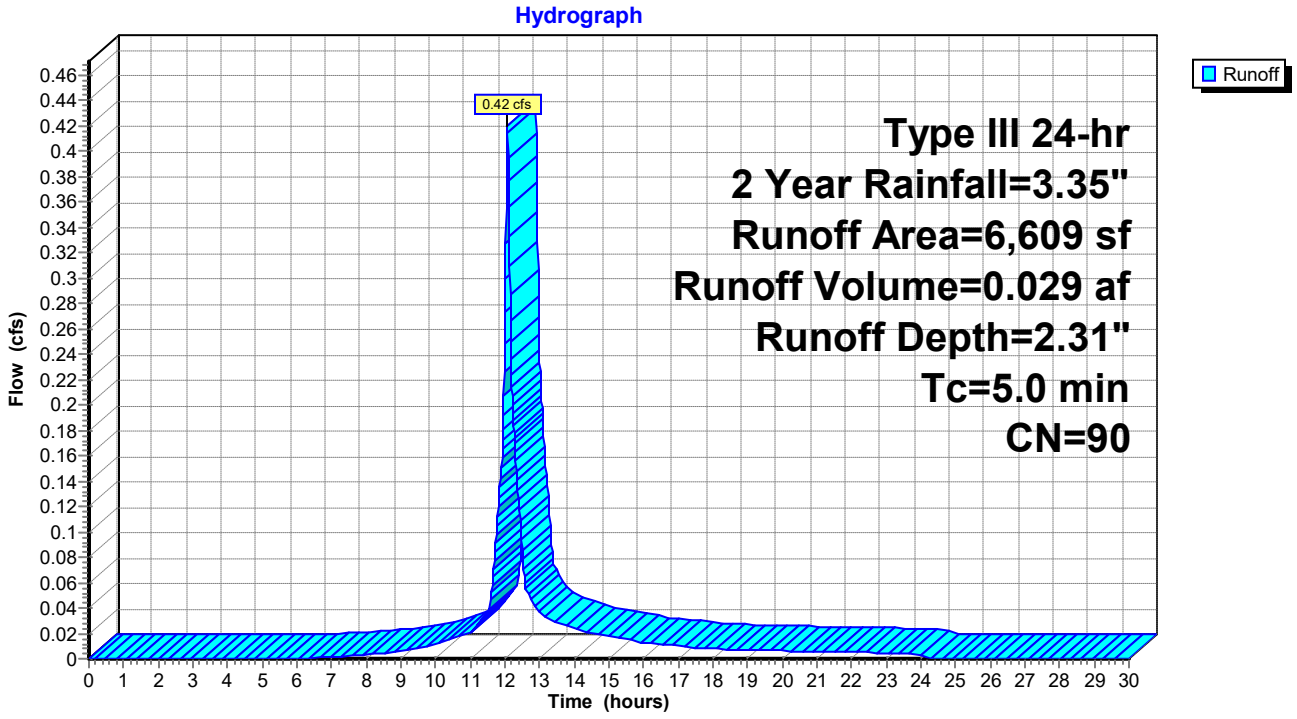
Runoff = 0.42 cfs @ 12.07 hrs, Volume= 0.029 af, Depth= 2.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.35"

Area (sf)	CN	Description
5,107	98	Paved parking, HSG B
1,502	61	>75% Grass cover, Good, HSG B
6,609	90	Weighted Average
1,502		22.73% Pervious Area
5,107		77.27% Impervious Area

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

Subcatchment P-7: Parking Lot & Driveway



Summary for Subcatchment P-8: Parking Lot & Driveway

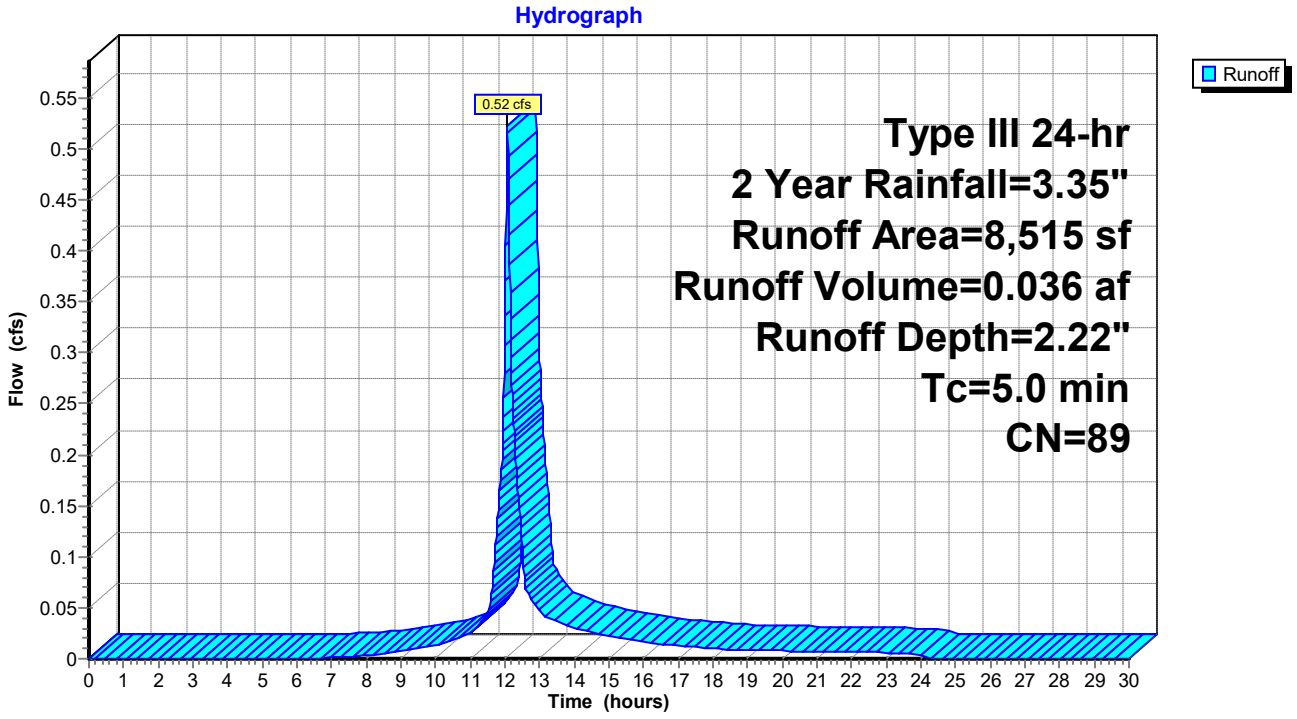
Runoff = 0.52 cfs @ 12.07 hrs, Volume= 0.036 af, Depth= 2.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.35"

Area (sf)	CN	Description
6,453	98	Paved parking, HSG B
2,062	61	>75% Grass cover, Good, HSG B
8,515	89	Weighted Average
2,062		24.22% Pervious Area
6,453		75.78% Impervious Area

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

Subcatchment P-8: Parking Lot & Driveway



Summary for Subcatchment P-9: Parking Lot & Driveway

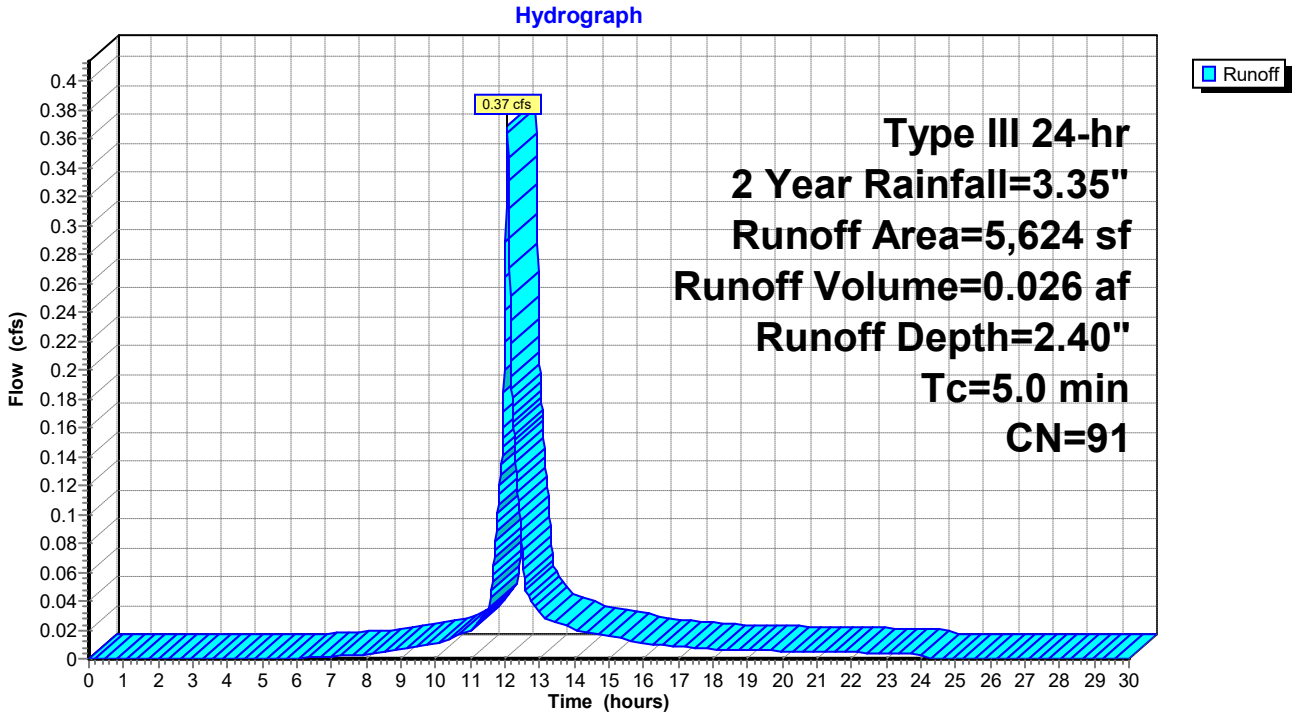
Runoff = 0.37 cfs @ 12.07 hrs, Volume= 0.026 af, Depth= 2.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.35"

Area (sf)	CN	Description
4,496	98	Paved parking, HSG B
1,128	61	>75% Grass cover, Good, HSG B
5,624	91	Weighted Average
1,128		20.06% Pervious Area
4,496		79.94% Impervious Area

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

Subcatchment P-9: Parking Lot & Driveway



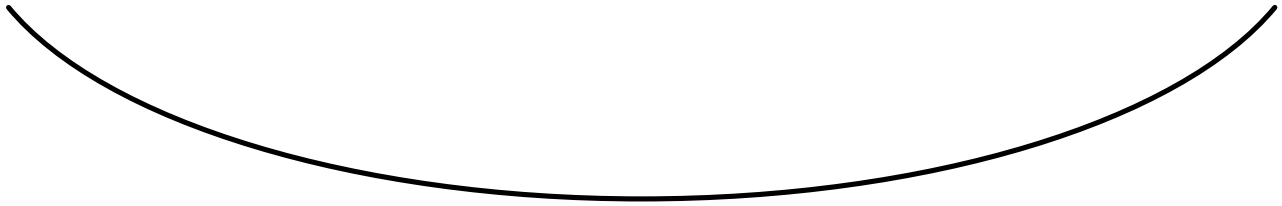
Summary for Reach 1R: Plpe Outfall

Inflow Area = 0.845 ac, 56.29% Impervious, Inflow Depth = 0.00" for 2 Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 0.20' Flow Area= 1.3 sf, Capacity= 1.06 cfs

10.00' x 0.20' deep Parabolic Channel, n= 0.069 Riprap, 6-inch
Length= 10.0' Slope= 0.0200 '/'
Inlet Invert= 207.00', Outlet Invert= 206.80'



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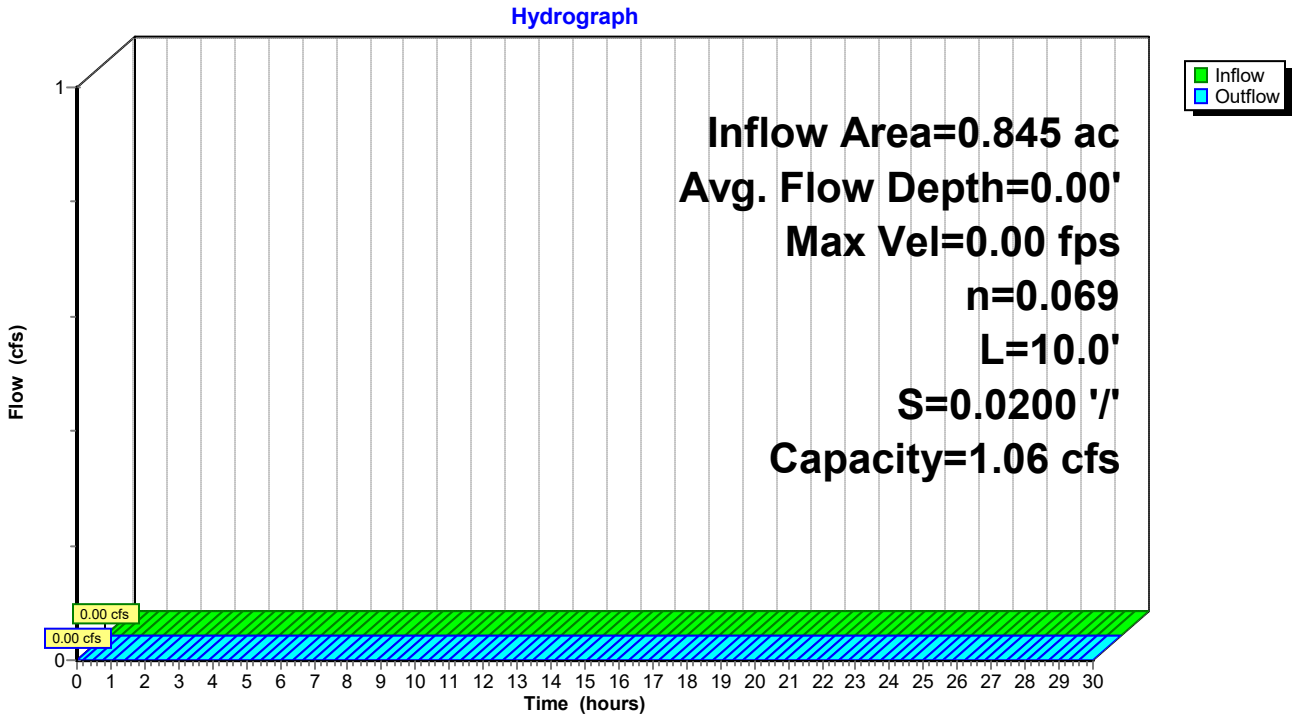
Reach 1R: Plpe Outfall



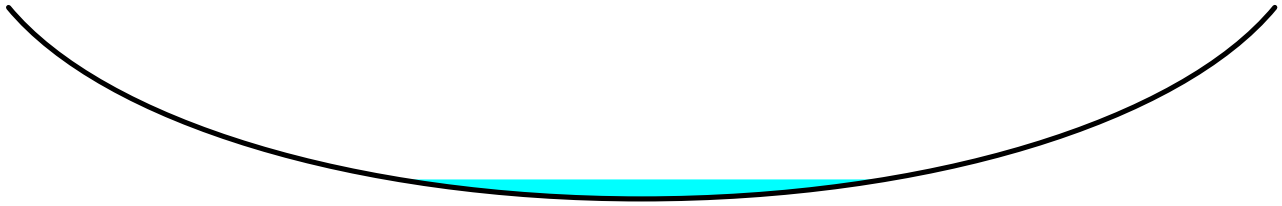
Summary for Reach 2R: Pipe Outfall

Inflow Area = 0.907 ac, 67.32% Impervious, Inflow Depth > 0.20" for 2 Year event
Inflow = 0.01 cfs @ 17.72 hrs, Volume= 0.015 af
Outflow = 0.01 cfs @ 17.74 hrs, Volume= 0.015 af, Atten= 0%, Lag= 1.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 0.27 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 0.26 fps, Avg. Travel Time= 0.6 min

Peak Storage= 0 cf @ 17.73 hrs
Average Depth at Peak Storage= 0.02'
Bank-Full Depth= 0.20' Flow Area= 1.3 sf, Capacity= 1.67 cfs

10.00' x 0.20' deep Parabolic Channel, n= 0.069 Riprap, 6-inch
Length= 10.0' Slope= 0.0500 '/'
Inlet Invert= 205.00', Outlet Invert= 204.50'



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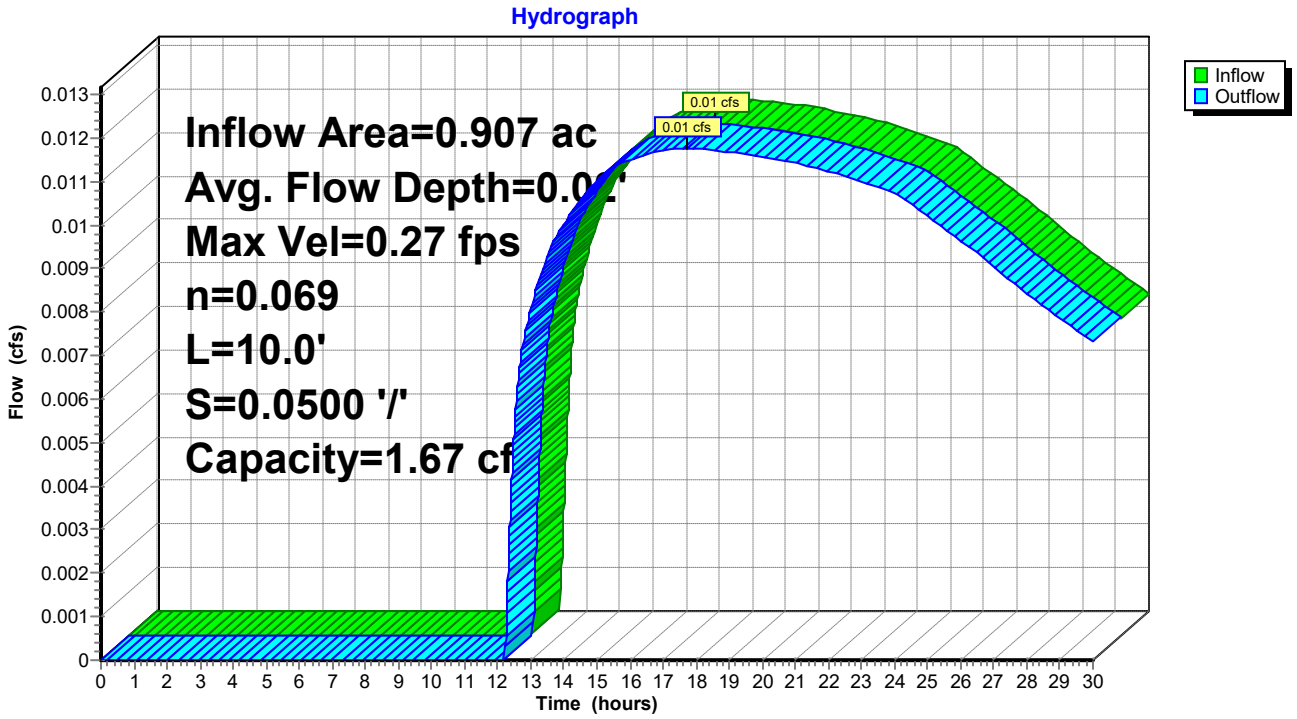
Reach 2R: Pipe Outfall

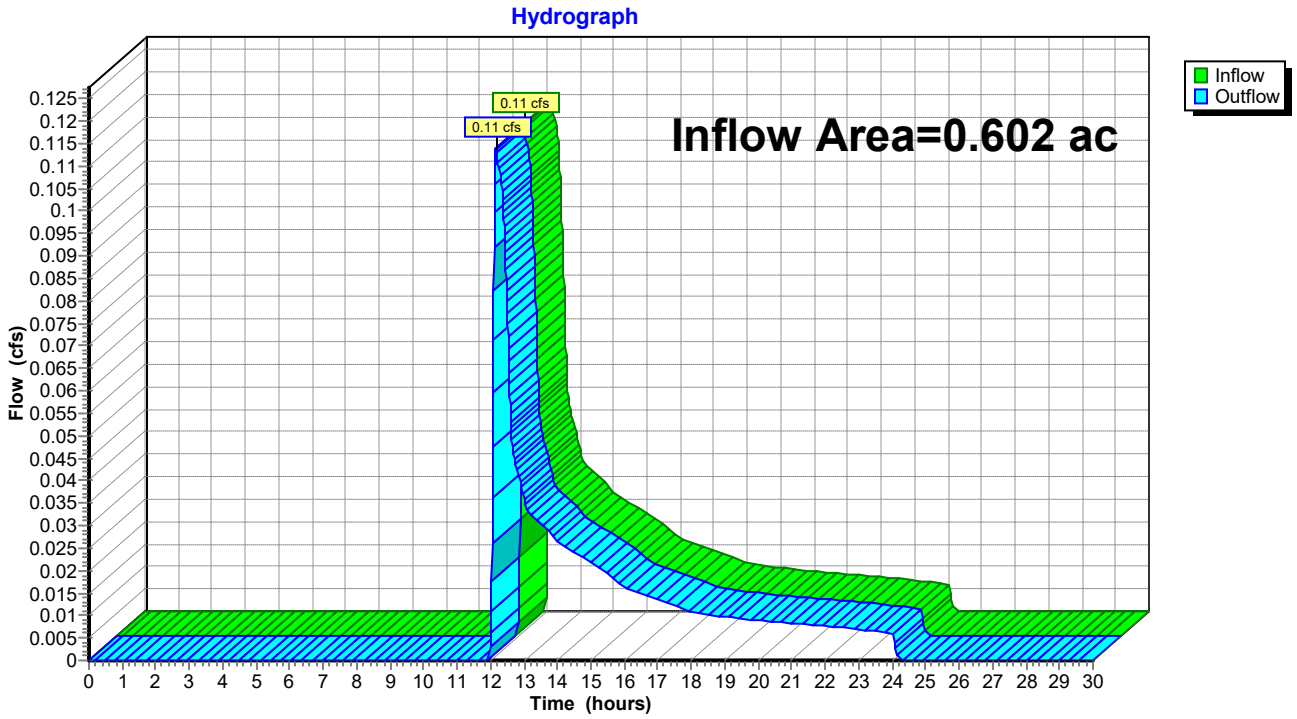


Summary for Reach DP-1: Washington Street

Inflow Area = 0.602 ac, 2.74% Impervious, Inflow Depth = 0.36" for 2 Year event
Inflow = 0.11 cfs @ 12.17 hrs, Volume= 0.018 af
Outflow = 0.11 cfs @ 12.17 hrs, Volume= 0.018 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Reach DP-1: Washington Street

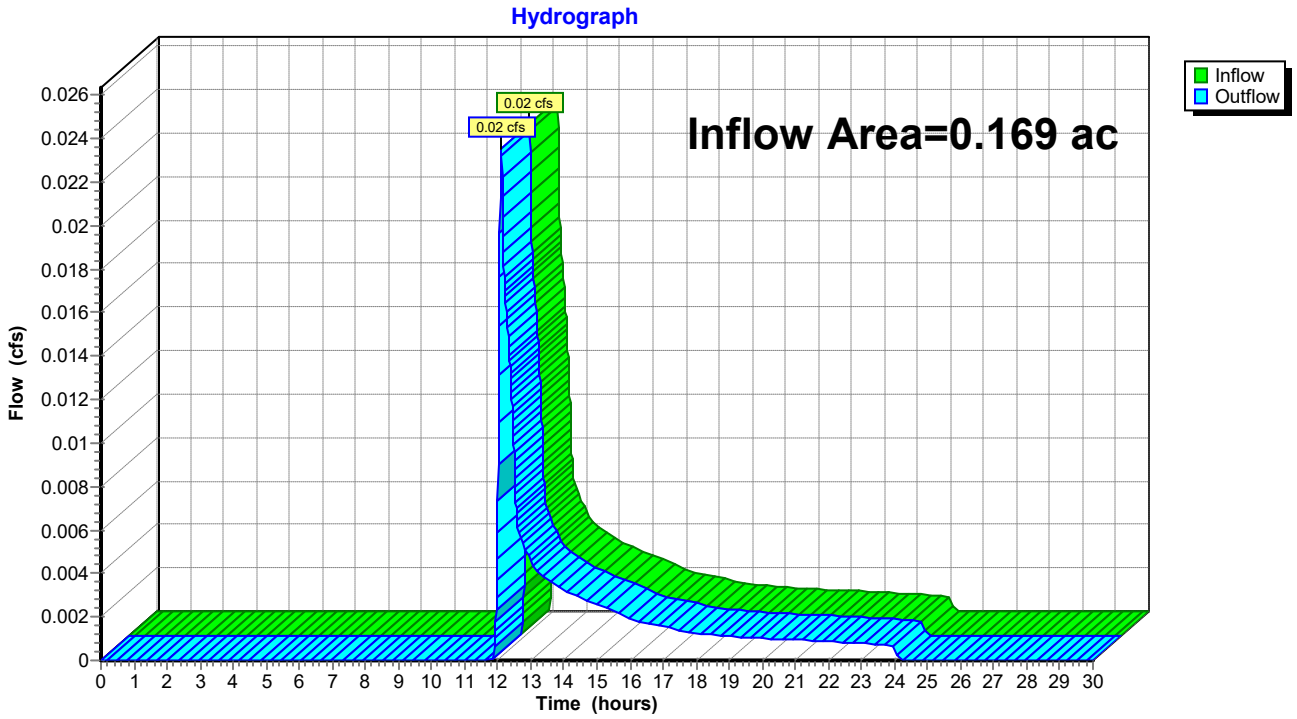


Summary for Reach DP-2: Abutting Property

Inflow Area = 0.169 ac, 22.27% Impervious, Inflow Depth = 0.17" for 2 Year event
Inflow = 0.02 cfs @ 12.10 hrs, Volume= 0.002 af
Outflow = 0.02 cfs @ 12.10 hrs, Volume= 0.002 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Reach DP-2: Abutting Property

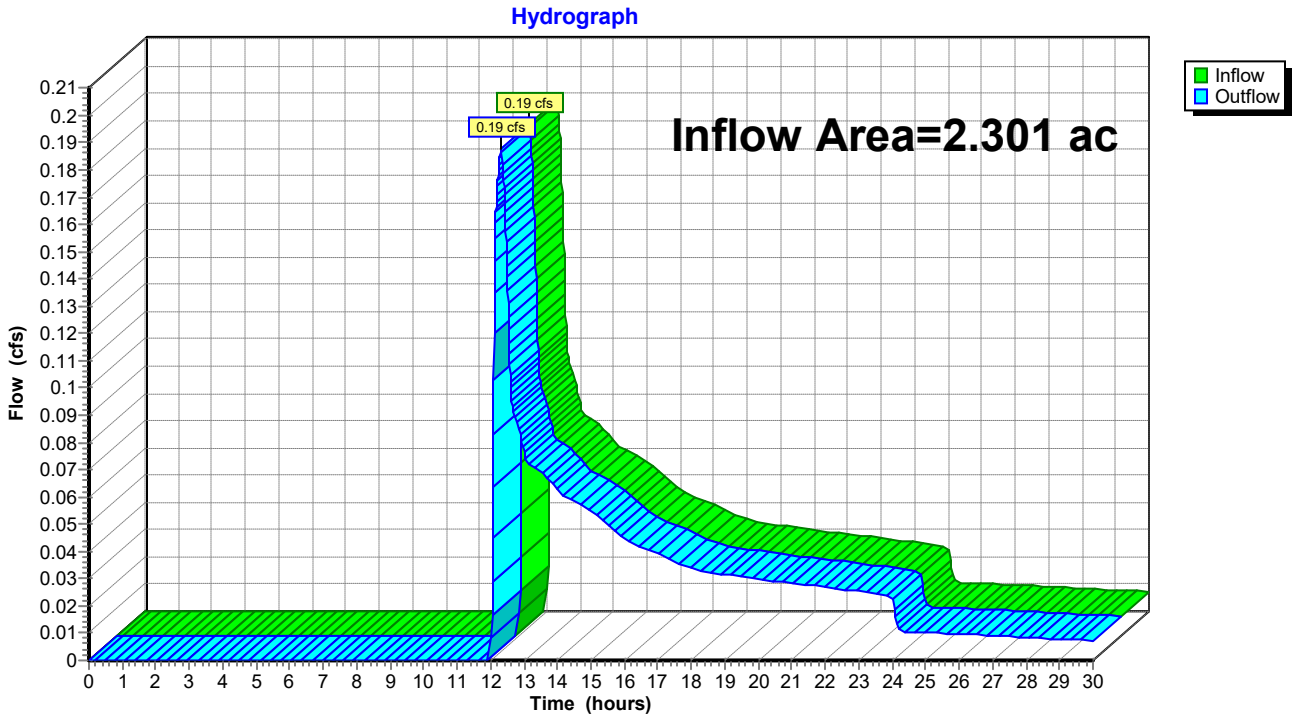


Summary for Reach DP-4: On-Site Wetlands

Inflow Area = 2.301 ac, 26.91% Impervious, Inflow Depth > 0.26" for 2 Year event
Inflow = 0.19 cfs @ 12.31 hrs, Volume= 0.049 af
Outflow = 0.19 cfs @ 12.31 hrs, Volume= 0.049 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Reach DP-4: On-Site Wetlands



Summary for Pond D1: Detention Basin #1

Inflow Area = 0.845 ac, 56.29% Impervious, Inflow Depth = 0.00" for 2 Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 207.00' @ 0.00 hrs Surf.Area= 2,516 sf Storage= 0 cf
Flood Elev= 210.50' Surf.Area= 2,516 sf Storage= 6,777 cf

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

Volume	Invert	Avail.Storage	Storage Description
#1A	207.00'	814 cf	**34.00'W x 74.00'L x 4.17'H Field A** 10,483 cf Overall - 8,448 cf Embedded = 2,035 cf x 40.0% Voids
#2A	207.50'	6,019 cf	**retain_it retain_it 3.0'** x 36 Inside #1 Inside= 84.0"W x 36.0"H => 21.33 sf x 8.00'L = 170.6 cf Outside= 96.0"W x 44.0"H => 29.33 sf x 8.00'L = 234.7 cf 4 Rows adjusted for 122.7 cf perimeter wall
		6,833 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	207.50'	**10.0" Round Culvert** L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 207.50' / 207.00' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf
#2	Device 1	210.40'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Device 1	207.50'	**1.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=207.00' (Free Discharge)
↑—**1=Culvert** (Controls 0.00 cfs)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
—**3=Orifice/Grate** (Controls 0.00 cfs)

Pond D1: Detention Basin #1 - Chamber Wizard Field A

Chamber Model = retain_it retain_it 3.0' (retain-it®)
Inside= 84.0"W x 36.0"H => 21.33 sf x 8.00'L = 170.6 cf
Outside= 96.0"W x 44.0"H => 29.33 sf x 8.00'L = 234.7 cf
4 Rows adjusted for 122.7 cf perimeter wall

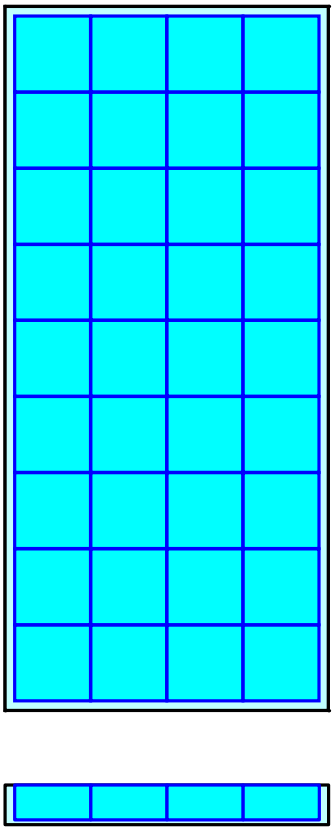
9 Chambers/Row x 8.00' Long = 72.00' Row Length +12.0" End Stone x 2 = 74.00' Base Length
4 Rows x 96.0" Wide + 12.0" Side Stone x 2 = 34.00' Base Width
6.0" Base + 44.0" Chamber Height = 4.17' Field Height

4.7 cf Sidewall x 9 x 2 + 4.7 cf Endwall x 4 x 2 = 122.7 cf Perimeter Wall
36 Chambers x 170.6 cf - 122.7 cf Perimeter wall = 6,019.2 cf Chamber Storage
36 Chambers x 234.7 cf = 8,448.0 cf Displacement

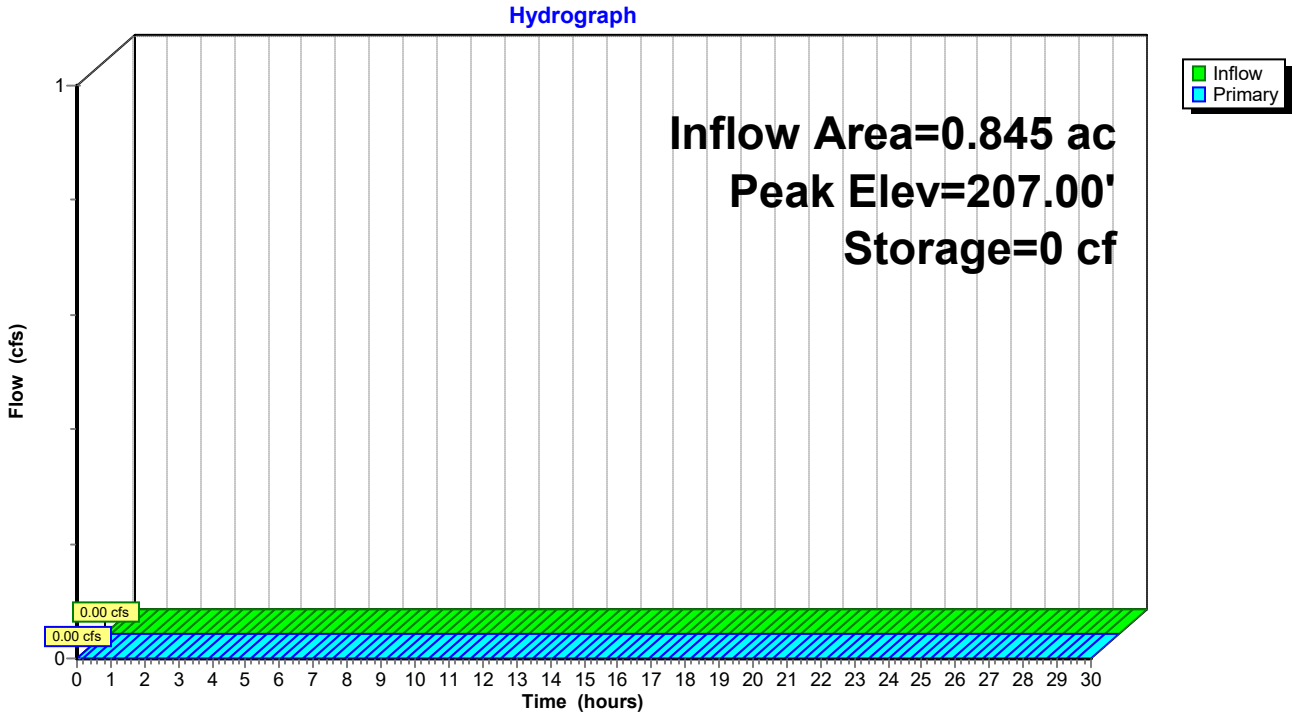
10,483.3 cf Field - 8,448.0 cf Chambers = 2,035.3 cf Stone x 40.0% Voids = 814.1 cf Stone Storage

Chamber Storage + Stone Storage = 6,833.4 cf = 0.157 af
Overall Storage Efficiency = 65.2%
Overall System Size = 74.00' x 34.00' x 4.17'

36 Chambers
388.3 cy Field
75.4 cy Stone



Pond D1: Detention Basin #1



Summary for Pond D2: Detention Basin #2

Inflow Area = 0.907 ac, 67.32% Impervious, Inflow Depth = 0.46" for 2 Year event
Inflow = 0.48 cfs @ 12.08 hrs, Volume= 0.035 af
Outflow = 0.01 cfs @ 17.72 hrs, Volume= 0.015 af, Atten= 98%, Lag= 338.6 min
Primary = 0.01 cfs @ 17.72 hrs, Volume= 0.015 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 205.74' @ 17.72 hrs Surf.Area= 2,628 sf Storage= 1,135 cf
Flood Elev= 210.00' Surf.Area= 2,628 sf Storage= 10,073 cf

Plug-Flow detention time= 561.1 min calculated for 0.015 af (43% of inflow)
Center-of-Mass det. time= 431.1 min (1,253.5 - 822.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	205.00'	1,108 cf	**18.00'W x 146.00'L x 5.58'H Field A** 14,673 cf Overall - 11,904 cf Embedded = 2,769 cf x 40.0% Voids
#2A	205.42'	9,041 cf	**retain_it retain_it 4.5'** x 36 Inside #1 Inside= 84.0"W x 54.0"H => 32.64 sf x 8.00'L = 261.1 cf Outside= 96.0"W x 62.0"H => 41.33 sf x 8.00'L = 330.7 cf 2 Rows adjusted for 358.8 cf perimeter wall
		10,149 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	205.50'	**10.0" Round Culvert** L= 12.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 205.50' / 205.00' S= 0.0417 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf
#2	Device 1	209.50'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Device 1	205.50'	**1.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.01 cfs @ 17.72 hrs HW=205.74' (Free Discharge)
└**1=Culvert** (Passes 0.01 cfs of 0.22 cfs potential flow)
├**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└**3=Orifice/Grate** (Orifice Controls 0.01 cfs @ 2.16 fps)

Pond D2: Detention Basin #2 - Chamber Wizard Field A

Chamber Model = retain_it retain_it 4.5' (retain-it®)
Inside= 84.0"W x 54.0"H => 32.64 sf x 8.00'L = 261.1 cf
Outside= 96.0"W x 62.0"H => 41.33 sf x 8.00'L = 330.7 cf
2 Rows adjusted for 358.8 cf perimeter wall

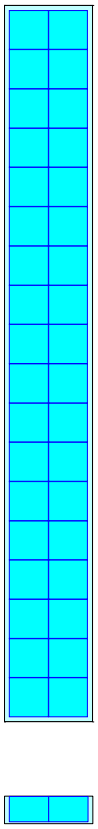
18 Chambers/Row x 8.00' Long = 144.00' Row Length +12.0" End Stone x 2 = 146.00' Base Length
2 Rows x 96.0" Wide + 12.0" Side Stone x 2 = 18.00' Base Width
5.0" Base + 62.0" Chamber Height = 5.58' Field Height

9.0 cf Sidewall x 18 x 2 + 9.0 cf Endwall x 2 x 2 = 358.8 cf Perimeter Wall
36 Chambers x 261.1 cf - 358.8 cf Perimeter wall = 9,041.2 cf Chamber Storage
36 Chambers x 330.7 cf = 11,904.0 cf Displacement

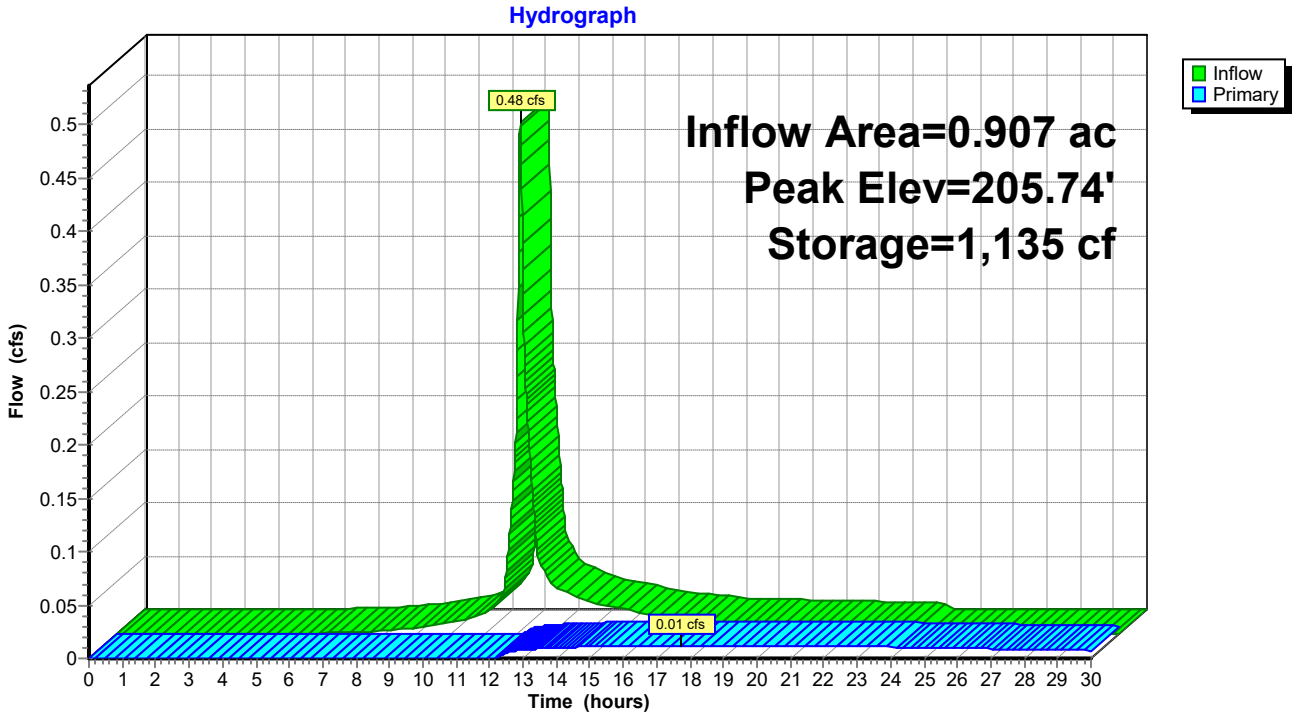
14,673.0 cf Field - 11,904.0 cf Chambers = 2,769.0 cf Stone x 40.0% Voids = 1,107.6 cf Stone Storage

Chamber Storage + Stone Storage = 10,148.8 cf = 0.233 af
Overall Storage Efficiency = 69.2%
Overall System Size = 146.00' x 18.00' x 5.58'

36 Chambers
543.4 cy Field
102.6 cy Stone



Pond D2: Detention Basin #2



Summary for Pond D3: Detention Basin #3

Inflow Area = 0.113 ac, 33.41% Impervious, Inflow Depth = 1.08" for 2 Year event
Inflow = 0.14 cfs @ 12.08 hrs, Volume= 0.010 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 206.47' @ 24.29 hrs Surf.Area= 666 sf Storage= 442 cf

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

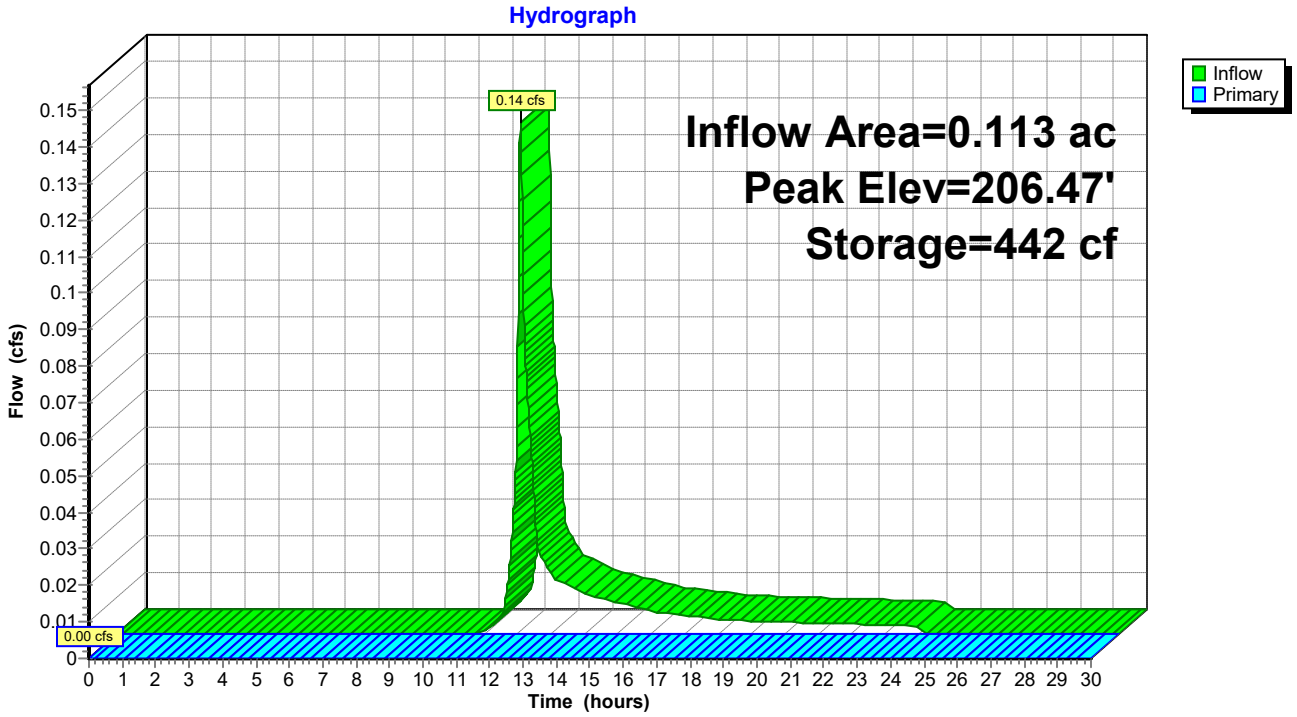
Volume	Invert	Avail.Storage	Storage Description
#1	205.50'	1,350 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
205.50	205	71.2	0	0	205
206.00	500	108.8	171	171	745
207.00	886	137.8	684	855	1,328
207.50	1,099	147.3	495	1,350	1,555

Device	Routing	Invert	Outlet Devices
#1	Primary	207.40'	**50.0' long x 1.0' 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=205.50' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond D3: Detention Basin #3



Summary for Pond R1: Recharger #1

Inflow Area = 0.845 ac, 56.29% Impervious, Inflow Depth = 1.66" for 2 Year event
Inflow = 1.69 cfs @ 12.08 hrs, Volume= 0.117 af
Outflow = 0.05 cfs @ 11.07 hrs, Volume= 0.084 af, Atten= 97%, Lag= 0.0 min
Discarded = 0.05 cfs @ 11.07 hrs, Volume= 0.084 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 208.89' @ 16.71 hrs Surf.Area= 2,160 sf Storage= 3,066 cf
Flood Elev= 212.60' Surf.Area= 2,160 sf Storage= 8,767 cf

Plug-Flow detention time= 465.3 min calculated for 0.084 af (72% of inflow)
Center-of-Mass det. time= 370.1 min (1,200.8 - 830.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	207.10'	870 cf	**36.00'W x 60.00'L x 5.71'H Field A** 12,330 cf Overall - 10,155 cf Embedded = 2,175 cf x 40.0% Voids
#2A	207.14'	7,927 cf	**retain_it retain_it 5.0'** x 28 Inside #1 Inside= 84.0"W x 60.0"H => 36.41 sf x 8.00'L = 291.3 cf Outside= 96.0"W x 68.0"H => 45.33 sf x 8.00'L = 362.7 cf 4 Rows adjusted for 228.6 cf perimeter wall
		8,797 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	210.20'	**8.0" Round Culvert** L= 14.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 210.20' / 210.00' S= 0.0143 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf
#2	Discarded	207.10'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.05 cfs @ 11.07 hrs HW=207.14' (Free Discharge)
↑**2=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=207.10' (Free Discharge)
↑**1=Culvert** (Controls 0.00 cfs)

Pond R1: Recharger #1 - Chamber Wizard Field A

Chamber Model = retain_it retain_it 5.0' (retain-it®)
Inside= 84.0"W x 60.0"H => 36.41 sf x 8.00'L = 291.3 cf
Outside= 96.0"W x 68.0"H => 45.33 sf x 8.00'L = 362.7 cf
4 Rows adjusted for 228.6 cf perimeter wall

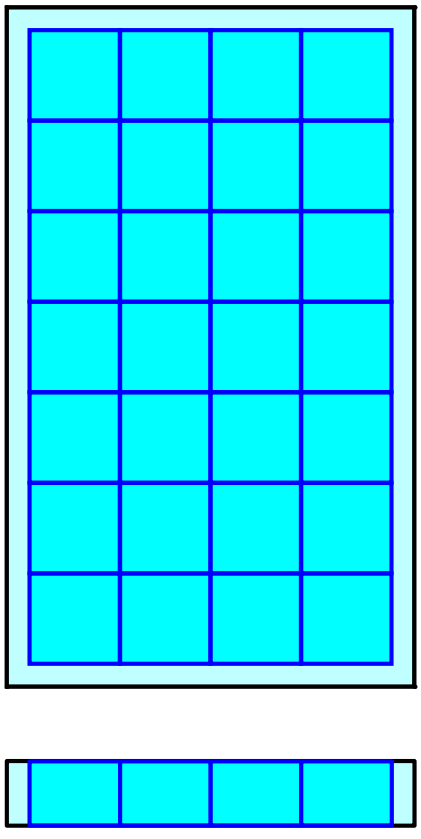
7 Chambers/Row x 8.00' Long = 56.00' Row Length +24.0" End Stone x 2 = 60.00' Base Length
4 Rows x 96.0" Wide + 24.0" Side Stone x 2 = 36.00' Base Width
0.5" Base + 68.0" Chamber Height = 5.71' Field Height

10.4 cf Sidewall x 7 x 2 + 10.4 cf Endwall x 4 x 2 = 228.6 cf Perimeter Wall
28 Chambers x 291.3 cf - 228.6 cf Perimeter wall = 7,927.3 cf Chamber Storage
28 Chambers x 362.7 cf = 10,154.7 cf Displacement

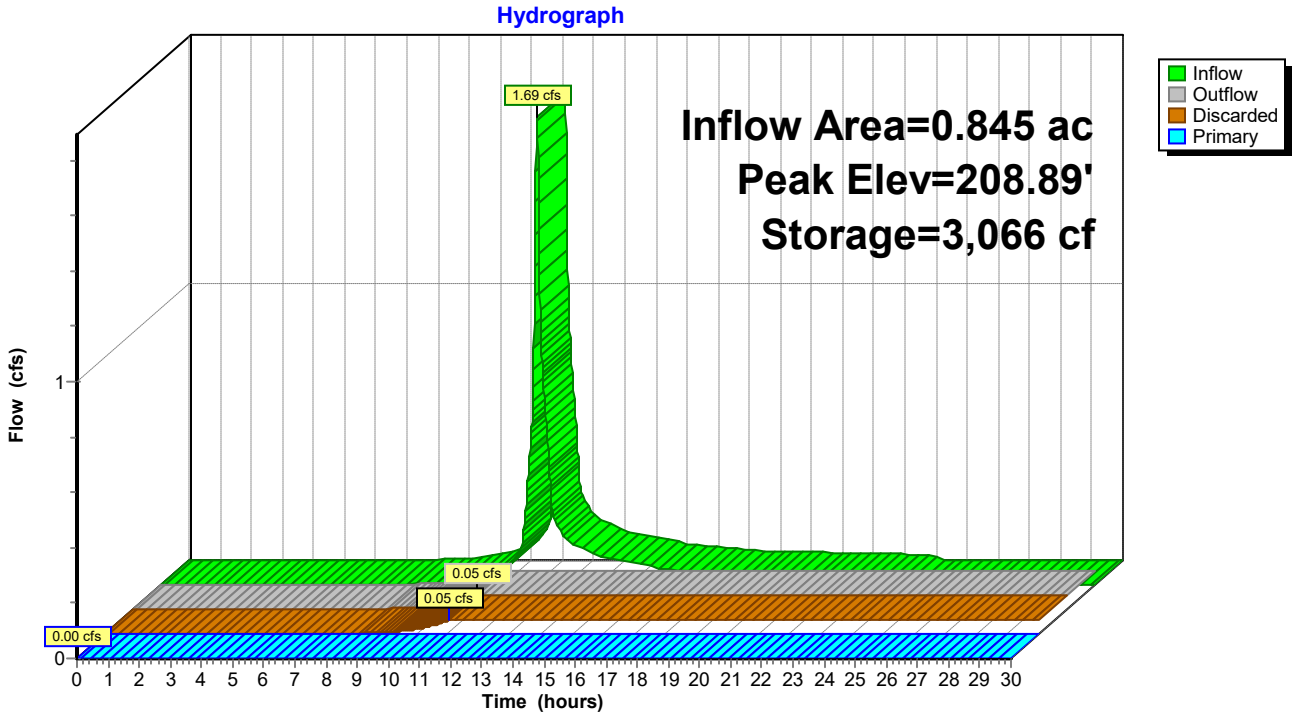
12,330.0 cf Field - 10,154.7 cf Chambers = 2,175.3 cf Stone x 40.0% Voids = 870.1 cf Stone Storage

Chamber Storage + Stone Storage = 8,797.4 cf = 0.202 af
Overall Storage Efficiency = 71.3%
Overall System Size = 60.00' x 36.00' x 5.71'

28 Chambers
456.7 cy Field
80.6 cy Stone



Pond R1: Recharger #1



Summary for Pond R2: Recharger #2

Inflow Area = 0.625 ac, 77.67% Impervious, Inflow Depth = 2.44" for 2 Year event
Inflow = 1.69 cfs @ 12.07 hrs, Volume= 0.127 af
Outflow = 0.06 cfs @ 9.92 hrs, Volume= 0.108 af, Atten= 97%, Lag= 0.0 min
Discarded = 0.06 cfs @ 9.92 hrs, Volume= 0.108 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 208.54' @ 15.61 hrs Surf.Area= 2,448 sf Storage= 2,983 cf
Flood Elev= 211.50' Surf.Area= 2,448 sf Storage= 7,963 cf

Plug-Flow detention time= 406.8 min calculated for 0.108 af (85% of inflow)
Center-of-Mass det. time= 340.7 min (1,115.9 - 775.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	207.00'	787 cf	**36.00'W x 68.00'L x 4.71'H Field A** 11,526 cf Overall - 9,557 cf Embedded = 1,969 cf x 40.0% Voids
#2A	207.04'	7,209 cf	**retain_it retain_it 4.0'** x 32 Inside #1 Inside= 84.0"W x 48.0"H => 28.87 sf x 8.00'L = 230.9 cf Outside= 96.0"W x 56.0"H => 37.33 sf x 8.00'L = 298.7 cf 4 Rows adjusted for 181.2 cf perimeter wall
		7,996 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	210.10'	**6.0" Round Culvert** L= 19.5' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 210.10' / 209.90' S= 0.0103 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#2	Discarded	207.00'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.06 cfs @ 9.92 hrs HW=207.04' (Free Discharge)
↑**2=Exfiltration** (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=207.00' (Free Discharge)
↑**1=Culvert** (Controls 0.00 cfs)

Pond R2: Recharger #2 - Chamber Wizard Field A

Chamber Model = retain_it retain_it 4.0' (retain-it®)
Inside= 84.0"W x 48.0"H => 28.87 sf x 8.00'L = 230.9 cf
Outside= 96.0"W x 56.0"H => 37.33 sf x 8.00'L = 298.7 cf
4 Rows adjusted for 181.2 cf perimeter wall

