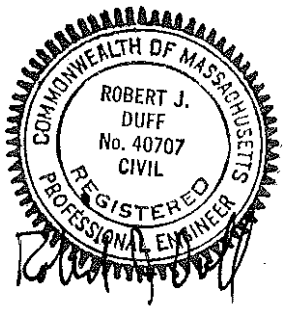
Stormwater Report
Franklin Heights Parcel B
Franklin, MA



12-8-2022

Date: September 14, 2022
Revised December 5, 2022

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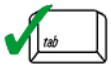
F-4471

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.

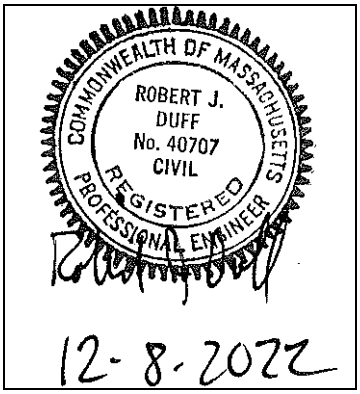
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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

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.

Project Description

The project site consists of approximately 20.3+/- acres of land located off Lincoln Street and is bordered to the east by a residential property, to the west by the previously constructed Franklin Heights Parcel A development, and to the north by residential properties off Daniels Street.. The parcel is located within Zoning District Rural Residential II. The site is largely surrounded by wetlands, which were delineated by Creative Land & Water Engineering, LLC and field located by Guerriere & Halnon, Inc.

Soils on site are identified in five categories – a Paxton Fine Sandy Loam – 305B, 3 to 8% slopes, a Woodbridge Fine Sandy Loam – 310B, 3 to 8% slopes, Swansea Muck – 51, 0 to 1% slopes, a Whitman Fine Sandy Loam – 73A, 0 to 3% slopes, extremely stony, and a Ridgebury Fine Sandy Loam – 71B, 3 to 8% slopes. Soils are based on the Web Soil Survey and site observations - See Appendix 2 / NRCS Soil Report.

The project proponent intends to construct a 62 unit 40-B development consisting of modified bituminous concrete berm, bituminous concrete roadways, bituminous concrete sidewalks and three-foot landscaped area between sidewalks and roadway. The proposed roadways will be a 22' wide paved surface with full access to Lincoln Street. Existing gated access to Daniels Street will be maintained for emergency use only. All units will be serviced by town water and sewer system. Storm water run-off will be collected by catch basin to manhole drainage systems. Run-off collected within the development will be sent to infiltration basins throughout the development for treatment, detention, and infiltration prior to discharge to the surrounding wetlands.

Pre-development drainage runoff from the entire 20.3± acre site was analyzed as two watershed - See Appendix 10 / Drainage Area Plans.

- EX-1 watershed area includes approximately 18.3 acres. Runoff from this watershed flows generally from the high point in the center of the property toward the wetlands around the perimeter of the site. The perimeter wetlands are identified as the point of analysis (EX AP-1).
- EX-2 watershed area includes approximately 2.0 acres. Runoff from this watershed flows generally from the high point in the center of the property toward the wetlands around the southerly perimeter of the site. The perimeter wetlands are identified as the point of analysis (EX AP-2).

The Post-Development Drainage Analysis regards the area as four watersheds –
See Appendix 10 / Drainage Area Plans.

- PR-1, PR-2, and PR-3 watersheds consist of paved roadways, sidewalks, driveways, roofs, lawns, and wooded areas within the proposed development. Runoff within these watersheds is collected by a series of catch basins conveyed by drainage pipes and manholes to the proposed infiltration basins, ultimately discharging at the adjacent wetlands. Analysis points for these watersheds is identified as AP-1, AP-2, AP-3, and AP-4 respectively. See post development watershed plan in appendices.

- PR-4 watershed includes runoff from grass areas of the developed portions of the site in addition to runoff from undeveloped portions of the site. Runoff generated within this watershed flows overland to the existing Bordering Vegetative Wetlands identified as AP-1.

- PR-5 watershed includes runoff from roofs and grass areas of the developed portions of the site in addition to runoff from undeveloped portions of the site. Runoff generated within this watershed flows overland to the existing Bordering Vegetative Wetlands identified as AP-2.

Post development stormwater runoff will be collected and conveyed via a standard catch basin and manhole collection system to either proposed infiltration basins for treatment, detention, and infiltration. The site has soils that are considered to have high stormwater runoff potential as identified in the NRCS Web Soil Survey information provided in Appendix 2. The site is designed to be in conformance with the Massachusetts Stormwater Management Guidelines and Massachusetts Wetlands Protection Act.

Compliance with the 10 Stormwater Standards

Standard 1: No new untreated Discharges

The proposed development has one distinct stormwater discharge location. Runoff to location AP-1 from subcatchments PR-1, PR-2, and PR-3 includes the stormwater runoff from the proposed roadways and driveways which will discharge into proposed infiltration basins. Also, contributing to these locations is the runoff from the developed and undeveloped portion of the site which flow overland to the adjacent properties. All impervious areas are collected in deep sump hooded catch basins and discharged to forebays prior to discharging to infiltration basins, this treatment system provides greater than 80% TSS removal discharge from the basins goes to the adjacent wetlands. Clean roof drainage is designed to be discharged to the proposed infiltration basins on-site. Runoff from subcatchment PR-4 consists of non-impervious areas and clean runoff from non-metal roofs from developed and undeveloped portions of the site which will be discharged to the existing BVW's located within the development.

Standard 2: Peak Rate Attenuation

HydroCAD, a stormwater design program based on TR-55, was used to evaluate the pre-development and post development peak discharge rates for the 2-, 10-, 25- and 100-year Type III - 24-hour storm events. The rainfall depths (3.20, 4.70, 5.50, and 6.70 inches) associated with the TP-40 rainfall data for storms (2, 10, 25 and 100-year) respectively, were entered into HydroCAD.

To get an accurate model of the stormwater infiltration and surface flows, the underlying soils, surface cover and slopes are considered. The NRCS Soil Survey for the site, included

in Appendix 2, depicts the soils on site are in five categories – a Paxton Fine Sandy Loam – 305B, 3 to 8% slopes, Hydrologic Group C, a Woodbridge Fine Sandy Loam – 310B, 3 to 8% slopes, Hydrologic Group C/D, Swansea Muck – 51, 0 to 1% slopes, Hydrologic Group B/D, a Whitman Fine Sandy Loam – 73A, 0 to 3% slopes, extremely stony, Hydrologic Group D, and a Ridgebury Fine Sandy Loam – 71B, 3 to 8% slopes, Hydrologic Group D. The existing soils are depicted relative to the surface cover, defined watershed areas and corresponding Time-of-Concentrations on the Pre-Development drainage plan in Appendix 10.

The HydroCAD model also requires information regarding the site. The existing conditions, or pre-development condition, was modeled using two watersheds EX-1and EX-2. Watershed EX-1 and EX-2 were used to model the stormwater being discharged to the surrounding wetlands identified as analysis point EX AP-1 and EX AP-2 The post development condition was evaluated using five watershed areas, PR-1, PR-2, PR-3, PR-4, PR-5 and two discharge point for analysis, AP-1and AP-2.

The post development watersheds PR-1, PR-2, and PR-3 consist of paved roadways and driveways, sidewalks, roofs, and lawn areas. All generated runoff is collected in catch basins and discharges into infiltration basins. Runoff generated in sub catchment area PR-4 flows via surface flow in a way like the predevelopment conditions and discharges to the perimeter wetlands identified as AP-1. Runoff generated in sub catchment area PR-5 flows via surface flow in a way like the predevelopment conditions and discharges to the wetlands along the southerly property line identified as AP-2. The Post-Development drainage plan, including defined watershed areas and corresponding time-of-concentrations, is included in Appendix 10. The detailed HydroCAD report included in Appendix 4 includes the calculations demonstrating the post-Development peak flow rates do not exceed the pre-development peak flow rates.

Runoff rates at the discharge points are required to be maintained to that of existing conditions by reducing the runoff areas and/or temporarily holding runoff in a detention basin and releasing it at slower rates to meet existing peak flow rates. See Tables 1A for a complete summary.

Table 1A: Peak Rate Attenuation Summary

	2-yr Storm	**10-yr Storm**	**25-yr Storm**	**100-yr Storm**
Flow to Analysis Point (AP-1)				
Pre-Development	17.3 cfs	37.2 cfs	48.9 cfs	67.0 cfs
Post-Development	15.2 cfs	36.8 cfs	46.8 cfs	66.6 cfs

Table 1B: Peak Rate Attenuation Summary

	2-yr Storm	**10-yr Storm**	**25-yr Storm**	**100-yr Storm**
Flow to Analysis Point (AP-2)				
Pre-Development	2.2	4.5	5.8	7.8
Post-Development	2.1	3.9	4.9	6.5

In addition to peak rate attenuation, an on-site storm drain collection system was designed based on the "Rational Method" using Manning's equation to carry a minimum 25-year storm event through the site. The proposed drainage pipes will be Class III reinforced concrete pipe (RCP) and where cover is less than 3.5 ft Class V RCP will be used. On-site storm drain calculations are included in Appendix 11 / Supplemental Attachments.

Standard 3: Recharge

Soil Evaluation

Soil evaluation is broken down into two stages. Stage 1 identifies the underlying soils just beneath the surface that contribute to how much runoff is generated as stormwater falls and moves across the surface. Stage 2 evaluates the soils in direct contact with the proposed infiltration BMPs. Appendix 2 includes the NRCS Soil Survey used for Stage 1 while Appendix 3 includes the on-site soil textural analysis in the specific locations that infiltration is proposed. The information from the NRCS Soil Survey is on the Pre and Post Development watershed plans in Appendix 10.

Recharge Volume

The required recharge volume is determined by calculating the proposed impervious area over the corresponding soil identified in the NRCS Soil Survey. As previously stated, the NRCS Soil Survey lists the site soils as Chattfield-Hollis-Rock outcrop complexes, Paxton Fine Sandy Loams, and Woodbridge Fine Sandy Loams. The site is an existing undeveloped residential parcel, and the project is considered a new development project, as noted in Standard 7, therefore the recharge volume was calculated for the total impervious area.

Table 2: Required Recharge Volume Calculation

	Recharge	**Impervious**	**Volume**
Hydrologic Group	(in/sqft)	(sqft)	(cf)
A - *sand*	0.60	None	0
B - *loam*	0.35	None	0
C - *silty loam*	0.25	109,362	2,278.4
D - *clay*	0.10	101,364	844.7
		Required Recharge Volume Total	**3,123.1 cf**

Stormwater Basin Sizing

There are three ways of determining the recharge volume provided by a storm water basin (Static, Simple Dynamic and Dynamic Field). The Static Method, used here, includes the volume of water that can be stored beneath the lowest outlet of the basin. This, the most conservative method of determining the recharge volume, does not account for any infiltration that takes place while the basin is filling with water and is less dependent on

maintenance of the basin since the only way for the water below the lowest invert can leave the basin is though infiltration. The following table summarizes the recharge volume provided by the infiltration basin. Detailed volume calculations for the basins are included in Appendix 5 / Stage-Area-Storage Calculations.

Table 3: Basin Recharge Volumes

	Recharge Volume
Basin 2 @ elev. = 243.30	12,522 cf
Total	12,522 cf

72-hour Drawdown

When using the conservative Static Method to determine infiltration volume provided, the Rawls Rate is used to represent the infiltration rate in place of a hydraulic conductivity rate. The specific rate chosen is based on the textural analysis of the in-situ soil performed by a competent soil professional.

A Massachusetts Certified Soil Evaluator performed an evaluation of the soil at the proposed infiltration BMP. The soil textural analysis for the infiltration BMP is listed below with the associated Rawls Rate used in the calculations. Where textural analysis varied within any single BMP, the most restrictive textural evaluation and Rawls Rate were used. Soil logs of the in-situ soil evaluation are included in Appendix 3 / Field Soils Evaluation.

Table 4: Rawls Rate

	Most Restrictive Soil Texture	**Rawls Rate (in/hour)**
Basin 2	Sandy Loam	1.02 in/hr

Drawdown time for detention basin #1 is 62 hours, as calculated by the HydroCAD model. Please see the Appendix for the HydroCAD drawdown table.

Drawdown time for the infiltration basin is determined by applying the Rawls Rate across the bottom area of the infiltration basin. The volume required for drawdown includes the entire volume below the lowest outlet in the infiltration basin. The following table summarizes the drawdown time for the basin to show it will drawdown within the 72-hour maximum.

Table 5: Basin Drawdown

	Storage Volume	**Bottom Area**	**Time for Drawdown**
Basin 2	12,522 cf	2326.5 sf	63 hours

A groundwater mounding analysis is required when the vertical separation from the bottom of the exfiltration system to the seasonal high groundwater is less than four (4) feet, *and* the recharge system is proposed to attenuate the peak discharge from a 10 year or higher storm event. The infiltration component of basin #2 is not included within the pre and post development model. Accordingly, a groundwater mounding analysis is not required per Mass Stormwater Policy requirements.

MS4 Bylaw Compliance:

Based on the Town of Franklin MS4 stormwater bylaw as specified in § 153-16 (B)(1)(a), new developments require the on-site stormwater management systems to be designed to retain the volume of runoff equivalent to, or greater than, one (1.0) inch multiplied by the total post-construction impervious surface area, and/or remove 90% of the average annual load of Total Suspended Solids (TSS) generated from the total post construction impervious area on site and 60% of the average annual load of Total Phosphorous (TP) generated from the post construction impervious surface area on site..

Standard 7 of the MassDEP Stormwater Management Standards indicates that a project that increases the impervious area shall not be considered a redevelopment.

The total site impervious area, including roofs, is 202,858.9 square feet. The equivalent 1" of runoff from these surfaces is 16,905 cubic feet. The total storage provided below the lowest inverts out are as follows. See Appendix 5 – Stage -Area-Storage calculations.

Basin 2 @ Elev. 243.30 = 12,552 cf
Cultec Recharge System #1 = 1,648 cf
Cultec Recharge System #2 = 1,648 cf
Cultec Recharge System #3 = 1,470 cf

Total Storage Volume Provided = 17,318 cf

Standard 4: Water Quality

Water Quality Volume

The required water quality volume is determined through a calculation of the proposed impervious pavement throughout the site and a determination of whether the site is in a critical area, or the proposed use is considered to produce a high pollutant load. As noted in Standards 5 and 6, the land use does not qualify as a use with a high pollutant load and no critical area was identified for this site. The required water quality volume is based on 0.5" due to the lack of rapid recharge rates or critical areas present on the site. Accordingly, the water quality volume is calculated at 0.5" over the area of new proposed impervious area.

The impervious area within the proposed site is calculated from the information entered HydroCAD and can be found in Appendix 4. 0.5 inches across 202,858.9 square feet of impervious area requires a water quality volume of 8,452.5 cu.ft. Detailed calculations for the stormwater basins are included in Appendix 5 / Stage-Area-Storage Calculations.

Removal of Total Suspended Solids

The water quality volume, as calculated in the previous section, is treated through "Treatment Trains" to provide a minimum of 80 percent TSS removal including 44 percent TSS removal for pretreatment prior to discharging to the infiltration BMP. The TSS Removal Worksheets are included in Appendix 6 for the proposed treatment trains. The infiltration basin in conjunction with deep sump hooded catch basins and sediment forebays complete the treatment trains at a minimum of 80 percent and 44 percent TSS removal.

Sediment Forebay Sizing

All the stormwater from the impervious pavement is collected and discharged to the proposed sediment forebays which are sized to treat 0.1" of runoff. Detailed calculations for TSS Removal are included in Appendix 5 / Stage-Area-Storage Calculations.

Basin Forebays:
0.1"/12" per foot x 99,360 sf = 828.0 cf of storage required

Table 6: Sediment Forebay Sizing

	Impervious Area being Discharged	Required Volume	Provided Volume
Basin 1	31,581 sf	263.2 c.f.	672 c.f.
Basin 2	67,779 sf	565.0 c.f.	803 c.f.

Standard 5: Land Uses with Higher Potential Pollutant Loads

The proposed project is not a use that would qualify as a LUHPPL.

Standard 6: Critical Areas

The subject property does not discharge to a critical area. The design utilizes stormwater BMPs designated as suitable for critical areas within the Massachusetts Stormwater Handbook. No metal roofs are proposed.

Standard 7: Redevelopment Project

This project is not a redevelopment project.

Standard 8: Construction Period Controls

A Construction Period Pollution Control Plan is included in Appendix 7 and will be followed to prevent discharge of erosion to abutting properties.

Standard 9: Operation and Maintenance Plan

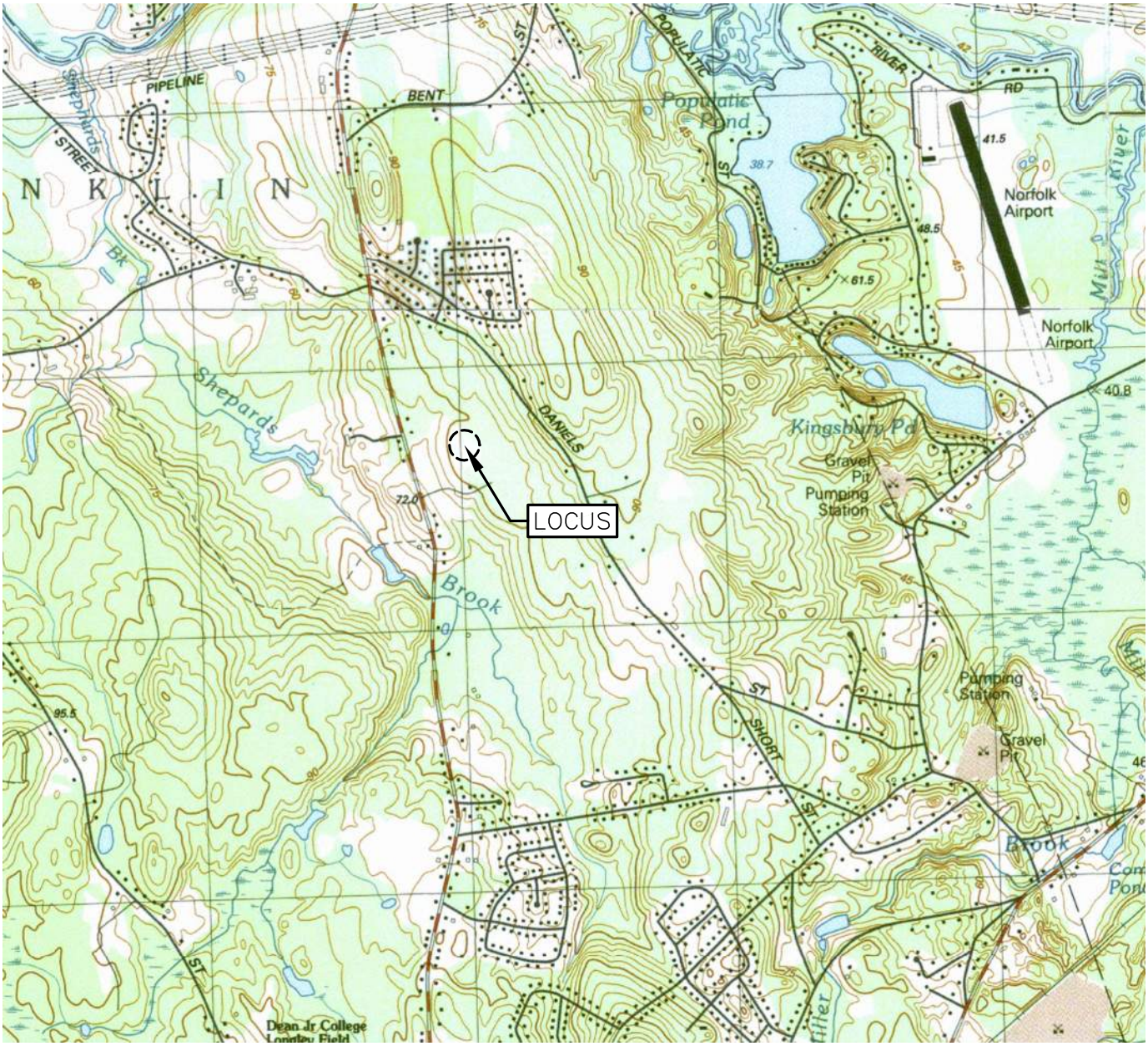
The Operation and Maintenance Plan included in Appendix 8 addresses the responsibilities of maintaining the stormwater BMPs.

Standard 10: Illicit Discharges to Drainage System

It is the intent of the developer to follow the Construction Period Pollution Prevention Control Plan and the Order of Conditions to mitigate the effects of the proposed project on the adjacent environment. Following completion of construction, the Operation and Maintenance Plan will be provided to the property manager who will continue the maintenance of the project. The Illicit Discharge Statement is included in Appendix 9.

Locus Map

Appendix 1



U.S.G.S.
Quadrangle

Scale: 1"=2000'

0 2000' 4000' 6000' 8000'

LOCUS MAP

FRANKLIN HEIGHTS PARCEL B
Franklin, Massachusetts

Date: July 7, 2022 | *Project No. F-4471*

Guerriere & Halnon, Inc.
Engineering & Land Surveying
333 WEST STREET, MILFORD, MA 01757
(508) 473-6630 FAX: (508) 473-8243
WWW.GUERRIEREANDHALNON.COM

NRCS Soils Report

Appendix 2

United States Department of Agriculture

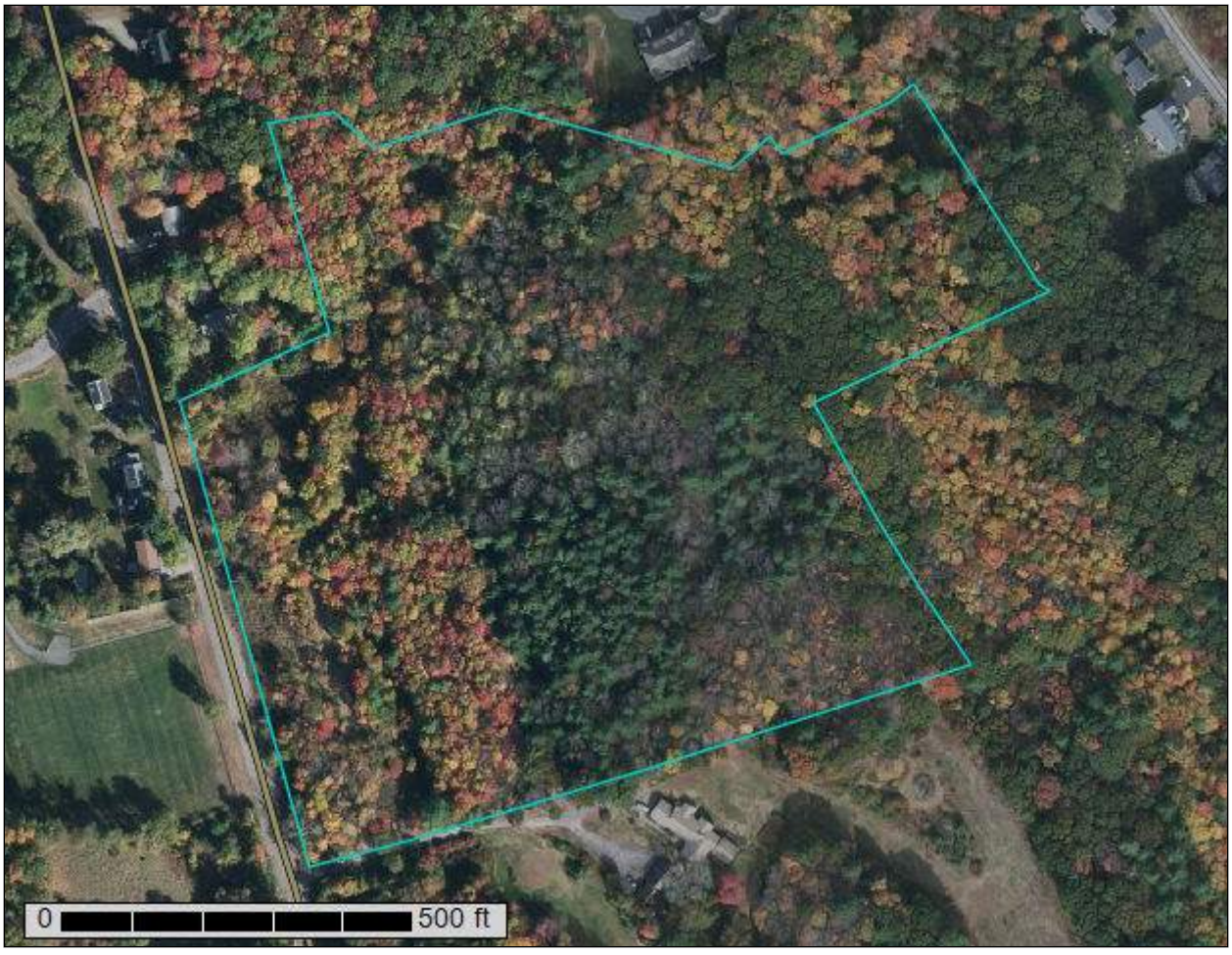
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Norfolk and Suffolk Counties, Massachusetts

Franklin Heights Parcel B



July 5, 2022

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

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Contents

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Hydrologic Soil Group (Franklin Heights Parcel B)

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

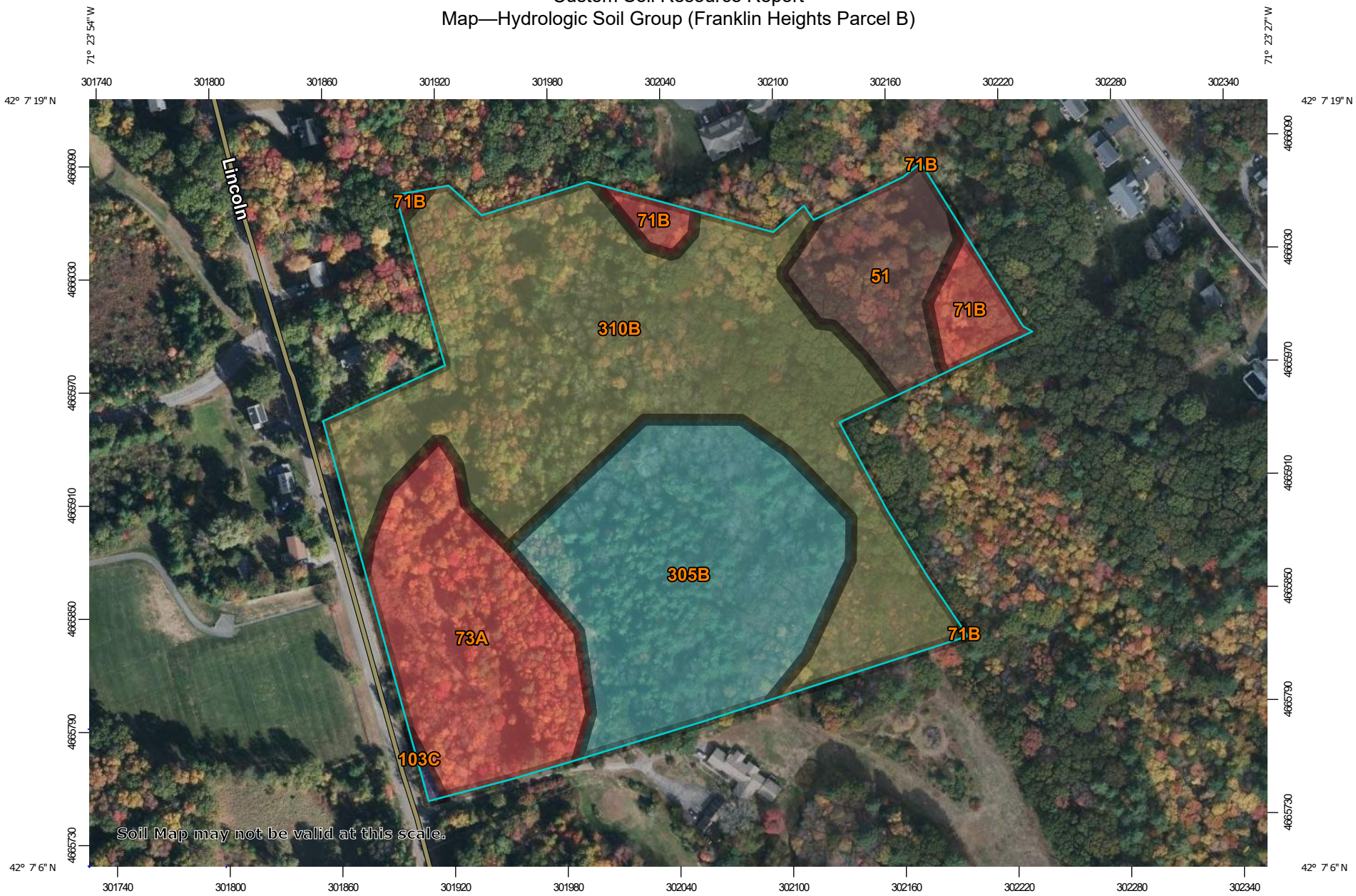
Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Custom Soil Resource Report
Map—Hydrologic Soil Group (Franklin Heights Parcel B)



Map Scale: 1:2,870 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 40 80 160 240

Feet: 0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Norfolk and Suffolk Counties, Massachusetts
Survey Area Data: Version 17, Sep 3, 2021

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

Date(s) aerial images were photographed: Aug 31, 2020—Oct 22, 2020

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.

Table—Hydrologic Soil Group (Franklin Heights Parcel B)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
51	Swansea muck, 0 to 1 percent slopes	B/D	1.7	8.1%
71B	Ridgebury fine sandy loam, 3 to 8 percent slopes, extremely stony	D	0.8	4.0%
73A	Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony	D	3.5	17.0%
103C	Charlton-Hollis-Rock outcrop complex, 8 to 15 percent slopes	B	0.0	0.2%
305B	Paxton fine sandy loam, 3 to 8 percent slopes	C	5.2	25.8%
310B	Woodbridge fine sandy loam, 3 to 8 percent slopes	C/D	9.1	44.9%
Totals for Area of Interest			**20.3**	**100.0%**

Rating Options—Hydrologic Soil Group (Franklin Heights Parcel B)

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

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Field Soils Evaluation

Appendix 3

TESTING INFORMATION

TESTING DATE: OCTOBER 27, 2005 SOIL EVALUATOR: DONALD R. NEILSEN

240.9 TP 10

LOAM	0"–6"
SANDY LOAM	6"–24"
VERY FINE SAND (REDDISH)	24"–48"

236.9 GW@15"

235.9 TP 11

LOAM	0"–6"
SANDY LOAM	6"–13"
VERY FINE SAND	13"

234.8 SEEPAGE @13"

237.5 TP 12

LOAM	0"–6"
SANDY LOAM	6"–26"
VERY FINE SAND	26"–52"

233.2 GW WEEPING @ 24"

236.3 TP 13

LOAM	0"–6"
SANDY LOAM	6"–24"
VERY FINE SAND	24"–38"

233.1 GW@24"

247.1 TP 14

LOAM	0"–6"
SANDY LOAM	6"–27"
VERY FINE SAND	27"–48"

243.1 GW@27"

253.7 TP 15

LOAM	0"–6"
SANDY LOAM	6"–24"
VERY FINE SAND	24"–48"

249.7 GW@24"

254.4 TP 16

LOAM	0"–6"
SANDY LOAM	6"–24"
VERY FINE SAND	24"–52"

250.1 GW@24"

255.7 TP 17

LOAM	0"–6"
SANDY LOAM	6"–24"
VERY FINE SAND	24"

253.7 GW@13"
REFUSAL@24"

254.8 TP 18

LOAM	0"–6"
SANDY LOAM	6"–24"
VERY FINE SAND	24"

252.8 GW@16"
FRACTURED ROCK

251.0 TP 19

LOAM	0"–6"
SANDY LOAM	6"–24"
VERY FINE SAND	24"–40"

247.7 GW@16"

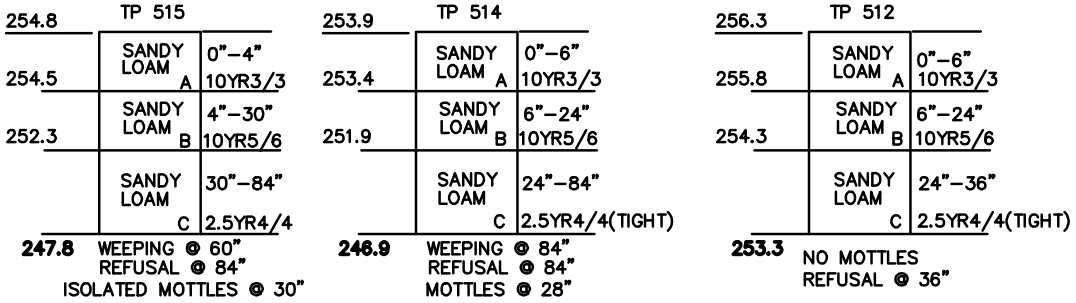
249.3 TP 20

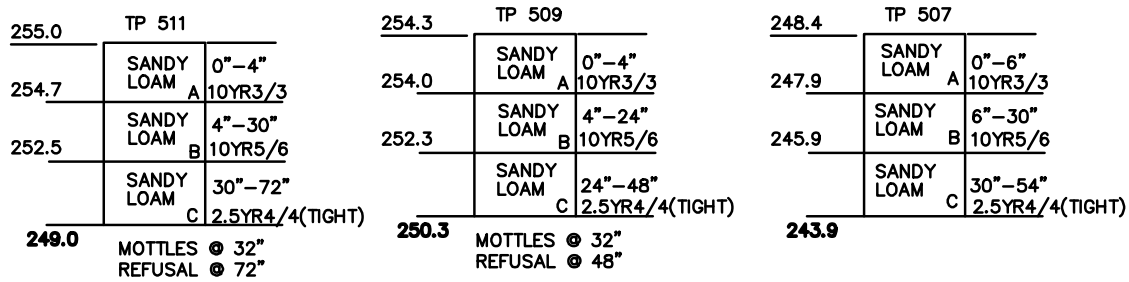
LOAM	0"–6"
SANDY LOAM	6"–18"
VERY FINE SAND	18"–36"

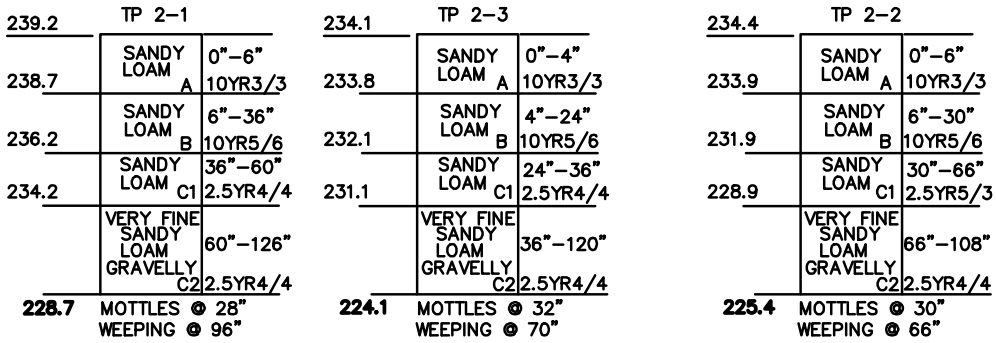
246.3 GW@3'

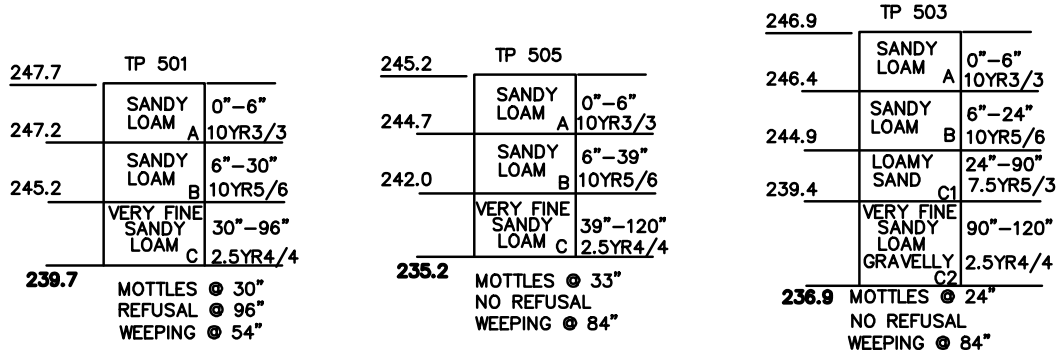
TESTING INFORMATION

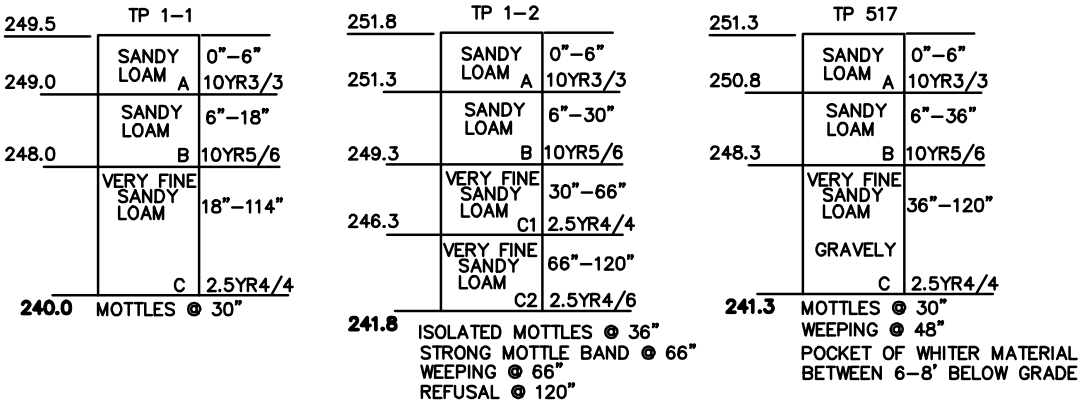
TESTING DATE: NOVEMBER 4, 2022 SOIL EVALUATOR: MICHAEL HASSETT





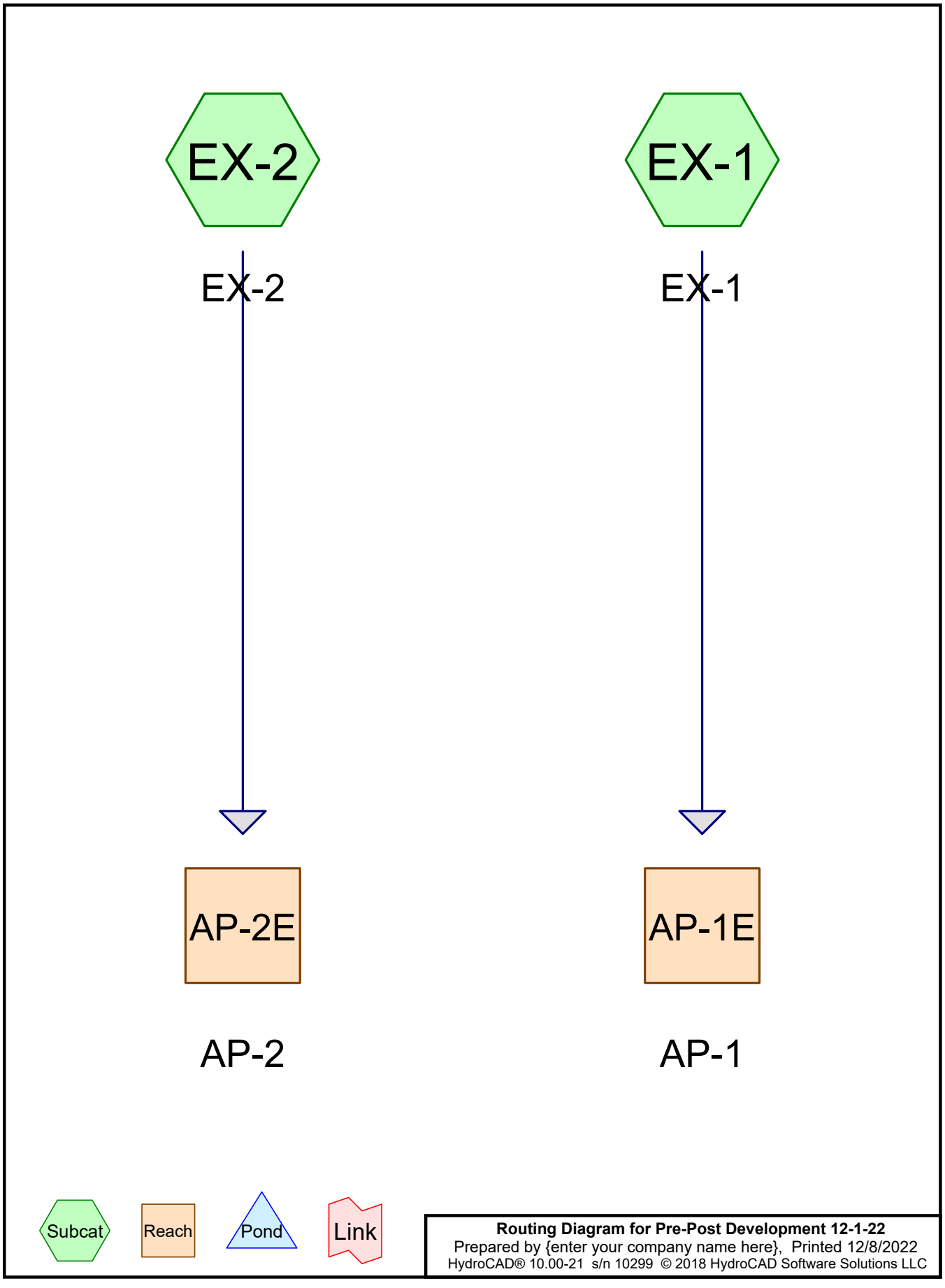






HydroCAD Calculations

Appendix 4



Routing Diagram for Pre-Post Development 12-1-22
Prepared by {enter your company name here}, Printed 12/8/2022
HydroCAD® 10.00-21 s/n 10299 © 2018 HydroCAD Software Solutions LLC

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.016	65	Brush, Good, HSG C (EX-1)
2.660	73	Brush, Good, HSG D (EX-1)
5.221	70	Woods, Good, HSG C (EX-1)
12.910	77	Woods, Good, HSG D (EX-1, EX-2)
20.807	**75**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
5.237	HSG C	EX-1
15.570	HSG D	EX-1, EX-2
0.000	Other	
20.807		**TOTAL AREA**

Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.016	2.660	0.000	2.676	Brush, Good	EX-1
0.000	0.000	5.221	12.910	0.000	18.131	Woods, Good	EX-1, EX-2
0.000	**0.000**	**5.237**	**15.570**	**0.000**	**20.807**	**TOTAL AREA**	

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EX-1: EX-1 Runoff Area=814,442 sf 0.00% Impervious Runoff Depth=1.04"
Flow Length=400' Tc=12.6 min CN=74 Runoff=17.3 cfs 1.617 af

Subcatchment EX-2: EX-2 Runoff Area=91,891 sf 0.00% Impervious Runoff Depth=1.21"
Flow Length=248' Slope=0.0300 '/' Tc=14.3 min CN=77 Runoff=2.2 cfs 0.213 af

Reach AP-1E: AP-1 Inflow=17.3 cfs 1.617 af
Outflow=17.3 cfs 1.617 af

Reach AP-2E: AP-2 Inflow=2.2 cfs 0.213 af
Outflow=2.2 cfs 0.213 af

Total Runoff Area = 20.807 ac Runoff Volume = 1.830 af Average Runoff Depth = 1.06"
100.00% Pervious = 20.807 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment EX-1: EX-1

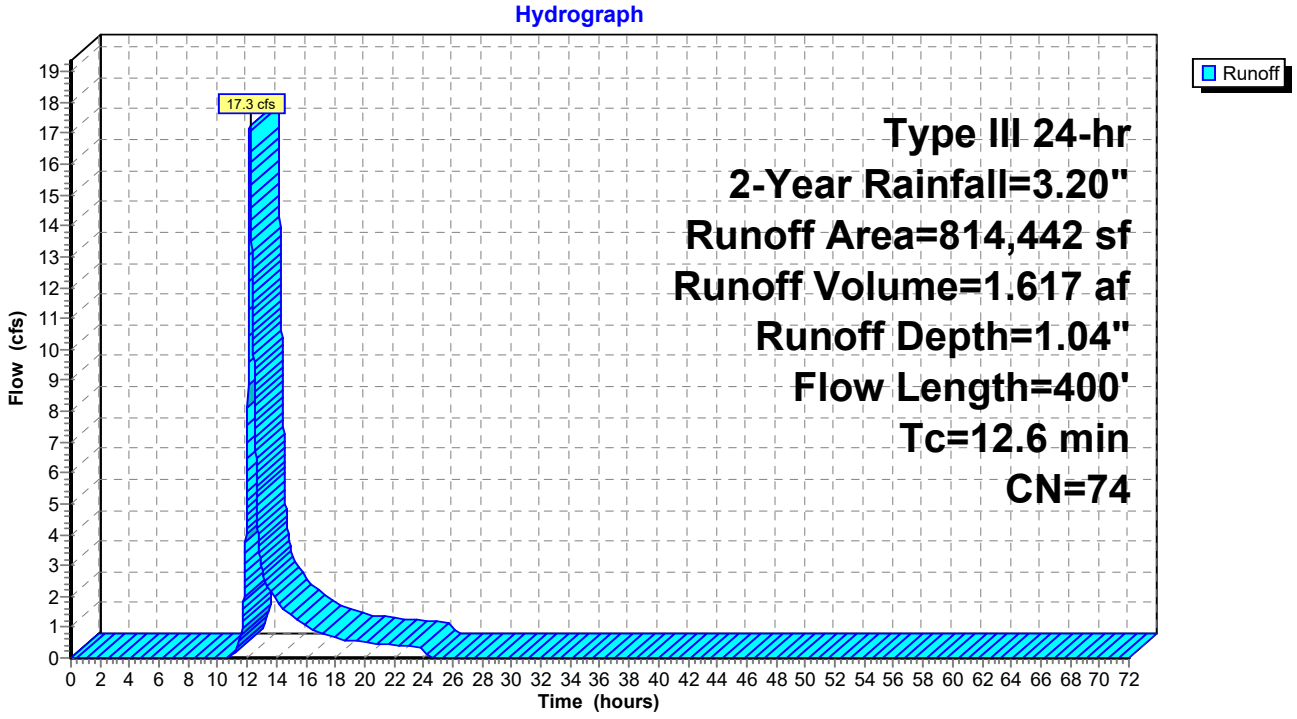
Runoff = 17.3 cfs @ 12.19 hrs, Volume= 1.617 af, Depth= 1.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
227,427	70	Woods, Good, HSG C
470,448	77	Woods, Good, HSG D
697	65	Brush, Good, HSG C
115,870	73	Brush, Good, HSG D
814,442	74	Weighted Average
814,442		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	30	0.0200	0.06		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.22"
2.8	190	0.0500	1.12		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.6	180	0.1400	1.87		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
12.6	400	Total			

Subcatchment EX-1: EX-1



Summary for Subcatchment EX-2: EX-2

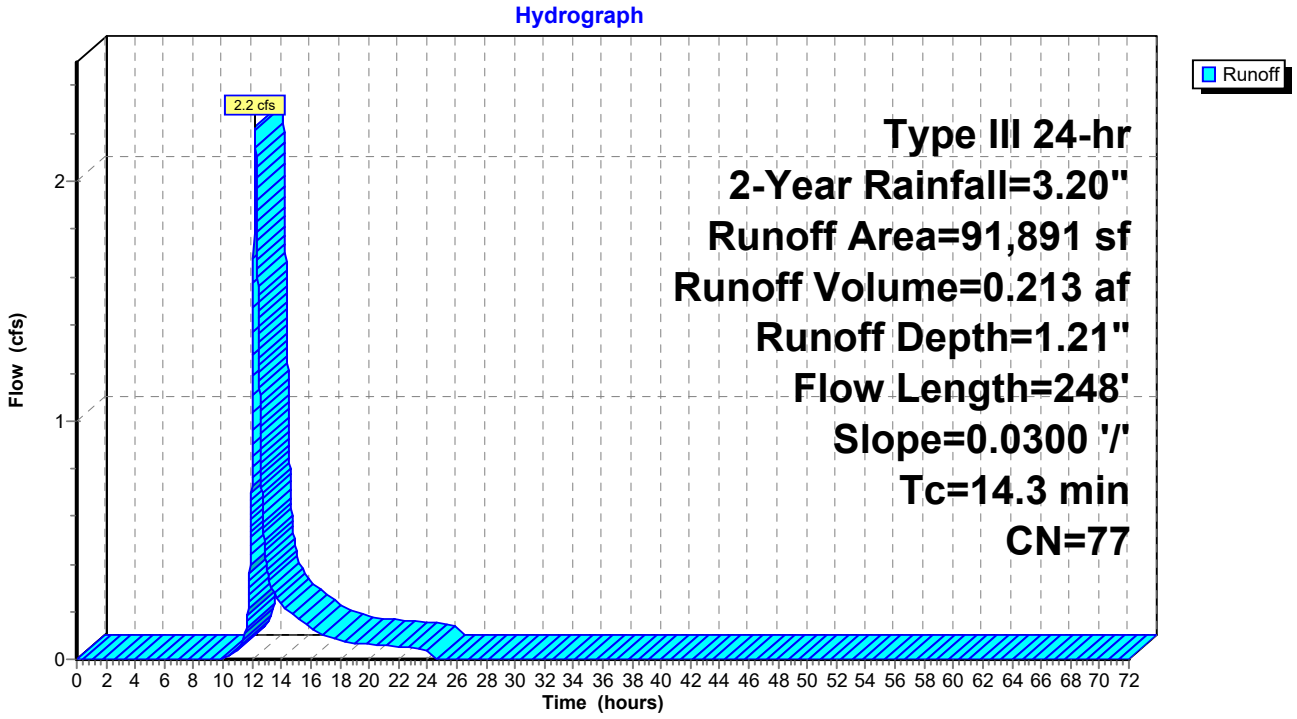
Runoff = 2.2 cfs @ 12.21 hrs, Volume= 0.213 af, Depth= 1.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
91,891	77	Woods, Good, HSG D
91,891		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0300	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.22"
3.8	198	0.0300	0.87		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.3	248	Total			

Subcatchment EX-2: EX-2



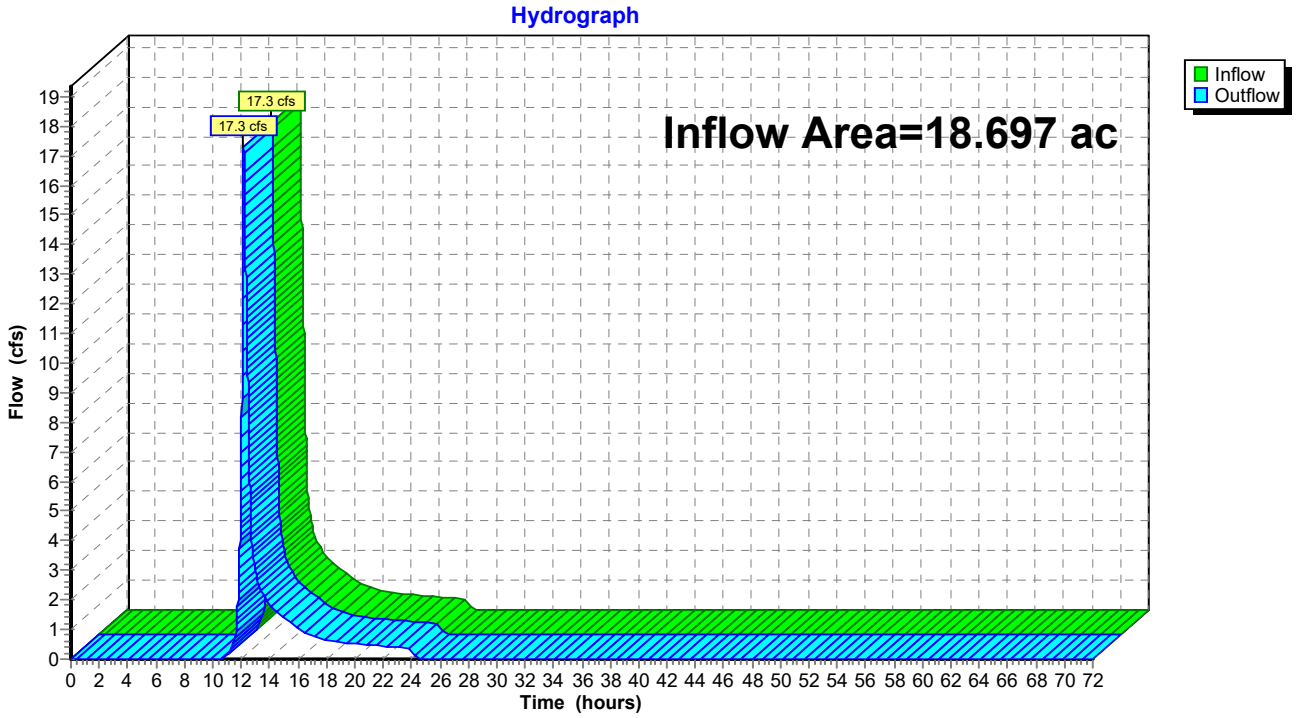
Summary for Reach AP-1E: AP-1

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 18.697 ac, 0.00% Impervious, Inflow Depth = 1.04" for 2-Year event
Inflow = 17.3 cfs @ 12.19 hrs, Volume= 1.617 af
Outflow = 17.3 cfs @ 12.19 hrs, Volume= 1.617 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3

Reach AP-1E: AP-1



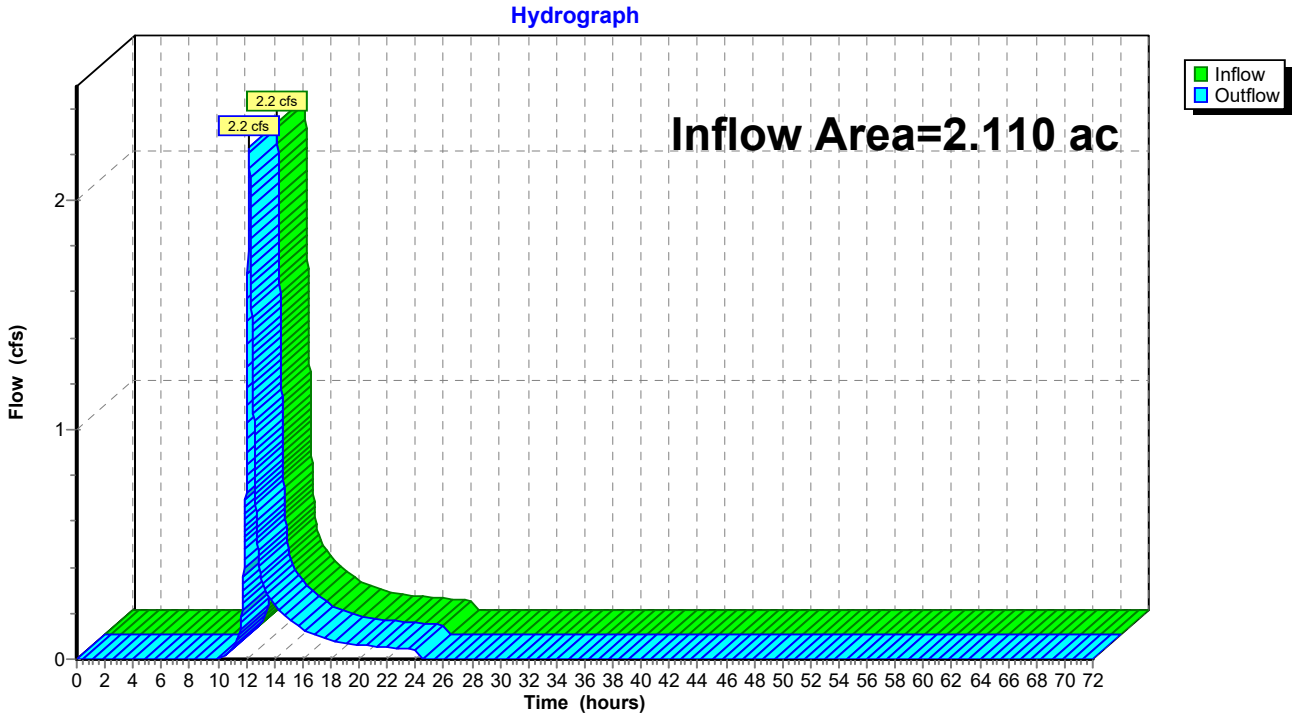
Summary for Reach AP-2E: AP-2

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.110 ac, 0.00% Impervious, Inflow Depth = 1.21" for 2-Year event
Inflow = 2.2 cfs @ 12.21 hrs, Volume= 0.213 af
Outflow = 2.2 cfs @ 12.21 hrs, Volume= 0.213 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3

Reach AP-2E: AP-2



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EX-1: EX-1 Runoff Area=814,442 sf 0.00% Impervious Runoff Depth=2.13"
Flow Length=400' Tc=12.6 min CN=74 Runoff=37.2 cfs 3.315 af

Subcatchment EX-2: EX-2 Runoff Area=91,891 sf 0.00% Impervious Runoff Depth=2.37"
Flow Length=248' Slope=0.0300 '/' Tc=14.3 min CN=77 Runoff=4.5 cfs 0.417 af

Reach AP-1E: AP-1 Inflow=37.2 cfs 3.315 af
Outflow=37.2 cfs 3.315 af

Reach AP-2E: AP-2 Inflow=4.5 cfs 0.417 af
Outflow=4.5 cfs 0.417 af

Total Runoff Area = 20.807 ac Runoff Volume = 3.732 af Average Runoff Depth = 2.15"
100.00% Pervious = 20.807 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment EX-1: EX-1

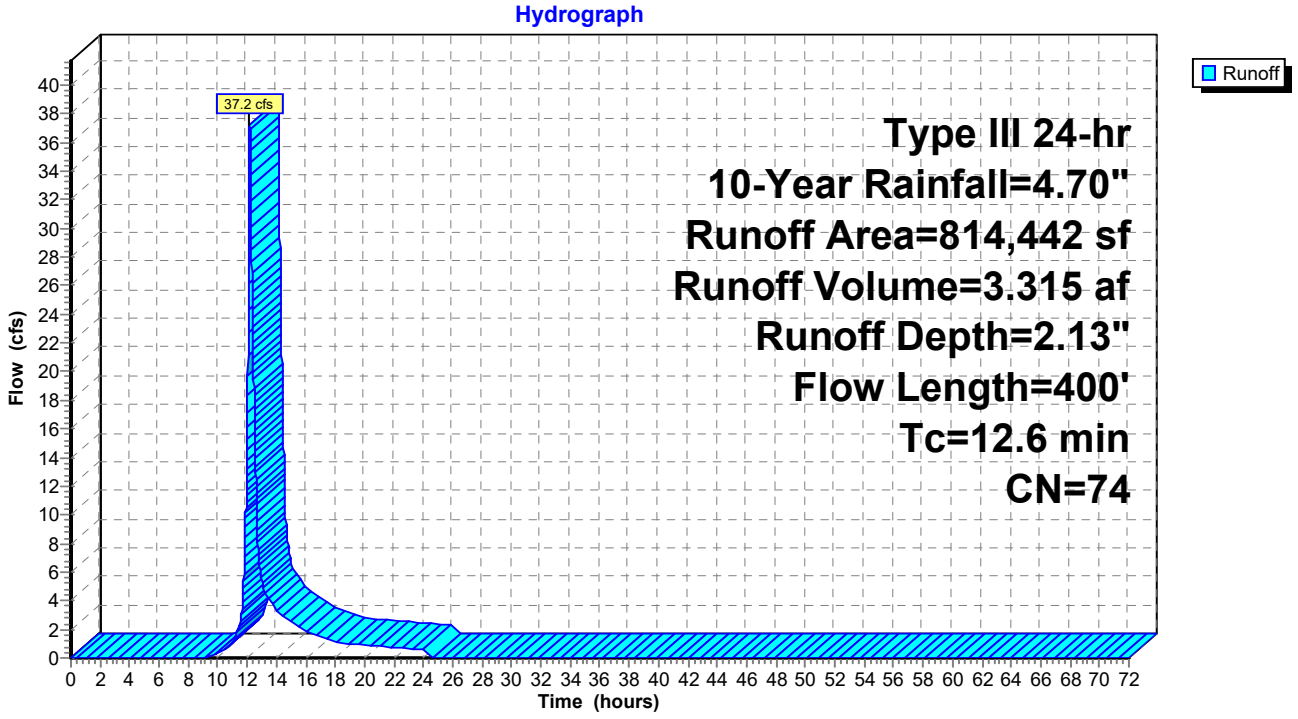
Runoff = 37.2 cfs @ 12.18 hrs, Volume= 3.315 af, Depth= 2.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.70"

