STORMWATER REPORT

for

TWO PROPOSED BUILDINGS
369 HOLDEN STREET
SHREWSBURY, MASSACHUSETTS

September 5, 2023

9/6/23

THOMPSON-LISTON ASSOCIATES, INC.
Professional Engineers Professional Land Surveyors
Erosion Control Specialists
info@tlainc.net (508) 869-6151

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THOMPSON-LISTON
ASSOCIATES, INC.
Professional Engineers Professional Land Surveyors
51 Main Street, Post Office Box 370
Boylston, Massachusetts 01505-0370
Telephone 508-869-6151 www.thompsonliston.com

LOCUS MAP FROM USGS MAP

COMMERCIAL BUILDINGS
369 HOLDEN ST.
SHREWSBURY, MA

0 1000 2000 FT
0 1/2 MILE

N

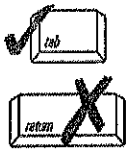
SOURCE: 1:25,000 USGS QUADRANGLES (MASSGIS)

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

Checklist for Stormwater Report

A. Introduction

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



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

The Stormwater Report must include:

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

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

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

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

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

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

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

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

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

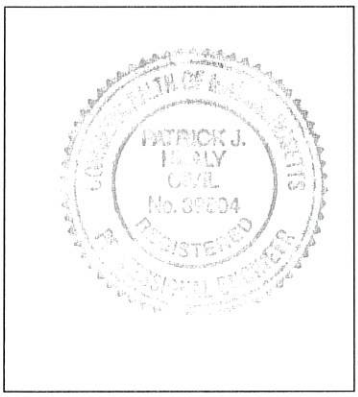
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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

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

Registered Professional Engineer's Certification

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

Registered Professional Engineer Block and Signature



Signature and Date 9/6/23

Checklist

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

☒ New development

☐ Redevelopment

☐ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

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

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

Standard 1: No New Untreated Discharges

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

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.

☒ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.

☒ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

☒ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

☐ Required Recharge volume reduced through use of the LID site Design Credits.

☒ Sizing the infiltration, BMPs is based on the following method: Check the method used.

☐ Static ☒ Simple Dynamic ☐ Dynamic Field[1]

☒ Runoff from all impervious areas at the site discharging to the infiltration BMP.

☐ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.

☒ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:

- ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
- ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
- ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
- ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

☒ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

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

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

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

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

Standard 4: Water Quality

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

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

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

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

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

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

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

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

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

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

☒ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.

☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.

☐ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.

☐ The NPDES Multi-Sector General Permit does ***not*** cover the land use.

☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.

☐ All exposure has been eliminated.

☐ All exposure has ***not*** been eliminated and all BMPs selected are on MassDEP LUHPPL list.

☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

☒ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.

☒ Critical areas and BMPs are identified in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

☐ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:

- ☐ Limited Project
- ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
- ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
- ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
- ☐ Bike Path and/or Foot Path
- ☐ Redevelopment Project
- ☐ Redevelopment portion of mix of new and redevelopment.

☐ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.

☐ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

☒ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

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

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

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

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

Standard 9: Operation and Maintenance Plan

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

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

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

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

Standard 10: Prohibition of Illicit Discharges

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

☐ An Illicit Discharge Compliance Statement is attached;

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

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info@tlainc.net (508) 869-6151

Stormwater Report
for
Proposed Buildings for
115 Northeast Cutoff Realty Trust
369 Holden Street
Shrewsbury, Massachusetts
September 5, 2023

Project Description:

The 14.6-acre site is located on the easterly side of Northeast Cutoff in Worcester, and the westerly side of Holden Street in Shrewsbury, approximately 500 feet north of the intersection with Route 70. In its existing condition, a portion of the site nearest the roads consists of weedy invasive plants, with some grass and emergent woodland vegetation on the previously disturbed land, further away from the road. The southern portion of the site includes a bordering vegetated wetland that flows to the south. Several culverts under Holden Street discharge runoff from a large wooded hillside. At the northerly end of the site an intermittent stream enters the site from the St. Pierre Manufacturing site, which passes flow from an industrial and office park that is located north and east of that property. This subject site itself drains entirely to the west and south to a large wetland that is tributary to Poor Farm Brook. Soils in this area are mostly sandy soils in the Merrimac and Agawam family, with a small area of "Urban Land" typical of fill that has been placed over native soils along Northeast Cutoff. This section of roadway was designed as a four-lane divided highway, but only half of the road surface was constructed. The remainder was graded out, but never completed. Drainage structures and other utilities present in the unfinished roadway. Soils in the portion of the site proposed for development are classified as hydrologic group A and B for the most part.

The owner proposes the construction of two free-standing buildings, one that is 12,000 s.f. and will be commercial in nature, with room for the business's trucks and other vehicles to be parked, interior access for vehicles to be loaded, and employee parking. The larger of the two buildings will be 50m00 s.f., and would serve as a distribution center, with auto parking at one end of the building and truck docks at the other end. With the site work, buildings and parking, the development will comprise approximately 6.54 acres of land. Retaining walls will be constructed on the south side of each of the parking lots to raise and level the grade of the site.

A drainage system, consisting of deep sump catch basins and drainage manholes is proposed in the parking lots, which will collect the site's surface runoff and discharge through proprietary hydrodynamic separators to provide pretreatment, before reaching several subsurface infiltration basins and one surface infiltration basin. One of the subsurface systems, shown as Pond 11, is sited such that it can be constructed with precast concrete cells that are 8'x8'x5'h. Two other systems, shown as Pond 13 and Pond 18, will be constructed using a proven system of HDPE chambers set in an envelope of crushed stone. Roof runoff from each building will be directed to the Infiltration Ponds.

The proposed infiltration ponds will handle over 90% of all rainfall events, but they will not contain very intense storms such as the 100-year 24-hour storm of over 7 inches of rainfall. Overflow pipes and spillways will be directed to rip rap velocity attenuation pads at their outlets to protect the downslopes from erosion.

Methodology:

In order to evaluate the existing and proposed hydrologic conditions of the site, we have employed the HydroCAD™ stormwater modeling software, which emulates the United States Department of Agriculture, Soil Conservation Service (SCS) hydrograph method as outlined in Technical Release 20 (1982). We have used the SCS modified soil cover complex method of evaluating cover conditions and underlying soil features in developing runoff curve numbers (RCN), and have determined Times of Concentration (ToC), using the methods described in the SCS's National Engineering Handbook, Section 4, Hydrology (1985). Each watershed with its Area, RCN and ToC, is described as a "Subcatchment" in HydroCAD™.

HydroCAD™ uses the Storage-Indication method for routing flows from "Subcatchment" areas through "Reaches" and "Ponds." Reaches are overland flow paths, pipe segments, or stream segments. Ponds are areas that collect water, such as basins, ponds or swales where outlet devices control outflow.

Rainfall was determined from the most recent NOAA Atlas 14, which uses higher statistical rainfall events than the earlier TP-40. The SCS's Type III Rainfall Distribution is used for these calculations, and is described in SCS Technical Release 55 (1986).

Additionally, in accordance with ordinary standards of design, the stormwater collection system is generally designed for the 2-year, 10-year and 25-year storms, and the effects of the 100-year storm are studied.

Design Points:

There are two design points studied as the contributing flow runs into an intermittent stream on the west side of the land, and where it reaches the large wetland and discharge leaves the site in a southeasterly direction. Several smaller subcatchments contribute flow toward the wetland and flow is summed in a reach that adds the flows. We will ensure that peak flows leaving the site do not increase by detaining and infiltrating flows within the developed portion of the site.

Calculation Summary and Comparison of Flows:

In all of the storms studied, the 2-, 10-, 25-- and 100-year storms, the runoff leaving the site in the post-development condition will not exceed the peak runoff in the existing (pre-development) condition. Due to the large multiple culvert from offsite contributing areas, the rates of flow are quite high. The following Tables A1 and A2 show the comparison of pre- and post-development flows at Design Points 1 and 2 respectively:

Table A1
Summary of Peak Rates of Flow
At Design Point 1

Design Point 1 Flow to intermittent stream where a culverted crossing is proposed	2-year 3.20"	10-year 4.93"	25-year 6.00"	100-year 7.66"
Predevelopment (Reach 5)	10.94 cfs	50.38 cfs	83.00 cfs	140.54 cfs
Postdevelopment Unmitigated	10.98 cfs	50.43 cfs	83.04 cfs	140.55 cfs
Post development (Reach 24)	10.90 cfs	50.27 cfs	82.84 cfs	140.35 cfs

Table A2
Summary of Peak Rates of Flow
At Design Point 2

Design Point 2 Total to Wetland south of the south boundary of the Site	2-year 3.20"	10-year 4.93"	25-year 6.00"	100-year 7.66"
Predevelopment (Reach 6)	13.91 cfs	64.19 cfs	105.89 cfs	180.91 cfs
Postdevelopment Unmitigated	14.69 cfs	65.33 cfs	107.16 cfs	182.12 cfs
Post development (Reach 25)	13.79 cfs	63.36 cfs	104.41 cfs	179.32 cfs

Hydraulic Calculations:

We compared the 25-year runoff calculations from Hydrocad to the Mannings open channel flow capacity of the pipes to verify that they are appropriately sized.

Soil Conditions:

A Soil Map and results of the soil test pits that we conducted on the site are shown in the Appendix.

DEP Stormwater Standards Compliance Statement

The project will comply with the Massachusetts DEP Stormwater Standards as described below. Where a particular Standard does not apply to the project, an explanation is provided. Each statement either describes compliance or directs the reader to the location (Plans, Calculations, or Appendix) where compliance is documented.

STANDARD 1 – NO NEW UNTREATED DISCHARGES

Runoff from the new development areas of the site includes runoff from parking areas, building roofs and landscaped areas. Runoff is collected into a piped drainage system and directed to a system of pipes and directed to infiltration and retention basins. The discharges from the infiltration/detention basins will be directed to the stabilized discharge points to disperse the flows prior to reaching the resource areas. The stabilized discharges are sized using guidelines such that the velocity will be non-erosive.

STANDARD 2 – PEAK RATE ATTENUATION

As described in the foregoing report and calculations, and as tabulated in the Summary of Stormwater Flows above, the peak rate of flow will not increase in the 2-year, 10-year, 25-year, or 100-year storm to the design point. The total Postdevelopment volume of runoff at the design point is below the predevelopment volume in the 2-, 10-, 25-, and 100-year storms. For these reasons, we do not foresee any off-site increase in flooding in the 100-year storm.

STANDARD 3 – RECHARGE

Given: Soil Types present on the site are: The textural classification for soil observed in test holes at the proposed infiltration/detention basins was determined using the NRCS methods and textural chart (DEP Stormwater Handbook, Vol.3, Ch.1, Figure 2.3.2, Rawls). We classified the soils in the areas of

the proposed recharge systems as Sandy Loam. Soil test logs are provided in the Appendix. Variable depths of rainfall must be used in determining the Required Recharge Volume (Rv), depending upon the hydrologic group of the soil: 0.10 inches for Hydrologic Group D soils, 0.25 for Hydrologic Group C, 0.35 for Hydrologic Group B, and 0.5 for Hydrologic Group A (DEP Stormwater Handbook, Vol.3, Ch.1, Table 2.3.2). The allowed soil permeability for Sand soils, as found in the test holes at the strata where recharge will take place, from Rawls, is 8.27 in/hr (DEP Stormwater Handbook, Vol.3, Ch.1, Table 2.3.3). A field test using an infiltrometer indicates a significantly higher rate will be achieved, over 25 inches per hour.

Determine Required Recharge Volume For Standard 3 Compliance

We calculated the Required Recharge Volume for the new impervious areas as follows:

$Rv = [IA_{HSG\ B}(acres) \times (0.35\ in) + IA_{HSG\ A}(acres) \times (0.5\ in)] / (12\ in/ft)$
$= [1.938\ acres \times 0.35\ in + 1.626\ acres \times 0.5\ in] / (12\ in/ft)$
$Rv = 0.124\ ac\text{-}ft$ or $5{,}413\ ft^3$

We must break this down for each of the infiltration ponds:

Pond 18: $[(0.258)(0.35)+(0.073)(0.5)] /12 = 0.011\ ac\text{-}ft = 460\ ft^3$
Pond 11: $[(0.534)(0.35)+(0.377)(0.5)] /12 = 0.031\ ac\text{-}ft = 1{,}363\ ft^3$
Pond 13: $[(0.390)(0.35)+(0.098)(0.5)] /12 = 0.015\ ac\text{-}ft = 673\ ft^3$
Pond 32: $[(0.756)(0.35)+(1.078)(0.5)] /12 = 0.067\ ac\text{-}ft = 2{,}917\ ft^3$

Determine Required Recharge Volume For Shrewsbury Stormwater Regulation Compliance

We calculated the required recharge volume to comply with the Town's regulatory standard as follows:

$SRv = [IA_{TOTAL}(acres) \times (1.0\ in)] / (12\ in/ft)$
$= [3.564\ acres \times 1.0\ in] / (12\ in/ft)$
$SRv = 0.297\ ac\text{-}ft$ or $12{,}937\ ft^3$

We similarly break this down for each of the infiltration ponds:

Pond 18: $0.331 \times 1/12 = 0.027\ ac\text{-}ft = 1{,}176\ ft^3$
Pond 11: $0.910 \times 1/12 = 0.076\ ac\text{-}ft = 3{,}310\ ft^3$
Pond 13: $0.488 \times 1/12 = 0.041\ ac\text{-}ft = 1{,}786\ ft^3$
Pond 32: $1.835 \times 1/12 = 0.153\ ac\text{-}ft = 6{,}665\ ft^3$

Area Correction

First we must verify that the minimum 65% of the impervious areas are directed to the infiltration measures in order to comply with Standard 3. The area contributory to the treatment system is 100% of new impervious area:

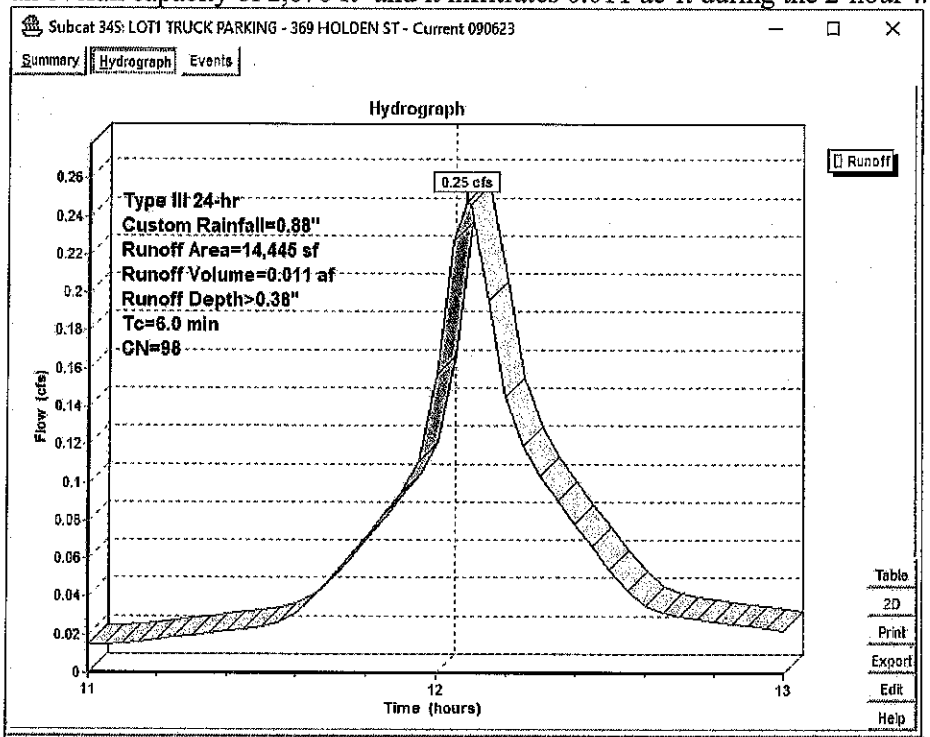
Infiltration % 100% **> 65% OK**

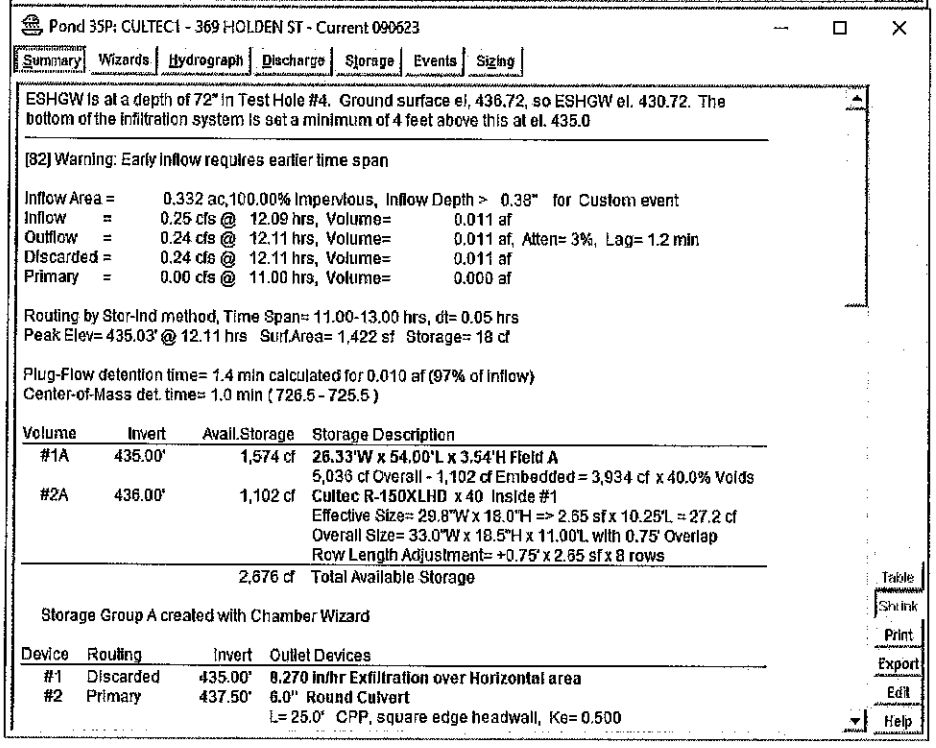
If all of the impervious areas were not contributing flow to infiltration measures, additional calculations would be required to determine a correction factor. That is not the case on this site.

Confirm Recharge Volume

We chose to use the Simple Dynamic method, as outlined in the DEP Stormwater Handbook to verify that the required recharge volume is provided. The following steps were undertaken: (1) using our hydrology software, HydroCad, new subcatchments were created with an area matching the impervious area directed to each of the infiltration ponds, a CN of 98, and a Tc of 6 minutes, (2) we set the time span for the subcatchment at 11 to 13 hours, (3) we then continued to adjust the rainfall for the subcatchment until the volume of runoff generated by the subcatchments was equivalent to the Rv for each area.