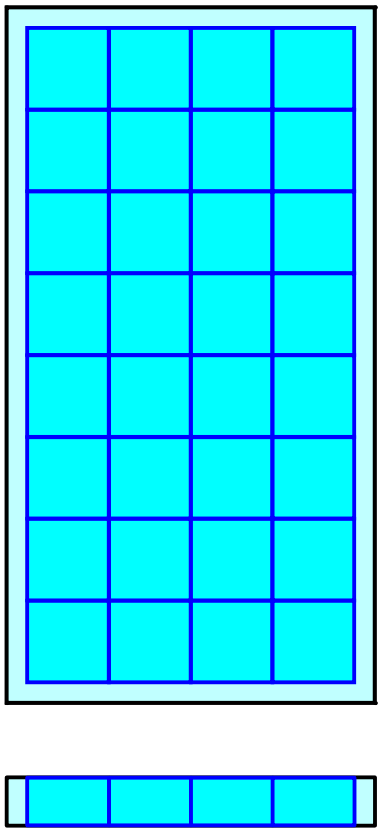
8 Chambers/Row x 8.00' Long = 64.00' Row Length +24.0" End Stone x 2 = 68.00' Base Length
4 Rows x 96.0" Wide + 24.0" Side Stone x 2 = 36.00' Base Width
0.5" Base + 56.0" Chamber Height = 4.71' Field Height

7.5 cf Sidewall x 8 x 2 + 7.5 cf Endwall x 4 x 2 = 181.2 cf Perimeter Wall
32 Chambers x 230.9 cf - 181.2 cf Perimeter wall = 7,208.9 cf Chamber Storage
32 Chambers x 298.7 cf = 9,557.3 cf Displacement

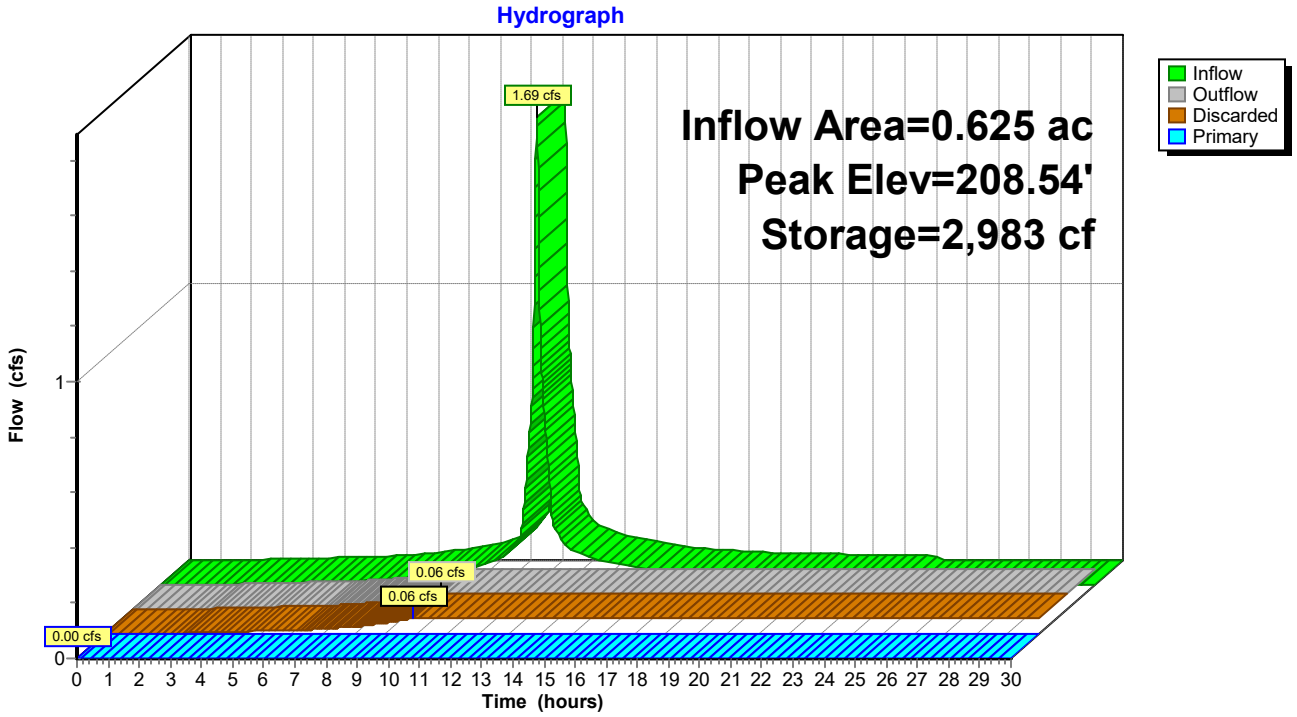
11,526.0 cf Field - 9,557.3 cf Chambers = 1,968.7 cf Stone x 40.0% Voids = 787.5 cf Stone Storage

Chamber Storage + Stone Storage = 7,996.3 cf = 0.184 af
Overall Storage Efficiency = 69.4%
Overall System Size = 68.00' x 36.00' x 4.71'

32 Chambers
426.9 cy Field
72.9 cy Stone



Pond R2: Recharger #2



Summary for Pond VP: On-Site Vernal Pool

Inflow Area = 2.301 ac, 20.67% Impervious, Inflow Depth = 0.21" for 2 Year event
Inflow = 0.22 cfs @ 12.37 hrs, Volume= 0.040 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min

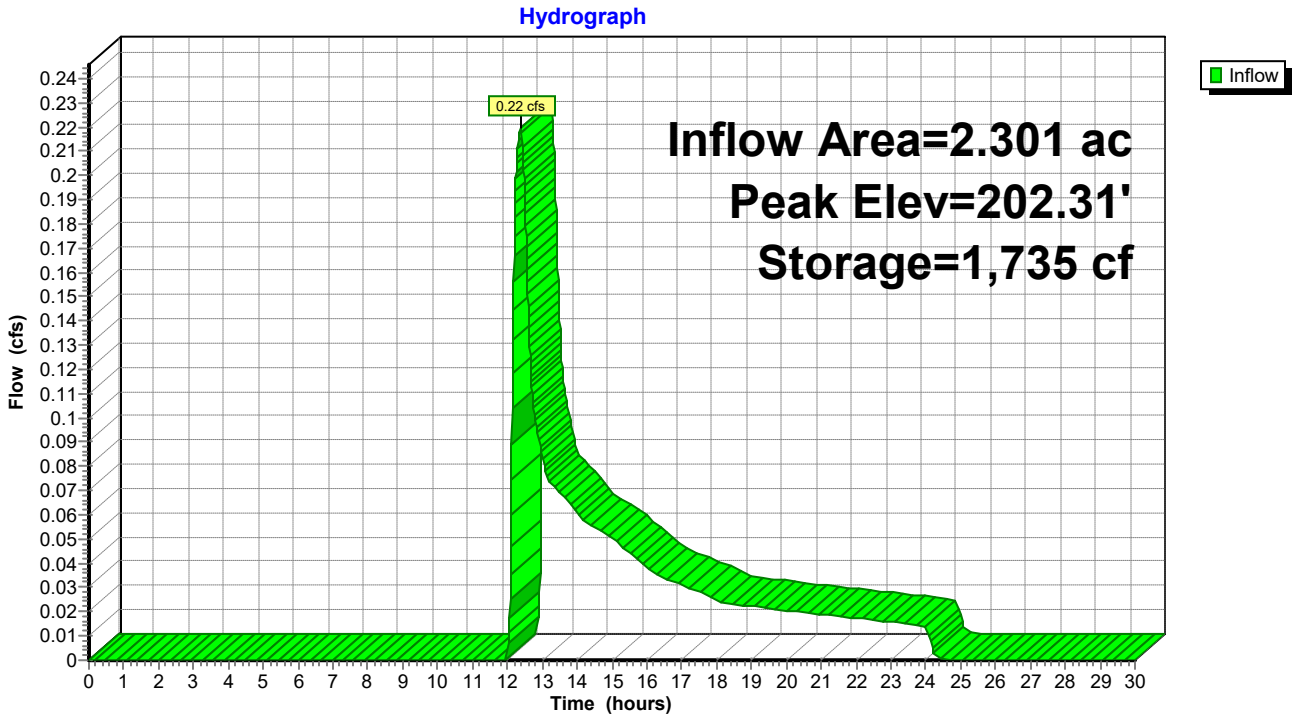
Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 202.31' @ 24.64 hrs Surf.Area= 1,521 sf Storage= 1,735 cf

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

Volume	Invert	Avail.Storage	Storage Description
#1	200.00'	30,113 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)
200.00	96	37.0	0	0	96
201.00	661	92.8	336	336	676
202.00	1,302	129.9	964	1,300	1,343
203.00	2,076	163.4	1,674	2,974	2,138
204.00	3,067	197.8	2,555	5,529	3,144
205.00	4,516	239.6	3,768	9,298	4,615
206.00	7,411	316.4	5,904	15,202	8,024
207.00	23,990	735.5	14,912	30,113	43,110

Pond VP: On-Site Vernal Pool



Summary for Subcatchment P-1: Uncontrolled to Street

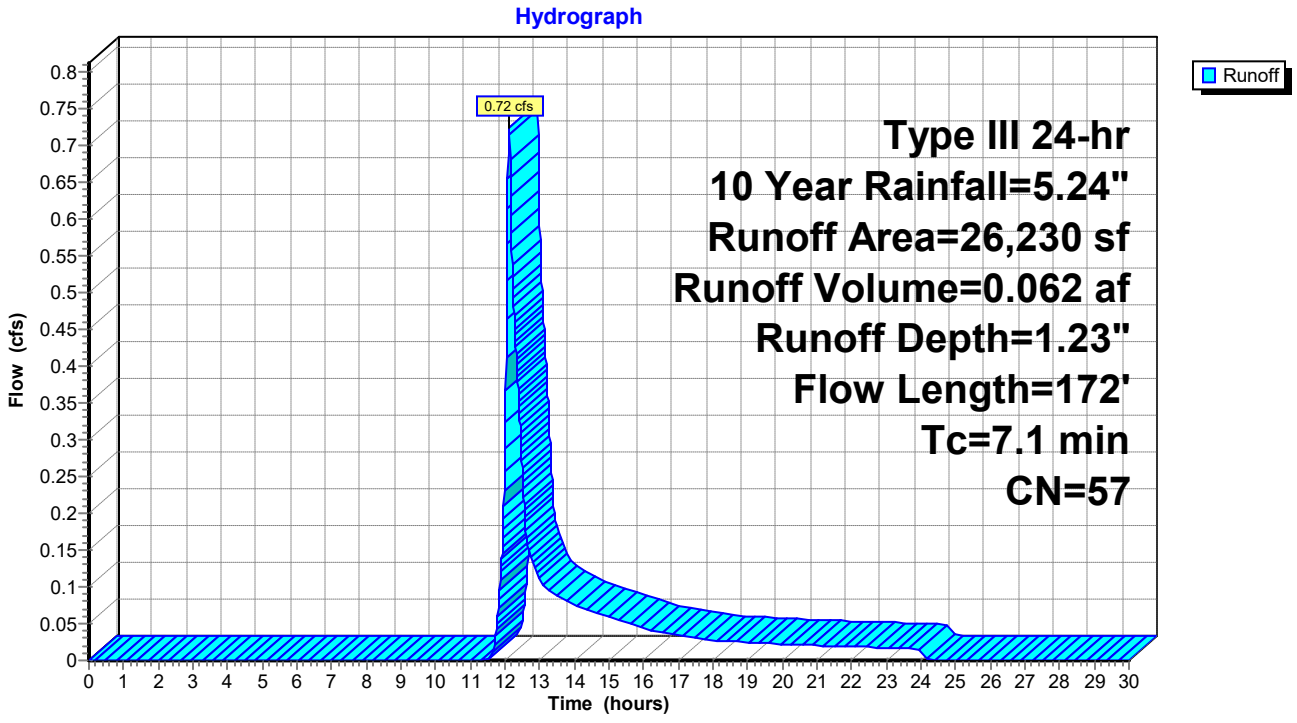
Runoff = 0.72 cfs @ 12.12 hrs, Volume= 0.062 af, Depth= 1.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.24"

Area (sf)	CN	Description
720	98	Paved parking, HSG B
5,287	61	>75% Grass cover, Good, HSG B
20,223	55	Woods, Good, HSG B
26,230	57	Weighted Average
25,510		97.26% Pervious Area
720		2.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	50	0.1740	0.16		**Sheet Flow, Segment 1** Woods: Light underbrush n= 0.400 P2= 3.35"
2.0	122	0.0434	1.04		**Shallow Concentrated Flow, Segment 2** Woodland Kv= 5.0 fps
7.1	172	Total			

Subcatchment P-1: Uncontrolled to Street



Summary for Subcatchment P-10: Area Drains to Detention

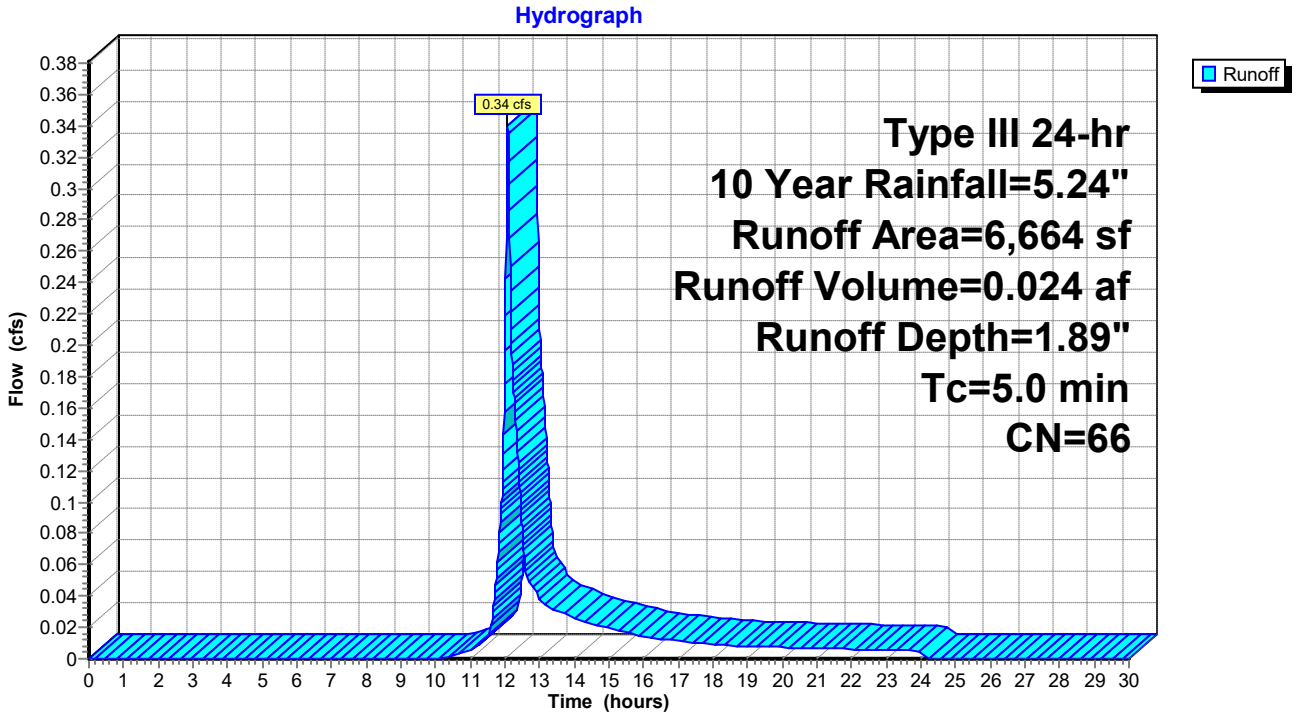
Runoff = 0.34 cfs @ 12.08 hrs, Volume= 0.024 af, Depth= 1.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.24"

Area (sf)	CN	Description
962	98	Paved parking, HSG B
5,702	61	>75% Grass cover, Good, HSG B
6,664	66	Weighted Average
5,702		85.56% Pervious Area
962		14.44% Impervious Area

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

Subcatchment P-10: Area Drains to Detention



Summary for Subcatchment P-11: Area Drains to Recharger

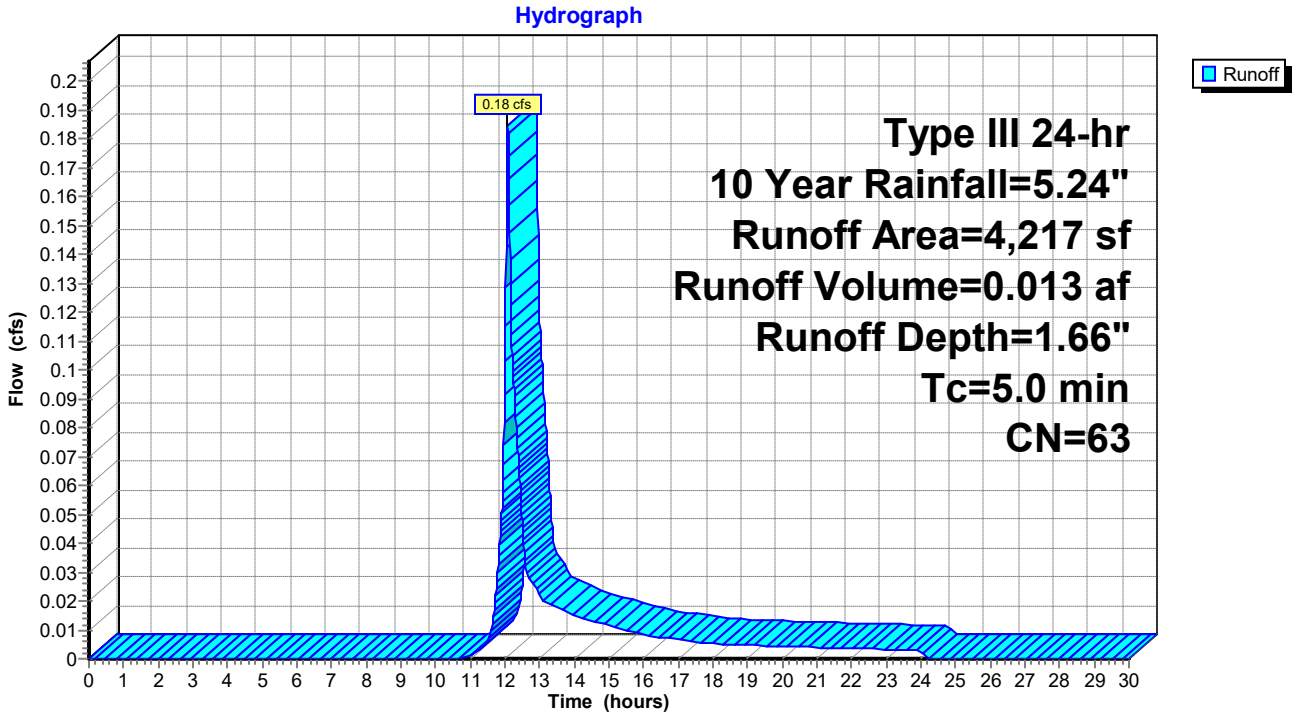
Runoff = 0.18 cfs @ 12.08 hrs, Volume= 0.013 af, Depth= 1.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.24"

Area (sf)	CN	Description
203	98	Paved parking, HSG B
4,014	61	>75% Grass cover, Good, HSG B
4,217	63	Weighted Average
4,014		95.19% Pervious Area
203		4.81% Impervious Area

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

Subcatchment P-11: Area Drains to Recharger



Summary for Subcatchment P-2a: Driveway & Yard

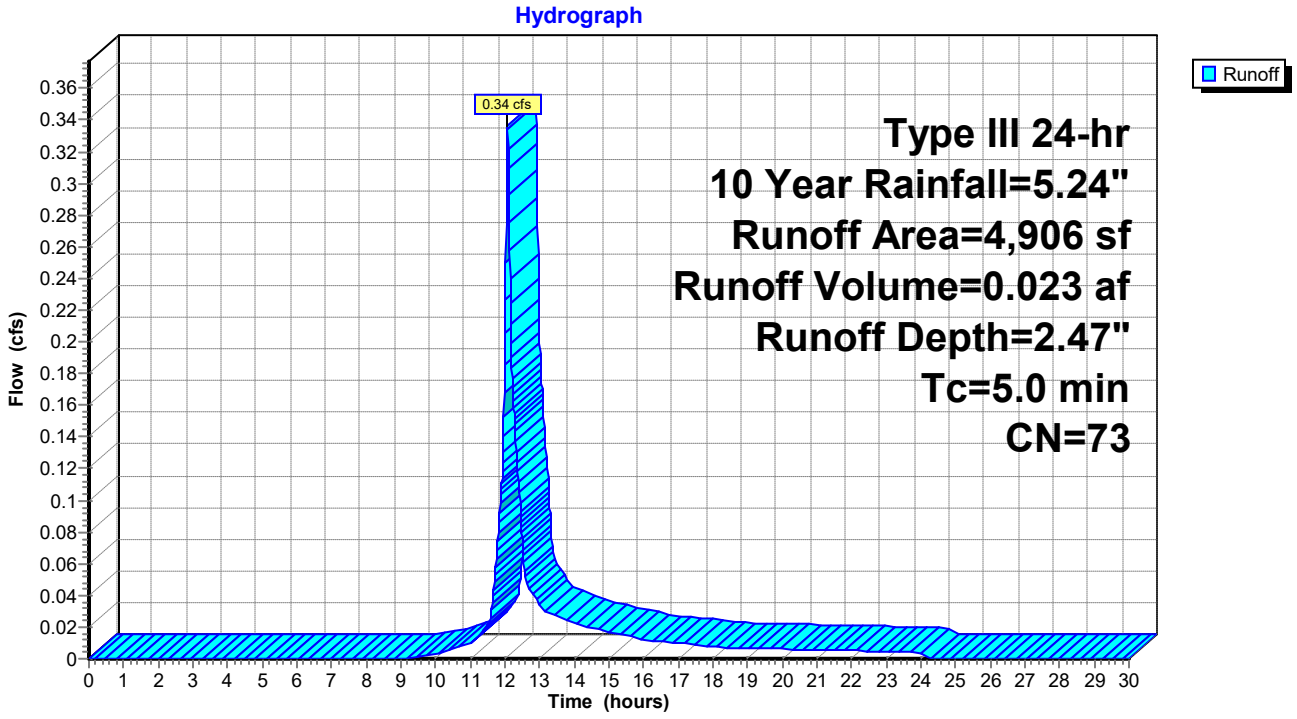
Runoff = 0.34 cfs @ 12.08 hrs, Volume= 0.023 af, Depth= 2.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.24"

Area (sf)	CN	Description
1,639	98	Paved parking, HSG B
3,267	61	>75% Grass cover, Good, HSG B
4,906	73	Weighted Average
3,267		66.59% Pervious Area
1,639		33.41% Impervious Area

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

Subcatchment P-2a: Driveway & Yard



Summary for Subcatchment P-2b: Uncontrolled to Abutter

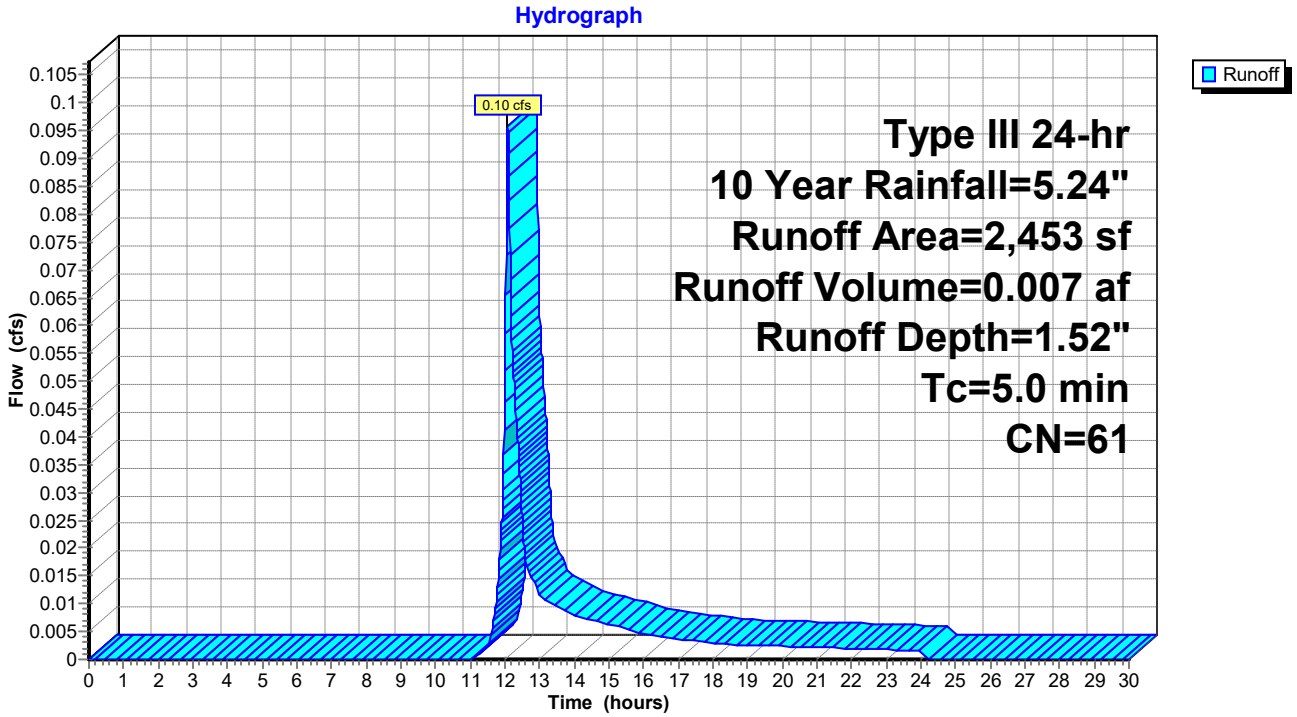
Runoff = 0.10 cfs @ 12.08 hrs, Volume= 0.007 af, Depth= 1.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.24"

Area (sf)	CN	Description
2,453	61	>75% Grass cover, Good, HSG B
2,453		100.00% Pervious Area

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

Subcatchment P-2b: Uncontrolled to Abutter



Summary for Subcatchment P-3: Uncontrolled to V.P.

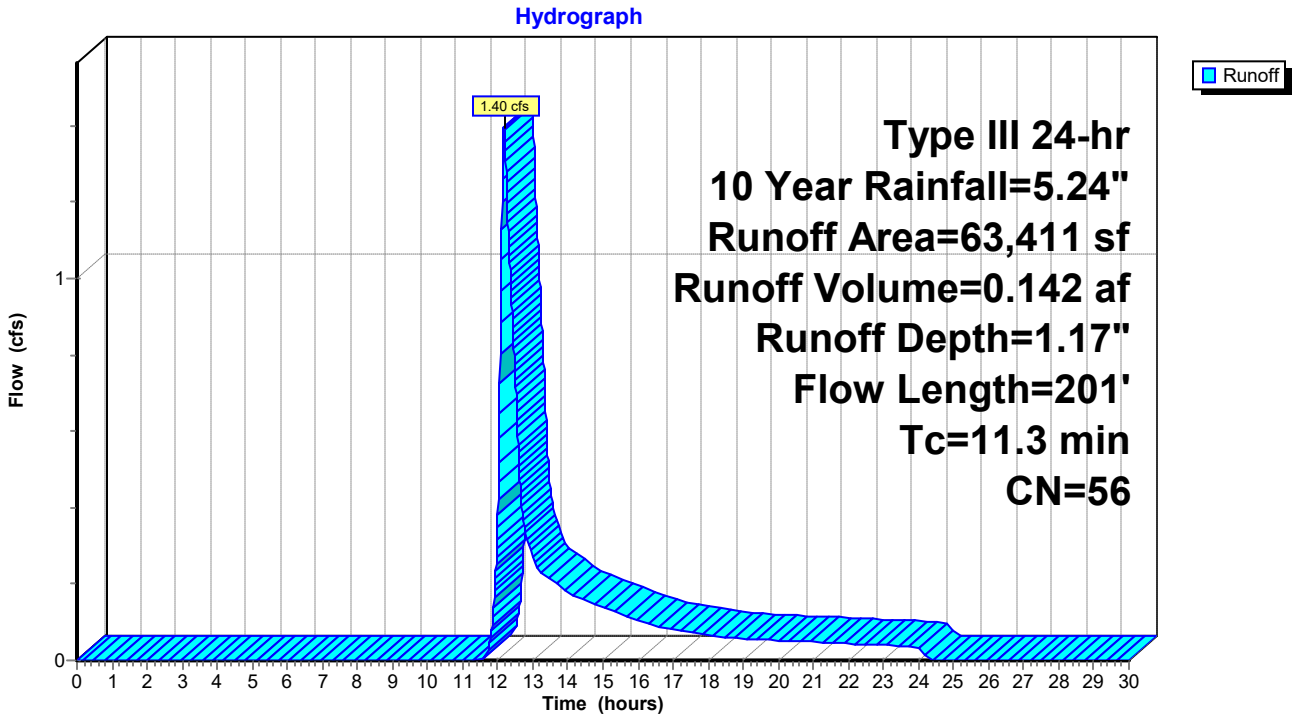
Runoff = 1.40 cfs @ 12.18 hrs, Volume= 0.142 af, Depth= 1.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.24"

Area (sf)	CN	Description
13,614	61	>75% Grass cover, Good, HSG B
49,797	55	Woods, Good, HSG B
63,411	56	Weighted Average
63,411		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.1	50	0.0400	0.09		**Sheet Flow, Segment 1** Woods: Light underbrush n= 0.400 P2= 3.35"
0.8	73	0.0507	1.58		**Shallow Concentrated Flow, Segment 2** Short Grass Pasture Kv= 7.0 fps
1.4	78	0.0359	0.95		**Shallow Concentrated Flow, Segment 3** Woodland Kv= 5.0 fps
11.3	201	Total			

Subcatchment P-3: Uncontrolled to V.P.



Summary for Subcatchment P-4: Uncontrolled to Wetlands

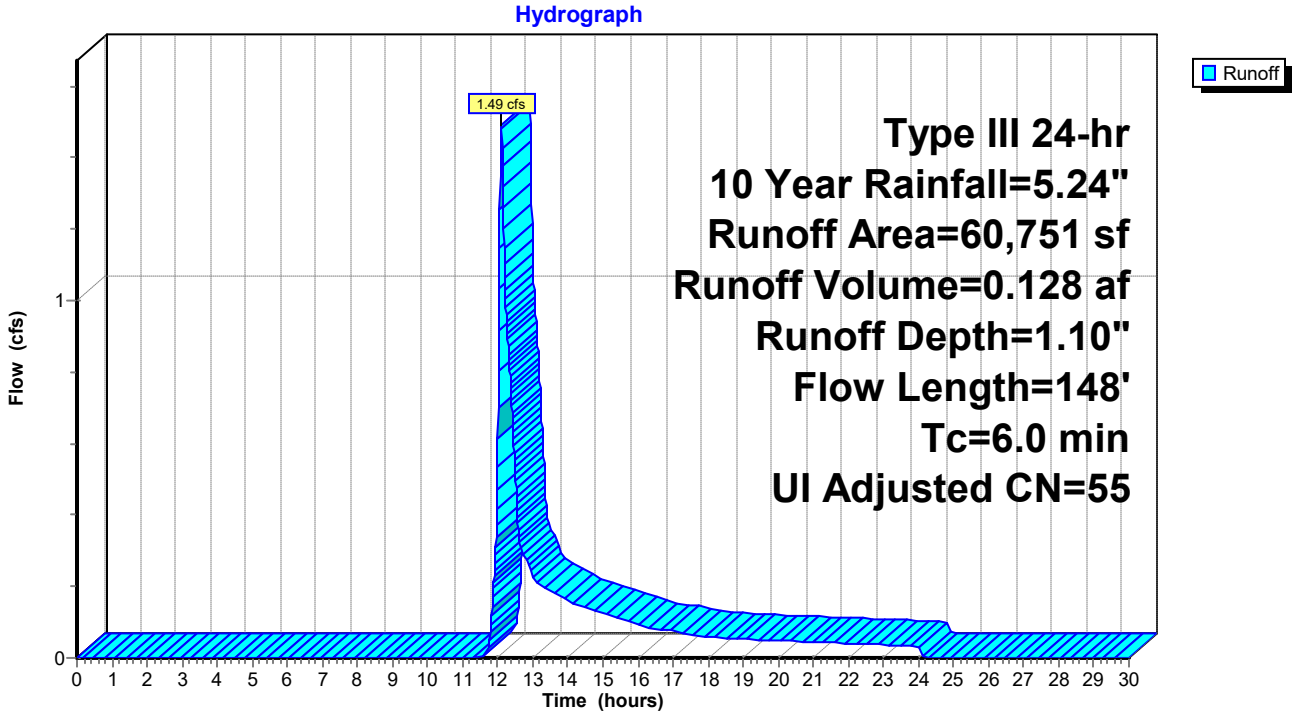
Runoff = 1.49 cfs @ 12.10 hrs, Volume= 0.128 af, Depth= 1.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.24"

Area (sf)	CN	Adj	Description
387	98		Unconnected pavement, HSG B
2,570	61		>75% Grass cover, Good, HSG B
57,794	55		Woods, Good, HSG B
60,751	56	55	Weighted Average, UI Adjusted
60,364			99.36% Pervious Area
387			0.64% Impervious Area
387			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.7	50	0.2100	0.18		**Sheet Flow, Segment 1** Woods: Light underbrush n= 0.400 P2= 3.35"
1.3	98	0.0663	1.29		**Shallow Concentrated Flow, Segment 2** Woodland Kv= 5.0 fps
6.0	148	Total			

Subcatchment P-4: Uncontrolled to Wetlands



Summary for Subcatchment P-5: New Building

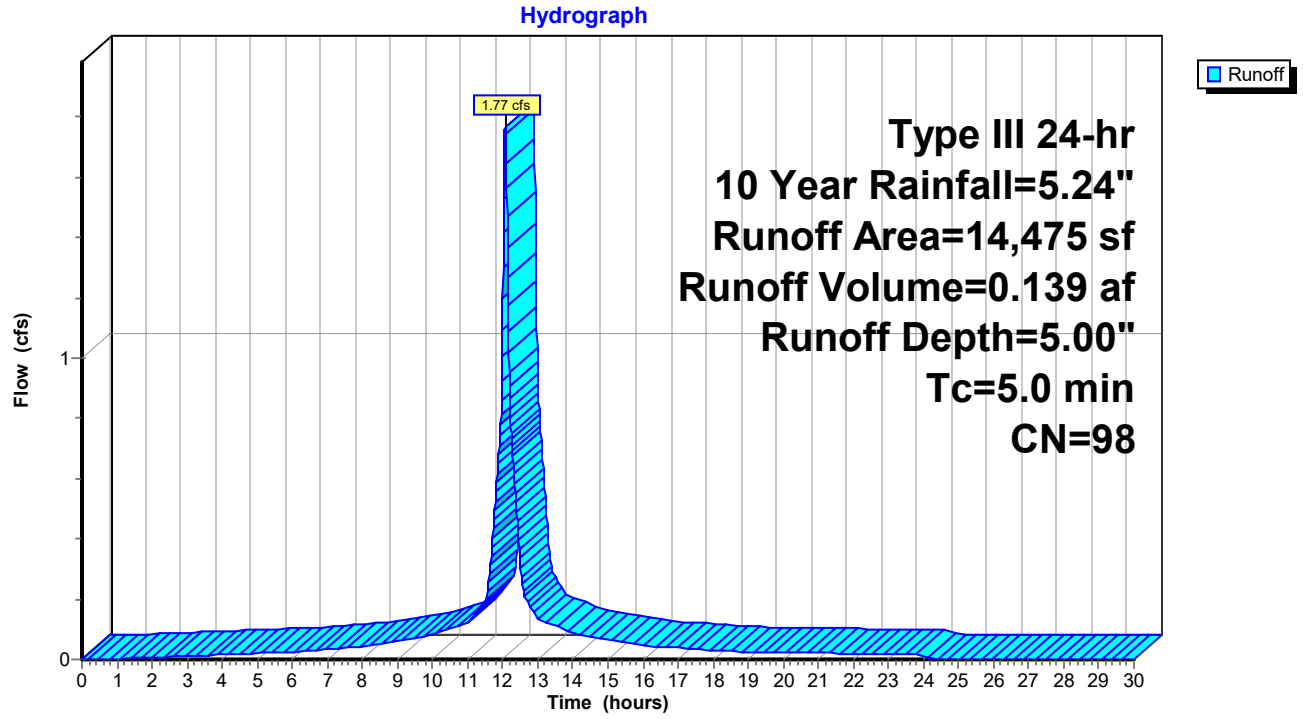
Runoff = 1.77 cfs @ 12.07 hrs, Volume= 0.139 af, Depth= 5.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.24"

Area (sf)	CN	Description
14,475	98	Roofs, HSG B
14,475		100.00% Impervious Area

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

Subcatchment P-5: New Building



Summary for Subcatchment P-6: Parking Lot & Driveway & SAS (partial)

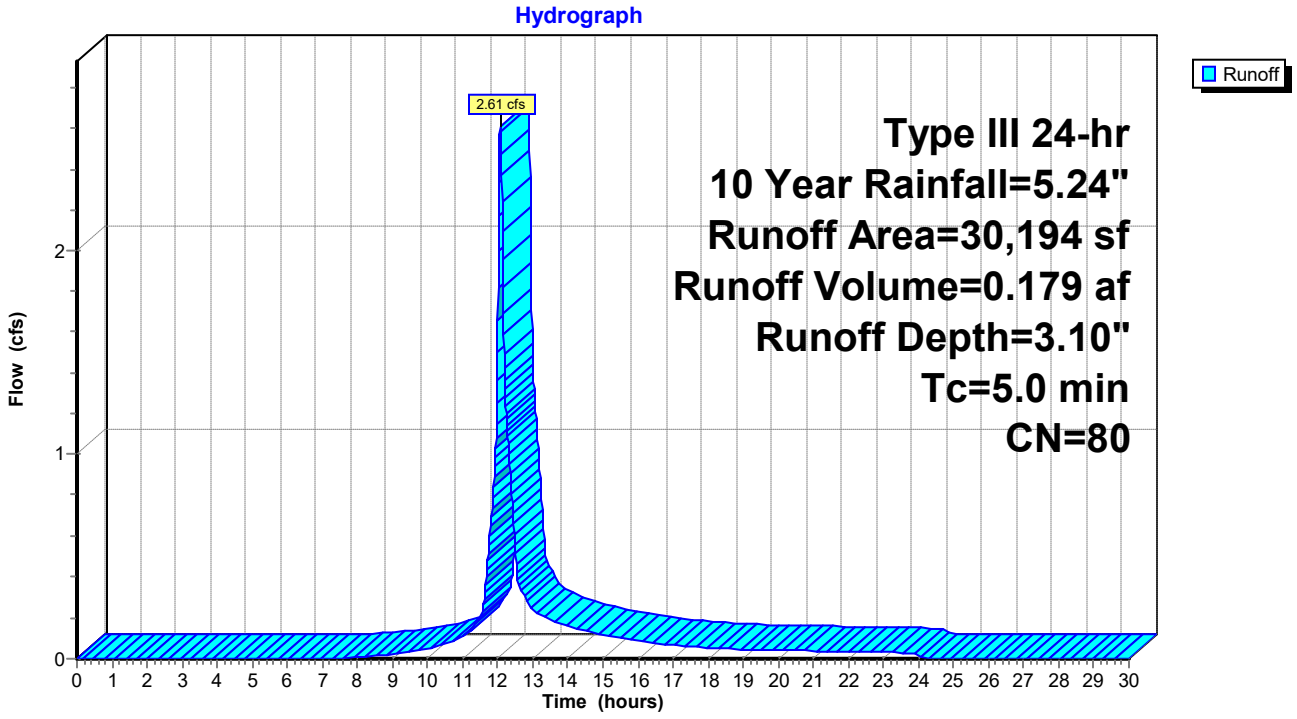
Runoff = 2.61 cfs @ 12.07 hrs, Volume= 0.179 af, Depth= 3.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.24"

Area (sf)	CN	Description
15,610	98	Paved parking, HSG B
14,584	61	>75% Grass cover, Good, HSG B
30,194	80	Weighted Average
14,584		48.30% Pervious Area
15,610		51.70% Impervious Area

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

Subcatchment P-6: Parking Lot & Driveway & SAS (partial)



Summary for Subcatchment P-7: Parking Lot & Driveway

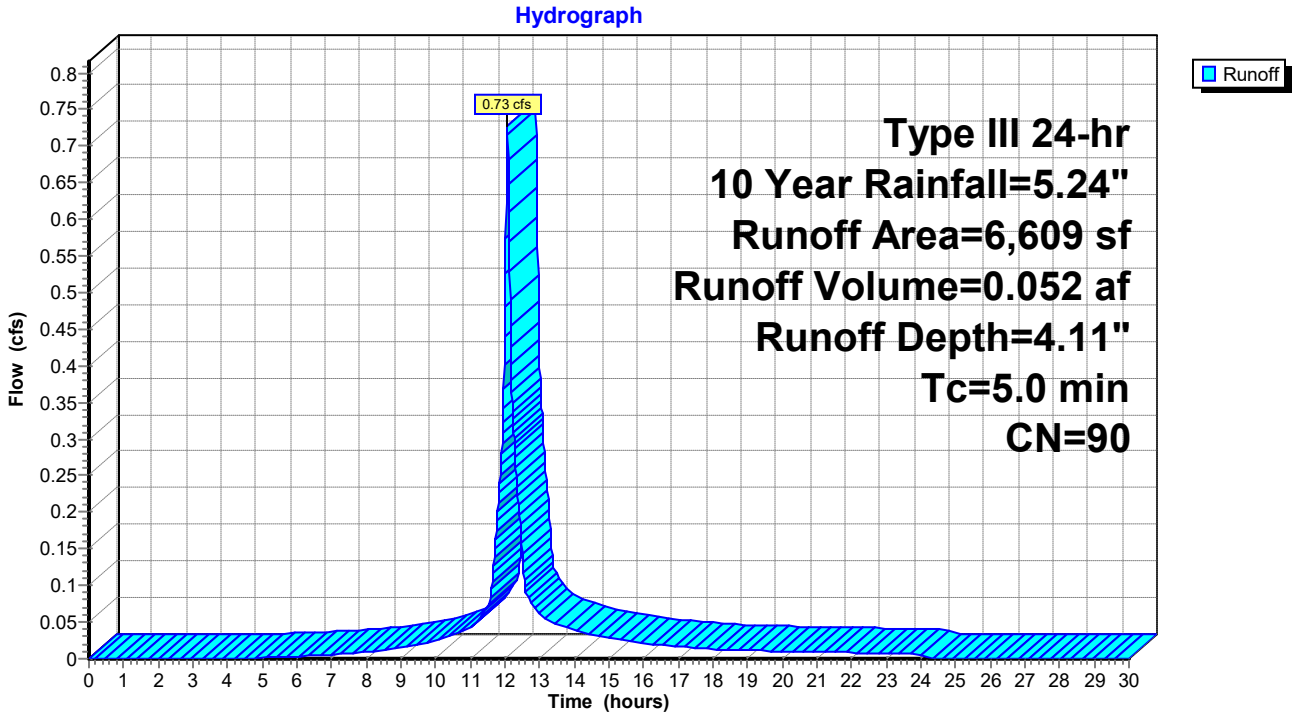
Runoff = 0.73 cfs @ 12.07 hrs, Volume= 0.052 af, Depth= 4.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.24"

Area (sf)	CN	Description
5,107	98	Paved parking, HSG B
1,502	61	>75% Grass cover, Good, HSG B
6,609	90	Weighted Average
1,502		22.73% Pervious Area
5,107		77.27% Impervious Area

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

Subcatchment P-7: Parking Lot & Driveway



Summary for Subcatchment P-8: Parking Lot & Driveway

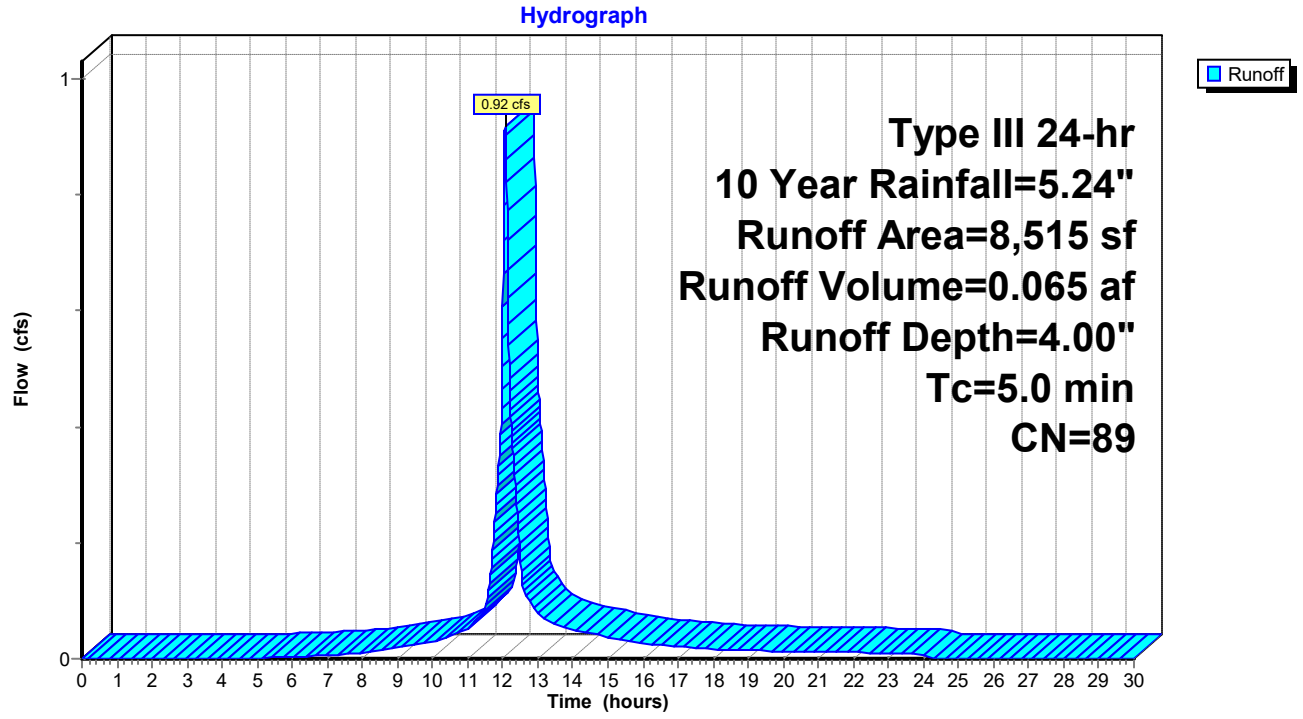
Runoff = 0.92 cfs @ 12.07 hrs, Volume= 0.065 af, Depth= 4.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.24"

Area (sf)	CN	Description
6,453	98	Paved parking, HSG B
2,062	61	>75% Grass cover, Good, HSG B
8,515	89	Weighted Average
2,062		24.22% Pervious Area
6,453		75.78% Impervious Area

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

Subcatchment P-8: Parking Lot & Driveway



Summary for Subcatchment P-9: Parking Lot & Driveway

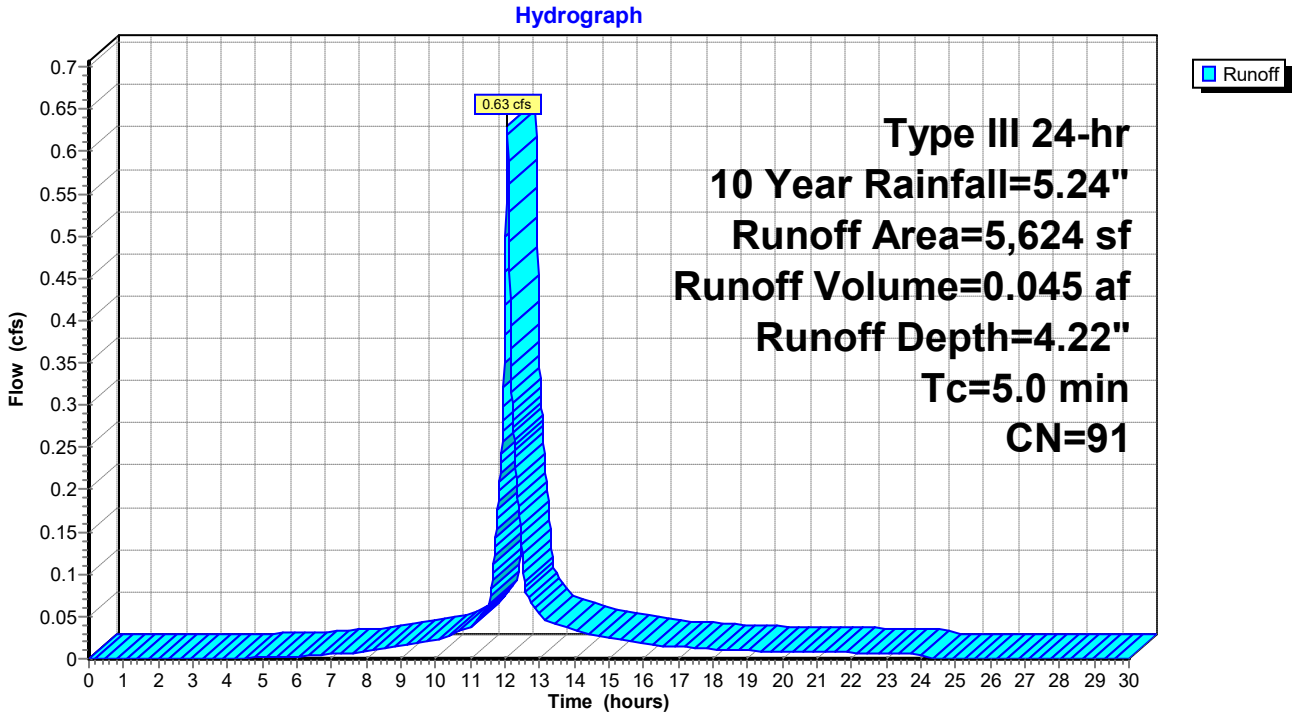
Runoff = 0.63 cfs @ 12.07 hrs, Volume= 0.045 af, Depth= 4.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=5.24"

Area (sf)	CN	Description
4,496	98	Paved parking, HSG B
1,128	61	>75% Grass cover, Good, HSG B
5,624	91	Weighted Average
1,128		20.06% Pervious Area
4,496		79.94% Impervious Area

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

Subcatchment P-9: Parking Lot & Driveway



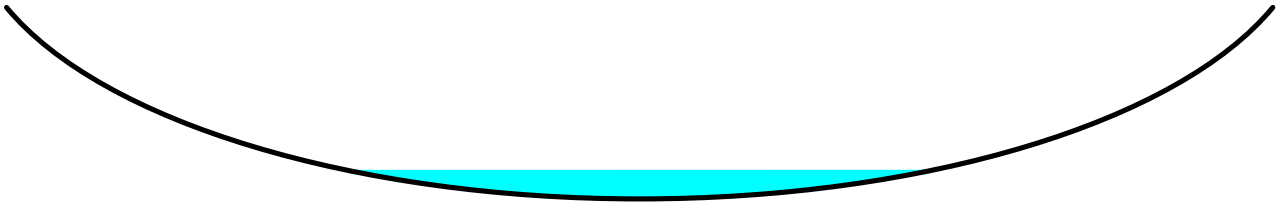
Summary for Reach 1R: Pipe Outfall

Inflow Area = 0.845 ac, 56.29% Impervious, Inflow Depth > 0.29" for 10 Year event
Inflow = 0.02 cfs @ 18.80 hrs, Volume= 0.020 af
Outflow = 0.02 cfs @ 18.82 hrs, Volume= 0.020 af, Atten= 0%, Lag= 1.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 0.23 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 0.21 fps, Avg. Travel Time= 0.8 min

Peak Storage= 1 cf @ 18.81 hrs
Average Depth at Peak Storage= 0.03'
Bank-Full Depth= 0.20' Flow Area= 1.3 sf, Capacity= 1.06 cfs

10.00' x 0.20' deep Parabolic Channel, n= 0.069 Riprap, 6-inch
Length= 10.0' Slope= 0.0200 '/'
Inlet Invert= 207.00', Outlet Invert= 206.80'



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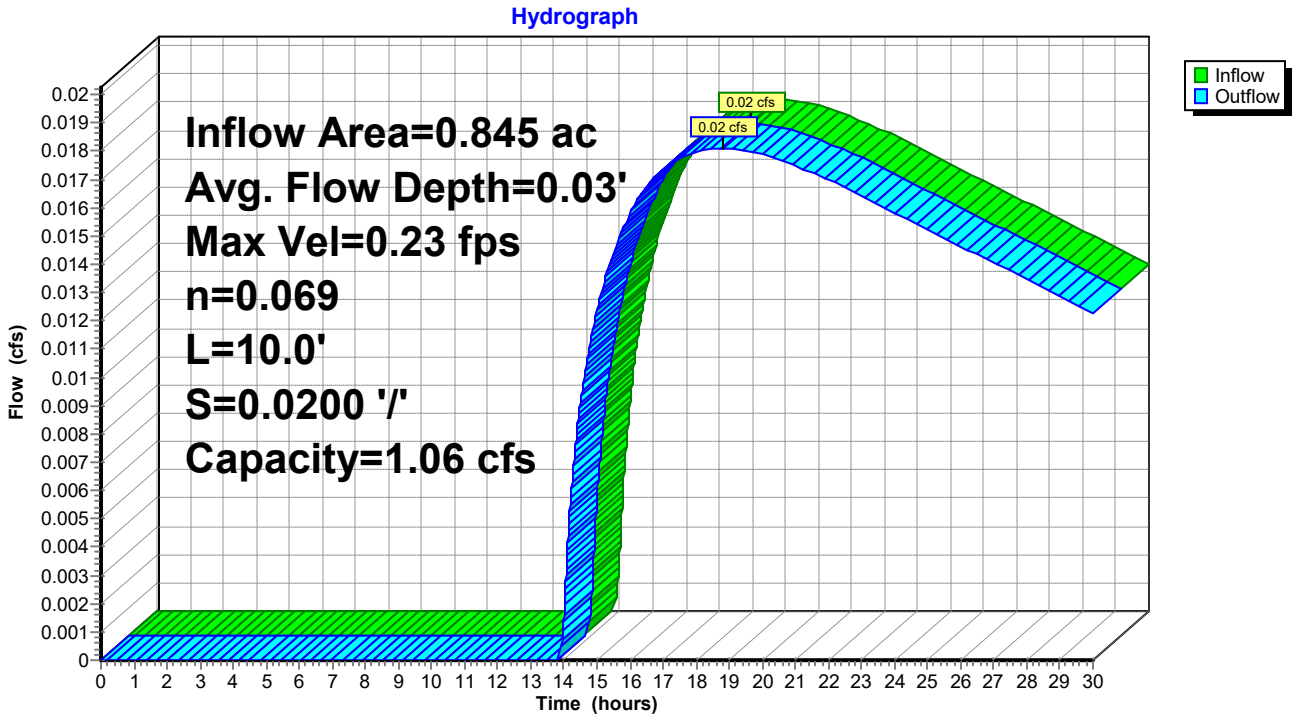
Reach 1R: Pipe Outfall



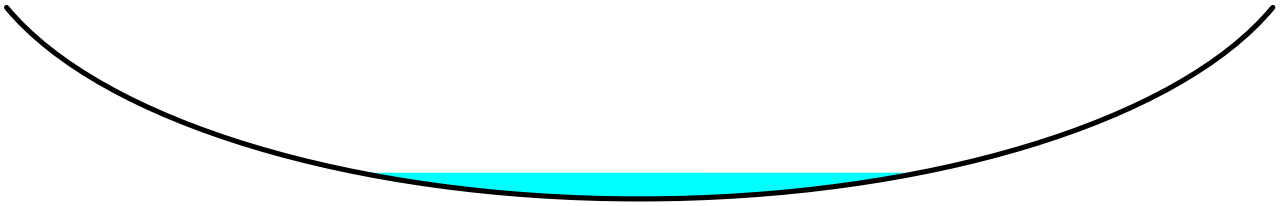
Summary for Reach 2R: Plpe Outfall

Inflow Area = 0.907 ac, 67.32% Impervious, Inflow Depth > 0.41" for 10 Year event
Inflow = 0.02 cfs @ 17.82 hrs, Volume= 0.031 af
Outflow = 0.02 cfs @ 17.83 hrs, Volume= 0.031 af, Atten= 0%, Lag= 0.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 0.33 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 0.32 fps, Avg. Travel Time= 0.5 min