Area (sf)	CN	Description
227,427	70	Woods, Good, HSG C
470,448	77	Woods, Good, HSG D
697	65	Brush, Good, HSG C
115,870	73	Brush, Good, HSG D
814,442	74	Weighted Average
814,442		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	30	0.0200	0.06		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.22"
2.8	190	0.0500	1.12		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.6	180	0.1400	1.87		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
12.6	400	Total			

Subcatchment EX-1: EX-1



Summary for Subcatchment EX-2: EX-2

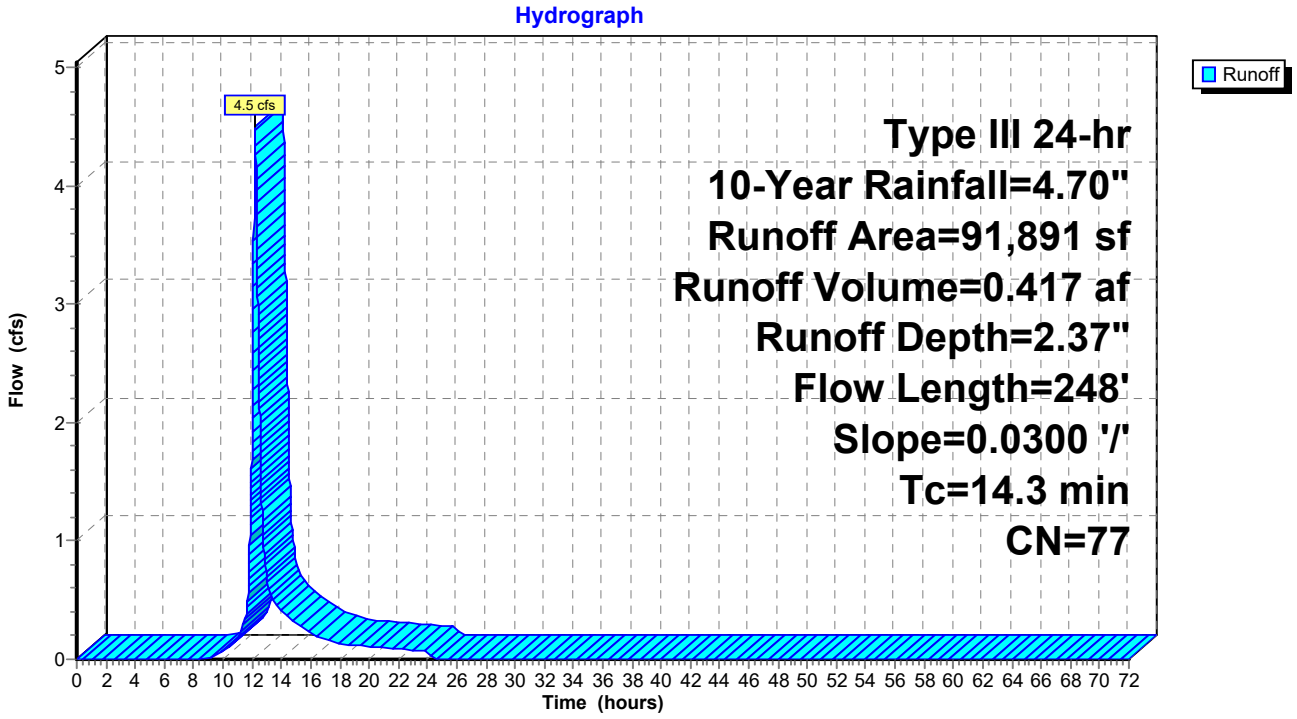
Runoff = 4.5 cfs @ 12.20 hrs, Volume= 0.417 af, Depth= 2.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.70"

Area (sf)	CN	Description
91,891	77	Woods, Good, HSG D
91,891		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0300	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.22"
3.8	198	0.0300	0.87		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.3	248	Total			

Subcatchment EX-2: EX-2



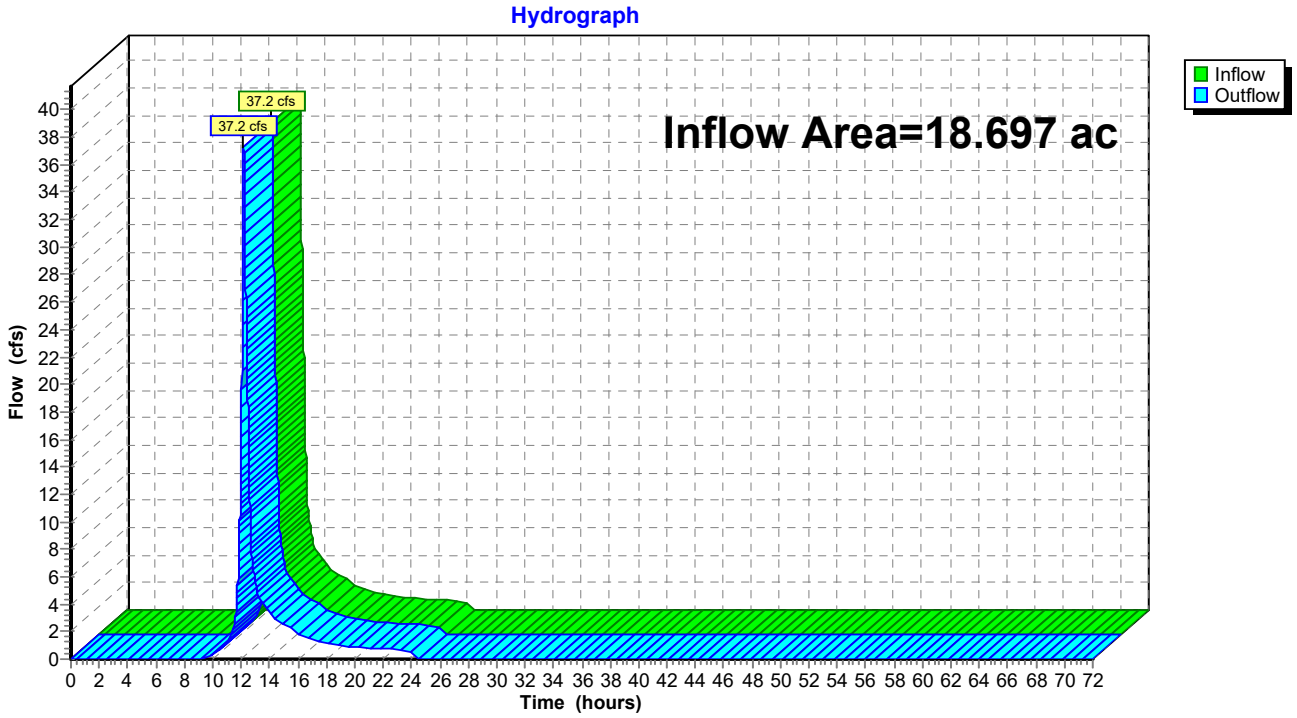
Summary for Reach AP-1E: AP-1

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 18.697 ac, 0.00% Impervious, Inflow Depth = 2.13" for 10-Year event
Inflow = 37.2 cfs @ 12.18 hrs, Volume= 3.315 af
Outflow = 37.2 cfs @ 12.18 hrs, Volume= 3.315 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3

Reach AP-1E: AP-1



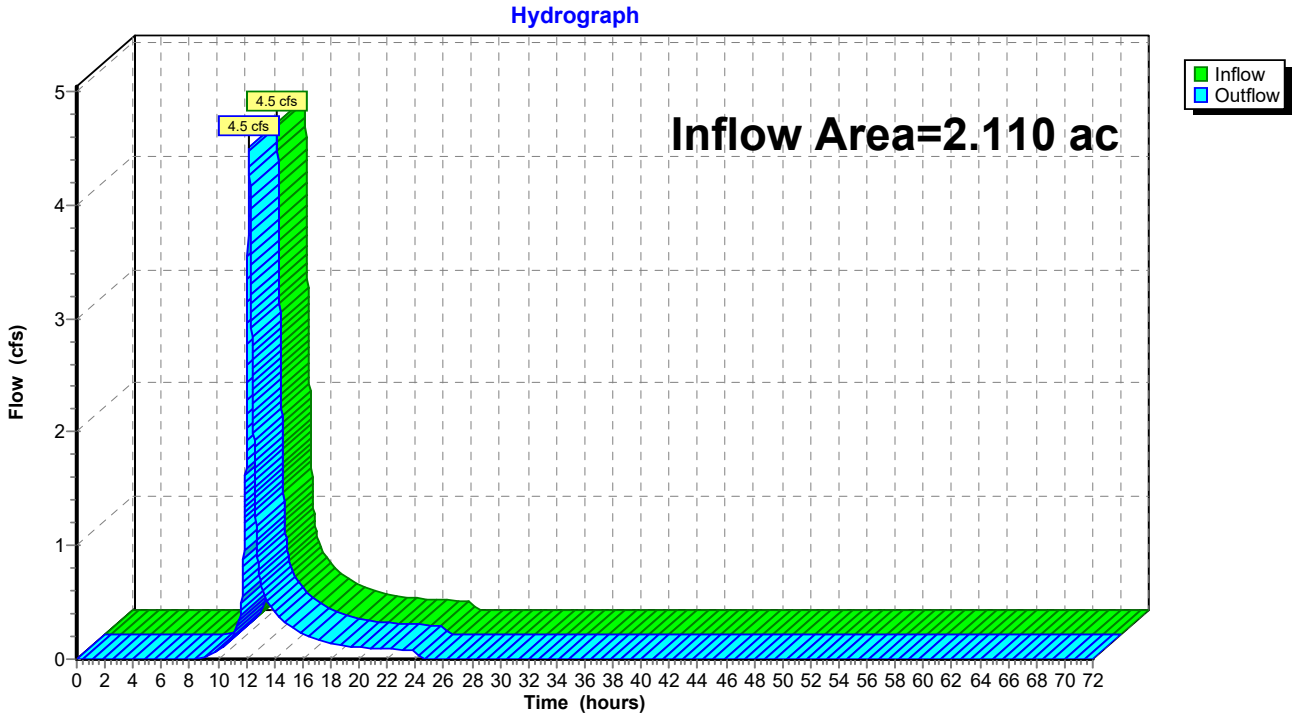
Summary for Reach AP-2E: AP-2

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.110 ac, 0.00% Impervious, Inflow Depth = 2.37" for 10-Year event
Inflow = 4.5 cfs @ 12.20 hrs, Volume= 0.417 af
Outflow = 4.5 cfs @ 12.20 hrs, Volume= 0.417 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3

Reach AP-2E: AP-2



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EX-1: EX-1 Runoff Area=814,442 sf 0.00% Impervious Runoff Depth=2.77"
Flow Length=400' Tc=12.6 min CN=74 Runoff=48.9 cfs 4.315 af

Subcatchment EX-2: EX-2 Runoff Area=91,891 sf 0.00% Impervious Runoff Depth=3.05"
Flow Length=248' Slope=0.0300 '/' Tc=14.3 min CN=77 Runoff=5.8 cfs 0.536 af

Reach AP-1E: AP-1 Inflow=48.9 cfs 4.315 af
Outflow=48.9 cfs 4.315 af

Reach AP-2E: AP-2 Inflow=5.8 cfs 0.536 af
Outflow=5.8 cfs 0.536 af

Total Runoff Area = 20.807 ac Runoff Volume = 4.850 af Average Runoff Depth = 2.80"
100.00% Pervious = 20.807 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment EX-1: EX-1

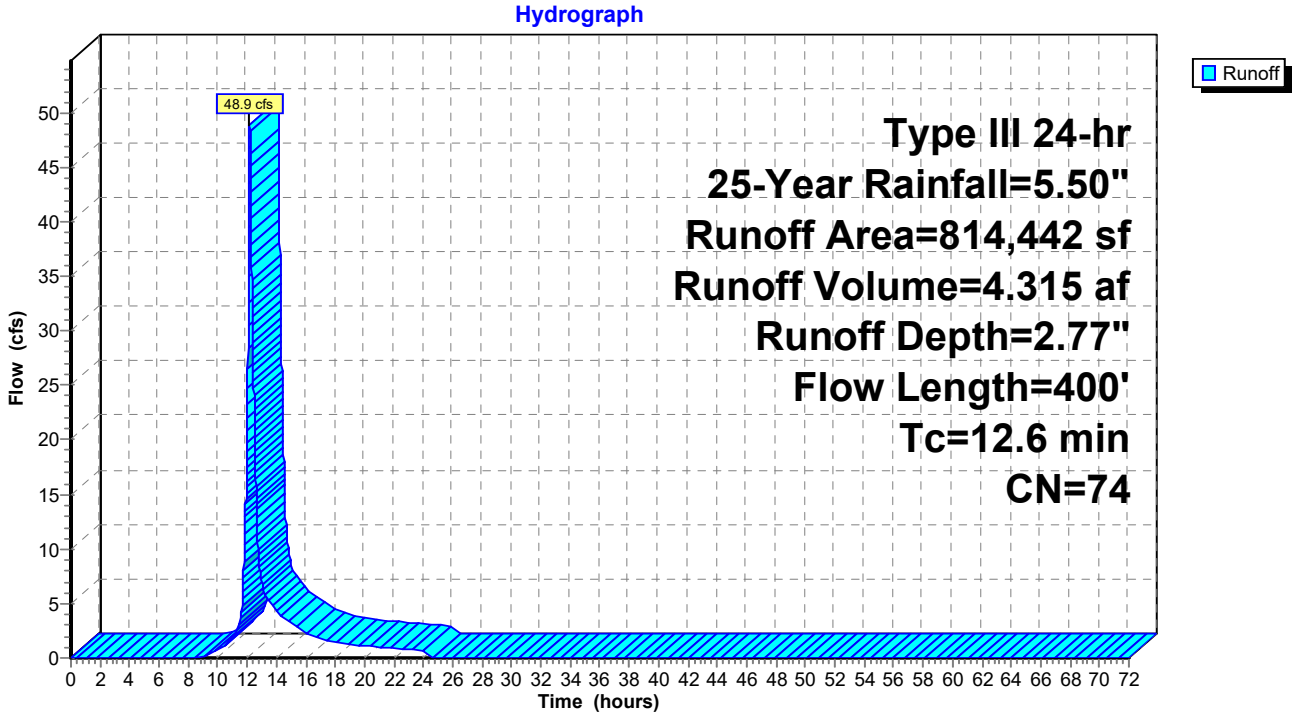
Runoff = 48.9 cfs @ 12.17 hrs, Volume= 4.315 af, Depth= 2.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Description
227,427	70	Woods, Good, HSG C
470,448	77	Woods, Good, HSG D
697	65	Brush, Good, HSG C
115,870	73	Brush, Good, HSG D
814,442	74	Weighted Average
814,442		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	30	0.0200	0.06		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.22"
2.8	190	0.0500	1.12		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.6	180	0.1400	1.87		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
12.6	400	Total			

Subcatchment EX-1: EX-1



Summary for Subcatchment EX-2: EX-2

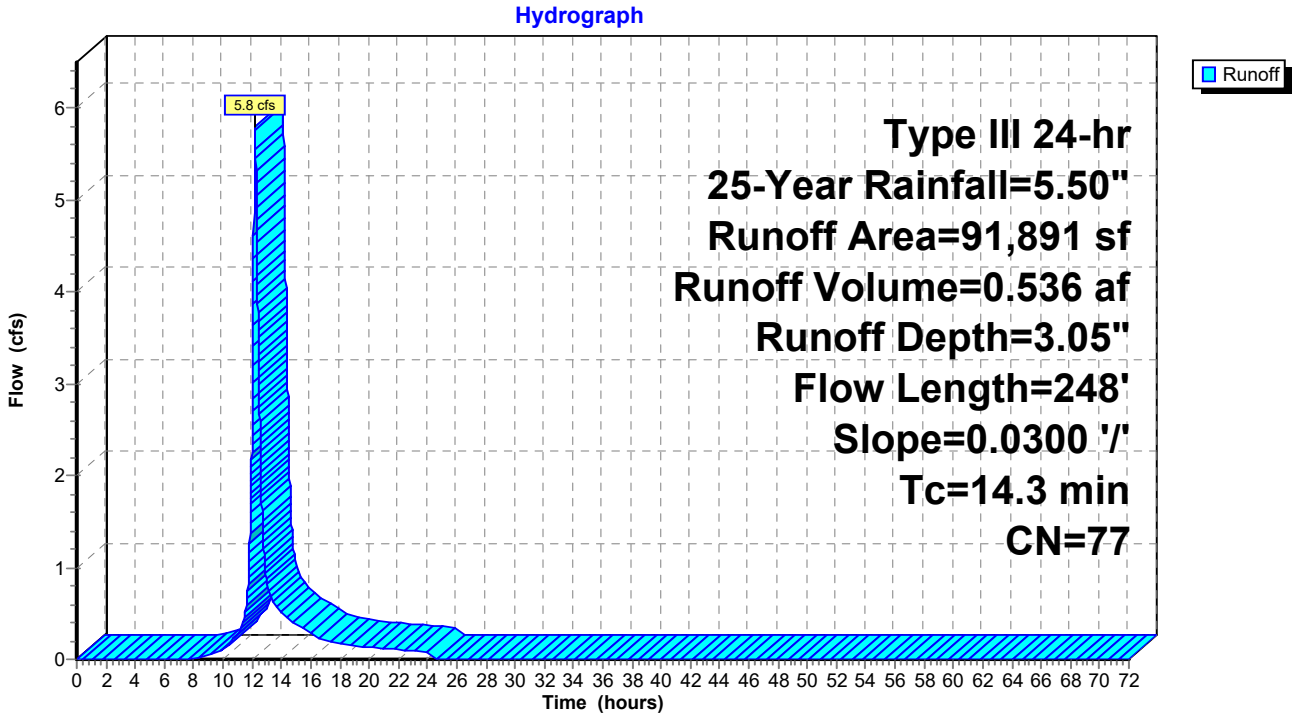
Runoff = 5.8 cfs @ 12.19 hrs, Volume= 0.536 af, Depth= 3.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Description
91,891	77	Woods, Good, HSG D
91,891		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0300	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.22"
3.8	198	0.0300	0.87		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.3	248	Total			

Subcatchment EX-2: EX-2



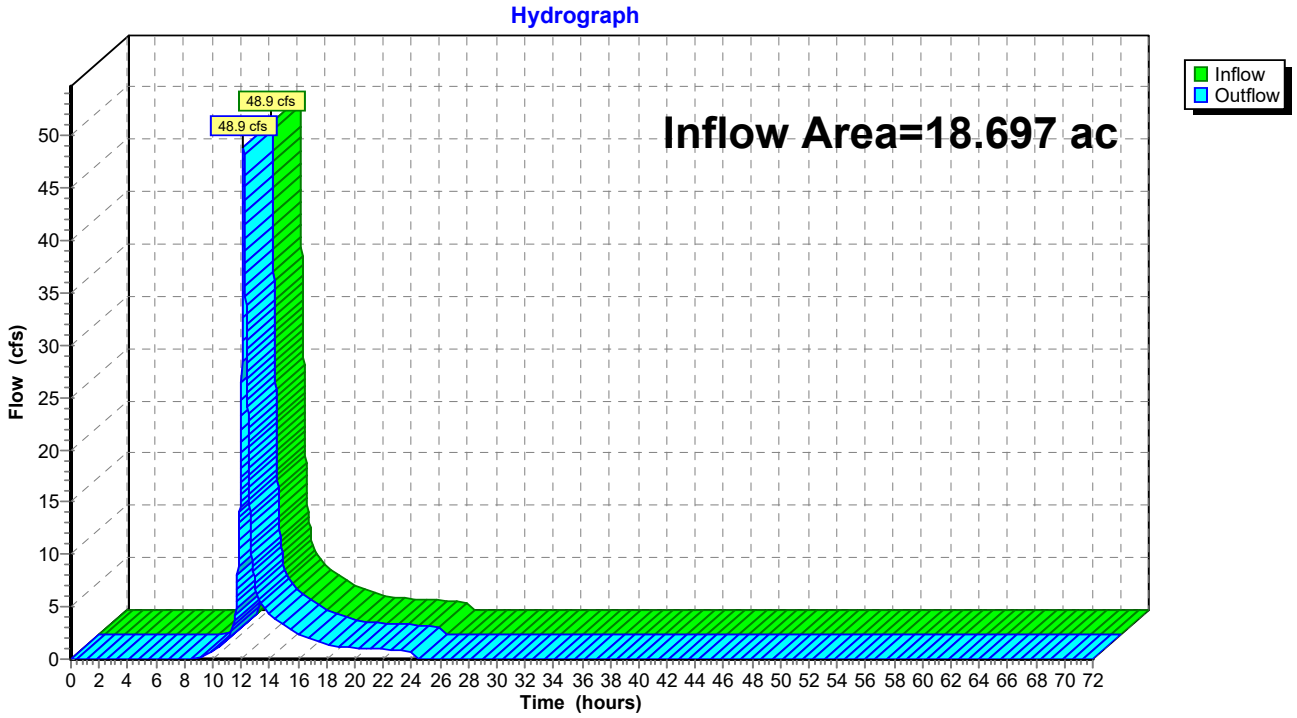
Summary for Reach AP-1E: AP-1

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 18.697 ac, 0.00% Impervious, Inflow Depth = 2.77" for 25-Year event
Inflow = 48.9 cfs @ 12.17 hrs, Volume= 4.315 af
Outflow = 48.9 cfs @ 12.17 hrs, Volume= 4.315 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3

Reach AP-1E: AP-1



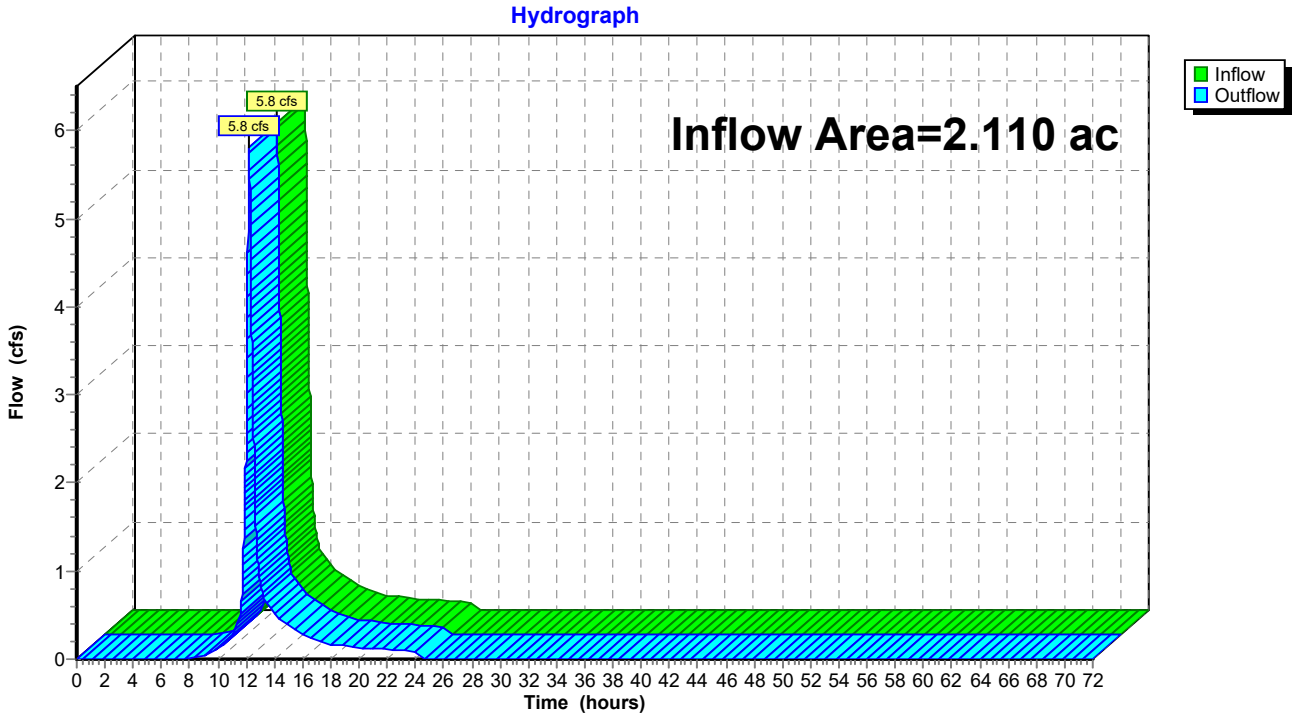
Summary for Reach AP-2E: AP-2

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.110 ac, 0.00% Impervious, Inflow Depth = 3.05" for 25-Year event
Inflow = 5.8 cfs @ 12.19 hrs, Volume= 0.536 af
Outflow = 5.8 cfs @ 12.19 hrs, Volume= 0.536 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3

Reach AP-2E: AP-2



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EX-1: EX-1 Runoff Area=814,442 sf 0.00% Impervious Runoff Depth=3.78"
Flow Length=400' Tc=12.6 min CN=74 Runoff=67.0 cfs 5.892 af

Subcatchment EX-2: EX-2 Runoff Area=91,891 sf 0.00% Impervious Runoff Depth=4.10"
Flow Length=248' Slope=0.0300 '/' Tc=14.3 min CN=77 Runoff=7.8 cfs 0.720 af

Reach AP-1E: AP-1 Inflow=67.0 cfs 5.892 af
Outflow=67.0 cfs 5.892 af

Reach AP-2E: AP-2 Inflow=7.8 cfs 0.720 af
Outflow=7.8 cfs 0.720 af

Total Runoff Area = 20.807 ac Runoff Volume = 6.613 af Average Runoff Depth = 3.81"
100.00% Pervious = 20.807 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment EX-1: EX-1

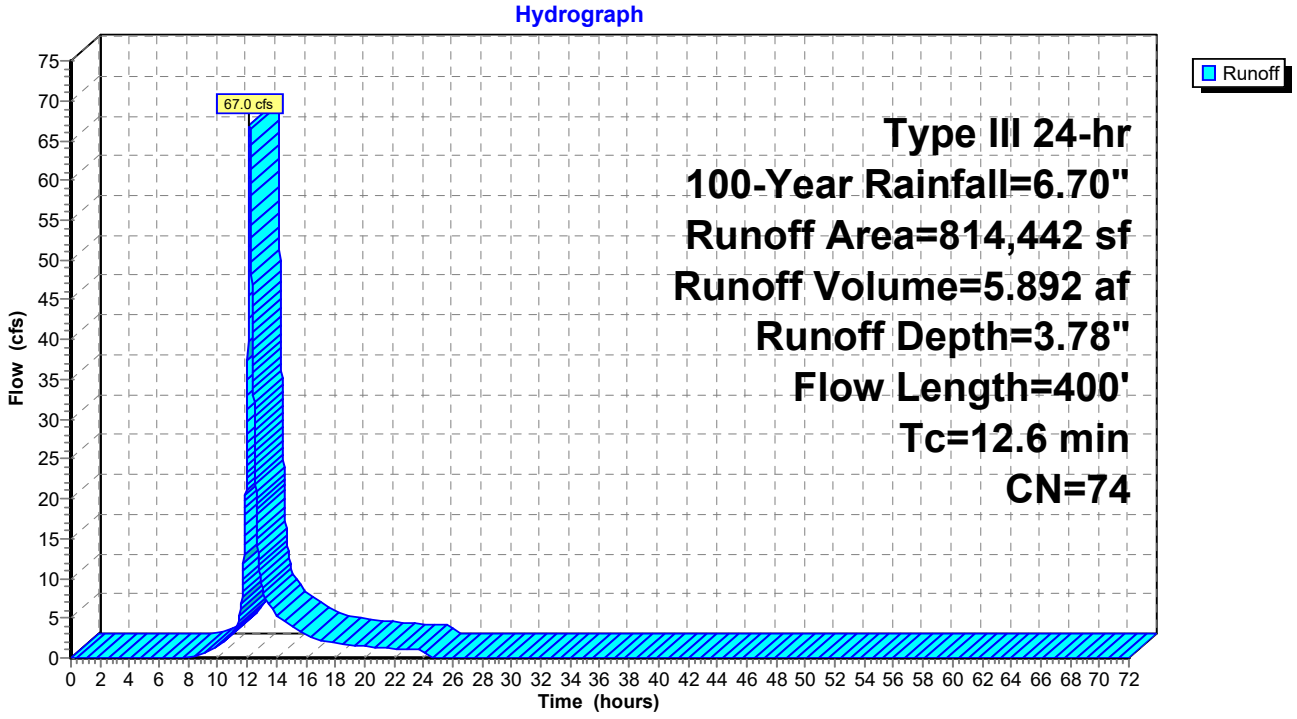
Runoff = 67.0 cfs @ 12.17 hrs, Volume= 5.892 af, Depth= 3.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=6.70"

Area (sf)	CN	Description
227,427	70	Woods, Good, HSG C
470,448	77	Woods, Good, HSG D
697	65	Brush, Good, HSG C
115,870	73	Brush, Good, HSG D
814,442	74	Weighted Average
814,442		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	30	0.0200	0.06		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.22"
2.8	190	0.0500	1.12		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.6	180	0.1400	1.87		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
12.6	400	Total			

Subcatchment EX-1: EX-1



Summary for Subcatchment EX-2: EX-2

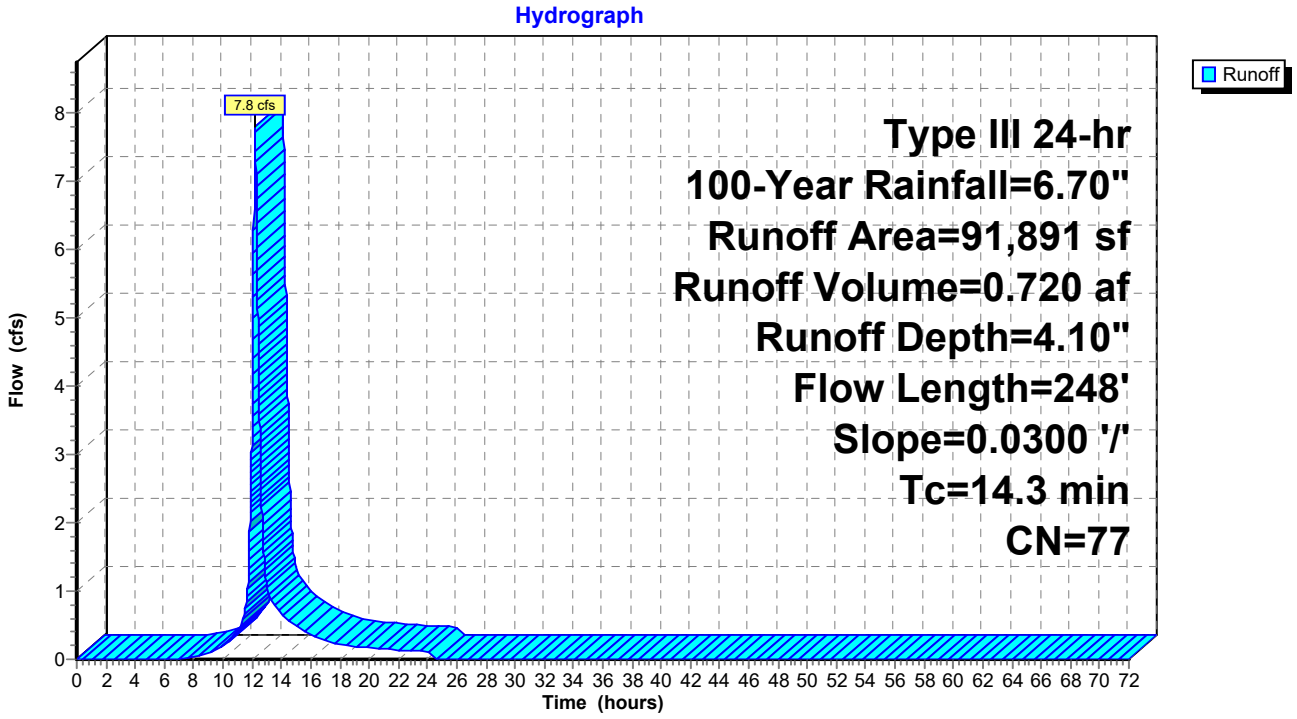
Runoff = 7.8 cfs @ 12.19 hrs, Volume= 0.720 af, Depth= 4.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=6.70"

Area (sf)	CN	Description
91,891	77	Woods, Good, HSG D
91,891		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0300	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.22"
3.8	198	0.0300	0.87		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.3	248	Total			

Subcatchment EX-2: EX-2



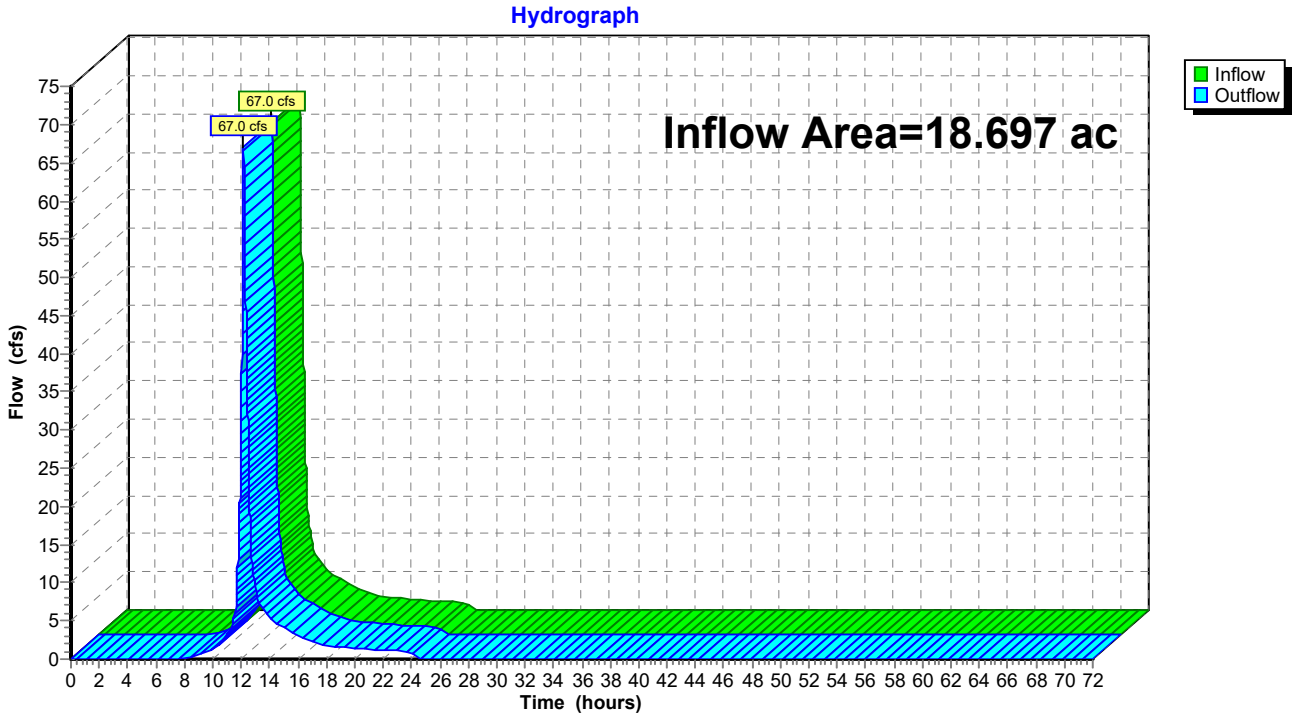
Summary for Reach AP-1E: AP-1

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 18.697 ac, 0.00% Impervious, Inflow Depth = 3.78" for 100-Year event
Inflow = 67.0 cfs @ 12.17 hrs, Volume= 5.892 af
Outflow = 67.0 cfs @ 12.17 hrs, Volume= 5.892 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3

Reach AP-1E: AP-1



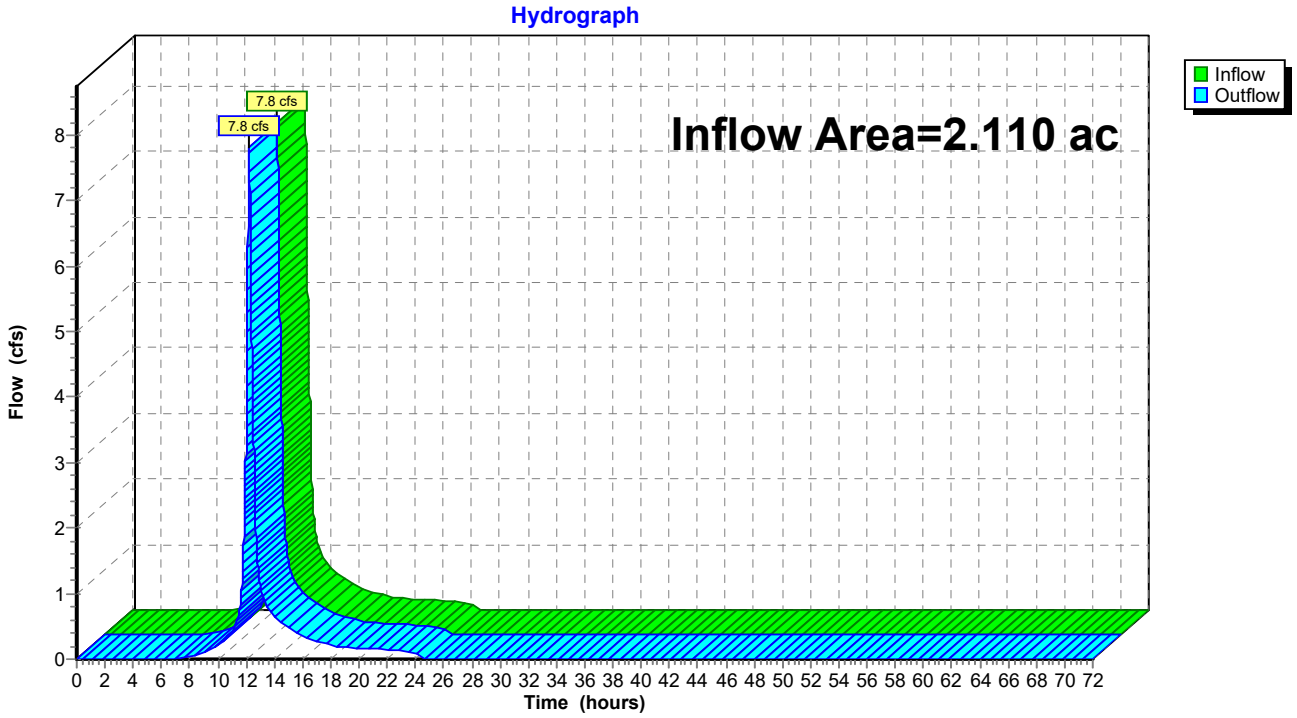
Summary for Reach AP-2E: AP-2

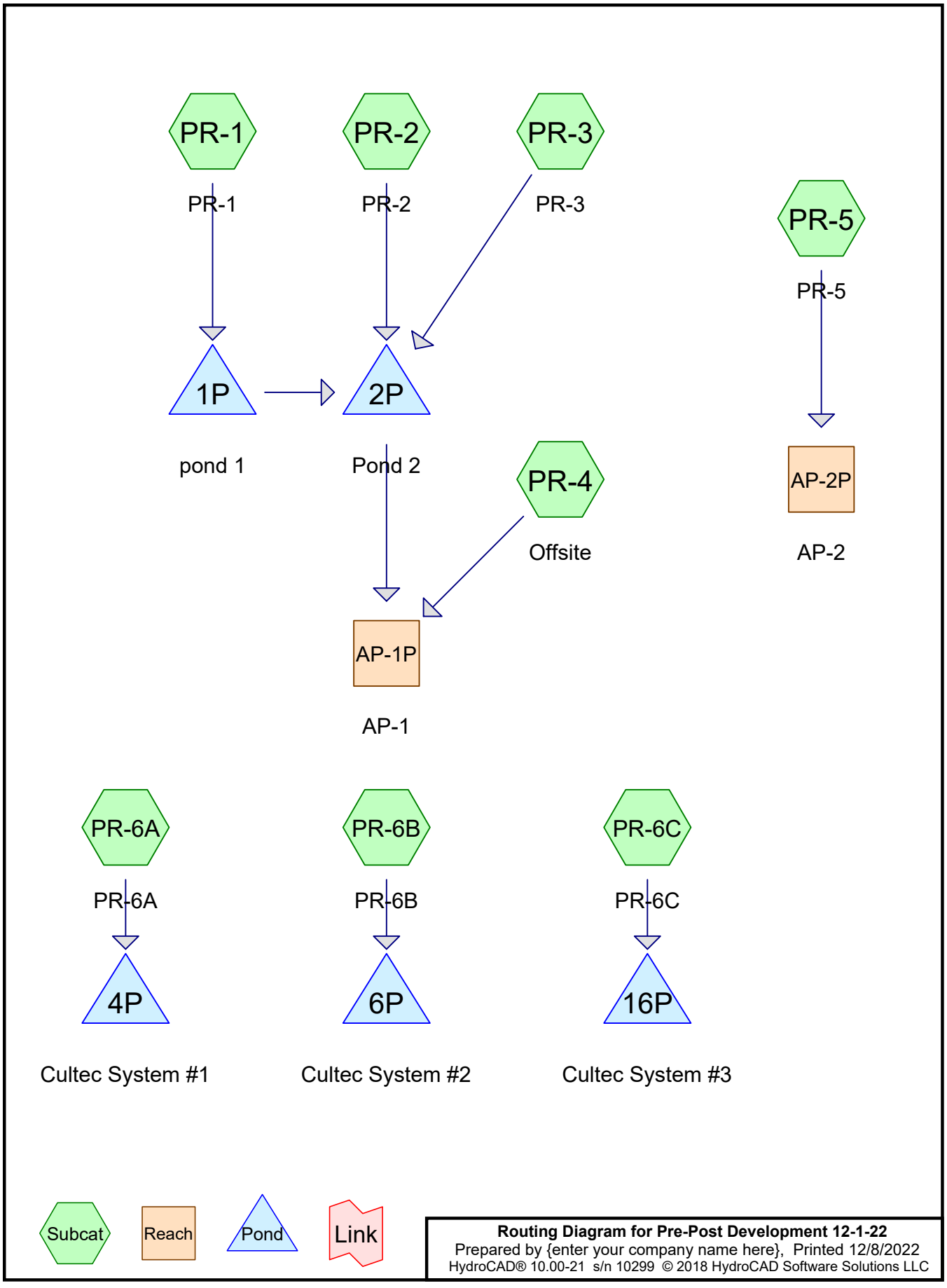
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.110 ac, 0.00% Impervious, Inflow Depth = 4.10" for 100-Year event
Inflow = 7.8 cfs @ 12.19 hrs, Volume= 0.720 af
Outflow = 7.8 cfs @ 12.19 hrs, Volume= 0.720 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3

Reach AP-2E: AP-2





Routing Diagram for Pre-Post Development 12-1-22
Prepared by {enter your company name here}, Printed 12/8/2022
HydroCAD® 10.00-21 s/n 10299 © 2018 HydroCAD Software Solutions LLC

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2.480	74	>75% Grass cover, Good, HSG C (PR-1, PR-2, PR-3, PR-4, PR-5)
2.476	80	>75% Grass cover, Good, HSG D (PR-1, PR-2, PR-3, PR-4, PR-5)
0.161	98	Basin 2 (PR-2)
2.510	73	Brush, Good, HSG D (PR-4)
1.264	98	Paved roads w/curbs & sewers (PR-2)
1.032	98	Paved roads w/curbs & sewers, HSG C (PR-1, PR-3)
0.195	98	Pond 1 (PR-1)
1.597	98	Roofs (PR-2, PR-4, PR-5)
0.516	98	Roofs, HSG C (PR-3, PR-6A, PR-6B, PR-6C)
0.248	98	Roofs, HSG D (PR-1, PR-3)
0.371	70	Woods, Good, HSG C (PR-4, PR-5)
7.509	77	Woods, Good, HSG D (PR-4, PR-5)
20.360	**82**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
4.399	HSG C	PR-1, PR-2, PR-3, PR-4, PR-5, PR-6A, PR-6B, PR-6C
12.743	HSG D	PR-1, PR-2, PR-3, PR-4, PR-5
3.217	Other	PR-1, PR-2, PR-4, PR-5
20.360		**TOTAL AREA**

Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	2.480	2.476	0.000	4.957	>75% Grass cover, Good	PR-1, PR-2, PR-3, PR-4, PR-5
0.000	0.000	0.000	0.000	0.161	0.161	Basin 2	PR-2
0.000	0.000	0.000	2.510	0.000	2.510	Brush, Good	PR-4
0.000	0.000	1.032	0.000	1.264	2.295	Paved roads w/curbs & sewers	PR-1, PR-2, PR-3
0.000	0.000	0.000	0.000	0.195	0.195	Pond 1	PR-1
0.000	0.000	0.516	0.248	1.597	2.361	Roofs	PR-1, PR-2, PR-3, PR-4, PR-5, PR-6A, PR-6B, PR-6C
0.000	0.000	0.371	7.509	0.000	7.880	Woods, Good	PR-4, PR-5

Ground Covers (selected nodes) (continued)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	**0.000**	**4.399**	**12.743**	**3.217**	**20.360**	**TOTAL AREA**	

Pipe Listing (selected nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	1P	247.00	246.43	60.4	0.0094	0.013	12.0	0.0	0.0
2	2P	234.00	232.00	61.6	0.0325	0.013	24.0	0.0	0.0

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment PR-1: PR-1 Runoff Area=77,528 sf 64.73% Impervious Runoff Depth=2.26"
Tc=6.0 min CN=91 Runoff=4.6 cfs 0.335 af

Subcatchment PR-2: PR-2 Runoff Area=181,058 sf 61.31% Impervious Runoff Depth=2.08"
Flow Length=240' Tc=9.9 min CN=89 Runoff=8.8 cfs 0.721 af

Subcatchment PR-3: PR-3 Runoff Area=24,210 sf 75.31% Impervious Runoff Depth=2.35"
Tc=6.0 min CN=92 Runoff=1.5 cfs 0.109 af

Subcatchment PR-4: Offsite Runoff Area=523,533 sf 1.90% Impervious Runoff Depth=1.15"
Flow Length=407' Tc=10.5 min CN=76 Runoff=13.4 cfs 1.154 af

Subcatchment PR-5: PR-5 Runoff Area=62,224 sf 17.14% Impervious Runoff Depth=1.47"
Flow Length=305' Slope=0.0300 '/' Tc=10.4 min CN=81 Runoff=2.1 cfs 0.175 af

Subcatchment PR-6A: PR-6A Runoff Area=6,619 sf 100.00% Impervious Runoff Depth=2.97"
Tc=6.0 min CN=98 Runoff=0.5 cfs 0.038 af

Subcatchment PR-6B: PR-6B Runoff Area=5,939 sf 100.00% Impervious Runoff Depth=2.97"
Tc=6.0 min CN=98 Runoff=0.4 cfs 0.034 af

Subcatchment PR-6C: PR-6C Runoff Area=5,750 sf 100.00% Impervious Runoff Depth=2.97"
Tc=6.0 min CN=98 Runoff=0.4 cfs 0.033 af

Reach AP-1P: AP-1 Inflow=15.2 cfs 2.031 af
Outflow=15.2 cfs 2.031 af

Reach AP-2P: AP-2 Inflow=2.1 cfs 0.175 af
Outflow=2.1 cfs 0.175 af

Pond 1P: pond 1 Peak Elev=250.46' Storage=8,919 cf Inflow=4.6 cfs 0.335 af
Outflow=0.2 cfs 0.335 af

Pond 2P: Pond 2 Peak Elev=244.12' Storage=16,784 cf Inflow=10.3 cfs 1.165 af
Outflow=4.8 cfs 0.877 af

Pond 4P: Cultec System #1 Peak Elev=1.16' Storage=554 cf Inflow=0.5 cfs 0.038 af
Outflow=0.0 cfs 0.038 af

Pond 6P: Cultec System #2 Peak Elev=1.03' Storage=474 cf Inflow=0.4 cfs 0.034 af
Outflow=0.0 cfs 0.034 af

Pond 16P: Cultec System #3 Peak Elev=1.14' Storage=482 cf Inflow=0.4 cfs 0.033 af
Outflow=0.0 cfs 0.033 af

Total Runoff Area = 20.360 ac Runoff Volume = 2.597 af Average Runoff Depth = 1.53"
75.38% Pervious = 15.347 ac 24.62% Impervious = 5.013 ac

Summary for Subcatchment PR-1: PR-1

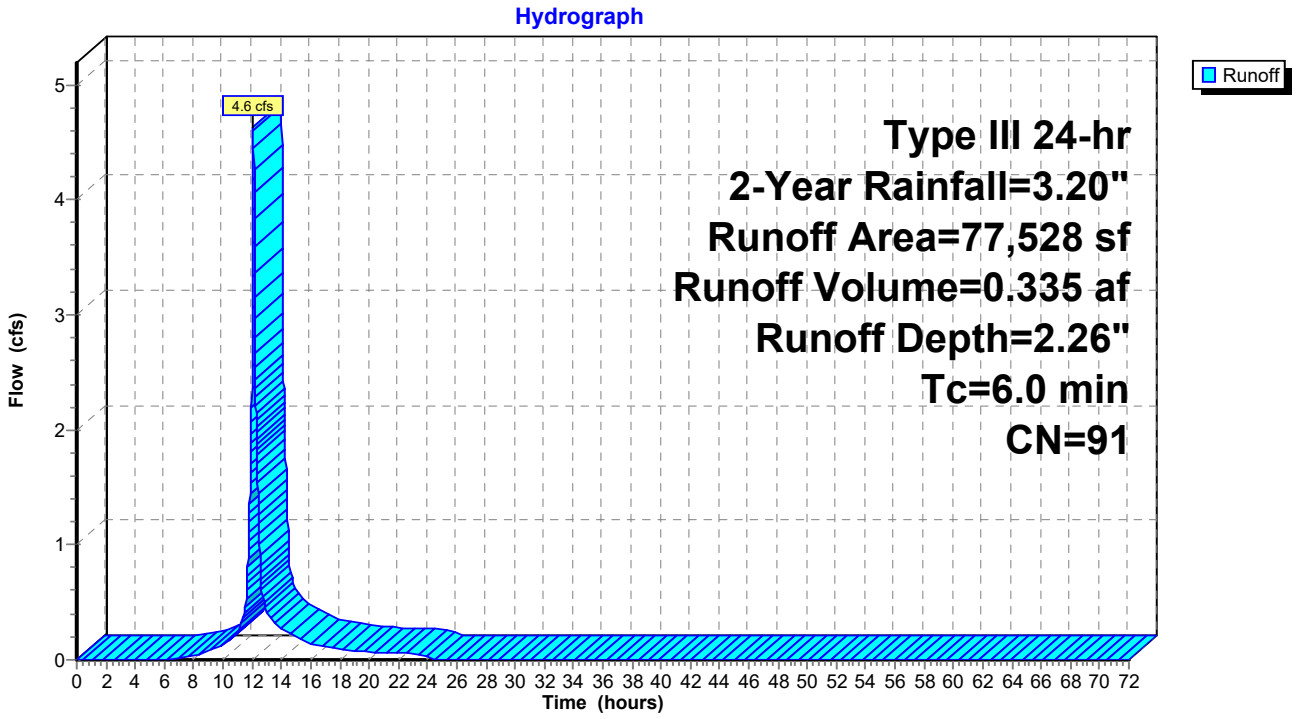
Runoff = 4.6 cfs @ 12.09 hrs, Volume= 0.335 af, Depth= 2.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.20"

	Area (sf)	CN	Description
	10,233	74	>75% Grass cover, Good, HSG C
	17,113	80	>75% Grass cover, Good, HSG D
	32,230	98	Paved roads w/curbs & sewers, HSG C
	9,455	98	Roofs, HSG D
*	8,497	98	Pond 1
	77,528	91	Weighted Average
	27,346		35.27% Pervious Area
	50,182		64.73% Impervious Area

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

Subcatchment PR-1: PR-1



Summary for Subcatchment PR-2: PR-2

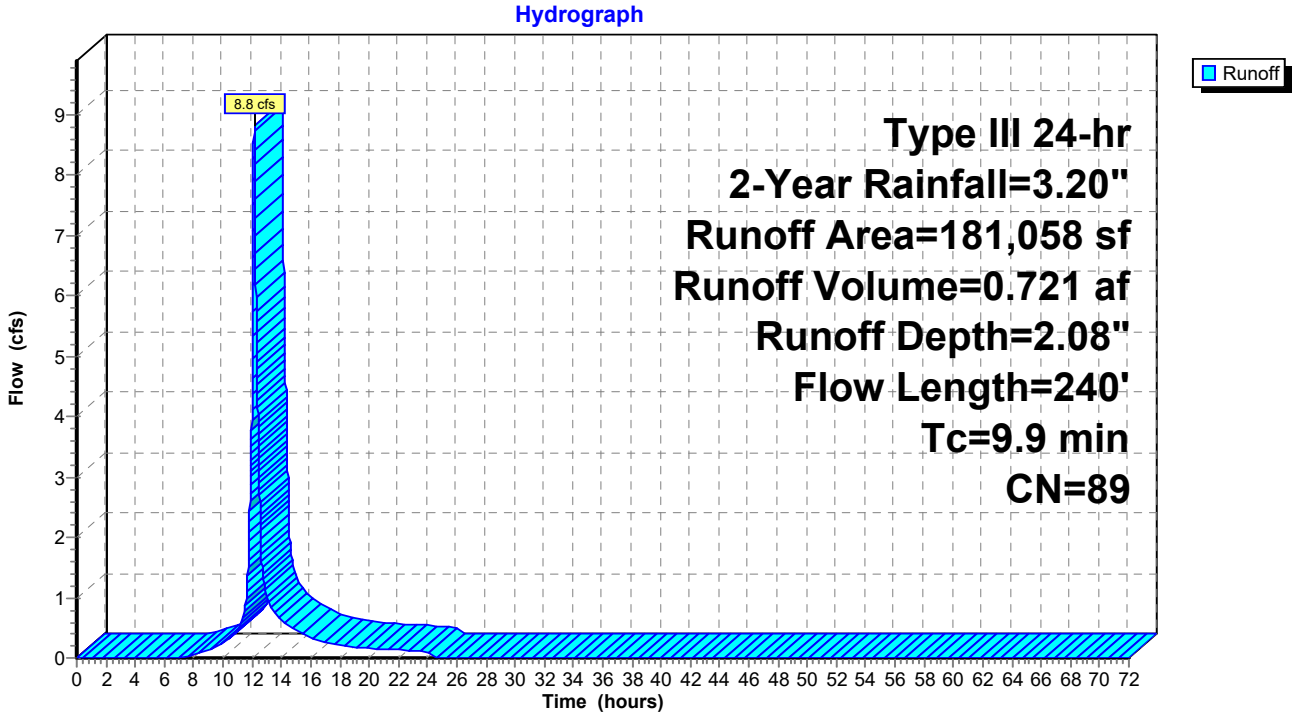
Runoff = 8.8 cfs @ 12.14 hrs, Volume= 0.721 af, Depth= 2.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.20"

	Area (sf)	CN	Description
	49,606	74	>75% Grass cover, Good, HSG C
	20,438	80	>75% Grass cover, Good, HSG D
	55,045	98	Paved roads w/curbs & sewers
*	48,936	98	Roofs
*	7,033	98	Basin 2
	181,058	89	Weighted Average
	70,044		38.69% Pervious Area
	111,014		61.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.0400	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.22"
3.7	190	0.0150	0.86		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
9.9	240	Total			

Subcatchment PR-2: PR-2



Summary for Subcatchment PR-3: PR-3

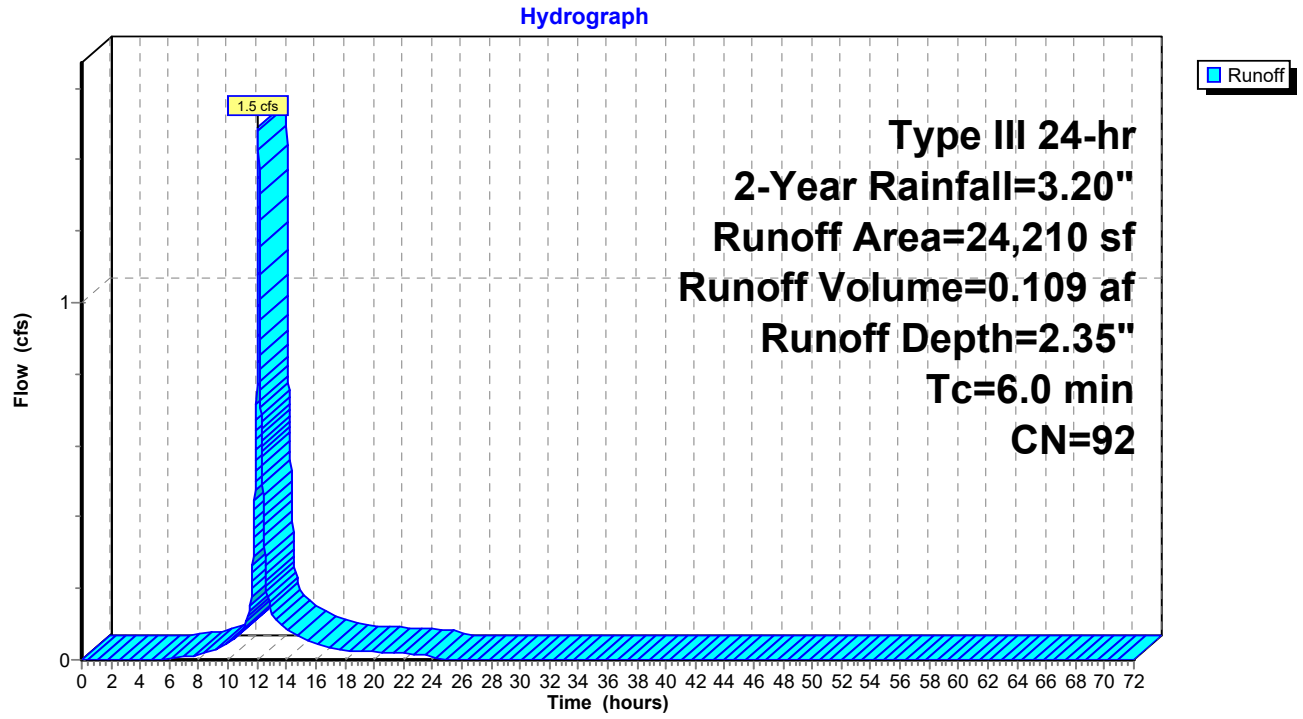
Runoff = 1.5 cfs @ 12.09 hrs, Volume= 0.109 af, Depth= 2.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
5,344	74	>75% Grass cover, Good, HSG C
633	80	>75% Grass cover, Good, HSG D
12,703	98	Paved roads w/curbs & sewers, HSG C
4,171	98	Roofs, HSG C
1,359	98	Roofs, HSG D
24,210	92	Weighted Average
5,977		24.69% Pervious Area
18,233		75.31% Impervious Area