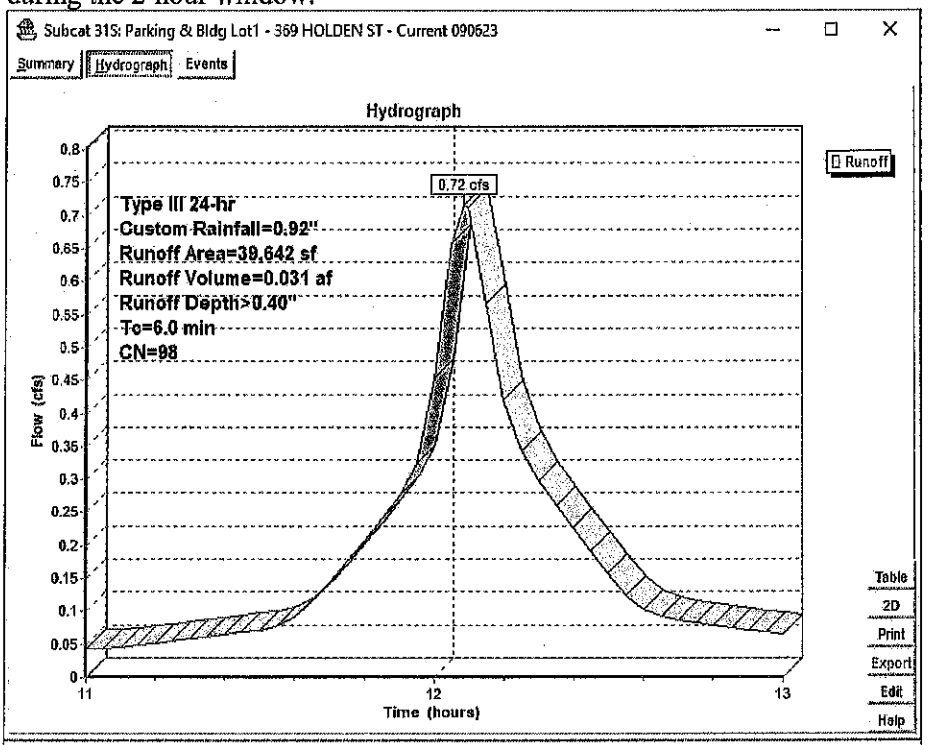
For the Pond 35 inflow representing the northerly parking area of Lot 1 (Subcatchment 34), a rainfall of 0.88" yields a runoff volume of 0.011 ac-ft, equivalent to the Rv. We then route this hydrograph through a copy of the infiltration/detention pond as designed. Pond 35 stores a maximum of 18 ft^3 of stormwater at a depth of 0.03 ft. (within the crushed stone base), has an overall capacity of 2,676 ft^3 and it infiltrates 0.011 ac-ft during the 2-hour window.

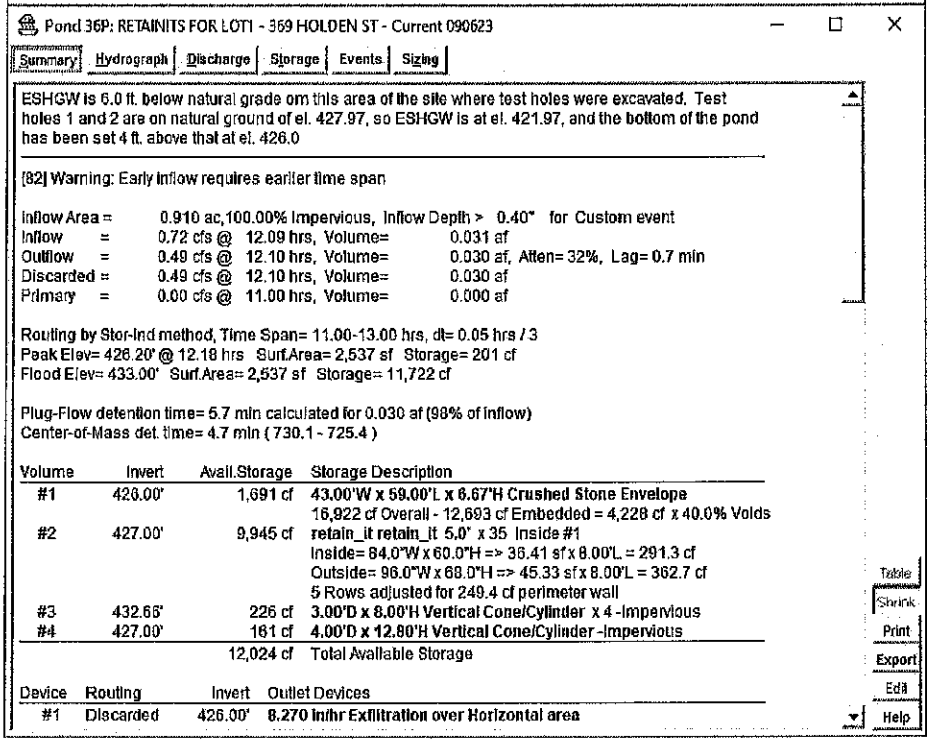




For the Pond 36 inflow representing the southerly parking area and roof of Lot 1, (Subcatchment 31), a rainfall of 0.92" yields a runoff volume of 0.031 ac-ft, equivalent to the

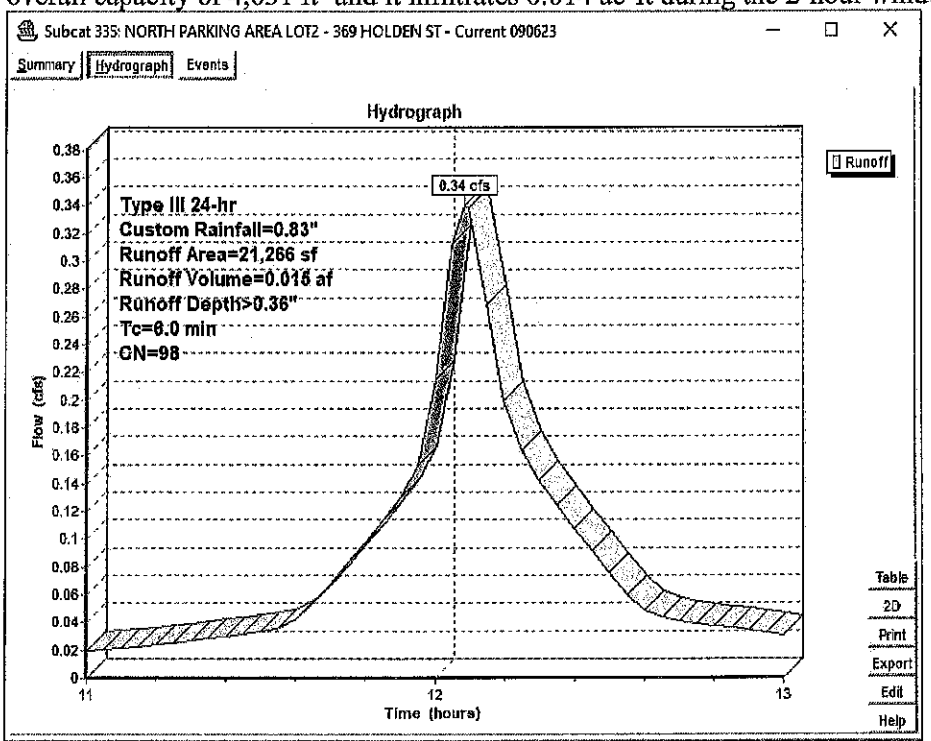
Rv. We then route this hydrograph through a copy of the infiltration/detention pond as designed. Pond 36 stores a maximum of 201 ft^3 of stormwater at a depth of 0.20 ft. (within the crushed stone base), has an overall capacity of 12,024 ft^3 and it infiltrates 0.030 ac-ft during the 2-hour window.

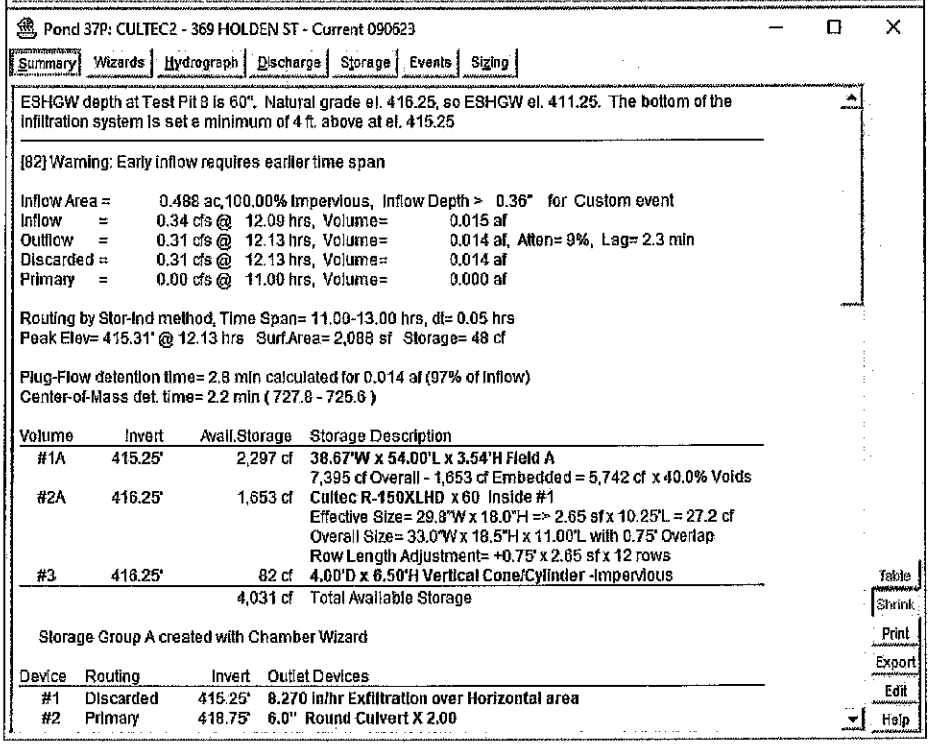




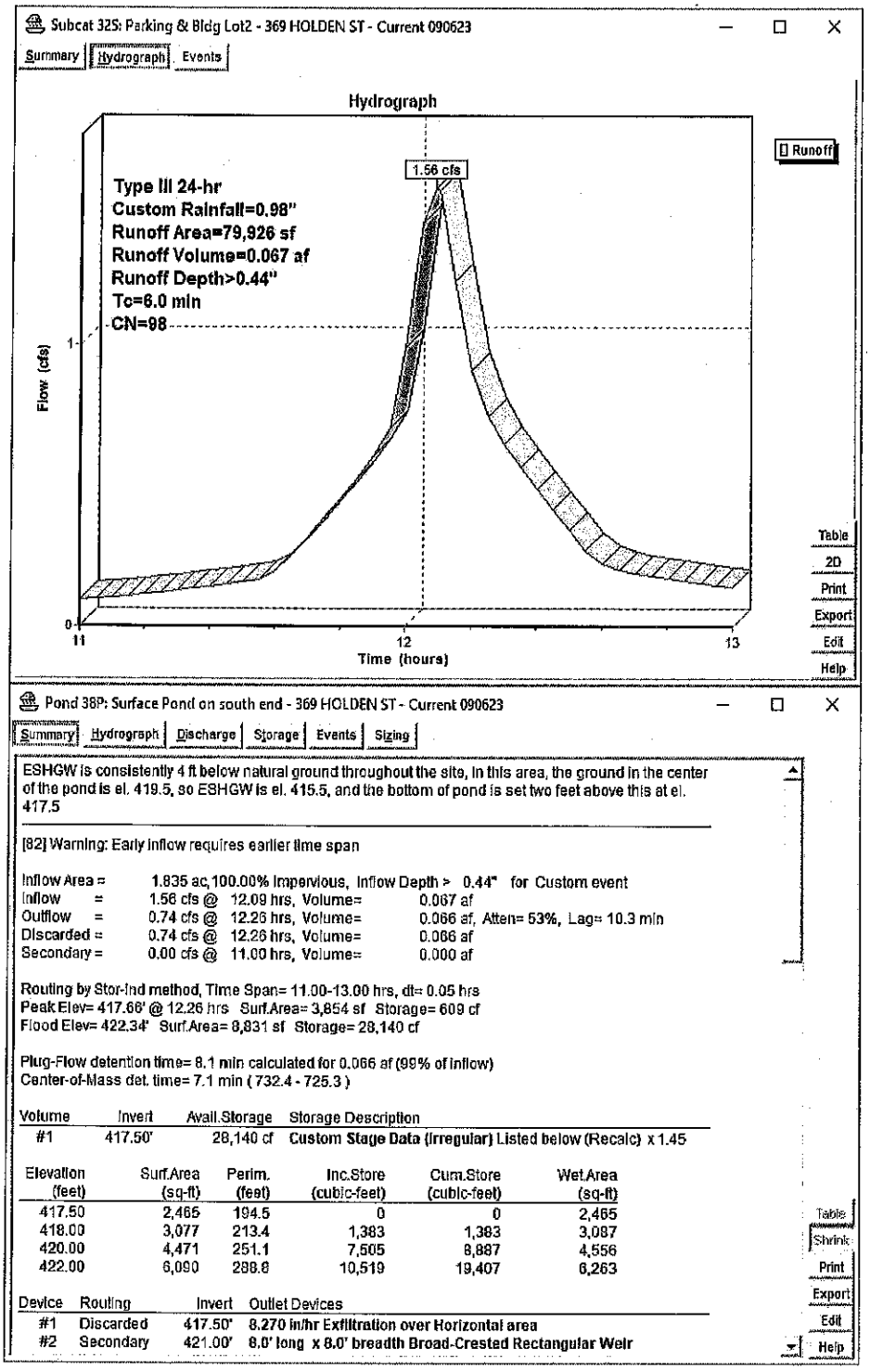
For the Pond 37 inflow representing the northerly parking area of Lot 2 (Subcatchment 33), a rainfall of 0.83" yields a runoff volume of 0.015 ac-ft, equivalent to the Rv. We then route this hydrograph through a copy of the infiltration/detention pond as designed. Pond 37 stores

a maximum of 48 ft^3 of stormwater at a depth of 0.06 ft. within the crushed stone base), has an overall capacity of 4,031 ft^3 and it infiltrates 0.014 ac-ft during the 2-hour window.





For the Pond 38 inflow representing the southerly trucking area and Roof of Lot 2, (Subcatchment 32), a rainfall of 0.98" yields a runoff volume of 0.067 ac-ft, equivalent to the Rv. We then route this hydrograph through a copy of the infiltration/detention pond as designed. Pond 38 stores a maximum of 609 ft^3 of stormwater at a depth of 0.16 ft. within the crushed stone base), has an overall capacity of 28,140 ft^3 and it infiltrates 0.066 ac-ft during the 2-hour window.



Standard 3 is met in all cases. These results show that the infiltration ponds has the capacity to infiltrate the Rv.

Town of Shrewsbury Stormwater Regulations require a volume of stormwater equivalent to one inch times the impervious area to be retained and infiltrated. Using the results stated above, we can confirm that each of the four ponds will fully hold and infiltrate the one inch volume for its contributing area.

Drawdown Time

The drawdown time, the time it takes for the infiltration structures to empty, must be checked for these ponds to verify that the structures will empty in a maximum of 72 hours using the prescribed formula in the DEP Handbook: Time = Rv/(K)(BA), where K is the soil permeability allowed from Rawls, and BA is the bottom area of the recharge structure.

For Pond 18, Time = $\frac{(460\ ft^3)}{(8.27\ in/hr)(1\ ft/12\ in)(1{,}421\ ft^2)} = 0.5$ hours

For Pond 11, Time = $\frac{(1{,}363\ ft^3)}{(8.27\ in/hr)(1\ ft/12\ in)(2{,}537\ ft^2)} = 0.8$ hours

For Pond 13, Time = $\frac{(673\ ft^3)}{(8.27\ in/hr)(1\ ft/12\ in)(2{,}088\ ft^2)} = 0.5$ hours

For Pond 32, Time = $\frac{(2{,}917\ ft^3)}{(8.27\ in/hr)(1\ ft/12\ in)(2{,}465\ ft^2)} = 1.7$ hours

The infiltration BMPs will empty in under 72 hours using the formula provided.

Groundwater Mounding

Although the Ponds mitigate the 10-year storm from the impervious areas, their bottoms are greater than 48" above seasonal high groundwater, therefore a groundwater mounding analysis is not needed.

STANDARD 4 – WATER QUALITY

Treatment of stormwater from impervious areas such as parking lots and driveways is required to remove 80% of total suspended solids (TSS) from a calculated Water Quality Volume. 90% is required by Shrewsbury's Stormwater Regulations. The Water Quality Volume is calculated based upon the new impervious area and a depth of rainfall determined by site factors such as proximity to critical areas and level of anticipated pollutant loads for the proposed use of the site. In this case, we are using a 1" depth of rainfall.

Calculate Water Quality Treatment Volume

We calculated the Required Water Quality Volume (V_{WQ}) for the new impervious areas as follows:

V_{WQ}= (D_{WQ}/12 inches/ft) x Impervious Area (acres) x (43,560 ft^2/ac)

V_{WQ}= (1 inch/12 inches/ft) x (3.564 ac) x (43,560 ft^2/ac)

V_{WQ}= 12,937 ft^3

Since all runoff from the new parking lot is directed through the treatment train described below and to the infiltration/retention Ponds 11, 13, 18, and 32 with a combined capacity of over 46,800 ft^3, the required V_{WQ} is effectively treated.

TSS Removal

Although runoff from roofs will be directed to infiltration structures, the roof surfaces are excluded from the TSS removal calculations, as treatment is not required.

Infiltration systems can provide the required treatment of suspended solids at a rate of 80%, pretreatment should be provided at a minimum rate of 44% from parking areas to minimize the possibility that solids and floatables will reach the underground structures and ultimately the

groundwater. We propose the inclusion of two hydrodynamic stormwater treatment units for the proposed parking runoff, along with deep sump catch basins with traps to provide pretreatment for the new impervious areas. We have not selected the hydrodynamic separator products for this site yet. We anticipate that one of three products will be used, since several are proposed, we are evaluating alternatives, including Rinker's Storceptor ST450i, Contech's CDS 2015-4-C, and Hydroworks' HydroGuard HG4. Each of them will provide effective pretreatment of runoff entering the subsurface ponds.

We have calculated the TSS removal rate from the new parking area runoff to Pond 11, 13, 18, or 35 as follows:

A total of 3.564 acres of new paved area have been proposed. For this site two different treatment trains have been designed. On the north wide of Lot 1, we cannot cross the existing gas main with drainage, so the northerly parking area that is relatively small is collected into a grate inlet hydrodynamic separator prior to reaching the infiltration pond. Let's clal this Treatment Train 1. Runoff reaching the remaining three infiltration ponds is first collected ny deep sump catch basins, is then routed through a hydrodynamic separator, and then into the infiltration ponds. This is Treatment Train 2.

Goal: 44% TSS removal prior to infiltration system

Train 1 Pre-treatment:
1.00 – 0.84 (STC450i) = 0.16
0.16 remaining TSS = 84.0% pre-treatment > 44% ✓

Train 2 Pre-treatment:
1.00 - 0.25 (catchbasins) = 0.75
0.75 (remaining) x 0.84 (CDS 2015-4-C) = 0.63 (grate inlet treatment unit)
0.75 - 0.63 = 0.12 remaining TSS = 88.0% pre-treatment > 44% ✓

Goal: 90% TSS removal required

Train 1: 0.16 x 0.80 = 0.128
0.16 – 0.13 = 0.032 = 96.8% total TSS removal

Train 2: 0.12 x 0.80 = 0.096
0.12 – 0.096 = 0.024 = 97.6% total TSS removal

We then calculated the final TSS removal efficiency as follows:

$$\frac{(0.968 \times 0.26) + (0.976 \times 0.47)}{(0.73)} = 97.3\%$$ total TSS removal for whole site > 90% ✓

Project information worksheets and documentation from Contech Stormwater Solutions regarding the sizing criteria and average annual TSS removal efficiencies for the specified hydrodynamic separators will be provided upon submittal of this report to them for conformance review.

TP Removal
In accordance with the Town of Shrewsbury's updated stormwater management standards, the site has been designed to meet the minimum standard of pollutant removal equivalent to 60% of the average

annual load of Total Phosphorus (TP) related to the total post construction impervious surface area on the site.

Infiltration basins are rated with a 60-70% total phosphorus removal efficiency by the Massachusetts Stormwater Handbook Vol. 2, with no pre-treatment required. The entire first inch of rainfall can be infiltrated with no primary outflow. Since the first one inch of runoff is fully contained, from both the roofs and the paved surfaces, the standard of 60% Total Phosphorus removal has been met by the infiltration structures.

STANDARD 5 – LUHPPLs

Business uses with greater than 1,000 VTD are identified as LUHPPLs. Unless we receive more information about an extraordinary traffic flow at one of the buildings from the prospective tenants, we cannot classify this facility as a LUHPPL. However, the one inch rule is being used to calculate the WQV in Standard 4 due to the site's situation in the Zone II to public water supply,

STANDARD 6 – CRITICAL AREAS

A Zone II to public water supply is a critical area, and the site is clearly situated within the Zone II; it is also included in the mapped Groundwater Protection Overlay Zoning District. We will use the 1" rule determine the WQV, and will target 44% pretreatment prior to discharge to the recharge BMPs.