Peak Storage= 1 cf @ 17.83 hrs
Average Depth at Peak Storage= 0.03'
Bank-Full Depth= 0.20' Flow Area= 1.3 sf, Capacity= 1.67 cfs

10.00' x 0.20' deep Parabolic Channel, n= 0.069 Riprap, 6-inch
Length= 10.0' Slope= 0.0500 '/'
Inlet Invert= 205.00', Outlet Invert= 204.50'



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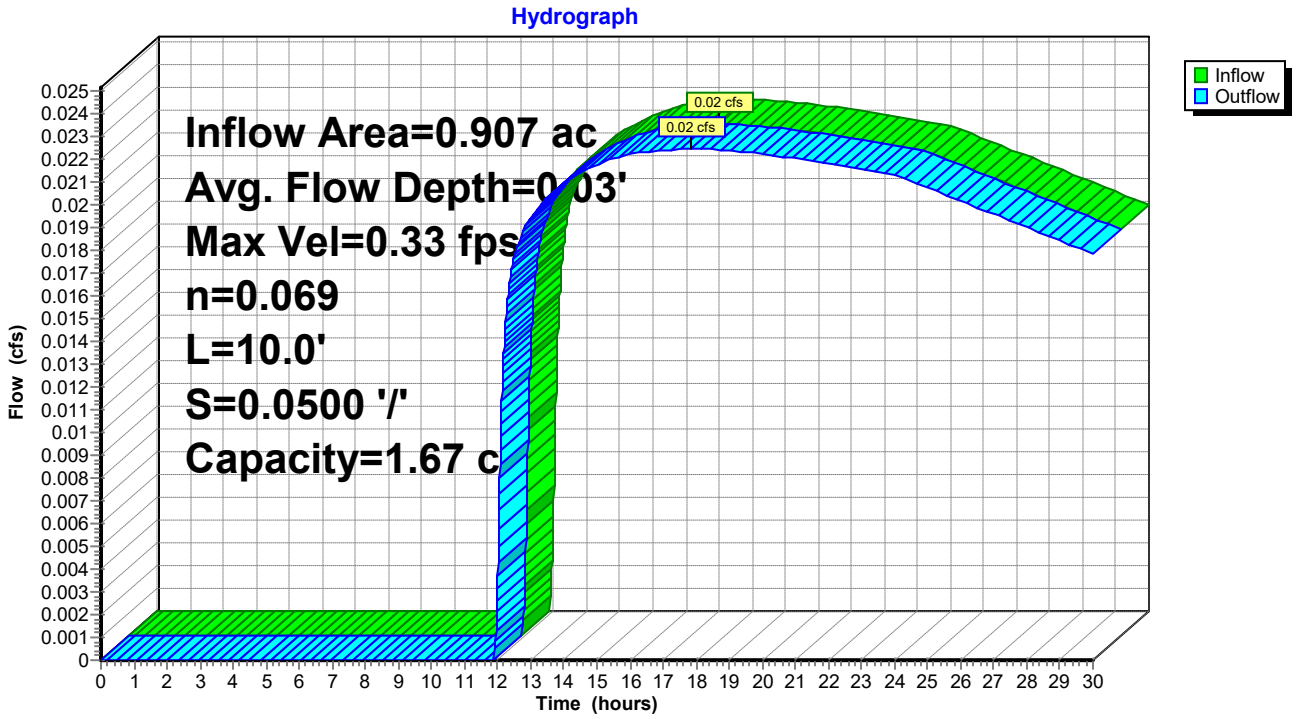
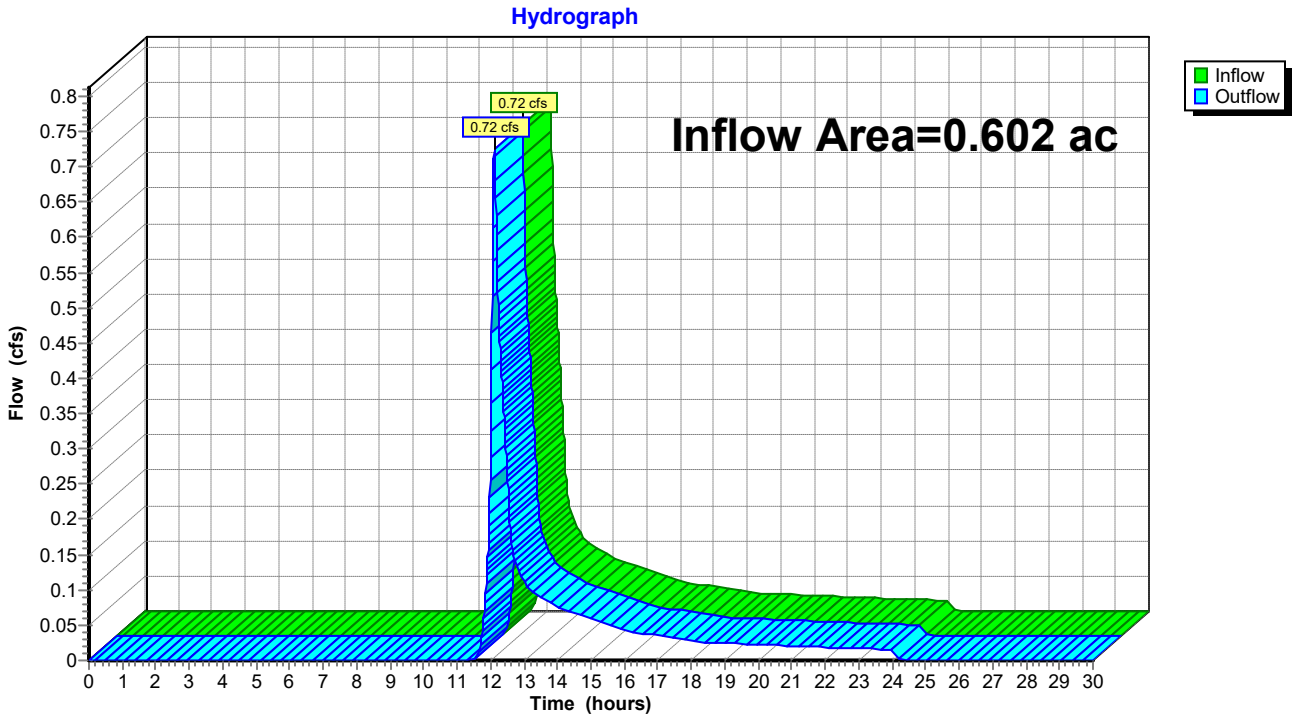


Summary for Reach DP-1: Washington Street

Inflow Area = 0.602 ac, 2.74% Impervious, Inflow Depth = 1.23" for 10 Year event
Inflow = 0.72 cfs @ 12.12 hrs, Volume= 0.062 af
Outflow = 0.72 cfs @ 12.12 hrs, Volume= 0.062 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Reach DP-1: Washington Street

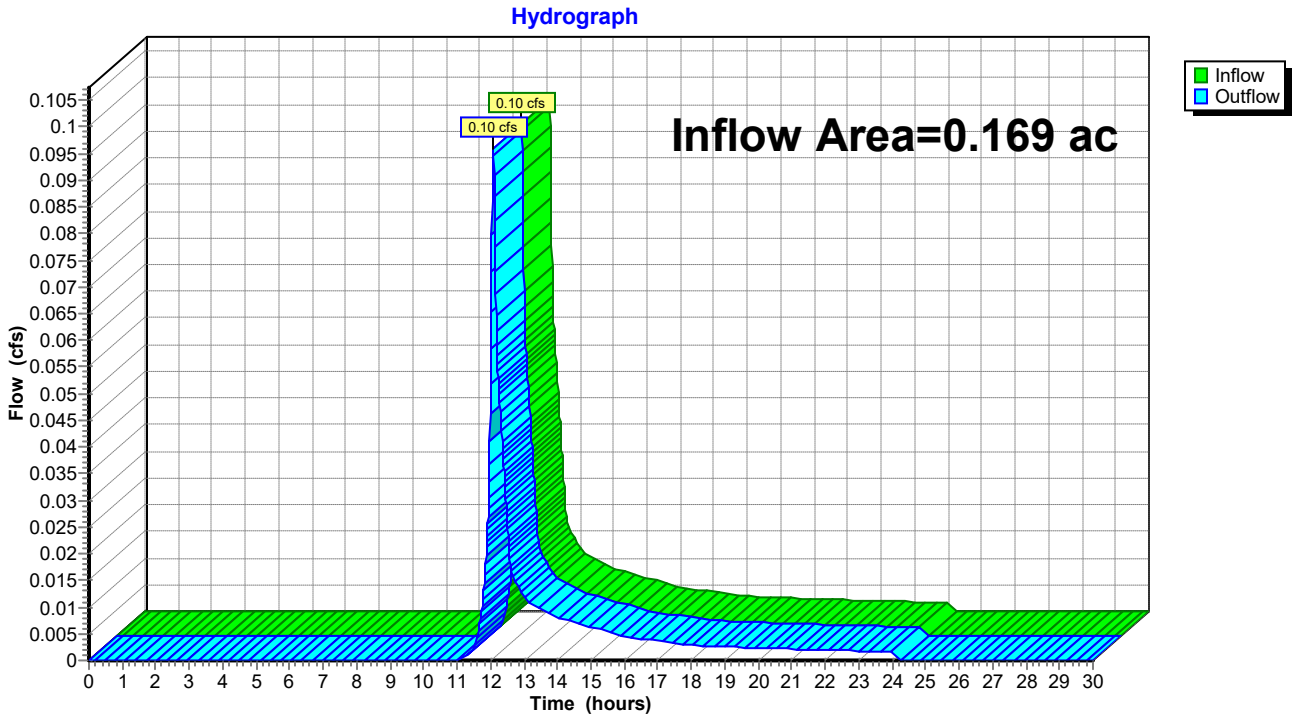


Summary for Reach DP-2: Abutting Property

Inflow Area = 0.169 ac, 22.27% Impervious, Inflow Depth = 0.51" for 10 Year event
Inflow = 0.10 cfs @ 12.08 hrs, Volume= 0.007 af
Outflow = 0.10 cfs @ 12.08 hrs, Volume= 0.007 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Reach DP-2: Abutting Property

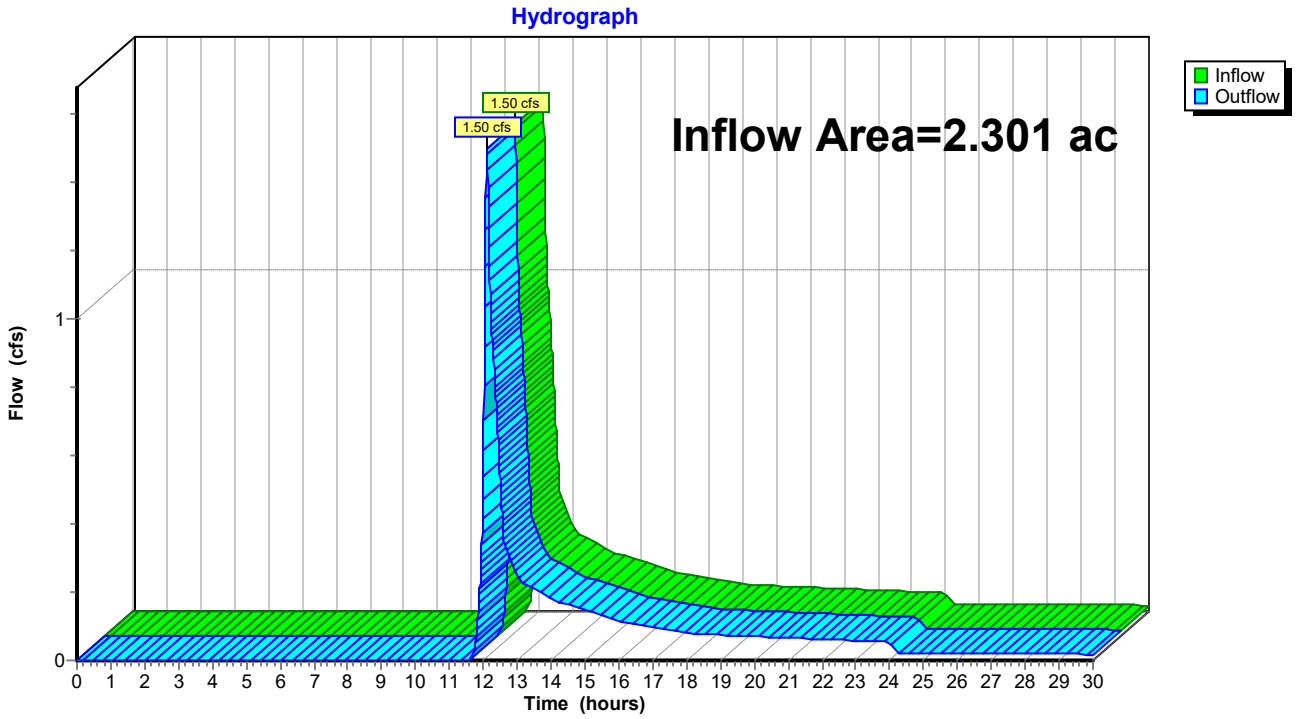


Summary for Reach DP-4: On-Site Wetlands

Inflow Area = 2.301 ac, 26.91% Impervious, Inflow Depth > 0.83" for 10 Year event
Inflow = 1.50 cfs @ 12.10 hrs, Volume= 0.159 af
Outflow = 1.50 cfs @ 12.10 hrs, Volume= 0.159 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Reach DP-4: On-Site Wetlands



Summary for Pond D1: Detention Basin #1

Inflow Area = 0.845 ac, 56.29% Impervious, Inflow Depth = 0.63" for 10 Year event
Inflow = 0.17 cfs @ 13.66 hrs, Volume= 0.044 af
Outflow = 0.02 cfs @ 18.80 hrs, Volume= 0.020 af, Atten= 90%, Lag= 308.6 min
Primary = 0.02 cfs @ 18.80 hrs, Volume= 0.020 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 208.02' @ 18.80 hrs Surf.Area= 2,516 sf Storage= 1,583 cf
Flood Elev= 210.50' Surf.Area= 2,516 sf Storage= 6,777 cf

Plug-Flow detention time= 487.5 min calculated for 0.020 af (46% of inflow)
Center-of-Mass det. time= 403.7 min (1,312.7 - 908.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	207.00'	814 cf	**34.00'W x 74.00'L x 4.17'H Field A** 10,483 cf Overall - 8,448 cf Embedded = 2,035 cf x 40.0% Voids
#2A	207.50'	6,019 cf	**retain_it retain_it 3.0'** x 36 Inside #1 Inside= 84.0"W x 36.0"H => 21.33 sf x 8.00'L = 170.6 cf Outside= 96.0"W x 44.0"H => 29.33 sf x 8.00'L = 234.7 cf 4 Rows adjusted for 122.7 cf perimeter wall
		6,833 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	207.50'	**10.0" Round Culvert** L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 207.50' / 207.00' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf
#2	Device 1	210.40'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Device 1	207.50'	**1.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.02 cfs @ 18.80 hrs HW=208.02' (Free Discharge)
└**1=Culvert** (Passes 0.02 cfs of 0.87 cfs potential flow)
  ├**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
  └**3=Orifice/Grate** (Orifice Controls 0.02 cfs @ 3.32 fps)

Pond D1: Detention Basin #1 - Chamber Wizard Field A

Chamber Model = retain_it retain_it 3.0' (retain-it®)
Inside= 84.0"W x 36.0"H => 21.33 sf x 8.00'L = 170.6 cf
Outside= 96.0"W x 44.0"H => 29.33 sf x 8.00'L = 234.7 cf
4 Rows adjusted for 122.7 cf perimeter wall

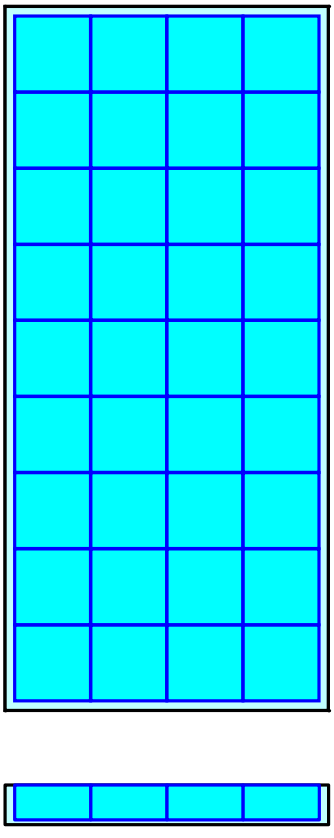
9 Chambers/Row x 8.00' Long = 72.00' Row Length +12.0" End Stone x 2 = 74.00' Base Length
4 Rows x 96.0" Wide + 12.0" Side Stone x 2 = 34.00' Base Width
6.0" Base + 44.0" Chamber Height = 4.17' Field Height

4.7 cf Sidewall x 9 x 2 + 4.7 cf Endwall x 4 x 2 = 122.7 cf Perimeter Wall
36 Chambers x 170.6 cf - 122.7 cf Perimeter wall = 6,019.2 cf Chamber Storage
36 Chambers x 234.7 cf = 8,448.0 cf Displacement

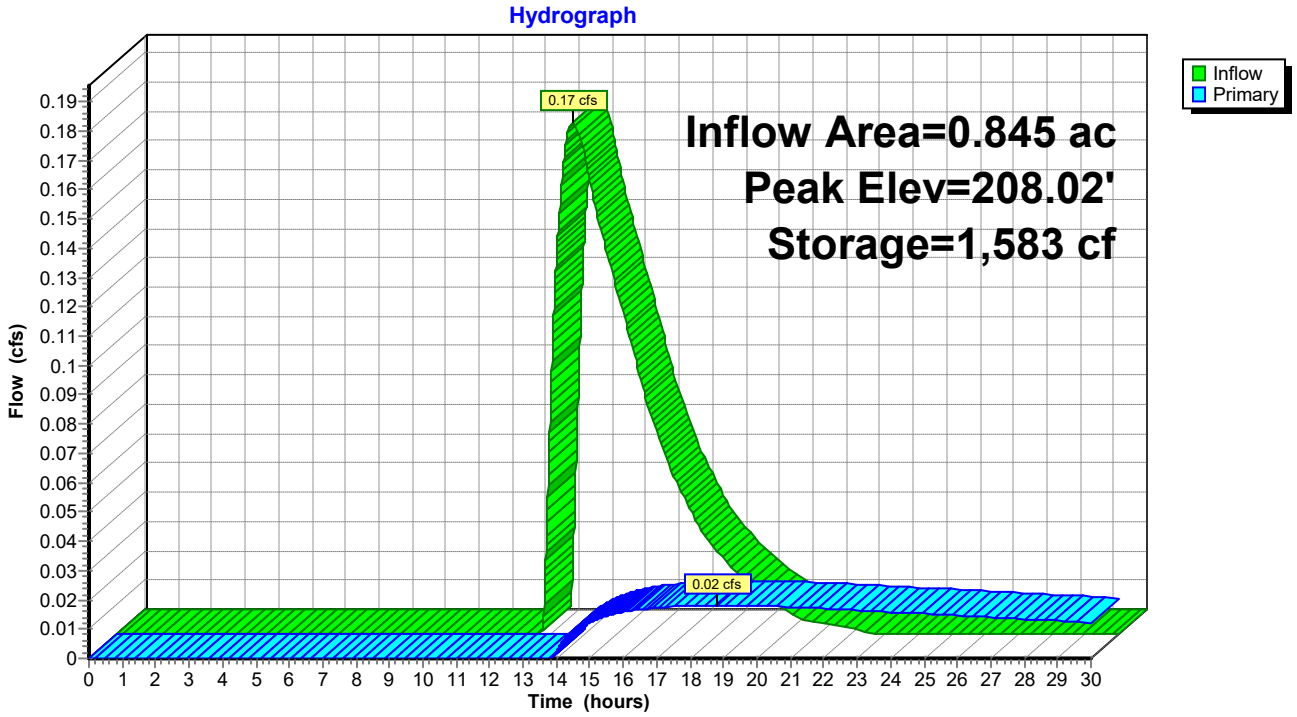
10,483.3 cf Field - 8,448.0 cf Chambers = 2,035.3 cf Stone x 40.0% Voids = 814.1 cf Stone Storage

Chamber Storage + Stone Storage = 6,833.4 cf = 0.157 af
Overall Storage Efficiency = 65.2%
Overall System Size = 74.00' x 34.00' x 4.17'

36 Chambers
388.3 cy Field
75.4 cy Stone



Pond D1: Detention Basin #1



Summary for Pond D2: Detention Basin #2

Inflow Area = 0.907 ac, 67.32% Impervious, Inflow Depth = 0.92" for 10 Year event
Inflow = 0.97 cfs @ 12.07 hrs, Volume= 0.070 af
Outflow = 0.02 cfs @ 17.82 hrs, Volume= 0.031 af, Atten= 98%, Lag= 344.8 min
Primary = 0.02 cfs @ 17.82 hrs, Volume= 0.031 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 206.27' @ 17.82 hrs Surf.Area= 2,628 sf Storage= 2,266 cf
Flood Elev= 210.00' Surf.Area= 2,628 sf Storage= 10,073 cf

Plug-Flow detention time= 570.4 min calculated for 0.031 af (44% of inflow)
Center-of-Mass det. time= 444.0 min (1,253.5 - 809.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	205.00'	1,108 cf	**18.00'W x 146.00'L x 5.58'H Field A** 14,673 cf Overall - 11,904 cf Embedded = 2,769 cf x 40.0% Voids
#2A	205.42'	9,041 cf	**retain_it retain_it 4.5'** x 36 Inside #1 Inside= 84.0"W x 54.0"H => 32.64 sf x 8.00'L = 261.1 cf Outside= 96.0"W x 62.0"H => 41.33 sf x 8.00'L = 330.7 cf 2 Rows adjusted for 358.8 cf perimeter wall
		10,149 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	205.50'	**10.0" Round Culvert** L= 12.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 205.50' / 205.00' S= 0.0417 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf
#2	Device 1	209.50'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Device 1	205.50'	**1.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.02 cfs @ 17.82 hrs HW=206.27' (Free Discharge)
└**1=Culvert** (Passes 0.02 cfs of 1.58 cfs potential flow)
├**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└**3=Orifice/Grate** (Orifice Controls 0.02 cfs @ 4.11 fps)

Pond D2: Detention Basin #2 - Chamber Wizard Field A

Chamber Model = retain_it retain_it 4.5' (retain-it®)
Inside= 84.0"W x 54.0"H => 32.64 sf x 8.00'L = 261.1 cf
Outside= 96.0"W x 62.0"H => 41.33 sf x 8.00'L = 330.7 cf
2 Rows adjusted for 358.8 cf perimeter wall

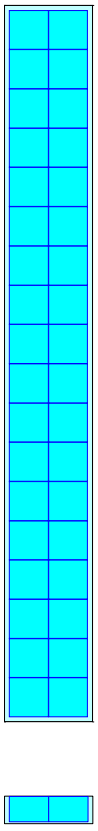
18 Chambers/Row x 8.00' Long = 144.00' Row Length +12.0" End Stone x 2 = 146.00' Base Length
2 Rows x 96.0" Wide + 12.0" Side Stone x 2 = 18.00' Base Width
5.0" Base + 62.0" Chamber Height = 5.58' Field Height

9.0 cf Sidewall x 18 x 2 + 9.0 cf Endwall x 2 x 2 = 358.8 cf Perimeter Wall
36 Chambers x 261.1 cf - 358.8 cf Perimeter wall = 9,041.2 cf Chamber Storage
36 Chambers x 330.7 cf = 11,904.0 cf Displacement

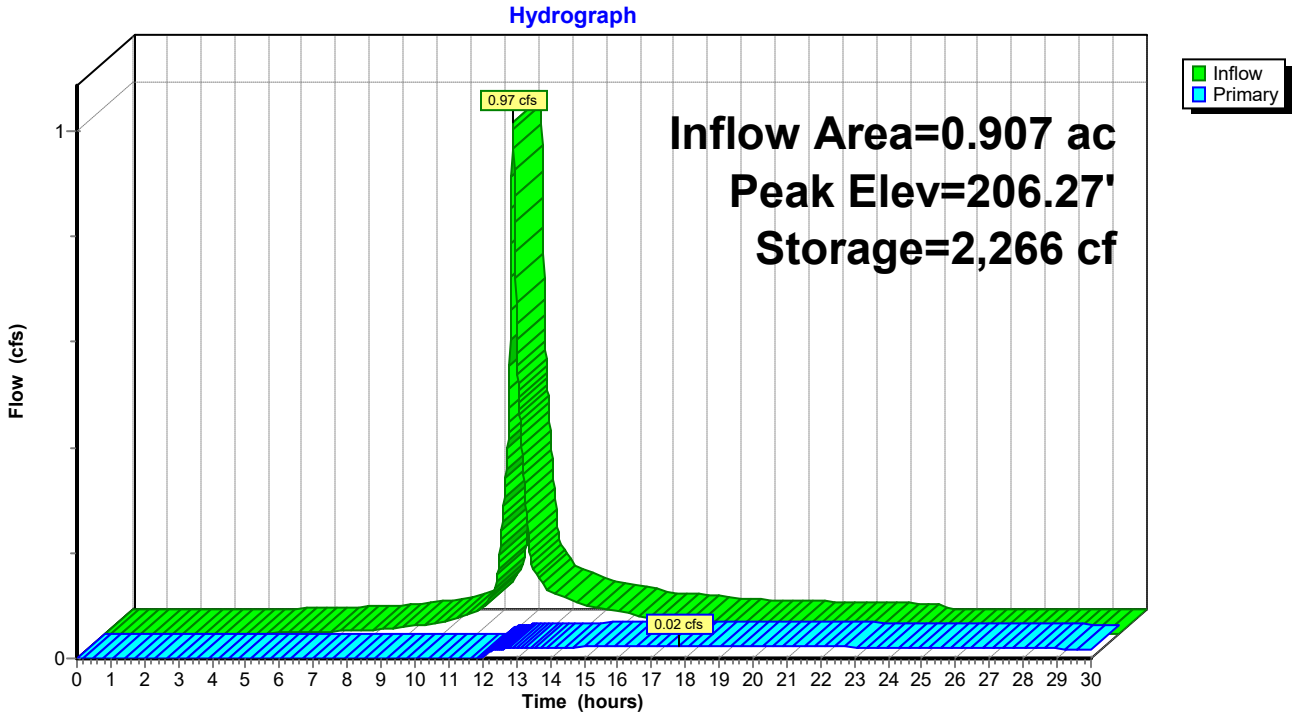
14,673.0 cf Field - 11,904.0 cf Chambers = 2,769.0 cf Stone x 40.0% Voids = 1,107.6 cf Stone Storage

Chamber Storage + Stone Storage = 10,148.8 cf = 0.233 af
Overall Storage Efficiency = 69.2%
Overall System Size = 146.00' x 18.00' x 5.58'

36 Chambers
543.4 cy Field
102.6 cy Stone



Pond D2: Detention Basin #2



Summary for Pond D3: Detention Basin #3

Inflow Area = 0.113 ac, 33.41% Impervious, Inflow Depth = 2.47" for 10 Year event
Inflow = 0.34 cfs @ 12.08 hrs, Volume= 0.023 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 207.17' @ 24.29 hrs Surf.Area= 955 sf Storage= 1,010 cf

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

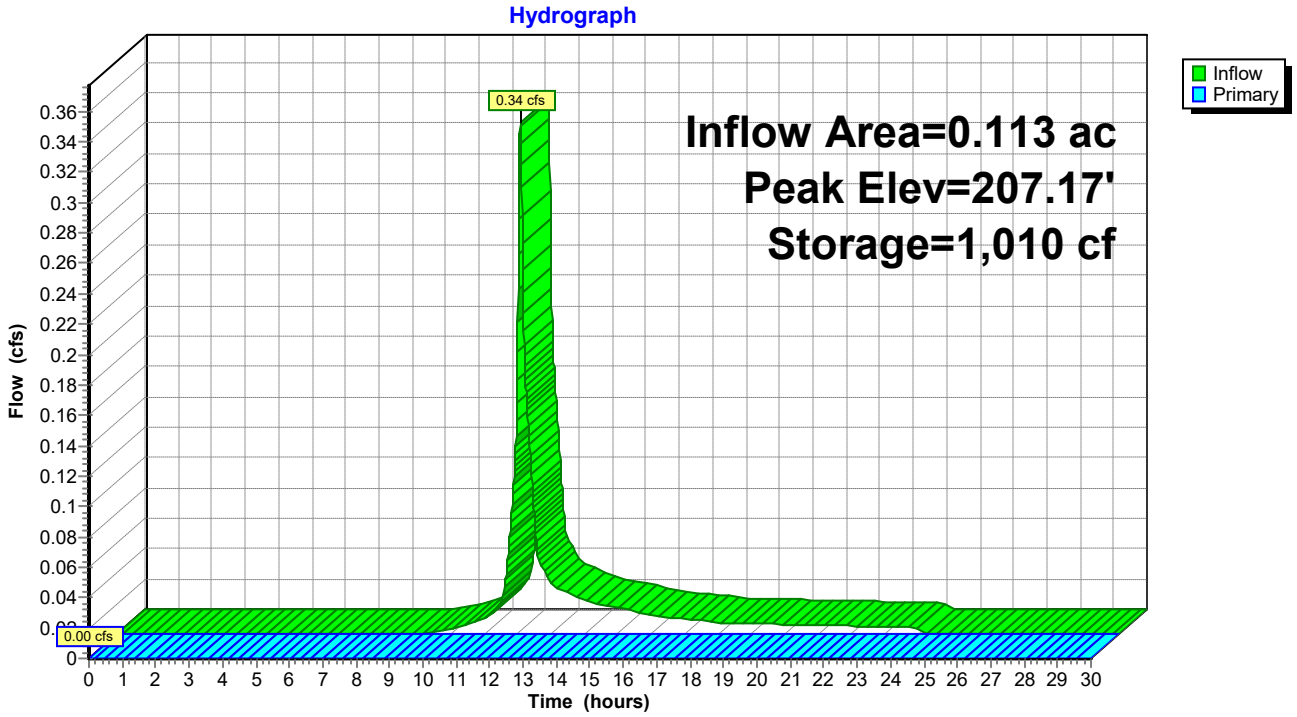
Volume	Invert	Avail.Storage	Storage Description
#1	205.50'	1,350 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
205.50	205	71.2	0	0	205
206.00	500	108.8	171	171	745
207.00	886	137.8	684	855	1,328
207.50	1,099	147.3	495	1,350	1,555

Device	Routing	Invert	Outlet Devices
#1	Primary	207.40'	**50.0' long x 1.0' 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=205.50' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond D3: Detention Basin #3



Summary for Pond R1: Recharger #1

Inflow Area = 0.845 ac, 56.29% Impervious, Inflow Depth = 3.28" for 10 Year event
Inflow = 3.34 cfs @ 12.07 hrs, Volume= 0.231 af
Outflow = 0.23 cfs @ 13.66 hrs, Volume= 0.135 af, Atten= 93%, Lag= 94.9 min
Discarded = 0.05 cfs @ 9.55 hrs, Volume= 0.091 af
Primary = 0.17 cfs @ 13.66 hrs, Volume= 0.044 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 210.43' @ 13.66 hrs Surf.Area= 2,160 sf Storage= 5,739 cf
Flood Elev= 212.60' Surf.Area= 2,160 sf Storage= 8,767 cf

Plug-Flow detention time= 367.2 min calculated for 0.135 af (59% of inflow)
Center-of-Mass det. time= 259.7 min (1,071.7 - 812.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	207.10'	870 cf	**36.00'W x 60.00'L x 5.71'H Field A** 12,330 cf Overall - 10,155 cf Embedded = 2,175 cf x 40.0% Voids
#2A	207.14'	7,927 cf	**retain_it retain_it 5.0'** x 28 Inside #1 Inside= 84.0"W x 60.0"H => 36.41 sf x 8.00'L = 291.3 cf Outside= 96.0"W x 68.0"H => 45.33 sf x 8.00'L = 362.7 cf 4 Rows adjusted for 228.6 cf perimeter wall
		8,797 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	210.20'	**8.0" Round Culvert** L= 14.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 210.20' / 210.00' S= 0.0143 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf
#2	Discarded	207.10'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.05 cfs @ 9.55 hrs HW=207.14' (Free Discharge)
↑**2=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.17 cfs @ 13.66 hrs HW=210.43' (Free Discharge)
↑**1=Culvert** (Barrel Controls 0.17 cfs @ 2.37 fps)

Pond R1: Recharger #1 - Chamber Wizard Field A

Chamber Model = retain_it retain_it 5.0' (retain-it®)
Inside= 84.0"W x 60.0"H => 36.41 sf x 8.00'L = 291.3 cf
Outside= 96.0"W x 68.0"H => 45.33 sf x 8.00'L = 362.7 cf
4 Rows adjusted for 228.6 cf perimeter wall

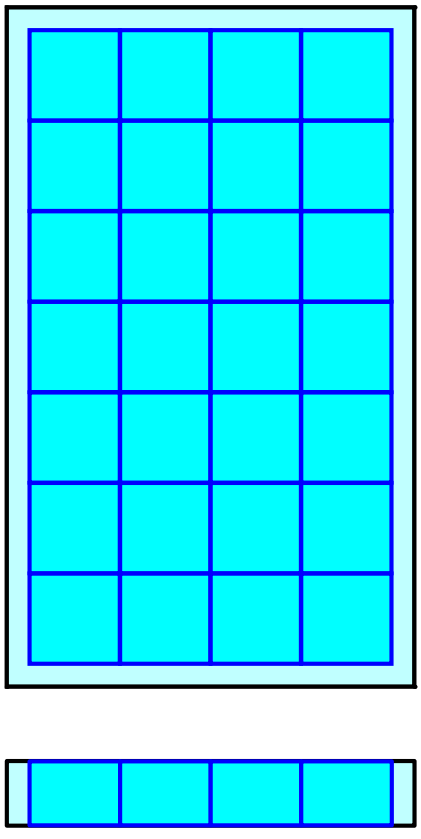
7 Chambers/Row x 8.00' Long = 56.00' Row Length +24.0" End Stone x 2 = 60.00' Base Length
4 Rows x 96.0" Wide + 24.0" Side Stone x 2 = 36.00' Base Width
0.5" Base + 68.0" Chamber Height = 5.71' Field Height

10.4 cf Sidewall x 7 x 2 + 10.4 cf Endwall x 4 x 2 = 228.6 cf Perimeter Wall
28 Chambers x 291.3 cf - 228.6 cf Perimeter wall = 7,927.3 cf Chamber Storage
28 Chambers x 362.7 cf = 10,154.7 cf Displacement

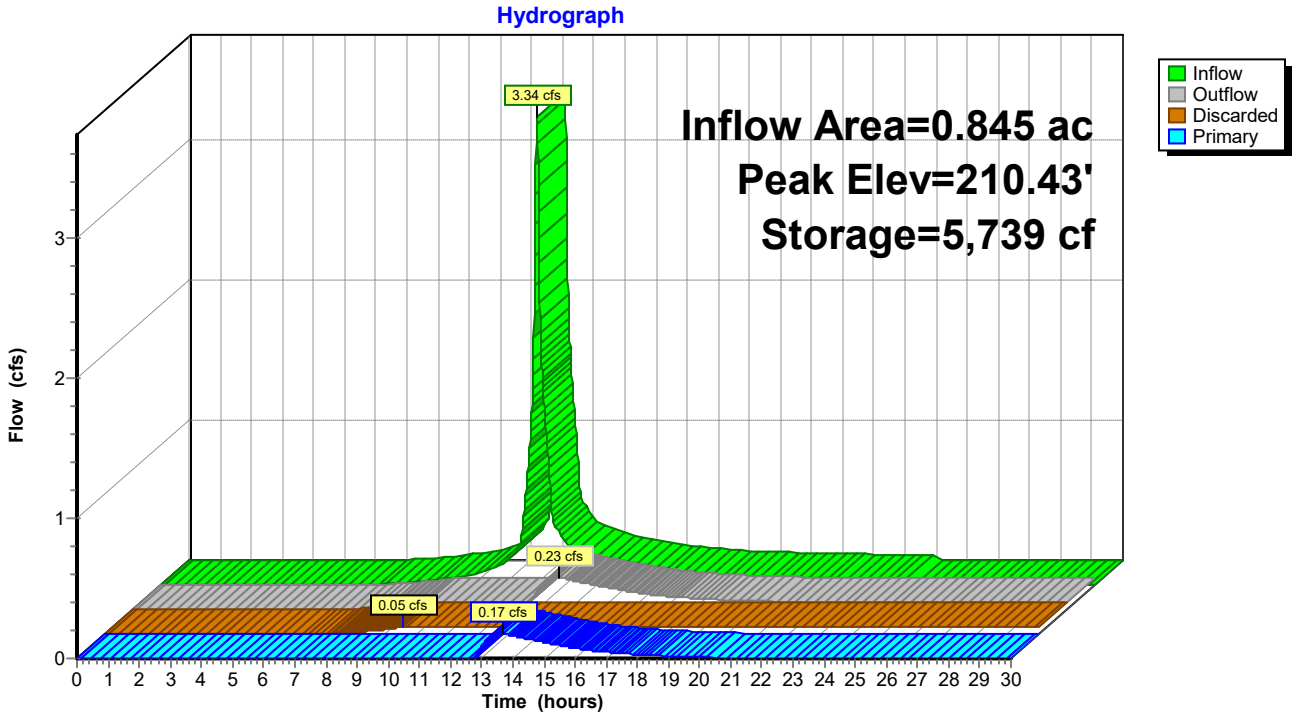
12,330.0 cf Field - 10,154.7 cf Chambers = 2,175.3 cf Stone x 40.0% Voids = 870.1 cf Stone Storage

Chamber Storage + Stone Storage = 8,797.4 cf = 0.202 af
Overall Storage Efficiency = 71.3%
Overall System Size = 60.00' x 36.00' x 5.71'

28 Chambers
456.7 cy Field
80.6 cy Stone



Pond R1: Recharger #1



Summary for Pond R2: Recharger #2

Inflow Area = 0.625 ac, 77.67% Impervious, Inflow Depth = 4.17" for 10 Year event
Inflow = 2.87 cfs @ 12.07 hrs, Volume= 0.217 af
Outflow = 0.06 cfs @ 17.35 hrs, Volume= 0.117 af, Atten= 98%, Lag= 317.0 min
Discarded = 0.06 cfs @ 8.44 hrs, Volume= 0.116 af
Primary = 0.00 cfs @ 17.35 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 210.12' @ 17.35 hrs Surf.Area= 2,448 sf Storage= 6,081 cf
Flood Elev= 211.50' Surf.Area= 2,448 sf Storage= 7,963 cf

Plug-Flow detention time= 415.6 min calculated for 0.117 af (54% of inflow)
Center-of-Mass det. time= 296.0 min (1,063.2 - 767.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	207.00'	787 cf	**36.00'W x 68.00'L x 4.71'H Field A** 11,526 cf Overall - 9,557 cf Embedded = 1,969 cf x 40.0% Voids
#2A	207.04'	7,209 cf	**retain_it retain_it 4.0'** x 32 Inside #1 Inside= 84.0"W x 48.0"H => 28.87 sf x 8.00'L = 230.9 cf Outside= 96.0"W x 56.0"H => 37.33 sf x 8.00'L = 298.7 cf 4 Rows adjusted for 181.2 cf perimeter wall
		7,996 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	210.10'	**6.0" Round Culvert** L= 19.5' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 210.10' / 209.90' S= 0.0103 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#2	Discarded	207.00'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.06 cfs @ 8.44 hrs HW=207.04' (Free Discharge)
↑**2=Exfiltration** (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=0.00 cfs @ 17.35 hrs HW=210.12' (Free Discharge)
↑**1=Culvert** (Barrel Controls 0.00 cfs @ 0.53 fps)

Pond R2: Recharger #2 - Chamber Wizard Field A

Chamber Model = retain_it retain_it 4.0' (retain-it®)
Inside= 84.0"W x 48.0"H => 28.87 sf x 8.00'L = 230.9 cf
Outside= 96.0"W x 56.0"H => 37.33 sf x 8.00'L = 298.7 cf
4 Rows adjusted for 181.2 cf perimeter wall

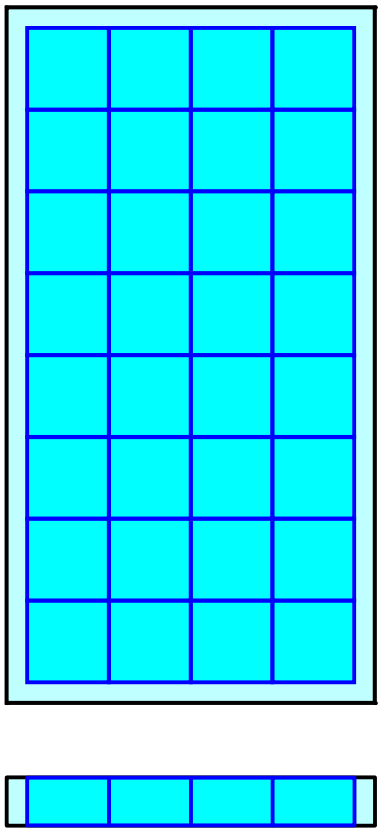
8 Chambers/Row x 8.00' Long = 64.00' Row Length +24.0" End Stone x 2 = 68.00' Base Length
4 Rows x 96.0" Wide + 24.0" Side Stone x 2 = 36.00' Base Width
0.5" Base + 56.0" Chamber Height = 4.71' Field Height

7.5 cf Sidewall x 8 x 2 + 7.5 cf Endwall x 4 x 2 = 181.2 cf Perimeter Wall
32 Chambers x 230.9 cf - 181.2 cf Perimeter wall = 7,208.9 cf Chamber Storage
32 Chambers x 298.7 cf = 9,557.3 cf Displacement

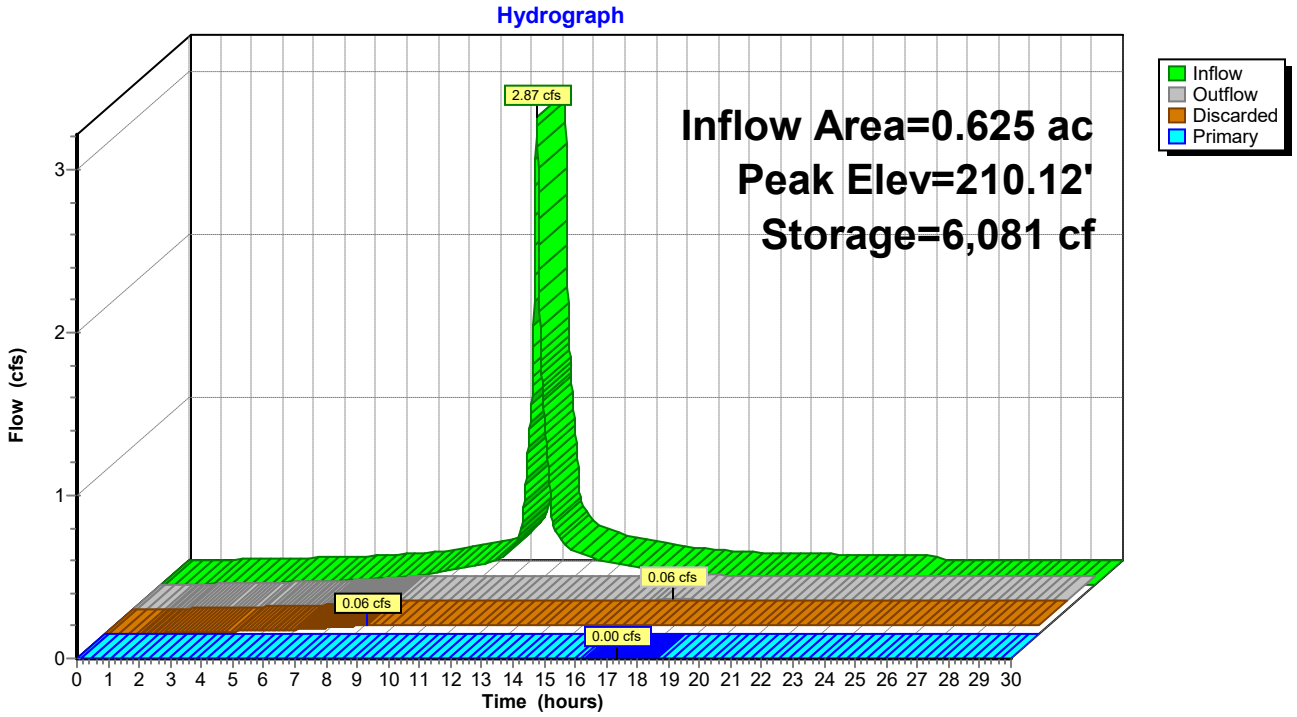
11,526.0 cf Field - 9,557.3 cf Chambers = 1,968.7 cf Stone x 40.0% Voids = 787.5 cf Stone Storage

Chamber Storage + Stone Storage = 7,996.3 cf = 0.184 af
Overall Storage Efficiency = 69.4%
Overall System Size = 68.00' x 36.00' x 4.71'

32 Chambers
426.9 cy Field
72.9 cy Stone



Pond R2: Recharger #2



Summary for Pond VP: On-Site Vernal Pool

Inflow Area = 2.301 ac, 20.67% Impervious, Inflow Depth > 0.84" for 10 Year event
Inflow = 1.40 cfs @ 12.18 hrs, Volume= 0.162 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min

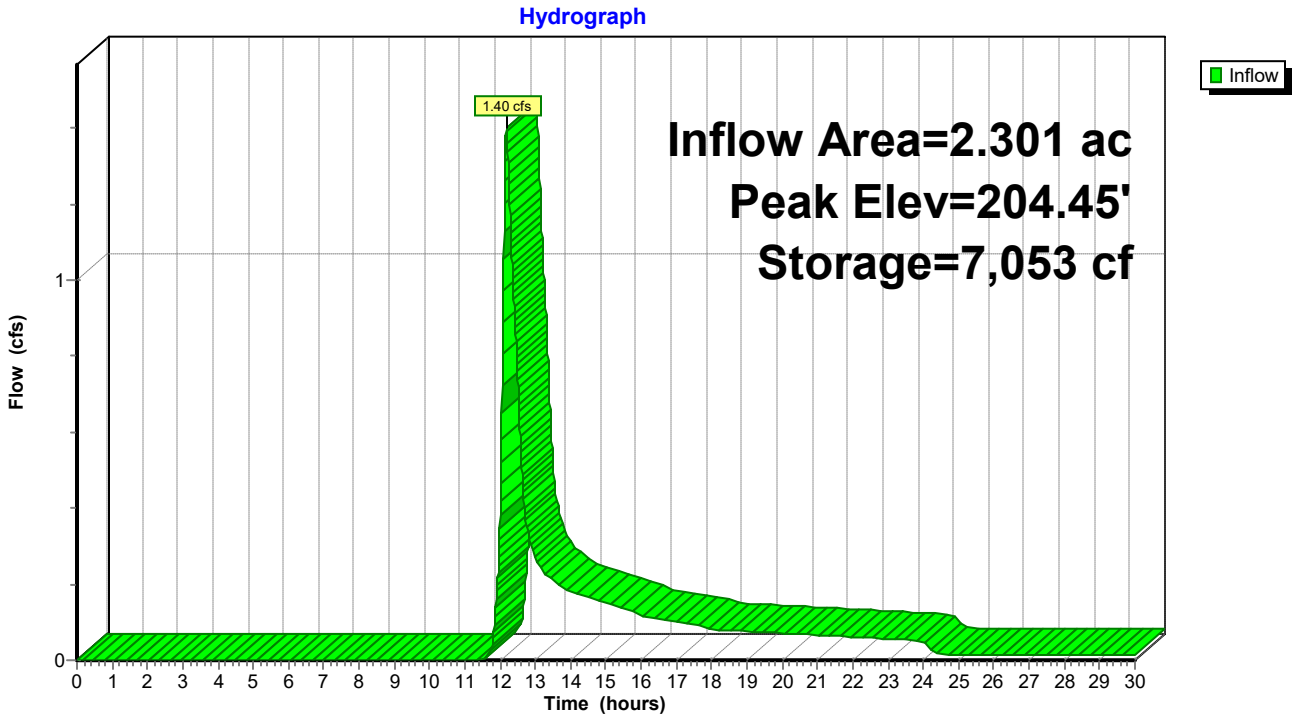
Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 204.45' @ 30.00 hrs Surf.Area= 3,687 sf Storage= 7,053 cf

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

Volume	Invert	Avail.Storage	Storage Description
#1	200.00'	30,113 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)
200.00	96	37.0	0	0	96
201.00	661	92.8	336	336	676
202.00	1,302	129.9	964	1,300	1,343
203.00	2,076	163.4	1,674	2,974	2,138
204.00	3,067	197.8	2,555	5,529	3,144
205.00	4,516	239.6	3,768	9,298	4,615
206.00	7,411	316.4	5,904	15,202	8,024
207.00	23,990	735.5	14,912	30,113	43,110

Pond VP: On-Site Vernal Pool



Summary for Subcatchment P-1: Uncontrolled to Street

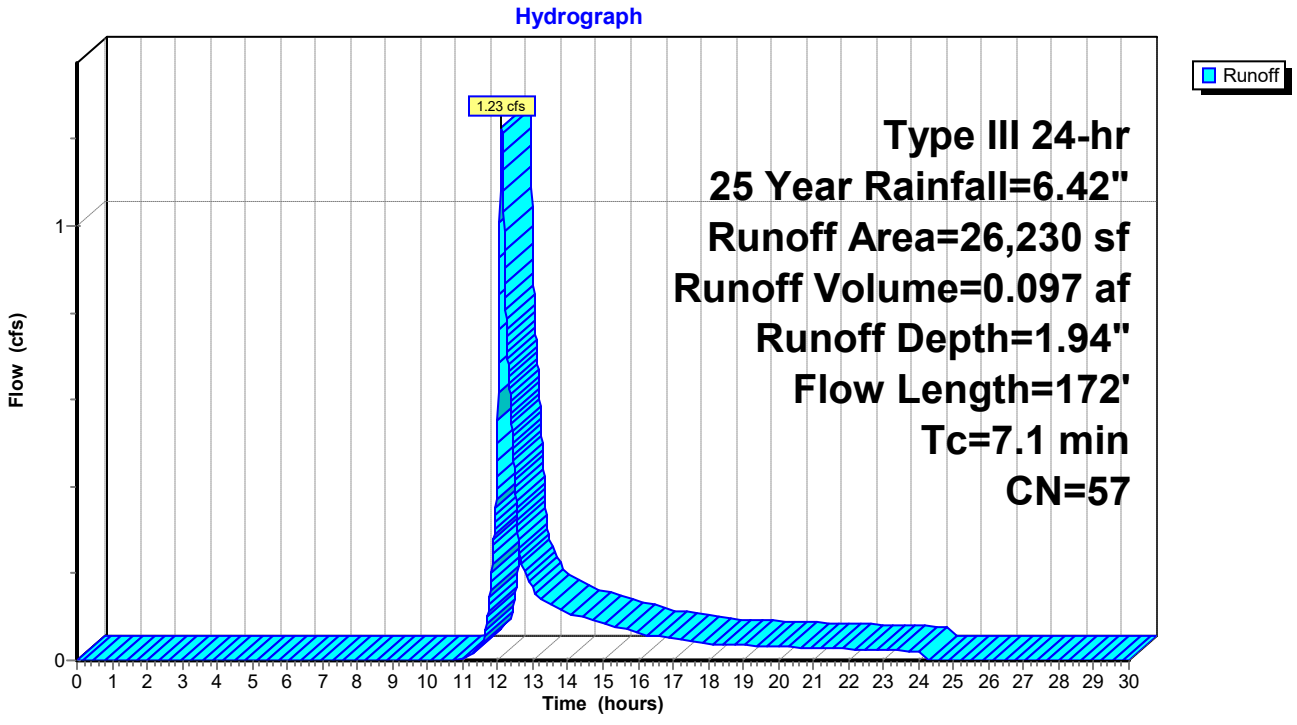
Runoff = 1.23 cfs @ 12.11 hrs, Volume= 0.097 af, Depth= 1.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.42"

Area (sf)	CN	Description
720	98	Paved parking, HSG B
5,287	61	>75% Grass cover, Good, HSG B
20,223	55	Woods, Good, HSG B
26,230	57	Weighted Average
25,510		97.26% Pervious Area
720		2.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	50	0.1740	0.16		**Sheet Flow, Segment 1** Woods: Light underbrush n= 0.400 P2= 3.35"
2.0	122	0.0434	1.04		**Shallow Concentrated Flow, Segment 2** Woodland Kv= 5.0 fps
7.1	172	Total			

Subcatchment P-1: Uncontrolled to Street



Summary for Subcatchment P-10: Area Drains to Detention

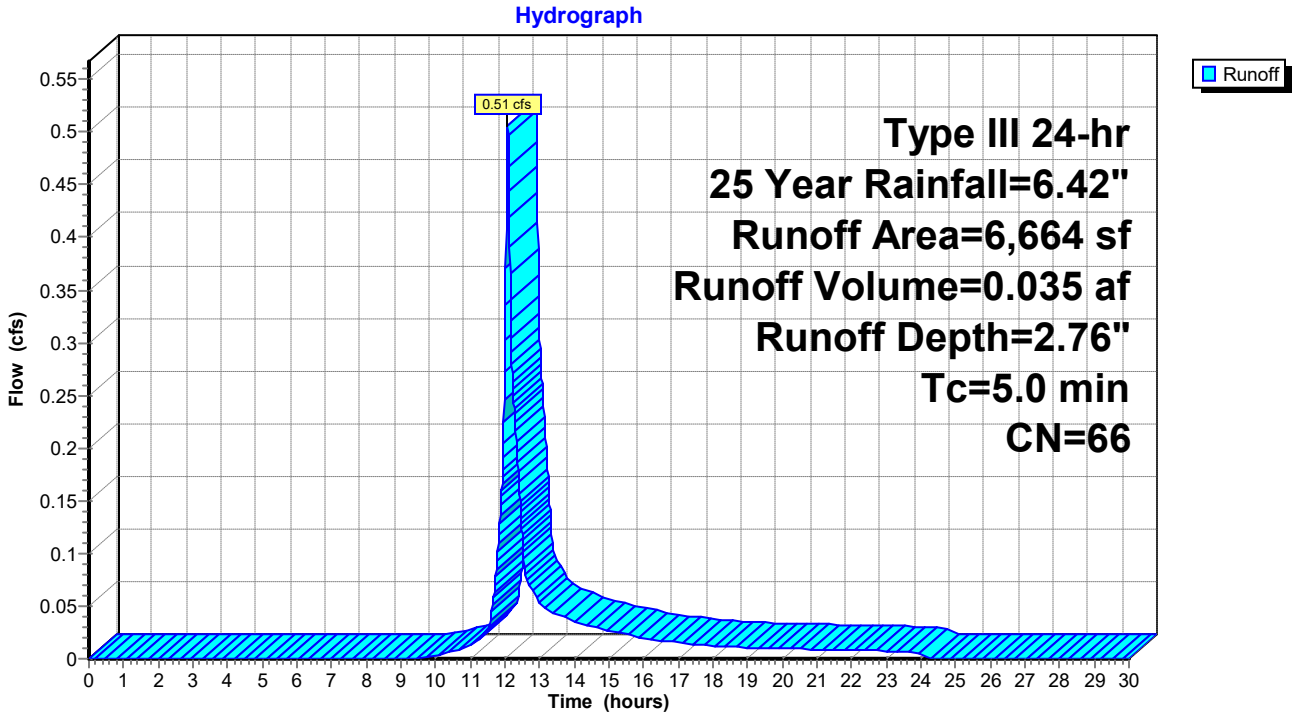
Runoff = 0.51 cfs @ 12.08 hrs, Volume= 0.035 af, Depth= 2.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.42"