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

Subcatchment PR-3: PR-3



Summary for Subcatchment PR-4: Offsite

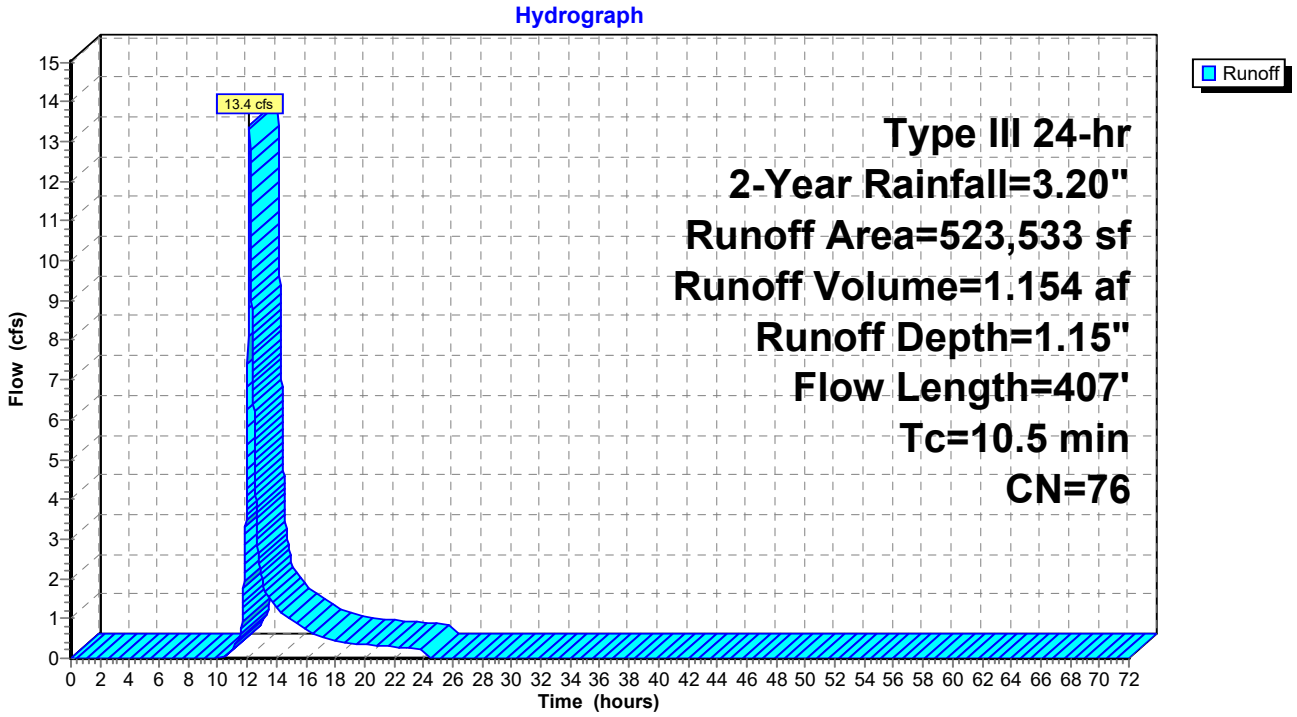
Runoff = 13.4 cfs @ 12.15 hrs, Volume= 1.154 af, Depth= 1.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.20"

	Area (sf)	CN	Description
	39,780	74	>75% Grass cover, Good, HSG C
	48,954	80	>75% Grass cover, Good, HSG D
	13,157	70	Woods, Good, HSG C
	302,368	77	Woods, Good, HSG D
	109,319	73	Brush, Good, HSG D
*	9,955	98	Roofs
	523,533	76	Weighted Average
	513,578		98.10% Pervious Area
	9,955		1.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	50	0.0150	0.13		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.22"
1.5	130	0.0450	1.48		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
2.7	227	0.0800	1.41		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
10.5	407	Total			

Subcatchment PR-4: Offsite



Summary for Subcatchment PR-5: PR-5

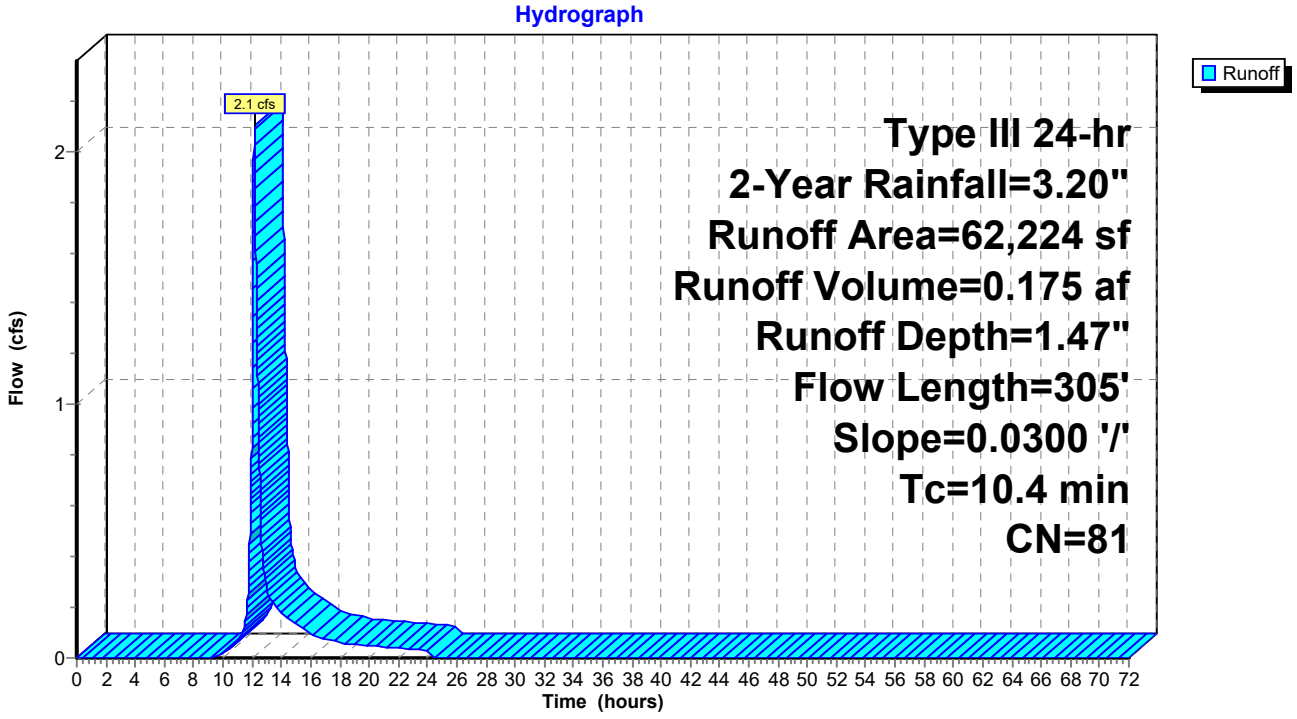
Runoff = 2.1 cfs @ 12.15 hrs, Volume= 0.175 af, Depth= 1.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.20"

	Area (sf)	CN	Description
*	10,668	98	Roofs
	24,726	77	Woods, Good, HSG D
	3,022	70	Woods, Good, HSG C
	3,082	74	>75% Grass cover, Good, HSG C
	20,726	80	>75% Grass cover, Good, HSG D
	62,224	81	Weighted Average
	51,556		82.86% Pervious Area
	10,668		17.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	50	0.0300	0.12		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.22"
3.5	255	0.0300	1.21		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
10.4	305	Total			

Subcatchment PR-5: PR-5



Summary for Subcatchment PR-6A: PR-6A

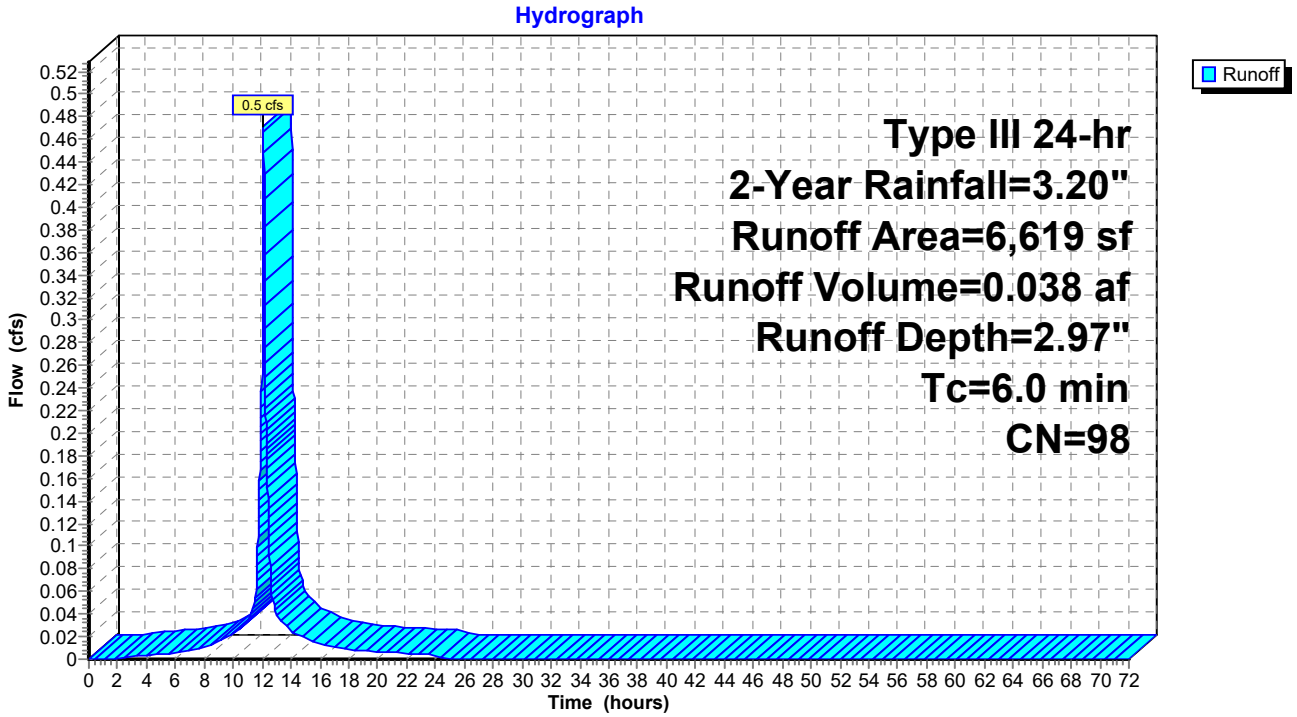
Runoff = 0.5 cfs @ 12.08 hrs, Volume= 0.038 af, Depth= 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
6,619	98	Roofs, HSG C
6,619		100.00% Impervious Area

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

Subcatchment PR-6A: PR-6A



Summary for Subcatchment PR-6B: PR-6B

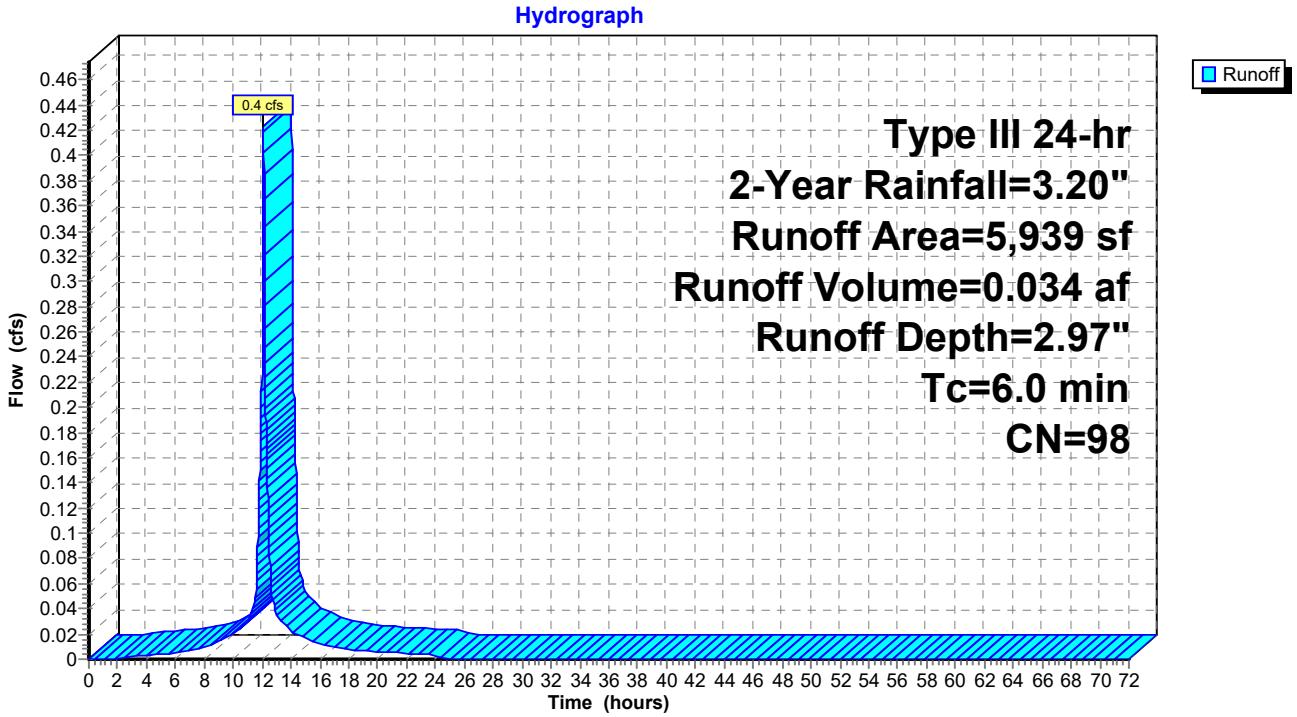
Runoff = 0.4 cfs @ 12.08 hrs, Volume= 0.034 af, Depth= 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
5,939	98	Roofs, HSG C
5,939		100.00% Impervious Area

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

Subcatchment PR-6B: PR-6B



Summary for Subcatchment PR-6C: PR-6C

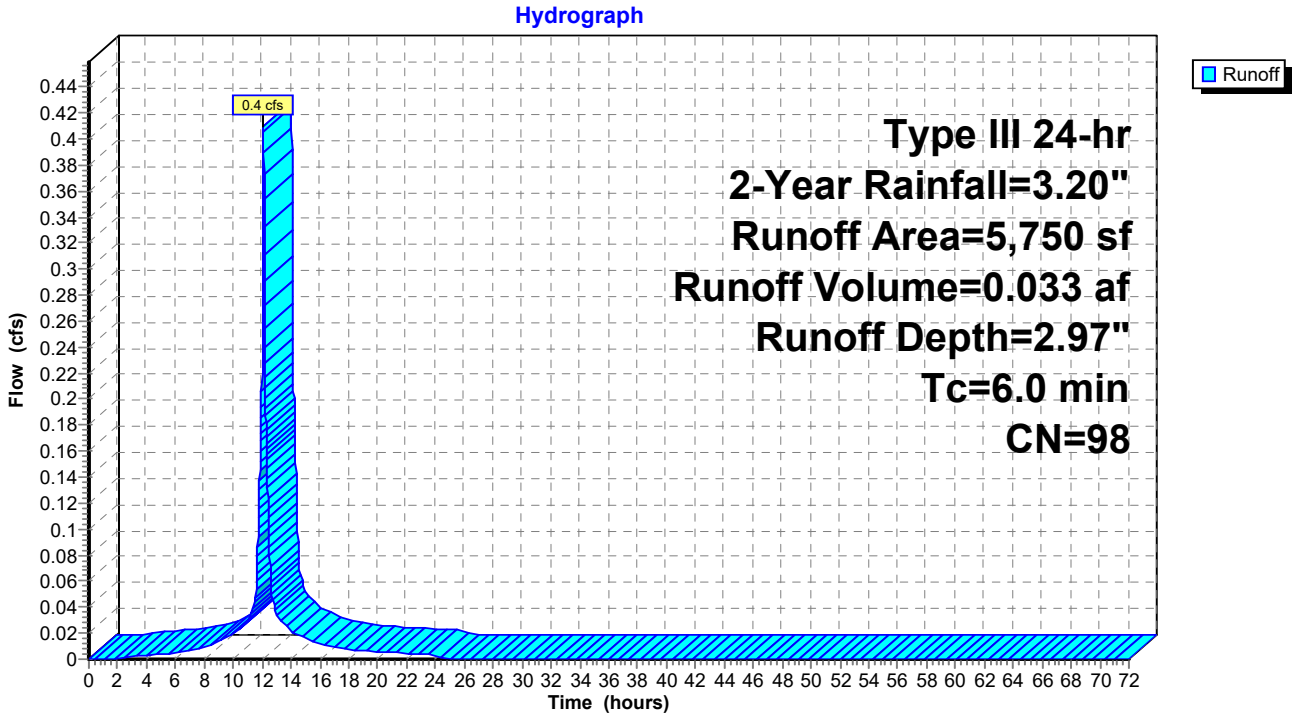
Runoff = 0.4 cfs @ 12.08 hrs, Volume= 0.033 af, Depth= 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
5,750	98	Roofs, HSG C
5,750		100.00% Impervious Area

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

Subcatchment PR-6C: PR-6C



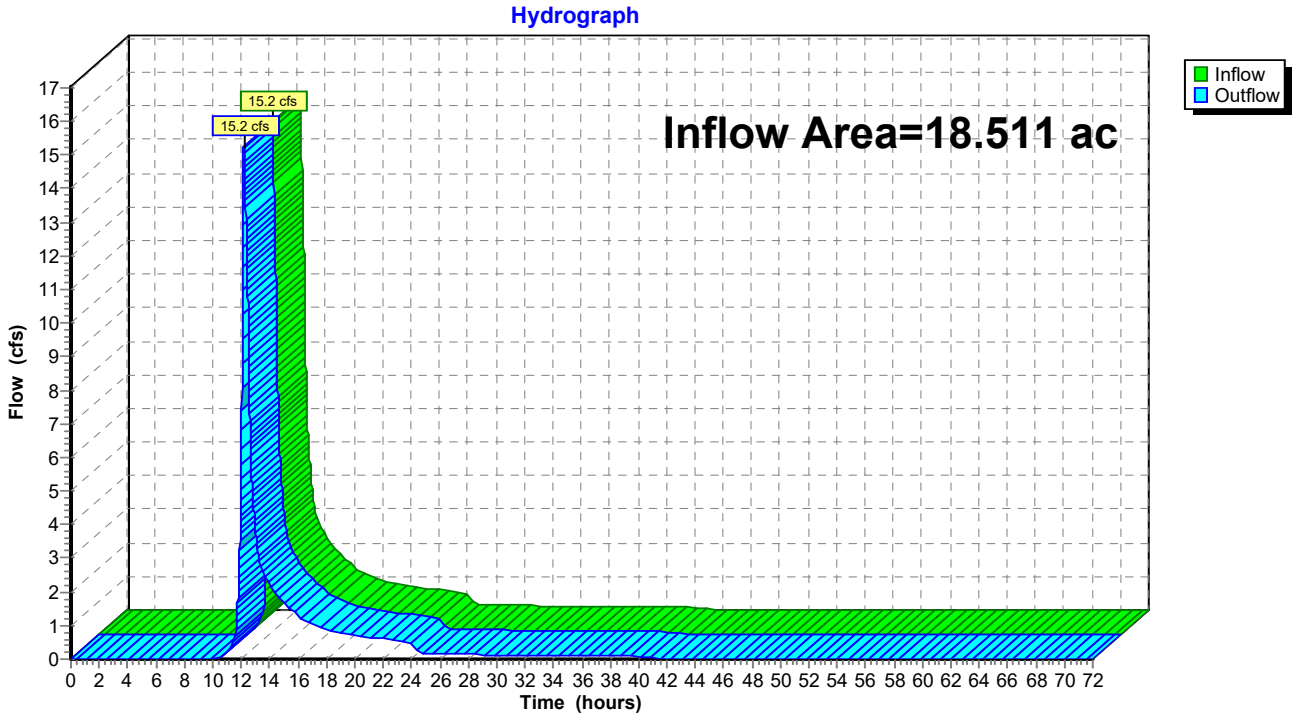
Summary for Reach AP-1P: AP-1

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 18.511 ac, 23.49% Impervious, Inflow Depth = 1.32" for 2-Year event
Inflow = 15.2 cfs @ 12.19 hrs, Volume= 2.031 af
Outflow = 15.2 cfs @ 12.19 hrs, Volume= 2.031 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3

Reach AP-1P: AP-1



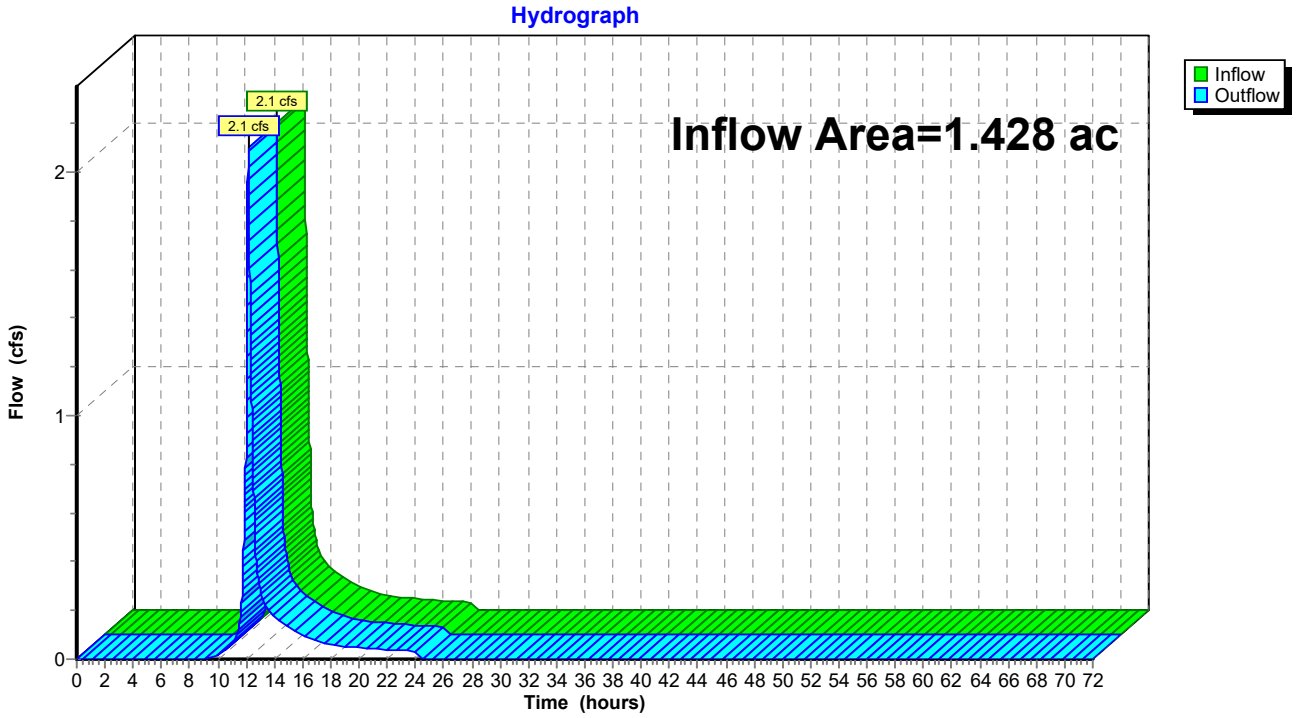
Summary for Reach AP-2P: AP-2

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.428 ac, 17.14% Impervious, Inflow Depth = 1.47" for 2-Year event
Inflow = 2.1 cfs @ 12.15 hrs, Volume= 0.175 af
Outflow = 2.1 cfs @ 12.15 hrs, Volume= 0.175 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3

Reach AP-2P: AP-2



Summary for Pond 1P: pond 1

Inflow Area = 1.780 ac, 64.73% Impervious, Inflow Depth = 2.26" for 2-Year event
Inflow = 4.6 cfs @ 12.09 hrs, Volume= 0.335 af
Outflow = 0.2 cfs @ 15.70 hrs, Volume= 0.335 af, Atten= 97%, Lag= 216.8 min
Primary = 0.2 cfs @ 15.70 hrs, Volume= 0.335 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 250.46' @ 15.70 hrs Surf.Area= 5,604 sf Storage= 8,919 cf
Flood Elev= 253.00' Surf.Area= 8,579 sf Storage= 26,860 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 604.9 min (1,407.4 - 802.5)

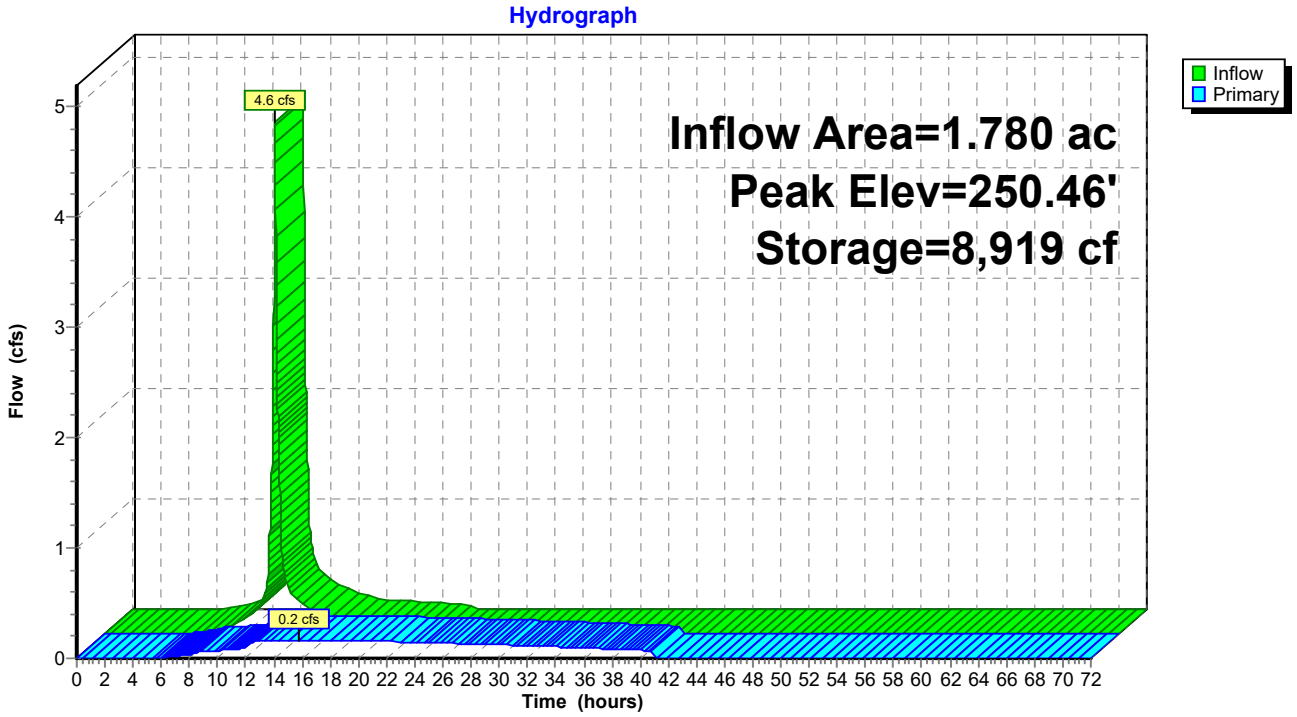
Volume	Invert	Avail.Storage	Storage Description
#1	248.50'	26,860 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
248.50	3,516	0	0
249.00	4,022	1,885	1,885
251.00	6,187	10,209	12,094
253.00	8,579	14,766	26,860

Device	Routing	Invert	Outlet Devices
#1	Primary	247.00'	**12.0" Round Culvert** L= 60.4' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 247.00' / 246.43' S= 0.0094 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	248.00'	**2.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	252.40'	**2.0" x 2.0" Horiz. Orifice/Grate X 6.00 columns** X 6 rows C= 0.600 in 24.0" x 24.0" Grate (25% open area) Limited to weir flow at low heads

Primary OutFlow Max=0.2 cfs @ 15.70 hrs HW=250.46' TW=243.51' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.2 cfs of 5.7 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.2 cfs @ 7.43 fps)
  └─**3=Orifice/Grate** (Controls 0.0 cfs)

Pond 1P: pond 1



Summary for Pond 2P: Pond 2

Inflow Area = 6.492 ac, 63.45% Impervious, Inflow Depth = 2.15" for 2-Year event
Inflow = 10.3 cfs @ 12.13 hrs, Volume= 1.165 af
Outflow = 4.8 cfs @ 12.38 hrs, Volume= 0.877 af, Atten= 54%, Lag= 15.3 min
Primary = 4.8 cfs @ 12.38 hrs, Volume= 0.877 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 244.12' @ 12.38 hrs Surf.Area= 5,670 sf Storage= 16,784 cf
Flood Elev= 245.50' Surf.Area= 6,671 sf Storage= 25,306 cf

Plug-Flow detention time= 333.9 min calculated for 0.877 af (75% of inflow)
Center-of-Mass det. time= 131.1 min (1,114.7 - 983.5)

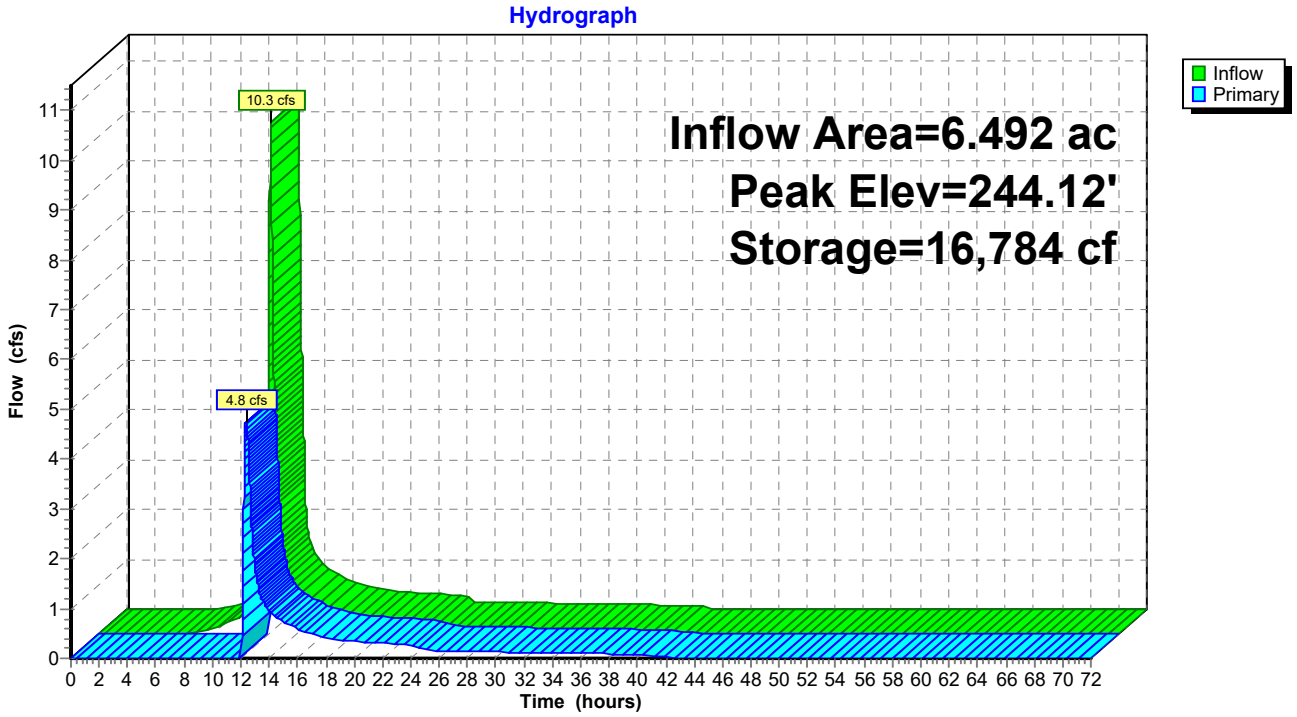
Volume	Invert	Avail.Storage	Storage Description
#1	240.00'	28,732 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
240.00	3,158	0	0
243.00	4,293	11,177	11,177
244.00	5,584	4,939	16,115
246.00	7,033	12,617	28,732

Device	Routing	Invert	Outlet Devices
#1	Primary	234.00'	**24.0" Round Culvert** L= 61.6' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 234.00' / 232.00' S= 0.0325 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	243.30'	**24.0" W x 12.0" H Vert. Orifice/Grate** C= 0.600
#3	Device 1	245.05'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Primary	245.50'	**10.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=4.8 cfs @ 12.38 hrs HW=244.12' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Passes 4.8 cfs of 40.3 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 4.8 cfs @ 2.90 fps)
  - **3=Orifice/Grate** (Controls 0.0 cfs)
- **4=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Pond 2P: Pond 2



Summary for Pond 4P: Cultec System #1

Inflow Area = 0.152 ac,100.00% Impervious, Inflow Depth = 2.97" for 2-Year event
Inflow = 0.5 cfs @ 12.08 hrs, Volume= 0.038 af
Outflow = 0.0 cfs @ 11.63 hrs, Volume= 0.038 af, Atten= 90%, Lag= 0.0 min
Discarded = 0.0 cfs @ 11.63 hrs, Volume= 0.038 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 1.16' @ 12.88 hrs Surf.Area= 810 sf Storage= 554 cf

Plug-Flow detention time= 83.0 min calculated for 0.038 af (100% of inflow)
Center-of-Mass det. time= 83.0 min (839.4 - 756.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	804 cf	**13.17'W x 61.50'L x 3.54'H Field A** 2,868 cf Overall - 857 cf Embedded = 2,011 cf x 40.0% Voids
#2A	0.50'	857 cf	**Cultec R-330XLHD** x 16 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 2 rows
		1,661 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.0 cfs @ 11.63 hrs HW=0.04' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.0 cfs)

Pond 4P: Cultec System #1 - Chamber Wizard Field A

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

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

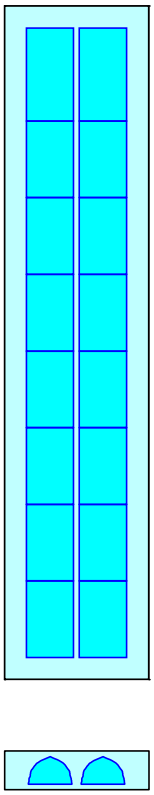
8 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 57.50' Row Length +24.0" End Stone x 2 = 61.50' Base Length
2 Rows x 52.0" Wide + 6.0" Spacing x 1 + 24.0" Side Stone x 2 = 13.17' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

16 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 2 Rows = 856.9 cf Chamber Storage

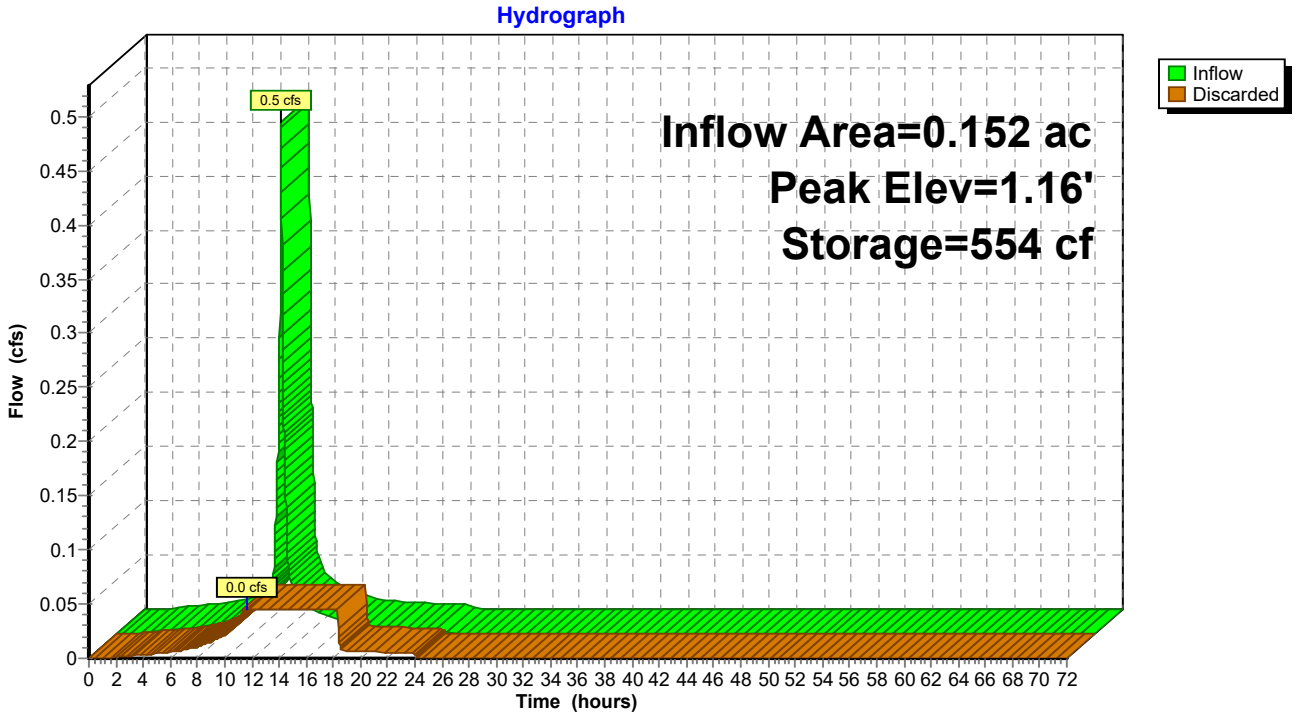
2,867.9 cf Field - 856.9 cf Chambers = 2,011.0 cf Stone x 40.0% Voids = 804.4 cf Stone Storage

Chamber Storage + Stone Storage = 1,661.3 cf = 0.038 af
Overall Storage Efficiency = 57.9%
Overall System Size = 61.50' x 13.17' x 3.54'

16 Chambers
106.2 cy Field
74.5 cy Stone



Pond 4P: Cultec System #1



Summary for Pond 6P: Cultec System #2

Inflow Area = 0.136 ac,100.00% Impervious, Inflow Depth = 2.97" for 2-Year event
Inflow = 0.4 cfs @ 12.08 hrs, Volume= 0.034 af
Outflow = 0.0 cfs @ 11.68 hrs, Volume= 0.034 af, Atten= 89%, Lag= 0.0 min
Discarded = 0.0 cfs @ 11.68 hrs, Volume= 0.034 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 1.03' @ 12.76 hrs Surf.Area= 810 sf Storage= 474 cf

Plug-Flow detention time= 68.2 min calculated for 0.034 af (100% of inflow)
Center-of-Mass det. time= 68.2 min (824.6 - 756.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	804 cf	**13.17'W x 61.50'L x 3.54'H Field A** 2,868 cf Overall - 857 cf Embedded = 2,011 cf x 40.0% Voids
#2A	0.50'	857 cf	**Cultec R-330XLHD** x 16 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 2 rows
		1,661 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.0 cfs @ 11.68 hrs HW=0.04' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.0 cfs)

Pond 6P: Cultec System #2 - Chamber Wizard Field A

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

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

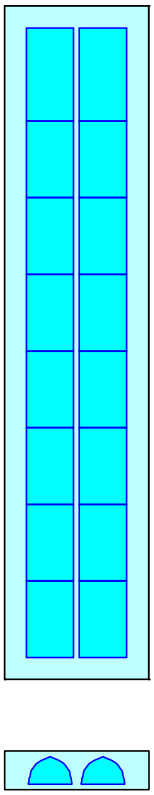
8 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 57.50' Row Length +24.0" End Stone x 2 = 61.50' Base Length
2 Rows x 52.0" Wide + 6.0" Spacing x 1 + 24.0" Side Stone x 2 = 13.17' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

16 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 2 Rows = 856.9 cf Chamber Storage

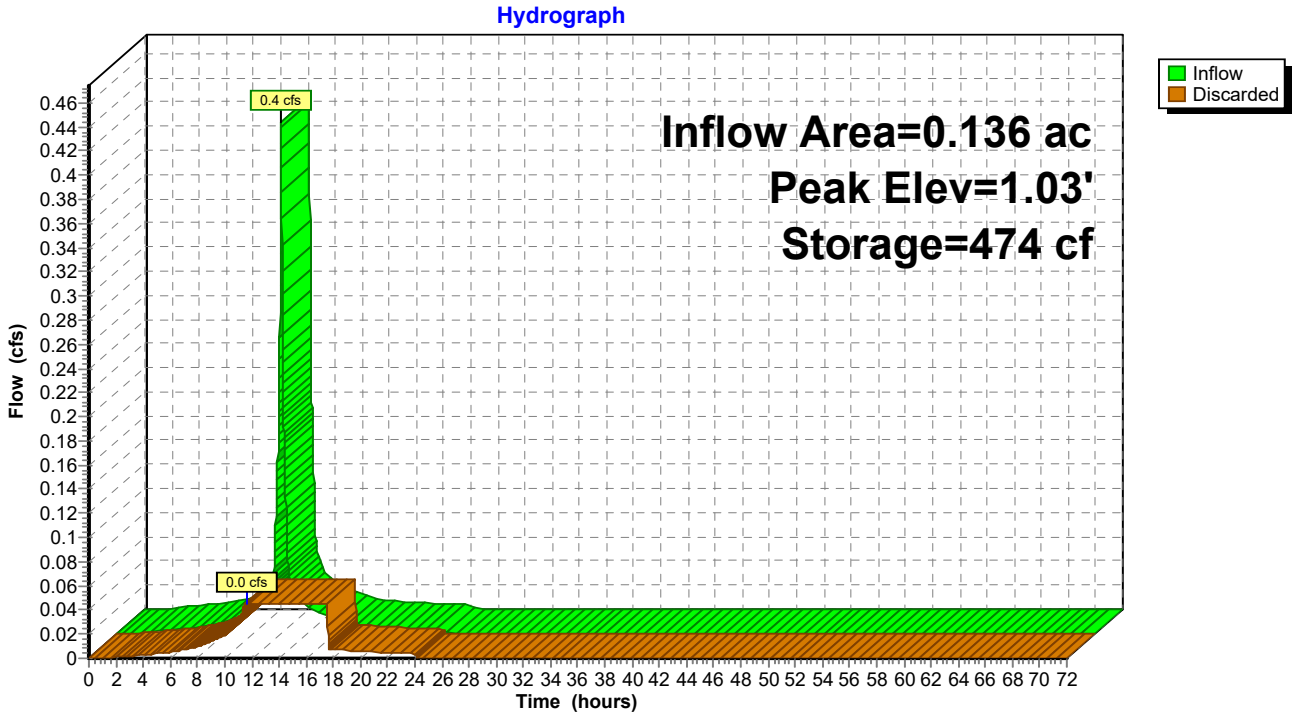
2,867.9 cf Field - 856.9 cf Chambers = 2,011.0 cf Stone x 40.0% Voids = 804.4 cf Stone Storage

Chamber Storage + Stone Storage = 1,661.3 cf = 0.038 af
Overall Storage Efficiency = 57.9%
Overall System Size = 61.50' x 13.17' x 3.54'

16 Chambers
106.2 cy Field
74.5 cy Stone



Pond 6P: Cultec System #2



Summary for Pond 16P: Cultec System #3

Inflow Area = 0.132 ac,100.00% Impervious, Inflow Depth = 2.97" for 2-Year event
Inflow = 0.4 cfs @ 12.08 hrs, Volume= 0.033 af
Outflow = 0.0 cfs @ 11.63 hrs, Volume= 0.033 af, Atten= 90%, Lag= 0.0 min
Discarded = 0.0 cfs @ 11.63 hrs, Volume= 0.033 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 1.14' @ 12.88 hrs Surf.Area= 700 sf Storage= 482 cf

Plug-Flow detention time= 83.8 min calculated for 0.033 af (100% of inflow)
Center-of-Mass det. time= 83.8 min (840.2 - 756.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	665 cf	**17.50'W x 40.00'L x 3.54'H Field A** 2,479 cf Overall - 816 cf Embedded = 1,663 cf x 40.0% Voids
#2A	0.50'	816 cf	**Cultec R-330XLHD** x 15 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 3 rows
		1,481 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.0 cfs @ 11.63 hrs HW=0.04' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.0 cfs)

Pond 16P: Cultec System #3 - Chamber Wizard Field A

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

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

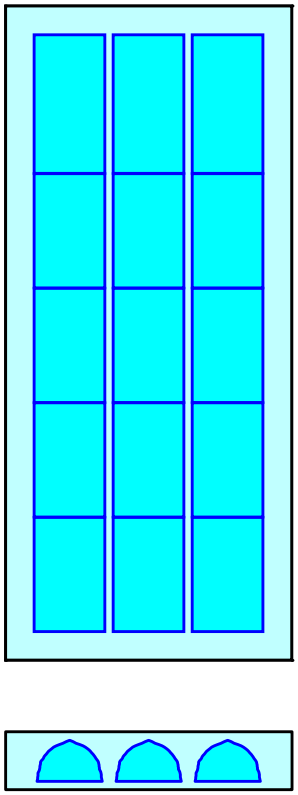
5 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 36.50' Row Length +21.0" End Stone x 2 = 40.00' Base Length
3 Rows x 52.0" Wide + 6.0" Spacing x 2 + 21.0" Side Stone x 2 = 17.50' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

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

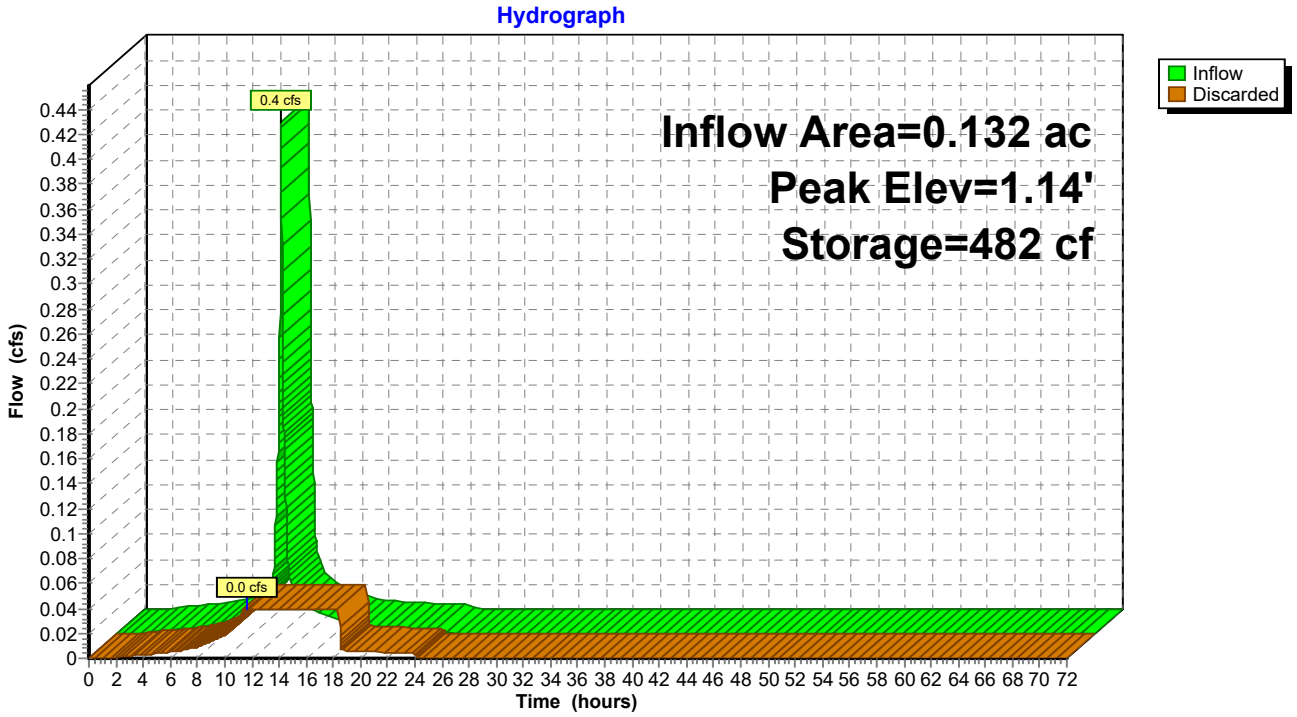
2,479.2 cf Field - 815.9 cf Chambers = 1,663.3 cf Stone x 40.0% Voids = 665.3 cf Stone Storage

Chamber Storage + Stone Storage = 1,481.2 cf = 0.034 af
Overall Storage Efficiency = 59.7%
Overall System Size = 40.00' x 17.50' x 3.54'

15 Chambers
91.8 cy Field
61.6 cy Stone



Pond 16P: Cultec System #3



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment PR-1: PR-1 Runoff Area=77,528 sf 64.73% Impervious Runoff Depth=3.69"
Tc=6.0 min CN=91 Runoff=7.4 cfs 0.547 af

Subcatchment PR-2: PR-2 Runoff Area=181,058 sf 61.31% Impervious Runoff Depth=3.49"
Flow Length=240' Tc=9.9 min CN=89 Runoff=14.6 cfs 1.207 af

Subcatchment PR-3: PR-3 Runoff Area=24,210 sf 75.31% Impervious Runoff Depth=3.80"
Tc=6.0 min CN=92 Runoff=2.4 cfs 0.176 af

Subcatchment PR-4: Offsite Runoff Area=523,533 sf 1.90% Impervious Runoff Depth=2.29"
Flow Length=407' Tc=10.5 min CN=76 Runoff=27.6 cfs 2.294 af

Subcatchment PR-5: PR-5 Runoff Area=62,224 sf 17.14% Impervious Runoff Depth=2.72"
Flow Length=305' Slope=0.0300 '/' Tc=10.4 min CN=81 Runoff=3.9 cfs 0.324 af

Subcatchment PR-6A: PR-6A Runoff Area=6,619 sf 100.00% Impervious Runoff Depth=4.46"
Tc=6.0 min CN=98 Runoff=0.7 cfs 0.057 af

Subcatchment PR-6B: PR-6B Runoff Area=5,939 sf 100.00% Impervious Runoff Depth=4.46"
Tc=6.0 min CN=98 Runoff=0.6 cfs 0.051 af

Subcatchment PR-6C: PR-6C Runoff Area=5,750 sf 100.00% Impervious Runoff Depth=4.46"
Tc=6.0 min CN=98 Runoff=0.6 cfs 0.049 af

Reach AP-1P: AP-1 Inflow=36.8 cfs 3.937 af
Outflow=36.8 cfs 3.937 af

Reach AP-2P: AP-2 Inflow=3.9 cfs 0.324 af
Outflow=3.9 cfs 0.324 af

Pond 1P: pond 1 Peak Elev=251.59' Storage=15,974 cf Inflow=7.4 cfs 0.547 af
Outflow=0.2 cfs 0.548 af

Pond 2P: Pond 2 Peak Elev=244.96' Storage=21,809 cf Inflow=16.8 cfs 1.931 af
Outflow=10.3 cfs 1.643 af

Pond 4P: Cultec System #1 Peak Elev=1.90' Storage=973 cf Inflow=0.7 cfs 0.057 af
Outflow=0.0 cfs 0.057 af

Pond 6P: Cultec System #2 Peak Elev=1.65' Storage=832 cf Inflow=0.6 cfs 0.051 af
Outflow=0.0 cfs 0.051 af

Pond 16P: Cultec System #3 Peak Elev=1.85' Storage=847 cf Inflow=0.6 cfs 0.049 af
Outflow=0.0 cfs 0.049 af

Total Runoff Area = 20.360 ac Runoff Volume = 4.705 af Average Runoff Depth = 2.77"
75.38% Pervious = 15.347 ac 24.62% Impervious = 5.013 ac

Summary for Subcatchment PR-1: PR-1

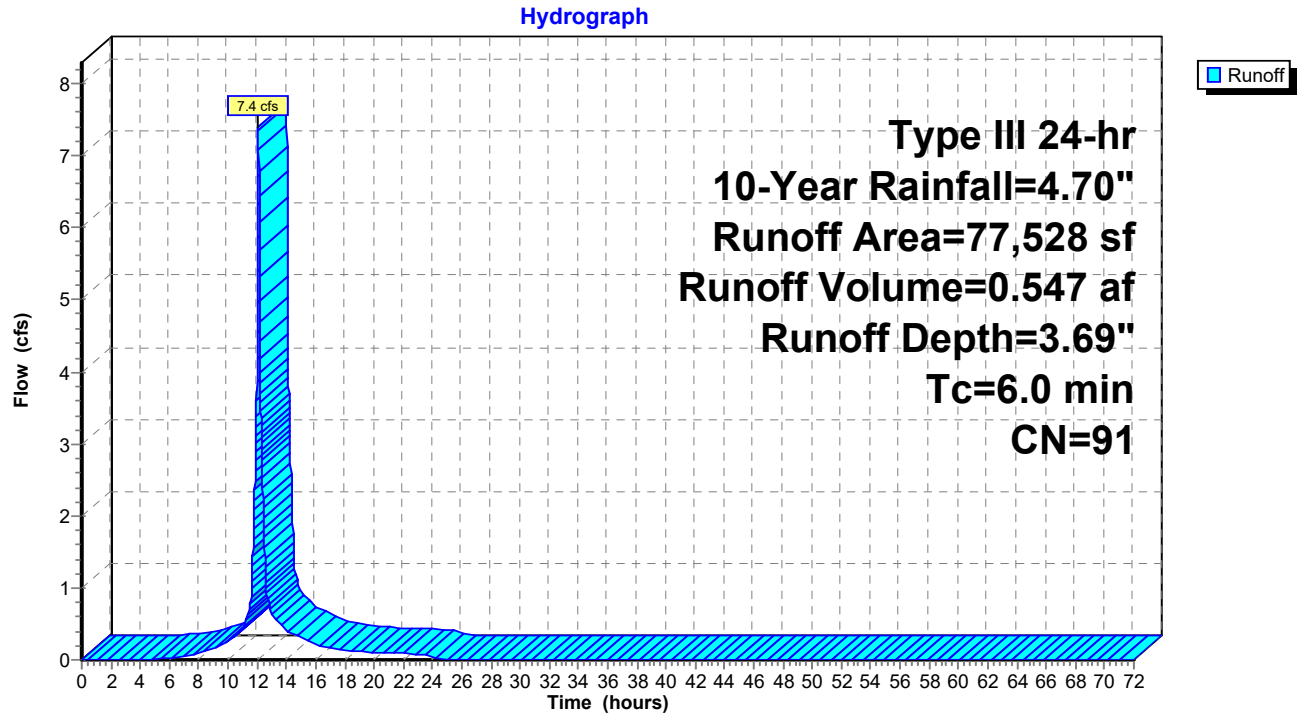
Runoff = 7.4 cfs @ 12.08 hrs, Volume= 0.547 af, Depth= 3.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.70"

	Area (sf)	CN	Description
	10,233	74	>75% Grass cover, Good, HSG C
	17,113	80	>75% Grass cover, Good, HSG D
	32,230	98	Paved roads w/curbs & sewers, HSG C
	9,455	98	Roofs, HSG D
*	8,497	98	Pond 1
	77,528	91	Weighted Average
	27,346		35.27% Pervious Area
	50,182		64.73% Impervious Area

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

Subcatchment PR-1: PR-1



Summary for Subcatchment PR-2: PR-2

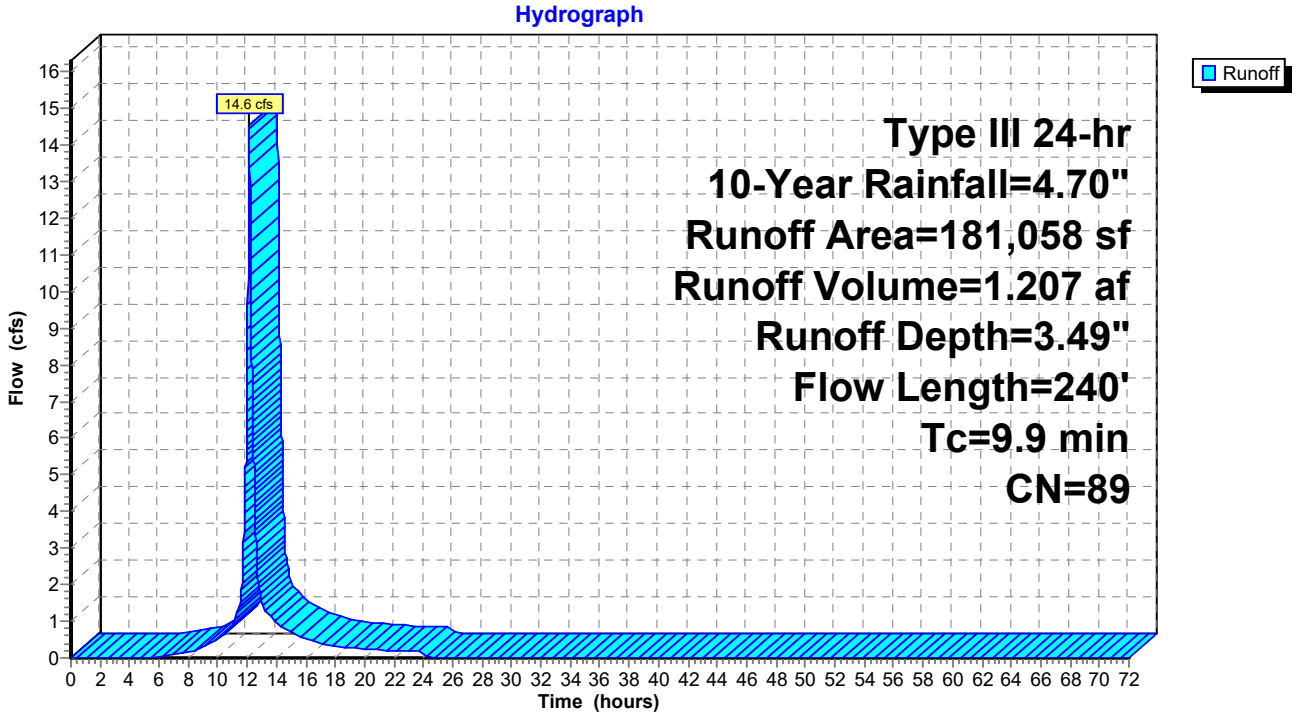
Runoff = 14.6 cfs @ 12.13 hrs, Volume= 1.207 af, Depth= 3.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.70"

	Area (sf)	CN	Description
	49,606	74	>75% Grass cover, Good, HSG C
	20,438	80	>75% Grass cover, Good, HSG D
	55,045	98	Paved roads w/curbs & sewers
*	48,936	98	Roofs
*	7,033	98	Basin 2
	181,058	89	Weighted Average
	70,044		38.69% Pervious Area
	111,014		61.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.0400	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.22"
3.7	190	0.0150	0.86		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
9.9	240	Total			

