Weston & Sampson

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WESTON & SAMPSON ENGINEERS, INC.
100 Foxborough Boulevard, Suite 250
Foxborough, MA 02035
tel: 508.698.3034

STORMWATER MANAGEMENT REPORT

February 2024

TOWN OF
Foxborough
MASSACHUSETTS

Department of Public Works
70 Elm Street

PREPARED FOR:
TOWN OF FOXBOROUGH

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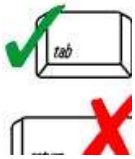
Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

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.

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.

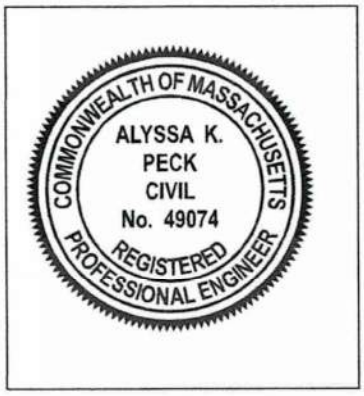
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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



Alyssa Peck 1.31.24
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.

Applicant/Project Name: Town of Foxborough – Department of Public Works

Project Address: 70 Elm Street, Foxborough, MA

Application Prepared by:

Firm: Weston & Sampson, Inc.
Registered PE: Alyssa Peck, PE

NARRATIVE

Project Description

The Town of Foxborough proposes expansion to the existing Department of Public Works (DPW) facility located at 70 Elm Street in Foxborough, Massachusetts. The proposed project is located at the existing Foxborough DPW property (hereinafter the "Site") which occupies approximately 9.75 acre parcel of land identified as Assessors Map ID 107-036-000.

The Site is located within a parcel that is owned and operated by the Town of Foxborough and is generally bordered by residential properties to the north, railroad tracks and residential properties to the south, Interstate highway I-95 to the east, and a solar field to the west. The Site includes a school bus parking area to the north and the DPW facility to the south. The proposed development includes improvements to both the DPW facility and the school bus parking area. A locus map of the site, as well as other site mapping, is included in Appendix A.

The existing DPW facility includes the main DPW garage with an approximate footprint of 11,000 square feet, an office building with approximate footprint of 2,280 square feet, a salt shed with an approximate footprint of 4,780 square feet, a vehicle storage building with an approximate footprint of 12,080 square feet, and several smaller sheds and covered storage containers. A fuel island is located in the northern portion of the Site between the DPW garage building and the school bus parking lot. The ground surface at the site is mostly comprised of asphalt pavement around existing buildings and a combination of packed gravel and recycled AC pavement millings in the area occupied by school bus parking and DPW yard area.

The subsurface utilities at the site include water, gas, sewer, electric, and drainage. An existing drainage trunk line bisects the site from west to east and carries offsite runoff from Elm Street across the Site to discharge into the wooded area adjacent to I-95 east of the Site. Elm Street is currently lacking any drainage improvements and the runoff from approximately 1,100 of Elm Street flows along the gutter of the roadway toward a low point located directly in front of DPW parcel, where it is collected via a set of two catch basins and conveyed east, across the DPW site via a 15"/12" trunk line. The trunk line picks up additional drainage from various catch basins located on DPW property and ultimately discharges on the west side of the Site into a wooded area adjacent to I-95.

The Town of Foxboro previously planned to extend roadway drainage along Elm Street and have prepared preliminary design documents that estimated additional offsite drainage area contributing to the trunk line to be approximately 74,341 square feet. Weston & Sampson considered this offsite area and its runoff in designing of stormwater infrastructure for the site to ensure adequate capacity

is provided to convey all site runoff, as well as offsite runoff in a safe and efficient manner. Since the existing 15"/12" turnk line is significantly undersized for the flow it contributing to it, the collector drain line will be upsized to provide sufficient capacity to convey 25-year storm. Since the ultimate discharge point from the trunk line is located off DPW property, the discharge pipe will remain in its current size, however an additional overflow structure will be added in the landscape strip adjacent to rear lot line to provide secondary discharge point for larger storms. Additionally sections of the site drainage will be disconnected from the collector drain pipe to keep the additional capacity of the trunk line available for conveyance of offsite drainage from Elm Street.

MassGIS indicates there are no wetlands located on the Site, however a small pocket wetland was identified west of the Site, across Elm Street, on the solar panel property. The wetland location identified by MassGIS was reviewed by Weston & Samson staff and Foxborough Conservation Agent and was confirmed not to be a wetland. Therefore, no wetland buffers are located on the Site.

The proposed project includes the construction of an approximately 9,700 square foot addition to the existing DPW building and a new approximately 3,400 square foot double sided fuel-island. The building addition will be located adjacent to the north side of the existing DPW building and will include four maintenance and and a wash bay. The new fuel island will be located north of the existing DPW building and will include 10,000 -gallon gasoline and diesel fuel tanks.
Additional proposed site improvements will include underground utilities, stormwater management areas, new asphalt pavement parking and driveways, a reconfigured school bus parking area, and ancillary landscape improvements.

Stormwater Management:

The proposed project will incorporate Stormwater Best Management Practices (BMPs) in compliance with the Massachusetts Department of Environmental Protection (DEP) Stormwater Management Standards and local regulations.

The approach to stormwater management for the project consists of maintaining existing drainage patterns, minimizing stormwater runoff to off-site areas, and installing structural BMPs to provide water quality treatment, groundwater recharge, and attenuation of peak flows. To achieve this, the runoff from the driveways, parking, and circulation areas will be conveyed to a proposed deep sump catch basins equipped with "gas and oil" hood traps and hydrodynamic separators for pretreatment before discharging into the proposed underground infiltration chamber system, which will provide additional water quality treatment and allow the stormwater to recharge into the ground. The roof runoff from the proposed building will discharge into the proposed underground infiltration chambers directly, where it will recharge into the ground.

Stormwater Design

Weston & Sampson utilized HydroCAD computer software to model the stormwater runoff for 2-year, 10-year, 25-year, and 100-year 24-hour storm events. The rainfall amounts used for the analysis were based on the NOAA Atlas 14, Volume 10. The rainfall depths were 3.43 inches, 5.24 inches, 6.37 inches, and 8.12 inches, respectively.

Soil information was obtained from the Natural Resources Conservation Service (NRCS) Norfolk and Suffolk Counties Web Soil Survey. The soil survey indicated mostly Udorthents with hydrologic rating A in the majority of the Site, Merrimac fine sandy loam with hydrologic rating A in the southern portion

of the site, and Canton fine sandy loam, with hydrologic rating B in the northern portion of the site.. Since most of the site was classified as hydrologic rating A, a Hydrologic Group A was assigned to the soils within the project area for the purposes of hydrologic calculations. The soil map and descriptions are included in Appendix A.

In addition to information gathered from Web Soil Survey, three test pits (TP-3 through TP-7) were performed in the locations of the proposed stormwater management systems to confirm soil information obtained from Web Soil Survey and to determine the feasibility of infiltration and respective infiltration rates. The test pits were excavated to a depth ranging from 7.5 feet to 9.2 feet below ground surface.. Additionally, borings and test pits were conducted for geotechnical purposes to help bolster the understanding of the subsurface conditions. Complete test pit and boring logs are included in Appendix A.. In summary, the test pit and boring logs indicate a mixture of sand and sandy loam to a depth below the proposed infiltration, therefore, a Rawl's rate of 1.02 inches per hour was used for the design of infiltration BMPs. No standing groundwater were observed during test, however redox features were noted at 72 inches and 70 inches below ground surface for TP-3 and TP-5 respectively. Complete test pit and boring logs are included in Appendix A.

Existing Drainage Conditions

The existing conditions in the project area of the site consists of approximately 242,912 square feet of impervious surface, comprised of the DPW buildings, driveways, and asphalt areas, and areas of compacted gravel/pavement millings. Topography of the site generally slopes from north at elevation 262 to south, at elevation 242, with the lowest point of the Site located in the southeastern corner, near the intersection of I-95 corridor and existing railroad tracks.

Based on the existing topography, the entire Site is delineated into one single watershed with Point of Analysis (POA-1), shown graphically in Appendix B.

POA-1 is further delineated into four Drainage Areas: A1, A2, B1, and C1. Drainage Area A1 contains western portion of the Site and includes majority of the bus parking area, DPW parking area in front of the existing DPW garage, and existing fuel island. Stormwater from this area flows toward a set of existing catch basins, where runoff is intercepted and discharged into the 12" RCP trunk line that carries stormwater across the Site from Elm Street toward wooded area adjacent to I-95.

Drainage Area A2 contains eastern portion of the Site and includes eastern portion of the bus parking area, northern portion of the DPW garage roof area, and DPW storage yard area located north and east of the existing DPW garage. Stormwater from this area flows toward a catch basin in the rear of the Site, and discharges into the 12" RCP trunk line that further carries the runoff to wooded area adjacent to I-95.

Drainage Area B1 includes a small parking lot in front of DPW admin building. The runoff from this area sheet flows toward an existing infiltration basin located along Elm Street. During large storm the overflow from the infiltration area overtops the basin and sheet flows along railroad corridor in the southeasterly direction toward POA-1.

Drainage Area C1 contains southeastern quadrant of the Site and includes roof areas from the DPW admin building, majority of the roof from DPW garage building, salt shed roof area and vehicle storage roof area, in addition to the DPW yard area surrounding the buildings. The runoff from this area sheet flows to the a couple of catch basins located in the center of the paved yard area behind DPW garage, where the runoff is intercepted and discharged into the wooded area adjacent to I-95 via a 10" steel pipe and 4" PVC pipe.

Proposed Drainage Conditions

In the proposed condition the amount of impervious surface on site will slightly decrease to approximately 228,764 square feet. While the school bus parking area will be expanded, the addition of the landscape buffers along Elm Street frontage and a number of landscape islands through the site will offset the increase in impervious area due to the school bus parking expansion and result in overall decrease in impervious area on site. To mitigate the runoff from the expanded bus parking area in the proposed condition, a series of underground chamber infiltration systems is proposed. The infiltration systems will ensure that proposed runoff rates will not exceed the existing rate of runoff. The stormwater runoff from the paved areas will be directed into deep sump catch basins and conveyed to hydrodynamic separators for pre-treatment prior to discharge into proposed infiltration systems.

Similar to the existing condition, the runoff from the Site discharges into a single overall design point - Points of Analysis: POA-1. The contributing drainage area is further divided into six drainage areas (A1, B1, B2, C1, D1, E1) which are graphically shown on Hydrology Map – Proposed Conditions in Appendix B.

Area A1 includes the reconfigured bus parking area. Storm water from this area will be collected via deep sump catch basins and will be treated by a proposed hydrodynamic separator prior to discharge into Underground Infiltration Chamber System C (INF-C). Overflow from the INF-C will discharge through an overflow grate into the landscaped area in the rear of the site.

Area B1 includes a paved circulation area in the western portion of the site, in front of the existing DPW admin and garage buildings. The runoff from the paved areas will be collected via deep sump catch basins and will be routed through a hydrodynamic separator before connecting into the existing trunk line that discharges into the wooded areas adjacent to I-95 through an existing outfall.

Area B2 includes a paved circulation area in the eastern portion of the site, north of existing vehicle storage area and east of the proposed DPW garage addition. This is an existing paved circulation area. The runoff from the paved areas will be collected via deep sump catch basins and will be routed through a hydrodynamic separator before connecting to the existing trunk line that discharges into the wooded areas adjacent to I-95 through an existing outfall.

Area C1 includes a portion of the roof area from DPW garage addition. The roof runoff from the vehicle storage building will discharge into the INF-A directly without pre-treatment as permitted under the MA Stormwater Regulations. The overflow from INF-A will discharge into the existing stormwater trunk line that discharges into the wooded areas adjacent to I-95 through an existing outfall.

Area D1 encompass the DPW yard area behind existing DPW garage building and existing vehicle storage and salt shed buildings. Stormwater from this area will be collected via deep sump catch basins and routed through a proposed hydrodynamic separator for pre-treatment. Following pre-treatment, the runoff from D1 will discharge into the Underground Infiltration Chamber System B (INF-B) for further treatment and recharge. Overflow from the INF-B will discharge through an overflow grate into the landscaped area in the rear of the site.

Area E1 includes the existing DPW yard area located in the southeastern corner of the site, and is bounded by rear property line, existing salt shed, and vehicle storage building. This area will be re-paved and the existing catch basin located in this area will be replaced with a hydrodynamic separator prior to discharging toward the wooded area abutting I-95. The existing outlet pipe will be replaced with a new pipe to improve pipe condition and capacity.

Best Management Practices (BMPs) and Low Impact Development (LID) Measures

Low Impact Development (LID) Measures will be incorporated, where possible, into this project. Unlike the existing condition, the proposed redevelopment provides sediment and oil removal, peak rate attenuation, and groundwater recharge. The BMPs used in this project are described below.

Deep Sump Hooded Catch Basins
The catch basins are to be constructed with a sump (minimum 4 feet) and oil/debris traps to prevent the discharge of sediments and floating contaminants.

Hydrodynamic Separators
The hydrodynamic separators dissipate velocity and allow oil and debris to rise and sediment to settle out.

Underground Infiltration Chambers
The infiltration areas will store and/or attenuate runoff from the storm events and allow for exfiltration of runoff and recharge of groundwater.

Below is an explanation of MassDEP Stormwater Standards 1-10 as they apply to the Town of Duxbury Public Works Facility project:

STANDARD 1 – NO NEW UNTREATED DISCHARGES

The proposed project will create no new untreated discharges.

The proposed project was designed to mimic existing conditions as much as possible and improve the conditions to the maximum extent practicable. Supporting information and computations demonstrating that no new untreated discharges will result from the project are presented through compliance with Standards 4 through 6.

Surface runoff from new impervious areas will be directed into deep sump catch basins /hydrodynamic separators for pre-treatment prior to discharging into proposed infiltration chamber systems, which were sized to store and recharge up to 10-year 24-hour storm event. For a 100-year

storm, the overflow from the underground infiltration chamber systems will discharge into existing drainage collector pipe that discharges into the wooded area behind the Site. Additional overflow grates from Infiltration Chamber System B and Infiltration System C will be provided in the landscaped area in the rear of the site to allow for safe overflow from the chamber systems during large storm events. The receiving area surrounding the overflow outlet grates will be stabilized with stone level spreader to help slow and distribute runoff to minimize any potential erosion.

STANDARD 2 – PEAK RATE ATTENUATION

The Project has been designed to fully comply with standard 2.

The rainfall-runoff response of the Site under existing and proposed conditions was analyzed for storm events with recurrence intervals of 2, 10, 25, and 100 years.

Post-construction peak runoff rates at the project site for the 2-, 10-, 25- and 100-year storms will not increase. Supporting documentation is included with this report. To ensure that the work incorporates the performance standards recommended in the DEP's Stormwater Management Policy, necessary erosion and sedimentation control measures will be utilized during construction. These measures will include compost filter tubes, catch basin sediment controls, and a stabilized construction entrance, as depicted on the plans.

STANDARD 3 – RECHARGE

The impervious area within the proposed project limits will slightly decrease after construction. In addition, the recharge will be provided in all three of the underground infiltration chamber systems. The recharge volume provided under post-development conditions is greater than the recharge volume required by DEP's stormwater management Standards. The minimum required recharge volume is computed to be 0 cubic feet since there is no increase in overall impervious area for the site. The proposed infiltration BMPs result in a total recharge volume of 20,997 cubic feet. The proposed infiltration BMPs all drain within 72 hours.

The recharge requirement calculation is included in Appendix C and illustrates compliance with the current DEP Stormwater policy.

STANDARD 4 – WATER QUALITY

This project incorporates several stormwater pretreatment and treatment BMPs. Runoff from paved surfaces is routed through pretreatment BMPs (deep sump catch basins, proprietary stormwater treatment units,) and subsurface recharge treatment BMPs. Non-contaminated roof runoff from DPW garage expansion is routed directly to the subsurface infiltration systems.

Per the MassDEP Stormwater Regulations, the Water Quality Volume (WQV) is 1.0 inches for the subject site due to the site being a land use with a higher potential pollutant load.

For redevelopment portion of the project, Standard 4 is required to be met only to the maximum extent practicable. Stormwater from all new impervious areas within the project limits will be directed

into at least one drainage structure for treatment. The treatment structures utilized on site include deep sump catch basins and hydrodynamic separators for redevelopment areas.

The northern portion of the Site, which includes DPW building addition and reconfigured bus parking area, was designed to provide full compliance with Standard 4. To achieve full compliance with this standard, the runoff from the paved areas in that portion of the site will be collected in deep sump catch basins and conveyed to hydrodynamic separators for pre-treatment before infiltration in the underground chambers.

STANDARD 5 – LAND USES WITH HIGHER POTENTIAL POLLUTANT LOADS (LUHPPLs)

Because the use of the property will involve maintenance of vehicles, storage of oils and anti-freeze, and snow storage; the land use has the potential for higher pollutant loads. A Long-Term Pollution Prevention Plan (included in Appendix D) identifies proper procedures of practices for source control and pollution prevention due to the site specific LUHPPL.

As this site is a re-development, the project need only to meet the pre-treatment requirement of Standard 5 for re-developed sections of the Site. The 44% TSS Removal pre-treatment will be achieved prior to discharging any runoff from the proposed paved areas. This requirement will be achieved using a treatment train of deep sump catch basins and hydrodynamic separators, combined with incorporating non-structural BMP's such as street sweeping.

For new-development section of the project, the requirement of 80% TSS removal prior to discharge will be achieved by utilizing a treatment train that consists of deep sump catch basins, hydrodynamic separators, and underground infiltration chambers. A 44% TSS removal pre-treatment will be achieved prior to directing any runoff from the paved areas into the proposed infiltration BMPs TSS removal worksheets documenting compliance are included in Appendix C of this report.

STANDARD 6 – CRITICAL AREAS

Not applicable. The project site is not located within a Critical Area.

STANDARD 7 – REDEVELOPMENTS AND OTHER PROJECTS SUBJECT TO THE STANDARDS ONLY TO THE MAXIMUM EXTENT PRACTICABLE

The new and expanded areas of impervious surfaces meet all standards for new development. For the existing developed portions of the project site, the TSS removal standard is met to the maximum extent practicable as described above.

However, this project provides significant improvement to the existing conditions. Addition of various BMPs will result in a reduction in annual stormwater pollutant loads from the Site and the incorporation of underground infiltration systems will provide significant groundwater recharge and reduce peak runoff from the site.

STANDARD 8 – CONSTRUCTION PERIOD POLLUTION PREVENTION AND EROSION AND SEDIMENT CONTROL

A detailed Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan is included in Appendix D of this report. To ensure that the work incorporates the performance standards recommended in the DEP's Stormwater Management Policy, necessary erosion and sedimentation control measures will be utilized during construction. These measures include compost filter tubes, catch basin protection, and a stabilized construction entrance, as depicted on the site plans. In addition, the contractor will be required to produce the SWPPP prior to any land disturbance since this project is resulting in over 1 acre of land disturbance.

STANDARD 9 – OPERATION AND MAINTENANCE PLAN

An Operations and Maintenance Plan is provided in Appendix D of this report. Town of Foxborough DPW will be responsible for the operation and maintenance of the proposed drainage system.

STANDARD 10 – PROHIBITION OF ILLICIT DISCHARGES

Illicit discharges will be prevented on the site through the use of spill/discharge prevention measures, along with good housekeeping and BMPs, and in accordance with the Long-Term Pollution Prevention Plan and O&M plan. A draft copy of the Illicit Discharge Compliance Statement has been developed for this site and is included in Appendix D. A signed Illicit Discharge Compliance Statement is included in Appendix D as well.

REGISTERED PROFESSIONAL ENGINEER'S CERTIFICATION

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-Term Pollution Prevention Plan, Construction Period Erosion and Sedimentation Control Plan, Post-Construction Operation and Maintenance Plan, Illicit Discharge Compliance Statement, 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

Alyssa Peck 1.31.24

Signature and Date

APPENDIX A

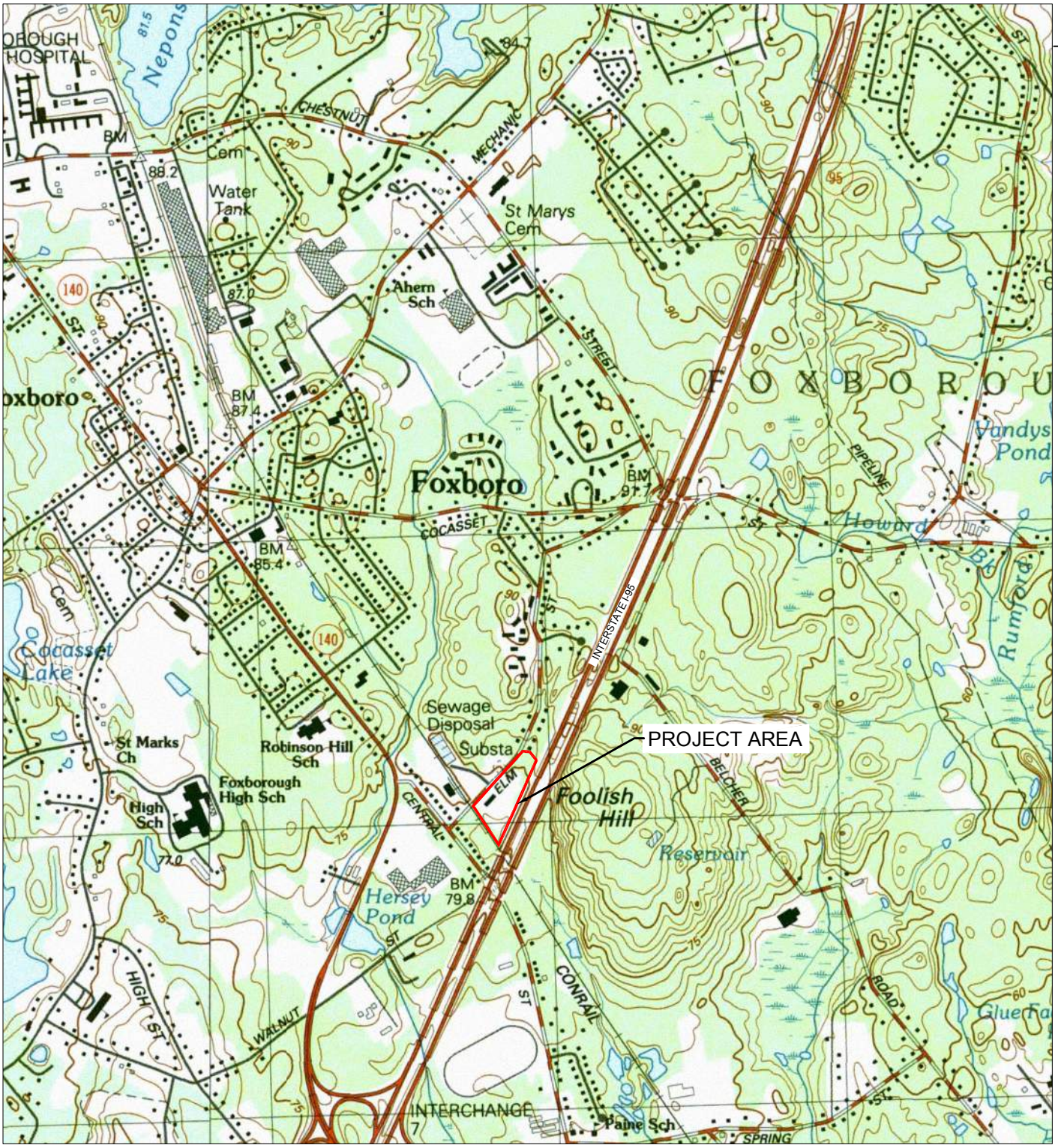


FIGURE 1
LOCUS MAP

FOXBOROUGH DPW
ADDITION AND RENOVATION

Weston & Sampson

Weston & Sampson Engineers, Inc.
55 Walker Brook Drive, Suite 100
Reading, MA 01867
(978) 977-0110 (800) SAMPSON
www.westonandsampson.com

SCALE 1" = 500'

Drawn by: EC	**Proj. Mgr.:** MC
Date: JANUARY 2023	
Sheet No.:	

N
W E
S

250 125 0 250
Feet

Data Source: Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Environmental Affairs

Legend

- Work Area
- Perennial Stream
- Intermittent Stream
- Marsh/Bog
- Wooded marsh
- Cranberry Bog
- Salt Marsh
- Open Water
- Reservoir (with PWSID)
- Tidal Flats
- Beach/Dune

ACECs

- ACECs

NHESP Habitats

- NHESP Estimated Habitats of Rare Wildlife
- NHESP Priority Habitats of Rare Species
- NHESP Certified Vernal Pools
- NHESP Potential Vernal Pools

100-Year Flood Zone

- 100-Year Flood Zone

Outstanding Resource Waters

- Public Water Supply Contributor
- ORW for ACEC
- ORW for both Water Supply and Other

FIGURE 1

DPW Feasibility Study
70 Elm Street
Foxborough MA

Environmental
Resource Map

Weston & Sampson

Path: \\wse03.local\WSE\Depts\Water\Water Resources Group\GIS - Constraints Mapping\Foxborough\DPW\Human Receptor.mxd **User:** GasparA **Saved:** 6/21/2021 10:26:48 AM **Opened:** 7/20/2023 10:02:07 AM

N
W E
S

200 100 0 200
Feet

Data Source: Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Environmental Affairs

Legend

- Work Area
- State Registry of Historic Places
- All Underground Storage Tanks

Tier Classified Sites

- Tier 1A
- Tier 1B
- Tier 1C
- Tier 1D
- Tier II

PUBLIC WATER SUPPLIES

- Community Ground Water
- Community Surface Water
- Surface Distribution Site
- Non-Transient Non-Community
- Transient Non-Community
- Proposed Well

CH21E AUL Sites

- CH21E AUL Sites

DEP BWP Major Facilities

Large Quantity Generators (LQG)

- EPA/RCRA-regulated Hazard. Waste
- MA-regulated Hazard. Waste
- MA and EPA/RCRA-regulated Hazard. Waste
- Zone I
- Solid Waste Facilities - All Landfills
- IWPAs
- DEP Approved Zone IIs
- Zone A
- ZONE B
- ZONE C
- Article 97 Land
- <all other values>

OWNER_TYPE

- Conservation Organization
- County
- Federal
- Land Trust
- Municipal
- Other
- Private
- Private Non-Profit
- Private-Private Dispute
- Public Non-Profit
- State
- State-Municipal Dispute
- State-Non-Profit Dispute
- State-Private Dispute
- State-State Dispute
- Unknown

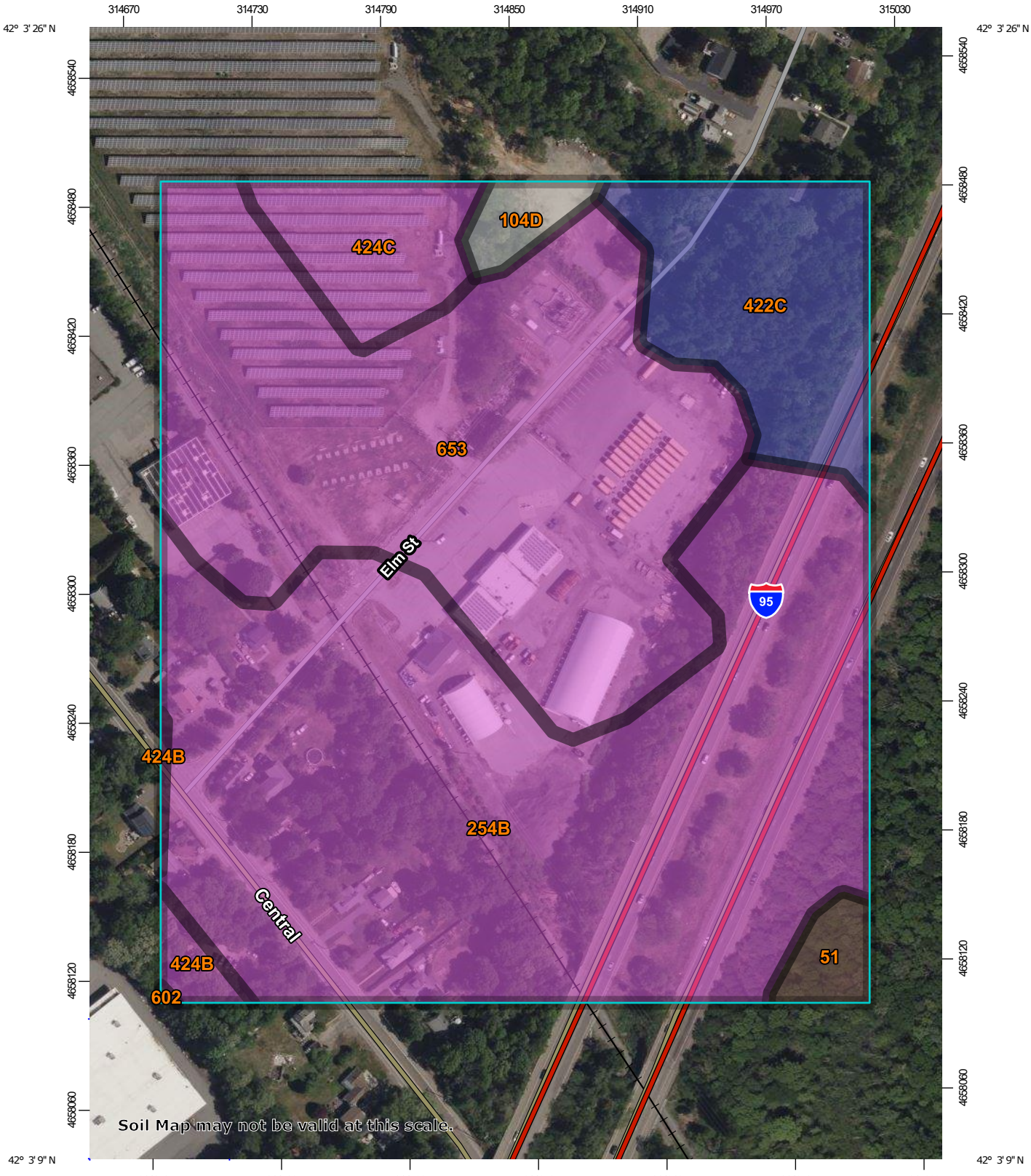
FIGURE 2

DPW Feasibility Study
70 Elm Street
Foxborough MA

Human Receptor Map

Weston & Sampson

Hydrologic Soil Group—Norfolk and Suffolk Counties, Massachusetts
(Foxborough DPW)



Map Scale: 1:2,560 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 35 70 140 210

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 18, Sep 9, 2022

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

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

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
51	Swansea muck, 0 to 1 percent slopes	B/D	0.4	1.4%
104D	Hollis-Rock outcrop-Charlton complex, 15 to 35 percent slopes		0.4	1.4%
254B	Merrimac fine sandy loam, 3 to 8 percent slopes	A	15.0	47.8%
422C	Canton fine sandy loam, 8 to 15 percent slopes, extremely stony	B	3.1	9.7%
424B	Canton fine sandy loam, 3 to 8 percent slopes, extremely bouldery	A	0.3	1.0%
424C	Canton fine sandy loam, 8 to 15 percent slopes, extremely bouldery	A	1.4	4.5%
602	Urban land, 0 to 15 percent slopes		0.0	0.0%
653	Udorthents, sandy	A	10.7	34.2%
Totals for Area of Interest			**31.4**	**100.0%**

Description

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.

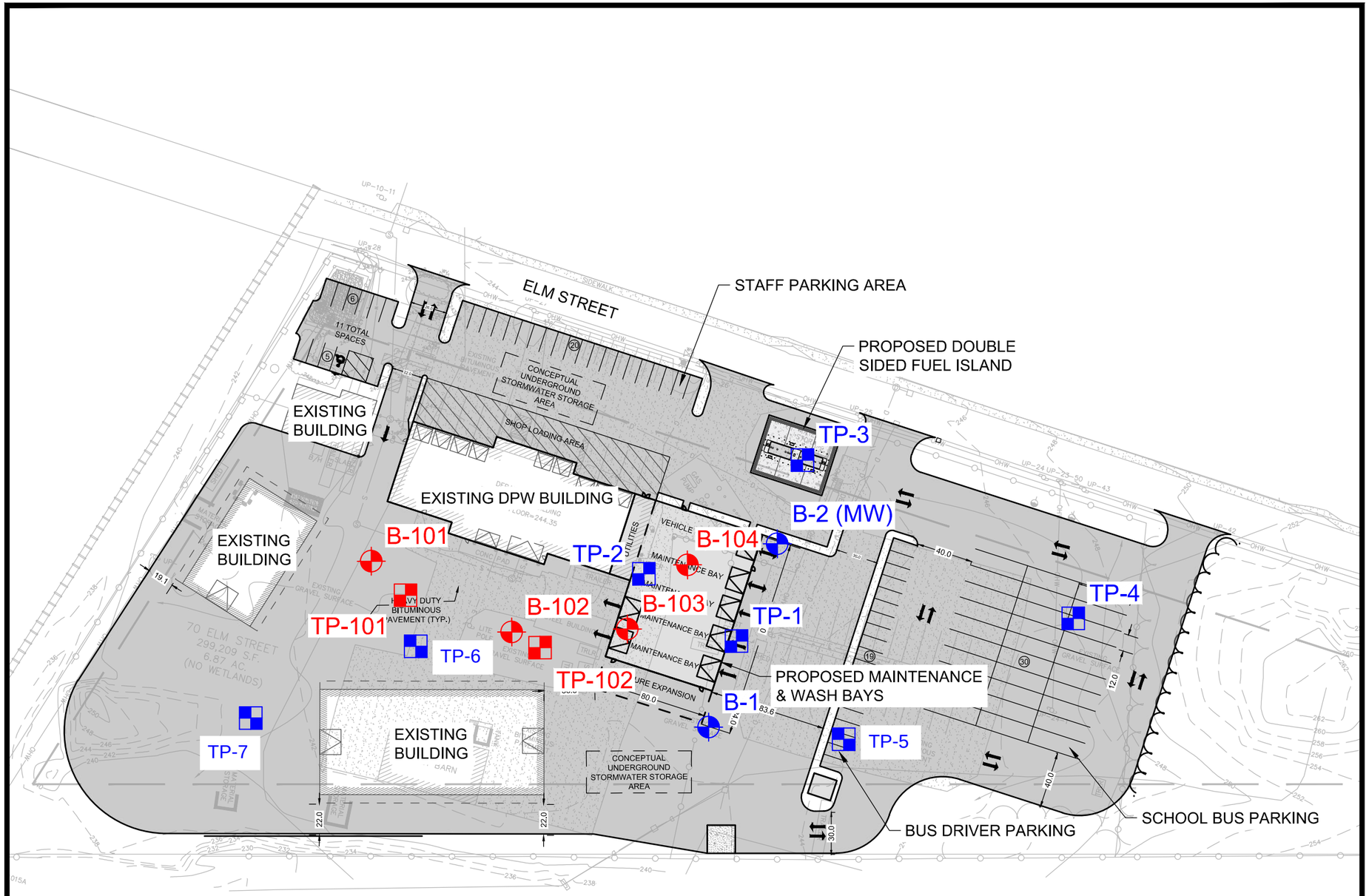
If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher



P:\MA\Foxborough, MA\ENG22-0799 Foxborough DPW Facility\Geotechnical\Figures\CAD\Figure 2 - Site Plan_Design.dwg

Weston & Sampson

Weston & Sampson Engineers, Inc.
55 Walkers Brook Drive, Suite 100
Reading, MA 01867
978.532.1900 800.SAMPSON
www.westonandsampson.com

NOTES

1. THIS PLAN IS BASED ON A CONCEPTUAL SITE LAYOUT PLAN PREPARED BY WESTON & SAMPSON ENGINEERS, INC. DATED JANUARY 2023.
2. FEASIBILITY PHASE BORINGS WERE COMPLETED BY G&M SUBSURFACE OF NORTH DIGHTON, MA ON OCTOBER 7, 2022.
3. FEASIBILITY PHASE TEST PITS WERE COMPLETED BY THE DEPARTMENT OF PUBLIC WORKS OF FOXBOROUGH, MA ON OCTOBER 7, 2022.
2. DESIGN PHASE BORINGS WERE COMPLETED BY NORTHERN DRILL SERVICE OF NORTHBOROUGH, MA ON AUGUST 10, 2023.
3. DESIGN PHASE TEST PITS WERE COMPLETED BY THE DEPARTMENT OF PUBLIC WORKS OF FOXBOROUGH, MA ON AUGUST 16, 2023.
4. ALL BORINGS AND TEST PITS WERE OBSERVED BY A WESTON & SAMPSON ENGINEER.
5. BORING AND TEST PIT LOCATIONS SHOWN ARE APPROXIMATE AND BASED ON FIELD MEASUREMENTS RELATIVE TO EXISTING SITE FEATURES.

LEGEND

B-X	DESIGNATION AND APPROXIMATE LOCATION OF FEASIBILITY PHASE BORING
TP-X	DESIGNATION AND APPROXIMATE LOCATION OF FEASIBILITY PHASE TEST PIT
B-X	DESIGNATION AND APPROXIMATE LOCATION OF DESIGN PHASE BORING
TP-X	DESIGNATION AND APPROXIMATE LOCATION OF DESIGN PHASE TEST PIT

GRAPHIC SCALE

80 40 0 80 160

SCALE: 1"=80'

ORIENTATION

TITLE

Test Pit an Boring Locations

PROJECT

FOXBOROUGH DPW

70 ELM STREET
FOXBOROUGH, MA 02035

DATE	10/2023
DRWN BY	AC
CHKD BY	SS
PRJ. NO.	ENG22-0799
REV. NO.	-

FIGURE

TEST PIT LOG

PROJECT NAME/NO.	Foxborough Department of Public Works Facility			**TEST PIT NUMBER**	
LOCATION	70 Elm Street, Foxborough MA			TP-3	
CLIENT	Town of Foxborough			GROUND SURFACE	
CONTRACTOR	Town	FOREMAN:		ELEVATION	See Site Plan
OBSERVED BY	Alyssa Peck	DATE	8/16/23	DEPTH TO GROUNDWATER BELOW	
CHECKED BY		DATE		SURFACE	72" b.g.s.

DEPTH BELOW GROUND SURFACE (in.)	TEST PIT DIAGRAM AND SOIL DESCRIPTION
4"	Asphalt
20"	FILL
32"	Gravelly coarse sand w/ some cobbles
60"	Gravelly medium sand, pockets of loamy sand (firm in place)
96"	Coarse sand
	- End of Exploration -

NOTES:

1. Redoxomorphic features at 72"

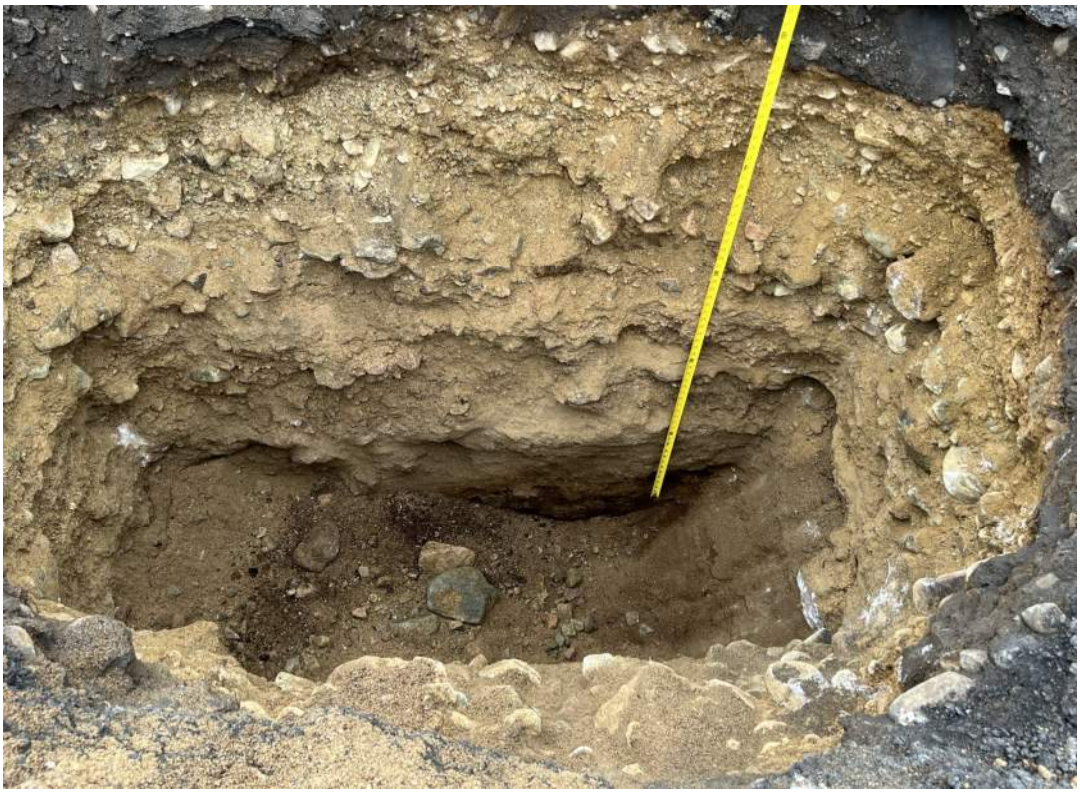
TEST PIT NUMBER
TP-3

WESTON & SAMPSON ENGINEERS, INC.

TEST PIT LOG

PROJECT NAME/NO.	Foxborough Department of Public Works Facility			**TEST PIT NUMBER**	
LOCATION	70 Elm Street, Foxborough MA			TP-3	
CLIENT	Town of Foxborough			GROUND SURFACE	
CONTRACTOR	Town	FOREMAN:		ELEVATION	See Site Plan
OBSERVED BY	Alyssa Peck	DATE	8/16/23	DEPTH TO GROUNDWATER BELOW	
CHECKED BY		DATE		SURFACE	72" b.g.s.

DEPTH BELOW GROUND SURFACE (in.)	TEST PIT DIAGRAM AND SOIL DESCRIPTION



NOTES:

1. Redoxomorphic features at 72"

TEST PIT NUMBER

TP-3

WESTON & SAMPSON ENGINEERS, INC.

TEST PIT LOG

PROJECT NAME/NO.	Foxborough Department of Public Works Facility			**TEST PIT NUMBER**	
LOCATION	70 Elm Street, Foxborough MA			TP-4	
CLIENT	Town of Foxborough			GROUND SURFACE	
CONTRACTOR	Town	FOREMAN:		ELEVATION	See Site Plan
OBSERVED BY	Alyssa Peck	DATE	8/16/23	DEPTH TO GROUNDWATER BELOW	
CHECKED BY		DATE		SURFACE	> 96" b.g.s.

DEPTH BELOW GROUND SURFACE (in.)	TEST PIT DIAGRAM AND SOIL DESCRIPTION
	FILL
96"	
	- End of Exploration -

NOTES:

1. No redoxomorphic features or standing water observed
2. Fill comprised of stumps, brick, wood, rebar.

TEST PIT NUMBER

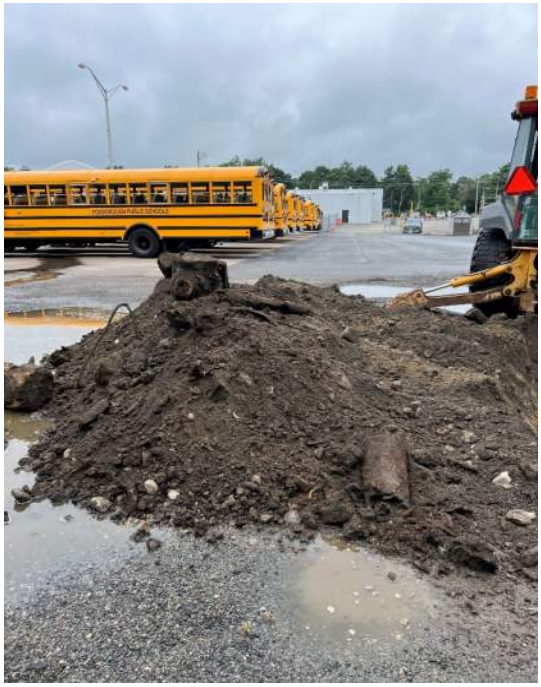
TP-4

WESTON & SAMPSON ENGINEERS, INC.

TEST PIT LOG

PROJECT NAME/NO.	Foxborough Department of Public Works Facility			**TEST PIT NUMBER**	
LOCATION	70 Elm Street, Foxborough MA			TP-4	
CLIENT	Town of Foxborough			GROUND SURFACE	
CONTRACTOR	Town	FOREMAN:		ELEVATION	See Site Plan
OBSERVED BY	Alyssa Peck	DATE	8/16/23	DEPTH TO GROUNDWATER BELOW	
CHECKED BY		DATE		SURFACE	> 96" b.g.s.

DEPTH BELOW GROUND SURFACE (in.)	TEST PIT DIAGRAM AND SOIL DESCRIPTION



NOTES:

1. No redoxomorphic features or standing water observed
2. Fill comprised of stumps, brick, wood, rebar.

TEST PIT NUMBER
TP-4

WESTON & SAMPSON ENGINEERS, INC.

TEST PIT LOG

PROJECT NAME/NO.	Foxborough Department of Public Works Facility			**TEST PIT NUMBER**	
LOCATION	70 Elm Street, Foxborough MA			TP-5	
CLIENT	Town of Foxborough			GROUND SURFACE	
CONTRACTOR	Town	FOREMAN:		ELEVATION	See Site Plan
OBSERVED BY	Alyssa Peck	DATE	8/16/23	DEPTH TO GROUNDWATER BELOW	
CHECKED BY		DATE		SURFACE	70" b.g.s.

DEPTH BELOW GROUND SURFACE (in.)	TEST PIT DIAGRAM AND SOIL DESCRIPTION
2"	Asphalt
16"	FILL
87"	Gravelly coarse sand w/ cobbles and boulders. Pockets of very fine sandy loam (firm in place). Reduced gravel, cobbles, and boulders with increased depth.
	- End of Exploration -

NOTES:

1. Redoxomorphic features at 70"

TEST PIT NUMBER
TP-5

WESTON & SAMPSON ENGINEERS, INC.

P:\MA\Foxborough, MA\ENG22-0799 Foxborough DPW Facility\Civil\Stormwater\Test Pits\[Test pit logs.xlsx]TP 3

TEST PIT LOG

PROJECT NAME/NO.	Foxborough Department of Public Works Facility			**TEST PIT NUMBER**	
LOCATION	70 Elm Street, Foxborough MA			TP-5	
CLIENT	Town of Foxborough			GROUND SURFACE	
CONTRACTOR	Town	FOREMAN:		ELEVATION	See Site Plan
OBSERVED BY	Alyssa Peck	DATE	8/16/23	DEPTH TO GROUNDWATER BELOW	
CHECKED BY		DATE		SURFACE	70" b.g.s.

DEPTH BELOW GROUND SURFACE (in.)	TEST PIT DIAGRAM AND SOIL DESCRIPTION

NOTES:

1. Redoxomorphic features at 70"

TEST PIT NUMBER

TP-5

WESTON & SAMPSON ENGINEERS, INC.

TEST PIT LOG

PROJECT NAME/NO.	Foxborough Department of Public Works Facility			**TEST PIT NUMBER**	
LOCATION	70 Elm Street, Foxborough MA			TP-6	
CLIENT	Town of Foxborough			GROUND SURFACE	
CONTRACTOR	Town	FOREMAN:		ELEVATION	See Site Plan
OBSERVED BY	Alyssa Peck	DATE	8/16/23	DEPTH TO GROUNDWATER BELOW	
CHECKED BY		DATE		SURFACE	> 105" b.g.s.

DEPTH BELOW GROUND SURFACE (in.)	TEST PIT DIAGRAM AND SOIL DESCRIPTION
46"	FILL
58"	Medium brown gravelly fine sandy loam
105"	Gravelly coarse sand w/ some cobbles
	- End of Exploration -

NOTES:

1. No redoxomorphic features or standing water observed

TEST PIT NUMBER
TP-6

WESTON & SAMPSON ENGINEERS, INC.

TEST PIT LOG

PROJECT NAME/NO.	Foxborough Department of Public Works Facility			**TEST PIT NUMBER**	
LOCATION	70 Elm Street, Foxborough MA			TP-6	
CLIENT	Town of Foxborough			GROUND SURFACE	
CONTRACTOR	Town	FOREMAN:		ELEVATION	See Site Plan
OBSERVED BY	Alyssa Peck	DATE	8/16/23	DEPTH TO GROUNDWATER BELOW	
CHECKED BY		DATE		SURFACE	> 105" b.g.s.

DEPTH BELOW GROUND SURFACE (in.)	TEST PIT DIAGRAM AND SOIL DESCRIPTION

NOTES:

1. No redoxomorphic features or standing water observed

TEST PIT NUMBER

TP-6

WESTON & SAMPSON ENGINEERS, INC.

TEST PIT LOG

PROJECT NAME/NO.	Foxborough Department of Public Works Facility			**TEST PIT NUMBER**	
LOCATION	70 Elm Street, Foxborough MA			TP-7	
CLIENT	Town of Foxborough			GROUND SURFACE	
CONTRACTOR	Town	FOREMAN:		ELEVATION	See Site Plan
OBSERVED BY	Alyssa Peck	DATE	8/16/23	DEPTH TO GROUNDWATER BELOW	
CHECKED BY		DATE		SURFACE	> 110" b.g.s.

DEPTH BELOW GROUND SURFACE (in.)	TEST PIT DIAGRAM AND SOIL DESCRIPTION
	FILL
110"	
	- End of Exploration -

NOTES:

1. No redoxomorphic features or standing water observed
2. Fill comprised of wood, plastic, stumps, glass.

TEST PIT NUMBER
TP-7

WESTON & SAMPSON ENGINEERS, INC.

P:\MA\Foxborough, MA\ENG22-0799 Foxborough DPW Facility\Civil\Stormwater\Test Pits\[Test pit logs.xlsx]TP 3

TEST PIT LOG

PROJECT NAME/NO.	Foxborough Department of Public Works Facility			**TEST PIT NUMBER**	
LOCATION	70 Elm Street, Foxborough MA			TP-7	
CLIENT	Town of Foxborough			GROUND SURFACE	
CONTRACTOR	Town	FOREMAN:		ELEVATION	See Site Plan
OBSERVED BY	Alyssa Peck	DATE	8/16/23	DEPTH TO GROUNDWATER BELOW	
CHECKED BY		DATE		SURFACE	> 110" b.g.s.

DEPTH BELOW GROUND SURFACE (in.)	TEST PIT DIAGRAM AND SOIL DESCRIPTION

NOTES:

1. No redoxomorphic features or standing water observed
2. Fill comprised of wood, plastic, stumps, glass.

TEST PIT NUMBER
TP-7

WESTON & SAMPSON ENGINEERS, INC.

Weston & Sampson

Foxborough DPW Feasibility Study
70 Elm Street, Foxborough, MA

BORING ID: B-101

WSE Project: ENG22-0799

CONTRACTOR:	G&M Subsurface	BORING LOCATION:	See Attached Figure	DATE START:	November 7, 2022
FOREMAN:	S. Canning	ADVANCE METHOD:	Rotary Wash Drilling	DATE FINISH:	November 7, 2022
LOGGED BY:	T. Blair, PE	AUGER DIAMETER:	N/A	GROUND EL:	243.0 ± (NAVD88)
CHECKED BY:	H. Flores, PE	SUPPORT CASING:	Driven Flush-Joint Casing (4" ID)	FINAL DEPTH:	11.0 ft.
EQUIPMENT:	Geoprobe 7822DT, Track Mounted	CORING METHOD:	N/A	GRID COORDS:	N/A
SPT HAMMER:	Automatic (140-lb.)	BACKFILL MATERIAL:	Drill Cuttings	GRID SYSTEM:	N/A

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	GEOTECHNICAL TEST DATA	STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS
				● N-Value, Raw (bpf) ☒ Organic Content (%) 10 20 30 40 ⊕ Moisture Content (%) ▶ Plastic Limit, PL (%) ◀ Liquid Limit, LL (%) 25 50 75 100		Surface: Asphalt concrete pavement millings.		Note: Values in brackets preceeding a remark indicate depth below ground surface (in feet) corresponding to the remark.
		S-01 14/24	11 2 2 3	● 4		Asphalt concrete pavement millings - 6 inches thick. **[FILL]**		
		S-02 14/24	11 18 18 28	● 36		**Sandy organic soil with gravel (OL)** - Soft; dark brown to black; moist; mostly organic low plasticity FINES, little fine to coarse sand, little fine gravel; mild organic odor. **[ORGANIC FILL]**		[2.0 - 11.0] Presence of cobbles and/or boulders in SP and GP layers inferred based on TP-101 observations and slow drilling/casing advancement rate.
		S-03 13/24	19 26 87 51	● >> 113		**Poorly graded sand with gravel (SP)** - Dense; tan; moist; mostly medium to coarse SAND, some fine to coarse gravel, trace non plastic fines; with cobbles and/or boulders. **[COARSE GLACIAL DEPOSIT]**		
5						**Poorly graded gravel with sand (GP)** - Very dense; brown; moist; mostly fine to coarse GRAVEL, some medium to coarse sand, trace non plastic fines; with cobbles and/or boulders. **[COARSE GLACIAL DEPOSIT]**	238	
		S-04 14/24	80 53 60 120	● >> 113				[10.5 - 11.0] Possible weathered bedrock.
10							233	**Boring ended upon practical drilling and sampling refusal at depth of 11.0 feet. Groundwater not observed in borehole.**
15							228	
20							223	

Refer to the attached index sheets for important information about this log including general notes, legends, and guidance on description methods and procedures.

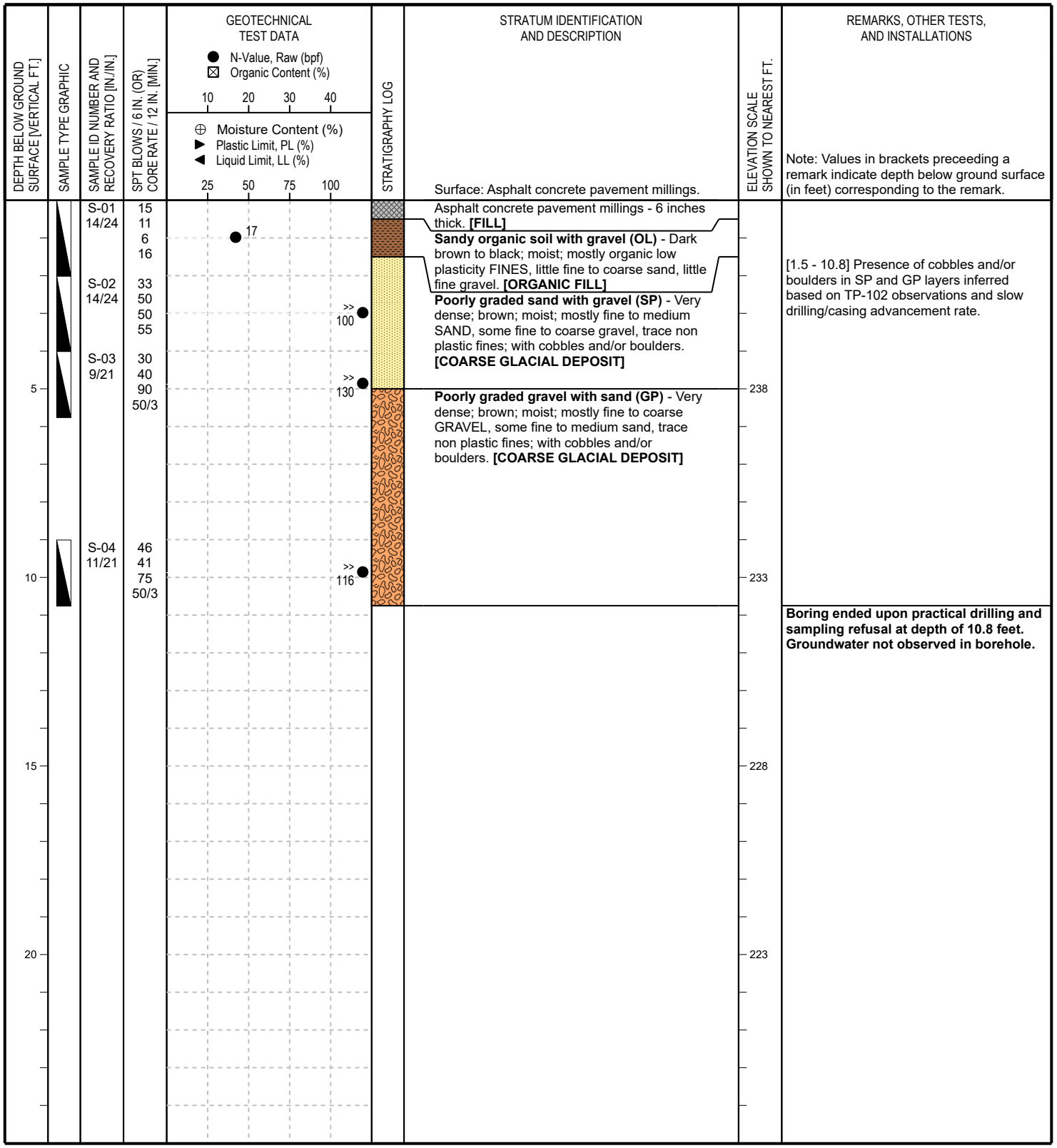
Weston & Sampson

WSE Project: ENG22-0799

Foxborough DPW Feasibility Study
70 Elm Street, Foxborough, MA

BORING ID: B-102

CONTRACTOR:	**G&M Subsurface**	BORING LOCATION:	**See Attached Figure**	DATE START:	**November 7, 2022**
FOREMAN:	**S. Canning**	ADVANCE METHOD:	**Rotary Wash Drilling**	DATE FINISH:	**November 7, 2022**
LOGGED BY:	**T. Blair, PE**	AUGER DIAMETER:	**N/A**	GROUND EL:	**243.0 ± (NAVD88)**
CHECKED BY:	**H. Flores, PE**	SUPPORT CASING:	**Driven Flush-Joint Casing (4" ID)**	FINAL DEPTH:	**10.8 ft.**
EQUIPMENT:	**Geoprobe 7822DT, Track Mounted**	CORING METHOD:	**N/A**	GRID COORDS:	**N/A**
SPT HAMMER:	**Automatic (140-lb.)**	BACKFILL MATERIAL:	**Drill Cuttings**	GRID SYSTEM:	**N/A**



Refer to the attached index sheets for important information about this log including general notes, legends, and guidance on description methods and procedures.

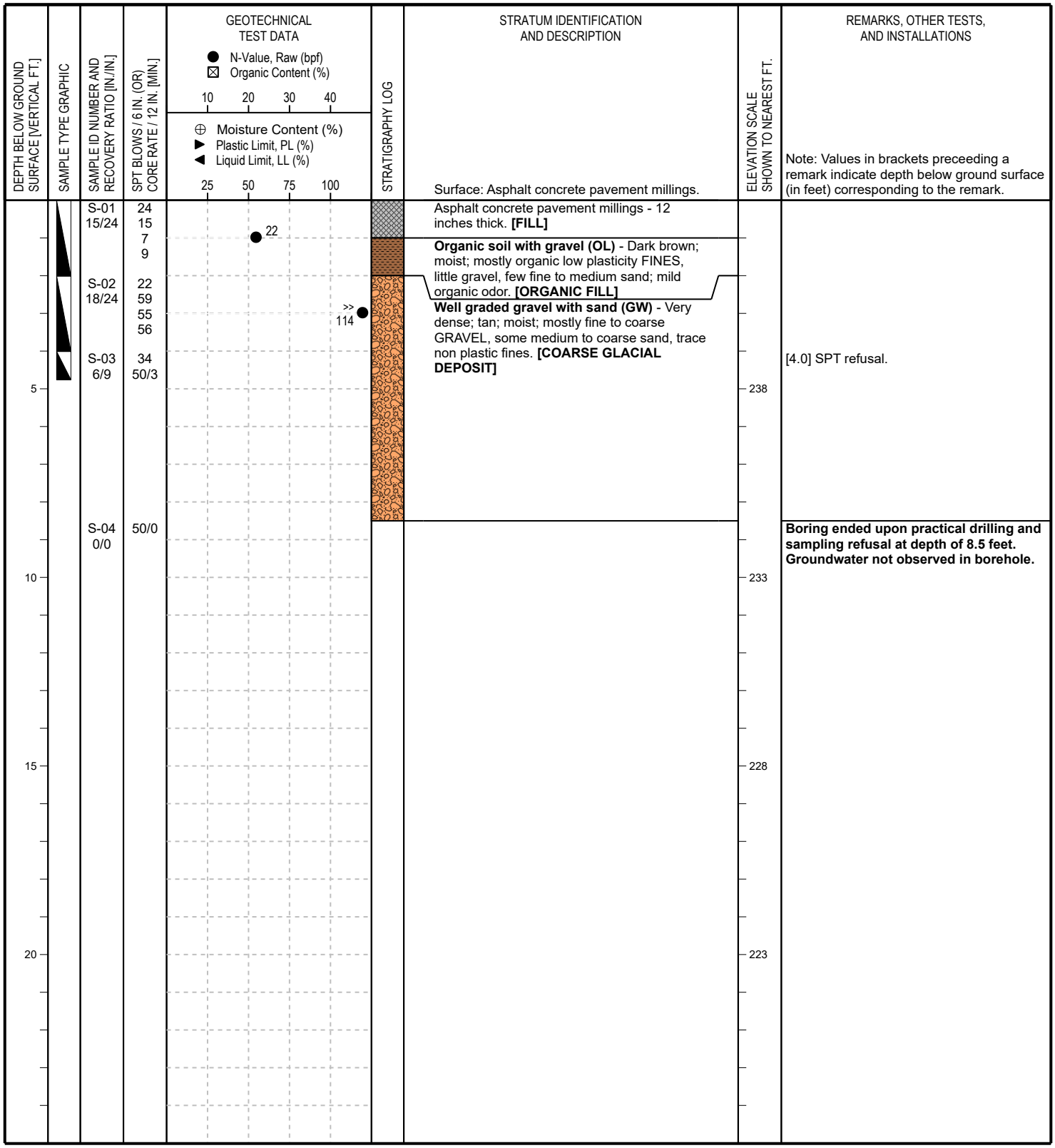
Weston & Sampson

Foxborough DPW Feasibility Study
70 Elm Street, Foxborough, MA

BORING ID: B-103

WSE Project: ENG22-0799

CONTRACTOR:	**G&M Subsurface**	BORING LOCATION:	**See Attached Figure**	DATE START:	**November 7, 2022**
FOREMAN:	**S. Canning**	ADVANCE METHOD:	**Rotary Wash Drilling**	DATE FINISH:	**November 7, 2022**
LOGGED BY:	**T. Blair, PE**	AUGER DIAMETER:	**N/A**	GROUND EL:	**243.0 ± (NAVD88)**
CHECKED BY:	**H. Flores, PE**	SUPPORT CASING:	**Driven Flush-Joint Casing (4" ID)**	FINAL DEPTH:	**8.5 ft.**
EQUIPMENT:	**Geoprobe 7822DT, Track Mounted**	CORING METHOD:	**N/A**	GRID COORDS:	**N/A**
SPT HAMMER:	**Automatic (140-lb.)**	BACKFILL MATERIAL:	**Drill Cuttings**	GRID SYSTEM:	**N/A**



Note: Values in brackets preceeding a remark indicate depth below ground surface (in feet) corresponding to the remark.

Refer to the attached index sheets for important information about this log including general notes, legends, and guidance on description methods and procedures.

Weston & Sampson

Foxborough DPW Feasibility Study
70 Elm Street, Foxborough, MA

BORING ID: B-104

WSE Project: ENG22-0799

CONTRACTOR:	G&M Subsurface	BORING LOCATION:	See Attached Figure	DATE START:	November 7, 2022
FOREMAN:	S. Canning	ADVANCE METHOD:	Rotary Wash Drilling	DATE FINISH:	November 7, 2022
LOGGED BY:	T. Blair, PE	AUGER DIAMETER:	N/A	GROUND EL:	243.0 ± (NAVD88)
CHECKED BY:	H. Flores, PE	SUPPORT CASING:	Driven Flush-Joint Casing (4" ID)	FINAL DEPTH:	11.0 ft.
EQUIPMENT:	Geoprobe 7822DT, Track Mounted	CORING METHOD:	N/A	GRID COORDS:	N/A
SPT HAMMER:	Automatic (140-lb.)	BACKFILL MATERIAL:	Drill Cuttings	GRID SYSTEM:	N/A

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	GEOTECHNICAL TEST DATA	STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS
				● N-Value, Raw (bpf) ☒ Organic Content (%) 10 20 30 40 ⊕ Moisture Content (%) ▶ Plastic Limit, PL (%) ◀ Liquid Limit, LL (%) 25 50 75 100		Surface: Asphalt concrete pavement millings.		Note: Values in brackets preceeding a remark indicate depth below ground surface (in feet) corresponding to the remark.
		S-01 11/24	12 23 11 10	34		Asphalt concrete pavement millings - 6 inches thick. **[FILL]**		
		S-02 0/24	6 1 2 1	3		**Well graded gravel with silt and sand (GW-GM)** - Dense; tan; moist; mostly fine to coarse GRAVEL, some fine to coarse sand, few non plastic fines. **[FILL]**		[2.0] No sample recovery. Gravel wedged in sampler tip upon retrieval. Attempt to retrieve a casing plug sample was also unsuccessful.
		S-03 15/24	2 2 2 13	4		**Sandy silt (ML)** - Soft; olive; moist; mostly non plastic FINES, some fine sand.		
5							238	
						Poorly graded gravel with sand (GP) - Very dense; brown; moist; mostly fine to coarse GRAVEL, some medium to coarse sand, trace non plastic fines. **[COARSE GLACIAL DEPOSIT]**		
		S-04 16/24	42 71 76 72	>> 147				
10							233	**Boring ended upon practical drilling and sampling refusal at depth of 11.0 feet. Groundwater not observed in borehole.**
15							228	
20							223	

Refer to the attached index sheets for important information about this log including general notes, legends, and guidance on description methods and procedures.

Weston & Sampson

Foxborough DPW Feasibility Study

TEST PIT ID: TP-101

WSE Project: ENG22-0799

70 Elm Street, Foxborough, MA

CONTRACTOR:	**Excavated by Town DPW**	TEST PIT LOCATION:	**See Attached Figure**	DATE START:	**November 7, 2022**
OPERATOR:	**A. Rouille**	PLAN DIMENSIONS:	**Length: 10.0 ft. , Width: 6.5 ft.**	DATE FINISH:	**November 7, 2022**
LOGGED BY:	**T. Blair, PE**	SEEPAGE REMARKS:	**No Seepage Observed**	GROUND EL:	**243.0 ± (NAVD88)**
CHECKED BY:	**H. Flores, PE**	CAVING REMARKS:	**No Caving Observed**	FINAL DEPTH:	**6.5 ft.**
EQUIPMENT:	**John Deere 310SJ Backhoe**	BACKFILL MATERIAL:	**Excavated Soil**	GRID COORDS:	**N/A**
BUCKET TYPE:	**Toothed, 12-in. (2.9 cubic-ft.)**	OTHER COMMENTS:		GRID SYSTEM:	**N/A**

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS
			Surface: Asphalt concrete pavement millings.		Note: Values in brackets preceeding a remark indicate depth below ground surface (in feet) corresponding to the remark.
			Asphalt concrete pavement millings - 3 inches thick. **[FILL]**		
			Well graded gravel with silt and sand (GW-GM) - Tan; moist; mostly fine to coarse GRAVEL, some fine to coarse sand, few non plastic fines. **[FILL]**		
			Sandy organic soil with gravel (OL) - Dark brown to black; moist; mostly organic low plasticity FINES, little fine to coarse sand, little fine gravel; mild organic odor. **[ORGANIC FILL]**		
			Poorly graded sand with gravel (SP) - Brown; moist; mostly medium to coarse SAND, some fine to coarse gravel, trace non plastic fines; common cobbles, occasional boulders. **[COARSE GLACIAL DEPOSIT]**		
			Wire rope encountered at interface between fill and native soils.		
5			**Poorly graded gravel with sand (GP)** - Brown; moist; mostly fine to coarse GRAVEL, some medium to coarse sand, trace non plastic fines; common cobbles, occasional boulders. **[COARSE GLACIAL DEPOSIT]**	238	
					Excavation ended at depth of 6.5 feet. Groundwater not observed in test pit.
10				233	

TEST PIT PHOTOGRAPHS

TP-101 - Sidewall View 1

TP-101 - Sidewall View 2

Refer to the attached index sheets for important information about this log including general notes, legends, and guidance on description methods and procedures.

Weston & Sampson

Foxborough DPW Feasibility Study

TEST PIT ID: TP-102

WSE Project: ENG22-0799

70 Elm Street, Foxborough, MA

CONTRACTOR:	**Excavated by Town DPW**	TEST PIT LOCATION:	**See Attached Figure**	DATE START:	**November 7, 2022**
OPERATOR:	**A. Rouille**	PLAN DIMENSIONS:	**Length: 10.0 ft. , Width: 8.0 ft.**	DATE FINISH:	**November 7, 2022**
LOGGED BY:	**T. Blair, PE**	SEEPAGE REMARKS:	**No Seepage Observed**	GROUND EL:	**243.0 ± (NAVD88)**
CHECKED BY:	**H. Flores, PE**	CAVING REMARKS:	**No Caving Observed**	FINAL DEPTH:	**6.0 ft.**
EQUIPMENT:	**John Deere 310SJ Backhoe**	BACKFILL MATERIAL:	**Excavated Soil**	GRID COORDS:	**N/A**
BUCKET TYPE:	**Toothed, 12-in. (2.9 cubic-ft.)**	OTHER COMMENTS:		GRID SYSTEM:	**N/A**

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS
			Surface: Asphalt concrete pavement millings.		Note: Values in brackets preceeding a remark indicate depth below ground surface (in feet) corresponding to the remark.
			Asphalt concrete pavement millings - 3 inches thick. **[FILL]**		
			Well graded gravel with silt and sand (GW-GM) - Tan; moist; mostly fine to coarse GRAVEL, some fine to coarse sand, few non plastic fines. **[FILL]**		
			Sandy organic soil with gravel (OL) - Dark brown to black; moist; mostly organic low plasticity FINES, little fine to coarse sand, little fine gravel; mild organic odor. **[ORGANIC FILL]**		
			Poorly graded sand with gravel (SP) - Brown; moist; mostly medium to coarse SAND, some fine to coarse gravel, trace non plastic fines; common cobbles, occasional boulders. **[COARSE GLACIAL DEPOSIT]**		
5				238	
			Poorly graded gravel with sand (GP) - Brown; moist; mostly fine to coarse GRAVEL, some medium to coarse sand, trace non plastic fines; occasional cobbles, occasional boulders. **[COARSE GLACIAL DEPOSIT]**		**Excavation ended at depth of 6.0 feet. Groundwater not observed in test pit.**
10				233	

TEST PIT PHOTOGRAPHS

TP-102 - Sidewall View 1

TP-102 - Sidewall View 2

Refer to the attached index sheets for important information about this log including general notes, legends, and guidance on description methods and procedures.

Weston & Sampson

WSE Project: ENG22-0799

Foxborough DPW
70 Elm Street, Foxborough, MA

BORING ID: B-1

CONTRACTOR:	**Northern Drill Service, Inc.**	BORING LOCATION:	**See Attached Figure**	DATE START:	**August 10, 2023**
FOREMAN:	**Tyler Kennedy**	ADVANCE METHOD:	**Rotary Wash Drilling**	DATE FINISH:	**August 10, 2023**
LOGGED BY:	**K. Lennon**	AUGER DIAMETER:	**N/A**	GROUND EL:	**242.0 ± (NAVD88)**
CHECKED BY:	**A. Chabot**	SUPPORT CASING:	**Driven Flush-Joint Casing (3" ID)**	FINAL DEPTH:	**19.0 ft. (Refusal)**
EQUIPMENT:	**Diedrich D-25, ATV Mounted**	CORING METHOD:	**N/A**	GRID COORDS:	**N:2845162.7333 / E:727585.4837**
SPT HAMMER:	**Automatic (140-lb.)**	BACKFILL MATERIAL:	**Drill Cuttings and Asphalt Patch**	GRID SYSTEM:	**NAD83 State Plane (MA)**

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	PID MEASUREMENT, PPM BY VOLUME (HEADSPACE)	GEOTECHNICAL TEST DATA (N-Value, Raw (bpf); Organic Content (%); Moisture Content (%); Plastic Limit, PL (%); Liquid Limit, LL (%))	STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS
						Surface: Asphalt concrete pavement.		Note: Values in brackets preceeding a remark indicate depth below ground surface (in feet) corresponding to the remark.
	S-1 12/24	31 42 48 45	1.1	>> 90		Asphalt- 3 inches thick.		Static groundwater level not measured due to drilling method.
						Well graded sand with gravel (SW) - Very dense; brown; moist; mostly fine to coarse SAND, little fine gravel, trace non plastic fines. **[FILL]**		
	S-2 14/24	42 36 58 100	15.7	>> 94		**Silty sand with gravel (SM) -** Very dense; olive; moist; mostly fine to coarse SAND, little fine gravel, little non plastic fines.		
	S-3 10/24	34 84 80 48	1.7	>> 164				[4.0 - 6.0] Difficult drilling.
5							237	[6.0] GC: 16%, SC: 68%, FC: 15%
	S-4 2/6	100	5.5			**Well graded sand (SW) -** Very dense; brown; wet; mostly fine to coarse SAND, few fine gravel, trace non plastic fines.		[9.0] Rock fragment.
10							232	
	S-5 0/1	50/1				**Well graded sand with gravel (SW) -** Very dense; light brown; wet; mostly fine to coarse SAND, some fine gravel, trace non plastic fines.		[14.0] Rock fragment.
15							227	
	S-6 0/0	50/0						***Sampler refusal at 19.0 ft. (exploration ended).***
20							222	
25							217	

Refer to the attached index sheets for important information about this log including general notes, legends, and guidance on description methods and procedures.

Weston & Sampson

WSE Project: ENG22-0799

Foxborough DPW
70 Elm Street, Foxborough, MA

BORING ID: B-2

CONTRACTOR:	**Northern Drill Service, Inc.**	BORING LOCATION:	**See Attached Figure**	DATE START:	**August 10, 2023**
FOREMAN:	**Tyler Kennedy**	ADVANCE METHOD:	**Rotary Wash Drilling**	DATE FINISH:	**August 10, 2023**
LOGGED BY:	**K. Lennon**	AUGER DIAMETER:	**N/A**	GROUND EL:	**243.0 ± (NAVD88)**
CHECKED BY:	**A. Chabot**	SUPPORT CASING:	**Driven Flush-Joint Casing (3" ID)**	FINAL DEPTH:	**24.5 ft.**
EQUIPMENT:	**Diedrich D-25, ATV Mounted**	CORING METHOD:	**N/A**	GRID COORDS:	**N:2845322.4763 / E:727522.2299**
SPT HAMMER:	**Automatic (140-lb.)**	BACKFILL MATERIAL:	**Monitoring Well Installed**	GRID SYSTEM:	**NAD83 State Plane (MA)**

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	PID MEASUREMENT, PPM BY VOLUME (HEADSPACE)	GEOTECHNICAL TEST DATA (● N-Value, Raw (bpf); ⊠ Organic Content (%); ⊕ Moisture Content (%); ▶ Plastic Limit, PL (%); ◀ Liquid Limit, LL (%))	STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS
							Surface: Asphalt concrete pavement.		Note: Values in brackets preceeding a remark indicate depth below ground surface (in feet) corresponding to the remark.
		S-1 12/24	33 22 14 6	3.5	36		Asphalt- 2 inches thick. **Poorly graded sand with gravel (SP)** - Dense; black and brown; moist; mostly fine to coarse SAND, little fine gravel, trace non plastic fines; trace asphalt.		
		S-2 13/24	3 4 9 3	37.5	13		**Sandy lean clay (CL)** - Stiff; brown and dark brown; moist; mostly medium plasticity FINES, little fine sand, trace fine gravel.		
		S-3 9/24	4 14 21 35	1.7	35		**Silty sand (SM)** - Dense; brown; moist; mostly fine to coarse SAND, some non plastic fines, few fine gravel.		
5		S-4 17/23	52 74 79 100/5	5.7	>> 153		**Well graded sand with silt and gravel (SW-SM)** - Very dense; olive; moist; mostly fine to coarse SAND, little fine gravel, few non plastic fines.	238	
		S-5 13/24	34 49 46 70	9.6	>> 95		**Well graded sand with silt and gravel (SW-SM)** - Very dense; brown; moist; mostly fine to coarse SAND, little fine to coarse gravel, few non plastic fines.		[8.0] GC: 27%, SC: 59%, FC: 14%
10		S-6 10/24	25 72 45 56	1.1	>> 117			233	
		S-7 5/24	11 21 15 18	15.0	36		**Well graded sand with gravel (SW)** - Dense; brown; moist; mostly fine to coarse SAND, little fine gravel, trace non plastic fines.		[14.0] Rock fragment.
15								228	
		S-8 4/24	26 24 24 39	9.2	48		**Clayey sand (SC)** - Dense; gray to brown; moist; mostly fine to coarse SAND, little medium plasticity fines, few fine gravel.		
20								223	
		S-9 4/6	100/6	0.4			**Clayey sand (SC)** - Very dense; brown; moist; mostly fine to medium SAND, some medium plasticity fines, trace fine gravel.		[24.5] GC: 2%, SC: 66%, FC: 32% **Exploration ended at 24.5 ft.**
25								218	

Refer to the attached index sheets for important information about this log including general notes, legends, and guidance on description methods and procedures.

Weston & Sampson

Foxborough DPW

TEST PIT ID: TP-1

WSE Project: ENG22-0799

70 Elm Street, Foxborough, MA

CONTRACTOR:	**Excavated by Town DPW**	TEST PIT LOCATION:	**See Attached Figure**	DATE START:	**August 16, 2023**
OPERATOR:	**Steve Benney**	PLAN DIMENSIONS:	**Length: 8.5 ft. , Width: 3.0 ft.**	DATE FINISH:	**August 16, 2023**
LOGGED BY:	**K. Lennon**	SEEPAGE REMARKS:	**No Seepage Observed**	GROUND EL:	**243.0 ± (NAVD88)**
CHECKED BY:	**A. Chabot**	CAVING REMARKS:	**No Caving Observed**	FINAL DEPTH:	**5.0 ft.**
EQUIPMENT:	**John Deere 310SJ Backhoe**	BACKFILL MATERIAL:	**Excavated Soil**	GRID COORDS:	**N:2845187 ± / E:727453 ±**
BUCKET TYPE:	**Toothed, 30-in. (8.5 cubic-ft.)**	OTHER COMMENTS:		GRID SYSTEM:	**NAD83 State Plane (MA)**

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	PID MEASUREMENT, PPM BY VOLUME (HEADSPACE)	STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS
				Surface: Gravel area.		Note: Values in brackets preceeding a remark indicate depth below ground surface (in feet) corresponding to the remark.
				Crushed stone- 6 inches thick.		
	G	1.8		**Well graded sand with gravel (SW)** - Gray; moist; mostly fine to coarse SAND, little fine to coarse gravel, trace non plastic fines. **[FILL]**		
	G	0.7		**Well graded sand with gravel (SW)** - Light brown; moist; mostly fine to coarse SAND, little fine to coarse gravel, trace non plastic fines. **[FILL]**		
	G	0.8		**Silt with sand (ML)** - Dark brown; moist; mostly low plasticity FINES, little fine to medium sand, trace fine gravel. **[SUBSOIL]**		
	G	1.1		**Well graded sand with gravel (SW)** - Light brown; moist; mostly fine to coarse SAND, little fine to coarse gravel, trace non plastic fines. *Common cobbles and occasional boulders*		
5					238	**Excavation ended at a depth of 5 feet.**

TEST PIT PHOTOGRAPHS

1. Sidewall Overview

2. Excavated Soil Pile

Weston & Sampson

Foxborough DPW

TEST PIT ID: TP-2

WSE Project: ENG22-0799

70 Elm Street, Foxborough, MA

CONTRACTOR:	**Excavated by Town DPW**	TEST PIT LOCATION:	**See Attached Figure**	DATE START:	**August 16, 2023**
OPERATOR:	**Steve Benney**	PLAN DIMENSIONS:	**Length: 7.2 ft. , Width: 7.2 ft.**	DATE FINISH:	**August 16, 2023**
LOGGED BY:	**K. Lennon**	SEEPAGE REMARKS:	**No Seepage Observed**	GROUND EL:	**243.0 ± (NAVD88)**
CHECKED BY:	**A. Chabot**	CAVING REMARKS:	**No Caving Observed**	FINAL DEPTH:	**4.5 ft.**
EQUIPMENT:	**John Deere 310SJ Backhoe**	BACKFILL MATERIAL:	**Excavated Soil**	GRID COORDS:	**N:2845220 ± / E:727505 ±**
BUCKET TYPE:	**Toothed, 30-in. (8.5 cubic-ft.)**	OTHER COMMENTS:		GRID SYSTEM:	**NAD83 State Plane (MA)**

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	PID MEASUREMENT, PPM BY VOLUME (HEADSPACE)	STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS
				Surface: Asphalt concrete pavement.		Note: Values in brackets preceeding a remark indicate depth below ground surface (in feet) corresponding to the remark.
				Asphalt- 4 inches thick.		
	G	1.9		**Silty sand with gravel (SM)** - Brown; moist; mostly fine to coarse SAND, little fine to coarse gravel, little low plasticity fines. **[FILL]**		
	G	1.0		**Silty sand with gravel (SM)** - Dark brown; moist; mostly fine to medium SAND, little organic non plastic fines, little fine to coarse gravel. **[FILL]**		
	G	0.5		**Well graded sand with gravel (SW)** - Brown; moist; mostly fine to coarse SAND, little fine to coarse gravel, trace non plastic fines. **[FILL]**		
				Common cobbles & trace boulders		
5					238	**Excavation ended at a depth of 4.5 feet to expose base of foundation footing.**

TEST PIT PHOTOGRAPHS

1. Sidewall Overview

2. Excavated Soil Pile

Refer to the attached index sheets for important information about this log including general notes, legends, and guidance on description methods and procedures.