Area (sf)	CN	Description
962	98	Paved parking, HSG B
5,702	61	>75% Grass cover, Good, HSG B
6,664	66	Weighted Average
5,702		85.56% Pervious Area
962		14.44% Impervious Area

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

Subcatchment P-10: Area Drains to Detention



Summary for Subcatchment P-11: Area Drains to Recharger

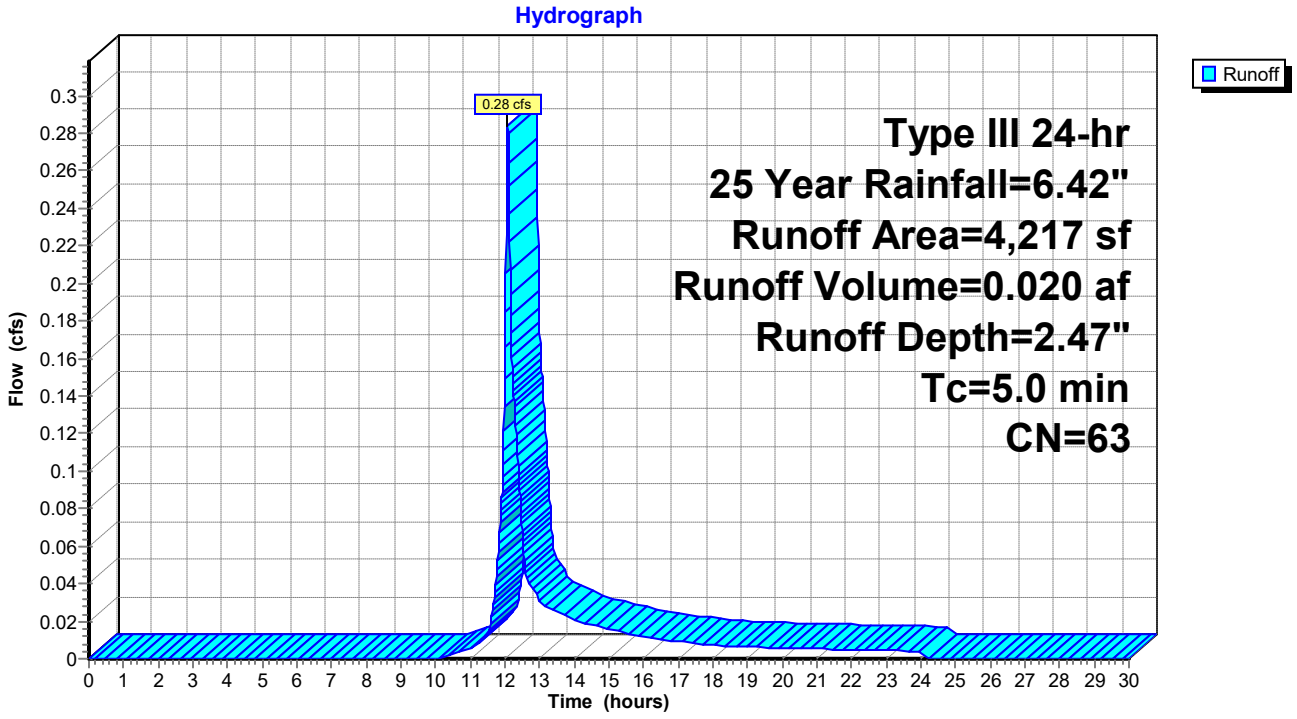
Runoff = 0.28 cfs @ 12.08 hrs, Volume= 0.020 af, Depth= 2.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.42"

Area (sf)	CN	Description
203	98	Paved parking, HSG B
4,014	61	>75% Grass cover, Good, HSG B
4,217	63	Weighted Average
4,014		95.19% Pervious Area
203		4.81% Impervious Area

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

Subcatchment P-11: Area Drains to Recharger



Summary for Subcatchment P-2a: Driveway & Yard

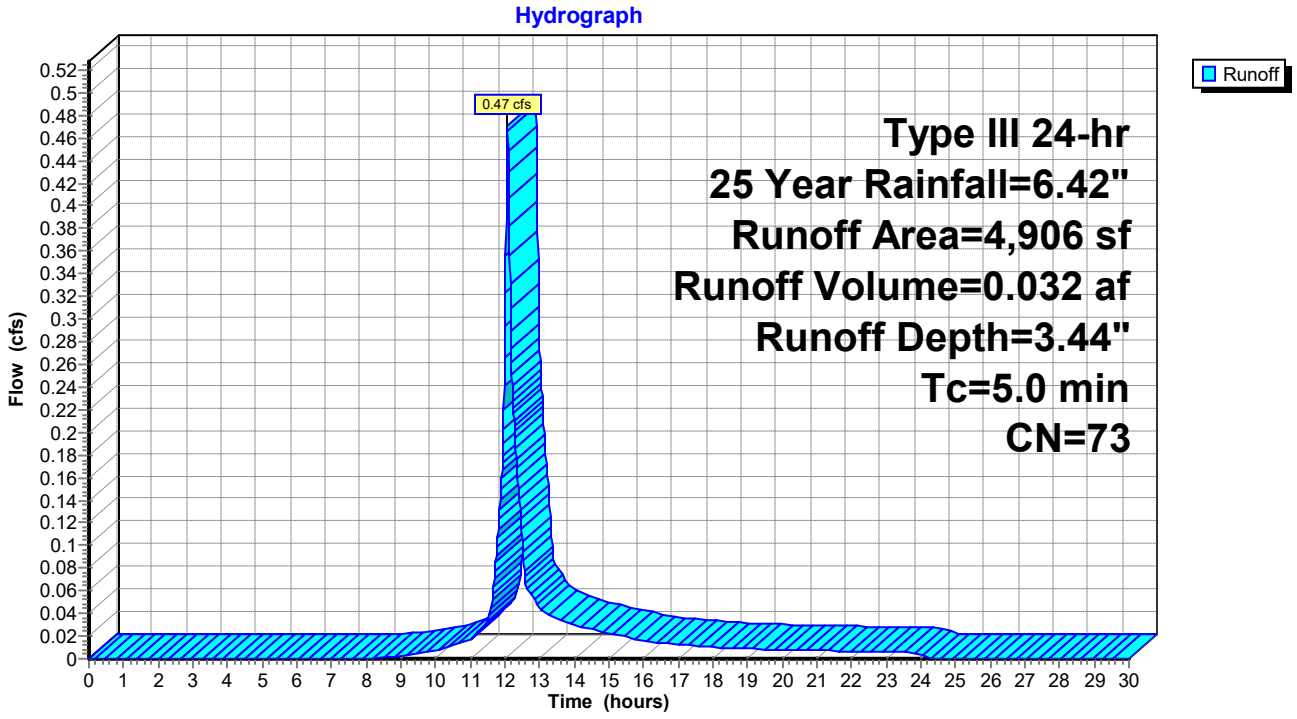
Runoff = 0.47 cfs @ 12.08 hrs, Volume= 0.032 af, Depth= 3.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.42"

Area (sf)	CN	Description
1,639	98	Paved parking, HSG B
3,267	61	>75% Grass cover, Good, HSG B
4,906	73	Weighted Average
3,267		66.59% Pervious Area
1,639		33.41% Impervious Area

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

Subcatchment P-2a: Driveway & Yard



Summary for Subcatchment P-2b: Uncontrolled to Abutter

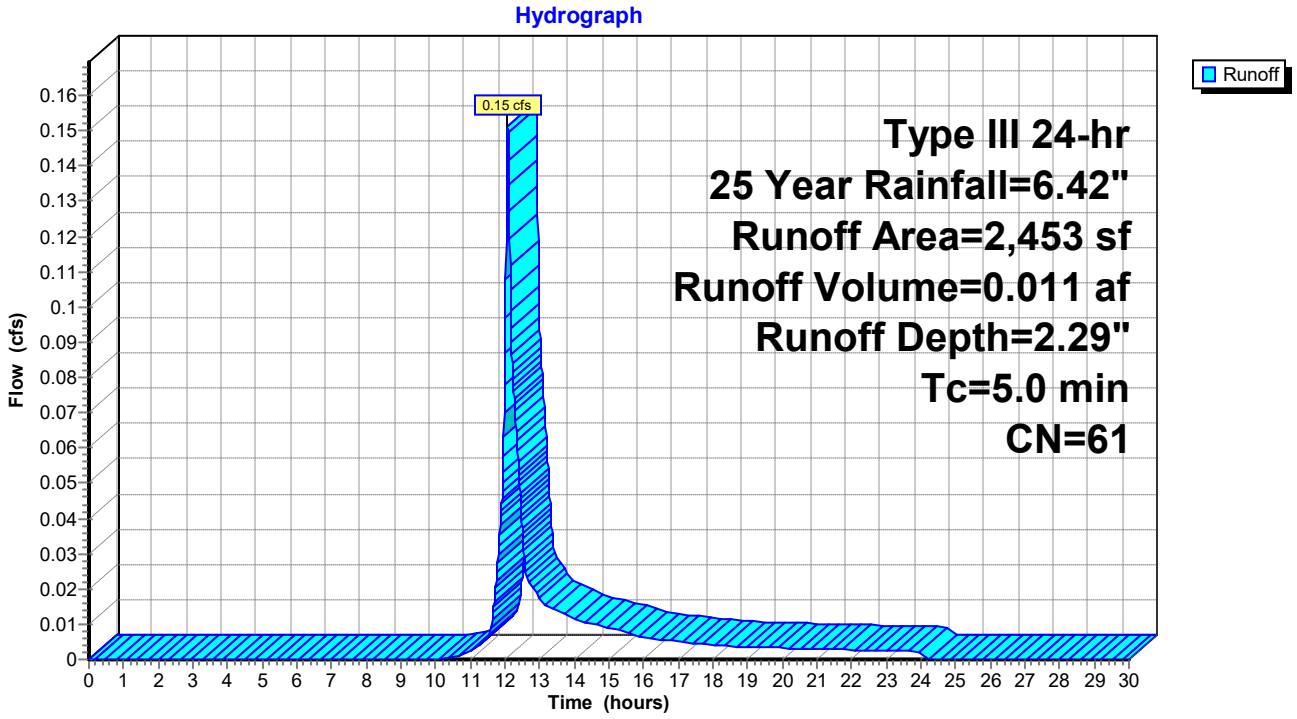
Runoff = 0.15 cfs @ 12.08 hrs, Volume= 0.011 af, Depth= 2.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.42"

Area (sf)	CN	Description
2,453	61	>75% Grass cover, Good, HSG B
2,453		100.00% Pervious Area

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

Subcatchment P-2b: Uncontrolled to Abutter



Summary for Subcatchment P-3: Uncontrolled to V.P.

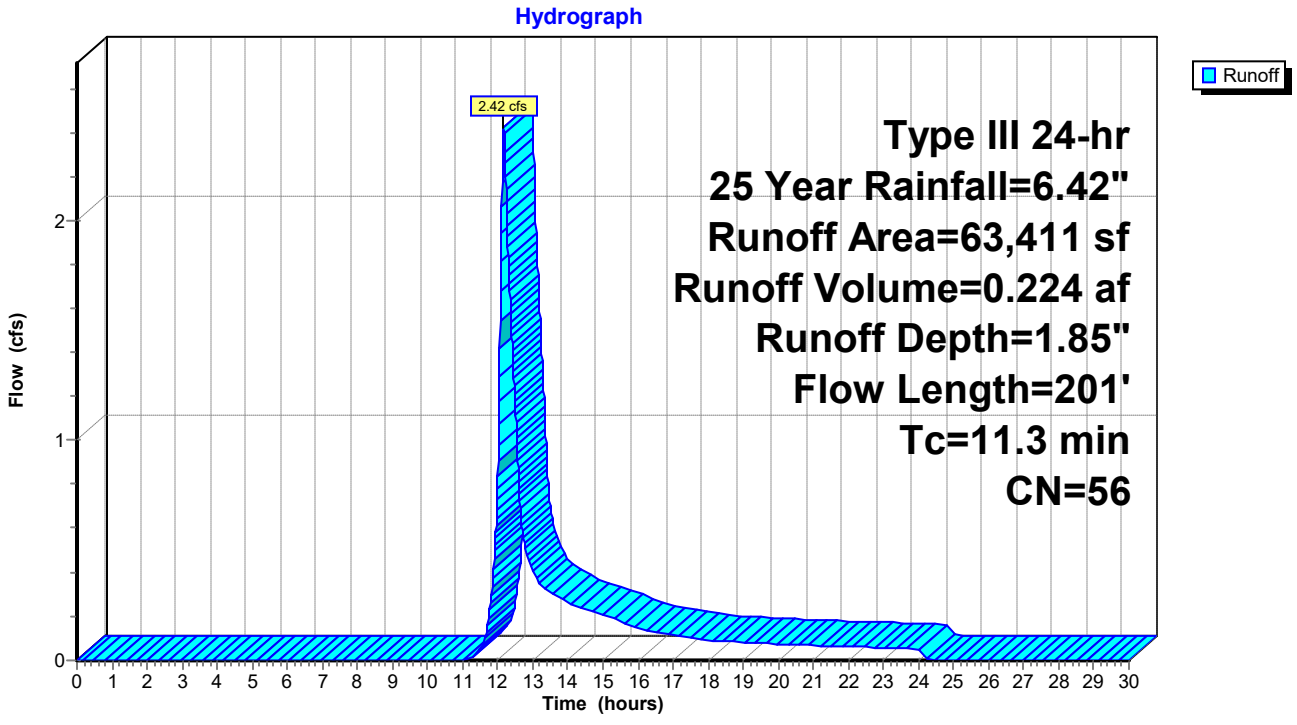
Runoff = 2.42 cfs @ 12.17 hrs, Volume= 0.224 af, Depth= 1.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.42"

Area (sf)	CN	Description
13,614	61	>75% Grass cover, Good, HSG B
49,797	55	Woods, Good, HSG B
63,411	56	Weighted Average
63,411		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.1	50	0.0400	0.09		**Sheet Flow, Segment 1** Woods: Light underbrush n= 0.400 P2= 3.35"
0.8	73	0.0507	1.58		**Shallow Concentrated Flow, Segment 2** Short Grass Pasture Kv= 7.0 fps
1.4	78	0.0359	0.95		**Shallow Concentrated Flow, Segment 3** Woodland Kv= 5.0 fps
11.3	201	Total			

Subcatchment P-3: Uncontrolled to V.P.



Summary for Subcatchment P-4: Uncontrolled to Wetlands

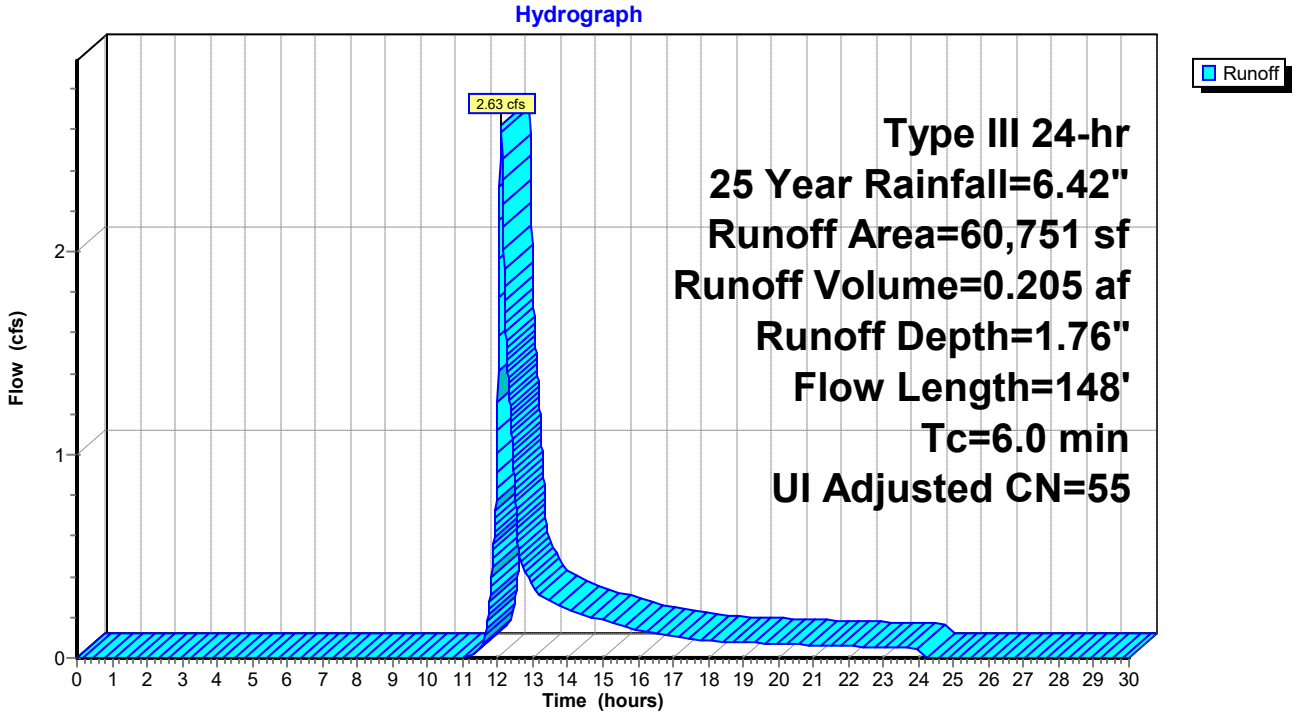
Runoff = 2.63 cfs @ 12.10 hrs, Volume= 0.205 af, Depth= 1.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.42"

Area (sf)	CN	Adj	Description
387	98		Unconnected pavement, HSG B
2,570	61		>75% Grass cover, Good, HSG B
57,794	55		Woods, Good, HSG B
60,751	56	55	Weighted Average, UI Adjusted
60,364			99.36% Pervious Area
387			0.64% Impervious Area
387			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.7	50	0.2100	0.18		**Sheet Flow, Segment 1** Woods: Light underbrush n= 0.400 P2= 3.35"
1.3	98	0.0663	1.29		**Shallow Concentrated Flow, Segment 2** Woodland Kv= 5.0 fps
6.0	148	Total			

Subcatchment P-4: Uncontrolled to Wetlands



Summary for Subcatchment P-5: New Building

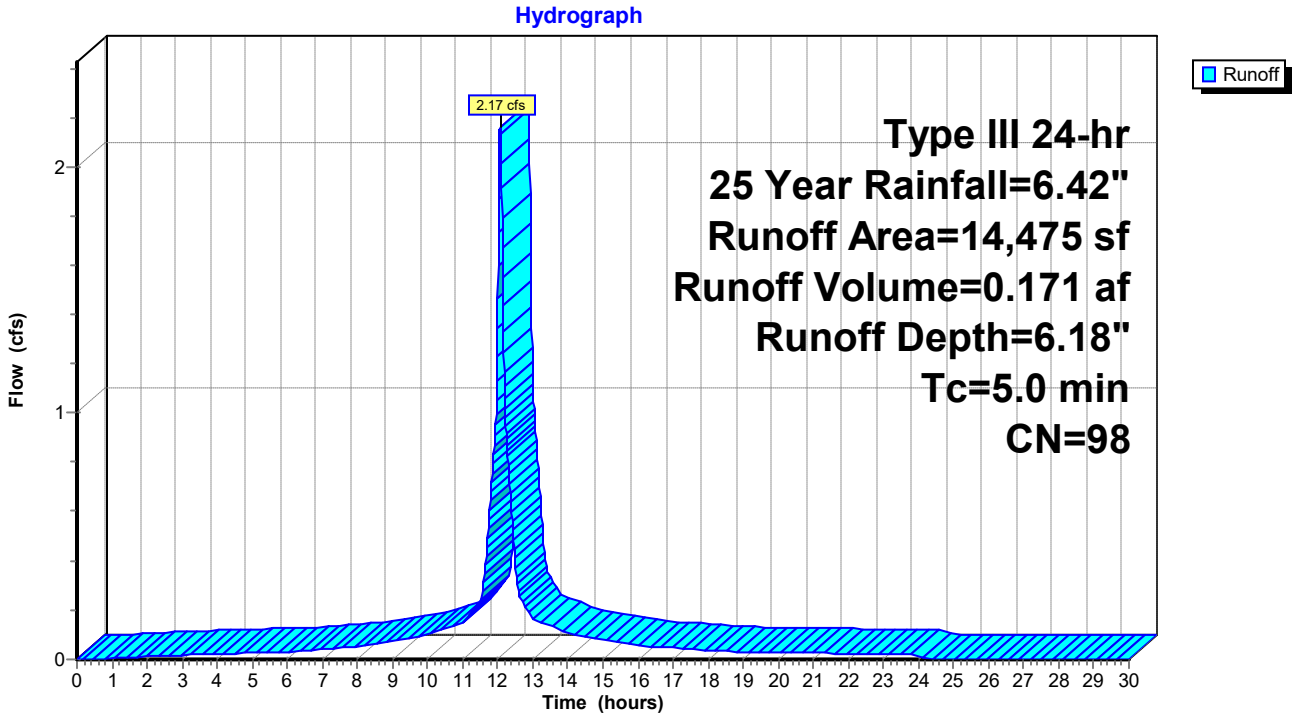
Runoff = 2.17 cfs @ 12.07 hrs, Volume= 0.171 af, Depth= 6.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.42"

Area (sf)	CN	Description
14,475	98	Roofs, HSG B
14,475		100.00% Impervious Area

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

Subcatchment P-5: New Building



Summary for Subcatchment P-6: Parking Lot & Driveway & SAS (partial)

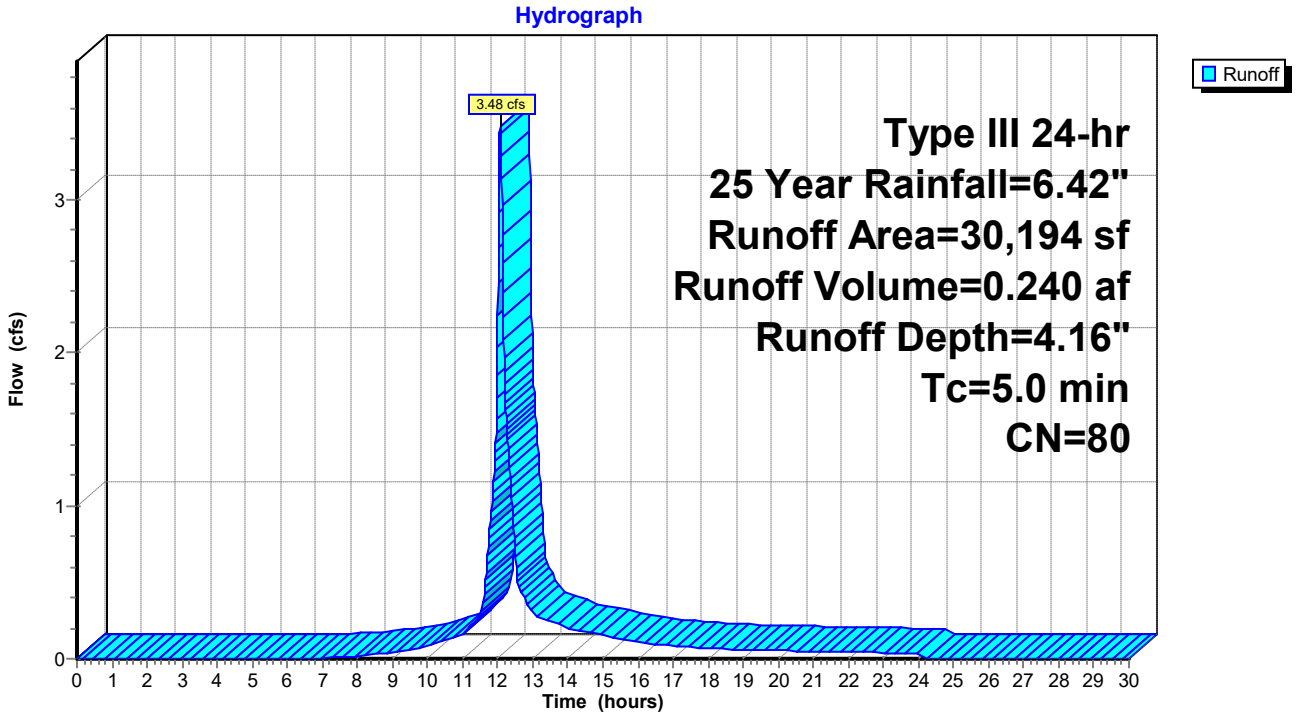
Runoff = 3.48 cfs @ 12.07 hrs, Volume= 0.240 af, Depth= 4.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.42"

Area (sf)	CN	Description
15,610	98	Paved parking, HSG B
14,584	61	>75% Grass cover, Good, HSG B
30,194	80	Weighted Average
14,584		48.30% Pervious Area
15,610		51.70% Impervious Area

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

Subcatchment P-6: Parking Lot & Driveway & SAS (partial)



Summary for Subcatchment P-7: Parking Lot & Driveway

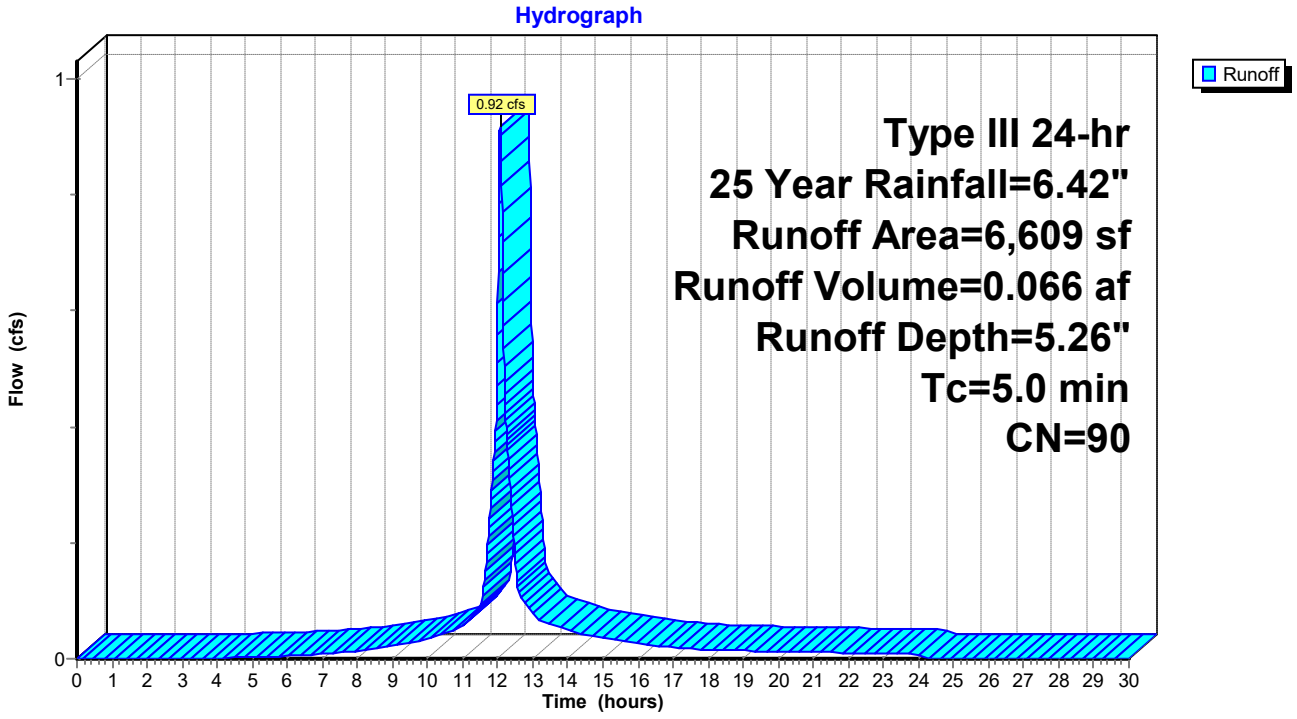
Runoff = 0.92 cfs @ 12.07 hrs, Volume= 0.066 af, Depth= 5.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.42"

Area (sf)	CN	Description
5,107	98	Paved parking, HSG B
1,502	61	>75% Grass cover, Good, HSG B
6,609	90	Weighted Average
1,502		22.73% Pervious Area
5,107		77.27% Impervious Area

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

Subcatchment P-7: Parking Lot & Driveway



Summary for Subcatchment P-8: Parking Lot & Driveway

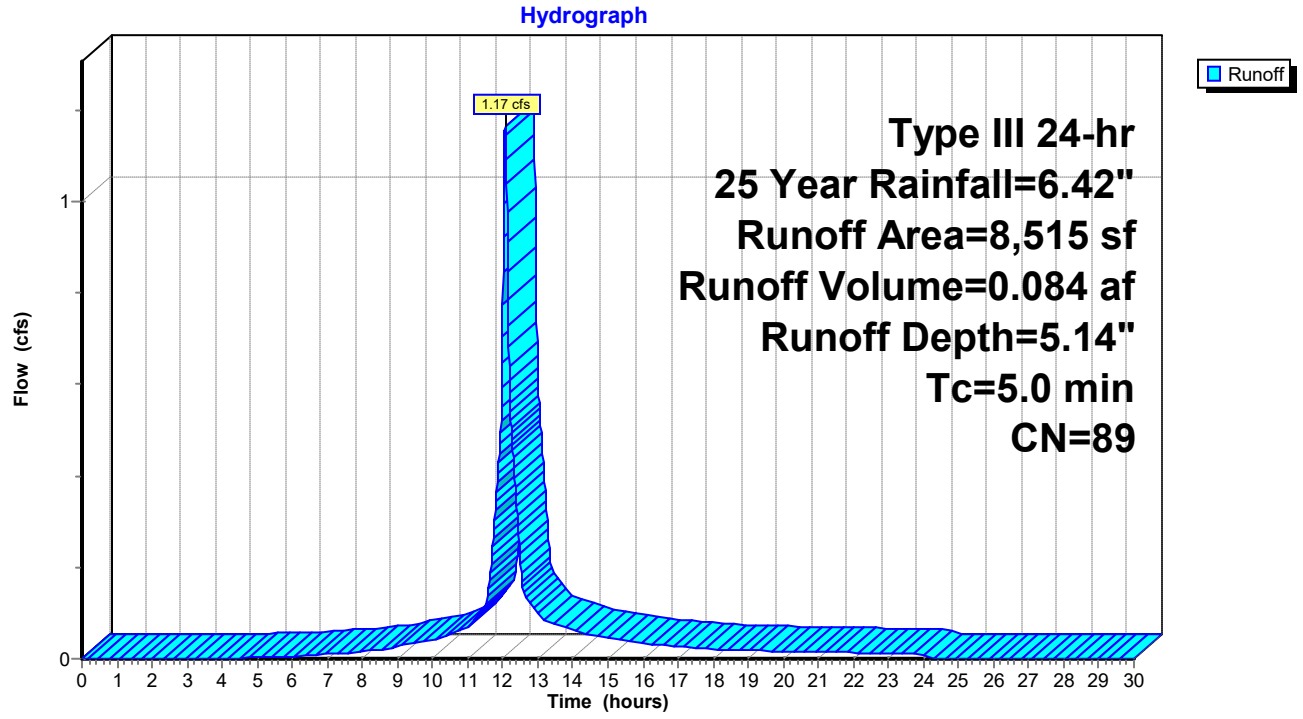
Runoff = 1.17 cfs @ 12.07 hrs, Volume= 0.084 af, Depth= 5.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.42"

Area (sf)	CN	Description
6,453	98	Paved parking, HSG B
2,062	61	>75% Grass cover, Good, HSG B
8,515	89	Weighted Average
2,062		24.22% Pervious Area
6,453		75.78% Impervious Area

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

Subcatchment P-8: Parking Lot & Driveway



Summary for Subcatchment P-9: Parking Lot & Driveway

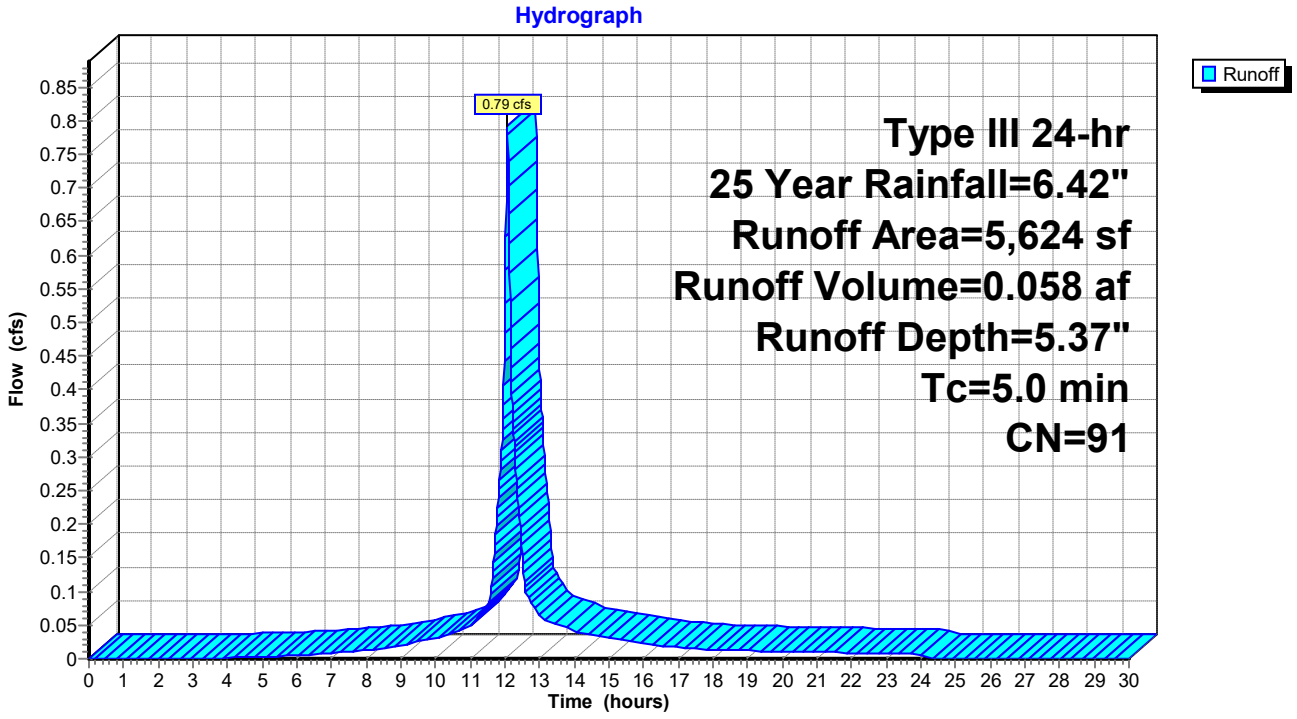
Runoff = 0.79 cfs @ 12.07 hrs, Volume= 0.058 af, Depth= 5.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.42"

Area (sf)	CN	Description
4,496	98	Paved parking, HSG B
1,128	61	>75% Grass cover, Good, HSG B
5,624	91	Weighted Average
1,128		20.06% Pervious Area
4,496		79.94% Impervious Area

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

Subcatchment P-9: Parking Lot & Driveway



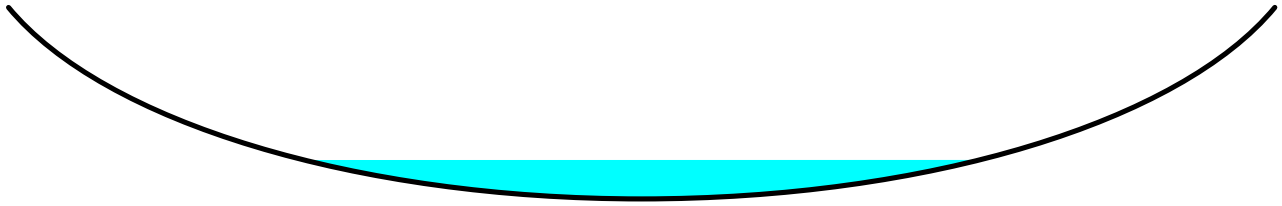
Summary for Reach 1R: Pipe Outfall

Inflow Area = 0.845 ac, 56.29% Impervious, Inflow Depth > 0.63" for 25 Year event
Inflow = 0.03 cfs @ 18.58 hrs, Volume= 0.044 af
Outflow = 0.03 cfs @ 18.60 hrs, Volume= 0.044 af, Atten= 0%, Lag= 1.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 0.28 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 0.27 fps, Avg. Travel Time= 0.6 min

Peak Storage= 1 cf @ 18.59 hrs
Average Depth at Peak Storage= 0.04'
Bank-Full Depth= 0.20' Flow Area= 1.3 sf, Capacity= 1.06 cfs

10.00' x 0.20' deep Parabolic Channel, n= 0.069 Riprap, 6-inch
Length= 10.0' Slope= 0.0200 '/'
Inlet Invert= 207.00', Outlet Invert= 206.80'



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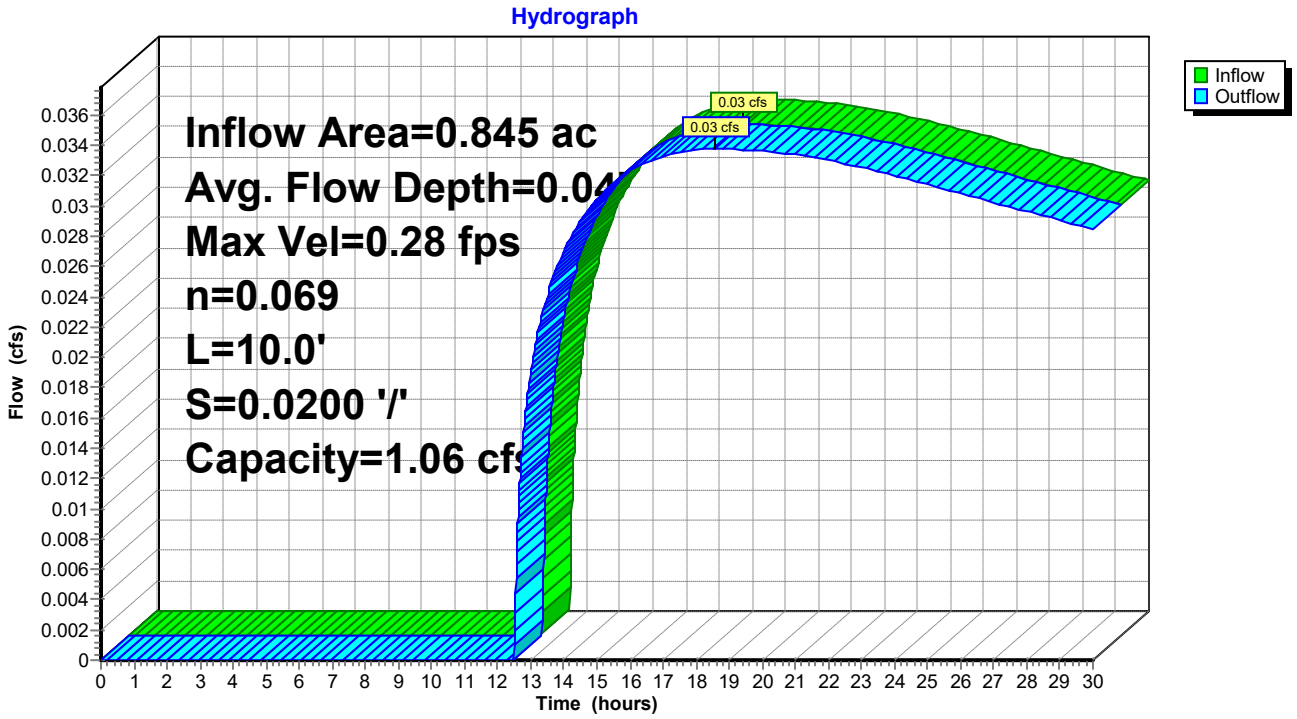
Reach 1R: Pipe Outfall



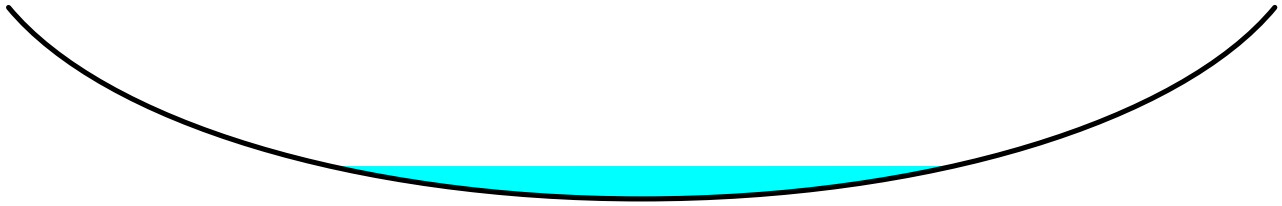
Summary for Reach 2R: PIpe Outfall

Inflow Area = 0.907 ac, 67.32% Impervious, Inflow Depth > 0.67" for 25 Year event
Inflow = 0.04 cfs @ 18.76 hrs, Volume= 0.051 af
Outflow = 0.04 cfs @ 18.78 hrs, Volume= 0.051 af, Atten= 0%, Lag= 0.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 0.39 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 0.37 fps, Avg. Travel Time= 0.4 min

Peak Storage= 1 cf @ 18.77 hrs
Average Depth at Peak Storage= 0.03'
Bank-Full Depth= 0.20' Flow Area= 1.3 sf, Capacity= 1.67 cfs

10.00' x 0.20' deep Parabolic Channel, n= 0.069 Riprap, 6-inch
Length= 10.0' Slope= 0.0500 '/'
Inlet Invert= 205.00', Outlet Invert= 204.50'



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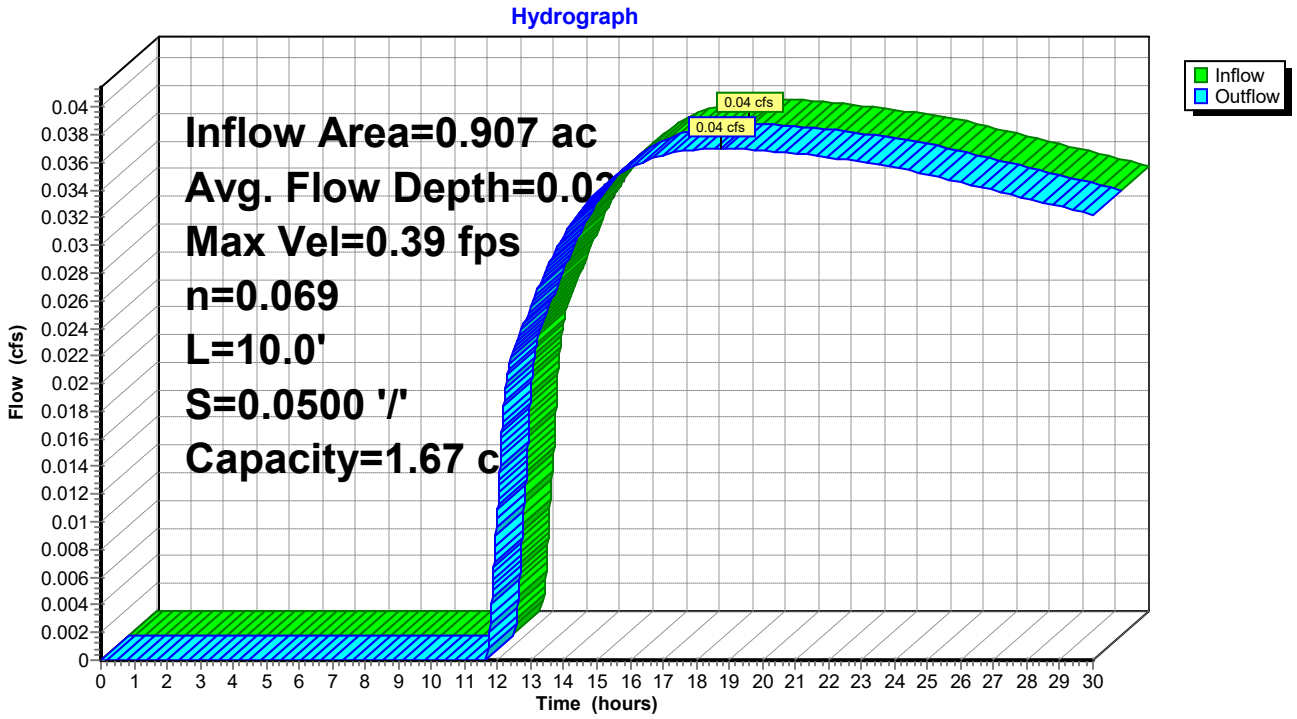
Reach 2R: PIpe Outfall

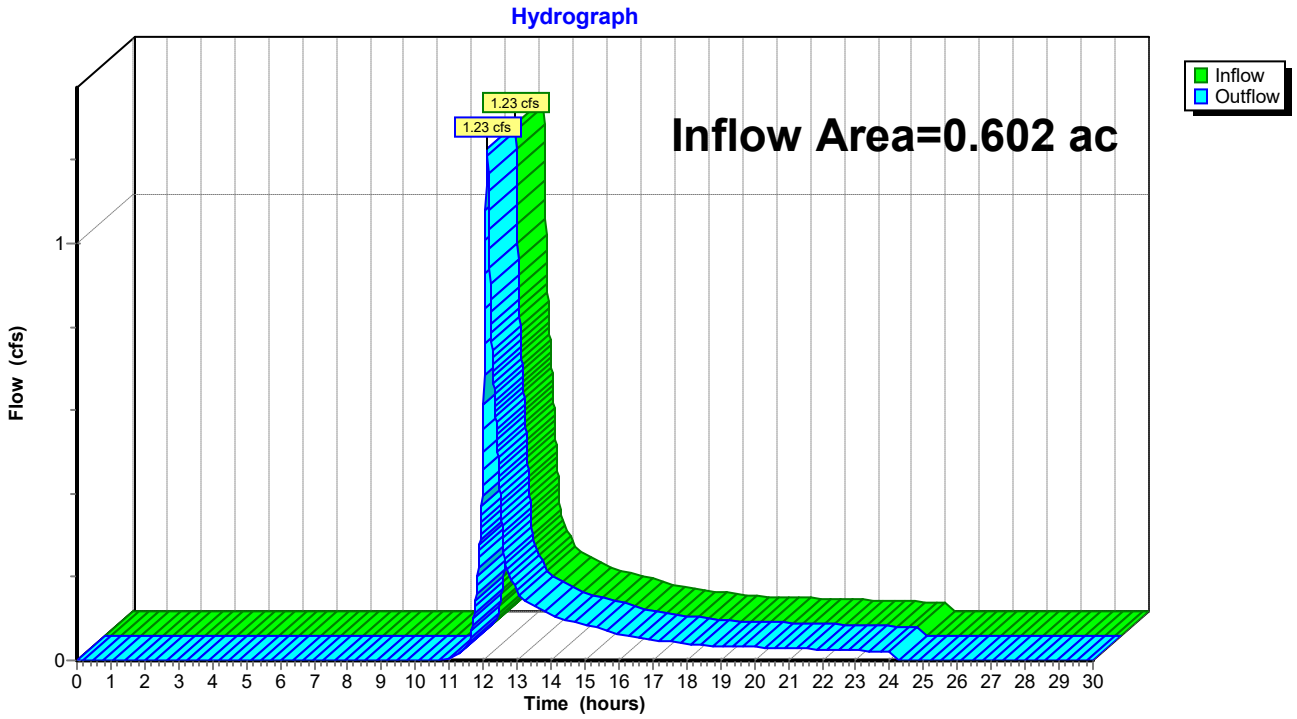


Summary for Reach DP-1: Washington Street

Inflow Area = 0.602 ac, 2.74% Impervious, Inflow Depth = 1.94" for 25 Year event
Inflow = 1.23 cfs @ 12.11 hrs, Volume= 0.097 af
Outflow = 1.23 cfs @ 12.11 hrs, Volume= 0.097 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Reach DP-1: Washington Street

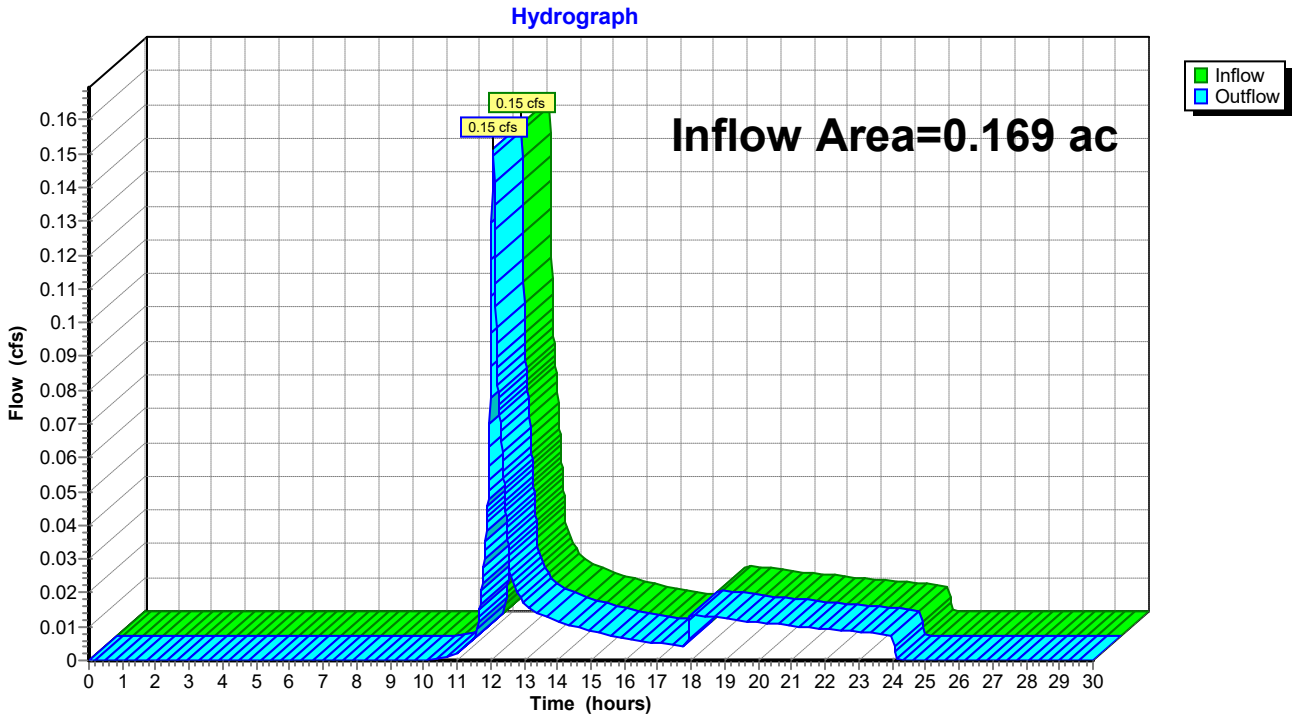


Summary for Reach DP-2: Abutting Property

Inflow Area = 0.169 ac, 22.27% Impervious, Inflow Depth = 1.03" for 25 Year event
Inflow = 0.15 cfs @ 12.08 hrs, Volume= 0.015 af
Outflow = 0.15 cfs @ 12.08 hrs, Volume= 0.015 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Reach DP-2: Abutting Property

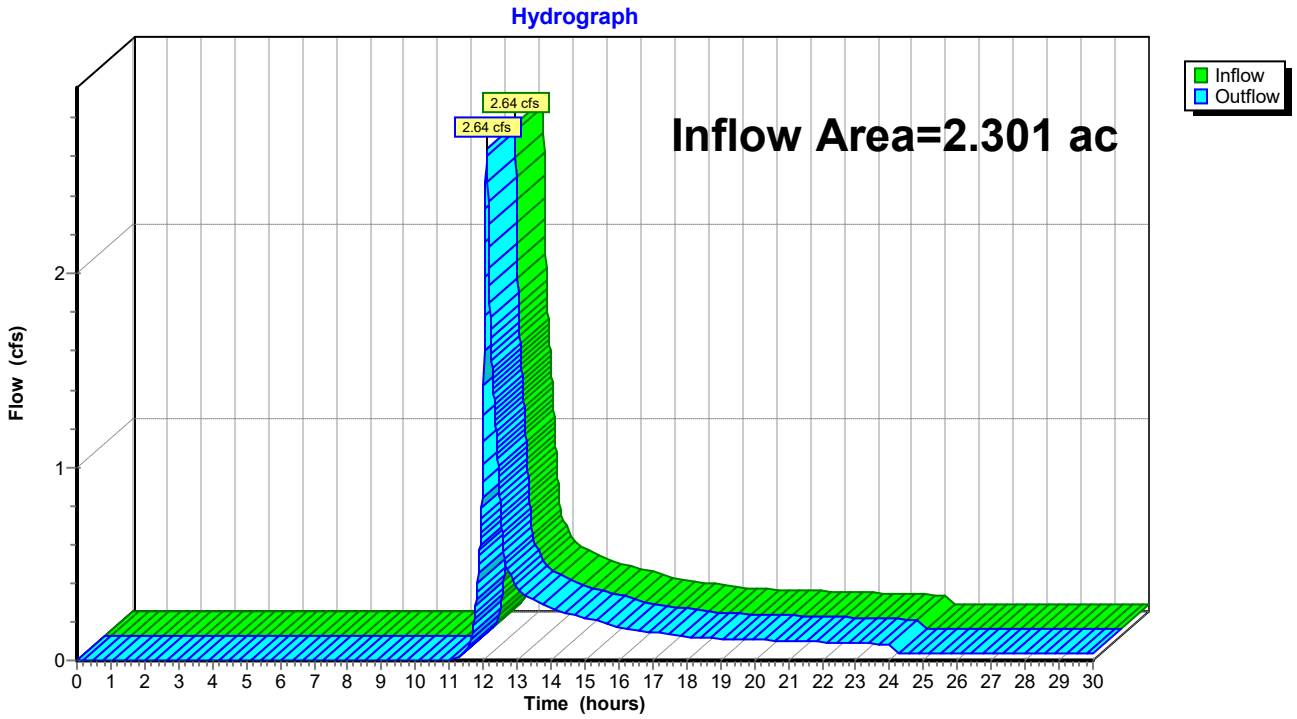


Summary for Reach DP-4: On-Site Wetlands

Inflow Area = 2.301 ac, 26.91% Impervious, Inflow Depth > 1.33" for 25 Year event
Inflow = 2.64 cfs @ 12.10 hrs, Volume= 0.256 af
Outflow = 2.64 cfs @ 12.10 hrs, Volume= 0.256 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Reach DP-4: On-Site Wetlands



Summary for Pond D1: Detention Basin #1

Inflow Area = 0.845 ac, 56.29% Impervious, Inflow Depth = 1.62" for 25 Year event
Inflow = 0.84 cfs @ 12.50 hrs, Volume= 0.114 af
Outflow = 0.03 cfs @ 18.58 hrs, Volume= 0.044 af, Atten= 96%, Lag= 364.8 min
Primary = 0.03 cfs @ 18.58 hrs, Volume= 0.044 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 209.20' @ 18.58 hrs Surf.Area= 2,516 sf Storage= 4,050 cf
Flood Elev= 210.50' Surf.Area= 2,516 sf Storage= 6,777 cf

Plug-Flow detention time= 524.2 min calculated for 0.044 af (39% of inflow)
Center-of-Mass det. time= 424.1 min (1,283.7 - 859.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	207.00'	814 cf	**34.00'W x 74.00'L x 4.17'H Field A** 10,483 cf Overall - 8,448 cf Embedded = 2,035 cf x 40.0% Voids
#2A	207.50'	6,019 cf	**retain_it retain_it 3.0'** x 36 Inside #1 Inside= 84.0"W x 36.0"H => 21.33 sf x 8.00'L = 170.6 cf Outside= 96.0"W x 44.0"H => 29.33 sf x 8.00'L = 234.7 cf 4 Rows adjusted for 122.7 cf perimeter wall
		6,833 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	207.50'	**10.0" Round Culvert** L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 207.50' / 207.00' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf
#2	Device 1	210.40'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Device 1	207.50'	**1.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.03 cfs @ 18.58 hrs HW=209.20' (Free Discharge)
└**1=Culvert** (Passes 0.03 cfs of 2.97 cfs potential flow)
  ├**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
  └**3=Orifice/Grate** (Orifice Controls 0.03 cfs @ 6.19 fps)

