



## Stormwater Management Report For

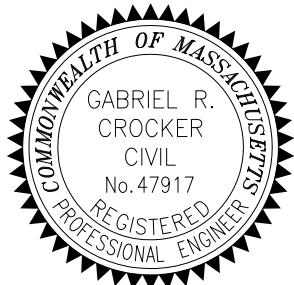
**Herb Chambers Bentley – Maserati – Lamborghini – Rolls-Royce – Alfa Romeo of Wayland**  
**533 Boston Post Road- Route 20**  
**Wayland, MA**

**January 12, 2023**

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## **SECTION 1 - NARRATIVE**

## **1.1 EXECUTIVE SUMMARY**

In accordance with the provisions of the Town of Wayland Zoning Bylaws, the Applicant, Herb Chambers 533 Boston Post Road, LLC (HC), proposes a modification and modernization of the existing Bentley - Maserati – Lamborghini – Rolls-Royce – Alfa Romeo of Wayland at 533 Boston Post Road in Wayland, MA. The proposed scope includes renovating the existing automobile dealership to add additional service bays for vehicle service. Site renovations include reconfigured parking for employees, customers, and vehicle inventory storage, as well as upgrades to stormwater management systems, utilities, and landscaping.

The site is bound by Boston Post Road (Route 20) to the north, commercial properties to the east (Richey & Clapper, Inc.) and west (Herb Chambers Jaguar Land Rover), and an undeveloped portion of the Herb Chambers Jaguar Land Rover parcel that extends to the South, which is mostly comprised of wetlands, and borders the Great Meadows National Wildlife Refuge and the former CSX Railway, which was recently purchased by the Town of Wayland. The site is located on Parcel 21-003 and is 2.95 acres. The property is located within the Limited Commercial District.

## **1.2 APPROVALS BEING SOUGHT**

This Stormwater Report is being filed in conjunction with the Notice of Intent (NOI) being filed with the Wayland Conservation Commission (WCC) and the Massachusetts Department of Environmental Protection (MA DEP) and Site Plan approval with the Wayland Zoning Board of Appeals (WZBA) for the proposed work. The Applicant requests that the permit approvals encompass the entirety of the scope listed below, and as shown in the accompanying plan set:

- Upgrade of the existing parking lot to provide employee parking and vehicle storage
- The renovation of the existing single-story structure to be used for vehicle sales and maintenance
- Stormwater BMP's
- Upgrades to utilities, landscaping, and lighting

## **1.3 FEMA – FLOODPLAIN SUMMARY**

The parcel is shown on FEMA Flood Insurance Rate Map Panel 25017C0507F dated 7/7/2014. The developed land on the property is located within Zone X, which is defined as areas determined to be outside the 0.2% annual chance floodplain. There is a Zone AE within proximity of the work proposed. Zone AE is defined as an area inundated by 1% annual chance flooding, where Base Flood Elevations (BFE's) have been determined. The BFE of the Zone AE is elevation 121.0. The work proposed is entirely outside the limits of the FEMA Zone AE.

## **1.4 ON-SITE SOIL INFORMATION**

The Natural Resource Conservation Service (NRCS) maps the entirety of on-site soil as Udorthents-Urban land complex, Soil Map Unit 656, which is defined as "excavated and filled land."

Northeast Geotech performed twelve (12) test borings the week of September 5, 2022, within the limit of work. The test borings performed within the drainage structures footprints revealed a subsurface comprised of a loose to medium dense, brown loamy sand. The subsurface soil conditions

in the area of the expanded parking lot and drainage improvements are consistent with a "B" soil. The proposed infiltration area is located fully within the limits of the HSG B soils and an infiltration rate of 1.02 inches per hour was used as this rate is consistent with sandy loam and we wanted our calculations to be conservative.

Depth to groundwater was noted in the upper right corner of each test pit log and appears to vary throughout the site. In the proposed parking area in front of the building (B-7), groundwater was noted at 5ft below existing grade, or at elevation 121.0±. In the area of the proposed infiltration Retain-It System (UG 2), groundwater was encountered at 5ft below existing grade, or at elevation 119.5±. For more information on the separation of groundwater at each of the infiltration BMP's, please refer to Section 4, Stormwater Calculations.

Refer to Section 6 for complete soil information.

## **1.5 WETLANDS AND ENVIRONMENTAL RESOURCE AREAS ANALYSIS**

The project does contain environmental resource areas, and therefore the project must be permitted through MassDEP and the Wayland Conservation Commission. There is a Bordering Vegetated Wetland (BVW) to the South of the site containing shallow marshes. According to the latest Mass. Division of Fisheries and Wildlife – Natural Heritage Program mapping, the southern portion of the site abuts a Priority Habitat of Rare Species (PHRS) as designated by the Natural Heritage and Endangered Species Program of the Division of Fisheries and Wildlife. There is a potential vernal pool within the PHRS, approximately 300±' from any proposed work. The limit of work is entirely out of the FEMA 100-year floodplain. The proposed project area is entirely developed.

The wetland resource areas located to the south of the property were delineated by Fred King, PE of DGT Associates in July of 2022.

The following is a summary of the buffer and protection zones that portions of the project are proposed within:

1) 100' Bordering Vegetated Wetland (BVW) Buffer (310 CMR 10.55).

Work within the 100' Bordering Vegetated Wetland (BVW) Buffer includes but is not limited to sections of the paved parking lots, retaining walls, some of the existing to be renovated building, as well as a portion of the building addition. The proposed scope is an improvement over the existing, which consists of the existing building and paved parking lot.

2) Bordering Land Subject to Flooding

The site is located near a BLSF, associated with the Sudbury River. The elevation of the 100 year (1% chance of flooding) has been determined by the FEMA Flood Study Profile Data as elevation 121.0 (NAVD 88). The boundary of the BLSF is the 121-foot contour and this contour is to the south of the limit of work.

### 3) Priority Habitat of Rare Species (PHRS)

A small portion of the proposed improvements are proposed within the PHRS. As mentioned above, there is a potential vernal pool located within the PHRS, approximately 300±' to the southeast of the limit of work. A copy of the Notice of Intent Application package including the plans will be submitted to NHESP for review.

## **1.6 OBJECTIVE OF CALCULATIONS**

The purpose of this stormwater analysis is to examine the stormwater runoff from the proposed site based upon the Massachusetts Department of Environmental Protection Stormwater Management Policy and the applicable provisions of the Town of Wayland Bylaws and regulations.

The goal of the stormwater management system design on this project is to comply with the MA Stormwater Management Requirements as well as the Town of Wayland's Stormwater Management Permit Regulations and provide improved water quality, reduce post-development peak runoff rates below pre-development peak flow rates, maximize the opportunities for recharge and infiltration, and protect the surrounding area from any potential flooding and/or environmental impacts associated with the unmitigated condition. The following stormwater hydrology calculations were performed using the 0.5- inch, 1- inch, 1-year, 2-year, 10-year, 25-year, and 100-year frequency, Type III, 24-hour SCS design storms and were compared for both pre-development and post-development conditions. The 1, 2, 10, 25 and 100-year storms and 0.5 and 1-inch storms were evaluated to demonstrate the proposed peak rates of discharge and volumes do not exceed pre-development peak rates and volumes.

## **1.7 METHODOLOGY**

We utilized the latest version of Hydro CAD for the overall stormwater hydrology/routing analysis to assess and compare peak rates of runoff and volumes at the various discharge points from the subject property. We then used Hydraflow Storm Sewers Extension Pack through AutoCAD Civil 3D to analyze the pipe design and to select appropriate pipe sizing.

Refer to Section 3 – HydroCAD Model, which includes the detailed print-out of the HydroCAD Model Reports for the 0.5 inch, 1-inch, 1, 2, 10, 25 and 100-year storms as well as Section 7 – Hydraulic Pipe Analysis / Sizing, which includes reports for the 10, and 100-year storms for pipe capacity analysis and sizing.

## **1.8 SITE HYDROLOGY**

### **Existing Conditions**

Please refer to the attached Existing Conditions Watershed Analysis Plan in Section 3.1. The property has been divided into one (1) subcatchment area based on the existing site topography and flow paths. The subcatchment's analysis standpoint is the wetland resource areas to the rear of the property. The subcatchment area has been analyzed and assigned an appropriate Curve Number to represent the existing surface cover and underlying soils conditions. Time of concentration have been computed and the extent of pervious vs. impervious cover computed. This data was then input into HydroCAD to determine peak rates of runoff at the design point which provides the location for which to compare existing versus proposed conditions to document compliance that the peak rates and volumes have been reduced in the regulatory storm events as required. A summary table is provided in the

Hydrology Model Results and Conclusions Section below. For the purposes of this analysis, the pre- and post- development drainage conditions were analyzed at one (1) "design points" or points of discharge where stormwater runoff currently drains to under existing conditions. The design point is described below:

- Design Point #1 (DP-1) is the BVW (flagged as Wetland A) located to the southwest of the proposed work. This BVW ultimately discharges to Wetland A (PD-6).

The parcel that the proposed project on is approximately  $2.95 \pm$  acres, however the limit of work being analyzed is approximately 3.03 acres of land consisting of an existing one-story building and bituminous driveway and parking area. The site generally conveys stormwater in a southerly direction towards the Wetlands. A more comprehensive description of the existing subcatchment area is provided below:

- Subcatchment E-1 is approximately 3.03AC (131,867 SF) and is comprised of the existing building, associated site parking area, gravel, mulched landscaped areas, lawn, and some undeveloped woodland area. Stormwater from these surfaces flow overland and undetained to Wetland A, or DP-1. This area is a mix of pervious and impervious surfaces (CN: 88) and the calculated time of concentration of 6.1 minutes is used.

### **Proposed Conditions**

The proposed project consists of reconfigured and expanded parking for vehicle inventory, the renovation and expansion of the existing car dealership. Construction will also include landscaping upgrades, stormwater treatment, drainage improvements and other associated utilities. The site, including the proposed parking areas, have been designed to drain to deep sump hooded catch basins or sediment forebays. The catch basins will capture and convey stormwater runoff, via an underground pipe system, to proprietary treatment units, to an underground infiltration system that will recharge the required Water Quality Volume (WQV). The rooftop runoff from the existing building and proposed addition has been designed to flow directly into the underground infiltration chambers. Infiltration basins to the rear of the property are proposed at the back of the parking area closest to the environmentally jurisdictional areas.

Please refer to the attached Proposed Conditions Watershed Plan. The proposed project has been divided into six (6) subcatchment areas and the various stormwater treatment and infiltration BMPs have been modeled. Appropriate Times of Concentration and Curve Numbers have been assigned for each catchment area. A more comprehensive description of the proposed subcatchment areas is provided below:

- Subcatchment P-1A is approximately 0.308 acres (13,425 SF) consisting of the proposed expanded parking lot, grassed area, and some of the existing wooded area (CN:86). Stormwater runoff from this area flows overland into Sediment Forebay 1, and then into infiltration basin #1, before discharging to DP-1. The minimum time of concentration of 6.0 minutes is used.
- Subcatchment P-1B is approximately 0.764 acres (33,268 SF) consisting of a portion of the bituminous driveway and reconfigured parking area, landscaped area, and a conveyance swale. Stormwater from this location flows overland through the conveyance swales into proposed sediment forebays #2 and #3 before discharging to the infiltration basin #2.

Stormwater ultimately flows to a rip rap splash pad at the rear of the property. The area is primarily impervious (CN: 87) and the minimum time of concentration of 6.0 minutes is used.

- Subcatchment P-1C is approximately 0.670 acres (29,201 SF) consisting of bituminous pavement and landscaped area. Stormwater in this area drains into a deep sump hooded catch basin, piped connection to a water quality separator and into the underground infiltration System (UG-2). Stormwater ultimately flows to a rip rap splash pad at the rear of the property. The area has a CN: 85 and the minimum time of concentration of 6.0 minutes is used.
- Subcatchment P-1D is approximately 0.308 acres (13,403 SF) is at the northern end of the limit of work. This area consists of grass/landscaped surface, woods, and the expanded parking lot area. Stormwater in this area travels overland to deep sump hooded catch basins into a proprietary treatment unit, to a subsurface retain it detention system (UG-1), and then through a pipe connection to UG-2. Stormwater ultimately flows to a rip rap splash pad at the rear of the property. This area has a CN: 82, and the minimum time of concentration of 6.0 minutes is used.
- Subcatchment P-B1 is approximately 0.787 acres (34,270 SF) is comprised of a portion of the existing building and the building addition. The roof runoff is collected and is piped directly into the infiltration system (UG-3). Stormwater ultimately flows to a rip rap splash pad at the rear of the property. The area has a CN: 98 and a minimum time of concentration of 6.0 minutes is used.
- Subcatchment P-1U is approximately 0.190 acres (8,290 SF) consisting of an undisturbed wooded area that flows undetained to the wetlands to the south of the property. Stormwater ultimately flows to a rip rap splash pad at the rear of the property. This area only includes the woods (CN: 55). A minimum time of concentration of 6.0 minutes is used.

### **Hydrology Model Results and Conclusions**

The goal of the stormwater design is to comply to the maximum extent practicable with the Massachusetts Stormwater Policy and the Town of Wayland Stormwater Management Regulations. The existing site contains 76,513 SF (1.76AC) of impervious area. The proposed site contains 93,128 SF (2.14 AC) of impervious area, which is an increase of 16,615 SF. The project, as proposed, is a renovation of a previously developed site. However, there is a slight increase in impervious area, the project is considered a mix of new construction and redevelopment. This analysis confirms that the stormwater system is receiving proper treatment and peak rates of runoff have been reduced to below pre-development rates using stormwater Best Management Practices including deep sump hooded catch basins, Contech CDS Water Quality Units, underground infiltration and detention systems, sediment forebays, and infiltration basins. The discharge points from the site have been engineered to employ properly designed rip-rap splash pads to further reduce discharge velocities and to spread out the discharge to prevent scour and point discharge erosion. The water quality units have been properly sized in accordance with MADEP guidance for water quality flows. Please refer to Section 4 of the Stormwater Report for calculations associated with the sizing.

The results of the pre- and post-development hydrology calculations provided in Section 3 are summarized in the following tables:

Table 1.9.1 shows the peak rate of runoff at each design point for the existing site as well as for the developed site at 1, 2, 10, 25, 100-year and 0.5 and 1-inch design storms.

Point of Analysis	0.5 in-Storm (cfs)			1 in-Storm (cfs)			1-Yr Storm (cfs)			2-Yr Storm (cfs)			10-Yr Storm (cfs)			25-Yr Storm (cfs)			100-Yr Storm (cfs)		
	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ
PD1	0.03	0.00	-0.03	0.78	0.00	-0.78	5.15	0.62	-4.53	6.72	1.37	-5.35	11.46	7.69	-3.77	15.17	12.35	-2.82	22.66	18.62	-4.04

**Table 1.9.1**

As shown in Table 1.9.1, the peak stormwater runoff generated by the development are the same or less in post development conditions versus the existing conditions at all design points, for every storm. All stormwater ultimately discharges to Wetland A. In all storms, the peak stormwater runoff to PD-6 is significantly reduced. Refer to Section 3 for the complete HydroCAD Analysis that documents the above results as well as the Existing and Proposed Conditions Watershed Plans, also enclosed in Section 3.

Table 1.9.2 shows the total volume discharge at each design point for the existing site as well as for the developed site at 1, 2, 10, 25, 100-year, 0.5-inch and 1-inch design storms.

Point of Analysis	0.5 in-Storm CF			1 in-Storm CF			1-Yr Storm CF			2-Yr Storm CF			10-Yr Storm CF			25-Yr Storm CF			100-Yr Storm CF		
	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ
PD1	295	0	-295	2,507	0	-2,507	15,288	1,932	-13,356	20,001	5,707	-14,294	34,959	18,747	-16,212	47,020	30,085	-16,935	71,954	54,837	-17,117

**Table 1.9.2**

As shown in Table 1.9.2, the total volume discharge generated by the development are the same or less in post development conditions versus the existing conditions at all design points, for every storm. Refer to Section 3 for the complete HydroCAD Analysis that documents the above results as well as the Existing and Proposed Conditions Watershed Plans, also enclosed in Section 3.

## 1.9 STORMWATER MANAGEMENT

The following section describes each of the ten (10) Massachusetts Stormwater Management Standards and describes how the project complies with each.

**Standard 1: No New Untreated Discharges** – No new stormwater conveyances (e.g. outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.

**All new stormwater system conveyances are treated prior to discharge and result in no erosion occurring on site. The drainage system has been designed to direct stormwater runoff from impervious areas through various stormwater systems designed to capture, convey, treat, detain, recharge and infiltrate (where appropriate) the runoff prior to discharge. The outfalls have been designed to mitigate erosion in the area of discharge, and the flows will not be increased.**

**Standard 2: Peak Rate Attenuation** – Stormwater management systems should be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates.

Please refer to Table 1.9.1 above. The stormwater management system reduces peak rates of runoff to below pre-development levels at all design points. All stormwater ultimately discharges to Wetland A (DP-1), and in all storms, the peak stormwater runoff to DP-1 is significantly reduced. This Standard has been met.

Standard 3: Recharge – Loss of annual recharge to groundwater shall be eliminated or minimized through the use of infiltration measures including environmentally sensitive site design, low impact development techniques, stormwater best management practices, and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from pre- development conditions based on soil type. This standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook.

The stormwater system includes two (2) infiltration BMP's: infiltration basins and subsurface infiltration chambers. The stormwater system has been designed to comply with the recharge requirements of the MA Stormwater Management Regulations meets the requirements for new construction. Refer to Section 4.0 for a summary of the stormwater recharge calculations.

Standard 4: Water Quality – Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS).

The project utilizes deep sump hooded catch basins, CDS Water Quality Units, subsurface infiltration systems, sediment forebays, and infiltration basins. Please refer to Section 4.4 for the TSS calculation spreadsheets.

Per the Town of Wayland Stormwater Management Bylaw, water quality volume for sizing of BMP's is based on 1-inch of runoff from the tributary area. Please refer to Section 4 of this report for Stormwater Management Calculations.

Standard 5: Land Uses with Higher Potential Pollutant Loads (LUHPPL) – For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable.

The proposed project is an automobile dealership and includes new and used vehicle sales, display and inventory storage and service. No exterior vehicle service or repair exterior equipment cleaning nor commercial vehicle washing are proposed. As such, the project is not a LUHPPL.

Standard 6: Critical Areas – Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply, and stormwater discharges near or to any other critical area, require the use of the specific source control and pollution prevention measures and the specific structural stormwater best management practices determined by the Department to be suitable for managing discharges to such areas, as provided in the Massachusetts Stormwater Handbook.

**The project is not located near a critical area, however, the project BMP's have been designed to treat stormwater as if they were discharging to a critical area.**

Standard 7: Redevelopment and Other Projects Subject to the Standards only to the maximum extent practicable – A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable: Standard 2, Standard 3, and the pretreatment and structural best management practice requirements of Standards 4, 5, and 6. Existing stormwater discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Stormwater Management Standards and improve existing conditions.

The existing site contains 76,513 SF (1.76 AC) of impervious area. The proposed site contains 93,128 SF (2.14 AC) of impervious area, which is an increase of 16,615 SF. The project is a renovation of a previously developed site. However, there is a slight increase in impervious area, the project is considered a mix of new construction and redevelopment. The bullet points below provide a summary of the project's compliance with Standards 2, 3, 4, 5, and 6 to the maximum extent practicable, and Standards 1, 8 ,9, 10 to the full extent.

- **Standard 1:** All new stormwater system conveyances are treated prior to discharge and result in no erosion occurring on site. The drainage system has been designed to direct stormwater runoff from impervious areas through various stormwater systems designed to capture, convey, treat, detain, recharge and infiltrate (where appropriate) the runoff prior to discharge. The outfalls are designed to prevent erosion and scour, and the peak rates of runoff will not be increased. Therefore, the project is in full compliance with this standard.
- **Standard 2:** The peak rate at all design points are reduced from the existing conditions using underground infiltration and detention chambers, infiltration basins and outlet control structures. The project is in full compliance with this standard.
- **Standard 3:** Please refer to Section 4 of the report. The existing impervious area within limit of work is 76,513 SF (1.76 acres) including pavement, buildings, compacted gravel parking and driveways. The total proposed impervious area within limit of work is 93,128 SF (2.14 Acres) including pavement and buildings. Therefore, there is an increase in impervious area of 16,615 SF (0.38 acres). Using

the underground infiltration chambers and the infiltration basins, the project is recharging all of impervious area and provides a recharge volume of 17,460 CF. Given the small increase in impervious area (16,632 SF), the required water quality volume to be provided is only 485 cubic feet, therefore the project provides significantly more recharge than is required by Standard 3.

- **Standard 4:** The Stormwater Management Systems have been designed to remove 80% or greater TSS post construction using various BMPS including deep sump hooded catch basins, oil/grit, CDS Water Quality Units, subsurface infiltration systems, sediment forebays, and infiltration basins. Please refer to Section 4.4 for the TSS calculation spreadsheets. The project is in full compliance with this standard.
- **Standard 5:** This standard is not applicable because the site is not considered a LUHPP as there is no exterior vehicle service or repair exterior equipment cleaning nor commercial vehicle washing are proposed.
- **Standard 6:** This standard is not applicable because the project is not located near a critical area, however, the project BMP's have been designed to treat stormwater as if the site were discharging to a critical area, treating the 1-inch WQV.
- **Standard 8:** An Erosion and Sedimentation Controls Plan has been incorporated into the Site Plans. The project is in full compliance with this standard.
- **Standard 9:** An Operation and Maintenance Plan has been provided in Section 5. The project is in full compliance with this standard.
- **Standard 10:** An Illicit Discharge Compliance Statement is included as required and is enclosed in Section 2.2. This will be provided prior to occupancy. The project is in full compliance with this standard.

Standard 8: Construction Period Pollution Prevention Plan and Erosion and Sedimentation Control – A plan to control construction-related impacts including erosion, sedimentation and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plan) shall be developed and implemented.

**An Erosion and Sedimentation Controls Plan has been incorporated into the Site Plans. A draft SWPPP is also enclosed in Section 8.**

Standard 9: Operation and Maintenance Plan – A long-term operation and maintenance plan shall be developed and implemented to ensure that stormwater management systems function as designed.

**An Operation and Maintenance Plan has been provided in Section 5 of this Report.**

Standard 10: Prohibition of Illicit Discharges – All illicit discharges to the stormwater management system are prohibited.

**An Illicit Discharge Compliance Statement is included as required and is enclosed in Section 2.2.**

#### **1.10 BEST MANAGEMENT PRACTICES (BMP'S)**

Various combinations of deep sump hooded catch basins, CDS water quality units, a constructed stormwater subsurface infiltration and detention systems, sediment forebays and infiltration basins will be used to treat stormwater runoff on the site. See Section 4 for stormwater management calculations.

#### **1.11 PIPE SIZING**

Refer to Section 7 for the Hydraulic Pipe Analysis/Sizing calculations, which utilizes the Hydraflow Storm Sewers Extension Pack through AutoCAD Civil 3D to analyze the pipe design and to select appropriate pipe sizing. Reports are included for the 10 and 100-year storms for pipe capacity analysis and sizing.

The tributary area for each inlet/subcatchment area has been computed along with pipe length, slope and friction coefficient. This approach was used to size the pipes such that the 10-year storm event is contained within the pipe. The 100-year storm was then checked to confirm the hydraulic grade line for the pipe network does not exceed the rim elevations of the drainage structures. In addition, pipe velocities were checked to be within the range of 2fps to 10 fps flowing 1/3 full. Those calculations are included in Section 7 herein.

#### **1.12 CONCLUSION**

In conclusion, the project has been designed in accordance with the requirements of the MA DEP's Stormwater Management Standards and in compliance with the Town of Wayland's Conservation Commission Wetland Regulations and Stormwater Management Bylaw.

#### **1.13 Figures**

FIG 1 ORTHOGRAPHIC MAP

FIG 2 FEMA FLOODPLAIN MAP

FIG 3 MASSDEP WETLANDS MAP

FIG 4 USGS MAP

FIG 5 NHESP HABITAT MAP

## **SECTION 2 – STORMWATER CHECKLIST**



# 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.<sup>1</sup> 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<sup>2</sup>
- 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.

<sup>1</sup> 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.

<sup>2</sup> 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.

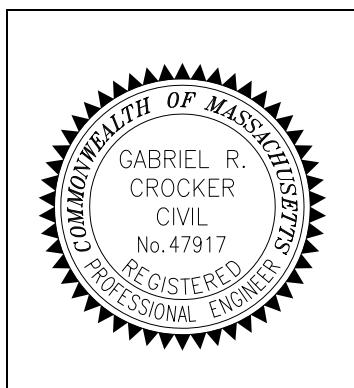
**Note:** Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that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



 1-12-2023

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

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## 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

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## 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<sup>1</sup>
- 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.

---

<sup>1</sup> 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.



# Checklist for Stormwater Report

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## 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

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## 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 proprietary 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

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## 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.

## **ILLICIT DISCHARGE COMPLIANCE STATEMENT**

### **Standard 10: Massachusetts Stormwater Standards Handbook**

Illicit discharges are defined as discharges into waters of the State or municipal separate stormwater system (MS4) that are not entirely comprised of stormwater. Exclusions for non-stormwater discharges into drainage systems include activities or facilities for firefighting, water line flushing, landscape irrigation, uncontaminated groundwater discharge, potable water sources, foundation drains, air conditioning condensation, footing drains, individual resident car washing, water used to clean residential buildings without detergents, water used for street washing, and flows from riparian habitats/wetlands. These exclusions are subject to change and are under the discretion of the local governing authority.

To the best of our knowledge and professional belief no illicit discharges to the stormwater system, surface waters, or wetland resource areas will remain on the site after construction. We will agree to implement a pollution prevention plan to prevent illicit discharges into the stormwater management system. The design of the site based on the plans associated with this report, prepared by Crocker Design Group, 2 Sharp Street, Unit B, Hingham, Massachusetts show a separation and no direct connection between the stormwater management systems and the wastewater and/ or groundwater on the site. To the maximum extent practicable, the design prevents entry of illicit discharges into the stormwater management system.

Engineer's Name: \_\_\_\_\_  
(please print)

Engineer's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Company: Crocker Design Group, LLC.

## **SECTION 3 – STORMATER HYDROLOGY MODEL**

# POINT OF DISCHARGE 1

PEAK DISCHARGE SUMMARY

---

0.5-INCH STORM = 0.03 cfs

1-INCH STORM = 0.78 cfs

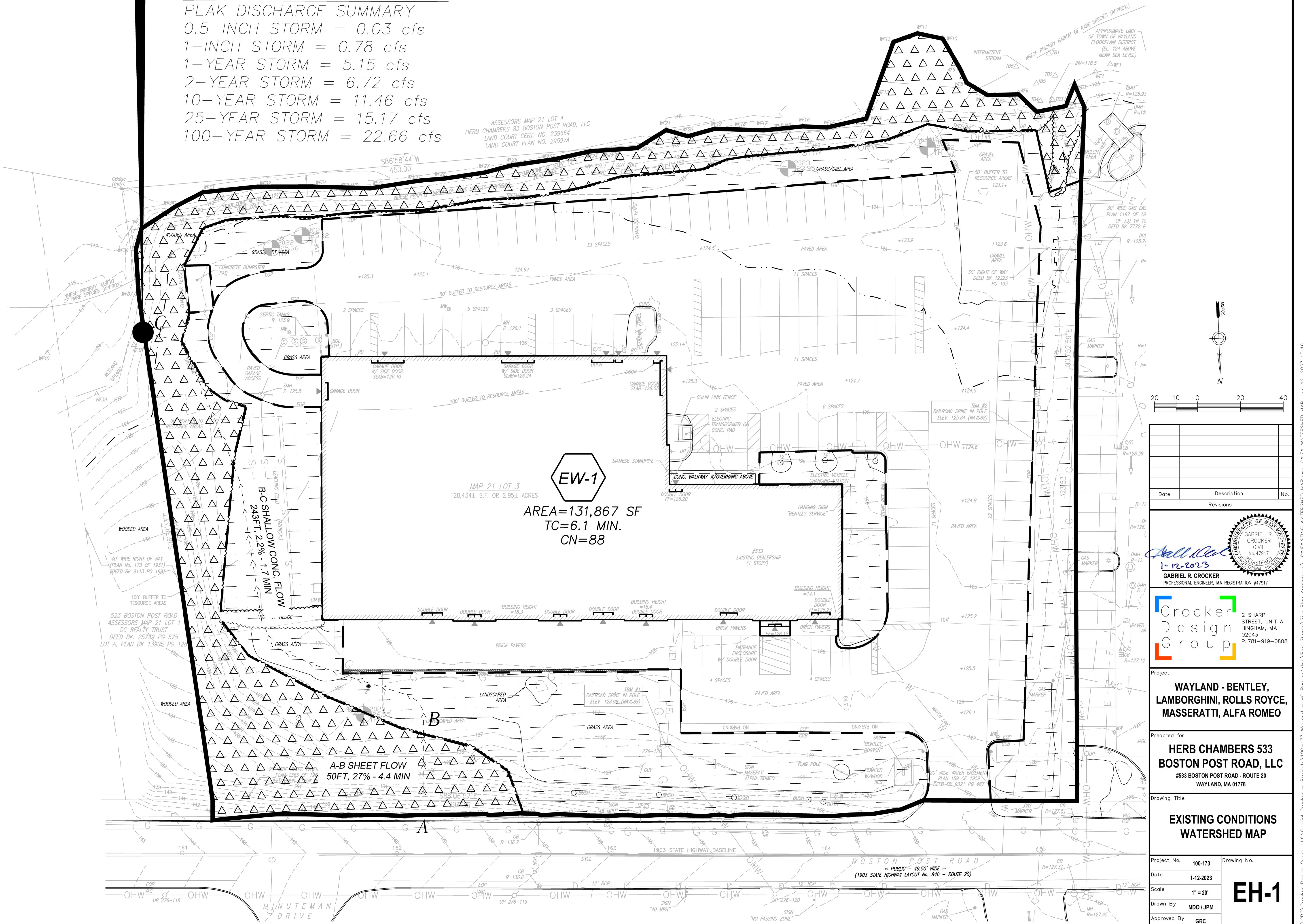
1-YEAR STORM = 5.15 cfs

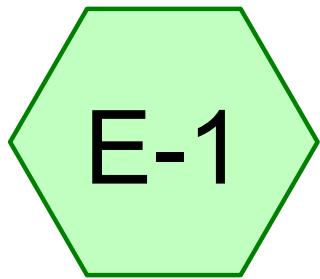
2-YEAR STORM = 6.72 cfs

10-YEAR STORM = 11.46 cfs

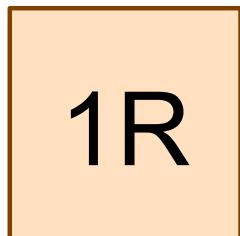
25-YEAR STORM = 15.17 cfs

100-YEAR STORM = 22.66 cfs

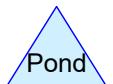




South to Bordering  
Vegetated Wetland



Bordering Vegetated  
Wetlands



Routing Diagram for Existing HydroCAD

Prepared by {enter your company name here}, Printed 1/12/2023  
HydroCAD® 10.00-26 s/n 01012 © 2020 HydroCAD Software Solutions LLC

## **Existing HydroCAD**

Prepared by {enter your company name here}  
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Page 2

## **Project Notes**

Rainfall events imported from "Proposed HydroCAD.hcp"

## Existing HydroCAD

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Page 3

### Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
32,809	74	>75% Grass cover, Good, HSG C (E-1)
2,698	96	Gravel surface, HSG B (E-1)
76,513	98	Paved parking, HSG C (E-1)
19,847	70	Woods, Good, HSG C (E-1)
<b>131,867</b>	<b>88</b>	<b>TOTAL AREA</b>

## Existing HydroCAD

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Page 4

### Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
2,698	HSG B	E-1
129,169	HSG C	E-1
0	HSG D	
0	Other	
<b>131,867</b>		<b>TOTAL AREA</b>

## Existing HydroCAD

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Page 5

### 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	Sub Num
0	0	32,809	0	0	32,809	>75% Grass cover, Good	
0	2,698	0	0	0	2,698	Gravel surface	
0	0	76,513	0	0	76,513	Paved parking	
0	0	19,847	0	0	19,847	Woods, Good	
<b>0</b>	<b>2,698</b>	<b>129,169</b>	<b>0</b>	<b>0</b>	<b>131,867</b>	<b>TOTAL AREA</b>	

**Existing HydroCAD**

Prepared by {enter your company name here}

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*Type III 24-hr .5" Storm Rainfall=0.50"*

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Page 6

---

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment E-1: South to Bordering**Runoff Area=131,867 sf 58.02% Impervious Runoff Depth>0.03"  
Flow Length=293' Tc=6.1 min CN=88 Runoff=0.03 cfs 295 cf**Reach 1R: Bordering Vegetated Wetlands**Inflow=0.03 cfs 295 cf  
Outflow=0.03 cfs 295 cf**Total Runoff Area = 131,867 sf Runoff Volume = 295 cf Average Runoff Depth = 0.03"**  
**41.98% Pervious = 55,354 sf 58.02% Impervious = 76,513 sf**

**Existing HydroCAD**

Prepared by {enter your company name here}

HydroCAD® 10.00-26 s/n 01012 © 2020 HydroCAD Software Solutions LLC

**Type III 24-hr .5" Storm Rainfall=0.50"**

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Page 7

**Summary for Subcatchment E-1: South to Bordering Vegetated Wetland**

Runoff = 0.03 cfs @ 12.37 hrs, Volume= 295 cf, Depth&gt; 0.03"

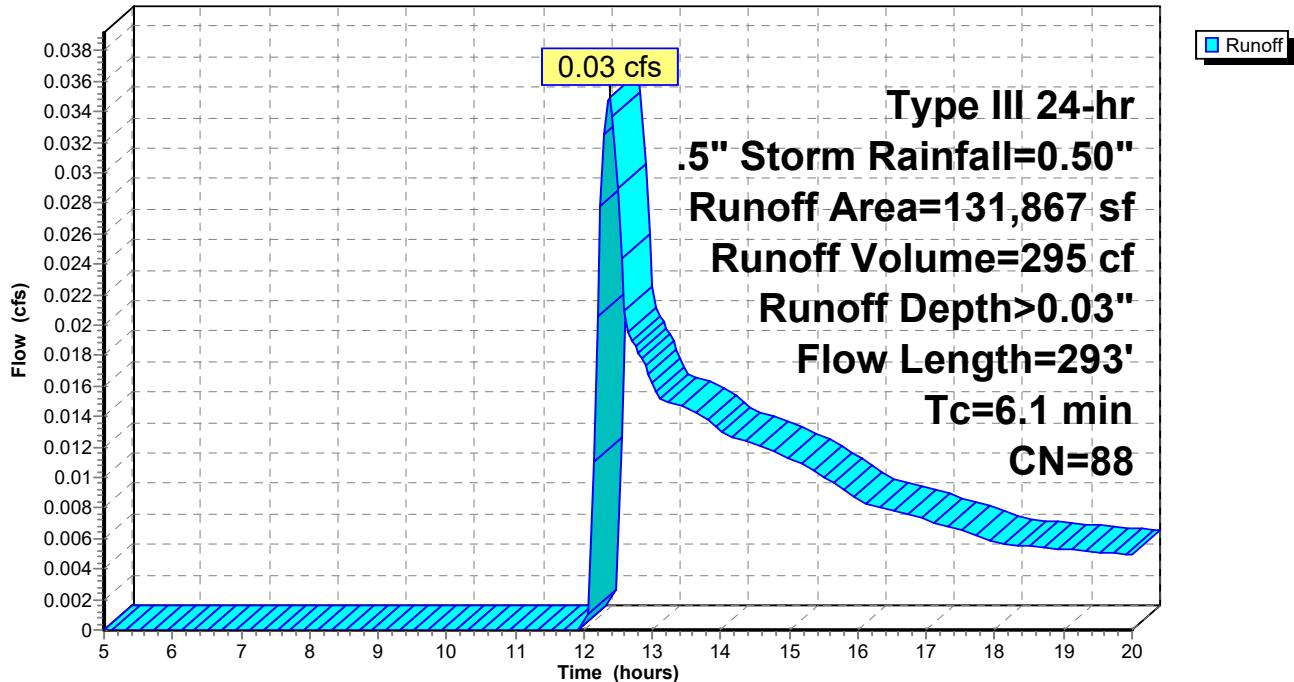
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr .5" Storm Rainfall=0.50"

Area (sf)	CN	Description
32,809	74	>75% Grass cover, Good, HSG C
76,513	98	Paved parking, HSG C
19,847	70	Woods, Good, HSG C
2,698	96	Gravel surface, HSG B
131,867	88	Weighted Average
55,354		41.98% Pervious Area
76,513		58.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.4	50	0.2700	0.19		<b>Sheet Flow, Sheet</b> Woods: Light underbrush n= 0.400 P2= 3.14"
1.7	243	0.0220	2.39		<b>Shallow Concentrated Flow, Shallow Concentrated</b> Unpaved Kv= 16.1 fps
6.1	293				Total

**Subcatchment E-1: South to Bordering Vegetated Wetland**

Hydrograph



**Hydrograph for Subcatchment E-1: South to Bordering Vegetated Wetland**

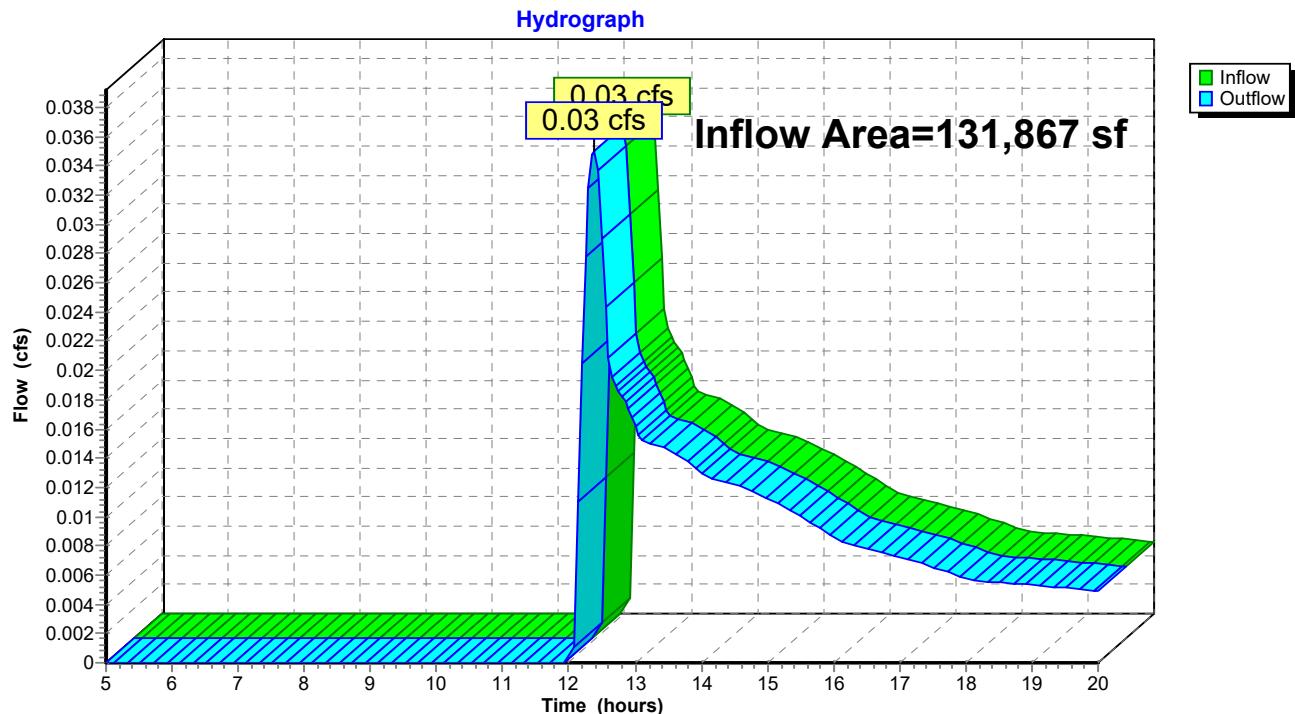
Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
5.00	0.03	0.00	0.00	18.25	0.47	0.02	0.01
5.25	0.03	0.00	0.00	18.50	0.47	0.02	0.01
5.50	0.03	0.00	0.00	18.75	0.47	0.02	0.01
5.75	0.03	0.00	0.00	19.00	0.47	0.03	0.01
6.00	0.04	0.00	0.00	19.25	0.47	0.03	0.01
6.25	0.04	0.00	0.00	19.50	0.48	0.03	0.01
6.50	0.04	0.00	0.00	19.75	0.48	0.03	0.01
6.75	0.04	0.00	0.00	20.00	<b>0.48</b>	<b>0.03</b>	0.00
7.00	0.05	0.00	0.00				
7.25	0.05	0.00	0.00				
7.50	0.05	0.00	0.00				
7.75	0.05	0.00	0.00				
8.00	0.06	0.00	0.00				
8.25	0.06	0.00	0.00				
8.50	0.06	0.00	0.00				
8.75	0.07	0.00	0.00				
9.00	0.07	0.00	0.00				
9.25	0.08	0.00	0.00				
9.50	0.08	0.00	0.00				
9.75	0.09	0.00	0.00				
10.00	0.09	0.00	0.00				
10.25	0.10	0.00	0.00				
10.50	0.11	0.00	0.00				
10.75	0.12	0.00	0.00				
11.00	0.13	0.00	0.00				
11.25	0.14	0.00	0.00				
11.50	0.15	0.00	0.00				
11.75	0.18	0.00	0.00				
12.00	0.25	0.00	0.00				
12.25	0.32	0.00	<b>0.03</b>				
12.50	0.35	0.00	<b>0.03</b>				
12.75	0.36	0.01	0.02				
13.00	0.37	0.01	0.02				
13.25	0.38	0.01	0.01				
13.50	0.39	0.01	0.01				
13.75	0.40	0.01	0.01				
14.00	0.41	0.01	0.01				
14.25	0.41	0.01	0.01				
14.50	0.42	0.01	0.01				
14.75	0.42	0.01	0.01				
15.00	0.43	0.02	0.01				
15.25	0.43	0.02	0.01				
15.50	0.44	0.02	0.01				
15.75	0.44	0.02	0.01				
16.00	0.44	0.02	0.01				
16.25	0.45	0.02	0.01				
16.50	0.45	0.02	0.01				
16.75	0.45	0.02	0.01				
17.00	0.45	0.02	0.01				
17.25	0.46	0.02	0.01				
17.50	0.46	0.02	0.01				
17.75	0.46	0.02	0.01				
18.00	0.46	0.02	0.01				

**Summary for Reach 1R: Bordering Vegetated Wetlands**

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

Inflow Area = 131,867 sf, 58.02% Impervious, Inflow Depth > 0.03" for .5" Storm event  
Inflow = 0.03 cfs @ 12.37 hrs, Volume= 295 cf  
Outflow = 0.03 cfs @ 12.37 hrs, Volume= 295 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

**Reach 1R: Bordering Vegetated Wetlands**

**Hydrograph for Reach 1R: Bordering Vegetated Wetlands**

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
5.00	0.00	0.00		18.25	0.01	0.01	
5.25	0.00	0.00		18.50	0.01	0.01	
5.50	0.00	0.00		18.75	0.01	0.01	
5.75	0.00	0.00		19.00	0.01	0.01	
6.00	0.00	0.00		19.25	0.01	0.01	
6.25	0.00	0.00		19.50	0.01	0.01	
6.50	0.00	0.00		19.75	0.01	0.01	
6.75	0.00	0.00		20.00	0.00	0.00	
7.00	0.00	0.00					
7.25	0.00	0.00					
7.50	0.00	0.00					
7.75	0.00	0.00					
8.00	0.00	0.00					
8.25	0.00	0.00					
8.50	0.00	0.00					
8.75	0.00	0.00					
9.00	0.00	0.00					
9.25	0.00	0.00					
9.50	0.00	0.00					
9.75	0.00	0.00					
10.00	0.00	0.00					
10.25	0.00	0.00					
10.50	0.00	0.00					
10.75	0.00	0.00					
11.00	0.00	0.00					
11.25	0.00	0.00					
11.50	0.00	0.00					
11.75	0.00	0.00					
12.00	0.00	0.00					
12.25	<b>0.03</b>	<b>0.03</b>					
12.50	<b>0.03</b>	<b>0.03</b>					
12.75	0.02	0.02					
13.00	0.02	0.02					
13.25	0.01	0.01					
13.50	0.01	0.01					
13.75	0.01	0.01					
14.00	0.01	0.01					
14.25	0.01	0.01					
14.50	0.01	0.01					
14.75	0.01	0.01					
15.00	0.01	0.01					
15.25	0.01	0.01					
15.50	0.01	0.01					
15.75	0.01	0.01					
16.00	0.01	0.01					
16.25	0.01	0.01					
16.50	0.01	0.01					
16.75	0.01	0.01					
17.00	0.01	0.01					
17.25	0.01	0.01					
17.50	0.01	0.01					
17.75	0.01	0.01					
18.00	0.01	0.01					

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*Type III 24-hr 1" Storm Rainfall=1.00"*

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment E-1: South to Bordering**Runoff Area=131,867 sf 58.02% Impervious Runoff Depth>0.23"  
Flow Length=293' Tc=6.1 min CN=88 Runoff=0.78 cfs 2,507 cf**Reach 1R: Bordering Vegetated Wetlands**Inflow=0.78 cfs 2,507 cf  
Outflow=0.78 cfs 2,507 cf**Total Runoff Area = 131,867 sf Runoff Volume = 2,507 cf Average Runoff Depth = 0.23"**  
**41.98% Pervious = 55,354 sf 58.02% Impervious = 76,513 sf**

### Summary for Subcatchment E-1: South to Bordering Vegetated Wetland

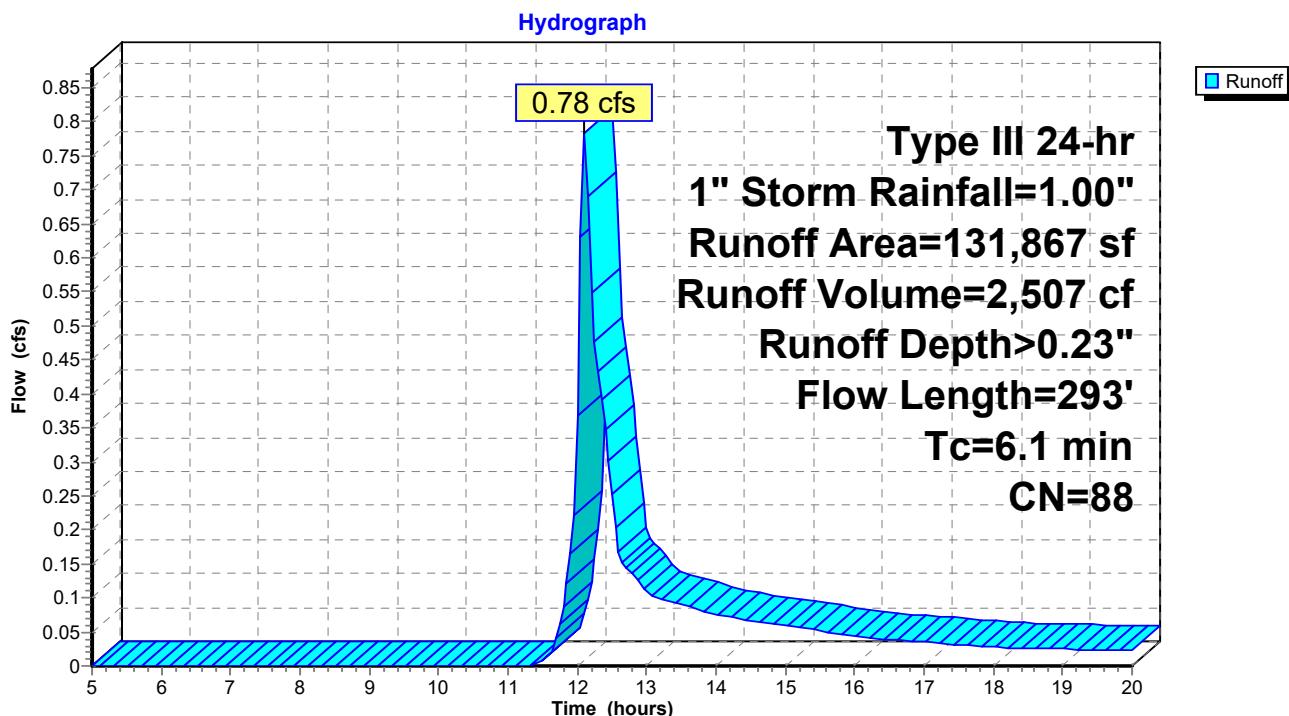
Runoff = 0.78 cfs @ 12.11 hrs, Volume= 2,507 cf, Depth> 0.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 1" Storm Rainfall=1.00"

Area (sf)	CN	Description
32,809	74	>75% Grass cover, Good, HSG C
76,513	98	Paved parking, HSG C
19,847	70	Woods, Good, HSG C
2,698	96	Gravel surface, HSG B
131,867	88	Weighted Average
55,354		41.98% Pervious Area
76,513		58.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.4	50	0.2700	0.19		<b>Sheet Flow, Sheet</b> Woods: Light underbrush n= 0.400 P2= 3.14"
1.7	243	0.0220	2.39		<b>Shallow Concentrated Flow, Shallow Concentrated</b> Unpaved Kv= 16.1 fps
6.1	293			Total	

### Subcatchment E-1: South to Bordering Vegetated Wetland



**Hydrograph for Subcatchment E-1: South to Bordering Vegetated Wetland**

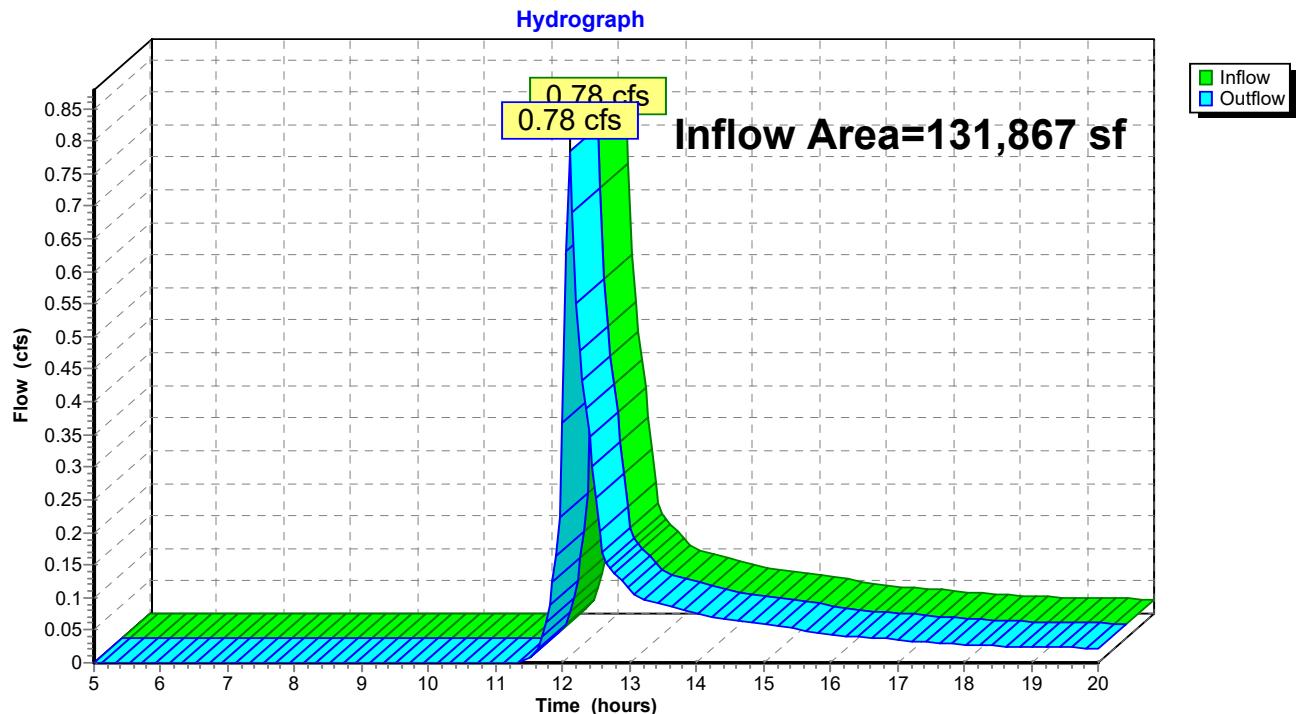
Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
5.00	0.06	0.00	0.00	18.25	0.93	0.21	0.03
5.25	0.06	0.00	0.00	18.50	0.94	0.22	0.03
5.50	0.06	0.00	0.00	18.75	0.94	0.22	0.03
5.75	0.07	0.00	0.00	19.00	0.94	0.22	0.02
6.00	0.07	0.00	0.00	19.25	0.95	0.22	0.02
6.25	0.08	0.00	0.00	19.50	0.95	0.22	0.02
6.50	0.08	0.00	0.00	19.75	0.95	0.23	0.02
6.75	0.09	0.00	0.00	20.00	<b>0.96</b>	<b>0.23</b>	0.02
7.00	0.09	0.00	0.00				
7.25	0.10	0.00	0.00				
7.50	0.10	0.00	0.00				
7.75	0.11	0.00	0.00				
8.00	0.11	0.00	0.00				
8.25	0.12	0.00	0.00				
8.50	0.13	0.00	0.00				
8.75	0.14	0.00	0.00				
9.00	0.15	0.00	0.00				
9.25	0.16	0.00	0.00				
9.50	0.17	0.00	0.00				
9.75	0.18	0.00	0.00				
10.00	0.19	0.00	0.00				
10.25	0.20	0.00	0.00				
10.50	0.22	0.00	0.00				
10.75	0.23	0.00	0.00				
11.00	0.25	0.00	0.00				
11.25	0.27	0.00	0.00				
11.50	0.30	0.00	0.01				
11.75	0.36	0.00	0.06				
12.00	0.50	0.03	<b>0.37</b>				
12.25	0.64	0.08	<b>0.48</b>				
12.50	0.70	0.10	0.25				
12.75	0.73	0.11	0.14				
13.00	0.75	0.12	0.11				
13.25	0.77	0.13	0.10				
13.50	0.78	0.14	0.09				
13.75	0.80	0.15	0.08				
14.00	0.81	0.15	0.08				
14.25	0.82	0.16	0.07				
14.50	0.83	0.16	0.07				
14.75	0.84	0.17	0.06				
15.00	0.85	0.17	0.06				
15.25	0.86	0.18	0.06				
15.50	0.87	0.18	0.05				
15.75	0.88	0.19	0.05				
16.00	0.89	0.19	0.04				
16.25	0.89	0.19	0.04				
16.50	0.90	0.20	0.04				
16.75	0.90	0.20	0.04				
17.00	0.91	0.20	0.04				
17.25	0.91	0.21	0.03				
17.50	0.92	0.21	0.03				
17.75	0.92	0.21	0.03				
18.00	0.93	0.21	0.03				

**Summary for Reach 1R: Bordering Vegetated Wetlands**

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

Inflow Area = 131,867 sf, 58.02% Impervious, Inflow Depth > 0.23" for 1" Storm event  
Inflow = 0.78 cfs @ 12.11 hrs, Volume= 2,507 cf  
Outflow = 0.78 cfs @ 12.11 hrs, Volume= 2,507 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

**Reach 1R: Bordering Vegetated Wetlands**

**Hydrograph for Reach 1R: Bordering Vegetated Wetlands**

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
5.00	0.00	0.00		18.25	0.03	0.03	
5.25	0.00	0.00		18.50	0.03	0.03	
5.50	0.00	0.00		18.75	0.03	0.03	
5.75	0.00	0.00		19.00	0.02	0.02	
6.00	0.00	0.00		19.25	0.02	0.02	
6.25	0.00	0.00		19.50	0.02	0.02	
6.50	0.00	0.00		19.75	0.02	0.02	
6.75	0.00	0.00		20.00	0.02	0.02	
7.00	0.00	0.00					
7.25	0.00	0.00					
7.50	0.00	0.00					
7.75	0.00	0.00					
8.00	0.00	0.00					
8.25	0.00	0.00					
8.50	0.00	0.00					
8.75	0.00	0.00					
9.00	0.00	0.00					
9.25	0.00	0.00					
9.50	0.00	0.00					
9.75	0.00	0.00					
10.00	0.00	0.00					
10.25	0.00	0.00					
10.50	0.00	0.00					
10.75	0.00	0.00					
11.00	0.00	0.00					
11.25	0.00	0.00					
11.50	0.01	0.01					
11.75	0.06	0.06					
12.00	<b>0.37</b>	<b>0.37</b>					
12.25	<b>0.48</b>	<b>0.48</b>					
12.50	0.25	0.25					
12.75	0.14	0.14					
13.00	0.11	0.11					
13.25	0.10	0.10					
13.50	0.09	0.09					
13.75	0.08	0.08					
14.00	0.08	0.08					
14.25	0.07	0.07					
14.50	0.07	0.07					
14.75	0.06	0.06					
15.00	0.06	0.06					
15.25	0.06	0.06					
15.50	0.05	0.05					
15.75	0.05	0.05					
16.00	0.04	0.04					
16.25	0.04	0.04					
16.50	0.04	0.04					
16.75	0.04	0.04					
17.00	0.04	0.04					
17.25	0.03	0.03					
17.50	0.03	0.03					
17.75	0.03	0.03					
18.00	0.03	0.03					

**Existing HydroCAD**

Prepared by {enter your company name here}

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*Type III 24-hr 1-YR Rainfall=2.62"*

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment E-1: South to Bordering** Runoff Area=131,867 sf 58.02% Impervious Runoff Depth>1.39"  
Flow Length=293' Tc=6.1 min CN=88 Runoff=5.15 cfs 15,228 cf

**Reach 1R: Bordering Vegetated Wetlands** Inflow=5.15 cfs 15,228 cf  
Outflow=5.15 cfs 15,228 cf

**Total Runoff Area = 131,867 sf Runoff Volume = 15,228 cf Average Runoff Depth = 1.39"**  
**41.98% Pervious = 55,354 sf 58.02% Impervious = 76,513 sf**

## Summary for Subcatchment E-1: South to Bordering Vegetated Wetland

Runoff = 5.15 cfs @ 12.09 hrs, Volume= 15,228 cf, Depth> 1.39"

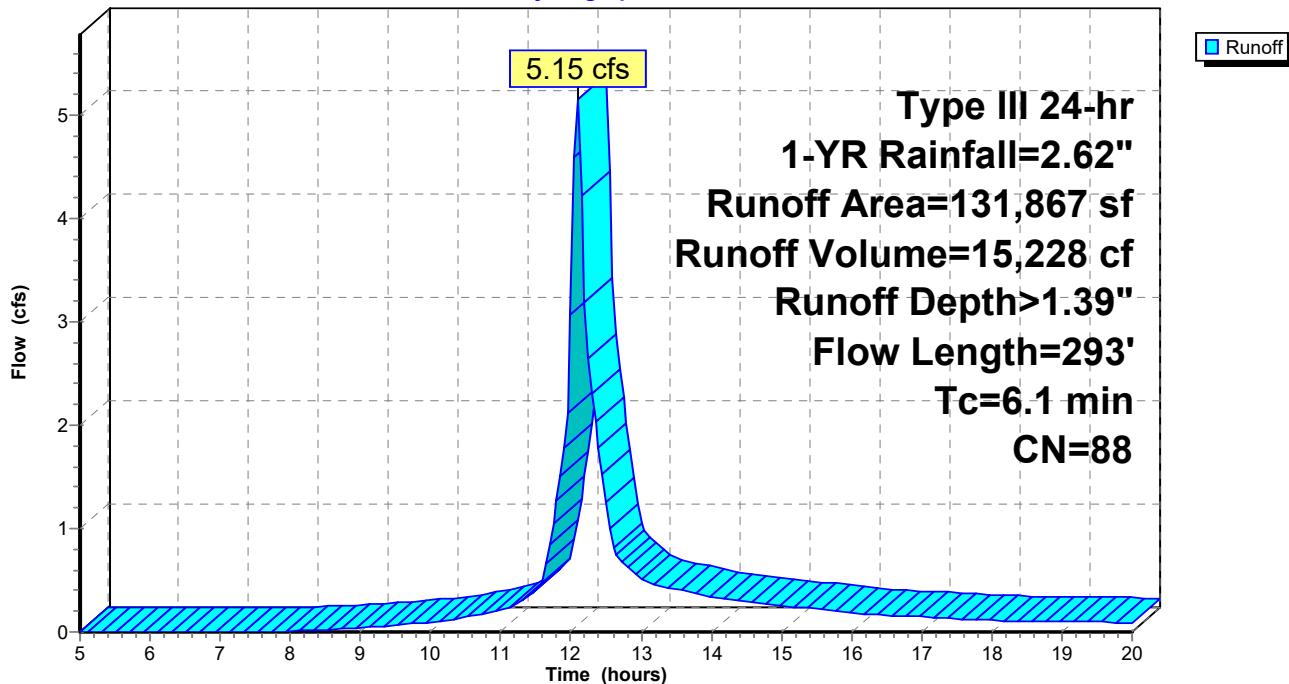
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 1-YR Rainfall=2.62"

Area (sf)	CN	Description
32,809	74	>75% Grass cover, Good, HSG C
76,513	98	Paved parking, HSG C
19,847	70	Woods, Good, HSG C
2,698	96	Gravel surface, HSG B
131,867	88	Weighted Average
55,354		41.98% Pervious Area
76,513		58.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.4	50	0.2700	0.19		<b>Sheet Flow, Sheet</b> Woods: Light underbrush n= 0.400 P2= 3.14"
1.7	243	0.0220	2.39		<b>Shallow Concentrated Flow, Shallow Concentrated</b> Unpaved Kv= 16.1 fps
6.1	293			Total	

## Subcatchment E-1: South to Bordering Vegetated Wetland

**Hydrograph**



**Hydrograph for Subcatchment E-1: South to Bordering Vegetated Wetland**

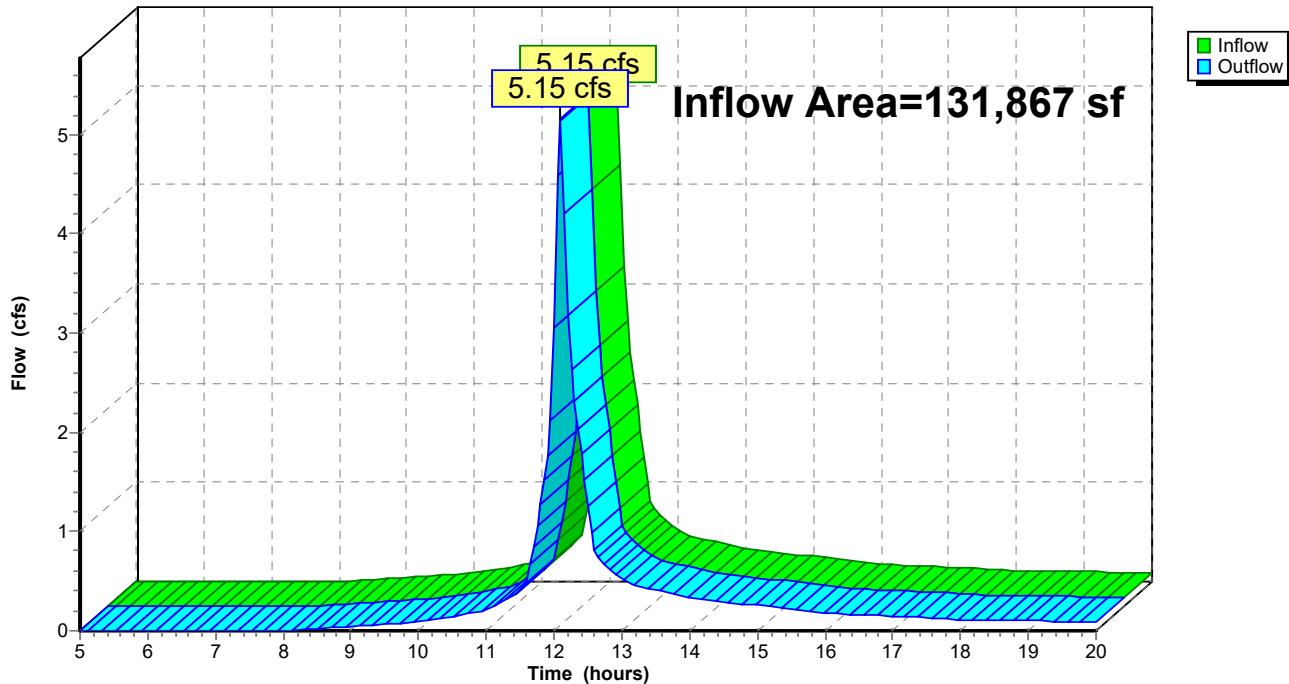
Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
5.00	0.15	0.00	0.00	18.25	2.44	1.33	0.11
5.25	0.16	0.00	0.00	18.50	2.45	1.34	0.10
5.50	0.17	0.00	0.00	18.75	2.46	1.35	0.10
5.75	0.18	0.00	0.00	19.00	2.47	1.36	0.10
6.00	0.19	0.00	0.00	19.25	2.48	1.36	0.10
6.25	0.20	0.00	0.00	19.50	2.49	1.37	0.09
6.50	0.21	0.00	0.00	19.75	2.50	1.38	0.09
6.75	0.22	0.00	0.00	20.00	<b>2.51</b>	<b>1.39</b>	0.09
7.00	0.24	0.00	0.00				
7.25	0.25	0.00	0.00				
7.50	0.27	0.00	0.00				
7.75	0.28	0.00	0.00				
8.00	0.30	0.00	0.01				
8.25	0.32	0.00	0.01				
8.50	0.34	0.00	0.02				
8.75	0.36	0.01	0.03				
9.00	0.38	0.01	0.04				
9.25	0.41	0.01	0.05				
9.50	0.43	0.02	0.06				
9.75	0.46	0.02	0.08				
10.00	0.50	0.03	0.10				
10.25	0.53	0.04	0.12				
10.50	0.57	0.05	0.15				
10.75	0.61	0.07	0.18				
11.00	0.65	0.08	0.21				
11.25	0.71	0.11	0.29				
11.50	0.78	0.14	0.40				
11.75	0.93	0.21	1.05				
12.00	1.31	0.45	<b>3.06</b>				
12.25	1.69	0.72	<b>2.64</b>				
12.50	1.84	0.84	1.25				
12.75	1.91	0.89	0.66				
13.00	1.96	0.94	0.52				
13.25	2.01	0.97	0.45				
13.50	2.05	1.01	0.41				
13.75	2.09	1.04	0.37				
14.00	2.12	1.07	0.34				
14.25	2.16	1.09	0.31				
14.50	2.19	1.12	0.29				
14.75	2.21	1.14	0.27				
15.00	2.24	1.16	0.26				
15.25	2.26	1.18	0.24				
15.50	2.28	1.20	0.22				
15.75	2.30	1.21	0.20				
16.00	2.32	1.23	0.18				
16.25	2.34	1.24	0.17				
16.50	2.35	1.26	0.16				
16.75	2.37	1.27	0.15				
17.00	2.38	1.28	0.15				
17.25	2.40	1.29	0.14				
17.50	2.41	1.30	0.13				
17.75	2.42	1.31	0.12				
18.00	2.43	1.32	0.11				

**Summary for Reach 1R: Bordering Vegetated Wetlands**

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

Inflow Area = 131,867 sf, 58.02% Impervious, Inflow Depth > 1.39" for 1-YR event  
Inflow = 5.15 cfs @ 12.09 hrs, Volume= 15,228 cf  
Outflow = 5.15 cfs @ 12.09 hrs, Volume= 15,228 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

**Reach 1R: Bordering Vegetated Wetlands****Hydrograph**

**Hydrograph for Reach 1R: Bordering Vegetated Wetlands**

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
5.00	0.00	0.00		18.25	0.11	0.11	
5.25	0.00	0.00		18.50	0.10	0.10	
5.50	0.00	0.00		18.75	0.10	0.10	
5.75	0.00	0.00		19.00	0.10	0.10	
6.00	0.00	0.00		19.25	0.10	0.10	
6.25	0.00	0.00		19.50	0.09	0.09	
6.50	0.00	0.00		19.75	0.09	0.09	
6.75	0.00	0.00		20.00	0.09	0.09	
7.00	0.00	0.00					
7.25	0.00	0.00					
7.50	0.00	0.00					
7.75	0.00	0.00					
8.00	0.01	0.01					
8.25	0.01	0.01					
8.50	0.02	0.02					
8.75	0.03	0.03					
9.00	0.04	0.04					
9.25	0.05	0.05					
9.50	0.06	0.06					
9.75	0.08	0.08					
10.00	0.10	0.10					
10.25	0.12	0.12					
10.50	0.15	0.15					
10.75	0.18	0.18					
11.00	0.21	0.21					
11.25	0.29	0.29					
11.50	0.40	0.40					
11.75	1.05	1.05					
12.00	<b>3.06</b>	<b>3.06</b>					
12.25	<b>2.64</b>	<b>2.64</b>					
12.50	1.25	1.25					
12.75	0.66	0.66					
13.00	0.52	0.52					
13.25	0.45	0.45					
13.50	0.41	0.41					
13.75	0.37	0.37					
14.00	0.34	0.34					
14.25	0.31	0.31					
14.50	0.29	0.29					
14.75	0.27	0.27					
15.00	0.26	0.26					
15.25	0.24	0.24					
15.50	0.22	0.22					
15.75	0.20	0.20					
16.00	0.18	0.18					
16.25	0.17	0.17					
16.50	0.16	0.16					
16.75	0.15	0.15					
17.00	0.15	0.15					
17.25	0.14	0.14					
17.50	0.13	0.13					
17.75	0.12	0.12					
18.00	0.11	0.11					

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*Type III 24-hr 2-YR Rainfall=3.14"*

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment E-1: South to Bordering**

Runoff Area=131,867 sf 58.02% Impervious Runoff Depth&gt;1.82"

Flow Length=293' Tc=6.1 min CN=88 Runoff=6.72 cfs 20,001 cf

**Reach 1R: Bordering Vegetated Wetlands**

Inflow=6.72 cfs 20,001 cf

Outflow=6.72 cfs 20,001 cf

**Total Runoff Area = 131,867 sf Runoff Volume = 20,001 cf Average Runoff Depth = 1.82"**  
**41.98% Pervious = 55,354 sf 58.02% Impervious = 76,513 sf**

**Existing HydroCAD**

Prepared by {enter your company name here}

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Type III 24-hr 2-YR Rainfall=3.14"

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**Summary for Subcatchment E-1: South to Bordering Vegetated Wetland**

Runoff = 6.72 cfs @ 12.09 hrs, Volume= 20,001 cf, Depth&gt; 1.82"

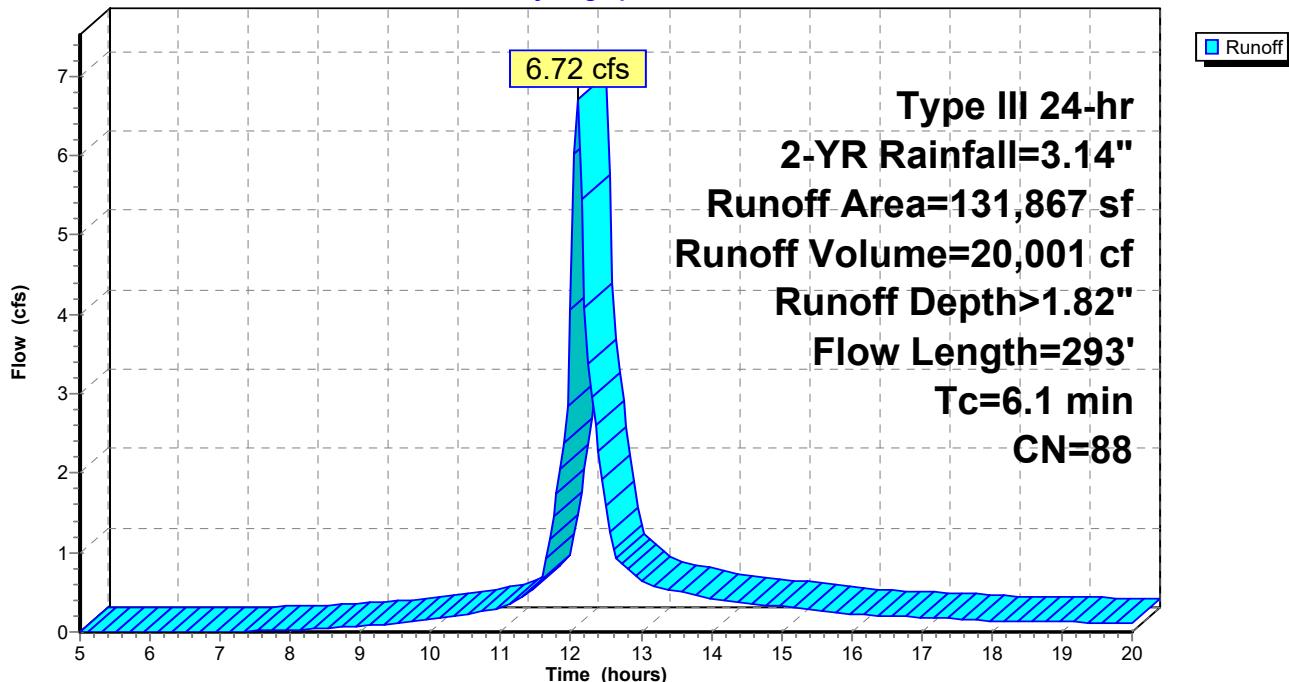
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2-YR Rainfall=3.14"

Area (sf)	CN	Description
32,809	74	>75% Grass cover, Good, HSG C
76,513	98	Paved parking, HSG C
19,847	70	Woods, Good, HSG C
2,698	96	Gravel surface, HSG B
131,867	88	Weighted Average
55,354		41.98% Pervious Area
76,513		58.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.4	50	0.2700	0.19		<b>Sheet Flow, Sheet</b> Woods: Light underbrush n= 0.400 P2= 3.14"
1.7	243	0.0220	2.39		<b>Shallow Concentrated Flow, Shallow Concentrated</b> Unpaved Kv= 16.1 fps
6.1	293			Total	

**Subcatchment E-1: South to Bordering Vegetated Wetland**

Hydrograph



**Hydrograph for Subcatchment E-1: South to Bordering Vegetated Wetland**

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
5.00	0.18	0.00	0.00	18.25	2.93	1.75	0.13
5.25	0.19	0.00	0.00	18.50	2.94	1.76	0.13
5.50	0.20	0.00	0.00	18.75	2.95	1.77	0.13
5.75	0.21	0.00	0.00	19.00	2.96	1.78	0.12
6.00	0.23	0.00	0.00	19.25	2.97	1.79	0.12
6.25	0.24	0.00	0.00	19.50	2.98	1.80	0.12
6.50	0.25	0.00	0.00	19.75	2.99	1.81	0.12
6.75	0.27	0.00	0.00	20.00	<b>3.00</b>	<b>1.82</b>	0.11
7.00	0.28	0.00	0.00				
7.25	0.30	0.00	0.01				
7.50	0.32	0.00	0.01				
7.75	0.34	0.00	0.02				
8.00	0.36	0.01	0.03				
8.25	0.38	0.01	0.03				
8.50	0.40	0.01	0.05				
8.75	0.43	0.02	0.06				
9.00	0.46	0.02	0.07				
9.25	0.49	0.03	0.09				
9.50	0.52	0.04	0.11				
9.75	0.56	0.05	0.13				
10.00	0.59	0.06	0.15				
10.25	0.63	0.08	0.18				
10.50	0.68	0.09	0.22				
10.75	0.73	0.11	0.27				
11.00	0.79	0.14	0.31				
11.25	0.85	0.17	0.41				
11.50	0.94	0.22	0.56				
11.75	1.12	0.32	1.45				
12.00	1.57	0.63	<b>4.05</b>				
12.25	2.02	0.99	<b>3.39</b>				
12.50	2.20	1.13	1.59				
12.75	2.29	1.20	0.84				
13.00	2.35	1.26	0.66				
13.25	2.41	1.30	0.56				
13.50	2.46	1.35	0.52				
13.75	2.51	1.39	0.47				
14.00	2.55	1.42	0.42				
14.25	2.58	1.45	0.39				
14.50	2.62	1.48	0.37				
14.75	2.65	1.51	0.34				
15.00	2.68	1.54	0.32				
15.25	2.71	1.56	0.30				
15.50	2.74	1.59	0.27				
15.75	2.76	1.61	0.25				
16.00	2.78	1.63	0.23				
16.25	2.80	1.64	0.21				
16.50	2.82	1.66	0.20				
16.75	2.84	1.68	0.19				
17.00	2.86	1.69	0.18				
17.25	2.87	1.70	0.17				
17.50	2.89	1.72	0.16				
17.75	2.90	1.73	0.15				
18.00	2.91	1.74	0.14				

### Summary for Reach 1R: Bordering Vegetated Wetlands

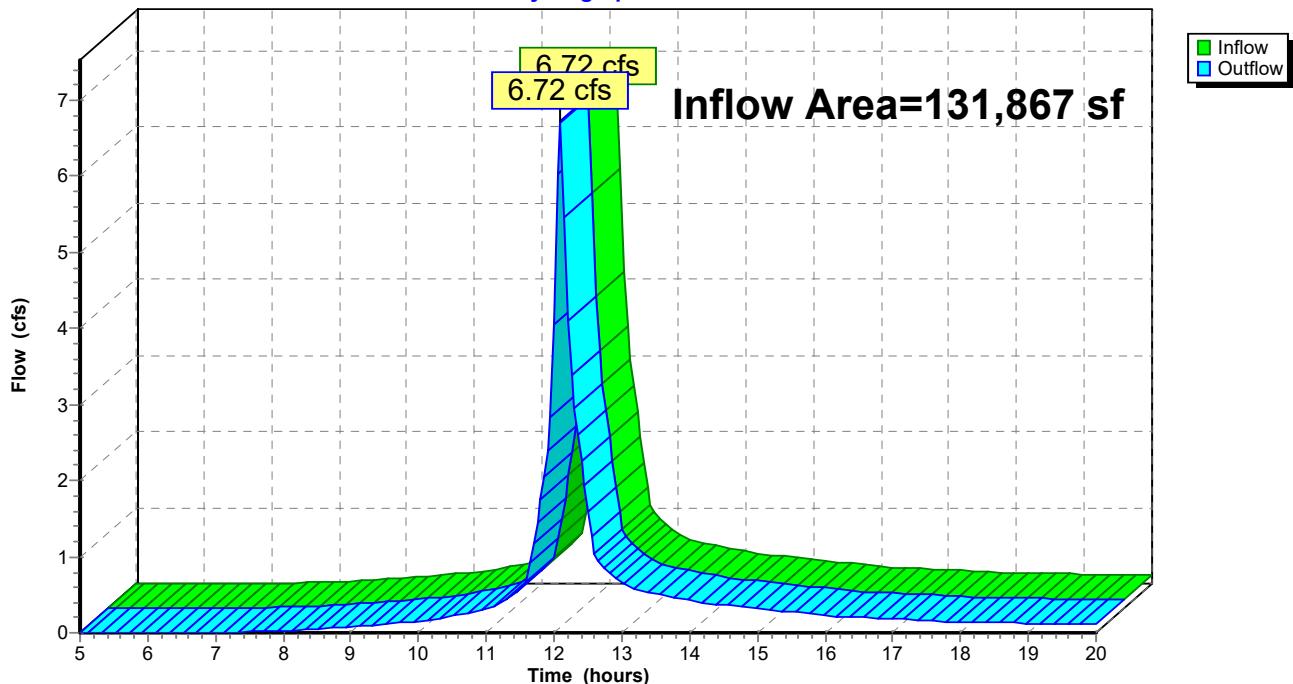
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 131,867 sf, 58.02% Impervious, Inflow Depth > 1.82" for 2-YR event  
Inflow = 6.72 cfs @ 12.09 hrs, Volume= 20,001 cf  
Outflow = 6.72 cfs @ 12.09 hrs, Volume= 20,001 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

### Reach 1R: Bordering Vegetated Wetlands

Hydrograph



**Hydrograph for Reach 1R: Bordering Vegetated Wetlands**

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
5.00	0.00	0.00		18.25	0.13	0.13	
5.25	0.00	0.00		18.50	0.13	0.13	
5.50	0.00	0.00		18.75	0.13	0.13	
5.75	0.00	0.00		19.00	0.12	0.12	
6.00	0.00	0.00		19.25	0.12	0.12	
6.25	0.00	0.00		19.50	0.12	0.12	
6.50	0.00	0.00		19.75	0.12	0.12	
6.75	0.00	0.00		20.00	0.11	0.11	
7.00	0.00	0.00					
7.25	0.01	0.01					
7.50	0.01	0.01					
7.75	0.02	0.02					
8.00	0.03	0.03					
8.25	0.03	0.03					
8.50	0.05	0.05					
8.75	0.06	0.06					
9.00	0.07	0.07					
9.25	0.09	0.09					
9.50	0.11	0.11					
9.75	0.13	0.13					
10.00	0.15	0.15					
10.25	0.18	0.18					
10.50	0.22	0.22					
10.75	0.27	0.27					
11.00	0.31	0.31					
11.25	0.41	0.41					
11.50	0.56	0.56					
11.75	1.45	1.45					
12.00	<b>4.05</b>	<b>4.05</b>					
12.25	<b>3.39</b>	<b>3.39</b>					
12.50	1.59	1.59					
12.75	0.84	0.84					
13.00	0.66	0.66					
13.25	0.56	0.56					
13.50	0.52	0.52					
13.75	0.47	0.47					
14.00	0.42	0.42					
14.25	0.39	0.39					
14.50	0.37	0.37					
14.75	0.34	0.34					
15.00	0.32	0.32					
15.25	0.30	0.30					
15.50	0.27	0.27					
15.75	0.25	0.25					
16.00	0.23	0.23					
16.25	0.21	0.21					
16.50	0.20	0.20					
16.75	0.19	0.19					
17.00	0.18	0.18					
17.25	0.17	0.17					
17.50	0.16	0.16					
17.75	0.15	0.15					
18.00	0.14	0.14					

**Existing HydroCAD**

Prepared by {enter your company name here}

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*Type III 24-hr 10-YR Rainfall=4.69"*

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment E-1: South to Bordering** Runoff Area=131,867 sf 58.02% Impervious Runoff Depth>3.18"  
Flow Length=293' Tc=6.1 min CN=88 Runoff=11.46 cfs 34,959 cf

**Reach 1R: Bordering Vegetated Wetlands**Inflow=11.46 cfs 34,959 cf  
Outflow=11.46 cfs 34,959 cf

**Total Runoff Area = 131,867 sf Runoff Volume = 34,959 cf Average Runoff Depth = 3.18"**  
**41.98% Pervious = 55,354 sf 58.02% Impervious = 76,513 sf**

## Summary for Subcatchment E-1: South to Bordering Vegetated Wetland

Runoff = 11.46 cfs @ 12.09 hrs, Volume= 34,959 cf, Depth> 3.18"

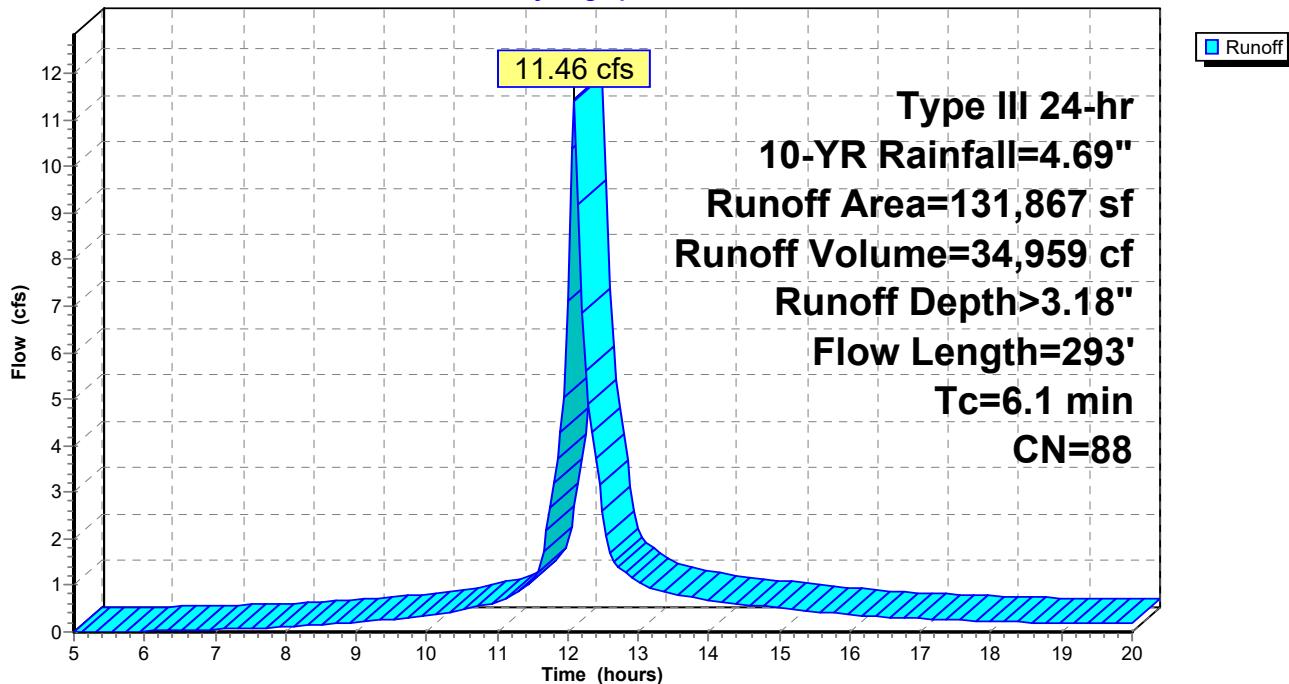
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 10-YR Rainfall=4.69"

Area (sf)	CN	Description
32,809	74	>75% Grass cover, Good, HSG C
76,513	98	Paved parking, HSG C
19,847	70	Woods, Good, HSG C
2,698	96	Gravel surface, HSG B
131,867	88	Weighted Average
55,354		41.98% Pervious Area
76,513		58.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.4	50	0.2700	0.19		<b>Sheet Flow, Sheet</b> Woods: Light underbrush n= 0.400 P2= 3.14"
1.7	243	0.0220	2.39		<b>Shallow Concentrated Flow, Shallow Concentrated</b> Unpaved Kv= 16.1 fps
6.1	293			Total	

## Subcatchment E-1: South to Bordering Vegetated Wetland

**Hydrograph**



**Hydrograph for Subcatchment E-1: South to Bordering Vegetated Wetland**

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
5.00	0.27	0.00	0.00	18.25	4.37	3.07	0.21
5.25	0.28	0.00	0.00	18.50	4.39	3.09	0.21
5.50	0.30	0.00	0.01	18.75	4.41	3.11	0.20
5.75	0.32	0.00	0.01	19.00	4.42	3.12	0.20
6.00	0.34	0.00	0.02	19.25	4.44	3.14	0.19
6.25	0.36	0.00	0.02	19.50	4.46	3.16	0.19
6.50	0.38	0.01	0.03	19.75	4.47	3.17	0.18
6.75	0.40	0.01	0.04	20.00	<b>4.49</b>	<b>3.19</b>	0.18
7.00	0.42	0.02	0.05				
7.25	0.45	0.02	0.06				
7.50	0.48	0.03	0.08				
7.75	0.50	0.03	0.09				
8.00	0.53	0.04	0.10				
8.25	0.57	0.05	0.12				
8.50	0.60	0.06	0.15				
8.75	0.64	0.08	0.18				
9.00	0.68	0.10	0.21				
9.25	0.73	0.11	0.24				
9.50	0.78	0.14	0.28				
9.75	0.83	0.16	0.31				
10.00	0.89	0.19	0.35				
10.25	0.95	0.22	0.41				
10.50	1.02	0.26	0.48				
10.75	1.09	0.31	0.55				
11.00	1.17	0.36	0.63				
11.25	1.27	0.42	0.82				
11.50	1.40	0.51	1.09				
11.75	1.67	0.70	2.69				
12.00	2.34	1.25	<b>7.11</b>				
12.25	3.02	1.84	<b>5.62</b>				
12.50	3.29	2.08	2.60				
12.75	3.42	2.19	1.36				
13.00	3.52	2.28	1.07				
13.25	3.60	2.36	0.91				
13.50	3.67	2.43	0.83				
13.75	3.74	2.49	0.75				
14.00	3.80	2.55	0.68				
14.25	3.86	2.60	0.62				
14.50	3.91	2.65	0.59				
14.75	3.96	2.69	0.55				
15.00	4.01	2.73	0.51				
15.25	4.05	2.77	0.48				
15.50	4.09	2.81	0.44				
15.75	4.12	2.84	0.40				
16.00	4.16	2.87	0.36				
16.25	4.19	2.90	0.34				
16.50	4.21	2.93	0.32				
16.75	4.24	2.95	0.30				
17.00	4.27	2.98	0.29				
17.25	4.29	3.00	0.27				
17.50	4.31	3.02	0.25				
17.75	4.33	3.04	0.24				
18.00	4.35	3.06	0.22				

### Summary for Reach 1R: Bordering Vegetated Wetlands

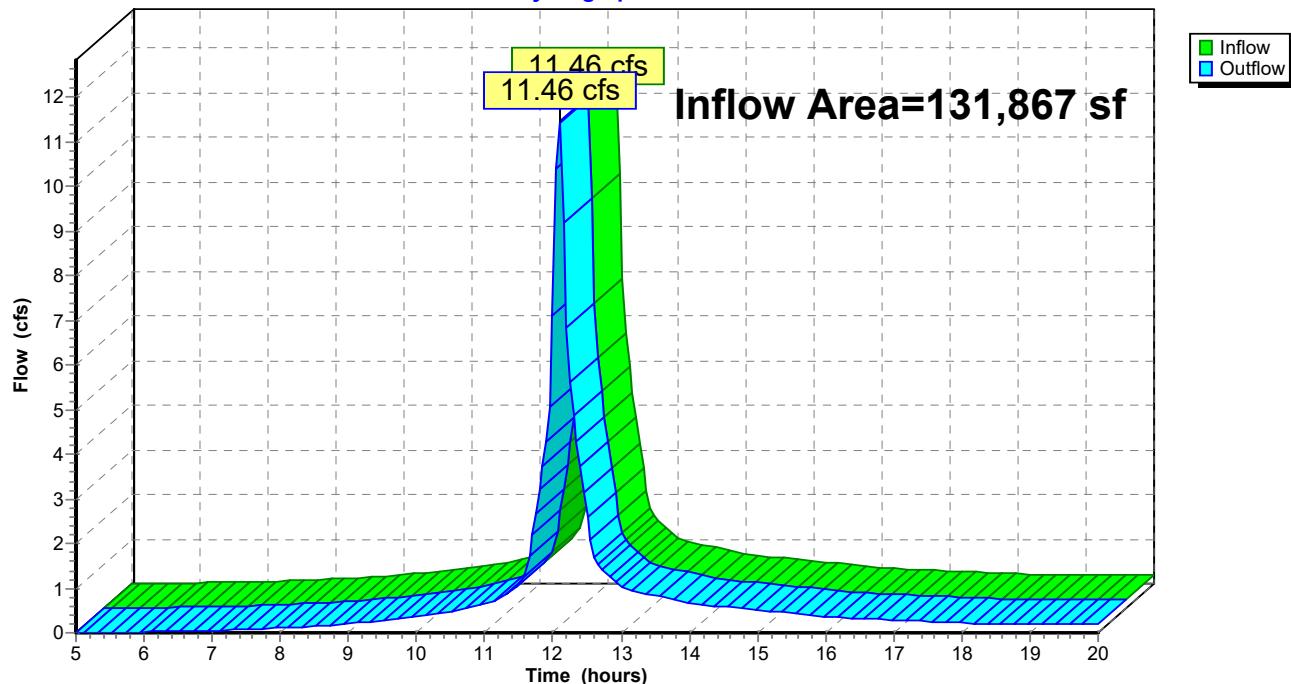
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 131,867 sf, 58.02% Impervious, Inflow Depth > 3.18" for 10-YR event  
Inflow = 11.46 cfs @ 12.09 hrs, Volume= 34,959 cf  
Outflow = 11.46 cfs @ 12.09 hrs, Volume= 34,959 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

### Reach 1R: Bordering Vegetated Wetlands

Hydrograph



**Hydrograph for Reach 1R: Bordering Vegetated Wetlands**

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
5.00	0.00	0.00		18.25	0.21	0.21	
5.25	0.00	0.00		18.50	0.21	0.21	
5.50	0.01	0.01		18.75	0.20	0.20	
5.75	0.01	0.01		19.00	0.20	0.20	
6.00	0.02	0.02		19.25	0.19	0.19	
6.25	0.02	0.02		19.50	0.19	0.19	
6.50	0.03	0.03		19.75	0.18	0.18	
6.75	0.04	0.04		20.00	0.18	0.18	
7.00	0.05	0.05					
7.25	0.06	0.06					
7.50	0.08	0.08					
7.75	0.09	0.09					
8.00	0.10	0.10					
8.25	0.12	0.12					
8.50	0.15	0.15					
8.75	0.18	0.18					
9.00	0.21	0.21					
9.25	0.24	0.24					
9.50	0.28	0.28					
9.75	0.31	0.31					
10.00	0.35	0.35					
10.25	0.41	0.41					
10.50	0.48	0.48					
10.75	0.55	0.55					
11.00	0.63	0.63					
11.25	0.82	0.82					
11.50	1.09	1.09					
11.75	2.69	2.69					
12.00	<b>7.11</b>	<b>7.11</b>					
12.25	<b>5.62</b>	<b>5.62</b>					
12.50	2.60	2.60					
12.75	1.36	1.36					
13.00	1.07	1.07					
13.25	0.91	0.91					
13.50	0.83	0.83					
13.75	0.75	0.75					
14.00	0.68	0.68					
14.25	0.62	0.62					
14.50	0.59	0.59					
14.75	0.55	0.55					
15.00	0.51	0.51					
15.25	0.48	0.48					
15.50	0.44	0.44					
15.75	0.40	0.40					
16.00	0.36	0.36					
16.25	0.34	0.34					
16.50	0.32	0.32					
16.75	0.30	0.30					
17.00	0.29	0.29					
17.25	0.27	0.27					
17.50	0.25	0.25					
17.75	0.24	0.24					
18.00	0.22	0.22					

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*Type III 24-hr 25-YR Rainfall=5.90"*

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment E-1: South to Bordering** Runoff Area=131,867 sf 58.02% Impervious Runoff Depth>4.28"  
Flow Length=293' Tc=6.1 min CN=88 Runoff=15.17 cfs 47,020 cf

**Reach 1R: Bordering Vegetated Wetlands**Inflow=15.17 cfs 47,020 cf  
Outflow=15.17 cfs 47,020 cf

**Total Runoff Area = 131,867 sf Runoff Volume = 47,020 cf Average Runoff Depth = 4.28"**  
**41.98% Pervious = 55,354 sf 58.02% Impervious = 76,513 sf**

**Existing HydroCAD**

Prepared by {enter your company name here}

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Type III 24-hr 25-YR Rainfall=5.90"

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**Summary for Subcatchment E-1: South to Bordering Vegetated Wetland**

Runoff = 15.17 cfs @ 12.09 hrs, Volume= 47,020 cf, Depth&gt; 4.28"

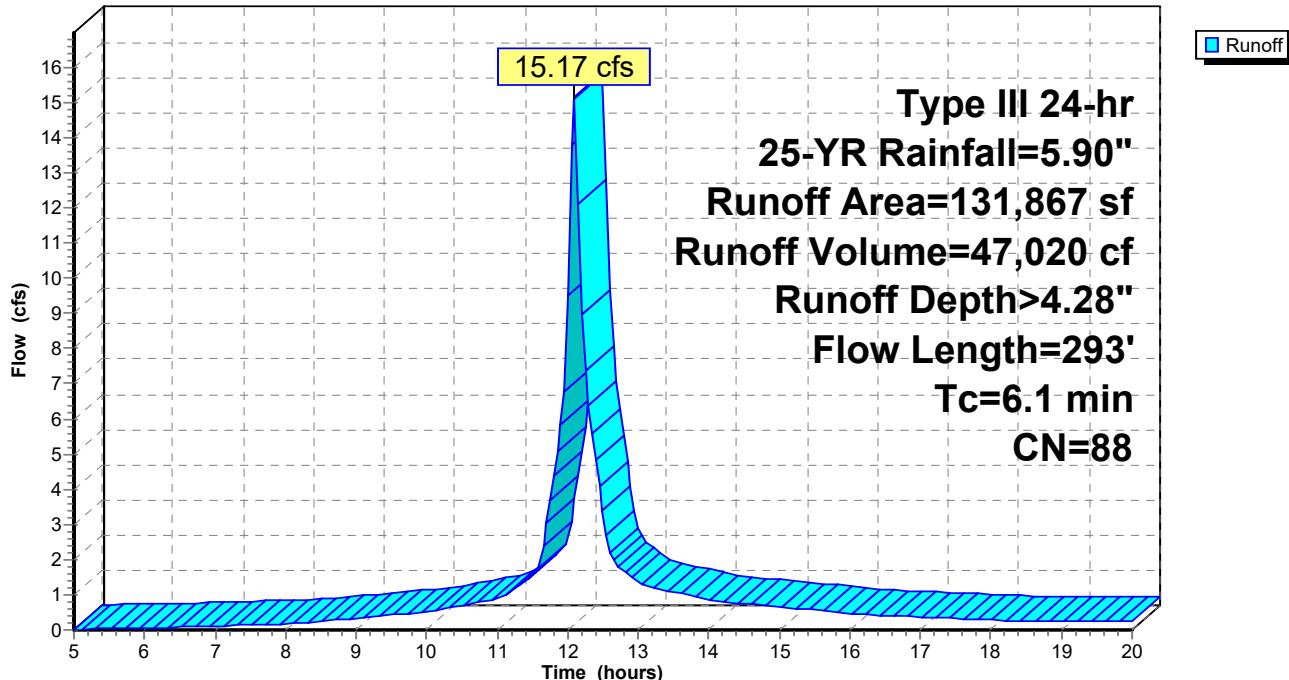
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 25-YR Rainfall=5.90"

Area (sf)	CN	Description
32,809	74	>75% Grass cover, Good, HSG C
76,513	98	Paved parking, HSG C
19,847	70	Woods, Good, HSG C
2,698	96	Gravel surface, HSG B
131,867	88	Weighted Average
55,354		41.98% Pervious Area
76,513		58.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.4	50	0.2700	0.19		<b>Sheet Flow, Sheet</b> Woods: Light underbrush n= 0.400 P2= 3.14"
1.7	243	0.0220	2.39		<b>Shallow Concentrated Flow, Shallow Concentrated</b> Unpaved Kv= 16.1 fps
6.1	293			Total	

**Subcatchment E-1: South to Bordering Vegetated Wetland**

Hydrograph



**Hydrograph for Subcatchment E-1: South to Bordering Vegetated Wetland**

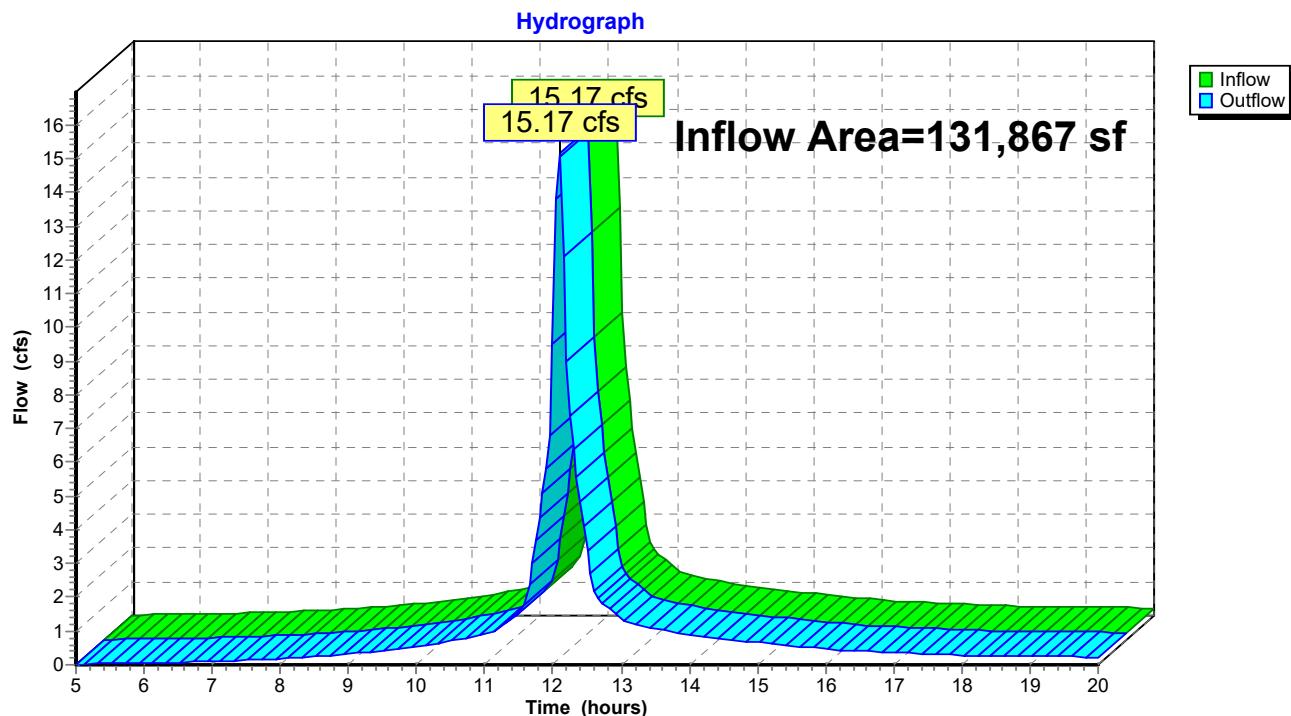
Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
5.00	0.33	0.00	0.02	18.25	5.50	4.14	0.27
5.25	0.36	0.00	0.03	18.50	5.52	4.17	0.27
5.50	0.38	0.01	0.04	18.75	5.54	4.19	0.26
5.75	0.40	0.01	0.04	19.00	5.57	4.21	0.25
6.00	0.42	0.02	0.05	19.25	5.59	4.23	0.25
6.25	0.45	0.02	0.06	19.50	5.61	4.25	0.24
6.50	0.48	0.03	0.08	19.75	5.63	4.27	0.23
6.75	0.50	0.03	0.09	20.00	<b>5.65</b>	<b>4.29</b>	0.23
7.00	0.53	0.04	0.11				
7.25	0.57	0.05	0.12				
7.50	0.60	0.06	0.14				
7.75	0.64	0.08	0.16				
8.00	0.67	0.09	0.18				
8.25	0.71	0.11	0.21				
8.50	0.76	0.13	0.25				
8.75	0.81	0.15	0.29				
9.00	0.86	0.18	0.33				
9.25	0.92	0.21	0.37				
9.50	0.98	0.24	0.42				
9.75	1.04	0.28	0.47				
10.00	1.12	0.32	0.53				
10.25	1.19	0.37	0.60				
10.50	1.28	0.43	0.70				
10.75	1.37	0.49	0.80				
11.00	1.48	0.56	0.90				
11.25	1.60	0.65	1.15				
11.50	1.76	0.77	1.51				
11.75	2.10	1.04	3.68				
12.00	2.95	1.77	<b>9.51</b>				
12.25	3.80	2.55	<b>7.36</b>				
12.50	4.14	2.86	3.38				
12.75	4.30	3.01	1.77				
13.00	4.42	3.13	1.38				
13.25	4.53	3.22	1.17				
13.50	4.62	3.31	1.07				
13.75	4.71	3.39	0.97				
14.00	4.78	3.47	0.87				
14.25	4.86	3.53	0.81				
14.50	4.92	3.59	0.76				
14.75	4.98	3.65	0.71				
15.00	5.04	3.71	0.66				
15.25	5.09	3.76	0.61				
15.50	5.14	3.80	0.56				
15.75	5.19	3.85	0.51				
16.00	5.23	3.89	0.46				
16.25	5.26	3.92	0.43				
16.50	5.30	3.95	0.41				
16.75	5.33	3.99	0.39				
17.00	5.37	4.02	0.37				
17.25	5.40	4.05	0.35				
17.50	5.42	4.07	0.33				
17.75	5.45	4.10	0.31				
18.00	5.48	4.12	0.28				

**Summary for Reach 1R: Bordering Vegetated Wetlands**

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

Inflow Area = 131,867 sf, 58.02% Impervious, Inflow Depth > 4.28" for 25-YR event  
Inflow = 15.17 cfs @ 12.09 hrs, Volume= 47,020 cf  
Outflow = 15.17 cfs @ 12.09 hrs, Volume= 47,020 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

**Reach 1R: Bordering Vegetated Wetlands**

**Hydrograph for Reach 1R: Bordering Vegetated Wetlands**

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
5.00	0.02	0.02		18.25	0.27	0.27	
5.25	0.03	0.03		18.50	0.27	0.27	
5.50	0.04	0.04		18.75	0.26	0.26	
5.75	0.04	0.04		19.00	0.25	0.25	
6.00	0.05	0.05		19.25	0.25	0.25	
6.25	0.06	0.06		19.50	0.24	0.24	
6.50	0.08	0.08		19.75	0.23	0.23	
6.75	0.09	0.09		20.00	0.23	0.23	
7.00	0.11	0.11					
7.25	0.12	0.12					
7.50	0.14	0.14					
7.75	0.16	0.16					
8.00	0.18	0.18					
8.25	0.21	0.21					
8.50	0.25	0.25					
8.75	0.29	0.29					
9.00	0.33	0.33					
9.25	0.37	0.37					
9.50	0.42	0.42					
9.75	0.47	0.47					
10.00	0.53	0.53					
10.25	0.60	0.60					
10.50	0.70	0.70					
10.75	0.80	0.80					
11.00	0.90	0.90					
11.25	1.15	1.15					
11.50	1.51	1.51					
11.75	3.68	3.68					
12.00	<b>9.51</b>	<b>9.51</b>					
12.25	<b>7.36</b>	<b>7.36</b>					
12.50	3.38	3.38					
12.75	1.77	1.77					
13.00	1.38	1.38					
13.25	1.17	1.17					
13.50	1.07	1.07					
13.75	0.97	0.97					
14.00	0.87	0.87					
14.25	0.81	0.81					
14.50	0.76	0.76					
14.75	0.71	0.71					
15.00	0.66	0.66					
15.25	0.61	0.61					
15.50	0.56	0.56					
15.75	0.51	0.51					
16.00	0.46	0.46					
16.25	0.43	0.43					
16.50	0.41	0.41					
16.75	0.39	0.39					
17.00	0.37	0.37					
17.25	0.35	0.35					
17.50	0.33	0.33					
17.75	0.31	0.31					
18.00	0.28	0.28					

**Existing HydroCAD**

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*Type III 24-hr 100-YR Rainfall=8.37"*

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment E-1: South to Bordering** Runoff Area=131,867 sf 58.02% Impervious Runoff Depth>6.55"  
Flow Length=293' Tc=6.1 min CN=88 Runoff=22.66 cfs 71,954 cf**Reach 1R: Bordering Vegetated Wetlands**

Inflow=22.66 cfs 71,954 cf

Outflow=22.66 cfs 71,954 cf

**Total Runoff Area = 131,867 sf Runoff Volume = 71,954 cf Average Runoff Depth = 6.55"**  
**41.98% Pervious = 55,354 sf 58.02% Impervious = 76,513 sf**

## Summary for Subcatchment E-1: South to Bordering Vegetated Wetland

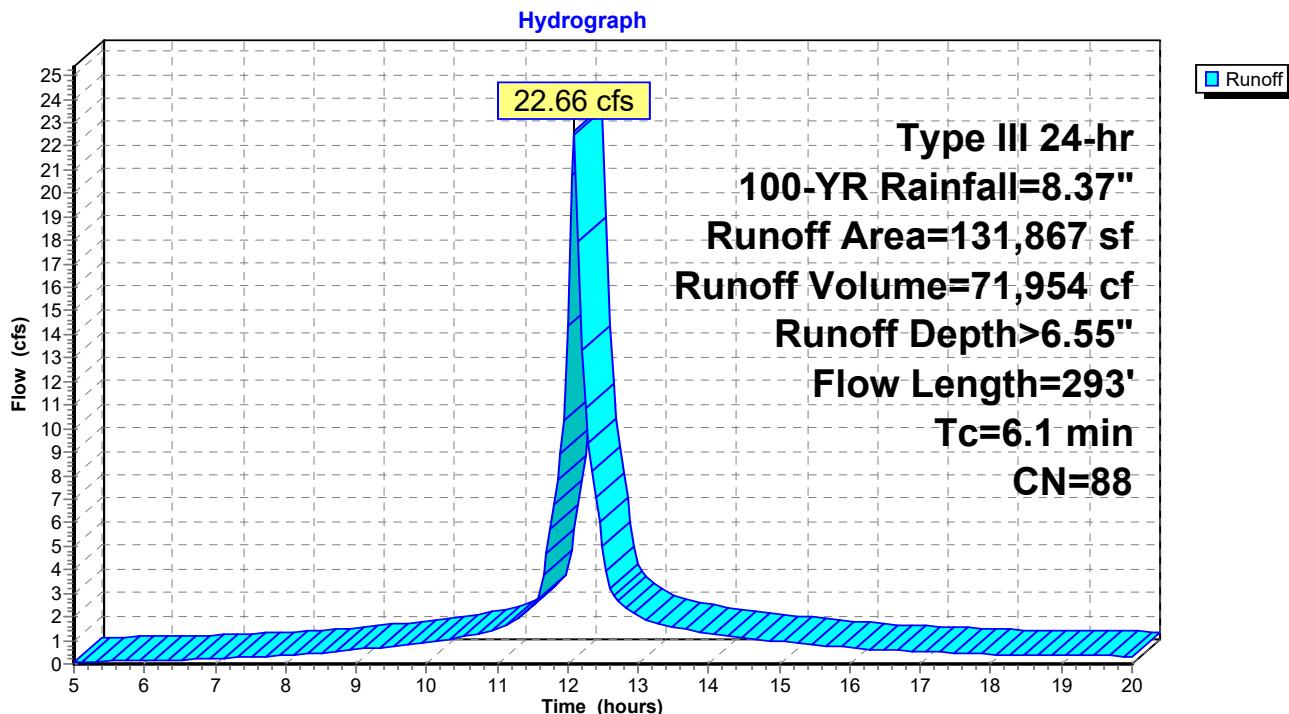
Runoff = 22.66 cfs @ 12.09 hrs, Volume= 71,954 cf, Depth> 6.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 100-YR Rainfall=8.37"

Area (sf)	CN	Description
32,809	74	>75% Grass cover, Good, HSG C
76,513	98	Paved parking, HSG C
19,847	70	Woods, Good, HSG C
2,698	96	Gravel surface, HSG B
131,867	88	Weighted Average
55,354		41.98% Pervious Area
76,513		58.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.4	50	0.2700	0.19		<b>Sheet Flow, Sheet</b> Woods: Light underbrush n= 0.400 P2= 3.14"
1.7	243	0.0220	2.39		<b>Shallow Concentrated Flow, Shallow Concentrated</b> Unpaved Kv= 16.1 fps
6.1	293			Total	

## Subcatchment E-1: South to Bordering Vegetated Wetland



**Hydrograph for Subcatchment E-1: South to Bordering Vegetated Wetland**

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
5.00	0.47	0.03	0.08	18.25	7.80	6.37	0.39
5.25	0.51	0.03	0.10	18.50	7.83	6.40	0.38
5.50	0.54	0.04	0.11	18.75	7.86	6.44	0.37
5.75	0.57	0.05	0.12	19.00	7.90	6.47	0.37
6.00	0.60	0.06	0.14	19.25	7.92	6.49	0.36
6.25	0.64	0.08	0.16	19.50	7.95	6.52	0.35
6.50	0.67	0.09	0.18	19.75	7.98	6.55	0.34
6.75	0.71	0.11	0.21	20.00	<b>8.01</b>	<b>6.58</b>	0.33
7.00	0.76	0.13	0.23				
7.25	0.80	0.15	0.26				
7.50	0.85	0.17	0.29				
7.75	0.90	0.20	0.32				
8.00	0.95	0.23	0.36				
8.25	1.01	0.26	0.40				
8.50	1.08	0.30	0.47				
8.75	1.14	0.34	0.53				
9.00	1.22	0.39	0.60				
9.25	1.30	0.44	0.67				
9.50	1.39	0.50	0.74				
9.75	1.48	0.57	0.82				
10.00	1.58	0.64	0.90				
10.25	1.69	0.72	1.01				
10.50	1.81	0.82	1.16				
10.75	1.95	0.92	1.31				
11.00	2.09	1.04	1.46				
11.25	2.27	1.19	1.85				
11.50	2.49	1.38	2.39				
11.75	2.97	1.79	5.73				
12.00	4.18	2.90	<b>14.38</b>				
12.25	5.40	4.05	<b>10.86</b>				
12.50	5.88	4.51	4.95				
12.75	6.10	4.72	2.58				
13.00	6.28	4.89	2.01				
13.25	6.42	5.04	1.71				
13.50	6.56	5.16	1.56				
13.75	6.68	5.28	1.42				
14.00	6.79	5.39	1.27				
14.25	6.89	5.48	1.17				
14.50	6.98	5.58	1.10				
14.75	7.07	5.66	1.03				
15.00	7.15	5.74	0.96				
15.25	7.23	5.81	0.89				
15.50	7.29	5.88	0.82				
15.75	7.36	5.94	0.75				
16.00	7.42	6.00	0.67				
16.25	7.47	6.05	0.63				
16.50	7.52	6.10	0.60				
16.75	7.57	6.15	0.57				
17.00	7.61	6.19	0.54				
17.25	7.66	6.23	0.50				
17.50	7.70	6.27	0.47				
17.75	7.73	6.31	0.44				
18.00	7.77	6.34	0.41				

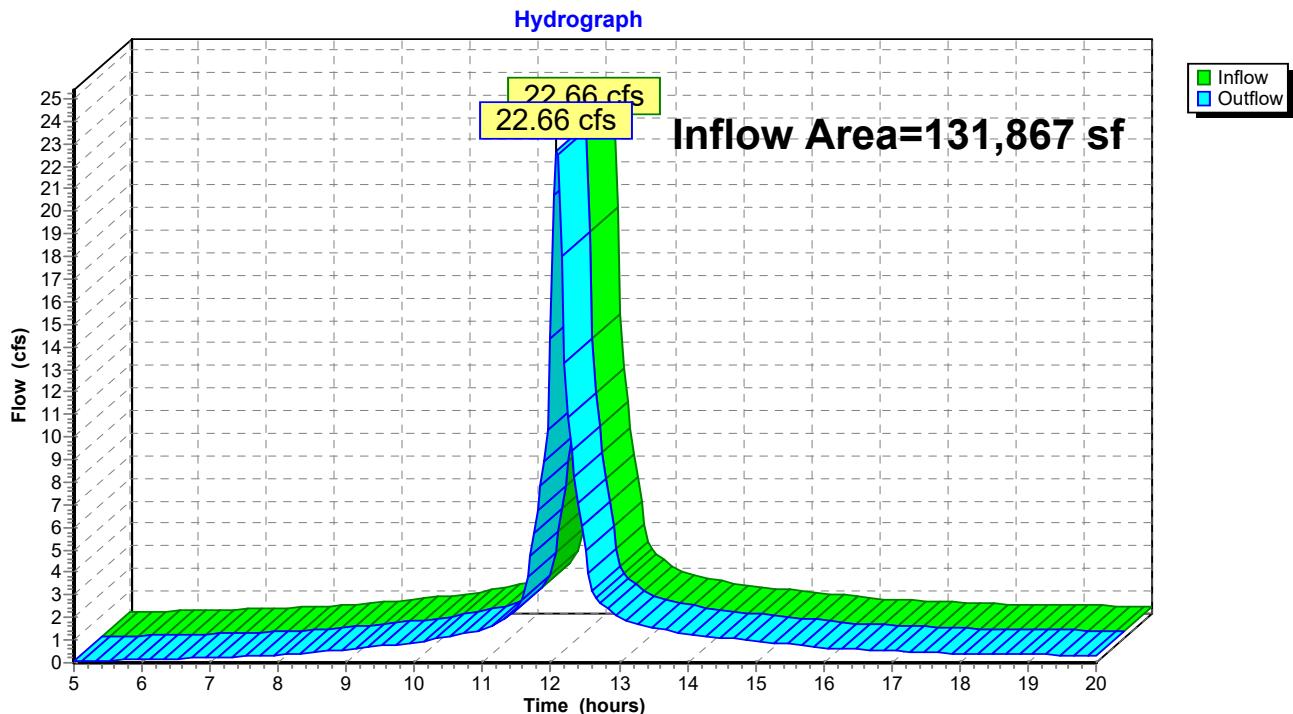
## Summary for Reach 1R: Bordering Vegetated Wetlands

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

Inflow Area = 131,867 sf, 58.02% Impervious, Inflow Depth > 6.55" for 100-YR event  
Inflow = 22.66 cfs @ 12.09 hrs, Volume= 71,954 cf  
Outflow = 22.66 cfs @ 12.09 hrs, Volume= 71,954 cf, Atten= 0%, Lag= 0.0 min

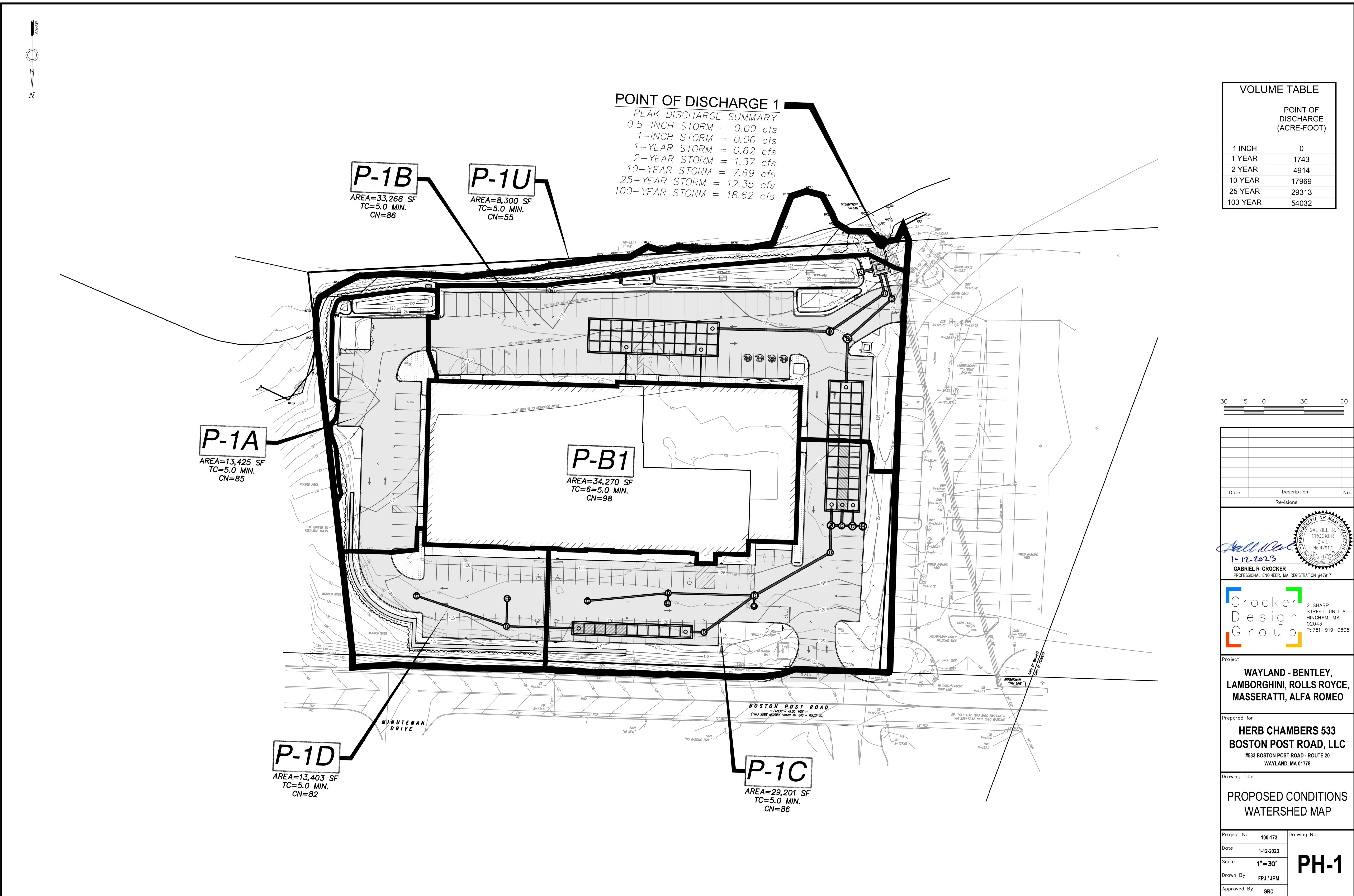
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

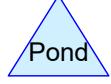
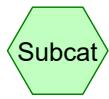
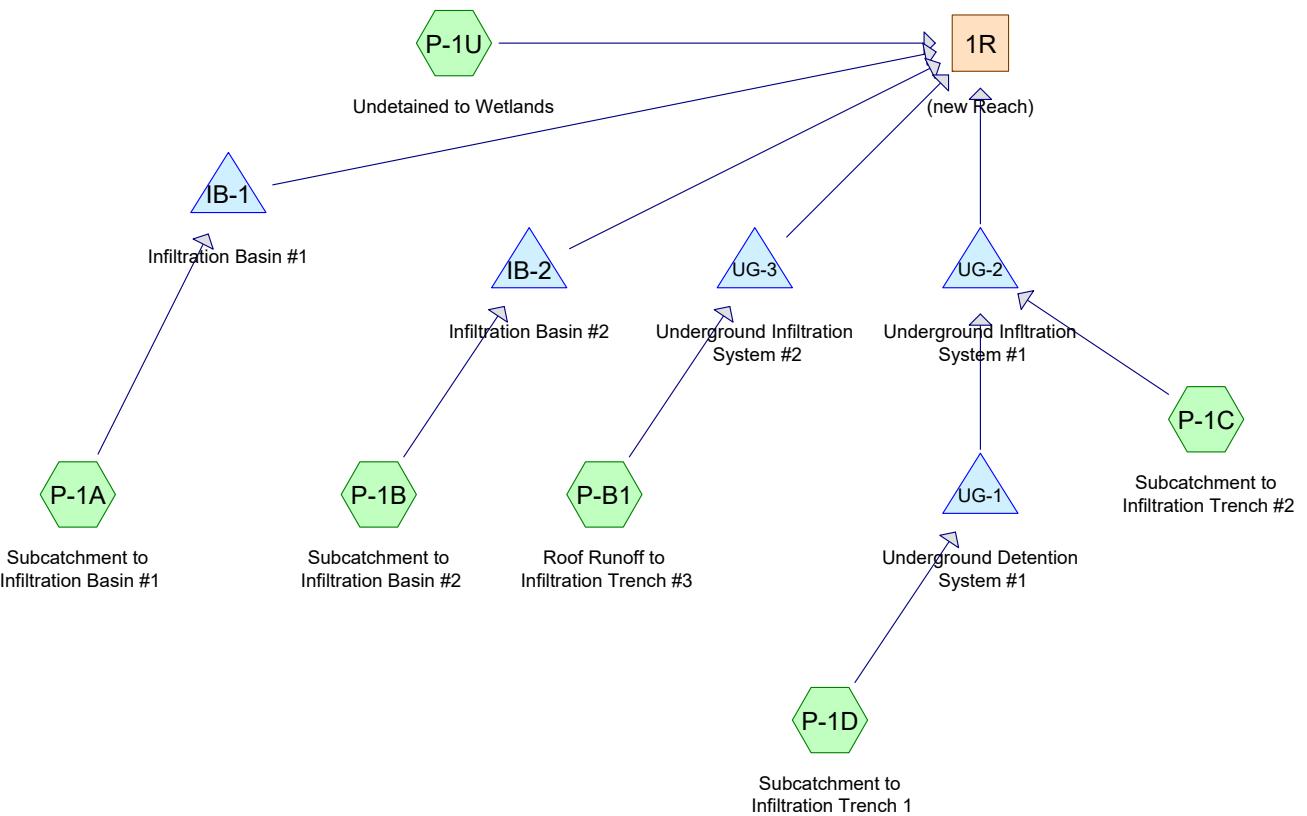
### Reach 1R: Bordering Vegetated Wetlands



### Hydrograph for Reach 1R: Bordering Vegetated Wetlands

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
5.00	0.08		0.08	18.25	0.39		0.39
5.25	0.10		0.10	18.50	0.38		0.38
5.50	0.11		0.11	18.75	0.37		0.37
5.75	0.12		0.12	19.00	0.37		0.37
6.00	0.14		0.14	19.25	0.36		0.36
6.25	0.16		0.16	19.50	0.35		0.35
6.50	0.18		0.18	19.75	0.34		0.34
6.75	0.21		0.21	20.00	0.33		0.33
7.00	0.23		0.23				
7.25	0.26		0.26				
7.50	0.29		0.29				
7.75	0.32		0.32				
8.00	0.36		0.36				
8.25	0.40		0.40				
8.50	0.47		0.47				
8.75	0.53		0.53				
9.00	0.60		0.60				
9.25	0.67		0.67				
9.50	0.74		0.74				
9.75	0.82		0.82				
10.00	0.90		0.90				
10.25	1.01		1.01				
10.50	1.16		1.16				
10.75	1.31		1.31				
11.00	1.46		1.46				
11.25	1.85		1.85				
11.50	2.39		2.39				
11.75	5.73		5.73				
12.00	<b>14.38</b>		<b>14.38</b>				
12.25	<b>10.86</b>		<b>10.86</b>				
12.50	4.95		4.95				
12.75	2.58		2.58				
13.00	2.01		2.01				
13.25	1.71		1.71				
13.50	1.56		1.56				
13.75	1.42		1.42				
14.00	1.27		1.27				
14.25	1.17		1.17				
14.50	1.10		1.10				
14.75	1.03		1.03				
15.00	0.96		0.96				
15.25	0.89		0.89				
15.50	0.82		0.82				
15.75	0.75		0.75				
16.00	0.67		0.67				
16.25	0.63		0.63				
16.50	0.60		0.60				
16.75	0.57		0.57				
17.00	0.54		0.54				
17.25	0.50		0.50				
17.50	0.47		0.47				
17.75	0.44		0.44				
18.00	0.41		0.41				





#### Routing Diagram for Proposed HydroCAD 533 Boston Post Road

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## **Proposed HydroCAD 533 Boston Post Road**

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### **Project Notes**

Rainfall events imported from "Existing HydroCAD.hcp"

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## **Area Listing (all nodes)**

Area (sq-ft)	CN	Description (subcatchment-numbers)
26,936	61	>75% Grass cover, Good, HSG B (P-1A, P-1B, P-1C, P-1D)
58,858	98	Paved parking, HSG B (P-1A, P-1B, P-1C, P-1D)
34,270	98	Roofs, HSG B (P-B1)
3,128	60	Woods, Fair, HSG B (P-1D)
8,675	55	Woods, Good, HSG B (P-1A, P-1U)
<b>131,867</b>	<b>87</b>	<b>TOTAL AREA</b>

# **Proposed HydroCAD 533 Boston Post Road**

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## **Soil Listing (all nodes)**

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
131,867	HSG B	P-1A, P-1B, P-1C, P-1D, P-1U, P-B1
0	HSG C	
0	HSG D	
0	Other	
<b>131,867</b>		<b>TOTAL AREA</b>

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## **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	Sub Num
0	26,936	0	0	0	26,936	>75% Grass cover, Good	
0	58,858	0	0	0	58,858	Paved parking	
0	34,270	0	0	0	34,270	Roofs	
0	3,128	0	0	0	3,128	Woods, Fair	
0	8,675	0	0	0	8,675	Woods, Good	
<b>0</b>	<b>131,867</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>131,867</b>	<b>TOTAL AREA</b>	

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## **Pipe Listing (all nodes)**

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	IB-2	121.90	121.70	20.0	0.0100	0.012	18.0	0.0	0.0
2	UG-1	122.40	121.50	140.0	0.0064	0.012	15.0	0.0	0.0
3	UG-2	121.50	121.50	30.0	0.0000	0.012	18.0	0.0	0.0
4	UG-2	122.02	121.70	60.0	0.0053	0.012	15.0	0.0	0.0
5	UG-3	121.50	121.50	70.0	0.0000	0.012	18.0	0.0	0.0
6	UG-3	122.02	121.70	60.0	0.0053	0.012	15.0	0.0	0.0

**Proposed HydroCAD 533 Boston Post Road**

Type III 24-hr .5" Storm Rainfall=0.50"

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Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

<b>Subcatchment P-1A: Subcatchment to</b>	Runoff Area=13,425 sf 66.59% Impervious Runoff Depth=0.01" Tc=6.0 min CN=85 Runoff=0.00 cfs 13 cf
<b>Subcatchment P-1B: Subcatchment to</b>	Runoff Area=33,268 sf 68.13% Impervious Runoff Depth=0.02" Tc=6.0 min CN=86 Runoff=0.00 cfs 47 cf
<b>Subcatchment P-1C: Subcatchment to</b>	Runoff Area=29,201 sf 66.54% Impervious Runoff Depth=0.02" Tc=6.0 min CN=86 Runoff=0.00 cfs 41 cf
<b>Subcatchment P-1D: Subcatchment to</b>	Runoff Area=13,403 sf 58.36% Impervious Runoff Depth=0.00" Tc=6.0 min CN=82 Runoff=0.00 cfs 2 cf
<b>Subcatchment P-1U: Undetained to Wetlands</b>	Runoff Area=8,300 sf 0.00% Impervious Runoff Depth=0.00" Tc=6.0 min CN=55 Runoff=0.00 cfs 0 cf
<b>Subcatchment P-B1: Roof Runoff to</b>	Runoff Area=34,270 sf 100.00% Impervious Runoff Depth=0.32" Tc=6.0 min CN=98 Runoff=0.29 cfs 908 cf
<b>Reach 1R: (new Reach)</b>	Inflow=0.00 cfs 0 cf Outflow=0.00 cfs 0 cf
<b>Pond IB-1: Infiltration Basin #1</b>	Peak Elev=122.00' Storage=0 cf Inflow=0.00 cfs 13 cf Discarded=0.00 cfs 13 cf Primary=0.00 cfs 0 cf Outflow=0.00 cfs 13 cf
<b>Pond IB-2: Infiltration Basin #2</b>	Peak Elev=122.00' Storage=1 cf Inflow=0.00 cfs 47 cf Discarded=0.00 cfs 47 cf Primary=0.00 cfs 0 cf Outflow=0.00 cfs 47 cf
<b>Pond UG-1: Underground Detention System #1</b>	Peak Elev=122.40' Storage=2 cf Inflow=0.00 cfs 2 cf 15.0" Round Culvert n=0.012 L=140.0' S=0.0064 '/' Outflow=0.00 cfs 1 cf
<b>Pond UG-2: Underground Infiltration System #1</b>	Peak Elev=121.50' Storage=1 cf Inflow=0.00 cfs 42 cf Discarded=0.00 cfs 42 cf Primary=0.00 cfs 0 cf Outflow=0.00 cfs 42 cf
<b>Pond UG-3: Underground Infiltration System #2</b>	Peak Elev=121.68' Storage=278 cf Inflow=0.29 cfs 908 cf Discarded=0.05 cfs 908 cf Primary=0.00 cfs 0 cf Outflow=0.05 cfs 908 cf

**Total Runoff Area = 131,867 sf Runoff Volume = 1,010 cf Average Runoff Depth = 0.09"**  
**29.38% Pervious = 38,739 sf 70.62% Impervious = 93,128 sf**

**Proposed HydroCAD 533 Boston Post Road**

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*Type III 24-hr .5" Storm Rainfall=0.50"*

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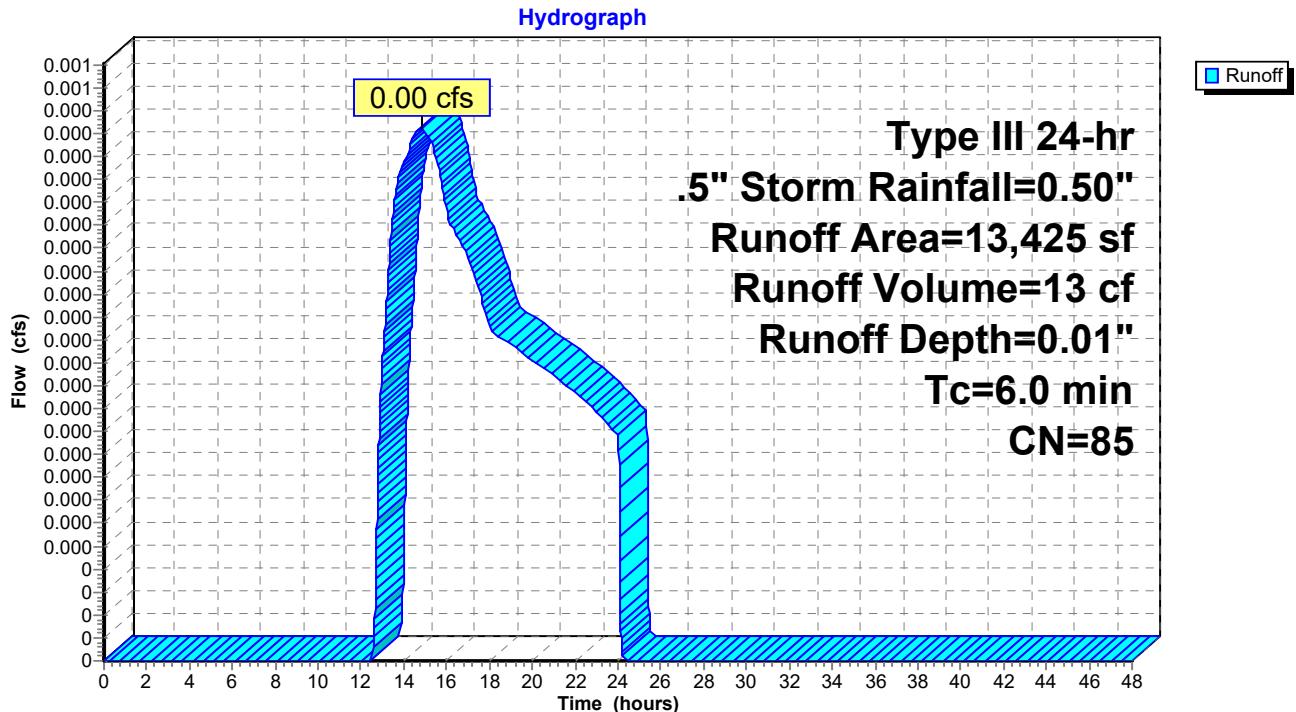
**Summary for Subcatchment P-1A: Subcatchment to Infiltration Basin #1**

Runoff = 0.00 cfs @ 14.82 hrs, Volume= 13 cf, Depth= 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
Type III 24-hr .5" Storm Rainfall=0.50"

Area (sf)	CN	Description
8,940	98	Paved parking, HSG B
4,110	61	>75% Grass cover, Good, HSG B
375	55	Woods, Good, HSG B
13,425	85	Weighted Average
4,485		33.41% Pervious Area
8,940		66.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0				<b>Direct Entry, Direct</b>	
5.0	0			Total, Increased to minimum Tc = 6.0 min	

**Subcatchment P-1A: Subcatchment to Infiltration Basin #1**

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*Type III 24-hr .5" Storm Rainfall=0.50"*

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**Hydrograph for Subcatchment P-1A: Subcatchment to Infiltration Basin #1**

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.50	0.50	0.01	0.00
0.50	0.00	0.00	0.00	27.00	0.50	0.01	0.00
1.00	0.01	0.00	0.00	27.50	0.50	0.01	0.00
1.50	0.01	0.00	0.00	28.00	0.50	0.01	0.00
2.00	0.01	0.00	0.00	28.50	0.50	0.01	0.00
2.50	0.01	0.00	0.00	29.00	0.50	0.01	0.00
3.00	0.02	0.00	0.00	29.50	0.50	0.01	0.00
3.50	0.02	0.00	0.00	30.00	0.50	0.01	0.00
4.00	0.02	0.00	0.00	30.50	0.50	0.01	0.00
4.50	0.02	0.00	0.00	31.00	0.50	0.01	0.00
5.00	0.03	0.00	0.00	31.50	0.50	0.01	0.00
5.50	0.03	0.00	0.00	32.00	0.50	0.01	0.00
6.00	0.04	0.00	0.00	32.50	0.50	0.01	0.00
6.50	0.04	0.00	0.00	33.00	0.50	0.01	0.00
7.00	0.05	0.00	0.00	33.50	0.50	0.01	0.00
7.50	0.05	0.00	0.00	34.00	0.50	0.01	0.00
8.00	0.06	0.00	0.00	34.50	0.50	0.01	0.00
8.50	0.06	0.00	0.00	35.00	0.50	0.01	0.00
9.00	0.07	0.00	0.00	35.50	0.50	0.01	0.00
9.50	0.08	0.00	0.00	36.00	0.50	0.01	0.00
10.00	0.09	0.00	0.00	36.50	0.50	0.01	0.00
10.50	0.11	0.00	0.00	37.00	0.50	0.01	0.00
11.00	0.13	0.00	0.00	37.50	0.50	0.01	0.00
11.50	0.15	0.00	0.00	38.00	0.50	0.01	0.00
12.00	0.25	0.00	0.00	38.50	0.50	0.01	0.00
12.50	0.35	0.00	0.00	39.00	0.50	0.01	0.00
13.00	0.37	0.00	0.00	39.50	0.50	0.01	0.00
13.50	0.39	0.00	0.00	40.00	0.50	0.01	0.00
14.00	0.41	0.00	0.00	40.50	0.50	0.01	0.00
14.50	0.42	0.00	<b>0.00</b>	41.00	0.50	0.01	0.00
15.00	0.43	0.00	<b>0.00</b>	41.50	0.50	0.01	0.00
15.50	0.44	0.00	0.00	42.00	0.50	0.01	0.00
16.00	0.44	0.00	0.00	42.50	0.50	0.01	0.00
16.50	0.45	0.00	0.00	43.00	0.50	0.01	0.00
17.00	0.45	0.01	0.00	43.50	0.50	0.01	0.00
17.50	0.46	0.01	0.00	44.00	0.50	0.01	0.00
18.00	0.46	0.01	0.00	44.50	0.50	0.01	0.00
18.50	0.47	0.01	0.00	45.00	0.50	0.01	0.00
19.00	0.47	0.01	0.00	45.50	0.50	0.01	0.00
19.50	0.48	0.01	0.00	46.00	0.50	0.01	0.00
20.00	0.48	0.01	0.00	46.50	0.50	0.01	0.00
20.50	0.48	0.01	0.00	47.00	0.50	0.01	0.00
21.00	0.48	0.01	0.00	47.50	0.50	0.01	0.00
21.50	0.49	0.01	0.00	48.00	0.50	0.01	0.00
22.00	0.49	0.01	0.00				
22.50	0.49	0.01	0.00				
23.00	0.50	0.01	0.00				
23.50	0.50	0.01	0.00				
24.00	<b>0.50</b>	<b>0.01</b>	0.00				
24.50	0.50	0.01	0.00				
25.00	0.50	0.01	0.00				
25.50	0.50	0.01	0.00				
26.00	0.50	0.01	0.00				

**Proposed HydroCAD 533 Boston Post Road**

Prepared by {enter your company name here}

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Type III 24-hr .5" Storm Rainfall=0.50"

Printed 1/12/2023

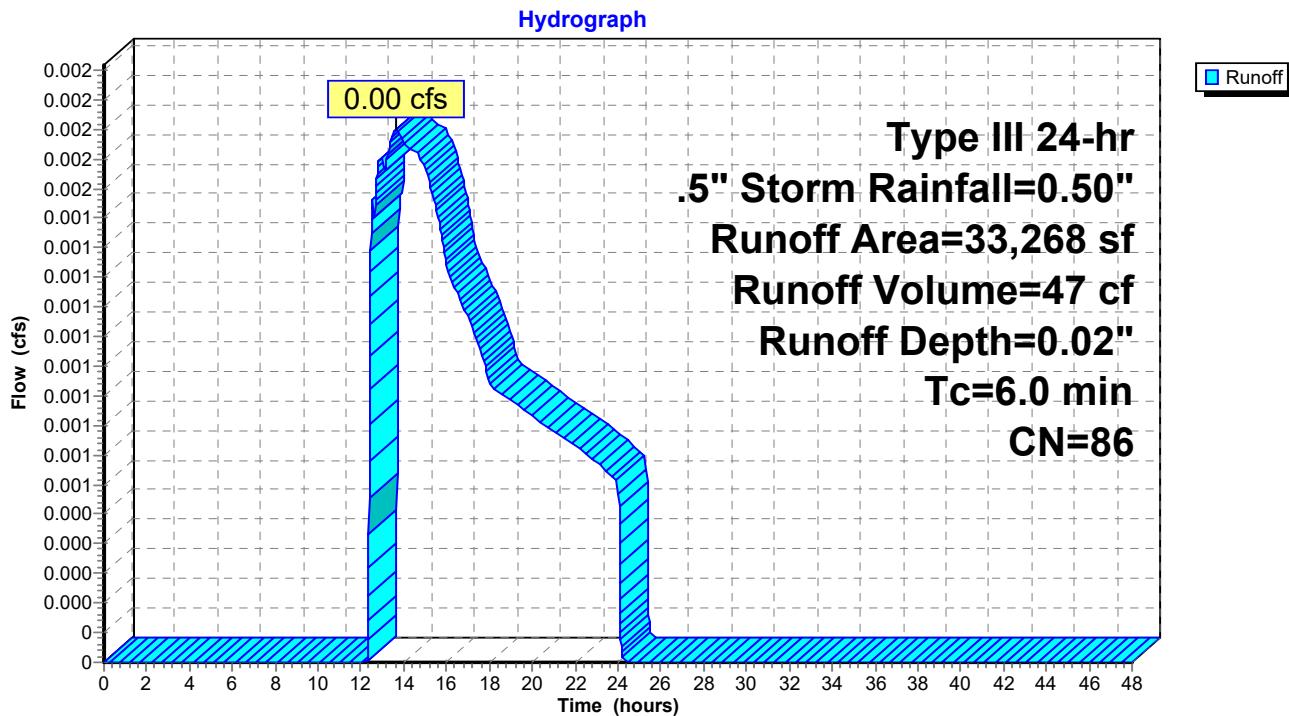
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**Summary for Subcatchment P-1B: Subcatchment to Infiltration Basin #2**

Runoff = 0.00 cfs @ 13.66 hrs, Volume= 47 cf, Depth= 0.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
Type III 24-hr .5" Storm Rainfall=0.50"

Area (sf)	CN	Description			
22,665	98	Paved parking, HSG B			
10,603	61	>75% Grass cover, Good, HSG B			
33,268	86	Weighted Average			
10,603		31.87% Pervious Area			
22,665		68.13% Impervious Area			
Tc	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Direct Entry
5.0	0				Total, Increased to minimum Tc = 6.0 min

**Subcatchment P-1B: Subcatchment to Infiltration Basin #2**

**Hydrograph for Subcatchment P-1B: Subcatchment to Infiltration Basin #2**

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.50	0.50	0.02	0.00
0.50	0.00	0.00	0.00	27.00	0.50	0.02	0.00
1.00	0.01	0.00	0.00	27.50	0.50	0.02	0.00
1.50	0.01	0.00	0.00	28.00	0.50	0.02	0.00
2.00	0.01	0.00	0.00	28.50	0.50	0.02	0.00
2.50	0.01	0.00	0.00	29.00	0.50	0.02	0.00
3.00	0.02	0.00	0.00	29.50	0.50	0.02	0.00
3.50	0.02	0.00	0.00	30.00	0.50	0.02	0.00
4.00	0.02	0.00	0.00	30.50	0.50	0.02	0.00
4.50	0.02	0.00	0.00	31.00	0.50	0.02	0.00
5.00	0.03	0.00	0.00	31.50	0.50	0.02	0.00
5.50	0.03	0.00	0.00	32.00	0.50	0.02	0.00
6.00	0.04	0.00	0.00	32.50	0.50	0.02	0.00
6.50	0.04	0.00	0.00	33.00	0.50	0.02	0.00
7.00	0.05	0.00	0.00	33.50	0.50	0.02	0.00
7.50	0.05	0.00	0.00	34.00	0.50	0.02	0.00
8.00	0.06	0.00	0.00	34.50	0.50	0.02	0.00
8.50	0.06	0.00	0.00	35.00	0.50	0.02	0.00
9.00	0.07	0.00	0.00	35.50	0.50	0.02	0.00
9.50	0.08	0.00	0.00	36.00	0.50	0.02	0.00
10.00	0.09	0.00	0.00	36.50	0.50	0.02	0.00
10.50	0.11	0.00	0.00	37.00	0.50	0.02	0.00
11.00	0.13	0.00	0.00	37.50	0.50	0.02	0.00
11.50	0.15	0.00	0.00	38.00	0.50	0.02	0.00
12.00	0.25	0.00	0.00	38.50	0.50	0.02	0.00
12.50	0.35	0.00	0.00	39.00	0.50	0.02	0.00
13.00	0.37	0.00	0.00	39.50	0.50	0.02	0.00
13.50	0.39	0.00	<b>0.00</b>	40.00	0.50	0.02	0.00
14.00	0.41	0.00	<b>0.00</b>	40.50	0.50	0.02	0.00
14.50	0.42	0.00	0.00	41.00	0.50	0.02	0.00
15.00	0.43	0.01	0.00	41.50	0.50	0.02	0.00
15.50	0.44	0.01	0.00	42.00	0.50	0.02	0.00
16.00	0.44	0.01	0.00	42.50	0.50	0.02	0.00
16.50	0.45	0.01	0.00	43.00	0.50	0.02	0.00
17.00	0.45	0.01	0.00	43.50	0.50	0.02	0.00
17.50	0.46	0.01	0.00	44.00	0.50	0.02	0.00
18.00	0.46	0.01	0.00	44.50	0.50	0.02	0.00
18.50	0.47	0.01	0.00	45.00	0.50	0.02	0.00
19.00	0.47	0.01	0.00	45.50	0.50	0.02	0.00
19.50	0.48	0.01	0.00	46.00	0.50	0.02	0.00
20.00	0.48	0.01	0.00	46.50	0.50	0.02	0.00
20.50	0.48	0.01	0.00	47.00	0.50	0.02	0.00
21.00	0.48	0.01	0.00	47.50	0.50	0.02	0.00
21.50	0.49	0.01	0.00	48.00	0.50	0.02	0.00
22.00	0.49	0.02	0.00				
22.50	0.49	0.02	0.00				
23.00	0.50	0.02	0.00				
23.50	0.50	0.02	0.00				
24.00	<b>0.50</b>	<b>0.02</b>	0.00				
24.50	0.50	0.02	0.00				
25.00	0.50	0.02	0.00				
25.50	0.50	0.02	0.00				
26.00	0.50	0.02	0.00				

**Proposed HydroCAD 533 Boston Post Road**

Prepared by {enter your company name here}

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*Type III 24-hr .5" Storm Rainfall=0.50"*

Printed 1/12/2023

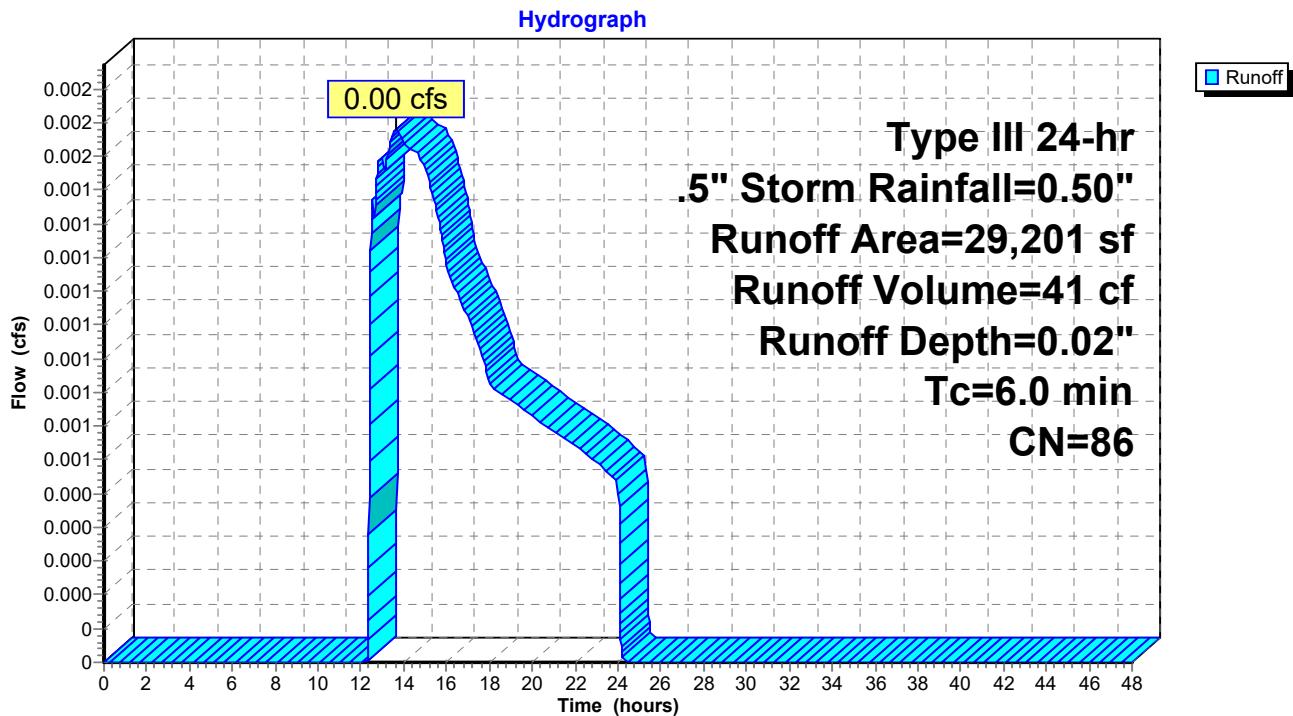
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**Summary for Subcatchment P-1C: Subcatchment to Infiltration Trench #2**

Runoff = 0.00 cfs @ 13.66 hrs, Volume= 41 cf, Depth= 0.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
Type III 24-hr .5" Storm Rainfall=0.50"

Area (sf)	CN	Description			
19,431	98	Paved parking, HSG B			
9,770	61	>75% Grass cover, Good, HSG B			
29,201	86	Weighted Average			
9,770		33.46% Pervious Area			
19,431		66.54% Impervious Area			
Tc	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					<b>Direct Entry, Direct Entry</b>
5.0	0				Total, Increased to minimum Tc = 6.0 min

**Subcatchment P-1C: Subcatchment to Infiltration Trench #2**

**Proposed HydroCAD 533 Boston Post Road**

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*Type III 24-hr .5" Storm Rainfall=0.50"*

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**Hydrograph for Subcatchment P-1C: Subcatchment to Infiltration Trench #2**

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.50	0.50	0.02	0.00
0.50	0.00	0.00	0.00	27.00	0.50	0.02	0.00
1.00	0.01	0.00	0.00	27.50	0.50	0.02	0.00
1.50	0.01	0.00	0.00	28.00	0.50	0.02	0.00
2.00	0.01	0.00	0.00	28.50	0.50	0.02	0.00
2.50	0.01	0.00	0.00	29.00	0.50	0.02	0.00
3.00	0.02	0.00	0.00	29.50	0.50	0.02	0.00
3.50	0.02	0.00	0.00	30.00	0.50	0.02	0.00
4.00	0.02	0.00	0.00	30.50	0.50	0.02	0.00
4.50	0.02	0.00	0.00	31.00	0.50	0.02	0.00
5.00	0.03	0.00	0.00	31.50	0.50	0.02	0.00
5.50	0.03	0.00	0.00	32.00	0.50	0.02	0.00
6.00	0.04	0.00	0.00	32.50	0.50	0.02	0.00
6.50	0.04	0.00	0.00	33.00	0.50	0.02	0.00
7.00	0.05	0.00	0.00	33.50	0.50	0.02	0.00
7.50	0.05	0.00	0.00	34.00	0.50	0.02	0.00
8.00	0.06	0.00	0.00	34.50	0.50	0.02	0.00
8.50	0.06	0.00	0.00	35.00	0.50	0.02	0.00
9.00	0.07	0.00	0.00	35.50	0.50	0.02	0.00
9.50	0.08	0.00	0.00	36.00	0.50	0.02	0.00
10.00	0.09	0.00	0.00	36.50	0.50	0.02	0.00
10.50	0.11	0.00	0.00	37.00	0.50	0.02	0.00
11.00	0.13	0.00	0.00	37.50	0.50	0.02	0.00
11.50	0.15	0.00	0.00	38.00	0.50	0.02	0.00
12.00	0.25	0.00	0.00	38.50	0.50	0.02	0.00
12.50	0.35	0.00	0.00	39.00	0.50	0.02	0.00
13.00	0.37	0.00	0.00	39.50	0.50	0.02	0.00
13.50	0.39	0.00	<b>0.00</b>	40.00	0.50	0.02	0.00
14.00	0.41	0.00	<b>0.00</b>	40.50	0.50	0.02	0.00
14.50	0.42	0.00	0.00	41.00	0.50	0.02	0.00
15.00	0.43	0.01	0.00	41.50	0.50	0.02	0.00
15.50	0.44	0.01	0.00	42.00	0.50	0.02	0.00
16.00	0.44	0.01	0.00	42.50	0.50	0.02	0.00
16.50	0.45	0.01	0.00	43.00	0.50	0.02	0.00
17.00	0.45	0.01	0.00	43.50	0.50	0.02	0.00
17.50	0.46	0.01	0.00	44.00	0.50	0.02	0.00
18.00	0.46	0.01	0.00	44.50	0.50	0.02	0.00
18.50	0.47	0.01	0.00	45.00	0.50	0.02	0.00
19.00	0.47	0.01	0.00	45.50	0.50	0.02	0.00
19.50	0.48	0.01	0.00	46.00	0.50	0.02	0.00
20.00	0.48	0.01	0.00	46.50	0.50	0.02	0.00
20.50	0.48	0.01	0.00	47.00	0.50	0.02	0.00
21.00	0.48	0.01	0.00	47.50	0.50	0.02	0.00
21.50	0.49	0.01	0.00	48.00	0.50	0.02	0.00
22.00	0.49	0.02	0.00				
22.50	0.49	0.02	0.00				
23.00	0.50	0.02	0.00				
23.50	0.50	0.02	0.00				
24.00	<b>0.50</b>	<b>0.02</b>	0.00				
24.50	0.50	0.02	0.00				
25.00	0.50	0.02	0.00				
25.50	0.50	0.02	0.00				
26.00	0.50	0.02	0.00				

**Proposed HydroCAD 533 Boston Post Road**

Prepared by {enter your company name here}

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*Type III 24-hr .5" Storm Rainfall=0.50"*

Printed 1/12/2023

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**Summary for Subcatchment P-1D: Subcatchment to Infiltration Trench 1**

Runoff = 0.00 cfs @ 21.98 hrs, Volume= 2 cf, Depth= 0.00"

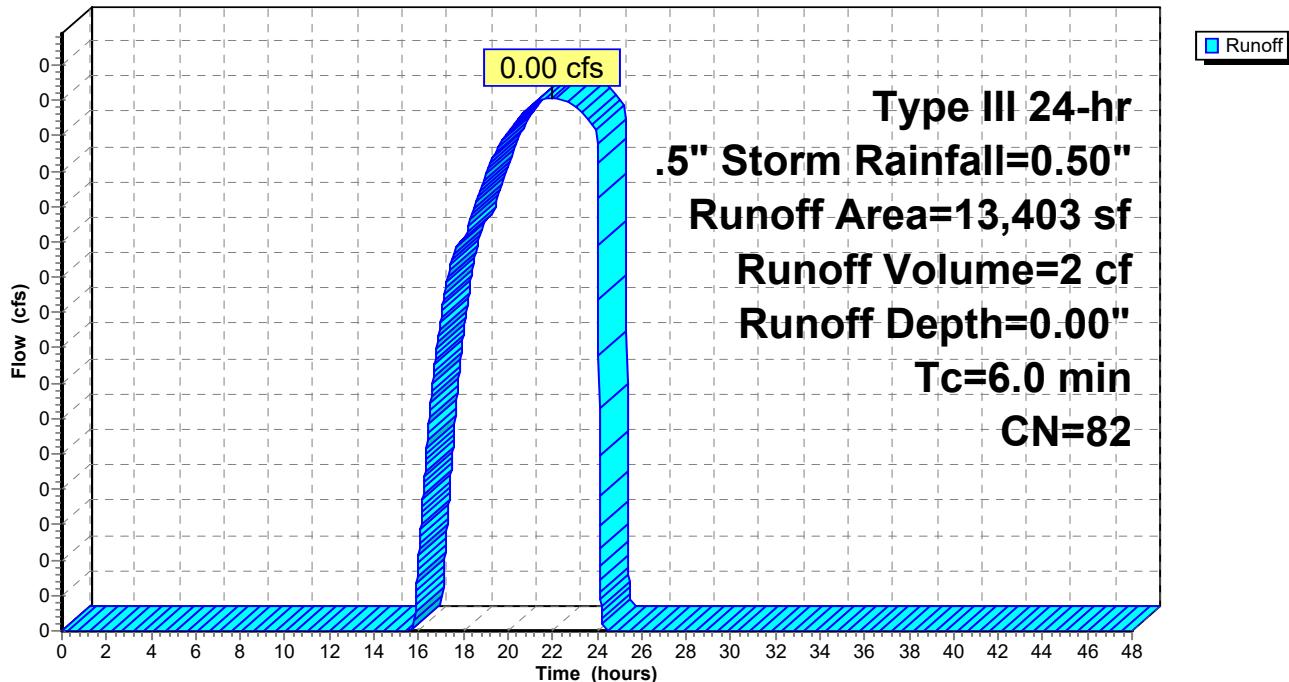
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
Type III 24-hr .5" Storm Rainfall=0.50"

Area (sf)	CN	Description
7,822	98	Paved parking, HSG B
2,453	61	>75% Grass cover, Good, HSG B
3,128	60	Woods, Fair, HSG B
13,403	82	Weighted Average
5,581		41.64% Pervious Area
7,822		58.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					<b>Direct Entry, Direct Entry</b>
5.0	0				Total, Increased to minimum Tc = 6.0 min

**Subcatchment P-1D: Subcatchment to Infiltration Trench 1**

Hydrograph



**Proposed HydroCAD 533 Boston Post Road**

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*Type III 24-hr .5" Storm Rainfall=0.50"*

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**Hydrograph for Subcatchment P-1D: Subcatchment to Infiltration Trench 1**

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.50	0.50	0.00	0.00
0.50	0.00	0.00	0.00	27.00	0.50	0.00	0.00
1.00	0.01	0.00	0.00	27.50	0.50	0.00	0.00
1.50	0.01	0.00	0.00	28.00	0.50	0.00	0.00
2.00	0.01	0.00	0.00	28.50	0.50	0.00	0.00
2.50	0.01	0.00	0.00	29.00	0.50	0.00	0.00
3.00	0.02	0.00	0.00	29.50	0.50	0.00	0.00
3.50	0.02	0.00	0.00	30.00	0.50	0.00	0.00
4.00	0.02	0.00	0.00	30.50	0.50	0.00	0.00
4.50	0.02	0.00	0.00	31.00	0.50	0.00	0.00
5.00	0.03	0.00	0.00	31.50	0.50	0.00	0.00
5.50	0.03	0.00	0.00	32.00	0.50	0.00	0.00
6.00	0.04	0.00	0.00	32.50	0.50	0.00	0.00
6.50	0.04	0.00	0.00	33.00	0.50	0.00	0.00
7.00	0.05	0.00	0.00	33.50	0.50	0.00	0.00
7.50	0.05	0.00	0.00	34.00	0.50	0.00	0.00
8.00	0.06	0.00	0.00	34.50	0.50	0.00	0.00
8.50	0.06	0.00	0.00	35.00	0.50	0.00	0.00
9.00	0.07	0.00	0.00	35.50	0.50	0.00	0.00
9.50	0.08	0.00	0.00	36.00	0.50	0.00	0.00
10.00	0.09	0.00	0.00	36.50	0.50	0.00	0.00
10.50	0.11	0.00	0.00	37.00	0.50	0.00	0.00
11.00	0.13	0.00	0.00	37.50	0.50	0.00	0.00
11.50	0.15	0.00	0.00	38.00	0.50	0.00	0.00
12.00	0.25	0.00	0.00	38.50	0.50	0.00	0.00
12.50	0.35	0.00	0.00	39.00	0.50	0.00	0.00
13.00	0.37	0.00	0.00	39.50	0.50	0.00	0.00
13.50	0.39	0.00	0.00	40.00	0.50	0.00	0.00
14.00	0.41	0.00	0.00	40.50	0.50	0.00	0.00
14.50	0.42	0.00	0.00	41.00	0.50	0.00	0.00
15.00	0.43	0.00	0.00	41.50	0.50	0.00	0.00
15.50	0.44	0.00	0.00	42.00	0.50	0.00	0.00
16.00	0.44	0.00	0.00	42.50	0.50	0.00	0.00
16.50	0.45	0.00	0.00	43.00	0.50	0.00	0.00
17.00	0.45	0.00	0.00	43.50	0.50	0.00	0.00
17.50	0.46	0.00	0.00	44.00	0.50	0.00	0.00
18.00	0.46	0.00	0.00	44.50	0.50	0.00	0.00
18.50	0.47	0.00	0.00	45.00	0.50	0.00	0.00
19.00	0.47	0.00	0.00	45.50	0.50	0.00	0.00
19.50	0.48	0.00	0.00	46.00	0.50	0.00	0.00
20.00	0.48	0.00	0.00	46.50	0.50	0.00	0.00
20.50	0.48	0.00	0.00	47.00	0.50	0.00	0.00
21.00	0.48	0.00	0.00	47.50	0.50	0.00	0.00
21.50	0.49	0.00	<b>0.00</b>	48.00	0.50	0.00	0.00
22.00	0.49	0.00	<b>0.00</b>				
22.50	0.49	0.00	0.00				
23.00	0.50	0.00	0.00				
23.50	0.50	0.00	0.00				
24.00	<b>0.50</b>	<b>0.00</b>	0.00				
24.50	0.50	0.00	0.00				
25.00	0.50	0.00	0.00				
25.50	0.50	0.00	0.00				
26.00	0.50	0.00	0.00				

**Summary for Subcatchment P-1U: Undetained to Wetlands**

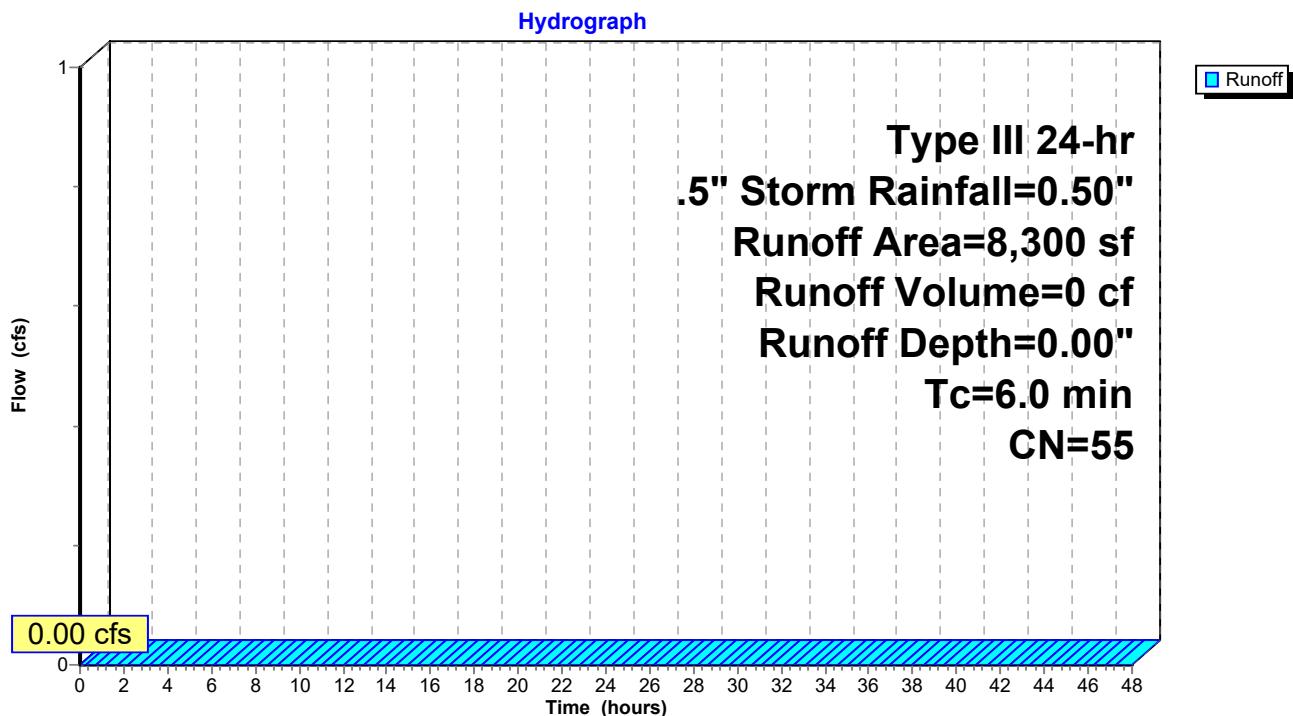
[45] Hint: Runoff=Zero

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
Type III 24-hr .5" Storm Rainfall=0.50"

Area (sf)	CN	Description
8,300	55	Woods, Good, HSG B
8,300		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0				<b>Direct Entry, Direct Entry</b>	
5.0	0			Total, Increased to minimum Tc = 6.0 min	

**Subcatchment P-1U: Undetained to Wetlands**

### Hydrograph for Subcatchment P-1U: Undetained to Wetlands

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	<b>0.00</b>	<b>0.00</b>	26.50	0.50	0.00	0.00
0.50	0.00	0.00	0.00	27.00	0.50	0.00	0.00
1.00	0.01	0.00	0.00	27.50	0.50	0.00	0.00
1.50	0.01	0.00	0.00	28.00	0.50	0.00	0.00
2.00	0.01	0.00	0.00	28.50	0.50	0.00	0.00
2.50	0.01	0.00	0.00	29.00	0.50	0.00	0.00
3.00	0.02	0.00	0.00	29.50	0.50	0.00	0.00
3.50	0.02	0.00	0.00	30.00	0.50	0.00	0.00
4.00	0.02	0.00	0.00	30.50	0.50	0.00	0.00
4.50	0.02	0.00	0.00	31.00	0.50	0.00	0.00
5.00	0.03	0.00	0.00	31.50	0.50	0.00	0.00
5.50	0.03	0.00	0.00	32.00	0.50	0.00	0.00
6.00	0.04	0.00	0.00	32.50	0.50	0.00	0.00
6.50	0.04	0.00	0.00	33.00	0.50	0.00	0.00
7.00	0.05	0.00	0.00	33.50	0.50	0.00	0.00
7.50	0.05	0.00	0.00	34.00	0.50	0.00	0.00
8.00	0.06	0.00	0.00	34.50	0.50	0.00	0.00
8.50	0.06	0.00	0.00	35.00	0.50	0.00	0.00
9.00	0.07	0.00	0.00	35.50	0.50	0.00	0.00
9.50	0.08	0.00	0.00	36.00	0.50	0.00	0.00
10.00	0.09	0.00	0.00	36.50	0.50	0.00	0.00
10.50	0.11	0.00	0.00	37.00	0.50	0.00	0.00
11.00	0.13	0.00	0.00	37.50	0.50	0.00	0.00
11.50	0.15	0.00	0.00	38.00	0.50	0.00	0.00
12.00	0.25	0.00	0.00	38.50	0.50	0.00	0.00
12.50	0.35	0.00	0.00	39.00	0.50	0.00	0.00
13.00	0.37	0.00	0.00	39.50	0.50	0.00	0.00
13.50	0.39	0.00	0.00	40.00	0.50	0.00	0.00
14.00	0.41	0.00	0.00	40.50	0.50	0.00	0.00
14.50	0.42	0.00	0.00	41.00	0.50	0.00	0.00
15.00	0.43	0.00	0.00	41.50	0.50	0.00	0.00
15.50	0.44	0.00	0.00	42.00	0.50	0.00	0.00
16.00	0.44	0.00	0.00	42.50	0.50	0.00	0.00
16.50	0.45	0.00	0.00	43.00	0.50	0.00	0.00
17.00	0.45	0.00	0.00	43.50	0.50	0.00	0.00
17.50	0.46	0.00	0.00	44.00	0.50	0.00	0.00
18.00	0.46	0.00	0.00	44.50	0.50	0.00	0.00
18.50	0.47	0.00	0.00	45.00	0.50	0.00	0.00
19.00	0.47	0.00	0.00	45.50	0.50	0.00	0.00
19.50	0.48	0.00	0.00	46.00	0.50	0.00	0.00
20.00	0.48	0.00	0.00	46.50	0.50	0.00	0.00
20.50	0.48	0.00	0.00	47.00	0.50	0.00	0.00
21.00	0.48	0.00	0.00	47.50	0.50	0.00	0.00
21.50	0.49	0.00	0.00	48.00	0.50	0.00	0.00
22.00	0.49	0.00	0.00				
22.50	0.49	0.00	0.00				
23.00	0.50	0.00	0.00				
23.50	0.50	0.00	0.00				
24.00	<b>0.50</b>	0.00	0.00				
24.50	0.50	0.00	0.00				
25.00	0.50	0.00	0.00				
25.50	0.50	0.00	0.00				
26.00	0.50	0.00	0.00				

### Summary for Subcatchment P-B1: Roof Runoff to Infiltration Trench #3

Runoff = 0.29 cfs @ 12.09 hrs, Volume= 908 cf, Depth= 0.32"

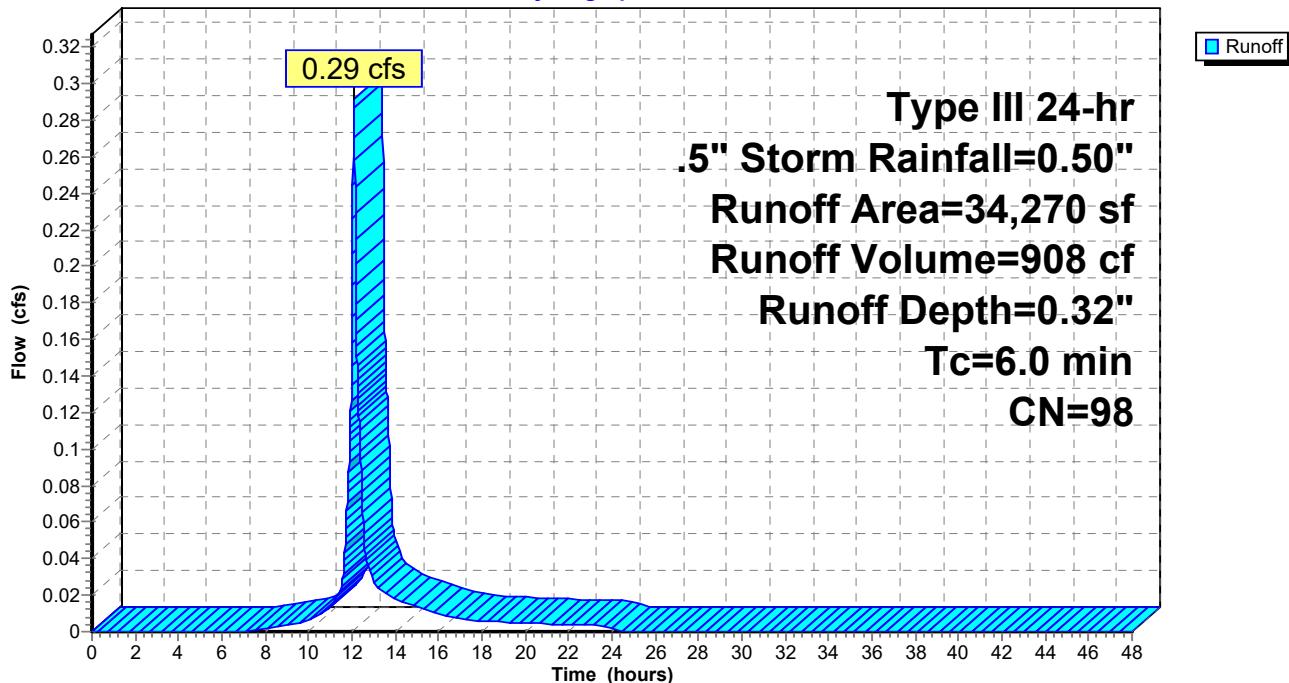
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
Type III 24-hr .5" Storm Rainfall=0.50"

Area (sf)	CN	Description
34,270	98	Roofs, HSG B
34,270		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0				<b>Direct Entry, Direct Entry</b>	
5.0	0			Total, Increased to minimum Tc = 6.0 min	

### Subcatchment P-B1: Roof Runoff to Infiltration Trench #3

Hydrograph



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**Hydrograph for Subcatchment P-B1: Roof Runoff to Infiltration Trench #3**

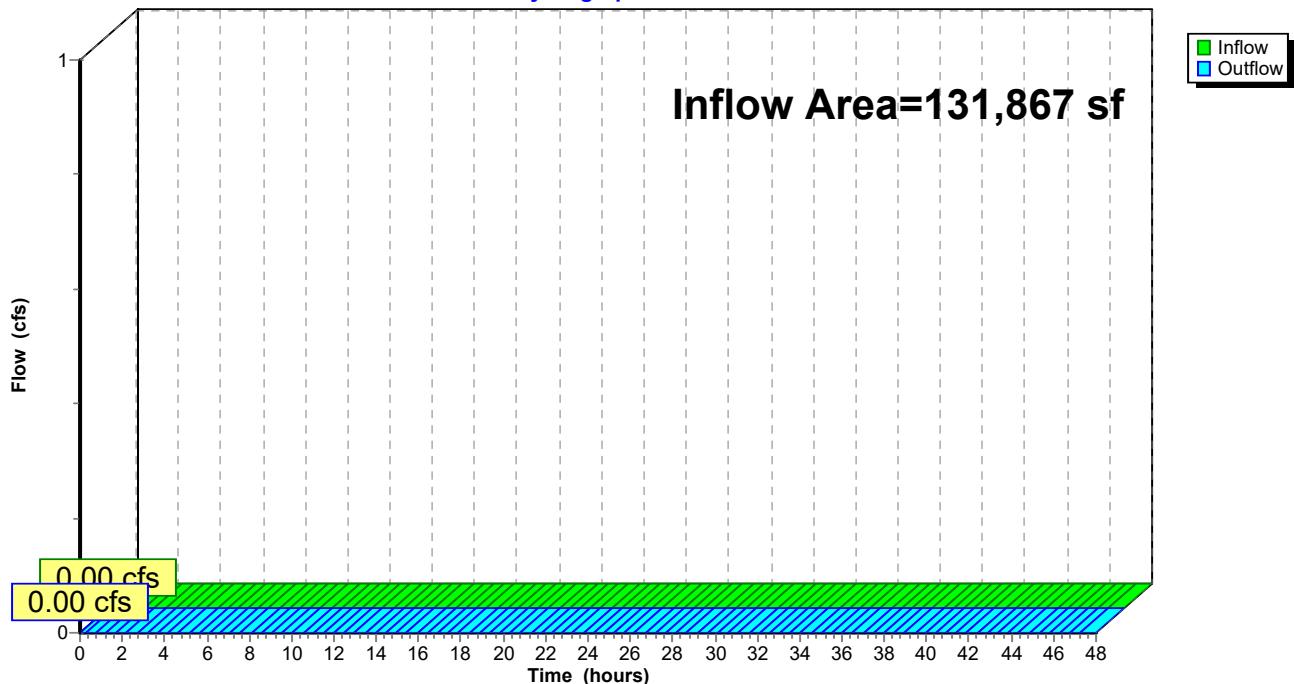
Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.50	0.50	0.32	0.00
0.50	0.00	0.00	0.00	27.00	0.50	0.32	0.00
1.00	0.01	0.00	0.00	27.50	0.50	0.32	0.00
1.50	0.01	0.00	0.00	28.00	0.50	0.32	0.00
2.00	0.01	0.00	0.00	28.50	0.50	0.32	0.00
2.50	0.01	0.00	0.00	29.00	0.50	0.32	0.00
3.00	0.02	0.00	0.00	29.50	0.50	0.32	0.00
3.50	0.02	0.00	0.00	30.00	0.50	0.32	0.00
4.00	0.02	0.00	0.00	30.50	0.50	0.32	0.00
4.50	0.02	0.00	0.00	31.00	0.50	0.32	0.00
5.00	0.03	0.00	0.00	31.50	0.50	0.32	0.00
5.50	0.03	0.00	0.00	32.00	0.50	0.32	0.00
6.00	0.04	0.00	0.00	32.50	0.50	0.32	0.00
6.50	0.04	0.00	0.00	33.00	0.50	0.32	0.00
7.00	0.05	0.00	0.00	33.50	0.50	0.32	0.00
7.50	0.05	0.00	0.00	34.00	0.50	0.32	0.00
8.00	0.06	0.00	0.00	34.50	0.50	0.32	0.00
8.50	0.06	0.00	0.00	35.00	0.50	0.32	0.00
9.00	0.07	0.00	0.00	35.50	0.50	0.32	0.00
9.50	0.08	0.01	0.01	36.00	0.50	0.32	0.00
10.00	0.09	0.01	0.01	36.50	0.50	0.32	0.00
10.50	0.11	0.02	0.01	37.00	0.50	0.32	0.00
11.00	0.13	0.02	0.01	37.50	0.50	0.32	0.00
11.50	0.15	0.04	0.02	38.00	0.50	0.32	0.00
12.00	0.25	0.11	<b>0.17</b>	38.50	0.50	0.32	0.00
12.50	0.35	0.19	<b>0.07</b>	39.00	0.50	0.32	0.00
13.00	0.37	0.21	0.03	39.50	0.50	0.32	0.00
13.50	0.39	0.22	0.02	40.00	0.50	0.32	0.00
14.00	0.41	0.23	0.02	40.50	0.50	0.32	0.00
14.50	0.42	0.24	0.02	41.00	0.50	0.32	0.00
15.00	0.43	0.25	0.01	41.50	0.50	0.32	0.00
15.50	0.44	0.26	0.01	42.00	0.50	0.32	0.00
16.00	0.44	0.27	0.01	42.50	0.50	0.32	0.00
16.50	0.45	0.27	0.01	43.00	0.50	0.32	0.00
17.00	0.45	0.28	0.01	43.50	0.50	0.32	0.00
17.50	0.46	0.28	0.01	44.00	0.50	0.32	0.00
18.00	0.46	0.29	0.01	44.50	0.50	0.32	0.00
18.50	0.47	0.29	0.01	45.00	0.50	0.32	0.00
19.00	0.47	0.29	0.01	45.50	0.50	0.32	0.00
19.50	0.48	0.30	0.00	46.00	0.50	0.32	0.00
20.00	0.48	0.30	0.00	46.50	0.50	0.32	0.00
20.50	0.48	0.30	0.00	47.00	0.50	0.32	0.00
21.00	0.48	0.30	0.00	47.50	0.50	0.32	0.00
21.50	0.49	0.31	0.00	48.00	0.50	0.32	0.00
22.00	0.49	0.31	0.00				
22.50	0.49	0.31	0.00				
23.00	0.50	0.31	0.00				
23.50	0.50	0.32	0.00				
24.00	<b>0.50</b>	<b>0.32</b>	0.00				
24.50	0.50	0.32	0.00				
25.00	0.50	0.32	0.00				
25.50	0.50	0.32	0.00				
26.00	0.50	0.32	0.00				

**Summary for Reach 1R: (new Reach)**

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

Inflow Area = 131,867 sf, 70.62% Impervious, Inflow Depth = 0.00" for .5" Storm 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

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3

**Reach 1R: (new Reach)****Hydrograph**

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**Hydrograph for Reach 1R: (new Reach)**

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	<b>0.00</b>		<b>0.00</b>	26.50	0.00		0.00
0.50	0.00	0.00	0.00	27.00	0.00		0.00
1.00	0.00	0.00	0.00	27.50	0.00		0.00
1.50	0.00	0.00	0.00	28.00	0.00		0.00
2.00	0.00	0.00	0.00	28.50	0.00		0.00
2.50	0.00	0.00	0.00	29.00	0.00		0.00
3.00	0.00	0.00	0.00	29.50	0.00		0.00
3.50	0.00	0.00	0.00	30.00	0.00		0.00
4.00	0.00	0.00	0.00	30.50	0.00		0.00
4.50	0.00	0.00	0.00	31.00	0.00		0.00
5.00	0.00	0.00	0.00	31.50	0.00		0.00
5.50	0.00	0.00	0.00	32.00	0.00		0.00
6.00	0.00	0.00	0.00	32.50	0.00		0.00
6.50	0.00	0.00	0.00	33.00	0.00		0.00
7.00	0.00	0.00	0.00	33.50	0.00		0.00
7.50	0.00	0.00	0.00	34.00	0.00		0.00
8.00	0.00	0.00	0.00	34.50	0.00		0.00
8.50	0.00	0.00	0.00	35.00	0.00		0.00
9.00	0.00	0.00	0.00	35.50	0.00		0.00
9.50	0.00	0.00	0.00	36.00	0.00		0.00
10.00	0.00	0.00	0.00	36.50	0.00		0.00
10.50	0.00	0.00	0.00	37.00	0.00		0.00
11.00	0.00	0.00	0.00	37.50	0.00		0.00
11.50	0.00	0.00	0.00	38.00	0.00		0.00
12.00	0.00	0.00	0.00	38.50	0.00		0.00
12.50	0.00	0.00	0.00	39.00	0.00		0.00
13.00	0.00	0.00	0.00	39.50	0.00		0.00
13.50	0.00	0.00	0.00	40.00	0.00		0.00
14.00	0.00	0.00	0.00	40.50	0.00		0.00
14.50	0.00	0.00	0.00	41.00	0.00		0.00
15.00	0.00	0.00	0.00	41.50	0.00		0.00
15.50	0.00	0.00	0.00	42.00	0.00		0.00
16.00	0.00	0.00	0.00	42.50	0.00		0.00
16.50	0.00	0.00	0.00	43.00	0.00		0.00
17.00	0.00	0.00	0.00	43.50	0.00		0.00
17.50	0.00	0.00	0.00	44.00	0.00		0.00
18.00	0.00	0.00	0.00	44.50	0.00		0.00
18.50	0.00	0.00	0.00	45.00	0.00		0.00
19.00	0.00	0.00	0.00	45.50	0.00		0.00
19.50	0.00	0.00	0.00	46.00	0.00		0.00
20.00	0.00	0.00	0.00	46.50	0.00		0.00
20.50	0.00	0.00	0.00	47.00	0.00		0.00
21.00	0.00	0.00	0.00	47.50	0.00		0.00
21.50	0.00	0.00	0.00	48.00	0.00		0.00
22.00	0.00	0.00					
22.50	0.00	0.00					
23.00	0.00	0.00					
23.50	0.00	0.00					
24.00	0.00	0.00					
24.50	0.00	0.00					
25.00	0.00	0.00					
25.50	0.00	0.00					
26.00	0.00	0.00					

**Summary for Pond IB-1: Infiltration Basin #1**

Inflow Area = 13,425 sf, 66.59% Impervious, Inflow Depth = 0.01" for .5" Storm event  
 Inflow = 0.00 cfs @ 14.82 hrs, Volume= 13 cf  
 Outflow = 0.00 cfs @ 14.92 hrs, Volume= 13 cf, Atten= 0%, Lag= 5.9 min  
 Discarded = 0.00 cfs @ 14.92 hrs, Volume= 13 cf  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3  
 Peak Elev= 122.00' @ 14.92 hrs Surf.Area= 94 sf Storage= 0 cf

Plug-Flow detention time= 7.1 min calculated for 13 cf (100% of inflow)  
 Center-of-Mass det. time= 7.0 min ( 1,068.4 - 1,061.4 )

Volume	Invert	Avail.Storage	Storage Description
#1	122.00'	1,077 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
122.00	93	0	0
123.00	434	264	264
124.00	839	637	900
124.20	927	177	1,077

Device	Routing	Invert	Outlet Devices
#1	Discarded	122.00'	<b>1.020 in/hr Exfiltration over Surface area</b> Phase-In= 0.01'
#2	Primary	123.85'	<b>5.0' long x 2.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

**Discarded OutFlow** Max=0.00 cfs @ 14.92 hrs HW=122.00' (Free Discharge)  
 ↑1=Exfiltration (Exfiltration Controls 0.00 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=122.00' TW=0.00' (Dynamic Tailwater)  
 ↑2=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)

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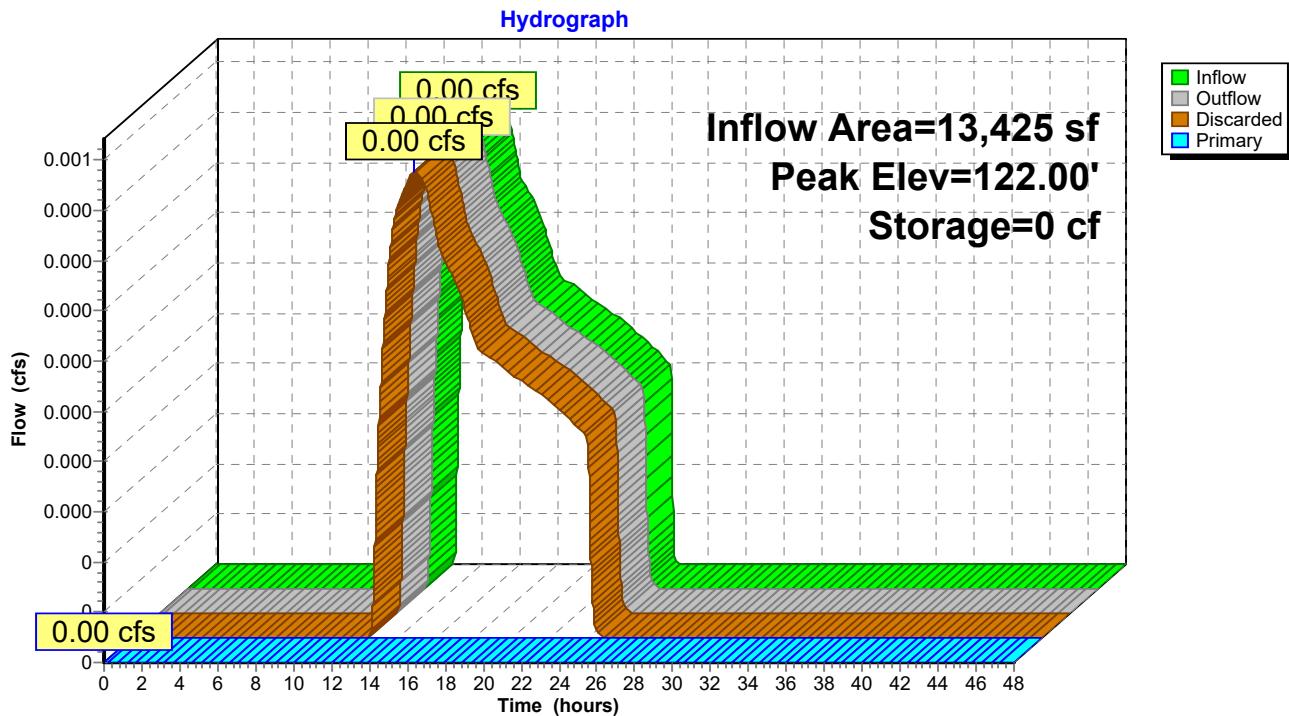
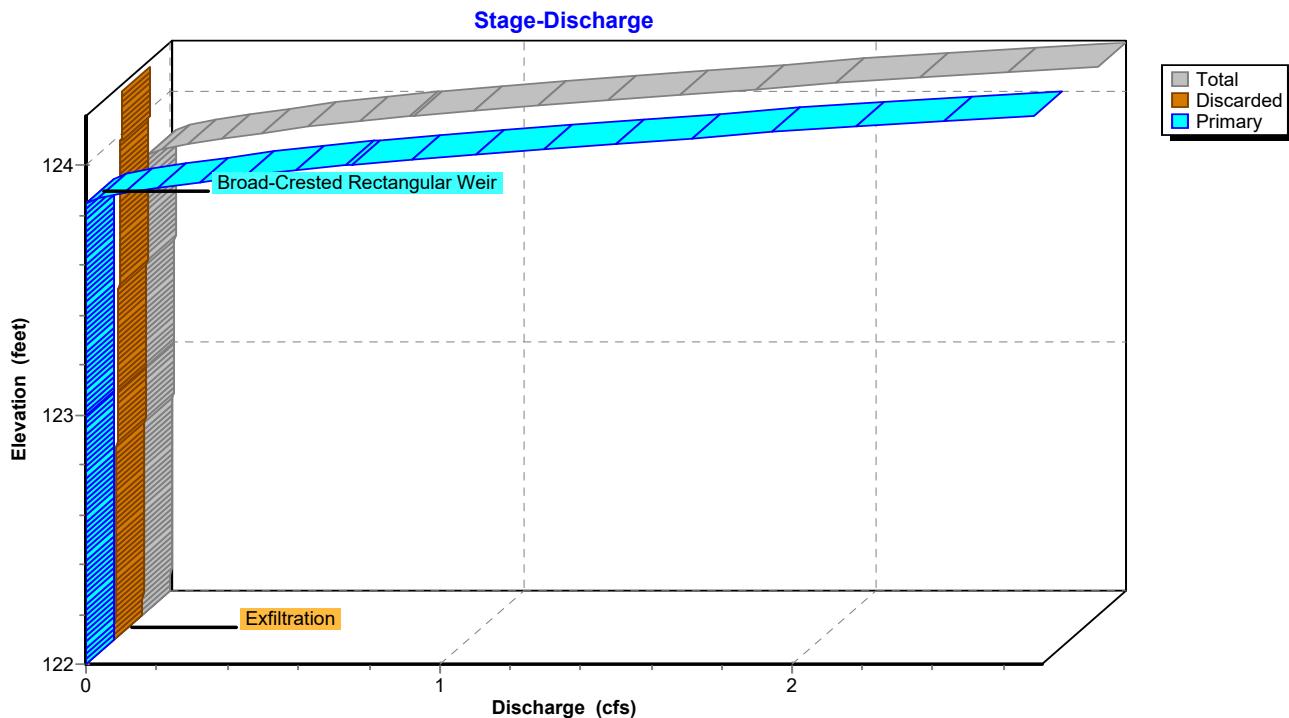
Prepared by {enter your company name here}

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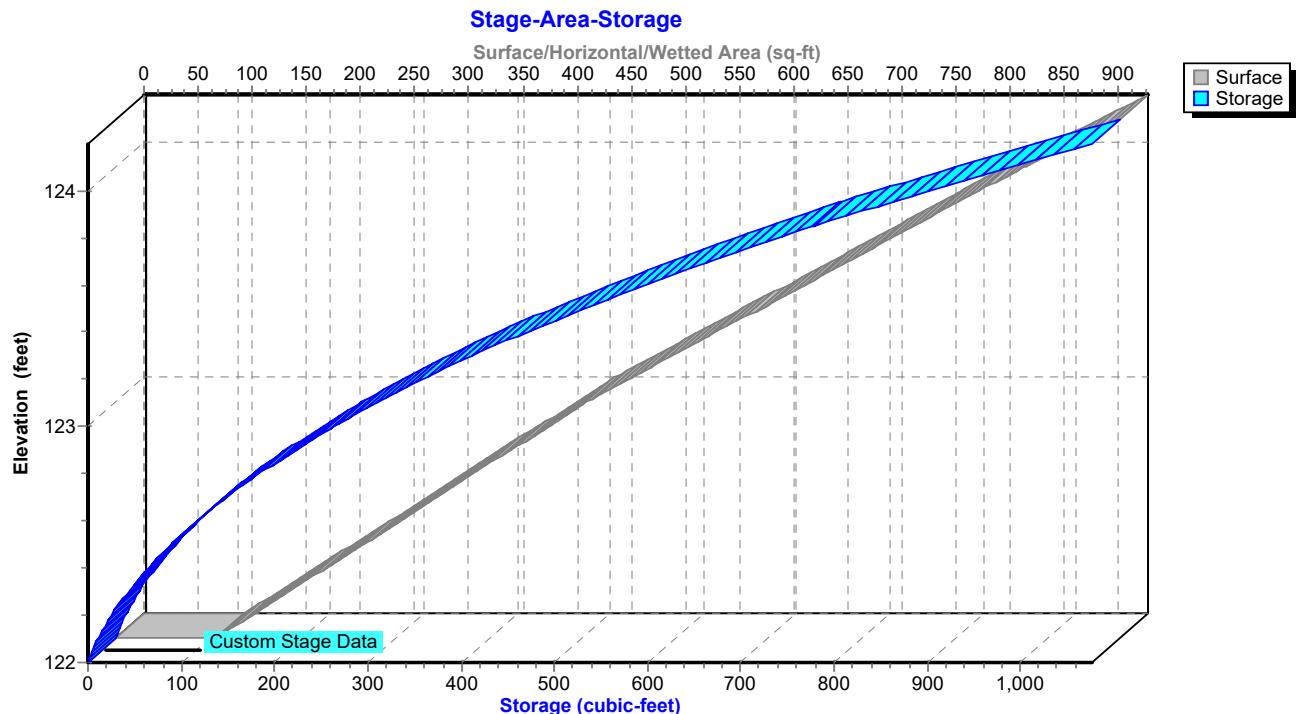
Type III 24-hr .5" Storm Rainfall=0.50"

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**Pond IB-1: Infiltration Basin #1****Pond IB-1: Infiltration Basin #1**

### Pond IB-1: Infiltration Basin #1



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*Type III 24-hr .5" Storm Rainfall=0.50"*

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**Hydrograph for Pond IB-1: Infiltration Basin #1**

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	122.00	0.00	0.00	<b>0.00</b>
1.00	0.00	0	122.00	0.00	0.00	0.00
2.00	0.00	0	122.00	0.00	0.00	0.00
3.00	0.00	0	122.00	0.00	0.00	0.00
4.00	0.00	0	122.00	0.00	0.00	0.00
5.00	0.00	0	122.00	0.00	0.00	0.00
6.00	0.00	0	122.00	0.00	0.00	0.00
7.00	0.00	0	122.00	0.00	0.00	0.00
8.00	0.00	0	122.00	0.00	0.00	0.00
9.00	0.00	0	122.00	0.00	0.00	0.00
10.00	0.00	0	122.00	0.00	0.00	0.00
11.00	0.00	0	122.00	0.00	0.00	0.00
12.00	0.00	0	122.00	0.00	0.00	0.00
13.00	0.00	0	122.00	0.00	0.00	0.00
14.00	<b>0.00</b>	<b>0</b>	<b>122.00</b>	<b>0.00</b>	<b>0.00</b>	0.00
15.00	<b>0.00</b>	<b>0</b>	<b>122.00</b>	<b>0.00</b>	<b>0.00</b>	0.00
16.00	0.00	0	122.00	0.00	0.00	0.00
17.00	0.00	0	122.00	0.00	0.00	0.00
18.00	0.00	0	122.00	0.00	0.00	0.00
19.00	0.00	0	122.00	0.00	0.00	0.00
20.00	0.00	0	122.00	0.00	0.00	0.00
21.00	0.00	0	122.00	0.00	0.00	0.00
22.00	0.00	0	122.00	0.00	0.00	0.00
23.00	0.00	0	122.00	0.00	0.00	0.00
24.00	0.00	0	122.00	0.00	0.00	0.00
25.00	0.00	0	122.00	0.00	0.00	0.00
26.00	0.00	0	122.00	0.00	0.00	0.00
27.00	0.00	0	122.00	0.00	0.00	0.00
28.00	0.00	0	122.00	0.00	0.00	0.00
29.00	0.00	0	122.00	0.00	0.00	0.00
30.00	0.00	0	122.00	0.00	0.00	0.00
31.00	0.00	0	122.00	0.00	0.00	0.00
32.00	0.00	0	122.00	0.00	0.00	0.00
33.00	0.00	0	122.00	0.00	0.00	0.00
34.00	0.00	0	122.00	0.00	0.00	0.00
35.00	0.00	0	122.00	0.00	0.00	0.00
36.00	0.00	0	122.00	0.00	0.00	0.00
37.00	0.00	0	122.00	0.00	0.00	0.00
38.00	0.00	0	122.00	0.00	0.00	0.00
39.00	0.00	0	122.00	0.00	0.00	0.00
40.00	0.00	0	122.00	0.00	0.00	0.00
41.00	0.00	0	122.00	0.00	0.00	0.00
42.00	0.00	0	122.00	0.00	0.00	0.00
43.00	0.00	0	122.00	0.00	0.00	0.00
44.00	0.00	0	122.00	0.00	0.00	0.00
45.00	0.00	0	122.00	0.00	0.00	0.00
46.00	0.00	0	122.00	0.00	0.00	0.00
47.00	0.00	0	122.00	0.00	0.00	0.00
48.00	0.00	0	122.00	0.00	0.00	0.00

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*Type III 24-hr .5" Storm Rainfall=0.50"*

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**Stage-Discharge for Pond IB-1: Infiltration Basin #1**

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
122.00	0.00	0.00	0.00
122.05	0.00	0.00	0.00
122.10	0.00	0.00	0.00
122.15	0.00	0.00	0.00
122.20	0.00	0.00	0.00
122.25	0.00	0.00	0.00
122.30	0.00	0.00	0.00
122.35	0.01	0.01	0.00
122.40	0.01	0.01	0.00
122.45	0.01	0.01	0.00
122.50	0.01	0.01	0.00
122.55	0.01	0.01	0.00
122.60	0.01	0.01	0.00
122.65	0.01	0.01	0.00
122.70	0.01	0.01	0.00
122.75	0.01	0.01	0.00
122.80	0.01	0.01	0.00
122.85	0.01	0.01	0.00
122.90	0.01	0.01	0.00
122.95	0.01	0.01	0.00
123.00	0.01	0.01	0.00
123.05	0.01	0.01	0.00
123.10	0.01	0.01	0.00
123.15	0.01	0.01	0.00
123.20	0.01	0.01	0.00
123.25	0.01	0.01	0.00
123.30	0.01	0.01	0.00
123.35	0.01	0.01	0.00
123.40	0.01	0.01	0.00
123.45	0.01	0.01	0.00
123.50	0.02	0.02	0.00
123.55	0.02	0.02	0.00
123.60	0.02	0.02	0.00
123.65	0.02	0.02	0.00
123.70	0.02	0.02	0.00
123.75	0.02	0.02	0.00
123.80	0.02	0.02	0.00
123.85	0.02	0.02	0.00
123.90	0.16	0.02	0.14
123.95	0.42	0.02	0.40
124.00	0.76	0.02	0.74
124.05	1.16	0.02	1.14
124.10	1.62	0.02	1.60
124.15	2.14	0.02	2.12
124.20	<b>2.71</b>	<b>0.02</b>	<b>2.68</b>

**Stage-Area-Storage for Pond IB-1: Infiltration Basin #1**

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
122.00	93	0
122.05	110	5
122.10	127	11
122.15	144	18
122.20	161	25
122.25	178	34
122.30	195	43
122.35	212	53
122.40	229	64
122.45	246	76
122.50	264	89
122.55	281	103
122.60	298	117
122.65	315	132
122.70	332	149
122.75	349	166
122.80	366	184
122.85	383	202
122.90	400	222
122.95	417	242
123.00	434	264
123.05	454	286
123.10	474	309
123.15	495	333
123.20	515	358
123.25	535	385
123.30	555	412
123.35	576	440
123.40	596	470
123.45	616	500
123.50	637	531
123.55	657	563
123.60	677	597
123.65	697	631
123.70	718	667
123.75	738	703
123.80	758	740
123.85	778	779
123.90	799	818
123.95	819	859
124.00	839	900
124.05	861	942
124.10	883	986
124.15	905	1,031
124.20	927	1,077

## Summary for Pond IB-2: Infiltration Basin #2

Inflow Area = 33,268 sf, 68.13% Impervious, Inflow Depth = 0.02" for .5" Storm event  
 Inflow = 0.00 cfs @ 13.66 hrs, Volume= 47 cf  
 Outflow = 0.00 cfs @ 13.79 hrs, Volume= 47 cf, Atten= 0%, Lag= 7.6 min  
 Discarded = 0.00 cfs @ 13.79 hrs, Volume= 47 cf  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3  
 Peak Elev= 122.00' @ 13.79 hrs Surf.Area= 673 sf Storage= 1 cf

Plug-Flow detention time= 7.1 min calculated for 47 cf (100% of inflow)  
 Center-of-Mass det. time= 7.1 min ( 1,032.3 - 1,025.2 )

Volume	Invert	Avail.Storage	Storage Description	
#1	122.00'	3,647 cf	<b>Custom Stage Data (Prismatic)</b>	Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	
122.00	672	0	0	
123.00	1,538	1,105	1,105	
124.00	2,504	2,021	3,126	
124.20	2,704	521	3,647	