Subcatchment PR-2: PR-2



Summary for Subcatchment PR-3: PR-3

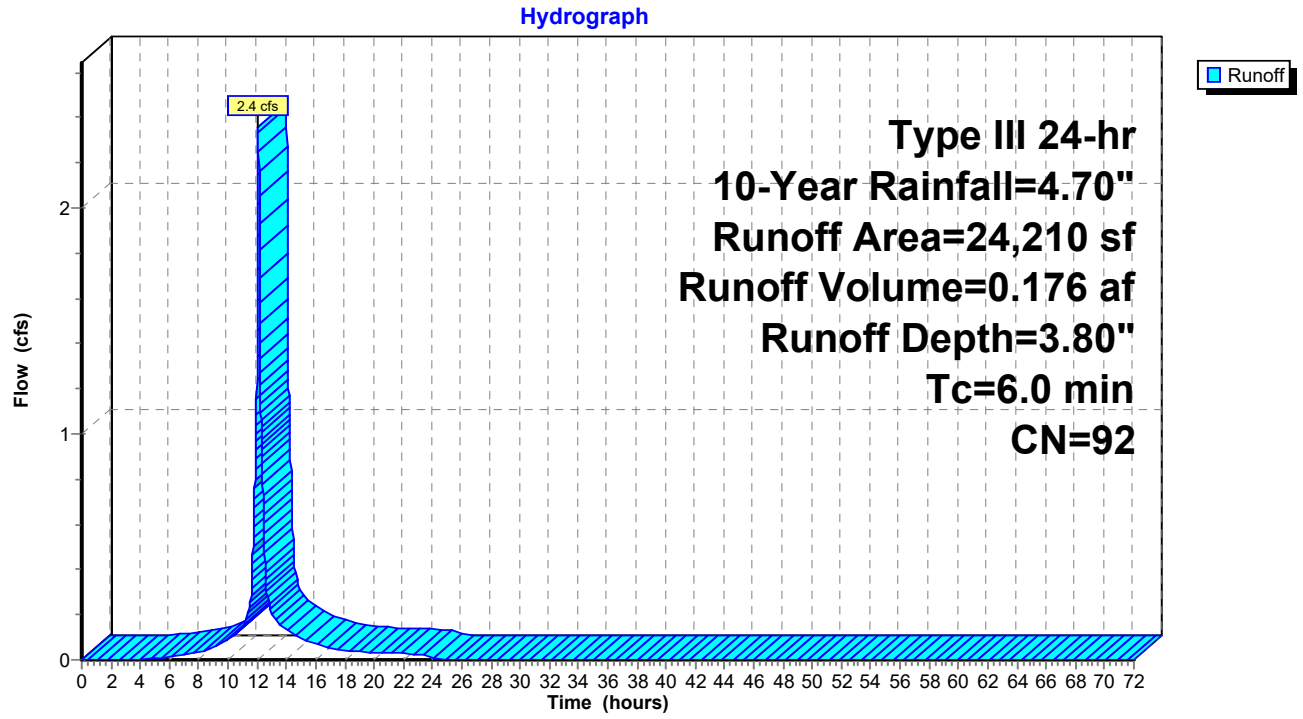
Runoff = 2.4 cfs @ 12.08 hrs, Volume= 0.176 af, Depth= 3.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.70"

Area (sf)	CN	Description
5,344	74	>75% Grass cover, Good, HSG C
633	80	>75% Grass cover, Good, HSG D
12,703	98	Paved roads w/curbs & sewers, HSG C
4,171	98	Roofs, HSG C
1,359	98	Roofs, HSG D
24,210	92	Weighted Average
5,977		24.69% Pervious Area
18,233		75.31% Impervious Area

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

Subcatchment PR-3: PR-3



Summary for Subcatchment PR-4: Offsite

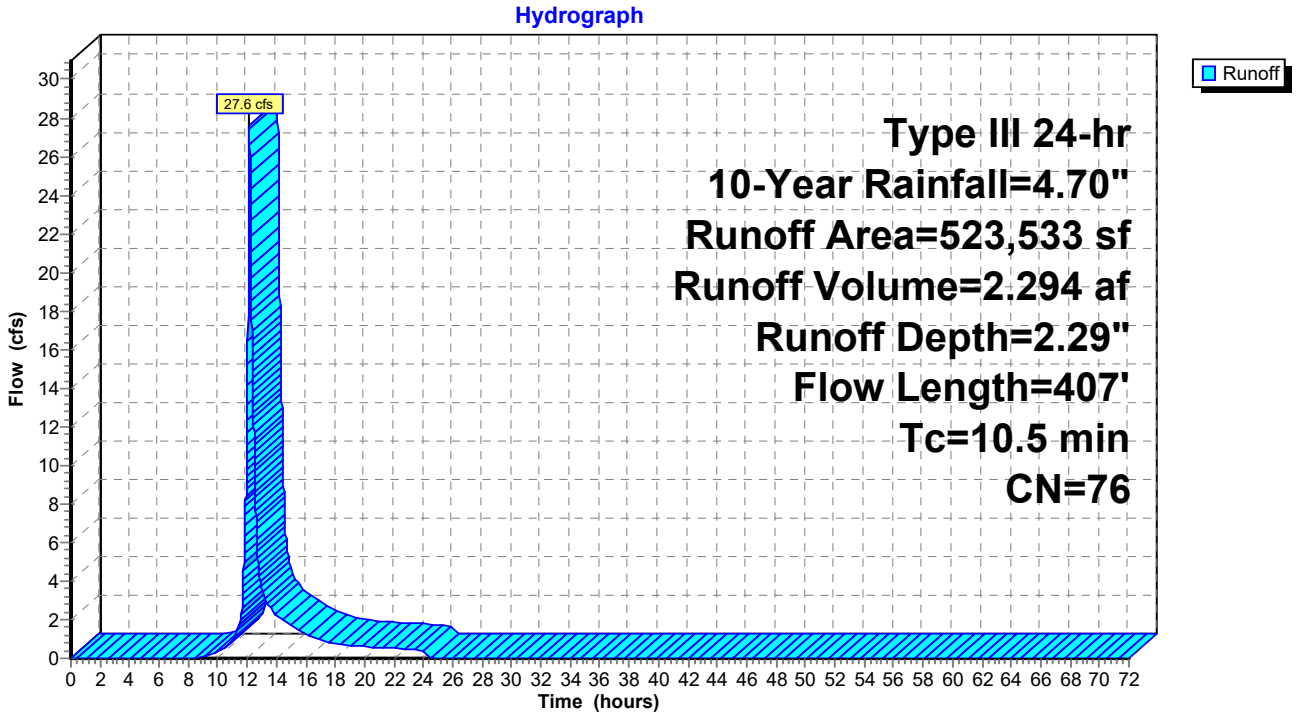
Runoff = 27.6 cfs @ 12.15 hrs, Volume= 2.294 af, Depth= 2.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.70"

	Area (sf)	CN	Description
	39,780	74	>75% Grass cover, Good, HSG C
	48,954	80	>75% Grass cover, Good, HSG D
	13,157	70	Woods, Good, HSG C
	302,368	77	Woods, Good, HSG D
	109,319	73	Brush, Good, HSG D
*	9,955	98	Roofs
	523,533	76	Weighted Average
	513,578		98.10% Pervious Area
	9,955		1.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	50	0.0150	0.13		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.22"
1.5	130	0.0450	1.48		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
2.7	227	0.0800	1.41		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
10.5	407	Total			

Subcatchment PR-4: Offsite



Summary for Subcatchment PR-5: PR-5

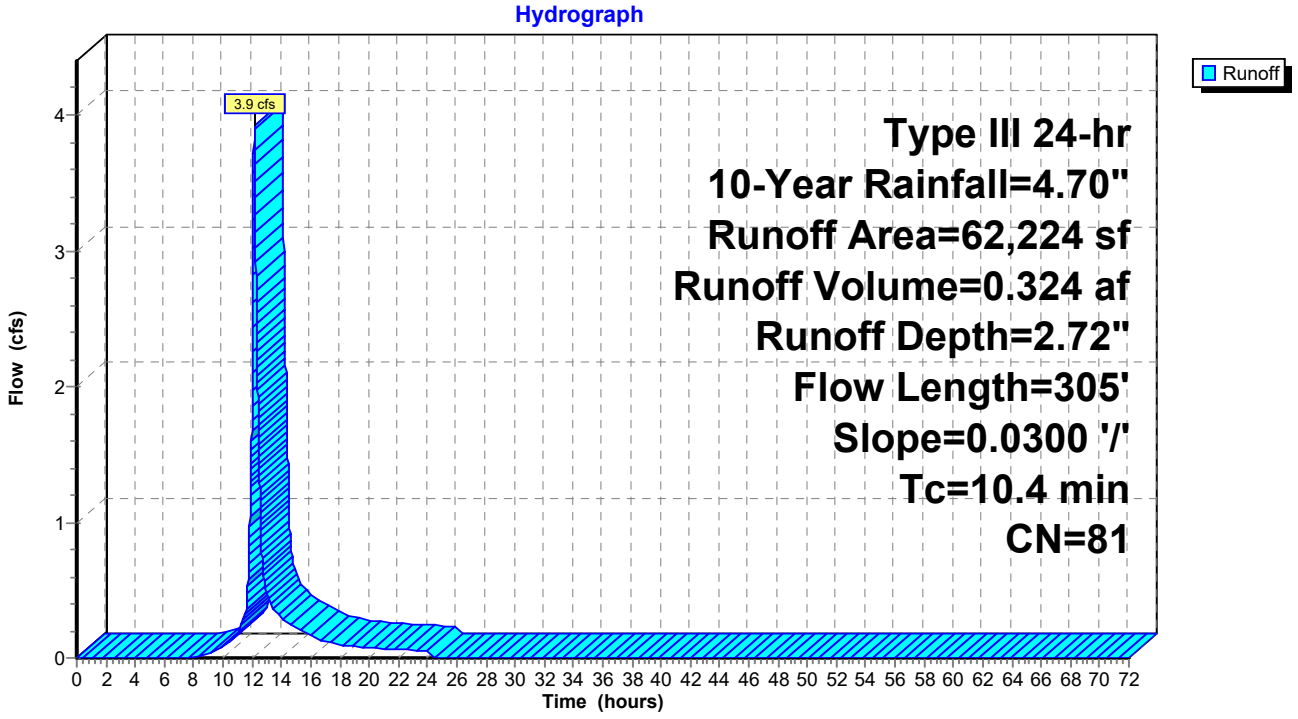
Runoff = 3.9 cfs @ 12.14 hrs, Volume= 0.324 af, Depth= 2.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.70"

	Area (sf)	CN	Description
*	10,668	98	Roofs
	24,726	77	Woods, Good, HSG D
	3,022	70	Woods, Good, HSG C
	3,082	74	>75% Grass cover, Good, HSG C
	20,726	80	>75% Grass cover, Good, HSG D
	62,224	81	Weighted Average
	51,556		82.86% Pervious Area
	10,668		17.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	50	0.0300	0.12		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.22"
3.5	255	0.0300	1.21		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
10.4	305	Total			

Subcatchment PR-5: PR-5



Summary for Subcatchment PR-6A: PR-6A

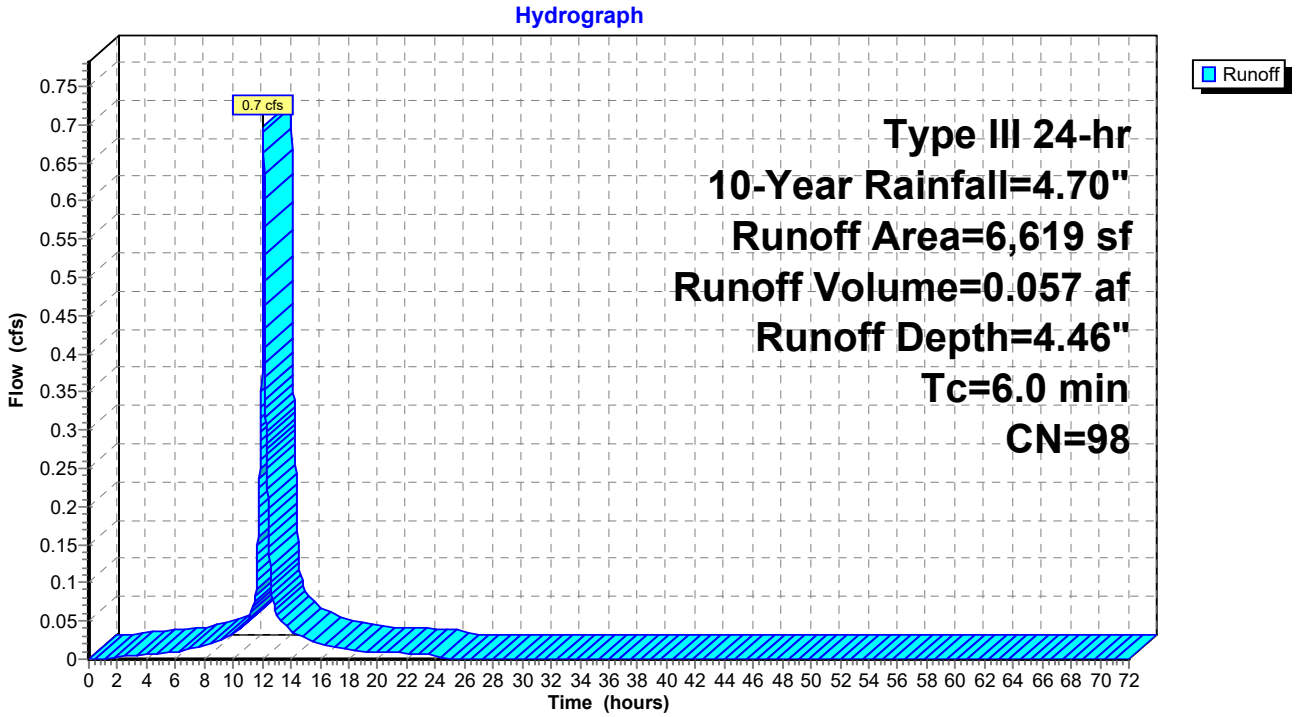
Runoff = 0.7 cfs @ 12.08 hrs, Volume= 0.057 af, Depth= 4.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.70"

Area (sf)	CN	Description
6,619	98	Roofs, HSG C
6,619		100.00% Impervious Area

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

Subcatchment PR-6A: PR-6A



Summary for Subcatchment PR-6B: PR-6B

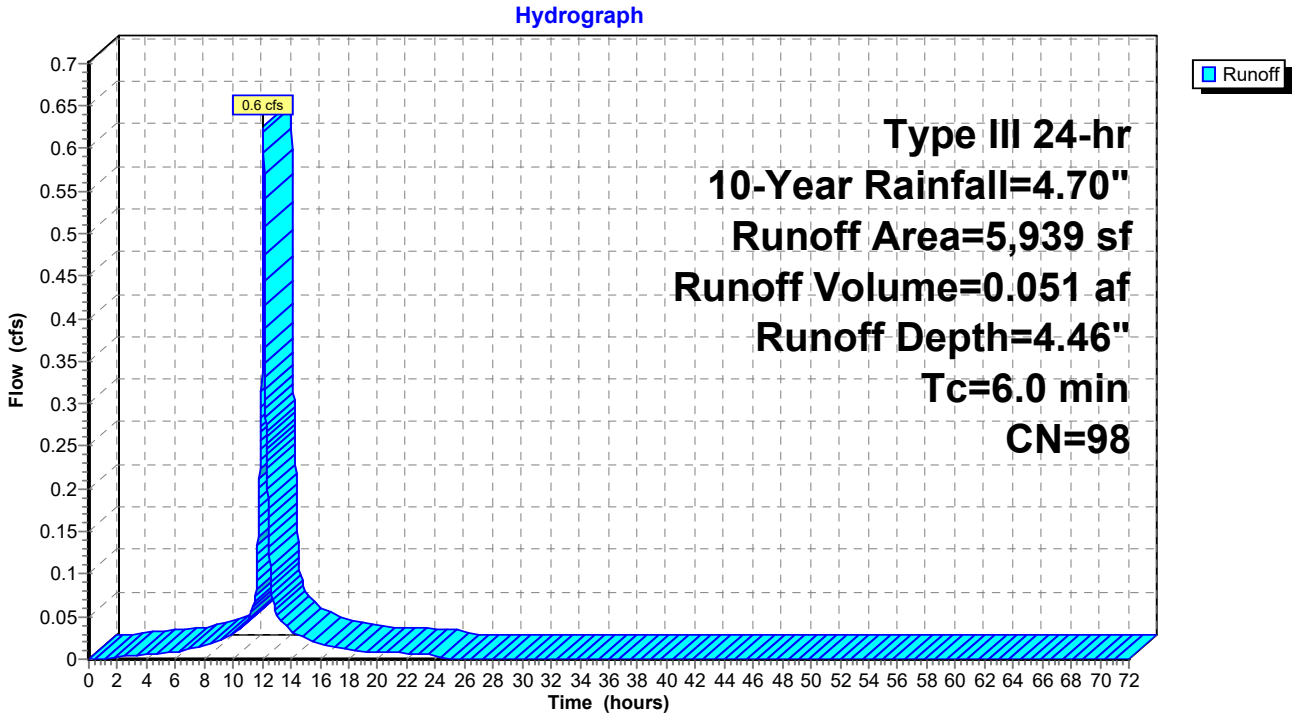
Runoff = 0.6 cfs @ 12.08 hrs, Volume= 0.051 af, Depth= 4.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.70"

Area (sf)	CN	Description
5,939	98	Roofs, HSG C
5,939		100.00% Impervious Area

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

Subcatchment PR-6B: PR-6B



Summary for Subcatchment PR-6C: PR-6C

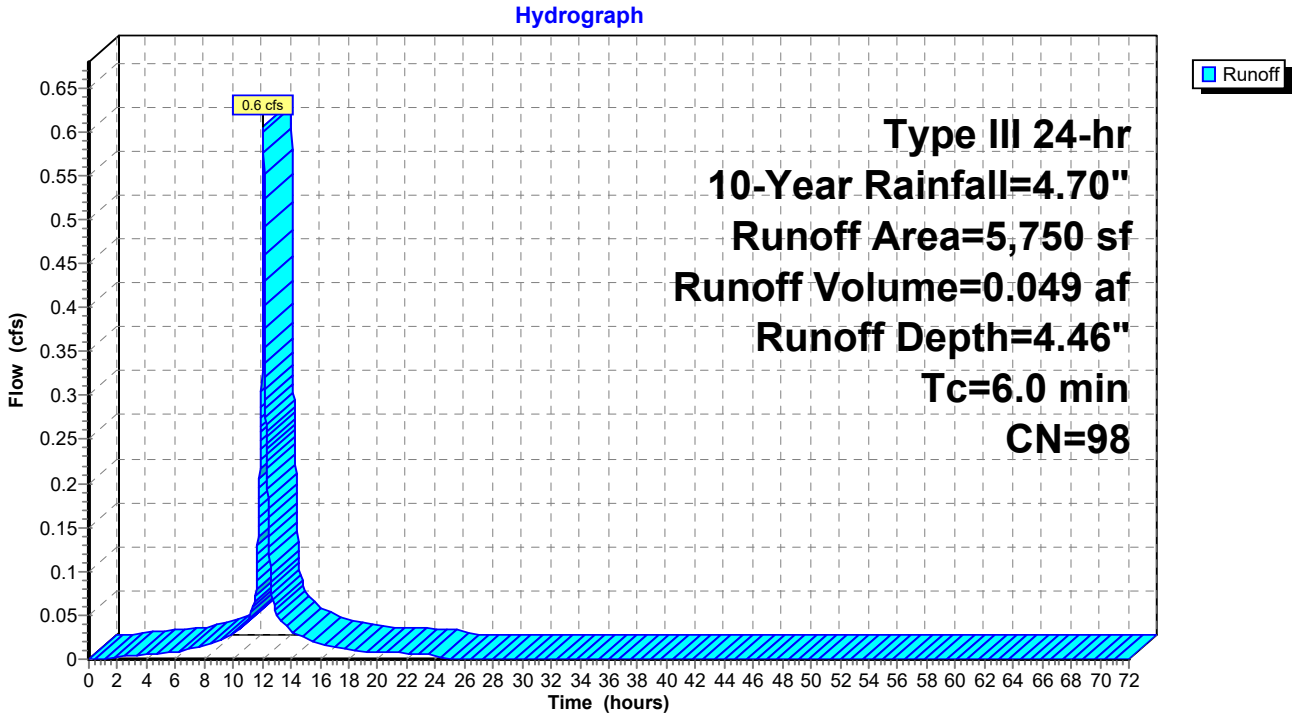
Runoff = 0.6 cfs @ 12.08 hrs, Volume= 0.049 af, Depth= 4.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.70"

Area (sf)	CN	Description
5,750	98	Roofs, HSG C
5,750		100.00% Impervious Area

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

Subcatchment PR-6C: PR-6C



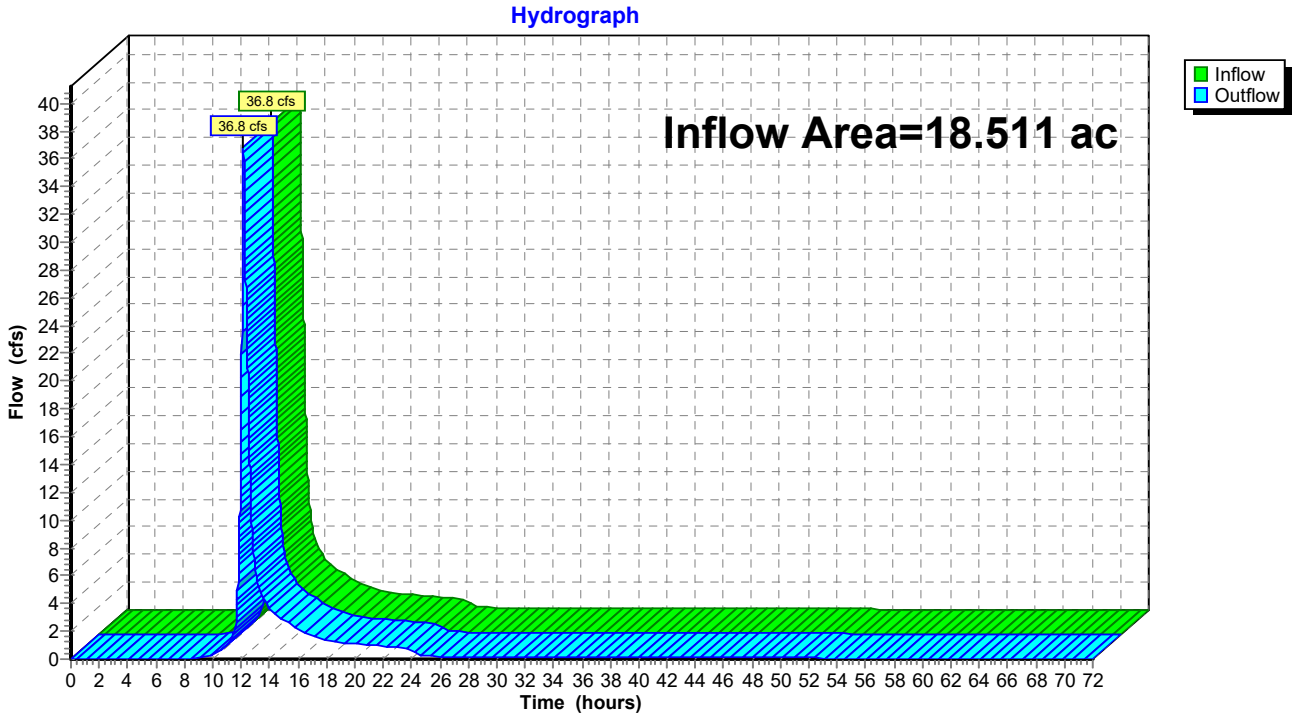
Summary for Reach AP-1P: AP-1

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 18.511 ac, 23.49% Impervious, Inflow Depth = 2.55" for 10-Year event
Inflow = 36.8 cfs @ 12.16 hrs, Volume= 3.937 af
Outflow = 36.8 cfs @ 12.16 hrs, Volume= 3.937 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3

Reach AP-1P: AP-1



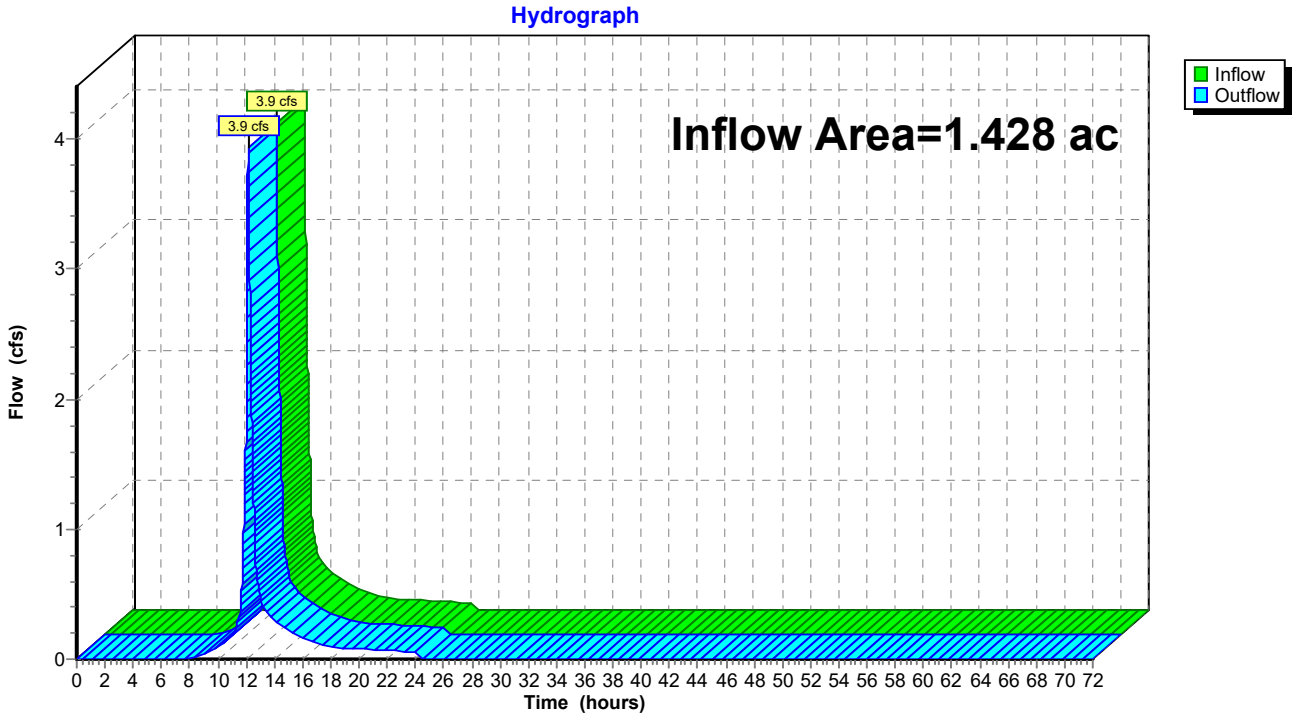
Summary for Reach AP-2P: AP-2

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.428 ac, 17.14% Impervious, Inflow Depth = 2.72" for 10-Year event
Inflow = 3.9 cfs @ 12.14 hrs, Volume= 0.324 af
Outflow = 3.9 cfs @ 12.14 hrs, Volume= 0.324 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3

Reach AP-2P: AP-2



Summary for Pond 1P: pond 1

Inflow Area = 1.780 ac, 64.73% Impervious, Inflow Depth = 3.69" for 10-Year event
Inflow = 7.4 cfs @ 12.08 hrs, Volume= 0.547 af
Outflow = 0.2 cfs @ 16.44 hrs, Volume= 0.548 af, Atten= 97%, Lag= 261.0 min
Primary = 0.2 cfs @ 16.44 hrs, Volume= 0.548 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 251.59' @ 16.44 hrs Surf.Area= 6,896 sf Storage= 15,974 cf
Flood Elev= 253.00' Surf.Area= 8,579 sf Storage= 26,860 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 885.0 min (1,673.9 - 788.9)

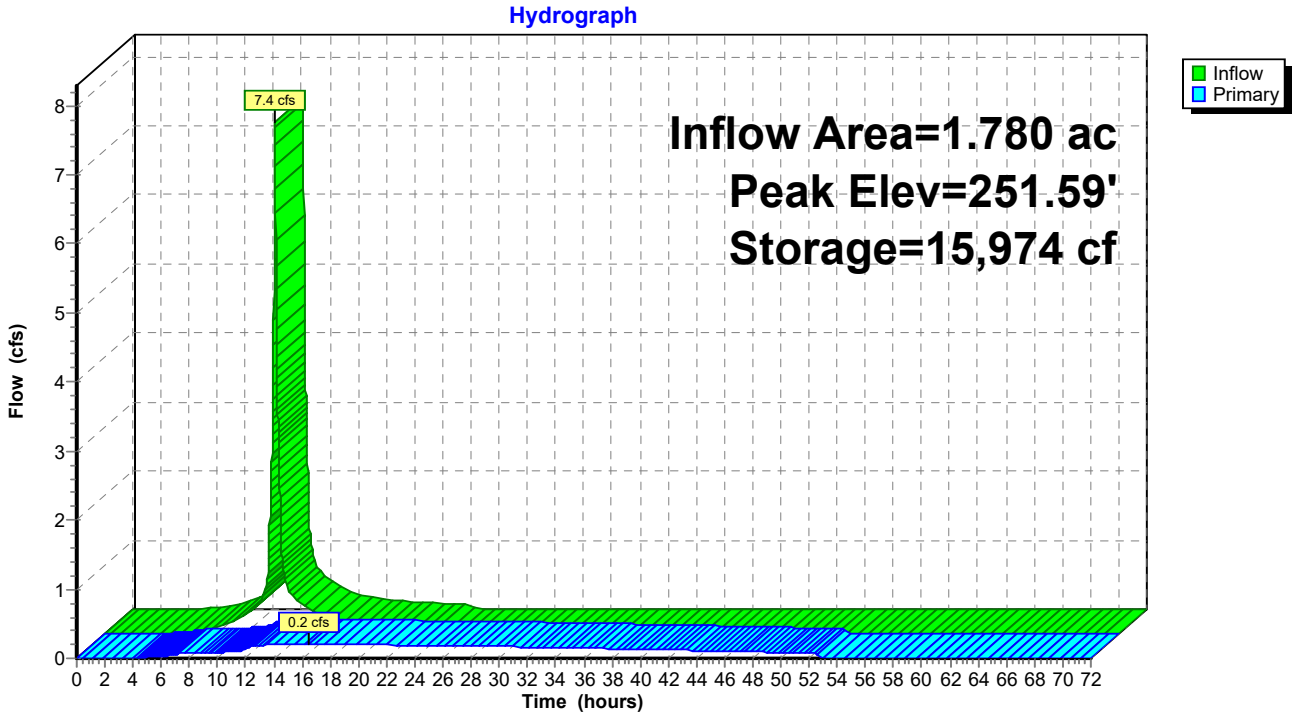
Volume	Invert	Avail.Storage	Storage Description
#1	248.50'	26,860 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
248.50	3,516	0	0
249.00	4,022	1,885	1,885
251.00	6,187	10,209	12,094
253.00	8,579	14,766	26,860

Device	Routing	Invert	Outlet Devices
#1	Primary	247.00'	**12.0" Round Culvert** L= 60.4' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 247.00' / 246.43' S= 0.0094 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	248.00'	**2.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	252.40'	**2.0" x 2.0" Horiz. Orifice/Grate X 6.00 columns** X 6 rows C= 0.600 in 24.0" x 24.0" Grate (25% open area) Limited to weir flow at low heads

Primary OutFlow Max=0.2 cfs @ 16.44 hrs HW=251.59' TW=243.54' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.2 cfs of 6.8 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.2 cfs @ 9.02 fps)
  └─**3=Orifice/Grate** (Controls 0.0 cfs)

Pond 1P: pond 1



Summary for Pond 2P: Pond 2

Inflow Area = 6.492 ac, 63.45% Impervious, Inflow Depth = 3.57" for 10-Year event
Inflow = 16.8 cfs @ 12.13 hrs, Volume= 1.931 af
Outflow = 10.3 cfs @ 12.28 hrs, Volume= 1.643 af, Atten= 39%, Lag= 8.9 min
Primary = 10.3 cfs @ 12.28 hrs, Volume= 1.643 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 244.96' @ 12.28 hrs Surf.Area= 6,279 sf Storage= 21,809 cf
Flood Elev= 245.50' Surf.Area= 6,671 sf Storage= 25,306 cf

Plug-Flow detention time= 310.8 min calculated for 1.643 af (85% of inflow)
Center-of-Mass det. time= 102.1 min (1,148.6 - 1,046.6)

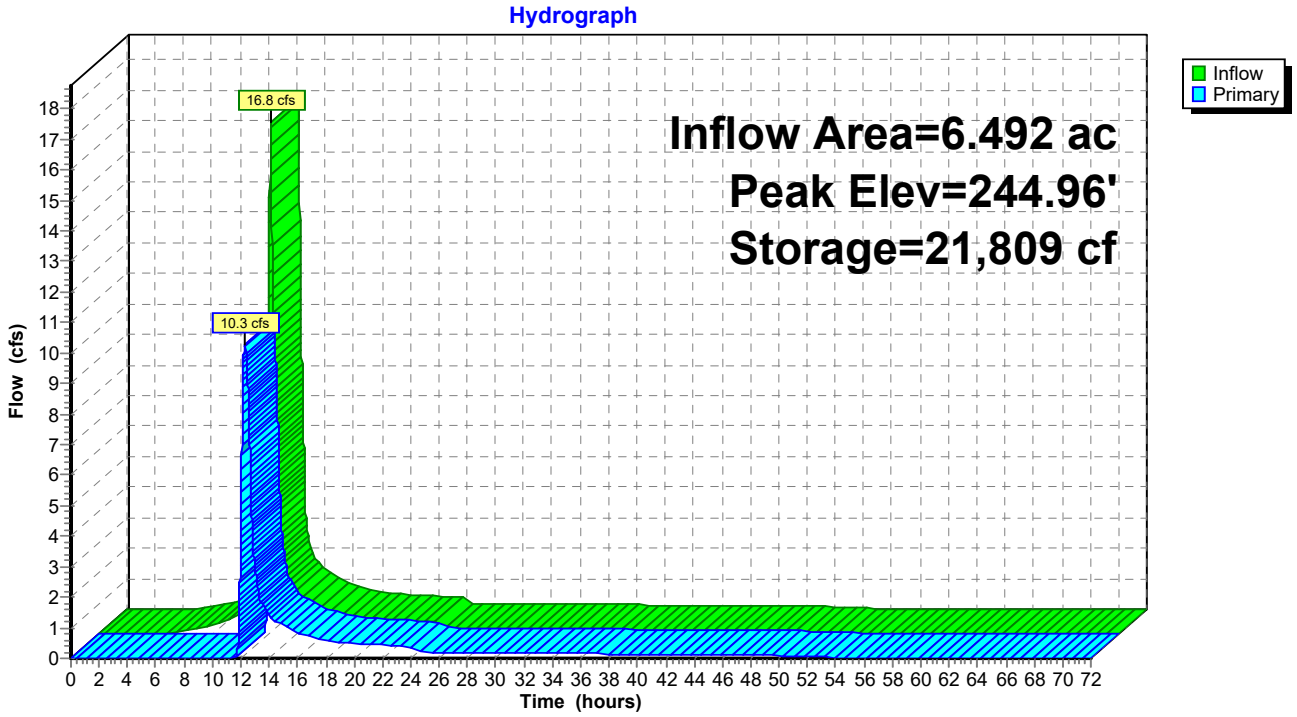
Volume	Invert	Avail.Storage	Storage Description
#1	240.00'	28,732 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
240.00	3,158	0	0
243.00	4,293	11,177	11,177
244.00	5,584	4,939	16,115
246.00	7,033	12,617	28,732

Device	Routing	Invert	Outlet Devices
#1	Primary	234.00'	**24.0" Round Culvert** L= 61.6' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 234.00' / 232.00' S= 0.0325 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	243.30'	**24.0" W x 12.0" H Vert. Orifice/Grate** C= 0.600
#3	Device 1	245.05'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Primary	245.50'	**10.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=10.3 cfs @ 12.28 hrs HW=244.96' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Passes 10.3 cfs of 42.1 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 10.3 cfs @ 5.14 fps)
  - **3=Orifice/Grate** (Controls 0.0 cfs)
- **4=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Pond 2P: Pond 2



Summary for Pond 4P: Cultec System #1

Inflow Area = 0.152 ac,100.00% Impervious, Inflow Depth = 4.46" for 10-Year event
Inflow = 0.7 cfs @ 12.08 hrs, Volume= 0.057 af
Outflow = 0.0 cfs @ 11.21 hrs, Volume= 0.057 af, Atten= 94%, Lag= 0.0 min
Discarded = 0.0 cfs @ 11.21 hrs, Volume= 0.057 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 1.90' @ 13.51 hrs Surf.Area= 810 sf Storage= 973 cf

Plug-Flow detention time= 163.4 min calculated for 0.057 af (100% of inflow)
Center-of-Mass det. time= 163.4 min (912.4 - 749.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	804 cf	**13.17'W x 61.50'L x 3.54'H Field A** 2,868 cf Overall - 857 cf Embedded = 2,011 cf x 40.0% Voids
#2A	0.50'	857 cf	**Cultec R-330XLHD** x 16 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 2 rows
		1,661 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.0 cfs @ 11.21 hrs HW=0.04' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.0 cfs)

Pond 4P: Cultec System #1 - Chamber Wizard Field A

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

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

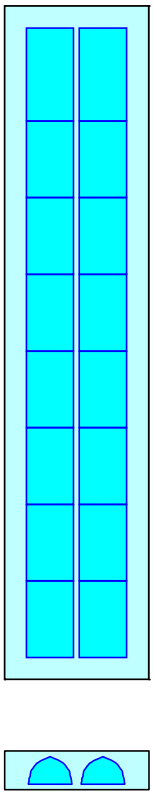
8 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 57.50' Row Length +24.0" End Stone x 2 = 61.50' Base Length
2 Rows x 52.0" Wide + 6.0" Spacing x 1 + 24.0" Side Stone x 2 = 13.17' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

16 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 2 Rows = 856.9 cf Chamber Storage

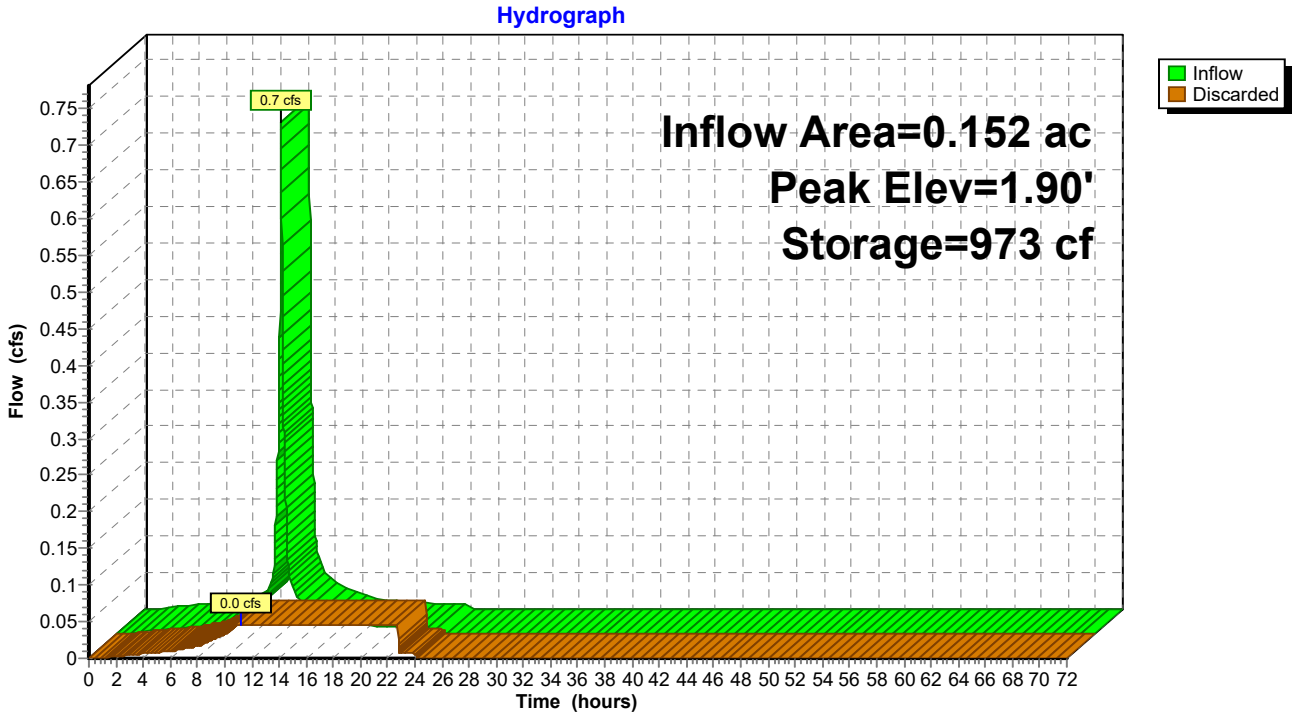
2,867.9 cf Field - 856.9 cf Chambers = 2,011.0 cf Stone x 40.0% Voids = 804.4 cf Stone Storage

Chamber Storage + Stone Storage = 1,661.3 cf = 0.038 af
Overall Storage Efficiency = 57.9%
Overall System Size = 61.50' x 13.17' x 3.54'

16 Chambers
106.2 cy Field
74.5 cy Stone



Pond 4P: Cultec System #1



Summary for Pond 6P: Cultec System #2

Inflow Area = 0.136 ac,100.00% Impervious, Inflow Depth = 4.46" for 10-Year event
Inflow = 0.6 cfs @ 12.08 hrs, Volume= 0.051 af
Outflow = 0.0 cfs @ 11.36 hrs, Volume= 0.051 af, Atten= 93%, Lag= 0.0 min
Discarded = 0.0 cfs @ 11.36 hrs, Volume= 0.051 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 1.65' @ 13.21 hrs Surf.Area= 810 sf Storage= 832 cf

Plug-Flow detention time= 135.1 min calculated for 0.051 af (100% of inflow)
Center-of-Mass det. time= 135.0 min (884.1 - 749.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	804 cf	**13.17'W x 61.50'L x 3.54'H Field A** 2,868 cf Overall - 857 cf Embedded = 2,011 cf x 40.0% Voids
#2A	0.50'	857 cf	**Cultec R-330XLHD** x 16 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 2 rows
		1,661 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.0 cfs @ 11.36 hrs HW=0.04' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.0 cfs)

Pond 6P: Cultec System #2 - Chamber Wizard Field A

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

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

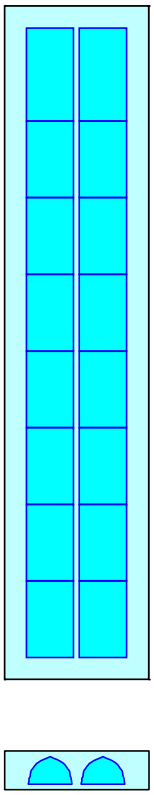
8 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 57.50' Row Length +24.0" End Stone x 2 = 61.50' Base Length
2 Rows x 52.0" Wide + 6.0" Spacing x 1 + 24.0" Side Stone x 2 = 13.17' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

16 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 2 Rows = 856.9 cf Chamber Storage

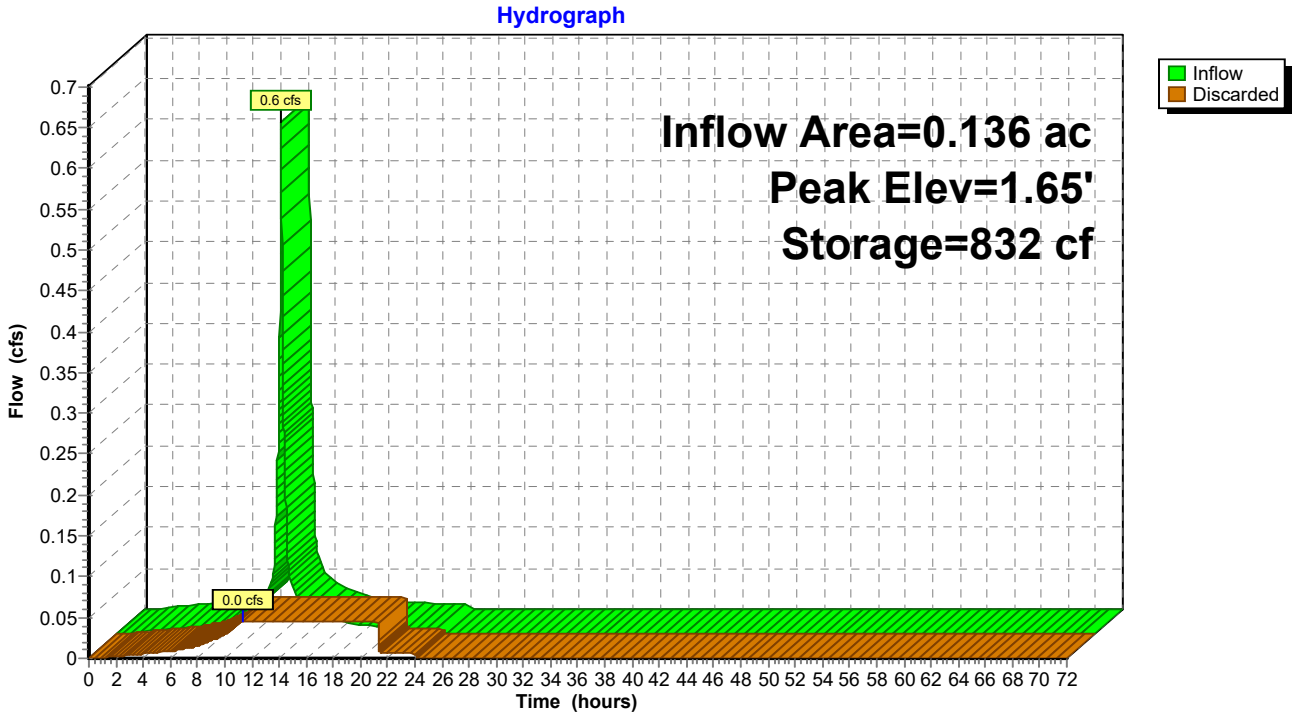
2,867.9 cf Field - 856.9 cf Chambers = 2,011.0 cf Stone x 40.0% Voids = 804.4 cf Stone Storage

Chamber Storage + Stone Storage = 1,661.3 cf = 0.038 af
Overall Storage Efficiency = 57.9%
Overall System Size = 61.50' x 13.17' x 3.54'

16 Chambers
106.2 cy Field
74.5 cy Stone



Pond 6P: Cultec System #2



Summary for Pond 16P: Cultec System #3

Inflow Area = 0.132 ac,100.00% Impervious, Inflow Depth = 4.46" for 10-Year event
Inflow = 0.6 cfs @ 12.08 hrs, Volume= 0.049 af
Outflow = 0.0 cfs @ 11.21 hrs, Volume= 0.049 af, Atten= 94%, Lag= 0.0 min
Discarded = 0.0 cfs @ 11.21 hrs, Volume= 0.049 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 1.85' @ 13.53 hrs Surf.Area= 700 sf Storage= 847 cf

Plug-Flow detention time= 164.8 min calculated for 0.049 af (100% of inflow)
Center-of-Mass det. time= 164.8 min (913.9 - 749.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	665 cf	**17.50'W x 40.00'L x 3.54'H Field A** 2,479 cf Overall - 816 cf Embedded = 1,663 cf x 40.0% Voids
#2A	0.50'	816 cf	**Cultec R-330XLHD** x 15 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 3 rows
		1,481 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.0 cfs @ 11.21 hrs HW=0.04' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.0 cfs)

Pond 16P: Cultec System #3 - Chamber Wizard Field A

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

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

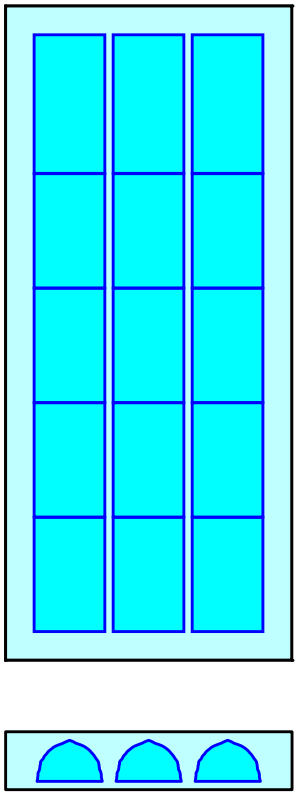
5 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 36.50' Row Length +21.0" End Stone x 2 = 40.00' Base Length
3 Rows x 52.0" Wide + 6.0" Spacing x 2 + 21.0" Side Stone x 2 = 17.50' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

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

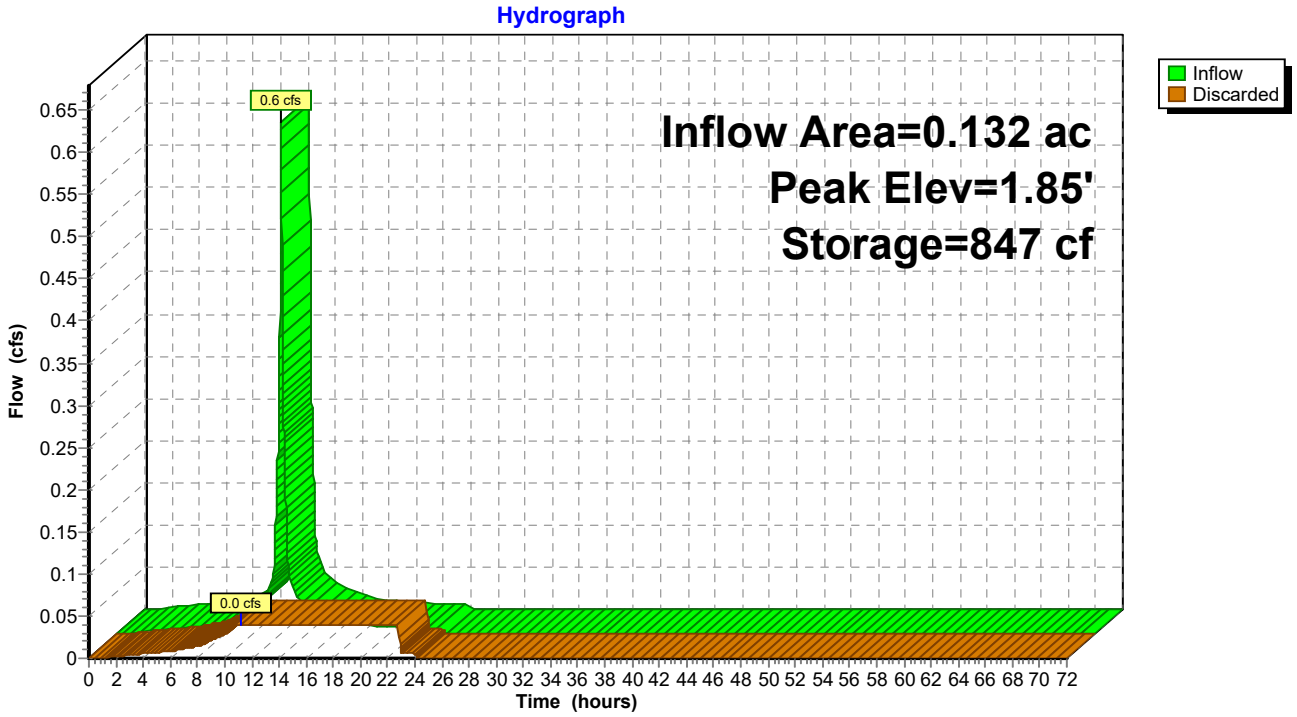
2,479.2 cf Field - 815.9 cf Chambers = 1,663.3 cf Stone x 40.0% Voids = 665.3 cf Stone Storage

Chamber Storage + Stone Storage = 1,481.2 cf = 0.034 af
Overall Storage Efficiency = 59.7%
Overall System Size = 40.00' x 17.50' x 3.54'

15 Chambers
91.8 cy Field
61.6 cy Stone



Pond 16P: Cultec System #3



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment PR-1: PR-1 Runoff Area=77,528 sf 64.73% Impervious Runoff Depth=4.47"
Tc=6.0 min CN=91 Runoff=8.9 cfs 0.663 af

Subcatchment PR-2: PR-2 Runoff Area=181,058 sf 61.31% Impervious Runoff Depth=4.25"
Flow Length=240' Tc=9.9 min CN=89 Runoff=17.6 cfs 1.473 af

Subcatchment PR-3: PR-3 Runoff Area=24,210 sf 75.31% Impervious Runoff Depth=4.58"
Tc=6.0 min CN=92 Runoff=2.8 cfs 0.212 af

Subcatchment PR-4: Offsite Runoff Area=523,533 sf 1.90% Impervious Runoff Depth=2.95"
Flow Length=407' Tc=10.5 min CN=76 Runoff=35.8 cfs 2.958 af

Subcatchment PR-5: PR-5 Runoff Area=62,224 sf 17.14% Impervious Runoff Depth=3.43"
Flow Length=305' Slope=0.0300 '/' Tc=10.4 min CN=81 Runoff=4.9 cfs 0.408 af

Subcatchment PR-6A: PR-6A Runoff Area=6,619 sf 100.00% Impervious Runoff Depth=5.26"
Tc=6.0 min CN=98 Runoff=0.8 cfs 0.067 af

Subcatchment PR-6B: PR-6B Runoff Area=5,939 sf 100.00% Impervious Runoff Depth=5.26"
Tc=6.0 min CN=98 Runoff=0.7 cfs 0.060 af

Subcatchment PR-6C: PR-6C Runoff Area=5,750 sf 100.00% Impervious Runoff Depth=5.26"
Tc=6.0 min CN=98 Runoff=0.7 cfs 0.058 af

Reach AP-1P: AP-1 Inflow=46.8 cfs 5.018 af
Outflow=46.8 cfs 5.018 af

Reach AP-2P: AP-2 Inflow=4.9 cfs 0.408 af
Outflow=4.9 cfs 0.408 af

Pond 1P: pond 1 Peak Elev=252.14' Storage=19,956 cf Inflow=8.9 cfs 0.663 af
Outflow=0.2 cfs 0.663 af

Pond 2P: Pond 2 Peak Elev=245.26' Storage=23,707 cf Inflow=20.2 cfs 2.348 af
Outflow=14.0 cfs 2.060 af

Pond 4P: Cultec System #1 Peak Elev=2.39' Storage=1,229 cf Inflow=0.8 cfs 0.067 af
Outflow=0.0 cfs 0.067 af

Pond 6P: Cultec System #2 Peak Elev=2.04' Storage=1,048 cf Inflow=0.7 cfs 0.060 af
Outflow=0.0 cfs 0.060 af

Pond 16P: Cultec System #3 Peak Elev=2.32' Storage=1,070 cf Inflow=0.7 cfs 0.058 af
Outflow=0.0 cfs 0.058 af

Total Runoff Area = 20.360 ac Runoff Volume = 5.898 af Average Runoff Depth = 3.48"
75.38% Pervious = 15.347 ac 24.62% Impervious = 5.013 ac

Summary for Subcatchment PR-1: PR-1

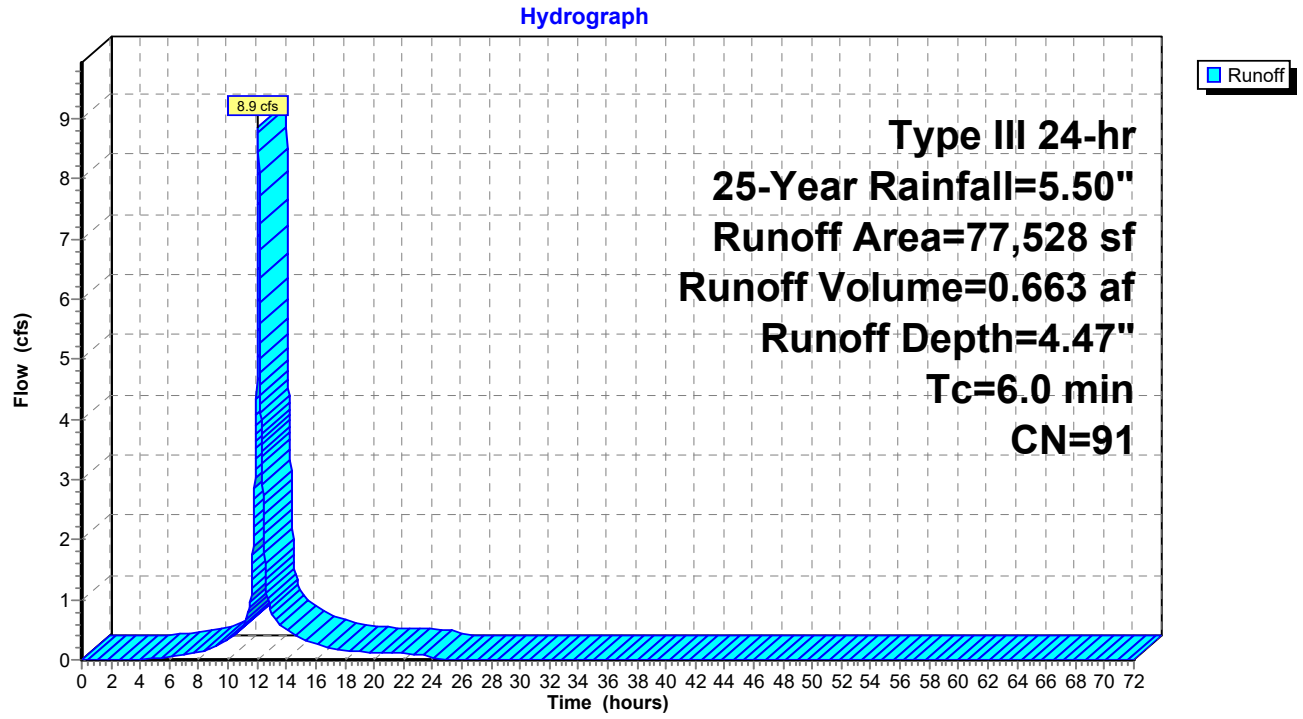
Runoff = 8.9 cfs @ 12.08 hrs, Volume= 0.663 af, Depth= 4.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.50"

	Area (sf)	CN	Description
	10,233	74	>75% Grass cover, Good, HSG C
	17,113	80	>75% Grass cover, Good, HSG D
	32,230	98	Paved roads w/curbs & sewers, HSG C
	9,455	98	Roofs, HSG D
*	8,497	98	Pond 1
	77,528	91	Weighted Average
	27,346		35.27% Pervious Area
	50,182		64.73% Impervious Area