STANDARD 7 – REDEVELOPMENT

No redevelopment is proposed. The new development site will comply with the Stormwater Standards.

STANDARD 8 – CONSTRUCTION PERIOD CONTROLS

An Erosion and Sedimentation Control Plan has been developed and a Stormwater Pollution Prevention Plan will be submitted prior to construction. The Erosion and Sedimentation Control Plan is shown in the Site Plans and the details of erosion and sedimentation control measures and BMPs are shown on the Detail Sheets of the Site Plans.

STANDARD 9 – OPERATION AND MAINTENANCE PLAN

An Operation and Maintenance Program covering the construction period and post-construction period maintenance and inspection requirements of the stormwater BMPs has been written and is included in the Appendix.

STANDARD 10 – PROHIBITION OF ILLICIT DISCHARGES

Provisions will be made to prevent illicit non-stormwater discharges to waters of the Commonwealth. The 115 Northeast Cutoff Realty Trust trustees are cognizant of the effects upon the environment of improper disposal of wastewater, raw materials, toxic and hazardous substances, oil and grease, and is seeks to prevent damage to the environment. The owner's property maintenance staff will regularly view the site.

The greatest potential for illicit discharges appears to be from the parking lot where petroleum fueled vehicles drive and park. An emergency spill containment kit consisting of absorbent materials will be purchased and will be kept in a location that is readily accessible to the parking lot for the rapid containment of spills of fuel, oil, or other automotive fluids which occur from motor vehicle

malfunction or collisions. No washing or refueling vehicles other than landscape maintenance equipment will occur on the site.

Prepared by: _____

Patrick J. Healy, P.E.
THOMPSON-LISTON ASSOCIATES, INC.

ILLICIT DISCHARGE COMPLIANCE STATEMENT

369 HOLDEN STREET, SHREWSBURY, MA
116 NORTHEAST CUTOFF, WORCESTER, MA

We will make provisions to prevent illicit non-stormwater discharges to waters of the Commonwealth. We are aware of the effects upon the environment of improper disposal of wastewater, process waste, raw materials, toxic and hazardous substances, oil and grease, and we agree to prevent such discharges that cause damage to the environment. We will regularly view the site for signs of non-stormwater discharges to prevent illicit discharges.

Concrete washout will be directed to an excavation near the building, outside the 100-foot Buffer Zone, where there will be no danger of concrete truck washout water reaching the stormwater inlet, infiltration basin, system or wetland resource areas.

The greatest potential for illicit discharges appears to be along the driveways and parking areas where privately owned vehicles will drive and park. We will not, and we will direct our contractors not to refuel construction vehicles or other mechanical equipment in the 100-foot Buffer Zone.

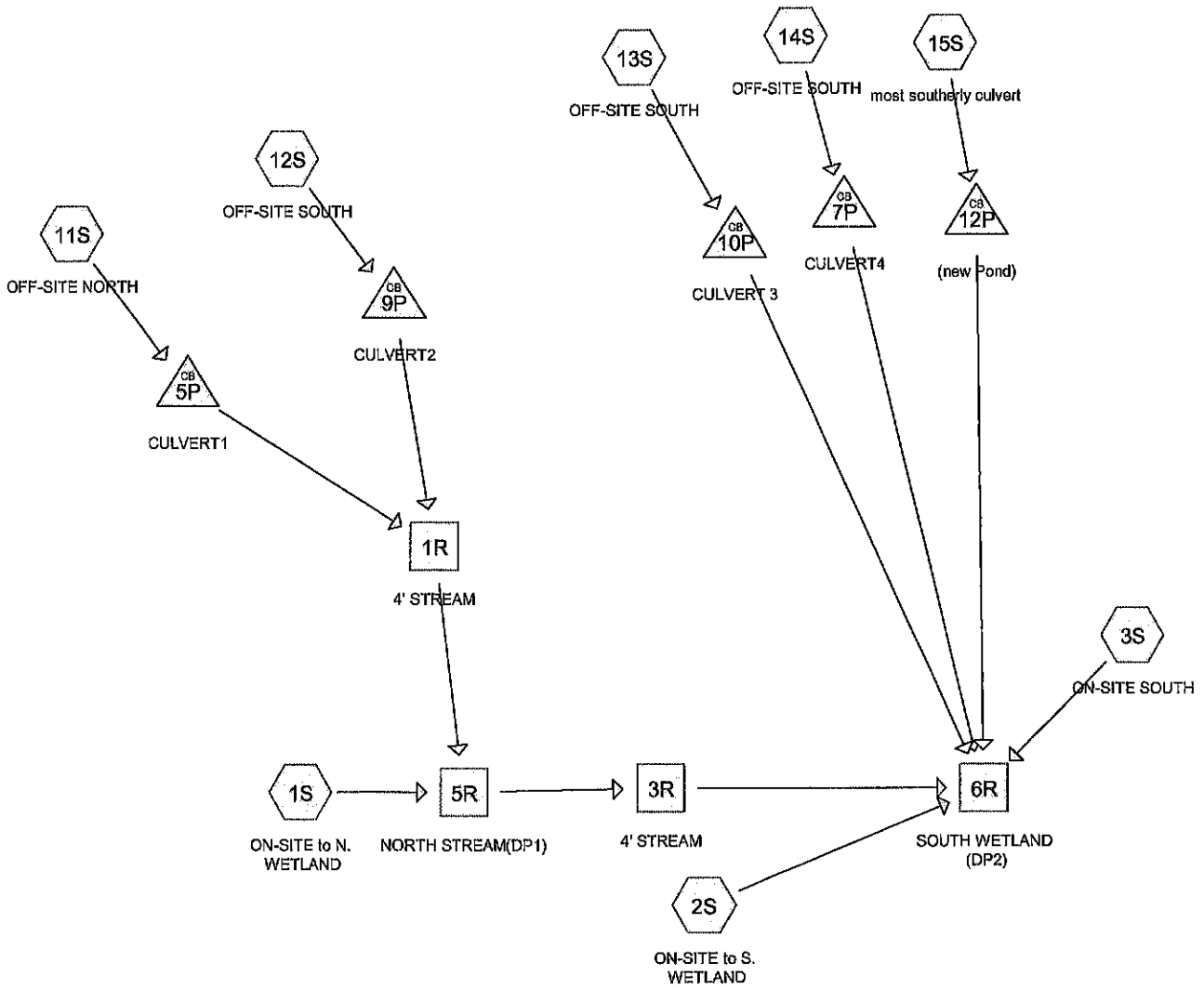
The Pollution Prevention Plan will include measures for construction period waste disposal, equipment and vehicle maintenance practices, and spill prevention and control measures. A spill cleanup kit will be available during the construction period.

By: _____

Meletios Chacharone, Trustee
115 Northeast Cutoff Realty Trust

PREDEVELOPMENT

PRE-DEVELOPMENT



Subcat Reach Pond Link

Routing Diagram for 369 HOLDEN ST - Current 090623
Prepared by THOMPSON-LISTON Associates, Inc., Printed 9/8/2023
HydroCAD® 10.00-26 s/n 00422 © 2020 HydroCAD Software Solutions LLC

Summary for Subcatchment 1S: ON-SITE to N. WETLAND

Runoff = 1.09 cfs @ 12.28 hrs, Volume= 0.182 af, Depth> 0.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Rainfall=3.20"

Area (sf)	CN	Description
9,912	30	Woods, Good, HSG A
214,361	55	Woods, Good, HSG B
55,556	77	Woods, Good, HSG D
279,829	58	Weighted Average
279,829		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	373	0.0844	0.69		**Lag/CN Method,**

Summary for Subcatchment 2S: ON-SITE to S. WETLAND

Runoff = 0.14 cfs @ 13.81 hrs, Volume= 0.085 af, Depth> 0.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Rainfall=3.20"

Area (sf)	CN	Description
113,545	30	Woods, Good, HSG A
291,277	55	Woods, Good, HSG B
8,892	77	Woods, Good, HSG D
413,714	49	Weighted Average
413,714		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.1	533	0.0841	0.59		**Lag/CN Method,**

Summary for Subcatchment 3S: ON-SITE SOUTH

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Rainfall=3.20"

Area (sf)	CN	Description
49,640	30	Woods, Good, HSG A
18,071	55	Woods, Good, HSG B
237	77	Woods, Good, HSG D
67,948	37	Weighted Average
67,948		100.00% Pervious Area

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

Summary for Subcatchment 11S: OFF-SITE NORTH

Runoff = 10.83 cfs @ 13.08 hrs, Volume= 3.107 af, Depth> 0.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Rainfall=3.20"

	Area (ac)	CN	Description
*	13.700	80	Industrial developed
	76.800	55	Woods, Good, HSG B
	11.900	61	>75% Grass cover, Good, HSG B
	102.400	59	Weighted Average
	102.400		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
61.4	3,373	0.0590	0.91		**Lag/CN Method,**

Summary for Subcatchment 12S: OFF-SITE SOUTH

Runoff = 0.78 cfs @ 12.56 hrs, Volume= 0.160 af, Depth> 0.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Rainfall=3.20"

Area (sf)	CN	Description
211,161	55	Woods, Good, HSG B
37,264	77	Woods, Good, HSG D
248,425	58	Weighted Average
248,425		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.3	1,600	0.1030	1.02		**Lag/CN Method,**

Summary for Subcatchment 13S: OFF-SITE SOUTH

Runoff = 4.61 cfs @ 12.56 hrs, Volume= 0.948 af, Depth> 0.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Rainfall=3.20"

Area (sf)	CN	Description
1,248,574	55	Woods, Good, HSG B
220,337	77	Woods, Good, HSG D
1,468,911	58	Weighted Average
1,468,911		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.3	1,600	0.1030	1.02		**Lag/CN Method,**

Summary for Subcatchment 14S: OFF-SITE SOUTH

Runoff = 0.99 cfs @ 12.56 hrs, Volume= 0.203 af, Depth> 0.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Rainfall=3.20"

Area (sf)	CN	Description
267,034	55	Woods, Good, HSG B
47,124	77	Woods, Good, HSG D
314,158	58	Weighted Average
314,158		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.3	1,600	0.1030	1.02		**Lag/CN Method,**

Summary for Subcatchment 15S: most southerly culvert

Runoff = 1.27 cfs @ 12.56 hrs, Volume= 0.261 af, Depth> 0.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Rainfall=3.20"

Area (sf)	CN	Description
343,695	55	Woods, Good, HSG B
60,652	77	Woods, Good, HSG D
404,347	58	Weighted Average
404,347		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.3	1,600	0.1030	1.02		**Lag/CN Method,**

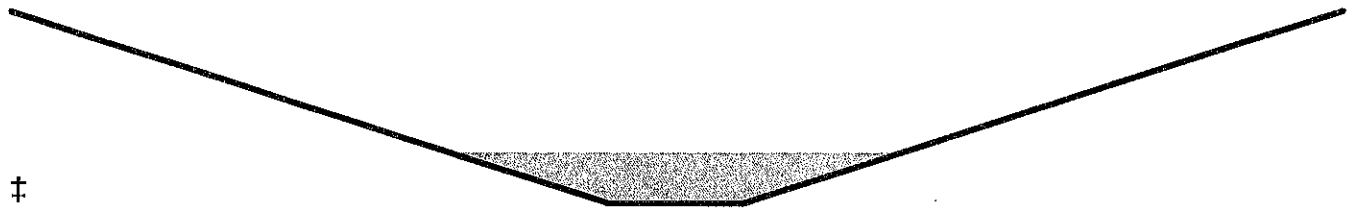
Summary for Reach 1R: 4' STREAM

Inflow Area = 108.103 ac, 0.00% Impervious, Inflow Depth > 0.33" for 2-yr event
Inflow = 10.95 cfs @ 13.07 hrs, Volume= 2.973 af, Incl. 0.30 cfs Inflow Loss
Outflow = 10.92 cfs @ 13.15 hrs, Volume= 2.963 af, Atten= 0%, Lag= 4.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.15 fps, Min. Travel Time= 2.5 min
Avg. Velocity = 2.07 fps, Avg. Travel Time= 3.9 min

Peak Storage= 1,672 cf @ 13.11 hrs
Average Depth at Peak Storage= 0.40'
Bank-Full Depth= 1.50' Flow Area= 33.0 sf, Capacity= 226.25 cfs

4.00' x 1.50' deep channel, n= 0.033 Stream, clean & straight
Side Slope Z-value= 12.0 '/' Top Width= 40.00'
Length= 482.0' Slope= 0.0301 '/'
Inlet Invert= 448.00', Outlet Invert= 433.50'



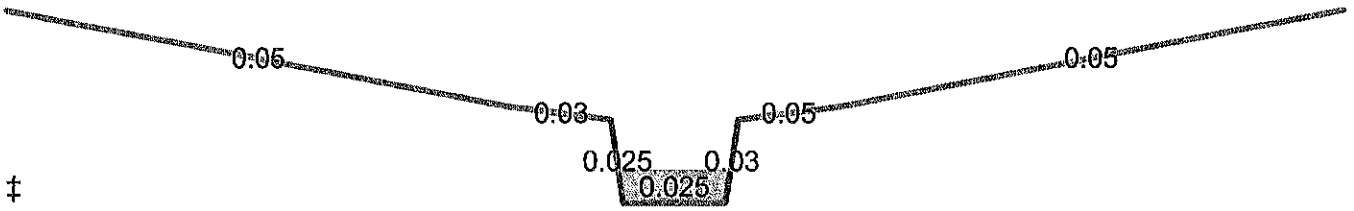
Summary for Reach 3R: 4' STREAM

Inflow Area = 114.527 ac, 0.00% Impervious, Inflow Depth > 0.27" for 2-yr event
Inflow = 10.63 cfs @ 13.23 hrs, Volume= 2.546 af, Incl. 0.30 cfs Inflow Loss
Outflow = 10.61 cfs @ 13.27 hrs, Volume= 2.542 af, Atten= 0%, Lag= 2.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.86 fps, Min. Travel Time= 1.4 min
Avg. Velocity = 2.59 fps, Avg. Travel Time= 2.7 min

Peak Storage= 920 cf @ 13.25 hrs
Average Depth at Peak Storage= 0.52'
Bank-Full Depth= 3.00' Flow Area= 57.1 sf, Capacity= 394.92 cfs

Custom cross-section, Length= 421.0' Slope= 0.0190 '/' (101 Elevation Intervals)
Flow calculated by Manning's Subdivision method
Inlet Invert= 420.36', Outlet Invert= 412.34'



Offset (feet)	Elevation (feet)	Chan.Depth (feet)	n	Description
0.00	3.00	0.00		
20.00	1.50	1.50	0.050	
24.00	1.30	1.70	0.030	Short grass
24.50	0.00	3.00	0.025	Earth, clean & winding
28.50	0.00	3.00	0.025	
29.00	1.30	1.70	0.030	
33.00	1.50	1.50	0.050	
53.00	3.00	0.00	0.050	

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	4.0	0	0.00
1.30	5.9	6.8	2,463	46.91
1.50	7.6	14.8	3,221	61.50
3.00	57.1	54.9	24,060	394.92

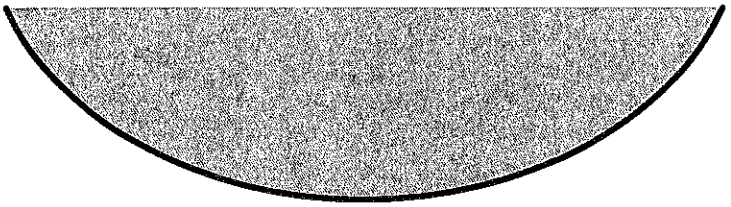
Summary for Reach 5R: NORTH STREAM(DP1)

Inflow Area = 114.527 ac, 0.00% Impervious, Inflow Depth > 0.30" for 2-yr event
Inflow = 10.96 cfs @ 13.14 hrs, Volume= 2.848 af, Incl. 0.30 cfs Inflow Loss
Outflow = 10.93 cfs @ 13.23 hrs, Volume= 2.839 af, Atten= 0%, Lag= 5.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.92 fps, Min. Travel Time= 3.0 min
Avg. Velocity = 2.48 fps, Avg. Travel Time= 4.7 min

Peak Storage= 1,936 cf @ 13.18 hrs
Average Depth at Peak Storage= 1.03'
Bank-Full Depth= 1.00' Flow Area= 2.7 sf, Capacity= 10.29 cfs

4.00' x 1.00' deep Parabolic Channel, n= 0.050 Mountain streams w/large boulders
Length= 695.0' Slope= 0.0348 '/'
Inlet Invert= 458.00', Outlet Invert= 433.82'



Summary for Reach 6R: SOUTH WETLAND (DP2)

Inflow Area = 175.801 ac, 0.00% Impervious, Inflow Depth > 0.28" for 2-yr event
Inflow = 13.89 cfs @ 13.21 hrs, Volume= 4.039 af
Outflow = 13.89 cfs @ 13.21 hrs, Volume= 4.039 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond 5P: CULVERT1

Inflow Area = 102.400 ac, 0.00% Impervious, Inflow Depth > 0.36" for 2-yr event
Inflow = 10.83 cfs @ 13.08 hrs, Volume= 3.107 af
Outflow = 10.83 cfs @ 13.08 hrs, Volume= 3.107 af, Atten= 0%, Lag= 0.0 min
Primary = 10.83 cfs @ 13.08 hrs, Volume= 3.107 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 453.29' @ 13.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	451.46'	**24.0" Round CMP_Round 24"** L= 62.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 451.46' / 450.46' S= 0.0161 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 3.14 sf
#2	Primary	454.01'	**105.0' long (Profile 5) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 2.79 2.93 3.06

Primary OutFlow Max=10.82 cfs @ 13.08 hrs HW=453.28' (Free Discharge)
1=CMP_Round 24" (Barrel Controls 10.82 cfs @ 4.72 fps)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond 7P: CULVERT4

Inflow Area = 7.212 ac, 0.00% Impervious, Inflow Depth > 0.34" for 2-yr event
Inflow = 0.99 cfs @ 12.56 hrs, Volume= 0.203 af
Outflow = 0.99 cfs @ 12.56 hrs, Volume= 0.203 af, Atten= 0%, Lag= 0.0 min
Primary = 0.99 cfs @ 12.56 hrs, Volume= 0.203 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 441.81' @ 12.56 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	441.30'	**12.0" Round RCP_Round 12"** L= 39.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 441.30' / 439.47' S= 0.0469 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Primary	442.71'	**102.0' long (Profile 5) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 2.79 2.93 3.06

Primary OutFlow Max=0.98 cfs @ 12.56 hrs HW=441.81' (Free Discharge)
1=RCP_Round 12" (Inlet Controls 0.98 cfs @ 2.43 fps)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond 9P: CULVERT2

Inflow Area = 5.703 ac, 0.00% Impervious, Inflow Depth > 0.34" for 2-yr event
Inflow = 0.78 cfs @ 12.56 hrs, Volume= 0.160 af
Outflow = 0.78 cfs @ 12.56 hrs, Volume= 0.160 af, Atten= 0%, Lag= 0.0 min
Primary = 0.78 cfs @ 12.56 hrs, Volume= 0.160 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 445.22' @ 12.56 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	444.77'	**12.0" Round RCP_Round 12"** L= 37.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 444.77' / 443.04' S= 0.0468 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Primary	447.85'	**134.0' long (Profile 5) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 2.79 2.93 3.06

Primary OutFlow Max=0.78 cfs @ 12.56 hrs HW=445.22' (Free Discharge)
1=RCP_Round 12" (Inlet Controls 0.78 cfs @ 2.28 fps)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond 10P: CULVERT 3