Weston & Sampson

Foxborough DPW

TEST PIT ID: TP-3

WSE Project: ENG22-0799

70 Elm Street, Foxborough, MA

CONTRACTOR:	**Excavated by Town DPW**	TEST PIT LOCATION:	**See Attached Figure**	DATE START:	**August 16, 2023**
OPERATOR:	**Steve Benney**	PLAN DIMENSIONS:	**Length: 7.7 ft. , Width: 6.0 ft.**	DATE FINISH:	**August 16, 2023**
LOGGED BY:	**K. Lennon**	SEEPAGE REMARKS:	**No Seepage Observed**	GROUND EL:	**244.0 ± (NAVD88)**
CHECKED BY:	**A. Chabot**	CAVING REMARKS:	**No Caving Observed**	FINAL DEPTH:	**5.0 ft.**
EQUIPMENT:	**John Deere 310SJ Backhoe**	BACKFILL MATERIAL:	**Excavated Soil**	GRID COORDS:	**N:2845356 ± / E:727478 ±**
BUCKET TYPE:	**Toothed, 30-in. (8.5 cubic-ft.)**	OTHER COMMENTS:		GRID SYSTEM:	**NAD83 State Plane (MA)**

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	PID MEASUREMENT, PPM BY VOLUME (HEADSPACE)	STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS
				Surface: Asphalt concrete pavement.		Note: Values in brackets preceeding a remark indicate depth below ground surface (in feet) corresponding to the remark.
				Asphalt- 3 inches thick.		
	G	0.7		**Poorly graded gravel with sand (GP)** - Black; moist; mostly fine to coarse GRAVEL, little fine to coarse sand. **[FILL]**		
	G	0.4		**Poorly graded gravel with silt and sand (GP-GM)** - Dark brown; moist; mostly fine to coarse GRAVEL, some fine to coarse sand, few non plastic fines; occasional wood and tree stumps, trace glass. **[FILL]**		
				Well graded sand with gravel (SW) - Tan; moist; mostly medium to coarse SAND, some fine to coarse gravel.		
	G	1.3		**Poorly graded sand (SP)** - Tan; moist; mostly fine SAND, trace non plastic fines.		
				numerous cobbles and common boulders		
5					239	**Excavation ended at a depth of 5 feet.**

TEST PIT PHOTOGRAPHS

1. Sidewall Overview

2. Excavated Soil Pile

Weston & Sampson

Foxborough DPW

TEST PIT ID: TP-4

WSE Project: ENG22-0799

70 Elm Street, Foxborough, MA

CONTRACTOR:	**Excavated by Town DPW**	TEST PIT LOCATION:	**See Attached Figure**	DATE START:	**August 16, 2023**
OPERATOR:	**Steve Benney**	PLAN DIMENSIONS:	**Length: 12.0 ft. , Width: 5.0 ft.**	DATE FINISH:	**August 16, 2023**
LOGGED BY:	**K. Lennon**	SEEPAGE REMARKS:	**No Seepage Observed**	GROUND EL:	**246.0 ± (NAVD88)**
CHECKED BY:	**A. Chabot**	CAVING REMARKS:	**Minor Caving**	FINAL DEPTH:	**8.0 ft.**
EQUIPMENT:	**John Deere 310SJ Backhoe**	BACKFILL MATERIAL:	**Excavated Soil**	GRID COORDS:	**N:2845485 ± / E:727660 ±**
BUCKET TYPE:	**Toothed, 30-in. (8.5 cubic-ft.)**	OTHER COMMENTS:		GRID SYSTEM:	**NAD83 State Plane (MA)**

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	PID MEASUREMENT, PPM BY VOLUME (HEADSPACE)	STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS
				Surface: Gravel area.		Note: Values in brackets preceeding a remark indicate depth below ground surface (in feet) corresponding to the remark.
	G	2.4		**Silty sand (SM)** - Dark brown; moist; mostly fine to coarse SAND, some non plastic fines, few fine to coarse gravel. **[FILL]**		
5					241	
				Common tree stumps and wood, occasional cobbles		
						Excavation ended at a depth of 8 feet.

TEST PIT PHOTOGRAPHS

1. Sidewall Overview

2. Excavated Soil Profile

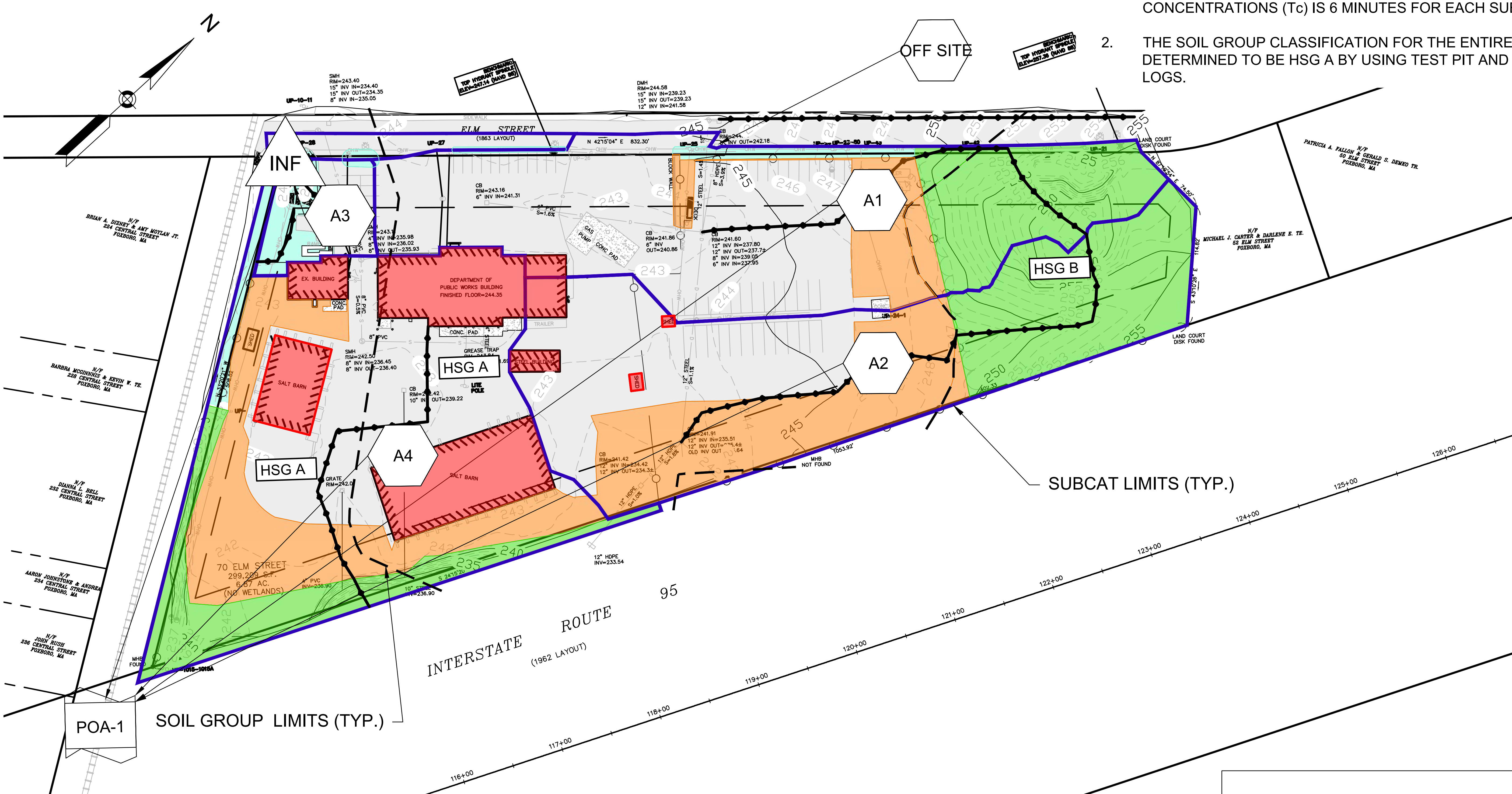
APPENDIX B

FOXBOROUGH DPW FACILITY
70 ELM STREET, FOXBOROU

Pre-Development Conditions vs. Post-Development Conditions									
Pre-Development Flows					Post-Development Flows				
Storm Event	2-year storm	10-year storm	25-year storm	100-year storm	Storm Event	2-year storm	10-year storm	25-year storm	100-year storm
	3.43 in	5.24 in	6.37 in	8.12 in		3.43 in	5.24 in	6.37 in	8.12 in
Subcatchment/Reach	Inflow (cfs)	Inflow (cfs)	Inflow (cfs)	Inflow (cfs)	Subcatchment/Reach	Inflow (cfs)	Inflow (cfs)	Inflow (cfs)	Inflow (cfs)
POA 1	18.30	28.54	35	45.13	POI 1	12.00	25.21	31.55	42.03

NOTE:

1. FOR MODELING PURPOSES, MINIMUM TIME OF CONCENTRATIONS (Tc) IS 6 MINUTES FOR EACH SUBCAT.
2. THE SOIL GROUP CLASSIFICATION FOR THE ENTIRE SITE WAS DETERMINED TO BE HSG A BY USING TEST PIT AND BORING LOGS.



LEGEND

- BUILDING, HSG A (CN=98)
- WOODS, GOOD, HSG A (CN=30)
- >75% GRASS COVER, GOOD, HSG A: (CN=39)
- ASPHALT MILLINGS, PACKED GRAVEL, HSG A (CN=96)
- PAVEMENT, HSG A (CN=98)

PLAN

SCALE: 1" = 100'

0 100 200 300 400

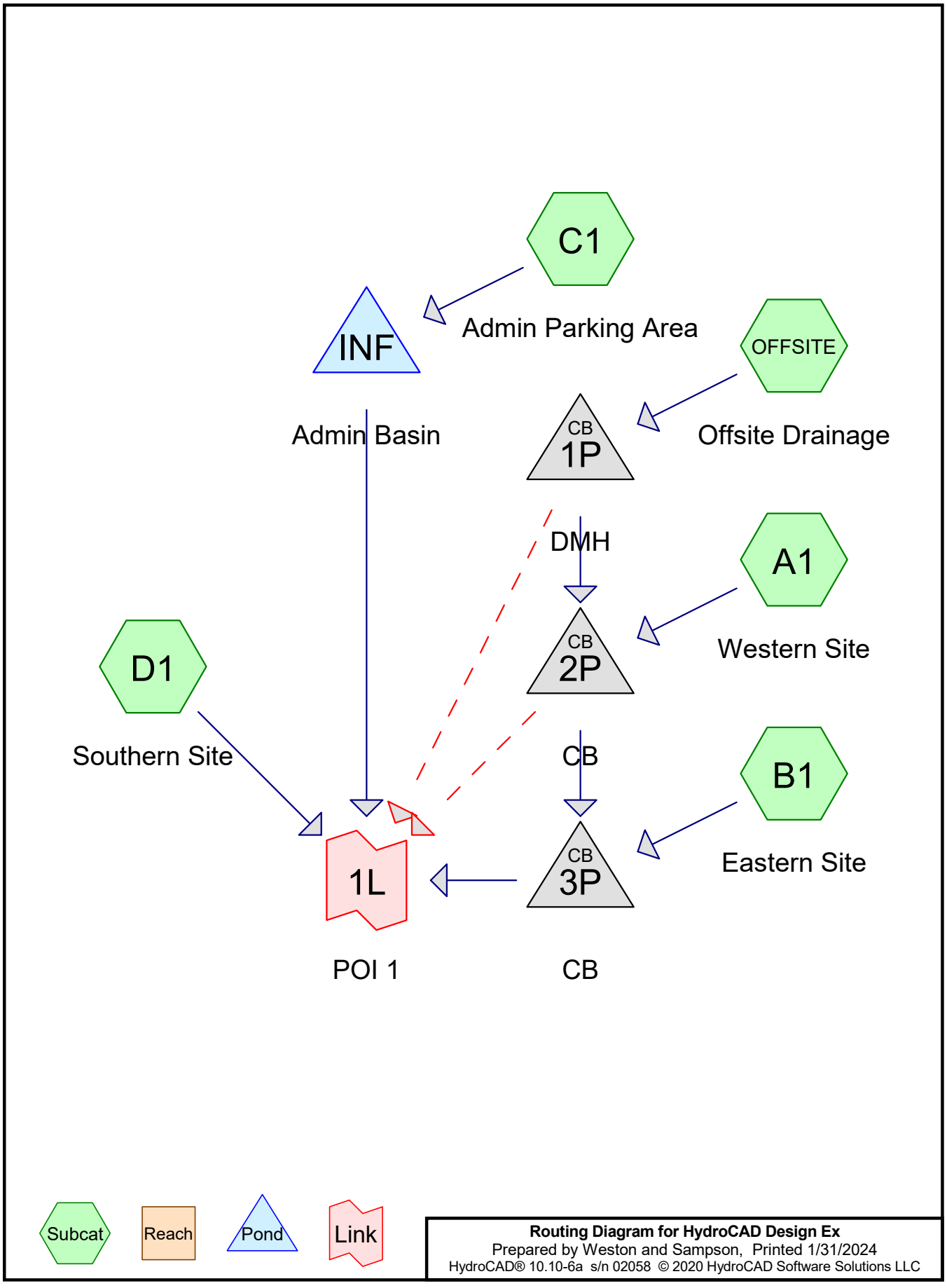
SCALE: 1" = 100'

TOWN OF FOXBORO, MA
NEW DEPARTMENT OF PUBLIC WORKS FACILITY

DRAINAGE AREA MAP
EXISTING CONDITIONS

DESIGNED BY: EC	CHECKED BY: EC	DATE: JANUARY 2024

Weston & Sampson℠



Routing Diagram for HydroCAD Design Ex
Prepared by Weston and Sampson, Printed 1/31/2024

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-yr	Type III 24-hr		Default	24.00	1	3.43	2
2	10-yr	Type III 24-hr		Default	24.00	1	5.24	2
3	25-yr	Type III 24-hr		Default	24.00	1	6.37	2
4	100-yr	Type III 24-hr		Default	24.00	1	8.12	2

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
12,306	39	>75% Grass cover, Good, HSG A (A1, C1, D1)
69,662	96	Gravel surface, HSG A (A1, B1, D1)
2,861	96	Gravel surface, HSG B (A1, B1)
165,113	98	Paved areas & roofs, HSG A (A1, B1, D1)
5,276	98	Paved parking, HSG A (C1)
74,341	98	Paved roads w/curbs & sewers, HSG A (OFFSITE)
47,363	30	Woods, Good, HSG A (A1, B1, D1)
20,734	55	Woods, Good, HSG B (A1, B1)
397,656	**85**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
374,061	HSG A	A1, B1, C1, D1, OFFSITE
23,595	HSG B	A1, B1
0	HSG C	
0	HSG D	
0	Other	
397,656		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover
12,306	0	0	0	0	12,306	>75% Grass cover, Good
69,662	2,861	0	0	0	72,523	Gravel surface
165,113	0	0	0	0	165,113	Paved areas & roofs
5,276	0	0	0	0	5,276	Paved parking
74,341	0	0	0	0	74,341	Paved roads w/curbs & sewers
47,363	20,734	0	0	0	68,097	Woods, Good
374,061	**23,595**	**0**	**0**	**0**	**397,656**	**TOTAL AREA**

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)
1	1P	239.23	237.80	107.0	0.0134	0.025	0.0	12.0	0.0
2	2P	237.70	235.51	204.0	0.0107	0.025	0.0	12.0	0.0
3	3P	235.40	233.54	134.0	0.0139	0.012	0.0	12.0	0.0

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A1: Western Site Runoff Area=97,020 sf 61.46% Impervious Runoff Depth=2.40"
Flow Length=436' Tc=13.9 min CN=WQ Runoff=4.32 cfs 19,432 cf

Subcatchment B1: Eastern Site Runoff Area=94,033 sf 37.99% Impervious Runoff Depth=2.18"
Flow Length=529' Tc=11.3 min CN=WQ Runoff=4.21 cfs 17,068 cf

Subcatchment C1: Admin Parking Area Runoff Area=10,248 sf 51.48% Impervious Runoff Depth=1.65"
Flow Length=73' Slope=0.0137 '/' Tc=6.5 min CN=WQ Runoff=0.40 cfs 1,408 cf

Subcatchment D1: Southern Site Runoff Area=122,014 sf 57.18% Impervious Runoff Depth=2.56"
Tc=6.0 min CN=WQ Runoff=7.57 cfs 26,032 cf

Subcatchment OFFSITE: Offsite Drainage Runoff Area=74,341 sf 100.00% Impervious Runoff Depth=3.20"
Tc=16.0 min CN=98 Runoff=4.25 cfs 19,804 cf

Pond 1P: DMH Peak Elev=244.62' Inflow=4.25 cfs 19,804 cf
Primary=4.02 cfs 19,749 cf Secondary=0.23 cfs 55 cf Outflow=4.25 cfs 19,804 cf

Pond 2P: CB Peak Elev=241.95' Inflow=8.34 cfs 39,181 cf
Primary=2.91 cfs 32,504 cf Secondary=5.43 cfs 6,677 cf Outflow=8.34 cfs 39,181 cf

Pond 3P: CB Peak Elev=240.51' Inflow=7.12 cfs 49,572 cf
Outflow=7.12 cfs 49,572 cf

Pond INF: Admin Basin Peak Elev=240.76' Storage=801 cf Inflow=0.40 cfs 1,408 cf
Discarded=0.01 cfs 1,408 cf Primary=0.00 cfs 0 cf Outflow=0.01 cfs 1,408 cf

Link 1L: POI 1 Inflow=18.30 cfs 82,336 cf
Primary=18.30 cfs 82,336 cf

Total Runoff Area = 397,656 sf Runoff Volume = 83,743 cf Average Runoff Depth = 2.53"
38.46% Pervious = 152,926 sf 61.54% Impervious = 244,730 sf

Summary for Subcatchment A1: Western Site

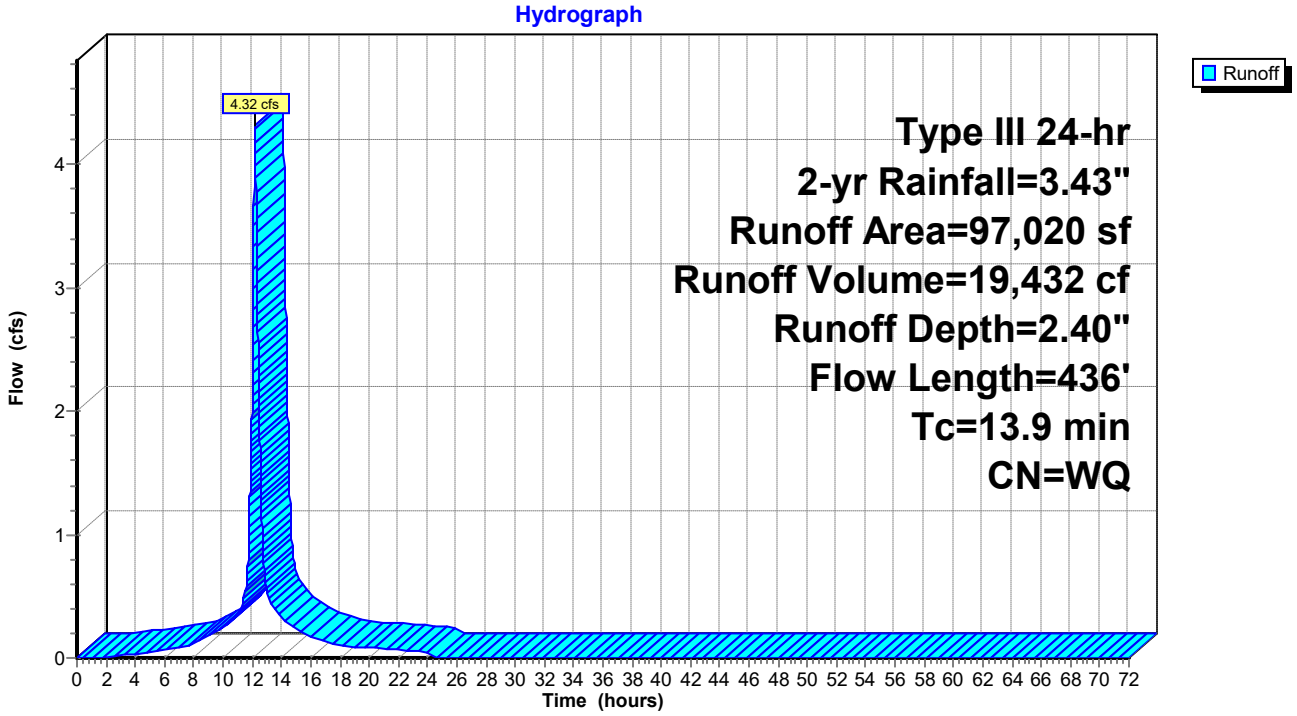
Runoff = 4.32 cfs @ 12.18 hrs, Volume= 19,432 cf, Depth= 2.40"
Routed to Pond 2P : CB

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.43"

	Area (sf)	CN	Description
*	59,628	98	Paved areas & roofs, HSG A
	3,018	39	>75% Grass cover, Good, HSG A
	1,612	30	Woods, Good, HSG A
	20,706	55	Woods, Good, HSG B
	10,073	96	Gravel surface, HSG A
	1,983	96	Gravel surface, HSG B
	97,020		Weighted Average
	37,392		38.54% Pervious Area
	59,628		61.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	115	0.0990	0.16		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.43"
0.6	91	0.0298	2.59		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.1	230	0.0310	3.57		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
13.9	436	Total			

Subcatchment A1: Western Site



Summary for Subcatchment B1: Eastern Site

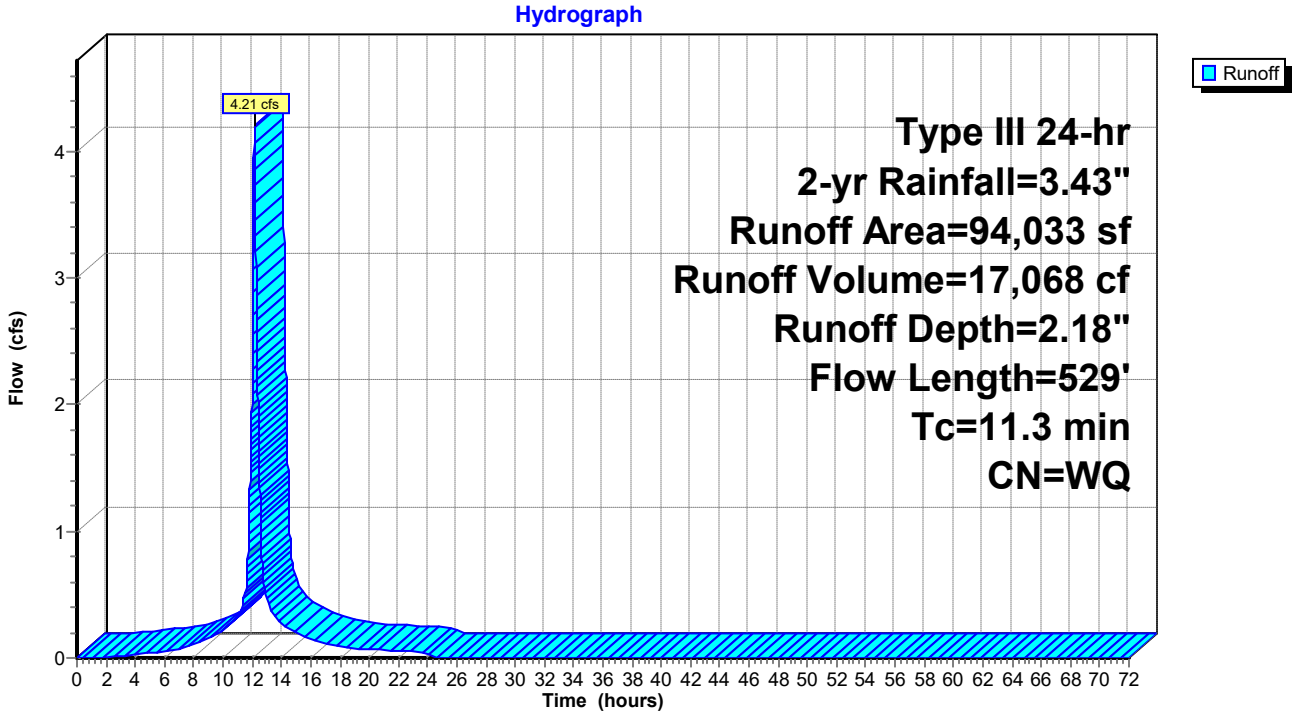
Runoff = 4.21 cfs @ 12.15 hrs, Volume= 17,068 cf, Depth= 2.18"
Routed to Pond 3P : CB

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.43"

	Area (sf)	CN	Description
*	35,720	98	Paved areas & roofs, HSG A
	29,570	96	Gravel surface, HSG A
	878	96	Gravel surface, HSG B
	27,837	30	Woods, Good, HSG A
	28	55	Woods, Good, HSG B
	94,033		Weighted Average
	58,313		62.01% Pervious Area
	35,720		37.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	86	0.1304	0.17		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.43"
0.5	132	0.0401	4.07		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
2.1	311	0.0143	2.43		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
11.3	529	Total			

Subcatchment B1: Eastern Site



Summary for Subcatchment C1: Admin Parking Area

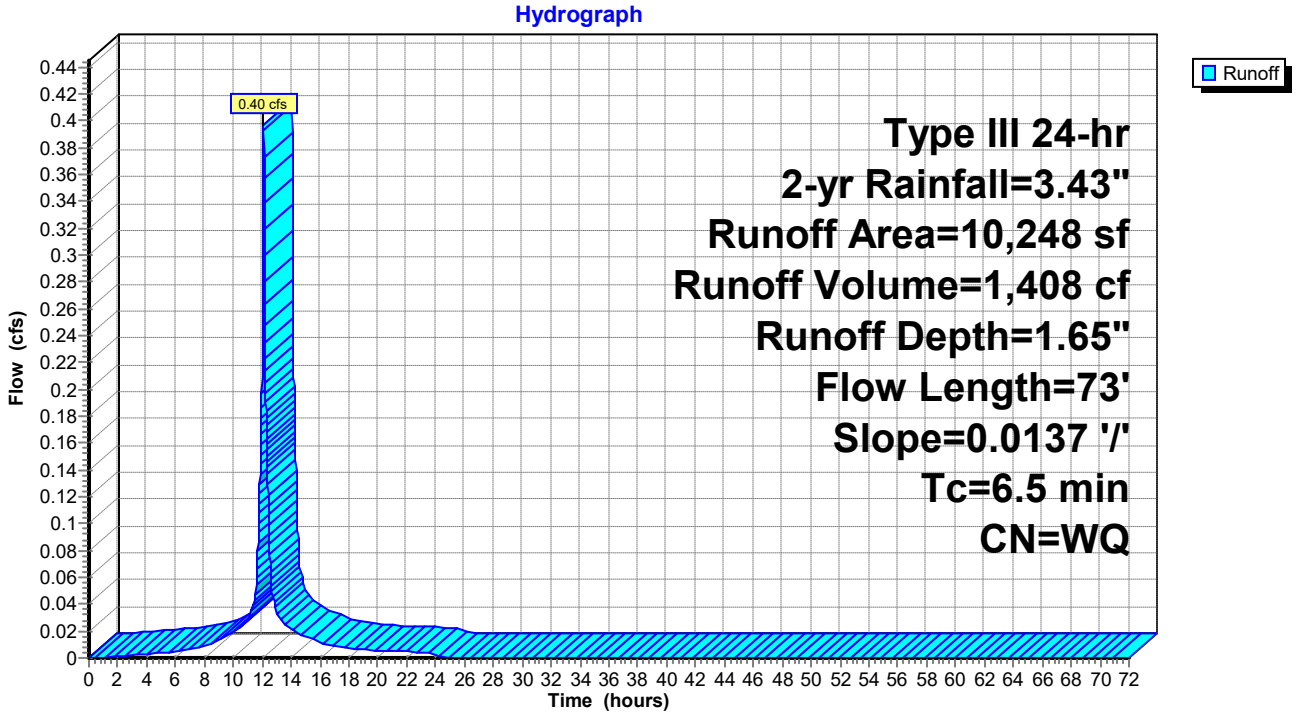
Runoff = 0.40 cfs @ 12.09 hrs, Volume= 1,408 cf, Depth= 1.65"
Routed to Pond INF : Admin Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.43"

Area (sf)	CN	Description
4,972	39	>75% Grass cover, Good, HSG A
5,276	98	Paved parking, HSG A
10,248		Weighted Average
4,972		48.52% Pervious Area
5,276		51.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	50	0.0137	0.13		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.43"
0.2	23	0.0137	2.38		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
6.5	73	Total			

Subcatchment C1: Admin Parking Area



Summary for Subcatchment D1: Southern Site

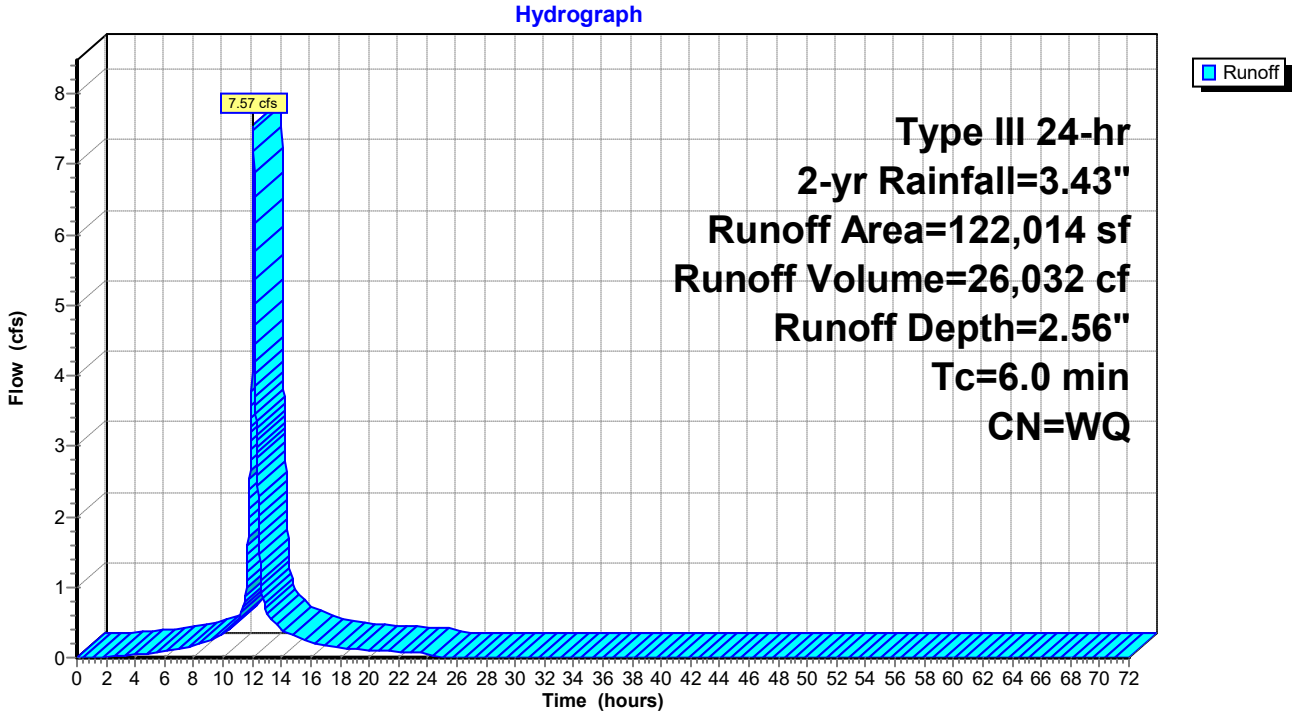
Runoff = 7.57 cfs @ 12.08 hrs, Volume= 26,032 cf, Depth= 2.56"
Routed to Link 1L : POI 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.43"

	Area (sf)	CN	Description
*	69,765	98	Paved areas & roofs, HSG A
	4,316	39	>75% Grass cover, Good, HSG A
	17,914	30	Woods, Good, HSG A
	30,019	96	Gravel surface, HSG A
	122,014		Weighted Average
	52,249		42.82% Pervious Area
	69,765		57.18% Impervious Area

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

Subcatchment D1: Southern Site



Summary for Subcatchment OFFSITE: Offsite Drainage

Total subcatchment represents approximately 2,039 LF of ROW (81,560 SF) minus areas that directly contribute to the onsite drainage network.

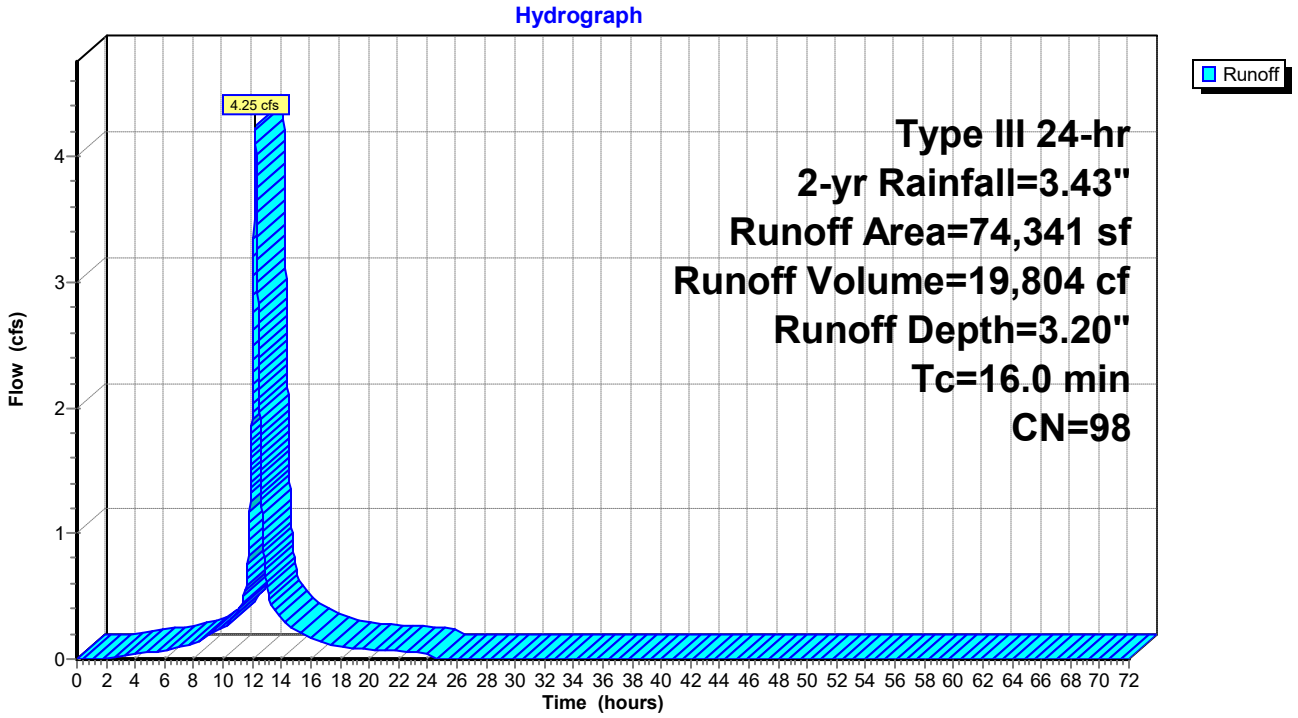
Runoff = 4.25 cfs @ 12.21 hrs, Volume= 19,804 cf, Depth= 3.20"
Routed to Pond 1P : DMH

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.43"

Area (sf)	CN	Description
74,341	98	Paved roads w/curbs & sewers, HSG A
74,341		100.00% Impervious Area

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

Subcatchment OFFSITE: Offsite Drainage



Summary for Pond 1P: DMH

Inflow Area = 74,341 sf,100.00% Impervious, Inflow Depth = 3.20" for 2-yr event
Inflow = 4.25 cfs @ 12.21 hrs, Volume= 19,804 cf
Outflow = 4.25 cfs @ 12.21 hrs, Volume= 19,804 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.02 cfs @ 12.21 hrs, Volume= 19,749 cf
Routed to Pond 2P : CB
Secondary = 0.23 cfs @ 12.21 hrs, Volume= 55 cf
Routed to Link 1L : POI 1

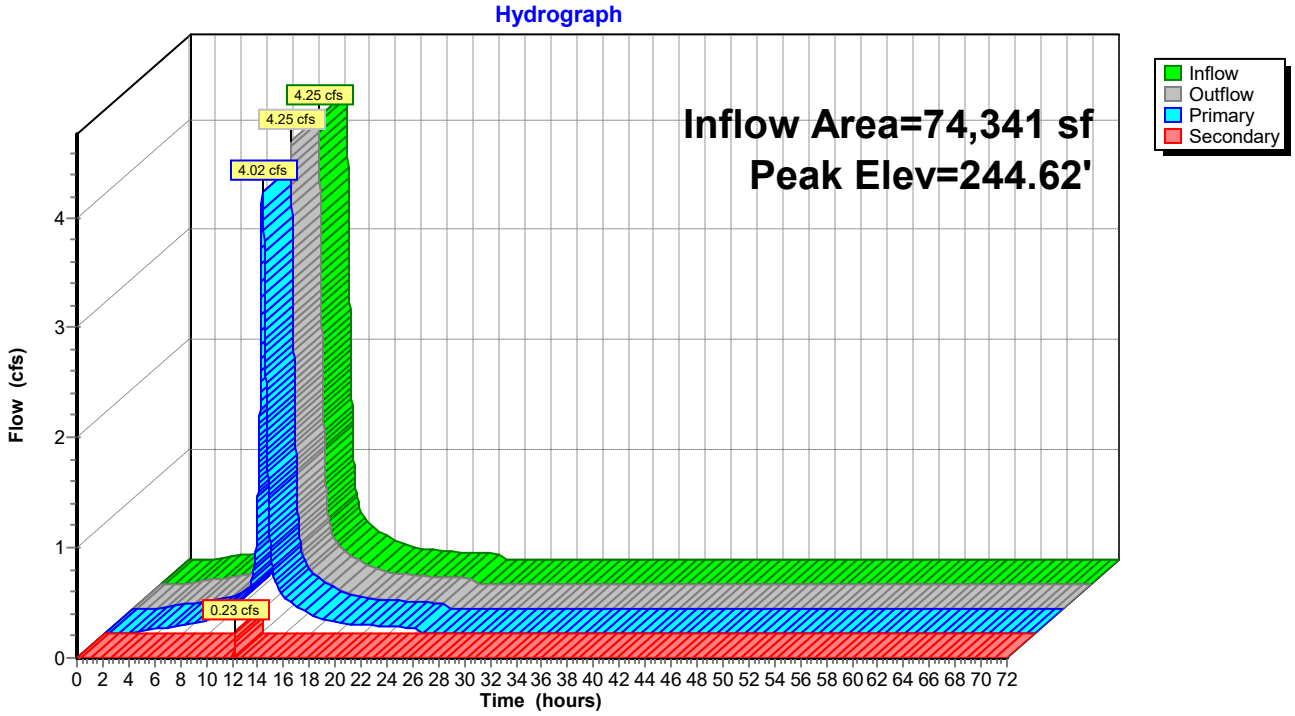
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 244.62' @ 12.21 hrs
Flood Elev= 244.83'

Device	Routing	Invert	Outlet Devices
#1	Primary	239.23'	**12.0" Round CMP_Round 12"** L= 107.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 239.23' / 237.80' S= 0.0134 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 0.79 sf
#2	Secondary	244.58'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=4.02 cfs @ 12.21 hrs HW=244.62' (Free Discharge)
↑—**1=CMP_Round 12"** (Barrel Controls 4.02 cfs @ 5.11 fps)

Secondary OutFlow Max=0.20 cfs @ 12.21 hrs HW=244.62' (Free Discharge)
↑—**2=Orifice/Grate** (Weir Controls 0.20 cfs @ 0.65 fps)

Pond 1P: DMH


Hydrograph
Inflow Area=74,341 sf
Peak Elev=244.62'
4.25 cfs
4.25 cfs
4.02 cfs
0.23 cfs
Inflow
Outflow
Primary
Secondary
Flow (cfs)
0
1
2
3
4
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72
Time (hours)

Summary for Pond 2P: CB

[58] Hint: Peaked 0.10' above defined flood level
[81] Warning: Exceeded Pond 1P by 1.59' @ 11.88 hrs

Inflow Area = 171,361 sf, 78.18% Impervious, Inflow Depth = 2.74" for 2-yr event
Inflow = 8.34 cfs @ 12.18 hrs, Volume= 39,181 cf
Outflow = 8.34 cfs @ 12.18 hrs, Volume= 39,181 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.91 cfs @ 12.18 hrs, Volume= 32,504 cf
Routed to Pond 3P : CB
Secondary = 5.43 cfs @ 12.18 hrs, Volume= 6,677 cf
Routed to Link 1L : POI 1

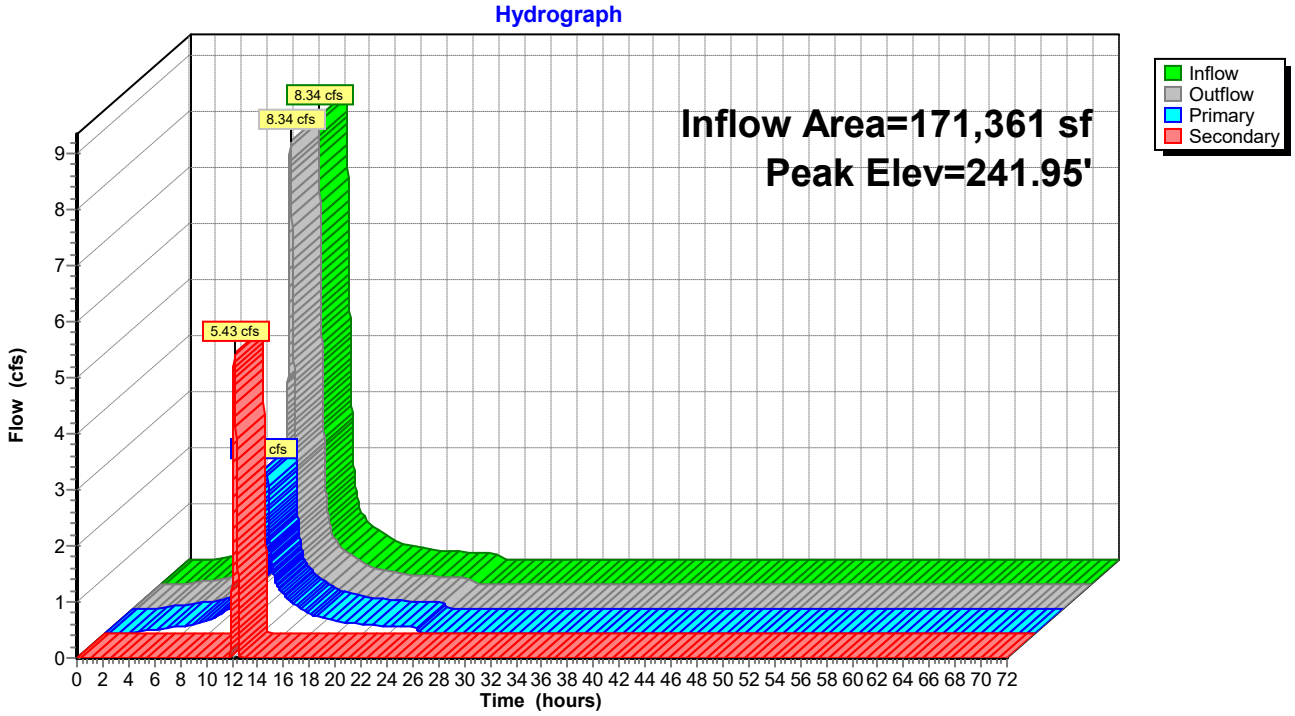
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 241.95' @ 12.18 hrs
Flood Elev= 241.85'

Device	Routing	Invert	Outlet Devices
#1	Primary	237.70'	**12.0" Round CMP_Round 12"** L= 204.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 237.70' / 235.51' S= 0.0107 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 0.79 sf
#2	Secondary	241.60'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=2.91 cfs @ 12.18 hrs HW=241.95' (Free Discharge)
↑—**1=CMP_Round 12"** (Barrel Controls 2.91 cfs @ 3.70 fps)

Secondary OutFlow Max=5.42 cfs @ 12.18 hrs HW=241.95' (Free Discharge)
↑—**2=Orifice/Grate** (Weir Controls 5.42 cfs @ 1.94 fps)

Pond 2P: CB


Hydrograph
Inflow Area=171,361 sf
Peak Elev=241.95'
8.34 cfs
8.34 cfs
5.43 cfs
cfs
Inflow
Outflow
Primary
Secondary
Flow (cfs)
Time (hours)
0 1 2 3 4 5 6 7 8 9
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72

Summary for Pond 3P: CB

[79] Warning: Submerged Pond 2P Primary device # 1 INLET by 2.81'

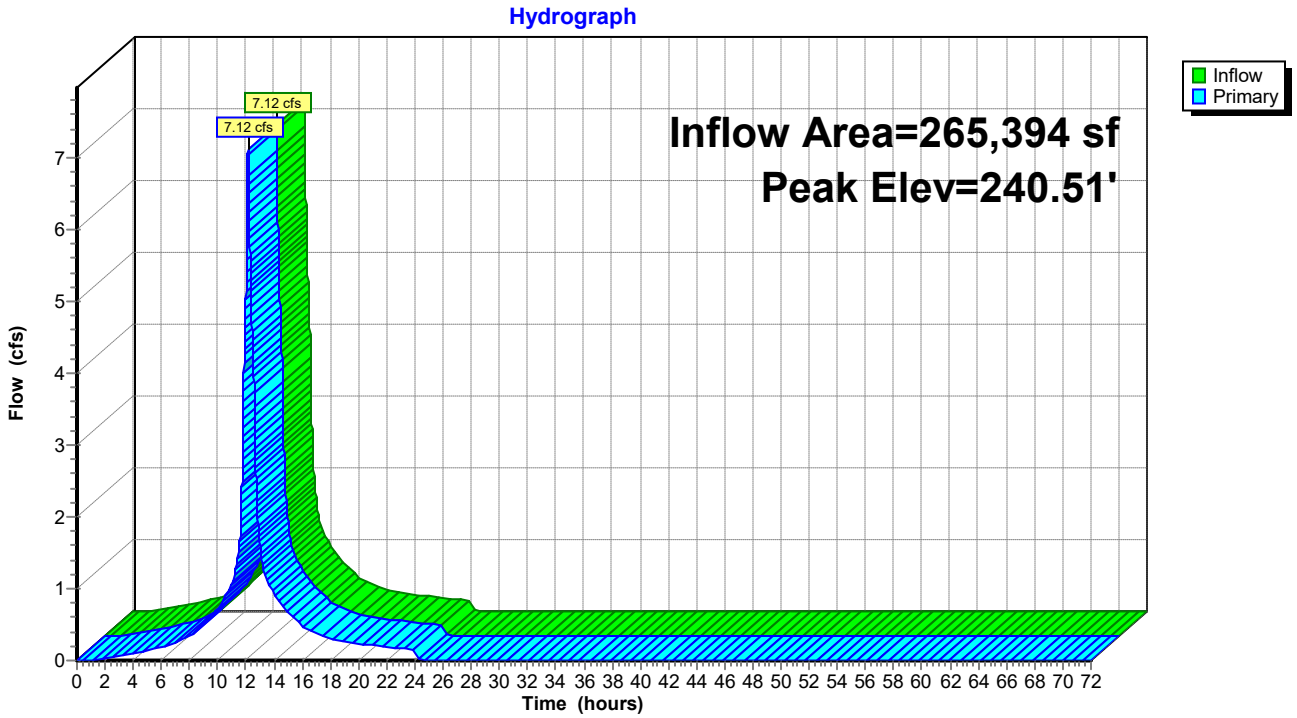
Inflow Area = 265,394 sf, 63.94% Impervious, Inflow Depth = 2.24" for 2-yr event
Inflow = 7.12 cfs @ 12.15 hrs, Volume= 49,572 cf
Outflow = 7.12 cfs @ 12.15 hrs, Volume= 49,572 cf, Atten= 0%, Lag= 0.0 min
Primary = 7.12 cfs @ 12.15 hrs, Volume= 49,572 cf
Routed to Link 1L : POI 1

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 240.51' @ 12.15 hrs
Flood Elev= 242.16'

Device	Routing	Invert	Outlet Devices
#1	Primary	235.40'	**12.0" Round RCP_Round 12"** L= 134.0' RCP, rounded edge headwall, Ke= 0.100 Inlet / Outlet Invert= 235.40' / 233.54' S= 0.0139 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Primary	241.91'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=7.12 cfs @ 12.15 hrs HW=240.51' (Free Discharge)
└─**1=RCP_Round 12"** (Barrel Controls 7.12 cfs @ 9.06 fps)
└─**2=Orifice/Grate** (Controls 0.00 cfs)

Pond 3P: CB



Summary for Pond INF: Admin Basin

Inflow Area = 10,248 sf, 51.48% Impervious, Inflow Depth = 1.65" for 2-yr event
Inflow = 0.40 cfs @ 12.09 hrs, Volume= 1,408 cf
Outflow = 0.01 cfs @ 15.40 hrs, Volume= 1,408 cf, Atten= 96%, Lag= 198.4 min
Discarded = 0.01 cfs @ 15.40 hrs, Volume= 1,408 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Link 1L : POI 1

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 240.76' @ 15.40 hrs Surf.Area= 602 sf Storage= 801 cf
Flood Elev= 243.00' Surf.Area= 1,045 sf Storage= 2,218 cf

Plug-Flow detention time= 688.6 min calculated for 1,408 cf (100% of inflow)
Center-of-Mass det. time= 688.6 min (1,444.9 - 756.3)

Volume	Invert	Avail.Storage	Storage Description
#1	237.00'	2,218 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

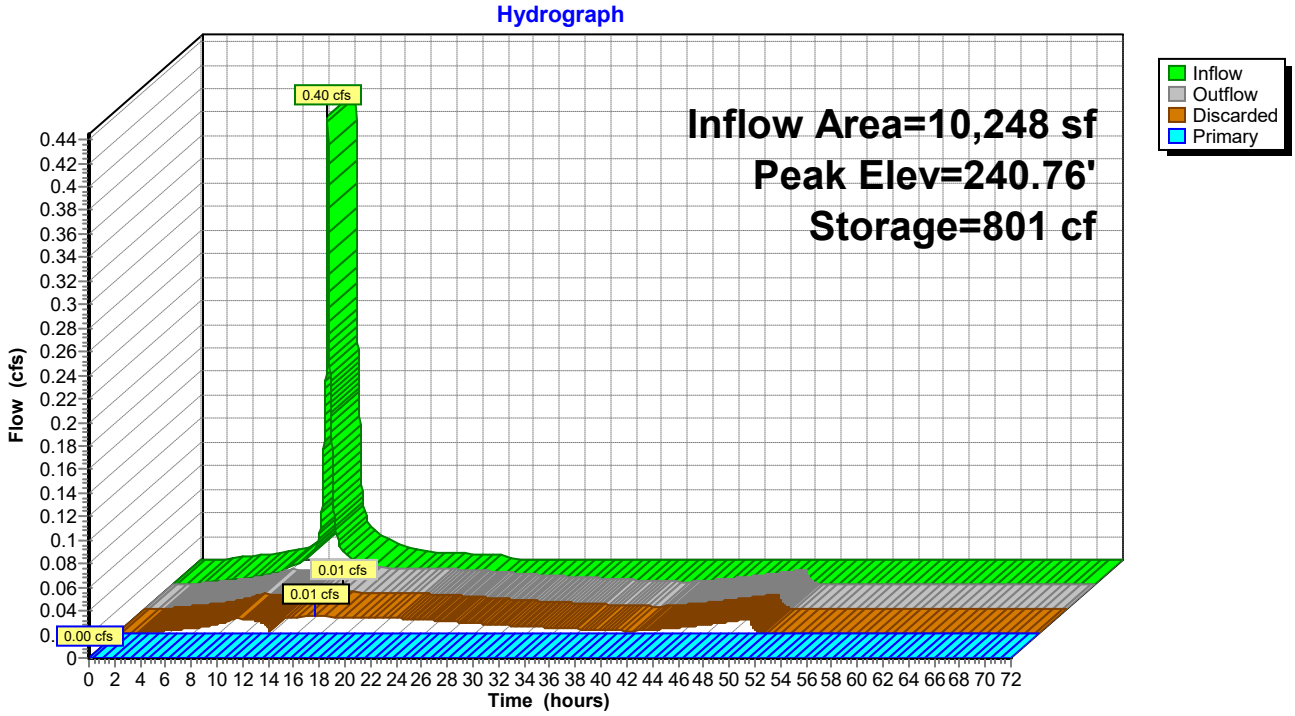
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
237.00	560	96.0	0.0	0	0	560
239.00	84	39.0	40.0	230	230	1,187
240.50	547	97.0	100.0	423	652	1,823
242.50	1,045	116.0	100.0	1,565	2,218	2,209

Device	Routing	Invert	Outlet Devices
#1	Discarded	237.00'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	242.45'	**29.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.01 cfs @ 15.40 hrs HW=240.76' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=237.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond INF: Admin Basin

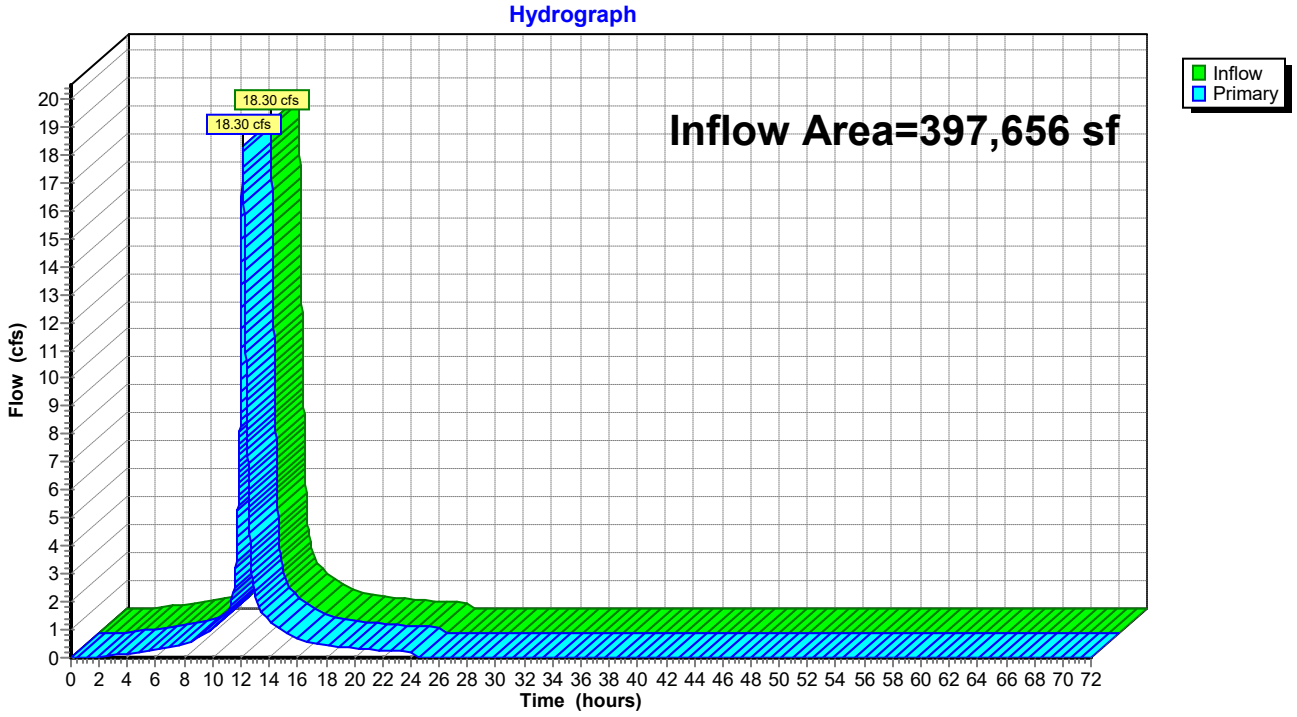


Summary for Link 1L: POI 1

Inflow Area = 397,656 sf, 61.54% Impervious, Inflow Depth = 2.48" for 2-yr event
Inflow = 18.30 cfs @ 12.13 hrs, Volume= 82,336 cf
Primary = 18.30 cfs @ 12.13 hrs, Volume= 82,336 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link 1L: POI 1



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A1: Western Site Runoff Area=97,020 sf 61.46% Impervious Runoff Depth=3.91"
Flow Length=436' Tc=13.9 min CN=WQ Runoff=6.99 cfs 31,619 cf

Subcatchment B1: Eastern Site Runoff Area=94,033 sf 37.99% Impervious Runoff Depth=3.45"
Flow Length=529' Tc=11.3 min CN=WQ Runoff=6.53 cfs 27,032 cf

Subcatchment C1: Admin Parking Area Runoff Area=10,248 sf 51.48% Impervious Runoff Depth=2.70"
Flow Length=73' Slope=0.0137 '/' Tc=6.5 min CN=WQ Runoff=0.61 cfs 2,304 cf

Subcatchment D1: Southern Site Runoff Area=122,014 sf 57.18% Impervious Runoff Depth=4.05"
Tc=6.0 min CN=WQ Runoff=11.70 cfs 41,131 cf

Subcatchment OFFSITE: Offsite Drainage Runoff Area=74,341 sf 100.00% Impervious Runoff Depth=5.00"
Tc=16.0 min CN=98 Runoff=6.54 cfs 30,993 cf

Pond 1P: DMH Peak Elev=244.79' Inflow=6.54 cfs 30,993 cf
Primary=4.07 cfs 29,168 cf Secondary=2.46 cfs 1,825 cf Outflow=6.54 cfs 30,993 cf

Pond 2P: CB Peak Elev=242.06' Inflow=11.06 cfs 60,787 cf
Primary=2.94 cfs 47,106 cf Secondary=8.13 cfs 13,681 cf Outflow=11.06 cfs 60,787 cf

Pond 3P: CB Peak Elev=242.06' Inflow=9.46 cfs 74,138 cf
Outflow=9.46 cfs 74,138 cf

Pond INF: Admin Basin Peak Elev=241.66' Storage=1,435 cf Inflow=0.61 cfs 2,304 cf
Discarded=0.02 cfs 2,304 cf Primary=0.00 cfs 0 cf Outflow=0.02 cfs 2,304 cf

Link 1L: POI 1 Inflow=28.54 cfs 130,775 cf
Primary=28.54 cfs 130,775 cf

Total Runoff Area = 397,656 sf Runoff Volume = 133,079 cf Average Runoff Depth = 4.02"
38.46% Pervious = 152,926 sf 61.54% Impervious = 244,730 sf

Summary for Subcatchment A1: Western Site

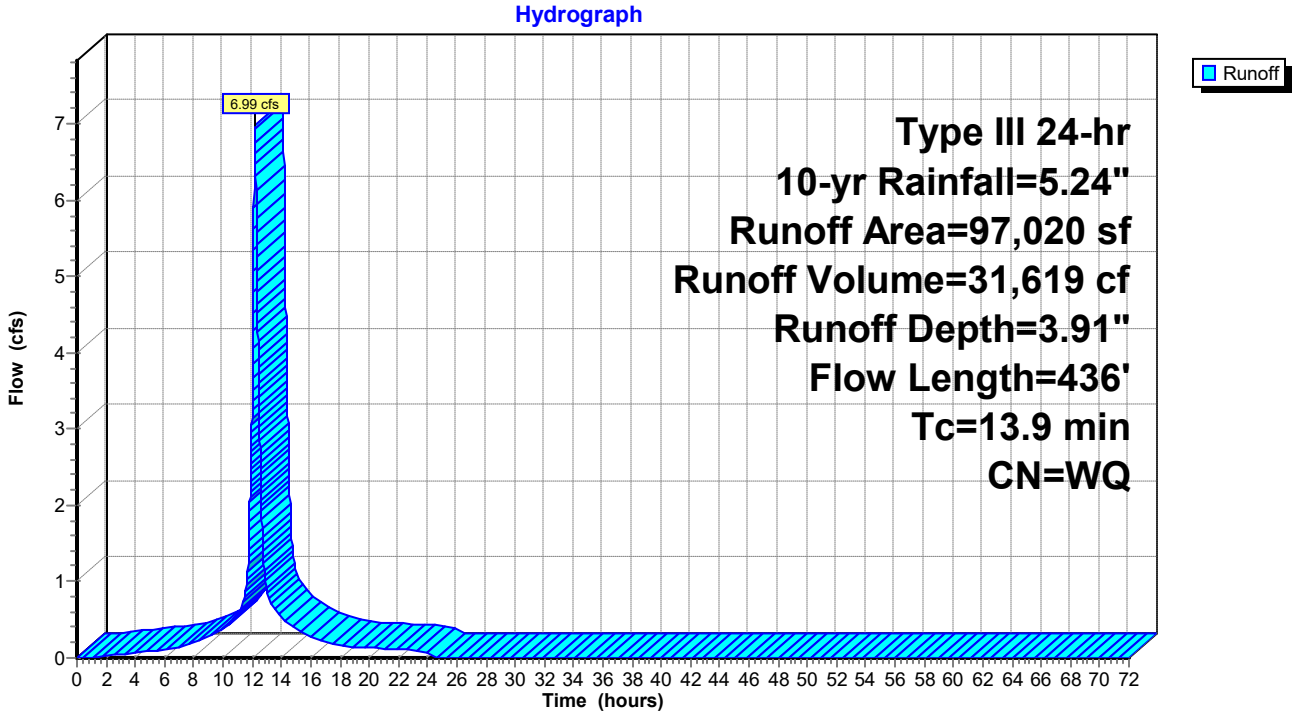
Runoff = 6.99 cfs @ 12.18 hrs, Volume= 31,619 cf, Depth= 3.91"
Routed to Pond 2P : CB

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.24"

	Area (sf)	CN	Description
*	59,628	98	Paved areas & roofs, HSG A
	3,018	39	>75% Grass cover, Good, HSG A
	1,612	30	Woods, Good, HSG A
	20,706	55	Woods, Good, HSG B
	10,073	96	Gravel surface, HSG A
	1,983	96	Gravel surface, HSG B
	97,020		Weighted Average
	37,392		38.54% Pervious Area
	59,628		61.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	115	0.0990	0.16		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.43"
0.6	91	0.0298	2.59		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.1	230	0.0310	3.57		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
13.9	436	Total			

Subcatchment A1: Western Site



Summary for Subcatchment B1: Eastern Site

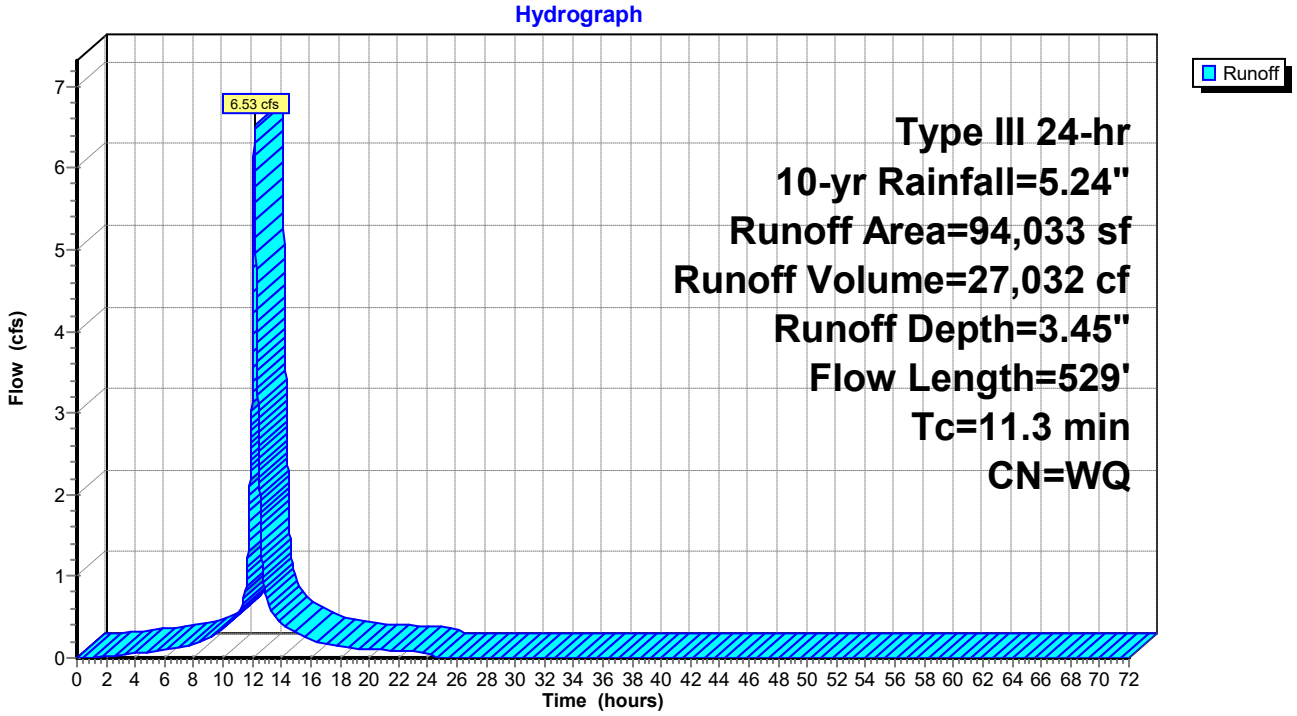
Runoff = 6.53 cfs @ 12.15 hrs, Volume= 27,032 cf, Depth= 3.45"
Routed to Pond 3P : CB

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.24"

	Area (sf)	CN	Description
*	35,720	98	Paved areas & roofs, HSG A
	29,570	96	Gravel surface, HSG A
	878	96	Gravel surface, HSG B
	27,837	30	Woods, Good, HSG A
	28	55	Woods, Good, HSG B
	94,033		Weighted Average
	58,313		62.01% Pervious Area
	35,720		37.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	86	0.1304	0.17		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.43"
0.5	132	0.0401	4.07		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
2.1	311	0.0143	2.43		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
11.3	529	Total			

Subcatchment B1: Eastern Site



Summary for Subcatchment C1: Admin Parking Area

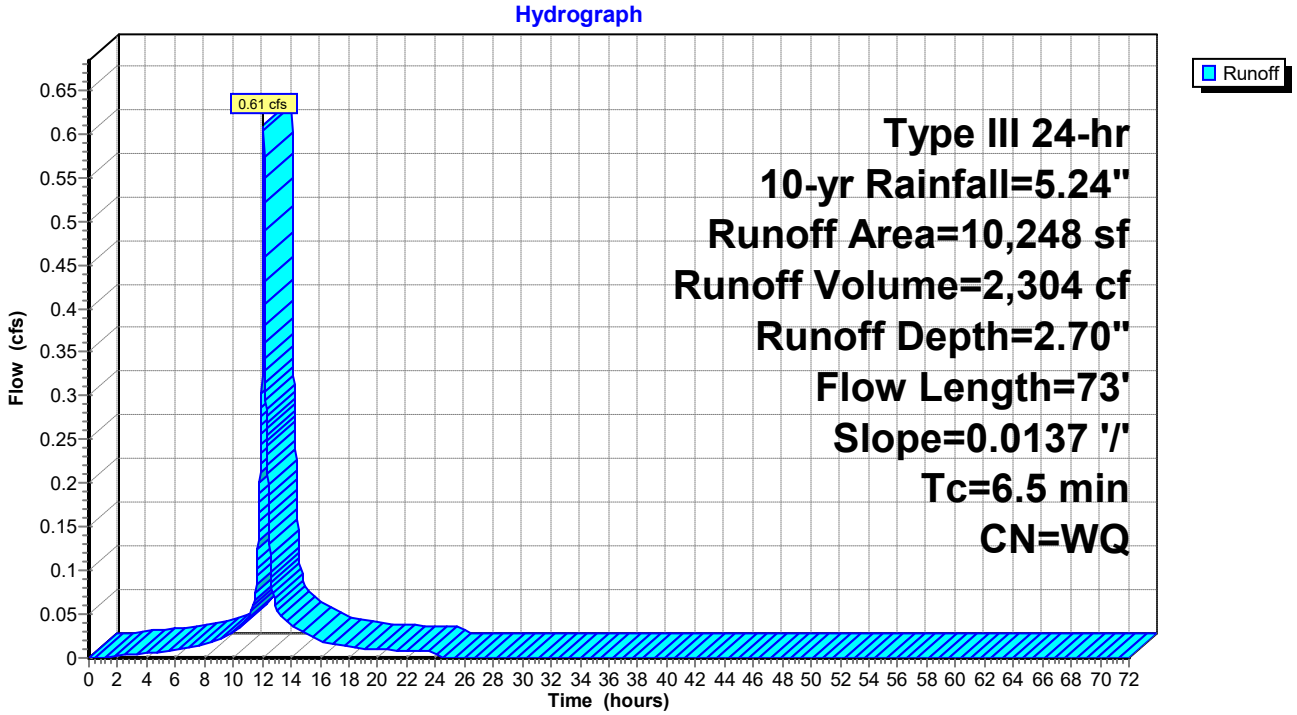
Runoff = 0.61 cfs @ 12.09 hrs, Volume= 2,304 cf, Depth= 2.70"
Routed to Pond INF : Admin Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.24"

Area (sf)	CN	Description
4,972	39	>75% Grass cover, Good, HSG A
5,276	98	Paved parking, HSG A
10,248		Weighted Average
4,972		48.52% Pervious Area
5,276		51.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	50	0.0137	0.13		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.43"
0.2	23	0.0137	2.38		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
6.5	73	Total			

Subcatchment C1: Admin Parking Area



Summary for Subcatchment D1: Southern Site

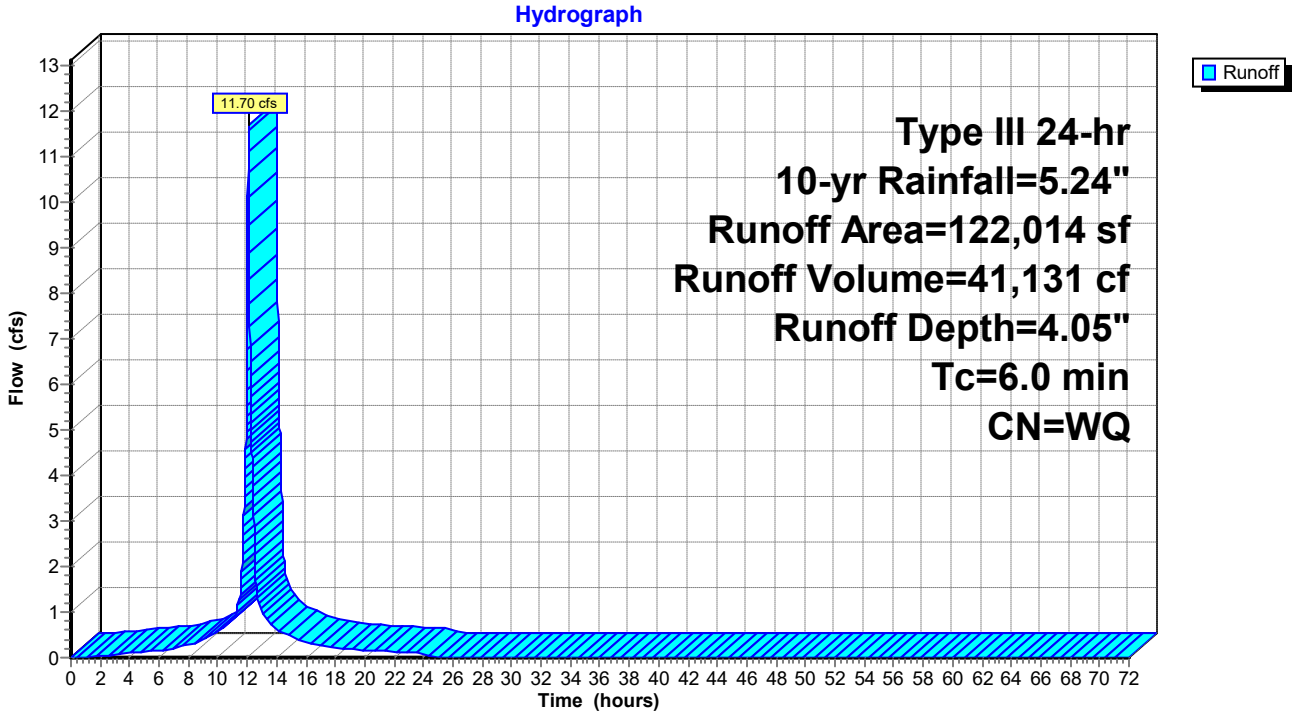
Runoff = 11.70 cfs @ 12.08 hrs, Volume= 41,131 cf, Depth= 4.05"
Routed to Link 1L : POI 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.24"

	Area (sf)	CN	Description
*	69,765	98	Paved areas & roofs, HSG A
	4,316	39	>75% Grass cover, Good, HSG A
	17,914	30	Woods, Good, HSG A
	30,019	96	Gravel surface, HSG A
	122,014		Weighted Average
	52,249		42.82% Pervious Area
	69,765		57.18% Impervious Area

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

Subcatchment D1: Southern Site



Summary for Subcatchment OFFSITE: Offsite Drainage

Total subcatchment represents approximately 2,039 LF of ROW (81,560 SF) minus areas that directly contribute to the onsite drainage network.