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

Subcatchment PR-1: PR-1



Summary for Subcatchment PR-2: PR-2

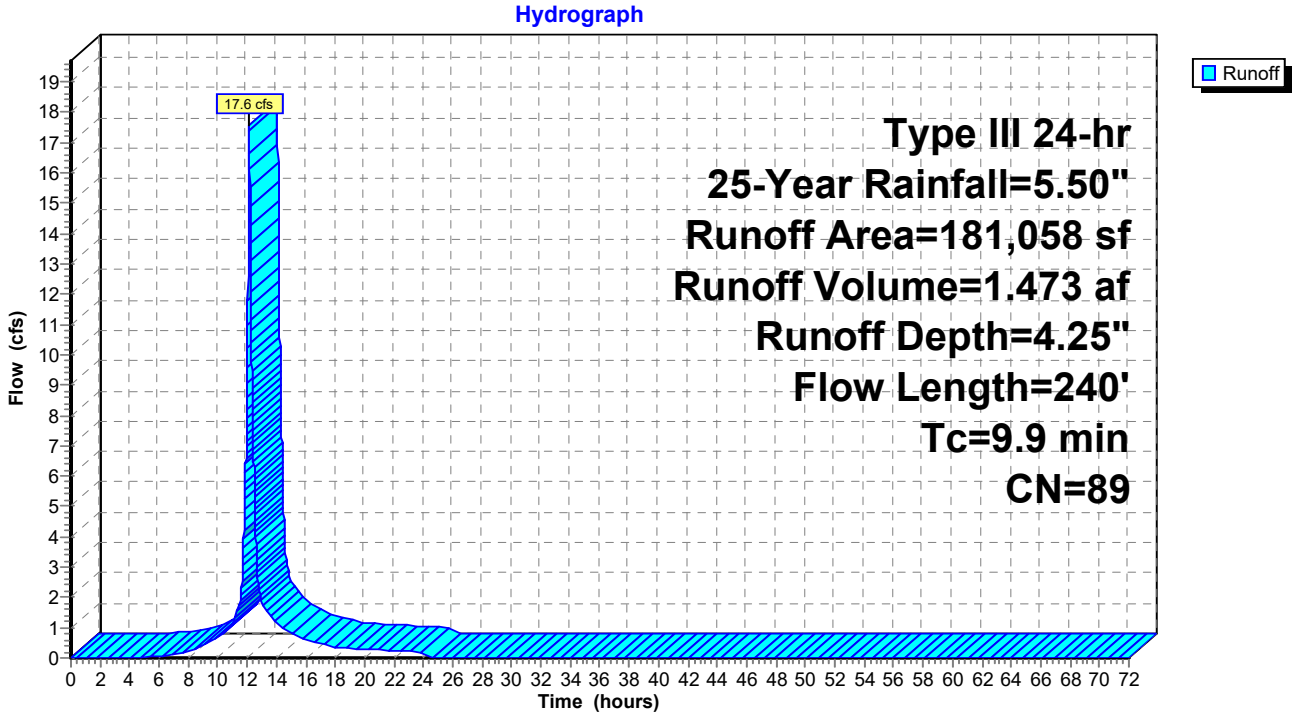
Runoff = 17.6 cfs @ 12.13 hrs, Volume= 1.473 af, Depth= 4.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.50"

	Area (sf)	CN	Description
	49,606	74	>75% Grass cover, Good, HSG C
	20,438	80	>75% Grass cover, Good, HSG D
	55,045	98	Paved roads w/curbs & sewers
*	48,936	98	Roofs
*	7,033	98	Basin 2
	181,058	89	Weighted Average
	70,044		38.69% Pervious Area
	111,014		61.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.0400	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.22"
3.7	190	0.0150	0.86		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
9.9	240	Total			

Subcatchment PR-2: PR-2



Summary for Subcatchment PR-3: PR-3

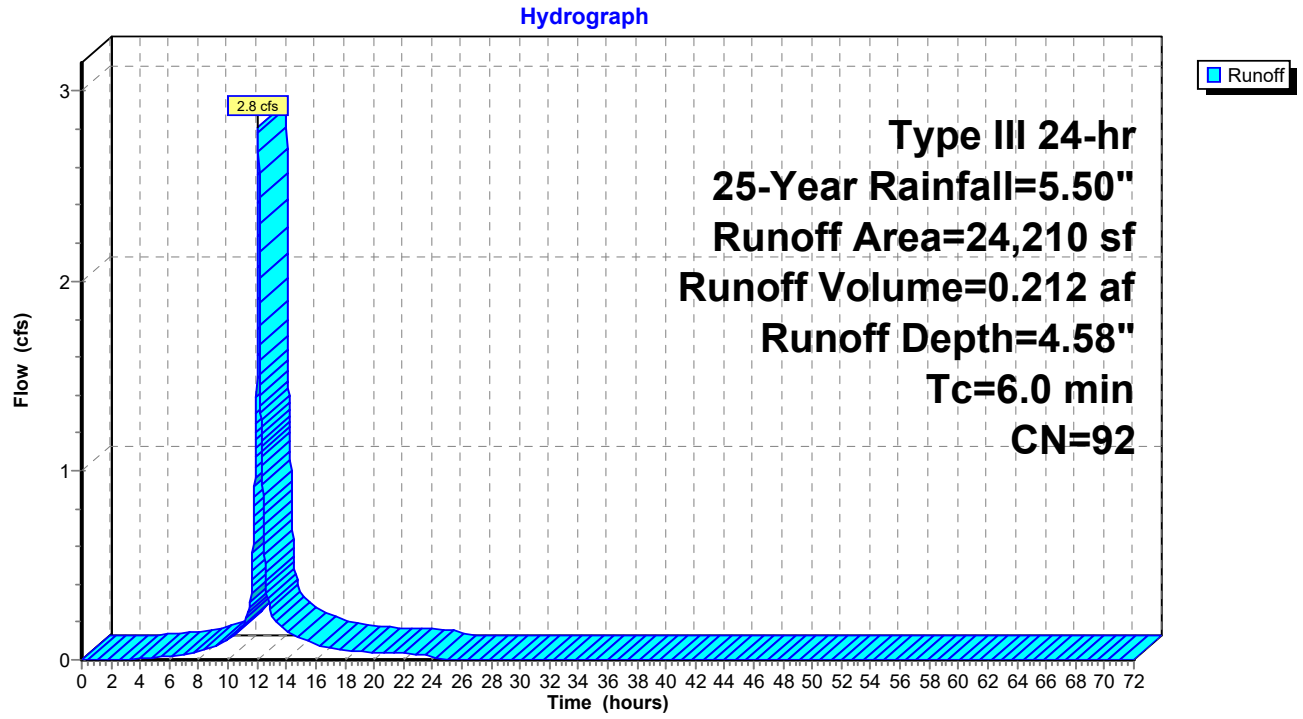
Runoff = 2.8 cfs @ 12.08 hrs, Volume= 0.212 af, Depth= 4.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Description
5,344	74	>75% Grass cover, Good, HSG C
633	80	>75% Grass cover, Good, HSG D
12,703	98	Paved roads w/curbs & sewers, HSG C
4,171	98	Roofs, HSG C
1,359	98	Roofs, HSG D
24,210	92	Weighted Average
5,977		24.69% Pervious Area
18,233		75.31% Impervious Area

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

Subcatchment PR-3: PR-3



Summary for Subcatchment PR-4: Offsite

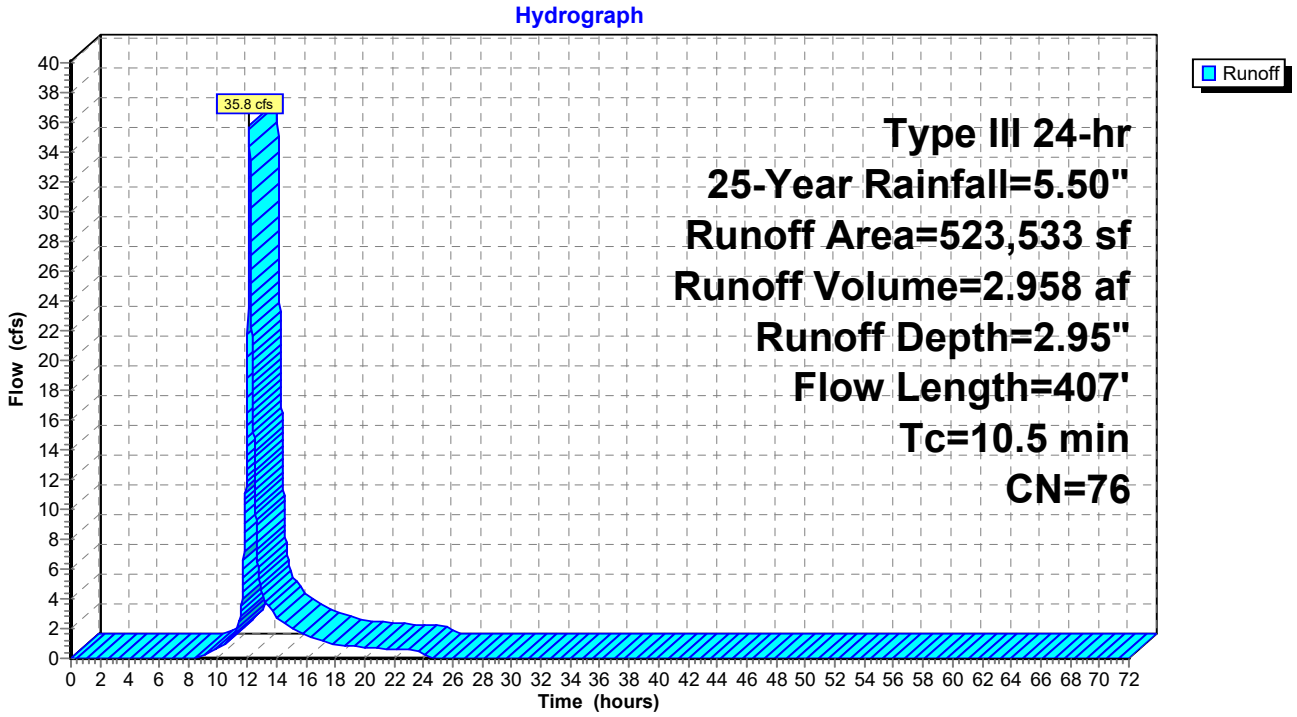
Runoff = 35.8 cfs @ 12.15 hrs, Volume= 2.958 af, Depth= 2.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.50"

	Area (sf)	CN	Description
	39,780	74	>75% Grass cover, Good, HSG C
	48,954	80	>75% Grass cover, Good, HSG D
	13,157	70	Woods, Good, HSG C
	302,368	77	Woods, Good, HSG D
	109,319	73	Brush, Good, HSG D
*	9,955	98	Roofs
	523,533	76	Weighted Average
	513,578		98.10% Pervious Area
	9,955		1.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	50	0.0150	0.13		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.22"
1.5	130	0.0450	1.48		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
2.7	227	0.0800	1.41		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
10.5	407	Total			

Subcatchment PR-4: Offsite



Summary for Subcatchment PR-5: PR-5

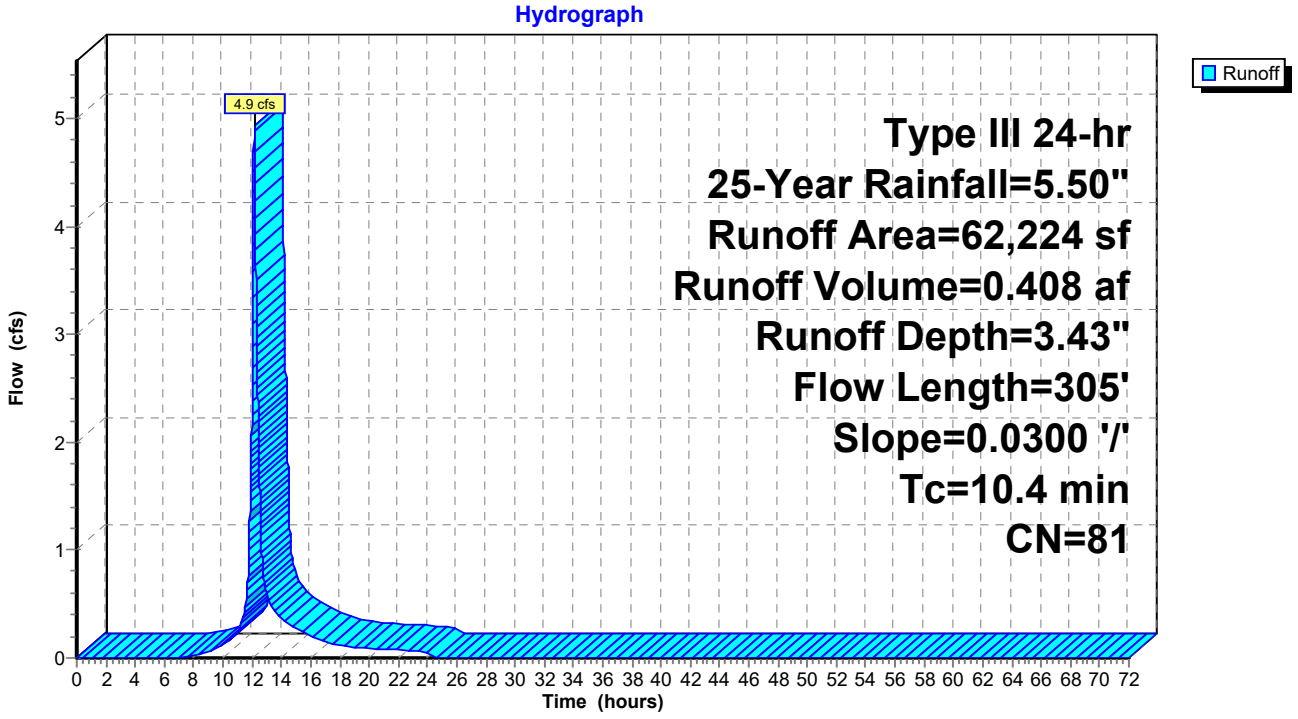
Runoff = 4.9 cfs @ 12.14 hrs, Volume= 0.408 af, Depth= 3.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.50"

	Area (sf)	CN	Description
*	10,668	98	Roofs
	24,726	77	Woods, Good, HSG D
	3,022	70	Woods, Good, HSG C
	3,082	74	>75% Grass cover, Good, HSG C
	20,726	80	>75% Grass cover, Good, HSG D
	62,224	81	Weighted Average
	51,556		82.86% Pervious Area
	10,668		17.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	50	0.0300	0.12		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.22"
3.5	255	0.0300	1.21		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
10.4	305	Total			

Subcatchment PR-5: PR-5



Summary for Subcatchment PR-6A: PR-6A

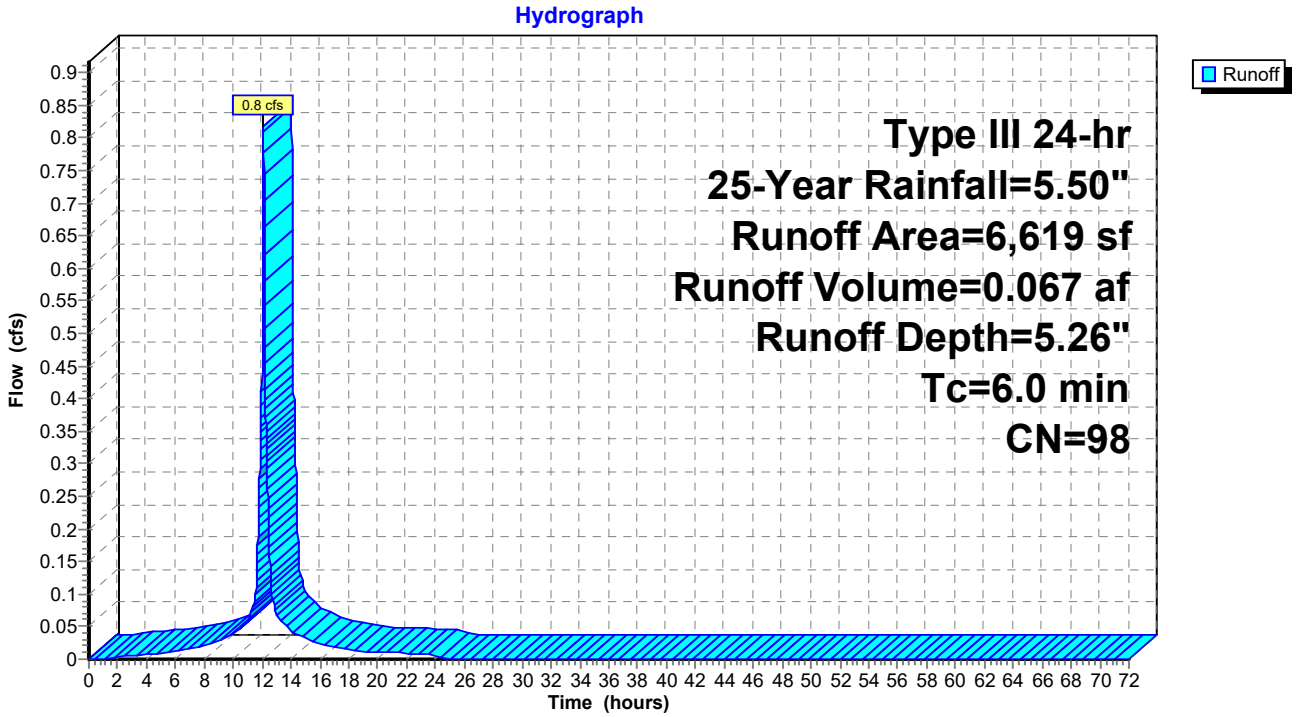
Runoff = 0.8 cfs @ 12.08 hrs, Volume= 0.067 af, Depth= 5.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Description
6,619	98	Roofs, HSG C
6,619		100.00% Impervious Area

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

Subcatchment PR-6A: PR-6A



Summary for Subcatchment PR-6B: PR-6B

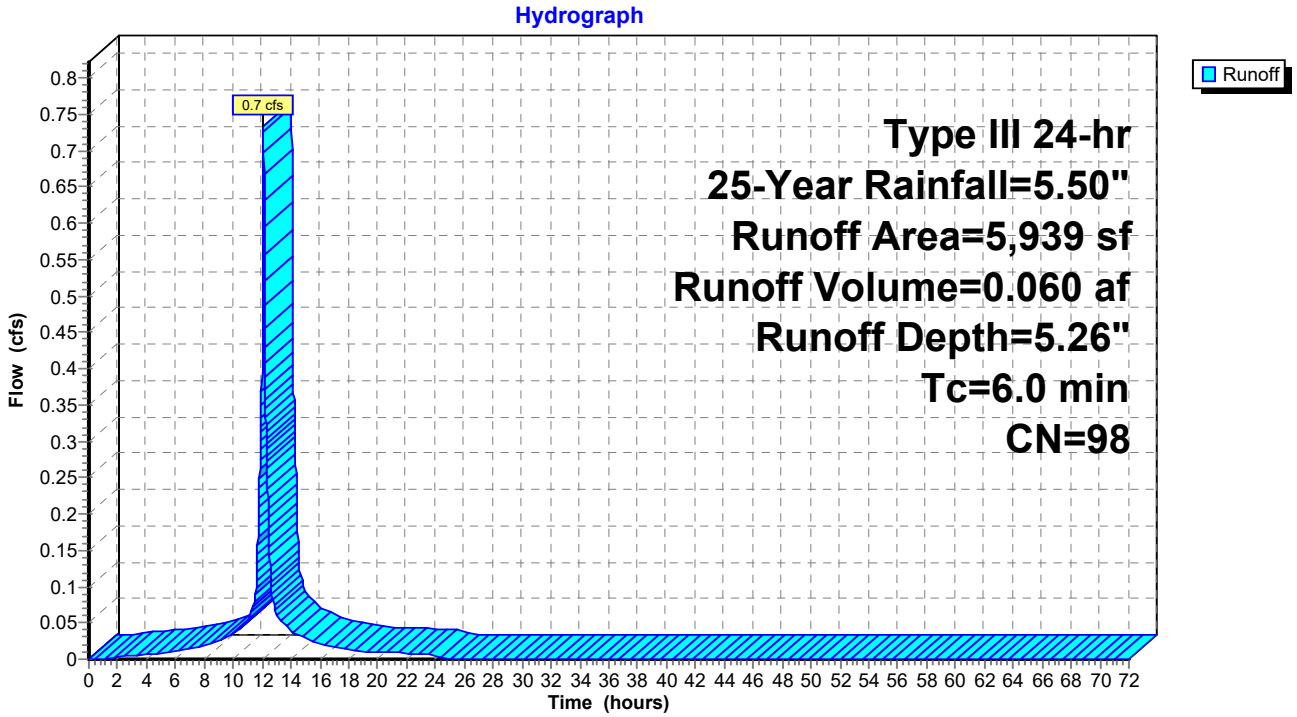
Runoff = 0.7 cfs @ 12.08 hrs, Volume= 0.060 af, Depth= 5.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Description
5,939	98	Roofs, HSG C
5,939		100.00% Impervious Area

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

Subcatchment PR-6B: PR-6B



Summary for Subcatchment PR-6C: PR-6C

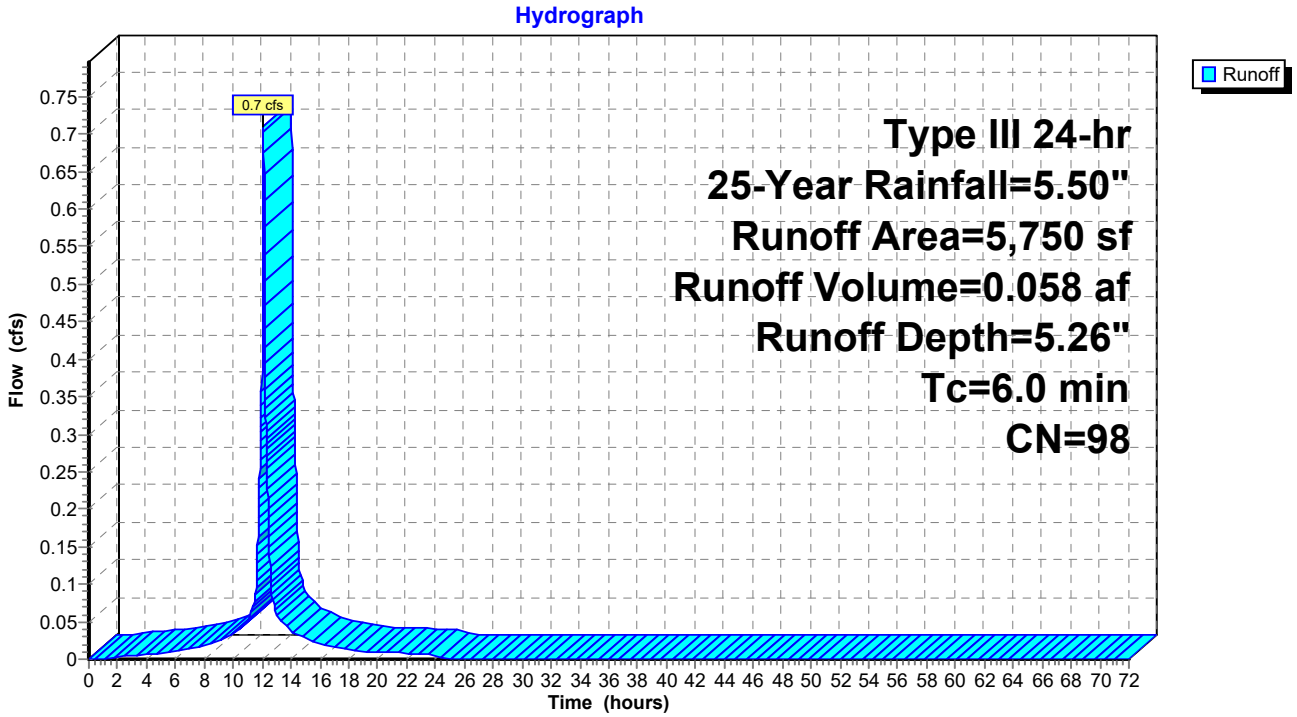
Runoff = 0.7 cfs @ 12.08 hrs, Volume= 0.058 af, Depth= 5.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.50"

Area (sf)	CN	Description
5,750	98	Roofs, HSG C
5,750		100.00% Impervious Area

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

Subcatchment PR-6C: PR-6C



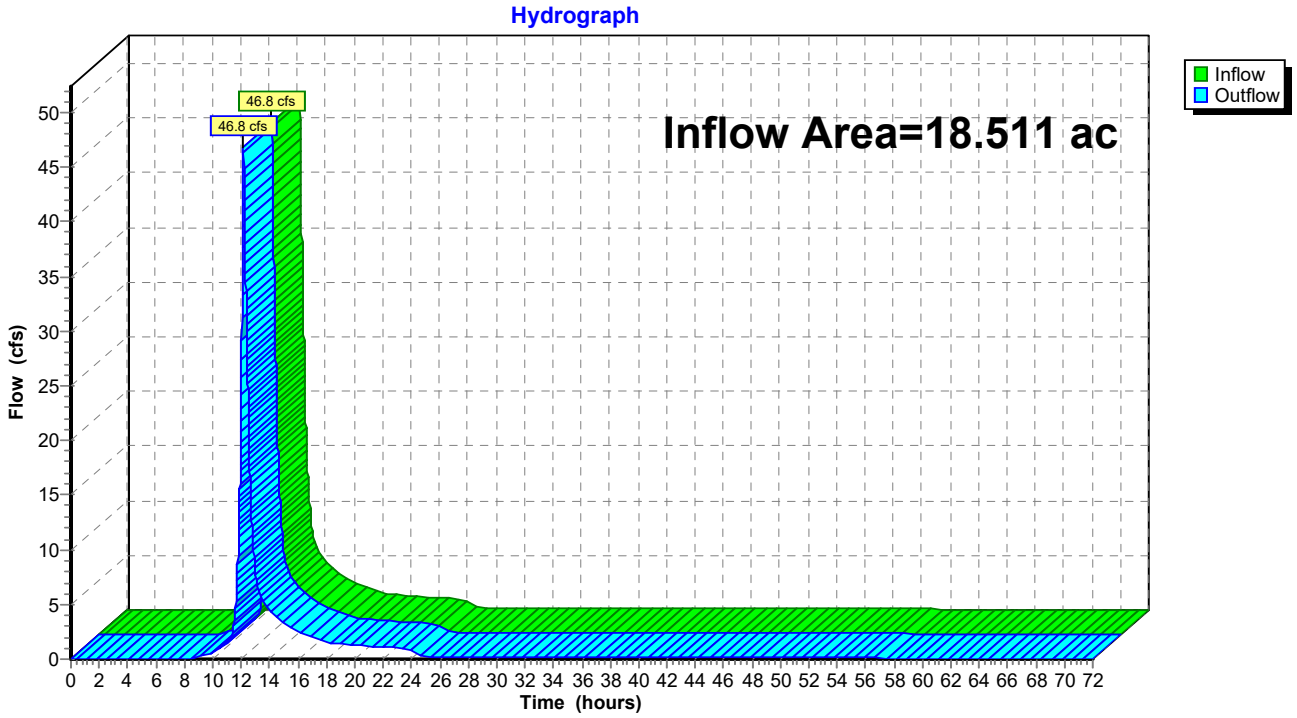
Summary for Reach AP-1P: AP-1

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 18.511 ac, 23.49% Impervious, Inflow Depth = 3.25" for 25-Year event
Inflow = 46.8 cfs @ 12.17 hrs, Volume= 5.018 af
Outflow = 46.8 cfs @ 12.17 hrs, Volume= 5.018 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3

Reach AP-1P: AP-1



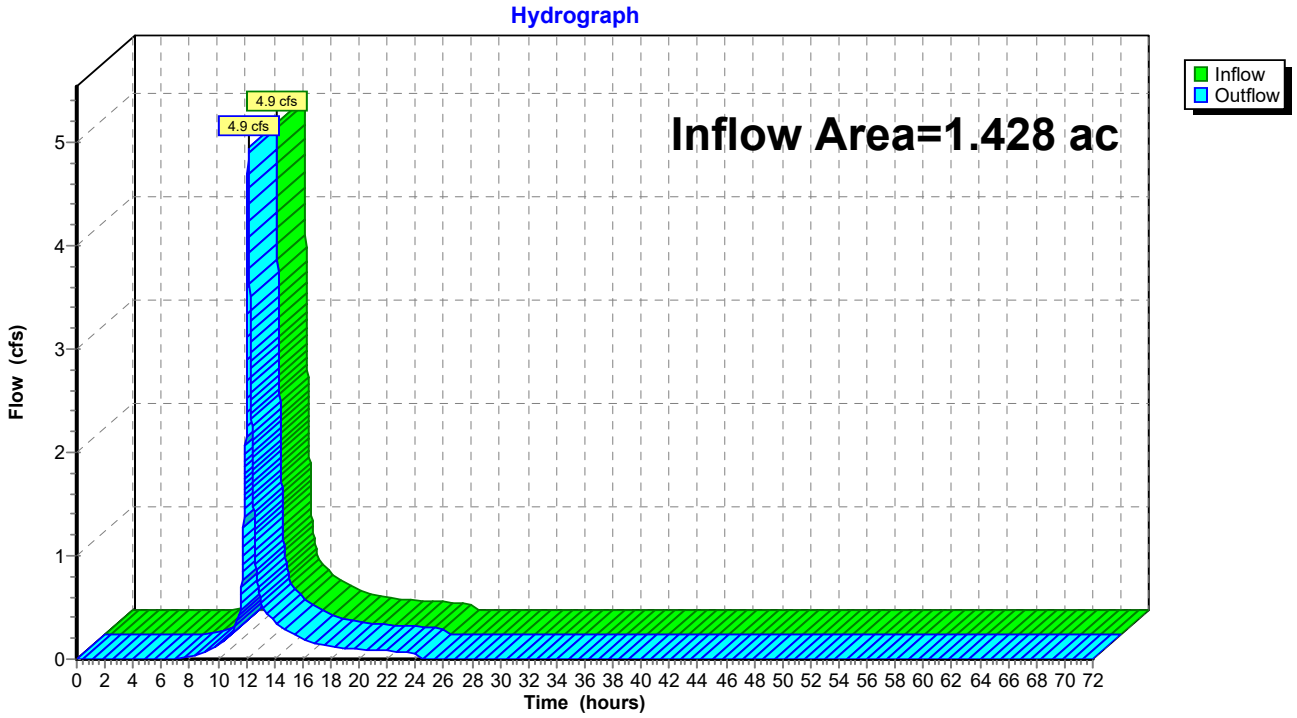
Summary for Reach AP-2P: AP-2

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.428 ac, 17.14% Impervious, Inflow Depth = 3.43" for 25-Year event
Inflow = 4.9 cfs @ 12.14 hrs, Volume= 0.408 af
Outflow = 4.9 cfs @ 12.14 hrs, Volume= 0.408 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3

Reach AP-2P: AP-2



Summary for Pond 1P: pond 1

Inflow Area = 1.780 ac, 64.73% Impervious, Inflow Depth = 4.47" for 25-Year event
Inflow = 8.9 cfs @ 12.08 hrs, Volume= 0.663 af
Outflow = 0.2 cfs @ 16.87 hrs, Volume= 0.663 af, Atten= 98%, Lag= 287.3 min
Primary = 0.2 cfs @ 16.87 hrs, Volume= 0.663 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 252.14' @ 16.87 hrs Surf.Area= 7,555 sf Storage= 19,956 cf
Flood Elev= 253.00' Surf.Area= 8,579 sf Storage= 26,860 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 1,022.8 min (1,806.5 - 783.8)

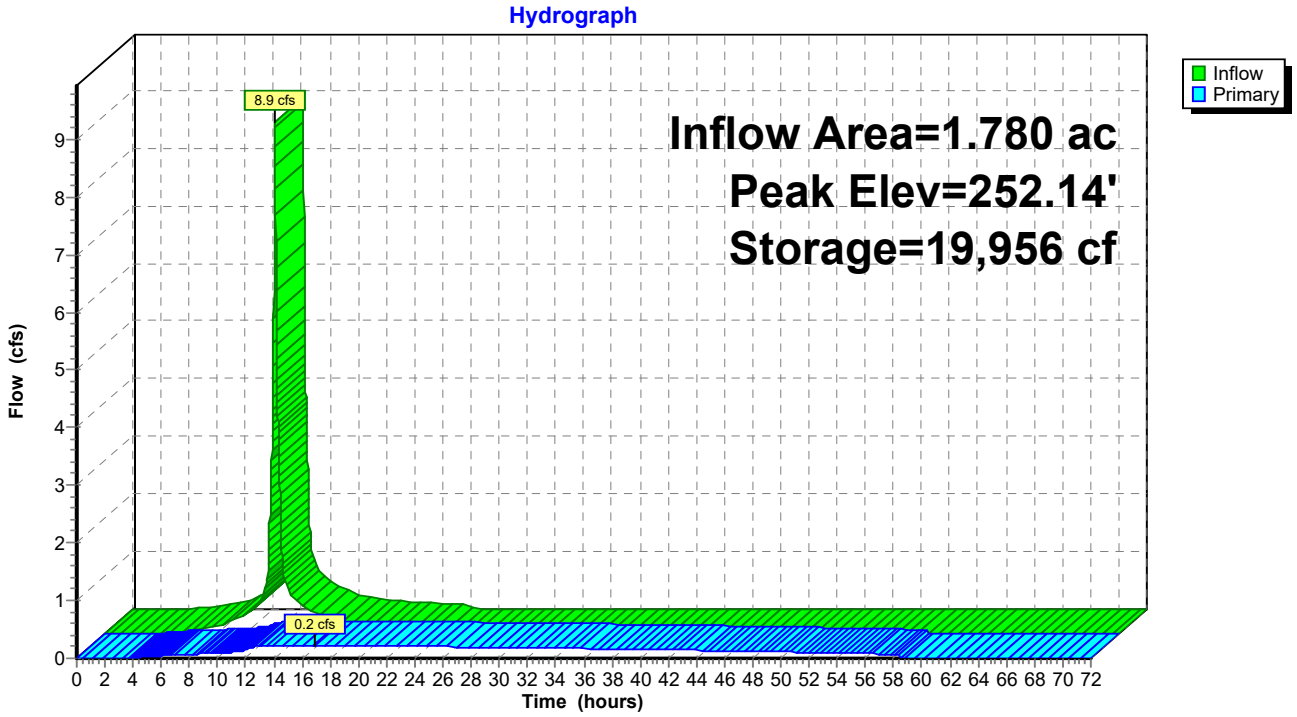
Volume	Invert	Avail.Storage	Storage Description
#1	248.50'	26,860 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
248.50	3,516	0	0
249.00	4,022	1,885	1,885
251.00	6,187	10,209	12,094
253.00	8,579	14,766	26,860

Device	Routing	Invert	Outlet Devices
#1	Primary	247.00'	**12.0" Round Culvert** L= 60.4' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 247.00' / 246.43' S= 0.0094 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	248.00'	**2.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	252.40'	**2.0" x 2.0" Horiz. Orifice/Grate X 6.00 columns** X 6 rows C= 0.600 in 24.0" x 24.0" Grate (25% open area) Limited to weir flow at low heads

Primary OutFlow Max=0.2 cfs @ 16.87 hrs HW=252.14' TW=243.55' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.2 cfs of 7.2 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.2 cfs @ 9.70 fps)
  └─**3=Orifice/Grate** (Controls 0.0 cfs)

Pond 1P: pond 1



Summary for Pond 2P: Pond 2

Inflow Area = 6.492 ac, 63.45% Impervious, Inflow Depth = 4.34" for 25-Year event
Inflow = 20.2 cfs @ 12.13 hrs, Volume= 2.348 af
Outflow = 14.0 cfs @ 12.24 hrs, Volume= 2.060 af, Atten= 31%, Lag= 6.9 min
Primary = 14.0 cfs @ 12.24 hrs, Volume= 2.060 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 245.26' @ 12.24 hrs Surf.Area= 6,495 sf Storage= 23,707 cf
Flood Elev= 245.50' Surf.Area= 6,671 sf Storage= 25,306 cf

Plug-Flow detention time= 305.3 min calculated for 2.060 af (88% of inflow)
Center-of-Mass det. time= 94.9 min (1,173.9 - 1,079.0)

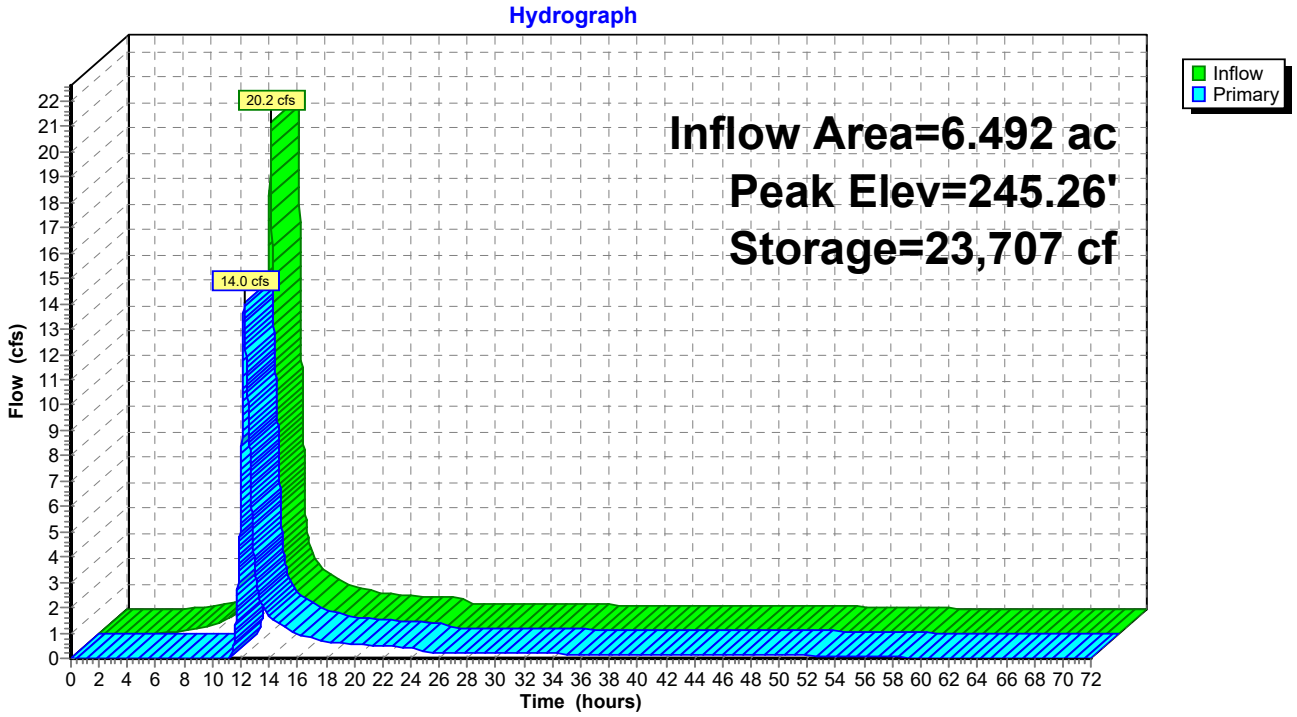
Volume	Invert	Avail.Storage	Storage Description
#1	240.00'	28,732 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
240.00	3,158	0	0
243.00	4,293	11,177	11,177
244.00	5,584	4,939	16,115
246.00	7,033	12,617	28,732

Device	Routing	Invert	Outlet Devices
#1	Primary	234.00'	**24.0" Round Culvert** L= 61.6' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 234.00' / 232.00' S= 0.0325 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	243.30'	**24.0" W x 12.0" H Vert. Orifice/Grate** C= 0.600
#3	Device 1	245.05'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Primary	245.50'	**10.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=14.0 cfs @ 12.24 hrs HW=245.26' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Passes 14.0 cfs of 42.7 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 11.6 cfs @ 5.78 fps)
  - **3=Orifice/Grate** (Weir Controls 2.5 cfs @ 1.49 fps)
- **4=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Pond 2P: Pond 2



Summary for Pond 4P: Cultec System #1

Inflow Area = 0.152 ac,100.00% Impervious, Inflow Depth = 5.26" for 25-Year event
Inflow = 0.8 cfs @ 12.08 hrs, Volume= 0.067 af
Outflow = 0.0 cfs @ 10.82 hrs, Volume= 0.067 af, Atten= 94%, Lag= 0.0 min
Discarded = 0.0 cfs @ 10.82 hrs, Volume= 0.067 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 2.39' @ 13.90 hrs Surf.Area= 810 sf Storage= 1,229 cf

Plug-Flow detention time= 214.9 min calculated for 0.067 af (100% of inflow)
Center-of-Mass det. time= 214.9 min (961.4 - 746.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	804 cf	**13.17'W x 61.50'L x 3.54'H Field A** 2,868 cf Overall - 857 cf Embedded = 2,011 cf x 40.0% Voids
#2A	0.50'	857 cf	**Cultec R-330XLHD** x 16 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 2 rows
		1,661 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.0 cfs @ 10.82 hrs HW=0.04' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.0 cfs)

Pond 4P: Cultec System #1 - Chamber Wizard Field A

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

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

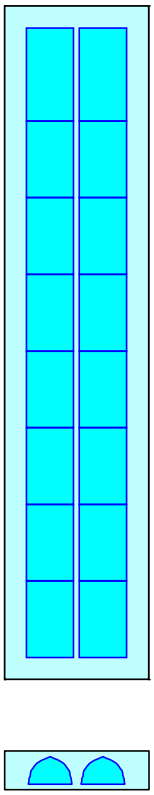
8 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 57.50' Row Length +24.0" End Stone x 2 = 61.50' Base Length
2 Rows x 52.0" Wide + 6.0" Spacing x 1 + 24.0" Side Stone x 2 = 13.17' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

16 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 2 Rows = 856.9 cf Chamber Storage

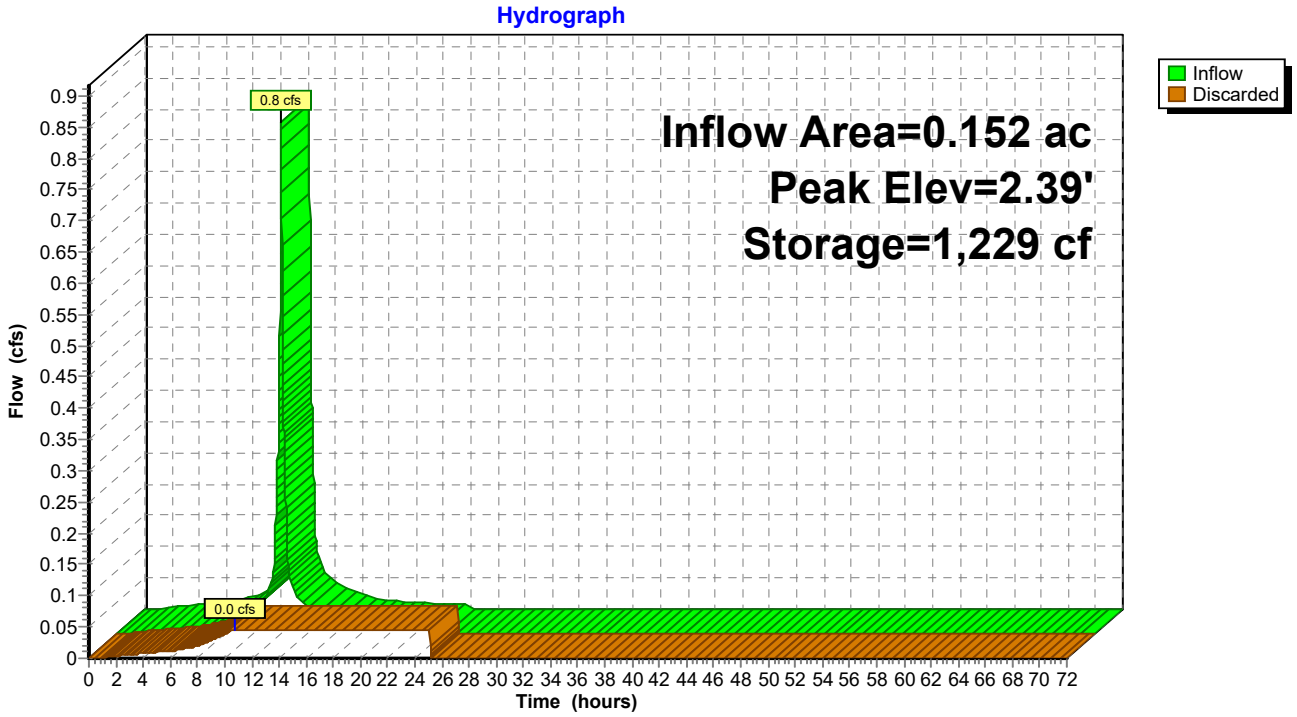
2,867.9 cf Field - 856.9 cf Chambers = 2,011.0 cf Stone x 40.0% Voids = 804.4 cf Stone Storage

Chamber Storage + Stone Storage = 1,661.3 cf = 0.038 af
Overall Storage Efficiency = 57.9%
Overall System Size = 61.50' x 13.17' x 3.54'

16 Chambers
106.2 cy Field
74.5 cy Stone



Pond 4P: Cultec System #1



Summary for Pond 6P: Cultec System #2

Inflow Area = 0.136 ac,100.00% Impervious, Inflow Depth = 5.26" for 25-Year event
Inflow = 0.7 cfs @ 12.08 hrs, Volume= 0.060 af
Outflow = 0.0 cfs @ 11.10 hrs, Volume= 0.060 af, Atten= 94%, Lag= 0.0 min
Discarded = 0.0 cfs @ 11.10 hrs, Volume= 0.060 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 2.04' @ 13.64 hrs Surf.Area= 810 sf Storage= 1,048 cf

Plug-Flow detention time= 177.8 min calculated for 0.060 af (100% of inflow)
Center-of-Mass det. time= 177.8 min (924.3 - 746.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	804 cf	**13.17'W x 61.50'L x 3.54'H Field A** 2,868 cf Overall - 857 cf Embedded = 2,011 cf x 40.0% Voids
#2A	0.50'	857 cf	**Cultec R-330XLHD** x 16 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 2 rows
		1,661 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.0 cfs @ 11.10 hrs HW=0.04' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.0 cfs)

Pond 6P: Cultec System #2 - Chamber Wizard Field A

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

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

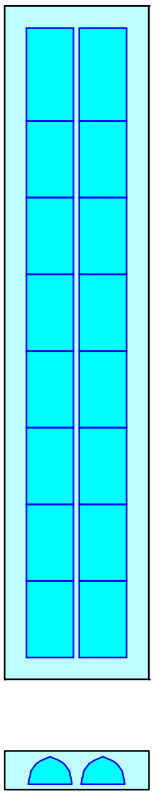
8 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 57.50' Row Length +24.0" End Stone x 2 = 61.50' Base Length
2 Rows x 52.0" Wide + 6.0" Spacing x 1 + 24.0" Side Stone x 2 = 13.17' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

16 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 2 Rows = 856.9 cf Chamber Storage

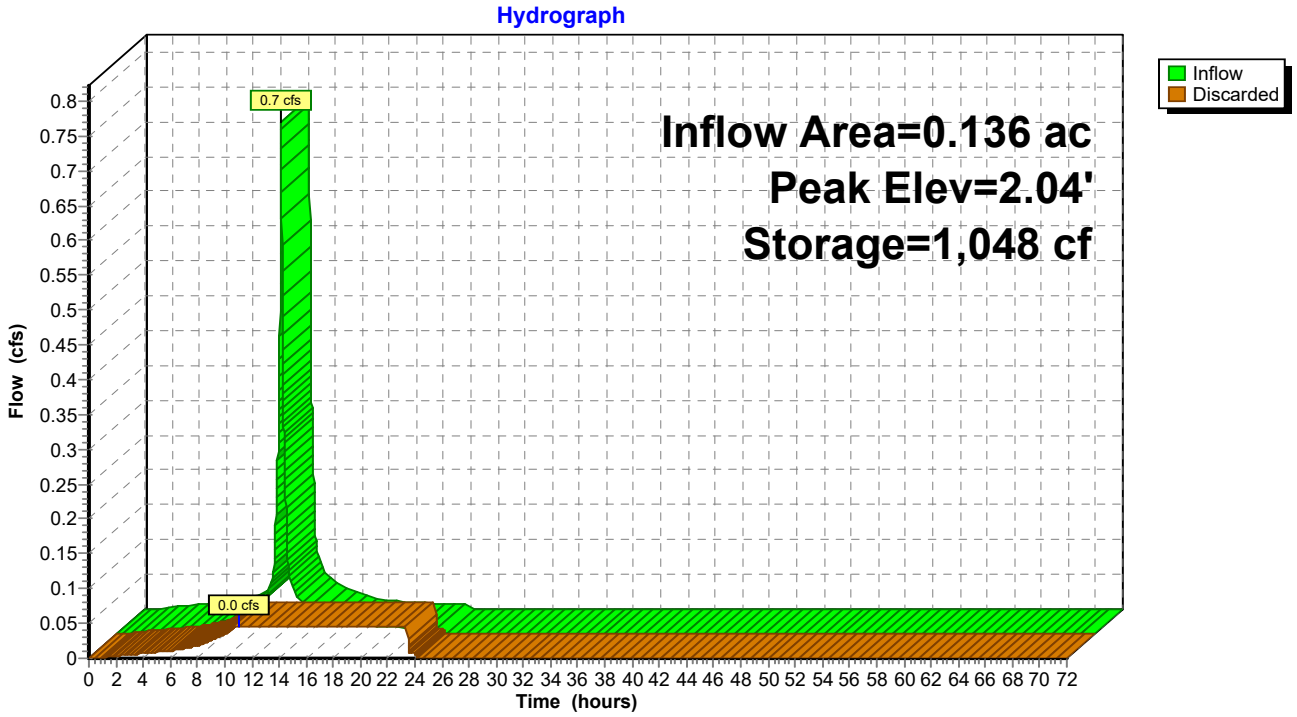
2,867.9 cf Field - 856.9 cf Chambers = 2,011.0 cf Stone x 40.0% Voids = 804.4 cf Stone Storage

Chamber Storage + Stone Storage = 1,661.3 cf = 0.038 af
Overall Storage Efficiency = 57.9%
Overall System Size = 61.50' x 13.17' x 3.54'

16 Chambers
106.2 cy Field
74.5 cy Stone



Pond 6P: Cultec System #2



Summary for Pond 16P: Cultec System #3

Inflow Area = 0.132 ac,100.00% Impervious, Inflow Depth = 5.26" for 25-Year event
Inflow = 0.7 cfs @ 12.08 hrs, Volume= 0.058 af
Outflow = 0.0 cfs @ 10.81 hrs, Volume= 0.058 af, Atten= 95%, Lag= 0.0 min
Discarded = 0.0 cfs @ 10.81 hrs, Volume= 0.058 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 2.32' @ 13.91 hrs Surf.Area= 700 sf Storage= 1,070 cf

Plug-Flow detention time= 216.7 min calculated for 0.058 af (100% of inflow)
Center-of-Mass det. time= 216.7 min (963.2 - 746.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	665 cf	**17.50'W x 40.00'L x 3.54'H Field A** 2,479 cf Overall - 816 cf Embedded = 1,663 cf x 40.0% Voids
#2A	0.50'	816 cf	**Cultec R-330XLHD** x 15 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 3 rows
		1,481 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.0 cfs @ 10.81 hrs HW=0.04' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.0 cfs)

Pond 16P: Cultec System #3 - Chamber Wizard Field A

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

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

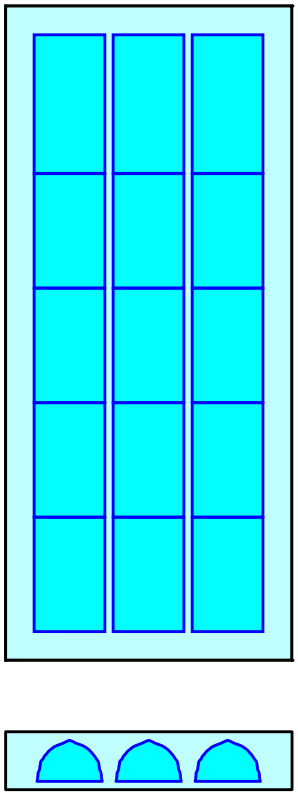
5 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 36.50' Row Length +21.0" End Stone x 2 = 40.00' Base Length
3 Rows x 52.0" Wide + 6.0" Spacing x 2 + 21.0" Side Stone x 2 = 17.50' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

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

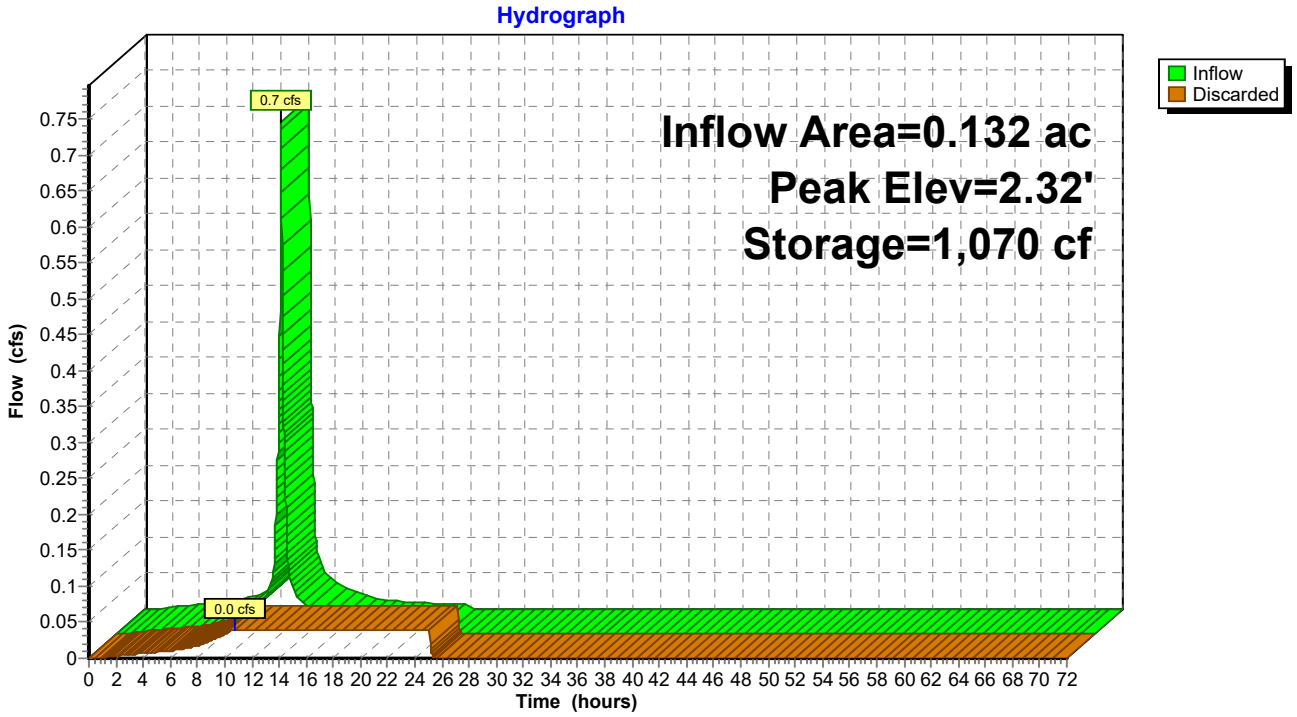
2,479.2 cf Field - 815.9 cf Chambers = 1,663.3 cf Stone x 40.0% Voids = 665.3 cf Stone Storage

Chamber Storage + Stone Storage = 1,481.2 cf = 0.034 af
Overall Storage Efficiency = 59.7%
Overall System Size = 40.00' x 17.50' x 3.54'

15 Chambers
91.8 cy Field
61.6 cy Stone



Pond 16P: Cultec System #3



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment PR-1: PR-1 Runoff Area=77,528 sf 64.73% Impervious Runoff Depth=5.64"
Tc=6.0 min CN=91 Runoff=11.1 cfs 0.837 af

Subcatchment PR-2: PR-2 Runoff Area=181,058 sf 61.31% Impervious Runoff Depth=5.42"
Flow Length=240' Tc=9.9 min CN=89 Runoff=22.1 cfs 1.876 af

Subcatchment PR-3: PR-3 Runoff Area=24,210 sf 75.31% Impervious Runoff Depth=5.76"
Tc=6.0 min CN=92 Runoff=3.5 cfs 0.267 af

Subcatchment PR-4: Offsite Runoff Area=523,533 sf 1.90% Impervious Runoff Depth=3.99"
Flow Length=407' Tc=10.5 min CN=76 Runoff=48.3 cfs 3.998 af

Subcatchment PR-5: PR-5 Runoff Area=62,224 sf 17.14% Impervious Runoff Depth=4.53"
Flow Length=305' Slope=0.0300 '/' Tc=10.4 min CN=81 Runoff=6.5 cfs 0.539 af

Subcatchment PR-6A: PR-6A Runoff Area=6,619 sf 100.00% Impervious Runoff Depth=6.46"
Tc=6.0 min CN=98 Runoff=1.0 cfs 0.082 af

Subcatchment PR-6B: PR-6B Runoff Area=5,939 sf 100.00% Impervious Runoff Depth=6.46"
Tc=6.0 min CN=98 Runoff=0.9 cfs 0.073 af

Subcatchment PR-6C: PR-6C Runoff Area=5,750 sf 100.00% Impervious Runoff Depth=6.46"
Tc=6.0 min CN=98 Runoff=0.9 cfs 0.071 af

Reach AP-1P: AP-1 Inflow=66.6 cfs 6.690 af
Outflow=66.6 cfs 6.690 af

Reach AP-2P: AP-2 Inflow=6.5 cfs 0.539 af
Outflow=6.5 cfs 0.539 af

Pond 1P: pond 1 Peak Elev=252.48' Storage=22,527 cf Inflow=11.1 cfs 0.837 af
Outflow=0.8 cfs 0.837 af

Pond 2P: Pond 2 Peak Elev=245.50' Storage=25,299 cf Inflow=25.3 cfs 2.980 af
Outflow=20.4 cfs 2.692 af

Pond 4P: Cultec System #1 Peak Elev=3.49' Storage=1,646 cf Inflow=1.0 cfs 0.082 af
Outflow=0.0 cfs 0.082 af

Pond 6P: Cultec System #2 Peak Elev=2.78' Storage=1,404 cf Inflow=0.9 cfs 0.073 af
Outflow=0.0 cfs 0.073 af

Pond 16P: Cultec System #3 Peak Elev=3.37' Storage=1,433 cf Inflow=0.9 cfs 0.071 af
Outflow=0.0 cfs 0.071 af

Total Runoff Area = 20.360 ac Runoff Volume = 7.742 af Average Runoff Depth = 4.56"
75.38% Pervious = 15.347 ac 24.62% Impervious = 5.013 ac