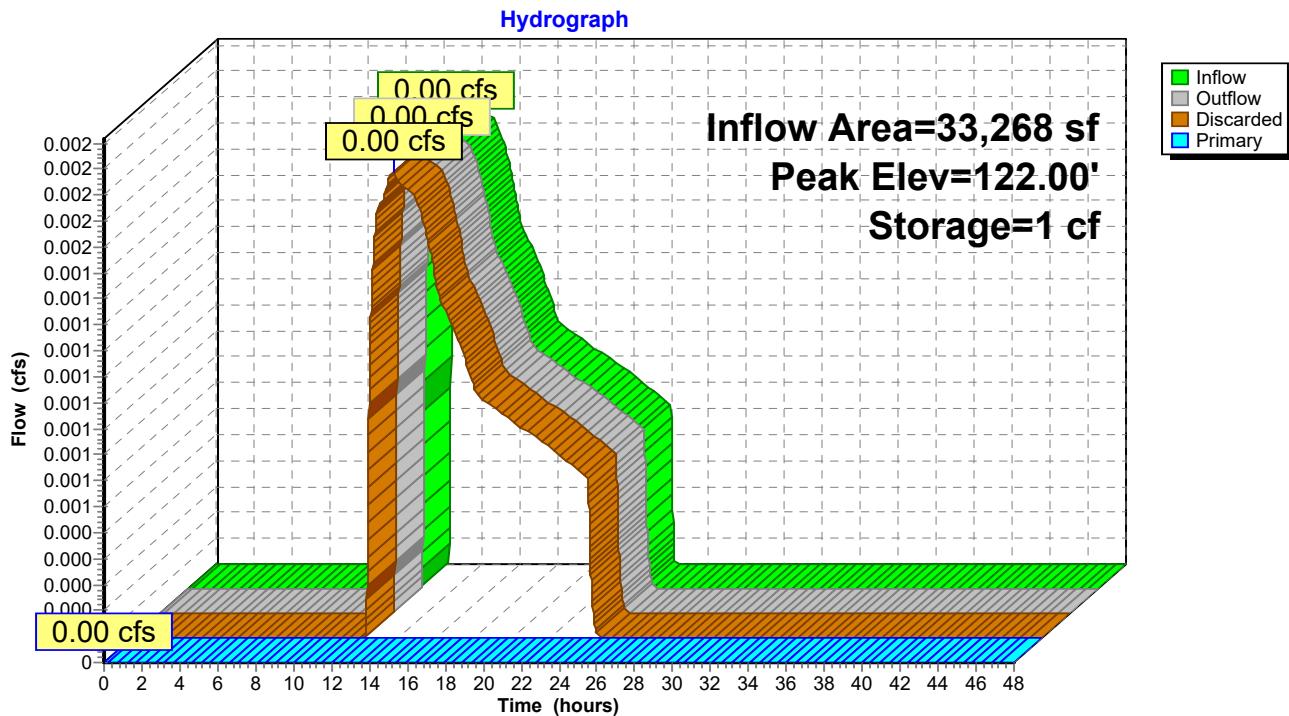
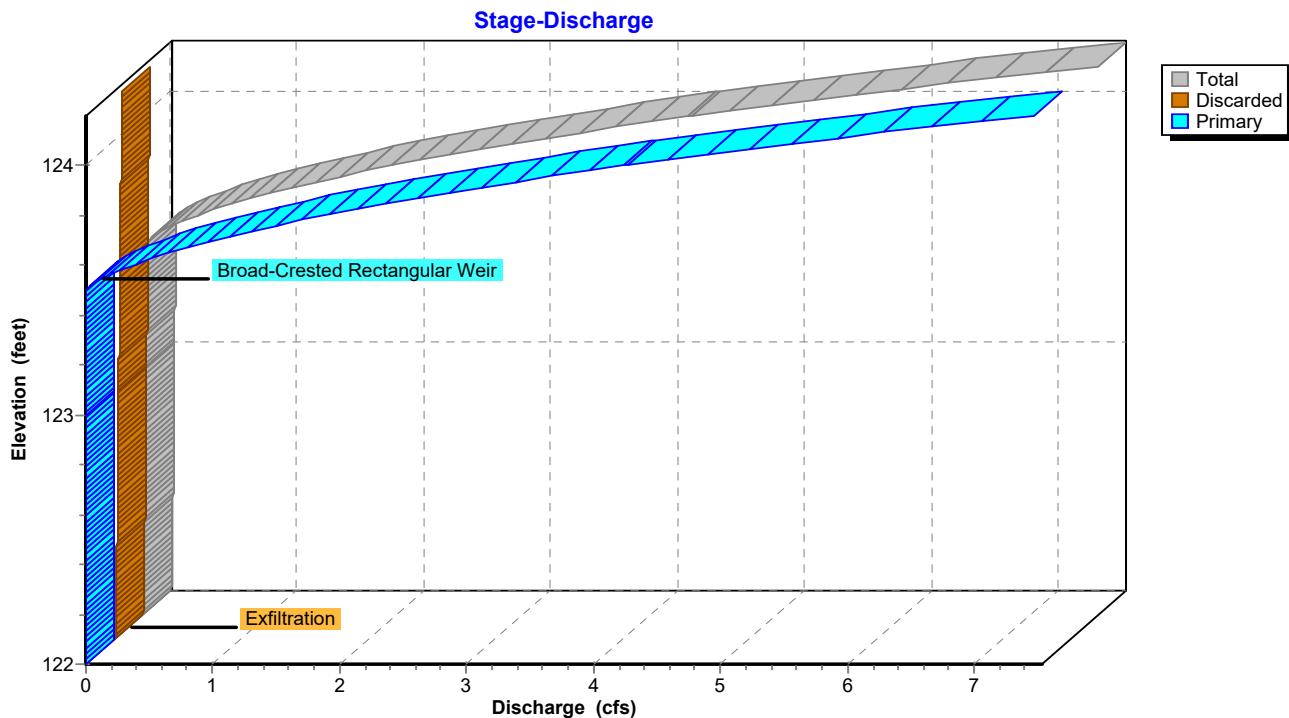
Device	Routing	Invert	Outlet Devices	
#1	Discarded	122.00'	<b>1.020 in/hr Exfiltration over Surface area</b>	Phase-In= 0.01'
#2	Device 3	123.50'	<b>4.0' long x 0.5' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32	
#3	Primary	121.90'	<b>18.0" Round Culvert</b> L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 121.90' / 121.70' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf	

**Discarded OutFlow** Max=0.00 cfs @ 13.79 hrs HW=122.00' (Free Discharge)

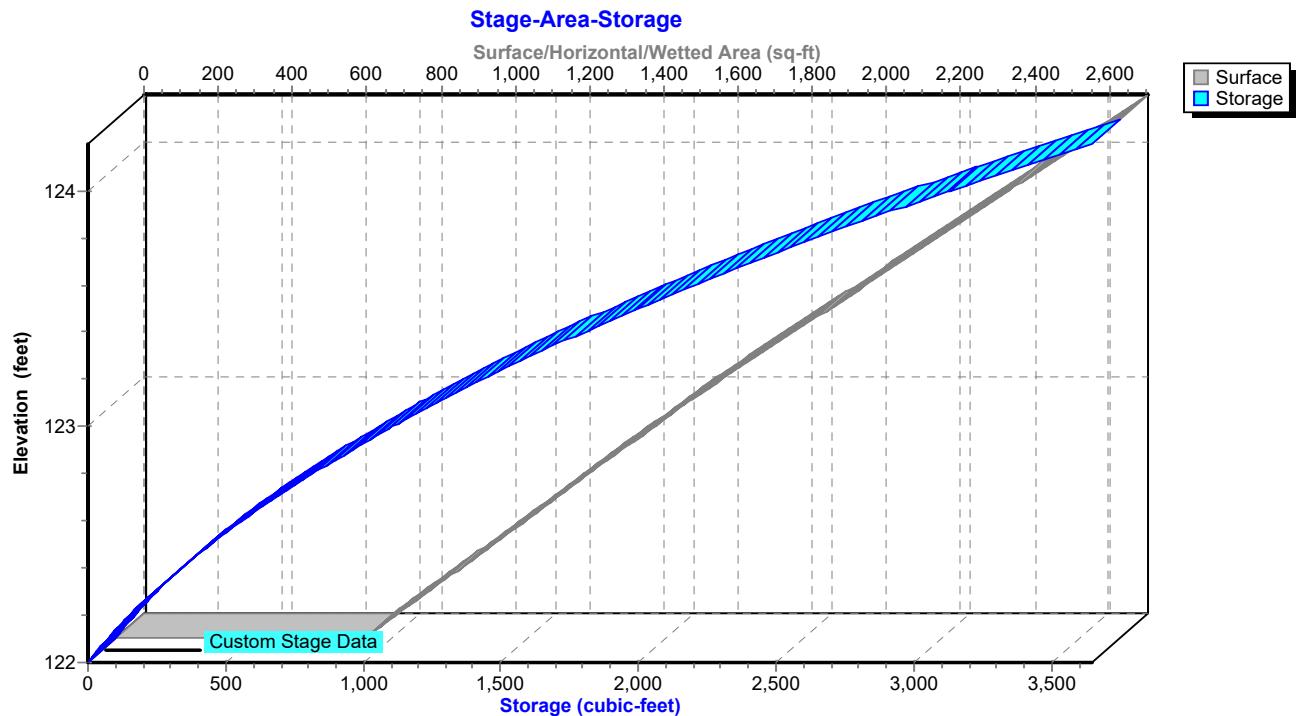
↑ 1=Exfiltration (Exfiltration Controls 0.00 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=122.00' TW=0.00' (Dynamic Tailwater)

↑ 3=Culvert (Passes 0.00 cfs of 0.05 cfs potential flow)  
 ↑ 2=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)

**Pond IB-2: Infiltration Basin #2****Pond IB-2: Infiltration Basin #2**

### Pond IB-2: Infiltration Basin #2



**Hydrograph for Pond IB-2: Infiltration Basin #2**

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	122.00	0.00	0.00	<b>0.00</b>
1.00	0.00	0	122.00	0.00	0.00	0.00
2.00	0.00	0	122.00	0.00	0.00	0.00
3.00	0.00	0	122.00	0.00	0.00	0.00
4.00	0.00	0	122.00	0.00	0.00	0.00
5.00	0.00	0	122.00	0.00	0.00	0.00
6.00	0.00	0	122.00	0.00	0.00	0.00
7.00	0.00	0	122.00	0.00	0.00	0.00
8.00	0.00	0	122.00	0.00	0.00	0.00
9.00	0.00	0	122.00	0.00	0.00	0.00
10.00	0.00	0	122.00	0.00	0.00	0.00
11.00	0.00	0	122.00	0.00	0.00	0.00
12.00	0.00	0	122.00	0.00	0.00	0.00
13.00	<b>0.00</b>	<b>1</b>	<b>122.00</b>	<b>0.00</b>	<b>0.00</b>	0.00
14.00	<b>0.00</b>	<b>1</b>	<b>122.00</b>	<b>0.00</b>	<b>0.00</b>	0.00
15.00	0.00	1	122.00	0.00	0.00	0.00
16.00	0.00	1	122.00	0.00	0.00	0.00
17.00	0.00	1	122.00	0.00	0.00	0.00
18.00	0.00	0	122.00	0.00	0.00	0.00
19.00	0.00	0	122.00	0.00	0.00	0.00
20.00	0.00	0	122.00	0.00	0.00	0.00
21.00	0.00	0	122.00	0.00	0.00	0.00
22.00	0.00	0	122.00	0.00	0.00	0.00
23.00	0.00	0	122.00	0.00	0.00	0.00
24.00	0.00	0	122.00	0.00	0.00	0.00
25.00	0.00	0	122.00	0.00	0.00	0.00
26.00	0.00	0	122.00	0.00	0.00	0.00
27.00	0.00	0	122.00	0.00	0.00	0.00
28.00	0.00	0	122.00	0.00	0.00	0.00
29.00	0.00	0	122.00	0.00	0.00	0.00
30.00	0.00	0	122.00	0.00	0.00	0.00
31.00	0.00	0	122.00	0.00	0.00	0.00
32.00	0.00	0	122.00	0.00	0.00	0.00
33.00	0.00	0	122.00	0.00	0.00	0.00
34.00	0.00	0	122.00	0.00	0.00	0.00
35.00	0.00	0	122.00	0.00	0.00	0.00
36.00	0.00	0	122.00	0.00	0.00	0.00
37.00	0.00	0	122.00	0.00	0.00	0.00
38.00	0.00	0	122.00	0.00	0.00	0.00
39.00	0.00	0	122.00	0.00	0.00	0.00
40.00	0.00	0	122.00	0.00	0.00	0.00
41.00	0.00	0	122.00	0.00	0.00	0.00
42.00	0.00	0	122.00	0.00	0.00	0.00
43.00	0.00	0	122.00	0.00	0.00	0.00
44.00	0.00	0	122.00	0.00	0.00	0.00
45.00	0.00	0	122.00	0.00	0.00	0.00
46.00	0.00	0	122.00	0.00	0.00	0.00
47.00	0.00	0	122.00	0.00	0.00	0.00
48.00	0.00	0	122.00	0.00	0.00	0.00

**Stage-Discharge for Pond IB-2: Infiltration Basin #2**

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
122.00	0.00	0.00	0.00
122.05	0.02	0.02	0.00
122.10	0.02	0.02	0.00
122.15	0.02	0.02	0.00
122.20	0.02	0.02	0.00
122.25	0.02	0.02	0.00
122.30	0.02	0.02	0.00
122.35	0.02	0.02	0.00
122.40	0.02	0.02	0.00
122.45	0.03	0.03	0.00
122.50	0.03	0.03	0.00
122.55	0.03	0.03	0.00
122.60	0.03	0.03	0.00
122.65	0.03	0.03	0.00
122.70	0.03	0.03	0.00
122.75	0.03	0.03	0.00
122.80	0.03	0.03	0.00
122.85	0.03	0.03	0.00
122.90	0.03	0.03	0.00
122.95	0.04	0.04	0.00
123.00	0.04	0.04	0.00
123.05	0.04	0.04	0.00
123.10	0.04	0.04	0.00
123.15	0.04	0.04	0.00
123.20	0.04	0.04	0.00
123.25	0.04	0.04	0.00
123.30	0.04	0.04	0.00
123.35	0.04	0.04	0.00
123.40	0.05	0.05	0.00
123.45	0.05	0.05	0.00
123.50	0.05	0.05	0.00
123.55	0.17	0.05	0.13
123.60	0.40	0.05	0.35
123.65	0.70	0.05	0.65
123.70	1.05	0.05	1.00
123.75	1.47	0.05	1.41
123.80	1.93	0.05	1.88
123.85	2.45	0.06	2.39
123.90	3.01	0.06	2.95
123.95	3.63	0.06	3.57
124.00	4.30	0.06	4.24
124.05	5.02	0.06	4.96
124.10	5.79	0.06	5.73
124.15	6.63	0.06	6.57
124.20	<b>7.54</b>	<b>0.06</b>	<b>7.47</b>

**Stage-Area-Storage for Pond IB-2: Infiltration Basin #2**

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
122.00	672	0
122.05	715	35
122.10	759	72
122.15	802	111
122.20	845	152
122.25	889	195
122.30	932	241
122.35	975	288
122.40	1,018	338
122.45	1,062	390
122.50	1,105	444
122.55	1,148	501
122.60	1,192	559
122.65	1,235	620
122.70	1,278	683
122.75	1,322	748
122.80	1,365	815
122.85	1,408	884
122.90	1,451	956
122.95	1,495	1,029
123.00	1,538	1,105
123.05	1,586	1,183
123.10	1,635	1,264
123.15	1,683	1,347
123.20	1,731	1,432
123.25	1,780	1,520
123.30	1,828	1,610
123.35	1,876	1,702
123.40	1,924	1,797
123.45	1,973	1,895
123.50	2,021	1,995
123.55	2,069	2,097
123.60	2,118	2,202
123.65	2,166	2,309
123.70	2,214	2,418
123.75	2,263	2,530
123.80	2,311	2,645
123.85	2,359	2,761
123.90	2,407	2,880
123.95	2,456	3,002
124.00	2,504	3,126
124.05	2,554	3,252
124.10	2,604	3,381
124.15	2,654	3,513
124.20	<b>2,704</b>	<b>3,647</b>

**Summary for Pond UG-1: Underground Detention System #1**

Inflow Area = 13,403 sf, 58.36% Impervious, Inflow Depth = 0.00" for .5" Storm event  
 Inflow = 0.00 cfs @ 21.98 hrs, Volume= 2 cf  
 Outflow = 0.00 cfs @ 24.11 hrs, Volume= 1 cf, Atten= 76%, Lag= 128.0 min  
 Primary = 0.00 cfs @ 24.11 hrs, Volume= 1 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3  
 Peak Elev= 122.40' @ 24.11 hrs Surf.Area= 820 sf Storage= 2 cf

Plug-Flow detention time= 772.1 min calculated for 1 cf (51% of inflow)  
 Center-of-Mass det. time= 663.8 min ( 1,894.6 - 1,230.7 )

Volume	Invert	Avail.Storage	Storage Description
#1A	122.40'	156 cf	<b>10.00'W x 82.00'L x 2.17'H Field A</b> 1,777 cf Overall - 1,387 cf Embedded = 390 cf x 40.0% Voids
#2A	122.40'	792 cf	<b>retain_it retain_it 1.5' x 10 Inside #1</b> Inside= 84.0"W x 18.0"H => 9.90 sf x 8.00'L = 79.2 cf Outside= 96.0"W x 26.0"H => 17.33 sf x 8.00'L = 138.7 cf
948 cf			Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	122.40'	<b>15.0" Round Culvert</b> L= 140.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 122.40' / 121.50' S= 0.0064 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.23 sf

**Primary OutFlow** Max=0.00 cfs @ 24.11 hrs HW=122.40' TW=121.50' (Dynamic Tailwater)  
 ↪1=Culvert (Barrel Controls 0.00 cfs @ 0.12 fps)

**Pond UG-1: Underground Detention System #1 - Chamber Wizard Field A****Chamber Model = retain\_it retain\_it 1.5' (retain-it®)**

Inside= 84.0"W x 18.0"H =&gt; 9.90 sf x 8.00'L = 79.2 cf

Outside= 96.0"W x 26.0"H =&gt; 17.33 sf x 8.00'L = 138.7 cf

10 Chambers/Row x 8.00' Long = 80.00' Row Length +12.0" End Stone x 2 = 82.00' Base Length

1 Rows x 96.0" Wide + 12.0" Side Stone x 2 = 10.00' Base Width

26.0" Chamber Height = 2.17' Field Height

10 Chambers x 79.2 cf = 791.7 cf Chamber Storage

10 Chambers x 138.7 cf = 1,386.7 cf Displacement

1,776.7 cf Field - 1,386.7 cf Chambers = 390.0 cf Stone x 40.0% Voids = 156.0 cf Stone Storage

Chamber Storage + Stone Storage = 947.7 cf = 0.022 af

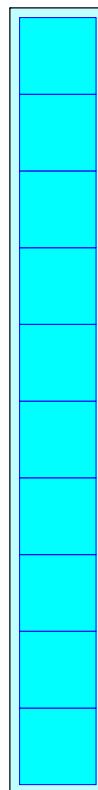
Overall Storage Efficiency = 53.3%

Overall System Size = 82.00' x 10.00' x 2.17'

10 Chambers

65.8 cy Field

14.4 cy Stone



**Proposed HydroCAD 533 Boston Post Road**

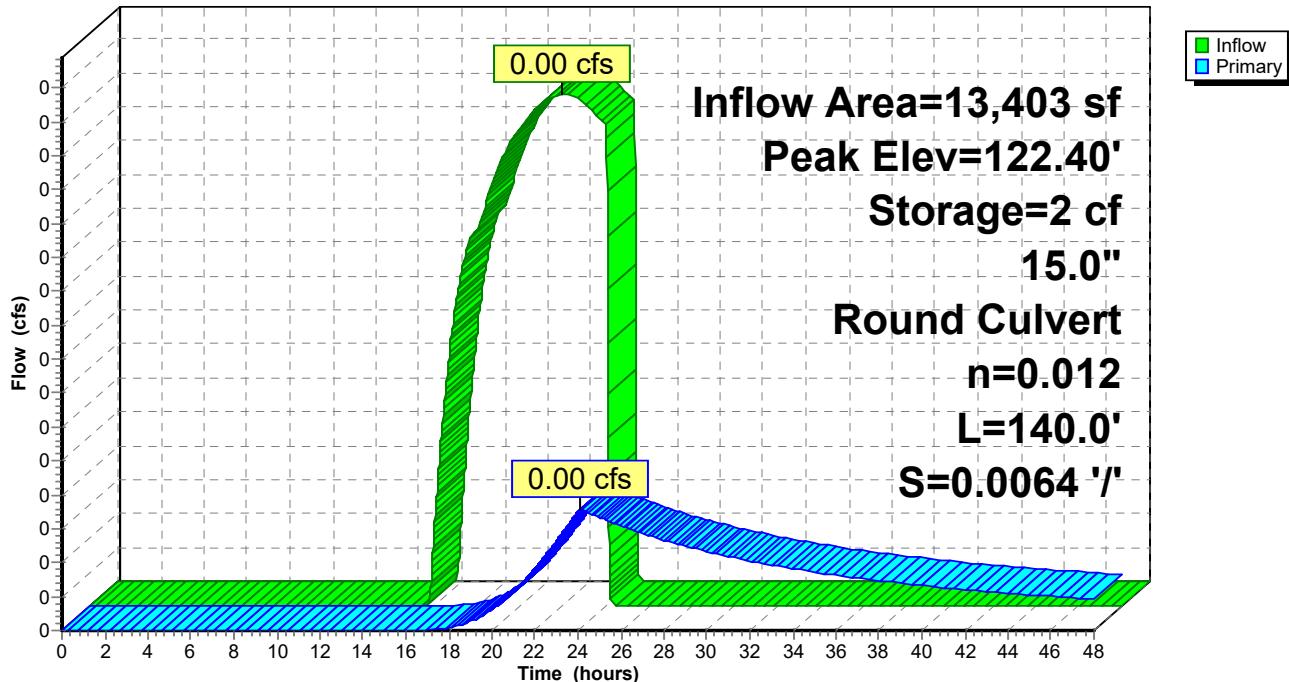
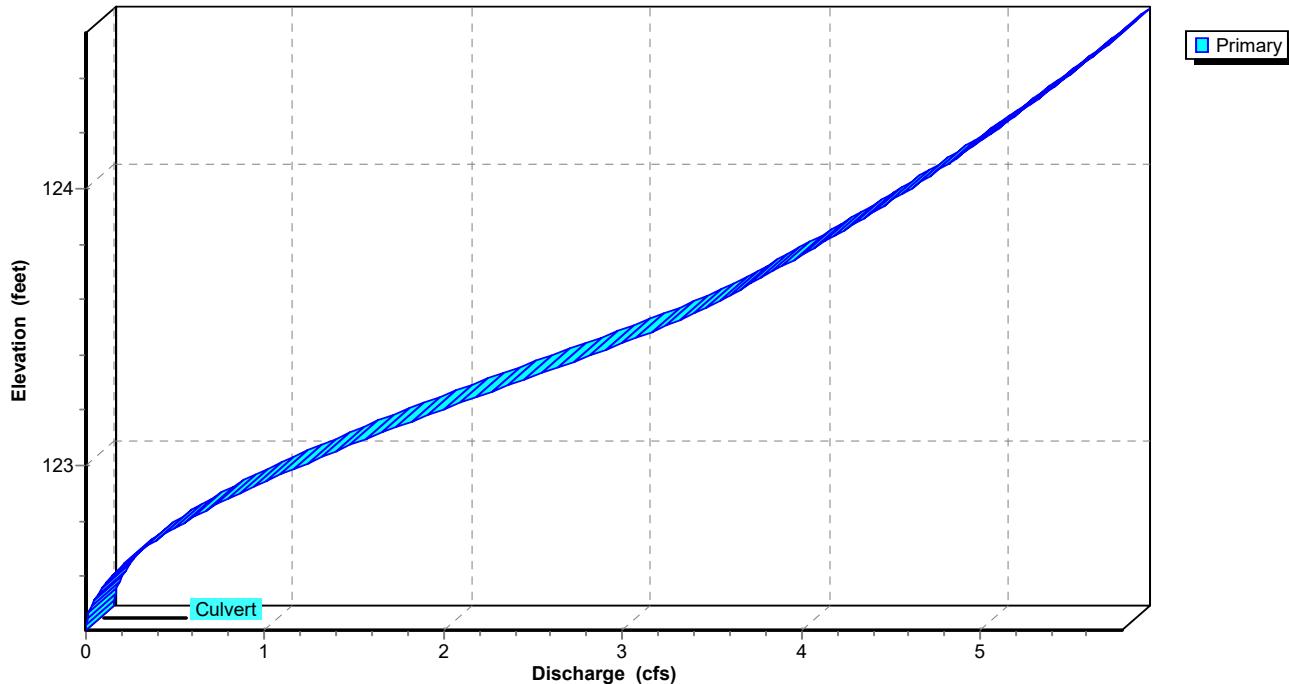
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Type III 24-hr .5" Storm Rainfall=0.50"

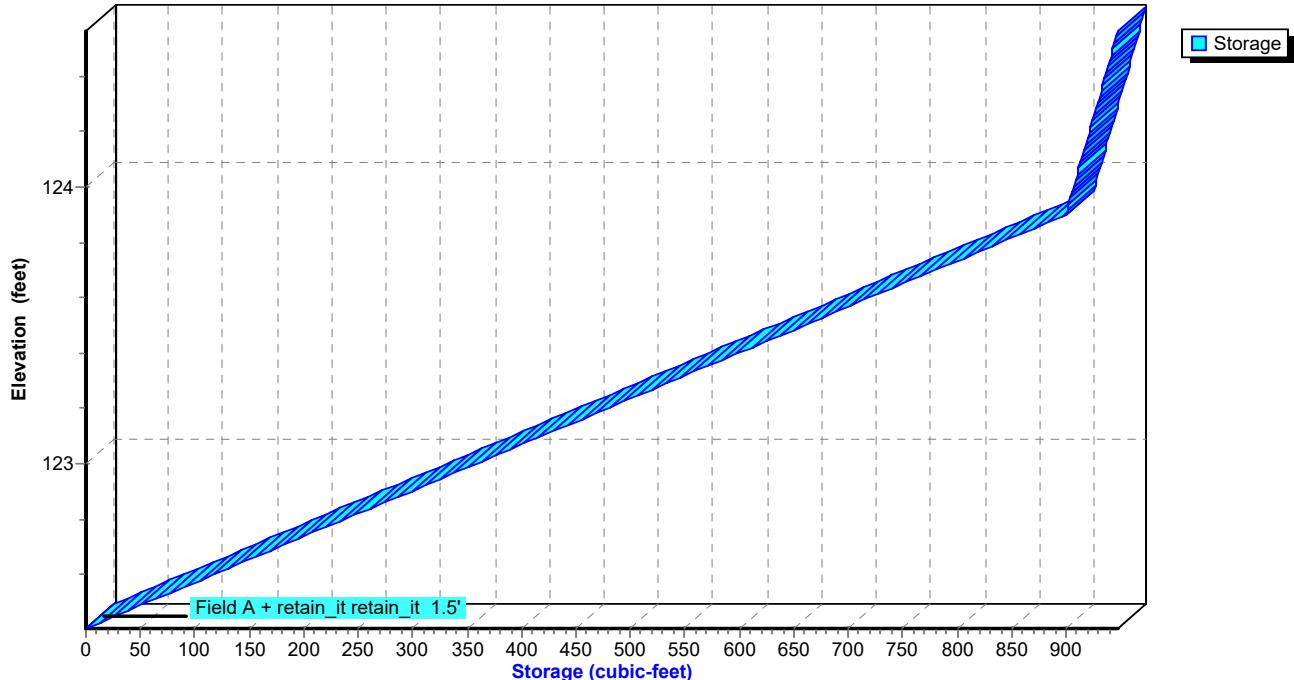
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**Pond UG-1: Underground Detention System #1****Hydrograph****Pond UG-1: Underground Detention System #1****Stage-Discharge**

### Pond UG-1: Underground Detention System #1

Stage-Area-Storage



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*Type III 24-hr .5" Storm Rainfall=0.50"*

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**Hydrograph for Pond UG-1: Underground Detention System #1**

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0	122.40	0.00
1.00	0.00	0	122.40	0.00
2.00	0.00	0	122.40	0.00
3.00	0.00	0	122.40	0.00
4.00	0.00	0	122.40	0.00
5.00	0.00	0	122.40	0.00
6.00	0.00	0	122.40	0.00
7.00	0.00	0	122.40	0.00
8.00	0.00	0	122.40	0.00
9.00	0.00	0	122.40	0.00
10.00	0.00	0	122.40	0.00
11.00	0.00	0	122.40	0.00
12.00	0.00	0	122.40	0.00
13.00	0.00	0	122.40	0.00
14.00	0.00	0	122.40	0.00
15.00	0.00	0	122.40	0.00
16.00	0.00	0	122.40	0.00
17.00	0.00	0	122.40	0.00
18.00	0.00	0	122.40	0.00
19.00	0.00	1	122.40	0.00
20.00	0.00	1	122.40	0.00
21.00	<b>0.00</b>	1	122.40	0.00
22.00	<b>0.00</b>	1	122.40	0.00
23.00	0.00	1	122.40	0.00
24.00	0.00	<b>2</b>	<b>122.40</b>	<b>0.00</b>
25.00	0.00	<b>2</b>	<b>122.40</b>	<b>0.00</b>
26.00	0.00	2	122.40	0.00
27.00	0.00	2	122.40	0.00
28.00	0.00	1	122.40	0.00
29.00	0.00	1	122.40	0.00
30.00	0.00	1	122.40	0.00
31.00	0.00	1	122.40	0.00
32.00	0.00	1	122.40	0.00
33.00	0.00	1	122.40	0.00
34.00	0.00	1	122.40	0.00
35.00	0.00	1	122.40	0.00
36.00	0.00	1	122.40	0.00
37.00	0.00	1	122.40	0.00
38.00	0.00	1	122.40	0.00
39.00	0.00	1	122.40	0.00
40.00	0.00	1	122.40	0.00
41.00	0.00	1	122.40	0.00
42.00	0.00	1	122.40	0.00
43.00	0.00	1	122.40	0.00
44.00	0.00	1	122.40	0.00
45.00	0.00	1	122.40	0.00
46.00	0.00	1	122.40	0.00
47.00	0.00	1	122.40	0.00
48.00	0.00	1	122.40	0.00

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*Type III 24-hr .5" Storm Rainfall=0.50"*

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**Stage-Discharge for Pond UG-1: Underground Detention System #1**

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
122.40	0.00	123.46	3.07	124.52	5.70
122.42	0.00	123.48	3.15	124.54	5.74
122.44	0.01	123.50	3.22	124.56	<b>5.78</b>
122.46	0.01	123.52	3.30		
122.48	0.02	123.54	3.37		
122.50	0.04	123.56	3.44		
122.52	0.06	123.58	3.50		
122.54	0.08	123.60	3.56		
122.56	0.10	123.62	3.62		
122.58	0.12	123.64	3.67		
122.60	0.15	123.66	3.72		
122.62	0.18	123.68	3.78		
122.64	0.22	123.70	3.83		
122.66	0.25	123.72	3.89		
122.68	0.29	123.74	3.94		
122.70	0.33	123.76	4.00		
122.72	0.38	123.78	4.05		
122.74	0.42	123.80	4.11		
122.76	0.47	123.82	4.16		
122.78	0.52	123.84	4.21		
122.80	0.58	123.86	4.26		
122.82	0.63	123.88	4.31		
122.84	0.69	123.90	4.36		
122.86	0.75	123.92	4.41		
122.88	0.81	123.94	4.46		
122.90	0.87	123.96	4.51		
122.92	0.94	123.98	4.56		
122.94	1.00	124.00	4.61		
122.96	1.07	124.02	4.65		
122.98	1.14	124.04	4.70		
123.00	1.21	124.06	4.75		
123.02	1.29	124.08	4.79		
123.04	1.36	124.10	4.84		
123.06	1.44	124.12	4.88		
123.08	1.51	124.14	4.93		
123.10	1.59	124.16	4.97		
123.12	1.67	124.18	5.01		
123.14	1.75	124.20	5.06		
123.16	1.83	124.22	5.10		
123.18	1.91	124.24	5.14		
123.20	1.99	124.26	5.18		
123.22	2.08	124.28	5.23		
123.24	2.16	124.30	5.27		
123.26	2.24	124.32	5.31		
123.28	2.33	124.34	5.35		
123.30	2.41	124.36	5.39		
123.32	2.50	124.38	5.43		
123.34	2.58	124.40	5.47		
123.36	2.66	124.42	5.51		
123.38	2.75	124.44	5.55		
123.40	2.83	124.46	5.59		
123.42	2.91	124.48	5.63		
123.44	2.99	124.50	5.67		

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**Stage-Area-Storage for Pond UG-1: Underground Detention System #1**

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
122.40	0	123.46	636	124.52	944
122.42	12	123.48	648	124.54	946
122.44	24	123.50	660	124.56	<b>947</b>
122.46	36	123.52	672		
122.48	48	123.54	684		
122.50	60	123.56	696		
122.52	72	123.58	708		
122.54	84	123.60	720		
122.56	96	123.62	732		
122.58	108	123.64	744		
122.60	120	123.66	756		
122.62	132	123.68	768		
122.64	144	123.70	780		
122.66	156	123.72	792		
122.68	168	123.74	804		
122.70	180	123.76	816		
122.72	192	123.78	828		
122.74	204	123.80	840		
122.76	216	123.82	852		
122.78	228	123.84	864		
122.80	240	123.86	876		
122.82	252	123.88	888		
122.84	264	123.90	900		
122.86	276	123.92	901		
122.88	288	123.94	903		
122.90	300	123.96	904		
122.92	312	123.98	905		
122.94	324	124.00	907		
122.96	336	124.02	908		
122.98	348	124.04	910		
123.00	360	124.06	911		
123.02	372	124.08	913		
123.04	384	124.10	914		
123.06	396	124.12	916		
123.08	408	124.14	917		
123.10	420	124.16	918		
123.12	432	124.18	920		
123.14	444	124.20	921		
123.16	456	124.22	923		
123.18	468	124.24	924		
123.20	480	124.26	926		
123.22	492	124.28	927		
123.24	504	124.30	929		
123.26	516	124.32	930		
123.28	528	124.34	931		
123.30	540	124.36	933		
123.32	552	124.38	934		
123.34	564	124.40	936		
123.36	576	124.42	937		
123.38	588	124.44	939		
123.40	600	124.46	940		
123.42	612	124.48	941		
123.44	624	124.50	943		

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**Summary for Pond UG-2: Underground Infiltration System #1**

Inflow Area = 42,604 sf, 63.97% Impervious, Inflow Depth > 0.01" for .5" Storm event  
 Inflow = 0.00 cfs @ 13.66 hrs, Volume= 42 cf  
 Outflow = 0.00 cfs @ 13.76 hrs, Volume= 42 cf, Atten= 0%, Lag= 6.2 min  
 Discarded = 0.00 cfs @ 13.76 hrs, Volume= 42 cf  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3  
 Peak Elev= 121.50' @ 13.76 hrs Surf.Area= 2,548 sf Storage= 1 cf

Plug-Flow detention time= 5.7 min calculated for 42 cf (100% of inflow)  
 Center-of-Mass det. time= 5.6 min ( 1,050.2 - 1,044.6 )

Volume	Invert	Avail.Storage	Storage Description
#1A	121.50'	260 cf	<b>26.00'W x 98.00'L x 2.67'H Field A</b> 6,795 cf Overall - 6,144 cf Embedded = 651 cf x 40.0% Voids
#2A	121.50'	3,913 cf	<b>retain_it retain_it 2.0' x 36 Inside #1</b> Inside= 84.0"W x 24.0"H => 13.78 sf x 8.00'L = 110.3 cf Outside= 96.0"W x 32.0"H => 21.33 sf x 8.00'L = 170.7 cf 3 Rows adjusted for 56.7 cf perimeter wall
4,174 cf			Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	121.50'	<b>1.020 in/hr Exfiltration over Surface area</b> Phase-In= 0.01'
#2	Device 3	121.50'	<b>18.0" Round Culvert</b> L= 30.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 121.50' / 121.50' S= 0.0000 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf
#3	Device 4	122.65'	<b>4.0' long Sharp-Crested Rectangular Weir</b> 2 End Contraction(s)
#4	Primary	122.02'	<b>15.0" Round Culvert</b> L= 60.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 122.02' / 121.70' S= 0.0053 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.23 sf

**Discarded OutFlow** Max=0.00 cfs @ 13.76 hrs HW=121.50' (Free Discharge)  
 ↑ 1=Exfiltration (Exfiltration Controls 0.00 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=121.50' TW=0.00' (Dynamic Tailwater)  
 ↑ 4=Culvert (Controls 0.00 cfs)  
 ↑ 3=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)  
 ↑ 2=Culvert (Controls 0.00 cfs)

**Pond UG-2: Underground Infiltration System #1 - Chamber Wizard Field A****Chamber Model = retain\_it retain\_it 2.0' (retain-it®)**

Inside= 84.0"W x 24.0"H =&gt; 13.78 sf x 8.00'L = 110.3 cf

Outside= 96.0"W x 32.0"H =&gt; 21.33 sf x 8.00'L = 170.7 cf

3 Rows adjusted for 56.7 cf perimeter wall

12 Chambers/Row x 8.00' Long = 96.00' Row Length +12.0" End Stone x 2 = 98.00' Base Length

3 Rows x 96.0" Wide + 12.0" Side Stone x 2 = 26.00' Base Width

32.0" Chamber Height = 2.67' Field Height

1.9 cf Sidewall x 12 x 2 + 1.9 cf Endwall x 3 x 2 = 56.7 cf Perimeter Wall

36 Chambers x 110.3 cf - 56.7 cf Perimeter wall = 3,913.4 cf Chamber Storage

36 Chambers x 170.7 cf = 6,144.0 cf Displacement

6,794.7 cf Field - 6,144.0 cf Chambers = 650.7 cf Stone x 40.0% Voids = 260.3 cf Stone Storage

Chamber Storage + Stone Storage = 4,173.6 cf = 0.096 af

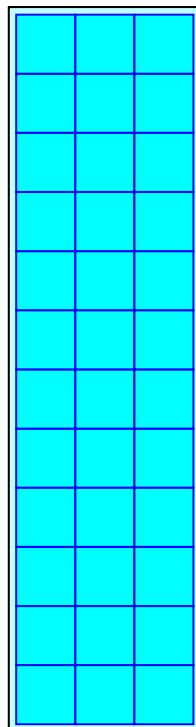
Overall Storage Efficiency = 61.4%

Overall System Size = 98.00' x 26.00' x 2.67'

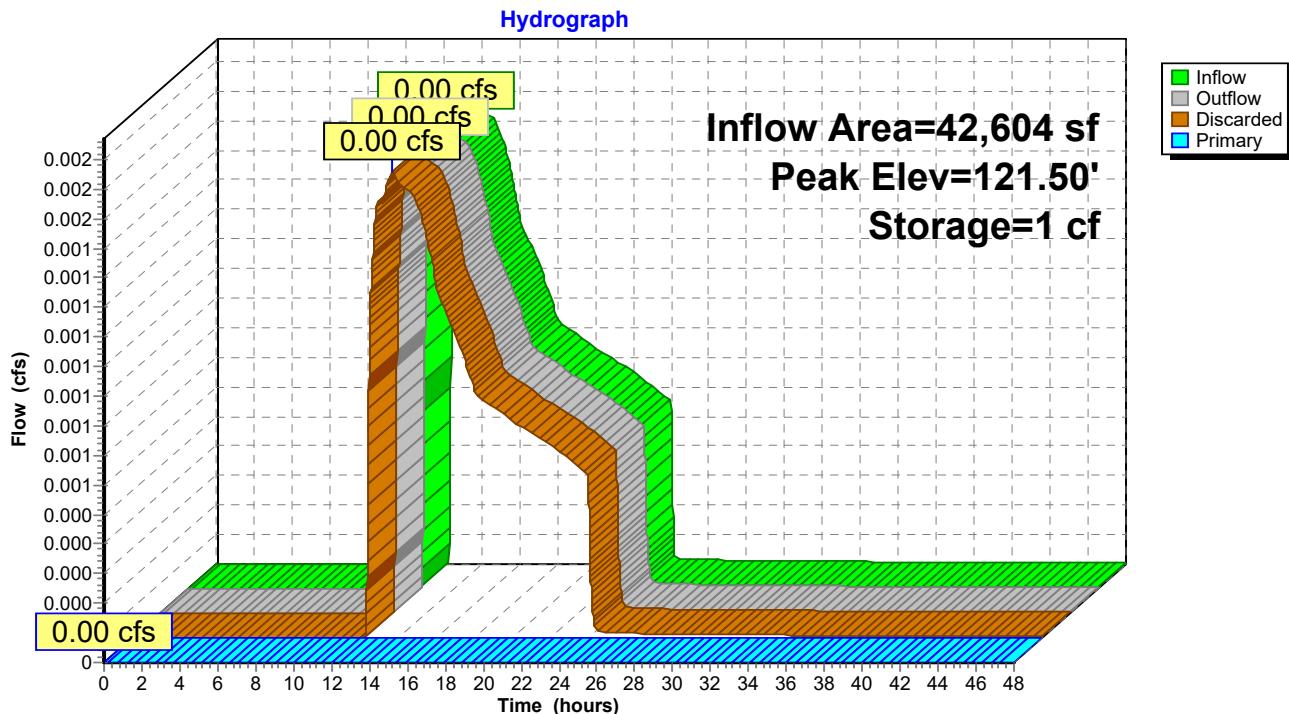
36 Chambers

251.7 cy Field

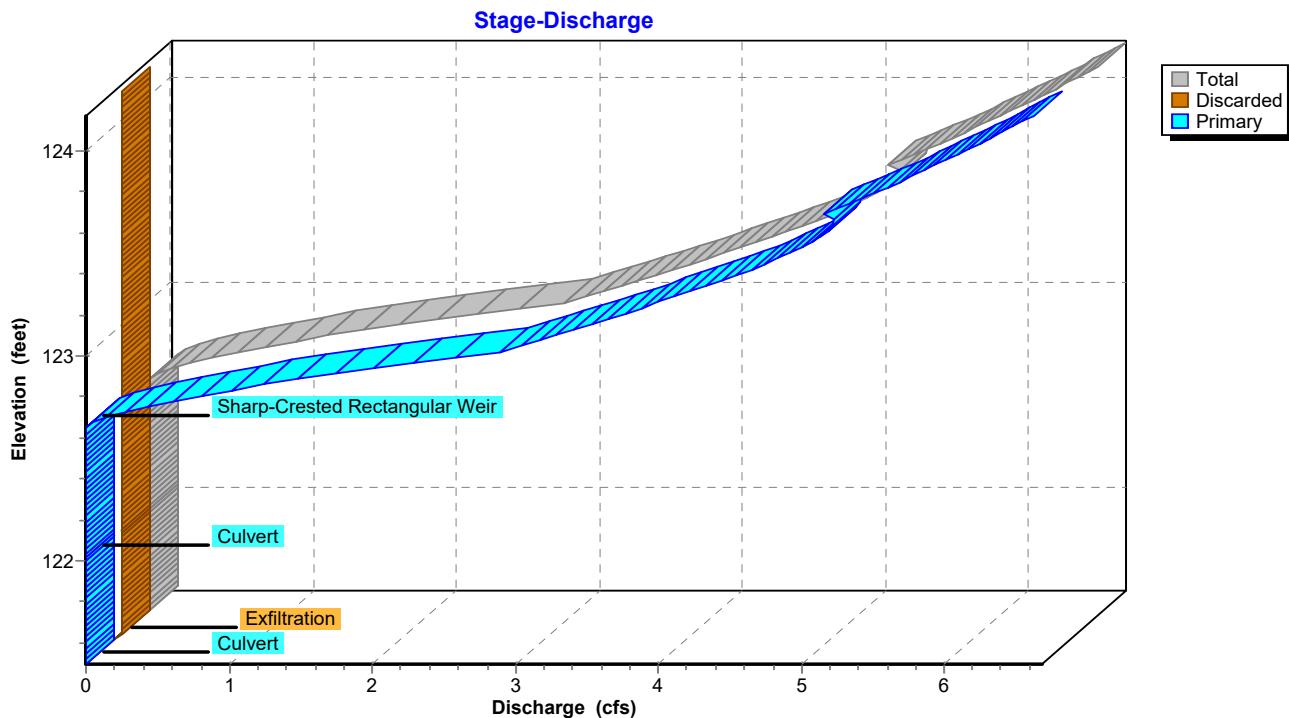
24.1 cy Stone

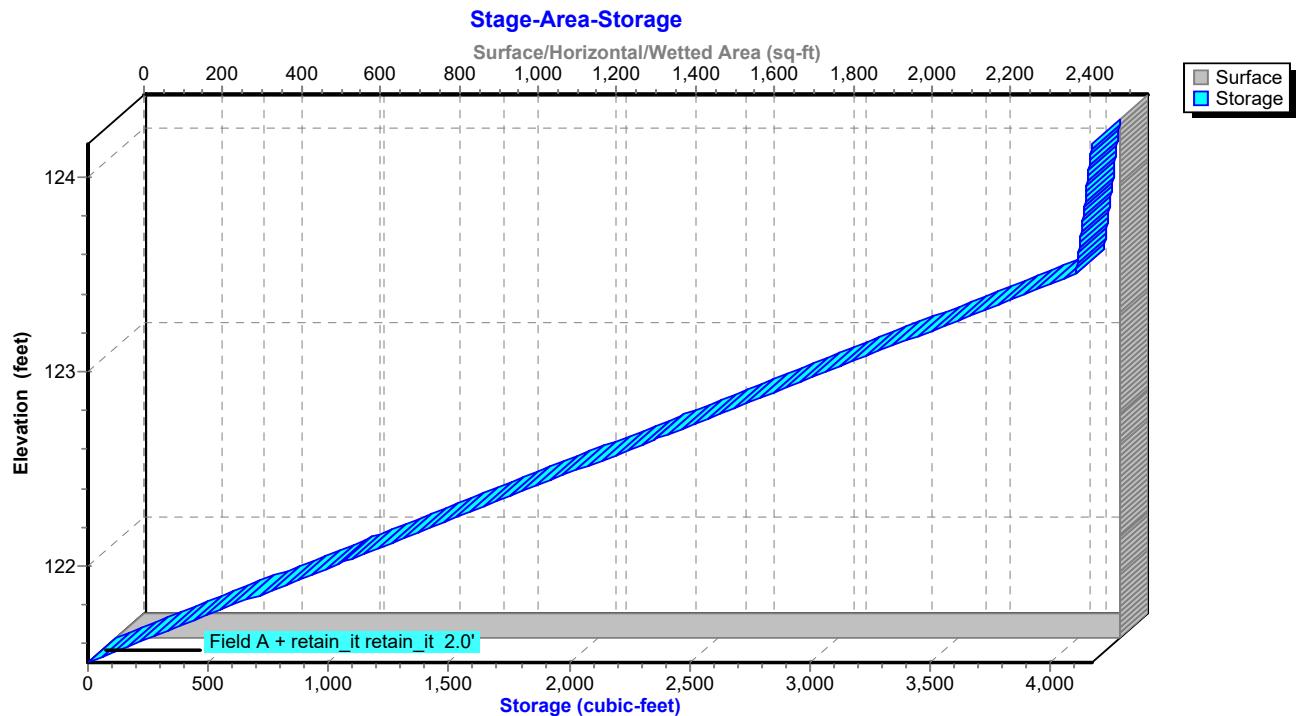


### Pond UG-2: Underground Infiltration System #1



### Pond UG-2: Underground Infiltration System #1



**Pond UG-2: Underground Infiltration System #1**

**Hydrograph for Pond UG-2: Underground Infiltration System #1**

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	121.50	0.00	0.00	<b>0.00</b>
1.00	0.00	0	121.50	0.00	0.00	0.00
2.00	0.00	0	121.50	0.00	0.00	0.00
3.00	0.00	0	121.50	0.00	0.00	0.00
4.00	0.00	0	121.50	0.00	0.00	0.00
5.00	0.00	0	121.50	0.00	0.00	0.00
6.00	0.00	0	121.50	0.00	0.00	0.00
7.00	0.00	0	121.50	0.00	0.00	0.00
8.00	0.00	0	121.50	0.00	0.00	0.00
9.00	0.00	0	121.50	0.00	0.00	0.00
10.00	0.00	0	121.50	0.00	0.00	0.00
11.00	0.00	0	121.50	0.00	0.00	0.00
12.00	0.00	0	121.50	0.00	0.00	0.00
13.00	<b>0.00</b>	<b>1</b>	<b>121.50</b>	<b>0.00</b>	<b>0.00</b>	0.00
14.00	<b>0.00</b>	<b>1</b>	<b>121.50</b>	<b>0.00</b>	<b>0.00</b>	0.00
15.00	0.00	1	121.50	0.00	0.00	0.00
16.00	0.00	0	121.50	0.00	0.00	0.00
17.00	0.00	0	121.50	0.00	0.00	0.00
18.00	0.00	0	121.50	0.00	0.00	0.00
19.00	0.00	0	121.50	0.00	0.00	0.00
20.00	0.00	0	121.50	0.00	0.00	0.00
21.00	0.00	0	121.50	0.00	0.00	0.00
22.00	0.00	0	121.50	0.00	0.00	0.00
23.00	0.00	0	121.50	0.00	0.00	0.00
24.00	0.00	0	121.50	0.00	0.00	0.00
25.00	0.00	0	121.50	0.00	0.00	0.00
26.00	0.00	0	121.50	0.00	0.00	0.00
27.00	0.00	0	121.50	0.00	0.00	0.00
28.00	0.00	0	121.50	0.00	0.00	0.00
29.00	0.00	0	121.50	0.00	0.00	0.00
30.00	0.00	0	121.50	0.00	0.00	0.00
31.00	0.00	0	121.50	0.00	0.00	0.00
32.00	0.00	0	121.50	0.00	0.00	0.00
33.00	0.00	0	121.50	0.00	0.00	0.00
34.00	0.00	0	121.50	0.00	0.00	0.00
35.00	0.00	0	121.50	0.00	0.00	0.00
36.00	0.00	0	121.50	0.00	0.00	0.00
37.00	0.00	0	121.50	0.00	0.00	0.00
38.00	0.00	0	121.50	0.00	0.00	0.00
39.00	0.00	0	121.50	0.00	0.00	0.00
40.00	0.00	0	121.50	0.00	0.00	0.00
41.00	0.00	0	121.50	0.00	0.00	0.00
42.00	0.00	0	121.50	0.00	0.00	0.00
43.00	0.00	0	121.50	0.00	0.00	0.00
44.00	0.00	0	121.50	0.00	0.00	0.00
45.00	0.00	0	121.50	0.00	0.00	0.00
46.00	0.00	0	121.50	0.00	0.00	0.00
47.00	0.00	0	121.50	0.00	0.00	0.00
48.00	0.00	0	121.50	0.00	0.00	0.00

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**Stage-Discharge for Pond UG-2: Underground Infiltration System #1**

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)	Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
121.50	0.00	<b>0.00</b>	0.00	124.15	<b>6.64</b>	0.06	<b>6.57</b>
121.55	0.06	<b>0.06</b>	0.00				
121.60	0.06	0.06	0.00				
121.65	0.06	0.06	0.00				
121.70	0.06	0.06	0.00				
121.75	0.06	0.06	0.00				
121.80	0.06	0.06	0.00				
121.85	0.06	0.06	0.00				
121.90	0.06	0.06	0.00				
121.95	0.06	0.06	0.00				
122.00	0.06	0.06	0.00				
122.05	0.06	0.06	0.00				
122.10	0.06	0.06	0.00				
122.15	0.06	0.06	0.00				
122.20	0.06	0.06	0.00				
122.25	0.06	0.06	0.00				
122.30	0.06	0.06	0.00				
122.35	0.06	0.06	0.00				
122.40	0.06	0.06	0.00				
122.45	0.06	0.06	0.00				
122.50	0.06	0.06	0.00				
122.55	0.06	0.06	0.00				
122.60	0.06	0.06	0.00				
122.65	0.06	0.06	0.00				
122.70	0.21	0.06	0.15				
122.75	0.47	0.06	0.41				
122.80	0.81	0.06	0.75				
122.85	1.22	0.06	1.16				
122.90	1.67	0.06	1.61				
122.95	2.18	0.06	2.12				
123.00	2.72	0.06	2.66				
123.05	3.12	0.06	3.06				
123.10	3.35	0.06	3.29				
123.15	3.57	0.06	3.51				
123.20	3.80	0.06	3.74				
123.25	4.02	0.06	3.96				
123.30	4.23	0.06	4.17				
123.35	4.44	0.06	4.38				
123.40	4.63	0.06	4.57				
123.45	4.81	0.06	4.75				
123.50	4.98	0.06	4.92				
123.55	5.12	0.06	5.06				
123.60	5.23	0.06	5.17				
123.65	5.29	0.06	5.23				
123.70	5.26	0.06	5.20				
123.75	5.43	0.06	5.37				
123.80	5.59	0.06	5.53				
123.85	5.75	0.06	5.69				
123.90	5.91	0.06	5.85				
123.95	6.06	0.06	6.00				
124.00	6.21	0.06	6.15				
124.05	6.36	0.06	6.30				
124.10	6.50	0.06	6.44				

**Stage-Area-Storage for Pond UG-2: Underground Infiltration System #1**

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
121.50	<b>2,548</b>	0	124.15	2,548	<b>4,172</b>
121.55	2,548	103			
121.60	2,548	205			
121.65	2,548	308			
121.70	2,548	411			
121.75	2,548	514			
121.80	2,548	616			
121.85	2,548	719			
121.90	2,548	822			
121.95	2,548	924			
122.00	2,548	1,027			
122.05	2,548	1,130			
122.10	2,548	1,233			
122.15	2,548	1,335			
122.20	2,548	1,438			
122.25	2,548	1,541			
122.30	2,548	1,643			
122.35	2,548	1,746			
122.40	2,548	1,849			
122.45	2,548	1,952			
122.50	2,548	2,054			
122.55	2,548	2,157			
122.60	2,548	2,260			
122.65	2,548	2,362			
122.70	2,548	2,465			
122.75	2,548	2,568			
122.80	2,548	2,671			
122.85	2,548	2,773			
122.90	2,548	2,876			
122.95	2,548	2,979			
123.00	2,548	3,081			
123.05	2,548	3,184			
123.10	2,548	3,287			
123.15	2,548	3,390			
123.20	2,548	3,492			
123.25	2,548	3,595			
123.30	2,548	3,698			
123.35	2,548	3,800			
123.40	2,548	3,903			
123.45	2,548	4,006			
123.50	2,548	4,109			
123.55	2,548	4,113			
123.60	2,548	4,118			
123.65	2,548	4,123			
123.70	2,548	4,128			
123.75	2,548	4,133			
123.80	2,548	4,138			
123.85	2,548	4,143			
123.90	2,548	4,148			
123.95	2,548	4,152			
124.00	2,548	4,157			
124.05	2,548	4,162			
124.10	2,548	4,167			

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**Summary for Pond UG-3: Underground Infiltration System #2**

Inflow Area = 34,270 sf, 100.00% Impervious, Inflow Depth = 0.32" for .5" Storm event  
 Inflow = 0.29 cfs @ 12.09 hrs, Volume= 908 cf  
 Outflow = 0.05 cfs @ 11.93 hrs, Volume= 908 cf, Atten= 84%, Lag= 0.0 min  
 Discarded = 0.05 cfs @ 11.93 hrs, Volume= 908 cf  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3  
 Peak Elev= 121.68' @ 12.58 hrs Surf.Area= 1,924 sf Storage= 278 cf

Plug-Flow detention time= 42.2 min calculated for 908 cf (100% of inflow)  
 Center-of-Mass det. time= 42.2 min ( 855.5 - 813.3 )

Volume	Invert	Avail.Storage	Storage Description
#1A	121.50'	209 cf	<b>26.00'W x 74.00'L x 2.67'H Field A</b> 5,131 cf Overall - 4,608 cf Embedded = 523 cf x 40.0% Voids
#2A	121.50'	2,932 cf	<b>retain_it retain_it 2.0' x 27 Inside #1</b> Inside= 84.0"W x 24.0"H => 13.78 sf x 8.00'L = 110.3 cf Outside= 96.0"W x 32.0"H => 21.33 sf x 8.00'L = 170.7 cf 3 Rows adjusted for 45.4 cf perimeter wall
3,141 cf			Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	121.50'	<b>1.020 in/hr Exfiltration over Surface area</b> Phase-In= 0.01'
#2	Device 3	121.50'	<b>18.0" Round Culvert</b> L= 70.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 121.50' / 121.50' S= 0.0000 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf
#3	Device 4	123.25'	<b>4.0' long Sharp-Crested Rectangular Weir</b> 2 End Contraction(s)
#4	Primary	122.02'	<b>15.0" Round Culvert</b> L= 60.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 122.02' / 121.70' S= 0.0053 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.23 sf

**Discarded OutFlow** Max=0.05 cfs @ 11.93 hrs HW=121.53' (Free Discharge)  
 ↑ 1=Exfiltration (Exfiltration Controls 0.05 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=121.50' TW=0.00' (Dynamic Tailwater)  
 ↑ 4=Culvert (Controls 0.00 cfs)  
 ↑ 3=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)  
 ↑ 2=Culvert (Controls 0.00 cfs)

**Pond UG-3: Underground Infiltration System #2 - Chamber Wizard Field A****Chamber Model = retain\_it retain\_it 2.0' (retain-it®)**

Inside= 84.0"W x 24.0"H =&gt; 13.78 sf x 8.00'L = 110.3 cf

Outside= 96.0"W x 32.0"H =&gt; 21.33 sf x 8.00'L = 170.7 cf

3 Rows adjusted for 45.4 cf perimeter wall

9 Chambers/Row x 8.00' Long = 72.00' Row Length +12.0" End Stone x 2 = 74.00' Base Length

3 Rows x 96.0" Wide + 12.0" Side Stone x 2 = 26.00' Base Width

32.0" Chamber Height = 2.67' Field Height

1.9 cf Sidewall x 9 x 2 + 1.9 cf Endwall x 3 x 2 = 45.4 cf Perimeter Wall

27 Chambers x 110.3 cf - 45.4 cf Perimeter wall = 2,932.2 cf Chamber Storage

27 Chambers x 170.7 cf = 4,608.0 cf Displacement

5,130.7 cf Field - 4,608.0 cf Chambers = 522.7 cf Stone x 40.0% Voids = 209.1 cf Stone Storage

Chamber Storage + Stone Storage = 3,141.3 cf = 0.072 af

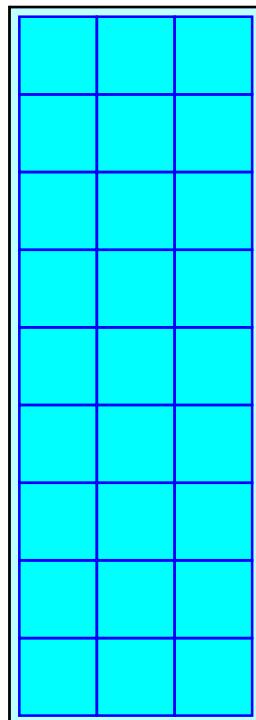
Overall Storage Efficiency = 61.2%

Overall System Size = 74.00' x 26.00' x 2.67'

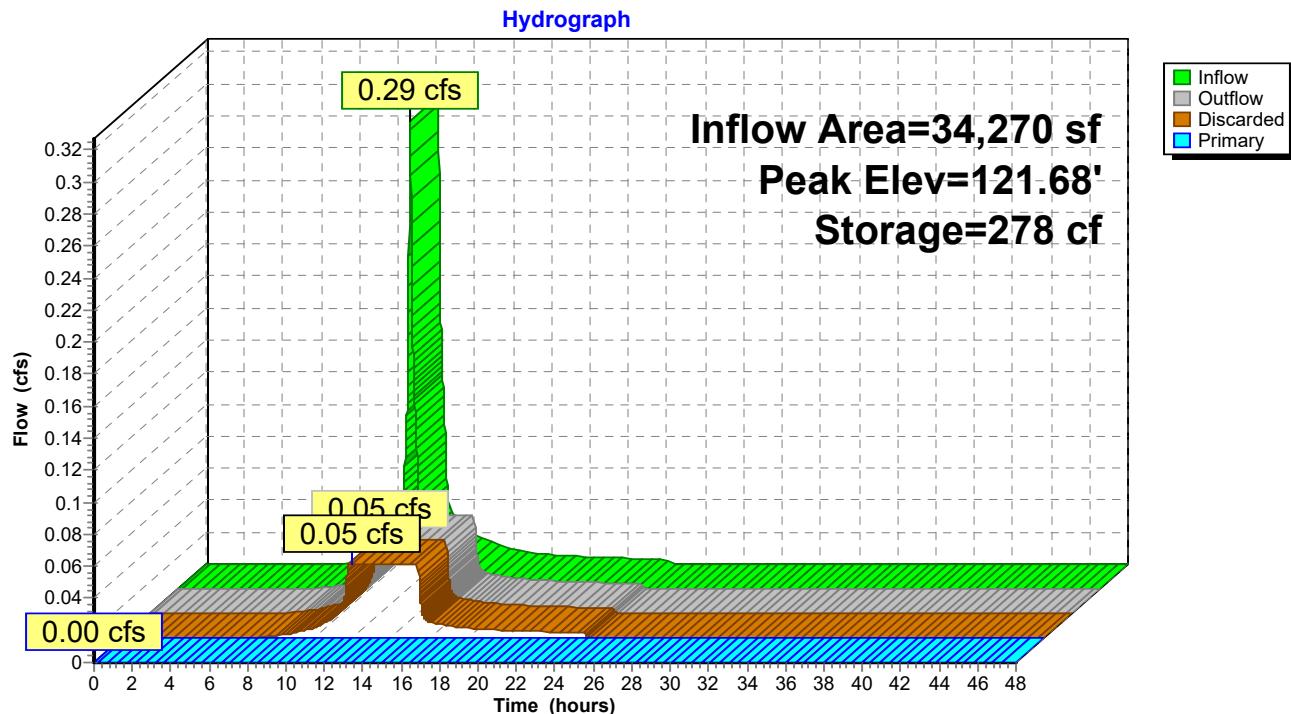
27 Chambers

190.0 cy Field

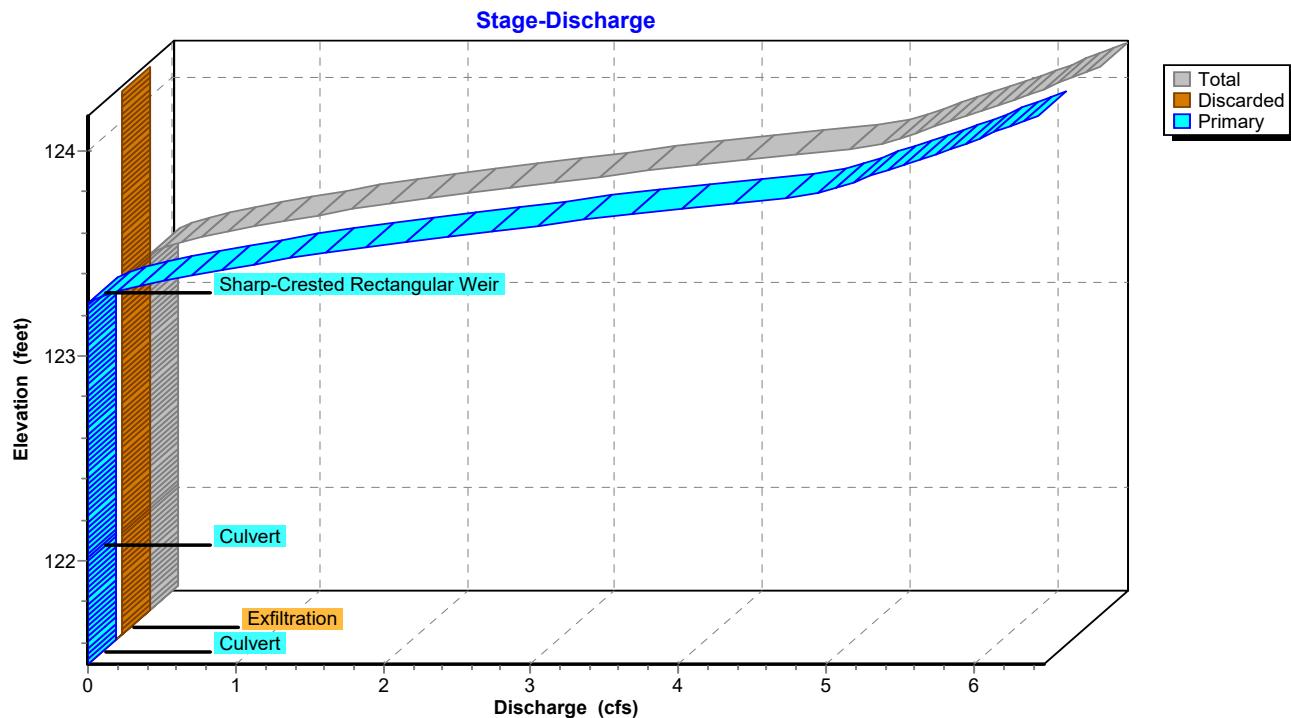
19.4 cy Stone

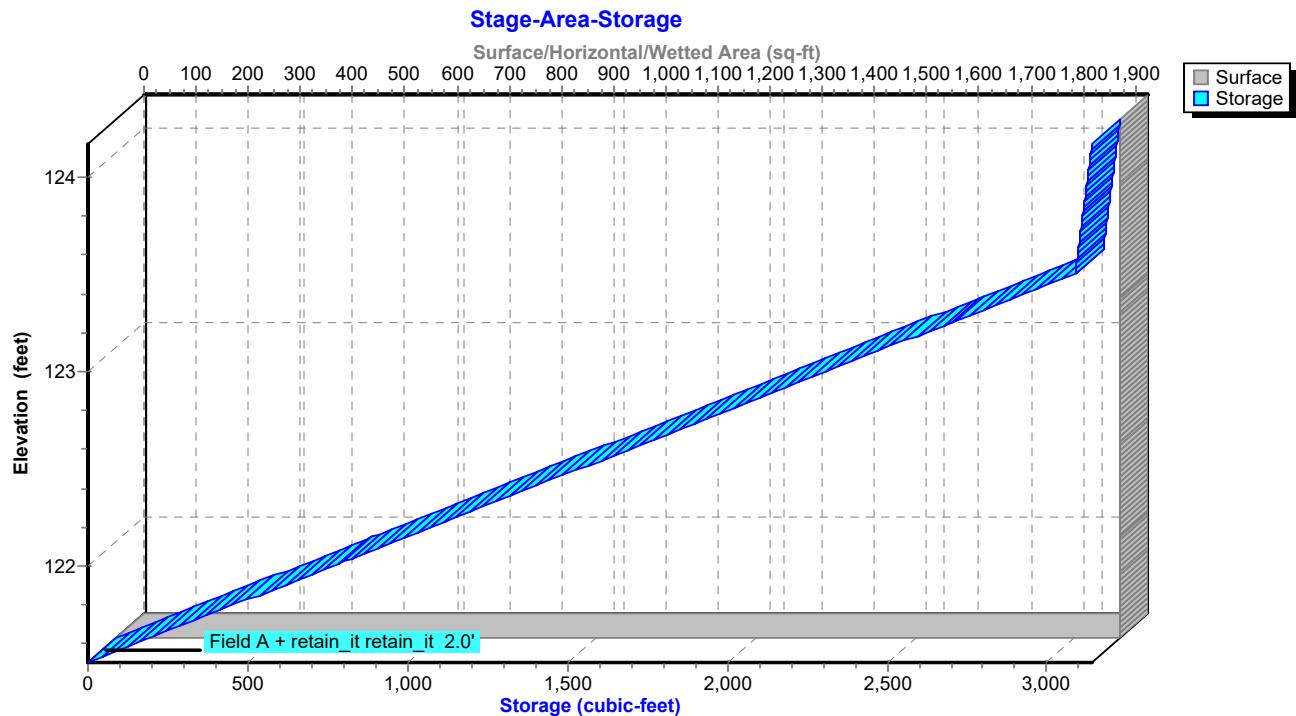


### Pond UG-3: Underground Infiltration System #2



### Pond UG-3: Underground Infiltration System #2



**Pond UG-3: Underground Infiltration System #2**

**Proposed HydroCAD 533 Boston Post Road**

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*Type III 24-hr .5" Storm Rainfall=0.50"*

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**Hydrograph for Pond UG-3: Underground Infiltration System #2**

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	121.50	0.00	0.00	<b>0.00</b>
1.00	0.00	0	121.50	0.00	0.00	0.00
2.00	0.00	0	121.50	0.00	0.00	0.00
3.00	0.00	0	121.50	0.00	0.00	0.00
4.00	0.00	0	121.50	0.00	0.00	0.00
5.00	0.00	0	121.50	0.00	0.00	0.00
6.00	0.00	0	121.50	0.00	0.00	0.00
7.00	0.00	0	121.50	0.00	0.00	0.00
8.00	0.00	0	121.50	0.00	0.00	0.00
9.00	0.00	1	121.50	0.00	0.00	0.00
10.00	0.01	2	121.50	0.01	0.01	0.00
11.00	0.01	4	121.50	<b>0.01</b>	<b>0.01</b>	0.00
12.00	<b>0.17</b>	<b>64</b>	<b>121.54</b>	<b>0.05</b>	<b>0.05</b>	0.00
13.00	<b>0.03</b>	<b>262</b>	<b>121.67</b>	0.05	0.05	0.00
14.00	0.02	176	121.61	0.05	0.05	0.00
15.00	0.01	68	121.54	0.05	0.05	0.00
16.00	0.01	3	121.50	0.01	0.01	0.00
17.00	0.01	3	121.50	0.01	0.01	0.00
18.00	0.01	2	121.50	0.01	0.01	0.00
19.00	0.01	2	121.50	0.01	0.01	0.00
20.00	0.00	2	121.50	0.00	0.00	0.00
21.00	0.00	1	121.50	0.00	0.00	0.00
22.00	0.00	1	121.50	0.00	0.00	0.00
23.00	0.00	1	121.50	0.00	0.00	0.00
24.00	0.00	1	121.50	0.00	0.00	0.00
25.00	0.00	0	121.50	0.00	0.00	0.00
26.00	0.00	0	121.50	0.00	0.00	0.00
27.00	0.00	0	121.50	0.00	0.00	0.00
28.00	0.00	0	121.50	0.00	0.00	0.00
29.00	0.00	0	121.50	0.00	0.00	0.00
30.00	0.00	0	121.50	0.00	0.00	0.00
31.00	0.00	0	121.50	0.00	0.00	0.00
32.00	0.00	0	121.50	0.00	0.00	0.00
33.00	0.00	0	121.50	0.00	0.00	0.00
34.00	0.00	0	121.50	0.00	0.00	0.00
35.00	0.00	0	121.50	0.00	0.00	0.00
36.00	0.00	0	121.50	0.00	0.00	0.00
37.00	0.00	0	121.50	0.00	0.00	0.00
38.00	0.00	0	121.50	0.00	0.00	0.00
39.00	0.00	0	121.50	0.00	0.00	0.00
40.00	0.00	0	121.50	0.00	0.00	0.00
41.00	0.00	0	121.50	0.00	0.00	0.00
42.00	0.00	0	121.50	0.00	0.00	0.00
43.00	0.00	0	121.50	0.00	0.00	0.00
44.00	0.00	0	121.50	0.00	0.00	0.00
45.00	0.00	0	121.50	0.00	0.00	0.00
46.00	0.00	0	121.50	0.00	0.00	0.00
47.00	0.00	0	121.50	0.00	0.00	0.00
48.00	0.00	0	121.50	0.00	0.00	0.00

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*Type III 24-hr .5" Storm Rainfall=0.50"*

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**Stage-Discharge for Pond UG-3: Underground Infiltration System #2**

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)	Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
121.50	0.00	<b>0.00</b>	0.00	124.15	<b>6.42</b>	0.05	<b>6.37</b>
121.55	0.05	<b>0.05</b>	0.00				
121.60	0.05	0.05	0.00				
121.65	0.05	0.05	0.00				
121.70	0.05	0.05	0.00				
121.75	0.05	0.05	0.00				
121.80	0.05	0.05	0.00				
121.85	0.05	0.05	0.00				
121.90	0.05	0.05	0.00				
121.95	0.05	0.05	0.00				
122.00	0.05	0.05	0.00				
122.05	0.05	0.05	0.00				
122.10	0.05	0.05	0.00				
122.15	0.05	0.05	0.00				
122.20	0.05	0.05	0.00				
122.25	0.05	0.05	0.00				
122.30	0.05	0.05	0.00				
122.35	0.05	0.05	0.00				
122.40	0.05	0.05	0.00				
122.45	0.05	0.05	0.00				
122.50	0.05	0.05	0.00				
122.55	0.05	0.05	0.00				
122.60	0.05	0.05	0.00				
122.65	0.05	0.05	0.00				
122.70	0.05	0.05	0.00				
122.75	0.05	0.05	0.00				
122.80	0.05	0.05	0.00				
122.85	0.05	0.05	0.00				
122.90	0.05	0.05	0.00				
122.95	0.05	0.05	0.00				
123.00	0.05	0.05	0.00				
123.05	0.05	0.05	0.00				
123.10	0.05	0.05	0.00				
123.15	0.05	0.05	0.00				
123.20	0.05	0.05	0.00				
123.25	0.05	0.05	0.00				
123.30	0.19	0.05	0.15				
123.35	0.46	0.05	0.41				
123.40	0.80	0.05	0.75				
123.45	1.20	0.05	1.16				
123.50	1.66	0.05	1.61				
123.55	2.16	0.05	2.12				
123.60	2.71	0.05	2.66				
123.65	3.29	0.05	3.24				
123.70	3.91	0.05	3.86				
123.75	4.55	0.05	4.51				
123.80	5.03	0.05	4.98				
123.85	5.25	0.05	5.20				
123.90	5.46	0.05	5.42				
123.95	5.67	0.05	5.62				
124.00	5.86	0.05	5.82				
124.05	6.05	0.05	6.01				
124.10	6.24	0.05	6.19				

**Stage-Area-Storage for Pond UG-3: Underground Infiltration System #2**

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
121.50	<b>1,924</b>	0	124.15	1,924	<b>3,140</b>
121.55	1,924	77			
121.60	1,924	154			
121.65	1,924	232			
121.70	1,924	309			
121.75	1,924	386			
121.80	1,924	463			
121.85	1,924	541			
121.90	1,924	618			
121.95	1,924	695			
122.00	1,924	772			
122.05	1,924	849			
122.10	1,924	927			
122.15	1,924	1,004			
122.20	1,924	1,081			
122.25	1,924	1,158			
122.30	1,924	1,236			
122.35	1,924	1,313			
122.40	1,924	1,390			
122.45	1,924	1,467			
122.50	1,924	1,544			
122.55	1,924	1,622			
122.60	1,924	1,699			
122.65	1,924	1,776			
122.70	1,924	1,853			
122.75	1,924	1,931			
122.80	1,924	2,008			
122.85	1,924	2,085			
122.90	1,924	2,162			
122.95	1,924	2,240			
123.00	1,924	2,317			
123.05	1,924	2,394			
123.10	1,924	2,471			
123.15	1,924	2,548			
123.20	1,924	2,626			
123.25	1,924	2,703			
123.30	1,924	2,780			
123.35	1,924	2,857			
123.40	1,924	2,935			
123.45	1,924	3,012			
123.50	1,924	3,089			
123.55	1,924	3,093			
123.60	1,924	3,097			
123.65	1,924	3,101			
123.70	1,924	3,105			
123.75	1,924	3,109			
123.80	1,924	3,113			
123.85	1,924	3,116			
123.90	1,924	3,120			
123.95	1,924	3,124			
124.00	1,924	3,128			
124.05	1,924	3,132			
124.10	1,924	3,136			

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Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

<b>Subcatchment P-1A: Subcatchment to</b>	Runoff Area=13,425 sf 66.59% Impervious Runoff Depth=0.17" Tc=6.0 min CN=85 Runoff=0.05 cfs 194 cf
<b>Subcatchment P-1B: Subcatchment to</b>	Runoff Area=33,268 sf 68.13% Impervious Runoff Depth=0.20" Tc=6.0 min CN=86 Runoff=0.14 cfs 548 cf
<b>Subcatchment P-1C: Subcatchment to</b>	Runoff Area=29,201 sf 66.54% Impervious Runoff Depth=0.20" Tc=6.0 min CN=86 Runoff=0.12 cfs 481 cf
<b>Subcatchment P-1D: Subcatchment to</b>	Runoff Area=13,403 sf 58.36% Impervious Runoff Depth=0.11" Tc=6.0 min CN=82 Runoff=0.02 cfs 128 cf
<b>Subcatchment P-1U: Undetained to Wetlands</b>	Runoff Area=8,300 sf 0.00% Impervious Runoff Depth=0.00" Tc=6.0 min CN=55 Runoff=0.00 cfs 0 cf
<b>Subcatchment P-B1: Roof Runoff to</b>	Runoff Area=34,270 sf 100.00% Impervious Runoff Depth=0.79" Tc=6.0 min CN=98 Runoff=0.70 cfs 2,259 cf
<b>Reach 1R: (new Reach)</b>	Inflow=0.00 cfs 0 cf Outflow=0.00 cfs 0 cf
<b>Pond IB-1: Infiltration Basin #1</b>	Peak Elev=122.41' Storage=67 cf Inflow=0.05 cfs 194 cf Discarded=0.01 cfs 194 cf Primary=0.00 cfs 0 cf Outflow=0.01 cfs 194 cf
<b>Pond IB-2: Infiltration Basin #2</b>	Peak Elev=122.21' Storage=162 cf Inflow=0.14 cfs 548 cf Discarded=0.02 cfs 548 cf Primary=0.00 cfs 0 cf Outflow=0.02 cfs 548 cf
<b>Pond UG-1: Underground Detention System #1</b>	Peak Elev=122.44' Storage=26 cf Inflow=0.02 cfs 128 cf 15.0" Round Culvert n=0.012 L=140.0' S=0.0064 '/' Outflow=0.01 cfs 126 cf
<b>Pond UG-2: Underground Infiltration System #1</b>	Peak Elev=121.53' Storage=55 cf Inflow=0.12 cfs 607 cf Discarded=0.06 cfs 607 cf Primary=0.00 cfs 0 cf Outflow=0.06 cfs 607 cf
<b>Pond UG-3: Underground Infiltration System</b>	Peak Elev=122.13' Storage=967 cf Inflow=0.70 cfs 2,259 cf Discarded=0.05 cfs 2,259 cf Primary=0.00 cfs 0 cf Outflow=0.05 cfs 2,259 cf

**Total Runoff Area = 131,867 sf Runoff Volume = 3,609 cf Average Runoff Depth = 0.33"**  
**29.38% Pervious = 38,739 sf 70.62% Impervious = 93,128 sf**

**Proposed HydroCAD 533 Boston Post Road**

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*Type III 24-hr 1" Storm Rainfall=1.00"*

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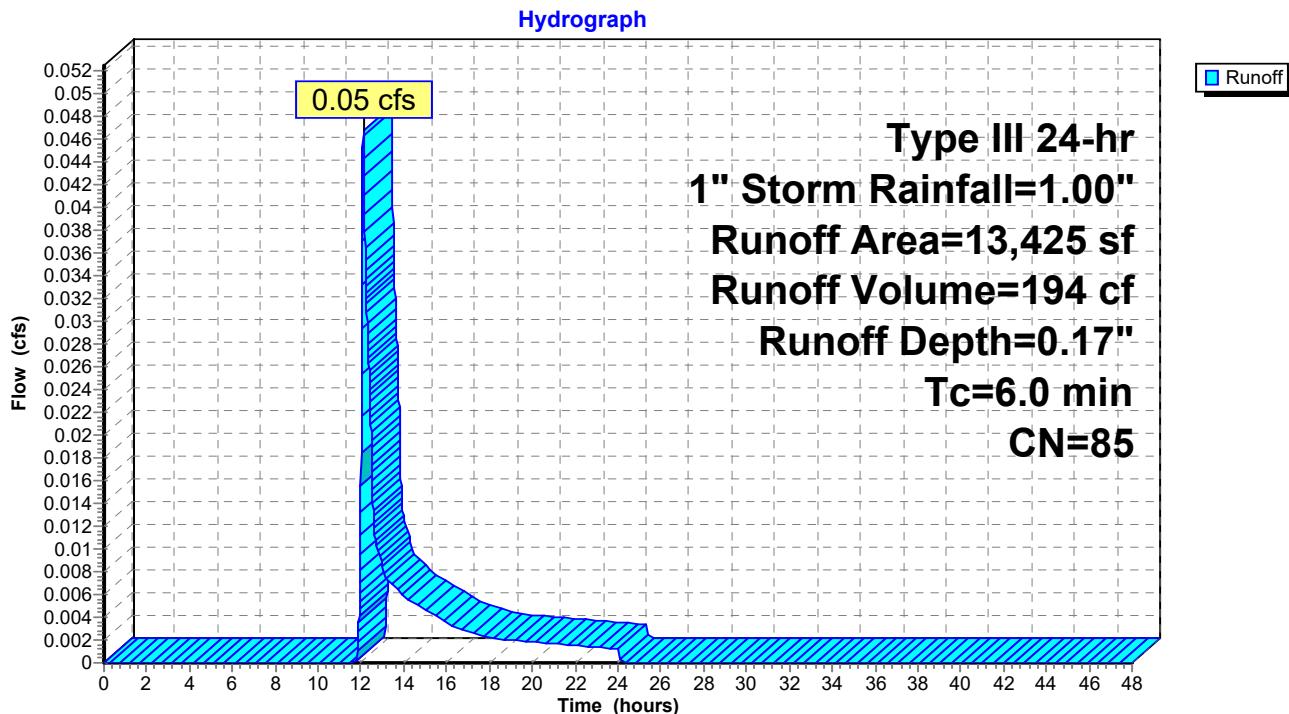
**Summary for Subcatchment P-1A: Subcatchment to Infiltration Basin #1**

Runoff = 0.05 cfs @ 12.11 hrs, Volume= 194 cf, Depth= 0.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
Type III 24-hr 1" Storm Rainfall=1.00"

Area (sf)	CN	Description
8,940	98	Paved parking, HSG B
4,110	61	>75% Grass cover, Good, HSG B
375	55	Woods, Good, HSG B
13,425	85	Weighted Average
4,485		33.41% Pervious Area
8,940		66.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0				<b>Direct Entry, Direct</b>	
5.0	0			Total, Increased to minimum Tc = 6.0 min	

**Subcatchment P-1A: Subcatchment to Infiltration Basin #1**

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Type III 24-hr 1" Storm Rainfall=1.00"

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**Hydrograph for Subcatchment P-1A: Subcatchment to Infiltration Basin #1**

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.50	1.00	0.17	0.00
0.50	0.00	0.00	0.00	27.00	1.00	0.17	0.00
1.00	0.01	0.00	0.00	27.50	1.00	0.17	0.00
1.50	0.01	0.00	0.00	28.00	1.00	0.17	0.00
2.00	0.02	0.00	0.00	28.50	1.00	0.17	0.00
2.50	0.03	0.00	0.00	29.00	1.00	0.17	0.00
3.00	0.03	0.00	0.00	29.50	1.00	0.17	0.00
3.50	0.04	0.00	0.00	30.00	1.00	0.17	0.00
4.00	0.04	0.00	0.00	30.50	1.00	0.17	0.00
4.50	0.05	0.00	0.00	31.00	1.00	0.17	0.00
5.00	0.06	0.00	0.00	31.50	1.00	0.17	0.00
5.50	0.06	0.00	0.00	32.00	1.00	0.17	0.00
6.00	0.07	0.00	0.00	32.50	1.00	0.17	0.00
6.50	0.08	0.00	0.00	33.00	1.00	0.17	0.00
7.00	0.09	0.00	0.00	33.50	1.00	0.17	0.00
7.50	0.10	0.00	0.00	34.00	1.00	0.17	0.00
8.00	0.11	0.00	0.00	34.50	1.00	0.17	0.00
8.50	0.13	0.00	0.00	35.00	1.00	0.17	0.00
9.00	0.15	0.00	0.00	35.50	1.00	0.17	0.00
9.50	0.17	0.00	0.00	36.00	1.00	0.17	0.00
10.00	0.19	0.00	0.00	36.50	1.00	0.17	0.00
10.50	0.22	0.00	0.00	37.00	1.00	0.17	0.00
11.00	0.25	0.00	0.00	37.50	1.00	0.17	0.00
11.50	0.30	0.00	0.00	38.00	1.00	0.17	0.00
12.00	0.50	0.01	<b>0.02</b>	38.50	1.00	0.17	0.00
12.50	0.70	0.06	<b>0.02</b>	39.00	1.00	0.17	0.00
13.00	0.75	0.07	0.01	39.50	1.00	0.17	0.00
13.50	0.78	0.08	0.01	40.00	1.00	0.17	0.00
14.00	0.81	0.09	0.01	40.50	1.00	0.17	0.00
14.50	0.83	0.10	0.01	41.00	1.00	0.17	0.00
15.00	0.85	0.11	0.00	41.50	1.00	0.17	0.00
15.50	0.87	0.12	0.00	42.00	1.00	0.17	0.00
16.00	0.89	0.12	0.00	42.50	1.00	0.17	0.00
16.50	0.90	0.13	0.00	43.00	1.00	0.17	0.00
17.00	0.91	0.13	0.00	43.50	1.00	0.17	0.00
17.50	0.92	0.14	0.00	44.00	1.00	0.17	0.00
18.00	0.93	0.14	0.00	44.50	1.00	0.17	0.00
18.50	0.94	0.14	0.00	45.00	1.00	0.17	0.00
19.00	0.94	0.15	0.00	45.50	1.00	0.17	0.00
19.50	0.95	0.15	0.00	46.00	1.00	0.17	0.00
20.00	0.96	0.15	0.00	46.50	1.00	0.17	0.00
20.50	0.96	0.16	0.00	47.00	1.00	0.17	0.00
21.00	0.97	0.16	0.00	47.50	1.00	0.17	0.00
21.50	0.98	0.16	0.00	48.00	1.00	0.17	0.00
22.00	0.98	0.16	0.00				
22.50	0.99	0.17	0.00				
23.00	0.99	0.17	0.00				
23.50	1.00	0.17	0.00				
24.00	<b>1.00</b>	<b>0.17</b>	0.00				
24.50	1.00	0.17	0.00				
25.00	1.00	0.17	0.00				
25.50	1.00	0.17	0.00				
26.00	1.00	0.17	0.00				

**Summary for Subcatchment P-1B: Subcatchment to Infiltration Basin #2**

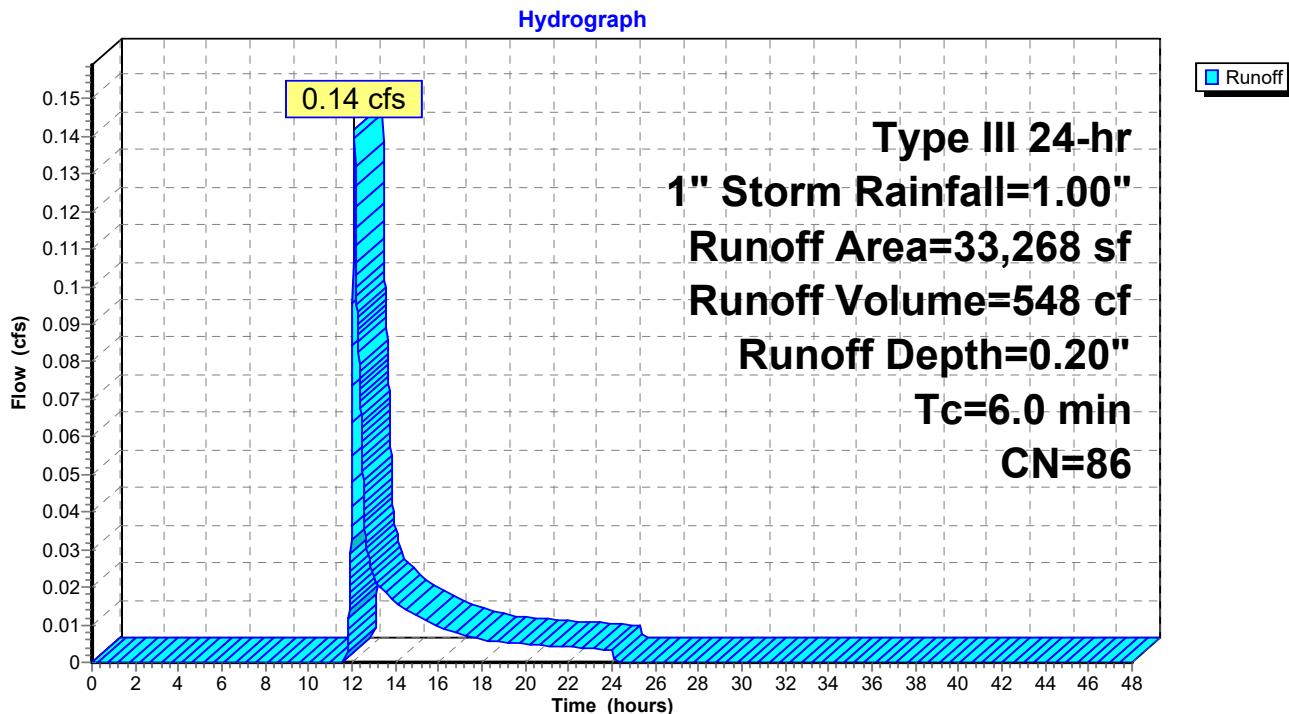
Runoff = 0.14 cfs @ 12.11 hrs, Volume= 548 cf, Depth= 0.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
Type III 24-hr 1" Storm Rainfall=1.00"

Area (sf)	CN	Description
22,665	98	Paved parking, HSG B
10,603	61	>75% Grass cover, Good, HSG B

33,268	86	Weighted Average
10,603		31.87% Pervious Area
22,665		68.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0				<b>Direct Entry, Direct Entry</b>	
5.0	0			Total, Increased to minimum Tc = 6.0 min	

**Subcatchment P-1B: Subcatchment to Infiltration Basin #2**

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Type III 24-hr 1" Storm Rainfall=1.00"

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**Hydrograph for Subcatchment P-1B: Subcatchment to Infiltration Basin #2**

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.50	1.00	0.20	0.00
0.50	0.00	0.00	0.00	27.00	1.00	0.20	0.00
1.00	0.01	0.00	0.00	27.50	1.00	0.20	0.00
1.50	0.01	0.00	0.00	28.00	1.00	0.20	0.00
2.00	0.02	0.00	0.00	28.50	1.00	0.20	0.00
2.50	0.03	0.00	0.00	29.00	1.00	0.20	0.00
3.00	0.03	0.00	0.00	29.50	1.00	0.20	0.00
3.50	0.04	0.00	0.00	30.00	1.00	0.20	0.00
4.00	0.04	0.00	0.00	30.50	1.00	0.20	0.00
4.50	0.05	0.00	0.00	31.00	1.00	0.20	0.00
5.00	0.06	0.00	0.00	31.50	1.00	0.20	0.00
5.50	0.06	0.00	0.00	32.00	1.00	0.20	0.00
6.00	0.07	0.00	0.00	32.50	1.00	0.20	0.00
6.50	0.08	0.00	0.00	33.00	1.00	0.20	0.00
7.00	0.09	0.00	0.00	33.50	1.00	0.20	0.00
7.50	0.10	0.00	0.00	34.00	1.00	0.20	0.00
8.00	0.11	0.00	0.00	34.50	1.00	0.20	0.00
8.50	0.13	0.00	0.00	35.00	1.00	0.20	0.00
9.00	0.15	0.00	0.00	35.50	1.00	0.20	0.00
9.50	0.17	0.00	0.00	36.00	1.00	0.20	0.00
10.00	0.19	0.00	0.00	36.50	1.00	0.20	0.00
10.50	0.22	0.00	0.00	37.00	1.00	0.20	0.00
11.00	0.25	0.00	0.00	37.50	1.00	0.20	0.00
11.50	0.30	0.00	0.00	38.00	1.00	0.20	0.00
12.00	0.50	0.02	<b>0.06</b>	38.50	1.00	0.20	0.00
12.50	0.70	0.07	<b>0.05</b>	39.00	1.00	0.20	0.00
13.00	0.75	0.09	0.02	39.50	1.00	0.20	0.00
13.50	0.78	0.10	0.02	40.00	1.00	0.20	0.00
14.00	0.81	0.11	0.02	40.50	1.00	0.20	0.00
14.50	0.83	0.12	0.01	41.00	1.00	0.20	0.00
15.00	0.85	0.13	0.01	41.50	1.00	0.20	0.00
15.50	0.87	0.14	0.01	42.00	1.00	0.20	0.00
16.00	0.89	0.14	0.01	42.50	1.00	0.20	0.00
16.50	0.90	0.15	0.01	43.00	1.00	0.20	0.00
17.00	0.91	0.15	0.01	43.50	1.00	0.20	0.00
17.50	0.92	0.16	0.01	44.00	1.00	0.20	0.00
18.00	0.93	0.16	0.01	44.50	1.00	0.20	0.00
18.50	0.94	0.17	0.01	45.00	1.00	0.20	0.00
19.00	0.94	0.17	0.01	45.50	1.00	0.20	0.00
19.50	0.95	0.17	0.01	46.00	1.00	0.20	0.00
20.00	0.96	0.18	0.00	46.50	1.00	0.20	0.00
20.50	0.96	0.18	0.00	47.00	1.00	0.20	0.00
21.00	0.97	0.18	0.00	47.50	1.00	0.20	0.00
21.50	0.98	0.19	0.00	48.00	1.00	0.20	0.00
22.00	0.98	0.19	0.00				
22.50	0.99	0.19	0.00				
23.00	0.99	0.19	0.00				
23.50	1.00	0.20	0.00				
24.00	<b>1.00</b>	<b>0.20</b>	0.00				
24.50	1.00	0.20	0.00				
25.00	1.00	0.20	0.00				
25.50	1.00	0.20	0.00				
26.00	1.00	0.20	0.00				

**Proposed HydroCAD 533 Boston Post Road**

Prepared by {enter your company name here}

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Type III 24-hr 1" Storm Rainfall=1.00"

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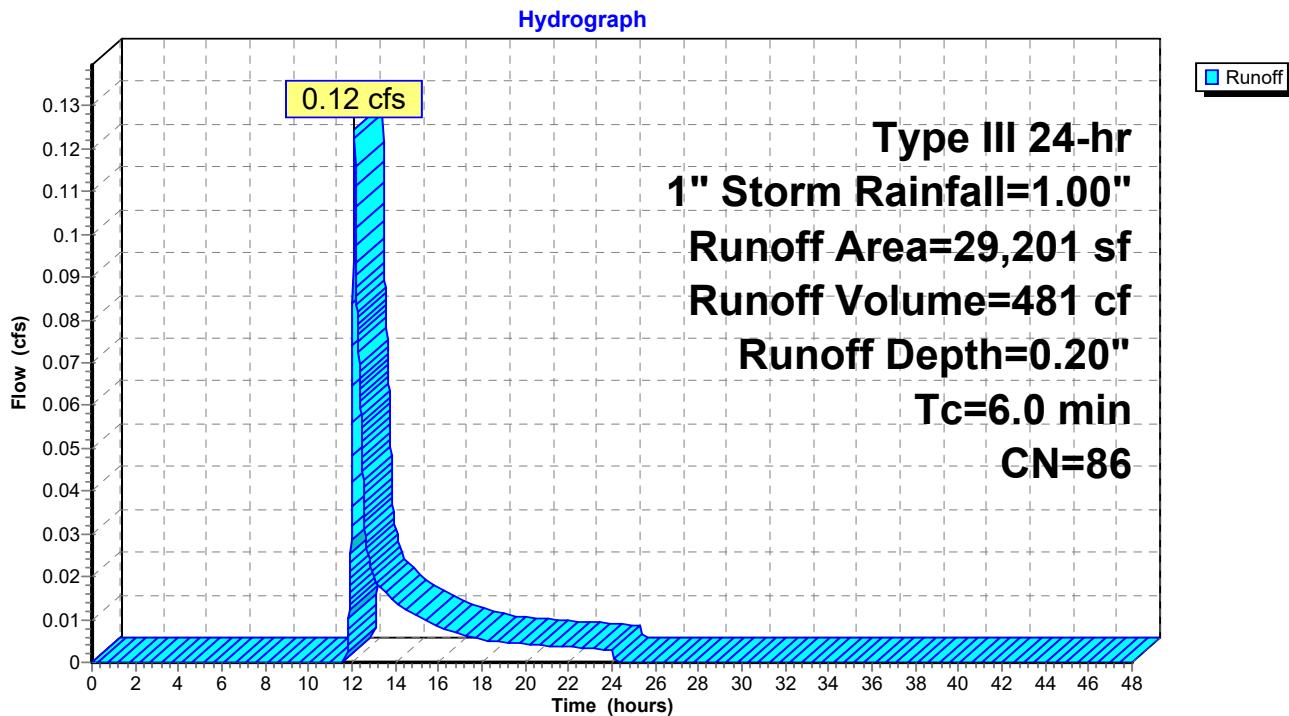
**Summary for Subcatchment P-1C: Subcatchment to Infiltration Trench #2**

Runoff = 0.12 cfs @ 12.11 hrs, Volume= 481 cf, Depth= 0.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
Type III 24-hr 1" Storm Rainfall=1.00"

Area (sf)	CN	Description
19,431	98	Paved parking, HSG B
9,770	61	>75% Grass cover, Good, HSG B

Tc	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Direct Entry
5.0	0				Total, Increased to minimum Tc = 6.0 min

**Subcatchment P-1C: Subcatchment to Infiltration Trench #2**

**Proposed HydroCAD 533 Boston Post Road**

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Type III 24-hr 1" Storm Rainfall=1.00"

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**Hydrograph for Subcatchment P-1C: Subcatchment to Infiltration Trench #2**

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.50	1.00	0.20	0.00
0.50	0.00	0.00	0.00	27.00	1.00	0.20	0.00
1.00	0.01	0.00	0.00	27.50	1.00	0.20	0.00
1.50	0.01	0.00	0.00	28.00	1.00	0.20	0.00
2.00	0.02	0.00	0.00	28.50	1.00	0.20	0.00
2.50	0.03	0.00	0.00	29.00	1.00	0.20	0.00
3.00	0.03	0.00	0.00	29.50	1.00	0.20	0.00
3.50	0.04	0.00	0.00	30.00	1.00	0.20	0.00
4.00	0.04	0.00	0.00	30.50	1.00	0.20	0.00
4.50	0.05	0.00	0.00	31.00	1.00	0.20	0.00
5.00	0.06	0.00	0.00	31.50	1.00	0.20	0.00
5.50	0.06	0.00	0.00	32.00	1.00	0.20	0.00
6.00	0.07	0.00	0.00	32.50	1.00	0.20	0.00
6.50	0.08	0.00	0.00	33.00	1.00	0.20	0.00
7.00	0.09	0.00	0.00	33.50	1.00	0.20	0.00
7.50	0.10	0.00	0.00	34.00	1.00	0.20	0.00
8.00	0.11	0.00	0.00	34.50	1.00	0.20	0.00
8.50	0.13	0.00	0.00	35.00	1.00	0.20	0.00
9.00	0.15	0.00	0.00	35.50	1.00	0.20	0.00
9.50	0.17	0.00	0.00	36.00	1.00	0.20	0.00
10.00	0.19	0.00	0.00	36.50	1.00	0.20	0.00
10.50	0.22	0.00	0.00	37.00	1.00	0.20	0.00
11.00	0.25	0.00	0.00	37.50	1.00	0.20	0.00
11.50	0.30	0.00	0.00	38.00	1.00	0.20	0.00
12.00	0.50	0.02	<b>0.05</b>	38.50	1.00	0.20	0.00
12.50	0.70	0.07	<b>0.04</b>	39.00	1.00	0.20	0.00
13.00	0.75	0.09	0.02	39.50	1.00	0.20	0.00
13.50	0.78	0.10	0.02	40.00	1.00	0.20	0.00
14.00	0.81	0.11	0.01	40.50	1.00	0.20	0.00
14.50	0.83	0.12	0.01	41.00	1.00	0.20	0.00
15.00	0.85	0.13	0.01	41.50	1.00	0.20	0.00
15.50	0.87	0.14	0.01	42.00	1.00	0.20	0.00
16.00	0.89	0.14	0.01	42.50	1.00	0.20	0.00
16.50	0.90	0.15	0.01	43.00	1.00	0.20	0.00
17.00	0.91	0.15	0.01	43.50	1.00	0.20	0.00
17.50	0.92	0.16	0.01	44.00	1.00	0.20	0.00
18.00	0.93	0.16	0.01	44.50	1.00	0.20	0.00
18.50	0.94	0.17	0.00	45.00	1.00	0.20	0.00
19.00	0.94	0.17	0.00	45.50	1.00	0.20	0.00
19.50	0.95	0.17	0.00	46.00	1.00	0.20	0.00
20.00	0.96	0.18	0.00	46.50	1.00	0.20	0.00
20.50	0.96	0.18	0.00	47.00	1.00	0.20	0.00
21.00	0.97	0.18	0.00	47.50	1.00	0.20	0.00
21.50	0.98	0.19	0.00	48.00	1.00	0.20	0.00
22.00	0.98	0.19	0.00				
22.50	0.99	0.19	0.00				
23.00	0.99	0.19	0.00				
23.50	1.00	0.20	0.00				
24.00	<b>1.00</b>	<b>0.20</b>	0.00				
24.50	1.00	0.20	0.00				
25.00	1.00	0.20	0.00				
25.50	1.00	0.20	0.00				
26.00	1.00	0.20	0.00				

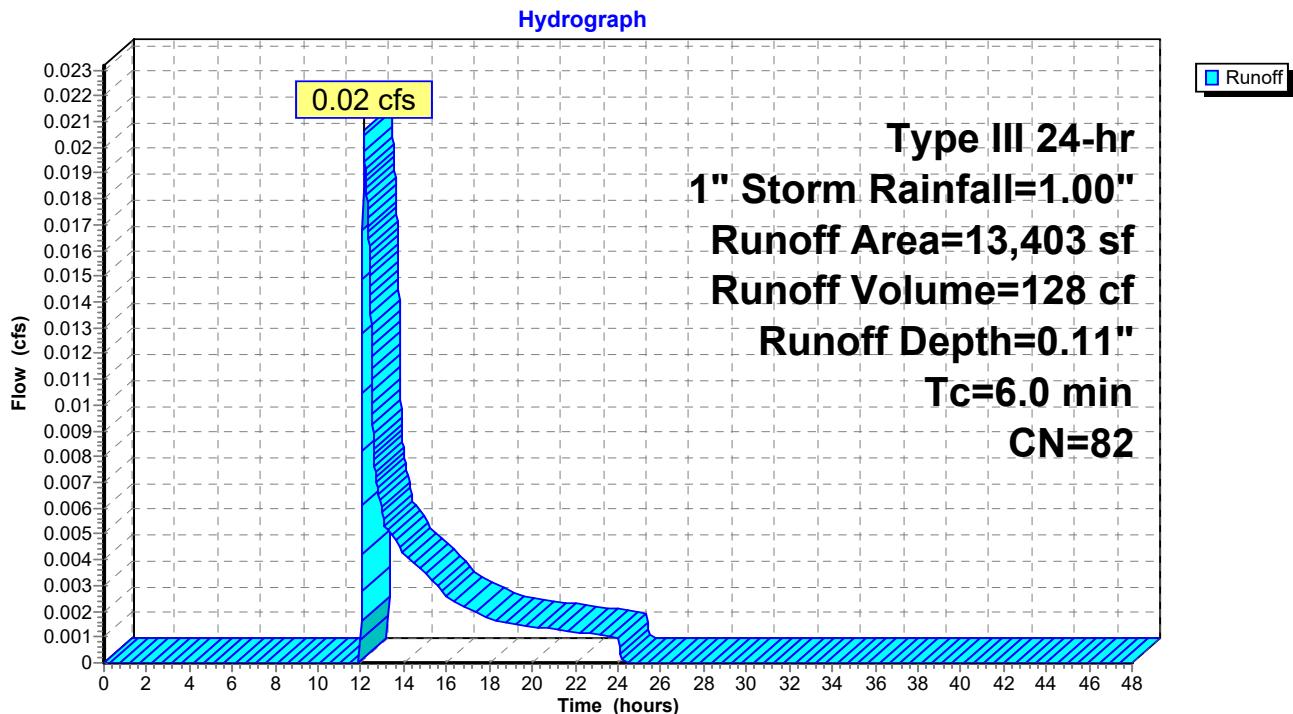
**Summary for Subcatchment P-1D: Subcatchment to Infiltration Trench 1**

Runoff = 0.02 cfs @ 12.14 hrs, Volume= 128 cf, Depth= 0.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
Type III 24-hr 1" Storm Rainfall=1.00"

Area (sf)	CN	Description
7,822	98	Paved parking, HSG B
2,453	61	>75% Grass cover, Good, HSG B
3,128	60	Woods, Fair, HSG B
13,403	82	Weighted Average
5,581		41.64% Pervious Area
7,822		58.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					<b>Direct Entry, Direct Entry</b>
5.0	0				Total, Increased to minimum Tc = 6.0 min

**Subcatchment P-1D: Subcatchment to Infiltration Trench 1**

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Type III 24-hr 1" Storm Rainfall=1.00"

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**Hydrograph for Subcatchment P-1D: Subcatchment to Infiltration Trench 1**

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.50	1.00	0.11	0.00
0.50	0.00	0.00	0.00	27.00	1.00	0.11	0.00
1.00	0.01	0.00	0.00	27.50	1.00	0.11	0.00
1.50	0.01	0.00	0.00	28.00	1.00	0.11	0.00
2.00	0.02	0.00	0.00	28.50	1.00	0.11	0.00
2.50	0.03	0.00	0.00	29.00	1.00	0.11	0.00
3.00	0.03	0.00	0.00	29.50	1.00	0.11	0.00
3.50	0.04	0.00	0.00	30.00	1.00	0.11	0.00
4.00	0.04	0.00	0.00	30.50	1.00	0.11	0.00
4.50	0.05	0.00	0.00	31.00	1.00	0.11	0.00
5.00	0.06	0.00	0.00	31.50	1.00	0.11	0.00
5.50	0.06	0.00	0.00	32.00	1.00	0.11	0.00
6.00	0.07	0.00	0.00	32.50	1.00	0.11	0.00
6.50	0.08	0.00	0.00	33.00	1.00	0.11	0.00
7.00	0.09	0.00	0.00	33.50	1.00	0.11	0.00
7.50	0.10	0.00	0.00	34.00	1.00	0.11	0.00
8.00	0.11	0.00	0.00	34.50	1.00	0.11	0.00
8.50	0.13	0.00	0.00	35.00	1.00	0.11	0.00
9.00	0.15	0.00	0.00	35.50	1.00	0.11	0.00
9.50	0.17	0.00	0.00	36.00	1.00	0.11	0.00
10.00	0.19	0.00	0.00	36.50	1.00	0.11	0.00
10.50	0.22	0.00	0.00	37.00	1.00	0.11	0.00
11.00	0.25	0.00	0.00	37.50	1.00	0.11	0.00
11.50	0.30	0.00	0.00	38.00	1.00	0.11	0.00
12.00	0.50	0.00	<b>0.00</b>	38.50	1.00	0.11	0.00
12.50	0.70	0.03	<b>0.01</b>	39.00	1.00	0.11	0.00
13.00	0.75	0.04	0.01	39.50	1.00	0.11	0.00
13.50	0.78	0.05	0.00	40.00	1.00	0.11	0.00
14.00	0.81	0.05	0.00	40.50	1.00	0.11	0.00
14.50	0.83	0.06	0.00	41.00	1.00	0.11	0.00
15.00	0.85	0.07	0.00	41.50	1.00	0.11	0.00
15.50	0.87	0.07	0.00	42.00	1.00	0.11	0.00
16.00	0.89	0.08	0.00	42.50	1.00	0.11	0.00
16.50	0.90	0.08	0.00	43.00	1.00	0.11	0.00
17.00	0.91	0.08	0.00	43.50	1.00	0.11	0.00
17.50	0.92	0.09	0.00	44.00	1.00	0.11	0.00
18.00	0.93	0.09	0.00	44.50	1.00	0.11	0.00
18.50	0.94	0.09	0.00	45.00	1.00	0.11	0.00
19.00	0.94	0.09	0.00	45.50	1.00	0.11	0.00
19.50	0.95	0.10	0.00	46.00	1.00	0.11	0.00
20.00	0.96	0.10	0.00	46.50	1.00	0.11	0.00
20.50	0.96	0.10	0.00	47.00	1.00	0.11	0.00
21.00	0.97	0.10	0.00	47.50	1.00	0.11	0.00
21.50	0.98	0.11	0.00	48.00	1.00	0.11	0.00
22.00	0.98	0.11	0.00				
22.50	0.99	0.11	0.00				
23.00	0.99	0.11	0.00				
23.50	1.00	0.11	0.00				
24.00	<b>1.00</b>	<b>0.11</b>	0.00				
24.50	1.00	0.11	0.00				
25.00	1.00	0.11	0.00				
25.50	1.00	0.11	0.00				
26.00	1.00	0.11	0.00				

**Summary for Subcatchment P-1U: Undetained to Wetlands**

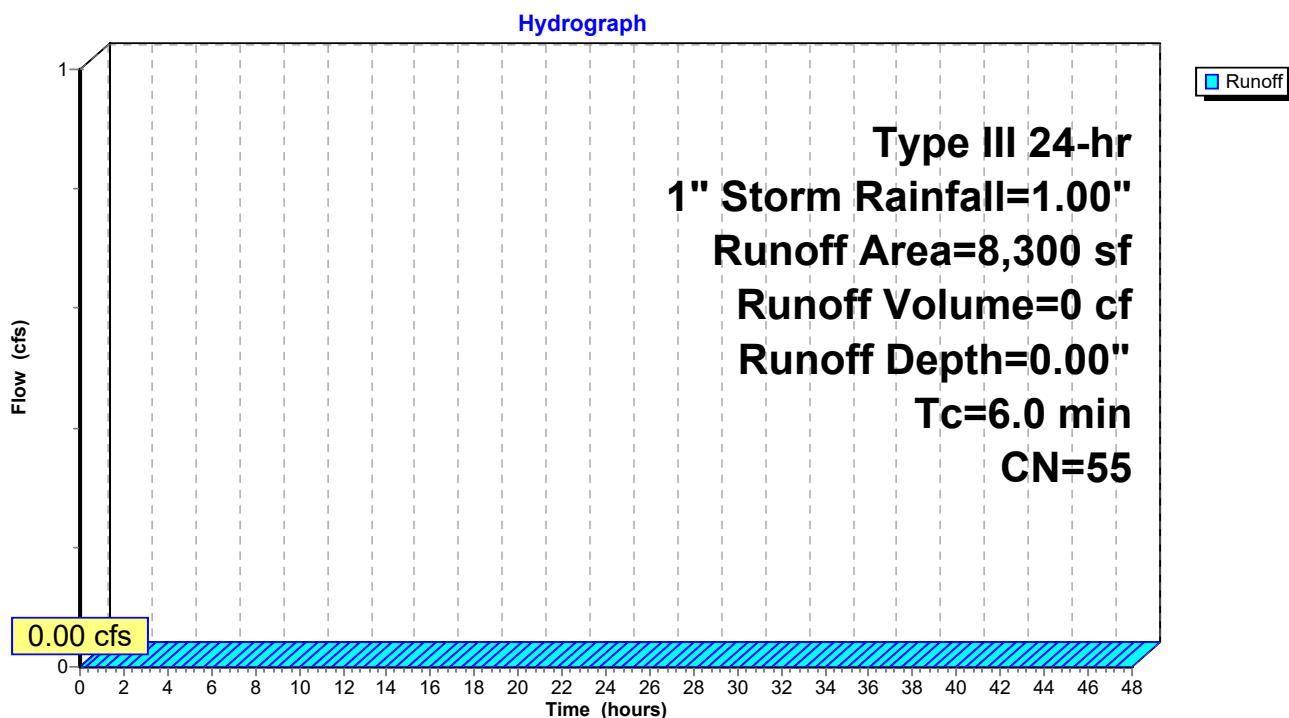
[45] Hint: Runoff=Zero

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
Type III 24-hr 1" Storm Rainfall=1.00"

Area (sf)	CN	Description
8,300	55	Woods, Good, HSG B
8,300		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0				<b>Direct Entry, Direct Entry</b>	
5.0	0			Total, Increased to minimum Tc = 6.0 min	

**Subcatchment P-1U: Undetained to Wetlands**

**Proposed HydroCAD 533 Boston Post Road**

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Type III 24-hr 1" Storm Rainfall=1.00"

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**Hydrograph for Subcatchment P-1U: Undetained to Wetlands**

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	<b>0.00</b>	<b>0.00</b>	26.50	1.00	0.00	0.00
0.50	0.00	0.00	0.00	27.00	1.00	0.00	0.00
1.00	0.01	0.00	0.00	27.50	1.00	0.00	0.00
1.50	0.01	0.00	0.00	28.00	1.00	0.00	0.00
2.00	0.02	0.00	0.00	28.50	1.00	0.00	0.00
2.50	0.03	0.00	0.00	29.00	1.00	0.00	0.00
3.00	0.03	0.00	0.00	29.50	1.00	0.00	0.00
3.50	0.04	0.00	0.00	30.00	1.00	0.00	0.00
4.00	0.04	0.00	0.00	30.50	1.00	0.00	0.00
4.50	0.05	0.00	0.00	31.00	1.00	0.00	0.00
5.00	0.06	0.00	0.00	31.50	1.00	0.00	0.00
5.50	0.06	0.00	0.00	32.00	1.00	0.00	0.00
6.00	0.07	0.00	0.00	32.50	1.00	0.00	0.00
6.50	0.08	0.00	0.00	33.00	1.00	0.00	0.00
7.00	0.09	0.00	0.00	33.50	1.00	0.00	0.00
7.50	0.10	0.00	0.00	34.00	1.00	0.00	0.00
8.00	0.11	0.00	0.00	34.50	1.00	0.00	0.00
8.50	0.13	0.00	0.00	35.00	1.00	0.00	0.00
9.00	0.15	0.00	0.00	35.50	1.00	0.00	0.00
9.50	0.17	0.00	0.00	36.00	1.00	0.00	0.00
10.00	0.19	0.00	0.00	36.50	1.00	0.00	0.00
10.50	0.22	0.00	0.00	37.00	1.00	0.00	0.00
11.00	0.25	0.00	0.00	37.50	1.00	0.00	0.00
11.50	0.30	0.00	0.00	38.00	1.00	0.00	0.00
12.00	0.50	0.00	0.00	38.50	1.00	0.00	0.00
12.50	0.70	0.00	0.00	39.00	1.00	0.00	0.00
13.00	0.75	0.00	0.00	39.50	1.00	0.00	0.00
13.50	0.78	0.00	0.00	40.00	1.00	0.00	0.00
14.00	0.81	0.00	0.00	40.50	1.00	0.00	0.00
14.50	0.83	0.00	0.00	41.00	1.00	0.00	0.00
15.00	0.85	0.00	0.00	41.50	1.00	0.00	0.00
15.50	0.87	0.00	0.00	42.00	1.00	0.00	0.00
16.00	0.89	0.00	0.00	42.50	1.00	0.00	0.00
16.50	0.90	0.00	0.00	43.00	1.00	0.00	0.00
17.00	0.91	0.00	0.00	43.50	1.00	0.00	0.00
17.50	0.92	0.00	0.00	44.00	1.00	0.00	0.00
18.00	0.93	0.00	0.00	44.50	1.00	0.00	0.00
18.50	0.94	0.00	0.00	45.00	1.00	0.00	0.00
19.00	0.94	0.00	0.00	45.50	1.00	0.00	0.00
19.50	0.95	0.00	0.00	46.00	1.00	0.00	0.00
20.00	0.96	0.00	0.00	46.50	1.00	0.00	0.00
20.50	0.96	0.00	0.00	47.00	1.00	0.00	0.00
21.00	0.97	0.00	0.00	47.50	1.00	0.00	0.00
21.50	0.98	0.00	0.00	48.00	1.00	0.00	0.00
22.00	0.98	0.00	0.00				
22.50	0.99	0.00	0.00				
23.00	0.99	0.00	0.00				
23.50	1.00	0.00	0.00				
24.00	<b>1.00</b>	0.00	0.00				
24.50	1.00	0.00	0.00				
25.00	1.00	0.00	0.00				
25.50	1.00	0.00	0.00				
26.00	1.00	0.00	0.00				

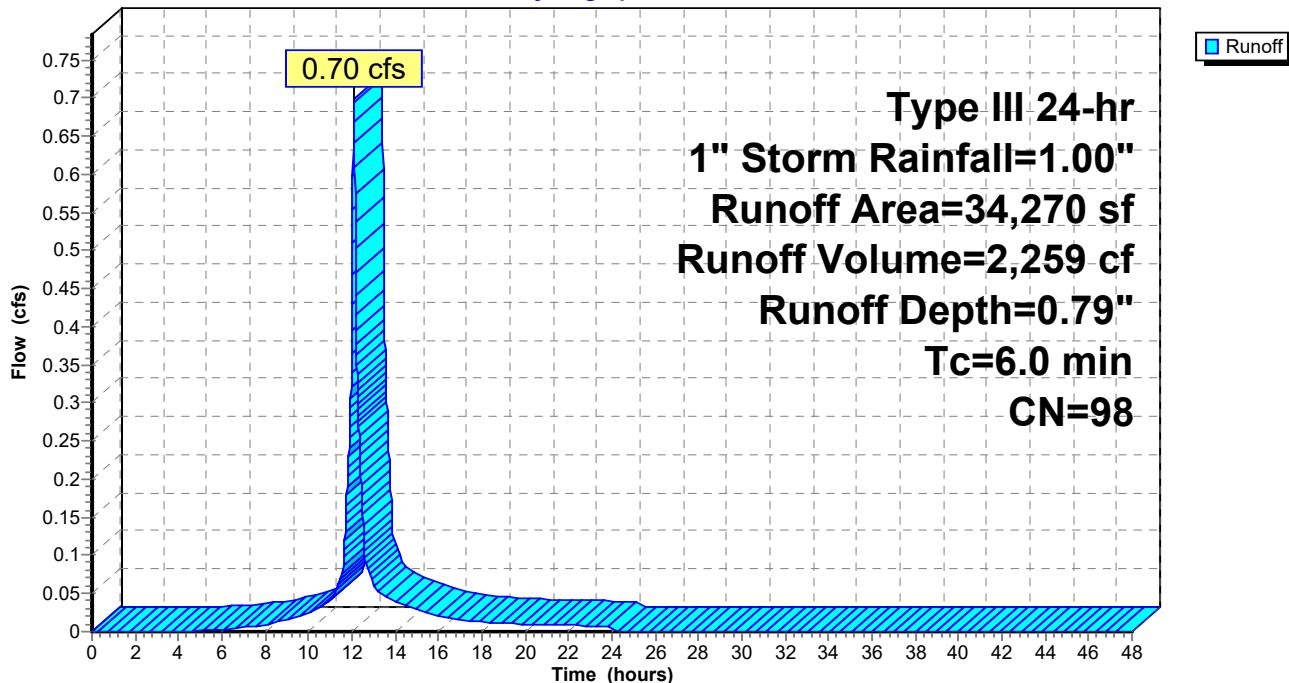
**Summary for Subcatchment P-B1: Roof Runoff to Infiltration Trench #3**

Runoff = 0.70 cfs @ 12.08 hrs, Volume= 2,259 cf, Depth= 0.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
Type III 24-hr 1" Storm Rainfall=1.00"

Area (sf)	CN	Description
34,270	98	Roofs, HSG B
34,270		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0				<b>Direct Entry, Direct Entry</b>	
5.0	0			Total, Increased to minimum Tc = 6.0 min	

**Subcatchment P-B1: Roof Runoff to Infiltration Trench #3****Hydrograph**

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**Hydrograph for Subcatchment P-B1: Roof Runoff to Infiltration Trench #3**

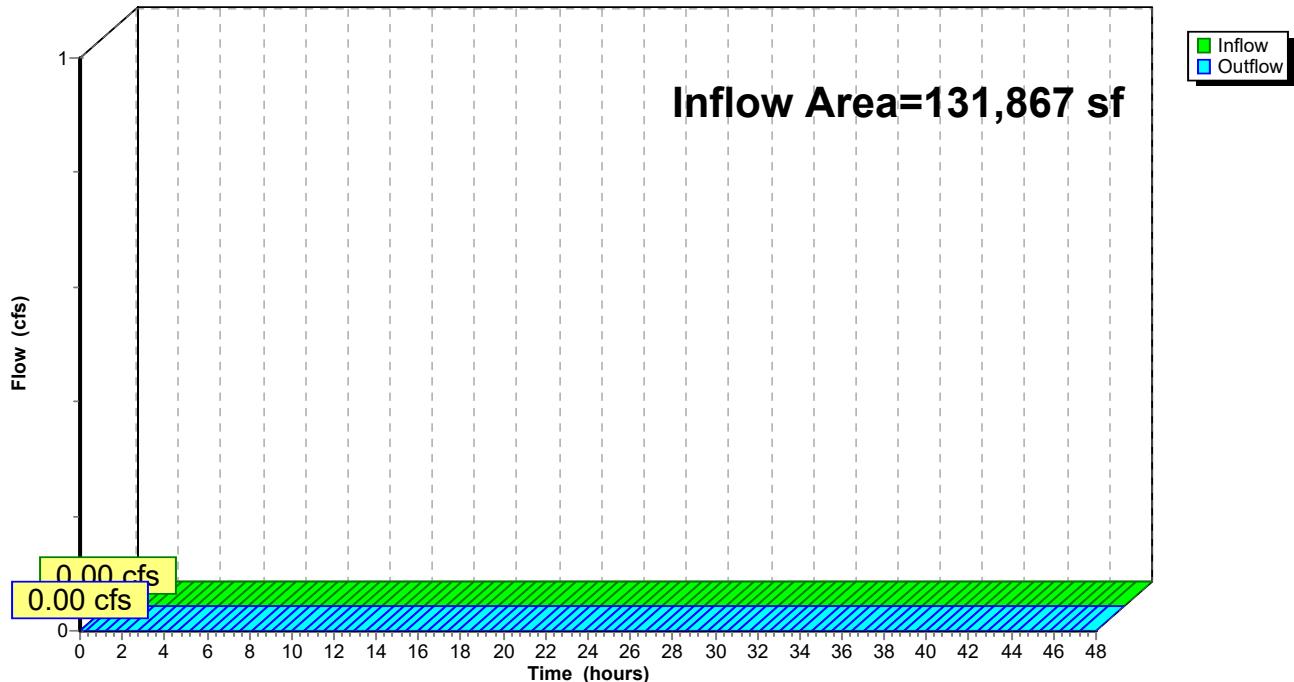
Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.50	1.00	0.79	0.00
0.50	0.00	0.00	0.00	27.00	1.00	0.79	0.00
1.00	0.01	0.00	0.00	27.50	1.00	0.79	0.00
1.50	0.01	0.00	0.00	28.00	1.00	0.79	0.00
2.00	0.02	0.00	0.00	28.50	1.00	0.79	0.00
2.50	0.03	0.00	0.00	29.00	1.00	0.79	0.00
3.00	0.03	0.00	0.00	29.50	1.00	0.79	0.00
3.50	0.04	0.00	0.00	30.00	1.00	0.79	0.00
4.00	0.04	0.00	0.00	30.50	1.00	0.79	0.00
4.50	0.05	0.00	0.00	31.00	1.00	0.79	0.00
5.00	0.06	0.00	0.00	31.50	1.00	0.79	0.00
5.50	0.06	0.00	0.00	32.00	1.00	0.79	0.00
6.00	0.07	0.00	0.00	32.50	1.00	0.79	0.00
6.50	0.08	0.01	0.00	33.00	1.00	0.79	0.00
7.00	0.09	0.01	0.01	33.50	1.00	0.79	0.00
7.50	0.10	0.01	0.01	34.00	1.00	0.79	0.00
8.00	0.11	0.02	0.01	34.50	1.00	0.79	0.00
8.50	0.13	0.03	0.01	35.00	1.00	0.79	0.00
9.00	0.15	0.04	0.02	35.50	1.00	0.79	0.00
9.50	0.17	0.05	0.02	36.00	1.00	0.79	0.00
10.00	0.19	0.06	0.02	36.50	1.00	0.79	0.00
10.50	0.22	0.08	0.03	37.00	1.00	0.79	0.00
11.00	0.25	0.11	0.04	37.50	1.00	0.79	0.00
11.50	0.30	0.14	0.07	38.00	1.00	0.79	0.00
12.00	0.50	0.32	<b>0.43</b>	38.50	1.00	0.79	0.00
12.50	0.70	0.51	<b>0.15</b>	39.00	1.00	0.79	0.00
13.00	0.75	0.55	0.06	39.50	1.00	0.79	0.00
13.50	0.78	0.58	0.05	40.00	1.00	0.79	0.00
14.00	0.81	0.61	0.04	40.50	1.00	0.79	0.00
14.50	0.83	0.63	0.03	41.00	1.00	0.79	0.00
15.00	0.85	0.65	0.03	41.50	1.00	0.79	0.00
15.50	0.87	0.67	0.03	42.00	1.00	0.79	0.00
16.00	0.89	0.68	0.02	42.50	1.00	0.79	0.00
16.50	0.90	0.69	0.02	43.00	1.00	0.79	0.00
17.00	0.91	0.70	0.02	43.50	1.00	0.79	0.00
17.50	0.92	0.71	0.01	44.00	1.00	0.79	0.00
18.00	0.93	0.72	0.01	44.50	1.00	0.79	0.00
18.50	0.94	0.73	0.01	45.00	1.00	0.79	0.00
19.00	0.94	0.74	0.01	45.50	1.00	0.79	0.00
19.50	0.95	0.74	0.01	46.00	1.00	0.79	0.00
20.00	0.96	0.75	0.01	46.50	1.00	0.79	0.00
20.50	0.96	0.76	0.01	47.00	1.00	0.79	0.00
21.00	0.97	0.76	0.01	47.50	1.00	0.79	0.00
21.50	0.98	0.77	0.01	48.00	1.00	0.79	0.00
22.00	0.98	0.77	0.01				
22.50	0.99	0.78	0.01				
23.00	0.99	0.78	0.01				
23.50	1.00	0.79	0.01				
24.00	<b>1.00</b>	<b>0.79</b>	0.01				
24.50	1.00	0.79	0.00				
25.00	1.00	0.79	0.00				
25.50	1.00	0.79	0.00				
26.00	1.00	0.79	0.00				

**Summary for Reach 1R: (new Reach)**

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

Inflow Area = 131,867 sf, 70.62% Impervious, Inflow Depth = 0.00" for 1" Storm 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

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3

**Reach 1R: (new Reach)****Hydrograph**

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**Hydrograph for Reach 1R: (new Reach)**

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	<b>0.00</b>		<b>0.00</b>	26.50	0.00		0.00
0.50	0.00	0.00	0.00	27.00	0.00	0.00	0.00
1.00	0.00	0.00	0.00	27.50	0.00	0.00	0.00
1.50	0.00	0.00	0.00	28.00	0.00	0.00	0.00
2.00	0.00	0.00	0.00	28.50	0.00	0.00	0.00
2.50	0.00	0.00	0.00	29.00	0.00	0.00	0.00
3.00	0.00	0.00	0.00	29.50	0.00	0.00	0.00
3.50	0.00	0.00	0.00	30.00	0.00	0.00	0.00
4.00	0.00	0.00	0.00	30.50	0.00	0.00	0.00
4.50	0.00	0.00	0.00	31.00	0.00	0.00	0.00
5.00	0.00	0.00	0.00	31.50	0.00	0.00	0.00
5.50	0.00	0.00	0.00	32.00	0.00	0.00	0.00
6.00	0.00	0.00	0.00	32.50	0.00	0.00	0.00
6.50	0.00	0.00	0.00	33.00	0.00	0.00	0.00
7.00	0.00	0.00	0.00	33.50	0.00	0.00	0.00
7.50	0.00	0.00	0.00	34.00	0.00	0.00	0.00
8.00	0.00	0.00	0.00	34.50	0.00	0.00	0.00
8.50	0.00	0.00	0.00	35.00	0.00	0.00	0.00
9.00	0.00	0.00	0.00	35.50	0.00	0.00	0.00
9.50	0.00	0.00	0.00	36.00	0.00	0.00	0.00
10.00	0.00	0.00	0.00	36.50	0.00	0.00	0.00
10.50	0.00	0.00	0.00	37.00	0.00	0.00	0.00
11.00	0.00	0.00	0.00	37.50	0.00	0.00	0.00
11.50	0.00	0.00	0.00	38.00	0.00	0.00	0.00
12.00	0.00	0.00	0.00	38.50	0.00	0.00	0.00
12.50	0.00	0.00	0.00	39.00	0.00	0.00	0.00
13.00	0.00	0.00	0.00	39.50	0.00	0.00	0.00
13.50	0.00	0.00	0.00	40.00	0.00	0.00	0.00
14.00	0.00	0.00	0.00	40.50	0.00	0.00	0.00
14.50	0.00	0.00	0.00	41.00	0.00	0.00	0.00
15.00	0.00	0.00	0.00	41.50	0.00	0.00	0.00
15.50	0.00	0.00	0.00	42.00	0.00	0.00	0.00
16.00	0.00	0.00	0.00	42.50	0.00	0.00	0.00
16.50	0.00	0.00	0.00	43.00	0.00	0.00	0.00
17.00	0.00	0.00	0.00	43.50	0.00	0.00	0.00
17.50	0.00	0.00	0.00	44.00	0.00	0.00	0.00
18.00	0.00	0.00	0.00	44.50	0.00	0.00	0.00
18.50	0.00	0.00	0.00	45.00	0.00	0.00	0.00
19.00	0.00	0.00	0.00	45.50	0.00	0.00	0.00
19.50	0.00	0.00	0.00	46.00	0.00	0.00	0.00
20.00	0.00	0.00	0.00	46.50	0.00	0.00	0.00
20.50	0.00	0.00	0.00	47.00	0.00	0.00	0.00
21.00	0.00	0.00	0.00	47.50	0.00	0.00	0.00
21.50	0.00	0.00	0.00	48.00	0.00	0.00	0.00
22.00	0.00	0.00					
22.50	0.00	0.00					
23.00	0.00	0.00					
23.50	0.00	0.00					
24.00	0.00	0.00					
24.50	0.00	0.00					
25.00	0.00	0.00					
25.50	0.00	0.00					
26.00	0.00	0.00					

**Summary for Pond IB-1: Infiltration Basin #1**

Inflow Area = 13,425 sf, 66.59% Impervious, Inflow Depth = 0.17" for 1" Storm event

Inflow = 0.05 cfs @ 12.11 hrs, Volume= 194 cf

Outflow = 0.01 cfs @ 14.23 hrs, Volume= 194 cf, Atten= 88%, Lag= 127.1 min

Discarded = 0.01 cfs @ 14.23 hrs, Volume= 194 cf

Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3

Peak Elev= 122.41' @ 14.23 hrs Surf.Area= 233 sf Storage= 67 cf

Plug-Flow detention time= 148.9 min calculated for 194 cf (100% of inflow)

Center-of-Mass det. time= 148.9 min ( 1,049.1 - 900.2 )

Volume	Invert	Avail.Storage	Storage Description
#1	122.00'	1,077 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
122.00	93	0	0
123.00	434	264	264
124.00	839	637	900
124.20	927	177	1,077

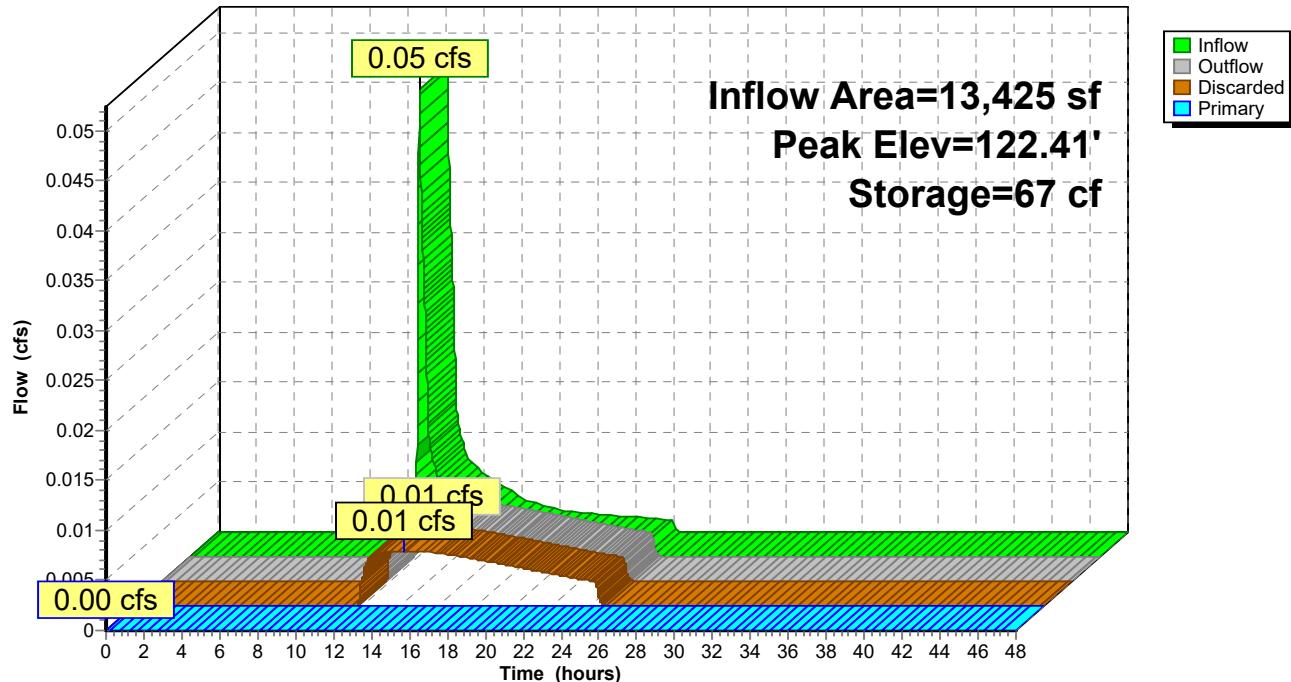
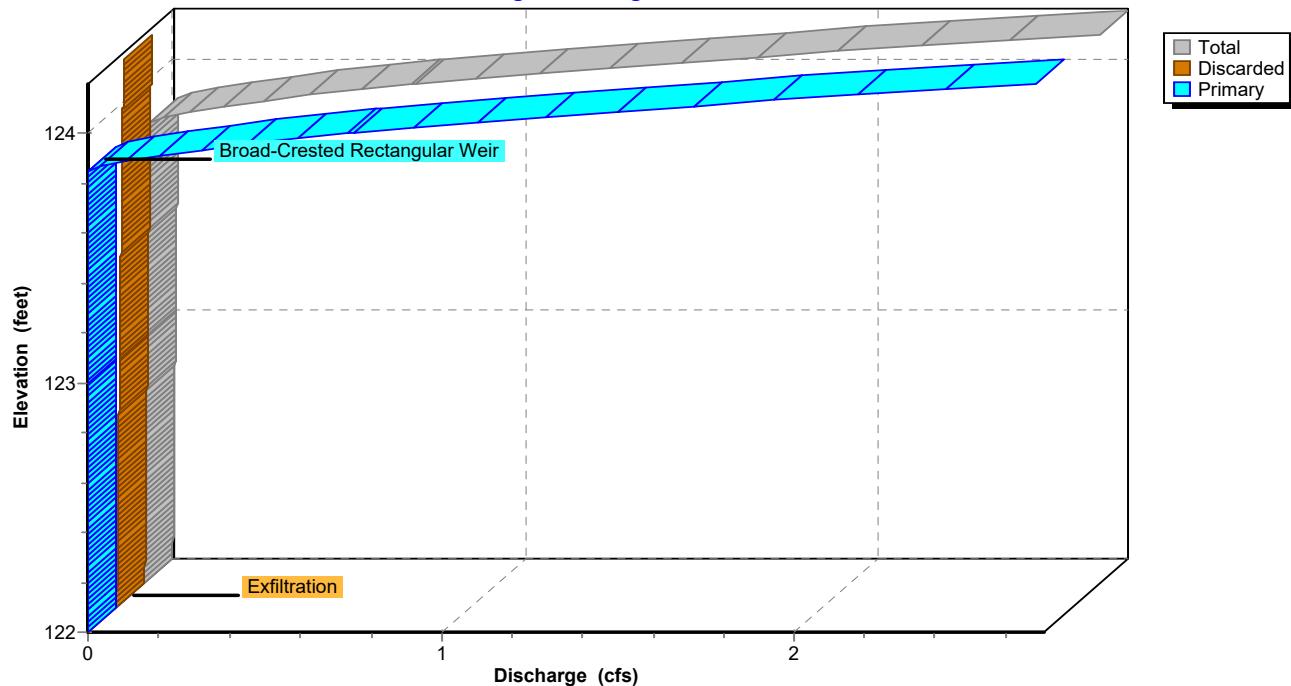
Device	Routing	Invert	Outlet Devices
#1	Discarded	122.00'	<b>1.020 in/hr Exfiltration over Surface area</b> Phase-In= 0.01'
#2	Primary	123.85'	<b>5.0' long x 2.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

**Discarded OutFlow** Max=0.01 cfs @ 14.23 hrs HW=122.41' (Free Discharge)

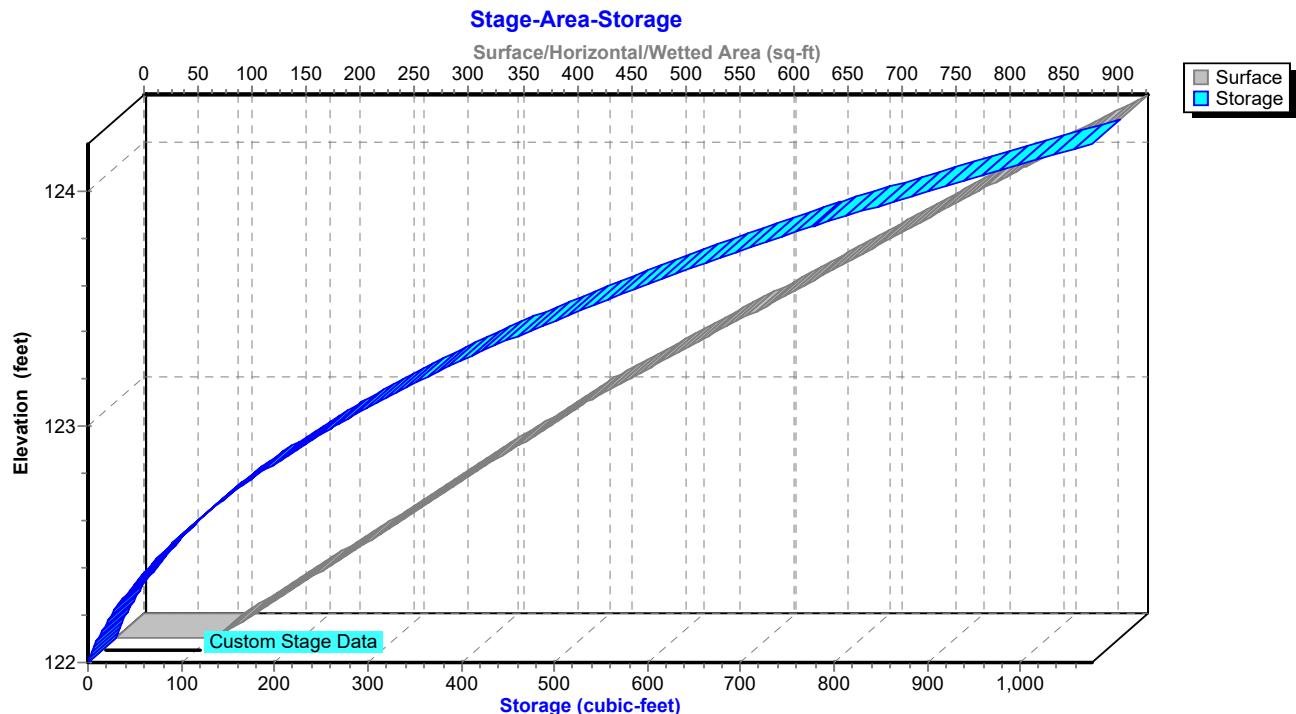
↑1=Exfiltration (Exfiltration Controls 0.01 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=122.00' TW=0.00' (Dynamic Tailwater)

↑2=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)

**Pond IB-1: Infiltration Basin #1****Hydrograph****Pond IB-1: Infiltration Basin #1****Stage-Discharge**

### Pond IB-1: Infiltration Basin #1



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**Hydrograph for Pond IB-1: Infiltration Basin #1**

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	122.00	0.00	0.00	<b>0.00</b>
1.00	0.00	0	122.00	0.00	0.00	0.00
2.00	0.00	0	122.00	0.00	0.00	0.00
3.00	0.00	0	122.00	0.00	0.00	0.00
4.00	0.00	0	122.00	0.00	0.00	0.00
5.00	0.00	0	122.00	0.00	0.00	0.00
6.00	0.00	0	122.00	0.00	0.00	0.00
7.00	0.00	0	122.00	0.00	0.00	0.00
8.00	0.00	0	122.00	0.00	0.00	0.00
9.00	0.00	0	122.00	0.00	0.00	0.00
10.00	0.00	0	122.00	0.00	0.00	0.00
11.00	0.00	0	122.00	0.00	0.00	0.00
12.00	<b>0.02</b>	3	122.03	0.00	0.00	0.00
13.00	<b>0.01</b>	62	122.39	0.01	0.01	0.00
14.00	0.01	<b>67</b>	<b>122.41</b>	<b>0.01</b>	<b>0.01</b>	0.00
15.00	0.00	<b>66</b>	<b>122.41</b>	<b>0.01</b>	<b>0.01</b>	0.00
16.00	0.00	61	122.39	0.01	0.01	0.00
17.00	0.00	54	122.35	0.01	0.01	0.00
18.00	0.00	45	122.31	0.00	0.00	0.00
19.00	0.00	37	122.26	0.00	0.00	0.00
20.00	0.00	28	122.22	0.00	0.00	0.00
21.00	0.00	21	122.17	0.00	0.00	0.00
22.00	0.00	15	122.13	0.00	0.00	0.00
23.00	0.00	9	122.08	0.00	0.00	0.00
24.00	0.00	4	122.04	0.00	0.00	0.00
25.00	0.00	0	122.00	0.00	0.00	0.00
26.00	0.00	0	122.00	0.00	0.00	0.00
27.00	0.00	0	122.00	0.00	0.00	0.00
28.00	0.00	0	122.00	0.00	0.00	0.00
29.00	0.00	0	122.00	0.00	0.00	0.00
30.00	0.00	0	122.00	0.00	0.00	0.00
31.00	0.00	0	122.00	0.00	0.00	0.00
32.00	0.00	0	122.00	0.00	0.00	0.00
33.00	0.00	0	122.00	0.00	0.00	0.00
34.00	0.00	0	122.00	0.00	0.00	0.00
35.00	0.00	0	122.00	0.00	0.00	0.00
36.00	0.00	0	122.00	0.00	0.00	0.00
37.00	0.00	0	122.00	0.00	0.00	0.00
38.00	0.00	0	122.00	0.00	0.00	0.00
39.00	0.00	0	122.00	0.00	0.00	0.00
40.00	0.00	0	122.00	0.00	0.00	0.00
41.00	0.00	0	122.00	0.00	0.00	0.00
42.00	0.00	0	122.00	0.00	0.00	0.00
43.00	0.00	0	122.00	0.00	0.00	0.00
44.00	0.00	0	122.00	0.00	0.00	0.00
45.00	0.00	0	122.00	0.00	0.00	0.00
46.00	0.00	0	122.00	0.00	0.00	0.00
47.00	0.00	0	122.00	0.00	0.00	0.00
48.00	0.00	0	122.00	0.00	0.00	0.00

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**Stage-Discharge for Pond IB-1: Infiltration Basin #1**

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
122.00	0.00	0.00	0.00
122.05	0.00	0.00	0.00
122.10	0.00	0.00	0.00
122.15	0.00	0.00	0.00
122.20	0.00	0.00	0.00
122.25	0.00	0.00	0.00
122.30	0.00	0.00	0.00
122.35	0.01	0.01	0.00
122.40	0.01	0.01	0.00
122.45	0.01	0.01	0.00
122.50	0.01	0.01	0.00
122.55	0.01	0.01	0.00
122.60	0.01	0.01	0.00
122.65	0.01	0.01	0.00
122.70	0.01	0.01	0.00
122.75	0.01	0.01	0.00
122.80	0.01	0.01	0.00
122.85	0.01	0.01	0.00
122.90	0.01	0.01	0.00
122.95	0.01	0.01	0.00
123.00	0.01	0.01	0.00
123.05	0.01	0.01	0.00
123.10	0.01	0.01	0.00
123.15	0.01	0.01	0.00
123.20	0.01	0.01	0.00
123.25	0.01	0.01	0.00
123.30	0.01	0.01	0.00
123.35	0.01	0.01	0.00
123.40	0.01	0.01	0.00
123.45	0.01	0.01	0.00
123.50	0.02	0.02	0.00
123.55	0.02	0.02	0.00
123.60	0.02	0.02	0.00
123.65	0.02	0.02	0.00
123.70	0.02	0.02	0.00
123.75	0.02	0.02	0.00
123.80	0.02	0.02	0.00
123.85	0.02	0.02	0.00
123.90	0.16	0.02	0.14
123.95	0.42	0.02	0.40
124.00	0.76	0.02	0.74
124.05	1.16	0.02	1.14
124.10	1.62	0.02	1.60
124.15	2.14	0.02	2.12
124.20	<b>2.71</b>	<b>0.02</b>	<b>2.68</b>

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**Stage-Area-Storage for Pond IB-1: Infiltration Basin #1**

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
122.00	93	0
122.05	110	5
122.10	127	11
122.15	144	18
122.20	161	25
122.25	178	34
122.30	195	43
122.35	212	53
122.40	229	64
122.45	246	76
122.50	264	89
122.55	281	103
122.60	298	117
122.65	315	132
122.70	332	149
122.75	349	166
122.80	366	184
122.85	383	202
122.90	400	222
122.95	417	242
123.00	434	264
123.05	454	286
123.10	474	309
123.15	495	333
123.20	515	358
123.25	535	385
123.30	555	412
123.35	576	440
123.40	596	470
123.45	616	500
123.50	637	531
123.55	657	563
123.60	677	597
123.65	697	631
123.70	718	667
123.75	738	703
123.80	758	740
123.85	778	779
123.90	799	818
123.95	819	859
124.00	839	900
124.05	861	942
124.10	883	986
124.15	905	1,031
124.20	927	1,077

## Summary for Pond IB-2: Infiltration Basin #2

Inflow Area = 33,268 sf, 68.13% Impervious, Inflow Depth = 0.20" for 1" Storm event  
 Inflow = 0.14 cfs @ 12.11 hrs, Volume= 548 cf  
 Outflow = 0.02 cfs @ 13.24 hrs, Volume= 548 cf, Atten= 86%, Lag= 67.8 min  
 Discarded = 0.02 cfs @ 13.24 hrs, Volume= 548 cf  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3  
 Peak Elev= 122.21' @ 13.24 hrs Surf.Area= 855 sf Storage= 162 cf

Plug-Flow detention time= 78.2 min calculated for 548 cf (100% of inflow)  
 Center-of-Mass det. time= 78.2 min ( 970.4 - 892.2 )

Volume	Invert	Avail.Storage	Storage Description	
#1	122.00'	3,647 cf	<b>Custom Stage Data (Prismatic)</b>	Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	
122.00	672	0	0	
123.00	1,538	1,105	1,105	
124.00	2,504	2,021	3,126	
124.20	2,704	521	3,647	
Device	Routing	Invert	Outlet Devices	
#1	Discarded	122.00'	<b>1.020 in/hr Exfiltration over Surface area</b>	Phase-In= 0.01'
#2	Device 3	123.50'	<b>4.0' long x 0.5' breadth Broad-Crested Rectangular Weir</b>	
			Head (feet) 0.20 0.40 0.60 0.80 1.00	
			Coef. (English) 2.80 2.92 3.08 3.30 3.32	
#3	Primary	121.90'	<b>18.0" Round Culvert</b>	
			L= 20.0' CPP, square edge headwall, Ke= 0.500	
			Inlet / Outlet Invert= 121.90' / 121.70' S= 0.0100 '/' Cc= 0.900	
			n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf	

**Discarded OutFlow** Max=0.02 cfs @ 13.24 hrs HW=122.21' (Free Discharge)

↑ 1=Exfiltration (Exfiltration Controls 0.02 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=122.00' TW=0.00' (Dynamic Tailwater)

↑ 3=Culvert (Passes 0.00 cfs of 0.05 cfs potential flow)

↑ 2=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)

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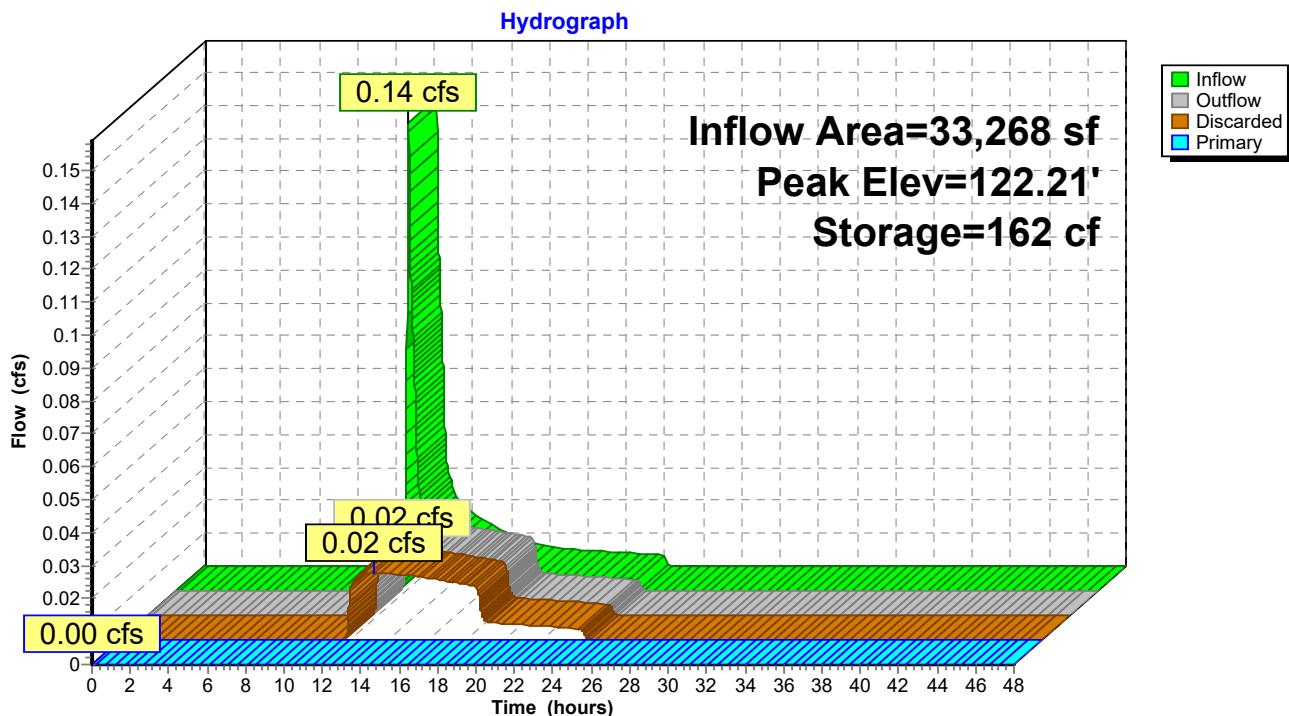
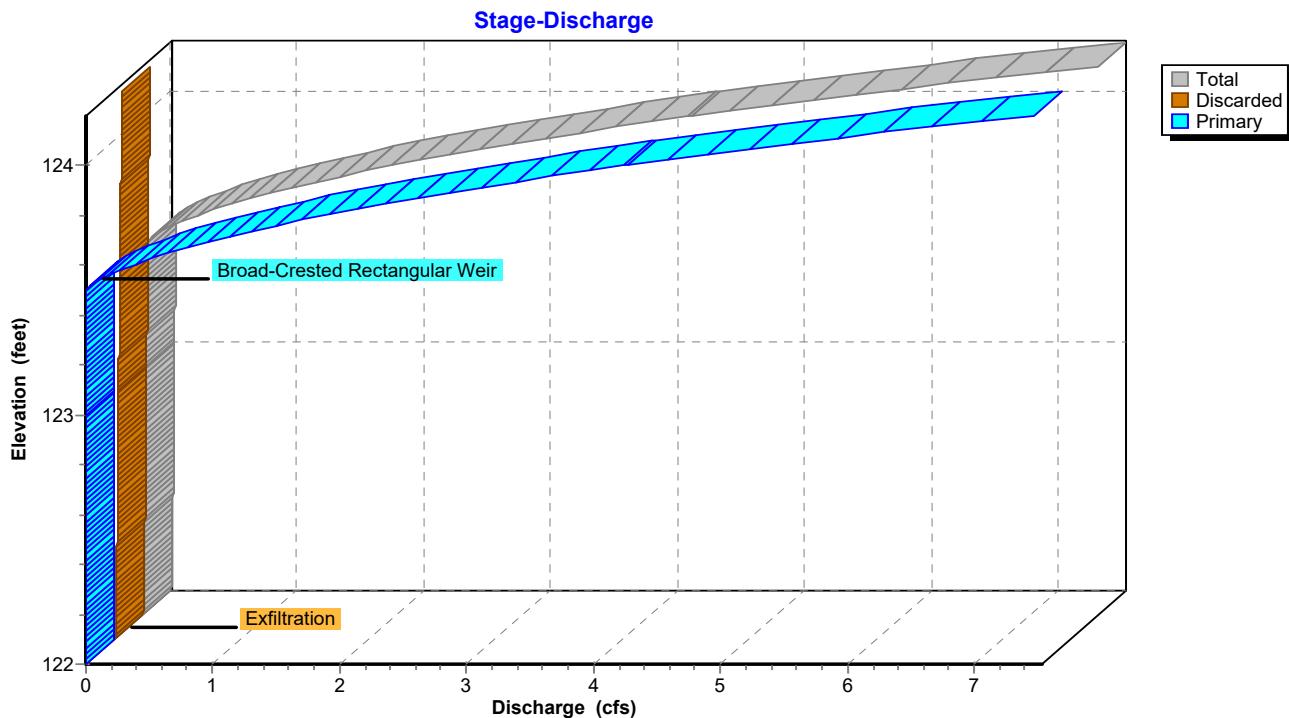
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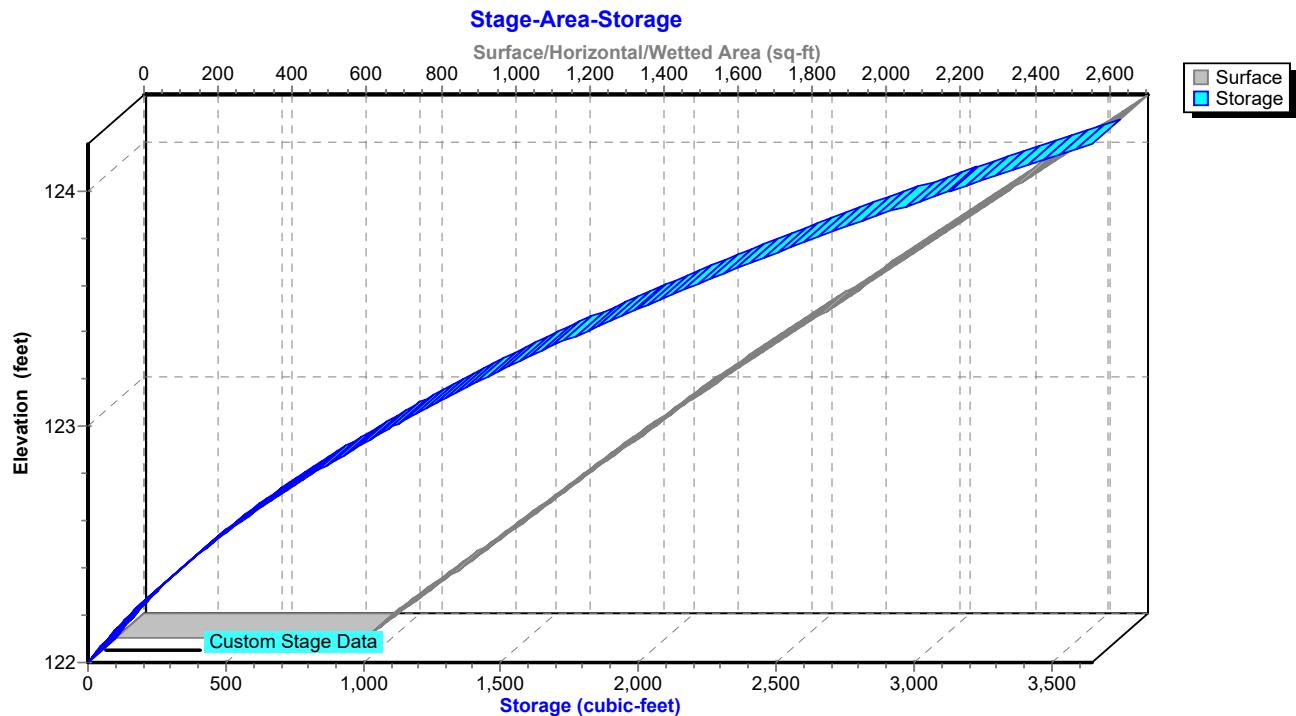
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**Pond IB-2: Infiltration Basin #2****Pond IB-2: Infiltration Basin #2**

### Pond IB-2: Infiltration Basin #2



**Hydrograph for Pond IB-2: Infiltration Basin #2**

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	122.00	0.00	0.00	<b>0.00</b>
1.00	0.00	0	122.00	0.00	0.00	0.00
2.00	0.00	0	122.00	0.00	0.00	0.00
3.00	0.00	0	122.00	0.00	0.00	0.00
4.00	0.00	0	122.00	0.00	0.00	0.00
5.00	0.00	0	122.00	0.00	0.00	0.00
6.00	0.00	0	122.00	0.00	0.00	0.00
7.00	0.00	0	122.00	0.00	0.00	0.00
8.00	0.00	0	122.00	0.00	0.00	0.00
9.00	0.00	0	122.00	0.00	0.00	0.00
10.00	0.00	0	122.00	0.00	0.00	0.00
11.00	0.00	0	122.00	0.00	0.00	0.00
12.00	<b>0.06</b>	10	122.01	0.02	0.02	0.00
13.00	<b>0.02</b>	<b>161</b>	<b>122.21</b>	<b>0.02</b>	<b>0.02</b>	0.00
14.00	0.02	<b>156</b>	<b>122.21</b>	<b>0.02</b>	<b>0.02</b>	0.00
15.00	0.01	136	122.18	0.02	0.02	0.00
16.00	0.01	106	122.14	0.02	0.02	0.00
17.00	0.01	70	122.10	0.02	0.02	0.00
18.00	0.01	32	122.05	0.02	0.02	0.00
19.00	0.01	3	122.00	0.01	0.01	0.00
20.00	0.00	2	122.00	0.00	0.00	0.00
21.00	0.00	2	122.00	0.00	0.00	0.00
22.00	0.00	2	122.00	0.00	0.00	0.00
23.00	0.00	2	122.00	0.00	0.00	0.00
24.00	0.00	1	122.00	0.00	0.00	0.00
25.00	0.00	0	122.00	0.00	0.00	0.00
26.00	0.00	0	122.00	0.00	0.00	0.00
27.00	0.00	0	122.00	0.00	0.00	0.00
28.00	0.00	0	122.00	0.00	0.00	0.00
29.00	0.00	0	122.00	0.00	0.00	0.00
30.00	0.00	0	122.00	0.00	0.00	0.00
31.00	0.00	0	122.00	0.00	0.00	0.00
32.00	0.00	0	122.00	0.00	0.00	0.00
33.00	0.00	0	122.00	0.00	0.00	0.00
34.00	0.00	0	122.00	0.00	0.00	0.00
35.00	0.00	0	122.00	0.00	0.00	0.00
36.00	0.00	0	122.00	0.00	0.00	0.00
37.00	0.00	0	122.00	0.00	0.00	0.00
38.00	0.00	0	122.00	0.00	0.00	0.00
39.00	0.00	0	122.00	0.00	0.00	0.00
40.00	0.00	0	122.00	0.00	0.00	0.00
41.00	0.00	0	122.00	0.00	0.00	0.00
42.00	0.00	0	122.00	0.00	0.00	0.00
43.00	0.00	0	122.00	0.00	0.00	0.00
44.00	0.00	0	122.00	0.00	0.00	0.00
45.00	0.00	0	122.00	0.00	0.00	0.00
46.00	0.00	0	122.00	0.00	0.00	0.00
47.00	0.00	0	122.00	0.00	0.00	0.00
48.00	0.00	0	122.00	0.00	0.00	0.00

**Stage-Discharge for Pond IB-2: Infiltration Basin #2**

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
122.00	0.00	0.00	0.00
122.05	0.02	0.02	0.00
122.10	0.02	0.02	0.00
122.15	0.02	0.02	0.00
122.20	0.02	0.02	0.00
122.25	0.02	0.02	0.00
122.30	0.02	0.02	0.00
122.35	0.02	0.02	0.00
122.40	0.02	0.02	0.00
122.45	0.03	0.03	0.00
122.50	0.03	0.03	0.00
122.55	0.03	0.03	0.00
122.60	0.03	0.03	0.00
122.65	0.03	0.03	0.00
122.70	0.03	0.03	0.00
122.75	0.03	0.03	0.00
122.80	0.03	0.03	0.00
122.85	0.03	0.03	0.00
122.90	0.03	0.03	0.00
122.95	0.04	0.04	0.00
123.00	0.04	0.04	0.00
123.05	0.04	0.04	0.00
123.10	0.04	0.04	0.00
123.15	0.04	0.04	0.00
123.20	0.04	0.04	0.00
123.25	0.04	0.04	0.00
123.30	0.04	0.04	0.00
123.35	0.04	0.04	0.00
123.40	0.05	0.05	0.00
123.45	0.05	0.05	0.00
123.50	0.05	0.05	0.00
123.55	0.17	0.05	0.13
123.60	0.40	0.05	0.35
123.65	0.70	0.05	0.65
123.70	1.05	0.05	1.00
123.75	1.47	0.05	1.41
123.80	1.93	0.05	1.88
123.85	2.45	0.06	2.39
123.90	3.01	0.06	2.95
123.95	3.63	0.06	3.57
124.00	4.30	0.06	4.24
124.05	5.02	0.06	4.96
124.10	5.79	0.06	5.73
124.15	6.63	0.06	6.57
124.20	<b>7.54</b>	<b>0.06</b>	<b>7.47</b>

**Stage-Area-Storage for Pond IB-2: Infiltration Basin #2**

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
122.00	672	0
122.05	715	35
122.10	759	72
122.15	802	111
122.20	845	152
122.25	889	195
122.30	932	241
122.35	975	288
122.40	1,018	338
122.45	1,062	390
122.50	1,105	444
122.55	1,148	501
122.60	1,192	559
122.65	1,235	620
122.70	1,278	683
122.75	1,322	748
122.80	1,365	815
122.85	1,408	884
122.90	1,451	956
122.95	1,495	1,029
123.00	1,538	1,105
123.05	1,586	1,183
123.10	1,635	1,264
123.15	1,683	1,347
123.20	1,731	1,432
123.25	1,780	1,520
123.30	1,828	1,610
123.35	1,876	1,702
123.40	1,924	1,797
123.45	1,973	1,895
123.50	2,021	1,995
123.55	2,069	2,097
123.60	2,118	2,202
123.65	2,166	2,309
123.70	2,214	2,418
123.75	2,263	2,530
123.80	2,311	2,645
123.85	2,359	2,761
123.90	2,407	2,880
123.95	2,456	3,002
124.00	2,504	3,126
124.05	2,554	3,252
124.10	2,604	3,381
124.15	2,654	3,513
124.20	<b>2,704</b>	<b>3,647</b>

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**Summary for Pond UG-1: Underground Detention System #1**

Inflow Area = 13,403 sf, 58.36% Impervious, Inflow Depth = 0.11" for 1" Storm event

Inflow = 0.02 cfs @ 12.14 hrs, Volume= 128 cf

Outflow = 0.01 cfs @ 12.82 hrs, Volume= 126 cf, Atten= 68%, Lag= 40.8 min

Primary = 0.01 cfs @ 12.82 hrs, Volume= 126 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3

Peak Elev= 122.44' @ 12.82 hrs Surf.Area= 820 sf Storage= 26 cf

Plug-Flow detention time= 114.2 min calculated for 126 cf (99% of inflow)

Center-of-Mass det. time= 108.3 min ( 1,036.3 - 928.0 )

Volume	Invert	Avail.Storage	Storage Description
#1A	122.40'	156 cf	<b>10.00'W x 82.00'L x 2.17'H Field A</b> 1,777 cf Overall - 1,387 cf Embedded = 390 cf x 40.0% Voids
#2A	122.40'	792 cf	<b>retain_it retain_it 1.5' x 10 Inside #1</b> Inside= 84.0"W x 18.0"H => 9.90 sf x 8.00'L = 79.2 cf Outside= 96.0"W x 26.0"H => 17.33 sf x 8.00'L = 138.7 cf
948 cf Total Available Storage			

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	122.40'	<b>15.0" Round Culvert</b> L= 140.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 122.40' / 121.50' S= 0.0064 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.23 sf

**Primary OutFlow** Max=0.01 cfs @ 12.82 hrs HW=122.44' TW=121.51' (Dynamic Tailwater)

↑1=Culvert (Barrel Controls 0.01 cfs @ 0.76 fps)

**Pond UG-1: Underground Detention System #1 - Chamber Wizard Field A****Chamber Model = retain\_it retain\_it 1.5' (retain-it®)**

Inside= 84.0"W x 18.0"H =&gt; 9.90 sf x 8.00'L = 79.2 cf

Outside= 96.0"W x 26.0"H =&gt; 17.33 sf x 8.00'L = 138.7 cf

10 Chambers/Row x 8.00' Long = 80.00' Row Length +12.0" End Stone x 2 = 82.00' Base Length

1 Rows x 96.0" Wide + 12.0" Side Stone x 2 = 10.00' Base Width

26.0" Chamber Height = 2.17' Field Height

10 Chambers x 79.2 cf = 791.7 cf Chamber Storage

10 Chambers x 138.7 cf = 1,386.7 cf Displacement

1,776.7 cf Field - 1,386.7 cf Chambers = 390.0 cf Stone x 40.0% Voids = 156.0 cf Stone Storage

Chamber Storage + Stone Storage = 947.7 cf = 0.022 af

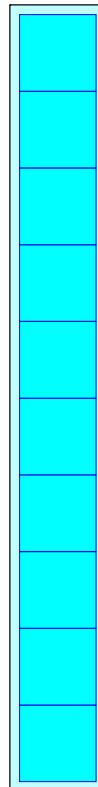
Overall Storage Efficiency = 53.3%

Overall System Size = 82.00' x 10.00' x 2.17'

10 Chambers

65.8 cy Field

14.4 cy Stone



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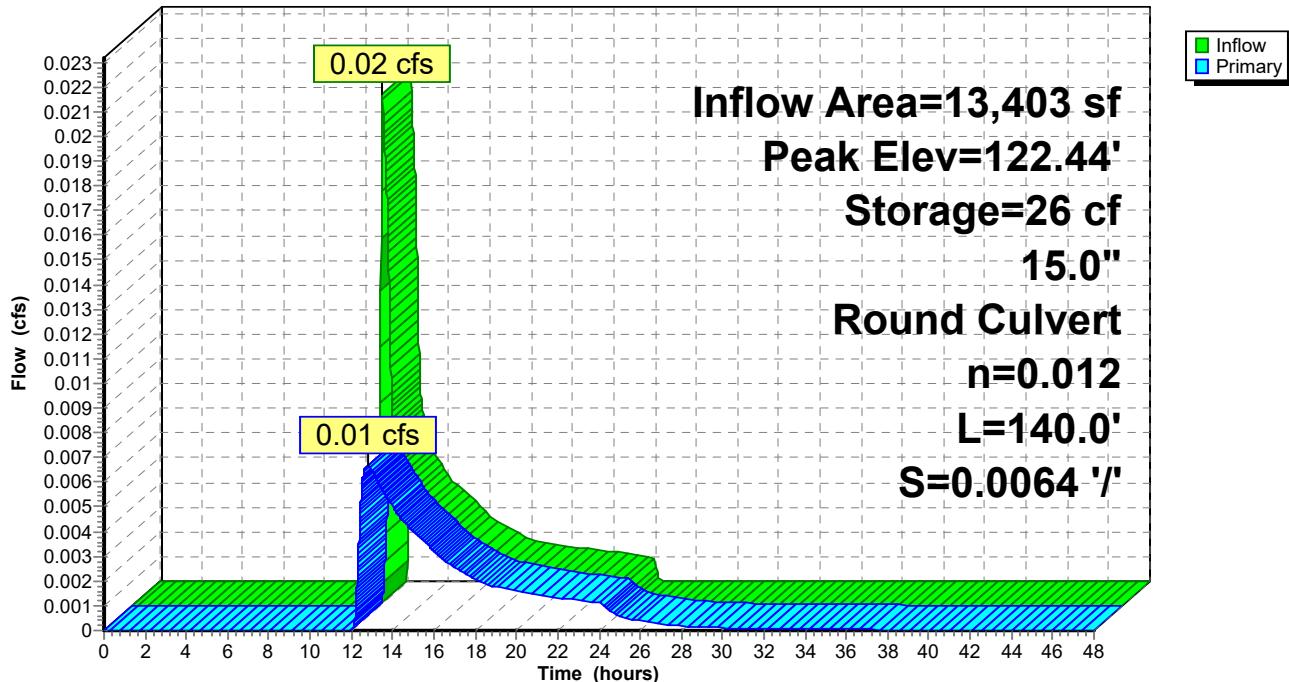
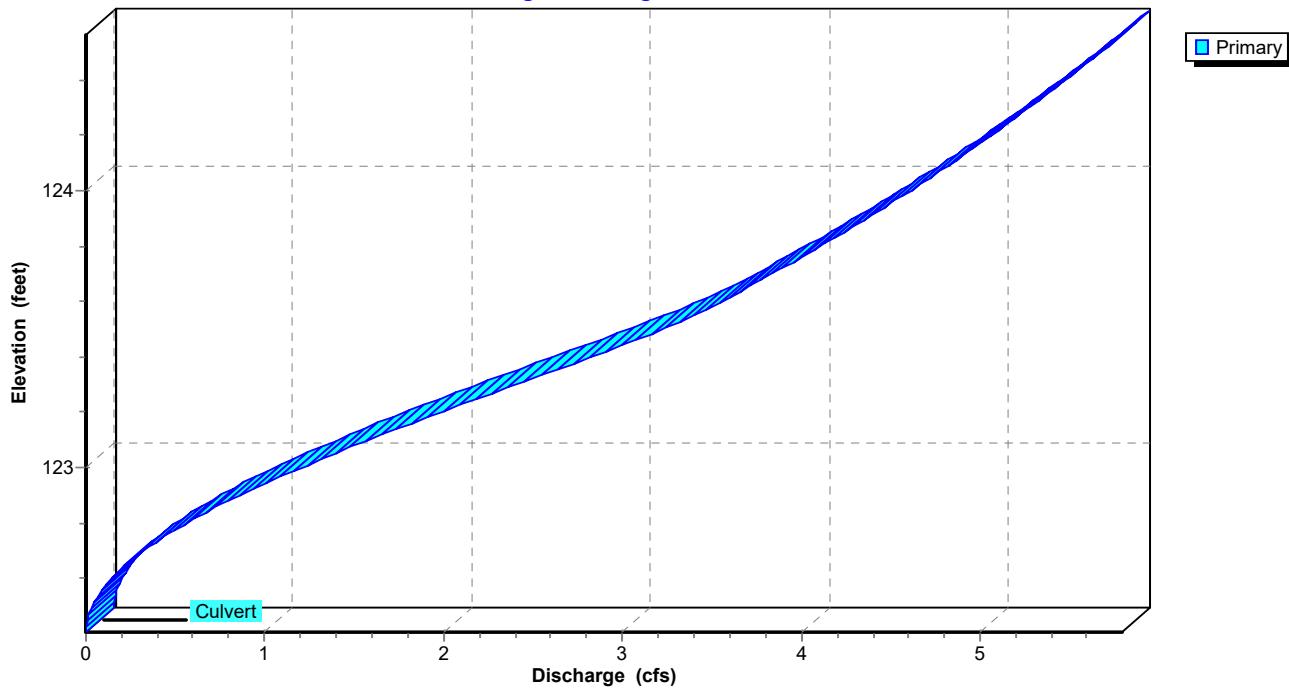
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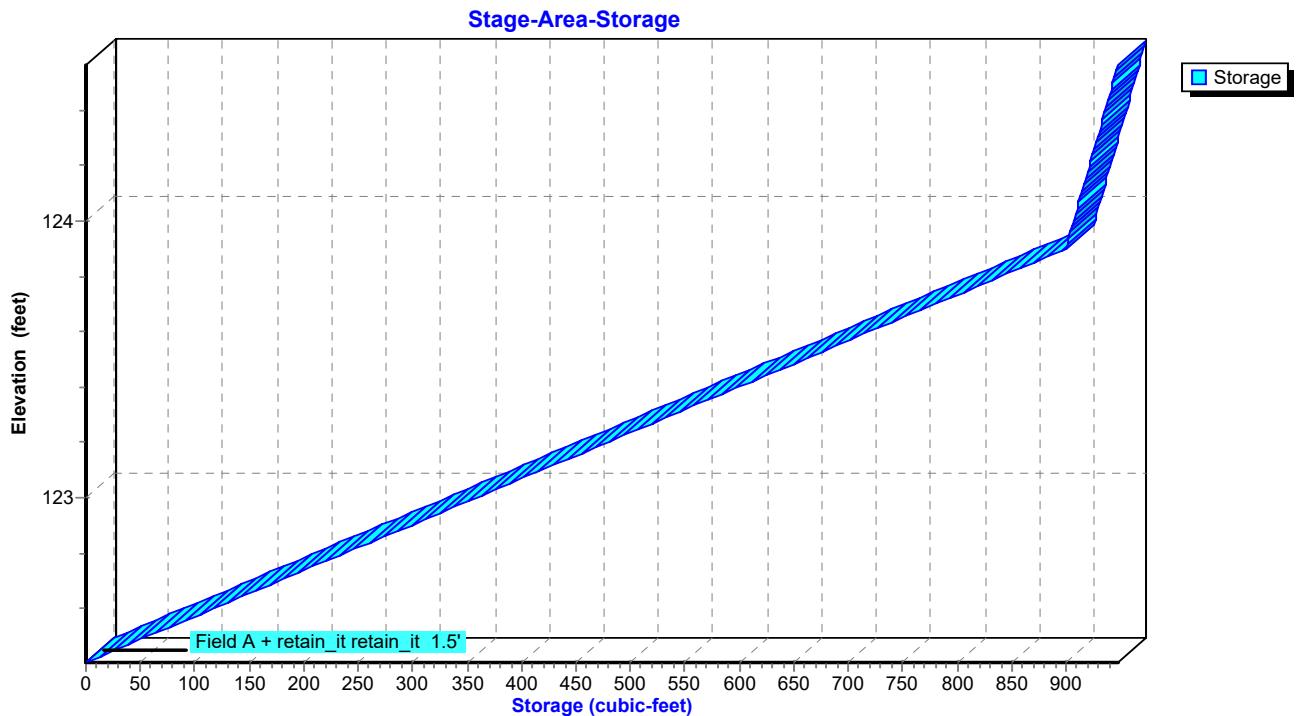
Type III 24-hr 1" Storm Rainfall=1.00"

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**Pond UG-1: Underground Detention System #1****Hydrograph****Pond UG-1: Underground Detention System #1****Stage-Discharge**

### Pond UG-1: Underground Detention System #1



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**Hydrograph for Pond UG-1: Underground Detention System #1**

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0	122.40	0.00
1.00	0.00	0	122.40	0.00
2.00	0.00	0	122.40	0.00
3.00	0.00	0	122.40	0.00
4.00	0.00	0	122.40	0.00
5.00	0.00	0	122.40	0.00
6.00	0.00	0	122.40	0.00
7.00	0.00	0	122.40	0.00
8.00	0.00	0	122.40	0.00
9.00	0.00	0	122.40	0.00
10.00	0.00	0	122.40	0.00
11.00	0.00	0	122.40	0.00
12.00	<b>0.00</b>	<b>0</b>	<b>122.40</b>	<b>0.00</b>
13.00	<b>0.01</b>	<b>26</b>	<b>122.44</b>	<b>0.01</b>
14.00	0.00	23	122.44	0.01
15.00	0.00	21	122.43	0.00
16.00	0.00	19	122.43	0.00
17.00	0.00	17	122.43	0.00
18.00	0.00	15	122.43	0.00
19.00	0.00	14	122.42	0.00
20.00	0.00	13	122.42	0.00
21.00	0.00	13	122.42	0.00
22.00	0.00	12	122.42	0.00
23.00	0.00	12	122.42	0.00
24.00	0.00	11	122.42	0.00
25.00	0.00	9	122.41	0.00
26.00	0.00	7	122.41	0.00
27.00	0.00	6	122.41	0.00
28.00	0.00	5	122.41	0.00
29.00	0.00	4	122.41	0.00
30.00	0.00	4	122.41	0.00
31.00	0.00	4	122.41	0.00
32.00	0.00	3	122.41	0.00
33.00	0.00	3	122.41	0.00
34.00	0.00	3	122.40	0.00
35.00	0.00	3	122.40	0.00
36.00	0.00	2	122.40	0.00
37.00	0.00	2	122.40	0.00
38.00	0.00	2	122.40	0.00
39.00	0.00	2	122.40	0.00
40.00	0.00	2	122.40	0.00
41.00	0.00	2	122.40	0.00
42.00	0.00	2	122.40	0.00
43.00	0.00	2	122.40	0.00
44.00	0.00	2	122.40	0.00
45.00	0.00	2	122.40	0.00
46.00	0.00	2	122.40	0.00
47.00	0.00	2	122.40	0.00
48.00	0.00	1	122.40	0.00

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**Stage-Discharge for Pond UG-1: Underground Detention System #1**

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
122.40	0.00	123.46	3.07	124.52	5.70
122.42	0.00	123.48	3.15	124.54	5.74
122.44	0.01	123.50	3.22	124.56	<b>5.78</b>
122.46	0.01	123.52	3.30		
122.48	0.02	123.54	3.37		
122.50	0.04	123.56	3.44		
122.52	0.06	123.58	3.50		
122.54	0.08	123.60	3.56		
122.56	0.10	123.62	3.62		
122.58	0.12	123.64	3.67		
122.60	0.15	123.66	3.72		
122.62	0.18	123.68	3.78		
122.64	0.22	123.70	3.83		
122.66	0.25	123.72	3.89		
122.68	0.29	123.74	3.94		
122.70	0.33	123.76	4.00		
122.72	0.38	123.78	4.05		
122.74	0.42	123.80	4.11		
122.76	0.47	123.82	4.16		
122.78	0.52	123.84	4.21		
122.80	0.58	123.86	4.26		
122.82	0.63	123.88	4.31		
122.84	0.69	123.90	4.36		
122.86	0.75	123.92	4.41		
122.88	0.81	123.94	4.46		
122.90	0.87	123.96	4.51		
122.92	0.94	123.98	4.56		
122.94	1.00	124.00	4.61		
122.96	1.07	124.02	4.65		
122.98	1.14	124.04	4.70		
123.00	1.21	124.06	4.75		
123.02	1.29	124.08	4.79		
123.04	1.36	124.10	4.84		
123.06	1.44	124.12	4.88		
123.08	1.51	124.14	4.93		
123.10	1.59	124.16	4.97		
123.12	1.67	124.18	5.01		
123.14	1.75	124.20	5.06		
123.16	1.83	124.22	5.10		
123.18	1.91	124.24	5.14		
123.20	1.99	124.26	5.18		
123.22	2.08	124.28	5.23		
123.24	2.16	124.30	5.27		
123.26	2.24	124.32	5.31		
123.28	2.33	124.34	5.35		
123.30	2.41	124.36	5.39		
123.32	2.50	124.38	5.43		
123.34	2.58	124.40	5.47		
123.36	2.66	124.42	5.51		
123.38	2.75	124.44	5.55		
123.40	2.83	124.46	5.59		
123.42	2.91	124.48	5.63		
123.44	2.99	124.50	5.67		

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**Stage-Area-Storage for Pond UG-1: Underground Detention System #1**

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
122.40	0	123.46	636	124.52	944
122.42	12	123.48	648	124.54	946
122.44	24	123.50	660	124.56	<b>947</b>
122.46	36	123.52	672		
122.48	48	123.54	684		
122.50	60	123.56	696		
122.52	72	123.58	708		
122.54	84	123.60	720		
122.56	96	123.62	732		
122.58	108	123.64	744		
122.60	120	123.66	756		
122.62	132	123.68	768		
122.64	144	123.70	780		
122.66	156	123.72	792		
122.68	168	123.74	804		
122.70	180	123.76	816		
122.72	192	123.78	828		
122.74	204	123.80	840		
122.76	216	123.82	852		
122.78	228	123.84	864		
122.80	240	123.86	876		
122.82	252	123.88	888		
122.84	264	123.90	900		
122.86	276	123.92	901		
122.88	288	123.94	903		
122.90	300	123.96	904		
122.92	312	123.98	905		
122.94	324	124.00	907		
122.96	336	124.02	908		
122.98	348	124.04	910		
123.00	360	124.06	911		
123.02	372	124.08	913		
123.04	384	124.10	914		
123.06	396	124.12	916		
123.08	408	124.14	917		
123.10	420	124.16	918		
123.12	432	124.18	920		
123.14	444	124.20	921		
123.16	456	124.22	923		
123.18	468	124.24	924		
123.20	480	124.26	926		
123.22	492	124.28	927		
123.24	504	124.30	929		
123.26	516	124.32	930		
123.28	528	124.34	931		
123.30	540	124.36	933		
123.32	552	124.38	934		
123.34	564	124.40	936		
123.36	576	124.42	937		
123.38	588	124.44	939		
123.40	600	124.46	940		
123.42	612	124.48	941		
123.44	624	124.50	943		

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**Summary for Pond UG-2: Underground Infiltration System #1**

Inflow Area = 42,604 sf, 63.97% Impervious, Inflow Depth > 0.17" for 1" Storm event  
 Inflow = 0.12 cfs @ 12.11 hrs, Volume= 607 cf  
 Outflow = 0.06 cfs @ 12.39 hrs, Volume= 607 cf, Atten= 52%, Lag= 17.0 min  
 Discarded = 0.06 cfs @ 12.39 hrs, Volume= 607 cf  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3  
 Peak Elev= 121.53' @ 12.44 hrs Surf.Area= 2,548 sf Storage= 55 cf

Plug-Flow detention time= 7.5 min calculated for 607 cf (100% of inflow)  
 Center-of-Mass det. time= 7.4 min ( 929.5 - 922.1 )

Volume	Invert	Avail.Storage	Storage Description
#1A	121.50'	260 cf	<b>26.00'W x 98.00'L x 2.67'H Field A</b> 6,795 cf Overall - 6,144 cf Embedded = 651 cf x 40.0% Voids
#2A	121.50'	3,913 cf	<b>retain_it retain_it 2.0' x 36 Inside #1</b> Inside= 84.0"W x 24.0"H => 13.78 sf x 8.00'L = 110.3 cf Outside= 96.0"W x 32.0"H => 21.33 sf x 8.00'L = 170.7 cf 3 Rows adjusted for 56.7 cf perimeter wall
4,174 cf			Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	121.50'	<b>1.020 in/hr Exfiltration over Surface area</b> Phase-In= 0.01'
#2	Device 3	121.50'	<b>18.0" Round Culvert</b> L= 30.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 121.50' / 121.50' S= 0.0000 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf
#3	Device 4	122.65'	<b>4.0' long Sharp-Crested Rectangular Weir</b> 2 End Contraction(s)
#4	Primary	122.02'	<b>15.0" Round Culvert</b> L= 60.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 122.02' / 121.70' S= 0.0053 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.23 sf

**Discarded OutFlow** Max=0.06 cfs @ 12.39 hrs HW=121.53' (Free Discharge)  
 ↑ 1=Exfiltration (Exfiltration Controls 0.06 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=121.50' TW=0.00' (Dynamic Tailwater)  
 ↑ 4=Culvert (Controls 0.00 cfs)  
 ↑ 3=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)  
 ↑ 2=Culvert (Controls 0.00 cfs)

**Pond UG-2: Underground Infiltration System #1 - Chamber Wizard Field A****Chamber Model = retain\_it retain\_it 2.0' (retain-it®)**

Inside= 84.0"W x 24.0"H =&gt; 13.78 sf x 8.00'L = 110.3 cf

Outside= 96.0"W x 32.0"H =&gt; 21.33 sf x 8.00'L = 170.7 cf

3 Rows adjusted for 56.7 cf perimeter wall

12 Chambers/Row x 8.00' Long = 96.00' Row Length +12.0" End Stone x 2 = 98.00' Base Length

3 Rows x 96.0" Wide + 12.0" Side Stone x 2 = 26.00' Base Width

32.0" Chamber Height = 2.67' Field Height

1.9 cf Sidewall x 12 x 2 + 1.9 cf Endwall x 3 x 2 = 56.7 cf Perimeter Wall

36 Chambers x 110.3 cf - 56.7 cf Perimeter wall = 3,913.4 cf Chamber Storage

36 Chambers x 170.7 cf = 6,144.0 cf Displacement

6,794.7 cf Field - 6,144.0 cf Chambers = 650.7 cf Stone x 40.0% Voids = 260.3 cf Stone Storage

Chamber Storage + Stone Storage = 4,173.6 cf = 0.096 af

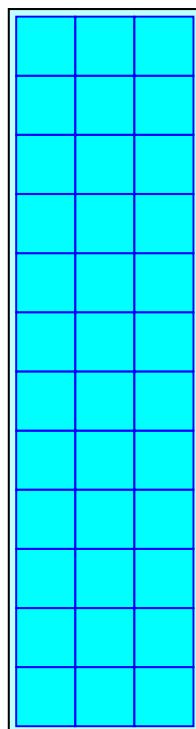
Overall Storage Efficiency = 61.4%

Overall System Size = 98.00' x 26.00' x 2.67'

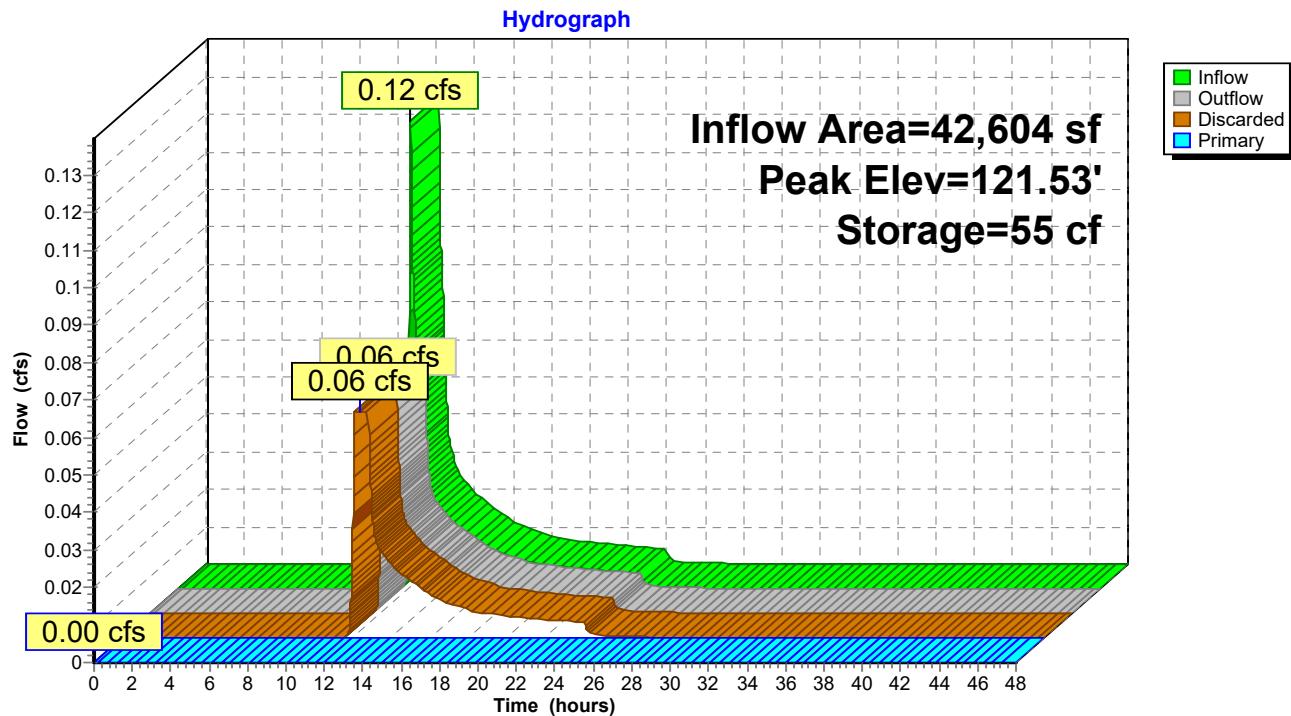
36 Chambers

251.7 cy Field

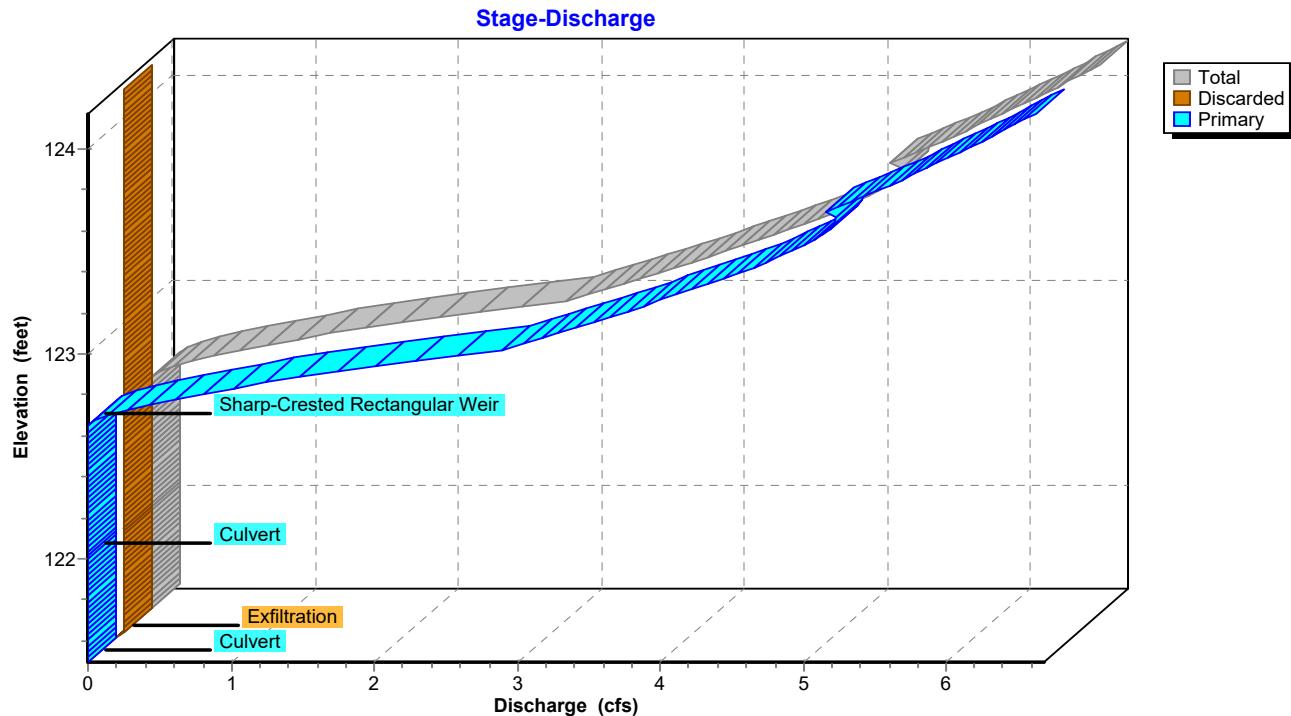
24.1 cy Stone

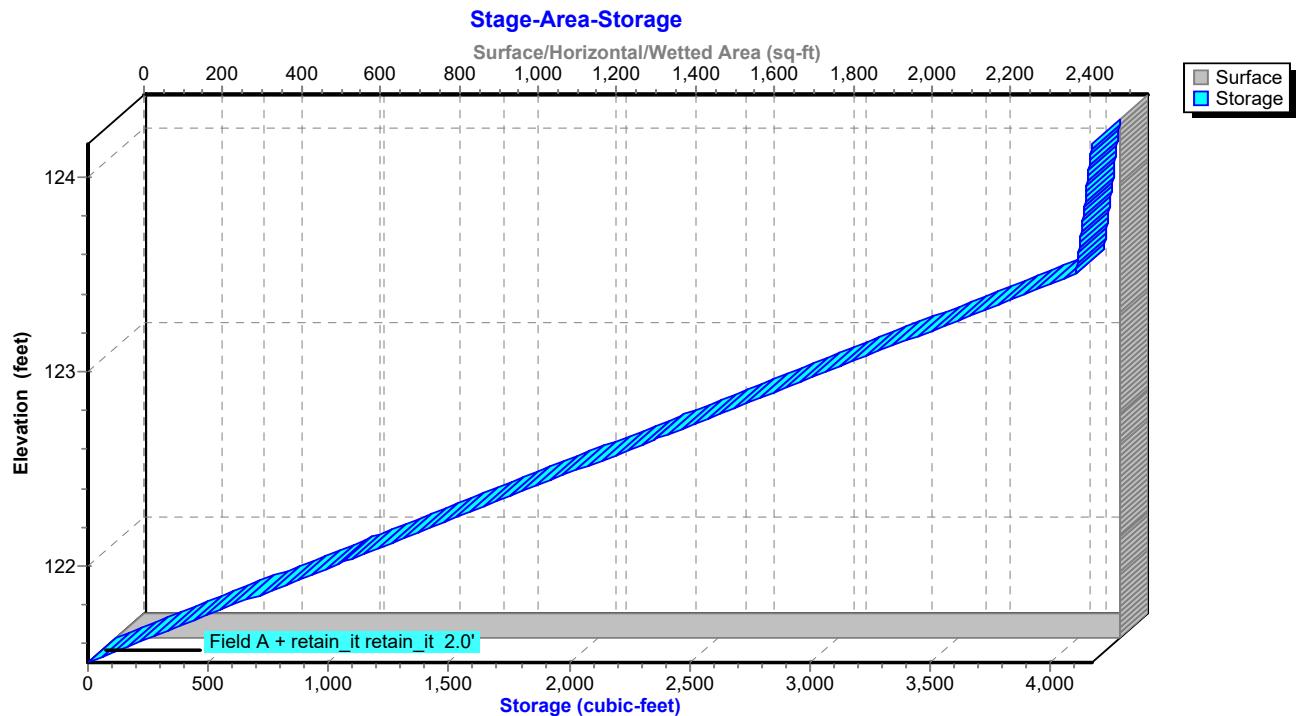


### Pond UG-2: Underground Infiltration System #1



### Pond UG-2: Underground Infiltration System #1



**Pond UG-2: Underground Infiltration System #1**

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**Hydrograph for Pond UG-2: Underground Infiltration System #1**

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	121.50	0.00	0.00	<b>0.00</b>
1.00	0.00	0	121.50	0.00	0.00	0.00
2.00	0.00	0	121.50	0.00	0.00	0.00
3.00	0.00	0	121.50	0.00	0.00	0.00
4.00	0.00	0	121.50	0.00	0.00	0.00
5.00	0.00	0	121.50	0.00	0.00	0.00
6.00	0.00	0	121.50	0.00	0.00	0.00
7.00	0.00	0	121.50	0.00	0.00	0.00
8.00	0.00	0	121.50	0.00	0.00	0.00
9.00	0.00	0	121.50	0.00	0.00	0.00
10.00	0.00	0	121.50	0.00	0.00	0.00
11.00	0.00	0	121.50	0.00	0.00	0.00
12.00	<b>0.05</b>	<b>8</b>	<b>121.50</b>	<b>0.02</b>	<b>0.02</b>	0.00
13.00	<b>0.03</b>	<b>12</b>	<b>121.51</b>	<b>0.04</b>	<b>0.04</b>	0.00
14.00	0.02	7	121.50	0.02	0.02	0.00
15.00	0.02	5	121.50	0.02	0.02	0.00
16.00	0.01	4	121.50	0.01	0.01	0.00
17.00	0.01	3	121.50	0.01	0.01	0.00
18.00	0.01	3	121.50	0.01	0.01	0.00
19.00	0.01	2	121.50	0.01	0.01	0.00
20.00	0.01	2	121.50	0.01	0.01	0.00
21.00	0.01	2	121.50	0.01	0.01	0.00
22.00	0.00	2	121.50	0.00	0.00	0.00
23.00	0.00	2	121.50	0.00	0.00	0.00
24.00	0.00	1	121.50	0.00	0.00	0.00
25.00	0.00	0	121.50	0.00	0.00	0.00
26.00	0.00	0	121.50	0.00	0.00	0.00
27.00	0.00	0	121.50	0.00	0.00	0.00
28.00	0.00	0	121.50	0.00	0.00	0.00
29.00	0.00	0	121.50	0.00	0.00	0.00
30.00	0.00	0	121.50	0.00	0.00	0.00
31.00	0.00	0	121.50	0.00	0.00	0.00
32.00	0.00	0	121.50	0.00	0.00	0.00
33.00	0.00	0	121.50	0.00	0.00	0.00
34.00	0.00	0	121.50	0.00	0.00	0.00
35.00	0.00	0	121.50	0.00	0.00	0.00
36.00	0.00	0	121.50	0.00	0.00	0.00
37.00	0.00	0	121.50	0.00	0.00	0.00
38.00	0.00	0	121.50	0.00	0.00	0.00
39.00	0.00	0	121.50	0.00	0.00	0.00
40.00	0.00	0	121.50	0.00	0.00	0.00
41.00	0.00	0	121.50	0.00	0.00	0.00
42.00	0.00	0	121.50	0.00	0.00	0.00
43.00	0.00	0	121.50	0.00	0.00	0.00
44.00	0.00	0	121.50	0.00	0.00	0.00
45.00	0.00	0	121.50	0.00	0.00	0.00
46.00	0.00	0	121.50	0.00	0.00	0.00
47.00	0.00	0	121.50	0.00	0.00	0.00
48.00	0.00	0	121.50	0.00	0.00	0.00

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**Stage-Discharge for Pond UG-2: Underground Infiltration System #1**

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)	Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
121.50	0.00	<b>0.00</b>	0.00	124.15	<b>6.64</b>	0.06	<b>6.57</b>
121.55	0.06	<b>0.06</b>	0.00				
121.60	0.06	0.06	0.00				
121.65	0.06	0.06	0.00				
121.70	0.06	0.06	0.00				
121.75	0.06	0.06	0.00				
121.80	0.06	0.06	0.00				
121.85	0.06	0.06	0.00				
121.90	0.06	0.06	0.00				
121.95	0.06	0.06	0.00				
122.00	0.06	0.06	0.00				
122.05	0.06	0.06	0.00				
122.10	0.06	0.06	0.00				
122.15	0.06	0.06	0.00				
122.20	0.06	0.06	0.00				
122.25	0.06	0.06	0.00				
122.30	0.06	0.06	0.00				
122.35	0.06	0.06	0.00				
122.40	0.06	0.06	0.00				
122.45	0.06	0.06	0.00				
122.50	0.06	0.06	0.00				
122.55	0.06	0.06	0.00				
122.60	0.06	0.06	0.00				
122.65	0.06	0.06	0.00				
122.70	0.21	0.06	0.15				
122.75	0.47	0.06	0.41				
122.80	0.81	0.06	0.75				
122.85	1.22	0.06	1.16				
122.90	1.67	0.06	1.61				
122.95	2.18	0.06	2.12				
123.00	2.72	0.06	2.66				
123.05	3.12	0.06	3.06				
123.10	3.35	0.06	3.29				
123.15	3.57	0.06	3.51				
123.20	3.80	0.06	3.74				
123.25	4.02	0.06	3.96				
123.30	4.23	0.06	4.17				
123.35	4.44	0.06	4.38				
123.40	4.63	0.06	4.57				
123.45	4.81	0.06	4.75				
123.50	4.98	0.06	4.92				
123.55	5.12	0.06	5.06				
123.60	5.23	0.06	5.17				
123.65	5.29	0.06	5.23				
123.70	5.26	0.06	5.20				
123.75	5.43	0.06	5.37				
123.80	5.59	0.06	5.53				
123.85	5.75	0.06	5.69				
123.90	5.91	0.06	5.85				
123.95	6.06	0.06	6.00				
124.00	6.21	0.06	6.15				
124.05	6.36	0.06	6.30				
124.10	6.50	0.06	6.44				

**Stage-Area-Storage for Pond UG-2: Underground Infiltration System #1**

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
121.50	<b>2,548</b>	0	124.15	2,548	<b>4,172</b>
121.55	2,548	103			
121.60	2,548	205			
121.65	2,548	308			
121.70	2,548	411			
121.75	2,548	514			
121.80	2,548	616			
121.85	2,548	719			
121.90	2,548	822			
121.95	2,548	924			
122.00	2,548	1,027			
122.05	2,548	1,130			
122.10	2,548	1,233			
122.15	2,548	1,335			
122.20	2,548	1,438			
122.25	2,548	1,541			
122.30	2,548	1,643			
122.35	2,548	1,746			
122.40	2,548	1,849			
122.45	2,548	1,952			
122.50	2,548	2,054			
122.55	2,548	2,157			
122.60	2,548	2,260			
122.65	2,548	2,362			
122.70	2,548	2,465			
122.75	2,548	2,568			
122.80	2,548	2,671			
122.85	2,548	2,773			
122.90	2,548	2,876			
122.95	2,548	2,979			
123.00	2,548	3,081			
123.05	2,548	3,184			
123.10	2,548	3,287			
123.15	2,548	3,390			
123.20	2,548	3,492			
123.25	2,548	3,595			
123.30	2,548	3,698			
123.35	2,548	3,800			
123.40	2,548	3,903			
123.45	2,548	4,006			
123.50	2,548	4,109			
123.55	2,548	4,113			
123.60	2,548	4,118			
123.65	2,548	4,123			
123.70	2,548	4,128			
123.75	2,548	4,133			
123.80	2,548	4,138			
123.85	2,548	4,143			
123.90	2,548	4,148			
123.95	2,548	4,152			
124.00	2,548	4,157			
124.05	2,548	4,162			
124.10	2,548	4,167			