Pond D1: Detention Basin #1 - Chamber Wizard Field A

Chamber Model = retain_it retain_it 3.0' (retain-it®)
Inside= 84.0"W x 36.0"H => 21.33 sf x 8.00'L = 170.6 cf
Outside= 96.0"W x 44.0"H => 29.33 sf x 8.00'L = 234.7 cf
4 Rows adjusted for 122.7 cf perimeter wall

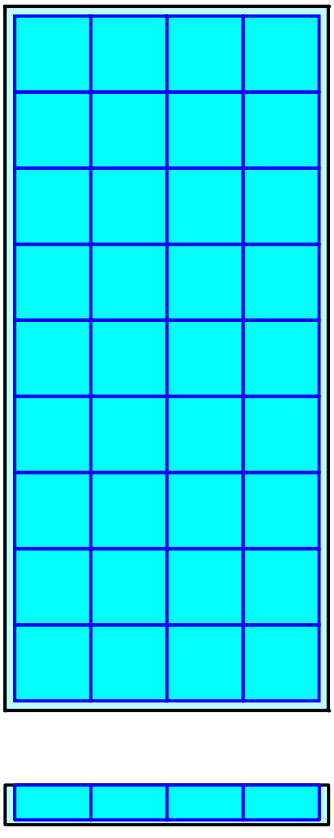
9 Chambers/Row x 8.00' Long = 72.00' Row Length +12.0" End Stone x 2 = 74.00' Base Length
4 Rows x 96.0" Wide + 12.0" Side Stone x 2 = 34.00' Base Width
6.0" Base + 44.0" Chamber Height = 4.17' Field Height

4.7 cf Sidewall x 9 x 2 + 4.7 cf Endwall x 4 x 2 = 122.7 cf Perimeter Wall
36 Chambers x 170.6 cf - 122.7 cf Perimeter wall = 6,019.2 cf Chamber Storage
36 Chambers x 234.7 cf = 8,448.0 cf Displacement

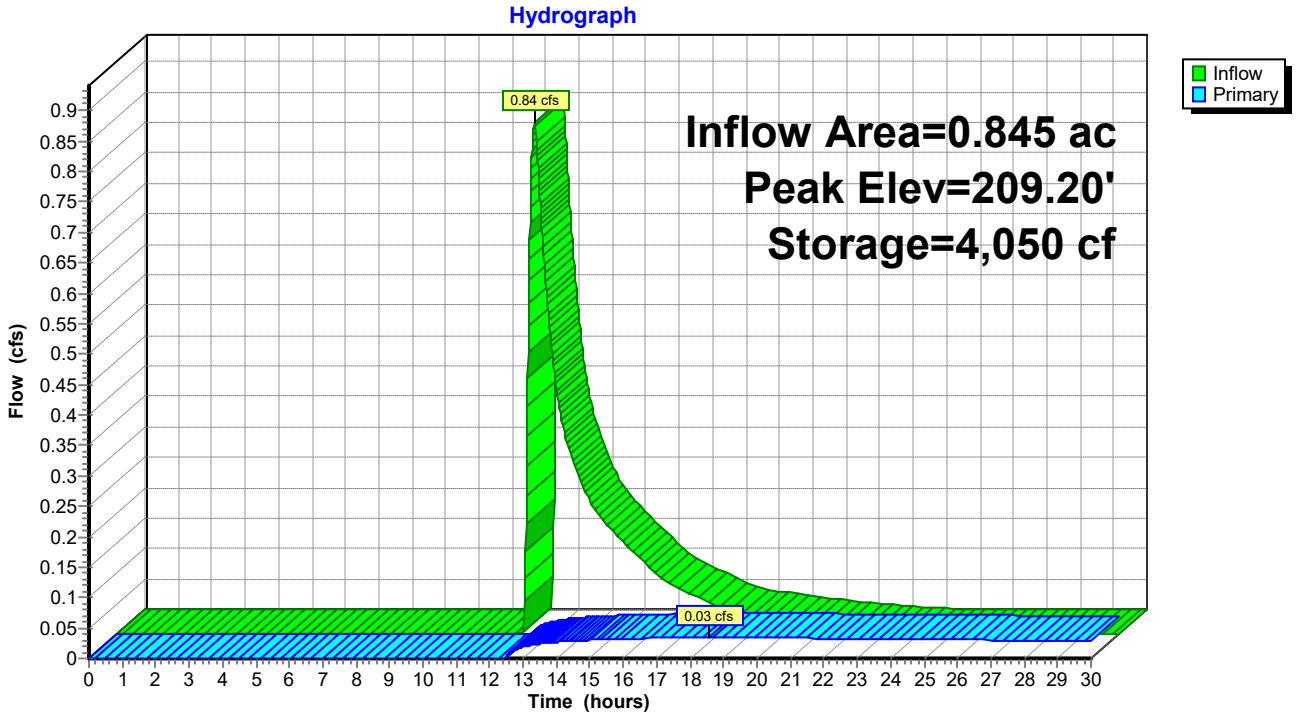
10,483.3 cf Field - 8,448.0 cf Chambers = 2,035.3 cf Stone x 40.0% Voids = 814.1 cf Stone Storage

Chamber Storage + Stone Storage = 6,833.4 cf = 0.157 af
Overall Storage Efficiency = 65.2%
Overall System Size = 74.00' x 34.00' x 4.17'

36 Chambers
388.3 cy Field
75.4 cy Stone



Pond D1: Detention Basin #1



Summary for Pond D2: Detention Basin #2

Inflow Area = 0.907 ac, 67.32% Impervious, Inflow Depth = 1.87" for 25 Year event
Inflow = 1.30 cfs @ 12.07 hrs, Volume= 0.141 af
Outflow = 0.04 cfs @ 18.76 hrs, Volume= 0.051 af, Atten= 97%, Lag= 401.5 min
Primary = 0.04 cfs @ 18.76 hrs, Volume= 0.051 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 207.53' @ 18.76 hrs Surf.Area= 2,628 sf Storage= 4,949 cf
Flood Elev= 210.00' Surf.Area= 2,628 sf Storage= 10,073 cf

Plug-Flow detention time= 581.5 min calculated for 0.051 af (36% of inflow)
Center-of-Mass det. time= 439.5 min (1,270.1 - 830.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	205.00'	1,108 cf	**18.00'W x 146.00'L x 5.58'H Field A** 14,673 cf Overall - 11,904 cf Embedded = 2,769 cf x 40.0% Voids
#2A	205.42'	9,041 cf	**retain_it retain_it 4.5'** x 36 Inside #1 Inside= 84.0"W x 54.0"H => 32.64 sf x 8.00'L = 261.1 cf Outside= 96.0"W x 62.0"H => 41.33 sf x 8.00'L = 330.7 cf 2 Rows adjusted for 358.8 cf perimeter wall
		10,149 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	205.50'	**10.0" Round Culvert** L= 12.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 205.50' / 205.00' S= 0.0417 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf
#2	Device 1	209.50'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Device 1	205.50'	**1.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.04 cfs @ 18.76 hrs HW=207.53' (Free Discharge)
└**1=Culvert** (Passes 0.04 cfs of 3.33 cfs potential flow)
  ├**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
  └**3=Orifice/Grate** (Orifice Controls 0.04 cfs @ 6.78 fps)

Pond D2: Detention Basin #2 - Chamber Wizard Field A

Chamber Model = retain_it retain_it 4.5' (retain-it®)
Inside= 84.0"W x 54.0"H => 32.64 sf x 8.00'L = 261.1 cf
Outside= 96.0"W x 62.0"H => 41.33 sf x 8.00'L = 330.7 cf
2 Rows adjusted for 358.8 cf perimeter wall

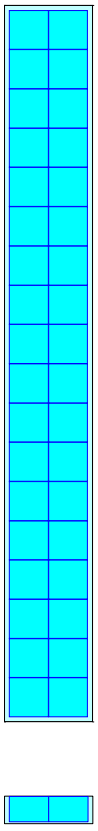
18 Chambers/Row x 8.00' Long = 144.00' Row Length +12.0" End Stone x 2 = 146.00' Base Length
2 Rows x 96.0" Wide + 12.0" Side Stone x 2 = 18.00' Base Width
5.0" Base + 62.0" Chamber Height = 5.58' Field Height

9.0 cf Sidewall x 18 x 2 + 9.0 cf Endwall x 2 x 2 = 358.8 cf Perimeter Wall
36 Chambers x 261.1 cf - 358.8 cf Perimeter wall = 9,041.2 cf Chamber Storage
36 Chambers x 330.7 cf = 11,904.0 cf Displacement

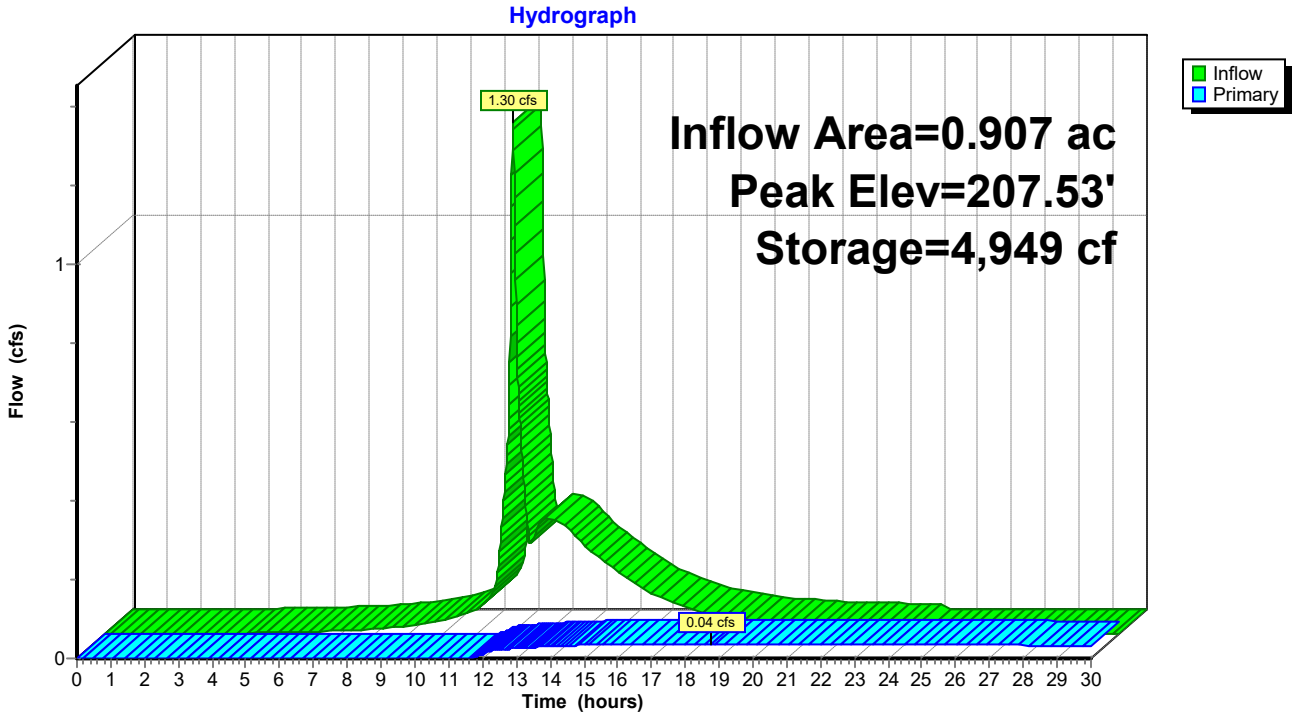
14,673.0 cf Field - 11,904.0 cf Chambers = 2,769.0 cf Stone x 40.0% Voids = 1,107.6 cf Stone Storage

Chamber Storage + Stone Storage = 10,148.8 cf = 0.233 af
Overall Storage Efficiency = 69.2%
Overall System Size = 146.00' x 18.00' x 5.58'

36 Chambers
543.4 cy Field
102.6 cy Stone



Pond D2: Detention Basin #2



Summary for Pond D3: Detention Basin #3

Inflow Area = 0.113 ac, 33.41% Impervious, Inflow Depth = 3.44" for 25 Year event
Inflow = 0.47 cfs @ 12.08 hrs, Volume= 0.032 af
Outflow = 0.01 cfs @ 17.99 hrs, Volume= 0.004 af, Atten= 98%, Lag= 355.0 min
Primary = 0.01 cfs @ 17.99 hrs, Volume= 0.004 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 207.40' @ 17.99 hrs Surf.Area= 1,055 sf Storage= 1,243 cf

Plug-Flow detention time= 580.8 min calculated for 0.004 af (12% of inflow)
Center-of-Mass det. time= 414.5 min (1,241.6 - 827.1)

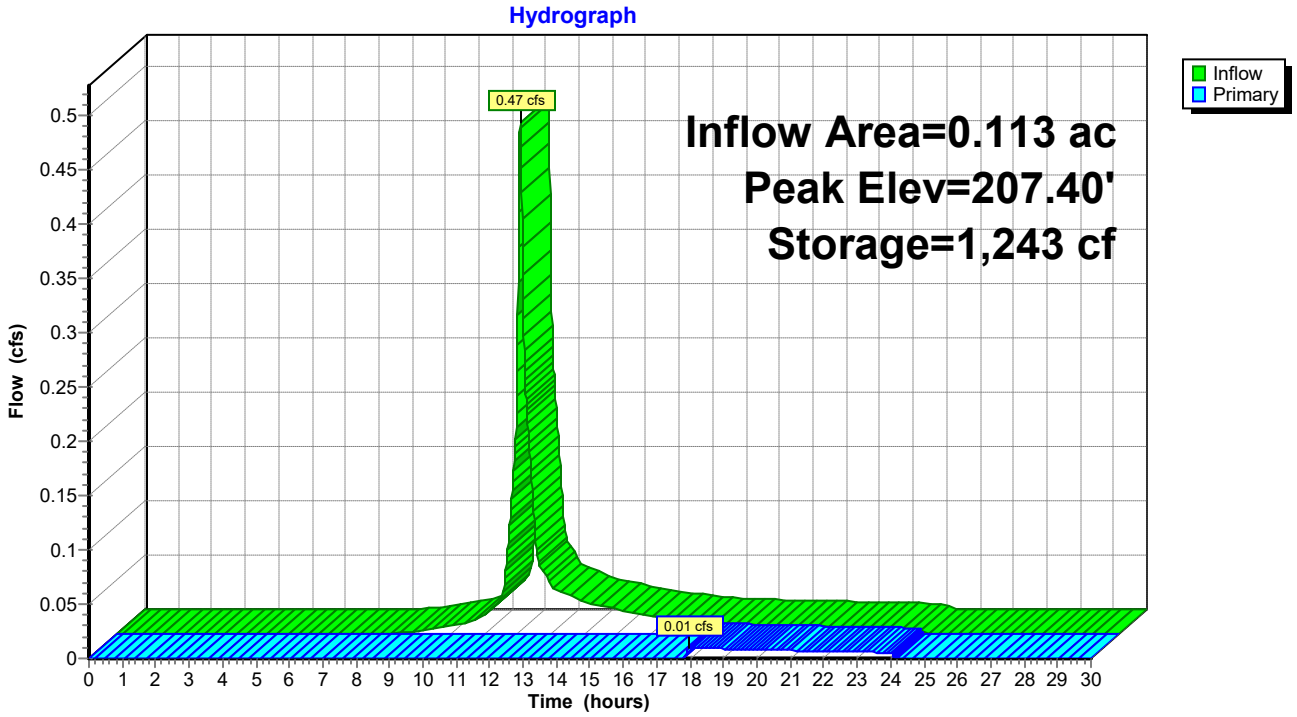
Volume	Invert	Avail.Storage	Storage Description
#1	205.50'	1,350 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
205.50	205	71.2	0	0	205
206.00	500	108.8	171	171	745
207.00	886	137.8	684	855	1,328
207.50	1,099	147.3	495	1,350	1,555

Device	Routing	Invert	Outlet Devices
#1	Primary	207.40'	**50.0' long x 1.0' 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=0.00 cfs @ 17.99 hrs HW=207.40' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 0.00 cfs @ 0.06 fps)

Pond D3: Detention Basin #3



Summary for Pond R1: Recharger #1

Inflow Area = 0.845 ac, 56.29% Impervious, Inflow Depth = 4.36" for 25 Year event
Inflow = 4.40 cfs @ 12.07 hrs, Volume= 0.307 af
Outflow = 0.89 cfs @ 12.50 hrs, Volume= 0.209 af, Atten= 80%, Lag= 25.6 min
Discarded = 0.05 cfs @ 8.82 hrs, Volume= 0.094 af
Primary = 0.84 cfs @ 12.50 hrs, Volume= 0.114 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 210.81' @ 12.50 hrs Surf.Area= 2,160 sf Storage= 6,394 cf
Flood Elev= 212.60' Surf.Area= 2,160 sf Storage= 8,767 cf

Plug-Flow detention time= 272.6 min calculated for 0.209 af (68% of inflow)
Center-of-Mass det. time= 176.2 min (980.5 - 804.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	207.10'	870 cf	**36.00'W x 60.00'L x 5.71'H Field A** 12,330 cf Overall - 10,155 cf Embedded = 2,175 cf x 40.0% Voids
#2A	207.14'	7,927 cf	**retain_it retain_it 5.0'** x 28 Inside #1 Inside= 84.0"W x 60.0"H => 36.41 sf x 8.00'L = 291.3 cf Outside= 96.0"W x 68.0"H => 45.33 sf x 8.00'L = 362.7 cf 4 Rows adjusted for 228.6 cf perimeter wall
		8,797 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	210.20'	**8.0" Round Culvert** L= 14.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 210.20' / 210.00' S= 0.0143 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf
#2	Discarded	207.10'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.05 cfs @ 8.82 hrs HW=207.14' (Free Discharge)
↑**2=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.84 cfs @ 12.50 hrs HW=210.81' (Free Discharge)
↑**1=Culvert** (Barrel Controls 0.84 cfs @ 3.28 fps)

Pond R1: Recharger #1 - Chamber Wizard Field A

Chamber Model = retain_it retain_it 5.0' (retain-it®)
Inside= 84.0"W x 60.0"H => 36.41 sf x 8.00'L = 291.3 cf
Outside= 96.0"W x 68.0"H => 45.33 sf x 8.00'L = 362.7 cf
4 Rows adjusted for 228.6 cf perimeter wall

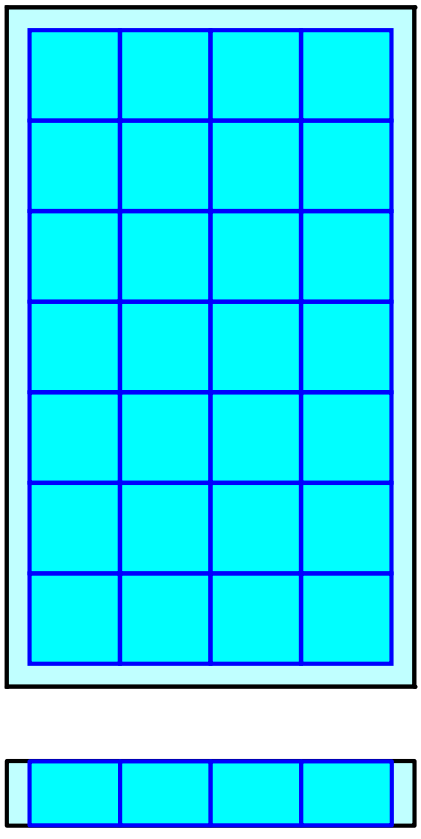
7 Chambers/Row x 8.00' Long = 56.00' Row Length +24.0" End Stone x 2 = 60.00' Base Length
4 Rows x 96.0" Wide + 24.0" Side Stone x 2 = 36.00' Base Width
0.5" Base + 68.0" Chamber Height = 5.71' Field Height

10.4 cf Sidewall x 7 x 2 + 10.4 cf Endwall x 4 x 2 = 228.6 cf Perimeter Wall
28 Chambers x 291.3 cf - 228.6 cf Perimeter wall = 7,927.3 cf Chamber Storage
28 Chambers x 362.7 cf = 10,154.7 cf Displacement

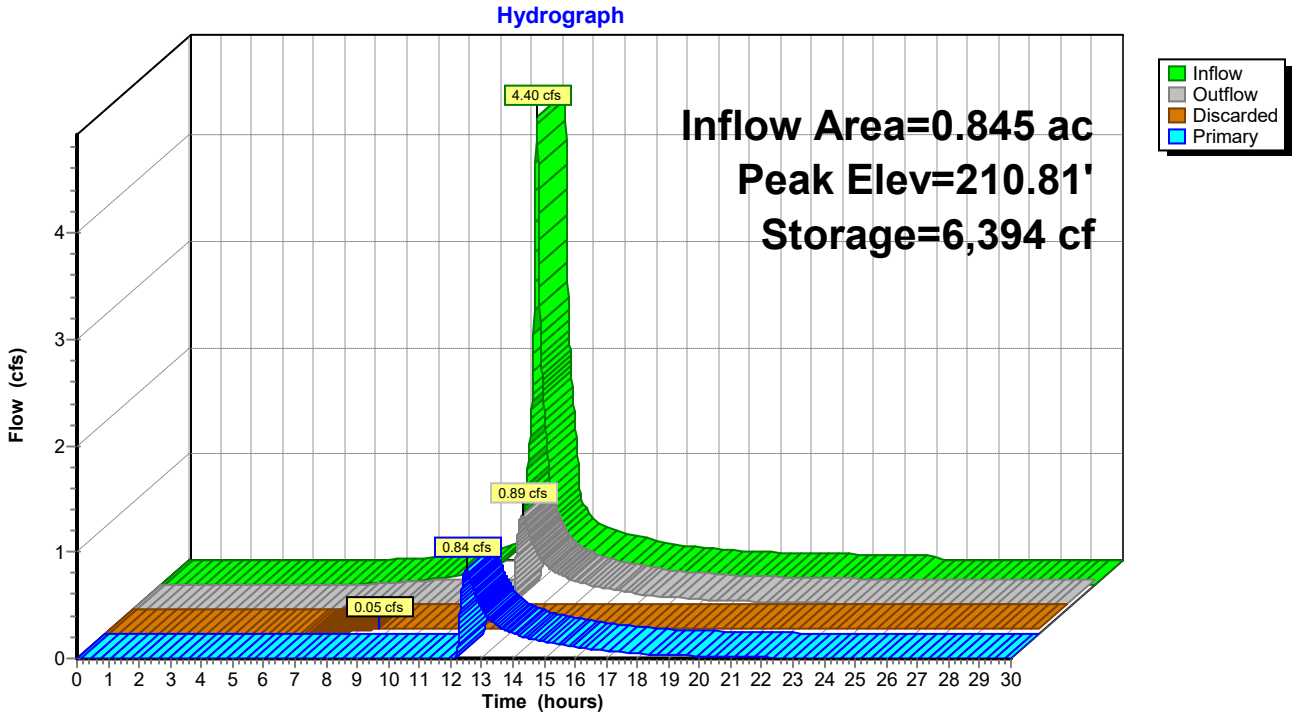
12,330.0 cf Field - 10,154.7 cf Chambers = 2,175.3 cf Stone x 40.0% Voids = 870.1 cf Stone Storage

Chamber Storage + Stone Storage = 8,797.4 cf = 0.202 af
Overall Storage Efficiency = 71.3%
Overall System Size = 60.00' x 36.00' x 5.71'

28 Chambers
456.7 cy Field
80.6 cy Stone



Pond R1: Recharger #1



Summary for Pond R2: Recharger #2

Inflow Area = 0.625 ac, 77.67% Impervious, Inflow Depth = 5.28" for 25 Year event
Inflow = 3.62 cfs @ 12.07 hrs, Volume= 0.275 af
Outflow = 0.25 cfs @ 13.36 hrs, Volume= 0.169 af, Atten= 93%, Lag= 77.0 min
Discarded = 0.06 cfs @ 7.63 hrs, Volume= 0.121 af
Primary = 0.19 cfs @ 13.36 hrs, Volume= 0.048 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 210.39' @ 13.36 hrs Surf.Area= 2,448 sf Storage= 6,612 cf
Flood Elev= 211.50' Surf.Area= 2,448 sf Storage= 7,963 cf

Plug-Flow detention time= 339.0 min calculated for 0.169 af (61% of inflow)
Center-of-Mass det. time= 230.4 min (994.2 - 763.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	207.00'	787 cf	**36.00'W x 68.00'L x 4.71'H Field A** 11,526 cf Overall - 9,557 cf Embedded = 1,969 cf x 40.0% Voids
#2A	207.04'	7,209 cf	**retain_it retain_it 4.0'** x 32 Inside #1 Inside= 84.0"W x 48.0"H => 28.87 sf x 8.00'L = 230.9 cf Outside= 96.0"W x 56.0"H => 37.33 sf x 8.00'L = 298.7 cf 4 Rows adjusted for 181.2 cf perimeter wall
		7,996 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	210.10'	**6.0" Round Culvert** L= 19.5' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 210.10' / 209.90' S= 0.0103 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#2	Discarded	207.00'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.06 cfs @ 7.63 hrs HW=207.04' (Free Discharge)
↑**2=Exfiltration** (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=0.19 cfs @ 13.36 hrs HW=210.39' (Free Discharge)
↑**1=Culvert** (Barrel Controls 0.19 cfs @ 2.33 fps)

Pond R2: Recharger #2 - Chamber Wizard Field A

Chamber Model = retain_it retain_it 4.0' (retain-it®)
Inside= 84.0"W x 48.0"H => 28.87 sf x 8.00'L = 230.9 cf
Outside= 96.0"W x 56.0"H => 37.33 sf x 8.00'L = 298.7 cf
4 Rows adjusted for 181.2 cf perimeter wall

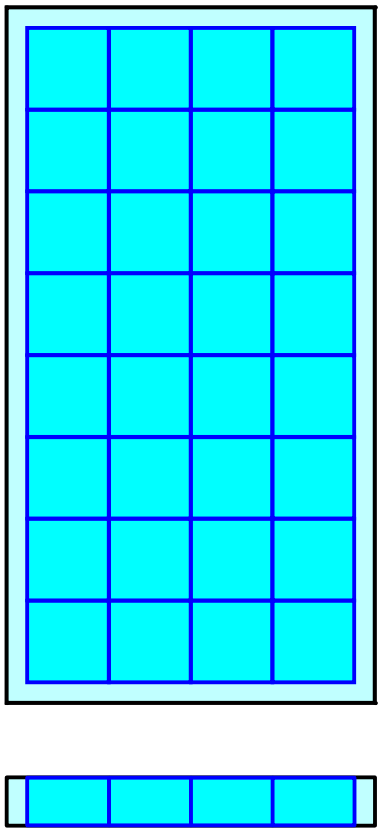
8 Chambers/Row x 8.00' Long = 64.00' Row Length +24.0" End Stone x 2 = 68.00' Base Length
4 Rows x 96.0" Wide + 24.0" Side Stone x 2 = 36.00' Base Width
0.5" Base + 56.0" Chamber Height = 4.71' Field Height

7.5 cf Sidewall x 8 x 2 + 7.5 cf Endwall x 4 x 2 = 181.2 cf Perimeter Wall
32 Chambers x 230.9 cf - 181.2 cf Perimeter wall = 7,208.9 cf Chamber Storage
32 Chambers x 298.7 cf = 9,557.3 cf Displacement

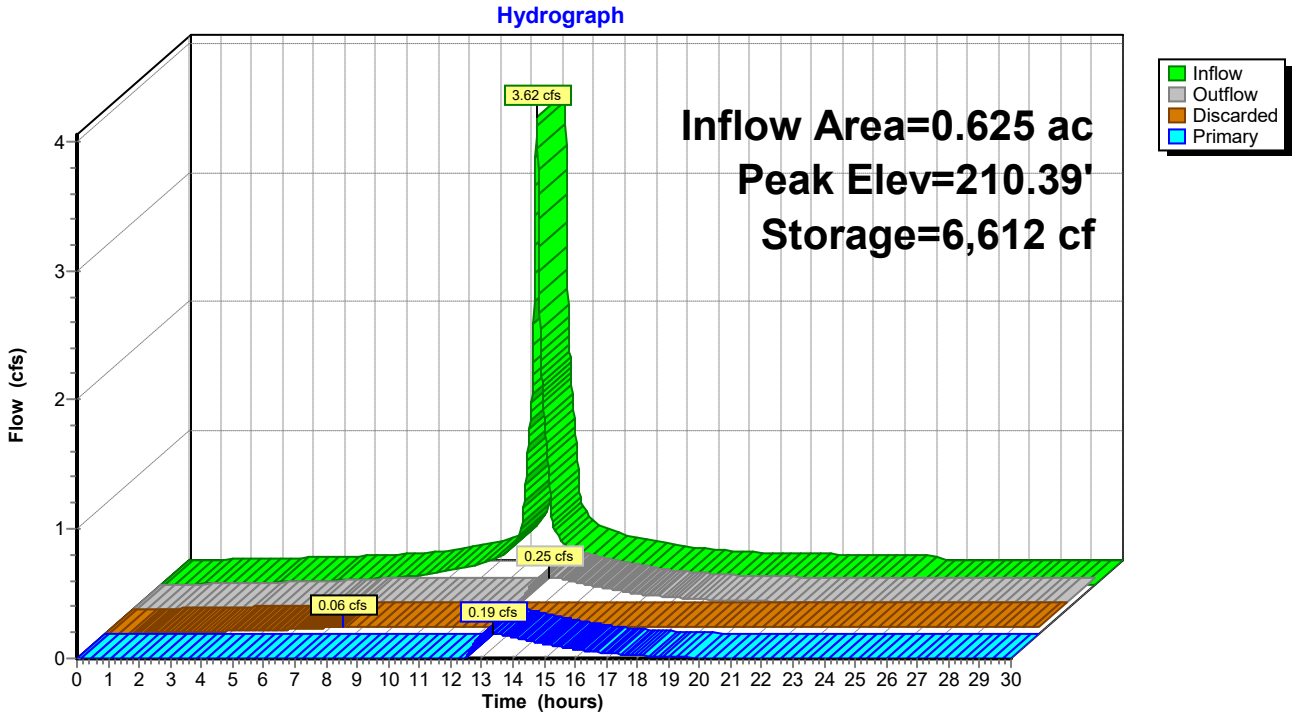
11,526.0 cf Field - 9,557.3 cf Chambers = 1,968.7 cf Stone x 40.0% Voids = 787.5 cf Stone Storage

Chamber Storage + Stone Storage = 7,996.3 cf = 0.184 af
Overall Storage Efficiency = 69.4%
Overall System Size = 68.00' x 36.00' x 4.71'

32 Chambers
426.9 cy Field
72.9 cy Stone



Pond R2: Recharger #2



Summary for Pond VP: On-Site Vernal Pool

Inflow Area = 2.301 ac, 20.67% Impervious, Inflow Depth > 1.40" for 25 Year event
Inflow = 2.42 cfs @ 12.17 hrs, Volume= 0.269 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min

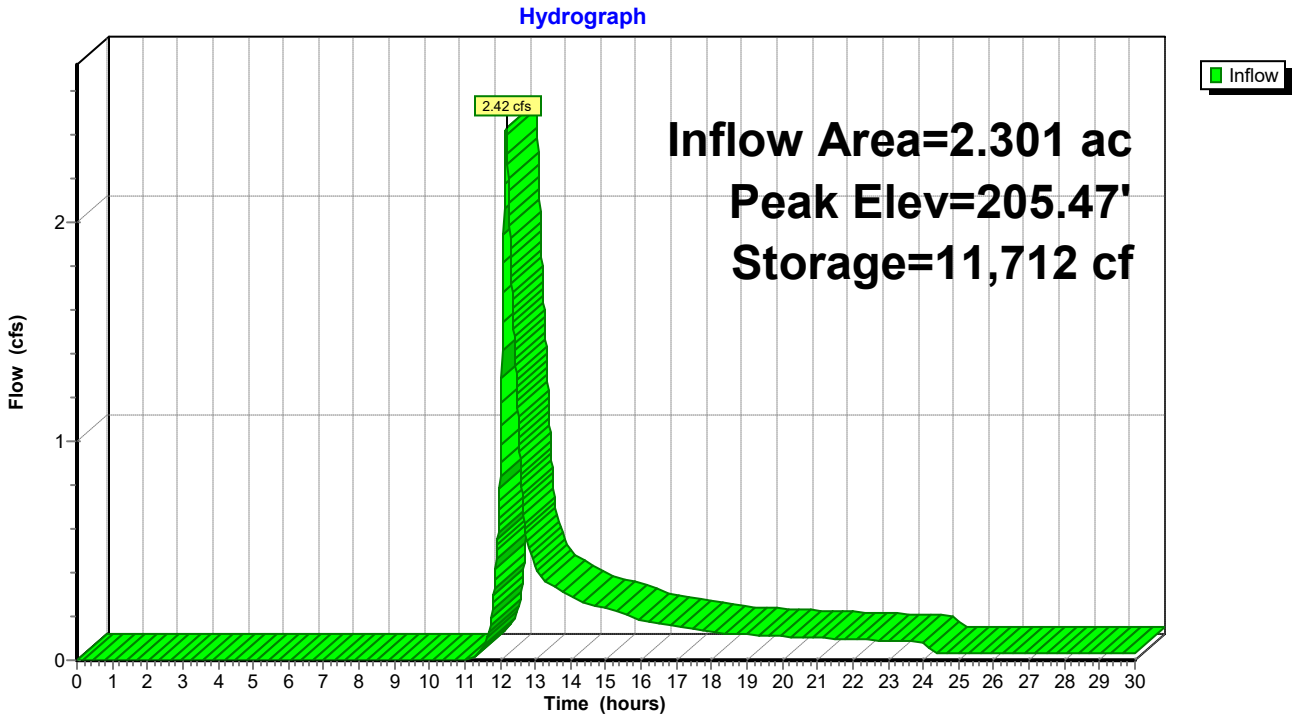
Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 205.47' @ 30.00 hrs Surf.Area= 5,787 sf Storage= 11,712 cf

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

Volume	Invert	Avail.Storage	Storage Description
#1	200.00'	30,113 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)
200.00	96	37.0	0	0	96
201.00	661	92.8	336	336	676
202.00	1,302	129.9	964	1,300	1,343
203.00	2,076	163.4	1,674	2,974	2,138
204.00	3,067	197.8	2,555	5,529	3,144
205.00	4,516	239.6	3,768	9,298	4,615
206.00	7,411	316.4	5,904	15,202	8,024
207.00	23,990	735.5	14,912	30,113	43,110

Pond VP: On-Site Vernal Pool



Summary for Subcatchment P-1: Uncontrolled to Street

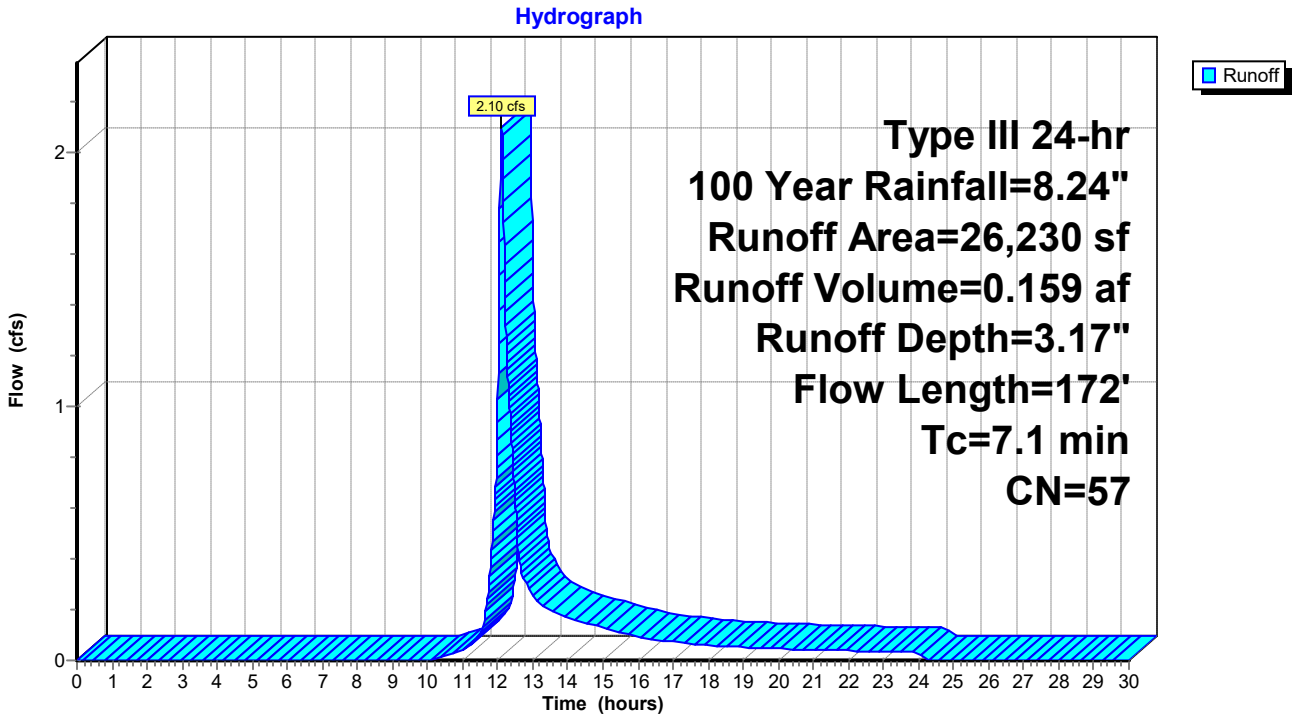
Runoff = 2.10 cfs @ 12.11 hrs, Volume= 0.159 af, Depth= 3.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.24"

Area (sf)	CN	Description
720	98	Paved parking, HSG B
5,287	61	>75% Grass cover, Good, HSG B
20,223	55	Woods, Good, HSG B
26,230	57	Weighted Average
25,510		97.26% Pervious Area
720		2.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	50	0.1740	0.16		**Sheet Flow, Segment 1** Woods: Light underbrush n= 0.400 P2= 3.35"
2.0	122	0.0434	1.04		**Shallow Concentrated Flow, Segment 2** Woodland Kv= 5.0 fps
7.1	172	Total			

Subcatchment P-1: Uncontrolled to Street



Summary for Subcatchment P-10: Area Drains to Detention

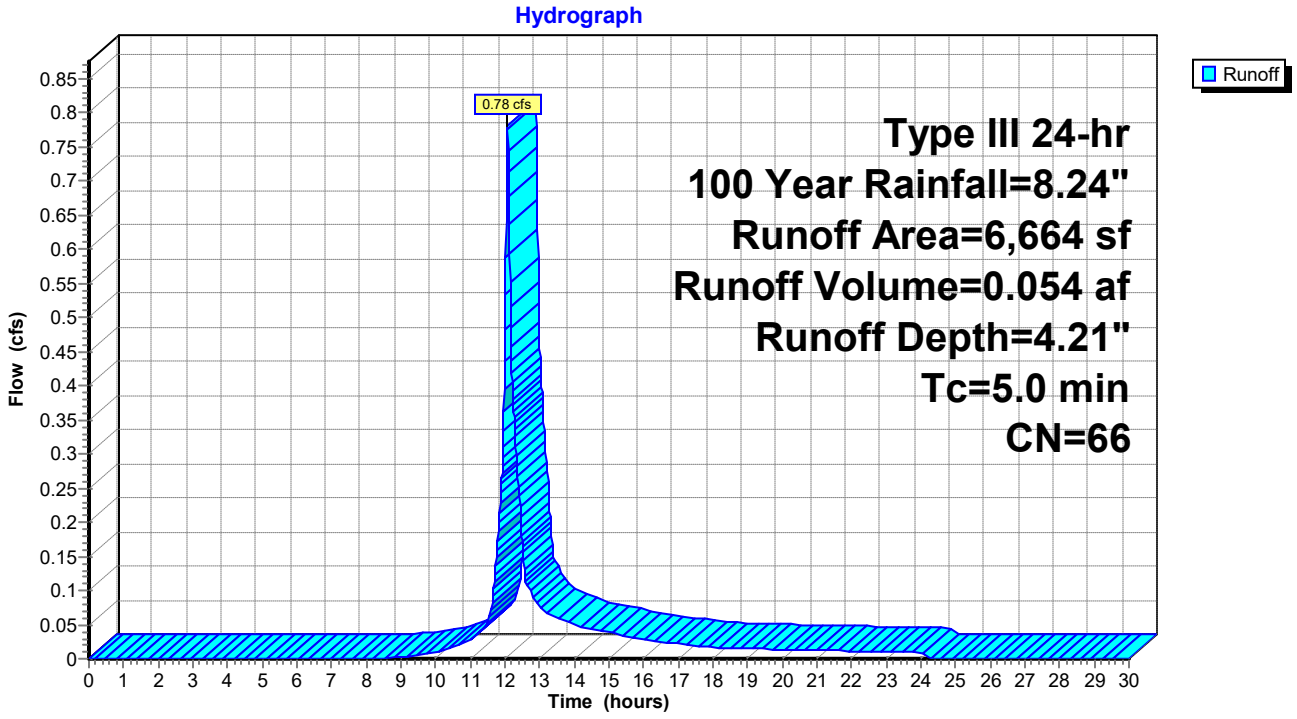
Runoff = 0.78 cfs @ 12.08 hrs, Volume= 0.054 af, Depth= 4.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.24"

Area (sf)	CN	Description
962	98	Paved parking, HSG B
5,702	61	>75% Grass cover, Good, HSG B
6,664	66	Weighted Average
5,702		85.56% Pervious Area
962		14.44% Impervious Area

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

Subcatchment P-10: Area Drains to Detention



Summary for Subcatchment P-11: Area Drains to Recharger

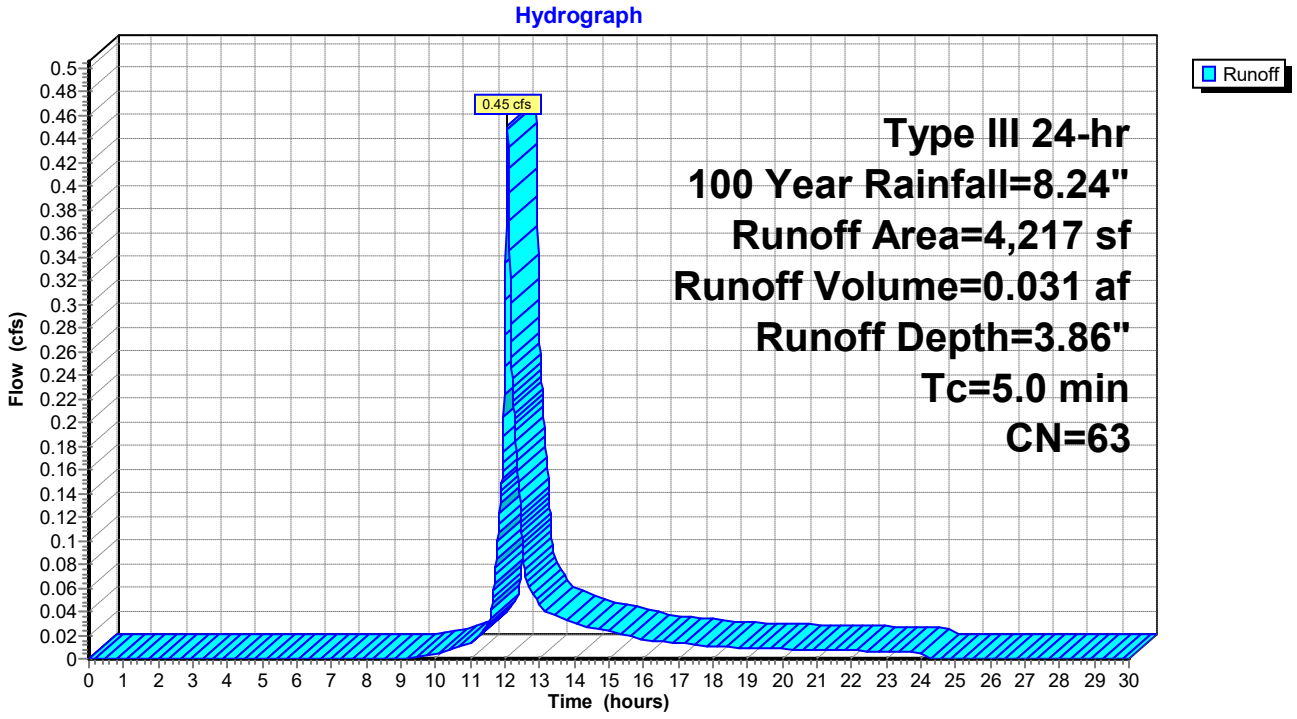
Runoff = 0.45 cfs @ 12.08 hrs, Volume= 0.031 af, Depth= 3.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.24"

Area (sf)	CN	Description
203	98	Paved parking, HSG B
4,014	61	>75% Grass cover, Good, HSG B
4,217	63	Weighted Average
4,014		95.19% Pervious Area
203		4.81% Impervious Area

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

Subcatchment P-11: Area Drains to Recharger



Summary for Subcatchment P-2a: Driveway & Yard

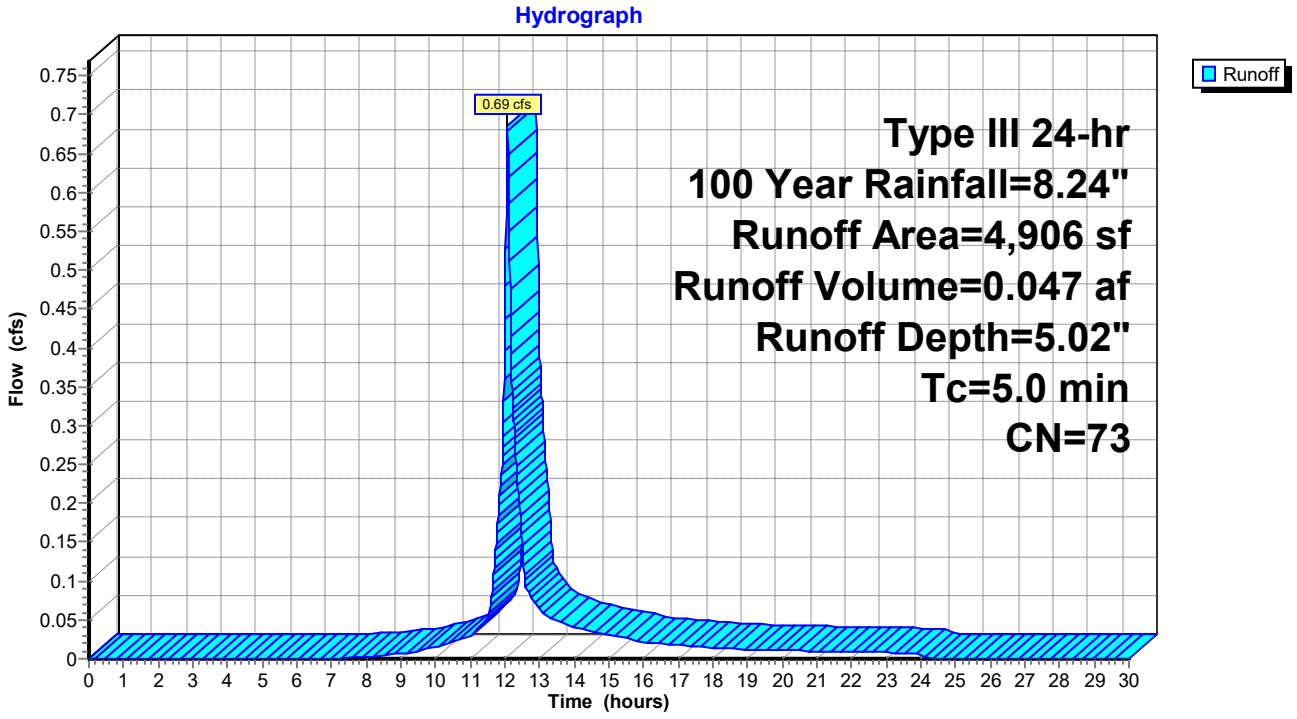
Runoff = 0.69 cfs @ 12.07 hrs, Volume= 0.047 af, Depth= 5.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.24"

Area (sf)	CN	Description
1,639	98	Paved parking, HSG B
3,267	61	>75% Grass cover, Good, HSG B
4,906	73	Weighted Average
3,267		66.59% Pervious Area
1,639		33.41% Impervious Area

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

Subcatchment P-2a: Driveway & Yard



Summary for Subcatchment P-2b: Uncontrolled to Abutter

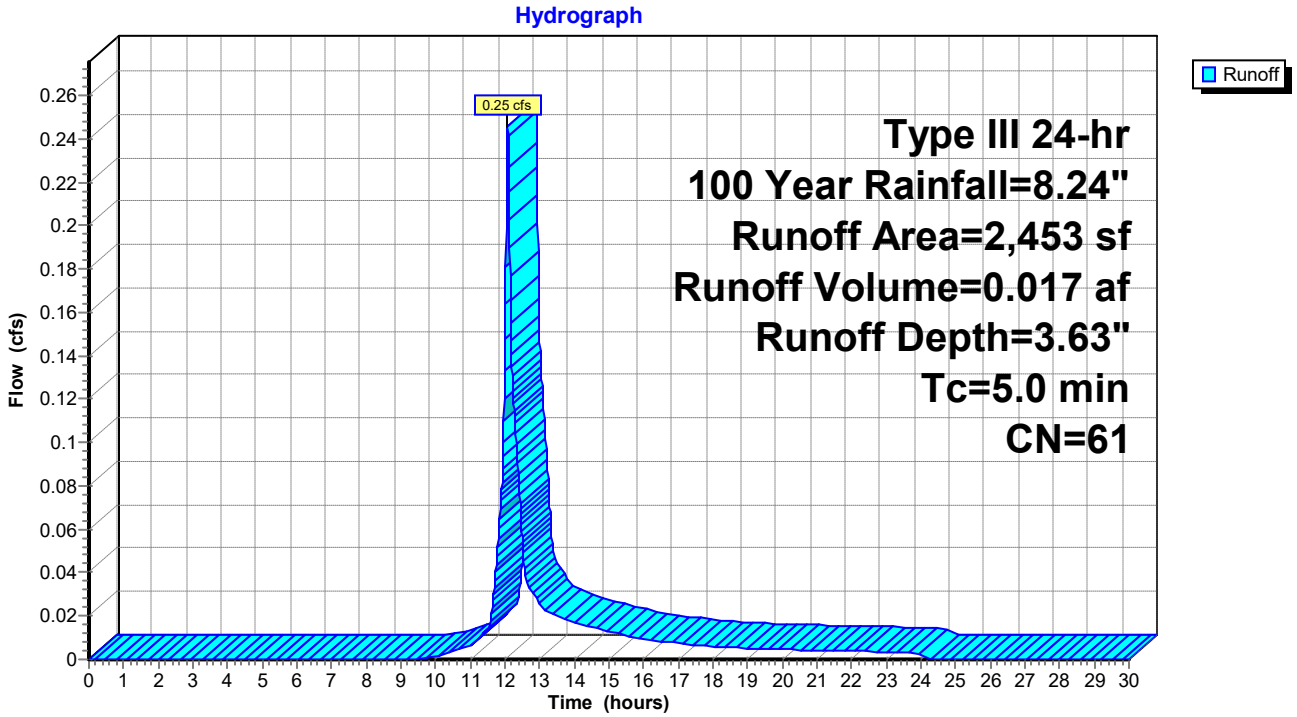
Runoff = 0.25 cfs @ 12.08 hrs, Volume= 0.017 af, Depth= 3.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.24"

Area (sf)	CN	Description
2,453	61	>75% Grass cover, Good, HSG B
2,453		100.00% Pervious Area

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

Subcatchment P-2b: Uncontrolled to Abutter



Summary for Subcatchment P-3: Uncontrolled to V.P.

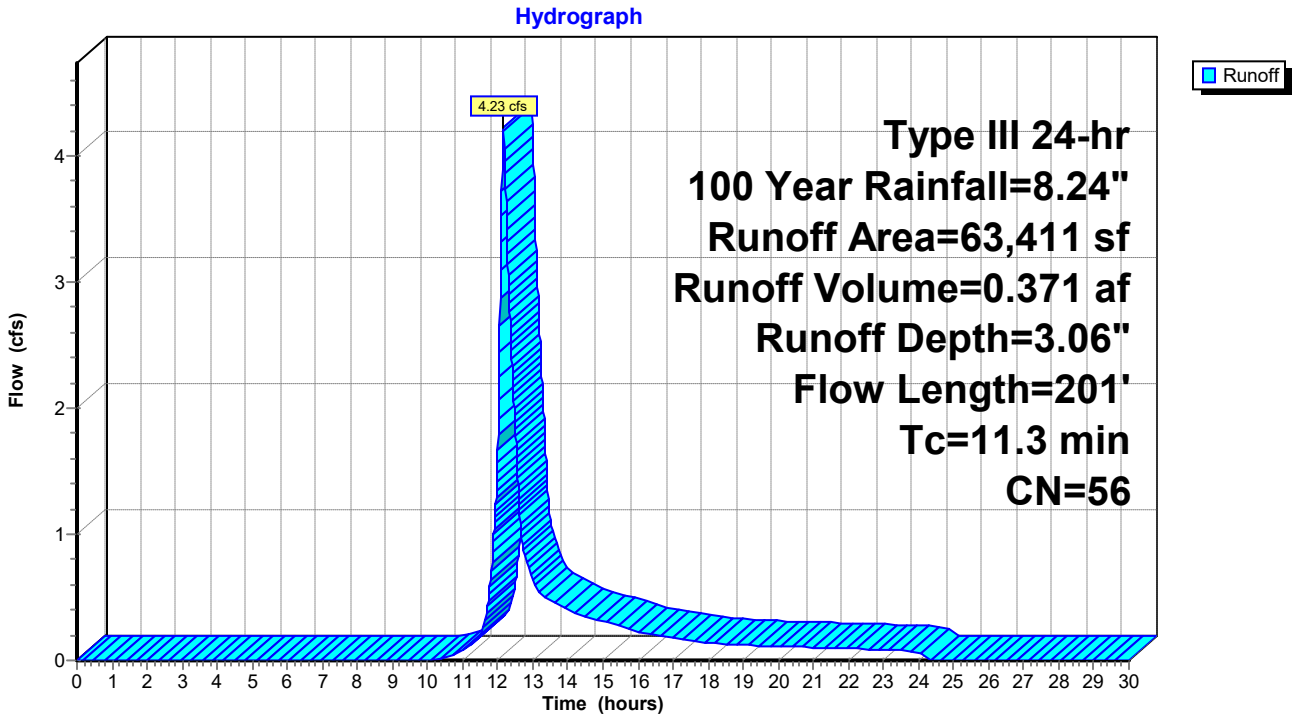
Runoff = 4.23 cfs @ 12.17 hrs, Volume= 0.371 af, Depth= 3.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.24"

Area (sf)	CN	Description
13,614	61	>75% Grass cover, Good, HSG B
49,797	55	Woods, Good, HSG B
63,411	56	Weighted Average
63,411		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.1	50	0.0400	0.09		**Sheet Flow, Segment 1** Woods: Light underbrush n= 0.400 P2= 3.35"
0.8	73	0.0507	1.58		**Shallow Concentrated Flow, Segment 2** Short Grass Pasture Kv= 7.0 fps
1.4	78	0.0359	0.95		**Shallow Concentrated Flow, Segment 3** Woodland Kv= 5.0 fps
11.3	201	Total			

Subcatchment P-3: Uncontrolled to V.P.