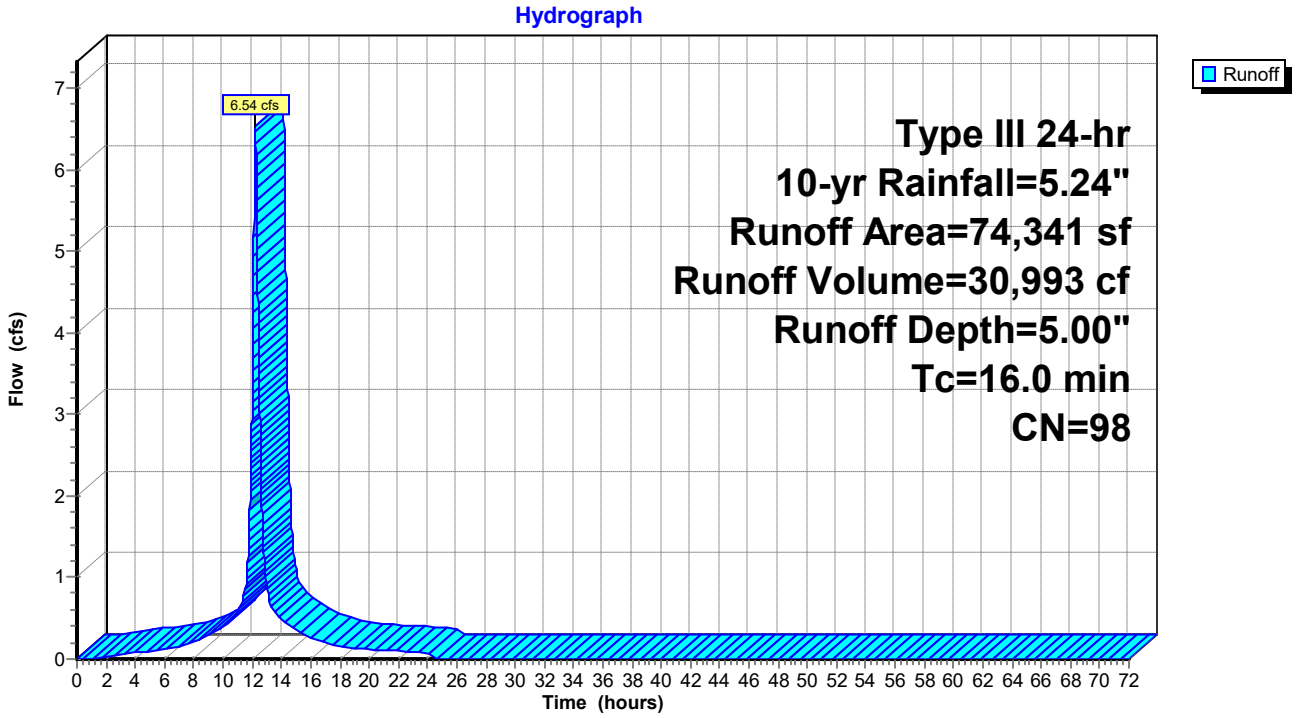
Runoff = 6.54 cfs @ 12.21 hrs, Volume= 30,993 cf, Depth= 5.00"
Routed to Pond 1P : DMH

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.24"

Area (sf)	CN	Description
74,341	98	Paved roads w/curbs & sewers, HSG A
74,341		100.00% Impervious Area

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

Subcatchment OFFSITE: Offsite Drainage



Summary for Pond 1P: DMH

Inflow Area = 74,341 sf,100.00% Impervious, Inflow Depth = 5.00" for 10-yr event
Inflow = 6.54 cfs @ 12.21 hrs, Volume= 30,993 cf
Outflow = 6.54 cfs @ 12.21 hrs, Volume= 30,993 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.07 cfs @ 12.21 hrs, Volume= 29,168 cf
Routed to Pond 2P : CB
Secondary = 2.46 cfs @ 12.21 hrs, Volume= 1,825 cf
Routed to Link 1L : POI 1

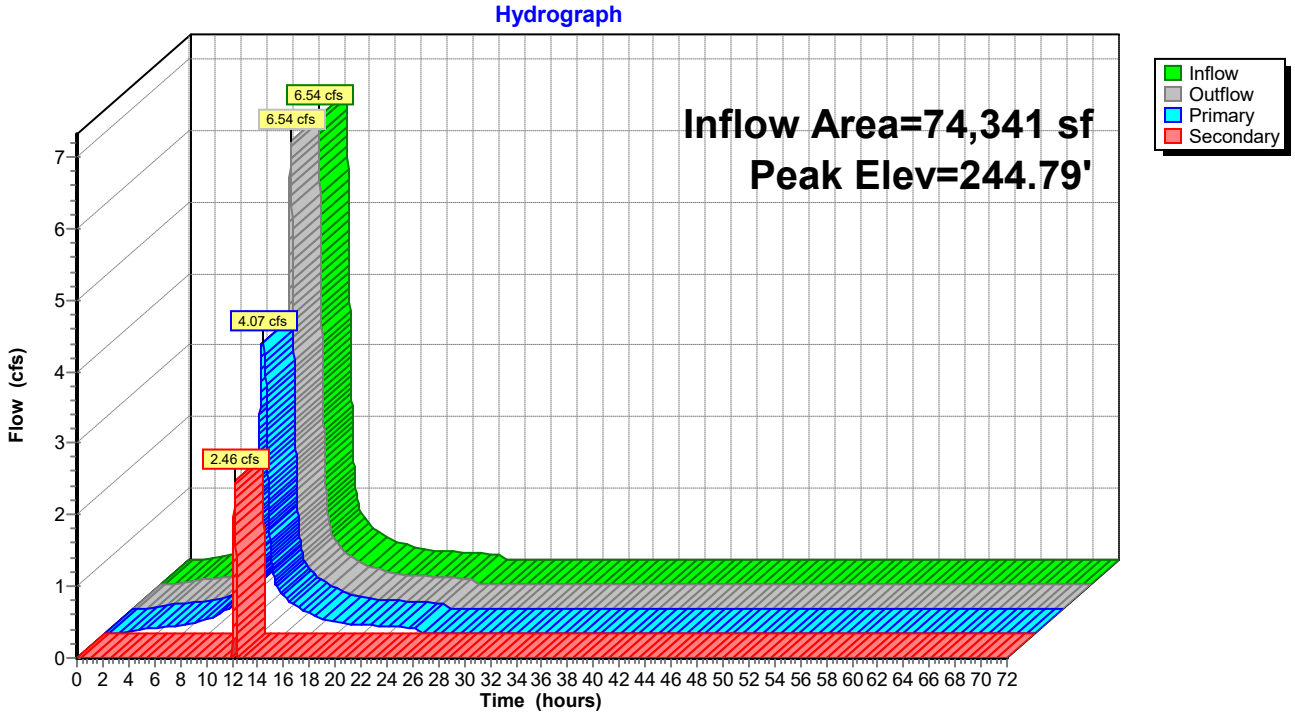
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 244.79' @ 12.21 hrs
Flood Elev= 244.83'

Device	Routing	Invert	Outlet Devices
#1	Primary	239.23'	**12.0" Round CMP_Round 12"** L= 107.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 239.23' / 237.80' S= 0.0134 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 0.79 sf
#2	Secondary	244.58'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=4.07 cfs @ 12.21 hrs HW=244.79' (Free Discharge)
↑—**1=CMP_Round 12"** (Barrel Controls 4.07 cfs @ 5.19 fps)

Secondary OutFlow Max=2.45 cfs @ 12.21 hrs HW=244.79' (Free Discharge)
↑—**2=Orifice/Grate** (Weir Controls 2.45 cfs @ 1.48 fps)

Pond 1P: DMH


Hydrograph
Inflow Area=74,341 sf
Peak Elev=244.79'
6.54 cfs
6.54 cfs
4.07 cfs
2.46 cfs
Inflow
Outflow
Primary
Secondary
Flow (cfs)
0 1 2 3 4 5 6 7
Time (hours)
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72

Summary for Pond 2P: CB

[58] Hint: Peaked 0.21' above defined flood level
[81] Warning: Exceeded Pond 1P by 1.59' @ 11.76 hrs

Inflow Area = 171,361 sf, 78.18% Impervious, Inflow Depth = 4.26" for 10-yr event
Inflow = 11.06 cfs @ 12.18 hrs, Volume= 60,787 cf
Outflow = 11.06 cfs @ 12.18 hrs, Volume= 60,787 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.94 cfs @ 12.18 hrs, Volume= 47,106 cf
Routed to Pond 3P : CB
Secondary = 8.13 cfs @ 12.18 hrs, Volume= 13,681 cf
Routed to Link 1L : POI 1

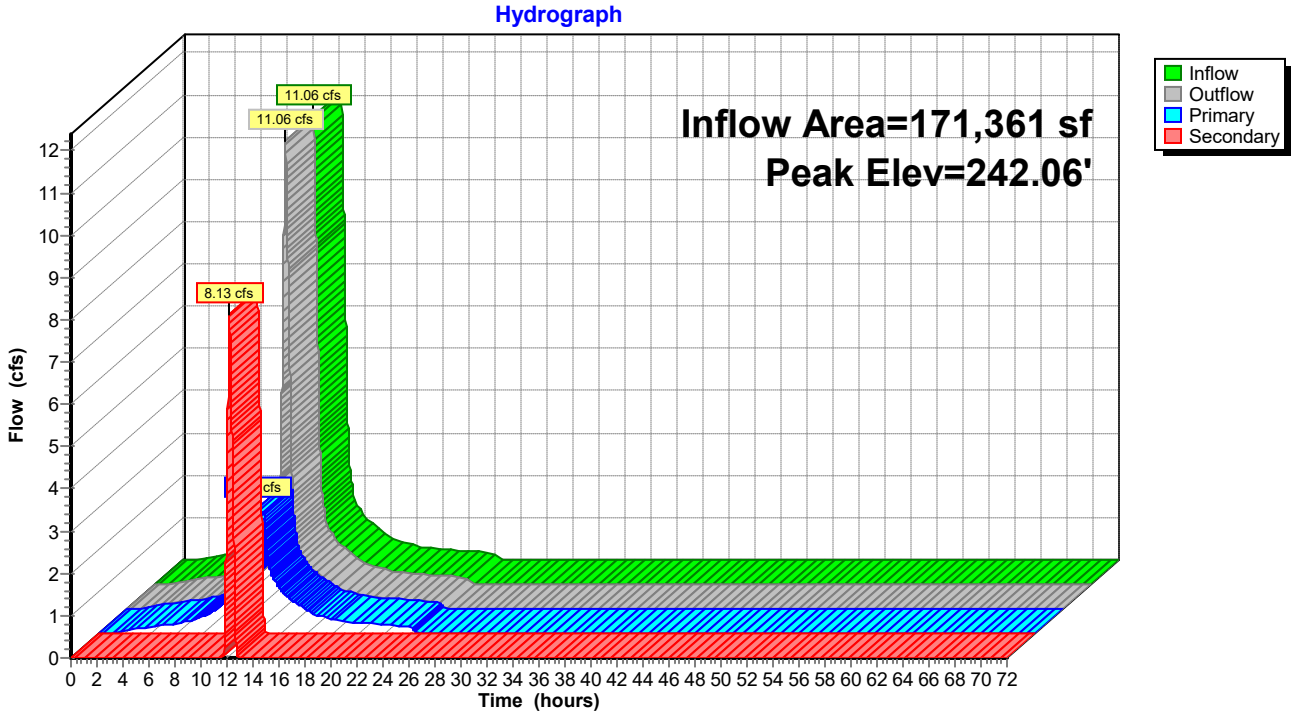
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 242.06' @ 12.18 hrs
Flood Elev= 241.85'

Device	Routing	Invert	Outlet Devices
#1	Primary	237.70'	**12.0" Round CMP_Round 12"** L= 204.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 237.70' / 235.51' S= 0.0107 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 0.79 sf
#2	Secondary	241.60'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=2.94 cfs @ 12.18 hrs HW=242.06' (Free Discharge)
↑—**1=CMP_Round 12"** (Barrel Controls 2.94 cfs @ 3.74 fps)

Secondary OutFlow Max=8.12 cfs @ 12.18 hrs HW=242.06' (Free Discharge)
↑—**2=Orifice/Grate** (Weir Controls 8.12 cfs @ 2.21 fps)

Pond 2P: CB


Hydrograph
Inflow Area=171,361 sf
Peak Elev=242.06'
11.06 cfs
11.06 cfs
8.13 cfs
cfs
Inflow
Outflow
Primary
Secondary
Flow (cfs)
Time (hours)
0 1 2 3 4 5 6 7 8 9 10 11 12
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72

Summary for Pond 3P: CB

[81] Warning: Exceeded Pond 2P by 0.01' @ 12.12 hrs

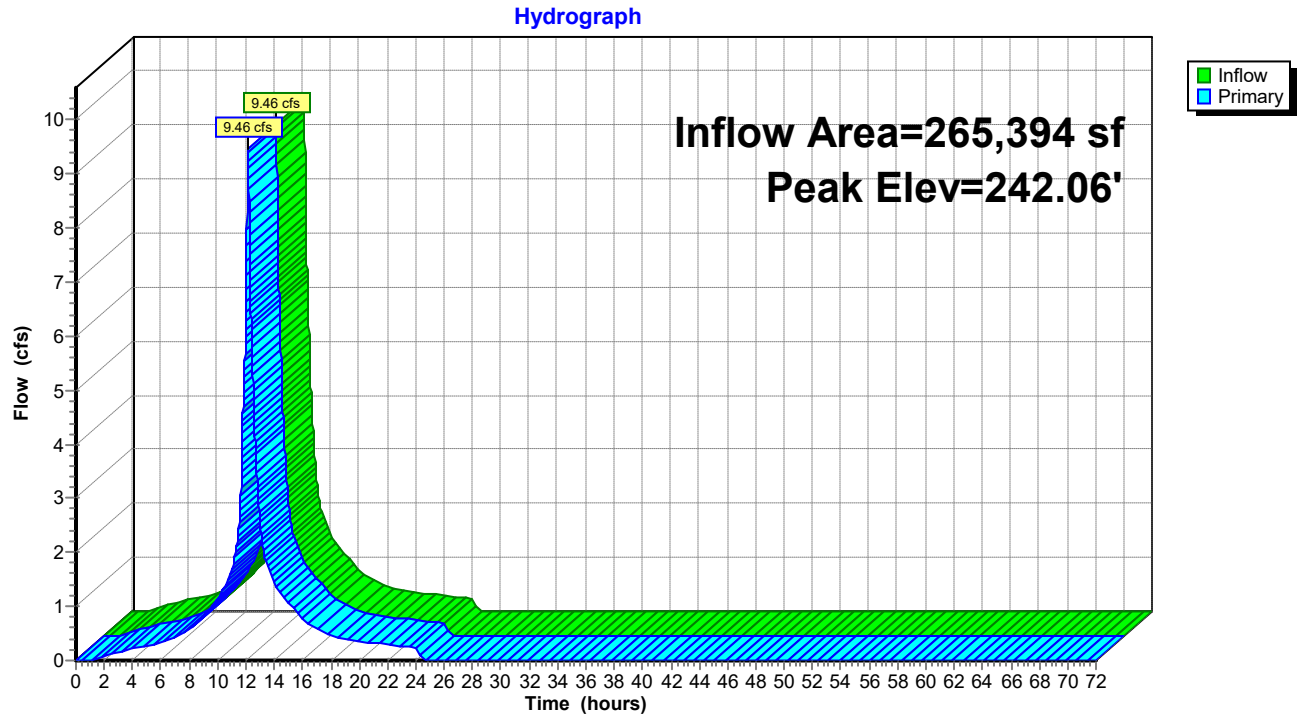
Inflow Area = 265,394 sf, 63.94% Impervious, Inflow Depth = 3.35" for 10-yr event
Inflow = 9.46 cfs @ 12.15 hrs, Volume= 74,138 cf
Outflow = 9.46 cfs @ 12.15 hrs, Volume= 74,138 cf, Atten= 0%, Lag= 0.0 min
Primary = 9.46 cfs @ 12.15 hrs, Volume= 74,138 cf
Routed to Link 1L : POI 1

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 242.06' @ 12.15 hrs
Flood Elev= 242.16'

Device	Routing	Invert	Outlet Devices
#1	Primary	235.40'	**12.0" Round RCP_Round 12"** L= 134.0' RCP, rounded edge headwall, Ke= 0.100 Inlet / Outlet Invert= 235.40' / 233.54' S= 0.0139 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Primary	241.91'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=9.43 cfs @ 12.15 hrs HW=242.06' (Free Discharge)
└─**1=RCP_Round 12"** (Barrel Controls 7.98 cfs @ 10.16 fps)
└─**2=Orifice/Grate** (Weir Controls 1.45 cfs @ 1.25 fps)

Pond 3P: CB



Summary for Pond INF: Admin Basin

Inflow Area = 10,248 sf, 51.48% Impervious, Inflow Depth = 2.70" for 10-yr event
Inflow = 0.61 cfs @ 12.09 hrs, Volume= 2,304 cf
Outflow = 0.02 cfs @ 16.12 hrs, Volume= 2,304 cf, Atten= 97%, Lag= 241.6 min
Discarded = 0.02 cfs @ 16.12 hrs, Volume= 2,304 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Link 1L : POI 1

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 241.66' @ 16.12 hrs Surf.Area= 816 sf Storage= 1,435 cf
Flood Elev= 243.00' Surf.Area= 1,045 sf Storage= 2,218 cf

Plug-Flow detention time= 891.9 min calculated for 2,303 cf (100% of inflow)
Center-of-Mass det. time= 892.1 min (1,651.0 - 758.9)

Volume	Invert	Avail.Storage	Storage Description
#1	237.00'	2,218 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

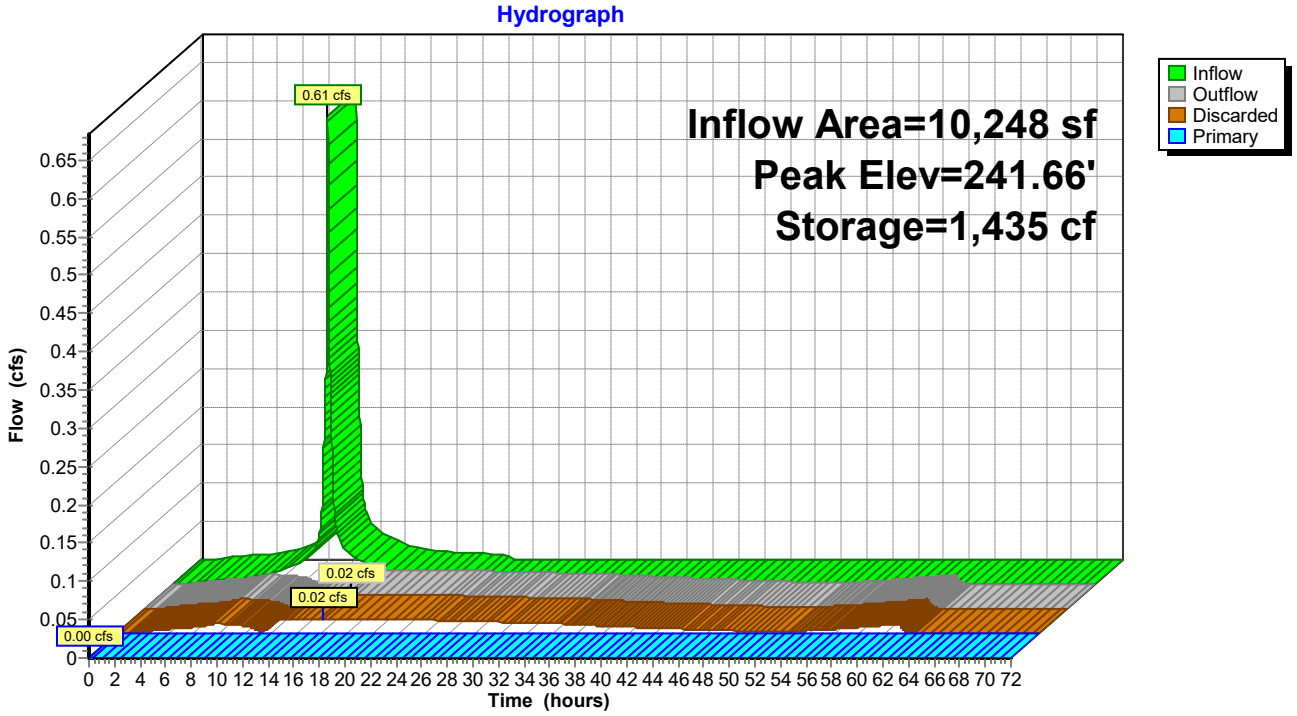
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
237.00	560	96.0	0.0	0	0	560
239.00	84	39.0	40.0	230	230	1,187
240.50	547	97.0	100.0	423	652	1,823
242.50	1,045	116.0	100.0	1,565	2,218	2,209

Device	Routing	Invert	Outlet Devices
#1	Discarded	237.00'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	242.45'	**29.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.02 cfs @ 16.12 hrs HW=241.66' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=237.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond INF: Admin Basin

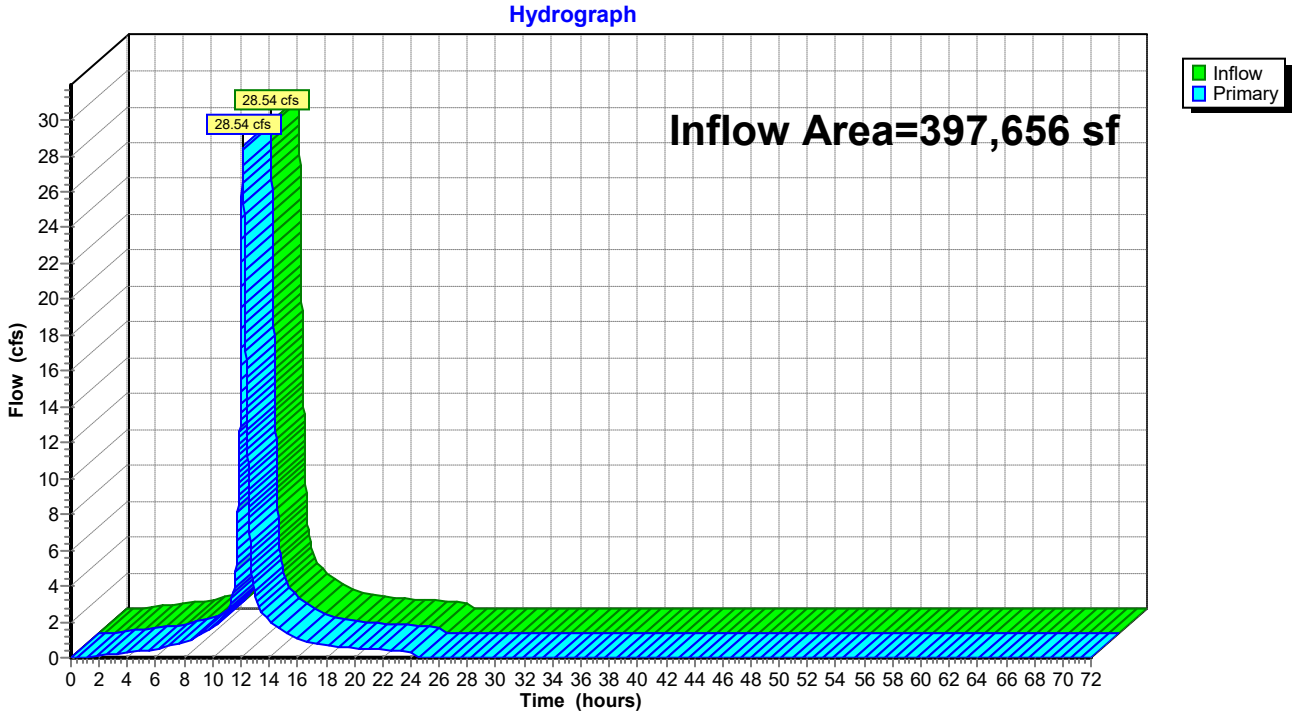


Summary for Link 1L: POI 1

Inflow Area = 397,656 sf, 61.54% Impervious, Inflow Depth = 3.95" for 10-yr event
Inflow = 28.54 cfs @ 12.13 hrs, Volume= 130,775 cf
Primary = 28.54 cfs @ 12.13 hrs, Volume= 130,775 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link 1L: POI 1



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A1: Western Site Runoff Area=97,020 sf 61.46% Impervious Runoff Depth=4.89"
Flow Length=436' Tc=13.9 min CN=WQ Runoff=8.74 cfs 39,540 cf

Subcatchment B1: Eastern Site Runoff Area=94,033 sf 37.99% Impervious Runoff Depth=4.27"
Flow Length=529' Tc=11.3 min CN=WQ Runoff=7.97 cfs 33,484 cf

Subcatchment C1: Admin Parking Area Runoff Area=10,248 sf 51.48% Impervious Runoff Depth=3.43"
Flow Length=73' Slope=0.0137 '/' Tc=6.5 min CN=WQ Runoff=0.75 cfs 2,926 cf

Subcatchment D1: Southern Site Runoff Area=122,014 sf 57.18% Impervious Runoff Depth=4.99"
Tc=6.0 min CN=WQ Runoff=14.27 cfs 50,769 cf

Subcatchment OFFSITE: Offsite Drainage Runoff Area=74,341 sf 100.00% Impervious Runoff Depth=6.13"
Tc=16.0 min CN=98 Runoff=7.96 cfs 37,985 cf

Pond 1P: DMH Peak Elev=244.86' Inflow=7.96 cfs 37,985 cf
Primary=4.10 cfs 34,478 cf Secondary=3.86 cfs 3,507 cf Outflow=7.96 cfs 37,985 cf

Pond 2P: CB Peak Elev=242.12' Inflow=12.83 cfs 74,018 cf
Primary=2.95 cfs 55,884 cf Secondary=9.88 cfs 18,133 cf Outflow=12.83 cfs 74,018 cf

Pond 3P: CB Peak Elev=242.14' Inflow=10.92 cfs 89,369 cf
Outflow=10.92 cfs 89,369 cf

Pond INF: Admin Basin Peak Elev=242.18' Storage=1,896 cf Inflow=0.75 cfs 2,926 cf
Discarded=0.02 cfs 2,926 cf Primary=0.00 cfs 0 cf Outflow=0.02 cfs 2,926 cf

Link 1L: POI 1 Inflow=35.00 cfs 161,778 cf
Primary=35.00 cfs 161,778 cf

Total Runoff Area = 397,656 sf Runoff Volume = 164,705 cf Average Runoff Depth = 4.97"
38.46% Pervious = 152,926 sf 61.54% Impervious = 244,730 sf

Summary for Subcatchment A1: Western Site

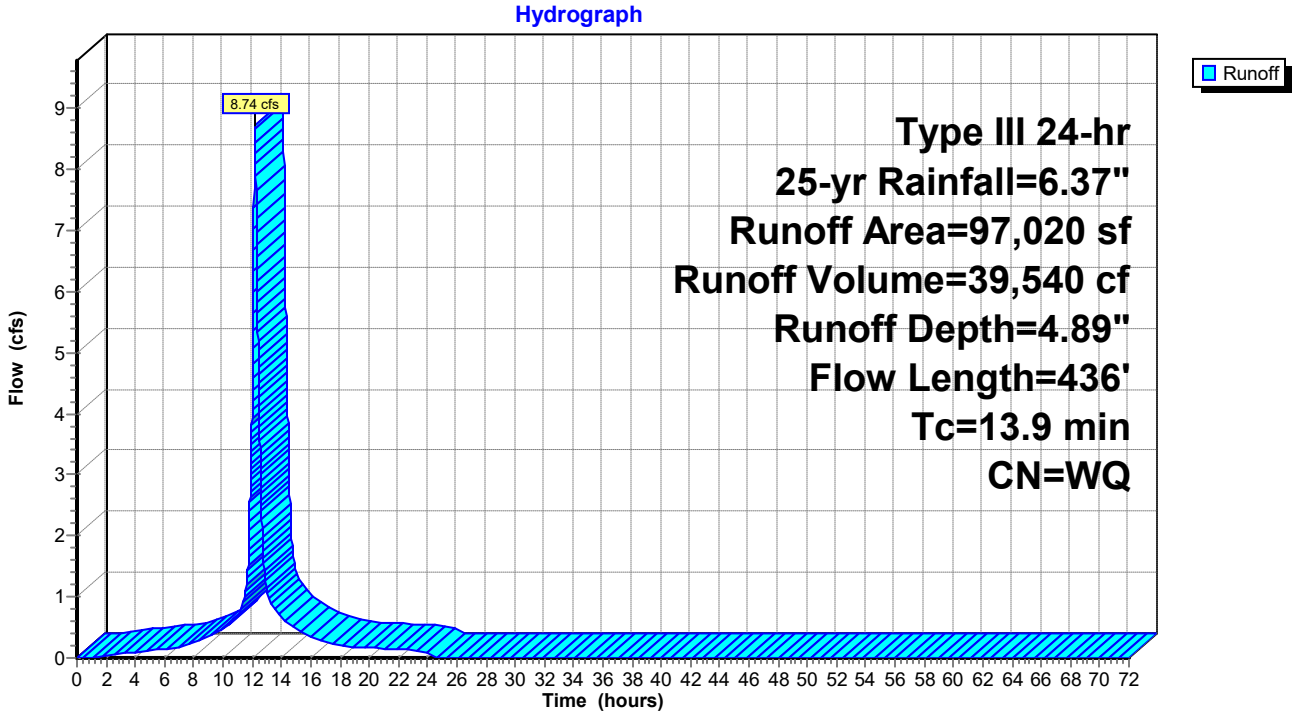
Runoff = 8.74 cfs @ 12.18 hrs, Volume= 39,540 cf, Depth= 4.89"
Routed to Pond 2P : CB

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.37"

	Area (sf)	CN	Description
*	59,628	98	Paved areas & roofs, HSG A
	3,018	39	>75% Grass cover, Good, HSG A
	1,612	30	Woods, Good, HSG A
	20,706	55	Woods, Good, HSG B
	10,073	96	Gravel surface, HSG A
	1,983	96	Gravel surface, HSG B
	97,020		Weighted Average
	37,392		38.54% Pervious Area
	59,628		61.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	115	0.0990	0.16		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.43"
0.6	91	0.0298	2.59		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.1	230	0.0310	3.57		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
13.9	436	Total			

Subcatchment A1: Western Site



Summary for Subcatchment B1: Eastern Site

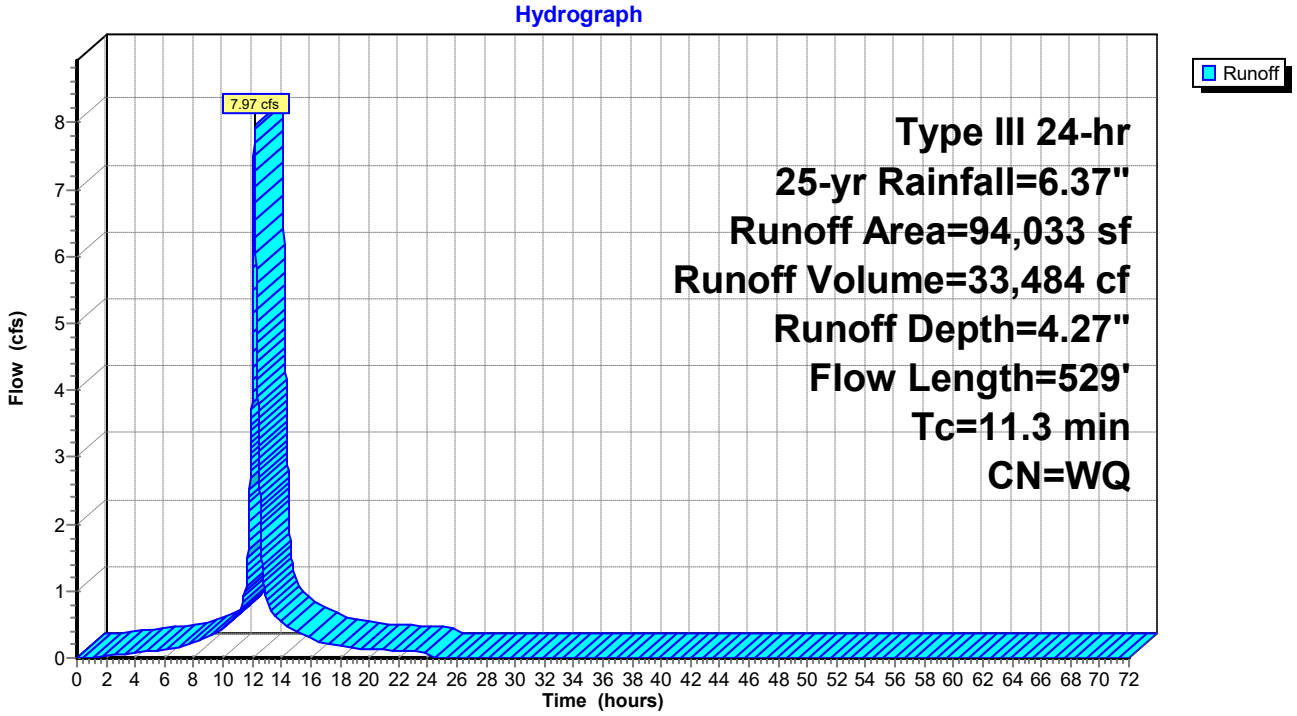
Runoff = 7.97 cfs @ 12.15 hrs, Volume= 33,484 cf, Depth= 4.27"
Routed to Pond 3P : CB

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.37"

	Area (sf)	CN	Description
*	35,720	98	Paved areas & roofs, HSG A
	29,570	96	Gravel surface, HSG A
	878	96	Gravel surface, HSG B
	27,837	30	Woods, Good, HSG A
	28	55	Woods, Good, HSG B
	94,033		Weighted Average
	58,313		62.01% Pervious Area
	35,720		37.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	86	0.1304	0.17		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.43"
0.5	132	0.0401	4.07		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
2.1	311	0.0143	2.43		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
11.3	529	Total			

Subcatchment B1: Eastern Site



Summary for Subcatchment C1: Admin Parking Area

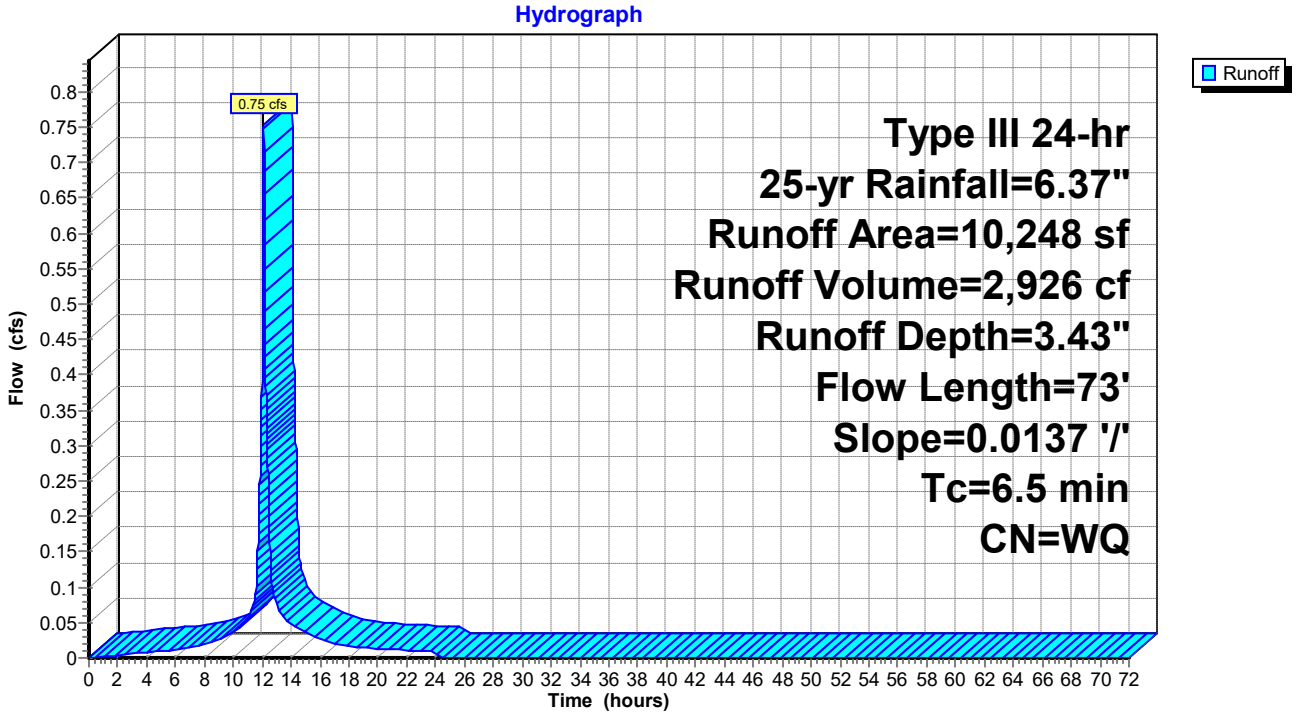
Runoff = 0.75 cfs @ 12.09 hrs, Volume= 2,926 cf, Depth= 3.43"
Routed to Pond INF : Admin Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.37"

Area (sf)	CN	Description
4,972	39	>75% Grass cover, Good, HSG A
5,276	98	Paved parking, HSG A
10,248		Weighted Average
4,972		48.52% Pervious Area
5,276		51.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	50	0.0137	0.13		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.43"
0.2	23	0.0137	2.38		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
6.5	73	Total			

Subcatchment C1: Admin Parking Area



Summary for Subcatchment D1: Southern Site

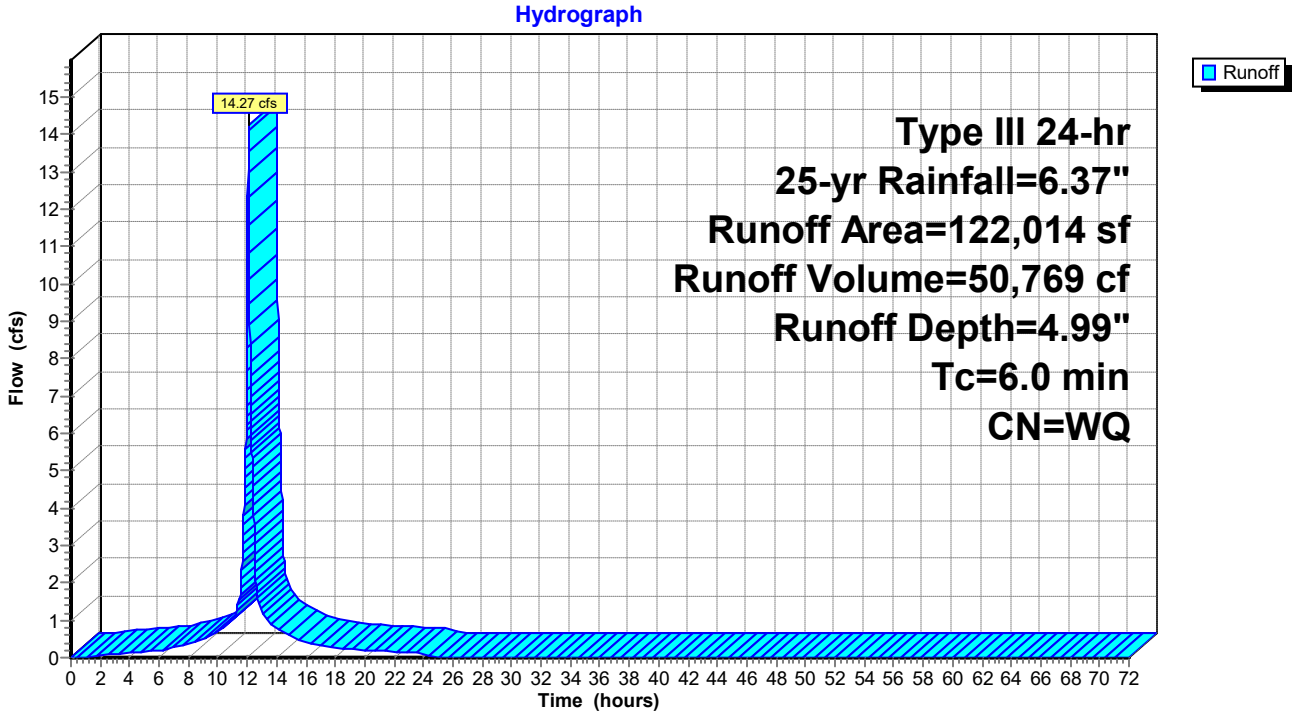
Runoff = 14.27 cfs @ 12.08 hrs, Volume= 50,769 cf, Depth= 4.99"
Routed to Link 1L : POI 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.37"

	Area (sf)	CN	Description
*	69,765	98	Paved areas & roofs, HSG A
	4,316	39	>75% Grass cover, Good, HSG A
	17,914	30	Woods, Good, HSG A
	30,019	96	Gravel surface, HSG A
	122,014		Weighted Average
	52,249		42.82% Pervious Area
	69,765		57.18% Impervious Area

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

Subcatchment D1: Southern Site



Summary for Subcatchment OFFSITE: Offsite Drainage

Total subcatchment represents approximately 2,039 LF of ROW (81,560 SF) minus areas that directly contribute to the onsite drainage network.

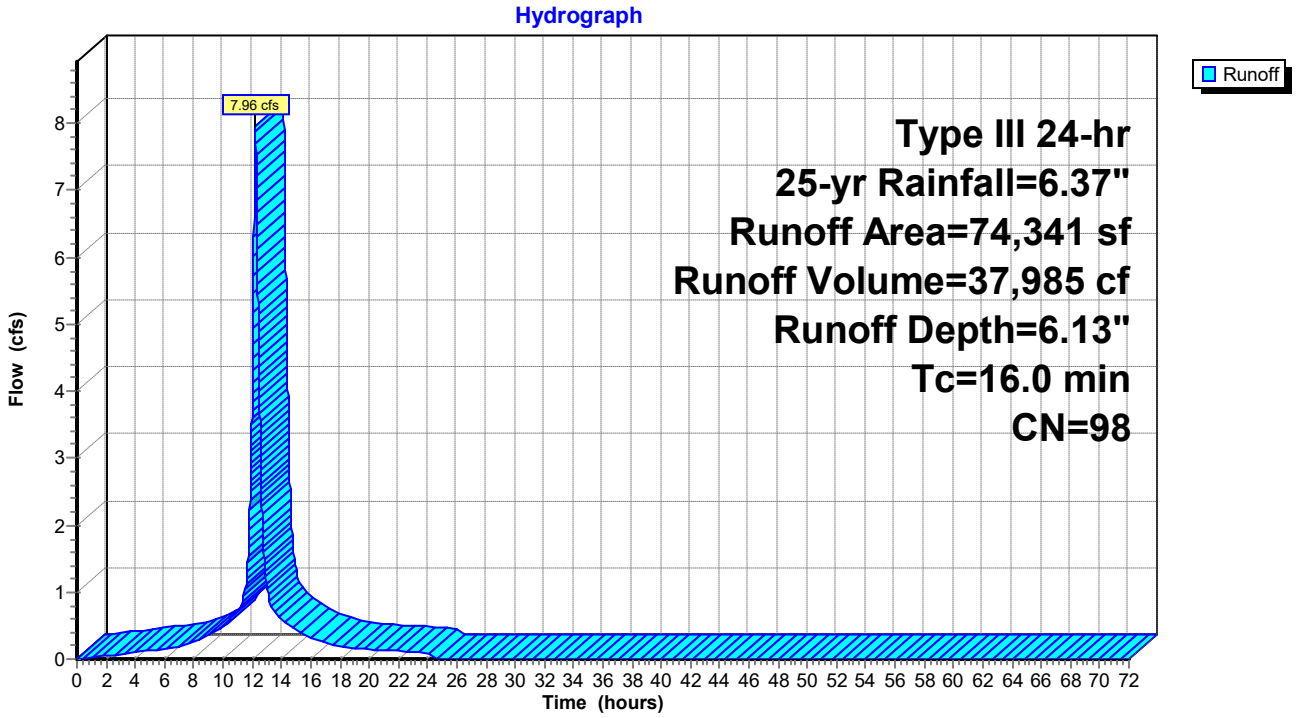
Runoff = 7.96 cfs @ 12.21 hrs, Volume= 37,985 cf, Depth= 6.13"
Routed to Pond 1P : DMH

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.37"

Area (sf)	CN	Description
74,341	98	Paved roads w/curbs & sewers, HSG A
74,341		100.00% Impervious Area

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

Subcatchment OFFSITE: Offsite Drainage



Summary for Pond 1P: DMH

[58] Hint: Peaked 0.03' above defined flood level

Inflow Area = 74,341 sf,100.00% Impervious, Inflow Depth = 6.13" for 25-yr event
Inflow = 7.96 cfs @ 12.21 hrs, Volume= 37,985 cf
Outflow = 7.96 cfs @ 12.21 hrs, Volume= 37,985 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.10 cfs @ 12.21 hrs, Volume= 34,478 cf
Routed to Pond 2P : CB
Secondary = 3.86 cfs @ 12.21 hrs, Volume= 3,507 cf
Routed to Link 1L : POI 1

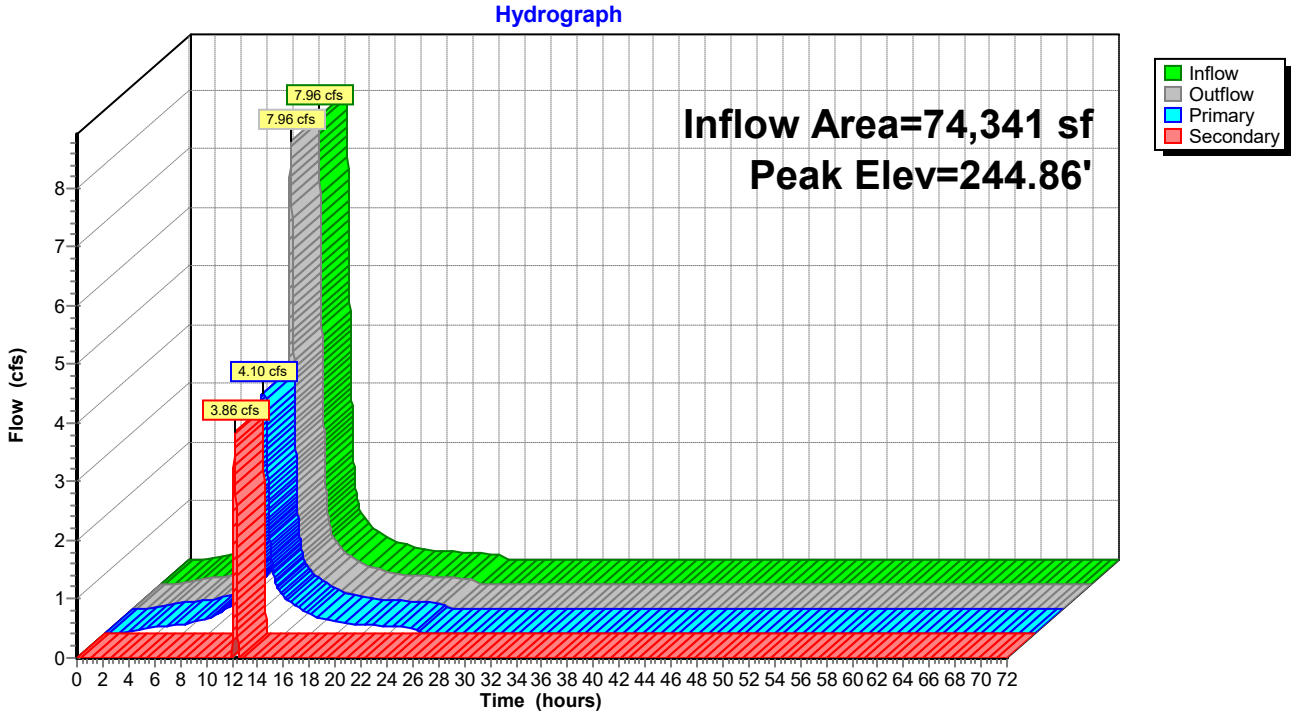
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 244.86' @ 12.21 hrs
Flood Elev= 244.83'

Device	Routing	Invert	Outlet Devices
#1	Primary	239.23'	**12.0" Round CMP_Round 12"** L= 107.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 239.23' / 237.80' S= 0.0134 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 0.79 sf
#2	Secondary	244.58'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=4.10 cfs @ 12.21 hrs HW=244.86' (Free Discharge)
1=CMP_Round 12" (Barrel Controls 4.10 cfs @ 5.22 fps)

Secondary OutFlow Max=3.84 cfs @ 12.21 hrs HW=244.86' (Free Discharge)
2=Orifice/Grate (Weir Controls 3.84 cfs @ 1.73 fps)

Pond 1P: DMH


Hydrograph
Inflow Area=74,341 sf
Peak Elev=244.86'
7.96 cfs
7.96 cfs
4.10 cfs
3.86 cfs
Inflow
Outflow
Primary
Secondary
Flow (cfs)
0
1
2
3
4
5
6
7
8
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72
Time (hours)

Summary for Pond 2P: CB

[58] Hint: Peaked 0.27' above defined flood level
[81] Warning: Exceeded Pond 1P by 1.59' @ 11.71 hrs

Inflow Area = 171,361 sf, 78.18% Impervious, Inflow Depth = 5.18" for 25-yr event
Inflow = 12.83 cfs @ 12.18 hrs, Volume= 74,018 cf
Outflow = 12.83 cfs @ 12.18 hrs, Volume= 74,018 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.95 cfs @ 12.18 hrs, Volume= 55,884 cf
Routed to Pond 3P : CB
Secondary = 9.88 cfs @ 12.18 hrs, Volume= 18,133 cf
Routed to Link 1L : POI 1

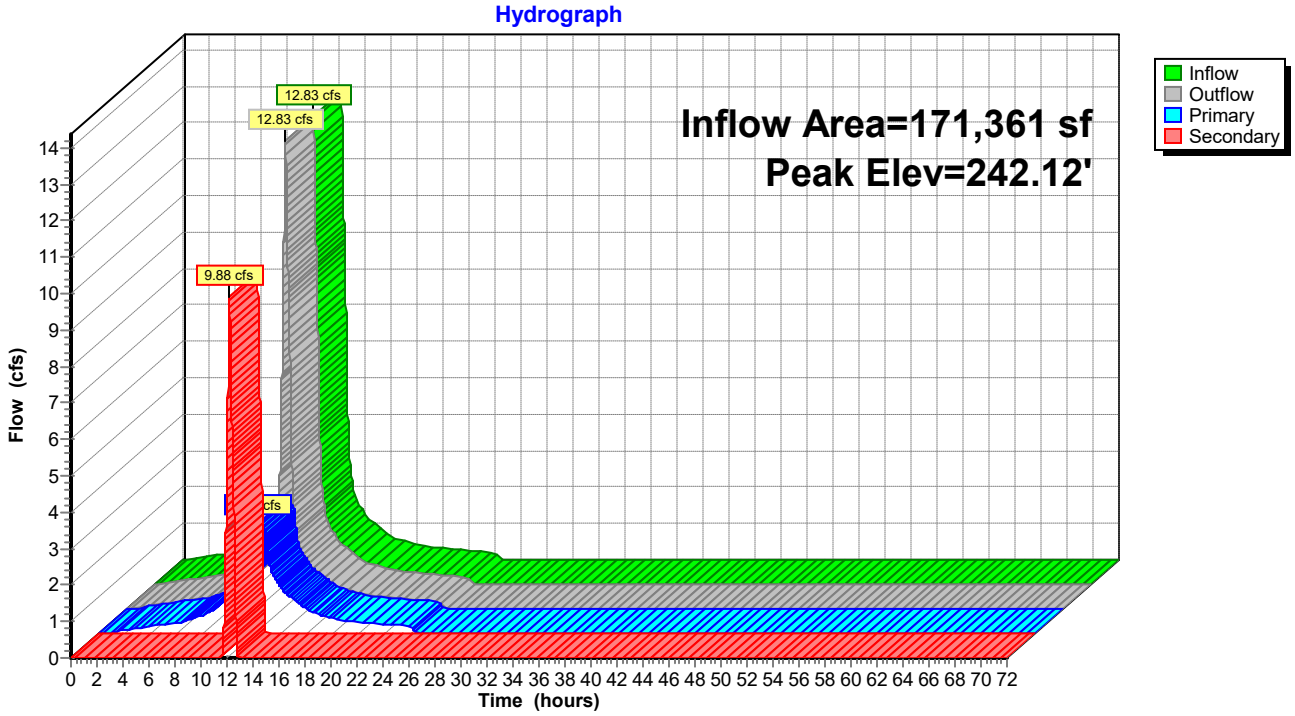
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 242.12' @ 12.18 hrs
Flood Elev= 241.85'

Device	Routing	Invert	Outlet Devices
#1	Primary	237.70'	**12.0" Round CMP_Round 12"** L= 204.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 237.70' / 235.51' S= 0.0107 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 0.79 sf
#2	Secondary	241.60'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=2.95 cfs @ 12.18 hrs HW=242.12' (Free Discharge)
↑—**1=CMP_Round 12"** (Barrel Controls 2.95 cfs @ 3.76 fps)

Secondary OutFlow Max=9.87 cfs @ 12.18 hrs HW=242.12' (Free Discharge)
↑—**2=Orifice/Grate** (Weir Controls 9.87 cfs @ 2.36 fps)

Pond 2P: CB


Hydrograph
Inflow Area=171,361 sf
Peak Elev=242.12'
12.83 cfs
12.83 cfs
9.88 cfs
Inflow
Outflow
Primary
Secondary
Flow (cfs)
Time (hours)
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14

Summary for Pond 3P: CB

[81] Warning: Exceeded Pond 2P by 0.04' @ 12.11 hrs

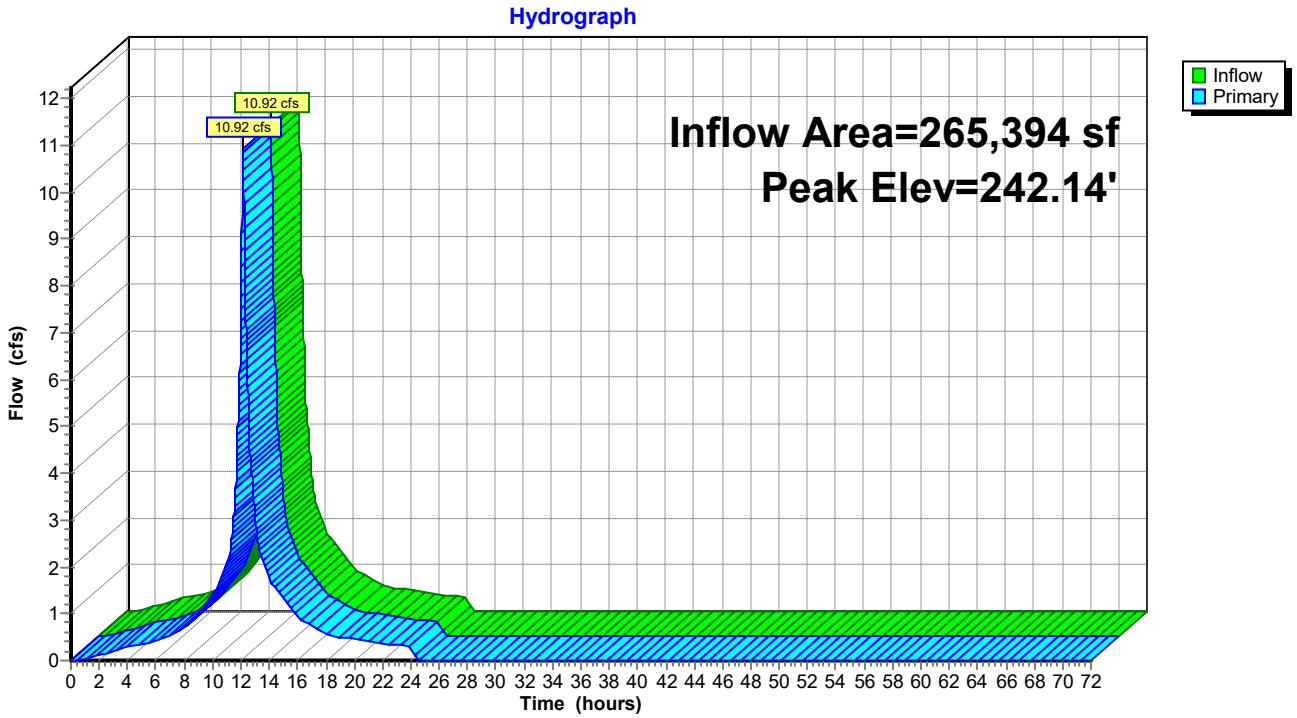
Inflow Area = 265,394 sf, 63.94% Impervious, Inflow Depth = 4.04" for 25-yr event
Inflow = 10.92 cfs @ 12.15 hrs, Volume= 89,369 cf
Outflow = 10.92 cfs @ 12.15 hrs, Volume= 89,369 cf, Atten= 0%, Lag= 0.0 min
Primary = 10.92 cfs @ 12.15 hrs, Volume= 89,369 cf
Routed to Link 1L : POI 1

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 242.14' @ 12.15 hrs
Flood Elev= 242.16'

Device	Routing	Invert	Outlet Devices
#1	Primary	235.40'	**12.0" Round RCP_Round 12"** L= 134.0' RCP, rounded edge headwall, Ke= 0.100 Inlet / Outlet Invert= 235.40' / 233.54' S= 0.0139 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Primary	241.91'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=10.89 cfs @ 12.15 hrs HW=242.14' (Free Discharge)
└─**1=RCP_Round 12"** (Barrel Controls 8.03 cfs @ 10.22 fps)
└─**2=Orifice/Grate** (Weir Controls 2.87 cfs @ 1.56 fps)

Pond 3P: CB



Summary for Pond INF: Admin Basin

Inflow Area = 10,248 sf, 51.48% Impervious, Inflow Depth = 3.43" for 25-yr event
Inflow = 0.75 cfs @ 12.09 hrs, Volume= 2,926 cf
Outflow = 0.02 cfs @ 16.66 hrs, Volume= 2,926 cf, Atten= 97%, Lag= 274.2 min
Discarded = 0.02 cfs @ 16.66 hrs, Volume= 2,926 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Link 1L : POI 1

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 242.18' @ 16.66 hrs Surf.Area= 954 sf Storage= 1,896 cf
Flood Elev= 243.00' Surf.Area= 1,045 sf Storage= 2,218 cf

Plug-Flow detention time= 1,011.8 min calculated for 2,926 cf (100% of inflow)
Center-of-Mass det. time= 1,012.0 min (1,772.8 - 760.7)

Volume	Invert	Avail.Storage	Storage Description
#1	237.00'	2,218 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

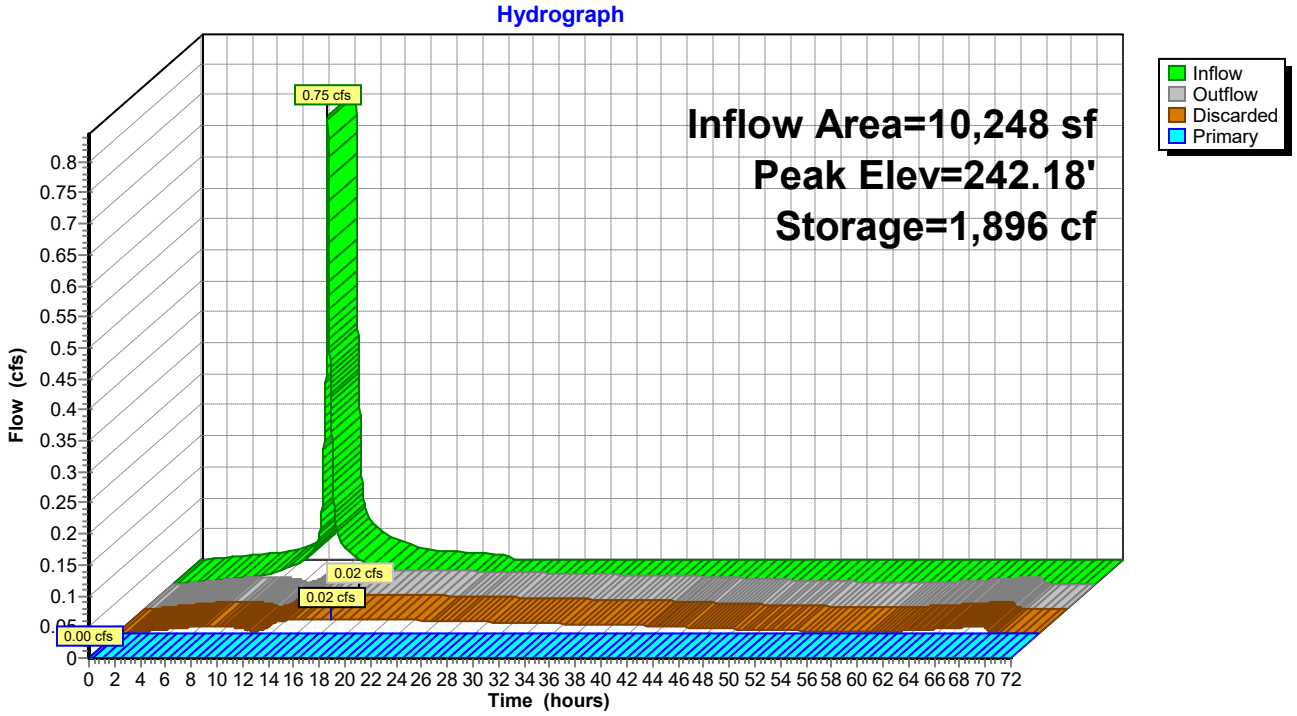
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
237.00	560	96.0	0.0	0	0	560
239.00	84	39.0	40.0	230	230	1,187
240.50	547	97.0	100.0	423	652	1,823
242.50	1,045	116.0	100.0	1,565	2,218	2,209

Device	Routing	Invert	Outlet Devices
#1	Discarded	237.00'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	242.45'	**29.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.02 cfs @ 16.66 hrs HW=242.18' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=237.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond INF: Admin Basin

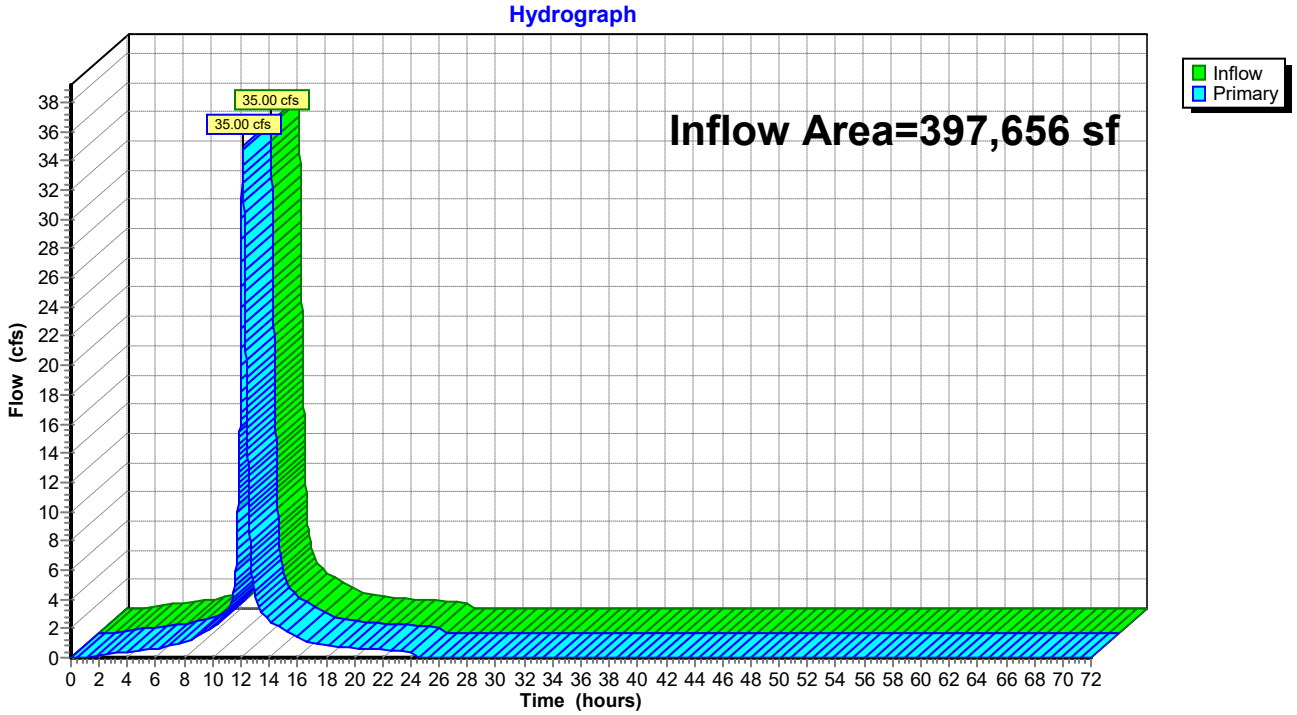


Summary for Link 1L: POI 1

Inflow Area = 397,656 sf, 61.54% Impervious, Inflow Depth = 4.88" for 25-yr event
Inflow = 35.00 cfs @ 12.13 hrs, Volume= 161,778 cf
Primary = 35.00 cfs @ 12.13 hrs, Volume= 161,778 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link 1L: POI 1



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A1: Western Site Runoff Area=97,020 sf 61.46% Impervious Runoff Depth=6.45"
Flow Length=436' Tc=13.9 min CN=WQ Runoff=11.53 cfs 52,142 cf

Subcatchment B1: Eastern Site Runoff Area=94,033 sf 37.99% Impervious Runoff Depth=5.60"
Flow Length=529' Tc=11.3 min CN=WQ Runoff=10.19 cfs 43,883 cf

Subcatchment C1: Admin Parking Area Runoff Area=10,248 sf 51.48% Impervious Runoff Depth=4.64"
Flow Length=73' Slope=0.0137 '/' Tc=6.5 min CN=WQ Runoff=1.04 cfs 3,965 cf

Subcatchment D1: Southern Site Runoff Area=122,014 sf 57.18% Impervious Runoff Depth=6.49"
Tc=6.0 min CN=WQ Runoff=18.31 cfs 66,026 cf

Subcatchment OFFSITE: Offsite Drainage Runoff Area=74,341 sf 100.00% Impervious Runoff Depth=7.88"
Tc=16.0 min CN=98 Runoff=10.16 cfs 48,818 cf

Pond 1P: DMH Peak Elev=244.96' Inflow=10.16 cfs 48,818 cf
Primary=4.13 cfs 42,172 cf Secondary=6.03 cfs 6,646 cf Outflow=10.16 cfs 48,818 cf

Pond 2P: CB Peak Elev=242.22' Inflow=15.66 cfs 94,314 cf
Primary=2.98 cfs 69,004 cf Secondary=12.68 cfs 25,310 cf Outflow=15.66 cfs 94,314 cf

Pond 3P: CB Peak Elev=242.24' Inflow=13.17 cfs 112,887 cf
Outflow=13.17 cfs 112,887 cf

Pond INF: Admin Basin Peak Elev=242.46' Storage=2,179 cf Inflow=1.04 cfs 3,965 cf
Discarded=0.02 cfs 3,392 cf Primary=0.11 cfs 563 cf Outflow=0.14 cfs 3,955 cf

Link 1L: POI 1 Inflow=45.13 cfs 211,431 cf
Primary=45.13 cfs 211,431 cf

Total Runoff Area = 397,656 sf Runoff Volume = 214,833 cf Average Runoff Depth = 6.48"
38.46% Pervious = 152,926 sf 61.54% Impervious = 244,730 sf

Summary for Subcatchment A1: Western Site

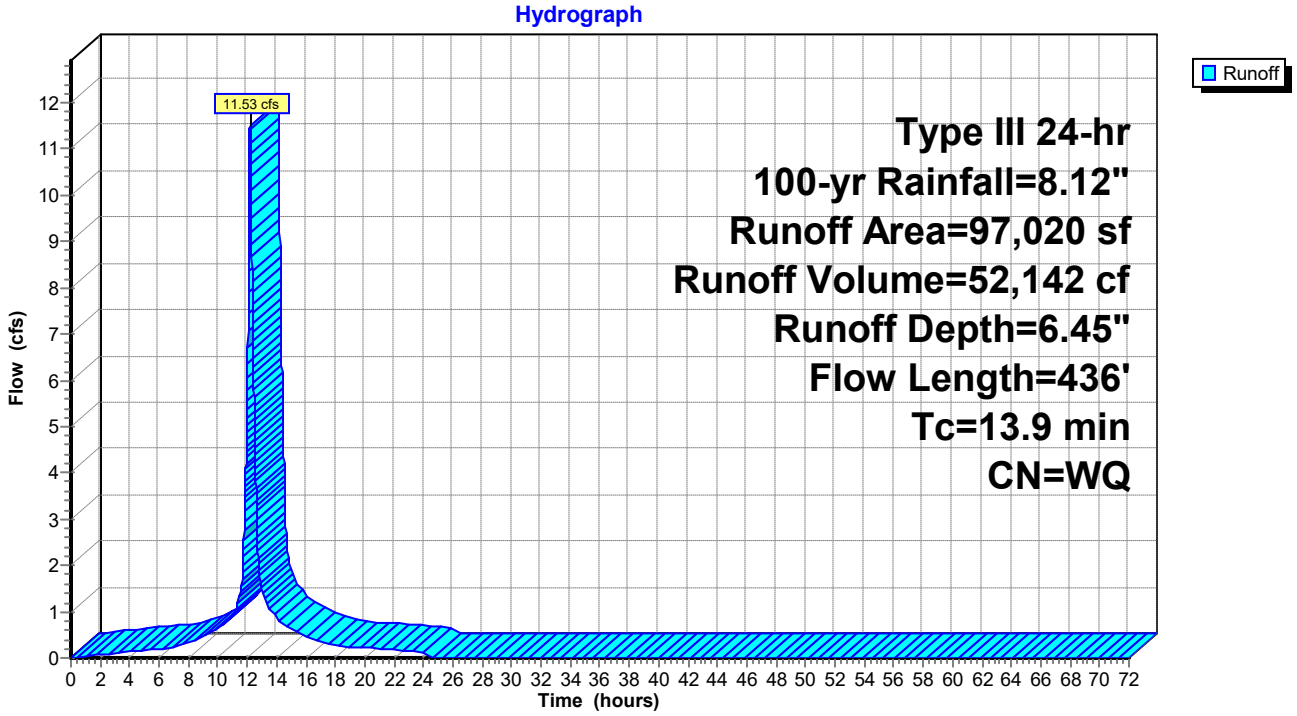
Runoff = 11.53 cfs @ 12.18 hrs, Volume= 52,142 cf, Depth= 6.45"
Routed to Pond 2P : CB

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.12"

	Area (sf)	CN	Description
*	59,628	98	Paved areas & roofs, HSG A
	3,018	39	>75% Grass cover, Good, HSG A
	1,612	30	Woods, Good, HSG A
	20,706	55	Woods, Good, HSG B
	10,073	96	Gravel surface, HSG A
	1,983	96	Gravel surface, HSG B
	97,020		Weighted Average
	37,392		38.54% Pervious Area
	59,628		61.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	115	0.0990	0.16		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.43"
0.6	91	0.0298	2.59		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.1	230	0.0310	3.57		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
13.9	436	Total			

Subcatchment A1: Western Site



Summary for Subcatchment B1: Eastern Site

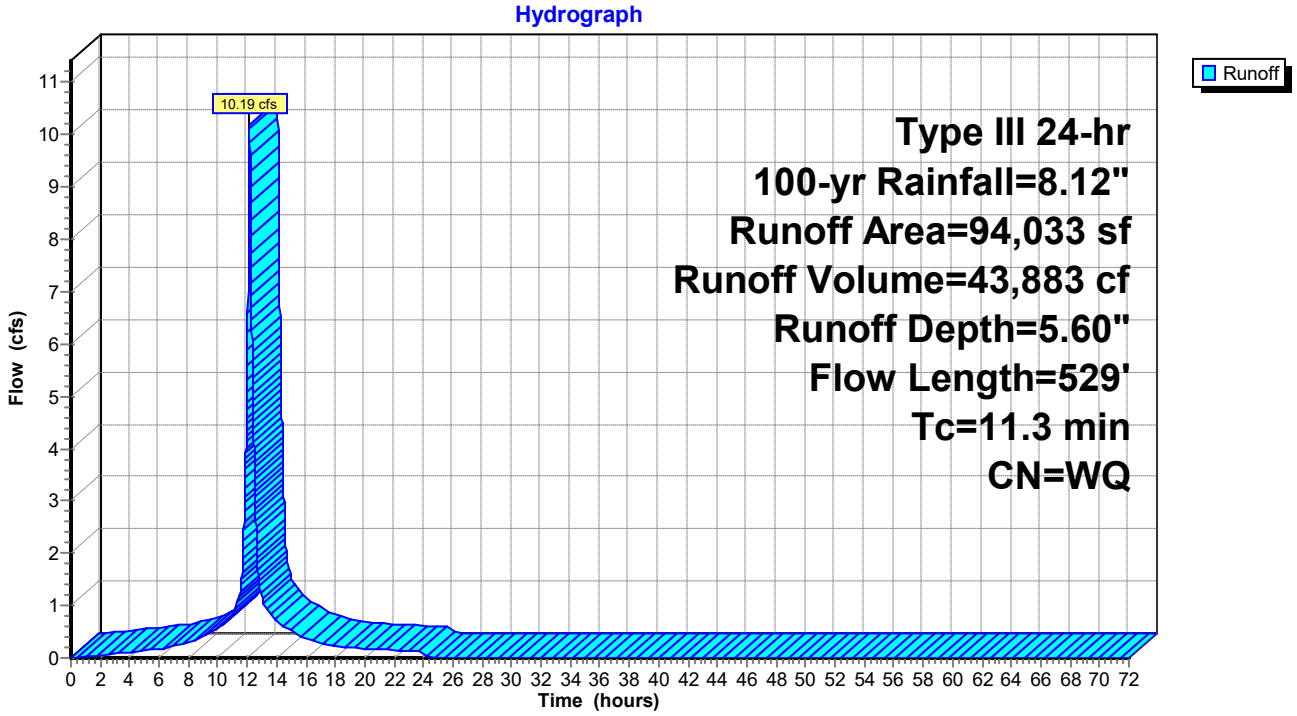
Runoff = 10.19 cfs @ 12.15 hrs, Volume= 43,883 cf, Depth= 5.60"
Routed to Pond 3P : CB

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.12"

	Area (sf)	CN	Description
*	35,720	98	Paved areas & roofs, HSG A
	29,570	96	Gravel surface, HSG A
	878	96	Gravel surface, HSG B
	27,837	30	Woods, Good, HSG A
	28	55	Woods, Good, HSG B
	94,033		Weighted Average
	58,313		62.01% Pervious Area
	35,720		37.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	86	0.1304	0.17		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.43"
0.5	132	0.0401	4.07		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
2.1	311	0.0143	2.43		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
11.3	529	Total			

Subcatchment B1: Eastern Site



Summary for Subcatchment C1: Admin Parking Area

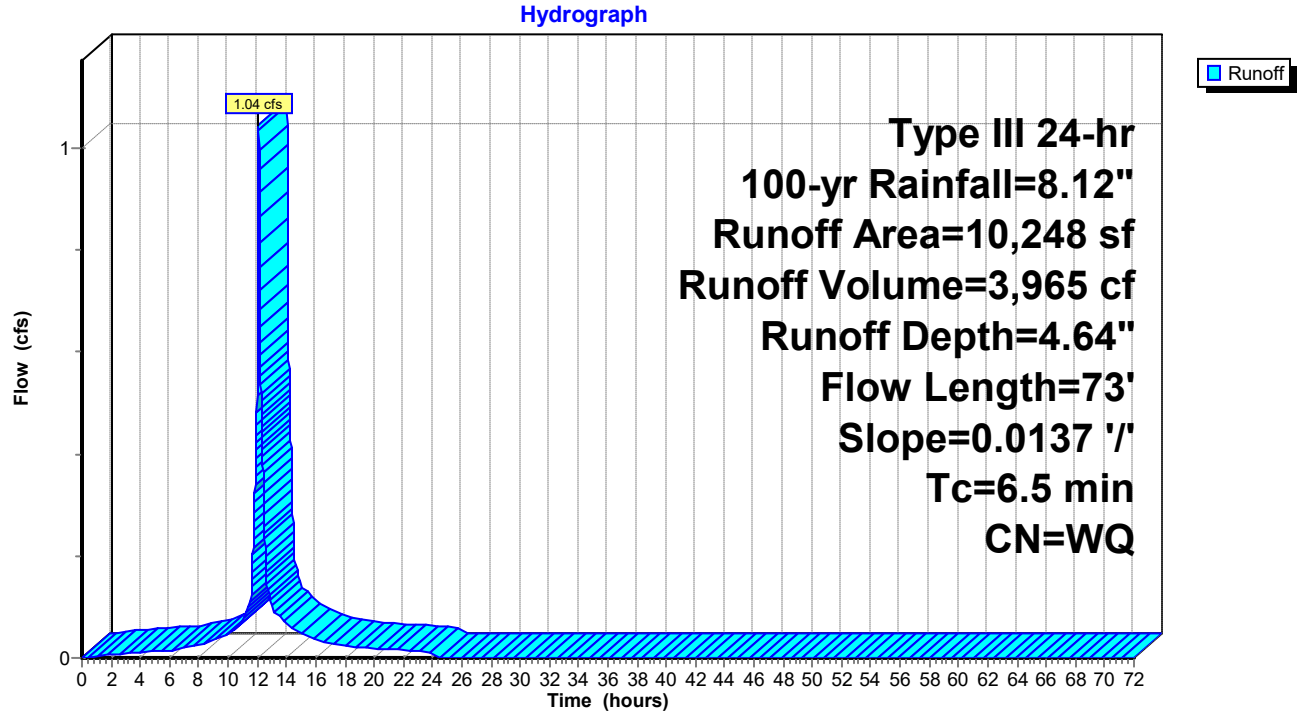
Runoff = 1.04 cfs @ 12.09 hrs, Volume= 3,965 cf, Depth= 4.64"
Routed to Pond INF : Admin Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.12"

Area (sf)	CN	Description
4,972	39	>75% Grass cover, Good, HSG A
5,276	98	Paved parking, HSG A
10,248		Weighted Average
4,972		48.52% Pervious Area
5,276		51.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	50	0.0137	0.13		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.43"
0.2	23	0.0137	2.38		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
6.5	73	Total			

Subcatchment C1: Admin Parking Area



Summary for Subcatchment D1: Southern Site

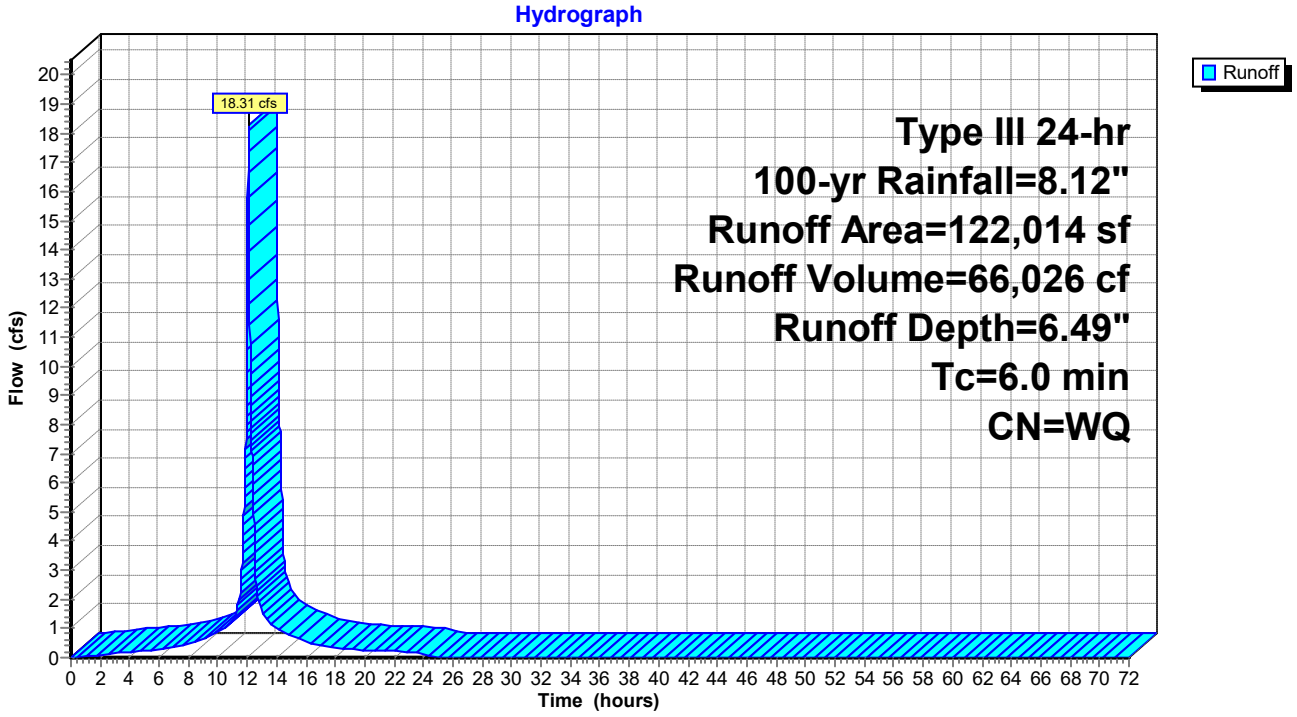
Runoff = 18.31 cfs @ 12.08 hrs, Volume= 66,026 cf, Depth= 6.49"
Routed to Link 1L : POI 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.12"

	Area (sf)	CN	Description
*	69,765	98	Paved areas & roofs, HSG A
	4,316	39	>75% Grass cover, Good, HSG A
	17,914	30	Woods, Good, HSG A
	30,019	96	Gravel surface, HSG A
	122,014		Weighted Average
	52,249		42.82% Pervious Area
	69,765		57.18% Impervious Area

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

Subcatchment D1: Southern Site



Summary for Subcatchment OFFSITE: Offsite Drainage

Total subcatchment represents approximately 2,039 LF of ROW (81,560 SF) minus areas that directly contribute to the onsite drainage network.