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**Summary for Pond UG-3: Underground Infiltration System #2**

Inflow Area = 34,270 sf, 100.00% Impervious, Inflow Depth = 0.79" for 1" Storm event  
 Inflow = 0.70 cfs @ 12.08 hrs, Volume= 2,259 cf  
 Outflow = 0.05 cfs @ 11.60 hrs, Volume= 2,259 cf, Atten= 94%, Lag= 0.0 min  
 Discarded = 0.05 cfs @ 11.60 hrs, Volume= 2,259 cf  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3  
 Peak Elev= 122.13' @ 13.63 hrs Surf.Area= 1,924 sf Storage= 967 cf

Plug-Flow detention time= 180.7 min calculated for 2,259 cf (100% of inflow)  
 Center-of-Mass det. time= 180.7 min ( 968.6 - 787.9 )

Volume	Invert	Avail.Storage	Storage Description
#1A	121.50'	209 cf	<b>26.00'W x 74.00'L x 2.67'H Field A</b> 5,131 cf Overall - 4,608 cf Embedded = 523 cf x 40.0% Voids
#2A	121.50'	2,932 cf	<b>retain_it retain_it 2.0' x 27 Inside #1</b> Inside= 84.0"W x 24.0"H => 13.78 sf x 8.00'L = 110.3 cf Outside= 96.0"W x 32.0"H => 21.33 sf x 8.00'L = 170.7 cf 3 Rows adjusted for 45.4 cf perimeter wall
3,141 cf			Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	121.50'	<b>1.020 in/hr Exfiltration over Surface area</b> Phase-In= 0.01'
#2	Device 3	121.50'	<b>18.0" Round Culvert</b> L= 70.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 121.50' / 121.50' S= 0.0000 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf
#3	Device 4	123.25'	<b>4.0' long Sharp-Crested Rectangular Weir</b> 2 End Contraction(s)
#4	Primary	122.02'	<b>15.0" Round Culvert</b> L= 60.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 122.02' / 121.70' S= 0.0053 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.23 sf

**Discarded OutFlow** Max=0.05 cfs @ 11.60 hrs HW=121.53' (Free Discharge)  
 ↑ 1=Exfiltration (Exfiltration Controls 0.05 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=121.50' TW=0.00' (Dynamic Tailwater)  
 ↑ 4=Culvert (Controls 0.00 cfs)  
 ↑ 3=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)  
 ↑ 2=Culvert (Controls 0.00 cfs)

**Pond UG-3: Underground Infiltration System #2 - Chamber Wizard Field A****Chamber Model = retain\_it retain\_it 2.0' (retain-it®)**

Inside= 84.0"W x 24.0"H =&gt; 13.78 sf x 8.00'L = 110.3 cf

Outside= 96.0"W x 32.0"H =&gt; 21.33 sf x 8.00'L = 170.7 cf

3 Rows adjusted for 45.4 cf perimeter wall

9 Chambers/Row x 8.00' Long = 72.00' Row Length +12.0" End Stone x 2 = 74.00' Base Length

3 Rows x 96.0" Wide + 12.0" Side Stone x 2 = 26.00' Base Width

32.0" Chamber Height = 2.67' Field Height

1.9 cf Sidewall x 9 x 2 + 1.9 cf Endwall x 3 x 2 = 45.4 cf Perimeter Wall

27 Chambers x 110.3 cf - 45.4 cf Perimeter wall = 2,932.2 cf Chamber Storage

27 Chambers x 170.7 cf = 4,608.0 cf Displacement

5,130.7 cf Field - 4,608.0 cf Chambers = 522.7 cf Stone x 40.0% Voids = 209.1 cf Stone Storage

Chamber Storage + Stone Storage = 3,141.3 cf = 0.072 af

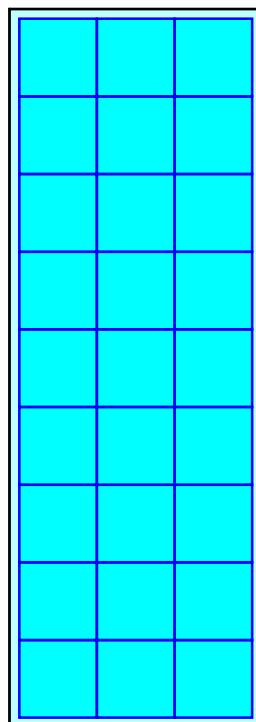
Overall Storage Efficiency = 61.2%

Overall System Size = 74.00' x 26.00' x 2.67'

27 Chambers

190.0 cy Field

19.4 cy Stone



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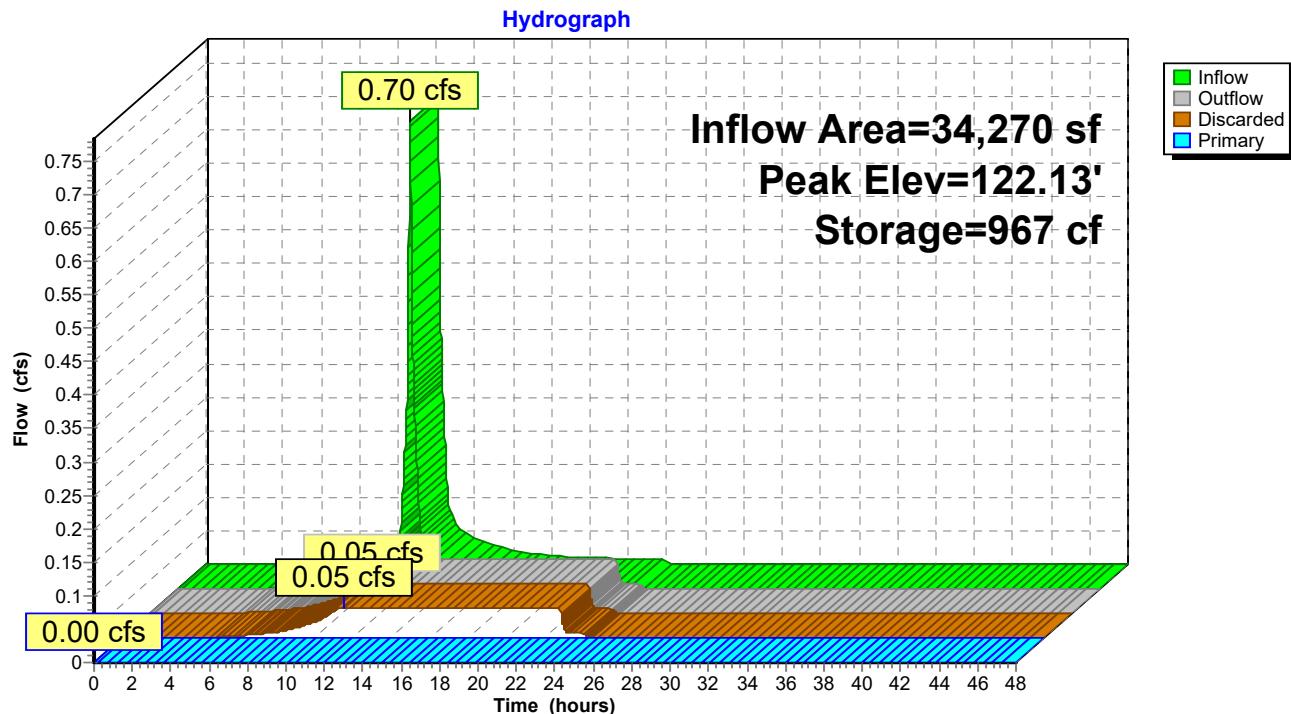
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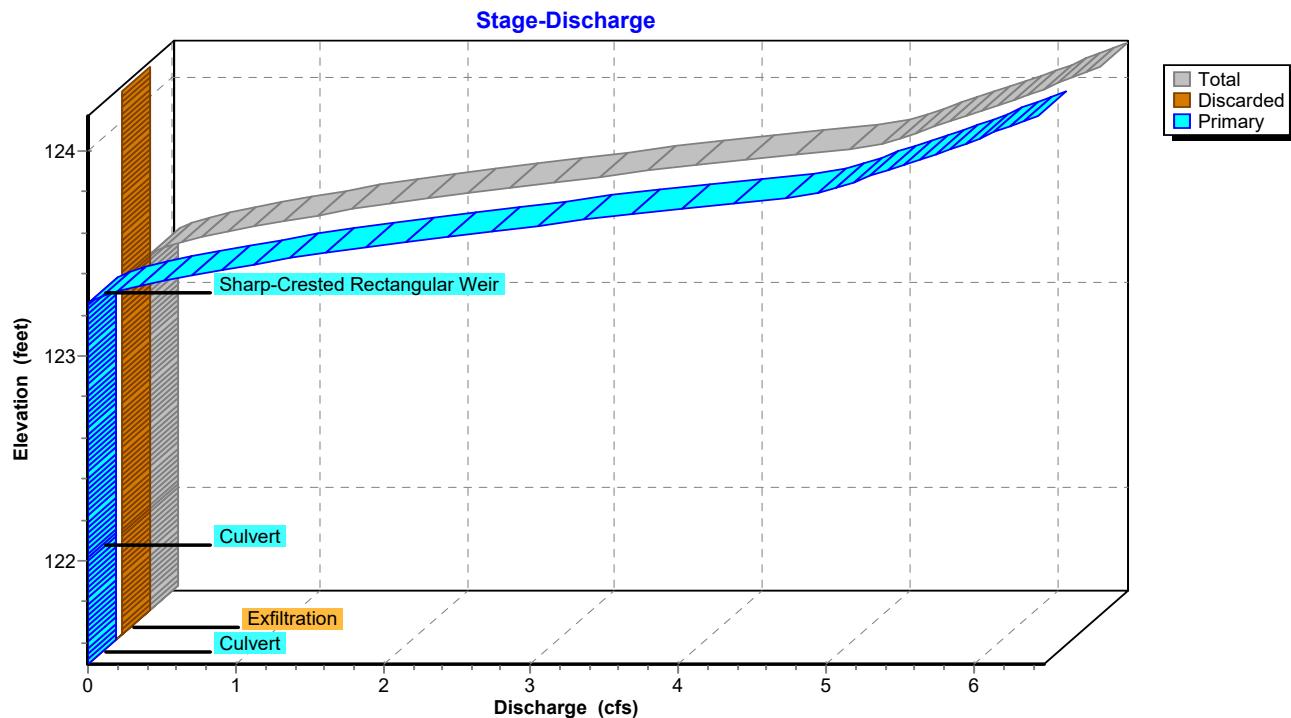
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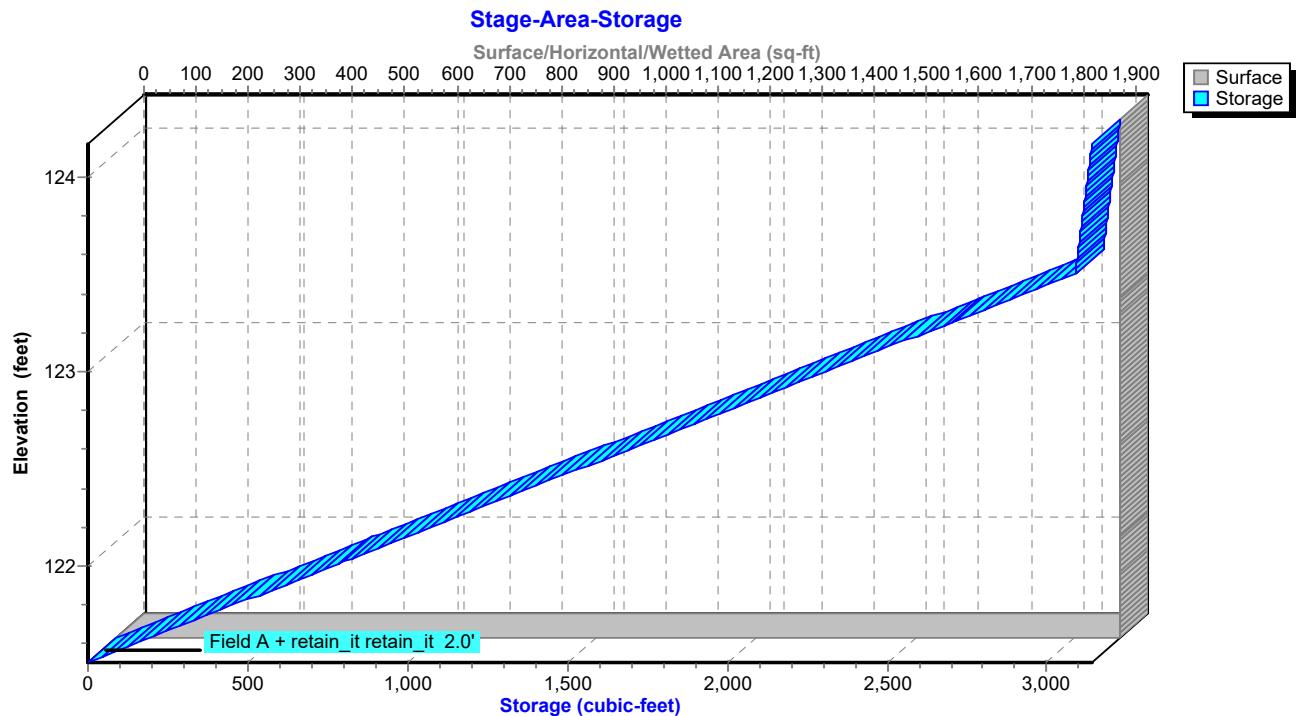
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## Pond UG-3: Underground Infiltration System #2



## Pond UG-3: Underground Infiltration System #2



**Pond UG-3: Underground Infiltration System #2**

**Hydrograph for Pond UG-3: Underground Infiltration System #2**

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	121.50	0.00	0.00	<b>0.00</b>
1.00	0.00	0	121.50	0.00	0.00	0.00
2.00	0.00	0	121.50	0.00	0.00	0.00
3.00	0.00	0	121.50	0.00	0.00	0.00
4.00	0.00	0	121.50	0.00	0.00	0.00
5.00	0.00	0	121.50	0.00	0.00	0.00
6.00	0.00	1	121.50	0.00	0.00	0.00
7.00	0.01	2	121.50	0.01	0.01	0.00
8.00	0.01	3	121.50	0.01	0.01	0.00
9.00	0.02	5	121.50	0.02	0.02	0.00
10.00	0.02	8	121.51	0.02	0.02	0.00
11.00	0.04	14	121.51	<b>0.04</b>	<b>0.04</b>	0.00
12.00	<b>0.43</b>	277	121.68	<b>0.05</b>	<b>0.05</b>	0.00
13.00	<b>0.06</b>	<b>954</b>	<b>122.12</b>	0.05	0.05	0.00
14.00	0.04	<b>963</b>	<b>122.12</b>	0.05	0.05	0.00
15.00	0.03	921	122.10	0.05	0.05	0.00
16.00	0.02	847	122.05	0.05	0.05	0.00
17.00	0.02	750	121.99	0.05	0.05	0.00
18.00	0.01	638	121.91	0.05	0.05	0.00
19.00	0.01	517	121.84	0.05	0.05	0.00
20.00	0.01	392	121.75	0.05	0.05	0.00
21.00	0.01	263	121.67	0.05	0.05	0.00
22.00	0.01	131	121.59	0.05	0.05	0.00
23.00	0.01	5	121.50	0.02	0.02	0.00
24.00	0.01	2	121.50	0.01	0.01	0.00
25.00	0.00	0	121.50	0.00	0.00	0.00
26.00	0.00	0	121.50	0.00	0.00	0.00
27.00	0.00	0	121.50	0.00	0.00	0.00
28.00	0.00	0	121.50	0.00	0.00	0.00
29.00	0.00	0	121.50	0.00	0.00	0.00
30.00	0.00	0	121.50	0.00	0.00	0.00
31.00	0.00	0	121.50	0.00	0.00	0.00
32.00	0.00	0	121.50	0.00	0.00	0.00
33.00	0.00	0	121.50	0.00	0.00	0.00
34.00	0.00	0	121.50	0.00	0.00	0.00
35.00	0.00	0	121.50	0.00	0.00	0.00
36.00	0.00	0	121.50	0.00	0.00	0.00
37.00	0.00	0	121.50	0.00	0.00	0.00
38.00	0.00	0	121.50	0.00	0.00	0.00
39.00	0.00	0	121.50	0.00	0.00	0.00
40.00	0.00	0	121.50	0.00	0.00	0.00
41.00	0.00	0	121.50	0.00	0.00	0.00
42.00	0.00	0	121.50	0.00	0.00	0.00
43.00	0.00	0	121.50	0.00	0.00	0.00
44.00	0.00	0	121.50	0.00	0.00	0.00
45.00	0.00	0	121.50	0.00	0.00	0.00
46.00	0.00	0	121.50	0.00	0.00	0.00
47.00	0.00	0	121.50	0.00	0.00	0.00
48.00	0.00	0	121.50	0.00	0.00	0.00

**Proposed HydroCAD 533 Boston Post Road**

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*Type III 24-hr 1" Storm Rainfall=1.00"*

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**Stage-Discharge for Pond UG-3: Underground Infiltration System #2**

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)	Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
121.50	0.00	<b>0.00</b>	0.00	124.15	<b>6.42</b>	0.05	<b>6.37</b>
121.55	0.05	<b>0.05</b>	0.00				
121.60	0.05	0.05	0.00				
121.65	0.05	0.05	0.00				
121.70	0.05	0.05	0.00				
121.75	0.05	0.05	0.00				
121.80	0.05	0.05	0.00				
121.85	0.05	0.05	0.00				
121.90	0.05	0.05	0.00				
121.95	0.05	0.05	0.00				
122.00	0.05	0.05	0.00				
122.05	0.05	0.05	0.00				
122.10	0.05	0.05	0.00				
122.15	0.05	0.05	0.00				
122.20	0.05	0.05	0.00				
122.25	0.05	0.05	0.00				
122.30	0.05	0.05	0.00				
122.35	0.05	0.05	0.00				
122.40	0.05	0.05	0.00				
122.45	0.05	0.05	0.00				
122.50	0.05	0.05	0.00				
122.55	0.05	0.05	0.00				
122.60	0.05	0.05	0.00				
122.65	0.05	0.05	0.00				
122.70	0.05	0.05	0.00				
122.75	0.05	0.05	0.00				
122.80	0.05	0.05	0.00				
122.85	0.05	0.05	0.00				
122.90	0.05	0.05	0.00				
122.95	0.05	0.05	0.00				
123.00	0.05	0.05	0.00				
123.05	0.05	0.05	0.00				
123.10	0.05	0.05	0.00				
123.15	0.05	0.05	0.00				
123.20	0.05	0.05	0.00				
123.25	0.05	0.05	0.00				
123.30	0.19	0.05	0.15				
123.35	0.46	0.05	0.41				
123.40	0.80	0.05	0.75				
123.45	1.20	0.05	1.16				
123.50	1.66	0.05	1.61				
123.55	2.16	0.05	2.12				
123.60	2.71	0.05	2.66				
123.65	3.29	0.05	3.24				
123.70	3.91	0.05	3.86				
123.75	4.55	0.05	4.51				
123.80	5.03	0.05	4.98				
123.85	5.25	0.05	5.20				
123.90	5.46	0.05	5.42				
123.95	5.67	0.05	5.62				
124.00	5.86	0.05	5.82				
124.05	6.05	0.05	6.01				
124.10	6.24	0.05	6.19				

**Stage-Area-Storage for Pond UG-3: Underground Infiltration System #2**

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
121.50	<b>1,924</b>	0	124.15	1,924	<b>3,140</b>
121.55	1,924	77			
121.60	1,924	154			
121.65	1,924	232			
121.70	1,924	309			
121.75	1,924	386			
121.80	1,924	463			
121.85	1,924	541			
121.90	1,924	618			
121.95	1,924	695			
122.00	1,924	772			
122.05	1,924	849			
122.10	1,924	927			
122.15	1,924	1,004			
122.20	1,924	1,081			
122.25	1,924	1,158			
122.30	1,924	1,236			
122.35	1,924	1,313			
122.40	1,924	1,390			
122.45	1,924	1,467			
122.50	1,924	1,544			
122.55	1,924	1,622			
122.60	1,924	1,699			
122.65	1,924	1,776			
122.70	1,924	1,853			
122.75	1,924	1,931			
122.80	1,924	2,008			
122.85	1,924	2,085			
122.90	1,924	2,162			
122.95	1,924	2,240			
123.00	1,924	2,317			
123.05	1,924	2,394			
123.10	1,924	2,471			
123.15	1,924	2,548			
123.20	1,924	2,626			
123.25	1,924	2,703			
123.30	1,924	2,780			
123.35	1,924	2,857			
123.40	1,924	2,935			
123.45	1,924	3,012			
123.50	1,924	3,089			
123.55	1,924	3,093			
123.60	1,924	3,097			
123.65	1,924	3,101			
123.70	1,924	3,105			
123.75	1,924	3,109			
123.80	1,924	3,113			
123.85	1,924	3,116			
123.90	1,924	3,120			
123.95	1,924	3,124			
124.00	1,924	3,128			
124.05	1,924	3,132			
124.10	1,924	3,136			

**Proposed HydroCAD 533 Boston Post Road**

Prepared by {enter your company name here}

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Type III 24-hr 1-YR Rainfall=2.62"

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Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

<b>Subcatchment P-1A: Subcatchment to</b>	Runoff Area=13,425 sf 66.59% Impervious Runoff Depth=1.27" Tc=6.0 min CN=85 Runoff=0.46 cfs 1,426 cf
<b>Subcatchment P-1B: Subcatchment to</b>	Runoff Area=33,268 sf 68.13% Impervious Runoff Depth=1.34" Tc=6.0 min CN=86 Runoff=1.20 cfs 3,721 cf
<b>Subcatchment P-1C: Subcatchment to</b>	Runoff Area=29,201 sf 66.54% Impervious Runoff Depth=1.34" Tc=6.0 min CN=86 Runoff=1.05 cfs 3,266 cf
<b>Subcatchment P-1D: Subcatchment to</b>	Runoff Area=13,403 sf 58.36% Impervious Runoff Depth=1.09" Tc=6.0 min CN=82 Runoff=0.39 cfs 1,214 cf
<b>Subcatchment P-1U: Undetained to Wetlands</b>	Runoff Area=8,300 sf 0.00% Impervious Runoff Depth=0.11" Tc=6.0 min CN=55 Runoff=0.00 cfs 73 cf
<b>Subcatchment P-B1: Roof Runoff to</b>	Runoff Area=34,270 sf 100.00% Impervious Runoff Depth=2.39" Tc=6.0 min CN=98 Runoff=1.99 cfs 6,826 cf
<b>Reach 1R: (new Reach)</b>	Inflow=0.62 cfs 1,932 cf Outflow=0.62 cfs 1,932 cf
<b>Pond IB-1: Infiltration Basin #1</b>	Peak Elev=123.86' Storage=788 cf Inflow=0.46 cfs 1,426 cf Discarded=0.02 cfs 1,344 cf Primary=0.02 cfs 82 cf Outflow=0.04 cfs 1,426 cf
<b>Pond IB-2: Infiltration Basin #2</b>	Peak Elev=123.52' Storage=2,039 cf Inflow=1.20 cfs 3,721 cf Discarded=0.05 cfs 3,523 cf Primary=0.04 cfs 198 cf Outflow=0.08 cfs 3,721 cf
<b>Pond UG-1: Underground Detention System #1</b>	Peak Elev=122.68' Storage=170 cf Inflow=0.39 cfs 1,214 cf 15.0" Round Culvert n=0.012 L=140.0' S=0.0064 '/' Outflow=0.28 cfs 1,212 cf
<b>Pond UG-2: Underground Infiltration System</b>	Peak Elev=122.63' Storage=2,315 cf Inflow=1.29 cfs 4,478 cf Discarded=0.06 cfs 4,478 cf Primary=0.00 cfs 0 cf Outflow=0.06 cfs 4,478 cf
<b>Pond UG-3: Underground Infiltration System</b>	Peak Elev=123.38' Storage=2,906 cf Inflow=1.99 cfs 6,826 cf Discarded=0.05 cfs 5,247 cf Primary=0.62 cfs 1,579 cf Outflow=0.67 cfs 6,826 cf
<b>Total Runoff Area = 131,867 sf Runoff Volume = 16,526 cf Average Runoff Depth = 1.50"</b>	
<b>29.38% Pervious = 38,739 sf 70.62% Impervious = 93,128 sf</b>	

### Summary for Subcatchment P-1A: Subcatchment to Infiltration Basin #1

Runoff = 0.46 cfs @ 12.09 hrs, Volume= 1,426 cf, Depth= 1.27"

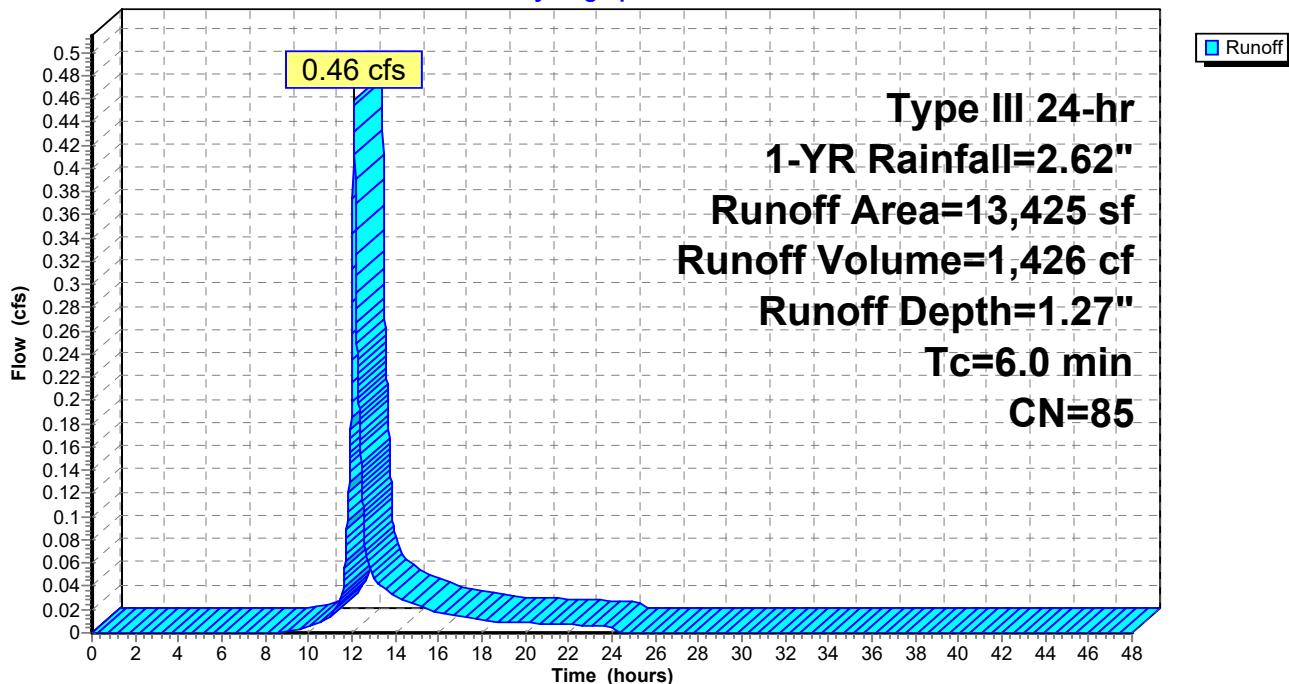
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
Type III 24-hr 1-YR Rainfall=2.62"

Area (sf)	CN	Description
8,940	98	Paved parking, HSG B
4,110	61	>75% Grass cover, Good, HSG B
375	55	Woods, Good, HSG B
13,425	85	Weighted Average
4,485		33.41% Pervious Area
8,940		66.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0				<b>Direct Entry, Direct</b>	
5.0	0			Total, Increased to minimum Tc = 6.0 min	

### Subcatchment P-1A: Subcatchment to Infiltration Basin #1

Hydrograph



**Proposed HydroCAD 533 Boston Post Road**

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Type III 24-hr 1-YR Rainfall=2.62"

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**Hydrograph for Subcatchment P-1A: Subcatchment to Infiltration Basin #1**

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.50	2.62	1.27	0.00
0.50	0.01	0.00	0.00	27.00	2.62	1.27	0.00
1.00	0.03	0.00	0.00	27.50	2.62	1.27	0.00
1.50	0.04	0.00	0.00	28.00	2.62	1.27	0.00
2.00	0.05	0.00	0.00	28.50	2.62	1.27	0.00
2.50	0.07	0.00	0.00	29.00	2.62	1.27	0.00
3.00	0.08	0.00	0.00	29.50	2.62	1.27	0.00
3.50	0.10	0.00	0.00	30.00	2.62	1.27	0.00
4.00	0.11	0.00	0.00	30.50	2.62	1.27	0.00
4.50	0.13	0.00	0.00	31.00	2.62	1.27	0.00
5.00	0.15	0.00	0.00	31.50	2.62	1.27	0.00
5.50	0.17	0.00	0.00	32.00	2.62	1.27	0.00
6.00	0.19	0.00	0.00	32.50	2.62	1.27	0.00
6.50	0.21	0.00	0.00	33.00	2.62	1.27	0.00
7.00	0.24	0.00	0.00	33.50	2.62	1.27	0.00
7.50	0.27	0.00	0.00	34.00	2.62	1.27	0.00
8.00	0.30	0.00	0.00	34.50	2.62	1.27	0.00
8.50	0.34	0.00	0.00	35.00	2.62	1.27	0.00
9.00	0.38	0.00	0.00	35.50	2.62	1.27	0.00
9.50	0.43	0.00	0.00	36.00	2.62	1.27	0.00
10.00	0.50	0.01	0.01	36.50	2.62	1.27	0.00
10.50	0.57	0.02	0.01	37.00	2.62	1.27	0.00
11.00	0.65	0.04	0.01	37.50	2.62	1.27	0.00
11.50	0.78	0.08	0.03	38.00	2.62	1.27	0.00
12.00	1.31	0.34	<b>0.26</b>	38.50	2.62	1.27	0.00
12.50	1.84	0.68	<b>0.11</b>	39.00	2.62	1.27	0.00
13.00	1.96	0.77	0.05	39.50	2.62	1.27	0.00
13.50	2.05	0.83	0.04	40.00	2.62	1.27	0.00
14.00	2.12	0.89	0.03	40.50	2.62	1.27	0.00
14.50	2.19	0.93	0.03	41.00	2.62	1.27	0.00
15.00	2.24	0.97	0.02	41.50	2.62	1.27	0.00
15.50	2.28	1.01	0.02	42.00	2.62	1.27	0.00
16.00	2.32	1.04	0.02	42.50	2.62	1.27	0.00
16.50	2.35	1.06	0.02	43.00	2.62	1.27	0.00
17.00	2.38	1.09	0.01	43.50	2.62	1.27	0.00
17.50	2.41	1.11	0.01	44.00	2.62	1.27	0.00
18.00	2.43	1.12	0.01	44.50	2.62	1.27	0.00
18.50	2.45	1.14	0.01	45.00	2.62	1.27	0.00
19.00	2.47	1.16	0.01	45.50	2.62	1.27	0.00
19.50	2.49	1.17	0.01	46.00	2.62	1.27	0.00
20.00	2.51	1.18	0.01	46.50	2.62	1.27	0.00
20.50	2.52	1.20	0.01	47.00	2.62	1.27	0.00
21.00	2.54	1.21	0.01	47.50	2.62	1.27	0.00
21.50	2.56	1.22	0.01	48.00	2.62	1.27	0.00
22.00	2.57	1.23	0.01				
22.50	2.58	1.25	0.01				
23.00	2.60	1.26	0.01				
23.50	2.61	1.27	0.01				
24.00	<b>2.62</b>	<b>1.27</b>	0.01				
24.50	2.62	1.27	0.00				
25.00	2.62	1.27	0.00				
25.50	2.62	1.27	0.00				
26.00	2.62	1.27	0.00				

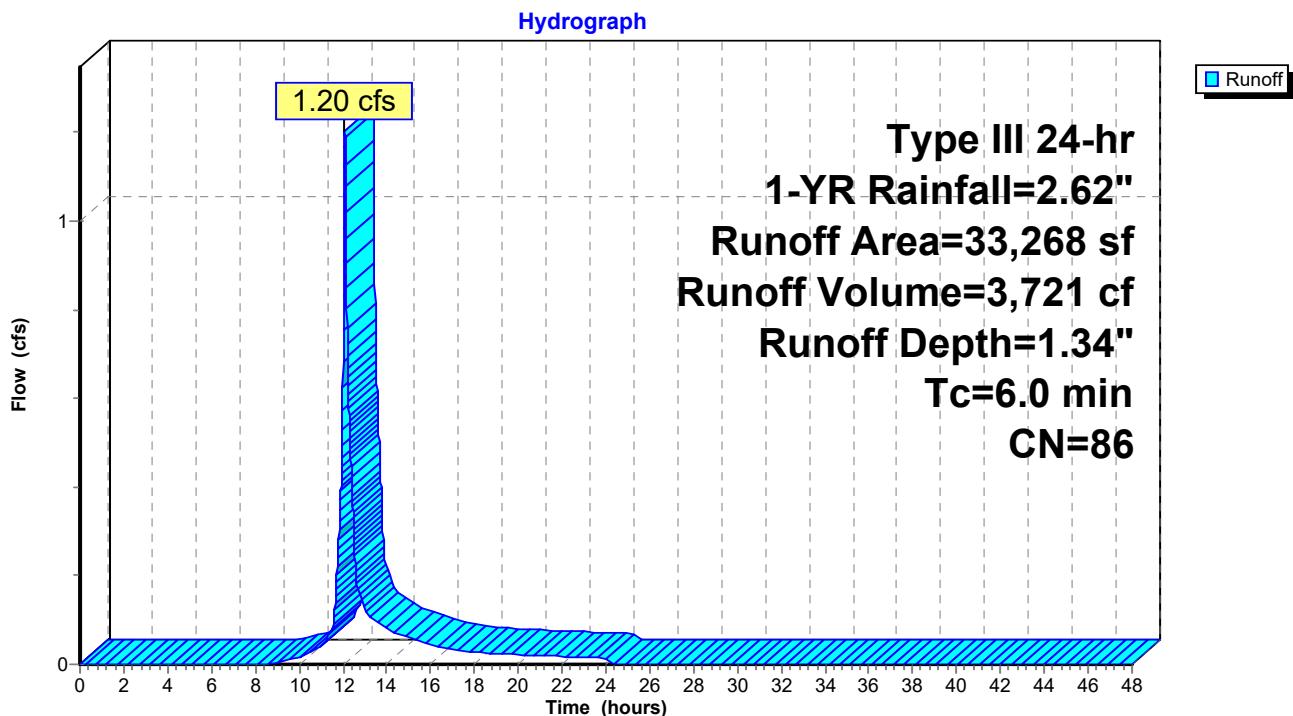
**Summary for Subcatchment P-1B: Subcatchment to Infiltration Basin #2**

Runoff = 1.20 cfs @ 12.09 hrs, Volume= 3,721 cf, Depth= 1.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
Type III 24-hr 1-YR Rainfall=2.62"

Area (sf)	CN	Description
22,665	98	Paved parking, HSG B
10,603	61	>75% Grass cover, Good, HSG B
33,268	86	Weighted Average
10,603		31.87% Pervious Area
22,665		68.13% Impervious Area

Tc	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0				<b>Direct Entry, Direct Entry</b>	
5.0	0			Total, Increased to minimum Tc = 6.0 min	

**Subcatchment P-1B: Subcatchment to Infiltration Basin #2**

**Proposed HydroCAD 533 Boston Post Road**

Prepared by {enter your company name here}

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Type III 24-hr 1-YR Rainfall=2.62"

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**Hydrograph for Subcatchment P-1B: Subcatchment to Infiltration Basin #2**

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.50	2.62	1.34	0.00
0.50	0.01	0.00	0.00	27.00	2.62	1.34	0.00
1.00	0.03	0.00	0.00	27.50	2.62	1.34	0.00
1.50	0.04	0.00	0.00	28.00	2.62	1.34	0.00
2.00	0.05	0.00	0.00	28.50	2.62	1.34	0.00
2.50	0.07	0.00	0.00	29.00	2.62	1.34	0.00
3.00	0.08	0.00	0.00	29.50	2.62	1.34	0.00
3.50	0.10	0.00	0.00	30.00	2.62	1.34	0.00
4.00	0.11	0.00	0.00	30.50	2.62	1.34	0.00
4.50	0.13	0.00	0.00	31.00	2.62	1.34	0.00
5.00	0.15	0.00	0.00	31.50	2.62	1.34	0.00
5.50	0.17	0.00	0.00	32.00	2.62	1.34	0.00
6.00	0.19	0.00	0.00	32.50	2.62	1.34	0.00
6.50	0.21	0.00	0.00	33.00	2.62	1.34	0.00
7.00	0.24	0.00	0.00	33.50	2.62	1.34	0.00
7.50	0.27	0.00	0.00	34.00	2.62	1.34	0.00
8.00	0.30	0.00	0.00	34.50	2.62	1.34	0.00
8.50	0.34	0.00	0.00	35.00	2.62	1.34	0.00
9.00	0.38	0.00	0.00	35.50	2.62	1.34	0.00
9.50	0.43	0.01	0.01	36.00	2.62	1.34	0.00
10.00	0.50	0.02	0.02	36.50	2.62	1.34	0.00
10.50	0.57	0.03	0.03	37.00	2.62	1.34	0.00
11.00	0.65	0.06	0.04	37.50	2.62	1.34	0.00
11.50	0.78	0.10	0.08	38.00	2.62	1.34	0.00
12.00	1.31	0.37	<b>0.68</b>	38.50	2.62	1.34	0.00
12.50	1.84	0.73	<b>0.29</b>	39.00	2.62	1.34	0.00
13.00	1.96	0.82	0.12	39.50	2.62	1.34	0.00
13.50	2.05	0.89	0.10	40.00	2.62	1.34	0.00
14.00	2.12	0.94	0.08	40.50	2.62	1.34	0.00
14.50	2.19	0.99	0.07	41.00	2.62	1.34	0.00
15.00	2.24	1.03	0.06	41.50	2.62	1.34	0.00
15.50	2.28	1.07	0.05	42.00	2.62	1.34	0.00
16.00	2.32	1.10	0.04	42.50	2.62	1.34	0.00
16.50	2.35	1.13	0.04	43.00	2.62	1.34	0.00
17.00	2.38	1.15	0.03	43.50	2.62	1.34	0.00
17.50	2.41	1.17	0.03	44.00	2.62	1.34	0.00
18.00	2.43	1.19	0.03	44.50	2.62	1.34	0.00
18.50	2.45	1.20	0.03	45.00	2.62	1.34	0.00
19.00	2.47	1.22	0.02	45.50	2.62	1.34	0.00
19.50	2.49	1.24	0.02	46.00	2.62	1.34	0.00
20.00	2.51	1.25	0.02	46.50	2.62	1.34	0.00
20.50	2.52	1.26	0.02	47.00	2.62	1.34	0.00
21.00	2.54	1.28	0.02	47.50	2.62	1.34	0.00
21.50	2.56	1.29	0.02	48.00	2.62	1.34	0.00
22.00	2.57	1.30	0.02				
22.50	2.58	1.31	0.02				
23.00	2.60	1.32	0.02				
23.50	2.61	1.33	0.02				
24.00	<b>2.62</b>	<b>1.34</b>	0.01				
24.50	2.62	1.34	0.00				
25.00	2.62	1.34	0.00				
25.50	2.62	1.34	0.00				
26.00	2.62	1.34	0.00				

**Summary for Subcatchment P-1C: Subcatchment to Infiltration Trench #2**

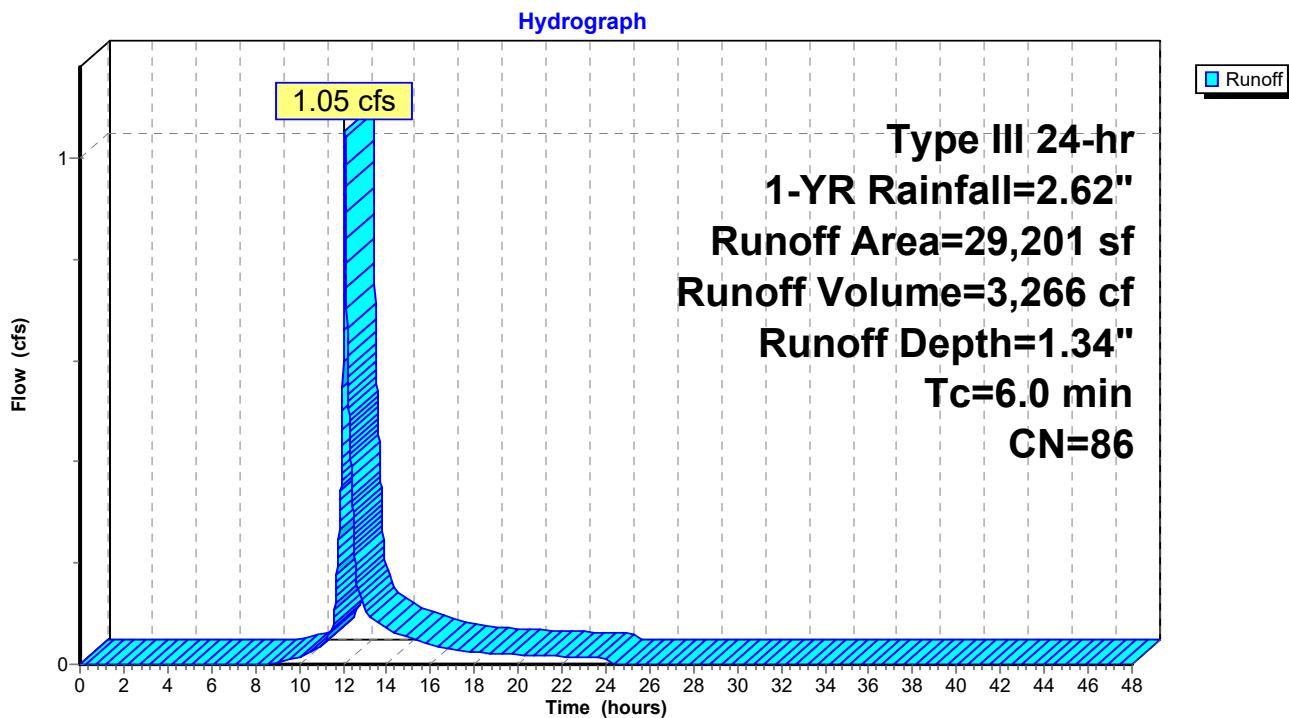
Runoff = 1.05 cfs @ 12.09 hrs, Volume= 3,266 cf, Depth= 1.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
Type III 24-hr 1-YR Rainfall=2.62"

Area (sf)	CN	Description
19,431	98	Paved parking, HSG B
9,770	61	>75% Grass cover, Good, HSG B

29,201	86	Weighted Average
9,770		33.46% Pervious Area
19,431		66.54% Impervious Area

Tc	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0				<b>Direct Entry, Direct Entry</b>	
5.0	0			Total, Increased to minimum Tc = 6.0 min	

**Subcatchment P-1C: Subcatchment to Infiltration Trench #2**

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Type III 24-hr 1-YR Rainfall=2.62"

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**Hydrograph for Subcatchment P-1C: Subcatchment to Infiltration Trench #2**

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.50	2.62	1.34	0.00
0.50	0.01	0.00	0.00	27.00	2.62	1.34	0.00
1.00	0.03	0.00	0.00	27.50	2.62	1.34	0.00
1.50	0.04	0.00	0.00	28.00	2.62	1.34	0.00
2.00	0.05	0.00	0.00	28.50	2.62	1.34	0.00
2.50	0.07	0.00	0.00	29.00	2.62	1.34	0.00
3.00	0.08	0.00	0.00	29.50	2.62	1.34	0.00
3.50	0.10	0.00	0.00	30.00	2.62	1.34	0.00
4.00	0.11	0.00	0.00	30.50	2.62	1.34	0.00
4.50	0.13	0.00	0.00	31.00	2.62	1.34	0.00
5.00	0.15	0.00	0.00	31.50	2.62	1.34	0.00
5.50	0.17	0.00	0.00	32.00	2.62	1.34	0.00
6.00	0.19	0.00	0.00	32.50	2.62	1.34	0.00
6.50	0.21	0.00	0.00	33.00	2.62	1.34	0.00
7.00	0.24	0.00	0.00	33.50	2.62	1.34	0.00
7.50	0.27	0.00	0.00	34.00	2.62	1.34	0.00
8.00	0.30	0.00	0.00	34.50	2.62	1.34	0.00
8.50	0.34	0.00	0.00	35.00	2.62	1.34	0.00
9.00	0.38	0.00	0.00	35.50	2.62	1.34	0.00
9.50	0.43	0.01	0.01	36.00	2.62	1.34	0.00
10.00	0.50	0.02	0.01	36.50	2.62	1.34	0.00
10.50	0.57	0.03	0.02	37.00	2.62	1.34	0.00
11.00	0.65	0.06	0.04	37.50	2.62	1.34	0.00
11.50	0.78	0.10	0.07	38.00	2.62	1.34	0.00
12.00	1.31	0.37	<b>0.60</b>	38.50	2.62	1.34	0.00
12.50	1.84	0.73	<b>0.26</b>	39.00	2.62	1.34	0.00
13.00	1.96	0.82	0.11	39.50	2.62	1.34	0.00
13.50	2.05	0.89	0.09	40.00	2.62	1.34	0.00
14.00	2.12	0.94	0.07	40.50	2.62	1.34	0.00
14.50	2.19	0.99	0.06	41.00	2.62	1.34	0.00
15.00	2.24	1.03	0.05	41.50	2.62	1.34	0.00
15.50	2.28	1.07	0.05	42.00	2.62	1.34	0.00
16.00	2.32	1.10	0.04	42.50	2.62	1.34	0.00
16.50	2.35	1.13	0.03	43.00	2.62	1.34	0.00
17.00	2.38	1.15	0.03	43.50	2.62	1.34	0.00
17.50	2.41	1.17	0.03	44.00	2.62	1.34	0.00
18.00	2.43	1.19	0.02	44.50	2.62	1.34	0.00
18.50	2.45	1.20	0.02	45.00	2.62	1.34	0.00
19.00	2.47	1.22	0.02	45.50	2.62	1.34	0.00
19.50	2.49	1.24	0.02	46.00	2.62	1.34	0.00
20.00	2.51	1.25	0.02	46.50	2.62	1.34	0.00
20.50	2.52	1.26	0.02	47.00	2.62	1.34	0.00
21.00	2.54	1.28	0.02	47.50	2.62	1.34	0.00
21.50	2.56	1.29	0.02	48.00	2.62	1.34	0.00
22.00	2.57	1.30	0.02				
22.50	2.58	1.31	0.02				
23.00	2.60	1.32	0.01				
23.50	2.61	1.33	0.01				
24.00	<b>2.62</b>	<b>1.34</b>	0.01				
24.50	2.62	1.34	0.00				
25.00	2.62	1.34	0.00				
25.50	2.62	1.34	0.00				
26.00	2.62	1.34	0.00				

**Proposed HydroCAD 533 Boston Post Road**

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Type III 24-hr 1-YR Rainfall=2.62"

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**Summary for Subcatchment P-1D: Subcatchment to Infiltration Trench 1**

Runoff = 0.39 cfs @ 12.09 hrs, Volume= 1,214 cf, Depth= 1.09"

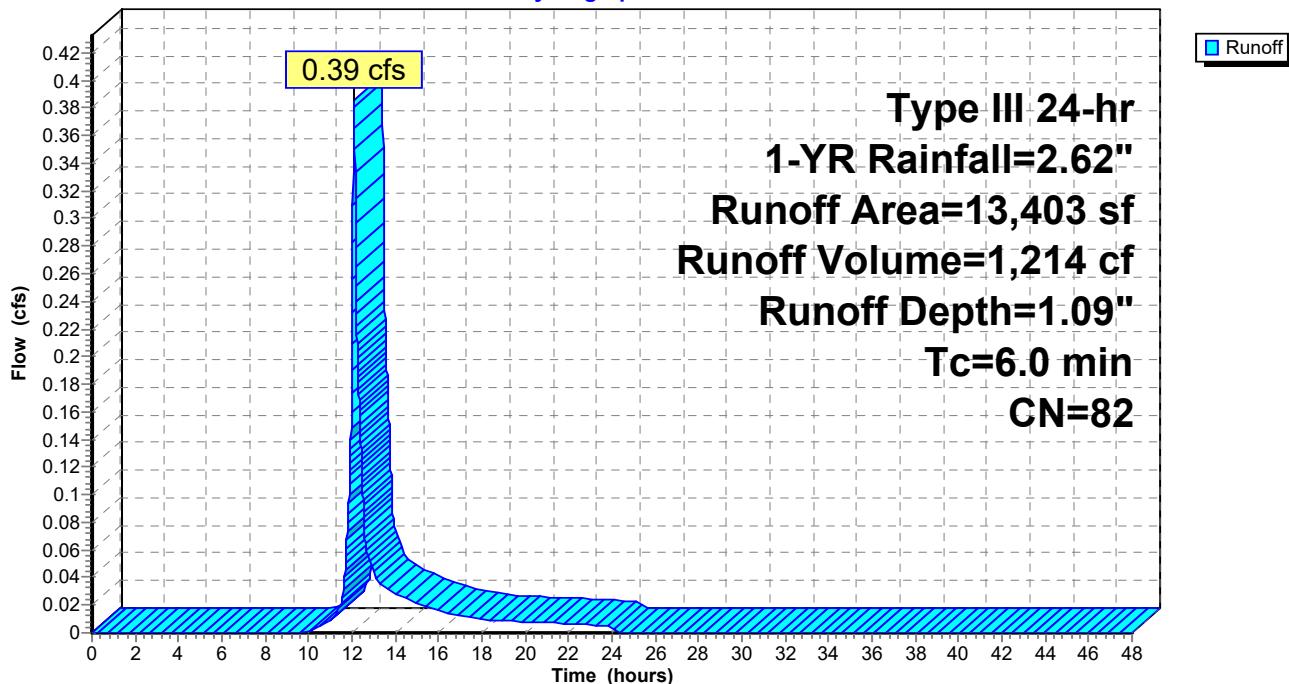
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
Type III 24-hr 1-YR Rainfall=2.62"

Area (sf)	CN	Description
7,822	98	Paved parking, HSG B
2,453	61	>75% Grass cover, Good, HSG B
3,128	60	Woods, Fair, HSG B
13,403	82	Weighted Average
5,581		41.64% Pervious Area
7,822		58.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0				<b>Direct Entry, Direct Entry</b>	
5.0	0			Total, Increased to minimum Tc = 6.0 min	

**Subcatchment P-1D: Subcatchment to Infiltration Trench 1**

Hydrograph



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Type III 24-hr 1-YR Rainfall=2.62"

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**Hydrograph for Subcatchment P-1D: Subcatchment to Infiltration Trench 1**

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.50	2.62	1.09	0.00
0.50	0.01	0.00	0.00	27.00	2.62	1.09	0.00
1.00	0.03	0.00	0.00	27.50	2.62	1.09	0.00
1.50	0.04	0.00	0.00	28.00	2.62	1.09	0.00
2.00	0.05	0.00	0.00	28.50	2.62	1.09	0.00
2.50	0.07	0.00	0.00	29.00	2.62	1.09	0.00
3.00	0.08	0.00	0.00	29.50	2.62	1.09	0.00
3.50	0.10	0.00	0.00	30.00	2.62	1.09	0.00
4.00	0.11	0.00	0.00	30.50	2.62	1.09	0.00
4.50	0.13	0.00	0.00	31.00	2.62	1.09	0.00
5.00	0.15	0.00	0.00	31.50	2.62	1.09	0.00
5.50	0.17	0.00	0.00	32.00	2.62	1.09	0.00
6.00	0.19	0.00	0.00	32.50	2.62	1.09	0.00
6.50	0.21	0.00	0.00	33.00	2.62	1.09	0.00
7.00	0.24	0.00	0.00	33.50	2.62	1.09	0.00
7.50	0.27	0.00	0.00	34.00	2.62	1.09	0.00
8.00	0.30	0.00	0.00	34.50	2.62	1.09	0.00
8.50	0.34	0.00	0.00	35.00	2.62	1.09	0.00
9.00	0.38	0.00	0.00	35.50	2.62	1.09	0.00
9.50	0.43	0.00	0.00	36.00	2.62	1.09	0.00
10.00	0.50	0.00	0.00	36.50	2.62	1.09	0.00
10.50	0.57	0.01	0.00	37.00	2.62	1.09	0.00
11.00	0.65	0.02	0.01	37.50	2.62	1.09	0.00
11.50	0.78	0.05	0.02	38.00	2.62	1.09	0.00
12.00	1.31	0.25	<b>0.21</b>	38.50	2.62	1.09	0.00
12.50	1.84	0.55	<b>0.10</b>	39.00	2.62	1.09	0.00
13.00	1.96	0.63	0.04	39.50	2.62	1.09	0.00
13.50	2.05	0.68	0.03	40.00	2.62	1.09	0.00
14.00	2.12	0.73	0.03	40.50	2.62	1.09	0.00
14.50	2.19	0.77	0.02	41.00	2.62	1.09	0.00
15.00	2.24	0.81	0.02	41.50	2.62	1.09	0.00
15.50	2.28	0.84	0.02	42.00	2.62	1.09	0.00
16.00	2.32	0.87	0.02	42.50	2.62	1.09	0.00
16.50	2.35	0.89	0.01	43.00	2.62	1.09	0.00
17.00	2.38	0.91	0.01	43.50	2.62	1.09	0.00
17.50	2.41	0.93	0.01	44.00	2.62	1.09	0.00
18.00	2.43	0.95	0.01	44.50	2.62	1.09	0.00
18.50	2.45	0.96	0.01	45.00	2.62	1.09	0.00
19.00	2.47	0.98	0.01	45.50	2.62	1.09	0.00
19.50	2.49	0.99	0.01	46.00	2.62	1.09	0.00
20.00	2.51	1.00	0.01	46.50	2.62	1.09	0.00
20.50	2.52	1.02	0.01	47.00	2.62	1.09	0.00
21.00	2.54	1.03	0.01	47.50	2.62	1.09	0.00
21.50	2.56	1.04	0.01	48.00	2.62	1.09	0.00
22.00	2.57	1.05	0.01				
22.50	2.58	1.06	0.01				
23.00	2.60	1.07	0.01				
23.50	2.61	1.08	0.01				
24.00	<b>2.62</b>	<b>1.09</b>	0.01				
24.50	2.62	1.09	0.00				
25.00	2.62	1.09	0.00				
25.50	2.62	1.09	0.00				
26.00	2.62	1.09	0.00				

**Proposed HydroCAD 533 Boston Post Road**

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Type III 24-hr 1-YR Rainfall=2.62"

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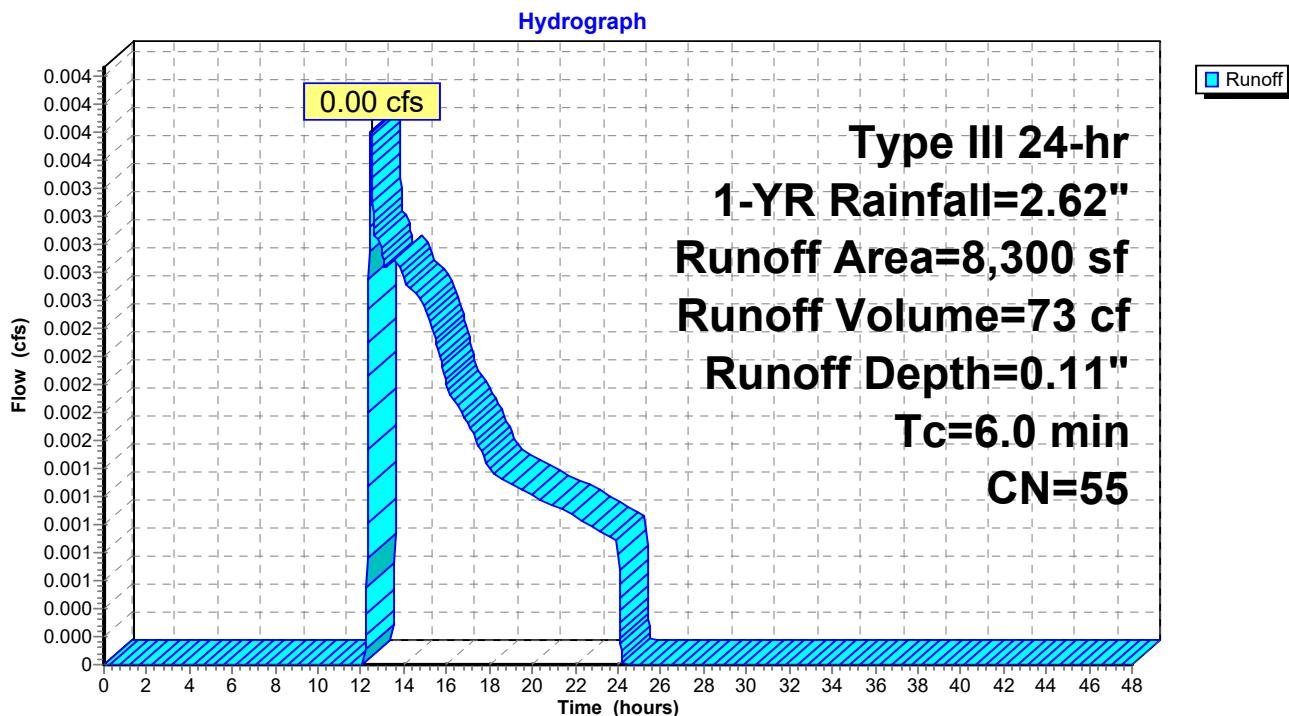
**Summary for Subcatchment P-1U: Undetained to Wetlands**

Runoff = 0.00 cfs @ 12.47 hrs, Volume= 73 cf, Depth= 0.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
Type III 24-hr 1-YR Rainfall=2.62"

Area (sf)	CN	Description
8,300	55	Woods, Good, HSG B
8,300		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0				<b>Direct Entry, Direct Entry</b>	
5.0	0			Total, Increased to minimum Tc = 6.0 min	

**Subcatchment P-1U: Undetained to Wetlands**

**Proposed HydroCAD 533 Boston Post Road**

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Type III 24-hr 1-YR Rainfall=2.62"

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**Hydrograph for Subcatchment P-1U: Undetained to Wetlands**

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.50	2.62	0.11	0.00
0.50	0.01	0.00	0.00	27.00	2.62	0.11	0.00
1.00	0.03	0.00	0.00	27.50	2.62	0.11	0.00
1.50	0.04	0.00	0.00	28.00	2.62	0.11	0.00
2.00	0.05	0.00	0.00	28.50	2.62	0.11	0.00
2.50	0.07	0.00	0.00	29.00	2.62	0.11	0.00
3.00	0.08	0.00	0.00	29.50	2.62	0.11	0.00
3.50	0.10	0.00	0.00	30.00	2.62	0.11	0.00
4.00	0.11	0.00	0.00	30.50	2.62	0.11	0.00
4.50	0.13	0.00	0.00	31.00	2.62	0.11	0.00
5.00	0.15	0.00	0.00	31.50	2.62	0.11	0.00
5.50	0.17	0.00	0.00	32.00	2.62	0.11	0.00
6.00	0.19	0.00	0.00	32.50	2.62	0.11	0.00
6.50	0.21	0.00	0.00	33.00	2.62	0.11	0.00
7.00	0.24	0.00	0.00	33.50	2.62	0.11	0.00
7.50	0.27	0.00	0.00	34.00	2.62	0.11	0.00
8.00	0.30	0.00	0.00	34.50	2.62	0.11	0.00
8.50	0.34	0.00	0.00	35.00	2.62	0.11	0.00
9.00	0.38	0.00	0.00	35.50	2.62	0.11	0.00
9.50	0.43	0.00	0.00	36.00	2.62	0.11	0.00
10.00	0.50	0.00	0.00	36.50	2.62	0.11	0.00
10.50	0.57	0.00	0.00	37.00	2.62	0.11	0.00
11.00	0.65	0.00	0.00	37.50	2.62	0.11	0.00
11.50	0.78	0.00	0.00	38.00	2.62	0.11	0.00
12.00	1.31	0.00	<b>0.00</b>	38.50	2.62	0.11	0.00
12.50	1.84	0.00	<b>0.00</b>	39.00	2.62	0.11	0.00
13.00	1.96	0.01	0.00	39.50	2.62	0.11	0.00
13.50	2.05	0.02	0.00	40.00	2.62	0.11	0.00
14.00	2.12	0.03	0.00	40.50	2.62	0.11	0.00
14.50	2.19	0.03	0.00	41.00	2.62	0.11	0.00
15.00	2.24	0.04	0.00	41.50	2.62	0.11	0.00
15.50	2.28	0.05	0.00	42.00	2.62	0.11	0.00
16.00	2.32	0.05	0.00	42.50	2.62	0.11	0.00
16.50	2.35	0.06	0.00	43.00	2.62	0.11	0.00
17.00	2.38	0.06	0.00	43.50	2.62	0.11	0.00
17.50	2.41	0.07	0.00	44.00	2.62	0.11	0.00
18.00	2.43	0.07	0.00	44.50	2.62	0.11	0.00
18.50	2.45	0.07	0.00	45.00	2.62	0.11	0.00
19.00	2.47	0.08	0.00	45.50	2.62	0.11	0.00
19.50	2.49	0.08	0.00	46.00	2.62	0.11	0.00
20.00	2.51	0.08	0.00	46.50	2.62	0.11	0.00
20.50	2.52	0.09	0.00	47.00	2.62	0.11	0.00
21.00	2.54	0.09	0.00	47.50	2.62	0.11	0.00
21.50	2.56	0.09	0.00	48.00	2.62	0.11	0.00
22.00	2.57	0.10	0.00				
22.50	2.58	0.10	0.00				
23.00	2.60	0.10	0.00				
23.50	2.61	0.10	0.00				
24.00	<b>2.62</b>	<b>0.11</b>	0.00				
24.50	2.62	0.11	0.00				
25.00	2.62	0.11	0.00				
25.50	2.62	0.11	0.00				
26.00	2.62	0.11	0.00				

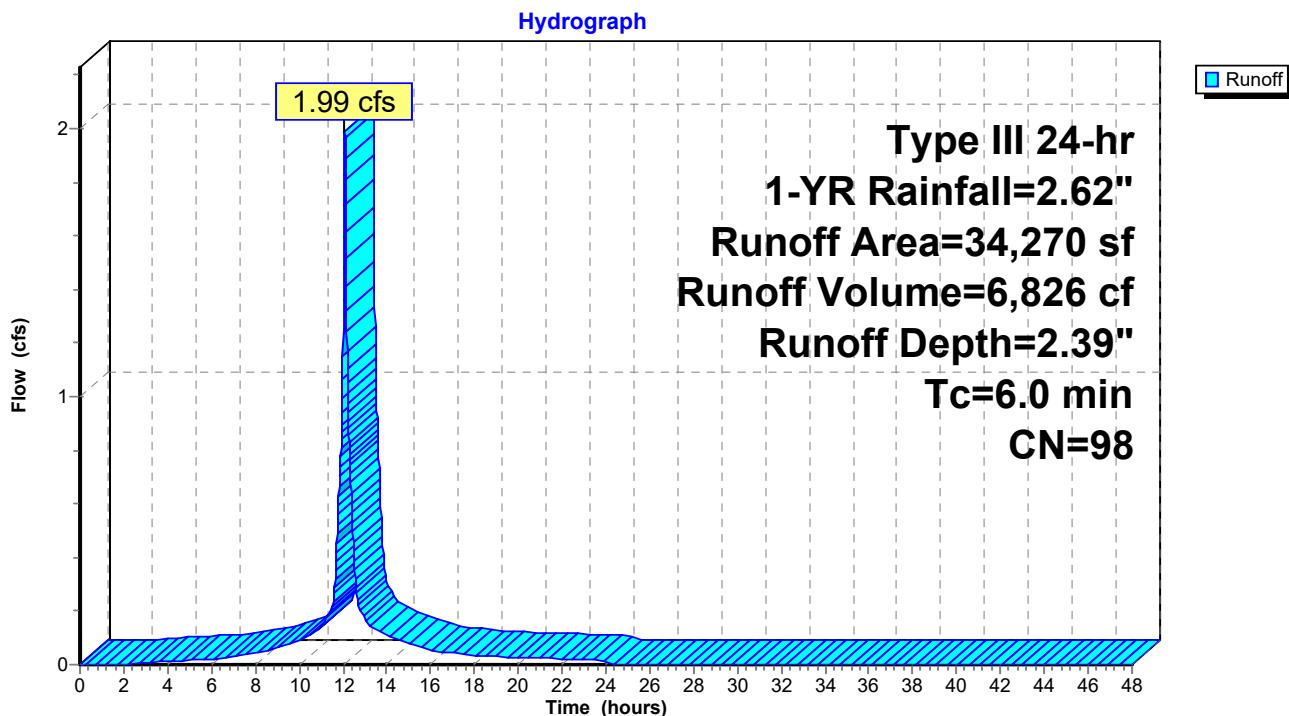
### Summary for Subcatchment P-B1: Roof Runoff to Infiltration Trench #3

Runoff = 1.99 cfs @ 12.08 hrs, Volume= 6,826 cf, Depth= 2.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
Type III 24-hr 1-YR Rainfall=2.62"

Area (sf)	CN	Description			
34,270	98	Roofs, HSG B			
34,270		100.00% Impervious Area			
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0				<b>Direct Entry, Direct Entry</b>	
5.0	0			Total, Increased to minimum Tc = 6.0 min	

### Subcatchment P-B1: Roof Runoff to Infiltration Trench #3



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Type III 24-hr 1-YR Rainfall=2.62"

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**Hydrograph for Subcatchment P-B1: Roof Runoff to Infiltration Trench #3**

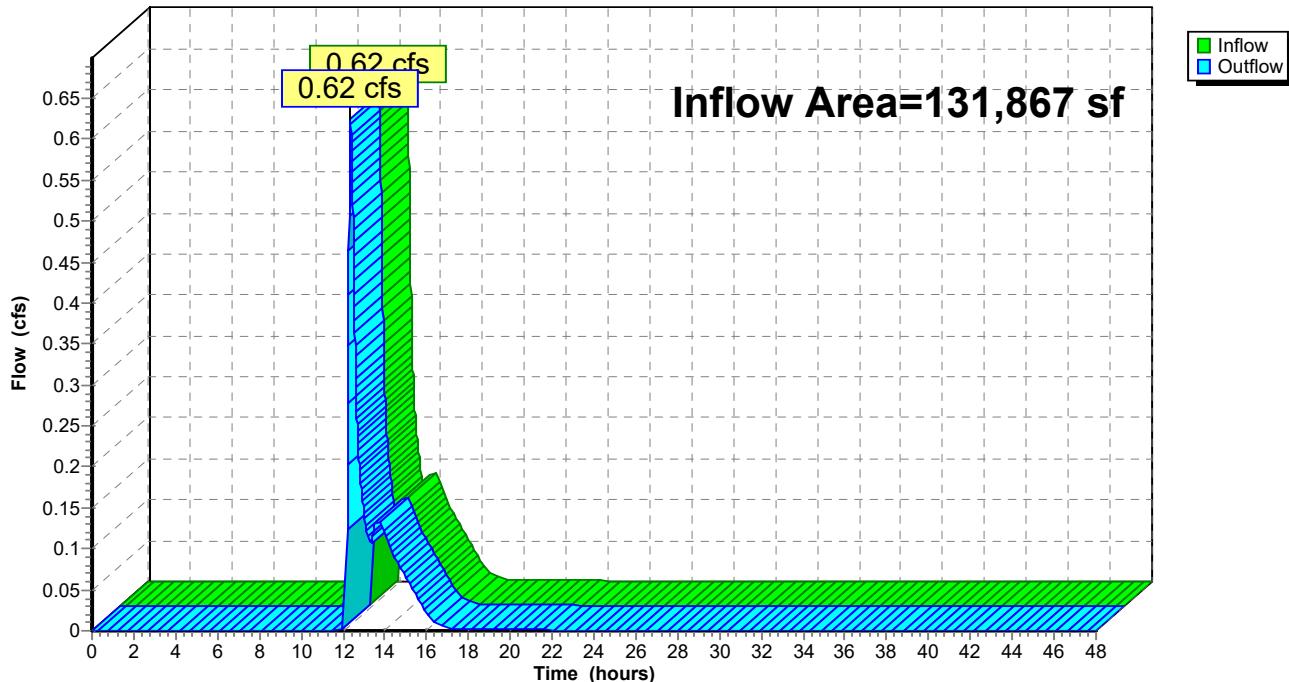
Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.50	2.62	2.39	0.00
0.50	0.01	0.00	0.00	27.00	2.62	2.39	0.00
1.00	0.03	0.00	0.00	27.50	2.62	2.39	0.00
1.50	0.04	0.00	0.00	28.00	2.62	2.39	0.00
2.00	0.05	0.00	0.00	28.50	2.62	2.39	0.00
2.50	0.07	0.00	0.00	29.00	2.62	2.39	0.00
3.00	0.08	0.01	0.01	29.50	2.62	2.39	0.00
3.50	0.10	0.01	0.01	30.00	2.62	2.39	0.00
4.00	0.11	0.02	0.01	30.50	2.62	2.39	0.00
4.50	0.13	0.03	0.01	31.00	2.62	2.39	0.00
5.00	0.15	0.04	0.02	31.50	2.62	2.39	0.00
5.50	0.17	0.05	0.02	32.00	2.62	2.39	0.00
6.00	0.19	0.06	0.02	32.50	2.62	2.39	0.00
6.50	0.21	0.08	0.03	33.00	2.62	2.39	0.00
7.00	0.24	0.10	0.03	33.50	2.62	2.39	0.00
7.50	0.27	0.12	0.04	34.00	2.62	2.39	0.00
8.00	0.30	0.14	0.04	34.50	2.62	2.39	0.00
8.50	0.34	0.17	0.05	35.00	2.62	2.39	0.00
9.00	0.38	0.21	0.06	35.50	2.62	2.39	0.00
9.50	0.43	0.26	0.08	36.00	2.62	2.39	0.00
10.00	0.50	0.31	0.09	36.50	2.62	2.39	0.00
10.50	0.57	0.38	0.11	37.00	2.62	2.39	0.00
11.00	0.65	0.46	0.14	37.50	2.62	2.39	0.00
11.50	0.78	0.58	0.22	38.00	2.62	2.39	0.00
12.00	1.31	1.09	<b>1.25</b>	38.50	2.62	2.39	0.00
12.50	1.84	1.62	<b>0.41</b>	39.00	2.62	2.39	0.00
13.00	1.96	1.74	0.17	39.50	2.62	2.39	0.00
13.50	2.05	1.83	0.13	40.00	2.62	2.39	0.00
14.00	2.12	1.90	0.11	40.50	2.62	2.39	0.00
14.50	2.19	1.96	0.09	41.00	2.62	2.39	0.00
15.00	2.24	2.01	0.08	41.50	2.62	2.39	0.00
15.50	2.28	2.06	0.07	42.00	2.62	2.39	0.00
16.00	2.32	2.09	0.06	42.50	2.62	2.39	0.00
16.50	2.35	2.13	0.05	43.00	2.62	2.39	0.00
17.00	2.38	2.15	0.04	43.50	2.62	2.39	0.00
17.50	2.41	2.18	0.04	44.00	2.62	2.39	0.00
18.00	2.43	2.20	0.03	44.50	2.62	2.39	0.00
18.50	2.45	2.22	0.03	45.00	2.62	2.39	0.00
19.00	2.47	2.24	0.03	45.50	2.62	2.39	0.00
19.50	2.49	2.26	0.03	46.00	2.62	2.39	0.00
20.00	2.51	2.28	0.03	46.50	2.62	2.39	0.00
20.50	2.52	2.29	0.03	47.00	2.62	2.39	0.00
21.00	2.54	2.31	0.02	47.50	2.62	2.39	0.00
21.50	2.56	2.33	0.02	48.00	2.62	2.39	0.00
22.00	2.57	2.34	0.02				
22.50	2.58	2.35	0.02				
23.00	2.60	2.37	0.02				
23.50	2.61	2.38	0.02				
24.00	<b>2.62</b>	<b>2.39</b>	0.02				
24.50	2.62	2.39	0.00				
25.00	2.62	2.39	0.00				
25.50	2.62	2.39	0.00				
26.00	2.62	2.39	0.00				

**Summary for Reach 1R: (new Reach)**

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

Inflow Area = 131,867 sf, 70.62% Impervious, Inflow Depth = 0.18" for 1-YR event  
Inflow = 0.62 cfs @ 12.36 hrs, Volume= 1,932 cf  
Outflow = 0.62 cfs @ 12.36 hrs, Volume= 1,932 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3

**Reach 1R: (new Reach)****Hydrograph**

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**Hydrograph for Reach 1R: (new Reach)**

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00	0.00	0.00	26.50	0.00	0.00	0.00
0.50	0.00	0.00	0.00	27.00	0.00	0.00	0.00
1.00	0.00	0.00	0.00	27.50	0.00	0.00	0.00
1.50	0.00	0.00	0.00	28.00	0.00	0.00	0.00
2.00	0.00	0.00	0.00	28.50	0.00	0.00	0.00
2.50	0.00	0.00	0.00	29.00	0.00	0.00	0.00
3.00	0.00	0.00	0.00	29.50	0.00	0.00	0.00
3.50	0.00	0.00	0.00	30.00	0.00	0.00	0.00
4.00	0.00	0.00	0.00	30.50	0.00	0.00	0.00
4.50	0.00	0.00	0.00	31.00	0.00	0.00	0.00
5.00	0.00	0.00	0.00	31.50	0.00	0.00	0.00
5.50	0.00	0.00	0.00	32.00	0.00	0.00	0.00
6.00	0.00	0.00	0.00	32.50	0.00	0.00	0.00
6.50	0.00	0.00	0.00	33.00	0.00	0.00	0.00
7.00	0.00	0.00	0.00	33.50	0.00	0.00	0.00
7.50	0.00	0.00	0.00	34.00	0.00	0.00	0.00
8.00	0.00	0.00	0.00	34.50	0.00	0.00	0.00
8.50	0.00	0.00	0.00	35.00	0.00	0.00	0.00
9.00	0.00	0.00	0.00	35.50	0.00	0.00	0.00
9.50	0.00	0.00	0.00	36.00	0.00	0.00	0.00
10.00	0.00	0.00	0.00	36.50	0.00	0.00	0.00
10.50	0.00	0.00	0.00	37.00	0.00	0.00	0.00
11.00	0.00	0.00	0.00	37.50	0.00	0.00	0.00
11.50	0.00	0.00	0.00	38.00	0.00	0.00	0.00
12.00	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	38.50	0.00	0.00	0.00
12.50	<b>0.47</b>	<b>0.47</b>	<b>0.47</b>	39.00	0.00	0.00	0.00
13.00	0.14	0.14	0.14	39.50	0.00	0.00	0.00
13.50	0.13	0.13	0.13	40.00	0.00	0.00	0.00
14.00	0.12	0.12	0.12	40.50	0.00	0.00	0.00
14.50	0.09	0.09	0.09	41.00	0.00	0.00	0.00
15.00	0.06	0.06	0.06	41.50	0.00	0.00	0.00
15.50	0.04	0.04	0.04	42.00	0.00	0.00	0.00
16.00	0.02	0.02	0.02	42.50	0.00	0.00	0.00
16.50	0.01	0.01	0.01	43.00	0.00	0.00	0.00
17.00	0.00	0.00	0.00	43.50	0.00	0.00	0.00
17.50	0.00	0.00	0.00	44.00	0.00	0.00	0.00
18.00	0.00	0.00	0.00	44.50	0.00	0.00	0.00
18.50	0.00	0.00	0.00	45.00	0.00	0.00	0.00
19.00	0.00	0.00	0.00	45.50	0.00	0.00	0.00
19.50	0.00	0.00	0.00	46.00	0.00	0.00	0.00
20.00	0.00	0.00	0.00	46.50	0.00	0.00	0.00
20.50	0.00	0.00	0.00	47.00	0.00	0.00	0.00
21.00	0.00	0.00	0.00	47.50	0.00	0.00	0.00
21.50	0.00	0.00	0.00	48.00	0.00	0.00	0.00
22.00	0.00	0.00	0.00				
22.50	0.00	0.00	0.00				
23.00	0.00	0.00	0.00				
23.50	0.00	0.00	0.00				
24.00	0.00	0.00	0.00				
24.50	0.00	0.00	0.00				
25.00	0.00	0.00	0.00				
25.50	0.00	0.00	0.00				
26.00	0.00	0.00	0.00				

### Summary for Pond IB-1: Infiltration Basin #1

Inflow Area = 13,425 sf, 66.59% Impervious, Inflow Depth = 1.27" for 1-YR event  
 Inflow = 0.46 cfs @ 12.09 hrs, Volume= 1,426 cf  
 Outflow = 0.04 cfs @ 13.66 hrs, Volume= 1,426 cf, Atten= 92%, Lag= 93.9 min  
 Discarded = 0.02 cfs @ 13.66 hrs, Volume= 1,344 cf  
 Primary = 0.02 cfs @ 13.66 hrs, Volume= 82 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3  
 Peak Elev= 123.86' @ 13.66 hrs Surf.Area= 783 sf Storage= 788 cf

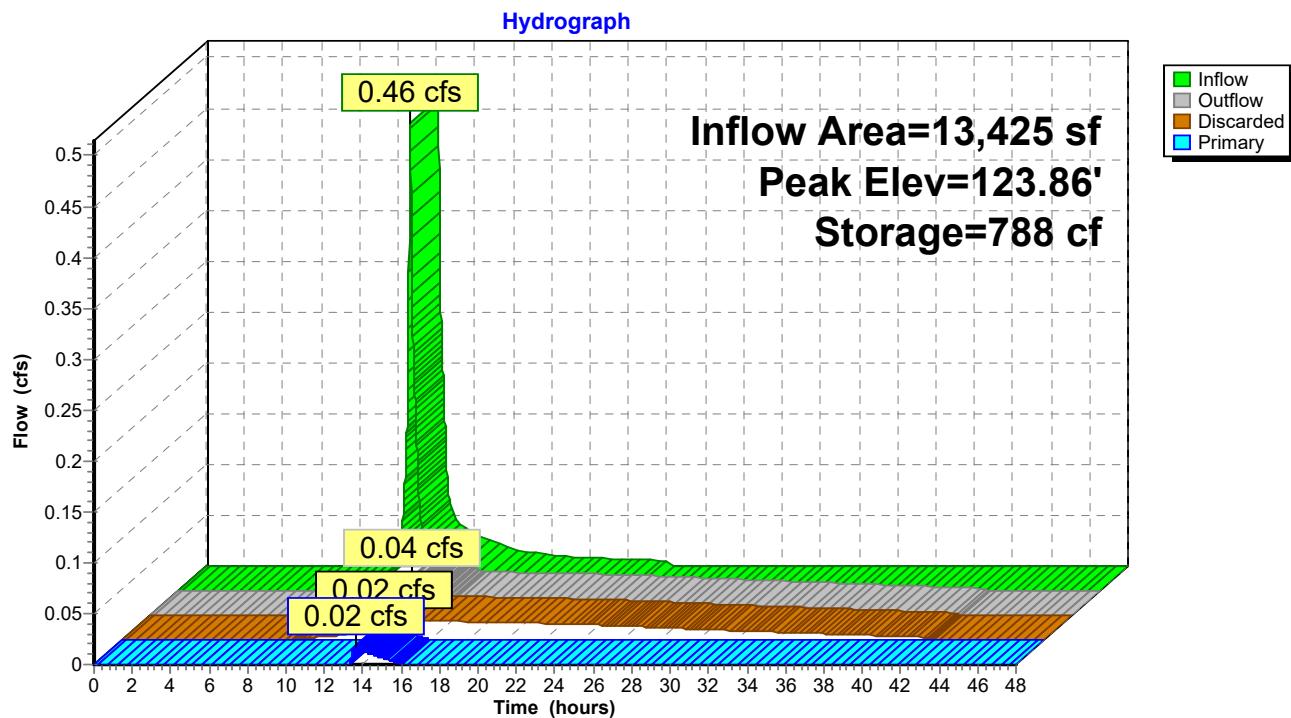
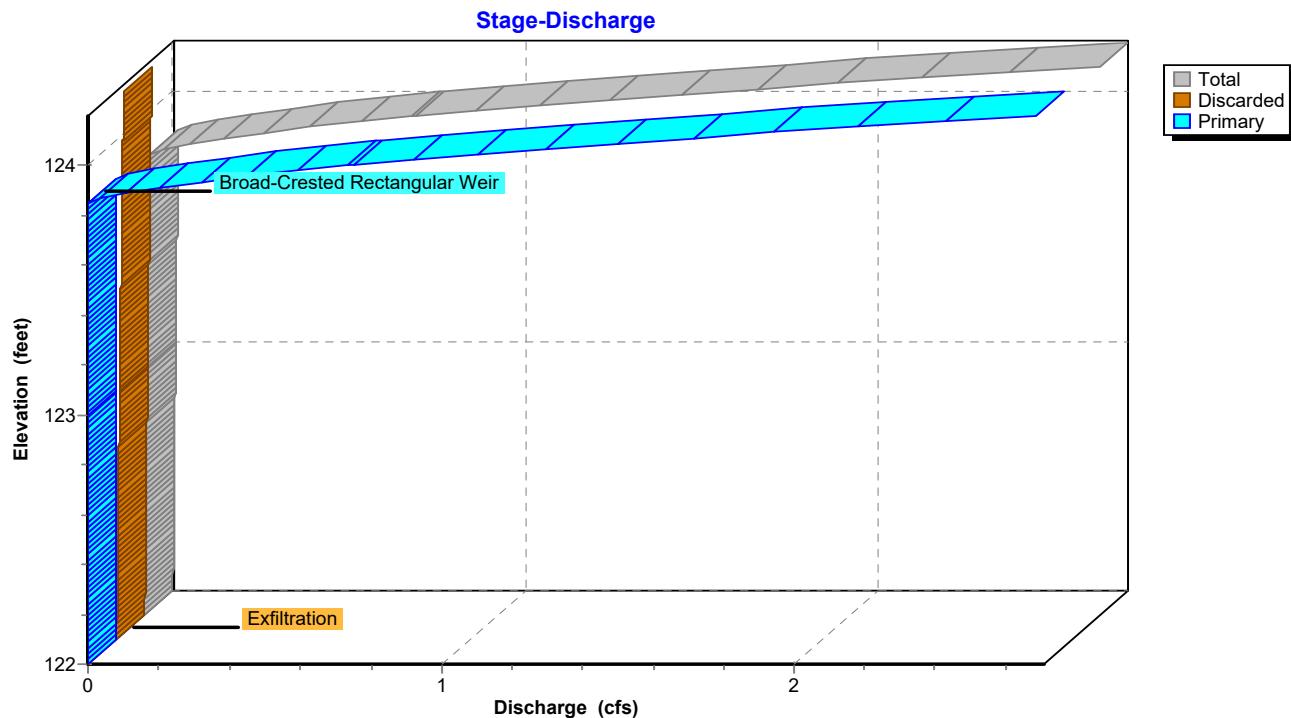
Plug-Flow detention time= 515.5 min calculated for 1,426 cf (100% of inflow)  
 Center-of-Mass det. time= 515.6 min ( 1,351.0 - 835.4 )

Volume	Invert	Avail.Storage	Storage Description
#1	122.00'	1,077 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
122.00	93	0	0
123.00	434	264	264
124.00	839	637	900
124.20	927	177	1,077

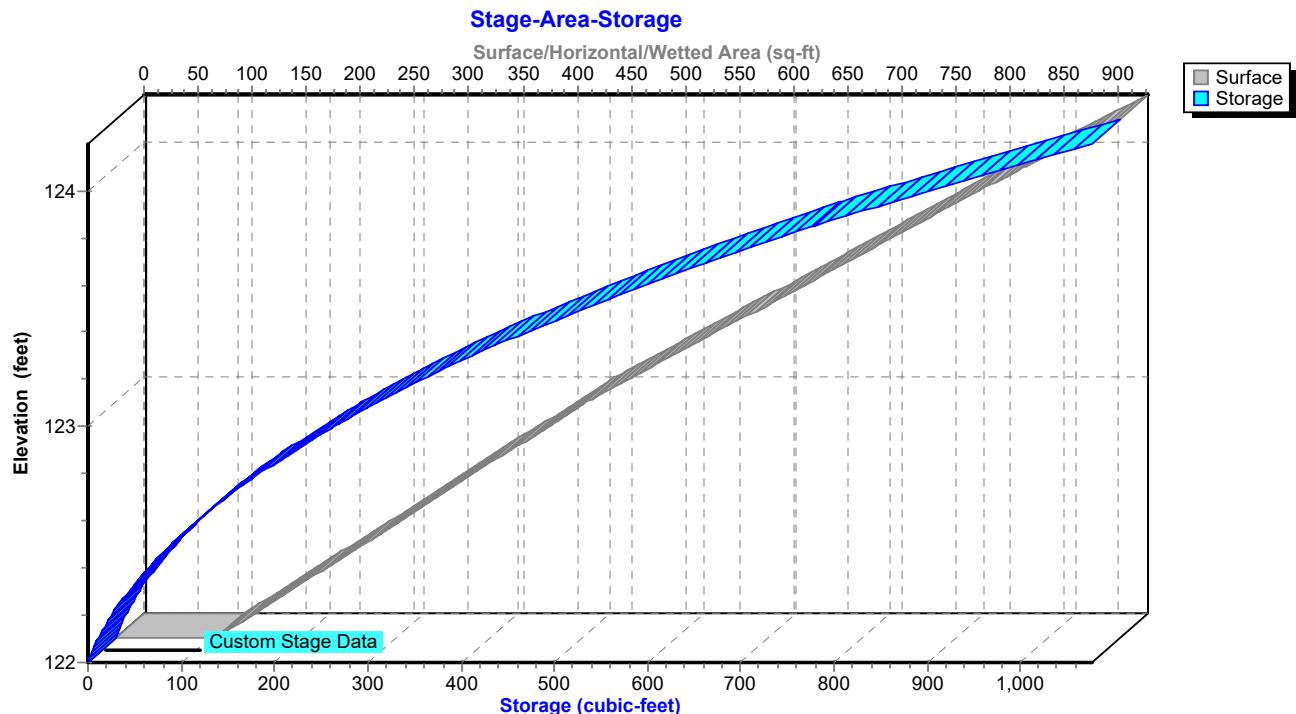
Device	Routing	Invert	Outlet Devices
#1	Discarded	122.00'	<b>1.020 in/hr Exfiltration over Surface area</b> Phase-In= 0.01'
#2	Primary	123.85'	<b>5.0' long x 2.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

**Discarded OutFlow** Max=0.02 cfs @ 13.66 hrs HW=123.86' (Free Discharge)  
 ↑1=Exfiltration (Exfiltration Controls 0.02 cfs)

**Primary OutFlow** Max=0.02 cfs @ 13.66 hrs HW=123.86' TW=0.00' (Dynamic Tailwater)  
 ↑2=Broad-Crested Rectangular Weir (Weir Controls 0.02 cfs @ 0.28 fps)

**Pond IB-1: Infiltration Basin #1****Pond IB-1: Infiltration Basin #1**

### Pond IB-1: Infiltration Basin #1



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**Hydrograph for Pond IB-1: Infiltration Basin #1**

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	122.00	0.00	0.00	0.00
1.00	0.00	0	122.00	0.00	0.00	0.00
2.00	0.00	0	122.00	0.00	0.00	0.00
3.00	0.00	0	122.00	0.00	0.00	0.00
4.00	0.00	0	122.00	0.00	0.00	0.00
5.00	0.00	0	122.00	0.00	0.00	0.00
6.00	0.00	0	122.00	0.00	0.00	0.00
7.00	0.00	0	122.00	0.00	0.00	0.00
8.00	0.00	0	122.00	0.00	0.00	0.00
9.00	0.00	0	122.00	0.00	0.00	0.00
10.00	0.01	4	122.04	0.00	0.00	0.00
11.00	0.01	27	122.21	0.00	0.00	0.00
12.00	<b>0.26</b>	217	122.89	0.01	0.01	0.00
13.00	<b>0.05</b>	<b>751</b>	<b>123.81</b>	<b>0.02</b>	<b>0.02</b>	<b>0.00</b>
14.00	0.03	<b>787</b>	<b>123.86</b>	<b>0.03</b>	<b>0.02</b>	<b>0.01</b>
15.00	0.02	784	123.86	0.02	0.02	0.01
16.00	0.02	779	123.85	0.02	0.02	0.00
17.00	0.01	768	123.84	0.02	0.02	0.00
18.00	0.01	747	123.81	0.02	0.02	0.00
19.00	0.01	718	123.77	0.02	0.02	0.00
20.00	0.01	688	123.73	0.02	0.02	0.00
21.00	0.01	656	123.69	0.02	0.02	0.00
22.00	0.01	623	123.64	0.02	0.02	0.00
23.00	0.01	589	123.59	0.02	0.02	0.00
24.00	0.01	555	123.54	0.02	0.02	0.00
25.00	0.00	503	123.45	0.01	0.01	0.00
26.00	0.00	452	123.37	0.01	0.01	0.00
27.00	0.00	404	123.28	0.01	0.01	0.00
28.00	0.00	358	123.20	0.01	0.01	0.00
29.00	0.00	316	123.11	0.01	0.01	0.00
30.00	0.00	277	123.03	0.01	0.01	0.00
31.00	0.00	240	122.94	0.01	0.01	0.00
32.00	0.00	206	122.86	0.01	0.01	0.00
33.00	0.00	174	122.77	0.01	0.01	0.00
34.00	0.00	145	122.69	0.01	0.01	0.00
35.00	0.00	119	122.60	0.01	0.01	0.00
36.00	0.00	94	122.52	0.01	0.01	0.00
37.00	0.00	73	122.43	0.01	0.01	0.00
38.00	0.00	53	122.35	0.01	0.01	0.00
39.00	0.00	37	122.26	0.00	0.00	0.00
40.00	0.00	22	122.18	0.00	0.00	0.00
41.00	0.00	10	122.09	0.00	0.00	0.00
42.00	0.00	1	122.01	0.00	0.00	0.00
43.00	0.00	0	122.00	0.00	0.00	0.00
44.00	0.00	0	122.00	0.00	0.00	0.00
45.00	0.00	0	122.00	0.00	0.00	0.00
46.00	0.00	0	122.00	0.00	0.00	0.00
47.00	0.00	0	122.00	0.00	0.00	0.00
48.00	0.00	0	122.00	0.00	0.00	0.00

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**Stage-Discharge for Pond IB-1: Infiltration Basin #1**

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
122.00	0.00	0.00	0.00
122.05	0.00	0.00	0.00
122.10	0.00	0.00	0.00
122.15	0.00	0.00	0.00
122.20	0.00	0.00	0.00
122.25	0.00	0.00	0.00
122.30	0.00	0.00	0.00
122.35	0.01	0.01	0.00
122.40	0.01	0.01	0.00
122.45	0.01	0.01	0.00
122.50	0.01	0.01	0.00
122.55	0.01	0.01	0.00
122.60	0.01	0.01	0.00
122.65	0.01	0.01	0.00
122.70	0.01	0.01	0.00
122.75	0.01	0.01	0.00
122.80	0.01	0.01	0.00
122.85	0.01	0.01	0.00
122.90	0.01	0.01	0.00
122.95	0.01	0.01	0.00
123.00	0.01	0.01	0.00
123.05	0.01	0.01	0.00
123.10	0.01	0.01	0.00
123.15	0.01	0.01	0.00
123.20	0.01	0.01	0.00
123.25	0.01	0.01	0.00
123.30	0.01	0.01	0.00
123.35	0.01	0.01	0.00
123.40	0.01	0.01	0.00
123.45	0.01	0.01	0.00
123.50	0.02	0.02	0.00
123.55	0.02	0.02	0.00
123.60	0.02	0.02	0.00
123.65	0.02	0.02	0.00
123.70	0.02	0.02	0.00
123.75	0.02	0.02	0.00
123.80	0.02	0.02	0.00
123.85	0.02	0.02	0.00
123.90	0.16	0.02	0.14
123.95	0.42	0.02	0.40
124.00	0.76	0.02	0.74
124.05	1.16	0.02	1.14
124.10	1.62	0.02	1.60
124.15	2.14	0.02	2.12
124.20	<b>2.71</b>	<b>0.02</b>	<b>2.68</b>

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**Stage-Area-Storage for Pond IB-1: Infiltration Basin #1**

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
122.00	93	0
122.05	110	5
122.10	127	11
122.15	144	18
122.20	161	25
122.25	178	34
122.30	195	43
122.35	212	53
122.40	229	64
122.45	246	76
122.50	264	89
122.55	281	103
122.60	298	117
122.65	315	132
122.70	332	149
122.75	349	166
122.80	366	184
122.85	383	202
122.90	400	222
122.95	417	242
123.00	434	264
123.05	454	286
123.10	474	309
123.15	495	333
123.20	515	358
123.25	535	385
123.30	555	412
123.35	576	440
123.40	596	470
123.45	616	500
123.50	637	531
123.55	657	563
123.60	677	597
123.65	697	631
123.70	718	667
123.75	738	703
123.80	758	740
123.85	778	779
123.90	799	818
123.95	819	859
124.00	839	900
124.05	861	942
124.10	883	986
124.15	905	1,031
124.20	927	1,077

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**Summary for Pond IB-2: Infiltration Basin #2**

Inflow Area = 33,268 sf, 68.13% Impervious, Inflow Depth = 1.34" for 1-YR event  
 Inflow = 1.20 cfs @ 12.09 hrs, Volume= 3,721 cf  
 Outflow = 0.08 cfs @ 13.86 hrs, Volume= 3,721 cf, Atten= 93%, Lag= 106.2 min  
 Discarded = 0.05 cfs @ 13.86 hrs, Volume= 3,523 cf  
 Primary = 0.04 cfs @ 13.86 hrs, Volume= 198 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3  
 Peak Elev= 123.52' @ 13.86 hrs Surf.Area= 2,042 sf Storage= 2,039 cf

Plug-Flow detention time= 484.5 min calculated for 3,720 cf (100% of inflow)  
 Center-of-Mass det. time= 484.6 min ( 1,316.1 - 831.5 )

Volume	Invert	Avail.Storage	Storage Description	
#1	122.00'	3,647 cf	<b>Custom Stage Data (Prismatic)</b>	Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	
122.00	672	0	0	
123.00	1,538	1,105	1,105	
124.00	2,504	2,021	3,126	
124.20	2,704	521	3,647	
Device	Routing	Invert	Outlet Devices	
#1	Discarded	122.00'	<b>1.020 in/hr Exfiltration over Surface area</b>	Phase-In= 0.01'
#2	Device 3	123.50'	<b>4.0' long x 0.5' breadth Broad-Crested Rectangular Weir</b>	
			Head (feet) 0.20 0.40 0.60 0.80 1.00	
			Coef. (English) 2.80 2.92 3.08 3.30 3.32	
#3	Primary	121.90'	<b>18.0" Round Culvert</b>	
			L= 20.0' CPP, square edge headwall, Ke= 0.500	
			Inlet / Outlet Invert= 121.90' / 121.70' S= 0.0100 '/' Cc= 0.900	
			n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf	

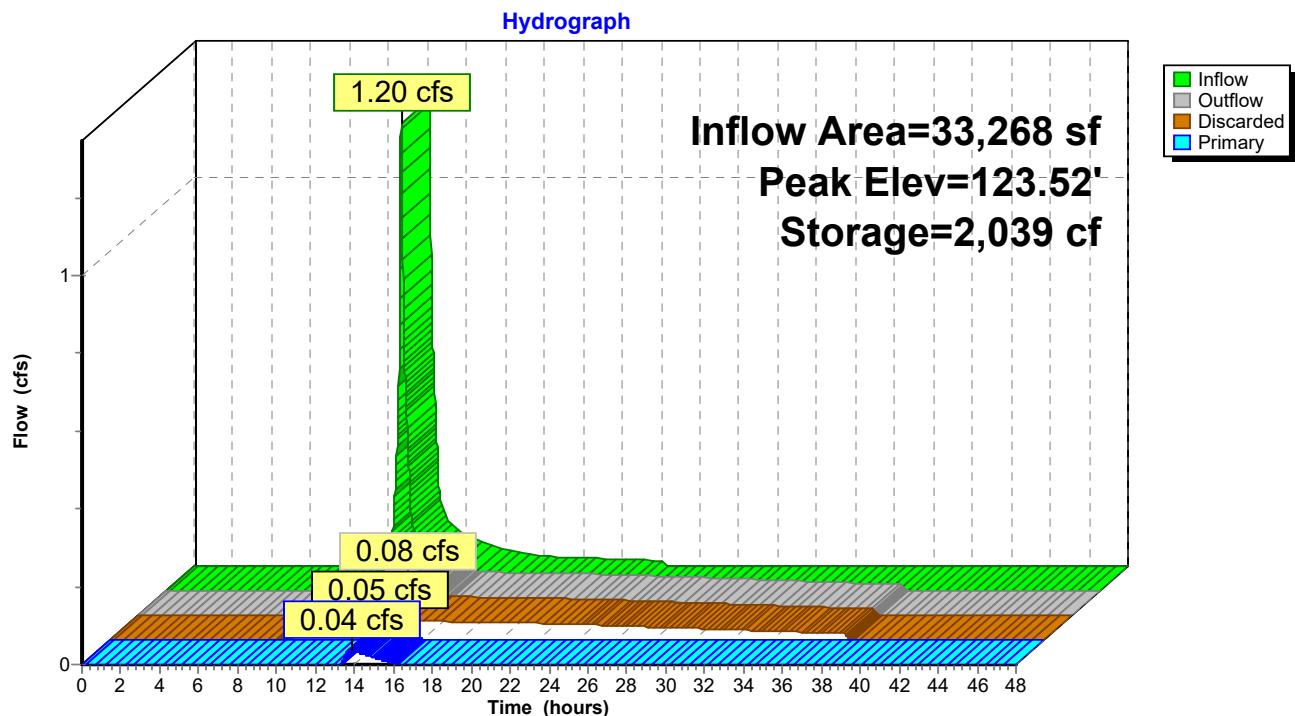
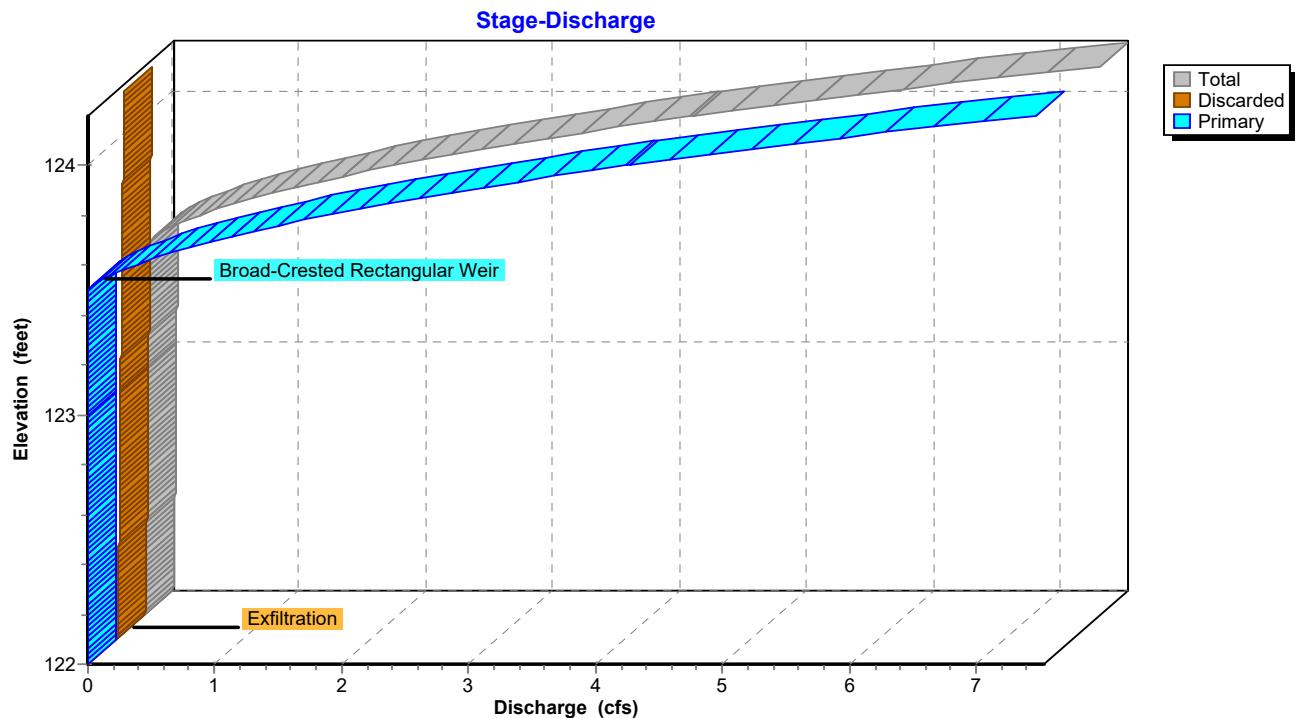
**Discarded OutFlow** Max=0.05 cfs @ 13.86 hrs HW=123.52' (Free Discharge)

↑ 1=Exfiltration (Exfiltration Controls 0.05 cfs)

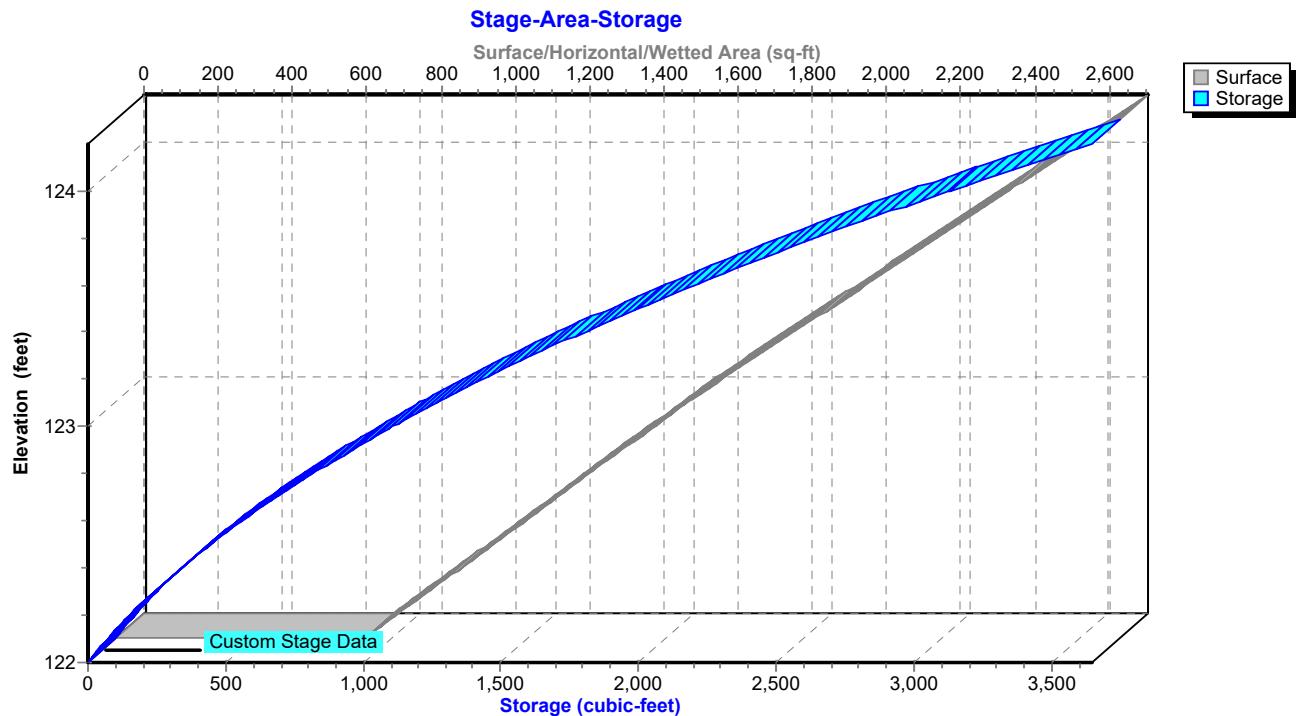
**Primary OutFlow** Max=0.04 cfs @ 13.86 hrs HW=123.52' TW=0.00' (Dynamic Tailwater)

↑ 3=Culvert (Passes 0.04 cfs of 7.27 cfs potential flow)

↑ 2=Broad-Crested Rectangular Weir (Weir Controls 0.04 cfs @ 0.42 fps)

**Pond IB-2: Infiltration Basin #2****Pond IB-2: Infiltration Basin #2**

### Pond IB-2: Infiltration Basin #2



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**Hydrograph for Pond IB-2: Infiltration Basin #2**

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	122.00	0.00	0.00	0.00
1.00	0.00	0	122.00	0.00	0.00	0.00
2.00	0.00	0	122.00	0.00	0.00	0.00
3.00	0.00	0	122.00	0.00	0.00	0.00
4.00	0.00	0	122.00	0.00	0.00	0.00
5.00	0.00	0	122.00	0.00	0.00	0.00
6.00	0.00	0	122.00	0.00	0.00	0.00
7.00	0.00	0	122.00	0.00	0.00	0.00
8.00	0.00	0	122.00	0.00	0.00	0.00
9.00	0.00	1	122.00	0.00	0.00	0.00
10.00	0.02	6	122.01	0.01	0.01	0.00
11.00	0.04	48	122.07	0.02	0.02	0.00
12.00	<b>0.68</b>	544	122.59	0.03	0.03	0.00
13.00	<b>0.12</b>	<b>1,925</b>	<b>123.47</b>	<b>0.05</b>	<b>0.05</b>	<b>0.00</b>
14.00	0.08	<b>2,038</b>	<b>123.52</b>	<b>0.08</b>	<b>0.05</b>	<b>0.04</b>
15.00	0.06	2,022	123.51	0.07	0.05	0.02
16.00	0.04	2,003	123.50	0.05	0.05	0.00
17.00	0.03	1,970	123.49	0.05	0.05	0.00
18.00	0.03	1,911	123.46	0.05	0.05	0.00
19.00	0.02	1,835	123.42	0.05	0.05	0.00
20.00	0.02	1,754	123.38	0.04	0.04	0.00
21.00	0.02	1,669	123.33	0.04	0.04	0.00
22.00	0.02	1,581	123.28	0.04	0.04	0.00
23.00	0.02	1,490	123.23	0.04	0.04	0.00
24.00	0.01	1,398	123.18	0.04	0.04	0.00
25.00	0.00	1,260	123.10	0.04	0.04	0.00
26.00	0.00	1,125	123.01	0.04	0.04	0.00
27.00	0.00	996	122.93	0.03	0.03	0.00
28.00	0.00	874	122.84	0.03	0.03	0.00
29.00	0.00	758	122.76	0.03	0.03	0.00
30.00	0.00	648	122.67	0.03	0.03	0.00
31.00	0.00	545	122.59	0.03	0.03	0.00
32.00	0.00	447	122.50	0.03	0.03	0.00
33.00	0.00	356	122.42	0.02	0.02	0.00
34.00	0.00	272	122.33	0.02	0.02	0.00
35.00	0.00	193	122.25	0.02	0.02	0.00
36.00	0.00	121	122.16	0.02	0.02	0.00
37.00	0.00	55	122.08	0.02	0.02	0.00
38.00	0.00	1	122.00	0.00	0.00	0.00
39.00	0.00	0	122.00	0.00	0.00	0.00
40.00	0.00	0	122.00	0.00	0.00	0.00
41.00	0.00	0	122.00	0.00	0.00	0.00
42.00	0.00	0	122.00	0.00	0.00	0.00
43.00	0.00	0	122.00	0.00	0.00	0.00
44.00	0.00	0	122.00	0.00	0.00	0.00
45.00	0.00	0	122.00	0.00	0.00	0.00
46.00	0.00	0	122.00	0.00	0.00	0.00
47.00	0.00	0	122.00	0.00	0.00	0.00
48.00	0.00	0	122.00	0.00	0.00	0.00

**Stage-Discharge for Pond IB-2: Infiltration Basin #2**

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
122.00	0.00	0.00	0.00
122.05	0.02	0.02	0.00
122.10	0.02	0.02	0.00
122.15	0.02	0.02	0.00
122.20	0.02	0.02	0.00
122.25	0.02	0.02	0.00
122.30	0.02	0.02	0.00
122.35	0.02	0.02	0.00
122.40	0.02	0.02	0.00
122.45	0.03	0.03	0.00
122.50	0.03	0.03	0.00
122.55	0.03	0.03	0.00
122.60	0.03	0.03	0.00
122.65	0.03	0.03	0.00
122.70	0.03	0.03	0.00
122.75	0.03	0.03	0.00
122.80	0.03	0.03	0.00
122.85	0.03	0.03	0.00
122.90	0.03	0.03	0.00
122.95	0.04	0.04	0.00
123.00	0.04	0.04	0.00
123.05	0.04	0.04	0.00
123.10	0.04	0.04	0.00
123.15	0.04	0.04	0.00
123.20	0.04	0.04	0.00
123.25	0.04	0.04	0.00
123.30	0.04	0.04	0.00
123.35	0.04	0.04	0.00
123.40	0.05	0.05	0.00
123.45	0.05	0.05	0.00
123.50	0.05	0.05	0.00
123.55	0.17	0.05	0.13
123.60	0.40	0.05	0.35
123.65	0.70	0.05	0.65
123.70	1.05	0.05	1.00
123.75	1.47	0.05	1.41
123.80	1.93	0.05	1.88
123.85	2.45	0.06	2.39
123.90	3.01	0.06	2.95
123.95	3.63	0.06	3.57
124.00	4.30	0.06	4.24
124.05	5.02	0.06	4.96
124.10	5.79	0.06	5.73
124.15	6.63	0.06	6.57
124.20	<b>7.54</b>	<b>0.06</b>	<b>7.47</b>

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**Stage-Area-Storage for Pond IB-2: Infiltration Basin #2**

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
122.00	672	0
122.05	715	35
122.10	759	72
122.15	802	111
122.20	845	152
122.25	889	195
122.30	932	241
122.35	975	288
122.40	1,018	338
122.45	1,062	390
122.50	1,105	444
122.55	1,148	501
122.60	1,192	559
122.65	1,235	620
122.70	1,278	683
122.75	1,322	748
122.80	1,365	815
122.85	1,408	884
122.90	1,451	956
122.95	1,495	1,029
123.00	1,538	1,105
123.05	1,586	1,183
123.10	1,635	1,264
123.15	1,683	1,347
123.20	1,731	1,432
123.25	1,780	1,520
123.30	1,828	1,610
123.35	1,876	1,702
123.40	1,924	1,797
123.45	1,973	1,895
123.50	2,021	1,995
123.55	2,069	2,097
123.60	2,118	2,202
123.65	2,166	2,309
123.70	2,214	2,418
123.75	2,263	2,530
123.80	2,311	2,645
123.85	2,359	2,761
123.90	2,407	2,880
123.95	2,456	3,002
124.00	2,504	3,126
124.05	2,554	3,252
124.10	2,604	3,381
124.15	2,654	3,513
124.20	<b>2,704</b>	<b>3,647</b>

**Summary for Pond UG-1: Underground Detention System #1**

Inflow Area = 13,403 sf, 58.36% Impervious, Inflow Depth = 1.09" for 1-YR event  
 Inflow = 0.39 cfs @ 12.09 hrs, Volume= 1,214 cf  
 Outflow = 0.28 cfs @ 12.15 hrs, Volume= 1,212 cf, Atten= 27%, Lag= 3.6 min  
 Primary = 0.28 cfs @ 12.15 hrs, Volume= 1,212 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3  
 Peak Elev= 122.68' @ 12.17 hrs Surf.Area= 820 sf Storage= 170 cf

Plug-Flow detention time= 64.8 min calculated for 1,212 cf (100% of inflow)  
 Center-of-Mass det. time= 64.3 min ( 910.7 - 846.4 )

Volume	Invert	Avail.Storage	Storage Description
#1A	122.40'	156 cf	<b>10.00'W x 82.00'L x 2.17'H Field A</b> 1,777 cf Overall - 1,387 cf Embedded = 390 cf x 40.0% Voids
#2A	122.40'	792 cf	<b>retain_it retain_it 1.5' x 10 Inside #1</b> Inside= 84.0"W x 18.0"H => 9.90 sf x 8.00'L = 79.2 cf Outside= 96.0"W x 26.0"H => 17.33 sf x 8.00'L = 138.7 cf
948 cf			Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	122.40'	<b>15.0" Round Culvert</b> L= 140.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 122.40' / 121.50' S= 0.0064 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.23 sf

**Primary OutFlow** Max=0.28 cfs @ 12.15 hrs HW=122.68' TW=121.97' (Dynamic Tailwater)  
 ↑1=Culvert (Outlet Controls 0.28 cfs @ 2.05 fps)

**Pond UG-1: Underground Detention System #1 - Chamber Wizard Field A****Chamber Model = retain\_it retain\_it 1.5' (retain-it®)**

Inside= 84.0"W x 18.0"H =&gt; 9.90 sf x 8.00'L = 79.2 cf

Outside= 96.0"W x 26.0"H =&gt; 17.33 sf x 8.00'L = 138.7 cf

10 Chambers/Row x 8.00' Long = 80.00' Row Length +12.0" End Stone x 2 = 82.00' Base Length

1 Rows x 96.0" Wide + 12.0" Side Stone x 2 = 10.00' Base Width

26.0" Chamber Height = 2.17' Field Height

10 Chambers x 79.2 cf = 791.7 cf Chamber Storage

10 Chambers x 138.7 cf = 1,386.7 cf Displacement

1,776.7 cf Field - 1,386.7 cf Chambers = 390.0 cf Stone x 40.0% Voids = 156.0 cf Stone Storage

Chamber Storage + Stone Storage = 947.7 cf = 0.022 af

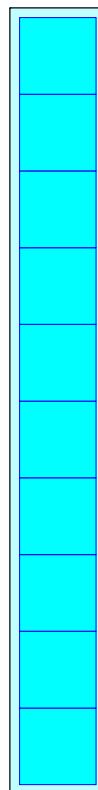
Overall Storage Efficiency = 53.3%

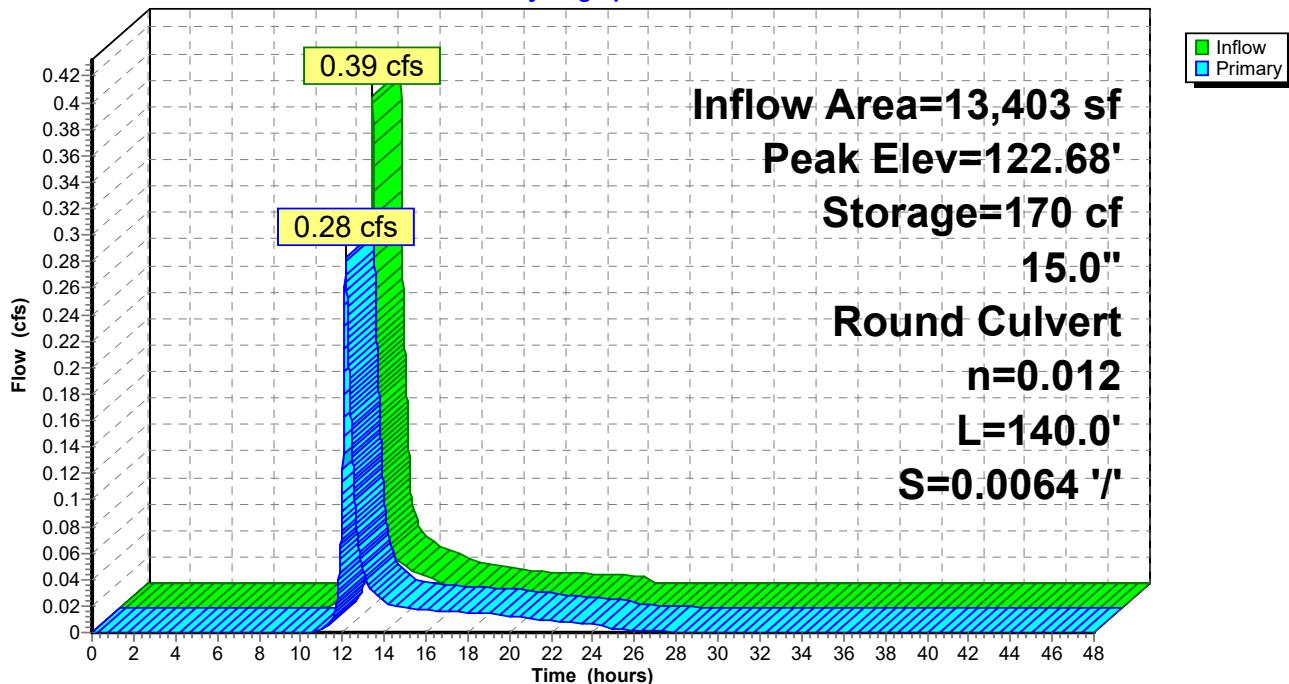
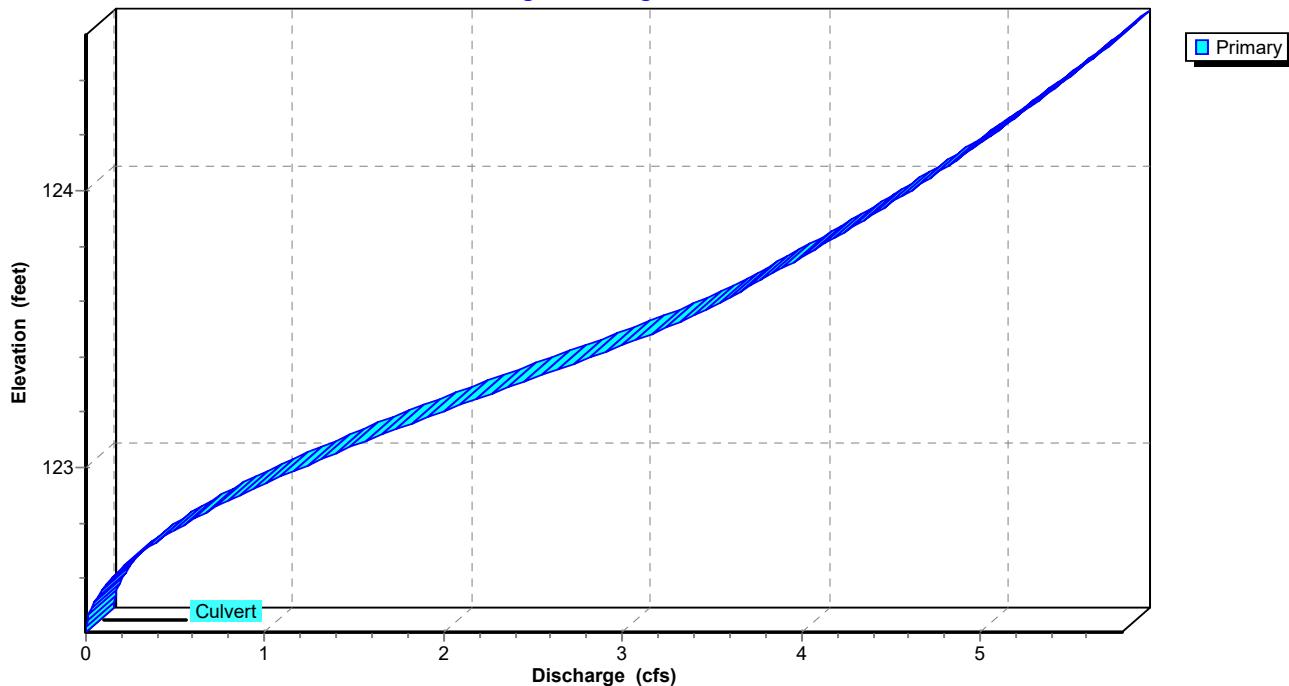
Overall System Size = 82.00' x 10.00' x 2.17'

10 Chambers

65.8 cy Field

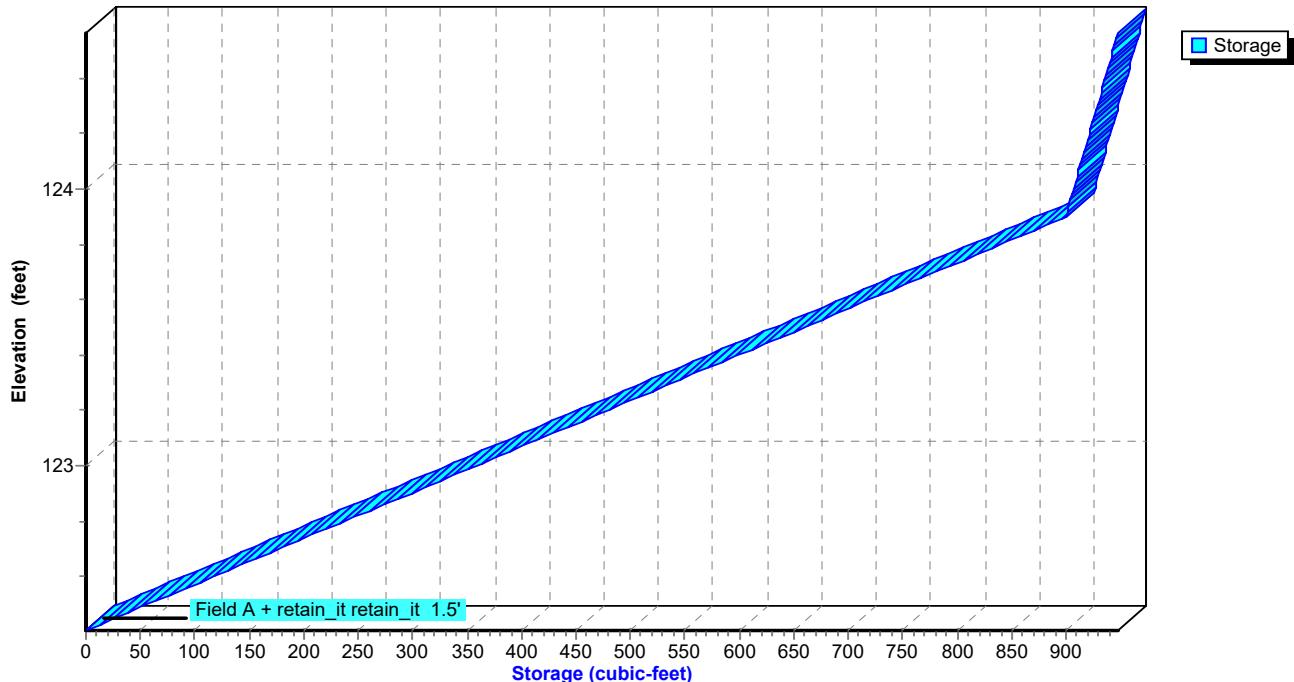
14.4 cy Stone



**Pond UG-1: Underground Detention System #1****Hydrograph****Pond UG-1: Underground Detention System #1****Stage-Discharge**

### Pond UG-1: Underground Detention System #1

Stage-Area-Storage



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**Hydrograph for Pond UG-1: Underground Detention System #1**

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0	122.40	0.00
1.00	0.00	0	122.40	0.00
2.00	0.00	0	122.40	0.00
3.00	0.00	0	122.40	0.00
4.00	0.00	0	122.40	0.00
5.00	0.00	0	122.40	0.00
6.00	0.00	0	122.40	0.00
7.00	0.00	0	122.40	0.00
8.00	0.00	0	122.40	0.00
9.00	0.00	0	122.40	0.00
10.00	0.00	1	122.40	0.00
11.00	0.01	16	122.43	0.00
12.00	<b>0.21</b>	<b>99</b>	<b>122.57</b>	<b>0.11</b>
13.00	<b>0.04</b>	<b>112</b>	<b>122.59</b>	<b>0.05</b>
14.00	0.03	120	122.60	0.02
15.00	0.02	136	122.63	0.02
16.00	0.02	139	122.63	0.02
17.00	0.01	129	122.62	0.02
18.00	0.01	113	122.59	0.02
19.00	0.01	94	122.56	0.01
20.00	0.01	76	122.53	0.01
21.00	0.01	61	122.50	0.01
22.00	0.01	50	122.48	0.01
23.00	0.01	42	122.47	0.01
24.00	0.01	37	122.46	0.01
25.00	0.00	22	122.44	0.00
26.00	0.00	15	122.43	0.00
27.00	0.00	12	122.42	0.00
28.00	0.00	9	122.42	0.00
29.00	0.00	7	122.41	0.00
30.00	0.00	6	122.41	0.00
31.00	0.00	5	122.41	0.00
32.00	0.00	5	122.41	0.00
33.00	0.00	4	122.41	0.00
34.00	0.00	4	122.41	0.00
35.00	0.00	3	122.41	0.00
36.00	0.00	3	122.41	0.00
37.00	0.00	3	122.40	0.00
38.00	0.00	3	122.40	0.00
39.00	0.00	3	122.40	0.00
40.00	0.00	2	122.40	0.00
41.00	0.00	2	122.40	0.00
42.00	0.00	2	122.40	0.00
43.00	0.00	2	122.40	0.00
44.00	0.00	2	122.40	0.00
45.00	0.00	2	122.40	0.00
46.00	0.00	2	122.40	0.00
47.00	0.00	2	122.40	0.00
48.00	0.00	2	122.40	0.00

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**Stage-Discharge for Pond UG-1: Underground Detention System #1**

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
122.40	0.00	123.46	3.07	124.52	5.70
122.42	0.00	123.48	3.15	124.54	5.74
122.44	0.01	123.50	3.22	124.56	<b>5.78</b>
122.46	0.01	123.52	3.30		
122.48	0.02	123.54	3.37		
122.50	0.04	123.56	3.44		
122.52	0.06	123.58	3.50		
122.54	0.08	123.60	3.56		
122.56	0.10	123.62	3.62		
122.58	0.12	123.64	3.67		
122.60	0.15	123.66	3.72		
122.62	0.18	123.68	3.78		
122.64	0.22	123.70	3.83		
122.66	0.25	123.72	3.89		
122.68	0.29	123.74	3.94		
122.70	0.33	123.76	4.00		
122.72	0.38	123.78	4.05		
122.74	0.42	123.80	4.11		
122.76	0.47	123.82	4.16		
122.78	0.52	123.84	4.21		
122.80	0.58	123.86	4.26		
122.82	0.63	123.88	4.31		
122.84	0.69	123.90	4.36		
122.86	0.75	123.92	4.41		
122.88	0.81	123.94	4.46		
122.90	0.87	123.96	4.51		
122.92	0.94	123.98	4.56		
122.94	1.00	124.00	4.61		
122.96	1.07	124.02	4.65		
122.98	1.14	124.04	4.70		
123.00	1.21	124.06	4.75		
123.02	1.29	124.08	4.79		
123.04	1.36	124.10	4.84		
123.06	1.44	124.12	4.88		
123.08	1.51	124.14	4.93		
123.10	1.59	124.16	4.97		
123.12	1.67	124.18	5.01		
123.14	1.75	124.20	5.06		
123.16	1.83	124.22	5.10		
123.18	1.91	124.24	5.14		
123.20	1.99	124.26	5.18		
123.22	2.08	124.28	5.23		
123.24	2.16	124.30	5.27		
123.26	2.24	124.32	5.31		
123.28	2.33	124.34	5.35		
123.30	2.41	124.36	5.39		
123.32	2.50	124.38	5.43		
123.34	2.58	124.40	5.47		
123.36	2.66	124.42	5.51		
123.38	2.75	124.44	5.55		
123.40	2.83	124.46	5.59		
123.42	2.91	124.48	5.63		
123.44	2.99	124.50	5.67		

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**Stage-Area-Storage for Pond UG-1: Underground Detention System #1**

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
122.40	0	123.46	636	124.52	944
122.42	12	123.48	648	124.54	946
122.44	24	123.50	660	124.56	<b>947</b>
122.46	36	123.52	672		
122.48	48	123.54	684		
122.50	60	123.56	696		
122.52	72	123.58	708		
122.54	84	123.60	720		
122.56	96	123.62	732		
122.58	108	123.64	744		
122.60	120	123.66	756		
122.62	132	123.68	768		
122.64	144	123.70	780		
122.66	156	123.72	792		
122.68	168	123.74	804		
122.70	180	123.76	816		
122.72	192	123.78	828		
122.74	204	123.80	840		
122.76	216	123.82	852		
122.78	228	123.84	864		
122.80	240	123.86	876		
122.82	252	123.88	888		
122.84	264	123.90	900		
122.86	276	123.92	901		
122.88	288	123.94	903		
122.90	300	123.96	904		
122.92	312	123.98	905		
122.94	324	124.00	907		
122.96	336	124.02	908		
122.98	348	124.04	910		
123.00	360	124.06	911		
123.02	372	124.08	913		
123.04	384	124.10	914		
123.06	396	124.12	916		
123.08	408	124.14	917		
123.10	420	124.16	918		
123.12	432	124.18	920		
123.14	444	124.20	921		
123.16	456	124.22	923		
123.18	468	124.24	924		
123.20	480	124.26	926		
123.22	492	124.28	927		
123.24	504	124.30	929		
123.26	516	124.32	930		
123.28	528	124.34	931		
123.30	540	124.36	933		
123.32	552	124.38	934		
123.34	564	124.40	936		
123.36	576	124.42	937		
123.38	588	124.44	939		
123.40	600	124.46	940		
123.42	612	124.48	941		
123.44	624	124.50	943		

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**Summary for Pond UG-2: Underground Infiltration System #1**

Inflow Area = 42,604 sf, 63.97% Impervious, Inflow Depth = 1.26" for 1-YR event  
 Inflow = 1.29 cfs @ 12.10 hrs, Volume= 4,478 cf  
 Outflow = 0.06 cfs @ 11.67 hrs, Volume= 4,478 cf, Atten= 95%, Lag= 0.0 min  
 Discarded = 0.06 cfs @ 11.67 hrs, Volume= 4,478 cf  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3  
 Peak Elev= 122.63' @ 15.72 hrs Surf.Area= 2,548 sf Storage= 2,315 cf

Plug-Flow detention time= 401.1 min calculated for 4,478 cf (100% of inflow)  
 Center-of-Mass det. time= 401.1 min ( 1,254.1 - 853.0 )

Volume	Invert	Avail.Storage	Storage Description
#1A	121.50'	260 cf	<b>26.00'W x 98.00'L x 2.67'H Field A</b> 6,795 cf Overall - 6,144 cf Embedded = 651 cf x 40.0% Voids
#2A	121.50'	3,913 cf	<b>retain_it retain_it 2.0' x 36 Inside #1</b> Inside= 84.0"W x 24.0"H => 13.78 sf x 8.00'L = 110.3 cf Outside= 96.0"W x 32.0"H => 21.33 sf x 8.00'L = 170.7 cf 3 Rows adjusted for 56.7 cf perimeter wall
4,174 cf			Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	121.50'	<b>1.020 in/hr Exfiltration over Surface area</b> Phase-In= 0.01'
#2	Device 3	121.50'	<b>18.0" Round Culvert</b> L= 30.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 121.50' / 121.50' S= 0.0000 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf
#3	Device 4	122.65'	<b>4.0' long Sharp-Crested Rectangular Weir</b> 2 End Contraction(s)
#4	Primary	122.02'	<b>15.0" Round Culvert</b> L= 60.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 122.02' / 121.70' S= 0.0053 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.23 sf

**Discarded OutFlow** Max=0.06 cfs @ 11.67 hrs HW=121.53' (Free Discharge)  
 ↑ 1=Exfiltration (Exfiltration Controls 0.06 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=121.50' TW=0.00' (Dynamic Tailwater)  
 ↑ 4=Culvert (Controls 0.00 cfs)  
 ↑ 3=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)  
 ↑ 2=Culvert (Controls 0.00 cfs)

**Pond UG-2: Underground Infiltration System #1 - Chamber Wizard Field A****Chamber Model = retain\_it retain\_it 2.0' (retain-it®)**

Inside= 84.0"W x 24.0"H =&gt; 13.78 sf x 8.00'L = 110.3 cf

Outside= 96.0"W x 32.0"H =&gt; 21.33 sf x 8.00'L = 170.7 cf

3 Rows adjusted for 56.7 cf perimeter wall

12 Chambers/Row x 8.00' Long = 96.00' Row Length +12.0" End Stone x 2 = 98.00' Base Length

3 Rows x 96.0" Wide + 12.0" Side Stone x 2 = 26.00' Base Width

32.0" Chamber Height = 2.67' Field Height

1.9 cf Sidewall x 12 x 2 + 1.9 cf Endwall x 3 x 2 = 56.7 cf Perimeter Wall

36 Chambers x 110.3 cf - 56.7 cf Perimeter wall = 3,913.4 cf Chamber Storage

36 Chambers x 170.7 cf = 6,144.0 cf Displacement

6,794.7 cf Field - 6,144.0 cf Chambers = 650.7 cf Stone x 40.0% Voids = 260.3 cf Stone Storage

Chamber Storage + Stone Storage = 4,173.6 cf = 0.096 af

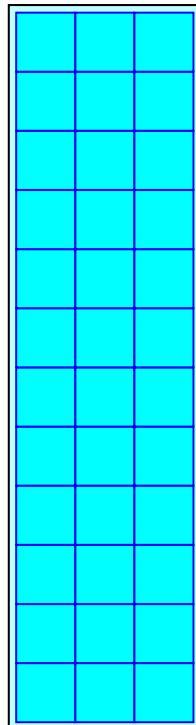
Overall Storage Efficiency = 61.4%

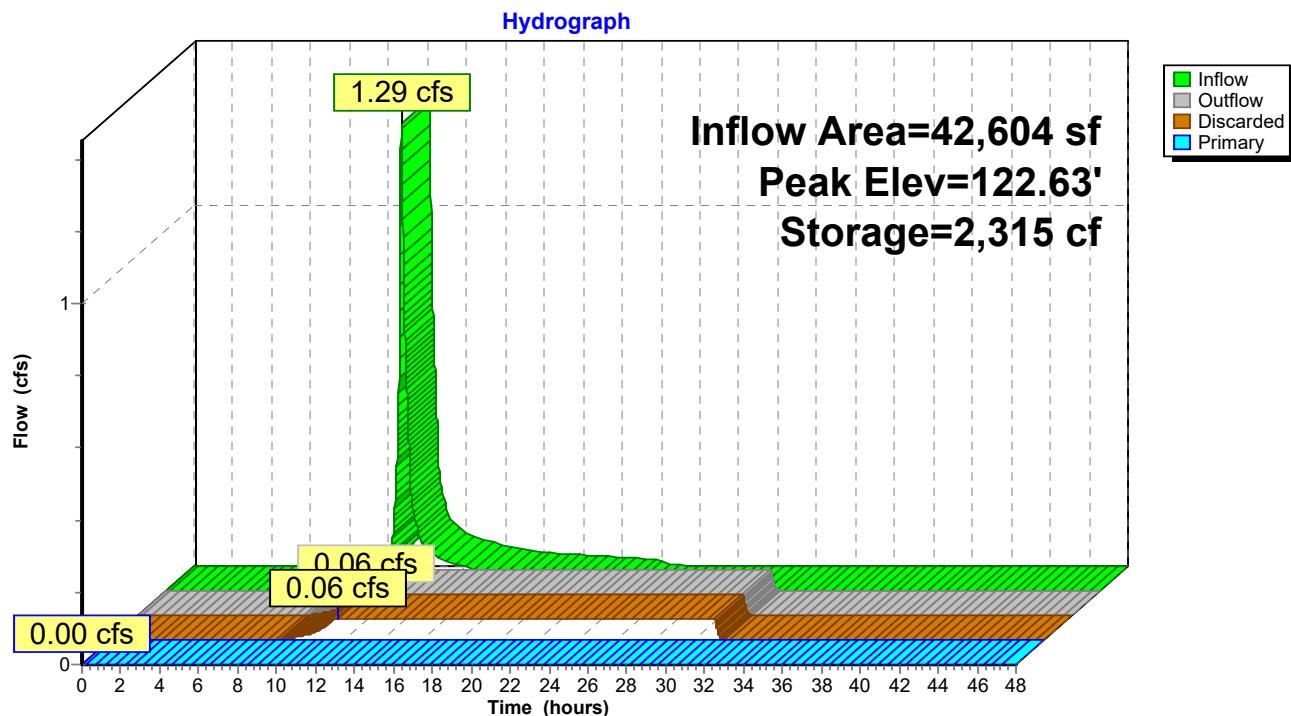
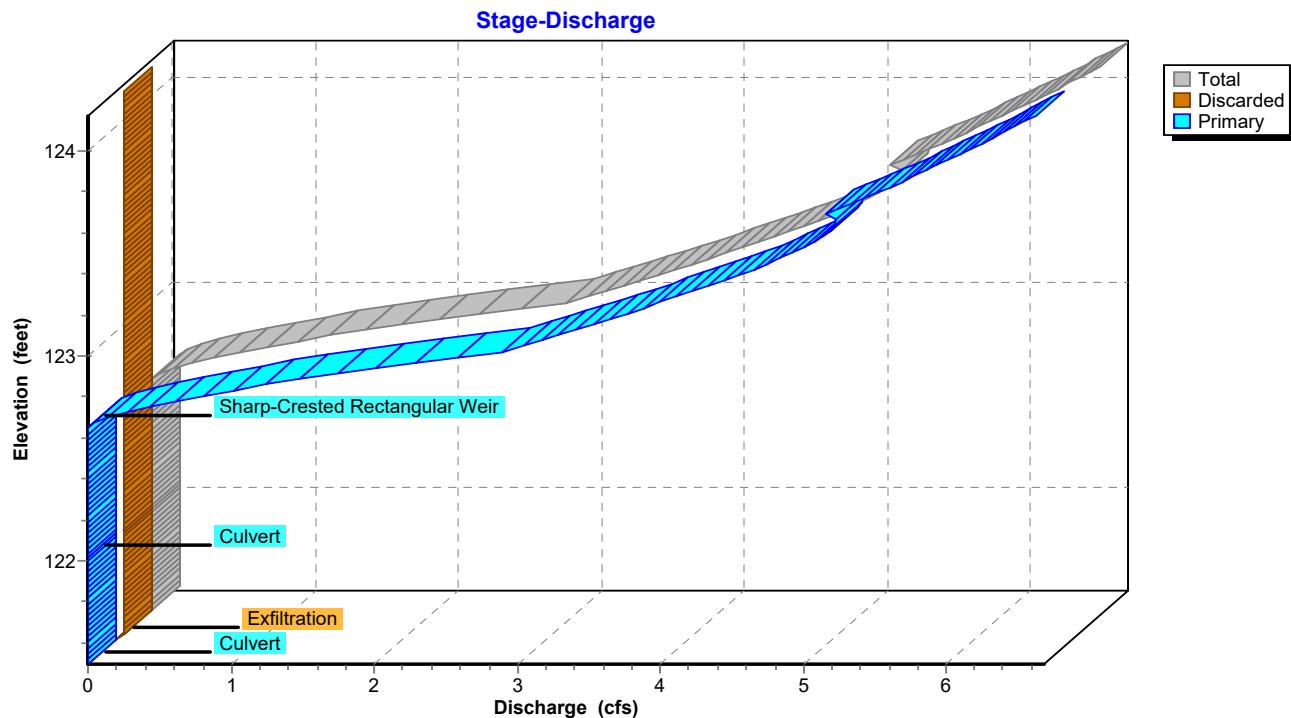
Overall System Size = 98.00' x 26.00' x 2.67'

36 Chambers

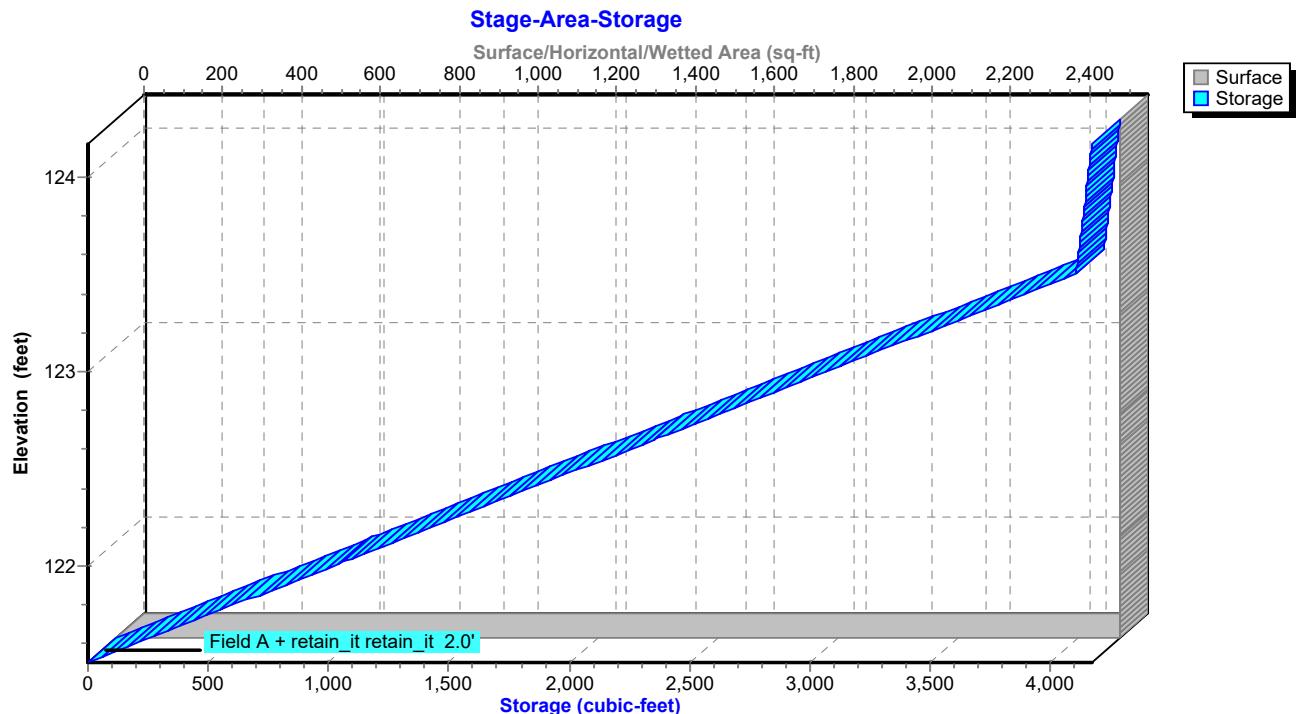
251.7 cy Field

24.1 cy Stone



**Pond UG-2: Underground Infiltration System #1****Pond UG-2: Underground Infiltration System #1**

### Pond UG-2: Underground Infiltration System #1



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**Hydrograph for Pond UG-2: Underground Infiltration System #1**

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	121.50	0.00	0.00	<b>0.00</b>
1.00	0.00	0	121.50	0.00	0.00	0.00
2.00	0.00	0	121.50	0.00	0.00	0.00
3.00	0.00	0	121.50	0.00	0.00	0.00
4.00	0.00	0	121.50	0.00	0.00	0.00
5.00	0.00	0	121.50	0.00	0.00	0.00
6.00	0.00	0	121.50	0.00	0.00	0.00
7.00	0.00	0	121.50	0.00	0.00	0.00
8.00	0.00	0	121.50	0.00	0.00	0.00
9.00	0.00	1	121.50	0.00	0.00	0.00
10.00	0.01	4	121.50	0.01	0.01	0.00
11.00	0.04	12	121.51	<b>0.04</b>	<b>0.04</b>	0.00
12.00	<b>0.70</b>	390	121.69	<b>0.06</b>	<b>0.06</b>	0.00
13.00	<b>0.16</b>	2,015	122.48	0.06	0.06	0.00
14.00	0.09	2,222	122.58	0.06	0.06	0.00
15.00	0.07	<b>2,299</b>	<b>122.62</b>	0.06	0.06	0.00
16.00	0.06	<b>2,313</b>	<b>122.63</b>	0.06	0.06	0.00
17.00	0.05	2,279	122.61	0.06	0.06	0.00
18.00	0.04	2,216	122.58	0.06	0.06	0.00
19.00	0.04	2,131	122.54	0.06	0.06	0.00
20.00	0.03	2,035	122.49	0.06	0.06	0.00
21.00	0.03	1,925	122.44	0.06	0.06	0.00
22.00	0.02	1,804	122.38	0.06	0.06	0.00
23.00	0.02	1,672	122.31	0.06	0.06	0.00
24.00	0.02	1,529	122.24	0.06	0.06	0.00
25.00	0.00	1,333	122.15	0.06	0.06	0.00
26.00	0.00	1,123	122.05	0.06	0.06	0.00
27.00	0.00	911	121.94	0.06	0.06	0.00
28.00	0.00	696	121.84	0.06	0.06	0.00
29.00	0.00	481	121.73	0.06	0.06	0.00
30.00	0.00	266	121.63	0.06	0.06	0.00
31.00	0.00	50	121.52	0.06	0.06	0.00
32.00	0.00	0	121.50	0.00	0.00	0.00
33.00	0.00	0	121.50	0.00	0.00	0.00
34.00	0.00	0	121.50	0.00	0.00	0.00
35.00	0.00	0	121.50	0.00	0.00	0.00
36.00	0.00	0	121.50	0.00	0.00	0.00
37.00	0.00	0	121.50	0.00	0.00	0.00
38.00	0.00	0	121.50	0.00	0.00	0.00
39.00	0.00	0	121.50	0.00	0.00	0.00
40.00	0.00	0	121.50	0.00	0.00	0.00
41.00	0.00	0	121.50	0.00	0.00	0.00
42.00	0.00	0	121.50	0.00	0.00	0.00
43.00	0.00	0	121.50	0.00	0.00	0.00
44.00	0.00	0	121.50	0.00	0.00	0.00
45.00	0.00	0	121.50	0.00	0.00	0.00
46.00	0.00	0	121.50	0.00	0.00	0.00
47.00	0.00	0	121.50	0.00	0.00	0.00
48.00	0.00	0	121.50	0.00	0.00	0.00

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**Stage-Discharge for Pond UG-2: Underground Infiltration System #1**

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)	Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
121.50	0.00	<b>0.00</b>	0.00	124.15	<b>6.64</b>	0.06	<b>6.57</b>
121.55	0.06	<b>0.06</b>	0.00				
121.60	0.06	0.06	0.00				
121.65	0.06	0.06	0.00				
121.70	0.06	0.06	0.00				
121.75	0.06	0.06	0.00				
121.80	0.06	0.06	0.00				
121.85	0.06	0.06	0.00				
121.90	0.06	0.06	0.00				
121.95	0.06	0.06	0.00				
122.00	0.06	0.06	0.00				
122.05	0.06	0.06	0.00				
122.10	0.06	0.06	0.00				
122.15	0.06	0.06	0.00				
122.20	0.06	0.06	0.00				
122.25	0.06	0.06	0.00				
122.30	0.06	0.06	0.00				
122.35	0.06	0.06	0.00				
122.40	0.06	0.06	0.00				
122.45	0.06	0.06	0.00				
122.50	0.06	0.06	0.00				
122.55	0.06	0.06	0.00				
122.60	0.06	0.06	0.00				
122.65	0.06	0.06	0.00				
122.70	0.21	0.06	0.15				
122.75	0.47	0.06	0.41				
122.80	0.81	0.06	0.75				
122.85	1.22	0.06	1.16				
122.90	1.67	0.06	1.61				
122.95	2.18	0.06	2.12				
123.00	2.72	0.06	2.66				
123.05	3.12	0.06	3.06				
123.10	3.35	0.06	3.29				
123.15	3.57	0.06	3.51				
123.20	3.80	0.06	3.74				
123.25	4.02	0.06	3.96				
123.30	4.23	0.06	4.17				
123.35	4.44	0.06	4.38				
123.40	4.63	0.06	4.57				
123.45	4.81	0.06	4.75				
123.50	4.98	0.06	4.92				
123.55	5.12	0.06	5.06				
123.60	5.23	0.06	5.17				
123.65	5.29	0.06	5.23				
123.70	5.26	0.06	5.20				
123.75	5.43	0.06	5.37				
123.80	5.59	0.06	5.53				
123.85	5.75	0.06	5.69				
123.90	5.91	0.06	5.85				
123.95	6.06	0.06	6.00				
124.00	6.21	0.06	6.15				
124.05	6.36	0.06	6.30				
124.10	6.50	0.06	6.44				

**Stage-Area-Storage for Pond UG-2: Underground Infiltration System #1**

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
121.50	<b>2,548</b>	0	124.15	2,548	<b>4,172</b>
121.55	2,548	103			
121.60	2,548	205			
121.65	2,548	308			
121.70	2,548	411			
121.75	2,548	514			
121.80	2,548	616			
121.85	2,548	719			
121.90	2,548	822			
121.95	2,548	924			
122.00	2,548	1,027			
122.05	2,548	1,130			
122.10	2,548	1,233			
122.15	2,548	1,335			
122.20	2,548	1,438			
122.25	2,548	1,541			
122.30	2,548	1,643			
122.35	2,548	1,746			
122.40	2,548	1,849			
122.45	2,548	1,952			
122.50	2,548	2,054			
122.55	2,548	2,157			
122.60	2,548	2,260			
122.65	2,548	2,362			
122.70	2,548	2,465			
122.75	2,548	2,568			
122.80	2,548	2,671			
122.85	2,548	2,773			
122.90	2,548	2,876			
122.95	2,548	2,979			
123.00	2,548	3,081			
123.05	2,548	3,184			
123.10	2,548	3,287			
123.15	2,548	3,390			
123.20	2,548	3,492			
123.25	2,548	3,595			
123.30	2,548	3,698			
123.35	2,548	3,800			
123.40	2,548	3,903			
123.45	2,548	4,006			
123.50	2,548	4,109			
123.55	2,548	4,113			
123.60	2,548	4,118			
123.65	2,548	4,123			
123.70	2,548	4,128			
123.75	2,548	4,133			
123.80	2,548	4,138			
123.85	2,548	4,143			
123.90	2,548	4,148			
123.95	2,548	4,152			
124.00	2,548	4,157			
124.05	2,548	4,162			
124.10	2,548	4,167			

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**Summary for Pond UG-3: Underground Infiltration System #2**

Inflow Area = 34,270 sf, 100.00% Impervious, Inflow Depth = 2.39" for 1-YR event  
 Inflow = 1.99 cfs @ 12.08 hrs, Volume= 6,826 cf  
 Outflow = 0.67 cfs @ 12.36 hrs, Volume= 6,826 cf, Atten= 66%, Lag= 16.6 min  
 Discarded = 0.05 cfs @ 8.97 hrs, Volume= 5,247 cf  
 Primary = 0.62 cfs @ 12.36 hrs, Volume= 1,579 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3  
 Peak Elev= 123.38' @ 12.36 hrs Surf.Area= 1,924 sf Storage= 2,906 cf

Plug-Flow detention time= 420.9 min calculated for 6,826 cf (100% of inflow)  
 Center-of-Mass det. time= 420.9 min ( 1,181.7 - 760.8 )

Volume	Invert	Avail.Storage	Storage Description
#1A	121.50'	209 cf	<b>26.00'W x 74.00'L x 2.67'H Field A</b> 5,131 cf Overall - 4,608 cf Embedded = 523 cf x 40.0% Voids
#2A	121.50'	2,932 cf	<b>retain_it retain_it 2.0' x 27 Inside #1</b> Inside= 84.0"W x 24.0"H => 13.78 sf x 8.00'L = 110.3 cf Outside= 96.0"W x 32.0"H => 21.33 sf x 8.00'L = 170.7 cf 3 Rows adjusted for 45.4 cf perimeter wall
3,141 cf			Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	121.50'	<b>1.020 in/hr Exfiltration over Surface area</b> Phase-In= 0.01'
#2	Device 3	121.50'	<b>18.0" Round Culvert</b> L= 70.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 121.50' / 121.50' S= 0.0000 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf
#3	Device 4	123.25'	<b>4.0' long Sharp-Crested Rectangular Weir</b> 2 End Contraction(s)
#4	Primary	122.02'	<b>15.0" Round Culvert</b> L= 60.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 122.02' / 121.70' S= 0.0053 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.23 sf

**Discarded OutFlow** Max=0.05 cfs @ 8.97 hrs HW=121.53' (Free Discharge)  
 ↑ 1=Exfiltration (Exfiltration Controls 0.05 cfs)

**Primary OutFlow** Max=0.62 cfs @ 12.36 hrs HW=123.38' TW=0.00' (Dynamic Tailwater)  
 ↑ 4=Culvert (Passes 0.62 cfs of 4.50 cfs potential flow)  
 ↑ 3=Sharp-Crested Rectangular Weir (Weir Controls 0.62 cfs @ 1.19 fps)  
 ↑ 2=Culvert (Passes 0.62 cfs of 2.44 cfs potential flow)

**Pond UG-3: Underground Infiltration System #2 - Chamber Wizard Field A****Chamber Model = retain\_it retain\_it 2.0' (retain-it®)**

Inside= 84.0"W x 24.0"H =&gt; 13.78 sf x 8.00'L = 110.3 cf

Outside= 96.0"W x 32.0"H =&gt; 21.33 sf x 8.00'L = 170.7 cf

3 Rows adjusted for 45.4 cf perimeter wall

9 Chambers/Row x 8.00' Long = 72.00' Row Length +12.0" End Stone x 2 = 74.00' Base Length

3 Rows x 96.0" Wide + 12.0" Side Stone x 2 = 26.00' Base Width

32.0" Chamber Height = 2.67' Field Height

1.9 cf Sidewall x 9 x 2 + 1.9 cf Endwall x 3 x 2 = 45.4 cf Perimeter Wall

27 Chambers x 110.3 cf - 45.4 cf Perimeter wall = 2,932.2 cf Chamber Storage

27 Chambers x 170.7 cf = 4,608.0 cf Displacement

5,130.7 cf Field - 4,608.0 cf Chambers = 522.7 cf Stone x 40.0% Voids = 209.1 cf Stone Storage

Chamber Storage + Stone Storage = 3,141.3 cf = 0.072 af

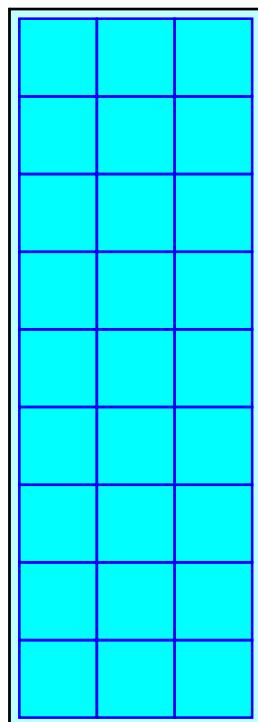
Overall Storage Efficiency = 61.2%

Overall System Size = 74.00' x 26.00' x 2.67'

27 Chambers

190.0 cy Field

19.4 cy Stone



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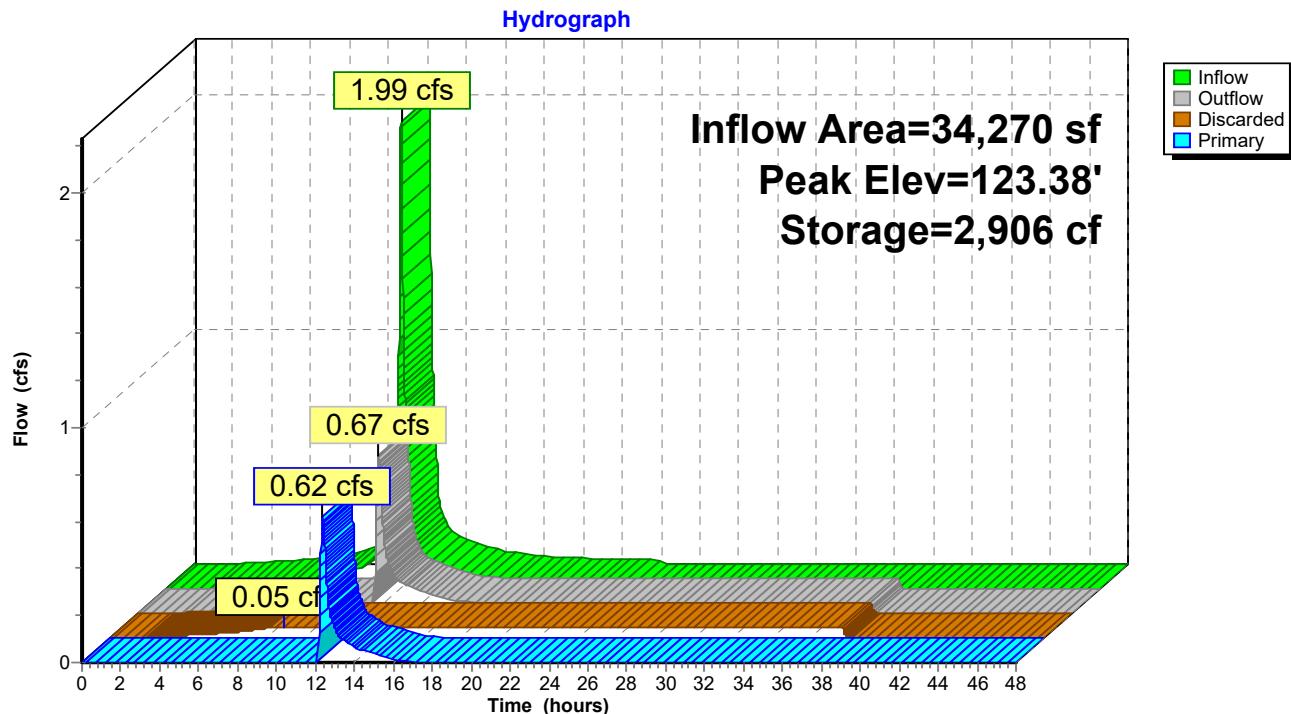
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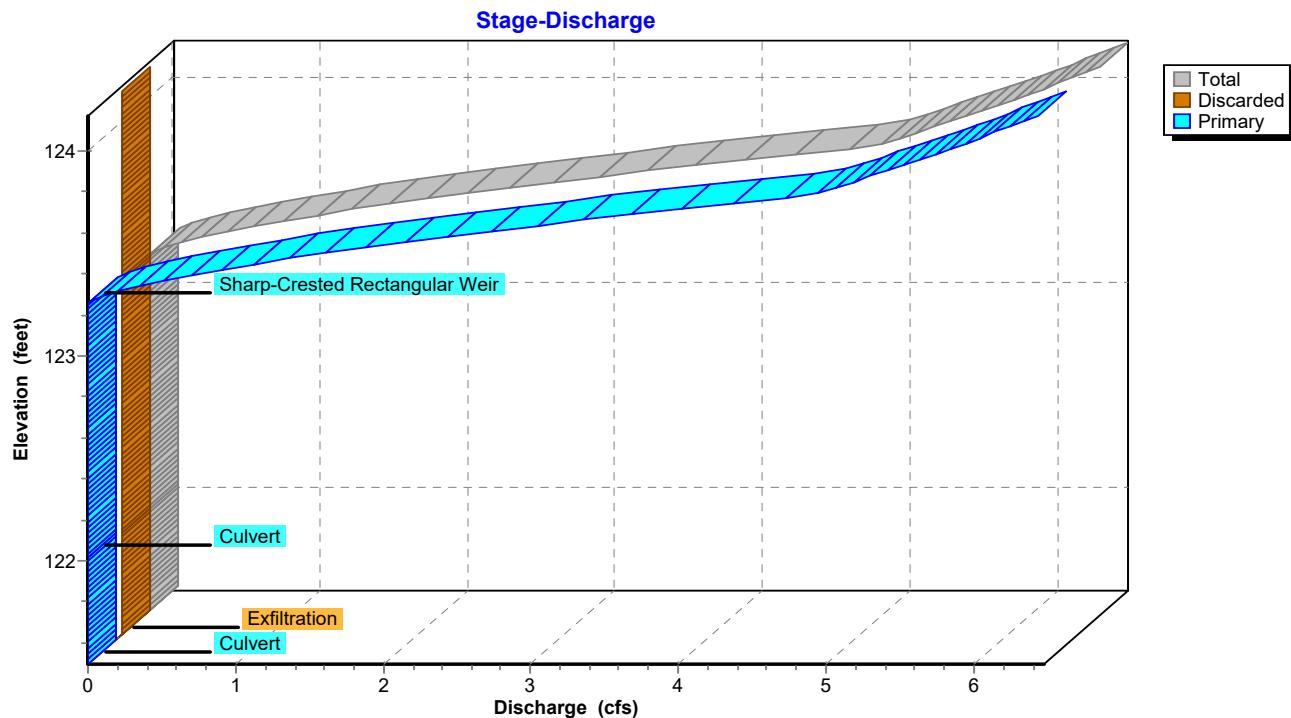
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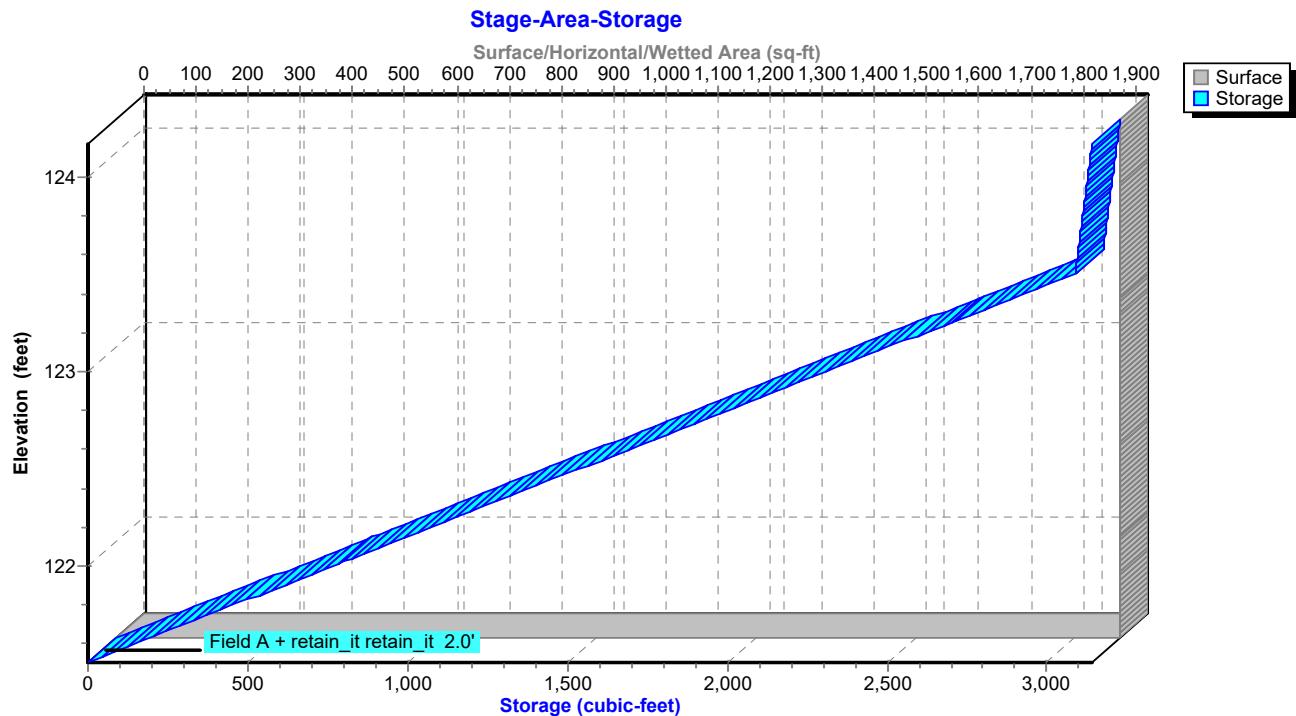
## Pond UG-3: Underground Infiltration System #2



## Pond UG-3: Underground Infiltration System #2



### Pond UG-3: Underground Infiltration System #2



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**Hydrograph for Pond UG-3: Underground Infiltration System #2**

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	121.50	0.00	0.00	0.00
1.00	0.00	0	121.50	0.00	0.00	0.00
2.00	0.00	0	121.50	0.00	0.00	0.00
3.00	0.01	2	121.50	0.01	0.01	0.00
4.00	0.01	4	121.50	0.01	0.01	0.00
5.00	0.02	6	121.50	0.02	0.02	0.00
6.00	0.02	7	121.50	0.02	0.02	0.00
7.00	0.03	10	121.51	0.03	0.03	0.00
8.00	0.04	14	121.51	0.04	<b>0.04</b>	0.00
9.00	0.06	43	121.53	0.05	<b>0.05</b>	0.00
10.00	0.09	158	121.60	0.05	0.05	0.00
11.00	0.14	399	121.76	0.05	0.05	0.00
12.00	<b>1.25</b>	<b>1,528</b>	<b>122.49</b>	<b>0.05</b>	0.05	<b>0.00</b>
13.00	<b>0.17</b>	<b>2,779</b>	<b>123.30</b>	<b>0.19</b>	0.05	<b>0.14</b>
14.00	0.11	2,748	123.28	0.11	0.05	0.07
15.00	0.08	2,734	123.27	0.08	0.05	0.04
16.00	0.06	2,720	123.26	0.06	0.05	0.02
17.00	0.04	2,708	123.25	0.05	0.05	0.00
18.00	0.03	2,684	123.24	0.05	0.05	0.00
19.00	0.03	2,635	123.21	0.05	0.05	0.00
20.00	0.03	2,575	123.17	0.05	0.05	0.00
21.00	0.02	2,504	123.12	0.05	0.05	0.00
22.00	0.02	2,426	123.07	0.05	0.05	0.00
23.00	0.02	2,339	123.01	0.05	0.05	0.00
24.00	0.02	2,244	122.95	0.05	0.05	0.00
25.00	0.00	2,086	122.85	0.05	0.05	0.00
26.00	0.00	1,922	122.74	0.05	0.05	0.00
27.00	0.00	1,759	122.64	0.05	0.05	0.00
28.00	0.00	1,595	122.53	0.05	0.05	0.00
29.00	0.00	1,432	122.43	0.05	0.05	0.00
30.00	0.00	1,268	122.32	0.05	0.05	0.00
31.00	0.00	1,105	122.22	0.05	0.05	0.00
32.00	0.00	941	122.11	0.05	0.05	0.00
33.00	0.00	778	122.00	0.05	0.05	0.00
34.00	0.00	614	121.90	0.05	0.05	0.00
35.00	0.00	451	121.79	0.05	0.05	0.00
36.00	0.00	287	121.69	0.05	0.05	0.00
37.00	0.00	123	121.58	0.05	0.05	0.00
38.00	0.00	0	121.50	0.00	0.00	0.00
39.00	0.00	0	121.50	0.00	0.00	0.00
40.00	0.00	0	121.50	0.00	0.00	0.00
41.00	0.00	0	121.50	0.00	0.00	0.00
42.00	0.00	0	121.50	0.00	0.00	0.00
43.00	0.00	0	121.50	0.00	0.00	0.00
44.00	0.00	0	121.50	0.00	0.00	0.00
45.00	0.00	0	121.50	0.00	0.00	0.00
46.00	0.00	0	121.50	0.00	0.00	0.00
47.00	0.00	0	121.50	0.00	0.00	0.00
48.00	0.00	0	121.50	0.00	0.00	0.00

**Proposed HydroCAD 533 Boston Post Road**

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Type III 24-hr 1-YR Rainfall=2.62"

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**Stage-Discharge for Pond UG-3: Underground Infiltration System #2**

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)	Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
121.50	0.00	<b>0.00</b>	0.00	124.15	<b>6.42</b>	0.05	<b>6.37</b>
121.55	0.05	<b>0.05</b>	0.00				
121.60	0.05	0.05	0.00				
121.65	0.05	0.05	0.00				
121.70	0.05	0.05	0.00				
121.75	0.05	0.05	0.00				
121.80	0.05	0.05	0.00				
121.85	0.05	0.05	0.00				
121.90	0.05	0.05	0.00				
121.95	0.05	0.05	0.00				
122.00	0.05	0.05	0.00				
122.05	0.05	0.05	0.00				
122.10	0.05	0.05	0.00				
122.15	0.05	0.05	0.00				
122.20	0.05	0.05	0.00				
122.25	0.05	0.05	0.00				
122.30	0.05	0.05	0.00				
122.35	0.05	0.05	0.00				
122.40	0.05	0.05	0.00				
122.45	0.05	0.05	0.00				
122.50	0.05	0.05	0.00				
122.55	0.05	0.05	0.00				
122.60	0.05	0.05	0.00				
122.65	0.05	0.05	0.00				
122.70	0.05	0.05	0.00				
122.75	0.05	0.05	0.00				
122.80	0.05	0.05	0.00				
122.85	0.05	0.05	0.00				
122.90	0.05	0.05	0.00				
122.95	0.05	0.05	0.00				
123.00	0.05	0.05	0.00				
123.05	0.05	0.05	0.00				
123.10	0.05	0.05	0.00				
123.15	0.05	0.05	0.00				
123.20	0.05	0.05	0.00				
123.25	0.05	0.05	0.00				
123.30	0.19	0.05	0.15				
123.35	0.46	0.05	0.41				
123.40	0.80	0.05	0.75				
123.45	1.20	0.05	1.16				
123.50	1.66	0.05	1.61				
123.55	2.16	0.05	2.12				
123.60	2.71	0.05	2.66				
123.65	3.29	0.05	3.24				
123.70	3.91	0.05	3.86				
123.75	4.55	0.05	4.51				
123.80	5.03	0.05	4.98				
123.85	5.25	0.05	5.20				
123.90	5.46	0.05	5.42				
123.95	5.67	0.05	5.62				
124.00	5.86	0.05	5.82				
124.05	6.05	0.05	6.01				
124.10	6.24	0.05	6.19				

**Stage-Area-Storage for Pond UG-3: Underground Infiltration System #2**

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
121.50	<b>1,924</b>	0	124.15	1,924	<b>3,140</b>
121.55	1,924	77			
121.60	1,924	154			
121.65	1,924	232			
121.70	1,924	309			
121.75	1,924	386			
121.80	1,924	463			
121.85	1,924	541			
121.90	1,924	618			
121.95	1,924	695			
122.00	1,924	772			
122.05	1,924	849			
122.10	1,924	927			
122.15	1,924	1,004			
122.20	1,924	1,081			
122.25	1,924	1,158			
122.30	1,924	1,236			
122.35	1,924	1,313			
122.40	1,924	1,390			
122.45	1,924	1,467			
122.50	1,924	1,544			
122.55	1,924	1,622			
122.60	1,924	1,699			
122.65	1,924	1,776			
122.70	1,924	1,853			
122.75	1,924	1,931			
122.80	1,924	2,008			
122.85	1,924	2,085			
122.90	1,924	2,162			
122.95	1,924	2,240			
123.00	1,924	2,317			
123.05	1,924	2,394			
123.10	1,924	2,471			
123.15	1,924	2,548			
123.20	1,924	2,626			
123.25	1,924	2,703			
123.30	1,924	2,780			
123.35	1,924	2,857			
123.40	1,924	2,935			
123.45	1,924	3,012			
123.50	1,924	3,089			
123.55	1,924	3,093			
123.60	1,924	3,097			
123.65	1,924	3,101			
123.70	1,924	3,105			
123.75	1,924	3,109			
123.80	1,924	3,113			
123.85	1,924	3,116			
123.90	1,924	3,120			
123.95	1,924	3,124			
124.00	1,924	3,128			
124.05	1,924	3,132			
124.10	1,924	3,136			

**Proposed HydroCAD 533 Boston Post Road**

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Type III 24-hr 2-YR Rainfall=3.14"

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Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

<b>Subcatchment P-1A: Subcatchment to</b>	Runoff Area=13,425 sf 66.59% Impervious Runoff Depth=1.71" Tc=6.0 min CN=85 Runoff=0.62 cfs 1,909 cf
<b>Subcatchment P-1B: Subcatchment to</b>	Runoff Area=33,268 sf 68.13% Impervious Runoff Depth=1.78" Tc=6.0 min CN=86 Runoff=1.60 cfs 4,943 cf
<b>Subcatchment P-1C: Subcatchment to</b>	Runoff Area=29,201 sf 66.54% Impervious Runoff Depth=1.78" Tc=6.0 min CN=86 Runoff=1.40 cfs 4,339 cf
<b>Subcatchment P-1D: Subcatchment to</b>	Runoff Area=13,403 sf 58.36% Impervious Runoff Depth=1.49" Tc=6.0 min CN=82 Runoff=0.54 cfs 1,664 cf
<b>Subcatchment P-1U: Undetained to Wetlands</b>	Runoff Area=8,300 sf 0.00% Impervious Runoff Depth=0.23" Tc=6.0 min CN=55 Runoff=0.02 cfs 161 cf
<b>Subcatchment P-B1: Roof Runoff to</b>	Runoff Area=34,270 sf 100.00% Impervious Runoff Depth=2.91" Tc=6.0 min CN=98 Runoff=2.40 cfs 8,304 cf
<b>Reach 1R: (new Reach)</b>	Inflow=1.37 cfs 5,707 cf Outflow=1.37 cfs 5,707 cf
<b>Pond IB-1: Infiltration Basin #1</b>	Peak Elev=123.91' Storage=826 cf Inflow=0.62 cfs 1,909 cf Discarded=0.02 cfs 1,437 cf Primary=0.18 cfs 473 cf Outflow=0.20 cfs 1,909 cf
<b>Pond IB-2: Infiltration Basin #2</b>	Peak Elev=123.60' Storage=2,201 cf Inflow=1.60 cfs 4,943 cf Discarded=0.05 cfs 3,772 cf Primary=0.35 cfs 1,171 cf Outflow=0.40 cfs 4,943 cf
<b>Pond UG-1: Underground Detention System #1</b>	Peak Elev=122.76' Storage=216 cf Inflow=0.54 cfs 1,664 cf 15.0" Round Culvert n=0.012 L=140.0' S=0.0064 '/' Outflow=0.39 cfs 1,662 cf
<b>Pond UG-2: Underground Infiltration System</b>	Peak Elev=122.71' Storage=2,495 cf Inflow=1.75 cfs 6,001 cf Discarded=0.06 cfs 4,899 cf Primary=0.21 cfs 1,102 cf Outflow=0.27 cfs 6,001 cf
<b>Pond UG-3: Underground Infiltration System</b>	Peak Elev=123.47' Storage=3,046 cf Inflow=2.40 cfs 8,304 cf Discarded=0.05 cfs 5,505 cf Primary=1.36 cfs 2,799 cf Outflow=1.40 cfs 8,304 cf
<b>Total Runoff Area = 131,867 sf Runoff Volume = 21,321 cf Average Runoff Depth = 1.94"</b>	
<b>29.38% Pervious = 38,739 sf 70.62% Impervious = 93,128 sf</b>	

### Summary for Subcatchment P-1A: Subcatchment to Infiltration Basin #1

Runoff = 0.62 cfs @ 12.09 hrs, Volume= 1,909 cf, Depth= 1.71"

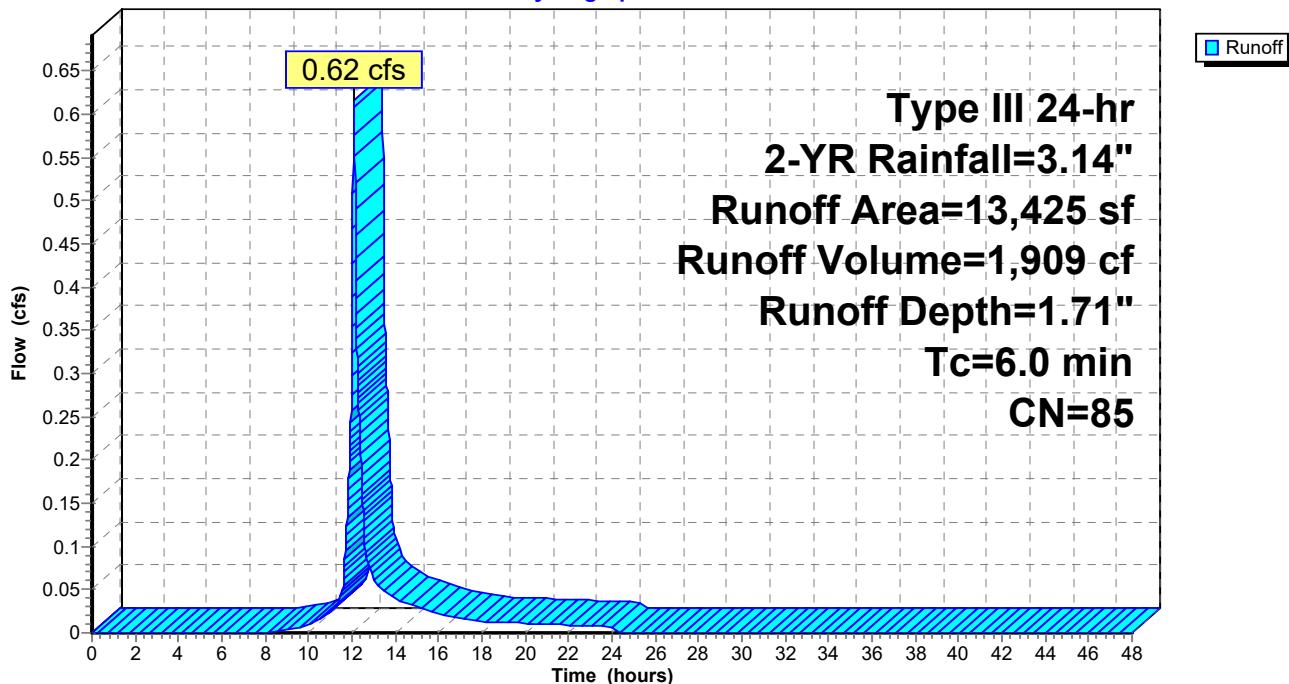
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
Type III 24-hr 2-YR Rainfall=3.14"

Area (sf)	CN	Description
8,940	98	Paved parking, HSG B
4,110	61	>75% Grass cover, Good, HSG B
375	55	Woods, Good, HSG B
13,425	85	Weighted Average
4,485		33.41% Pervious Area
8,940		66.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0				<b>Direct Entry, Direct</b>	
5.0	0			Total, Increased to minimum Tc = 6.0 min	

### Subcatchment P-1A: Subcatchment to Infiltration Basin #1

Hydrograph



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Type III 24-hr 2-YR Rainfall=3.14"

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**Hydrograph for Subcatchment P-1A: Subcatchment to Infiltration Basin #1**

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.50	3.14	1.71	0.00
0.50	0.02	0.00	0.00	27.00	3.14	1.71	0.00
1.00	0.03	0.00	0.00	27.50	3.14	1.71	0.00
1.50	0.05	0.00	0.00	28.00	3.14	1.71	0.00
2.00	0.06	0.00	0.00	28.50	3.14	1.71	0.00
2.50	0.08	0.00	0.00	29.00	3.14	1.71	0.00
3.00	0.10	0.00	0.00	29.50	3.14	1.71	0.00
3.50	0.12	0.00	0.00	30.00	3.14	1.71	0.00
4.00	0.14	0.00	0.00	30.50	3.14	1.71	0.00
4.50	0.16	0.00	0.00	31.00	3.14	1.71	0.00
5.00	0.18	0.00	0.00	31.50	3.14	1.71	0.00
5.50	0.20	0.00	0.00	32.00	3.14	1.71	0.00
6.00	0.23	0.00	0.00	32.50	3.14	1.71	0.00
6.50	0.25	0.00	0.00	33.00	3.14	1.71	0.00
7.00	0.28	0.00	0.00	33.50	3.14	1.71	0.00
7.50	0.32	0.00	0.00	34.00	3.14	1.71	0.00
8.00	0.36	0.00	0.00	34.50	3.14	1.71	0.00
8.50	0.40	0.00	0.00	35.00	3.14	1.71	0.00
9.00	0.46	0.01	0.00	35.50	3.14	1.71	0.00
9.50	0.52	0.01	0.01	36.00	3.14	1.71	0.00
10.00	0.59	0.03	0.01	36.50	3.14	1.71	0.00
10.50	0.68	0.05	0.02	37.00	3.14	1.71	0.00
11.00	0.79	0.08	0.02	37.50	3.14	1.71	0.00
11.50	0.94	0.14	0.05	38.00	3.14	1.71	0.00
12.00	1.57	0.50	<b>0.35</b>	38.50	3.14	1.71	0.00
12.50	2.20	0.95	<b>0.15</b>	39.00	3.14	1.71	0.00
13.00	2.35	1.06	0.06	39.50	3.14	1.71	0.00
13.50	2.46	1.15	0.05	40.00	3.14	1.71	0.00
14.00	2.55	1.22	0.04	40.50	3.14	1.71	0.00
14.50	2.62	1.27	0.03	41.00	3.14	1.71	0.00
15.00	2.68	1.33	0.03	41.50	3.14	1.71	0.00
15.50	2.74	1.37	0.03	42.00	3.14	1.71	0.00
16.00	2.78	1.41	0.02	42.50	3.14	1.71	0.00
16.50	2.82	1.44	0.02	43.00	3.14	1.71	0.00
17.00	2.86	1.47	0.02	43.50	3.14	1.71	0.00
17.50	2.89	1.49	0.02	44.00	3.14	1.71	0.00
18.00	2.91	1.52	0.01	44.50	3.14	1.71	0.00
18.50	2.94	1.54	0.01	45.00	3.14	1.71	0.00
19.00	2.96	1.56	0.01	45.50	3.14	1.71	0.00
19.50	2.98	1.57	0.01	46.00	3.14	1.71	0.00
20.00	3.00	1.59	0.01	46.50	3.14	1.71	0.00
20.50	3.02	1.61	0.01	47.00	3.14	1.71	0.00
21.00	3.04	1.63	0.01	47.50	3.14	1.71	0.00
21.50	3.06	1.64	0.01	48.00	3.14	1.71	0.00
22.00	3.08	1.66	0.01				
22.50	3.10	1.67	0.01				
23.00	3.11	1.68	0.01				
23.50	3.13	1.69	0.01				
24.00	<b>3.14</b>	<b>1.71</b>	0.01				
24.50	3.14	1.71	0.00				
25.00	3.14	1.71	0.00				
25.50	3.14	1.71	0.00				
26.00	3.14	1.71	0.00				

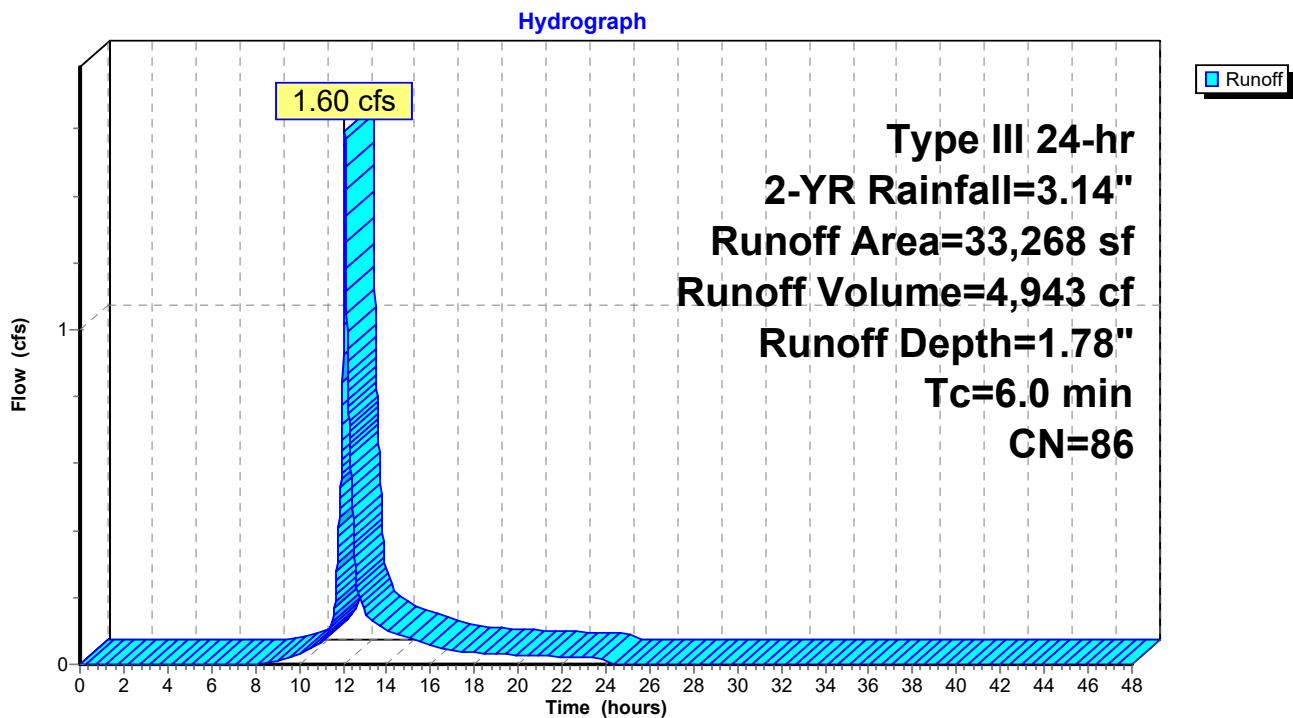
### Summary for Subcatchment P-1B: Subcatchment to Infiltration Basin #2

Runoff = 1.60 cfs @ 12.09 hrs, Volume= 4,943 cf, Depth= 1.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
Type III 24-hr 2-YR Rainfall=3.14"

Area (sf)	CN	Description			
22,665	98	Paved parking, HSG B			
10,603	61	>75% Grass cover, Good, HSG B			
33,268	86	Weighted Average			
10,603		31.87% Pervious Area			
22,665		68.13% Impervious Area			
Tc	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Direct Entry
5.0	0				Total, Increased to minimum Tc = 6.0 min

### Subcatchment P-1B: Subcatchment to Infiltration Basin #2



**Proposed HydroCAD 533 Boston Post Road**

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Type III 24-hr 2-YR Rainfall=3.14"

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**Hydrograph for Subcatchment P-1B: Subcatchment to Infiltration Basin #2**

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.50	3.14	1.78	0.00
0.50	0.02	0.00	0.00	27.00	3.14	1.78	0.00
1.00	0.03	0.00	0.00	27.50	3.14	1.78	0.00
1.50	0.05	0.00	0.00	28.00	3.14	1.78	0.00
2.00	0.06	0.00	0.00	28.50	3.14	1.78	0.00
2.50	0.08	0.00	0.00	29.00	3.14	1.78	0.00
3.00	0.10	0.00	0.00	29.50	3.14	1.78	0.00
3.50	0.12	0.00	0.00	30.00	3.14	1.78	0.00
4.00	0.14	0.00	0.00	30.50	3.14	1.78	0.00
4.50	0.16	0.00	0.00	31.00	3.14	1.78	0.00
5.00	0.18	0.00	0.00	31.50	3.14	1.78	0.00
5.50	0.20	0.00	0.00	32.00	3.14	1.78	0.00
6.00	0.23	0.00	0.00	32.50	3.14	1.78	0.00
6.50	0.25	0.00	0.00	33.00	3.14	1.78	0.00
7.00	0.28	0.00	0.00	33.50	3.14	1.78	0.00
7.50	0.32	0.00	0.00	34.00	3.14	1.78	0.00
8.00	0.36	0.00	0.00	34.50	3.14	1.78	0.00
8.50	0.40	0.00	0.01	35.00	3.14	1.78	0.00
9.00	0.46	0.01	0.01	35.50	3.14	1.78	0.00
9.50	0.52	0.02	0.02	36.00	3.14	1.78	0.00
10.00	0.59	0.04	0.03	36.50	3.14	1.78	0.00
10.50	0.68	0.06	0.04	37.00	3.14	1.78	0.00
11.00	0.79	0.10	0.06	37.50	3.14	1.78	0.00
11.50	0.94	0.17	0.12	38.00	3.14	1.78	0.00
12.00	1.57	0.54	<b>0.93</b>	38.50	3.14	1.78	0.00
12.50	2.20	1.01	<b>0.38</b>	39.00	3.14	1.78	0.00
13.00	2.35	1.13	0.16	39.50	3.14	1.78	0.00
13.50	2.46	1.21	0.12	40.00	3.14	1.78	0.00
14.00	2.55	1.28	0.10	40.50	3.14	1.78	0.00
14.50	2.62	1.34	0.09	41.00	3.14	1.78	0.00
15.00	2.68	1.39	0.08	41.50	3.14	1.78	0.00
15.50	2.74	1.44	0.07	42.00	3.14	1.78	0.00
16.00	2.78	1.48	0.06	42.50	3.14	1.78	0.00
16.50	2.82	1.51	0.05	43.00	3.14	1.78	0.00
17.00	2.86	1.54	0.04	43.50	3.14	1.78	0.00
17.50	2.89	1.57	0.04	44.00	3.14	1.78	0.00
18.00	2.91	1.59	0.03	44.50	3.14	1.78	0.00
18.50	2.94	1.61	0.03	45.00	3.14	1.78	0.00
19.00	2.96	1.63	0.03	45.50	3.14	1.78	0.00
19.50	2.98	1.65	0.03	46.00	3.14	1.78	0.00
20.00	3.00	1.67	0.03	46.50	3.14	1.78	0.00
20.50	3.02	1.68	0.03	47.00	3.14	1.78	0.00
21.00	3.04	1.70	0.02	47.50	3.14	1.78	0.00
21.50	3.06	1.72	0.02	48.00	3.14	1.78	0.00
22.00	3.08	1.73	0.02				
22.50	3.10	1.75	0.02				
23.00	3.11	1.76	0.02				
23.50	3.13	1.77	0.02				
24.00	<b>3.14</b>	<b>1.78</b>	0.02				
24.50	3.14	1.78	0.00				
25.00	3.14	1.78	0.00				
25.50	3.14	1.78	0.00				
26.00	3.14	1.78	0.00				

**Summary for Subcatchment P-1C: Subcatchment to Infiltration Trench #2**

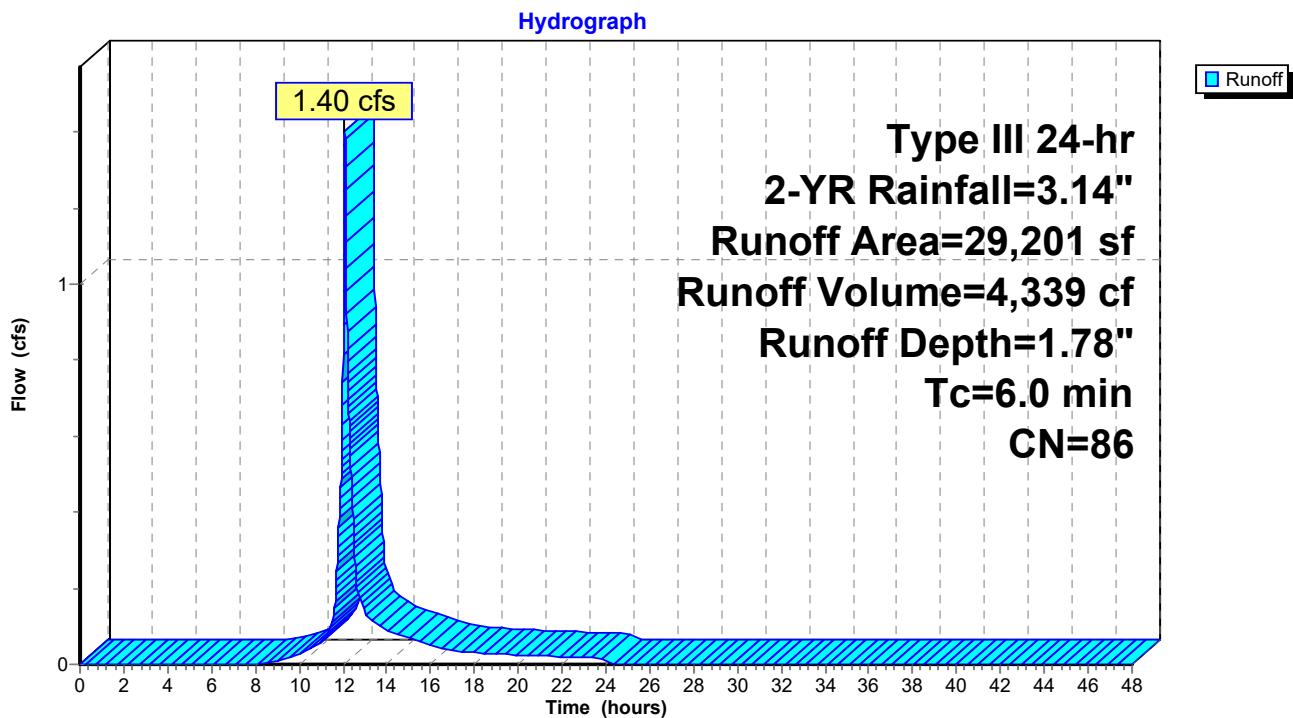
Runoff = 1.40 cfs @ 12.09 hrs, Volume= 4,339 cf, Depth= 1.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
Type III 24-hr 2-YR Rainfall=3.14"

Area (sf)	CN	Description
19,431	98	Paved parking, HSG B
9,770	61	>75% Grass cover, Good, HSG B
29,201	86	Weighted Average
9,770		33.46% Pervious Area
19,431		66.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0				<b>Direct Entry, Direct Entry</b>	
5.0	0			Total, Increased to minimum Tc = 6.0 min	

**Subcatchment P-1C: Subcatchment to Infiltration Trench #2**

**Proposed HydroCAD 533 Boston Post Road**

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Type III 24-hr 2-YR Rainfall=3.14"

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**Hydrograph for Subcatchment P-1C: Subcatchment to Infiltration Trench #2**

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.50	3.14	1.78	0.00
0.50	0.02	0.00	0.00	27.00	3.14	1.78	0.00
1.00	0.03	0.00	0.00	27.50	3.14	1.78	0.00
1.50	0.05	0.00	0.00	28.00	3.14	1.78	0.00
2.00	0.06	0.00	0.00	28.50	3.14	1.78	0.00
2.50	0.08	0.00	0.00	29.00	3.14	1.78	0.00
3.00	0.10	0.00	0.00	29.50	3.14	1.78	0.00
3.50	0.12	0.00	0.00	30.00	3.14	1.78	0.00
4.00	0.14	0.00	0.00	30.50	3.14	1.78	0.00
4.50	0.16	0.00	0.00	31.00	3.14	1.78	0.00
5.00	0.18	0.00	0.00	31.50	3.14	1.78	0.00
5.50	0.20	0.00	0.00	32.00	3.14	1.78	0.00
6.00	0.23	0.00	0.00	32.50	3.14	1.78	0.00
6.50	0.25	0.00	0.00	33.00	3.14	1.78	0.00
7.00	0.28	0.00	0.00	33.50	3.14	1.78	0.00
7.50	0.32	0.00	0.00	34.00	3.14	1.78	0.00
8.00	0.36	0.00	0.00	34.50	3.14	1.78	0.00
8.50	0.40	0.00	0.01	35.00	3.14	1.78	0.00
9.00	0.46	0.01	0.01	35.50	3.14	1.78	0.00
9.50	0.52	0.02	0.02	36.00	3.14	1.78	0.00
10.00	0.59	0.04	0.03	36.50	3.14	1.78	0.00
10.50	0.68	0.06	0.04	37.00	3.14	1.78	0.00
11.00	0.79	0.10	0.06	37.50	3.14	1.78	0.00
11.50	0.94	0.17	0.11	38.00	3.14	1.78	0.00
12.00	1.57	0.54	<b>0.81</b>	38.50	3.14	1.78	0.00
12.50	2.20	1.01	<b>0.33</b>	39.00	3.14	1.78	0.00
13.00	2.35	1.13	0.14	39.50	3.14	1.78	0.00
13.50	2.46	1.21	0.11	40.00	3.14	1.78	0.00
14.00	2.55	1.28	0.09	40.50	3.14	1.78	0.00
14.50	2.62	1.34	0.08	41.00	3.14	1.78	0.00
15.00	2.68	1.39	0.07	41.50	3.14	1.78	0.00
15.50	2.74	1.44	0.06	42.00	3.14	1.78	0.00
16.00	2.78	1.48	0.05	42.50	3.14	1.78	0.00
16.50	2.82	1.51	0.04	43.00	3.14	1.78	0.00
17.00	2.86	1.54	0.04	43.50	3.14	1.78	0.00
17.50	2.89	1.57	0.03	44.00	3.14	1.78	0.00
18.00	2.91	1.59	0.03	44.50	3.14	1.78	0.00
18.50	2.94	1.61	0.03	45.00	3.14	1.78	0.00
19.00	2.96	1.63	0.03	45.50	3.14	1.78	0.00
19.50	2.98	1.65	0.03	46.00	3.14	1.78	0.00
20.00	3.00	1.67	0.02	46.50	3.14	1.78	0.00
20.50	3.02	1.68	0.02	47.00	3.14	1.78	0.00
21.00	3.04	1.70	0.02	47.50	3.14	1.78	0.00
21.50	3.06	1.72	0.02	48.00	3.14	1.78	0.00
22.00	3.08	1.73	0.02				
22.50	3.10	1.75	0.02				
23.00	3.11	1.76	0.02				
23.50	3.13	1.77	0.02				
24.00	<b>3.14</b>	<b>1.78</b>	0.02				
24.50	3.14	1.78	0.00				
25.00	3.14	1.78	0.00				
25.50	3.14	1.78	0.00				
26.00	3.14	1.78	0.00				

### Summary for Subcatchment P-1D: Subcatchment to Infiltration Trench 1

Runoff = 0.54 cfs @ 12.09 hrs, Volume= 1,664 cf, Depth= 1.49"

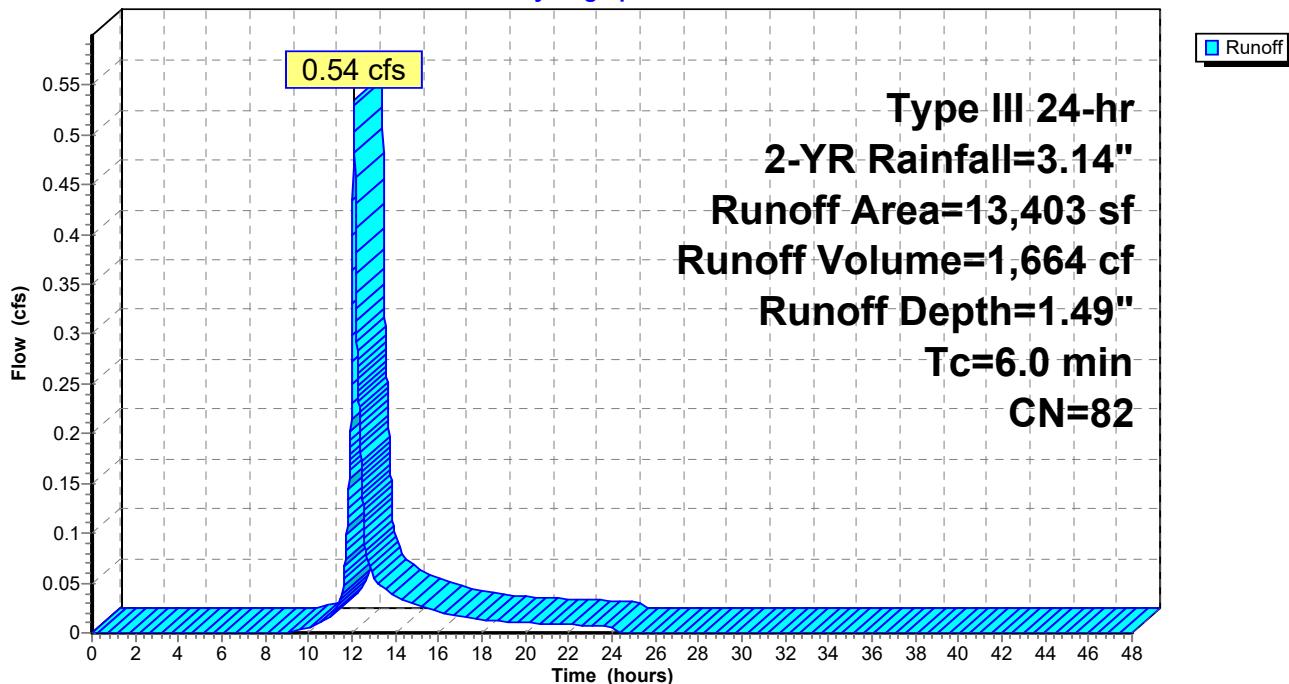
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
Type III 24-hr 2-YR Rainfall=3.14"

Area (sf)	CN	Description
7,822	98	Paved parking, HSG B
2,453	61	>75% Grass cover, Good, HSG B
3,128	60	Woods, Fair, HSG B
13,403	82	Weighted Average
5,581		41.64% Pervious Area
7,822		58.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0				<b>Direct Entry, Direct Entry</b>	
5.0	0			Total, Increased to minimum Tc = 6.0 min	

### Subcatchment P-1D: Subcatchment to Infiltration Trench 1

Hydrograph



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Type III 24-hr 2-YR Rainfall=3.14"

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**Hydrograph for Subcatchment P-1D: Subcatchment to Infiltration Trench 1**