Inflow Area = 33.722 ac, 0.00% Impervious, Inflow Depth > 0.34" for 2-yr event
Inflow = 4.61 cfs @ 12.56 hrs, Volume= 0.948 af
Outflow = 4.61 cfs @ 12.56 hrs, Volume= 0.948 af, Atten= 0%, Lag= 0.0 min
Primary = 4.61 cfs @ 12.56 hrs, Volume= 0.948 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 443.29' @ 12.56 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	441.30'	**12.0" Round RCP_Round 12"** L= 37.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 441.30' / 439.47' S= 0.0495 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Primary	443.55'	**102.0' long (Profile 5) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 2.79 2.93 3.06

Primary OutFlow Max=4.59 cfs @ 12.56 hrs HW=443.28' (Free Discharge)
↑—**1=RCP_Round 12"** (Inlet Controls 4.59 cfs @ 5.85 fps)
└—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 12P: (new Pond)

Inflow Area = 9.283 ac, 0.00% Impervious, Inflow Depth > 0.34" for 2-yr event
Inflow = 1.27 cfs @ 12.56 hrs, Volume= 0.261 af
Outflow = 1.27 cfs @ 12.56 hrs, Volume= 0.261 af, Atten= 0%, Lag= 0.0 min
Primary = 1.27 cfs @ 12.56 hrs, Volume= 0.261 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 428.75' @ 12.56 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	428.07'	**12.0" Round CMP_Round 12"** L= 50.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 428.07' / 425.62' S= 0.0490 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 0.79 sf
#2	Primary	431.67'	**90.0' long (Profile 5) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 2.79 2.93 3.06

Primary OutFlow Max=1.26 cfs @ 12.56 hrs HW=428.75' (Free Discharge)
↑—**1=CMP_Round 12"** (Inlet Controls 1.26 cfs @ 2.22 fps)
└—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Subcatchment 1S: ON-SITE to N. WETLAND

Runoff = 6.47 cfs @ 12.15 hrs, Volume= 0.604 af, Depth> 1.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.93"

Area (sf)	CN	Description
9,912	30	Woods, Good, HSG A
214,361	55	Woods, Good, HSG B
55,556	77	Woods, Good, HSG D
279,829	58	Weighted Average
279,829		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	373	0.0844	0.69		**Lag/CN Method,**

Summary for Subcatchment 2S: ON-SITE to S. WETLAND

Runoff = 2.99 cfs @ 12.34 hrs, Volume= 0.482 af, Depth> 0.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.93"

Area (sf)	CN	Description
113,545	30	Woods, Good, HSG A
291,277	55	Woods, Good, HSG B
8,892	77	Woods, Good, HSG D
413,714	49	Weighted Average
413,714		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.1	533	0.0841	0.59		**Lag/CN Method,**

Summary for Subcatchment 3S: ON-SITE SOUTH

Runoff = 0.03 cfs @ 14.81 hrs, Volume= 0.016 af, Depth> 0.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.93"

Area (sf)	CN	Description
49,640	30	Woods, Good, HSG A
18,071	55	Woods, Good, HSG B
237	77	Woods, Good, HSG D
67,948	37	Weighted Average
67,948		100.00% Pervious Area

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

Summary for Subcatchment 11S: OFF-SITE NORTH

Runoff = 48.32 cfs @ 12.92 hrs, Volume= 9.997 af, Depth> 1.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.93"

	Area (ac)	CN	Description
*	13.700	80	Industrial developed
	76.800	55	Woods, Good, HSG B
	11.900	61	>75% Grass cover, Good, HSG B
	102.400	59	Weighted Average
	102.400		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
61.4	3,373	0.0590	0.91		**Lag/CN Method,**

Summary for Subcatchment 12S: OFF-SITE SOUTH

Runoff = 3.88 cfs @ 12.43 hrs, Volume= 0.533 af, Depth> 1.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.93"

Area (sf)	CN	Description
211,161	55	Woods, Good, HSG B
37,264	77	Woods, Good, HSG D
248,425	58	Weighted Average
248,425		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.3	1,600	0.1030	1.02		**Lag/CN Method,**

Summary for Subcatchment 13S: OFF-SITE SOUTH

Runoff = 22.97 cfs @ 12.43 hrs, Volume= 3.152 af, Depth> 1.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.93"

Area (sf)	CN	Description
1,248,574	55	Woods, Good, HSG B
220,337	77	Woods, Good, HSG D
1,468,911	58	Weighted Average
1,468,911		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.3	1,600	0.1030	1.02		**Lag/CN Method,**

Summary for Subcatchment 14S: OFF-SITE SOUTH

Runoff = 4.91 cfs @ 12.43 hrs, Volume= 0.674 af, Depth> 1.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.93"

Area (sf)	CN	Description
267,034	55	Woods, Good, HSG B
47,124	77	Woods, Good, HSG D
314,158	58	Weighted Average
314,158		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.3	1,600	0.1030	1.02		**Lag/CN Method,**

Summary for Subcatchment 15S: most southerly culvert

Runoff = 6.32 cfs @ 12.43 hrs, Volume= 0.868 af, Depth> 1.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.93"

Area (sf)	CN	Description
343,695	55	Woods, Good, HSG B
60,652	77	Woods, Good, HSG D
404,347	58	Weighted Average
404,347		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.3	1,600	0.1030	1.02		**Lag/CN Method,**

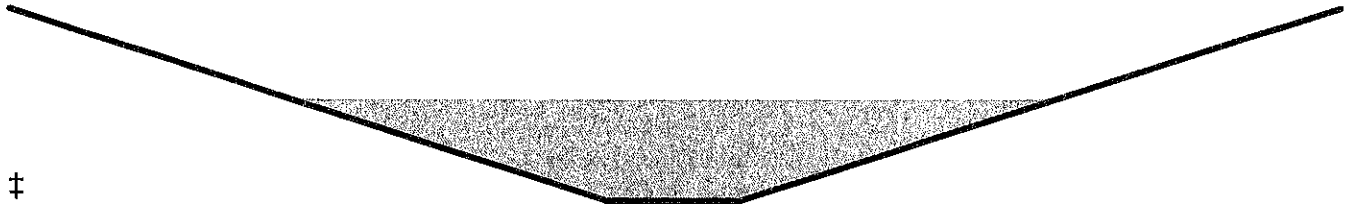
Summary for Reach 1R: 4' STREAM

Inflow Area = 108.103 ac, 0.00% Impervious, Inflow Depth > 1.14" for 10-yr event
Inflow = 49.76 cfs @ 12.91 hrs, Volume= 10.226 af, Incl. 0.30 cfs Inflow Loss
Outflow = 49.60 cfs @ 12.97 hrs, Volume= 10.207 af, Atten= 0%, Lag= 3.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.67 fps, Min. Travel Time= 1.7 min
Avg. Velocity = 2.80 fps, Avg. Travel Time= 2.9 min

Peak Storage= 5,127 cf @ 12.94 hrs
Average Depth at Peak Storage= 0.79'
Bank-Full Depth= 1.50' Flow Area= 33.0 sf, Capacity= 226.25 cfs

4.00' x 1.50' deep channel, n= 0.033 Stream, clean & straight
Side Slope Z-value= 12.0 '/' Top Width= 40.00'
Length= 482.0' Slope= 0.0301 '/'
Inlet Invert= 448.00', Outlet Invert= 433.50'



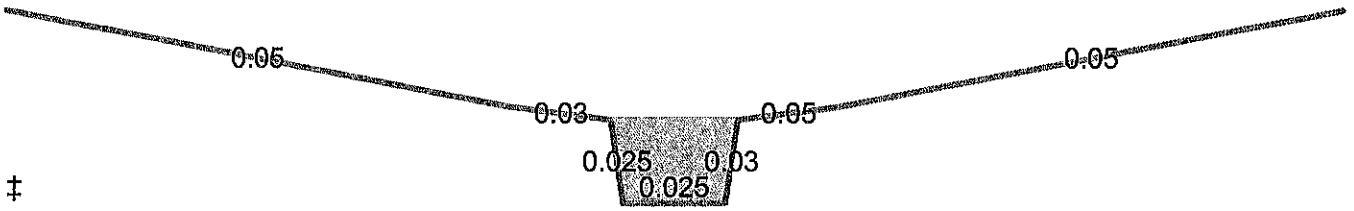
Summary for Reach 3R: 4' STREAM

Inflow Area = 114.527 ac, 0.00% Impervious, Inflow Depth > 1.07" for 10-yr event
Inflow = 49.95 cfs @ 13.04 hrs, Volume= 10.181 af, Incl. 0.30 cfs Inflow Loss
Outflow = 49.88 cfs @ 13.07 hrs, Volume= 10.171 af, Atten= 0%, Lag= 1.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 8.15 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 4.25 fps, Avg. Travel Time= 1.7 min

Peak Storage= 2,578 cf @ 13.05 hrs
Average Depth at Peak Storage= 1.35'
Bank-Full Depth= 3.00' Flow Area= 57.1 sf, Capacity= 394.92 cfs

Custom cross-section, Length= 421.0' Slope= 0.0190 '/' (101 Elevation Intervals)
Flow calculated by Manning's Subdivision method
Inlet Invert= 420.36', Outlet Invert= 412.34'



Offset (feet)	Elevation (feet)	Chan.Depth (feet)	n	Description
0.00	3.00	0.00		
20.00	1.50	1.50	0.050	
24.00	1.30	1.70	0.030	Short grass
24.50	0.00	3.00	0.025	Earth, clean & winding
28.50	0.00	3.00	0.025	
29.00	1.30	1.70	0.030	
33.00	1.50	1.50	0.050	
53.00	3.00	0.00	0.050	

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	4.0	0	0.00
1.30	5.9	6.8	2,463	46.91
1.50	7.6	14.8	3,221	61.50
3.00	57.1	54.9	24,060	394.92

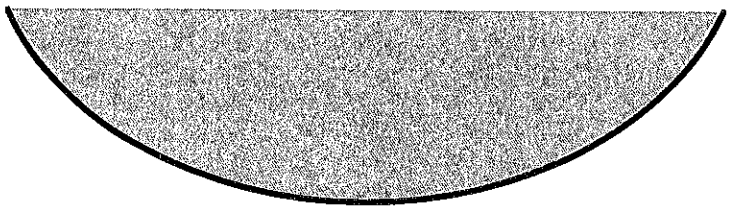
Summary for Reach 5R: NORTH STREAM(DP1)

Inflow Area = 114.527 ac, 0.00% Impervious, Inflow Depth > 1.10" for 10-yr event
Inflow = 50.47 cfs @ 12.96 hrs, Volume= 10.505 af, Incl. 0.30 cfs Inflow Loss
Outflow = 50.25 cfs @ 13.04 hrs, Volume= 10.482 af, Atten= 0%, Lag= 4.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.96 fps, Min. Travel Time= 2.3 min
Avg. Velocity = 3.41 fps, Avg. Travel Time= 3.4 min

Peak Storage= 7,042 cf @ 13.00 hrs
Average Depth at Peak Storage= 2.87'
Bank-Full Depth= 1.00' Flow Area= 2.7 sf, Capacity= 10.29 cfs

4.00' x 1.00' deep Parabolic Channel, n= 0.050 Mountain streams w/large boulders
Length= 695.0' Slope= 0.0348 '/'
Inlet Invert= 458.00', Outlet Invert= 433.82'



Summary for Reach 6R: SOUTH WETLAND (DP2)

Inflow Area = 175.801 ac, 0.00% Impervious, Inflow Depth > 1.05" for 10-yr event
Inflow = 63.99 cfs @ 12.95 hrs, Volume= 15.362 af
Outflow = 63.99 cfs @ 12.95 hrs, Volume= 15.362 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond 5P: CULVERT1

Inflow Area = 102.400 ac, 0.00% Impervious, Inflow Depth > 1.17" for 10-yr event
Inflow = 48.32 cfs @ 12.92 hrs, Volume= 9.997 af
Outflow = 48.32 cfs @ 12.92 hrs, Volume= 9.997 af, Atten= 0%, Lag= 0.0 min
Primary = 48.32 cfs @ 12.92 hrs, Volume= 9.997 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 454.24' @ 12.92 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	451.46'	**24.0" Round CMP_Round 24"** L= 62.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 451.46' / 450.46' S= 0.0161 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 3.14 sf
#2	Primary	454.01'	**105.0' long (Profile 5) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 2.79 2.93 3.06

Primary OutFlow Max=48.20 cfs @ 12.92 hrs HW=454.24' (Free Discharge)
1=CMP_Round 24" (Barrel Controls 15.43 cfs @ 4.91 fps)
2=Broad-Crested Rectangular Weir (Weir Controls 32.77 cfs @ 1.34 fps)

Summary for Pond 7P: CULVERT4

Inflow Area =	7.212 ac,	0.00% Impervious,	Inflow Depth >	1.12"	for 10-yr event
Inflow =	4.91 cfs @	12.43 hrs,	Volume=	0.674 af	
Outflow =	4.91 cfs @	12.43 hrs,	Volume=	0.674 af,	Atten= 0%, Lag= 0.0 min
Primary =	4.91 cfs @	12.43 hrs,	Volume=	0.674 af	

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 442.74' @ 12.43 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	441.30'	**12.0" Round RCP_Round 12"** L= 39.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 441.30' / 439.47' S= 0.0469 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Primary	442.71'	**102.0' long (Profile 5) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 2.79 2.93 3.06

Primary OutFlow Max=4.88 cfs @ 12.43 hrs HW=442.74' (Free Discharge)
1=RCP_Round 12" (Inlet Controls 3.66 cfs @ 4.66 fps)
2=Broad-Crested Rectangular Weir (Weir Controls 1.22 cfs @ 0.45 fps)

Summary for Pond 9P: CULVERT2

Inflow Area =	5.703 ac,	0.00% Impervious,	Inflow Depth >	1.12"	for 10-yr event
Inflow =	3.88 cfs @	12.43 hrs,	Volume=	0.533 af	
Outflow =	3.88 cfs @	12.43 hrs,	Volume=	0.533 af,	Atten= 0%, Lag= 0.0 min
Primary =	3.88 cfs @	12.43 hrs,	Volume=	0.533 af	

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 446.33' @ 12.43 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	444.77'	**12.0" Round RCP_Round 12"** L= 37.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 444.77' / 443.04' S= 0.0468 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Primary	447.85'	**134.0' long (Profile 5) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 2.79 2.93 3.06

Primary OutFlow Max=3.87 cfs @ 12.43 hrs HW=446.32' (Free Discharge)
1=RCP_Round 12" (Inlet Controls 3.87 cfs @ 4.93 fps)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond 10P: CULVERT 3

Inflow Area = 33.722 ac, 0.00% Impervious, Inflow Depth > 1.12" for 10-yr event
Inflow = 22.97 cfs @ 12.43 hrs, Volume= 3.152 af
Outflow = 22.97 cfs @ 12.43 hrs, Volume= 3.152 af, Atten= 0%, Lag= 0.0 min
Primary = 22.97 cfs @ 12.43 hrs, Volume= 3.152 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 443.71' @ 12.43 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	441.30'	**12.0" Round RCP_Round 12"** L= 37.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 441.30' / 439.47' S= 0.0495 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Primary	443.55'	**102.0' long (Profile 5) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 2.79 2.93 3.06

Primary OutFlow Max=22.87 cfs @ 12.43 hrs HW=443.71' (Free Discharge)
↑—**1=RCP_Round 12"** (Inlet Controls 5.22 cfs @ 6.65 fps)
└—**2=Broad-Crested Rectangular Weir** (Weir Controls 17.65 cfs @ 1.10 fps)

Summary for Pond 12P: (new Pond)

Inflow Area = 9.283 ac, 0.00% Impervious, Inflow Depth > 1.12" for 10-yr event
Inflow = 6.32 cfs @ 12.43 hrs, Volume= 0.868 af
Outflow = 6.32 cfs @ 12.43 hrs, Volume= 0.868 af, Atten= 0%, Lag= 0.0 min
Primary = 6.32 cfs @ 12.43 hrs, Volume= 0.868 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 431.70' @ 12.43 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	428.07'	**12.0" Round CMP_Round 12"** L= 50.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 428.07' / 425.62' S= 0.0490 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 0.79 sf
#2	Primary	431.67'	**90.0' long (Profile 5) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 2.79 2.93 3.06

Primary OutFlow Max=6.10 cfs @ 12.43 hrs HW=431.69' (Free Discharge)
↑—**1=CMP_Round 12"** (Barrel Controls 5.11 cfs @ 6.51 fps)
└—**2=Broad-Crested Rectangular Weir** (Weir Controls 0.98 cfs @ 0.44 fps)

Summary for Subcatchment 1S: ON-SITE to N. WETLAND

Runoff = 10.84 cfs @ 12.14 hrs, Volume= 0.939 af, Depth> 1.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Rainfall=6.00"

Area (sf)	CN	Description
9,912	30	Woods, Good, HSG A
214,361	55	Woods, Good, HSG B
55,556	77	Woods, Good, HSG D
279,829	58	Weighted Average
279,829		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	373	0.0844	0.69		**Lag/CN Method,**

Summary for Subcatchment 2S: ON-SITE to S. WETLAND

Runoff = 6.74 cfs @ 12.26 hrs, Volume= 0.844 af, Depth> 1.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Rainfall=6.00"

Area (sf)	CN	Description
113,545	30	Woods, Good, HSG A
291,277	55	Woods, Good, HSG B
8,892	77	Woods, Good, HSG D
413,714	49	Weighted Average
413,714		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.1	533	0.0841	0.59		**Lag/CN Method,**

Summary for Subcatchment 3S: ON-SITE SOUTH

Runoff = 0.15 cfs @ 12.54 hrs, Volume= 0.044 af, Depth> 0.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Rainfall=6.00"

Area (sf)	CN	Description
49,640	30	Woods, Good, HSG A
18,071	55	Woods, Good, HSG B
237	77	Woods, Good, HSG D
67,948	37	Weighted Average
67,948		100.00% Pervious Area

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

Summary for Subcatchment 11S: OFF-SITE NORTH

Runoff = 79.35 cfs @ 12.90 hrs, Volume= 15.414 af, Depth> 1.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Rainfall=6.00"

	Area (ac)	CN	Description
*	13.700	80	Industrial developed
	76.800	55	Woods, Good, HSG B
	11.900	61	>75% Grass cover, Good, HSG B
	102.400	59	Weighted Average
	102.400		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
61.4	3,373	0.0590	0.91		**Lag/CN Method,**

Summary for Subcatchment 12S: OFF-SITE SOUTH

Runoff = 6.49 cfs @ 12.41 hrs, Volume= 0.829 af, Depth> 1.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Rainfall=6.00"

Area (sf)	CN	Description
211,161	55	Woods, Good, HSG B
37,264	77	Woods, Good, HSG D
248,425	58	Weighted Average
248,425		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.3	1,600	0.1030	1.02		**Lag/CN Method,**

Summary for Subcatchment 13S: OFF-SITE SOUTH

Runoff = 38.39 cfs @ 12.41 hrs, Volume= 4.902 af, Depth> 1.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Rainfall=6.00"

Area (sf)	CN	Description
1,248,574	55	Woods, Good, HSG B
220,337	77	Woods, Good, HSG D
1,468,911	58	Weighted Average
1,468,911		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.3	1,600	0.1030	1.02		**Lag/CN Method,**

Summary for Subcatchment 14S: OFF-SITE SOUTH

Runoff = 8.21 cfs @ 12.41 hrs, Volume= 1.048 af, Depth> 1.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Rainfall=6.00"

Area (sf)	CN	Description
267,034	55	Woods, Good, HSG B
47,124	77	Woods, Good, HSG D
314,158	58	Weighted Average
314,158		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.3	1,600	0.1030	1.02		**Lag/CN Method,**

Summary for Subcatchment 15S: most southerly culvert

Runoff = 10.57 cfs @ 12.41 hrs, Volume= 1.349 af, Depth> 1.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Rainfall=6.00"

Area (sf)	CN	Description
343,695	55	Woods, Good, HSG B
60,652	77	Woods, Good, HSG D
404,347	58	Weighted Average
404,347		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.3	1,600	0.1030	1.02		**Lag/CN Method,**