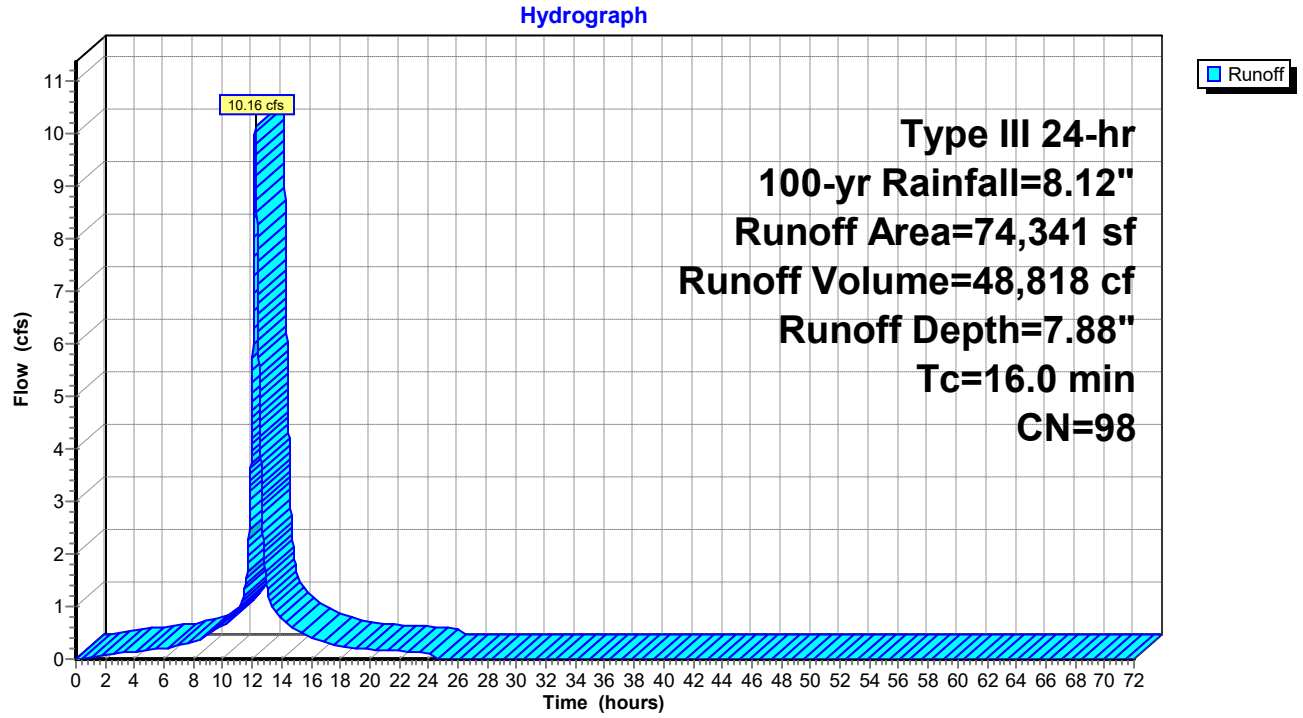
Runoff = 10.16 cfs @ 12.21 hrs, Volume= 48,818 cf, Depth= 7.88"
Routed to Pond 1P : DMH

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.12"

Area (sf)	CN	Description
74,341	98	Paved roads w/curbs & sewers, HSG A
74,341		100.00% Impervious Area

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

Subcatchment OFFSITE: Offsite Drainage



Summary for Pond 1P: DMH

[58] Hint: Peaked 0.13' above defined flood level

Inflow Area = 74,341 sf,100.00% Impervious, Inflow Depth = 7.88" for 100-yr event
Inflow = 10.16 cfs @ 12.21 hrs, Volume= 48,818 cf
Outflow = 10.16 cfs @ 12.21 hrs, Volume= 48,818 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.13 cfs @ 12.21 hrs, Volume= 42,172 cf
Routed to Pond 2P : CB
Secondary = 6.03 cfs @ 12.21 hrs, Volume= 6,646 cf
Routed to Link 1L : POI 1

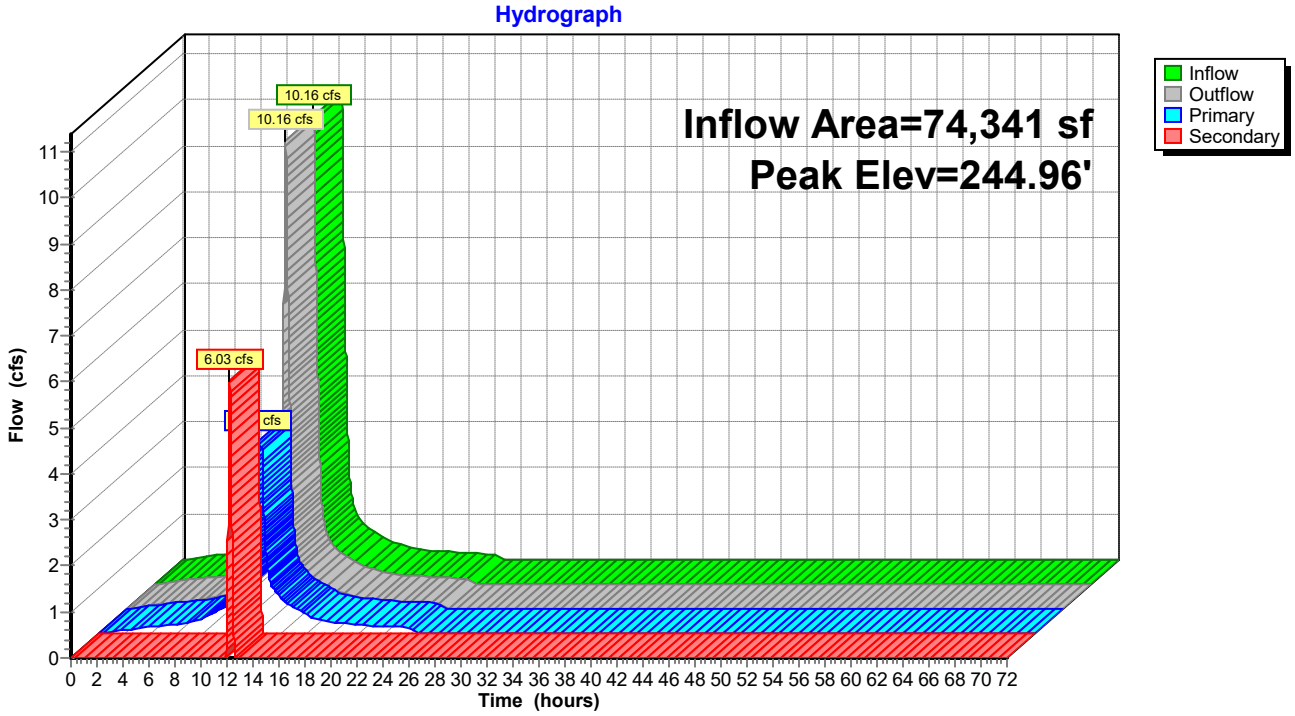
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 244.96' @ 12.21 hrs
Flood Elev= 244.83'

Device	Routing	Invert	Outlet Devices
#1	Primary	239.23'	**12.0" Round CMP_Round 12"** L= 107.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 239.23' / 237.80' S= 0.0134 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 0.79 sf
#2	Secondary	244.58'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=4.13 cfs @ 12.21 hrs HW=244.96' (Free Discharge)
1=CMP_Round 12" (Barrel Controls 4.13 cfs @ 5.26 fps)

Secondary OutFlow Max=6.02 cfs @ 12.21 hrs HW=244.96' (Free Discharge)
2=Orifice/Grate (Weir Controls 6.02 cfs @ 2.00 fps)

Pond 1P: DMH


Hydrograph
Inflow Area=74,341 sf
Peak Elev=244.96'
10.16 cfs
10.16 cfs
6.03 cfs
cfs
Inflow
Outflow
Primary
Secondary
Flow (cfs)
0 1 2 3 4 5 6 7 8 9 10 11
Time (hours)
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72

Summary for Pond 2P: CB

[58] Hint: Peaked 0.37' above defined flood level
[81] Warning: Exceeded Pond 1P by 1.59' @ 13.01 hrs

Inflow Area = 171,361 sf, 78.18% Impervious, Inflow Depth = 6.60" for 100-yr event
Inflow = 15.66 cfs @ 12.18 hrs, Volume= 94,314 cf
Outflow = 15.66 cfs @ 12.18 hrs, Volume= 94,314 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.98 cfs @ 12.18 hrs, Volume= 69,004 cf
Routed to Pond 3P : CB
Secondary = 12.68 cfs @ 12.18 hrs, Volume= 25,310 cf
Routed to Link 1L : POI 1

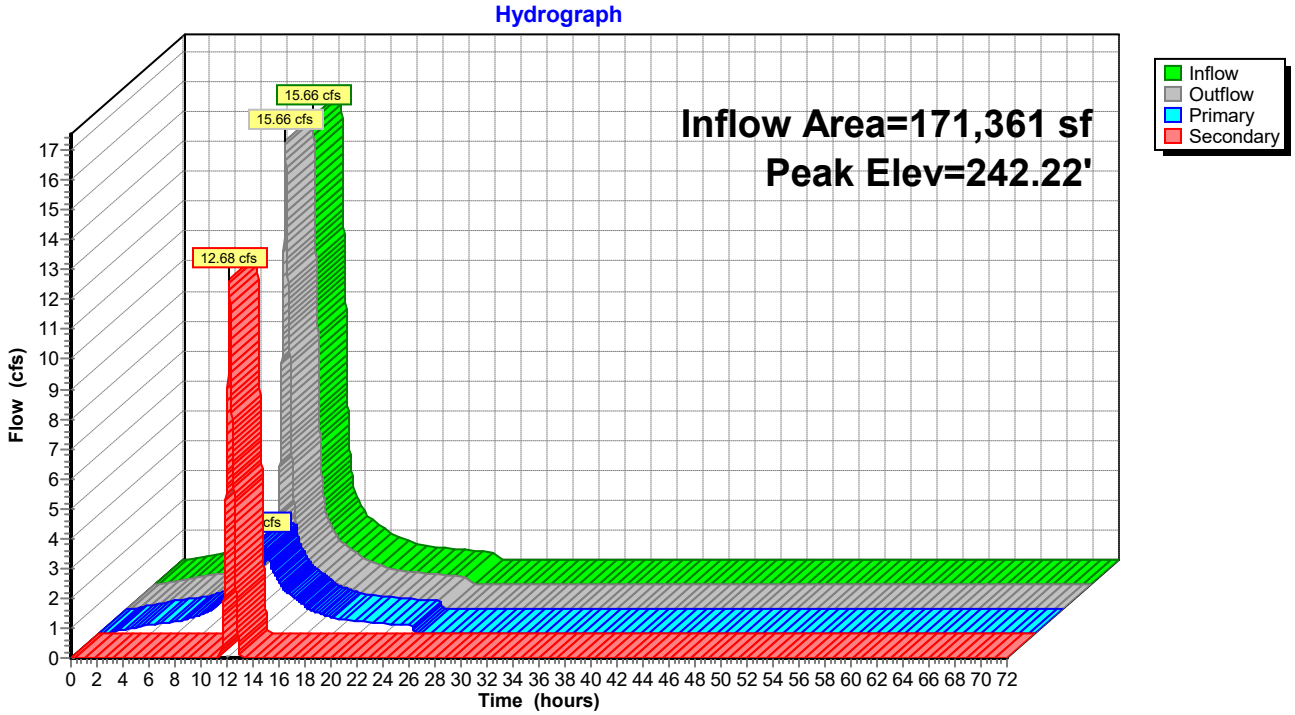
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 242.22' @ 12.18 hrs
Flood Elev= 241.85'

Device	Routing	Invert	Outlet Devices
#1	Primary	237.70'	**12.0" Round CMP_Round 12"** L= 204.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 237.70' / 235.51' S= 0.0107 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 0.79 sf
#2	Secondary	241.60'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=2.98 cfs @ 12.18 hrs HW=242.22' (Free Discharge)
↑—**1=CMP_Round 12"** (Barrel Controls 2.98 cfs @ 3.79 fps)

Secondary OutFlow Max=12.67 cfs @ 12.18 hrs HW=242.22' (Free Discharge)
↑—**2=Orifice/Grate** (Weir Controls 12.67 cfs @ 2.57 fps)

Pond 2P: CB


Hydrograph
Inflow Area=171,361 sf
Peak Elev=242.22'
15.66 cfs
15.66 cfs
12.68 cfs
Inflow
Outflow
Primary
Secondary
Flow (cfs)
Time (hours)

Summary for Pond 3P: CB

[58] Hint: Peaked 0.08' above defined flood level
[81] Warning: Exceeded Pond 2P by 0.06' @ 12.11 hrs

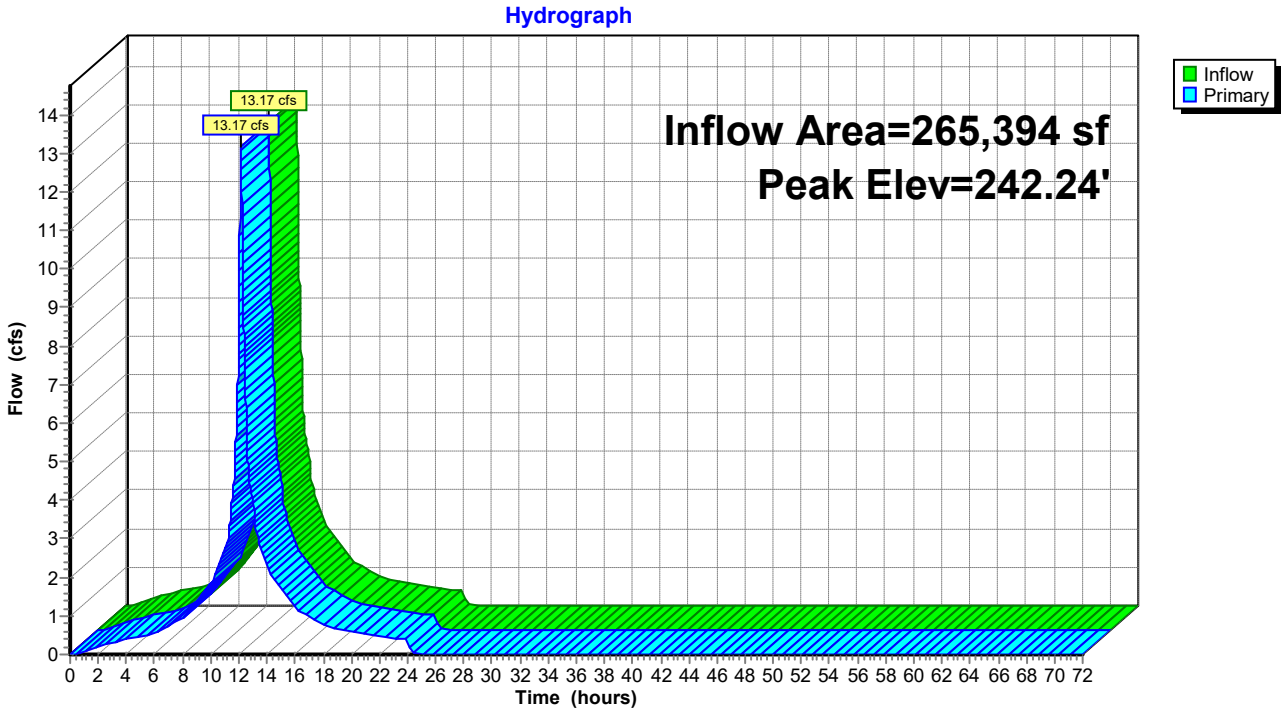
Inflow Area = 265,394 sf, 63.94% Impervious, Inflow Depth = 5.10" for 100-yr event
Inflow = 13.17 cfs @ 12.15 hrs, Volume= 112,887 cf
Outflow = 13.17 cfs @ 12.15 hrs, Volume= 112,887 cf, Atten= 0%, Lag= 0.0 min
Primary = 13.17 cfs @ 12.15 hrs, Volume= 112,887 cf
Routed to Link 1L : POI 1

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 242.24' @ 12.15 hrs
Flood Elev= 242.16'

Device	Routing	Invert	Outlet Devices
#1	Primary	235.40'	**12.0" Round RCP_Round 12"** L= 134.0' RCP, rounded edge headwall, Ke= 0.100 Inlet / Outlet Invert= 235.40' / 233.54' S= 0.0139 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Primary	241.91'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=13.15 cfs @ 12.15 hrs HW=242.24' (Free Discharge)
└**1=RCP_Round 12"** (Barrel Controls 8.08 cfs @ 10.29 fps)
└**2=Orifice/Grate** (Weir Controls 5.06 cfs @ 1.89 fps)

Pond 3P: CB



Summary for Pond INF: Admin Basin

Inflow Area = 10,248 sf, 51.48% Impervious, Inflow Depth = 4.64" for 100-yr event
Inflow = 1.04 cfs @ 12.09 hrs, Volume= 3,965 cf
Outflow = 0.14 cfs @ 12.72 hrs, Volume= 3,955 cf, Atten= 87%, Lag= 37.7 min
Discarded = 0.02 cfs @ 12.72 hrs, Volume= 3,392 cf
Primary = 0.11 cfs @ 12.72 hrs, Volume= 563 cf
Routed to Link 1L : POI 1

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 242.46' @ 12.72 hrs Surf.Area= 1,034 sf Storage= 2,179 cf
Flood Elev= 243.00' Surf.Area= 1,045 sf Storage= 2,218 cf

Plug-Flow detention time= 928.9 min calculated for 3,955 cf (100% of inflow)
Center-of-Mass det. time= 927.1 min (1,690.0 - 762.8)

Volume	Invert	Avail.Storage	Storage Description
#1	237.00'	2,218 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

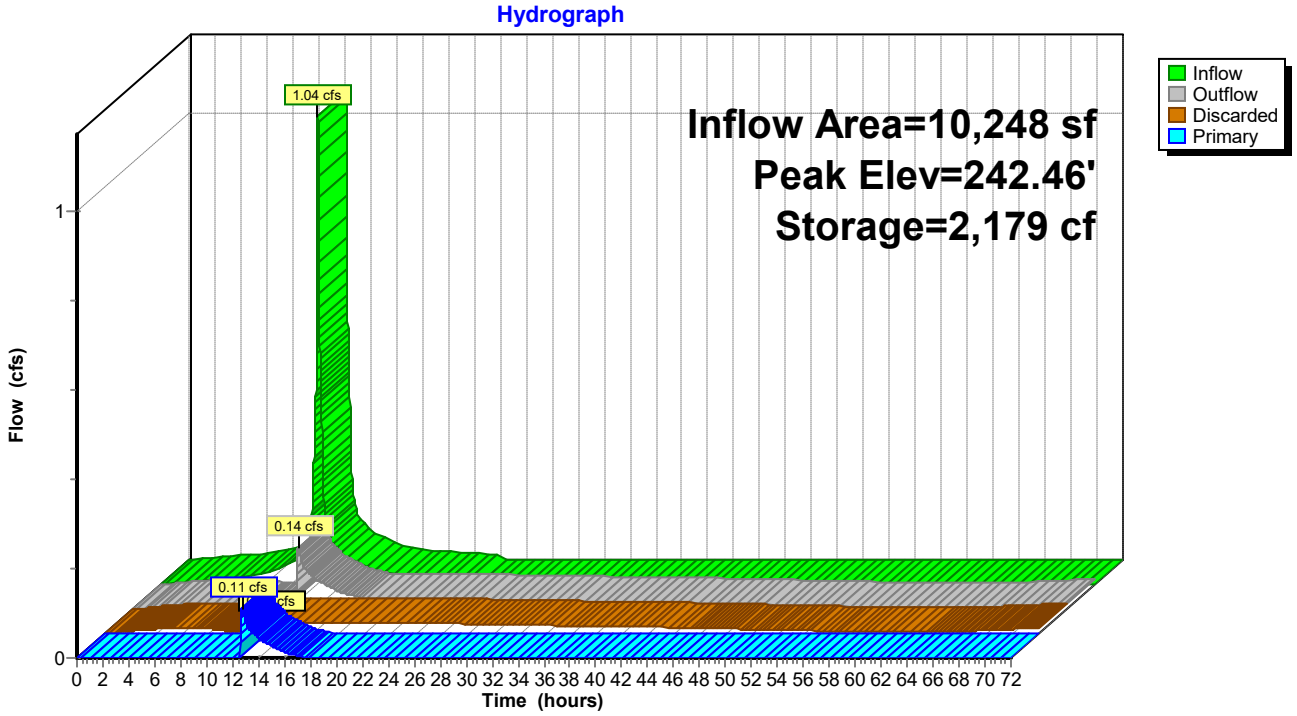
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
237.00	560	96.0	0.0	0	0	560
239.00	84	39.0	40.0	230	230	1,187
240.50	547	97.0	100.0	423	652	1,823
242.50	1,045	116.0	100.0	1,565	2,218	2,209

Device	Routing	Invert	Outlet Devices
#1	Discarded	237.00'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	242.45'	**29.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.02 cfs @ 12.72 hrs HW=242.46' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.09 cfs @ 12.72 hrs HW=242.46' (Free Discharge)
2=Broad-Crested Rectangular Weir (Weir Controls 0.09 cfs @ 0.26 fps)

Pond INF: Admin Basin

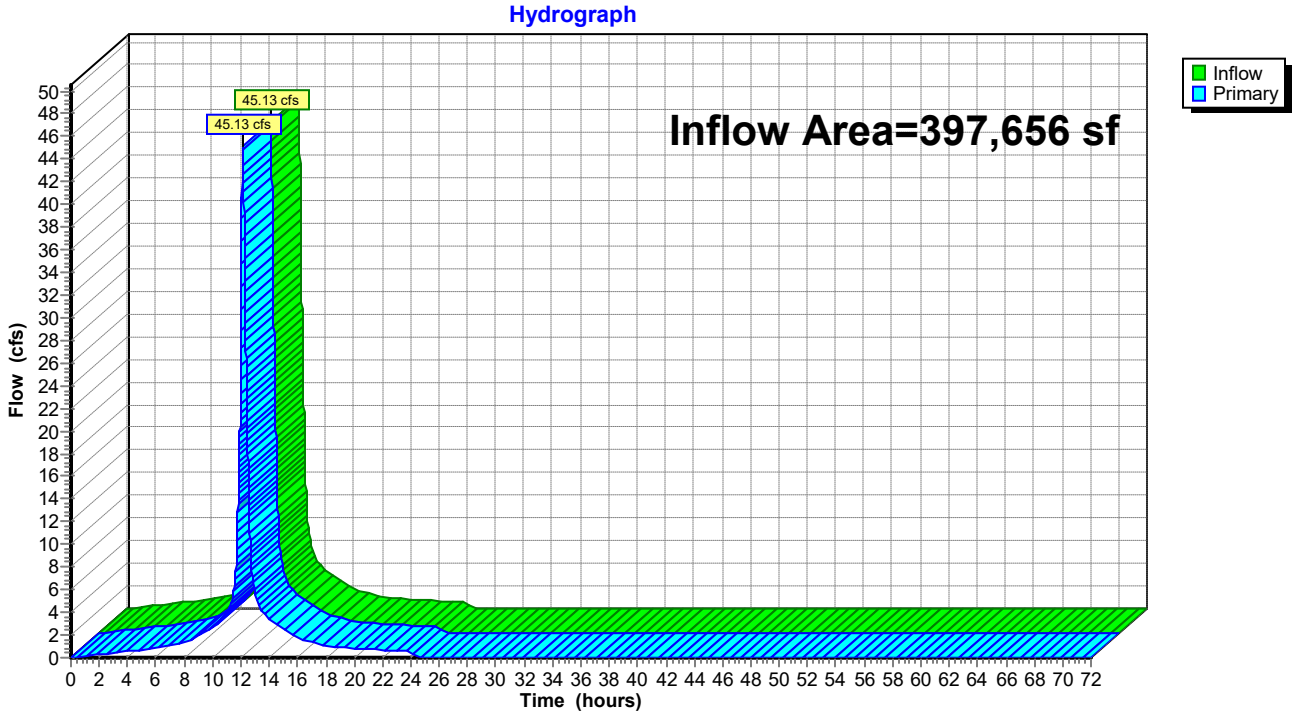


Summary for Link 1L: POI 1

Inflow Area = 397,656 sf, 61.54% Impervious, Inflow Depth = 6.38" for 100-yr event
Inflow = 45.13 cfs @ 12.13 hrs, Volume= 211,431 cf
Primary = 45.13 cfs @ 12.13 hrs, Volume= 211,431 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

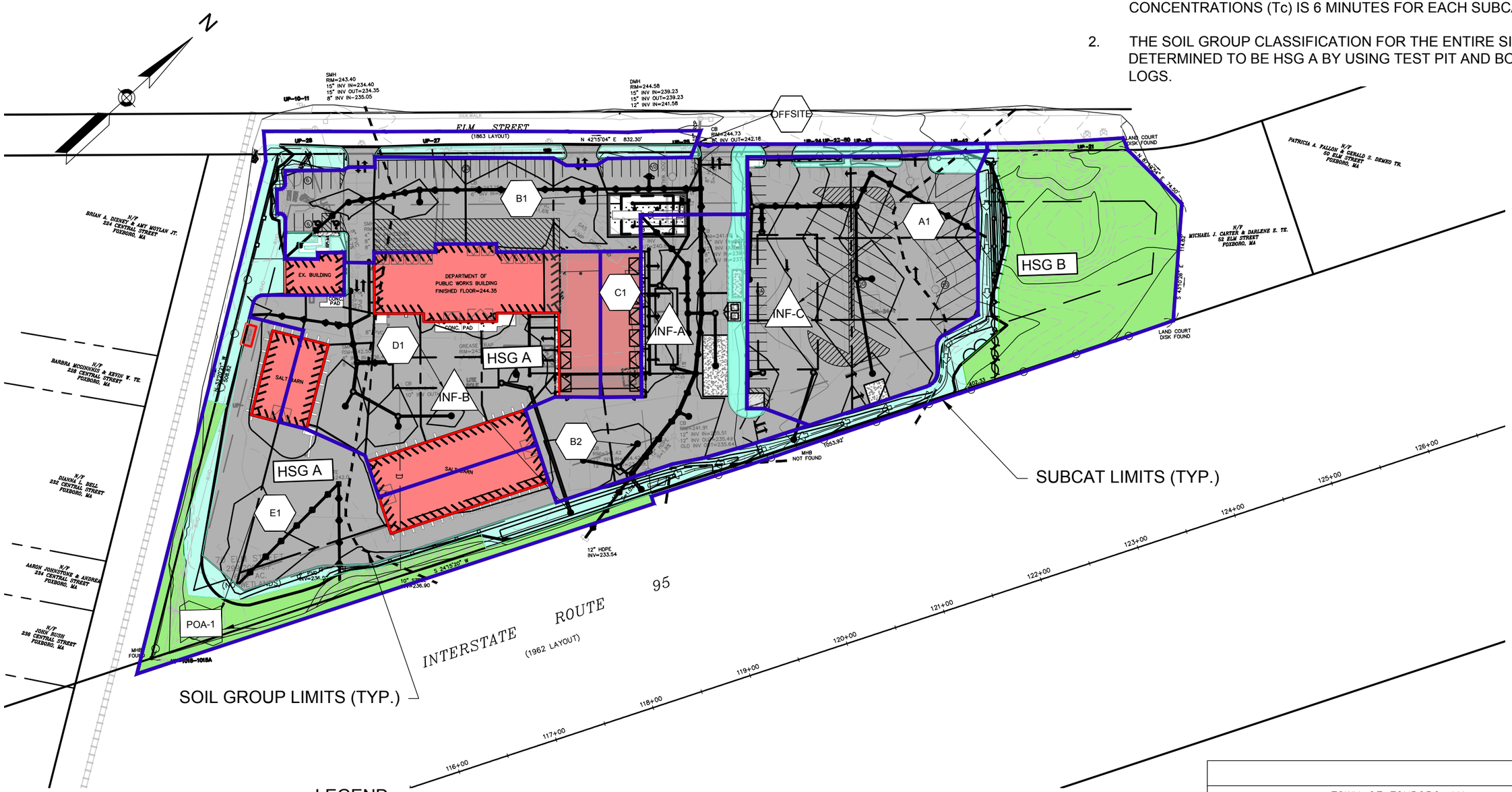
Link 1L: POI 1



NOTE:

1. FOR MODELING PURPOSES, MINIMUM TIME OF CONCENTRATIONS (Tc) IS 6 MINUTES FOR EACH SUBCAT.

2. THE SOIL GROUP CLASSIFICATION FOR THE ENTIRE SITE WAS DETERMINED TO BE HSG A BY USING TEST PIT AND BORING LOGS.



LEGEND

- BUILDING, HSG A (CN=98)
- WOODS, GOOD, HSG A (CN=30)
- >75% GRASS COVER, GOOD, HSG A: (CN=39)
- ASPHALT MILLINGS, PACKED GRAVEL, HSG A (CN=96)
- PAVEMENT, HSG A (CN=98)

PLAN

SCALE: 1" = 100'

0 100 200 300 400

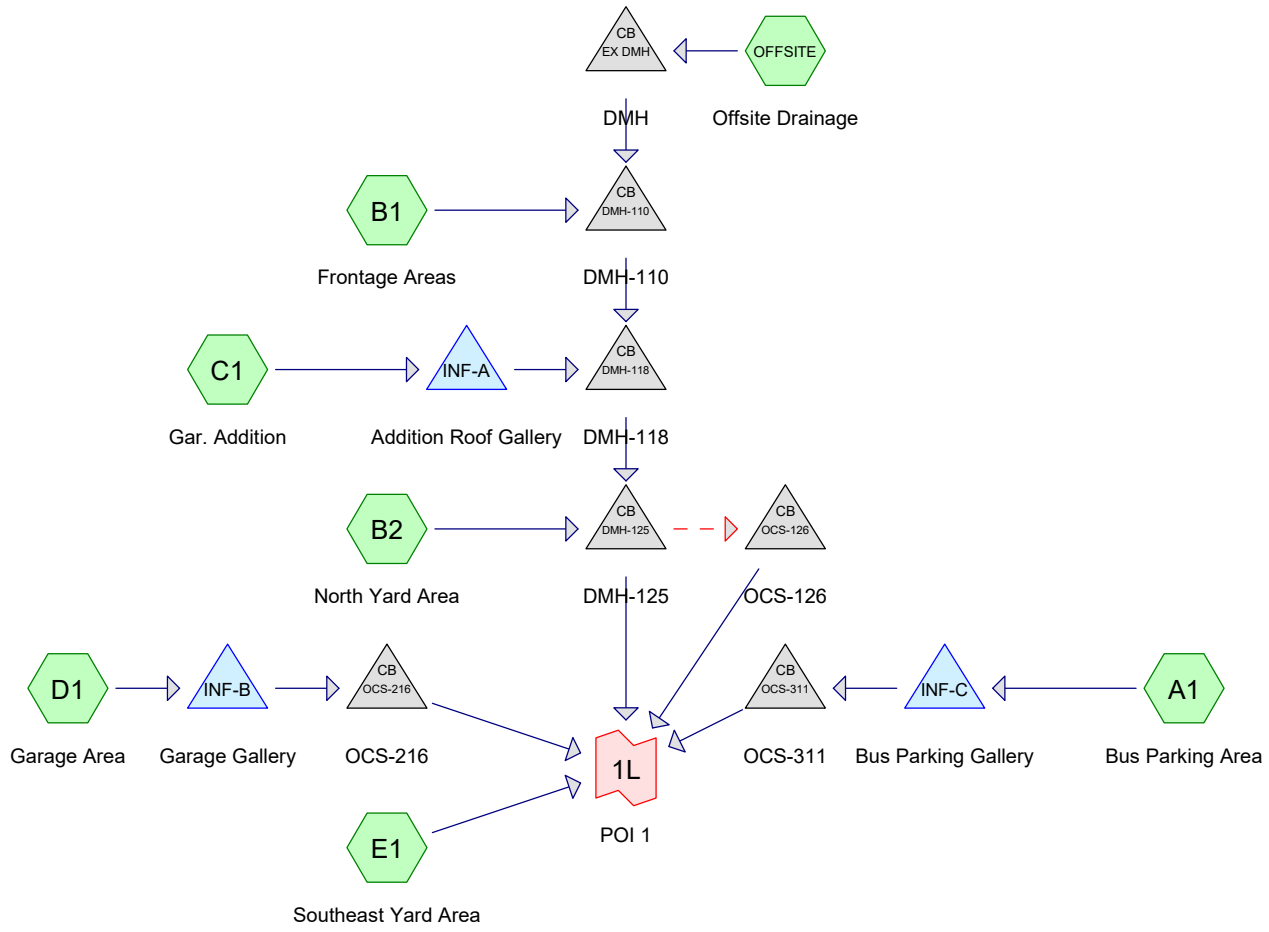
SCALE: 1" = 100'

TOWN OF FOXBORO, MA
NEW DEPARTMENT OF PUBLIC WORKS FACILITY

DRAINAGE AREA MAP
PROPOSED CONDITIONS

DESIGNED BY: EC	CHECKED BY: EC	DATE: JANUARY 2024

Weston & Sampson℠



Subcat Reach Pond Link

Routing Diagram for HydroCAD Design Prop
Prepared by Weston and Sampson, Printed 1/31/2024

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-yr	Type III 24-hr		Default	24.00	1	3.43	2
2	10-yr	Type III 24-hr		Default	24.00	1	5.24	2
3	25-yr	Type III 24-hr		Default	24.00	1	6.37	2
4	100-yr	Type III 24-hr		Default	24.00	1	8.12	2

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
35,254	39	>75% Grass cover, Good, HSG A (A1, B1, B2, E1)
7,225	61	>75% Grass cover, Good, HSG B (A1, E1)
74,341	98	Elm St right-of-way (OFFSITE)
125,123	98	Paved areas & roofs (B1, B2, D1)
50,842	98	Paved parking (A1)
47,097	98	Paved parking, HSG A (E1)
5,702	98	Roofs, HSG A (C1)
17,412	30	Woods, Good, HSG A (E1)
34,660	55	Woods, Good, HSG B (E1)
397,656	**85**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
105,465	HSG A	A1, B1, B2, C1, E1
41,885	HSG B	A1, E1
0	HSG C	
0	HSG D	
250,306	Other	A1, B1, B2, D1, OFFSITE
397,656		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Su Nu
35,254	7,225	0	0	0	42,479	>75% Grass cover, Good	
0	0	0	0	74,341	74,341	Elm St right-of-way	
0	0	0	0	125,123	125,123	Paved areas & roofs	
47,097	0	0	0	50,842	97,939	Paved parking	
5,702	0	0	0	0	5,702	Roofs	
17,412	34,660	0	0	0	52,072	Woods, Good	
105,465	**41,885**	**0**	**0**	**250,306**	**397,656**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)
1	DMH-110	236.04	235.45	118.0	0.0050	0.012	0.0	24.0	0.0
2	DMH-118	234.97	234.78	37.0	0.0051	0.012	0.0	24.0	0.0
3	DMH-125	235.40	233.54	130.0	0.0143	0.012	0.0	12.0	0.0
4	DMH-125	239.30	237.90	70.0	0.0200	0.012	0.0	12.0	0.0
5	EX DMH	239.23	238.90	20.0	0.0165	0.012	0.0	15.0	0.0
6	INF-A	239.60	239.00	50.0	0.0120	0.013	0.0	12.0	0.0
7	INF-B	237.65	237.40	50.0	0.0050	0.013	0.0	24.0	0.0
8	INF-C	242.80	242.30	100.0	0.0050	0.012	0.0	12.0	0.0

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

Subcatchment A1: Bus Parking Area Runoff Area=52,591 sf 96.67% Impervious Runoff Depth=3.10"
Tc=6.0 min CN=WQ Runoff=3.90 cfs 13,575 cf

Subcatchment B1: Frontage Areas Runoff Area=40,229 sf 89.49% Impervious Runoff Depth=2.86"
Tc=6.0 min CN=WQ Runoff=2.76 cfs 9,593 cf

Subcatchment B2: North Yard Area Runoff Area=35,224 sf 91.15% Impervious Runoff Depth=2.91"
Tc=6.0 min CN=WQ Runoff=2.46 cfs 8,554 cf

Subcatchment C1: Gar. Addition Runoff Area=5,702 sf 100.00% Impervious Runoff Depth=3.20"
Tc=6.0 min CN=98 Runoff=0.44 cfs 1,519 cf

Subcatchment D1: Garage Area Runoff Area=57,016 sf 100.00% Impervious Runoff Depth=3.20"
Tc=6.0 min CN=98 Runoff=4.37 cfs 15,189 cf

Subcatchment E1: Southeast Yard Area Runoff Area=132,553 sf 35.53% Impervious Runoff Depth=1.25"
Tc=6.0 min CN=WQ Runoff=3.73 cfs 13,786 cf

Subcatchment OFFSITE: Offsite Drainage Runoff Area=74,341 sf 100.00% Impervious Runoff Depth=3.20"
Tc=16.0 min CN=98 Runoff=4.25 cfs 19,804 cf

Pond DMH-110: DMH-110 Peak Elev=237.28' Inflow=6.03 cfs 29,396 cf
Outflow=6.03 cfs 29,396 cf

Pond DMH-118: DMH-118 Peak Elev=236.30' Inflow=6.03 cfs 29,396 cf
Outflow=6.03 cfs 29,396 cf

Pond DMH-125: DMH-125 Peak Elev=240.28' Inflow=8.32 cfs 37,950 cf
Primary=6.25 cfs 36,710 cf Secondary=2.07 cfs 1,240 cf Outflow=8.32 cfs 37,950 cf

Pond EX DMH: DMH Peak Elev=240.31' Inflow=4.25 cfs 19,804 cf
Outflow=4.25 cfs 19,804 cf

Pond INF-A: Addition Roof Gallery Peak Elev=240.37' Storage=537 cf Inflow=0.44 cfs 1,519 cf
Discarded=0.04 cfs 1,519 cf Primary=0.00 cfs 0 cf Outflow=0.04 cfs 1,519 cf

Pond INF-B: Garage Gallery Peak Elev=239.18' Storage=6,184 cf Inflow=4.37 cfs 15,189 cf
Discarded=0.10 cfs 10,955 cf Primary=1.63 cfs 4,233 cf Outflow=1.73 cfs 15,188 cf

Pond INF-C: Bus Parking Gallery Peak Elev=242.54' Storage=6,296 cf Inflow=3.90 cfs 13,575 cf
Discarded=0.19 cfs 13,575 cf Primary=0.00 cfs 0 cf Outflow=0.19 cfs 13,575 cf

Pond OCS-126: OCS-126 Peak Elev=241.10' Inflow=2.07 cfs 1,240 cf
Outflow=2.07 cfs 1,240 cf

Pond OCS-216: OCS-216 Peak Elev=241.16' Inflow=1.63 cfs 4,233 cf
Outflow=1.63 cfs 4,233 cf

Pond OCS-311: OCS-311 Peak Elev=245.00' Inflow=0.00 cfs 0 cf
Outflow=0.00 cfs 0 cf

Link 1L: POI 1 Inflow=12.00 cfs 55,970 cf
Primary=12.00 cfs 55,970 cf

Total Runoff Area = 397,656 sf Runoff Volume = 82,019 cf Average Runoff Depth = 2.48"
23.78% Pervious = 94,551 sf 76.22% Impervious = 303,105 sf

Summary for Subcatchment A1: Bus Parking Area

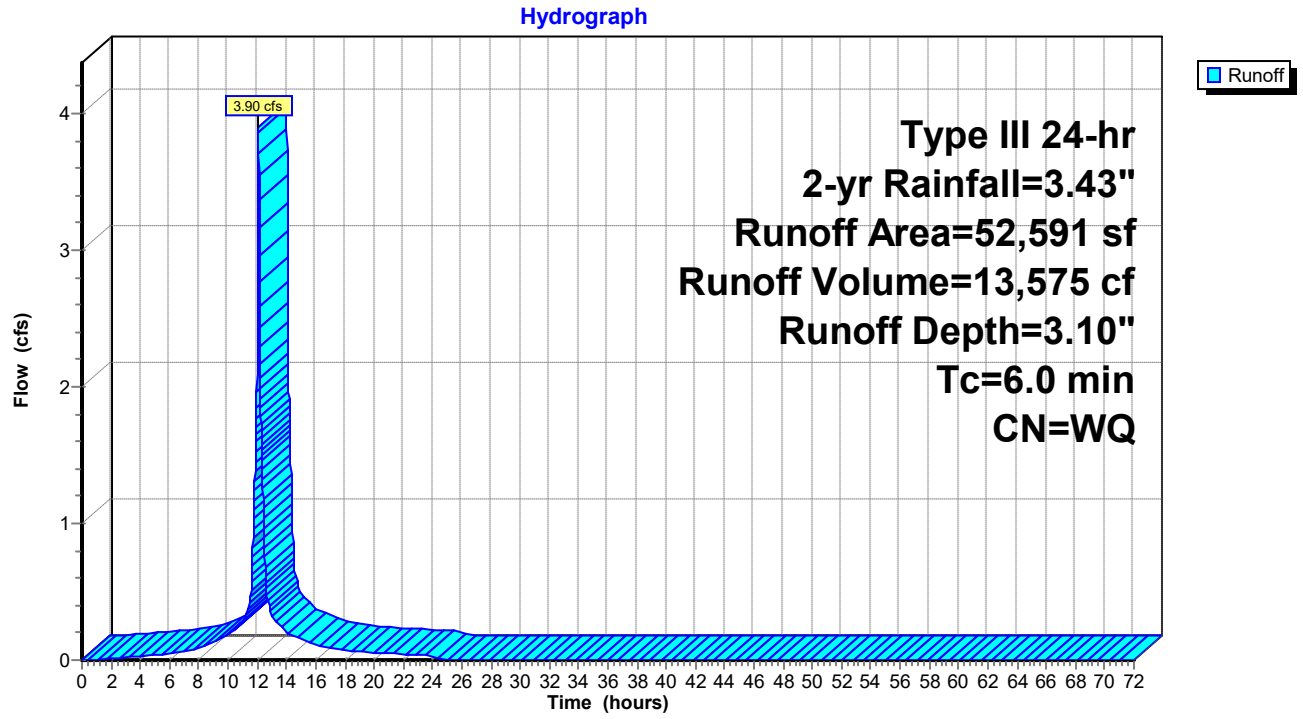
Runoff = 3.90 cfs @ 12.08 hrs, Volume= 13,575 cf, Depth= 3.10"
Routed to Pond INF-C : Bus Parking Gallery

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.43"

	Area (sf)	CN	Description
*	50,842	98	Paved parking
	673	61	>75% Grass cover, Good, HSG B
	1,076	39	>75% Grass cover, Good, HSG A
	52,591		Weighted Average
	1,749		3.33% Pervious Area
	50,842		96.67% Impervious Area

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

Subcatchment A1: Bus Parking Area



Summary for Subcatchment B1: Frontage Areas

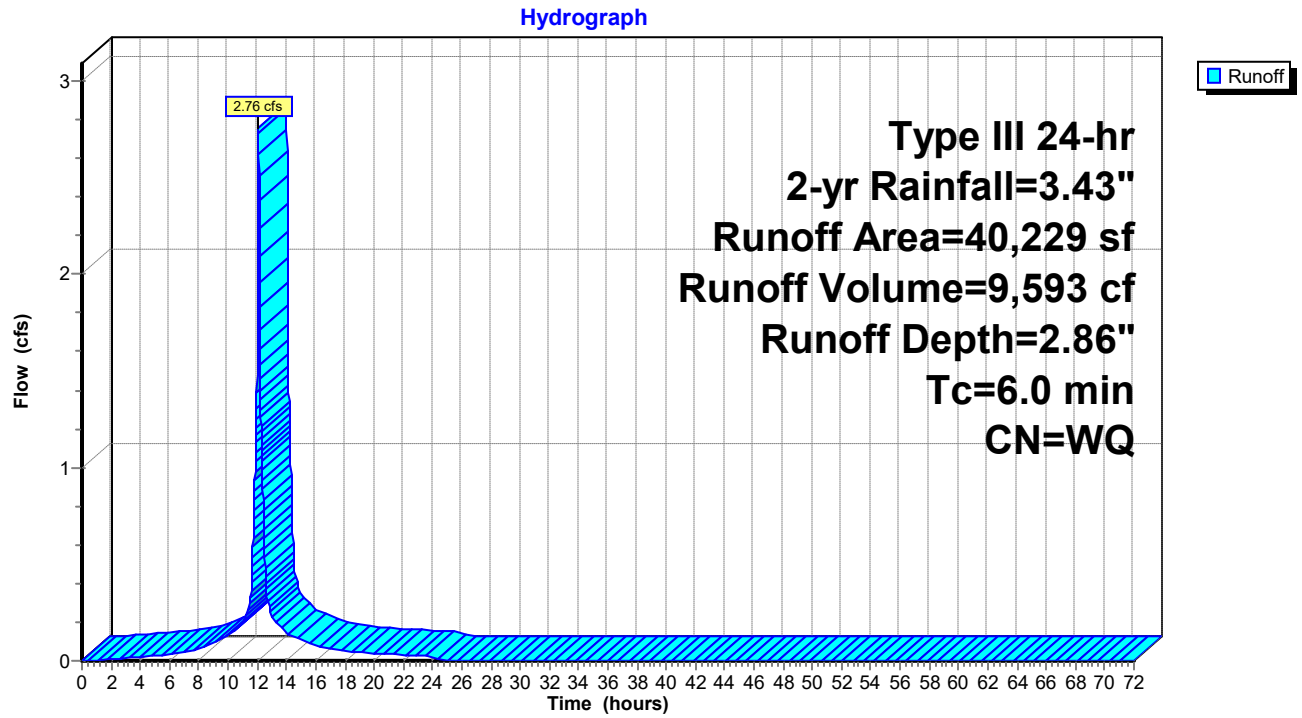
Runoff = 2.76 cfs @ 12.08 hrs, Volume= 9,593 cf, Depth= 2.86"
Routed to Pond DMH-110 : DMH-110

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.43"

	Area (sf)	CN	Description
*	36,002	98	Paved areas & roofs
	4,227	39	>75% Grass cover, Good, HSG A
	40,229		Weighted Average
	4,227		10.51% Pervious Area
	36,002		89.49% Impervious Area

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

Subcatchment B1: Frontage Areas



Summary for Subcatchment B2: North Yard Area

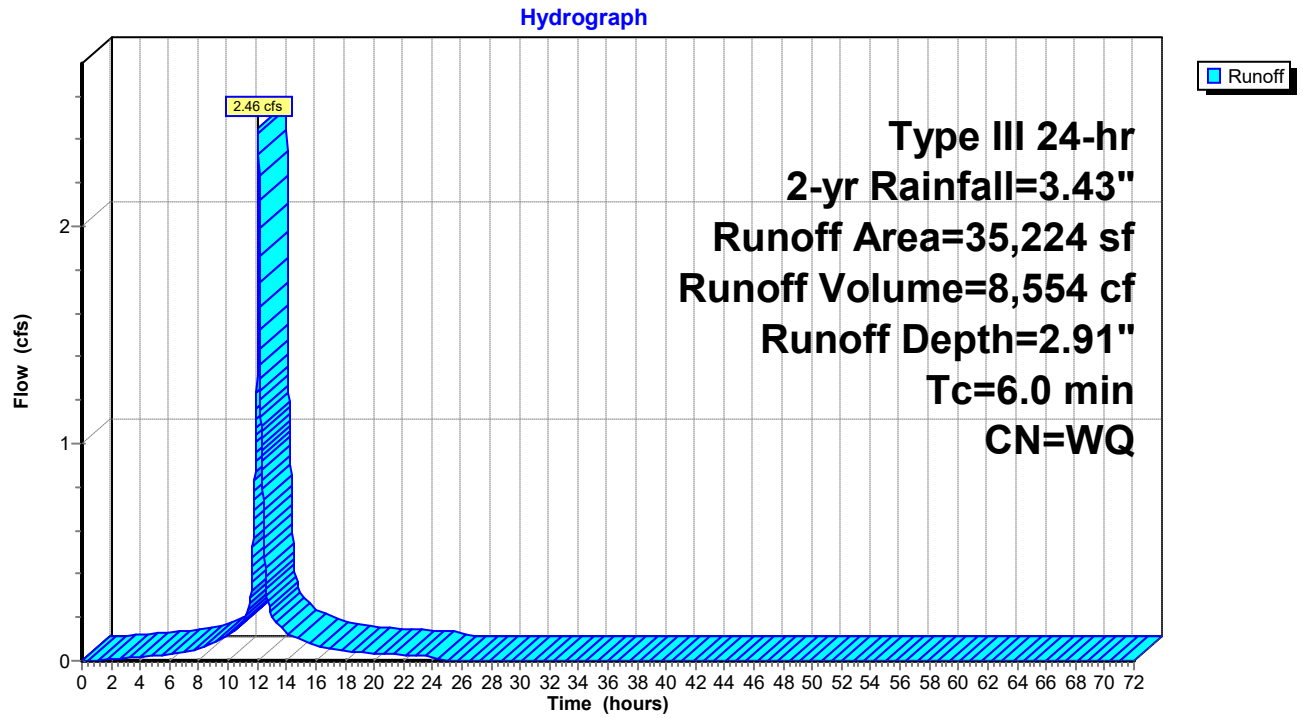
Runoff = 2.46 cfs @ 12.08 hrs, Volume= 8,554 cf, Depth= 2.91"
Routed to Pond DMH-125 : DMH-125

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.43"

	Area (sf)	CN	Description
*	32,105	98	Paved areas & roofs
	3,119	39	>75% Grass cover, Good, HSG A
	35,224		Weighted Average
	3,119		8.85% Pervious Area
	32,105		91.15% Impervious Area

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

Subcatchment B2: North Yard Area



Summary for Subcatchment C1: Gar. Addition

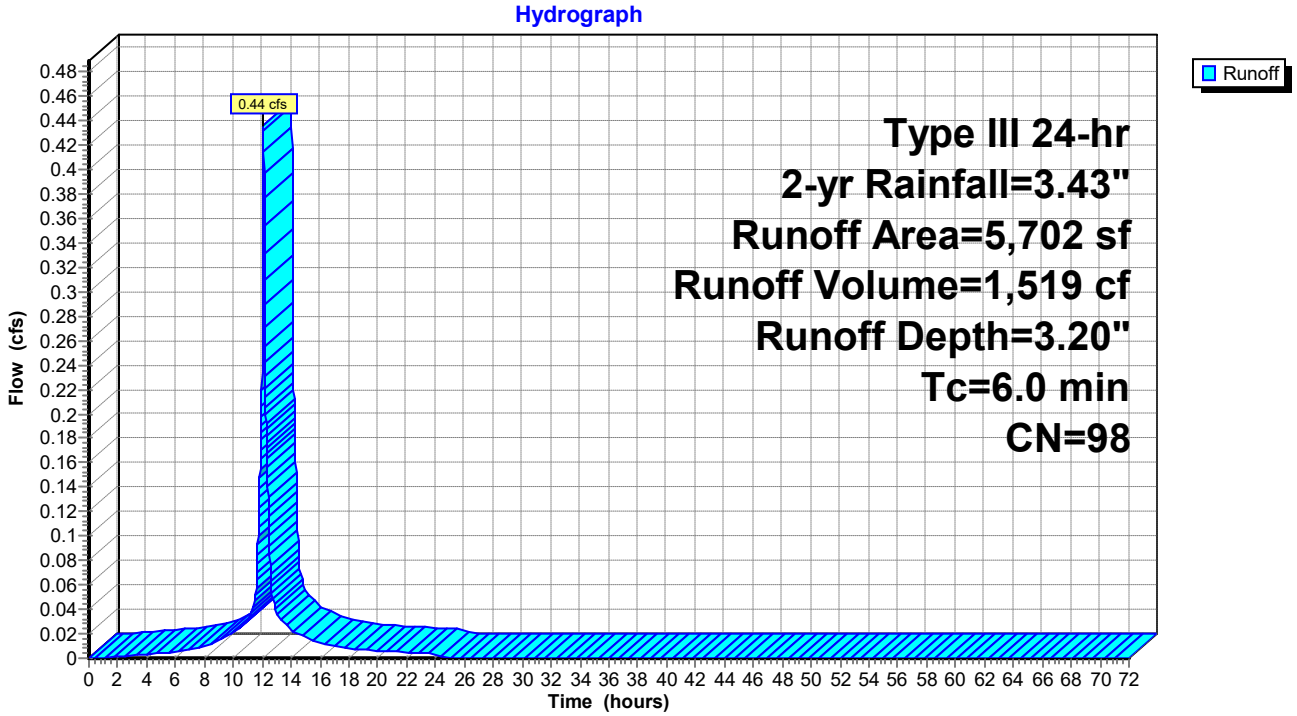
Runoff = 0.44 cfs @ 12.08 hrs, Volume= 1,519 cf, Depth= 3.20"
Routed to Pond INF-A : Addition Roof Gallery

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.43"

Area (sf)	CN	Description
5,702	98	Roofs, HSG A
5,702		100.00% Impervious Area

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

Subcatchment C1: Gar. Addition



Summary for Subcatchment D1: Garage Area

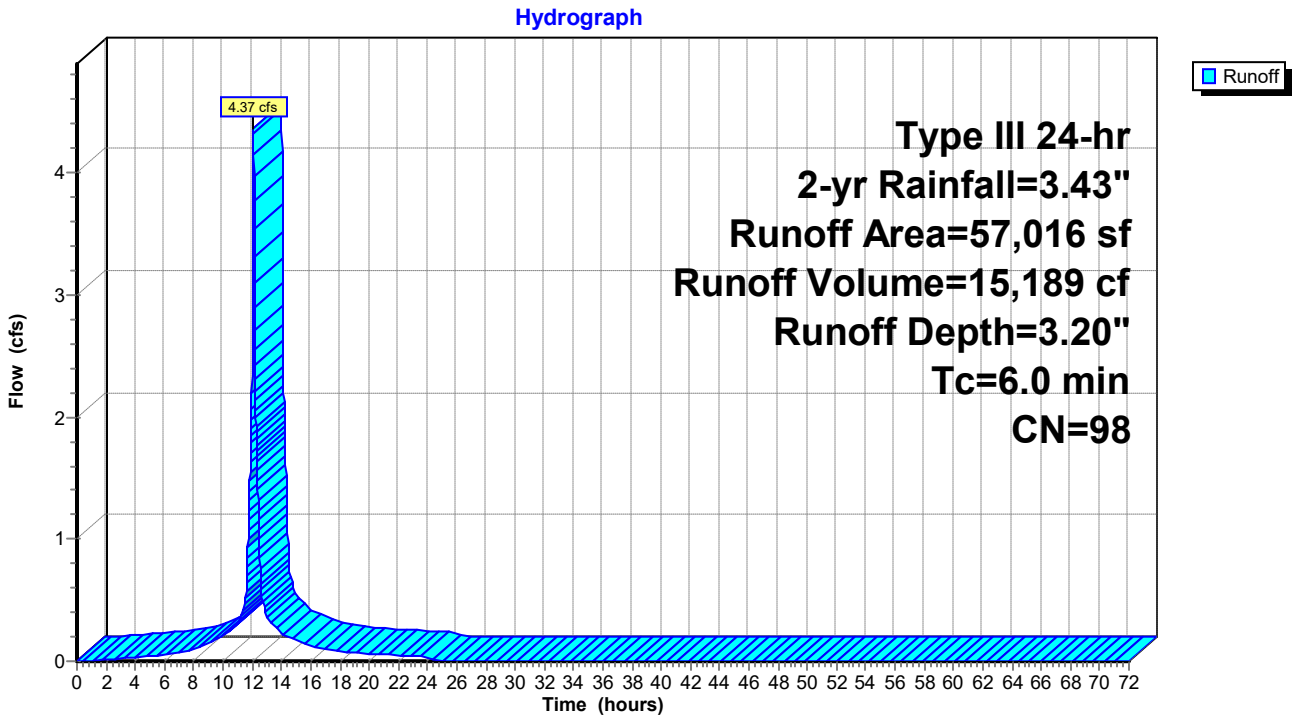
Runoff = 4.37 cfs @ 12.08 hrs, Volume= 15,189 cf, Depth= 3.20"
Routed to Pond INF-B : Garage Gallery

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.43"

	Area (sf)	CN	Description
*	57,016	98	Paved areas & roofs
	57,016		100.00% Impervious Area

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

Subcatchment D1: Garage Area



Summary for Subcatchment E1: Southeast Yard Area

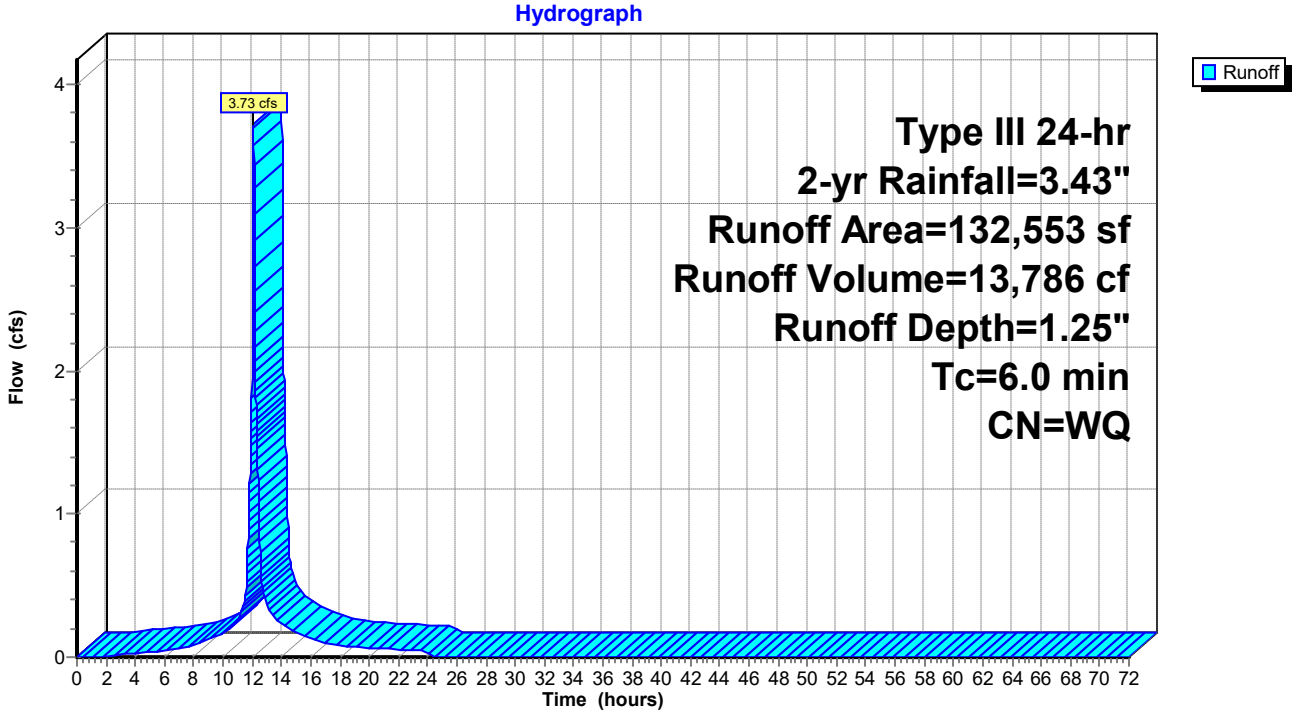
Runoff = 3.73 cfs @ 12.09 hrs, Volume= 13,786 cf, Depth= 1.25"
Routed to Link 1L : POI 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.43"

Area (sf)	CN	Description
47,097	98	Paved parking, HSG A
26,832	39	>75% Grass cover, Good, HSG A
17,412	30	Woods, Good, HSG A
34,660	55	Woods, Good, HSG B
6,552	61	>75% Grass cover, Good, HSG B
132,553		Weighted Average
85,456		64.47% Pervious Area
47,097		35.53% Impervious Area

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

Subcatchment E1: Southeast Yard Area



Summary for Subcatchment OFFSITE: Offsite Drainage

Total subcatchment represents approximately 2,039 LF of ROW (81,560 SF) minus areas that directly contribute to the onsite drainage network.

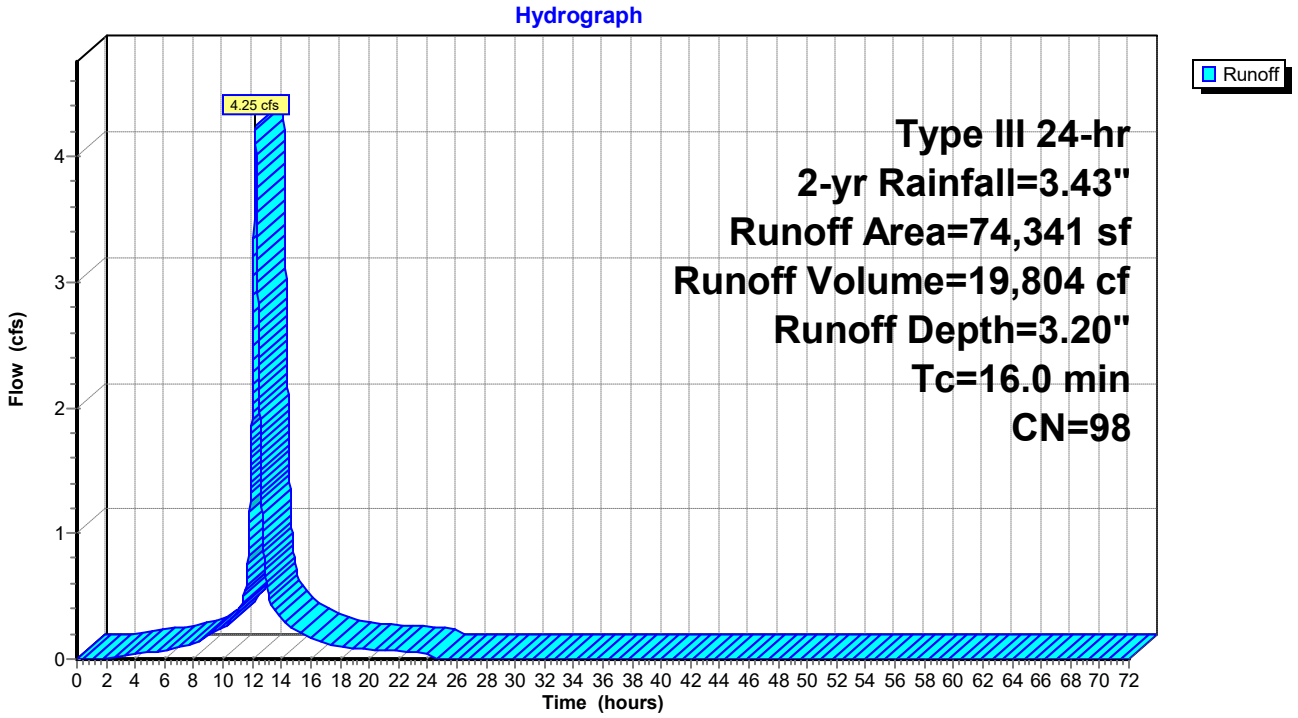
Runoff = 4.25 cfs @ 12.21 hrs, Volume= 19,804 cf, Depth= 3.20"
Routed to Pond EX DMH : DMH

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.43"

	Area (sf)	CN	Description
*	74,341	98	Elm St right-of-way
	74,341		100.00% Impervious Area

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

Subcatchment OFFSITE: Offsite Drainage



Summary for Pond DMH-110: DMH-110

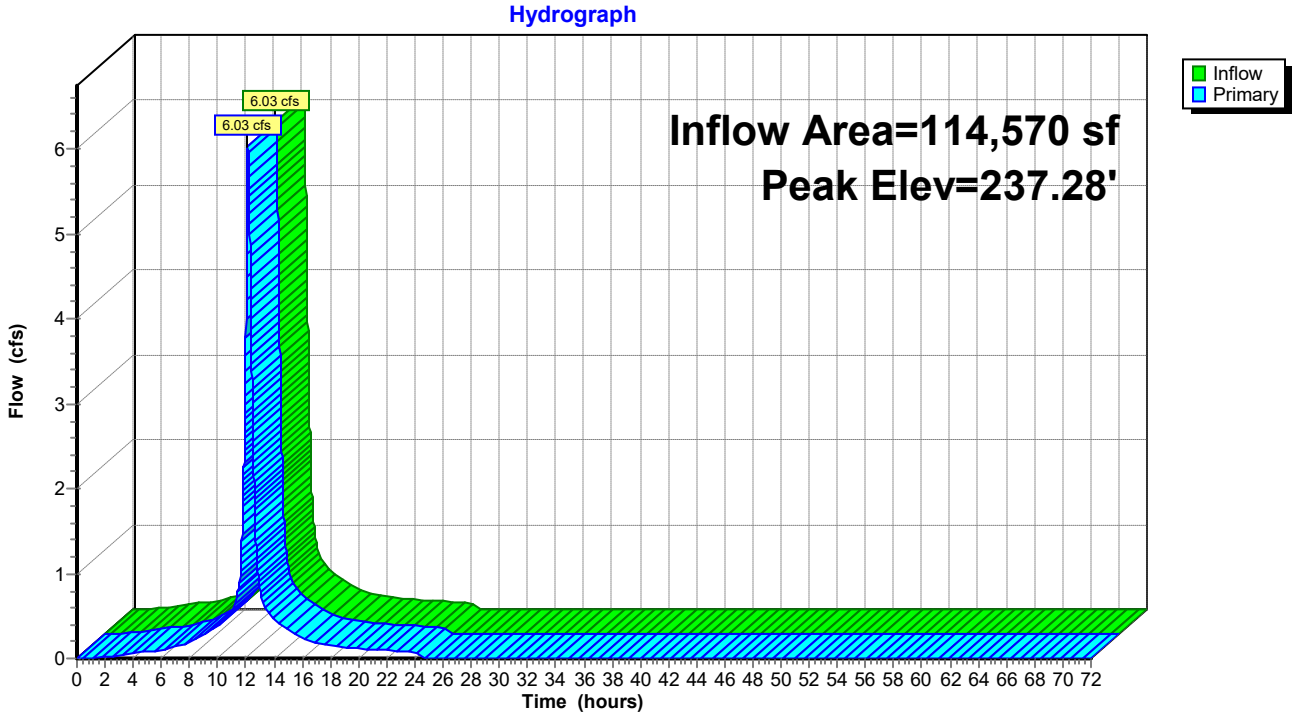
Inflow Area = 114,570 sf, 96.31% Impervious, Inflow Depth = 3.08" for 2-yr event
Inflow = 6.03 cfs @ 12.13 hrs, Volume= 29,396 cf
Outflow = 6.03 cfs @ 12.13 hrs, Volume= 29,396 cf, Atten= 0%, Lag= 0.0 min
Primary = 6.03 cfs @ 12.13 hrs, Volume= 29,396 cf
Routed to Pond DMH-118 : DMH-118

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 237.28' @ 12.13 hrs
Flood Elev= 241.60'

Device	Routing	Invert	Outlet Devices
#1	Primary	236.04'	**24.0" Round Culvert** L= 118.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 236.04' / 235.45' S= 0.0050 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 3.14 sf
#2	Primary	244.43'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=6.03 cfs @ 12.13 hrs HW=237.28' (Free Discharge)
1=Culvert (Barrel Controls 6.03 cfs @ 4.23 fps)
2=Orifice/Grate (Controls 0.00 cfs)

Pond DMH-110: DMH-110



Summary for Pond DMH-118: DMH-118

[79] Warning: Submerged Pond DMH-110 Primary device # 1 INLET by 0.26'

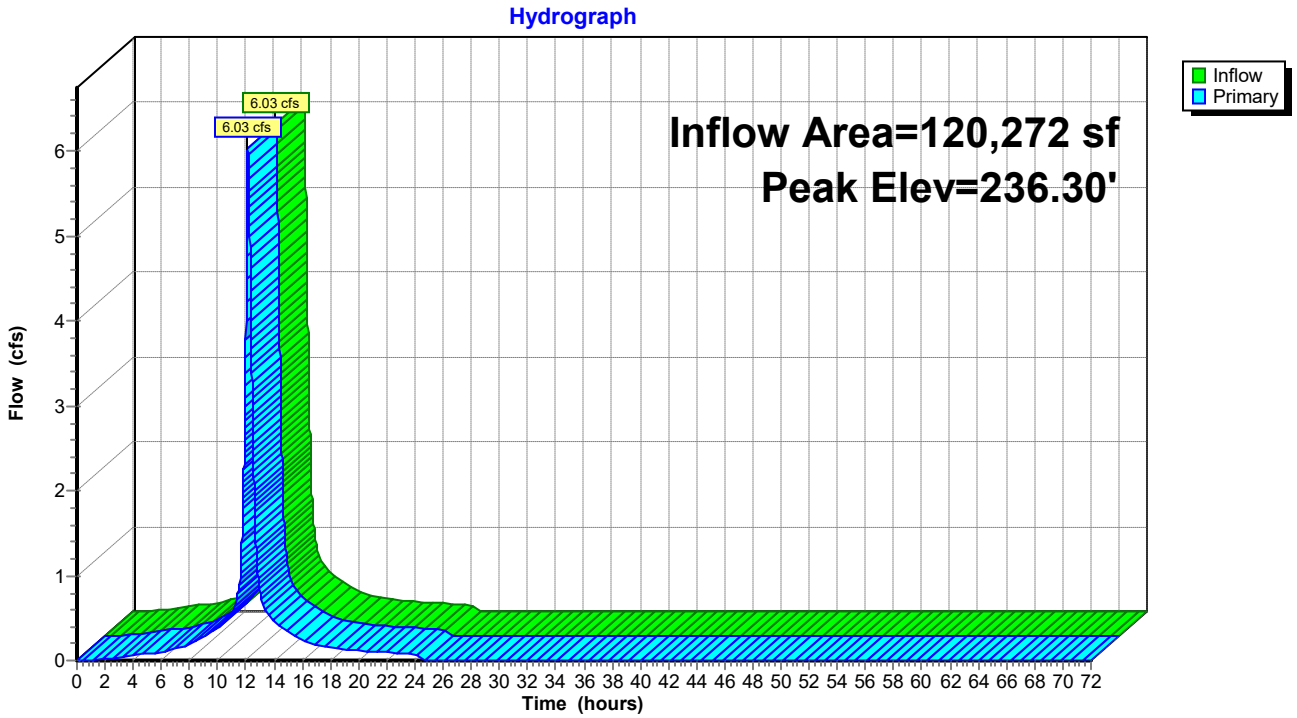
Inflow Area = 120,272 sf, 96.49% Impervious, Inflow Depth = 2.93" for 2-yr event
Inflow = 6.03 cfs @ 12.13 hrs, Volume= 29,396 cf
Outflow = 6.03 cfs @ 12.13 hrs, Volume= 29,396 cf, Atten= 0%, Lag= 0.0 min
Primary = 6.03 cfs @ 12.13 hrs, Volume= 29,396 cf
Routed to Pond DMH-125 : DMH-125

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 236.30' @ 12.13 hrs
Flood Elev= 241.41'

Device	Routing	Invert	Outlet Devices
#1	Primary	234.97'	**24.0" Round culvert** L= 37.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 234.97' / 234.78' S= 0.0051 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 3.14 sf
#2	Primary	243.98'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=6.03 cfs @ 12.13 hrs HW=236.30' (Free Discharge)
└─**1=culvert** (Barrel Controls 6.03 cfs @ 3.83 fps)
└─**2=Orifice/Grate** (Controls 0.00 cfs)

Pond DMH-118: DMH-118



Summary for Pond DMH-125: DMH-125

[81] Warning: Exceeded Pond DMH-118 by 3.99' @ 12.10 hrs

Inflow Area = 155,496 sf, 95.28% Impervious, Inflow Depth = 2.93" for 2-yr event
Inflow = 8.32 cfs @ 12.10 hrs, Volume= 37,950 cf
Outflow = 8.32 cfs @ 12.10 hrs, Volume= 37,950 cf, Atten= 0%, Lag= 0.0 min
Primary = 6.25 cfs @ 12.10 hrs, Volume= 36,710 cf
Routed to Link 1L : POI 1
Secondary = 2.07 cfs @ 12.10 hrs, Volume= 1,240 cf
Routed to Pond OCS-126 : OCS-126

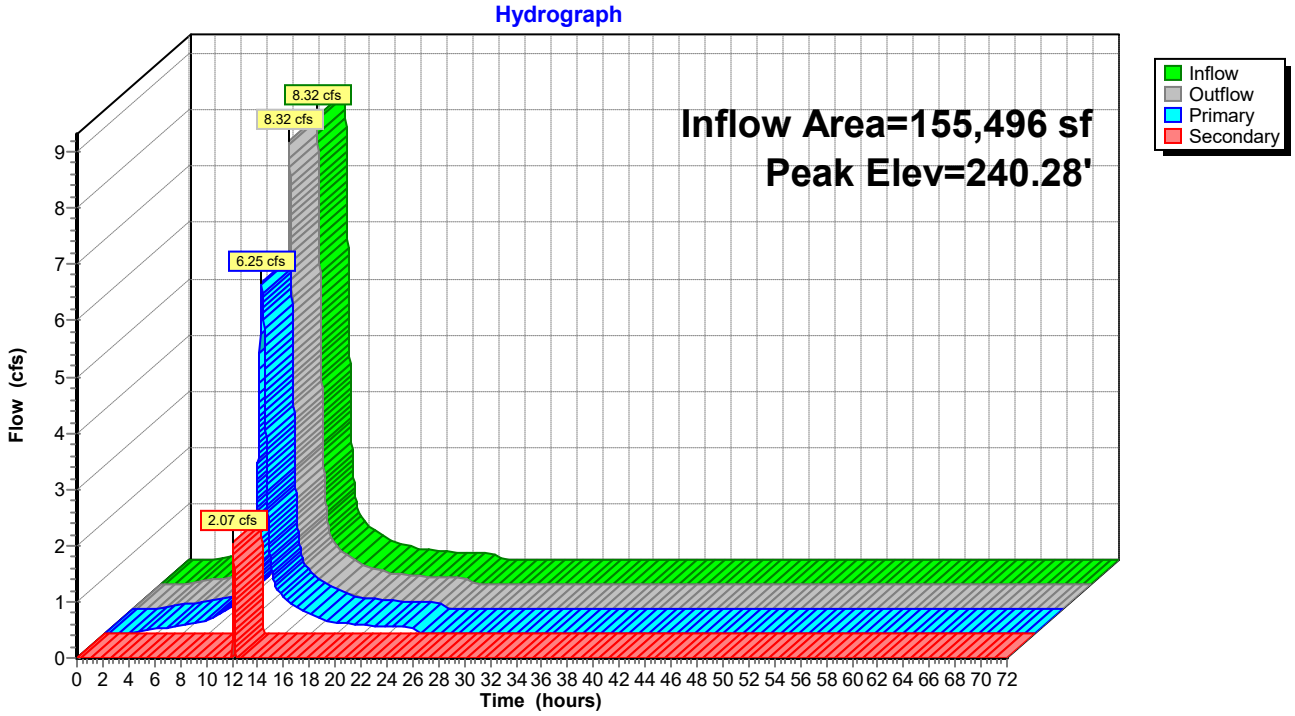
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 240.28' @ 12.10 hrs
Flood Elev= 240.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	235.40'	**12.0" Round Culvert** L= 130.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 235.40' / 233.54' S= 0.0143 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#2	Secondary	239.30'	**12.0" Round Culvert** L= 70.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 239.30' / 237.90' S= 0.0200 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=6.24 cfs @ 12.10 hrs HW=240.27' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 6.24 cfs @ 7.95 fps)

Secondary OutFlow Max=2.07 cfs @ 12.10 hrs HW=240.27' (Free Discharge)
↑—**2=Culvert** (Inlet Controls 2.07 cfs @ 2.65 fps)

Pond DMH-125: DMH-125



Summary for Pond EX DMH: DMH

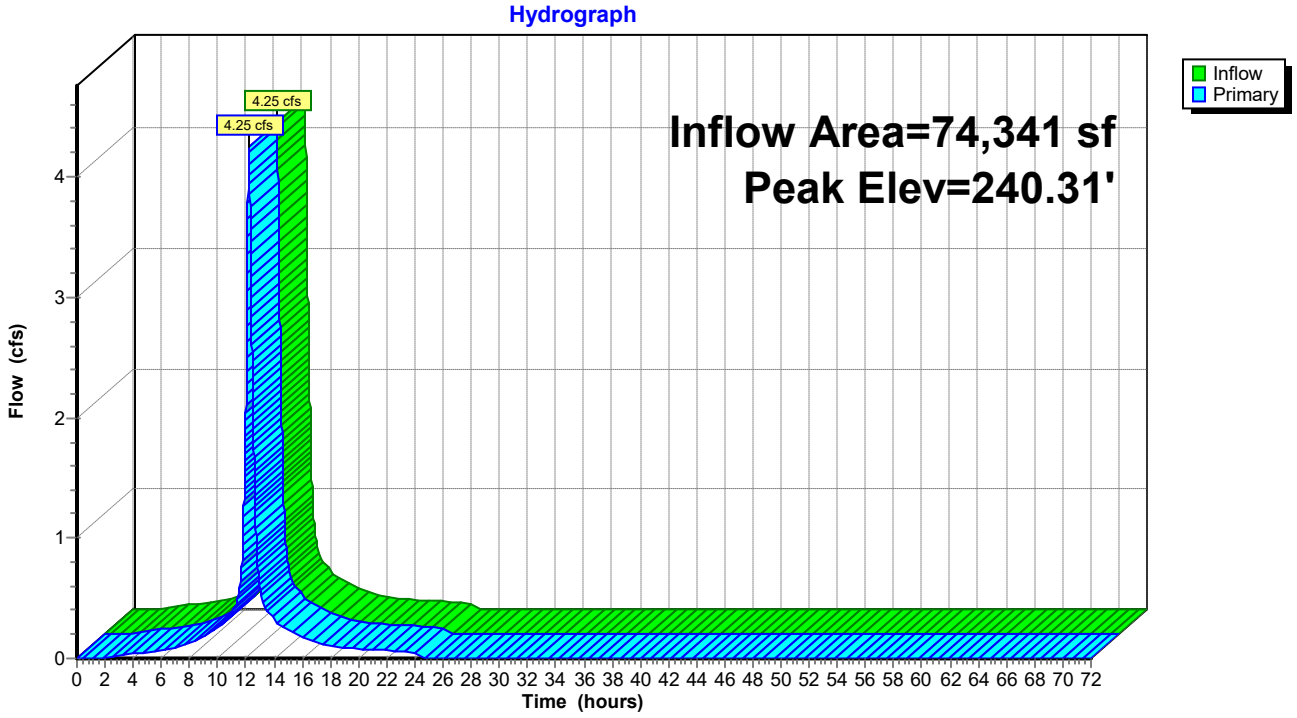
Inflow Area = 74,341 sf,100.00% Impervious, Inflow Depth = 3.20" for 2-yr event
Inflow = 4.25 cfs @ 12.21 hrs, Volume= 19,804 cf
Outflow = 4.25 cfs @ 12.21 hrs, Volume= 19,804 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.25 cfs @ 12.21 hrs, Volume= 19,804 cf
Routed to Pond DMH-110 : DMH-110

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 240.31' @ 12.21 hrs
Flood Elev= 244.83'

Device	Routing	Invert	Outlet Devices
#1	Primary	239.23'	**15.0" Round RCP_Round 15"** L= 20.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 239.23' / 238.90' S= 0.0165 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 1.23 sf
#2	Primary	244.58'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=4.25 cfs @ 12.21 hrs HW=240.31' (Free Discharge)
└─**1=RCP_Round 15"** (Barrel Controls 4.25 cfs @ 5.03 fps)
└─**2=Orifice/Grate** (Controls 0.00 cfs)

Pond EX DMH: DMH



Summary for Pond INF-A: Addition Roof Gallery

Inflow Area = 5,702 sf,100.00% Impervious, Inflow Depth = 3.20" for 2-yr event
Inflow = 0.44 cfs @ 12.08 hrs, Volume= 1,519 cf
Outflow = 0.04 cfs @ 12.90 hrs, Volume= 1,519 cf, Atten= 91%, Lag= 49.0 min
Discarded = 0.04 cfs @ 12.90 hrs, Volume= 1,519 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Pond DMH-118 : DMH-118

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 240.37' @ 12.90 hrs Surf.Area= 1,600 sf Storage= 537 cf
Flood Elev= 242.03' Surf.Area= 1,600 sf Storage= 2,022 cf

Plug-Flow detention time= 94.8 min calculated for 1,519 cf (100% of inflow)
Center-of-Mass det. time= 94.8 min (849.8 - 755.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	239.70'	1,139 cf	**21.50'W x 74.40'L x 2.33'H Field A** 3,732 cf Overall - 885 cf Embedded = 2,848 cf x 40.0% Voids
#2A	240.20'	885 cf	**ADS_StormTech SC-310 +Cap** x 60 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 60 Chambers in 6 Rows
		2,024 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	239.60'	**12.0" Round Culvert** L= 50.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 239.60' / 239.00' S= 0.0120 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	240.95'	**2.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height
#3	Discarded	239.70'	**1.020 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.04 cfs @ 12.90 hrs HW=240.37' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=239.70' (Free Discharge)
└**1=Culvert** (Passes 0.00 cfs of 0.03 cfs potential flow)
└**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond INF-A: Addition Roof Gallery - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-310 +Cap (ADS StormTech® SC-310 with cap length)
Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf
Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

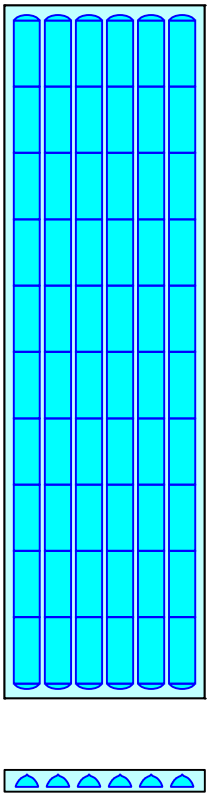
10 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 72.40' Row Length +12.0" End Stone x 2 = 74.40' Base Length
6 Rows x 34.0" Wide + 6.0" Spacing x 5 + 12.0" Side Stone x 2 = 21.50' Base Width
6.0" Stone Base + 16.0" Chamber Height + 6.0" Stone Cover = 2.33' Field Height

60 Chambers x 14.7 cf = 884.5 cf Chamber Storage

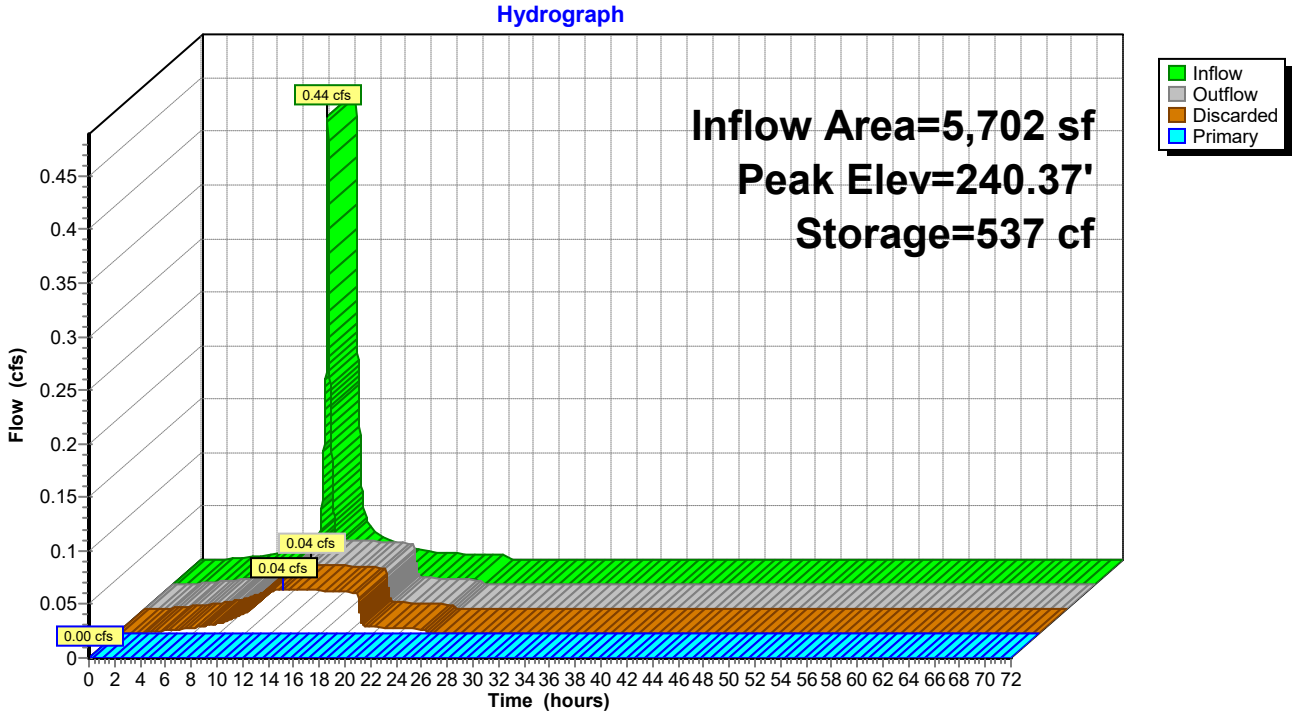
3,732.4 cf Field - 884.5 cf Chambers = 2,847.9 cf Stone x 40.0% Voids = 1,139.2 cf Stone Storage

Chamber Storage + Stone Storage = 2,023.7 cf = 0.046 af
Overall Storage Efficiency = 54.2%
Overall System Size = 74.40' x 21.50' x 2.33'