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.50	3.14	1.49	0.00
0.50	0.02	0.00	0.00	27.00	3.14	1.49	0.00
1.00	0.03	0.00	0.00	27.50	3.14	1.49	0.00
1.50	0.05	0.00	0.00	28.00	3.14	1.49	0.00
2.00	0.06	0.00	0.00	28.50	3.14	1.49	0.00
2.50	0.08	0.00	0.00	29.00	3.14	1.49	0.00
3.00	0.10	0.00	0.00	29.50	3.14	1.49	0.00
3.50	0.12	0.00	0.00	30.00	3.14	1.49	0.00
4.00	0.14	0.00	0.00	30.50	3.14	1.49	0.00
4.50	0.16	0.00	0.00	31.00	3.14	1.49	0.00
5.00	0.18	0.00	0.00	31.50	3.14	1.49	0.00
5.50	0.20	0.00	0.00	32.00	3.14	1.49	0.00
6.00	0.23	0.00	0.00	32.50	3.14	1.49	0.00
6.50	0.25	0.00	0.00	33.00	3.14	1.49	0.00
7.00	0.28	0.00	0.00	33.50	3.14	1.49	0.00
7.50	0.32	0.00	0.00	34.00	3.14	1.49	0.00
8.00	0.36	0.00	0.00	34.50	3.14	1.49	0.00
8.50	0.40	0.00	0.00	35.00	3.14	1.49	0.00
9.00	0.46	0.00	0.00	35.50	3.14	1.49	0.00
9.50	0.52	0.00	0.00	36.00	3.14	1.49	0.00
10.00	0.59	0.01	0.01	36.50	3.14	1.49	0.00
10.50	0.68	0.02	0.01	37.00	3.14	1.49	0.00
11.00	0.79	0.05	0.02	37.50	3.14	1.49	0.00
11.50	0.94	0.09	0.03	38.00	3.14	1.49	0.00
12.00	1.57	0.38	<b>0.30</b>	38.50	3.14	1.49	0.00
12.50	2.20	0.79	<b>0.13</b>	39.00	3.14	1.49	0.00
13.00	2.35	0.89	0.06	39.50	3.14	1.49	0.00
13.50	2.46	0.97	0.04	40.00	3.14	1.49	0.00
14.00	2.55	1.03	0.04	40.50	3.14	1.49	0.00
14.50	2.62	1.09	0.03	41.00	3.14	1.49	0.00
15.00	2.68	1.13	0.03	41.50	3.14	1.49	0.00
15.50	2.74	1.18	0.02	42.00	3.14	1.49	0.00
16.00	2.78	1.21	0.02	42.50	3.14	1.49	0.00
16.50	2.82	1.24	0.02	43.00	3.14	1.49	0.00
17.00	2.86	1.27	0.02	43.50	3.14	1.49	0.00
17.50	2.89	1.29	0.01	44.00	3.14	1.49	0.00
18.00	2.91	1.31	0.01	44.50	3.14	1.49	0.00
18.50	2.94	1.33	0.01	45.00	3.14	1.49	0.00
19.00	2.96	1.35	0.01	45.50	3.14	1.49	0.00
19.50	2.98	1.37	0.01	46.00	3.14	1.49	0.00
20.00	3.00	1.38	0.01	46.50	3.14	1.49	0.00
20.50	3.02	1.40	0.01	47.00	3.14	1.49	0.00
21.00	3.04	1.41	0.01	47.50	3.14	1.49	0.00
21.50	3.06	1.43	0.01	48.00	3.14	1.49	0.00
22.00	3.08	1.44	0.01				
22.50	3.10	1.45	0.01				
23.00	3.11	1.47	0.01				
23.50	3.13	1.48	0.01				
24.00	<b>3.14</b>	<b>1.49</b>	0.01				
24.50	3.14	1.49	0.00				
25.00	3.14	1.49	0.00				
25.50	3.14	1.49	0.00				
26.00	3.14	1.49	0.00				

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Type III 24-hr 2-YR Rainfall=3.14"

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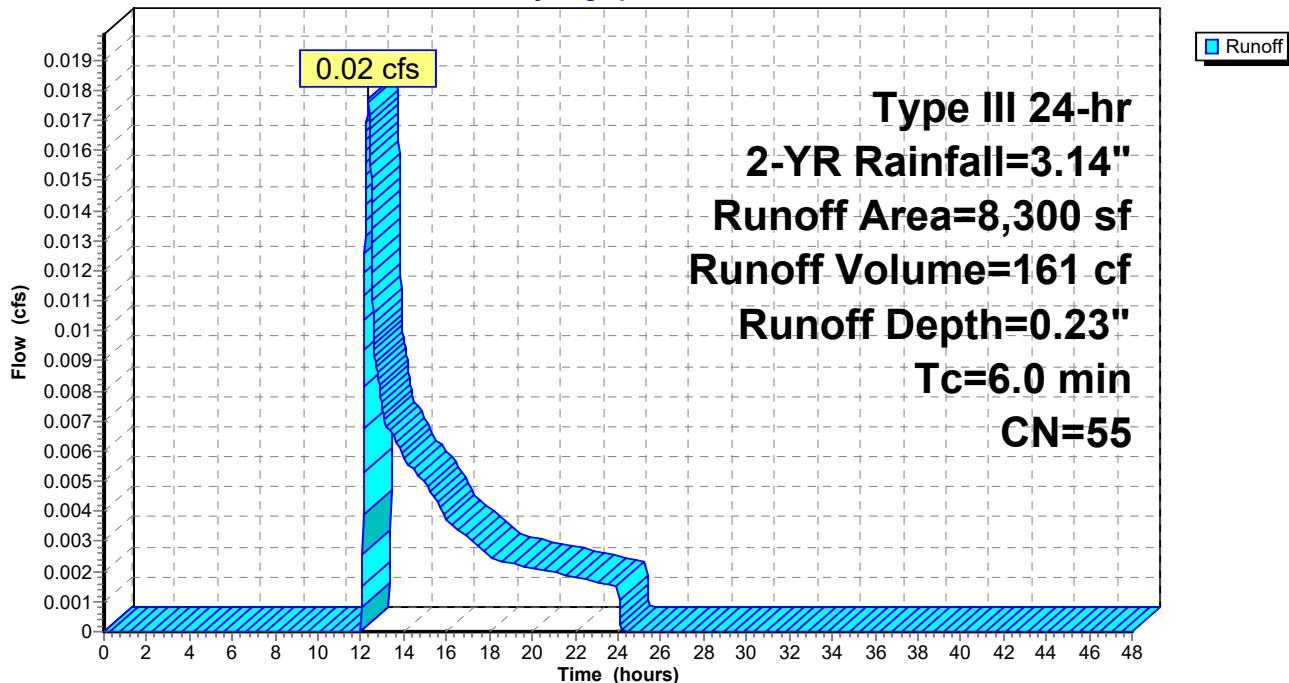
**Summary for Subcatchment P-1U: Undetained to Wetlands**

Runoff = 0.02 cfs @ 12.34 hrs, Volume= 161 cf, Depth= 0.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
Type III 24-hr 2-YR Rainfall=3.14"

Area (sf)	CN	Description
8,300	55	Woods, Good, HSG B
8,300		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0				<b>Direct Entry, Direct Entry</b>	
5.0	0			Total, Increased to minimum Tc = 6.0 min	

**Subcatchment P-1U: Undetained to Wetlands****Hydrograph**

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Type III 24-hr 2-YR Rainfall=3.14"

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**Hydrograph for Subcatchment P-1U: Undetained to Wetlands**

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.50	3.14	0.23	0.00
0.50	0.02	0.00	0.00	27.00	3.14	0.23	0.00
1.00	0.03	0.00	0.00	27.50	3.14	0.23	0.00
1.50	0.05	0.00	0.00	28.00	3.14	0.23	0.00
2.00	0.06	0.00	0.00	28.50	3.14	0.23	0.00
2.50	0.08	0.00	0.00	29.00	3.14	0.23	0.00
3.00	0.10	0.00	0.00	29.50	3.14	0.23	0.00
3.50	0.12	0.00	0.00	30.00	3.14	0.23	0.00
4.00	0.14	0.00	0.00	30.50	3.14	0.23	0.00
4.50	0.16	0.00	0.00	31.00	3.14	0.23	0.00
5.00	0.18	0.00	0.00	31.50	3.14	0.23	0.00
5.50	0.20	0.00	0.00	32.00	3.14	0.23	0.00
6.00	0.23	0.00	0.00	32.50	3.14	0.23	0.00
6.50	0.25	0.00	0.00	33.00	3.14	0.23	0.00
7.00	0.28	0.00	0.00	33.50	3.14	0.23	0.00
7.50	0.32	0.00	0.00	34.00	3.14	0.23	0.00
8.00	0.36	0.00	0.00	34.50	3.14	0.23	0.00
8.50	0.40	0.00	0.00	35.00	3.14	0.23	0.00
9.00	0.46	0.00	0.00	35.50	3.14	0.23	0.00
9.50	0.52	0.00	0.00	36.00	3.14	0.23	0.00
10.00	0.59	0.00	0.00	36.50	3.14	0.23	0.00
10.50	0.68	0.00	0.00	37.00	3.14	0.23	0.00
11.00	0.79	0.00	0.00	37.50	3.14	0.23	0.00
11.50	0.94	0.00	0.00	38.00	3.14	0.23	0.00
12.00	1.57	0.00	<b>0.00</b>	38.50	3.14	0.23	0.00
12.50	2.20	0.04	<b>0.01</b>	39.00	3.14	0.23	0.00
13.00	2.35	0.06	0.01	39.50	3.14	0.23	0.00
13.50	2.46	0.08	0.01	40.00	3.14	0.23	0.00
14.00	2.55	0.09	0.01	40.50	3.14	0.23	0.00
14.50	2.62	0.11	0.01	41.00	3.14	0.23	0.00
15.00	2.68	0.12	0.00	41.50	3.14	0.23	0.00
15.50	2.74	0.13	0.00	42.00	3.14	0.23	0.00
16.00	2.78	0.14	0.00	42.50	3.14	0.23	0.00
16.50	2.82	0.15	0.00	43.00	3.14	0.23	0.00
17.00	2.86	0.16	0.00	43.50	3.14	0.23	0.00
17.50	2.89	0.17	0.00	44.00	3.14	0.23	0.00
18.00	2.91	0.17	0.00	44.50	3.14	0.23	0.00
18.50	2.94	0.18	0.00	45.00	3.14	0.23	0.00
19.00	2.96	0.18	0.00	45.50	3.14	0.23	0.00
19.50	2.98	0.19	0.00	46.00	3.14	0.23	0.00
20.00	3.00	0.20	0.00	46.50	3.14	0.23	0.00
20.50	3.02	0.20	0.00	47.00	3.14	0.23	0.00
21.00	3.04	0.21	0.00	47.50	3.14	0.23	0.00
21.50	3.06	0.21	0.00	48.00	3.14	0.23	0.00
22.00	3.08	0.22	0.00				
22.50	3.10	0.22	0.00				
23.00	3.11	0.23	0.00				
23.50	3.13	0.23	0.00				
24.00	<b>3.14</b>	<b>0.23</b>	0.00				
24.50	3.14	0.23	0.00				
25.00	3.14	0.23	0.00				
25.50	3.14	0.23	0.00				
26.00	3.14	0.23	0.00				

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Type III 24-hr 2-YR Rainfall=3.14"

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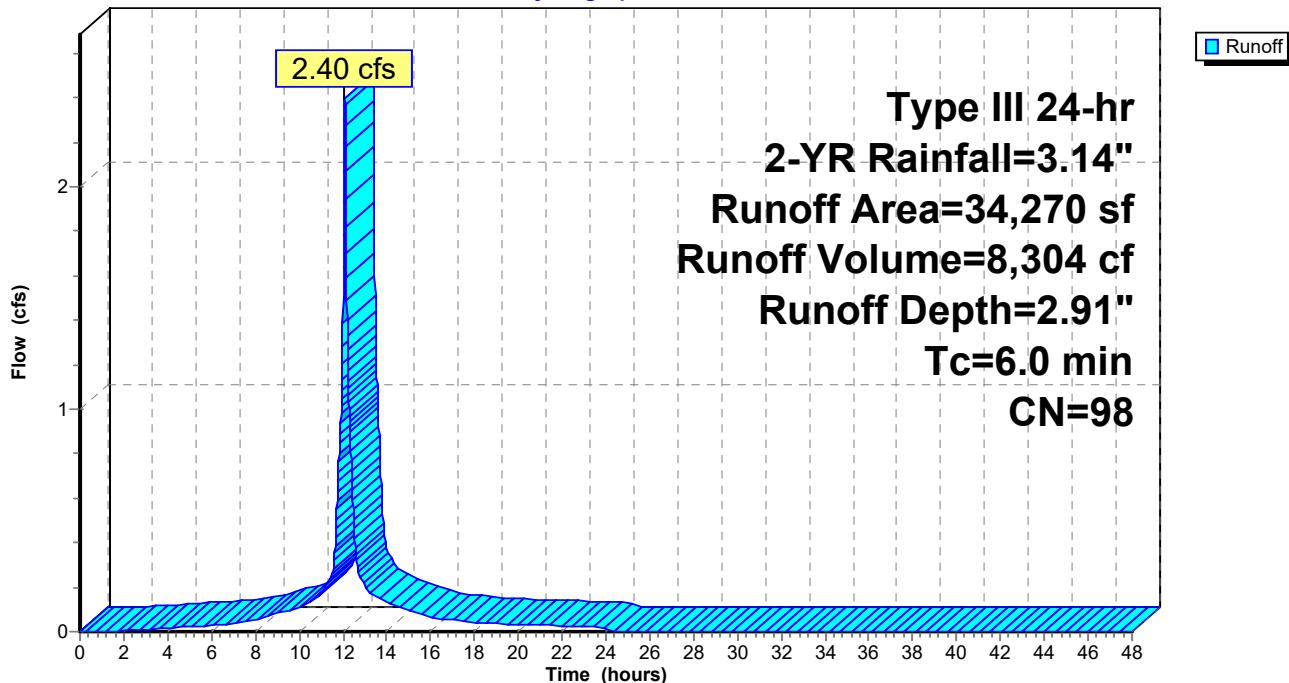
**Summary for Subcatchment P-B1: Roof Runoff to Infiltration Trench #3**

Runoff = 2.40 cfs @ 12.08 hrs, Volume= 8,304 cf, Depth= 2.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
Type III 24-hr 2-YR Rainfall=3.14"

Area (sf)	CN	Description
34,270	98	Roofs, HSG B
34,270		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0				<b>Direct Entry, Direct Entry</b>	
5.0	0			Total, Increased to minimum Tc = 6.0 min	

**Subcatchment P-B1: Roof Runoff to Infiltration Trench #3****Hydrograph**

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**Hydrograph for Subcatchment P-B1: Roof Runoff to Infiltration Trench #3**

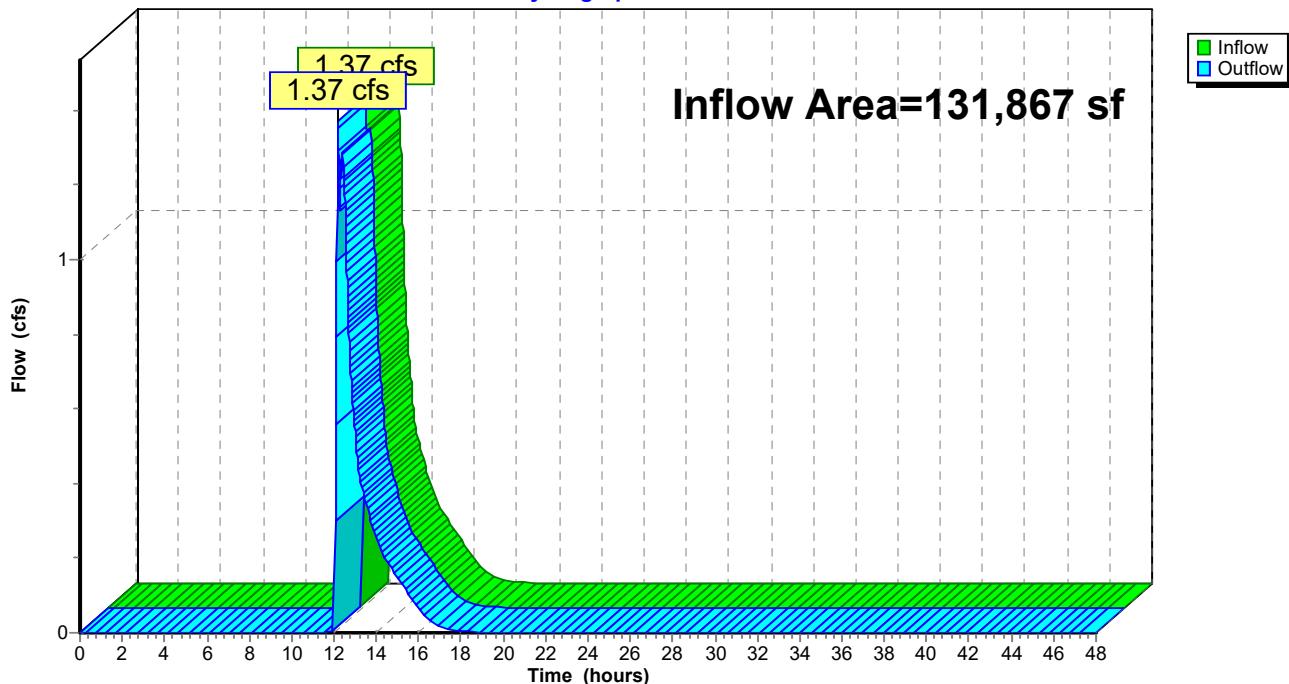
Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.50	3.14	2.91	0.00
0.50	0.02	0.00	0.00	27.00	3.14	2.91	0.00
1.00	0.03	0.00	0.00	27.50	3.14	2.91	0.00
1.50	0.05	0.00	0.00	28.00	3.14	2.91	0.00
2.00	0.06	0.00	0.00	28.50	3.14	2.91	0.00
2.50	0.08	0.01	0.01	29.00	3.14	2.91	0.00
3.00	0.10	0.01	0.01	29.50	3.14	2.91	0.00
3.50	0.12	0.02	0.01	30.00	3.14	2.91	0.00
4.00	0.14	0.03	0.02	30.50	3.14	2.91	0.00
4.50	0.16	0.04	0.02	31.00	3.14	2.91	0.00
5.00	0.18	0.06	0.02	31.50	3.14	2.91	0.00
5.50	0.20	0.07	0.03	32.00	3.14	2.91	0.00
6.00	0.23	0.09	0.03	32.50	3.14	2.91	0.00
6.50	0.25	0.11	0.03	33.00	3.14	2.91	0.00
7.00	0.28	0.13	0.04	33.50	3.14	2.91	0.00
7.50	0.32	0.16	0.05	34.00	3.14	2.91	0.00
8.00	0.36	0.19	0.05	34.50	3.14	2.91	0.00
8.50	0.40	0.23	0.07	35.00	3.14	2.91	0.00
9.00	0.46	0.28	0.08	35.50	3.14	2.91	0.00
9.50	0.52	0.34	0.10	36.00	3.14	2.91	0.00
10.00	0.59	0.40	0.11	36.50	3.14	2.91	0.00
10.50	0.68	0.48	0.14	37.00	3.14	2.91	0.00
11.00	0.79	0.58	0.17	37.50	3.14	2.91	0.00
11.50	0.94	0.73	0.27	38.00	3.14	2.91	0.00
12.00	1.57	1.35	<b>1.51</b>	38.50	3.14	2.91	0.00
12.50	2.20	1.98	<b>0.50</b>	39.00	3.14	2.91	0.00
13.00	2.35	2.13	0.20	39.50	3.14	2.91	0.00
13.50	2.46	2.23	0.16	40.00	3.14	2.91	0.00
14.00	2.55	2.32	0.13	40.50	3.14	2.91	0.00
14.50	2.62	2.39	0.11	41.00	3.14	2.91	0.00
15.00	2.68	2.45	0.10	41.50	3.14	2.91	0.00
15.50	2.74	2.51	0.08	42.00	3.14	2.91	0.00
16.00	2.78	2.55	0.07	42.50	3.14	2.91	0.00
16.50	2.82	2.59	0.06	43.00	3.14	2.91	0.00
17.00	2.86	2.62	0.05	43.50	3.14	2.91	0.00
17.50	2.89	2.66	0.05	44.00	3.14	2.91	0.00
18.00	2.91	2.68	0.04	44.50	3.14	2.91	0.00
18.50	2.94	2.71	0.04	45.00	3.14	2.91	0.00
19.00	2.96	2.73	0.04	45.50	3.14	2.91	0.00
19.50	2.98	2.75	0.03	46.00	3.14	2.91	0.00
20.00	3.00	2.77	0.03	46.50	3.14	2.91	0.00
20.50	3.02	2.79	0.03	47.00	3.14	2.91	0.00
21.00	3.04	2.81	0.03	47.50	3.14	2.91	0.00
21.50	3.06	2.83	0.03	48.00	3.14	2.91	0.00
22.00	3.08	2.85	0.03				
22.50	3.10	2.86	0.03				
23.00	3.11	2.88	0.02				
23.50	3.13	2.89	0.02				
24.00	<b>3.14</b>	<b>2.91</b>	0.02				
24.50	3.14	2.91	0.00				
25.00	3.14	2.91	0.00				
25.50	3.14	2.91	0.00				
26.00	3.14	2.91	0.00				

**Summary for Reach 1R: (new Reach)**

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

Inflow Area = 131,867 sf, 70.62% Impervious, Inflow Depth = 0.52" for 2-YR event  
Inflow = 1.37 cfs @ 12.19 hrs, Volume= 5,707 cf  
Outflow = 1.37 cfs @ 12.19 hrs, Volume= 5,707 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3

**Reach 1R: (new Reach)****Hydrograph**

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**Hydrograph for Reach 1R: (new Reach)**

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00	0.00	0.00	26.50	0.00	0.00	0.00
0.50	0.00	0.00	0.00	27.00	0.00	0.00	0.00
1.00	0.00	0.00	0.00	27.50	0.00	0.00	0.00
1.50	0.00	0.00	0.00	28.00	0.00	0.00	0.00
2.00	0.00	0.00	0.00	28.50	0.00	0.00	0.00
2.50	0.00	0.00	0.00	29.00	0.00	0.00	0.00
3.00	0.00	0.00	0.00	29.50	0.00	0.00	0.00
3.50	0.00	0.00	0.00	30.00	0.00	0.00	0.00
4.00	0.00	0.00	0.00	30.50	0.00	0.00	0.00
4.50	0.00	0.00	0.00	31.00	0.00	0.00	0.00
5.00	0.00	0.00	0.00	31.50	0.00	0.00	0.00
5.50	0.00	0.00	0.00	32.00	0.00	0.00	0.00
6.00	0.00	0.00	0.00	32.50	0.00	0.00	0.00
6.50	0.00	0.00	0.00	33.00	0.00	0.00	0.00
7.00	0.00	0.00	0.00	33.50	0.00	0.00	0.00
7.50	0.00	0.00	0.00	34.00	0.00	0.00	0.00
8.00	0.00	0.00	0.00	34.50	0.00	0.00	0.00
8.50	0.00	0.00	0.00	35.00	0.00	0.00	0.00
9.00	0.00	0.00	0.00	35.50	0.00	0.00	0.00
9.50	0.00	0.00	0.00	36.00	0.00	0.00	0.00
10.00	0.00	0.00	0.00	36.50	0.00	0.00	0.00
10.50	0.00	0.00	0.00	37.00	0.00	0.00	0.00
11.00	0.00	0.00	0.00	37.50	0.00	0.00	0.00
11.50	0.00	0.00	0.00	38.00	0.00	0.00	0.00
12.00	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	38.50	0.00	0.00	0.00
12.50	<b>1.19</b>	<b>1.19</b>	<b>1.19</b>	39.00	0.00	0.00	0.00
13.00	0.54	0.54	0.54	39.50	0.00	0.00	0.00
13.50	0.35	0.35	0.35	40.00	0.00	0.00	0.00
14.00	0.26	0.26	0.26	40.50	0.00	0.00	0.00
14.50	0.19	0.19	0.19	41.00	0.00	0.00	0.00
15.00	0.15	0.15	0.15	41.50	0.00	0.00	0.00
15.50	0.11	0.11	0.11	42.00	0.00	0.00	0.00
16.00	0.07	0.07	0.07	42.50	0.00	0.00	0.00
16.50	0.04	0.04	0.04	43.00	0.00	0.00	0.00
17.00	0.02	0.02	0.02	43.50	0.00	0.00	0.00
17.50	0.01	0.01	0.01	44.00	0.00	0.00	0.00
18.00	0.00	0.00	0.00	44.50	0.00	0.00	0.00
18.50	0.00	0.00	0.00	45.00	0.00	0.00	0.00
19.00	0.00	0.00	0.00	45.50	0.00	0.00	0.00
19.50	0.00	0.00	0.00	46.00	0.00	0.00	0.00
20.00	0.00	0.00	0.00	46.50	0.00	0.00	0.00
20.50	0.00	0.00	0.00	47.00	0.00	0.00	0.00
21.00	0.00	0.00	0.00	47.50	0.00	0.00	0.00
21.50	0.00	0.00	0.00	48.00	0.00	0.00	0.00
22.00	0.00	0.00	0.00				
22.50	0.00	0.00	0.00				
23.00	0.00	0.00	0.00				
23.50	0.00	0.00	0.00				
24.00	0.00	0.00	0.00				
24.50	0.00	0.00	0.00				
25.00	0.00	0.00	0.00				
25.50	0.00	0.00	0.00				
26.00	0.00	0.00	0.00				

### Summary for Pond IB-1: Infiltration Basin #1

Inflow Area = 13,425 sf, 66.59% Impervious, Inflow Depth = 1.71" for 2-YR event  
 Inflow = 0.62 cfs @ 12.09 hrs, Volume= 1,909 cf  
 Outflow = 0.20 cfs @ 12.41 hrs, Volume= 1,909 cf, Atten= 67%, Lag= 19.3 min  
 Discarded = 0.02 cfs @ 12.41 hrs, Volume= 1,437 cf  
 Primary = 0.18 cfs @ 12.41 hrs, Volume= 473 cf

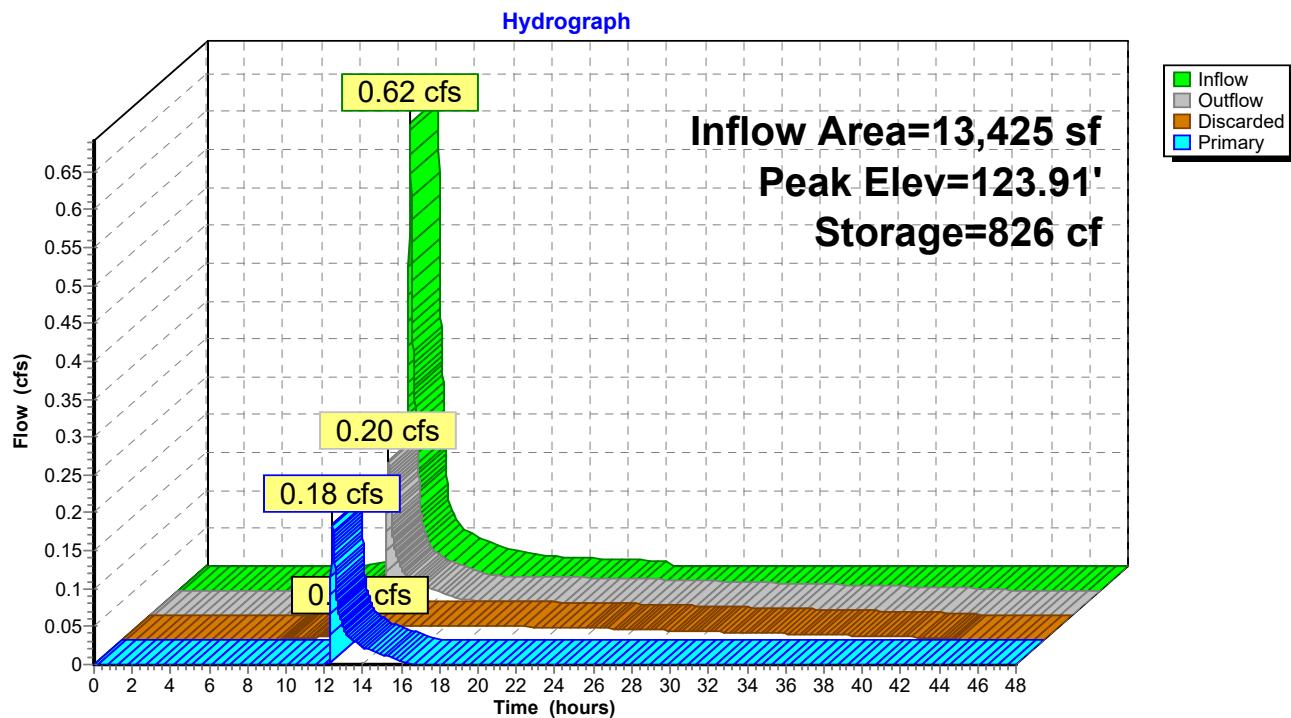
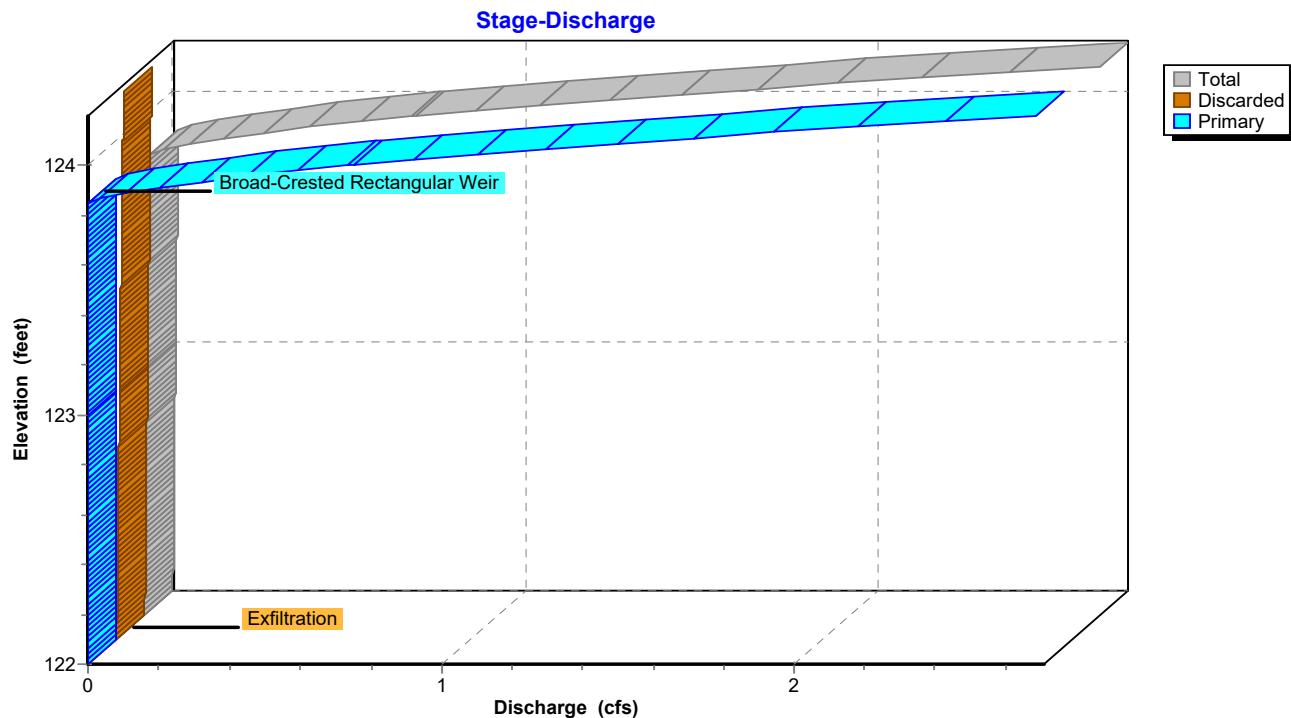
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3  
 Peak Elev= 123.91' @ 12.41 hrs Surf.Area= 802 sf Storage= 826 cf

Plug-Flow detention time= 418.9 min calculated for 1,909 cf (100% of inflow)  
 Center-of-Mass det. time= 419.1 min ( 1,246.0 - 826.9 )

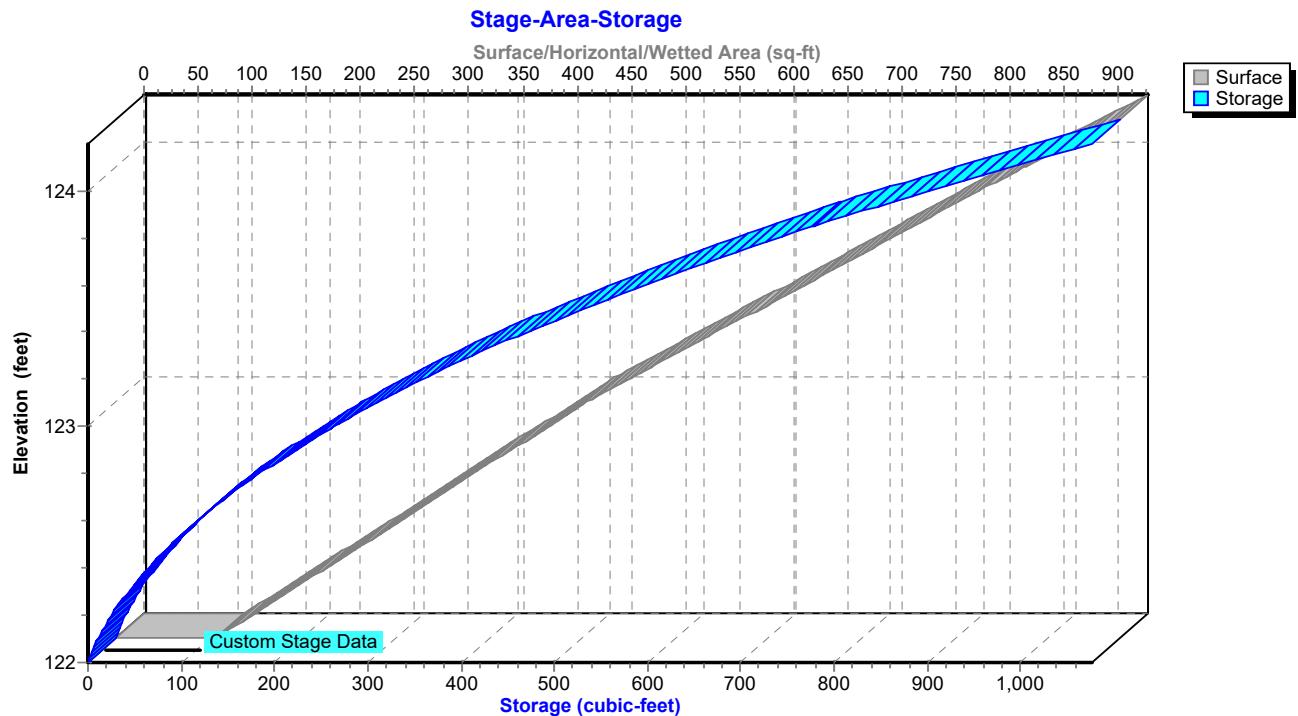
Volume	Invert	Avail.Storage	Storage Description
#1	122.00'	1,077 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
122.00	93	0	0
123.00	434	264	264
124.00	839	637	900
124.20	927	177	1,077
Device	Routing	Invert	Outlet Devices
#1	Discarded	122.00'	<b>1.020 in/hr Exfiltration over Surface area</b> Phase-In= 0.01'
#2	Primary	123.85'	<b>5.0' long x 2.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

**Discarded OutFlow** Max=0.02 cfs @ 12.41 hrs HW=123.91' (Free Discharge)  
 ↑ 1=Exfiltration (Exfiltration Controls 0.02 cfs)

**Primary OutFlow** Max=0.18 cfs @ 12.41 hrs HW=123.91' TW=0.00' (Dynamic Tailwater)  
 ↑ 2=Broad-Crested Rectangular Weir (Weir Controls 0.18 cfs @ 0.62 fps)

**Pond IB-1: Infiltration Basin #1****Pond IB-1: Infiltration Basin #1**

### Pond IB-1: Infiltration Basin #1



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**Hydrograph for Pond IB-1: Infiltration Basin #1**

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	122.00	0.00	0.00	0.00
1.00	0.00	0	122.00	0.00	0.00	0.00
2.00	0.00	0	122.00	0.00	0.00	0.00
3.00	0.00	0	122.00	0.00	0.00	0.00
4.00	0.00	0	122.00	0.00	0.00	0.00
5.00	0.00	0	122.00	0.00	0.00	0.00
6.00	0.00	0	122.00	0.00	0.00	0.00
7.00	0.00	0	122.00	0.00	0.00	0.00
8.00	0.00	0	122.00	0.00	0.00	0.00
9.00	0.00	1	122.01	0.00	0.00	0.00
10.00	0.01	15	122.13	0.00	0.00	0.00
11.00	0.02	58	122.37	0.01	0.01	0.00
12.00	<b>0.35</b>	<b>336</b>	<b>123.16</b>	<b>0.01</b>	<b>0.01</b>	<b>0.00</b>
13.00	<b>0.06</b>	<b>798</b>	<b>123.87</b>	<b>0.07</b>	<b>0.02</b>	<b>0.05</b>
14.00	0.04	790	123.86	0.04	0.02	0.02
15.00	0.03	787	123.86	0.03	0.02	0.01
16.00	0.02	783	123.86	0.02	0.02	0.00
17.00	0.02	779	123.85	0.02	0.02	0.00
18.00	0.01	768	123.84	0.02	0.02	0.00
19.00	0.01	748	123.81	0.02	0.02	0.00
20.00	0.01	725	123.78	0.02	0.02	0.00
21.00	0.01	699	123.74	0.02	0.02	0.00
22.00	0.01	671	123.71	0.02	0.02	0.00
23.00	0.01	641	123.66	0.02	0.02	0.00
24.00	0.01	609	123.62	0.02	0.02	0.00
25.00	0.00	555	123.54	0.02	0.02	0.00
26.00	0.00	501	123.45	0.01	0.01	0.00
27.00	0.00	450	123.37	0.01	0.01	0.00
28.00	0.00	402	123.28	0.01	0.01	0.00
29.00	0.00	357	123.20	0.01	0.01	0.00
30.00	0.00	315	123.11	0.01	0.01	0.00
31.00	0.00	275	123.03	0.01	0.01	0.00
32.00	0.00	239	122.94	0.01	0.01	0.00
33.00	0.00	205	122.86	0.01	0.01	0.00
34.00	0.00	173	122.77	0.01	0.01	0.00
35.00	0.00	144	122.69	0.01	0.01	0.00
36.00	0.00	118	122.60	0.01	0.01	0.00
37.00	0.00	94	122.52	0.01	0.01	0.00
38.00	0.00	72	122.43	0.01	0.01	0.00
39.00	0.00	53	122.35	0.00	0.00	0.00
40.00	0.00	36	122.26	0.00	0.00	0.00
41.00	0.00	22	122.18	0.00	0.00	0.00
42.00	0.00	10	122.09	0.00	0.00	0.00
43.00	0.00	1	122.01	0.00	0.00	0.00
44.00	0.00	0	122.00	0.00	0.00	0.00
45.00	0.00	0	122.00	0.00	0.00	0.00
46.00	0.00	0	122.00	0.00	0.00	0.00
47.00	0.00	0	122.00	0.00	0.00	0.00
48.00	0.00	0	122.00	0.00	0.00	0.00

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**Stage-Discharge for Pond IB-1: Infiltration Basin #1**

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
122.00	0.00	0.00	0.00
122.05	0.00	0.00	0.00
122.10	0.00	0.00	0.00
122.15	0.00	0.00	0.00
122.20	0.00	0.00	0.00
122.25	0.00	0.00	0.00
122.30	0.00	0.00	0.00
122.35	0.01	0.01	0.00
122.40	0.01	0.01	0.00
122.45	0.01	0.01	0.00
122.50	0.01	0.01	0.00
122.55	0.01	0.01	0.00
122.60	0.01	0.01	0.00
122.65	0.01	0.01	0.00
122.70	0.01	0.01	0.00
122.75	0.01	0.01	0.00
122.80	0.01	0.01	0.00
122.85	0.01	0.01	0.00
122.90	0.01	0.01	0.00
122.95	0.01	0.01	0.00
123.00	0.01	0.01	0.00
123.05	0.01	0.01	0.00
123.10	0.01	0.01	0.00
123.15	0.01	0.01	0.00
123.20	0.01	0.01	0.00
123.25	0.01	0.01	0.00
123.30	0.01	0.01	0.00
123.35	0.01	0.01	0.00
123.40	0.01	0.01	0.00
123.45	0.01	0.01	0.00
123.50	0.02	0.02	0.00
123.55	0.02	0.02	0.00
123.60	0.02	0.02	0.00
123.65	0.02	0.02	0.00
123.70	0.02	0.02	0.00
123.75	0.02	0.02	0.00
123.80	0.02	0.02	0.00
123.85	0.02	0.02	0.00
123.90	0.16	0.02	0.14
123.95	0.42	0.02	0.40
124.00	0.76	0.02	0.74
124.05	1.16	0.02	1.14
124.10	1.62	0.02	1.60
124.15	2.14	0.02	2.12
124.20	<b>2.71</b>	<b>0.02</b>	<b>2.68</b>

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**Stage-Area-Storage for Pond IB-1: Infiltration Basin #1**

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
122.00	93	0
122.05	110	5
122.10	127	11
122.15	144	18
122.20	161	25
122.25	178	34
122.30	195	43
122.35	212	53
122.40	229	64
122.45	246	76
122.50	264	89
122.55	281	103
122.60	298	117
122.65	315	132
122.70	332	149
122.75	349	166
122.80	366	184
122.85	383	202
122.90	400	222
122.95	417	242
123.00	434	264
123.05	454	286
123.10	474	309
123.15	495	333
123.20	515	358
123.25	535	385
123.30	555	412
123.35	576	440
123.40	596	470
123.45	616	500
123.50	637	531
123.55	657	563
123.60	677	597
123.65	697	631
123.70	718	667
123.75	738	703
123.80	758	740
123.85	778	779
123.90	799	818
123.95	819	859
124.00	839	900
124.05	861	942
124.10	883	986
124.15	905	1,031
124.20	927	1,077

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**Summary for Pond IB-2: Infiltration Basin #2**

Inflow Area = 33,268 sf, 68.13% Impervious, Inflow Depth = 1.78" for 2-YR event  
 Inflow = 1.60 cfs @ 12.09 hrs, Volume= 4,943 cf  
 Outflow = 0.40 cfs @ 12.48 hrs, Volume= 4,943 cf, Atten= 75%, Lag= 23.7 min  
 Discarded = 0.05 cfs @ 12.48 hrs, Volume= 3,772 cf  
 Primary = 0.35 cfs @ 12.48 hrs, Volume= 1,171 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3  
 Peak Elev= 123.60' @ 12.48 hrs Surf.Area= 2,117 sf Storage= 2,201 cf

Plug-Flow detention time= 398.5 min calculated for 4,943 cf (100% of inflow)  
 Center-of-Mass det. time= 398.5 min ( 1,221.9 - 823.4 )

Volume	Invert	Avail.Storage	Storage Description	
#1	122.00'	3,647 cf	<b>Custom Stage Data (Prismatic)</b>	Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	
122.00	672	0	0	
123.00	1,538	1,105	1,105	
124.00	2,504	2,021	3,126	
124.20	2,704	521	3,647	
Device	Routing	Invert	Outlet Devices	
#1	Discarded	122.00'	<b>1.020 in/hr Exfiltration over Surface area</b>	Phase-In= 0.01'
#2	Device 3	123.50'	<b>4.0' long x 0.5' breadth Broad-Crested Rectangular Weir</b>	
			Head (feet) 0.20 0.40 0.60 0.80 1.00	
			Coef. (English) 2.80 2.92 3.08 3.30 3.32	
#3	Primary	121.90'	<b>18.0" Round Culvert</b>	
			L= 20.0' CPP, square edge headwall, Ke= 0.500	
			Inlet / Outlet Invert= 121.90' / 121.70' S= 0.0100 '/' Cc= 0.900	
			n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf	

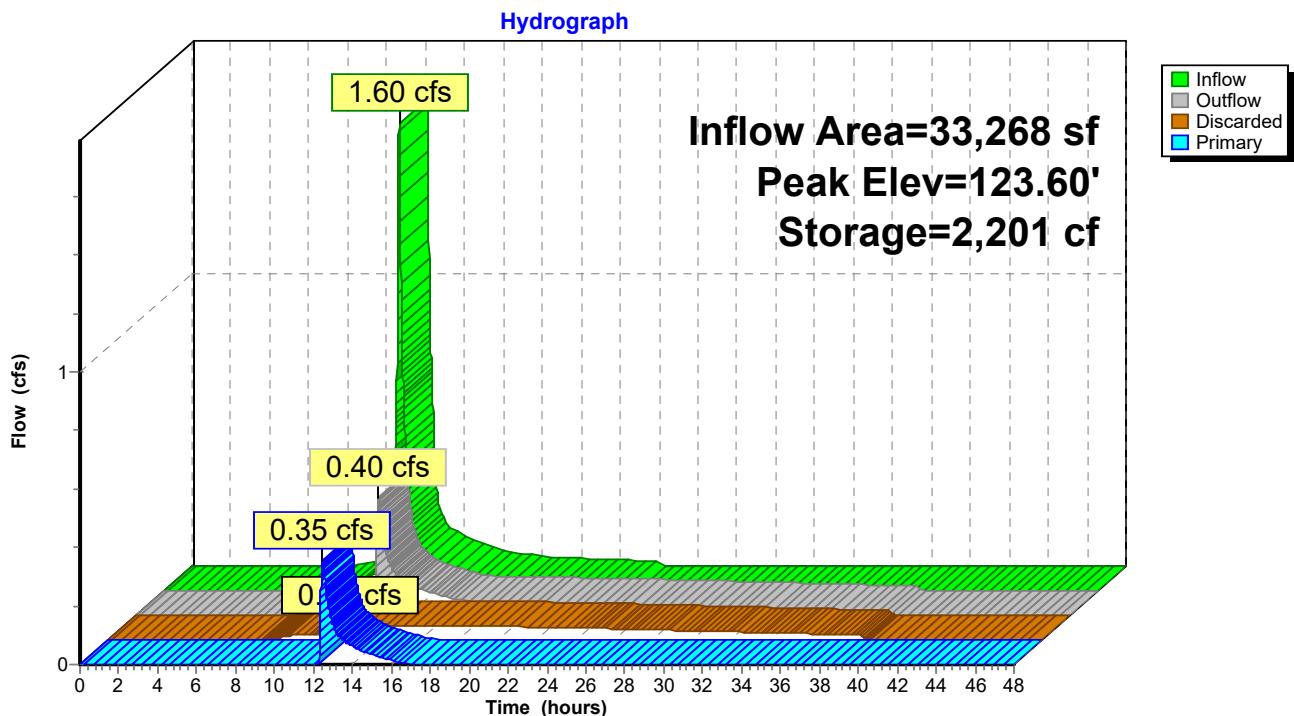
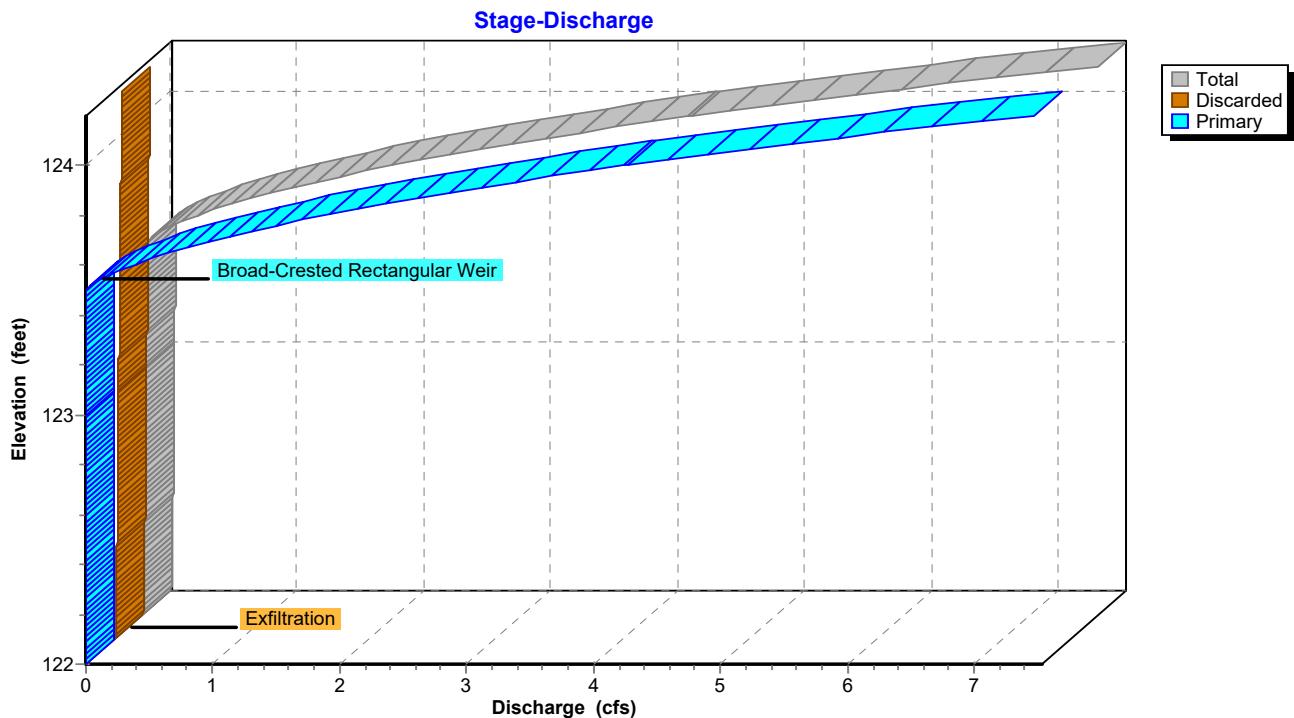
**Discarded OutFlow** Max=0.05 cfs @ 12.48 hrs HW=123.60' (Free Discharge)

↑ 1=Exfiltration (Exfiltration Controls 0.05 cfs)

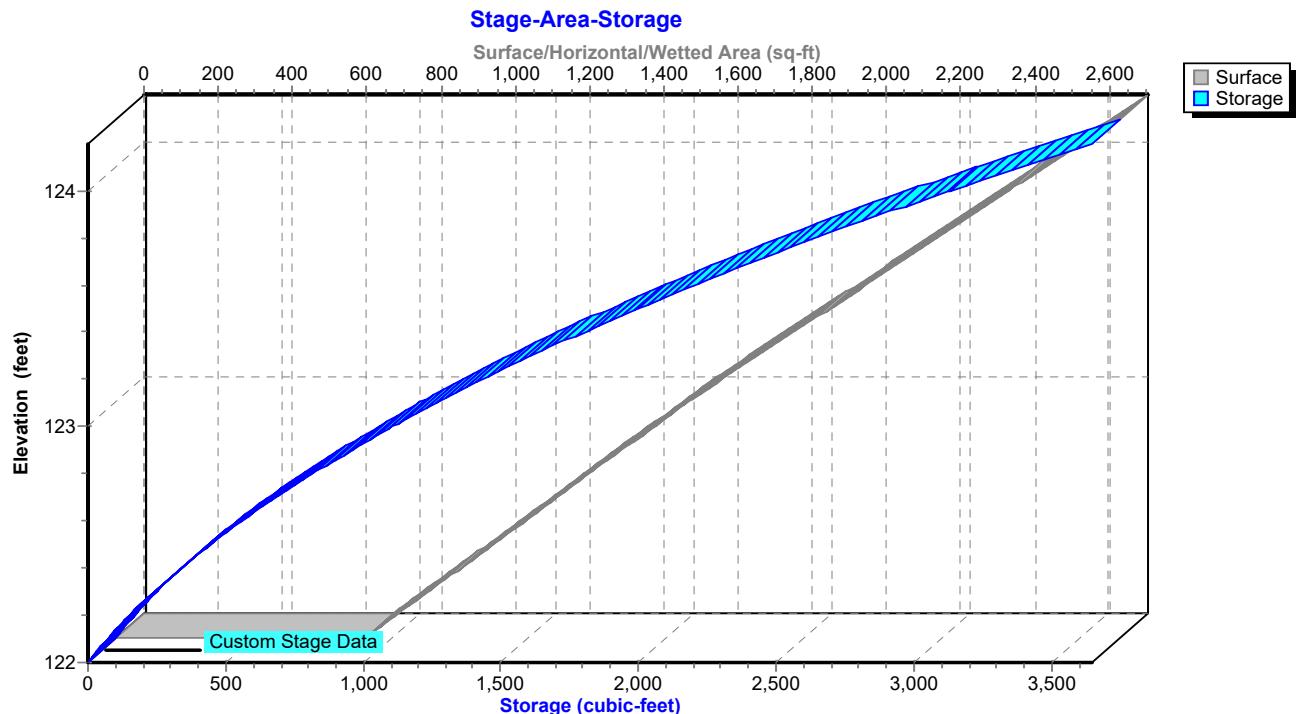
**Primary OutFlow** Max=0.35 cfs @ 12.48 hrs HW=123.60' TW=0.00' (Dynamic Tailwater)

↑ 3=Culvert (Passes 0.35 cfs of 7.70 cfs potential flow)

↑ 2=Broad-Crested Rectangular Weir (Weir Controls 0.35 cfs @ 0.88 fps)

**Pond IB-2: Infiltration Basin #2****Pond IB-2: Infiltration Basin #2**

### Pond IB-2: Infiltration Basin #2



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**Hydrograph for Pond IB-2: Infiltration Basin #2**

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	122.00	0.00	0.00	0.00
1.00	0.00	0	122.00	0.00	0.00	0.00
2.00	0.00	0	122.00	0.00	0.00	0.00
3.00	0.00	0	122.00	0.00	0.00	0.00
4.00	0.00	0	122.00	0.00	0.00	0.00
5.00	0.00	0	122.00	0.00	0.00	0.00
6.00	0.00	0	122.00	0.00	0.00	0.00
7.00	0.00	0	122.00	0.00	0.00	0.00
8.00	0.00	1	122.00	0.00	0.00	0.00
9.00	0.01	4	122.01	0.01	0.01	0.00
10.00	0.03	22	122.03	0.02	0.02	0.00
11.00	0.06	122	122.16	0.02	0.02	0.00
12.00	<b>0.93</b>	<b>844</b>	<b>122.82</b>	<b>0.03</b>	<b>0.03</b>	<b>0.00</b>
13.00	<b>0.16</b>	<b>2,104</b>	<b>123.55</b>	<b>0.19</b>	<b>0.05</b>	<b>0.14</b>
14.00	0.10	2,058	123.53	0.11	0.05	0.06
15.00	0.08	2,038	123.52	0.08	0.05	0.03
16.00	0.06	2,018	123.51	0.06	0.05	0.01
17.00	0.04	1,999	123.50	0.05	0.05	0.00
18.00	0.03	1,967	123.49	0.05	0.05	0.00
19.00	0.03	1,912	123.46	0.05	0.05	0.00
20.00	0.03	1,849	123.43	0.05	0.05	0.00
21.00	0.02	1,778	123.39	0.05	0.05	0.00
22.00	0.02	1,702	123.35	0.04	0.04	0.00
23.00	0.02	1,622	123.31	0.04	0.04	0.00
24.00	0.02	1,537	123.26	0.04	0.04	0.00
25.00	0.00	1,394	123.18	0.04	0.04	0.00
26.00	0.00	1,252	123.09	0.04	0.04	0.00
27.00	0.00	1,117	123.01	0.04	0.04	0.00
28.00	0.00	989	122.92	0.03	0.03	0.00
29.00	0.00	867	122.84	0.03	0.03	0.00
30.00	0.00	752	122.75	0.03	0.03	0.00
31.00	0.00	642	122.67	0.03	0.03	0.00
32.00	0.00	539	122.58	0.03	0.03	0.00
33.00	0.00	442	122.50	0.03	0.03	0.00
34.00	0.00	351	122.41	0.02	0.02	0.00
35.00	0.00	267	122.33	0.02	0.02	0.00
36.00	0.00	189	122.24	0.02	0.02	0.00
37.00	0.00	117	122.16	0.02	0.02	0.00
38.00	0.00	51	122.07	0.02	0.02	0.00
39.00	0.00	1	122.00	0.00	0.00	0.00
40.00	0.00	0	122.00	0.00	0.00	0.00
41.00	0.00	0	122.00	0.00	0.00	0.00
42.00	0.00	0	122.00	0.00	0.00	0.00
43.00	0.00	0	122.00	0.00	0.00	0.00
44.00	0.00	0	122.00	0.00	0.00	0.00
45.00	0.00	0	122.00	0.00	0.00	0.00
46.00	0.00	0	122.00	0.00	0.00	0.00
47.00	0.00	0	122.00	0.00	0.00	0.00
48.00	0.00	0	122.00	0.00	0.00	0.00

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**Stage-Discharge for Pond IB-2: Infiltration Basin #2**

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
122.00	0.00	0.00	0.00
122.05	0.02	0.02	0.00
122.10	0.02	0.02	0.00
122.15	0.02	0.02	0.00
122.20	0.02	0.02	0.00
122.25	0.02	0.02	0.00
122.30	0.02	0.02	0.00
122.35	0.02	0.02	0.00
122.40	0.02	0.02	0.00
122.45	0.03	0.03	0.00
122.50	0.03	0.03	0.00
122.55	0.03	0.03	0.00
122.60	0.03	0.03	0.00
122.65	0.03	0.03	0.00
122.70	0.03	0.03	0.00
122.75	0.03	0.03	0.00
122.80	0.03	0.03	0.00
122.85	0.03	0.03	0.00
122.90	0.03	0.03	0.00
122.95	0.04	0.04	0.00
123.00	0.04	0.04	0.00
123.05	0.04	0.04	0.00
123.10	0.04	0.04	0.00
123.15	0.04	0.04	0.00
123.20	0.04	0.04	0.00
123.25	0.04	0.04	0.00
123.30	0.04	0.04	0.00
123.35	0.04	0.04	0.00
123.40	0.05	0.05	0.00
123.45	0.05	0.05	0.00
123.50	0.05	0.05	0.00
123.55	0.17	0.05	0.13
123.60	0.40	0.05	0.35
123.65	0.70	0.05	0.65
123.70	1.05	0.05	1.00
123.75	1.47	0.05	1.41
123.80	1.93	0.05	1.88
123.85	2.45	0.06	2.39
123.90	3.01	0.06	2.95
123.95	3.63	0.06	3.57
124.00	4.30	0.06	4.24
124.05	5.02	0.06	4.96
124.10	5.79	0.06	5.73
124.15	6.63	0.06	6.57
124.20	<b>7.54</b>	<b>0.06</b>	<b>7.47</b>

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**Stage-Area-Storage for Pond IB-2: Infiltration Basin #2**

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
122.00	672	0
122.05	715	35
122.10	759	72
122.15	802	111
122.20	845	152
122.25	889	195
122.30	932	241
122.35	975	288
122.40	1,018	338
122.45	1,062	390
122.50	1,105	444
122.55	1,148	501
122.60	1,192	559
122.65	1,235	620
122.70	1,278	683
122.75	1,322	748
122.80	1,365	815
122.85	1,408	884
122.90	1,451	956
122.95	1,495	1,029
123.00	1,538	1,105
123.05	1,586	1,183
123.10	1,635	1,264
123.15	1,683	1,347
123.20	1,731	1,432
123.25	1,780	1,520
123.30	1,828	1,610
123.35	1,876	1,702
123.40	1,924	1,797
123.45	1,973	1,895
123.50	2,021	1,995
123.55	2,069	2,097
123.60	2,118	2,202
123.65	2,166	2,309
123.70	2,214	2,418
123.75	2,263	2,530
123.80	2,311	2,645
123.85	2,359	2,761
123.90	2,407	2,880
123.95	2,456	3,002
124.00	2,504	3,126
124.05	2,554	3,252
124.10	2,604	3,381
124.15	2,654	3,513
124.20	<b>2,704</b>	<b>3,647</b>

**Summary for Pond UG-1: Underground Detention System #1**

Inflow Area = 13,403 sf, 58.36% Impervious, Inflow Depth = 1.49" for 2-YR event  
 Inflow = 0.54 cfs @ 12.09 hrs, Volume= 1,664 cf  
 Outflow = 0.39 cfs @ 12.14 hrs, Volume= 1,662 cf, Atten= 26%, Lag= 3.0 min  
 Primary = 0.39 cfs @ 12.14 hrs, Volume= 1,662 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3  
 Peak Elev= 122.76' @ 12.17 hrs Surf.Area= 820 sf Storage= 216 cf

Plug-Flow detention time= 64.9 min calculated for 1,662 cf (100% of inflow)  
 Center-of-Mass det. time= 64.5 min ( 901.7 - 837.2 )

Volume	Invert	Avail.Storage	Storage Description
#1A	122.40'	156 cf	<b>10.00'W x 82.00'L x 2.17'H Field A</b> 1,777 cf Overall - 1,387 cf Embedded = 390 cf x 40.0% Voids
#2A	122.40'	792 cf	<b>retain_it retain_it 1.5' x 10 Inside #1</b> Inside= 84.0"W x 18.0"H => 9.90 sf x 8.00'L = 79.2 cf Outside= 96.0"W x 26.0"H => 17.33 sf x 8.00'L = 138.7 cf
948 cf			Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	122.40'	<b>15.0" Round Culvert</b> L= 140.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 122.40' / 121.50' S= 0.0064 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.23 sf

**Primary OutFlow** Max=0.39 cfs @ 12.14 hrs HW=122.76' TW=122.18' (Dynamic Tailwater)  
 ↑1=Culvert (Outlet Controls 0.39 cfs @ 2.06 fps)

**Pond UG-1: Underground Detention System #1 - Chamber Wizard Field A****Chamber Model = retain\_it retain\_it 1.5' (retain-it®)**

Inside= 84.0"W x 18.0"H =&gt; 9.90 sf x 8.00'L = 79.2 cf

Outside= 96.0"W x 26.0"H =&gt; 17.33 sf x 8.00'L = 138.7 cf

10 Chambers/Row x 8.00' Long = 80.00' Row Length +12.0" End Stone x 2 = 82.00' Base Length

1 Rows x 96.0" Wide + 12.0" Side Stone x 2 = 10.00' Base Width

26.0" Chamber Height = 2.17' Field Height

10 Chambers x 79.2 cf = 791.7 cf Chamber Storage

10 Chambers x 138.7 cf = 1,386.7 cf Displacement

1,776.7 cf Field - 1,386.7 cf Chambers = 390.0 cf Stone x 40.0% Voids = 156.0 cf Stone Storage

Chamber Storage + Stone Storage = 947.7 cf = 0.022 af

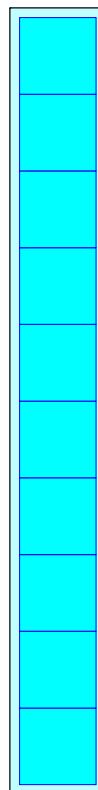
Overall Storage Efficiency = 53.3%

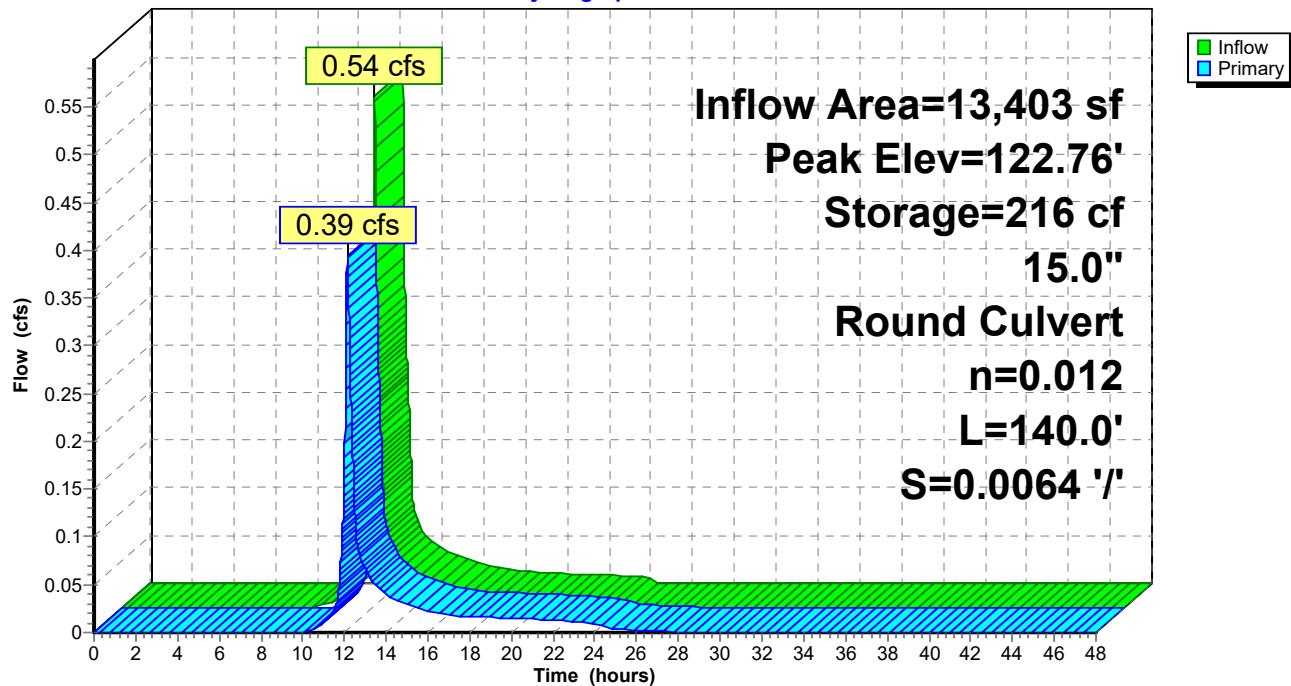
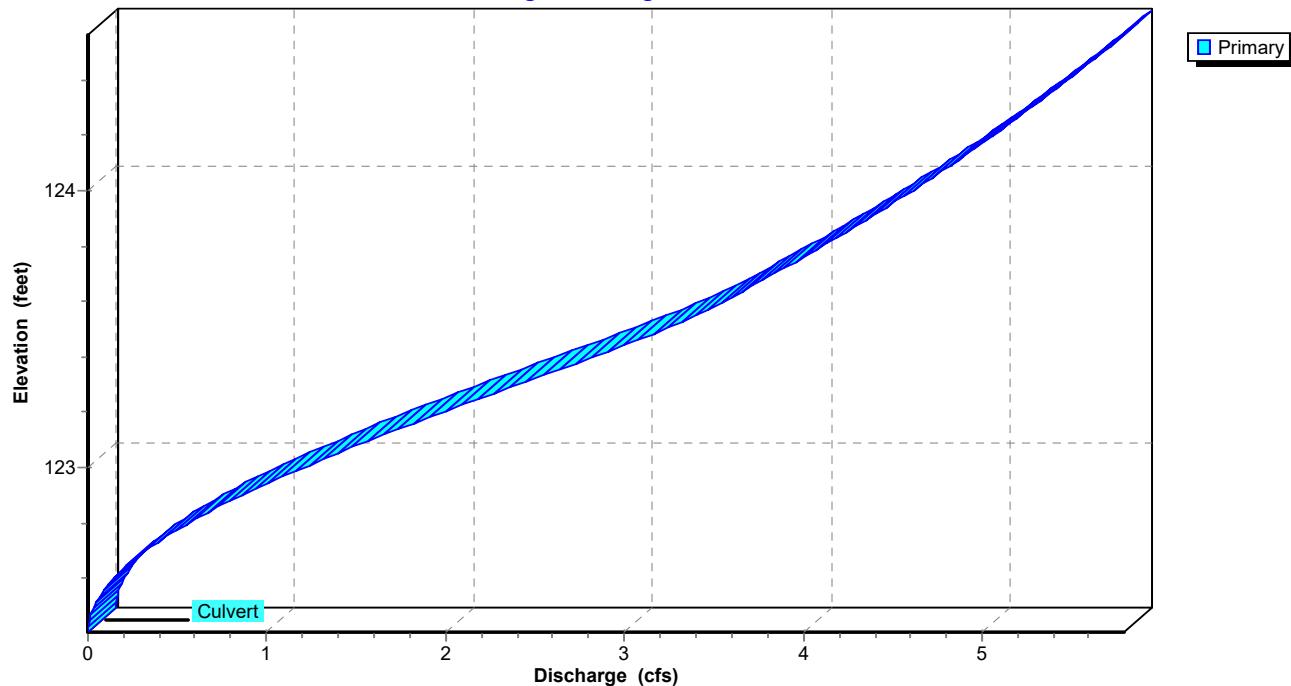
Overall System Size = 82.00' x 10.00' x 2.17'

10 Chambers

65.8 cy Field

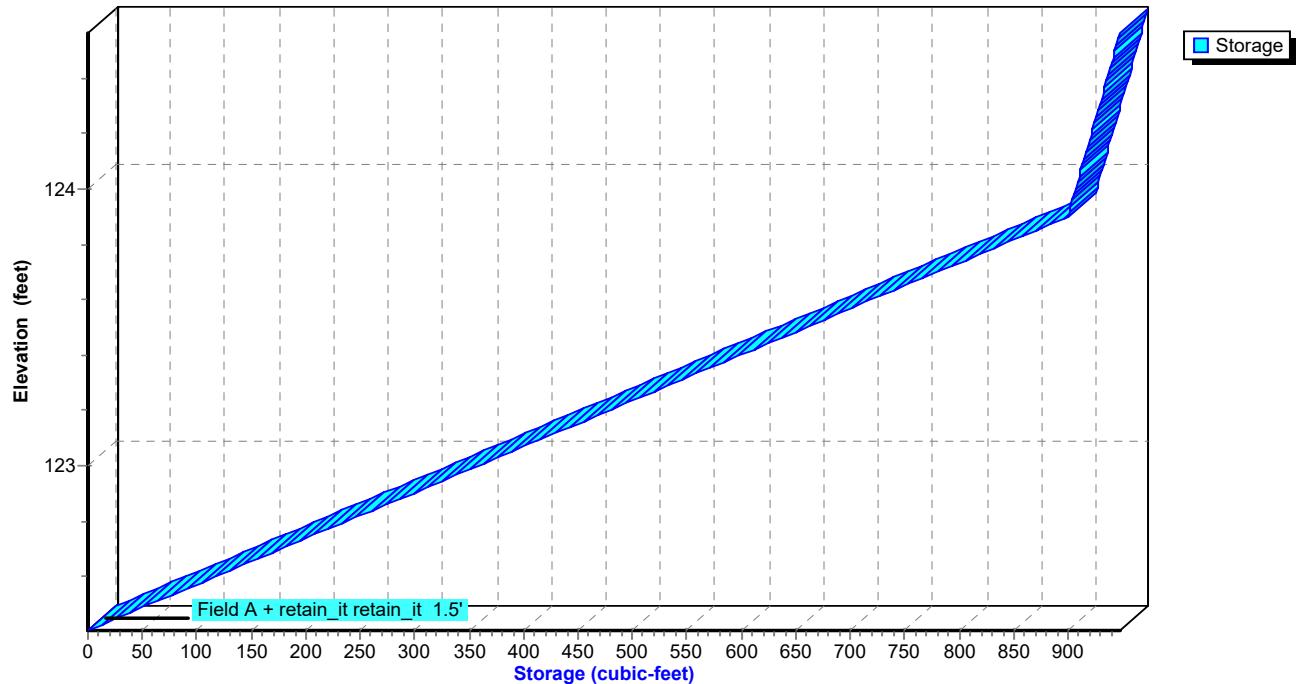
14.4 cy Stone



**Pond UG-1: Underground Detention System #1****Hydrograph****Pond UG-1: Underground Detention System #1****Stage-Discharge**

### Pond UG-1: Underground Detention System #1

Stage-Area-Storage



**Hydrograph for Pond UG-1: Underground Detention System #1**

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0	122.40	0.00
1.00	0.00	0	122.40	0.00
2.00	0.00	0	122.40	0.00
3.00	0.00	0	122.40	0.00
4.00	0.00	0	122.40	0.00
5.00	0.00	0	122.40	0.00
6.00	0.00	0	122.40	0.00
7.00	0.00	0	122.40	0.00
8.00	0.00	0	122.40	0.00
9.00	0.00	0	122.40	0.00
10.00	0.01	9	122.41	0.00
11.00	0.02	32	122.45	0.01
12.00	<b>0.30</b>	<b>128</b>	<b>122.61</b>	<b>0.17</b>
13.00	<b>0.06</b>	<b>196</b>	<b>122.73</b>	<b>0.07</b>
14.00	0.04	177	122.70	0.04
15.00	0.03	168	122.68	0.03
16.00	0.02	161	122.67	0.02
17.00	0.02	154	122.66	0.02
18.00	0.01	144	122.64	0.02
19.00	0.01	129	122.61	0.02
20.00	0.01	111	122.58	0.02
21.00	0.01	93	122.55	0.01
22.00	0.01	76	122.53	0.01
23.00	0.01	62	122.50	0.01
24.00	0.01	51	122.48	0.01
25.00	0.00	30	122.45	0.00
26.00	0.00	20	122.43	0.00
27.00	0.00	15	122.42	0.00
28.00	0.00	11	122.42	0.00
29.00	0.00	9	122.42	0.00
30.00	0.00	7	122.41	0.00
31.00	0.00	6	122.41	0.00
32.00	0.00	5	122.41	0.00
33.00	0.00	5	122.41	0.00
34.00	0.00	4	122.41	0.00
35.00	0.00	4	122.41	0.00
36.00	0.00	3	122.41	0.00
37.00	0.00	3	122.41	0.00
38.00	0.00	3	122.40	0.00
39.00	0.00	3	122.40	0.00
40.00	0.00	3	122.40	0.00
41.00	0.00	2	122.40	0.00
42.00	0.00	2	122.40	0.00
43.00	0.00	2	122.40	0.00
44.00	0.00	2	122.40	0.00
45.00	0.00	2	122.40	0.00
46.00	0.00	2	122.40	0.00
47.00	0.00	2	122.40	0.00
48.00	0.00	2	122.40	0.00

**Stage-Discharge for Pond UG-1: Underground Detention System #1**

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
122.40	0.00	123.46	3.07	124.52	5.70
122.42	0.00	123.48	3.15	124.54	5.74
122.44	0.01	123.50	3.22	124.56	<b>5.78</b>
122.46	0.01	123.52	3.30		
122.48	0.02	123.54	3.37		
122.50	0.04	123.56	3.44		
122.52	0.06	123.58	3.50		
122.54	0.08	123.60	3.56		
122.56	0.10	123.62	3.62		
122.58	0.12	123.64	3.67		
122.60	0.15	123.66	3.72		
122.62	0.18	123.68	3.78		
122.64	0.22	123.70	3.83		
122.66	0.25	123.72	3.89		
122.68	0.29	123.74	3.94		
122.70	0.33	123.76	4.00		
122.72	0.38	123.78	4.05		
122.74	0.42	123.80	4.11		
122.76	0.47	123.82	4.16		
122.78	0.52	123.84	4.21		
122.80	0.58	123.86	4.26		
122.82	0.63	123.88	4.31		
122.84	0.69	123.90	4.36		
122.86	0.75	123.92	4.41		
122.88	0.81	123.94	4.46		
122.90	0.87	123.96	4.51		
122.92	0.94	123.98	4.56		
122.94	1.00	124.00	4.61		
122.96	1.07	124.02	4.65		
122.98	1.14	124.04	4.70		
123.00	1.21	124.06	4.75		
123.02	1.29	124.08	4.79		
123.04	1.36	124.10	4.84		
123.06	1.44	124.12	4.88		
123.08	1.51	124.14	4.93		
123.10	1.59	124.16	4.97		
123.12	1.67	124.18	5.01		
123.14	1.75	124.20	5.06		
123.16	1.83	124.22	5.10		
123.18	1.91	124.24	5.14		
123.20	1.99	124.26	5.18		
123.22	2.08	124.28	5.23		
123.24	2.16	124.30	5.27		
123.26	2.24	124.32	5.31		
123.28	2.33	124.34	5.35		
123.30	2.41	124.36	5.39		
123.32	2.50	124.38	5.43		
123.34	2.58	124.40	5.47		
123.36	2.66	124.42	5.51		
123.38	2.75	124.44	5.55		
123.40	2.83	124.46	5.59		
123.42	2.91	124.48	5.63		
123.44	2.99	124.50	5.67		

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**Stage-Area-Storage for Pond UG-1: Underground Detention System #1**

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
122.40	0	123.46	636	124.52	944
122.42	12	123.48	648	124.54	946
122.44	24	123.50	660	124.56	<b>947</b>
122.46	36	123.52	672		
122.48	48	123.54	684		
122.50	60	123.56	696		
122.52	72	123.58	708		
122.54	84	123.60	720		
122.56	96	123.62	732		
122.58	108	123.64	744		
122.60	120	123.66	756		
122.62	132	123.68	768		
122.64	144	123.70	780		
122.66	156	123.72	792		
122.68	168	123.74	804		
122.70	180	123.76	816		
122.72	192	123.78	828		
122.74	204	123.80	840		
122.76	216	123.82	852		
122.78	228	123.84	864		
122.80	240	123.86	876		
122.82	252	123.88	888		
122.84	264	123.90	900		
122.86	276	123.92	901		
122.88	288	123.94	903		
122.90	300	123.96	904		
122.92	312	123.98	905		
122.94	324	124.00	907		
122.96	336	124.02	908		
122.98	348	124.04	910		
123.00	360	124.06	911		
123.02	372	124.08	913		
123.04	384	124.10	914		
123.06	396	124.12	916		
123.08	408	124.14	917		
123.10	420	124.16	918		
123.12	432	124.18	920		
123.14	444	124.20	921		
123.16	456	124.22	923		
123.18	468	124.24	924		
123.20	480	124.26	926		
123.22	492	124.28	927		
123.24	504	124.30	929		
123.26	516	124.32	930		
123.28	528	124.34	931		
123.30	540	124.36	933		
123.32	552	124.38	934		
123.34	564	124.40	936		
123.36	576	124.42	937		
123.38	588	124.44	939		
123.40	600	124.46	940		
123.42	612	124.48	941		
123.44	624	124.50	943		

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**Summary for Pond UG-2: Underground Infiltration System #1**

Inflow Area = 42,604 sf, 63.97% Impervious, Inflow Depth = 1.69" for 2-YR event  
 Inflow = 1.75 cfs @ 12.10 hrs, Volume= 6,001 cf  
 Outflow = 0.27 cfs @ 12.67 hrs, Volume= 6,001 cf, Atten= 84%, Lag= 34.5 min  
 Discarded = 0.06 cfs @ 11.38 hrs, Volume= 4,899 cf  
 Primary = 0.21 cfs @ 12.67 hrs, Volume= 1,102 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3  
 Peak Elev= 122.71' @ 12.67 hrs Surf.Area= 2,548 sf Storage= 2,495 cf

Plug-Flow detention time= 348.2 min calculated for 6,000 cf (100% of inflow)  
 Center-of-Mass det. time= 348.1 min ( 1,193.2 - 845.1 )

Volume	Invert	Avail.Storage	Storage Description
#1A	121.50'	260 cf	<b>26.00'W x 98.00'L x 2.67'H Field A</b> 6,795 cf Overall - 6,144 cf Embedded = 651 cf x 40.0% Voids
#2A	121.50'	3,913 cf	<b>retain_it retain_it 2.0' x 36 Inside #1</b> Inside= 84.0"W x 24.0"H => 13.78 sf x 8.00'L = 110.3 cf Outside= 96.0"W x 32.0"H => 21.33 sf x 8.00'L = 170.7 cf 3 Rows adjusted for 56.7 cf perimeter wall
4,174 cf			Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	121.50'	<b>1.020 in/hr Exfiltration over Surface area</b> Phase-In= 0.01'
#2	Device 3	121.50'	<b>18.0" Round Culvert</b> L= 30.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 121.50' / 121.50' S= 0.0000 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf
#3	Device 4	122.65'	<b>4.0' long Sharp-Crested Rectangular Weir</b> 2 End Contraction(s)
#4	Primary	122.02'	<b>15.0" Round Culvert</b> L= 60.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 122.02' / 121.70' S= 0.0053 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.23 sf

**Discarded OutFlow** Max=0.06 cfs @ 11.38 hrs HW=121.53' (Free Discharge)  
 ↑ 1=Exfiltration (Exfiltration Controls 0.06 cfs)

**Primary OutFlow** Max=0.21 cfs @ 12.67 hrs HW=122.71' TW=0.00' (Dynamic Tailwater)  
 ↑ 4=Culvert (Passes 0.21 cfs of 1.60 cfs potential flow)  
 ↑ 3=Sharp-Crested Rectangular Weir (Weir Controls 0.21 cfs @ 0.83 fps)  
 ↑ 2=Culvert (Passes 0.21 cfs of 1.48 cfs potential flow)

**Pond UG-2: Underground Infiltration System #1 - Chamber Wizard Field A****Chamber Model = retain\_it retain\_it 2.0' (retain-it®)**

Inside= 84.0"W x 24.0"H =&gt; 13.78 sf x 8.00'L = 110.3 cf

Outside= 96.0"W x 32.0"H =&gt; 21.33 sf x 8.00'L = 170.7 cf

3 Rows adjusted for 56.7 cf perimeter wall

12 Chambers/Row x 8.00' Long = 96.00' Row Length +12.0" End Stone x 2 = 98.00' Base Length

3 Rows x 96.0" Wide + 12.0" Side Stone x 2 = 26.00' Base Width

32.0" Chamber Height = 2.67' Field Height

1.9 cf Sidewall x 12 x 2 + 1.9 cf Endwall x 3 x 2 = 56.7 cf Perimeter Wall

36 Chambers x 110.3 cf - 56.7 cf Perimeter wall = 3,913.4 cf Chamber Storage

36 Chambers x 170.7 cf = 6,144.0 cf Displacement

6,794.7 cf Field - 6,144.0 cf Chambers = 650.7 cf Stone x 40.0% Voids = 260.3 cf Stone Storage

Chamber Storage + Stone Storage = 4,173.6 cf = 0.096 af

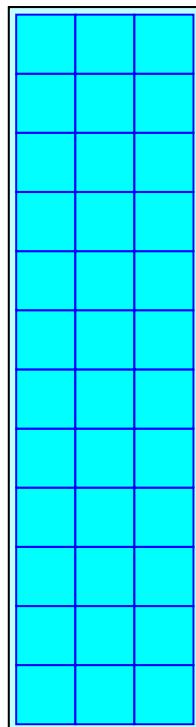
Overall Storage Efficiency = 61.4%

Overall System Size = 98.00' x 26.00' x 2.67'

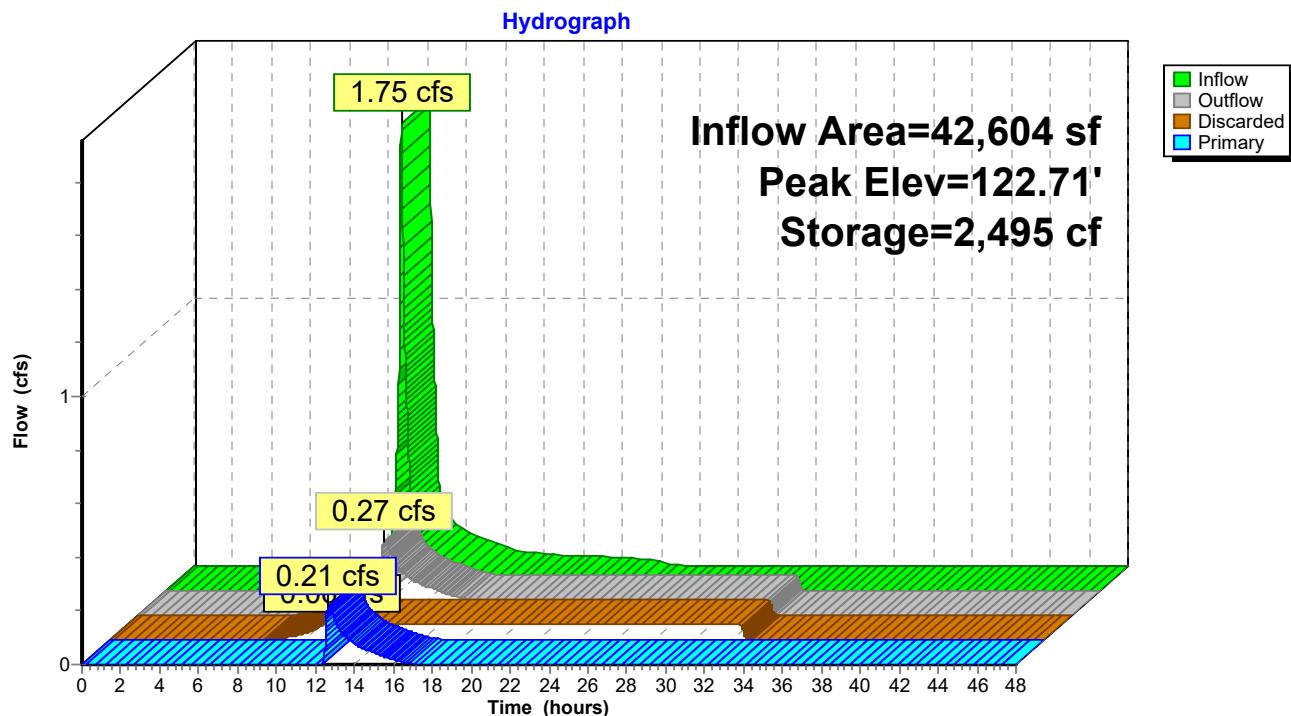
36 Chambers

251.7 cy Field

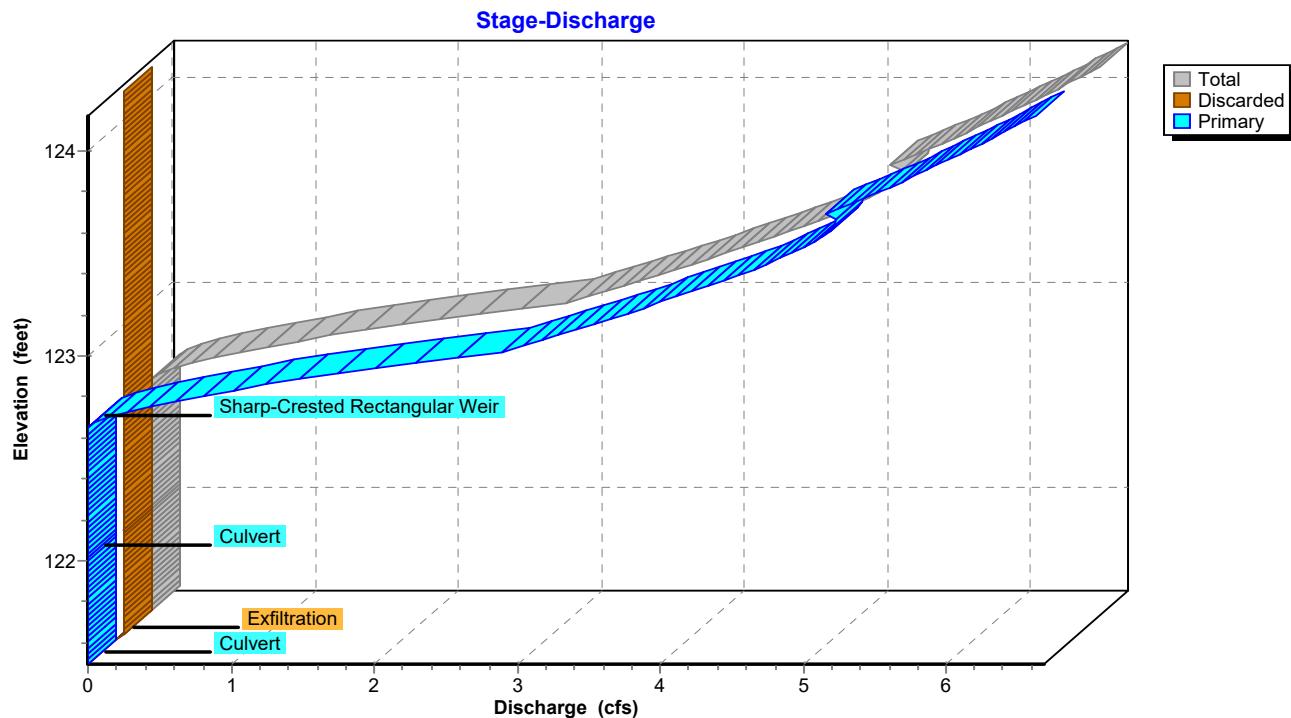
24.1 cy Stone



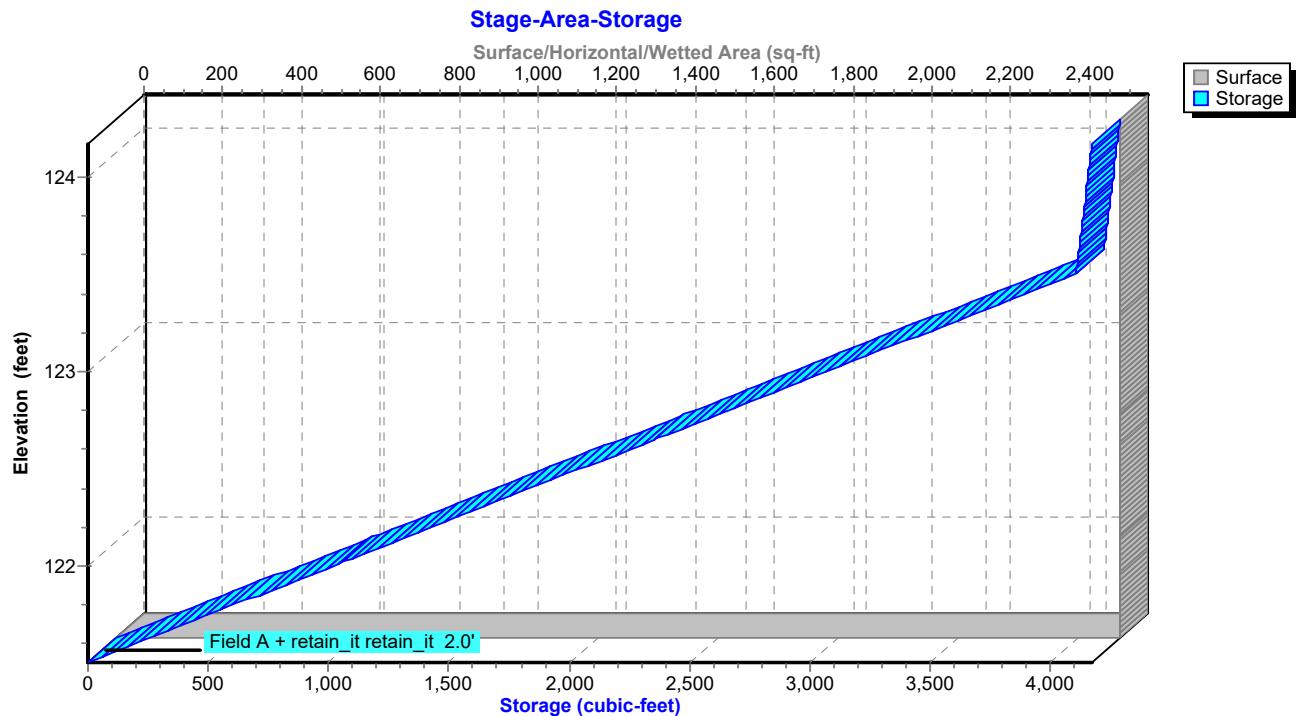
### Pond UG-2: Underground Infiltration System #1



### Pond UG-2: Underground Infiltration System #1



### Pond UG-2: Underground Infiltration System #1



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**Hydrograph for Pond UG-2: Underground Infiltration System #1**

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	121.50	0.00	0.00	0.00
1.00	0.00	0	121.50	0.00	0.00	0.00
2.00	0.00	0	121.50	0.00	0.00	0.00
3.00	0.00	0	121.50	0.00	0.00	0.00
4.00	0.00	0	121.50	0.00	0.00	0.00
5.00	0.00	0	121.50	0.00	0.00	0.00
6.00	0.00	0	121.50	0.00	0.00	0.00
7.00	0.00	0	121.50	0.00	0.00	0.00
8.00	0.00	0	121.50	0.00	0.00	0.00
9.00	0.01	3	121.50	0.01	0.01	0.00
10.00	0.03	8	121.50	0.02	0.02	0.00
11.00	0.07	21	121.51	0.06	<b>0.06</b>	0.00
12.00	<b>0.98</b>	<b>657</b>	<b>121.82</b>	<b>0.06</b>	<b>0.06</b>	<b>0.00</b>
13.00	<b>0.20</b>	<b>2,475</b>	<b>122.70</b>	<b>0.23</b>	0.06	<b>0.17</b>
14.00	0.13	2,430	122.68	0.14	0.06	0.08
15.00	0.10	2,408	122.67	0.10	0.06	0.04
16.00	0.07	2,387	122.66	0.08	0.06	0.02
17.00	0.06	2,367	122.65	0.06	0.06	0.00
18.00	0.05	2,334	122.64	0.06	0.06	0.00
19.00	0.04	2,276	122.61	0.06	0.06	0.00
20.00	0.04	2,206	122.57	0.06	0.06	0.00
21.00	0.04	2,125	122.53	0.06	0.06	0.00
22.00	0.03	2,032	122.49	0.06	0.06	0.00
23.00	0.03	1,926	122.44	0.06	0.06	0.00
24.00	0.03	1,807	122.38	0.06	0.06	0.00
25.00	0.00	1,618	122.29	0.06	0.06	0.00
26.00	0.00	1,411	122.19	0.06	0.06	0.00
27.00	0.00	1,200	122.08	0.06	0.06	0.00
28.00	0.00	987	121.98	0.06	0.06	0.00
29.00	0.00	773	121.88	0.06	0.06	0.00
30.00	0.00	558	121.77	0.06	0.06	0.00
31.00	0.00	343	121.67	0.06	0.06	0.00
32.00	0.00	127	121.56	0.06	0.06	0.00
33.00	0.00	0	121.50	0.00	0.00	0.00
34.00	0.00	0	121.50	0.00	0.00	0.00
35.00	0.00	0	121.50	0.00	0.00	0.00
36.00	0.00	0	121.50	0.00	0.00	0.00
37.00	0.00	0	121.50	0.00	0.00	0.00
38.00	0.00	0	121.50	0.00	0.00	0.00
39.00	0.00	0	121.50	0.00	0.00	0.00
40.00	0.00	0	121.50	0.00	0.00	0.00
41.00	0.00	0	121.50	0.00	0.00	0.00
42.00	0.00	0	121.50	0.00	0.00	0.00
43.00	0.00	0	121.50	0.00	0.00	0.00
44.00	0.00	0	121.50	0.00	0.00	0.00
45.00	0.00	0	121.50	0.00	0.00	0.00
46.00	0.00	0	121.50	0.00	0.00	0.00
47.00	0.00	0	121.50	0.00	0.00	0.00
48.00	0.00	0	121.50	0.00	0.00	0.00

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**Stage-Discharge for Pond UG-2: Underground Infiltration System #1**

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)	Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
121.50	0.00	<b>0.00</b>	0.00	124.15	<b>6.64</b>	0.06	<b>6.57</b>
121.55	0.06	<b>0.06</b>	0.00				
121.60	0.06	0.06	0.00				
121.65	0.06	0.06	0.00				
121.70	0.06	0.06	0.00				
121.75	0.06	0.06	0.00				
121.80	0.06	0.06	0.00				
121.85	0.06	0.06	0.00				
121.90	0.06	0.06	0.00				
121.95	0.06	0.06	0.00				
122.00	0.06	0.06	0.00				
122.05	0.06	0.06	0.00				
122.10	0.06	0.06	0.00				
122.15	0.06	0.06	0.00				
122.20	0.06	0.06	0.00				
122.25	0.06	0.06	0.00				
122.30	0.06	0.06	0.00				
122.35	0.06	0.06	0.00				
122.40	0.06	0.06	0.00				
122.45	0.06	0.06	0.00				
122.50	0.06	0.06	0.00				
122.55	0.06	0.06	0.00				
122.60	0.06	0.06	0.00				
122.65	0.06	0.06	0.00				
122.70	0.21	0.06	0.15				
122.75	0.47	0.06	0.41				
122.80	0.81	0.06	0.75				
122.85	1.22	0.06	1.16				
122.90	1.67	0.06	1.61				
122.95	2.18	0.06	2.12				
123.00	2.72	0.06	2.66				
123.05	3.12	0.06	3.06				
123.10	3.35	0.06	3.29				
123.15	3.57	0.06	3.51				
123.20	3.80	0.06	3.74				
123.25	4.02	0.06	3.96				
123.30	4.23	0.06	4.17				
123.35	4.44	0.06	4.38				
123.40	4.63	0.06	4.57				
123.45	4.81	0.06	4.75				
123.50	4.98	0.06	4.92				
123.55	5.12	0.06	5.06				
123.60	5.23	0.06	5.17				
123.65	5.29	0.06	5.23				
123.70	5.26	0.06	5.20				
123.75	5.43	0.06	5.37				
123.80	5.59	0.06	5.53				
123.85	5.75	0.06	5.69				
123.90	5.91	0.06	5.85				
123.95	6.06	0.06	6.00				
124.00	6.21	0.06	6.15				
124.05	6.36	0.06	6.30				
124.10	6.50	0.06	6.44				

**Stage-Area-Storage for Pond UG-2: Underground Infiltration System #1**

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
121.50	<b>2,548</b>	0	124.15	2,548	<b>4,172</b>
121.55	2,548	103			
121.60	2,548	205			
121.65	2,548	308			
121.70	2,548	411			
121.75	2,548	514			
121.80	2,548	616			
121.85	2,548	719			
121.90	2,548	822			
121.95	2,548	924			
122.00	2,548	1,027			
122.05	2,548	1,130			
122.10	2,548	1,233			
122.15	2,548	1,335			
122.20	2,548	1,438			
122.25	2,548	1,541			
122.30	2,548	1,643			
122.35	2,548	1,746			
122.40	2,548	1,849			
122.45	2,548	1,952			
122.50	2,548	2,054			
122.55	2,548	2,157			
122.60	2,548	2,260			
122.65	2,548	2,362			
122.70	2,548	2,465			
122.75	2,548	2,568			
122.80	2,548	2,671			
122.85	2,548	2,773			
122.90	2,548	2,876			
122.95	2,548	2,979			
123.00	2,548	3,081			
123.05	2,548	3,184			
123.10	2,548	3,287			
123.15	2,548	3,390			
123.20	2,548	3,492			
123.25	2,548	3,595			
123.30	2,548	3,698			
123.35	2,548	3,800			
123.40	2,548	3,903			
123.45	2,548	4,006			
123.50	2,548	4,109			
123.55	2,548	4,113			
123.60	2,548	4,118			
123.65	2,548	4,123			
123.70	2,548	4,128			
123.75	2,548	4,133			
123.80	2,548	4,138			
123.85	2,548	4,143			
123.90	2,548	4,148			
123.95	2,548	4,152			
124.00	2,548	4,157			
124.05	2,548	4,162			
124.10	2,548	4,167			

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**Summary for Pond UG-3: Underground Infiltration System #2**

Inflow Area = 34,270 sf, 100.00% Impervious, Inflow Depth = 2.91" for 2-YR event  
 Inflow = 2.40 cfs @ 12.08 hrs, Volume= 8,304 cf  
 Outflow = 1.40 cfs @ 12.19 hrs, Volume= 8,304 cf, Atten= 42%, Lag= 6.5 min  
 Discarded = 0.05 cfs @ 8.39 hrs, Volume= 5,505 cf  
 Primary = 1.36 cfs @ 12.19 hrs, Volume= 2,799 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3  
 Peak Elev= 123.47' @ 12.19 hrs Surf.Area= 1,924 sf Storage= 3,046 cf

Plug-Flow detention time= 368.4 min calculated for 8,304 cf (100% of inflow)  
 Center-of-Mass det. time= 368.4 min ( 1,125.2 - 756.8 )

Volume	Invert	Avail.Storage	Storage Description
#1A	121.50'	209 cf	<b>26.00'W x 74.00'L x 2.67'H Field A</b> 5,131 cf Overall - 4,608 cf Embedded = 523 cf x 40.0% Voids
#2A	121.50'	2,932 cf	<b>retain_it retain_it 2.0' x 27 Inside #1</b> Inside= 84.0"W x 24.0"H => 13.78 sf x 8.00'L = 110.3 cf Outside= 96.0"W x 32.0"H => 21.33 sf x 8.00'L = 170.7 cf 3 Rows adjusted for 45.4 cf perimeter wall
3,141 cf			Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	121.50'	<b>1.020 in/hr Exfiltration over Surface area</b> Phase-In= 0.01'
#2	Device 3	121.50'	<b>18.0" Round Culvert</b> L= 70.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 121.50' / 121.50' S= 0.0000 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf
#3	Device 4	123.25'	<b>4.0' long Sharp-Crested Rectangular Weir</b> 2 End Contraction(s)
#4	Primary	122.02'	<b>15.0" Round Culvert</b> L= 60.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 122.02' / 121.70' S= 0.0053 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.23 sf

**Discarded OutFlow** Max=0.05 cfs @ 8.39 hrs HW=121.53' (Free Discharge)  
 ↑ 1=Exfiltration (Exfiltration Controls 0.05 cfs)

**Primary OutFlow** Max=1.36 cfs @ 12.19 hrs HW=123.47' TW=0.00' (Dynamic Tailwater)  
 ↑ 4=Culvert (Passes 1.36 cfs of 4.83 cfs potential flow)  
 ↑ 3=Sharp-Crested Rectangular Weir (Weir Controls 1.36 cfs @ 1.54 fps)  
 ↑ 2=Culvert (Passes 1.36 cfs of 3.17 cfs potential flow)

**Pond UG-3: Underground Infiltration System #2 - Chamber Wizard Field A****Chamber Model = retain\_it retain\_it 2.0' (retain-it®)**

Inside= 84.0"W x 24.0"H =&gt; 13.78 sf x 8.00'L = 110.3 cf

Outside= 96.0"W x 32.0"H =&gt; 21.33 sf x 8.00'L = 170.7 cf

3 Rows adjusted for 45.4 cf perimeter wall

9 Chambers/Row x 8.00' Long = 72.00' Row Length +12.0" End Stone x 2 = 74.00' Base Length

3 Rows x 96.0" Wide + 12.0" Side Stone x 2 = 26.00' Base Width

32.0" Chamber Height = 2.67' Field Height

1.9 cf Sidewall x 9 x 2 + 1.9 cf Endwall x 3 x 2 = 45.4 cf Perimeter Wall

27 Chambers x 110.3 cf - 45.4 cf Perimeter wall = 2,932.2 cf Chamber Storage

27 Chambers x 170.7 cf = 4,608.0 cf Displacement

5,130.7 cf Field - 4,608.0 cf Chambers = 522.7 cf Stone x 40.0% Voids = 209.1 cf Stone Storage

Chamber Storage + Stone Storage = 3,141.3 cf = 0.072 af

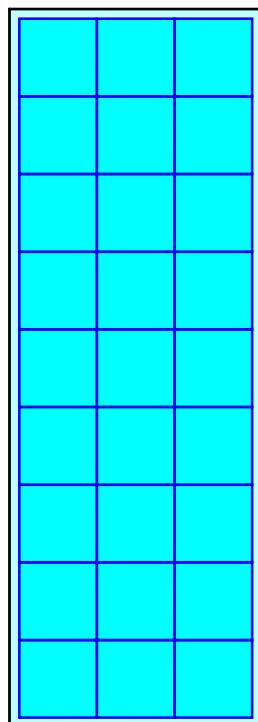
Overall Storage Efficiency = 61.2%

Overall System Size = 74.00' x 26.00' x 2.67'

27 Chambers

190.0 cy Field

19.4 cy Stone



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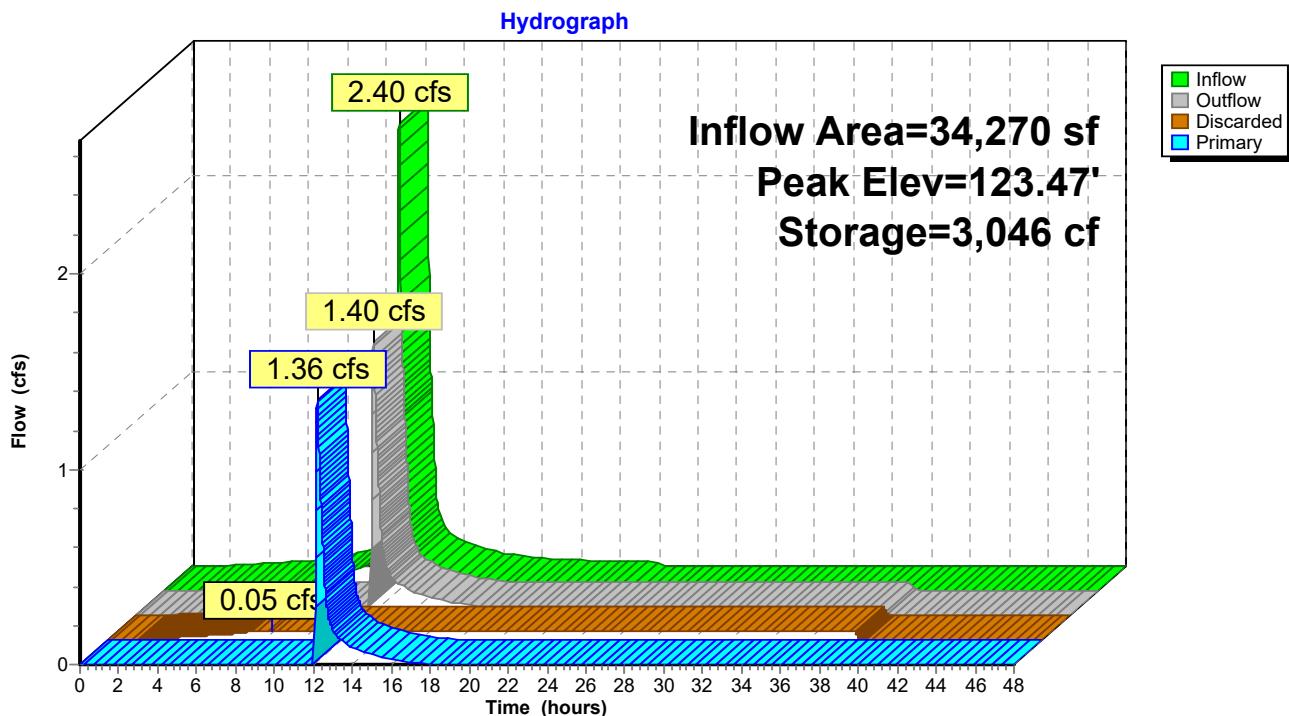
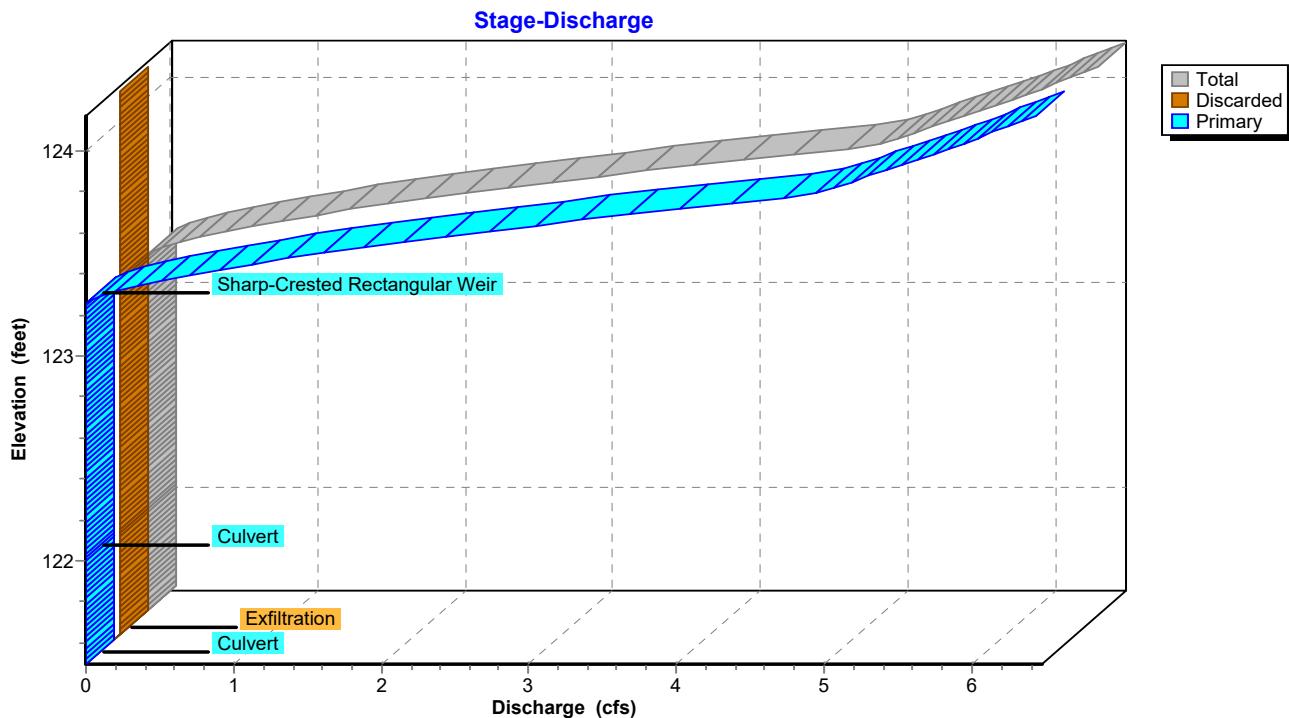
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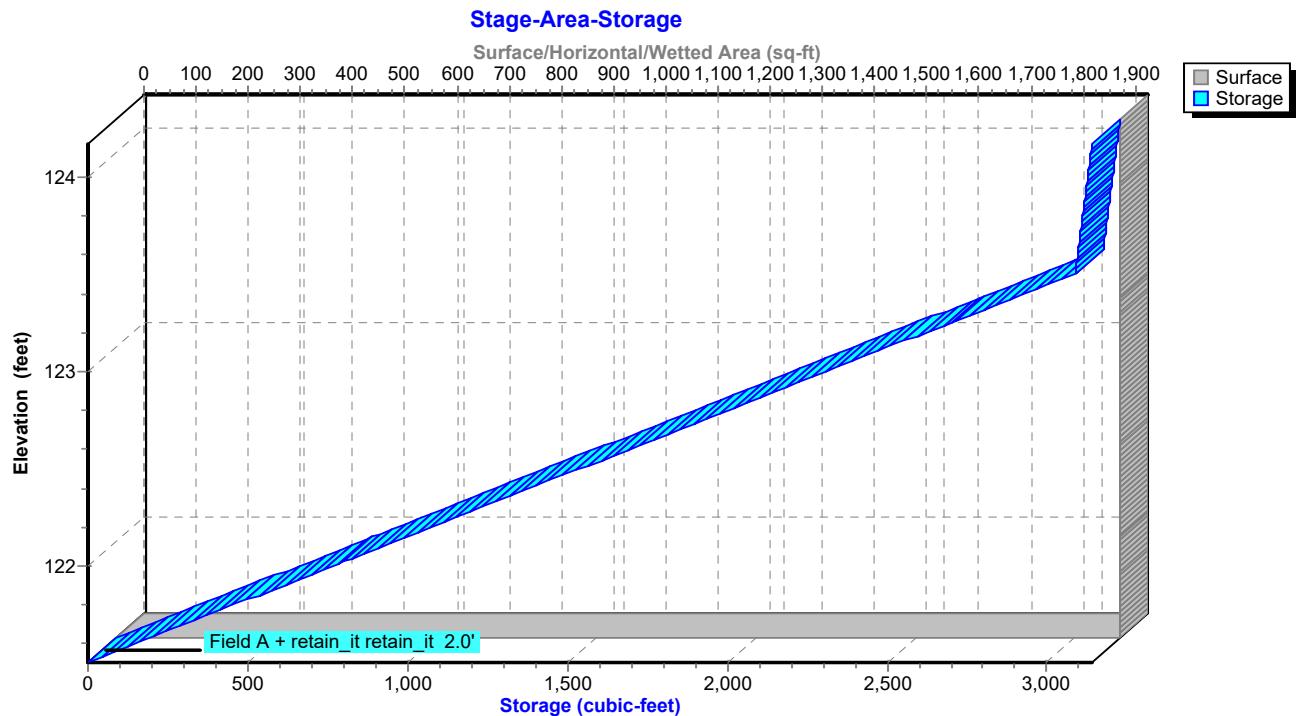
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**Pond UG-3: Underground Infiltration System #2****Pond UG-3: Underground Infiltration System #2**

### Pond UG-3: Underground Infiltration System #2



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Type III 24-hr 2-YR Rainfall=3.14"

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**Hydrograph for Pond UG-3: Underground Infiltration System #2**

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	121.50	0.00	0.00	0.00
1.00	0.00	0	121.50	0.00	0.00	0.00
2.00	0.00	1	121.50	0.00	0.00	0.00
3.00	0.01	3	121.50	0.01	0.01	0.00
4.00	0.02	5	121.50	0.02	0.02	0.00
5.00	0.02	8	121.50	0.02	0.02	0.00
6.00	0.03	9	121.51	0.03	0.03	0.00
7.00	0.04	13	121.51	0.04	0.04	0.00
8.00	0.05	24	121.52	0.05	<b>0.05</b>	0.00
9.00	0.08	99	121.56	0.05	<b>0.05</b>	0.00
10.00	0.11	279	121.68	0.05	0.05	0.00
11.00	0.17	612	121.90	0.05	0.05	0.00
12.00	<b>1.51</b>	<b>2,015</b>	<b>122.80</b>	<b>0.05</b>	0.05	<b>0.00</b>
13.00	<b>0.20</b>	<b>2,791</b>	<b>123.31</b>	<b>0.22</b>	0.05	<b>0.18</b>
14.00	0.13	2,758	123.29	0.13	0.05	0.09
15.00	0.10	2,743	123.28	0.10	0.05	0.05
16.00	0.07	2,728	123.27	0.07	0.05	0.03
17.00	0.05	2,716	123.26	0.06	0.05	0.01
18.00	0.04	2,704	123.25	0.05	0.05	0.00
19.00	0.04	2,678	123.23	0.05	0.05	0.00
20.00	0.03	2,638	123.21	0.05	0.05	0.00
21.00	0.03	2,587	123.17	0.05	0.05	0.00
22.00	0.03	2,525	123.14	0.05	0.05	0.00
23.00	0.02	2,454	123.09	0.05	0.05	0.00
24.00	0.02	2,372	123.04	0.05	0.05	0.00
25.00	0.00	2,216	122.93	0.05	0.05	0.00
26.00	0.00	2,052	122.83	0.05	0.05	0.00
27.00	0.00	1,888	122.72	0.05	0.05	0.00
28.00	0.00	1,725	122.62	0.05	0.05	0.00
29.00	0.00	1,561	122.51	0.05	0.05	0.00
30.00	0.00	1,398	122.41	0.05	0.05	0.00
31.00	0.00	1,234	122.30	0.05	0.05	0.00
32.00	0.00	1,071	122.19	0.05	0.05	0.00
33.00	0.00	907	122.09	0.05	0.05	0.00
34.00	0.00	744	121.98	0.05	0.05	0.00
35.00	0.00	580	121.88	0.05	0.05	0.00
36.00	0.00	417	121.77	0.05	0.05	0.00
37.00	0.00	253	121.66	0.05	0.05	0.00
38.00	0.00	90	121.56	0.05	0.05	0.00
39.00	0.00	0	121.50	0.00	0.00	0.00
40.00	0.00	0	121.50	0.00	0.00	0.00
41.00	0.00	0	121.50	0.00	0.00	0.00
42.00	0.00	0	121.50	0.00	0.00	0.00
43.00	0.00	0	121.50	0.00	0.00	0.00
44.00	0.00	0	121.50	0.00	0.00	0.00
45.00	0.00	0	121.50	0.00	0.00	0.00
46.00	0.00	0	121.50	0.00	0.00	0.00
47.00	0.00	0	121.50	0.00	0.00	0.00
48.00	0.00	0	121.50	0.00	0.00	0.00

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**Stage-Discharge for Pond UG-3: Underground Infiltration System #2**

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)	Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
121.50	0.00	<b>0.00</b>	0.00	124.15	<b>6.42</b>	0.05	<b>6.37</b>
121.55	0.05	<b>0.05</b>	0.00				
121.60	0.05	0.05	0.00				
121.65	0.05	0.05	0.00				
121.70	0.05	0.05	0.00				
121.75	0.05	0.05	0.00				
121.80	0.05	0.05	0.00				
121.85	0.05	0.05	0.00				
121.90	0.05	0.05	0.00				
121.95	0.05	0.05	0.00				
122.00	0.05	0.05	0.00				
122.05	0.05	0.05	0.00				
122.10	0.05	0.05	0.00				
122.15	0.05	0.05	0.00				
122.20	0.05	0.05	0.00				
122.25	0.05	0.05	0.00				
122.30	0.05	0.05	0.00				
122.35	0.05	0.05	0.00				
122.40	0.05	0.05	0.00				
122.45	0.05	0.05	0.00				
122.50	0.05	0.05	0.00				
122.55	0.05	0.05	0.00				
122.60	0.05	0.05	0.00				
122.65	0.05	0.05	0.00				
122.70	0.05	0.05	0.00				
122.75	0.05	0.05	0.00				
122.80	0.05	0.05	0.00				
122.85	0.05	0.05	0.00				
122.90	0.05	0.05	0.00				
122.95	0.05	0.05	0.00				
123.00	0.05	0.05	0.00				
123.05	0.05	0.05	0.00				
123.10	0.05	0.05	0.00				
123.15	0.05	0.05	0.00				
123.20	0.05	0.05	0.00				
123.25	0.05	0.05	0.00				
123.30	0.19	0.05	0.15				
123.35	0.46	0.05	0.41				
123.40	0.80	0.05	0.75				
123.45	1.20	0.05	1.16				
123.50	1.66	0.05	1.61				
123.55	2.16	0.05	2.12				
123.60	2.71	0.05	2.66				
123.65	3.29	0.05	3.24				
123.70	3.91	0.05	3.86				
123.75	4.55	0.05	4.51				
123.80	5.03	0.05	4.98				
123.85	5.25	0.05	5.20				
123.90	5.46	0.05	5.42				
123.95	5.67	0.05	5.62				
124.00	5.86	0.05	5.82				
124.05	6.05	0.05	6.01				
124.10	6.24	0.05	6.19				

**Stage-Area-Storage for Pond UG-3: Underground Infiltration System #2**

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
121.50	<b>1,924</b>	0	124.15	1,924	<b>3,140</b>
121.55	1,924	77			
121.60	1,924	154			
121.65	1,924	232			
121.70	1,924	309			
121.75	1,924	386			
121.80	1,924	463			
121.85	1,924	541			
121.90	1,924	618			
121.95	1,924	695			
122.00	1,924	772			
122.05	1,924	849			
122.10	1,924	927			
122.15	1,924	1,004			
122.20	1,924	1,081			
122.25	1,924	1,158			
122.30	1,924	1,236			
122.35	1,924	1,313			
122.40	1,924	1,390			
122.45	1,924	1,467			
122.50	1,924	1,544			
122.55	1,924	1,622			
122.60	1,924	1,699			
122.65	1,924	1,776			
122.70	1,924	1,853			
122.75	1,924	1,931			
122.80	1,924	2,008			
122.85	1,924	2,085			
122.90	1,924	2,162			
122.95	1,924	2,240			
123.00	1,924	2,317			
123.05	1,924	2,394			
123.10	1,924	2,471			
123.15	1,924	2,548			
123.20	1,924	2,626			
123.25	1,924	2,703			
123.30	1,924	2,780			
123.35	1,924	2,857			
123.40	1,924	2,935			
123.45	1,924	3,012			
123.50	1,924	3,089			
123.55	1,924	3,093			
123.60	1,924	3,097			
123.65	1,924	3,101			
123.70	1,924	3,105			
123.75	1,924	3,109			
123.80	1,924	3,113			
123.85	1,924	3,116			
123.90	1,924	3,120			
123.95	1,924	3,124			
124.00	1,924	3,128			
124.05	1,924	3,132			
124.10	1,924	3,136			

**Proposed HydroCAD 533 Boston Post Road**

Prepared by {enter your company name here}

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Type III 24-hr 10-YR Rainfall=4.69"

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Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

<b>Subcatchment P-1A: Subcatchment to</b>	Runoff Area=13,425 sf 66.59% Impervious Runoff Depth=3.08" Tc=6.0 min CN=85 Runoff=1.11 cfs 3,449 cf
<b>Subcatchment P-1B: Subcatchment to</b>	Runoff Area=33,268 sf 68.13% Impervious Runoff Depth=3.18" Tc=6.0 min CN=86 Runoff=2.82 cfs 8,813 cf
<b>Subcatchment P-1C: Subcatchment to</b>	Runoff Area=29,201 sf 66.54% Impervious Runoff Depth=3.18" Tc=6.0 min CN=86 Runoff=2.47 cfs 7,735 cf
<b>Subcatchment P-1D: Subcatchment to</b>	Runoff Area=13,403 sf 58.36% Impervious Runoff Depth=2.80" Tc=6.0 min CN=82 Runoff=1.01 cfs 3,131 cf
<b>Subcatchment P-1U: Undetained to Wetlands</b>	Runoff Area=8,300 sf 0.00% Impervious Runoff Depth=0.83" Tc=6.0 min CN=55 Runoff=0.14 cfs 574 cf
<b>Subcatchment P-B1: Roof Runoff to</b>	Runoff Area=34,270 sf 100.00% Impervious Runoff Depth=4.45" Tc=6.0 min CN=98 Runoff=3.61 cfs 12,719 cf
<b>Reach 1R: (new Reach)</b>	Inflow=7.69 cfs 18,747 cf Outflow=7.69 cfs 18,747 cf
<b>Pond IB-1: Infiltration Basin #1</b>	Peak Elev=124.03' Storage=928 cf Inflow=1.11 cfs 3,449 cf Discarded=0.02 cfs 1,637 cf Primary=1.00 cfs 1,812 cf Outflow=1.02 cfs 3,449 cf
<b>Pond IB-2: Infiltration Basin #2</b>	Peak Elev=123.82' Storage=2,680 cf Inflow=2.82 cfs 8,813 cf Discarded=0.05 cfs 4,312 cf Primary=2.03 cfs 4,501 cf Outflow=2.09 cfs 8,813 cf
<b>Pond UG-1: Underground Detention System #1</b>	Peak Elev=123.09' Storage=415 cf Inflow=1.01 cfs 3,131 cf 15.0" Round Culvert n=0.012 L=140.0' S=0.0064 '/' Outflow=0.66 cfs 3,129 cf
<b>Pond UG-2: Underground Infiltration</b>	Peak Elev=122.94' Storage=2,967 cf Inflow=3.05 cfs 10,864 cf Discarded=0.06 cfs 5,675 cf Primary=2.06 cfs 5,190 cf Outflow=2.12 cfs 10,864 cf
<b>Pond UG-3: Underground Infiltration</b>	Peak Elev=123.68' Storage=3,103 cf Inflow=3.61 cfs 12,719 cf Discarded=0.05 cfs 6,049 cf Primary=3.56 cfs 6,670 cf Outflow=3.61 cfs 12,719 cf

**Total Runoff Area = 131,867 sf Runoff Volume = 36,421 cf Average Runoff Depth = 3.31"**  
**29.38% Pervious = 38,739 sf 70.62% Impervious = 93,128 sf**

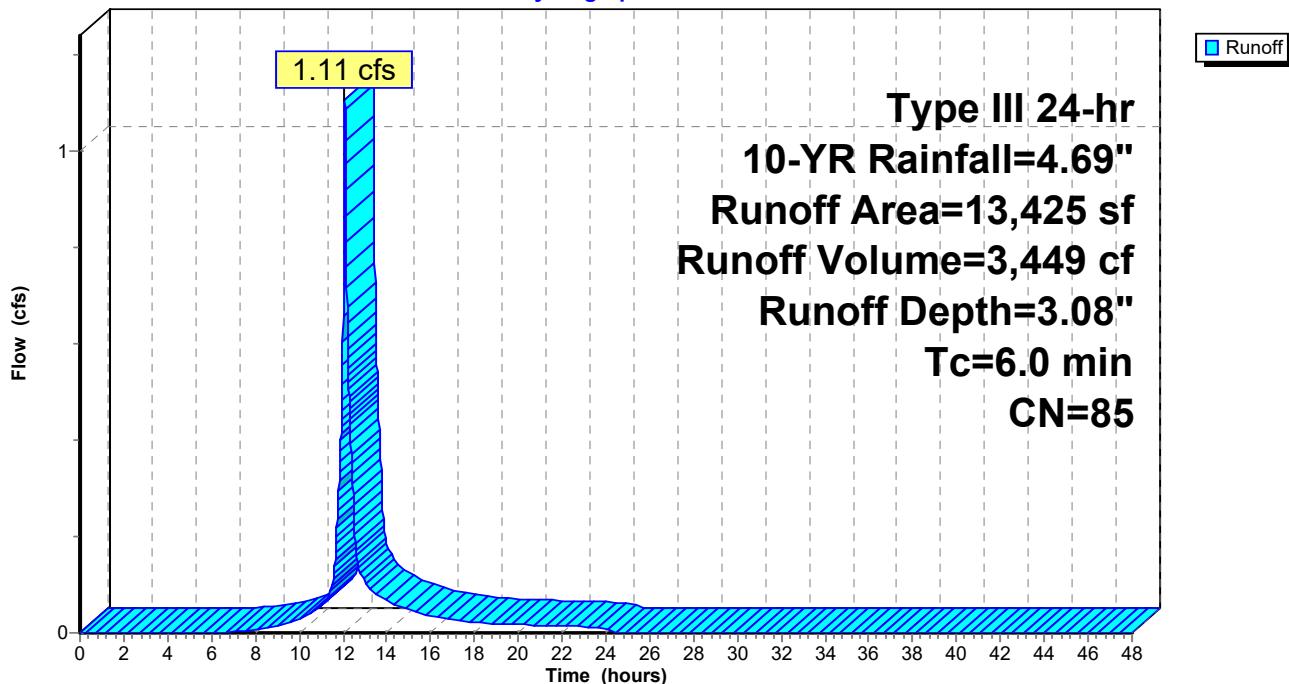
**Summary for Subcatchment P-1A: Subcatchment to Infiltration Basin #1**

Runoff = 1.11 cfs @ 12.09 hrs, Volume= 3,449 cf, Depth= 3.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
Type III 24-hr 10-YR Rainfall=4.69"

Area (sf)	CN	Description
8,940	98	Paved parking, HSG B
4,110	61	>75% Grass cover, Good, HSG B
375	55	Woods, Good, HSG B
13,425	85	Weighted Average
4,485		33.41% Pervious Area
8,940		66.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					<b>Direct Entry, Direct</b>
5.0	0				Total, Increased to minimum Tc = 6.0 min

**Subcatchment P-1A: Subcatchment to Infiltration Basin #1****Hydrograph**

**Proposed HydroCAD 533 Boston Post Road**

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Type III 24-hr 10-YR Rainfall=4.69"

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**Hydrograph for Subcatchment P-1A: Subcatchment to Infiltration Basin #1**

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.50	4.69	3.08	0.00
0.50	0.02	0.00	0.00	27.00	4.69	3.08	0.00
1.00	0.05	0.00	0.00	27.50	4.69	3.08	0.00
1.50	0.07	0.00	0.00	28.00	4.69	3.08	0.00
2.00	0.09	0.00	0.00	28.50	4.69	3.08	0.00
2.50	0.12	0.00	0.00	29.00	4.69	3.08	0.00
3.00	0.14	0.00	0.00	29.50	4.69	3.08	0.00
3.50	0.17	0.00	0.00	30.00	4.69	3.08	0.00
4.00	0.20	0.00	0.00	30.50	4.69	3.08	0.00
4.50	0.23	0.00	0.00	31.00	4.69	3.08	0.00
5.00	0.27	0.00	0.00	31.50	4.69	3.08	0.00
5.50	0.30	0.00	0.00	32.00	4.69	3.08	0.00
6.00	0.34	0.00	0.00	32.50	4.69	3.08	0.00
6.50	0.38	0.00	0.00	33.00	4.69	3.08	0.00
7.00	0.42	0.00	0.00	33.50	4.69	3.08	0.00
7.50	0.48	0.01	0.00	34.00	4.69	3.08	0.00
8.00	0.53	0.02	0.01	34.50	4.69	3.08	0.00
8.50	0.60	0.03	0.01	35.00	4.69	3.08	0.00
9.00	0.68	0.05	0.01	35.50	4.69	3.08	0.00
9.50	0.78	0.08	0.02	36.00	4.69	3.08	0.00
10.00	0.89	0.12	0.03	36.50	4.69	3.08	0.00
10.50	1.02	0.18	0.04	37.00	4.69	3.08	0.00
11.00	1.17	0.26	0.05	37.50	4.69	3.08	0.00
11.50	1.40	0.39	0.10	38.00	4.69	3.08	0.00
12.00	2.34	1.06	<b>0.66</b>	38.50	4.69	3.08	0.00
12.50	3.29	1.84	<b>0.25</b>	39.00	4.69	3.08	0.00
13.00	3.52	2.03	0.10	39.50	4.69	3.08	0.00
13.50	3.67	2.17	0.08	40.00	4.69	3.08	0.00
14.00	3.80	2.28	0.07	40.50	4.69	3.08	0.00
14.50	3.91	2.38	0.06	41.00	4.69	3.08	0.00
15.00	4.01	2.46	0.05	41.50	4.69	3.08	0.00
15.50	4.09	2.54	0.04	42.00	4.69	3.08	0.00
16.00	4.16	2.60	0.04	42.50	4.69	3.08	0.00
16.50	4.21	2.65	0.03	43.00	4.69	3.08	0.00
17.00	4.27	2.70	0.03	43.50	4.69	3.08	0.00
17.50	4.31	2.74	0.03	44.00	4.69	3.08	0.00
18.00	4.35	2.77	0.02	44.50	4.69	3.08	0.00
18.50	4.39	2.81	0.02	45.00	4.69	3.08	0.00
19.00	4.42	2.84	0.02	45.50	4.69	3.08	0.00
19.50	4.46	2.87	0.02	46.00	4.69	3.08	0.00
20.00	4.49	2.90	0.02	46.50	4.69	3.08	0.00
20.50	4.52	2.93	0.02	47.00	4.69	3.08	0.00
21.00	4.55	2.95	0.02	47.50	4.69	3.08	0.00
21.50	4.57	2.98	0.02	48.00	4.69	3.08	0.00
22.00	4.60	3.00	0.01				
22.50	4.62	3.02	0.01				
23.00	4.65	3.04	0.01				
23.50	4.67	3.06	0.01				
24.00	<b>4.69</b>	<b>3.08</b>	0.01				
24.50	4.69	3.08	0.00				
25.00	4.69	3.08	0.00				
25.50	4.69	3.08	0.00				
26.00	4.69	3.08	0.00				

**Summary for Subcatchment P-1B: Subcatchment to Infiltration Basin #2**

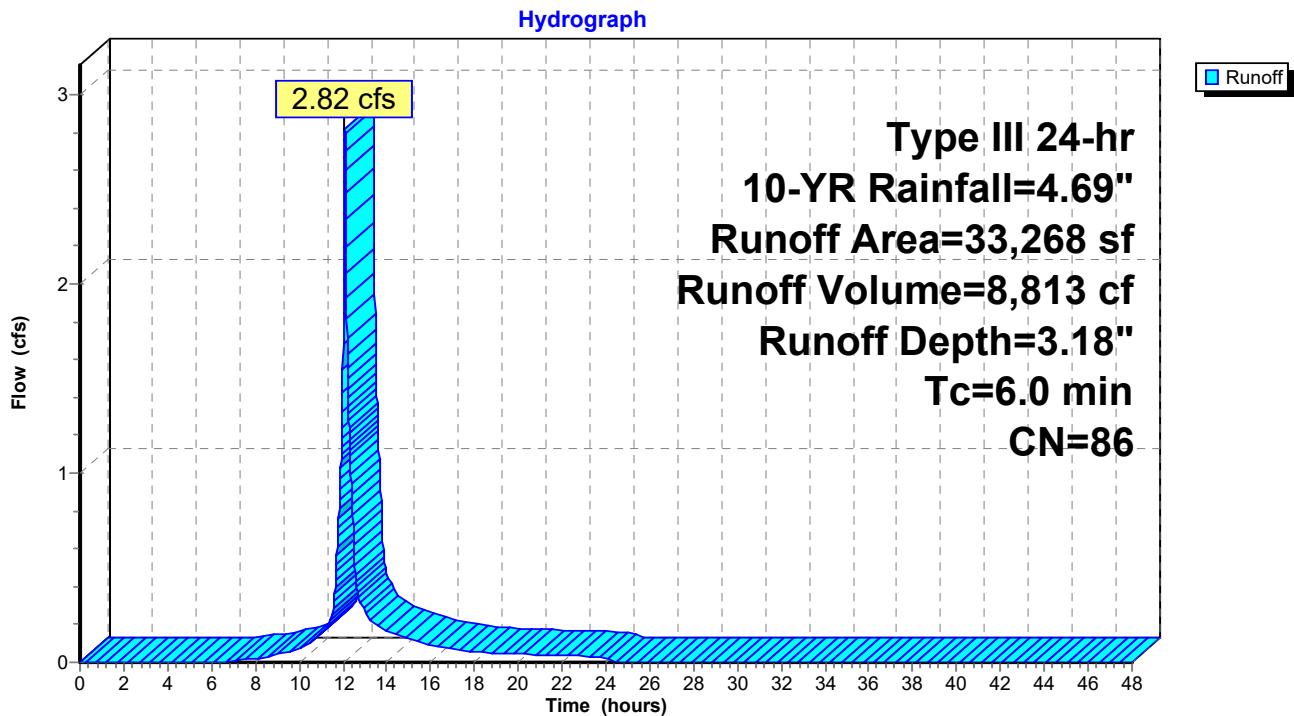
Runoff = 2.82 cfs @ 12.09 hrs, Volume= 8,813 cf, Depth= 3.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
Type III 24-hr 10-YR Rainfall=4.69"

Area (sf)	CN	Description
22,665	98	Paved parking, HSG B
10,603	61	>75% Grass cover, Good, HSG B
33,268	86	Weighted Average
10,603		31.87% Pervious Area
22,665		68.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0				<b>Direct Entry, Direct Entry</b>	
5.0	0			Total, Increased to minimum Tc = 6.0 min	

**Subcatchment P-1B: Subcatchment to Infiltration Basin #2**

**Proposed HydroCAD 533 Boston Post Road**

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Type III 24-hr 10-YR Rainfall=4.69"

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**Hydrograph for Subcatchment P-1B: Subcatchment to Infiltration Basin #2**

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.50	4.69	3.18	0.00
0.50	0.02	0.00	0.00	27.00	4.69	3.18	0.00
1.00	0.05	0.00	0.00	27.50	4.69	3.18	0.00
1.50	0.07	0.00	0.00	28.00	4.69	3.18	0.00
2.00	0.09	0.00	0.00	28.50	4.69	3.18	0.00
2.50	0.12	0.00	0.00	29.00	4.69	3.18	0.00
3.00	0.14	0.00	0.00	29.50	4.69	3.18	0.00
3.50	0.17	0.00	0.00	30.00	4.69	3.18	0.00
4.00	0.20	0.00	0.00	30.50	4.69	3.18	0.00
4.50	0.23	0.00	0.00	31.00	4.69	3.18	0.00
5.00	0.27	0.00	0.00	31.50	4.69	3.18	0.00
5.50	0.30	0.00	0.00	32.00	4.69	3.18	0.00
6.00	0.34	0.00	0.00	32.50	4.69	3.18	0.00
6.50	0.38	0.00	0.00	33.00	4.69	3.18	0.00
7.00	0.42	0.01	0.01	33.50	4.69	3.18	0.00
7.50	0.48	0.01	0.01	34.00	4.69	3.18	0.00
8.00	0.53	0.02	0.02	34.50	4.69	3.18	0.00
8.50	0.60	0.04	0.03	35.00	4.69	3.18	0.00
9.00	0.68	0.06	0.04	35.50	4.69	3.18	0.00
9.50	0.78	0.10	0.06	36.00	4.69	3.18	0.00
10.00	0.89	0.14	0.08	36.50	4.69	3.18	0.00
10.50	1.02	0.21	0.11	37.00	4.69	3.18	0.00
11.00	1.17	0.29	0.14	37.50	4.69	3.18	0.00
11.50	1.40	0.43	0.25	38.00	4.69	3.18	0.00
12.00	2.34	1.12	<b>1.69</b>	38.50	4.69	3.18	0.00
12.50	3.29	1.92	<b>0.63</b>	39.00	4.69	3.18	0.00
13.00	3.52	2.11	0.26	39.50	4.69	3.18	0.00
13.50	3.67	2.25	0.20	40.00	4.69	3.18	0.00
14.00	3.80	2.37	0.17	40.50	4.69	3.18	0.00
14.50	3.91	2.47	0.14	41.00	4.69	3.18	0.00
15.00	4.01	2.55	0.13	41.50	4.69	3.18	0.00
15.50	4.09	2.63	0.11	42.00	4.69	3.18	0.00
16.00	4.16	2.69	0.09	42.50	4.69	3.18	0.00
16.50	4.21	2.74	0.08	43.00	4.69	3.18	0.00
17.00	4.27	2.79	0.07	43.50	4.69	3.18	0.00
17.50	4.31	2.83	0.06	44.00	4.69	3.18	0.00
18.00	4.35	2.87	0.05	44.50	4.69	3.18	0.00
18.50	4.39	2.90	0.05	45.00	4.69	3.18	0.00
19.00	4.42	2.93	0.05	45.50	4.69	3.18	0.00
19.50	4.46	2.96	0.05	46.00	4.69	3.18	0.00
20.00	4.49	2.99	0.04	46.50	4.69	3.18	0.00
20.50	4.52	3.02	0.04	47.00	4.69	3.18	0.00
21.00	4.55	3.05	0.04	47.50	4.69	3.18	0.00
21.50	4.57	3.07	0.04	48.00	4.69	3.18	0.00
22.00	4.60	3.10	0.04				
22.50	4.62	3.12	0.03				
23.00	4.65	3.14	0.03				
23.50	4.67	3.16	0.03				
24.00	<b>4.69</b>	<b>3.18</b>	0.03				
24.50	4.69	3.18	0.00				
25.00	4.69	3.18	0.00				
25.50	4.69	3.18	0.00				
26.00	4.69	3.18	0.00				

**Summary for Subcatchment P-1C: Subcatchment to Infiltration Trench #2**

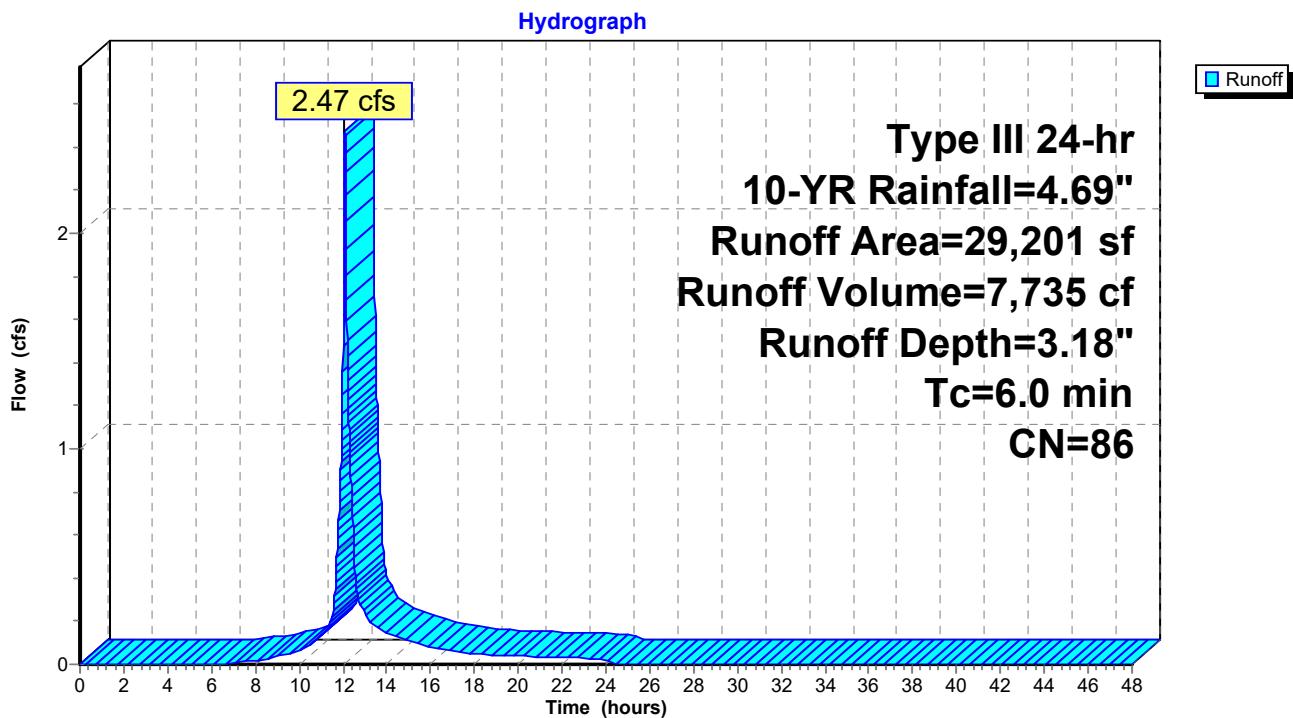
Runoff = 2.47 cfs @ 12.09 hrs, Volume= 7,735 cf, Depth= 3.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
Type III 24-hr 10-YR Rainfall=4.69"

Area (sf)	CN	Description
19,431	98	Paved parking, HSG B
9,770	61	>75% Grass cover, Good, HSG B

29,201	86	Weighted Average
9,770		33.46% Pervious Area
19,431		66.54% Impervious Area

Tc	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0				<b>Direct Entry, Direct Entry</b>	
5.0	0			Total, Increased to minimum Tc = 6.0 min	

**Subcatchment P-1C: Subcatchment to Infiltration Trench #2**

**Proposed HydroCAD 533 Boston Post Road**

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Type III 24-hr 10-YR Rainfall=4.69"

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**Hydrograph for Subcatchment P-1C: Subcatchment to Infiltration Trench #2**

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.50	4.69	3.18	0.00
0.50	0.02	0.00	0.00	27.00	4.69	3.18	0.00
1.00	0.05	0.00	0.00	27.50	4.69	3.18	0.00
1.50	0.07	0.00	0.00	28.00	4.69	3.18	0.00
2.00	0.09	0.00	0.00	28.50	4.69	3.18	0.00
2.50	0.12	0.00	0.00	29.00	4.69	3.18	0.00
3.00	0.14	0.00	0.00	29.50	4.69	3.18	0.00
3.50	0.17	0.00	0.00	30.00	4.69	3.18	0.00
4.00	0.20	0.00	0.00	30.50	4.69	3.18	0.00
4.50	0.23	0.00	0.00	31.00	4.69	3.18	0.00
5.00	0.27	0.00	0.00	31.50	4.69	3.18	0.00
5.50	0.30	0.00	0.00	32.00	4.69	3.18	0.00
6.00	0.34	0.00	0.00	32.50	4.69	3.18	0.00
6.50	0.38	0.00	0.00	33.00	4.69	3.18	0.00
7.00	0.42	0.01	0.01	33.50	4.69	3.18	0.00
7.50	0.48	0.01	0.01	34.00	4.69	3.18	0.00
8.00	0.53	0.02	0.02	34.50	4.69	3.18	0.00
8.50	0.60	0.04	0.03	35.00	4.69	3.18	0.00
9.00	0.68	0.06	0.04	35.50	4.69	3.18	0.00
9.50	0.78	0.10	0.05	36.00	4.69	3.18	0.00
10.00	0.89	0.14	0.07	36.50	4.69	3.18	0.00
10.50	1.02	0.21	0.09	37.00	4.69	3.18	0.00
11.00	1.17	0.29	0.12	37.50	4.69	3.18	0.00
11.50	1.40	0.43	0.22	38.00	4.69	3.18	0.00
12.00	2.34	1.12	<b>1.48</b>	38.50	4.69	3.18	0.00
12.50	3.29	1.92	<b>0.55</b>	39.00	4.69	3.18	0.00
13.00	3.52	2.11	0.23	39.50	4.69	3.18	0.00
13.50	3.67	2.25	0.18	40.00	4.69	3.18	0.00
14.00	3.80	2.37	0.15	40.50	4.69	3.18	0.00
14.50	3.91	2.47	0.13	41.00	4.69	3.18	0.00
15.00	4.01	2.55	0.11	41.50	4.69	3.18	0.00
15.50	4.09	2.63	0.09	42.00	4.69	3.18	0.00
16.00	4.16	2.69	0.08	42.50	4.69	3.18	0.00
16.50	4.21	2.74	0.07	43.00	4.69	3.18	0.00
17.00	4.27	2.79	0.06	43.50	4.69	3.18	0.00
17.50	4.31	2.83	0.06	44.00	4.69	3.18	0.00
18.00	4.35	2.87	0.05	44.50	4.69	3.18	0.00
18.50	4.39	2.90	0.04	45.00	4.69	3.18	0.00
19.00	4.42	2.93	0.04	45.50	4.69	3.18	0.00
19.50	4.46	2.96	0.04	46.00	4.69	3.18	0.00
20.00	4.49	2.99	0.04	46.50	4.69	3.18	0.00
20.50	4.52	3.02	0.04	47.00	4.69	3.18	0.00
21.00	4.55	3.05	0.04	47.50	4.69	3.18	0.00
21.50	4.57	3.07	0.03	48.00	4.69	3.18	0.00
22.00	4.60	3.10	0.03				
22.50	4.62	3.12	0.03				
23.00	4.65	3.14	0.03				
23.50	4.67	3.16	0.03				
24.00	<b>4.69</b>	<b>3.18</b>	0.03				
24.50	4.69	3.18	0.00				
25.00	4.69	3.18	0.00				
25.50	4.69	3.18	0.00				
26.00	4.69	3.18	0.00				

**Proposed HydroCAD 533 Boston Post Road**

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Type III 24-hr 10-YR Rainfall=4.69"

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**Summary for Subcatchment P-1D: Subcatchment to Infiltration Trench 1**

Runoff = 1.01 cfs @ 12.09 hrs, Volume= 3,131 cf, Depth= 2.80"

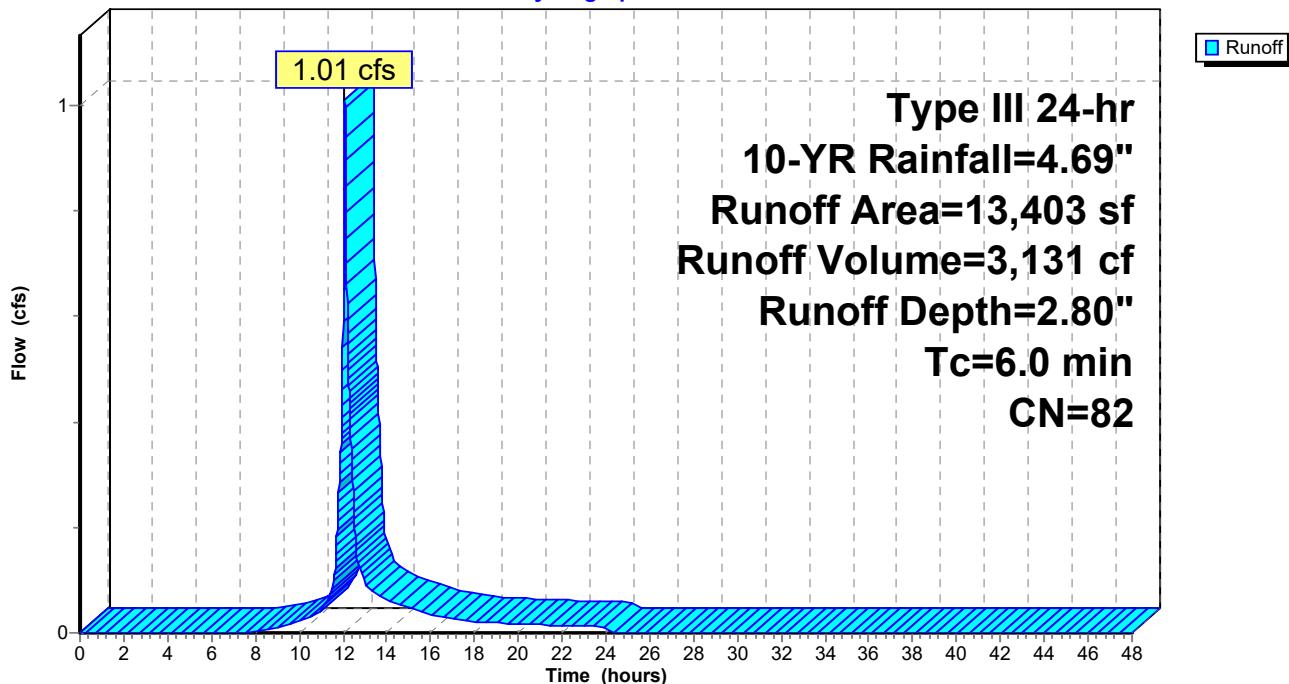
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
Type III 24-hr 10-YR Rainfall=4.69"

Area (sf)	CN	Description
7,822	98	Paved parking, HSG B
2,453	61	>75% Grass cover, Good, HSG B
3,128	60	Woods, Fair, HSG B
13,403	82	Weighted Average
5,581		41.64% Pervious Area
7,822		58.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0				<b>Direct Entry, Direct Entry</b>	
5.0	0			Total, Increased to minimum Tc = 6.0 min	

**Subcatchment P-1D: Subcatchment to Infiltration Trench 1**

Hydrograph



**Proposed HydroCAD 533 Boston Post Road**

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Type III 24-hr 10-YR Rainfall=4.69"

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**Hydrograph for Subcatchment P-1D: Subcatchment to Infiltration Trench 1**

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.50	4.69	2.80	0.00
0.50	0.02	0.00	0.00	27.00	4.69	2.80	0.00
1.00	0.05	0.00	0.00	27.50	4.69	2.80	0.00
1.50	0.07	0.00	0.00	28.00	4.69	2.80	0.00
2.00	0.09	0.00	0.00	28.50	4.69	2.80	0.00
2.50	0.12	0.00	0.00	29.00	4.69	2.80	0.00
3.00	0.14	0.00	0.00	29.50	4.69	2.80	0.00
3.50	0.17	0.00	0.00	30.00	4.69	2.80	0.00
4.00	0.20	0.00	0.00	30.50	4.69	2.80	0.00
4.50	0.23	0.00	0.00	31.00	4.69	2.80	0.00
5.00	0.27	0.00	0.00	31.50	4.69	2.80	0.00
5.50	0.30	0.00	0.00	32.00	4.69	2.80	0.00
6.00	0.34	0.00	0.00	32.50	4.69	2.80	0.00
6.50	0.38	0.00	0.00	33.00	4.69	2.80	0.00
7.00	0.42	0.00	0.00	33.50	4.69	2.80	0.00
7.50	0.48	0.00	0.00	34.00	4.69	2.80	0.00
8.00	0.53	0.00	0.00	34.50	4.69	2.80	0.00
8.50	0.60	0.01	0.01	35.00	4.69	2.80	0.00
9.00	0.68	0.02	0.01	35.50	4.69	2.80	0.00
9.50	0.78	0.05	0.01	36.00	4.69	2.80	0.00
10.00	0.89	0.08	0.02	36.50	4.69	2.80	0.00
10.50	1.02	0.12	0.03	37.00	4.69	2.80	0.00
11.00	1.17	0.18	0.04	37.50	4.69	2.80	0.00
11.50	1.40	0.29	0.08	38.00	4.69	2.80	0.00
12.00	2.34	0.89	<b>0.59</b>	38.50	4.69	2.80	0.00
12.50	3.29	1.61	<b>0.23</b>	39.00	4.69	2.80	0.00
13.00	3.52	1.80	0.10	39.50	4.69	2.80	0.00
13.50	3.67	1.93	0.08	40.00	4.69	2.80	0.00
14.00	3.80	2.04	0.06	40.50	4.69	2.80	0.00
14.50	3.91	2.13	0.05	41.00	4.69	2.80	0.00
15.00	4.01	2.21	0.05	41.50	4.69	2.80	0.00
15.50	4.09	2.28	0.04	42.00	4.69	2.80	0.00
16.00	4.16	2.34	0.03	42.50	4.69	2.80	0.00
16.50	4.21	2.39	0.03	43.00	4.69	2.80	0.00
17.00	4.27	2.43	0.03	43.50	4.69	2.80	0.00
17.50	4.31	2.47	0.02	44.00	4.69	2.80	0.00
18.00	4.35	2.51	0.02	44.50	4.69	2.80	0.00
18.50	4.39	2.54	0.02	45.00	4.69	2.80	0.00
19.00	4.42	2.57	0.02	45.50	4.69	2.80	0.00
19.50	4.46	2.60	0.02	46.00	4.69	2.80	0.00
20.00	4.49	2.63	0.02	46.50	4.69	2.80	0.00
20.50	4.52	2.65	0.02	47.00	4.69	2.80	0.00
21.00	4.55	2.68	0.02	47.50	4.69	2.80	0.00
21.50	4.57	2.70	0.01	48.00	4.69	2.80	0.00
22.00	4.60	2.72	0.01				
22.50	4.62	2.75	0.01				
23.00	4.65	2.77	0.01				
23.50	4.67	2.79	0.01				
24.00	<b>4.69</b>	<b>2.80</b>	0.01				
24.50	4.69	2.80	0.00				
25.00	4.69	2.80	0.00				
25.50	4.69	2.80	0.00				
26.00	4.69	2.80	0.00				

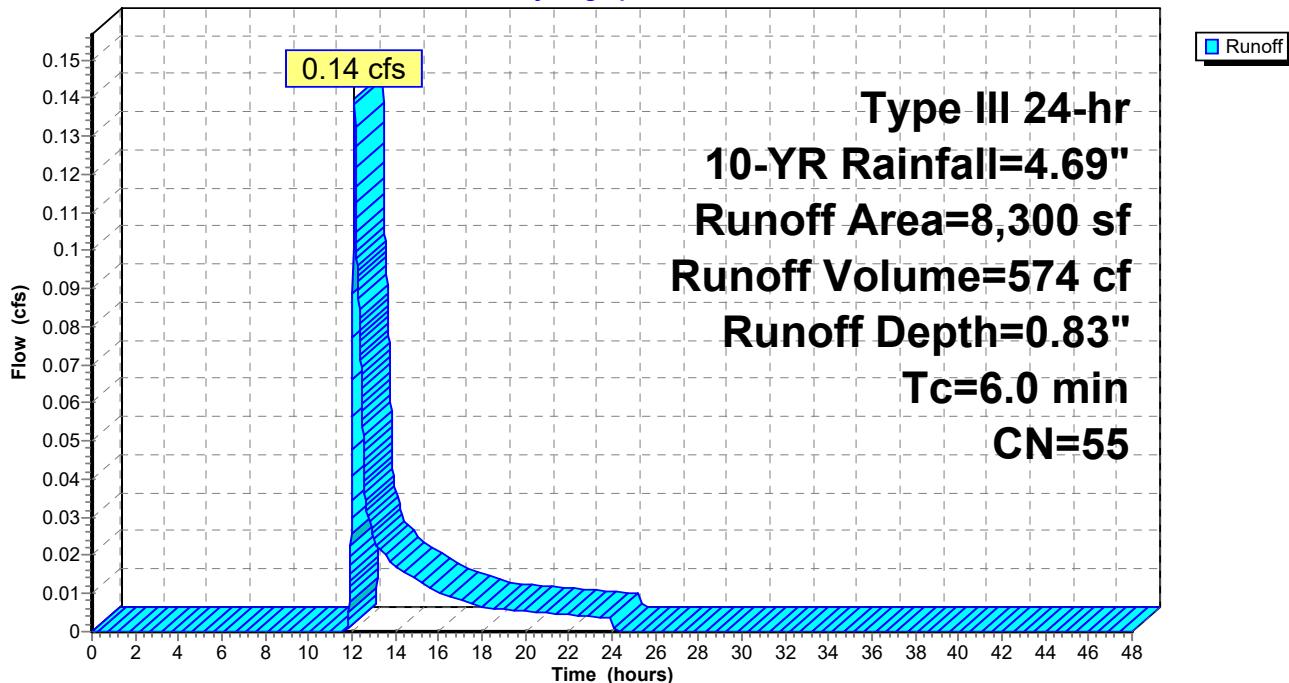
**Summary for Subcatchment P-1U: Undetained to Wetlands**

Runoff = 0.14 cfs @ 12.11 hrs, Volume= 574 cf, Depth= 0.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
Type III 24-hr 10-YR Rainfall=4.69"

Area (sf)	CN	Description
8,300	55	Woods, Good, HSG B
8,300		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0				<b>Direct Entry, Direct Entry</b>	
5.0	0			Total, Increased to minimum Tc = 6.0 min	

**Subcatchment P-1U: Undetained to Wetlands****Hydrograph**

**Proposed HydroCAD 533 Boston Post Road**

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Type III 24-hr 10-YR Rainfall=4.69"

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**Hydrograph for Subcatchment P-1U: Undetained to Wetlands**

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.50	4.69	0.83	0.00
0.50	0.02	0.00	0.00	27.00	4.69	0.83	0.00
1.00	0.05	0.00	0.00	27.50	4.69	0.83	0.00
1.50	0.07	0.00	0.00	28.00	4.69	0.83	0.00
2.00	0.09	0.00	0.00	28.50	4.69	0.83	0.00
2.50	0.12	0.00	0.00	29.00	4.69	0.83	0.00
3.00	0.14	0.00	0.00	29.50	4.69	0.83	0.00
3.50	0.17	0.00	0.00	30.00	4.69	0.83	0.00
4.00	0.20	0.00	0.00	30.50	4.69	0.83	0.00
4.50	0.23	0.00	0.00	31.00	4.69	0.83	0.00
5.00	0.27	0.00	0.00	31.50	4.69	0.83	0.00
5.50	0.30	0.00	0.00	32.00	4.69	0.83	0.00
6.00	0.34	0.00	0.00	32.50	4.69	0.83	0.00
6.50	0.38	0.00	0.00	33.00	4.69	0.83	0.00
7.00	0.42	0.00	0.00	33.50	4.69	0.83	0.00
7.50	0.48	0.00	0.00	34.00	4.69	0.83	0.00
8.00	0.53	0.00	0.00	34.50	4.69	0.83	0.00
8.50	0.60	0.00	0.00	35.00	4.69	0.83	0.00
9.00	0.68	0.00	0.00	35.50	4.69	0.83	0.00
9.50	0.78	0.00	0.00	36.00	4.69	0.83	0.00
10.00	0.89	0.00	0.00	36.50	4.69	0.83	0.00
10.50	1.02	0.00	0.00	37.00	4.69	0.83	0.00
11.00	1.17	0.00	0.00	37.50	4.69	0.83	0.00
11.50	1.40	0.00	0.00	38.00	4.69	0.83	0.00
12.00	2.34	0.06	<b>0.05</b>	38.50	4.69	0.83	0.00
12.50	3.29	0.28	<b>0.05</b>	39.00	4.69	0.83	0.00
13.00	3.52	0.35	0.02	39.50	4.69	0.83	0.00
13.50	3.67	0.41	0.02	40.00	4.69	0.83	0.00
14.00	3.80	0.45	0.02	40.50	4.69	0.83	0.00
14.50	3.91	0.50	0.02	41.00	4.69	0.83	0.00
15.00	4.01	0.53	0.01	41.50	4.69	0.83	0.00
15.50	4.09	0.57	0.01	42.00	4.69	0.83	0.00
16.00	4.16	0.59	0.01	42.50	4.69	0.83	0.00
16.50	4.21	0.62	0.01	43.00	4.69	0.83	0.00
17.00	4.27	0.64	0.01	43.50	4.69	0.83	0.00
17.50	4.31	0.66	0.01	44.00	4.69	0.83	0.00
18.00	4.35	0.68	0.01	44.50	4.69	0.83	0.00
18.50	4.39	0.69	0.01	45.00	4.69	0.83	0.00
19.00	4.42	0.71	0.01	45.50	4.69	0.83	0.00
19.50	4.46	0.72	0.01	46.00	4.69	0.83	0.00
20.00	4.49	0.74	0.01	46.50	4.69	0.83	0.00
20.50	4.52	0.75	0.01	47.00	4.69	0.83	0.00
21.00	4.55	0.76	0.00	47.50	4.69	0.83	0.00
21.50	4.57	0.78	0.00	48.00	4.69	0.83	0.00
22.00	4.60	0.79	0.00				
22.50	4.62	0.80	0.00				
23.00	4.65	0.81	0.00				
23.50	4.67	0.82	0.00				
24.00	<b>4.69</b>	<b>0.83</b>	0.00				
24.50	4.69	0.83	0.00				
25.00	4.69	0.83	0.00				
25.50	4.69	0.83	0.00				
26.00	4.69	0.83	0.00				

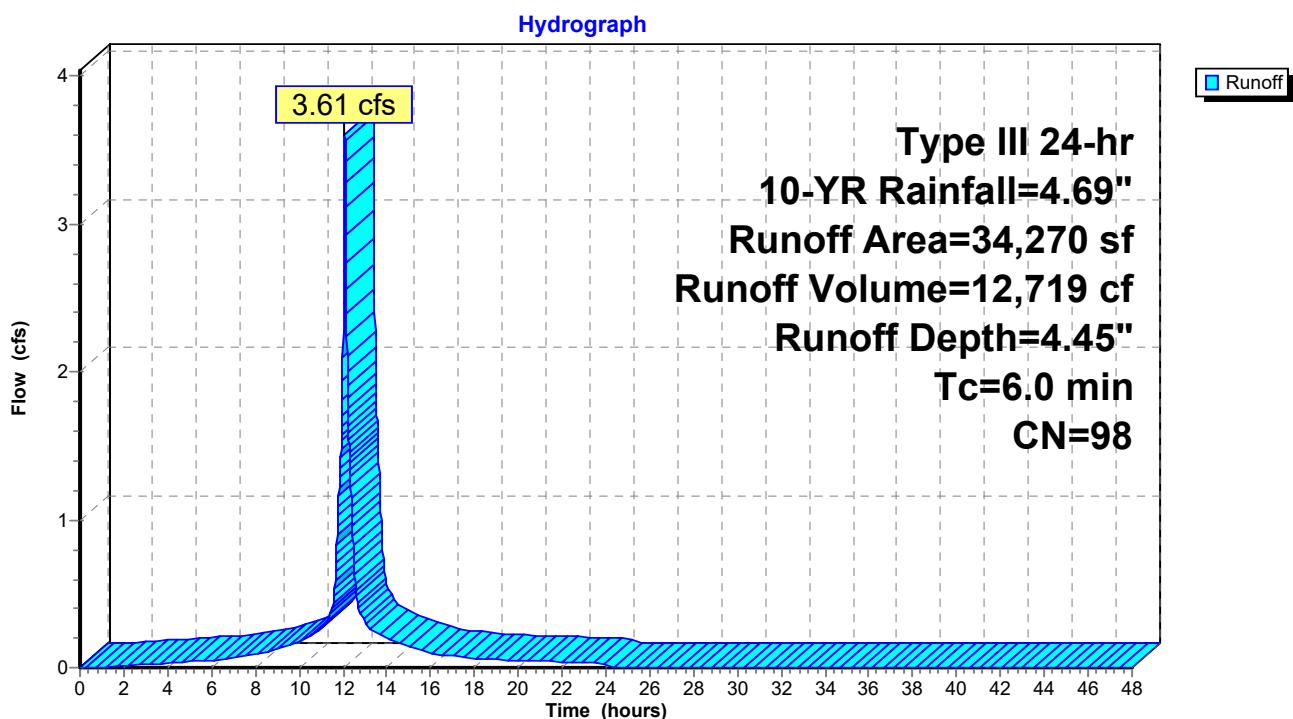
**Summary for Subcatchment P-B1: Roof Runoff to Infiltration Trench #3**

Runoff = 3.61 cfs @ 12.08 hrs, Volume= 12,719 cf, Depth= 4.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
Type III 24-hr 10-YR Rainfall=4.69"

Area (sf)	CN	Description
34,270	98	Roofs, HSG B
34,270		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0				<b>Direct Entry, Direct Entry</b>	
5.0	0			Total, Increased to minimum Tc = 6.0 min	

**Subcatchment P-B1: Roof Runoff to Infiltration Trench #3**

**Proposed HydroCAD 533 Boston Post Road**

Prepared by {enter your company name here}

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Type III 24-hr 10-YR Rainfall=4.69"

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**Hydrograph for Subcatchment P-B1: Roof Runoff to Infiltration Trench #3**

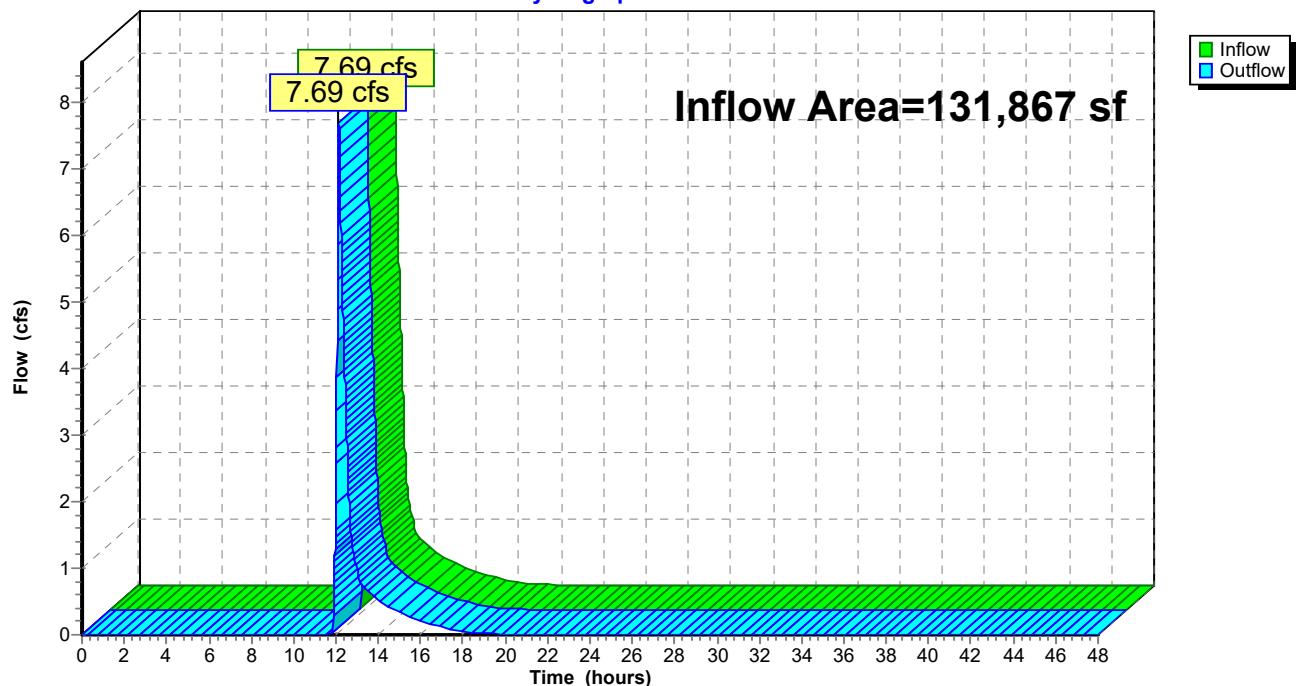
Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.50	4.69	4.45	0.00
0.50	0.02	0.00	0.00	27.00	4.69	4.45	0.00
1.00	0.05	0.00	0.00	27.50	4.69	4.45	0.00
1.50	0.07	0.00	0.01	28.00	4.69	4.45	0.00
2.00	0.09	0.01	0.01	28.50	4.69	4.45	0.00
2.50	0.12	0.02	0.02	29.00	4.69	4.45	0.00
3.00	0.14	0.03	0.02	29.50	4.69	4.45	0.00
3.50	0.17	0.05	0.03	30.00	4.69	4.45	0.00
4.00	0.20	0.07	0.03	30.50	4.69	4.45	0.00
4.50	0.23	0.09	0.04	31.00	4.69	4.45	0.00
5.00	0.27	0.12	0.04	31.50	4.69	4.45	0.00
5.50	0.30	0.15	0.05	32.00	4.69	4.45	0.00
6.00	0.34	0.18	0.05	32.50	4.69	4.45	0.00
6.50	0.38	0.21	0.06	33.00	4.69	4.45	0.00
7.00	0.42	0.25	0.07	33.50	4.69	4.45	0.00
7.50	0.48	0.30	0.08	34.00	4.69	4.45	0.00
8.00	0.53	0.35	0.09	34.50	4.69	4.45	0.00
8.50	0.60	0.41	0.11	35.00	4.69	4.45	0.00
9.00	0.68	0.49	0.13	35.50	4.69	4.45	0.00
9.50	0.78	0.58	0.15	36.00	4.69	4.45	0.00
10.00	0.89	0.68	0.17	36.50	4.69	4.45	0.00
10.50	1.02	0.81	0.21	37.00	4.69	4.45	0.00
11.00	1.17	0.96	0.26	37.50	4.69	4.45	0.00
11.50	1.40	1.18	0.40	38.00	4.69	4.45	0.00
12.00	2.34	2.12	<b>2.27</b>	38.50	4.69	4.45	0.00
12.50	3.29	3.06	<b>0.74</b>	39.00	4.69	4.45	0.00
13.00	3.52	3.28	0.30	39.50	4.69	4.45	0.00
13.50	3.67	3.44	0.23	40.00	4.69	4.45	0.00
14.00	3.80	3.57	0.19	40.50	4.69	4.45	0.00
14.50	3.91	3.68	0.16	41.00	4.69	4.45	0.00
15.00	4.01	3.77	0.14	41.50	4.69	4.45	0.00
15.50	4.09	3.85	0.12	42.00	4.69	4.45	0.00
16.00	4.16	3.92	0.10	42.50	4.69	4.45	0.00
16.50	4.21	3.98	0.09	43.00	4.69	4.45	0.00
17.00	4.27	4.03	0.08	43.50	4.69	4.45	0.00
17.50	4.31	4.08	0.07	44.00	4.69	4.45	0.00
18.00	4.35	4.12	0.06	44.50	4.69	4.45	0.00
18.50	4.39	4.15	0.06	45.00	4.69	4.45	0.00
19.00	4.42	4.19	0.05	45.50	4.69	4.45	0.00
19.50	4.46	4.22	0.05	46.00	4.69	4.45	0.00
20.00	4.49	4.25	0.05	46.50	4.69	4.45	0.00
20.50	4.52	4.28	0.05	47.00	4.69	4.45	0.00
21.00	4.55	4.31	0.04	47.50	4.69	4.45	0.00
21.50	4.57	4.34	0.04	48.00	4.69	4.45	0.00
22.00	4.60	4.36	0.04				
22.50	4.62	4.39	0.04				
23.00	4.65	4.41	0.04				
23.50	4.67	4.43	0.03				
24.00	<b>4.69</b>	<b>4.45</b>	0.03				
24.50	4.69	4.45	0.00				
25.00	4.69	4.45	0.00				
25.50	4.69	4.45	0.00				
26.00	4.69	4.45	0.00				

**Summary for Reach 1R: (new Reach)**

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

Inflow Area = 131,867 sf, 70.62% Impervious, Inflow Depth = 1.71" for 10-YR event  
Inflow = 7.69 cfs @ 12.14 hrs, Volume= 18,747 cf  
Outflow = 7.69 cfs @ 12.14 hrs, Volume= 18,747 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3

**Reach 1R: (new Reach)****Hydrograph**

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Type III 24-hr 10-YR Rainfall=4.69"

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**Hydrograph for Reach 1R: (new Reach)**

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00	0.00	0.00	26.50	0.00	0.00	0.00
0.50	0.00	0.00	0.00	27.00	0.00	0.00	0.00
1.00	0.00	0.00	0.00	27.50	0.00	0.00	0.00
1.50	0.00	0.00	0.00	28.00	0.00	0.00	0.00
2.00	0.00	0.00	0.00	28.50	0.00	0.00	0.00
2.50	0.00	0.00	0.00	29.00	0.00	0.00	0.00
3.00	0.00	0.00	0.00	29.50	0.00	0.00	0.00
3.50	0.00	0.00	0.00	30.00	0.00	0.00	0.00
4.00	0.00	0.00	0.00	30.50	0.00	0.00	0.00
4.50	0.00	0.00	0.00	31.00	0.00	0.00	0.00
5.00	0.00	0.00	0.00	31.50	0.00	0.00	0.00
5.50	0.00	0.00	0.00	32.00	0.00	0.00	0.00
6.00	0.00	0.00	0.00	32.50	0.00	0.00	0.00
6.50	0.00	0.00	0.00	33.00	0.00	0.00	0.00
7.00	0.00	0.00	0.00	33.50	0.00	0.00	0.00
7.50	0.00	0.00	0.00	34.00	0.00	0.00	0.00
8.00	0.00	0.00	0.00	34.50	0.00	0.00	0.00
8.50	0.00	0.00	0.00	35.00	0.00	0.00	0.00
9.00	0.00	0.00	0.00	35.50	0.00	0.00	0.00
9.50	0.00	0.00	0.00	36.00	0.00	0.00	0.00
10.00	0.00	0.00	0.00	36.50	0.00	0.00	0.00
10.50	0.00	0.00	0.00	37.00	0.00	0.00	0.00
11.00	0.00	0.00	0.00	37.50	0.00	0.00	0.00
11.50	0.00	0.00	0.00	38.00	0.00	0.00	0.00
12.00	<b>1.98</b>	<b>1.98</b>	0.00	38.50	0.00	0.00	0.00
12.50	<b>3.04</b>	<b>3.04</b>	0.00	39.00	0.00	0.00	0.00
13.00	0.98	0.98	0.00	39.50	0.00	0.00	0.00
13.50	0.66	0.66	0.00	40.00	0.00	0.00	0.00
14.00	0.51	0.51	0.00	40.50	0.00	0.00	0.00
14.50	0.41	0.41	0.00	41.00	0.00	0.00	0.00
15.00	0.34	0.34	0.00	41.50	0.00	0.00	0.00
15.50	0.27	0.27	0.00	42.00	0.00	0.00	0.00
16.00	0.20	0.20	0.00	42.50	0.00	0.00	0.00
16.50	0.15	0.15	0.00	43.00	0.00	0.00	0.00
17.00	0.12	0.12	0.00	43.50	0.00	0.00	0.00
17.50	0.09	0.09	0.00	44.00	0.00	0.00	0.00
18.00	0.06	0.06	0.00	44.50	0.00	0.00	0.00
18.50	0.04	0.04	0.00	45.00	0.00	0.00	0.00
19.00	0.03	0.03	0.00	45.50	0.00	0.00	0.00
19.50	0.02	0.02	0.00	46.00	0.00	0.00	0.00
20.00	0.01	0.01	0.00	46.50	0.00	0.00	0.00
20.50	0.01	0.01	0.00	47.00	0.00	0.00	0.00
21.00	0.01	0.01	0.00	47.50	0.00	0.00	0.00
21.50	0.00	0.00	0.00	48.00	0.00	0.00	0.00
22.00	0.00	0.00	0.00				
22.50	0.00	0.00	0.00				
23.00	0.00	0.00	0.00				
23.50	0.00	0.00	0.00				
24.00	0.00	0.00	0.00				
24.50	0.00	0.00	0.00				
25.00	0.00	0.00	0.00				
25.50	0.00	0.00	0.00				
26.00	0.00	0.00	0.00				

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**Summary for Pond IB-1: Infiltration Basin #1**

Inflow Area = 13,425 sf, 66.59% Impervious, Inflow Depth = 3.08" for 10-YR event  
 Inflow = 1.11 cfs @ 12.09 hrs, Volume= 3,449 cf  
 Outflow = 1.02 cfs @ 12.12 hrs, Volume= 3,449 cf, Atten= 8%, Lag= 2.1 min  
 Discarded = 0.02 cfs @ 12.12 hrs, Volume= 1,637 cf  
 Primary = 1.00 cfs @ 12.12 hrs, Volume= 1,812 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3  
 Peak Elev= 124.03' @ 12.12 hrs Surf.Area= 854 sf Storage= 928 cf

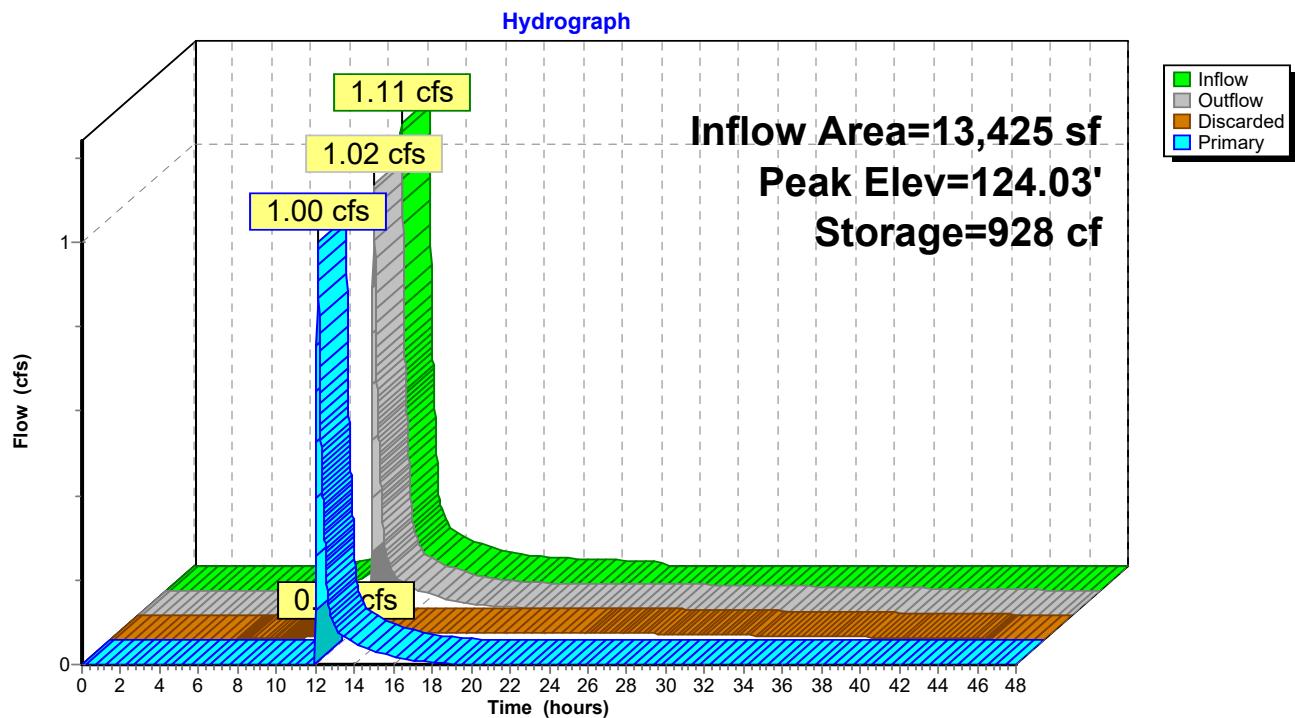
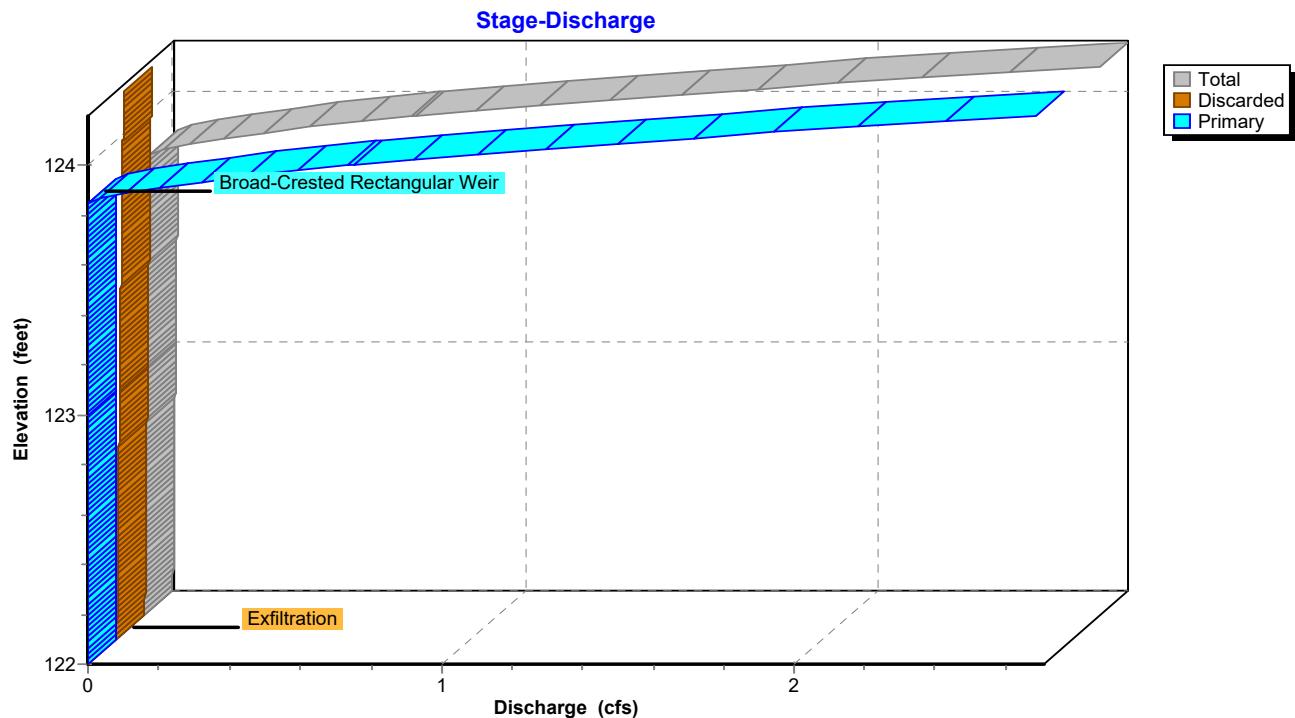
Plug-Flow detention time= 271.0 min calculated for 3,448 cf (100% of inflow)  
 Center-of-Mass det. time= 271.2 min ( 1,081.3 - 810.0 )

Volume	Invert	Avail.Storage	Storage Description
#1	122.00'	1,077 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
122.00	93	0	0
123.00	434	264	264
124.00	839	637	900
124.20	927	177	1,077

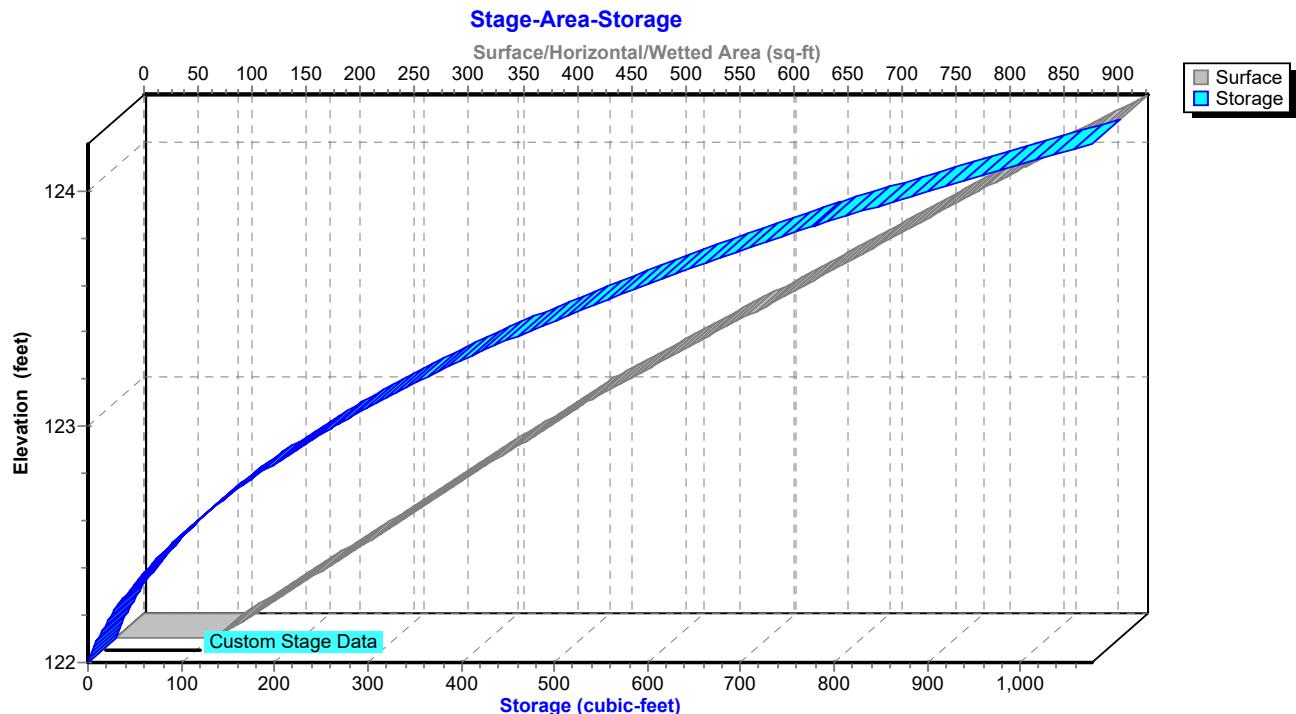
Device	Routing	Invert	Outlet Devices
#1	Discarded	122.00'	<b>1.020 in/hr Exfiltration over Surface area</b> Phase-In= 0.01'
#2	Primary	123.85'	<b>5.0' long x 2.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

**Discarded OutFlow** Max=0.02 cfs @ 12.12 hrs HW=124.03' (Free Discharge)  
 ↑ 1=Exfiltration (Exfiltration Controls 0.02 cfs)

**Primary OutFlow** Max=1.00 cfs @ 12.12 hrs HW=124.03' TW=0.00' (Dynamic Tailwater)  
 ↑ 2=Broad-Crested Rectangular Weir (Weir Controls 1.00 cfs @ 1.09 fps)

**Pond IB-1: Infiltration Basin #1****Pond IB-1: Infiltration Basin #1**

### Pond IB-1: Infiltration Basin #1



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**Hydrograph for Pond IB-1: Infiltration Basin #1**

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	122.00	0.00	0.00	0.00
1.00	0.00	0	122.00	0.00	0.00	0.00
2.00	0.00	0	122.00	0.00	0.00	0.00
3.00	0.00	0	122.00	0.00	0.00	0.00
4.00	0.00	0	122.00	0.00	0.00	0.00
5.00	0.00	0	122.00	0.00	0.00	0.00
6.00	0.00	0	122.00	0.00	0.00	0.00
7.00	0.00	1	122.01	0.00	0.00	0.00
8.00	0.01	7	122.06	0.00	0.00	0.00
9.00	0.01	31	122.23	0.00	0.00	0.00
10.00	0.03	89	122.50	0.01	0.01	0.00
11.00	0.05	205	122.86	0.01	0.01	0.00
12.00	<b>0.66</b>	<b>768</b>	<b>123.84</b>	<b>0.02</b>	<b>0.02</b>	<b>0.00</b>
13.00	<b>0.10</b>	<b>808</b>	<b>123.89</b>	<b>0.11</b>	<b>0.02</b>	<b>0.09</b>
14.00	0.07	798	123.87	0.07	0.02	0.05
15.00	0.05	793	123.87	0.05	0.02	0.03
16.00	0.04	789	123.86	0.04	0.02	0.02
17.00	0.03	786	123.86	0.03	0.02	0.01
18.00	0.02	782	123.85	0.02	0.02	0.00
19.00	0.02	781	123.85	0.02	0.02	0.00
20.00	0.02	778	123.85	0.02	0.02	0.00
21.00	0.02	772	123.84	0.02	0.02	0.00
22.00	0.01	761	123.83	0.02	0.02	0.00
23.00	0.01	746	123.81	0.02	0.02	0.00
24.00	0.01	726	123.78	0.02	0.02	0.00
25.00	0.00	667	123.70	0.02	0.02	0.00
26.00	0.00	607	123.62	0.02	0.02	0.00
27.00	0.00	551	123.53	0.02	0.02	0.00
28.00	0.00	497	123.45	0.01	0.01	0.00
29.00	0.00	446	123.36	0.01	0.01	0.00
30.00	0.00	398	123.28	0.01	0.01	0.00
31.00	0.00	354	123.19	0.01	0.01	0.00
32.00	0.00	312	123.11	0.01	0.01	0.00
33.00	0.00	273	123.02	0.01	0.01	0.00
34.00	0.00	236	122.94	0.01	0.01	0.00
35.00	0.00	202	122.85	0.01	0.01	0.00
36.00	0.00	171	122.77	0.01	0.01	0.00
37.00	0.00	142	122.68	0.01	0.01	0.00
38.00	0.00	116	122.60	0.01	0.01	0.00
39.00	0.00	92	122.51	0.01	0.01	0.00
40.00	0.00	70	122.43	0.01	0.01	0.00
41.00	0.00	51	122.34	0.00	0.00	0.00
42.00	0.00	35	122.26	0.00	0.00	0.00
43.00	0.00	21	122.17	0.00	0.00	0.00
44.00	0.00	9	122.09	0.00	0.00	0.00
45.00	0.00	0	122.00	0.00	0.00	0.00
46.00	0.00	0	122.00	0.00	0.00	0.00
47.00	0.00	0	122.00	0.00	0.00	0.00
48.00	0.00	0	122.00	0.00	0.00	0.00

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**Stage-Discharge for Pond IB-1: Infiltration Basin #1**

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
122.00	0.00	0.00	0.00
122.05	0.00	0.00	0.00
122.10	0.00	0.00	0.00
122.15	0.00	0.00	0.00
122.20	0.00	0.00	0.00
122.25	0.00	0.00	0.00
122.30	0.00	0.00	0.00
122.35	0.01	0.01	0.00
122.40	0.01	0.01	0.00
122.45	0.01	0.01	0.00
122.50	0.01	0.01	0.00
122.55	0.01	0.01	0.00
122.60	0.01	0.01	0.00
122.65	0.01	0.01	0.00
122.70	0.01	0.01	0.00
122.75	0.01	0.01	0.00
122.80	0.01	0.01	0.00
122.85	0.01	0.01	0.00
122.90	0.01	0.01	0.00
122.95	0.01	0.01	0.00
123.00	0.01	0.01	0.00
123.05	0.01	0.01	0.00
123.10	0.01	0.01	0.00
123.15	0.01	0.01	0.00
123.20	0.01	0.01	0.00
123.25	0.01	0.01	0.00
123.30	0.01	0.01	0.00
123.35	0.01	0.01	0.00
123.40	0.01	0.01	0.00
123.45	0.01	0.01	0.00
123.50	0.02	0.02	0.00
123.55	0.02	0.02	0.00
123.60	0.02	0.02	0.00
123.65	0.02	0.02	0.00
123.70	0.02	0.02	0.00
123.75	0.02	0.02	0.00
123.80	0.02	0.02	0.00
123.85	0.02	0.02	0.00
123.90	0.16	0.02	0.14
123.95	0.42	0.02	0.40
124.00	0.76	0.02	0.74
124.05	1.16	0.02	1.14
124.10	1.62	0.02	1.60
124.15	2.14	0.02	2.12
124.20	<b>2.71</b>	<b>0.02</b>	<b>2.68</b>

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**Stage-Area-Storage for Pond IB-1: Infiltration Basin #1**

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
122.00	93	0
122.05	110	5
122.10	127	11
122.15	144	18
122.20	161	25
122.25	178	34
122.30	195	43
122.35	212	53
122.40	229	64
122.45	246	76
122.50	264	89
122.55	281	103
122.60	298	117
122.65	315	132
122.70	332	149
122.75	349	166
122.80	366	184
122.85	383	202
122.90	400	222
122.95	417	242
123.00	434	264
123.05	454	286
123.10	474	309
123.15	495	333
123.20	515	358
123.25	535	385
123.30	555	412
123.35	576	440
123.40	596	470
123.45	616	500
123.50	637	531
123.55	657	563
123.60	677	597
123.65	697	631
123.70	718	667
123.75	738	703
123.80	758	740
123.85	778	779
123.90	799	818
123.95	819	859
124.00	839	900
124.05	861	942
124.10	883	986
124.15	905	1,031
124.20	927	1,077

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**Summary for Pond IB-2: Infiltration Basin #2**

Inflow Area = 33,268 sf, 68.13% Impervious, Inflow Depth = 3.18" for 10-YR event  
 Inflow = 2.82 cfs @ 12.09 hrs, Volume= 8,813 cf  
 Outflow = 2.09 cfs @ 12.16 hrs, Volume= 8,813 cf, Atten= 26%, Lag= 4.3 min  
 Discarded = 0.05 cfs @ 12.16 hrs, Volume= 4,312 cf  
 Primary = 2.03 cfs @ 12.16 hrs, Volume= 4,501 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3  
 Peak Elev= 123.82' @ 12.16 hrs Surf.Area= 2,326 sf Storage= 2,680 cf

Plug-Flow detention time= 263.8 min calculated for 8,813 cf (100% of inflow)  
 Center-of-Mass det. time= 263.8 min ( 1,070.7 - 806.9 )

Volume	Invert	Avail.Storage	Storage Description	
#1	122.00'	3,647 cf	<b>Custom Stage Data (Prismatic)</b>	Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	
122.00	672	0	0	
123.00	1,538	1,105	1,105	
124.00	2,504	2,021	3,126	
124.20	2,704	521	3,647	
Device	Routing	Invert	Outlet Devices	
#1	Discarded	122.00'	<b>1.020 in/hr Exfiltration over Surface area</b>	Phase-In= 0.01'
#2	Device 3	123.50'	<b>4.0' long x 0.5' breadth Broad-Crested Rectangular Weir</b>	
			Head (feet) 0.20 0.40 0.60 0.80 1.00	
			Coef. (English) 2.80 2.92 3.08 3.30 3.32	
#3	Primary	121.90'	<b>18.0" Round Culvert</b>	
			L= 20.0' CPP, square edge headwall, Ke= 0.500	
			Inlet / Outlet Invert= 121.90' / 121.70' S= 0.0100 '/' Cc= 0.900	
			n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf	

**Discarded OutFlow** Max=0.05 cfs @ 12.16 hrs HW=123.82' (Free Discharge)

↑ 1=Exfiltration (Exfiltration Controls 0.05 cfs)

**Primary OutFlow** Max=2.03 cfs @ 12.16 hrs HW=123.82' TW=0.00' (Dynamic Tailwater)

↑ 3=Culvert (Passes 2.03 cfs of 8.67 cfs potential flow)

↑ 2=Broad-Crested Rectangular Weir (Weir Controls 2.03 cfs @ 1.61 fps)

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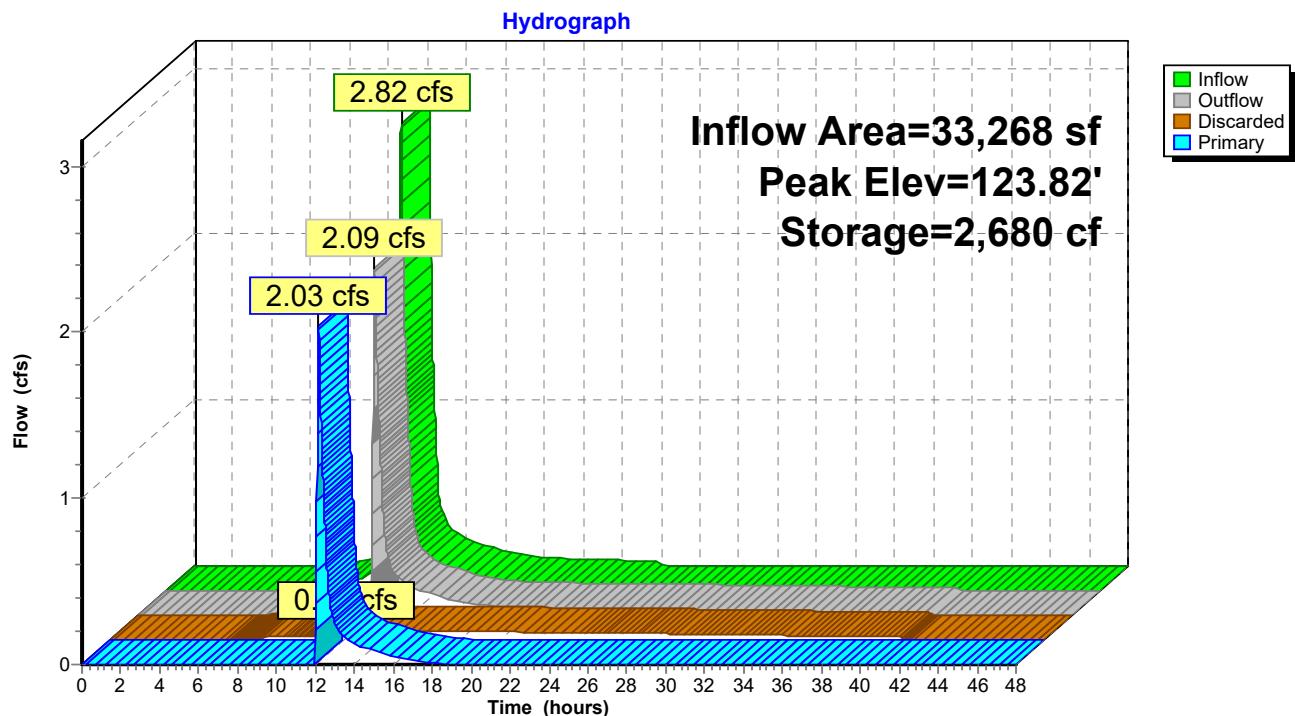
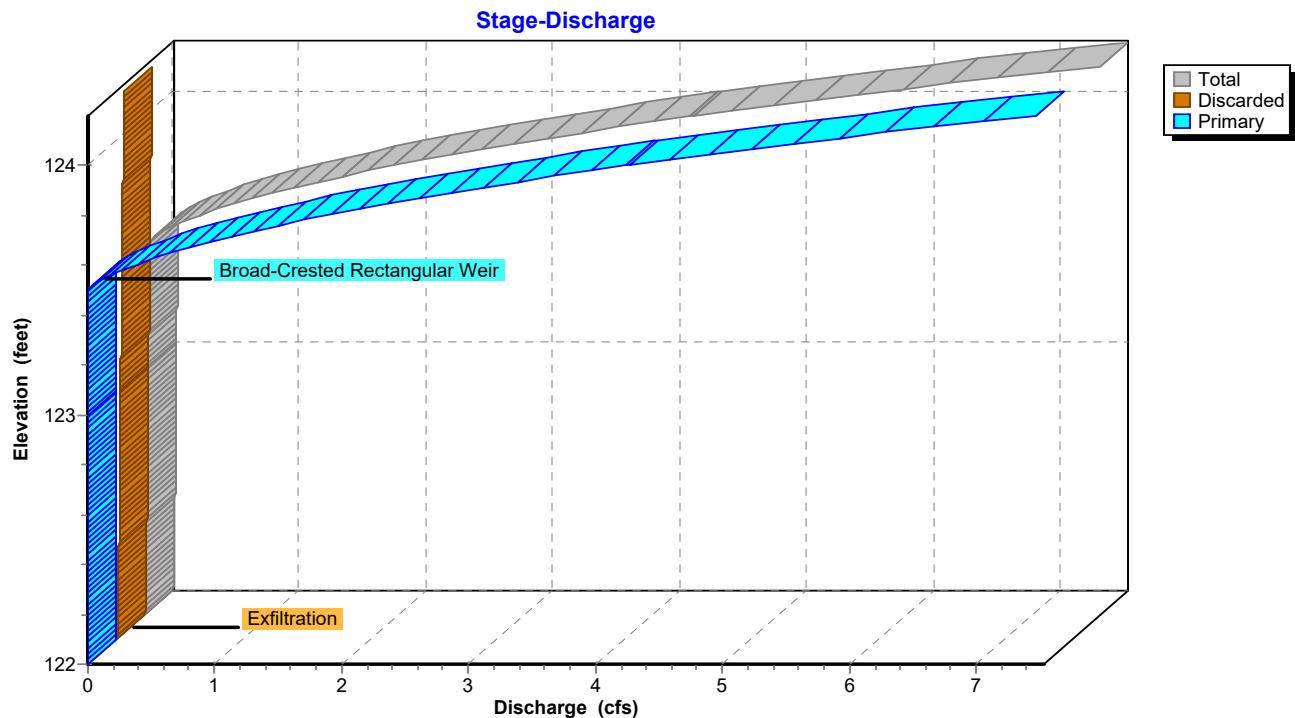
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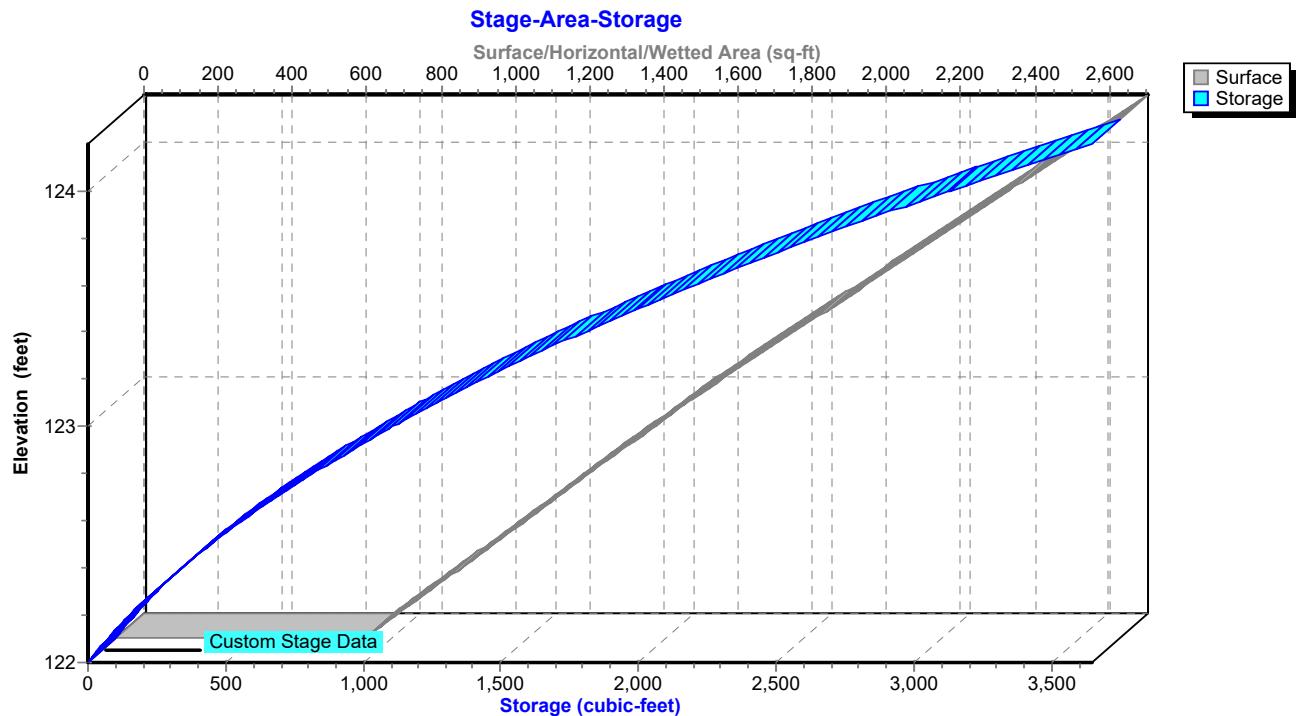
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**Pond IB-2: Infiltration Basin #2****Pond IB-2: Infiltration Basin #2**