Summary for Subcatchment PR-1: PR-1

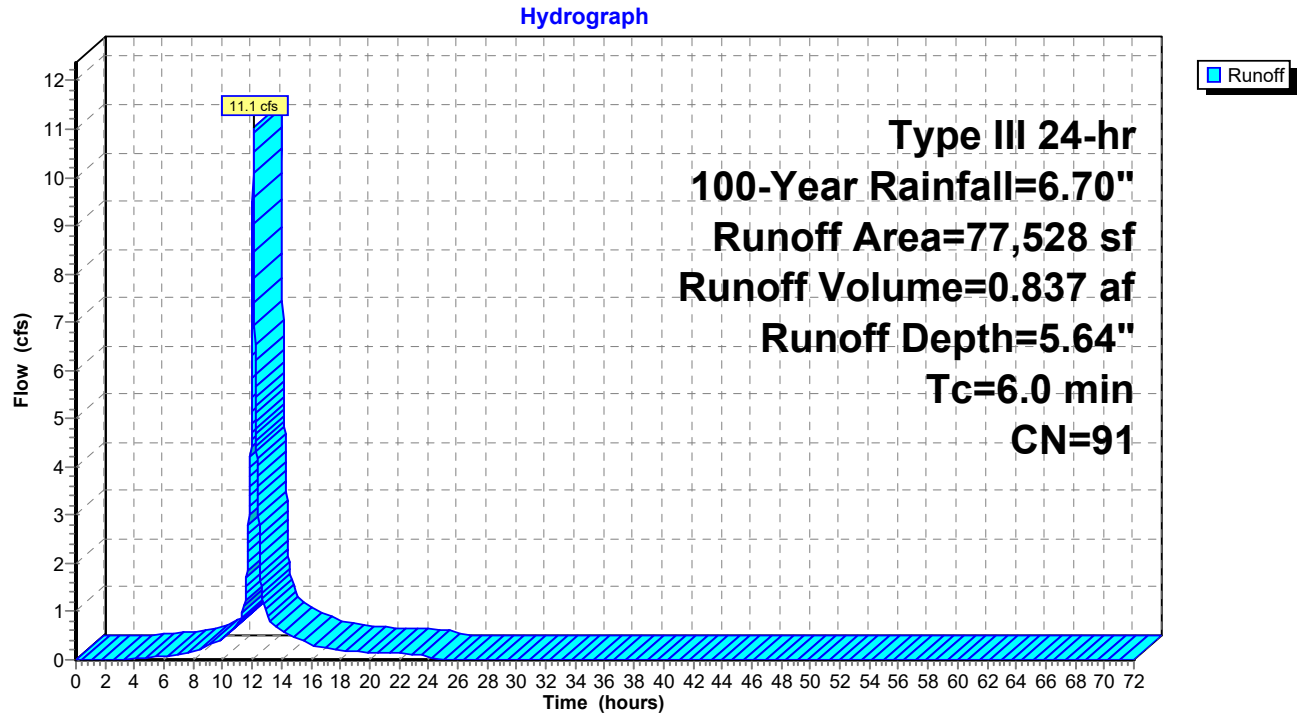
Runoff = 11.1 cfs @ 12.08 hrs, Volume= 0.837 af, Depth= 5.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=6.70"

	Area (sf)	CN	Description
	10,233	74	>75% Grass cover, Good, HSG C
	17,113	80	>75% Grass cover, Good, HSG D
	32,230	98	Paved roads w/curbs & sewers, HSG C
	9,455	98	Roofs, HSG D
*	8,497	98	Pond 1
	77,528	91	Weighted Average
	27,346		35.27% Pervious Area
	50,182		64.73% Impervious Area

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

Subcatchment PR-1: PR-1



Summary for Subcatchment PR-2: PR-2

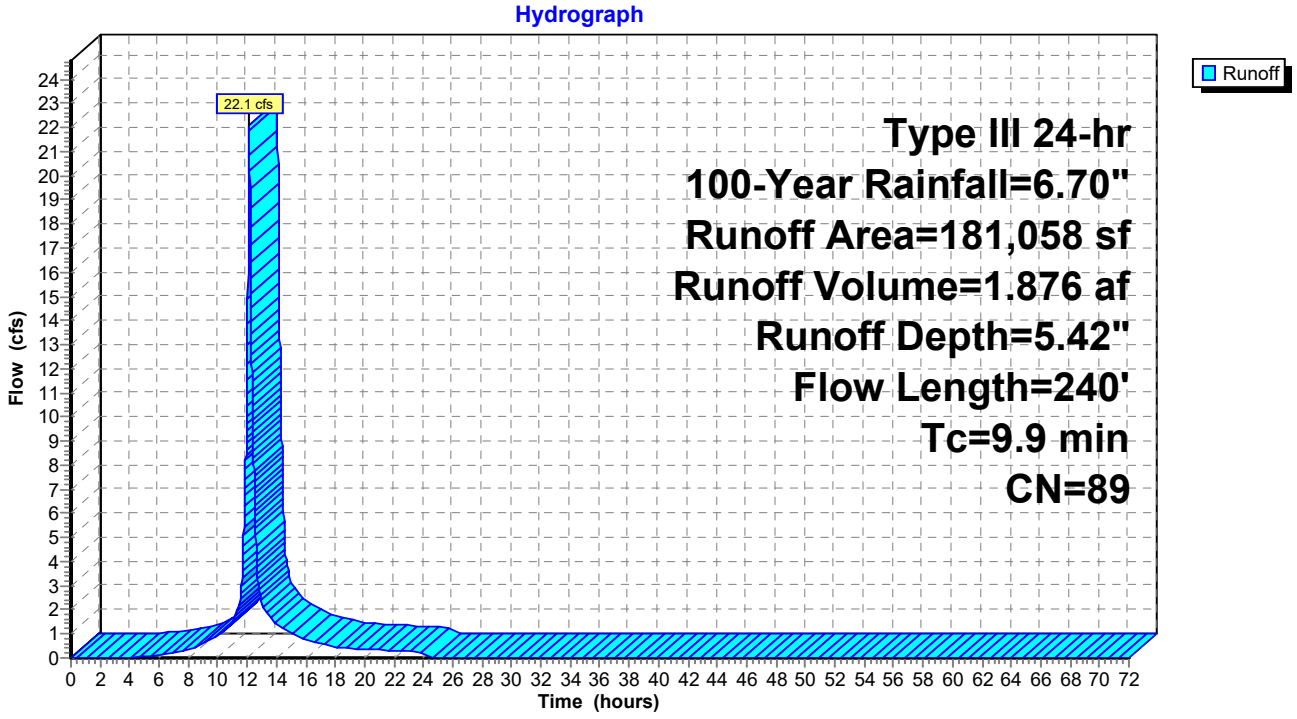
Runoff = 22.1 cfs @ 12.13 hrs, Volume= 1.876 af, Depth= 5.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=6.70"

	Area (sf)	CN	Description
	49,606	74	>75% Grass cover, Good, HSG C
	20,438	80	>75% Grass cover, Good, HSG D
	55,045	98	Paved roads w/curbs & sewers
*	48,936	98	Roofs
*	7,033	98	Basin 2
	181,058	89	Weighted Average
	70,044		38.69% Pervious Area
	111,014		61.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.0400	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.22"
3.7	190	0.0150	0.86		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
9.9	240	Total			

Subcatchment PR-2: PR-2



Summary for Subcatchment PR-3: PR-3

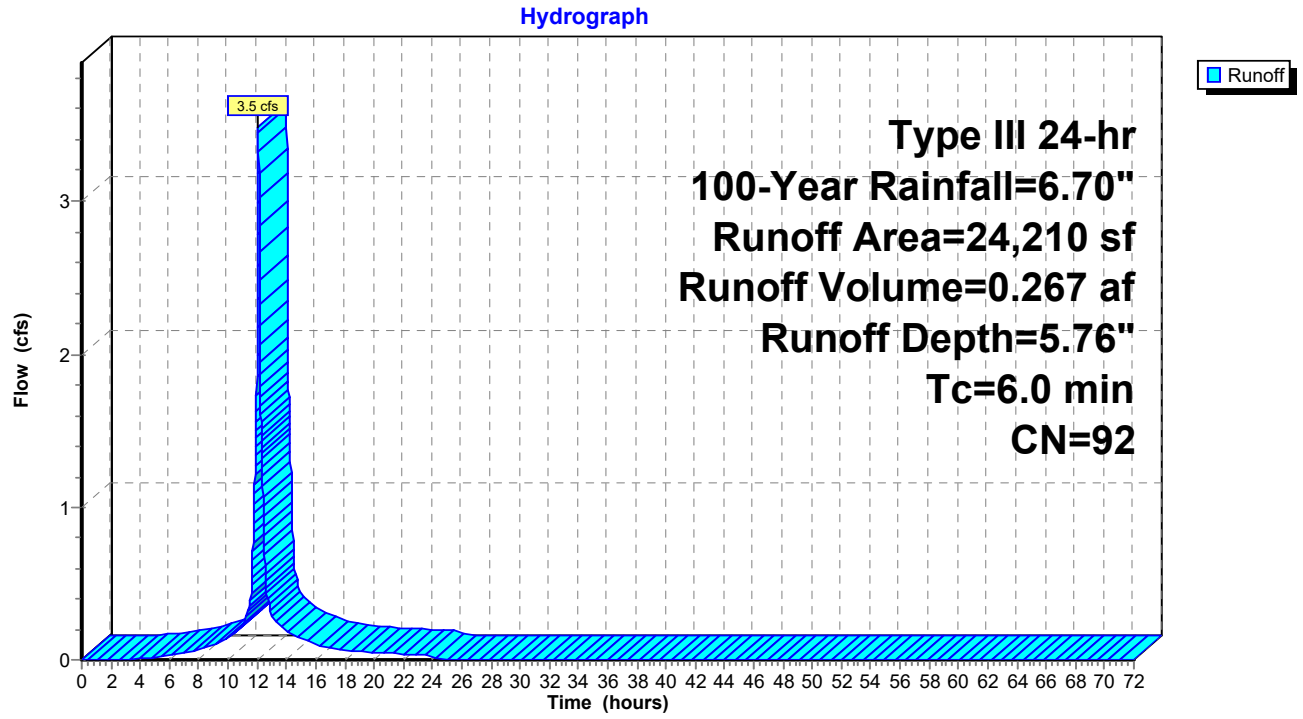
Runoff = 3.5 cfs @ 12.08 hrs, Volume= 0.267 af, Depth= 5.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=6.70"

Area (sf)	CN	Description
5,344	74	>75% Grass cover, Good, HSG C
633	80	>75% Grass cover, Good, HSG D
12,703	98	Paved roads w/curbs & sewers, HSG C
4,171	98	Roofs, HSG C
1,359	98	Roofs, HSG D
24,210	92	Weighted Average
5,977		24.69% Pervious Area
18,233		75.31% Impervious Area

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

Subcatchment PR-3: PR-3



Summary for Subcatchment PR-4: Offsite

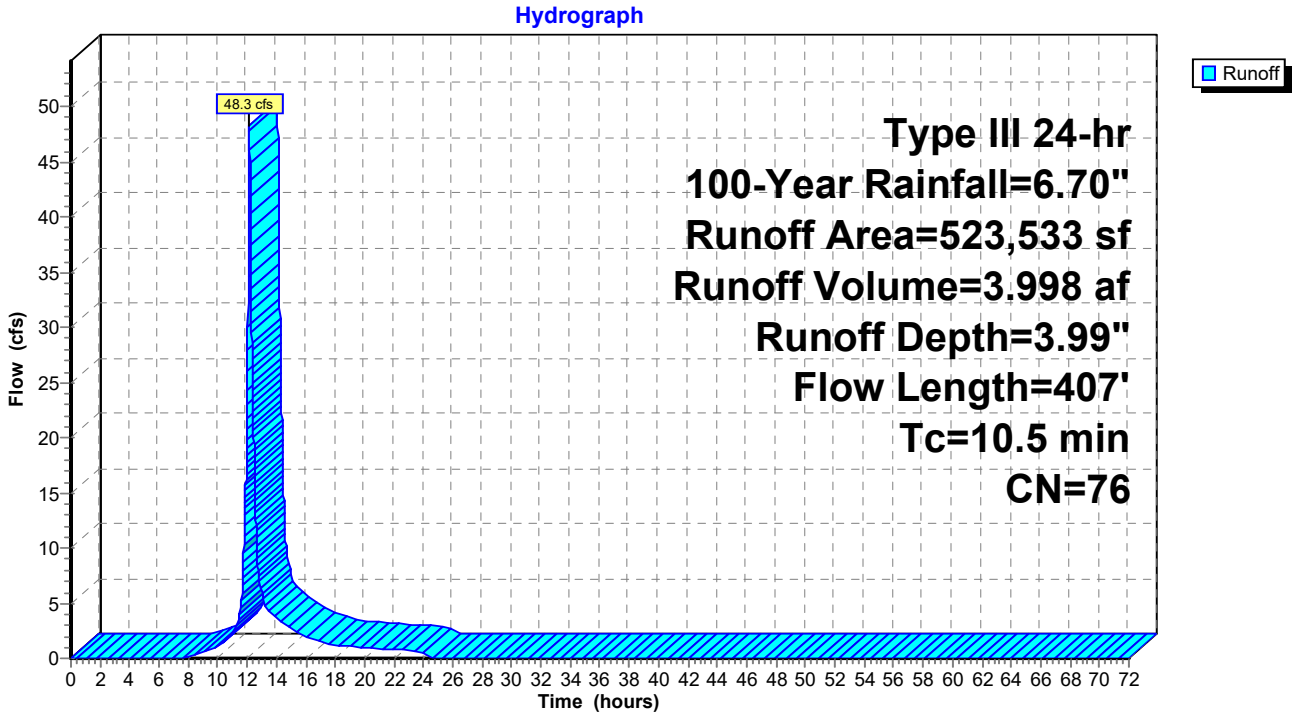
Runoff = 48.3 cfs @ 12.15 hrs, Volume= 3.998 af, Depth= 3.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=6.70"

	Area (sf)	CN	Description
	39,780	74	>75% Grass cover, Good, HSG C
	48,954	80	>75% Grass cover, Good, HSG D
	13,157	70	Woods, Good, HSG C
	302,368	77	Woods, Good, HSG D
	109,319	73	Brush, Good, HSG D
*	9,955	98	Roofs
	523,533	76	Weighted Average
	513,578		98.10% Pervious Area
	9,955		1.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	50	0.0150	0.13		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.22"
1.5	130	0.0450	1.48		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
2.7	227	0.0800	1.41		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
10.5	407	Total			

Subcatchment PR-4: Offsite



Summary for Subcatchment PR-5: PR-5

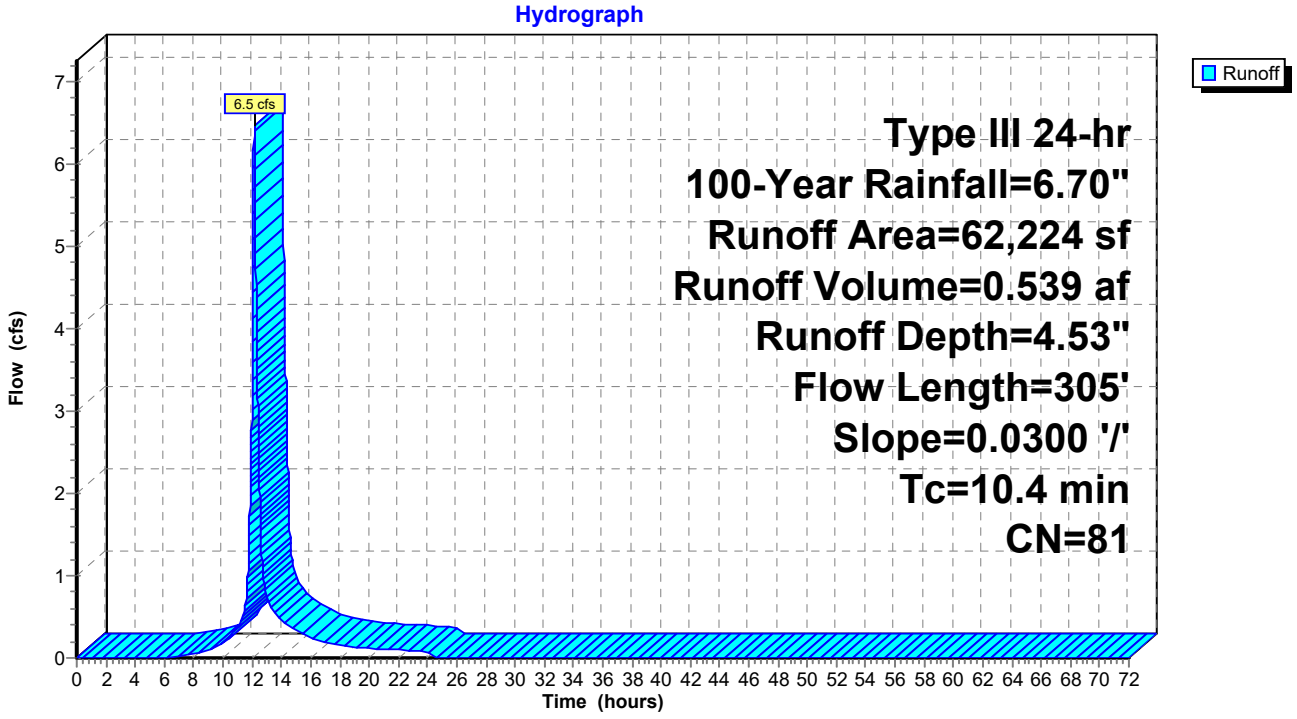
Runoff = 6.5 cfs @ 12.14 hrs, Volume= 0.539 af, Depth= 4.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=6.70"

	Area (sf)	CN	Description
*	10,668	98	Roofs
	24,726	77	Woods, Good, HSG D
	3,022	70	Woods, Good, HSG C
	3,082	74	>75% Grass cover, Good, HSG C
	20,726	80	>75% Grass cover, Good, HSG D
	62,224	81	Weighted Average
	51,556		82.86% Pervious Area
	10,668		17.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	50	0.0300	0.12		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.22"
3.5	255	0.0300	1.21		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
10.4	305	Total			

Subcatchment PR-5: PR-5



Summary for Subcatchment PR-6A: PR-6A

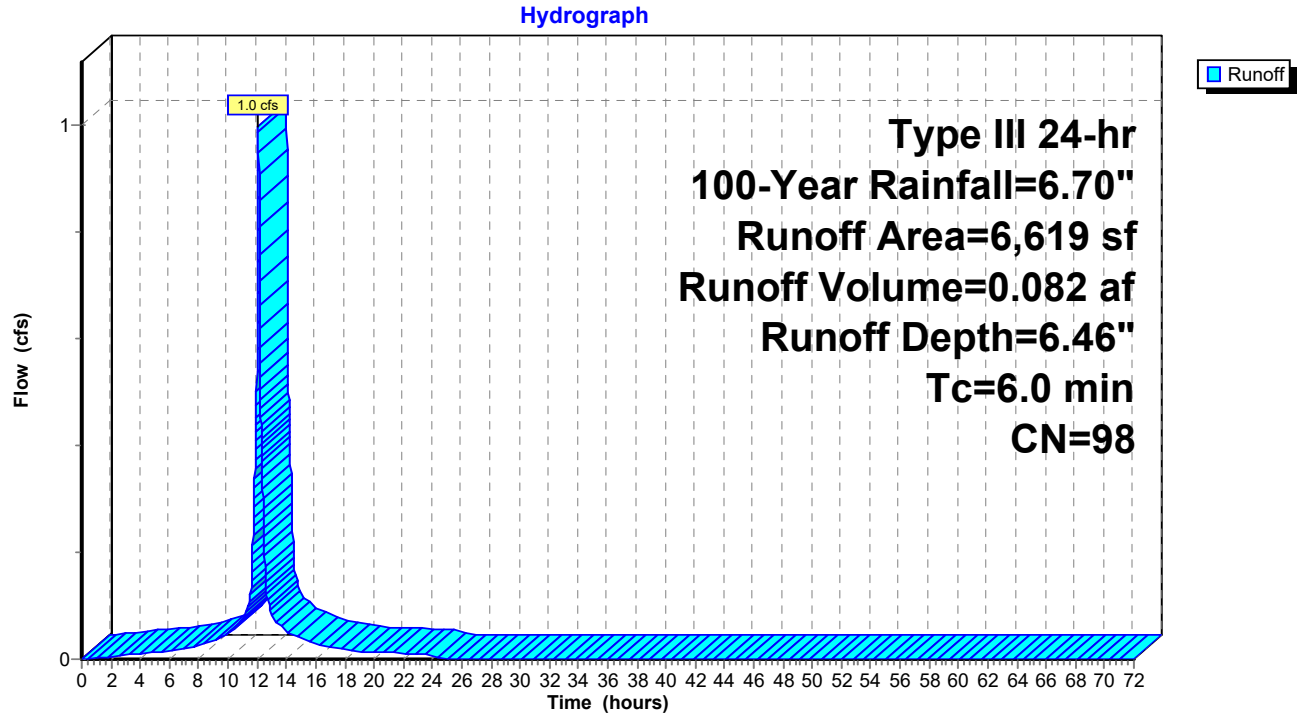
Runoff = 1.0 cfs @ 12.08 hrs, Volume= 0.082 af, Depth= 6.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=6.70"

Area (sf)	CN	Description
6,619	98	Roofs, HSG C
6,619		100.00% Impervious Area

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

Subcatchment PR-6A: PR-6A



Summary for Subcatchment PR-6B: PR-6B

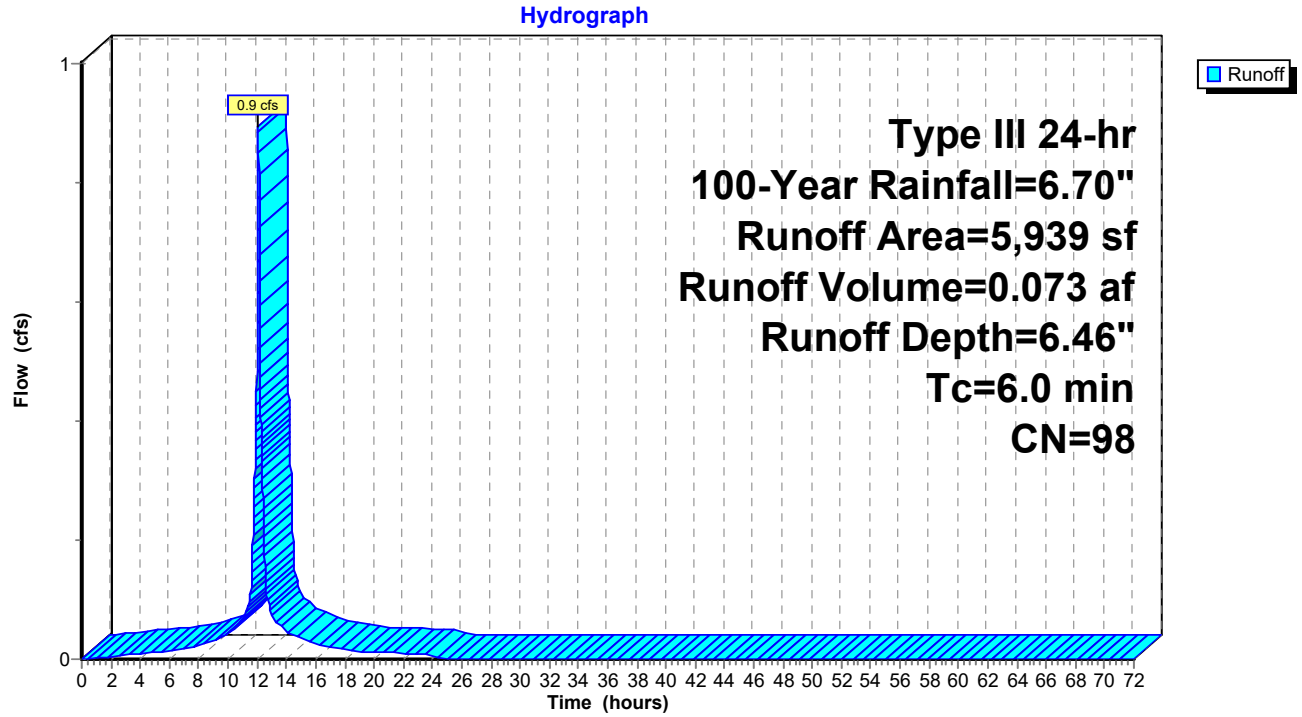
Runoff = 0.9 cfs @ 12.08 hrs, Volume= 0.073 af, Depth= 6.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=6.70"

Area (sf)	CN	Description
5,939	98	Roofs, HSG C
5,939		100.00% Impervious Area

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

Subcatchment PR-6B: PR-6B



Summary for Subcatchment PR-6C: PR-6C

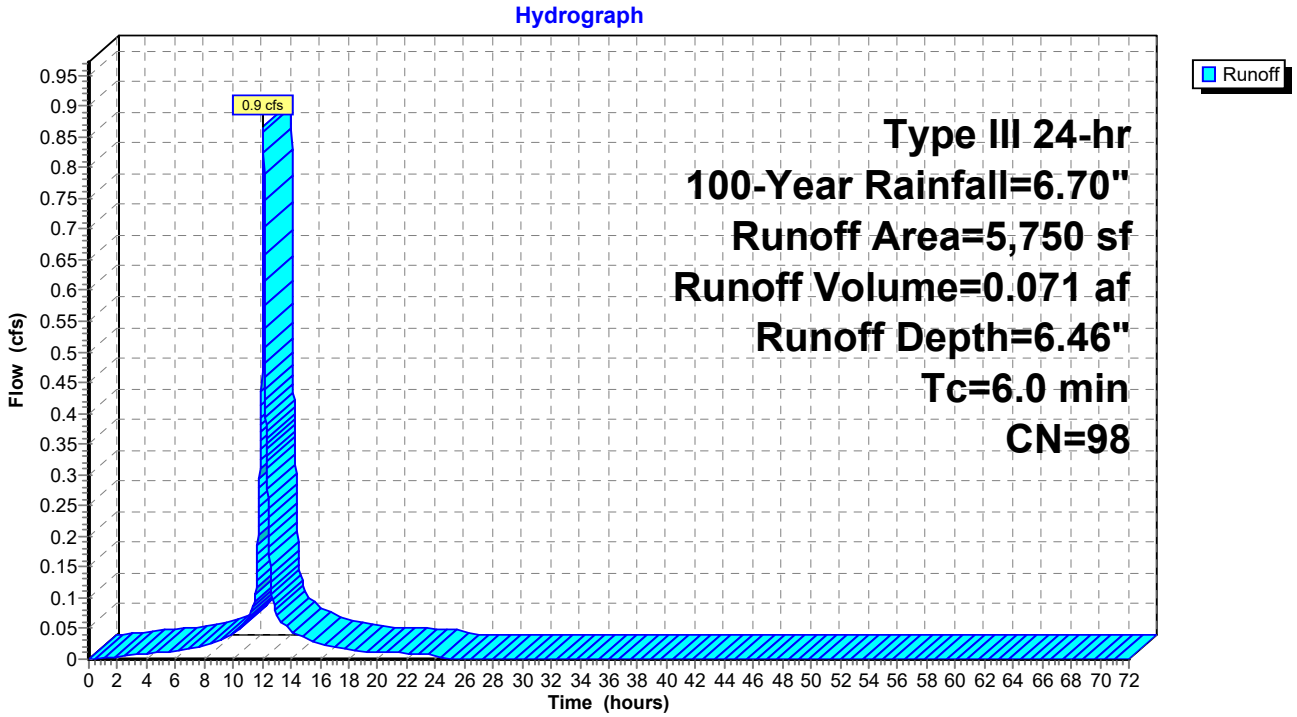
Runoff = 0.9 cfs @ 12.08 hrs, Volume= 0.071 af, Depth= 6.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=6.70"

Area (sf)	CN	Description
5,750	98	Roofs, HSG C
5,750		100.00% Impervious Area

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

Subcatchment PR-6C: PR-6C



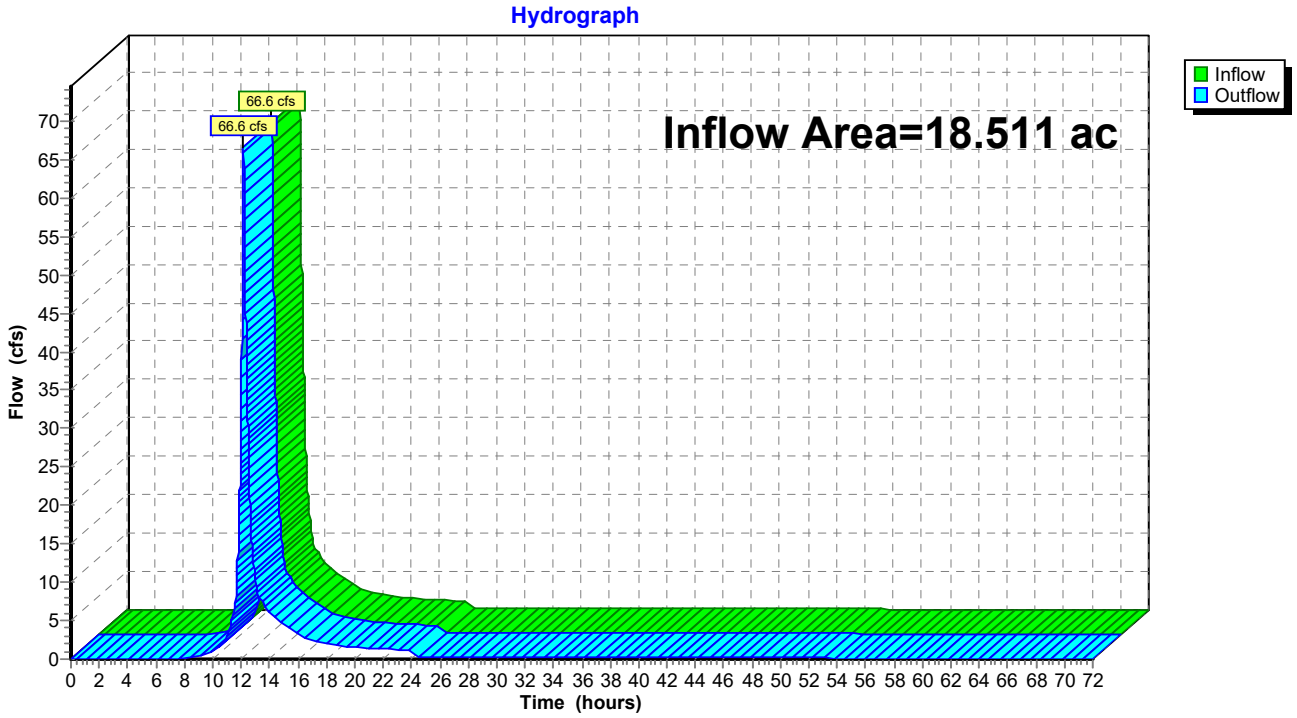
Summary for Reach AP-1P: AP-1

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 18.511 ac, 23.49% Impervious, Inflow Depth = 4.34" for 100-Year event
Inflow = 66.6 cfs @ 12.17 hrs, Volume= 6.690 af
Outflow = 66.6 cfs @ 12.17 hrs, Volume= 6.690 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3

Reach AP-1P: AP-1



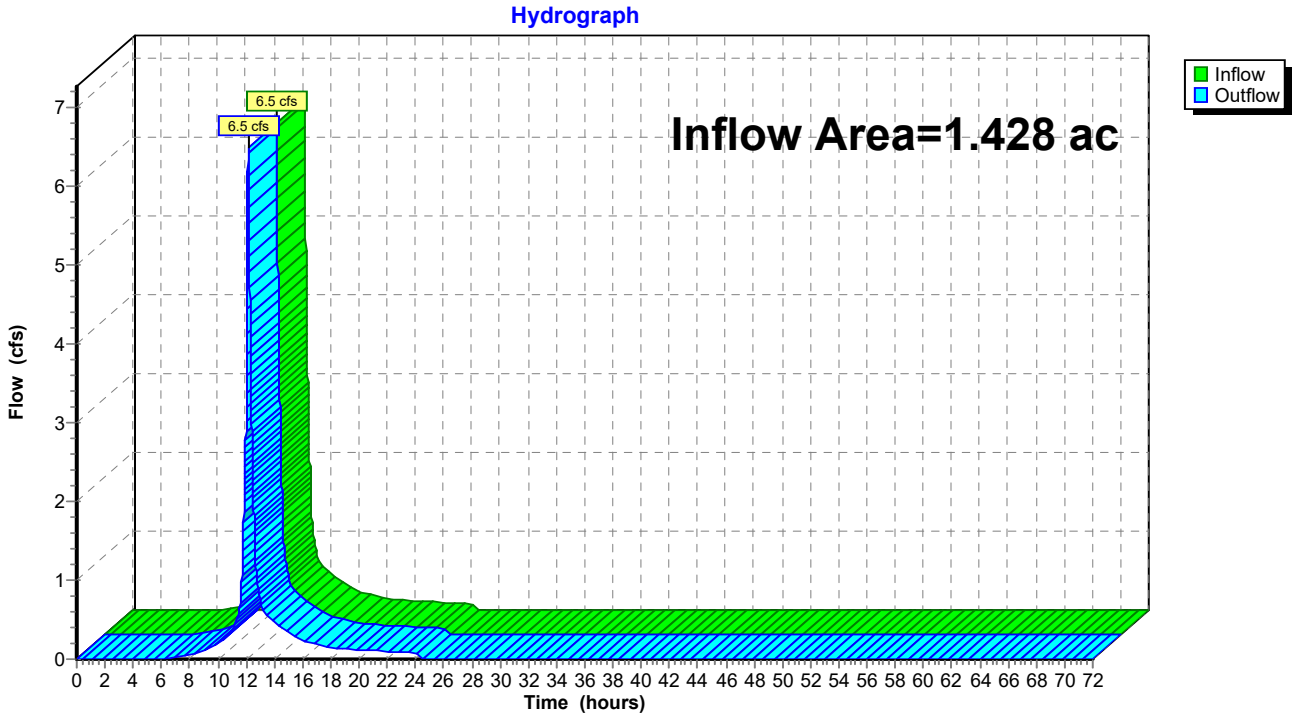
Summary for Reach AP-2P: AP-2

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.428 ac, 17.14% Impervious, Inflow Depth = 4.53" for 100-Year event
Inflow = 6.5 cfs @ 12.14 hrs, Volume= 0.539 af
Outflow = 6.5 cfs @ 12.14 hrs, Volume= 0.539 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3

Reach AP-2P: AP-2



Summary for Pond 1P: pond 1

Inflow Area = 1.780 ac, 64.73% Impervious, Inflow Depth = 5.64" for 100-Year event
Inflow = 11.1 cfs @ 12.08 hrs, Volume= 0.837 af
Outflow = 0.8 cfs @ 13.40 hrs, Volume= 0.837 af, Atten= 93%, Lag= 79.2 min
Primary = 0.8 cfs @ 13.40 hrs, Volume= 0.837 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 252.48' @ 13.40 hrs Surf.Area= 7,952 sf Storage= 22,527 cf
Flood Elev= 253.00' Surf.Area= 8,579 sf Storage= 26,860 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 975.6 min (1,753.3 - 777.7)

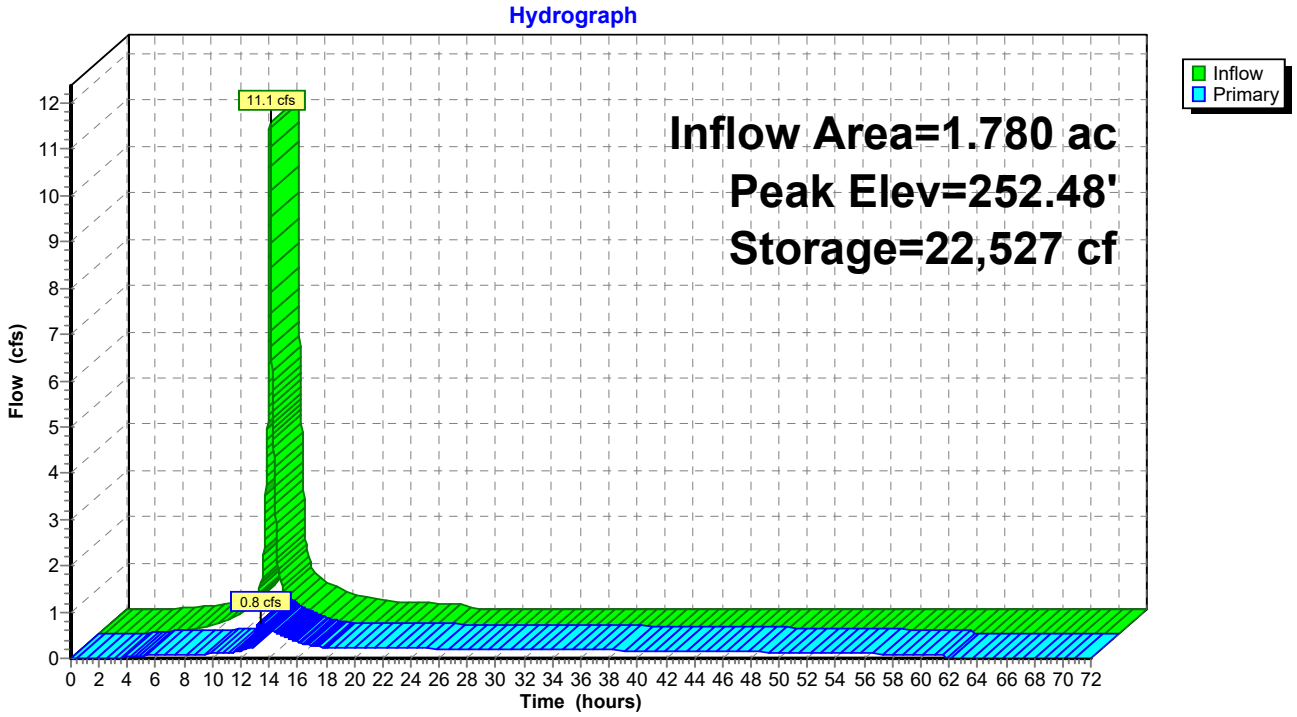
Volume	Invert	Avail.Storage	Storage Description
#1	248.50'	26,860 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
248.50	3,516	0	0
249.00	4,022	1,885	1,885
251.00	6,187	10,209	12,094
253.00	8,579	14,766	26,860

Device	Routing	Invert	Outlet Devices
#1	Primary	247.00'	**12.0" Round Culvert** L= 60.4' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 247.00' / 246.43' S= 0.0094 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	248.00'	**2.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	252.40'	**2.0" x 2.0" Horiz. Orifice/Grate X 6.00 columns** X 6 rows C= 0.600 in 24.0" x 24.0" Grate (25% open area) Limited to weir flow at low heads

Primary OutFlow Max=0.8 cfs @ 13.40 hrs HW=252.48' TW=243.92' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.8 cfs of 7.4 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.2 cfs @ 10.09 fps)
  └─**3=Orifice/Grate** (Weir Controls 0.5 cfs @ 0.90 fps)

Pond 1P: pond 1



Summary for Pond 2P: Pond 2

Inflow Area = 6.492 ac, 63.45% Impervious, Inflow Depth = 5.51" for 100-Year event
Inflow = 25.3 cfs @ 12.13 hrs, Volume= 2.980 af
Outflow = 20.4 cfs @ 12.21 hrs, Volume= 2.692 af, Atten= 20%, Lag= 4.7 min
Primary = 20.4 cfs @ 12.21 hrs, Volume= 2.692 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 245.50' @ 12.21 hrs Surf.Area= 6,670 sf Storage= 25,299 cf
Flood Elev= 245.50' Surf.Area= 6,671 sf Storage= 25,306 cf

Plug-Flow detention time= 263.9 min calculated for 2.692 af (90% of inflow)
Center-of-Mass det. time= 79.0 min (1,137.0 - 1,058.1)

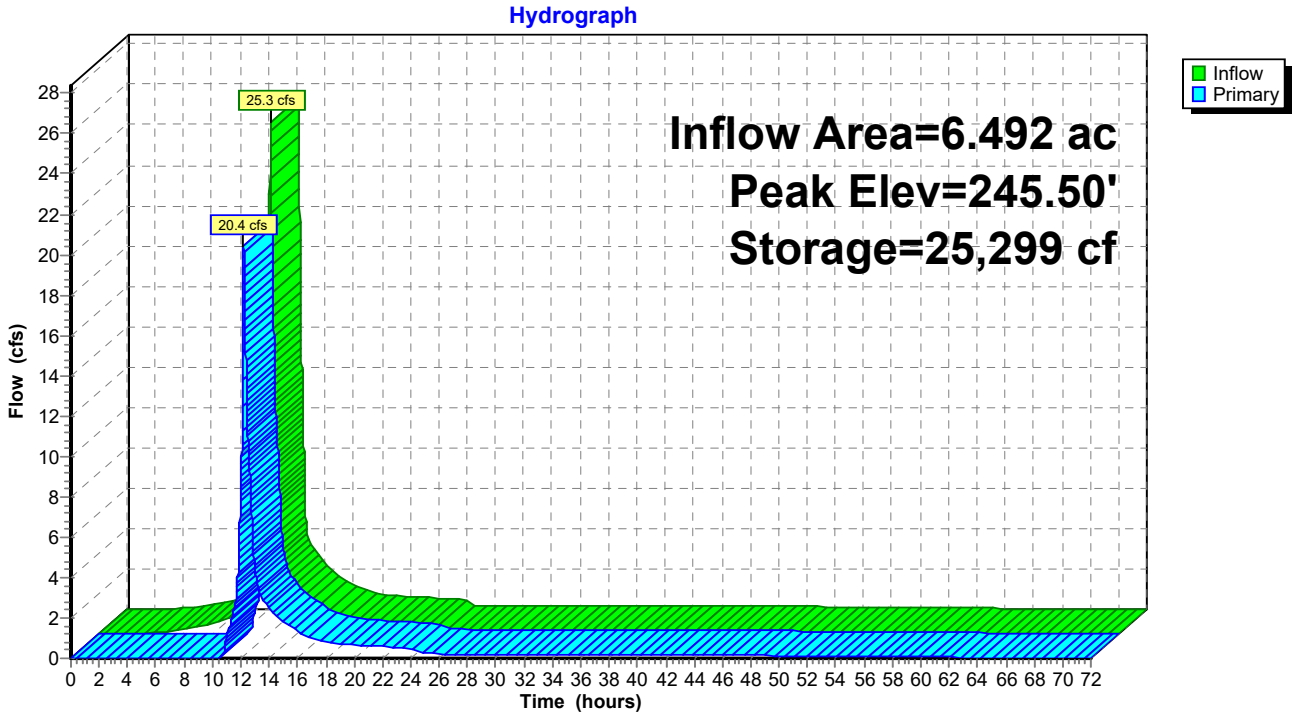
Volume	Invert	Avail.Storage	Storage Description
#1	240.00'	28,732 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
240.00	3,158	0	0
243.00	4,293	11,177	11,177
244.00	5,584	4,939	16,115
246.00	7,033	12,617	28,732

Device	Routing	Invert	Outlet Devices
#1	Primary	234.00'	**24.0" Round Culvert** L= 61.6' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 234.00' / 232.00' S= 0.0325 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	243.30'	**24.0" W x 12.0" H Vert. Orifice/Grate** C= 0.600
#3	Device 1	245.05'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Primary	245.50'	**10.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=20.4 cfs @ 12.21 hrs HW=245.50' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Passes 20.4 cfs of 43.2 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 12.5 cfs @ 6.25 fps)
  - **3=Orifice/Grate** (Weir Controls 7.9 cfs @ 2.19 fps)
- **4=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Pond 2P: Pond 2



Summary for Pond 4P: Cultec System #1

Inflow Area = 0.152 ac,100.00% Impervious, Inflow Depth = 6.46" for 100-Year event
Inflow = 1.0 cfs @ 12.08 hrs, Volume= 0.082 af
Outflow = 0.0 cfs @ 10.33 hrs, Volume= 0.082 af, Atten= 95%, Lag= 0.0 min
Discarded = 0.0 cfs @ 10.33 hrs, Volume= 0.082 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 3.49' @ 14.52 hrs Surf.Area= 810 sf Storage= 1,646 cf

Plug-Flow detention time= 297.1 min calculated for 0.082 af (100% of inflow)
Center-of-Mass det. time= 297.1 min (1,040.7 - 743.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	804 cf	**13.17'W x 61.50'L x 3.54'H Field A** 2,868 cf Overall - 857 cf Embedded = 2,011 cf x 40.0% Voids
#2A	0.50'	857 cf	**Cultec R-330XLHD** x 16 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 2 rows
		1,661 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.0 cfs @ 10.33 hrs HW=0.04' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.0 cfs)

Pond 4P: Cultec System #1 - Chamber Wizard Field A

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

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

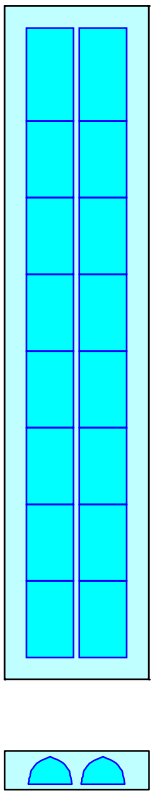
8 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 57.50' Row Length +24.0" End Stone x 2 = 61.50' Base Length
2 Rows x 52.0" Wide + 6.0" Spacing x 1 + 24.0" Side Stone x 2 = 13.17' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

16 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 2 Rows = 856.9 cf Chamber Storage

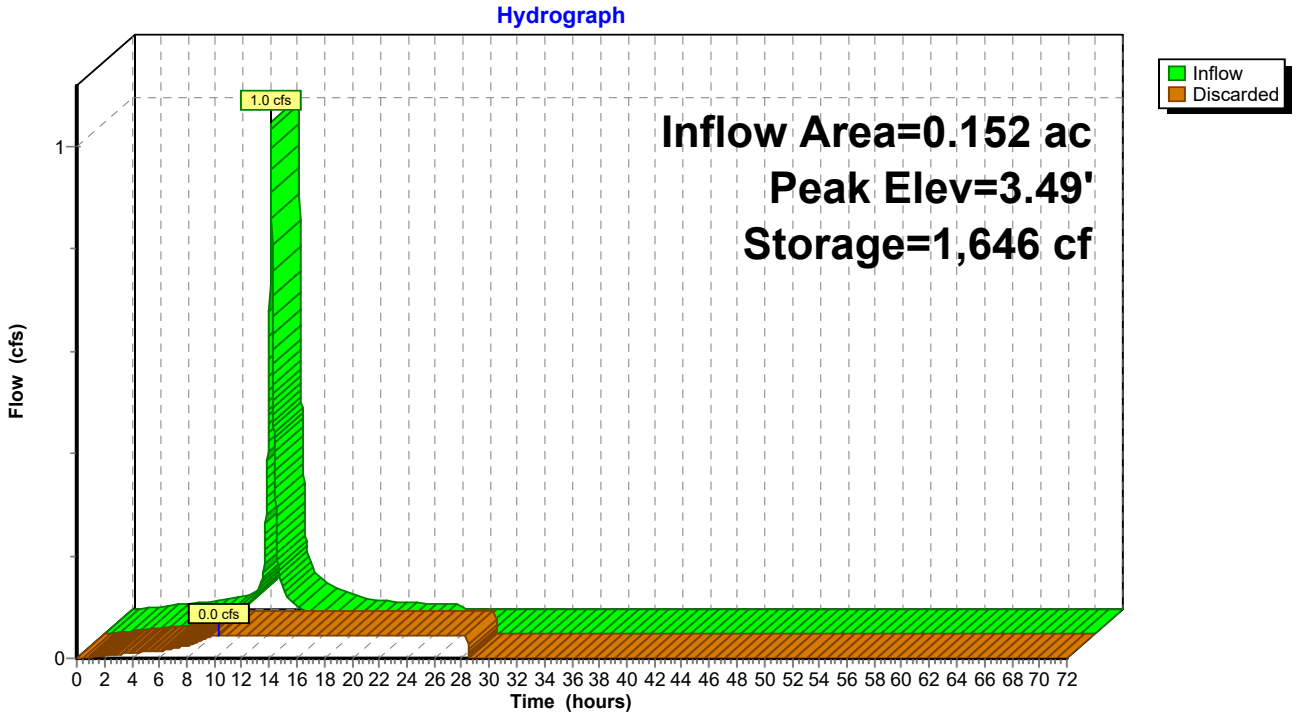
2,867.9 cf Field - 856.9 cf Chambers = 2,011.0 cf Stone x 40.0% Voids = 804.4 cf Stone Storage

Chamber Storage + Stone Storage = 1,661.3 cf = 0.038 af
Overall Storage Efficiency = 57.9%
Overall System Size = 61.50' x 13.17' x 3.54'

16 Chambers
106.2 cy Field
74.5 cy Stone



Pond 4P: Cultec System #1



Summary for Pond 6P: Cultec System #2

Inflow Area = 0.136 ac,100.00% Impervious, Inflow Depth = 6.46" for 100-Year event
Inflow = 0.9 cfs @ 12.08 hrs, Volume= 0.073 af
Outflow = 0.0 cfs @ 10.60 hrs, Volume= 0.073 af, Atten= 95%, Lag= 0.0 min
Discarded = 0.0 cfs @ 10.60 hrs, Volume= 0.073 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 2.78' @ 14.10 hrs Surf.Area= 810 sf Storage= 1,404 cf

Plug-Flow detention time= 249.0 min calculated for 0.073 af (100% of inflow)
Center-of-Mass det. time= 249.0 min (992.5 - 743.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	804 cf	**13.17'W x 61.50'L x 3.54'H Field A** 2,868 cf Overall - 857 cf Embedded = 2,011 cf x 40.0% Voids
#2A	0.50'	857 cf	**Cultec R-330XLHD** x 16 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 2 rows
		1,661 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.0 cfs @ 10.60 hrs HW=0.04' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.0 cfs)

Pond 6P: Cultec System #2 - Chamber Wizard Field A

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

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

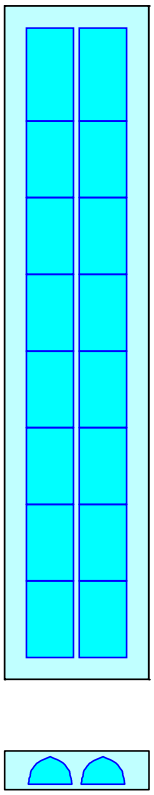
8 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 57.50' Row Length +24.0" End Stone x 2 = 61.50' Base Length
2 Rows x 52.0" Wide + 6.0" Spacing x 1 + 24.0" Side Stone x 2 = 13.17' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

16 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 2 Rows = 856.9 cf Chamber Storage

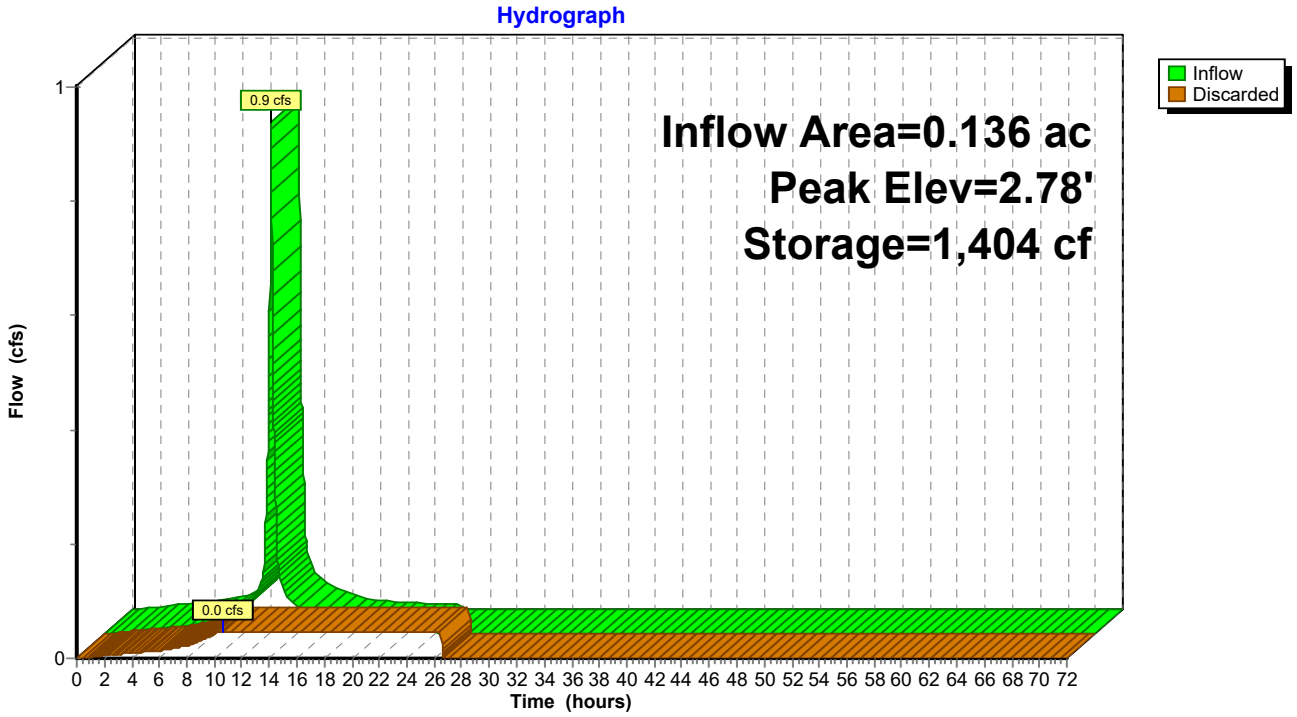
2,867.9 cf Field - 856.9 cf Chambers = 2,011.0 cf Stone x 40.0% Voids = 804.4 cf Stone Storage

Chamber Storage + Stone Storage = 1,661.3 cf = 0.038 af
Overall Storage Efficiency = 57.9%
Overall System Size = 61.50' x 13.17' x 3.54'

16 Chambers
106.2 cy Field
74.5 cy Stone



Pond 6P: Cultec System #2



Summary for Pond 16P: Cultec System #3

Inflow Area = 0.132 ac,100.00% Impervious, Inflow Depth = 6.46" for 100-Year event
Inflow = 0.9 cfs @ 12.08 hrs, Volume= 0.071 af
Outflow = 0.0 cfs @ 10.31 hrs, Volume= 0.071 af, Atten= 95%, Lag= 0.0 min
Discarded = 0.0 cfs @ 10.31 hrs, Volume= 0.071 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 3.37' @ 14.54 hrs Surf.Area= 700 sf Storage= 1,433 cf

Plug-Flow detention time= 299.5 min calculated for 0.071 af (100% of inflow)
Center-of-Mass det. time= 299.5 min (1,043.0 - 743.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	665 cf	**17.50'W x 40.00'L x 3.54'H Field A** 2,479 cf Overall - 816 cf Embedded = 1,663 cf x 40.0% Voids
#2A	0.50'	816 cf	**Cultec R-330XLHD** x 15 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 3 rows
		1,481 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.0 cfs @ 10.31 hrs HW=0.04' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.0 cfs)

Pond 16P: Cultec System #3 - Chamber Wizard Field A

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

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

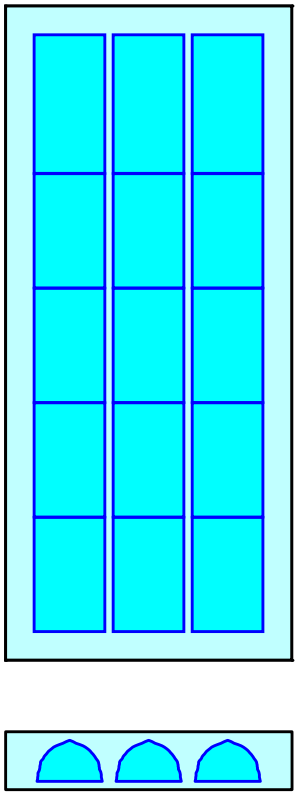
5 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 36.50' Row Length +21.0" End Stone x 2 = 40.00' Base Length
3 Rows x 52.0" Wide + 6.0" Spacing x 2 + 21.0" Side Stone x 2 = 17.50' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

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

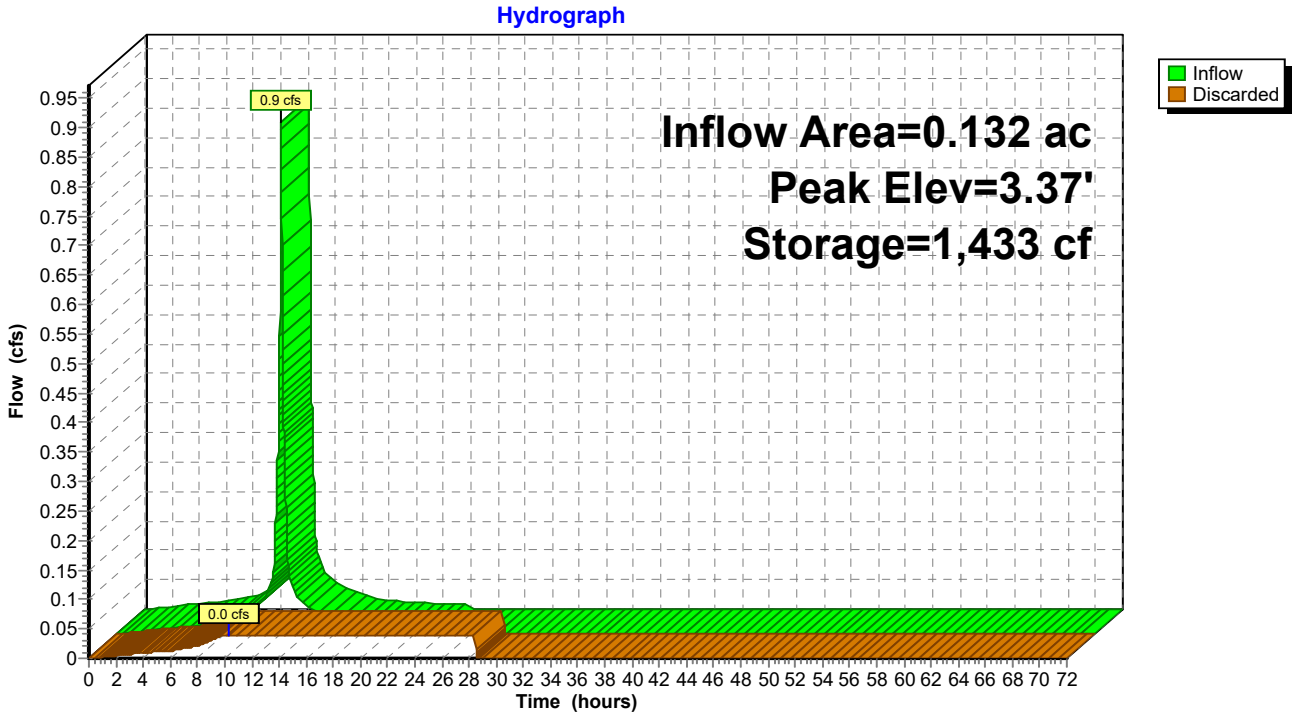
2,479.2 cf Field - 815.9 cf Chambers = 1,663.3 cf Stone x 40.0% Voids = 665.3 cf Stone Storage

Chamber Storage + Stone Storage = 1,481.2 cf = 0.034 af
Overall Storage Efficiency = 59.7%
Overall System Size = 40.00' x 17.50' x 3.54'

15 Chambers
91.8 cy Field
61.6 cy Stone



Pond 16P: Cultec System #3



Stage-Area-Storage Calculations

Appendix 5

Stage-Area-Storage for Pond 1P: pond 1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
248.50	3,516	0
248.55	3,567	177
248.60	3,617	357
248.65	3,668	539
248.70	3,718	723
248.75	3,769	911
248.80	3,820	1,100
248.85	3,870	1,293
248.90	3,921	1,487
248.95	3,971	1,685
249.00	4,022	1,885
249.05	4,076	2,087
249.10	4,130	2,292
249.15	4,184	2,500
249.20	4,238	2,711
249.25	4,293	2,924
249.30	4,347	3,140
249.35	4,401	3,359
249.40	4,455	3,580
249.45	4,509	3,804
249.50	4,563	4,031
249.55	4,617	4,260
249.60	4,671	4,493
249.65	4,726	4,727
249.70	4,780	4,965
249.75	4,834	5,205
249.80	4,888	5,449
249.85	4,942	5,694
249.90	4,996	5,943
249.95	5,050	6,194
250.00	5,105	6,448
250.05	5,159	6,704
250.10	5,213	6,964
250.15	5,267	7,226
250.20	5,321	7,490
250.25	5,375	7,758
250.30	5,429	8,028
250.35	5,483	8,301
250.40	5,538	8,576
250.45	5,592	8,854
250.50	5,646	9,135
250.55	5,700	9,419
250.60	5,754	9,705
250.65	5,808	9,994
250.70	5,862	10,286
250.75	5,916	10,581
250.80	5,971	10,878
250.85	6,025	11,178
250.90	6,079	11,480
250.95	6,133	11,786
251.00	6,187	12,094
251.05	6,247	12,404
251.10	6,307	12,718
251.15	6,366	13,035
251.20	6,426	13,355
251.25	6,486	13,678
251.30	6,546	14,003
251.35	6,606	14,332
251.40	6,665	14,664
251.45	6,725	14,999
251.50	6,785	15,337
251.55	6,845	15,677
251.60	6,905	16,021
251.65	6,964	16,368
251.70	7,024	16,717
251.75	7,084	17,070
251.80	7,144	17,426
251.85	7,204	17,785
251.90	7,263	18,146
251.95	7,323	18,511
252.00	7,383	18,879
252.05	7,443	19,249
252.10	7,503	19,623
252.15	7,562	19,999
252.20	7,622	20,379
252.25	7,682	20,762
252.30	7,742	21,147
252.35	7,802	21,536
252.40	7,861	21,927
252.45	7,921	22,322
252.50	7,981	22,720
252.55	8,041	23,120
252.60	8,101	23,524
252.65	8,160	23,930
252.70	8,220	24,340
252.75	8,280	24,752
252.80	8,340	25,168
252.85	8,400	25,586
252.90	8,459	26,008
252.95	8,519	26,432
253.00	**8,579**	**26,860**