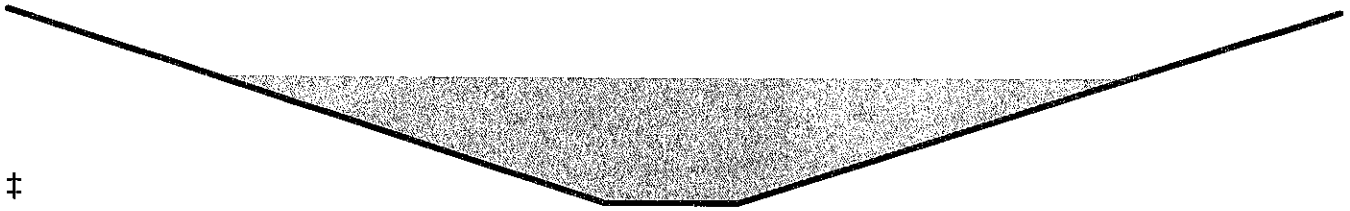
Summary for Reach 1R: 4' STREAM

Inflow Area = 108.103 ac, 0.00% Impervious, Inflow Depth > 1.77" for 25-yr event
Inflow = 81.85 cfs @ 12.89 hrs, Volume= 15.927 af, Incl. 0.30 cfs Inflow Loss
Outflow = 81.60 cfs @ 12.93 hrs, Volume= 15.902 af, Atten= 0%, Lag= 2.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.30 fps, Min. Travel Time= 1.5 min
Avg. Velocity = 3.08 fps, Avg. Travel Time= 2.6 min

Peak Storage= 7,432 cf @ 12.90 hrs
Average Depth at Peak Storage= 0.98'
Bank-Full Depth= 1.50' Flow Area= 33.0 sf, Capacity= 226.25 cfs

4.00' x 1.50' deep channel, n= 0.033 Stream, clean & straight
Side Slope Z-value= 12.0 '/' Top Width= 40.00'
Length= 482.0' Slope= 0.0301 '/'
Inlet Invert= 448.00', Outlet Invert= 433.50'



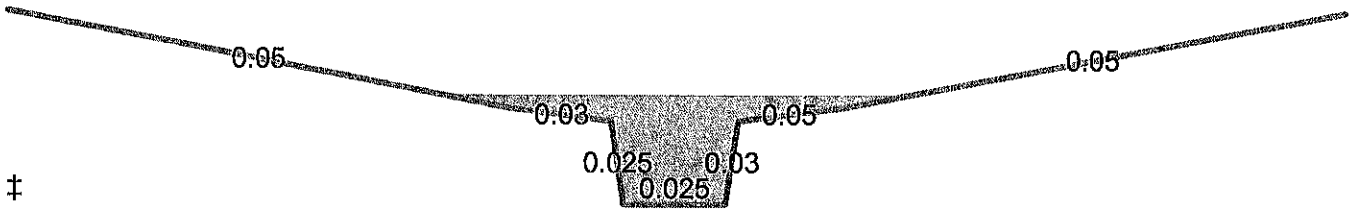
Summary for Reach 3R: 4' STREAM

Inflow Area = 114.527 ac, 0.00% Impervious, Inflow Depth > 1.70" for 25-yr event
Inflow = 82.45 cfs @ 13.00 hrs, Volume= 16.188 af, Incl. 0.30 cfs Inflow Loss
Outflow = 82.29 cfs @ 13.03 hrs, Volume= 16.173 af, Atten= 0%, Lag= 2.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 8.20 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 4.81 fps, Avg. Travel Time= 1.5 min

Peak Storage= 4,587 cf @ 13.02 hrs
Average Depth at Peak Storage= 1.71'
Bank-Full Depth= 3.00' Flow Area= 57.1 sf, Capacity= 394.92 cfs

Custom cross-section, Length= 421.0' Slope= 0.0190 '/' (101 Elevation Intervals)
Flow calculated by Manning's Subdivision method
Inlet Invert= 420.36', Outlet Invert= 412.34'



Offset (feet)	Elevation (feet)	Chan.Depth (feet)	n	Description
0.00	3.00	0.00		
20.00	1.50	1.50	0.050	
24.00	1.30	1.70	0.030	Short grass
24.50	0.00	3.00	0.025	Earth, clean & winding
28.50	0.00	3.00	0.025	
29.00	1.30	1.70	0.030	
33.00	1.50	1.50	0.050	
53.00	3.00	0.00	0.050	

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	4.0	0	0.00
1.30	5.9	6.8	2,463	46.91
1.50	7.6	14.8	3,221	61.50
3.00	57.1	54.9	24,060	394.92

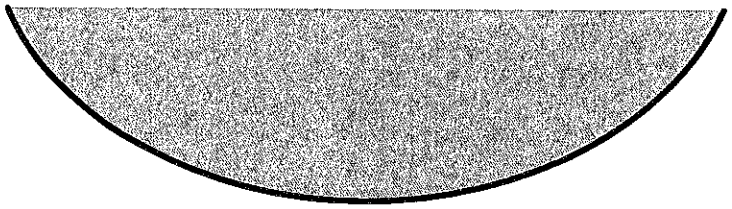
Summary for Reach 5R: NORTH STREAM(DP1)

Inflow Area = 114.527 ac, 0.00% Impervious, Inflow Depth > 1.73" for 25-yr event
Inflow = 83.08 cfs @ 12.93 hrs, Volume= 16.526 af, Incl. 0.30 cfs Inflow Loss
Outflow = 82.75 cfs @ 13.00 hrs, Volume= 16.494 af, Atten= 0%, Lag= 4.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.11 fps, Min. Travel Time= 2.3 min
Avg. Velocity = 3.70 fps, Avg. Travel Time= 3.1 min

Peak Storage= 11,259 cf @ 12.96 hrs
Average Depth at Peak Storage= 4.39'
Bank-Full Depth= 1.00' Flow Area= 2.7 sf, Capacity= 10.29 cfs

4.00' x 1.00' deep Parabolic Channel, n= 0.050 Mountain streams w/large boulders
Length= 695.0' Slope= 0.0348 '/'
Inlet Invert= 458.00', Outlet Invert= 433.82'



Summary for Reach 6R: SOUTH WETLAND (DP2)

Inflow Area = 175.801 ac, 0.00% Impervious, Inflow Depth > 1.66" for 25-yr event
Inflow = 105.53 cfs @ 12.88 hrs, Volume= 24.361 af
Outflow = 105.53 cfs @ 12.88 hrs, Volume= 24.361 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond 5P: CULVERT1

Inflow Area = 102.400 ac, 0.00% Impervious, Inflow Depth > 1.81" for 25-yr event
Inflow = 79.35 cfs @ 12.90 hrs, Volume= 15.414 af
Outflow = 79.35 cfs @ 12.90 hrs, Volume= 15.414 af, Atten= 0%, Lag= 0.0 min
Primary = 79.35 cfs @ 12.90 hrs, Volume= 15.414 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 454.37' @ 12.90 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	451.46'	**24.0" Round CMP_Round 24"** L= 62.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 451.46' / 450.46' S= 0.0161 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 3.14 sf
#2	Primary	454.01'	**105.0' long (Profile 5) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 2.79 2.93 3.06

Primary OutFlow Max=79.33 cfs @ 12.90 hrs HW=454.37' (Free Discharge)
└─**1=CMP_Round 24"** (Barrel Controls 15.98 cfs @ 5.09 fps)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 63.36 cfs @ 1.67 fps)

Summary for Pond 7P: CULVERT4

Inflow Area = 7.212 ac, 0.00% Impervious, Inflow Depth > 1.74" for 25-yr event
Inflow = 8.21 cfs @ 12.41 hrs, Volume= 1.048 af
Outflow = 8.21 cfs @ 12.41 hrs, Volume= 1.048 af, Atten= 0%, Lag= 0.0 min
Primary = 8.21 cfs @ 12.41 hrs, Volume= 1.048 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 442.77' @ 12.41 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	441.30'	**12.0" Round RCP_Round 12"** L= 39.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 441.30' / 439.47' S= 0.0469 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Primary	442.71'	**102.0' long (Profile 5) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 2.79 2.93 3.06

Primary OutFlow Max=8.17 cfs @ 12.41 hrs HW=442.77' (Free Discharge)
└─**1=RCP_Round 12"** (Inlet Controls 3.73 cfs @ 4.75 fps)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 4.44 cfs @ 0.70 fps)

Summary for Pond 9P: CULVERT2

Inflow Area = 5.703 ac, 0.00% Impervious, Inflow Depth > 1.74" for 25-yr event
Inflow = 6.49 cfs @ 12.41 hrs, Volume= 0.829 af
Outflow = 6.49 cfs @ 12.41 hrs, Volume= 0.829 af, Atten= 0%, Lag= 0.0 min
Primary = 6.49 cfs @ 12.41 hrs, Volume= 0.829 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 447.86' @ 12.40 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	444.77'	**12.0" Round RCP_Round 12"** L= 37.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 444.77' / 443.04' S= 0.0468 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Primary	447.85'	**134.0' long (Profile 5) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 2.79 2.93 3.06

Primary OutFlow Max=6.26 cfs @ 12.41 hrs HW=447.86' (Free Discharge)
└─**1=RCP_Round 12"** (Inlet Controls 6.08 cfs @ 7.74 fps)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 0.17 cfs @ 0.22 fps)

Summary for Pond 10P: CULVERT 3

Inflow Area = 33.722 ac, 0.00% Impervious, Inflow Depth > 1.74" for 25-yr event
Inflow = 38.39 cfs @ 12.41 hrs, Volume= 4.902 af
Outflow = 38.39 cfs @ 12.41 hrs, Volume= 4.902 af, Atten= 0%, Lag= 0.0 min
Primary = 38.39 cfs @ 12.41 hrs, Volume= 4.902 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 443.79' @ 12.41 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	441.30'	**12.0" Round RCP_Round 12"** L= 37.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 441.30' / 439.47' S= 0.0495 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Primary	443.55'	**102.0' long (Profile 5) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 2.79 2.93 3.06

Primary OutFlow Max=38.27 cfs @ 12.41 hrs HW=443.79' (Free Discharge)
1=RCP_Round 12" (Inlet Controls 5.33 cfs @ 6.79 fps)
2=Broad-Crested Rectangular Weir (Weir Controls 32.94 cfs @ 1.36 fps)

Summary for Pond 12P: (new Pond)

Inflow Area = 9.283 ac, 0.00% Impervious, Inflow Depth > 1.74" for 25-yr event
Inflow = 10.57 cfs @ 12.41 hrs, Volume= 1.349 af
Outflow = 10.57 cfs @ 12.41 hrs, Volume= 1.349 af, Atten= 0%, Lag= 0.0 min
Primary = 10.57 cfs @ 12.41 hrs, Volume= 1.349 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 431.75' @ 12.41 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	428.07'	**12.0" Round CMP_Round 12"** L= 50.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 428.07' / 425.62' S= 0.0490 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 0.79 sf
#2	Primary	431.67'	**90.0' long (Profile 5) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 2.79 2.93 3.06

Primary OutFlow Max=10.49 cfs @ 12.41 hrs HW=431.75' (Free Discharge)
1=CMP_Round 12" (Barrel Controls 5.14 cfs @ 6.55 fps)
2=Broad-Crested Rectangular Weir (Weir Controls 5.35 cfs @ 0.77 fps)

Summary for Subcatchment 1S: ON-SITE to N. WETLAND

Runoff = 18.56 cfs @ 12.14 hrs, Volume= 1.533 af, Depth> 2.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=7.66"

Area (sf)	CN	Description
9,912	30	Woods, Good, HSG A
214,361	55	Woods, Good, HSG B
55,556	77	Woods, Good, HSG D
279,829	58	Weighted Average
279,829		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	373	0.0844	0.69		**Lag/CN Method,**

Summary for Subcatchment 2S: ON-SITE to S. WETLAND

Runoff = 14.28 cfs @ 12.24 hrs, Volume= 1.534 af, Depth> 1.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=7.66"

Area (sf)	CN	Description
113,545	30	Woods, Good, HSG A
291,277	55	Woods, Good, HSG B
8,892	77	Woods, Good, HSG D
413,714	49	Weighted Average
413,714		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.1	533	0.0841	0.59		**Lag/CN Method,**

Summary for Subcatchment 3S: ON-SITE SOUTH

Runoff = 0.63 cfs @ 12.38 hrs, Volume= 0.110 af, Depth> 0.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=7.66"

Area (sf)	CN	Description
49,640	30	Woods, Good, HSG A
18,071	55	Woods, Good, HSG B
237	77	Woods, Good, HSG D
67,948	37	Weighted Average
67,948		100.00% Pervious Area

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

Summary for Subcatchment 11S: OFF-SITE NORTH

Runoff = 134.05 cfs @ 12.88 hrs, Volume= 24.980 af, Depth> 2.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=7.66"

	Area (ac)	CN	Description
*	13.700	80	Industrial developed
	76.800	55	Woods, Good, HSG B
	11.900	61	>75% Grass cover, Good, HSG B
	102.400	59	Weighted Average
	102.400		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
61.4	3,373	0.0590	0.91		**Lag/CN Method,**

Summary for Subcatchment 12S: OFF-SITE SOUTH

Runoff = 11.11 cfs @ 12.39 hrs, Volume= 1.354 af, Depth> 2.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=7.66"

Area (sf)	CN	Description
211,161	55	Woods, Good, HSG B
37,264	77	Woods, Good, HSG D
248,425	58	Weighted Average
248,425		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.3	1,600	0.1030	1.02		**Lag/CN Method,**

Summary for Subcatchment 13S: OFF-SITE SOUTH

Runoff = 65.68 cfs @ 12.39 hrs, Volume= 8.009 af, Depth> 2.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=7.66"

Area (sf)	CN	Description
1,248,574	55	Woods, Good, HSG B
220,337	77	Woods, Good, HSG D
1,468,911	58	Weighted Average
1,468,911		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.3	1,600	0.1030	1.02		**Lag/CN Method,**

Summary for Subcatchment 14S: OFF-SITE SOUTH

Runoff = 14.05 cfs @ 12.39 hrs, Volume= 1.713 af, Depth> 2.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=7.66"

Area (sf)	CN	Description
267,034	55	Woods, Good, HSG B
47,124	77	Woods, Good, HSG D
314,158	58	Weighted Average
314,158		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.3	1,600	0.1030	1.02		**Lag/CN Method,**

Summary for Subcatchment 15S: most southerly culvert

Runoff = 18.08 cfs @ 12.39 hrs, Volume= 2.205 af, Depth> 2.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=7.66"

Area (sf)	CN	Description
343,695	55	Woods, Good, HSG B
60,652	77	Woods, Good, HSG D
404,347	58	Weighted Average
404,347		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.3	1,600	0.1030	1.02		**Lag/CN Method,**

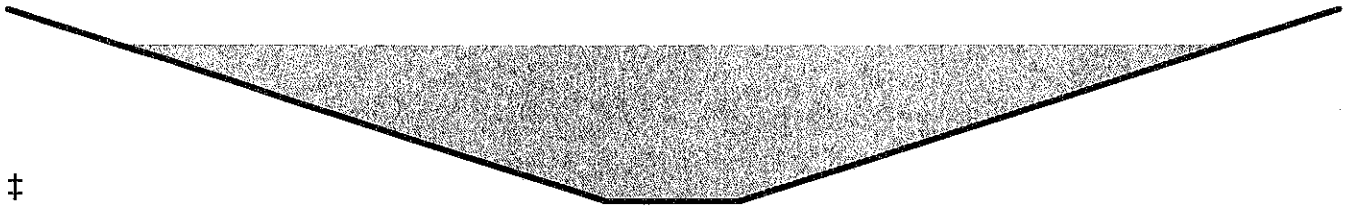
Summary for Reach 1R: 4' STREAM

Inflow Area = 108.103 ac, 0.00% Impervious, Inflow Depth > 2.89" for 100-yr event
Inflow = 138.34 cfs @ 12.86 hrs, Volume= 25.997 af, Incl. 0.30 cfs Inflow Loss
Outflow = 138.12 cfs @ 12.89 hrs, Volume= 25.964 af, Atten= 0%, Lag= 2.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.05 fps, Min. Travel Time= 1.3 min
Avg. Velocity = 3.39 fps, Avg. Travel Time= 2.4 min

Peak Storage= 11,009 cf @ 12.88 hrs
Average Depth at Peak Storage= 1.22'
Bank-Full Depth= 1.50' Flow Area= 33.0 sf, Capacity= 226.25 cfs

4.00' x 1.50' deep channel, n= 0.033 Stream, clean & straight
Side Slope Z-value= 12.0 '/' Top Width= 40.00'
Length= 482.0' Slope= 0.0301 '/'
Inlet Invert= 448.00', Outlet Invert= 433.50'



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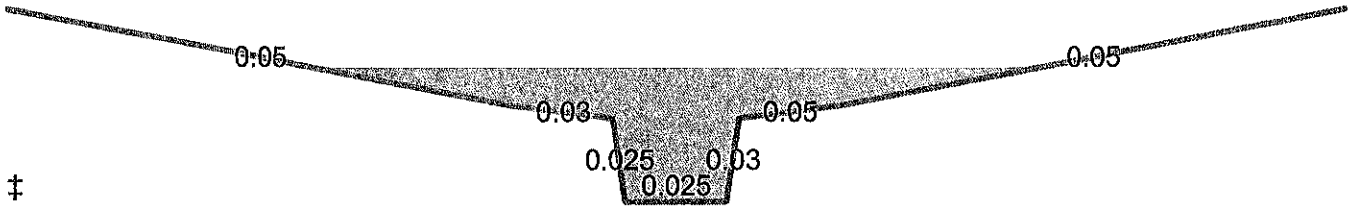
Summary for Reach 3R: 4' STREAM

Inflow Area = 114.527 ac, 0.00% Impervious, Inflow Depth > 2.81" for 100-yr event
Inflow = 139.83 cfs @ 12.96 hrs, Volume= 26.791 af, Incl. 0.30 cfs Inflow Loss
Outflow = 139.57 cfs @ 13.00 hrs, Volume= 26.772 af, Atten= 0%, Lag= 2.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 8.20 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 5.28 fps, Avg. Travel Time= 1.3 min

Peak Storage= 8,428 cf @ 12.98 hrs
Average Depth at Peak Storage= 2.09'
Bank-Full Depth= 3.00' Flow Area= 57.1 sf, Capacity= 394.92 cfs

Custom cross-section, Length= 421.0' Slope= 0.0190 '/' (101 Elevation Intervals)
Flow calculated by Manning's Subdivision method
Inlet Invert= 420.36', Outlet Invert= 412.34'



‡

Offset (feet)	Elevation (feet)	Chan.Depth (feet)	n	Description
0.00	3.00	0.00		
20.00	1.50	1.50	0.050	
24.00	1.30	1.70	0.030	Short grass
24.50	0.00	3.00	0.025	Earth, clean & winding
28.50	0.00	3.00	0.025	
29.00	1.30	1.70	0.030	
33.00	1.50	1.50	0.050	
53.00	3.00	0.00	0.050	

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	4.0	0	0.00
1.30	5.9	6.8	2,463	46.91
1.50	7.6	14.8	3,221	61.50
3.00	57.1	54.9	24,060	394.92

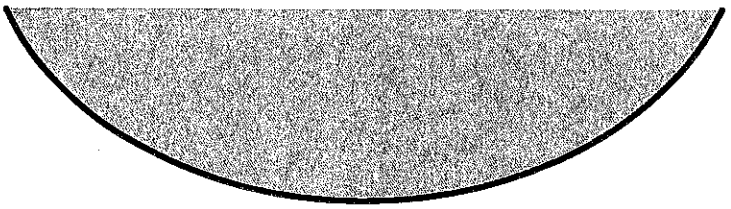
Summary for Reach 5R: NORTH STREAM(DP1)