### Pond IB-2: Infiltration Basin #2



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**Hydrograph for Pond IB-2: Infiltration Basin #2**

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	122.00	0.00	0.00	0.00
1.00	0.00	0	122.00	0.00	0.00	0.00
2.00	0.00	0	122.00	0.00	0.00	0.00
3.00	0.00	0	122.00	0.00	0.00	0.00
4.00	0.00	0	122.00	0.00	0.00	0.00
5.00	0.00	0	122.00	0.00	0.00	0.00
6.00	0.00	0	122.00	0.00	0.00	0.00
7.00	0.01	3	122.00	0.01	0.01	0.00
8.00	0.02	8	122.01	0.02	0.02	0.00
9.00	0.04	53	122.08	0.02	0.02	0.00
10.00	0.08	193	122.25	0.02	0.02	0.00
11.00	0.14	490	122.54	0.03	0.03	0.00
12.00	<b>1.69</b>	<b>1,943</b>	<b>123.47</b>	<b>0.05</b>	<b>0.05</b>	<b>0.00</b>
13.00	<b>0.26</b>	<b>2,158</b>	<b>123.58</b>	<b>0.30</b>	<b>0.05</b>	<b>0.25</b>
14.00	0.17	2,099	123.55	0.18	0.05	0.13
15.00	0.13	2,073	123.54	0.13	0.05	0.08
16.00	0.09	2,048	123.53	0.10	0.05	0.05
17.00	0.07	2,031	123.52	0.07	0.05	0.03
18.00	0.05	2,015	123.51	0.06	0.05	0.01
19.00	0.05	2,004	123.50	0.05	0.05	0.00
20.00	0.04	1,993	123.50	0.05	0.05	0.00
21.00	0.04	1,972	123.49	0.05	0.05	0.00
22.00	0.04	1,939	123.47	0.05	0.05	0.00
23.00	0.03	1,894	123.45	0.05	0.05	0.00
24.00	0.03	1,838	123.42	0.05	0.05	0.00
25.00	0.00	1,685	123.34	0.04	0.04	0.00
26.00	0.00	1,530	123.26	0.04	0.04	0.00
27.00	0.00	1,382	123.17	0.04	0.04	0.00
28.00	0.00	1,241	123.09	0.04	0.04	0.00
29.00	0.00	1,106	123.00	0.04	0.04	0.00
30.00	0.00	979	122.92	0.03	0.03	0.00
31.00	0.00	857	122.83	0.03	0.03	0.00
32.00	0.00	742	122.75	0.03	0.03	0.00
33.00	0.00	633	122.66	0.03	0.03	0.00
34.00	0.00	531	122.58	0.03	0.03	0.00
35.00	0.00	434	122.49	0.03	0.03	0.00
36.00	0.00	344	122.41	0.02	0.02	0.00
37.00	0.00	260	122.32	0.02	0.02	0.00
38.00	0.00	183	122.24	0.02	0.02	0.00
39.00	0.00	111	122.15	0.02	0.02	0.00
40.00	0.00	46	122.07	0.02	0.02	0.00
41.00	0.00	0	122.00	0.00	0.00	0.00
42.00	0.00	0	122.00	0.00	0.00	0.00
43.00	0.00	0	122.00	0.00	0.00	0.00
44.00	0.00	0	122.00	0.00	0.00	0.00
45.00	0.00	0	122.00	0.00	0.00	0.00
46.00	0.00	0	122.00	0.00	0.00	0.00
47.00	0.00	0	122.00	0.00	0.00	0.00
48.00	0.00	0	122.00	0.00	0.00	0.00

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**Stage-Discharge for Pond IB-2: Infiltration Basin #2**

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
122.00	0.00	0.00	0.00
122.05	0.02	0.02	0.00
122.10	0.02	0.02	0.00
122.15	0.02	0.02	0.00
122.20	0.02	0.02	0.00
122.25	0.02	0.02	0.00
122.30	0.02	0.02	0.00
122.35	0.02	0.02	0.00
122.40	0.02	0.02	0.00
122.45	0.03	0.03	0.00
122.50	0.03	0.03	0.00
122.55	0.03	0.03	0.00
122.60	0.03	0.03	0.00
122.65	0.03	0.03	0.00
122.70	0.03	0.03	0.00
122.75	0.03	0.03	0.00
122.80	0.03	0.03	0.00
122.85	0.03	0.03	0.00
122.90	0.03	0.03	0.00
122.95	0.04	0.04	0.00
123.00	0.04	0.04	0.00
123.05	0.04	0.04	0.00
123.10	0.04	0.04	0.00
123.15	0.04	0.04	0.00
123.20	0.04	0.04	0.00
123.25	0.04	0.04	0.00
123.30	0.04	0.04	0.00
123.35	0.04	0.04	0.00
123.40	0.05	0.05	0.00
123.45	0.05	0.05	0.00
123.50	0.05	0.05	0.00
123.55	0.17	0.05	0.13
123.60	0.40	0.05	0.35
123.65	0.70	0.05	0.65
123.70	1.05	0.05	1.00
123.75	1.47	0.05	1.41
123.80	1.93	0.05	1.88
123.85	2.45	0.06	2.39
123.90	3.01	0.06	2.95
123.95	3.63	0.06	3.57
124.00	4.30	0.06	4.24
124.05	5.02	0.06	4.96
124.10	5.79	0.06	5.73
124.15	6.63	0.06	6.57
124.20	<b>7.54</b>	<b>0.06</b>	<b>7.47</b>

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**Stage-Area-Storage for Pond IB-2: Infiltration Basin #2**

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
122.00	672	0
122.05	715	35
122.10	759	72
122.15	802	111
122.20	845	152
122.25	889	195
122.30	932	241
122.35	975	288
122.40	1,018	338
122.45	1,062	390
122.50	1,105	444
122.55	1,148	501
122.60	1,192	559
122.65	1,235	620
122.70	1,278	683
122.75	1,322	748
122.80	1,365	815
122.85	1,408	884
122.90	1,451	956
122.95	1,495	1,029
123.00	1,538	1,105
123.05	1,586	1,183
123.10	1,635	1,264
123.15	1,683	1,347
123.20	1,731	1,432
123.25	1,780	1,520
123.30	1,828	1,610
123.35	1,876	1,702
123.40	1,924	1,797
123.45	1,973	1,895
123.50	2,021	1,995
123.55	2,069	2,097
123.60	2,118	2,202
123.65	2,166	2,309
123.70	2,214	2,418
123.75	2,263	2,530
123.80	2,311	2,645
123.85	2,359	2,761
123.90	2,407	2,880
123.95	2,456	3,002
124.00	2,504	3,126
124.05	2,554	3,252
124.10	2,604	3,381
124.15	2,654	3,513
124.20	<b>2,704</b>	<b>3,647</b>

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**Summary for Pond UG-1: Underground Detention System #1**

Inflow Area = 13,403 sf, 58.36% Impervious, Inflow Depth = 2.80" for 10-YR event  
 Inflow = 1.01 cfs @ 12.09 hrs, Volume= 3,131 cf  
 Outflow = 0.66 cfs @ 12.16 hrs, Volume= 3,129 cf, Atten= 34%, Lag= 4.5 min  
 Primary = 0.66 cfs @ 12.16 hrs, Volume= 3,129 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3  
 Peak Elev= 123.09' @ 12.18 hrs Surf.Area= 820 sf Storage= 415 cf

Plug-Flow detention time= 48.2 min calculated for 3,129 cf (100% of inflow)  
 Center-of-Mass det. time= 47.9 min ( 866.8 - 819.0 )

Volume	Invert	Avail.Storage	Storage Description
#1A	122.40'	156 cf	<b>10.00'W x 82.00'L x 2.17'H Field A</b> 1,777 cf Overall - 1,387 cf Embedded = 390 cf x 40.0% Voids
#2A	122.40'	792 cf	<b>retain_it retain_it 1.5' x 10 Inside #1</b> Inside= 84.0"W x 18.0"H => 9.90 sf x 8.00'L = 79.2 cf Outside= 96.0"W x 26.0"H => 17.33 sf x 8.00'L = 138.7 cf
948 cf			Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	122.40'	<b>15.0" Round Culvert</b> L= 140.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 122.40' / 121.50' S= 0.0064 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.23 sf

**Primary OutFlow** Max=0.66 cfs @ 12.16 hrs HW=123.09' TW=122.93' (Dynamic Tailwater)  
 ↑1=Culvert (Outlet Controls 0.66 cfs @ 1.38 fps)

**Pond UG-1: Underground Detention System #1 - Chamber Wizard Field A****Chamber Model = retain\_it retain\_it 1.5' (retain-it®)**

Inside= 84.0"W x 18.0"H =&gt; 9.90 sf x 8.00'L = 79.2 cf

Outside= 96.0"W x 26.0"H =&gt; 17.33 sf x 8.00'L = 138.7 cf

10 Chambers/Row x 8.00' Long = 80.00' Row Length +12.0" End Stone x 2 = 82.00' Base Length

1 Rows x 96.0" Wide + 12.0" Side Stone x 2 = 10.00' Base Width

26.0" Chamber Height = 2.17' Field Height

10 Chambers x 79.2 cf = 791.7 cf Chamber Storage

10 Chambers x 138.7 cf = 1,386.7 cf Displacement

1,776.7 cf Field - 1,386.7 cf Chambers = 390.0 cf Stone x 40.0% Voids = 156.0 cf Stone Storage

Chamber Storage + Stone Storage = 947.7 cf = 0.022 af

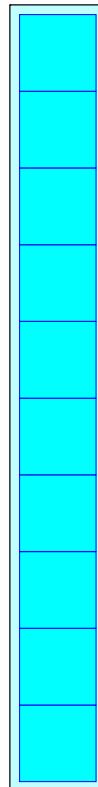
Overall Storage Efficiency = 53.3%

Overall System Size = 82.00' x 10.00' x 2.17'

10 Chambers

65.8 cy Field

14.4 cy Stone



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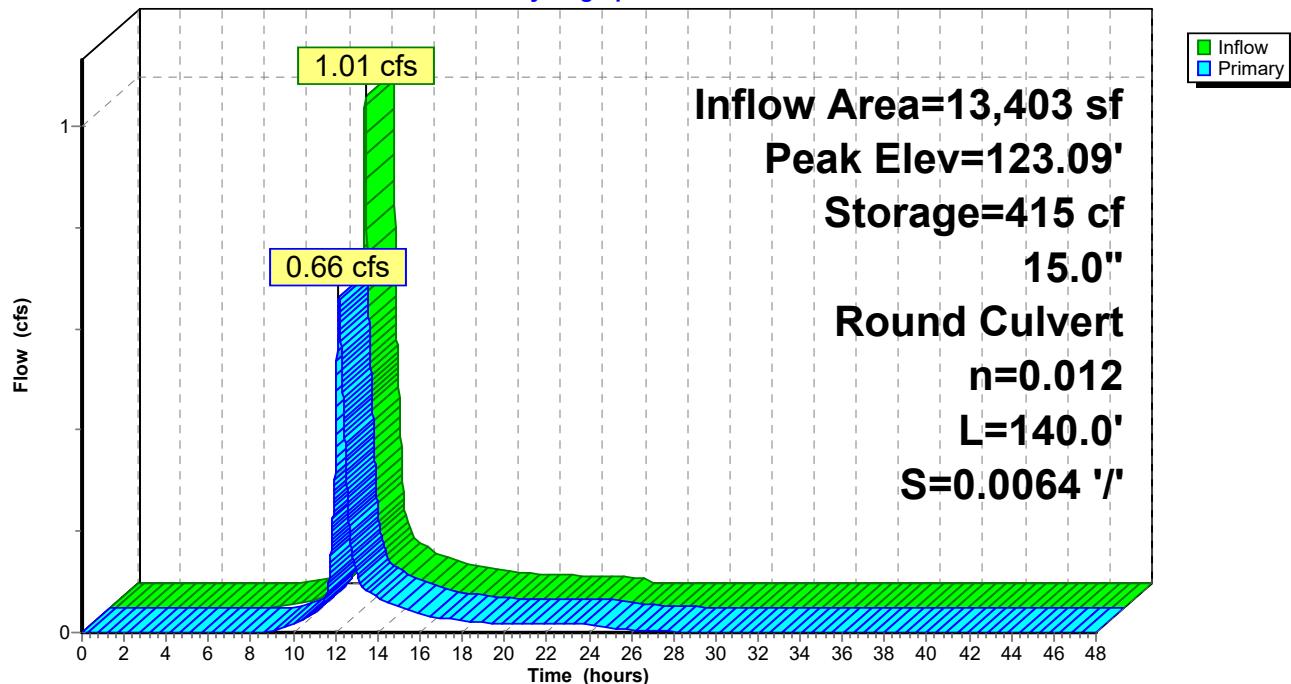
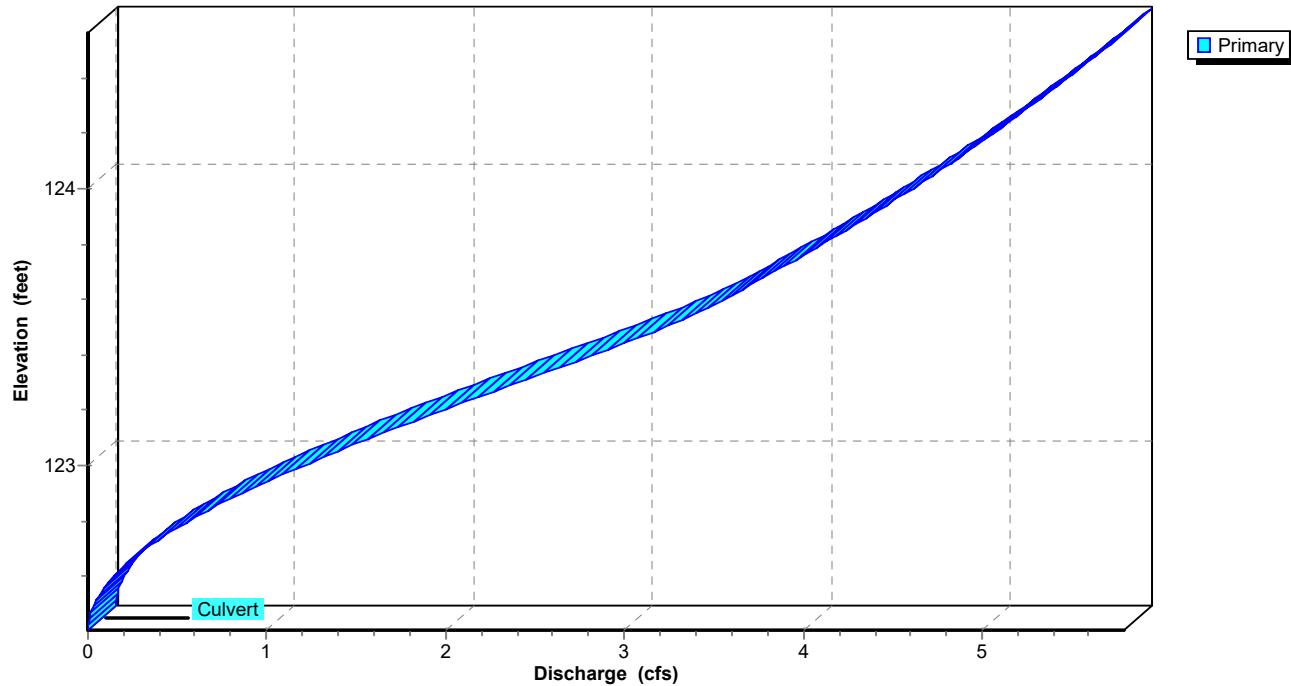
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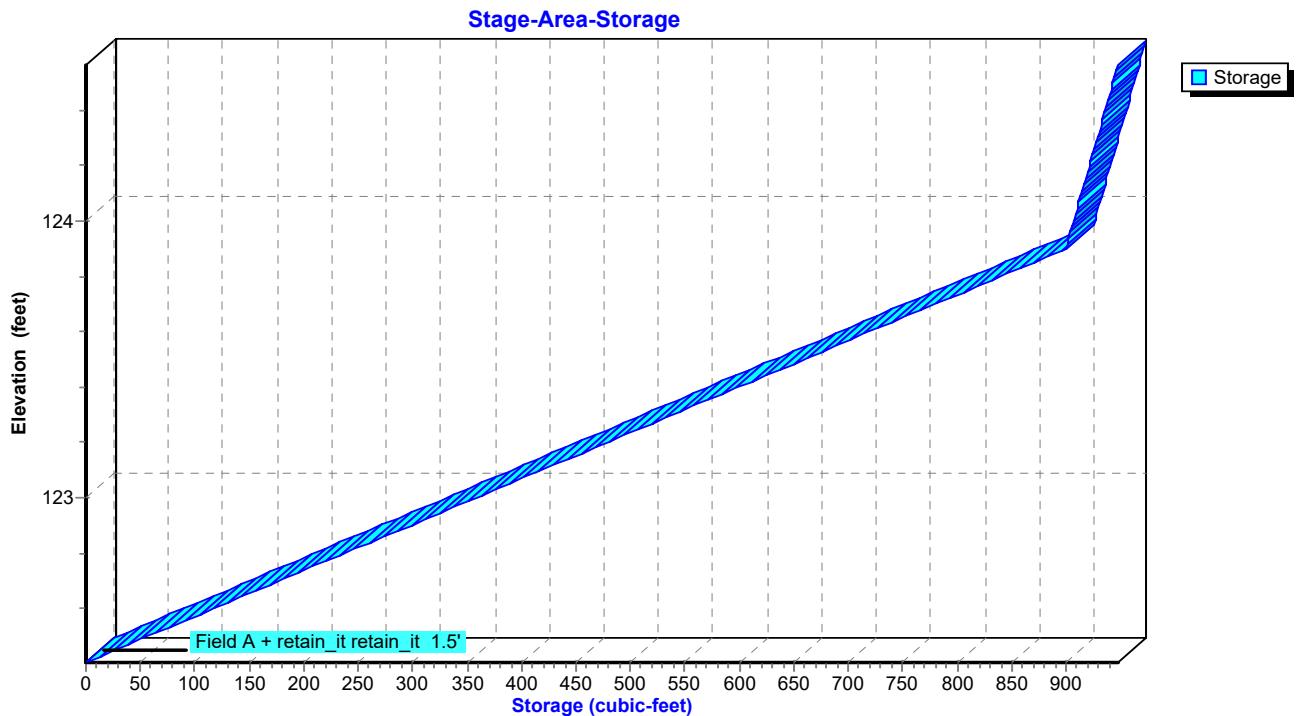
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**Pond UG-1: Underground Detention System #1****Hydrograph****Pond UG-1: Underground Detention System #1****Stage-Discharge**

### Pond UG-1: Underground Detention System #1



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**Hydrograph for Pond UG-1: Underground Detention System #1**

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0	122.40	0.00
1.00	0.00	0	122.40	0.00
2.00	0.00	0	122.40	0.00
3.00	0.00	0	122.40	0.00
4.00	0.00	0	122.40	0.00
5.00	0.00	0	122.40	0.00
6.00	0.00	0	122.40	0.00
7.00	0.00	0	122.40	0.00
8.00	0.00	3	122.41	0.00
9.00	0.01	20	122.43	0.00
10.00	0.02	39	122.47	0.02
11.00	0.04	60	122.50	0.04
12.00	<b>0.59</b>	<b>219</b>	<b>122.77</b>	<b>0.35</b>
13.00	<b>0.10</b>	<b>226</b>	<b>122.78</b>	<b>0.12</b>
14.00	0.06	196	122.73	0.07
15.00	0.05	184	122.71	0.05
16.00	0.03	174	122.69	0.04
17.00	0.03	166	122.68	0.03
18.00	0.02	160	122.67	0.02
19.00	0.02	156	122.66	0.02
20.00	0.02	152	122.65	0.02
21.00	0.02	147	122.64	0.02
22.00	0.01	137	122.63	0.02
23.00	0.01	125	122.61	0.02
24.00	0.01	109	122.58	0.02
25.00	0.00	70	122.52	0.01
26.00	0.00	43	122.47	0.01
27.00	0.00	28	122.45	0.00
28.00	0.00	19	122.43	0.00
29.00	0.00	14	122.42	0.00
30.00	0.00	11	122.42	0.00
31.00	0.00	9	122.41	0.00
32.00	0.00	7	122.41	0.00
33.00	0.00	6	122.41	0.00
34.00	0.00	5	122.41	0.00
35.00	0.00	5	122.41	0.00
36.00	0.00	4	122.41	0.00
37.00	0.00	4	122.41	0.00
38.00	0.00	3	122.41	0.00
39.00	0.00	3	122.41	0.00
40.00	0.00	3	122.40	0.00
41.00	0.00	3	122.40	0.00
42.00	0.00	3	122.40	0.00
43.00	0.00	2	122.40	0.00
44.00	0.00	2	122.40	0.00
45.00	0.00	2	122.40	0.00
46.00	0.00	2	122.40	0.00
47.00	0.00	2	122.40	0.00
48.00	0.00	2	122.40	0.00

**Stage-Discharge for Pond UG-1: Underground Detention System #1**

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
122.40	0.00	123.46	3.07	124.52	5.70
122.42	0.00	123.48	3.15	124.54	5.74
122.44	0.01	123.50	3.22	124.56	<b>5.78</b>
122.46	0.01	123.52	3.30		
122.48	0.02	123.54	3.37		
122.50	0.04	123.56	3.44		
122.52	0.06	123.58	3.50		
122.54	0.08	123.60	3.56		
122.56	0.10	123.62	3.62		
122.58	0.12	123.64	3.67		
122.60	0.15	123.66	3.72		
122.62	0.18	123.68	3.78		
122.64	0.22	123.70	3.83		
122.66	0.25	123.72	3.89		
122.68	0.29	123.74	3.94		
122.70	0.33	123.76	4.00		
122.72	0.38	123.78	4.05		
122.74	0.42	123.80	4.11		
122.76	0.47	123.82	4.16		
122.78	0.52	123.84	4.21		
122.80	0.58	123.86	4.26		
122.82	0.63	123.88	4.31		
122.84	0.69	123.90	4.36		
122.86	0.75	123.92	4.41		
122.88	0.81	123.94	4.46		
122.90	0.87	123.96	4.51		
122.92	0.94	123.98	4.56		
122.94	1.00	124.00	4.61		
122.96	1.07	124.02	4.65		
122.98	1.14	124.04	4.70		
123.00	1.21	124.06	4.75		
123.02	1.29	124.08	4.79		
123.04	1.36	124.10	4.84		
123.06	1.44	124.12	4.88		
123.08	1.51	124.14	4.93		
123.10	1.59	124.16	4.97		
123.12	1.67	124.18	5.01		
123.14	1.75	124.20	5.06		
123.16	1.83	124.22	5.10		
123.18	1.91	124.24	5.14		
123.20	1.99	124.26	5.18		
123.22	2.08	124.28	5.23		
123.24	2.16	124.30	5.27		
123.26	2.24	124.32	5.31		
123.28	2.33	124.34	5.35		
123.30	2.41	124.36	5.39		
123.32	2.50	124.38	5.43		
123.34	2.58	124.40	5.47		
123.36	2.66	124.42	5.51		
123.38	2.75	124.44	5.55		
123.40	2.83	124.46	5.59		
123.42	2.91	124.48	5.63		
123.44	2.99	124.50	5.67		

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**Stage-Area-Storage for Pond UG-1: Underground Detention System #1**

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
122.40	0	123.46	636	124.52	944
122.42	12	123.48	648	124.54	946
122.44	24	123.50	660	124.56	<b>947</b>
122.46	36	123.52	672		
122.48	48	123.54	684		
122.50	60	123.56	696		
122.52	72	123.58	708		
122.54	84	123.60	720		
122.56	96	123.62	732		
122.58	108	123.64	744		
122.60	120	123.66	756		
122.62	132	123.68	768		
122.64	144	123.70	780		
122.66	156	123.72	792		
122.68	168	123.74	804		
122.70	180	123.76	816		
122.72	192	123.78	828		
122.74	204	123.80	840		
122.76	216	123.82	852		
122.78	228	123.84	864		
122.80	240	123.86	876		
122.82	252	123.88	888		
122.84	264	123.90	900		
122.86	276	123.92	901		
122.88	288	123.94	903		
122.90	300	123.96	904		
122.92	312	123.98	905		
122.94	324	124.00	907		
122.96	336	124.02	908		
122.98	348	124.04	910		
123.00	360	124.06	911		
123.02	372	124.08	913		
123.04	384	124.10	914		
123.06	396	124.12	916		
123.08	408	124.14	917		
123.10	420	124.16	918		
123.12	432	124.18	920		
123.14	444	124.20	921		
123.16	456	124.22	923		
123.18	468	124.24	924		
123.20	480	124.26	926		
123.22	492	124.28	927		
123.24	504	124.30	929		
123.26	516	124.32	930		
123.28	528	124.34	931		
123.30	540	124.36	933		
123.32	552	124.38	934		
123.34	564	124.40	936		
123.36	576	124.42	937		
123.38	588	124.44	939		
123.40	600	124.46	940		
123.42	612	124.48	941		
123.44	624	124.50	943		

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**Summary for Pond UG-2: Underground Infiltration System #1**

Inflow Area = 42,604 sf, 63.97% Impervious, Inflow Depth = 3.06" for 10-YR event  
 Inflow = 3.05 cfs @ 12.09 hrs, Volume= 10,864 cf  
 Outflow = 2.12 cfs @ 12.19 hrs, Volume= 10,864 cf, Atten= 31%, Lag= 6.2 min  
 Discarded = 0.06 cfs @ 10.17 hrs, Volume= 5,675 cf  
 Primary = 2.06 cfs @ 12.19 hrs, Volume= 5,190 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3  
 Peak Elev= 122.94' @ 12.19 hrs Surf.Area= 2,548 sf Storage= 2,967 cf

Plug-Flow detention time= 230.6 min calculated for 10,864 cf (100% of inflow)  
 Center-of-Mass det. time= 230.6 min ( 1,054.7 - 824.1 )

Volume	Invert	Avail.Storage	Storage Description
#1A	121.50'	260 cf	<b>26.00'W x 98.00'L x 2.67'H Field A</b> 6,795 cf Overall - 6,144 cf Embedded = 651 cf x 40.0% Voids
#2A	121.50'	3,913 cf	<b>retain_it retain_it 2.0' x 36 Inside #1</b> Inside= 84.0"W x 24.0"H => 13.78 sf x 8.00'L = 110.3 cf Outside= 96.0"W x 32.0"H => 21.33 sf x 8.00'L = 170.7 cf 3 Rows adjusted for 56.7 cf perimeter wall
4,174 cf			Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	121.50'	<b>1.020 in/hr Exfiltration over Surface area</b> Phase-In= 0.01'
#2	Device 3	121.50'	<b>18.0" Round Culvert</b> L= 30.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 121.50' / 121.50' S= 0.0000 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf
#3	Device 4	122.65'	<b>4.0' long Sharp-Crested Rectangular Weir</b> 2 End Contraction(s)
#4	Primary	122.02'	<b>15.0" Round Culvert</b> L= 60.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 122.02' / 121.70' S= 0.0053 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.23 sf

**Discarded OutFlow** Max=0.06 cfs @ 10.17 hrs HW=121.53' (Free Discharge)  
 ↑ 1=Exfiltration (Exfiltration Controls 0.06 cfs)

**Primary OutFlow** Max=2.05 cfs @ 12.19 hrs HW=122.94' TW=0.00' (Dynamic Tailwater)  
 ↑ 4=Culvert (Passes 2.05 cfs of 2.58 cfs potential flow)  
 ↑ 3=Sharp-Crested Rectangular Weir (Weir Controls 2.05 cfs @ 1.77 fps)  
 ↑ 2=Culvert (Passes 2.05 cfs of 3.60 cfs potential flow)

**Pond UG-2: Underground Infiltration System #1 - Chamber Wizard Field A****Chamber Model = retain\_it retain\_it 2.0' (retain-it®)**

Inside= 84.0"W x 24.0"H =&gt; 13.78 sf x 8.00'L = 110.3 cf

Outside= 96.0"W x 32.0"H =&gt; 21.33 sf x 8.00'L = 170.7 cf

3 Rows adjusted for 56.7 cf perimeter wall

12 Chambers/Row x 8.00' Long = 96.00' Row Length +12.0" End Stone x 2 = 98.00' Base Length

3 Rows x 96.0" Wide + 12.0" Side Stone x 2 = 26.00' Base Width

32.0" Chamber Height = 2.67' Field Height

1.9 cf Sidewall x 12 x 2 + 1.9 cf Endwall x 3 x 2 = 56.7 cf Perimeter Wall

36 Chambers x 110.3 cf - 56.7 cf Perimeter wall = 3,913.4 cf Chamber Storage

36 Chambers x 170.7 cf = 6,144.0 cf Displacement

6,794.7 cf Field - 6,144.0 cf Chambers = 650.7 cf Stone x 40.0% Voids = 260.3 cf Stone Storage

Chamber Storage + Stone Storage = 4,173.6 cf = 0.096 af

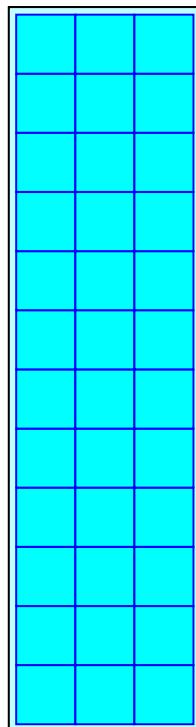
Overall Storage Efficiency = 61.4%

Overall System Size = 98.00' x 26.00' x 2.67'

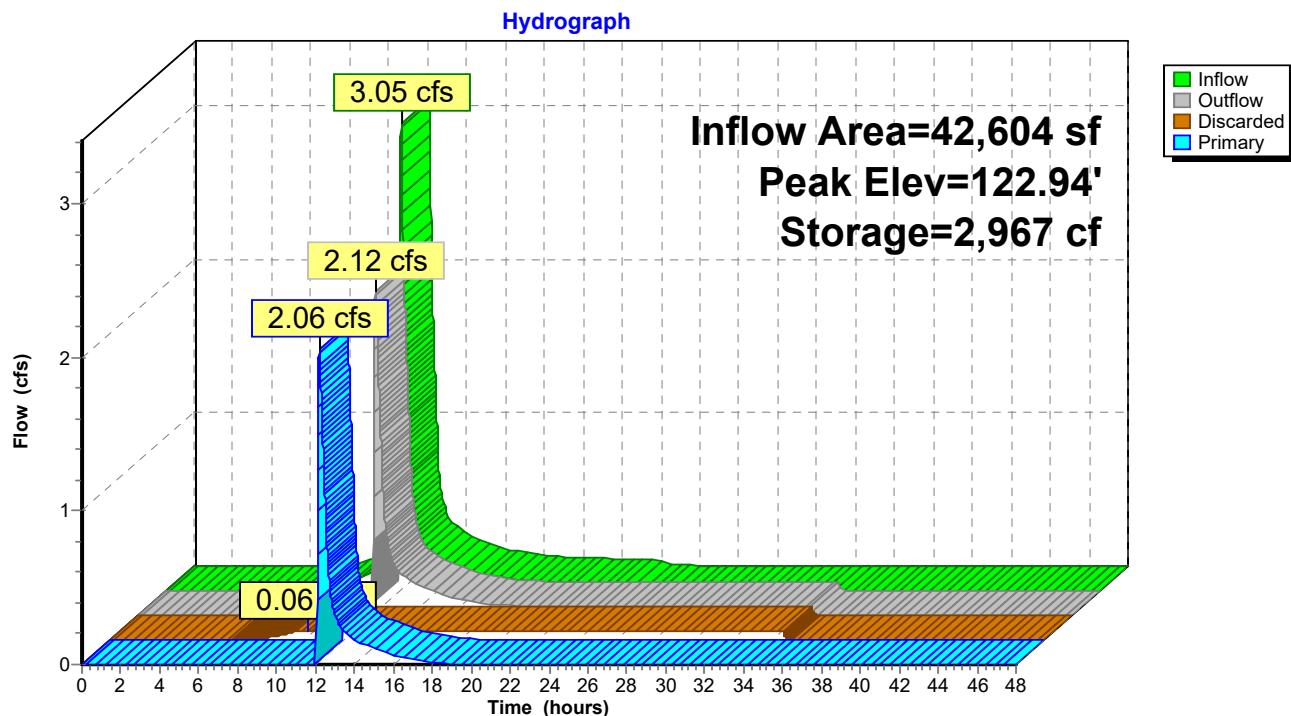
36 Chambers

251.7 cy Field

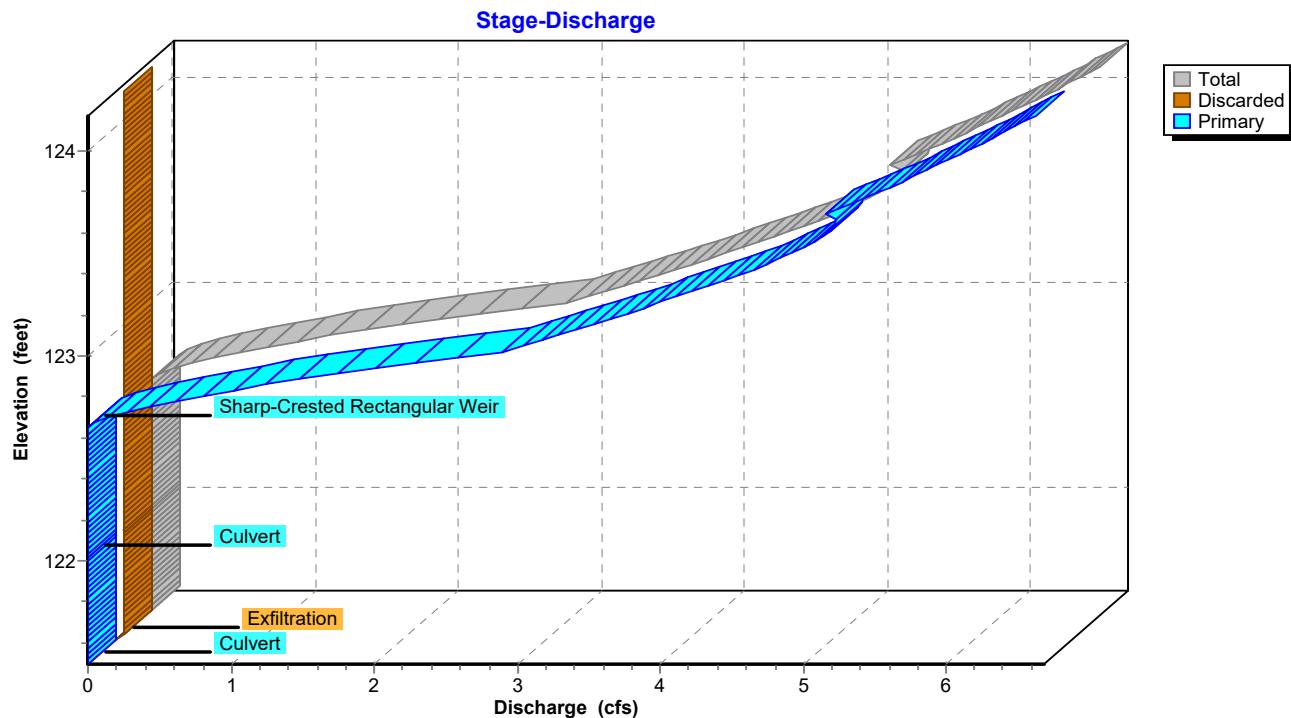
24.1 cy Stone



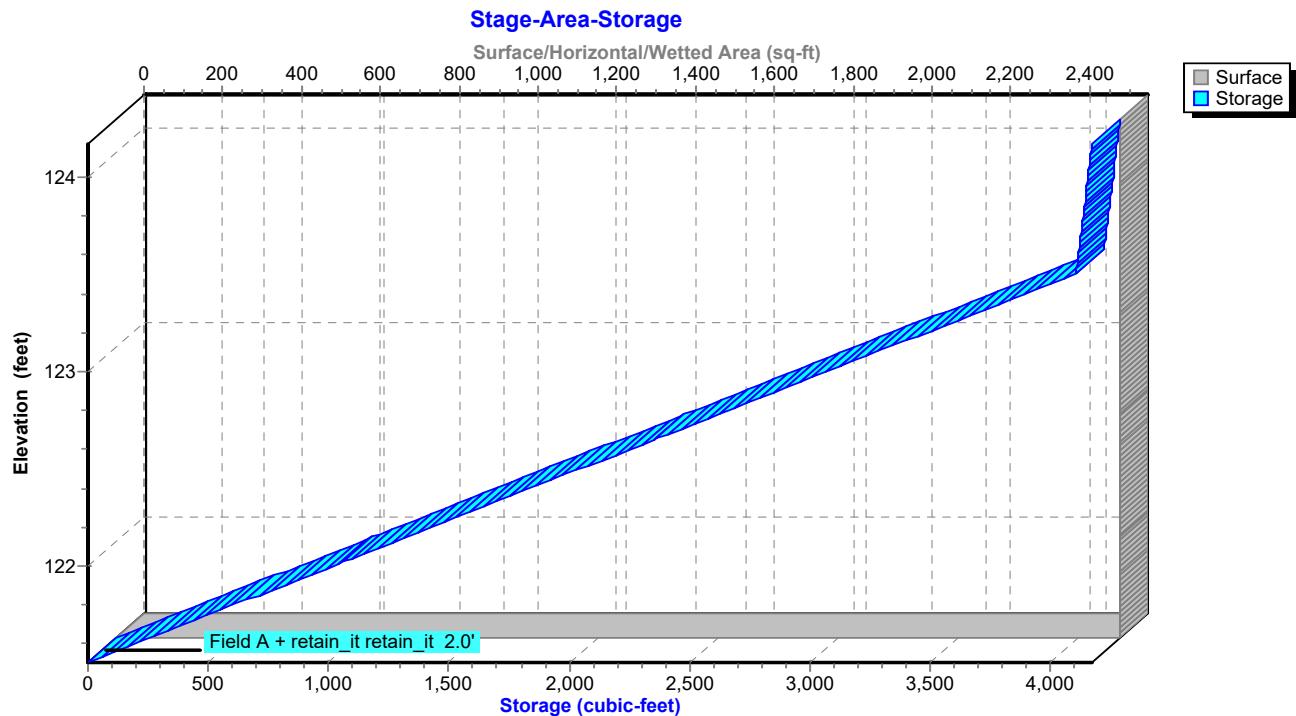
### Pond UG-2: Underground Infiltration System #1



### Pond UG-2: Underground Infiltration System #1



### Pond UG-2: Underground Infiltration System #1



**Proposed HydroCAD 533 Boston Post Road**

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Type III 24-hr 10-YR Rainfall=4.69"

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**Hydrograph for Pond UG-2: Underground Infiltration System #1**

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	121.50	0.00	0.00	0.00
1.00	0.00	0	121.50	0.00	0.00	0.00
2.00	0.00	0	121.50	0.00	0.00	0.00
3.00	0.00	0	121.50	0.00	0.00	0.00
4.00	0.00	0	121.50	0.00	0.00	0.00
5.00	0.00	0	121.50	0.00	0.00	0.00
6.00	0.00	0	121.50	0.00	0.00	0.00
7.00	0.01	2	121.50	0.01	0.01	0.00
8.00	0.02	5	121.50	0.02	0.02	0.00
9.00	0.04	13	121.51	0.04	0.04	0.00
10.00	0.08	39	121.52	0.06	<b>0.06</b>	0.00
11.00	0.16	250	121.62	0.06	<b>0.06</b>	0.00
12.00	<b>1.83</b>	<b>1,780</b>	<b>122.37</b>	<b>0.06</b>	0.06	<b>0.00</b>
13.00	<b>0.35</b>	<b>2,539</b>	<b>122.74</b>	<b>0.39</b>	0.06	<b>0.33</b>
14.00	0.21	2,474	122.70	0.23	0.06	0.17
15.00	0.16	2,446	122.69	0.17	0.06	0.11
16.00	0.12	2,421	122.68	0.12	0.06	0.06
17.00	0.09	2,402	122.67	0.10	0.06	0.03
18.00	0.07	2,385	122.66	0.08	0.06	0.02
19.00	0.06	2,373	122.65	0.06	0.06	0.00
20.00	0.06	2,362	122.65	0.06	0.06	0.00
21.00	0.05	2,341	122.64	0.06	0.06	0.00
22.00	0.05	2,307	122.62	0.06	0.06	0.00
23.00	0.04	2,259	122.60	0.06	0.06	0.00
24.00	0.04	2,197	122.57	0.06	0.06	0.00
25.00	0.01	2,031	122.49	0.06	0.06	0.00
26.00	0.01	1,842	122.40	0.06	0.06	0.00
27.00	0.00	1,640	122.30	0.06	0.06	0.00
28.00	0.00	1,432	122.20	0.06	0.06	0.00
29.00	0.00	1,221	122.09	0.06	0.06	0.00
30.00	0.00	1,007	121.99	0.06	0.06	0.00
31.00	0.00	793	121.89	0.06	0.06	0.00
32.00	0.00	578	121.78	0.06	0.06	0.00
33.00	0.00	363	121.68	0.06	0.06	0.00
34.00	0.00	147	121.57	0.06	0.06	0.00
35.00	0.00	0	121.50	0.00	0.00	0.00
36.00	0.00	0	121.50	0.00	0.00	0.00
37.00	0.00	0	121.50	0.00	0.00	0.00
38.00	0.00	0	121.50	0.00	0.00	0.00
39.00	0.00	0	121.50	0.00	0.00	0.00
40.00	0.00	0	121.50	0.00	0.00	0.00
41.00	0.00	0	121.50	0.00	0.00	0.00
42.00	0.00	0	121.50	0.00	0.00	0.00
43.00	0.00	0	121.50	0.00	0.00	0.00
44.00	0.00	0	121.50	0.00	0.00	0.00
45.00	0.00	0	121.50	0.00	0.00	0.00
46.00	0.00	0	121.50	0.00	0.00	0.00
47.00	0.00	0	121.50	0.00	0.00	0.00
48.00	0.00	0	121.50	0.00	0.00	0.00

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**Stage-Discharge for Pond UG-2: Underground Infiltration System #1**

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)	Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
121.50	0.00	<b>0.00</b>	0.00	124.15	<b>6.64</b>	0.06	<b>6.57</b>
121.55	0.06	<b>0.06</b>	0.00				
121.60	0.06	0.06	0.00				
121.65	0.06	0.06	0.00				
121.70	0.06	0.06	0.00				
121.75	0.06	0.06	0.00				
121.80	0.06	0.06	0.00				
121.85	0.06	0.06	0.00				
121.90	0.06	0.06	0.00				
121.95	0.06	0.06	0.00				
122.00	0.06	0.06	0.00				
122.05	0.06	0.06	0.00				
122.10	0.06	0.06	0.00				
122.15	0.06	0.06	0.00				
122.20	0.06	0.06	0.00				
122.25	0.06	0.06	0.00				
122.30	0.06	0.06	0.00				
122.35	0.06	0.06	0.00				
122.40	0.06	0.06	0.00				
122.45	0.06	0.06	0.00				
122.50	0.06	0.06	0.00				
122.55	0.06	0.06	0.00				
122.60	0.06	0.06	0.00				
122.65	0.06	0.06	0.00				
122.70	0.21	0.06	0.15				
122.75	0.47	0.06	0.41				
122.80	0.81	0.06	0.75				
122.85	1.22	0.06	1.16				
122.90	1.67	0.06	1.61				
122.95	2.18	0.06	2.12				
123.00	2.72	0.06	2.66				
123.05	3.12	0.06	3.06				
123.10	3.35	0.06	3.29				
123.15	3.57	0.06	3.51				
123.20	3.80	0.06	3.74				
123.25	4.02	0.06	3.96				
123.30	4.23	0.06	4.17				
123.35	4.44	0.06	4.38				
123.40	4.63	0.06	4.57				
123.45	4.81	0.06	4.75				
123.50	4.98	0.06	4.92				
123.55	5.12	0.06	5.06				
123.60	5.23	0.06	5.17				
123.65	5.29	0.06	5.23				
123.70	5.26	0.06	5.20				
123.75	5.43	0.06	5.37				
123.80	5.59	0.06	5.53				
123.85	5.75	0.06	5.69				
123.90	5.91	0.06	5.85				
123.95	6.06	0.06	6.00				
124.00	6.21	0.06	6.15				
124.05	6.36	0.06	6.30				
124.10	6.50	0.06	6.44				

**Stage-Area-Storage for Pond UG-2: Underground Infiltration System #1**

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
121.50	<b>2,548</b>	0	124.15	2,548	<b>4,172</b>
121.55	2,548	103			
121.60	2,548	205			
121.65	2,548	308			
121.70	2,548	411			
121.75	2,548	514			
121.80	2,548	616			
121.85	2,548	719			
121.90	2,548	822			
121.95	2,548	924			
122.00	2,548	1,027			
122.05	2,548	1,130			
122.10	2,548	1,233			
122.15	2,548	1,335			
122.20	2,548	1,438			
122.25	2,548	1,541			
122.30	2,548	1,643			
122.35	2,548	1,746			
122.40	2,548	1,849			
122.45	2,548	1,952			
122.50	2,548	2,054			
122.55	2,548	2,157			
122.60	2,548	2,260			
122.65	2,548	2,362			
122.70	2,548	2,465			
122.75	2,548	2,568			
122.80	2,548	2,671			
122.85	2,548	2,773			
122.90	2,548	2,876			
122.95	2,548	2,979			
123.00	2,548	3,081			
123.05	2,548	3,184			
123.10	2,548	3,287			
123.15	2,548	3,390			
123.20	2,548	3,492			
123.25	2,548	3,595			
123.30	2,548	3,698			
123.35	2,548	3,800			
123.40	2,548	3,903			
123.45	2,548	4,006			
123.50	2,548	4,109			
123.55	2,548	4,113			
123.60	2,548	4,118			
123.65	2,548	4,123			
123.70	2,548	4,128			
123.75	2,548	4,133			
123.80	2,548	4,138			
123.85	2,548	4,143			
123.90	2,548	4,148			
123.95	2,548	4,152			
124.00	2,548	4,157			
124.05	2,548	4,162			
124.10	2,548	4,167			

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**Summary for Pond UG-3: Underground Infiltration System #2**

Inflow Area = 34,270 sf, 100.00% Impervious, Inflow Depth = 4.45" for 10-YR event  
 Inflow = 3.61 cfs @ 12.08 hrs, Volume= 12,719 cf  
 Outflow = 3.61 cfs @ 12.09 hrs, Volume= 12,719 cf, Atten= 0%, Lag= 0.1 min  
 Discarded = 0.05 cfs @ 6.71 hrs, Volume= 6,049 cf  
 Primary = 3.56 cfs @ 12.09 hrs, Volume= 6,670 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3  
 Peak Elev= 123.68' @ 12.09 hrs Surf.Area= 1,924 sf Storage= 3,103 cf

Plug-Flow detention time= 274.9 min calculated for 12,719 cf (100% of inflow)  
 Center-of-Mass det. time= 274.9 min ( 1,024.0 - 749.1 )

Volume	Invert	Avail.Storage	Storage Description
#1A	121.50'	209 cf	<b>26.00'W x 74.00'L x 2.67'H Field A</b> 5,131 cf Overall - 4,608 cf Embedded = 523 cf x 40.0% Voids
#2A	121.50'	2,932 cf	<b>retain_it retain_it 2.0' x 27 Inside #1</b> Inside= 84.0"W x 24.0"H => 13.78 sf x 8.00'L = 110.3 cf Outside= 96.0"W x 32.0"H => 21.33 sf x 8.00'L = 170.7 cf 3 Rows adjusted for 45.4 cf perimeter wall
3,141 cf			Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	121.50'	<b>1.020 in/hr Exfiltration over Surface area</b> Phase-In= 0.01'
#2	Device 3	121.50'	<b>18.0" Round Culvert</b> L= 70.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 121.50' / 121.50' S= 0.0000 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf
#3	Device 4	123.25'	<b>4.0' long Sharp-Crested Rectangular Weir</b> 2 End Contraction(s)
#4	Primary	122.02'	<b>15.0" Round Culvert</b> L= 60.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 122.02' / 121.70' S= 0.0053 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.23 sf

**Discarded OutFlow** Max=0.05 cfs @ 6.71 hrs HW=121.53' (Free Discharge)  
 ↑ 1=Exfiltration (Exfiltration Controls 0.05 cfs)

**Primary OutFlow** Max=3.55 cfs @ 12.09 hrs HW=123.68' TW=0.00' (Dynamic Tailwater)  
 ↑ 4=Culvert (Passes 3.55 cfs of 5.22 cfs potential flow)  
 ↑ 3=Sharp-Crested Rectangular Weir (Weir Controls 3.55 cfs @ 2.13 fps)  
 ↑ 2=Culvert (Passes 3.55 cfs of 4.38 cfs potential flow)

**Pond UG-3: Underground Infiltration System #2 - Chamber Wizard Field A****Chamber Model = retain\_it retain\_it 2.0' (retain-it®)**

Inside= 84.0"W x 24.0"H =&gt; 13.78 sf x 8.00'L = 110.3 cf

Outside= 96.0"W x 32.0"H =&gt; 21.33 sf x 8.00'L = 170.7 cf

3 Rows adjusted for 45.4 cf perimeter wall

9 Chambers/Row x 8.00' Long = 72.00' Row Length +12.0" End Stone x 2 = 74.00' Base Length

3 Rows x 96.0" Wide + 12.0" Side Stone x 2 = 26.00' Base Width

32.0" Chamber Height = 2.67' Field Height

1.9 cf Sidewall x 9 x 2 + 1.9 cf Endwall x 3 x 2 = 45.4 cf Perimeter Wall

27 Chambers x 110.3 cf - 45.4 cf Perimeter wall = 2,932.2 cf Chamber Storage

27 Chambers x 170.7 cf = 4,608.0 cf Displacement

5,130.7 cf Field - 4,608.0 cf Chambers = 522.7 cf Stone x 40.0% Voids = 209.1 cf Stone Storage

Chamber Storage + Stone Storage = 3,141.3 cf = 0.072 af

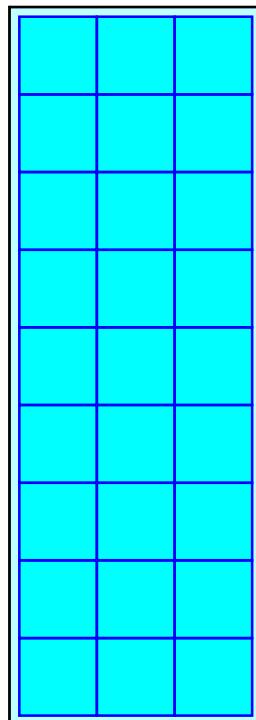
Overall Storage Efficiency = 61.2%

Overall System Size = 74.00' x 26.00' x 2.67'

27 Chambers

190.0 cy Field

19.4 cy Stone



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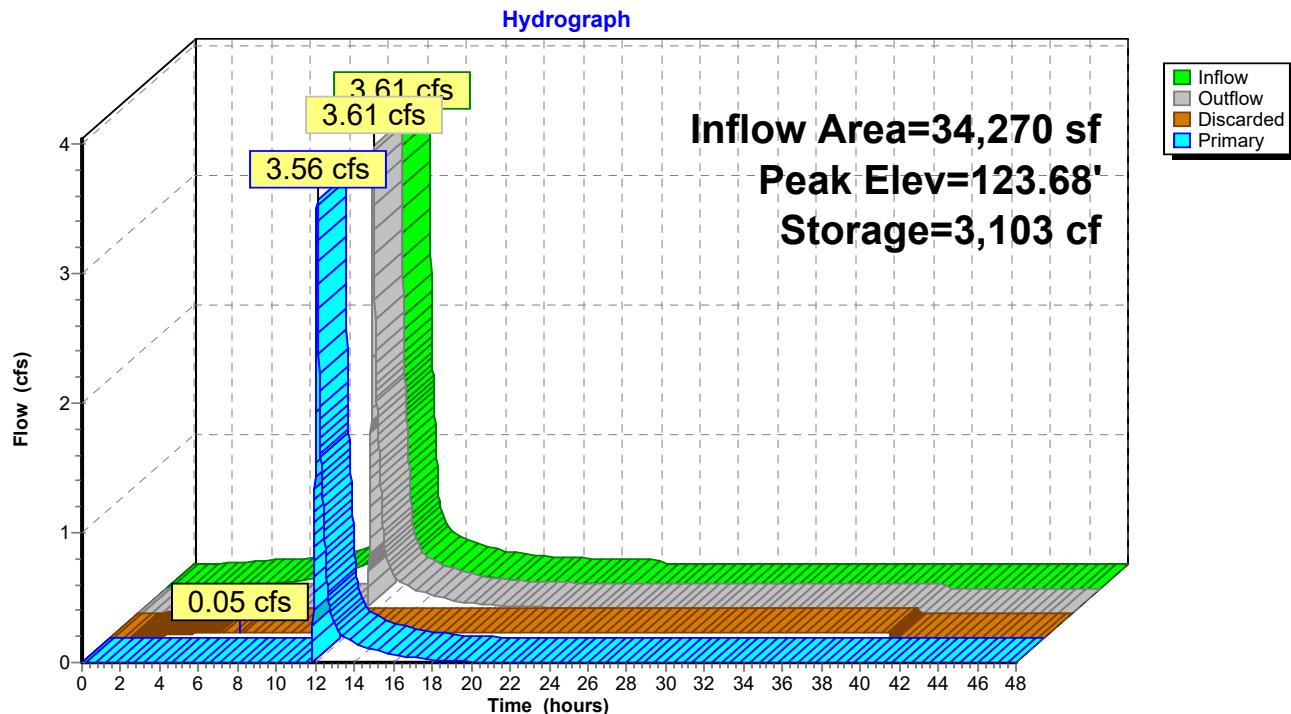
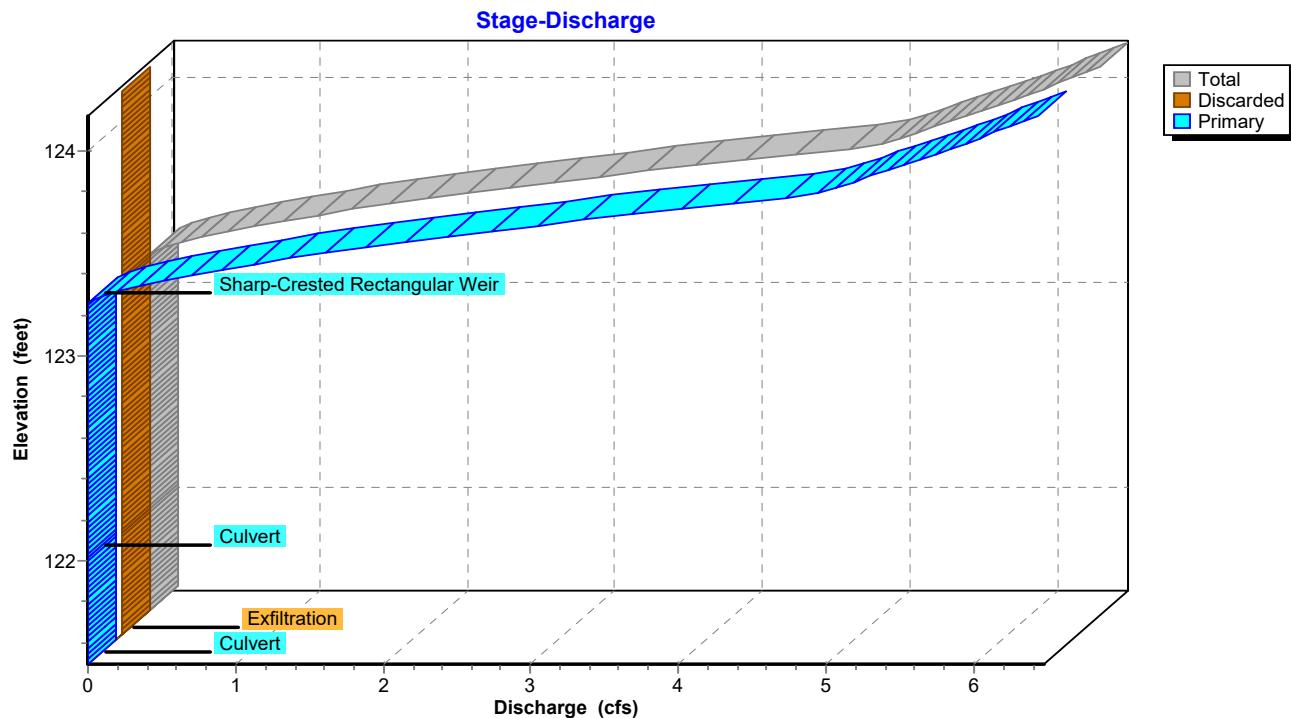
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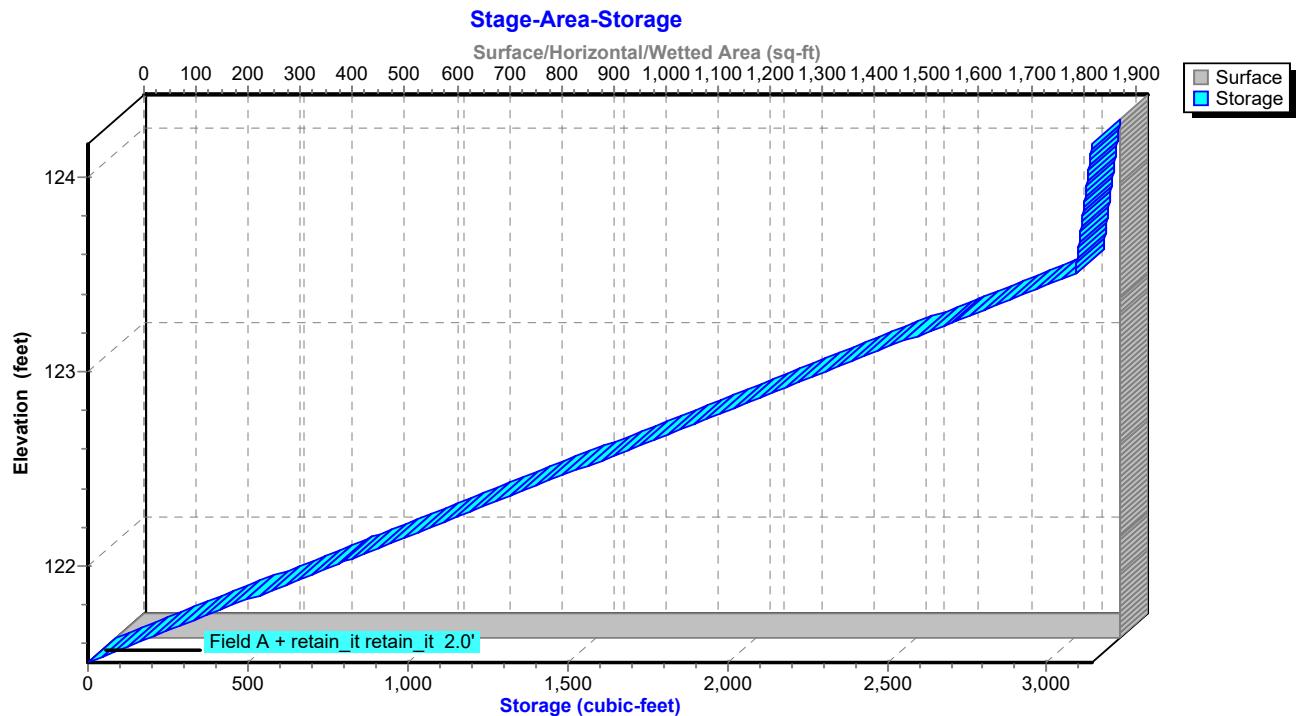
Type III 24-hr 10-YR Rainfall=4.69"

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**Pond UG-3: Underground Infiltration System #2****Pond UG-3: Underground Infiltration System #2**

### Pond UG-3: Underground Infiltration System #2



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**Hydrograph for Pond UG-3: Underground Infiltration System #2**

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	121.50	0.00	0.00	0.00
1.00	0.00	0	121.50	0.00	0.00	0.00
2.00	0.01	4	121.50	0.01	0.01	0.00
3.00	0.02	8	121.50	0.02	0.02	0.00
4.00	0.03	11	121.51	0.03	0.03	0.00
5.00	0.04	14	121.51	0.04	0.04	0.00
6.00	0.05	18	121.51	0.05	<b>0.05</b>	0.00
7.00	0.07	61	121.54	0.05	<b>0.05</b>	0.00
8.00	0.09	174	121.61	0.05	0.05	0.00
9.00	0.13	392	121.75	0.05	0.05	0.00
10.00	0.17	766	122.00	0.05	0.05	0.00
11.00	0.26	1,366	122.38	0.05	0.05	0.00
12.00	<b>2.27</b>	<b>3,091</b>	<b>123.53</b>	<b>1.97</b>	0.05	<b>1.93</b>
13.00	<b>0.30</b>	<b>2,823</b>	<b>123.33</b>	<b>0.33</b>	0.05	<b>0.28</b>
14.00	0.19	2,783	123.30	0.20	0.05	0.15
15.00	0.14	2,764	123.29	0.15	0.05	0.10
16.00	0.10	2,746	123.28	0.11	0.05	0.06
17.00	0.08	2,734	123.27	0.08	0.05	0.04
18.00	0.06	2,723	123.26	0.06	0.05	0.02
19.00	0.05	2,716	123.26	0.06	0.05	0.01
20.00	0.05	2,711	123.26	0.05	0.05	0.00
21.00	0.04	2,705	123.25	0.05	0.05	0.00
22.00	0.04	2,694	123.24	0.05	0.05	0.00
23.00	0.04	2,668	123.23	0.05	0.05	0.00
24.00	0.03	2,627	123.20	0.05	0.05	0.00
25.00	0.00	2,474	123.10	0.05	0.05	0.00
26.00	0.00	2,311	123.00	0.05	0.05	0.00
27.00	0.00	2,147	122.89	0.05	0.05	0.00
28.00	0.00	1,983	122.78	0.05	0.05	0.00
29.00	0.00	1,820	122.68	0.05	0.05	0.00
30.00	0.00	1,656	122.57	0.05	0.05	0.00
31.00	0.00	1,493	122.47	0.05	0.05	0.00
32.00	0.00	1,329	122.36	0.05	0.05	0.00
33.00	0.00	1,166	122.25	0.05	0.05	0.00
34.00	0.00	1,002	122.15	0.05	0.05	0.00
35.00	0.00	839	122.04	0.05	0.05	0.00
36.00	0.00	675	121.94	0.05	0.05	0.00
37.00	0.00	512	121.83	0.05	0.05	0.00
38.00	0.00	348	121.73	0.05	0.05	0.00
39.00	0.00	185	121.62	0.05	0.05	0.00
40.00	0.00	21	121.51	0.05	0.05	0.00
41.00	0.00	0	121.50	0.00	0.00	0.00
42.00	0.00	0	121.50	0.00	0.00	0.00
43.00	0.00	0	121.50	0.00	0.00	0.00
44.00	0.00	0	121.50	0.00	0.00	0.00
45.00	0.00	0	121.50	0.00	0.00	0.00
46.00	0.00	0	121.50	0.00	0.00	0.00
47.00	0.00	0	121.50	0.00	0.00	0.00
48.00	0.00	0	121.50	0.00	0.00	0.00

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**Stage-Discharge for Pond UG-3: Underground Infiltration System #2**

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)	Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
121.50	0.00	<b>0.00</b>	0.00	124.15	<b>6.42</b>	0.05	<b>6.37</b>
121.55	0.05	<b>0.05</b>	0.00				
121.60	0.05	0.05	0.00				
121.65	0.05	0.05	0.00				
121.70	0.05	0.05	0.00				
121.75	0.05	0.05	0.00				
121.80	0.05	0.05	0.00				
121.85	0.05	0.05	0.00				
121.90	0.05	0.05	0.00				
121.95	0.05	0.05	0.00				
122.00	0.05	0.05	0.00				
122.05	0.05	0.05	0.00				
122.10	0.05	0.05	0.00				
122.15	0.05	0.05	0.00				
122.20	0.05	0.05	0.00				
122.25	0.05	0.05	0.00				
122.30	0.05	0.05	0.00				
122.35	0.05	0.05	0.00				
122.40	0.05	0.05	0.00				
122.45	0.05	0.05	0.00				
122.50	0.05	0.05	0.00				
122.55	0.05	0.05	0.00				
122.60	0.05	0.05	0.00				
122.65	0.05	0.05	0.00				
122.70	0.05	0.05	0.00				
122.75	0.05	0.05	0.00				
122.80	0.05	0.05	0.00				
122.85	0.05	0.05	0.00				
122.90	0.05	0.05	0.00				
122.95	0.05	0.05	0.00				
123.00	0.05	0.05	0.00				
123.05	0.05	0.05	0.00				
123.10	0.05	0.05	0.00				
123.15	0.05	0.05	0.00				
123.20	0.05	0.05	0.00				
123.25	0.05	0.05	0.00				
123.30	0.19	0.05	0.15				
123.35	0.46	0.05	0.41				
123.40	0.80	0.05	0.75				
123.45	1.20	0.05	1.16				
123.50	1.66	0.05	1.61				
123.55	2.16	0.05	2.12				
123.60	2.71	0.05	2.66				
123.65	3.29	0.05	3.24				
123.70	3.91	0.05	3.86				
123.75	4.55	0.05	4.51				
123.80	5.03	0.05	4.98				
123.85	5.25	0.05	5.20				
123.90	5.46	0.05	5.42				
123.95	5.67	0.05	5.62				
124.00	5.86	0.05	5.82				
124.05	6.05	0.05	6.01				
124.10	6.24	0.05	6.19				

**Proposed HydroCAD 533 Boston Post Road**

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Type III 24-hr 10-YR Rainfall=4.69"

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**Stage-Area-Storage for Pond UG-3: Underground Infiltration System #2**

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
121.50	<b>1,924</b>	0	124.15	1,924	<b>3,140</b>
121.55	1,924	77			
121.60	1,924	154			
121.65	1,924	232			
121.70	1,924	309			
121.75	1,924	386			
121.80	1,924	463			
121.85	1,924	541			
121.90	1,924	618			
121.95	1,924	695			
122.00	1,924	772			
122.05	1,924	849			
122.10	1,924	927			
122.15	1,924	1,004			
122.20	1,924	1,081			
122.25	1,924	1,158			
122.30	1,924	1,236			
122.35	1,924	1,313			
122.40	1,924	1,390			
122.45	1,924	1,467			
122.50	1,924	1,544			
122.55	1,924	1,622			
122.60	1,924	1,699			
122.65	1,924	1,776			
122.70	1,924	1,853			
122.75	1,924	1,931			
122.80	1,924	2,008			
122.85	1,924	2,085			
122.90	1,924	2,162			
122.95	1,924	2,240			
123.00	1,924	2,317			
123.05	1,924	2,394			
123.10	1,924	2,471			
123.15	1,924	2,548			
123.20	1,924	2,626			
123.25	1,924	2,703			
123.30	1,924	2,780			
123.35	1,924	2,857			
123.40	1,924	2,935			
123.45	1,924	3,012			
123.50	1,924	3,089			
123.55	1,924	3,093			
123.60	1,924	3,097			
123.65	1,924	3,101			
123.70	1,924	3,105			
123.75	1,924	3,109			
123.80	1,924	3,113			
123.85	1,924	3,116			
123.90	1,924	3,120			
123.95	1,924	3,124			
124.00	1,924	3,128			
124.05	1,924	3,132			
124.10	1,924	3,136			

**Proposed HydroCAD 533 Boston Post Road**

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Type III 24-hr 25-YR Rainfall=5.90"

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Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

**Subcatchment P-1A: Subcatchment to** Runoff Area=13,425 sf 66.59% Impervious Runoff Depth=4.21"  
Tc=6.0 min CN=85 Runoff=1.49 cfs 4,708 cf**Subcatchment P-1B: Subcatchment to** Runoff Area=33,268 sf 68.13% Impervious Runoff Depth=4.31"  
Tc=6.0 min CN=86 Runoff=3.78 cfs 11,961 cf**Subcatchment P-1C: Subcatchment to** Runoff Area=29,201 sf 66.54% Impervious Runoff Depth=4.31"  
Tc=6.0 min CN=86 Runoff=3.31 cfs 10,499 cf**Subcatchment P-1D: Subcatchment to** Runoff Area=13,403 sf 58.36% Impervious Runoff Depth=3.90"  
Tc=6.0 min CN=82 Runoff=1.39 cfs 4,351 cf**Subcatchment P-1U: Undetained to Wetlands** Runoff Area=8,300 sf 0.00% Impervious Runoff Depth=1.46"  
Tc=6.0 min CN=55 Runoff=0.29 cfs 1,010 cf**Subcatchment P-B1: Roof Runoff to** Runoff Area=34,270 sf 100.00% Impervious Runoff Depth=5.66"  
Tc=6.0 min CN=98 Runoff=4.55 cfs 16,170 cf**Reach 1R: (new Reach)** Inflow=12.32 cfs 30,085 cf  
Outflow=12.32 cfs 30,085 cf**Pond IB-1: Infiltration Basin #1** Peak Elev=124.08' Storage=968 cf Inflow=1.49 cfs 4,708 cf  
Discarded=0.02 cfs 1,732 cf Primary=1.41 cfs 2,976 cf Outflow=1.43 cfs 4,708 cf**Pond IB-2: Infiltration Basin #2** Peak Elev=123.92' Storage=2,930 cf Inflow=3.78 cfs 11,961 cf  
Discarded=0.06 cfs 4,582 cf Primary=3.20 cfs 7,379 cf Outflow=3.26 cfs 11,961 cf**Pond UG-1: Underground Detention System #1** Peak Elev=123.31' Storage=543 cf Inflow=1.39 cfs 4,351 cf  
15.0" Round Culvert n=0.012 L=140.0' S=0.0064 '/' Outflow=1.10 cfs 4,349 cf**Pond UG-2: Underground Infiltration** Peak Elev=123.13' Storage=3,345 cf Inflow=4.29 cfs 14,848 cf  
Discarded=0.06 cfs 6,037 cf Primary=3.42 cfs 8,810 cf Outflow=3.48 cfs 14,848 cf**Pond UG-3: Underground Infiltration** Peak Elev=123.75' Storage=3,109 cf Inflow=4.55 cfs 16,170 cf  
Discarded=0.05 cfs 6,260 cf Primary=4.50 cfs 9,909 cf Outflow=4.55 cfs 16,170 cf**Total Runoff Area = 131,867 sf Runoff Volume = 48,699 cf Average Runoff Depth = 4.43"**  
**29.38% Pervious = 38,739 sf 70.62% Impervious = 93,128 sf**

**Proposed HydroCAD 533 Boston Post Road**

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Type III 24-hr 25-YR Rainfall=5.90"

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**Summary for Subcatchment P-1A: Subcatchment to Infiltration Basin #1**

Runoff = 1.49 cfs @ 12.09 hrs, Volume= 4,708 cf, Depth= 4.21"

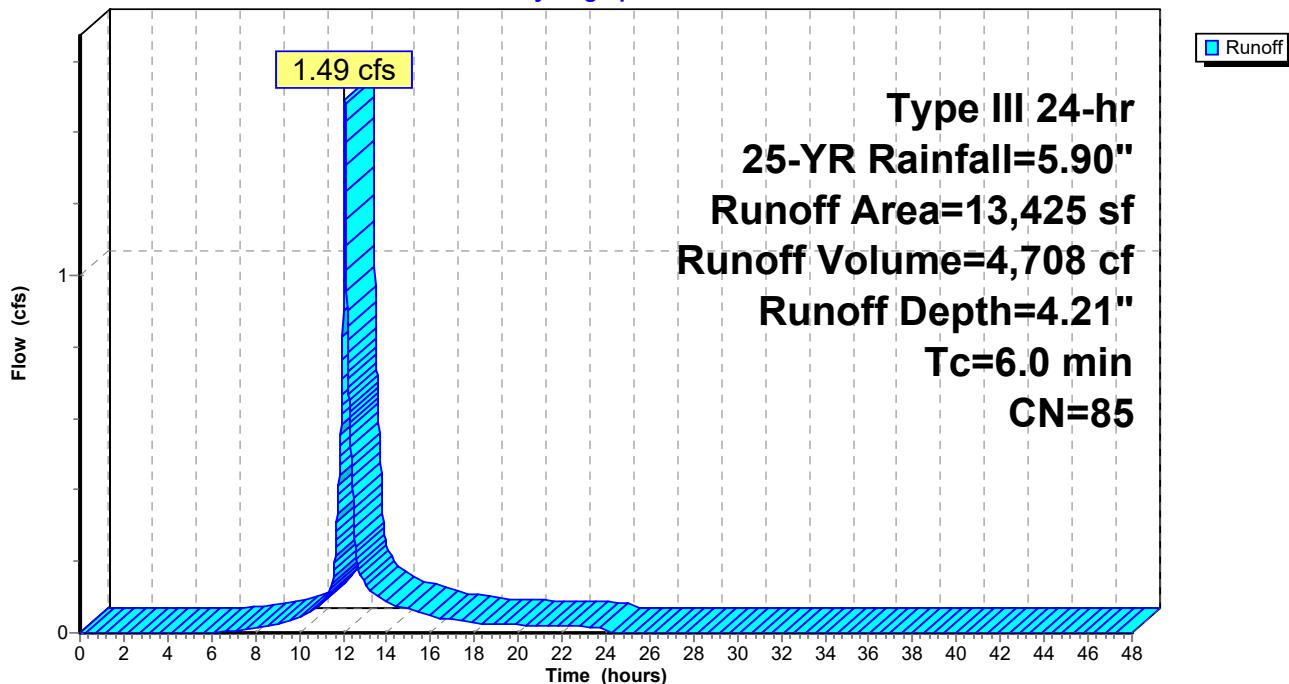
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
Type III 24-hr 25-YR Rainfall=5.90"

Area (sf)	CN	Description
8,940	98	Paved parking, HSG B
4,110	61	>75% Grass cover, Good, HSG B
375	55	Woods, Good, HSG B
13,425	85	Weighted Average
4,485		33.41% Pervious Area
8,940		66.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0				<b>Direct Entry, Direct</b>	
5.0	0			Total, Increased to minimum Tc = 6.0 min	

**Subcatchment P-1A: Subcatchment to Infiltration Basin #1**

Hydrograph



**Proposed HydroCAD 533 Boston Post Road**

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Type III 24-hr 25-YR Rainfall=5.90"

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**Hydrograph for Subcatchment P-1A: Subcatchment to Infiltration Basin #1**

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.50	5.90	4.21	0.00
0.50	0.03	0.00	0.00	27.00	5.90	4.21	0.00
1.00	0.06	0.00	0.00	27.50	5.90	4.21	0.00
1.50	0.09	0.00	0.00	28.00	5.90	4.21	0.00
2.00	0.12	0.00	0.00	28.50	5.90	4.21	0.00
2.50	0.15	0.00	0.00	29.00	5.90	4.21	0.00
3.00	0.18	0.00	0.00	29.50	5.90	4.21	0.00
3.50	0.22	0.00	0.00	30.00	5.90	4.21	0.00
4.00	0.25	0.00	0.00	30.50	5.90	4.21	0.00
4.50	0.29	0.00	0.00	31.00	5.90	4.21	0.00
5.00	0.33	0.00	0.00	31.50	5.90	4.21	0.00
5.50	0.38	0.00	0.00	32.00	5.90	4.21	0.00
6.00	0.42	0.00	0.00	32.50	5.90	4.21	0.00
6.50	0.48	0.01	0.00	33.00	5.90	4.21	0.00
7.00	0.53	0.02	0.01	33.50	5.90	4.21	0.00
7.50	0.60	0.03	0.01	34.00	5.90	4.21	0.00
8.00	0.67	0.05	0.01	34.50	5.90	4.21	0.00
8.50	0.76	0.08	0.02	35.00	5.90	4.21	0.00
9.00	0.86	0.11	0.03	35.50	5.90	4.21	0.00
9.50	0.98	0.16	0.03	36.00	5.90	4.21	0.00
10.00	1.12	0.23	0.04	36.50	5.90	4.21	0.00
10.50	1.28	0.32	0.06	37.00	5.90	4.21	0.00
11.00	1.48	0.44	0.08	37.50	5.90	4.21	0.00
11.50	1.76	0.62	0.14	38.00	5.90	4.21	0.00
12.00	2.95	1.55	<b>0.90</b>	38.50	5.90	4.21	0.00
12.50	4.14	2.58	<b>0.33</b>	39.00	5.90	4.21	0.00
13.00	4.42	2.84	0.14	39.50	5.90	4.21	0.00
13.50	4.62	3.02	0.11	40.00	5.90	4.21	0.00
14.00	4.78	3.17	0.09	40.50	5.90	4.21	0.00
14.50	4.92	3.30	0.07	41.00	5.90	4.21	0.00
15.00	5.04	3.41	0.07	41.50	5.90	4.21	0.00
15.50	5.14	3.50	0.06	42.00	5.90	4.21	0.00
16.00	5.23	3.58	0.05	42.50	5.90	4.21	0.00
16.50	5.30	3.65	0.04	43.00	5.90	4.21	0.00
17.00	5.37	3.71	0.04	43.50	5.90	4.21	0.00
17.50	5.42	3.76	0.03	44.00	5.90	4.21	0.00
18.00	5.48	3.81	0.03	44.50	5.90	4.21	0.00
18.50	5.52	3.85	0.03	45.00	5.90	4.21	0.00
19.00	5.57	3.89	0.03	45.50	5.90	4.21	0.00
19.50	5.61	3.93	0.02	46.00	5.90	4.21	0.00
20.00	5.65	3.97	0.02	46.50	5.90	4.21	0.00
20.50	5.68	4.01	0.02	47.00	5.90	4.21	0.00
21.00	5.72	4.04	0.02	47.50	5.90	4.21	0.00
21.50	5.75	4.07	0.02	48.00	5.90	4.21	0.00
22.00	5.79	4.10	0.02				
22.50	5.82	4.13	0.02				
23.00	5.85	4.16	0.02				
23.50	5.87	4.18	0.02				
24.00	<b>5.90</b>	<b>4.21</b>	0.01				
24.50	5.90	4.21	0.00				
25.00	5.90	4.21	0.00				
25.50	5.90	4.21	0.00				
26.00	5.90	4.21	0.00				

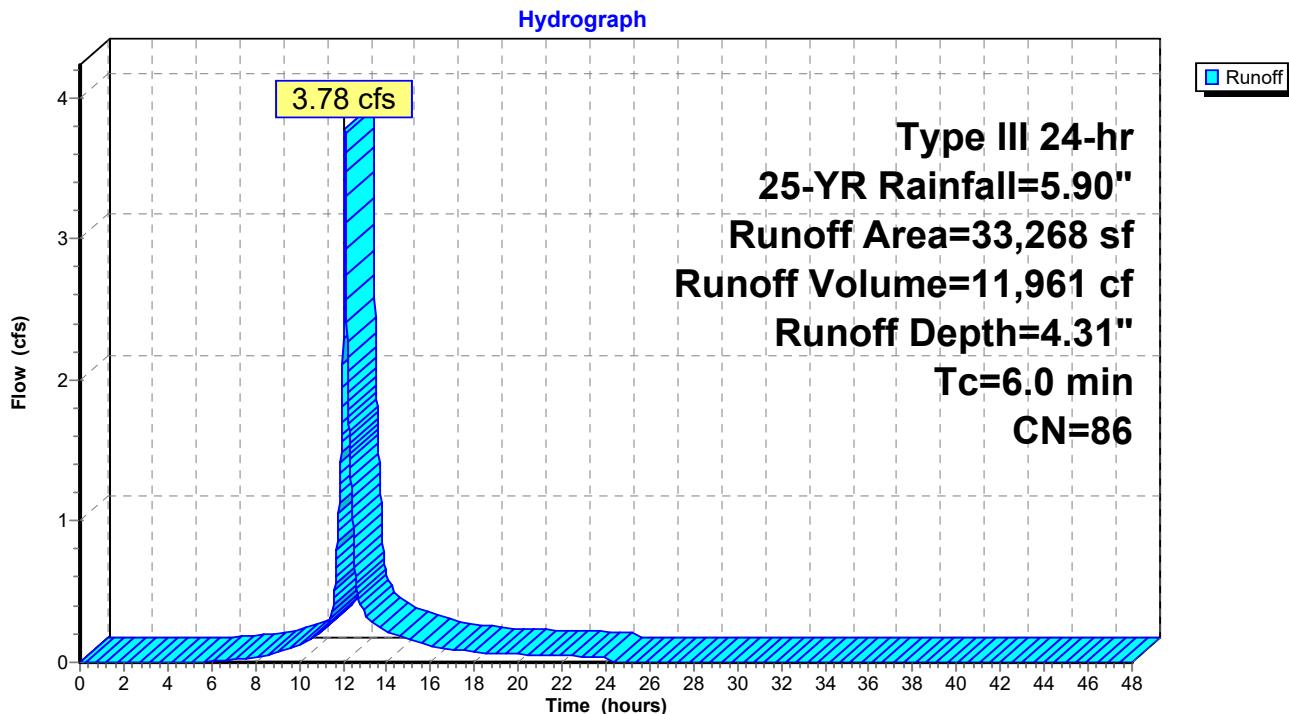
**Summary for Subcatchment P-1B: Subcatchment to Infiltration Basin #2**

Runoff = 3.78 cfs @ 12.09 hrs, Volume= 11,961 cf, Depth= 4.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
Type III 24-hr 25-YR Rainfall=5.90"

Area (sf)	CN	Description
22,665	98	Paved parking, HSG B
10,603	61	>75% Grass cover, Good, HSG B
33,268	86	Weighted Average
10,603		31.87% Pervious Area
22,665		68.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0				<b>Direct Entry, Direct Entry</b>	
5.0	0			Total, Increased to minimum Tc = 6.0 min	

**Subcatchment P-1B: Subcatchment to Infiltration Basin #2**

**Proposed HydroCAD 533 Boston Post Road**

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Type III 24-hr 25-YR Rainfall=5.90"

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**Hydrograph for Subcatchment P-1B: Subcatchment to Infiltration Basin #2**

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.50	5.90	4.31	0.00
0.50	0.03	0.00	0.00	27.00	5.90	4.31	0.00
1.00	0.06	0.00	0.00	27.50	5.90	4.31	0.00
1.50	0.09	0.00	0.00	28.00	5.90	4.31	0.00
2.00	0.12	0.00	0.00	28.50	5.90	4.31	0.00
2.50	0.15	0.00	0.00	29.00	5.90	4.31	0.00
3.00	0.18	0.00	0.00	29.50	5.90	4.31	0.00
3.50	0.22	0.00	0.00	30.00	5.90	4.31	0.00
4.00	0.25	0.00	0.00	30.50	5.90	4.31	0.00
4.50	0.29	0.00	0.00	31.00	5.90	4.31	0.00
5.00	0.33	0.00	0.00	31.50	5.90	4.31	0.00
5.50	0.38	0.00	0.00	32.00	5.90	4.31	0.00
6.00	0.42	0.01	0.01	32.50	5.90	4.31	0.00
6.50	0.48	0.01	0.01	33.00	5.90	4.31	0.00
7.00	0.53	0.02	0.02	33.50	5.90	4.31	0.00
7.50	0.60	0.04	0.03	34.00	5.90	4.31	0.00
8.00	0.67	0.06	0.04	34.50	5.90	4.31	0.00
8.50	0.76	0.09	0.05	35.00	5.90	4.31	0.00
9.00	0.86	0.13	0.07	35.50	5.90	4.31	0.00
9.50	0.98	0.19	0.09	36.00	5.90	4.31	0.00
10.00	1.12	0.26	0.12	36.50	5.90	4.31	0.00
10.50	1.28	0.35	0.16	37.00	5.90	4.31	0.00
11.00	1.48	0.48	0.21	37.50	5.90	4.31	0.00
11.50	1.76	0.67	0.35	38.00	5.90	4.31	0.00
12.00	2.95	1.62	<b>2.29</b>	38.50	5.90	4.31	0.00
12.50	4.14	2.68	<b>0.83</b>	39.00	5.90	4.31	0.00
13.00	4.42	2.93	0.34	39.50	5.90	4.31	0.00
13.50	4.62	3.12	0.27	40.00	5.90	4.31	0.00
14.00	4.78	3.27	0.22	40.50	5.90	4.31	0.00
14.50	4.92	3.39	0.19	41.00	5.90	4.31	0.00
15.00	5.04	3.50	0.16	41.50	5.90	4.31	0.00
15.50	5.14	3.60	0.14	42.00	5.90	4.31	0.00
16.00	5.23	3.68	0.12	42.50	5.90	4.31	0.00
16.50	5.30	3.75	0.10	43.00	5.90	4.31	0.00
17.00	5.37	3.81	0.09	43.50	5.90	4.31	0.00
17.50	5.42	3.86	0.08	44.00	5.90	4.31	0.00
18.00	5.48	3.91	0.07	44.50	5.90	4.31	0.00
18.50	5.52	3.96	0.07	45.00	5.90	4.31	0.00
19.00	5.57	4.00	0.06	45.50	5.90	4.31	0.00
19.50	5.61	4.04	0.06	46.00	5.90	4.31	0.00
20.00	5.65	4.07	0.06	46.50	5.90	4.31	0.00
20.50	5.68	4.11	0.05	47.00	5.90	4.31	0.00
21.00	5.72	4.14	0.05	47.50	5.90	4.31	0.00
21.50	5.75	4.18	0.05	48.00	5.90	4.31	0.00
22.00	5.79	4.21	0.05				
22.50	5.82	4.24	0.04				
23.00	5.85	4.26	0.04				
23.50	5.87	4.29	0.04				
24.00	<b>5.90</b>	<b>4.31</b>	0.04				
24.50	5.90	4.31	0.00				
25.00	5.90	4.31	0.00				
25.50	5.90	4.31	0.00				
26.00	5.90	4.31	0.00				

**Summary for Subcatchment P-1C: Subcatchment to Infiltration Trench #2**

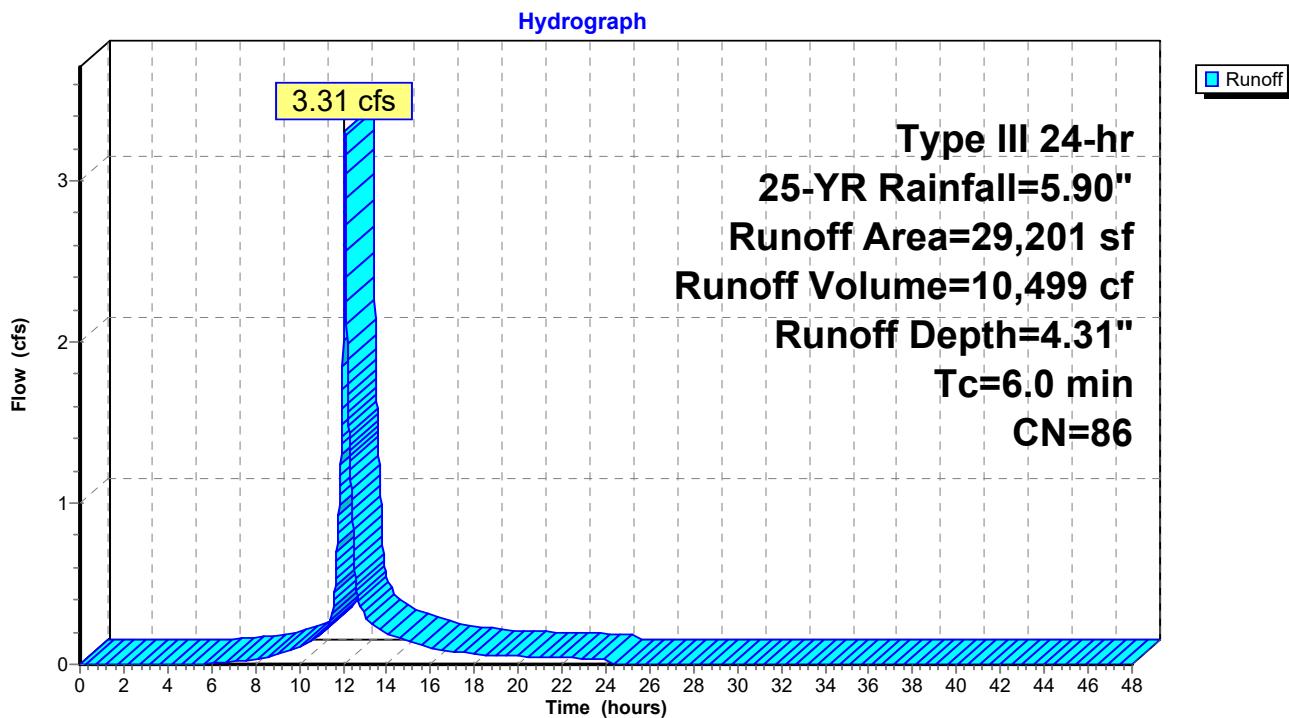
Runoff = 3.31 cfs @ 12.09 hrs, Volume= 10,499 cf, Depth= 4.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
Type III 24-hr 25-YR Rainfall=5.90"

Area (sf)	CN	Description
19,431	98	Paved parking, HSG B
9,770	61	>75% Grass cover, Good, HSG B

29,201	86	Weighted Average
9,770		33.46% Pervious Area
19,431		66.54% Impervious Area

Tc	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0				<b>Direct Entry, Direct Entry</b>	
5.0	0			Total, Increased to minimum Tc = 6.0 min	

**Subcatchment P-1C: Subcatchment to Infiltration Trench #2**

**Proposed HydroCAD 533 Boston Post Road**

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Type III 24-hr 25-YR Rainfall=5.90"

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**Hydrograph for Subcatchment P-1C: Subcatchment to Infiltration Trench #2**

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.50	5.90	4.31	0.00
0.50	0.03	0.00	0.00	27.00	5.90	4.31	0.00
1.00	0.06	0.00	0.00	27.50	5.90	4.31	0.00
1.50	0.09	0.00	0.00	28.00	5.90	4.31	0.00
2.00	0.12	0.00	0.00	28.50	5.90	4.31	0.00
2.50	0.15	0.00	0.00	29.00	5.90	4.31	0.00
3.00	0.18	0.00	0.00	29.50	5.90	4.31	0.00
3.50	0.22	0.00	0.00	30.00	5.90	4.31	0.00
4.00	0.25	0.00	0.00	30.50	5.90	4.31	0.00
4.50	0.29	0.00	0.00	31.00	5.90	4.31	0.00
5.00	0.33	0.00	0.00	31.50	5.90	4.31	0.00
5.50	0.38	0.00	0.00	32.00	5.90	4.31	0.00
6.00	0.42	0.01	0.01	32.50	5.90	4.31	0.00
6.50	0.48	0.01	0.01	33.00	5.90	4.31	0.00
7.00	0.53	0.02	0.02	33.50	5.90	4.31	0.00
7.50	0.60	0.04	0.02	34.00	5.90	4.31	0.00
8.00	0.67	0.06	0.03	34.50	5.90	4.31	0.00
8.50	0.76	0.09	0.04	35.00	5.90	4.31	0.00
9.00	0.86	0.13	0.06	35.50	5.90	4.31	0.00
9.50	0.98	0.19	0.08	36.00	5.90	4.31	0.00
10.00	1.12	0.26	0.10	36.50	5.90	4.31	0.00
10.50	1.28	0.35	0.14	37.00	5.90	4.31	0.00
11.00	1.48	0.48	0.18	37.50	5.90	4.31	0.00
11.50	1.76	0.67	0.31	38.00	5.90	4.31	0.00
12.00	2.95	1.62	<b>2.01</b>	38.50	5.90	4.31	0.00
12.50	4.14	2.68	<b>0.73</b>	39.00	5.90	4.31	0.00
13.00	4.42	2.93	0.30	39.50	5.90	4.31	0.00
13.50	4.62	3.12	0.23	40.00	5.90	4.31	0.00
14.00	4.78	3.27	0.19	40.50	5.90	4.31	0.00
14.50	4.92	3.39	0.16	41.00	5.90	4.31	0.00
15.00	5.04	3.50	0.14	41.50	5.90	4.31	0.00
15.50	5.14	3.60	0.12	42.00	5.90	4.31	0.00
16.00	5.23	3.68	0.10	42.50	5.90	4.31	0.00
16.50	5.30	3.75	0.09	43.00	5.90	4.31	0.00
17.00	5.37	3.81	0.08	43.50	5.90	4.31	0.00
17.50	5.42	3.86	0.07	44.00	5.90	4.31	0.00
18.00	5.48	3.91	0.06	44.50	5.90	4.31	0.00
18.50	5.52	3.96	0.06	45.00	5.90	4.31	0.00
19.00	5.57	4.00	0.06	45.50	5.90	4.31	0.00
19.50	5.61	4.04	0.05	46.00	5.90	4.31	0.00
20.00	5.65	4.07	0.05	46.50	5.90	4.31	0.00
20.50	5.68	4.11	0.05	47.00	5.90	4.31	0.00
21.00	5.72	4.14	0.05	47.50	5.90	4.31	0.00
21.50	5.75	4.18	0.04	48.00	5.90	4.31	0.00
22.00	5.79	4.21	0.04				
22.50	5.82	4.24	0.04				
23.00	5.85	4.26	0.04				
23.50	5.87	4.29	0.03				
24.00	<b>5.90</b>	<b>4.31</b>	0.03				
24.50	5.90	4.31	0.00				
25.00	5.90	4.31	0.00				
25.50	5.90	4.31	0.00				
26.00	5.90	4.31	0.00				

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Type III 24-hr 25-YR Rainfall=5.90"

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**Summary for Subcatchment P-1D: Subcatchment to Infiltration Trench 1**

Runoff = 1.39 cfs @ 12.09 hrs, Volume= 4,351 cf, Depth= 3.90"

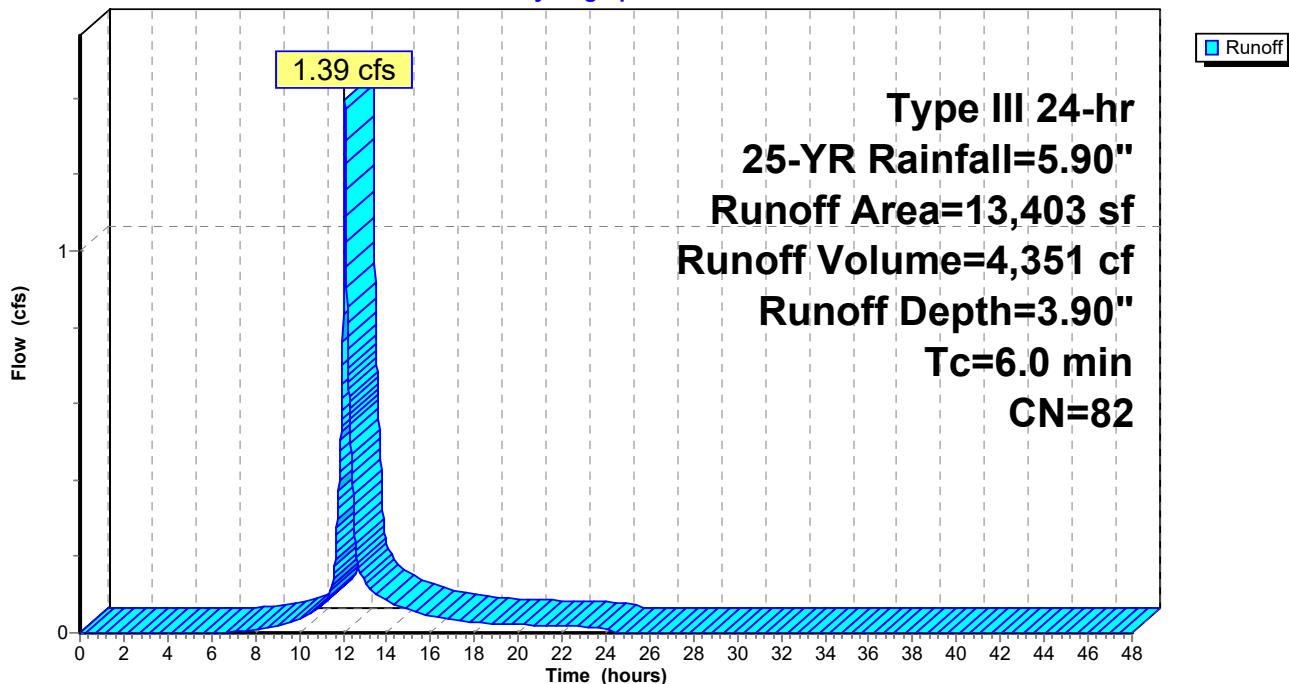
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
Type III 24-hr 25-YR Rainfall=5.90"

Area (sf)	CN	Description
7,822	98	Paved parking, HSG B
2,453	61	>75% Grass cover, Good, HSG B
3,128	60	Woods, Fair, HSG B
13,403	82	Weighted Average
5,581		41.64% Pervious Area
7,822		58.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					<b>Direct Entry, Direct Entry</b>
5.0	0				Total, Increased to minimum Tc = 6.0 min

**Subcatchment P-1D: Subcatchment to Infiltration Trench 1**

Hydrograph



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Type III 24-hr 25-YR Rainfall=5.90"

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**Hydrograph for Subcatchment P-1D: Subcatchment to Infiltration Trench 1**

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.50	5.90	3.90	0.00
0.50	0.03	0.00	0.00	27.00	5.90	3.90	0.00
1.00	0.06	0.00	0.00	27.50	5.90	3.90	0.00
1.50	0.09	0.00	0.00	28.00	5.90	3.90	0.00
2.00	0.12	0.00	0.00	28.50	5.90	3.90	0.00
2.50	0.15	0.00	0.00	29.00	5.90	3.90	0.00
3.00	0.18	0.00	0.00	29.50	5.90	3.90	0.00
3.50	0.22	0.00	0.00	30.00	5.90	3.90	0.00
4.00	0.25	0.00	0.00	30.50	5.90	3.90	0.00
4.50	0.29	0.00	0.00	31.00	5.90	3.90	0.00
5.00	0.33	0.00	0.00	31.50	5.90	3.90	0.00
5.50	0.38	0.00	0.00	32.00	5.90	3.90	0.00
6.00	0.42	0.00	0.00	32.50	5.90	3.90	0.00
6.50	0.48	0.00	0.00	33.00	5.90	3.90	0.00
7.00	0.53	0.00	0.00	33.50	5.90	3.90	0.00
7.50	0.60	0.01	0.01	34.00	5.90	3.90	0.00
8.00	0.67	0.02	0.01	34.50	5.90	3.90	0.00
8.50	0.76	0.04	0.01	35.00	5.90	3.90	0.00
9.00	0.86	0.07	0.02	35.50	5.90	3.90	0.00
9.50	0.98	0.11	0.03	36.00	5.90	3.90	0.00
10.00	1.12	0.16	0.04	36.50	5.90	3.90	0.00
10.50	1.28	0.23	0.05	37.00	5.90	3.90	0.00
11.00	1.48	0.33	0.07	37.50	5.90	3.90	0.00
11.50	1.76	0.50	0.12	38.00	5.90	3.90	0.00
12.00	2.95	1.34	<b>0.83</b>	38.50	5.90	3.90	0.00
12.50	4.14	2.32	<b>0.31</b>	39.00	5.90	3.90	0.00
13.00	4.42	2.57	0.13	39.50	5.90	3.90	0.00
13.50	4.62	2.74	0.10	40.00	5.90	3.90	0.00
14.00	4.78	2.89	0.08	40.50	5.90	3.90	0.00
14.50	4.92	3.01	0.07	41.00	5.90	3.90	0.00
15.00	5.04	3.11	0.06	41.50	5.90	3.90	0.00
15.50	5.14	3.21	0.05	42.00	5.90	3.90	0.00
16.00	5.23	3.28	0.04	42.50	5.90	3.90	0.00
16.50	5.30	3.35	0.04	43.00	5.90	3.90	0.00
17.00	5.37	3.41	0.04	43.50	5.90	3.90	0.00
17.50	5.42	3.46	0.03	44.00	5.90	3.90	0.00
18.00	5.48	3.51	0.03	44.50	5.90	3.90	0.00
18.50	5.52	3.55	0.03	45.00	5.90	3.90	0.00
19.00	5.57	3.59	0.02	45.50	5.90	3.90	0.00
19.50	5.61	3.63	0.02	46.00	5.90	3.90	0.00
20.00	5.65	3.66	0.02	46.50	5.90	3.90	0.00
20.50	5.68	3.70	0.02	47.00	5.90	3.90	0.00
21.00	5.72	3.73	0.02	47.50	5.90	3.90	0.00
21.50	5.75	3.76	0.02	48.00	5.90	3.90	0.00
22.00	5.79	3.79	0.02				
22.50	5.82	3.82	0.02				
23.00	5.85	3.85	0.02				
23.50	5.87	3.87	0.02				
24.00	<b>5.90</b>	<b>3.90</b>	0.01				
24.50	5.90	3.90	0.00				
25.00	5.90	3.90	0.00				
25.50	5.90	3.90	0.00				
26.00	5.90	3.90	0.00				

### Summary for Subcatchment P-1U: Undetained to Wetlands

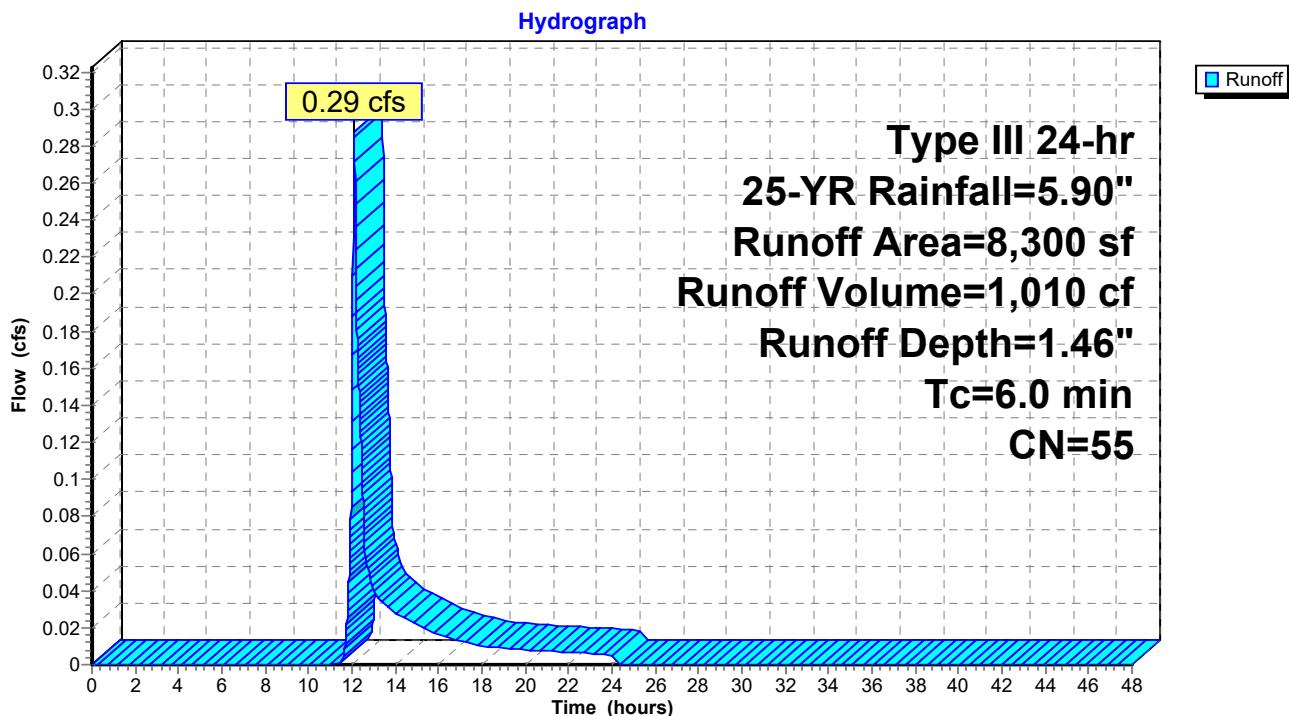
Runoff = 0.29 cfs @ 12.10 hrs, Volume= 1,010 cf, Depth= 1.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 25-YR Rainfall=5.90"

Area (sf)	CN	Description
8,300	55	Woods, Good, HSG B
8,300		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0				<b>Direct Entry, Direct Entry</b>	
5.0	0			Total, Increased to minimum Tc = 6.0 min	

### Subcatchment P-1U: Undetained to Wetlands



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Type III 24-hr 25-YR Rainfall=5.90"

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**Hydrograph for Subcatchment P-1U: Undetained to Wetlands**

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.50	5.90	1.46	0.00
0.50	0.03	0.00	0.00	27.00	5.90	1.46	0.00
1.00	0.06	0.00	0.00	27.50	5.90	1.46	0.00
1.50	0.09	0.00	0.00	28.00	5.90	1.46	0.00
2.00	0.12	0.00	0.00	28.50	5.90	1.46	0.00
2.50	0.15	0.00	0.00	29.00	5.90	1.46	0.00
3.00	0.18	0.00	0.00	29.50	5.90	1.46	0.00
3.50	0.22	0.00	0.00	30.00	5.90	1.46	0.00
4.00	0.25	0.00	0.00	30.50	5.90	1.46	0.00
4.50	0.29	0.00	0.00	31.00	5.90	1.46	0.00
5.00	0.33	0.00	0.00	31.50	5.90	1.46	0.00
5.50	0.38	0.00	0.00	32.00	5.90	1.46	0.00
6.00	0.42	0.00	0.00	32.50	5.90	1.46	0.00
6.50	0.48	0.00	0.00	33.00	5.90	1.46	0.00
7.00	0.53	0.00	0.00	33.50	5.90	1.46	0.00
7.50	0.60	0.00	0.00	34.00	5.90	1.46	0.00
8.00	0.67	0.00	0.00	34.50	5.90	1.46	0.00
8.50	0.76	0.00	0.00	35.00	5.90	1.46	0.00
9.00	0.86	0.00	0.00	35.50	5.90	1.46	0.00
9.50	0.98	0.00	0.00	36.00	5.90	1.46	0.00
10.00	1.12	0.00	0.00	36.50	5.90	1.46	0.00
10.50	1.28	0.00	0.00	37.00	5.90	1.46	0.00
11.00	1.48	0.00	0.00	37.50	5.90	1.46	0.00
11.50	1.76	0.00	0.00	38.00	5.90	1.46	0.00
12.00	2.95	0.18	<b>0.13</b>	38.50	5.90	1.46	0.00
12.50	4.14	0.59	<b>0.09</b>	39.00	5.90	1.46	0.00
13.00	4.42	0.71	0.04	39.50	5.90	1.46	0.00
13.50	4.62	0.80	0.03	40.00	5.90	1.46	0.00
14.00	4.78	0.87	0.03	40.50	5.90	1.46	0.00
14.50	4.92	0.94	0.02	41.00	5.90	1.46	0.00
15.00	5.04	1.00	0.02	41.50	5.90	1.46	0.00
15.50	5.14	1.05	0.02	42.00	5.90	1.46	0.00
16.00	5.23	1.10	0.02	42.50	5.90	1.46	0.00
16.50	5.30	1.13	0.01	43.00	5.90	1.46	0.00
17.00	5.37	1.17	0.01	43.50	5.90	1.46	0.00
17.50	5.42	1.20	0.01	44.00	5.90	1.46	0.00
18.00	5.48	1.23	0.01	44.50	5.90	1.46	0.00
18.50	5.52	1.25	0.01	45.00	5.90	1.46	0.00
19.00	5.57	1.27	0.01	45.50	5.90	1.46	0.00
19.50	5.61	1.30	0.01	46.00	5.90	1.46	0.00
20.00	5.65	1.32	0.01	46.50	5.90	1.46	0.00
20.50	5.68	1.34	0.01	47.00	5.90	1.46	0.00
21.00	5.72	1.36	0.01	47.50	5.90	1.46	0.00
21.50	5.75	1.38	0.01	48.00	5.90	1.46	0.00
22.00	5.79	1.40	0.01				
22.50	5.82	1.41	0.01				
23.00	5.85	1.43	0.01				
23.50	5.87	1.45	0.01				
24.00	<b>5.90</b>	<b>1.46</b>	0.01				
24.50	5.90	1.46	0.00				
25.00	5.90	1.46	0.00				
25.50	5.90	1.46	0.00				
26.00	5.90	1.46	0.00				

**Proposed HydroCAD 533 Boston Post Road**

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Type III 24-hr 25-YR Rainfall=5.90"

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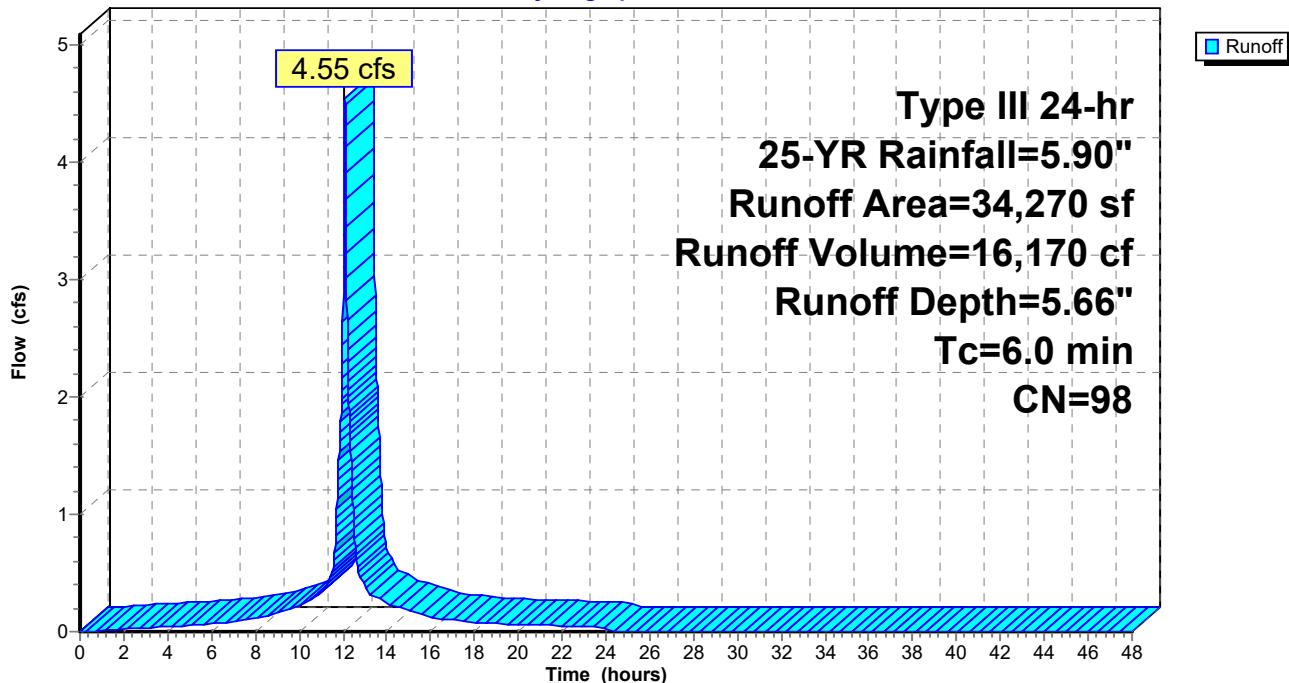
**Summary for Subcatchment P-B1: Roof Runoff to Infiltration Trench #3**

Runoff = 4.55 cfs @ 12.08 hrs, Volume= 16,170 cf, Depth= 5.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
Type III 24-hr 25-YR Rainfall=5.90"

Area (sf)	CN	Description
34,270	98	Roofs, HSG B
34,270		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0				<b>Direct Entry, Direct Entry</b>	
5.0	0			Total, Increased to minimum Tc = 6.0 min	

**Subcatchment P-B1: Roof Runoff to Infiltration Trench #3****Hydrograph**

**Proposed HydroCAD 533 Boston Post Road**

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Type III 24-hr 25-YR Rainfall=5.90"

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**Hydrograph for Subcatchment P-B1: Roof Runoff to Infiltration Trench #3**

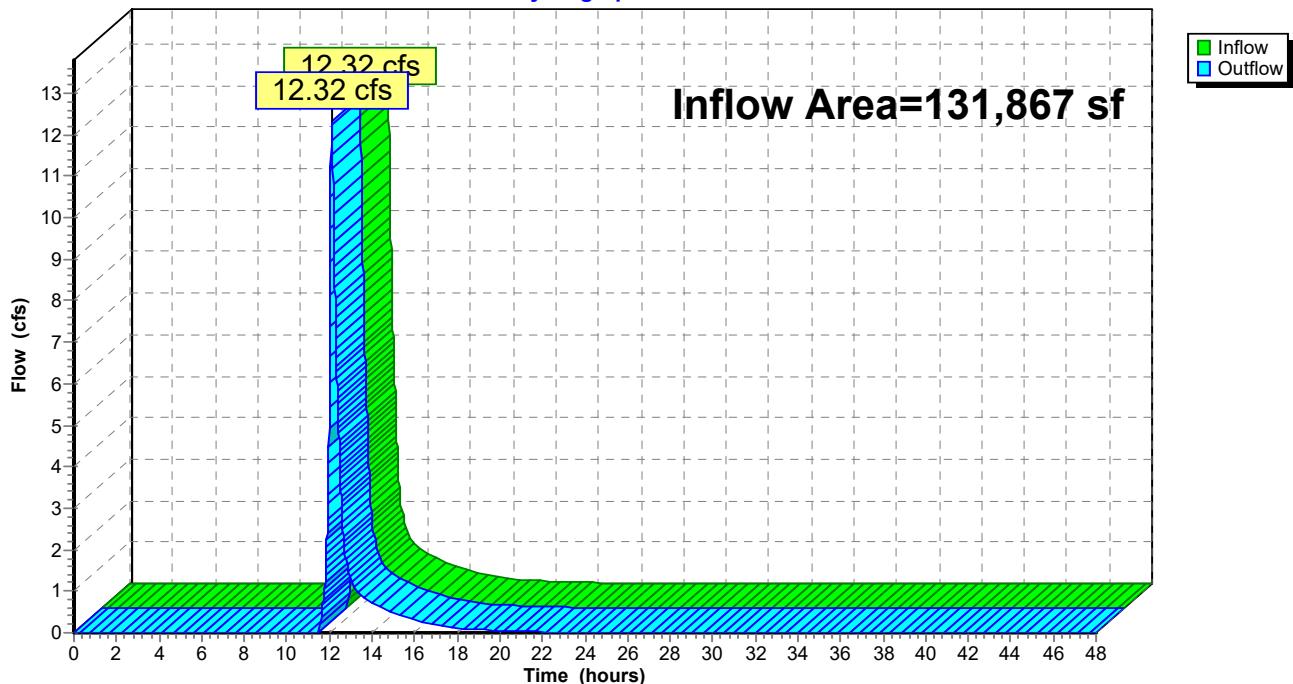
Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.50	5.90	5.66	0.00
0.50	0.03	0.00	0.00	27.00	5.90	5.66	0.00
1.00	0.06	0.00	0.01	27.50	5.90	5.66	0.00
1.50	0.09	0.01	0.01	28.00	5.90	5.66	0.00
2.00	0.12	0.02	0.02	28.50	5.90	5.66	0.00
2.50	0.15	0.04	0.03	29.00	5.90	5.66	0.00
3.00	0.18	0.06	0.03	29.50	5.90	5.66	0.00
3.50	0.22	0.08	0.04	30.00	5.90	5.66	0.00
4.00	0.25	0.11	0.05	30.50	5.90	5.66	0.00
4.50	0.29	0.14	0.05	31.00	5.90	5.66	0.00
5.00	0.33	0.17	0.06	31.50	5.90	5.66	0.00
5.50	0.38	0.21	0.06	32.00	5.90	5.66	0.00
6.00	0.42	0.25	0.07	32.50	5.90	5.66	0.00
6.50	0.48	0.30	0.08	33.00	5.90	5.66	0.00
7.00	0.53	0.35	0.09	33.50	5.90	5.66	0.00
7.50	0.60	0.41	0.10	34.00	5.90	5.66	0.00
8.00	0.67	0.48	0.11	34.50	5.90	5.66	0.00
8.50	0.76	0.56	0.14	35.00	5.90	5.66	0.00
9.00	0.86	0.66	0.16	35.50	5.90	5.66	0.00
9.50	0.98	0.77	0.19	36.00	5.90	5.66	0.00
10.00	1.12	0.90	0.22	36.50	5.90	5.66	0.00
10.50	1.28	1.06	0.27	37.00	5.90	5.66	0.00
11.00	1.48	1.26	0.33	37.50	5.90	5.66	0.00
11.50	1.76	1.53	0.51	38.00	5.90	5.66	0.00
12.00	2.95	2.72	<b>2.86</b>	38.50	5.90	5.66	0.00
12.50	4.14	3.91	<b>0.94</b>	39.00	5.90	5.66	0.00
13.00	4.42	4.19	0.38	39.50	5.90	5.66	0.00
13.50	4.62	4.39	0.30	40.00	5.90	5.66	0.00
14.00	4.78	4.55	0.24	40.50	5.90	5.66	0.00
14.50	4.92	4.68	0.21	41.00	5.90	5.66	0.00
15.00	5.04	4.80	0.18	41.50	5.90	5.66	0.00
15.50	5.14	4.91	0.15	42.00	5.90	5.66	0.00
16.00	5.23	4.99	0.13	42.50	5.90	5.66	0.00
16.50	5.30	5.06	0.11	43.00	5.90	5.66	0.00
17.00	5.37	5.13	0.10	43.50	5.90	5.66	0.00
17.50	5.42	5.19	0.09	44.00	5.90	5.66	0.00
18.00	5.48	5.24	0.08	44.50	5.90	5.66	0.00
18.50	5.52	5.28	0.07	45.00	5.90	5.66	0.00
19.00	5.57	5.33	0.07	45.50	5.90	5.66	0.00
19.50	5.61	5.37	0.06	46.00	5.90	5.66	0.00
20.00	5.65	5.41	0.06	46.50	5.90	5.66	0.00
20.50	5.68	5.45	0.06	47.00	5.90	5.66	0.00
21.00	5.72	5.48	0.06	47.50	5.90	5.66	0.00
21.50	5.75	5.52	0.05	48.00	5.90	5.66	0.00
22.00	5.79	5.55	0.05				
22.50	5.82	5.58	0.05				
23.00	5.85	5.61	0.05				
23.50	5.87	5.64	0.04				
24.00	<b>5.90</b>	<b>5.66</b>	0.04				
24.50	5.90	5.66	0.00				
25.00	5.90	5.66	0.00				
25.50	5.90	5.66	0.00				
26.00	5.90	5.66	0.00				

**Summary for Reach 1R: (new Reach)**

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

Inflow Area = 131,867 sf, 70.62% Impervious, Inflow Depth = 2.74" for 25-YR event  
Inflow = 12.32 cfs @ 12.11 hrs, Volume= 30,085 cf  
Outflow = 12.32 cfs @ 12.11 hrs, Volume= 30,085 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3

**Reach 1R: (new Reach)****Hydrograph**

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Type III 24-hr 25-YR Rainfall=5.90"

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**Hydrograph for Reach 1R: (new Reach)**

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00	0.00	0.00	26.50	0.00	0.00	0.00
0.50	0.00	0.00	0.00	27.00	0.00	0.00	0.00
1.00	0.00	0.00	0.00	27.50	0.00	0.00	0.00
1.50	0.00	0.00	0.00	28.00	0.00	0.00	0.00
2.00	0.00	0.00	0.00	28.50	0.00	0.00	0.00
2.50	0.00	0.00	0.00	29.00	0.00	0.00	0.00
3.00	0.00	0.00	0.00	29.50	0.00	0.00	0.00
3.50	0.00	0.00	0.00	30.00	0.00	0.00	0.00
4.00	0.00	0.00	0.00	30.50	0.00	0.00	0.00
4.50	0.00	0.00	0.00	31.00	0.00	0.00	0.00
5.00	0.00	0.00	0.00	31.50	0.00	0.00	0.00
5.50	0.00	0.00	0.00	32.00	0.00	0.00	0.00
6.00	0.00	0.00	0.00	32.50	0.00	0.00	0.00
6.50	0.00	0.00	0.00	33.00	0.00	0.00	0.00
7.00	0.00	0.00	0.00	33.50	0.00	0.00	0.00
7.50	0.00	0.00	0.00	34.00	0.00	0.00	0.00
8.00	0.00	0.00	0.00	34.50	0.00	0.00	0.00
8.50	0.00	0.00	0.00	35.00	0.00	0.00	0.00
9.00	0.00	0.00	0.00	35.50	0.00	0.00	0.00
9.50	0.00	0.00	0.00	36.00	0.00	0.00	0.00
10.00	0.00	0.00	0.00	36.50	0.00	0.00	0.00
10.50	0.00	0.00	0.00	37.00	0.00	0.00	0.00
11.00	0.00	0.00	0.00	37.50	0.00	0.00	0.00
11.50	0.00	0.00	0.00	38.00	0.00	0.00	0.00
12.00	<b>6.03</b>	<b>6.03</b>	0.00	38.50	0.00	0.00	0.00
12.50	<b>3.97</b>	<b>3.97</b>	0.00	39.00	0.00	0.00	0.00
13.00	1.31	1.31	0.00	39.50	0.00	0.00	0.00
13.50	0.91	0.91	0.00	40.00	0.00	0.00	0.00
14.00	0.71	0.71	0.00	40.50	0.00	0.00	0.00
14.50	0.58	0.58	0.00	41.00	0.00	0.00	0.00
15.00	0.49	0.49	0.00	41.50	0.00	0.00	0.00
15.50	0.40	0.40	0.00	42.00	0.00	0.00	0.00
16.00	0.31	0.31	0.00	42.50	0.00	0.00	0.00
16.50	0.24	0.24	0.00	43.00	0.00	0.00	0.00
17.00	0.20	0.20	0.00	43.50	0.00	0.00	0.00
17.50	0.16	0.16	0.00	44.00	0.00	0.00	0.00
18.00	0.12	0.12	0.00	44.50	0.00	0.00	0.00
18.50	0.09	0.09	0.00	45.00	0.00	0.00	0.00
19.00	0.08	0.08	0.00	45.50	0.00	0.00	0.00
19.50	0.07	0.07	0.00	46.00	0.00	0.00	0.00
20.00	0.05	0.05	0.00	46.50	0.00	0.00	0.00
20.50	0.04	0.04	0.00	47.00	0.00	0.00	0.00
21.00	0.04	0.04	0.00	47.50	0.00	0.00	0.00
21.50	0.03	0.03	0.00	48.00	0.00	0.00	0.00
22.00	0.02	0.02	0.00				
22.50	0.01	0.01	0.00				
23.00	0.01	0.01	0.00				
23.50	0.01	0.01	0.00				
24.00	0.01	0.01	0.00				
24.50	0.00	0.00	0.00				
25.00	0.00	0.00	0.00				
25.50	0.00	0.00	0.00				
26.00	0.00	0.00	0.00				

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**Summary for Pond IB-1: Infiltration Basin #1**

Inflow Area = 13,425 sf, 66.59% Impervious, Inflow Depth = 4.21" for 25-YR event  
 Inflow = 1.49 cfs @ 12.09 hrs, Volume= 4,708 cf  
 Outflow = 1.43 cfs @ 12.11 hrs, Volume= 4,708 cf, Atten= 4%, Lag= 1.5 min  
 Discarded = 0.02 cfs @ 12.11 hrs, Volume= 1,732 cf  
 Primary = 1.41 cfs @ 12.11 hrs, Volume= 2,976 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3  
 Peak Elev= 124.08' @ 12.11 hrs Surf.Area= 874 sf Storage= 968 cf

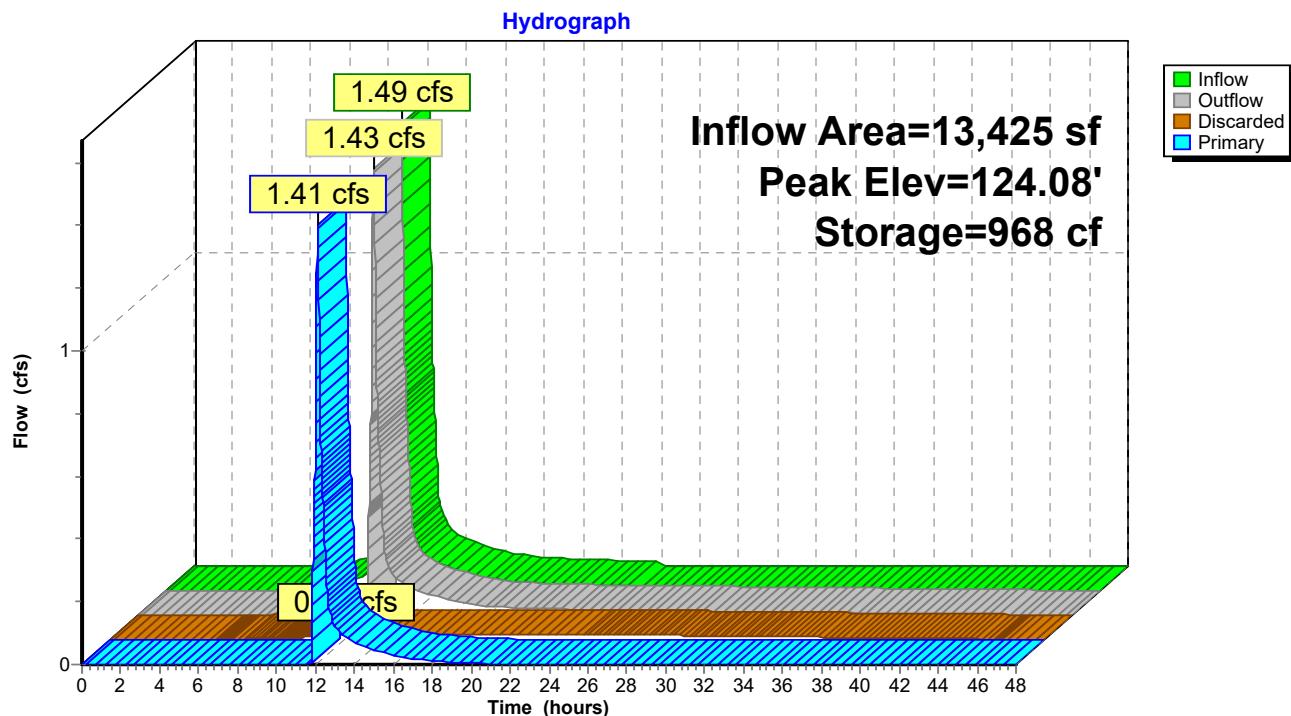
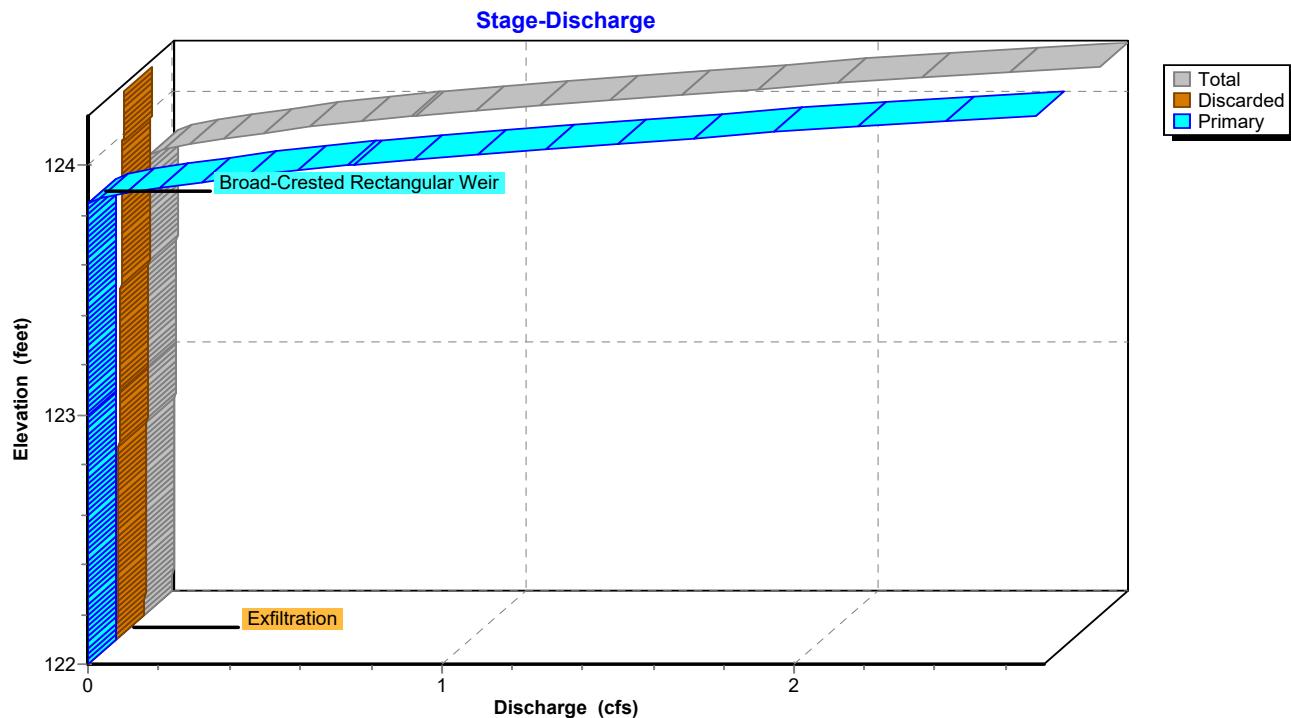
Plug-Flow detention time= 212.4 min calculated for 4,708 cf (100% of inflow)  
 Center-of-Mass det. time= 212.4 min ( 1,013.7 - 801.3 )

Volume	Invert	Avail.Storage	Storage Description
#1	122.00'	1,077 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
122.00	93	0	0
123.00	434	264	264
124.00	839	637	900
124.20	927	177	1,077

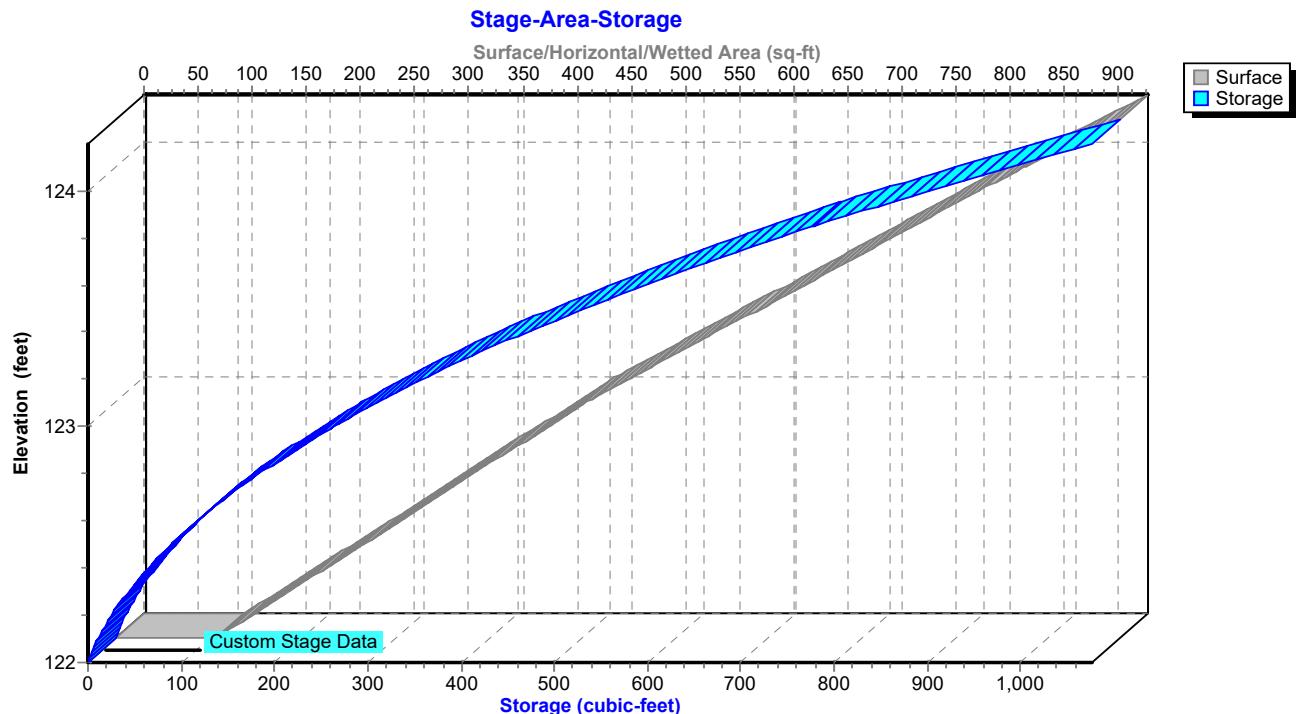
Device	Routing	Invert	Outlet Devices
#1	Discarded	122.00'	<b>1.020 in/hr Exfiltration over Surface area</b> Phase-In= 0.01'
#2	Primary	123.85'	<b>5.0' long x 2.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

**Discarded OutFlow** Max=0.02 cfs @ 12.11 hrs HW=124.08' (Free Discharge)  
 ↑1=Exfiltration (Exfiltration Controls 0.02 cfs)

**Primary OutFlow** Max=1.40 cfs @ 12.11 hrs HW=124.08' TW=0.00' (Dynamic Tailwater)  
 ↑2=Broad-Crested Rectangular Weir (Weir Controls 1.40 cfs @ 1.22 fps)

**Pond IB-1: Infiltration Basin #1****Pond IB-1: Infiltration Basin #1**

### Pond IB-1: Infiltration Basin #1



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**Hydrograph for Pond IB-1: Infiltration Basin #1**

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	122.00	0.00	0.00	0.00
1.00	0.00	0	122.00	0.00	0.00	0.00
2.00	0.00	0	122.00	0.00	0.00	0.00
3.00	0.00	0	122.00	0.00	0.00	0.00
4.00	0.00	0	122.00	0.00	0.00	0.00
5.00	0.00	0	122.00	0.00	0.00	0.00
6.00	0.00	1	122.01	0.00	0.00	0.00
7.00	0.01	6	122.06	0.00	0.00	0.00
8.00	0.01	29	122.22	0.00	0.00	0.00
9.00	0.03	78	122.46	0.01	0.01	0.00
10.00	0.04	177	122.78	0.01	0.01	0.00
11.00	0.08	359	123.20	0.01	0.01	0.00
12.00	<b>0.90</b>	<b>897</b>	<b>124.00</b>	<b>0.73</b>	<b>0.02</b>	<b>0.71</b>
13.00	<b>0.14</b>	<b>815</b>	<b>123.90</b>	<b>0.14</b>	<b>0.02</b>	<b>0.12</b>
14.00	0.09	803	123.88	0.09	0.02	0.07
15.00	0.07	798	123.87	0.07	0.02	0.05
16.00	0.05	792	123.87	0.05	0.02	0.03
17.00	0.04	789	123.86	0.04	0.02	0.02
18.00	0.03	786	123.86	0.03	0.02	0.01
19.00	0.03	784	123.86	0.03	0.02	0.01
20.00	0.02	783	123.86	0.02	0.02	0.00
21.00	0.02	781	123.85	0.02	0.02	0.00
22.00	0.02	780	123.85	0.02	0.02	0.00
23.00	0.02	777	123.85	0.02	0.02	0.00
24.00	0.01	768	123.84	0.02	0.02	0.00
25.00	0.00	708	123.76	0.02	0.02	0.00
26.00	0.00	647	123.67	0.02	0.02	0.00
27.00	0.00	588	123.59	0.02	0.02	0.00
28.00	0.00	533	123.50	0.02	0.02	0.00
29.00	0.00	480	123.42	0.01	0.01	0.00
30.00	0.00	430	123.33	0.01	0.01	0.00
31.00	0.00	383	123.25	0.01	0.01	0.00
32.00	0.00	339	123.16	0.01	0.01	0.00
33.00	0.00	298	123.08	0.01	0.01	0.00
34.00	0.00	260	122.99	0.01	0.01	0.00
35.00	0.00	225	122.91	0.01	0.01	0.00
36.00	0.00	192	122.82	0.01	0.01	0.00
37.00	0.00	161	122.74	0.01	0.01	0.00
38.00	0.00	133	122.65	0.01	0.01	0.00
39.00	0.00	108	122.57	0.01	0.01	0.00
40.00	0.00	85	122.48	0.01	0.01	0.00
41.00	0.00	64	122.40	0.01	0.01	0.00
42.00	0.00	46	122.31	0.00	0.00	0.00
43.00	0.00	30	122.23	0.00	0.00	0.00
44.00	0.00	17	122.14	0.00	0.00	0.00
45.00	0.00	6	122.06	0.00	0.00	0.00
46.00	0.00	0	122.00	0.00	0.00	0.00
47.00	0.00	0	122.00	0.00	0.00	0.00
48.00	0.00	0	122.00	0.00	0.00	0.00

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**Stage-Discharge for Pond IB-1: Infiltration Basin #1**

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
122.00	0.00	0.00	0.00
122.05	0.00	0.00	0.00
122.10	0.00	0.00	0.00
122.15	0.00	0.00	0.00
122.20	0.00	0.00	0.00
122.25	0.00	0.00	0.00
122.30	0.00	0.00	0.00
122.35	0.01	0.01	0.00
122.40	0.01	0.01	0.00
122.45	0.01	0.01	0.00
122.50	0.01	0.01	0.00
122.55	0.01	0.01	0.00
122.60	0.01	0.01	0.00
122.65	0.01	0.01	0.00
122.70	0.01	0.01	0.00
122.75	0.01	0.01	0.00
122.80	0.01	0.01	0.00
122.85	0.01	0.01	0.00
122.90	0.01	0.01	0.00
122.95	0.01	0.01	0.00
123.00	0.01	0.01	0.00
123.05	0.01	0.01	0.00
123.10	0.01	0.01	0.00
123.15	0.01	0.01	0.00
123.20	0.01	0.01	0.00
123.25	0.01	0.01	0.00
123.30	0.01	0.01	0.00
123.35	0.01	0.01	0.00
123.40	0.01	0.01	0.00
123.45	0.01	0.01	0.00
123.50	0.02	0.02	0.00
123.55	0.02	0.02	0.00
123.60	0.02	0.02	0.00
123.65	0.02	0.02	0.00
123.70	0.02	0.02	0.00
123.75	0.02	0.02	0.00
123.80	0.02	0.02	0.00
123.85	0.02	0.02	0.00
123.90	0.16	0.02	0.14
123.95	0.42	0.02	0.40
124.00	0.76	0.02	0.74
124.05	1.16	0.02	1.14
124.10	1.62	0.02	1.60
124.15	2.14	0.02	2.12
124.20	<b>2.71</b>	<b>0.02</b>	<b>2.68</b>

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**Stage-Area-Storage for Pond IB-1: Infiltration Basin #1**

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
122.00	93	0
122.05	110	5
122.10	127	11
122.15	144	18
122.20	161	25
122.25	178	34
122.30	195	43
122.35	212	53
122.40	229	64
122.45	246	76
122.50	264	89
122.55	281	103
122.60	298	117
122.65	315	132
122.70	332	149
122.75	349	166
122.80	366	184
122.85	383	202
122.90	400	222
122.95	417	242
123.00	434	264
123.05	454	286
123.10	474	309
123.15	495	333
123.20	515	358
123.25	535	385
123.30	555	412
123.35	576	440
123.40	596	470
123.45	616	500
123.50	637	531
123.55	657	563
123.60	677	597
123.65	697	631
123.70	718	667
123.75	738	703
123.80	758	740
123.85	778	779
123.90	799	818
123.95	819	859
124.00	839	900
124.05	861	942
124.10	883	986
124.15	905	1,031
124.20	927	1,077

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**Summary for Pond IB-2: Infiltration Basin #2**

Inflow Area = 33,268 sf, 68.13% Impervious, Inflow Depth = 4.31" for 25-YR event  
 Inflow = 3.78 cfs @ 12.09 hrs, Volume= 11,961 cf  
 Outflow = 3.26 cfs @ 12.13 hrs, Volume= 11,961 cf, Atten= 14%, Lag= 2.8 min  
 Discarded = 0.06 cfs @ 12.13 hrs, Volume= 4,582 cf  
 Primary = 3.20 cfs @ 12.13 hrs, Volume= 7,379 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3  
 Peak Elev= 123.92' @ 12.13 hrs Surf.Area= 2,427 sf Storage= 2,930 cf

Plug-Flow detention time= 209.4 min calculated for 11,959 cf (100% of inflow)  
 Center-of-Mass det. time= 209.6 min ( 1,007.9 - 798.3 )

Volume	Invert	Avail.Storage	Storage Description	
#1	122.00'	3,647 cf	<b>Custom Stage Data (Prismatic)</b>	Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	
122.00	672	0	0	
123.00	1,538	1,105	1,105	
124.00	2,504	2,021	3,126	
124.20	2,704	521	3,647	
Device	Routing	Invert	Outlet Devices	
#1	Discarded	122.00'	<b>1.020 in/hr Exfiltration over Surface area</b>	Phase-In= 0.01'
#2	Device 3	123.50'	<b>4.0' long x 0.5' breadth Broad-Crested Rectangular Weir</b>	
			Head (feet) 0.20 0.40 0.60 0.80 1.00	
			Coef. (English) 2.80 2.92 3.08 3.30 3.32	
#3	Primary	121.90'	<b>18.0" Round Culvert</b>	
			L= 20.0' CPP, square edge headwall, Ke= 0.500	
			Inlet / Outlet Invert= 121.90' / 121.70' S= 0.0100 '/' Cc= 0.900	
			n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf	

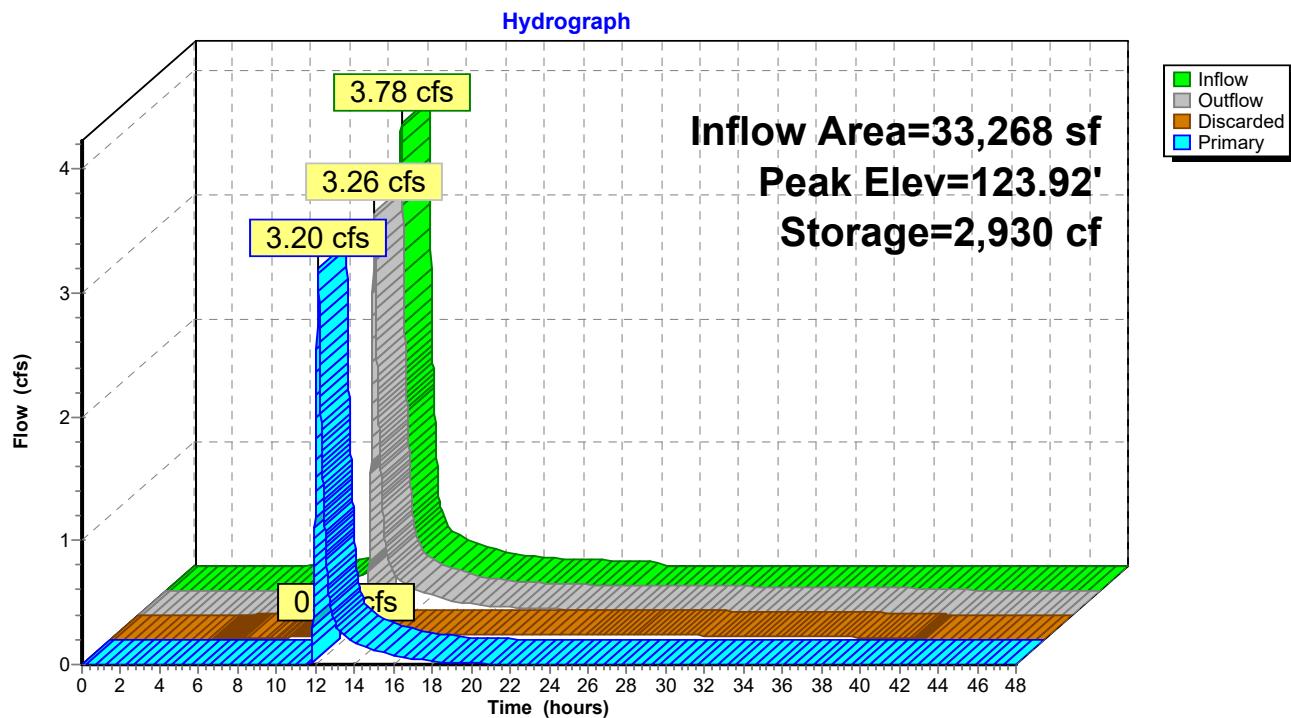
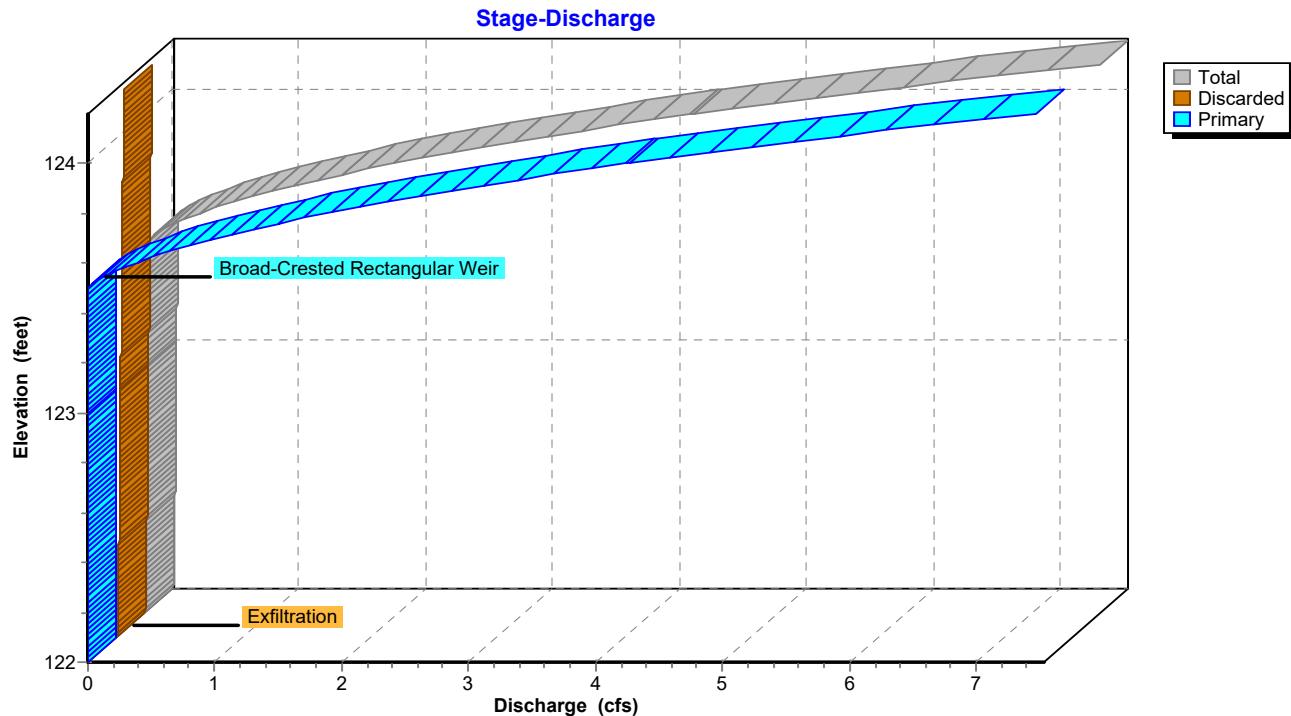
**Discarded OutFlow** Max=0.06 cfs @ 12.13 hrs HW=123.92' (Free Discharge)

↑ 1=Exfiltration (Exfiltration Controls 0.06 cfs)

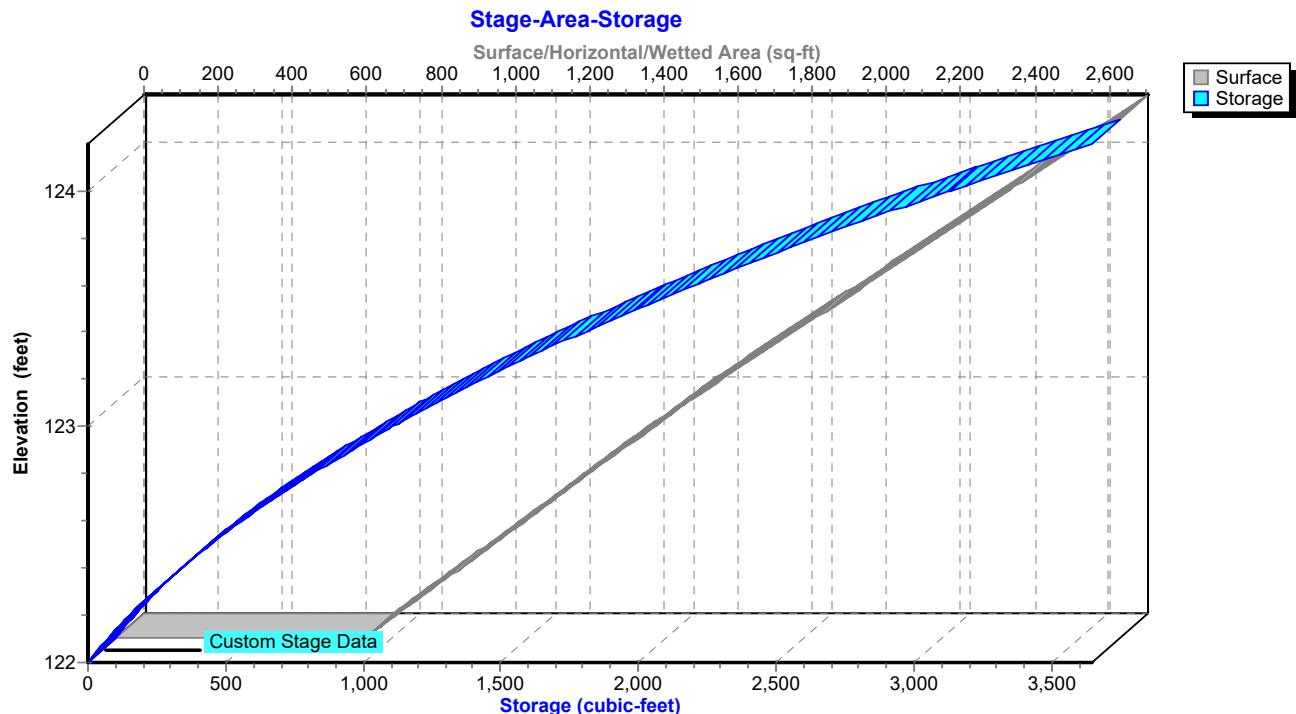
**Primary OutFlow** Max=3.20 cfs @ 12.13 hrs HW=123.92' TW=0.00' (Dynamic Tailwater)

↑ 3=Culvert (Passes 3.20 cfs of 8.94 cfs potential flow)

↑ 2=Broad-Crested Rectangular Weir (Weir Controls 3.20 cfs @ 1.90 fps)

**Pond IB-2: Infiltration Basin #2****Pond IB-2: Infiltration Basin #2**

### Pond IB-2: Infiltration Basin #2



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**Hydrograph for Pond IB-2: Infiltration Basin #2**

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	122.00	0.00	0.00	0.00
1.00	0.00	0	122.00	0.00	0.00	0.00
2.00	0.00	0	122.00	0.00	0.00	0.00
3.00	0.00	0	122.00	0.00	0.00	0.00
4.00	0.00	0	122.00	0.00	0.00	0.00
5.00	0.00	0	122.00	0.00	0.00	0.00
6.00	0.01	3	122.00	0.01	0.01	0.00
7.00	0.02	8	122.01	0.02	0.02	0.00
8.00	0.04	46	122.07	0.02	0.02	0.00
9.00	0.07	165	122.22	0.02	0.02	0.00
10.00	0.12	416	122.47	0.03	0.03	0.00
11.00	0.21	884	122.85	0.03	0.03	0.00
12.00	<b>2.29</b>	<b>2,525</b>	<b>123.75</b>	<b>1.45</b>	<b>0.05</b>	<b>1.40</b>
13.00	<b>0.34</b>	<b>2,194</b>	<b>123.60</b>	<b>0.39</b>	<b>0.05</b>	<b>0.34</b>
14.00	0.22	2,125	123.56	0.23	0.05	0.18
15.00	0.16	2,095	123.55	0.17	0.05	0.12
16.00	0.12	2,067	123.54	0.12	0.05	0.08
17.00	0.09	2,048	123.53	0.10	0.05	0.05
18.00	0.07	2,032	123.52	0.08	0.05	0.03
19.00	0.06	2,021	123.51	0.06	0.05	0.02
20.00	0.06	2,014	123.51	0.06	0.05	0.01
21.00	0.05	2,007	123.51	0.05	0.05	0.01
22.00	0.05	2,000	123.50	0.05	0.05	0.00
23.00	0.04	1,986	123.50	0.05	0.05	0.00
24.00	0.04	1,958	123.48	0.05	0.05	0.00
25.00	0.00	1,803	123.40	0.05	0.05	0.00
26.00	0.00	1,643	123.32	0.04	0.04	0.00
27.00	0.00	1,489	123.23	0.04	0.04	0.00
28.00	0.00	1,343	123.15	0.04	0.04	0.00
29.00	0.00	1,203	123.06	0.04	0.04	0.00
30.00	0.00	1,071	122.98	0.04	0.04	0.00
31.00	0.00	945	122.89	0.03	0.03	0.00
32.00	0.00	825	122.81	0.03	0.03	0.00
33.00	0.00	712	122.72	0.03	0.03	0.00
34.00	0.00	605	122.64	0.03	0.03	0.00
35.00	0.00	504	122.55	0.03	0.03	0.00
36.00	0.00	409	122.47	0.03	0.03	0.00
37.00	0.00	321	122.38	0.02	0.02	0.00
38.00	0.00	239	122.30	0.02	0.02	0.00
39.00	0.00	163	122.21	0.02	0.02	0.00
40.00	0.00	93	122.13	0.02	0.02	0.00
41.00	0.00	30	122.04	0.02	0.02	0.00
42.00	0.00	0	122.00	0.00	0.00	0.00
43.00	0.00	0	122.00	0.00	0.00	0.00
44.00	0.00	0	122.00	0.00	0.00	0.00
45.00	0.00	0	122.00	0.00	0.00	0.00
46.00	0.00	0	122.00	0.00	0.00	0.00
47.00	0.00	0	122.00	0.00	0.00	0.00
48.00	0.00	0	122.00	0.00	0.00	0.00

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**Stage-Discharge for Pond IB-2: Infiltration Basin #2**

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
122.00	0.00	0.00	0.00
122.05	0.02	0.02	0.00
122.10	0.02	0.02	0.00
122.15	0.02	0.02	0.00
122.20	0.02	0.02	0.00
122.25	0.02	0.02	0.00
122.30	0.02	0.02	0.00
122.35	0.02	0.02	0.00
122.40	0.02	0.02	0.00
122.45	0.03	0.03	0.00
122.50	0.03	0.03	0.00
122.55	0.03	0.03	0.00
122.60	0.03	0.03	0.00
122.65	0.03	0.03	0.00
122.70	0.03	0.03	0.00
122.75	0.03	0.03	0.00
122.80	0.03	0.03	0.00
122.85	0.03	0.03	0.00
122.90	0.03	0.03	0.00
122.95	0.04	0.04	0.00
123.00	0.04	0.04	0.00
123.05	0.04	0.04	0.00
123.10	0.04	0.04	0.00
123.15	0.04	0.04	0.00
123.20	0.04	0.04	0.00
123.25	0.04	0.04	0.00
123.30	0.04	0.04	0.00
123.35	0.04	0.04	0.00
123.40	0.05	0.05	0.00
123.45	0.05	0.05	0.00
123.50	0.05	0.05	0.00
123.55	0.17	0.05	0.13
123.60	0.40	0.05	0.35
123.65	0.70	0.05	0.65
123.70	1.05	0.05	1.00
123.75	1.47	0.05	1.41
123.80	1.93	0.05	1.88
123.85	2.45	0.06	2.39
123.90	3.01	0.06	2.95
123.95	3.63	0.06	3.57
124.00	4.30	0.06	4.24
124.05	5.02	0.06	4.96
124.10	5.79	0.06	5.73
124.15	6.63	0.06	6.57
124.20	<b>7.54</b>	<b>0.06</b>	<b>7.47</b>

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**Stage-Area-Storage for Pond IB-2: Infiltration Basin #2**

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
122.00	672	0
122.05	715	35
122.10	759	72
122.15	802	111
122.20	845	152
122.25	889	195
122.30	932	241
122.35	975	288
122.40	1,018	338
122.45	1,062	390
122.50	1,105	444
122.55	1,148	501
122.60	1,192	559
122.65	1,235	620
122.70	1,278	683
122.75	1,322	748
122.80	1,365	815
122.85	1,408	884
122.90	1,451	956
122.95	1,495	1,029
123.00	1,538	1,105
123.05	1,586	1,183
123.10	1,635	1,264
123.15	1,683	1,347
123.20	1,731	1,432
123.25	1,780	1,520
123.30	1,828	1,610
123.35	1,876	1,702
123.40	1,924	1,797
123.45	1,973	1,895
123.50	2,021	1,995
123.55	2,069	2,097
123.60	2,118	2,202
123.65	2,166	2,309
123.70	2,214	2,418
123.75	2,263	2,530
123.80	2,311	2,645
123.85	2,359	2,761
123.90	2,407	2,880
123.95	2,456	3,002
124.00	2,504	3,126
124.05	2,554	3,252
124.10	2,604	3,381
124.15	2,654	3,513
124.20	<b>2,704</b>	<b>3,647</b>

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**Summary for Pond UG-1: Underground Detention System #1**

Inflow Area = 13,403 sf, 58.36% Impervious, Inflow Depth = 3.90" for 25-YR event  
 Inflow = 1.39 cfs @ 12.09 hrs, Volume= 4,351 cf  
 Outflow = 1.10 cfs @ 12.14 hrs, Volume= 4,349 cf, Atten= 21%, Lag= 3.0 min  
 Primary = 1.10 cfs @ 12.14 hrs, Volume= 4,349 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3  
 Peak Elev= 123.31' @ 12.15 hrs Surf.Area= 820 sf Storage= 543 cf

Plug-Flow detention time= 40.1 min calculated for 4,349 cf (100% of inflow)  
 Center-of-Mass det. time= 39.8 min ( 849.4 - 809.6 )

Volume	Invert	Avail.Storage	Storage Description
#1A	122.40'	156 cf	<b>10.00'W x 82.00'L x 2.17'H Field A</b> 1,777 cf Overall - 1,387 cf Embedded = 390 cf x 40.0% Voids
#2A	122.40'	792 cf	<b>retain_it retain_it 1.5' x 10 Inside #1</b> Inside= 84.0"W x 18.0"H => 9.90 sf x 8.00'L = 79.2 cf Outside= 96.0"W x 26.0"H => 17.33 sf x 8.00'L = 138.7 cf
948 cf			Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	122.40'	<b>15.0" Round Culvert</b> L= 140.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 122.40' / 121.50' S= 0.0064 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.23 sf

**Primary OutFlow** Max=1.10 cfs @ 12.14 hrs HW=123.30' TW=123.12' (Dynamic Tailwater)  
 ↗1=Culvert (Outlet Controls 1.10 cfs @ 1.62 fps)

**Pond UG-1: Underground Detention System #1 - Chamber Wizard Field A****Chamber Model = retain\_it retain\_it 1.5' (retain-it®)**

Inside= 84.0"W x 18.0"H =&gt; 9.90 sf x 8.00'L = 79.2 cf

Outside= 96.0"W x 26.0"H =&gt; 17.33 sf x 8.00'L = 138.7 cf

10 Chambers/Row x 8.00' Long = 80.00' Row Length +12.0" End Stone x 2 = 82.00' Base Length

1 Rows x 96.0" Wide + 12.0" Side Stone x 2 = 10.00' Base Width

26.0" Chamber Height = 2.17' Field Height

10 Chambers x 79.2 cf = 791.7 cf Chamber Storage

10 Chambers x 138.7 cf = 1,386.7 cf Displacement

1,776.7 cf Field - 1,386.7 cf Chambers = 390.0 cf Stone x 40.0% Voids = 156.0 cf Stone Storage

Chamber Storage + Stone Storage = 947.7 cf = 0.022 af

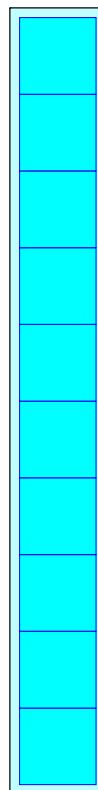
Overall Storage Efficiency = 53.3%

Overall System Size = 82.00' x 10.00' x 2.17'

10 Chambers

65.8 cy Field

14.4 cy Stone



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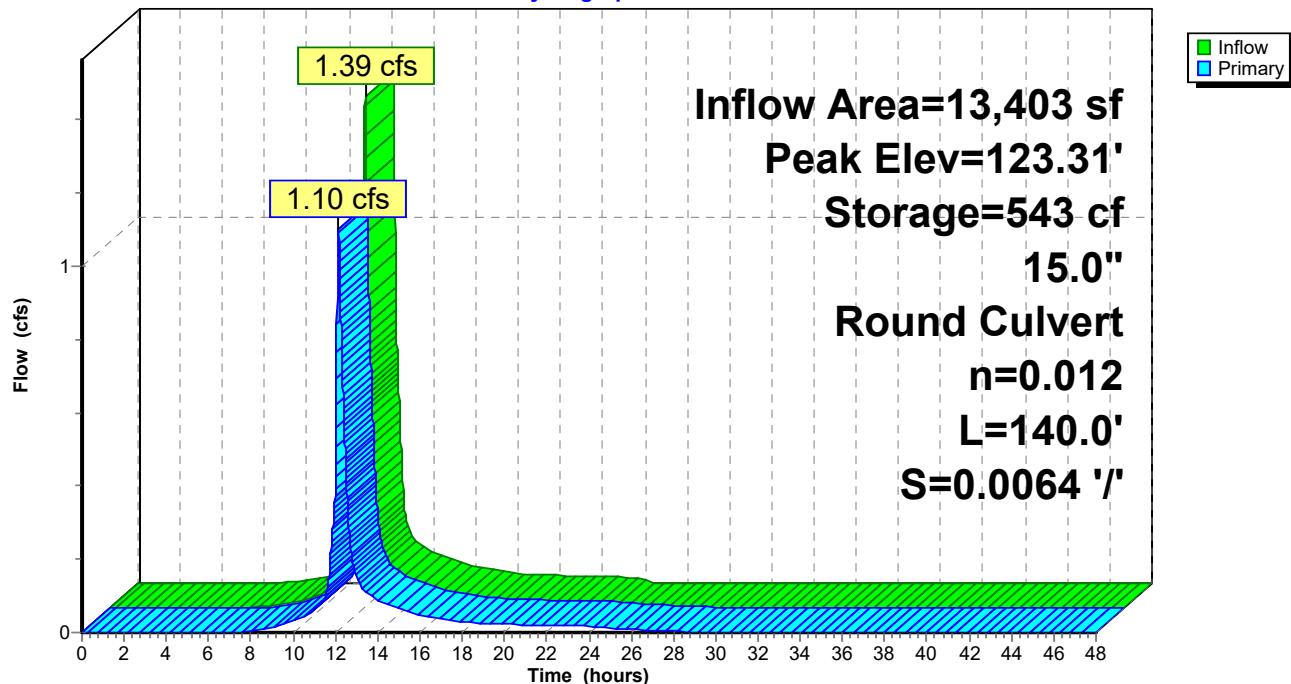
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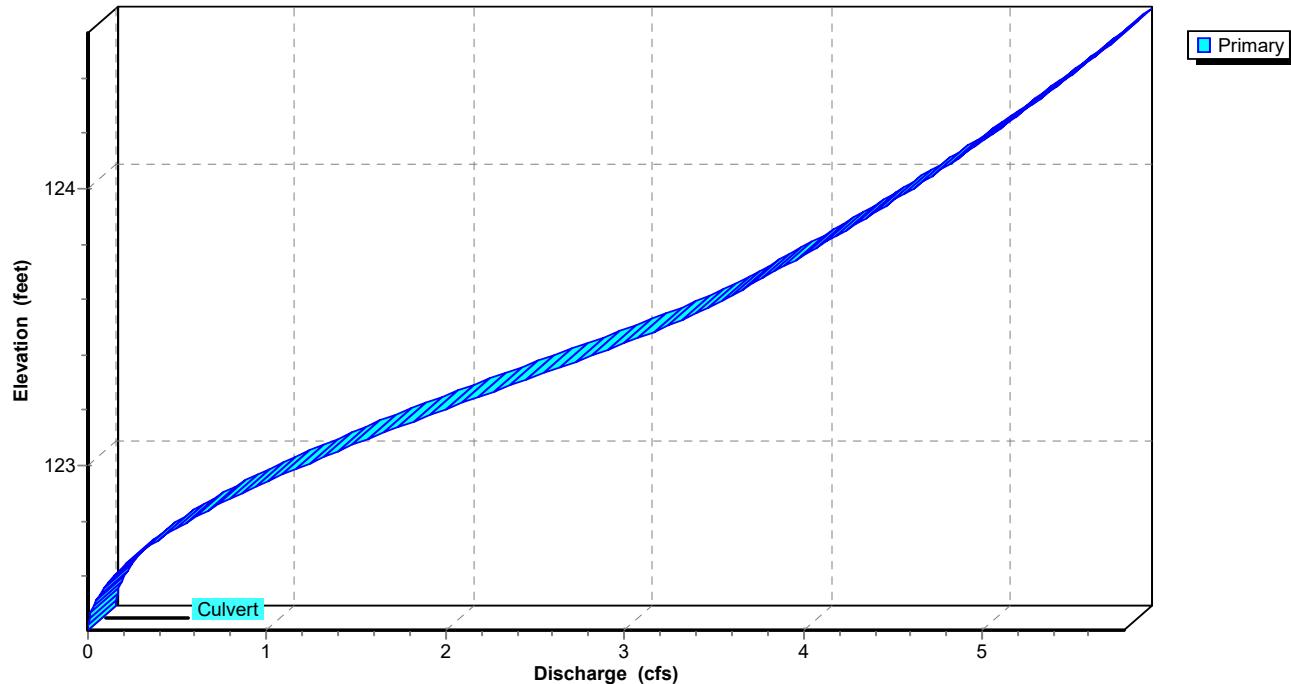
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**Pond UG-1: Underground Detention System #1**

Hydrograph

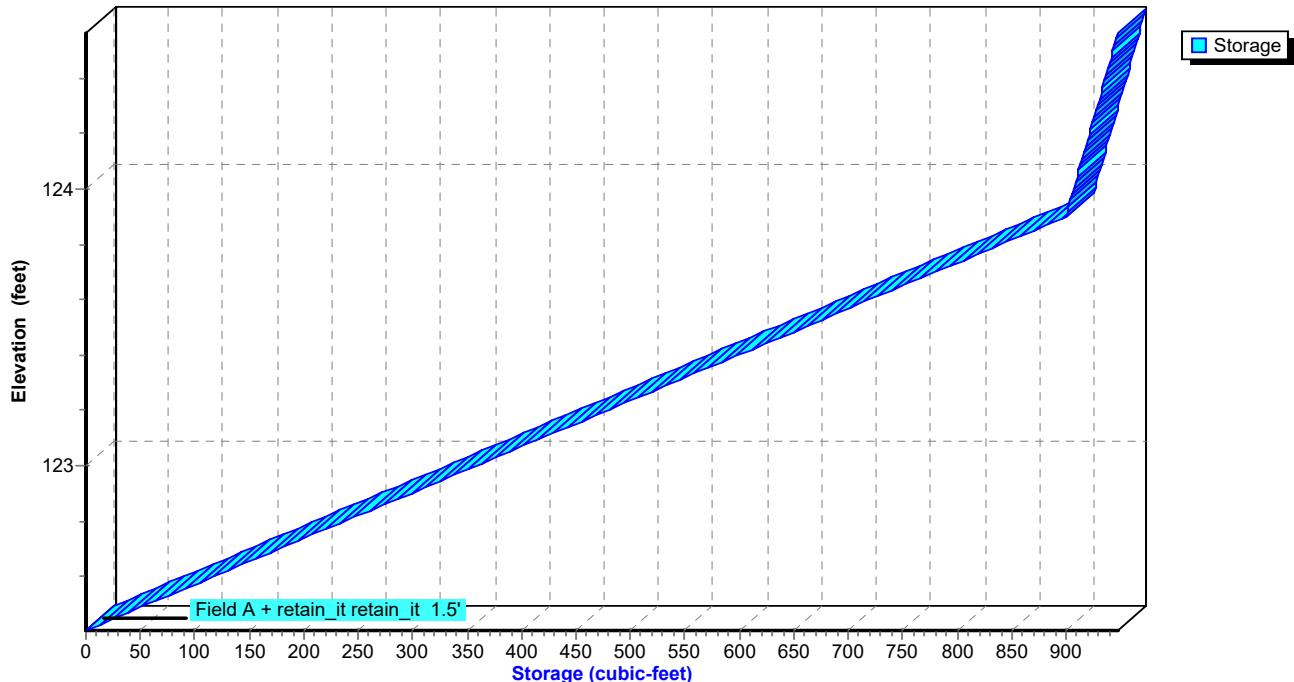
**Pond UG-1: Underground Detention System #1**

Stage-Discharge



### Pond UG-1: Underground Detention System #1

Stage-Area-Storage



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**Hydrograph for Pond UG-1: Underground Detention System #1**

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0	122.40	0.00
1.00	0.00	0	122.40	0.00
2.00	0.00	0	122.40	0.00
3.00	0.00	0	122.40	0.00
4.00	0.00	0	122.40	0.00
5.00	0.00	0	122.40	0.00
6.00	0.00	0	122.40	0.00
7.00	0.00	3	122.41	0.00
8.00	0.01	18	122.43	0.00
9.00	0.02	37	122.46	0.01
10.00	0.04	54	122.49	0.03
11.00	0.07	78	122.53	0.06
12.00	<b>0.83</b>	<b>336</b>	<b>122.96</b>	<b>0.42</b>
13.00	<b>0.13</b>	<b>244</b>	<b>122.81</b>	<b>0.15</b>
14.00	0.08	210	122.75	0.09
15.00	0.06	195	122.73	0.07
16.00	0.04	182	122.70	0.05
17.00	0.04	174	122.69	0.04
18.00	0.03	167	122.68	0.03
19.00	0.02	162	122.67	0.03
20.00	0.02	160	122.67	0.02
21.00	0.02	157	122.66	0.02
22.00	0.02	155	122.66	0.02
23.00	0.02	151	122.65	0.02
24.00	0.01	143	122.64	0.02
25.00	0.00	100	122.57	0.01
26.00	0.00	63	122.50	0.01
27.00	0.00	39	122.46	0.00
28.00	0.00	26	122.44	0.00
29.00	0.00	18	122.43	0.00
30.00	0.00	13	122.42	0.00
31.00	0.00	11	122.42	0.00
32.00	0.00	9	122.41	0.00
33.00	0.00	7	122.41	0.00
34.00	0.00	6	122.41	0.00
35.00	0.00	5	122.41	0.00
36.00	0.00	5	122.41	0.00
37.00	0.00	4	122.41	0.00
38.00	0.00	4	122.41	0.00
39.00	0.00	3	122.41	0.00
40.00	0.00	3	122.41	0.00
41.00	0.00	3	122.40	0.00
42.00	0.00	3	122.40	0.00
43.00	0.00	3	122.40	0.00
44.00	0.00	2	122.40	0.00
45.00	0.00	2	122.40	0.00
46.00	0.00	2	122.40	0.00
47.00	0.00	2	122.40	0.00
48.00	0.00	2	122.40	0.00

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**Stage-Discharge for Pond UG-1: Underground Detention System #1**

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
122.40	0.00	123.46	3.07	124.52	5.70
122.42	0.00	123.48	3.15	124.54	5.74
122.44	0.01	123.50	3.22	124.56	<b>5.78</b>
122.46	0.01	123.52	3.30		
122.48	0.02	123.54	3.37		
122.50	0.04	123.56	3.44		
122.52	0.06	123.58	3.50		
122.54	0.08	123.60	3.56		
122.56	0.10	123.62	3.62		
122.58	0.12	123.64	3.67		
122.60	0.15	123.66	3.72		
122.62	0.18	123.68	3.78		
122.64	0.22	123.70	3.83		
122.66	0.25	123.72	3.89		
122.68	0.29	123.74	3.94		
122.70	0.33	123.76	4.00		
122.72	0.38	123.78	4.05		
122.74	0.42	123.80	4.11		
122.76	0.47	123.82	4.16		
122.78	0.52	123.84	4.21		
122.80	0.58	123.86	4.26		
122.82	0.63	123.88	4.31		
122.84	0.69	123.90	4.36		
122.86	0.75	123.92	4.41		
122.88	0.81	123.94	4.46		
122.90	0.87	123.96	4.51		
122.92	0.94	123.98	4.56		
122.94	1.00	124.00	4.61		
122.96	1.07	124.02	4.65		
122.98	1.14	124.04	4.70		
123.00	1.21	124.06	4.75		
123.02	1.29	124.08	4.79		
123.04	1.36	124.10	4.84		
123.06	1.44	124.12	4.88		
123.08	1.51	124.14	4.93		
123.10	1.59	124.16	4.97		
123.12	1.67	124.18	5.01		
123.14	1.75	124.20	5.06		
123.16	1.83	124.22	5.10		
123.18	1.91	124.24	5.14		
123.20	1.99	124.26	5.18		
123.22	2.08	124.28	5.23		
123.24	2.16	124.30	5.27		
123.26	2.24	124.32	5.31		
123.28	2.33	124.34	5.35		
123.30	2.41	124.36	5.39		
123.32	2.50	124.38	5.43		
123.34	2.58	124.40	5.47		
123.36	2.66	124.42	5.51		
123.38	2.75	124.44	5.55		
123.40	2.83	124.46	5.59		
123.42	2.91	124.48	5.63		
123.44	2.99	124.50	5.67		

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**Stage-Area-Storage for Pond UG-1: Underground Detention System #1**

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
122.40	0	123.46	636	124.52	944
122.42	12	123.48	648	124.54	946
122.44	24	123.50	660	124.56	<b>947</b>
122.46	36	123.52	672		
122.48	48	123.54	684		
122.50	60	123.56	696		
122.52	72	123.58	708		
122.54	84	123.60	720		
122.56	96	123.62	732		
122.58	108	123.64	744		
122.60	120	123.66	756		
122.62	132	123.68	768		
122.64	144	123.70	780		
122.66	156	123.72	792		
122.68	168	123.74	804		
122.70	180	123.76	816		
122.72	192	123.78	828		
122.74	204	123.80	840		
122.76	216	123.82	852		
122.78	228	123.84	864		
122.80	240	123.86	876		
122.82	252	123.88	888		
122.84	264	123.90	900		
122.86	276	123.92	901		
122.88	288	123.94	903		
122.90	300	123.96	904		
122.92	312	123.98	905		
122.94	324	124.00	907		
122.96	336	124.02	908		
122.98	348	124.04	910		
123.00	360	124.06	911		
123.02	372	124.08	913		
123.04	384	124.10	914		
123.06	396	124.12	916		
123.08	408	124.14	917		
123.10	420	124.16	918		
123.12	432	124.18	920		
123.14	444	124.20	921		
123.16	456	124.22	923		
123.18	468	124.24	924		
123.20	480	124.26	926		
123.22	492	124.28	927		
123.24	504	124.30	929		
123.26	516	124.32	930		
123.28	528	124.34	931		
123.30	540	124.36	933		
123.32	552	124.38	934		
123.34	564	124.40	936		
123.36	576	124.42	937		
123.38	588	124.44	939		
123.40	600	124.46	940		
123.42	612	124.48	941		
123.44	624	124.50	943		

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**Summary for Pond UG-2: Underground Infiltration System #1**

Inflow Area = 42,604 sf, 63.97% Impervious, Inflow Depth = 4.18" for 25-YR event  
 Inflow = 4.29 cfs @ 12.10 hrs, Volume= 14,848 cf  
 Outflow = 3.48 cfs @ 12.16 hrs, Volume= 14,848 cf, Atten= 19%, Lag= 3.9 min  
 Discarded = 0.06 cfs @ 9.32 hrs, Volume= 6,037 cf  
 Primary = 3.42 cfs @ 12.16 hrs, Volume= 8,810 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3  
 Peak Elev= 123.13' @ 12.16 hrs Surf.Area= 2,548 sf Storage= 3,345 cf

Plug-Flow detention time= 182.2 min calculated for 14,848 cf (100% of inflow)  
 Center-of-Mass det. time= 182.2 min ( 995.4 - 813.3 )

Volume	Invert	Avail.Storage	Storage Description
#1A	121.50'	260 cf	<b>26.00'W x 98.00'L x 2.67'H Field A</b> 6,795 cf Overall - 6,144 cf Embedded = 651 cf x 40.0% Voids
#2A	121.50'	3,913 cf	<b>retain_it retain_it 2.0' x 36 Inside #1</b> Inside= 84.0"W x 24.0"H => 13.78 sf x 8.00'L = 110.3 cf Outside= 96.0"W x 32.0"H => 21.33 sf x 8.00'L = 170.7 cf 3 Rows adjusted for 56.7 cf perimeter wall
4,174 cf			Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	121.50'	<b>1.020 in/hr Exfiltration over Surface area</b> Phase-In= 0.01'
#2	Device 3	121.50'	<b>18.0" Round Culvert</b> L= 30.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 121.50' / 121.50' S= 0.0000 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf
#3	Device 4	122.65'	<b>4.0' long Sharp-Crested Rectangular Weir</b> 2 End Contraction(s)
#4	Primary	122.02'	<b>15.0" Round Culvert</b> L= 60.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 122.02' / 121.70' S= 0.0053 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.23 sf

**Discarded OutFlow** Max=0.06 cfs @ 9.32 hrs HW=121.53' (Free Discharge)  
 ↑ 1=Exfiltration (Exfiltration Controls 0.06 cfs)

**Primary OutFlow** Max=3.42 cfs @ 12.16 hrs HW=123.13' TW=0.00' (Dynamic Tailwater)  
 ↑ 4=Culvert (Barrel Controls 3.42 cfs @ 3.94 fps)  
 ↑ 3=Sharp-Crested Rectangular Weir (Passes 3.42 cfs of 4.22 cfs potential flow)  
 ↑ 2=Culvert (Passes 3.42 cfs of 4.65 cfs potential flow)

**Pond UG-2: Underground Infiltration System #1 - Chamber Wizard Field A****Chamber Model = retain\_it retain\_it 2.0' (retain-it®)**

Inside= 84.0"W x 24.0"H =&gt; 13.78 sf x 8.00'L = 110.3 cf

Outside= 96.0"W x 32.0"H =&gt; 21.33 sf x 8.00'L = 170.7 cf

3 Rows adjusted for 56.7 cf perimeter wall

12 Chambers/Row x 8.00' Long = 96.00' Row Length +12.0" End Stone x 2 = 98.00' Base Length

3 Rows x 96.0" Wide + 12.0" Side Stone x 2 = 26.00' Base Width

32.0" Chamber Height = 2.67' Field Height

1.9 cf Sidewall x 12 x 2 + 1.9 cf Endwall x 3 x 2 = 56.7 cf Perimeter Wall

36 Chambers x 110.3 cf - 56.7 cf Perimeter wall = 3,913.4 cf Chamber Storage

36 Chambers x 170.7 cf = 6,144.0 cf Displacement

6,794.7 cf Field - 6,144.0 cf Chambers = 650.7 cf Stone x 40.0% Voids = 260.3 cf Stone Storage

Chamber Storage + Stone Storage = 4,173.6 cf = 0.096 af

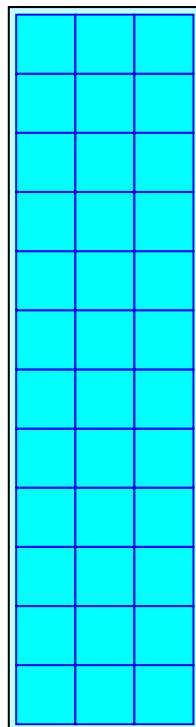
Overall Storage Efficiency = 61.4%

Overall System Size = 98.00' x 26.00' x 2.67'

36 Chambers

251.7 cy Field

24.1 cy Stone



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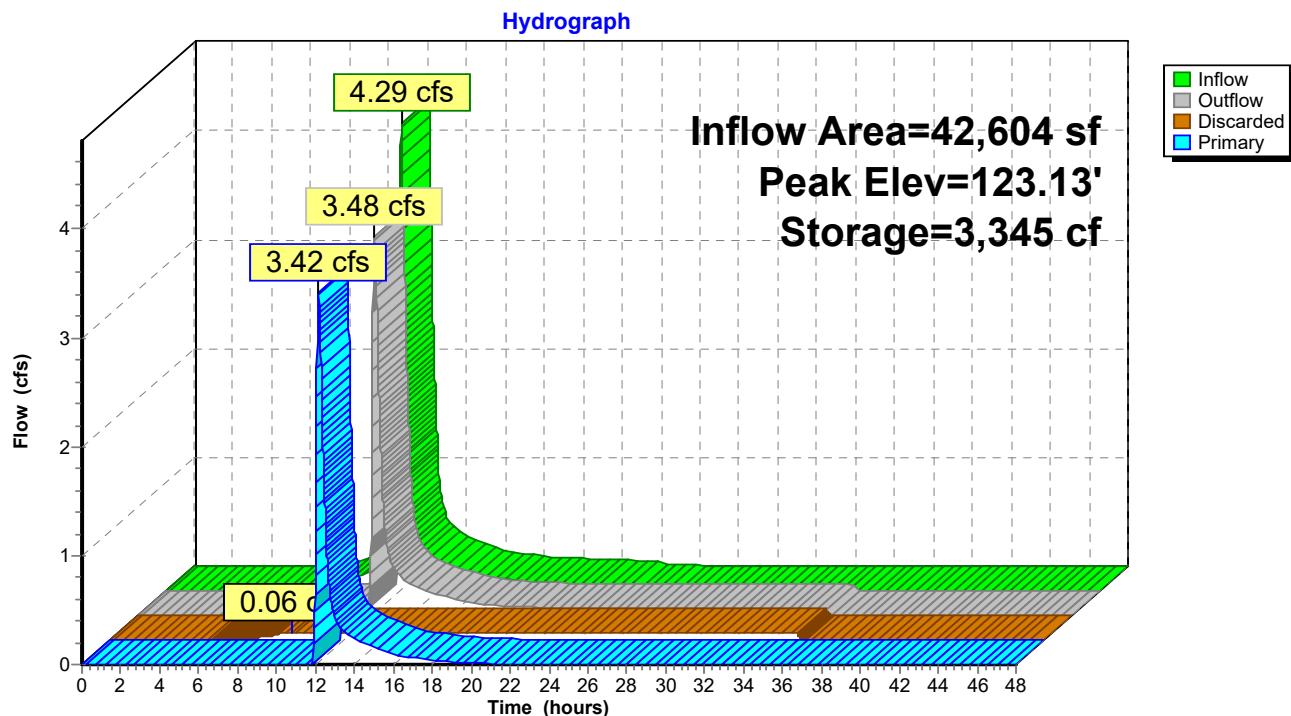
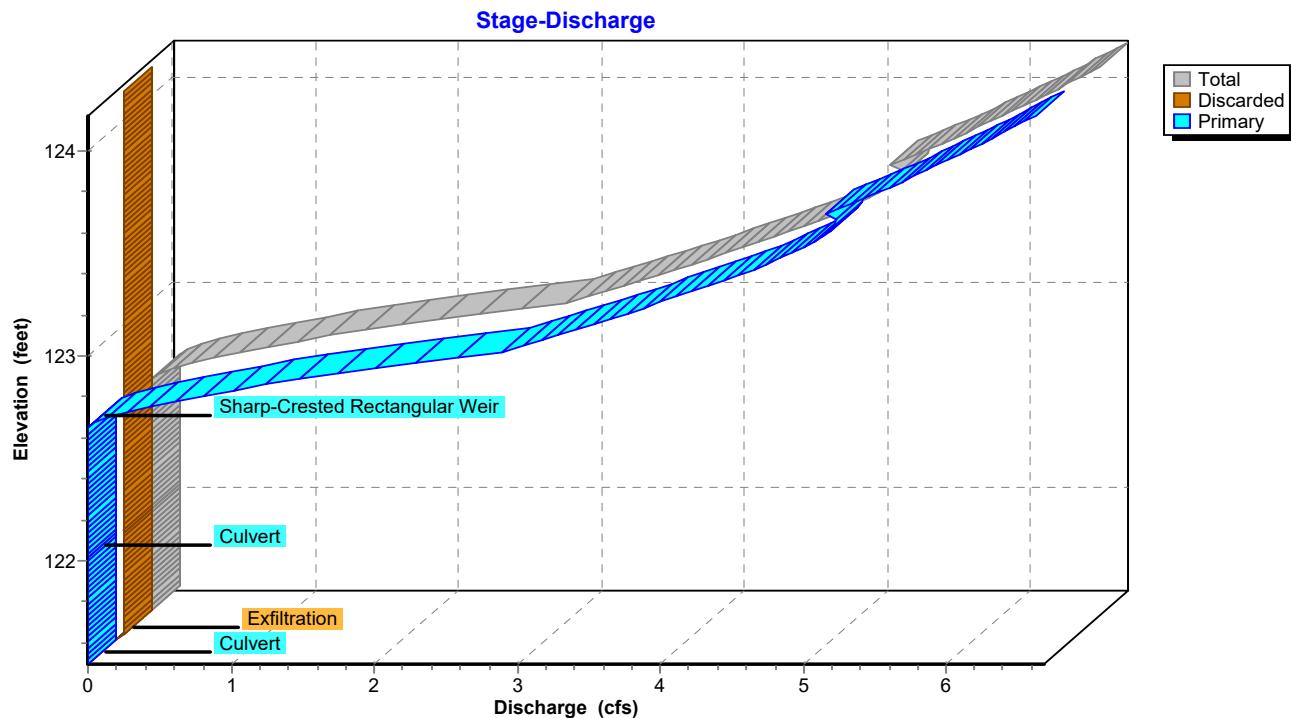
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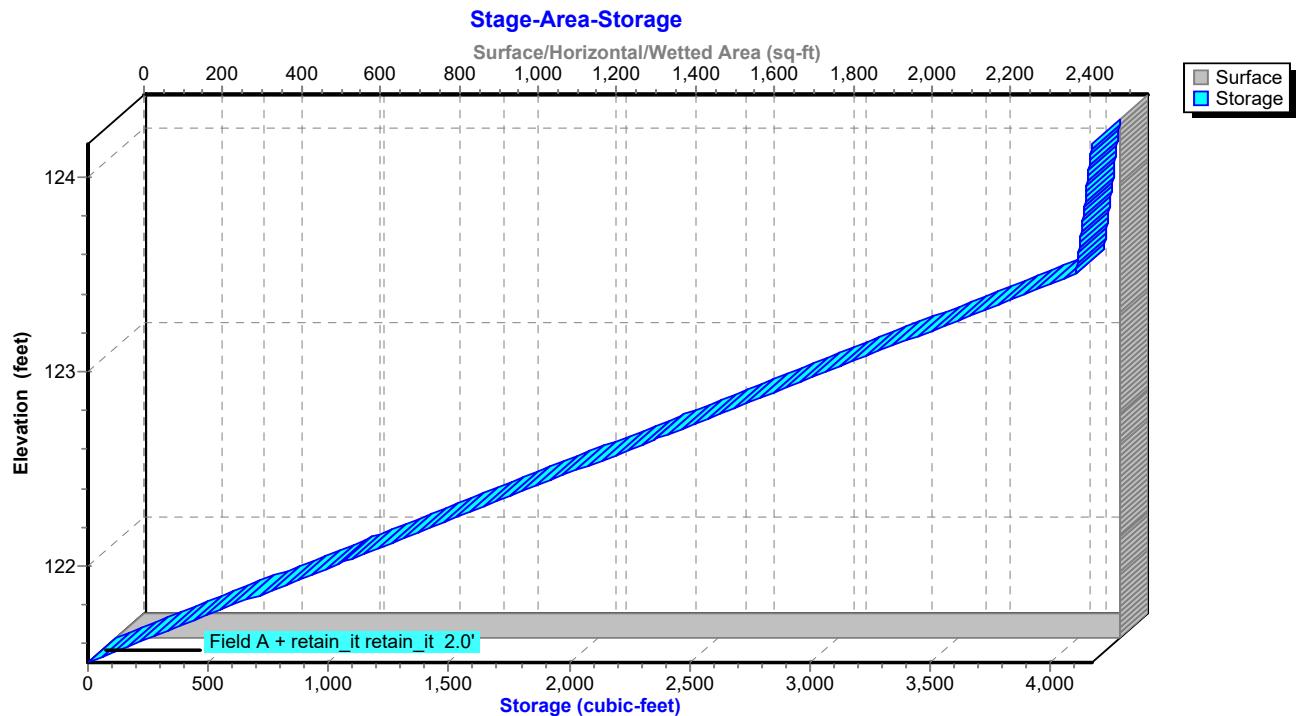
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**Pond UG-2: Underground Infiltration System #1****Pond UG-2: Underground Infiltration System #1**

### Pond UG-2: Underground Infiltration System #1



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**Hydrograph for Pond UG-2: Underground Infiltration System #1**

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	121.50	0.00	0.00	0.00
1.00	0.00	0	121.50	0.00	0.00	0.00
2.00	0.00	0	121.50	0.00	0.00	0.00
3.00	0.00	0	121.50	0.00	0.00	0.00
4.00	0.00	0	121.50	0.00	0.00	0.00
5.00	0.00	0	121.50	0.00	0.00	0.00
6.00	0.01	2	121.50	0.01	0.01	0.00
7.00	0.02	5	121.50	0.02	0.02	0.00
8.00	0.03	11	121.51	0.03	0.03	0.00
9.00	0.08	28	121.51	0.06	<b>0.06</b>	0.00
10.00	0.13	184	121.59	0.06	<b>0.06</b>	0.00
11.00	0.24	628	121.81	0.06	0.06	0.00
12.00	<b>2.43</b>	<b>2,739</b>	<b>122.83</b>	<b>1.08</b>	0.06	<b>1.02</b>
13.00	<b>0.45</b>	<b>2,577</b>	<b>122.75</b>	<b>0.50</b>	0.06	<b>0.44</b>
14.00	0.28	2,503	122.72	0.29	0.06	0.23
15.00	0.21	2,471	122.70	0.22	0.06	0.16
16.00	0.15	2,441	122.69	0.16	0.06	0.10
17.00	0.12	2,421	122.68	0.12	0.06	0.06
18.00	0.09	2,403	122.67	0.10	0.06	0.04
19.00	0.08	2,392	122.66	0.08	0.06	0.02
20.00	0.07	2,384	122.66	0.07	0.06	0.01
21.00	0.07	2,377	122.66	0.07	0.06	0.01
22.00	0.06	2,369	122.65	0.06	0.06	0.00
23.00	0.05	2,356	122.65	0.06	0.06	0.00
24.00	0.05	2,328	122.63	0.06	0.06	0.00
25.00	0.01	2,170	122.56	0.06	0.06	0.00
26.00	0.01	1,990	122.47	0.06	0.06	0.00
27.00	0.00	1,797	122.37	0.06	0.06	0.00
28.00	0.00	1,594	122.28	0.06	0.06	0.00
29.00	0.00	1,385	122.17	0.06	0.06	0.00
30.00	0.00	1,173	122.07	0.06	0.06	0.00
31.00	0.00	960	121.97	0.06	0.06	0.00
32.00	0.00	745	121.86	0.06	0.06	0.00
33.00	0.00	530	121.76	0.06	0.06	0.00
34.00	0.00	314	121.65	0.06	0.06	0.00
35.00	0.00	99	121.55	0.06	0.06	0.00
36.00	0.00	0	121.50	0.00	0.00	0.00
37.00	0.00	0	121.50	0.00	0.00	0.00
38.00	0.00	0	121.50	0.00	0.00	0.00
39.00	0.00	0	121.50	0.00	0.00	0.00
40.00	0.00	0	121.50	0.00	0.00	0.00
41.00	0.00	0	121.50	0.00	0.00	0.00
42.00	0.00	0	121.50	0.00	0.00	0.00
43.00	0.00	0	121.50	0.00	0.00	0.00
44.00	0.00	0	121.50	0.00	0.00	0.00
45.00	0.00	0	121.50	0.00	0.00	0.00
46.00	0.00	0	121.50	0.00	0.00	0.00
47.00	0.00	0	121.50	0.00	0.00	0.00
48.00	0.00	0	121.50	0.00	0.00	0.00

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**Stage-Discharge for Pond UG-2: Underground Infiltration System #1**

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)	Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
121.50	0.00	<b>0.00</b>	0.00	124.15	<b>6.64</b>	0.06	<b>6.57</b>
121.55	0.06	<b>0.06</b>	0.00				
121.60	0.06	0.06	0.00				
121.65	0.06	0.06	0.00				
121.70	0.06	0.06	0.00				
121.75	0.06	0.06	0.00				
121.80	0.06	0.06	0.00				
121.85	0.06	0.06	0.00				
121.90	0.06	0.06	0.00				
121.95	0.06	0.06	0.00				
122.00	0.06	0.06	0.00				
122.05	0.06	0.06	0.00				
122.10	0.06	0.06	0.00				
122.15	0.06	0.06	0.00				
122.20	0.06	0.06	0.00				
122.25	0.06	0.06	0.00				
122.30	0.06	0.06	0.00				
122.35	0.06	0.06	0.00				
122.40	0.06	0.06	0.00				
122.45	0.06	0.06	0.00				
122.50	0.06	0.06	0.00				
122.55	0.06	0.06	0.00				
122.60	0.06	0.06	0.00				
122.65	0.06	0.06	0.00				
122.70	0.21	0.06	0.15				
122.75	0.47	0.06	0.41				
122.80	0.81	0.06	0.75				
122.85	1.22	0.06	1.16				
122.90	1.67	0.06	1.61				
122.95	2.18	0.06	2.12				
123.00	2.72	0.06	2.66				
123.05	3.12	0.06	3.06				
123.10	3.35	0.06	3.29				
123.15	3.57	0.06	3.51				
123.20	3.80	0.06	3.74				
123.25	4.02	0.06	3.96				
123.30	4.23	0.06	4.17				
123.35	4.44	0.06	4.38				
123.40	4.63	0.06	4.57				
123.45	4.81	0.06	4.75				
123.50	4.98	0.06	4.92				
123.55	5.12	0.06	5.06				
123.60	5.23	0.06	5.17				
123.65	5.29	0.06	5.23				
123.70	5.26	0.06	5.20				
123.75	5.43	0.06	5.37				
123.80	5.59	0.06	5.53				
123.85	5.75	0.06	5.69				
123.90	5.91	0.06	5.85				
123.95	6.06	0.06	6.00				
124.00	6.21	0.06	6.15				
124.05	6.36	0.06	6.30				
124.10	6.50	0.06	6.44				

**Stage-Area-Storage for Pond UG-2: Underground Infiltration System #1**

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
121.50	<b>2,548</b>	0	124.15	2,548	<b>4,172</b>
121.55	2,548	103			
121.60	2,548	205			
121.65	2,548	308			
121.70	2,548	411			
121.75	2,548	514			
121.80	2,548	616			
121.85	2,548	719			
121.90	2,548	822			
121.95	2,548	924			
122.00	2,548	1,027			
122.05	2,548	1,130			
122.10	2,548	1,233			
122.15	2,548	1,335			
122.20	2,548	1,438			
122.25	2,548	1,541			
122.30	2,548	1,643			
122.35	2,548	1,746			
122.40	2,548	1,849			
122.45	2,548	1,952			
122.50	2,548	2,054			
122.55	2,548	2,157			
122.60	2,548	2,260			
122.65	2,548	2,362			
122.70	2,548	2,465			
122.75	2,548	2,568			
122.80	2,548	2,671			
122.85	2,548	2,773			
122.90	2,548	2,876			
122.95	2,548	2,979			
123.00	2,548	3,081			
123.05	2,548	3,184			
123.10	2,548	3,287			
123.15	2,548	3,390			
123.20	2,548	3,492			
123.25	2,548	3,595			
123.30	2,548	3,698			
123.35	2,548	3,800			
123.40	2,548	3,903			
123.45	2,548	4,006			
123.50	2,548	4,109			
123.55	2,548	4,113			
123.60	2,548	4,118			
123.65	2,548	4,123			
123.70	2,548	4,128			
123.75	2,548	4,133			
123.80	2,548	4,138			
123.85	2,548	4,143			
123.90	2,548	4,148			
123.95	2,548	4,152			
124.00	2,548	4,157			
124.05	2,548	4,162			
124.10	2,548	4,167			

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**Summary for Pond UG-3: Underground Infiltration System #2**

Inflow Area = 34,270 sf, 100.00% Impervious, Inflow Depth = 5.66" for 25-YR event  
 Inflow = 4.55 cfs @ 12.08 hrs, Volume= 16,170 cf  
 Outflow = 4.55 cfs @ 12.08 hrs, Volume= 16,170 cf, Atten= 0%, Lag= 0.1 min  
 Discarded = 0.05 cfs @ 5.20 hrs, Volume= 6,260 cf  
 Primary = 4.50 cfs @ 12.08 hrs, Volume= 9,909 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3  
 Peak Elev= 123.75' @ 12.08 hrs Surf.Area= 1,924 sf Storage= 3,109 cf

Plug-Flow detention time= 229.5 min calculated for 16,166 cf (100% of inflow)  
 Center-of-Mass det. time= 229.7 min ( 975.1 - 745.4 )

Volume	Invert	Avail.Storage	Storage Description
#1A	121.50'	209 cf	<b>26.00'W x 74.00'L x 2.67'H Field A</b> 5,131 cf Overall - 4,608 cf Embedded = 523 cf x 40.0% Voids
#2A	121.50'	2,932 cf	<b>retain_it retain_it 2.0' x 27 Inside #1</b> Inside= 84.0"W x 24.0"H => 13.78 sf x 8.00'L = 110.3 cf Outside= 96.0"W x 32.0"H => 21.33 sf x 8.00'L = 170.7 cf 3 Rows adjusted for 45.4 cf perimeter wall
3,141 cf			Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	121.50'	<b>1.020 in/hr Exfiltration over Surface area</b> Phase-In= 0.01'
#2	Device 3	121.50'	<b>18.0" Round Culvert</b> L= 70.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 121.50' / 121.50' S= 0.0000 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf
#3	Device 4	123.25'	<b>4.0' long Sharp-Crested Rectangular Weir</b> 2 End Contraction(s)
#4	Primary	122.02'	<b>15.0" Round Culvert</b> L= 60.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 122.02' / 121.70' S= 0.0053 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.23 sf

**Discarded OutFlow** Max=0.05 cfs @ 5.20 hrs HW=121.53' (Free Discharge)  
 ↑ 1=Exfiltration (Exfiltration Controls 0.05 cfs)

**Primary OutFlow** Max=4.49 cfs @ 12.08 hrs HW=123.75' TW=0.00' (Dynamic Tailwater)  
 ↑ 4=Culvert (Passes 4.49 cfs of 5.36 cfs potential flow)  
 ↑ 3=Sharp-Crested Rectangular Weir (Weir Controls 4.49 cfs @ 2.31 fps)  
 ↑ 2=Culvert (Passes 4.49 cfs of 4.74 cfs potential flow)

**Pond UG-3: Underground Infiltration System #2 - Chamber Wizard Field A****Chamber Model = retain\_it retain\_it 2.0' (retain-it®)**

Inside= 84.0"W x 24.0"H =&gt; 13.78 sf x 8.00'L = 110.3 cf

Outside= 96.0"W x 32.0"H =&gt; 21.33 sf x 8.00'L = 170.7 cf

3 Rows adjusted for 45.4 cf perimeter wall

9 Chambers/Row x 8.00' Long = 72.00' Row Length +12.0" End Stone x 2 = 74.00' Base Length

3 Rows x 96.0" Wide + 12.0" Side Stone x 2 = 26.00' Base Width

32.0" Chamber Height = 2.67' Field Height

1.9 cf Sidewall x 9 x 2 + 1.9 cf Endwall x 3 x 2 = 45.4 cf Perimeter Wall

27 Chambers x 110.3 cf - 45.4 cf Perimeter wall = 2,932.2 cf Chamber Storage

27 Chambers x 170.7 cf = 4,608.0 cf Displacement

5,130.7 cf Field - 4,608.0 cf Chambers = 522.7 cf Stone x 40.0% Voids = 209.1 cf Stone Storage

Chamber Storage + Stone Storage = 3,141.3 cf = 0.072 af

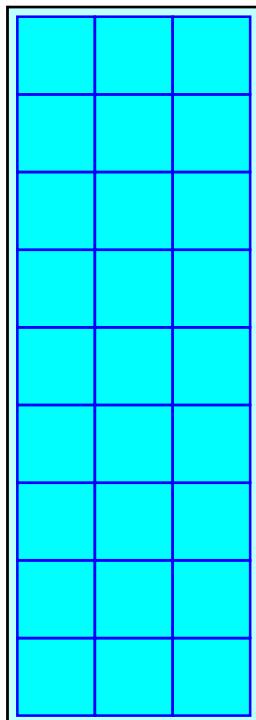
Overall Storage Efficiency = 61.2%

Overall System Size = 74.00' x 26.00' x 2.67'