Summary for Subcatchment P-4: Uncontrolled to Wetlands

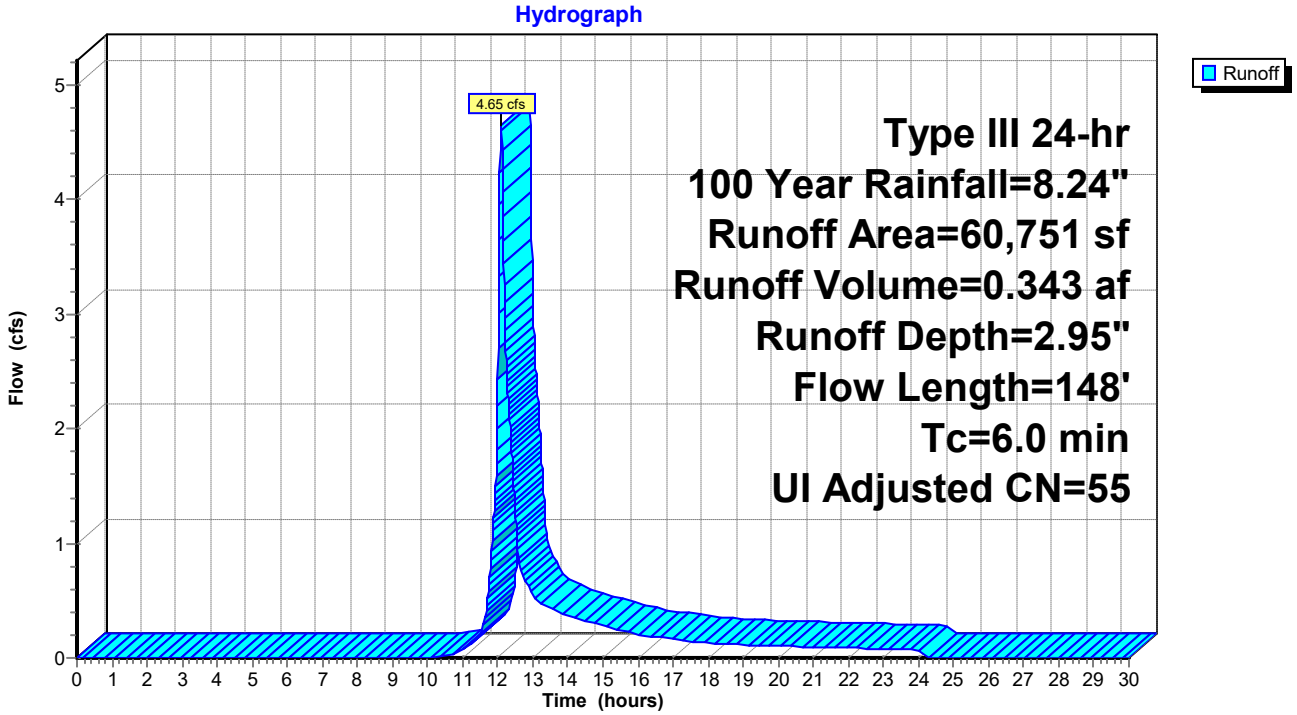
Runoff = 4.65 cfs @ 12.09 hrs, Volume= 0.343 af, Depth= 2.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.24"

Area (sf)	CN	Adj	Description
387	98		Unconnected pavement, HSG B
2,570	61		>75% Grass cover, Good, HSG B
57,794	55		Woods, Good, HSG B
60,751	56	55	Weighted Average, UI Adjusted
60,364			99.36% Pervious Area
387			0.64% Impervious Area
387			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.7	50	0.2100	0.18		**Sheet Flow, Segment 1** Woods: Light underbrush n= 0.400 P2= 3.35"
1.3	98	0.0663	1.29		**Shallow Concentrated Flow, Segment 2** Woodland Kv= 5.0 fps
6.0	148	Total			

Subcatchment P-4: Uncontrolled to Wetlands



Summary for Subcatchment P-5: New Building

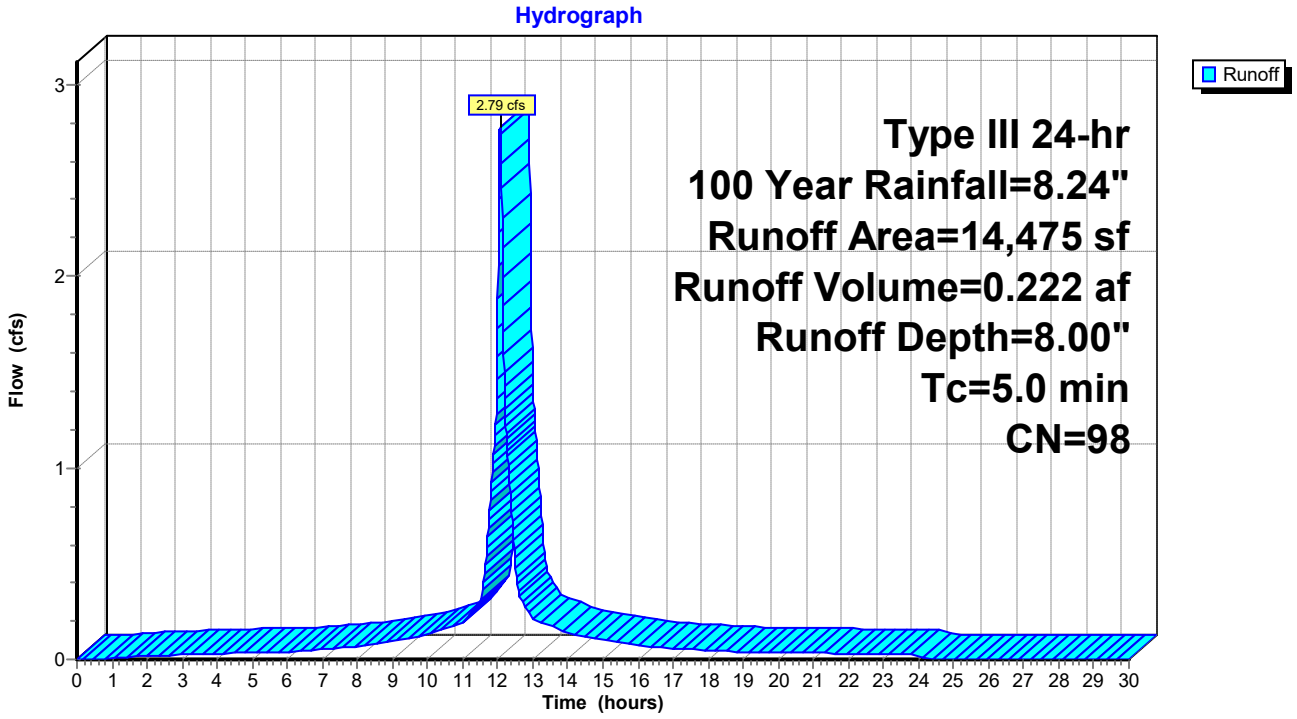
Runoff = 2.79 cfs @ 12.07 hrs, Volume= 0.222 af, Depth= 8.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.24"

Area (sf)	CN	Description
14,475	98	Roofs, HSG B
14,475		100.00% Impervious Area

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

Subcatchment P-5: New Building



Summary for Subcatchment P-6: Parking Lot & Driveway & SAS (partial)

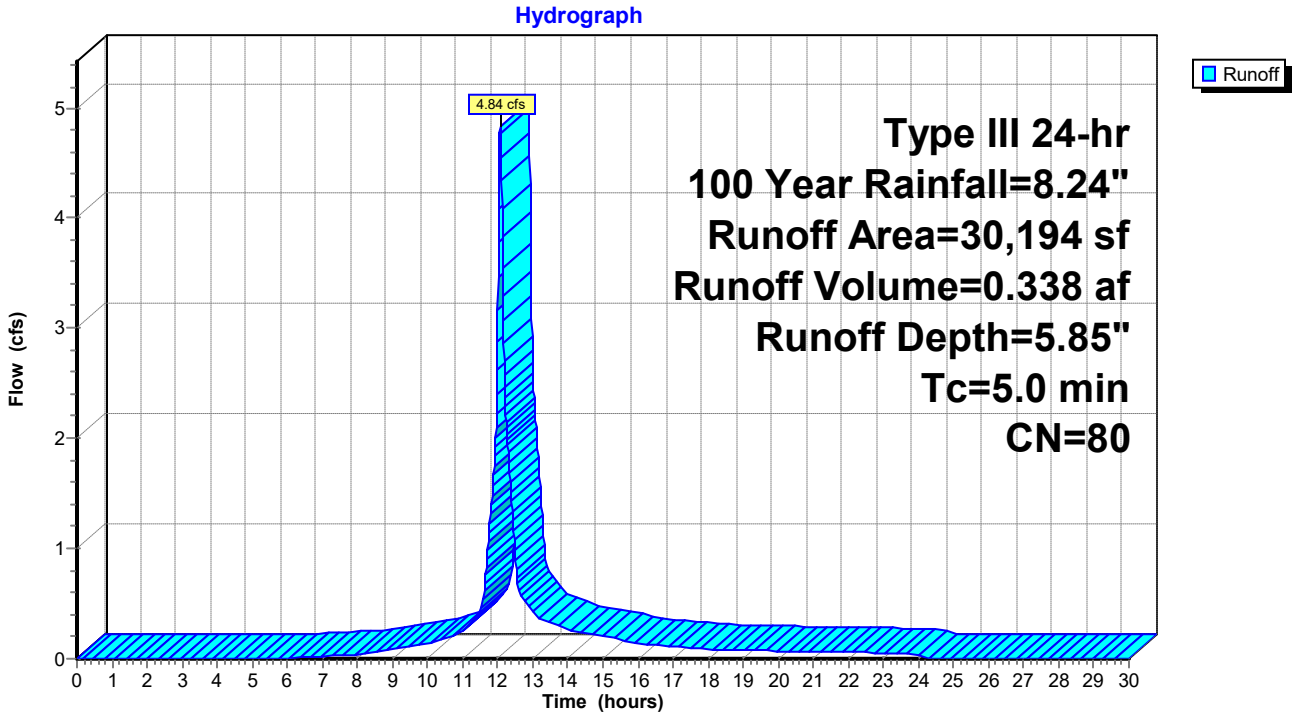
Runoff = 4.84 cfs @ 12.07 hrs, Volume= 0.338 af, Depth= 5.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.24"

Area (sf)	CN	Description
15,610	98	Paved parking, HSG B
14,584	61	>75% Grass cover, Good, HSG B
30,194	80	Weighted Average
14,584		48.30% Pervious Area
15,610		51.70% Impervious Area

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

Subcatchment P-6: Parking Lot & Driveway & SAS (partial)



Summary for Subcatchment P-7: Parking Lot & Driveway

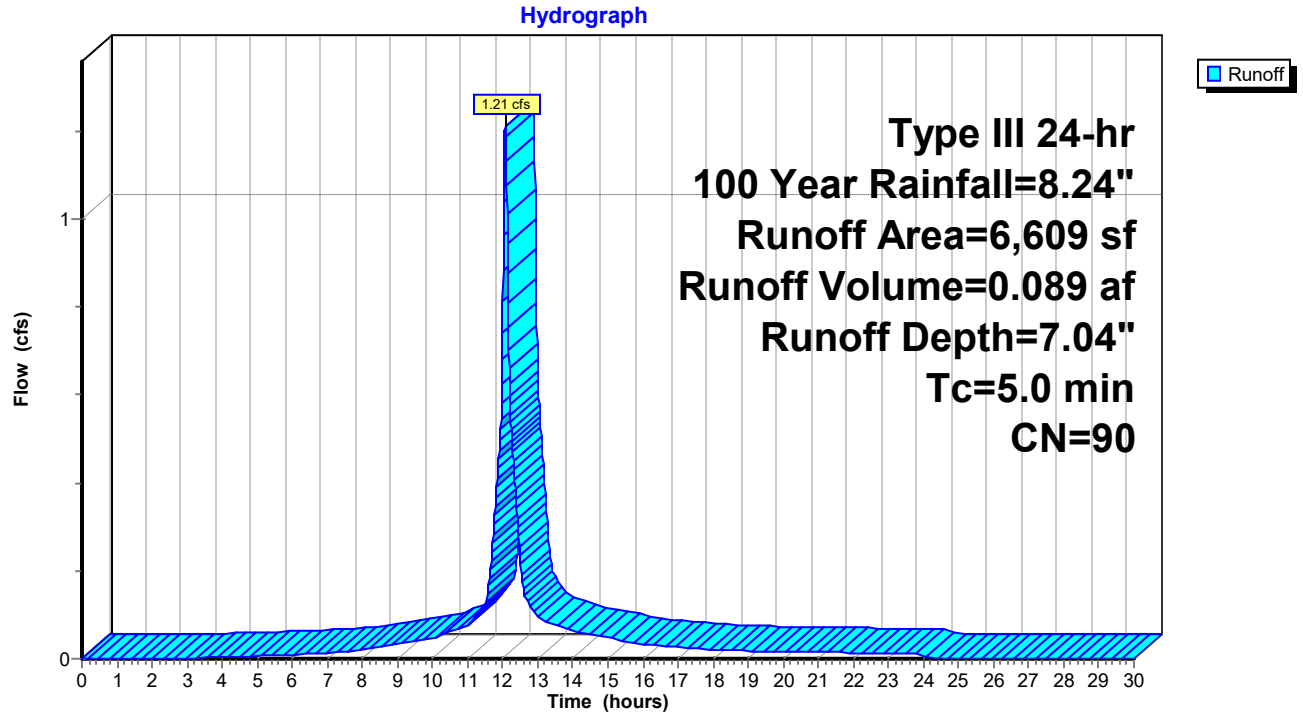
Runoff = 1.21 cfs @ 12.07 hrs, Volume= 0.089 af, Depth= 7.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.24"

Area (sf)	CN	Description
5,107	98	Paved parking, HSG B
1,502	61	>75% Grass cover, Good, HSG B
6,609	90	Weighted Average
1,502		22.73% Pervious Area
5,107		77.27% Impervious Area

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

Subcatchment P-7: Parking Lot & Driveway



Summary for Subcatchment P-8: Parking Lot & Driveway

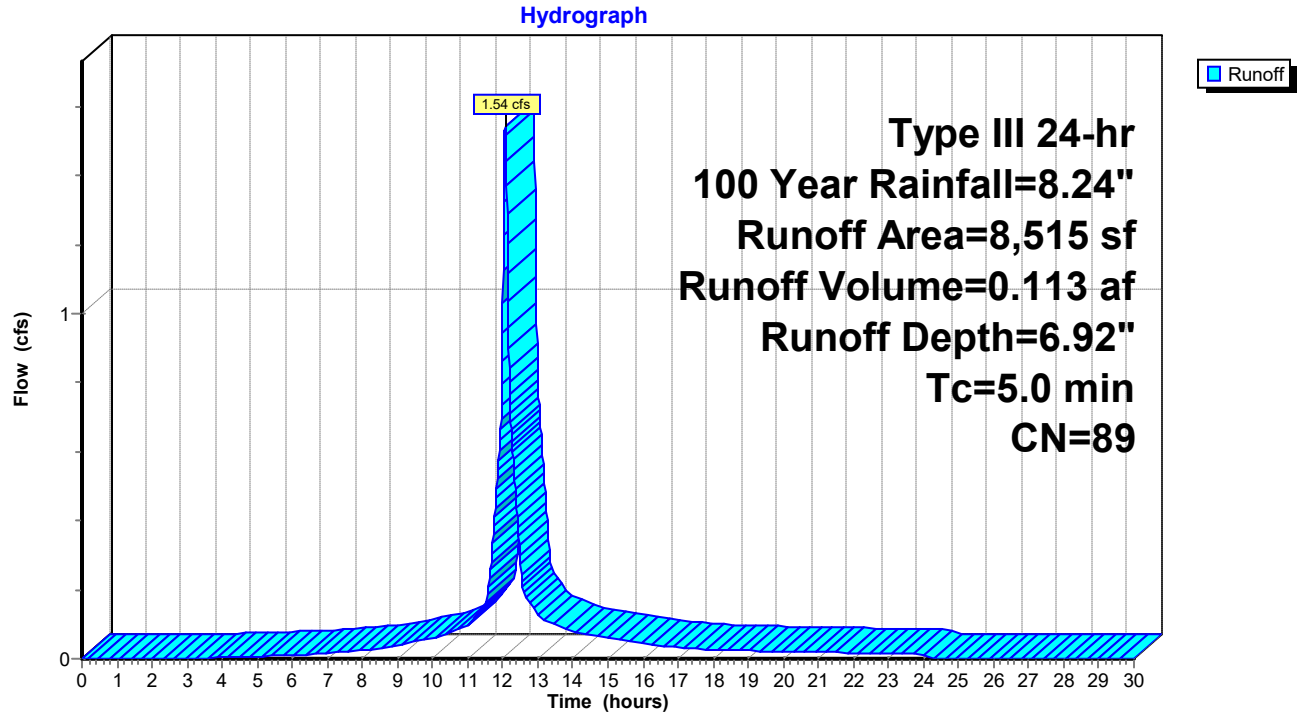
Runoff = 1.54 cfs @ 12.07 hrs, Volume= 0.113 af, Depth= 6.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.24"

Area (sf)	CN	Description
6,453	98	Paved parking, HSG B
2,062	61	>75% Grass cover, Good, HSG B
8,515	89	Weighted Average
2,062		24.22% Pervious Area
6,453		75.78% Impervious Area

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

Subcatchment P-8: Parking Lot & Driveway



Summary for Subcatchment P-9: Parking Lot & Driveway

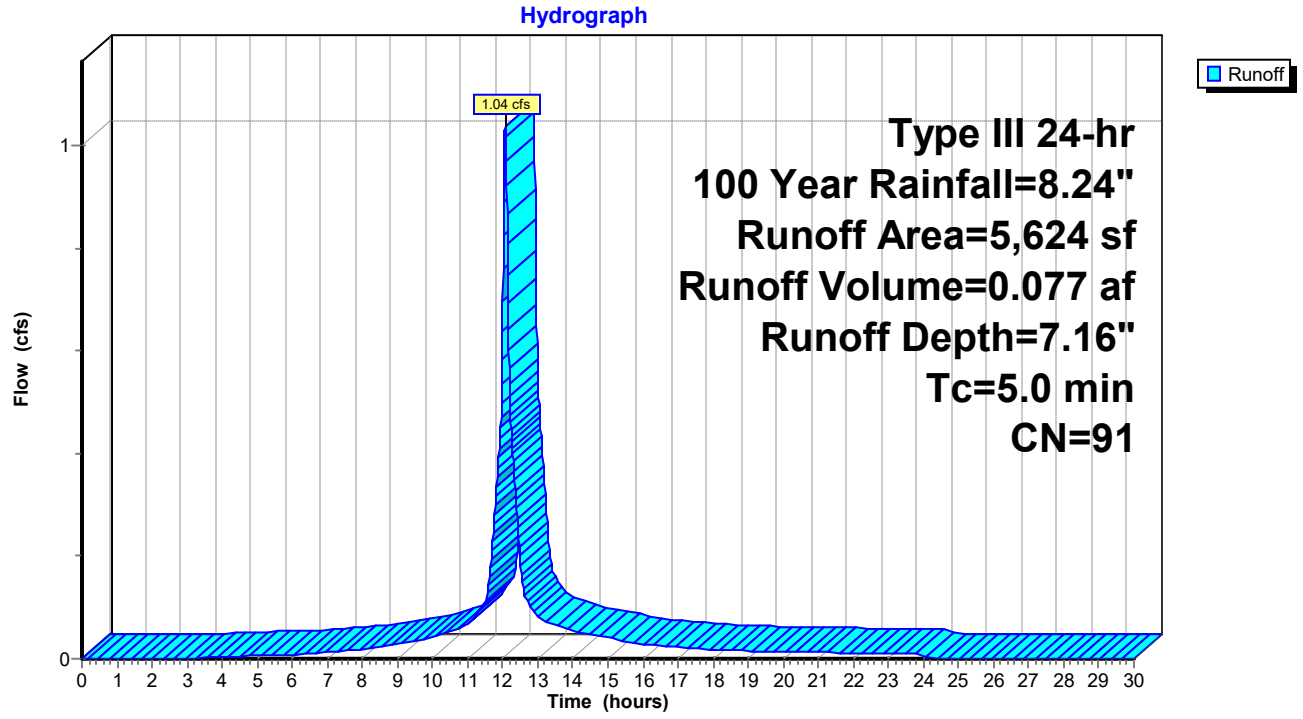
Runoff = 1.04 cfs @ 12.07 hrs, Volume= 0.077 af, Depth= 7.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.24"

Area (sf)	CN	Description
4,496	98	Paved parking, HSG B
1,128	61	>75% Grass cover, Good, HSG B
5,624	91	Weighted Average
1,128		20.06% Pervious Area
4,496		79.94% Impervious Area

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

Subcatchment P-9: Parking Lot & Driveway



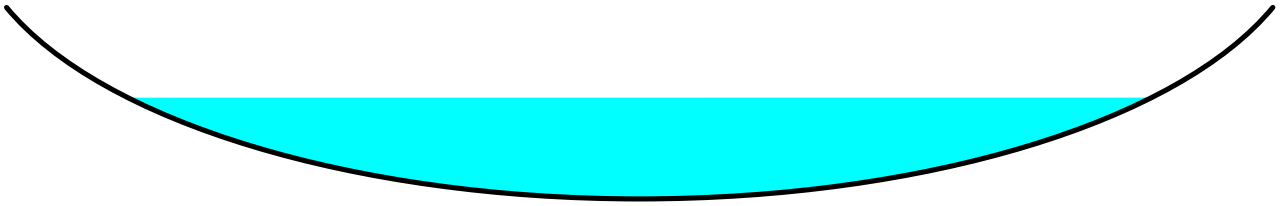
Summary for Reach 1R: Plpe Outfall

Inflow Area = 0.845 ac, 56.29% Impervious, Inflow Depth > 1.47" for 100 Year event
Inflow = 0.27 cfs @ 14.51 hrs, Volume= 0.104 af
Outflow = 0.27 cfs @ 14.51 hrs, Volume= 0.104 af, Atten= 0%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 0.52 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 0.33 fps, Avg. Travel Time= 0.5 min

Peak Storage= 5 cf @ 14.51 hrs
Average Depth at Peak Storage= 0.11'
Bank-Full Depth= 0.20' Flow Area= 1.3 sf, Capacity= 1.06 cfs

10.00' x 0.20' deep Parabolic Channel, n= 0.069 Riprap, 6-inch
Length= 10.0' Slope= 0.0200 '/'
Inlet Invert= 207.00', Outlet Invert= 206.80'



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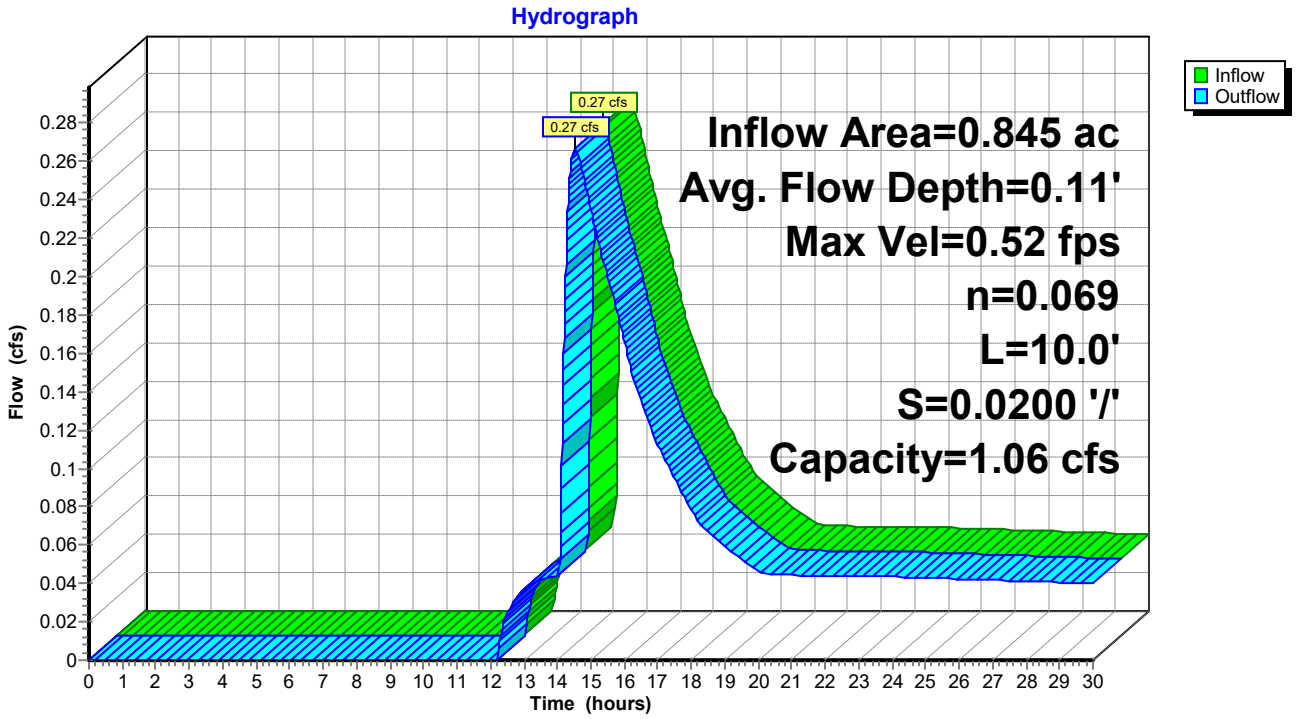
Reach 1R: Plpe Outfall



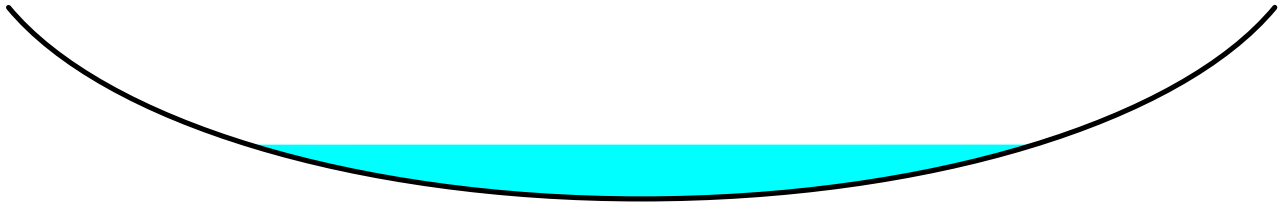
Summary for Reach 2R: Pipe Outfall

Inflow Area = 0.907 ac, 67.32% Impervious, Inflow Depth > 1.08" for 100 Year event
Inflow = 0.11 cfs @ 17.07 hrs, Volume= 0.081 af
Outflow = 0.11 cfs @ 17.08 hrs, Volume= 0.081 af, Atten= 0%, Lag= 0.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 0.54 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 0.42 fps, Avg. Travel Time= 0.4 min

Peak Storage= 2 cf @ 17.08 hrs
Average Depth at Peak Storage= 0.06'
Bank-Full Depth= 0.20' Flow Area= 1.3 sf, Capacity= 1.67 cfs

10.00' x 0.20' deep Parabolic Channel, n= 0.069 Riprap, 6-inch
Length= 10.0' Slope= 0.0500 '/'
Inlet Invert= 205.00', Outlet Invert= 204.50'



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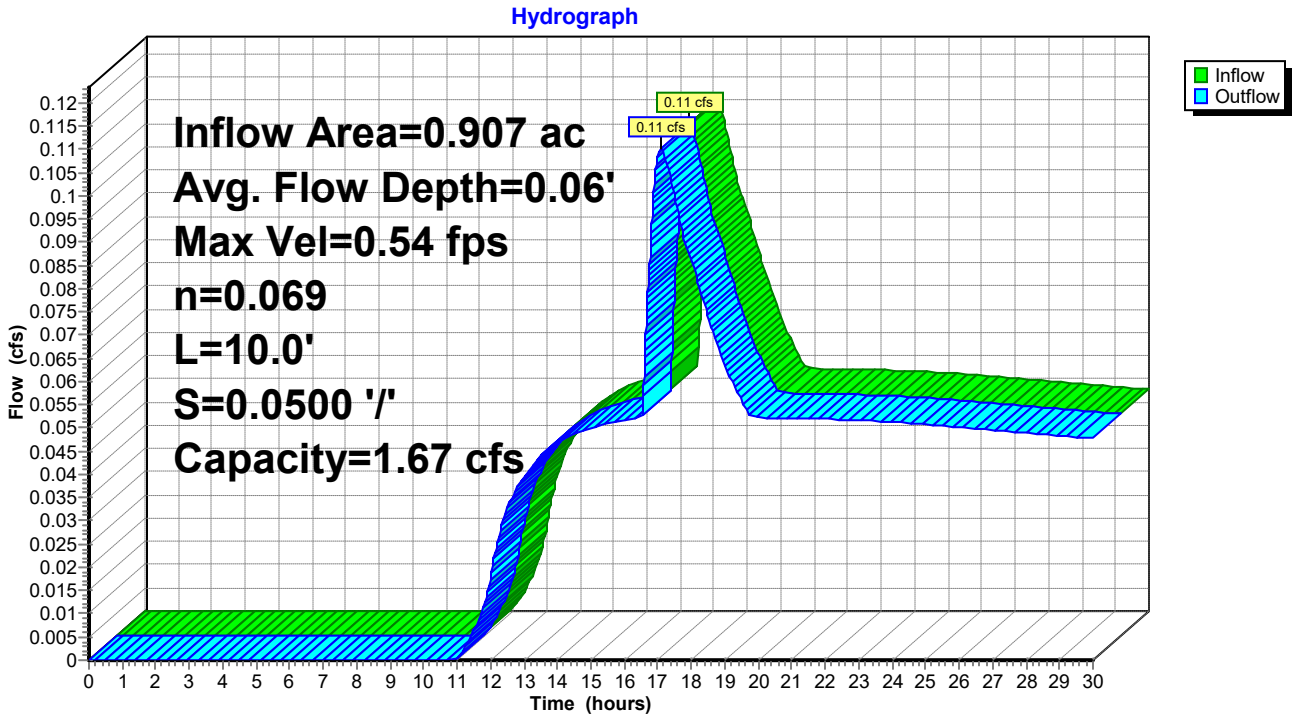
Reach 2R: Pipe Outfall

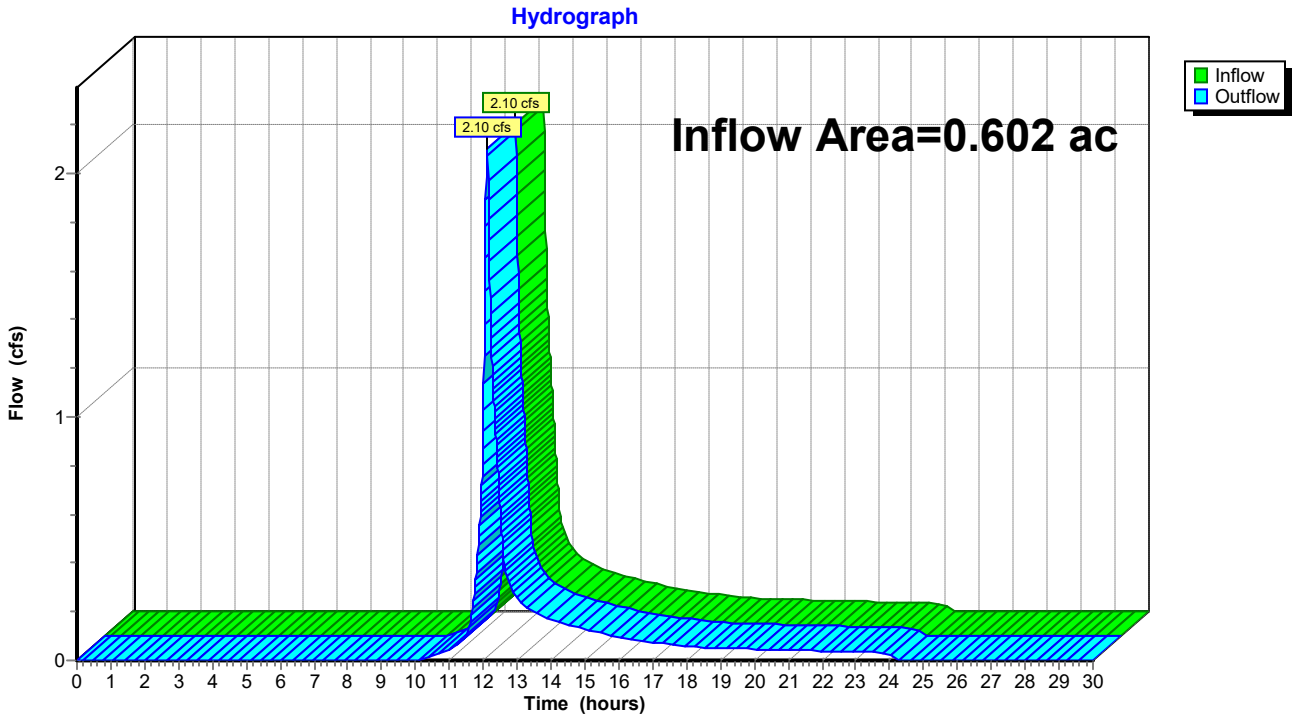


Summary for Reach DP-1: Washington Street

Inflow Area = 0.602 ac, 2.74% Impervious, Inflow Depth = 3.17" for 100 Year event
Inflow = 2.10 cfs @ 12.11 hrs, Volume= 0.159 af
Outflow = 2.10 cfs @ 12.11 hrs, Volume= 0.159 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Reach DP-1: Washington Street

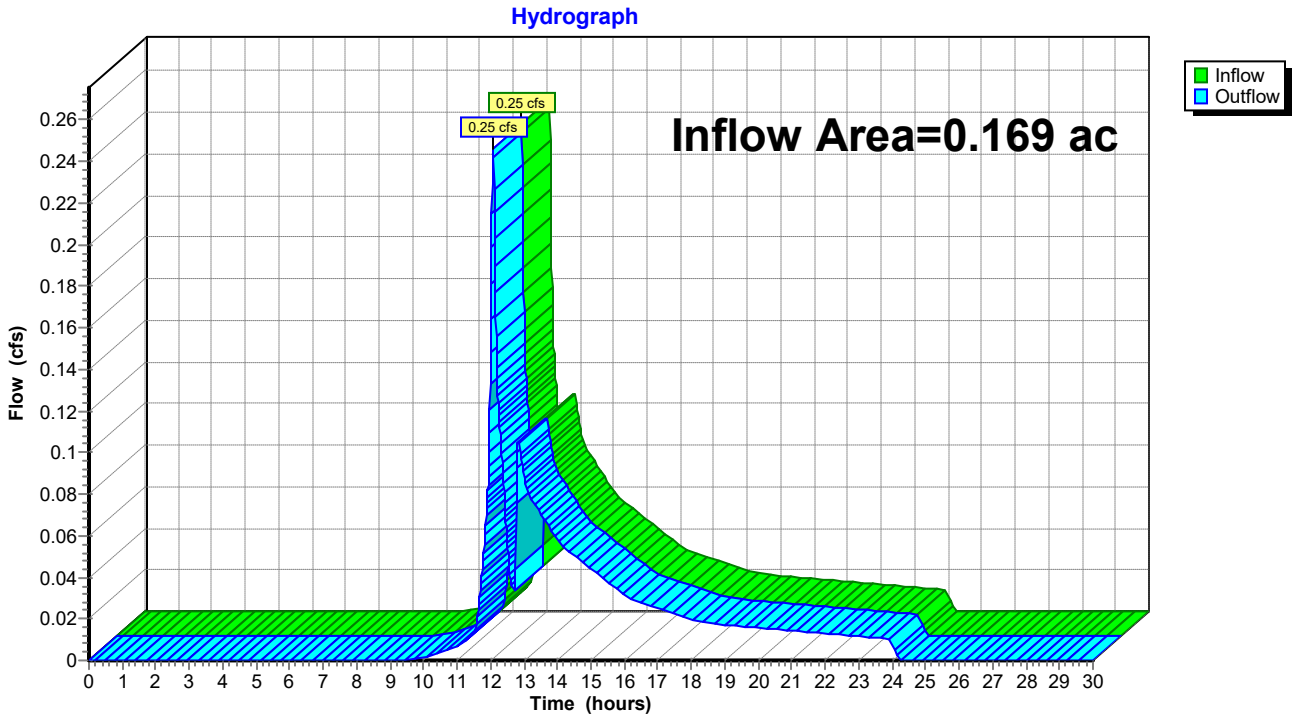


Summary for Reach DP-2: Abutting Property

Inflow Area = 0.169 ac, 22.27% Impervious, Inflow Depth = 2.53" for 100 Year event
Inflow = 0.25 cfs @ 12.08 hrs, Volume= 0.036 af
Outflow = 0.25 cfs @ 12.08 hrs, Volume= 0.036 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Reach DP-2: Abutting Property

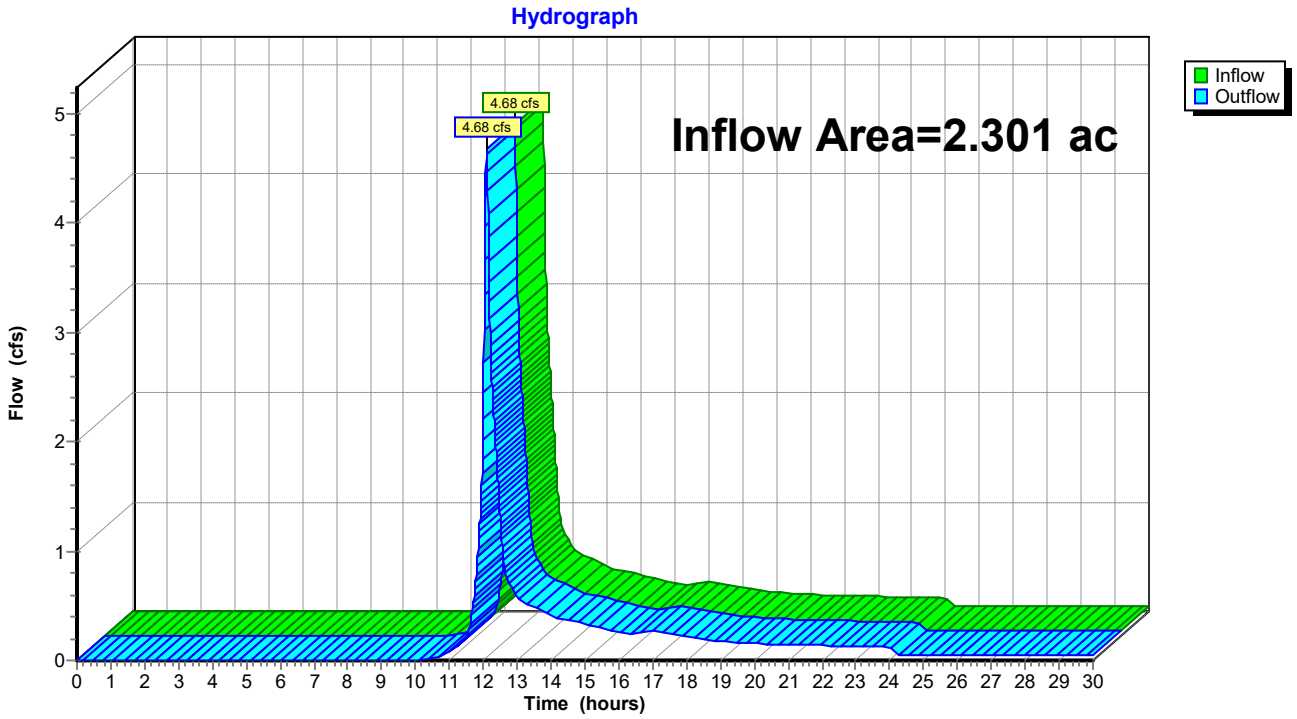


Summary for Reach DP-4: On-Site Wetlands

Inflow Area = 2.301 ac, 26.91% Impervious, Inflow Depth > 2.21" for 100 Year event
Inflow = 4.68 cfs @ 12.09 hrs, Volume= 0.424 af
Outflow = 4.68 cfs @ 12.09 hrs, Volume= 0.424 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Reach DP-4: On-Site Wetlands



Summary for Pond D1: Detention Basin #1

Inflow Area = 0.845 ac, 56.29% Impervious, Inflow Depth = 3.25" for 100 Year event
Inflow = 1.79 cfs @ 12.38 hrs, Volume= 0.229 af
Outflow = 0.27 cfs @ 14.51 hrs, Volume= 0.104 af, Atten= 85%, Lag= 127.4 min
Primary = 0.27 cfs @ 14.51 hrs, Volume= 0.104 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 210.47' @ 14.51 hrs Surf.Area= 2,516 sf Storage= 6,718 cf
Flood Elev= 210.50' Surf.Area= 2,516 sf Storage= 6,777 cf

Plug-Flow detention time= 391.3 min calculated for 0.104 af (45% of inflow)
Center-of-Mass det. time= 297.6 min (1,140.0 - 842.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	207.00'	814 cf	**34.00'W x 74.00'L x 4.17'H Field A** 10,483 cf Overall - 8,448 cf Embedded = 2,035 cf x 40.0% Voids
#2A	207.50'	6,019 cf	**retain_it retain_it 3.0'** x 36 Inside #1 Inside= 84.0"W x 36.0"H => 21.33 sf x 8.00'L = 170.6 cf Outside= 96.0"W x 44.0"H => 29.33 sf x 8.00'L = 234.7 cf 4 Rows adjusted for 122.7 cf perimeter wall
		6,833 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	207.50'	**10.0" Round Culvert** L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 207.50' / 207.00' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf
#2	Device 1	210.40'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Device 1	207.50'	**1.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.26 cfs @ 14.51 hrs HW=210.47' (Free Discharge)
↑**1=Culvert** (Passes 0.26 cfs of 4.20 cfs potential flow)
↑**2=Broad-Crested Rectangular Weir** (Weir Controls 0.22 cfs @ 0.75 fps)
3=Orifice/Grate (Orifice Controls 0.04 cfs @ 8.24 fps)

Pond D1: Detention Basin #1 - Chamber Wizard Field A

Chamber Model = retain_it retain_it 3.0' (retain-it®)
Inside= 84.0"W x 36.0"H => 21.33 sf x 8.00'L = 170.6 cf
Outside= 96.0"W x 44.0"H => 29.33 sf x 8.00'L = 234.7 cf
4 Rows adjusted for 122.7 cf perimeter wall

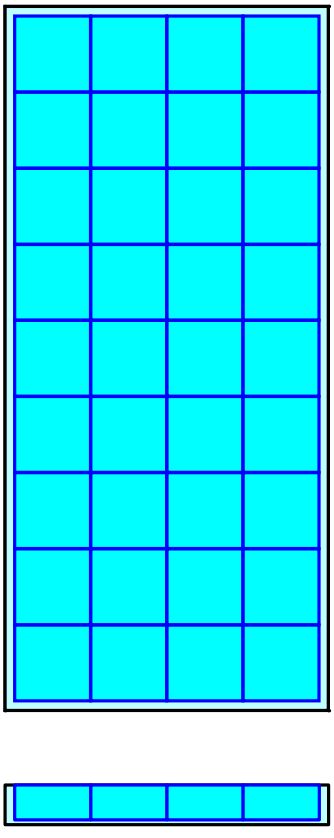
9 Chambers/Row x 8.00' Long = 72.00' Row Length +12.0" End Stone x 2 = 74.00' Base Length
4 Rows x 96.0" Wide + 12.0" Side Stone x 2 = 34.00' Base Width
6.0" Base + 44.0" Chamber Height = 4.17' Field Height

4.7 cf Sidewall x 9 x 2 + 4.7 cf Endwall x 4 x 2 = 122.7 cf Perimeter Wall
36 Chambers x 170.6 cf - 122.7 cf Perimeter wall = 6,019.2 cf Chamber Storage
36 Chambers x 234.7 cf = 8,448.0 cf Displacement

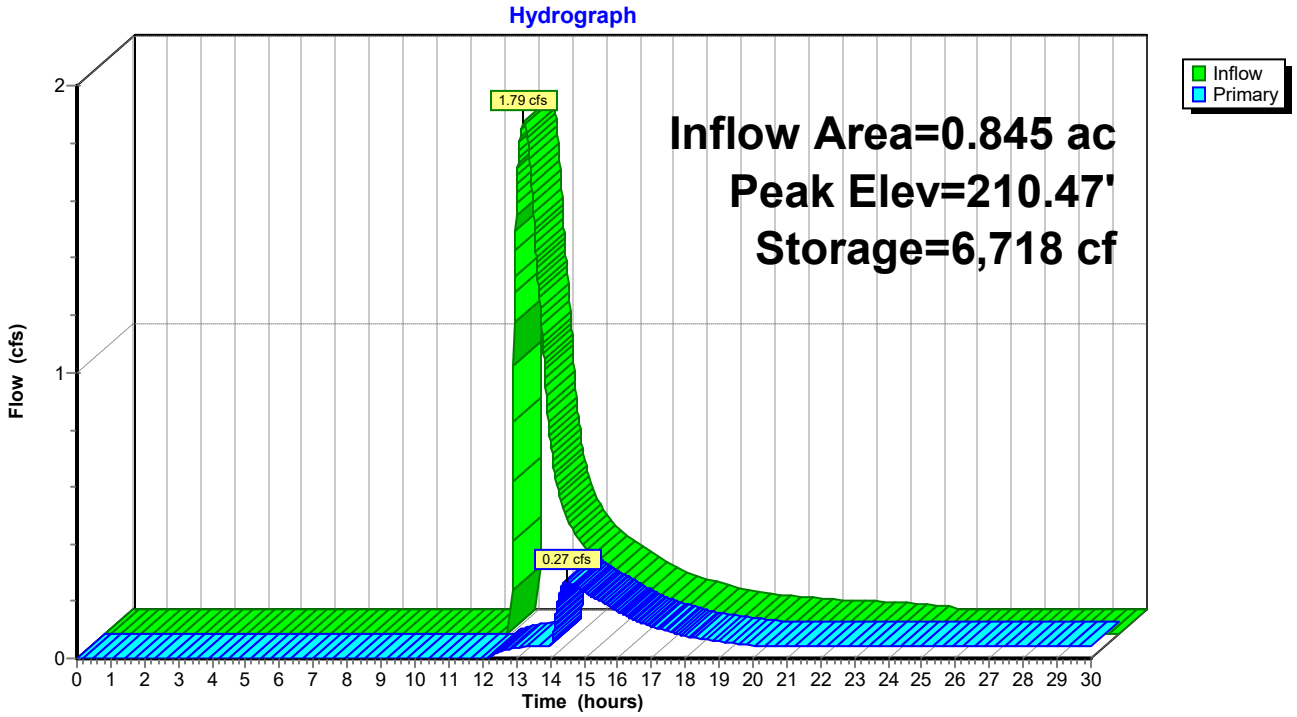
10,483.3 cf Field - 8,448.0 cf Chambers = 2,035.3 cf Stone x 40.0% Voids = 814.1 cf Stone Storage

Chamber Storage + Stone Storage = 6,833.4 cf = 0.157 af
Overall Storage Efficiency = 65.2%
Overall System Size = 74.00' x 34.00' x 4.17'

36 Chambers
388.3 cy Field
75.4 cy Stone



Pond D1: Detention Basin #1



Summary for Pond D2: Detention Basin #2

Inflow Area = 0.907 ac, 67.32% Impervious, Inflow Depth = 3.44" for 100 Year event
Inflow = 1.82 cfs @ 12.07 hrs, Volume= 0.260 af
Outflow = 0.11 cfs @ 17.07 hrs, Volume= 0.081 af, Atten= 94%, Lag= 300.0 min
Primary = 0.11 cfs @ 17.07 hrs, Volume= 0.081 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 209.53' @ 17.07 hrs Surf.Area= 2,628 sf Storage= 9,231 cf
Flood Elev= 210.00' Surf.Area= 2,628 sf Storage= 10,073 cf

Plug-Flow detention time= 558.9 min calculated for 0.081 af (31% of inflow)
Center-of-Mass det. time= 426.8 min (1,247.9 - 821.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	205.00'	1,108 cf	**18.00'W x 146.00'L x 5.58'H Field A** 14,673 cf Overall - 11,904 cf Embedded = 2,769 cf x 40.0% Voids
#2A	205.42'	9,041 cf	**retain_it retain_it 4.5'** x 36 Inside #1 Inside= 84.0"W x 54.0"H => 32.64 sf x 8.00'L = 261.1 cf Outside= 96.0"W x 62.0"H => 41.33 sf x 8.00'L = 330.7 cf 2 Rows adjusted for 358.8 cf perimeter wall
		10,149 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	205.50'	**10.0" Round Culvert** L= 12.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 205.50' / 205.00' S= 0.0417 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf
#2	Device 1	209.50'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Device 1	205.50'	**1.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.10 cfs @ 17.07 hrs HW=209.53' (Free Discharge)
└**1=Culvert** (Passes 0.10 cfs of 4.99 cfs potential flow)
  ├**2=Broad-Crested Rectangular Weir** (Weir Controls 0.05 cfs @ 0.47 fps)
  └**3=Orifice/Grate** (Orifice Controls 0.05 cfs @ 9.61 fps)

Pond D2: Detention Basin #2 - Chamber Wizard Field A

Chamber Model = retain_it retain_it 4.5' (retain-it®)
Inside= 84.0"W x 54.0"H => 32.64 sf x 8.00'L = 261.1 cf
Outside= 96.0"W x 62.0"H => 41.33 sf x 8.00'L = 330.7 cf
2 Rows adjusted for 358.8 cf perimeter wall

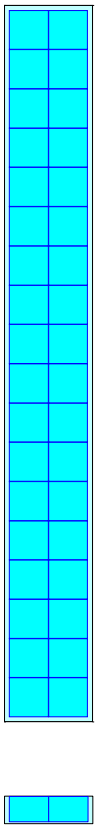
18 Chambers/Row x 8.00' Long = 144.00' Row Length +12.0" End Stone x 2 = 146.00' Base Length
2 Rows x 96.0" Wide + 12.0" Side Stone x 2 = 18.00' Base Width
5.0" Base + 62.0" Chamber Height = 5.58' Field Height

9.0 cf Sidewall x 18 x 2 + 9.0 cf Endwall x 2 x 2 = 358.8 cf Perimeter Wall
36 Chambers x 261.1 cf - 358.8 cf Perimeter wall = 9,041.2 cf Chamber Storage
36 Chambers x 330.7 cf = 11,904.0 cf Displacement

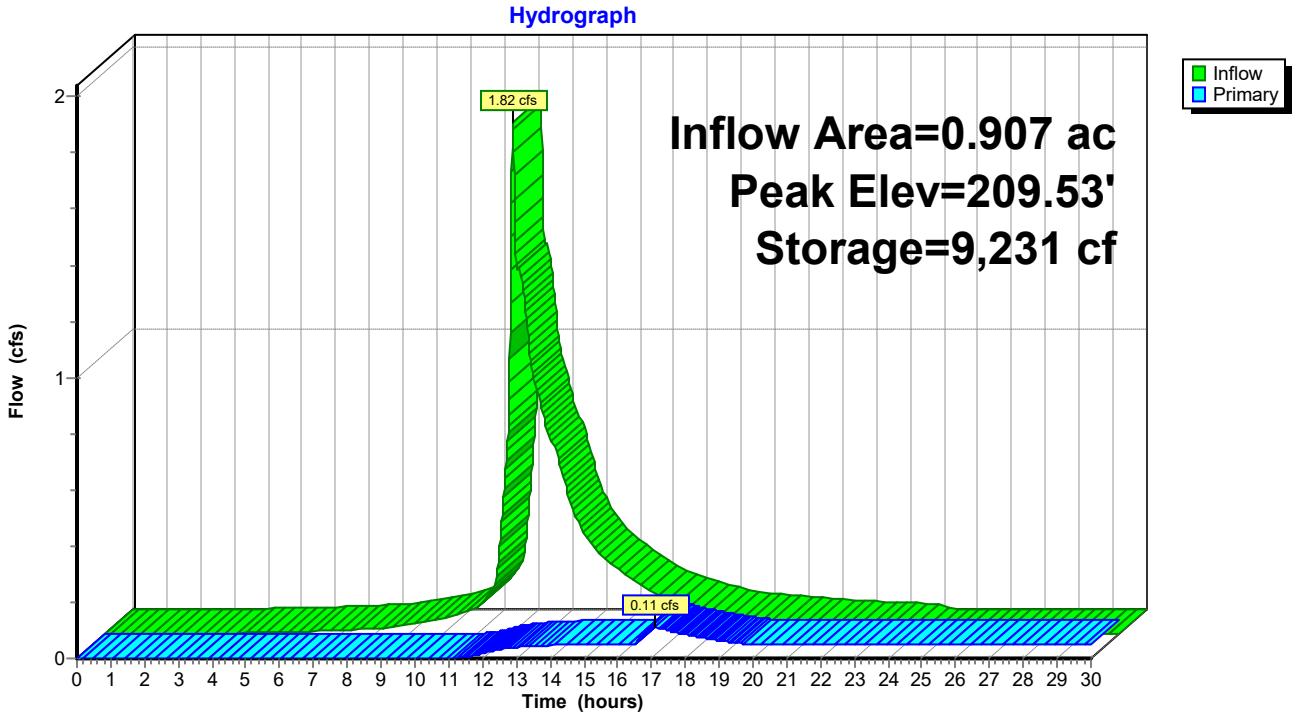
14,673.0 cf Field - 11,904.0 cf Chambers = 2,769.0 cf Stone x 40.0% Voids = 1,107.6 cf Stone Storage

Chamber Storage + Stone Storage = 10,148.8 cf = 0.233 af
Overall Storage Efficiency = 69.2%
Overall System Size = 146.00' x 18.00' x 5.58'

36 Chambers
543.4 cy Field
102.6 cy Stone



Pond D2: Detention Basin #2



Summary for Pond D3: Detention Basin #3

Inflow Area = 0.113 ac, 33.41% Impervious, Inflow Depth = 5.02" for 100 Year event
Inflow = 0.69 cfs @ 12.07 hrs, Volume= 0.047 af
Outflow = 0.08 cfs @ 12.81 hrs, Volume= 0.019 af, Atten= 89%, Lag= 44.4 min
Primary = 0.08 cfs @ 12.81 hrs, Volume= 0.019 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 207.40' @ 12.81 hrs Surf.Area= 1,056 sf Storage= 1,247 cf

Plug-Flow detention time= 285.0 min calculated for 0.019 af (39% of inflow)
Center-of-Mass det. time= 163.0 min (979.3 - 816.3)