Inflow Area = 114.527 ac, 0.00% Impervious, Inflow Depth > 2.85" for 100-yr event
Inflow = 140.65 cfs @ 12.89 hrs, Volume= 27.161 af, Incl. 0.30 cfs Inflow Loss
Outflow = 140.13 cfs @ 12.96 hrs, Volume= 27.117 af, Atten= 0%, Lag= 4.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.21 fps, Min. Travel Time= 2.2 min
Avg. Velocity = 3.99 fps, Avg. Travel Time= 2.9 min

Peak Storage= 18,707 cf @ 12.93 hrs
Average Depth at Peak Storage= 7.08'
Bank-Full Depth= 1.00' Flow Area= 2.7 sf, Capacity= 10.29 cfs

4.00' x 1.00' deep Parabolic Channel, n= 0.050 Mountain streams w/large boulders
Length= 695.0' Slope= 0.0348 '/'
Inlet Invert= 458.00', Outlet Invert= 433.82'



Summary for Reach 6R: SOUTH WETLAND (DP2)

Inflow Area = 175.801 ac, 0.00% Impervious, Inflow Depth > 2.75" for 100-yr event
Inflow = 180.43 cfs @ 12.78 hrs, Volume= 40.342 af
Outflow = 180.43 cfs @ 12.78 hrs, Volume= 40.342 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond 5P: CULVERT1

Inflow Area = 102.400 ac, 0.00% Impervious, Inflow Depth > 2.93" for 100-yr event
Inflow = 134.05 cfs @ 12.88 hrs, Volume= 24.980 af
Outflow = 134.05 cfs @ 12.88 hrs, Volume= 24.980 af, Atten= 0%, Lag= 0.0 min
Primary = 134.05 cfs @ 12.88 hrs, Volume= 24.980 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 454.55' @ 12.88 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	451.46'	**24.0" Round CMP_Round 24"** L= 62.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 451.46' / 450.46' S= 0.0161 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 3.14 sf
#2	Primary	454.01'	**105.0' long (Profile 5) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 2.79 2.93 3.06

Primary OutFlow Max=133.78 cfs @ 12.88 hrs HW=454.55' (Free Discharge)
1=CMP_Round 24" (Barrel Controls 16.71 cfs @ 5.32 fps)
2=Broad-Crested Rectangular Weir (Weir Controls 117.07 cfs @ 2.06 fps)

Summary for Pond 7P: CULVERT4

Inflow Area = 7.212 ac, 0.00% Impervious, Inflow Depth > 2.85" for 100-yr event
Inflow = 14.05 cfs @ 12.39 hrs, Volume= 1.713 af
Outflow = 14.05 cfs @ 12.39 hrs, Volume= 1.713 af, Atten= 0%, Lag= 0.0 min
Primary = 14.05 cfs @ 12.39 hrs, Volume= 1.713 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 442.82' @ 12.39 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	441.30'	**12.0" Round RCP_Round 12"** L= 39.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 441.30' / 439.47' S= 0.0469 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Primary	442.71'	**102.0' long (Profile 5) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 2.79 2.93 3.06

Primary OutFlow Max=13.99 cfs @ 12.39 hrs HW=442.82' (Free Discharge)
1=RCP_Round 12" (Inlet Controls 3.82 cfs @ 4.86 fps)
2=Broad-Crested Rectangular Weir (Weir Controls 10.17 cfs @ 0.92 fps)

Summary for Pond 9P: CULVERT2

Inflow Area = 5.703 ac, 0.00% Impervious, Inflow Depth > 2.85" for 100-yr event
Inflow = 11.11 cfs @ 12.39 hrs, Volume= 1.354 af
Outflow = 11.11 cfs @ 12.39 hrs, Volume= 1.354 af, Atten= 0%, Lag= 0.0 min
Primary = 11.11 cfs @ 12.39 hrs, Volume= 1.354 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 447.91' @ 12.39 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	444.77'	**12.0" Round RCP_Round 12"** L= 37.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 444.77' / 443.04' S= 0.0468 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Primary	447.85'	**134.0' long (Profile 5) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 2.79 2.93 3.06

Primary OutFlow Max=10.97 cfs @ 12.39 hrs HW=447.91' (Free Discharge)
1=RCP_Round 12" (Inlet Controls 6.14 cfs @ 7.82 fps)
2=Broad-Crested Rectangular Weir (Weir Controls 4.83 cfs @ 0.65 fps)

Summary for Pond 10P: CULVERT 3

Inflow Area = 33.722 ac, 0.00% Impervious, Inflow Depth > 2.85" for 100-yr event
Inflow = 65.68 cfs @ 12.39 hrs, Volume= 8.009 af
Outflow = 65.68 cfs @ 12.39 hrs, Volume= 8.009 af, Atten= 0%, Lag= 0.0 min
Primary = 65.68 cfs @ 12.39 hrs, Volume= 8.009 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 443.90' @ 12.39 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	441.30'	**12.0" Round RCP_Round 12"** L= 37.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 441.30' / 439.47' S= 0.0495 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Primary	443.55'	**102.0' long (Profile 5) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 2.79 2.93 3.06

Primary OutFlow Max=65.46 cfs @ 12.39 hrs HW=443.90' (Free Discharge)
↑—**1=RCP_Round 12"** (Inlet Controls 5.49 cfs @ 6.98 fps)
└—**2=Broad-Crested Rectangular Weir** (Weir Controls 59.98 cfs @ 1.66 fps)

Summary for Pond 12P: (new Pond)

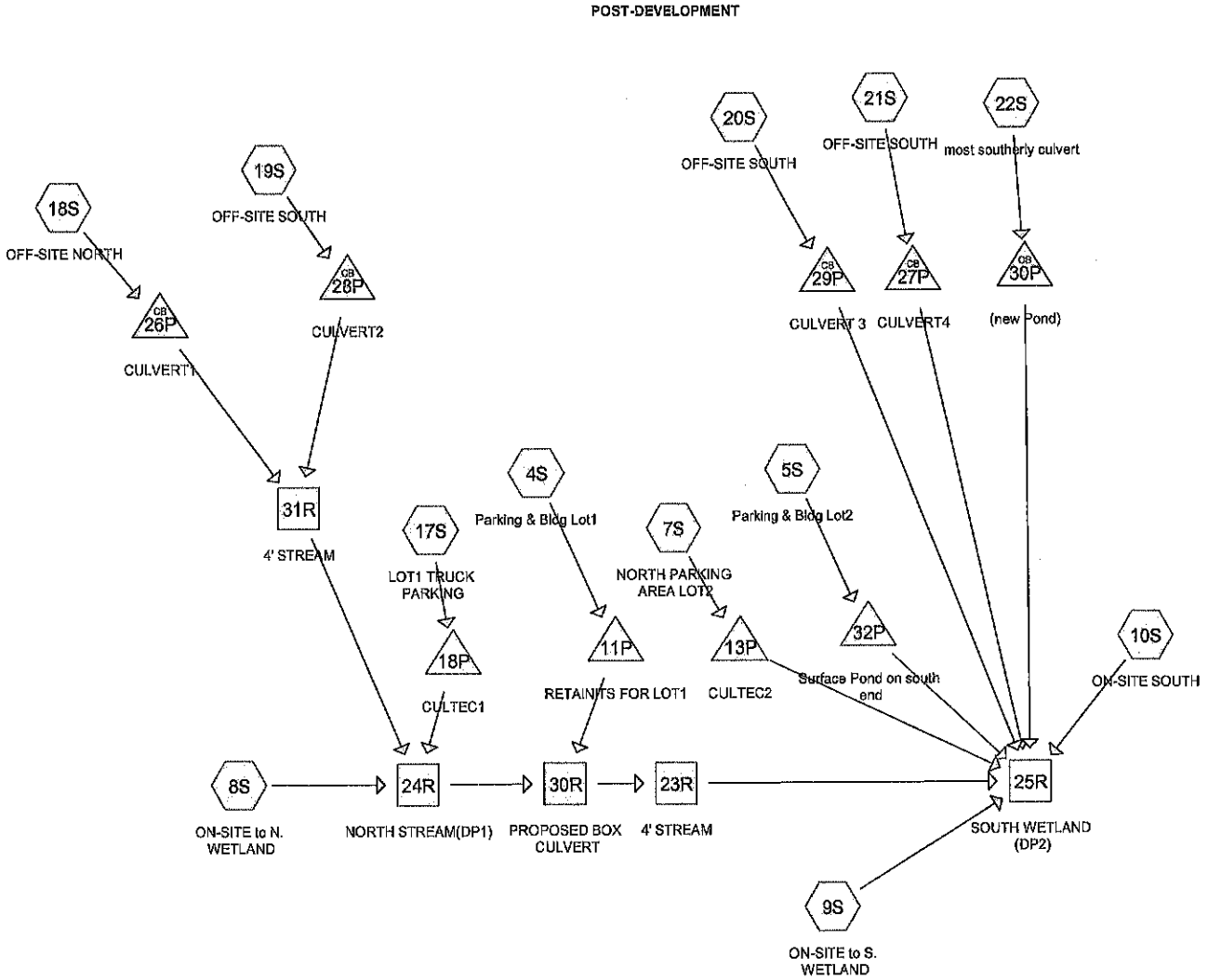
Inflow Area = 9.283 ac, 0.00% Impervious, Inflow Depth > 2.85" for 100-yr event
Inflow = 18.08 cfs @ 12.39 hrs, Volume= 2.205 af
Outflow = 18.08 cfs @ 12.39 hrs, Volume= 2.205 af, Atten= 0%, Lag= 0.0 min
Primary = 18.08 cfs @ 12.39 hrs, Volume= 2.205 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 431.81' @ 12.39 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	428.07'	**12.0" Round CMP_Round 12"** L= 50.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 428.07' / 425.62' S= 0.0490 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 0.79 sf
#2	Primary	431.67'	**90.0' long (Profile 5) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 2.79 2.93 3.06

Primary OutFlow Max=17.97 cfs @ 12.39 hrs HW=431.81' (Free Discharge)
↑—**1=CMP_Round 12"** (Barrel Controls 5.17 cfs @ 6.58 fps)
└—**2=Broad-Crested Rectangular Weir** (Weir Controls 12.80 cfs @ 1.03 fps)

POSTDEVELOPMENT



Routing Diagram for 369 HOLDEN ST - Current 090623
Prepared by THOMPSON-LISTON Associates, Inc., Printed 9/8/2023
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Summary for Subcatchment 4S: Parking & Bldg Lot1

AREAS TO CB1,2,3 & LOT1 ROOF DRAIN

Runoff = 2.13 cfs @ 12.10 hrs, Volume= 0.155 af, Depth> 1.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Rainfall=3.20"

Area (sf)	CN	Description
12,000	98	Roofs, HSG A
27,642	98	Paved parking, HSG D
15,619	39	>75% Grass cover, Good, HSG A
55,261	81	Weighted Average
15,619		28.26% Pervious Area
39,642		71.74% Impervious Area

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

Summary for Subcatchment 5S: Parking & Bldg Lot2

Runoff = 5.77 cfs @ 12.09 hrs, Volume= 0.433 af, Depth> 2.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Rainfall=3.20"

	Area (sf)	CN	Description
*	29,772	98	Paved parking (CB7&8)
*	50,154	98	ROOF
	1,800	61	>75% Grass cover, Good, HSG B
	10,948	61	>75% Grass cover, Good, HSG B
	92,674	93	Weighted Average
	12,748		13.76% Pervious Area
	79,926		86.24% Impervious Area

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

Summary for Subcatchment 7S: NORTH PARKING AREA LOT2

AREAS TO CB5+CB6

Runoff = 1.52 cfs @ 12.09 hrs, Volume= 0.110 af, Depth> 1.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Rainfall=3.20"

Area (sf)	CN	Description
21,266	98	Paved parking, HSG A
10,077	61	>75% Grass cover, Good, HSG B
31,343	86	Weighted Average
10,077		32.15% Pervious Area
21,266		67.85% Impervious Area

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

Summary for Subcatchment 8S: ON-SITE to N. WETLAND

Runoff = 0.98 cfs @ 12.28 hrs, Volume= 0.165 af, Depth> 0.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Rainfall=3.20"

Area (sf)	CN	Description
8,984	30	Woods, Good, HSG A
194,313	55	Woods, Good, HSG B
50,360	77	Woods, Good, HSG D
253,657	58	Weighted Average
253,657		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	373	0.0844	0.69		**Lag/CN Method,**

Summary for Subcatchment 9S: ON-SITE to S. WETLAND

Runoff = 0.08 cfs @ 13.81 hrs, Volume= 0.050 af, Depth> 0.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Rainfall=3.20"

Area (sf)	CN	Description
59,838	30	Woods, Good, HSG A
151,191	55	Woods, Good, HSG B
4,686	77	Woods, Good, HSG D
27,297	55	Woods, Good, HSG B
243,012	49	Weighted Average
243,012		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.1	533	0.0841	0.59		**Lag/CN Method,**

Summary for Subcatchment 10S: ON-SITE SOUTH

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Rainfall=3.20"

Area (sf)	CN	Description
49,640	30	Woods, Good, HSG A
18,071	55	Woods, Good, HSG B
237	77	Woods, Good, HSG D
67,948	37	Weighted Average
67,948		100.00% Pervious Area

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

Summary for Subcatchment 17S: LOT1 TRUCK PARKING

AREA TO GRATE INLET WQU

Runoff = 0.89 cfs @ 12.09 hrs, Volume= 0.064 af, Depth> 1.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Rainfall=3.20"

Area (sf)	CN	Description
14,445	98	Paved parking, HSG A
3,154	39	>75% Grass cover, Good, HSG A
17,599	87	Weighted Average
3,154		17.92% Pervious Area
14,445		82.08% Impervious Area

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

Summary for Subcatchment 18S: OFF-SITE NORTH

Runoff = 10.83 cfs @ 13.08 hrs, Volume= 3.107 af, Depth> 0.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Rainfall=3.20"

	Area (ac)	CN	Description
*	13.700	80	Industrial developed
	76.800	55	Woods, Good, HSG B
	11.900	61	>75% Grass cover, Good, HSG B
	102.400	59	Weighted Average
	102.400		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
61.4	3,373	0.0590	0.91		**Lag/CN Method,**

Summary for Subcatchment 19S: OFF-SITE SOUTH

Runoff = 0.78 cfs @ 12.56 hrs, Volume= 0.160 af, Depth> 0.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Rainfall=3.20"

Area (sf)	CN	Description
211,161	55	Woods, Good, HSG B
37,264	77	Woods, Good, HSG D
248,425	58	Weighted Average
248,425		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.3	1,600	0.1030	1.02		**Lag/CN Method,**

Summary for Subcatchment 20S: OFF-SITE SOUTH

Runoff = 4.61 cfs @ 12.56 hrs, Volume= 0.948 af, Depth> 0.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Rainfall=3.20"

Area (sf)	CN	Description
1,248,574	55	Woods, Good, HSG B
220,337	77	Woods, Good, HSG D
1,468,911	58	Weighted Average
1,468,911		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.3	1,600	0.1030	1.02		**Lag/CN Method,**

Summary for Subcatchment 21S: OFF-SITE SOUTH

Runoff = 0.99 cfs @ 12.56 hrs, Volume= 0.203 af, Depth> 0.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Rainfall=3.20"

Area (sf)	CN	Description
267,034	55	Woods, Good, HSG B
47,124	77	Woods, Good, HSG D
314,158	58	Weighted Average
314,158		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.3	1,600	0.1030	1.02		**Lag/CN Method,**

Summary for Subcatchment 22S: most southerly culvert

Runoff = 1.27 cfs @ 12.56 hrs, Volume= 0.261 af, Depth> 0.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Rainfall=3.20"

Area (sf)	CN	Description
343,695	55	Woods, Good, HSG B
60,652	77	Woods, Good, HSG D
404,347	58	Weighted Average
404,347		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.3	1,600	0.1030	1.02		**Lag/CN Method,**

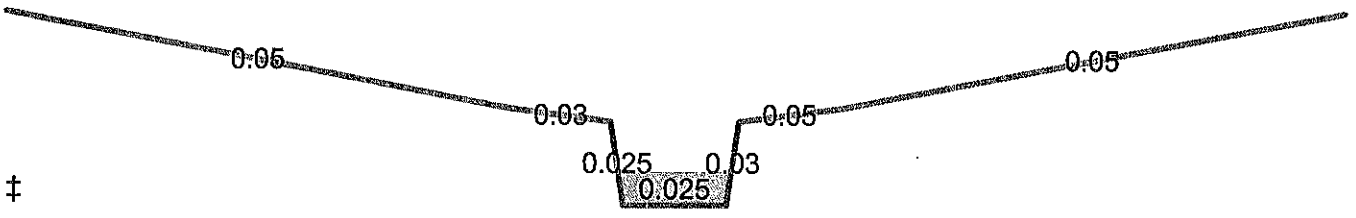
Summary for Reach 23R: 4' STREAM

Inflow Area = 115.599 ac, 1.07% Impervious, Inflow Depth > 0.26" for 2-yr event
Inflow = 10.59 cfs @ 13.23 hrs, Volume= 2.529 af, Incl. 0.30 cfs Inflow Loss
Outflow = 10.58 cfs @ 13.27 hrs, Volume= 2.525 af, Atten= 0%, Lag= 2.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.86 fps, Min. Travel Time= 1.4 min
Avg. Velocity = 2.59 fps, Avg. Travel Time= 2.7 min

Peak Storage= 918 cf @ 13.25 hrs
Average Depth at Peak Storage= 0.52'
Bank-Full Depth= 3.00' Flow Area= 57.1 sf, Capacity= 394.92 cfs

Custom cross-section, Length= 421.0' Slope= 0.0190 '/' (101 Elevation Intervals)
Flow calculated by Manning's Subdivision method
Inlet Invert= 420.36', Outlet Invert= 412.34'



Offset (feet)	Elevation (feet)	Chan.Depth (feet)	n	Description
0.00	3.00	0.00		
20.00	1.50	1.50	0.050	
24.00	1.30	1.70	0.030	Short grass
24.50	0.00	3.00	0.025	Earth, clean & winding
28.50	0.00	3.00	0.025	
29.00	1.30	1.70	0.030	
33.00	1.50	1.50	0.050	
53.00	3.00	0.00	0.050	

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	4.0	0	0.00
1.30	5.9	6.8	2,463	46.91
1.50	7.6	14.8	3,221	61.50
3.00	57.1	54.9	24,060	394.92

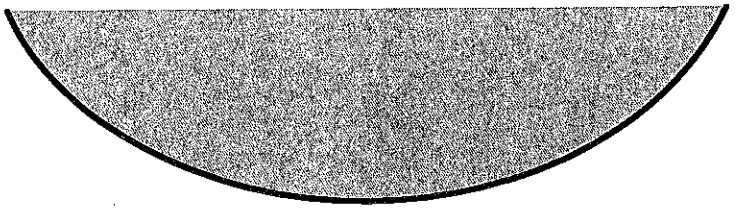
Summary for Reach 24R: NORTH STREAM(DP1)

Inflow Area = 114.330 ac, 0.29% Impervious, Inflow Depth > 0.30" for 2-yr event
Inflow = 10.93 cfs @ 13.15 hrs, Volume= 2.831 af, Incl. 0.30 cfs Inflow Loss
Outflow = 10.90 cfs @ 13.23 hrs, Volume= 2.822 af, Atten= 0%, Lag= 5.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.92 fps, Min. Travel Time= 3.0 min
Avg. Velocity = 2.47 fps, Avg. Travel Time= 4.7 min

Peak Storage= 1,932 cf @ 13.18 hrs
Average Depth at Peak Storage= 1.03'
Bank-Full Depth= 1.00' Flow Area= 2.7 sf, Capacity= 10.29 cfs

4.00' x 1.00' deep Parabolic Channel, n= 0.050 Mountain streams w/large boulders
Length= 695.0' Slope= 0.0348 '/'
Inlet Invert= 458.00', Outlet Invert= 433.82'



Summary for Reach 25R: SOUTH WETLAND (DP2)

Inflow Area = 175.801 ac, 2.03% Impervious, Inflow Depth > 0.27" for 2-yr event
Inflow = 13.79 cfs @ 13.21 hrs, Volume= 3.987 af
Outflow = 13.79 cfs @ 13.21 hrs, Volume= 3.987 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