60 Chambers
138.2 cy Field
105.5 cy Stone



Pond INF-A: Addition Roof Gallery



Summary for Pond INF-B: Garage Gallery

Inflow Area = 57,016 sf,100.00% Impervious, Inflow Depth = 3.20" for 2-yr event
Inflow = 4.37 cfs @ 12.08 hrs, Volume= 15,189 cf
Outflow = 1.73 cfs @ 12.30 hrs, Volume= 15,188 cf, Atten= 60%, Lag= 12.9 min
Discarded = 0.10 cfs @ 12.30 hrs, Volume= 10,955 cf
Primary = 1.63 cfs @ 12.30 hrs, Volume= 4,233 cf
Routed to Pond OCS-216 : OCS-216

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 239.18' @ 12.30 hrs Surf.Area= 3,590 sf Storage= 6,184 cf
Flood Elev= 240.40' Surf.Area= 3,590 sf Storage= 7,727 cf

Plug-Flow detention time= 381.5 min calculated for 15,186 cf (100% of inflow)
Center-of-Mass det. time= 381.6 min (1,136.6 - 755.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	236.65'	3,225 cf	**34.75'W x 103.30'L x 3.50'H Field A** 12,563 cf Overall - 4,502 cf Embedded = 8,061 cf x 40.0% Voids
#2A	237.15'	4,502 cf	**ADS_StormTech SC-740 +Cap** x 98 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 98 Chambers in 7 Rows
		7,727 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	237.65'	**24.0" Round Culvert** L= 50.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 237.65' / 237.40' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	238.85'	**2.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height
#3	Discarded	236.65'	**1.020 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.10 cfs @ 12.30 hrs HW=239.18' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.10 cfs)

Primary OutFlow Max=1.62 cfs @ 12.30 hrs HW=239.18' (Free Discharge)
└**1=Culvert** (Passes 1.62 cfs of 7.58 cfs potential flow)
└**2=Sharp-Crested Rectangular Weir** (Weir Controls 1.62 cfs @ 2.03 fps)

Pond INF-B: Garage Gallery - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

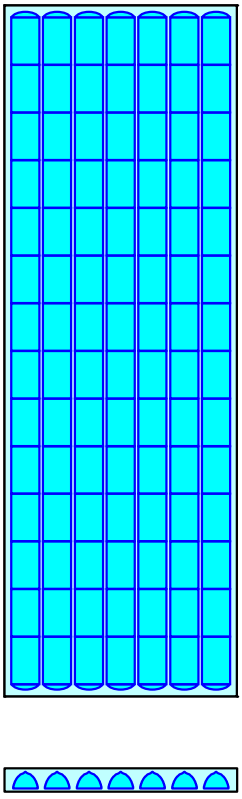
14 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 101.30' Row Length +12.0" End Stone x 2 = 103.30' Base Length
7 Rows x 51.0" Wide + 6.0" Spacing x 6 + 12.0" Side Stone x 2 = 34.75' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

98 Chambers x 45.9 cf = 4,502.1 cf Chamber Storage

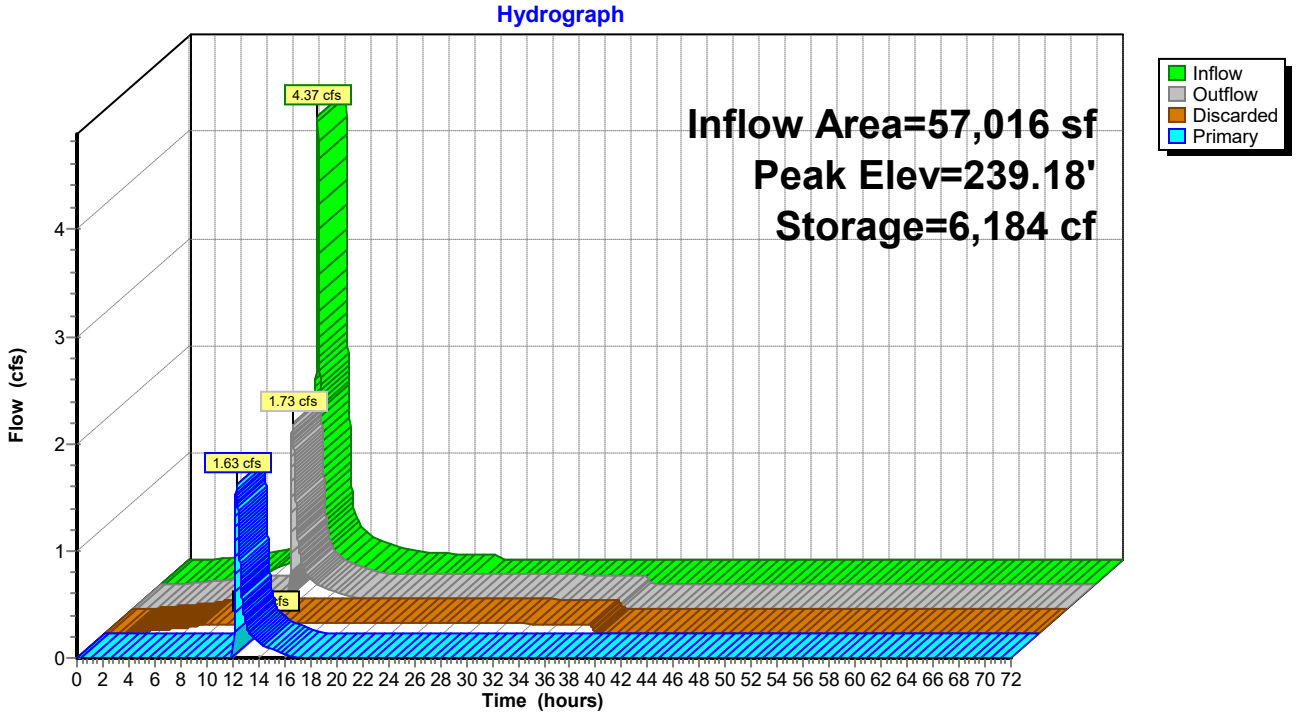
12,563.5 cf Field - 4,502.1 cf Chambers = 8,061.3 cf Stone x 40.0% Voids = 3,224.5 cf Stone Storage

Chamber Storage + Stone Storage = 7,726.7 cf = 0.177 af
Overall Storage Efficiency = 61.5%
Overall System Size = 103.30' x 34.75' x 3.50'

98 Chambers
465.3 cy Field
298.6 cy Stone



Pond INF-B: Garage Gallery



Summary for Pond INF-C: Bus Parking Gallery

Inflow Area = 52,591 sf, 96.67% Impervious, Inflow Depth = 3.10" for 2-yr event
Inflow = 3.90 cfs @ 12.08 hrs, Volume= 13,575 cf
Outflow = 0.19 cfs @ 14.19 hrs, Volume= 13,575 cf, Atten= 95%, Lag= 126.5 min
Discarded = 0.19 cfs @ 14.19 hrs, Volume= 13,575 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Pond OCS-311 : OCS-311

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 242.54' @ 14.19 hrs Surf.Area= 7,709 sf Storage= 6,296 cf
Flood Elev= 244.80' Surf.Area= 7,709 sf Storage= 16,746 cf

Plug-Flow detention time= 277.5 min calculated for 13,575 cf (100% of inflow)
Center-of-Mass det. time= 277.4 min (1,032.8 - 755.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	241.30'	6,823 cf	**58.50'W x 131.78'L x 3.50'H Field A** 26,981 cf Overall - 9,923 cf Embedded = 17,058 cf x 40.0% Voids
#2A	241.80'	9,923 cf	**ADS_StormTech SC-740 +Cap** x 216 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 216 Chambers in 12 Rows
		16,746 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	242.80'	**12.0" Round Culvert** L= 100.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 242.80' / 242.30' S= 0.0050 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#2	Device 1	244.05'	**2.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height
#3	Discarded	241.30'	**1.020 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.19 cfs @ 14.19 hrs HW=242.54' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.19 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=241.30' (Free Discharge)
└**1=Culvert** (Controls 0.00 cfs)
└**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond INF-C: Bus Parking Gallery - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

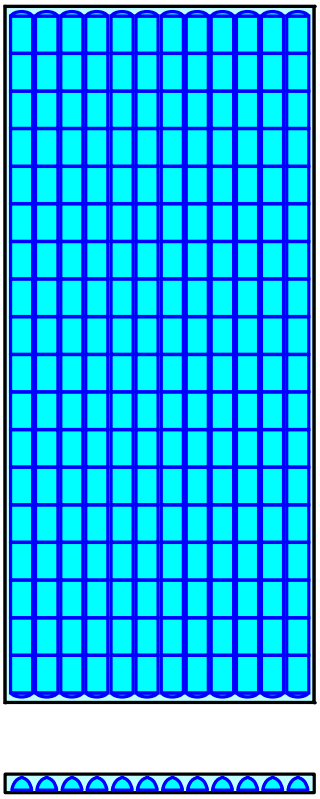
18 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 129.78' Row Length +12.0" End Stone x 2 = 131.78' Base Length
12 Rows x 51.0" Wide + 6.0" Spacing x 11 + 12.0" Side Stone x 2 = 58.50' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

216 Chambers x 45.9 cf = 9,923.0 cf Chamber Storage

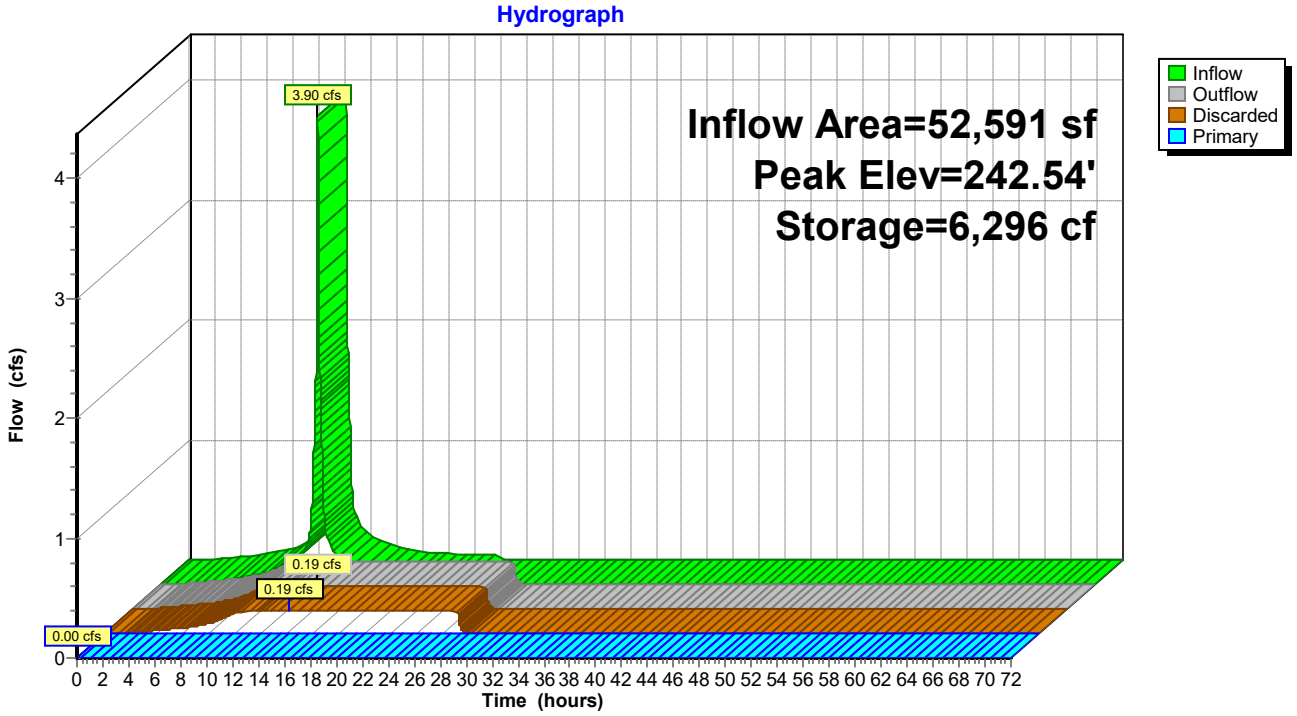
26,981.3 cf Field - 9,923.0 cf Chambers = 17,058.2 cf Stone x 40.0% Voids = 6,823.3 cf Stone Storage

Chamber Storage + Stone Storage = 16,746.3 cf = 0.384 af
Overall Storage Efficiency = 62.1%
Overall System Size = 131.78' x 58.50' x 3.50'

216 Chambers
999.3 cy Field
631.8 cy Stone



Pond INF-C: Bus Parking Gallery



Summary for Pond OCS-126: OCS-126

[57] Hint: Peaked at 241.10' (Flood elevation advised)
[81] Warning: Exceeded Pond DMH-125 by 5.52' @ 0.00 hrs

Inflow	=	2.07 cfs @	12.10 hrs,	Volume=	1,240 cf
Outflow	=	2.07 cfs @	12.10 hrs,	Volume=	1,240 cf, Atten= 0%, Lag= 0.0 min
Primary	=	2.07 cfs @	12.10 hrs,	Volume=	1,240 cf

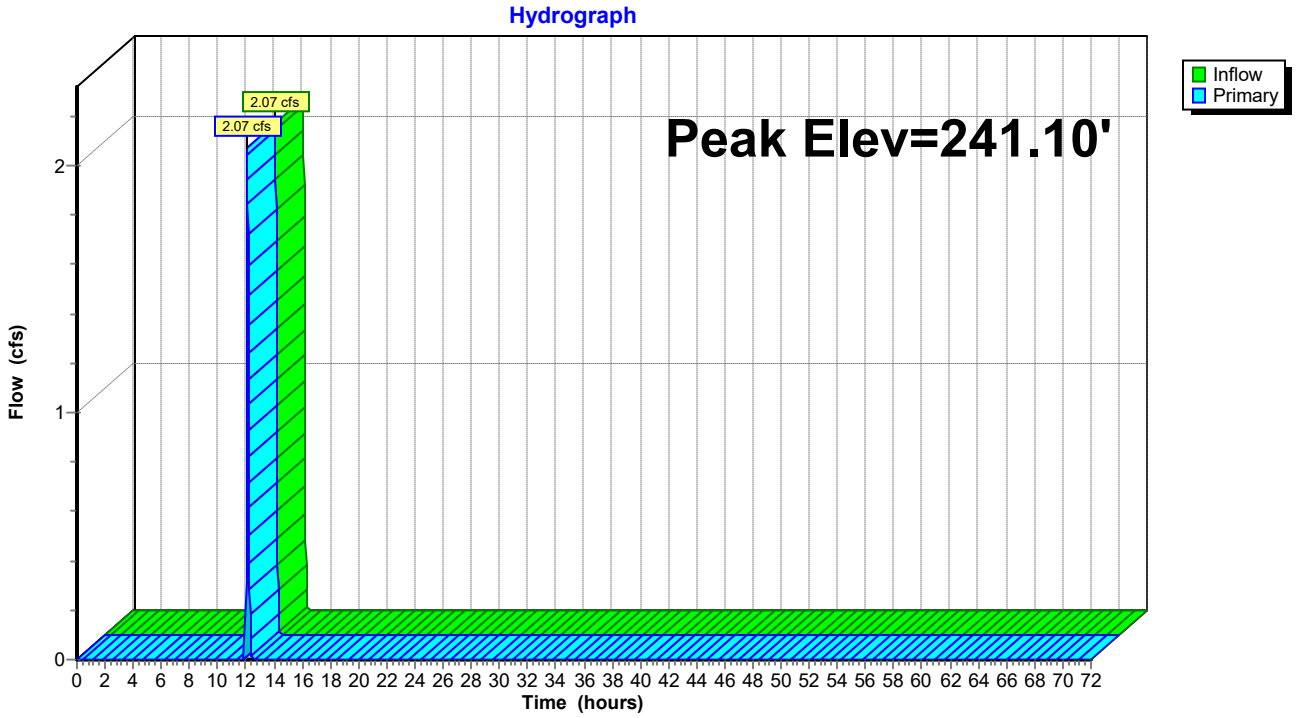
Routed to Link 1L : POI 1

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 241.10' @ 12.10 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	240.92'	**24.0" x 24.0" Horiz. Overflow Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=2.06 cfs @ 12.10 hrs HW=241.10' (Free Discharge)
1=Overflow Grate (Weir Controls 2.06 cfs @ 1.40 fps)

Pond OCS-126: OCS-126



Summary for Pond OCS-216: OCS-216

[58] Hint: Peaked 0.66' above defined flood level
[81] Warning: Exceeded Pond INF-B by 4.35' @ 0.00 hrs

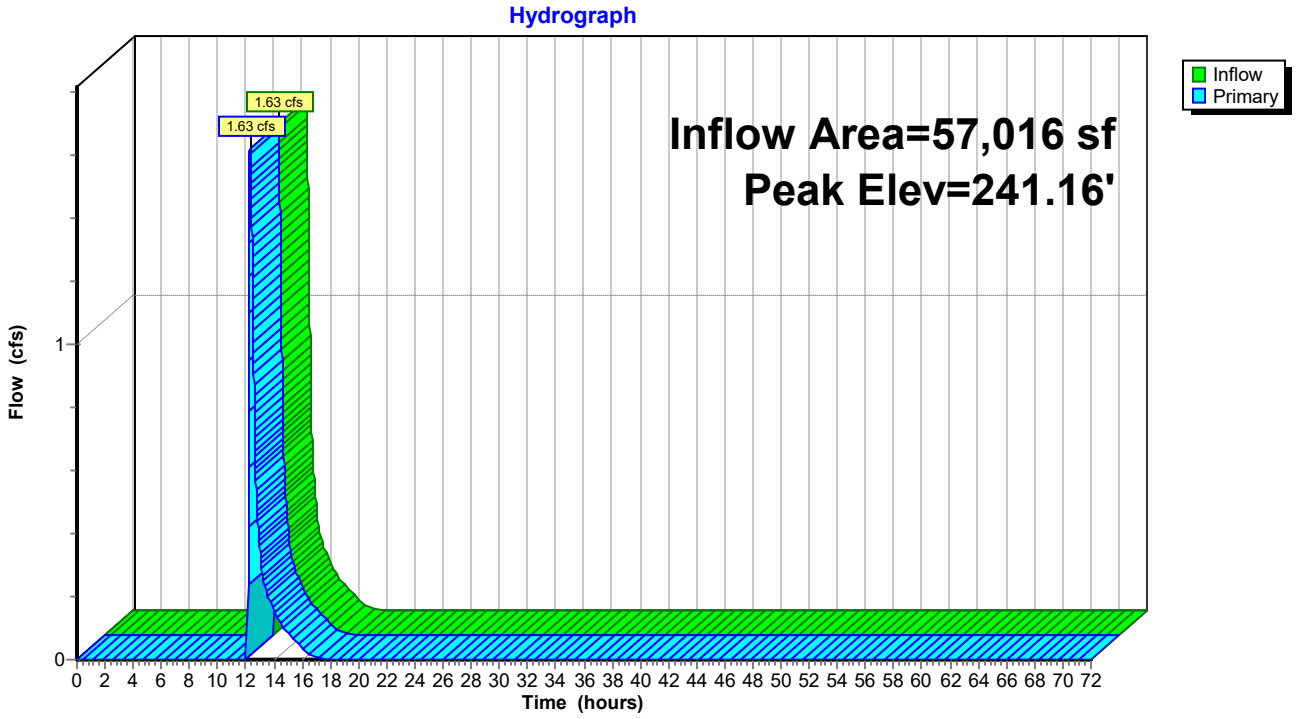
Inflow Area = 57,016 sf,100.00% Impervious, Inflow Depth = 0.89" for 2-yr event
Inflow = 1.63 cfs @ 12.30 hrs, Volume= 4,233 cf
Outflow = 1.63 cfs @ 12.30 hrs, Volume= 4,233 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.63 cfs @ 12.30 hrs, Volume= 4,233 cf
Routed to Link 1L : POI 1

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 241.16' @ 12.30 hrs
Flood Elev= 240.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	241.00'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.62 cfs @ 12.30 hrs HW=241.16' (Free Discharge)
1=Orifice/Grate (Weir Controls 1.62 cfs @ 1.29 fps)

Pond OCS-216: OCS-216



Summary for Pond OCS-311: OCS-311

[58] Hint: Peaked 4.50' above defined flood level
[81] Warning: Exceeded Pond INF-C by 3.70' @ 0.00 hrs

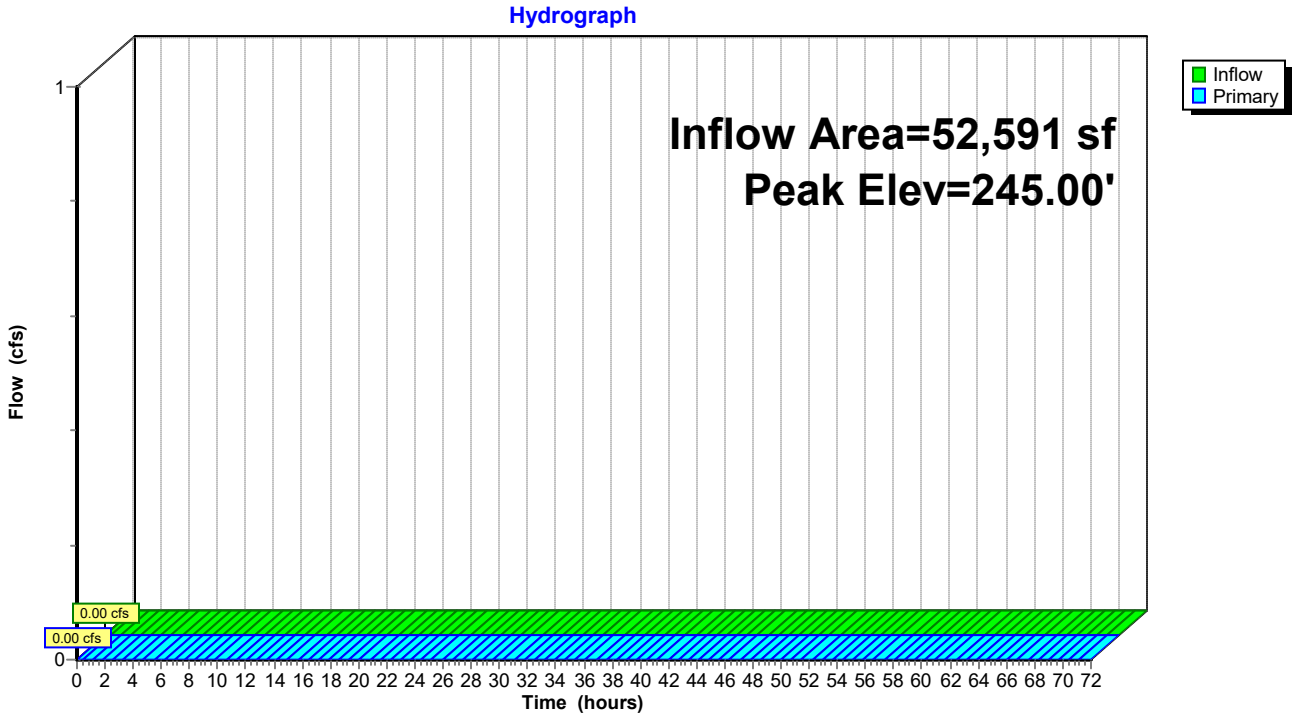
Inflow Area = 52,591 sf, 96.67% Impervious, Inflow Depth = 0.00" for 2-yr event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Link 1L : POI 1

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 245.00' @ 0.00 hrs
Flood Elev= 240.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	245.00'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=245.00' (Free Discharge)
1=Orifice/Grate (Controls 0.00 cfs)

Pond OCS-311: OCS-311

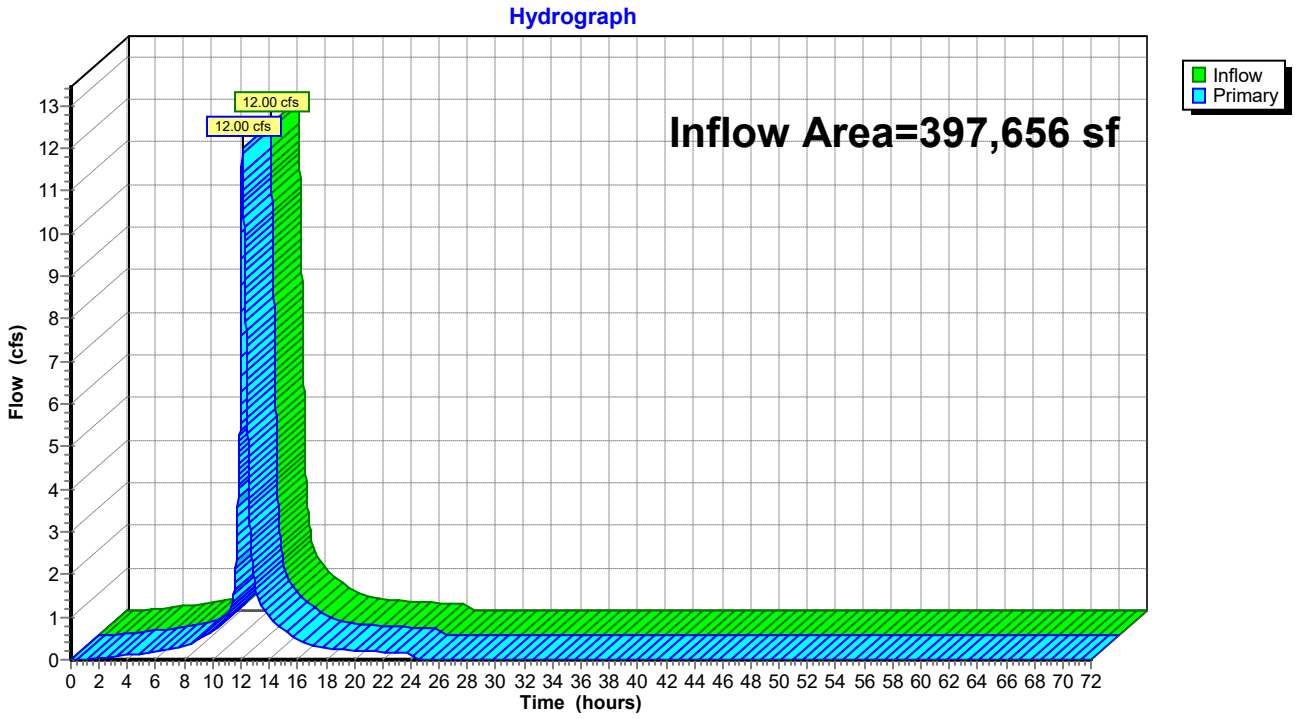


Summary for Link 1L: POI 1

Inflow Area = 397,656 sf, 76.22% Impervious, Inflow Depth = 1.69" for 2-yr event
Inflow = 12.00 cfs @ 12.10 hrs, Volume= 55,970 cf
Primary = 12.00 cfs @ 12.10 hrs, Volume= 55,970 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link 1L: POI 1



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

Subcatchment A1: Bus Parking Area Runoff Area=52,591 sf 96.67% Impervious Runoff Depth=4.86"
Tc=6.0 min CN=WQ Runoff=6.01 cfs 21,304 cf

Subcatchment B1: Frontage Areas Runoff Area=40,229 sf 89.49% Impervious Runoff Depth=4.50"
Tc=6.0 min CN=WQ Runoff=4.24 cfs 15,098 cf

Subcatchment B2: North Yard Area Runoff Area=35,224 sf 91.15% Impervious Runoff Depth=4.58"
Tc=6.0 min CN=WQ Runoff=3.78 cfs 13,450 cf

Subcatchment C1: Gar. Addition Runoff Area=5,702 sf 100.00% Impervious Runoff Depth=5.00"
Tc=6.0 min CN=98 Runoff=0.67 cfs 2,377 cf

Subcatchment D1: Garage Area Runoff Area=57,016 sf 100.00% Impervious Runoff Depth=5.00"
Tc=6.0 min CN=98 Runoff=6.71 cfs 23,770 cf

Subcatchment E1: Southeast Yard Area Runoff Area=132,553 sf 35.53% Impervious Runoff Depth=2.19"
Tc=6.0 min CN=WQ Runoff=6.61 cfs 24,226 cf

Subcatchment OFFSITE: Offsite Drainage Runoff Area=74,341 sf 100.00% Impervious Runoff Depth=5.00"
Tc=16.0 min CN=98 Runoff=6.54 cfs 30,993 cf

Pond DMH-110: DMH-110 Peak Elev=237.66' Inflow=9.28 cfs 46,091 cf
Outflow=9.28 cfs 46,091 cf

Pond DMH-118: DMH-118 Peak Elev=236.72' Inflow=9.28 cfs 46,091 cf
Outflow=9.28 cfs 46,091 cf

Pond DMH-125: DMH-125 Peak Elev=242.66' Inflow=12.80 cfs 59,540 cf
Primary=7.75 cfs 54,478 cf Secondary=5.05 cfs 5,062 cf Outflow=12.80 cfs 59,540 cf

Pond EX DMH: DMH Peak Elev=240.78' Inflow=6.54 cfs 30,993 cf
Outflow=6.54 cfs 30,993 cf

Pond INF-A: Addition Roof Gallery Peak Elev=240.75' Storage=981 cf Inflow=0.67 cfs 2,377 cf
Discarded=0.04 cfs 2,377 cf Primary=0.00 cfs 0 cf Outflow=0.04 cfs 2,377 cf

Pond INF-B: Garage Gallery Peak Elev=239.61' Storage=6,951 cf Inflow=6.71 cfs 23,770 cf
Discarded=0.10 cfs 12,224 cf Primary=6.04 cfs 11,546 cf Outflow=6.14 cfs 23,770 cf

Pond INF-C: Bus Parking Gallery Peak Elev=243.47' Storage=11,656 cf Inflow=6.01 cfs 21,304 cf
Discarded=0.20 cfs 21,304 cf Primary=0.00 cfs 0 cf Outflow=0.20 cfs 21,304 cf

Pond OCS-126: OCS-126 Peak Elev=241.25' Inflow=5.05 cfs 5,062 cf
Outflow=5.05 cfs 5,062 cf

Pond OCS-216: OCS-216 Peak Elev=241.38' Inflow=6.04 cfs 11,546 cf
Outflow=6.04 cfs 11,546 cf

Pond OCS-311: OCS-311 Peak Elev=245.00' Inflow=0.00 cfs 0 cf
Outflow=0.00 cfs 0 cf

Link 1L: POI 1 Inflow=25.21 cfs 95,313 cf
Primary=25.21 cfs 95,313 cf

Total Runoff Area = 397,656 sf Runoff Volume = 131,218 cf Average Runoff Depth = 3.96"
23.78% Pervious = 94,551 sf 76.22% Impervious = 303,105 sf

Summary for Subcatchment A1: Bus Parking Area

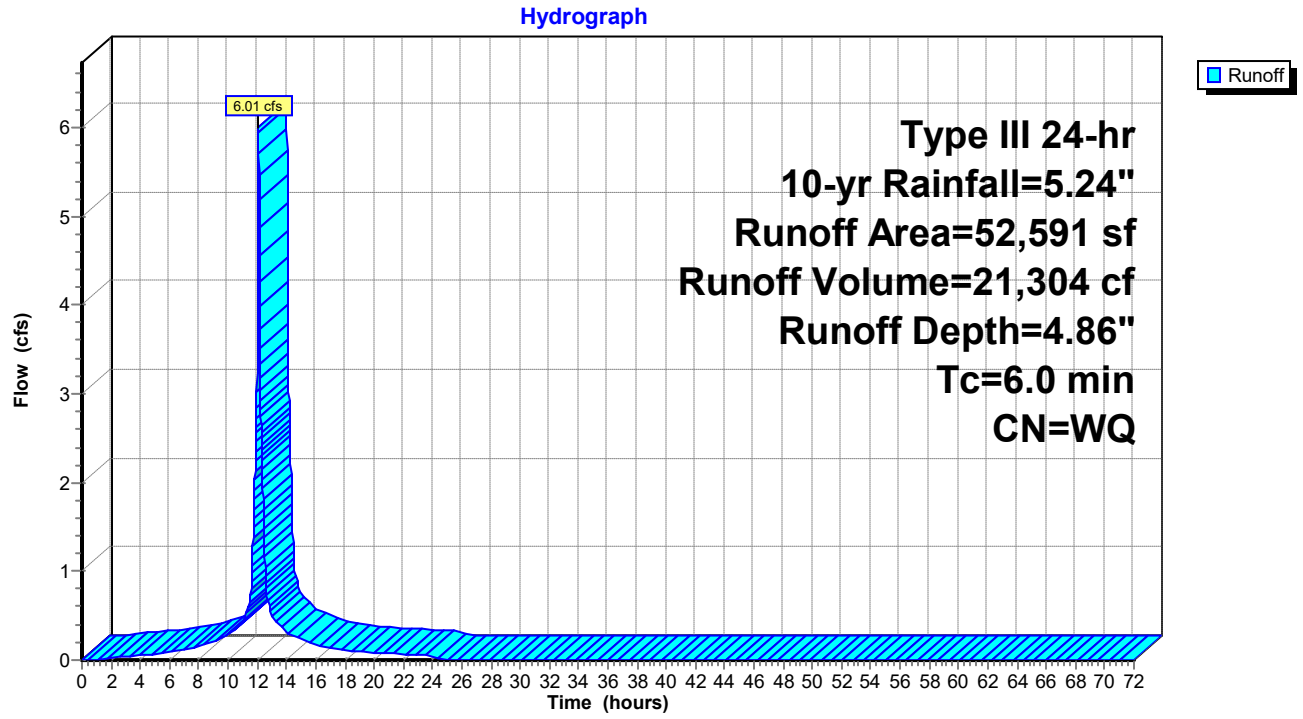
Runoff = 6.01 cfs @ 12.08 hrs, Volume= 21,304 cf, Depth= 4.86"
Routed to Pond INF-C : Bus Parking Gallery

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.24"

	Area (sf)	CN	Description
*	50,842	98	Paved parking
	673	61	>75% Grass cover, Good, HSG B
	1,076	39	>75% Grass cover, Good, HSG A
	52,591		Weighted Average
	1,749		3.33% Pervious Area
	50,842		96.67% Impervious Area

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

Subcatchment A1: Bus Parking Area



Summary for Subcatchment B1: Frontage Areas

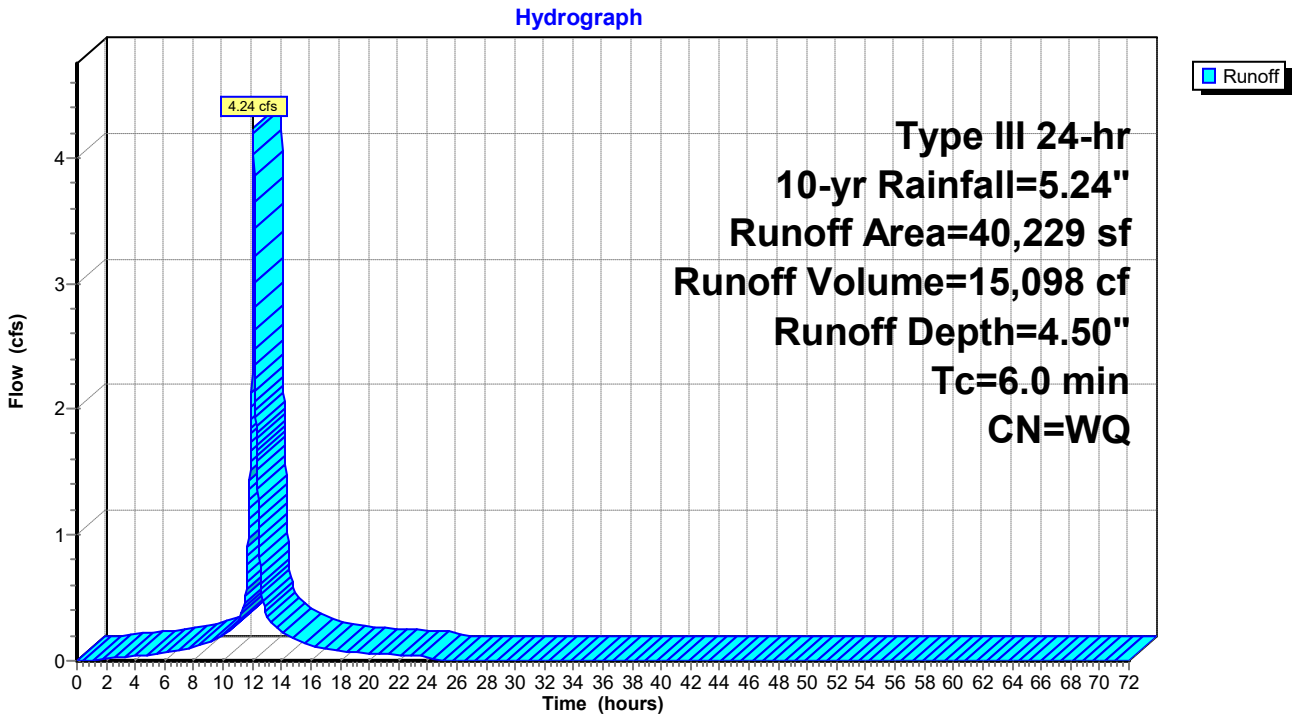
Runoff = 4.24 cfs @ 12.08 hrs, Volume= 15,098 cf, Depth= 4.50"
Routed to Pond DMH-110 : DMH-110

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.24"

	Area (sf)	CN	Description
*	36,002	98	Paved areas & roofs
	4,227	39	>75% Grass cover, Good, HSG A
	40,229		Weighted Average
	4,227		10.51% Pervious Area
	36,002		89.49% Impervious Area

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

Subcatchment B1: Frontage Areas



Summary for Subcatchment B2: North Yard Area

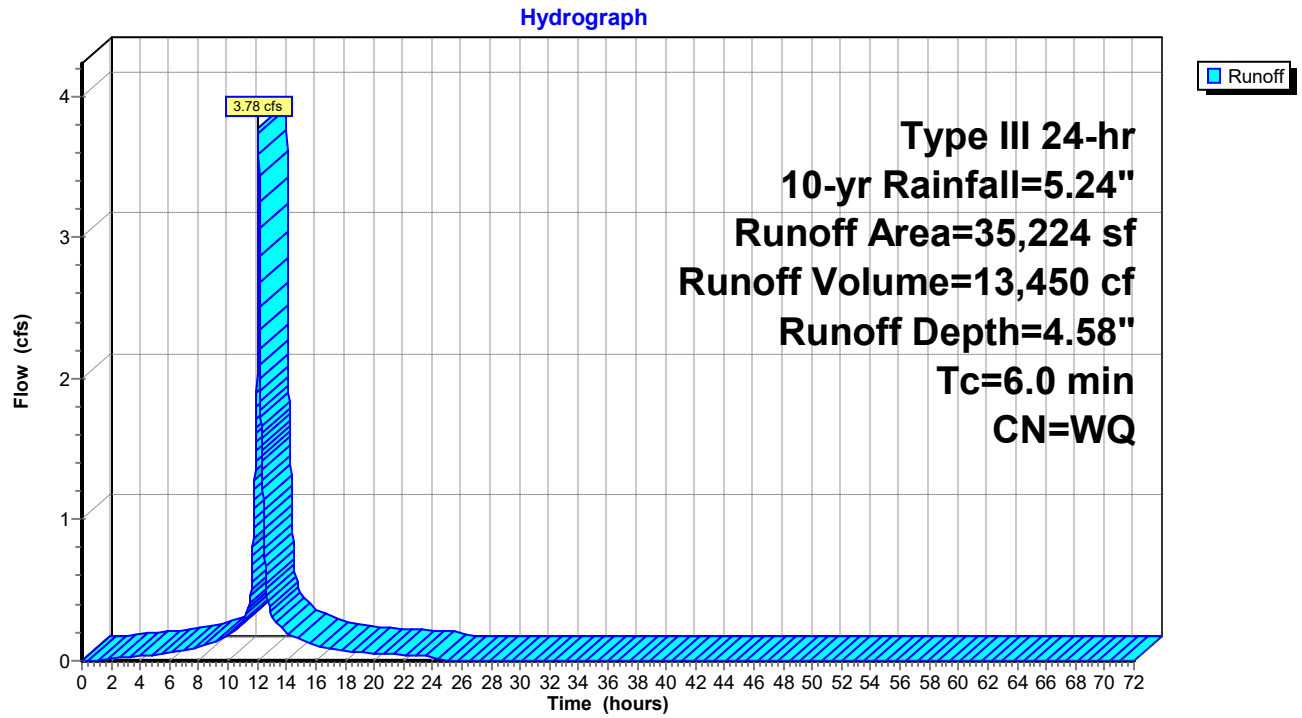
Runoff = 3.78 cfs @ 12.08 hrs, Volume= 13,450 cf, Depth= 4.58"
Routed to Pond DMH-125 : DMH-125

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.24"

	Area (sf)	CN	Description
*	32,105	98	Paved areas & roofs
	3,119	39	>75% Grass cover, Good, HSG A
	35,224		Weighted Average
	3,119		8.85% Pervious Area
	32,105		91.15% Impervious Area

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

Subcatchment B2: North Yard Area



Summary for Subcatchment C1: Gar. Addition

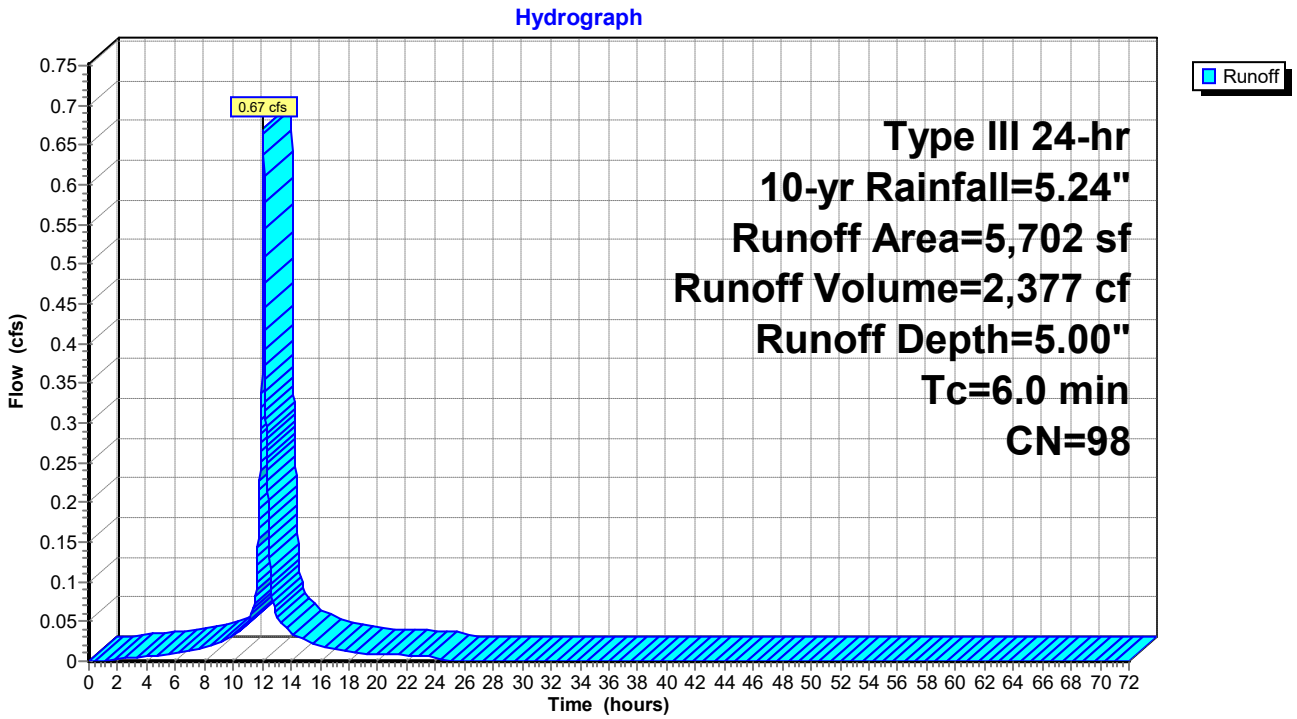
Runoff = 0.67 cfs @ 12.08 hrs, Volume= 2,377 cf, Depth= 5.00"
Routed to Pond INF-A : Addition Roof Gallery

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.24"

Area (sf)	CN	Description
5,702	98	Roofs, HSG A
5,702		100.00% Impervious Area

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

Subcatchment C1: Gar. Addition



Summary for Subcatchment D1: Garage Area

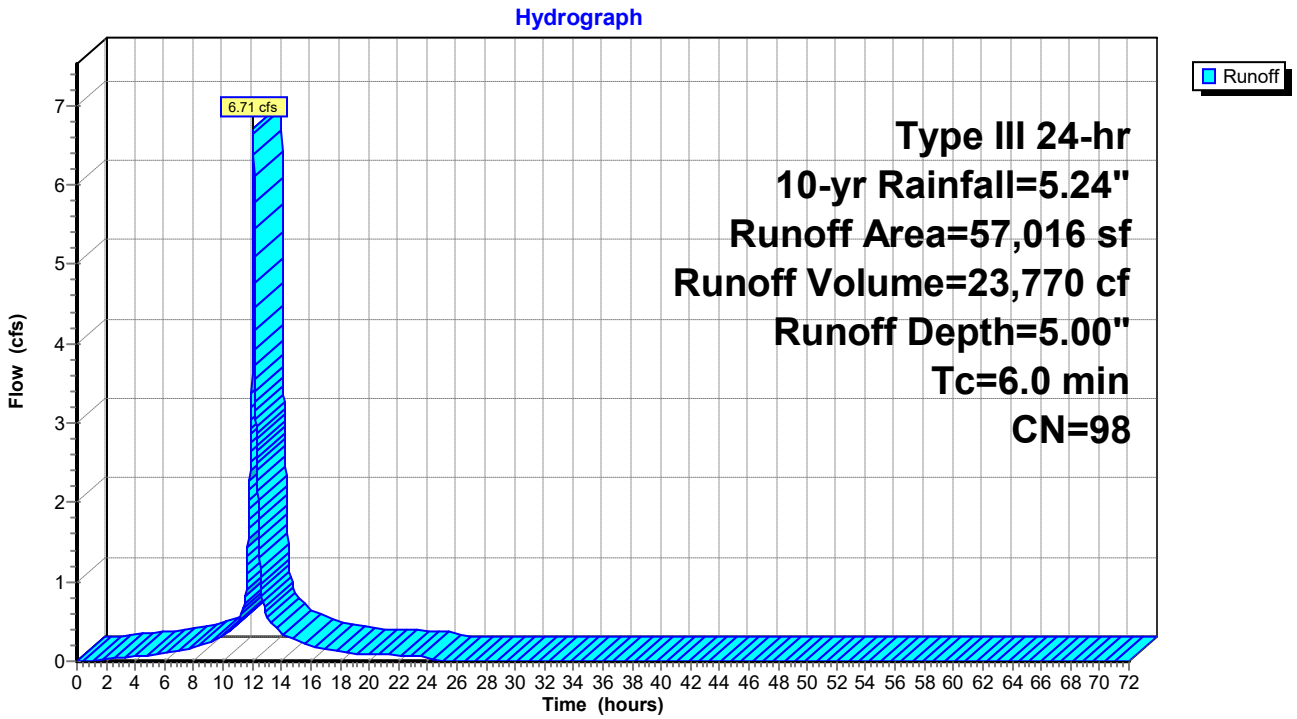
Runoff = 6.71 cfs @ 12.08 hrs, Volume= 23,770 cf, Depth= 5.00"
Routed to Pond INF-B : Garage Gallery

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.24"

	Area (sf)	CN	Description
*	57,016	98	Paved areas & roofs
	57,016		100.00% Impervious Area

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

Subcatchment D1: Garage Area



Summary for Subcatchment E1: Southeast Yard Area

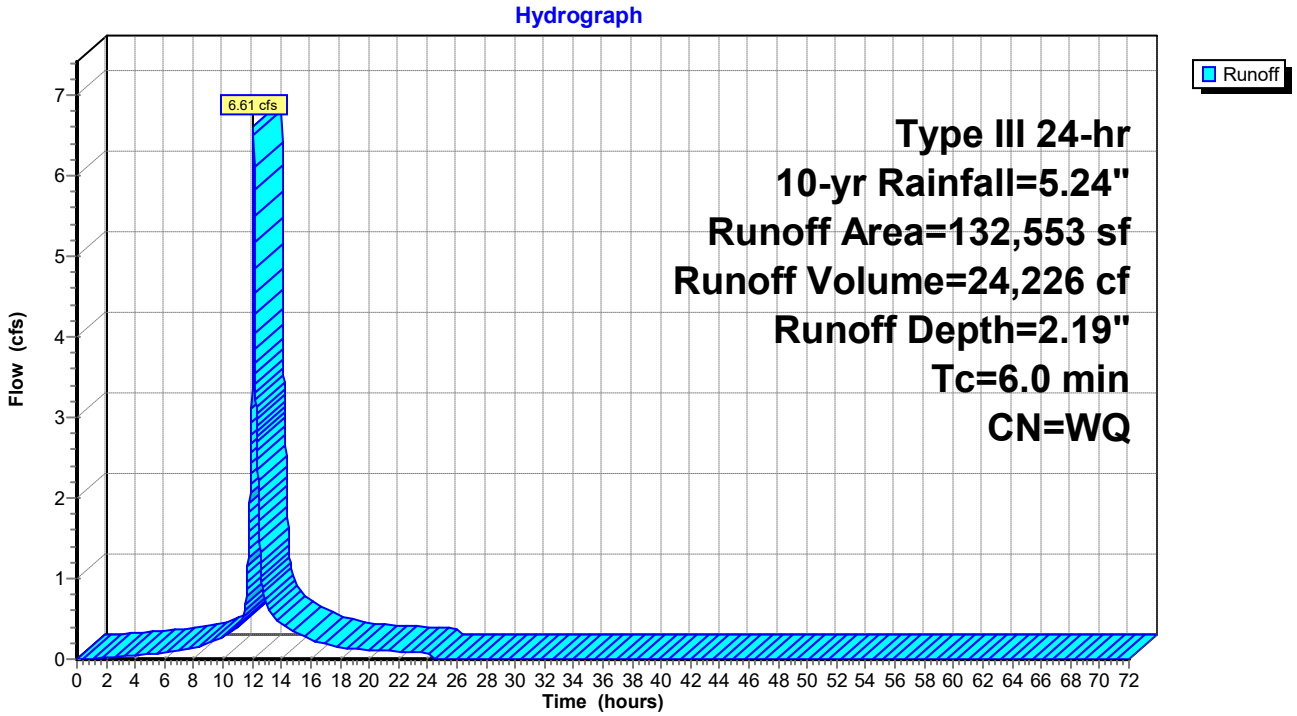
Runoff = 6.61 cfs @ 12.09 hrs, Volume= 24,226 cf, Depth= 2.19"
Routed to Link 1L : POI 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.24"

Area (sf)	CN	Description
47,097	98	Paved parking, HSG A
26,832	39	>75% Grass cover, Good, HSG A
17,412	30	Woods, Good, HSG A
34,660	55	Woods, Good, HSG B
6,552	61	>75% Grass cover, Good, HSG B
132,553		Weighted Average
85,456		64.47% Pervious Area
47,097		35.53% Impervious Area

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

Subcatchment E1: Southeast Yard Area



Summary for Subcatchment OFFSITE: Offsite Drainage

Total subcatchment represents approximately 2,039 LF of ROW (81,560 SF) minus areas that directly contribute to the onsite drainage network.

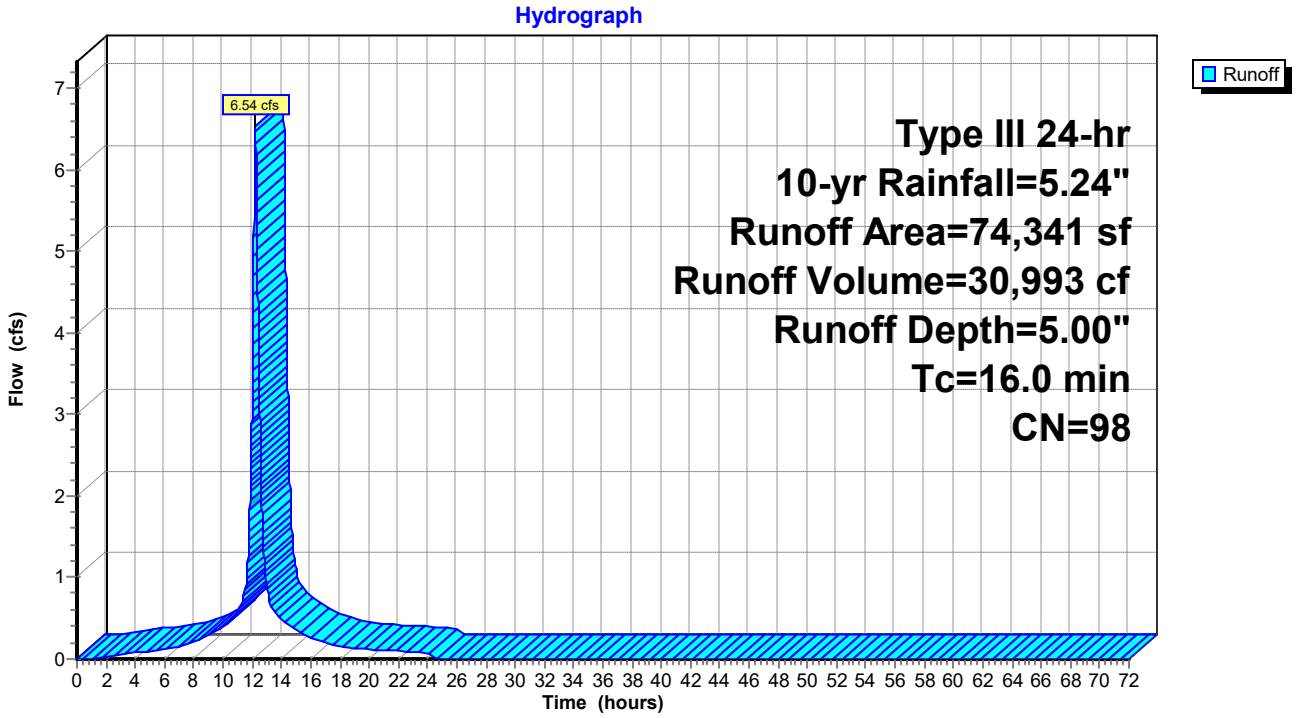
Runoff = 6.54 cfs @ 12.21 hrs, Volume= 30,993 cf, Depth= 5.00"
Routed to Pond EX DMH : DMH

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.24"

	Area (sf)	CN	Description
*	74,341	98	Elm St right-of-way
	74,341		100.00% Impervious Area

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

Subcatchment OFFSITE: Offsite Drainage



Summary for Pond DMH-110: DMH-110

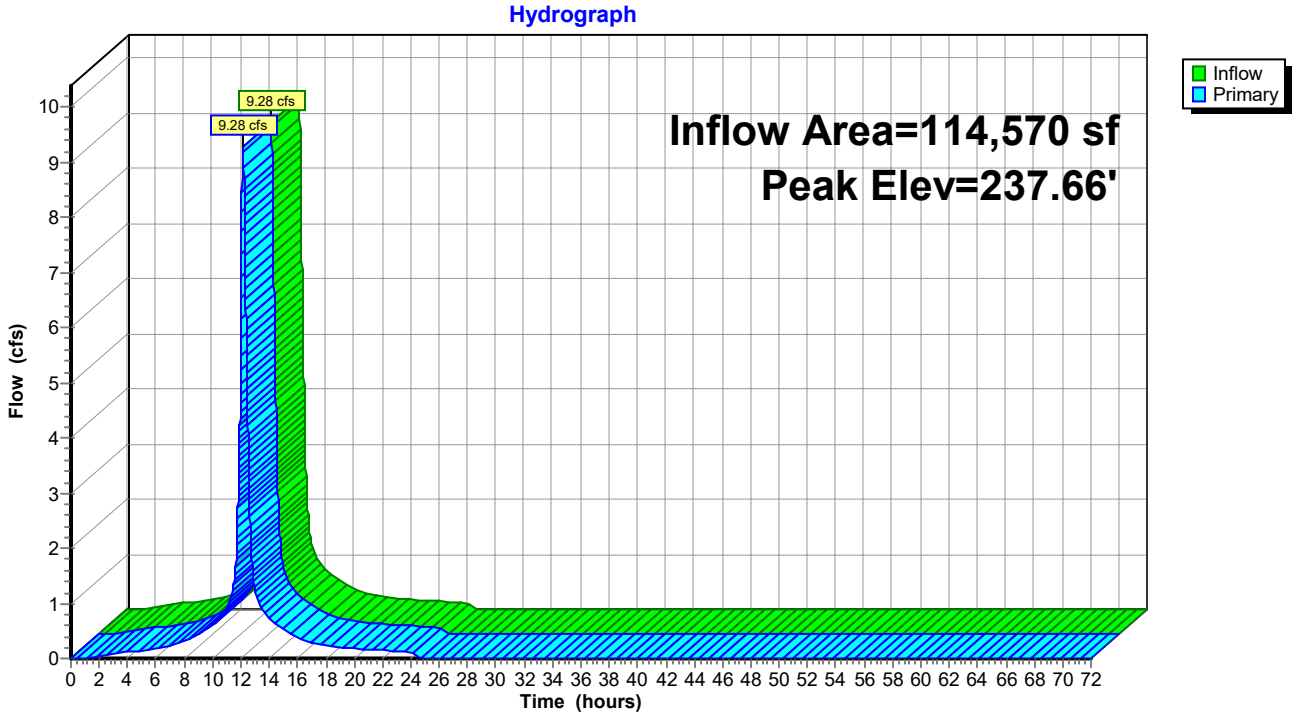
Inflow Area = 114,570 sf, 96.31% Impervious, Inflow Depth = 4.83" for 10-yr event
Inflow = 9.28 cfs @ 12.13 hrs, Volume= 46,091 cf
Outflow = 9.28 cfs @ 12.13 hrs, Volume= 46,091 cf, Atten= 0%, Lag= 0.0 min
Primary = 9.28 cfs @ 12.13 hrs, Volume= 46,091 cf
Routed to Pond DMH-118 : DMH-118

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 237.66' @ 12.13 hrs
Flood Elev= 241.60'

Device	Routing	Invert	Outlet Devices
#1	Primary	236.04'	**24.0" Round Culvert** L= 118.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 236.04' / 235.45' S= 0.0050 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 3.14 sf
#2	Primary	244.43'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=9.28 cfs @ 12.13 hrs HW=237.66' (Free Discharge)
└**1=Culvert** (Barrel Controls 9.28 cfs @ 4.64 fps)
└**2=Orifice/Grate** (Controls 0.00 cfs)

Pond DMH-110: DMH-110



Summary for Pond DMH-118: DMH-118

[79] Warning: Submerged Pond DMH-110 Primary device # 1 INLET by 0.68'

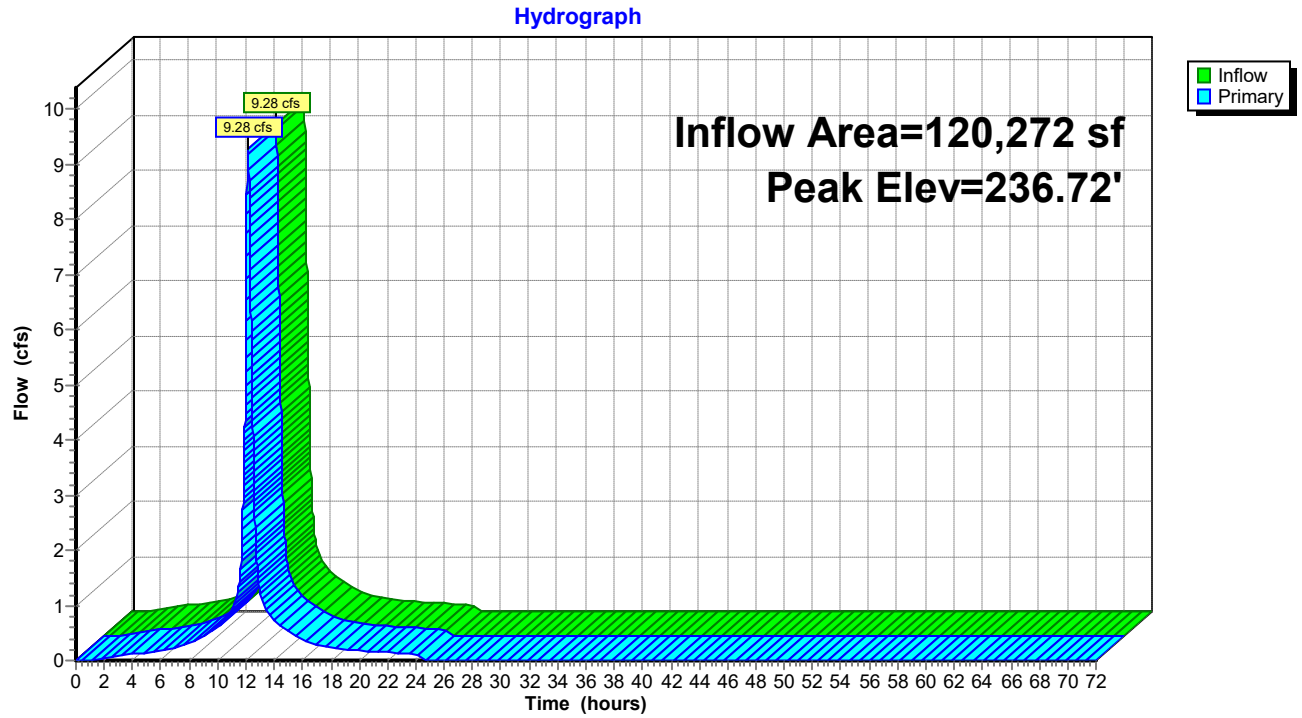
Inflow Area = 120,272 sf, 96.49% Impervious, Inflow Depth = 4.60" for 10-yr event
Inflow = 9.28 cfs @ 12.13 hrs, Volume= 46,091 cf
Outflow = 9.28 cfs @ 12.13 hrs, Volume= 46,091 cf, Atten= 0%, Lag= 0.0 min
Primary = 9.28 cfs @ 12.13 hrs, Volume= 46,091 cf
Routed to Pond DMH-125 : DMH-125

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 236.72' @ 12.13 hrs
Flood Elev= 241.41'

Device	Routing	Invert	Outlet Devices
#1	Primary	234.97'	**24.0" Round culvert** L= 37.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 234.97' / 234.78' S= 0.0051 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 3.14 sf
#2	Primary	243.98'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=9.28 cfs @ 12.13 hrs HW=236.71' (Free Discharge)
└─**1=culvert** (Barrel Controls 9.28 cfs @ 4.26 fps)
└─**2=Orifice/Grate** (Controls 0.00 cfs)

Pond DMH-118: DMH-118



Summary for Pond DMH-125: DMH-125

[58] Hint: Peaked 2.16' above defined flood level
[81] Warning: Exceeded Pond DMH-118 by 5.96' @ 12.10 hrs

Inflow Area = 155,496 sf, 95.28% Impervious, Inflow Depth = 4.59" for 10-yr event
Inflow = 12.80 cfs @ 12.10 hrs, Volume= 59,540 cf
Outflow = 12.80 cfs @ 12.10 hrs, Volume= 59,540 cf, Atten= 0%, Lag= 0.0 min
Primary = 7.75 cfs @ 12.10 hrs, Volume= 54,478 cf
Routed to Link 1L : POI 1
Secondary = 5.05 cfs @ 12.10 hrs, Volume= 5,062 cf
Routed to Pond OCS-126 : OCS-126

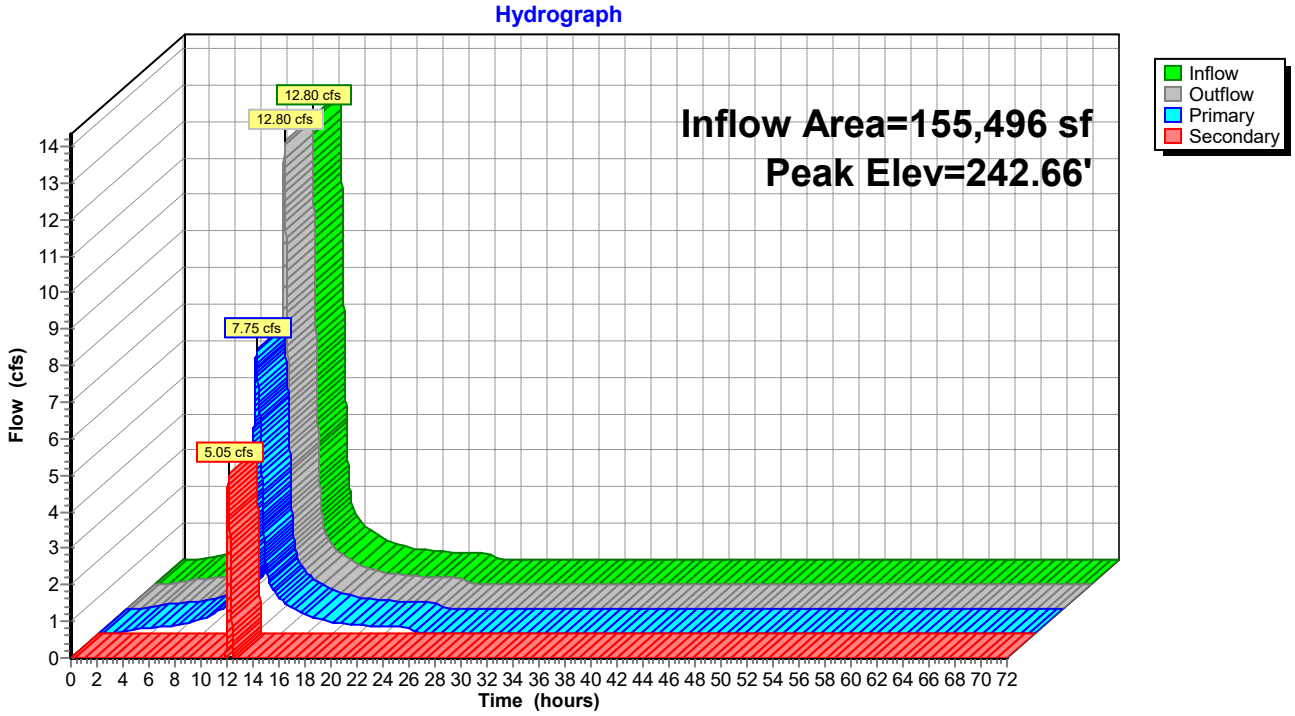
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 242.66' @ 12.10 hrs
Flood Elev= 240.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	235.40'	**12.0" Round Culvert** L= 130.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 235.40' / 233.54' S= 0.0143 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#2	Secondary	239.30'	**12.0" Round Culvert** L= 70.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 239.30' / 237.90' S= 0.0200 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=7.74 cfs @ 12.10 hrs HW=242.65' (Free Discharge)
↑—**1=Culvert** (Barrel Controls 7.74 cfs @ 9.86 fps)

Secondary OutFlow Max=5.04 cfs @ 12.10 hrs HW=242.65' (Free Discharge)
↑—**2=Culvert** (Inlet Controls 5.04 cfs @ 6.42 fps)

Pond DMH-125: DMH-125



Summary for Pond EX DMH: DMH

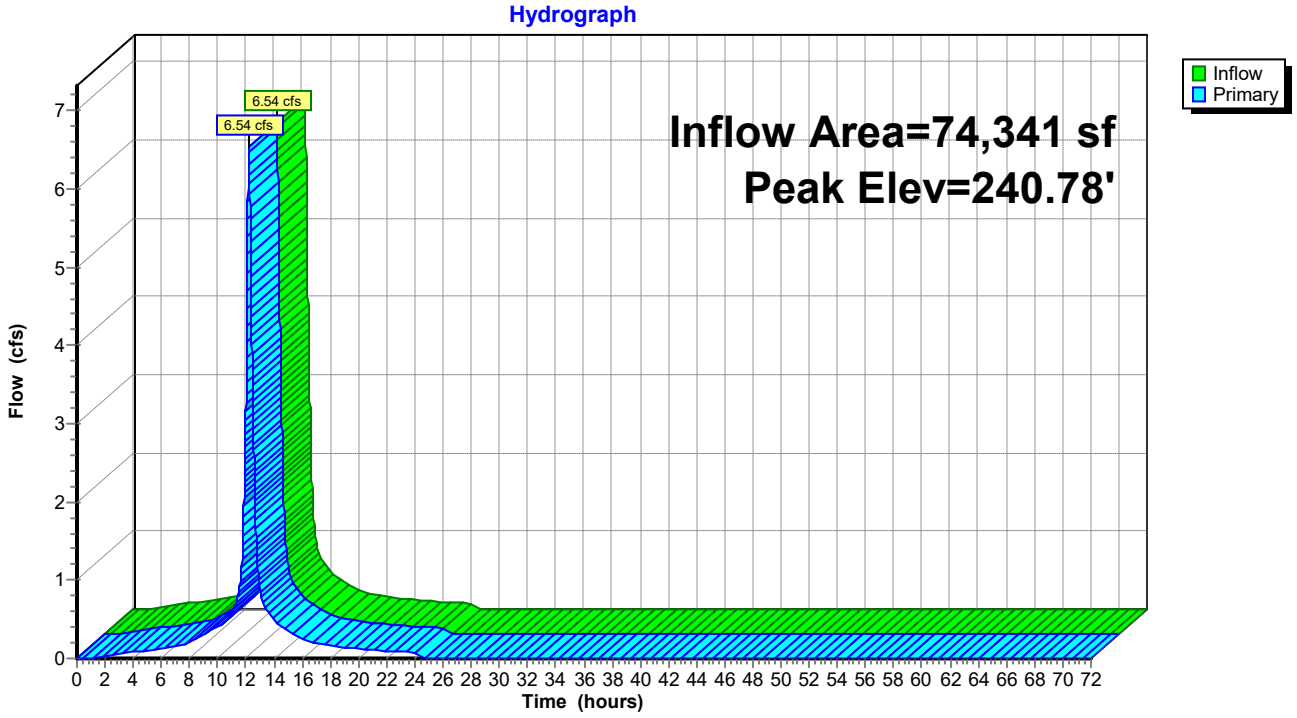
Inflow Area = 74,341 sf,100.00% Impervious, Inflow Depth = 5.00" for 10-yr event
Inflow = 6.54 cfs @ 12.21 hrs, Volume= 30,993 cf
Outflow = 6.54 cfs @ 12.21 hrs, Volume= 30,993 cf, Atten= 0%, Lag= 0.0 min
Primary = 6.54 cfs @ 12.21 hrs, Volume= 30,993 cf
Routed to Pond DMH-110 : DMH-110

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 240.78' @ 12.21 hrs
Flood Elev= 244.83'

Device	Routing	Invert	Outlet Devices
#1	Primary	239.23'	**15.0" Round RCP_Round 15"** L= 20.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 239.23' / 238.90' S= 0.0165 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 1.23 sf
#2	Primary	244.58'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=6.54 cfs @ 12.21 hrs HW=240.78' (Free Discharge)
1=RCP_Round 15" (Barrel Controls 6.54 cfs @ 5.51 fps)
2=Orifice/Grate (Controls 0.00 cfs)

Pond EX DMH: DMH



Summary for Pond INF-A: Addition Roof Gallery

Inflow Area = 5,702 sf,100.00% Impervious, Inflow Depth = 5.00" for 10-yr event
Inflow = 0.67 cfs @ 12.08 hrs, Volume= 2,377 cf
Outflow = 0.04 cfs @ 13.57 hrs, Volume= 2,377 cf, Atten= 94%, Lag= 89.1 min
Discarded = 0.04 cfs @ 13.57 hrs, Volume= 2,377 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Pond DMH-118 : DMH-118

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 240.75' @ 13.57 hrs Surf.Area= 1,600 sf Storage= 981 cf
Flood Elev= 242.03' Surf.Area= 1,600 sf Storage= 2,022 cf

Plug-Flow detention time= 185.5 min calculated for 2,377 cf (100% of inflow)
Center-of-Mass det. time= 185.5 min (932.8 - 747.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	239.70'	1,139 cf	**21.50'W x 74.40'L x 2.33'H Field A** 3,732 cf Overall - 885 cf Embedded = 2,848 cf x 40.0% Voids
#2A	240.20'	885 cf	**ADS_StormTech SC-310 +Cap** x 60 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 60 Chambers in 6 Rows
		2,024 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	239.60'	**12.0" Round Culvert** L= 50.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 239.60' / 239.00' S= 0.0120 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	240.95'	**2.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height
#3	Discarded	239.70'	**1.020 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.04 cfs @ 13.57 hrs HW=240.75' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=239.70' (Free Discharge)
└**1=Culvert** (Passes 0.00 cfs of 0.03 cfs potential flow)
└**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond INF-A: Addition Roof Gallery - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-310 +Cap (ADS StormTech® SC-310 with cap length)
Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf
Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

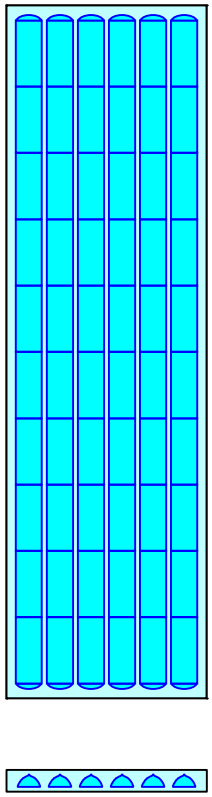
10 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 72.40' Row Length +12.0" End Stone x 2 = 74.40' Base Length
6 Rows x 34.0" Wide + 6.0" Spacing x 5 + 12.0" Side Stone x 2 = 21.50' Base Width
6.0" Stone Base + 16.0" Chamber Height + 6.0" Stone Cover = 2.33' Field Height

60 Chambers x 14.7 cf = 884.5 cf Chamber Storage

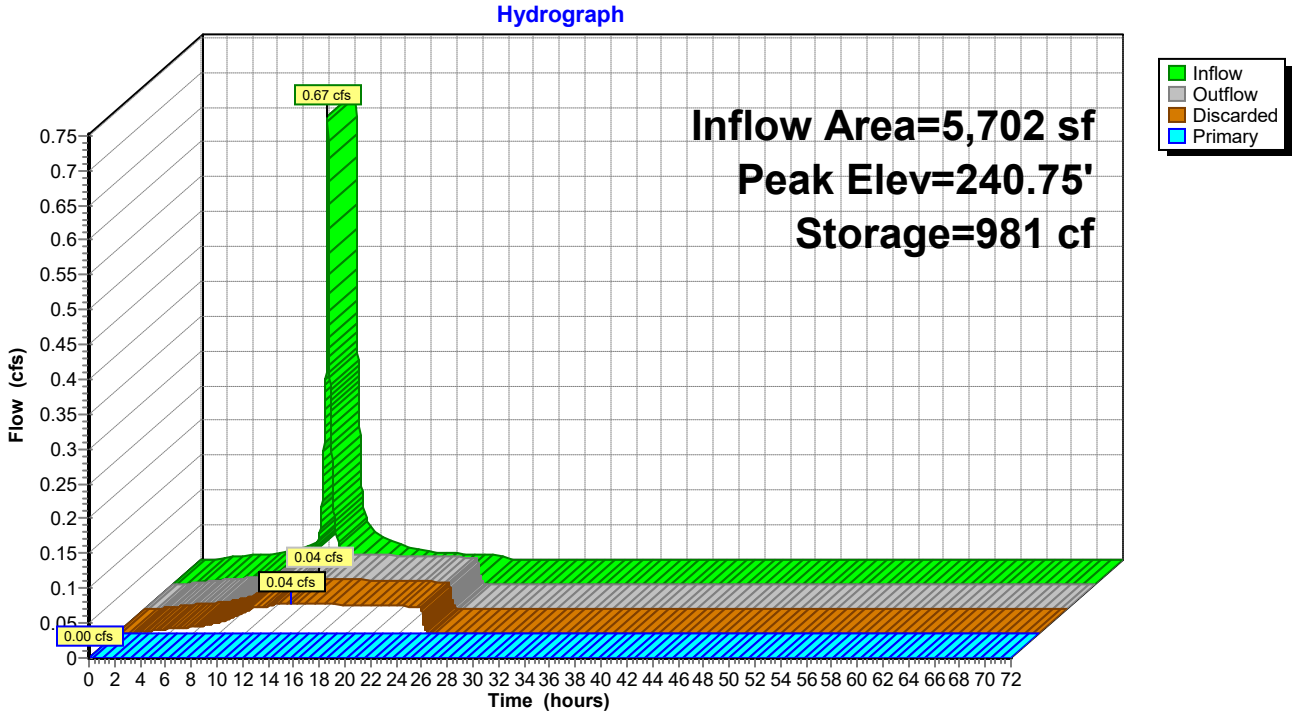
3,732.4 cf Field - 884.5 cf Chambers = 2,847.9 cf Stone x 40.0% Voids = 1,139.2 cf Stone Storage

Chamber Storage + Stone Storage = 2,023.7 cf = 0.046 af
Overall Storage Efficiency = 54.2%
Overall System Size = 74.40' x 21.50' x 2.33'

60 Chambers
138.2 cy Field
105.5 cy Stone



Pond INF-A: Addition Roof Gallery



Summary for Pond INF-B: Garage Gallery

Inflow Area = 57,016 sf,100.00% Impervious, Inflow Depth = 5.00" for 10-yr event
Inflow = 6.71 cfs @ 12.08 hrs, Volume= 23,770 cf
Outflow = 6.14 cfs @ 12.12 hrs, Volume= 23,770 cf, Atten= 9%, Lag= 2.1 min
Discarded = 0.10 cfs @ 12.12 hrs, Volume= 12,224 cf
Primary = 6.04 cfs @ 12.12 hrs, Volume= 11,546 cf
Routed to Pond OCS-216 : OCS-216

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 239.61' @ 12.12 hrs Surf.Area= 3,590 sf Storage= 6,951 cf
Flood Elev= 240.40' Surf.Area= 3,590 sf Storage= 7,727 cf

Plug-Flow detention time= 284.8 min calculated for 23,767 cf (100% of inflow)
Center-of-Mass det. time= 284.9 min (1,032.1 - 747.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	236.65'	3,225 cf	**34.75'W x 103.30'L x 3.50'H Field A** 12,563 cf Overall - 4,502 cf Embedded = 8,061 cf x 40.0% Voids
#2A	237.15'	4,502 cf	**ADS_StormTech SC-740 +Cap** x 98 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 98 Chambers in 7 Rows
		7,727 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	237.65'	**24.0" Round Culvert** L= 50.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 237.65' / 237.40' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	238.85'	**2.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height
#3	Discarded	236.65'	**1.020 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.10 cfs @ 12.12 hrs HW=239.61' (Free Discharge)
↑—**3=Exfiltration** (Exfiltration Controls 0.10 cfs)

Primary OutFlow Max=6.03 cfs @ 12.12 hrs HW=239.61' (Free Discharge)
↑—**1=Culvert** (Passes 6.03 cfs of 11.06 cfs potential flow)
↑—**2=Sharp-Crested Rectangular Weir** (Weir Controls 6.03 cfs @ 3.38 fps)

Pond INF-B: Garage Gallery - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

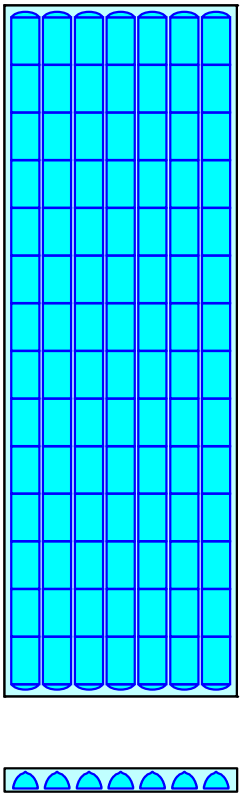
14 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 101.30' Row Length +12.0" End Stone x 2 = 103.30' Base Length
7 Rows x 51.0" Wide + 6.0" Spacing x 6 + 12.0" Side Stone x 2 = 34.75' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