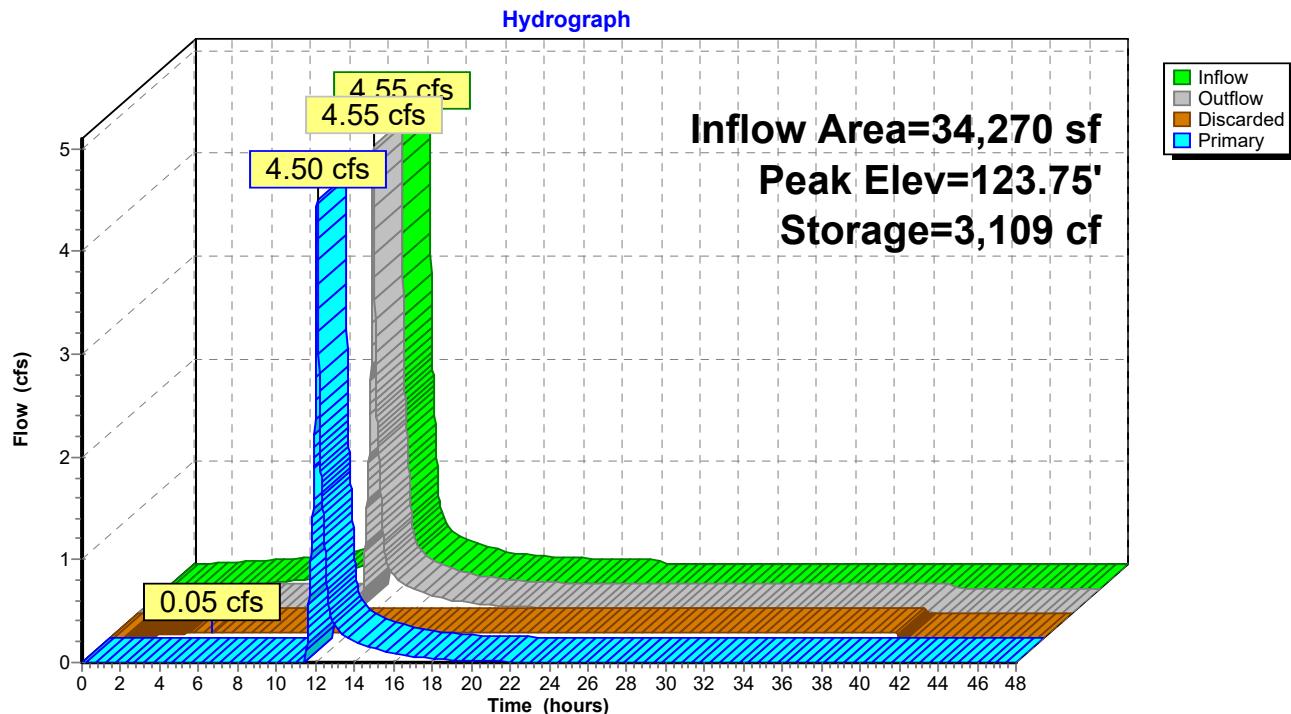
27 Chambers

190.0 cy Field

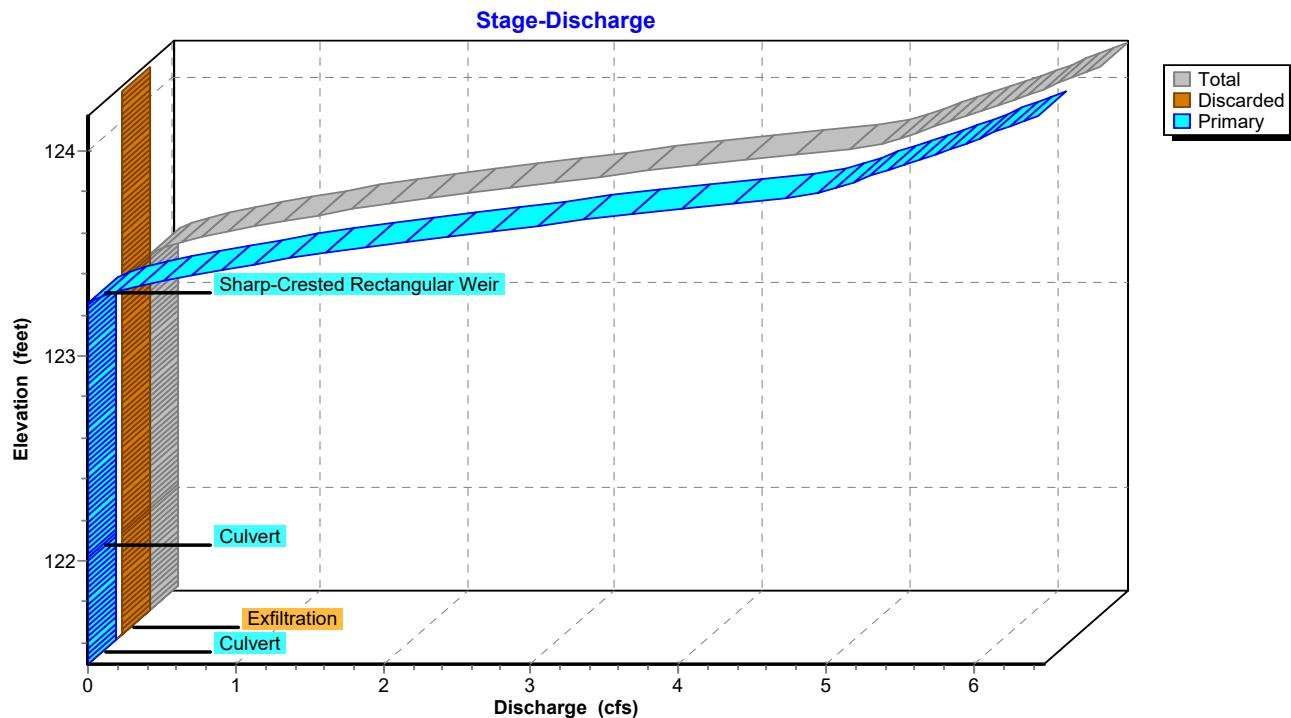
19.4 cy Stone



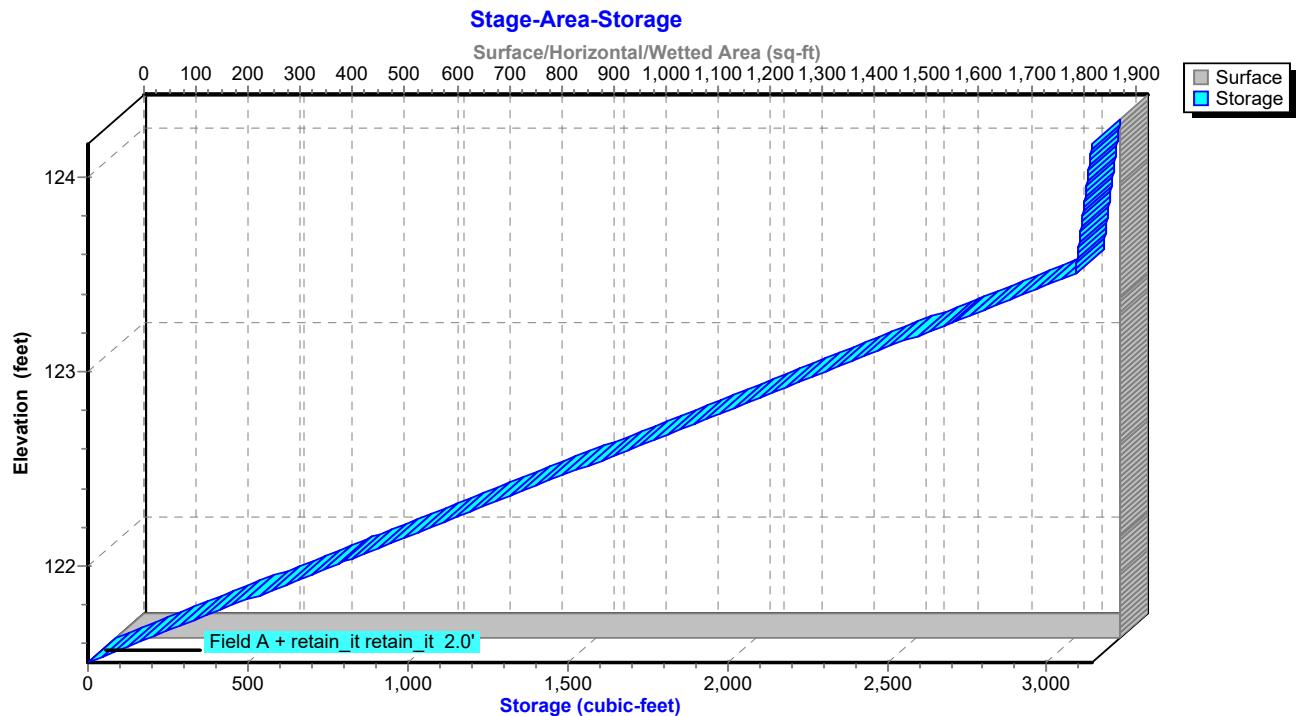
### Pond UG-3: Underground Infiltration System #2



### Pond UG-3: Underground Infiltration System #2



### Pond UG-3: Underground Infiltration System #2



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**Hydrograph for Pond UG-3: Underground Infiltration System #2**

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	121.50	0.00	0.00	0.00
1.00	0.01	1	121.50	0.00	0.00	0.00
2.00	0.02	7	121.50	0.02	0.02	0.00
3.00	0.03	11	121.51	0.03	0.03	0.00
4.00	0.05	15	121.51	0.04	0.04	0.00
5.00	0.06	34	121.52	0.05	<b>0.05</b>	0.00
6.00	0.07	87	121.56	0.05	<b>0.05</b>	0.00
7.00	0.09	196	121.63	0.05	0.05	0.00
8.00	0.11	392	121.75	0.05	0.05	0.00
9.00	0.16	720	121.97	0.05	0.05	0.00
10.00	0.22	1,244	122.31	0.05	0.05	0.00
11.00	0.33	2,051	122.83	0.05	0.05	0.00
12.00	<b>2.86</b>	<b>3,098</b>	<b>123.61</b>	<b>2.82</b>	0.05	<b>2.77</b>
13.00	<b>0.38</b>	<b>2,846</b>	<b>123.34</b>	<b>0.41</b>	0.05	<b>0.37</b>
14.00	0.24	2,799	123.31	0.25	0.05	0.20
15.00	0.18	2,778	123.30	0.19	0.05	0.14
16.00	0.13	2,758	123.29	0.13	0.05	0.09
17.00	0.10	2,745	123.28	0.10	0.05	0.06
18.00	0.08	2,733	123.27	0.08	0.05	0.04
19.00	0.07	2,726	123.27	0.07	0.05	0.02
20.00	0.06	2,722	123.26	0.06	0.05	0.02
21.00	0.06	2,717	123.26	0.06	0.05	0.01
22.00	0.05	2,713	123.26	0.05	0.05	0.01
23.00	0.05	2,707	123.25	0.05	0.05	0.00
24.00	0.04	2,696	123.25	0.05	0.05	0.00
25.00	0.00	2,546	123.15	0.05	0.05	0.00
26.00	0.00	2,383	123.04	0.05	0.05	0.00
27.00	0.00	2,219	122.94	0.05	0.05	0.00
28.00	0.00	2,055	122.83	0.05	0.05	0.00
29.00	0.00	1,892	122.72	0.05	0.05	0.00
30.00	0.00	1,728	122.62	0.05	0.05	0.00
31.00	0.00	1,565	122.51	0.05	0.05	0.00
32.00	0.00	1,401	122.41	0.05	0.05	0.00
33.00	0.00	1,238	122.30	0.05	0.05	0.00
34.00	0.00	1,074	122.20	0.05	0.05	0.00
35.00	0.00	911	122.09	0.05	0.05	0.00
36.00	0.00	747	121.98	0.05	0.05	0.00
37.00	0.00	584	121.88	0.05	0.05	0.00
38.00	0.00	420	121.77	0.05	0.05	0.00
39.00	0.00	257	121.67	0.05	0.05	0.00
40.00	0.00	93	121.56	0.05	0.05	0.00
41.00	0.00	0	121.50	0.00	0.00	0.00
42.00	0.00	0	121.50	0.00	0.00	0.00
43.00	0.00	0	121.50	0.00	0.00	0.00
44.00	0.00	0	121.50	0.00	0.00	0.00
45.00	0.00	0	121.50	0.00	0.00	0.00
46.00	0.00	0	121.50	0.00	0.00	0.00
47.00	0.00	0	121.50	0.00	0.00	0.00
48.00	0.00	0	121.50	0.00	0.00	0.00

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**Stage-Discharge for Pond UG-3: Underground Infiltration System #2**

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)	Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
121.50	0.00	<b>0.00</b>	0.00	124.15	<b>6.42</b>	0.05	<b>6.37</b>
121.55	0.05	<b>0.05</b>	0.00				
121.60	0.05	0.05	0.00				
121.65	0.05	0.05	0.00				
121.70	0.05	0.05	0.00				
121.75	0.05	0.05	0.00				
121.80	0.05	0.05	0.00				
121.85	0.05	0.05	0.00				
121.90	0.05	0.05	0.00				
121.95	0.05	0.05	0.00				
122.00	0.05	0.05	0.00				
122.05	0.05	0.05	0.00				
122.10	0.05	0.05	0.00				
122.15	0.05	0.05	0.00				
122.20	0.05	0.05	0.00				
122.25	0.05	0.05	0.00				
122.30	0.05	0.05	0.00				
122.35	0.05	0.05	0.00				
122.40	0.05	0.05	0.00				
122.45	0.05	0.05	0.00				
122.50	0.05	0.05	0.00				
122.55	0.05	0.05	0.00				
122.60	0.05	0.05	0.00				
122.65	0.05	0.05	0.00				
122.70	0.05	0.05	0.00				
122.75	0.05	0.05	0.00				
122.80	0.05	0.05	0.00				
122.85	0.05	0.05	0.00				
122.90	0.05	0.05	0.00				
122.95	0.05	0.05	0.00				
123.00	0.05	0.05	0.00				
123.05	0.05	0.05	0.00				
123.10	0.05	0.05	0.00				
123.15	0.05	0.05	0.00				
123.20	0.05	0.05	0.00				
123.25	0.05	0.05	0.00				
123.30	0.19	0.05	0.15				
123.35	0.46	0.05	0.41				
123.40	0.80	0.05	0.75				
123.45	1.20	0.05	1.16				
123.50	1.66	0.05	1.61				
123.55	2.16	0.05	2.12				
123.60	2.71	0.05	2.66				
123.65	3.29	0.05	3.24				
123.70	3.91	0.05	3.86				
123.75	4.55	0.05	4.51				
123.80	5.03	0.05	4.98				
123.85	5.25	0.05	5.20				
123.90	5.46	0.05	5.42				
123.95	5.67	0.05	5.62				
124.00	5.86	0.05	5.82				
124.05	6.05	0.05	6.01				
124.10	6.24	0.05	6.19				

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**Stage-Area-Storage for Pond UG-3: Underground Infiltration System #2**

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
121.50	<b>1,924</b>	0	124.15	1,924	<b>3,140</b>
121.55	1,924	77			
121.60	1,924	154			
121.65	1,924	232			
121.70	1,924	309			
121.75	1,924	386			
121.80	1,924	463			
121.85	1,924	541			
121.90	1,924	618			
121.95	1,924	695			
122.00	1,924	772			
122.05	1,924	849			
122.10	1,924	927			
122.15	1,924	1,004			
122.20	1,924	1,081			
122.25	1,924	1,158			
122.30	1,924	1,236			
122.35	1,924	1,313			
122.40	1,924	1,390			
122.45	1,924	1,467			
122.50	1,924	1,544			
122.55	1,924	1,622			
122.60	1,924	1,699			
122.65	1,924	1,776			
122.70	1,924	1,853			
122.75	1,924	1,931			
122.80	1,924	2,008			
122.85	1,924	2,085			
122.90	1,924	2,162			
122.95	1,924	2,240			
123.00	1,924	2,317			
123.05	1,924	2,394			
123.10	1,924	2,471			
123.15	1,924	2,548			
123.20	1,924	2,626			
123.25	1,924	2,703			
123.30	1,924	2,780			
123.35	1,924	2,857			
123.40	1,924	2,935			
123.45	1,924	3,012			
123.50	1,924	3,089			
123.55	1,924	3,093			
123.60	1,924	3,097			
123.65	1,924	3,101			
123.70	1,924	3,105			
123.75	1,924	3,109			
123.80	1,924	3,113			
123.85	1,924	3,116			
123.90	1,924	3,120			
123.95	1,924	3,124			
124.00	1,924	3,128			
124.05	1,924	3,132			
124.10	1,924	3,136			

**Proposed HydroCAD 533 Boston Post Road**

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Type III 24-hr 100-YR Rainfall=8.37"

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Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

<b>Subcatchment P-1A: Subcatchment to</b>	Runoff Area=13,425 sf 66.59% Impervious Runoff Depth=6.57" Tc=6.0 min CN=85 Runoff=2.28 cfs 7,351 cf
<b>Subcatchment P-1B: Subcatchment to</b>	Runoff Area=33,268 sf 68.13% Impervious Runoff Depth=6.69" Tc=6.0 min CN=86 Runoff=5.73 cfs 18,548 cf
<b>Subcatchment P-1C: Subcatchment to</b>	Runoff Area=29,201 sf 66.54% Impervious Runoff Depth=6.69" Tc=6.0 min CN=86 Runoff=5.03 cfs 16,281 cf
<b>Subcatchment P-1D: Subcatchment to</b>	Runoff Area=13,403 sf 58.36% Impervious Runoff Depth=6.21" Tc=6.0 min CN=82 Runoff=2.18 cfs 6,938 cf
<b>Subcatchment P-1U: Undetained to Wetlands</b>	Runoff Area=8,300 sf 0.00% Impervious Runoff Depth=3.04" Tc=6.0 min CN=55 Runoff=0.66 cfs 2,103 cf
<b>Subcatchment P-B1: Roof Runoff to</b>	Runoff Area=34,270 sf 100.00% Impervious Runoff Depth=8.13" Tc=6.0 min CN=98 Runoff=6.47 cfs 23,218 cf
<b>Reach 1R: (new Reach)</b>	Inflow=18.62 cfs 54,837 cf Outflow=18.62 cfs 54,837 cf
<b>Pond IB-1: Infiltration Basin #1</b>	Peak Elev=124.16' Storage=1,036 cf Inflow=2.28 cfs 7,351 cf Discarded=0.02 cfs 1,839 cf Primary=2.18 cfs 5,512 cf Outflow=2.20 cfs 7,351 cf
<b>Pond IB-2: Infiltration Basin #2</b>	Peak Elev=124.06' Storage=3,268 cf Inflow=5.73 cfs 18,548 cf Discarded=0.06 cfs 4,892 cf Primary=5.05 cfs 13,656 cf Outflow=5.11 cfs 18,548 cf
<b>Pond UG-1: Underground Detention System #1</b>	Peak Elev=123.66' Storage=757 cf Inflow=2.18 cfs 6,938 cf 15.0" Round Culvert n=0.012 L=140.0' S=0.0064 '/' Outflow=1.67 cfs 6,936 cf
<b>Pond UG-2: Underground Infiltration</b>	Peak Elev=123.51' Storage=4,110 cf Inflow=6.60 cfs 23,217 cf Discarded=0.06 cfs 6,432 cf Primary=4.95 cfs 16,785 cf Outflow=5.01 cfs 23,217 cf
<b>Pond UG-3: Underground Infiltration</b>	Peak Elev=124.16' Storage=3,141 cf Inflow=6.47 cfs 23,218 cf Discarded=0.05 cfs 6,436 cf Primary=6.40 cfs 16,781 cf Outflow=6.45 cfs 23,218 cf
<b>Total Runoff Area = 131,867 sf Runoff Volume = 74,439 cf Average Runoff Depth = 6.77"</b>	
<b>29.38% Pervious = 38,739 sf 70.62% Impervious = 93,128 sf</b>	

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Type III 24-hr 100-YR Rainfall=8.37"

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**Summary for Subcatchment P-1A: Subcatchment to Infiltration Basin #1**

Runoff = 2.28 cfs @ 12.08 hrs, Volume= 7,351 cf, Depth= 6.57"

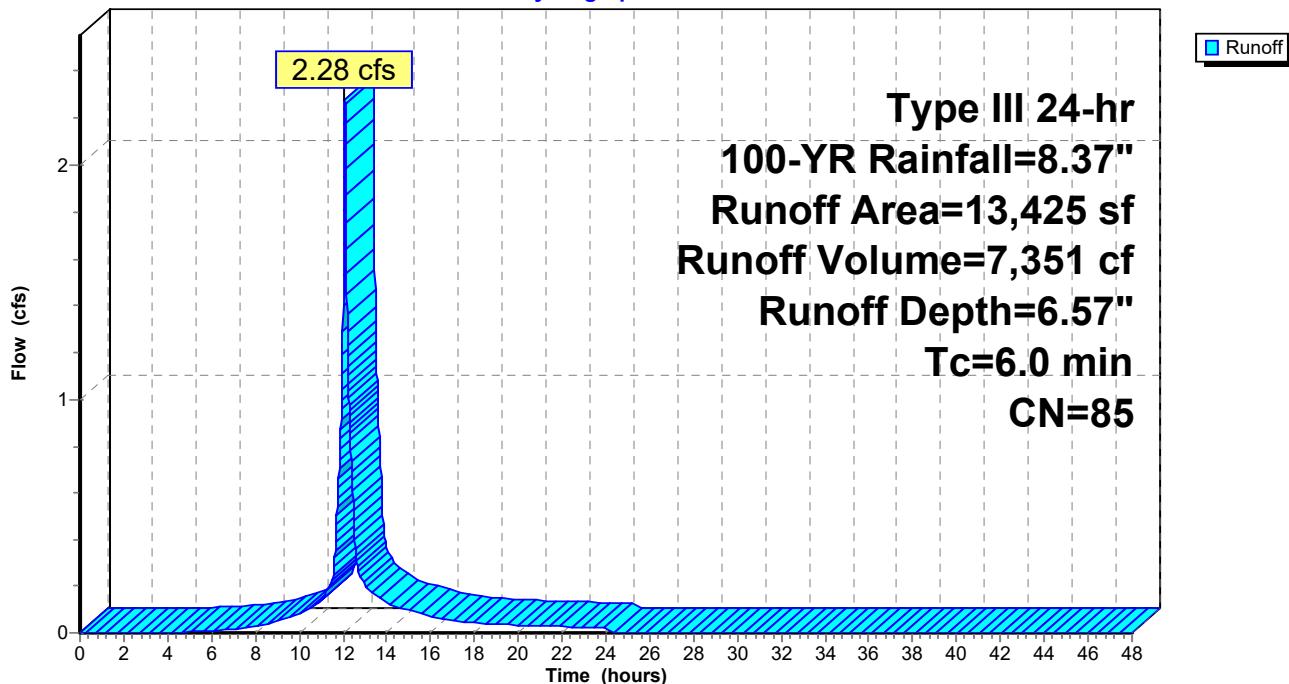
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
Type III 24-hr 100-YR Rainfall=8.37"

Area (sf)	CN	Description
8,940	98	Paved parking, HSG B
4,110	61	>75% Grass cover, Good, HSG B
375	55	Woods, Good, HSG B
13,425	85	Weighted Average
4,485		33.41% Pervious Area
8,940		66.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0				<b>Direct Entry, Direct</b>	
5.0	0			Total, Increased to minimum Tc = 6.0 min	

**Subcatchment P-1A: Subcatchment to Infiltration Basin #1**

Hydrograph



**Proposed HydroCAD 533 Boston Post Road**

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Type III 24-hr 100-YR Rainfall=8.37"

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**Hydrograph for Subcatchment P-1A: Subcatchment to Infiltration Basin #1**

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.50	8.37	6.57	0.00
0.50	0.04	0.00	0.00	27.00	8.37	6.57	0.00
1.00	0.08	0.00	0.00	27.50	8.37	6.57	0.00
1.50	0.13	0.00	0.00	28.00	8.37	6.57	0.00
2.00	0.17	0.00	0.00	28.50	8.37	6.57	0.00
2.50	0.21	0.00	0.00	29.00	8.37	6.57	0.00
3.00	0.26	0.00	0.00	29.50	8.37	6.57	0.00
3.50	0.31	0.00	0.00	30.00	8.37	6.57	0.00
4.00	0.36	0.00	0.00	30.50	8.37	6.57	0.00
4.50	0.42	0.00	0.00	31.00	8.37	6.57	0.00
5.00	0.47	0.01	0.00	31.50	8.37	6.57	0.00
5.50	0.54	0.02	0.01	32.00	8.37	6.57	0.00
6.00	0.60	0.03	0.01	32.50	8.37	6.57	0.00
6.50	0.67	0.05	0.01	33.00	8.37	6.57	0.00
7.00	0.76	0.08	0.02	33.50	8.37	6.57	0.00
7.50	0.85	0.11	0.02	34.00	8.37	6.57	0.00
8.00	0.95	0.15	0.03	34.50	8.37	6.57	0.00
8.50	1.08	0.21	0.04	35.00	8.37	6.57	0.00
9.00	1.22	0.29	0.05	35.50	8.37	6.57	0.00
9.50	1.39	0.38	0.07	36.00	8.37	6.57	0.00
10.00	1.58	0.50	0.08	36.50	8.37	6.57	0.00
10.50	1.81	0.66	0.11	37.00	8.37	6.57	0.00
11.00	2.09	0.86	0.14	37.50	8.37	6.57	0.00
11.50	2.49	1.17	0.23	38.00	8.37	6.57	0.00
12.00	4.18	2.62	<b>1.40</b>	38.50	8.37	6.57	0.00
12.50	5.88	4.19	<b>0.49</b>	39.00	8.37	6.57	0.00
13.00	6.28	4.56	0.20	39.50	8.37	6.57	0.00
13.50	6.56	4.83	0.16	40.00	8.37	6.57	0.00
14.00	6.79	5.05	0.13	40.50	8.37	6.57	0.00
14.50	6.98	5.23	0.11	41.00	8.37	6.57	0.00
15.00	7.15	5.40	0.10	41.50	8.37	6.57	0.00
15.50	7.29	5.54	0.08	42.00	8.37	6.57	0.00
16.00	7.42	5.65	0.07	42.50	8.37	6.57	0.00
16.50	7.52	5.75	0.06	43.00	8.37	6.57	0.00
17.00	7.61	5.84	0.05	43.50	8.37	6.57	0.00
17.50	7.70	5.92	0.05	44.00	8.37	6.57	0.00
18.00	7.77	5.99	0.04	44.50	8.37	6.57	0.00
18.50	7.83	6.05	0.04	45.00	8.37	6.57	0.00
19.00	7.90	6.11	0.04	45.50	8.37	6.57	0.00
19.50	7.95	6.17	0.03	46.00	8.37	6.57	0.00
20.00	8.01	6.22	0.03	46.50	8.37	6.57	0.00
20.50	8.06	6.27	0.03	47.00	8.37	6.57	0.00
21.00	8.11	6.32	0.03	47.50	8.37	6.57	0.00
21.50	8.16	6.37	0.03	48.00	8.37	6.57	0.00
22.00	8.21	6.41	0.03				
22.50	8.25	6.46	0.03				
23.00	8.29	6.50	0.02				
23.50	8.33	6.54	0.02				
24.00	<b>8.37</b>	<b>6.57</b>	0.02				
24.50	8.37	6.57	0.00				
25.00	8.37	6.57	0.00				
25.50	8.37	6.57	0.00				
26.00	8.37	6.57	0.00				

**Summary for Subcatchment P-1B: Subcatchment to Infiltration Basin #2**

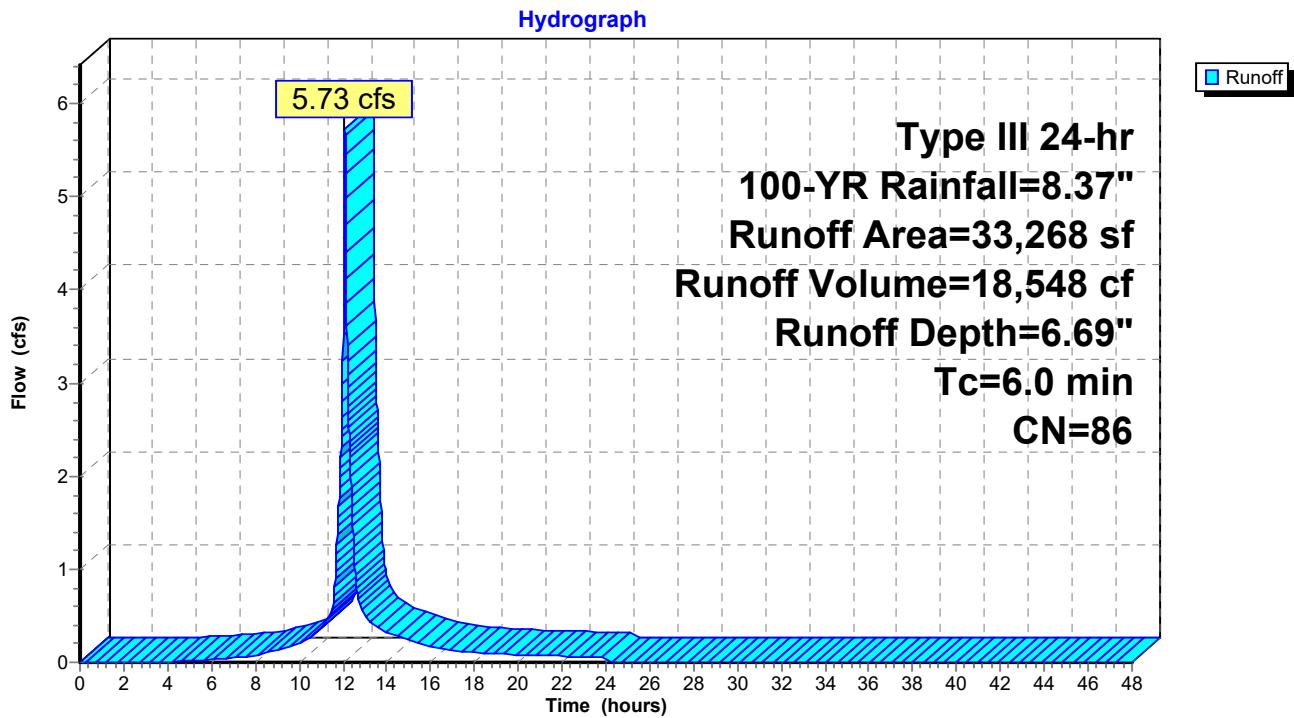
Runoff = 5.73 cfs @ 12.08 hrs, Volume= 18,548 cf, Depth= 6.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
Type III 24-hr 100-YR Rainfall=8.37"

Area (sf)	CN	Description
22,665	98	Paved parking, HSG B
10,603	61	>75% Grass cover, Good, HSG B
33,268	86	Weighted Average
10,603		31.87% Pervious Area
22,665		68.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0				<b>Direct Entry, Direct Entry</b>	
5.0	0			Total, Increased to minimum Tc = 6.0 min	

**Subcatchment P-1B: Subcatchment to Infiltration Basin #2**

**Proposed HydroCAD 533 Boston Post Road**

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Type III 24-hr 100-YR Rainfall=8.37"

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**Hydrograph for Subcatchment P-1B: Subcatchment to Infiltration Basin #2**

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.50	8.37	6.69	0.00
0.50	0.04	0.00	0.00	27.00	8.37	6.69	0.00
1.00	0.08	0.00	0.00	27.50	8.37	6.69	0.00
1.50	0.13	0.00	0.00	28.00	8.37	6.69	0.00
2.00	0.17	0.00	0.00	28.50	8.37	6.69	0.00
2.50	0.21	0.00	0.00	29.00	8.37	6.69	0.00
3.00	0.26	0.00	0.00	29.50	8.37	6.69	0.00
3.50	0.31	0.00	0.00	30.00	8.37	6.69	0.00
4.00	0.36	0.00	0.00	30.50	8.37	6.69	0.00
4.50	0.42	0.00	0.01	31.00	8.37	6.69	0.00
5.00	0.47	0.01	0.01	31.50	8.37	6.69	0.00
5.50	0.54	0.02	0.02	32.00	8.37	6.69	0.00
6.00	0.60	0.04	0.03	32.50	8.37	6.69	0.00
6.50	0.67	0.06	0.04	33.00	8.37	6.69	0.00
7.00	0.76	0.09	0.05	33.50	8.37	6.69	0.00
7.50	0.85	0.13	0.06	34.00	8.37	6.69	0.00
8.00	0.95	0.18	0.08	34.50	8.37	6.69	0.00
8.50	1.08	0.24	0.10	35.00	8.37	6.69	0.00
9.00	1.22	0.32	0.13	35.50	8.37	6.69	0.00
9.50	1.39	0.42	0.17	36.00	8.37	6.69	0.00
10.00	1.58	0.55	0.21	36.50	8.37	6.69	0.00
10.50	1.81	0.71	0.27	37.00	8.37	6.69	0.00
11.00	2.09	0.92	0.35	37.50	8.37	6.69	0.00
11.50	2.49	1.24	0.58	38.00	8.37	6.69	0.00
12.00	4.18	2.71	<b>3.53</b>	38.50	8.37	6.69	0.00
12.50	5.88	4.29	<b>1.22</b>	39.00	8.37	6.69	0.00
13.00	6.28	4.67	0.50	39.50	8.37	6.69	0.00
13.50	6.56	4.94	0.39	40.00	8.37	6.69	0.00
14.00	6.79	5.16	0.32	40.50	8.37	6.69	0.00
14.50	6.98	5.35	0.27	41.00	8.37	6.69	0.00
15.00	7.15	5.51	0.24	41.50	8.37	6.69	0.00
15.50	7.29	5.65	0.20	42.00	8.37	6.69	0.00
16.00	7.42	5.77	0.17	42.50	8.37	6.69	0.00
16.50	7.52	5.87	0.15	43.00	8.37	6.69	0.00
17.00	7.61	5.96	0.13	43.50	8.37	6.69	0.00
17.50	7.70	6.04	0.12	44.00	8.37	6.69	0.00
18.00	7.77	6.11	0.10	44.50	8.37	6.69	0.00
18.50	7.83	6.17	0.10	45.00	8.37	6.69	0.00
19.00	7.90	6.23	0.09	45.50	8.37	6.69	0.00
19.50	7.95	6.29	0.09	46.00	8.37	6.69	0.00
20.00	8.01	6.34	0.08	46.50	8.37	6.69	0.00
20.50	8.06	6.39	0.08	47.00	8.37	6.69	0.00
21.00	8.11	6.44	0.07	47.50	8.37	6.69	0.00
21.50	8.16	6.49	0.07	48.00	8.37	6.69	0.00
22.00	8.21	6.53	0.07				
22.50	8.25	6.58	0.06				
23.00	8.29	6.62	0.06				
23.50	8.33	6.65	0.06				
24.00	<b>8.37</b>	<b>6.69</b>	0.05				
24.50	8.37	6.69	0.00				
25.00	8.37	6.69	0.00				
25.50	8.37	6.69	0.00				
26.00	8.37	6.69	0.00				

**Proposed HydroCAD 533 Boston Post Road**

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Type III 24-hr 100-YR Rainfall=8.37"

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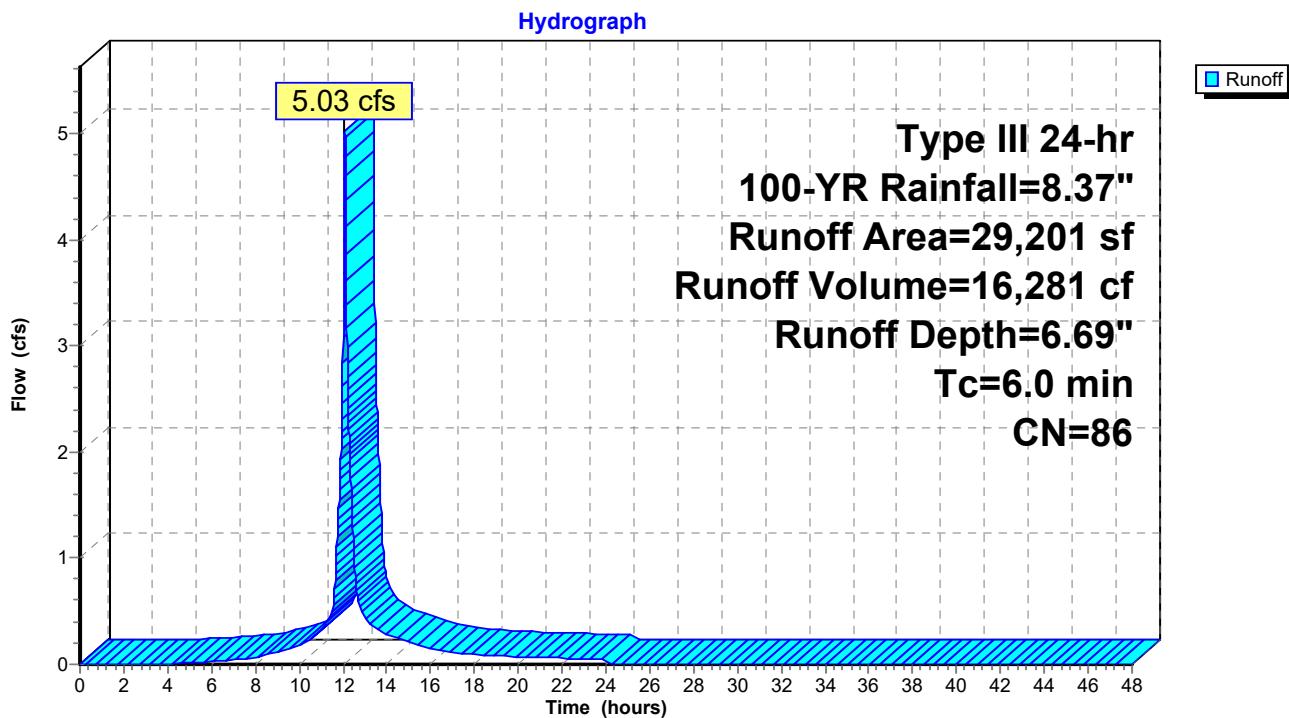
**Summary for Subcatchment P-1C: Subcatchment to Infiltration Trench #2**

Runoff = 5.03 cfs @ 12.08 hrs, Volume= 16,281 cf, Depth= 6.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
Type III 24-hr 100-YR Rainfall=8.37"

Area (sf)	CN	Description
19,431	98	Paved parking, HSG B
9,770	61	>75% Grass cover, Good, HSG B

Tc	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Direct Entry
5.0	0				Total, Increased to minimum Tc = 6.0 min

**Subcatchment P-1C: Subcatchment to Infiltration Trench #2**

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Type III 24-hr 100-YR Rainfall=8.37"

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**Hydrograph for Subcatchment P-1C: Subcatchment to Infiltration Trench #2**

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.50	8.37	6.69	0.00
0.50	0.04	0.00	0.00	27.00	8.37	6.69	0.00
1.00	0.08	0.00	0.00	27.50	8.37	6.69	0.00
1.50	0.13	0.00	0.00	28.00	8.37	6.69	0.00
2.00	0.17	0.00	0.00	28.50	8.37	6.69	0.00
2.50	0.21	0.00	0.00	29.00	8.37	6.69	0.00
3.00	0.26	0.00	0.00	29.50	8.37	6.69	0.00
3.50	0.31	0.00	0.00	30.00	8.37	6.69	0.00
4.00	0.36	0.00	0.00	30.50	8.37	6.69	0.00
4.50	0.42	0.00	0.01	31.00	8.37	6.69	0.00
5.00	0.47	0.01	0.01	31.50	8.37	6.69	0.00
5.50	0.54	0.02	0.02	32.00	8.37	6.69	0.00
6.00	0.60	0.04	0.02	32.50	8.37	6.69	0.00
6.50	0.67	0.06	0.03	33.00	8.37	6.69	0.00
7.00	0.76	0.09	0.04	33.50	8.37	6.69	0.00
7.50	0.85	0.13	0.05	34.00	8.37	6.69	0.00
8.00	0.95	0.18	0.07	34.50	8.37	6.69	0.00
8.50	1.08	0.24	0.09	35.00	8.37	6.69	0.00
9.00	1.22	0.32	0.12	35.50	8.37	6.69	0.00
9.50	1.39	0.42	0.15	36.00	8.37	6.69	0.00
10.00	1.58	0.55	0.18	36.50	8.37	6.69	0.00
10.50	1.81	0.71	0.24	37.00	8.37	6.69	0.00
11.00	2.09	0.92	0.31	37.50	8.37	6.69	0.00
11.50	2.49	1.24	0.50	38.00	8.37	6.69	0.00
12.00	4.18	2.71	<b>3.10</b>	38.50	8.37	6.69	0.00
12.50	5.88	4.29	<b>1.07</b>	39.00	8.37	6.69	0.00
13.00	6.28	4.67	0.44	39.50	8.37	6.69	0.00
13.50	6.56	4.94	0.34	40.00	8.37	6.69	0.00
14.00	6.79	5.16	0.28	40.50	8.37	6.69	0.00
14.50	6.98	5.35	0.24	41.00	8.37	6.69	0.00
15.00	7.15	5.51	0.21	41.50	8.37	6.69	0.00
15.50	7.29	5.65	0.18	42.00	8.37	6.69	0.00
16.00	7.42	5.77	0.15	42.50	8.37	6.69	0.00
16.50	7.52	5.87	0.13	43.00	8.37	6.69	0.00
17.00	7.61	5.96	0.12	43.50	8.37	6.69	0.00
17.50	7.70	6.04	0.10	44.00	8.37	6.69	0.00
18.00	7.77	6.11	0.09	44.50	8.37	6.69	0.00
18.50	7.83	6.17	0.08	45.00	8.37	6.69	0.00
19.00	7.90	6.23	0.08	45.50	8.37	6.69	0.00
19.50	7.95	6.29	0.08	46.00	8.37	6.69	0.00
20.00	8.01	6.34	0.07	46.50	8.37	6.69	0.00
20.50	8.06	6.39	0.07	47.00	8.37	6.69	0.00
21.00	8.11	6.44	0.07	47.50	8.37	6.69	0.00
21.50	8.16	6.49	0.06	48.00	8.37	6.69	0.00
22.00	8.21	6.53	0.06				
22.50	8.25	6.58	0.06				
23.00	8.29	6.62	0.05				
23.50	8.33	6.65	0.05				
24.00	<b>8.37</b>	<b>6.69</b>	0.05				
24.50	8.37	6.69	0.00				
25.00	8.37	6.69	0.00				
25.50	8.37	6.69	0.00				
26.00	8.37	6.69	0.00				

**Proposed HydroCAD 533 Boston Post Road**

Prepared by {enter your company name here}

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Type III 24-hr 100-YR Rainfall=8.37"

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**Summary for Subcatchment P-1D: Subcatchment to Infiltration Trench 1**

Runoff = 2.18 cfs @ 12.09 hrs, Volume= 6,938 cf, Depth= 6.21"

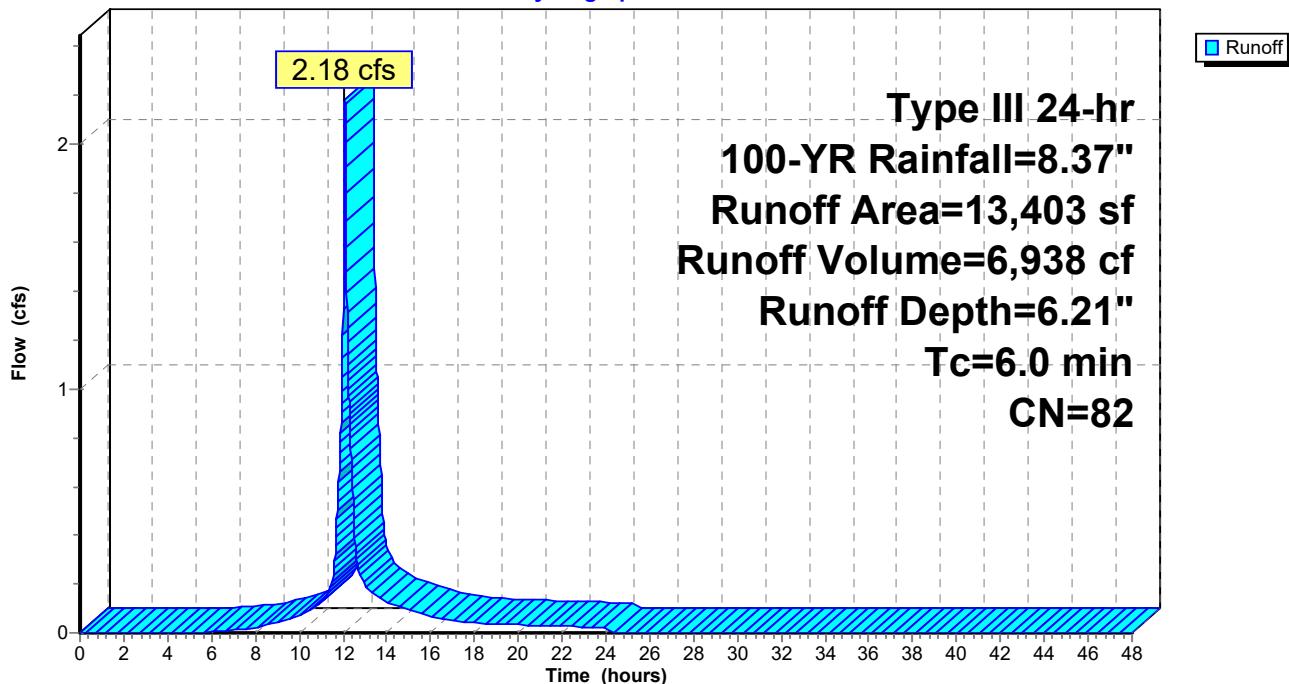
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
Type III 24-hr 100-YR Rainfall=8.37"

Area (sf)	CN	Description
7,822	98	Paved parking, HSG B
2,453	61	>75% Grass cover, Good, HSG B
3,128	60	Woods, Fair, HSG B
13,403	82	Weighted Average
5,581		41.64% Pervious Area
7,822		58.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					<b>Direct Entry, Direct Entry</b>
5.0	0				Total, Increased to minimum Tc = 6.0 min

**Subcatchment P-1D: Subcatchment to Infiltration Trench 1**

Hydrograph



**Proposed HydroCAD 533 Boston Post Road**

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Type III 24-hr 100-YR Rainfall=8.37"

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**Hydrograph for Subcatchment P-1D: Subcatchment to Infiltration Trench 1**

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.50	8.37	6.21	0.00
0.50	0.04	0.00	0.00	27.00	8.37	6.21	0.00
1.00	0.08	0.00	0.00	27.50	8.37	6.21	0.00
1.50	0.13	0.00	0.00	28.00	8.37	6.21	0.00
2.00	0.17	0.00	0.00	28.50	8.37	6.21	0.00
2.50	0.21	0.00	0.00	29.00	8.37	6.21	0.00
3.00	0.26	0.00	0.00	29.50	8.37	6.21	0.00
3.50	0.31	0.00	0.00	30.00	8.37	6.21	0.00
4.00	0.36	0.00	0.00	30.50	8.37	6.21	0.00
4.50	0.42	0.00	0.00	31.00	8.37	6.21	0.00
5.00	0.47	0.00	0.00	31.50	8.37	6.21	0.00
5.50	0.54	0.00	0.00	32.00	8.37	6.21	0.00
6.00	0.60	0.01	0.01	32.50	8.37	6.21	0.00
6.50	0.67	0.02	0.01	33.00	8.37	6.21	0.00
7.00	0.76	0.04	0.01	33.50	8.37	6.21	0.00
7.50	0.85	0.06	0.02	34.00	8.37	6.21	0.00
8.00	0.95	0.10	0.02	34.50	8.37	6.21	0.00
8.50	1.08	0.14	0.03	35.00	8.37	6.21	0.00
9.00	1.22	0.20	0.04	35.50	8.37	6.21	0.00
9.50	1.39	0.29	0.06	36.00	8.37	6.21	0.00
10.00	1.58	0.39	0.07	36.50	8.37	6.21	0.00
10.50	1.81	0.53	0.09	37.00	8.37	6.21	0.00
11.00	2.09	0.71	0.12	37.50	8.37	6.21	0.00
11.50	2.49	0.99	0.21	38.00	8.37	6.21	0.00
12.00	4.18	2.36	<b>1.33</b>	38.50	8.37	6.21	0.00
12.50	5.88	3.87	<b>0.48</b>	39.00	8.37	6.21	0.00
13.00	6.28	4.24	0.20	39.50	8.37	6.21	0.00
13.50	6.56	4.50	0.15	40.00	8.37	6.21	0.00
14.00	6.79	4.72	0.12	40.50	8.37	6.21	0.00
14.50	6.98	4.90	0.11	41.00	8.37	6.21	0.00
15.00	7.15	5.06	0.09	41.50	8.37	6.21	0.00
15.50	7.29	5.19	0.08	42.00	8.37	6.21	0.00
16.00	7.42	5.31	0.07	42.50	8.37	6.21	0.00
16.50	7.52	5.40	0.06	43.00	8.37	6.21	0.00
17.00	7.61	5.49	0.05	43.50	8.37	6.21	0.00
17.50	7.70	5.57	0.05	44.00	8.37	6.21	0.00
18.00	7.77	5.64	0.04	44.50	8.37	6.21	0.00
18.50	7.83	5.70	0.04	45.00	8.37	6.21	0.00
19.00	7.90	5.76	0.04	45.50	8.37	6.21	0.00
19.50	7.95	5.82	0.03	46.00	8.37	6.21	0.00
20.00	8.01	5.87	0.03	46.50	8.37	6.21	0.00
20.50	8.06	5.92	0.03	47.00	8.37	6.21	0.00
21.00	8.11	5.97	0.03	47.50	8.37	6.21	0.00
21.50	8.16	6.01	0.03	48.00	8.37	6.21	0.00
22.00	8.21	6.06	0.03				
22.50	8.25	6.10	0.03				
23.00	8.29	6.14	0.02				
23.50	8.33	6.18	0.02				
24.00	<b>8.37</b>	<b>6.21</b>	0.02				
24.50	8.37	6.21	0.00				
25.00	8.37	6.21	0.00				
25.50	8.37	6.21	0.00				
26.00	8.37	6.21	0.00				

### Summary for Subcatchment P-1U: Undetained to Wetlands

Runoff = 0.66 cfs @ 12.09 hrs, Volume= 2,103 cf, Depth= 3.04"

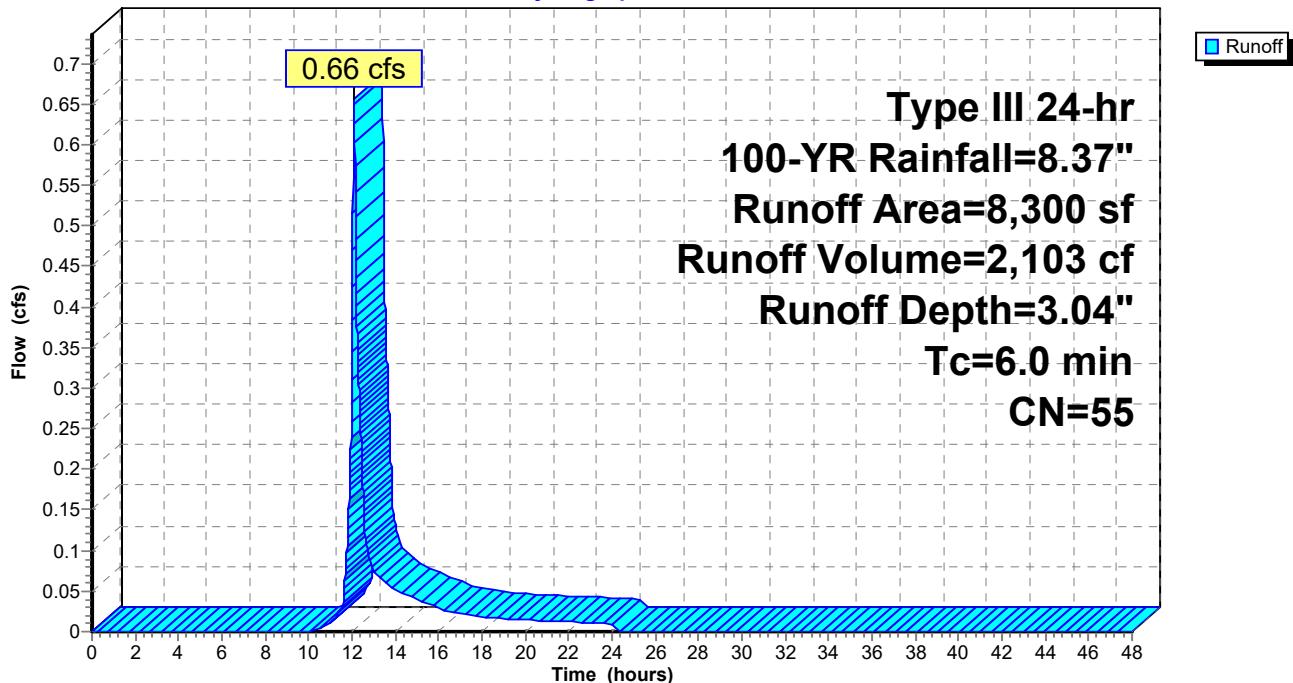
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 100-YR Rainfall=8.37"

Area (sf)	CN	Description
8,300	55	Woods, Good, HSG B
8,300		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0				<b>Direct Entry, Direct Entry</b>	
5.0	0			Total, Increased to minimum Tc = 6.0 min	

### Subcatchment P-1U: Undetained to Wetlands

**Hydrograph**



**Proposed HydroCAD 533 Boston Post Road**

Prepared by {enter your company name here}

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Type III 24-hr 100-YR Rainfall=8.37"

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**Hydrograph for Subcatchment P-1U: Undetained to Wetlands**

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.50	8.37	3.04	0.00
0.50	0.04	0.00	0.00	27.00	8.37	3.04	0.00
1.00	0.08	0.00	0.00	27.50	8.37	3.04	0.00
1.50	0.13	0.00	0.00	28.00	8.37	3.04	0.00
2.00	0.17	0.00	0.00	28.50	8.37	3.04	0.00
2.50	0.21	0.00	0.00	29.00	8.37	3.04	0.00
3.00	0.26	0.00	0.00	29.50	8.37	3.04	0.00
3.50	0.31	0.00	0.00	30.00	8.37	3.04	0.00
4.00	0.36	0.00	0.00	30.50	8.37	3.04	0.00
4.50	0.42	0.00	0.00	31.00	8.37	3.04	0.00
5.00	0.47	0.00	0.00	31.50	8.37	3.04	0.00
5.50	0.54	0.00	0.00	32.00	8.37	3.04	0.00
6.00	0.60	0.00	0.00	32.50	8.37	3.04	0.00
6.50	0.67	0.00	0.00	33.00	8.37	3.04	0.00
7.00	0.76	0.00	0.00	33.50	8.37	3.04	0.00
7.50	0.85	0.00	0.00	34.00	8.37	3.04	0.00
8.00	0.95	0.00	0.00	34.50	8.37	3.04	0.00
8.50	1.08	0.00	0.00	35.00	8.37	3.04	0.00
9.00	1.22	0.00	0.00	35.50	8.37	3.04	0.00
9.50	1.39	0.00	0.00	36.00	8.37	3.04	0.00
10.00	1.58	0.00	0.00	36.50	8.37	3.04	0.00
10.50	1.81	0.00	0.00	37.00	8.37	3.04	0.00
11.00	2.09	0.02	0.01	37.50	8.37	3.04	0.00
11.50	2.49	0.08	0.03	38.00	8.37	3.04	0.00
12.00	4.18	0.61	<b>0.35</b>	38.50	8.37	3.04	0.00
12.50	5.88	1.45	<b>0.18</b>	39.00	8.37	3.04	0.00
13.00	6.28	1.68	0.08	39.50	8.37	3.04	0.00
13.50	6.56	1.85	0.06	40.00	8.37	3.04	0.00
14.00	6.79	1.99	0.05	40.50	8.37	3.04	0.00
14.50	6.98	2.11	0.05	41.00	8.37	3.04	0.00
15.00	7.15	2.22	0.04	41.50	8.37	3.04	0.00
15.50	7.29	2.31	0.03	42.00	8.37	3.04	0.00
16.00	7.42	2.39	0.03	42.50	8.37	3.04	0.00
16.50	7.52	2.46	0.03	43.00	8.37	3.04	0.00
17.00	7.61	2.52	0.02	43.50	8.37	3.04	0.00
17.50	7.70	2.58	0.02	44.00	8.37	3.04	0.00
18.00	7.77	2.63	0.02	44.50	8.37	3.04	0.00
18.50	7.83	2.67	0.02	45.00	8.37	3.04	0.00
19.00	7.90	2.71	0.02	45.50	8.37	3.04	0.00
19.50	7.95	2.75	0.02	46.00	8.37	3.04	0.00
20.00	8.01	2.79	0.01	46.50	8.37	3.04	0.00
20.50	8.06	2.83	0.01	47.00	8.37	3.04	0.00
21.00	8.11	2.86	0.01	47.50	8.37	3.04	0.00
21.50	8.16	2.90	0.01	48.00	8.37	3.04	0.00
22.00	8.21	2.93	0.01				
22.50	8.25	2.96	0.01				
23.00	8.29	2.99	0.01				
23.50	8.33	3.01	0.01				
24.00	<b>8.37</b>	<b>3.04</b>	0.01				
24.50	8.37	3.04	0.00				
25.00	8.37	3.04	0.00				
25.50	8.37	3.04	0.00				
26.00	8.37	3.04	0.00				

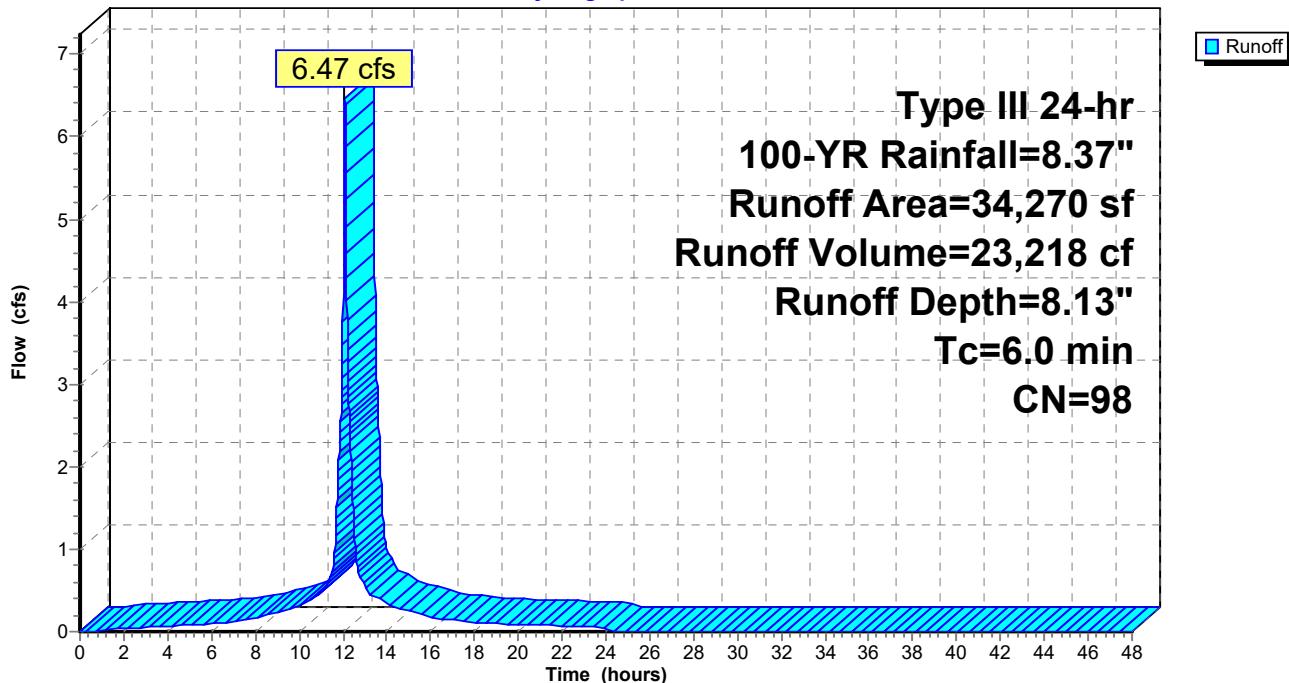
**Summary for Subcatchment P-B1: Roof Runoff to Infiltration Trench #3**

Runoff = 6.47 cfs @ 12.08 hrs, Volume= 23,218 cf, Depth= 8.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
Type III 24-hr 100-YR Rainfall=8.37"

Area (sf)	CN	Description
34,270	98	Roofs, HSG B
34,270		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0				<b>Direct Entry, Direct Entry</b>	
5.0	0			Total, Increased to minimum Tc = 6.0 min	

**Subcatchment P-B1: Roof Runoff to Infiltration Trench #3****Hydrograph**

**Proposed HydroCAD 533 Boston Post Road**

Prepared by {enter your company name here}

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Type III 24-hr 100-YR Rainfall=8.37"

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**Hydrograph for Subcatchment P-B1: Roof Runoff to Infiltration Trench #3**

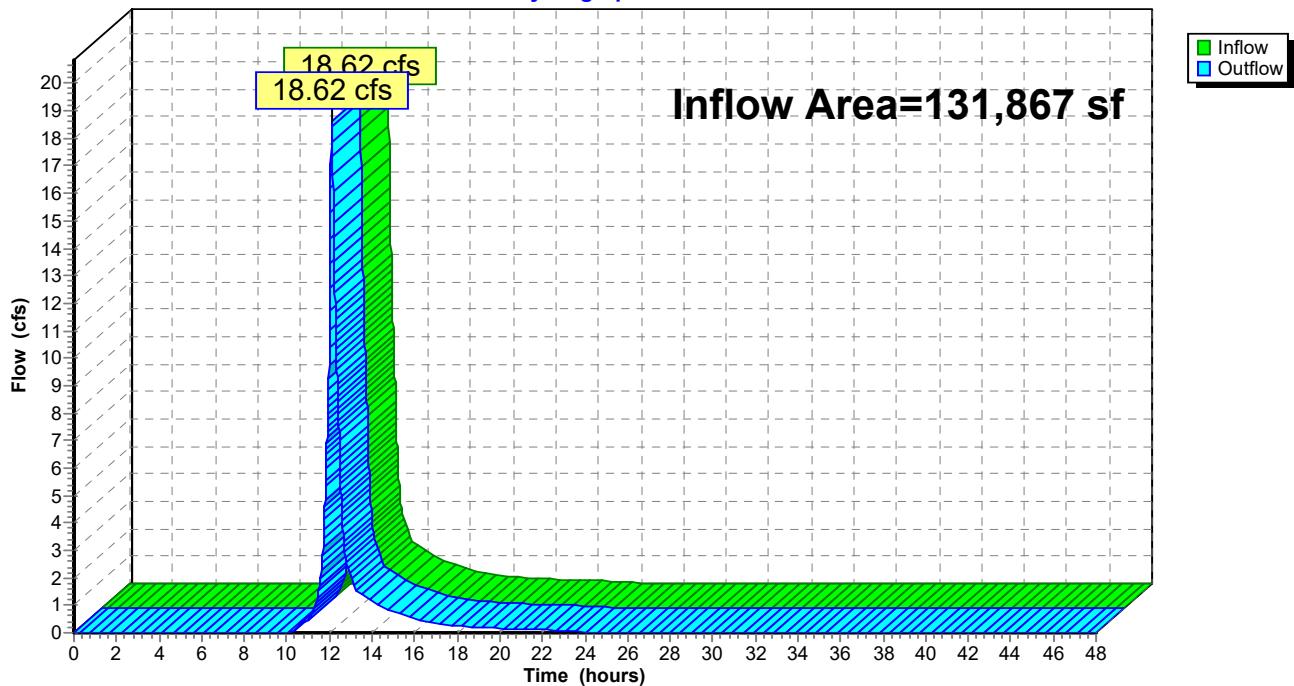
Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.50	8.37	8.13	0.00
0.50	0.04	0.00	0.00	27.00	8.37	8.13	0.00
1.00	0.08	0.01	0.02	27.50	8.37	8.13	0.00
1.50	0.13	0.02	0.03	28.00	8.37	8.13	0.00
2.00	0.17	0.05	0.04	28.50	8.37	8.13	0.00
2.50	0.21	0.08	0.05	29.00	8.37	8.13	0.00
3.00	0.26	0.11	0.06	29.50	8.37	8.13	0.00
3.50	0.31	0.15	0.06	30.00	8.37	8.13	0.00
4.00	0.36	0.19	0.07	30.50	8.37	8.13	0.00
4.50	0.42	0.24	0.08	31.00	8.37	8.13	0.00
5.00	0.47	0.30	0.09	31.50	8.37	8.13	0.00
5.50	0.54	0.35	0.09	32.00	8.37	8.13	0.00
6.00	0.60	0.41	0.10	32.50	8.37	8.13	0.00
6.50	0.67	0.48	0.11	33.00	8.37	8.13	0.00
7.00	0.76	0.56	0.13	33.50	8.37	8.13	0.00
7.50	0.85	0.65	0.15	34.00	8.37	8.13	0.00
8.00	0.95	0.75	0.16	34.50	8.37	8.13	0.00
8.50	1.08	0.86	0.20	35.00	8.37	8.13	0.00
9.00	1.22	1.01	0.24	35.50	8.37	8.13	0.00
9.50	1.39	1.17	0.28	36.00	8.37	8.13	0.00
10.00	1.58	1.36	0.31	36.50	8.37	8.13	0.00
10.50	1.81	1.59	0.39	37.00	8.37	8.13	0.00
11.00	2.09	1.87	0.47	37.50	8.37	8.13	0.00
11.50	2.49	2.27	0.73	38.00	8.37	8.13	0.00
12.00	4.18	3.95	<b>4.07</b>	38.50	8.37	8.13	0.00
12.50	5.88	5.64	<b>1.33</b>	39.00	8.37	8.13	0.00
13.00	6.28	6.04	0.54	39.50	8.37	8.13	0.00
13.50	6.56	6.32	0.42	40.00	8.37	8.13	0.00
14.00	6.79	6.55	0.34	40.50	8.37	8.13	0.00
14.50	6.98	6.74	0.29	41.00	8.37	8.13	0.00
15.00	7.15	6.91	0.26	41.50	8.37	8.13	0.00
15.50	7.29	7.06	0.22	42.00	8.37	8.13	0.00
16.00	7.42	7.18	0.18	42.50	8.37	8.13	0.00
16.50	7.52	7.28	0.16	43.00	8.37	8.13	0.00
17.00	7.61	7.37	0.14	43.50	8.37	8.13	0.00
17.50	7.70	7.46	0.13	44.00	8.37	8.13	0.00
18.00	7.77	7.53	0.11	44.50	8.37	8.13	0.00
18.50	7.83	7.59	0.10	45.00	8.37	8.13	0.00
19.00	7.90	7.66	0.10	45.50	8.37	8.13	0.00
19.50	7.95	7.71	0.09	46.00	8.37	8.13	0.00
20.00	8.01	7.77	0.09	46.50	8.37	8.13	0.00
20.50	8.06	7.82	0.08	47.00	8.37	8.13	0.00
21.00	8.11	7.87	0.08	47.50	8.37	8.13	0.00
21.50	8.16	7.92	0.08	48.00	8.37	8.13	0.00
22.00	8.21	7.97	0.07				
22.50	8.25	8.01	0.07				
23.00	8.29	8.05	0.06				
23.50	8.33	8.09	0.06				
24.00	<b>8.37</b>	<b>8.13</b>	0.06				
24.50	8.37	8.13	0.00				
25.00	8.37	8.13	0.00				
25.50	8.37	8.13	0.00				
26.00	8.37	8.13	0.00				

**Summary for Reach 1R: (new Reach)**

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

Inflow Area = 131,867 sf, 70.62% Impervious, Inflow Depth = 4.99" for 100-YR event  
Inflow = 18.62 cfs @ 12.11 hrs, Volume= 54,837 cf  
Outflow = 18.62 cfs @ 12.11 hrs, Volume= 54,837 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3

**Reach 1R: (new Reach)****Hydrograph**

**Proposed HydroCAD 533 Boston Post Road**

Prepared by {enter your company name here}

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Type III 24-hr 100-YR Rainfall=8.37"

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**Hydrograph for Reach 1R: (new Reach)**

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
0.00	0.00	0.00	0.00	26.50	0.00	0.00	0.00
0.50	0.00	0.00	0.00	27.00	0.00	0.00	0.00
1.00	0.00	0.00	0.00	27.50	0.00	0.00	0.00
1.50	0.00	0.00	0.00	28.00	0.00	0.00	0.00
2.00	0.00	0.00	0.00	28.50	0.00	0.00	0.00
2.50	0.00	0.00	0.00	29.00	0.00	0.00	0.00
3.00	0.00	0.00	0.00	29.50	0.00	0.00	0.00
3.50	0.00	0.00	0.00	30.00	0.00	0.00	0.00
4.00	0.00	0.00	0.00	30.50	0.00	0.00	0.00
4.50	0.00	0.00	0.00	31.00	0.00	0.00	0.00
5.00	0.00	0.00	0.00	31.50	0.00	0.00	0.00
5.50	0.00	0.00	0.00	32.00	0.00	0.00	0.00
6.00	0.00	0.00	0.00	32.50	0.00	0.00	0.00
6.50	0.00	0.00	0.00	33.00	0.00	0.00	0.00
7.00	0.00	0.00	0.00	33.50	0.00	0.00	0.00
7.50	0.00	0.00	0.00	34.00	0.00	0.00	0.00
8.00	0.00	0.00	0.00	34.50	0.00	0.00	0.00
8.50	0.00	0.00	0.00	35.00	0.00	0.00	0.00
9.00	0.00	0.00	0.00	35.50	0.00	0.00	0.00
9.50	0.00	0.00	0.00	36.00	0.00	0.00	0.00
10.00	0.00	0.00	0.00	36.50	0.00	0.00	0.00
10.50	0.27	0.27	0.00	37.00	0.00	0.00	0.00
11.00	0.42	0.42	0.00	37.50	0.00	0.00	0.00
11.50	1.50	1.50	0.00	38.00	0.00	0.00	0.00
12.00	<b>11.02</b>	<b>11.02</b>	0.00	38.50	0.00	0.00	0.00
12.50	<b>6.11</b>	<b>6.11</b>	0.00	39.00	0.00	0.00	0.00
13.00	1.98	1.98	0.00	39.50	0.00	0.00	0.00
13.50	1.40	1.40	0.00	40.00	0.00	0.00	0.00
14.00	1.12	1.12	0.00	40.50	0.00	0.00	0.00
14.50	0.93	0.93	0.00	41.00	0.00	0.00	0.00
15.00	0.79	0.79	0.00	41.50	0.00	0.00	0.00
15.50	0.66	0.66	0.00	42.00	0.00	0.00	0.00
16.00	0.52	0.52	0.00	42.50	0.00	0.00	0.00
16.50	0.43	0.43	0.00	43.00	0.00	0.00	0.00
17.00	0.37	0.37	0.00	43.50	0.00	0.00	0.00
17.50	0.31	0.31	0.00	44.00	0.00	0.00	0.00
18.00	0.25	0.25	0.00	44.50	0.00	0.00	0.00
18.50	0.21	0.21	0.00	45.00	0.00	0.00	0.00
19.00	0.19	0.19	0.00	45.50	0.00	0.00	0.00
19.50	0.17	0.17	0.00	46.00	0.00	0.00	0.00
20.00	0.16	0.16	0.00	46.50	0.00	0.00	0.00
20.50	0.14	0.14	0.00	47.00	0.00	0.00	0.00
21.00	0.13	0.13	0.00	47.50	0.00	0.00	0.00
21.50	0.11	0.11	0.00	48.00	0.00	0.00	0.00
22.00	0.10	0.10	0.00				
22.50	0.09	0.09	0.00				
23.00	0.07	0.07	0.00				
23.50	0.06	0.06	0.00				
24.00	0.05	0.05	0.00				
24.50	0.00	0.00	0.00				
25.00	0.00	0.00	0.00				
25.50	0.00	0.00	0.00				
26.00	0.00	0.00	0.00				

### Summary for Pond IB-1: Infiltration Basin #1

Inflow Area = 13,425 sf, 66.59% Impervious, Inflow Depth = 6.57" for 100-YR event  
 Inflow = 2.28 cfs @ 12.08 hrs, Volume= 7,351 cf  
 Outflow = 2.20 cfs @ 12.11 hrs, Volume= 7,351 cf, Atten= 4%, Lag= 1.3 min  
 Discarded = 0.02 cfs @ 12.11 hrs, Volume= 1,839 cf  
 Primary = 2.18 cfs @ 12.11 hrs, Volume= 5,512 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3  
 Peak Elev= 124.16' @ 12.11 hrs Surf.Area= 908 sf Storage= 1,036 cf

Plug-Flow detention time= 146.3 min calculated for 7,351 cf (100% of inflow)  
 Center-of-Mass det. time= 146.2 min ( 935.2 - 789.0 )

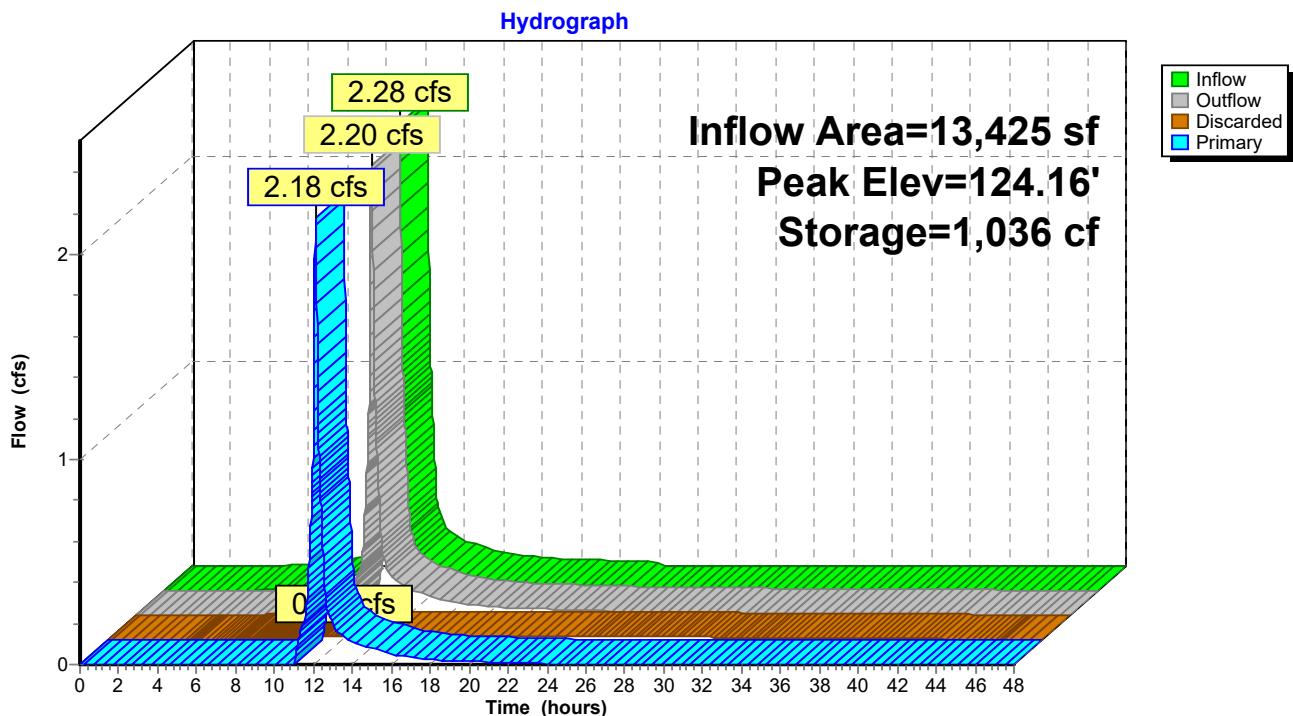
Volume	Invert	Avail.Storage	Storage Description
#1	122.00'	1,077 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
122.00	93	0	0
123.00	434	264	264
124.00	839	637	900
124.20	927	177	1,077

Device	Routing	Invert	Outlet Devices
#1	Discarded	122.00'	<b>1.020 in/hr Exfiltration over Surface area</b> Phase-In= 0.01'
#2	Primary	123.85'	<b>5.0' long x 2.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

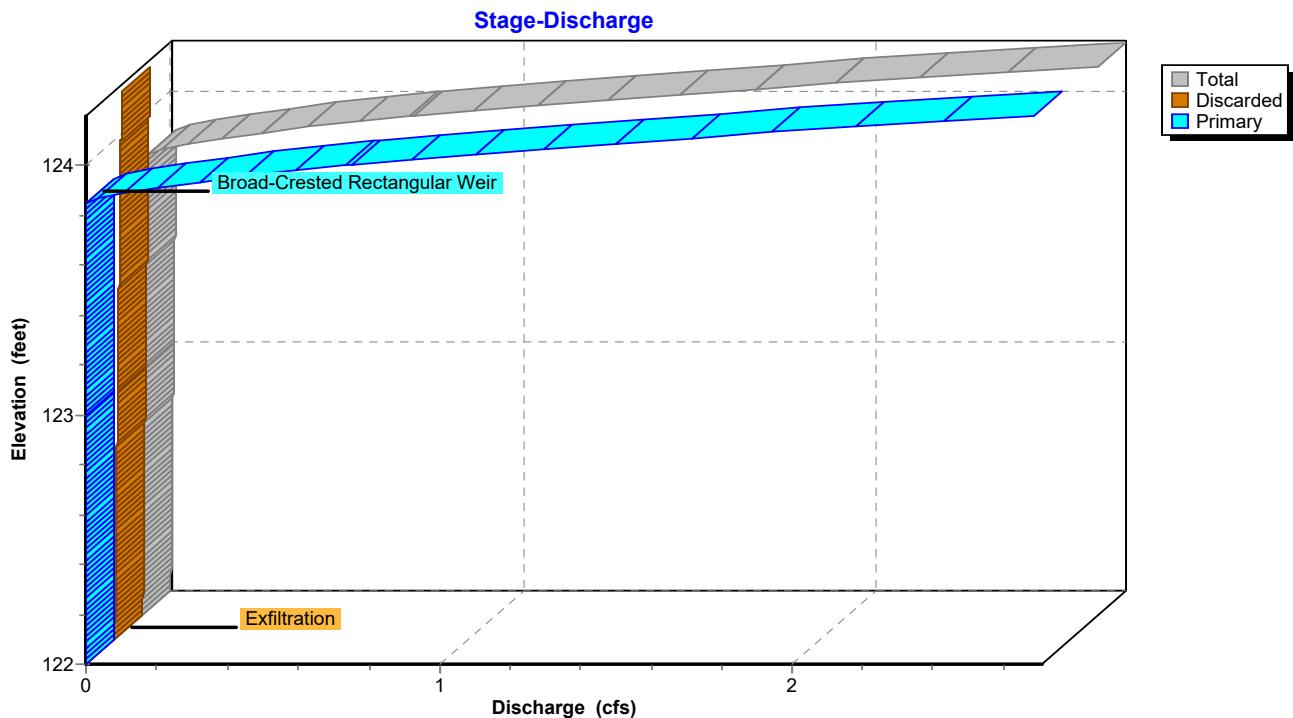
**Discarded OutFlow** Max=0.02 cfs @ 12.11 hrs HW=124.16' (Free Discharge)  
 ↑ 1=Exfiltration (Exfiltration Controls 0.02 cfs)

**Primary OutFlow** Max=2.18 cfs @ 12.11 hrs HW=124.16' TW=0.00' (Dynamic Tailwater)  
 ↑ 2=Broad-Crested Rectangular Weir (Weir Controls 2.18 cfs @ 1.42 fps)

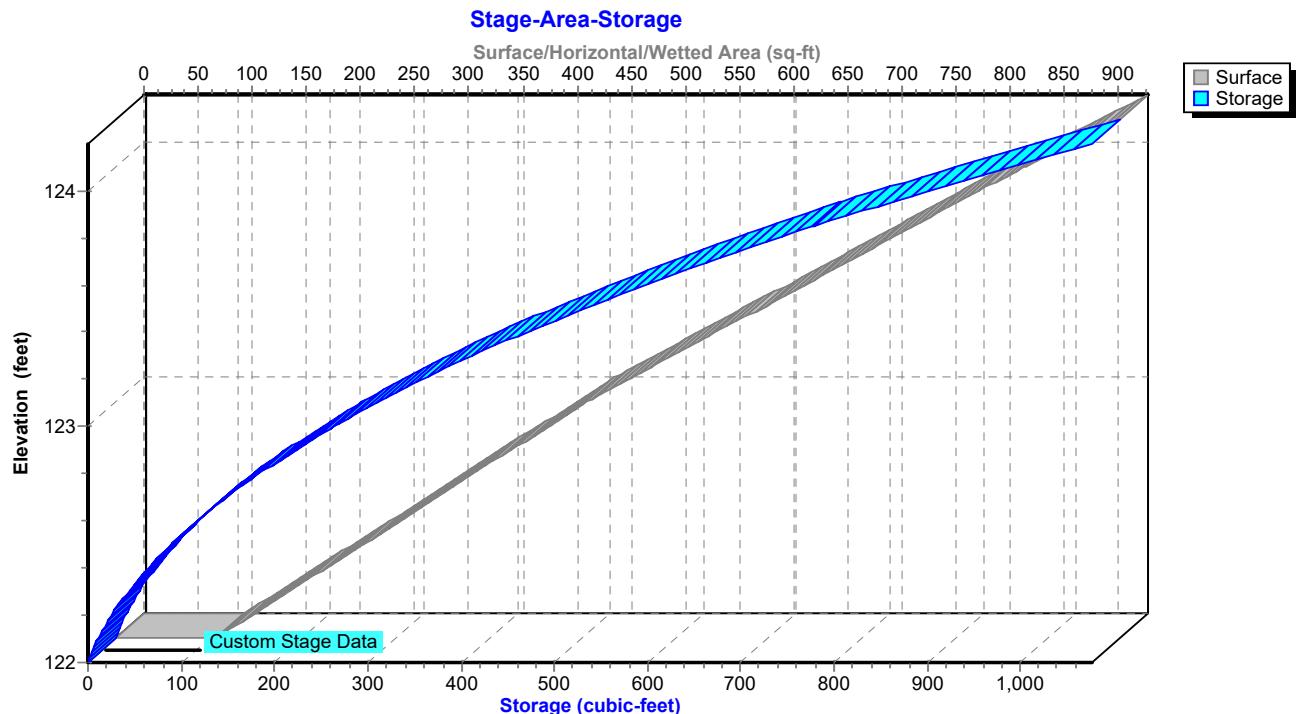
### Pond IB-1: Infiltration Basin #1



### Pond IB-1: Infiltration Basin #1



### Pond IB-1: Infiltration Basin #1



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**Hydrograph for Pond IB-1: Infiltration Basin #1**

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	122.00	0.00	0.00	0.00
1.00	0.00	0	122.00	0.00	0.00	0.00
2.00	0.00	0	122.00	0.00	0.00	0.00
3.00	0.00	0	122.00	0.00	0.00	0.00
4.00	0.00	0	122.00	0.00	0.00	0.00
5.00	0.00	2	122.02	0.00	0.00	0.00
6.00	0.01	16	122.14	0.00	0.00	0.00
7.00	0.02	49	122.33	0.00	0.00	0.00
8.00	0.03	111	122.58	0.01	0.01	0.00
9.00	0.05	223	122.90	0.01	0.01	0.00
10.00	0.08	417	123.31	0.01	0.01	0.00
11.00	0.14	744	123.81	0.02	0.02	0.00
12.00	<b>1.40</b>	<b>944</b>	<b>124.05</b>	<b>1.17</b>	<b>0.02</b>	<b>1.15</b>
13.00	<b>0.20</b>	<b>827</b>	<b>123.91</b>	<b>0.21</b>	<b>0.02</b>	<b>0.19</b>
14.00	0.13	812	123.89	0.13	0.02	0.11
15.00	0.10	805	123.88	0.10	0.02	0.08
16.00	0.07	798	123.88	0.07	0.02	0.05
17.00	0.05	794	123.87	0.05	0.02	0.04
18.00	0.04	791	123.87	0.04	0.02	0.02
19.00	0.04	789	123.86	0.04	0.02	0.02
20.00	0.03	787	123.86	0.03	0.02	0.01
21.00	0.03	786	123.86	0.03	0.02	0.01
22.00	0.03	785	123.86	0.03	0.02	0.01
23.00	0.02	784	123.86	0.02	0.02	0.01
24.00	0.02	782	123.85	0.02	0.02	0.00
25.00	0.00	723	123.78	0.02	0.02	0.00
26.00	0.00	661	123.69	0.02	0.02	0.00
27.00	0.00	602	123.61	0.02	0.02	0.00
28.00	0.00	545	123.52	0.02	0.02	0.00
29.00	0.00	492	123.44	0.01	0.01	0.00
30.00	0.00	441	123.35	0.01	0.01	0.00
31.00	0.00	394	123.27	0.01	0.01	0.00
32.00	0.00	349	123.18	0.01	0.01	0.00
33.00	0.00	308	123.10	0.01	0.01	0.00
34.00	0.00	269	123.01	0.01	0.01	0.00
35.00	0.00	233	122.93	0.01	0.01	0.00
36.00	0.00	199	122.84	0.01	0.01	0.00
37.00	0.00	168	122.76	0.01	0.01	0.00
38.00	0.00	140	122.67	0.01	0.01	0.00
39.00	0.00	113	122.59	0.01	0.01	0.00
40.00	0.00	90	122.50	0.01	0.01	0.00
41.00	0.00	68	122.42	0.01	0.01	0.00
42.00	0.00	50	122.33	0.00	0.00	0.00
43.00	0.00	33	122.25	0.00	0.00	0.00
44.00	0.00	20	122.16	0.00	0.00	0.00
45.00	0.00	8	122.08	0.00	0.00	0.00
46.00	0.00	0	122.00	0.00	0.00	0.00
47.00	0.00	0	122.00	0.00	0.00	0.00
48.00	0.00	0	122.00	0.00	0.00	0.00

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**Stage-Discharge for Pond IB-1: Infiltration Basin #1**

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
122.00	0.00	0.00	0.00
122.05	0.00	0.00	0.00
122.10	0.00	0.00	0.00
122.15	0.00	0.00	0.00
122.20	0.00	0.00	0.00
122.25	0.00	0.00	0.00
122.30	0.00	0.00	0.00
122.35	0.01	0.01	0.00
122.40	0.01	0.01	0.00
122.45	0.01	0.01	0.00
122.50	0.01	0.01	0.00
122.55	0.01	0.01	0.00
122.60	0.01	0.01	0.00
122.65	0.01	0.01	0.00
122.70	0.01	0.01	0.00
122.75	0.01	0.01	0.00
122.80	0.01	0.01	0.00
122.85	0.01	0.01	0.00
122.90	0.01	0.01	0.00
122.95	0.01	0.01	0.00
123.00	0.01	0.01	0.00
123.05	0.01	0.01	0.00
123.10	0.01	0.01	0.00
123.15	0.01	0.01	0.00
123.20	0.01	0.01	0.00
123.25	0.01	0.01	0.00
123.30	0.01	0.01	0.00
123.35	0.01	0.01	0.00
123.40	0.01	0.01	0.00
123.45	0.01	0.01	0.00
123.50	0.02	0.02	0.00
123.55	0.02	0.02	0.00
123.60	0.02	0.02	0.00
123.65	0.02	0.02	0.00
123.70	0.02	0.02	0.00
123.75	0.02	0.02	0.00
123.80	0.02	0.02	0.00
123.85	0.02	0.02	0.00
123.90	0.16	0.02	0.14
123.95	0.42	0.02	0.40
124.00	0.76	0.02	0.74
124.05	1.16	0.02	1.14
124.10	1.62	0.02	1.60
124.15	2.14	0.02	2.12
124.20	<b>2.71</b>	<b>0.02</b>	<b>2.68</b>

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**Stage-Area-Storage for Pond IB-1: Infiltration Basin #1**

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
122.00	93	0
122.05	110	5
122.10	127	11
122.15	144	18
122.20	161	25
122.25	178	34
122.30	195	43
122.35	212	53
122.40	229	64
122.45	246	76
122.50	264	89
122.55	281	103
122.60	298	117
122.65	315	132
122.70	332	149
122.75	349	166
122.80	366	184
122.85	383	202
122.90	400	222
122.95	417	242
123.00	434	264
123.05	454	286
123.10	474	309
123.15	495	333
123.20	515	358
123.25	535	385
123.30	555	412
123.35	576	440
123.40	596	470
123.45	616	500
123.50	637	531
123.55	657	563
123.60	677	597
123.65	697	631
123.70	718	667
123.75	738	703
123.80	758	740
123.85	778	779
123.90	799	818
123.95	819	859
124.00	839	900
124.05	861	942
124.10	883	986
124.15	905	1,031
124.20	927	1,077

## Summary for Pond IB-2: Infiltration Basin #2

Inflow Area = 33,268 sf, 68.13% Impervious, Inflow Depth = 6.69" for 100-YR event  
 Inflow = 5.73 cfs @ 12.08 hrs, Volume= 18,548 cf  
 Outflow = 5.11 cfs @ 12.13 hrs, Volume= 18,548 cf, Atten= 11%, Lag= 2.4 min  
 Discarded = 0.06 cfs @ 12.13 hrs, Volume= 4,892 cf  
 Primary = 5.05 cfs @ 12.13 hrs, Volume= 13,656 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3  
 Peak Elev= 124.06' @ 12.13 hrs Surf.Area= 2,560 sf Storage= 3,268 cf

Plug-Flow detention time= 147.0 min calculated for 18,544 cf (100% of inflow)  
 Center-of-Mass det. time= 147.2 min ( 933.5 - 786.3 )

Volume	Invert	Avail.Storage	Storage Description	
#1	122.00'	3,647 cf	<b>Custom Stage Data (Prismatic)</b>	Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	
122.00	672	0	0	
123.00	1,538	1,105	1,105	
124.00	2,504	2,021	3,126	
124.20	2,704	521	3,647	
Device	Routing	Invert	Outlet Devices	
#1	Discarded	122.00'	<b>1.020 in/hr Exfiltration over Surface area</b>	Phase-In= 0.01'
#2	Device 3	123.50'	<b>4.0' long x 0.5' breadth Broad-Crested Rectangular Weir</b>	
			Head (feet) 0.20 0.40 0.60 0.80 1.00	
			Coef. (English) 2.80 2.92 3.08 3.30 3.32	
#3	Primary	121.90'	<b>18.0" Round Culvert</b>	
			L= 20.0' CPP, square edge headwall, Ke= 0.500	
			Inlet / Outlet Invert= 121.90' / 121.70' S= 0.0100 '/' Cc= 0.900	
			n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf	

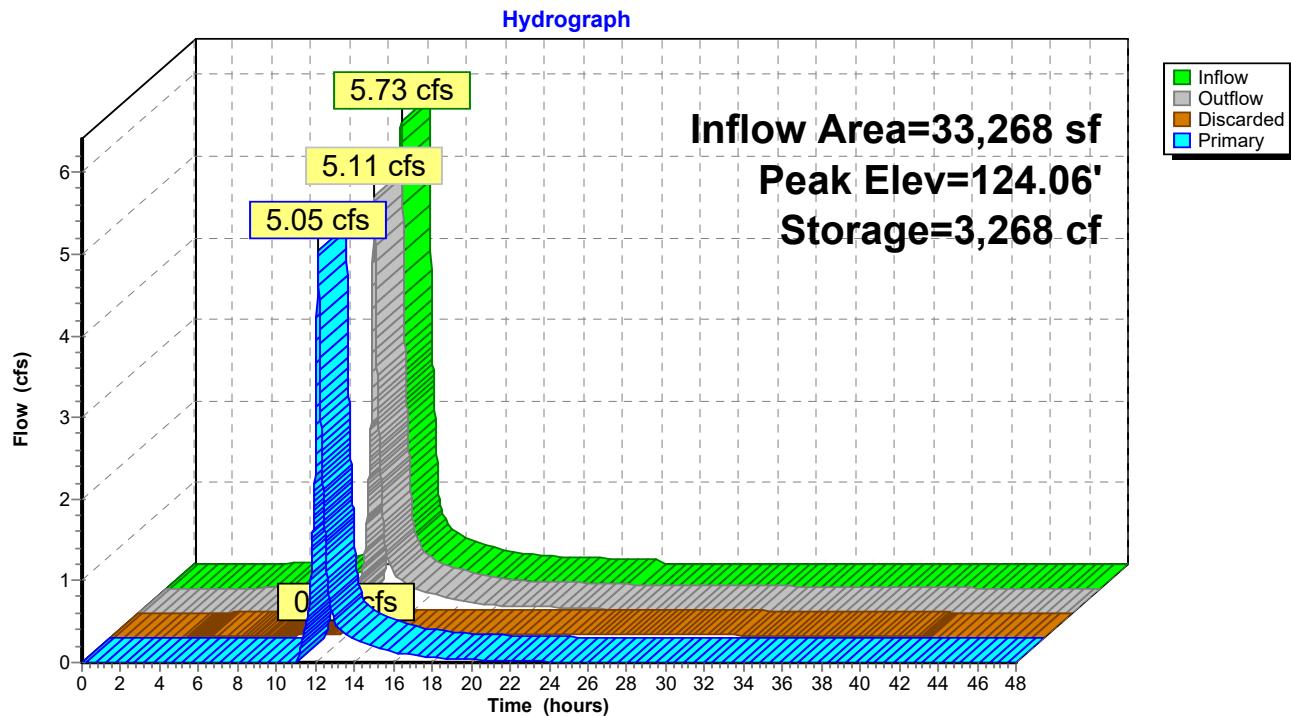
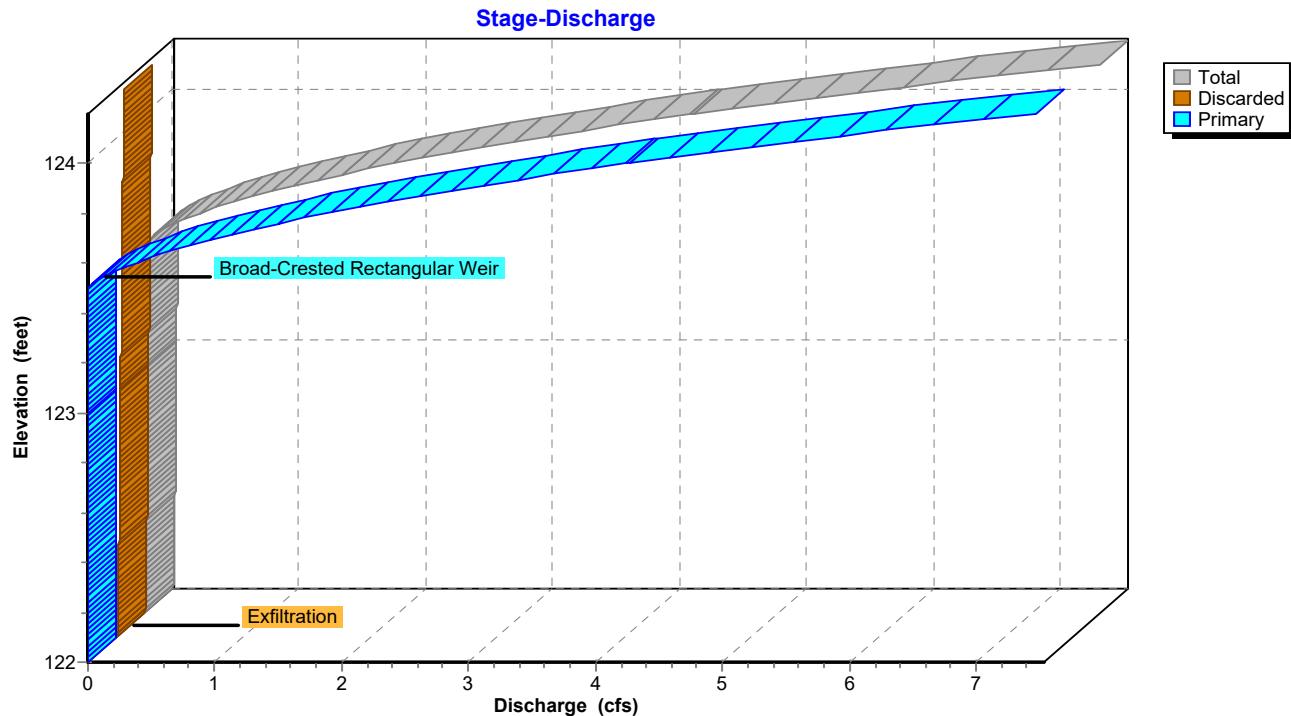
**Discarded OutFlow** Max=0.06 cfs @ 12.13 hrs HW=124.06' (Free Discharge)

↑ 1=Exfiltration (Exfiltration Controls 0.06 cfs)

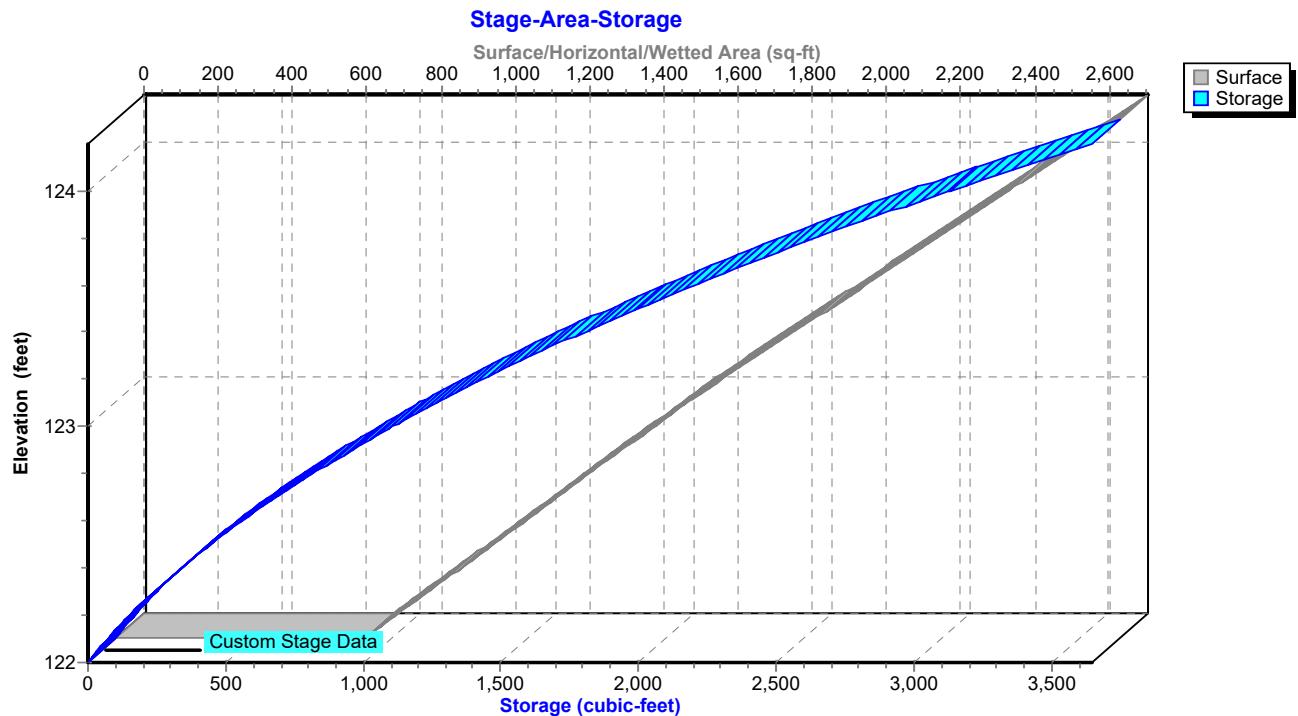
**Primary OutFlow** Max=5.05 cfs @ 12.13 hrs HW=124.06' TW=0.00' (Dynamic Tailwater)

↑ 3=Culvert (Passes 5.05 cfs of 9.75 cfs potential flow)

↑ 2=Broad-Crested Rectangular Weir (Weir Controls 5.05 cfs @ 2.27 fps)

**Pond IB-2: Infiltration Basin #2****Pond IB-2: Infiltration Basin #2**

### Pond IB-2: Infiltration Basin #2



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**Hydrograph for Pond IB-2: Infiltration Basin #2**

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	122.00	0.00	0.00	0.00
1.00	0.00	0	122.00	0.00	0.00	0.00
2.00	0.00	0	122.00	0.00	0.00	0.00
3.00	0.00	0	122.00	0.00	0.00	0.00
4.00	0.00	1	122.00	0.00	0.00	0.00
5.00	0.01	5	122.01	0.01	0.01	0.00
6.00	0.03	22	122.03	0.02	0.02	0.00
7.00	0.05	91	122.13	0.02	0.02	0.00
8.00	0.08	243	122.30	0.02	0.02	0.00
9.00	0.13	529	122.57	0.03	0.03	0.00
10.00	0.21	1,030	122.95	0.04	0.04	0.00
11.00	0.35	1,869	123.44	0.05	0.05	0.00
12.00	<b>3.53</b>	<b>2,795</b>	<b>123.86</b>	<b>2.60</b>	<b>0.06</b>	<b>2.55</b>
13.00	<b>0.50</b>	<b>2,260</b>	<b>123.63</b>	<b>0.56</b>	<b>0.05</b>	<b>0.51</b>
14.00	0.32	2,173	123.59	0.33	0.05	0.28
15.00	0.24	2,135	123.57	0.25	0.05	0.20
16.00	0.17	2,100	123.55	0.18	0.05	0.13
17.00	0.13	2,077	123.54	0.14	0.05	0.09
18.00	0.10	2,057	123.53	0.11	0.05	0.06
19.00	0.09	2,046	123.53	0.09	0.05	0.05
20.00	0.08	2,039	123.52	0.08	0.05	0.04
21.00	0.07	2,033	123.52	0.08	0.05	0.03
22.00	0.07	2,026	123.52	0.07	0.05	0.02
23.00	0.06	2,019	123.51	0.06	0.05	0.01
24.00	0.05	2,011	123.51	0.06	0.05	0.01
25.00	0.00	1,857	123.43	0.05	0.05	0.00
26.00	0.00	1,694	123.35	0.04	0.04	0.00
27.00	0.00	1,538	123.26	0.04	0.04	0.00
28.00	0.00	1,390	123.18	0.04	0.04	0.00
29.00	0.00	1,248	123.09	0.04	0.04	0.00
30.00	0.00	1,113	123.01	0.04	0.04	0.00
31.00	0.00	985	122.92	0.03	0.03	0.00
32.00	0.00	864	122.84	0.03	0.03	0.00
33.00	0.00	748	122.75	0.03	0.03	0.00
34.00	0.00	639	122.67	0.03	0.03	0.00
35.00	0.00	536	122.58	0.03	0.03	0.00
36.00	0.00	439	122.50	0.03	0.03	0.00
37.00	0.00	349	122.41	0.02	0.02	0.00
38.00	0.00	265	122.33	0.02	0.02	0.00
39.00	0.00	187	122.24	0.02	0.02	0.00
40.00	0.00	115	122.16	0.02	0.02	0.00
41.00	0.00	49	122.07	0.02	0.02	0.00
42.00	0.00	1	122.00	0.00	0.00	0.00
43.00	0.00	0	122.00	0.00	0.00	0.00
44.00	0.00	0	122.00	0.00	0.00	0.00
45.00	0.00	0	122.00	0.00	0.00	0.00
46.00	0.00	0	122.00	0.00	0.00	0.00
47.00	0.00	0	122.00	0.00	0.00	0.00
48.00	0.00	0	122.00	0.00	0.00	0.00

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**Stage-Discharge for Pond IB-2: Infiltration Basin #2**

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
122.00	0.00	0.00	0.00
122.05	0.02	0.02	0.00
122.10	0.02	0.02	0.00
122.15	0.02	0.02	0.00
122.20	0.02	0.02	0.00
122.25	0.02	0.02	0.00
122.30	0.02	0.02	0.00
122.35	0.02	0.02	0.00
122.40	0.02	0.02	0.00
122.45	0.03	0.03	0.00
122.50	0.03	0.03	0.00
122.55	0.03	0.03	0.00
122.60	0.03	0.03	0.00
122.65	0.03	0.03	0.00
122.70	0.03	0.03	0.00
122.75	0.03	0.03	0.00
122.80	0.03	0.03	0.00
122.85	0.03	0.03	0.00
122.90	0.03	0.03	0.00
122.95	0.04	0.04	0.00
123.00	0.04	0.04	0.00
123.05	0.04	0.04	0.00
123.10	0.04	0.04	0.00
123.15	0.04	0.04	0.00
123.20	0.04	0.04	0.00
123.25	0.04	0.04	0.00
123.30	0.04	0.04	0.00
123.35	0.04	0.04	0.00
123.40	0.05	0.05	0.00
123.45	0.05	0.05	0.00
123.50	0.05	0.05	0.00
123.55	0.17	0.05	0.13
123.60	0.40	0.05	0.35
123.65	0.70	0.05	0.65
123.70	1.05	0.05	1.00
123.75	1.47	0.05	1.41
123.80	1.93	0.05	1.88
123.85	2.45	0.06	2.39
123.90	3.01	0.06	2.95
123.95	3.63	0.06	3.57
124.00	4.30	0.06	4.24
124.05	5.02	0.06	4.96
124.10	5.79	0.06	5.73
124.15	6.63	0.06	6.57
124.20	<b>7.54</b>	<b>0.06</b>	<b>7.47</b>

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**Stage-Area-Storage for Pond IB-2: Infiltration Basin #2**

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
122.00	672	0
122.05	715	35
122.10	759	72
122.15	802	111
122.20	845	152
122.25	889	195
122.30	932	241
122.35	975	288
122.40	1,018	338
122.45	1,062	390
122.50	1,105	444
122.55	1,148	501
122.60	1,192	559
122.65	1,235	620
122.70	1,278	683
122.75	1,322	748
122.80	1,365	815
122.85	1,408	884
122.90	1,451	956
122.95	1,495	1,029
123.00	1,538	1,105
123.05	1,586	1,183
123.10	1,635	1,264
123.15	1,683	1,347
123.20	1,731	1,432
123.25	1,780	1,520
123.30	1,828	1,610
123.35	1,876	1,702
123.40	1,924	1,797
123.45	1,973	1,895
123.50	2,021	1,995
123.55	2,069	2,097
123.60	2,118	2,202
123.65	2,166	2,309
123.70	2,214	2,418
123.75	2,263	2,530
123.80	2,311	2,645
123.85	2,359	2,761
123.90	2,407	2,880
123.95	2,456	3,002
124.00	2,504	3,126
124.05	2,554	3,252
124.10	2,604	3,381
124.15	2,654	3,513
124.20	<b>2,704</b>	<b>3,647</b>

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**Summary for Pond UG-1: Underground Detention System #1**

Inflow Area = 13,403 sf, 58.36% Impervious, Inflow Depth = 6.21" for 100-YR event  
 Inflow = 2.18 cfs @ 12.09 hrs, Volume= 6,938 cf  
 Outflow = 1.67 cfs @ 12.12 hrs, Volume= 6,936 cf, Atten= 24%, Lag= 2.3 min  
 Primary = 1.67 cfs @ 12.12 hrs, Volume= 6,936 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3  
 Peak Elev= 123.66' @ 12.16 hrs Surf.Area= 820 sf Storage= 757 cf

Plug-Flow detention time= 29.9 min calculated for 6,936 cf (100% of inflow)  
 Center-of-Mass det. time= 29.7 min ( 826.2 - 796.5 )

Volume	Invert	Avail.Storage	Storage Description
#1A	122.40'	156 cf	<b>10.00'W x 82.00'L x 2.17'H Field A</b> 1,777 cf Overall - 1,387 cf Embedded = 390 cf x 40.0% Voids
#2A	122.40'	792 cf	<b>retain_it retain_it 1.5' x 10 Inside #1</b> Inside= 84.0"W x 18.0"H => 9.90 sf x 8.00'L = 79.2 cf Outside= 96.0"W x 26.0"H => 17.33 sf x 8.00'L = 138.7 cf
948 cf			Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	122.40'	<b>15.0" Round Culvert</b> L= 140.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 122.40' / 121.50' S= 0.0064 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.23 sf

**Primary OutFlow** Max=1.67 cfs @ 12.12 hrs HW=123.63' TW=123.45' (Dynamic Tailwater)  
 ↑1=Culvert (Outlet Controls 1.67 cfs @ 1.71 fps)

**Pond UG-1: Underground Detention System #1 - Chamber Wizard Field A****Chamber Model = retain\_it retain\_it 1.5' (retain-it®)**

Inside= 84.0"W x 18.0"H =&gt; 9.90 sf x 8.00'L = 79.2 cf

Outside= 96.0"W x 26.0"H =&gt; 17.33 sf x 8.00'L = 138.7 cf

10 Chambers/Row x 8.00' Long = 80.00' Row Length +12.0" End Stone x 2 = 82.00' Base Length

1 Rows x 96.0" Wide + 12.0" Side Stone x 2 = 10.00' Base Width

26.0" Chamber Height = 2.17' Field Height

10 Chambers x 79.2 cf = 791.7 cf Chamber Storage

10 Chambers x 138.7 cf = 1,386.7 cf Displacement

1,776.7 cf Field - 1,386.7 cf Chambers = 390.0 cf Stone x 40.0% Voids = 156.0 cf Stone Storage

Chamber Storage + Stone Storage = 947.7 cf = 0.022 af

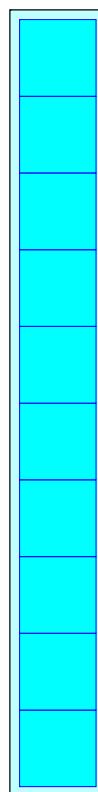
Overall Storage Efficiency = 53.3%

Overall System Size = 82.00' x 10.00' x 2.17'

10 Chambers

65.8 cy Field

14.4 cy Stone



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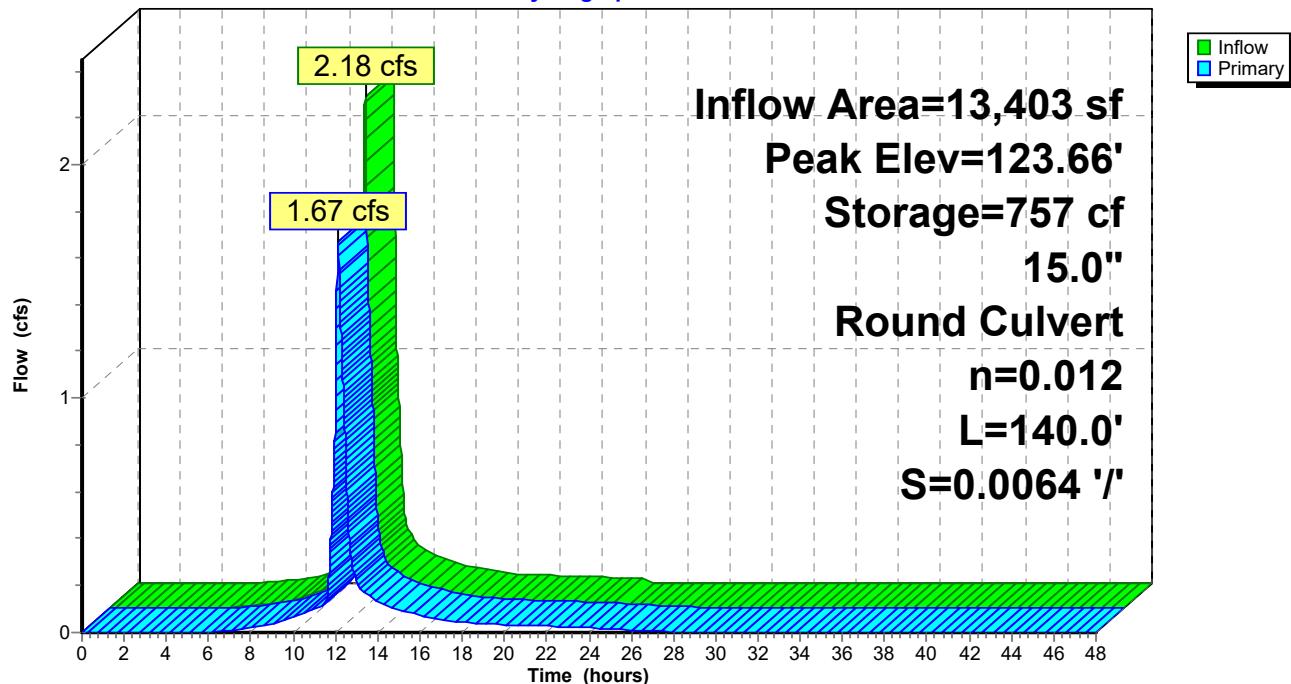
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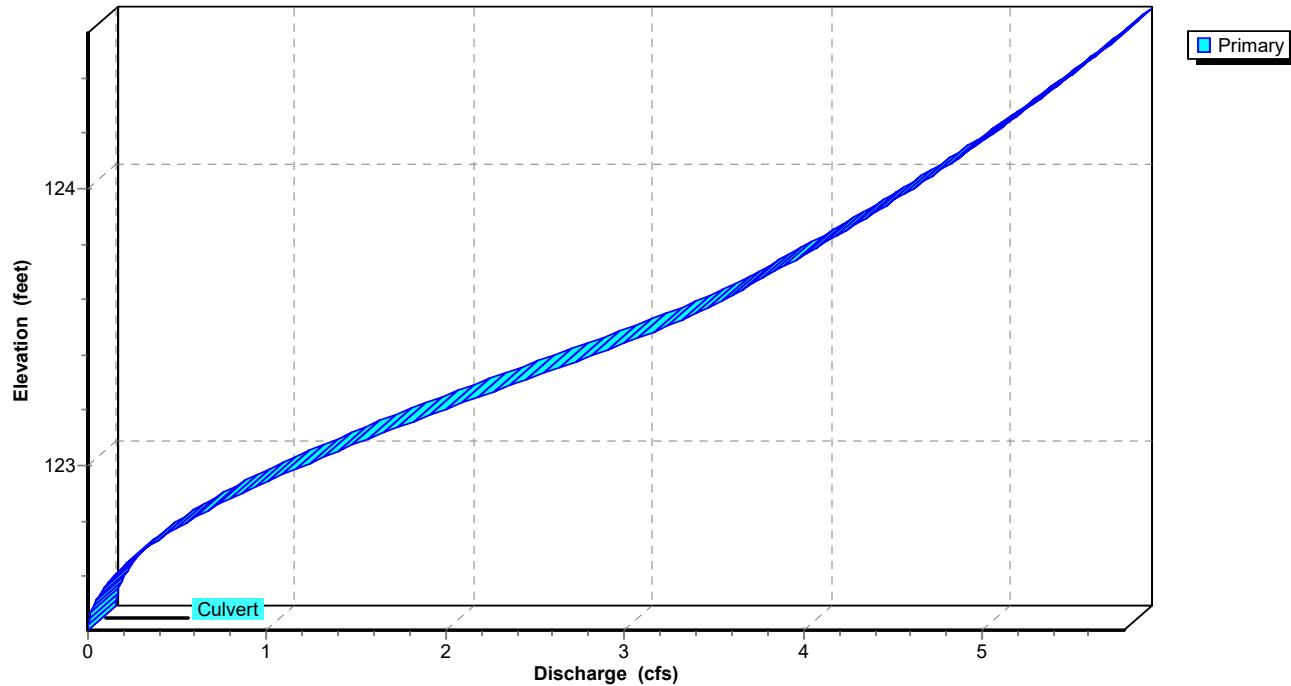
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**Pond UG-1: Underground Detention System #1**

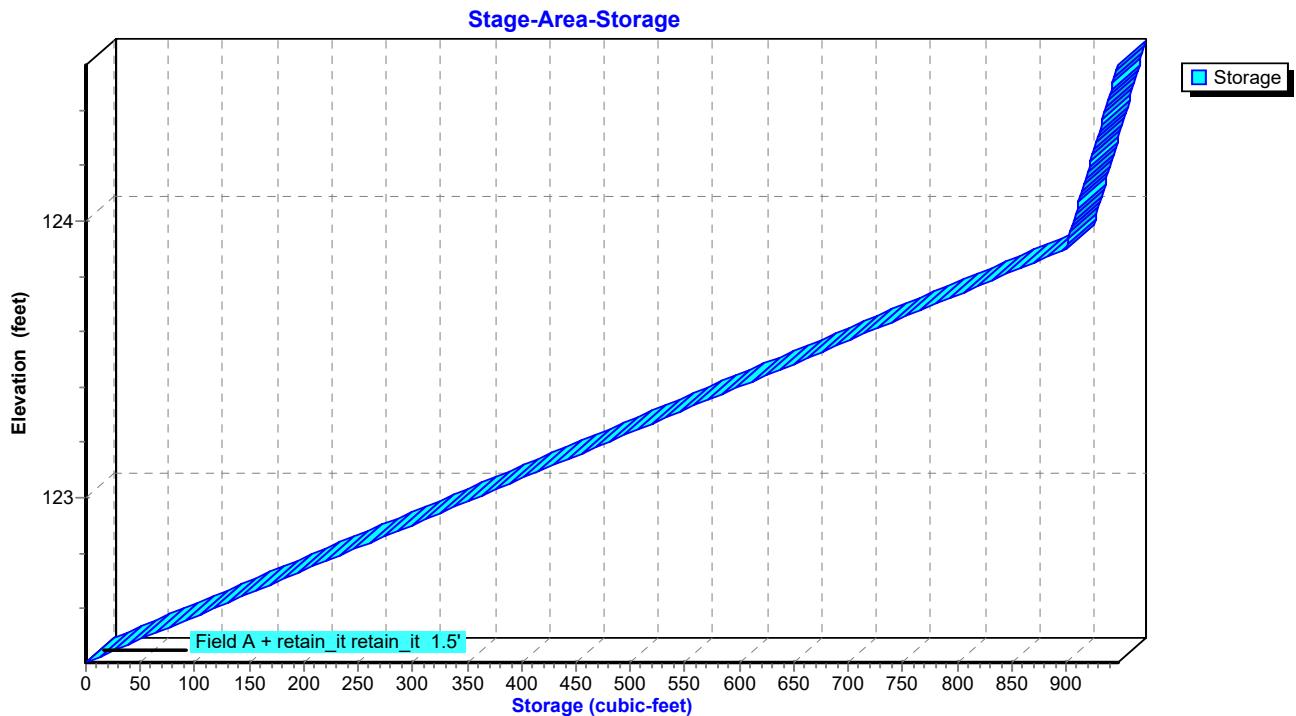
Hydrograph

**Pond UG-1: Underground Detention System #1**

Stage-Discharge



### Pond UG-1: Underground Detention System #1



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**Hydrograph for Pond UG-1: Underground Detention System #1**

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0	122.40	0.00
1.00	0.00	0	122.40	0.00
2.00	0.00	0	122.40	0.00
3.00	0.00	0	122.40	0.00
4.00	0.00	0	122.40	0.00
5.00	0.00	0	122.40	0.00
6.00	0.01	10	122.42	0.00
7.00	0.01	27	122.45	0.01
8.00	0.02	42	122.47	0.02
9.00	0.04	59	122.50	0.04
10.00	0.07	81	122.54	0.06
11.00	0.12	127	122.61	0.10
12.00	<b>1.33</b>	<b>492</b>	<b>123.22</b>	<b>0.95</b>
13.00	<b>0.20</b>	<b>276</b>	<b>122.86</b>	<b>0.22</b>
14.00	0.12	233	122.79	0.13
15.00	0.09	215	122.76	0.10
16.00	0.07	198	122.73	0.07
17.00	0.05	187	122.71	0.06
18.00	0.04	178	122.70	0.04
19.00	0.04	173	122.69	0.04
20.00	0.03	170	122.68	0.03
21.00	0.03	167	122.68	0.03
22.00	0.03	165	122.67	0.03
23.00	0.02	162	122.67	0.02
24.00	0.02	159	122.66	0.02
25.00	0.00	114	122.59	0.01
26.00	0.00	74	122.52	0.01
27.00	0.00	46	122.48	0.01
28.00	0.00	29	122.45	0.00
29.00	0.00	20	122.43	0.00
30.00	0.00	15	122.42	0.00
31.00	0.00	11	122.42	0.00
32.00	0.00	9	122.42	0.00
33.00	0.00	8	122.41	0.00
34.00	0.00	6	122.41	0.00
35.00	0.00	5	122.41	0.00
36.00	0.00	5	122.41	0.00
37.00	0.00	4	122.41	0.00
38.00	0.00	4	122.41	0.00
39.00	0.00	3	122.41	0.00
40.00	0.00	3	122.41	0.00
41.00	0.00	3	122.40	0.00
42.00	0.00	3	122.40	0.00
43.00	0.00	3	122.40	0.00
44.00	0.00	2	122.40	0.00
45.00	0.00	2	122.40	0.00
46.00	0.00	2	122.40	0.00
47.00	0.00	2	122.40	0.00
48.00	0.00	2	122.40	0.00

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**Stage-Discharge for Pond UG-1: Underground Detention System #1**

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
122.40	0.00	123.46	3.07	124.52	5.70
122.42	0.00	123.48	3.15	124.54	5.74
122.44	0.01	123.50	3.22	124.56	<b>5.78</b>
122.46	0.01	123.52	3.30		
122.48	0.02	123.54	3.37		
122.50	0.04	123.56	3.44		
122.52	0.06	123.58	3.50		
122.54	0.08	123.60	3.56		
122.56	0.10	123.62	3.62		
122.58	0.12	123.64	3.67		
122.60	0.15	123.66	3.72		
122.62	0.18	123.68	3.78		
122.64	0.22	123.70	3.83		
122.66	0.25	123.72	3.89		
122.68	0.29	123.74	3.94		
122.70	0.33	123.76	4.00		
122.72	0.38	123.78	4.05		
122.74	0.42	123.80	4.11		
122.76	0.47	123.82	4.16		
122.78	0.52	123.84	4.21		
122.80	0.58	123.86	4.26		
122.82	0.63	123.88	4.31		
122.84	0.69	123.90	4.36		
122.86	0.75	123.92	4.41		
122.88	0.81	123.94	4.46		
122.90	0.87	123.96	4.51		
122.92	0.94	123.98	4.56		
122.94	1.00	124.00	4.61		
122.96	1.07	124.02	4.65		
122.98	1.14	124.04	4.70		
123.00	1.21	124.06	4.75		
123.02	1.29	124.08	4.79		
123.04	1.36	124.10	4.84		
123.06	1.44	124.12	4.88		
123.08	1.51	124.14	4.93		
123.10	1.59	124.16	4.97		
123.12	1.67	124.18	5.01		
123.14	1.75	124.20	5.06		
123.16	1.83	124.22	5.10		
123.18	1.91	124.24	5.14		
123.20	1.99	124.26	5.18		
123.22	2.08	124.28	5.23		
123.24	2.16	124.30	5.27		
123.26	2.24	124.32	5.31		
123.28	2.33	124.34	5.35		
123.30	2.41	124.36	5.39		
123.32	2.50	124.38	5.43		
123.34	2.58	124.40	5.47		
123.36	2.66	124.42	5.51		
123.38	2.75	124.44	5.55		
123.40	2.83	124.46	5.59		
123.42	2.91	124.48	5.63		
123.44	2.99	124.50	5.67		

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**Stage-Area-Storage for Pond UG-1: Underground Detention System #1**

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
122.40	0	123.46	636	124.52	944
122.42	12	123.48	648	124.54	946
122.44	24	123.50	660	124.56	<b>947</b>
122.46	36	123.52	672		
122.48	48	123.54	684		
122.50	60	123.56	696		
122.52	72	123.58	708		
122.54	84	123.60	720		
122.56	96	123.62	732		
122.58	108	123.64	744		
122.60	120	123.66	756		
122.62	132	123.68	768		
122.64	144	123.70	780		
122.66	156	123.72	792		
122.68	168	123.74	804		
122.70	180	123.76	816		
122.72	192	123.78	828		
122.74	204	123.80	840		
122.76	216	123.82	852		
122.78	228	123.84	864		
122.80	240	123.86	876		
122.82	252	123.88	888		
122.84	264	123.90	900		
122.86	276	123.92	901		
122.88	288	123.94	903		
122.90	300	123.96	904		
122.92	312	123.98	905		
122.94	324	124.00	907		
122.96	336	124.02	908		
122.98	348	124.04	910		
123.00	360	124.06	911		
123.02	372	124.08	913		
123.04	384	124.10	914		
123.06	396	124.12	916		
123.08	408	124.14	917		
123.10	420	124.16	918		
123.12	432	124.18	920		
123.14	444	124.20	921		
123.16	456	124.22	923		
123.18	468	124.24	924		
123.20	480	124.26	926		
123.22	492	124.28	927		
123.24	504	124.30	929		
123.26	516	124.32	930		
123.28	528	124.34	931		
123.30	540	124.36	933		
123.32	552	124.38	934		
123.34	564	124.40	936		
123.36	576	124.42	937		
123.38	588	124.44	939		
123.40	600	124.46	940		
123.42	612	124.48	941		
123.44	624	124.50	943		

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**Summary for Pond UG-2: Underground Infiltration System #1**

Inflow Area = 42,604 sf, 63.97% Impervious, Inflow Depth = 6.54" for 100-YR event  
 Inflow = 6.60 cfs @ 12.09 hrs, Volume= 23,217 cf  
 Outflow = 5.01 cfs @ 12.17 hrs, Volume= 23,217 cf, Atten= 24%, Lag= 4.7 min  
 Discarded = 0.06 cfs @ 8.03 hrs, Volume= 6,432 cf  
 Primary = 4.95 cfs @ 12.17 hrs, Volume= 16,785 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3  
 Peak Elev= 123.51' @ 12.17 hrs Surf.Area= 2,548 sf Storage= 4,110 cf

Plug-Flow detention time= 126.9 min calculated for 23,217 cf (100% of inflow)  
 Center-of-Mass det. time= 126.9 min ( 925.1 - 798.2 )

Volume	Invert	Avail.Storage	Storage Description
#1A	121.50'	260 cf	<b>26.00'W x 98.00'L x 2.67'H Field A</b> 6,795 cf Overall - 6,144 cf Embedded = 651 cf x 40.0% Voids
#2A	121.50'	3,913 cf	<b>retain_it retain_it 2.0' x 36 Inside #1</b> Inside= 84.0"W x 24.0"H => 13.78 sf x 8.00'L = 110.3 cf Outside= 96.0"W x 32.0"H => 21.33 sf x 8.00'L = 170.7 cf 3 Rows adjusted for 56.7 cf perimeter wall
4,174 cf			Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	121.50'	<b>1.020 in/hr Exfiltration over Surface area</b> Phase-In= 0.01'
#2	Device 3	121.50'	<b>18.0" Round Culvert</b> L= 30.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 121.50' / 121.50' S= 0.0000 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf
#3	Device 4	122.65'	<b>4.0' long Sharp-Crested Rectangular Weir</b> 2 End Contraction(s)
#4	Primary	122.02'	<b>15.0" Round Culvert</b> L= 60.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 122.02' / 121.70' S= 0.0053 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.23 sf

**Discarded OutFlow** Max=0.06 cfs @ 8.03 hrs HW=121.53' (Free Discharge)  
 ↑ 1=Exfiltration (Exfiltration Controls 0.06 cfs)

**Primary OutFlow** Max=4.95 cfs @ 12.17 hrs HW=123.51' TW=0.00' (Dynamic Tailwater)  
 ↑ 4=Culvert (Barrel Controls 4.95 cfs @ 4.28 fps)  
 ↑ 3=Sharp-Crested Rectangular Weir (Passes 4.95 cfs of 9.98 cfs potential flow)  
 ↑ 2=Culvert (Passes 4.95 cfs of 6.23 cfs potential flow)

**Pond UG-2: Underground Infiltration System #1 - Chamber Wizard Field A****Chamber Model = retain\_it retain\_it 2.0' (retain-it®)**

Inside= 84.0"W x 24.0"H =&gt; 13.78 sf x 8.00'L = 110.3 cf

Outside= 96.0"W x 32.0"H =&gt; 21.33 sf x 8.00'L = 170.7 cf

3 Rows adjusted for 56.7 cf perimeter wall

12 Chambers/Row x 8.00' Long = 96.00' Row Length +12.0" End Stone x 2 = 98.00' Base Length

3 Rows x 96.0" Wide + 12.0" Side Stone x 2 = 26.00' Base Width

32.0" Chamber Height = 2.67' Field Height

1.9 cf Sidewall x 12 x 2 + 1.9 cf Endwall x 3 x 2 = 56.7 cf Perimeter Wall

36 Chambers x 110.3 cf - 56.7 cf Perimeter wall = 3,913.4 cf Chamber Storage

36 Chambers x 170.7 cf = 6,144.0 cf Displacement

6,794.7 cf Field - 6,144.0 cf Chambers = 650.7 cf Stone x 40.0% Voids = 260.3 cf Stone Storage

Chamber Storage + Stone Storage = 4,173.6 cf = 0.096 af

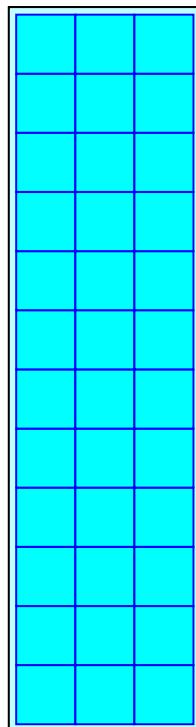
Overall Storage Efficiency = 61.4%

Overall System Size = 98.00' x 26.00' x 2.67'

36 Chambers

251.7 cy Field

24.1 cy Stone



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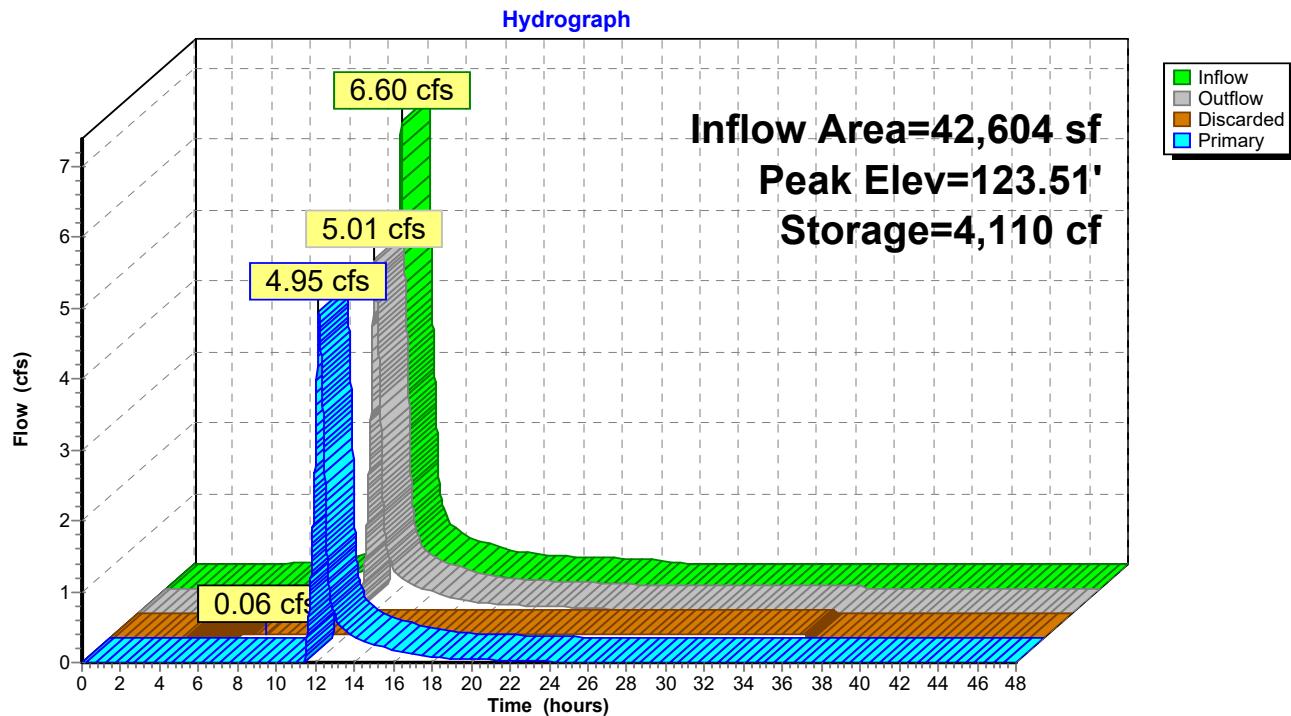
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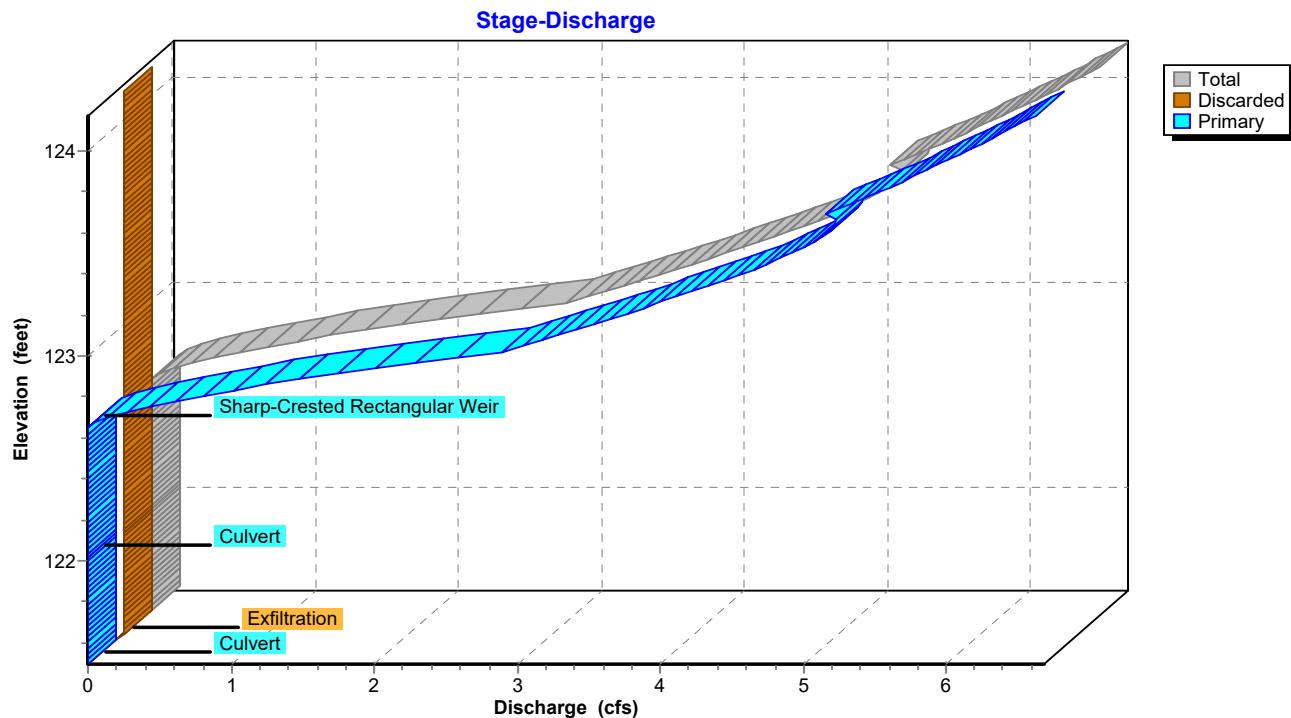
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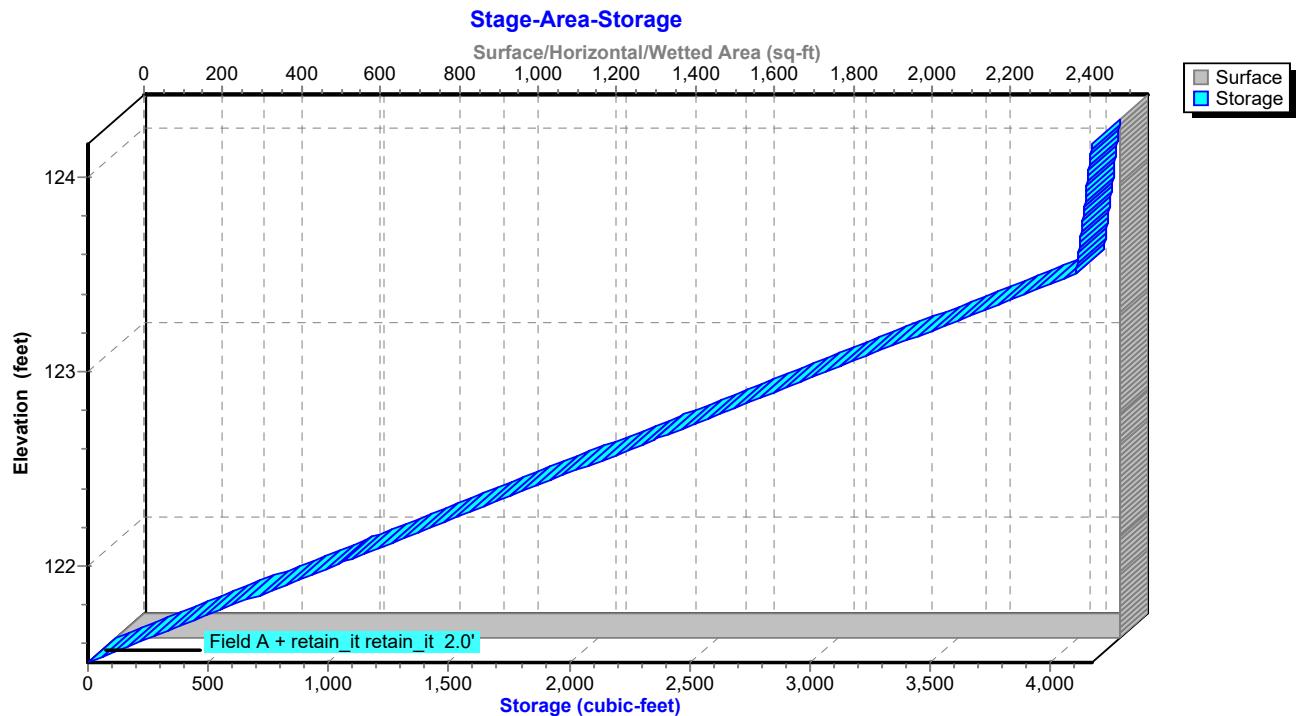
## Pond UG-2: Underground Infiltration System #1



## Pond UG-2: Underground Infiltration System #1



### Pond UG-2: Underground Infiltration System #1



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**Hydrograph for Pond UG-2: Underground Infiltration System #1**

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	121.50	0.00	0.00	0.00
1.00	0.00	0	121.50	0.00	0.00	0.00
2.00	0.00	0	121.50	0.00	0.00	0.00
3.00	0.00	0	121.50	0.00	0.00	0.00
4.00	0.00	0	121.50	0.00	0.00	0.00
5.00	0.01	4	121.50	0.01	0.01	0.00
6.00	0.02	8	121.50	0.02	0.02	0.00
7.00	0.05	16	121.51	0.05	0.05	0.00
8.00	0.09	52	121.53	0.06	<b>0.06</b>	0.00
9.00	0.15	260	121.63	0.06	<b>0.06</b>	0.00
10.00	0.24	759	121.87	0.06	0.06	0.00
11.00	0.41	1,699	122.33	0.06	0.06	0.00
12.00	<b>4.05</b>	<b>3,160</b>	<b>123.04</b>	<b>3.07</b>	0.06	<b>3.01</b>
13.00	<b>0.66</b>	<b>2,646</b>	<b>122.79</b>	<b>0.73</b>	0.06	<b>0.67</b>
14.00	0.41	2,553	122.74	0.43	0.06	0.37
15.00	0.31	2,513	122.72	0.32	0.06	0.26
16.00	0.22	2,476	122.71	0.23	0.06	0.17
17.00	0.17	2,451	122.69	0.18	0.06	0.12
18.00	0.13	2,431	122.68	0.14	0.06	0.08
19.00	0.12	2,419	122.68	0.12	0.06	0.06
20.00	0.11	2,411	122.67	0.11	0.06	0.05
21.00	0.10	2,404	122.67	0.10	0.06	0.04
22.00	0.09	2,397	122.67	0.09	0.06	0.03
23.00	0.08	2,390	122.66	0.08	0.06	0.02
24.00	0.07	2,382	122.66	0.07	0.06	0.01
25.00	0.01	2,227	122.58	0.06	0.06	0.00
26.00	0.01	2,051	122.50	0.06	0.06	0.00
27.00	0.01	1,863	122.41	0.06	0.06	0.00
28.00	0.00	1,663	122.31	0.06	0.06	0.00
29.00	0.00	1,455	122.21	0.06	0.06	0.00
30.00	0.00	1,244	122.11	0.06	0.06	0.00
31.00	0.00	1,031	122.00	0.06	0.06	0.00
32.00	0.00	816	121.90	0.06	0.06	0.00
33.00	0.00	602	121.79	0.06	0.06	0.00
34.00	0.00	386	121.69	0.06	0.06	0.00
35.00	0.00	170	121.58	0.06	0.06	0.00
36.00	0.00	1	121.50	0.00	0.00	0.00
37.00	0.00	0	121.50	0.00	0.00	0.00
38.00	0.00	0	121.50	0.00	0.00	0.00
39.00	0.00	0	121.50	0.00	0.00	0.00
40.00	0.00	0	121.50	0.00	0.00	0.00
41.00	0.00	0	121.50	0.00	0.00	0.00
42.00	0.00	0	121.50	0.00	0.00	0.00
43.00	0.00	0	121.50	0.00	0.00	0.00
44.00	0.00	0	121.50	0.00	0.00	0.00
45.00	0.00	0	121.50	0.00	0.00	0.00
46.00	0.00	0	121.50	0.00	0.00	0.00
47.00	0.00	0	121.50	0.00	0.00	0.00
48.00	0.00	0	121.50	0.00	0.00	0.00

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**Stage-Discharge for Pond UG-2: Underground Infiltration System #1**

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)	Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
121.50	0.00	<b>0.00</b>	0.00	124.15	<b>6.64</b>	0.06	<b>6.57</b>
121.55	0.06	<b>0.06</b>	0.00				
121.60	0.06	0.06	0.00				
121.65	0.06	0.06	0.00				
121.70	0.06	0.06	0.00				
121.75	0.06	0.06	0.00				
121.80	0.06	0.06	0.00				
121.85	0.06	0.06	0.00				
121.90	0.06	0.06	0.00				
121.95	0.06	0.06	0.00				
122.00	0.06	0.06	0.00				
122.05	0.06	0.06	0.00				
122.10	0.06	0.06	0.00				
122.15	0.06	0.06	0.00				
122.20	0.06	0.06	0.00				
122.25	0.06	0.06	0.00				
122.30	0.06	0.06	0.00				
122.35	0.06	0.06	0.00				
122.40	0.06	0.06	0.00				
122.45	0.06	0.06	0.00				
122.50	0.06	0.06	0.00				
122.55	0.06	0.06	0.00				
122.60	0.06	0.06	0.00				
122.65	0.06	0.06	0.00				
122.70	0.21	0.06	0.15				
122.75	0.47	0.06	0.41				
122.80	0.81	0.06	0.75				
122.85	1.22	0.06	1.16				
122.90	1.67	0.06	1.61				
122.95	2.18	0.06	2.12				
123.00	2.72	0.06	2.66				
123.05	3.12	0.06	3.06				
123.10	3.35	0.06	3.29				
123.15	3.57	0.06	3.51				
123.20	3.80	0.06	3.74				
123.25	4.02	0.06	3.96				
123.30	4.23	0.06	4.17				
123.35	4.44	0.06	4.38				
123.40	4.63	0.06	4.57				
123.45	4.81	0.06	4.75				
123.50	4.98	0.06	4.92				
123.55	5.12	0.06	5.06				
123.60	5.23	0.06	5.17				
123.65	5.29	0.06	5.23				
123.70	5.26	0.06	5.20				
123.75	5.43	0.06	5.37				
123.80	5.59	0.06	5.53				
123.85	5.75	0.06	5.69				
123.90	5.91	0.06	5.85				
123.95	6.06	0.06	6.00				
124.00	6.21	0.06	6.15				
124.05	6.36	0.06	6.30				
124.10	6.50	0.06	6.44				

**Stage-Area-Storage for Pond UG-2: Underground Infiltration System #1**

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
121.50	<b>2,548</b>	0	124.15	2,548	<b>4,172</b>
121.55	2,548	103			
121.60	2,548	205			
121.65	2,548	308			
121.70	2,548	411			
121.75	2,548	514			
121.80	2,548	616			
121.85	2,548	719			
121.90	2,548	822			
121.95	2,548	924			
122.00	2,548	1,027			
122.05	2,548	1,130			
122.10	2,548	1,233			
122.15	2,548	1,335			
122.20	2,548	1,438			
122.25	2,548	1,541			
122.30	2,548	1,643			
122.35	2,548	1,746			
122.40	2,548	1,849			
122.45	2,548	1,952			
122.50	2,548	2,054			
122.55	2,548	2,157			
122.60	2,548	2,260			
122.65	2,548	2,362			
122.70	2,548	2,465			
122.75	2,548	2,568			
122.80	2,548	2,671			
122.85	2,548	2,773			
122.90	2,548	2,876			
122.95	2,548	2,979			
123.00	2,548	3,081			
123.05	2,548	3,184			
123.10	2,548	3,287			
123.15	2,548	3,390			
123.20	2,548	3,492			
123.25	2,548	3,595			
123.30	2,548	3,698			
123.35	2,548	3,800			
123.40	2,548	3,903			
123.45	2,548	4,006			
123.50	2,548	4,109			
123.55	2,548	4,113			
123.60	2,548	4,118			
123.65	2,548	4,123			
123.70	2,548	4,128			
123.75	2,548	4,133			
123.80	2,548	4,138			
123.85	2,548	4,143			
123.90	2,548	4,148			
123.95	2,548	4,152			
124.00	2,548	4,157			
124.05	2,548	4,162			
124.10	2,548	4,167			

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**Summary for Pond UG-3: Underground Infiltration System #2**

Inflow Area = 34,270 sf, 100.00% Impervious, Inflow Depth = 8.13" for 100-YR event  
 Inflow = 6.47 cfs @ 12.08 hrs, Volume= 23,218 cf  
 Outflow = 6.45 cfs @ 12.09 hrs, Volume= 23,218 cf, Atten= 0%, Lag= 0.4 min  
 Discarded = 0.05 cfs @ 3.25 hrs, Volume= 6,436 cf  
 Primary = 6.40 cfs @ 12.09 hrs, Volume= 16,781 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3  
 Peak Elev= 124.16' @ 12.09 hrs Surf.Area= 1,924 sf Storage= 3,141 cf

Plug-Flow detention time= 172.7 min calculated for 23,213 cf (100% of inflow)  
 Center-of-Mass det. time= 172.9 min ( 913.6 - 740.7 )

Volume	Invert	Avail.Storage	Storage Description
#1A	121.50'	209 cf	<b>26.00'W x 74.00'L x 2.67'H Field A</b> 5,131 cf Overall - 4,608 cf Embedded = 523 cf x 40.0% Voids
#2A	121.50'	2,932 cf	<b>retain_it retain_it 2.0' x 27 Inside #1</b> Inside= 84.0"W x 24.0"H => 13.78 sf x 8.00'L = 110.3 cf Outside= 96.0"W x 32.0"H => 21.33 sf x 8.00'L = 170.7 cf 3 Rows adjusted for 45.4 cf perimeter wall
3,141 cf			Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	121.50'	<b>1.020 in/hr Exfiltration over Surface area</b> Phase-In= 0.01'
#2	Device 3	121.50'	<b>18.0" Round Culvert</b> L= 70.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 121.50' / 121.50' S= 0.0000 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.77 sf
#3	Device 4	123.25'	<b>4.0' long Sharp-Crested Rectangular Weir</b> 2 End Contraction(s)
#4	Primary	122.02'	<b>15.0" Round Culvert</b> L= 60.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 122.02' / 121.70' S= 0.0053 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.23 sf

**Discarded OutFlow** Max=0.05 cfs @ 3.25 hrs HW=121.53' (Free Discharge)  
 ↑ 1=Exfiltration (Exfiltration Controls 0.05 cfs)

**Primary OutFlow** Max=6.40 cfs @ 12.09 hrs HW=124.16' TW=0.00' (Dynamic Tailwater)  
 ↑ 4=Culvert (Passes 6.40 cfs of 6.60 cfs potential flow)  
 ↑ 3=Sharp-Crested Rectangular Weir (Passes 6.40 cfs of 10.80 cfs potential flow)  
 ↑ 2=Culvert (Inlet Controls 6.40 cfs @ 3.62 fps)

**Pond UG-3: Underground Infiltration System #2 - Chamber Wizard Field A****Chamber Model = retain\_it retain\_it 2.0' (retain-it®)**

Inside= 84.0"W x 24.0"H =&gt; 13.78 sf x 8.00'L = 110.3 cf

Outside= 96.0"W x 32.0"H =&gt; 21.33 sf x 8.00'L = 170.7 cf

3 Rows adjusted for 45.4 cf perimeter wall

9 Chambers/Row x 8.00' Long = 72.00' Row Length +12.0" End Stone x 2 = 74.00' Base Length

3 Rows x 96.0" Wide + 12.0" Side Stone x 2 = 26.00' Base Width

32.0" Chamber Height = 2.67' Field Height

1.9 cf Sidewall x 9 x 2 + 1.9 cf Endwall x 3 x 2 = 45.4 cf Perimeter Wall

27 Chambers x 110.3 cf - 45.4 cf Perimeter wall = 2,932.2 cf Chamber Storage

27 Chambers x 170.7 cf = 4,608.0 cf Displacement

5,130.7 cf Field - 4,608.0 cf Chambers = 522.7 cf Stone x 40.0% Voids = 209.1 cf Stone Storage

Chamber Storage + Stone Storage = 3,141.3 cf = 0.072 af

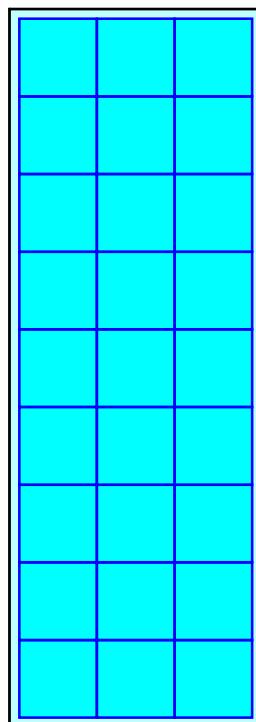
Overall Storage Efficiency = 61.2%

Overall System Size = 74.00' x 26.00' x 2.67'

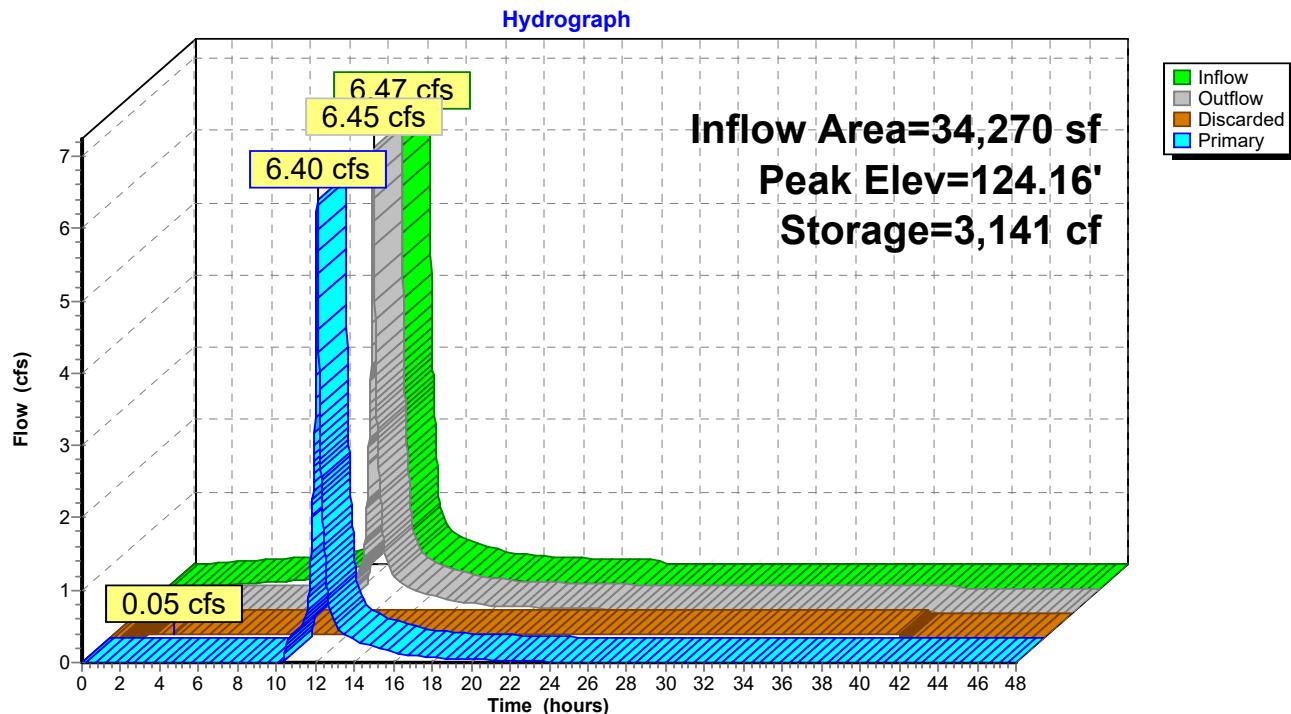
27 Chambers

190.0 cy Field

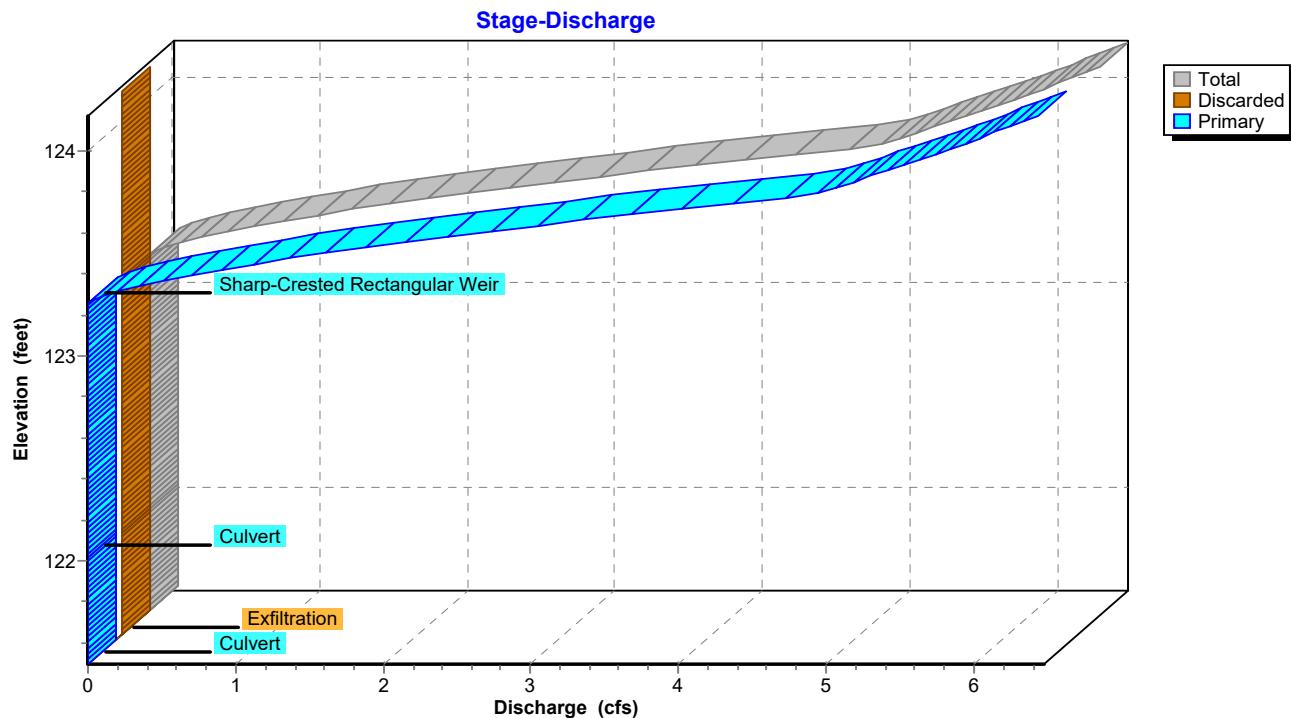
19.4 cy Stone



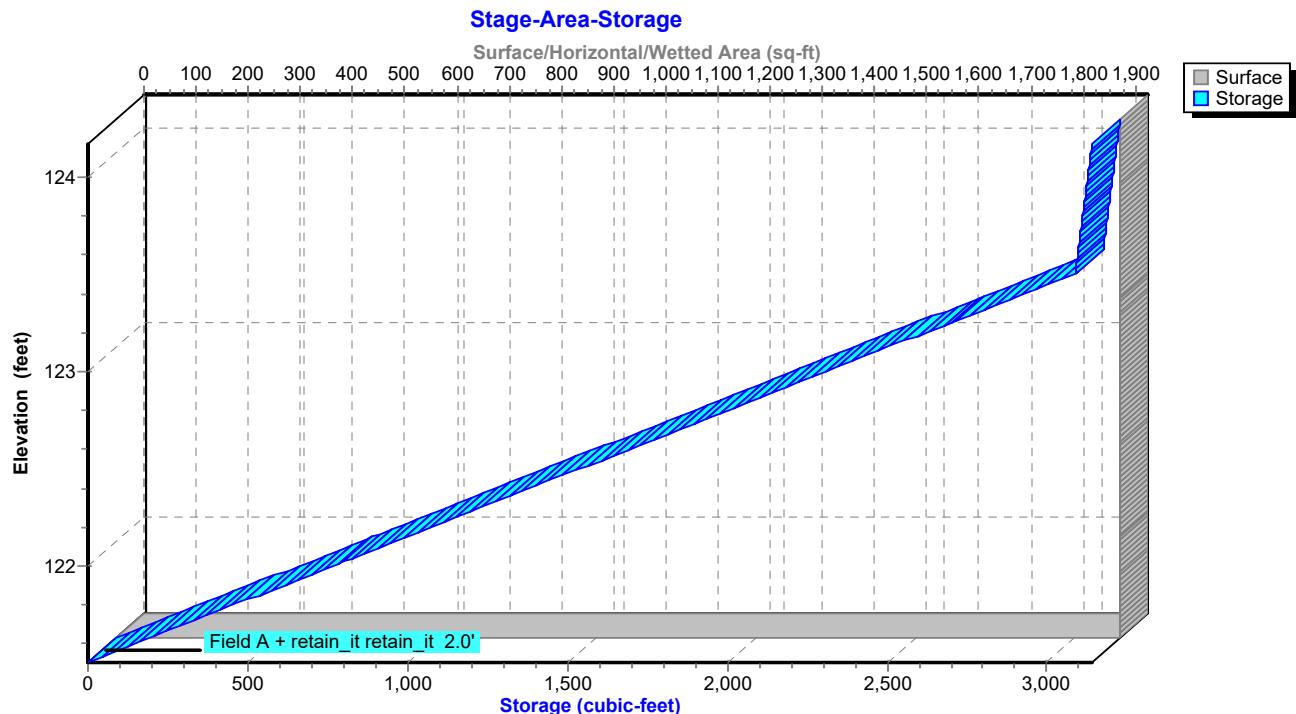
### Pond UG-3: Underground Infiltration System #2



### Pond UG-3: Underground Infiltration System #2



### Pond UG-3: Underground Infiltration System #2



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**Hydrograph for Pond UG-3: Underground Infiltration System #2**

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	121.50	0.00	0.00	0.00
1.00	0.02	5	121.50	0.01	0.01	0.00
2.00	0.04	13	121.51	0.04	0.04	0.00
3.00	0.06	29	121.52	0.05	<b>0.05</b>	0.00
4.00	0.07	98	121.56	0.05	<b>0.05</b>	0.00
5.00	0.09	218	121.64	0.05	0.05	0.00
6.00	0.10	384	121.75	0.05	0.05	0.00
7.00	0.13	625	121.90	0.05	0.05	0.00
8.00	0.16	989	122.14	0.05	0.05	0.00
9.00	0.24	1,540	122.50	0.05	0.05	0.00
10.00	0.31	2,366	123.03	0.05	0.05	0.00
11.00	0.47	2,857	123.35	0.45	0.05	0.41
12.00	<b>4.07</b>	<b>3,105</b>	<b>123.71</b>	<b>4.02</b>	0.05	<b>3.97</b>
13.00	<b>0.54</b>	<b>2,887</b>	<b>123.37</b>	<b>0.58</b>	0.05	<b>0.53</b>
14.00	0.34	2,830	123.33	0.35	0.05	0.31
15.00	0.26	2,804	123.32	0.26	0.05	0.22
16.00	0.18	2,779	123.30	0.19	0.05	0.14
17.00	0.14	2,763	123.29	0.15	0.05	0.10
18.00	0.11	2,749	123.28	0.11	0.05	0.07
19.00	0.10	2,742	123.28	0.10	0.05	0.05
20.00	0.09	2,737	123.27	0.09	0.05	0.04
21.00	0.08	2,733	123.27	0.08	0.05	0.04
22.00	0.07	2,728	123.27	0.07	0.05	0.03
23.00	0.06	2,724	123.26	0.07	0.05	0.02
24.00	0.06	2,718	123.26	0.06	0.05	0.01
25.00	0.00	2,569	123.16	0.05	0.05	0.00
26.00	0.00	2,405	123.06	0.05	0.05	0.00
27.00	0.00	2,242	122.95	0.05	0.05	0.00
28.00	0.00	2,078	122.85	0.05	0.05	0.00
29.00	0.00	1,915	122.74	0.05	0.05	0.00
30.00	0.00	1,751	122.63	0.05	0.05	0.00
31.00	0.00	1,587	122.53	0.05	0.05	0.00
32.00	0.00	1,424	122.42	0.05	0.05	0.00
33.00	0.00	1,260	122.32	0.05	0.05	0.00
34.00	0.00	1,097	122.21	0.05	0.05	0.00
35.00	0.00	933	122.10	0.05	0.05	0.00
36.00	0.00	770	122.00	0.05	0.05	0.00
37.00	0.00	606	121.89	0.05	0.05	0.00
38.00	0.00	443	121.79	0.05	0.05	0.00
39.00	0.00	279	121.68	0.05	0.05	0.00
40.00	0.00	116	121.57	0.05	0.05	0.00
41.00	0.00	0	121.50	0.00	0.00	0.00
42.00	0.00	0	121.50	0.00	0.00	0.00
43.00	0.00	0	121.50	0.00	0.00	0.00
44.00	0.00	0	121.50	0.00	0.00	0.00
45.00	0.00	0	121.50	0.00	0.00	0.00
46.00	0.00	0	121.50	0.00	0.00	0.00
47.00	0.00	0	121.50	0.00	0.00	0.00
48.00	0.00	0	121.50	0.00	0.00	0.00

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**Stage-Discharge for Pond UG-3: Underground Infiltration System #2**

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)	Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
121.50	0.00	<b>0.00</b>	0.00	124.15	<b>6.42</b>	0.05	<b>6.37</b>
121.55	0.05	<b>0.05</b>	0.00				
121.60	0.05	0.05	0.00				
121.65	0.05	0.05	0.00				
121.70	0.05	0.05	0.00				
121.75	0.05	0.05	0.00				
121.80	0.05	0.05	0.00				
121.85	0.05	0.05	0.00				
121.90	0.05	0.05	0.00				
121.95	0.05	0.05	0.00				
122.00	0.05	0.05	0.00				
122.05	0.05	0.05	0.00				
122.10	0.05	0.05	0.00				
122.15	0.05	0.05	0.00				
122.20	0.05	0.05	0.00				
122.25	0.05	0.05	0.00				
122.30	0.05	0.05	0.00				
122.35	0.05	0.05	0.00				
122.40	0.05	0.05	0.00				
122.45	0.05	0.05	0.00				
122.50	0.05	0.05	0.00				
122.55	0.05	0.05	0.00				
122.60	0.05	0.05	0.00				
122.65	0.05	0.05	0.00				
122.70	0.05	0.05	0.00				
122.75	0.05	0.05	0.00				
122.80	0.05	0.05	0.00				
122.85	0.05	0.05	0.00				
122.90	0.05	0.05	0.00				
122.95	0.05	0.05	0.00				
123.00	0.05	0.05	0.00				
123.05	0.05	0.05	0.00				
123.10	0.05	0.05	0.00				
123.15	0.05	0.05	0.00				
123.20	0.05	0.05	0.00				
123.25	0.05	0.05	0.00				
123.30	0.19	0.05	0.15				
123.35	0.46	0.05	0.41				
123.40	0.80	0.05	0.75				
123.45	1.20	0.05	1.16				
123.50	1.66	0.05	1.61				
123.55	2.16	0.05	2.12				
123.60	2.71	0.05	2.66				
123.65	3.29	0.05	3.24				
123.70	3.91	0.05	3.86				
123.75	4.55	0.05	4.51				
123.80	5.03	0.05	4.98				
123.85	5.25	0.05	5.20				
123.90	5.46	0.05	5.42				
123.95	5.67	0.05	5.62				
124.00	5.86	0.05	5.82				
124.05	6.05	0.05	6.01				
124.10	6.24	0.05	6.19				

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**Stage-Area-Storage for Pond UG-3: Underground Infiltration System #2**

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
121.50	<b>1,924</b>	0	124.15	1,924	<b>3,140</b>
121.55	1,924	77			
121.60	1,924	154			
121.65	1,924	232			
121.70	1,924	309			
121.75	1,924	386			
121.80	1,924	463			
121.85	1,924	541			
121.90	1,924	618			
121.95	1,924	695			
122.00	1,924	772			
122.05	1,924	849			
122.10	1,924	927			
122.15	1,924	1,004			
122.20	1,924	1,081			
122.25	1,924	1,158			
122.30	1,924	1,236			
122.35	1,924	1,313			
122.40	1,924	1,390			
122.45	1,924	1,467			
122.50	1,924	1,544			
122.55	1,924	1,622			
122.60	1,924	1,699			
122.65	1,924	1,776			
122.70	1,924	1,853			
122.75	1,924	1,931			
122.80	1,924	2,008			
122.85	1,924	2,085			
122.90	1,924	2,162			
122.95	1,924	2,240			
123.00	1,924	2,317			
123.05	1,924	2,394			
123.10	1,924	2,471			
123.15	1,924	2,548			
123.20	1,924	2,626			
123.25	1,924	2,703			
123.30	1,924	2,780			
123.35	1,924	2,857			
123.40	1,924	2,935			
123.45	1,924	3,012			
123.50	1,924	3,089			
123.55	1,924	3,093			
123.60	1,924	3,097			
123.65	1,924	3,101			
123.70	1,924	3,105			
123.75	1,924	3,109			
123.80	1,924	3,113			
123.85	1,924	3,116			
123.90	1,924	3,120			
123.95	1,924	3,124			
124.00	1,924	3,128			
124.05	1,924	3,132			
124.10	1,924	3,136			

## **SECTION 4 – STORMWATER MANAGEMENT CALCULATIONS**

## 4.1 STANDARD 3: RECHARGE CALCULATIONS

The Required Recharge Volume is computed using the equation provided in the 2008 Massachusetts Stormwater Handbook. The volume is computed as an equivalent depth of rainfall over the proposed impervious areas in accordance with a Target Depth Factor based on the soil classifications. The Calculations is as follows:

$$Rv = (F) X (\text{Impervious Area})$$

(Equation 1) Volume 3, Ch 1, page 15

- $Rv$  = Required Recharge Volume, expressed in cubic feet, cubic yards, or acre-feet
- $F$  = Target Depth Factor associated with each Hydrologic Soil Group (HSG)
- Impervious Area = new pavement and new rooftop area
- The Target Depth Factor “ $F$ ” per Table 2.3.2, Volume 3, Chapter 1 for each soil classification is as follows:
  - A soils = 0.60 inches
  - B soils = 0.35 inches
  - C soils = 0.25 inches
  - D soils = 0.10 inches

The existing impervious area within limit of work is 76,513 SF (pavement, buildings, compacted gravel parking) and the total proposed impervious area within limit of work is 93,128 SF (pavement, buildings). Therefore, there is an increase in impervious area of 16,615 SF.

Infiltration basins and underground infiltration chambers are utilized as infiltration BMPs for the site. Based on the test pits performed, groundwater was assumed to be at elevation 119.5 and 121.0. It appears that the infiltration basins and subsurface infiltration has the minimum 2-feet of separation between the bottom of the recharge structure and seasonal high groundwater.

Based on the above formula, the minimum required recharge volume for the site is as follows:

Per Section 1.3, the onsite soils are considered “B” soils:

- $F$  (B soils) = 0.35 inches
- Impervious Area = 93,128 SF

$$Rv = (F) X (\text{Impervious Area})$$

$$Rv = (0.35 \text{ in}) \times (1\text{ft}/12 \text{ in}) \times 93,128 \text{ SF} = 2,717 \text{ CF}$$

**TOTAL RECHARGE VOLUME REQUIRED = 2,717 CF**

**Recharge Volume BMP Table**

Infiltration BMP	Infiltration Rate (in/hr) k	Storage (Recharge) Volume (CF) Rv
Infiltration Basin #1 (IB#1)	1.02	764
Infiltration Basin #2 (IB#2)	1.02	1,995
Underground Infiltration Chambers (UG#2)	1.02	2,362
Underground Infiltration Chambers (UG#3)	1.02	2,626
<b>Totals</b>		<b>7,747</b>

*k = saturated hydraulic conductivity (in/hr)*  
*Rv = storage volume (CF)*  
*Volume 3, Chapter 1 of the MA Stormwater Handbook*

**TOTAL RECHARGE VOLUME PROVIDED = 7,747 CF**

**Conclusion:**

Due to groundwater depth restricting infiltration BMPs elsewhere on the site, we feel that this design recharges to the maximum extent practicable and meets the standard for recharge for new development.

## 4.2 DRAWDOWN TIME

Below are the drawdown time calculations for the infiltration systems proposed on the site. The calculation uses estimated hydraulic conductivity values "K" in accordance with the Rawls Rates table. The formula below utilized the recommended formula per the MA Stormwater Handbook as follows:

$$\text{Drawdown Time} = Rv / [(K * \text{Bottom Area}) * (1\text{FT}/12\text{IN})]$$

- $Rv$  = Storage Volume (CF)
- $K$  = Saturated Hydraulic Conductivity per Rawls Rate Table
- Bottom Area = Area of Bottom of Proposed Recharge Structure

Below is a summary table of the drawdown calculations:

DRAWDOWN CALCULATIONS				
Infiltration BMP	Infiltration Rate (IN/HR) k	Storage (Recharge) Volume Provided (CF) Rv	Bottom Area (SF)	Draw Down Time (HR)
Infiltration Basin #1 (IB#1)	1.02	764	140	64.20
Infiltration Basin #2 (IB#2)	1.02	1,995	672	34.92
Underground Infiltration Chambers (UG#2)	1.02	2,362	2,548	10.91
Underground Infiltration Chambers (UG#3)	1.02	2,626	1,924	16.06
<b>Totals</b>		<b>7,747</b>		

*k = saturated hydraulic conductivity (IN/HR)  
Rv = storage volume (CF)  
Bottom Area (SF)  
Volume 3, Chapter 1 of the MA Stormwater Handbook*

### Conclusion:

The calculations show that the infiltration BMP draws down in less than 72 hours, as required.

## 4.3 STANDARD 4: WATER QUALITY

Stormwater runoff is proposed to be treated through various combinations of deep sump catch basins, grass swales, offline water quality units, underground infiltration and detention chambers and permeable pavement. All combinations of BMP's treat the required 1-inch WQV to at least 80% TSS removal. Please refer to section 4.5 for all TSS removal calculations.

A table has been provided below that calculates the water quality flow and provides the sizing of the water quality units selected. The WQU's have been sized to treat 1" WQV of the contributing tributary area. There is one (1) in-line CDS1515 unit proposed and one (1) offline CDS2015 unit proposed. A diversion manhole directs the required water quality flow (1-inch) into the water quality unit. The larger flows will pass over the weir, and directly into the underground infiltration chambers. The elevation of the weir is calculated using the Manning's equation. Please see the following spread sheets for the calculations. A flow of 0.75 CFS in an 18" RCP pipe with a slope of 0.5% will develop a water depth in the pipe of approximate 3.4 inches. The weir elevation is proposed to be 3.4 inches higher than the invert in to ensure that the 1" WQV is treated in the WQU. The water quality calculated flow was used to size the unit.

<b><u>Water Quality Unit Sizing Using Equivalent Flow from 1" Rainfall Depth</u></b>										
Basin / WQ structure	Tributary Area (acres)	Tributary Area (sq miles)	Pervious (sf)	Impervious %	CN Value (Estimated)	WQV (ln)	Tc (min)	qu (csm/in)	WQF = qu A Q (cfs)	Unit
CDS #1	0.31	0.0005	5,581	58%	83	1.00	5	795	0.22	CDS-1515
CDS #2	0.67	0.0010	9,770	67%	86	1.00	5	795	0.55	CDS-2015

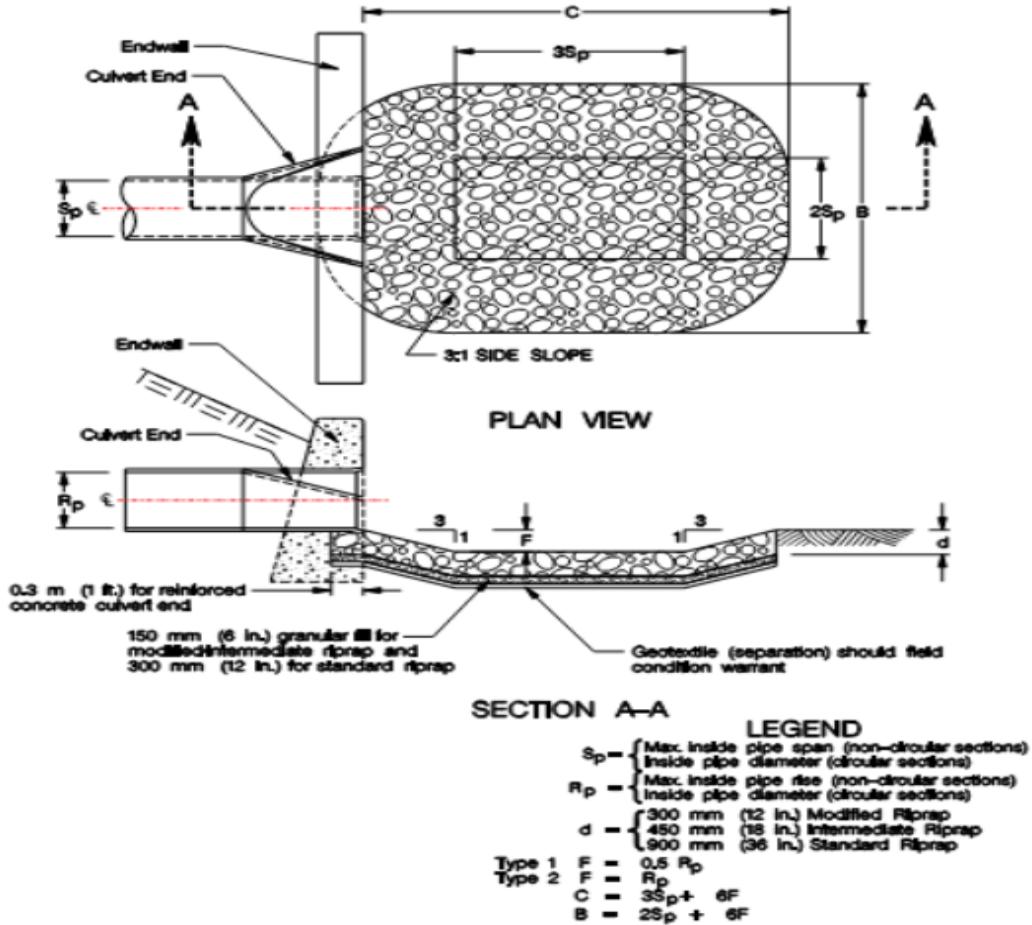
## 4.4 RIP RAP SPLASH PAD

Rip rap splash pads are designed to dissipate energy, prevent scour at the stormwater outlet, and minimize the potential for downstream erosion. A LEVEL SPREADER / PLUNGE POOLE was sized for each of the outlets of the drainage system. The calculations below are in accordance with the methodology of the "2002 Connecticut Guidelines for Soil Erosion and Sediment Control" produced by The Connecticut Council on Soil and Water Conservation.

<b>Preformed Scour Hole Calculations</b>										
	Q (25Y) (cfs)	Do (ft.)	TW (ft.)	Depression (ft.)	C (ft.)	3Sp (ft.)	B (ft.)	2Sp (ft.)	d50 (ft.)	(in.)
18" HDPE Pipe	11.13	1.5	0.30	0.75	9.00	4.50	7.50	3.00	0.60	7.20

### **Conclusion:**

As identified above, the discharge points have been designed to accommodate and exceed the required minimum rip-rap stone sizing



## 4.5 TSS REMOVAL

The project has been designed to comply with the required 80% TSS (minimum) removal per the Massachusetts Stormwater Regulations. Various combinations of stormwater BMPs including deep sump hooded catch basins, oil/grit separators, proprietary water quality units and subsurface infiltration chambers are utilized.

Please refer to the attached TSS calculation sheets that follow:

## INSTRUCTIONS:

Non-automated: Mar. 4, 2008

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

TSS Removal  
Calculation Worksheet

UNDERGROUND INFILTRATION BASIN UG-1 (via CB, WQU)				
A BMP <sup>1</sup>	B TSS Removal Rate <sup>1</sup>	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Deep Sump and Hooded Catch Basin	0.25	1.00	0.25	0.75
CDS WQU	0.80	0.75	0.60	0.15
Detention BASIN UG-1 (Retain-It System)	0.00	0.15	0.00	0.15
	0.00	0.15	0.00	0.15

Total TSS Removal =

85%

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

Project: 533 BP Rd, Wayland  
 Prepared By: DJN  
 Date: 1/12/2023

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

## INSTRUCTIONS:

Non-automated: Mar. 4, 2008

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

TSS Removal  
Calculation Worksheet

UNDERGROUND INFILTRATION BASIN UG-1 (via CB, WQU)				
A BMP <sup>1</sup>	B TSS Removal Rate <sup>1</sup>	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Deep Sump and Hooded Catch Basin	0.25	1.00	0.25	0.75
CDS	0.80	0.75	0.60	0.15
UNDERGROUND INFILTRATION CHAMBERS UG-1 (Retain-It System)	0.80	0.15	0.12	0.03
		0.00	0.00	0.03

Total TSS Removal =

97%

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

Project: 533 BP Rd, Wayland  
 Prepared By: DJN  
 Date: 1/12/2023

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

## INSTRUCTIONS:

Non-automated: Mar. 4, 2008

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

TSS Removal  
Calculation Worksheet

Location: Infiltration Basin with Sediment Forebay				
A BMP <sup>1</sup>	B TSS Removal Rate <sup>1</sup>	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Infiltration Basin with Sediment Forebay	0.80	1.00	0.80	0.20
	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00

**Total TSS Removal =** 80%

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

Project:	533 BP, Wayland
Prepared By:	DJN
Date:	1/12/2023

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



particle re-suspension. In order to not restrict the Owner's ability to maintain the SWTD, the minimum dimension providing access from the ground surface to the sump chamber shall be 20 inches in diameter.

2. The SWTD shall be designed to capture and retain Total Petroleum Hydrocarbons generated by wet-weather flow and dry-weather gross spills. The minimum storage capacity provided by the SWTD shall be in accordance with the volume listed in Table 1 below.

**TABLE 1**

CDS Model	Treatment Capacity (cfs)/(L/s)	Minimum Sump Storage Capacity (yd <sup>3</sup> )/(m <sup>3</sup> )	Minimum Oil Storage Capacity (gal)/(L)
CDS2015-G	0.7 (19.8)	0.5 (0.4)	70 (265)
CDS2015-4	0.7 (19.8)	0.5 (1.4)	70 (265)
CDS2015	0.7(19.8)	1.3 (1.0)	92 (348)
CDS2020	1.1 (31.2)	1.3 (1.0)	131 (496)
CDS2025	1.6 (45.3)	1.3 (1.0)	143 (541)
CDS3020	2.0 (56.6)	2.1 (1.6)	146 (552)
CDS3030	3.0 (85.0)	2.1 (1.6)	205 (776)
CDS3035	3.8 (106.2)	2.1 (1.6)	234 (885)
CDS4030	4.5 (127.4)	5.6 (4.3)	407 (1540)
CDS4040	6.0 (169.9)	5.6 (4.3)	492 (1862)
CDS4045	7.5 (212.4)	5.6 (4.3)	534 (2012)
CDS2020-D	1.1 (31.2)	1.3 (1.0)	131 (495)
CDS3020-D	2.0 (56.6)	2.1 (1.6)	146 (552)
CDS3030-D	3.0 (85.0)	2.1 (1.6)	205 (776)
CDS3035-D	3.8 (106.2)	2.1 (1.6)	234 (885)
CDS4030-D	4.5 (127.4)	4.3 (3.3)	328 (1241)
CDS4040-D	6.0 (169.9)	4.3 (3.3)	396 (1499)
CDS4045-D	7.5 (212.4)	4.3 (3.3)	430 (1627)
CDS5640-D	9.0 (254.9)	5.6 (4.3)	490 (1854)
CDS5653-D	14.0 (396.5)	5.6 (4.3)	599 (2267)
CDS5668-D	19.0 (538.1)	5.6 (4.3)	733 (2774)
CDS5678-D	25.0 (708.0)	5.6 (4.3)	814 (3081)
CDS3030-DV	3.0 (85.0)	2.1 (1.6)	205 (776)
CDS5042-DV	9.0 (254.9)	1.9 (1.5)	294 (1112)
CDS5050-DV	11.0 (311.5)	1.9 (1.5)	367 (1389)
CDS7070-DV	26.0 (736.3)	3.3 (2.5)	914 (3459)
CDS10060-DV	30.0 (849.6)	5.0 (3.8)	792 (2997)
CDS10080-DV	50.0 (1416.0)	5.0 (3.8)	1057 (4000)
CDS100100-DV	64.0 (1812.5)	5.0 (3.8)	1320 (4996)

## **SECTION 5 – LONG TERM OPERATION & MAINTENANCE**

# **LONG-TERM STORMWATER OPERATION & MAINTENANCE PLAN**

## **HERB CHAMBERS 533 Boston Post Road, LLC**

533 BOSTON POST ROAD  
WAYLAND, MA 01778

### **PROJECT OVERVIEW:**

The Applicant, Herb Chambers 533 Boston Post Road, LLC (HC), proposes a modification and modernization of the existing Bentley - Maserati – Lamborghini – Rolls-Royce – Alfa Romeo of Wayland at 533 Boston Post Road in Wayland, MA. The proposed scope includes renovating the existing automobile dealership to add additional service bays for vehicle service. Site renovations include reconfigured parking for employees, customers, and vehicle inventory storage, as well as upgrades to stormwater management systems, utilities, and landscaping.

The site is bound by Boston Post Road (Route 20) to the north, commercial properties to the east (Richey & Clapper, Inc.) and west (Herb Chambers Jaguar Land Rover), and an undeveloped portion of the Herb Chambers Jaguar Land Rover parcel that extends to the South, which is mostly comprised of wetlands, and borders the Great Meadows National Wildlife Refuge and the former CSX Railway, which was recently purchased by the Town of Wayland. The site is located on Parcel 21-003 and is 2.95 acres. The property is located within the Limited Commercial District.

Appended to this document is a sample maintenance form and a chart describing the anticipated frequency of tasks.

### **OWNER AND RESPONSIBLE PARTY:**

#### ***Current Land Owners:***

Herb Chambers 533 Boston Post Road, LLC.  
533 Boston Post Road  
Wayland, MA 01778

#### ***Proposed Site Contractor:***

TBD

For any service beyond the service ability of staff on site for Herb Chambers, there will be subcontracting to the appropriate vendors such as street sweeping, catch basin and water quality unit cleaning, etc.

## **CONSTRUCTION MANAGEMENT:**

A construction manager with adequate knowledge and experience on projects of similar size and scope shall be employed to oversee all site work related construction. The contractor shall incorporate the appropriate techniques to control sediment and erosion pollution during construction in accordance with the *Massachusetts Erosion and Sediment Control Guidelines for Urban and Suburban Areas* and any conditions of approval from the local conservation commission.

Care should be taken when constructing stormwater control structures. Light earth-moving equipment shall be used to excavate in the vicinity of the infiltration areas. Use of heavy equipment causes excessive compaction of the soils beneath the basin resulting in reduced infiltration capacity. At no time shall temporary infiltration areas or settling basins be constructed in the vicinity of the proposed infiltration basins in order to prevent the soils from becoming clogged with sediment.

## **ON-GOING MAINTENANCE CONTRACT**

The non-structural and structural approaches recommended below, as well as the required BMP maintenance, will be completed by the selected contractor. Adequate personnel with appropriate training and access to proper equipment will be available to complete the tasks. Future responsible parties must be notified of their responsibility to operate and maintain the system in perpetuity.

## **MAINTENANCE LOG**

The Responsible Party shall develop and maintain a log of inspections, maintenance, repairs, and disposal (including location of disposal) during the life of the project. Records will be maintained for at least 3 years and be made available to the Massachusetts Department of Environmental Protection or the Town of Wayland in accordance with the provisions of the Massachusetts Stormwater Handbook. A sample of such a maintenance log is provided.

## **STORMWATER BMP MAINTENANCE**

The proposed stormwater management system has been designed with appropriate BMPs aimed at reducing the pollutants discharge based upon the intended use of the property. All BMPs require regular maintenance to function as intended. Some management measures have simple maintenance requirements; others are more involved. The Responsible Party must have all BMPs regularly inspected to ensure they are operating properly on an as needed basis, including during runoff events exceeding 0.5 inches of rainfall.

A description of the non-structural and structural approaches to be incorporated is indicated below. The following best management practices are proposed to be incorporated into the stormwater management design to reduce source runoff and improve stormwater runoff discharge quality. The Responsible Party will regularly inspect all BMPs to ensure they are

operating properly. If any deficiencies are identified during these inspections, action to resolve it will be initiated and documented on the maintenance log.

## **STRUCTURAL BMPs**

### Deep Sump Hooded Catch Basins

On a regular basis the inlet pipe and outlet pipe shall be checked for debris and removed as necessary to ensure unobstructed flow of water. Inspections shall occur at least four times per year, and at the end of the foliage and snow removal seasons. Inspections shall verify the tees are secure and free flowing. Sediments must also be removed four times per year or 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. Basins shall be cleaned using a vacuum pump. All liquid shall be pumped from the sump of each basin at least once per year. All sediments and hydrocarbons should be properly handled and disposed of in accordance with local, state and federal guidelines and regulations.

### Subsurface Infiltration/Detention Systems

The subsurface system (retain-it, 2.0' tall) has been designed with an access manhole to aid in the removal of sediment and debris. Preventative maintenance shall be performed in accordance with manufacturer's instructions, which is enclosed in this section. Retain-it suggests periodic inspections with a greater number occurring during the systems start-up to identify any issues of concern as they may arise. Cleaning will take place at the completion of construction and as deemed necessary based on the inspections. Retain-it recommends use of a vacuum truck to suction the accumulated sediment, oils and greases, and trash and debris from the system. Oils and greases may additionally be handled by on-site staff utilizing absorbent products to soak up the oils. Refer to the enclosed "retain-it Owners Maintenance Manual."

### CDS Water Quality Units

Contech CDS water quality units shall be maintained in accordance with the manufacturer's recommendations. Refer to the enclosed "CDS Guide: Operation, Design Performance and Maintenance." Cleaning of a CDS system should be done during dry weather when no flow is entering the system. Typically, a vacuum truck removes accumulated sediment and oil most efficiently. Simply remove the manhole covers and insert the vacuum hose into the sump. The system should be completely drained down and the sump fully evacuated of sediment. The area outside the screen should also be

cleaned out if pollutant build-up exists in this area. The system should be cleaned out immediately in the case of an oil or gasoline spill.

Inspection should occur at least twice annually, once in the fall and then in the spring after the snow melts. Ideally the unit should be checked frequently throughout the first year, and that will dictate the schedule going forward. All sediment and hydrocarbons should be properly handled and disposed of in accordance with local, state and federal guidelines and regulations. Cleaning will take place at the completion of construction and as deemed necessary based on the inspections and manufacturer's requirements.

## **NON-STRUCTURAL BMPs**

### Grass Conveyance Swale

Inspect grass swale the first few months after construction to make sure that there is no drilling or gulling, and that vegetation in the swale is adequate. Thereafter, inspect twice a year for slope integrity, soil moisture, vegetative health, soil stability, soil compaction, soil erosion, ponding, and sediment accumulation. Regular maintenance tasks include mowing, fertilizing, liming, watering, pruning, weeding and pest control. Mow the swale at least once per year. Do not cut the grass shorter than three to four inches. Keep grass height under 6 inches to maintain the design depth necessary to serve as conveyance. Do not mow excessively, because it may increase the design flow velocity. Remove sediment and debris manually at least once per year. Re seed periodically to maintain the dense growth of grass vegetation. Take care to protect grass swale from snow removal procedures and off-street parking.

### Pavement Sweeping

As street sweeping is a BMP under DEP guidelines, this non-structural BMP is an effective removal of Total Suspended Solids (TSS) in a comprehensive stormwater management program. Litter and debris are to be regularly picked up and removed from the pavement. Paved areas are to be swept a minimum of quarterly per year.

### Pervious Areas and Slopes

Runoff from pervious areas and slopes shall be directed over vegetated areas to promote settlement of suspended solids before entering a wetland or resource area. Steep pervious slopes will be permanently vegetated to dissipate energy and reduce potential erosion. No constructed vegetated slopes should exceed 2H:1V. Slopes exceeding 2:1 shall be stabilized with rip-rap, jute netting or other similar measures to minimize the potential for future erosion.

## Drainage Control Structures, Flared End Sections, Trash Racks, Riprap Pads, Swales, and Level Spreader Splash Pads

Basin control structures and flared end sections shall be inspected and any debris or growth surrounding or within these structures shall be removed. Any/all debris or vegetation encroaching on the control structures our outfall components shall be removed or appropriately trimmed back to maintain the designed control elevation and flow patterns/cross section without impediment. Inspection should occur twice annually, once in the fall and then in the spring after the snow melts. Cleaning will take place at the completion of construction and as deemed necessary based on the inspections and manufacturer's requirements.

## Pest and Insect Control

- As a first-line defense against pests/insects and weeds (the "First-Line Defense"), the party responsible for maintenance shall avoid the use of non-organic pesticides, herbicides, fungicides and insecticides unless spot treatment is required for a specific control application. The owner shall not be required to undertake extraordinary measures or incur unreasonable cost to locate, purchase or apply non-organic products.
- If the First-Line Defense fails, as determined by the owner or party responsible for maintenance, in its sole but reasonable discretion, non-organic approaches to pest/insect control may be used, the same to be applied by a professional licensed in the Commonwealth of Massachusetts, where required. But in no event shall such non-organic approaches be used within the 100ft. buffer zone to the wetlands, unless approved by the Wayland Conservation Commission.

## Waste Management

Solid waste and recycling will be contained in dumpsters for routine and regular trash pickup. The maintenance staff is directed to place their trash and recyclables in the appropriate bins at the trash/recycling facility provided on site.

## Snow Removal

Snow removal is handled by Herb Chambers own in-house facility maintenance personnel. The drive aisles are plowed to maintain access through the site and around the building. The Chambers team will tightly arrange the vehicles together in one part of the lot, then plow the open section of the lot toward the islands, then move the cars back into their spaces and plow the remainder. The Chambers team anticipates they can typically handle between 1 to 1.5 feet of snow accumulation before having to switch to hauling off site. The Chambers team will contract to have the snow hauled from the site.

### Hazardous Waste and Spill Control Containment

In the event of a discharge or spill of oil or another hazardous material, outlets to stormwater management facilities immediately downstream of the spill shall be plugged so that hazardous materials do not enter the system. In the event of a discharge of oil or other hazardous material, responsible facility personnel shall notify the appropriate state agencies, the Town of Wayland DPW and the EPA National Response Center 1-800-424-8802 shall be notified. All hazardous waste materials will be disposed of in a manner specified by local, state and/or federal regulations and by the manufacturer of such products.

### Activities Prohibited on Site

Any exterior/outdoor vehicle servicing, equipment cleaning, or vehicle washing of any kind on the subject property is prohibited. Also refer to the Order of Conditions by the Conservation Commission and Planning Board Decision(s), as all general and special conditions post-construction must be followed in perpetuity, once issued.

## Stormwater BMP Inspection and Maintenance Log

Facility Name	
Address	
Begin Date	End Date

Date	BMP ID#	BMP Description	Inspected by:	Cause for Inspection	Exceptions Noted	Comments and Actions Taken

**Instructions:** Record all inspections and maintenance for all treatment BMPs on this form. Use additional log sheets and/or attach extended comments or documentation as necessary. Submit a copy of the completed log with the annual independent inspectors' report to the municipality and start a new log at that time.

BMP ID# — Always use ID# from the Operation and Maintenance Manual.

Inspected by — Note all inspections and maintenance on this form, including the required independent annual inspection.

Cause for inspection — Note if the inspection is routine, pre-rainy-season, post-storm, annual, or in response to a noted problem or complaint.

Exceptions noted — Note any condition that requires correction or indicates a need for maintenance.

Comments and actions taken — Describe any maintenance done and need for follow-up.

# Stormwater BMP Inspection Matrix

## CDS® Inspection and Maintenance Guide

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## Maintenance

The CDS system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects pollutants will depend more heavily on site activities than the size of the unit. For example, unstable soils or heavy winter sanding will cause the grit chamber to fill more quickly but regular sweeping of paved surfaces will slow accumulation.

## Inspection

Inspection is the key to effective maintenance and is easily performed. Pollutant transport and deposition may vary from year to year and regular inspections will help ensure that the system is cleaned out at the appropriate time. At a minimum, inspections should be performed twice per year (e.g. spring and fall) however more frequent inspections may be necessary in climates where winter sanding operations may lead to rapid accumulations, or in equipment washdown areas. Installations should also be inspected more frequently where excessive amounts of trash are expected.

The visual inspection should ascertain that the system components are in working order and that there are no blockages or obstructions in the inlet and separation screen. The inspection should also quantify the accumulation of hydrocarbons, trash, and sediment in the system. Measuring pollutant accumulation can be done with a calibrated dipstick, tape measure or other measuring instrument. If absorbent material is used for enhanced removal of hydrocarbons, the level of discoloration of the sorbent material should also be identified during inspection. It is useful and often required as part of an operating permit to keep a record of each inspection. A simple form for doing so is provided.

Access to the CDS unit is typically achieved through two manhole access covers. One opening allows for inspection and cleanout of the separation chamber (cylinder and screen) and isolated sump. The other allows for inspection and cleanout of sediment captured and retained outside the screen. For deep units, a single manhole access point would allow both sump cleanout and access outside the screen.

The CDS system should be cleaned when the level of sediment has reached 75% of capacity in the isolated sump or when an appreciable level of hydrocarbons and trash has accumulated. If absorbent material is used, it should be replaced when significant discoloration has occurred. Performance will not be impacted until 100% of the sump capacity is exceeded however it is recommended that the system be cleaned prior to that for easier removal of sediment. The level of sediment is easily determined by measuring from finished grade down to the top of the sediment pile. To avoid underestimating the level of sediment in the chamber, the measuring device must be lowered to the top of the sediment pile carefully. Particles at the top of the pile typically offer less resistance to the end of the rod than consolidated particles toward the bottom of the pile. Once this measurement is recorded, it should be compared to the as-built drawing for the unit to determine whether the height of the sediment pile off the bottom of the sump floor exceeds 75% of the total height of isolated sump.

## Cleaning

Cleaning of a CDS systems should be done during dry weather conditions when no flow is entering the system. The use of a vacuum truck is generally the most effective and convenient method of removing pollutants from the system. Simply remove the manhole covers and insert the vacuum hose into the sump. The system should be completely drained down and the sump fully evacuated of sediment. The area outside the screen should also be cleaned out if pollutant build-up exists in this area.

In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, the system should be cleaned out immediately in the event of an oil or gasoline spill should be cleaned out immediately. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use absorbent pads since they are usually less expensive to dispose than the oil/water emulsion that may be created by vacuuming the oily layer. Trash and debris can be netted out to separate it from the other pollutants. The screen should be power washed to ensure it is free of trash and debris.

Manhole covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and also to ensure that proper safety precautions have been followed. Confined space entry procedures need to be followed if physical access is required. Disposal of all material removed from the CDS system should be done in accordance with local regulations. In many jurisdictions, disposal of the sediments may be handled in the same manner as the disposal of sediments removed from catch basins or deep sump manholes.



CDS Model	Diameter		Distance from Water Surface to Top of Sediment Pile		Sediment Storage Capacity	
	ft	m	ft	m	yd <sup>3</sup>	m <sup>3</sup>
CDS2015-4	4	1.2	3.0	0.9	0.9	0.7
CDS2015	5	1.5	3.0	0.9	1.3	1.0
CDS2020	5	1.5	3.5	1.1	1.3	1.0
CDS2025	5	1.5	4.0	1.2	1.3	1.0
CDS3020	6	1.8	4.0	1.2	2.1	1.6
CDS3030	6	1.8	4.6	1.4	2.1	1.6
CDS3035	6	1.8	5.0	1.5	2.1	1.6
CDS4030	8	2.4	4.6	1.4	5.6	4.3
CDS4040	8	2.4	5.7	1.7	5.6	4.3
CDS4045	8	2.4	6.2	1.9	5.6	4.3
CDS5640	10	3.0	6.3	1.9	8.7	6.7
CDS5653	10	3.0	7.7	2.3	8.7	6.7
CDS5668	10	3.0	9.3	2.8	8.7	6.7
CDS5678	10	3.0	10.3	3.1	8.7	6.7

Table 1: CDS Maintenance Indicators and Sediment Storage Capacities



#### Support

- Drawings and specifications are available at [www.contechstormwater.com](http://www.contechstormwater.com).
- Site-specific design support is available from our engineers.

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The product(s) described may be protected by one or more of the following US patents: 5,322,629; 5,624,576; 5,707,527; 5,759,415; 5,788,848; 5,985,157; 6,027,639; 6,350,374; 6,406,218; 6,641,720; 6,511,595; 6,649,048; 6,991,114; 6,998,038; 7,186,058; 7,296,692; 7,297,266; 7,517,450 related foreign patents or other patents pending.

## CDS Inspection & Maintenance Log

CDS Model: \_\_\_\_\_ Location: \_\_\_\_\_

Date	Water depth to sediment <sup>1</sup>	Floatable Layer Thickness <sup>2</sup>	Describe Maintenance Performed	Maintenance Personnel	Comments

1. The water depth to sediment is determined by taking two measurements with a stadia rod: one measurement from the manhole opening to the top of the sediment pile and the other from the manhole opening to the water surface. If the difference between these measurements is less than the values listed in table 1 the system should be cleaned out. Note: to avoid underestimating the volume of sediment in the chamber, the measuring device must be carefully lowered to the top of the sediment pile.
2. For optimum performance, the system should be cleaned out when the floating hydrocarbon layer accumulates to an appreciable thickness. In the event of an oil spill, the system should be cleaned immediately.



## OWNERS MAINTENANCE MANUAL

retain-it, LLC  
560 Salmon Brook Street  
Granby, CT 06035  
(860) 413-3050

**retain-it ®**

## **Owners Maintenance Manual**

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Sample Maintenance Log

## Description

retain-it® is a subsurface Storm Water Management system constructed of precast concrete structures. They are installed in a side by side configuration creating a continuous internal flow channel integrated throughout the system. Systems are constructed with designated inlet and outlet modules, some with multiple inlets and outlets depending on the site storm water system layout. Infiltration systems typically have an inlet and sidewalls/ base constructed on a stone infiltration blanket with geofabric installed at the native soil interface. Other systems incorporate outlet flow control devices. Detention systems are typically lined with a watertight membrane and have inlet and outlet control devices.

The retain-it® system can consist of multiple varying layouts, with no two the same. Given this, it should be noted that the operation and maintenance requirements are very similar regardless of the intended layout. It is important that the end user know the specific elements of each system so as to understand how best to optimize its operation.

**Installation per Design:** Operation is simple to follow where the installation was performed in accordance with the design specifications, drawings and calculations. Specifics shall be identified in the design drawings. As-built drawings will benefit the locating of specific design modules where the system has been buried below a parking lot area. Optional access manholes or removable grates may be installed above every inlet/outlet pipe and at critical design elements designated by the design.

**Daily Operation and Long Term Maintenance:** In general, daily usage of the system is self sufficient and will operate without requiring any outside assistance, except for periodic inspection to verify optimal performance and maintenance for removal of collected pollutants. A longer term maintenance program should incorporate a more thorough inspection of the all elements of the system to verify proper operating condition. This is more important with the infiltration type of systems where the soil infiltration surface may become restricted due to fine particle build up. Long term maintenance should include provisions for cleaning and removal of collected solids, oils and debris from the system.

**System Operation:** The system operational function is initiated according to rainfall runoff flows entering the structure. Internally, the runoff flows in a set pattern or sequence throughout the module layout in accordance with the hydraulic design conditions. The flows primarily operate on system head derived from the changes in

elevation from the internal water surface and the outlet invert elevation. Some designs incorporate internal flow controls to satisfy hydraulic conditions that enhance water quality treatment or other intended purposes. Modified systems may incorporate a pump, but in general there are no mechanical apparatus required.

End user operations primarily consist of inspection and maintenance of the system over time.

**Periodic Inspection:** Important note - All storm water management systems react differently depending on the conditions that are characteristic to the contributing water shed. Variables such as storm intensity, runoff flow rates, site geology, surface stabilization and pollution load will affect the system operation. As does the inspection and maintenance frequency to ensure optimum effectiveness.