Stage-Area-Storage for Pond 2P: Pond 2

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
240.00	3,158	0	241.04	3,551	3,489
240.02	3,166	63	241.06	3,559	3,560
240.04	3,173	127	241.08	3,567	3,631
240.06	3,181	190	241.10	3,574	3,703
240.08	3,188	254	241.12	3,582	3,774
240.10	3,196	318	241.14	3,589	3,846
240.12	3,203	382	241.16	3,597	3,918
240.14	3,211	446	241.18	3,604	3,990
240.16	3,219	510	241.20	3,612	4,062
240.18	3,226	575	241.22	3,620	4,134
240.20	3,234	639	241.24	3,627	4,207
240.22	3,241	704	241.26	3,635	4,279
240.24	3,249	769	241.28	3,642	4,352
240.26	3,256	834	241.30	3,650	4,425
240.28	3,264	899	241.32	3,657	4,498
240.30	3,272	964	241.34	3,665	4,571
240.32	3,279	1,030	241.36	3,673	4,645
240.34	3,287	1,096	241.38	3,680	4,718
240.36	3,294	1,161	241.40	3,688	4,792
240.38	3,302	1,227	241.42	3,695	4,866
240.40	3,309	1,293	241.44	3,703	4,940
240.42	3,317	1,360	241.46	3,710	5,014
240.44	3,324	1,426	241.48	3,718	5,088
240.46	3,332	1,493	241.50	3,726	5,163
240.48	3,340	1,559	241.52	3,733	5,237
240.50	3,347	1,626	241.54	3,741	5,312
240.52	3,355	1,693	241.56	3,748	5,387
240.54	3,362	1,760	241.58	3,756	5,462
240.56	3,370	1,828	241.60	3,763	5,537
240.58	3,377	1,895	241.62	3,771	5,612
240.60	3,385	1,963	241.64	3,778	5,688
240.62	3,393	2,031	241.66	3,786	5,764
240.64	3,400	2,099	241.68	3,794	5,839
240.66	3,408	2,167	241.70	3,801	5,915
240.68	3,415	2,235	241.72	3,809	5,991
240.70	3,423	2,303	241.74	3,816	6,068
240.72	3,430	2,372	241.76	3,824	6,144
240.74	3,438	2,441	241.78	3,831	6,221
240.76	3,446	2,509	241.80	3,839	6,297
240.78	3,453	2,578	241.82	3,847	6,374
240.80	3,461	2,647	241.84	3,854	6,451
240.82	3,468	2,717	241.86	3,862	6,528
240.84	3,476	2,786	241.88	3,869	6,606
240.86	3,483	2,856	241.90	3,877	6,683
240.88	3,491	2,926	241.92	3,884	6,761
240.90	3,499	2,995	241.94	3,892	6,838
240.92	3,506	3,065	241.96	3,900	6,916
240.94	3,514	3,136	241.98	3,907	6,994
240.96	3,521	3,206	242.00	3,915	7,073
240.98	3,529	3,277	242.02	3,922	7,151
241.00	3,536	3,347	242.04	3,930	7,230
241.02	3,544	3,418	242.06	3,937	7,308

Stage-Area-Storage for Pond 2P: Pond 2 (continued)

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
242.08	3,945	7,387	243.12	4,448	11,701
242.10	3,952	7,466	243.14	4,474	11,790
242.12	3,960	7,545	243.16	4,500	11,880
242.14	3,968	7,624	243.18	4,525	11,970
242.16	3,975	7,704	243.20	4,551	12,061
242.18	3,983	7,783	243.22	4,577	12,152
242.20	3,990	7,863	243.24	4,603	12,244
242.22	3,998	7,943	243.26	4,629	12,336
242.24	4,005	8,023	243.28	4,654	12,429
242.26	4,013	8,103	243.30	4,680	12,522
242.28	4,021	8,184	243.32	4,706	12,616
242.30	4,028	8,264	243.34	4,732	12,711
242.32	4,036	8,345	243.36	4,758	12,806
242.34	4,043	8,426	243.38	4,784	12,901
242.36	4,051	8,506	243.40	4,809	12,997
242.38	4,058	8,588	243.42	4,835	13,093
242.40	4,066	8,669	243.44	4,861	13,190
242.42	4,074	8,750	243.46	4,887	13,288
242.44	4,081	8,832	243.48	4,913	13,386
242.46	4,089	8,913	243.50	4,939	13,484
242.48	4,096	8,995	243.52	4,964	13,583
242.50	4,104	9,077	243.54	4,990	13,683
242.52	4,111	9,159	243.56	5,016	13,783
242.54	4,119	9,242	243.58	5,042	13,884
242.56	4,127	9,324	243.60	5,068	13,985
242.58	4,134	9,407	243.62	5,093	14,086
242.60	4,142	9,490	243.64	5,119	14,188
242.62	4,149	9,572	243.66	5,145	14,291
242.64	4,157	9,656	243.68	5,171	14,394
242.66	4,164	9,739	243.70	5,197	14,498
242.68	4,172	9,822	243.72	5,223	14,602
242.70	4,179	9,906	243.74	5,248	14,707
242.72	4,187	9,989	243.76	5,274	14,812
242.74	4,195	10,073	243.78	5,300	14,918
242.76	4,202	10,157	243.80	5,326	15,024
242.78	4,210	10,241	243.82	5,352	15,131
242.80	4,217	10,325	243.84	5,377	15,238
242.82	4,225	10,410	243.86	5,403	15,346
242.84	4,232	10,494	243.88	5,429	15,454
242.86	4,240	10,579	243.90	5,455	15,563
242.88	4,248	10,664	243.92	5,481	15,672
242.90	4,255	10,749	243.94	5,507	15,782
242.92	4,263	10,834	243.96	5,532	15,893
242.94	4,270	10,920	243.98	5,558	16,004
242.96	4,278	11,005	244.00	5,584	16,115
242.98	4,285	11,091	244.02	5,598	16,227
243.00	4,293	11,177	244.04	5,613	16,339
243.02	4,319	11,263	244.06	5,627	16,451
243.04	4,345	11,349	244.08	5,642	16,564
243.06	4,370	11,436	244.10	5,656	16,677
243.08	4,396	11,524	244.12	5,671	16,790
243.10	4,422	11,612	244.14	5,685	16,904

Stage-Area-Storage for Pond 2P: Pond 2 (continued)

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
244.16	5,700	17,018
244.18	5,714	17,132
244.20	5,729	17,246
244.22	5,743	17,361
244.24	5,758	17,476
244.26	5,772	17,591
244.28	5,787	17,707
244.30	5,801	17,823
244.32	5,816	17,939
244.34	5,830	18,055
244.36	5,845	18,172
244.38	5,859	18,289
244.40	5,874	18,407
244.42	5,888	18,524
244.44	5,903	18,642
244.46	5,917	18,760
244.48	5,932	18,879
244.50	5,946	18,998
244.52	5,961	19,117
244.54	5,975	19,236
244.56	5,990	19,356
244.58	6,004	19,476
244.60	6,019	19,596
244.62	6,033	19,716
244.64	6,048	19,837
244.66	6,062	19,958
244.68	6,077	20,080
244.70	6,091	20,201
244.72	6,106	20,323
244.74	6,120	20,446
244.76	6,135	20,568
244.78	6,149	20,691
244.80	6,164	20,814
244.82	6,178	20,937
244.84	6,193	21,061
244.86	6,207	21,185
244.88	6,222	21,309
244.90	6,236	21,434
244.92	6,251	21,559
244.94	6,265	21,684
244.96	6,280	21,809
244.98	6,294	21,935
245.00	6,309	22,061
245.02	6,323	22,188
245.04	6,337	22,314
245.06	6,352	22,441
245.08	6,366	22,568
245.10	6,381	22,696
245.12	6,395	22,823
245.14	6,410	22,952
245.16	6,424	23,080
245.18	6,439	23,209
245.20	6,453	23,337
245.22	6,468	23,467
245.24	6,482	23,596
245.26	6,497	23,726
245.28	6,511	23,856
245.30	6,526	23,986
245.32	6,540	24,117
245.34	6,555	24,248
245.36	6,569	24,379
245.38	6,584	24,511
245.40	6,598	24,643
245.42	6,613	24,775
245.44	6,627	24,907
245.46	6,642	25,040
245.48	6,656	25,173
245.50	6,671	25,306
245.52	6,685	25,440
245.54	6,700	25,573
245.56	6,714	25,708
245.58	6,729	25,842
245.60	6,743	25,977
245.62	6,758	26,112
245.64	6,772	26,247
245.66	6,787	26,383
245.68	6,801	26,519
245.70	6,816	26,655
245.72	6,830	26,791
245.74	6,845	26,928
245.76	6,859	27,065
245.78	6,874	27,202
245.80	6,888	27,340
245.82	6,903	27,478
245.84	6,917	27,616
245.86	6,932	27,754
245.88	6,946	27,893
245.90	6,961	28,032
245.92	6,975	28,172
245.94	6,990	28,311
245.96	7,004	28,451
245.98	7,019	28,591
246.00	**7,033**	**28,732**

TSS Removal Worksheet

Appendix 6

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Franklin Heights Parcel B, Franklin MA - Basin #1

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Deep Sump Hooded Catch Basin	0.25	1.00	0.25	0.75
Sediment Forebay	0.25	0.75	0.19	0.56

Pretreatment

Total TSS Removal = 44%

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

Project: F-4471

Prepared By: Michael Hassett

Date: 7/7/2022

*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

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Franklin Heights Parcel B, Franklin MA - Basin #1

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Detention Basin	0.50	1.00	0.50	0.50
Infiltration Basin	0.80	0.5	0.40	0.10

Total TSS Removal = 90%

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

Project: F-4471

Prepared By: Michael Hassett

Date: 12/8/2022

*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

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Franklin Heights Parcel B, Franklin MA - Basin #2

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Deep Sump Hooded Catch Basin	0.25	1.00	0.25	0.75
Sediment Forebay	0.25	0.75	0.19	0.56

Pretreatment

Total TSS Removal = 44%

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

Project: F-4471

Prepared By: Michael Hassett

Date: 7/7/2022

*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

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Franklin Heights Parcel B, Franklin MA - Basin #2

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Infiltration Basin	0.80	1.00	0.80	0.20

Total TSS Removal = 80%

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

Project: F-4471

Prepared By: Michael Hassett

Date: 12/7/2022

*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

Construction Period Pollution Prevention Plan

Appendix 7

Construction Period Pollution Prevention Plan and Erosion and Sedimentation Control.
EPA NPDES – Storm Water Pollution Prevention Plan (SWPPP)

A. Names of Persons or Entity Responsible for Plan Compliance

Applicant: Oliver Crossing Realty Trust c/o Bruce Wheeler
148 Park Street
North Reading, MA 01864
PH: 617-538-2472

B. Construction Period Pollution Prevention Measures

1. Inventory materials to be present on-site during construction.
2. Train employees and subcontractors in prevention and clean up procedures.
3. All materials stored on site will be stored in their appropriate containers and if possible, under a roof or covered.
4. Follow manufacturer's recommendation for disposal of used containers.
5. Store only enough product on site to do the job.
6. On site equipment, fueling and maintenance measures:
    a. Inspect on-site vehicles and equipment daily for leaks.
    b. Conduct all vehicle and equipment maintenance and refueling in front of building, away from storm drains.
    c. Perform major repairs and maintenance off site.
    d. Use drip pans, drip cloths or absorbent pads when replacing spent fuels.
    e. Collect spent fuels and remove from site, per Local and State regulations.
    f. Maintain a clean construction entrance where truck traffic is frequent to reduce soil compaction constant sweeping is required and limit tracking of sediment into streets, sweeping street when silt is observed on street.
7. Stockpile materials and maintain Erosion Control around the materials where it can easily be accessed. Maintain easy access to clean up materials to include brooms, mops, rags gloves, goggles, sand, sawdust, plastic and metal trash containers.
8. Clean up spills.
    a. Never hose down "dirty" pavement or impermeable surfaces where fluids have spilled. Use dry clean up methods (sawdust, cat litter and/or rags and absorbent pads).
    b. Sweep up dry materials immediately. Never wash them away or bury them.
    c. Clean up spills on dirt areas by digging up and properly disposing of contaminated soil in a certified container and notify a certified hauler for removal.
    d. Report significant spills to the Fire Department.
9. It is the responsibility of the site superintendent or employees designated by the Applicant to inspect erosion control and repair as needed, also to inspect all on site vehicles for leaks and check all containers on site that may contain hazardous materials daily.

C. Erosion and Sedimentation Control Plan.

See Site Plan prepared by Guerriere & Halnon, Inc. Dated 09/14/2022 and revised through 12/7/22.

D. Site Development Plans.

See Site Plan prepared by Guerriere & Halnon, Inc. Dated 09/14/2022 and revised through 12/7/22.

E. Plans: Construction Sequencing Plan – Construction and phasing of the project, including of the wetland crossing and replication area, shall be performed in accordance with the plan prepared by CLAWE, LLC, dated 7/20/22 and revised through 12/05/22. A copy of the phasing plan is included below:

Phase I
a. Install/maintain the erosion control along the wetland crossing from station 10+00 to 14+50
b. Using Conservation Commission approved or equal device to create suitable temporary access through wetland using wood
or rubber mats, steel plates and temporary culvert as needed
c. Install perimeter erosion control for the entire site
d. Clear for road, wetland replication area, stormwater basin #1, units 41/42 (location of site trailer and storage containers)
e .Prepare replication area as designed and approved by Franklin Conservation Commission
f. Strip top soil from 10+00 to 14+50 and transport soil to wetland replication area with wetland plants to be saved
g. Construct wetland replication with planting as specified and protect it from erosion damage
h. Construct access road from 10+00 to 14+50 including the installation of culvert per designed plan; complete the road to binder
i. All castings set at binder grade so that drainage can function as designed. This applies to all Phases.

Phase II
a. Clear for road 21+00 to 27+00, units 1-20 and units 53 to 60; infiltration basin #2 and any dry wells associated with units
b. Strip and stockpile loam for road construction in area units 53, 54, 55, and 56
c. Construct road and utilities to binder start 27+00 to 23+00 including units 5 to 12 loop road
d. During road and utilities installation, begin foundation and building work starting with units 1 /2 in order
e. Stromwater basin #1 to be complete to functional prior to installation of binder for this phase
f. Infiltration Basin #2 to be functional prior to foundations for units 9/10
g. Unit construction to continue around loop, loam to remain in area of units until construction commences on those units
h. All stumps to be ground on site, chips to be used for erosion control

Phase III
a. Clear for balance of road and units 43 to 52 and units 21 to 24
b. Create new loam stockpile in area 51/52
c. Surplus site fill to be stockpile units 47 to 50
d. Construct balance of road to binder
e. Unit construction to continue in sequence around site

Phase IV
a. Clear balance of trees
b. Construct structural fill to bottom of footing elevation +/-c. Stabilize slope as per fill operation details
c. Unit construction balance of site

Phase V
a. Adjust castings to final grade and install top cot for all roads
b. Clean all basins and catch basins

c. Punch list

Erosion control devices to be used during construction include but not limited to:

- Compost socks
- Stake silt fence
- Woodchips or stump grinding check dams
- Runoff interception swales
- Sediment basins
- Flocculant for turbidity control as needed
- Mud traps at intersection of pavement and dirt road
- Hydroseeding

F. Construction Waste Management Plan

a. Dumpster for trash and bulk waste collection shall be provided separately for construction.
b. Recycle materials whenever possible (paper, plaster cardboard, metal cans). Separate containers for material are recommended.
c. Segregate and provide containers for disposal options for waste.
d. Do not bury waste and debris on site.
e. Certified haulers will be hired to remove the dumpster container waste as needed. Recycling products will also be removed off site weekly.
f. The sewer system is only for disposal of human waste, and substances permitted for disposal in the site sewer permit with the Town B.O.H.

G. <u>Operation and Maintenance of Erosion and Sedimentation Controls</u>

The operation and maintenance of sedimentation control shall be the responsibility of the contractor. The inspection and maintenance of the stormwater component shall be performed as noted below. The contractor shall have erosion control in place at all times. The contractor, based on future weather reports, shall prepare and inspect all erosion control devices; cleaning, repairing and upgrading is a priority so that the devices perform as per design. Inspect the site during rain events. Do not stay away from the site. At a minimum there should be inspection to assure the devices are not clogged or plugged, or that devices have not been destroyed or damaged during the rain event. After a storm event inspection is required to clean and repair any damage components. Immediate repair is required.

H. <u>Inspection and Maintenance Schedules</u>

1. Inspection must be conducted at least once every 7 days and within 24 hours of the end of a storm event 0.5 inches or greater.
2. Inspection frequency can be reduced to once a month if:
    a. The site is temporarily stabilized.
    b. Runoff is unlikely due to winter conditions when site is covered with snow or ice.
3. Inspections must be conducted by qualified personnel, “qualified personnel” means a person knowledgeable in the principles and practice of erosion and sediment controls and who possess the skills to assess the conditions and take measures to maintain and ensure proper operation, also to conclude if the erosion control methods selected are effective.
4. For each inspection, the inspection report must include: (See attached inspection and maintenance log)
    a. The inspection date.
    b. Names, titles of personnel making the inspection.
    c. Weather information for the period since the last inspection.
    d. Weather information at the time of the inspection.

e. Locations of discharges of sediment from the site, if any.
f. Locations of BMP's that need to be maintained.
g. Locations where additional BMP's may be required.
h. Corrective action required or any changes to the SWPPP that may be necessary.

5. The owner, or their representative, such as the contractor, shall inspect the following in-place work.

Inspection Schedule:

Erosion Control	Weekly
Catch Basins	Weekly
Temporary Sedimentation Traps/Basins	Weekly
Street Sweeping	Weekly

Please Note: Special inspections shall also be made after a significant rainfall event.

Maintenance Schedule

Erosion Control Devices Failure	Immediately
Catch Basins	Sump 1/4 full of sediment
Street Sweeping	14 days minimum and prior to any significant rain event.

Please Note: Special maintenance shall also be made after a significant rainfall event.

I. Inspection and Maintenance Log Form. (Log Form Follows)

Long Term Operation and Maintenance Plan

Appendix 8

The following shall serve as the (O&M) Plan required by Standard 9, as well as the Long-Term Pollution Prevention Plan required by Standard 4.

A. Names of Persons or Entity Responsible for Plan Compliance

Applicant: Oliver Crossing Realty Trust c/o Bruce Wheeler
148 Park Street
North Reading, MA 01864
PH: 617-538-2472

B. Good housekeeping practices

1. Maintain site, landscaping and vegetation.
2. Sweep and pick up litter on pavements and grounds.
3. Deliveries shall be monitored by owners or representative to ensure that if any spillage occurs, it shall be contained and cleaned up immediately.
4. Maintain pavement and curbing in good repair.

C. Requirements for routine inspections and maintenance of stormwater BMPs

1. Plans: The stormwater Operation and Maintenance Plan shall consist of all Plans, documents and all local state and federal approvals as required for the subject property.
2. Record Keeping:
   a. Maintain a log of all operation and maintenance activities for at least three years following construction, including inspections, repairs, replacement and disposal (for disposal, the log shall indicate the type of material and the disposal location).
   b. Make this log available to MassDEP and the Conservation Commission upon request; and
   c. Allow MassDEP and the Conservation Commission to inspect each BMP to determine whether the responsible party is implementing the Operation and Maintenance Plan.
3. Descriptions and Designs: The Best Management Practices (BMP) incorporated into the design include the following.
   a. Street Sweeping – Stipulated within the Construction Period Pollution Prevention Plan, the Long-Term Pollution Prevention Plan, and the Operation and Maintenance Plan. As the amount of TSS removal is discretionary, no credit was taken within the calculations for this BMP.
   b. Deep sump catch basins with hoods installed to promote TSS Removal of solids and control floatable pollutants. This BMP has a design rate of 25% TSS Removal.
   c. Detention & Infiltration basins and sediment forebays provided to promote the required 80% TSS Removal. Refer to TSS Removal Worksheet in Standard 4 for treatment train.
   d. Safety Fencing: Provide 5-FT high chain link fence with lockable gates around detention basins for public safety.
   e. Spill Containment Kit to contain and clean-up spills that could occur on site.
   f. Infiltration Chambers – subsurface infiltration BMP provides the required groundwater recharge and has a design rate of 80% TSS Removal. Refer to TSS Removal Worksheet included in the Attachments.

4. BMP Maintenance: After construction it is the responsibility of the owner to perform maintenance. The cleaning of the components of the stormwater management system shall generally be as follows:
   a. Roadway: The owner shall keep the roadway swept with a mechanical sweeper or hand swept semi-annually at a minimum.

b. Catch Basins: Shall be cleaned by excavating, pumping or vacuuming four times per year and at the end of foliage and snow removal seasons. The sediment shall be disposed of off-site by the Owner. Inspect quarterly, remove silt when ¼ full.

c. Sediment Forebay/Detention/Infiltration Basin: Preventative maintenance shall be performed at least four times per year. Inspection shall be performed after every major storm for the first three months and monthly thereafter, and when there are discharges through the high outlet orifice. Mowing of the buffer area, and bottom of basin; removal of trash and debris; removal of grass clippings and organic matter to be performed at least twice per year. Pretreatment devices shall be inspected every other month and a least twice a year and after every major storm event.

d. Basin outfalls and rip-rap aprons: Preventative maintenance shall be performed at least four times per year. Inspection shall be performed after every major storm for the first three months and monthly thereafter. Removal of trash and debris; removal of grass clippings and organic matter, and removal of accumulated silt to be performed at least twice per year.

e. Infiltration Chambers: Inspect after 2 years of commission using the inspection port via a CCTV and inspect every year thereafter or as needed depending on rainfall and site conditions. Cleaning with high pressure water through culvert cleaning nozzle when sediment accumulation reaches a depth of 3 inches or more. A maintenance log shall be kept for all maintenance activities.

5. Access Provisions: All of the components of the storm water system shall be accessible by the Owner

D. <u>Spill prevention and response plans</u>

1. Inventory materials to be present on-site during construction.
2. Train employees and subcontractors in prevention and clean up procedures.
3. All materials stored on site will be stored in their appropriate containers under a roof.
4. Follow manufacturers recommendation for disposal of used containers.
5. Store only enough product on site to do the job.
6. On site equipment, fueling and maintenance measures:
   a. Inspect on-site vehicles and equipment daily for leaks.
   b. Conduct all vehicle and equipment maintenance and refueling in one location, away from storm drains.
   c. Perform major repairs and maintenance off site.
   d. Use drip pans, drip cloths or absorbent pads when replacing spent fuels.
   e. Collect spent fuels and remove from site.
7. Clean up spills.
   a. Never hose down “dirty” pavement or impermeable surfaces where fluids have spilled. Use dry clean up methods (sawdust, cat litter and/or rags and absorbent pads).
   b. Sweep up dry materials immediately. Never wash them away or bury them.
   c. Clean up spills on dirt areas by digging up and properly disposing of contaminated soil.
   d. Report significant spills to the Fire Department, Conservation Commission and Board of Health.

E. Provisions for maintenance of lawns, gardens, and other landscaped areas
Use only organic fertilizer. Dispose of clippings outside of the 100-foot buffer zone to the adjacent wetland.

F. Requirements for storage and use of herbicides, and pesticides
The application of herbicides or pesticides will be done by professional certified contractor.

G. Provisions for operation and management of septic system
Site to be serviced by public sewer.

H. Requirements for handling of pet waste
Pet waste should never be dumped or washed into the local storm drain system. Waste shall be picked up immediately and placed in bags and properly disposed of in the garbage to be collected and taken to a landfill.

I. Provisions for washing of vehicles
Washing of vehicles shall be done in an area as to eliminate wash water from being directly discharged to the local storm drain system. Vehicles should be washed in areas where wash water can be held prior to discharging to the sanitary sewer system or in areas where infiltration precludes runoff to storm drains. Avoid using detergents whenever possible.

J. Provisions for solid waste management
1. Waste Management Plan
    a. Recycle materials whenever possible (paper, plaster cardboard, metal cans). Separate containers for material are recommended.
    b. Do not bury waste and debris on site.
    c. Certified haulers will be hired to remove the dumpster container waste as needed. Recycling products will also be removed off site weekly.

K. Snow disposal and plowing plans relative to Wetland Resource Areas
Snow storage is adequate around the site for large storm events. Storage of snow shall not be placed directly near areas adjacent to the proposed infiltration basin.

L. Winter Road Salt and/or Sand Use and Storage restrictions
No sand, salt, or chemicals for de-icing will be stored outside.

M. Street sweeping schedules
Sweeping, the act of cleaning pavement can be done by mechanical sweepers, vacuum sweeper or hand sweeper. The quantity of sand is a direct correlation with the treatment of ice and snow and the types of chemicals and spreaders that are being used on site to manage snow. If a liquid de-icer such as calcium chloride is used as a pretreatment to new events the amount of sand is minimized. Sweeping for this site should be done semi-annually at a minimum. Collecting the particulate before it enters the catch basins is cheaper and more environmentally friendly than in a catch basin mixing with oils and greases in the surface water runoff in catch basins.

N. Provisions for prevention of illicit discharges to the stormwater management system
The discharge into the stormwater system is not being violated, see attachment for illicit discharges compliance.

O. Training the staff or personnel involved with implementing Long-Term Pollution Prevention Plan

The owner shall develop policies and procedures for containing the illicit spilling of oils, soda, beer, paper and litter. These wastes provide a degrading of the water quality. The placement of signs and trash barrels with lids around the site would contribute to a clean water quality site condition.

P. List of Emergency contacts for implementing Long-Term Pollution Prevention Plan:

Oliver Crossing Realty Trust c/o Bruce Wheeler
148 Park Street
North Reading, MA 01864
PH: 617-538-2472

This shall be the contact until such time as the project is sold.

Q. Estimated BMP Maintenance Costs

The following prices are estimates of the costs associated with maintenance of the proposed site BMPs. Costs provided are only estimates and may not reflect actual costs to perform the work. Actual costs may vary depending on company/personnel performing the work. Actual costs may increase over time.

BMP	Estimated Maintenance Cost
Pavement sweeping	$ 400 per year
Catch basin cleaning	$ 200 per catch basin per cleaning
Infiltration/Detention Basins	$ 200 per cleaning
Infiltration Chambers	$ 500 per cleaning
Spill Containment Kit	$ 750 purchase price

Illicit Discharge Statement

Appendix 9

Illicit Discharge Compliance Statement

It is the intent of the Applicant, Oliver Crossing Realty Trust, c/o Bruce Wheeler, 148 Park Street, North Reading, MA 01864 to prevent illicit discharges to the stormwater management system, including wastewater discharges and discharges of stormwater contaminated by contact with process wastes, raw materials, toxic pollutants, hazardous substances, oil, or grease. There will be no connection to the storm water system to inadvertently direct other types of liquids, chemicals or solids into the storm drainage system. The Owner will also promote a clean Green Environment by mitigating spills onto pavements; oils, soda, chemicals, pet waste, debris and litter.

Respectfully Acknowledged,

_____

Drainage Area Plans

Appendix 10


71B
RIDGEBURY FINE SANDY LOAM, 3 TO 8
PERCENT SLOPES, EXTREMELY STONY
51
SWANSEA MUCK, 0 TO 1 PERCENT
SLOPES
HSG B/D
310B
WOODBRIDGE FINE SANDY LOAM, 3 TO 8
PERCENT SLOPES
HSG C
305B
PAXTON FINE SANDY LOAM, 3 TO 8
PERCENT SLOPES
HSG C
73A
WHITMAN FINE SANDY LOAM, 0 TO 3
PERCENT SLOPES, EXTREMELY STONY
HSG D
MASS SPC NAD83
BENCHMARK
TOP OF LARGE
CUT SPIKE
ELEVATION=252.62
(NAVD88)
BENCHMARK
TOP OF IRON ROD
ELEVATION=247.25
(NAVD88)
BKA1–BKA7
LOCATED
NOVEMBER
2022
SEE ORAD RECORDED AT
THE NORFOLK COUNTY
REGISTRY OF DEEDS,
BOOK 7224, PG 356.
EX-1
EX-2
AP-1E
Tc FLOWPATH
20' WIDE WAY
20' WIDE DRAIN EASEMENT
LINCOLN STREET
(PUBLIC~60' WIDE)
COUNTY LAYOUT OF OCT. 29, 1946
N/F
FORD
N/F
ESTHIMER
EX. BUILDING #4
EX. BUILDING #5
BUILDING #1
BUILDING #2
BUILDING #3
BUILDING #6
BUILDING #7
BUILDING #28
LEANNE WAY
TROOPER PAUL BARRY WAY
SHAYNE DRIVE
S32°13'18"E 336.13'
S59°52'39"E 18.57'
S64°44'46"W 373.00'
S28°42'49"E 173.68'
S31°33'35"E 136.74'
S34°11'06"E 124.85'
S31°40'52"E 10.72'
S72°06'26"W 484.12'
S73°03'31"W 230.11'
S73°31'41"W 122.41'
S75°13'53"W 150.02'
N15°40'07"W 687.82'
N65°26'46"E 234.51'
N16°18'07"W 309.56'
N79°54'43"E 94.17'
S48°24'29"E 77.89'
N72°29'25"E 194.32'
S74°58'41"E 336.22'
N49°28'53"E 70.80'
S34°32'52"E 30.01'
N64°25'45"E 172.9'
N61°55'52"E 40.21'
TIME OF CONCENTRATION (Tc)
EX-1 11 MINUTES
EX-2 = 6.0 MINUTES
LEGEND
TC PATH
SOIL BOUNDARY
DRAINAGE AREA

F4471

APPROVED DATE:

TOWN_PLANNING_BOARD

BEING A MAJORITY

LEGAL NOTES

UTILITIES ARE PLOTTED AS A COMPILATION OF RECORD DOCUMENTS, MARKINGS AND OTHER OBSERVED EVIDENCE TO DEVELOP A VIEW OF THE UNDERGROUND UTILITIES AND SHOULD BE CONSIDERED APPROXIMATE. LACKING EXCAVATION, THE EXACT LOCATION OF UNDERGROUND FEATURES CANNOT BE ACCURATELY, COMPLETELY AND RELIABLY DEPICTED. ADDITIONAL UTILITIES, NOT EVIDENCED BY RECORD DOCUMENTS OR OBSERVED PHYSICAL EVIDENCE, MAY EXIST. CONTRACTORS (IN ACCORDANCE WITH MASS.G.L. CHAPTER 82 SECTION 40 AS AMENDED) MUST CONTACT ALL UTILITY COMPANIES BEFORE EXCAVATING AND DRILLING AND CALL DIGSAFE AT 1(888)DIG-SAFE{7233}.

CONSTRUCTION ON THIS LAND IS SUBJECT TO ANY EASEMENTS, RIGHTS-OF-WAY, RESTRICTIONS, RESERVATIONS, OR OTHER LIMITATIONS WHICH MAY BE REVEALED BY AN EXAMINATION OF THE TITLE.

OWNER(S)

JOSEPHINE A. FARINA AND CATHERINE L. MEDAGLIA,
TRUSTEES OF THE HARMONY NOMINEE REALTY TRUST
PO BOX 600269
120 ADAMS STREET
NEWTON, MA 02460

JOHN A. FARINA
ANTHONY J. MEDAGLIA, JR.
STEPHEN M. COLLINS
BRYON R. COLLINS
DAVID C. COLLINS
SEAN C. COLLINS
C/O KATHRYN G. COLLINS, ESQ.
HORNUNG & SCIMONE PC
5 COMMONWEALTH ROAD, 4TH FLOOR
NATICK, MA 01760

APPLICANT

OLIVER CROSSING REALTY TRUST
148 PARK STREET
NORTH READING MA, 01864

LOCUS REFERENCES

PLAN BK. 553 PLAN PG. 1 OF 2006
A.M. 219 LOT 178.2

FRANKLIN HEIGHTS
PARCEL B
40B DEVELOPMENT PLAN
FRANKLIN MASSACHUSETTS

EXISTING WATERSHED

SEPTEMBER 14, 2022

DATE	REVISION DESCRIPTION
12/7/22	PER CONSULTANTS COMMENTS

GRAPHIC SCALE: 1"=60'

0 50 75 100 150 200 FEET
0 5 10 15 20 30 40 50 60 METERS

Guerriere & Halnon, Inc.
ENGINEERING & LAND SURVEYING
55 WEST CENTRAL ST.
FRANKLIN, MA 02038
PH. (508) 528-3221
FX. (508) 528-7921
www.gandhengineering.com

SHEET 1 OF 2

JOB NO. F4471

APPROVED DATE:

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PROPOSED WATERSHED

SEPTEMBER 14, 2022

DATE	REVISION DESCRIPTION
12/7/22	PER CONSULTANTS COMMENTS

GRAPHIC SCALE: 1"=60'

0 50 75 100 150 200 FEET
0 5 10 15 20 30 40 50 60 METERS

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FRANKLIN MASSACHUSETTS

STORMWATER BMP MAP

SEPTEMBER 14, 2022

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12/7/22	PER CONSULTANTS COMMENTS

GRAPHIC SCALE: 1"=60'

0 50 75 100 150 200 FEET
0 5 10 15 20 30 40 50 60 METERS

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SHEET 1 OF 1

JOB NO. F4471

LEGEND

SOIL BOUNDARY

DRAINAGE AREA

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F4471

APPROVED DATE:

TOWN_PLANNING_BOARD

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A.M. 219 LOT 178.2

FRANKLIN HEIGHTS
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40B DEVELOPMENT PLAN
FRANKLIN MASSACHUSETTS

STREET DRAINAGE AREA MAP

SEPTEMBER 14, 2022

DATE	REVISION DESCRIPTION
12/7/22	PER CONSULTANTS COMMENTS

GRAPHIC SCALE: 1"=60'

0 50 75 100 150 200 FEET
0 5 10 15 20 30 40 50 60 METERS

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LEGEND

SOIL BOUNDARY

DRAINAGE AREA

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SUPPLEMENTAL ATTACHMENTS

Appendix 11

Land Use Coefficients "C"

Pave	0.90
Gravel	0.80
Wetland	0.72
Grass	0.30
Woods	0.25
Roof	0.90

Drainage Area	Land Use Area Impervious (acres)	Gravel (acres)	Wetland (acres)	Pervious (acres)	Woods (acres)	Roof (acres)	Total (acres)	Weighted "C"
DA-1A	0.180			0.139		0.070	0.389	0.69
DA-1B	0.145			0.121		0.087	0.353	0.69
DA-1C	0.195			0.126		0.076	0.397	0.71
DA-1D	0.166			0.122		0.072	0.359	0.70
DA-1E	0.053			0.036		0.028	0.118	0.72
DA-2A	0.099			0.030		0.071	0.201	0.81
DA-2B	0.046			0.021		0.000	0.067	0.71
DA-3A	0.114			0.024		0.000	0.138	0.80
DA-3B	0.081			0.000		0.000	0.081	0.90
DA-4A	0.164			0.056		0.088	0.307	0.79
DA-4B	0.061			0.579		0.223	0.862	0.50
DA-4C	0.160			0.067		0.098	0.325	0.78
DA-4D	0.168			0.167		0.095	0.430	0.67
DA-5A	0.131			0.433		0.172	0.736	0.55
DA-5B	0.193			0.230		0.102	0.524	0.64
DA-5C	0.083			0.082		0.058	0.223	0.68
DA-6A	0.044			0.000		0.000	0.044	0.90
DA-6B	0.163			0.096		0.094	0.353	0.74
SUBTOTAL	2.246	0.000	0.000	2.330	0.000	0.157	5.908	
OVERALL TOTALS	2.246			2.330	0.000	0.157	4.733	

Guerriere & Halnon, Inc.
55 West Central Steet
Franklin, MA 01757-0235

Project: Franklin Heights, Franklin MA
Job No.: 4280

DESIGN COMPUTATIONS FOR STORM DRAINS

Prepared By: KKP Date: 7/06/2022 Revised: 12/7/22
Checked By: Date: Revised:

Drainage Area	Upper Structure	Lower Structure	Sum of CA's (sf)	Time of Concentration (Tc) (min)	Rainfall Intensity (I) (in/hr)	Actual Peak Flow Rate (Q) (cfs)	Pipe Diameter (in)	Slope (ft/ft)	Roughness Coefficient (n)	Design Flow Full (Q) (cfs)	Velocity Flow Full (V) (fps)	Actual Velocity (V) (fps)	Length of Pipe (L)* (ft)	Time in pipe (min)	Total Fall (ft)	Invert Elevation Elev. Upper End	Invert Elevation Elev. Lower End	Rim Elev Elev. Upper End	Rim Elev Elev. Lower End	Destination
DA-1	CB-8	DMH-18	0.28	6.00	5.50	1.55	12	0.005	0.011	2.98	3.79	1.97	91.9	0.40	0.46	251.35	250.89	255.80	253.69	
	DMH-18	DMH-2	0.28	6.40	5.50	1.55	12	0.005	0.011	2.99	3.80	1.97	51.7	0.23	0.26	250.89	250.63	253.69	253.33	
	CB-2A	DMH-2	0.27	6.00	5.50	1.47	12	0.013	0.011	4.78	6.09	1.87	15.5	0.04	0.20	250.35	250.15	253.20	253.35	
	CB-2B	DMH-2	0.25	6.00	5.50	1.35	12	0.017	0.011	5.50	7.01	1.72	8.8	0.02	0.15	250.30	250.15	253.20	253.35	
	CB-2C	DMH-2	0.25	6.00	5.50	1.38	12	0.005	0.011	2.97	3.78	1.75	14.1	0.06	0.07	250.20	250.13	253.20	253.35	
	CB-2D	DMH-2	0.08	6.00	5.50	0.47	12	0.005	0.011	3.00	3.82	0.59	5.9	0.03	0.03	250.16	250.13	253.20	253.35	INFILTRATION BASIN #1
	DMH-2	DMH-7	1.13	6.63	5.50	6.20	18	0.005	0.011	8.79	4.97	3.51	75.8	0.25	0.38	250.13	249.75	253.35	254.05	
	DMH-7	DMH-8	1.13	6.88	5.50	6.20	18	0.005	0.011	8.77	4.96	3.51	80.1	0.27	0.40	249.65	249.25	254.05	253.35	
	DMH-8	FES #1	1.13	7.15	5.50	6.20	18	0.006	0.011	9.91	5.61	3.51	23.5	0.07	0.15	249.15	249.00	253.35		
DA-2	CB-3A	DMH-3	0.16	6.00	5.50	0.89	12	0.010	0.011	4.24	5.40	1.14	16.8	0.05	0.17	247.52	247.35	251.36	251.34	
	CB-3B	DMH-3	0.05	6.00	5.50	0.26	12	0.010	0.011	4.14	5.28	0.33	5.2	0.02	0.05	247.40	247.35	251.36	251.34	
	DMH-3	DMH-9	0.21	6.05	5.50	1.16	12	0.010	0.011	4.24	5.40	1.47	32.5	0.10	0.33	247.25	246.92	251.34	251.03	
DA-3	CB-1A	DMH-1	0.11	6.00	5.50	0.61	12	0.005	0.011	2.94	3.74	0.77	26.7	0.12	0.13	247.71	247.58	251.26	251.53	
	CB-1B	DMH-1	0.07	6.00	5.50	0.40	12	0.005	0.011	3.01	3.83	0.51	31.4	0.14	0.16	247.74	247.58	251.26	251.53	
	DMH-1	DMH-9	0.18	6.14	5.50	1.01	12	0.005	0.011	2.99	3.81	1.28	111.1	0.49	0.56	247.48	246.92	251.53	251.03	
	DMH-9	DMH-10	0.39	6.62	5.50	2.16	12	0.005	0.011	2.98	3.79	2.75	98.0	0.43	0.49	246.82	246.33	251.03	249.56	
	DMH-10	DMH-4	0.39	7.05	5.50	2.16	12	0.005	0.011	2.98	3.79	2.75	69.1	0.30	0.35	246.33	245.98	249.56	249.23	
DA-4	CB-4A	DMH-4	0.24	6.00	5.50	1.34	12	0.011	0.011	4.41	5.61	1.70	13.7	0.04	0.15	244.30	244.15	249.03	249.23	
	CB-4B	DMH-4	0.43	6.00	5.50	2.36	12	0.010	0.011	4.30	5.48	3.00	14.4	0.04	0.15	244.30	244.15	249.03	249.23	
	CB-4C	DMH-4	0.25	6.00	5.50	1.39	12	0.010	0.011	4.21	5.37	1.76	23.0	0.07	0.23	246.06	245.83	249.04	249.23	
	DMH-4	DMH-16	1.32	6.04	5.50	7.25	18	0.005	0.011	8.80	4.98	4.10	31.8	0.11	0.16	245.73	245.57	249.23	249.33	
	DMH-16	DMH-15	1.32	6.15	5.50	7.25	18	0.005	0.011	8.80	4.98	4.10	51.7	0.17	0.26	245.47	245.21	249.33	250.17	
DA-6	CB-6A	DMH-6	0.04	6.00	5.50	0.22	12	0.011	0.011	4.38	5.58	0.28	23.1	0.07	0.25	252.10	251.85	256.39	256.03	INFILTRATION BASIN #2
	CB-6B	DMH-6	0.26	6.07	5.50	1.43	12	0.020	0.011	5.88	7.49	1.82	12.8	0.03	0.25	252.10	251.85	256.31	256.03	
	DMH-6	DMH-11	0.30	6.10	5.50	1.65	12	0.034	0.011	7.78	9.91	2.10	36.6	0.06	1.25	251.75	250.50	256.03	255.04	
	DMH-11	DMH-12	0.30	6.16	5.50	1.65	12	0.026	0.011	6.73	8.57	2.10	54.8	0.11	1.40	250.40	249.00	255.04	253.69	
	DMH-12	DMH-13	0.30	6.27	5.50	1.65	12	0.024	0.011	6.51	8.29	2.10	58.6	0.12	1.40	248.90	247.50	253.69	252.28	
	CB #7	DMH-17	0.15	6.00	5.50	0.83	12	0.005	0.011	2.99	3.80	1.06	71.6	0.31	0.36	248.06	247.70	250.90	253.50	
	DMH-17	DMH-13	0.15	6.31	5.50	0.83	12	0.005	0.011	2.97	3.78	1.06	74.6	0.33	0.37	247.60	247.23	253.50	252.28	
	DMH-13	DMH-5	0.45	6.64	5.50	2.48	12	0.005	0.011	2.98	3.79	3.15	135.9	0.60	0.68	247.13	246.45	252.28	250.20	
DA-5	CB-5A	DMH-5	0.40	6.00	5.50	2.21	12	0.012	0.011	4.65	5.93	2.82	16.4	0.05	0.20	246.20	246.00	250.09	250.20	
	CB-5B	DMH-5	0.33	6.05	5.50	1.84	12	0.012	0.011	4.61	5.87	2.34	8.3	0.02	0.10	246.10	246.00	250.09	250.20	
	DMH-5	DMH-14	1.19	7.24	5.50	6.53	18	0.005	0.011	8.75	4.95	3.69	94.5	0.32	0.47	245.95	245.48	250.20	250.97	
	DMH-14	DMH-15	1.19	7.56	5.50	6.53	18	0.005	0.011	8.72	4.94	3.69	50.7	0.17	0.25	245.38	245.13	250.97	250.17	
	CB #9	DMH-15	0.43	6.00	5.50	2.36	12	0.010	0.011	4.18	5.32	3.00	35.5	0.11	0.35	246.35	246.00	250.75	250.17	
	DMH-15	FES #2	2.93	6.32	5.50	16.13	18	0.017	0.011	16.42	9.29	9.13	20.0	0.04	0.35	245.13	244.78	250.17		

Post Construction Inspection Report

INSPECTION DATE:						
Person Inspecting		Weather				Other Personnel Present
		Clear				
Item	**N/A***	**sat.****	**NMR*****	**CAM****	**MCA***	**Comments:**
Pavement Swept						
Catch Basins						
CB #1A						
CB #1B						
CB #2A						
CB #2B						
CA #2C						
CA #2D						
CB #3A						
CB #3B						
CB #4A						
CB #4B						
CB 4C						
CB #5A						
CB #5B						
CB #6A						
CB #6B						
CB #7						
CB #8						
CB #9						
Stormwater Basins						
Sediment Forebay #1						
Detention Basin #1						
Sediment Forebay #2						
Infiltration Basin #2						
FES #3						

CULTEC Recharger® 330XLHD Stormwater Chamber

The Recharger® 330XLHD is a 30.5" (775 mm) tall, high capacity chamber. Typically when using this model, fewer chambers are required resulting in less labor and a smaller installation area. The Recharger® 330XLHD has the side portal internal manifold feature. HVLV® FC-24 Feed Connectors are inserted into the side portals to create the internal manifold.

Size (L x W x H)	8.5' x 52" x 30.5" 2.59 m x 1321 mm x 775 mm
Installed Length	7' 2.13 m
Length Adjustment per Run	1.50' 0.46 m
Chamber Storage	7.46 ft³/ft 0.69 m³/m 52.21 ft³/unit 1.48 m³/unit
Min. Installed Storage	11.32 ft³/ft 1.05 m³/m 79.26 ft³/unit 2.24 m³/unit
Min. Area Required	33.83 ft² 3.14 m²
Chamber Weight	73.0 lbs 33.11 kg
Shipping	30 chambers/skid 2,335 lbs/skid 10 skids/48' flatbed
Min. Center-to-Center Spacing	4.83' 1.47 m
Max. Allowable Cover	12' 3.66 m
Max. Inlet Opening in End Wall	24" HDPE, PVC 600 mm HDPE, PVC
Max. Allowable O.D. in Side Portal	10" HDPE, 12" PVC 250 mm HDPE, 300 mm PVC
Compatible Feed Connector	HVLV FC-24 Feed Connector

Calculations are based on installed chamber length.
All above values are nominal.
Min. installed storage includes 6" (152 mm) stone base, 6" (152 mm) stone above crown of chamber and typical stone surround at 58" (1473 mm) center-to-center spacing.

	Stone Foundation Depth		
	6" 152 mm	12" 305 mm	18" 457 mm
Chamber and Stone Storage Per Chamber	79.26 ft³ 2.24 m³	86.03 ft³ 2.44 m³	92.79 ft³ 2.63 m³
Min. Effective Depth	3.54' 1.08 m	4.04' 1.23 m	4.54' 1.38 m
Stone Required Per Chamber	2.50 yd³ 1.91 m³	3.13 yd³ 2.39 m³	3.76 yd³ 2.87 m³

Calculations are based on installed chamber length.
Includes 6" (305 mm) stone above crown of chamber and typical stone surround at 58"(1473 mm) center-to-center spacing and stone foundation as listed in table.
Stone void calculated at 40%.

Recharger® 330XLHD Bare Chamber Storage Volumes

Elevation		Incremental Storage Volume				Cumulative Storage	
in.	mm	ft³/ft	m³/m	ft³	m³	ft³	m³
30.5	775	0.000	0.000	0.000	0.000	52.213	1.479
30	762	0.019	0.002	0.133	0.004	52.213	1.479
29	737	0.051	0.005	0.357	0.010	52.080	1.475
28	711	0.084	0.008	0.588	0.017	51.723	1.465
27	686	0.124	0.012	0.868	0.025	51.135	1.448
26	660	0.150	0.014	1.05	0.030	50.267	1.424
25	635	0.173	0.016	1.211	0.034	49.217	1.394
24	609	0.191	0.018	1.337	0.038	48.006	1.360
23	584	0.207	0.019	1.449	0.041	46.669	1.322
22	559	0.221	0.021	1.547	0.044	45.220	1.281
21	533	0.233	0.022	1.631	0.046	43.673	1.237
20	508	0.244	0.023	1.708	0.048	42.042	1.191
19	483	0.254	0.024	1.778	0.050	40.334	1.142
18	457	0.264	0.025	1.848	0.052	38.556	1.092
17	432	0.271	0.025	1.897	0.054	36.708	1.040
16	406	0.283	0.026	1.981	0.056	34.811	0.986
15	381	0.294	0.027	2.058	0.058	32.830	0.930
14	356	0.296	0.027	2.072	0.059	30.772	0.871
13	330	0.299	0.028	2.093	0.059	28.700	0.813
12	305	0.301	0.028	2.107	0.060	26.607	0.754
11	279	0.303	0.028	2.121	0.060	24.500	0.694
10	254	0.304	0.028	2.128	0.060	22.379	0.634
9	229	0.306	0.028	2.142	0.061	20.251	0.574
8	203	0.313	0.029	2.191	0.062	18.109	0.513
7	178	0.321	0.030	2.247	0.064	15.918	0.451
6	152	0.322	0.030	2.254	0.064	13.671	0.387
5	127	0.323	0.030	2.261	0.064	11.417	0.323
4	102	0.324	0.030	2.268	0.064	9.156	0.259
3	76	0.325	0.030	2.275	0.064	6.888	0.195
2	51	0.327	0.030	2.289	0.065	4.613	0.131
1	25	0.332	0.031	2.324	0.066	2.324	0.066
Total		**7.459**	**0.693**	**52.213**	**1.479**	**52.213**	**1.479**

Calculations are based on installed chamber length.

Visit http://cultec.com/downloads/
for Product Downloads and CAD details.

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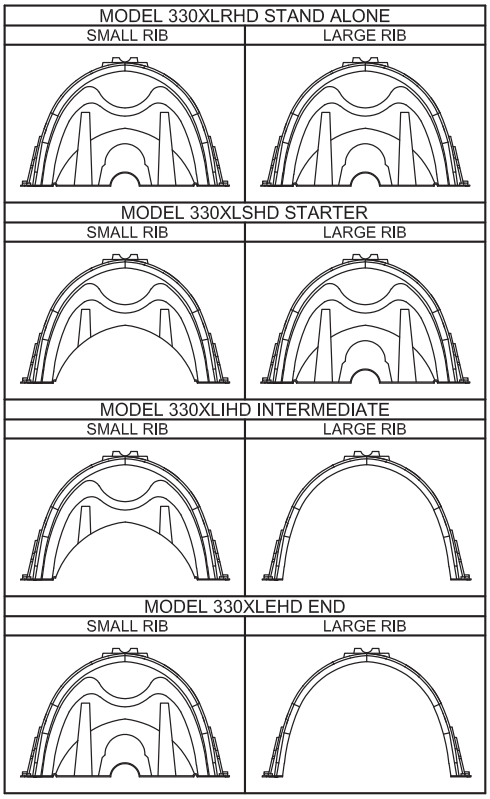
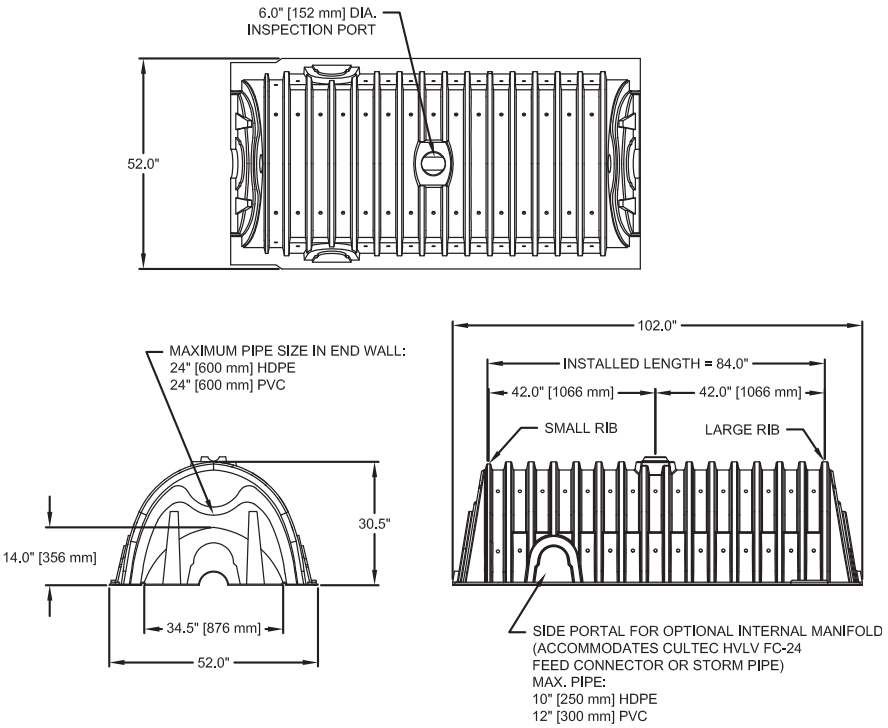
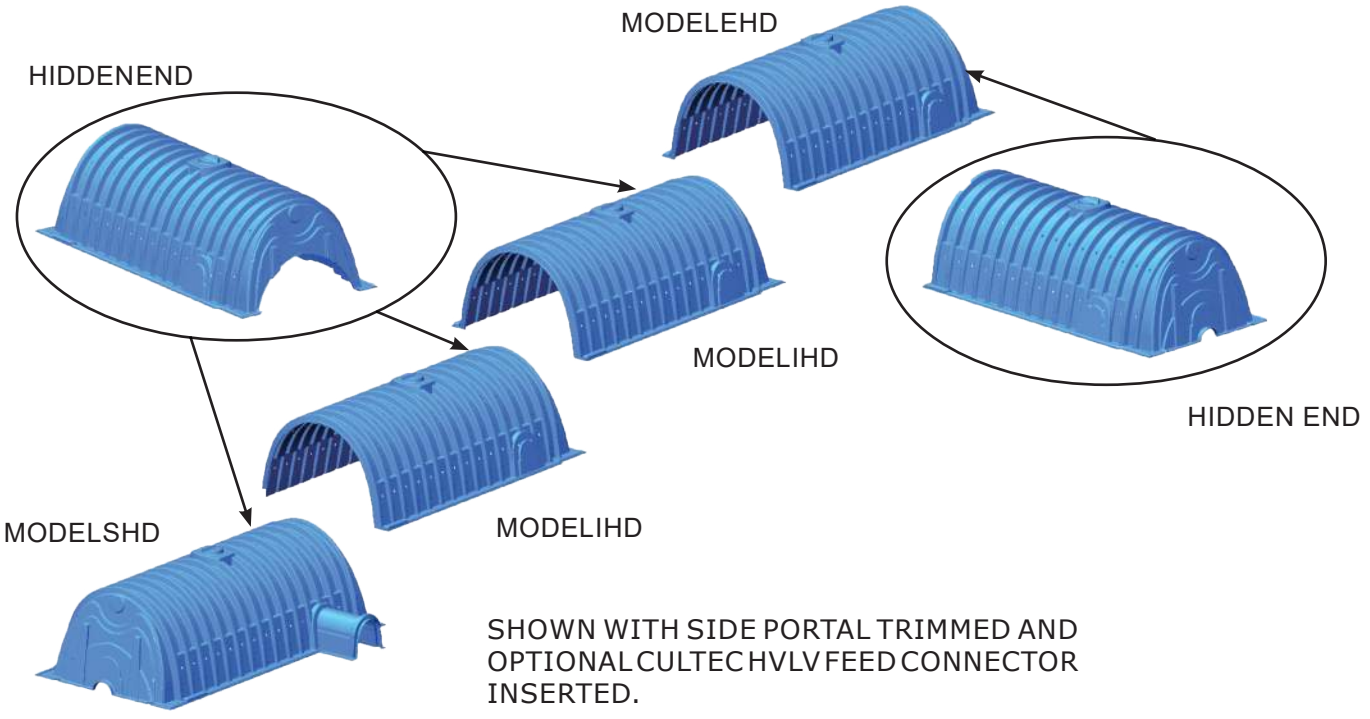
Three View Drawing





CULTEC RECHARGER 330XLHD CHAMBER STORAGE = 7.459 CF/FT [0.693 m³/m]
INSTALLED LENGTH ADJUSTMENT = 1.5' [0.46 m]
SIDE PORTAL ACCEPTS CULTEC HVLV FC-24 FEED CONNECTOR

Typical Interlock Installation



SHOWN WITH SIDE PORTAL TRIMMED AND OPTIONAL CULTEC HVLV FEED CONNECTOR INSERTED.