98 Chambers x 45.9 cf = 4,502.1 cf Chamber Storage

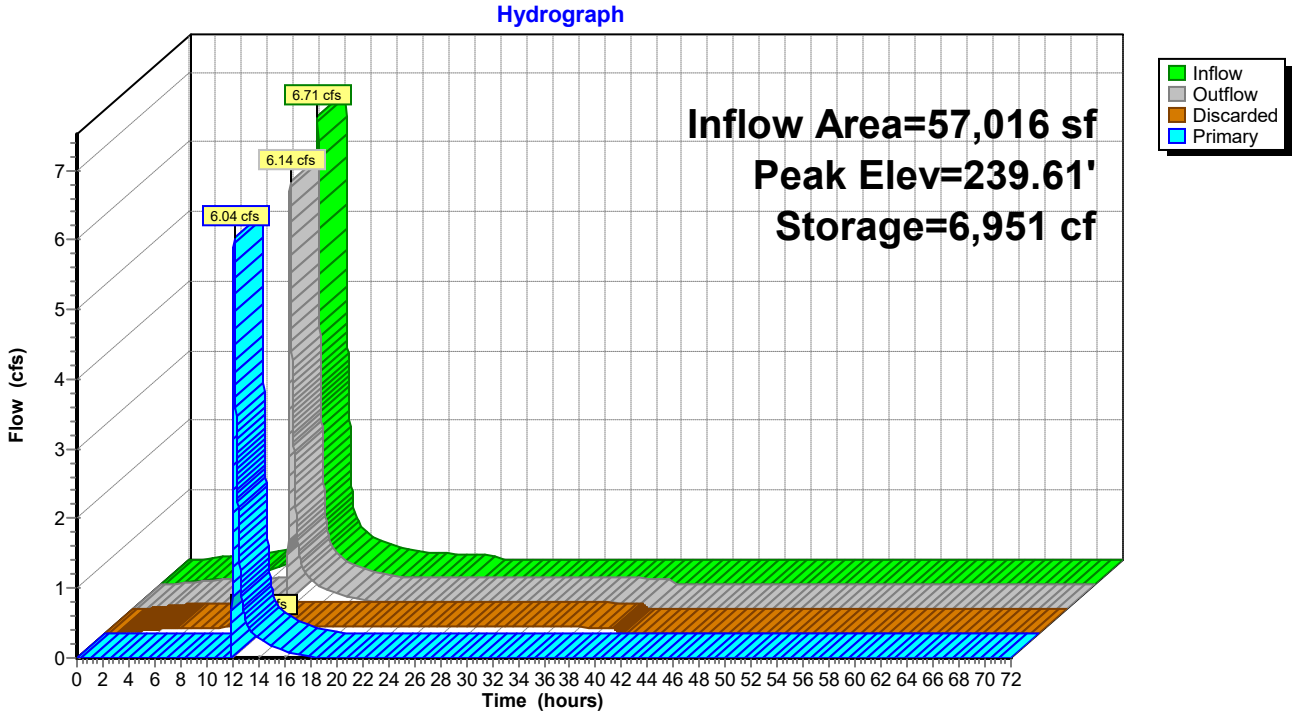
12,563.5 cf Field - 4,502.1 cf Chambers = 8,061.3 cf Stone x 40.0% Voids = 3,224.5 cf Stone Storage

Chamber Storage + Stone Storage = 7,726.7 cf = 0.177 af
Overall Storage Efficiency = 61.5%
Overall System Size = 103.30' x 34.75' x 3.50'

98 Chambers
465.3 cy Field
298.6 cy Stone



Pond INF-B: Garage Gallery



Summary for Pond INF-C: Bus Parking Gallery

Inflow Area = 52,591 sf, 96.67% Impervious, Inflow Depth = 4.86" for 10-yr event
Inflow = 6.01 cfs @ 12.08 hrs, Volume= 21,304 cf
Outflow = 0.20 cfs @ 15.54 hrs, Volume= 21,304 cf, Atten= 97%, Lag= 207.3 min
Discarded = 0.20 cfs @ 15.54 hrs, Volume= 21,304 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Pond OCS-311 : OCS-311

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 243.47' @ 15.54 hrs Surf.Area= 7,709 sf Storage= 11,656 cf
Flood Elev= 244.80' Surf.Area= 7,709 sf Storage= 16,746 cf

Plug-Flow detention time= 509.1 min calculated for 21,304 cf (100% of inflow)
Center-of-Mass det. time= 509.1 min (1,257.1 - 748.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	241.30'	6,823 cf	**58.50'W x 131.78'L x 3.50'H Field A** 26,981 cf Overall - 9,923 cf Embedded = 17,058 cf x 40.0% Voids
#2A	241.80'	9,923 cf	**ADS_StormTech SC-740 +Cap** x 216 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 216 Chambers in 12 Rows
		16,746 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	242.80'	**12.0" Round Culvert** L= 100.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 242.80' / 242.30' S= 0.0050 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#2	Device 1	244.05'	**2.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height
#3	Discarded	241.30'	**1.020 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.20 cfs @ 15.54 hrs HW=243.47' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.20 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=241.30' (Free Discharge)
└**1=Culvert** (Controls 0.00 cfs)
└**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond INF-C: Bus Parking Gallery - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

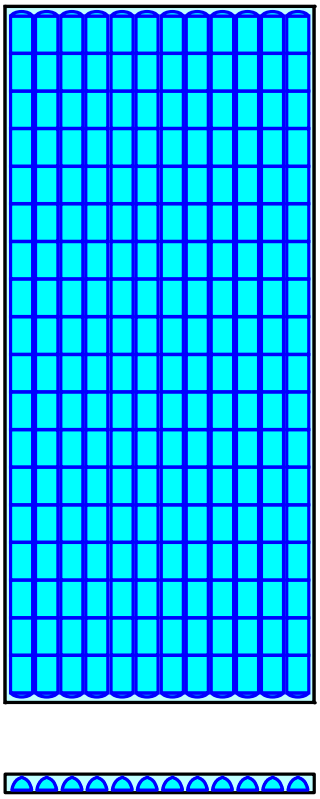
18 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 129.78' Row Length +12.0" End Stone x 2 = 131.78' Base Length
12 Rows x 51.0" Wide + 6.0" Spacing x 11 + 12.0" Side Stone x 2 = 58.50' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

216 Chambers x 45.9 cf = 9,923.0 cf Chamber Storage

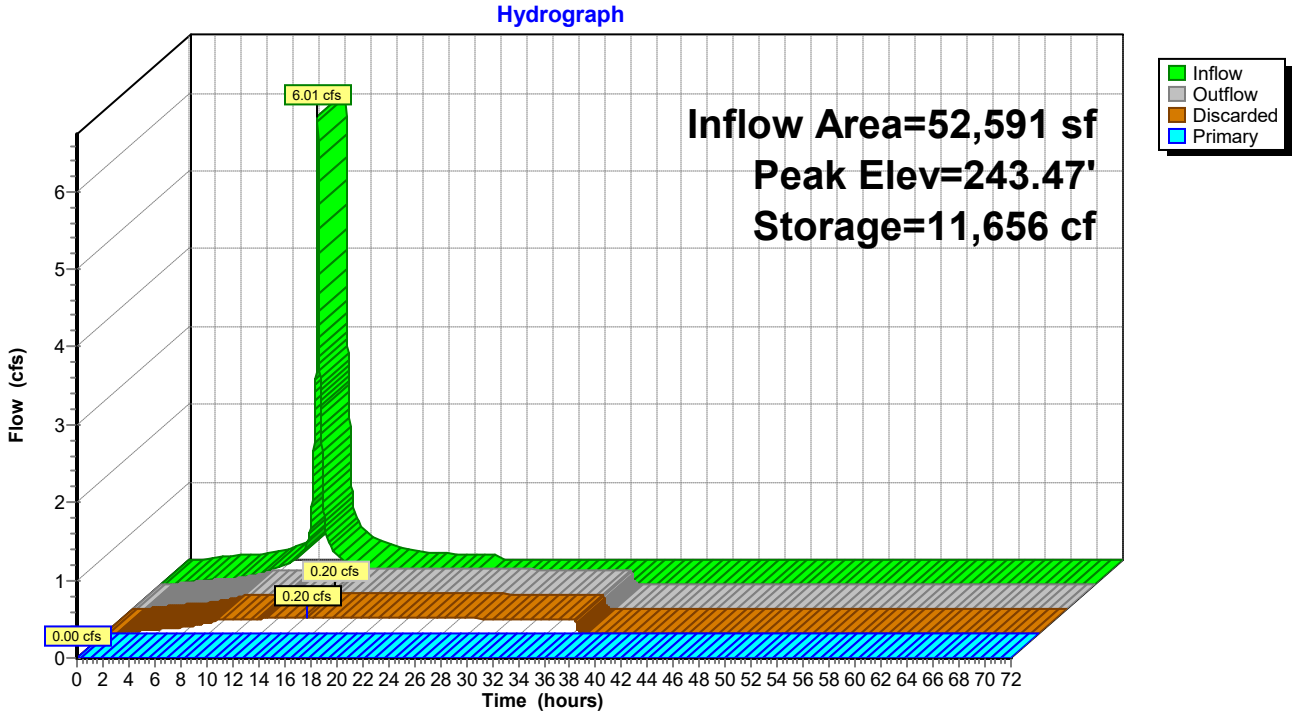
26,981.3 cf Field - 9,923.0 cf Chambers = 17,058.2 cf Stone x 40.0% Voids = 6,823.3 cf Stone Storage

Chamber Storage + Stone Storage = 16,746.3 cf = 0.384 af
Overall Storage Efficiency = 62.1%
Overall System Size = 131.78' x 58.50' x 3.50'

216 Chambers
999.3 cy Field
631.8 cy Stone



Pond INF-C: Bus Parking Gallery



Summary for Pond OCS-126: OCS-126

[57] Hint: Peaked at 241.25' (Flood elevation advised)
[81] Warning: Exceeded Pond DMH-125 by 5.52' @ 0.00 hrs

Inflow	=	5.05 cfs @	12.10 hrs,	Volume=	5,062 cf
Outflow	=	5.05 cfs @	12.10 hrs,	Volume=	5,062 cf, Atten= 0%, Lag= 0.0 min
Primary	=	5.05 cfs @	12.10 hrs,	Volume=	5,062 cf

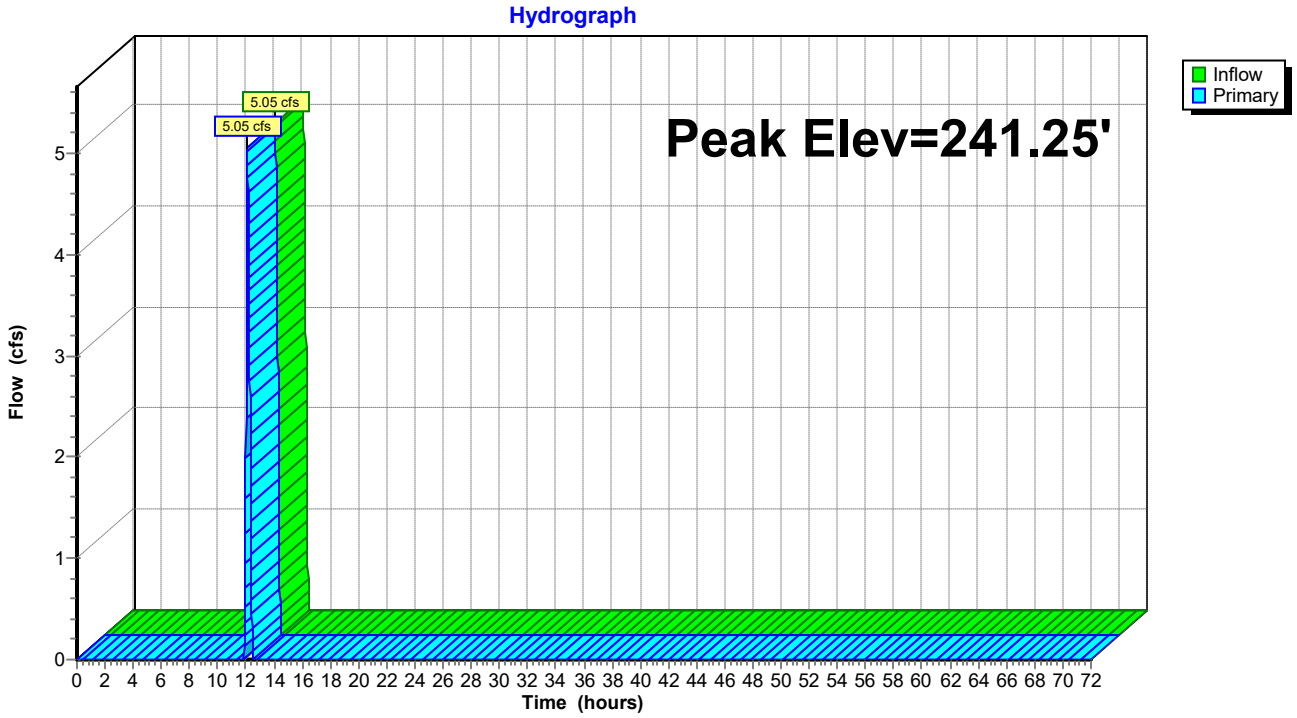
Routed to Link 1L : POI 1

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 241.25' @ 12.10 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	240.92'	**24.0" x 24.0" Horiz. Overflow Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=5.04 cfs @ 12.10 hrs HW=241.25' (Free Discharge)
1=Overflow Grate (Weir Controls 5.04 cfs @ 1.89 fps)

Pond OCS-126: OCS-126



Summary for Pond OCS-216: OCS-216

[58] Hint: Peaked 0.88' above defined flood level
[81] Warning: Exceeded Pond INF-B by 4.35' @ 0.00 hrs

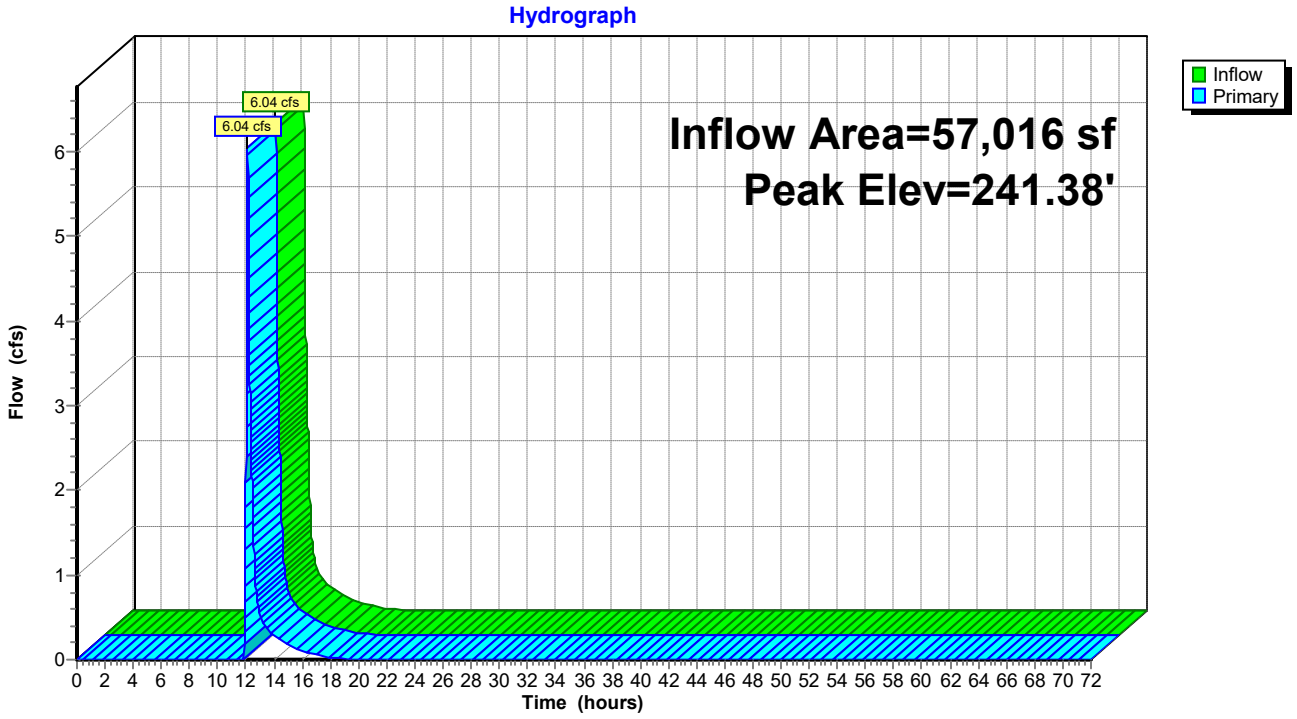
Inflow Area = 57,016 sf,100.00% Impervious, Inflow Depth = 2.43" for 10-yr event
Inflow = 6.04 cfs @ 12.12 hrs, Volume= 11,546 cf
Outflow = 6.04 cfs @ 12.12 hrs, Volume= 11,546 cf, Atten= 0%, Lag= 0.0 min
Primary = 6.04 cfs @ 12.12 hrs, Volume= 11,546 cf
Routed to Link 1L : POI 1

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 241.38' @ 12.12 hrs
Flood Elev= 240.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	241.00'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=6.03 cfs @ 12.12 hrs HW=241.38' (Free Discharge)
1=Orifice/Grate (Weir Controls 6.03 cfs @ 2.01 fps)

Pond OCS-216: OCS-216



Summary for Pond OCS-311: OCS-311

[58] Hint: Peaked 4.50' above defined flood level
[81] Warning: Exceeded Pond INF-C by 3.70' @ 0.00 hrs

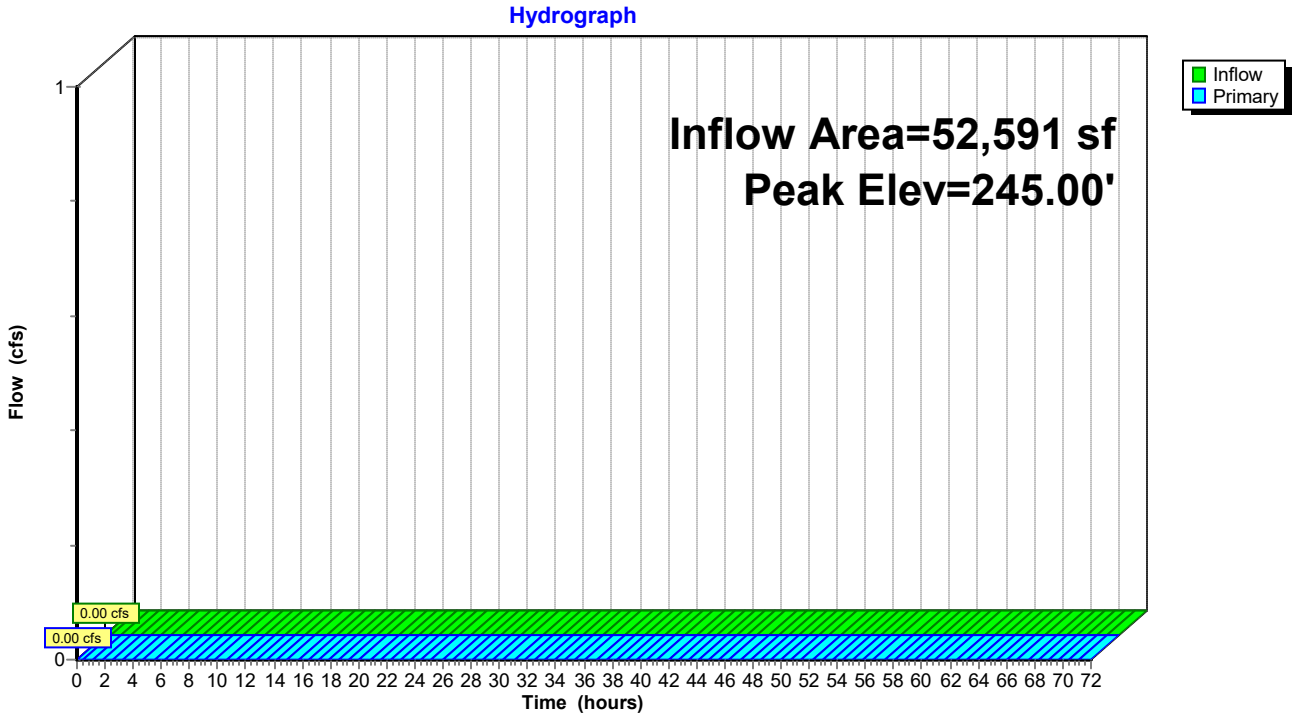
Inflow Area = 52,591 sf, 96.67% Impervious, Inflow Depth = 0.00" for 10-yr event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Link 1L : POI 1

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 245.00' @ 0.00 hrs
Flood Elev= 240.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	245.00'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=245.00' (Free Discharge)
1=Orifice/Grate (Controls 0.00 cfs)

Pond OCS-311: OCS-311

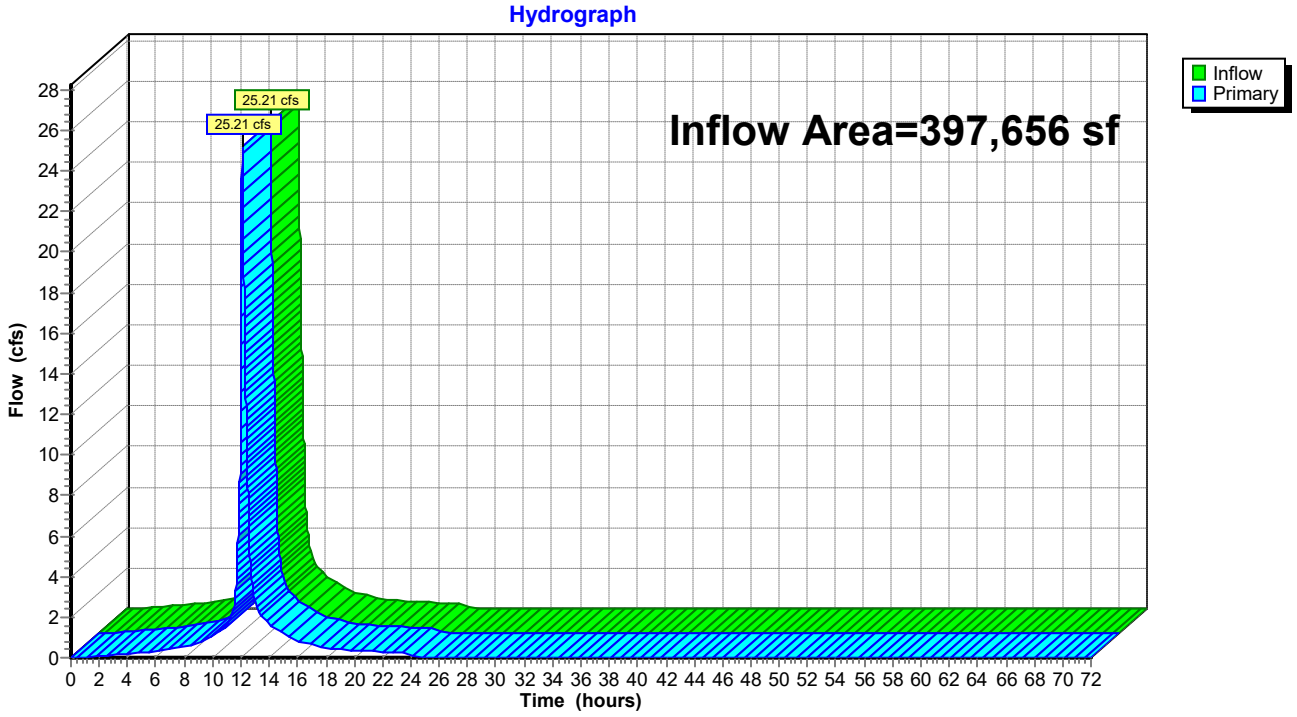


Summary for Link 1L: POI 1

Inflow Area = 397,656 sf, 76.22% Impervious, Inflow Depth = 2.88" for 10-yr event
Inflow = 25.21 cfs @ 12.10 hrs, Volume= 95,313 cf
Primary = 25.21 cfs @ 12.10 hrs, Volume= 95,313 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link 1L: POI 1



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

Subcatchment A1: Bus Parking Area Runoff Area=52,591 sf 96.67% Impervious Runoff Depth=5.97"
Tc=6.0 min CN=WQ Runoff=7.33 cfs 26,155 cf

Subcatchment B1: Frontage Areas Runoff Area=40,229 sf 89.49% Impervious Runoff Depth=5.55"
Tc=6.0 min CN=WQ Runoff=5.17 cfs 18,591 cf

Subcatchment B2: North Yard Area Runoff Area=35,224 sf 91.15% Impervious Runoff Depth=5.64"
Tc=6.0 min CN=WQ Runoff=4.61 cfs 16,549 cf

Subcatchment C1: Gar. Addition Runoff Area=5,702 sf 100.00% Impervious Runoff Depth=6.13"
Tc=6.0 min CN=98 Runoff=0.82 cfs 2,913 cf

Subcatchment D1: Garage Area Runoff Area=57,016 sf 100.00% Impervious Runoff Depth=6.13"
Tc=6.0 min CN=98 Runoff=8.17 cfs 29,133 cf

Subcatchment E1: Southeast Yard Area Runoff Area=132,553 sf 35.53% Impervious Runoff Depth=2.87"
Tc=6.0 min CN=WQ Runoff=8.64 cfs 31,720 cf

Subcatchment OFFSITE: Offsite Drainage Runoff Area=74,341 sf 100.00% Impervious Runoff Depth=6.13"
Tc=16.0 min CN=98 Runoff=7.96 cfs 37,985 cf

Pond DMH-110: DMH-110 Peak Elev=237.93' Inflow=11.32 cfs 56,577 cf
Outflow=11.32 cfs 56,577 cf

Pond DMH-118: DMH-118 Peak Elev=236.97' Inflow=11.32 cfs 56,667 cf
Outflow=11.32 cfs 56,667 cf

Pond DMH-125: DMH-125 Peak Elev=245.01' Inflow=15.61 cfs 73,215 cf
Primary=8.80 cfs 65,243 cf Secondary=6.82 cfs 7,973 cf Outflow=15.61 cfs 73,215 cf

Pond EX DMH: DMH Peak Elev=241.19' Inflow=7.96 cfs 37,985 cf
Outflow=7.96 cfs 37,985 cf

Pond INF-A: Addition Roof Gallery Peak Elev=240.97' Storage=1,230 cf Inflow=0.82 cfs 2,913 cf
Discarded=0.04 cfs 2,823 cf Primary=0.03 cfs 90 cf Outflow=0.08 cfs 2,913 cf

Pond INF-B: Garage Gallery Peak Elev=239.73' Storage=7,122 cf Inflow=8.17 cfs 29,133 cf
Discarded=0.10 cfs 12,709 cf Primary=7.61 cfs 16,424 cf Outflow=7.71 cfs 29,133 cf

Pond INF-C: Bus Parking Gallery Peak Elev=244.12' Storage=14,602 cf Inflow=7.33 cfs 26,155 cf
Discarded=0.21 cfs 25,293 cf Primary=0.14 cfs 861 cf Outflow=0.35 cfs 26,155 cf

Pond OCS-126: OCS-126 Peak Elev=241.33' Inflow=6.82 cfs 7,973 cf
Outflow=6.82 cfs 7,973 cf

Pond OCS-216: OCS-216 Peak Elev=241.44' Inflow=7.61 cfs 16,424 cf
Outflow=7.61 cfs 16,424 cf

Pond OCS-311: OCS-311 Peak Elev=245.03' Inflow=0.14 cfs 861 cf
Outflow=0.14 cfs 861 cf

Link 1L: POI 1 Inflow=31.68 cfs 122,221 cf
Primary=31.68 cfs 122,221 cf

Total Runoff Area = 397,656 sf Runoff Volume = 163,047 cf Average Runoff Depth = 4.92"
23.78% Pervious = 94,551 sf 76.22% Impervious = 303,105 sf

Summary for Subcatchment A1: Bus Parking Area

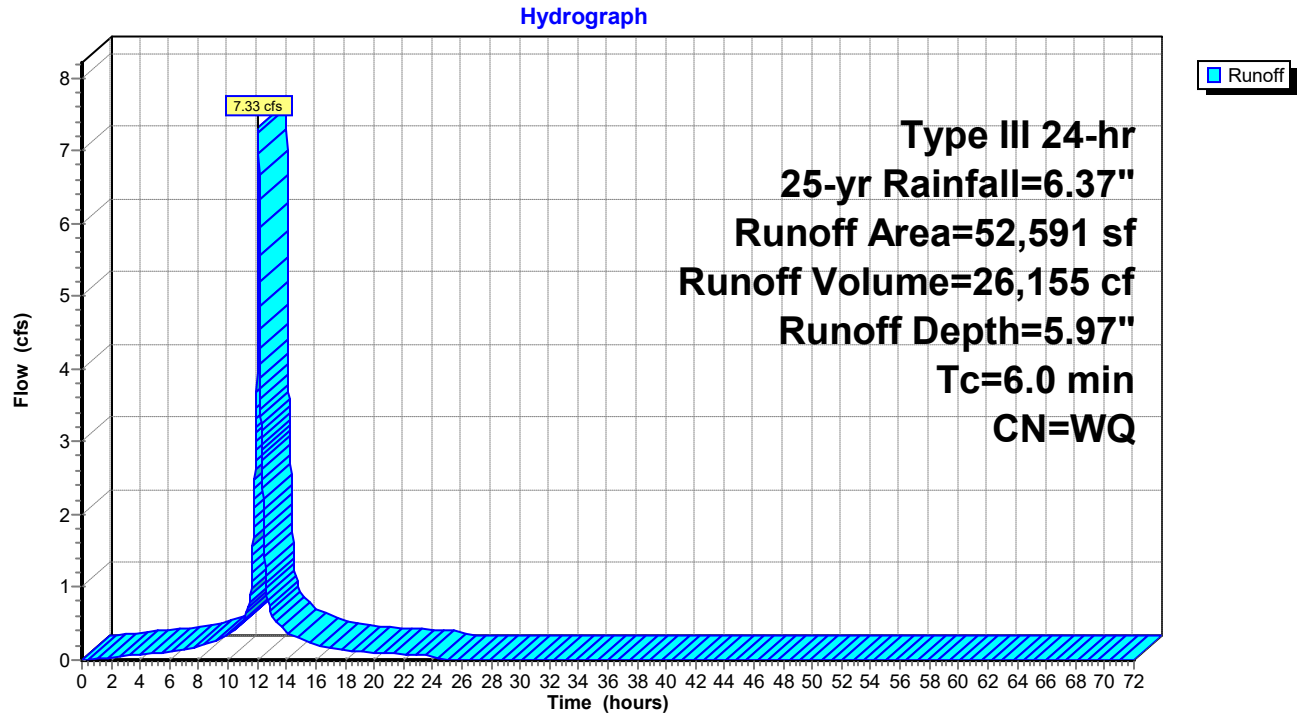
Runoff = 7.33 cfs @ 12.08 hrs, Volume= 26,155 cf, Depth= 5.97"
Routed to Pond INF-C : Bus Parking Gallery

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.37"

	Area (sf)	CN	Description
*	50,842	98	Paved parking
	673	61	>75% Grass cover, Good, HSG B
	1,076	39	>75% Grass cover, Good, HSG A
	52,591		Weighted Average
	1,749		3.33% Pervious Area
	50,842		96.67% Impervious Area

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

Subcatchment A1: Bus Parking Area



Summary for Subcatchment B1: Frontage Areas

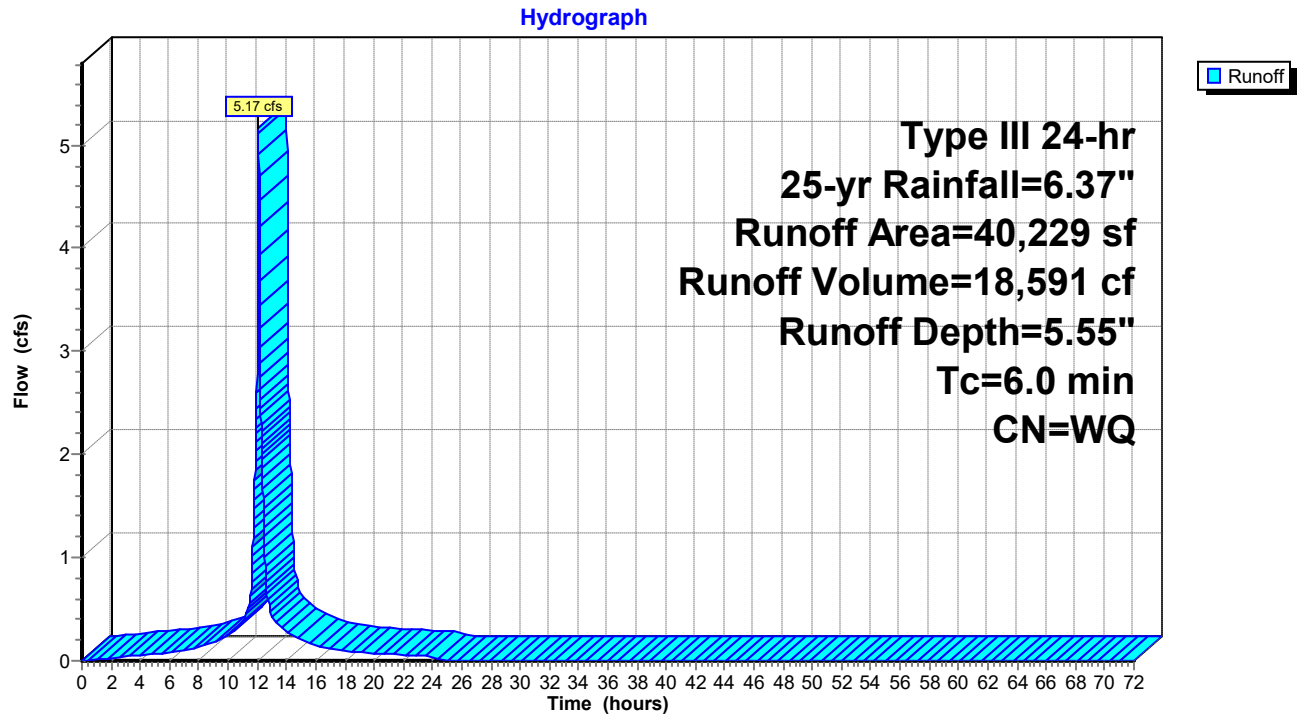
Runoff = 5.17 cfs @ 12.08 hrs, Volume= 18,591 cf, Depth= 5.55"
Routed to Pond DMH-110 : DMH-110

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.37"

	Area (sf)	CN	Description
*	36,002	98	Paved areas & roofs
	4,227	39	>75% Grass cover, Good, HSG A
	40,229		Weighted Average
	4,227		10.51% Pervious Area
	36,002		89.49% Impervious Area

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

Subcatchment B1: Frontage Areas



Summary for Subcatchment B2: North Yard Area

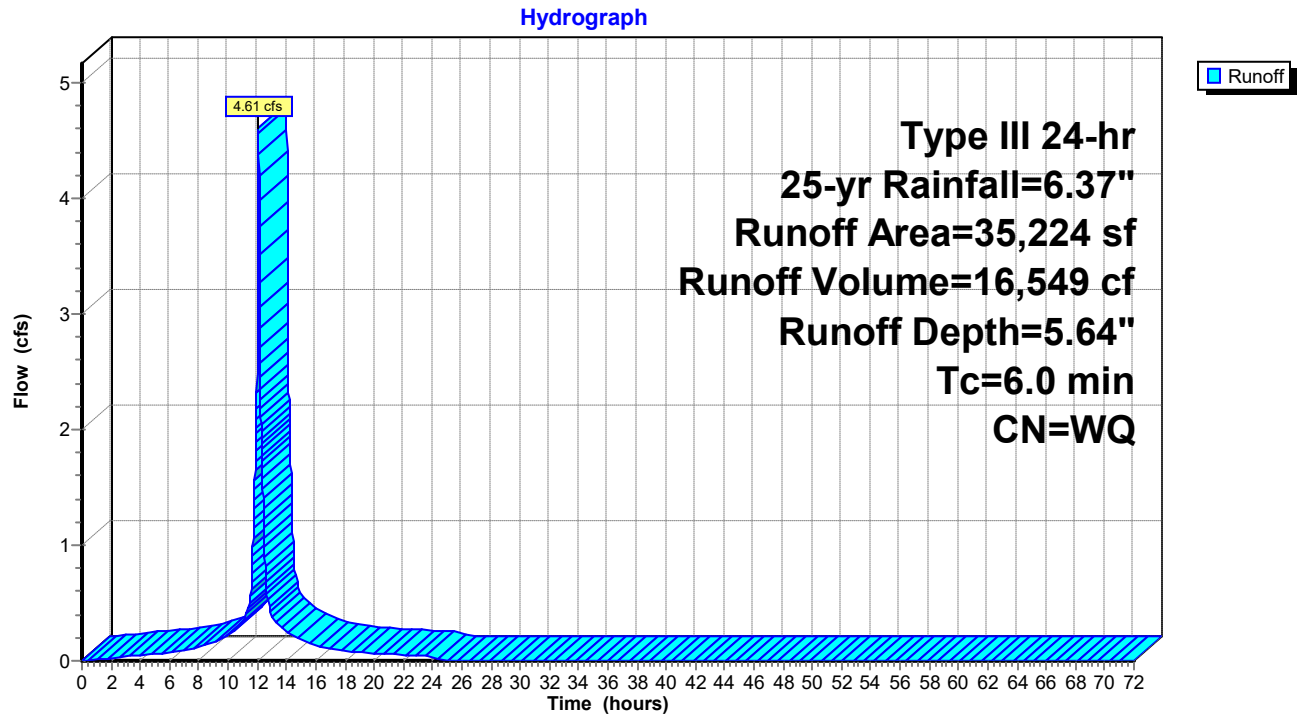
Runoff = 4.61 cfs @ 12.08 hrs, Volume= 16,549 cf, Depth= 5.64"
Routed to Pond DMH-125 : DMH-125

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.37"

	Area (sf)	CN	Description
*	32,105	98	Paved areas & roofs
	3,119	39	>75% Grass cover, Good, HSG A
	35,224		Weighted Average
	3,119		8.85% Pervious Area
	32,105		91.15% Impervious Area

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

Subcatchment B2: North Yard Area



Summary for Subcatchment C1: Gar. Addition

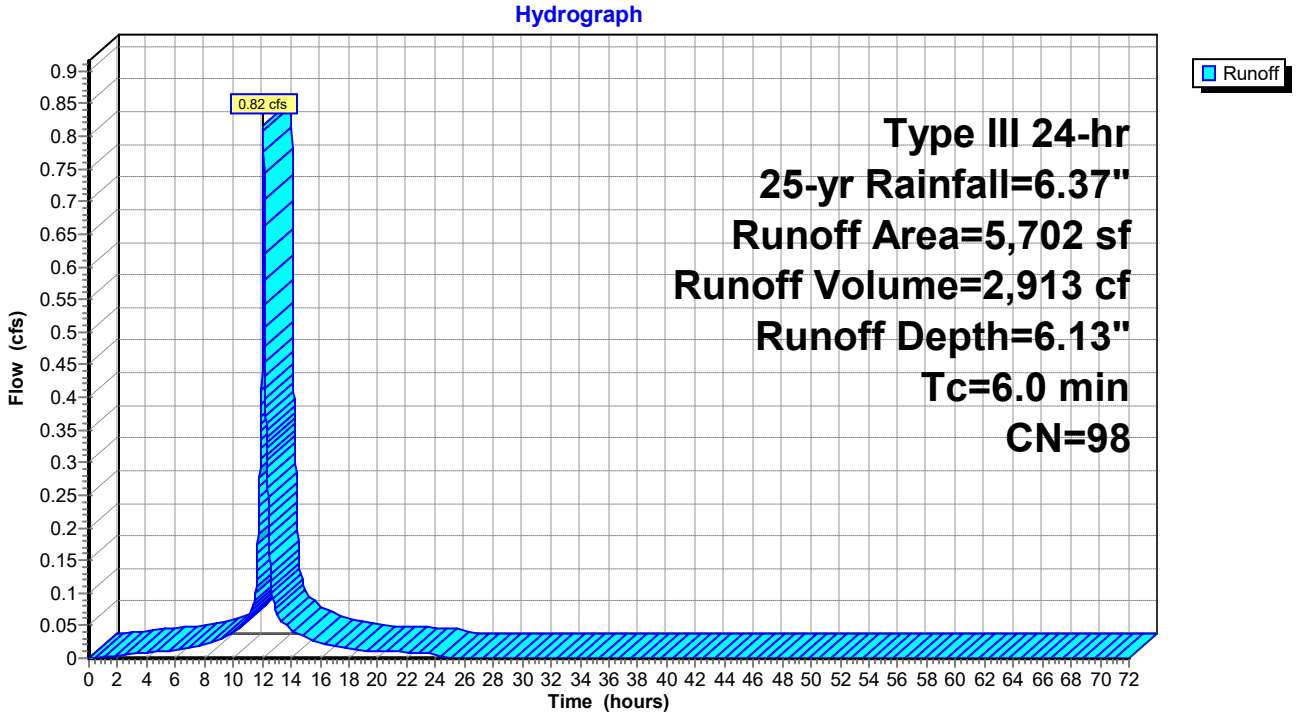
Runoff = 0.82 cfs @ 12.08 hrs, Volume= 2,913 cf, Depth= 6.13"
Routed to Pond INF-A : Addition Roof Gallery

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.37"

Area (sf)	CN	Description
5,702	98	Roofs, HSG A
5,702		100.00% Impervious Area

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

Subcatchment C1: Gar. Addition



Summary for Subcatchment D1: Garage Area

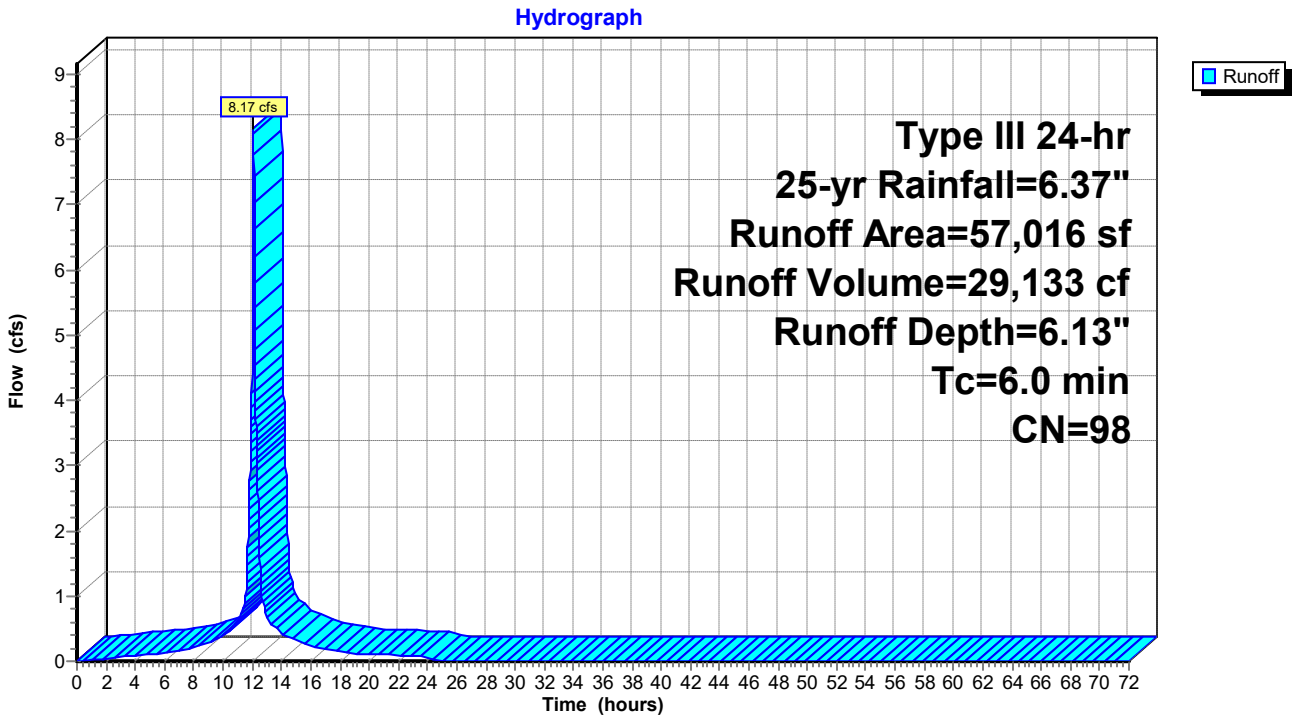
Runoff = 8.17 cfs @ 12.08 hrs, Volume= 29,133 cf, Depth= 6.13"
Routed to Pond INF-B : Garage Gallery

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.37"

	Area (sf)	CN	Description
*	57,016	98	Paved areas & roofs
	57,016		100.00% Impervious Area

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

Subcatchment D1: Garage Area



Summary for Subcatchment E1: Southeast Yard Area

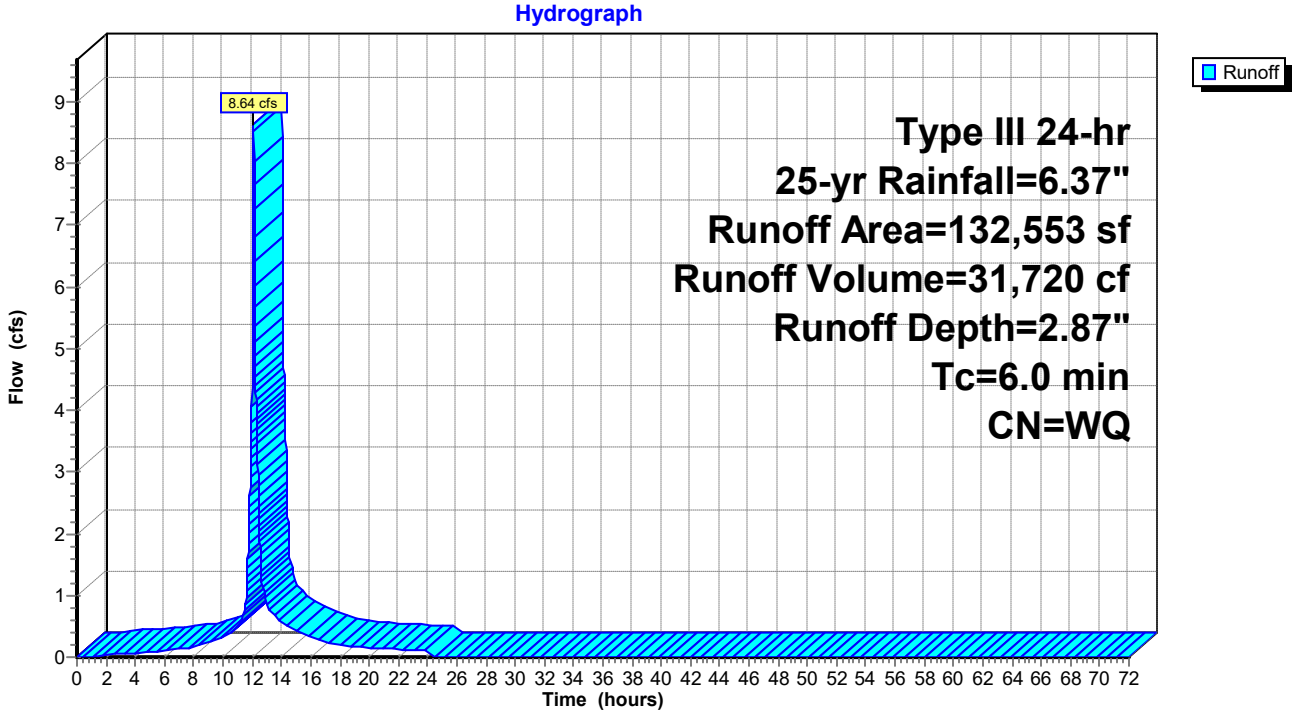
Runoff = 8.64 cfs @ 12.09 hrs, Volume= 31,720 cf, Depth= 2.87"
Routed to Link 1L : POI 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.37"

Area (sf)	CN	Description
47,097	98	Paved parking, HSG A
26,832	39	>75% Grass cover, Good, HSG A
17,412	30	Woods, Good, HSG A
34,660	55	Woods, Good, HSG B
6,552	61	>75% Grass cover, Good, HSG B
132,553		Weighted Average
85,456		64.47% Pervious Area
47,097		35.53% Impervious Area

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

Subcatchment E1: Southeast Yard Area



Summary for Subcatchment OFFSITE: Offsite Drainage

Total subcatchment represents approximately 2,039 LF of ROW (81,560 SF) minus areas that directly contribute to the onsite drainage network.

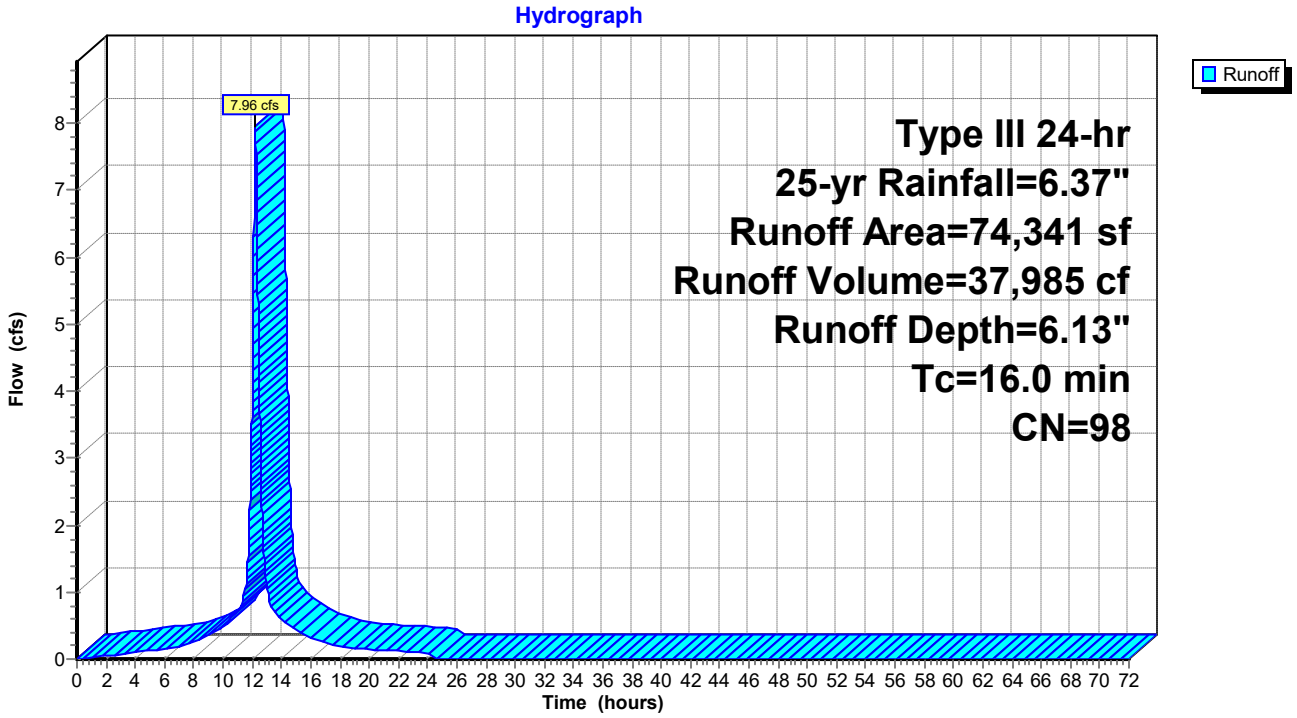
Runoff = 7.96 cfs @ 12.21 hrs, Volume= 37,985 cf, Depth= 6.13"
Routed to Pond EX DMH : DMH

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.37"

	Area (sf)	CN	Description
*	74,341	98	Elm St right-of-way
	74,341		100.00% Impervious Area

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

Subcatchment OFFSITE: Offsite Drainage



Summary for Pond DMH-110: DMH-110

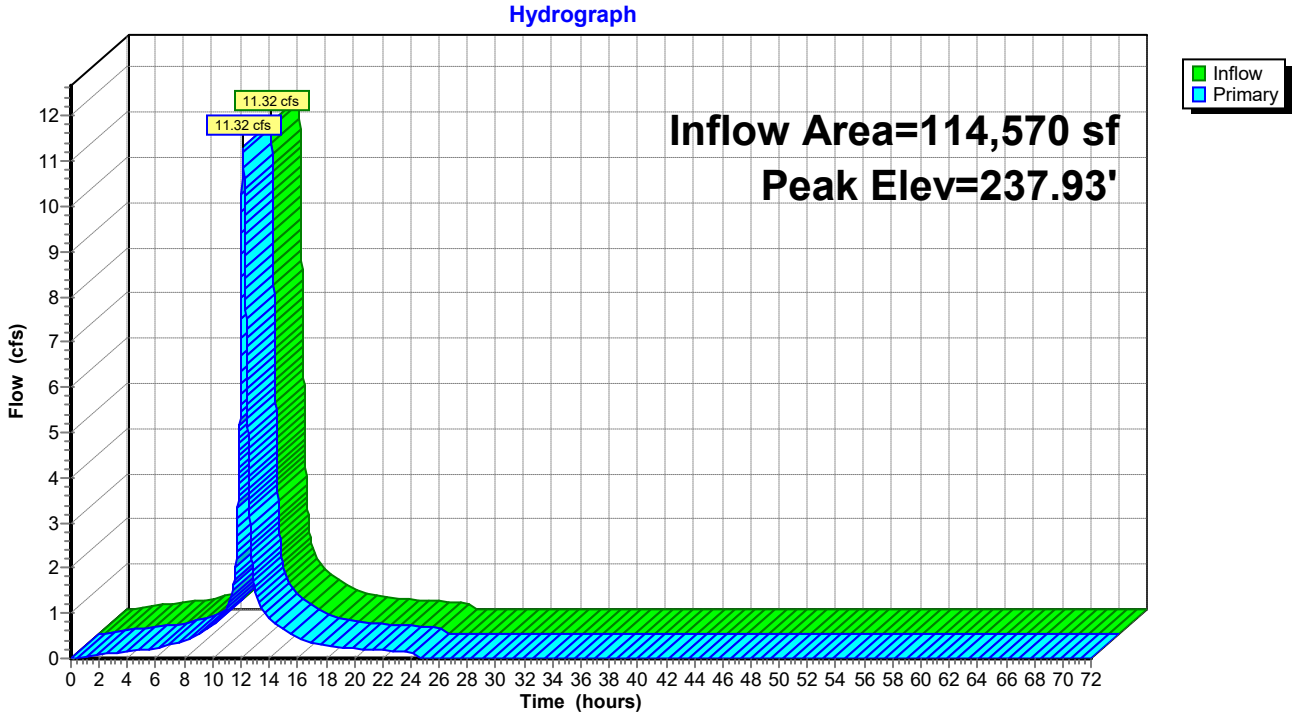
Inflow Area = 114,570 sf, 96.31% Impervious, Inflow Depth = 5.93" for 25-yr event
Inflow = 11.32 cfs @ 12.13 hrs, Volume= 56,577 cf
Outflow = 11.32 cfs @ 12.13 hrs, Volume= 56,577 cf, Atten= 0%, Lag= 0.0 min
Primary = 11.32 cfs @ 12.13 hrs, Volume= 56,577 cf
Routed to Pond DMH-118 : DMH-118

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 237.93' @ 12.13 hrs
Flood Elev= 241.60'

Device	Routing	Invert	Outlet Devices
#1	Primary	236.04'	**24.0" Round Culvert** L= 118.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 236.04' / 235.45' S= 0.0050 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 3.14 sf
#2	Primary	244.43'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=11.33 cfs @ 12.13 hrs HW=237.93' (Free Discharge)
└─**1=Culvert** (Inlet Controls 11.33 cfs @ 3.69 fps)
└─**2=Orifice/Grate** (Controls 0.00 cfs)

Pond DMH-110: DMH-110



Summary for Pond DMH-118: DMH-118

[79] Warning: Submerged Pond DMH-110 Primary device # 1 INLET by 0.93'

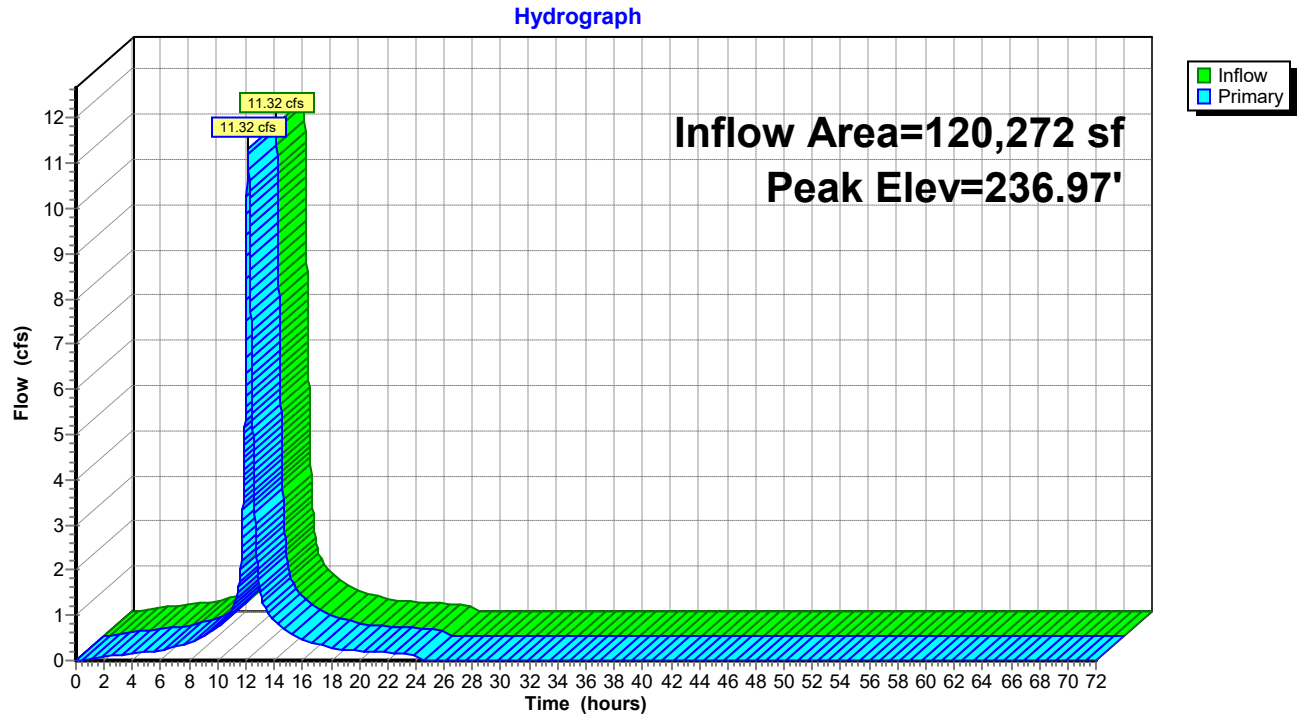
Inflow Area = 120,272 sf, 96.49% Impervious, Inflow Depth = 5.65" for 25-yr event
Inflow = 11.32 cfs @ 12.13 hrs, Volume= 56,667 cf
Outflow = 11.32 cfs @ 12.13 hrs, Volume= 56,667 cf, Atten= 0%, Lag= 0.0 min
Primary = 11.32 cfs @ 12.13 hrs, Volume= 56,667 cf
Routed to Pond DMH-125 : DMH-125

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 236.97' @ 12.13 hrs
Flood Elev= 241.41'

Device	Routing	Invert	Outlet Devices
#1	Primary	234.97'	**24.0" Round culvert** L= 37.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 234.97' / 234.78' S= 0.0051 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 3.14 sf
#2	Primary	243.98'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=11.32 cfs @ 12.13 hrs HW=236.97' (Free Discharge)
└─**1=culvert** (Barrel Controls 11.32 cfs @ 4.49 fps)
└─**2=Orifice/Grate** (Controls 0.00 cfs)

Pond DMH-118: DMH-118



Summary for Pond DMH-125: DMH-125

[58] Hint: Peaked 4.51' above defined flood level
[81] Warning: Exceeded Pond DMH-118 by 8.06' @ 12.10 hrs

Inflow Area = 155,496 sf, 95.28% Impervious, Inflow Depth = 5.65" for 25-yr event
Inflow = 15.61 cfs @ 12.10 hrs, Volume= 73,215 cf
Outflow = 15.61 cfs @ 12.10 hrs, Volume= 73,215 cf, Atten= 0%, Lag= 0.0 min
Primary = 8.80 cfs @ 12.10 hrs, Volume= 65,243 cf
Routed to Link 1L : POI 1
Secondary = 6.82 cfs @ 12.10 hrs, Volume= 7,973 cf
Routed to Pond OCS-126 : OCS-126

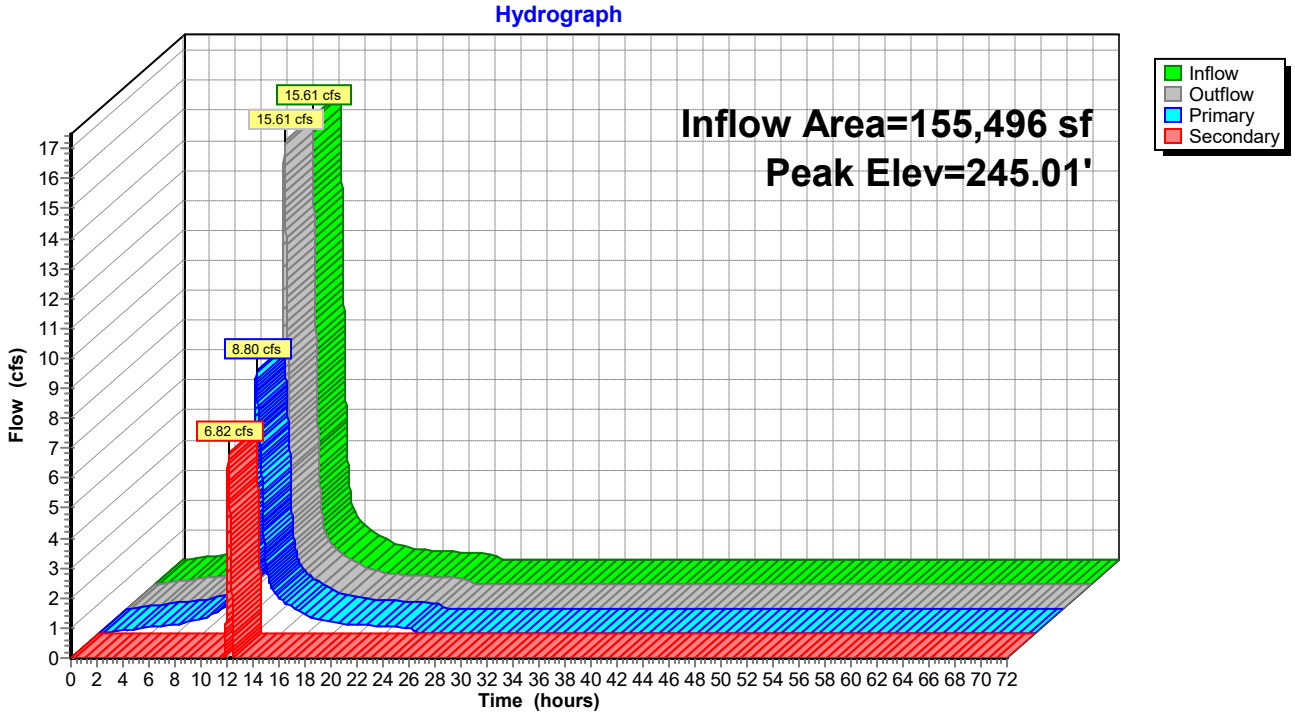
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 245.01' @ 12.10 hrs
Flood Elev= 240.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	235.40'	**12.0" Round Culvert** L= 130.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 235.40' / 233.54' S= 0.0143 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#2	Secondary	239.30'	**12.0" Round Culvert** L= 70.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 239.30' / 237.90' S= 0.0200 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=8.79 cfs @ 12.10 hrs HW=245.00' (Free Discharge)
1=Culvert (Barrel Controls 8.79 cfs @ 11.19 fps)

Secondary OutFlow Max=6.81 cfs @ 12.10 hrs HW=245.00' (Free Discharge)
2=Culvert (Inlet Controls 6.81 cfs @ 8.67 fps)

Pond DMH-125: DMH-125



Summary for Pond EX DMH: DMH

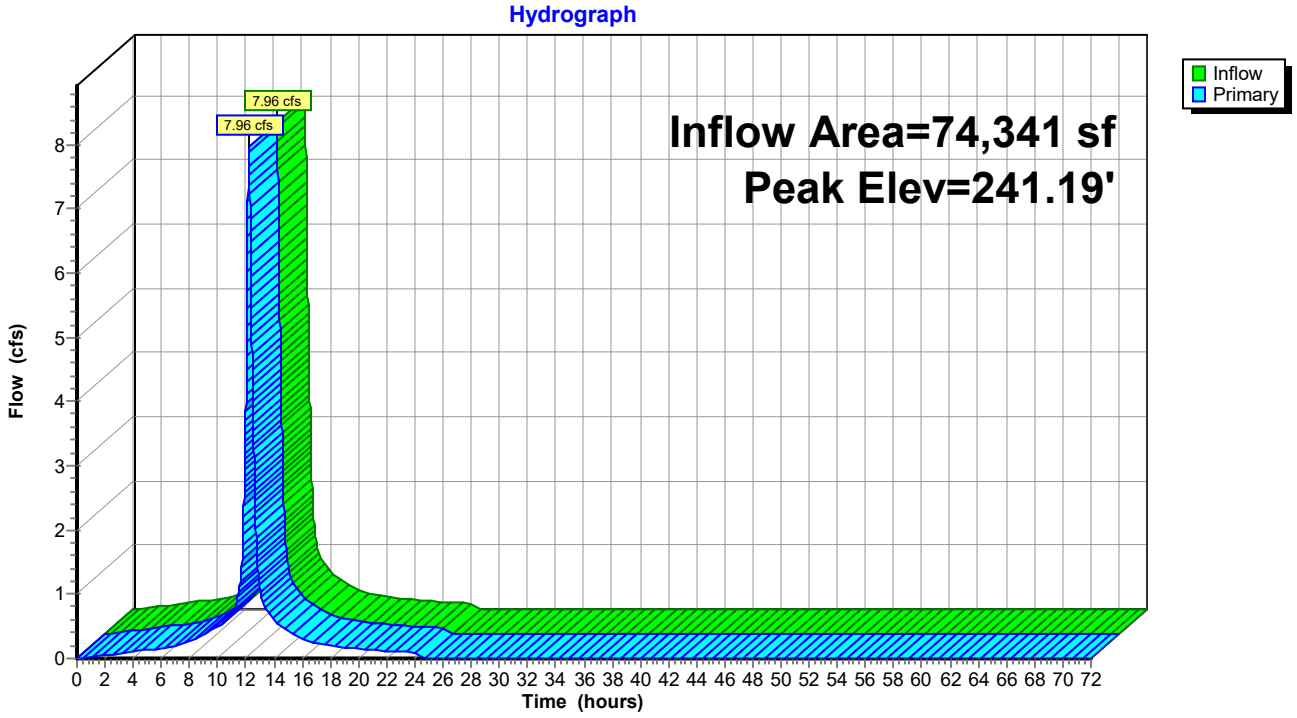
Inflow Area = 74,341 sf,100.00% Impervious, Inflow Depth = 6.13" for 25-yr event
Inflow = 7.96 cfs @ 12.21 hrs, Volume= 37,985 cf
Outflow = 7.96 cfs @ 12.21 hrs, Volume= 37,985 cf, Atten= 0%, Lag= 0.0 min
Primary = 7.96 cfs @ 12.21 hrs, Volume= 37,985 cf
Routed to Pond DMH-110 : DMH-110

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 241.19' @ 12.21 hrs
Flood Elev= 244.83'

Device	Routing	Invert	Outlet Devices
#1	Primary	239.23'	**15.0" Round RCP_Round 15"** L= 20.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 239.23' / 238.90' S= 0.0165 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 1.23 sf
#2	Primary	244.58'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=7.96 cfs @ 12.21 hrs HW=241.19' (Free Discharge)
└─**1=RCP_Round 15"** (Barrel Controls 7.96 cfs @ 6.48 fps)
└─**2=Orifice/Grate** (Controls 0.00 cfs)

Pond EX DMH: DMH



Summary for Pond INF-A: Addition Roof Gallery

Inflow Area = 5,702 sf,100.00% Impervious, Inflow Depth = 6.13" for 25-yr event
Inflow = 0.82 cfs @ 12.08 hrs, Volume= 2,913 cf
Outflow = 0.08 cfs @ 12.90 hrs, Volume= 2,913 cf, Atten= 91%, Lag= 49.1 min
Discarded = 0.04 cfs @ 12.90 hrs, Volume= 2,823 cf
Primary = 0.03 cfs @ 12.90 hrs, Volume= 90 cf
Routed to Pond DMH-118 : DMH-118

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 240.97' @ 12.90 hrs Surf.Area= 1,600 sf Storage= 1,230 cf
Flood Elev= 242.03' Surf.Area= 1,600 sf Storage= 2,022 cf

Plug-Flow detention time= 226.7 min calculated for 2,913 cf (100% of inflow)
Center-of-Mass det. time= 226.6 min (970.9 - 744.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	239.70'	1,139 cf	**21.50'W x 74.40'L x 2.33'H Field A** 3,732 cf Overall - 885 cf Embedded = 2,848 cf x 40.0% Voids
#2A	240.20'	885 cf	**ADS_StormTech SC-310 +Cap** x 60 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 60 Chambers in 6 Rows
		2,024 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	239.60'	**12.0" Round Culvert** L= 50.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 239.60' / 239.00' S= 0.0120 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	240.95'	**2.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height
#3	Discarded	239.70'	**1.020 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.04 cfs @ 12.90 hrs HW=240.97' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=0.03 cfs @ 12.90 hrs HW=240.97' (Free Discharge)
└**1=Culvert** (Passes 0.03 cfs of 2.79 cfs potential flow)
└**2=Sharp-Crested Rectangular Weir** (Weir Controls 0.03 cfs @ 0.50 fps)

Pond INF-A: Addition Roof Gallery - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-310 +Cap (ADS StormTech® SC-310 with cap length)
Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf
Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

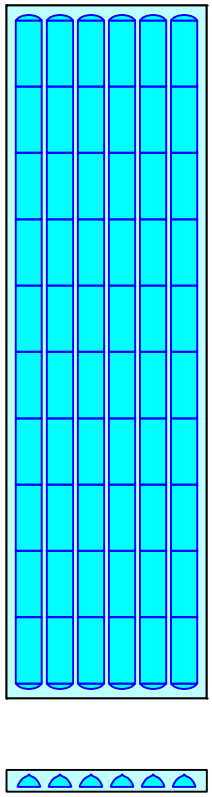
10 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 72.40' Row Length +12.0" End Stone x 2 = 74.40' Base Length
6 Rows x 34.0" Wide + 6.0" Spacing x 5 + 12.0" Side Stone x 2 = 21.50' Base Width
6.0" Stone Base + 16.0" Chamber Height + 6.0" Stone Cover = 2.33' Field Height

60 Chambers x 14.7 cf = 884.5 cf Chamber Storage

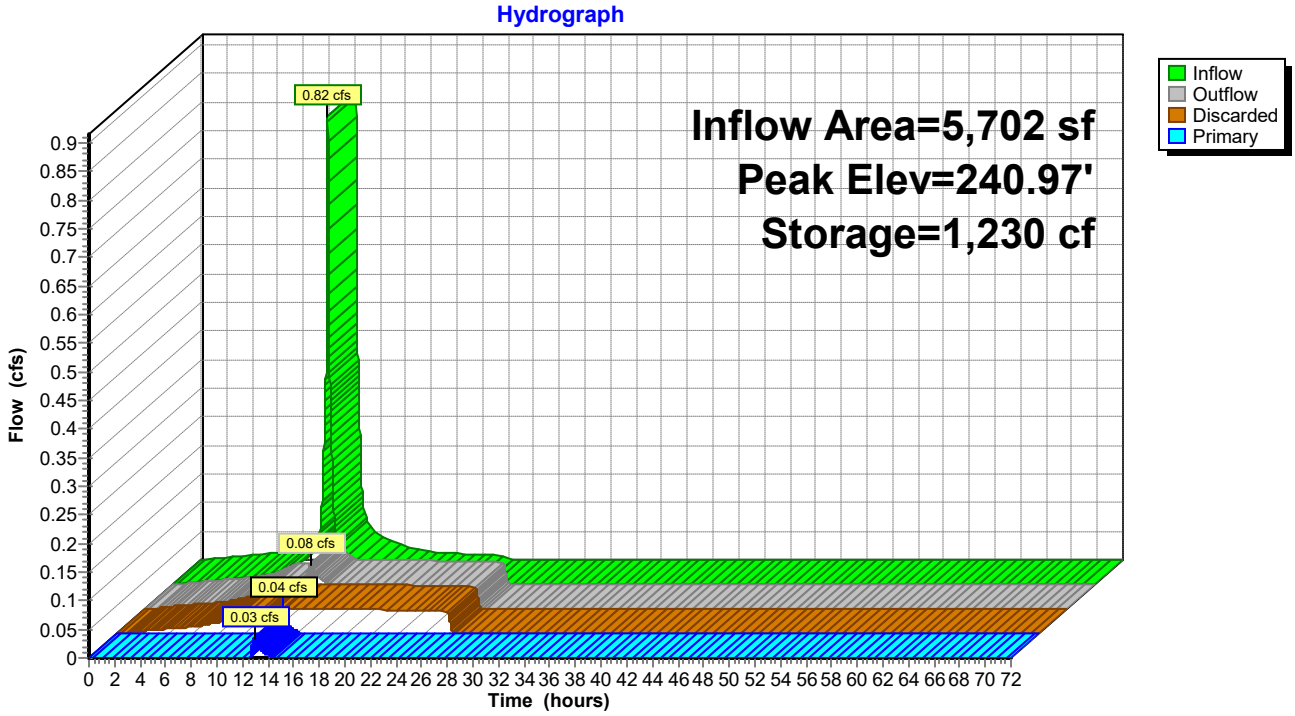
3,732.4 cf Field - 884.5 cf Chambers = 2,847.9 cf Stone x 40.0% Voids = 1,139.2 cf Stone Storage

Chamber Storage + Stone Storage = 2,023.7 cf = 0.046 af
Overall Storage Efficiency = 54.2%
Overall System Size = 74.40' x 21.50' x 2.33'

60 Chambers
138.2 cy Field
105.5 cy Stone



Pond INF-A: Addition Roof Gallery



Summary for Pond INF-B: Garage Gallery

Inflow Area = 57,016 sf,100.00% Impervious, Inflow Depth = 6.13" for 25-yr event
Inflow = 8.17 cfs @ 12.08 hrs, Volume= 29,133 cf
Outflow = 7.71 cfs @ 12.11 hrs, Volume= 29,133 cf, Atten= 6%, Lag= 1.7 min
Discarded = 0.10 cfs @ 12.11 hrs, Volume= 12,709 cf
Primary = 7.61 cfs @ 12.11 hrs, Volume= 16,424 cf
Routed to Pond OCS-216 : OCS-216

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 239.73' @ 12.11 hrs Surf.Area= 3,590 sf Storage= 7,122 cf
Flood Elev= 240.40' Surf.Area= 3,590 sf Storage= 7,727 cf

Plug-Flow detention time= 248.1 min calculated for 29,129 cf (100% of inflow)
Center-of-Mass det. time= 248.2 min (992.5 - 744.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	236.65'	3,225 cf	**34.75'W x 103.30'L x 3.50'H Field A** 12,563 cf Overall - 4,502 cf Embedded = 8,061 cf x 40.0% Voids
#2A	237.15'	4,502 cf	**ADS_StormTech SC-740 +Cap** x 98 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 98 Chambers in 7 Rows
		7,727 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	237.65'	**24.0" Round Culvert** L= 50.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 237.65' / 237.40' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	238.85'	**2.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height
#3	Discarded	236.65'	**1.020 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.10 cfs @ 12.11 hrs HW=239.73' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.10 cfs)

Primary OutFlow Max=7.60 cfs @ 12.11 hrs HW=239.73' (Free Discharge)
└**1=Culvert** (Passes 7.60 cfs of 11.99 cfs potential flow)
└**2=Sharp-Crested Rectangular Weir** (Weir Controls 7.60 cfs @ 3.72 fps)

Pond INF-B: Garage Gallery - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

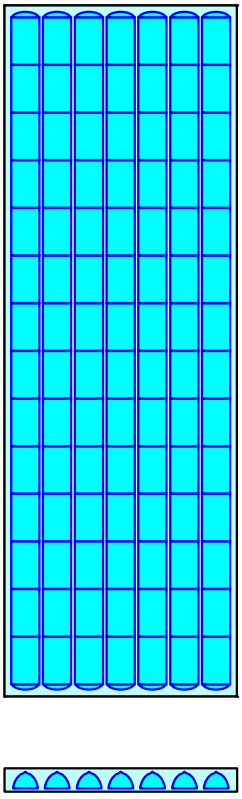
14 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 101.30' Row Length +12.0" End Stone x 2 = 103.30' Base Length
7 Rows x 51.0" Wide + 6.0" Spacing x 6 + 12.0" Side Stone x 2 = 34.75' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

98 Chambers x 45.9 cf = 4,502.1 cf Chamber Storage

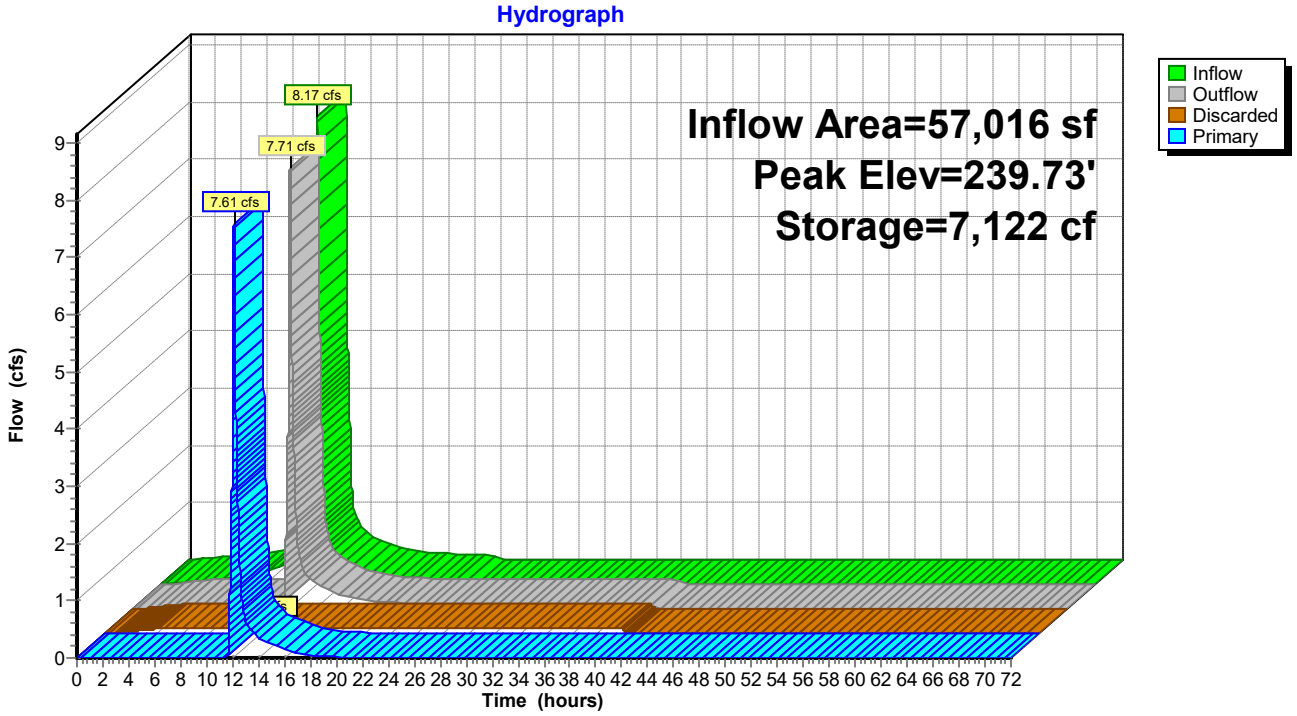
12,563.5 cf Field - 4,502.1 cf Chambers = 8,061.3 cf Stone x 40.0% Voids = 3,224.5 cf Stone Storage

Chamber Storage + Stone Storage = 7,726.7 cf = 0.177 af
Overall Storage Efficiency = 61.5%
Overall System Size = 103.30' x 34.75' x 3.50'

98 Chambers
465.3 cy Field
298.6 cy Stone



Pond INF-B: Garage Gallery



Summary for Pond INF-C: Bus Parking Gallery

Inflow Area = 52,591 sf, 96.67% Impervious, Inflow Depth = 5.97" for 25-yr event
Inflow = 7.33 cfs @ 12.08 hrs, Volume= 26,155 cf
Outflow = 0.35 cfs @ 14.33 hrs, Volume= 26,155 cf, Atten= 95%, Lag= 134.7 min
Discarded = 0.21 cfs @ 14.33 hrs, Volume= 25,293 cf
Primary = 0.14 cfs @ 14.33 hrs, Volume= 861 cf
Routed to Pond OCS-311 : OCS-311

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 244.12' @ 14.33 hrs Surf.Area= 7,709 sf Storage= 14,602 cf
Flood Elev= 244.80' Surf.Area= 7,709 sf Storage= 16,746 cf