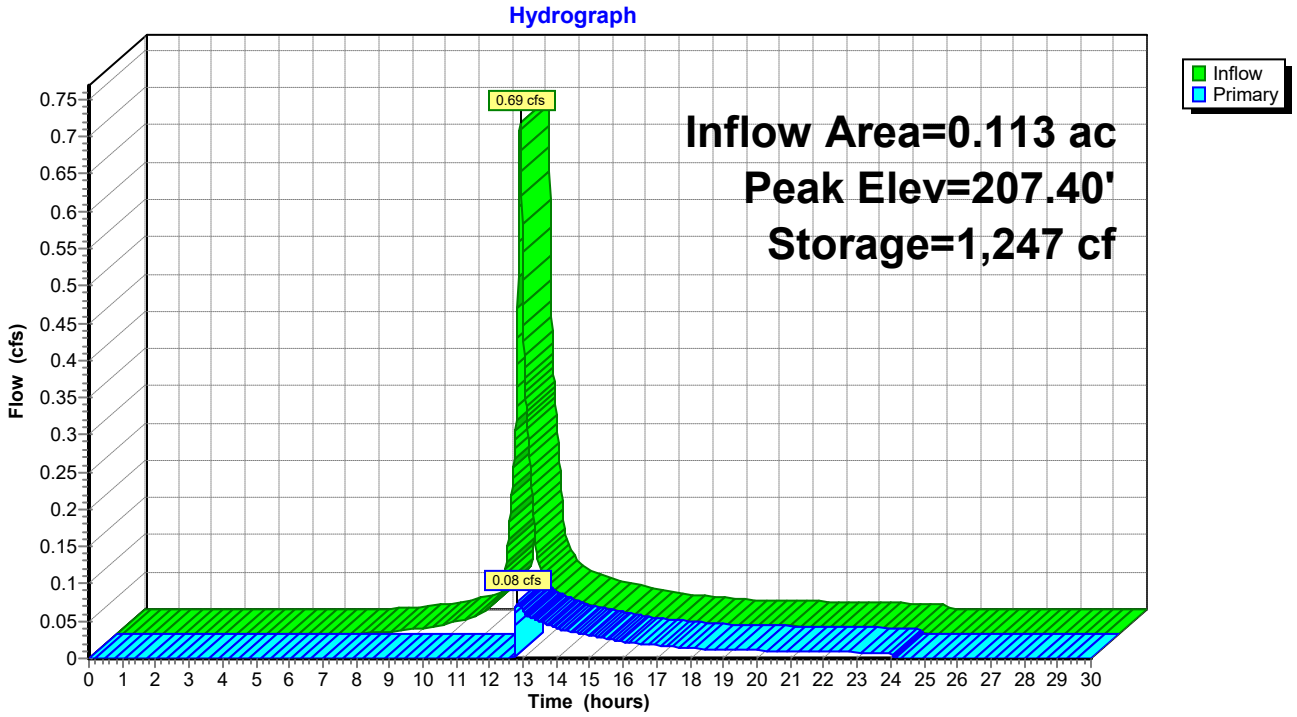
Volume	Invert	Avail.Storage	Storage Description
#1	205.50'	1,350 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
205.50	205	71.2	0	0	205
206.00	500	108.8	171	171	745
207.00	886	137.8	684	855	1,328
207.50	1,099	147.3	495	1,350	1,555

Device	Routing	Invert	Outlet Devices
#1	Primary	207.40'	**50.0' long x 1.0' 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=0.03 cfs @ 12.81 hrs HW=207.40' (Free Discharge)
↑**1=Broad-Crested Rectangular Weir** (Weir Controls 0.03 cfs @ 0.17 fps)

Pond D3: Detention Basin #3



Summary for Pond R1: Recharger #1

Inflow Area = 0.845 ac, 56.29% Impervious, Inflow Depth = 6.06" for 100 Year event
Inflow = 6.05 cfs @ 12.07 hrs, Volume= 0.427 af
Outflow = 1.84 cfs @ 12.38 hrs, Volume= 0.327 af, Atten= 70%, Lag= 18.6 min
Discarded = 0.05 cfs @ 7.90 hrs, Volume= 0.099 af
Primary = 1.79 cfs @ 12.38 hrs, Volume= 0.229 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 211.67' @ 12.38 hrs Surf.Area= 2,160 sf Storage= 7,874 cf
Flood Elev= 212.60' Surf.Area= 2,160 sf Storage= 8,767 cf

Plug-Flow detention time= 205.8 min calculated for 0.327 af (77% of inflow)
Center-of-Mass det. time= 123.4 min (918.7 - 795.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	207.10'	870 cf	**36.00'W x 60.00'L x 5.71'H Field A** 12,330 cf Overall - 10,155 cf Embedded = 2,175 cf x 40.0% Voids
#2A	207.14'	7,927 cf	**retain_it retain_it 5.0'** x 28 Inside #1 Inside= 84.0"W x 60.0"H => 36.41 sf x 8.00'L = 291.3 cf Outside= 96.0"W x 68.0"H => 45.33 sf x 8.00'L = 362.7 cf 4 Rows adjusted for 228.6 cf perimeter wall
		8,797 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	210.20'	**8.0" Round Culvert** L= 14.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 210.20' / 210.00' S= 0.0143 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf
#2	Discarded	207.10'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.05 cfs @ 7.90 hrs HW=207.14' (Free Discharge)
↑**2=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=1.79 cfs @ 12.38 hrs HW=211.67' (Free Discharge)
↑**1=Culvert** (Inlet Controls 1.79 cfs @ 5.12 fps)

Pond R1: Recharger #1 - Chamber Wizard Field A

Chamber Model = retain_it retain_it 5.0' (retain-it®)
Inside= 84.0"W x 60.0"H => 36.41 sf x 8.00'L = 291.3 cf
Outside= 96.0"W x 68.0"H => 45.33 sf x 8.00'L = 362.7 cf
4 Rows adjusted for 228.6 cf perimeter wall

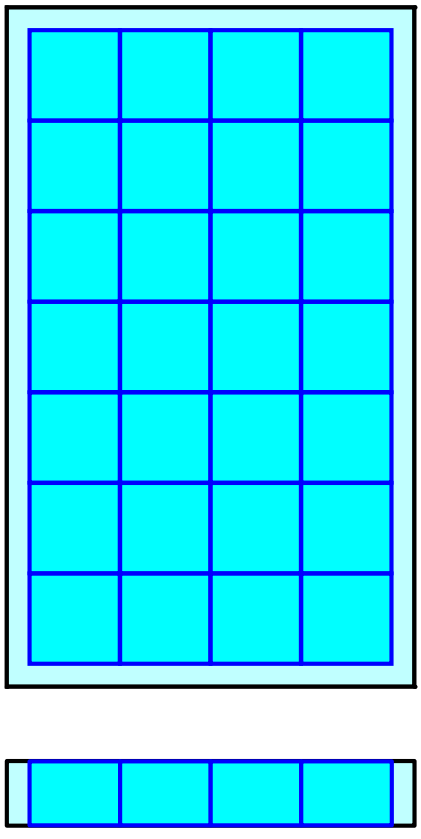
7 Chambers/Row x 8.00' Long = 56.00' Row Length +24.0" End Stone x 2 = 60.00' Base Length
4 Rows x 96.0" Wide + 24.0" Side Stone x 2 = 36.00' Base Width
0.5" Base + 68.0" Chamber Height = 5.71' Field Height

10.4 cf Sidewall x 7 x 2 + 10.4 cf Endwall x 4 x 2 = 228.6 cf Perimeter Wall
28 Chambers x 291.3 cf - 228.6 cf Perimeter wall = 7,927.3 cf Chamber Storage
28 Chambers x 362.7 cf = 10,154.7 cf Displacement

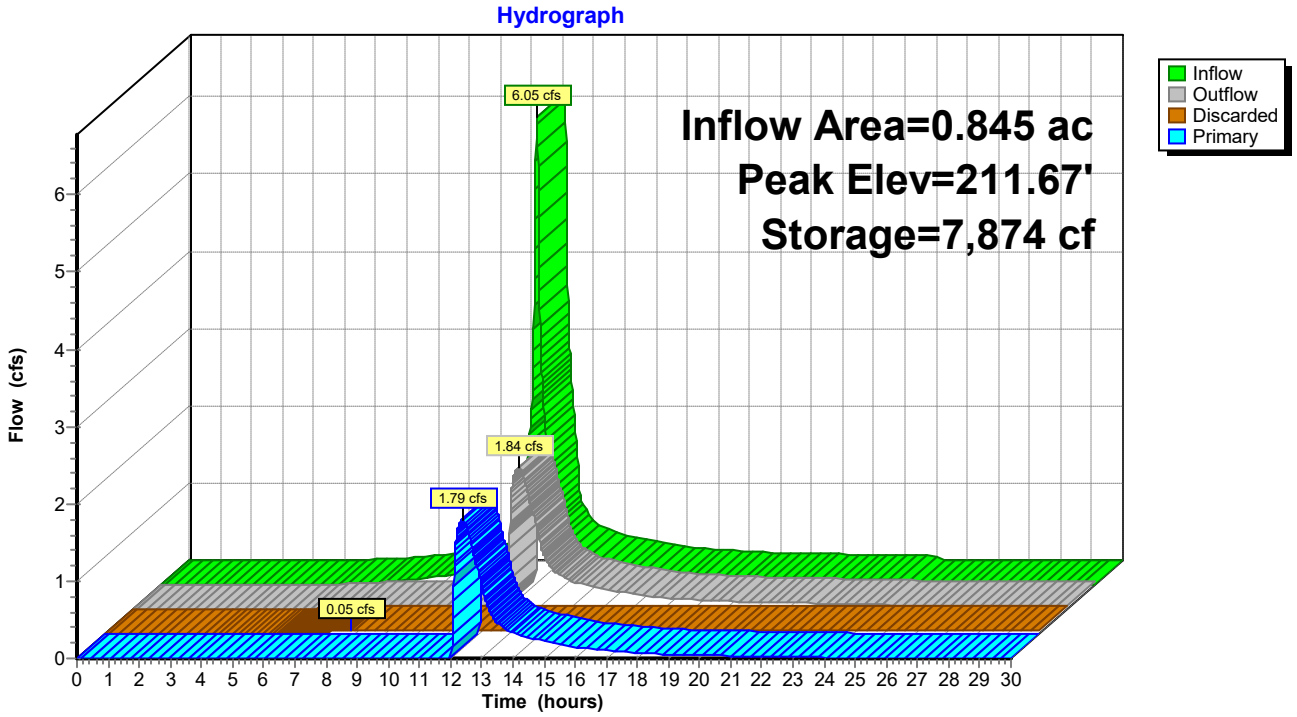
12,330.0 cf Field - 10,154.7 cf Chambers = 2,175.3 cf Stone x 40.0% Voids = 870.1 cf Stone Storage

Chamber Storage + Stone Storage = 8,797.4 cf = 0.202 af
Overall Storage Efficiency = 71.3%
Overall System Size = 60.00' x 36.00' x 5.71'

28 Chambers
456.7 cy Field
80.6 cy Stone



Pond R1: Recharger #1



Summary for Pond R2: Recharger #2

Inflow Area = 0.625 ac, 77.67% Impervious, Inflow Depth = 7.02" for 100 Year event
Inflow = 4.78 cfs @ 12.07 hrs, Volume= 0.365 af
Outflow = 0.77 cfs @ 12.53 hrs, Volume= 0.255 af, Atten= 84%, Lag= 27.7 min
Discarded = 0.06 cfs @ 6.60 hrs, Volume= 0.126 af
Primary = 0.72 cfs @ 12.53 hrs, Volume= 0.129 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 211.03' @ 12.53 hrs Surf.Area= 2,448 sf Storage= 7,867 cf
Flood Elev= 211.50' Surf.Area= 2,448 sf Storage= 7,963 cf

Plug-Flow detention time= 262.5 min calculated for 0.255 af (70% of inflow)
Center-of-Mass det. time= 166.0 min (925.7 - 759.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	207.00'	787 cf	**36.00'W x 68.00'L x 4.71'H Field A** 11,526 cf Overall - 9,557 cf Embedded = 1,969 cf x 40.0% Voids
#2A	207.04'	7,209 cf	**retain_it retain_it 4.0'** x 32 Inside #1 Inside= 84.0"W x 48.0"H => 28.87 sf x 8.00'L = 230.9 cf Outside= 96.0"W x 56.0"H => 37.33 sf x 8.00'L = 298.7 cf 4 Rows adjusted for 181.2 cf perimeter wall
		7,996 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	210.10'	**6.0" Round Culvert** L= 19.5' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 210.10' / 209.90' S= 0.0103 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#2	Discarded	207.00'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.06 cfs @ 6.60 hrs HW=207.04' (Free Discharge)
↑**2=Exfiltration** (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=0.72 cfs @ 12.53 hrs HW=211.03' (Free Discharge)
↑**1=Culvert** (Barrel Controls 0.72 cfs @ 3.65 fps)

Pond R2: Recharger #2 - Chamber Wizard Field A

Chamber Model = retain_it retain_it 4.0' (retain-it®)
Inside= 84.0"W x 48.0"H => 28.87 sf x 8.00'L = 230.9 cf
Outside= 96.0"W x 56.0"H => 37.33 sf x 8.00'L = 298.7 cf
4 Rows adjusted for 181.2 cf perimeter wall

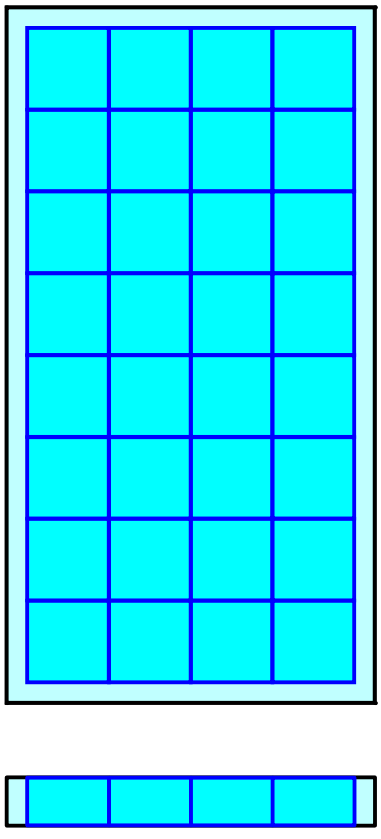
8 Chambers/Row x 8.00' Long = 64.00' Row Length +24.0" End Stone x 2 = 68.00' Base Length
4 Rows x 96.0" Wide + 24.0" Side Stone x 2 = 36.00' Base Width
0.5" Base + 56.0" Chamber Height = 4.71' Field Height

7.5 cf Sidewall x 8 x 2 + 7.5 cf Endwall x 4 x 2 = 181.2 cf Perimeter Wall
32 Chambers x 230.9 cf - 181.2 cf Perimeter wall = 7,208.9 cf Chamber Storage
32 Chambers x 298.7 cf = 9,557.3 cf Displacement

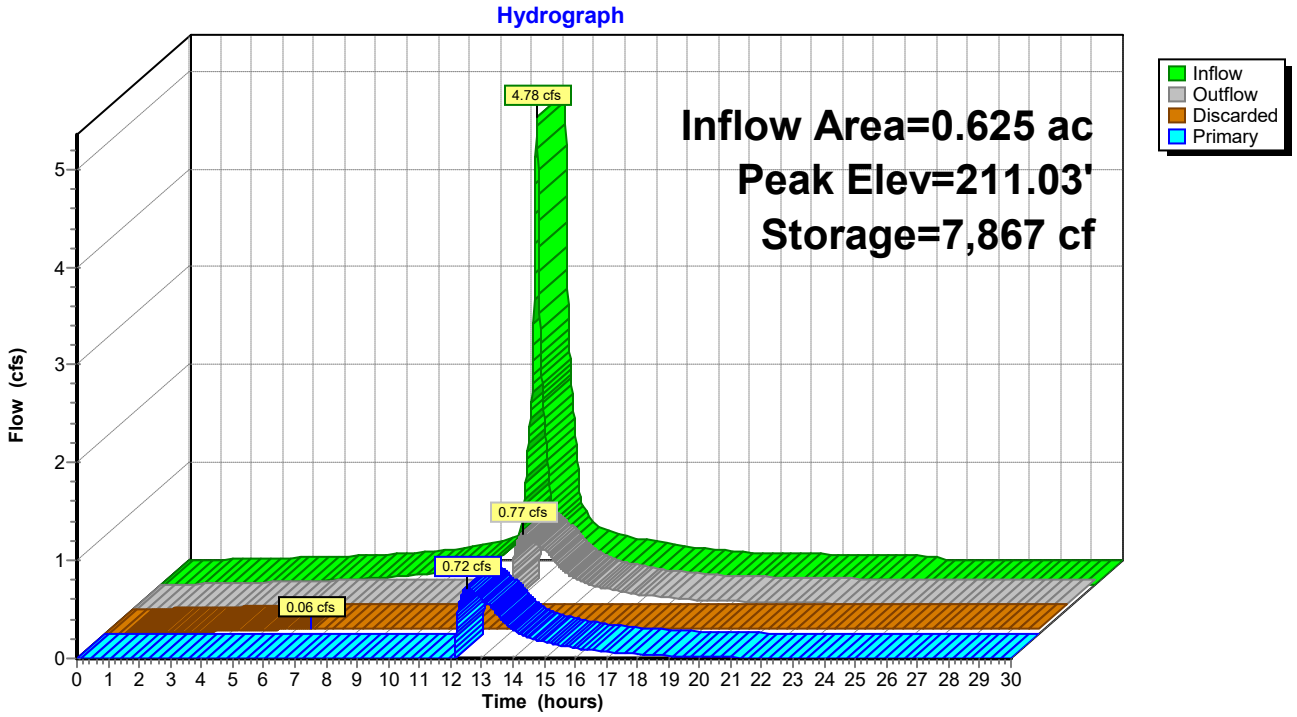
11,526.0 cf Field - 9,557.3 cf Chambers = 1,968.7 cf Stone x 40.0% Voids = 787.5 cf Stone Storage

Chamber Storage + Stone Storage = 7,996.3 cf = 0.184 af
Overall Storage Efficiency = 69.4%
Overall System Size = 68.00' x 36.00' x 4.71'

32 Chambers
426.9 cy Field
72.9 cy Stone



Pond R2: Recharger #2



Summary for Pond VP: On-Site Vernal Pool

Inflow Area = 2.301 ac, 20.67% Impervious, Inflow Depth > 2.48" for 100 Year event
Inflow = 4.23 cfs @ 12.17 hrs, Volume= 0.475 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min

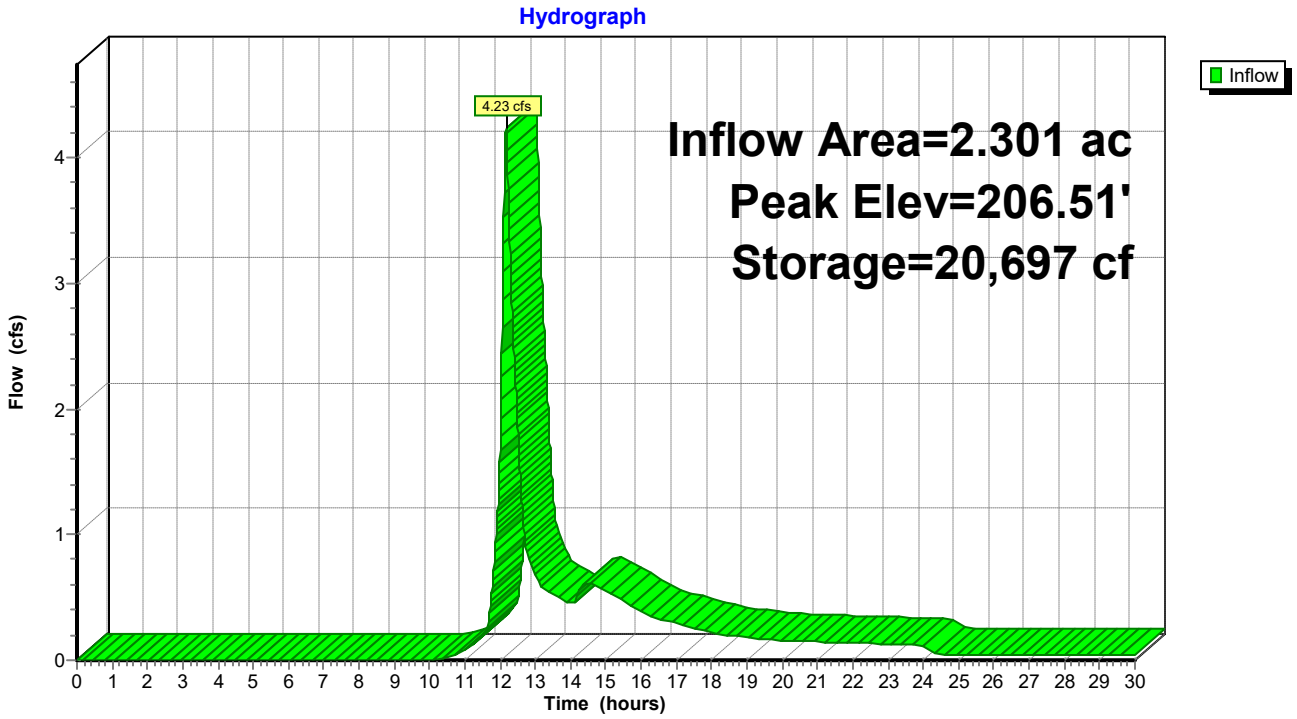
Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 206.51' @ 30.00 hrs Surf.Area= 14,645 sf Storage= 20,697 cf

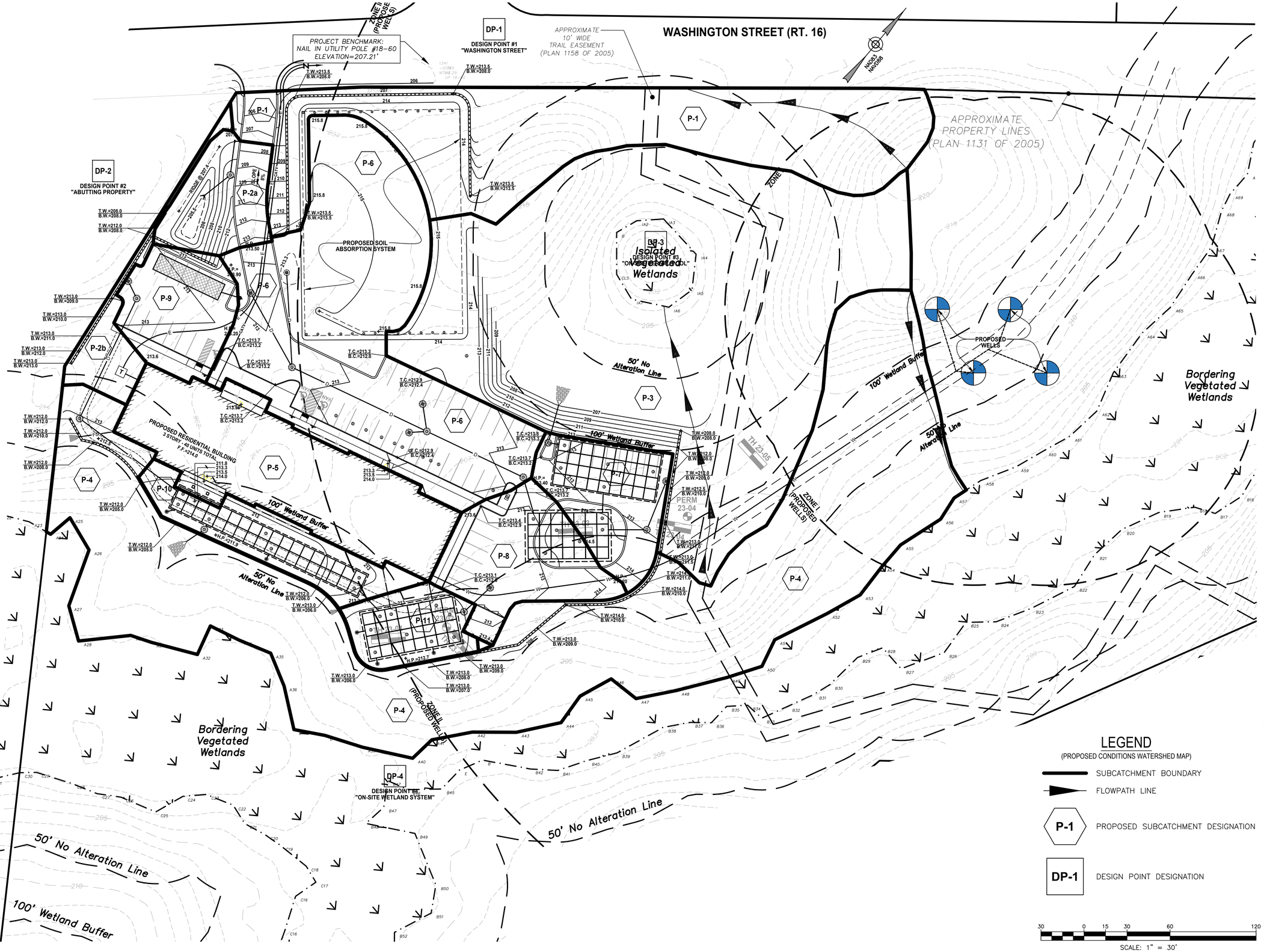
Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	200.00'	30,113 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)
200.00	96	37.0	0	0	96
201.00	661	92.8	336	336	676
202.00	1,302	129.9	964	1,300	1,343
203.00	2,076	163.4	1,674	2,974	2,138
204.00	3,067	197.8	2,555	5,529	3,144
205.00	4,516	239.6	3,768	9,298	4,615
206.00	7,411	316.4	5,904	15,202	8,024
207.00	23,990	735.5	14,912	30,113	43,110

Pond VP: On-Site Vernal Pool





DGT Associates
Surveying & Engineering

Framingham
Boston ● Worcester ● Preston, CT

1071 Worcester Road
Framingham, MA 01701
508-879-0030

www.DGTassociates.com

PLAN INTENT:

THE INTENT OF THIS PLAN IS FOR PERMITTING PURPOSES ONLY AND SHALL NOT BE USED FOR CONSTRUCTION PURPOSES.

PARCEL ID:

MAP 7, LOT 0, BLOCK 49

ISSUED FOR:

PERMITTING

NO.	APP	DATE	DESCRIPTION

DATE: **FEBRUARY 9, 2024**

SCALE: **1" = 30'**

DESIGN:	DRAFTED:	CHECKED:
KMR	**KMR**	**BEC**

PROJECT TITLE:

WASHINGTON STREET ATTAINABLE HOUSING

0 WASHINGTON STREET
SHERBORN, MASSACHUSETTS 01770

SHEET TITLE:

PROPOSED CONDITIONS WATERSHED MAP

SHEET: **1 OF 1**

PROJECT NO.: **F25902**

WSD-PR

F:\F-25900\F-25902 Murchison Washington St Sherborn\F-25902_Master\Dwg\F25902 Eng Wp.dwg

DGT Associates
Surveying & Engineering

1071 Worcester Rd.
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www.dgtassociates.com

APPENDIX 1

Soils Data

Soil Test Data Report by
DGT Associates
(Testing performed on December 5, 2023)
with NRCS Soils Information
for Middlesex County

Washington Street Sherborn Homes
0 Washington Street
Sherborn, MA 01770

DGT Job No.: F25902

DGT Associates
Surveying & Engineering

1071 Worcester Rd.
Framingham, MA 01701
508.879.0030
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December 28, 2023

Job: 25902

Bob Murchison
177 Lake Street
Sherborn, MA 01770

RE: #0 Washington Street – Soil Testing

Dear Bob:

This report contains the results of the on-site soil testing conducted by DGT Associates on December 5, 2023, at the subject property in Sherborn, Massachusetts. The testing consisted of five (5) deep hole test pits and two (2) permeability tests.

The purpose of the testing was to assess the suitability of the soils for the design of Stormwater BMP's at the subject property. Testing was performed by a Massachusetts Licensed Soil Evaluator, Frederick J. Schobel, E.I.T., of DGT. Backhoe excavation services were provided by Cambell C. Jones Construction.

According to the Natural Resources Conservation Service (NRCS) Soils Mapping, the soil in the area of testing is Charlton-Hollis-Rock outcrop. The testing generally confirmed the NRCS data. The NRCS soils map and soil information is contained in Attachment #3.

The Test Holes generally revealed a fine sandy loam topsoil over a firm sandy loam substratum. The soil test logs and Soil Test Hole Location Plan are contained in Attachment #1 and Attachment #2 respectively.

The Estimated Seasonal High Groundwater Table (ESHGWT) was determined by the observation of redoximorphic features within each of the test holes. The redoximorphic features were observed between 30 - 63" below grade. Weeping and standing groundwater were also observed in all of these test holes. The weeping groundwater was observed between 70 – 110" below grade, and standing groundwater was observed between 98 – 110" below grade.

No refusal was observed in any of the test pits conducted on the site.

Permeability tests utilizing the US Army Corps of Engineers method "In-situ Permeability Testing in the Vadose Zone" were performed adjacent to test holes TH 23-02 and 23-04. The resulting permeability rates were 0.895 and 1.177 inches per hour respectively. Therefore, the design permeability rate that will be used for stormwater infiltration will be based on the RAWLS rate published in the Massachusetts Stormwater Handbook for Sandy Loam (1.02 inches per hour). The tabulation of these tests is included at the end of this report.

Please contact me if you have any questions regarding this report.

Sincerely,
DGT Associates

Fred Schobel

Frederick J Schobel, EIT (SE 14561)
Staff Engineer

DGT Associates
Surveying &
Engineering

1071 Worcester Rd.
Framingham, MA 01701
508.879.0030
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Attachments:

1. Deep Test Hole and Permeability Test Logs
2. Soil Test Hole Location Plan
3. NRCS Soil Maps and Information

Attachment 1

Deep Hole and Permeability Test Logs

Location Address or Lot No. #0 Washington Street, Sherborn, MA 01770

On-site Soil Testing Review

Deep Hole Number TH 23-01 Date: 12/5/2023 Time: A.M. Weather 40º Sunny

Location (identify on site plan) see sketch

Land Use Vacant Lot Slope (%) 8-15% Surface Stones Some

Vegetation Wooded

Landform Ridges, Hills

Position on landscape (see sketch)

Distances from:

Open Water Body	See sketch	Feet	Drainageway	See sketch	Feet
Possible Wet Area	See sketch	Feet	Property Line	See sketch	Feet
Drinking Water Well	See sketch	Feet	Other		

DEEP OBSERVATION HOLE LOG

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)
0 – 9”	A	Sandy Loam (Fine)	10 YR 3/2	None Observed	Massive-Friable, w/ Cobbles, Stones, and Boulders
9 – 30”	B_W	Sandy Loam (Fine)	10 YR 5/6	None Observed	Massive-Friable, w/ Cobbles, Stones, and Boulders
30 – 44”	C_1	Sandy Loam	10 YR 5/3	>5% @ 30”	Massive-Friable, w/ Cobbles, Stones, and Boulders
44 – 108”	C_2	Sandy Loam	2.5 Y 5/3		Massive-Friable, Firm-in-place, Gravelly with Cobbles, Stones, and Boulders

Parent Material (geologic) Coarse-loamy melt-out till derived from granite, gneiss, and/or schist Depth to Bedrock: None Observed

Depth to Groundwater: Standing Water in the Hole: @ 98” Weeping from Pit Face: @ 70”

Estimated Seasonal High Ground Water: @ 30” Based on soil morphology

Location Address or Lot No. #0 Washington Street, Sherborn, MA 01770

On-site Soil Testing Review

Deep Hole Number TH 23-02 Date: 12/5/2023 Time: A.M. Weather 40º Sunny

Location (identify on site plan) see sketch

Land Use Vacant Lot Slope (%) 8-15% Surface Stones Some

Vegetation Wooded

Landform Ridges, Hills

Position on landscape (see sketch)

Distances from:

Open Water Body	See sketch	Feet	Drainageway	See sketch	Feet
Possible Wet Area	See sketch	Feet	Property Line	See sketch	Feet
Drinking Water Well	See sketch	Feet	Other		

DEEP OBSERVATION HOLE LOG

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)
0 – 5”	A	Sandy Loam (Fine)	10 YR 3/2	None Observed	Massive-Friable, w/ Cobbles, Stones, and Boulders
5 – 28”	B_W	Sandy Loam (Fine)	10 YR 5/6	None Observed	Massive-Friable, w/ Cobbles, Stones, and Boulders
28 – 37”	BC	Sandy Loam	10 YR 5/4	None Observed	Massive-Friable, w/ Cobbles, Stones, and Boulders
37 – 120”	C	Sandy Loam	2.5 Y 5/3	>5% @ 54”	Massive-Friable, Firm-in-place, Gravelly w/ Cobbles, Stones, and Boulders

Parent Material (geologic) Coarse-loamy melt-out till derived from granite, gneiss, and/or schist Depth to Bedrock: None Observed

Depth to Groundwater: Standing Water in the Hole: @ 110” Weeping from Pit Face: @ 94”

Estimated Seasonal High Ground Water: @ 54” Based on soil morphology

Location Address or Lot No. #0 Washington Street, Sherborn, MA 01770

On-site Soil Testing Review

Deep Hole Number TH 23-03 Date: 12/5/2023 Time: A.M. Weather 40º Sunny

Location (identify on site plan) see sketch

Land Use Vacant Lot Slope (%) 8-15% Surface Stones Some

Vegetation Wooded

Landform Ridges, Hills

Position on landscape (see sketch)

Distances from:

Open Water Body	See sketch	Feet	Drainageway	See sketch	Feet
Possible Wet Area	See sketch	Feet	Property Line	See sketch	Feet
Drinking Water Well	See sketch	Feet	Other		

DEEP OBSERVATION HOLE LOG

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)
0 – 5”	A	Sandy Loam (Fine)	10 YR 3/2	None Observed	Massive-Friable, w/ Cobbles, Stones, and Boulders
5 – 16”	B_W	Sandy Loam (Fine)	10 YR 5/6	None Observed	Massive-Friable, w/ Cobbles, Stones, and Boulders
16 – 38”	BC	Sandy Loam	10 YR 5/4	None Observed	Massive-Friable, Gravelly w/ Cobbles, Stones, and Boulders
38 – 126”	C	Sandy Loam	2.5 Y 5/3	>5% @ 63”	Massive-Friable, Firm-in-place, Gravelly w/ Cobbles, Stones, and Boulders

Parent Material (geologic) Coarse-loamy melt-out till derived from granite, gneiss, and/or schist Depth to Bedrock: None Observed

Depth to Groundwater: Standing Water in the Hole: @ 110” Weeping from Pit Face: @ 110”

Estimated Seasonal High Ground Water: @ 63” Based on soil morphology

Location Address or Lot No. #0 Washington Street, Sherborn, MA 01770

On-site Soil Testing Review

Deep Hole Number TH 23-04 Date: 12/5/2023 Time: P.M. Weather 40º Sunny

Location (identify on site plan) see sketch

Land Use Vacant Lot Slope (%) 8-15% Surface Stones Some

Vegetation Wooded

Landform Ridges, Hills

Position on landscape (see sketch)

Distances from:

Open Water Body	See sketch	Feet	Drainageway	See sketch	Feet
Possible Wet Area	See sketch	Feet	Property Line	See sketch	Feet
Drinking Water Well	See sketch	Feet	Other		

DEEP OBSERVATION HOLE LOG

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)
0 – 5”	A	Sandy Loam (Fine)	10 YR 3/2	None Observed	Massive-Friable, w/ Cobbles, Stones, and Boulders
5 – 18”	B_W	Sandy Loam (Fine)	10 YR 5/6	None Observed	Massive-Friable, w/ Cobbles, Stones, and Boulders
18 – 30”	BC	Sandy Loam	10 YR 5/4	None Observed	Massive-Friable, Gravelly w/ Cobbles, Stones, and Boulders
30 – 108”	C	Sandy Loam	2.5 Y 5/3	None Observed	Massive-Friable, Firm-in-place, Gravelly w/ Cobbles, Stones, and Boulders

Parent Material (geologic) Coarse-loamy melt-out till derived from granite, gneiss, and/or schist Depth to Bedrock: None Observed

Depth to Groundwater: Standing Water in the Hole: @ 104” Weeping from Pit Face: @ 100”

Estimated Seasonal High Ground Water: @ 100” Based on weeping

Location Address or Lot No. #0 Washington Street, Sherborn, MA 01770

On-site Soil Testing Review

Deep Hole Number TH 23-05 Date: 12/5/2023 Time: P.M. Weather 40º Sunny

Location (identify on site plan) see sketch

Land Use Vacant Lot Slope (%) 8-15% Surface Stones Some

Vegetation Wooded

Landform Ridges, Hills

Position on landscape (see sketch)

Distances from:

Open Water Body	See sketch	Feet	Drainageway	See sketch	Feet
Possible Wet Area	See sketch	Feet	Property Line	See sketch	Feet
Drinking Water Well	See sketch	Feet	Other		

DEEP OBSERVATION HOLE LOG

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)
0 – 3”	A	Sandy Loam (Fine)	10 YR 3/2	None Observed	Massive-Friable, w/ Cobbles, Stones, and Boulders
3 – 12”	B_W	Sandy Loam (Fine)	10 YR 5/6	None Observed	Massive-Friable, w/ Cobbles, Stones, and Boulders
12 – 32”	BC	Sandy Loam	10 YR 5/4	None Observed	Massive-Friable, Gravelly w/ Cobbles, Stones, and Boulders
32 – 108”	C	Sandy Loam	2.5 Y 5/3	>5% @ 35”	Massive-Friable, Firm-in-place, Gravelly w/ Cobbles, Stones, and Boulders

Parent Material (geologic) Coarse-loamy melt-out till derived from granite, gneiss, and/or schist Depth to Bedrock: None Observed

Depth to Groundwater: Standing Water in the Hole: @ 99” Weeping from Pit Face: @ 90”

Estimated Seasonal High Ground Water: @ 35” Based on soil morphology

Permeability Test Pit 23-02

Date Performed:	5-Dec-23
Soil Horizon of Perm Test:	C
Depth to water level =	32"
Depth to bottom of tube =	43"
Start Soak:	10:41 a.m.
Start Test:	10:56 a.m.

	Time Interval (Minutes)	Incremental Volume(L)
Test 1:	6	0.250
Test 2:	8	0.500
Test 3:	6	0.250
Test 4:	6	0.250
Test 5:	6	0.250
Test 6:	6	0.250
Test 7:	6	0.250
Test 8:	6	0.250
Test 9:	6	0.250
Test 10:	6	0.250
Cumulative Time/Volume	**62**	**2.750**

Q=Cumulative Volume cm^3 / Total time in seconds

Q= 0.739 cm^3/sec

Computation of Permeability(k)

k=Q / 5.5 r Hw=

k=coefficient of permeability (cm/sec)

r=inside radius of pipe in centimeters= 7.6 (6" DIA.)

Hw=applied head in centimeters= 28 cm (11 inches)

Q=Computed flow rate in CC/sec= 0.739 cm^3/sec

k=Q / 5.5 r Hw= **0.00063 cm/sec** 0.895 IN/HR

Permeability Test Pit 23-04

Date Performed:	5-Dec-23
Soil Horizon of Perm Test:	C
Depth to water level =	30"
Depth to bottom of tube =	41"
Start Soak:	12:49 p.m.
Start Test:	1:04 p.m.

	Time Interval (Minutes)	Incremental Volume(L)
Test 1:	10	0.750
Test 2:	10	0.500
Test 3:	10	0.500
Test 4:	10	0.750
Test 5:	10	0.500
Test 6:	10	0.500
Cumulative Time/Volume	**60**	**3.500**

Q=Cumulative Volume cm^3 / Total time in seconds

Q= 0.972 cm^3/sec

Computation of Permeability(k)

k=Q / 5.5 r Hw=

k=coefficient of permeability (cm/sec)

r=inside radius of pipe in centimeters= 7.6 (6" DIA.)

Hw=applied head in centimeters= 28 cm (11 inches)

Q=Computed flow rate in CC/sec= 0.972 cm^3/sec

k=Q / 5.5 r Hw= **0.00083 cm/sec** 1.177 IN/HR

Attachment 2

Soil Test Hole Location Plan

WASHINGTON STREET
(PUBLIC – 60' WIDE)

PROJECT BENCHMARK:
NAIL IN UTILITY POLE #18-60
ELEVATION=207.21'

APPROXIMATE
10' WIDE
TRAIL EASEMENT
(PLAN 1158 OF 2005)

APPROXIMATE
PROPERTY LINES
(PLAN 1131 OF 2005)

Isolated
Vegetated
Wetlands

Bordering
Vegetated
Wetlands

Bordering
Vegetated
Wetlands

50' No Alteration Line

100' Wetland Buffer

50' No Alteration Line

100' Wetland Buffer

50' No Alteration Line

100' Wetland Buffer

50' No Alteration Line

100' Wetland Buffer

TH 23-05

PERM
23-04
TH 23-04

TH 23-03

PERM
23-02
TH 23-02

TH 23-01

DHTP A2-1
DHTP A2-2
DHTP A2-3
DHTP A2-4

TP 5
TOP=210.5

TP 6
TOP=209.8

TP 2
TOP=213.1

TP 1
TOP=212.0

Conc
Head Wall

Conc
Head Wall

APPROXIMATE
TRAIL EAS
DB.49025,
(PLAN 1158

PROJECT BENCHMARK:
NAIL IN UTILITY POLE #22
ELEVATION=225.15'

GREENWOOD ST
(PUBLIC – VARIABL

40 0 20 40 80 160
SCALE: 1" = 40'

DGT Associates
Surveying & Engineering

Framingham
Boston ● Worcester ● Preston, CT

1071 Worcester Road
Framingham, MA 01701
508-879-0030

www.DGTassociates.com

NO.	APP	DATE	DESCRIPTION

DATE: **DECEMBER 28, 2023**

SCALE: **1" = 40'**

DESIGN:	DRAFTED:	CHECKED:
	FJS	

PROJECT TITLE:

SOIL TEST LOCATION MAP

0 WASHINGTON STREET
SHERBORN, MA 01770

SHEET TITLE:

SOIL TEST HOLE LOCATION PLAN

SHEET: **1 OF 1**

PROJECT NO.: **F25902**

ST-1

F:\F-25900\F-25902 Murchison Washington St Sherborn\F-25902_Master\Dwg\F25902 Eng Wp.dwg

Attachment 3

National Resources Conservation Service (NRCS)
Soils Map and Information

Map Scale: 1:6,080 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 250 500 1000 1500

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

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

Soil Survey Area: Middlesex County, Massachusetts
Survey Area Data: Version 23, Sep 12, 2023

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

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

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
52A	Freetown muck, 0 to 1 percent slopes	0.4	0.3%
53A	Freetown muck, ponded, 0 to 1 percent slopes	10.9	7.0%
71B	Ridgebury fine sandy loam, 3 to 8 percent slopes, extremely stony	4.3	2.8%
73B	Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony	16.9	10.9%
103C	Charlton-Hollis-Rock outcrop complex, 8 to 15 percent slopes	63.0	40.5%
103D	Charlton-Hollis-Rock outcrop complex, 15 to 25 percent slopes	5.5	3.5%
104D	Hollis-Rock outcrop-Charlton complex, 15 to 25 percent slopes	6.7	4.3%
305C	Paxton fine sandy loam, 8 to 15 percent slopes	1.5	1.0%
307B	Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony	1.1	0.7%
307C	Paxton fine sandy loam, 8 to 15 percent slopes, extremely stony	32.9	21.2%
311B	Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony	10.1	6.5%
424D	Canton fine sandy loam, 15 to 25 percent slopes, extremely bouldery	2.2	1.4%
Totals for Area of Interest		**155.4**	**100.0%**

Map Unit Description (Brief, Generated)

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this report, along with the maps, provide information on the composition of map units and properties of their components.

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

The Map Unit Description (Brief, Generated) report displays a generated description of the major soils that occur in a map unit. Descriptions of non-soil (miscellaneous areas) and minor map unit components are not included. This description is generated from the underlying soil attribute data.

Additional information about the map units described in this report is available in other Soil Data Mart reports, which give properties of the soils and the limitations, capabilities, and potentials for many uses. Also, the narratives that accompany the Soil Data Mart reports define some of the properties included in the map unit descriptions.

Report—Map Unit Description (Brief, Generated)

Middlesex County, Massachusetts

Map Unit: 52A—Freetown muck, 0 to 1 percent slopes

Component: Freetown (85%)

The Freetown component makes up 85 percent of the map unit. Slopes are 0 to 1 percent. This component is on depressions on alluvial plains, depressions on uplands. The parent material consists of highly decomposed organic material. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is very high. Shrink-swell potential is low. This soil is rarely flooded. It is frequently ponded. A seasonal zone of water saturation is at 0 inches during January, February, March, April, May, June, July, August, September, October, November, December. Organic matter content in the surface horizon is about 82 percent. This component is in the F144AY043MA Acidic Organic Wetlands ecological site. Nonirrigated land capability classification is 5w. This soil meets hydric criteria.

Component: Whitman (5%)

Generated brief soil descriptions are created for major soil components. The Whitman soil is a minor component.

Component: Scarboro (5%)

Generated brief soil descriptions are created for major soil components. The Scarboro soil is a minor component.

Component: Swansea (5%)

Generated brief soil descriptions are created for major soil components. The Swansea soil is a minor component.

Map Unit: 53A—Freetown muck, ponded, 0 to 1 percent slopes

Component: Freetown, ponded (85%)

The Freetown, ponded component makes up 85 percent of the map unit. Slopes are 0 to 1 percent. This component is on depressions on alluvial plains, depressions on uplands. The parent material consists of highly decomposed organic material. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is very high. Shrink-swell potential is low. This soil is rarely flooded. It is frequently ponded. A seasonal zone of water saturation is at 0 inches during January, February, March, April, May, June, July, August, September, October, November, December. Organic matter content in the surface horizon is about 82 percent. This component is in the F144AY043MA Acidic Organic Wetlands ecological site. Nonirrigated land capability classification is 5w. This soil meets hydric criteria.

Component: Whitman, ponded (5%)

Generated brief soil descriptions are created for major soil components. The Whitman, ponded soil is a minor component.

Component: Swansea, ponded (5%)

Generated brief soil descriptions are created for major soil components. The Swansea, ponded soil is a minor component.

Component: Scarboro (5%)

Generated brief soil descriptions are created for major soil components. The Scarboro soil is a minor component.

Map Unit: 71B—Ridgebury fine sandy loam, 3 to 8 percent slopes, extremely stony

Component: Ridgebury, extremely stony (80%)

The Ridgebury, extremely stony component makes up 80 percent of the map unit. Slopes are 3 to 8 percent. This component is on depressions on glaciated uplands. The parent material consists of coarse-loamy lodgment till derived from gneiss, granite, and/or schist. Depth to a root restrictive layer, densic material, is 15 to 35 inches (depth from the mineral surface is 14 to 32 inches). The natural drainage class is poorly drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches (or restricted depth) is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 3 inches (depth from the mineral surface is 2 inches) during January, February, March, April, May, November, December. Organic matter content in the surface horizon is about 95 percent. Below this thin organic horizon the organic matter content is about 10 percent. This component is in the F144AY009CT Wet Till Depressions ecological site. Nonirrigated land capability classification is 7s. This soil meets hydric criteria.

Component: Woodbridge, extremely stony (10%)

Generated brief soil descriptions are created for major soil components. The Woodbridge, extremely stony soil is a minor component.

Component: Whitman, extremely stony (8%)

Generated brief soil descriptions are created for major soil components. The Whitman, extremely stony soil is a minor component.

Component: Paxton, extremely stony (2%)

Generated brief soil descriptions are created for major soil components. The Paxton, extremely stony soil is a minor component.

Map Unit: 73B—Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony

Component: Whitman, extremely stony (81%)

The Whitman, extremely stony component makes up 81 percent of the map unit. Slopes are 0 to 3 percent. This component is on depressions on glaciated uplands. The parent material consists of coarse-loamy lodgment till derived from gneiss, granite, and/or schist. Depth to a root restrictive layer, densic material, is 7 to 38 inches (depth from the mineral surface is 7 to 30 inches). The natural drainage class is very poorly drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches (or restricted depth) is very low. Shrink-swell potential is low. This soil is not flooded. It is frequently ponded. A seasonal zone of water saturation is at 0 inches during January, February, March, April, May, June, September, October, November, December. Organic matter content in the surface horizon is about 95 percent. This component is in the F144AY041MA Very Wet Till Depressions ecological site. Nonirrigated land capability classification is 7s. This soil meets hydric criteria.

Component: Ridgebury, extremely stony (10%)

Generated brief soil descriptions are created for major soil components. The Ridgebury, extremely stony soil is a minor component.

Component: Scarboro (5%)

Generated brief soil descriptions are created for major soil components. The Scarboro soil is a minor component.

Component: Swansea (3%)

Generated brief soil descriptions are created for major soil components. The Swansea soil is a minor component.

Component: Woodbridge, extremely stony (1%)

Generated brief soil descriptions are created for major soil components. The Woodbridge, extremely stony soil is a minor component.

Map Unit: 103C—Charlton-Hollis-Rock outcrop complex, 8 to 15 percent slopes

Component: Charlton, extremely stony (50%)

The Charlton, extremely stony component makes up 50 percent of the map unit. Slopes are 8 to 15 percent. This component is on bedrock-controlled hills on glaciated uplands. The parent material consists of coarse-loamy melt-out till derived from granite, gneiss, and/or schist. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 95 percent. Below this thin organic horizon the organic matter content is about 10 percent. This component is in the F144AY034CT Well Drained Till Uplands ecological site. Nonirrigated land capability classification is 7s. This soil does not meet hydric criteria.

Component: Hollis, extremely stony (20%)

The Hollis, extremely stony component makes up 20 percent of the map unit. Slopes are 8 to 15 percent. This component is on bedrock-controlled ridges on glaciated uplands. The parent material consists of coarse-loamy melt-out till derived from granite, gneiss, and/or schist. Depth to a root restrictive layer, bedrock, lithic, is 8 to 23 inches (depth from the mineral surface is 8 to 18 inches). The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches (or restricted depth) is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 95 percent. Below this thin organic horizon the organic matter content is about 10 percent. This component is in the F144AY033MA Shallow Dry Till Uplands ecological site. Nonirrigated land capability classification is 7s. This soil does not meet hydric criteria.

Component: Rock outcrop (10%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Component: Woodbridge, extremely stony (8%)

Generated brief soil descriptions are created for major soil components. The Woodbridge, extremely stony soil is a minor component.

Component: Canton, extremely stony (5%)

Generated brief soil descriptions are created for major soil components. The Canton, extremely stony soil is a minor component.

Component: Chatfield, extremely stony (5%)

Generated brief soil descriptions are created for major soil components. The Chatfield, extremely stony soil is a minor component.

Component: Ridgebury, extremely stony (2%)

Generated brief soil descriptions are created for major soil components. The Ridgebury, extremely stony soil is a minor component.

Map Unit: 103D—Charlton-Hollis-Rock outcrop complex, 15 to 25 percent slopes

Component: Charlton (50%)

The Charlton component makes up 50 percent of the map unit. Slopes are 15 to 25 percent. This component is on ground moraines on uplands, drumlins on uplands. The parent material consists of friable loamy eolian deposits over friable loamy basal till derived from granite and gneiss. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. This component is in the F144AY034CT Well Drained Till Uplands ecological site. Nonirrigated land capability classification is 6s. This soil does not meet hydric criteria.

Component: Hollis (25%)

The Hollis component makes up 25 percent of the map unit. Slopes are 15 to 25 percent. This component is on hills on uplands, ridges on uplands. The parent material consists of friable, shallow loamy basal till over granite and gneiss. Depth to a root restrictive layer, bedrock, lithic, is 8 to 20 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches (or restricted depth) is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. This component is in the F144AY033MA Shallow Dry Till Uplands ecological site. Nonirrigated land capability classification is 6s. This soil does not meet hydric criteria.

Component: Rock outcrop (15%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Component: Canton (2%)

Generated brief soil descriptions are created for major soil components. The Canton soil is a minor component.

Component: Narragansett (2%)

Generated brief soil descriptions are created for major soil components. The Narragansett soil is a minor component.

Component: Woodbridge (2%)

Generated brief soil descriptions are created for major soil components. The Woodbridge soil is a minor component.

Component: Unnamed (2%)

Generated brief soil descriptions are created for major soil components. The Unnamed soil is a minor component.

Component: Montauk (2%)

Generated brief soil descriptions are created for major soil components. The Montauk soil is a minor component.

Map Unit: 104D—Hollis-Rock outcrop-Charlton complex, 15 to 25 percent slopes

Component: Hollis (35%)

The Hollis component makes up 35 percent of the map unit. Slopes are 15 to 25 percent. This component is on ridges on uplands, hills on uplands. The parent material consists of friable, shallow loamy basal till over granite and gneiss. Depth to a root restrictive layer, bedrock, lithic, is 8 to 20 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches (or restricted depth) is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. This component is in the F144AY033MA Shallow Dry Till Uplands ecological site. Nonirrigated land capability classification is 6s. This soil does not meet hydric criteria.

Component: Rock outcrop (30%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Component: Charlton (20%)

The Charlton component makes up 20 percent of the map unit. Slopes are 15 to 25 percent. This component is on hills on uplands. The parent material consists of friable loamy eolian deposits over friable loamy basal till derived from granite and gneiss. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. This component is in the F144AY034CT Well Drained Till Uplands ecological site. Nonirrigated land capability classification is 6s. This soil does not meet hydric criteria.

Component: Canton (10%)

Generated brief soil descriptions are created for major soil components. The Canton soil is a minor component.

Component: Montauk (3%)

Generated brief soil descriptions are created for major soil components. The Montauk soil is a minor component.

Component: Unnamed (2%)

Generated brief soil descriptions are created for major soil components. The Unnamed soil is a minor component.

Map Unit: 305C—Paxton fine sandy loam, 8 to 15 percent slopes

Component: Paxton (85%)

The Paxton component makes up 85 percent of the map unit. Slopes are 8 to 15 percent. This component is on hills on uplands. The parent material consists of coarse-loamy lodgment till derived from gneiss, granite, and/or schist. Depth to a root restrictive layer, densic material, is 20 to 39 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 24 inches during January, February, March, April, November, December. Organic matter content in the surface horizon is about 6 percent. This component is in the F144AY007CT Well Drained Dense Till Uplands ecological site. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.

Component: Charlton (7%)

Generated brief soil descriptions are created for major soil components. The Charlton soil is a minor component.

Component: Woodbridge (6%)

Generated brief soil descriptions are created for major soil components. The Woodbridge soil is a minor component.

Component: Ridgebury (2%)

Generated brief soil descriptions are created for major soil components. The Ridgebury soil is a minor component.

Map Unit: 307B—Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony

Component: Paxton, extremely stony (80%)

The Paxton, extremely stony component makes up 80 percent of the map unit. Slopes are 0 to 8 percent. This component is on hills on uplands. The parent material consists of coarse-loamy lodgment till derived from gneiss, granite, and/or schist. Depth to a root restrictive layer, densic material, is 20 to 43 inches (depth from the mineral surface is 20 to 39 inches). The natural drainage class is well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 26 inches (depth from the mineral surface is 24 inches) during January, February, March, April, November, December. Organic matter content in the surface horizon is about 95 percent. Below this thin organic horizon the organic matter content is about 10 percent. This component is in the F144AY007CT Well Drained Dense Till Uplands ecological site. Nonirrigated land capability classification is 7s. This soil does not meet hydric criteria.

Component: Woodbridge, extremely stony (10%)

Generated brief soil descriptions are created for major soil components. The Woodbridge, extremely stony soil is a minor component.

Component: Charlton, extremely stony (5%)

Generated brief soil descriptions are created for major soil components. The Charlton, extremely stony soil is a minor component.

Component: Ridgebury, extremely stony (4%)

Generated brief soil descriptions are created for major soil components. The Ridgebury, extremely stony soil is a minor component.

Component: Whitman, extremely stony (1%)

Generated brief soil descriptions are created for major soil components. The Whitman, extremely stony soil is a minor component.

Map Unit: 307C—Paxton fine sandy loam, 8 to 15 percent slopes, extremely stony

Component: Paxton, extremely stony (85%)

The Paxton, extremely stony component makes up 85 percent of the map unit. Slopes are 8 to 15 percent. This component is on hills on uplands. The parent material consists of coarse-loamy lodgment till derived from gneiss, granite, and/or schist. Depth to a root restrictive layer, densic material, is 20 to 43 inches (depth from the mineral surface is 20 to 39 inches). The natural drainage class is well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 26 inches (depth from the mineral surface is 24 inches) during January, February, March, April, November, December. Organic matter content in the surface horizon is about 95 percent. Below this thin organic horizon the organic matter content is about 10 percent. This component is in the F144AY007CT Well Drained Dense Till Uplands ecological site. Nonirrigated land capability classification is 7s. This soil does not meet hydric criteria.

Component: Charlton, extremely stony (8%)

Generated brief soil descriptions are created for major soil components. The Charlton, extremely stony soil is a minor component.