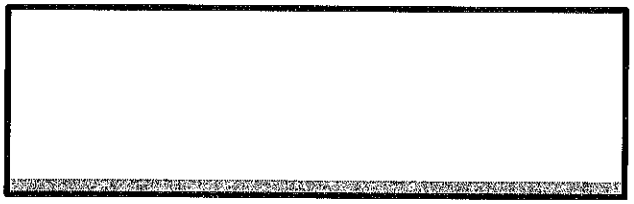
Summary for Reach 30R: PROPOSED BOX CULVERT

Inflow Area = 115.599 ac, 1.07% Impervious, Inflow Depth > 0.29" for 2-yr event
Inflow = 10.90 cfs @ 13.23 hrs, Volume= 2.822 af
Outflow = 10.89 cfs @ 13.23 hrs, Volume= 2.822 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.60 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 2.52 fps, Avg. Travel Time= 0.2 min

Peak Storage= 71 cf @ 13.23 hrs
Average Depth at Peak Storage= 0.24'
Bank-Full Depth= 3.00' Flow Area= 30.0 sf, Capacity= 408.69 cfs

120.0" W x 36.0" H Box Pipe
n= 0.012
Length= 30.0' Slope= 0.0100 '/'
Inlet Invert= 419.30', Outlet Invert= 419.00'



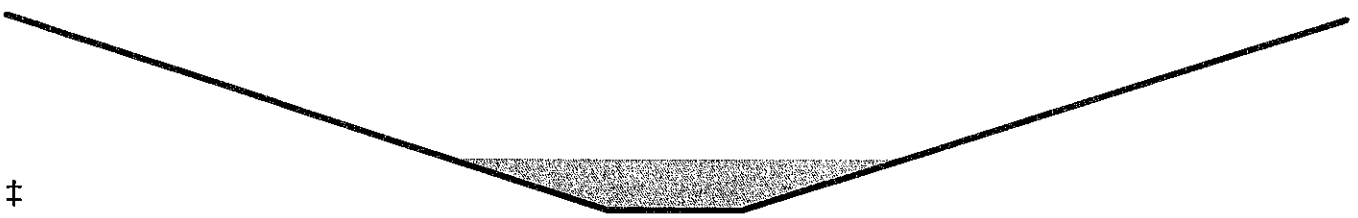
Summary for Reach 31R: 4' STREAM

Inflow Area = 108.103 ac, 0.00% Impervious, Inflow Depth > 0.33" for 2-yr event
Inflow = 10.95 cfs @ 13.07 hrs, Volume= 2.973 af, Incl. 0.30 cfs Inflow Loss
Outflow = 10.92 cfs @ 13.15 hrs, Volume= 2.963 af, Atten= 0%, Lag= 4.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.15 fps, Min. Travel Time= 2.5 min
Avg. Velocity = 2.07 fps, Avg. Travel Time= 3.9 min

Peak Storage= 1,672 cf @ 13.11 hrs
Average Depth at Peak Storage= 0.40'
Bank-Full Depth= 1.50' Flow Area= 33.0 sf, Capacity= 226.25 cfs

4.00' x 1.50' deep channel, n= 0.033 Stream, clean & straight
Side Slope Z-value= 12.0 '/' Top Width= 40.00'
Length= 482.0' Slope= 0.0301 '/'
Inlet Invert= 448.00', Outlet Invert= 433.50'



‡

Summary for Pond 11P: RETAINITS FOR LOT1

ESHGW is 6.0 ft. below natural grade om this area of the site where test holes were excavated. Test holes 1 and 2 are on natural ground of el. 427.97, so ESHGW is at el. 421.97, and the bottom of the pond has been set 4 ft. above that at el. 426.0

Inflow Area =	1.269 ac, 71.74% Impervious, Inflow Depth >	1.47"	for 2-yr event	
Inflow =	2.13 cfs @	12.10 hrs, Volume=	0.155 af	
Outflow =	0.49 cfs @	11.90 hrs, Volume=	0.155 af,	Atten= 77%, Lag= 0.0 min
Discarded =	0.49 cfs @	11.90 hrs, Volume=	0.155 af	
Primary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 427.31' @ 12.53 hrs Surf.Area= 2,537 sf Storage= 1,665 cf
Flood Elev= 433.00' Surf.Area= 2,537 sf Storage= 11,722 cf

Plug-Flow detention time= 22.1 min calculated for 0.155 af (100% of inflow)
Center-of-Mass det. time= 21.5 min (860.4 - 838.9)

Volume	Invert	Avail.Storage	Storage Description
#1	426.00'	1,691 cf	**43.00'W x 59.00'L x 6.67'H Crushed Stone Envelope** 16,922 cf Overall - 12,693 cf Embedded = 4,228 cf x 40.0% Voids
#2	427.00'	9,945 cf	**retain_it retain_it 5.0'** x 35 Inside #1 Inside= 84.0"W x 60.0"H => 36.41 sf x 8.00'L = 291.3 cf Outside= 96.0"W x 68.0"H => 45.33 sf x 8.00'L = 362.7 cf 5 Rows adjusted for 249.4 cf perimeter wall
#3	432.66'	226 cf	**3.00'D x 8.00'H Vertical Cone/Cylinder** x 4 -Impervious
#4	427.00'	161 cf	**4.00'D x 12.80'H Vertical Cone/Cylinder** -Impervious
		12,024 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	426.00'	**8.270 in/hr Exfiltration over Horizontal area**
#2	Primary	432.50'	**12.0" Round Culvert** L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 432.50' / 427.50' S= 0.2000 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Discarded OutFlow Max=0.49 cfs @ 11.90 hrs HW=426.16' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.49 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=426.00' (Free Discharge)
↑**2=Culvert** (Controls 0.00 cfs)

Summary for Pond 13P: CULTEC2

ESHGW depth at Test Pit 8 is 60". Natural grade el. 416.25, so ESHGW el. 411.25. The bottom of the infiltration system is set e minimum of 4 ft. above at el. 415.25

Inflow Area =	0.720 ac, 67.85% Impervious, Inflow Depth >	1.83"	for 2-yr event	
Inflow =	1.52 cfs @	12.09 hrs, Volume=	0.110 af	
Outflow =	0.40 cfs @	11.90 hrs, Volume=	0.110 af,	Atten= 74%, Lag= 0.0 min
Discarded =	0.40 cfs @	11.90 hrs, Volume=	0.110 af	
Primary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 416.35' @ 12.48 hrs Surf.Area= 2,088 sf Storage= 1,016 cf

Plug-Flow detention time= 14.6 min calculated for 0.110 af (100% of inflow)
Center-of-Mass det. time= 14.2 min (836.2 - 822.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	415.25'	2,297 cf	**38.67'W x 54.00'L x 3.54'H Field A** 7,395 cf Overall - 1,653 cf Embedded = 5,742 cf x 40.0% Voids
#2A	416.25'	1,653 cf	**Cultec R-150XLHD** x 60 Inside #1 Effective Size= 29.8"W x 18.0"H => 2.65 sf x 10.25'L = 27.2 cf Overall Size= 33.0"W x 18.5"H x 11.00'L with 0.75' Overlap Row Length Adjustment= +0.75' x 2.65 sf x 12 rows
#3	416.25'	82 cf	**4.00'D x 6.50'H Vertical Cone/Cylinder** -Impervious
		4,031 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	415.25'	**8.270 in/hr Exfiltration over Horizontal area**
#2	Primary	418.75'	**6.0" Round Culvert X 2.00** L= 80.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 418.75' / 416.00' S= 0.0344 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf

Discarded OutFlow Max=0.40 cfs @ 11.90 hrs HW=415.34' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.40 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=415.25' (Free Discharge)
↑**2=Culvert** (Controls 0.00 cfs)

Summary for Pond 18P: CULTEC1

ESHGW is at a depth of 72" in Test Hole #4. Ground surface el, 436.72, so ESHGW el. 430.72. The bottom of the infiltration system is set a minimum of 4 feet above this at el. 435.0

Inflow Area =	0.404 ac, 82.08% Impervious, Inflow Depth > 1.91" for 2-yr event			
Inflow =	0.89 cfs @	12.09 hrs, Volume=	0.064 af	
Outflow =	0.27 cfs @	11.90 hrs, Volume=	0.064 af, Atten= 69%, Lag= 0.0 min	
Discarded =	0.27 cfs @	11.90 hrs, Volume=	0.064 af	
Primary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 435.87' @ 12.43 hrs Surf.Area= 1,422 sf Storage= 495 cf

Plug-Flow detention time= 9.4 min calculated for 0.064 af (100% of inflow)
Center-of-Mass det. time= 9.2 min (827.5 - 818.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	435.00'	1,574 cf	**26.33'W x 54.00'L x 3.54'H Field A** 5,036 cf Overall - 1,102 cf Embedded = 3,934 cf x 40.0% Voids
#2A	436.00'	1,102 cf	**Cultec R-150XLHD** x 40 Inside #1 Effective Size= 29.8"W x 18.0"H => 2.65 sf x 10.25'L = 27.2 cf Overall Size= 33.0"W x 18.5"H x 11.00'L with 0.75' Overlap Row Length Adjustment= +0.75' x 2.65 sf x 8 rows
		2,676 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	435.00'	**8.270 in/hr Exfiltration over Horizontal area**
#2	Primary	437.50'	**6.0" Round Culvert** L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 437.50' / 436.00' S= 0.0600 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf

Discarded OutFlow Max=0.27 cfs @ 11.90 hrs HW=435.04' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.27 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=435.00' (Free Discharge)
└**2=Culvert** (Controls 0.00 cfs)

Summary for Pond 26P: CULVERT1

Inflow Area = 102.400 ac, 0.00% Impervious, Inflow Depth > 0.36" for 2-yr event
Inflow = 10.83 cfs @ 13.08 hrs, Volume= 3.107 af
Outflow = 10.83 cfs @ 13.08 hrs, Volume= 3.107 af, Atten= 0%, Lag= 0.0 min
Primary = 10.83 cfs @ 13.08 hrs, Volume= 3.107 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 453.29' @ 13.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	451.46'	**24.0" Round CMP_Round 24"** L= 62.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 451.46' / 450.46' S= 0.0161 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 3.14 sf
#2	Primary	454.01'	**105.0' long (Profile 5) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 2.79 2.93 3.06

Primary OutFlow Max=10.82 cfs @ 13.08 hrs HW=453.28' (Free Discharge)
├**1=CMP_Round 24"** (Barrel Controls 10.82 cfs @ 4.72 fps)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 27P: CULVERT4

Inflow Area = 7.212 ac, 0.00% Impervious, Inflow Depth > 0.34" for 2-yr event
Inflow = 0.99 cfs @ 12.56 hrs, Volume= 0.203 af
Outflow = 0.99 cfs @ 12.56 hrs, Volume= 0.203 af, Atten= 0%, Lag= 0.0 min
Primary = 0.99 cfs @ 12.56 hrs, Volume= 0.203 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 441.81' @ 12.56 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	441.30'	**12.0" Round RCP_Round 12"** L= 39.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 441.30' / 439.47' S= 0.0469 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Primary	442.71'	**102.0' long (Profile 5) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 2.79 2.93 3.06

Primary OutFlow Max=0.98 cfs @ 12.56 hrs HW=441.81' (Free Discharge)
↑—**1=RCP_Round 12"** (Inlet Controls 0.98 cfs @ 2.43 fps)
└—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 28P: CULVERT2

Inflow Area = 5.703 ac, 0.00% Impervious, Inflow Depth > 0.34" for 2-yr event
Inflow = 0.78 cfs @ 12.56 hrs, Volume= 0.160 af
Outflow = 0.78 cfs @ 12.56 hrs, Volume= 0.160 af, Atten= 0%, Lag= 0.0 min
Primary = 0.78 cfs @ 12.56 hrs, Volume= 0.160 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 445.22' @ 12.56 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	444.77'	**12.0" Round RCP_Round 12"** L= 37.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 444.77' / 443.04' S= 0.0468 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Primary	447.85'	**134.0' long (Profile 5) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 2.79 2.93 3.06

Primary OutFlow Max=0.78 cfs @ 12.56 hrs HW=445.22' (Free Discharge)
↑—**1=RCP_Round 12"** (Inlet Controls 0.78 cfs @ 2.28 fps)
└—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 29P: CULVERT 3

Inflow Area = 33.722 ac, 0.00% Impervious, Inflow Depth > 0.34" for 2-yr event
Inflow = 4.61 cfs @ 12.56 hrs, Volume= 0.948 af
Outflow = 4.61 cfs @ 12.56 hrs, Volume= 0.948 af, Atten= 0%, Lag= 0.0 min
Primary = 4.61 cfs @ 12.56 hrs, Volume= 0.948 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 443.29' @ 12.56 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	441.30'	**12.0" Round RCP_Round 12"** L= 37.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 441.30' / 439.47' S= 0.0495 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Primary	443.55'	**102.0' long (Profile 5) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 2.79 2.93 3.06

Primary OutFlow Max=4.59 cfs @ 12.56 hrs HW=443.28' (Free Discharge)
↑—**1=RCP_Round 12"** (Inlet Controls 4.59 cfs @ 5.85 fps)
└—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 30P: (new Pond)

Inflow Area = 9.283 ac, 0.00% Impervious, Inflow Depth > 0.34" for 2-yr event
Inflow = 1.27 cfs @ 12.56 hrs, Volume= 0.261 af
Outflow = 1.27 cfs @ 12.56 hrs, Volume= 0.261 af, Atten= 0%, Lag= 0.0 min
Primary = 1.27 cfs @ 12.56 hrs, Volume= 0.261 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 428.75' @ 12.56 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	428.07'	**12.0" Round CMP_Round 12"** L= 50.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 428.07' / 425.62' S= 0.0490 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 0.79 sf
#2	Primary	431.67'	**90.0' long (Profile 5) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 2.79 2.93 3.06

Primary OutFlow Max=1.26 cfs @ 12.56 hrs HW=428.75' (Free Discharge)
↑—**1=CMP_Round 12"** (Inlet Controls 1.26 cfs @ 2.22 fps)
└—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 32P: Surface Pond on south end

ESHGW is consistently 4 ft below natural ground throughout the site, in this area, the ground in the center of the pond is el. 419.5, so ESHGW is el. 415.5, and the bottom of pond is set two feet above this at el. 417.5

Inflow Area = 2.128 ac, 86.24% Impervious, Inflow Depth > 2.44" for 2-yr event
Inflow = 5.77 cfs @ 12.09 hrs, Volume= 0.433 af
Outflow = 0.97 cfs @ 12.56 hrs, Volume= 0.433 af, Atten= 83%, Lag= 28.6 min
Discarded = 0.97 cfs @ 12.56 hrs, Volume= 0.433 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Peak Elev= 418.79' @ 12.56 hrs Surf.Area= 5,051 sf Storage= 5,768 cf
Flood Elev= 422.34' Surf.Area= 7,945 sf Storage= 26,479 cf

Plug-Flow detention time= 41.5 min calculated for 0.432 af (100% of inflow)
Center-of-Mass det. time= 40.9 min (833.1 - 792.2)

Volume	Invert	Avail.Storage	Storage Description
#1	417.50'	26,479 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
417.50	3,691	237.5	0	0	3,691
418.00	4,431	256.5	2,028	2,028	4,448
420.00	6,080	293.7	10,468	12,495	6,167
422.00	7,945	331.3	13,983	26,479	8,139

Device	Routing	Invert	Outlet Devices
#1	Discarded	417.50'	**8.270 in/hr Exfiltration over Horizontal area**
#2	Secondary	421.00'	**8.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Discarded OutFlow Max=0.97 cfs @ 12.56 hrs HW=418.79' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.97 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=417.50' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Subcatchment 4S: Parking & Bldg Lot1

AREAS TO CB1,2,3 & LOT1 ROOF DRAIN

Runoff = 4.26 cfs @ 12.09 hrs, Volume= 0.309 af, Depth> 2.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.93"

Area (sf)	CN	Description
12,000	98	Roofs, HSG A
27,642	98	Paved parking, HSG D
15,619	39	>75% Grass cover, Good, HSG A
55,261	81	Weighted Average
15,619		28.26% Pervious Area
39,642		71.74% Impervious Area

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

Summary for Subcatchment 5S: Parking & Bldg Lot2

Runoff = 9.47 cfs @ 12.09 hrs, Volume= 0.732 af, Depth> 4.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.93"

	Area (sf)	CN	Description
*	29,772	98	Paved parking (CB7&8)
*	50,154	98	ROOF
	1,800	61	>75% Grass cover, Good, HSG B
	10,948	61	>75% Grass cover, Good, HSG B
	92,674	93	Weighted Average
	12,748		13.76% Pervious Area
	79,926		86.24% Impervious Area

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

Summary for Subcatchment 7S: NORTH PARKING AREA LOT2

AREAS TO CB5+CB6

Runoff = 2.77 cfs @ 12.09 hrs, Volume= 0.204 af, Depth> 3.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.93"

Area (sf)	CN	Description
21,266	98	Paved parking, HSG A
10,077	61	>75% Grass cover, Good, HSG B
31,343	86	Weighted Average
10,077		32.15% Pervious Area
21,266		67.85% Impervious Area

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

Summary for Subcatchment 8S: ON-SITE to N. WETLAND

Runoff = 5.86 cfs @ 12.15 hrs, Volume= 0.547 af, Depth> 1.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.93"

Area (sf)	CN	Description
8,984	30	Woods, Good, HSG A
194,313	55	Woods, Good, HSG B
50,360	77	Woods, Good, HSG D
253,657	58	Weighted Average
253,657		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	373	0.0844	0.69		**Lag/CN Method,**

Summary for Subcatchment 9S: ON-SITE to S. WETLAND

Runoff = 1.76 cfs @ 12.34 hrs, Volume= 0.283 af, Depth> 0.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.93"

Area (sf)	CN	Description
59,838	30	Woods, Good, HSG A
151,191	55	Woods, Good, HSG B
4,686	77	Woods, Good, HSG D
27,297	55	Woods, Good, HSG B
243,012	49	Weighted Average
243,012		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.1	533	0.0841	0.59		**Lag/CN Method,**

Summary for Subcatchment 10S: ON-SITE SOUTH

Runoff = 0.03 cfs @ 14.81 hrs, Volume= 0.016 af, Depth> 0.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.93"

Area (sf)	CN	Description
49,640	30	Woods, Good, HSG A
18,071	55	Woods, Good, HSG B
237	77	Woods, Good, HSG D
67,948	37	Weighted Average
67,948		100.00% Pervious Area

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

Summary for Subcatchment 17S: LOT1 TRUCK PARKING

AREA TO GRATE INLET WQU

Runoff = 1.59 cfs @ 12.09 hrs, Volume= 0.118 af, Depth> 3.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.93"

Area (sf)	CN	Description
14,445	98	Paved parking, HSG A
3,154	39	>75% Grass cover, Good, HSG A
17,599	87	Weighted Average
3,154		17.92% Pervious Area
14,445		82.08% Impervious Area

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

Summary for Subcatchment 18S: OFF-SITE NORTH

Runoff = 48.32 cfs @ 12.92 hrs, Volume= 9.997 af, Depth> 1.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.93"

	Area (ac)	CN	Description
*	13.700	80	Industrial developed
	76.800	55	Woods, Good, HSG B
	11.900	61	>75% Grass cover, Good, HSG B
	102.400	59	Weighted Average
	102.400		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
61.4	3,373	0.0590	0.91		**Lag/CN Method,**

Summary for Subcatchment 19S: OFF-SITE SOUTH

Runoff = 3.88 cfs @ 12.43 hrs, Volume= 0.533 af, Depth> 1.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.93"

Area (sf)	CN	Description
211,161	55	Woods, Good, HSG B
37,264	77	Woods, Good, HSG D
248,425	58	Weighted Average
248,425		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.3	1,600	0.1030	1.02		**Lag/CN Method,**

Summary for Subcatchment 20S: OFF-SITE SOUTH

Runoff = 22.97 cfs @ 12.43 hrs, Volume= 3.152 af, Depth> 1.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.93"