Inspections should be done periodically, with a greater number scheduled during the system start up and less frequently as the operator becomes familiar with the system performance characteristics. It is recommended that the end user keep records of the performance using the inspection log record sheet found in the back of this manual. These records shall identify the cycle of maintenance "system calibration" required for the specific applications based on the contributing water shed variables operating under "normal" conditions.

Please note that immediate maintenance may be required during "non-normal" events such as during adverse weather conditions or emergency fuel spills. See information on emergency spills in this manual.

Visual inspection of all assessable components shall be performed throughout the lifetime of the system. Access has been supplied at critical points to monitor hydraulic performance and removed pollutants buildup.

### **Standard Maintenance:**

After construction has been completed and all disturbed surfaces have been stabilized by means of vegetation, asphalt or concrete surfaces, and all drainage system components have been constructed and are free of construction debris and sediments; then the storm water management system can be considered in an operational status.

Periodic visual inspections will help to identify issues of concern. The usual indicators are signs of slow flows, backed up water, visible oil, trash and debris or an excessive amount of sediment in the storage area.

Normal operational flows can be observed to flow freely at the predicted design elevations, from the inlet to the outlet module, following a serpentine path thru the storage and attenuation modules. Note that some modules are designed to permanently

retain water where others may hold water and slowly release it over a typical 24 hour period. During a storm water event, the flows and water surface elevations will fluctuate from a low flow to a high flow/ storage status. The storage modules should fill during the event and drain down within a 24 hour period after the event has stopped. All pipes, orifices, weirs and standpipes should pass flows freely and at optimum capacity.

Standard maintenance is performed using a vacuum truck to suction the accumulated sediments, oils and greases and trash and debris from the system. Whereas an on-site maintenance staff can remove these items by hand, it is preferred that the vacuum truck be used as dictated by specific system conditions. When a specialized module designed to have a permanent water level is used, the vacuum truck should pump the liquid level down to inspect the below water elevation structures and sump storage areas.

Oils and greases can be handled by on-site staff by utilizing absorbent products that soak up the oils (and not) converting the oils from a liquid into a manageable solid form. These oil soaked absorbent materials should be disposed of in an approved manner.

Sediments, trash and debris shall be removed and disposed of in an approved manner.

Any indications of hazardous material, determined by visual inspection, testing, smell or abnormality, should be reported and handled per appropriate regulations.

## **Flow Conditions**

System operators should familiarize themselves with proper hydraulic flow condition indicators, acceptable depths of sedimentation, debris and trash build up, and concentrations of oils and greases.

*Hydraulic flow conditions* are those that are established by the design as either a flow/storage or as a water quality treatment function. Both have performance characteristics that can be visually identified so as to determine the effective and efficient operation of the system.

The engineering design drawings should note the various expected water surface level elevations that are achieved during different design storms within the various modules. Since it is difficult for a visual inspection to coincide with the exact time given water elevations are predicted, the following guidelines are given for evaluation.

### **Visual Inspection Guide:**

#### Internal Flow Evaluation

Low flow: water should flow freely from the inlet to the outlet, travelling the intended attenuation path thru the system with the water surface elevation below the structure

beam height (12" deep), the system should drain completely 24 hours after a storm event,

Medium flow: the system should hold and maintain a water level during the 24 hour storm event and yet continually fill as the storm increases or drain downward as the event recedes. Flow within the system should occur freely from inlet to outlet only being restricted when a flow control structure has been integrally designed in place. Flow control devices may result in a water level backing up either temporarily or permanently; noting devices such as water quality modules may require a permanent water level to operate properly (see water quality treatment). Other system applications should drain completely 24 hours after a storm event.

High flow: the system should fill to the maximum design storm water level elevation (hydraulic grade line) per design. In most cases, that is the highest storage elevation available in the system, at the underside of the module top slab, or the invert of the overflow pipe. As the storm event recedes, the water level should begin to drain down via flow thru the system and discharge. The system should drain completely within 24 hours after a storm event.

## **Pollutant Storage Capacities**

### **Oil and Grease**

Oil and Grease Collection (with optional Oil water separator module specified) - Oil and grease accumulation is generally a function related to vehicle parking lot and drive areas, oil generating land uses or emergency spill conditions. It is important to maintain the system from accumulating excessive volumes of oils in that they may wash over into other sections of the system potentially clogging and reducing the infiltration capacity, blocking control devices and contaminating the overall system. The following standards apply.

Oil should not accumulate more than a visible sheen on the water surface in the oil water separation module only. A sheen is described as a fine, thin oil layer on the water surface identified by the glossy rainbow colors. A dipstick (dry wooden stick) can be used as a probe to determine the thickness of oil on the surface.

Accumulated oils could be associated with insufficient maintenance or a potential large volume oil resource. Any accumulation of oil should be promptly maintained by an experienced waste handler. Emergency spills such as those generated by an accidental spill shall be contained and removed immediately before the next storm event. Spills shall be handled in accordance with local environmental regulations. See spill and accumulated oil maintenance procedures.

## Sediments

Sediments (with optional primary grit module or sedimentation modules specified) - Sediments shall be periodically removed from the system as they accumulate within the designated storage modules. The inlet modules are generally equipped with a sediment storage sump located in the base of the inlet structure. Inspection should be performed after major storm events or a minimum of annually, unless a different inspection cycle has been determined to be sufficient. Inspection shall consist of using a probe to determine the presence of and depth of the accumulated solids. Access is via the 24" manhole.

Note that excessive volumes of sediments will reduce the performance and efficiency of the system. Regional accumulations of solids such as those associated with ice and snow, may result in large springtime volumes of sand and gravels used for traction and ice control.

## Trash and Debris

Trash and Debris (with optional trash and debris module specified) - Trash and debris accumulates in the inlet module in three forms; floating debris, neutrally buoyant, and heavy material. The floating debris is visible from the access manhole floating on the water surface in the form of but not limited to wood, paper, plastic, foam, bottles and cans. The neutrally buoyant material resides below the surface and combines with the natural flow regime of the system. It is hard to detect and can only be recognized when at a high concentration appears as a thickening of the water viscosity. Heavier material will simply settle to the sump base and combine with the sediments.

Note that trash and debris typically cause the most problems when they become lodged in a flow control device such as an outlet elbow, riser pipe, and orifice or weir structure. This can be detected visibly when the system is pumped down during maintenance. It can also be evaluated as a condition when flow is impeded and the water level backs up higher than the design elevations.

## **Emergency Spill Conditions (with optional emergency spill control module specified):**

Emergency spill conditions are defined as an excessive accumulation of hydrocarbons such as oil, gasoline, diesel fuel, transmission oil or antifreeze usually resulting from an accidental discharge. Excessive accumulation is described as any amount larger than a thin "sheen" visible on the water surface.

Care should be given in handling these types of fluids. The incident should be reported to the appropriate authorities and should be mitigated by a hazardous waste consultant approved for such matters.

**retain-it ®**

Maintenance Log

Storm Water Management System

Location: ID #:

<u>Date</u>	<u>Inspection Notes</u>	<u>Inspector</u>
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**Note the following conditions:**

Inlet Module

Outlet Module

Water Quality Module

Oil Elbow

Oil Accumulation

Sedimentation Accumulation

Trash and Debris Quantity

Flow Conditions

Flow Control Outlet Structure

Overflow Pipe

## **SECTION 6 – SOILS TESTING DATA**



**NORTHEAST**  
**GEOTECHNICAL, INC.**  
*Delivering Practical Engineering Solutions*

**GEOTECHNICAL ENGINEERING REPORT  
PROPOSED BUILDING ADDITION  
HERB CHAMBERS BENTLEY OF BOSTON  
533 BOSTON POST ROAD  
WAYLAND, MASSACHUSETTS**

**Prepared For:**  
**Herb Chambers 533 Boston Post Road, LLC**  
**295 McGrath Highway**  
**Somerville, MA 02143**

**Prepared By:**  
**Northeast Geotechnical, Inc.**  
**166 Raymond Hall Drive**  
**North Attleborough, MA 02760**

**Project No. H494.00**  
**September 30, 2022**



September 30, 2022

Project No. H494.00

Herb Chambers 533 Boston Post Road, LLC  
c/o John Welch  
Director of Construction & Facilities  
The Herb Chambers Companies – Jennings Road Management Corporation  
295 McGrath Highway  
Somerville, MA 02143

SUBJECT: Geotechnical Engineering Report  
Proposed Building Addition  
Herb Chambers Bentley of Boston  
533 Boston Post Road  
Wayland, MA

Dear John:

Northeast Geotechnical, Inc. is pleased to present this report summarizing the results of our geotechnical engineering studies for the proposed building addition being planned for the subject site. Our studies have been performed in accordance with our proposal to you dated August 5, 2022.

Our first objective was to assess the existing subsurface soil and groundwater conditions in the proposed building area and potential subsurface stormwater drainage areas by observing and logging exploratory soil test borings. Then, based on the subsurface conditions encountered, we developed geotechnical engineering recommendations for use in foundation and ground floor slab design for the proposed building addition and for use in earthwork construction activities. We also developed a recommended seismic site class based on the subsurface soil conditions encountered. Conclusions regarding estimated seasonal high groundwater observations are also presented.

## **BACKGROUND**

Site plans provided to us by Crocker Design Group show a proposed, one-story addition with a mezzanine level located at the southwest end of the existing one-story building in an area that is mostly covered with pavement. The addition is shown to cover a footprint area of about 9,000 square feet. We assume the finish floor elevation will match the existing building near Elevation 126 feet which is close to the existing grades of about  $125\pm$  to  $126\pm$  feet in this area.

Three potential subsurface stormwater drainage areas are also being proposed generally in existing pavement areas along the north, south and west sides of the site.

## **SUBSURFACE EXPLORATORY SOIL TEST BORINGS**

Northeast Geotechnical, Inc. coordinated, observed and logged 12 soil test borings (B-1 to B-12) on October 7 to 9, 2022 to assess the subsurface soil and groundwater conditions in the proposed building addition area and the potential subsurface stormwater drainage areas. Test borings B-1 to B-6 were performed in the proposed building addition area and test borings B-7 to B-12 were performed in the potential subsurface drainage areas.

The test borings were performed by Drilex Environmental, Inc. of Auburn, Massachusetts using a truck-mounted drill rig. Each boring was advanced using  $4.25\pm$  inch inside diameter hollow stem augers to depths of about  $10\pm$  to  $20\pm$  feet below existing ground surface except for test boring B-6. This boring was advanced using  $3\pm$  inch diameter flush joint casing to a depth of about  $30\pm$  feet below existing ground surface. The test borings were terminated in apparent natural granular soil deposits.

Standard Penetration Testing was performed in the borings at about  $5\pm$  foot intervals or less. This testing consisted of driving a standard 2 inch outside diameter split spoon sampler up to 24 inches at each sampling depth by repeated blows of a 140 pound automatic trip safety hammer falling 30 inches. The sum of the hammer blows from the 6 to 18 inch interval is the Standard Penetration Resistance of the soil sampled.

A two-inch diameter PVC groundwater observation well was installed in completed borings B-7, B-9 and B-11 in the proposed stormwater drainage areas. The wells were installed to depths of about 15 feet below existing ground surface.

The test borings were located in the field by Northeast Geotechnical, Inc. using taping, pacing and/or line of sight from existing site and building features. The test boring locations are approximately shown on the attached Subsurface Exploration Location Plan (Figure No. 1). The locations shown on the attached plan should be considered accurate only to the degree implied by the methods used in the field.

Our logs of the conditions encountered in the test borings are attached. The logs include the Standard Penetration Test results, our visual field sample descriptions using Burmister's descriptions, and other observations and information including groundwater observation well installation details. USDA textural classifications are also included for the samples from test borings B-7 to B-12.

Note that the soil descriptions of the split spoon samples are generally representative of the minus  $1.4\pm$  inch size fraction of the overall soil deposits sampled. This is the approximate inside diameter of the split spoon sampler.

## **LABORATORY SOIL TESTING**

Select soil samples from the test borings were submitted to Thielsch Engineering's soils testing laboratory in Cranston, Rhode Island for grain-size analysis to assess basic engineering properties and reuse potential of the materials sampled. The test results are attached and are representative of the  $1.4\pm$  inch minus fraction of the overall soil deposits sampled.

**GENERAL SUBSURFACE SOIL AND GROUNDWATER CONDITIONS**

The test borings we observed and logged generally indicated up to about  $7\pm$  feet of existing fill materials beneath a surface asphalt layer that was generally about  $3\pm$  to  $4\pm$  inches thick. At test borings B-7, B-8 and B-9 however, the asphalt layer appeared to be about  $6\pm$  to  $9\pm$  inches thick.

The existing granular fill generally appeared to consist of loose to medium dense, fine to coarse sand and fine to coarse gravel with variable silt content. The fill at boring B-1 appeared to contain trace amounts of organics and the fill at boring B-5 appeared to contain some ash.

The existing granular fill appeared to be underlain by natural deposits consisting primarily of loose to medium dense, silty sands and sandy silts to the depths explored. The silty sands occasionally contained variable gravel content particularly at borings B-3, B-4, B-6 and B-10 as indicated on the boring logs. Natural ground referenced in this report is considered the natural loose to medium dense, silty sands and sandy silts.

An apparent natural organic silt/sandy silt layer was encountered in borings B-9 and B-12 between the existing fill and the natural non-organic deposits typically at depths of about  $3\pm$  to  $3.5\pm$  feet below existing ground surface. The natural organic silt layer appeared to be about  $1.5\pm$  to  $2\pm$  feet thick and appeared very loose.

Refer to the attached test boring logs for more information regarding the thickness, description and density of the soils sampled. Also refer to the attached laboratory test results for gradation distribution of the tested soil samples.

Stabilized groundwater levels were recorded in the observation wells installed in test borings B-7, B-9 and B-11 at depths of about  $5\pm$  to  $7\pm$  feet below existing ground surface on September 8, 9, and 27, 2022 (refer to the attached boring logs). These depths generally correspond to elevations roughly of about  $119\pm$  to  $119.5\pm$  feet.

There was evidence of seasonal high groundwater in some of the test borings performed in the potential subsurface stormwater infiltration areas as indicated on the test borings logs. Based on our observations, we estimate seasonal high groundwater at the following depths/elevations:

<b><u>Test Boring No.</u></b>	<b><u>Estimated Seasonal High Groundwater Depth/Elevation</u></b>
B-7 and B-8	$5\pm$ feet/ $121\pm$ feet
B-9 and B-10	$5\pm$ feet/ $119.5\pm$ feet
B-11 and B-12	$5\pm$ feet/ $119.5\pm$ feet

Note that groundwater levels will fluctuate due to variations in temperature, precipitation and other factors. Therefore, groundwater levels at any time could be different than those reported herein.

**BUILDING ADDITION CONCLUSIONS AND RECOMMENDATIONS**

It is our opinion that the natural granular soil deposits are suitable to support the proposed building addition using normal spread footings and slab-on-grade construction provided the subgrades are prepared as recommended herein. The existing fill may also be suitable for floor slab support only provided it is successfully compacted in-place to a firm and stable condition using vibratory drum compaction as recommended herein. Existing fill should be removed and replaced below proposed new foundations however, as recommended herein. Building area earthwork should be performed under the full-time observation of a qualified geotechnical engineer.

Our geotechnical engineering conclusions and recommendations for preparation of the proposed building addition area subgrade, re-use of on-site materials, foundation and slab design and seismic site class are presented based on the test borings we observed and logged, the laboratory test results and our geotechnical engineering analysis and evaluation of this information. Our conclusions and recommendations are subject to the attached Limitations and Service Constraints.

**Building Addition Subgrade Preparation**

The existing surface asphalt layer and other surface materials should be stripped from the proposed building addition area and to a distance of at least 5 feet outside the proposed exterior foundation limits. Existing underground utility pipes and other below grade structures, if present, should also be excavated and removed from the proposed building area and to at least 5 feet outside the proposed foundation limits. The excavations made to remove existing underground utility pipes and other below grade structures should be made using a smooth edge bucket to reduce subgrade disturbance.

The excavations should be backfilled with controlled, compacted lifts of structural fill. We recommend structural fill be placed up to proposed slab subgrade elevation in 6 inch maximum thick lifts in confined areas where lighter compaction equipment is usually used and 12 inch maximum thick lifts in open areas where heavier compaction equipment is typically used.

Each lift of structural fill placed within the building addition area should be compacted using suitable vibratory compaction equipment to at least 95 percent of the fill material's maximum dry density as determined by ASTM D-1557. In addition to achieving the minimum degree of compaction, each lift of fill should be compacted to a firm and stable condition as assessed by a qualified, on-site geotechnical engineer.

Structural fill from off-site sources should be free from ice and snow, roots, sod, rubbish, and other deleterious or organic material, and meet the following gradation criteria:

**Off-Site Structural Fill Gradation Recommendation**

Sieve Size	Percent Finer by Weight
6 inches	100
No. 10	30-95
No. 40	10-70
No. 200	0-12

Structural fill should not be placed over frozen ground and should be protected from becoming frozen. Frozen ground should be removed prior to placing structural fill for compaction. Placement and compaction of structural fill within the proposed building addition area should be observed and tested by a qualified geotechnical engineer.

If groundwater is encountered, dewatering will be required. The size of open excavations should be limited to that which can be adequately dewatered using the contractor's chosen dewatering methods. The initial lift of structural backfill should consist of  $\frac{3}{4}$  inch crushed stone in a wet condition. A layer of geotextile filter fabric should be placed on the exposed subgrade prior to placing the crushed stone.

Following removal and backfilling of the existing underground utilities and structures from the proposed building addition area, the existing fill should then be compacted in-place by making at least 15 passes over the proposed building addition area and at least 5 feet beyond with a walk-behind double drum vibratory compactor. If weak or unstable areas are identified, these areas should be removed and be replaced with compacted structural fill or  $\frac{3}{4}$  inch crushed stone if in a wet condition.

In-place compaction of existing fill and fill placement and compaction within the proposed building area should be observed by a qualified geotechnical engineer.

### **Re-use of On-Site Materials as Structural Fill**

Some of the excavated existing fill and the natural sandy soils should generally be suitable for re-use as structural fill provided they are protected from becoming too wet and/or frozen during construction.

Excavated existing fill and natural sandy soils could be reused as compacted structural fill under the following conditions:

- The materials are free of foreign and organic matter and boulders larger than 6 inches in size;
- The materials are not frozen; and
- The materials have no more than 30 percent passing the no. 200 sieve and the materials are at suitable moisture contents to allow placement and compaction to the required density and to a firm and stable condition on the day it is placed.

### **Building Addition Foundations**

Provided the building addition area is prepared as recommended above, spread footings may be used to support the proposed building. All footings should be over-excavated using a smooth edge bucket for the placement of at least 12 inches of  $\frac{3}{4}$  inch crushed stone up to proposed bottom of footing elevation. If the 12 inch deep minimum over-excavation terminates in existing fill, the over-excavation should be continued until natural ground is achieved. Excavations near the existing building should be performed in such a manner such that existing building foundations are not undermined.

Once natural ground is achieved, the over-excavations should be cleaned of any loose soil by hand and then be backfilled with compacted 12 inch maximum thick lifts of  $\frac{3}{4}$  inch crushed stone. Each lift should be compacted with vibratory plate compactors. A layer of geotextile filter fabric should be placed on the exposed natural subgrade prior to placing the crushed stone.

Test borings performed outside the proposed building addition area (B-9 and B-12) encountered a layer of organic soil below existing granular fill and above natural granular soils. Therefore, an organic soil layer may be encountered during foundation excavations which extends into the proposed building addition area. This organic soil layer should be removed from the proposed building footprint and be replaced with controlled, adequately compacted lifts of structural fill.

If groundwater is encountered, the contractor should be required to properly dewater the excavations to allow visual assessment of the natural ground and to allow backfilling to be performed in the dry.

Provided these recommendations are successfully implemented, the maximum allowable foundation bearing pressure should not exceed 2,000 pounds per square foot. Exterior footings should be located a minimum of four feet below adjacent ground surface for frost protection.

Regardless of the recommended allowable bearing pressure, continuous wall footings should be at least 36 inches wide and column footings should be at least 36 inches in the least lateral dimension.

Footings should not be poured over frozen ground and frost should not be allowed to penetrate beneath footings. Footings should be adequately backfilled before frost can penetrate below them or they should otherwise be protected from frost penetration using a combination of heat and insulation blankets until they can be adequately backfilled.

Utilities should not be located within the one horizontal to one vertical theoretical stress zone of the foundations. Where applicable, exterior foundations should be lowered to allow pipe penetrations to be installed through the foundation walls above the top of foundations.

Footings and foundation walls should be backfilled with controlled 6 to 8 inch maximum thick lifts of suitable structural fill. Each lift of backfill above bottom of footing elevation to slab subgrade elevation should be compacted to at least 92 percent of the fill material's maximum dry density as determined by ASTM D-1557 and to a firm and stable condition.

Backfill should not be placed over frozen ground. All frozen ground should be removed prior to placing backfill for compaction.

### Floor Slab Support

The ground floor slab for the proposed building addition can be supported on-grade provided the preceding recommendations are satisfactorily implemented. The floor slab should bear directly on a 12 inch minimum thick base course layer of sand and gravel compacted to at least 95 percent of the material's maximum dry density as determined by ASTM D-1557.

The base course sand and gravel should be free from ice and snow, roots, sod, rubbish, and other deleterious or organic material, and meet the following gradation criteria:

**Base Course Sand and Gravel**

<u>Sieve Size</u>	<u>Percent Finer by Weight</u>
4 inch	100
½ inch	50-85
No. 4	40-75
No. 10	30-60
No. 40	10-35
No. 100	5-20
No. 200	2-8

**Seismic Site Class**

We recommend a seismic site class E for seismic design of the proposed building addition in accordance with the ninth edition of the Massachusetts State Building Code provided the recommendations presented in this report are followed under appropriate geotechnical engineering observation during construction.

**Design Review and Construction Observation**

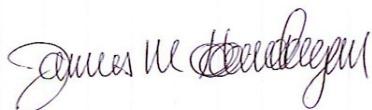
Northeast Geotechnical should be retained to review the foundation plans and earthwork specifications prior to bidding for construction to see that our recommendations have been properly interpreted and included.

Northeast Geotechnical should also be retained to provide construction observation and soil testing services during the earthwork phase of the project. The purpose of our participation is to observe that the contractors perform earthwork in general compliance with the recommendations presented in this report and to verify our design assumptions in the field. In addition, we can provide engineering input in a timely manner if subsurface conditions are found to vary from those anticipated prior to construction and warrant a design change or a change in earthwork procedures.

We have enjoyed working with you on this project and look forward to continuing our involvement during the upcoming construction phase. If you have any questions or require additional information, please do not hesitate to call.

Sincerely,

Northeast Geotechnical, Inc.

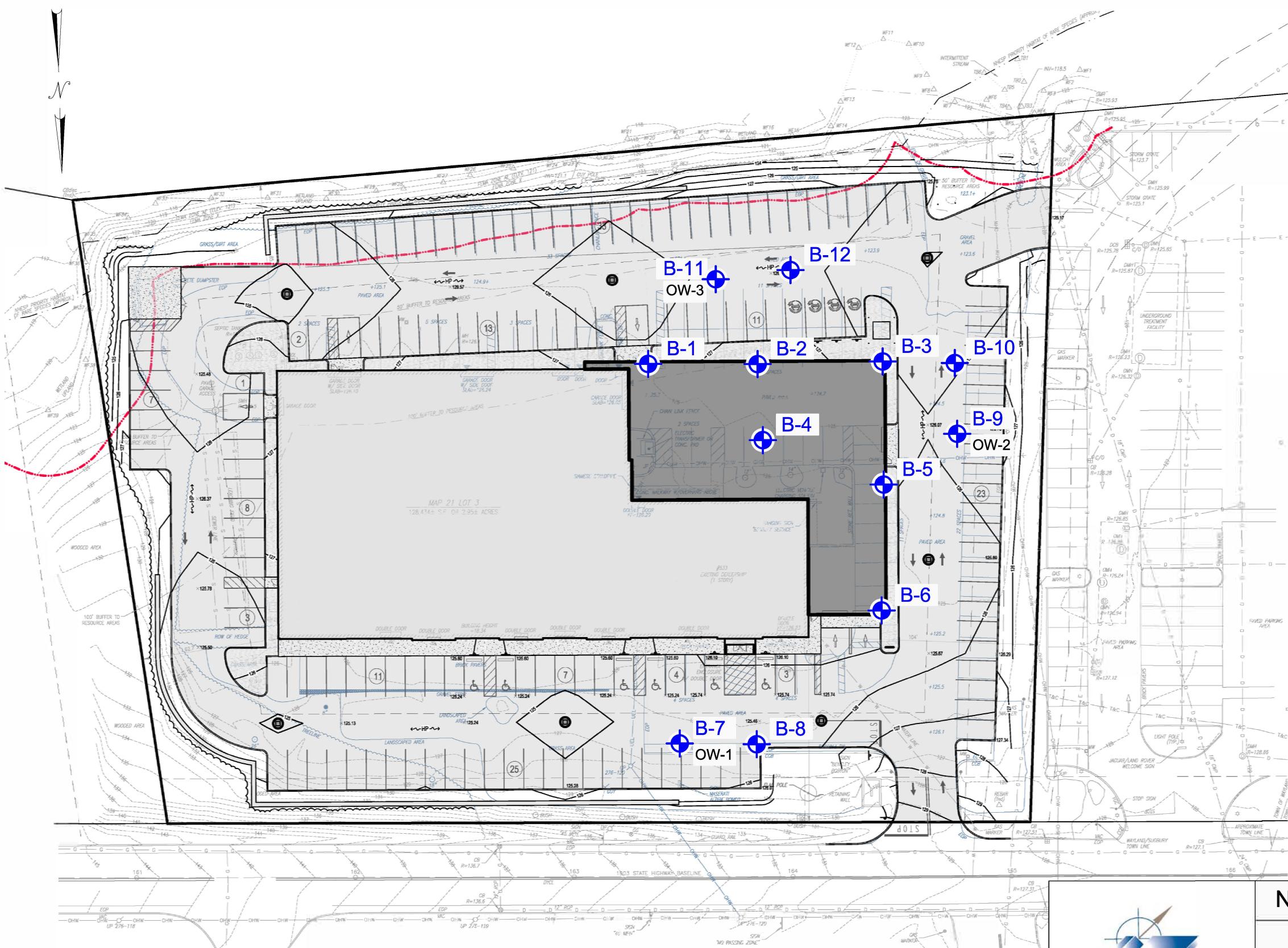


James M. Handanyan, P.E.  
Principal Engineer



Glenn A. Olson, P.E.  
Principal Engineer

Attachments: Figure No. 1 – Subsurface Exploration Location Plan  
Limitations and Service Constraints  
Test Boring Logs  
Laboratory Soil Test Results



NORTHEAST GEOTECHNICAL, INC.

PROPOSED BUILDING ADDITION  
HERB CHAMBERS BENTLEY OF BOSTON

533 BOSTON POST ROAD      WAYLAND, MA

SUBSURFACE EXPLORATION LOCATION PLAN

Project No.: H494.00      Drawn By: JJP      Reviewed By: J. HANDANYAN, P.E.

Date: 9/10/2022      Scale: 1"=50'      Figure No.: 1

## **LIMITATIONS AND SERVICE CONSTRAINTS**

### **Geotechnical Engineering Consulting Services**

The opinions, conclusions and recommendations presented in this report are based upon the scope of services, information obtained through the performance of the services, and the schedule as agreed upon by Northeast Geotechnical, Inc. and the party for whom this report was originally prepared. This report is an instrument of professional service and was prepared in accordance with the generally accepted standards and level of skill and care under similar conditions and circumstances established by the geotechnical consulting industry. No representation, warranty, or guarantee, express or implied, is intended or given. To the extent that Northeast Geotechnical, Inc. relied upon any information prepared by other parties not under contract to Northeast Geotechnical, Inc. , Northeast Geotechnical, Inc. makes no representation as to the accuracy or completeness of such information. This report is expressly for the sole and exclusive use of the party for whom this report was originally prepared and/or other specifically named parties have the right to make use of and rely upon this report. Reuse of this report or any portion thereof for other than its intended purpose, or if modified, or if used by third parties, shall be at the user's sole risk.

Furthermore, nothing contained in this document shall relieve any other party of its responsibility to abide by contract documents and applicable laws, codes, regulations, or standards.

#### **Subsurface Explorations and Testing**

Results of any observations, subsurface exploration or testing, and any findings presented in this report apply solely to conditions existing at the time when Northeast Geotechnical, Inc.'s exploratory work was performed. It must be recognized that any such observations and exploratory or testing activities are inherently limited and do not represent a conclusive or complete characterization. Conditions in other parts of the project site may vary from those at the locations where data were collected and conditions can change with time. Northeast Geotechnical, Inc.'s ability to interpret exploratory and test results is related to the availability of the data and the extent of the exploratory and testing activities.

The findings, conclusions and recommendations submitted in this report are based, in part, on data obtained from subsurface borings, test pits, and specific, discrete sampling locations. The nature and extent of variation between these test locations, which may be widely spaced, may not become evident until construction. If variations are subsequently encountered, it will be necessary to re-evaluate the conclusions and recommendations of this report.

Correlations and descriptions of subsurface conditions presented in boring logs, test pit logs, subsurface profiles, and other materials are approximate only. Subsurface conditions may vary significantly from those encountered in borings and sampling locations and transitions between subsurface materials may be gradual or highly variable.

Conditions at the time water level measurements and other subsurface observations were made are presented in the boring logs or other sampling forms. These field data have been reviewed and interpretations provided in this report. However, groundwater levels may be variable and may fluctuate due to variation in precipitation, temperature, and other factors. Therefore, groundwater levels at the site at any time may be different than stated in this report.

### **Review**

In the event that any change in the nature, design, or location of the proposed structure(s) is planned, the conclusions and recommendations in this report shall not be considered valid unless the changes are reviewed and the conclusions and recommendations of this report are modified or verified in writing.

Northeast Geotechnical, Inc. should be provided the opportunity for a general review of final design plans and specifications to assess that our recommendations have been properly interpreted and included in the design and construction documents.

### **Construction**

To verify conditions presented in this report and modify recommendations based on field conditions encountered in the field, Northeast Geotechnical, Inc. should be retained to provide geotechnical engineering services during the construction phase of the project. This is to observe compliance with design concepts, specifications, and recommendations contained in this report, and to verify and refine our recommendations as necessary in the event that subsurface conditions differ from those anticipated prior to the start of construction.

# NORTHEAST GEOTECHNICAL, INC.

<b>TEST BORING LOG</b>		Project: <u>Proposed Building Addition</u> <u>Herb Chambers Bentley of Boston</u> <u>533 Boston Post Road</u> <u>Wayland, MA</u>		Test Boring No.: <u>B-1</u> Page: <u>1 of 1</u> File No.: <u>H494.00</u> Reviewed By: <u>J. Handanyan, P.E.</u>	
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Boring Co. <u>Drilex Environmental, Inc.</u>		Date/Weather: <u>9-8-2022 / Clear, 50s to 70s °F</u>	
Foreman: <u>Chris Hogan</u>		Northeast Geotechnical Observer: <u>Christian Rice, P.E.</u>	
Boring Equipment:	Mobile B-57 Truck-Mounted Drill Rig 3½-inch I.D. Hollow-Stem Augers 2" O.D. Split Spoon, 140 lb. Auto Hammer	Test Boring Location:	See Subsurface Exploration Location Plan
		Ground Surface Elevation:	<u>125± feet</u>
		Depth to Water:	<u>7± feet</u>

Sample Data						Strata Change	Sample Description
No.	Depth	Pen.	Rec.	Blows per 6 in.	Rem.		
S-1	0.5-2.5'	24"	17"	15-16-10-7		Existing Fill 7'±	Pavement, 0.3± 4± inches BITUMINOUS CONCRETE
S-2	2.5-4.5'	24"	5"	8-4-1-2			Dense, tan-brown, F/C SAND and F/C GRAVEL, little Silt, moist
S-3	5-7'	24"	3"	2-3-4-9			Loose, tan-dark brown, F/M SAND, some slightly Organic Silt, some F/C Gravel, moist
S-4	7-9'	24"	16"	17-12-11-10	2		Loose, tan-dark brown, F/C SAND, some slightly Organic Silt, little F. Gravel, moist
S-5	10-12'	24"	18"	3-3-3-4			Medium dense, tan-rust, F/M SAND, little (+) Silt, trace F. Gravel, wet
S-6	15-17'	24"	19"	4-5-5-7			Loose, gray-tan-rust, F/M SAND and SILT, wet
S-7	20-22'	24"	15"	6-8-7-6			Medium dense, gray-tan, F/M SAND and SILT, trace F. Gravel, wet
					3	Natural Silty Sand 19'±	Bottom of boring at 22± feet

Notes:	Standard Penetration Resistance (Blows/Foot)	Density	Abbreviations	
			F = Fine	M = Medium
1) Augered to approximately 0.5± feet below ground surface (bgs) through existing pavement.	0 - 4	Very Loose	C = Coarse	F/M = Fine to Medium
2) Groundwater encountered at 7± feet bgs while sampling.	4 - 10	Loose	F/C = Fine to Coarse	
3) Boring terminated at 22± feet bgs.	10 - 30	Med. Dense	Proportions Used	
	30 - 50	Dense	Trace (T) = 0 - 10%	
	50+	Very Dense	Little (Li) = 10 - 20%	
			Some (So) = 20 - 35%	
			AND = 35-50%	

# NORTHEAST GEOTECHNICAL, INC.

<b>TEST BORING LOG</b>		Project: <u>Proposed Building Addition</u> <u>Herb Chambers Bentley of Boston</u> <u>533 Boston Post Road</u> <u>Wayland, MA</u>				Test Boring No.: <u>B-2</u> Page: <u>1 of 1</u> File No.: <u>H494.00</u> Reviewed By: <u>J. Handanyan, P.E.</u>			
Boring Co. <u>Drilex Environmental, Inc.</u>						Date/Weather: <u>9-9-2022 / Clear, 50s to 70s °F</u>			
Foreman: <u>Chris Hogan</u>						Northeast Geotechnical Observer: <u>Christian Rice, P.E.</u>			
Boring Equipment: <u>Mobile B-57 Truck-Mounted Drill Rig</u> <u>3½-inch I.D. Hollow-Stem Augers</u> <u>2" O.D. Split Spoon, 140 lb. Auto Hammer</u>						Test Boring Location: <u>See Subsurface Exploration Location Plan</u>			
						Ground Surface Elevation: <u>125± feet</u>			
						Depth to Water: <u>7.5± feet</u>			
Sample Data						Strata Change		Sample Description	
No.	Depth	Pen.	Rec.	Blows per 6 in.	Rem.				
5'	S-1	0.5-2.5	24"	10"	4-4-4-2	2	Pavement, 0.3±	3.5± inches BITUMINOUS CONCRETE	
	S-2	2.5-4.5	24"	19"	2-1-1-2		Existing Fill 2.5±	Loose, light brown, F/C SAND and F/C GRAVEL, trace (+) Silt, moist	
	S-3	5-7'	24"	6"	2-5-9-8		Natural Silt 7'±	Very loose, tan-rust, SILT, some F. Sand, moist	
	S-4	7-9'	24"	18"	8-10-12-9	3	Natural Silty Sand 10'±	Medium dense, gray-tan, SILT, trace F. Sand, moist	
	S-5	10-12'	24"	18"	3-4-4-4		Natural Silt 14'±	Medium dense, gray-tan-rust, F/M SAND, some Silt, wet	
	S-6	15-17'	24"	20"	5-5-6-7		Natural Silty Sand	Loose, tan, SILT, trace F. Sand, wet	
	S-7	20-22'	24"	15"	8-9-8-7		22'±	Medium dense, tan, F/C SAND and SILT, little F. Gravel, wet	
					4		Bottom of boring at 22± feet		
Notes:						Standard Penetration Resistance (Blows/Foot)	Density	Abbreviations	
1) Augered to approximately 0.5± feet below ground surface (bgs) through existing pavement. 2) Cobbles observed in auger cuttings of upper soils. 3) Groundwater measured at 7.5± feet bgs following auger removal at completion of boring. 4) Boring terminated at 22± feet bgs.						0 - 4	Very Loose	F = Fine	
						4 - 10	Loose	M = Medium	
						10 - 30	Med. Dense	C = Coarse	
						30 - 50	Dense	F/M = Fine to Medium	
						50+	Very Dense	F/C = Fine to Coarse	
								Proportions Used	
								Trace (T) = 0 - 10%	
								Little (Li) = 10 - 20%	
								Some (So) = 20 - 35%	
								AND = 35-50%	

# NORTHEAST GEOTECHNICAL, INC.

TEST BORING LOG		Project: <u>Proposed Building Addition</u> <u>Herb Chambers Bentley of Boston</u> <u>533 Boston Post Road</u> <u>Wayland, MA</u>				Test Boring No.: <u>B-3</u> Page: <u>1 of 1</u> File No.: <u>H494.00</u> Reviewed By: <u>J. Handanyan, P.E.</u>			
Boring Co. <u>Drilex Environmental, Inc.</u>						Date/Weather: <u>9-8-2022 / Clear, 50s to 70s °F</u>			
Foreman: <u>Chris Hogan</u>						Northeast Geotechnical Observer: <u>Christian Rice, P.E.</u>			
Boring Equipment: <u>Mobile B-57 Truck-Mounted Drill Rig</u> <u>3½-inch I.D. Hollow-Stem Augers</u> <u>2" O.D. Split Spoon, 140 lb. Auto Hammer</u>						Test Boring Location: <u>See Subsurface Exploration Location Plan</u>			
						Ground Surface Elevation: <u>124.5± feet</u>			
						Depth to Water: <u>4.2± feet</u>			
Sample Data						Strata Change		Sample Description	
	No.	Depth	Pen.	Rec.	Blows per 6 in.	Rem.			
5'	S-1	0.5-2.5	24"	12"	8-11-10-8		1	Pavement, 0.3±	3± inches BITUMINOUS CONCRETE
	S-2	2.5-4.5	24"	4"	5-4-1-1	2		Existing Fill	Medium dense, tan-brown, F/C SAND and F/C GRAVEL, little Silt, moist
	S-3	5-7'	24"	19"	2-3-5-6			5'±	Loose, tan-brown, F/C SAND and F. GRAVEL, little Silt, wet
	S-4	7-9'	24"	16"	9-7-8-5			Natural Sandy Silt	Loose, gray-tan-rust, SILT and F/M SAND, trace F. Gravel, wet
	S-5	10-12'	24"	16"	3-3-4-5		3	10'±	Medium dense, gray-tan-rust, SILT, little F. Sand, wet
	S-6A	15-16.5	18"	14"	3-4-6			Natural Silt	Loose, gray-tan, SILT, trace F. Sand, wet
	S-6B	16.5-17'	6"	4"	9			13'±	
10'	S-6B	16.5-17'	6"	4"	9			Natural Silty Sand	Loose to medium dense, tan, F/M SAND, little Silt, wet
	S-6A	15-16.5	18"	14"	3-4-6			16.5'±	Gray-tan, F/C SAND and F/C GRAVEL, some Silt, wet
	S-7	20-22'	24"	10"	5-6-10-8		4	Natural Silty Sand with Gravel	Medium dense, gray-brown, F/C SAND and SILT, little F/C Gravel, wet
	S-7	20-22'	24"	10"	5-6-10-8			22'±	Bottom of boring at 22± feet
	S-7	20-22'	24"	10"	5-6-10-8				
	S-7	20-22'	24"	10"	5-6-10-8				
	S-7	20-22'	24"	10"	5-6-10-8				
Notes:						Standard Penetration Resistance (Blows/Foot)		Density	
1) Augered to approximately 0.5± feet below ground surface (bgs) through existing pavement.						0 - 4		Very Loose	
2) Groundwater measured at 4.2± feet bgs following auger removal at completion of boring.						4 - 10		Loose	
3) Auger grinding on probable cobble or boulder observed at approximately 13± feet bgs.						10 - 30		Med. Dense	
4) Boring terminated at 22± feet bgs.						30 - 50		Dense	
						50+		Very Dense	
								Proportions Used	
								Trace (T) = 0 - 10%	
								Little (Li) = 10 - 20%	
								Some (So) = 20 - 35%	
								AND = 35-50%	

# NORTHEAST GEOTECHNICAL, INC.

<b>TEST BORING LOG</b>		Project: <u>Proposed Building Addition</u> <u>Herb Chambers Bentley of Boston</u> <u>533 Boston Post Road</u> <u>Wayland, MA</u>		Test Boring No.: <u>B-4</u> Page: <u>1 of 1</u> File No.: <u>H494.00</u> Reviewed By: <u>J. Handanyan, P.E.</u>	
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Boring Co. <u>Drilex Environmental, Inc.</u>	Date/Weather: <u>9-9-2022 / Clear, 50s to 70s °F</u>
Foreman: <u>Chris Hogan</u>	Northeast Geotechnical Observer: <u>Christian Rice, P.E.</u>
Boring Equipment: <u>Mobile B-57 Truck-Mounted Drill Rig</u>	Test Boring Location: <u>See Subsurface Exploration Location Plan</u>
<u>3½-inch I.D. Hollow-Stem Augers</u>	Ground Surface Elevation: <u>125± feet</u>
<u>2" O.D. Split Spoon, 140 lb. Auto Hammer</u>	Depth to Water: <u>7± feet</u>

Sample Data						Strata Change	Sample Description
No.	Depth	Pen.	Rec.	Blows per 6 in.	Rem.		
S-1	0.5-2.5'	24"	8"	11-11-7-9		1	Pavement, 0.3± 4± inches BITUMINOUS CONCRETE
S-2A	2.5-3.5'	12"	12"	5-4		Existing Fill 3.5± Natural Sandy Silt 7'± Natural Silty Sand with Gravel 22±	Medium dense, brown, F/C SAND, some F/C Gravel, little (+) Silt, moist
S-2B	3.5-4.5'	12"	4"	1-1			Brown, F/C SAND, some F/C Gravel, little (+) Silt, moist
S-3	5-7'	24"	10"	2-2-5-4			Light brown, SILT and F/M SAND, moist
S-4	7-9'	24"	5"	7-10-14-12			Loose, gray-tan-rust, SILT, trace F/M Sand, moist
S-5	10-12'	24"	16"	6-10-37-20	3		Medium dense, gray-tan, F/C GRAVEL, some Silt, some F/C Sand, wet
S-6	15-17'	24"	18"	9-8-8-12			Dense, gray-tan-brown, F/C SAND, some (+) Silt, little F/C Gravel, wet
S-7	20-22'	24"	8"	7-15-15-15			Medium dense, tan-rust, F/C SAND and SILT, little F/C Gravel, wet
					4		Dense, tan, F/C SAND, some (-) Silt, little F/C Gravel, wet
							Bottom of boring at 22± feet

Notes:	Standard Penetration Resistance (Blows/Foot)	Density	Abbreviations
			F = Fine
1) Augered to approximately 0.5± feet below ground surface (bgs) through existing pavement.	0 - 4	Very Loose	M = Medium
2) Groundwater encountered at 7± feet bgs while sampling.	4 - 10	Loose	C = Coarse
3) Auger grinding on probable cobble or boulder observed at approximately 11± feet bgs.	10 - 30	Med. Dense	F/M = Fine to Medium
4) Boring terminated at 22± feet bgs.	30 - 50	Dense	F/C = Fine to Coarse
	50+	Very Dense	Proportions Used
			Trace (T) = 0 - 10%
			Little (Li) = 10 - 20%
			Some (So) = 20 - 35%
			AND = 35-50%

# NORTHEAST GEOTECHNICAL, INC.

<b>TEST BORING LOG</b>		Project: <u>Proposed Building Addition</u> <u>Herb Chambers Bentley of Boston</u> <u>533 Boston Post Road</u> <u>Wayland, MA</u>				Test Boring No.: <u>B-5</u> Page: <u>1 of 1</u> File No.: <u>H494.00</u> Reviewed By: <u>J. Handanyan, P.E.</u>		
Boring Co. <u>Drilex Environmental, Inc.</u>						Date/Weather: <u>9-9-2022 / Clear, 50s to 70s °F</u>		
Foreman: <u>Chris Hogan</u>						Northeast Geotechnical Observer: <u>Christian Rice, P.E.</u>		
Boring Equipment: <u>Mobile B-57 Truck-Mounted Drill Rig</u> <u>3½-inch I.D. Hollow-Stem Augers</u> <u>2" O.D. Split Spoon, 140 lb. Auto Hammer</u>						Test Boring Location: <u>See Subsurface Exploration Location Plan</u>		
						Ground Surface Elevation: <u>125± feet</u>		
						Depth to Water: <u>6± feet</u>		
Sample Data								
No.	Depth	Pen.	Rec.	Blows per 6 in.	Rem.	Strata Change	Sample Description	
5'						1	Pavement, 0.3± 4± inches BITUMINOUS CONCRETE	
	S-1	0.5-2.5'	24"	19"	3-3-3-5		Existing Fill 3'±	Loose, tan, F/M SAND, little F. Gravel, trace Silt, moist Tan-brown-black, F/C SAND, some Silt, some Ash, trace F. Gravel, moist
	S-2A	2.5-3'	6"	6"	2			
	S-2B	3-4.5'	18"	17"	3-3-8		Natural Silty Sand, 5'±	Loose, tan-rust, F/M SAND, some Silt, moist
	S-3	5-7'	24"	15"	5-6-6-6	2		Medium dense, tan-rust, F/M SAND, trace Silt, wet
	S-4	7-9'	24"	20"	5-5-8-8			Medium dense, light brown, F/M SAND, trace Silt, wet
	S-5	10-12'	24"	18"	2-3-5-6			Loose, light brown, F/M SAND, trace Silt, wet
	S-6	15-17'	24"	20"	4-4-6-7			Loose to medium dense, light brown, F/M SAND, trace Silt, wet
						3		
10'								
15'								
20'								
25'								
Notes:						Standard Penetration Resistance	Density	Abbreviations
1) Augered to approximately 0.5± feet below ground surface (bgs) through existing pavement. 2) Groundwater encountered at 6± feet bgs while sampling. 3) Auger grinding on probable cobble or boulder observed at approximately 18± feet bgs. 4) Boring terminated at 22± feet bgs.						(Blows/Foot)	Very Loose	F = Fine
						0 - 4	Loose	M = Medium
						4 - 10	Med. Dense	C = Coarse
						10 - 30	Dense	F/M = Fine to Medium
						30 - 50	Very Dense	F/C = Fine to Coarse
						50+		Proportions Used
								Trace (T) = 0 - 10%
								Little (Li) = 10 - 20%
								Some (So) = 20 - 35%
								AND = 35-50%

# NORTHEAST GEOTECHNICAL, INC.

<b>TEST BORING LOG</b>		Project: <u>Proposed Building Addition</u> <u>Herb Chambers Bentley of Boston</u> <u>533 Boston Post Road</u> <u>Wayland, MA</u>				Test Boring No.: <u>B-6</u> Page: <u>1 of 1</u> File No.: <u>H494.00</u> Reviewed By: <u>J. Handanyan, P.E.</u>			
Boring Co. <u>Drilex Environmental, Inc.</u>						Date/Weather: <u>9-8-2022 / Clear, 50s to 70s °F</u>			
Foreman: <u>Chris Hogan</u>						Northeast Geotechnical Observer: <u>Christian Rice, P.E.</u>			
Boring Equipment: <u>Mobile B-57 Truck-Mounted Drill Rig</u> <u>3-inch Diameter Casing w/ Roller Bit</u> <u>2" O.D. Split Spoon, 140 lb. Auto Hammer</u>						Test Boring Location: <u>See Subsurface Exploration Location Plan</u>			
						Ground Surface Elevation: <u>125± feet</u>			
						Depth to Water: <u>&gt;4.5± feet (See Note 2)</u>			
Sample Data						Strata Change		Sample Description	
No.	Depth	Pen.	Rec.	Blows per 6 in.	Rem.				
5'						1	Pavement, 0.3±	4± inches BITUMINOUS CONCRETE	
	S-1A	0.5-1.3	9"	9"	8-4		Existing Fill, 1.3±	Gray-brown, F/C SAND, some F/C Gravel, little (-) Silt, moist	
	S-1B	1.3-2.5	15"	6"	3-2			Tan, SILT, little F/M Sand, moist	
	S-2	2.5-4.5	24"	17"	3-3-3-5	2		Loose, tan-rust, F/M SAND and SILT, moist	
	S-3	4.5-6'	18"	16"	7-7-7			Medium dense, tan-rust, SILT, some F. Sand	
	S-4	6-8'	24"	14"	5-4-4-4			Loose, gray-tan-rust, F. SAND and SILT	
	S-5	9-11'	24"	15"	3-3-3-3			Loose, tan-rust, F. SAND and SILT	
10'									
	15'	S-6	14-16'	24"	13"	2-2-3-6			Loose, gray-tan, F/M SAND, little Silt
20'		S-7	19-21'	24"	24"	1-3-2-3			Loose, light brown, F/M SAND, trace Silt
	25'	S-8	24-26'	24"	19"	1-1-1-2			Very loose, light brown, F/M SAND, trace Silt
S-9	29-31'	24"	8"	8-8-7-8	4	3	Nat'l Silty Sand w/ Gravel, 31±	Medium dense, gray-brown, F/C SAND, little Silt, little F. Gravel	
Notes:						Standard Penetration Resistance (Blows/Foot)	Density	Abbreviations	
1) Augered to approximately 0.5± feet below ground surface (bgs) through existing pavement. 2) Groundwater not encountered prior to introducing water into borehole using drive-and-wash drilling methods following S-2 sample. 3) Drilling resistance increased at approximately 28± feet bgs. 4) Boring terminated at 31± feet bgs.						0 - 4	Very Loose	F = Fine	
						4 - 10	Loose	M = Medium	
						10 - 30	Med. Dense	C = Coarse	
						30 - 50	Dense	F/M = Fine to Medium	
						50+	Very Dense	F/C = Fine to Coarse	
								Proportions Used	
								Trace (T) = 0 - 10%	
								Little (Li) = 10 - 20%	
								Some (So) = 20 - 35%	
								AND = 35-50%	

# NORTHEAST GEOTECHNICAL, INC.

<b>TEST BORING LOG</b>		Project: <u>Proposed Building Addition</u> <u>Herb Chambers Bentley of Boston</u> <u>533 Boston Post Road</u> <u>Wayland, MA</u>				Test Boring No.: <u>B-7/OW-1</u> Page: <u>1 of 1</u> File No.: <u>H494.00</u> Reviewed By: <u>J. Handanyan, P.E.</u>					
Boring Co. <u>Drilex Environmental, Inc.</u>						Date/Weather: <u>9-7-2022 / Overcast, 60s to 70s °F</u>					
Foreman: <u>Chris Hogan</u>						Northeast Geotechnical Observer: <u>Christian Rice, P.E.</u>					
Boring Equipment: <u>Mobile B-57 Truck-Mounted Drill Rig</u>						Test Boring Location: <u>See Subsurface Exploration Location Plan</u>					
						Ground Surface Elevation: <u>126± feet</u>					
						Depth to Water: <u>See Notes 3 and 4</u>					
Sample Data						Sample Description					
No.	Depth	Pen.	Rec.	Blows per 6 in.	Rem.	Strata Change					
5'					1	Pavement, 0.8±	9± inches BITUMINOUS CONCRETE				
	S-1	1-3'	24"	15"	4-3-4-4			Loose, tan-rust, F/M SAND, some Silt, moist (USDA: Loamy Sand)			
	S-2	3-5'	24"	13"	5-5-6-6			Medium dense, tan-rust, F/M SAND, little Silt, moist (USDA: Loamy Sand)			
	S-3	5-7'	24"	14"	4-3-2-3	2		Loose, gray-tan, F/M SAND, some Silt, wet (USDA: Loamy Sand)			
						3					
S-4	7-9'	24"	16"	2-3-2-2			Loose, gray-tan, F/M SAND, little (+) Silt, wet (USDA: Loamy Sand)				
10'											
	S-5	10-12'	24"	17"	3-2-1-2			Very loose, tan, F. SAND, some Silt, wet (USDA: Sand)			
	S-6	12-14'	24"	20"	3-2-3-3			Loose, tan, F/M SAND, little (+) Silt, wet (USDA: Loamy Sand)			
	S-7	15-17'	24"	11"	1-1-2-2			Very loose, tan, F/M SAND, little Silt, wet (USDA: Loamy Sand)			
						4					
15'											
20'											
25'											
Notes:						Standard Penetration Resistance		Density			
1) Augered to approximately 0.8± feet below ground surface (bgs) through existing pavement. 2) Redoximorphic features observed in S-3 sample at approximately 5± feet bgs. 3) Groundwater encountered at 6± feet bgs while sampling. 4) Boring terminated at 17± feet bgs. Groundwater observation well OW-1 installed upon completion. See well installation details above. Well readings: ·9/8/2022: 7± feet ·9/9/2022: 6.9± feet ·9/27/2022: 7.1± feet						(Blows/Foot)		Very Loose		F = Fine	
						0 - 4		Loose		M = Medium	
						4 - 10		Med. Dense		C = Coarse	
						10 - 30		Dense		F/M = Fine to Medium	
						30 - 50		Very Dense		F/C = Fine to Coarse	
						50+				Proportions Used	
										Trace (T) = 0 - 10%	
										Little (Li) = 10 - 20%	
										Some (So) = 20 - 35%	
										AND = 35-50%	

# NORTHEAST GEOTECHNICAL, INC.

<b>TEST BORING LOG</b>		Project: <u>Proposed Building Addition</u> <u>Herb Chambers Bentley of Boston</u> <u>533 Boston Post Road</u> <u>Wayland, MA</u>	Test Boring No.: <u>B-8</u> Page: <u>1 of 1</u> File No.: <u>H494.00</u> Reviewed By: <u>J. Handanyan, P.E.</u>
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Boring Co. <u>Drilex Environmental, Inc.</u>		Date/Weather: <u>9-7-2022 / Overcast, 60s to 70s °F</u>	
Foreman:	<u>Chris Hogan</u>	Northeast Geotechnical Observer:	<u>Christian Rice, P.E.</u>
Boring Equipment:	<u>Mobile B-57 Truck-Mounted Drill Rig</u>	Test Boring Location:	<u>See Subsurface Exploration Location Plan</u>
	<u>3½-inch I.D. Hollow-Stem Augers</u>	Ground Surface Elevation:	<u>126± feet</u>
	<u>2" O.D. Split Spoon, 140 lb. Auto Hammer</u>	Depth to Water:	<u>See Test Boring B-7</u>

Sample Data						Strata Change	Sample Description
No.	Depth	Pen.	Rec.	Blows per 6 in.	Rem.		
S-1	0.5-2.5'	24"	18"	2-2-4-6		5'± Natural Silt 5'± Natural Silty Sand 12'±	Pavement, 0.5± 6± inches BITUMINOUS CONCRETE
S-2	2.5-4.5'	24"	17"	6-6-7-8			Loose, gray-tan-rust, SILT, trace F/M Sand, moist (USDA: Loam)
S-3	5-7'	24"	13"	3-6-5-7	2		Medium dense, tan-rust, SILT, trace (+) F/M Sand, moist (USDA: Loam)
S-4	7-9'	24"	20"	5-4-6-5			Medium dense, tan-rust, F/M SAND, some Silt, wet, mottling throughout sample (USDA: Loamy Sand)
S-5	10-12'	24"	17"	2-3-2-3			Loose to medium dense, tan-rust, F/M SAND and SILT, wet, mottling throughout sample (USDA: Sandy Loam)
					3		Loose, gray-tan-rust, F. SAND, some Silt, wet (USDA: Sand)
							Bottom of boring at 12± feet

Notes:	Standard Penetration Resistance (Blows/Foot)	Density	Abbreviations	
			F = Fine	M = Medium
1) Augered to approximately 0.5± feet below ground surface (bgs) through existing pavement.	0 - 4	Very Loose	C = Coarse	F/M = Fine to Medium
2) Redoximorphic features observed in S-3 sample at approximately 5± feet bgs.	4 - 10	Loose	F/C = Fine to Coarse	Proportions Used
3) Boring terminated at 12± feet bgs.	10 - 30	Med. Dense	Trace (T) = 0 - 10%	Trace (T) = 0 - 10%
	30 - 50	Dense	Little (Li) = 10 - 20%	Little (Li) = 10 - 20%
	50+	Very Dense	Some (So) = 20 - 35%	Some (So) = 20 - 35%
			AND = 35-50%	AND = 35-50%

# NORTHEAST GEOTECHNICAL, INC.

<b>TEST BORING LOG</b>		Project: <u>Proposed Building Addition</u> <u>Herb Chambers Bentley of Boston</u> <u>533 Boston Post Road</u> <u>Wayland, MA</u>				Test Boring No.: <u>B-9/OW-2</u> Page: <u>1 of 1</u> File No.: <u>H494.00</u> Reviewed By: <u>J. Handanyan, P.E.</u>			
Boring Co. <u>Drilex Environmental, Inc.</u>						Date/Weather: <u>9-7-2022 / Overcast, 60s to 70s °F</u>			
Foreman: <u>Chris Hogan</u>						Northeast Geotechnical Observer: <u>Christian Rice, P.E.</u>			
Boring Equipment: <u>Mobile B-57 Truck-Mounted Drill Rig</u>						Test Boring Location: <u>See Subsurface Exploration Location Plan</u>			
						Ground Surface Elevation: <u>124.5± feet</u>			
						Depth to Water: <u>See Notes 3 and 4</u>			
Sample Data						Strata Change		Sample Description	
	No.	Depth	Pen.	Rec.	Blows per 6 in.	Rem.			
5'	S-1	0.5-2.5'	24"	10"	5-6-12-6		1	Pavement, 0.5±	6± inches BITUMINOUS CONCRETE
	S-2A	2.5-3'	6"	6"	3		3'±	Existing Fill	M. dense, tan, F/M SAND and F/C GRAVEL, trace (+) Silt (USDA: Very Gravelly Loamy Sand)
	S-2B	3-4.5'	18"	9"	1-1-1		Organic Sandy Silt, 5'±	Tan-brown, F/C SAND and F/C GRAVEL, little Silt (USDA: Very Gravelly Loamy Sand)	
	S-3	5-7'	24"	18"	2-4-4-4	2,3	Natural Silty Sand 8'±	Very loose, dark brown, Organic SILT, little F/M Sand, moist (USDA: Organic Sandy Loam)	
	S-4A	7-8'	12"	12"	3-6		Nat'l Sandy Silt 10'±	Loose, tan-rust, F/M SAND, some Silt, moist to wet, mottling at top of recovered sample (USDA: Loamy Sand)	
	S-4B	8-9'	12"	12"	6-6			Tan-light brown, F/M SAND, little Silt, wet (USDA: Loamy Sand)	
	S-5	10-12'	24"	19"	7-11-14-12			Tan, SILT, little F/M Sand, trace F. Gravel wet (USDA: Silt Loam)	
10'	S-6	12-14'	24"	18"	5-14-17-17		Natural Sand and Silt	Medium dense, tan-brown, F/C SAND, some (+) Silt, little F. Gravel, wet (USDA: Gravelly Loamy Sand)	
	S-7	15-17'	24"	18"	7-11-10-14			Dense, tan-brown, F/C SAND, some (+) Silt, little F. Gravel, wet (USDA: Gravelly Loamy Sand)	
						4		Medium dense, gray-tan-brown, SILT and F/M SAND, wet (USDA: Loam)	
								Bottom of boring at 17± feet	
								Groundwater observation well installation details:	
								· 2-inch diameter solid PVC riser from 0.5± to 5± feet bgs.	
								· 2-inch diameter screened PVC from 5± to 15± feet bgs.	
15'							· Backfilled with auger cuttings from 0.8± to 2.5± feet bgs.		
							· Backfilled with bentonite from 2.5± to 4± feet bgs.		
							· Backfilled with silica sand from 4± to 15± feet bgs.		
							· Flush-mounted road box cover surrounded with cement at ground surface.		
Notes:						Standard Penetration Resistance (Blows/Foot)		Density	
1) Augered to approximately 0.5± feet below ground surface (bgs) through existing pavement. 2) Redoximorphic features observed in S-3 sample at approximately 5± feet bgs. 3) Groundwater encountered at 6.5± feet bgs while sampling. 4) Boring terminated at 17± feet bgs. Groundwater observation well OW-2 installed upon completion. See well installation details above. Well readings: · 9/8/2022: 5.2± feet · 9/9/2022: 5.3± feet · 9/27/2022: 5.7± feet						0 - 4 4 - 10 10 - 30 30 - 50 50+		Very Loose Loose Med. Dense Dense Very Dense	
								Abbreviations	
								F = Fine	
								M = Medium	
								C = Coarse	
								F/M = Fine to Medium	
								F/C = Fine to Coarse	
								Proportions Used	
								Trace (T) = 0 - 10%	
								Little (Li) = 10 - 20%	
								Some (So) = 20 - 35%	
								AND = 35-50%	

# NORTHEAST GEOTECHNICAL, INC.

<b>TEST BORING LOG</b>		Project: <u>Proposed Building Addition</u> <u>Herb Chambers Bentley of Boston</u> <u>533 Boston Post Road</u> <u>Wayland, MA</u>		Test Boring No.: <u>B-10</u> Page: <u>1 of 1</u> File No.: <u>H494.00</u> Reviewed By: <u>J. Handanyan, P.E.</u>	
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Boring Co. <u>Drilex Environmental, Inc.</u>	Date/Weather: <u>9-7-2022 / Overcast, 60s to 70s °F</u>
Foreman: <u>Chris Hogan</u>	Northeast Geotechnical Observer: <u>Christian Rice, P.E.</u>
Boring Equipment: <u>Mobile B-57 Truck-Mounted Drill Rig</u>	Test Boring Location: <u>See Subsurface Exploration Location Plan</u>
<u>3½-inch I.D. Hollow-Stem Augers</u>	Ground Surface Elevation: <u>124.5± feet</u>
<u>2" O.D. Split Spoon, 140 lb. Auto Hammer</u>	Depth to Water: <u>See Test Boring B-9</u>

Sample Data						Strata Change	Sample Description
No.	Depth	Pen.	Rec.	Blows per 6 in.	Rem.		
S-1	0.5-2'	18"	13"	6-8-14-50/0"	2	Existing Fill 4'±	Pavement, 0.3± 3± inches BITUMINOUS CONCRETE
S-2	2-4'	24"	2"	4-2-2-5	3		M. dense, brown, F/C SAND and F/C GRAVEL, little Silt (USDA: Very Gravelly Loamy Sand) Very loose to loose, brown, F/C GRAVEL and F/C SAND, little (+) Silt (USDA: Extremely Gravelly Loamy Sand)
S-3	5-7'	24"	0"	7-7-10-12			Medium dense, No recovery
S-4	7-9'	24"	3"	8-10-15-13			Medium dense, brown, F/C SAND, little F. Gravel, little Silt, wet (USDA: Gravelly Loamy Sand)
S-5	10-12'	24"	15"	4-4-6-7			Loose to medium dense, tan, SILT, trace F. Sand, wet (USDA: Silt)
					4,5		
							Bottom of boring at 12± feet

Notes:	Standard Penetration Resistance (Blows/Foot)	Density	Abbreviations	
			F = Fine	M = Medium
1) Augered to approximately 0.5± feet below ground surface (bgs) through existing pavement.	0 - 4	Very Loose	C = Coarse	F/M = Fine to Medium
2) Sampler and auger refusal at approximately 2± feet bgs. Offset boring 7± feet south then continued.	4 - 10	Loose	F/C = Fine to Coarse	
3) Cobbles observed in upper auger cuttings.	10 - 30	Med. Dense	Proportions Used	
4) Boring terminated at 12± feet bgs.	30 - 50	Dense	Trace (T) = 0 - 10%	
5) No mottling or redoximorphic features observed.	50+	Very Dense	Little (Li) = 10 - 20%	
			Some (So) = 20 - 35%	
			AND = 35-50%	

# NORTHEAST GEOTECHNICAL, INC.

<b>TEST BORING LOG</b>		Project: <u>Proposed Building Addition</u> <u>Herb Chambers Bentley of Boston</u> <u>533 Boston Post Road</u> <u>Wayland, MA</u>				Test Boring No.: <u>B-11/OW-3</u> Page: <u>1 of 1</u> File No.: <u>H494.00</u> Reviewed By: <u>J. Handanyan, P.E.</u>			
Boring Co. <u>Drilex Environmental, Inc.</u>						Date/Weather: <u>9-7-2022 / Overcast, 60s to 70s °F</u>			
Foreman: <u>Chris Hogan</u>						Northeast Geotechnical Observer: <u>Christian Rice, P.E.</u>			
Boring Equipment: <u>Mobile B-57 Truck-Mounted Drill Rig</u>						Test Boring Location: <u>See Subsurface Exploration Location Plan</u>			
						Ground Surface Elevation: <u>124.5± feet</u>			
						Depth to Water: <u>See Notes 4 and 5</u>			
Sample Data						Strata Change		Sample Description	
No.	Depth	Pen.	Rec.	Blows per 6 in.	Rem.				
5'	S-1	0.5-1.5	12"	7"	20-24	2	Pavement, 0.3±	4± inches BITUMINOUS CONCRETE	
	S-2	2.5-4.5	24"	0"	6-6-4-2		Existing Fill 2.5'±	Tan-brown, F/C GRAVEL and F/C SAND, little Silt, moist (USDA: Very Gravelly Loamy Sand)	
	S-3	5-7'	24"	12"	1-2-3-9	3,4	Possible Fill or Nat'l Soil, 5'±	Loose to medium dense, No recovery	
	S-4A	7-8'	12"	12"	7-6		Natural Sand 8'±	Loose, tan-rust, F/C SAND, trace Silt, trace F. Gravel, wet, mottling at top of recovered sample (USDA: Sand)	
	S-4B	8-9'	12"	12"	6-6			Tan, F/C SAND, trace Silt, wet (USDA: Sand)	
	S-5	10-12'	24"	17"	2-3-2-3		Natural Sandy Silt	Gray-tan-rust, SILT and F. SAND, wet, mottling throughout sample (USDA: Loamy Sand)	
	S-6	12-14'	24"	20"	2-2-2-4			Loose, gray-tan-rust, SILT, little F. Sand, wet, mottling throughout sample (USDA: Sandy Loam)	
	S-7	15-17'	24"	23"	1-2-3-7		Nat'l Silty Sand 17'±	Very loose to loose, gray-tan-rust, SILT, little F. Sand, wet, mottling throughout sample (USDA: Sandy Loam)	
10'					5			Loose, gray-tan, F/M SAND, some Silt, wet (USDA: Loamy Sand)	
								Bottom of boring at 17± feet	
								Groundwater observation well installation details:	
								· 2-inch diameter solid PVC riser from 0.5± to 5± feet bgs.	
								· 2-inch diameter screened PVC from 5± to 15± feet bgs.	
								· Backfilled with auger cuttings from 0.8± to 2.5± feet bgs.	
								· Backfilled with bentonite from 2.5± to 4± feet bgs.	
								· Backfilled with silica sand from 4± to 15± feet bgs.	
								· Flush-mounted road box cover surrounded with cement at ground surface.	
Notes:						Standard Penetration Resistance		Density	
1) Augered to approximately 0.5± feet below ground surface (bgs) through existing pavement. 2) Split spoon sampler moved out of vertical alignment at approximately 1.5± feet bgs on probably boulder. Augered to 2.5± feet bgs through probable boulder. 3) Redoximorphic features observed in S-3 sample at approximately 5± feet bgs. 4) Groundwater encountered at 6± feet bgs while sampling. 5) Boring terminated at 17± feet bgs. Groundwater observation well OW-3 installed upon completion. See well installation details above. Well readings: <u>9/8/2022: 5.5± feet</u> <u>9/9/2022: 5.6± feet</u> <u>9/27/2022: 5.8± feet</u>						(Blows/Foot)		Abbreviations	
						0 - 4		F = Fine	
						4 - 10		M = Medium	
						Very Loose		C = Coarse	
						10 - 30		F/M = Fine to Medium	
						Med. Dense		F/C = Fine to Coarse	
						30 - 50		Proportions Used	
						50+		Trace (T) = 0 - 10%	
								Little (Li) = 10 - 20%	
								Some (So) = 20 - 35%	
								AND = 35-50%	

# NORTHEAST GEOTECHNICAL, INC.

TEST BORING LOG		Project: <u>Proposed Building Addition</u> <u>Herb Chambers Bentley of Boston</u> <u>533 Boston Post Road</u> <u>Wayland, MA</u>	Test Boring No.: <u>B-12</u> Page: <u>1 of 1</u> File No.: <u>H494.00</u> Reviewed By: <u>J. Handanyan, P.E.</u>
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Boring Co. <u>Drilex Environmental, Inc.</u>	Date/Weather: <u>9-8-2022 / Clear, 50s to 70s °F</u>
Foreman: <u>Chris Hogan</u>	Northeast Geotechnical Observer: <u>Christian Rice, P.E.</u>
Boring Equipment: <u>Mobile B-57 Truck-Mounted Drill Rig</u>	Test Boring Location: <u>See Subsurface Exploration Location Plan</u>
<u>3½-inch I.D. Hollow-Stem Augers</u>	Ground Surface Elevation: <u>124± feet</u>
<u>2" O.D. Split Spoon, 140 lb. Auto Hammer</u>	Depth to Water: <u>See Test Boring B-11</u>

Sample Data						Strata Change	Sample Description
No.	Depth	Pen.	Rec.	Blows per 6 in.	Rem.		
S-1	0.5-2.5	24"	16"	14-12-6-3		Existing Fill  Natural Silty Sand	Pavement, 0.3± 4± inches BITUMINOUS CONCRETE
S-2A	2.5-3.5	12"	12"	1-2			Medium dense, tan-brown, F/C SAND and F/C GRAVEL, little Silt (USDA: <i>Very Gravelly Loamy Sand</i> )
S-2B	3.5-4.5	12"	9"	1/12"			3.5± * 5± Brown, Organic SILT, trace F. Sand, moist (USDA: <i>Organic Loam</i> )
S-3	5-7'	24"	18"	5-5-8-8	2		Medium dense, tan-rust, F/M SAND, trace Silt, trace F. Gravel, wet, mottling near middle of sample (USDA: <i>Sand</i> )
S-4	7-9'	24"	24"	9-10-12-12			Medium dense, tan-brown-rust, F/M SAND, little (+) Silt, wet, mottling throughout sample (USDA: <i>Loamy Sand</i> )
S-5	10-12'	24"	19"	4-4-4-4			Loose, tan-rust, F/M SAND, some Silt, wet, mottling throughout sample (USDA: <i>Loamy Sand</i> )
					3		Bottom of boring at 12± feet

Notes:	Standard Penetration Resistance		Density	Abbreviations
	(Blows/Foot)			
1) Augered to approximately 0.5± feet below ground surface (bgs) through existing pavement.	0 - 4	Very Loose Loose Med. Dense Dense Very Dense	Very Loose Loose Med. Dense Dense Very Dense	F = Fine
2) Redoximorphic features observed in S-3 sample at approximately 6± feet bgs.	4 - 10			M = Medium
3) Boring terminated at 12± feet bgs.	10 - 30			C = Coarse
	30 - 50			F/M = Fine to Medium
	50+			F/C = Fine to Coarse
				Proportions Used
				Trace (T) = 0 - 10%
				Little (Li) = 10 - 20%
				Some (So) = 20 - 35%
				AND = 35-50%



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Let's Build a Solid Foundation

Client Information:  
Northeast Geotechnical  
North Attleboro, MA  
PM: James Handanyan  
Assigned By: James Handanyan  
Collected By: James Handanyan

Project Information:  
**Herb Chambers Building Addition**  
**Wayland, MA**  
TEI Project Number: 74-22-0002.101  
Summary Page:  
Report Date:

1 of 2  
09.26.22

## LABORATORY TESTING DATA SHEET, Report No.: 7422-J-173

Boring No.	Sample No.	Depth (ft)	Laboratory No.	Identification Tests							Proctor / CBR / Permeability Tests							Laboratory Log and Soil Description			
				As Rcvd Moisture Content %	LL %	PL %	Gravel %	Sand %	Fines %	Org. %	pH	Dry unit wt. (pcf)	Test Moisture Content %	$\gamma_d$	MAX (pcf)	$\gamma_d$	MAX (pcf)	Target Test Setup as % of Proctor	CBR @ 0.1"	CBR @ 0.2"	Permeability cm/sec
				D2216	D4318	D6913			D2974	D4792				D1557							
B-1	S-2	2.5-4.5	22-S-3701	18.4			24.8	47.8	27.4	3.1										Brown silty sand with gravel	
B-2	S-2	2.5-4.5	22-S-3702				0.0	26.8	73.2											Brown silt with sand	
B-3	S-3	5-7	22-S-3703				3.6	48.0	48.4											Brown silty sand	
B-4	S-3	5-7	22-S-3704				0.0	3.9	96.1											Brown silt	
B-5	S-3	5-7	22-S-3705				0.0	96.5	3.5											Brown poorly graded sand	
B-6	S-4	6-8	22-S-3706				0.0	54.6	45.4											Brown silty sand	
B-7	S-5	10-12	22-S-3707				0.0	69.1	30.9											Brown silty sand (sand)	
B-8	S-5	10-12	22-S-3708				0.0	77.4	22.6											Brown silty sand (sand)	
B-9	S-4B	8-9	22-S-3709				0.7	18.7	80.6											Brown silt with sand (silt loam)	
B-9	S-7	15-17	22-S-3710				0.0	36.4	63.6											Brown sandy silt (loam)	
B-10	S-4	7-9	22-S-3711				16.5	68.0	15.5											Brown silty sand with gravel (loamy sand)	
B-10	S-5	10-12	22-S-3712				0.0	2.2	97.8											Brown silty clay (silt)	

Date Received: 09.15.22

Reviewed By:

Date Reviewed: 09.26.22

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Let's Build a Solid Foundation

Client Information:  
Northeast Geotechnical  
North Attleboro, MA  
PM: James Handanyan  
Assigned By: James Handanyan  
Collected By: James Handanyan

Project Information:  
**Herb Chambers Building Addition**  
**Wayland, MA**  
TEI Project Number: 74-22-0002.101  
Summary Page:  
Report Date:

2 of 2  
09.26.22

### LABORATORY TESTING DATA SHEET, Report No.: 7422-J-173

Boring No.	Sample No.	Depth (ft)	Laboratory No.	Identification Tests							Proctor / CBR / Permeability Tests							Laboratory Log and Soil Description		
				As Rcvd Moisture Content %	LL %	PL %	Gravel %	Sand %	Fines %	Org. %	pH	Dry unit wt. (pcf)	Test Moisture Content %	$\gamma_d$	MAX (pcf)	$\gamma_d$	MAX (pcf)	Target Test Setup as % of Proctor	CBR @ 0.1"	CBR @ 0.2"
B-11	S-4B	8-9	22-S-3713				0.0	49.1	50.9											Brown sandy silt (loamy sand)
B-12	S-3	5-7	22-S-3714				3.5	91.4	5.1											Brown poorly graded sand with silt (sand)

Date Received: 09.15.22

Reviewed By:

Date Reviewed: 09.26.22

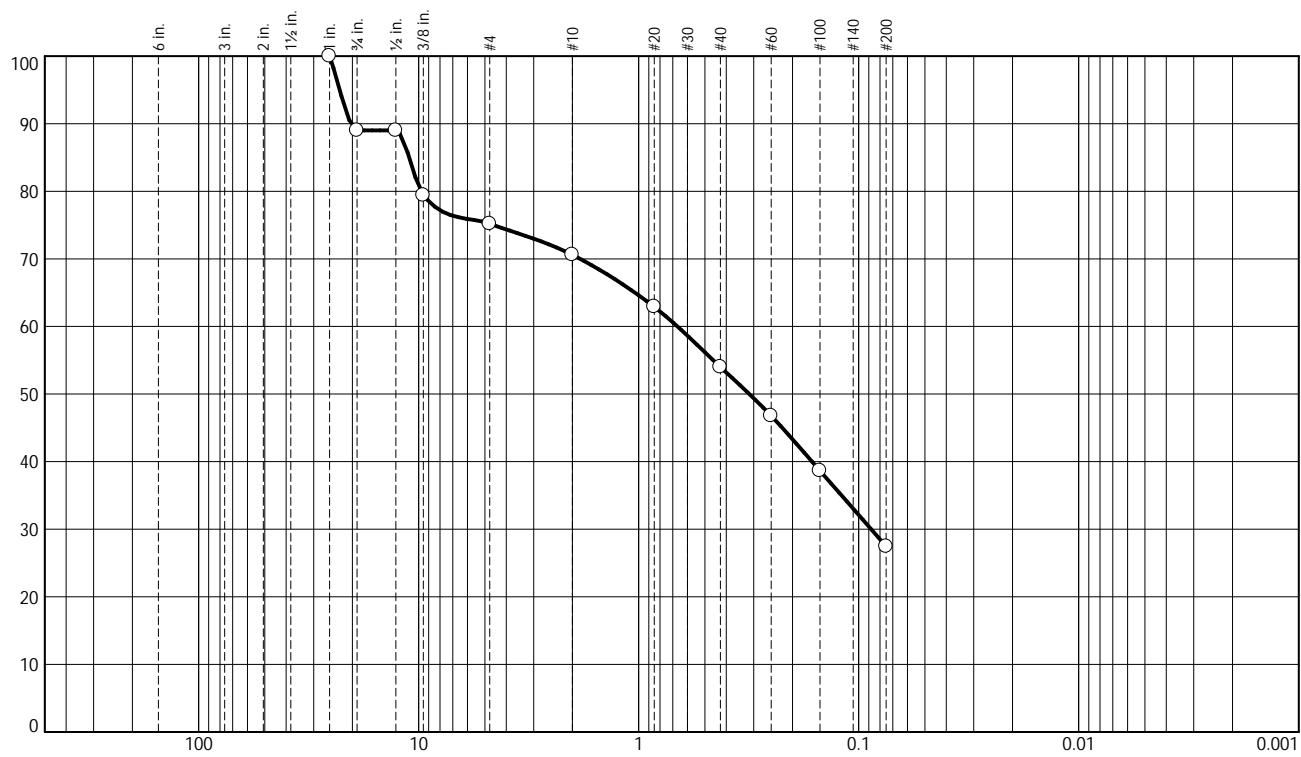
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# Particle Size Distribution Report

ASTM D6913



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
	0.0	11.0	13.8	4.6	16.6	26.6	27.4

Test Results (ASTM D6913)				
Sieve Size or Diam. (mm.)	Finer (%)	Spec.* (%)	Out of Spec. (%)	Pct. of Fines
1"	100.0			
3/4"	89.0			
1/2"	89.0			
3/8"	79.4			
#4	75.2			
#10	70.6			93.9
#20	62.9			83.6
#40	54.0			71.8
#60	46.8			62.2
#100	38.7			51.4
#200	27.4			36.5

\* (no specification provided)

Material Description	
Brown silty sand with gravel	
<u>Atterberg Limits</u>	
PL= NP      LL= NV      PI= NP	
<u>Coefficients</u>	
D <sub>90</sub> = 20.3294	D <sub>85</sub> = 11.0381
D <sub>50</sub> = 0.3142	D <sub>30</sub> = 0.0878
D <sub>10</sub> =	C <sub>U</sub> =
<u>Classification</u>	
USCS= SM	AASHTO= A-2-4(0)
<u>Test Remarks</u>	

Source of Sample: Borings  
Sample Number: B-1 / S-2

Depth: 2.5-4.5'

Sample Date: 09.19.22

Thielsch Engineering Inc.

Cranston, RI

Client: Northeast Geotechnical, Inc.  
Project: Herb Chambers Building Addition  
Wayland, MA

Project No: 74-22-0002.202

Figure 22-S-3701

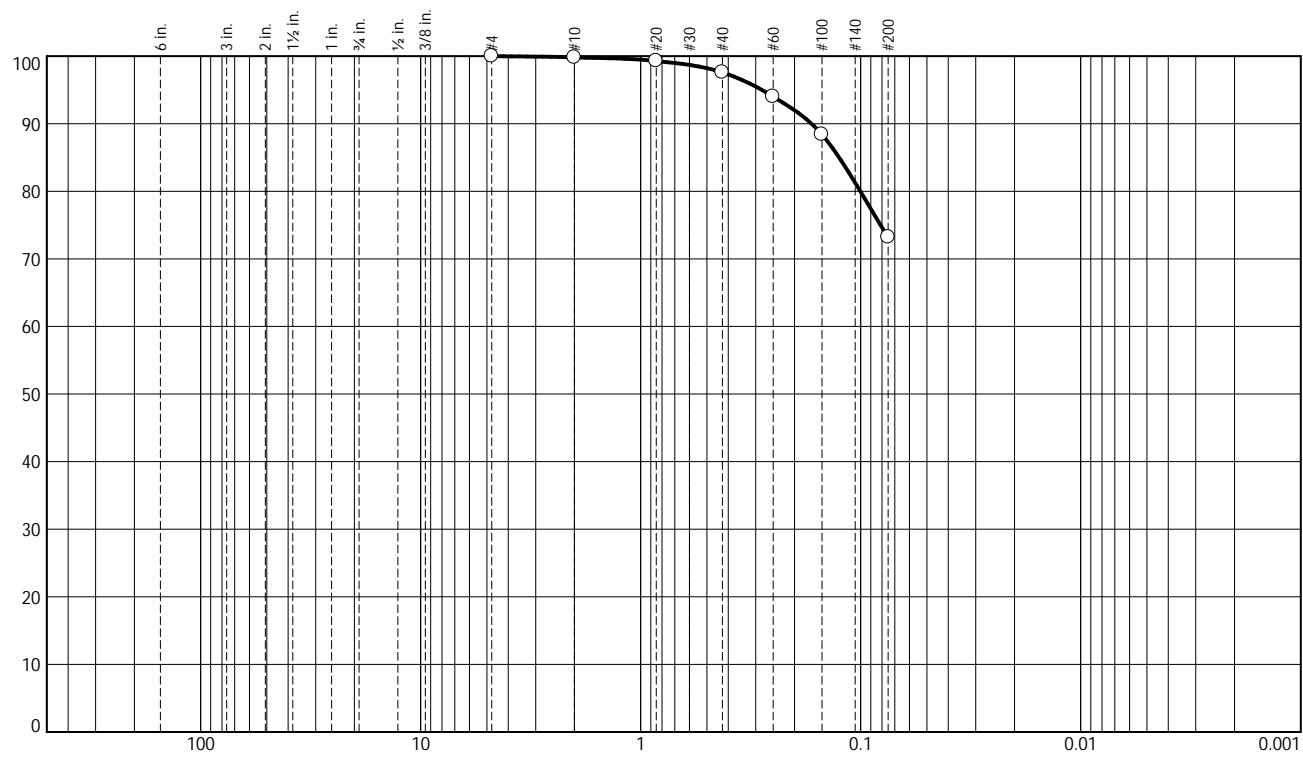
Tested By: SL / FR

Checked By: Rebecca Roth

These results are for the exclusive use of the client for whom they were obtained. They apply only to the samples tested and are not indicative of apparently identical samples.

# Particle Size Distribution Report

ASTM D6913



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.2	2.2	24.4	73.2	

Test Results (ASTM D6913)				
Sieve Size or Diam. (mm.)	Finer (%)	Spec.* (%)	Out of Spec. (%)	Pct. of Fines
#4	100.0			
#10	99.8			
#20	99.3			
#40	97.6			
#60	94.0			
#100	88.4			
#200	73.2			

\* (no specification provided)

Material Description	
Brown silt with sand	
PL= NP	Atterberg Limits LL= NV      PI= NP
D <sub>90</sub> = 0.1672	Coefficients D <sub>85</sub> = 0.1253      D <sub>60</sub> =
D <sub>50</sub> =	D <sub>30</sub> =      D <sub>15</sub> =
D <sub>10</sub> =	C <sub>U</sub> =      C <sub>C</sub> =
USCS= ML	Classification AASHTO= A-4(0)
Test Remarks	
Sample visually classified as non-plastic.	

Source of Sample: Borings  
Sample Number: B-2 / S-2

Depth: 2.5-4.5'

Sample Date: 09.23.22

Thielsch Engineering Inc.

Cranston, RI

Client: Northeast Geotechnical, Inc.  
Project: Herb Chambers Building Addition  
Wayland, MA

Project No: 74-22-0002.202

Figure 22-S-3702

Tested By: SL / FR

Checked By: Rebecca Roth

These results are for the exclusive use of the client for whom they were obtained. They apply only to the samples tested and are not indicative of apparently identical samples.

# Particle Size Distribution Report

ASTM D6913



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.6	1.4	10.9	35.7	48.4	

Test Results (ASTM D6913)				
Sieve Size or Diam. (mm.)	Finer (%)	Spec.* (%)	Out of Spec. (%)	Pct. of Fines
3/4"	100.0			
1/2"	97.6			
3/8"	96.8			
#4	96.4			
#10	95.0			
#20	90.7			
#40	84.1			
#60	76.6			
#100	57.0			
#200	48.4			

\* (no specification provided)

Source of Sample: Borings  
Sample Number: B-3 / S-3

Depth: 5-7'

Sample Date: 09.23.22

Material Description					
Brown silty sand					
PL=	NP	Atterberg Limits	LL=	NV	PI= NP
D <sub>90</sub> =	0.7783	D <sub>85</sub> =	0.4609	D <sub>60</sub> =	0.1649
D <sub>50</sub> =	0.0877	D <sub>30</sub> =		D <sub>15</sub> =	
D <sub>10</sub> =		C <sub>U</sub> =		C <sub>C</sub> =	
USCS=	SM	Classification	AASHTO=	A-4(0)	
Test Remarks					
Sample visually classified as non-plastic.					

Thielsch Engineering Inc.

Cranston, RI

Client: Northeast Geotechnical, Inc.  
Project: Herb Chambers Building Addition  
Wayland, MA

Project No: 74-22-0002.202

Figure 22-S-3703

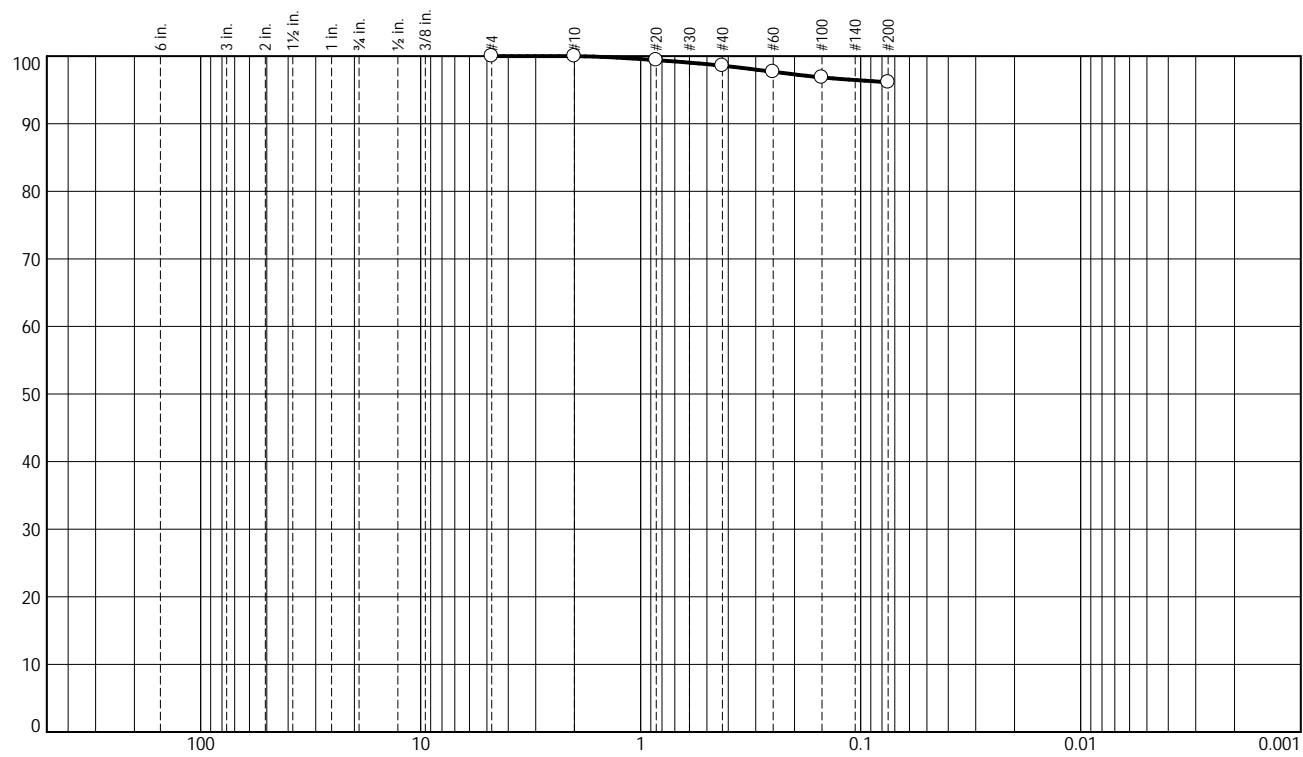
Tested By: SL / FR

Checked By: Rebecca Roth

These results are for the exclusive use of the client for whom they were obtained. They apply only to the samples tested and are not indicative of apparently identical samples.

# Particle Size Distribution Report

ASTM D6913



% +3"

% Gravel

% Sand

% Fines

Coarse

Fine

Coarse

Medium

Fine

Silt

Clay

0.0

0.0

0.0

0.0

1.4

2.5

96.1

## Test Results (ASTM D6913)

Sieve Size or Diam. (mm.)	Finer (%)	Spec.* (%)	Out of Spec. (%)	Pct. of Fines
#4	100.0			
#10	100.0			
#20	99.4			
#40	98.6			
#60	97.7			
#100	96.8			
#200	96.1			

\* (no specification provided)

Source of Sample: Borings  
Sample Number: B-4 / S-3

Depth: 5-7'

Sample Date: 09.23.22

## Material Description

Brown silt

PL= NP

Atterberg Limits

PI= NP

LL= NV

D<sub>90</sub>=

D<sub>85</sub>=

D<sub>60</sub>=

D<sub>50</sub>=

D<sub>30</sub>=

D<sub>15</sub>=

D<sub>10</sub>=

C<sub>U</sub>=

C<sub>C</sub>=

USCS= ML

Classification

AASHTO= A-4(0)

Test Remarks

Sample visually classified as non-plastic.

Thielsch Engineering Inc.

Cranston, RI

Client: Northeast Geotechnical, Inc.

Project: Herb Chambers Building Addition  
Wayland, MA

Project No: 74-22-0002.202

Figure 22-S-3704

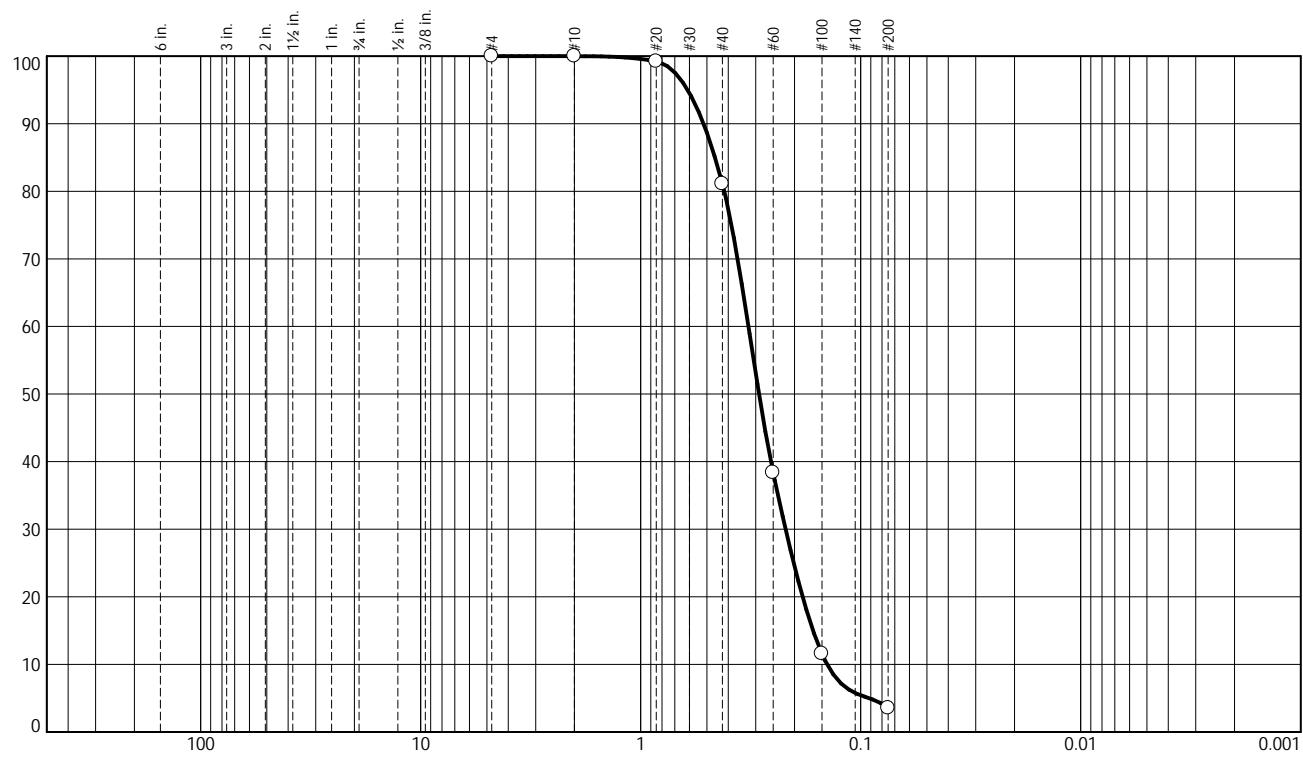
Tested By: SL / FR

Checked By: Rebecca Roth

These results are for the exclusive use of the client for whom they were obtained. They apply only to the samples tested and are not indicative of apparently identical samples.

# Particle Size Distribution Report

ASTM D6913



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
	0.0	0.0	0.0	18.9	77.6	3.5	

Test Results (ASTM D6913)				
Sieve Size or Diam. (mm.)	Finer (%)	Spec.* (%)	Out of Spec. (%)	Pct. of Fines
#4	100.0			
#10	100.0			
#20	99.2			
#40	81.1			
#60	38.4			
#100	11.6			
#200	3.5			

\* (no specification provided)

Material Description	
Brown poorly graded sand	
PL= NP	Atterberg Limits LL= NV      PI= NP
D <sub>90</sub> = 0.5183	Coefficients D <sub>85</sub> = 0.4594      D <sub>60</sub> = 0.3237
D <sub>50</sub> = 0.2898	D <sub>30</sub> = 0.2194      D <sub>15</sub> = 0.1647
D <sub>10</sub> = 0.1421	C <sub>U</sub> = 2.28      C <sub>C</sub> = 1.05
USCS= SP	Classification AASHTO= A-3
Test Remarks	

Source of Sample: Borings      Depth: 5-7'  
Sample Number: B-5 / S-3

Sample Date: 09.23.22

Thielsch Engineering Inc.

Cranston, RI

Client: Northeast Geotechnical, Inc.  
Project: Herb Chambers Building Addition  
Wayland, MA

Project No: 74-22-0002.202

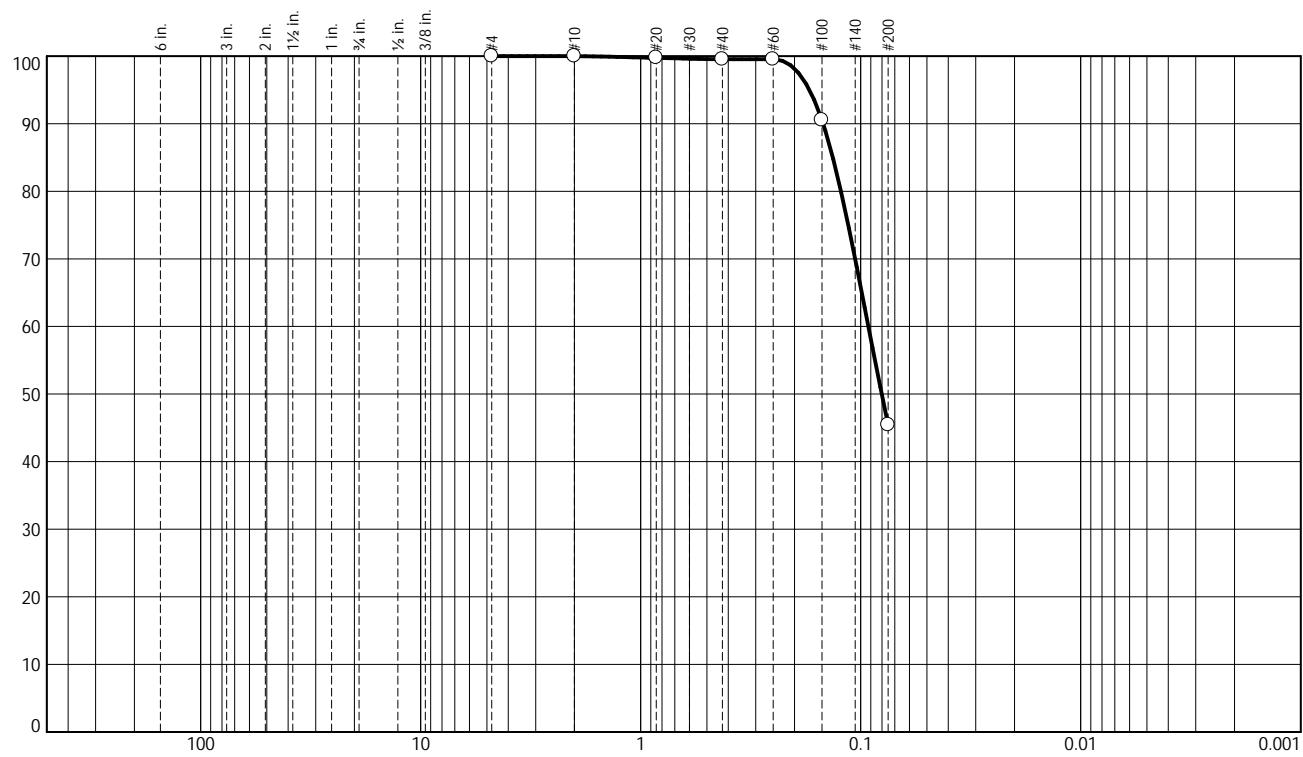
Figure 22-S-3705

Tested By: SL / FR      Checked By: Rebecca Roth

These results are for the exclusive use of the client for whom they were obtained. They apply only to the samples tested and are not indicative of apparently identical samples.

# Particle Size Distribution Report

ASTM D6913



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
	0.0	0.0	0.0	0.5	54.1	45.4	

Test Results (ASTM D6913)				
Sieve Size or Diam. (mm.)	Finer (%)	Spec.* (%)	Out of Spec. (%)	Pct. of Fines
#4	100.0			
#10	100.0			
#20	99.7			
#40	99.5			
#60	99.5			
#100	90.5			
#200	45.4			

\* (no specification provided)

Source of Sample: Borings  
Sample Number: B-6 / S-4

Depth: 6-8'

Sample Date: 09.23.22

Material Description	
Brown silty sand	
PL= NP	Atterberg Limits LL= NV      PI= NP
D <sub>90</sub> = 0.1481	Coefficients D <sub>85</sub> = 0.1338      D <sub>60</sub> = 0.0923
D <sub>50</sub> = 0.0803	D <sub>30</sub> =      D <sub>15</sub> =
D <sub>10</sub> =	C <sub>U</sub> =      C <sub>C</sub> =
USCS= SM	Classification AASHTO= A-4(0)
Test Remarks	
Sample visually classified as non-plastic.	

Thielsch Engineering Inc.

Cranston, RI

Client: Northeast Geotechnical, Inc.  
Project: Herb Chambers Building Addition  
Wayland, MA

Project No: 74-22-0002.202

Figure 22-S-3706

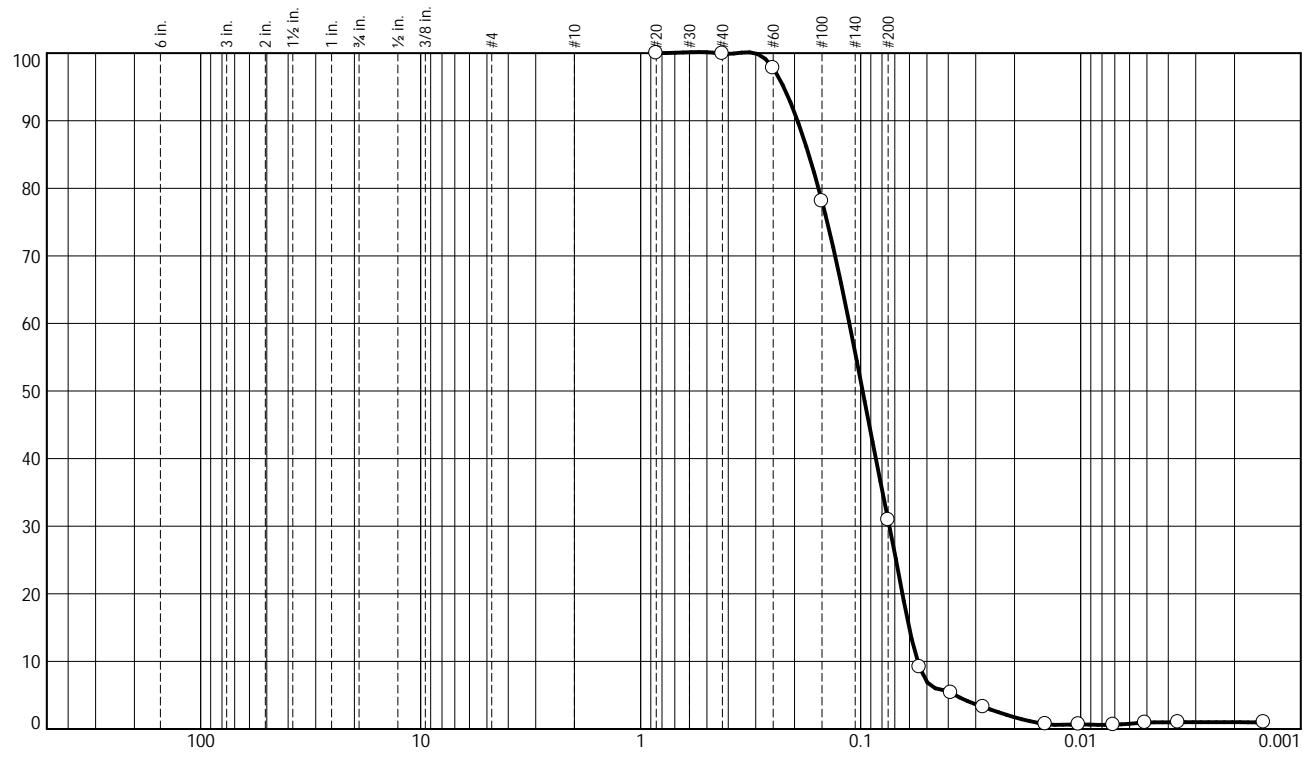
Tested By: SL / FR

Checked By: Rebecca Roth

These results are for the exclusive use of the client for whom they were obtained. They apply only to the samples tested and are not indicative of apparently identical samples.

# Particle Size Distribution Report

ASTM D6913 and ASTM D7928



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
	0.0	0.0	0.0	0.1	69.0	29.9	1.0

Test Results (ASTM D6913 and ASTM D7928)				
Sieve Size or Diam. (mm.)	Finer (%)	Spec.* (%)	Out of Spec. (%)	Pct. of Fines
#20	100.0			
#40	99.9			
#60	97.8			
#100	78.1			
#200	30.9			
0.0541 mm.	9.2			
0.0389 mm.	5.4			
0.0277 mm.	3.3			
0.0145 mm.	0.7			
0.0102 mm.	0.7			
0.0071 mm.	0.6			
0.0051 mm.	0.9			
0.0036 mm.	1.0			
0.0015 mm.	1.0			

\* (no specification provided)

Source of Sample: Borings  
Sample Number: B-7 / S-5

Depth: 10-12'

Sample Date: 09.23.22

<u>Material Description</u>	
Brown silty sand	
PL= NP	Atterberg Limits LL= NV      PI= NP
D <sub>90</sub> = 0.1937	Coefficients D <sub>85</sub> = 0.1723      D <sub>60</sub> = 0.1126
D <sub>50</sub> = 0.0980	D <sub>30</sub> = 0.0740      D <sub>15</sub> = 0.0603
D <sub>10</sub> = 0.0552	C <sub>U</sub> = 2.04      C <sub>C</sub> = 0.88
USCS= SM	Classification AASHTO= A-2-4(0)
Test Remarks Sample visually classified as non-plastic.	

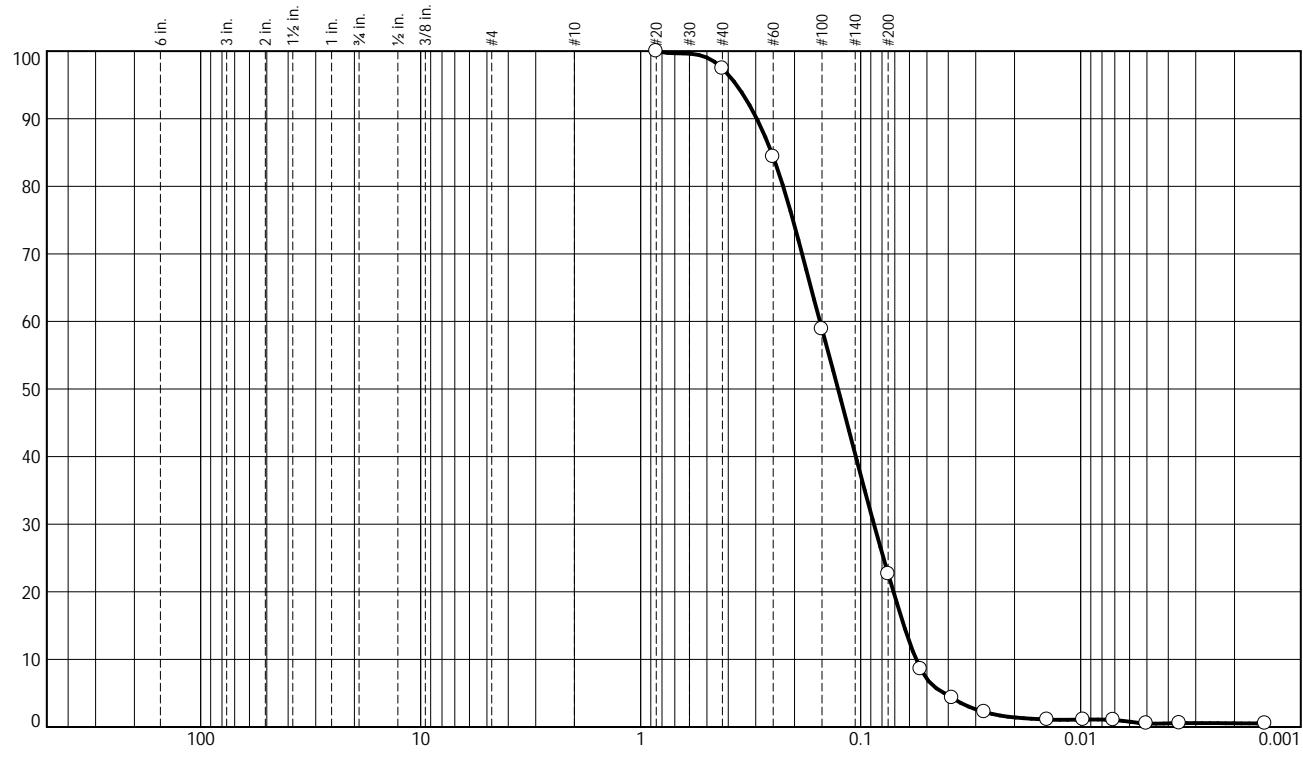
Thielsch Engineering Inc.  Cranston, RI	Client: Northeast Geotechnical, Inc. Project: Herb Chambers Building Addition Wayland, MA Project No: 74-22-0002.202
Tested By: SL / SF / SF / SL	Checked By: Rebecca Roth

Figure 22-S-3707

These results are for the exclusive use of the client for whom they were obtained. They apply only to the samples tested and are not indicative of apparently identical samples.

# Particle Size Distribution Report

ASTM D6913 and ASTM D7928



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						22.1	0.5
0.0	0.0	0.0	0.0	2.6	74.8		

Test Results (ASTM D6913 and ASTM D7928)				
Sieve Size or Diam. (mm.)	Finer (%)	Spec.* (%)	Out of Spec. (%)	Pct. of Fines
#20	100.0			
#40	97.4			
#60	84.4			
#100	58.9			
#200	22.6			
0.0534 mm.	8.6			
0.0384 mm.	4.3			
0.0274 mm.	2.2			
0.0142 mm.	1.1			
0.0097 mm.	1.1			
0.0071 mm.	1.0			
0.0050 mm.	0.5			
0.0036 mm.	0.6			
0.0015 mm.	0.5			

\* (no specification provided)

Source of Sample: Borings  
Sample Number: B-8 / S-5

Depth: 10-12'

Sample Date: 09.23.22

<u>Material Description</u>	
Brown silty sand	
PL= NP	Atterberg Limits LL= NV      PI= NP
D <sub>90</sub> = 0.2969	Coefficients D <sub>85</sub> = 0.2542      D <sub>60</sub> = 0.1533
D <sub>50</sub> = 0.1267	D <sub>30</sub> = 0.0871      D <sub>15</sub> = 0.0636
D <sub>10</sub> = 0.0560	C <sub>U</sub> = 2.74      C <sub>C</sub> = 0.88
USCS= SM	Classification AASHTO= A-2-4(0)
Test Remarks	

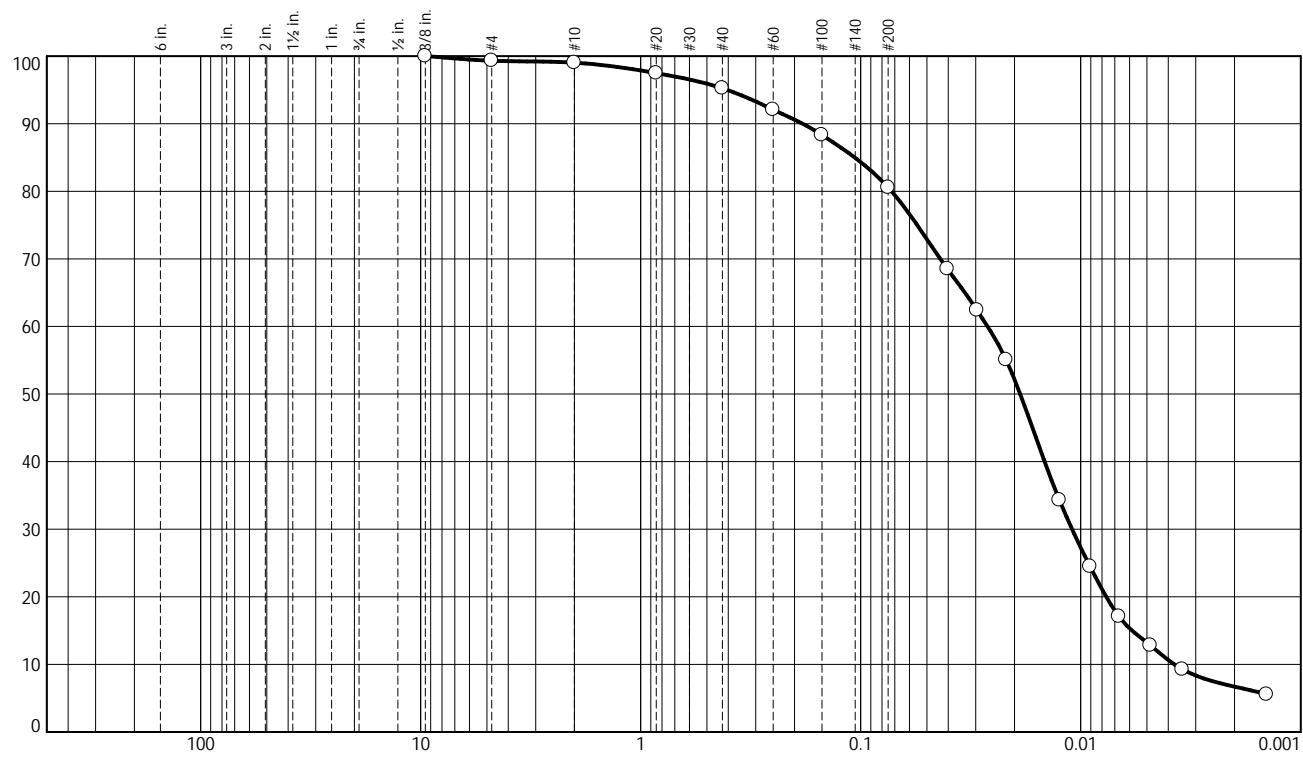
Thielsch Engineering Inc.  Cranston, RI	Client: Northeast Geotechnical, Inc. Project: Herb Chambers Building Addition Wayland, MA Project No: 74-22-0002.202
	Figure 22-S-3708

Tested By: SF / SL      Checked By: Rebecca Roth

These results are for the exclusive use of the client for whom they were obtained. They apply only to the samples tested and are not indicative of apparently identical samples.

# Particle Size Distribution Report

ASTM D6913 and ASTM D7928



% +3"

% Gravel

% Sand

% Fines

Coarse

Fine

Coarse

Medium

Fine

Silt

Clay

0.0

0.0

0.7

0.3

3.8

14.6

73.9

6.7

## Test Results (ASTM D6913 and ASTM D7928)

Sieve Size or Diam. (mm.)	Finer (%)	Spec.* (%)	Out of Spec. (%)	Pct. of Fines
3/8"	100.0			
#4	99.3			
#10	99.0			99.7
#20	97.5			98.2
#40	95.2			95.9
#60	92.1			92.7
#100	88.3			88.9
#200	80.6			81.1
0.0403 mm.	68.5			
0.0296 mm.	62.4			
0.0218 mm.	55.0			
0.0125 mm.	34.3			
0.0091 mm.	24.5			
0.0067 mm.	17.1			
0.0048 mm.	12.8			
0.0035 mm.	9.3			
0.0014 mm.	5.5			

\* (no specification provided)

Source of Sample: Borings  
Sample Number: B-9 / S-4B

Depth: 8-9'

Sample Date: 09.23.22

## Material Description

Brown silt with sand

PL= NP

Atterberg Limits

LL= NV

PI= NP

## Coefficients

D<sub>90</sub>= 0.1838

D<sub>85</sub>= 0.1064

D<sub>60</sub>= 0.0265

D<sub>50</sub>= 0.0188

D<sub>30</sub>= 0.0109

D<sub>15</sub>= 0.0058

D<sub>10</sub>= 0.0038

C<sub>U</sub>= 7.05

C<sub>C</sub>= 1.20

## Classification

USCS= ML

AASHTO= A-4(0)

## Test Remarks

Sample visually classified as non-plastic.

Thielsch Engineering Inc.  
Cranston, RI

Client: Northeast Geotechnical, Inc.  
Project: Herb Chambers Building Addition  
Wayland, MA  
Project No: 74-22-0002.202

Figure 22-S-3709

Tested By: SF / SL

Checked By: Rebecca Roth

These results are for the exclusive use of the client for whom they were obtained. They apply only to the samples tested and are not indicative of apparently identical samples.

# Particle Size Distribution Report

ASTM D6913 and ASTM D7928



% +3"

% Gravel

% Sand

% Fines

Coarse

Fine

Coarse

Medium

Fine

Silt

Clay

0.0

0.0

0.0

0.8

12.7

22.9

55.4

8.2

## Test Results (ASTM D6913 and ASTM D7928)

Sieve Size or Diam. (mm.)	Finer (%)	Spec.* (%)	Out of Spec. (%)	Pct. of Fines
#4	100.0			
#10	99.2			
#20	95.1			
#40	86.5			
#60	78.6			
#100	71.7			
#200	63.6			
0.0410 mm.	52.2			
0.0303 mm.	46.4			
0.0223 mm.	40.6			
0.0111 mm.	27.1			
0.0088 mm.	22.8			
0.0065 mm.	18.9			
0.0047 mm.	14.8			
0.0034 mm.	11.6			
0.0014 mm.	6.3			

\* (no specification provided)

Source of Sample: Borings  
Sample Number: B-9 / S-7

Depth: 15-17'

Sample Date: 09.23.22

## Material Description

Brown sandy silt

PL=

Atterberg Limits

LL=

PI=

D<sub>90</sub>= 0.5481

D<sub>85</sub>= 0.3825

D<sub>60</sub>= 0.0609

D<sub>50</sub>= 0.0365

D<sub>30</sub>= 0.0129

D<sub>15</sub>= 0.0048

D<sub>10</sub>= 0.0027

C<sub>u</sub>= 22.45

C<sub>c</sub>= 1.01

USCS= ML

AASHTO= A-4(0)

Classification

Test Remarks

Sample visually classified as plastic. Sample rolled to 1/4"

Thielsch Engineering Inc.

Cranston, RI

Client: Northeast Geotechnical, Inc.

Project: Herb Chambers Building Addition  
Wayland, MA

Project No: 74-22-0002.202

Figure 22-S-3710

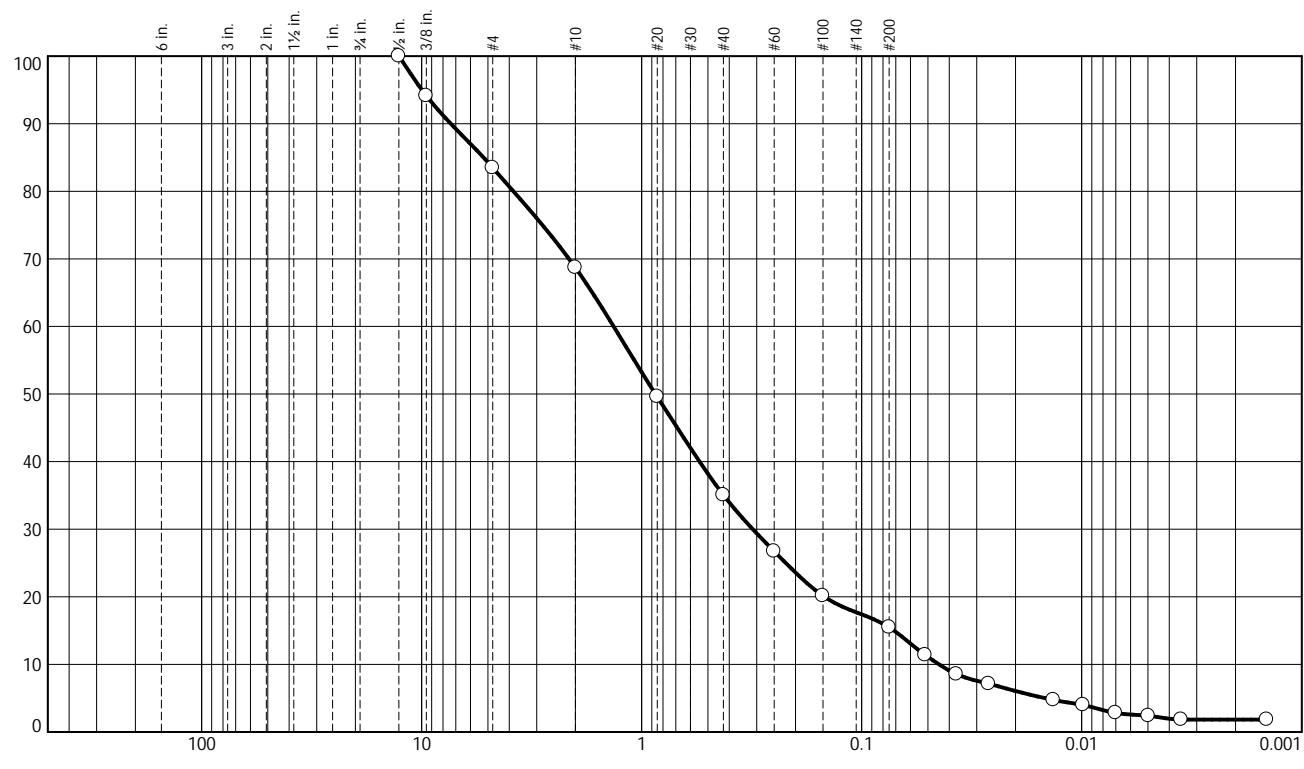
Tested By: SF / SL

Checked By: Rebecca Roth

These results are for the exclusive use of the client for whom they were obtained. They apply only to the samples tested and are not indicative of apparently identical samples.

# Particle Size Distribution Report

ASTM D6913 and ASTM D7928



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
				33.6	19.6		
0.0	0.0	16.5	14.8	33.6	19.6	13.7	1.8

Test Results (ASTM D6913 and ASTM D7928)				
Sieve Size or Diam. (mm.)	Finer (%)	Spec.* (%)	Out of Spec. (%)	Pct. of Fines
1/2"	100.0			
3/8"	94.1			
#4	83.5			
#10	68.7			82.3
#20	49.6			59.4
#40	35.1			42.0
#60	26.7			32.0
#100	20.1			24.1
#200	15.5			18.5
0.0515 mm.	11.4			
0.0371 mm.	8.6			
0.0265 mm.	7.1			
0.0134 mm.	4.7			
0.0099 mm.	4.0			
0.0070 mm.	2.8			
0.0050 mm.	2.4			
0.0035 mm.	1.8			
0.0014 mm.	1.8			

\* (no specification provided)

Source of Sample: Borings      Depth: 7-9'  
Sample Number: B-10 / S-4

Sample Date: 09.23.22

## Material Description

Brown silty sand with gravel

Atterberg Limits  
 PL= NP      LL= NV      PI= NP  
 Coefficients  
 $D_{90}= 7.3721$      $D_{85}= 5.2347$      $D_{60}= 1.3409$   
 $D_{50}= 0.8659$      $D_{30}= 0.3127$      $D_{15}= 0.0713$   
 $D_{10}= 0.0445$      $C_u= 30.11$      $C_c= 1.64$

Classification  
 USCS= SM      AASHTO= A-1-b

## Test Remarks

Thielsch Engineering Inc.  Cranston, RI	Client: Northeast Geotechnical, Inc. Project: Herb Chambers Building Addition Wayland, MA Project No: 74-22-0002.202
Tested By: SF / SL	Checked By: Rebecca Roth

Figure 22-S-3711

These results are for the exclusive use of the client for whom they were obtained. They apply only to the samples tested and are not indicative of apparently identical samples.

# Particle Size Distribution Report

ASTM D6913 and ASTM D7928



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
	0.0	0.0	0.0	0.2	2.0	88.6	9.2

Test Results (ASTM D6913 and ASTM D7928)				
Sieve Size or Diam. (mm.)	Finer (%)	Spec.* (%)	Out of Spec. (%)	Pct. of Fines
#20	100.0			
#40	99.8			
#60	99.5			
#100	98.6			
#200	97.8			
0.0365 mm.	85.6			
0.0275 mm.	76.8			
0.0205 mm.	68.4			
0.0117 mm.	43.1			
0.0088 mm.	31.7			
0.0066 mm.	23.5			
0.0048 mm.	16.8			
0.0034 mm.	12.6			
0.0014 mm.	7.5			

\* (no specification provided)

Source of Sample: Borings  
Sample Number: B-10 / S-5

Depth: 10-12'

Sample Date: 09.23.22

Material Description		
Brown silty clay		
PL=	Atterberg Limits	PI=
	LL=	
D <sub>90</sub> = 0.0440	D <sub>85</sub> = 0.0356	D <sub>60</sub> = 0.0168
D <sub>50</sub> = 0.0136	D <sub>30</sub> = 0.0084	D <sub>15</sub> = 0.0042
D <sub>10</sub> = 0.0023	C <sub>U</sub> = 7.20	C <sub>C</sub> = 1.79
USCS= ML	AASHTO= A-4(0)	
Classification		
Test Remarks		
Sample visually classified as plastic. Sample rolled to 1/8".		

Thielsch Engineering Inc.

Cranston, RI

Client: Northeast Geotechnical, Inc.  
Project: Herb Chambers Building Addition  
Wayland, MA

Project No: 74-22-0002.202

Figure 22-S-3712

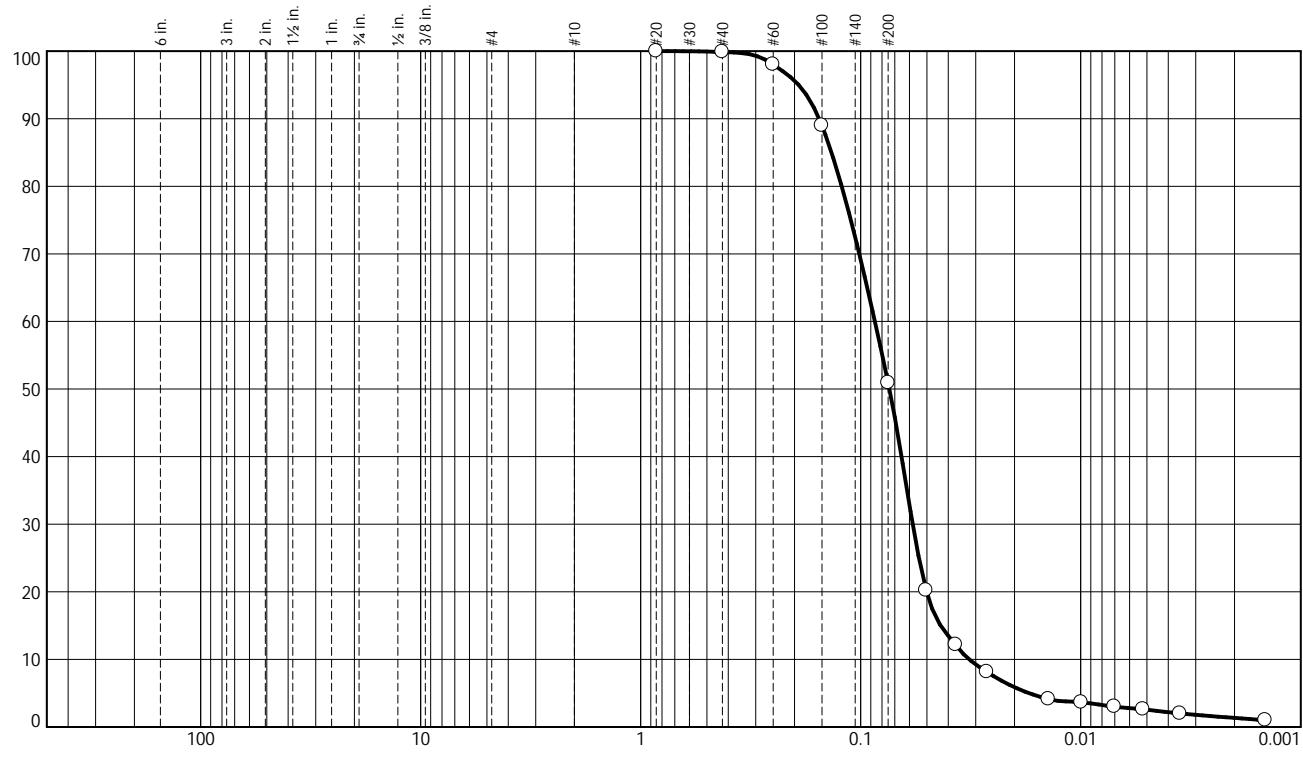
Tested By: SF / SL

Checked By: Rebecca Roth

These results are for the exclusive use of the client for whom they were obtained. They apply only to the samples tested and are not indicative of apparently identical samples.

# Particle Size Distribution Report

ASTM D6913 and ASTM D7928



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
	0.0	0.0	0.0	0.1	49.0	49.6	1.3

Test Results (ASTM D6913 and ASTM D7928)				
Sieve Size or Diam. (mm.)	Finer (%)	Spec.* (%)	Out of Spec. (%)	Pct. of Fines
#20	100.0			
#40	99.9			
#60	98.0			
#100	89.0			
#200	50.9			
0.0504 mm.	20.2			
0.0370 mm.	12.2			
0.0267 mm.	8.1			
0.0140 mm.	4.1			
0.0099 mm.	3.7			
0.0070 mm.	3.0			
0.0052 mm.	2.6			
0.0035 mm.	2.0			
0.0014 mm.	1.0			

\* (no specification provided)

Source of Sample: Borings      Depth: 8-9'  
Sample Number: B-11 / S-4B

Sample Date: 09.23.22

<u>Material Description</u>	
Brown sandy silt	
PL= NP	Atterberg Limits LL= NV      PI= NP
D <sub>90</sub> = 0.1545	D <sub>85</sub> = 0.1358      D <sub>60</sub> = 0.0863
D <sub>50</sub> = 0.0740	D <sub>30</sub> = 0.0580      D <sub>15</sub> = 0.0433
D <sub>10</sub> = 0.0321	C <sub>U</sub> = 2.68      C <sub>C</sub> = 1.22
USCS= ML	Classification AASHTO= A-4(0)
Test Remarks Sample visually classified as non-plastic.	

Thielsch Engineering Inc.  Cranston, RI	Client: Northeast Geotechnical, Inc. Project: Herb Chambers Building Addition Wayland, MA Project No: 74-22-0002.202
Figure 22-S-3713	

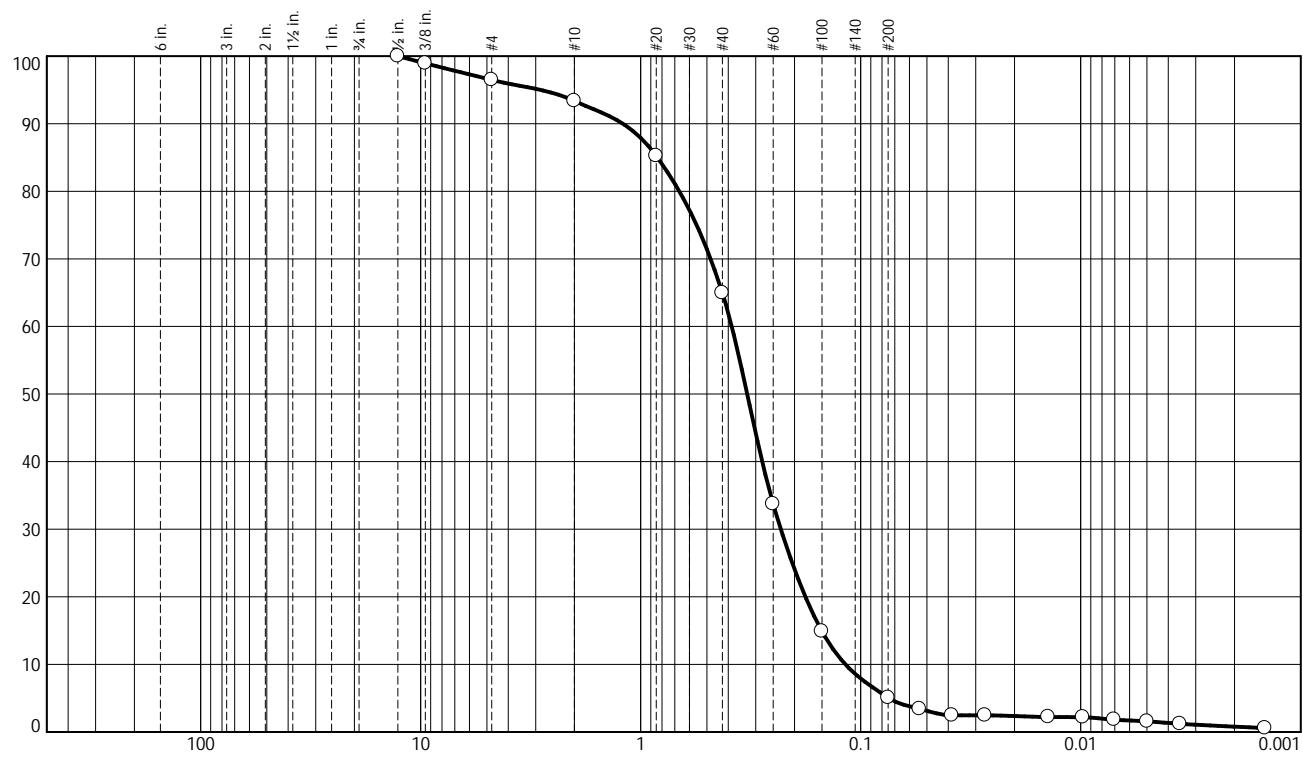
Tested By: SF / FR / SF / SL

Checked By: Rebecca Roth

These results are for the exclusive use of the client for whom they were obtained. They apply only to the samples tested and are not indicative of apparently identical samples.

# Particle Size Distribution Report

ASTM D6913 and ASTM D7928



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
	0.0	3.5	3.1	28.4	59.9	4.3	0.8

Test Results (ASTM D6913 and ASTM D7928)				
Sieve Size or Diam. (mm.)	Finer (%)	Spec.* (%)	Out of Spec. (%)	Pct. of Fines
1/2"	100.0			
3/8"	98.9			
#4	96.5			
#10	93.4			96.8
#20	85.2			88.4
#40	65.0			67.3
#60	33.7			35.0
#100	14.9			15.4
#200	5.1			5.3
0.0540 mm.	3.4			
0.0384 mm.	2.5			
0.0272 mm.	2.5			
0.0141 mm.	2.2			
0.0098 mm.	2.2			
0.0070 mm.	1.8			
0.0050 mm.	1.6			
0.0035 mm.	1.2			
0.0015 mm.	0.6			

\* (no specification provided)

Source of Sample: Borings      Depth: 5-7'  
Sample Number: B-12 / S-3

### Material Description

Brown poorly graded sand with silt

PL= NP      Atterberg Limits      LL= NV      PI= NP

Coefficients  
 $D_{90}= 1.2042$        $D_{85}= 0.8398$        $D_{60}= 0.3854$   
 $D_{50}= 0.3280$        $D_{30}= 0.2306$        $D_{15}= 0.1506$   
 $D_{10}= 0.1174$        $C_u= 3.28$        $C_c= 1.18$

Classification  
 USCS= SP-SM      AASHTO= A-3

Test Remarks

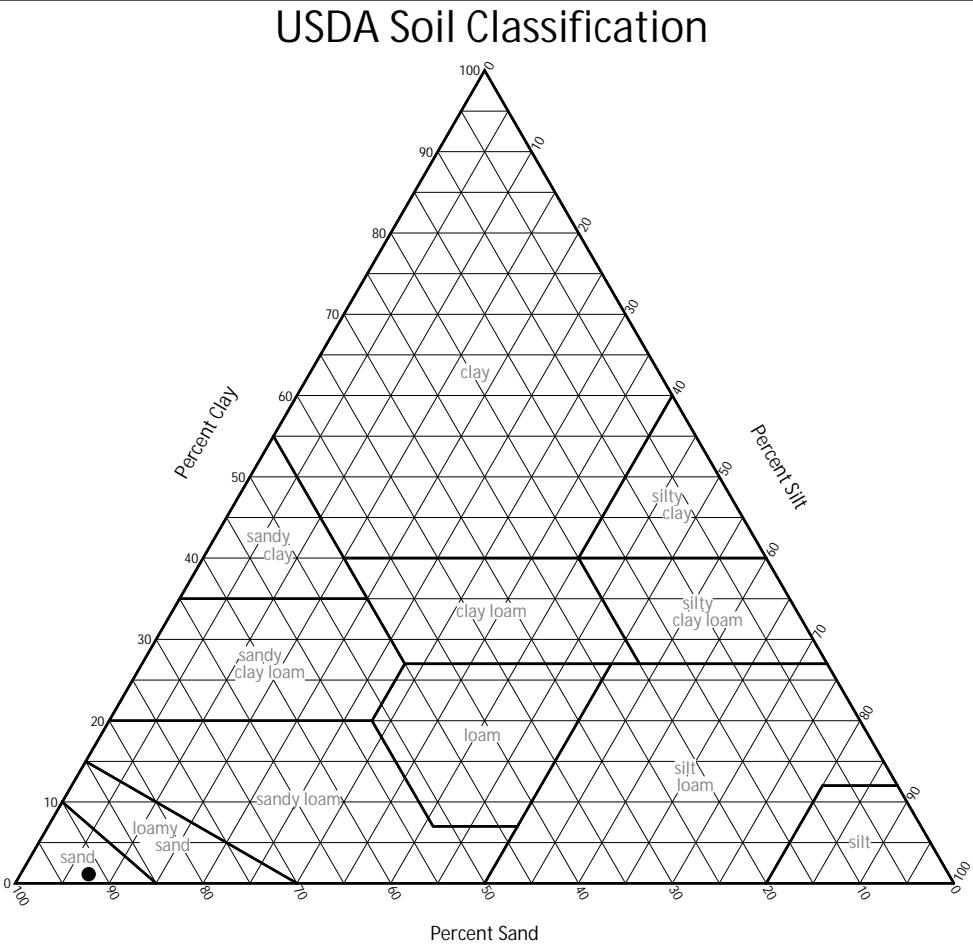
Thielsch Engineering Inc.  Cranston, RI	Client: Northeast Geotechnical, Inc. Project: Herb Chambers Building Addition Wayland, MA Project No: 74-22-0002.202	Sample Date: 09.23.22
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Tested By: SF / SL

Checked By: Rebecca Roth

Figure 22-S-3714

These results are for the exclusive use of the client for whom they were obtained. They apply only to the samples tested and are not indicative of apparently identical samples.



SOIL DATA						
Source	Sample No.	Depth	Percentages From Material Passing a #10 Sieve			Classification
			Sand	Silt	Clay	
Borings	B-7 / S-5	10-12'	91.6	7.4	1.0	Sand

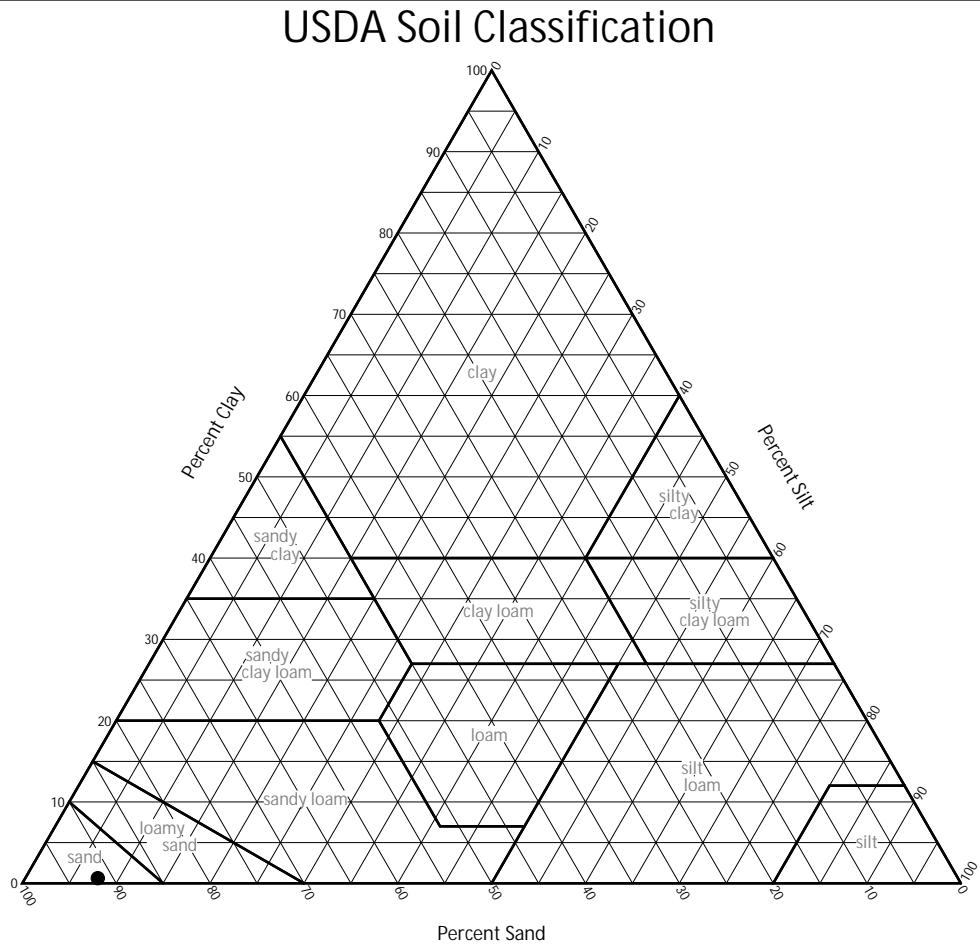
Thielsch Engineering Inc.  
Cranston, RI

Client: Northeast Geotechnical, Inc.  
Project: Herb Chambers Building Addition  
Wayland, MA  
Project No.: 74-22-0002.202

Figure 22-S-3707

Checked By: RR

These results are for the exclusive use of the client for whom they were obtained. They apply only to the samples tested and are not indicative of apparently identical samples.



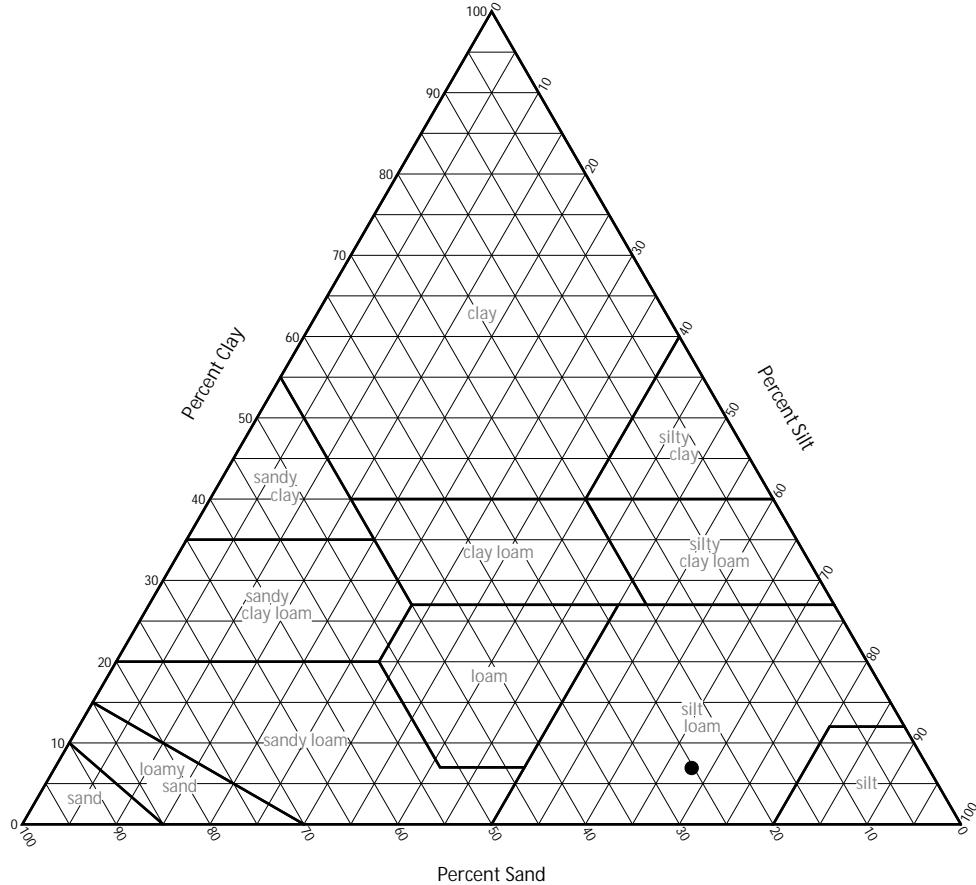
Source	Sample No.	Depth	SOIL DATA			Classification
			Sand	Silt	Clay	
● Borings	B-8 / S-5	10-12'	91.6	7.9	0.5	Sand

<b>Thielsch Engineering Inc.</b>  <b>Cranston, RI</b>	Client: Northeast Geotechnical, Inc. Project: Herb Chambers Building Addition Wayland, MA Project No.: 74-22-0002.202
	Figure 22-S-3708

Checked By: RR

These results are for the exclusive use of the client for whom they were obtained. They apply only to the samples tested and are not indicative of apparently identical samples.

## USDA Soil Classification



SOIL DATA						
Source	Sample No.	Depth	Percentages From Material Passing a #10 Sieve			Classification
			Sand	Silt	Clay	
● Borings	B-9 / S-4B	8-9'	25.2	68.1	6.8	Silt loam

Thielsch Engineering Inc.

Cranston, RI

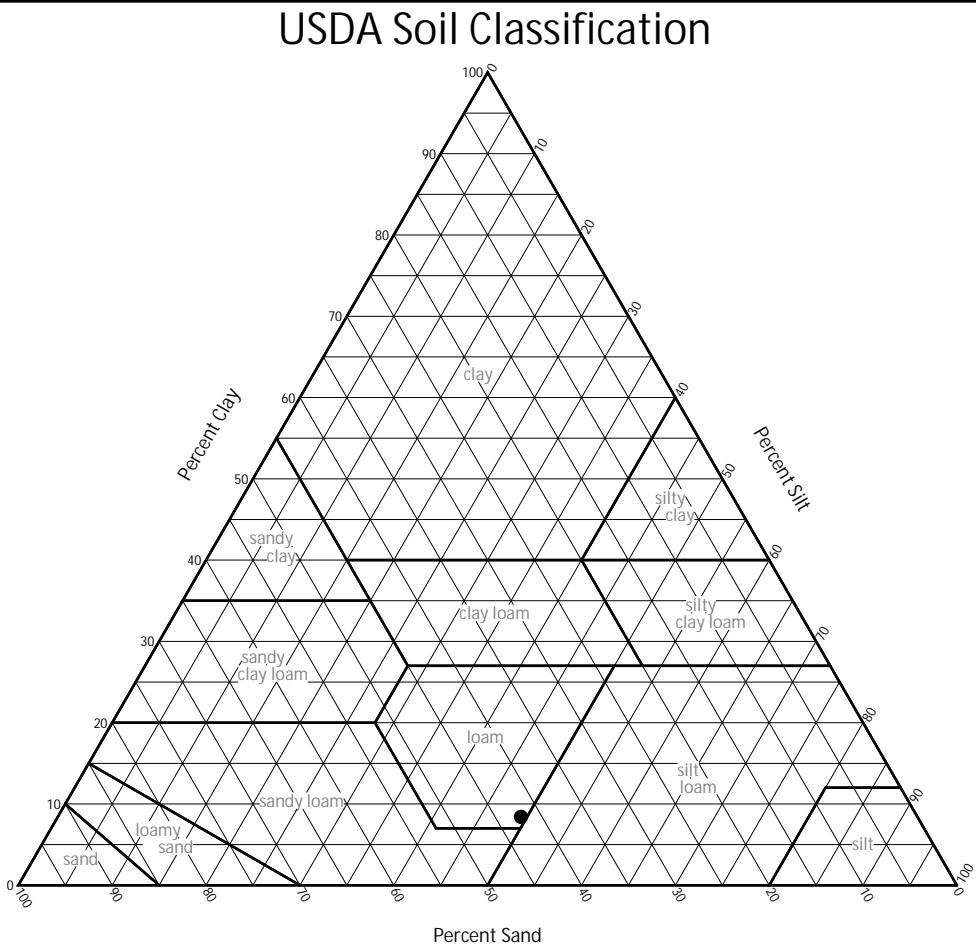
Client: Northeast Geotechnical, Inc.  
 Project: Herb Chambers Building Addition  
 Wayland, MA

Project No.: 74-22-0002.202

Figure 22-S-3709

Checked By: RR

These results are for the exclusive use of the client for whom they were obtained. They apply only to the samples tested and are not indicative of apparently identical samples.



SOIL DATA						
Source	Sample No.	Depth	Percentages From Material Passing a #10 Sieve			Classification
			Sand	Silt	Clay	
● Borings	B-9 / S-7	15-17'	42.2	49.5	8.3	Loam

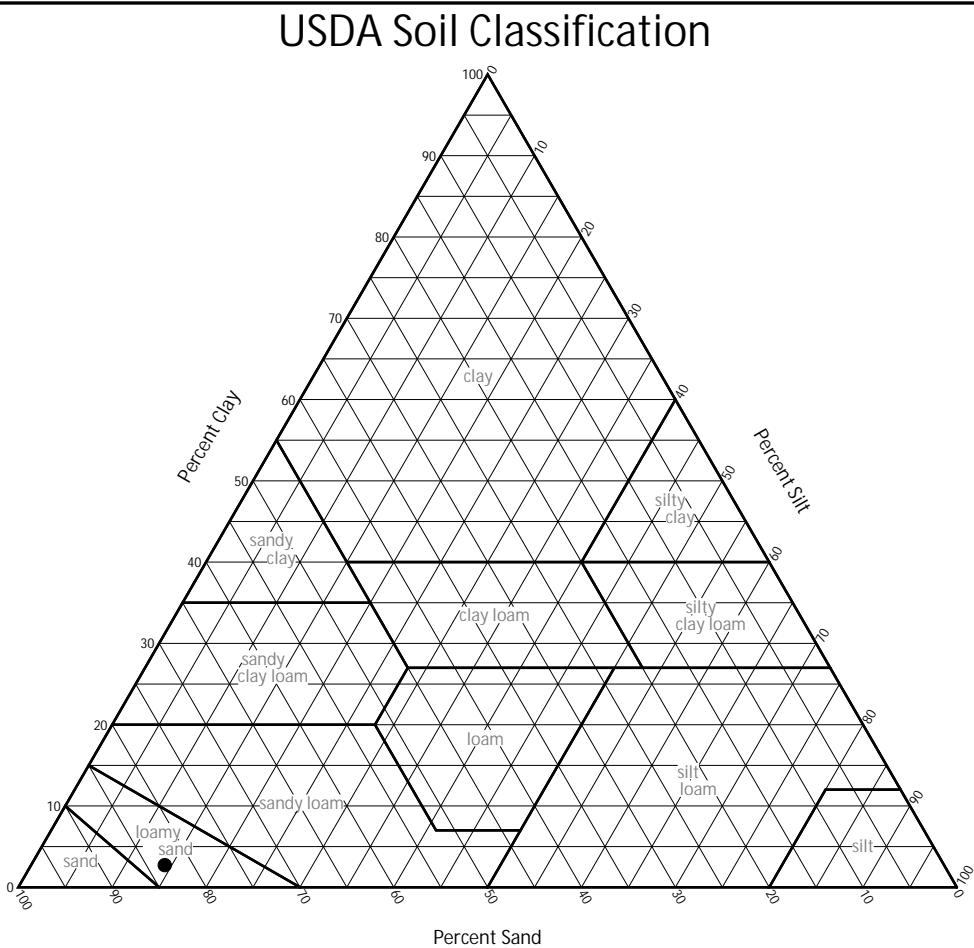
Thielsch Engineering Inc.  
Cranston, RI

Client: Northeast Geotechnical, Inc.  
Project: Herb Chambers Building Addition  
Wayland, MA  
Project No.: 74-22-0002.202

Figure 22-S-3710

Checked By: RR

These results are for the exclusive use of the client for whom they were obtained. They apply only to the samples tested and are not indicative of apparently identical samples.

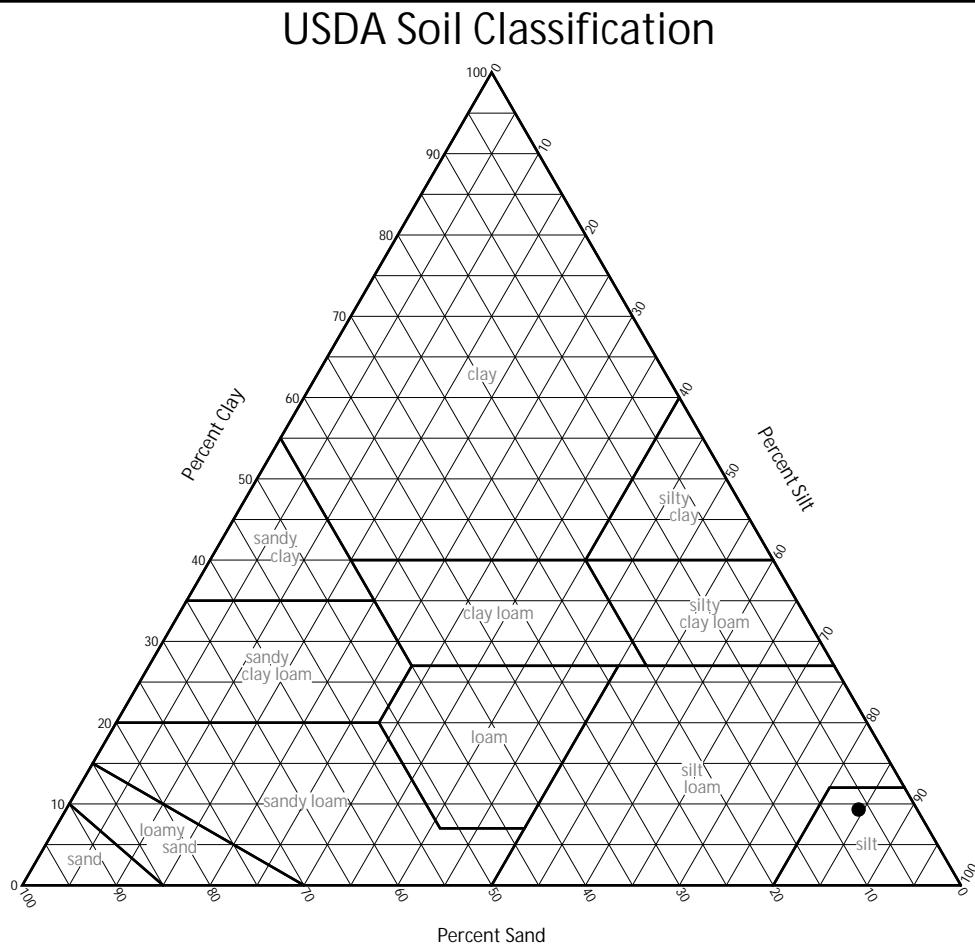


Source	Sample No.	Depth	SOIL DATA			Classification
			Sand	Silt	Clay	
● Borings	B-10 / S-4	7-9'	83.0	14.4	2.6	Loamy sand

Thielsch Engineering Inc. Cranston, RI	Client: Northeast Geotechnical, Inc. Project: Herb Chambers Building Addition Wayland, MA Project No.: 74-22-0002.202
	Figure 22-S-3711

Checked By: RR \_\_\_\_\_

These results are for the exclusive use of the client for whom they were obtained. They apply only to the samples tested and are not indicative of apparently identical samples.



SOIL DATA						
Source	Sample No.	Depth	Percentages From Material Passing a #10 Sieve			Classification
			Sand	Silt	Clay	
● Borings	B-10 / S-5	10-12'	6.2	84.6	9.2	Silt

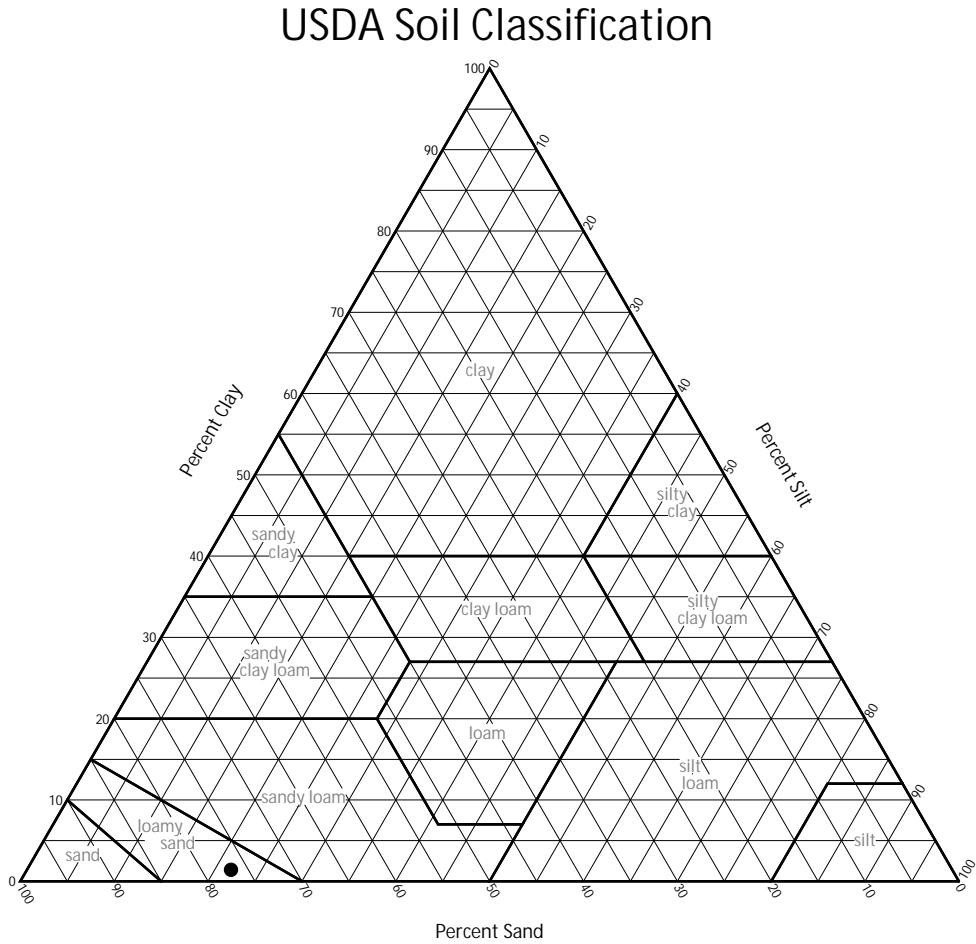
Thielsch Engineering Inc.  
Cranston, RI

Client: Northeast Geotechnical, Inc.  
Project: Herb Chambers Building Addition  
Wayland, MA  
Project No.: 74-22-0002.202

Figure 22-S-3712

Checked By: RR

These results are for the exclusive use of the client for whom they were obtained. They apply only to the samples tested and are not indicative of apparently identical samples.

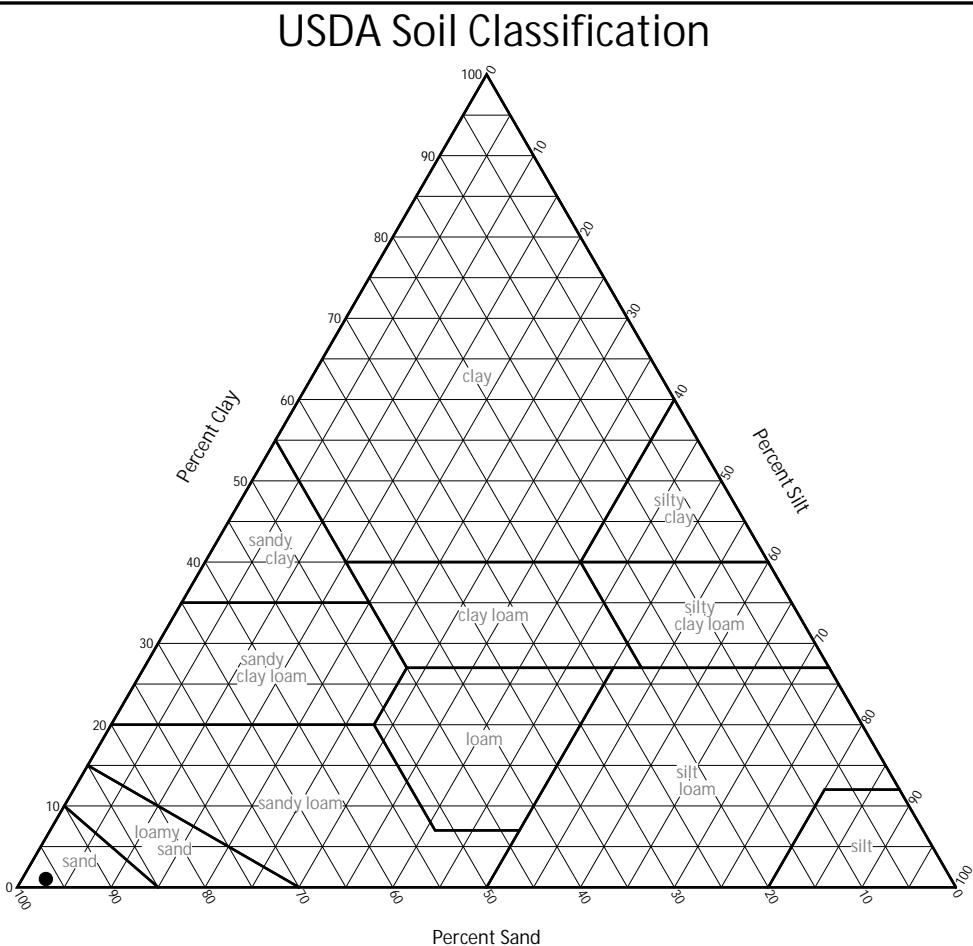


SOIL DATA						
Source	Sample No.	Depth	Percentages From Material Passing a #10 Sieve			Classification
			Sand	Silt	Clay	
● Borings	B-11 / S-4B	8-9'	76.8	21.9	1.3	Loamy sand

<b>Thielsch Engineering Inc.</b> Cranston, RI	Client: Northeast Geotechnical, Inc. Project: Herb Chambers Building Addition Wayland, MA Project No.: 74-22-0002.202	Figure 22-S-3713
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Checked By: RR

These results are for the exclusive use of the client for whom they were obtained. They apply only to the samples tested and are not indicative of apparently identical samples.



SOIL DATA						
Source	Sample No.	Depth	Percentages From Material Passing a #10 Sieve			Classification
			Sand	Silt	Clay	
Borings	B-12 / S-3	5-7'	96.4	2.8	0.9	Sand

Thielsch Engineering Inc.  
Cranston, RI

Client: Northeast Geotechnical, Inc.  
Project: Herb Chambers Building Addition  
Wayland, MA  
Project No.: 74-22-0002.202

Figure 22-S-3714

Checked By: RR

Project No. 100-173

Date: 10/25/22  
Revision: \_\_\_\_\_

Commonwealth of Massachusetts  
Wayland, Massachusetts

### *Soil Suitability Assessment for On-site Sewage Disposal*

Performed By: David Newhall Test Dates: 10/19/22  
Performed By: \_\_\_\_\_ Test Dates: \_\_\_\_\_  
Witnessed By: N/A Drainage Testhole #: 22-01D Through 22-04D  
Witnessed By: \_\_\_\_\_ Testhole #: \_\_\_\_\_

#### FACILITY INFORMATION

Site Location: \_\_\_\_\_ Owner/ Applicant Information:  
Builder's lot #: \_\_\_\_\_ Name: Herb Chambers 43 Braintree Street, LLC  
Street Address: 533 Boston Post Road Address: 259 McGrath Highway  
Town, State, Zip: Wayland, MA Town, State, Zip: Somerville, MA 02143  
Assessor's Map: Map 21 Lot 003 Telephone no.: \_\_\_\_\_

#### SITE INFORMATION

##### Construction Type:

New Construction:  Repair:  Upgrade:  Drainage:

Published Soil Survey Available: No:  Yes:

Year Published: 2022 Publication Scale: Attached a. Soil Map Unit: 656 Drainage Class: N/A  
b. Soil Map Unit: \_\_\_\_\_ Drainage Class: \_\_\_\_\_

Soil Name: a. Urban Land Complex Soil Limitations: Filled Land

Surficial Geologic Report Available: No:  Yes:

Year Published: 1974 Publication Scale: 1:24,000

Geological Material/map unit: Qlsc/Qal

Landform: Low level of Cherry Brook stage/

##### Flood Insurance Rate Map:

Above 500 year flood boundary? No:  Yes:  Within a velocity zone? No:  Yes:

Within 500 year flood boundary? No:  Yes:  Within 100 year flood boundary? No:  Yes:

##### Wetland Area:

National Wetland Inventory Map: (map unit) n/a Name: \_\_\_\_\_

Wetlands Conservancy Program Map: (map unit) n/a Name: \_\_\_\_\_

Current Water Resource Conditions (USGS): (Month/year) October-2022

Range: Above Normal:  Normal:  Below Normal:

Other References Reviewed: \_\_\_\_\_

Comments: \_\_\_\_\_

Project No.: 100-173

Date: 10/25/22  
Revised: \_\_\_\_\_

\*Deep Hole # 22-01D to 22-04D

Street Address: 533 Boston Post Road  
Town: Wayland, MA  
Assessor's Map: Map 21 Lot 003

#### DETERMINATION OF HIGH GROUNDWATER ELEVATION

Method Used:

- Depth observed standing in observation hole: A: \_\_\_\_\_ inches B: \_\_\_\_\_ inches
- Depth weeping from side of observation hole: A: \_\_\_\_\_ inches B: \_\_\_\_\_ inches
- Depth to soil mottles: \_\_\_\_\_ inches
- Ground water adjustment: \_\_\_\_\_ inches

Index Well Number: MA-WKW 2R Wayland Reading Date: 10/19/22 Index well level: Normal

Adjustment factor: None Adjustment groundwater level: \_\_\_\_\_

#### DEPTH OF PERVERSIVE MATERIAL

##### Depth of Naturally Occurring Pervious Material

Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system? Yes:  No:

If yes, at what depth was it observed? Upper Boundary (inches): see logs  
Lower Boundary (inches): see logs

#### CERTIFICATION

I certify that I have passed the soil evaluator examination approved by the Department of Environmental Protection and that the above analysis was performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017.

Signature of Soil Evaluator: \_\_\_\_\_ Date: \_\_\_\_\_

Typed or Printed Name of Soil Evaluator: David Newhall

Date of Soil Evaluator Exam: May 2018

Name of Board of Health Witness: N/A Drainage  
Board of Health: N/A Drainage

\*If applicable, only deep hole with shallowest ESHGW listed.

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FORMS 11 AND 12  
SOIL EVALUATOR FORM

### ON-SITE REVIEW

DEEP HOLE #: 21-01D DATE: 10/19/22 TIME: 8:30 AM WEATHER: Sunny 55°

SITE ADDRESS or MAP/LOT #: 533 Boston Post Road Wayland, MA

OWNER: Herb Chambers 533 Boston Post Rd LLC JOB NO.: 100-173

LOCATION (Identify on Plan): See Attached Plan GROUND ELEVATION AT SURFACE OF HOLE: See Attached Plan

LAND USE: Commercial SURFACE STONES: Yes:  No:  SLOPE (%): 0-3%

VEGETATION: Grass/ Gravel LANDFORM: Foothillslope

#### DISTANCES FROM:

OPEN WATER BODY: >100 ft PROPERTY LINE: >10 ft POSSIBLE WET AREA: >30 ft DRAINAGEWAY: >50 ft

DRINKING WATER WELL: >200 ft OTHER: \_\_\_\_\_

#### DEEP OBSERVATION HOLE LOG

Depth (inches)	Soil Hor./Layer	Soil Texture (USDA)	Soil Color (Munsell)	Redoximorphic Features	Other (Structure, Consistency,% Gravels, Stones, Boulders)
0-30"	Fill	-	-	-	-
0"-70"	C1	Sand	10 YR 5/4	Damp @ 58" Weeping @ 66"	60% Gravel, Single Grain, Loose

PARENT MATERIAL: Sandy Glaciofluvial Deposits Unsuitable Material Present? Yes:  No:  If Yes:

Disturbed Soil:  Fill Mat'l:  Impervious Layer(s):  Weathered/Fractured Rock:  Bedrock:

GROUNDWATER OBSERVED: Yes:  No:  If Yes: What is the depth of Groundwater:

Standing in Hole: \_\_\_\_\_ Weeping from Face: 66" Saturating the Face: 58" Mottling: \_\_\_\_\_

Estimated Depth to Seasonal High Ground Water : 58"

#### PERCOLATION TEST

Percolation Hole #:	<u>N/A Drainage</u>	Percolation Hole #:	<u> </u>
Test Date:	<u> </u>	Test Date:	<u> </u>
Depth of Perc:	<u> </u>	Depth of Perc:	<u> </u>
Start of Presoak:	<u> </u>	Start of Presoak:	<u> </u>
End of Presoak:	<u> </u>	End of Presoak:	<u> </u>
Time @ 12":	<u> </u>	Time @ 12":	<u> </u>
Time @ 9":	<u> </u>	Time @ 9":	<u> </u>
Time Elapse:(12"-9")	<u> </u>	Time Elapse:(12"-9")	<u> </u>
Time AT 6":	<u> </u>	Time AT 6":	<u> </u>
Time Elapse: (9"-6"):	<u> </u>	Time Elapse: (9"-6"):	<u> </u>
Rate: (min/in.):	<u> </u>	Rate: (min/in.):	<u> </u>
Test Passed/ Failed/ Discon/ Add. Test Req'd:	<u> </u>	Test Passed/ Failed/ Discon/ Add. Testing Req'd:	<u> </u>

Performed By: David Newhall Witnessed By: N/A Drainage Mach./Oper.: Pitt Pipeline  
Comments: \_\_\_\_\_

An indication that the "site passed" indicates only that the basic criteria for a soil evaluation and percolation test under Title 5 have been met in the area tested. Further soil evaluations and design work are necessary to determine whether a septic system for a particular use, meeting the requirements of Title 5 and applicable local bylaws, will in fact be feasible on this site.

An indication that the "site failed" indicates only that the area tested did not meet the minimum criteria (at the time of testing) for a successful soil evaluation and/or percolation test in the area tested. Additional testing at another depth or other areas may result in passing results.

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FORMS 11 AND 12  
SOIL EVALUATOR FORM

### ON-SITE REVIEW

DEEP HOLE #: 22-02D DATE: 10/19/22 TIME: 9:30 AM WEATHER: Sunny 55°

SITE ADDRESS or MAP/LOT #: 533 Boston Post Road Wayland, MA

OWNER: Herb Chambers 533 Boston Post Rd LLC JOB NO.: 100-173

LOCATION (Identify on Plan): See Attached Plan GROUND ELEVATION AT SURFACE OF HOLE: See Attached Plan

LAND USE: Commercial SURFACE STONES: Yes:  No:  SLOPE (%): 0-3%

VEGETATION: Grass LANDFORM: Foothill

#### DISTANCES FROM:

OPEN WATER BODY: >100 ft PROPERTY LINE: >10 ft POSSIBLE WET AREA: >30 ft DRAINAGEWAY: >50 ft

DRINKING WATER WELL: >200 ft OTHER: \_\_\_\_\_

#### DEEP OBSERVATION HOLE LOG

Depth (inches)	Soil Hor./Layer	Soil Texture (USDA)	Soil Color (Munsell)	Redoximorphic Features	Other (Structure, Consistency,% Gravels, Stones, Boulders)
0-30"	Fill	-	-	-	-
30"-70"	C1	Sand	10 YR 4/4	Damp @ 60" Weeping @ 66"	60% Gravel, Single Grain, Loose
70"-88"	C2	Loam	10 YR 2/2		Blocky, Friable, 5% Gravel

PARENT MATERIAL: Sandy Glaciofluvial Deposits Unsuitable Material Present? Yes:  No:  If Yes:

Disturbed Soil:  Fill Mat'l:  Impervious Layer(s):  Weathered/Fractured Rock:  Bedrock:

GROUNDWATER OBSERVED: Yes:  No:  If Yes: What is the depth of Groundwater:

Standing in Hole: \_\_\_\_\_ Weeping from Face: 66" Saturating the Face: 60" Mottling: \_\_\_\_\_

Estimated Depth to Seasonal High Ground Water : 60"

#### PERCOLATION TEST

Percolation Hole #:	<u>N/A Drainage</u>	Percolation Hole #:	<u> </u>
Test Date:	<u> </u>	Test Date:	<u> </u>
Depth of Perc:	<u> </u>	Depth of Perc:	<u> </u>
Start of Presoak:	<u> </u>	Start of Presoak:	<u> </u>
End of Presoak:	<u> </u>	End of Presoak:	<u> </u>
Time @ 12":	<u> </u>	Time @ 12":	<u> </u>
Time @ 9":	<u> </u>	Time @ 9":	<u> </u>
Time Elapse:(12"-9")	<u> </u>	Time Elapse:(12"-9")	<u> </u>
Time AT 6":	<u> </u>	Time AT 6":	<u> </u>
Time Elapse: (9"-6"):	<u> </u>	Time Elapse: (9"-6"):	<u> </u>
Rate: (min/in.):	<u> </u>	Rate: (min/in.):	<u> </u>
Test Passed/ Failed/ Discon/ Add. Test Req'd:	<u> </u>	Test Passed/ Failed/ Discon/ Add. Testing Req'd:	<u> </u>

Performed By: David Newhall Witnessed By: N/A Drainage Mach./Oper.: Pitt Pipeline  
Comments: \_\_\_\_\_

An indication that the "site passed" indicates only that the basic criteria for a soil evaluation and percolation test under Title 5 have been met in the area tested. Further soil evaluations and design work are necessary to determine whether a septic system for a particular use, meeting the requirements of Title 5 and applicable local bylaws, will in fact be feasible on this site.

An indication that the "site failed" indicates only that the area tested did not meet the minimum criteria (at the time of testing) for a successful soil evaluation and/or percolation test in the area tested. Additional testing at another depth or other areas may result in passing results.

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FORMS 11 AND 12  
SOIL EVALUATOR FORM

### ON-SITE REVIEW

DEEP HOLE #: 22-03D DATE: 10/19/22 TIME: 10:30 AM WEATHER: Sunny 55°

SITE ADDRESS or MAP/LOT #: 533 Boston Post Road Wayland, MA

OWNER: Herb Chambers 533 Boston Post Rd LLC JOB NO.: 100-173

LOCATION (Identify on Plan): See Attached Plan GROUND ELEVATION AT SURFACE OF HOLE: See Attached Plan

LAND USE: Commercial SURFACE STONES: Yes:  No:  SLOPE (%): 0-3%

VEGETATION: Grass/ Gravel LANDFORM: Foothslope

#### DISTANCES FROM:

OPEN WATER BODY: >100 ft PROPERTY LINE: >10 ft POSSIBLE WET AREA: >30 ft DRAINAGEWAY: >50 ft

DRINKING WATER WELL: >200 ft OTHER: \_\_\_\_\_

#### DEEP OBSERVATION HOLE LOG

Depth (inches)	Soil Hor./Layer	Soil Texture (USDA)	Soil Color (Munsell)	Redoximorphic Features	Other (Structure, Consistency,% Gravels, Stones, Boulders)
0-82"	Fill	-	-	-	-
82"-104"	C1	Loamy Sand	10 YR 5/4		Massive, Friable, 40% Gravel
104"-128"	C2	Loam	10 YR 2/2		Blocky, Friable

PARENT MATERIAL: Sandy Glaciofluvial Deposits Unsuitable Material Present? Yes:  No:  If Yes:

Disturbed Soil:  Fill Mat'l:  Impervious Layer(s):  Weathered/Fractured Rock:  Bedrock:

GROUNDWATER OBSERVED: Yes:  No:  If Yes: What is the depth of Groundwater:

Standing in Hole: \_\_\_\_\_ Weeping from Face: 69" Saturating the Face: \_\_\_\_\_ Mottling: \_\_\_\_\_

Estimated Depth to Seasonal High Ground Water : 69"

#### PERCOLATION TEST

Percolation Hole #:	<u>N/A Drainage</u>	Percolation Hole #:	<u> </u>
Test Date:	<u> </u>	Test Date:	<u> </u>
Depth of Perc:	<u> </u>	Depth of Perc:	<u> </u>
Start of Presoak:	<u> </u>	Start of Presoak:	<u> </u>
End of Presoak:	<u> </u>	End of Presoak:	<u> </u>
Time @ 12":	<u> </u>	Time @ 12":	<u> </u>
Time @ 9":	<u> </u>	Time @ 9":	<u> </u>
Time Elapse:(12"-9")	<u> </u>	Time Elapse:(12"-9")	<u> </u>
Time AT 6":	<u> </u>	Time AT 6":	<u> </u>
Time Elapse: (9"-6"):	<u> </u>	Time Elapse: (9"-6"):	<u> </u>
Rate: (min/in.):	<u> </u>	Rate: (min/in.):	<u> </u>
Test Passed/ Failed/ Discon/ Add. Test Req'd:	<u> </u>	Test Passed/ Failed/ Discon/ Add. Testing Req'd:	<u> </u>

Performed By: David Newhall Witnessed By: N/A Drainage Mach./Oper.: Pitt Pipeline  
Comments: \_\_\_\_\_

An indication that the "site passed" indicates only that the basic criteria for a soil evaluation and percolation test under Title 5 have been met in the area tested. Further soil evaluations and design work are necessary to determine whether a septic system for a particular use, meeting the requirements of Title 5 and applicable local bylaws, will in fact be feasible on this site.

An indication that the "site failed" indicates only that the area tested did not meet the minimum criteria (at the time of testing) for a successful soil evaluation and/or percolation test in the area tested. Additional testing at another depth or other areas may result in passing results.

CROCKER DESIGN GROUP  
2 SHARP STREET UNIT B  
HINGHAM, MA 02043  
781-919-0808  
CROCKERDESIGNGROUP.COM

FORMS 11 AND 12  
SOIL EVALUATOR FORM

### ON-SITE REVIEW

DEEP HOLE #: 22-04D DATE: 10/19/22 TIME: 12:30 PM WEATHER: Sunny 55°

SITE ADDRESS or MAP/LOT #: 533 Boston Post Road Wayland, MA

OWNER: Herb Chambers 533 Boston Post Rd LLC JOB NO.: 100-173

LOCATION (Identify on Plan): See Attached Plan GROUND ELEVATION AT SURFACE OF HOLE: See Attached Plan

LAND USE: Commercial SURFACE STONES: Yes:  No:  SLOPE (%): 0-3%

VEGETATION: Grass/ Gravel LANDFORM: Foothslope

#### DISTANCES FROM:

OPEN WATER BODY: >100 ft PROPERTY LINE: >10 ft POSSIBLE WET AREA: >30 ft DRAINAGEWAY: >50 ft

DRINKING WATER WELL: >200 ft OTHER: \_\_\_\_\_

#### DEEP OBSERVATION HOLE LOG

Depth (inches)	Soil Hor./Layer	Soil Texture (USDA)	Soil Color (Munsell)	Redoximorphic Features	Other (Structure, Consistency,% Gravels, Stones, Boulders)
0"-72"	Fill	-	-	-	-
72"-114"	C1	Loamy Sand	10 YR 4/4	Weeping @ 70"	Single Grain, Loose

PARENT MATERIAL: Sandy Glaciofluvial Deposits Unsuitable Material Present? Yes:  No:  If Yes:

Disturbed Soil:  Fill Mat'l:  Impervious Layer(s):  Weathered/Fractured Rock:  Bedrock:

GROUNDWATER OBSERVED: Yes:  No:  If Yes: What is the depth of Groundwater:  
Standing in Hole: \_\_\_\_\_ Weeping from Face: 70" Saturating the Face: \_\_\_\_\_ Mottling: \_\_\_\_\_

Estimated Depth to Seasonal High Ground Water : 70"

#### PERCOLATION TEST

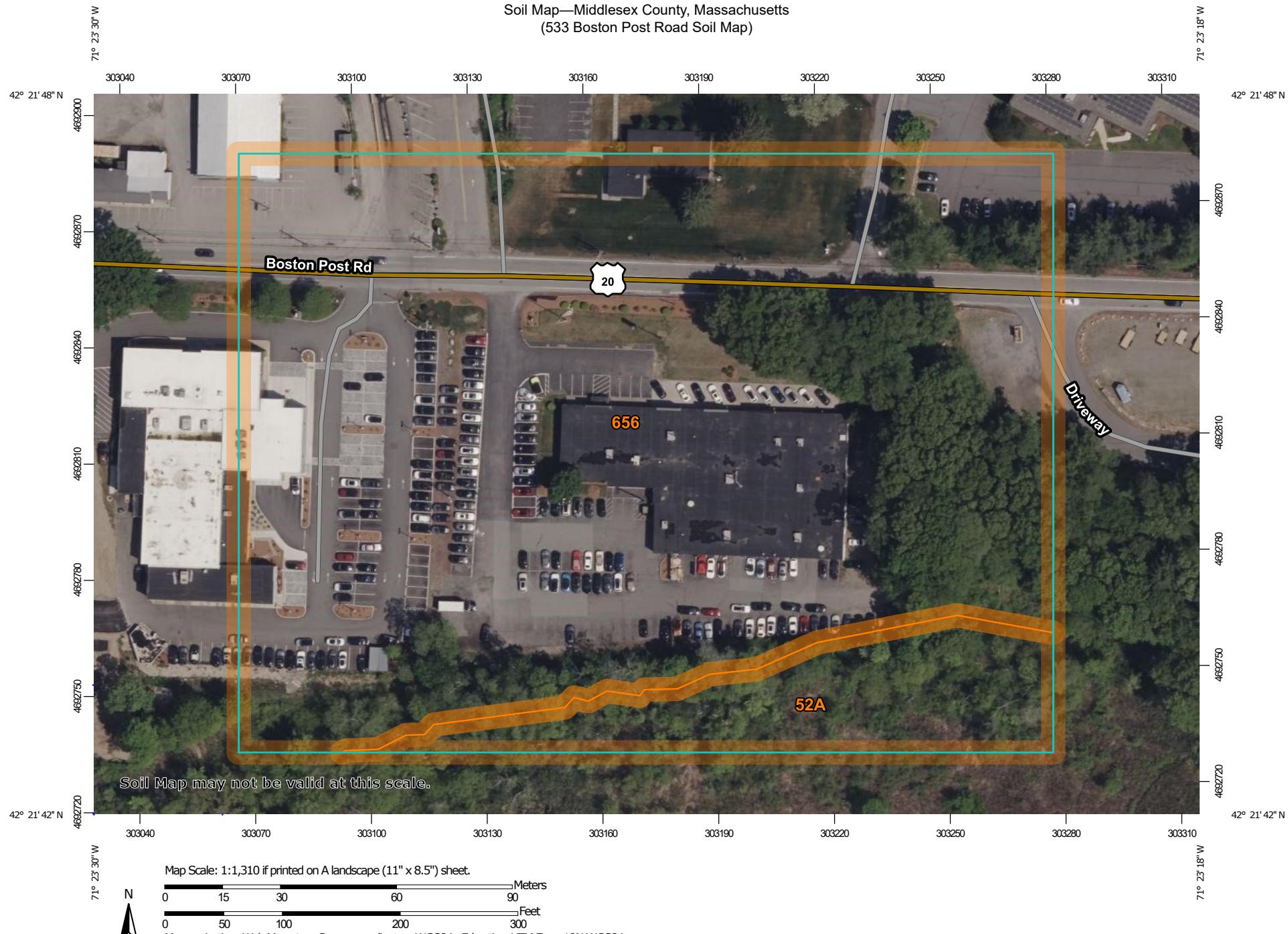
Percolation Hole #:	<u>N/A Drainage</u>	Percolation Hole #:	<u> </u>
Test Date:	<u> </u>	Test Date:	<u> </u>
Depth of Perc:	<u> </u>	Depth of Perc:	<u> </u>
Start of Presoak:	<u> </u>	Start of Presoak:	<u> </u>
End of Presoak:	<u> </u>	End of Presoak:	<u> </u>
Time @ 12":	<u> </u>	Time @ 12":	<u> </u>
Time @ 9":	<u> </u>	Time @ 9":	<u> </u>
Time Elapse:(12"-9")	<u> </u>	Time Elapse:(12"-9")	<u> </u>
Time AT 6":	<u> </u>	Time AT 6":	<u> </u>
Time Elapse: (9"-6"):	<u> </u>	Time Elapse: (9"-6"):	<u> </u>
Rate: (min/in.):	<u> </u>	Rate: (min/in.):	<u> </u>
Test Passed/ Failed/ Discon/ Add. Test Req'd:	<u> </u>	Test Passed/ Failed/ Discon/ Add. Testing Req'd:	<u> </u>

Performed By: David Newhall Witnessed By: N/A Drainage Mach./Oper.: Pitt Pipeline  
Comments: \_\_\_\_\_

An indication that the "site passed" indicates only that the basic criteria for a soil evaluation and percolation test under Title 5 have been met in the area tested. Further soil evaluations and design work are necessary to determine whether a septic system for a particular use, meeting the requirements of Title 5 and applicable local bylaws, will in fact be feasible on this site.

An indication that the "site failed" indicates only that the area tested did not meet the minimum criteria (at the time of testing) for a successful soil evaluation and/or percolation test in the area tested. Additional testing at another depth or other areas may result in passing results.

Soil Map—Middlesex County, Massachusetts  
(533 Boston Post Road Soil Map)



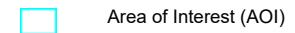
Natural Resources  
Conservation Service

Web Soil Survey  
National Cooperative Soil Survey

10/24/2022  
Page 1 of 3

## MAP LEGEND

### Area of Interest (AOI)



Area of Interest (AOI)

### Soils



Soil Map Unit Polygons



Soil Map Unit Lines



Soil Map Unit Points

### Special Point Features



Blowout



Borrow Pit



Clay Spot



Closed Depression



Gravel Pit



Gravelly Spot



Landfill



Lava Flow



Marsh or swamp



Mine or Quarry



Miscellaneous Water



Perennial Water



Rock Outcrop



Saline Spot



Sandy Spot



Severely Eroded Spot



Sinkhole



Slide or Slip



Sodic Spot



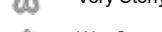
Spoil Area



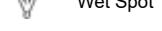
Stony Spot



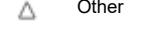
Very Stony Spot



Wet Spot

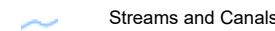


Other



Special Line Features

### Water Features



Streams and Canals

### Transportation



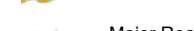
Rails



Interstate Highways



US Routes



Major Roads



Local Roads

### Background



Aerial Photography

## MAP INFORMATION

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

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

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

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

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Middlesex County, Massachusetts

Survey Area Data: Version 22, Sep 9, 2022

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

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

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



## Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
52A	Freetown muck, 0 to 1 percent slopes	0.9	11.0%
656	Udorthents-Urban land complex	7.2	89.0%
<b>Totals for Area of Interest</b>		<b>8.1</b>	<b>100.0%</b>

## Middlesex County, Massachusetts

### 52A—Freetown muck, 0 to 1 percent slopes

#### Map Unit Setting

*National map unit symbol:* 2t2q9

*Elevation:* 0 to 1,110 feet

*Mean annual precipitation:* 36 to 71 inches

*Mean annual air temperature:* 39 to 55 degrees F

*Frost-free period:* 140 to 240 days

*Farmland classification:* Not prime farmland

#### Map Unit Composition

*Freetown and similar soils:* 85 percent

*Minor components:* 15 percent

*Estimates are based on observations, descriptions, and transects of  
the mapunit.*

#### Description of Freetown

##### Setting

*Landform:* Depressions, depressions, swamps, kettles, marshes, bogs

*Landform position (two-dimensional):* Toeslope

*Landform position (three-dimensional):* Tread, dip

*Down-slope shape:* Concave

*Across-slope shape:* Concave

*Parent material:* Highly decomposed organic material

##### Typical profile

*Oe - 0 to 2 inches:* mucky peat

*Oa - 2 to 79 inches:* muck

##### Properties and qualities

*Slope:* 0 to 1 percent

*Surface area covered with cobbles, stones or boulders:* 0.0 percent

*Depth to restrictive feature:* More than 80 inches

*Drainage class:* Very poorly drained

*Runoff class:* Negligible

*Capacity of the most limiting layer to transmit water*

*(Ksat):* Moderately low to high (0.14 to 14.17 in/hr)

*Depth to water table:* About 0 to 6 inches

*Frequency of flooding:* Rare

*Frequency of ponding:* Frequent

*Available water supply, 0 to 60 inches:* Very high (about 19.2 inches)

##### Interpretive groups

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 5w

*Hydrologic Soil Group:* B/D

*Ecological site:* F144AY043MA - Acidic Organic Wetlands



*Hydric soil rating:* Yes

### Minor Components

#### Whitman

*Percent of map unit:* 5 percent  
*Landform:* Drainageways, depressions  
*Landform position (two-dimensional):* Toeslope  
*Landform position (three-dimensional):* Base slope  
*Down-slope shape:* Concave  
*Across-slope shape:* Concave  
*Hydric soil rating:* Yes

#### Scarboro

*Percent of map unit:* 5 percent  
*Landform:* Drainageways, depressions  
*Landform position (two-dimensional):* Toeslope  
*Landform position (three-dimensional):* Base slope, tread, dip  
*Down-slope shape:* Concave  
*Across-slope shape:* Concave  
*Hydric soil rating:* Yes

#### Swansea

*Percent of map unit:* 5 percent  
*Landform:* Bogs, swamps, marshes, depressions, depressions, kettles  
*Landform position (two-dimensional):* Toeslope  
*Landform position (three-dimensional):* Tread, dip  
*Down-slope shape:* Concave  
*Across-slope shape:* Concave  
*Hydric soil rating:* Yes

## Data Source Information

Soil Survey Area: Middlesex County, Massachusetts  
Survey Area Data: Version 22, Sep 9, 2022



## Middlesex County, Massachusetts

### 656—Udorthents-Urban land complex

#### Map Unit Setting

*National map unit symbol:* 995k

*Elevation:* 0 to 3,000 feet

*Mean annual precipitation:* 32 to 54 inches

*Mean annual air temperature:* 43 to 54 degrees F

*Frost-free period:* 110 to 240 days

*Farmland classification:* Not prime farmland

#### Map Unit Composition

*Udorthents and similar soils:* 45 percent

*Urban land:* 35 percent

*Minor components:* 20 percent

*Estimates are based on observations, descriptions, and transects of the mapunit.*

#### Description of Udorthents

##### Setting

*Parent material:* Loamy alluvium and/or sandy glaciofluvial deposits and/or loamy glaciolacustrine deposits and/or loamy marine deposits and/or loamy basal till and/or loamy lodgment till

##### Properties and qualities

*Slope:* 0 to 15 percent

*Depth to restrictive feature:* More than 80 inches

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

#### Description of Urban Land

##### Setting

*Landform position (two-dimensional):* Footslope

*Landform position (three-dimensional):* Base slope

*Down-slope shape:* Linear

*Across-slope shape:* Linear

*Parent material:* Excavated and filled land

#### Minor Components

##### Canton

*Percent of map unit:* 10 percent

*Landform:* Hills

*Landform position (two-dimensional):* Backslope, toeslope

*Landform position (three-dimensional):* Side slope, base slope

*Down-slope shape:* Linear

*Across-slope shape:* Convex

*Hydric soil rating:* No



**Merrimac**

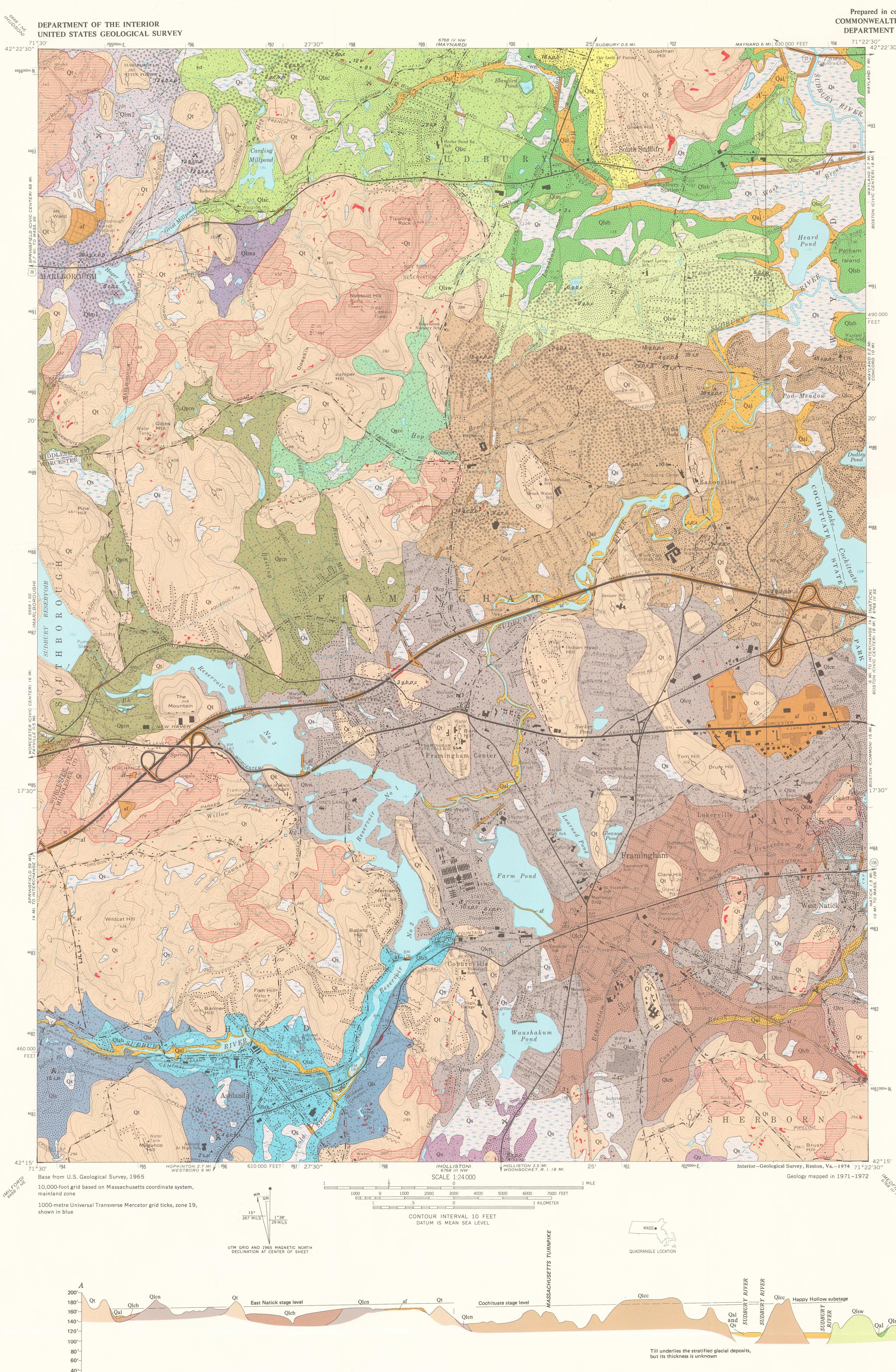
*Percent of map unit:* 5 percent  
*Landform:* Terraces, plains  
*Landform position (two-dimensional):* Shoulder  
*Landform position (three-dimensional):* Tread, rise  
*Down-slope shape:* Convex  
*Across-slope shape:* Convex  
*Hydric soil rating:* No

**Paxton**

*Percent of map unit:* 5 percent  
*Landform:* Hillslopes  
*Landform position (two-dimensional):* Summit, backslope  
*Landform position (three-dimensional):* Head slope, side slope  
*Down-slope shape:* Convex  
*Across-slope shape:* Convex  
*Hydric soil rating:* No

## Data Source Information

Soil Survey Area: Middlesex County, Massachusetts  
Survey Area Data: Version 22, Sep 9, 2022



## SURFICIAL GEOLOGIC MAP OF THE FRAMINGHAM QUADRANGLE, MIDDLESEX AND WORCHESTER COUNTIES, MASSACHUSETTS

By  
Arthur E. Nelson  
1974

Massachusetts (Framingham quad.) Surficial  
1:24,000, 1974

For sale by U.S. Geological Survey, Reston, Virginia 22092, price \$1.00

3 1818 00096163 9

## NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The community map repository should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) Report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS Report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study Report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study Report for information on flood control structures for this jurisdiction.

The projection used in the preparation of this map was Massachusetts State Plane Mainland Zone (FIPS zone 2001). The horizontal datum was NAD 83, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at <http://www.ngs.noaa.gov> or contact the National Geodetic Survey at the following address:

NGS Information Services  
NOAA/NMNS12  
National Geodetic Survey  
SSMC-3, #5202  
1215 East-West Highway  
Silver Spring, Maryland 20910-3262  
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit its website at <http://www.ngs.noaa.gov>.

Base map information shown on this FIRM was derived from orthophotography provided by MassGIS at a scale of 1:500 from photography dated April 2008.

The profile baselines depicted on this map represent the hydraulic modeling baselines that match the flow profiles in the FIS report. As a result of improved topographic data, the **profile baseline**, in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

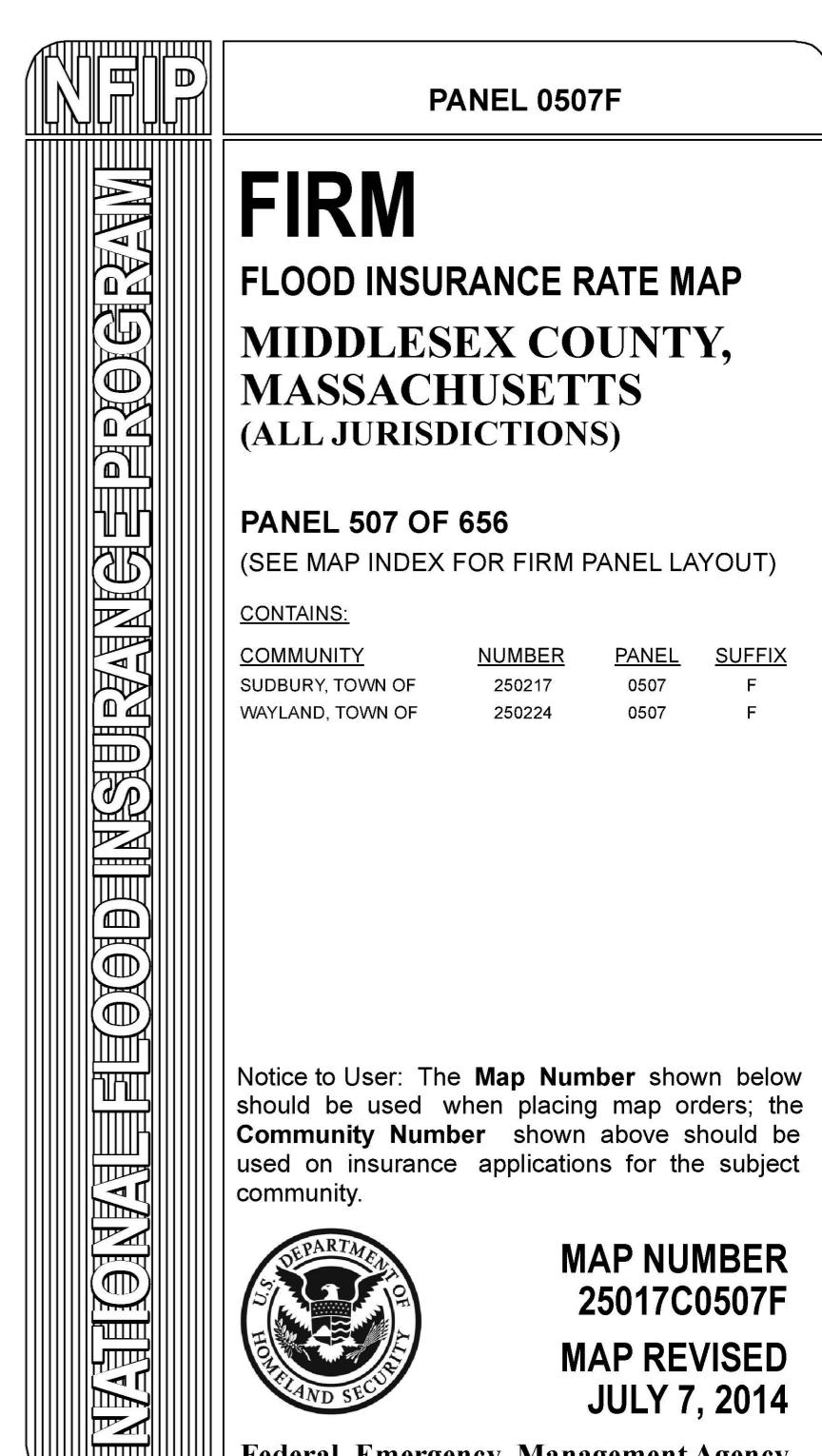
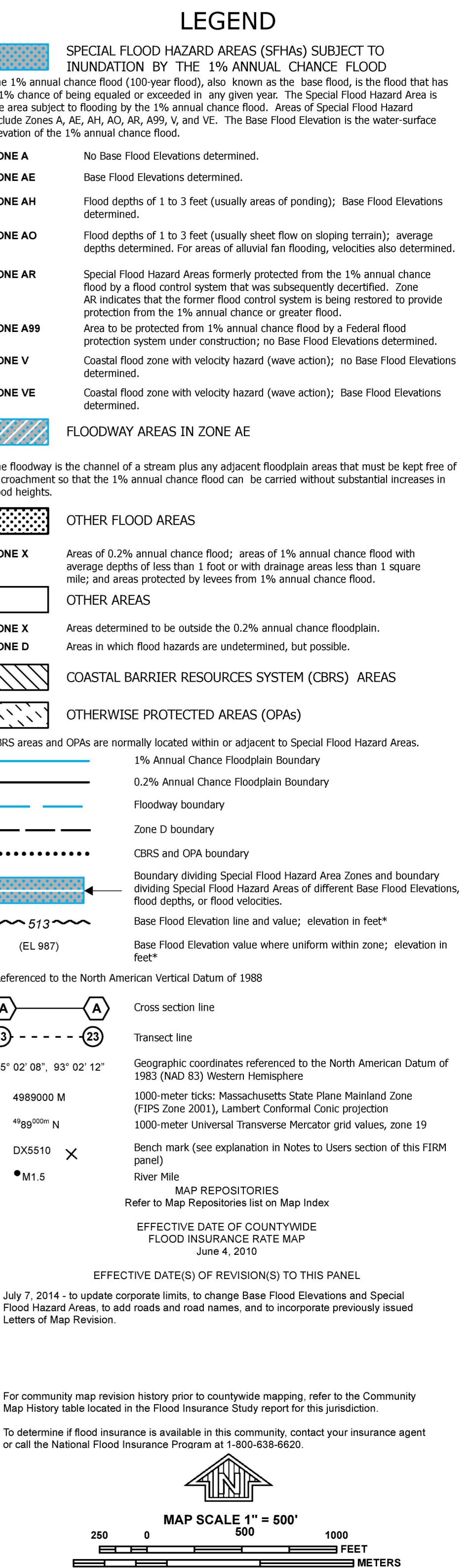
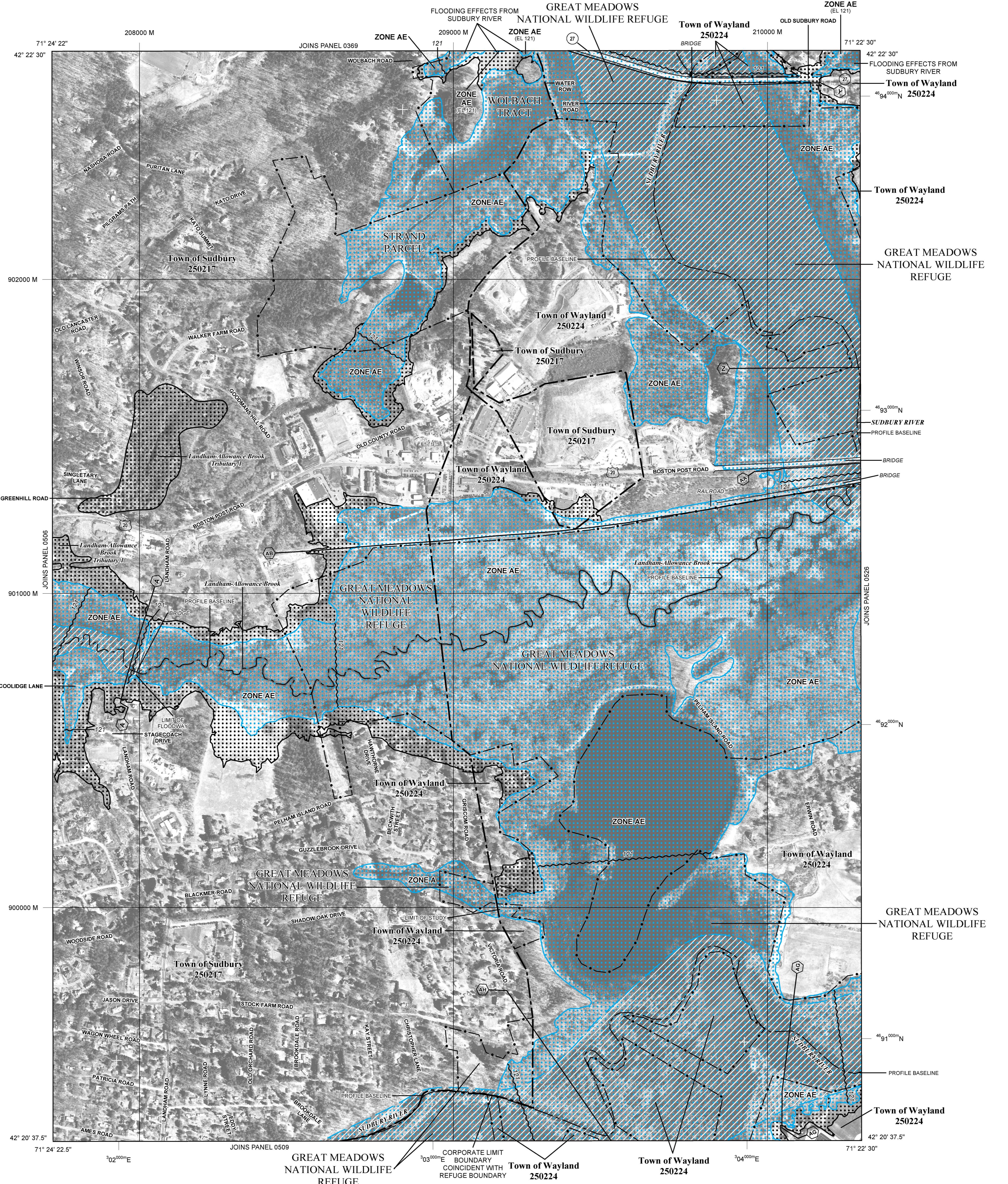
This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables for multiple streams in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

**Corporate limits** shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a **Listing of Communities** table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

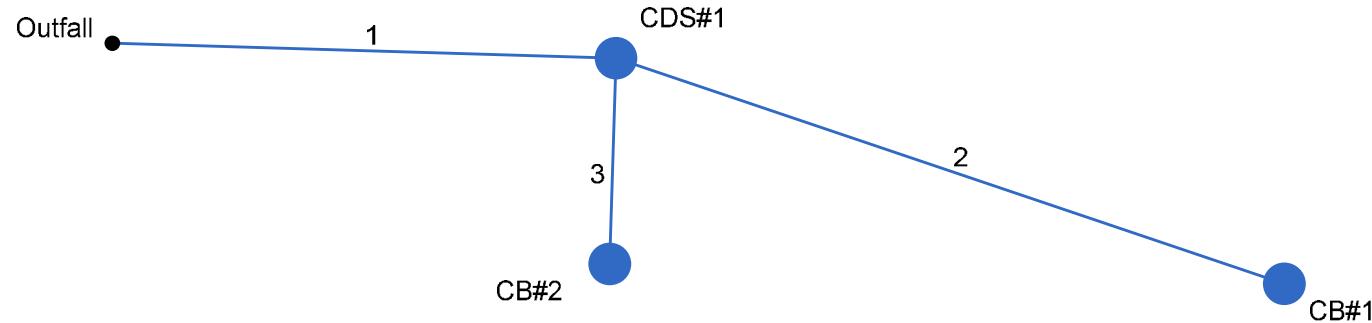
For information on available products associated with this FIRM visit the **Map Service Center (MSC)** website at <http://msc.fema.gov>. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

If you have questions about this map, how to order products, or the National Flood Insurance Program in general, please call the **FEMA Map Information eXchange (FMIX)** at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA website at <http://www.fema.gov/business/nfp>.