Component: Woodbridge, extremely stony (6%)

Generated brief soil descriptions are created for major soil components. The Woodbridge, extremely stony soil is a minor component.

Component: Ridgebury, extremely stony (1%)

Generated brief soil descriptions are created for major soil components. The Ridgebury, extremely stony soil is a minor component.

Map Unit: 311B—Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony

Component: Woodbridge, very stony (82%)

The Woodbridge, very stony component makes up 82 percent of the map unit. Slopes are 0 to 8 percent. This component is on hills on uplands. The parent material consists of coarse-loamy lodgment till derived from gneiss, granite, and/or schist. Depth to a root restrictive layer, densic material, is 20 to 43 inches (depth from the mineral surface is 20 to 39 inches). The natural drainage class is moderately well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 20 inches (depth from the mineral surface is 18 inches) during January, February, March, April, May, November, December. Organic matter content in the surface horizon is about 95 percent. Below this thin organic horizon the organic matter content is about 7 percent. This component is in the F144AY037MA Moist Dense Till Uplands ecological site. Nonirrigated land capability classification is 6s. This soil does not meet hydric criteria.

Component: Paxton, very stony (10%)

Generated brief soil descriptions are created for major soil components. The Paxton, very stony soil is a minor component.

Component: Ridgebury, very stony (8%)

Generated brief soil descriptions are created for major soil components. The Ridgebury, very stony soil is a minor component.

Map Unit: 424D—Canton fine sandy loam, 15 to 25 percent slopes, extremely bouldery

Component: Canton (85%)

The Canton component makes up 85 percent of the map unit. Slopes are 15 to 25 percent. This component is on hills on till uplands. The parent material consists of friable loamy eolian deposits over friable sandy basal till derived from granite and gneiss. Depth to a root restrictive layer, strongly contrasting textural stratification, is 18 to 30 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches (or restricted depth) is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. This component is in the F144AY034CT Well Drained Till Uplands ecological site. Nonirrigated land capability classification is 7s. This soil does not meet hydric criteria.

Component: Charlton (10%)

Generated brief soil descriptions are created for major soil components. The Charlton soil is a minor component.

Component: Hinckley (5%)

Generated brief soil descriptions are created for major soil components. The Hinckley soil is a minor component.

Data Source Information

Soil Survey Area: Middlesex County, Massachusetts
Survey Area Data: Version 23, Sep 12, 2023

DGT Associates
Surveying &
Engineering

1071 Worcester Rd.
Framingham, MA 01701
508.879.0030
www.dgtassociates.com

APPENDIX 2

Long-Term Pollution Prevention Plan with Attachments

Washington Street Sherborn Homes
0 Washington Street
Sherborn, MA 01770

DGT Job No.: F25902

DGT Associates
Surveying & Engineering

1071 Worcester Rd.
Framingham, MA 01701
508.879.0030
www.dgtassociates.com

Long-Term Pollution Prevention Plan

Attachment 1
MassDEP Snow Disposal Guidance

Attachment 2
Snow Disposal Exhibit Plan

Washington Street Sherborn Homes

0 Washington Street
Sherborn, MA 01770

DGT Job No.: F25902

INTRODUCTION

This Long Term Pollution Prevention Plan (LTPPP) prepared by DGT Associates is for the anticipated property management at the Washington Street Sherborn Homes in Sherborn, Massachusetts. The document provides detailed information on practices for pollution prevention and source control to be implemented at the property following construction.

This document has been prepared in accordance with the requirements of the Stormwater Regulations issued by the Massachusetts Department of Environmental Protection (MassDEP), effective January 2, 2008. It is intended to comply with Standards 4 and 9.

The property owner will implement this Long-Term Pollution Prevention Plan and proactively conduct operations at the site in an environmentally responsible manner.

Compliance with this Long-Term Pollution Prevention Plan does not in any way dismiss the owner from compliance with other applicable Federal, State or local laws.

LONG-TERM POLLUTION PREVENTION PLAN - IMPLEMENTATION

The owner is responsible for the implementation of the Long-Term Pollution Prevention Plan and will reevaluate and amend this Long-Term Pollution Prevention Plan whenever an improvement or modification to operations can be implemented.

AVAILABILITY OF PLAN DOCUMENTS

The owner shall maintain a copy of the Long-Term Pollution Prevention Plan and related inspection reports, amendments, etc. at their offices. Copies will be made available for review to authorized personnel of the Sherborn DPW, and other authorized public officials upon request.

1.0 LONG-TERM POLLUTION PREVENTION PLAN RESPONSIBILITIES

1.01 RESPONSIBLE PARTY AND CONTACT INFORMATION

At the completion of the project, the site will be the responsibility of the owner/applicant.

Presently, the responsible party for the implementation of the Long-Term Pollution Prevention Plan is:

Washington Street Sherborn Homes, LLC
Attn.: Bob Murchison
177 Lake Street
Sherborn, MA 01770
Bob.murchison@me.com

1.02 RESPONSIBILTIES FOR IMPLEMENTATION

The following responsibilities for the implementation of the Long-Term Pollution Prevention Plan are as follows:

- Oversee property management activities on the site.
- Oversee inspection, monitoring, and reporting compliance. Ensure property management contracts includes both this Long-Term Pollution Prevention Plan as well as the Stormwater Operations and Maintenance Plan, and any other requirements issued by the Town of Sherborn to ensure compliance with this Long-Term Pollution Prevent Plan and the Operations and Maintenance Plan.
- Provide training, if necessary, to those responsible for the inspection, monitoring, and maintenance of the site.
- Identify other potential pollutant sources or deficiencies in the BMP's (Best Management Practices) and amend the Long-Term Pollution Prevention Plan as appropriate to address those issues.

2.0 PROJECT DESCRIPTION

2.01 EXISTING SITE DESCRIPTION

Currently the site is comprised of an undeveloped wooded parcel of land. The grades vary throughout the site with various on-site wetland resource areas. An existing walking path traverses through the property for use by the public. Stormwater runoff from the subject site flows overland to the wetland areas.

2.02 PROPOSED PROJECT

The proposed project includes construction of a new 14,475± square foot residential building with 40 units. Site improvements include a paved entry driveway, a paved parking lot and associated site landscaping. Other proposed improvements include on-site sewage disposal system and on-site water supply wells as well as a stormwater management system to meet the current MassDEP Stormwater Management Regulations.

The new stormwater management system is designed to ensure that the runoff peak flows after development will be the same or less than the existing conditions and will meet the water quality treatment and groundwater recharge requirements per the Massachusetts Stormwater Regulations. This is

to ensure that there will be no impact to the downstream wetland resource areas or surrounding areas at the site. Maintenance of the stormwater management features is included in the Stormwater Operations and Maintenance Plan (Appendix 3).

3.0 PRACTICES FOR SOURCE CONTROL AND POLLUTION PREVENTION

3.01 Good Housekeeping:
Good housekeeping procedures to reduce the possibility of accidental releases and to reduce safety hazards include, but not be limited to the following:

- Proper handling and storage of solid wastes,
- Proper handling, storage and inventory of household chemicals, and
- Prompt cleanup and removal of de minimus releases.
- The owner of the facility will contract for solid waste disposal and recycling.

3.02 Storage and Proper Disposal of Hazardous Chemicals:
The owner should be aware of not only the potential hazards of various chemicals to the human body but also to the environment. Personnel need to be instructed on the proper disposal of hazardous waste and should use the Town programs such as Hazardous Waste Days for the disposal of various chemicals, including automobile fluids, paints, solvents, cleaners, etc.

3.03 Vehicle Washing:
The washing of personal vehicles on the property is not allowed. The owner should communicate the impacts of outdoor washing of vehicles on the stormwater drainage system. High loads of nutrients, metals, and hydrocarbons can enter the stormwater drainage system and have negative impacts on downstream environments. The use of commercial car wash facilities equipped for the washing of vehicles and equipment should be encouraged.

3.04 Routine Inspections and Maintenance of Stormwater BMP's:
Detailed information regarding stormwater BMPs, including descriptions and maintenance requirements is contained in the Stormwater Operations and Maintenance Plan (Appendix 3).

3.05 Spill Prevention and Response:
The owner will implement release response procedures for releases of significant materials such as fuels, oils, or chemical materials onto the ground or other areas that could reasonably be expected to discharge to surface or groundwater.

Reportable quantities will immediately be reported to the applicable Federal, State and local agencies as required by law.

Applicable containment and cleanup procedures will be performed immediately. Impacted material collected during the response must be removed promptly and disposed of in accordance with Federal, State and local requirements. A licensed emergency response contractor may be required to assist in cleanup of releases depending on the size and location of the release, and the ability of the Contractor to perform the required response.

Reportable quantities are established under the following:

1. 40 CFR Part 110 addressing the discharge of oil in such quantities as may be harmful pursuant to Section 311 (b) (4) of the Clean Water Act.
2. 40 CFR Part 117 addresses the determination of such quantities of hazardous substances that may be harmful pursuant to Section 311 (b) (3) of the Clean Water Act.
3. 40 CFR Part 302 addresses the designation, reportable quantities, and notification requirements for the release of substances designated under section 311 (b) (2) (A) of the Clean Water Act.

3.06 Maintenance of Lawns, Fields and other Landscaped Areas:
The site includes lawn areas that require turf management to maintain them in good condition for their intended purposes. Application of fertilizers, herbicides and pesticides should be minimized.

3.07 Storage of Fertilizers, Herbicides, and Pesticides:
These chemicals should be stored inside or under cover with adequate containment.

3.08 Pet Waste Management:
The owner should require and implement “pooper-scooper” requirements for pets on the property to maintain the property free of pet waste.

3.09 Operation and Maintenance of Sanitary Sewer System
Sewage is discharged to the on-site sanitary sewer system. The system is designed for a sewage flow of 7,700 gallons per day and consists of two septic tanks, pump chamber (storage tank and duplex pumping system) and a pressure-dosed subsurface soil absorption system (aka leaching area). The system also includes an innovative and alternative treatment system to reduce the total nitrogen within the wastewater being discharged to the leaching area. The septic system, inclusive of all of its different components, must be maintained and operated in conformance with Massachusetts Title 5 Regulations. Many common chemicals can be a threat to the environment if disposed improperly. Hazardous chemicals must NOT be “poured down the drain.”

The following are the recommended maintenance and inspection procedures:

a. All components should be inspected by the owner quarterly for proper operation. This includes:
    1. Septic Tanks (Sludge thickness, scum thickness, sanitary tees and general structural integrity.
    2. Pump System: Check the control box, record the event counter, check the float switches, alarms and pump alteration, check sump for sludge buildup, manually test pumps, check for tank integrity.
    3. Soil Absorption System: Measure ponding depth in the trench observation tubes for signs of abnormal ponding depth.
b. Additional inspection requirements on an annual basis:
    1. Test the pressure of the soil absorption system laterals (pressure lines) by installing a line gauge on the fitting on the distal ends. Test at least four lines at a time.
    2. Check the system vents for proper air venting.
    3. Check and calibrate the pump chamber dose.

The following are Routine Maintenance Tasks:

a. The septic tanks are to be pumped to remove sludge when the accumulated sludge exceeds 1 foot in thickness or at least every 2 years.
b. The floating scum is to be removed when it exceeds 6 inches in thickness or at least every 2 years.
c. Any sludge in the pump storage tank and pump chamber must be removed if it exceeds 4 inches.
d. Perform any repairs or maintenance as indicated by the results of the inspections immediately as required.
e. The leaching area pressure lines must be cleaned annually.

Note that the pumping of the tankage need only remove sufficient liquid to remove the accumulated sludge and scum. It is not necessary to remove all liquid content.

3.10 Solid Waste Management:

All waste materials are to be stored in securely lidded dumpster(s) or other secure containers as applicable to the material. Said dumpsters and containers will be monitored by the owner and emptied by a licensed waste disposal contractor on a regular basis.

3.11 Snow Disposal and Use of Deicing Chemicals:

The proposed project will require a snow management plan to be fully developed by the Owner. This plan should include the information contained within this Section 3.11 when developing the site-specific plan.

Maintenance personnel and any contractors selected for snow plowing and deicing shall be made fully aware of the requirements of this section. During typical snow plowing operations, snow shall be pushed to the shoulders of the roads. In circumstances where excess snow is impacting public safety or parking capacity, and requires snow stockpiling, the stockpiles shall be created only at designated areas. If severe conditions result in the designated areas being full, low use areas may be used for snow stockpiling on an emergency basis or snow may be removed off site. The snow shall be removed from the site and properly disposed of in accordance with the MassDEP Snow Disposal Guidance. (See Attachment 1)

Care must be taken to avoid damage of structures and landscaping.

Alternatives to sodium chloride (commonly used salt) such as sand or calcium chloride, and reduced applications, should be considered and implemented if public safety is not jeopardized.

Before winter begins, the owner and the contractor should review snow plowing, deicing, and stockpiling procedures. Areas designated for stockpiling should be cleaned of any debris. After winter but no later than May 15, the debris must be removed from the stockpiling areas and any damage to the turf, vegetation, fences, etc., should be repaired.

3.12 Street Sweeping

A driveway and parking lot sweeping program should be developed in order to limit the amount of debris and pollutants that could have a negative effect on the components of the Stormwater Management System. Sweeping a minimum of twice (2) per year is recommended. Frequency should be based on the time of year as well as the weather. The first sweeping should be during the month of March before the spring rains wash off residual sand from winter applications. This will allow for the highest removal of street dirt and pollutants before they are washed into the other BMP's of the Stormwater Management System. The second sweeping should take place during the month of November to allow for the removal of leaves, twigs, and other debris caused by the late year storms, leaf fall and before the snow arrives. Any other sweeping should be determined by the owner on an as needed basis. If possible, additional sweeping should take place if the roadways and parking lots become cluttered with dirt and debris that may have a negative effect of the other components of the Stormwater Management System.

Once removed from paved surfaces, the sweepings must be handled and disposed of properly. Pavement sweepings are solid waste subject to the Massachusetts solid waste regulations.

3.13 Stormwater System:
All routine maintenance of the new Stormwater System shall be in accordance with the Stormwater Operations and Maintenance Plan contained within Appendix 3.

4.0 INSPECTIONS AND REPORT PREPARATION

The owner shall maintain inspection and maintenance logs of the maintenance and repair of the site for items as contained in this Long-Term Pollution Prevention Plan and Stormwater Operation and Maintenance Plan. Generally, forms need to be completed when inspections, maintenance and repairs are performed. In conjunction with the Long-Term Pollution Prevention Plan, the requirements of the Stormwater Operations and Maintenance Plan shall be implemented, and the owner will oversee the inspections and preparation of the required inspection reports for compliance with that document. Forms for this purpose are contained in Appendix 3.

5.0 COORDINATION WITH OTHER PERMITS AND REQUIREMENTS

This project will be subject to a permit issued by the Town of Sherborn and other agencies as applicable. Certain conditions of those approvals affecting the long-term management of the property shall be considered part of this Long-Term Pollution Prevention Plan. The owner shall become familiar with those documents and perform their work in compliance thereto.

ATTACHMENTS

1. MassDEP Snow Disposal Guidance
2. Snow Disposal Exhibit Plan

Attachment 1

MassDEP SNOW DISPOSAL GUIDANCE

Snow Disposal Guidance

Effective Date: March 8, 2001

Guideline No. BRPG01-01

Applicability: Applies to all federal, state, regional and local agencies, as well as to private businesses.

Supersedes: BRP Snow Disposal Guideline BRPG97-1 issued 12/19/97, and all previous snow disposal guidance

Approved by: Glenn Haas, Assistant Commissioner for Resource Protection

PURPOSE: To provide guidelines to all government agencies and private businesses regarding snow disposal site selection, site preparation and maintenance, and emergency snow disposal options that are acceptable to the Department of Environmental Protection, Bureau of Resource Protection.

APPLICABILITY: These Guidelines are issued by the Bureau of Resource Protection on behalf of all Bureau Programs (including Drinking Water Supply, Wetlands and Waterways, Wastewater Management, and Watershed Planning and Permitting). They apply to public agencies and private businesses disposing of snow in the Commonwealth of Massachusetts.

INTRODUCTION

Finding a place to dispose of collected snow poses a challenge to municipalities and businesses as they clear roads, parking lots, bridges, and sidewalks. While we are all aware of the threats to public safety caused by snow, collected snow that is contaminated with road salt, sand, litter, and automotive pollutants such as oil also threatens public health and the environment.

As snow melts, road salt, sand, litter, and other pollutants are transported into surface water or through the soil where they may eventually reach the groundwater. Road salt and other pollutants can contaminate water supplies and are toxic to aquatic life at certain levels. Sand washed into waterbodies can create sand bars or fill in wetlands and ponds, impacting aquatic life, causing flooding, and affecting our use of these resources.

There are several steps that communities can take to minimize the impacts of snow disposal on public health and the environment. These steps will help communities avoid the costs of a contaminated water supply, degraded waterbodies, and flooding. Everything we do on the land has the potential to impact our water resources. Given the authority of local government over the use of the land, municipal officials and staff have a critically important role to play in protecting our water resources.

The purpose of these guidelines is to help municipalities and businesses select, prepare, and maintain appropriate snow disposal sites before the snow begins to accumulate through the winter.

RECOMMENDED GUIDELINES

These snow disposal guidelines address: (1) site selection; (2) site preparation and maintenance; and (3) emergency snow disposal.

1. SITE SELECTION

The key to selecting effective snow disposal sites is to locate them adjacent to or on pervious surfaces in upland areas away from water resources and wells. At these locations, the snow meltwater can filter in to the soil, leaving behind sand and debris which can be removed in the springtime. The following areas should be avoided:

- Avoid dumping of snow into any waterbody, including rivers, the ocean, reservoirs, ponds, or wetlands. In addition to water quality impacts and flooding, snow disposed of in open water can cause navigational hazards when it freezes into ice blocks.
- Do not dump snow within a Zone II or Interim Wellhead Protection Area (IWPA) of a public water supply well or within 75 feet of a private well, where road salt may contaminate water supplies.
- Avoid dumping snow on MassDEP-designated high and medium-yield aquifers where it may contaminate groundwater (see the next page for information on ordering maps from MassGIS showing the locations of aquifers, Zone II's, and IWPAs in your community).
- Avoid dumping snow in sanitary landfills and gravel pits. Snow meltwater will create more contaminated leachate in landfills posing a greater risk to groundwater, and in gravel pits, there is little opportunity for pollutants to be filtered out of the meltwater because groundwater is close to the land surface.
- Avoid disposing of snow on top of storm drain catch basins or in stormwater drainage swales or ditches. Snow combined with sand and debris may block a storm drainage system, causing localized flooding. A high volume of sand, sediment, and litter released from melting snow also may be quickly transported through the system into surface water.

Site Selection Procedures

a. It is important that the municipal Department of Public Works or Highway Department, Conservation Commission, and Board of Health work together to select appropriate snow disposal sites. The following steps should be taken:
b. Estimate how much snow disposal capacity is needed for the season so that an adequate number of disposal sites can be selected and prepared.

c. Identify sites that could potentially be used for snow disposal such as municipal open space (e.g., parking lots or parks).
d. Sites located in upland locations that are not likely to impact sensitive environmental resources should be selected first.
e. If more storage space is still needed, prioritize the sites with the least environmental impact (using the site selection criteria, and local or MassGIS maps as a guide).

MassGIS Maps of Open Space and Water Resources

If local maps do not show the information you need to select appropriate snow disposal sites, you may order maps from MassGIS (Massachusetts Geographic Information System) which show publicly owned open spaces and approximate locations of sensitive environmental resources (locations should be field-verified where possible). Different coverages or map themes depicting sensitive environmental resources are available from MassGIS on the map you order. At a minimum, you should order the Priority Resources Map. The Priority Resources Map includes aquifers, public water supplies, MassDEP-approved Zone II's, Interim Wellhead Protection Areas, Wetlands, Open Space, Areas of Critical Environmental Concern, NHESP Wetlands Habitats, MassDEP Permitted Solid Waste facilities, Surface Water Protection areas (Zone A's) and base map features. The cost of this map is $25.00. Other coverages or map themes you may consider, depending on the location of your city or town, include Outstanding Resource Waters and MassDEP Eelgrass Resources. These are available at $25.00 each, with each map theme being depicted on a separate map. Maps should be ordered from MassGIS . Maps may also be ordered by fax at 617-626-1249 (order form available from the MassGIS web site) or mail. For further information, contact MassGIS at 617-626-1189.

2. SITE PREPARATION AND MAINTENANCE

In addition to carefully selecting disposal sites before the winter begins, it is important to prepare and maintain these sites to maximize their effectiveness. The following maintenance measures should be undertaken for all snow disposal sites:

- A silt fence or equivalent barrier should be placed securely on the downgradient side of the snow disposal site.
- To filter pollutants out of the meltwater, a 50-foot vegetative buffer strip should be maintained during the growth season between the disposal site and adjacent waterbodies.
- Debris should be cleared from the site prior to using the site for snow disposal.
- Debris should be cleared from the site and properly disposed of at the end of the snow season and no later than May 15.

3. EMERGENCY SNOW DISPOSAL

As mentioned earlier, it is important to estimate the amount of snow disposal capacity you will need so that an adequate number of upland disposal sites can be selected and prepared.

If despite your planning, upland disposal sites have been exhausted, snow may be disposed of near waterbodies. A vegetated buffer of at least 50 feet should still be maintained between the site and the waterbody in these situations. Furthermore, it is essential that the other guidelines for preparing and maintaining snow disposal sites be followed to minimize the threat to adjacent waterbodies.

Under extraordinary conditions, when all land-based snow disposal options are exhausted, disposal of snow that is not obviously contaminated with road salt, sand, and other pollutants may be allowed in certain waterbodies under certain conditions. In these dire situations, notify your Conservation Commission and the appropriate MassDEP Regional Service Center before disposing of snow in a waterbody.

Use the following guidelines in these emergency situations:

- Dispose of snow in open water with adequate flow and mixing to prevent ice dams from forming.
- Do not dispose of snow in saltmarshes, vegetated wetlands, certified vernal pools, shellfish beds, mudflats, drinking water reservoirs and their tributaries, Zone IIs or IWPAs of public water supply wells, Outstanding Resource Waters, or Areas of Critical Environmental Concern.
- Do not dispose of snow where trucks may cause shoreline damage or erosion.
- Consult with the municipal Conservation Commission to ensure that snow disposal in open water complies with local ordinances and bylaws.

FOR MORE INFORMATION

If you need more information, contact one of MassDEP's Regional Service Centers:

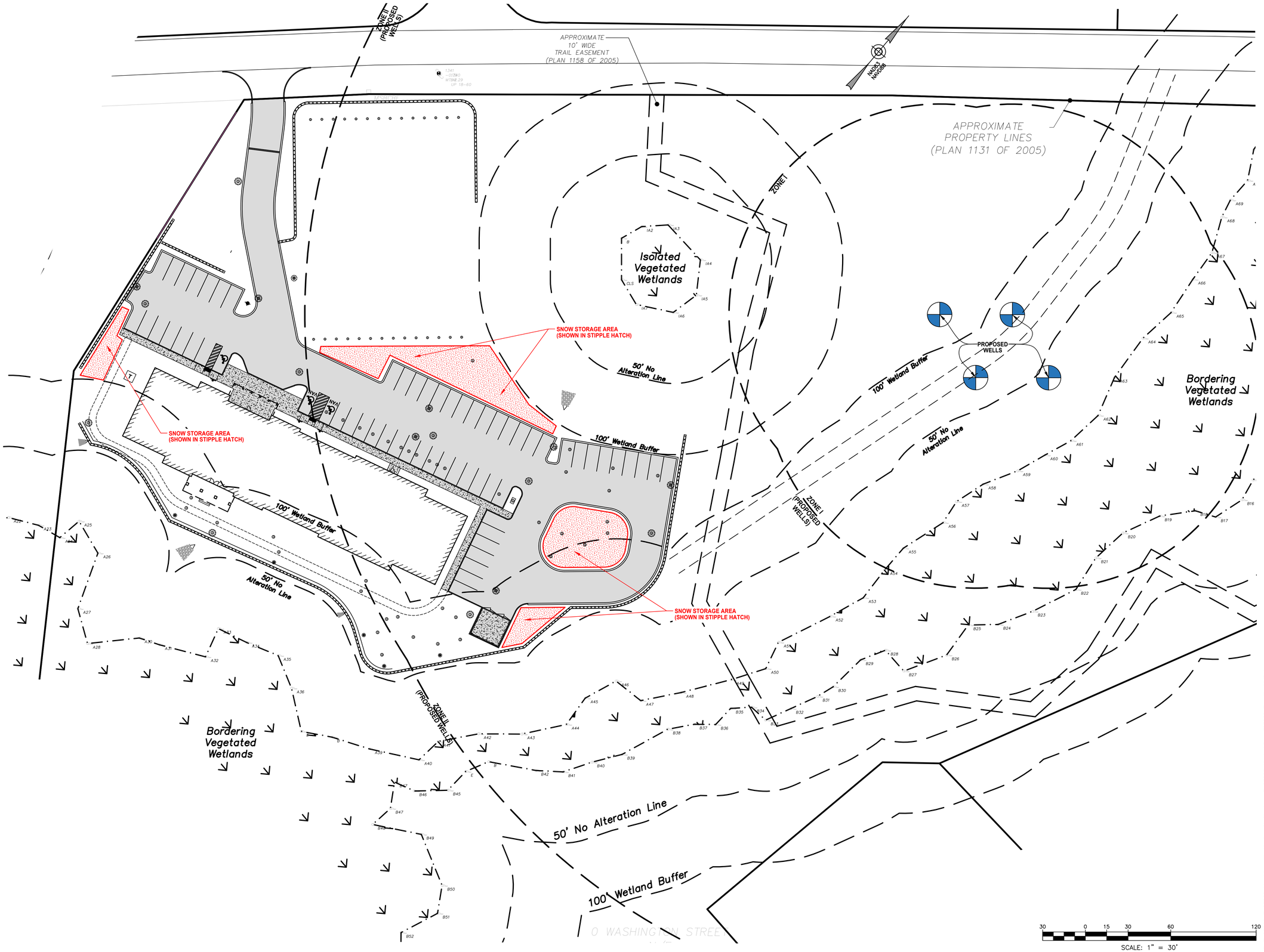
Northeast Regional Office, Wilmington, 978-694-3200
Southeast Regional Office, Lakeville, 508-946-2714
Central Regional Office, Worcester, 508-792-7683
Western Regional Office, Springfield, 413-755-2214

or

Call Thomas Maguire of DEP's Bureau of Resource Protection in Boston at 617-292-5602.

Attachment 2

SNOW DISPOSAL EXHIBIT PLAN



DGT Associates
Surveying & Engineering

Framingham
Boston ● Worcester ● Preston, CT

1071 Worcester Road
Framingham, MA 01701
508-879-0030

www.DGTassociates.com

PARCEL ID:

MAP 7, LOT 0, BLOCK 49

ISSUED FOR:

COMPREHENSIVE PERMIT APPLICATION

NO.	APP	DATE	DESCRIPTION
1	BEC	2/9/24	DESIGN DEVELOPMENT

DATE: **JANUARY 23, 2024**

SCALE: **1" = 30'**

DESIGN:	DRAFTED:	CHECKED:
KMR	KMR/JAL	JAL/BEC

PROJECT TITLE:

WASHINGTON STREET SHERBORN HOMES

0 WASHINGTON STREET
SHERBORN, MASSACHUSETTS 01770

SHEET TITLE:

SNOW STORAGE EXHIBIT PLAN

SHEET: **1 OF 1**

PROJECT NO.: **F-25902**

SNOW

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Surveying & Engineering

1071 Worcester Rd.
Framingham, MA 01701
508.879.0030
www.dgtassociates.com

APPENDIX 3

Stormwater BMP Operation & Maintenance Plan

Washington Street Sherborn Homes
0 Washington Street
Sherborn, MA 01770

DGT Job No.: F25902

DGT Associates
Surveying & Engineering

1071 Worcester Rd.
Framingham, MA 01701
508.879.0030
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Stormwater BMP Operation and Maintenance Plan

Operation and Maintenance Manual
Inspection Forms
Stormwater System Maintenance Record
Proprietary Systems Operation and Maintenance Guides

Washington Street Sherborn Homes

0 Washington Street
Sherborn, MA 01770

DGT Job No.: F25902

STORMWATER MANAGEMENT SYSTEM

OPERATION AND MAINTENANCE PLAN

Washington Street Sherborn Homes
0 Washington Street in Sherborn, MA

In order for the stormwater management system to function properly as designed, the system must be inspected on a regular basis and maintained. The responsibility for the maintenance and operation of the system will be as follows:

Washington Street Sherborn Homes, LLC
Attn.: Bob Murchison
177 Lake Street
Sherborn, MA 01770
Bob.murchison@me.com

Routine inspections and some of the routine maintenance tasks will be performed by the owner's maintenance personnel. Hired outside contractors will be utilized for some items such as the removal of trapped oils, hydrocarbons and sediment from the stormwater treatment units and for non-routine repairs.

The stormwater management system contains the following Stormwater Best Management Practices (BMPs):

- Deep Sump Catch Basins
- Stormwater Treatment Units
- Subsurface Recharger (Infiltration) Systems
- Subsurface Detention Systems
- Surface Detention Basin
- Pipe Outfalls
- Outlet Control Structures

OPERATION AND MAINTENANCE MANUAL

Upon completion of the project, a complete Stormwater Management System, Operation and Maintenance Plan (O&M) shall be prepared containing detailed plans of the as-built system components, a description of the purpose and function of each component, inspection and maintenance tasks and schedules, check lists, and report forms.

INSPECTIONS AND MAINTENANCE

The following pages describe the inspection, routine maintenance and non-routine maintenance which are required for each BMP. These are described in a general manner at this time. The final O&M Plan will contain detailed information and actual schedules. The inspection and maintenance requirements are based on the recommendations from the MassDEP Stormwater Management Standards Handbook, February 2008. Maintenance requirements for the Stormwater Treatment Unit will be per the manufacturer's specifications. We have included the recommended maintenance requirements from the CDS Technologies design manual for the specified treatment unit. If other systems are selected, maintenance shall be in accordance with the manufacturer's recommendations.

The recommended procedures below should be followed strictly for at least the first two years of the system operation. During that period, the observations and experience gained from the

monitoring and maintenance will provide the information necessary so that adjustments can be made for the most efficient operation and maintenance of the system.

NON-STORMWATER DISCHARGES

This is to provide notice to the owner and operator(s) of the subject property that the discharge of any non-stormwater to the stormwater management system is prohibited. Also, there shall be no modifications to the stormwater system for the purpose of discharging non-stormwater to the system. Non-stormwater discharges are any liquid or materials that are not the result of natural rainfall runoff or runoff from snow and ice melt. Non-stormwater discharges include, but are not limited to, detergents, soaps and sanitary sewage. The purpose of this is to protect groundwater and surface water quality, and the downstream wetlands resource areas, as well as to ensure compliance with applicable laws.

CONFINED SPACE ENTRY

Note that any inspections or maintenance activity of underground piping, chambers, deep manholes, etc that requires entry into the system must be in accordance with OSHA confined space regulations.

DEEP SUMP CATCH BASINS

DESCRIPTION AND FUNCTION

These structures collect stormwater from small drainage areas with added features to enhance the capture of gas, oils, grease, trash, floating debris, and sediment. The inlet to each deep sump catch basin is a cast iron grate over a precast concrete structure. The sump is over-sized to a minimum depth of 4 feet below the outlet pipe invert to enhance trapping of sediment. The outlet pipe includes a hooded cover to keep floating hydrocarbons and other floating debris in the catch basin.

The deep sump catch basins are effective as a pretreatment device for other stormwater BMP's.

INSPECTIONS

The deep sump catch basins should be inspected at least four times per year including at the end of the foliage and snow removal seasons. For a full inspection, remove the grate and inspect the general condition of the unit including the amount of floating debris and the presence of hydrocarbons if any. If the inspection finds a large presence of hydrocarbons, such as a layer of floating oil or a strong odor of gas, it should be removed immediately. Measure the amount of sediment that has been collected. Pipe outlets should be clear of debris. To be effective, the 4-foot deep sump must be water tight to maintain a permanent pool to the outlet pipe invert. If the water level is significantly below the outlet pipe, closer inspection for possible leaks is warranted. Note that a water level somewhat below the outlet pipe is normal during extended periods with no precipitation due to evaporation and minor expected seepage.

ROUTINE MAINTENANCE

Initially, the deep sump catch basins should be cleaned a minimum of two times a year and additionally, if necessary, based on the results of the quarterly inspection. Cleaning consists of the removal of floating hydrocarbons and accumulated sediment and clearing the inlet grate and

outlet pipe. Sediment should be removed from the deep sump catch basin if the measurement of the sediment is over one foot in depth. A hazardous waste disposal contractor must perform the removal of hydrocarbons.

NON-ROUTINE MAINTENANCE

These are structural repairs and replacement of system components. Typical items for this BMP may include:

- Repairing the outlet hood and/or pipe
- Filling cracks in the concrete
- Patching mortar and brick.
- Resetting inlet grates

MAINTENANCE EQUIPMENT

- Hand tools for opening grates
- Measuring stick
- Vacuum pumping truck (haz-mat contractor for hydrocarbon removal)
- Vacuum pumping truck or clamshell (for sediment removal)

STORMWATER TREATMENT UNITS

DESCRIPTION AND FUNCTION

The Stormwater Treatment Units (STUs) are non-mechanical self-operating systems that function any time there is flow into the storm drainage system. The STU technology features a patented non-blocking, indirect screening technique to capture and retain a wide range of organic and inorganic solids and pollutants including suspended solids, fine sands, larger particles, and trash. The units are equipped with conventional oil baffles to capture and retain oil and grease. Pollutants are retained in the units' separation chamber and sump even when the design capacity is exceeded.

INSPECTIONS

The unit(s) should be inspected on a bi-monthly basis and after major storm events for the first year. Remove the cover and inspect the general condition of the unit including the amount of floating debris and the presence of hydrocarbons if any. If the inspection finds a large presence of hydrocarbons, such as a layer of floating oil or a strong odor of gasoline, it should be removed immediately. Measure the amount of sediment that has collected using a measuring stick or "Sludge Judge" measuring tube. Pipe inlets and outlets should be clear of debris. After the first year, the number of inspections may be reduced based on the experience during the first-year monitoring but not less than 2 times per year. Two of the inspections must include one at the end of the foliage season and one at the end of the snow season.

ROUTINE MAINTENANCE

The units should be cleaned a minimum of two times during the first year or when the sediment level reaches 75% of the capacity of the isolated sump or when an appreciable level of hydrocarbons and trash has accumulated, per the manufacturer's maintenance specifications. A copy of the CDS Technologies Inspection and Maintenance Guide is provided attached to the end of this section. Cleaning consists of the removal of floating hydrocarbons and accumulated sediment and clearing the inlet pipes. The removal of hydrocarbons must be performed by a hazardous waste disposal contractor. Removal of the sediment is by a standard vacuum truck.

NON-ROUTINE MAINTENANCE

These are structural repairs and replacement of system components. Typical items for this BMP may include:

Repairing the inlet or outlet pipes.
Filling cracks in the concrete
Resetting covers.

MAINTENANCE EQUIPMENT

Hand tools for opening covers
Measuring stick or "Sludge Judge".
Vacuum pumping truck (haz-mat contractor for hydrocarbon removal)
Contracted vacuum pumping truck (for sediment removal)

SUBSURFACE RECHARGE (INFILTRATION) SYSTEMS

DESCRIPTION AND FUNCTION

Recharger #1 and Recharger #2 are subsurface (underground) infiltration systems and are constructed of precast concrete galleys surrounded by washed stone and filter fabric. The chambers create voids within the stone to provide stormwater infiltration. The chambers are constructed in a permeable soil suitable for infiltrating. An emergency overflow is provided for the system once the storage volume is exceeded. Manholes are to be brought to finished grade and will be used for access and maintenance.

The purpose of the infiltration systems is to meet the recharge requirements and to treat runoff from the paved areas of the site per the MassDEP Stormwater Management Standards.

INSPECTIONS

The infiltration systems should be inspected after every major storm for the first few months. After this time period it may be inspected once each year and should preferably be inspected two to three days after a significant storm event. The inspection should examine whether the systems are draining properly following storms. The underground infiltration systems should drain within a maximum of 72 hours following a storm event. Pipe inlets and outlets should be clear of debris and there should be no significant accumulation of sediment in the chambers. The annual inspection of the infiltration systems should include removal of the key manhole covers/observation ports to view the interior of the chamber. If significant accumulation of sediment occurs, most will be near the inlet pipe(s) to the underground chambers and can be removed by hand or vacuum pumper. A significant accumulation of sediment may indicate a problem with soil migrating into the system from the surrounding soil indicating a failure of the filter fabric protection or a pipe problem in the pipe leading into the system. Also, the outlet control structure for each subsurface recharge system shall be inspected. Refer to the inspection section for the outlet control structures for the proper procedures.

ROUTINE MAINTENANCE

The stormwater system includes significant pretreatment BMPs that protect the infiltration systems so sediment removal should rarely be required. Routine maintenance generally includes clearing debris from the inlet and outlet pipes if found during an inspection.

NON-ROUTINE MAINTENANCE

These are structural repairs and replacement of system components. Typical items for this BMP may include:

- Repairing the inlet pipes
- Filling cracks in the concrete
- Resetting covers
- Removal of significant accumulation of sediment from the chambers that affects the infiltration capacity.

MAINTENANCE EQUIPMENT

Hand tools for opening covers, flashlight.
Equipment as may be necessary to comply with OSHA confined space requirements.

SUBSURFACE DETENTION SYSTEMS

DESCRIPTION AND FUNCTION

The purpose of the detention systems is to temporarily store runoff and release the water at a controlled rate to the downstream wetland resource areas. This is to meet the peak flow requirements of the MassDEP Stormwater Management Standards.

Detention Systems #1 and #2 are subsurface (underground) detention systems and are constructed of precast concrete galleys surrounded by washed stone and filter fabric/impermeable barrier. Outlet control manholes are included to control the peak rate of runoff to downstream drainage systems.

INSPECTIONS

The detention systems should be inspected after every major storm for the first few months. After this time period they may be inspected once each year and should preferably be inspected two to three days after a significant storm event. The inspection should examine whether the chamber is draining properly following storms. Pipe inlets and outlets should be clear of debris and there should be no significant accumulation of sediment in the chambers. The annual inspection of the detention systems should include removal of the key manhole covers to view the interior of the chamber. If significant accumulation of sediment occurs, most will be near the inlet pipe(s) to the underground chamber and can be removed by hand or vacuum pumper. A significant accumulation of sediment may indicate a problem with soil migrating into the system from the surrounding soil indicating a failure of the filter fabric protection or a pipe problem in the pipe leading into the system. Also, the outlet control structure for each subsurface detention system shall be inspected. Refer to the inspection section for the Outlet Control Structures for the proper procedures.

ROUTINE MAINTENANCE

The stormwater system includes significant pretreatment BMPs that protect the detention systems so sediment removal should rarely be required. Routine maintenance generally includes clearing debris from the inlet and outlet pipes if found during an inspection.

NON-ROUTINE MAINTENANCE

These are structural repairs and replacement of system components. Typical items for this BMP may include:

- Repairing the inlet pipes
- Filling cracks in the concrete
- Resetting covers
- Removal of significant accumulation of sediment from the chambers. Removal of sediment typically requires jetting the system.

MAINTENANCE EQUIPMENT

Hand tools for opening covers, flash light.
Equipment as may be necessary to comply with OSHA confined space requirements.

SURFACE DETENTION BASIN

DESCRIPTION AND FUNCTION

Detention Basin #3 is an open, vegetated depression that temporarily detains stormwater runoff from the site and regulates the outflow. The outflow is controlled by a broad crested vegetated weir.

INSPECTIONS

The basin should be inspected semi-annually with additional inspections during the first few months after completion of the re-grading to ensure that the vegetation becomes adequately established. The basin should be inspected for slope integrity, soil moisture, vegetative health, soil stability, soil compaction, soil erosion, ponding and sedimentation. Significant ponding should be present for only a few hours following a rain event.

ROUTINE MAINTENANCE

Repairs and reseeding may be needed during the first few months until the vegetation becomes secure. The basin should be mowed once or twice per year to prevent the establishment of trees and shrubs, except those specifically planted as part of the landscape plan. The mowing must be in the mid-summer when the basin is as dry as possible, and the grass clippings should be removed. The grass should not be cut shorter than four inches. Sediment and debris should be removed at least once a year in late spring. Other tasks include fertilizing of the side slope vegetation, liming, watering, pruning, and weed and pest control. Additional mowing to 4-inch height to maintain a more “landscaped” or “manicured” appearance is allowable.

Debris cannot be allowed to accumulate on the overflow weir.

NON-ROUTINE MAINTENANCE

These are structural repairs and replacement of system components. Typical items for this BMP may include:

Major repairs of slopes

Removal of accumulated sediment should be performed at least every 10 years or when warranted based on the inspection.

MAINTENANCE EQUIPMENT

Grounds equipment
(mower, rakes, etc.)
Tractor Mower for basin bottom.

PIPE OUTFALLS

INSPECTIONS

The pipe outfalls should be inspected monthly and after a significant rain event for the first few months of operation and twice per year minimum following that. Inspect the general condition of the area including the amount of debris, the presence of hydrocarbons if any, the amount of sediment, the condition of the vegetation within and adjacent to the pipe outlets, the condition of the outfall stone and the area downstream. If the inspection finds a large presence of sediment, it should be removed. Measure the amount of sediment that has collected. Pipe inlets should be clear of debris with special attention paid to make sure no rilling or erosion has taken place around the lip of the spreader.

ROUTINE MAINTENANCE

The pipe outfalls should be cleaned a minimum of one time per year and additionally, if necessary, based on the results of the inspections. Cleaning consists of the removal of accumulated sediment and debris and clearing the inlet pipe. Vegetation around the pipe outlet should be mowed or trimmed throughout the year with the clippings removed and disposed of outside the area around the outfall. If the lip has eroded, it should be fixed immediately to prevent erosion. Observe the pipe outfalls for signs that the pipe is not draining properly. This is best observed during a significant storm event. A hazardous waste disposal contractor must perform the removal of hydrocarbons if any.

NON-ROUTINE MAINTENANCE

These are structural repairs and replacement of system components. Typical items for this BMP may include:

Re-vegetation of surrounding areas
Replacement of riprap stone lining

MAINTENANCE EQUIPMENT

Hand tools for cleaning trash and sediment

OUTLET CONTROL STRUCTURES

DESCRIPTION AND FUNCTION

These structures are precast concrete structures that regulate captured stormwater volume and the flow within subsurface rechargers and detention basins. The outlet control structures are underground manhole structures with various inlet and outlet pipes and a weir wall with orifices to control flow.

INSPECTIONS

The outlet control structures should be inspected at least four times per year including at the end of the foliage and snow removal seasons. For a full inspection, remove the cover/grate and inspect the general condition of the units including the condition of the interior weir wall and inlet/outlet pipes and orifices as applicable.

ROUTINE MAINTENANCE

Initially, the outlet control structures should be cleaned a minimum of two times a year and additionally, if necessary, based on the results of the quarterly inspection. Cleaning consists of the removal of floating debris, if any, from the interior of the structure and clearing the inlet grate, outlet pipes, weirs and control orifices as applicable for each unit.

NON-ROUTINE MAINTENANCE

These are structural repairs and replacement of system components. Typical items for this BMP may include:

- Repairing the inlet/outlet pipes
- Filling cracks in the concrete
- Patching mortar and brick.
- Resetting inlet grates

MAINTENANCE EQUIPMENT

Hand tools for opening grates & measuring stick.

STORMWATER SYSTEM MAINTENANCE BUDGET (PRELIMINARY)

The following is a preliminary budget for the first two years after the completion of the project. The cost assumes contracting for the services to provide routine maintenance.

Stormwater System structures to be inspected and maintained:

Item #1	Deep Sump Catch Basins (6 total)
	Area Drains (1 total)
	Trench Drains (1 total)
Item #2	Stormwater Treatment Units (5 total)
Item #3	Subsurface Recharge (Infiltration) System (2 total)
Item #4	Subsurface Detention System (2 total)
Item #5	Surface Detention Basin (1 total)
Item #6	Pipe Outfalls (2 total)
Item #7	Outlet Control Structures (2 total)

ROUTINE MAINTENANCE:
Item #1 will require a pump truck to be hired and the structure will need to be pumped to clean all of the sediment and debris out of it. This is to be done a minimum of 2 times per year.

1 Pump Truck x 2 Times/Year x $1,500 = $ 3,000/year for pumping service

Item #2 will require a vactor truck to be hired and the structure will need to be pumped to clean all of the sediment and debris out of the units. This is to be done a minimum of 2 times per year.

1 Pump Truck x 2 Times/Year x $800 = $ 1,600/year for pumping services

Item #3 routine maintenance will require removing accumulated sediment as necessary, and at least once every five (5) years near the inlet and outlet pipes if found during an inspection and the cleaning of the outlet control structure.

Est. cost = $ 300 per unit per year = $600/year

Item #4 routine maintenance will require removing accumulated sediment as necessary, and at least once every five (5) years near the inlet and outlet pipes if found during an inspection and the cleaning of the outlet control structure.

Est. cost = $ 300 per unit per year = $600/year

Item #5 will require removing accumulated sediment and debris in the basin if found during an annual inspection and the cleaning of the outlet structure. The sediment and debris should be removed with the use of hand tools (or pump truck if significant accumulation of sediment occurs).

Est. Cost = $ 600 per unit per year = $600/year

Item #6 routine maintenance will require the moving/replacing of stone and removing debris at least 2 times per year.

Est. cost = $ 500 per unit per year = $1,000/year

Item #7 routine maintenance will require removing accumulated sediment and debris out of the structures as necessary, and at least once every five (5) years.

Est. cost = $ 300 per unit per year = $600/year

Total Estimated Yearly Budget (First Year) = $8,000/year for Routine Maintenance

ROUTINE INSPECTIONS:
The routine inspections shall be performed by the on-site maintenance personnel on a monthly basis and after every major rainfall event (assumed 1 major rainfall event per month). A two (2) man crew will perform the inspections to the stormwater BMP's. The following is the budget for the routine inspections:

Deep Sump Catch Basins = 10 minutes/structure per inspection
Stormwater Treatment Units = 15 minutes/structure per inspection
Subsurface Infiltration Systems = 30 minutes/structure per inspection
Subsurface Detention Systems = 30 minutes/structure per inspection
Surface Detention Basins = 30 minutes/structure per inspection
Pipe Outfalls = 10 minutes/structure per inspection
Outlet Control Structures = 15 minutes/structure per inspection

STORMWATER MANAGEMENT SYSTEM

INSPECTION AND MAINTENANCE FORMS

CONTENTS:

INSPECTION FORMS

- Deep Sump Catch Basins
- Stormwater Treatment Units
- Subsurface Recharge (Infiltration) Systems
- Subsurface Detention Systems
- Surface Detention Basin
- Pipe Outfalls
- Outlet Control Structures

MAINTENANCE / REPAIR RECORD FORM

STORMWATER BMP	**INSPECTION SCHEDULE**	**MAINTENANCE SCHEDULE**
DEEP SUMP CATCH BASINS	4x per year	2x per year
STORMWATER TREATMENT UNITS	2x per year	2x per year
INFILTRATION SYSTEMS	1x per year	1x per year
SUBSURFACE DETENTION BASINS	1x per year	1x per year
SURFACE DETENTION BASIN	2x per year	2x per year
PIPE OUTFALLS	2x per year	2x per year
OUTLET CONTROL STRUCTURES	4x per year	4x per year

DEEP SUMP CATCH BASINS, AREA DRAINS, & TRENCH DRAINS

Routine Inspection Checklist - Inspected quarterly Date _____

	Inlet Grate	Sediment Depth	Hydrocarbons*	Structural Integrity	Pipes Clear	Recommended Maintenance
CB #1						
CB #2						
CB #3						
CB #4						
CB #5						
CB #6						
AD #1						
TD #1						

* Presence of hydrocarbons is a clearly visible layer of oil, gasoline, grease, hydraulic fluid, etc., floating on the surface or a strong odor of gas or oil

STORMWATER TREATMENT UNITS

Routine Inspection Checklist - Inspected 2 x per year Date _____

	Structural Integrity	Sediment Depth	Hydrocarbons*	Inlet/Outlet Pipe	Floating Debris	Recommended Maintenance
STU #1						
STU #2						
STU #3						
STU #4						
STU #5						

* Presence of hydrocarbons is a clearly visible layer of oil, gasoline, grease, hydraulic fluid, etc., floating on the surface or a strong odor of gas or oil

SUBSURFACE RECHARGERS & DETENTION SYSTEMS **Date** _____

Routine Inspection Checklist - Inspected annually two to three days after a rainfall.

	Draining Properly	Sediment	Structural Integrity	Pipe Inlet/Outlet	Debris	Recommended Maintenance
Recharger #1						
Recharger #2						
Detention #1						
Detention #2						

	Ponding	Sediment Depth	Outlet Structure	Floating Debris	Vegetation	Recommended Maintenance
Detention #3						

* Presence of hydrocarbons is a clearly visible layer of oil, gasoline, grease, hydraulic fluid, etc., floating on the surface or a strong odor of gas or oil

PIPE OUTFALLS

Routine Inspection Checklist - Inspected semi-annually. Date _____

	Draining Properly	Sediment	Structural Integrity	Pipe Inlet/Outlet	Debris	Outlet Erosion
Pipe Outfall #1						
Pipe Outfall #2						

OUTLET CONTROL STRUCTURES

Routine Inspection Checklist - Inspected quarterly Date _____

	Inlet Grate	Sediment Depth	Hydrocarbons*	Structural Integrity	Pipes Clear	Recommended Maintenance
OCS #1						
OCS #2						

* Presence of hydrocarbons is a clearly visible layer of oil, gasoline, grease, hydraulic fluid, etc., floating on the surface or a strong odor of gas or oil

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STORMWATER SYSTEM MAINTENANCE RECORD

Date of Maintenance: _____ Performed By:_____

Maintenance / repair tasks were performed on the following on-site BMP structures:

Stormwater Structure Work Performed._____

Other Comments:

CONTECH®
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CDS® Inspection and Maintenance Guide

CDS TECHNOLOGIES

Maintenance

The CDS system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects pollutants will depend more heavily on site activities than the size of the unit. For example, unstable soils or heavy winter sanding will cause the grit chamber to fill more quickly but regular sweeping of paved surfaces will slow accumulation.

Inspection

Inspection is the key to effective maintenance and is easily performed. Pollutant transport and deposition may vary from year to year and regular inspections will help ensure that the system is cleaned out at the appropriate time. At a minimum, inspections should be performed twice per year (e.g. spring and fall) however more frequent inspections may be necessary in climates where winter sanding operations may lead to rapid accumulations, or in equipment washdown areas. Installations should also be inspected more frequently where excessive amounts of trash are expected.

The visual inspection should ascertain that the system components are in working order and that there are no blockages or obstructions in the inlet and separation screen. The inspection should also quantify the accumulation of hydrocarbons, trash, and sediment in the system. Measuring pollutant accumulation can be done with a calibrated dipstick, tape measure or other measuring instrument. If absorbent material is used for enhanced removal of hydrocarbons, the level of discoloration of the sorbent material should also be identified during inspection. It is useful and often required as part of an operating permit to keep a record of each inspection. A simple form for doing so is provided.

Access to the CDS unit is typically achieved through two manhole access covers. One opening allows for inspection and cleanout of the separation chamber (cylinder and screen) and isolated sump. The other allows for inspection and cleanout of sediment captured and retained outside the screen. For deep units, a single manhole access point would allows both sump cleanout and access outside the screen.

The CDS system should be cleaned when the level of sediment has reached 75% of capacity in the isolated sump or when an appreciable level of hydrocarbons and trash has accumulated. If absorbent material is used, it should be replaced when significant discoloration has occurred. Performance will not be impacted until 100% of the sump capacity is exceeded however it is recommended that the system be cleaned prior to that for easier removal of sediment. The level of sediment is easily determined by measuring from finished grade down to the top of the sediment pile. To avoid underestimating the level of sediment in the chamber, the measuring device must be lowered to the top of the sediment pile carefully. Particles at the top of the pile typically offer less resistance to the end of the rod than consolidated particles toward the bottom of the pile. Once this measurement is recorded, it should be compared to the as-built drawing for the unit to determine weather the height of the sediment pile off the bottom of the sump floor exceeds 75% of the total height of isolated sump.

Cleaning

Cleaning of a CDS systems should be done during dry weather conditions when no flow is entering the system. The use of a vacuum truck is generally the most effective and convenient method of removing pollutants from the system. Simply remove the manhole covers and insert the vacuum hose into the sump. The system should be completely drained down and the sump fully evacuated of sediment. The area outside the screen should also be cleaned out if pollutant build-up exists in this area.

In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, the system should be cleaned out immediately in the event of an oil or gasoline spill should be cleaned out immediately. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use absorbent pads since they are usually less expensive to dispose than the oil/water emulsion that may be created by vacuuming the oily layer. Trash and debris can be netted out to separate it from the other pollutants. The screen should be power washed to ensure it is free of trash and debris.

Manhole covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and also to ensure that proper safety precautions have been followed. Confined space entry procedures need to be followed if physical access is required. Disposal of all material removed from the CDS system should be done in accordance with local regulations. In many jurisdictions, disposal of the sediments may be handled in the same manner as the disposal of sediments removed from catch basins or deep sump manholes.

CDS Model	Diameter		Distance from Water Surface to Top of Sediment Pile		Sediment Storage Capacity	
	ft	m	ft	m	y^3	m^3
CDS1515	3	0.9	3.0	0.9	0.5	0.4
CDS2015	4	1.2	3.0	0.9	0.9	0.7
CDS2015	5	1.3	3.0	0.9	1.3	1.0
CDS2020	5	1.3	3.5	1.1	1.3	1.0
CDS2025	5	1.3	4.0	1.2	1.3	1.0
CDS3020	6	1.8	4.0	1.2	2.1	1.6
CDS3025	6	1.8	4.0	1.2	2.1	1.6
CDS3030	6	1.8	4.6	1.4	2.1	1.6
CDS3035	6	1.8	5.0	1.5	2.1	1.6
CDS4030	8	2.4	4.6	1.4	5.6	4.3
CDS4040	8	2.4	5.7	1.7	5.6	4.3
CDS4045	8	2.4	6.2	1.9	5.6	4.3
CDS5640	10	3.0	6.3	1.9	8.7	6.7
CDS5653	10	3.0	7.7	2.3	8.7	6.7
CDS5668	10	3.0	9.3	2.8	8.7	6.7
CDS5678	10	3.0	10.3	3.1	8.7	6.7

Table 1: CDS Maintenance Indicators and Sediment Storage Capacities

Support

- Drawings and specifications are available at www.contechstormwater.com.
- Site-specific design support is available from our engineers.

Contech Engineered Solutions LLC provides site solutions for the civil engineering industry. Contech's portfolio includes bridges, drainage, sanitary sewer, stormwater, earth stabilization and wastewater treament products. For information, visit www.ContechES.com or call 800.338.1122

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800.925.5240
www.ContechES.com

CDS Inspection & Maintenance Log

CDS Model: _____ Location: _____

Date	Water depth to sediment[1]	Floatable Layer Thickness[2]	Describe Maintenance Performed	Maintenance Personnel	Comments

1. The water depth to sediment is determined by taking two measurements with a stadia rod: one measurement from the manhole opening to the top of the sediment pile and the other from the manhole opening to the water surface. If the difference between these measurements is less than the values listed in table 1 the system should be cleaned out. **Note: to avoid underestimating the volume of sediment in the chamber, the measuring device must be carefully lowered to the top of the sediment pile.**

2. For optimum performance, the system should be cleaned out when the floating hydrocarbon layer accumulates to an appreciable thickness. In the event of an oil spill, the system should be cleaned immediately.