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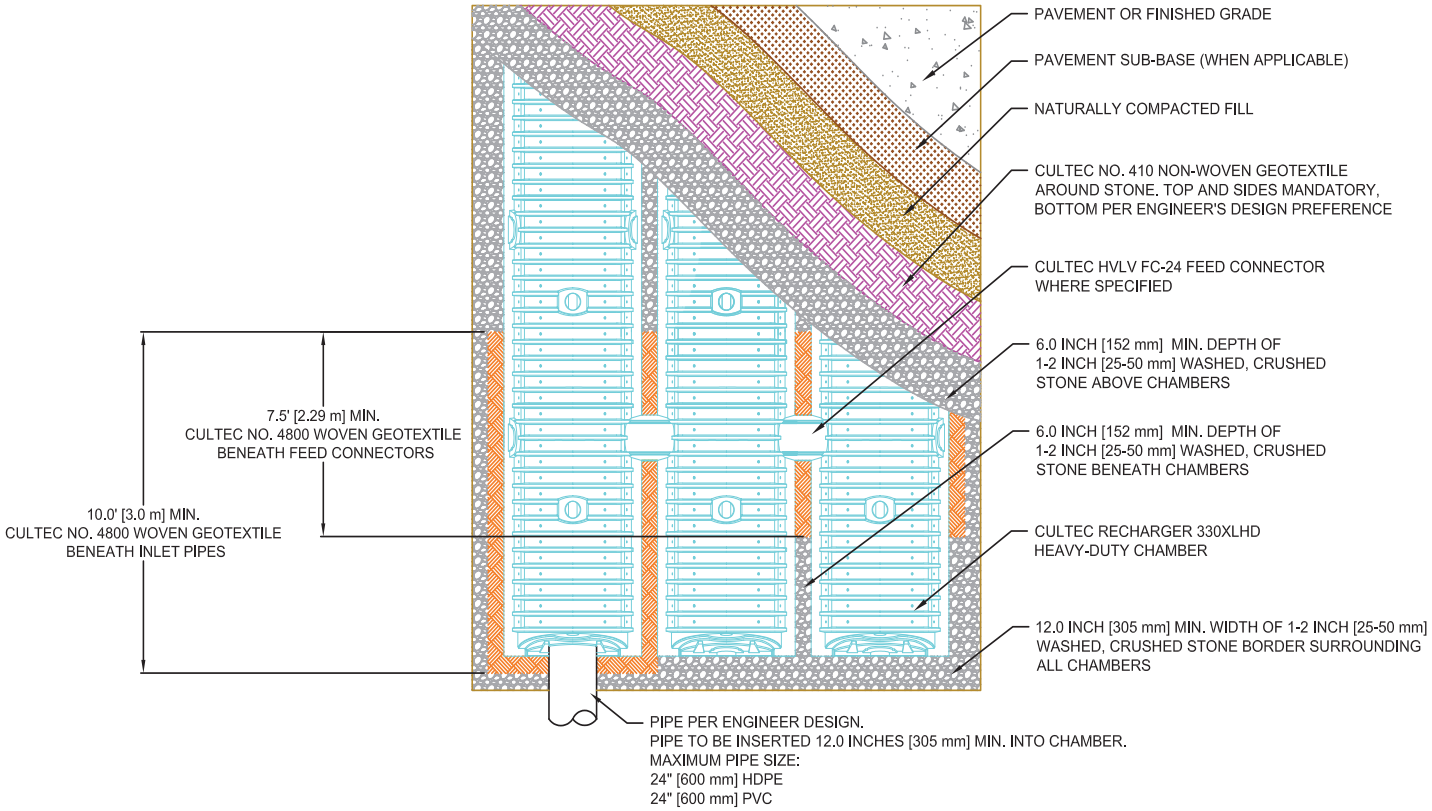
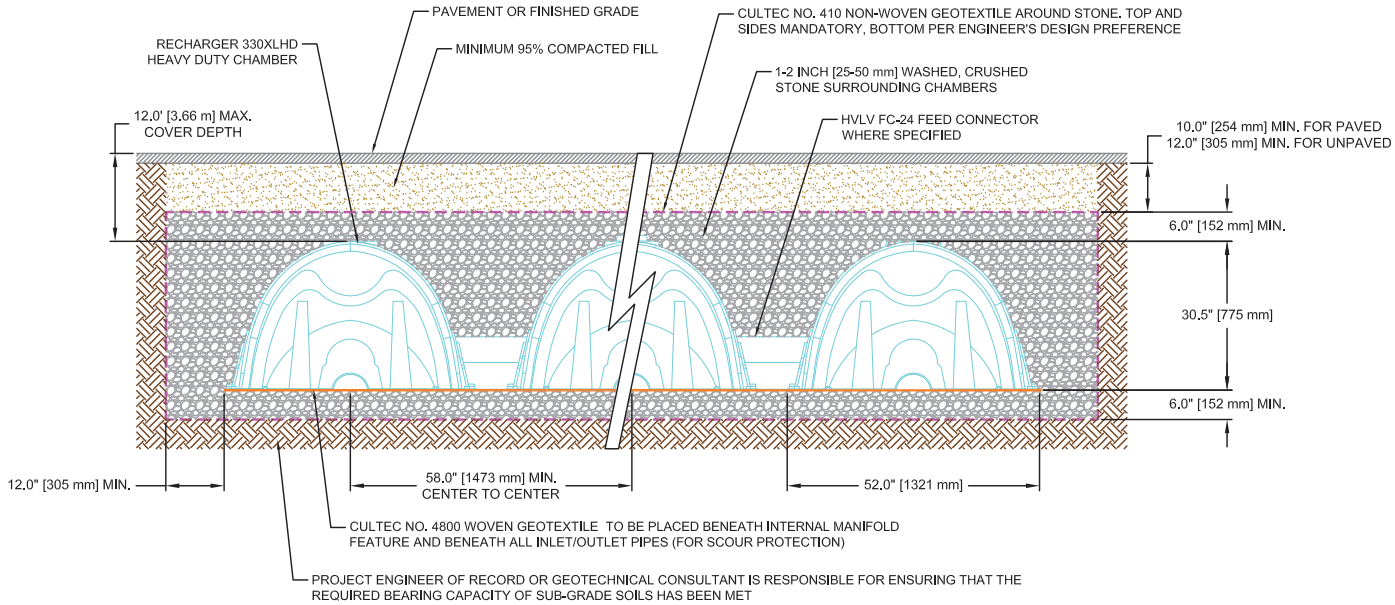
Plan View Drawing



Typical Cross Section for Traffic Application



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CULTEC Recharger® 330XLHD Specifications

GENERAL

CULTEC Recharger® 330XLHD chambers are designed for underground stormwater management. The chambers may be used for retention, recharging, detention or controlling the flow of on-site stormwater runoff.

CHAMBER PARAMETERS

1. The chambers shall be manufactured in the U.S.A. by CULTEC, Inc. of Brookfield, CT (cultec.com, 203-775-4416).
2. The chamber shall be vacuum thermoformed of polyethylene with a black interior and blue exterior.
3. The chamber shall be arched in shape.
4. The chamber shall be open-bottomed.
5. The chamber shall be joined using an interlocking overlapping rib method. Connections must be fully shouldered overlapping ribs, having no separate couplings or separate end walls.
6. The nominal chamber dimensions of the CULTEC Recharger® 330XLHD shall be 30.5 inches (775 mm) tall, 52 inches (1321 mm) wide and 8.5 feet (2.59 m) long. The installed length of a joined Recharger® 330XLHD shall be 7 feet (2.13 m).
7. Maximum inlet opening on the chamber end wall is 24 inches (600 mm) HDPE, PVC.
8. The chamber shall have two side portals to accept CULTEC HVLV® FC-24 Feed Connectors to create an internal manifold. Maximum allowable O.D. in the side portal is 10 inches (250 mm) HDPE and 12 inches (300 mm) PVC.
9. The nominal chamber dimensions of the CULTEC HVLV® FC-24 Feed Connector shall be 12 inches (305 mm) tall, 16 inches (406 mm) wide and 24.2 inches (614 mm) long.
10. The nominal storage volume of the Recharger® 330XLHD chamber shall be 7.459 ft^3 / ft (0.693 m^3 / m) - without stone. The nominal storage volume of a single Recharger® 330XLRHD Stand Alone unit shall be 63.40 ft^3 (1.80 m^3) - without stone. The nominal storage volume of a joined Recharger® 330XLIHD Intermediate unit shall be 52.213 ft^3 (1.478 m^3) - without stone. The nominal storage volume of the length adjustment amount per run shall be 11.19 ft^3 (1.04 m^3) - without stone.
11. The nominal storage volume of the HVLV® FC-24 Feed Connector shall be 0.913 ft^3 / ft (0.026 m^3 / m) - without stone.
12. The Recharger® 330XLHD chamber shall have fifty-six discharge holes bored into the sidewalls of the unit's core to promote lateral conveyance of water.
13. The Recharger® 330XLHD chamber shall have 16 corrugations.
14. The end wall of the chamber, when present, shall be an integral part of the continuously formed unit. Separate end plates cannot be used with this unit.
15. The Recharger® 330XLRHD Stand Alone unit must be formed as a whole chamber having two fully formed integral end walls and having no separate end plates or separate end walls.
16. The Recharger® 330XLSHD Starter unit must be formed as a whole chamber having one fully formed integral end wall and one partially formed integral end wall with a lower transfer opening of 14 inches (356 mm) high x 34.5 inches (876 mm) wide.
17. The Recharger® 330XLIHD Intermediate unit must be formed as a whole chamber having one fully open end wall and one partially formed integral end wall with a lower transfer opening of 14 inches (356 mm) high x 34.5 inches (876 mm) wide.
18. The Recharger® 330XLEHD End unit must be formed as a whole chamber having one fully formed integral end wall and one fully open end wall and having no separate end plates or end walls.
19. The HVLV® FC-24 Feed Connector must be formed as a whole chamber having two open end walls and having no separate end plates or separate end walls. The unit shall fit into the side portals of the Recharger® 330XLHD and act as cross feed connections.
20. Chambers must have horizontal stiffening flex reduction steps between the ribs.
21. The chamber shall have a raised integral cap at the top of the arch in the center of each unit to be used as an optional inspection port or clean-out.
22. The units may be trimmed to custom lengths by cutting back to any corrugation on the large rib end.
23. The chamber shall be manufactured in an ISO 9001:2015 certified facility.
24. The chamber shall be designed and manufactured to meet the material and structural requirements of IAPMO PS 63-2019, including resistance to AASHTO H-10 and H-20 highway live loads, when installed in accordance with CULTEC's installation instructions.
25. The chamber shall be designed and manufactured in accordance with the specifications of NSAI Irish Agrement Board Certificate for Cultec Attenuation and Infiltration.
26. Maximum allowable cover over the top of the chamber shall be 12' (3.66 m).
27. The chamber shall be designed to withstand traffic loads when installed according to CULTEC's recommended installation instructions.

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CULTEC RECHARGER® 330XLHD PRODUCT SPECIFICATIONS

GENERAL

CULTEC RECHARGER 330XLHD CHAMBERS ARE DESIGNED FOR UNDERGROUND STORMWATER MANAGEMENT. THE CHAMBERS MAY BE USED FOR RETENTION, RECHARGING, DETENTION OR CONTROLLING THE FLOW OF ON-SITE STORMWATER RUNOFF.

CHAMBER PARAMETERS

1. THE CHAMBERS SHALL BE MANUFACTURED BY CULTEC, INC. OF BROOKFIELD, CT, USA. (203-775-4416 OR 1-800-428-5832)
2. THE CHAMBER SHALL BE VACUUM THERMOFORMED OF HIGH MOLECULAR WEIGHT HIGH DENSITY POLYETHYLENE (HMWHDPE) WITH A BLACK INTERIOR AND BLUE EXTERIOR.
3. THE CHAMBER SHALL BE ARCHED IN SHAPE.
4. THE CHAMBER SHALL BE OPEN-BOTTOMED.
5. THE CHAMBER SHALL BE JOINED USING AN INTERLOCKING OVERLAPPING RIB METHOD. CONNECTIONS MUST BE FULLY SHOULDERED OVERLAPPING RIBS, HAVING NO SEPARATE COUPLINGS OR SEPARATE END WALLS
6. THE NOMINAL CHAMBER DIMENSIONS OF THE CULTEC RECHARGER 330XLHD SHALL BE 30.5 INCHES (775 mm) TALL, 52 INCHES (1321 mm) WIDE AND 8.5 FEET (2.59 m) LONG. THE INSTALLED LENGTH OF A JOINED RECHARGER 330XLHD SHALL BE 7 FEET (2.13 m).
7. MAXIMUM INLET OPENING ON THE CHAMBER ENDWALL IS 24 INCHES (600 mm) HDPE.
8. THE CHAMBER SHALL HAVE TWO SIDE PORTALS TO ACCEPT CULTEC HVLV® FC-24 FEED CONNECTORS TO CREATE AN INTERNAL MANIFOLD. THE NOMINAL DIMENSIONS OF EACH SIDE PORTAL SHALL BE 10.5 INCHES (267 mm) HIGH BY 11.5 INCHES (292 mm) WIDE. MAXIMUM ALLOWABLE OUTER DIAMETER (O.D.) PIPE SIZE IN THE SIDE PORTAL IS 11.75 INCHES (298 mm).
9. THE NOMINAL CHAMBER DIMENSIONS OF THE CULTEC HVLV FC-24 FEED CONNECTOR SHALL BE 12 INCHES (305 mm) TALL, 16 INCHES (406 mm) WIDE AND 24.2 INCHES (614 mm) LONG.
10. THE NOMINAL STORAGE VOLUME OF THE RECHARGER 330XLHD CHAMBER SHALL BE 7.459 FT³ / FT (0.693 m³ / m) - WITHOUT STONE. THE NOMINAL STORAGE VOLUME OF A JOINED RECHARGER 330XLHD SHALL BE 52.213 FT³ / UNIT (1.478 m³ / UNIT) - WITHOUT STONE.
11. THE NOMINAL STORAGE VOLUME OF THE HVLV FC-24 FEED CONNECTOR SHALL BE 0.913 FT³ / FT (0.085 m³ / m) - WITHOUT STONE.
12. THE RECHARGER 330XLHD CHAMBER SHALL HAVE FIFTY-SIX DISCHARGE HOLES BORED INTO THE SIDEWALLS OF THE UNIT'S CORE TO PROMOTE LATERAL CONVEYANCE OF WATER.
13. THE RECHARGER 330XLHD CHAMBER SHALL HAVE 16 CORRUGATIONS.
14. THE ENDWALL OF THE CHAMBER, WHEN PRESENT, SHALL BE AN INTEGRAL PART OF THE CONTINUOUSLY FORMED UNIT. SEPARATE END PLATES CANNOT BE USED WITH THIS UNIT.
15. THE RECHARGER 330XLRHD STAND ALONE UNIT MUST BE FORMED AS A WHOLE CHAMBER HAVING TWO FULLY FORMED INTEGRAL ENDWALLS AND HAVING NO SEPARATE END PLATES OR SEPARATE END WALLS.
16. THE RECHARGER 330XLSHD STARTER UNIT MUST BE FORMED AS A WHOLE CHAMBER HAVING ONE FULLY FORMED INTEGRAL ENDWALL AND ONE PARTIALLY FORMED INTEGRAL ENDWALL WITH A LOWER TRANSFER OPENING OF 14 INCHES (356 mm) HIGH X 34.5 INCHES (876 mm) WIDE.
17. THE RECHARGER 330XLIHD INTERMEDIATE UNIT MUST BE FORMED AS A WHOLE CHAMBER HAVING ONE FULLY OPEN ENDWALL AND ONE PARTIALLY FORMED INTEGRAL ENDWALL WITH A LOWER TRANSFER OPENING OF 14 INCHES (356 mm) HIGH X 34.5 INCHES (876 mm) WIDE.
18. THE RECHARGER 330XLEHD END UNIT MUST BE FORMED AS A WHOLE CHAMBER HAVING ONE FULLY FORMED INTEGRAL ENDWALL AND ONE FULLY OPEN END WALL AND HAVING NO SEPARATE END PLATES OR END WALLS.
19. THE HVLV FC-24 FEED CONNECTOR MUST BE FORMED AS A WHOLE CHAMBER HAVING TWO OPEN END WALLS AND HAVING NO SEPARATE END PLATES OR SEPARATE END WALLS. THE UNIT SHALL FIT INTO THE SIDE PORTALS OF THE RECHARGER 330XLHD AND ACT AS CROSS FEED CONNECTIONS.
20. CHAMBERS MUST HAVE HORIZONTAL STIFFENING FLEX REDUCTION STEPS BETWEEN THE RIBS.
21. THE CHAMBER SHALL HAVE A 6 INCH (152 mm) DIAMETER RAISED INTEGRAL CAP AT THE TOP OF THE ARCH IN THE CENTER OF EACH UNIT TO BE USED AS AN OPTIONAL INSPECTION PORT OR CLEAN-OUT.
22. THE UNITS MAY BE TRIMMED TO CUSTOM LENGTHS BY CUTTING BACK TO ANY CORRUGATION.
23. THE CHAMBER SHALL BE MANUFACTURED IN AN ISO 9001:2015 CERTIFIED FACILITY.
24. THE CHAMBER SHALL BE DESIGNED AND MANUFACTURED TO MEET THE MATERIAL AND STRUCTURAL REQUIREMENTS OF IAPMO PS 63-2019, INCLUDING RESISTANCE TO AASHTO H-10 AND H-20 HIGHWAY LIVE LOADS, WHEN INSTALLED IN ACCORDANCE WITH CULTEC'S INSTALLATION INSTRUCTIONS.
25. THE CHAMBER SHALL BE DESIGNED AND MANUFACTURED IN ACCORDANCE WITH THE SPECIFICATIONS OF NSAI IRISH AGREEMENT BOARD CERTIFICATE FOR CULTEC ATTENUATION AND INFILTRATION.
26. MAXIMUM ALLOWED COVER OVER TOP OF UNIT SHALL BE 12 FEET (3.66 m)
27. THE CHAMBER SHALL BE DESIGNED TO WITHSTAND TRAFFIC LOADS WHEN INSTALLED ACCORDING TO CULTEC'S RECOMMENDED INSTALLATION INSTRUCTIONS.

CULTEC HVLV FC-24 FEED CONNECTOR PRODUCT SPECIFICATIONS

GENERAL

CULTEC HVLV FC-24 FEED CONNECTORS ARE DESIGNED TO CREATE AN INTERNAL MANIFOLD FOR CULTEC RECHARGER MODEL 330XLHD STORMWATER CHAMBERS.

CHAMBER PARAMETERS

1. THE CHAMBERS SHALL BE MANUFACTURED BY CULTEC, INC. OF BROOKFIELD, CT. (203-775-4416 OR 1-800-428-5832)
2. THE CHAMBER SHALL BE VACUUM THERMOFORMED OF HIGH MOLECULAR WEIGHT HIGH DENSITY POLYETHYLENE (HMWHDPE) WITH A BLACK INTERIOR AND BLUE EXTERIOR.
3. THE CHAMBER SHALL BE ARCHED IN SHAPE.
4. THE CHAMBER SHALL BE OPEN-BOTTOMED.
5. THE NOMINAL CHAMBER DIMENSIONS OF THE CULTEC HVLV FC-24 FEED CONNECTOR SHALL BE 12 INCHES (305 mm) TALL, 16 INCHES (406 mm) WIDE AND 24.2 INCHES (614 mm) LONG.
6. THE NOMINAL STORAGE VOLUME OF THE HVLV FC-24 FEED CONNECTOR SHALL BE 0.913 FT³ / FT (0.085 m³ / m) - WITHOUT STONE.
7. THE HVLV FC-24 FEED CONNECTOR CHAMBER SHALL HAVE 2 CORRUGATIONS.
8. THE HVLV FC-24 FEED CONNECTOR MUST BE FORMED AS A WHOLE CHAMBER HAVING TWO OPEN END WALLS AND HAVING NO SEPARATE END PLATES OR SEPARATE END WALLS. THE UNIT SHALL FIT INTO THE SIDE PORTALS OF THE CULTEC RECHARGER STORMWATER CHAMBER AND ACT AS CROSS FEED CONNECTIONS CREATING AN INTERNAL MANIFOLD.
9. THE CHAMBER SHALL BE DESIGNED TO WITHSTAND TRAFFIC LOADS WHEN INSTALLED ACCORDING TO CULTEC'S RECOMMENDED INSTALLATION INSTRUCTIONS.
10. THE CHAMBER SHALL BE MANUFACTURED IN AN ISO 9001:2015 CERTIFIED FACILITY.

CULTEC NO. 410™ NON-WOVEN GEOTEXTILE

CULTEC NO. 410™ NON-WOVEN GEOTEXTILE MAY BE USED WITH CULTEC CONTACTOR® AND RECHARGER® STORMWATER INSTALLATIONS TO PROVIDE A BARRIER THAT PREVENTS SOIL INTRUSION INTO THE STONE.

GEOTEXTILE PARAMETERS

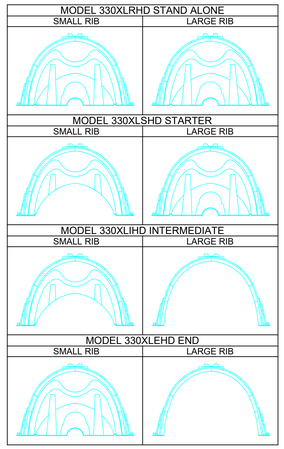
1. THE GEOTEXTILE SHALL BE PROVIDED BY CULTEC, INC. OF BROOKFIELD, CT. (203-775-4416 OR 1-800-428-5832)
2. THE GEOTEXTILE SHALL BE BLACK IN APPEARANCE.
3. THE GEOTEXTILE SHALL HAVE A TYPICAL WEIGHT OF 4.5 OZ/SY (142 G/M).
4. THE GEOTEXTILE SHALL HAVE A TENSILE STRENGTH VALUE OF 120 LBS (533 N) PER ASTM D4632 TESTING METHOD.
5. THE GEOTEXTILE SHALL HAVE AN ELONGATION @ BREAK VALUE OF 50% PER ASTM D4632 TESTING METHOD.
6. THE GEOTEXTILE SHALL HAVE A MULLEN BURST VALUE OF 225 PSI (1551 KPA) PER ASTM D3786 TESTING METHOD.
7. THE GEOTEXTILE SHALL HAVE A PUNCTURE STRENGTH VALUE OF 65 LBS (289 N) PER ASTM D4833 TESTING METHOD.
8. THE GEOTEXTILE SHALL HAVE A CBR PUNCTURE VALUE OF 340 LBS (1513 N) PER ASTM D6241 TESTING METHOD.
9. THE GEOTEXTILE SHALL HAVE A TRAPEZOID TEAR VALUE OF 50 LBS (222 N) PER ASTM D4533 TESTING METHOD.
10. THE GEOTEXTILE SHALL HAVE A AOS VALUE OF 70 U.S. SIEVE (0.212 MM) PER ASTM D4751 TESTING METHOD.
11. THE GEOTEXTILE SHALL HAVE A PERMITTIVITY VALUE OF 1.7 SEC-1 PER ASTM D4491 TESTING METHOD.
12. THE GEOTEXTILE SHALL HAVE A WATER FLOW RATE VALUE OF 135 GAL/MIN/SF (5500 L/MIN/SM) PER ASTM D4491 TESTING METHOD.
13. THE GEOTEXTILE SHALL HAVE A UV STABILITY @ 500 HOURS VALUE OF 70% PER ASTM D4355 TESTING METHOD.

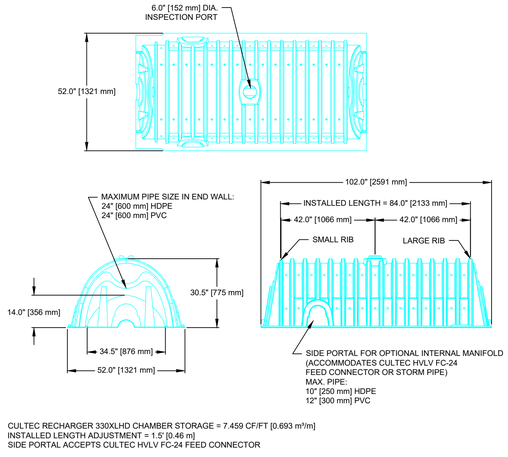
CULTEC NO. 4800™ WOVEN GEOTEXTILE

CULTEC NO. 4800 WOVEN GEOTEXTILE IS DESIGNED AS A UNDERLAYMENT TO PREVENT SCOURING CAUSED BY WATER MOVEMENT WITHIN THE CULTEC CHAMBERS AND FEED CONNECTORS UTILIZING THE CULTEC MANIFOLD FEATURE. IT MAY ALSO BE USED AS A COMPONENT OF THE CULTEC SEPARATOR ROW TO ACT AS A BARRIER TO PREVENT SOIL/CONTAMINANT INTRUSION INTO THE STONE WHILE ALLOWING FOR MAINTENANCE.

GEOTEXTILE PARAMETERS

1. THE GEOTEXTILE SHALL BE PROVIDED BY CULTEC, INC. OF BROOKFIELD, CT. (203-775-4416 OR 1-800-428-5832)
2. THE GEOTEXTILE SHALL BE BLACK IN APPEARANCE.
3. THE GEOTEXTILE SHALL HAVE A TENSILE STRENGTH OF 550 X 550 LBS (2,448 X 2,448 N) PER ASTM D4632 TESTING METHOD.
4. THE GEOTEXTILE SHALL HAVE A ELONGATION @ BREAK RESISTANCE OF 20 X 20% PER ASTM D4632 TESTING METHOD.
5. THE GEOTEXTILE SHALL HAVE A WIDE WIDTH TENSILE RESISTANCE OF 5,070 X 5,070 LBS/FT (74 X 74 KN/M) PER ASTM D4595 TESTING METHOD.
6. THE GEOTEXTILE SHALL HAVE A WIDE WIDTH TENSILE RESISTANCE @ 2% STRAIN OF 960 X 1,096 LBS/FT (14 X 16 KN/M) PER ASTM D4595 TESTING METHOD.
7. THE GEOTEXTILE SHALL HAVE A WIDE WIDTH TENSILE RESISTANCE @ 5% STRAIN OF 2,740 X 2, 740 LBS/FT (40 X 40 KN/M) PER ASTM D4595 TESTING METHOD.
8. THE GEOTEXTILE SHALL HAVE A WIDE WIDTH TENSILE RESISTANCE @ 10% STRAIN OF 4,800 X 4,800 LBS/FT (70 X 70 KN/M) PER ASTM D4595 TESTING METHOD.
9. THE GEOTEXTILE SHALL HAVE A CBR PUNCTURE RESISTANCE OF 1,700 LBS (7,560 N) PER ASTM D6241 TESTING METHOD.
10. THE GEOTEXTILE SHALL HAVE A TRAPEZOIDAL TEAR RESISTANCE OF 180 X 180 LBS (801 X 801 N) PER ASTM D4533 TESTING METHOD.
11. THE GEOTEXTILE SHALL HAVE AN APPARENT OPENING SIZE OF 40 US STD. SIEVE (0.425 MM) PER ASTM D4751 TESTING METHOD.
12. THE GEOTEXTILE SHALL HAVE A PERMITTIVITY RATING OF 0.15 SEC-1 PER ASTM D4491 TESTING METHOD.
13. THE GEOTEXTILE SHALL HAVE A WATER FLOW RATING OF 11.5 GPM/FT2 (470 LPM/M2) PER ASTM D4491 TESTING METHOD.
14. THE GEOTEXTILE SHALL HAVE A UV RESISTANCE OF 80% @ 500 HRS. PER ASTM D4355 TESTING METHOD.

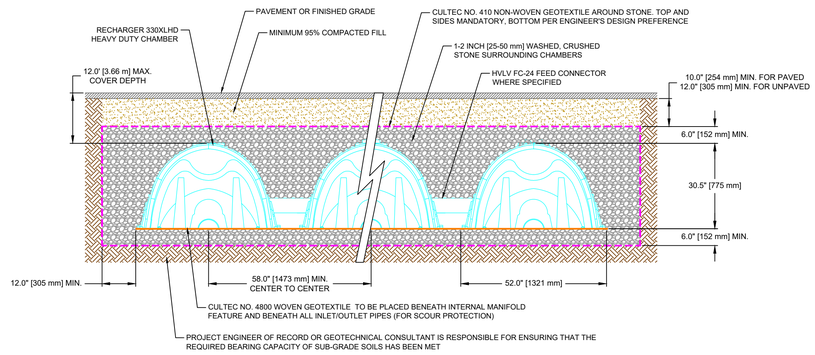




CULTEC RECHARGER 330XLHD CHAMBER STORAGE = 7.459 CF/FT [0.693 m³/m]
INSTALLED LENGTH ADJUSTMENT = 1.5' [0.46 m]
SIDE PORTAL ACCEPTS CULTEC HVLV FC-24 FEED CONNECTOR

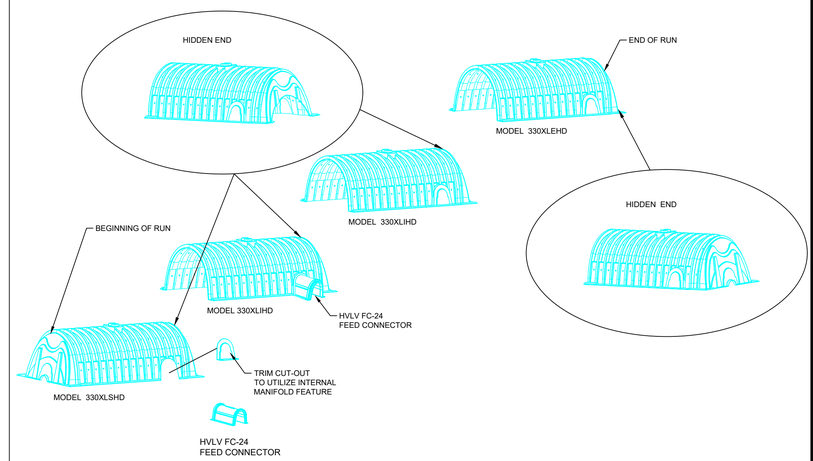
330XLHD 2.0

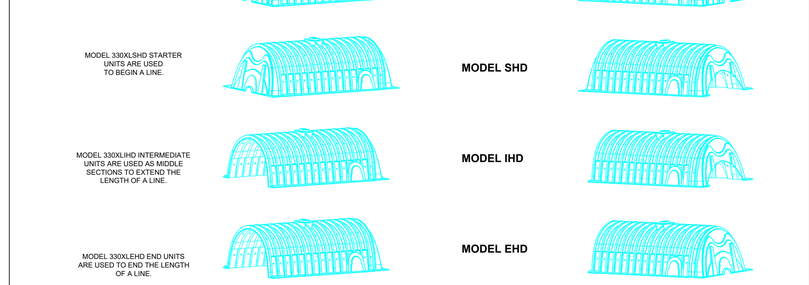
CULTEC RECHARGER 330XLHD HEAVY DUTY THREE VIEW



330XLHD 3.0

CULTEC RECHARGER 330XLHD HEAVY DUTY END DETAIL INFORMATION



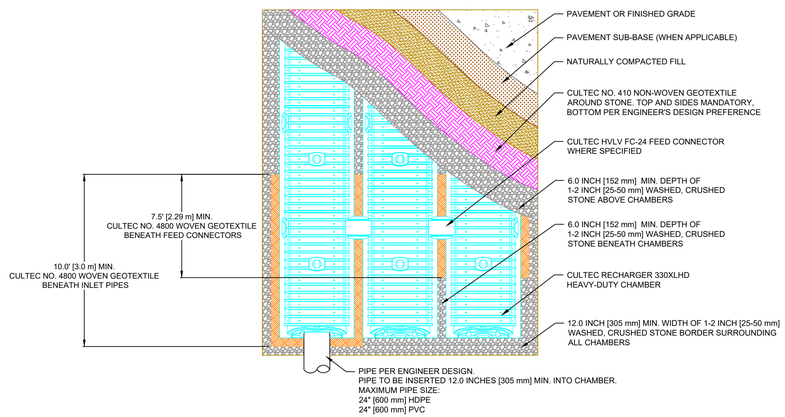


330XLHD 1.0

GENERAL NOTES

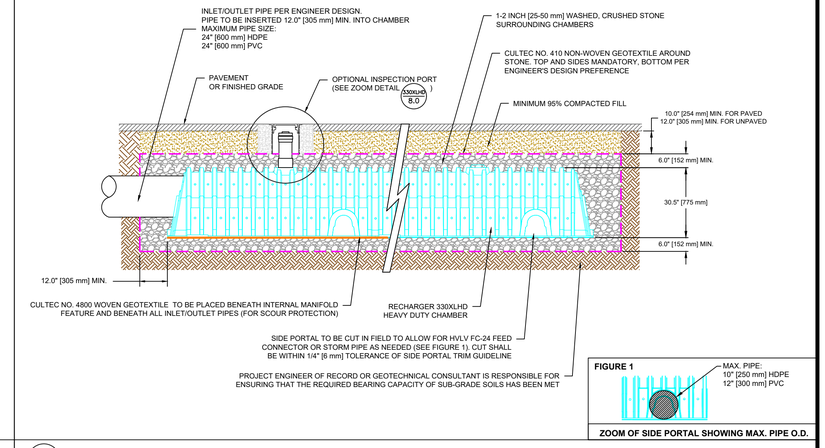
330XLHD 4.0

CULTEC RECHARGER 330XLHD HEAVY DUTY CROSS SECTION



330XLHD 5.0

CULTEC RECHARGER 330XLHD HEAVY DUTY TYPICAL INTERLOCK

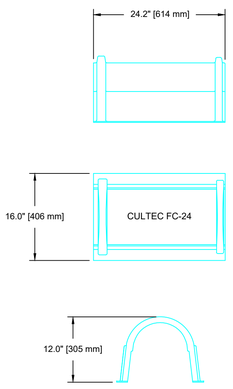


330XLHD 6.0

CULTEC RECHARGER 330XLHD HEAVY DUTY PLAN VIEW

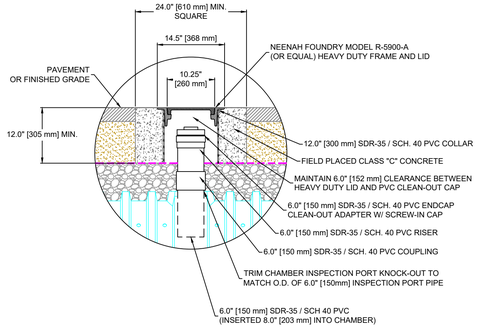
330XLHD 7.0

CULTEC HVLV FC-24 FEED CONNECTOR THREE VIEW



330XLHD 8.0

OPTIONAL INSPECTION PORT- ZOOM DETAIL



330XLHD 9.0

CULTEC INTERNAL MANIFOLD- OPTIONAL INSPECTION PORT DETAIL

CULTEC, Inc.
Subsurface Stormwater Management Systems
P.O. Box 280
878 Federal Road
Brookfield, CT 06804
www.cultec.com
PH: (203) 775-4416
PH: (800) 4-CULTEC
FX: (203) 775-1462
tech@cultec.com

THIS DRAWING WAS PREPARED TO SUPPORT THE PROJECT ENGINEER OF RECORD FOR THE PROPOSED SYSTEM. IT IS THE ULTIMATE RESPONSIBILITY OF THE PROJECT ENGINEER OF RECORD TO ENSURE THAT THE CULTEC SYSTEM'S DESIGN IS IN FULL COMPLIANCE WITH ALL APPLICABLE LAWS AND REGULATIONS. IT IS THE PROJECT ENGINEER OF RECORD'S RESPONSIBILITY TO ENSURE THAT THE CULTEC PRODUCTS ARE DESIGNED IN ACCORDANCE WITH CULTEC'S MINIMUM REQUIREMENTS. CULTEC DOES NOT APPROVE PLANS, SIZING, OR SYSTEM DESIGNS.

RECHARGER 330XLHD
DETAIL SHEET
TRAFFIC APPLICATION

CULTEC STORMWATER CHAMBER

PROJECT NO:		DATE:	2019
DESIGNED BY:	CULTEC, INC	CHECKED BY:	TECH
SCALE:	N.T.S.	SHEET NO:	1 OF 1

CULTEC RECHARGER® 330XLHD PRODUCT SPECIFICATIONS

GENERAL
CULTEC RECHARGER 330XLHD CHAMBERS ARE DESIGNED FOR UNDERGROUND STORMWATER MANAGEMENT. THE CHAMBERS MAY BE USED FOR RETENTION, RECHARGING, DETENTION OR CONTROLLING THE FLOW OF ON-SITE STORMWATER RUNOFF.

CHAMBER PARAMETERS

1. THE CHAMBERS SHALL BE MANUFACTURED BY CULTEC, INC. OF BROOKFIELD, CT, USA. (203-775-4416 OR 1-800-428-5832)
2. THE CHAMBER SHALL BE VACUUM THERMOFORMED OF HIGH MOLECULAR WEIGHT HIGH DENSITY POLYETHYLENE (HMWHDPE) WITH A BLACK INTERIOR AND BLUE EXTERIOR.
3. THE CHAMBER SHALL BE ARCHED IN SHAPE.
4. THE CHAMBER SHALL BE OPEN-BOTTOMED.
5. THE CHAMBER SHALL BE JOINED USING AN INTERLOCKING OVERLAPPING RIB METHOD. CONNECTIONS MUST BE FULLY SHOULDERED OVERLAPPING RIBS, HAVING NO SEPARATE COUPLINGS OR SEPARATE END WALLS
6. THE NOMINAL CHAMBER DIMENSIONS OF THE CULTEC RECHARGER 330XLHD SHALL BE 30.5 INCHES (775 mm) TALL, 52 INCHES (1321 mm) WIDE AND 8.5 FEET (2.59 m) LONG. THE INSTALLED LENGTH OF A JOINED RECHARGER 330XLHD SHALL BE 7 FEET (2.13 m).
7. MAXIMUM INLET OPENING ON THE CHAMBER ENDWALL IS 24 INCHES (600 mm).
8. THE CHAMBER SHALL HAVE TWO SIDE PORTALS TO ACCEPT CULTEC HVLV® FC-24 FEED CONNECTORS TO CREATE AN INTERNAL MANIFOLD. THE NOMINAL DIMENSIONS OF EACH SIDE PORTAL SHALL BE 10.5 INCHES (267 mm) HIGH BY 11.5 INCHES (292 mm) WIDE. MAXIMUM ALLOWABLE OUTER DIAMETER (O.D.) PIPE SIZE IN THE SIDE PORTAL IS 11.75 INCHES (298 mm).
9. THE NOMINAL CHAMBER DIMENSIONS OF THE CULTEC HVLV FC-24 FEED CONNECTOR SHALL BE 12 INCHES (305 mm) TALL, 16 INCHES (406 mm) WIDE AND 24.2 INCHES (614 mm) LONG.
10. THE NOMINAL STORAGE VOLUME OF THE RECHARGER 330XLHD CHAMBER SHALL BE 7.459 FT³ / FT (0.693 m³ / m) - WITHOUT STONE. THE NOMINAL STORAGE VOLUME OF A JOINED RECHARGER 330XLHD SHALL BE 52.213 FT³ / UNIT (1.478 m³ / UNIT) - WITHOUT STONE.
11. THE NOMINAL STORAGE VOLUME OF THE HVLV FC-24 FEED CONNECTOR SHALL BE 0.913 FT³ / FT (0.085 m³ / m) - WITHOUT STONE.
12. THE RECHARGER 330XLHD CHAMBER SHALL HAVE FIFTY-SIX DISCHARGE HOLES BORED INTO THE SIDEWALLS OF THE UNIT'S CORE TO PROMOTE LATERAL CONVEYANCE OF WATER.
13. THE RECHARGER 330XLHD CHAMBER SHALL HAVE 16 CORRUGATIONS.
14. THE ENDWALL OF THE CHAMBER, WHEN PRESENT, SHALL BE AN INTEGRAL PART OF THE CONTINUOUSLY FORMED UNIT. SEPARATE END PLATES CANNOT BE USED WITH THIS UNIT.
15. THE RECHARGER 330XLRHD STAND ALONE UNIT MUST BE FORMED AS A WHOLE CHAMBER HAVING TWO FULLY FORMED INTEGRAL ENDWALLS AND HAVING NO SEPARATE END PLATES OR SEPARATE END WALLS.
16. THE RECHARGER 330XLSHD STARTER UNIT MUST BE FORMED AS A WHOLE CHAMBER HAVING ONE FULLY FORMED INTEGRAL ENDWALL AND ONE PARTIALLY FORMED INTEGRAL ENDWALL WITH A LOWER TRANSFER OPENING OF 14 INCHES (356 mm) HIGH X 34.5 INCHES (876 mm) WIDE.
17. THE RECHARGER 330XLIHD INTERMEDIATE UNIT MUST BE FORMED AS A WHOLE CHAMBER HAVING ONE FULLY OPEN ENDWALL AND ONE PARTIALLY FORMED INTEGRAL ENDWALL WITH A LOWER TRANSFER OPENING OF 14 INCHES (356 mm) HIGH X 34.5 INCHES (876 mm) WIDE.
18. THE RECHARGER 330XLEHD END UNIT MUST BE FORMED AS A WHOLE CHAMBER HAVING ONE FULLY FORMED INTEGRAL ENDWALL AND ONE FULLY OPEN END WALL AND HAVING NO SEPARATE END PLATES OR END WALLS.
19. THE HVLV FC-24 FEED CONNECTOR MUST BE FORMED AS A WHOLE CHAMBER HAVING TWO OPEN END WALLS AND HAVING NO SEPARATE END PLATES OR SEPARATE END WALLS. THE UNIT SHALL FIT INTO THE SIDE PORTALS OF THE RECHARGER 330XLHD AND ACT AS CROSS FEED CONNECTIONS.
20. CHAMBERS MUST HAVE HORIZONTAL STIFFENING FLEX REDUCTION STEPS BETWEEN THE RIBS.
21. THE CHAMBER SHALL HAVE A 6 INCH (152 mm) DIAMETER RAISED INTEGRAL CAP AT THE TOP OF THE ARCH IN THE CENTER OF EACH UNIT TO BE USED AS AN OPTIONAL INSPECTION PORT OR CLEAN-OUT.
22. THE UNITS MAY BE TRIMMED TO CUSTOM LENGTHS BY CUTTING BACK TO ANY CORRUGATION.
23. THE CHAMBER SHALL BE MANUFACTURED IN AN ISO 9001:2015 CERTIFIED FACILITY.
24. THE CHAMBER SHALL BE DESIGNED AND MANUFACTURED TO MEET THE MATERIAL AND STRUCTURAL REQUIREMENTS OF IAPMO PS 63-2019, INCLUDING RESISTANCE TO AASHTO H-10 AND H-20 HIGHWAY LIVE LOADS, WHEN INSTALLED IN ACCORDANCE WITH CULTEC'S INSTALLATION INSTRUCTIONS.
25. THE CHAMBER SHALL BE DESIGNED AND MANUFACTURED IN ACCORDANCE WITH THE SPECIFICATIONS OF NSAI IRISH AGREEMENT BOARD CERTIFICATE FOR CULTEC ATTENUATION AND INFILTRATION.
26. MAXIMUM ALLOWED COVER OVER TOP OF UNIT SHALL BE 12 FEET (3.66 m)
27. THE CHAMBER SHALL BE DESIGNED TO WITHSTAND TRAFFIC LOADS WHEN INSTALLED ACCORDING TO CULTEC'S RECOMMENDED INSTALLATION INSTRUCTIONS.

CULTEC HVLV FC-24 FEED CONNECTOR PRODUCT SPECIFICATIONS

GENERAL
CULTEC HVLV FC-24 FEED CONNECTORS ARE DESIGNED TO CREATE AN INTERNAL MANIFOLD FOR CULTEC RECHARGER MODEL 330XLHD STORMWATER CHAMBERS.

CHAMBER PARAMETERS

1. THE CHAMBERS SHALL BE MANUFACTURED BY CULTEC, INC. OF BROOKFIELD, CT. (203-775-4416 OR 1-800-428-5832)
2. THE CHAMBER SHALL BE VACUUM THERMOFORMED OF HIGH MOLECULAR WEIGHT HIGH DENSITY POLYETHYLENE (HMWHDPE) WITH A BLACK INTERIOR AND BLUE EXTERIOR.
3. THE CHAMBER SHALL BE ARCHED IN SHAPE.
4. THE CHAMBER SHALL BE OPEN-BOTTOMED.
5. THE NOMINAL CHAMBER DIMENSIONS OF THE CULTEC HVLV FC-24 FEED CONNECTOR SHALL BE 12 INCHES (305 mm) TALL, 16 INCHES (406 mm) WIDE AND 24.2 INCHES (614 mm) LONG.
6. THE NOMINAL STORAGE VOLUME OF THE HVLV FC-24 FEED CONNECTOR SHALL BE 0.913 FT³ / FT (0.085 m³ / m) - WITHOUT STONE.
7. THE HVLV FC-24 FEED CONNECTOR CHAMBER SHALL HAVE 2 CORRUGATIONS.
8. THE HVLV FC-24 FEED CONNECTOR MUST BE FORMED AS A WHOLE CHAMBER HAVING TWO OPEN END WALLS AND HAVING NO SEPARATE END PLATES OR SEPARATE END WALLS. THE UNIT SHALL FIT INTO THE SIDE PORTALS OF THE CULTEC RECHARGER STORMWATER CHAMBER AND ACT AS CROSS FEED CONNECTIONS CREATING AN INTERNAL MANIFOLD.
9. THE CHAMBER SHALL BE DESIGNED TO WITHSTAND TRAFFIC LOADS WHEN INSTALLED ACCORDING TO CULTEC'S RECOMMENDED INSTALLATION INSTRUCTIONS.
10. THE CHAMBER SHALL BE MANUFACTURED IN AN ISO 9001:2015 CERTIFIED FACILITY.

CULTEC NO. 410™ NON-WOVEN GEOTEXTILE

CULTEC NO. 410™ NON-WOVEN GEOTEXTILE MAY BE USED WITH CULTEC CONTACTOR® AND RECHARGER® STORMWATER INSTALLATIONS TO PROVIDE A BARRIER THAT PREVENTS SOIL INTRUSION INTO THE STONE.

GEOTEXTILE PARAMETERS

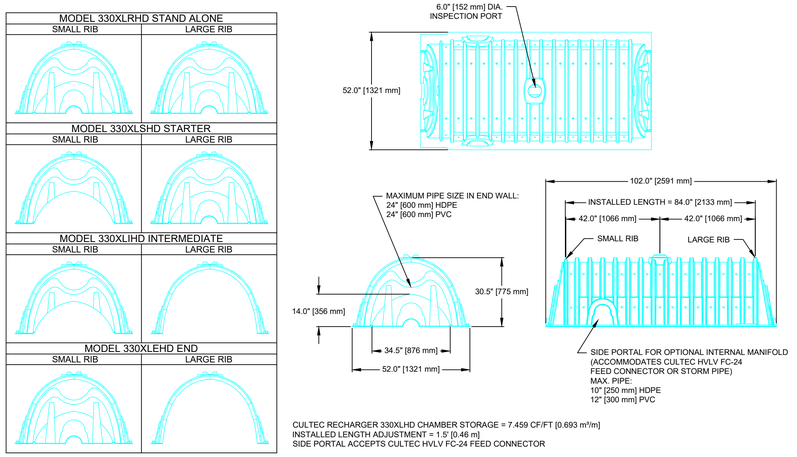
1. THE GEOTEXTILE SHALL BE PROVIDED BY CULTEC, INC. OF BROOKFIELD, CT. (203-775-4416 OR 1-800-428-5832)
2. THE GEOTEXTILE SHALL BE BLACK IN APPEARANCE.
3. THE GEOTEXTILE SHALL HAVE A TYPICAL WEIGHT OF 4.5 OZ/SY (142 G/M).
4. THE GEOTEXTILE SHALL HAVE A TENSILE STRENGTH VALUE OF 120 LBS (533 N) PER ASTM D4632 TESTING METHOD.
5. THE GEOTEXTILE SHALL HAVE AN ELONGATION @ BREAK VALUE OF 50% PER ASTM D4632 TESTING METHOD.
6. THE GEOTEXTILE SHALL HAVE A MULLEN BURST VALUE OF 225 PSI (1551 KPA) PER ASTM D3786 TESTING METHOD.
7. THE GEOTEXTILE SHALL HAVE A PUNCTURE STRENGTH VALUE OF 65 LBS (289 N) PER ASTM D4833 TESTING METHOD.
8. THE GEOTEXTILE SHALL HAVE A CBR PUNCTURE VALUE OF 340 LBS (1513 N) PER ASTM D6241 TESTING METHOD.
9. THE GEOTEXTILE SHALL HAVE A TRAPEZOID TEAR VALUE OF 50 LBS (222 N) PER ASTM D4533 TESTING METHOD.
10. THE GEOTEXTILE SHALL HAVE A AOS VALUE OF 70 U.S. SIEVE (0.212 MM) PER ASTM D4751 TESTING METHOD.
11. THE GEOTEXTILE SHALL HAVE A PERMITTIVITY VALUE OF 1.7 SEC-1 PER ASTM D4491 TESTING METHOD.
12. THE GEOTEXTILE SHALL HAVE A WATER FLOW RATE VALUE OF 135 GAL/MIN/SF (5500 L/MIN/SM) PER ASTM D4491 TESTING METHOD.
13. THE GEOTEXTILE SHALL HAVE A UV STABILITY @ 500 HOURS VALUE OF 70% PER ASTM D4355 TESTING METHOD.

CULTEC NO. 4800™ WOVEN GEOTEXTILE

CULTEC NO. 4800 WOVEN GEOTEXTILE IS DESIGNED AS A UNDERLAYMENT TO PREVENT SCOURING CAUSED BY WATER MOVEMENT WITHIN THE CULTEC CHAMBERS AND FEED CONNECTORS UTILIZING THE CULTEC MANIFOLD FEATURE. IT MAY ALSO BE USED AS A COMPONENT OF THE CULTEC SEPARATOR ROW TO ACT AS A BARRIER TO PREVENT SOIL/CONTAMINANT INTRUSION INTO THE STONE WHILE ALLOWING FOR MAINTENANCE.

GEOTEXTILE PARAMETERS

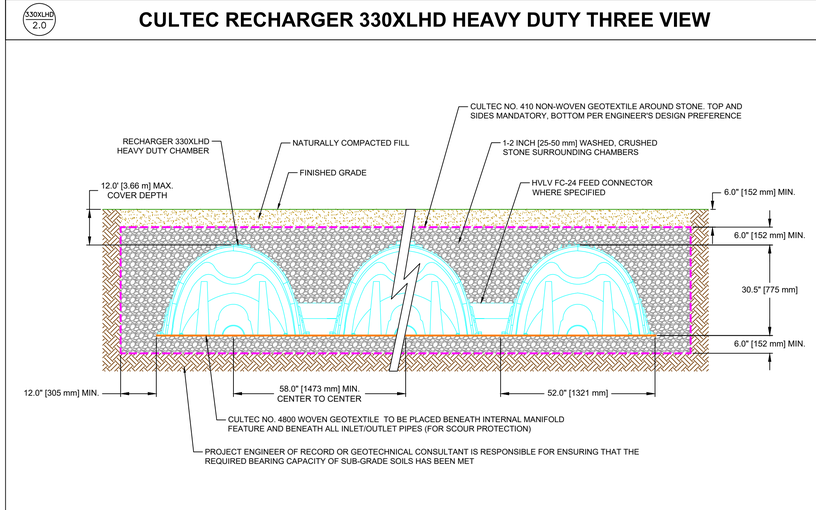
1. THE GEOTEXTILE SHALL BE PROVIDED BY CULTEC, INC. OF BROOKFIELD, CT. (203-775-4416 OR 1-800-428-5832)
2. THE GEOTEXTILE SHALL BE BLACK IN APPEARANCE.
3. THE GEOTEXTILE SHALL HAVE A TENSILE STRENGTH OF 550 X 550 LBS (2,448 X 2,448 N) PER ASTM D4632 TESTING METHOD.
4. THE GEOTEXTILE SHALL HAVE A ELONGATION @ BREAK RESISTANCE OF 20 X 20% PER ASTM D4632 TESTING METHOD.
5. THE GEOTEXTILE SHALL HAVE A WIDE WIDTH TENSILE RESISTANCE OF 5,070 X 5,070 LBS/FT (74 X 74 KN/M) PER ASTM D4595 TESTING METHOD.
6. THE GEOTEXTILE SHALL HAVE A WIDE WIDTH TENSILE RESISTANCE @ 2% STRAIN OF 960 X 1,096 LBS/FT (14 X 16 KN/M) PER ASTM D4595 TESTING METHOD.
7. THE GEOTEXTILE SHALL HAVE A WIDE WIDTH TENSILE RESISTANCE @ 5% STRAIN OF 2,740 X 2, 740 LBS/FT (40 X 40 KN/M) PER ASTM D4595 TESTING METHOD.
8. THE GEOTEXTILE SHALL HAVE A WIDE WIDTH TENSILE RESISTANCE @ 10% STRAIN OF 4,800 X 4,800 LBS/FT (70 X 70 KN/M) PER ASTM D4595 TESTING METHOD.
9. THE GEOTEXTILE SHALL HAVE A CBR PUNCTURE RESISTANCE OF 1,700 LBS (7,560 N) PER ASTM D6241 TESTING METHOD.
10. THE GEOTEXTILE SHALL HAVE A TRAPEZOIDAL TEAR RESISTANCE OF 180 X 180 LBS (801 X 801 N) PER ASTM D4533 TESTING METHOD.
11. THE GEOTEXTILE SHALL HAVE AN APPARENT OPENING SIZE OF 40 US STD. SIEVE (0.425 MM) PER ASTM D4751 TESTING METHOD.
12. THE GEOTEXTILE SHALL HAVE A PERMITTIVITY RATING OF 0.15 SEC-1 PER ASTM D4491 TESTING METHOD.
13. THE GEOTEXTILE SHALL HAVE A WATER FLOW RATING OF 11.5 GPM/FT2 (470 LPM/M2) PER ASTM D4491 TESTING METHOD.
14. THE GEOTEXTILE SHALL HAVE A UV RESISTANCE OF 80% @ 500 HRS. PER ASTM D4355 TESTING METHOD.

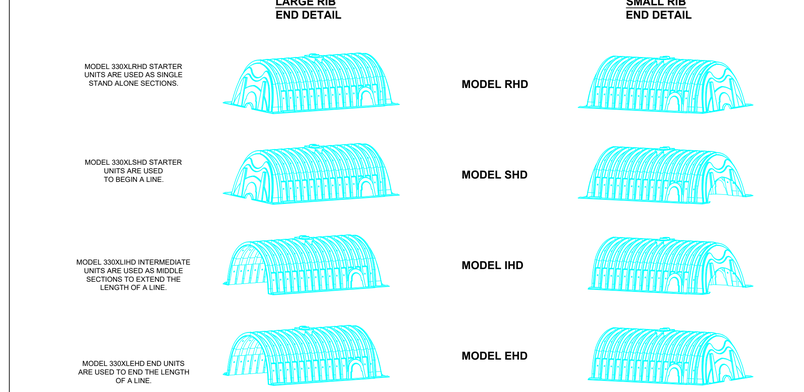


CULTEC RECHARGER 330XLHD CHAMBER STORAGE = 7.459 CF/FT [0.693 m³/m]
INSTALLED LENGTH ADJUSTMENT = 1.5' [0.46 m]
SIDE PORTAL ACCEPTS CULTEC HVLV FC-24 FEED CONNECTOR

330XLHD 2.0

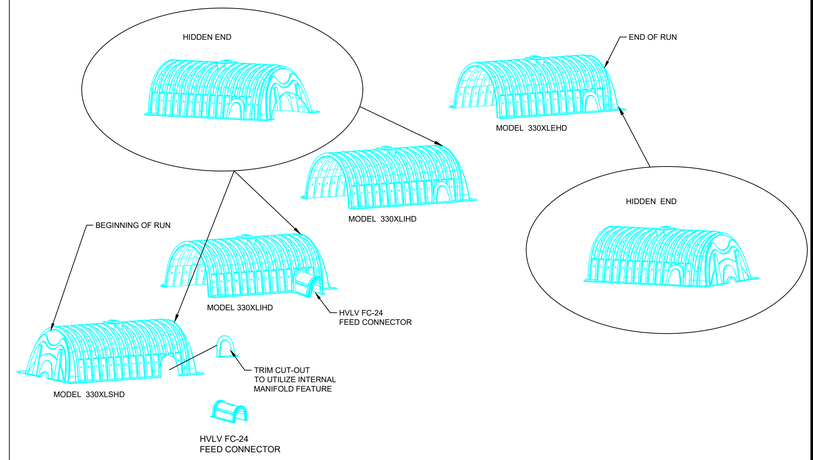
CULTEC RECHARGER 330XLHD HEAVY DUTY THREE VIEW





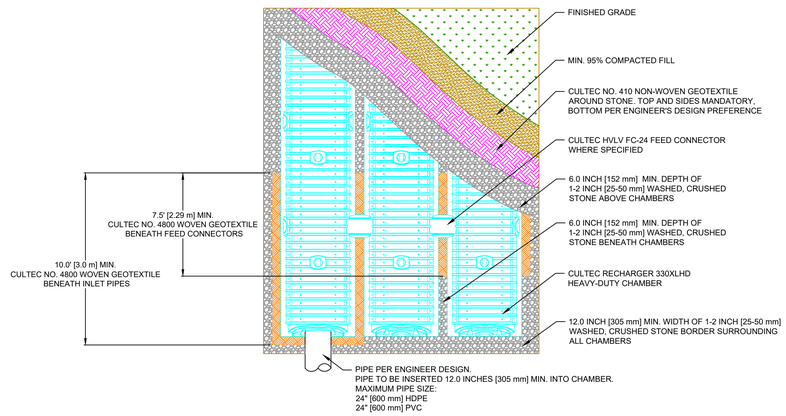
330XLHD 3.0

CULTEC RECHARGER 330XLHD HEAVY DUTY END DETAIL INFORMATION



330XLHD 1.0

GENERAL NOTES

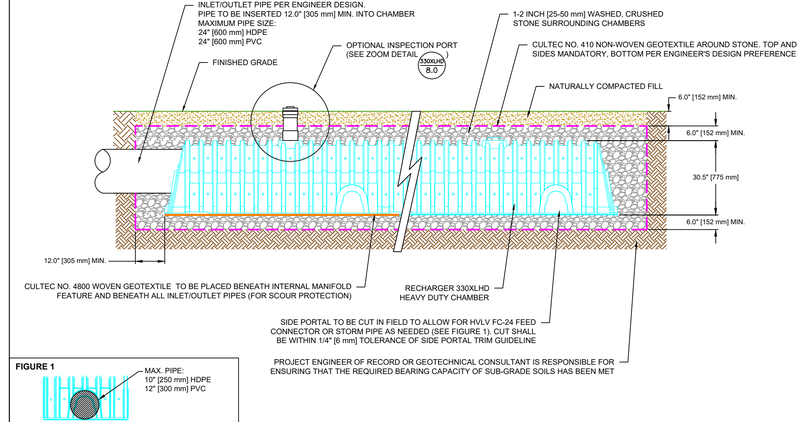


330XLHD 4.0

CULTEC RECHARGER 330XLHD HEAVY DUTY CROSS SECTION

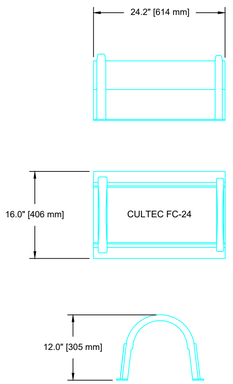
330XLHD 5.0

CULTEC RECHARGER 330XLHD HEAVY DUTY TYPICAL INTERLOCK



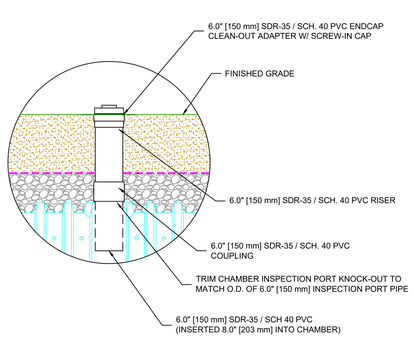
330XLHD 6.0

CULTEC RECHARGER 330XLHD HEAVY DUTY PLAN VIEW



330XLHD 7.0

CULTEC HVLV FC-24 FEED CONNECTOR THREE VIEW



330XLHD 8.0

OPTIONAL INSPECTION PORT- ZOOM DETAIL

330XLHD 9.0

CULTEC INTERNAL MANIFOLD- OPTIONAL INSPECTION PORT DETAIL

TM
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THIS DRAWING WAS PREPARED TO SUPPORT THE PROJECT ENGINEER OF RECORD FOR THE PROPOSED SYSTEM. IT IS THE ULTIMATE RESPONSIBILITY OF THE PROJECT ENGINEER OF RECORD TO ENSURE THAT THE CULTEC SYSTEM'S DESIGN IS IN FULL COMPLIANCE WITH ALL APPLICABLE LAWS AND REGULATIONS. IT IS THE PROJECT ENGINEER OF RECORD'S RESPONSIBILITY TO ENSURE THAT THE CULTEC PRODUCTS ARE DESIGNED IN ACCORDANCE WITH CULTEC'S MINIMUM REQUIREMENTS. CULTEC DOES NOT APPROVE PLANS, SIZING, OR SYSTEM DESIGNS.

RECHARGER 330XLHD
DETAIL SHEET
NON-TRAFFIC APPLICATION

CULTEC STORMWATER CHAMBER

PROJECT NO:		DATE:	2019
DESIGNED BY:	CULTEC, INC	CHECKED BY:	TECH
SCALE:	N.T.S.	SHEET NO:	1 OF 1