## **SECTION 7 – HYDRAULIC PIPE SIZING**

# Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan

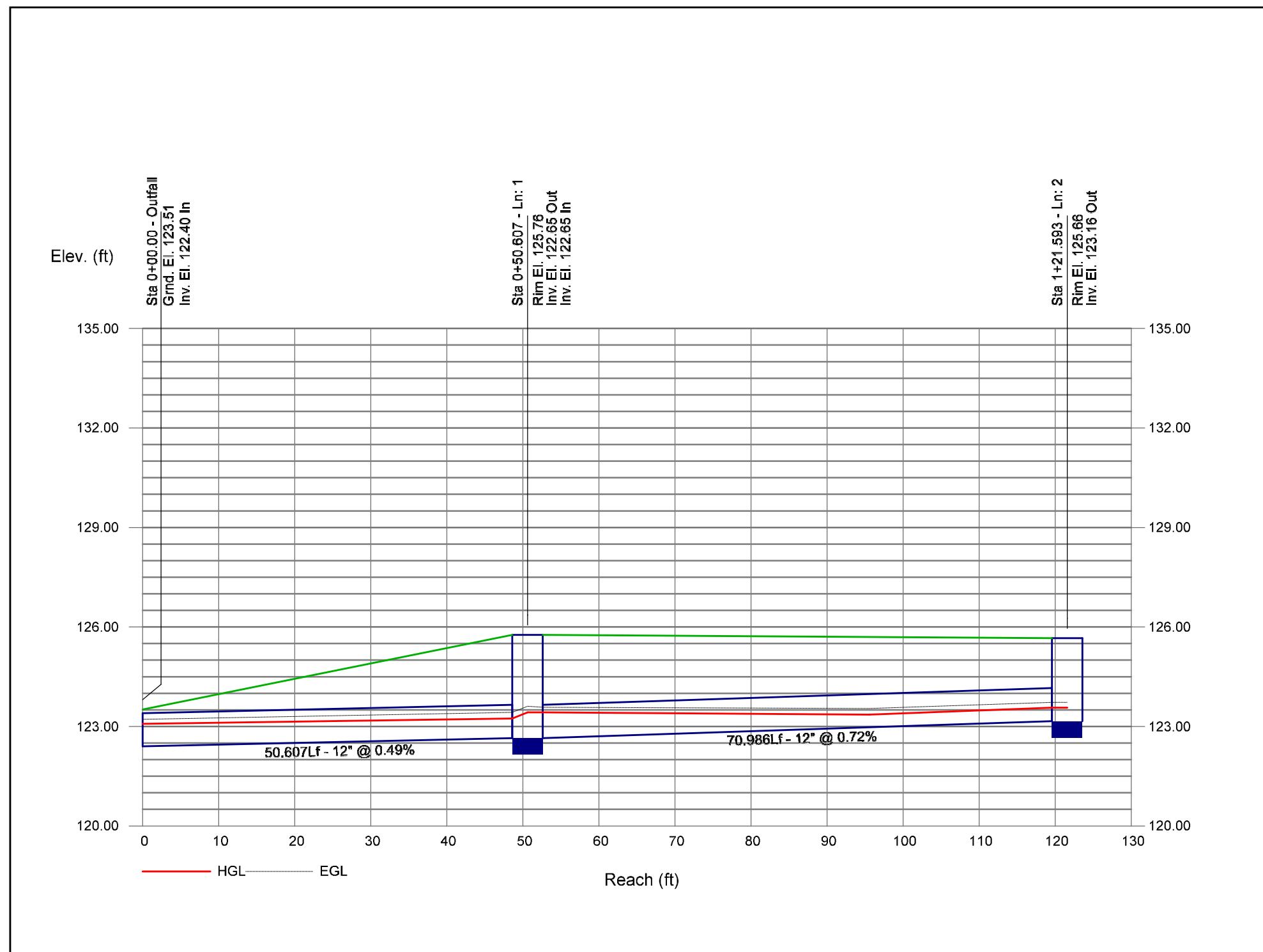


# Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr (ft)	Total (ac)		(C)	Incr	Total	Inlet (min)	Syst (min)				Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	50.607	0.00	0.31	0.84	0.00	0.26	6.0	6.5	6.5	1.66	2.50	3.17	12	0.49	122.40	122.65	123.08	123.24	123.51	125.76	CDS1 to INLET1
2	1	70.986	0.18	0.18	0.79	0.14	0.14	6.0	6.0	6.7	0.95	3.02	2.31	12	0.72	122.65	123.16	123.42	123.57	125.76	125.66	CB1 to CDS1
3	1	20.763	0.13	0.13	0.88	0.11	0.11	6.0	6.0	6.7	0.77	3.50	2.06	12	0.96	122.65	122.85	123.42	123.22	125.76	125.40	CB2 to CDS1
Project File: storm1.stm														Number of lines: 3		Run Date: 1/12/2023						
NOTES:Intensity = 32.47 / (Inlet time + 3.40) ^ 0.70; Return period =Yrs. 10 ; c = cir e = ellip b = box																						

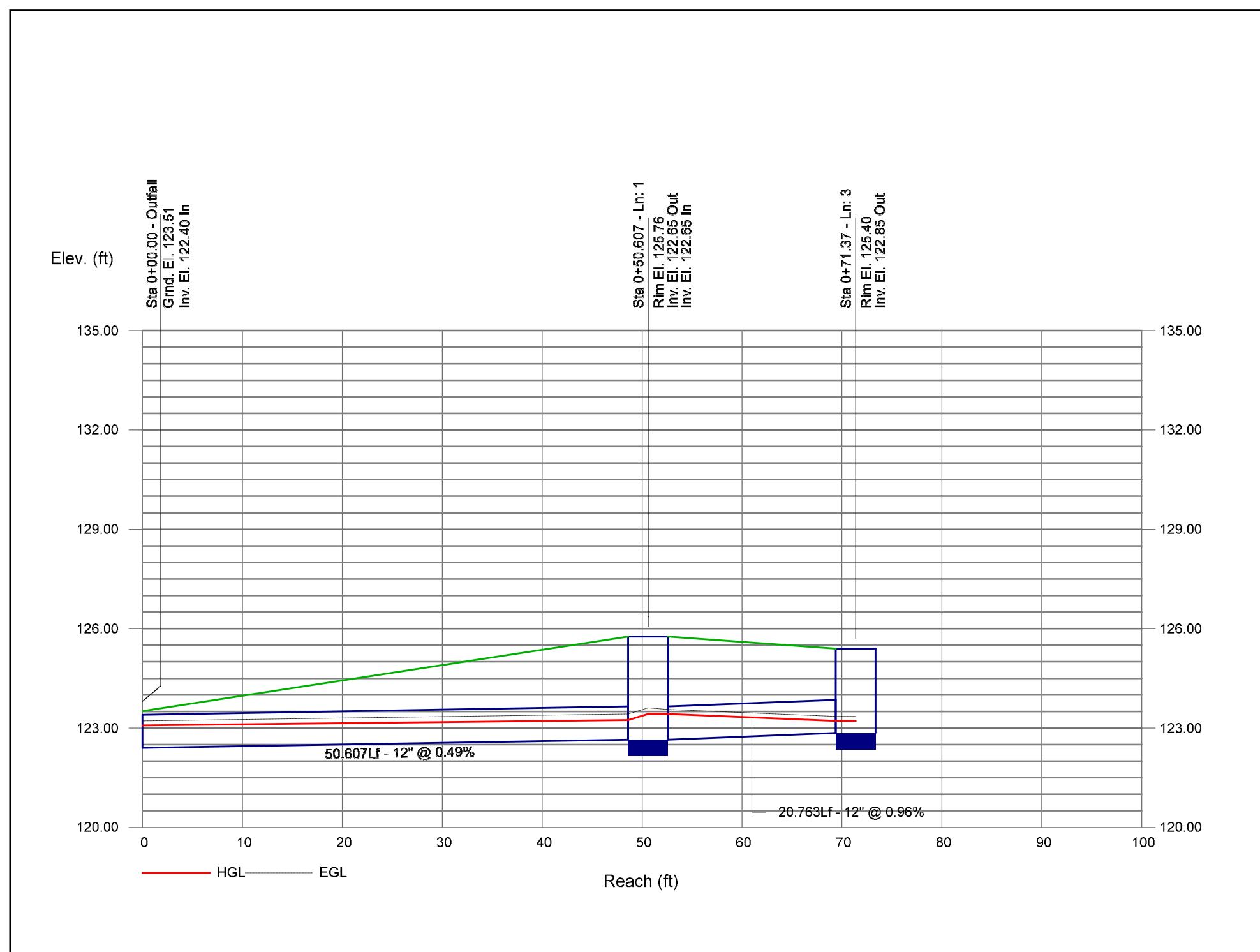
# Storm Sewer Profile

Proj. file: storm1.stm

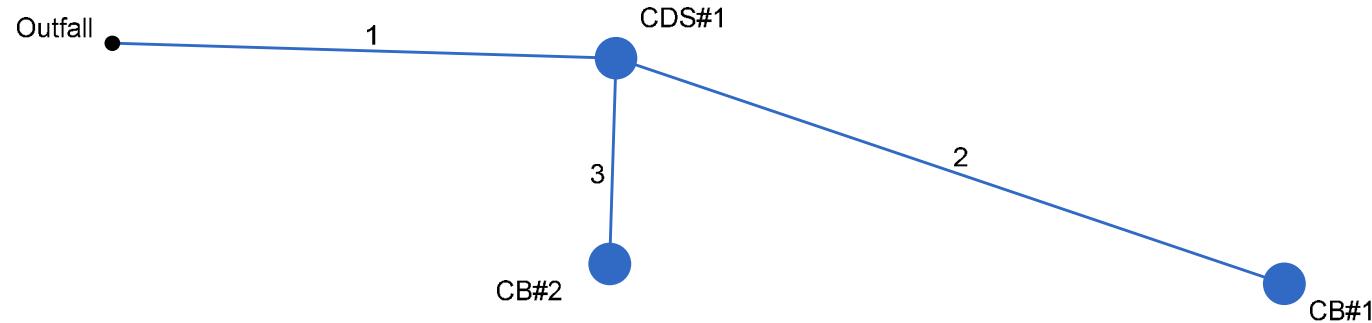


# Storm Sewer Profile

Proj. file: storm1.stm



# Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



Project File: storm1.stm

Number of lines: 3

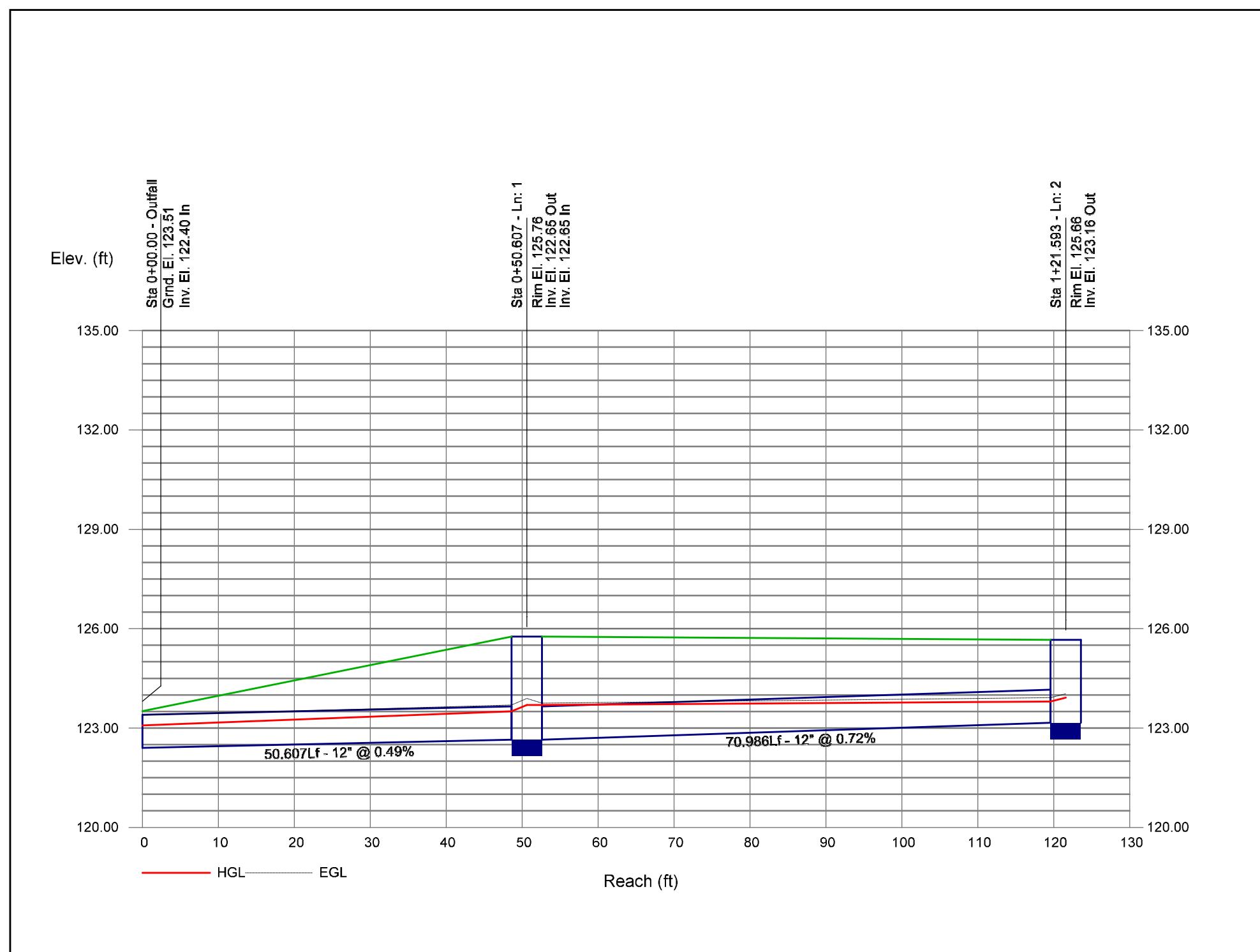
Date: 1/12/2023

# Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr (ft)	Total (ac)		(C)	Incr	Total	Inlet (min)	Syst (min)				Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	50.607	0.00	0.31	0.84	0.00	0.26	6.0	6.5	9.8	2.52	2.50	3.98	12	0.49	122.40	122.65	123.08	123.51	123.51	125.76	CDS1 to INLET1
2	1	70.986	0.18	0.18	0.79	0.14	0.14	6.0	6.0	10.2	1.45	3.02	2.28	12	0.72	122.65	123.16	123.70	123.80	125.76	125.66	CB1 to CDS1
3	1	20.763	0.13	0.13	0.88	0.11	0.11	6.0	6.0	10.2	1.17	3.50	1.55	12	0.96	122.65	122.85	123.70	123.71	125.76	125.40	CB2 to CDS1
Project File: storm1.stm														Number of lines: 3		Run Date: 1/12/2023						
NOTES:Intensity = 49.45 / (Inlet time + 3.40) ^ 0.70; Return period =Yrs. 100 ; c = cir e = ellip b = box																						

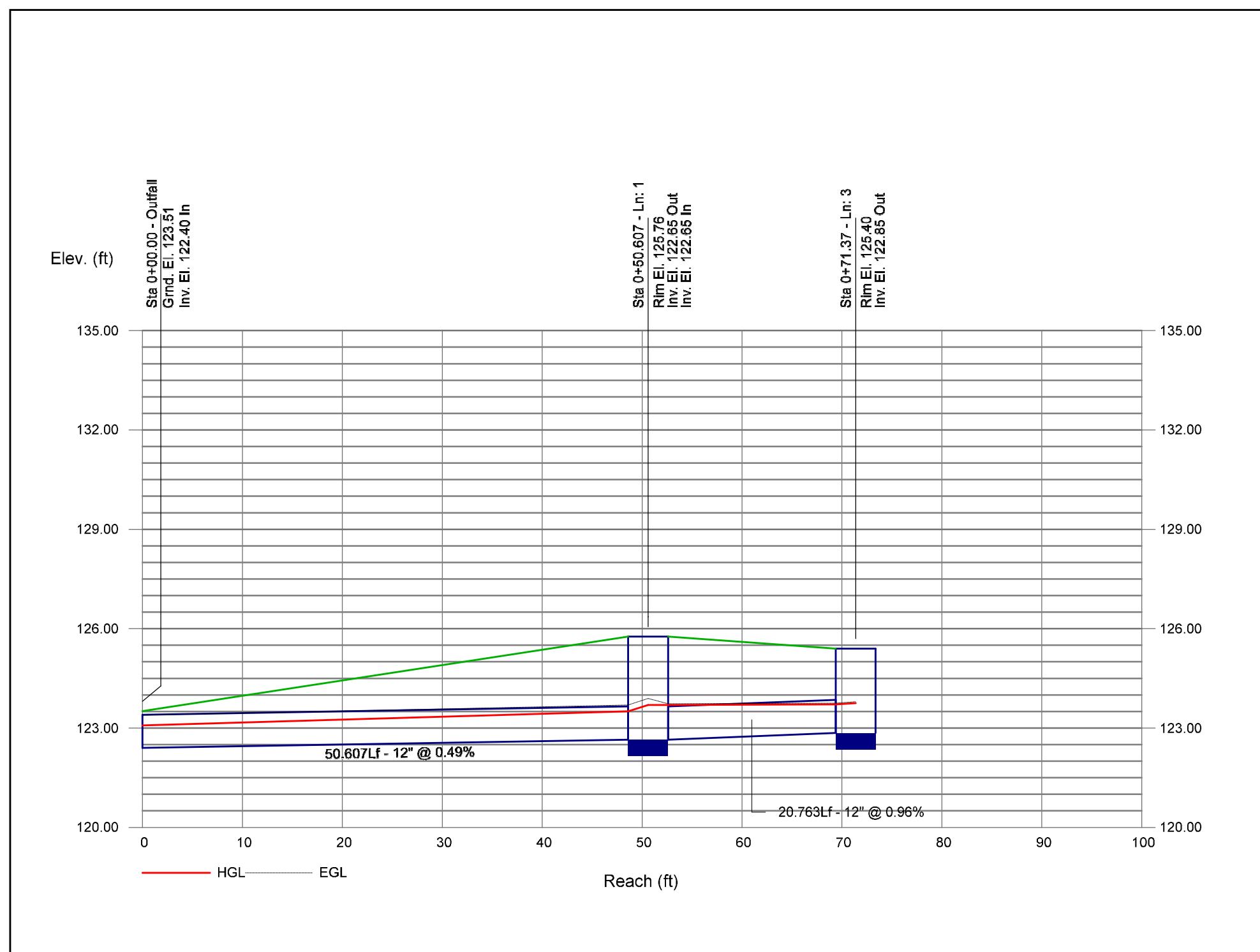
# Storm Sewer Profile

Proj. file: storm1.stm

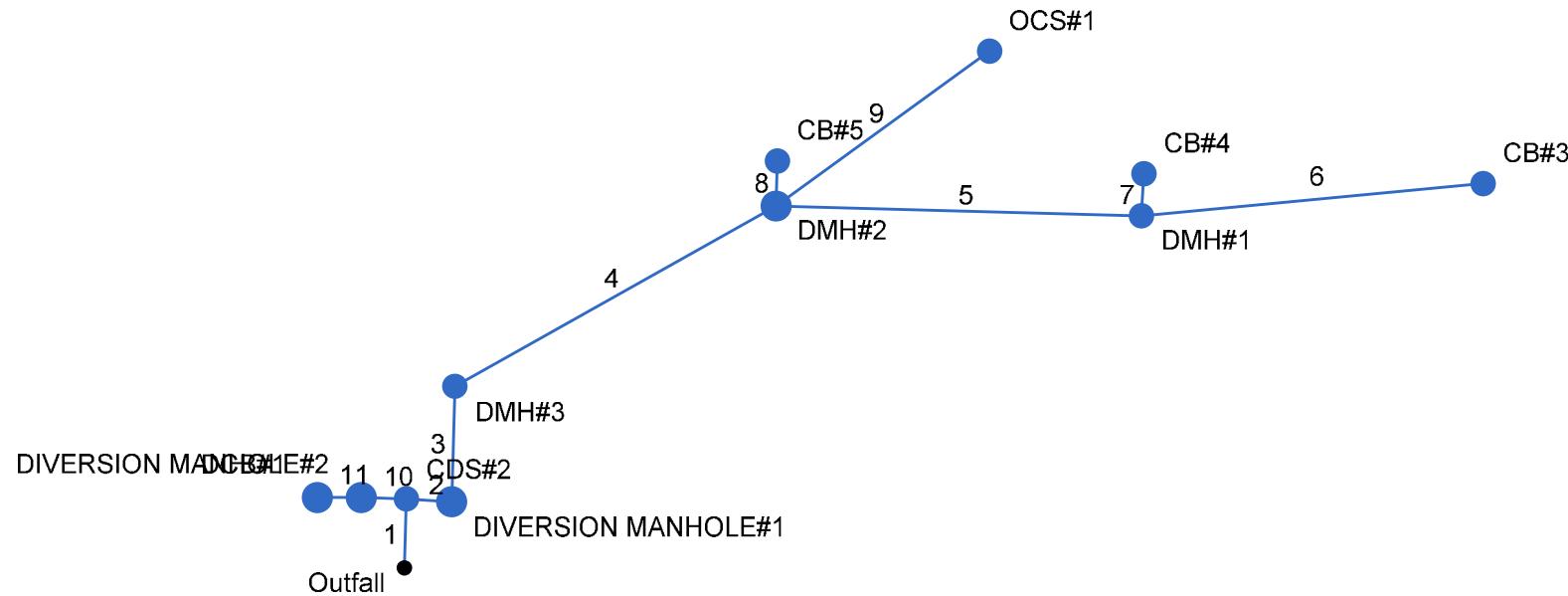


# Storm Sewer Profile

Proj. file: storm1.stm



# Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan

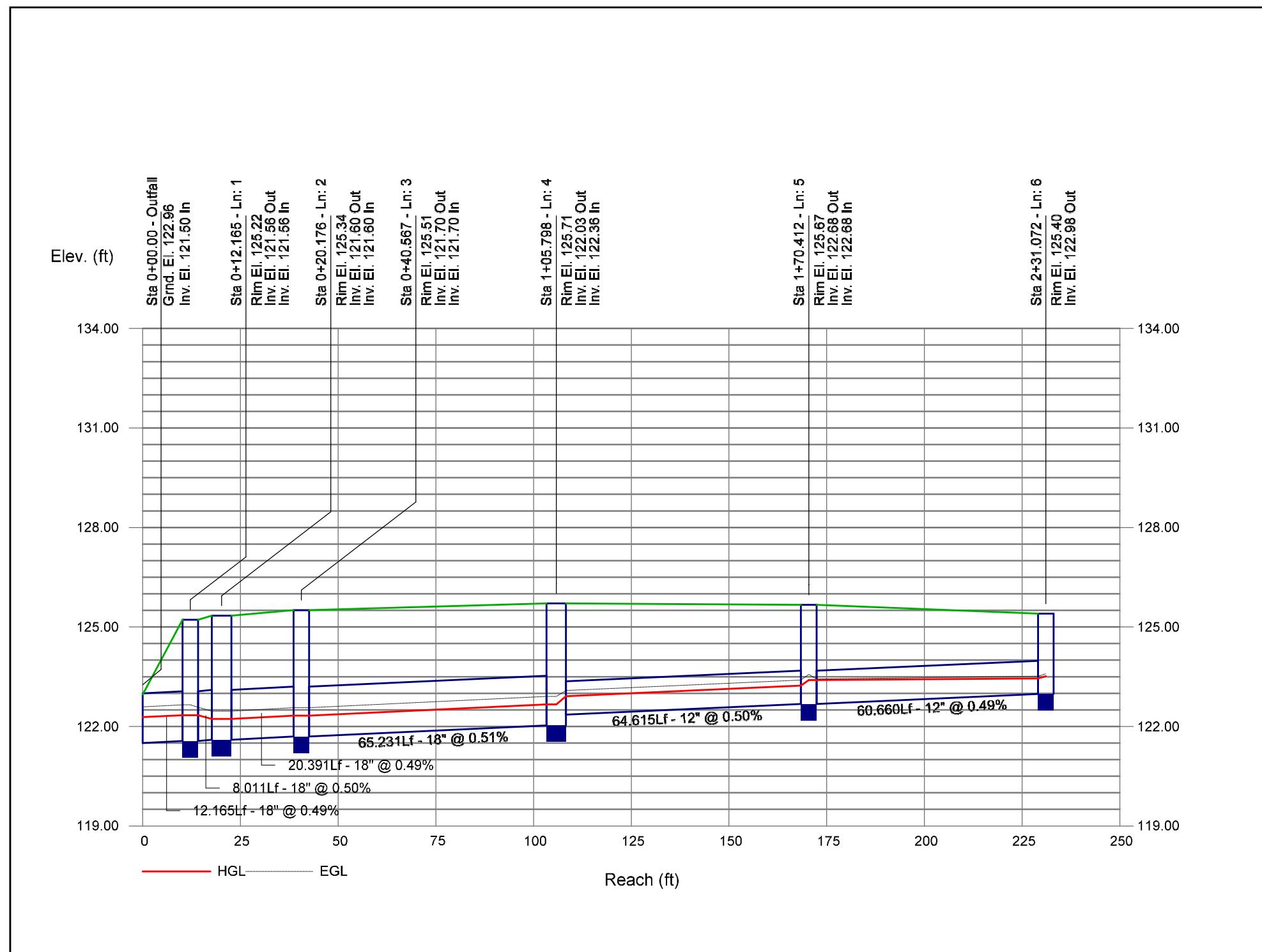


# Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr (ft)	Total (ac)		Incr	Total	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	12.165	0.00	0.67	0.00	0.00	0.57	0.0	7.3	6.1	4.17	7.99	4.48	18	0.49	121.50	121.56	122.28	122.34	122.96	125.22	CDS2 to INLET2B
2	1	8.011	0.00	0.39	0.00	0.00	0.34	0.0	7.3	6.1	2.73	8.04	3.42	18	0.50	121.56	121.60	122.34	122.23	125.22	125.34	OCS2 to CDS2
3	2	20.391	0.00	0.39	0.00	0.00	0.34	0.0	7.2	6.2	2.74	7.97	3.92	18	0.49	121.60	121.70	122.23	122.33	125.34	125.51	DMH3 to OCS2
4	3	65.231	0.00	0.39	0.00	0.00	0.34	0.0	6.9	6.3	2.78	8.09	3.95	18	0.51	121.70	122.03	122.33	122.66	125.51	125.71	DMH2 to DMH3
5	4	64.615	0.00	0.26	0.00	0.00	0.23	0.0	6.6	6.4	1.47	2.51	3.32	12	0.50	122.36	122.68	122.91	123.23	125.71	125.67	DMH1 to DMH2
6	5	60.660	0.13	0.13	0.89	0.12	0.12	6.0	6.0	6.7	0.78	2.50	1.72	12	0.49	122.68	122.98	123.40	123.45	125.67	125.40	CB3 to DMH1
7	5	7.626	0.13	0.13	0.87	0.11	0.11	6.0	6.0	6.7	0.76	3.65	2.10	12	1.05	122.68	122.76	123.40	123.12	125.67	125.40	CB4 to DMH1
8	4	7.971	0.13	0.13	0.84	0.11	0.11	6.0	6.0	6.7	0.73	5.05	3.28	12	2.01	122.36	122.52	122.66	122.88	125.71	125.50	CB5 to DMH2
9	4	46.684	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.66	4.89	2.08	15	0.49	122.17	122.40	122.66	122.72	125.71	126.59	OCS1 to DMH2
10	1	8.001	0.00	0.28	0.00	0.00	0.24	0.0	6.0	6.7	1.57	2.73	3.60	12	0.50	121.89	121.93	122.43	122.47	125.22	125.10	OCS3 to CDS2
11	10	7.779	0.28	0.28	0.84	0.24	0.24	6.0	6.0	6.7	1.58	4.95	3.54	12	1.93	121.93	122.08	122.50	122.61	125.10	124.98	DCB1 to OCS3
Project File: storm2-10.stm														Number of lines: 11				Run Date: 1/12/2023				
NOTES:Intensity = 32.47 / (Inlet time + 3.40) ^ 0.70; Return period =Yrs. 10 ; c = cir e = ellip b = box																						

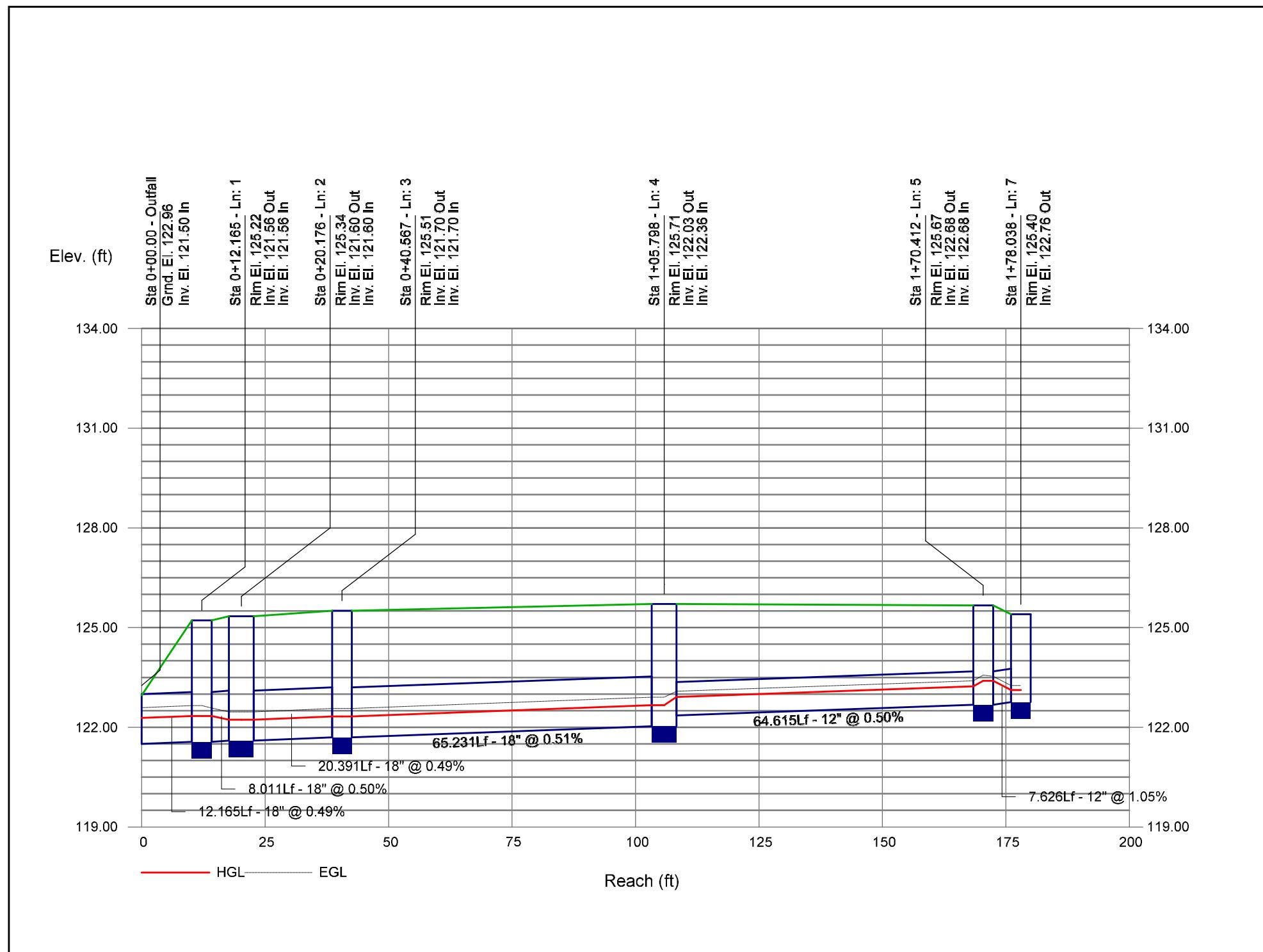
# Storm Sewer Profile

Proj. file: storm2-10.stm



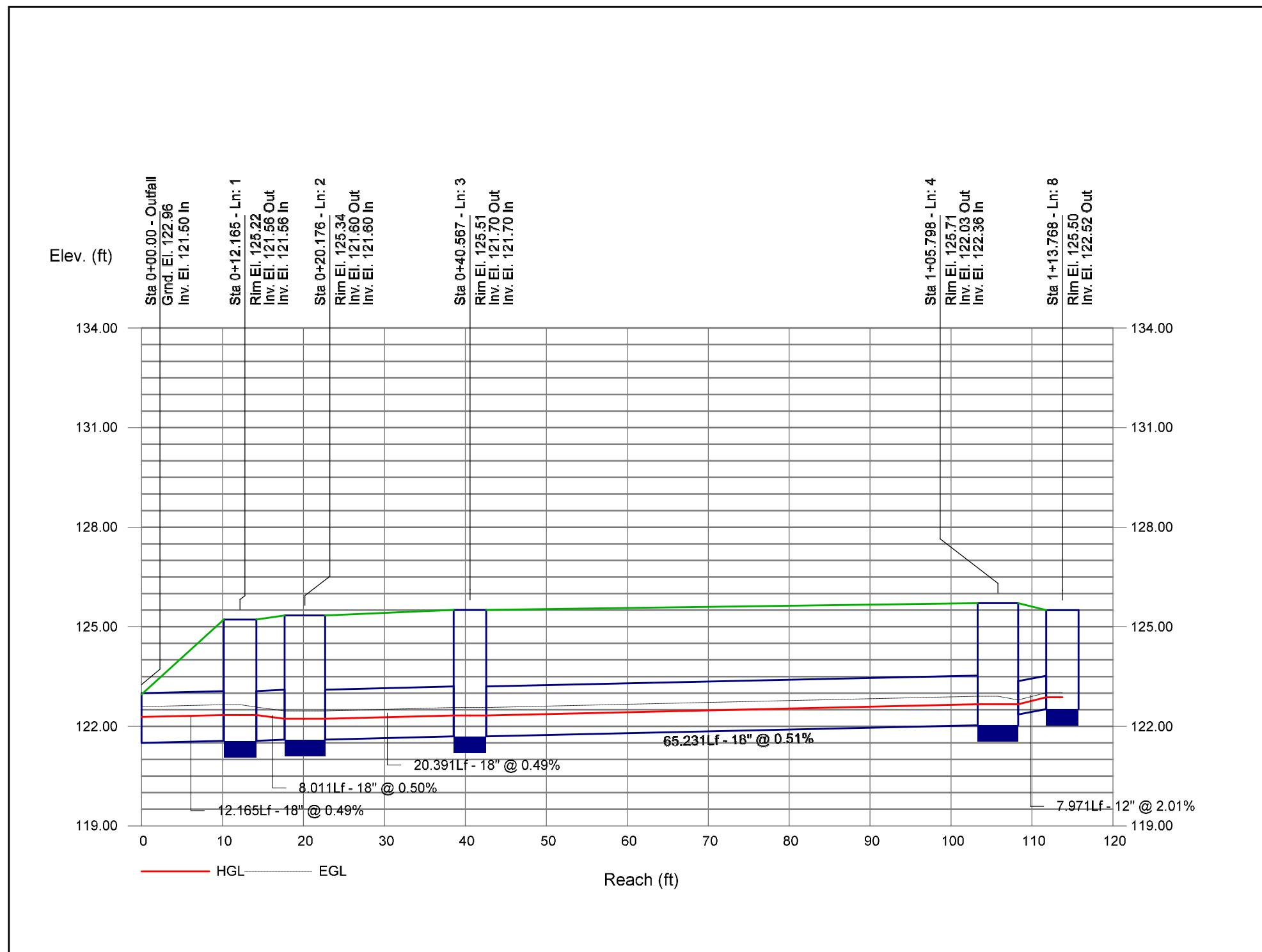
# Storm Sewer Profile

Proj. file: storm2-10.stm



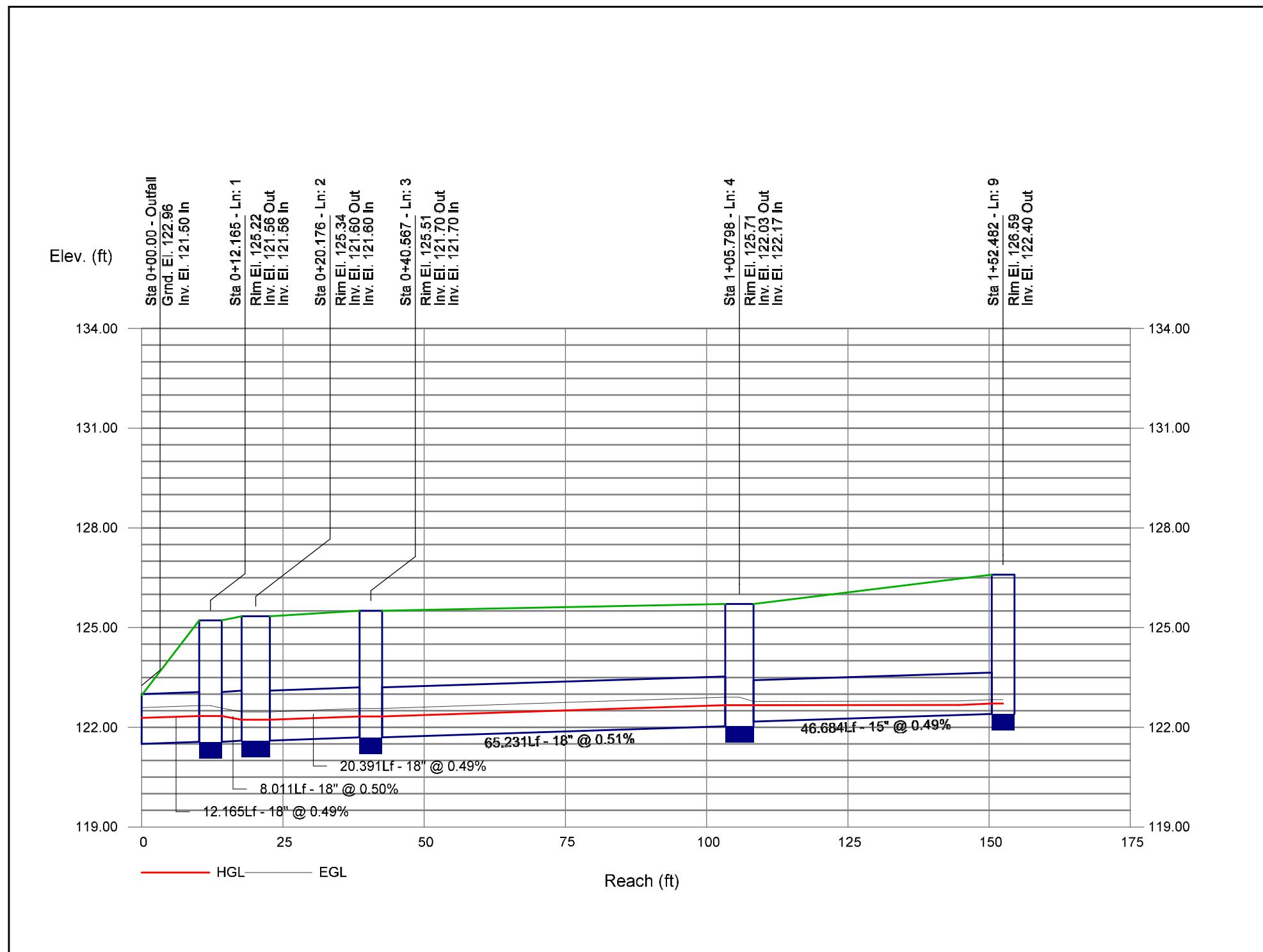
# Storm Sewer Profile

Proj. file: storm2-10.stm



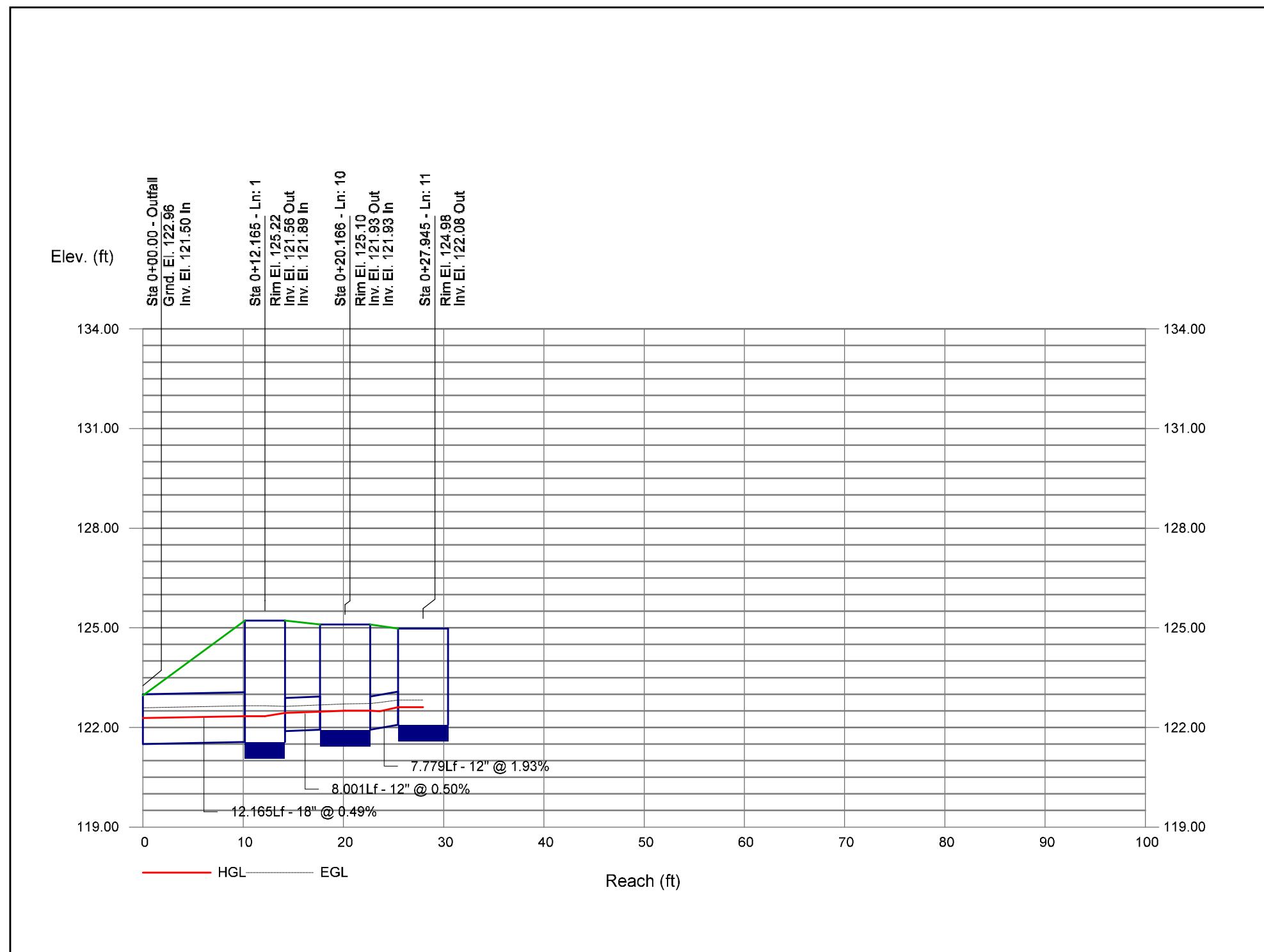
# Storm Sewer Profile

Proj. file: storm2-10.stm

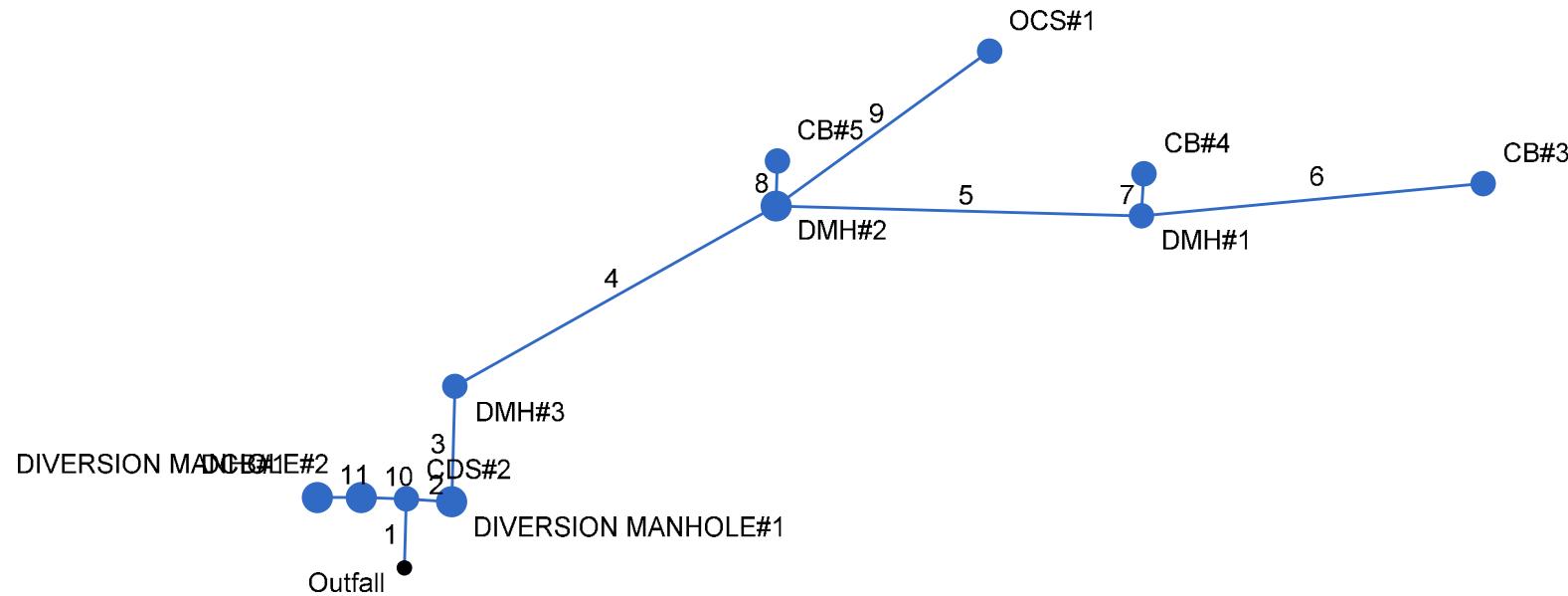


# Storm Sewer Profile

Proj. file: storm2-10.stm



# Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan

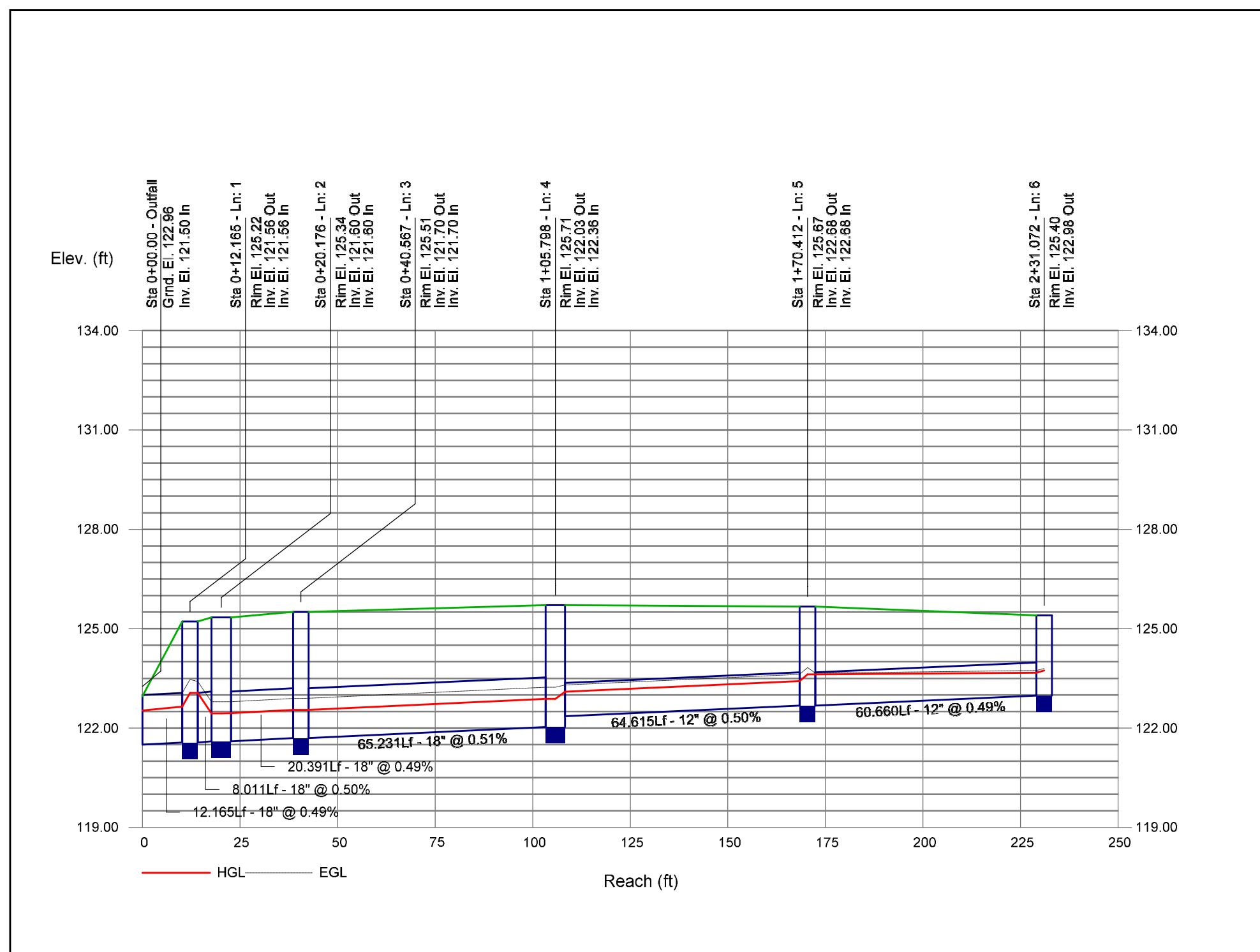


# Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr (ft)	Total (ac)		Incr	Total	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	12.165	0.00	0.67	0.00	0.00	0.57	0.0	7.2	9.4	7.04	7.99	5.30	18	0.49	121.50	121.56	122.53	122.65	122.96	125.22	CDS2 to INLET2B
2	1	8.011	0.00	0.39	0.00	0.00	0.34	0.0	7.2	9.4	4.85	8.04	3.73	18	0.50	121.56	121.60	123.06	122.45	125.22	125.34	OCS2 to CDS2
3	2	20.391	0.00	0.39	0.00	0.00	0.34	0.0	7.1	9.4	4.86	7.97	4.73	18	0.49	121.60	121.70	122.45	122.55	125.34	125.51	DMH3 to OCS2
4	3	65.231	0.00	0.39	0.00	0.00	0.34	0.0	6.9	9.6	4.91	8.09	4.76	18	0.51	121.70	122.03	122.55	122.88	125.51	125.71	DMH2 to DMH3
5	4	64.615	0.00	0.26	0.00	0.00	0.23	0.0	6.6	9.8	2.24	2.51	3.61	12	0.50	122.36	122.68	123.10	123.42	125.71	125.67	DMH1 to DMH2
6	5	60.660	0.13	0.13	0.89	0.12	0.12	6.0	6.0	10.2	1.18	2.50	1.79	12	0.49	122.68	122.98	123.62	123.67	125.67	125.40	CB3 to DMH1
7	5	7.626	0.13	0.13	0.87	0.11	0.11	6.0	6.0	10.2	1.15	3.65	2.43	12	1.05	122.68	122.76	123.62	123.21	125.67	125.40	CB4 to DMH1
8	4	7.971	0.13	0.13	0.84	0.11	0.11	6.0	6.0	10.2	1.11	5.05	3.00	12	2.01	122.36	122.52	122.88	122.96	125.71	125.50	CB5 to DMH2
9	4	46.684	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	1.67	4.89	2.92	15	0.49	122.17	122.40	122.88	122.91	125.71	126.59	OCS1 to DMH2
10	1	8.001	0.00	0.28	0.00	0.00	0.24	0.0	6.0	10.2	2.39	2.73	3.05	12	0.50	121.89	121.93	123.06	123.09	125.22	125.10	OCS3 to CDS2
11	10	7.779	0.28	0.28	0.84	0.24	0.24	6.0	6.0	10.2	2.40	4.95	3.06	12	1.93	121.93	122.08	123.11	123.14	125.10	124.98	DCB1 to OCS3
Project File: storm2-100.stm														Number of lines: 11				Run Date: 1/12/2023				
NOTES:Intensity = 49.45 / (Inlet time + 3.40) ^ 0.70; Return period =Yrs. 100 ; c = cir e = ellip b = box																						

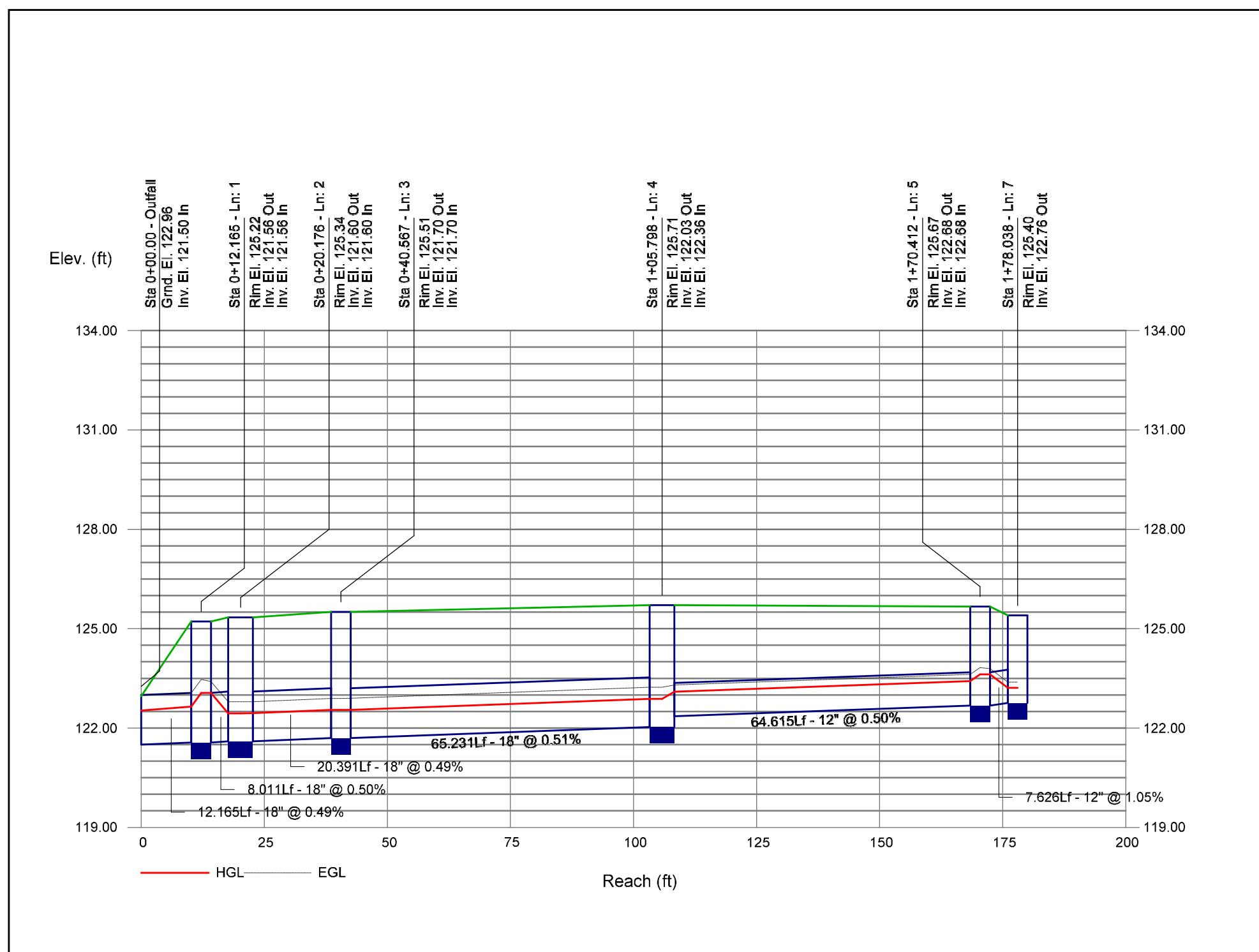
# Storm Sewer Profile

Proj. file: storm2-100.stm



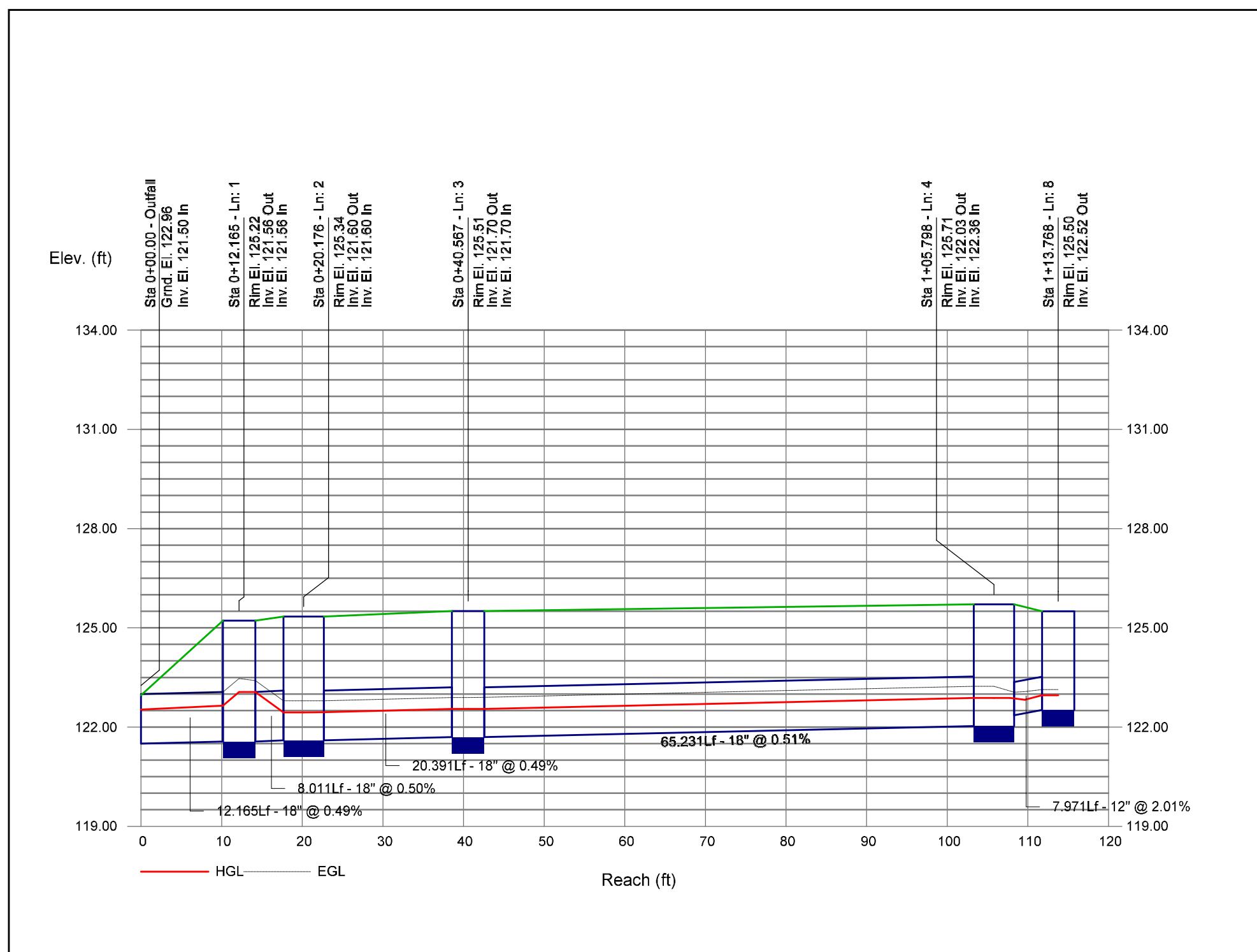
# Storm Sewer Profile

Proj. file: storm2-100.stm



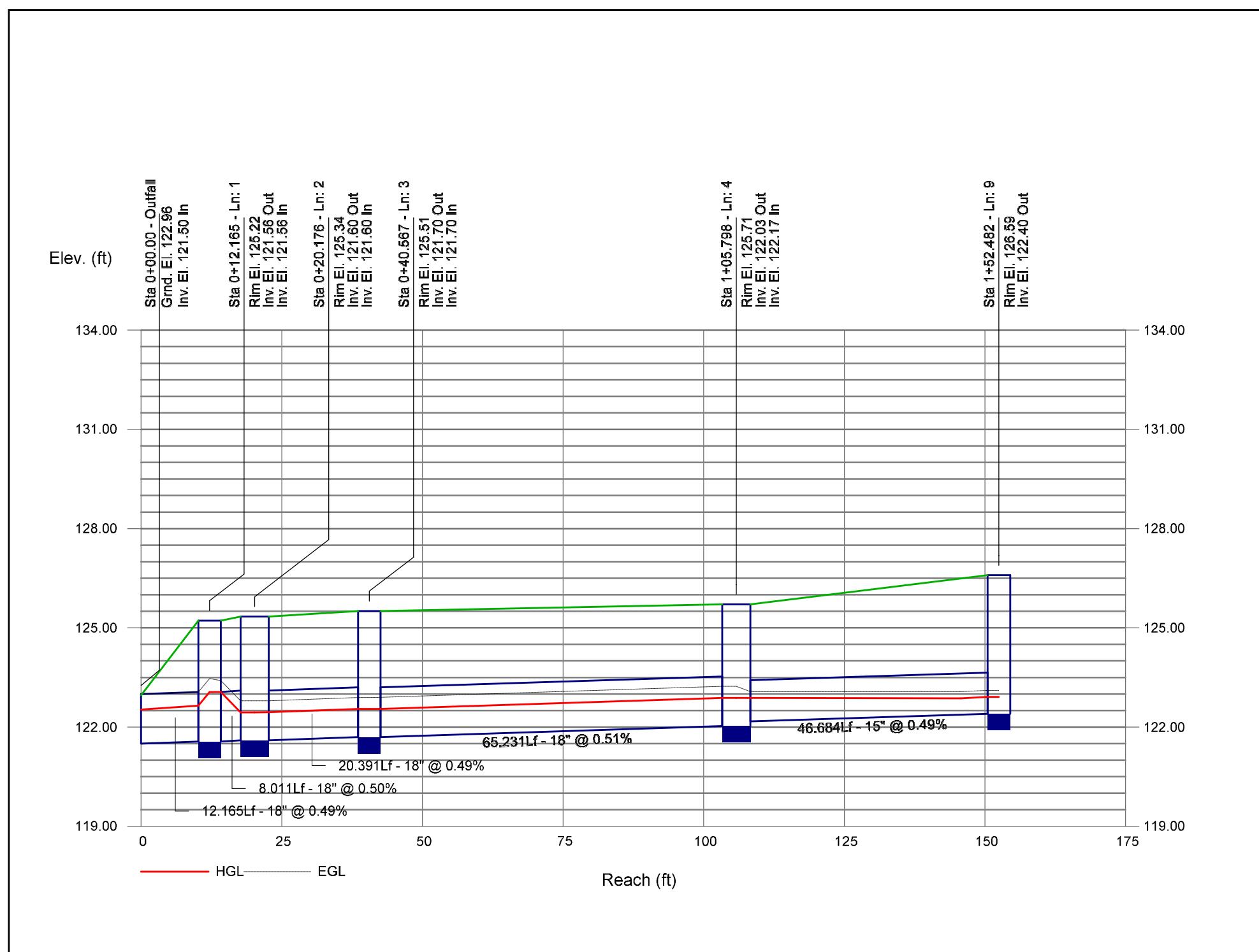
# Storm Sewer Profile

Proj. file: storm2-100.stm



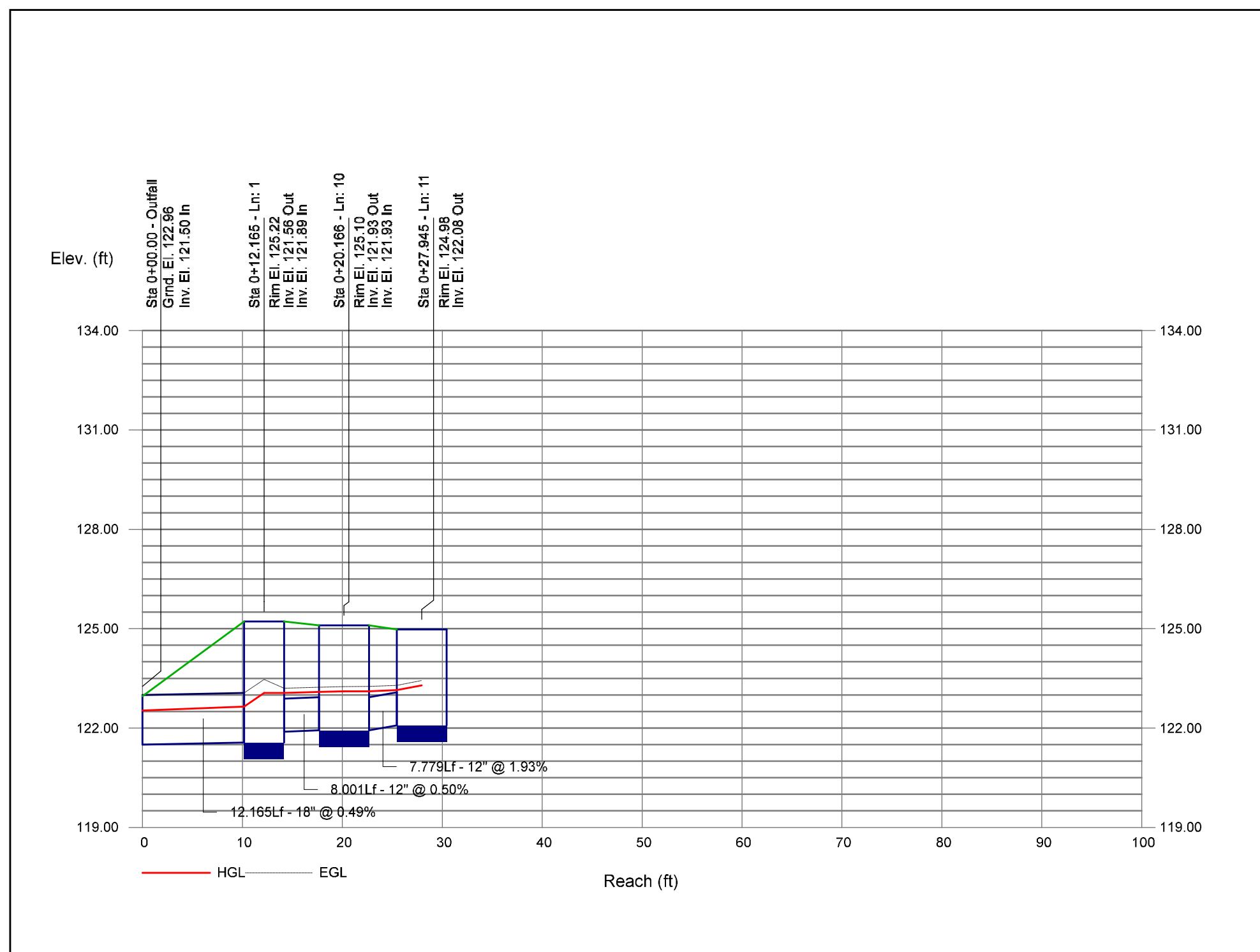
# Storm Sewer Profile

Proj. file: storm2-100.stm

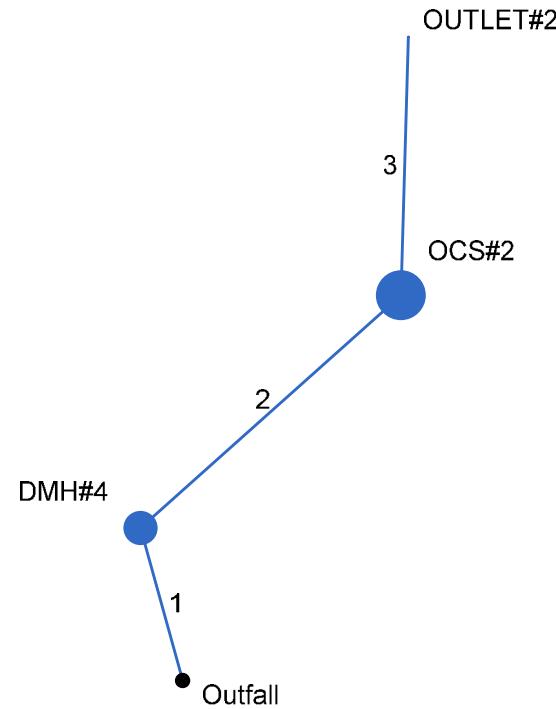


# Storm Sewer Profile

Proj. file: storm2-100.stm



# Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan

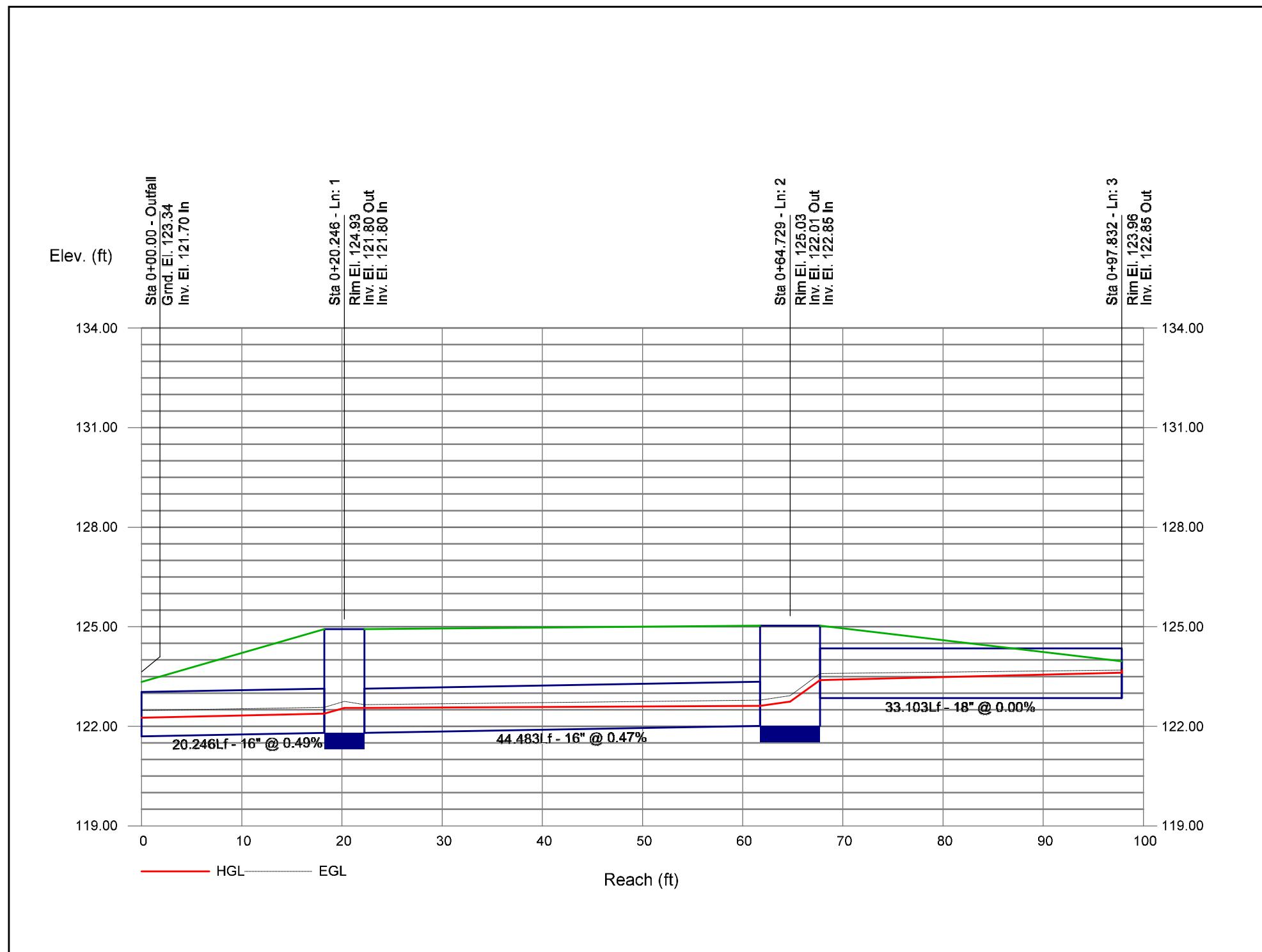


# Storm Sewer Tabulation

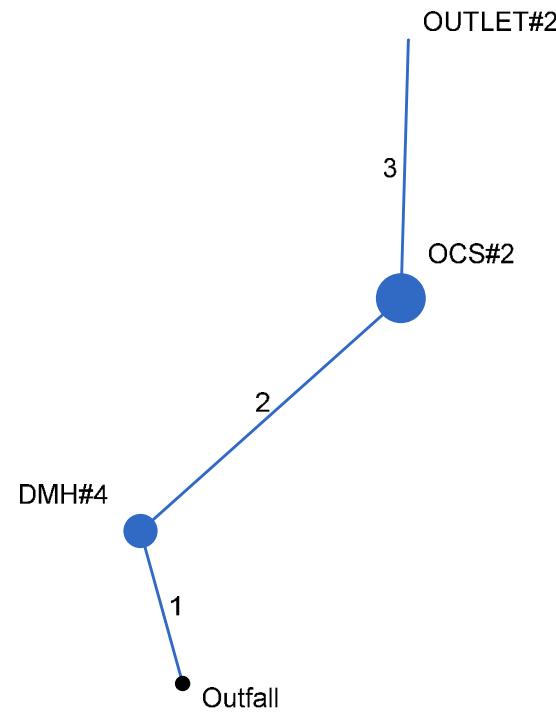
Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr (ft)	Total (ac)		Incr	Total	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	20.246	0.00	0.00	0.00	0.00	0.00	0.0	0.4	0.0	2.06	4.54	3.64	15	0.49	121.70	121.80	122.27	122.40	123.34	124.93	DMH4 to OUTFAL
2	1	44.483	0.00	0.00	0.00	0.00	0.00	0.0	0.2	0.0	2.06	4.44	2.94	15	0.47	121.80	122.01	122.58	122.64	124.93	125.03	OCS2 to DMH4
3	2	33.000	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	2.06	0.00	2.93	18	0.00	122.85	122.85	123.39	123.62	125.03	123.96	OUTLET2 to OCS
Project File: storm3-10.stm														Number of lines: 3				Run Date: 1/12/2023				
NOTES:Intensity = 32.47 / (Inlet time + 3.40) ^ 0.70; Return period =Yrs. 10 ; c = cir e = ellip b = box																						

# Storm Sewer Profile

Proj. file: storm3-10.stm



# Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



Project File: storm3-100.stm

Number of lines: 3

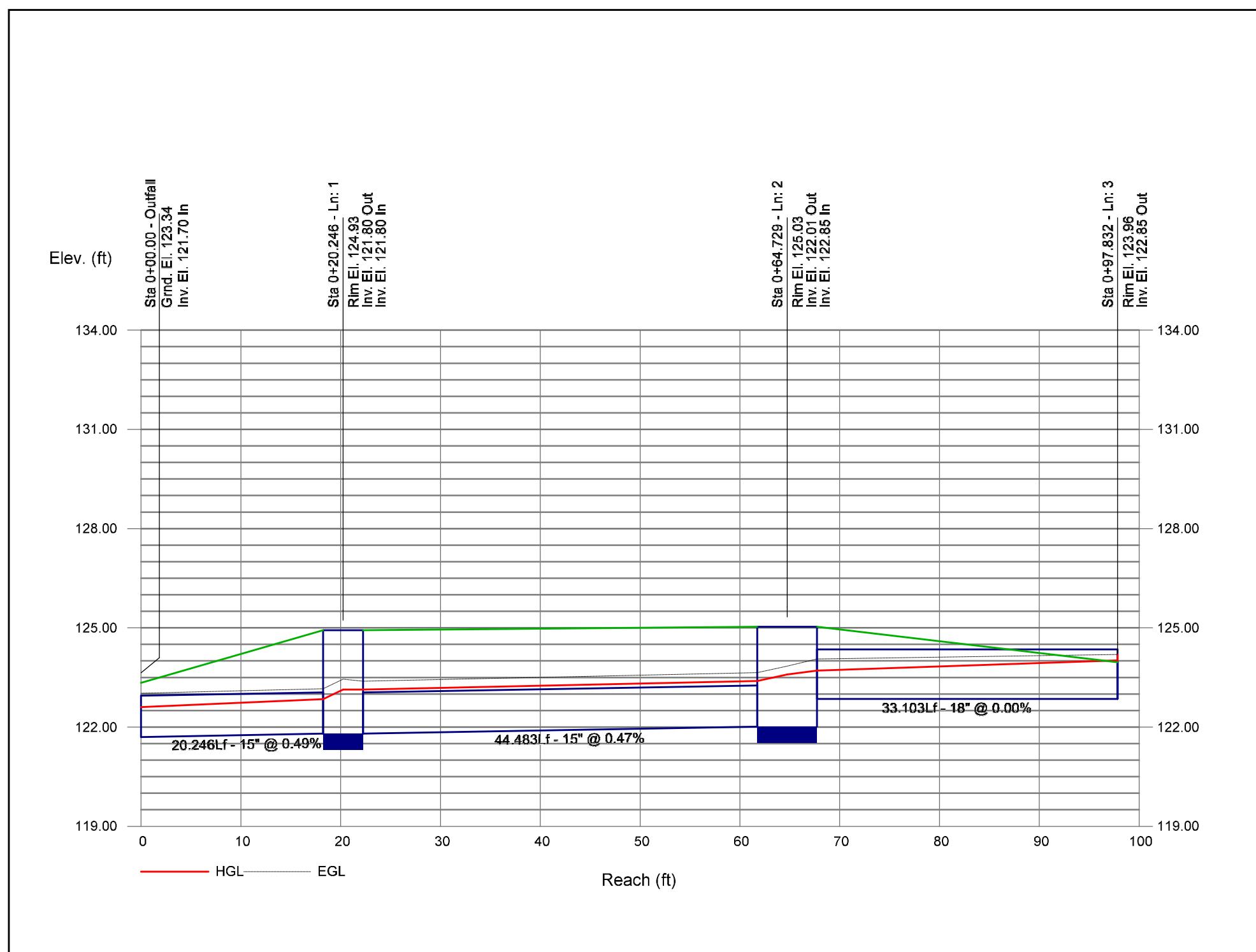
Date: 1/12/2023

# Storm Sewer Tabulation

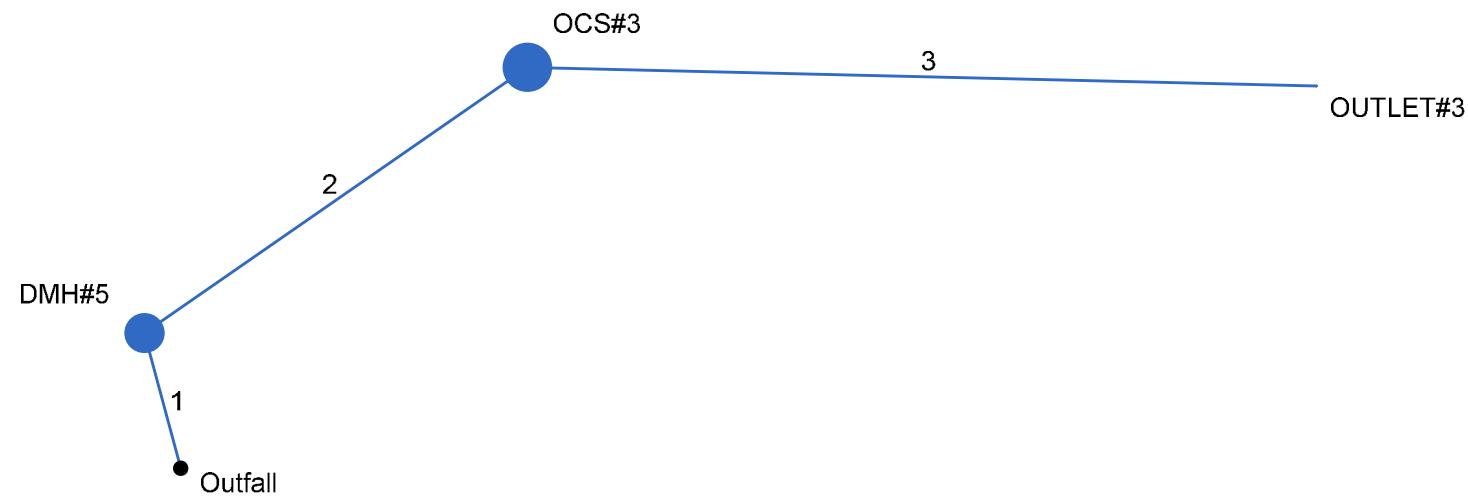
Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr (ft)	Total (ac)		Incr	Total	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	20.246	0.00	0.00	0.00	0.00	0.00	0.0	0.3	0.0	4.95	4.54	4.87	15	0.49	121.70	121.80	122.60	122.84	123.34	124.93	DMH4 to OUTFAL
2	1	44.483	0.00	0.00	0.00	0.00	0.00	0.0	0.1	0.0	4.95	4.44	4.03	15	0.47	121.80	122.01	123.13	123.39	124.93	125.03	OCS2 to DMH4
3	2	33.103	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	4.95	0.00	4.05	18	0.00	122.85	122.85	123.71	124.02	125.03	123.96	OUTLET2 to OCS
Project File: storm3-100.stm														Number of lines: 3		Run Date: 1/12/2023						
NOTES:Intensity = 49.45 / (Inlet time + 3.40) ^ 0.70; Return period =Yrs. 100 ; c = cir e = ellip b = box																						

# Storm Sewer Profile

Proj. file: storm3-100.stm



# Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



Project File: storm4-10.stm

Number of lines: 3

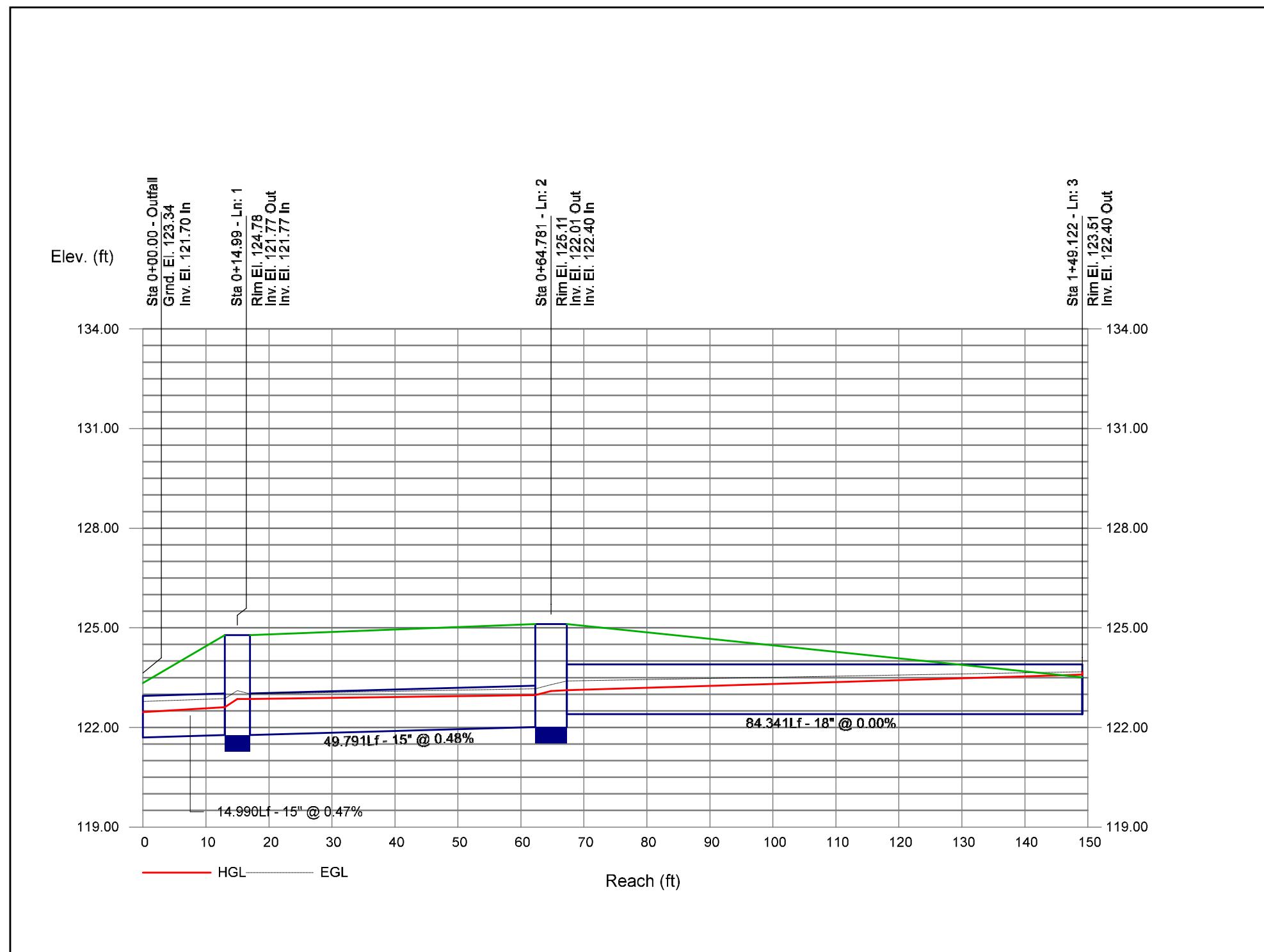
Date: 1/12/2023

# Storm Sewer Tabulation

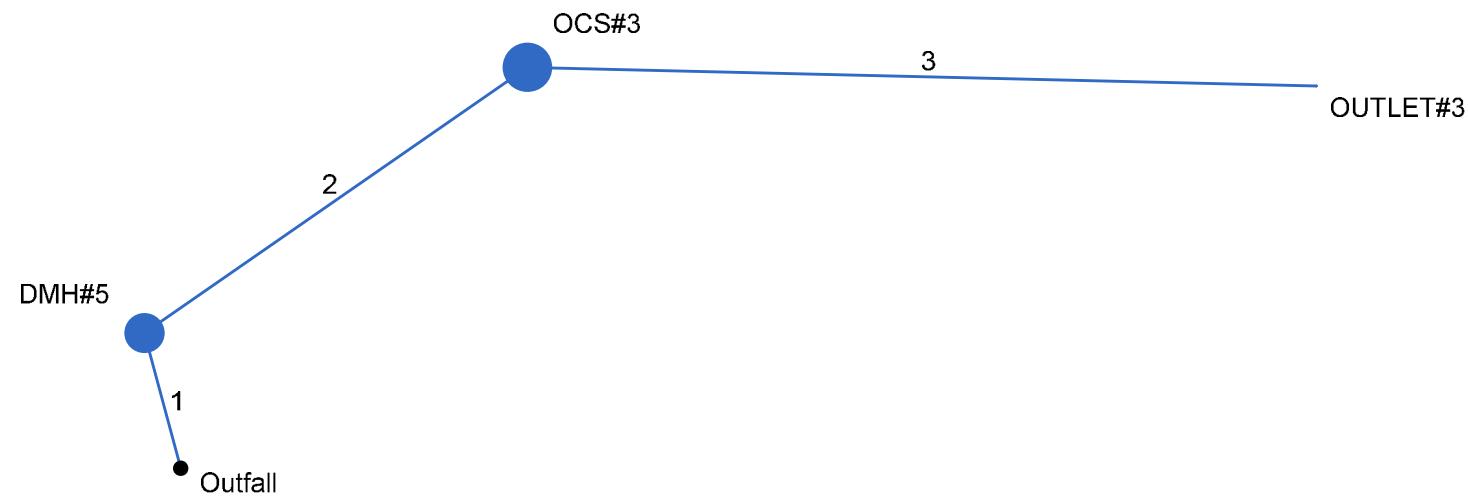
Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr (ft)	Total (ac)		Incr	Total	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	14.990	0.00	0.00	0.00	0.00	0.00	0.0	0.7	0.0	3.56	4.41	4.30	15	0.47	121.70	121.77	122.46	122.61	123.34	124.78	DMH5 to OUTFAL
2	1	49.791	0.00	0.00	0.00	0.00	0.00	0.0	0.4	0.0	3.56	4.48	3.33	15	0.48	121.77	122.01	122.85	122.97	124.78	125.11	OCS3 to DMH5
3	2	84.341	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	3.56	0.00	3.31	18	0.00	122.40	122.40	123.12	123.59	125.11	123.51	OUTLET3 to OCS
Project File: storm4-10.stm														Number of lines: 3				Run Date: 1/12/2023				
NOTES:Intensity = 32.47 / (Inlet time + 3.40) ^ 0.70; Return period =Yrs. 10 ; c = cir e = ellip b = box																						

# Storm Sewer Profile

Proj. file: storm4-10.stm



# Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan

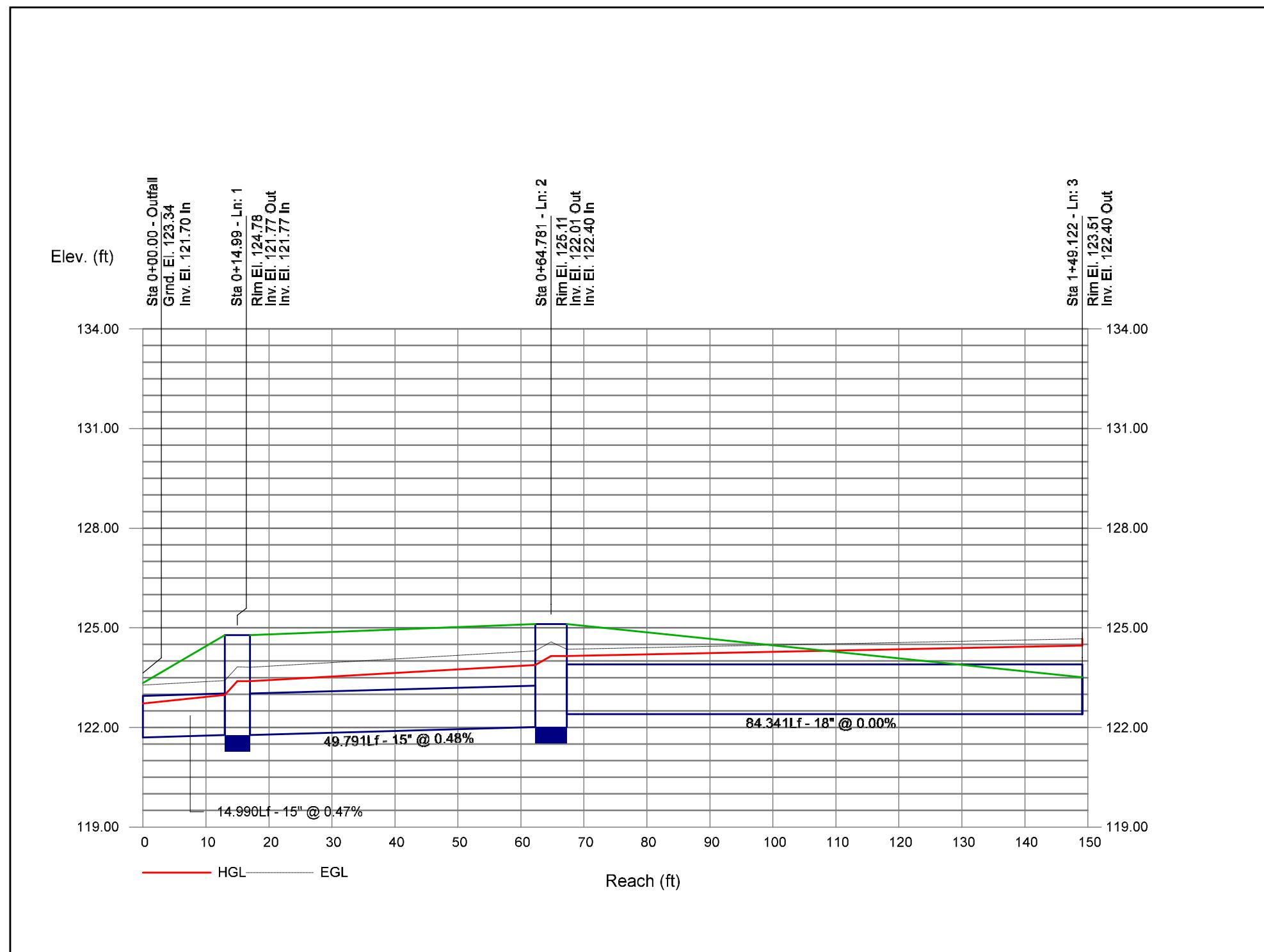


# Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr (ft)	Total (ac)		(C)	Incr	Total	Inlet (min)	Syst (min)				Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	14.990	0.00	0.00	0.00	0.00	0.0	0.5	0.0	6.40	4.41	5.62	15	0.47	121.70	121.77	122.72	122.98	123.34	124.78	DMH5 to OUTFAL	
2	1	49.791	0.00	0.00	0.00	0.00	0.0	0.4	0.0	6.40	4.48	5.22	15	0.48	121.77	122.01	123.39	123.88	124.78	125.11	OCS3 to DMH5	
3	2	84.341	0.00	0.00	0.00	0.00	0.0	0.0	0.0	6.40	0.00	3.62	18	0.00	122.40	122.40	124.15	124.46	125.11	123.51	OUTLET3 to OCS	
Project File: storm4-100.stm														Number of lines: 3				Run Date: 1/12/2023				
NOTES:Intensity = 49.45 / (Inlet time + 3.40) ^ 0.70; Return period =Yrs. 100 ; c = cir e = ellip b = box																						

# Storm Sewer Profile

Proj. file: storm4-100.stm



## **SECTION 8 – DRAFT SWPPP**

# Construction Stormwater Pollution Prevention Plan Template

To be covered under the U.S. Environmental Protection Agency's (EPA) Construction General Permit (CGP), all construction operators are required to develop a "Stormwater Pollution Prevention Plan" (or "SWPPP") prior to submitting a Notice of Intent (NOI) for permit coverage. EPA created this SWPPP Template to help you develop a SWPPP that is compliant with the minimum requirements of Part 7 of [EPA's 2022 Construction General Permit](#) ("2022 CGP"), and is customizable to your specific project and site.

## Instructions for Using the SWPPP Template

Each section of the SWPPP Template includes instructions and space for your project and site information. Read the instructions for each section before you complete that section. Specific instructions on what information to include is indicated in each text field in **blue text**. Click on the blue text and the instructions will disappear once you start typing. The SWPPP Template is an editable document file so that you can easily add tables and additional text and delete unneeded or non-applicable fields. Note that some sections may require only a brief description while others may require several pages of explanation.

The following tips for using this template will help ensure that you meet the minimum permit requirements:

- Read the [2022 CGP](#) thoroughly before you begin preparation of your SWPPP to ensure that you have a working understanding of the permit's underlying requirements. You will also need to consult Part 9 of the permit to determine if your State or Tribe has included additional requirements that affect you.
- Complete the SWPPP prior to submitting your NOI for permit coverage. This is required in Parts 1.4 and 7.1.
- If you prepared a SWPPP under a previous version of EPA's CGP, you must update your SWPPP to ensure that the 2022 CGP requirements are addressed prior to submitting your NOI.
- If there is more than one construction operator for your project, consider coordinating development of your SWPPP with the other operators.
- Once EPA has provided your site with coverage under the CGP, include your NOI, your authorization email, and a copy of the CGP as attachments to the SWPPP. See Appendices B and C of the SWPPP Template.

While EPA has made every effort to ensure the accuracy of all instructions contained in the SWPPP Template, it is the permit, not the template, that determines the actual obligations of regulated construction stormwater discharges. In the event of a conflict between the SWPPP Template and any corresponding provision of the 2022 CGP, you must abide by the requirements in the permit. EPA welcomes comments on the SWPPP Template at any time and will consider those comments in any future revision of this document. You may contact EPA for CGP-related inquiries at [cgp@epa.gov](mailto:cgp@epa.gov).

**Stormwater Pollution Prevention Plan (SWPPP)**

**For Construction Activities At:**

Herb Chambers Bentley of Wayland  
533 Boston Post Road  
Wayland, MA 01778  
Insert Project/Site Telephone Number

**SWPPP Prepared For:**

Insert Operator Company or Organization Name  
Insert Name  
Insert Address  
Insert City, State, Zip Code  
Insert Telephone Number  
Insert Fax/Email

**SWPPP Prepared By:**

Crocker Design Group, LLC.  
Gabe Crocker, P.E.  
2 Sharp Street, Unit A  
Hingham, MA 02043  
781-919-0808  
gabecrocker@crockerdesigngroup.com

**SWPPP Preparation Date:**

Insert Date

**Estimated Project Dates:**

**Project Start Date:** TBD

**Project Completion Date:** TBD

## Contents

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<b>SECTION 1: CONTACT INFORMATION/RESPONSIBLE PARTIES .....</b>	<b>1</b>
1.1    Operator(s) / Subcontractor(s) .....	1
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## SECTION 1: CONTACT INFORMATION/RESPONSIBLE PARTIES

### 1.1 Operator(s) / Subcontractor(s)

#### Instructions (see definition of "operator" at CGP Part 1.1.1):

- Identify all site operators who will be engaged in construction activities at the site and the areas of the site over which each operator has control (Part 7.2.1). Indicate respective responsibilities, where appropriate. Also include the 24-hour emergency contact.
- List subcontractors expected to work on-site. Notify subcontractors of stormwater requirements applicable to their work.
- Consider using Subcontractor Agreements such as the type included as a sample in Appendix G of this Template.

#### Operator(s):

Insert Company or Organization Name

Insert Name

Insert Address

Insert City, State, Zip Code

Insert Telephone Number

Insert Fax/Email

Insert area of control (if more than one operator at site)

[Repeat as necessary.]

#### Subcontractor(s):

Insert Company or Organization Name

Insert Name

Insert Address

Insert City, State, Zip Code

Insert Telephone Number

Insert Fax/Email

Insert area of control (if more than one operator at site)

[Repeat as necessary.]

#### Emergency 24-Hour Contact:

Insert Company or Organization Name

Insert Name

Insert Telephone Number

## 1.2 Stormwater Team

### Instructions (see CGP Parts 6 and 7.2.2):

- Identify the individuals (by name and position) that you have made part of the project's stormwater team pursuant to CGP Part 6.1, their individual responsibilities, and which members are responsible for inspections. At a minimum the stormwater team is comprised of individuals who are responsible for the design, installation, maintenance, and/or repair of stormwater controls; the application and storage of treatment chemicals (if applicable); conducting inspections as required in CGP Part 4.1; and taking corrective actions as required in Part 5.
- Each member of the stormwater team must have ready access to either an electronic or paper copy of applicable portions of the 2022 CGP and the SWPPP.
- Each member of the stormwater team must understand the requirements of the 2022 CGP and their specific responsibilities with respect to those requirements, including the information in Part 6.2.
- For projects that receive coverage under the 2022 CGP on or after February 17, 2023, to be considered a qualified person under Part 4.1 to conduct inspections under Part 4, you must, at a minimum, either:
  - ✓ Have completed the [EPA construction inspection course](#) developed for this permit and have passed the exam; or
  - ✓ Hold a current valid construction inspection certification or license from a program that, at a minimum, covers the following:
    - Principles and practices of erosion and sediment control and pollution prevention practices at construction sites;
    - Proper installation, and maintenance of erosion and sediment controls and pollution prevention practices used at construction sites; and
    - Performance of inspections, including the proper completion of required reports and documentation, consistent with the requirements of Part 4.

Note that if one of the following topics (e.g., installation and maintenance of pollution prevention practices) is not covered by the non-EPA training program, you may consider supplementing the training with the analogous module of the EPA course (e.g., Module 4) that covers the missing topic.

- Include documentation showing completion of trainings in Appendix I of this SWPPP template.
- For projects that receive coverage under the 2022 CGP prior to February 17, 2023, any personnel conducting site inspections pursuant to Part 4 on your site must, at a minimum:
  - ✓ Be knowledgeable in the principles and practice of erosion and sediment controls and pollution prevention,
  - ✓ Possess the appropriate skills and training in conditions at the construction site that could impact stormwater quality, and
  - ✓ Possess the appropriate skills and training in the effectiveness of any stormwater controls selected and installed to meet the requirements of this permit.

**Stormwater Team**

Name and/or Position, and Contact	Responsibilities	I Have Completed Training Required by CGP Part 6.2	I Have Read the CGP and Understand the Applicable Requirements
Gabe Crocker, Crocker Design Group Principal 781-919-0808 gabecrocker@crockerdesigngroup.com	SWPPP Preparer	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes Date: 11/5/2021
Insert Name of Responsible Person Insert Position Insert Telephone Number Insert Email	Personnel Responsible for Installation & Maintenance of Stormwater BMPs	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes Date: <a href="#">Click here to enter a date.</a>
Gabe Crocker, Crocker Design Group	Inspection Personnel	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes Date: 11/5/2021
	Personnel Responsible for Taking Corrective Action	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes Date: <a href="#">Click here to enter a date.</a>

[Insert or delete rows as necessary.]

**Stormwater Team Members Who Conduct Inspections Pursuant to CGP Part 4**

Name and/or Position and Contact	Training(s) Received	Date Training(s) Completed	If Training is a Non-EPA Training, Confirm that it Satisfies the Minimum Elements of CGP Part 6.3.b
Gabe Crocker PE 781-919-0808 gabecrocker@crockerdesigngroup.com	CGP	Date: 11/15/2021	<input type="checkbox"/> Principles and practices of erosion and sediment control and pollution prevention practices at construction sites <input type="checkbox"/> Proper installation and maintenance of erosion and sediment controls and pollution prevention practices used at construction sites <input type="checkbox"/> Performance of inspections, including the proper completion of required reports and documentation, consistent with the requirements of Part 4
Insert Name of Responsible Person Insert Position Insert Telephone Number Insert Email	Insert Title of Training Received	Date: <a href="#">Click here to enter a date.</a>	<input type="checkbox"/> Principles and practices of erosion and sediment control and pollution prevention practices at construction sites <input type="checkbox"/> Proper installation and maintenance of erosion and sediment controls and pollution prevention practices used at construction sites <input type="checkbox"/> Performance of inspections, including the proper completion of required reports and documentation,

Stormwater Pollution Prevention Plan (SWPPP)  
Herb Chambers Mercedes of Sudbury

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			consistent with the requirements of Part 4
Insert Name of Responsible Person Insert Position Insert Telephone Number Insert Email	Insert Title of Training Received	Date: <a href="#">Click here to enter a date.</a>	<input type="checkbox"/> Principles and practices of erosion and sediment control and pollution prevention practices at construction sites <input type="checkbox"/> Proper installation and maintenance of erosion and sediment controls and pollution prevention practices used at construction sites <input type="checkbox"/> Performance of inspections, including the proper completion of required reports and documentation, consistent with the requirements of Part 4

[Insert or delete rows as necessary.]

## SECTION 2: SITE EVALUATION, ASSESSMENT, AND PLANNING

### 2.1 Project/Site Information

**Instructions (see "Project/Site Information," Section IV of Appendix H – NOI Form and Instructions):**

- In this section, compile basic site information that will be helpful when you file your NOI.

#### Project Name and Address

Project/Site Name: [Herb Chambers Bentley of Wayland](#)

Street/Location: [533 Boston Post Road](#)

City: [Wayland](#)

State: [MA](#)

ZIP Code: [01778](#)

County or Similar Government Division: [South Middlesex](#)

#### Project Latitude/Longitude

Latitude: 42.3626° N

(decimal degrees)

Longitude: -71.3901 ° W

(decimal degrees)

Latitude/longitude data source:  Map  GPS  Other (please specify): [Nearmap](#)

Horizontal Reference Datum:  NAD 27  NAD 83  WGS 84

#### Additional Site Information

Is your site located on Indian country lands, or on a property of religious or cultural significance to an Indian Tribe?  Yes  No

If yes, provide the name of the Indian Tribe associated with the area of Indian country (including the name of Indian reservation if applicable), or if not in Indian country, provide the name of the Indian Tribe associated with the property: [Insert Text Here](#)

## 2.2 Discharge Information

**Instructions (see “Discharge Information,” Section V of Appendix H – NOI Form and Instructions):**

- In this section, include information relating to your site's discharge. This information corresponds to the “Discharge Information” section of the NOI form.
- List all of the stormwater points of discharge from your site. Identify each point of discharge with a unique 3-digit ID (e.g., 001, 002).
- For each unique point of discharge you list, specify the name of the first receiving water that receives stormwater directly from the point of discharge and/or from the MS4 that the point of discharge discharges to. You may have multiple points of discharge that discharge to the same receiving water. For assistance in identifying the receiving water to which you discharge, you may use [EPA's Stormwater Discharge Mapping Tool](#).
- Next, specify whether any waters of the U.S. that you discharge to are listed as “impaired” as defined in [Appendix A](#), and the pollutants causing the impairment. Identify any Total Maximum Daily Loads (TMDL) that have been completed for any of the waters of the U.S. that you discharge to and the pollutants for which there is a TMDL. For more information on impaired waters and TMDLs, including a list of TMDL contacts and links by State, visit <https://www.epa.gov/tmdl>. For assistance in identifying any impaired waters or applicable TMDLs, you may use [EPA's Stormwater Discharge Mapping Tool](#).
- Finally, indicate whether any receiving water that you discharge to is designated as a Tier 2, Tier 2.5, or Tier 3 water and if so, what the designation is (2, 2.5, or 3). A list of Tier 2, 2.5, and 3 waters located in the areas eligible for coverage under this permit can be found at <https://www.epa.gov/npdes/construction-general-permit-resources-tools-and-templates>.

Does your project/site discharge stormwater into a Municipal Separate Storm Sewer System (MS4)?

Yes     No

Are there any waters of the U.S. within 50 feet of your project's earth disturbances?

Yes     No

**For each point of discharge, provide a point of discharge ID (a unique 3-digit ID, e.g., 001, 002), the name of the first receiving water that receives stormwater directly from the point of discharge and/or from the MS4 that the point of discharge discharges to, and the following receiving water information, if applicable:**

Point of Discharge ID	Name of receiving water that receives stormwater discharge:	Is the receiving water impaired (on the CWA 303(d) list)?	If yes, list the pollutants that are causing the impairment:	Has a TMDL been completed for this receiving waterbody?	If yes, list TMDL Name and ID:	Pollutant(s) for which there is a TMDL:	Is this receiving water designated as a Tier 2, Tier 2.5, or Tier 3 water?	If yes, specify which Tier (2, 2.5, or 3)?
[001]	Sudbury River	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Mercury in Fish Tissue, Water Chestnut	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Tier 2
[002]	Hop Brook	<input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Dissolved Oxygen, Nutrient/eutrophication Biological Indicators, Total Phosphorus	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Tier 2

[Include additional rows or delete as necessary.]

## 2.3 Nature of the Construction Activities

### Instructions (see CGP Parts 1.2.1.c and 7.2.3):

- Provide a general description of the nature of the construction activities at your site.
- Describe the size of the property (in acres or length in miles if a linear construction site), the total area expected to be disturbed by the construction activities (to the nearest quarter acre or quarter mile if a linear construction site), and the maximum area expected to be disturbed at any one time.
- A description of any on-site and off-site construction support activity areas covered by this permit;
- Indicate the type of construction site, whether there will be certain demolition activities, and whether the predevelopment land use was for agriculture.
- Provide a list and description of all pollutant-generating activities (e.g., paving operations; concrete, paint, and stucco washout and waste disposal; solid waste storage and disposal; and dewatering operations) and indicate for each activity the associated pollutants or pollutant constituents (e.g., sediment, fertilizers, pesticides, paints, caulk, sealants, fluorescent light ballasts, contaminated substrates, solvents, fuels) which could be discharged in stormwater from your construction site.
- Describe the construction support activities covered by this permit (see Part 1.2.1.c of the permit).

### General Description of Project

Provide a general description of the nature of your construction activities, including the age or dates of past renovations for structures that are undergoing demolition:

Herb Chambers proposes an addition ( $9,315\pm$  SF footprint) to the existing one-story Bentley Dealership ( $24,956\pm$  SF footprint) for the sales and display of new vehicles as well as vehicle maintenance. Site renovations also include reconfigured parking for employees, customers and vehicle storage as well as upgrades to stormwater treatment and utilities.

If you are conducting earth-disturbing activities in response to a public emergency, document the cause of the public emergency (e.g., mud slides, earthquake, extreme flooding conditions, widespread disruption in essential public services), information substantiating its occurrence (e.g., State disaster declaration or similar State or local declaration), and a description of the construction necessary to reestablish affected public services:

N/A

Business days and hours for the project: M-F, 8AM-5PM, Occasional Saturdays

#### **Size of Construction Site**

Size of Property	2.95 acres
Total Area Expected to be Disturbed by Construction Activities	2.2 acres
Maximum Area Expected to be Disturbed at Any One Time, Including On-site and Off-site Construction Support Areas	2.2 acres

[Repeat as necessary for individual project phases.]

#### **Type of Construction Site (check all that apply):**

- Single-Family Residential     Multi-Family Residential     Commercial     Industrial  
 Institutional     Highway or Road     Utility     Other \_\_\_\_\_

Will you be discharging dewatering water from your site?       Yes     No

If yes, will you be discharging dewatering water from a current or former Federal or State remediation site?       Yes     No

#### **Pollutant-Generating Activities**

List and describe all pollutant-generating activities and indicate for each activity the associated pollutants or pollutant constituents that could be discharged in stormwater from your construction site. Take into account where potential spills and leaks could occur that contribute pollutants to stormwater discharges, and any known hazardous or toxic substances, such as PCBs and asbestos, that will be disturbed during construction.

<b>Pollutant-Generating Activity</b> (e.g., paving operations; concrete, paint, and stucco washout and waste disposal; solid waste storage and disposal; and dewatering operations)	<b>Pollutants or Pollutant Constituents</b> (e.g., sediment, fertilizers, pesticides, paints, caulks, sealants, fluorescent light ballasts, contaminated substrates, solvents, fuels)
Paving Operations	Hot Mix Asphalt
Dewatering Operations	Silt
Heavy Equipment Use	Diesel Fuel and Lubricant Products
Concrete Washout	Concrete Residue
Concrete Curing Materials	Chemical Solvents
Concrete Form Oil	Oil Mixture

[Include additional rows or delete as necessary.]

**Construction Support Activities** (only provide if applicable)

Describe any construction support activities for the project (e.g., concrete or asphalt batch plants, equipment staging yards, material storage areas, excavated material disposal areas, borrow areas):

[Insert Description of Construction Support Activity](#)

Contact information for construction support activity:

[Insert Name](#)

[Insert Telephone No.](#)

[Insert Email](#)

[Insert Address And/Or Latitude/Longitude](#)

[Repeat as necessary.]

**2.4 Sequence and Estimated Dates of Construction Activities**

**Instructions (see CGP Part 7.2.3):**

- Describe the intended construction sequence and duration of major activities.
- For each portion or phase of the construction site, include the following:
  - ✓ Commencement and duration of construction activities, including clearing and grubbing, mass grading, demolition activities, site preparation (i.e., excavating, cutting and filling), final grading, and creation of soil and vegetation stockpiles requiring stabilization;
  - ✓ Temporary or permanent cessation of construction activities in each portion of the site;
  - ✓ Temporary or final stabilization of exposed areas for each portion of the site. The dates for stabilization must reflect the applicable deadlines to which you are subject to in Part 2.2.14; and
  - ✓ Removal of temporary stormwater controls and construction equipment or vehicles, and cessation of any construction-related pollutant-generating activities.
- The construction sequence must reflect the following requirements:
  - ✓ Part 2.1.3 (installation of stormwater controls); and
  - ✓ Parts 2.2.14 (stabilization deadlines).

### **Phase I**

<b>Before any site grading activities begin</b>	
Estimated Start Date of Construction Activities for this Phase	TBD
Estimated End Date of Construction Activities for this Phase	TBD
Estimated Date(s) of Application of Stabilization Measures for Areas of the Site Required to be Stabilized	TBD [Add additional dates as necessary]
Estimated Date(s) when Stormwater Controls will be Removed	TBD [Add additional dates as necessary]

\*Suitable growing period for permanent seeding shall be between April 15-November 15, but could be extended with engineer's approval

### **Phase II**

<b>Site Grading</b>	
Estimated Start Date of Construction Activities for this Phase	TBD
Estimated End Date of Construction Activities for this Phase	TBD
Estimated Date(s) of Application of Stabilization Measures for Areas of the Site Required to be Stabilized	TBD [Add additional dates as necessary]
Estimated Date(s) when Stormwater Controls will be Removed	TBD [Add additional dates as necessary]

\*Suitable growing period for permanent seeding shall be between April 15-November 15, but could be extended with engineer's approval

### **Phase III**

<b>Parking Lot/Site Drainage Construction</b>	
Estimated Start Date of Construction Activities for this Phase	TBD
Estimated End Date of Construction Activities for this Phase	TBD
Estimated Date(s) of Application of Stabilization Measures for Areas of the Site Required to be Stabilized	TBD [Add additional dates as necessary]
Estimated Date(s) when Stormwater Controls will be Removed	TBD [Add additional dates as necessary]

[Repeat as needed.]

## 2.5 Authorized Non-Stormwater Discharges

### Instructions (see CGP Parts 1.2.2 and 7.2.5):

- Identify all authorized non-stormwater discharges. The authorized non-stormwater discharges identified in Part 1.2.2 of the 2022 CGP include:
  - ✓ Discharges from emergency fire-fighting activities;
  - ✓ Fire hydrant flushings;
  - ✓ Landscape irrigation;
  - ✓ Waters used to wash vehicles and equipment, provided that there is no discharge of soaps, solvents, or detergents used for such purposes;
  - ✓ Water used to control dust;
  - ✓ Potable water including uncontaminated water line flushings;
  - ✓ External building washdown, provided soaps, solvents and detergents are not used, and external surfaces do not contain hazardous substances as defined in CGP Appendix A (e.g., paint or caulk containing polychlorinated biphenyls (PCBs));
  - ✓ Pavement wash waters provided spills or leaks of toxic or hazardous materials have not occurred (unless all spilled material has been removed) and detergents are not used. You are prohibited from directing pavement wash waters directly into any receiving water, storm drain inlet, or constructed or natural site drainage features, unless the conveyance is connected to a sediment basin, sediment trap, or similarly effective control;
  - ✓ Uncontaminated air conditioning or compressor condensate;
  - ✓ Uncontaminated, non-turbid discharges of ground water or spring water;
  - ✓ Foundation or footing drains where flows are not contaminated with process materials such as solvents or contaminated ground water; and
  - ✓ Uncontaminated construction dewatering water discharged in accordance with Part 2.4.

**List of Authorized Non-Stormwater Discharges Present at the Site**

<b>Authorized Non-Stormwater Discharge</b>	<b>Will or May Occur at Your Site?</b>
Discharges from emergency fire-fighting activities	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Fire hydrant flushings	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Landscape irrigation	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Water used to wash vehicles and equipment	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Water used to control dust	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Potable water including uncontaminated water line flushings	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
External building washdown (soaps/solvents are not used and external surfaces do not contain hazardous substances)	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Pavement wash waters	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Uncontaminated air conditioning or compressor condensate	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Uncontaminated, non-turbid discharges of ground water or spring water	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Foundation or footing drains	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Uncontaminated construction dewatering water	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

(Note: You are required to identify the likely locations of these authorized non-stormwater discharges on your site map. See Section 2.6, below, of this SWPPP Template.)

Notes:

Depending on timing of potable water main and fire hydrant flushing, it is assumed the clean, clear water may be discharged to the completed underground drainage system provided the flows are properly controlled and the system is ready to accept the flow. If not, the flow will be controlled through localized control measures including dewatering basins on site as needed.

Construction dewatering activities, expected to be minimal given current groundwater conditions and time of year of excavation activities, are to be addressed via localized control measures including dewatering sumps. Sumps shall be excavated adjacent to area requiring dewatering. Sumps will be lined with washed, crushed stone. Insert perforated pipe in crushed stone. Place 2" dewatering pump within the perforated pipe. Discharge to silt bag filter placed in the recharge area. Depth of sump shall be less than width.

Water used to control dust is not anticipated to produce a "discharge." Care shall be taken to prevent "over-watering" of the site.

## 2.6 Site Maps

### Instructions (see CGP Part 7.2.4):

- Attach site maps in Appendix A of the Template. For most projects, a series of site maps is necessary and recommended. The first should show the undeveloped site and its current features. An additional map or maps should be created to show the developed site or, for more complicated sites, show the major phases of development.

### These maps must include the following features:

- Boundaries of the property and of the locations where construction will occur, including:
  - ✓ Locations where earth-disturbing activities will occur, noting any phasing of construction activities and any demolition activities;
  - ✓ Approximate slopes before and after major grading activities. Note any areas of steep slopes, as defined in CGP Appendix A;
  - ✓ Locations where sediment, soil, or other construction materials will be stockpiled;
  - ✓ Locations of any crossings of receiving waters;
  - ✓ Designated points where vehicles will exit onto paved roads;
  - ✓ Locations of structures and other impervious surfaces upon completion of construction; and
  - ✓ Locations of on-site and off-site construction support activity areas covered by the permit (see CGP Part 1.2.1.c).
- Locations of any receiving waters, including wetlands, within your site and all receiving waters within one mile downstream of the site's discharge point(s). Indicate which receiving waters are listed as impaired, and which are identified by your State, Tribe, or EPA as Tier 2, Tier 2.5, or Tier 3 waters.
- Any areas of Federally-listed critical habitat for endangered or threatened species within the action area of the site as defined in CGP Appendix A (Helpful resources: CGP Appendix D and [www.epa.gov/npdes/construction-general-permit-cgp-threatened-and-endangered-species-eligibility](http://www.epa.gov/npdes/construction-general-permit-cgp-threatened-and-endangered-species-eligibility)).
- Type and extent of pre-construction cover on the site (e.g., vegetative cover, forest, pasture, pavement, structures).
- Drainage pattern(s) of stormwater and authorized non-stormwater before and after major grading activities.
- Stormwater and authorized non-stormwater discharge locations, including:
  - ✓ Locations where stormwater and/or authorized non-stormwater will be discharged to storm drain inlets, including a notation of whether the inlet conveys stormwater to a sediment basin, sediment trap, or similarly effective control; and
  - ✓ Locations where stormwater or allowable non-stormwater will be discharged directly to receiving waters, including wetlands (i.e., not via a storm drain inlet).
  - ✓ Locations where turbidity benchmark monitoring will take place to comply with Part 3.3, if applicable to your site.
- Locations of all potential pollutant-generating activities identified in Part 7.2.3g (note: you should have those identified in Section 2.3 (Nature of the Construction Activities) in this SWPPP Template).
- Designated areas where construction wastes that are covered by the exception in Part 2.3.3e.ii (i.e., they are not pollutant-generating) will be stored.

- Locations of stormwater controls, including natural buffer areas and any shared controls utilized to comply with the permit.
- Locations where polymers, flocculants, or other treatment chemicals will be used and stored.

## SECTION 3: DOCUMENTATION OF COMPLIANCE WITH OTHER FEDERAL REQUIREMENTS

### 3.1 Endangered Species Protection

**Instructions (see CGP Parts 1.1.5, 7.2.9.a, Appendix D, and the “Endangered Species Protection” section of the Appendix H – NOI Form and Instructions as well as resources available at [www.epa.gov/npdes/construction-general-permit-cgp-threatened-and-endangered-species-eligibility](http://www.epa.gov/npdes/construction-general-permit-cgp-threatened-and-endangered-species-eligibility)):**

Using the instructions in [Appendix D](#) of the permit, determine which criterion listed below (A-F) applies with respect to the protection of endangered species. To make this determination, you must use information from **BOTH** the National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS). Both the NMFS and USFWS maintain lists of Endangered Species Act-listed (ESA-listed) species and designated critical habitat. Operators must consult both when determining their eligibility.

- Check only 1 box, include the required information, and provide a sound basis for supporting the criterion selected. Select the most conservative criterion that applies.
- Include documentation supporting your determination of eligibility required in the Endangered Species Protection section of the NOI in NeT or the ESA worksheet in CGP Appendix D.

#### Eligibility Criterion

Following the process outlined in Appendix D, under which criterion are you eligible for coverage under this permit?

- Criterion A:** No ESA-listed species and/or designated critical habitat present in action area. Using the process outlined in Appendix D of the CGP, you certify that ESA-listed species and designated critical habitat(s) under the jurisdiction of the USFWS or NMFS are not likely to occur in your site's “action area” as defined in Appendix A of the CGP.  
*Please Note: NMFS' jurisdiction includes ESA-listed marine and estuarine species that spawn in inland rivers.*
- Check to confirm you have provided documentation in your SWPPP as required by CGP Appendix D (Note: reliance on State resources is not acceptable; see CGP Appendix D).

**Documentation:** [Insert Text Here](#)

### **Eligibility Criterion**

Following the process outlined in Appendix D, under which criterion are you eligible for coverage under this permit?

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- Criterion B:** Eligibility requirements met by another operator under the 2022 CGP. The construction site's discharges and discharge-related activities were already addressed in another operator's valid certification of eligibility for your "action area" under eligibility Criterion A, C, D, E, or F of the 2022 CGP and you have confirmed that no additional ESA-listed species and/or designated critical habitat under the jurisdiction of USFWS and/or NMFS not considered in the that certification may be present or located in the "action area." To certify your eligibility under this criterion, there must be no lapse of NPDES permit coverage in the other CGP operator's certification. By certifying eligibility under this criterion, you agree to comply with any conditions upon which the other CGP operator's certification was based. You must include in your NOI the NPDES ID from the other 2022 CGP operator's notification of authorization under this permit and list any measures that you must comply with. If your certification is based on another 2022 CGP operator's certification under criterion C, you must provide EPA with the relevant supporting information required of existing dischargers in Criterion C.
- Check to confirm you have provided documentation in your SWPPP as required by CGP Appendix D.

### **Documentation:** [Insert Text Here](#)

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- Criterion C:** Discharges not likely to result in any short- or long-term adverse effects to ESA-listed species and/or designated critical habitat. ESA-listed species and/or designated critical habitat(s) under the jurisdiction of the USFWS and/or NMFS are likely to occur in or near your site's "action area," and you certify to EPA that your site's discharges and discharge-related activities are not likely to result in any short- or long-term adverse effects to ESA-listed threatened or endangered species and/or designated critical habitat. This certification may include consideration of any stormwater controls and/or management practices you will adopt to ensure that your discharges and discharge-related activities are not likely to result in any short- or long-term adverse effects to ESA-listed species and/or designated critical habitat. To certify your eligibility under this criterion, indicate 1) the ESA-listed species and/or designated habitat located in your "action area" using the process outlined in Appendix D of this permit; 2) the distance between the site and the listed species and/or designated critical habitat in the action area (in miles); and 3) a rationale describing specifically how short- or long-term adverse effects to ESA-listed species will be avoided from the discharges and discharge-related activities. (Note: You must include a copy of your site map from your SWPPP showing the upland and in-water extent of your "action area" with your NOI.)
- Check to confirm you have provided documentation in your SWPPP as required by CGP Appendix D.

### **Documentation:** [Insert Text Here](#)

### **Eligibility Criterion**

Following the process outlined in Appendix D, under which criterion are you eligible for coverage under this permit?

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- Criterion D:** Coordination with USFWS and/or NMFS has successfully concluded.

Coordination between you and the USFWS and/or NMFS has concluded. The coordination must have addressed the effects of your site's discharges and discharge-related activities on ESA-listed species and/or designated critical habitat under the jurisdiction of USFWS and/or NMFS, and resulted in a written confirmation from USFWS and/or NMFS that the effects of your site's discharges and discharge-related activities are not likely to result in any short- or long-term adverse effects. By certifying eligibility under this criterion, you agree to comply with any conditions you must meet for your site's discharges and discharge-related activities to not likely result in any short- or long-term adverse effects. You must include copies of the correspondence with the participating agencies in your SWPPP and this NOI.

- Check to confirm you have provided documentation in your SWPPP as required by CGP Appendix D.

**Documentation:** [Insert Text Here](#)

### **Eligibility Criterion**

Following the process outlined in Appendix D, under which criterion are you eligible for coverage under this permit?

---

- Criterion E:** ESA Section 7 consultation has successfully concluded. Consultation between a Federal agency and the USFWS and/or NMFS under section 7 of the ESA has concluded. Consultations can be either formal or informal, and would have occurred only as a result of a separate Federal action (e.g., during application for an individual wastewater discharge permit or the issuance of a wetlands dredge and fill permit), and the consultation must have addressed the effects of your construction activity's discharges and discharge-related activities on all ESA-listed threatened or endangered species and all designated critical habitat under the jurisdiction of each Service, as appropriate, in your action area. The result of this consultation must be either:
- i. A biological opinion currently in effect that determined that the action in question (taking into account the effects of your facility's discharges and discharge-related activities) is likely to adversely affect, but is not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat. The biological opinion must have included the effects of your facility's discharges and discharge-related activities on all the listed species and designated critical habitat in your action area under the jurisdiction of each Service, as appropriate. To be eligible under (i), any reasonable and prudent measures specified in the incidental take statement must be implemented;
  - ii. Written concurrence (e.g., letter of concurrence) from the applicable Service(s) with a determination that your facility's discharges and discharge-related activities are not likely to adversely affect ESA-listed species and/or designated critical habitat. The concurrence letter must have included the effects of your facility's discharges and discharge-related activities on all the ESA-listed species and/or designated critical habitat on your species list(s) acquired from USFWS and/or NMFS as part of this worksheet.

The consultation does not warrant reinitiation under 50 CFR § 402.16; or, if reinitiation of consultation is required (e.g., due to a new species listing, critical habitat designation, or new information), the Federal action agency has reinitiated the consultation and the result of the consultation is consistent with the statements above. (Note: you must include any reinitiation documentation from the Services or consulting Federal agency with your NOI.) -

- Check to confirm you have provided documentation in your SWPPP as required by CGP Appendix D.

**Documentation:** [Insert Text Here](#)

### **Eligibility Criterion**

Following the process outlined in Appendix D, under which criterion are you eligible for coverage under this permit?

- Criterion F:** Issuance of section 10 permit. Potential take is authorized through the issuance of a permit under section 10 of the ESA by the USFWS and/or NMFS, and this authorization addresses the effects of the site's discharges and discharge-related activities on ESA-listed species and designated critical habitat. You must include copies of the correspondence between yourself and the participating agencies in your SWPPP and your NOI.
- Check to confirm you have provided documentation in your SWPPP as required by CGP Appendix D.

**Documentation:** [Insert Text Here](#)

### **3.2 Historic Property Screening Process**

#### **Instructions (see CGP Part 1.1.6, 7.2.9.b, Appendix E, and the “Historic Preservation” section of the Appendix H – NOI Form and Instructions):**

Follow the screening process in Appendix E of the permit to determine whether your installation of subsurface earth-disturbing stormwater controls will have an effect on historic properties.

- Include documentation supporting your determination of eligibility.
- To contact your applicable State historic preservation office, information is available at <https://ncshpo.org/directory/>
- To contact your applicable Tribal historic preservation office, information is available at [https://grantsdev.cr.nps.gov/THPO\\_Review/index.cfm](https://grantsdev.cr.nps.gov/THPO_Review/index.cfm)

### **Appendix E, Step 1**

Do you plan on installing any stormwater controls that require subsurface earth disturbance, including, but not limited to, any of the following stormwater controls at your site? Check all that apply below, and proceed to Appendix E, Step 2.

- Dike
- Berm
- Catch Basin
- Pond
- Constructed Site Drainage Feature (e.g., ditch, trench, perimeter drain, swale, etc.)
- Culvert
- Channel
- Other type of ground-disturbing stormwater control: [Underground infiltration, detention chambers, infiltration Basins, and sediment forebays.](#)

(Note: If you will not be installing any subsurface earth-disturbing stormwater controls, no further documentation is required for Section 3.2 of the Template.)

#### **Appendix E, Step 2**

If you answered yes in Step 1, have prior professional cultural resource surveys or other evaluations determined that historic properties do not exist, or have prior disturbances at the site have precluded the existence of historic properties?  YES  NO

- If yes, no further documentation is required for Section 3.2 of the Template and you may provide the prior documentation in your SWPPP.
- If no, proceed to Appendix E, Step 3.

#### **Appendix E, Step 3**

If you answered no in Step 2, have you determined that your installation of subsurface earth-disturbing stormwater controls will have no effect on historic properties?  YES  NO

- If yes, provide documentation of the basis for your determination.  
*See attached results from the Massachusetts Cultural Resource Information System that indicates there are no historical areas, buildings, burial grounds, objects or structures.*
- If no, proceed to Appendix E, Step 4.

#### **Appendix E, Steps 4 and 5**

If you answered no in Step 3, did the State Historic Preservation Officer (SHPO), Tribal Historic Preservation Office (THPO), or other Tribal representative (whichever applies) respond to you within 15 calendar days to indicate their views as to the likelihood that historic properties are potentially present on your site and may be impacted by the installation of stormwater controls that require subsurface earth disturbance?  YES  NO

- If yes, describe the nature of their response:
  - Written indication that no historic properties will be affected by the installation of stormwater controls. *Insert copies of letters, emails, or other communication between you and the applicable SHPO, THPO, or other Tribal representative*
  - Written indication that adverse effects to historic properties from the installation of stormwater controls can be mitigated by agreed upon actions. *Insert copies of letters, emails, or other communication between you and the applicable SHPO, THPO, or other Tribal representative*
  - No agreement has been reached regarding measures to mitigate effects to historic properties from the installation of stormwater controls. *Provide a description of any significant remaining disagreements regarding mitigation measures and insert copies of letters, emails, or other communication between you and the applicable SHPO, THPO, or other Tribal representative*
  - Other: *Insert copies of letters, emails, or other communication between you and the applicable SHPO, THPO, or other Tribal representative*

- If no, no further documentation is required for Section 3.2 of the Template.

### **3.3 Safe Drinking Water Act Underground Injection Control Requirements**

#### **Instructions (see CGP Part 7.2.9.c):**

- If you will use any of the identified controls in this section, document any contact you have had with the applicable State agency or EPA Regional Office responsible for implementing the requirements for underground injection wells in the Safe Drinking Water Act and EPA's implementing regulations at 40 CFR Parts 144-147.
- For State UIC program contacts, refer to the following EPA website:  
<https://www.epa.gov/uic>.

Do you plan to install any of the following controls? Check all that apply below.

- Infiltration trenches (if stormwater is directed to any bored, drilled, driven shaft or dug hole that is deeper than its widest surface dimension, or has a subsurface fluid distribution system)
- Commercially manufactured pre-cast or pre-built proprietary subsurface detention vaults, chambers, or other devices designed to capture and infiltrate stormwater flow
- Drywells, seepage pits, or improved sinkholes (if stormwater is directed to any bored, drilled, driven shaft or dug hole that is deeper than its widest surface dimension, or has a subsurface fluid distribution system)

If yes, insert copies of letters, emails, or other communication between you and the State agency or EPA regional office.

## SECTION 4: EROSION AND SEDIMENT CONTROLS AND DEWATERING PRACTICES

### General Instructions (See CGP Parts 2.2 and 7.2.6):

- Describe the erosion and sediment controls that will be implemented at your site to meet the requirements of CGP Part 2.2.
- Describe any applicable stormwater control design specifications (including references to any manufacturer specifications and/or erosion and sediment control manuals/ordinances relied upon).
- Describe any routine stormwater control maintenance specifications.
- Describe the projected schedule for stormwater control installation/implementation.

#### 4.1 *Natural Buffers or Equivalent Sediment Controls*

##### Instructions (see CGP Parts 2.2.1 and 7.2.6.b.i, and Appendix F):

This section only applies to you if discharge to a receiving water is located within 50 feet of your site's earth disturbances. If this is the case, consult CGP Part 2.2.1 and Appendix F for information on how to comply with the buffer requirements.

- Describe the compliance alternative (CGP Part 2.2.1.a.i, ii, or iii) that you will implement to meet the buffer requirements, and include any required documentation supporting the alternative selected. For alternative 3, also include why it is infeasible for you to provide and maintain an undisturbed natural buffer of any size. For "linear construction sites" where it is infeasible to implement alternative 1, 2, or 3, also include a description of any buffer width retained and/or supplemental erosion and sediment controls installed. The compliance alternative selected must be maintained throughout the duration of permit coverage. However, if you select a different compliance alternative during your period of permit coverage, you must modify your SWPPP to reflect this change.
- If you qualify for one of the exceptions in CGP Part 2.2.1.b, include documentation related to your qualification for such exceptions.

#### Buffer Compliance Alternatives

Are there any receiving waters within 50 feet of your project's earth disturbances?  YES  NO

(Note: If no, no further documentation is required for Section 4.1 in the SWPPP Template.  
Continue to Section 4.2.)

Check the compliance alternative that you have chosen:

- (i) I will provide and maintain a 50-foot undisturbed natural buffer.

(Note 1: You must show the 50-foot boundary line of the natural buffer on your site map.)

(Note 2: You must show on your site map how all discharges from your construction disturbances through the natural buffer area will first be treated by the site's erosion and sediment controls. Also, show on the site map any velocity dissipation devices used to prevent erosion within the natural buffer area.)

- (ii) I will provide and maintain an undisturbed natural buffer that is less than 50 feet and is supplemented by additional erosion and sediment controls that achieve, in combination, the sediment load reduction equivalent to a 50-foot undisturbed natural buffer.

(Note 1: You must show the boundary line of the natural buffer on your site map.)

(Note 2: You must show on your site map how all discharges from your construction disturbances through the natural buffer area will first be treated by the site's erosion and sediment controls. Also, show on the site map any velocity dissipation devices used to prevent erosion within the natural buffer area.)

- Insert width of natural buffer to be retained
  - Insert either of the following:
    - (1) The estimated sediment removal from a 50-foot buffer using applicable tables in Appendix F, Attachment 1. Include information about the buffer vegetation and soil type that predominate at your site
- OR
- (2) If you conducted a site-specific calculation for the estimated sediment removal of a 50-foot buffer, provide the specific removal efficiency, and information you relied upon to make your site-specific calculation
- Insert description of additional erosion and sediment controls to be used in combination with natural buffer area
  - Insert the following information:
    - (1) Specify the model or other tool used to estimate sediment load reductions from the combination of the buffer area and additional erosion and sediment controls installed at your site, and
    - (2) Include the results of calculations showing that the combination of your buffer area and the additional erosion and sediment controls installed at your site will meet or exceed the sediment removal efficiency of a 50-foot buffer

- (iii) It is infeasible to provide and maintain an undisturbed natural buffer of any size, therefore I will implement erosion and sediment controls that achieve the sediment load reduction equivalent to a 50-foot undisturbed natural buffer.

- Insert rationale for concluding that it is infeasible to provide and maintain a natural buffer of any size
  - Insert either one of the following:
    - (1) The estimated sediment removal from a 50-foot buffer using applicable tables in Appendix F, Attachment 1. Include information about the buffer vegetation and soil type that predominate at your site
- OR
- (2) If you conducted a site-specific calculation for the estimated sediment removal of a 50-foot buffer, provide the specific removal efficiency, and information you relied upon to make your site-specific calculation
- Insert description of additional erosion and sediment controls to be used in combination with natural buffer area
  - Insert the following information:

- (1) Specify the model or other tool used to estimate sediment load reductions from the combination of the buffer area and additional erosion and sediment controls installed at your site, and
- (2) Include the results of calculations showing that the combination of your buffer area and the additional erosion and sediment controls installed at your site will meet or exceed the sediment removal efficiency of a 50-foot buffer

I qualify for one of the exceptions in Part 2.2.1.b. (If you have checked this box, provide information on the applicable buffer exception that applies, below.)

#### **Buffer Exceptions**

Which of the following exceptions to the buffer requirements applies to your site?

There is no discharge of stormwater to waters of the U.S. through the area between the disturbed portions of the site and any waters of the U.S. located within 50 feet of your site

(Note: If this exception applies, no further documentation is required for Section 4.1 of the Template.)

No natural buffer exists due to preexisting development disturbances (e.g., structures, impervious surfaces) that occurred prior to the initiation of planning for this project.

(Note 1: If this exception applies, no further documentation is required for Section 4.1 of the Template.)

(Note 2: Where some natural buffer exists but portions of the area within 50 feet of the surface water are occupied by preexisting development disturbances, you must still comply with the one of the CGP Part 2.2.1.a compliance alternatives.)

For “linear construction sites” (defined in Appendix A), site constraints (e.g., limited right-of-way) make it infeasible to meet any of the CGP Part 2.2.1.a compliance alternatives, provided that, to the extent feasible, you limit disturbances within 50 feet of the receiving water. **Include documentation here of the following:** (1) why it is infeasible for you to meet one of the buffer compliance alternatives, and (2) buffer width retained and/or supplemental erosion and sediment controls to treat discharges to the surface water

The project qualifies as “small residential lot” construction (defined in Appendix A as “a lot being developed for residential purposes that will disturb less than 1 acre of land, but is part of a larger residential project that will ultimately disturb greater than or equal to 1 acre”) (see Appendix F, Part F.3.2).

For Alternative 1:

- Insert width of natural buffer to be retained
- Insert applicable requirements based on Table F-1
- Insert description of how you will comply with these requirements

For Alternative 2:

- Insert (1) the assigned risk level based on Appendix F Applicable Table F-2 through F-6 and (2) the predominant soil type and average slope at your site
- Insert applicable requirements based on Appendix F, Table F-7

- Insert description of how you will comply with these requirements

(Note 1: If you alternatively choose to comply with any of the options that are available to other sites in Part 2.2.1.a and F.2.1 of this Appendix, then additional documentation may be needed.)

- Buffer disturbances are authorized under a CWA Section 404 permit. [Insert description of any earth disturbances that will occur within the buffer area](#)

(Note 1: If this exception applies, no further documentation is required for Section 4.1 of the Template.)  
(Note 2: This exception only applies to the limits of disturbance authorized under the Section 404 permit and does not apply to any disturbances within 50 feet of a receiving water that are adjacent to the disturbances authorized under Section 404 and that are covered by this permit.)
- Buffer disturbances will occur for the construction of a water-dependent structure or water access area (e.g., pier, boat ramp, and trail). [Insert description of any earth disturbances that will occur within the buffer area](#)

(Note: If this exception applies, no further documentation is required for Section 4.1 of the Template.)

## 4.2 Perimeter Controls

### Instructions (see CGP Parts 2.2.3 and 7.2.6.b.ii):

- Describe sediment controls that will be used (e.g., silt fences, filter berms, compost filter socks, gravel barriers, temporary diversion dikes) to meet the Part 2.2.3 requirement to “install sediment controls along any perimeter areas of the site that are downslope from any exposed soil or other disturbed areas.”
- For linear projects (as defined in Appendix A), where you have determined that the use of perimeter controls in portions of the site is infeasible (e.g. due to a limited or restricted right-of-way), document other practices that you will implement to minimize pollutant discharges to perimeter areas of the site.

### General

- Silt (mulch) sock and silt fence will be installed along perimeter areas of the site that could receive pollutant/sediment discharge.

### Specific Perimeter Controls

Silt Sock/Silt Fence	
<b>Description:</b> A 12-inch silt sock will be staked on alternating sides, embedded +/-3-inches into the ground, with a silt fence installed on the side of the silt sock closest to the project perimeter, or a double silt sock with silt fence is proposed.	
Installation	TBD

<b>Silt Sock/Silt Fence</b>	
<b>Maintenance Requirements</b>	Remove sediment before it has accumulated to one-half of the above ground height of any perimeter control. (Note: At a minimum, you must provide for maintenance that meets the following requirement in CGP Part 2.2.3.ci: "Remove sediment before it has accumulated to one-half of the above-ground height of any perimeter control" And in CGP Part 2.2.3.cii: "After a storm event, if there is evidence of stormwater circumventing or undercutting the perimeter control, extend controls and/or repair undercut areas to fix the problem.")
<b>Design Specifications</b>	See attached site plans for specifications.

[Repeat as needed for individual perimeter controls.]

#### 4.3 Sediment Track-Out

**Instructions (see CGP Parts 2.2.4 and 7.2.6.b.iii):**

- Describe stormwater controls that will be used to minimize sediment track-out.
- Describe location(s) of vehicle exit(s), procedures to remove accumulated sediment off-site (e.g., vehicle tracking), and stabilization practices (e.g., stone pads or wash racks or both) to minimize off-site vehicle tracking of sediment. Also include the design, installation, and maintenance specifications for each control.

**General**

- Construction traffic will be limited to one (1) designated entrance/exit point to public paved roads, and it shall have a gravel/stone tracking pad installed. See enclosed Sheet C-3 in Appendix A for locations and details. Construction entrances shall be built to slope to a sump area within the construction entrance.

**Specific Track-Out Controls**

<b>Gravel/Stone Construction Entrance Tracking Pads</b>	
<b>Description:</b> Temporary gravel or crushed stone construction entrances/exits or other means shall be used to minimize off-site movement of soil with vehicles. Construction access points shall be maintained to minimize tracking of soil onto public roads and existing parking lots to remain. If the rock entrance is not working to keep streets clean, then install wheel wash, sweep streets, or wash streets if wash water can be collected.	
<b>Installation</b>	Insert approximate date of installation

<b>Gravel/Stone Construction Entrance Tracking Pads</b>	
<b>Maintenance Requirements</b>	<p>Stabilized construction entrances shall be inspected daily. Gravel or crushed stone shall be added if the pad is no longer in accordance with the specifications. If the rock entrance is not working to keep streets clean, then install wheel wash, sweep streets, or wash streets if wash water can be collected. When sediment has been tracked off of the site, it shall be removed by the end of the same working day, or by the end of the next working day if track-out occurs on a non-workday. Remove sediment by sweeping, shoveling or vacuuming roadways where sediment has been tracked-out.</p> <p>(Note: At a minimum, you must provide for maintenance that meets the following requirement in CGP Part 2.2.4.d: "Where sediment has been tracked-out from your site onto paved roads, sidewalks, or other paved areas outside of your site, remove the deposited sediment by the end of the same business day in which the track-out occurs or by the end of the next business day if track-out occurs on a non-business day. Remove the track-out by sweeping, shoveling, or vacuuming these surfaces, or by using other similarly effective means of sediment removal. You are prohibited from hosing or sweeping tracked-out sediment into any constructed or natural site drainage feature, storm drain inlet, or receiving water.")</p>
<b>Design Specifications</b>	Include copies of design specifications here

[Repeat as needed for individual track-out controls.]

#### **4.4 Stockpiles or Land Clearing Debris Piles Comprised of Sediment or Soil**

##### **Instructions (see CGP Parts 2.2.5 and 7.2.6):**

- Describe stormwater controls and other measures you will take to minimize the discharge of sediment or soil particles from stockpiled sediment or soil. Include a description of structural practices (e.g., diversions, berms, ditches, storage basins), including design, installation, and maintenance specifications, used to divert flows from stockpiled sediment or soil, retain or detain flows, or otherwise limit exposure and the discharge of pollutants from stockpiled sediment or soil.
- For piles that will be unused for 14 or more days, describe what cover or other appropriate temporary stabilization will be used.
- Also, describe any controls or procedures used to minimize exposure resulting from adding to or removing materials from the pile.

##### **General**

- Piles will be located outside of any natural buffers and away from any stormwater conveyances, drain inlets, future infiltration locations and areas where stormwater flow is concentrated. Material stockpile locations are noted on the attached site plans. Stockpiling of sediment is not anticipated, but the SWPPP will be updated accordingly if the situation is need/arises to store these materials on site.
- Material stockpiling on the site will be minimized by the contractor to the extent practicable.
- See sheet C-2 in Appendix A for potential stockpile locations.

### Specific Stockpile Controls

<b>Entrenched Silt Fence Barrier</b>	
<b>Description:</b> Entrenched Silt Fence Barrier	
<b>Installation</b>	TBD
<b>Maintenance Requirements</b>	The silt fence and temporary erosion controls shall be installed immediately after the stockpile has been established. For piles that will be unused for 14 or more days, provide cover over the stockpile or temporary stabilization to avoid direct contact with precipitation and wind. Install a sediment barrier along all downgradient perimeter areas of stockpiles. You are prohibited from hosing down or sweeping soil or sediment accumulated on pavement or other impervious surfaces into any stormwater conveyance, storm drain inlet, or water of the U.S. (Note: At a minimum, you must comply with following requirement in CGP Part 2.2.5.d: "You are prohibited from hosing down or sweeping soil or sediment accumulated on pavement or other impervious surfaces into any constructed or natural site drainage feature, storm drain inlet, or receiving water")
<b>Design Specifications</b>	See attached site plan for specifications.

[Repeat as needed for individual stockpile controls.]

### 4.5 Minimize Dust

#### Instructions (see CGP Parts 2.2.6 and 7.2.6):

Describe controls and procedures you will use at your site to minimize the generation of dust.

#### General

- Dust from the site shall be controlled by using a mobile pressure-type distributor truck to apply water to disturbed areas. The mobile unit shall apply water at a rate of 300 gallons per acre and minimized as necessary to prevent runoff and ponding.

### Specific Dust Controls

<b>Insert name of dust control to be installed</b>	
<b>Description:</b> Dust from the site shall be controlled by using a mobile pressure-type distributor truck to apply water to disturbed areas. The mobile unit shall apply water at a rate of 300 gallons per acre and minimized as necessary to prevent runoff and ponding.	
<b>Installation</b>	Ongoing/As needed
<b>Maintenance Requirements</b>	Dust control shall be implemented as needed once site grading has been initiated and during windy conditions (forecasted or actual wind conditions of 20 mph or greater) while site grading is occurring. Spraying of water shall be performed no more than three times a day during the months of May–September and once per day during the months of October–April or whenever the dryness of the soil warrants it. At least one mobile unit shall be available at all times to distribute water to control dust on the project area. Each mobile unit shall be equipped with a positive shutoff valve to prevent over watering of the disturbed area.
<b>Design Specifications</b>	N/A

[Repeat as needed for individual dust controls.]

#### 4.6 Minimize Steep Slope Disturbances

##### Instructions (see CGP Parts 2.2.7 and 7.2.6):

- Describe how you will minimize the disturbance to steep slopes (as defined by CGP Appendix A).
- Describe controls (e.g., erosion control blankets, tackifiers), including design, installation and maintenance specifications, that will be implemented to minimize sediment discharges from slope disturbances.

##### General

- Erosion control blankets shall be used to provide stabilization for slopes greater than 3:1 throughout the site.

##### Specific Steep Slope Controls

Erosion Control Blanket	
<b>Description:</b> Erosion control blankets shall be used to provide stabilization for the slopes in the grass drainage channels and sediment basins, and on slopes greater than 3:1 throughout the site.	
Installation	TBD
Maintenance Requirements	The erosion control blanket shall be inspected weekly and immediately after storm events to determine if cracks, tears, or breaches have formed in the fabric; if so, the blanket shall be repaired or replaced immediately. Good contact with the soil shall be maintained and erosion shall not occur under the blanket. Any areas where the blanket is not in close contact with the ground shall be repaired or replaced.
Design Specifications	See attached site plan.

[Repeat as needed for individual steep slope controls.]

#### 4.7 Topsoil

##### Instructions (see CGP Parts 2.2.8 and 7.2.6):

- Describe how topsoil will be preserved and identify these areas and associated control measures on your site map(s).
- If it is infeasible for you to preserve topsoil on your site, provide an explanation for why this is the case.

##### General

- Topsoil stockpiling is not proposed on site. Topsoil will be stripped and loaded into 18-wheelers and hauled off site. As such, no locations for temporary topsoil stockpiling are included in the plan.

### **Specific Topsoil Controls**

<b>Insert name of topsoil control to be installed</b>	
<b>Description:</b> Insert description of topsoil control to be installed	
<b>Installation</b>	Insert approximate date of installation
<b>Maintenance Requirements</b>	Insert maintenance requirements for the topsoil control
<b>Design Specifications</b>	Include copies of design specifications here

[Repeat as needed for individual topsoil controls.]

### **4.8 Soil Compaction**

#### **Instructions (see CGP Parts 2.2.9 and 7.2.6):**

In areas where final vegetative stabilization will occur or where infiltration practices will be installed, describe the controls, including design, installation, and maintenance specifications that will be used to restrict vehicle or equipment access or condition the soil for seeding or planting.

#### **General**

- Protect proposed infiltration areas by adding an erosion control barrier around the perimeter of all proposed infiltration areas.
- See sheet C-2 and C-5.1 in Appendix A for locations of silt fence and underground infiltration system.

### **Specific Soil Compaction Controls**

<b>Entrenched Silt Fence Barrier</b>	
<b>Description:</b> An erosion control barrier, consisting of silt fencing, shall be installed around the perimeter of all proposed infiltration areas to prevent construction vehicles from impacting the area, to decrease the velocity of sheet flows and intercept, and detain small amounts of sediment from disturbed areas.	
<b>Installation</b>	TBD
<b>Maintenance Requirements</b>	The erosion control barrier shall be installed after clearing and grubbing. Silt fence shall be inspected weekly, following storms, and daily during rainy periods. Damaged sections shall be replaced. Concentrated flows shall be intercepted and rerouted. Sediment accumulations shall be removed when reaching a depth of 6-inches.
<b>Design Specifications</b>	See attached site plan.

[Repeat as needed for individual soil compaction controls.]

#### 4.9 Storm Drain Inlets

##### Instructions (see CGP Parts 2.2.10 and 7.2.6.iv):

Describe controls (e.g., inserts, rock-filled bags, or block and gravel) including design, installation, and maintenance specifications that will be implemented to protect all inlets that carry stormwater flow from your site to a receiving water, provided you have the authority to access the storm drain inlet. Inlet protection measures are not required when storm drain inlets to which your site discharges are conveyed to a sediment basin, sediment trap, or similarly effective control.

##### General

- Filter bags will be installed at all storm drain inlets to prevent sediment from entering the drainage system.

##### Specific Storm Drain Inlet Controls

Filter Bags	
<b>Description:</b> Filter bag manufactured specifically for controlling sediment flow into all storm drain inlets to prevent coarse sediment from entering drainage systems prior to permanent stabilization of the disturbed area.	
Installation	TBD
Maintenance Requirements	Storm drain inlet protection shall be inspected weekly and following storms. Clean, or remove and replace the protection measures as sediment accumulates, the filter becomes clogged, and/or performance is compromised. Where there is evidence of sediment accumulation adjacent to the inlet protection measure, remove the deposited sediment by the end of the same business day in which it is found or by the end of the following business day if removal by the same business day is not feasible. (Note: At a minimum, you must comply with following requirement in CGP Part 2.2.10.b: "Clean, or remove and replace, the inlet protection measures as sediment accumulates, the filter becomes clogged, and/or performance is compromised. Where there is evidence of sediment accumulation adjacent to the inlet protection measure, remove the deposited sediment by the end of the same business day in which it is found or by the end of the following business day if removal by the same business day is not feasible.")
Design Specifications	See attached site plan.

[Repeat as needed for individual storm drain inlet controls.]

#### 4.10 Constructed Site Drainage Feature

##### Instructions (see CGP Parts 2.2.11 and 7.2.6):

If you will be installing a constructed site drainage feature, describe control practices (e.g., erosion controls and/or velocity dissipation devices such as check dams and sediment traps), including design specifications and details (volume, dimensions, outlet structure), that will be implemented at the construction site.

##### General

- There are no stormwater conveyance channels proposed.

[Repeat as needed for individual constructed site drainage features.]

#### 4.11 Sediment Basins or Similar Impoundments

##### Instructions (see CGP Parts 2.2.12 and 7.2.6.b.v):

If you will install a sediment basin or similar impoundment, include design specifications and other details (volume, dimensions, outlet structure) that will be implemented in conformance with CGP Parts 2.2.12 and 7.2.6.b.iv.

- Sediment basins must be situated outside of receiving waters and any natural buffers established under CGP Part 2.2.1; and designed to avoid collecting water from wetlands.
- At a minimum, sediment basins provide storage for either (1) the calculated volume of runoff from the 2-year, 24-hour storm (see <https://www.epa.gov/npdes/construction-general-permit-2-year-24-hour-storm-frequencies>), or (2) 3,600 cubic feet per acre drained.
- Sediment basins must also utilize outlet structures that withdraw water from the surface, unless infeasible.
- Use erosion controls and velocity dissipation devices to prevent erosion at inlets and outlets.

##### General

- Site runoff during construction will be captured and managed in a localized fashion by constructing berms and diversion swales to create sediment basins that provide the required capture capacity in accordance with the above volumetric requirements. The goal is to avoid large downstream sediment basins to the extent possible and manage runoff as close to the source as possible.
- If sediment basins are determined to be needed, they will be sized on a case-by-case basis as the needs arise, and the SWPPP will be updated accordingly. In no circumstance will a sediment basin be placed directly over a proposed infiltration area.

### Specific Sediment Basin Controls

Typical Sediment Basin	
<b>Description:</b> Localized Sediment Basin(s) to be installed using low permeability berms and diversion swales.	
<b>Installation</b>	TBD
<b>Maintenance Requirements</b>	Remove accumulated sediment to maintain at least one-half of the design capacity and conduct all other appropriate maintenance to ensure the basin or impoundment remains in effective operating condition. (Note: At a minimum, you must comply with following requirement in CGP Part 2.2.12.f: "Remove accumulated sediment to maintain at least one-half of the design capacity and conduct all other appropriate maintenance to ensure the basin or impoundment remains in effective operating condition.")
<b>Design Specifications</b>	To be sized on-site in compliance with the calculated volume of runoff from the 2-year, 24-hour storm or 3,600 cubic feet per acre drained.  See sheet C-5 in Appendix A for proposed locations of temporary sediment basins for the site.

[Repeat as needed for individual sediment basin controls.]

### 4.12 Chemical Treatment

**Instructions (see CGP Parts 2.2.13 and 7.2.6.b.vi):**

If you are using treatment chemicals (e.g., polymers, flocculants, coagulants) at your site, provide details for each of the items below. This information is required as part of the SWPPP requirements in CGP Part 7.2.6.b.vi.

There is no chemical treatment proposed at this time.

#### Soil Types

List all the soil types including soil types expected to be exposed during construction in areas of the project that will drain to chemical treatment systems and those expected to be found in fill material: **N/A**

#### Treatment Chemicals

List all treatment chemicals that will be used at the site and explain why these chemicals are suited to the soil characteristics: **N/A**

Describe the dosage of all treatment chemicals you will use at the site or the methodology you will use to determine dosage: **N/A**

Provide information from any applicable Safety Data Sheets (SDS): **N/A**

Describe how each of the chemicals will be stored consistent with CGP Part 2.2.13c: **N/A**

Include references to applicable State or local requirements affecting the use of treatment chemicals, and copies of applicable manufacturer's specifications regarding the use of your specific treatment chemicals and/or chemical treatment systems: **N/A**

#### Special Controls for Cationic Treatment Chemicals (if applicable)

If the applicable EPA Regional Office authorized you to use cationic treatment chemicals, include the official EPA authorization letter or other communication, and identify the specific

controls and implementation procedures designed to ensure that your use of cationic treatment chemicals will not lead to a discharge that does not meet water quality standards: **N/A**

#### **Schematic Drawings of Stormwater Controls/Chemical Treatment Systems**

Provide schematic drawings of any chemically-enhanced stormwater controls or chemical treatment systems to be used for application of treatment chemicals: **N/A**

#### **Training**

Describe the training that personnel who handle and apply chemicals have received prior to permit coverage, or will receive prior to the use of treatment chemicals: **N/A**

### **4.13 Dewatering Practices**

#### **Instructions (see CGP Parts 2.4 and 7.2.6):**

If you will be discharging accumulated stormwater and/or ground water drained from building foundations, vaults, trenches, or other similar points of accumulation, include design specifications and details of all dewatering practices that are installed and maintained to comply with CGP Part 2.4.

- Do not place dewatering controls on steep slopes.
- Use a suitable filtration device if dewatering water is found or expected to contain materials that cause a visible sheen on the water surface or visible oily deposits on the bottom or shoreline of the receiving water.
- Use well-vegetated, upland areas of the site to infiltrate dewatering water before discharging. Do not use receiving waters as part of the treatment area.
- Use stable, erosion-resistant surfaces to discharge from dewatering controls. Additionally, at all points where dewatering water is discharged, comply with the velocity dissipation requirements of Part 2.2.11.

#### **General**

- Some dewatering is anticipated during excavation for the installation of the deepest drainage and water tanks (i.e. oil/grit tanks and water tank for car wash, etc.).

#### **Specific Dewatering Practices**

<b>Localized Sump Dewatering</b>	
<b>Description:</b> Localized Sump Dewatering	
<b>Installation</b>	TBD
<b>Maintenance Requirements</b>	Maintain pump screens and discharge silt bags to ensure clear discharge water. (Note: At a minimum, you must comply with following requirement in CGP Part 2.4: "For backwash water, either haul it away for disposal or return it to the beginning of the treatment process; replace and clean the filter media used in dewatering devices when the pressure differential equals or exceeds the manufacturer's specifications.")
<b>Design Specifications</b>	Excavate sump adjacent to area requiring dewatering. Line sump with washed, crushed stone. Insert perforated pipe in crushed stone. Place 2" dewatering pump within the perforated pipe. Discharge to silt bag filter placed in the recharge area. Depth of sump shall be less than width.

[Repeat as needed for individual dewatering practices.]

#### **4.14 Other Stormwater Controls**

**Instructions:**

Describe any other stormwater controls that do not fit into the above categories.

**General**

- There are no other stormwater controls proposed.

[Repeat as needed.]

#### **4.15 Site Stabilization**

**Instructions (see CGP Parts 2.2.14 and 7.2.6.b.vii):**

The CGP requires you to immediately initiate stabilization when work in an area of your site has permanently or temporarily stopped, and to complete certain stabilization activities within prescribed deadlines. Construction projects disturbing more than 5 acres at any one time have a different deadline than projects disturbing 5 acres or less at any one time. See CGP Part 2.2.14.a. Construction projects in arid, semi-arid, and drought-stricken areas during the seasonally dry period and projects discharging to a sediment- or nutrient-impaired water or a Tier 2, 2.5, or 3 water have different stabilization deadlines. See CGP Part 2.2.14.b. For your SWPPP, you must include the following:

- Describe the specific vegetative and/or non-vegetative practices that will be used to stabilize exposed soils where construction activities have temporarily or permanently ceased. Avoid using impervious surfaces for stabilization whenever possible.
- The stabilization deadline(s) that will be met in accordance with Part 2.2.14.a and 2.2.14.b.
- Once you begin construction, consider using the Grading/Stabilization Activities log in Appendix H of the Template to document your compliance with the stabilization requirements in CGP Part 2.2.14.

**Total Amount of Land Disturbance Occurring at Any One Time**

- Five Acres or less  
 More than Five Acres

**Use this template box if you are not located in an arid, semi-arid, or drought-stricken area and are not discharging to a sediment- or nutrient-impaired water or Tier 2, Tier 2.5, or Tier 3 water.**

<b>Temporary Stabilization</b>	
<input checked="" type="checkbox"/> Vegetative	<input type="checkbox"/> Non-Vegetative
<input checked="" type="checkbox"/> Temporary	<input type="checkbox"/> Permanent
<b>Description:</b>	
<ul style="list-style-type: none"> <li>▪ Initiation of temporary vegetative cover shall occur immediately where construction will cease for more than 14 days. It shall be established using hydroseeding for areas of exposed soil (including stockpiles) during the growing season from April 15 to November 15.</li> <li>▪ Complete all soil conditioning, seeding, watering or irrigation installation, mulching or other required activities related to the planting and initial establishment of vegetation as soon as conditions or circumstances allow it on your site.</li> <li>▪ Outside of the growing season, the contractor will provide temporary stabilization by utilizing spray tackifier in lieu of hydroseed.</li> <li>▪ See General Note 6, 7 and 8 on Sheet C-5 in Appendix A.</li> </ul>	
<b>Installation</b>	TBD
<b>Completion</b>	TBD
<b>Maintenance Requirements</b>	Stabilized areas shall be inspected weekly and after storm events until a dense cover of vegetation has become established. If failure is noticed at the seeded area, the area shall be reseeded, fertilized, and mulched immediately.
<b>Design Specifications</b>	See attached site plans in Appendix A.

<b>Mulching</b>	
<input type="checkbox"/> Vegetative	<input checked="" type="checkbox"/> Non-Vegetative
<input checked="" type="checkbox"/> Temporary	<input type="checkbox"/> Permanent
<b>Description:</b>	
<ul style="list-style-type: none"> <li>▪ Wood chip mulch shall provide immediate protection to exposed soils during short periods of disturbance. Wood chip mulch shall also be applied in areas that have been seeded for temporary or permanent stabilization.</li> <li>▪ Complete all soil conditioning, seeding, watering or irrigation installation, mulching or other required activities related to the planting and initial establishment of vegetation as soon as conditions or circumstances allow it on your site.</li> </ul>	
<b>Installation</b>	TBD
<b>Completion</b>	TBD
<b>Maintenance Requirements</b>	Mulched areas shall be inspected weekly and after storm events to check for movement of mulch or erosion. If washout, breakage, or erosion occurs, the surface shall be repaired, and new mulch shall be applied to the damaged area.
<b>Design Specifications</b>	See attached site plans in Appendix A.

<b>Mulching</b>	
<input checked="" type="checkbox"/> Vegetative	<input type="checkbox"/> Non-Vegetative
<input type="checkbox"/> Temporary	<input checked="" type="checkbox"/> Permanent
<b>Description:</b>	
<ul style="list-style-type: none"> <li>▪ Initiation of permanent stabilization measures shall occur immediately after the final design grades are achieved and earth moving activities cease. Native species of plants shall be used to establish vegetative cover on exposed soils. Permanent stabilization shall be completed in accordance with the procedures outlined in the Final Stabilization section of this report. Portions of the site where construction activities have permanently ceased shall be stabilized as soon as possible, but no later than 14 calendar days after stabilization has been initiated.</li> </ul>	
<b>Installation</b>	TBD
<b>Completion</b>	TBD
<b>Maintenance Requirements</b>	All seeded areas shall be inspected weekly during construction activities and after storm events until a dense cover of vegetation has been established. If failure is noticed at the seeded area, the area shall be reseeded, fertilized, and mulched immediately. Care shall be taken to avoid compacting newly placed topsoil. After construction is completed at the site, permanently stabilized areas shall be monitored until final stabilization is reached.
<b>Design Specifications</b>	See attached site plans in Appendix A.

[Repeat as needed for additional stabilization practices.]

**Use this template box if you are located in an arid, semi-arid, or drought-stricken area.**

<b>Insert name of site stabilization practice</b>	
<input type="checkbox"/> Vegetative	<input type="checkbox"/> Non-Vegetative
<input type="checkbox"/> Temporary	<input type="checkbox"/> Permanent
<b>Description:</b>	
<ul style="list-style-type: none"> <li>▪ Insert description of stabilization practice to be installed</li> <li>▪ Note how design will meet requirements of Part 2.2.14.b</li> </ul>	
<b>Dry Period</b>	<ul style="list-style-type: none"> <li>▪ Beginning month of seasonally dry period: Insert approximate date</li> <li>▪ Ending month of seasonally dry period: Insert approximate date</li> <li>▪ Site conditions during this period: Describe your site conditions during this period</li> </ul>
<b>Installation and completion schedule</b>	<p>Describe the schedule you will follow for initiating and completing vegetative stabilization</p> <ul style="list-style-type: none"> <li>▪ Approximate installation date: Insert approximate date</li> <li>▪ Approximate completion date: Insert approximate date</li> </ul>
<b>Maintenance Requirements</b>	Insert maintenance requirements for the stabilization practice
<b>Design Specifications</b>	Include copies of design specifications here

[Repeat as needed for additional stabilization practices.]

**Use this template box if you are discharging to a sediment- or nutrient-impaired water or to a water that is identified by your State, Tribe, or EPA as Tier 2, Tier 2.5, or Tier 3 for antidegradation purposes.**

<b>Insert name of site stabilization practice</b>	
<input type="checkbox"/> Vegetative <input type="checkbox"/> Non-Vegetative <input type="checkbox"/> Temporary <input type="checkbox"/> Permanent	
<b>Description:</b> <ul style="list-style-type: none"> <li>▪ Insert description of stabilization practice to be installed</li> <li>▪ Note how design will meet requirements of Part 2.2.14.b.iii</li> </ul>	
<b>Installation</b>	Insert approximate date of installation
<b>Completion</b>	(Must be completed as soon as practicable, but no later than seven calendar days after stabilization has been initiated) Insert approximate completion date
<b>Maintenance Requirements</b>	Insert maintenance requirements for the stabilization practice
<b>Design Specifications</b>	Include copies of design specifications here

[Repeat as needed for additional stabilization practices.]

**Use this template box if unforeseen circumstances have delayed the initiation and/or completion of vegetative stabilization.** Note: You will not be able to include this information in your initial SWPPP. If you are affected by circumstances such as those described in CGP Part 2.2.14.b.ii, you will need to modify your SWPPP to include this information.

<b>Insert name of site stabilization practice</b>	
<input type="checkbox"/> Vegetative <input type="checkbox"/> Non-Vegetative <input type="checkbox"/> Temporary <input type="checkbox"/> Permanent	
<b>Description:</b> <ul style="list-style-type: none"> <li>▪ Insert description of stabilization practice to be installed</li> <li>▪ Note how design will meet requirements of Part 2.2.14.b.ii</li> </ul>	
<b>Justification</b>	Insert description of circumstances that prevent you from meeting the deadlines required in CGP CGP Parts 2.2.14.a
<b>Installation and completion schedule</b>	<b>Vegetative Measures:</b> Describe the schedule you will follow for initiating and completing vegetative stabilization <ul style="list-style-type: none"> <li>▪ Approximate installation date: Insert approximate date</li> <li>▪ Approximate completion date: Insert the approximate date</li> </ul>
	<b>Non-Vegetative Measures:</b> (Must be completed within 14 days of the cessation of construction if disturbing 5 acres or less; within 7 days if disturbing more than 5 acres) <ul style="list-style-type: none"> <li>▪ Approximate installation date: Insert the approximate date</li> <li>▪ Approximate completion date: Insert the approximate date</li> </ul>
<b>Maintenance Requirements</b>	Insert maintenance requirements for the stabilization practice
<b>Design Specifications</b>	Include copies of design specifications here

[Repeat as needed for additional stabilization practices.]

## SECTION 5: POLLUTION PREVENTION CONTROLS

### 5.1 Potential Sources of Pollution

#### Instructions (see CGP Part 7.2.3.g):

- Identify and describe all pollutant-generating activities at your site (e.g., paving operations; concrete, paint, and stucco washout and waste disposal; solid waste storage and disposal).
- For each pollutant-generating activity, include an inventory of pollutants or pollutant constituents associated with that activity (e.g., sediment, fertilizers, and/or pesticides, paints, solvents, fuels), which could be exposed to rainfall or snowmelt, and could be discharged in stormwater from your construction site. You must take into account where potential spills and leaks could occur that contribute pollutants to stormwater discharges, and any known hazardous or toxic substances, such as PCBs and asbestos, that will be disturbed or removed during construction.

#### Construction Site Pollutants

Pollutant-Generating Activity	Pollutants or Pollutant Constituents (that could be discharged if exposed to stormwater)	Location on Site (or reference SWPPP site map where this is shown)
Asphalt/Paving/Concrete	Oil, petroleum distillates, concrete residue	Streets, parking areas
Curing compounds	Naptha	Curb and gutter/walkways
Hydraulic oil/fluids	Mineral Oil	Leaks or broken hoses from equipment
Gasoline	Benzene, ethyl benzene, toluene, xylene, MTBE	Leaks or broken hoses from equipment
Diesel Fuel	Petroleum distillate, oil & grease, naphthalene, xylenes	Leaks or broken hoses from equipment
Antifreeze/Coolant	Ethylene glycol, propylene glycol, heavy metals (copper, lead, zinc)	Leaks or broken hoses from equipment
Sanitary Toilets	Bacteria, parasites, and viruses	See Plan (near proposed dumpster location)

[Include additional rows as necessary.]

\*\*Containerized pollutants shall be safely stored within the designated, enclosed storage containers (Conex Boxes). See Sheet C-5 in Appendix A for proposed location of storage units.

## 5.2 Spill Prevention and Response

### Instructions (see CGP Parts 2.3.6 and 7.2.6.b.viii):

- Describe procedures you will use to prevent and respond to leaks, spills, and other releases. You must implement the following at a minimum:
  - ✓ Procedures for expeditiously stopping, containing, and cleaning up spills, leaks, and other releases. Identify the name or title of the employee(s) responsible for detection and response of spills or leaks; and
  - ✓ Procedures for notification of appropriate facility personnel, emergency response agencies, and regulatory agencies where a leak, spill, or other release containing a hazardous substance or oil in an amount equal to or in excess of a reportable quantity consistent with Part 2.3.6 and established under either 40 CFR part 110, 40 CFR part 117, or 40 CFR part 302, occurs during a 24-hour period. Contact information must be in locations that are readily accessible and available to all employees.
- Some projects/site may be required to develop a Spill Prevention Control and Countermeasure (SPCC) plan under a separate regulatory program (Section 311 of the CWA). If you are required to develop an SPCC plan, or you already have one, you should include references to the relevant requirements from your plan.

- i. Employee Training: All employees shall be trained as detailed in the Inspection and Maintenance section of this report. For this specific site, the Contractor's Project Manager, (TBD) will be responsible for detection and response of spills or leaks.
- ii. Vehicle Maintenance: Vehicles and equipment shall be maintained off-site. All vehicles and equipment including subcontractor vehicles shall be checked for leaking oil and fluids. Vehicles leaking fluids shall not be allowed on-site.
- iii. Hazardous Material Storage: Hazardous materials shall be stored in accordance with this report and federal and municipal regulations. Enclosed storage units (Conex Boxes) are proposed on site. See Sheet C-5 in Appendix A.
- iv. Spill Kits: Spill kits shall be kept within the materials storage area.  
  
Spills: All spills shall be cleaned up immediately upon discovery. Spent absorbent materials and rags shall be hauled off-site immediately after the spill is cleaned up for disposal at an approved landfill. Spills in an amount equal to or in excess of a reportable quantity established under either 40 CFR 110, 40 CFR 117, or 40 CFR 302 occurring during a 24-hour period shall be reported to the National Response Center at 1-800-424-8802 and MA DEP at 617-792-7653. You must also, within seven (7) calendar days of knowledge of the release, provide a description of the release, the circumstances leading to the release, and the date of the release. State, tribal, or local requirements may necessitate additional reporting of spills or discharges to local emergency response, public health, or drinking water supply agencies.
- v. Material safety data sheets: A material inventory and emergency contact information shall be maintained at the on-site project trailer.

### 5.3 Fueling and Maintenance of Equipment or Vehicles

#### Instructions (see CGP Parts 2.3.1 and 7.2.6):

- Describe equipment/vehicle fueling and maintenance practices that will be implemented to eliminate the discharge of spilled or leaked chemicals (e.g., providing secondary containment (examples: spill berms, dikes, spill containment pallets) and cover where appropriate, and/or having spill kits readily available.)

#### General

- There will be no storage of vehicle fuel or maintenance of vehicles on site. A licensed contractor will fuel the construction vehicles and equipment while on site.

### 5.4 Washing of Equipment and Vehicles

#### Instructions (see CGP Parts 2.3.2 and 7.2.6):

- Describe equipment/vehicle washing practices that will be used to minimize the discharge of pollutants from equipment and vehicle washing, wheel wash water, and other types of wash waters (e.g., locating activities away from receiving waters and storm drain inlets or constructed or natural site drainage features and directing wash waters to a sediment basin or sediment trap, using filtration devices, such as filter bags or sand filters, or using other similarly effective controls).
- Describe how you will prevent the discharge of soaps, detergents, or solvents and provide storage by either (1) cover (examples: plastic sheeting or temporary roofs) to prevent these detergents from coming into contact with rainwater, or (2) a similarly effective means designed to minimize the discharge of pollutants from these areas.

#### General

- There is no on-site vehicle or equipment washing proposed.

### 5.5 Storage, Handling, and Disposal of Building Products, Materials, and Wastes

#### Instructions (see CGP Parts 2.3.3 and 7.2.6):

For any of the types of building products, materials, and wastes in Sections 5.5.1-5.5.6 below that you expect to use or store at your site, provide the information on how you will comply with the corresponding CGP provision and the specific practices that you will employ.

#### 5.5.1 Building Materials and Building Products

(Note: Examples include asphalt sealants, copper flashing, roofing materials, adhesives, concrete admixtures, and gravel and mulch stockpiles.)

#### General

- Building products including adhesives, concrete admixtures, and form oil shall be stored in the designated, enclosed storage units (Conex Boxes).

### Specific Pollution Prevention Practices

<b>Cover</b>	
<b>Description:</b> A cover, in this case Conex boxes will be used to minimize the exposure of these products to precipitation and to stormwater.	
<b>Implementation</b>	As Needed
<b>Maintenance Requirements</b>	Monitor cover, and replace/repair as needed.
<b>Design Specifications</b>	N/A

[Repeat as needed.]

### 5.5.2 Pesticides, Herbicides, Insecticides, Fertilizers, and Landscape Materials

#### General

- Pesticides, herbicides, insecticides, and fertilizers are prohibited from use on this site. Landscape materials will be covered during storage, although storage is not anticipated as these materials are proposed to be delivered at the time of installation.

### Specific Pollution Prevention Practices

<b>Cover</b>	
<b>Description:</b> A cover (e.g. plastic sheeting) will be used to minimize the exposure of landscape materials to precipitation and to stormwater.	
<b>Implementation</b>	As Needed
<b>Maintenance Requirements</b>	Monitor container and replace/repair as needed.
<b>Design Specifications</b>	N/A

[Repeat as needed.]

### 5.5.3 Diesel Fuel, Oil, Hydraulic Fluids, Other Petroleum Products, and Other Chemicals

#### General

- Diesel fuel will not be stored on site. Rather, a fueling truck will deliver to the site, and directly fill the equipment as-needed.
- Chemicals will be stored in water tight containers (Conex Boxes). Also, a spill kit should be on site at all times.

### Specific Pollution Prevention Practices

<b>Cover</b>	
<b>Description:</b> Chemicals will be stored in water tight containers (Conex Boxes) to minimize exposure of these containers to precipitation and to stormwater.	
<b>Implementation</b>	As Needed
<b>Maintenance Requirements</b>	Monitor container and replace/repair as needed.
<b>Design Specifications</b>	N/A

<b>Spill Kit</b>	
<b>Description:</b> A spill kit should be available on site and ensuring personnel are available to respond expeditiously in the event of a leak or spill. Clean up spills immediately, using dry clean-up methods where possible and dispose of used materials properly. You are prohibited from hosing the area down to clean surfaces or spills. Eliminate the source of the spill to prevent a discharge or furtherance of an ongoing discharge.	
<b>Implementation</b>	As Needed
<b>Maintenance Requirements</b>	Employees should be trained in spill response and know where the spill kit is stored on site.
<b>Design Specifications</b>	N/A

[Repeat as needed.]

#### **5.5.4 Hazardous or Toxic Waste**

(Note: Examples include paints, caulk, sealants, fluorescent light ballasts, solvents, petroleum-based products, wood preservatives, additives, curing compounds, and acids.)

##### **General**

- Hazardous and toxic wastes will be separated from construction and domestic waste. Hazardous and toxic wastes shall be stored in Conex boxes and a spill kit should be stored on site at all times.

##### **Specific Pollution Prevention Practices**

<b>Storage</b>	
<b>Description:</b> Store waste in Conex boxes, to prevent leakage and corrosion, and which are labeled in accordance with applicable resource conservation and recovery act (RCRA) requirements, and all other applicable federal, state, tribal or local requirements. Store all outside containers within appropriately-sized secondary containment to prevent spills from being discharged.	
<b>Implementation</b>	As Needed
<b>Maintenance Requirements</b>	Dispose of hazardous or toxic waste in accordance with the manufacturer's recommended method of disposal and in compliance with federal, state, tribal and local requirements.
<b>Design Specifications</b>	N/A

<b>Spill Kit</b>	
<b>Description:</b> A spill kit should be available on site and ensuring personnel are available to respond expeditiously in the event of a leak or spill. Clean up spills immediately, using dry clean-up methods where possible and dispose of used materials properly. You are prohibited from hosing the area down to clean surfaces or spills. Eliminate the source of the spill to prevent a discharge or furtherance of an ongoing discharge.	
<b>Implementation</b>	As Needed
<b>Maintenance Requirements</b>	Employees should be trained in spill response and know where the spill kit is stored on site.
<b>Design Specifications</b>	N/A

[Repeat as needed.]

### **5.5.5 Construction and Domestic Waste**

(Note: Examples include packaging materials, scrap construction materials, masonry products, timber, pipe and electrical cuttings, plastics, styrofoam, concrete, demolition debris, and other trash or discarded materials.)

#### **General**

- Waste containers shall be provided to contain domestic wastes and shall be regularly removed from the site.

#### **Specific Pollution Prevention Practices**

<b>Waste Containers</b>	
<b>Description:</b> Waste containers (e.g., dumpster, trash receptacle) of sufficient size and number to contain construction and domestic wastes.	
<b>Implementation</b>	Upon mobilization to the site, and replacement as needed.
<b>Maintenance Requirements</b>	Keep waste container lids closed when not in use and close lids at the end of the business day for those containers that are actively used throughout the day. For waste containers that do not have lids, provide either a cover to minimize the exposure of wastes to precipitation, or a similarly effective means designed to minimize the discharge of pollutants. Clean up immediately if containers overflow.
<b>Design Specifications</b>	N/A

[Repeat as needed.]

### **5.5.6 Sanitary Waste**

#### **General**

- Insert general description of how you will comply with CGP Part 2.3.3.f

#### **Specific Pollution Prevention Practices**

<b>Sanitary Toilets</b>	
<b>Description:</b> Position portable toilets so that they are secure and will not be tipped or knocked over, and located away from waters of the U.S. and stormwater inlets or conveyances.	
<b>Implementation</b>	Upon mobilization to the site.
<b>Maintenance Requirements</b>	After every cleaning and scheduled maintenance of toilets, they should be checked to ensure they are secured and not at risk to tip over.
<b>Design Specifications</b>	N/A

[Repeat as needed.]

## 5.6 Washing of Applicators and Containers used for Stucco, Paint, Concrete, Form Release Oils, Cutting Compounds, or Other Materials

### Instructions (see CGP Parts 2.3.4 and 7.2.6):

Describe how you will comply with the CGP Part 2.3.4 requirement for washing applications and containers.

#### General

- A designated temporary, above-grade washout area shall be constructed as needed for the washout and cleanout of stucco, paint, or other non-hazardous construction materials.

#### Specific Pollution Prevention Practices

Washout Areas	
<b>Description:</b> A designated temporary, above-grade washout area shall be constructed as needed for the washout and cleanout of stucco, paint, or other non-hazardous construction materials. The temporary washout area shall be a leak-proof container with sufficient volume to contain all liquid and waste generated by washout operations. The temporary washout shall be sited outside of all buffer zones.	
Implementation	The washout area shall be constructed as needed.
Maintenance Requirements	The washout areas shall be inspected daily to ensure that all washing is being discharged into the washout area, no leaks or tears are present, and to identify when wastes need to be removed. The washout areas shall be cleaned out once the area is filled to 75 percent of the holding capacity. Liquid wastes shall be disposed of in accordance with applicable Federal and State requirements and shall not be discharged into drainage systems.
Design Specifications	N/A

[Repeat as needed.]

## 5.7 Application of Fertilizers

### Instructions (CGP Parts 2.3.5 and 7.2.6.x):

Describe how you will comply with the CGP Part 2.3.5 requirement for the application of fertilizers.

#### General

- Due to the proximity of the site to Wetlands and Priority Habitats, the use of fertilizers, herbicides and pesticides are prohibited on this property

## 5.8 Other Pollution Prevention Practices

### Instructions:

Describe any additional pollution prevention practices that do not fit into the above categories.

### General

- Insert general description of the problem this control is designed to address

### Specific Pollution Prevention Practices

Insert name of pollution prevention practice	
<b>Description:</b> Insert description of practice to be implemented	
<b>Implementation</b>	Insert approximate date of implementation
<b>Maintenance Requirements</b>	Insert maintenance requirements for the pollution prevention practice
<b>Design Specifications</b>	If applicable include copies of design specifications here

[Repeat as needed.]

## SECTION 6: INSPECTION, MAINTENANCE, AND CORRECTIVE ACTION

### 6.1 Inspection Personnel and Procedures

#### Instructions (see CGP Parts 4, 5, and 7.2.7):

Describe the procedures you will follow for maintaining your stormwater controls, conducting inspections, and, where necessary, taking corrective actions in accordance with CGP Parts 4, 5, and 7.2.7.

#### Site Inspection Schedule

Select the inspection frequency(ies) that applies, based on CGP Parts 4.2, 4.3, or 4.4

(Note: you may be subject to different inspection frequencies in different areas of the site. Check all that apply and indicate which portion(s) of the site it applies to.)

#### Standard Frequency:

- Every 7 calendar days
- Every 14 calendar days and within 24 hours of either:
  - A storm event that produces 0.25 inches or more of rain within a 24-hour period (including when there are multiple, smaller storms that alone produce less than 0.25 inches but together produce 0.25 inches or more in 24 hours), or
  - A storm event that produces 0.25 inches or more of rain within a 24-hour period on the first day of a storm and continues to produce 0.25 inches or more of rain on subsequent days (you conduct an inspection within 24 hours of the first day of the storm and within 24 hours after the last day of the storm that produces 0.25 inches or more of rain (i.e., only two inspections would be required for such a storm event)), or
  - A discharge caused by snowmelt from a storm event that produces 3.25 inches or more of snow within a 24-hour period.

#### Increased Frequency (if applicable):

For areas of sites discharging to sediment or nutrient-impaired waters or to waters designated as Tier 2, Tier 2.5, or Tier 3

- Every 7 days and within 24 hours of either:
  - A storm event that produces 0.25 inches or more of rain within a 24-hour period, or
  - A discharge caused by snowmelt from a storm event that produces 3.25 inches or more of snow within a 24-hour period.

#### Reduced Frequency (if applicable)

**For stabilized areas**

- Twice during first month, no more than 14 calendar days apart; then once per month after first month until permit coverage is terminated consistent with Part 9 in any area of your site where the stabilization steps in 2.2.14.a have been completed.
- [Specify locations where stabilization steps have been completed](#)
  - [Insert date that they were completed](#)
- (Note: It is likely that you will not be able to include this in your initial SWPPP. If you qualify for this reduction (see CGP Part 4.4.1), you will need to modify your SWPPP to include this information. If construction activity resumes in this portion of the site at a later date, the inspection frequency immediately increases to that required in Parts 4.2 and 4.3, as applicable.)

**For stabilized areas on “linear construction sites” (as defined in Appendix A)**

- Twice during first month, no more than 14 calendar days apart; then once more within 24 hours of a storm event that produces 0.25 inches or more of rain within a 24-hour period, or within 24 hours of a snowmelt discharge from a storm event that produces 3.25 inches or more of snow within a 24-hour period
- [Specify locations where stabilization steps have been completed](#)
  - [Insert date that they were completed](#)
- (Note: It is likely that you will not be able to include this in your initial SWPPP. If you qualify for this reduction (see CGP Part 4.4.1), you will need to modify your SWPPP to include this information.)

**For arid, semi-arid, or drought-stricken areas during seasonally dry periods or during drought**

- Once per month and within 24 hours of either:
- A storm event that produces 0.25 inches or more of rain within a 24-hour period, or
  - A snowmelt discharge from a storm event that produces 3.25 inches or more of snow within a 24-hour period.

Insert beginning and ending month identified as the seasonally dry period for your area or the valid period of drought:

- Beginning month of the seasonally dry period: [Insert approximate date](#)
- Ending month of the seasonally dry period: [Insert approximate date](#)

**For frozen conditions where construction activities are being conducted**

- Once per month

Insert beginning and ending dates of frozen conditions on your site:

- Beginning date of frozen conditions: [Insert approximate date](#)
- Ending date of frozen conditions: [Insert approximate date](#)

**For frozen conditions where construction activities are suspended**

- Inspections are temporarily suspended

Insert beginning and ending dates of frozen conditions on your site:

- Beginning date of frozen conditions: [Insert approximate date](#)
- Ending date of frozen conditions: [Insert approximate date](#)

**Dewatering Inspection Schedule**

Select the inspection frequency that applies based on CGP Part 4.3.2

#### **Dewatering Inspection**

- Once per day on which the discharge of dewatering water occurs.

#### **Rain Gauge Location (if applicable)**

The National Weather Service Station will be monitored and rainfall amounts will be utilized to prepare for storm events and schedule inspections afterwards.

#### **Inspection Report Forms**

Inspection Report forms are attached in Appendix D of this SWPPP.

(Note: EPA has developed a sample inspection form that CGP operators can use. The form is available at <https://www.epa.gov/npdes/stormwater-discharges-construction-activities#resources>)

### **6.2 Corrective Action**

#### **Instructions (CGP Parts 5 and 7.2.7):**

- Describe the procedures for taking corrective action in compliance with CGP Part 5.

#### **Personnel Responsible for Corrective Actions**

TBD

#### **Corrective Action Logs**

Corrective Action forms are attached in Appendix E of this SWPPP.

(Note: EPA has developed a sample corrective action log that CGP operators can use. The form is available at <https://www.epa.gov/npdes/stormwater-discharges-construction-activities#resources>)

### **6.3 Delegation of Authority**

#### **Instructions:**

- Identify the individual(s) or positions within the company who have been delegated authority to sign inspection reports.
- Attach a copy of the signed delegation of authority (see example in Appendix J of this SWPPP Template.)
- For more on this topic, see Appendix G, Subsection 11 of EPA's CGP.

#### **Duly Authorized Representative(s) or Position(s):**

Insert Company or Organization Name

Insert Name

Insert Position

Insert Address

Insert City, State, Zip Code

**Duly Authorized Representative(s) or Position(s):**

Insert Telephone Number

Insert Fax/Email

## SECTION 7: TURBIDITY BENCHMARK MONITORING FOR DEWATERING DISCHARGES

### **Instructions (see CGP Part 3.3 and 7.2.8):**

- If you are required to comply with the Part 3.3 turbidity benchmark monitoring requirements, describe the procedures you will follow to:
  - ✓ Collect and evaluate samples,
  - ✓ Report results to EPA and keep records of monitoring information, and
  - ✓ Take corrective action when necessary.
- Include the specific type of turbidity meter you will use for monitoring, as well as any manuals or manufacturer instructions on how to operate and calibrate the meter.
- Describe any coordinating arrangement you may have with any other permitted operators on the same site with respect to compliance with the turbidity monitoring requirements, including which parties are tasked with specific responsibilities.
- If EPA has approved of an alternate turbidity benchmark pursuant to Part 3.3.2.b, include any data and other documentation you relied on to request use of the specific alternative benchmark.

### **Procedures:**

<b>Collecting and evaluating samples</b>	Describe how you will collect and evaluate samples
<b>Reporting results and keeping monitoring information records</b>	Describe how you will report results to EPA and keep monitoring information records
<b>Taking corrective action when necessary</b>	Describe how you will take corrective action when necessary

### **Turbidity Meter:**

<b>Type of turbidity meter</b>	Insert the type of turbidity meter
--------------------------------	------------------------------------

### **Turbidity meter manuals and manufacturer instructions**

Insert a copy of any manuals and manufacturer instructions in Appendix N of this SWPPP Template.

### **Coordinating Arrangements for Turbidity Monitoring (if applicable):**

<b>Permitted operator name</b>	Insert operator name
<b>Permitted operator NPDES ID</b>	Insert operator NPDES ID
<b>Coordinating Arrangement</b>	Describe the coordinating arrangement including which parties are tasked with specific responsibilities

[Repeat as necessary.]

### **Alternate turbidity benchmark (if applicable):**

<b>Alternate turbidity benchmark (NTU)</b>	Insert alternate turbidity benchmark
<b>Data and documentation used to request the alternate benchmark</b>	Insert the data and documentation that was submitted to EPA to request the alternate benchmark

## SECTION 8: CERTIFICATION AND NOTIFICATION

**Instructions (CGP Appendix G, Part G.11.2):**

- The following certification statement must be signed and dated by a person who meets the requirements of Appendix G, Part G.11.2.
- This certification must be re-signed in the event of a SWPPP Modification.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name: \_\_\_\_\_ Title: \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

[Repeat as needed for multiple construction operators at the site.]

## **SWPPP APPENDICES**

Attach the following documentation to the SWPPP:

### **Appendix A – Site Maps**

### **Appendix B – Copy of 2022 CGP**

(Note: The 2022 CGP is available at <https://www.epa.gov/npdes/2022-construction-general-permit-cgp>)

### **Appendix C – NOI and EPA Authorization Email**

### **Appendix D – Site Inspection Form and Dewatering Inspection Form (if applicable)**

(Note: EPA has developed a sample site inspection form template that CGP operators can use. The template is available at <https://www.epa.gov/npdes/construction-general-permit-resources-tools-and-templates>). Where the operator will be dewatering at the site, EPA has developed a separate dewatering inspection form template to use to document the required information. This template is available at <https://www.epa.gov/npdes/construction-general-permit-resources-tools-and-templates>.

### **Appendix E – Corrective Action Log**

(Note: EPA has developed a sample corrective action log that CGP operators can use. The form is available at <https://www.epa.gov/npdes/construction-general-permit-resources-tools-and-templates>)

### **Appendix F – SWPPP Amendment Log**

### **Appendix G – Subcontractor Certifications/Agreements**

### **Appendix H – Grading and Stabilization Activities Log**

### **Appendix I – Training Documentation**

### **Appendix J – Delegation of Authority**

### **Appendix K – Endangered Species Documentation**

### **Appendix L – Historic Preservation Documentation**

### **Appendix M – Rainfall Gauge Recording**

### **Appendix N – Turbidity Meter Manual and Manufacturer's Instructions**

**Appendix A – Site Maps**

INSERT SITE MAPS CONSISTENT WITH TEMPLATE SECTION 2.6

**Appendix B – Copy of 2022 CGP**

INSERT COPY OF 2022 CGP

(Note: The 2022 CGP is available at <https://www.epa.gov/npdes/2022-construction-general-permit-cgp>)

**Appendix C – Copy of NOI and EPA Authorization Email**

INSERT COPY OF NOI AND EPA'S AUTHORIZATION EMAIL PROVIDING COVERAGE UNDER THE CGP

**Appendix D – Copy of Site and Dewatering Inspection Forms**

INSERT COPIES OF SITE AND DEWATERING INSPECTION FORMS YOU WILL USE TO PREPARE  
INSPECTION REPORTS

(Note: EPA has developed a sample site inspection and dewatering inspection form templates  
that CGP operators can use. The template is available at  
<https://www.epa.gov/npdes/construction-general-permit-resources-tools-and-templates>)

**Appendix E – Copy of Corrective Action Log**

INSERT COPY OF CORRECTIVE ACTION LOG YOU WILL USE

(Note: EPA has developed a sample corrective action log that CGP operators can use. The form is available at <https://www.epa.gov/npdes/stormwater-discharges-construction-activities#resources>)

## **Appendix F – *Sample* SWPPP Amendment Log**

**Instructions (see CGP Part 7.4):**

- Create a log here of changes and updates to the SWPPP. You may use the table below to track these modifications.
  - SWPPP modifications are required pursuant to CGP Part 7.4.1 in the following circumstances:
    - ✓ Whenever new operators become active in construction activities on your site, or you make changes to your construction plans, stormwater controls, or other activities at your site that are no longer accurately reflected in your SWPPP (this includes changes made in response to corrective actions triggered under CGP Part 5);
    - ✓ To reflect areas on your site map where operational control has been transferred (and the date of transfer) since initiating permit coverage;
    - ✓ If inspections or investigations determine that SWPPP modifications are necessary for compliance with this permit;
    - ✓ Where EPA determines it is necessary to install and/or implement additional controls at your site in order to meet requirements of the permit;
    - ✓ To reflect any revisions to applicable Federal, State, Tribal, or local requirements that affect the stormwater control measures implemented at the site; and
    - ✓ If applicable, if a change in chemical treatment systems or chemically-enhanced stormwater control is made, including use of a different treatment chemical, different dosage rate, or different area of application.

**Appendix G – *Sample* Subcontractor Certifications/Agreements**

SUBCONTRACTOR CERTIFICATION  
STORMWATER POLLUTION PREVENTION PLAN

Project Number: \_\_\_\_\_

Project Title: \_\_\_\_\_

Operator(s): \_\_\_\_\_

As a subcontractor, you are required to comply with the Stormwater Pollution Prevention Plan (SWPPP) for any work that you perform on-site. Any person or group who violates any condition of the SWPPP may be subject to substantial penalties or loss of contract. You are encouraged to advise each of your employees working on this project of the requirements of the SWPPP. A copy of the SWPPP is available for your review at the office trailer.

Each subcontractor engaged in activities at the construction site that could impact stormwater must be identified and sign the following certification statement:

**I certify under the penalty of law that I have read and understand the terms and conditions of the SWPPP for the above designated project and agree to follow the practices described in the SWPPP.**

This certification is hereby signed in reference to the above named project:

Company: \_\_\_\_\_

Address: \_\_\_\_\_

Telephone Number: \_\_\_\_\_

Type of construction service to be provided: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Signature: \_\_\_\_\_

Title: \_\_\_\_\_

Date: \_\_\_\_\_

## Appendix H – *Sample* Grading and Stabilization Activities Log

**Appendix I –Training Documentation**

INSERT DOCUMENTATION CONSISTENT WITH SWPPP TEMPLATE SECTION 1.2 AND CGP PART 7.2.2

**Appendix J – Sample Delegation of Authority Form****Delegation of Authority**

I, \_\_\_\_\_ (name), hereby designate the person or specifically described position below to be a duly authorized representative for the purpose of overseeing compliance with environmental requirements, including the EPA's Construction General Permit (CGP), at the \_\_\_\_\_ construction site. The designee is authorized to sign any reports, stormwater pollution prevention plans and all other documents required by the permit.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ (name of person or position)  
\_\_\_\_\_ (company)  
\_\_\_\_\_ (address)  
\_\_\_\_\_ (city, State, zip)  
\_\_\_\_\_ (phone)

By signing this authorization, I confirm that I meet the requirements to make such a designation as set forth in Appendix G of EPA's CGP, and that the designee above meets the definition of a "duly authorized representative" as set forth in Appendix G.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

**Name:** \_\_\_\_\_

**Company:** \_\_\_\_\_

**Title:** \_\_\_\_\_

**Signature:** \_\_\_\_\_

**Date:** \_\_\_\_\_

**Appendix K – Endangered Species Documentation**

INSERT DOCUMENTATION CONSISTENT WITH SWPPP TEMPLATE SECTION 3.1 AND CGP APPENDIX D

**Appendix L – Historic Properties Documentation**

INSERT DOCUMENTATION CONSISTENT WITH SWPPP TEMPLATE SECTION 3.2 AND CGP APPENDIX E

### **Appendix M – Rainfall Gauge Recording**

Use the table below to record the rainfall gauge readings at the beginning and end of each work day. An example table follows.

Month/Year			Month/Year			Month/Year		
Day	Start time	End time	Day	Start time	End time	Day	Start time	End time
1			1			1		
2			2			2		
3			3			3		
4			4			4		
5			5			5		
6			6			6		
7			7			7		
8			8			8		
9			9			9		
10			10			10		
11			11			11		
12			12			12		
13			13			13		
14			14			14		
15			15			15		
16			16			16		
17			17			17		
18			18			18		
19			19			19		
20			20			20		
21			21			21		
22			22			22		
23			23			23		
24			24			24		
25			25			25		
26			26			26		
27			27			27		
28			28			28		
29			29			29		
30			30			30		
31			31			31		

## Example Rainfall Gauge Recording

April 2022			May 2022			June 2022		
Day	7:00 am	4:400 pm	Day	7:00 am	4:00 pm	Day	7:00 am	4:00 pm
1	--	--	1	0.2	0	1	0	0.4
2	--	--	2	0	0	2	0	0
3	0	0	3	0.1	0.3	3	--	--
4	0	0.3	4	0	0	4	--	--
5	0	0	5	0	0	5	0	0

In this example (for only partial months), 0.25-inch rainfall inspections would have been conducted on April 4 and June 1.

**Appendix N – Turbidity Monitoring Sampling Documentation**

INSERT DOCUMENTATION CONSISTENT WITH SWPPP TEMPLATE SECTION 7.2.8 AND CGP PART 3.3.4

**SECTION 9 – PROJECT PLANS  
(Under Separate Cover)**