Plug-Flow detention time= 604.8 min calculated for 26,151 cf (100% of inflow)
Center-of-Mass det. time= 604.8 min (1,350.0 - 745.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	241.30'	6,823 cf	**58.50'W x 131.78'L x 3.50'H Field A** 26,981 cf Overall - 9,923 cf Embedded = 17,058 cf x 40.0% Voids
#2A	241.80'	9,923 cf	**ADS_StormTech SC-740 +Cap** x 216 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 216 Chambers in 12 Rows
		16,746 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	242.80'	**12.0" Round Culvert** L= 100.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 242.80' / 242.30' S= 0.0050 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#2	Device 1	244.05'	**2.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height
#3	Discarded	241.30'	**1.020 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.21 cfs @ 14.33 hrs HW=244.12' (Free Discharge)
↑—**3=Exfiltration** (Exfiltration Controls 0.21 cfs)

Primary OutFlow Max=0.14 cfs @ 14.33 hrs HW=244.12' (Free Discharge)
↑—**1=Culvert** (Passes 0.14 cfs of 2.70 cfs potential flow)
↑—**2=Sharp-Crested Rectangular Weir** (Weir Controls 0.14 cfs @ 0.85 fps)

Pond INF-C: Bus Parking Gallery - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

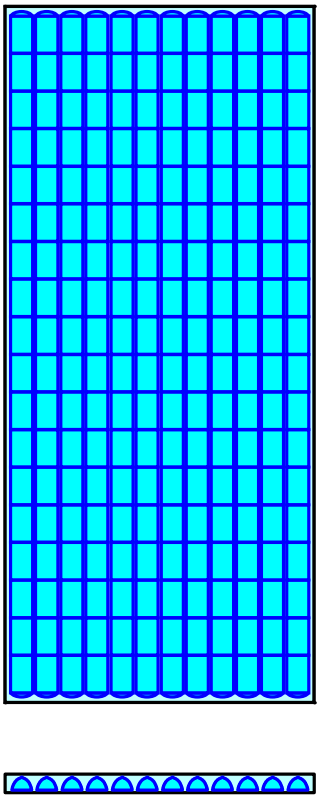
18 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 129.78' Row Length +12.0" End Stone x 2 = 131.78' Base Length
12 Rows x 51.0" Wide + 6.0" Spacing x 11 + 12.0" Side Stone x 2 = 58.50' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

216 Chambers x 45.9 cf = 9,923.0 cf Chamber Storage

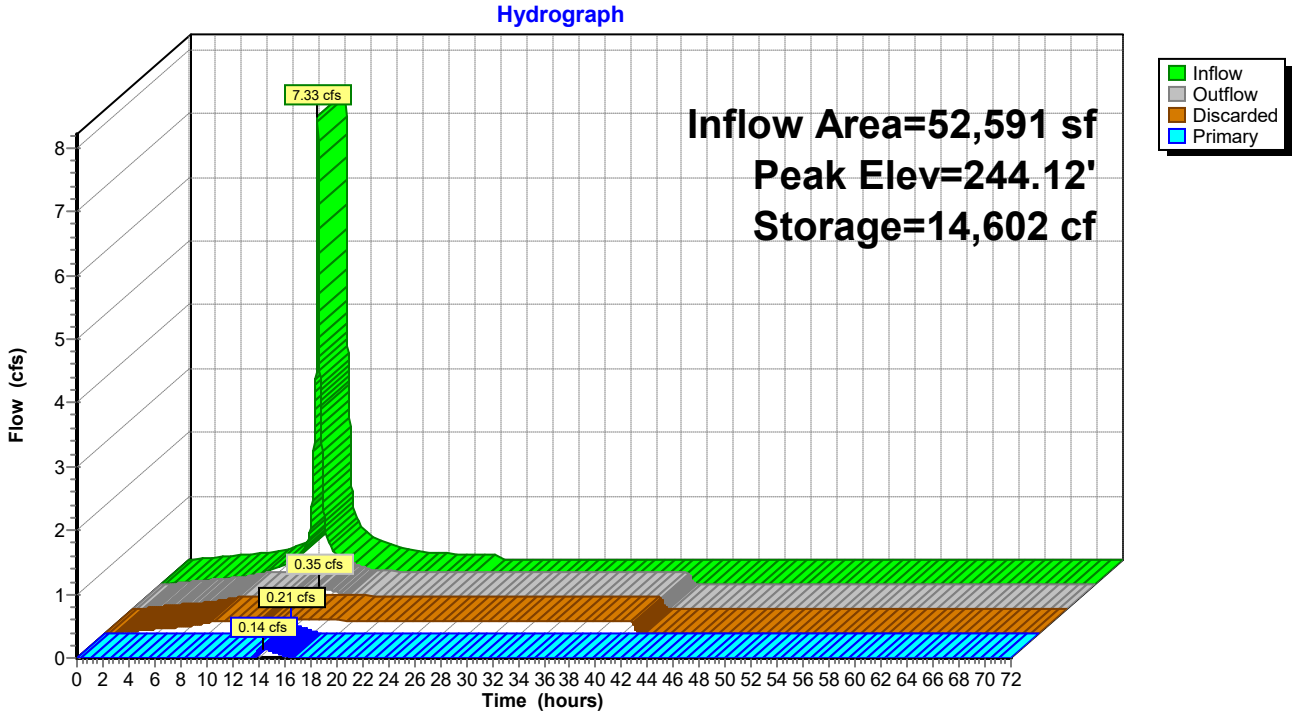
26,981.3 cf Field - 9,923.0 cf Chambers = 17,058.2 cf Stone x 40.0% Voids = 6,823.3 cf Stone Storage

Chamber Storage + Stone Storage = 16,746.3 cf = 0.384 af
Overall Storage Efficiency = 62.1%
Overall System Size = 131.78' x 58.50' x 3.50'

216 Chambers
999.3 cy Field
631.8 cy Stone



Pond INF-C: Bus Parking Gallery



Summary for Pond OCS-126: OCS-126

[57] Hint: Peaked at 241.33' (Flood elevation advised)
[81] Warning: Exceeded Pond DMH-125 by 5.52' @ 0.00 hrs

Inflow	=	6.82 cfs @	12.10 hrs,	Volume=	7,973 cf
Outflow	=	6.82 cfs @	12.10 hrs,	Volume=	7,973 cf, Atten= 0%, Lag= 0.0 min
Primary	=	6.82 cfs @	12.10 hrs,	Volume=	7,973 cf

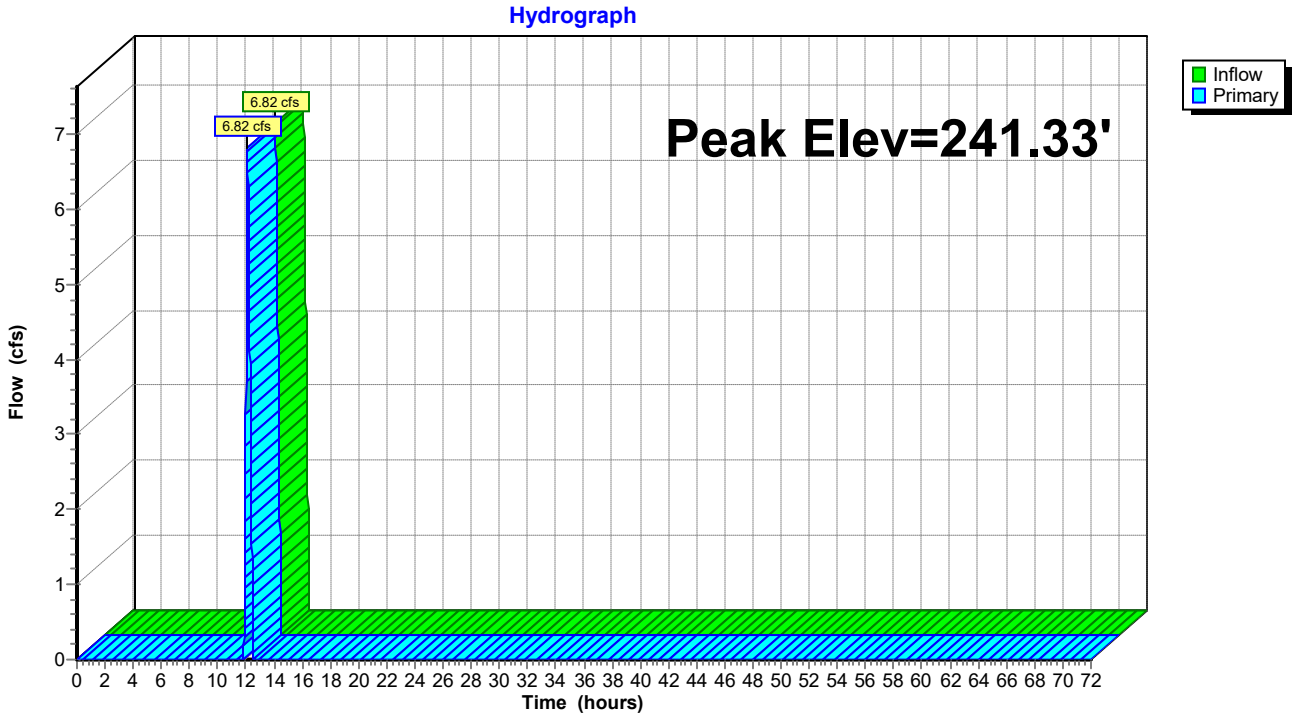
Routed to Link 1L : POI 1

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 241.33' @ 12.10 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	240.92'	**24.0" x 24.0" Horiz. Overflow Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=6.81 cfs @ 12.10 hrs HW=241.33' (Free Discharge)
1=Overflow Grate (Weir Controls 6.81 cfs @ 2.09 fps)

Pond OCS-126: OCS-126



Summary for Pond OCS-216: OCS-216

[58] Hint: Peaked 0.94' above defined flood level
[81] Warning: Exceeded Pond INF-B by 4.35' @ 0.00 hrs

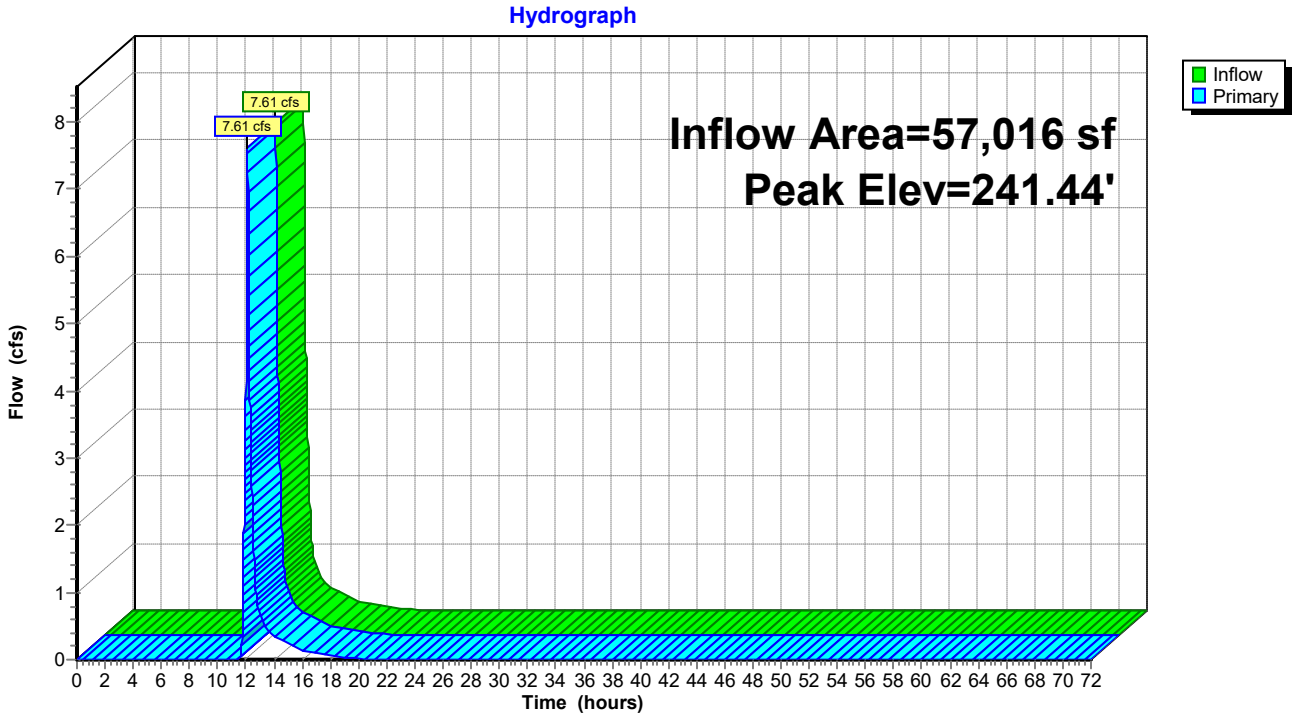
Inflow Area = 57,016 sf,100.00% Impervious, Inflow Depth = 3.46" for 25-yr event
Inflow = 7.61 cfs @ 12.11 hrs, Volume= 16,424 cf
Outflow = 7.61 cfs @ 12.11 hrs, Volume= 16,424 cf, Atten= 0%, Lag= 0.0 min
Primary = 7.61 cfs @ 12.11 hrs, Volume= 16,424 cf
Routed to Link 1L : POI 1

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 241.44' @ 12.11 hrs
Flood Elev= 240.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	241.00'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=7.60 cfs @ 12.11 hrs HW=241.44' (Free Discharge)
1=Orifice/Grate (Weir Controls 7.60 cfs @ 2.17 fps)

Pond OCS-216: OCS-216



Summary for Pond OCS-311: OCS-311

[58] Hint: Peaked 4.53' above defined flood level
[81] Warning: Exceeded Pond INF-C by 3.70' @ 0.00 hrs

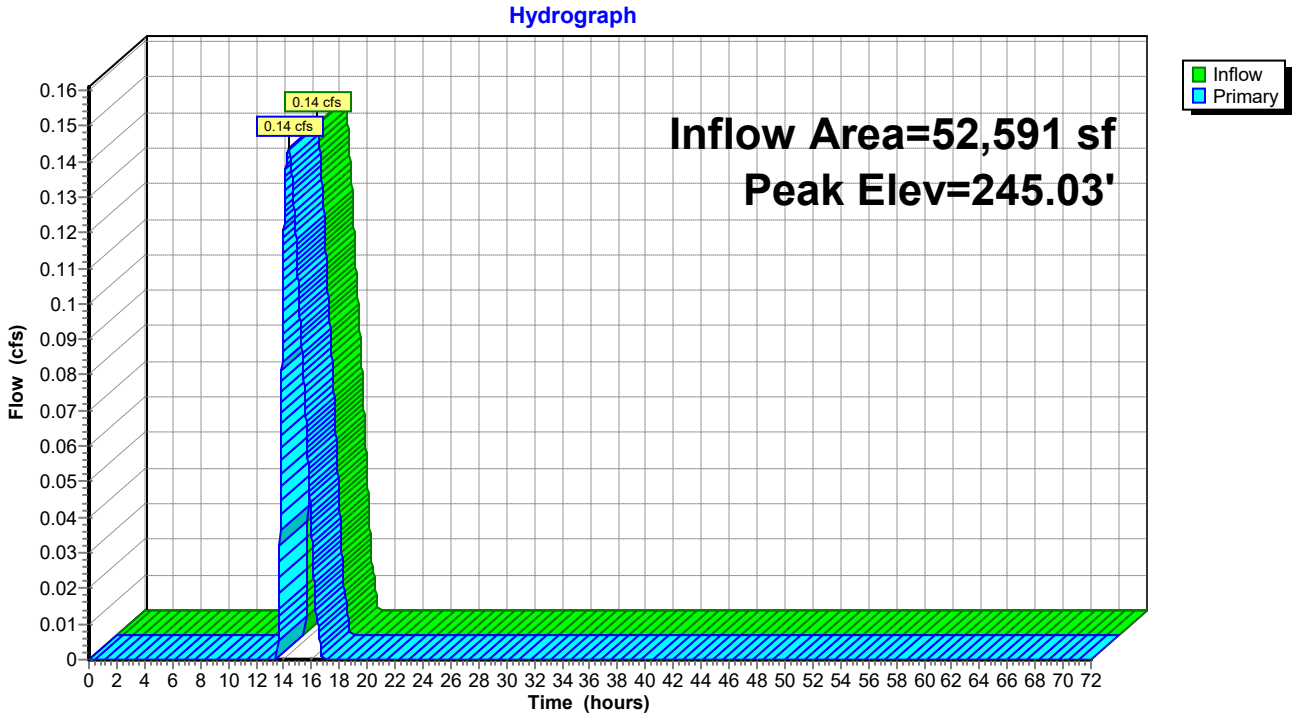
Inflow Area = 52,591 sf, 96.67% Impervious, Inflow Depth = 0.20" for 25-yr event
Inflow = 0.14 cfs @ 14.33 hrs, Volume= 861 cf
Outflow = 0.14 cfs @ 14.33 hrs, Volume= 861 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.14 cfs @ 14.33 hrs, Volume= 861 cf
Routed to Link 1L : POI 1

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 245.03' @ 14.33 hrs
Flood Elev= 240.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	245.00'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.14 cfs @ 14.33 hrs HW=245.03' (Free Discharge)
1=Orifice/Grate (Weir Controls 0.14 cfs @ 0.58 fps)

Pond OCS-311: OCS-311

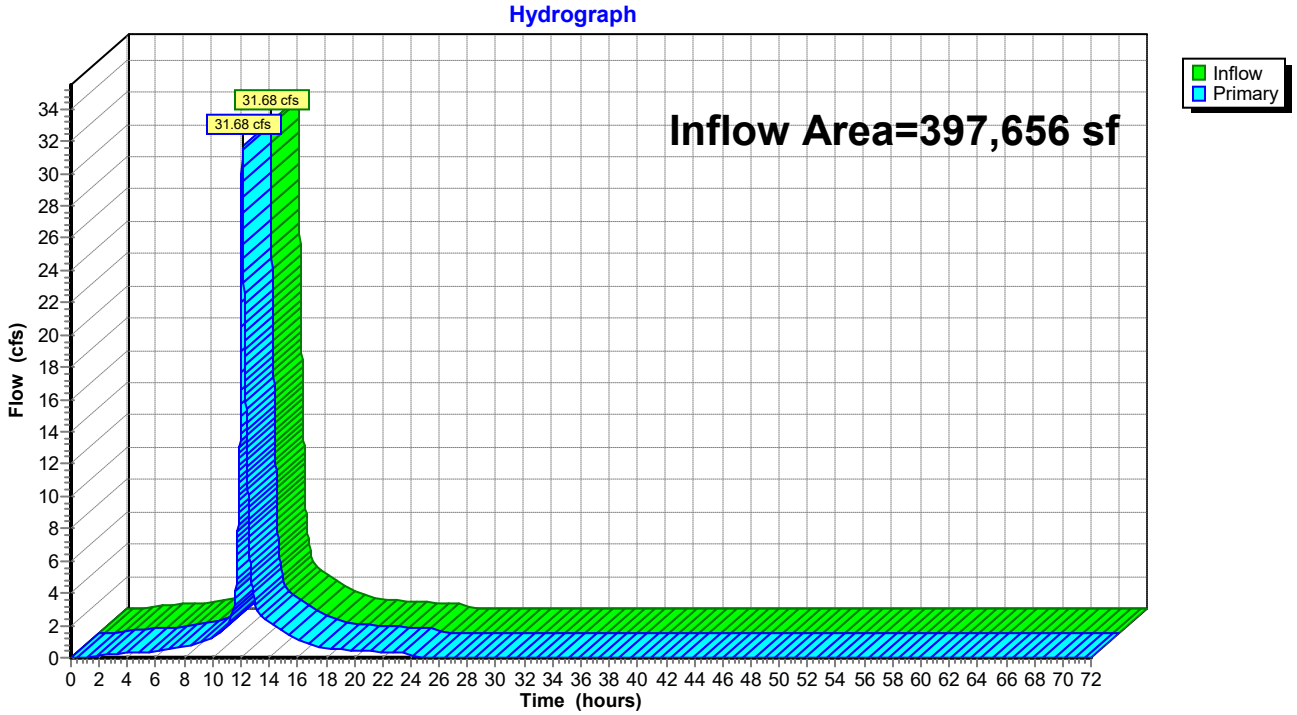


Summary for Link 1L: POI 1

Inflow Area = 397,656 sf, 76.22% Impervious, Inflow Depth = 3.69" for 25-yr event
Inflow = 31.68 cfs @ 12.10 hrs, Volume= 122,221 cf
Primary = 31.68 cfs @ 12.10 hrs, Volume= 122,221 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link 1L: POI 1



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

Subcatchment A1: Bus Parking Area Runoff Area=52,591 sf 96.67% Impervious Runoff Depth=7.69"
Tc=6.0 min CN=WQ Runoff=9.39 cfs 33,693 cf

Subcatchment B1: Frontage Areas Runoff Area=40,229 sf 89.49% Impervious Runoff Depth=7.18"
Tc=6.0 min CN=WQ Runoff=6.67 cfs 24,067 cf

Subcatchment B2: North Yard Area Runoff Area=35,224 sf 91.15% Impervious Runoff Depth=7.29"
Tc=6.0 min CN=WQ Runoff=5.94 cfs 21,397 cf

Subcatchment C1: Gar. Addition Runoff Area=5,702 sf 100.00% Impervious Runoff Depth=7.88"
Tc=6.0 min CN=98 Runoff=1.04 cfs 3,744 cf

Subcatchment D1: Garage Area Runoff Area=57,016 sf 100.00% Impervious Runoff Depth=7.88"
Tc=6.0 min CN=98 Runoff=10.44 cfs 37,441 cf

Subcatchment E1: Southeast Yard Area Runoff Area=132,553 sf 35.53% Impervious Runoff Depth=4.03"
Tc=6.0 min CN=WQ Runoff=12.33 cfs 44,484 cf

Subcatchment OFFSITE: Offsite Drainage Runoff Area=74,341 sf 100.00% Impervious Runoff Depth=7.88"
Tc=16.0 min CN=98 Runoff=10.16 cfs 48,818 cf

Pond DMH-110: DMH-110 Peak Elev=238.52' Inflow=14.52 cfs 72,885 cf
Outflow=14.52 cfs 72,885 cf

Pond DMH-118: DMH-118 Peak Elev=237.45' Inflow=14.52 cfs 73,527 cf
Outflow=14.52 cfs 73,527 cf

Pond DMH-125: DMH-125 Peak Elev=249.80' Inflow=20.06 cfs 94,924 cf
Primary=10.62 cfs 81,801 cf Secondary=9.44 cfs 13,123 cf Outflow=20.06 cfs 94,924 cf

Pond EX DMH: DMH Peak Elev=241.85' Inflow=10.16 cfs 48,818 cf
Outflow=10.16 cfs 48,818 cf

Pond INF-A: Addition Roof Gallery Peak Elev=241.07' Storage=1,326 cf Inflow=1.04 cfs 3,744 cf
Discarded=0.04 cfs 3,102 cf Primary=0.34 cfs 642 cf Outflow=0.38 cfs 3,744 cf

Pond INF-B: Garage Gallery Peak Elev=239.88' Storage=7,342 cf Inflow=10.44 cfs 37,441 cf
Discarded=0.11 cfs 13,124 cf Primary=9.85 cfs 24,317 cf Outflow=9.96 cfs 37,441 cf

Pond INF-C: Bus Parking Gallery Peak Elev=244.44' Storage=15,635 cf Inflow=9.39 cfs 33,693 cf
Discarded=0.21 cfs 26,820 cf Primary=2.11 cfs 6,873 cf Outflow=2.32 cfs 33,693 cf

Pond OCS-126: OCS-126 Peak Elev=241.43' Inflow=9.44 cfs 13,123 cf
Outflow=9.44 cfs 13,123 cf

Pond OCS-216: OCS-216 Peak Elev=241.52' Inflow=9.85 cfs 24,317 cf
Outflow=9.85 cfs 24,317 cf

Pond OCS-311: OCS-311 Peak Elev=245.19' Inflow=2.11 cfs 6,873 cf
Outflow=2.11 cfs 6,873 cf

Link 1L: POI 1 Inflow=42.03 cfs 170,598 cf
Primary=42.03 cfs 170,598 cf

Total Runoff Area = 397,656 sf Runoff Volume = 213,645 cf Average Runoff Depth = 6.45"
23.78% Pervious = 94,551 sf 76.22% Impervious = 303,105 sf

Summary for Subcatchment A1: Bus Parking Area

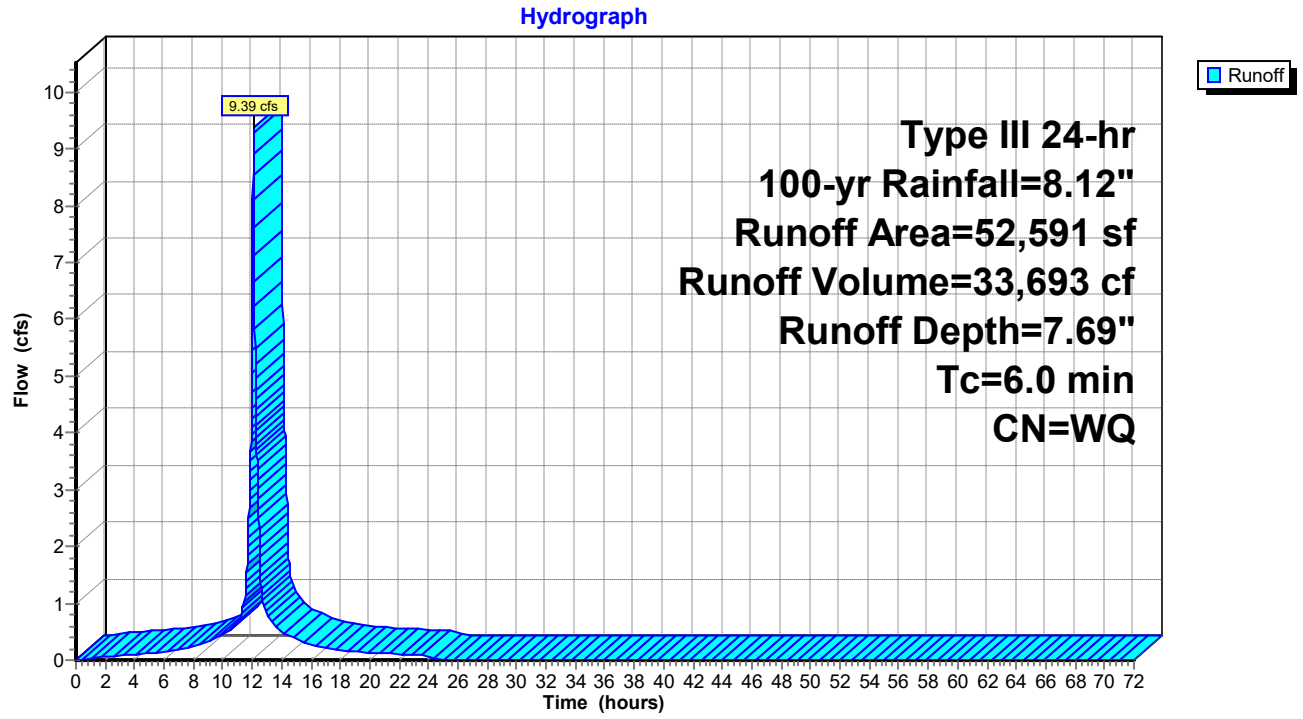
Runoff = 9.39 cfs @ 12.08 hrs, Volume= 33,693 cf, Depth= 7.69"
Routed to Pond INF-C : Bus Parking Gallery

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.12"

	Area (sf)	CN	Description
*	50,842	98	Paved parking
	673	61	>75% Grass cover, Good, HSG B
	1,076	39	>75% Grass cover, Good, HSG A
	52,591		Weighted Average
	1,749		3.33% Pervious Area
	50,842		96.67% Impervious Area

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

Subcatchment A1: Bus Parking Area



Summary for Subcatchment B1: Frontage Areas

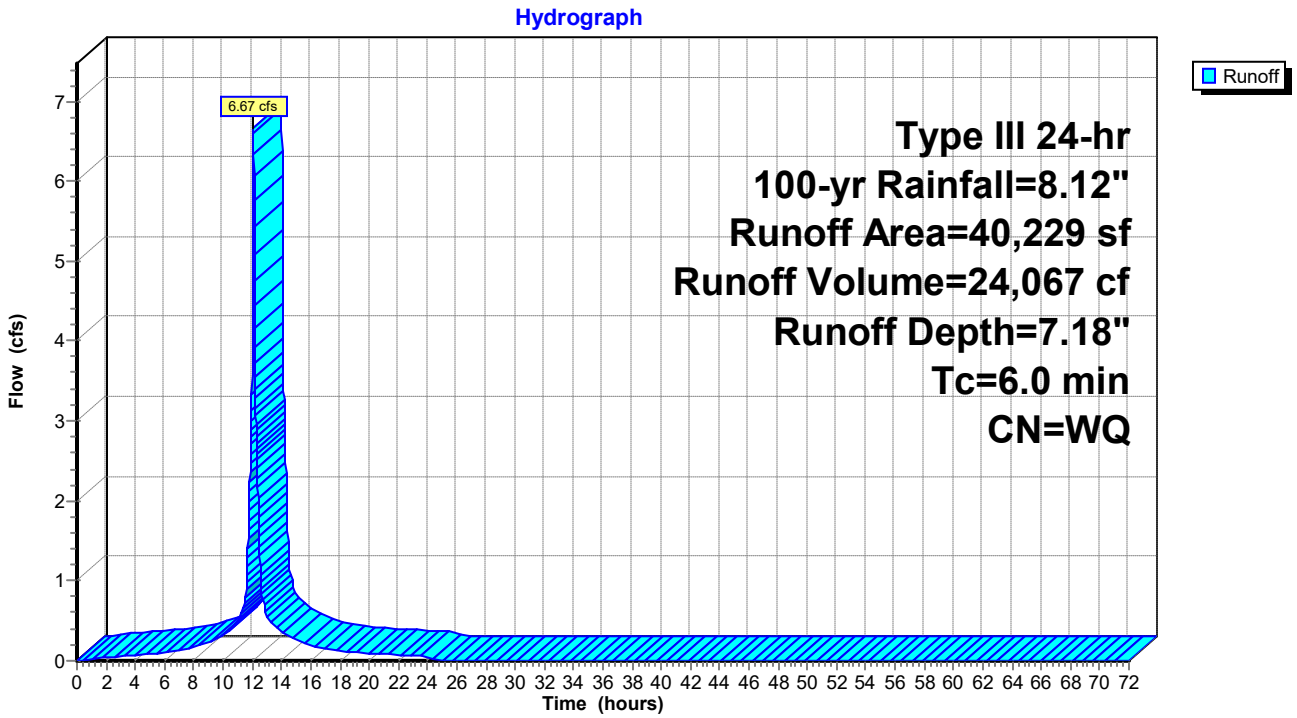
Runoff = 6.67 cfs @ 12.08 hrs, Volume= 24,067 cf, Depth= 7.18"
Routed to Pond DMH-110 : DMH-110

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.12"

	Area (sf)	CN	Description
*	36,002	98	Paved areas & roofs
	4,227	39	>75% Grass cover, Good, HSG A
	40,229		Weighted Average
	4,227		10.51% Pervious Area
	36,002		89.49% Impervious Area

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

Subcatchment B1: Frontage Areas



Summary for Subcatchment B2: North Yard Area

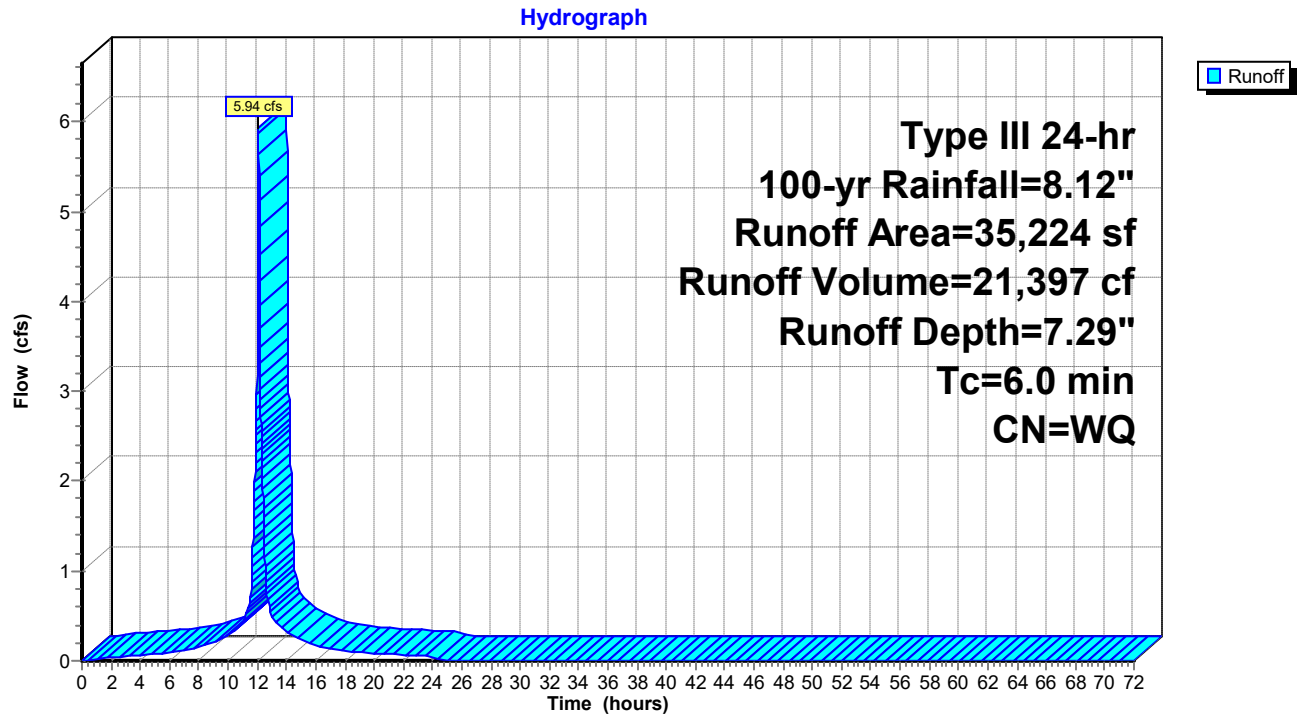
Runoff = 5.94 cfs @ 12.08 hrs, Volume= 21,397 cf, Depth= 7.29"
Routed to Pond DMH-125 : DMH-125

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.12"

	Area (sf)	CN	Description
*	32,105	98	Paved areas & roofs
	3,119	39	>75% Grass cover, Good, HSG A
	35,224		Weighted Average
	3,119		8.85% Pervious Area
	32,105		91.15% Impervious Area

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

Subcatchment B2: North Yard Area



Summary for Subcatchment C1: Gar. Addition

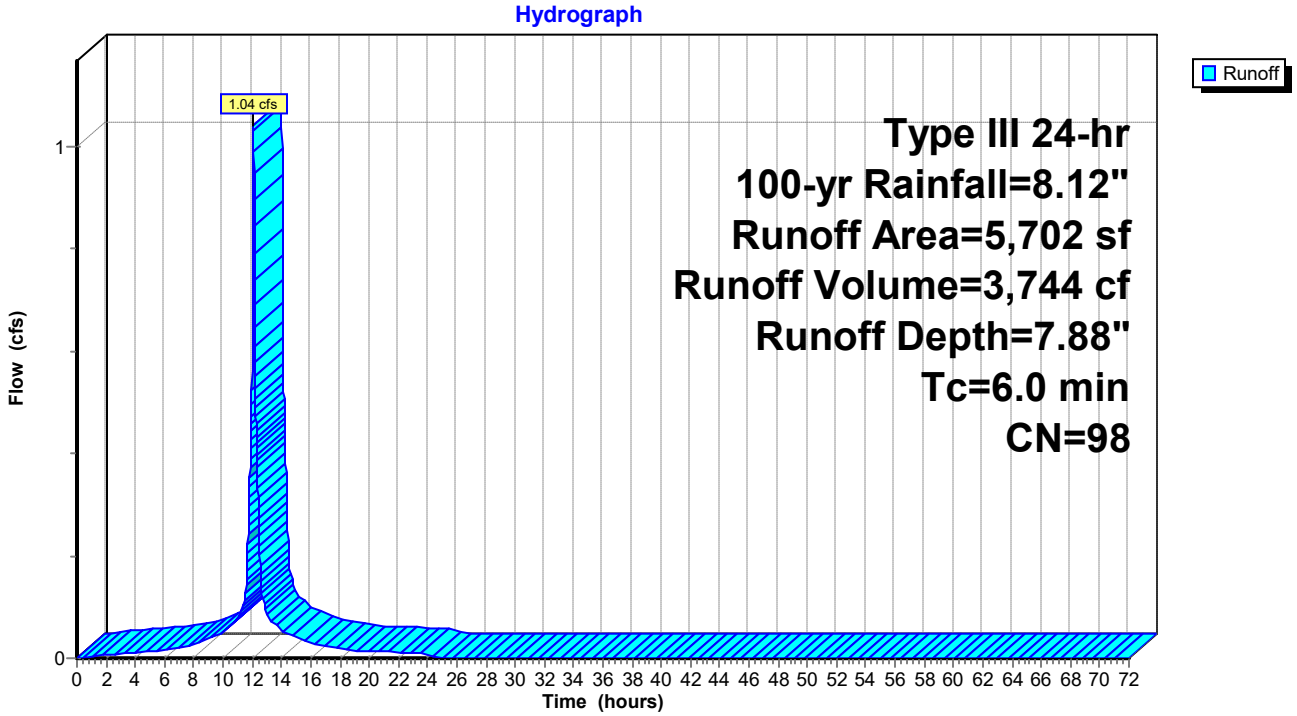
Runoff = 1.04 cfs @ 12.08 hrs, Volume= 3,744 cf, Depth= 7.88"
Routed to Pond INF-A : Addition Roof Gallery

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.12"

Area (sf)	CN	Description
5,702	98	Roofs, HSG A
5,702		100.00% Impervious Area

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

Subcatchment C1: Gar. Addition



Summary for Subcatchment D1: Garage Area

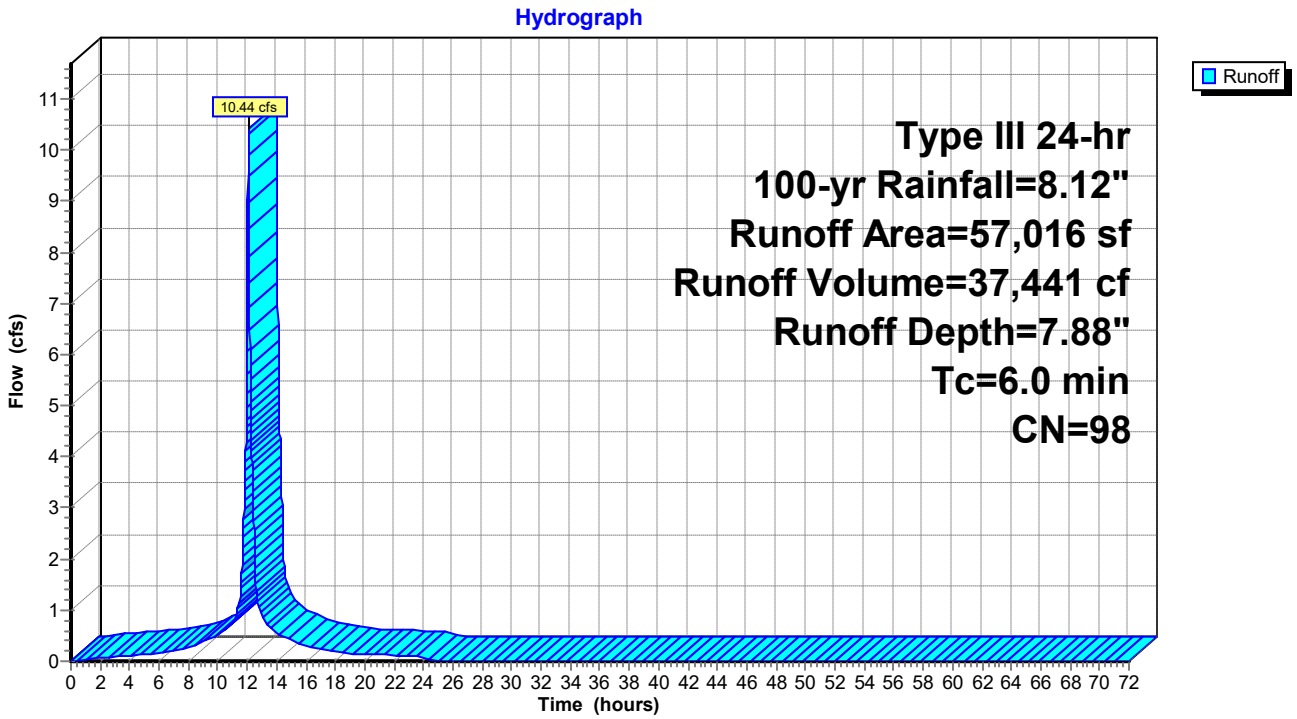
Runoff = 10.44 cfs @ 12.08 hrs, Volume= 37,441 cf, Depth= 7.88"
Routed to Pond INF-B : Garage Gallery

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.12"

	Area (sf)	CN	Description
*	57,016	98	Paved areas & roofs
	57,016		100.00% Impervious Area

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

Subcatchment D1: Garage Area



Summary for Subcatchment E1: Southeast Yard Area

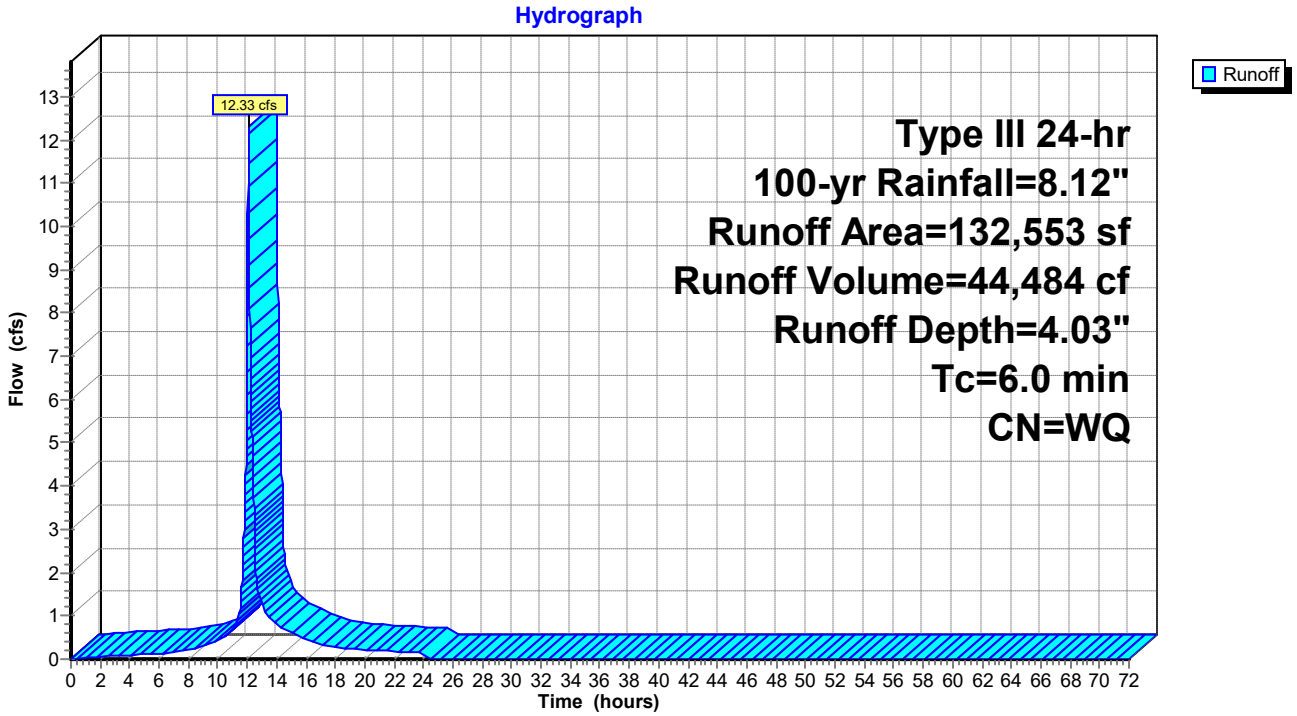
Runoff = 12.33 cfs @ 12.09 hrs, Volume= 44,484 cf, Depth= 4.03"
Routed to Link 1L : POI 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.12"

Area (sf)	CN	Description
47,097	98	Paved parking, HSG A
26,832	39	>75% Grass cover, Good, HSG A
17,412	30	Woods, Good, HSG A
34,660	55	Woods, Good, HSG B
6,552	61	>75% Grass cover, Good, HSG B
132,553		Weighted Average
85,456		64.47% Pervious Area
47,097		35.53% Impervious Area

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

Subcatchment E1: Southeast Yard Area



Summary for Subcatchment OFFSITE: Offsite Drainage

Total subcatchment represents approximately 2,039 LF of ROW (81,560 SF) minus areas that directly contribute to the onsite drainage network.

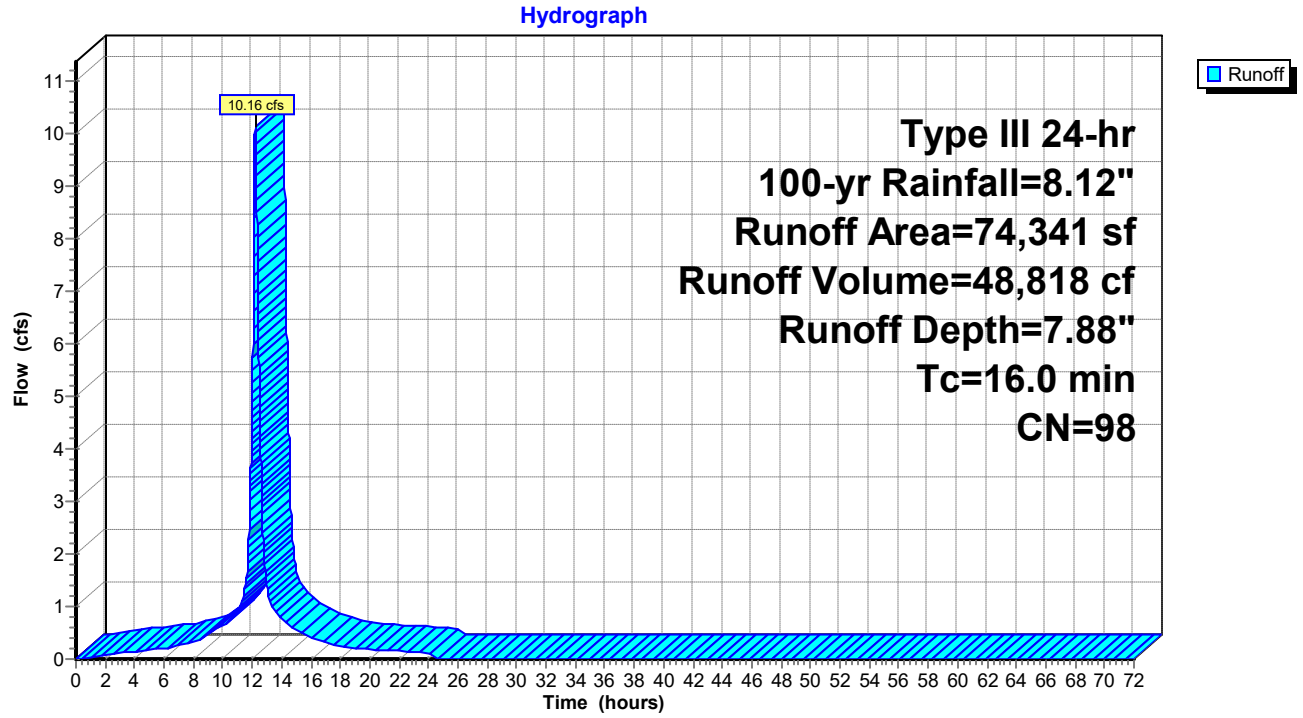
Runoff = 10.16 cfs @ 12.21 hrs, Volume= 48,818 cf, Depth= 7.88"
Routed to Pond EX DMH : DMH

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.12"

	Area (sf)	CN	Description
*	74,341	98	Elm St right-of-way
	74,341		100.00% Impervious Area

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

Subcatchment OFFSITE: Offsite Drainage



Summary for Pond DMH-110: DMH-110

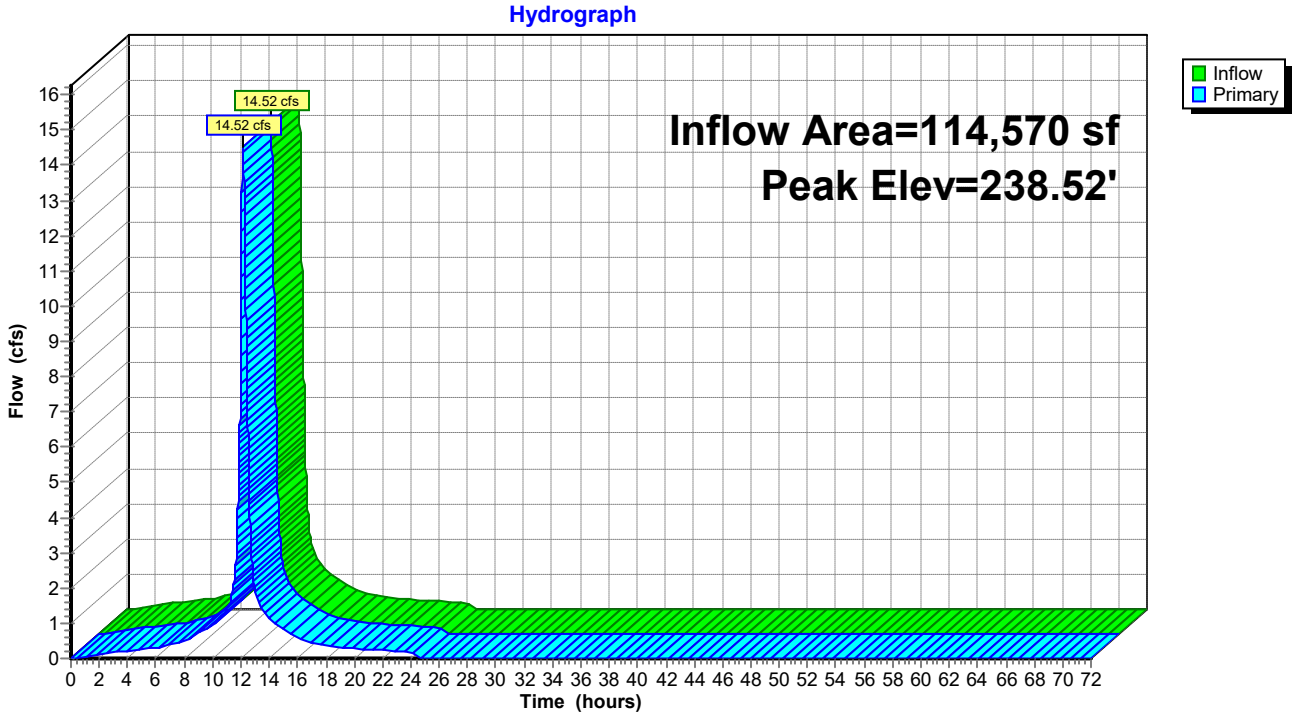
Inflow Area = 114,570 sf, 96.31% Impervious, Inflow Depth = 7.63" for 100-yr event
Inflow = 14.52 cfs @ 12.13 hrs, Volume= 72,885 cf
Outflow = 14.52 cfs @ 12.13 hrs, Volume= 72,885 cf, Atten= 0%, Lag= 0.0 min
Primary = 14.52 cfs @ 12.13 hrs, Volume= 72,885 cf
Routed to Pond DMH-118 : DMH-118

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 238.52' @ 12.13 hrs
Flood Elev= 241.60'

Device	Routing	Invert	Outlet Devices
#1	Primary	236.04'	**24.0" Round Culvert** L= 118.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 236.04' / 235.45' S= 0.0050 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 3.14 sf
#2	Primary	244.43'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=14.51 cfs @ 12.13 hrs HW=238.52' (Free Discharge)
1=Culvert (Inlet Controls 14.51 cfs @ 4.62 fps)
2=Orifice/Grate (Controls 0.00 cfs)

Pond DMH-110: DMH-110



Summary for Pond DMH-118: DMH-118

[79] Warning: Submerged Pond DMH-110 Primary device # 1 INLET by 1.41'

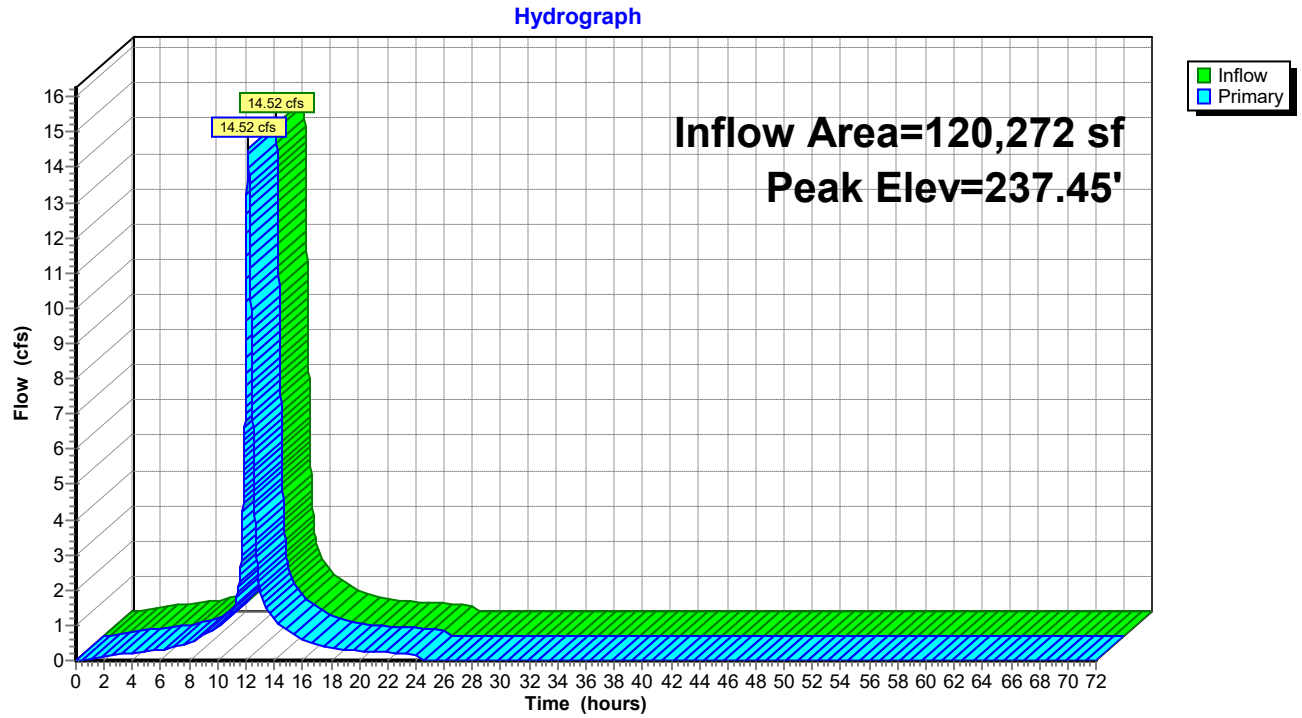
Inflow Area = 120,272 sf, 96.49% Impervious, Inflow Depth = 7.34" for 100-yr event
Inflow = 14.52 cfs @ 12.13 hrs, Volume= 73,527 cf
Outflow = 14.52 cfs @ 12.13 hrs, Volume= 73,527 cf, Atten= 0%, Lag= 0.0 min
Primary = 14.52 cfs @ 12.13 hrs, Volume= 73,527 cf
Routed to Pond DMH-125 : DMH-125

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 237.45' @ 12.13 hrs
Flood Elev= 241.41'

Device	Routing	Invert	Outlet Devices
#1	Primary	234.97'	**24.0" Round culvert** L= 37.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 234.97' / 234.78' S= 0.0051 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 3.14 sf
#2	Primary	243.98'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=14.51 cfs @ 12.13 hrs HW=237.45' (Free Discharge)
└─**1=culvert** (Inlet Controls 14.51 cfs @ 4.62 fps)
└─**2=Orifice/Grate** (Controls 0.00 cfs)

Pond DMH-118: DMH-118



Summary for Pond DMH-125: DMH-125

[58] Hint: Peaked 9.30' above defined flood level
[81] Warning: Exceeded Pond DMH-118 by 12.39' @ 12.10 hrs

Inflow Area = 155,496 sf, 95.28% Impervious, Inflow Depth = 7.33" for 100-yr event
Inflow = 20.06 cfs @ 12.10 hrs, Volume= 94,924 cf
Outflow = 20.06 cfs @ 12.10 hrs, Volume= 94,924 cf, Atten= 0%, Lag= 0.0 min
Primary = 10.62 cfs @ 12.10 hrs, Volume= 81,801 cf
Routed to Link 1L : POI 1
Secondary = 9.44 cfs @ 12.10 hrs, Volume= 13,123 cf
Routed to Pond OCS-126 : OCS-126

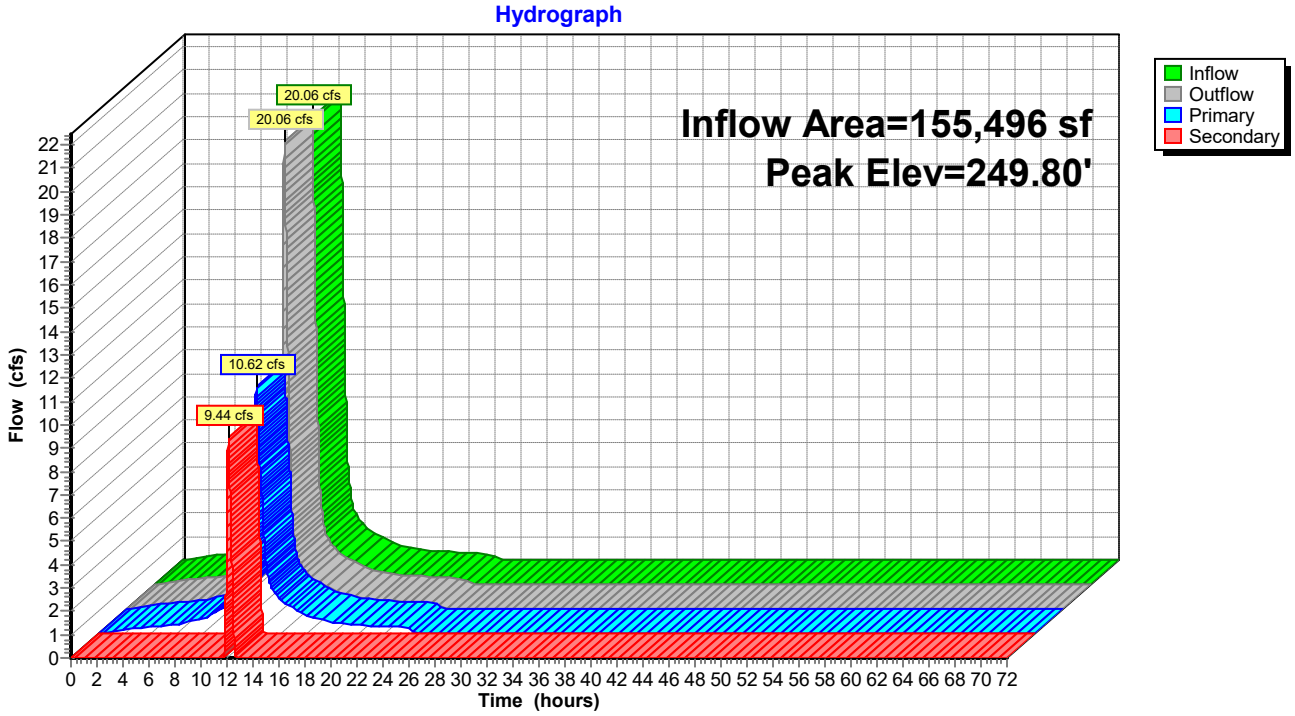
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 249.80' @ 12.10 hrs
Flood Elev= 240.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	235.40'	**12.0" Round Culvert** L= 130.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 235.40' / 233.54' S= 0.0143 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#2	Secondary	239.30'	**12.0" Round Culvert** L= 70.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 239.30' / 237.90' S= 0.0200 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=10.61 cfs @ 12.10 hrs HW=249.77' (Free Discharge)
1=Culvert (Barrel Controls 10.61 cfs @ 13.51 fps)

Secondary OutFlow Max=9.43 cfs @ 12.10 hrs HW=249.77' (Free Discharge)
2=Culvert (Inlet Controls 9.43 cfs @ 12.01 fps)

Pond DMH-125: DMH-125



Summary for Pond EX DMH: DMH

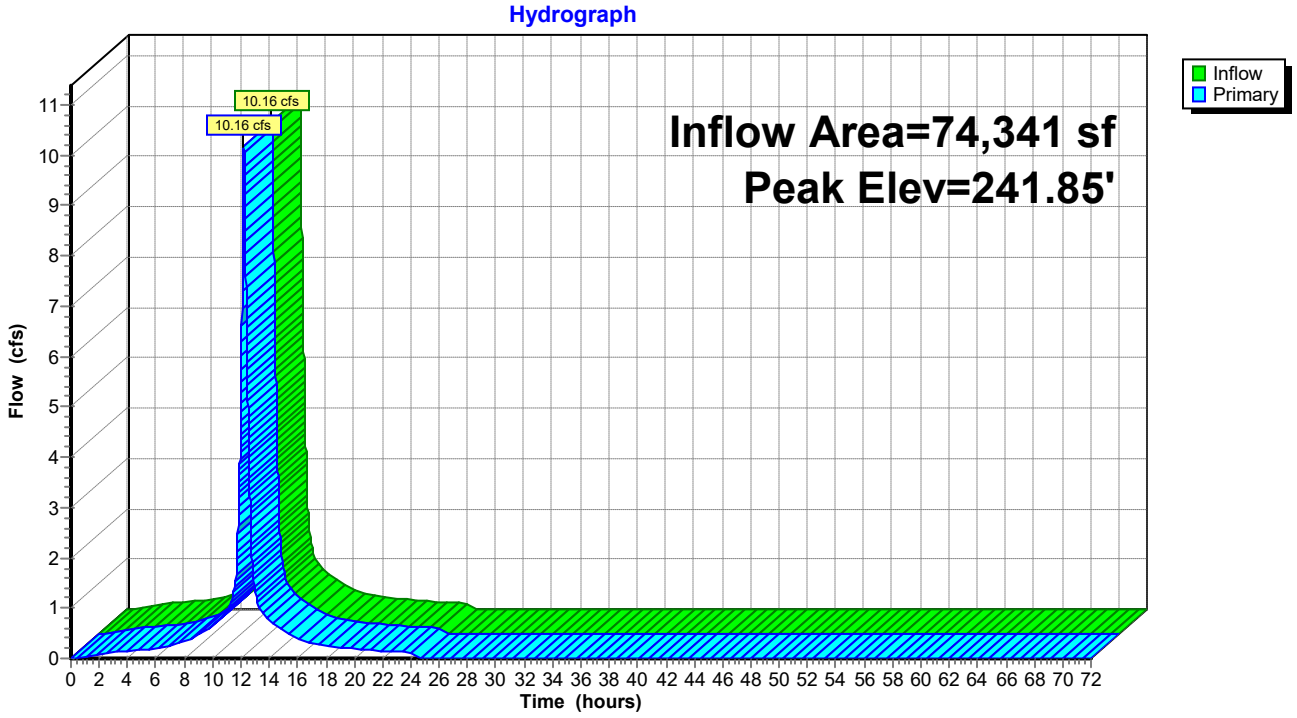
Inflow Area = 74,341 sf,100.00% Impervious, Inflow Depth = 7.88" for 100-yr event
Inflow = 10.16 cfs @ 12.21 hrs, Volume= 48,818 cf
Outflow = 10.16 cfs @ 12.21 hrs, Volume= 48,818 cf, Atten= 0%, Lag= 0.0 min
Primary = 10.16 cfs @ 12.21 hrs, Volume= 48,818 cf
Routed to Pond DMH-110 : DMH-110

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 241.85' @ 12.21 hrs
Flood Elev= 244.83'

Device	Routing	Invert	Outlet Devices
#1	Primary	239.23'	**15.0" Round RCP_Round 15"** L= 20.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 239.23' / 238.90' S= 0.0165 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 1.23 sf
#2	Primary	244.58'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=10.16 cfs @ 12.21 hrs HW=241.85' (Free Discharge)
└**1=RCP_Round 15"** (Barrel Controls 10.16 cfs @ 8.28 fps)
└**2=Orifice/Grate** (Controls 0.00 cfs)

Pond EX DMH: DMH



Summary for Pond INF-A: Addition Roof Gallery

Inflow Area = 5,702 sf,100.00% Impervious, Inflow Depth = 7.88" for 100-yr event
Inflow = 1.04 cfs @ 12.08 hrs, Volume= 3,744 cf
Outflow = 0.38 cfs @ 12.33 hrs, Volume= 3,744 cf, Atten= 63%, Lag= 14.6 min
Discarded = 0.04 cfs @ 12.33 hrs, Volume= 3,102 cf
Primary = 0.34 cfs @ 12.33 hrs, Volume= 642 cf
Routed to Pond DMH-118 : DMH-118

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 241.07' @ 12.33 hrs Surf.Area= 1,600 sf Storage= 1,326 cf
Flood Elev= 242.03' Surf.Area= 1,600 sf Storage= 2,022 cf

Plug-Flow detention time= 200.7 min calculated for 3,744 cf (100% of inflow)
Center-of-Mass det. time= 200.6 min (941.7 - 741.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	239.70'	1,139 cf	**21.50'W x 74.40'L x 2.33'H Field A** 3,732 cf Overall - 885 cf Embedded = 2,848 cf x 40.0% Voids
#2A	240.20'	885 cf	**ADS_StormTech SC-310 +Cap** x 60 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 60 Chambers in 6 Rows
		2,024 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	239.60'	**12.0" Round Culvert** L= 50.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 239.60' / 239.00' S= 0.0120 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	240.95'	**2.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height
#3	Discarded	239.70'	**1.020 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.04 cfs @ 12.33 hrs HW=241.07' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=0.34 cfs @ 12.33 hrs HW=241.07' (Free Discharge)
└**1=Culvert** (Passes 0.34 cfs of 2.94 cfs potential flow)
└**2=Sharp-Crested Rectangular Weir** (Weir Controls 0.34 cfs @ 1.15 fps)

Pond INF-A: Addition Roof Gallery - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-310 +Cap (ADS StormTech® SC-310 with cap length)
Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf
Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

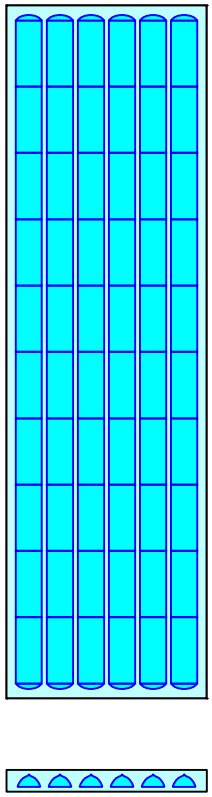
10 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 72.40' Row Length +12.0" End Stone x 2 = 74.40' Base Length
6 Rows x 34.0" Wide + 6.0" Spacing x 5 + 12.0" Side Stone x 2 = 21.50' Base Width
6.0" Stone Base + 16.0" Chamber Height + 6.0" Stone Cover = 2.33' Field Height

60 Chambers x 14.7 cf = 884.5 cf Chamber Storage

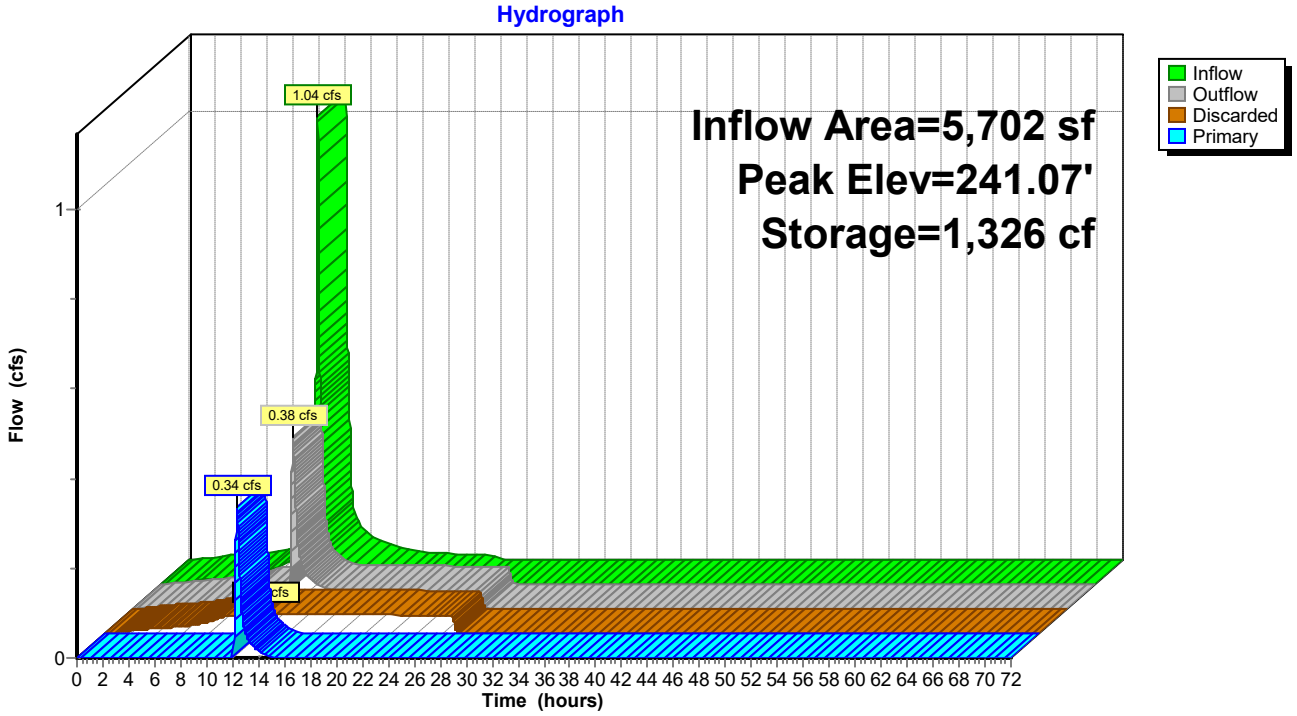
3,732.4 cf Field - 884.5 cf Chambers = 2,847.9 cf Stone x 40.0% Voids = 1,139.2 cf Stone Storage

Chamber Storage + Stone Storage = 2,023.7 cf = 0.046 af
Overall Storage Efficiency = 54.2%
Overall System Size = 74.40' x 21.50' x 2.33'

60 Chambers
138.2 cy Field
105.5 cy Stone



Pond INF-A: Addition Roof Gallery



Summary for Pond INF-B: Garage Gallery

Inflow Area = 57,016 sf,100.00% Impervious, Inflow Depth = 7.88" for 100-yr event
Inflow = 10.44 cfs @ 12.08 hrs, Volume= 37,441 cf
Outflow = 9.96 cfs @ 12.11 hrs, Volume= 37,441 cf, Atten= 5%, Lag= 1.5 min
Discarded = 0.11 cfs @ 12.11 hrs, Volume= 13,124 cf
Primary = 9.85 cfs @ 12.11 hrs, Volume= 24,317 cf
Routed to Pond OCS-216 : OCS-216

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 239.88' @ 12.11 hrs Surf.Area= 3,590 sf Storage= 7,342 cf
Flood Elev= 240.40' Surf.Area= 3,590 sf Storage= 7,727 cf

Plug-Flow detention time= 206.8 min calculated for 37,436 cf (100% of inflow)
Center-of-Mass det. time= 206.9 min (947.9 - 741.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	236.65'	3,225 cf	**34.75'W x 103.30'L x 3.50'H Field A** 12,563 cf Overall - 4,502 cf Embedded = 8,061 cf x 40.0% Voids
#2A	237.15'	4,502 cf	**ADS_StormTech SC-740 +Cap** x 98 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 98 Chambers in 7 Rows
		7,727 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	237.65'	**24.0" Round Culvert** L= 50.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 237.65' / 237.40' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	238.85'	**2.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height
#3	Discarded	236.65'	**1.020 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.11 cfs @ 12.11 hrs HW=239.88' (Free Discharge)
↑└**3=Exfiltration** (Exfiltration Controls 0.11 cfs)

Primary OutFlow Max=9.84 cfs @ 12.11 hrs HW=239.88' (Free Discharge)
↑└**1=Culvert** (Passes 9.84 cfs of 13.13 cfs potential flow)
↑└**2=Sharp-Crested Rectangular Weir** (Weir Controls 9.84 cfs @ 4.16 fps)

Pond INF-B: Garage Gallery - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

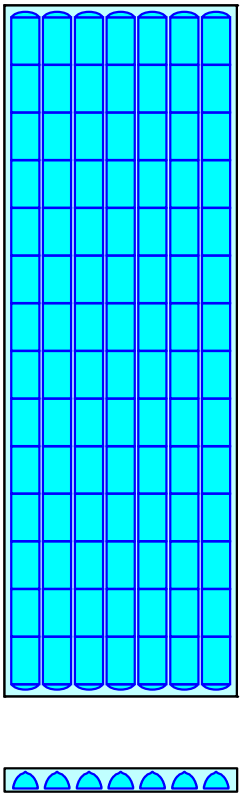
14 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 101.30' Row Length +12.0" End Stone x 2 = 103.30' Base Length
7 Rows x 51.0" Wide + 6.0" Spacing x 6 + 12.0" Side Stone x 2 = 34.75' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

98 Chambers x 45.9 cf = 4,502.1 cf Chamber Storage

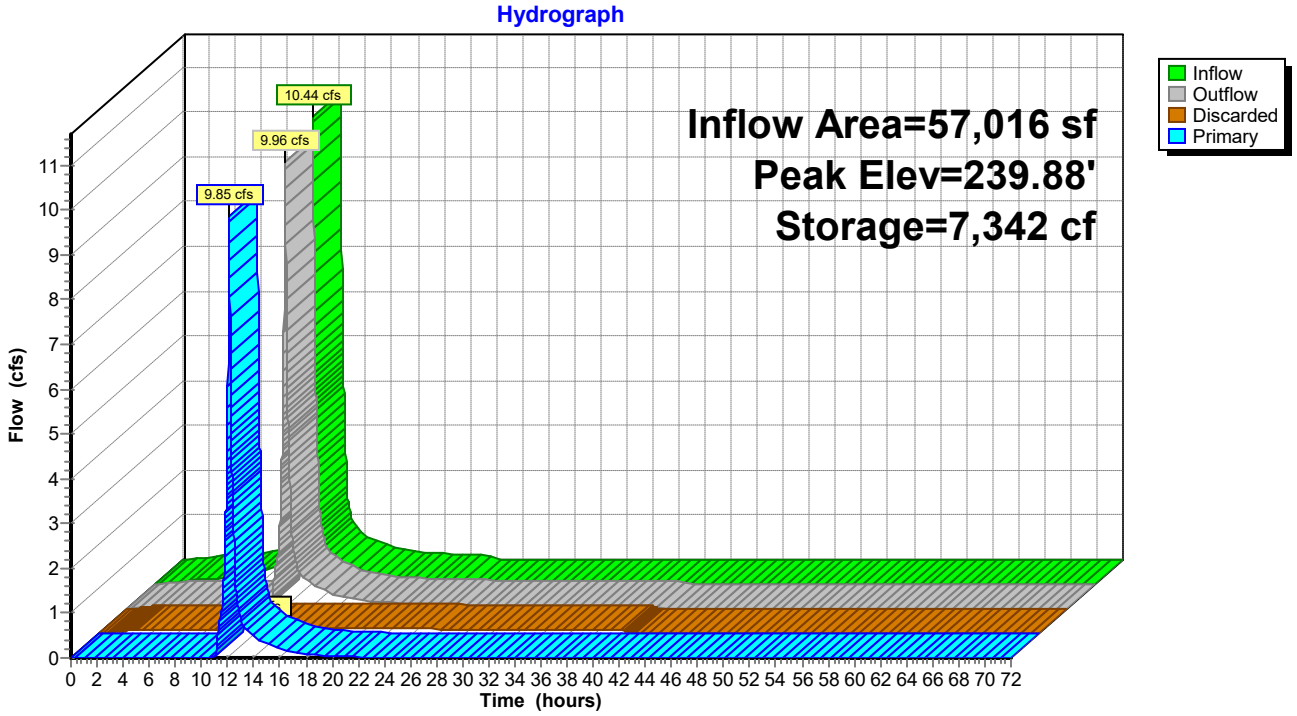
12,563.5 cf Field - 4,502.1 cf Chambers = 8,061.3 cf Stone x 40.0% Voids = 3,224.5 cf Stone Storage

Chamber Storage + Stone Storage = 7,726.7 cf = 0.177 af
Overall Storage Efficiency = 61.5%
Overall System Size = 103.30' x 34.75' x 3.50'

98 Chambers
465.3 cy Field
298.6 cy Stone



Pond INF-B: Garage Gallery



Summary for Pond INF-C: Bus Parking Gallery

Inflow Area = 52,591 sf, 96.67% Impervious, Inflow Depth = 7.69" for 100-yr event
Inflow = 9.39 cfs @ 12.08 hrs, Volume= 33,693 cf
Outflow = 2.32 cfs @ 12.46 hrs, Volume= 33,693 cf, Atten= 75%, Lag= 22.3 min
Discarded = 0.21 cfs @ 12.46 hrs, Volume= 26,820 cf
Primary = 2.11 cfs @ 12.46 hrs, Volume= 6,873 cf
Routed to Pond OCS-311 : OCS-311

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 244.44' @ 12.46 hrs Surf.Area= 7,709 sf Storage= 15,635 cf
Flood Elev= 244.80' Surf.Area= 7,709 sf Storage= 16,746 cf

Plug-Flow detention time= 510.3 min calculated for 33,693 cf (100% of inflow)
Center-of-Mass det. time= 510.2 min (1,252.4 - 742.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	241.30'	6,823 cf	**58.50'W x 131.78'L x 3.50'H Field A** 26,981 cf Overall - 9,923 cf Embedded = 17,058 cf x 40.0% Voids
#2A	241.80'	9,923 cf	**ADS_StormTech SC-740 +Cap** x 216 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 216 Chambers in 12 Rows
		16,746 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	242.80'	**12.0" Round Culvert** L= 100.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 242.80' / 242.30' S= 0.0050 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#2	Device 1	244.05'	**2.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height
#3	Discarded	241.30'	**1.020 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.21 cfs @ 12.46 hrs HW=244.44' (Free Discharge)
↑└**3=Exfiltration** (Exfiltration Controls 0.21 cfs)

Primary OutFlow Max=2.11 cfs @ 12.46 hrs HW=244.44' (Free Discharge)
↑└**1=Culvert** (Passes 2.11 cfs of 3.15 cfs potential flow)
↑└**2=Sharp-Crested Rectangular Weir** (Weir Controls 2.11 cfs @ 2.23 fps)

Pond INF-C: Bus Parking Gallery - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

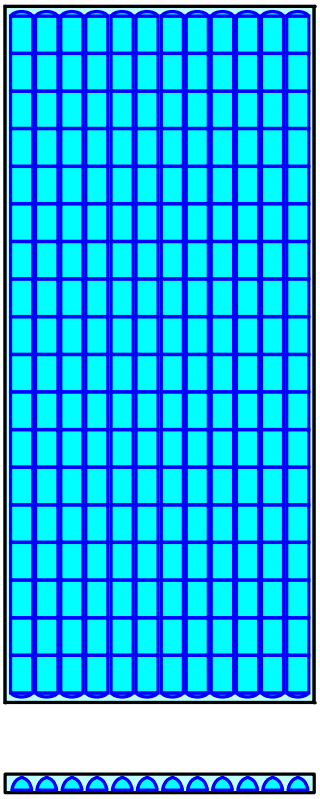
18 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 129.78' Row Length +12.0" End Stone x 2 = 131.78' Base Length
12 Rows x 51.0" Wide + 6.0" Spacing x 11 + 12.0" Side Stone x 2 = 58.50' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

216 Chambers x 45.9 cf = 9,923.0 cf Chamber Storage

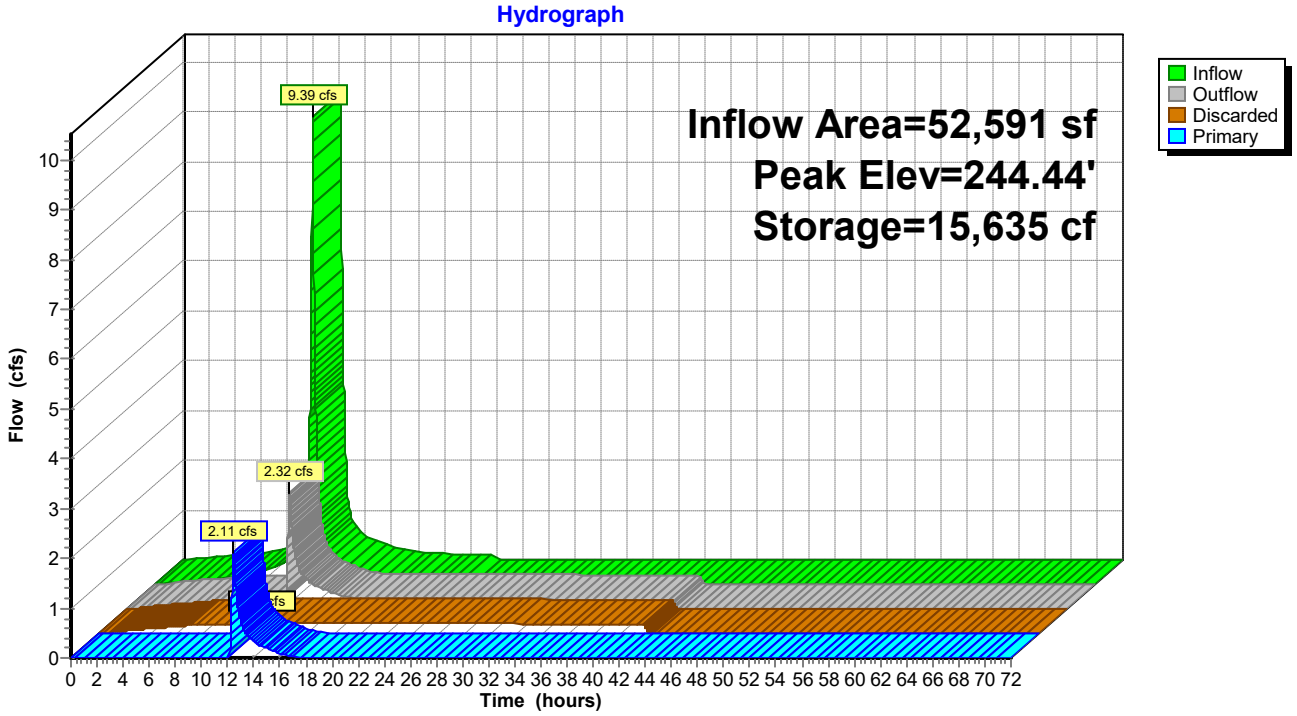
26,981.3 cf Field - 9,923.0 cf Chambers = 17,058.2 cf Stone x 40.0% Voids = 6,823.3 cf Stone Storage

Chamber Storage + Stone Storage = 16,746.3 cf = 0.384 af
Overall Storage Efficiency = 62.1%
Overall System Size = 131.78' x 58.50' x 3.50'

216 Chambers
999.3 cy Field
631.8 cy Stone



Pond INF-C: Bus Parking Gallery



Summary for Pond OCS-126: OCS-126

[57] Hint: Peaked at 241.43' (Flood elevation advised)
[81] Warning: Exceeded Pond DMH-125 by 5.52' @ 0.00 hrs

Inflow	=	9.44 cfs @	12.10 hrs,	Volume=	13,123 cf
Outflow	=	9.44 cfs @	12.10 hrs,	Volume=	13,123 cf, Atten= 0%, Lag= 0.0 min
Primary	=	9.44 cfs @	12.10 hrs,	Volume=	13,123 cf

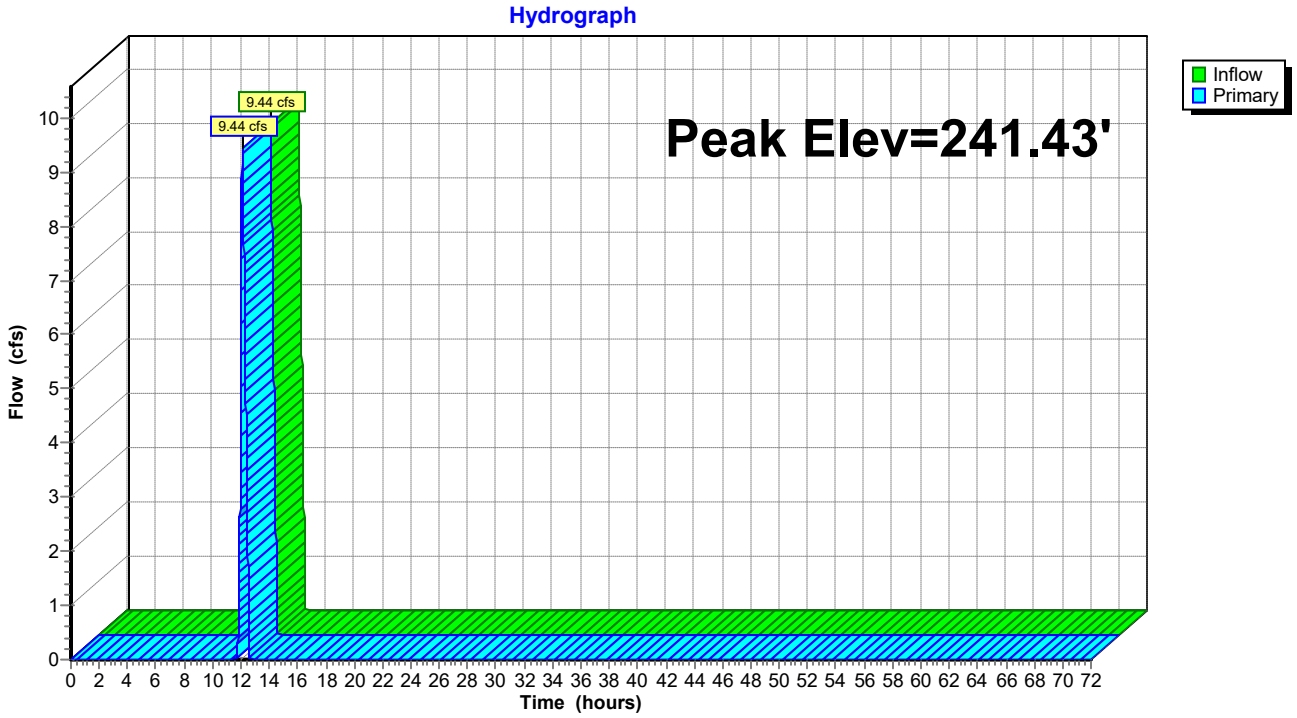
Routed to Link 1L : POI 1

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 241.43' @ 12.10 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	240.92'	**24.0" x 24.0" Horiz. Overflow Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=9.43 cfs @ 12.10 hrs HW=241.43' (Free Discharge)
1=Overflow Grate (Weir Controls 9.43 cfs @ 2.33 fps)

Pond OCS-126: OCS-126



Summary for Pond OCS-216: OCS-216

[58] Hint: Peaked 1.02' above defined flood level
[81] Warning: Exceeded Pond INF-B by 4.35' @ 0.00 hrs

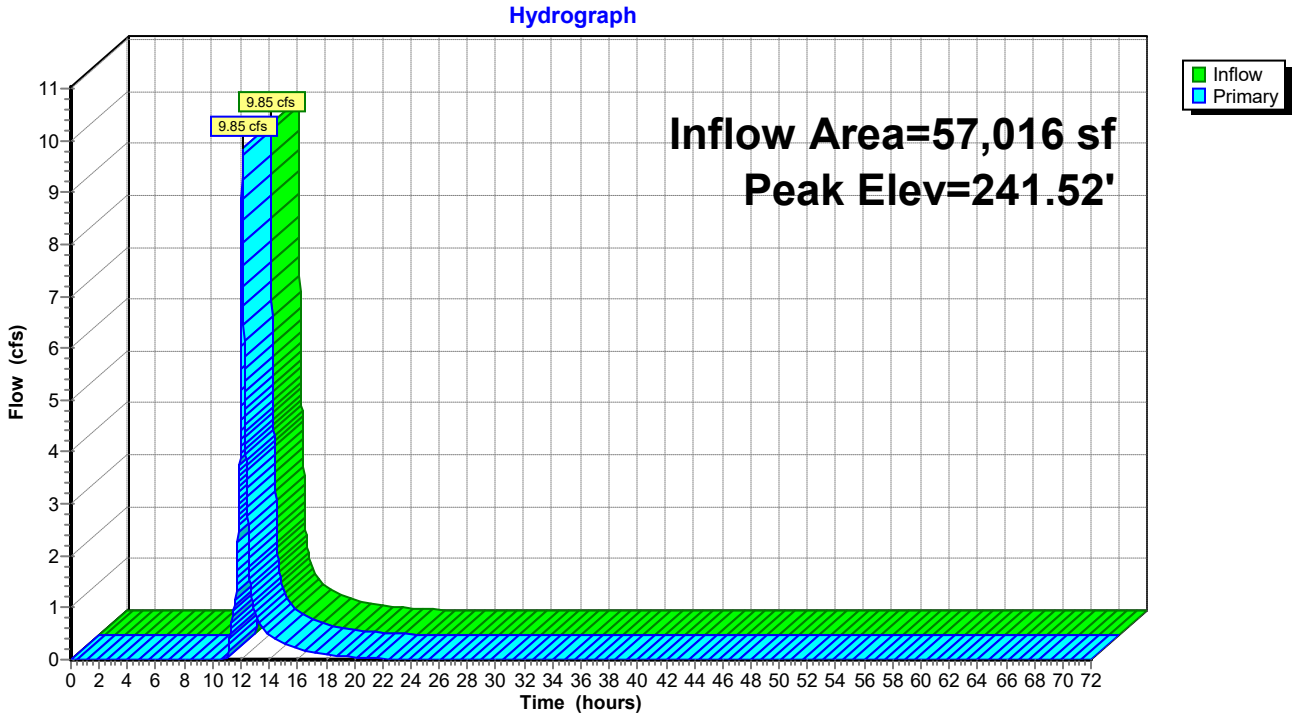
Inflow Area = 57,016 sf,100.00% Impervious, Inflow Depth = 5.12" for 100-yr event
Inflow = 9.85 cfs @ 12.11 hrs, Volume= 24,317 cf
Outflow = 9.85 cfs @ 12.11 hrs, Volume= 24,317 cf, Atten= 0%, Lag= 0.0 min
Primary = 9.85 cfs @ 12.11 hrs, Volume= 24,317 cf
Routed to Link 1L : POI 1

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 241.52' @ 12.11 hrs
Flood Elev= 240.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	241.00'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=9.84 cfs @ 12.11 hrs HW=241.52' (Free Discharge)
1=Orifice/Grate (Weir Controls 9.84 cfs @ 2.36 fps)

Pond OCS-216: OCS-216



Summary for Pond OCS-311: OCS-311

[58] Hint: Peaked 4.69' above defined flood level
[81] Warning: Exceeded Pond INF-C by 3.70' @ 0.00 hrs

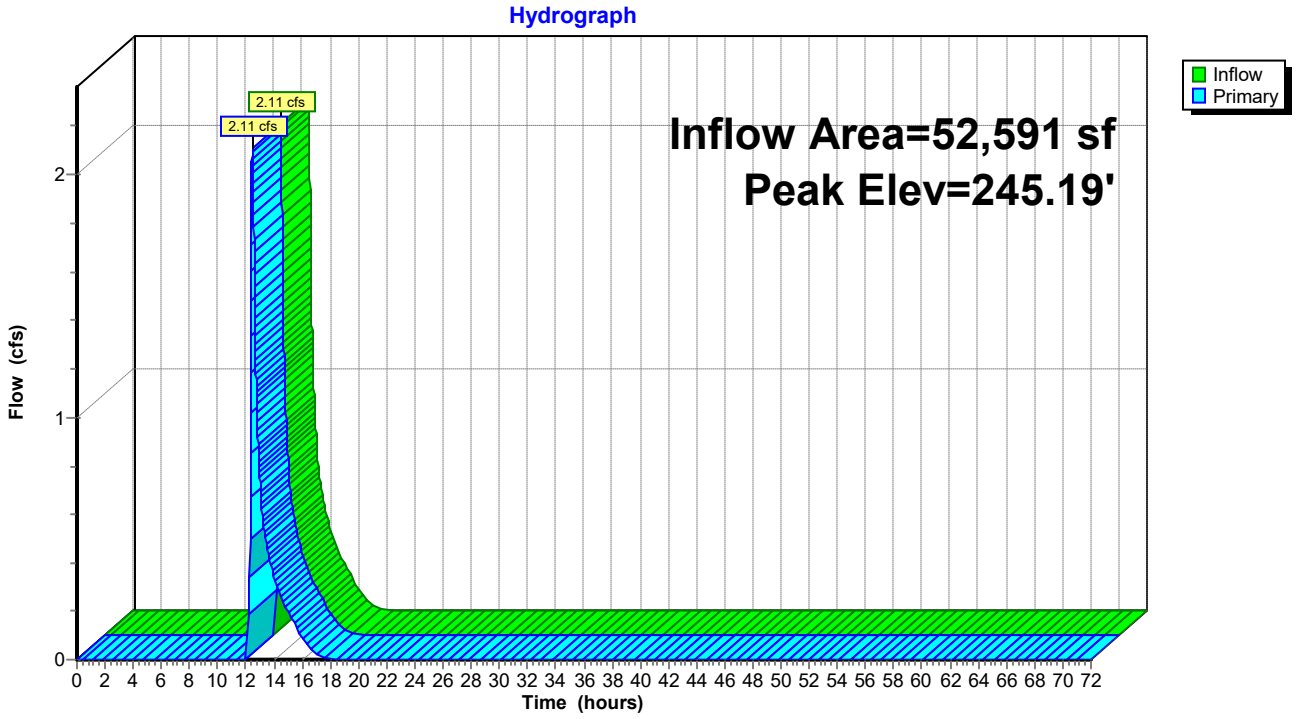
Inflow Area = 52,591 sf, 96.67% Impervious, Inflow Depth = 1.57" for 100-yr event
Inflow = 2.11 cfs @ 12.46 hrs, Volume= 6,873 cf
Outflow = 2.11 cfs @ 12.46 hrs, Volume= 6,873 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.11 cfs @ 12.46 hrs, Volume= 6,873 cf
Routed to Link 1L : POI 1

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 245.19' @ 12.46 hrs
Flood Elev= 240.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	245.00'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=2.11 cfs @ 12.46 hrs HW=245.19' (Free Discharge)
1=Orifice/Grate (Weir Controls 2.11 cfs @ 1.41 fps)

Pond OCS-311: OCS-311

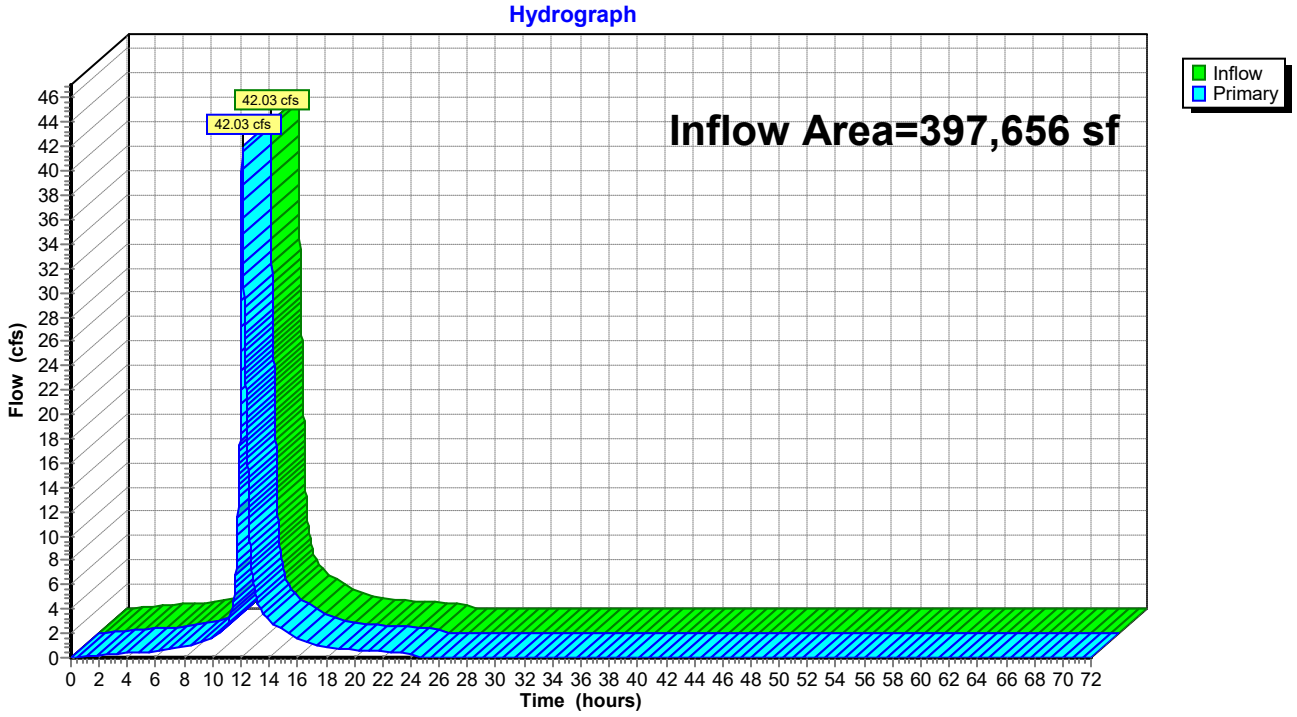


Summary for Link 1L: POI 1

Inflow Area = 397,656 sf, 76.22% Impervious, Inflow Depth = 5.15" for 100-yr event
Inflow = 42.03 cfs @ 12.10 hrs, Volume= 170,598 cf
Primary = 42.03 cfs @ 12.10 hrs, Volume= 170,598 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link 1L: POI 1



APPENDIX C

FOXBOROUGH DPW FACILITY
RECHARGE CALCULATION

REQUIRED RECHARGE

Area Summary	
	Area (SF)*
Existing Impervious	242,912
Proposed Impervious	228,764
Required Recharge Area *(Proposed - Existing)*	0

* Areas retrieved from HydroCAD

Note: Site consists of HSG A soils.

Hydrologic Soil Group Summary		
Group	Target Depth Factor (in)	Area (SF)
A	0.6	0
B	0.35	0
C	0.25	0
D	0.1	0

Required Recharge (*Rv*) Calculation:

Rv = Target Depth Factor x Δ Impervious Area

Rv = 0.6 x (1/12) x 0

Rv = 0 CF

PROPOSED RECHARGE SUMMARY

Detailed calculations on following pages

Location	Volume (CF)
Field A Chambers	1,205
Field B Chambers	5,437
Field C Chambers	14,355
Total	20,997

Rv = 0 CF

Provided recharge = 20,997 CF

Recharge Requirement is exceeded.

PROPOSED RECHARGE

Underground Infiltration Chambers - INF-A

ADS StormTech SC-310 (34.0"W x 16.0"H => 2.07 SF x 7.12'L)

Avail. SC-310 storage (from HydroCAD	884.50	CF	(60 chambers+end caps)
Available Stone Storage (from HydroCAD	1139.20	CF	
Overall System Area	1599.60	SF	
Bottom of Chamber Elevation	240.20	FT	
Weir elevation	240.95	FT	
Chamber storage height	0.75	FT	
Net Storage at Weir Elevation (from HydroCAD)	**1,205.00**	**CF**	
Stone and Chamber recharge volume	**1,205**	**CF**	

Underground Infiltration Chambers - INF-B

ADS StormTech MC-7400 (51.0"W x 30.0"H => 6.45 SF x 7.12'L)

Avail. MC-7400 storage (from HydroCAD	4,502.10	CF	(34 chambers+end caps)
Available Stone Storage (from HydroCAD	3224.50	CF	
Overall System Area	3589.68	SF	
Bottom of Chamber Elevation	237.15	FT	
Weir elevation	238.85	FT	
Chamber storage height	1.70	FT	
Net Storage at Weir Elevation (from HydroCAD)	**5,437.00**	**CF**	
Stone and Chamber recharge volume	**5,437**	**CF**	

Underground Infiltration Chambers - INF-C

ADS StormTech MC-7400 (51.0"W x 30.0"H => 6.45 SF x 7.12'L)

Avail. MC-4500 storage (from HydroCAD	9,923.00	CF	(75 chambers+ end caps)
Available Stone Storage (from HydroCAD	6823.30	CF	
Overall System Area	7709.13	SF	
Bottom of Chamber Elevation	241.80	FT	
Weir elevation	244.05	FT	
Chamber storage height	2.25	FT	
Net Storage at Weir Elevation (from HydroCAD)	**14,355.00**	**CF**	
Stone and Chamber recharge volume	**14,355**	**CF**	

FOXBOROUGH DPW FACILITY
DRAWDOWN CALCULATION

-- MAXIMUM DRAWDOWN TIME IS 72 HOURS --

Time to drawdown calculation

$$\text{Time} = \frac{Rv}{k * \text{bottom area}}$$

where,

Rv =	storage volume
k =	saturated hydraulic conductivity rate
bottom area =	average surface storage area of recharge structure

PROPOSED STORAGE DRAWDOWN CALCULATIONS

Leaching Chambers - Field A		
Net storage volume	1,205	CF
Bottom area	1,600	SF
k	1.02	in/hr
Time =	8.86	hours

Proposed drawdown time is acceptable.

Leaching Chambers - Field B		
Net storage volume	5,437	CF
Bottom area	3,590	SF
k	1.02	in/hr
Time =	17.82	hours

Proposed drawdown time is acceptable.

Leaching Chambers - Field C		
Net storage volume	14,355	CF
Bottom area	7,709	SF
k	1.02	in/hr
Time =	21.91	hours

Proposed drawdown time is acceptable.

FOXBOROUGH DPW FACILITY
WATER QUALITY VOLUME CALCULATION

As stated in the Stormwater Handbook, for a LUHPPL, the required water quality volume equals 1.0 inch of runoff times the total impervious area of the post-development site.

TOTAL STORAGE PROVIDED		
Field A Storage =	1,205	CF
Field B Storage =	5,437	CF
Field D Storage =	14,355	CF
Total Storage Provided =	20,997	CF

WQV CALCULATION		
Proposed Impervious Area =	228,764	SF
1" Water Quality Storage		
228,764 sf x 1" x 1'/12"=	19,064	CF

Proposed recharge exceeds the 1 inch water quality volume requirements.

Project : Foxboro DPW
Location: 70 Elm Street
Prepared by: Elena Compter

Purpose: To calculate the water quality flow rate (WQF) over a given site area.

References: MassDEP Wetlands Program/Unites States Department of Agriculture Natural Resources Conservation Service TR-55 Manual

Given

Structure Name	Impervious (Acres)	A (miles²)	Tc (min)	Tc (hr)	WQV (in)
SWTU-109	0.826	0.001290625	6	0.1	1
SWTU-113	0.737	0.001151563	6	0.1	1
SWTU-115	0.034	0.000053125	6	0.1	1
SWTU-308	0.810	0.001265625	6	0.1	1
SWTU-310	0.373	0.000582813	6	0.1	1
SWTU-209	0.549	0.000857813	6	0.1	1
SWTU-212	0.162	0.000253125	6	0.1	1
SWTU-400	0.641	0.001001563	6	0.1	1

Procedure: Determine unit peak discharge(qu) using Figure 1 or 2 contained the reference material. Using the Tc, read the unit peak disharge (qu) from Table in Figure 2. qu is expressed in the following units: cfs/mi²/watershed inches (csm/in).

Structure Name	Impervious (Acres)
SWTU-109	774
SWTU-113	774
SWTU-115	774
SWTU-308	774
SWTU-310	774
SWTU-209	774
SWTU-212	774
SWTU-400	774

1. Compute Q Rate using the following equation:

Q= (qu) (A) (WQV)

where: q = flow rate associated with the first 1" of runoff
qu = the unit peak discharge, in csm/in
A = impervious surface drainage area (in square miles)
WQV = water quality volume in watershed inches (1.0" in this case)

Structure	Q treatment

Name	(cfs)
SWTU-109	0.999
SWTU-113	0.891
SWTU-115	0.041
SWTU-308	0.980
SWTU-310	0.451
SWTU-209	0.664
SWTU-212	0.196
SWTU-400	0.775

INSTRUCTIONS:

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

Location: Pre-Treatment Train A1, D1

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Street Sweeping	5.0%	100.0%	5%	95%
Deep Sump and Hooded Catch Basin	25.0%	95.0%	24%	71%
Hydrodynamic Separator	50.0%	71.3%	36%	36%
Isolator Row	25.0%	35.6%	9%	27%
	0.0%	26.7%	0%	27%
	0.0%	26.7%	0%	27%

Total TSS Removal = 73%

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

Project: Foxboro DPW

Prepared By: Elena Compter

Pretreatment rate is above 44% prior to

Date: **1/30/2024**

Infiltration BMP

INSTRUCTIONS:

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

Location: Treatment Train A1, D1

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Street Sweeping	5.0%	100.0%	5%	95%
Deep Sump and Hooded Catch Basin	25.0%	95.0%	24%	71%
Hydrodynamic Separator	50.0%	71.3%	36%	36%
Isolator Row	25.0%	35.6%	9%	27%
Subsurface Infiltrationf Chambers	80.0%	26.7%	21%	5%

Total TSS Removal = 95%

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

Project: Foxboro DPW
Prepared By: Elena Compter
Date: 1/30/2024

Treatment rate is above 80%

INSTRUCTIONS:

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

Location: Treatment Train B1, B2, & D1

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Street Sweeping	5.0%	100.0%	5%	95%
Deep Sump and Hooded Catch Basin	25.0%	95.0%	24%	71%
Hydrodynamic Separator	50.0%	71.3%	36%	36%
	25.0%	35.6%	9%	27%
	0.0%	26.7%	0%	27%

Total TSS Removal = 73%

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

Project: Foxboro DPW

Prepared By: Elena Compter

Treatment rate below 80% but is maximum extent practicable for re-development

Date: 1/30/2024

Fact Sheet #4

Stormwater Technology: Stormceptor

(Hydro Conduit, formerly CSR New England Pipe)

Revised February 2003

*The **Stormceptor Fact Sheet** is one in a series of fact sheets for stormwater technologies and related performance evaluations, which are undertaken by the **Massachusetts STrategic Envirotechnology Partnership (STEP).***

The STEP evaluation entitled, *Technology Assessment, Stormceptor CSR New England Pipe*, January 1998 is the information source for this fact sheet. When a more thorough understanding of a system is required, the full *Technology Assessment* should be reviewed. Copies are available for downloading from the STEP Web site (www.STEPSITE.org/) or by contacting the STEP Program (Phone: 617/626/1197, FAX: 617/626/1180, email: linda.benevides@state.ma.us). This fact sheet is subject to future updates as additional performance information becomes available.

Description/Definition

Stormceptor is a prefabricated, underground unit that separates oils, grease, and sediment from stormwater runoff when installed with an existing or new pipe conveyance system. The unit is divided into two chambers–a treatment and a flow bypass chamber. During typical storm events, runoff is directed by the inflow weir through a drop pipe into the lower treatment chamber where sediment, oil, and grease are separated from the flow by gravity. The bypass chamber is designed to convey excess stormwater, which overtops the inflow weir, through the system without treatment.

Equipment and Sizing

The on-line Stormceptor units are available in eight sizes ranging from six and twelve feet in diameter with capacities of 900 to 7200 gallons. Since issuing the STEP assessment in 1998, the manufacturer has expanded the Stormceptor product line to include a storm drain inlet (STC 450i) and three units (Models STC 11000, STC 13000, and STC16000). These systems are not included in the STEP evaluation. Users and decision-makers may require additional field test results and new data for these new systems in order to accept performance ratings, particularly if they are higher than those reported in the STEP technology assessment and this fact sheet.

Stormceptor units are available in either precast concrete or fiberglass for special applications. Concrete units are pre-engineered for HS-20 min. traffic loading at the surface. Fiberglass units can be used in areas where there is a potential for oil and chemical spills.

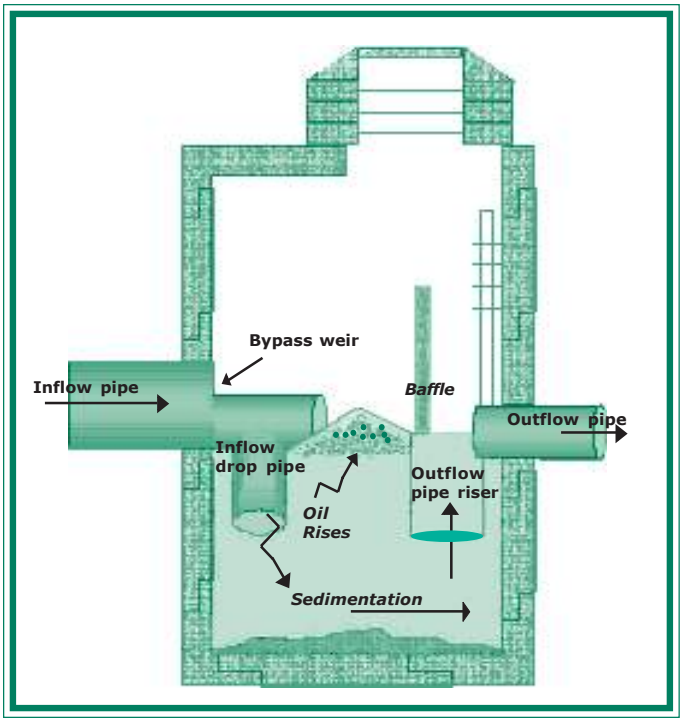


Figure 1. Stormceptor operation during average flow conditions.

Performance/Effectiveness

The system is designed to provide separation of sediment, oil, and grease from stormwater by routing runoff into a low-turbulence environment where solids settle and oils float out of solution. The system sizing is based on the drainage area, historical rainfall data, and the solids removal efficiency required. It is recommended that the system be used in combination with other stormwater controls to conform with the Massachusetts Stormwater Management Policy and standards.

An Imperial Model STC 2000 (equivalent to the Model STC 2400) in Edmonton, Canada treats flow from a 9.8 acre commercial parking lot. This system was monitored during four storm events in 1996 and shown to have an average total suspended solids (TSS) removal efficiency of 52 percent. In designing a system to achieve a comparable removal efficiency, the relationship between system size and impervious drainage area should be considered, as detailed in Table 1 and the Technology Assessment Report.

A Model STC 1200 in Westwood, Massachusetts treats flow from 0.65 acres consisting of a paved truck loading area at a manufacturing facility. The unit was monitored for six storm events in 1997, but only four events had measurable TSS influent concentrations. Of these four events, the average TSS removal efficiency was calculated to be 77 percent, which is less than the 80 percent removal targeted by the manufacturer.

Based on these field monitoring results, and when the unit sizing follows the guidance in Table 1, removal efficiencies between 52 percent and 77 percent may be achieved where installations have similar rainfall and land use characteristics as those reviewed for the STEP evaluation. It is recommended that additional field research and new data be evaluated to validate performance ratings higher than those verified by STEP.

Specific performance claims for oil and grease were not evaluated by STEP. However, total petroleum hydrocarbons (TPH) were analyzed during the Westwood study. Results indicated that the unit was effective in capturing oils.

Stormceptor Model Number	Maximum Impervious Area (acres)	
	77% TSS removal	52% TSS removal
STC 900	0.45	0.9
STC 1200	0.7	1.45
STC 1800	1.25	2.55
STC 2400	1.65	3.35
STC 3600	2.6	5.3
STC 4800	3.6	7.25
STC 6000	4.6	9.25
STC 7200	5.55	11.25

Table 1: Sizing for TSS removal (adapted from the manufacturer's sizing in the 1998 STEP Report) Use the table to determine a TSS removal rate. Use the new Rinker method for sizing Stormceptor units. The sizing method has been changed since publication of the STEP Report. **Note:** To achieve 52% and 77% TSS removal rates on some sites, it may be necessary to use lower maximum impervious areas than those in Table 1.

Technology Status

The Stormceptor system provides greater solids separation and higher TSS removal efficiencies than oil and grit separators. Stormceptor systems are among the category of hydrodynamic separators, which are flow-through devices with the capacity to settle or separate grit, oil, sediment, or other pollutants from stormwater. According to the U.S. Environmental Protection Agency, "Hydrodynamic separators are most effective where the materials to be removed from runoff are heavy particulates - which can be settled - or floatables - which can be captured, rather than solids with poor settleability or dissolved pollutants."

The field studies evaluated for the STEP assessment predate the Stormwater Best Management Practice Demonstration Tier II Protocol (2001), which is applicable in Massachusetts and other states in the Technology Acceptance Reciprocity Partnership (TARP), to ensure quality controlled studies that can be shared among participating states. Therefore, interstate reciprocity is not available to the manufacturer, based on performance claims that were evaluated by STEP in 1998. If the TARP Protocol requirements are fulfilled in the future, the manufacturer could pursue reciprocal verification for Stormceptor systems in participating TARP states. More information on the TARP Protocol is available on the following Web site: www.dep.state.pa.us/dep/deputate/pollprev/techservices/tarp.

Applications/Advantages

- Stormceptor systems identified in Table 1 should be used in combination with other BMPs to remove 80 percent of the average annual load of TSS (DEP Stormwater Policy Standard 4). Systems may be well suited for pretreatment in a mixed component system designed for stormwater recharge.
- Performance data show that Stormceptor may provide TSS removal rates in the range of 52 percent to 77 percent when sized according to Table 1. Higher TSS removal rates were achieved during low flow, low intensity storms with less than one third of an inch of runoff. Also, by reducing the impervious drainage area, relative to the system size, the STEP Technology Assessment Report indicated that higher removal efficiencies may be achievable. However, STEP recommends collection of additional data "representing a varied set of operating conditions over a realistic maintenance cycle to verify TSS removal rates greater than 80 percent."
- The Stormceptor system is suitable for new and retrofit applications. For retrofit applications, it should not

take the place of a catch basin for the systems that have been verified. Also, for retrofit applications, it should be installed in lateral lines and not main trunk lines.

- The system is particularly well suited in constricted areas and where space is limited.
- It also is suitable for use in areas of high potential pollutant loads (DEP Stormwater Policy Standard 5), where it may be used effectively in capturing and containing oil and chemical spills. *Web site:* www.state.ma.us/dep/brp/stormwtr/stormpub.htm.

Considerations/Limitations

- Systems are not expected to provide significant nutrient (nitrogen and phosphorus) or fecal coliform removal.
- The systems are not recommended for use in critical areas, such as public drinking water supplies, certified vernal pools, public swimming beaches, shellfish growing areas, cold water fisheries, and some Areas of Critical Environmental Concern (ACECs), except as a pretreatment device for BMPs that have been approved by DEP for use in critical areas. The structural BMPs approved for use in critical areas are described in Standard 6 of the Stormwater Management Policy, www.state.ma.us/dep/brp/stormwtr/stormpub.htm.
- There is a limited set of useful data for predicting the relationship between treatment efficiency and loading rates. Removal efficiencies have not been demonstrated for all unit sizes.
- Further research is needed to determine how much TSS bypasses the treatment chamber during certain, higher velocity storm events which recur less frequently.
- Systems require regular maintenance to minimize the potential for washout of the accumulated sediments.

Reliability/Maintenance

All BMPs require scheduled, routine maintenance to ensure that they operate as efficiently as possible. Although maintenance requirements are site specific, a general relationship between cleaning needs and depths of sediment has been established by the manufacturer. Inspection of the Stormceptor interior should be done after major storm events, particularly in the first year of operation. It is recommended that material in the treatment chamber be pumped out by a vacuum truck semiannually, or when the sediment and pollutant loads reach about 15 percent of the total storage. If the unit is used for spill containment, it should be pumped after the event is contained. Typical cleaning costs were estimated by the manufacturer in 1998 to be $250, with disposal costs averaging $300 to $500. The expected life of a system has been estimated to be 50 to 100 years.

Sediment Depths Indicating Required Maintenance	
Model Number	**Sediment Depth (feet)**
STC 900	0.5
STC 1200	0.75
STC 1800	1
STC 2400	1
STC 3600	1.25
STC 4800	1
STC 6000	1.5
STC 7200	1.25

Table 2: The Stormceptor clean out is based on 15 percent of the sediment storage volume in the

References

Winkler, E.S. 1998. "Technology Assessment, Stormceptor." University of Massachusetts, Amherst, MA. *STEP Web site:* www.STEPSITE.org/

Massachusetts Department of Environmental Protection and Office of Coastal Zone Management. 1997. "Stormwater Management Handbooks, Volumes One and Two." Boston, MA. *Handbooks Web site:* www.state.ma.us/dep/brp/stormwtr/stormpub.htm.

United States Environmental Protection Agency. "Storm Water Technology Fact Sheet Hydrodynamic Separators." EPA 832-F-99-017.

Stormceptor Web sites: www.rinkermaterials.com/stormceptor

TARP Web site: www.dep.state.pa.us/dep/deputate/pollprev/techservices/tarp

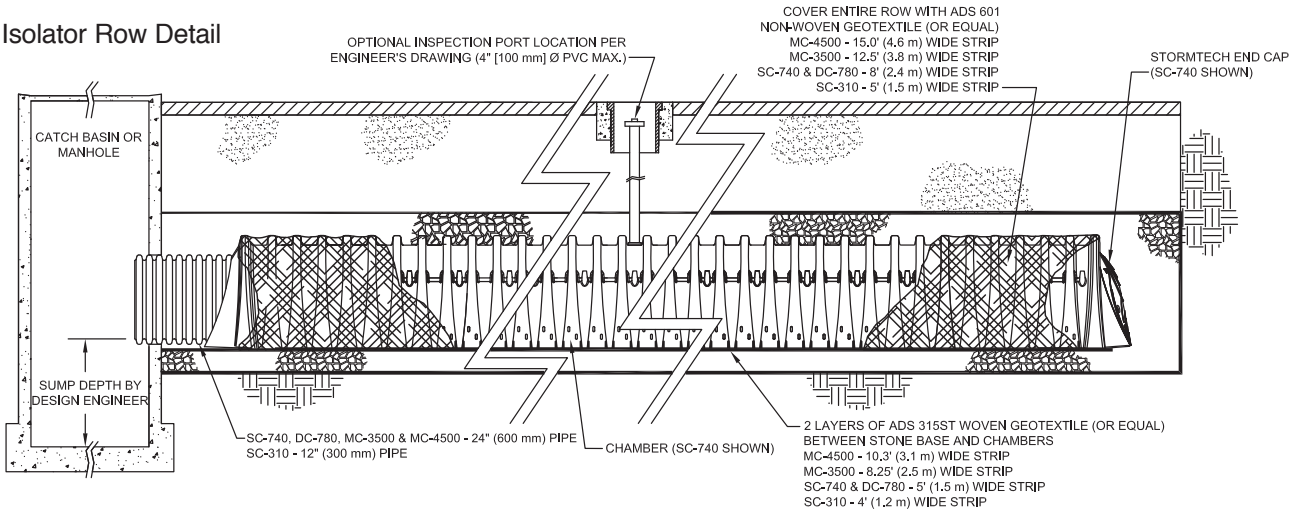
STEP Verification vs. Regulatory Approval

STEP assistance to developers of innovative technologies and STEP verification of stormwater treatment systems is not required to receive necessary approvals from conservation commissions or the Department of Environmental Protection (DEP). However, if a system has received verfication, a conservation commission shall presume that the technology will function as proposed, provided the conditions are similar to those in which performance was verified. STEP reports are not technology approvals, and do not constitute an endorsement or recommendation for use. Questions on regulatory issues should be referred to the DEP regional offices.

StormTech and Stormwater Quality

StormTech's patented Isolator™ Row is a row of chambers wrapped in a geotextile which filters the stormwater trapping pollutants in the row. The Isolator Row provides a way to inspect and maintain the system.

Isolator Row Detail



Note: For many applications, the non-woven geotextile over the DC-780, MC-3500 and MC-4500 Isolator Row chambers can be eliminated or substituted with the AASHTO Class 1 woven geotextile. Contact your StormTech representative for assistance.

Isolator Row Field Verification Testing at the University of New Hampshire Stormwater Center

- Field testing (TARP tier II protocol) of the Isolator Row has been ongoing since December 2006.
- Removal efficiencies for TSS have improved as the filter cake has built up on the bottom fabric of the Isolator Row.
- Current data shows a TSS removal efficiency which exceeds 80%.

Removal Efficiency Results:

- Total Suspended Solids = 80%
- Phosphorous = 49%
- Total Petroleum Hydrocarbons = 90%
- Zinc = 53%

This system achieves a removal efficiency of 80% for TSS which meets most municipal recommended levels for water quality treatment.

Inspection and Maintenance

The Isolator Row can be inspected through the upstream manhole or optional inspection port.

Maintenance is easily accomplished with the JetVac process.

The frequency of inspection and maintenance varies by location. Contact StormTech for assistance with inspection and maintenance scheduling.

StormTech Isolator Row

UNH EXCERPT STARTS HERE

The StormTech Isolator Row is an effective filtration/infiltration system best suited to locations where space is at a premium and the system's relatively expensive installation cost can be offset by increasing available space for development.

About the StormTech Isolator Row

The StormTech Isolator Row is a manufactured system designed to provide subsurface water quality treatment and easy access for maintenance. It is typically used to remove pollution from runoff before it flows into unlined infiltration chambers designed for detention and water quantity control. The Isolator Row consists of a series of StormTech chambers installed over a layer of woven geotextile, which sits on a crushed stone infiltration bed surrounded with filter fabric. The bed is directly connected to an upstream manhole for maintenance access and large storm bypass. At UNHSC, the Isolator Row has met a TSS median annual removal standard of 80 percent, and exhibited an enhanced capacity to remove phosphorus. The Isolator Row is well suited for urban environments where space is at a premium.

Implementation

The StormTech Isolator Row is part of a class of manufactured, subsurface filtration/infiltration systems that are being used more and more throughout the United States. In general, these systems are best suited to locations where above ground space is at a premium. They are often used in urban areas, where they are located beneath parking lots and other infrastructure. As with any infiltration system, care must be taken when locating these systems near pollution hotspots, or where seasonal high groundwater levels may lead to groundwater contamination. In such cases, if installed, the systems should be lined to prevent infiltration into groundwater, and outfitted with subdrains that discharge to the surface. Designs for the StormTech Isolator Row are available from the manufacturer.

System Performance

Cost & Maintenance

While subsurface HDPE systems such as the Isolator Row tend to be more expensive than conventional stormwater treatments like retention ponds, the costs are ameliorated by the increase in available space for development. The cost to install a StormTech Isolator Row system large enough to treat runoff from one acre of impervious surface was $34,000 in 2006.

In more than two years of operation, the system is at less than 50 percent of its recommended maintenance trigger point. Maintenance should be conducted when the sediment in the chambers reaches approximately three inches in depth according to recommendations from the manufacturer. Sediment accumulation can be monitored through inspection ports. When maintenance is needed, the entire row can be

Fast Facts

CATEGORY / BMP TYPE
Filtration, Infiltration, Manufactured Treatment Device

UNIT OPERATIONS & PROCESSES
Hydrologic (Flow Alteration)

Water Quality: Physical (Sedimentation, Filtration) & Chemical (Sorption)

DESIGN SOURCE
StormTech, LLC

BASIC DIMENSIONS
Chamber: 51" wide X 30" high X 85.4" long

SPECIFICATIONS
Catchment Area: 1 acre

Water Quality Flow: 1 cfs

Water Quality Volume: 3,300 cf

INSTALLATION COST
$34,000 per acre treated

MAINTENANCE
Maintenance Sensitivity: Low

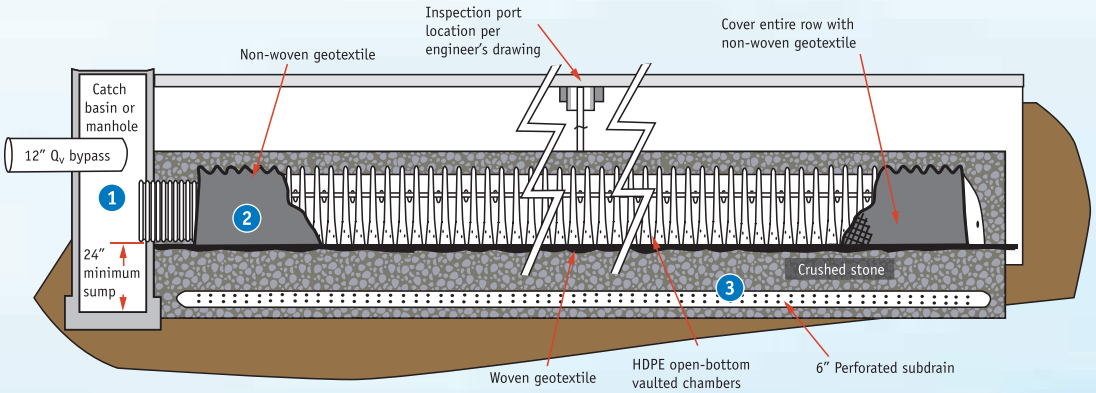
Inspections: High

Sediment Removal: Moderate

How the System Works

WATER QUALITY TREATMENT PROCESS ▼

1. Runoff flows into the Isolator Row chambers from a catchbasin or pipe.
2. Runoff slowly passes from the chambers through a woven geotextile fabric and into the crushed stone reservoir below the system. The runoff passes through the fabric, leaving behind sediments and associated contaminants through the physical unit operations of filtration and sedimentation. As an organic filter cake develops over the fabric, phosphorus is also removed via the chemical process of sorption.
3. Filtered runoff collects in a perforated subdrain and returns to a storm drain system, infiltrates into the subgrade, or is discharged to the surface.



washed clean through an access manhole and by a hydro-jet with sediment removed by vactoring (vacuuming). Entry into the system is considered a confined space entry and requires trained personnel and equipment.

During two years of evaluation at UNHSC, the Isolator Row has accumulated, at most, one and one half inches of sediment in its chambers. As a result, researchers have not performed maintenance on the system. The Isolator Row presents an interesting opportunity to study the relationship between maintenance and performance. Researchers have observed enhanced phosphorus removal as the system develops an organic filter cake between the chambers and the woven geotextile fabric that lies beneath them. This enhancement is tempered by the likelihood that, as the filter cake continues to grow, hydraulic efficiency will decline and more runoff will bypass the system untreated until maintenance is performed. Analyses are underway to develop maintenance recommendations that balance and optimize the water quality and water quantity management abilities of this system.

Cold Climate

This system's water quality treatment and volume control capacity remained strong in all seasons, reinforcing the conclusion that filtration and infiltration systems perform well, even in cold climates.

Water Quality Treatment

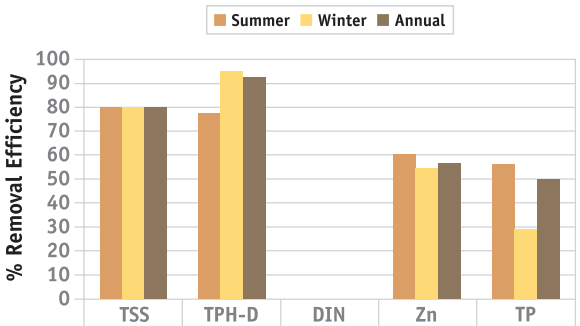
The StormTech Isolator Row system does a good job of reducing the concentration of common pollutants associated with stormwater performance assessment with the exception of nitrogen. It generally meets EPA's recommended level of removal for total suspended solids, and meets regional ambient water quality criteria for heavy metals and petroleum hydrocarbons. The system has a capacity to achieve modest levels of total phosphorus removal, which may be enhanced over time. (See Cost & Maintenance Section.) The lack of nitrogen treatment is typical for non-vegetated aerobic systems. Nutrient load reduction would be further increased through volume reduction by infiltration. Like all other systems monitored at UNHSC, it does not provide chloride removal.

The chart at top right reflects the system's performance in removing total suspended solids, total petroleum hydrocarbons, dissolved inorganic nitrogen, total phosphorus, and zinc. Values represent results recorded over a two-year monitoring period, with the data further divided into summer and winter components.

Water Quantity Control

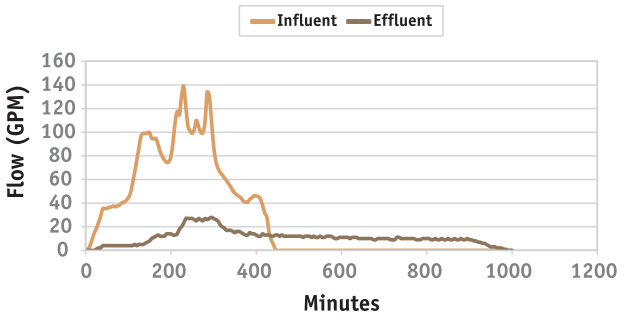
Like other infiltration and filtration systems, the StormTech Isolator Row system exhibits the capacity to reduce peak flows and could be used to reduce runoff volume in appropriate soils, such as those belonging to groups "A" or "B." The figure at bottom right provides information on peak flow reduction and lag times for the system.

POLLUTANT REMOVAL: 2006–2008



Median Annual Influent Event Mean Concentrations (EMC) in mg/L				
48	860 ug/L	.2	.04	.08

HYDRAULIC PERFORMANCE



	Winter	Summer	Annual Average
Average Peak Flow Reduction	71%	81%	76%
Average Lag Time (minutes)	358	190	274

SYSTEM DESIGN

The StormTech Isolator Row is designed to provide subsurface water quality treatment for small storms. The manufacturer adapts the system's design in accordance with local watershed conditions and target treatment objectives.

Chamber units are made of high-density polyethylene (HDPE) pipe and are designed to bear loads consistent with those experienced by parking lots. The UNHSC chamber dimensions are 51 x 30 x 85.4 inches and can be linked together to form linear rows up to 200 feet long. The chambers are laid over woven geotextile, which rests on an infiltration base composed of one foot of three quarter inch crushed stone. The entire excavation is then wrapped in nonwoven geotextile to protect the system from the migration of fine particles from the surrounding soil.

A three- to five-foot separation from seasonal high groundwater table (as designated by regulations) is necessary to minimize the potential for groundwater contamination. Stormwater flows of up to one cubic foot per second (cfs) enter the system through an upstream manhole or other flow diverter. This is representative of flow-based sizing of a BMP common for devices that have limited detention or storage. Such devices are often better described by a maximum treatable flow rate as opposed to a treatment volume.

A bypass is incorporated in the StormTech system where flows exceeding the design rate are bypassed around the device and flow directly into adjacent chambers that can be sized to treat the CP_v and Q_p. Because of the bypass design, maintenance requirements are extremely important. A poorly maintained device would bypass prematurely into the unlined chamber systems and eventually clog subsurface soils resulting in system failure.

APPENDIX D

To meet the requirements of Standard 4 of the Massachusetts Stormwater Handbook, this Long-Term Pollution Prevention Plan is provided to identify the proper procedures of practices for source control and pollution prevention.

STORAGE AND HANDLING OF OIL AND OTHER HAZARDOUS MATERIALS

All oil products and other hazardous materials stored in quantities greater than or equal to 55 gallons will be stored in double walled tanks or provided with other means of secondary containment.

The handling/use of oil and vehicle maintenance fluids will be conducted in the vehicle maintenance and/or shop area of the facility, which will be equipped with floor drains connected to an oil/gas/sand separator prior to discharge to a tight tank.

VEHICLE STORAGE AND WASHING

Vehicles will be stored within the building or under the building canopy. Areas under cover or out in the open will be monitored for any potential contamination to the infiltration system or resource areas. Vehicle washing will be performed in the vehicle wash bay of the facility. Wash water will be collected by floor drains located within the wash bay and will be piped to a tight tank. The exterior knock down pad for rinsing vehicles will be treated with a deep sump hooded catch basin and a water quality structure prior to infiltration. This vehicle rinsing area will be registered with the DEP in accordance with the Underground Injection Control (UIC) regulations.

OPERATION AND MAINTENANCE OF STORMWATER CONTROL STRUCTURES

Included in this Appendix is the Operation and Maintenance plan for this site, which includes street sweeping of the paved areas and periodic removal of sediment from catch basins and other stormwater structures. The Department of Public Works will be responsible for the implementation of the plan.

MATERIAL STORAGE AREA

The material storage areas will be inspected and maintained, as required, to prevent erosion or any potential contamination to the infiltration system or resource areas.

LANDSCAPING

The landscaped areas will be maintained by the Department of Public Works. Fertilizers, if stored on site, will be stored under cover and no fertilizers will be stored within the buffer zone.

PET WASTE MANAGEMENT

It is not expected that pets will be accessing the facility; therefore, it is not necessary to design to manage pet waste.

WASTEWATER SYSTEM

Wastewater will be generated in the building. The building will be tied into the Town's sewer system, so there will be no onsite septic facilities.

DE-ICING & SNOW DISPOSAL

The DPW intends to utilize salt and sand to treat the paved surfaces of the driveways and main circulation areas during snow and ice events. Salt will be stored inside the proposed salt shed on site. Snow storage will consist of pushing snow into grassed areas along the perimeter of the property.

GOOD HOUSEKEEPING MEASURES

The DPW will implement good housekeeping measures to prevent any pollutants generated by the activities on site from entering surface waters and/or groundwater. These measures will include developing and following SPCC plan, maintaining stormwater BMP in accordance with O&M Plan to ensure optimal operation of stormwater BMPs, and following requirements of LTPPP plan as outline above.

SECTION 1 – INTRODUCTION

The project consists of construction of a new public works facility in Foxborough, MA. The new facility will be constructed on the site currently occupied by the existing public works facility, located at 70 Elm Street, Foxboro, MA. The work includes construction of a DPW garage expansion including 3 new maintenance bays and 1 wash bay , repaving of existing parking, circulations, and DPW yard areas, and expanding and reconfiguring of the school bus parking area. Additional improvements will include an upgraded closed drainage system, site utilities, fuel island with above-ground fuel storage tanks and canopy, pavement markings, signage, loam and seed, plantings, and other incidental work.

As part of this project, this "Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan" has been created to ensure that no disturbance to the wetland resource is created during the construction of these repairs.

SECTION 2 – CONSTRUCTION PERIOD POLLUTION PREVENTION MEASURES

Best Management Practices (BMPs) will be utilized as Construction Period Pollution Prevention Measures to reduce potential pollutants and prevent any off-site discharge. The objectives of the BMPs for construction activity are to minimize the disturbed areas, stabilize any disturbed areas, control the site perimeter and retain sediment. Both erosion and sedimentation controls and non-stormwater best management measures will be used to minimize site disturbance and ensure compliance with the performance standards of the Wetlands Protection Act (WPA) and MassDEP Stormwater Standards. Measures will be taken to minimize the area disturbed by construction activities to reduce the potential for soil erosion and stormwater pollution problems. In addition, good housekeeping measures will be followed for the day-to-day operation of the construction site under the control of the contractor to minimize the impact of construction. This section describes the control practices that will be in place during construction activities. All recommended control practices will comply with the standards set in the MassDEP Stormwater Handbook.

2.1 Minimize Disturbed Area and Protect Natural Features and Soil

To minimize disturbed areas, all work will be completed within well-defined work limits. These work limits are shown on the site plans included with this submission. The Contractor shall not disturb native vegetation in any undisturbed area without prior approval from the Engineer. The Contractor will be responsible to make sure that all workers know the proper work limits and do not extend their work into the undisturbed areas. The protective measures are described in more detail in the following sections.

2.2 Control Stormwater Flowing onto and through the project

The Contractor will be required to install compost filter tubes between the work area and the surrounding vegetation area and construct a grasses swale to keep runoff from upstream landscape areas from entering site drainage network.

2.3 Stabilize Soils

The Contractor shall limit the area of land which is exposed and free from vegetation during the project. The soils will be exposed for no longer that one week.

2.4 Proper storage and cover of any stockpiles

The location of the Contractor's storage areas for equipment and/or materials shall be upon cleared portions of the job site, or areas to be cleared as a part of this project, and shall require written approval of the Engineer.

Adequate measures for erosion and sediment control such as the placement of compost filter tubes around the downstream perimeter of stockpiles, and in front of water body, shall be employed to protect any downstream areas from siltation.

The Engineer may designate an area or areas where the Contractor may store materials used in his operations.

2.5 Perimeter Controls and Sediment Barriers

Erosion control lines as described in Section 5 will be utilized to ensure that no sedimentation occurs outside the perimeter of the work area.

2.6 Storm Drain Inlet Protection

Catch basin protection will be implemented for all catch basins affected by the work area. Inlet sediment control will be placed within the catch basin to minimize sediment loading into the catch basin.

2.7 Retain Sediment On-Site

The Contractor will be responsible to monitor all erosion control measures. Whenever necessary, the Contractor will clear all sediment from the compost filter tubes. Daily monitoring should be conducted using the attached Inspection Form.

2.8 Material Handling and Waste Management

All materials stored on-site will be stored in a neat, orderly manner in appropriate containers. All materials will be kept in their original containers with the original manufacturer's label. Substances will not be mixed with one another unless recommended by the manufacturer.

All waste materials will be collected and stored in a securely lidded metal container from a licensed management company. The waste and any construction debris from the site will be hauled off-site daily and disposed of properly. The contractor will be responsible for all waste removal. Manufacturer's recommendations for proper use and disposal will be followed for all materials.

2.9 Designated Washout Areas

The Contractor shall use washout facilities at their own plants, unless otherwise directed by the Engineer.

2.10 Proper Equipment/Vehicle Fueling and Maintenance Practices

On-site vehicles will be monitored for leaks and receive regular preventative maintenance to reduce the risk of leakage. To ensure that leaks on stored equipment do not contaminate the site oil-absorbing mats will be placed under all equipment during storage. Regular fueling and service of the equipment may be performed using approved methods and with care taken to minimize chance of spills. Repair of equipment or machinery within the 100' water resources area shall not be allowed without the prior approval of the Engineer. Any petroleum products will be stored in tightly sealed containers that are clearly labeled.

2.11 Equipment/Vehicle Washing

The Contractor will be responsible to ensure that no equipment is washed on-site except to remove sediments prior to transport from the site.

SECTION 3 – SPILL PREVENTION AND CONTROL PLAN

The Contractor will be responsible for preventing spills in accordance with the project specifications and applicable federal, state and local regulations. The Contractor will identify a properly trained site employee, involved with the day-to-day site operations to be the spill prevention and cleanup coordinator. The name(s) of the responsible spill personnel will be posted on-site. Each employee will be instructed that all spills are to be reported to the spill prevention and cleanup coordinator.

3.1 Spill Control Equipment

Spill control/containment equipment will be kept in the Work Area. Materials and equipment necessary for spill cleanup will be kept either in the Work Area or in an otherwise accessible on-site location. Equipment and materials will include, but not be limited to, absorbent booms/mats, brooms, dust pans, mops, rags, gloves, goggles, sand, plastic and metal containers specifically for this purpose. It is the responsibility of the Contractor to ensure the inventory will be readily accessible and maintained.

3.2 Notification

All workers will be directed to inform the on-site supervisor of a spill event. The supervisor will assess the incident and initiate proper containment and response procedures immediately upon notification. Workers should avoid direct contact with spilled materials during the containment procedures. Primary notification of a spill should be made to the local Fire Department and Police Departments. Secondary Notification will be to the certified cleanup contractor if deemed necessary by Fire and/or Police personnel. The third level of notification is to the DEP. The specific cleanup contractor to be used will be identified by the Contractor prior to commencement of construction activities.

3.3 Spill Containment and Clean-Up Measures

Spills will be contained with granular sorbent material, sand, sorbent pads, booms, or all of the above, to prevent spreading. Certified cleanup contractors should complete spill cleanup. The material manufacturer's recommended methods for spill cleanup will be clearly posted and on-site personnel will be made aware of the procedures and the location of the information and cleanup supplies.

3.4 Hazardous Materials Spill Report

The Contractor will report and record any spill. The spill report will present a description of the release, including the quantity and type of material, date of the spill, circumstances leading to the release, location of spill, response actions and personnel, documentation of notifications and corrective measures implemented to prevent reoccurrence.

This document does not relieve the Contractor of the Federal reporting requirements of 40 CFR Part 110, 40 CFR Part 117, 40 CFR Part 302 and the State requirements specified under the Massachusetts Contingency Plan (M.C.P) relating to spills or other releases of oils or hazardous substances. Where a release containing a hazardous substance or oil in an amount equal to or in excess of a reportable quantity established under either 40 CFR Part 110, 40 CFR Part 117 or 40 CFR Part 302, occurs during a twenty-four (24) hour period, the Contractor is required to comply with the response requirements of the above-mentioned regulations. Spills of oil or hazardous material in excess of the reportable quantity will be reported to the National Response Center (NRC).

SECTION 4 – CONTACT INFORMATION/RESPONSIBLE PARTIES

Owner/Operator:
Christopher Gallagher, Director
Dept. of Public Works
70 Elm Street
Foxborough, MA 02035
781-389-6139

Engineer:
Alyssa Peck, PE
Weston & Sampson, Inc.
100 Foxborough Blvd, Suite 250
Foxborough, MA 02035
508-203-8331

Site Inspector:
TBD

Contractor:
TBD

SECTION 5 – EROSION AND SEDIMENTATION CONTROL

Erosion and Sedimentation Control details and layout can be found in the attached plan set. In addition, a technical specification (Environmental Protection) has been included with this report, which details all Erosion and Sedimentation controls.

SECTION 6 – SITE DEVELOPMENT PLAN

The Site Development Plan is included in the attached plan set.

SECTION 7 – OPERATION AND MAINTENANCE OF EROSION CONTROL

The erosion control measures will be installed as detailed in the technical specification. Environmental Protection. If there is a failure to the controls, the Contractor will be required to stop work until the failure is repaired.

Periodically throughout the work, whenever the Engineer deems it necessary, the sediment that has been deposited against the controls will be removed to ensure that the controls are working properly.

SECTION 8 – OPERATION AND MAINTENANCE OF EROSION CONTROL

During construction the erosion and sedimentation controls will be inspected daily. Once the contractor is selected, an on-site inspector will be selected to work closely with the Engineer to ensure that all erosion and sedimentation controls are in place and working properly. An Inspection Form is included.

Inspection Form

Inspected By: _____ Date: _____Time:_____

YES	NO	DOES NOT APPLY	ITEM
			Do any erosion/siltation control measures require repair or clean out to maintain adequate function?
			Is there any evidence that sediment is leaving the site and entering the wetlands?
			Are any temporary soil stockpiles or construction materials located in non-approved areas?
			Are on-site construction traffic routes, parking, and storage of equipment and supplies located in areas not specifically designed for them?

Specific location, current weather conditions, and action to be taken:

_____

_____

_____

_____

_____

Other Comments:

_____

_____

Pending the actions noted above I certify that the site is in compliance with the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan.

Signature:_____ Date: _____

SECTION I – PURPOSE/INTENT

The purpose of this document is to provide for the health, safety, and general welfare of the citizens of Foxborough, Massachusetts through the regulation of non-stormwater discharges into existing outstanding resource areas near the proposed public works facility site to the maximum extent practicable, as required by federal and state law. This document establishes methods for controlling the introduction of pollutants into existing outstanding resource areas to comply with requirements of the National Pollutant Discharge Elimination System (NPDES) permit process.

SECTION II - DEFINITIONS

For the purposes of this statement, the following shall mean:

Best Management Practices (BMPs): Schedules of activities, prohibitions of practices, general good housekeeping practices, pollution prevention and educational practices, maintenance procedures, and other management practices to prevent or reduce the discharge of pollutants directly or indirectly to stormwater, receiving waters, or stormwater conveyance systems. BMPs also include treatment practices, operating procedures, and practices to control site runoff, spillage or leaks, sludge or water disposal, or drainage from raw materials storage.

Clean Water Act: The federal Water Pollution Control Act (33 U.S.C § 1251 et seq.), and any subsequent amendments thereto.

Construction Activity: Activities subject to the Massachusetts Erosion and Sedimentation Control Act or NPDES Construction Permits. Such activities include but are not limited to clearing and grubbing, grading, excavating, and demolition.

Hazardous Materials: Any material, including any substance, waste, or combination thereof, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may cause, or significantly contribute to, a substantial present or potential hazard to human health, safety, property, or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

Illegal Connection: An illegal connection is defined as either of the following:

a. Any pipe, open channel, drain or conveyance, whether on the surface or subsurface, which allows an illicit discharge to enter the outstanding resource area including but not limited to any conveyances which allow any non-stormwater discharge including sewage, process wastewater, and wash water, regardless of whether said drain or connection has been previously allowed, permitted, or approved by an authorized enforcement agency; or
b. Any pipe, open channel, drain or conveyance connected to the Town of Foxborough storm water treatment system which has not been documented in plans, maps, or equivalent records and approved by an authorized enforcement agency.

Illicit Discharge: Any direct or indirect non-stormwater discharge to the Town of Foxborough stormwater treatment system, except as exempted in Section II of this ordinance.

Industrial Activity: Activities subject to NPDES Industrial Permits as defined in 40CFR, Section 122.26 (b) (14).

National Pollutant Discharge Elimination System (NPDES) Stormwater Discharge Permit: A permit issued by MassDEP under authority delegated pursuant to 33 USC § 1342 (b) that authorizes the discharge of pollutants to waters of the United States, whether the permit is applicable on an individual, group, or general area-wide basis.

Town of Foxborough Stormwater Treatment System: Any facility, owned or maintained by the town, designed or used for collecting and/or conveying stormwater, including but not limited to roads with drainage systems, Town of Foxborough streets, curbs, gutters, inlets, catch basins, piped storm drains, pumping facilities, infiltration, retention and detention basins, natural and man-made or altered drainage channels, reservoirs, and other drainage structures.

Non-Stormwater Discharge: Any discharge to the storm drain system that is not composed entirely of stormwater.

Person: Any individual, association, organization, partnership, firm, joint venture, public or private corporation, trust, estate, commission, board, public or private institution, utility, cooperative, city, county or other political subdivision of the State, interstate body, or any other legal entity.

Pollutant: Anything which causes or contributes to pollution. Pollutants may include, but are not limited to: paints, varnishes, and solvents; petroleum hydrocarbons; automotive fluids; cooking grease; detergents (biodegradable or otherwise); degreasers; cleaning chemicals; non-hazardous liquid and solid wastes; refuse, rubbish, garbage, litter, or other discarded or abandoned objects and accumulations, so that same may cause or contribute to pollution; floatables; pesticides, herbicides, and fertilizers; liquid and solid wastes; sewage, fecal coliform and pathogens; dissolved and particulate metals; animal wastes; wastes and residues that result from constructing a building or structure; concrete and cement; and noxious or offensive matter of any kind.

Pollution: Contamination or other alteration of any water's physical, chemical, or biological properties by addition of any constituent including but not limited to a change in temperature, taste, color, turbidity, or odor of such waters, or the discharge of any liquid, gaseous, solid, radioactive, or other substance into any such waters as will or is likely to create a nuisance or render such waters harmful, detrimental, or injurious to the public health, safety, welfare, or environment, or to domestic, commercial, industrial, agricultural, recreational, or other legitimate beneficial uses, or to livestock, wild animals, birds, fish or other aquatic life.

Premises: Any building, lot, parcel of land, or portion of land whether improved or unimproved including adjacent sidewalks and parking strips.

Stormwater: Any surface flow, runoff, and drainage consisting entirely of water from any form of natural precipitation and resulting from such precipitation.

Wastewater: Any water or other liquid discharged from a facility, that has been used, as for washing, flushing, or in a manufacturing process, and so contains waste products.

SECTION III - PROHIBITIONS

Prohibition of Illicit Discharges:

No person shall throw, drain, or otherwise discharge, cause or allow others under its control to throw, drain, or otherwise discharge into the Town of Foxborough stormwater treatment system or watercourses any materials, including but not limited to, any pollutants or waters containing any pollutants, other than stormwater. The commencement, conduct, or continuance of any illicit discharge to the storm drain system is prohibited except as described as follows:

1. Water line flushing performed by a government agency, other potable water sources, landscape irrigation or lawn watering, diverted stream flows, rising ground water, ground water infiltration to storm drains, uncontaminated pumped ground water, foundation or footing drains (not including active groundwater dewatering systems), crawl space pumps, air conditioning condensation, springs, natural riparian habitat or wetland flows, and any other water source not containing pollutants;

2. Discharges or flows from firefighting, and other discharges specified in writing by the Town of Foxborough as being necessary to protect public health and safety;

3. Dye testing is an allowable discharge, but requires a verbal notification to the Town of Foxborough prior to the time of the test;

4. Any non-stormwater discharge permitted under an NPDES permit, waiver, or waste discharge order issued to the discharger and administered under the authority of the Federal Environmental Protection Agency, provided that the discharger is in full compliance with all requirements of the permit, waiver, or order and other applicable laws and regulations, and provided that written approval has been granted for a discharge to the Town of Foxborough stormwater treatment system.

SECTION IV – INDUSTRIAL OR CONSTRUCTION ACTIVITY DISCHARGES

Any person subject to an industrial or construction activity NPDES stormwater discharge permit shall comply with all provisions of such permit. Proof of compliance with said permit may be required in a form acceptable to the Town of Foxborough Department of Public Works prior to allowing discharges to the Arlington stormwater treatment system.

SECTION V – NOTIFICATION OF SPILLS AND ACCIDENTAL DISCHARGES

Notwithstanding other requirements of law, as soon as any person responsible for a facility, activity or operation, or responsible for emergency response for a facility, activity or operation has information of any known or suspected release of pollutants or non-stormwater discharges from that facility, activity, or operation which are resulting or may result in illicit discharges or pollutants discharging into stormwater, the Town of Foxborough stormwater treatment system, State Waters, or Waters of the U.S., said person shall take all necessary steps to ensure the discovery, containment, and cleanup of such release so as to minimize the effects of the discharge. In the event of such a release of hazardous materials, said person shall immediately notify emergency response agencies of the occurrence via emergency dispatch services. In the event of a release of non-hazardous materials, said person shall notify the Town of Foxborough Department of Public Works in person or by phone no later than the next business day, including the nature, quantity and time of occurrence of the discharge. Notifications in person or by phone shall be confirmed by written notice, via certified mail return receipt requested addressed to the Town of Foxborough Department of Public Works within three (3) business days of the initial notice. If the discharge of prohibited materials emanates from a commercial or industrial establishment, the owner or operator of such establishment shall also retain an on-site written record of the discharge and the actions taken to prevent its recurrence. Such records shall be retained for at least three years.

IN WITNESS WHEREOF the parties hereto have executed copies of this Agreement on the _____ day of _____, _____.

_____
Christopher F. Gallagher, PE
Director, Department of Public Works

Operation and Maintenance Plan

Foxborough Department of Public Works Facility

SECTION 1 – INTRODUCTION

The following document has been written to comply with the stormwater guidelines set forth by the Massachusetts Department of Environmental Protection (MassDEP). The intent of these guidelines is to encourage Low Impact Development techniques to improve the quality of the stormwater runoff. These techniques, also known as Best Management Practices (BMPs) collect, store, and treat the runoff before discharging to adjacent environmental resources.

SECTION 2 - PURPOSE

This Operation and Maintenance Plan (O&M Plan) is intended to provide a mechanism for the consistent inspection and maintenance of each BMP installed on the project site. Included in this O&M Plan is a description of each BMP type and an inspection form for each BMP. The Town of Foxboroubh is the owner and operator of the system and is responsible for its upkeep and maintenance. This work will be funded on an annual basis through the Town's operating budget. The estimated budget to maintain these BMPs utilizing the Department of Public Works workforce and equipment is approximately $7,000 per year. This budget assumes that Town equipment will be utilized, and no additional equipment rental is required.

In the event the Town sells the property, it is the Town's responsibility to transfer this plan, as well as the past three years of operation and maintenance records, to the new property owner. The Owner shall also notify the planning board or its agent of the changes in ownership or assignment of financial responsibility.

SECTION 3 – BMP DESCRIPTION AND LOCATIONS

3.1 Street Sweeping

Street sweeping consists of using a street sweeping machine to clean impervious areas of accumulated sediment, debris, and trash at the parking areas surrounding the public works facility.

3.2 Deep Sump Hooded Catch Basins

Deep sump catch basins utilizing catch basin hoods will be located throughout the site and used as pre-treatment before entering the infiltration systems or other Town stormwater infrastructure. The deep sump catch basins are designed to remove trash, debris, hydrocarbons, and coarse sediment from the stormwater runoff.

3.3 Stormwater Treatment Unit Structures

There are five Stormwater Treatment Unit Structures on site. These structures are hydrodynamic separators and will be used for TSS and hydrocarbon removal before entering the subsurface infiltration chamber systems. Hydrodynamic separators provide effective spill control and can retain grit, suspended solids, oils and grease during periods of both low and high flows.

3.4 Outlet Control Structure

The outlet control structures are used to control discharges from captured stormwater. They release the water in a controlled manner to control peak discharges.

3.5 Drain Manholes

Drain Manholes will be located throughout the site and used to convey and redirect stormwater collected from deep sump catch basins. They allow for access, connection points, and change-in-direction points in the underground drainage system.

3.6 Subsurface Infiltration chambers

There will be three subsurface infiltration systems built on site that will receive and treat stormwater. The infiltration chambers are designed to be constructed upon a layer of crushed stone to promote infiltration of stormwater. The storage provided by the chambers assist with mitigation of peak rate run off and pollutant removal.

SECTION 4 – INSPECTION, MAINTENANCE, AND SCHEDULE

4.1 Street Sweeping

Street sweeping shall be performed on all impervious surfaces on a quarterly basis, with sweeping performed primarily in the spring and fall. Street sweeping shall be performed using a high efficiency vacuum street sweeping machine or a regenerative air sweeper. A mechanical rotary broom sweeper may be used if sweeping is performed on a monthly basis.

In the event of contamination by a spill or other means, all street sweeping cleanings must be evaluated in accordance with the Hazardous Waste Regulations, 310 CMR 30.000 and handled as hazardous waste.

In the absence of evidence of contamination, street sweeping cleanings may be taken to a landfill or other facility permitted by MassDEP to accept Solid Waste without any prior approval by MassDEP. Please note that current MassDEP regulations prevent landfills from accepting materials that contain free-draining liquids.

4.2 Deep Sump Hooded Catch Basins and Outlet Control Structures

Inspect and/or clean catch basin and outlet control structures at least four times per year and at the end of foliage and snow removal seasons. Sediments must be removed whenever the depth of deposits is greater than or equal to one half the depth from the bottom of the invert of the lowest pipe in the basin. The structures should be cleaned a minimum of four times per year regardless of the amount of sediment in the basin. The site is considered a land use with a higher potential pollutant load, therefore if catch basins are found to be filled to capacity with sediment during a cleaning, the frequency of cleaning shall be increased. Catch basins and outlet control structures shall be cleaned with clamshell buckets or by hand tools where necessary. Catch basin hoods shall be inspected annually. Open and close the access hatch and flush or rod the anti-siphon device to ensure proper

operation.

In the event of contamination by a spill or other means, all cleanings must be evaluated in accordance with the Hazardous Waste Regulations, 310 CMR 30.000 and handled as hazardous waste.

In the absence of evidence of contamination, catch basin cleanings may be taken to a landfill or other facility permitted by MassDEP to accept Solid Waste without any prior approval by MassDEP. Please note that current MassDEP regulations prevent landfills from accepting materials that contain free-draining liquids.

4.3 Drain Manholes

Inspect and/or clean drain manholes at least four times per year while inspecting the catch basins. Remove all accumulated sediments and debris, and dispose of in accordance with local, state, and federal regulations. Drain Manholes shall be cleaned with clamshell buckets or by hand tools where necessary.

In the event of contamination by a spill or other means, all cleanings must be evaluated in accordance with the Hazardous Waste Regulations, 310 CMR 30.000 and handled as hazardous waste.

In the absence of evidence of contamination, manhole cleanings may be taken to a landfill or other facility permitted by MassDEP to accept Solid Waste without any prior approval by MassDEP. Please note that current MassDEP regulations prevent landfills from accepting materials that contain free-draining liquids.

4.4 Water Quality Structures

Water Quality Structures shall be inspected every six months for the first year. Following the first year, the structures can be inspected a minimum of once per year or as first year data indicates. After a hazardous spill, structures shall be inspected immediately. The structures shall be cleaned a minimum of once per year or when the sediment depth is 15% of its capacity. Polluted water, sediments, and debris should be disposed of in accordance with local, state, and federal regulations.

4.5 Subsurface Detention/Infiltration Chambers

The isolation row in the subsurface structures shall be inspected every six months during the first year, and annually thereafter. Inspection may be conducted from the surface using inspection ports. A stadia rod may be inserted to determine the depth of sediment. If upon visual inspection it is found that sediment has accumulated to an average depth exceeding 3-inches, cleanout is required. Cleaning out of the isolator row may be performed with a JetVac process as recommended by the manufacturer as shown in Attachment D Isolator row documentation

4.6 Inspections and Record Keeping

- An inspection form should be filled out every time maintenance work is performed.
- A binder should be kept at the Public Works Facility that contains all the completed

inspection forms and any other related materials.

- A review of all Operation & Maintenance actions should take place annually to ensure that these Stormwater BMPs are being taken care of in the manner described in this Operation & Maintenance Plan.

- All operation and maintenance log forms for the last three years, at a minimum, shall be kept on site at the Public Works Facility.

The inspection and maintenance schedule may be refined in the future based on the findings and results of this operation and maintenance program or policy.

SECTION 5 – GENERAL GOOD HOUSEKEEPING PRACTICES

All non-hazardous waste shall be stored in designated trash or recycling containers onsite for periodic collection by the local trash collector. The owner shall have maintenance staff who monitor the site for the accumulation of trash. Any trash that is seen onsite shall immediately be collected and placed into designated trash or recycling containers. The owner's maintenance staff shall make an inspection of the site once per week at minimum.

SECTION 6 - ANNUAL REPORTING

The owner must keep annual reports regarding the inspection and maintenance of the BMPs at the Public Works Facility. The reports must include:

1. Description of the conditions of the BMPs
2. Description of maintenance performed
3. Receipts for maintenance performed

SECTION 7 – OWNER MAINTENANCE AGREEMENT

The stormwater management system shall be owned and maintained by the following party:

Christopher Gallagher, PE
Director of Public Works
70 Elm Street
Foxboro, MA 02035

The owner of the stormwater management system has reviewed and understands the contents of this Stormwater Operation and Maintenance Plan. The signature below constitutes the owner's commitment to maintain the stormwater system in accordance with this plan.

Signature: _____
Christopher Gallagher, DPW Director

Street Sweeping

Frequency:	Quarterly average, primarily in the spring and fall if using a high efficiency vacuum sweeper or regenerative air sweeper. Monthly, if using a mechanical rotary broom sweeper.
Location:	Parking Lots and Driveways
Inspected By:	_____ Date: _____
Observations:	_____ _____ _____
Actions Taken:	_____ _____ _____
Instructions:	Sweep all impervious areas, including parking lots, driveways, and roadways using high efficiency vacuum street sweeping machine, regenerative air sweeper, or mechanical rotary broom sweeper. All trash, debris, and sediments should be disposed of in accordance with local, state, and federal regulations

Deep Sump Catch Basins & Outlet Control Structures

Frequency: Inspect and/or clean catch basin and outlet control structures at least four times per year and at the end of foliage and snow removal seasons.

Structure Number: _____

Inspected By: _____ Date: _____

Observations: _____
_____
_____

Actions Taken: _____
_____
_____

Instructions: Clean units four times per year or whenever the depth of the deposits is greater than or equal to one half the depth from the bottom of the invert to the lowest pipe in the structure. Open and close hood and check anti-siphon vent for clogging.

Drain Manholes

Frequency:	Inspect and/or clean drain manholes at least four times per year while inspecting the catch basins.
Structure Number:	_____
Inspected By:	_____ Date: _____
Observations:	_____ _____ _____
Actions Taken:	_____ _____ _____
Instructions:	Clean units four times per year at a minimum, or whenever catch basins are inspected. Remove sediment and debris. All debris, and sediments should be disposed of in accordance with local, state, and federal regulations. Drain Manholes shall be cleaned with clamshell buckets or by hand tools where necessary.

Stormwater Treatment Unit Structures

Frequency: Stormwater Treatment Unit Structures shall be inspected every six months for the first year. Following the first year, the structures can be inspected a minimum of once per year or as first year data indicates. After a hazardous spill, structures shall be inspected immediately.

Structure Number: _____

Inspected By: _____ Date: _____

Observations: _____
_____
_____

Actions Taken: _____
_____
_____

Instructions: Clean unit when the sediment depth is 15% of its capacity. Dispose of sediment and debris in accordance with local, state, and federal laws.

Subsurface Infiltration Chambers

Frequency: The Subsurface Infiltration Chambers should be inspected every six months during the first year and annually thereafter.

Structure No.: _____

Inspected By: _____ Date: _____

Observations: _____
_____
_____

Actions Taken: _____
_____
_____

Instructions: Inspect underground isolation rows of chambers via manholes or inspection ports. Use reverse water jet to pull sediment back into manhole. Remove sediment, and dispose of in accordance with local, state, and federal regulations.

Check that the subsurface infiltration chambers are draining completely within 72 hours of rain events. All trash, debris, and sediments should be disposed of in accordance with local, state, and federal regulations.