Area (sf)	CN	Description
1,248,574	55	Woods, Good, HSG B
220,337	77	Woods, Good, HSG D
1,468,911	58	Weighted Average
1,468,911		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.3	1,600	0.1030	1.02		**Lag/CN Method,**

Summary for Subcatchment 21S: OFF-SITE SOUTH

Runoff = 4.91 cfs @ 12.43 hrs, Volume= 0.674 af, Depth> 1.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.93"

Area (sf)	CN	Description
267,034	55	Woods, Good, HSG B
47,124	77	Woods, Good, HSG D
314,158	58	Weighted Average
314,158		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.3	1,600	0.1030	1.02		**Lag/CN Method,**

Summary for Subcatchment 22S: most southerly culvert

Runoff = 6.32 cfs @ 12.43 hrs, Volume= 0.868 af, Depth> 1.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.93"

Area (sf)	CN	Description
343,695	55	Woods, Good, HSG B
60,652	77	Woods, Good, HSG D
404,347	58	Weighted Average
404,347		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.3	1,600	0.1030	1.02		**Lag/CN Method,**

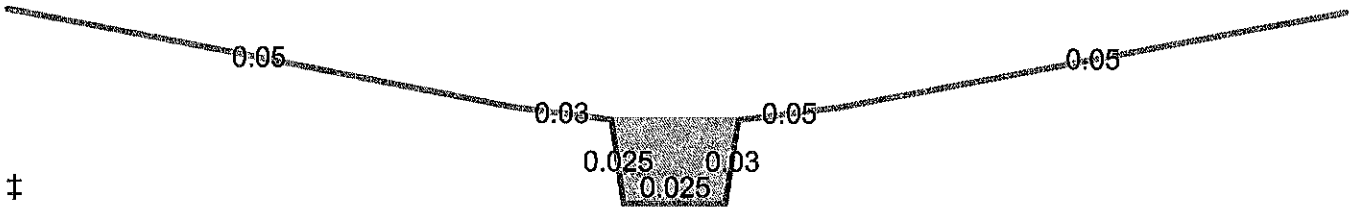
Summary for Reach 23R: 4' STREAM

Inflow Area = 115.599 ac, 1.07% Impervious, Inflow Depth > 1.05" for 10-yr event
Inflow = 49.84 cfs @ 13.04 hrs, Volume= 10.125 af, Incl. 0.30 cfs Inflow Loss
Outflow = 49.77 cfs @ 13.07 hrs, Volume= 10.114 af, Atten= 0%, Lag= 1.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 8.15 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 4.23 fps, Avg. Travel Time= 1.7 min

Peak Storage= 2,574 cf @ 13.05 hrs
Average Depth at Peak Storage= 1.34'
Bank-Full Depth= 3.00' Flow Area= 57.1 sf, Capacity= 394.92 cfs

Custom cross-section, Length= 421.0' Slope= 0.0190 '/' (101 Elevation Intervals)
Flow calculated by Manning's Subdivision method
Inlet Invert= 420.36', Outlet Invert= 412.34'



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Offset (feet)	Elevation (feet)	Chan.Depth (feet)	n	Description
0.00	3.00	0.00		
20.00	1.50	1.50	0.050	
24.00	1.30	1.70	0.030	Short grass
24.50	0.00	3.00	0.025	Earth, clean & winding
28.50	0.00	3.00	0.025	
29.00	1.30	1.70	0.030	
33.00	1.50	1.50	0.050	
53.00	3.00	0.00	0.050	

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	4.0	0	0.00
1.30	5.9	6.8	2,463	46.91
1.50	7.6	14.8	3,221	61.50
3.00	57.1	54.9	24,060	394.92

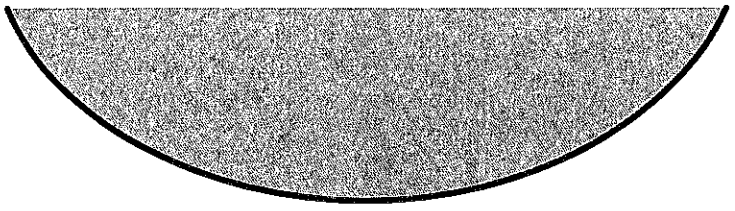
Summary for Reach 24R: NORTH STREAM(DP1)

Inflow Area = 114.330 ac, 0.29% Impervious, Inflow Depth > 1.10" for 10-yr event
Inflow = 50.36 cfs @ 12.96 hrs, Volume= 10.449 af, Incl. 0.30 cfs Inflow Loss
Outflow = 50.14 cfs @ 13.04 hrs, Volume= 10.426 af, Atten= 0%, Lag= 4.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.96 fps, Min. Travel Time= 2.3 min
Avg. Velocity = 3.40 fps, Avg. Travel Time= 3.4 min

Peak Storage= 7,027 cf @ 13.00 hrs
Average Depth at Peak Storage= 2.87'
Bank-Full Depth= 1.00' Flow Area= 2.7 sf, Capacity= 10.29 cfs

4.00' x 1.00' deep Parabolic Channel, n= 0.050 Mountain streams w/large boulders
Length= 695.0' Slope= 0.0348 '/'
Inlet Invert= 458.00', Outlet Invert= 433.82'



Summary for Reach 25R: SOUTH WETLAND (DP2)

Inflow Area = 175.801 ac, 2.03% Impervious, Inflow Depth > 1.03" for 10-yr event
Inflow = 63.36 cfs @ 12.95 hrs, Volume= 15.107 af
Outflow = 63.36 cfs @ 12.95 hrs, Volume= 15.107 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

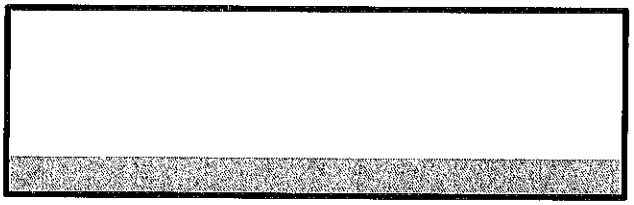
Summary for Reach 30R: PROPOSED BOX CULVERT

Inflow Area = 115.599 ac, 1.07% Impervious, Inflow Depth > 1.08" for 10-yr event
Inflow = 50.14 cfs @ 13.04 hrs, Volume= 10.426 af
Outflow = 50.14 cfs @ 13.04 hrs, Volume= 10.425 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 8.24 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 4.02 fps, Avg. Travel Time= 0.1 min

Peak Storage= 183 cf @ 13.04 hrs
Average Depth at Peak Storage= 0.61'
Bank-Full Depth= 3.00' Flow Area= 30.0 sf, Capacity= 408.69 cfs

120.0" W x 36.0" H Box Pipe
n= 0.012
Length= 30.0' Slope= 0.0100 '/'
Inlet Invert= 419.30', Outlet Invert= 419.00'



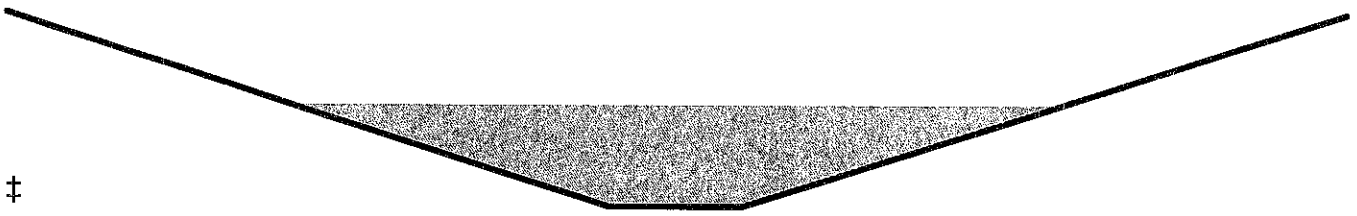
Summary for Reach 31R: 4' STREAM

Inflow Area = 108.103 ac, 0.00% Impervious, Inflow Depth > 1.14" for 10-yr event
Inflow = 49.76 cfs @ 12.91 hrs, Volume= 10.226 af, Incl. 0.30 cfs Inflow Loss
Outflow = 49.60 cfs @ 12.97 hrs, Volume= 10.207 af, Atten= 0%, Lag= 3.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.67 fps, Min. Travel Time= 1.7 min
Avg. Velocity = 2.80 fps, Avg. Travel Time= 2.9 min

Peak Storage= 5,127 cf @ 12.94 hrs
Average Depth at Peak Storage= 0.79'
Bank-Full Depth= 1.50' Flow Area= 33.0 sf, Capacity= 226.25 cfs

4.00' x 1.50' deep channel, n= 0.033 Stream, clean & straight
Side Slope Z-value= 12.0 '/' Top Width= 40.00'
Length= 482.0' Slope= 0.0301 '/'
Inlet Invert= 448.00', Outlet Invert= 433.50'



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Summary for Pond 11P: RETAINITS FOR LOT1

ESHGW is 6.0 ft. below natural grade om this area of the site where test holes were excavated. Test holes 1 and 2 are on natural ground of el. 427.97, so ESHGW is at el. 421.97, and the bottom of the pond has been set 4 ft. above that at el. 426.0

Inflow Area =	1.269 ac, 71.74% Impervious, Inflow Depth >	2.92"	for 10-yr event	
Inflow =	4.26 cfs @	12.09 hrs, Volume=	0.309 af	
Outflow =	0.49 cfs @	11.70 hrs, Volume=	0.308 af,	Atten= 89%, Lag= 0.0 min
Discarded =	0.49 cfs @	11.70 hrs, Volume=	0.308 af	
Primary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 428.78' @ 12.86 hrs Surf.Area= 2,537 sf Storage= 4,780 cf
Flood Elev= 433.00' Surf.Area= 2,537 sf Storage= 11,722 cf

Plug-Flow detention time= 78.1 min calculated for 0.308 af (100% of inflow)
Center-of-Mass det. time= 77.2 min (896.3 - 819.1)

Volume	Invert	Avail.Storage	Storage Description
#1	426.00'	1,691 cf	**43.00'W x 59.00'L x 6.67'H Crushed Stone Envelope** 16,922 cf Overall - 12,693 cf Embedded = 4,228 cf x 40.0% Voids
#2	427.00'	9,945 cf	**retain_it retain_it 5.0'** x 35 Inside #1 Inside= 84.0"W x 60.0"H => 36.41 sf x 8.00'L = 291.3 cf Outside= 96.0"W x 68.0"H => 45.33 sf x 8.00'L = 362.7 cf 5 Rows adjusted for 249.4 cf perimeter wall
#3	432.66'	226 cf	**3.00'D x 8.00'H Vertical Cone/Cylinder** x 4 -Impervious
#4	427.00'	161 cf	**4.00'D x 12.80'H Vertical Cone/Cylinder** -Impervious
		12,024 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	426.00'	**8.270 in/hr Exfiltration over Horizontal area**
#2	Primary	432.50'	**12.0" Round Culvert** L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 432.50' / 427.50' S= 0.2000 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Discarded OutFlow Max=0.49 cfs @ 11.70 hrs HW=426.16' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.49 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=426.00' (Free Discharge)
↑**2=Culvert** (Controls 0.00 cfs)

Summary for Pond 13P: CULTEC2

ESHGW depth at Test Pit 8 is 60". Natural grade el. 416.25, so ESHGW el. 411.25. The bottom of the infiltration system is set e minimum of 4 ft. above at el. 415.25

Inflow Area =	0.720 ac, 67.85% Impervious, Inflow Depth >	3.40"	for 10-yr event	
Inflow =	2.77 cfs @	12.09 hrs, Volume=	0.204 af	
Outflow =	0.40 cfs @	11.70 hrs, Volume=	0.204 af,	Atten= 86%, Lag= 0.0 min
Discarded =	0.40 cfs @	11.70 hrs, Volume=	0.204 af	
Primary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 417.45' @ 12.62 hrs Surf.Area= 2,088 sf Storage= 2,775 cf

Plug-Flow detention time= 47.0 min calculated for 0.203 af (100% of inflow)
Center-of-Mass det. time= 46.6 min (851.1 - 804.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	415.25'	2,297 cf	**38.67'W x 54.00'L x 3.54'H Field A** 7,395 cf Overall - 1,653 cf Embedded = 5,742 cf x 40.0% Voids
#2A	416.25'	1,653 cf	**Cultec R-150XLHD** x 60 Inside #1 Effective Size= 29.8"W x 18.0"H => 2.65 sf x 10.25'L = 27.2 cf Overall Size= 33.0"W x 18.5"H x 11.00'L with 0.75' Overlap Row Length Adjustment= +0.75' x 2.65 sf x 12 rows
#3	416.25'	82 cf	**4.00'D x 6.50'H Vertical Cone/Cylinder** -Impervious
		4,031 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	415.25'	**8.270 in/hr Exfiltration over Horizontal area**
#2	Primary	418.75'	**6.0" Round Culvert X 2.00** L= 80.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 418.75' / 416.00' S= 0.0344 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf

Discarded OutFlow Max=0.40 cfs @ 11.70 hrs HW=415.33' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.40 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=415.25' (Free Discharge)
↑**2=Culvert** (Controls 0.00 cfs)

Summary for Pond 18P: CULTEC1

ESHGW is at a depth of 72" in Test Hole #4. Ground surface el, 436.72, so ESHGW el. 430.72. The bottom of the infiltration system is set a minimum of 4 feet above this at el. 435.0

Inflow Area =	0.404 ac, 82.08% Impervious, Inflow Depth > 3.50" for 10-yr event			
Inflow =	1.59 cfs @	12.09 hrs, Volume=	0.118 af	
Outflow =	0.27 cfs @	11.70 hrs, Volume=	0.118 af, Atten= 83%, Lag= 0.0 min	
Discarded =	0.27 cfs @	11.70 hrs, Volume=	0.118 af	
Primary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 436.77' @ 12.56 hrs Surf.Area= 1,422 sf Storage= 1,443 cf

Plug-Flow detention time= 32.4 min calculated for 0.118 af (100% of inflow)
Center-of-Mass det. time= 32.2 min (833.5 - 801.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	435.00'	1,574 cf	**26.33'W x 54.00'L x 3.54'H Field A** 5,036 cf Overall - 1,102 cf Embedded = 3,934 cf x 40.0% Voids
#2A	436.00'	1,102 cf	**Cultec R-150XLHD** x 40 Inside #1 Effective Size= 29.8"W x 18.0"H => 2.65 sf x 10.25'L = 27.2 cf Overall Size= 33.0"W x 18.5"H x 11.00'L with 0.75' Overlap Row Length Adjustment= +0.75' x 2.65 sf x 8 rows
		2,676 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	435.00'	**8.270 in/hr Exfiltration over Horizontal area**
#2	Primary	437.50'	**6.0" Round Culvert** L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 437.50' / 436.00' S= 0.0600 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf

Discarded OutFlow Max=0.27 cfs @ 11.70 hrs HW=435.04' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.27 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=435.00' (Free Discharge)
└**2=Culvert** (Controls 0.00 cfs)

Summary for Pond 26P: CULVERT1

Inflow Area = 102.400 ac, 0.00% Impervious, Inflow Depth > 1.17" for 10-yr event
Inflow = 48.32 cfs @ 12.92 hrs, Volume= 9.997 af
Outflow = 48.32 cfs @ 12.92 hrs, Volume= 9.997 af, Atten= 0%, Lag= 0.0 min
Primary = 48.32 cfs @ 12.92 hrs, Volume= 9.997 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 454.24' @ 12.92 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	451.46'	**24.0" Round CMP_Round 24"** L= 62.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 451.46' / 450.46' S= 0.0161 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 3.14 sf
#2	Primary	454.01'	**105.0' long (Profile 5) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 2.79 2.93 3.06

Primary OutFlow Max=48.20 cfs @ 12.92 hrs HW=454.24' (Free Discharge)
├**1=CMP_Round 24"** (Barrel Controls 15.43 cfs @ 4.91 fps)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 32.77 cfs @ 1.34 fps)

Summary for Pond 27P: CULVERT4

Inflow Area = 7.212 ac, 0.00% Impervious, Inflow Depth > 1.12" for 10-yr event
Inflow = 4.91 cfs @ 12.43 hrs, Volume= 0.674 af
Outflow = 4.91 cfs @ 12.43 hrs, Volume= 0.674 af, Atten= 0%, Lag= 0.0 min
Primary = 4.91 cfs @ 12.43 hrs, Volume= 0.674 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 442.74' @ 12.43 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	441.30'	**12.0" Round RCP_Round 12"** L= 39.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 441.30' / 439.47' S= 0.0469 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Primary	442.71'	**102.0' long (Profile 5) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 2.79 2.93 3.06

Primary OutFlow Max=4.88 cfs @ 12.43 hrs HW=442.74' (Free Discharge)
↑—**1=RCP_Round 12"** (Inlet Controls 3.66 cfs @ 4.66 fps)
└—**2=Broad-Crested Rectangular Weir** (Weir Controls 1.22 cfs @ 0.45 fps)

Summary for Pond 28P: CULVERT2

Inflow Area = 5.703 ac, 0.00% Impervious, Inflow Depth > 1.12" for 10-yr event
Inflow = 3.88 cfs @ 12.43 hrs, Volume= 0.533 af
Outflow = 3.88 cfs @ 12.43 hrs, Volume= 0.533 af, Atten= 0%, Lag= 0.0 min
Primary = 3.88 cfs @ 12.43 hrs, Volume= 0.533 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 446.33' @ 12.43 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	444.77'	**12.0" Round RCP_Round 12"** L= 37.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 444.77' / 443.04' S= 0.0468 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Primary	447.85'	**134.0' long (Profile 5) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 2.79 2.93 3.06

Primary OutFlow Max=3.87 cfs @ 12.43 hrs HW=446.32' (Free Discharge)
↑—**1=RCP_Round 12"** (Inlet Controls 3.87 cfs @ 4.93 fps)
└—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 29P: CULVERT 3

Inflow Area = 33.722 ac, 0.00% Impervious, Inflow Depth > 1.12" for 10-yr event
Inflow = 22.97 cfs @ 12.43 hrs, Volume= 3.152 af
Outflow = 22.97 cfs @ 12.43 hrs, Volume= 3.152 af, Atten= 0%, Lag= 0.0 min
Primary = 22.97 cfs @ 12.43 hrs, Volume= 3.152 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 443.71' @ 12.43 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	441.30'	**12.0" Round RCP_Round 12"** L= 37.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 441.30' / 439.47' S= 0.0495 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Primary	443.55'	**102.0' long (Profile 5) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 2.79 2.93 3.06

Primary OutFlow Max=22.87 cfs @ 12.43 hrs HW=443.71' (Free Discharge)
↑—**1=RCP_Round 12"** (Inlet Controls 5.22 cfs @ 6.65 fps)
└—**2=Broad-Crested Rectangular Weir** (Weir Controls 17.65 cfs @ 1.10 fps)

Summary for Pond 30P: (new Pond)

Inflow Area =	9.283 ac,	0.00% Impervious,	Inflow Depth >	1.12"	for 10-yr event
Inflow =	6.32 cfs @	12.43 hrs, Volume=	0.868 af		
Outflow =	6.32 cfs @	12.43 hrs, Volume=	0.868 af,	Atten= 0%,	Lag= 0.0 min
Primary =	6.32 cfs @	12.43 hrs, Volume=	0.868 af		

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 431.70' @ 12.43 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	428.07'	**12.0" Round CMP_Round 12"** L= 50.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 428.07' / 425.62' S= 0.0490 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 0.79 sf
#2	Primary	431.67'	**90.0' long (Profile 5) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 2.79 2.93 3.06

Primary OutFlow Max=6.10 cfs @ 12.43 hrs HW=431.69' (Free Discharge)
↑—**1=CMP_Round 12"** (Barrel Controls 5.11 cfs @ 6.51 fps)
└—**2=Broad-Crested Rectangular Weir** (Weir Controls 0.98 cfs @ 0.44 fps)

Summary for Pond 32P: Surface Pond on south end

ESHGW is consistently 4 ft below natural ground throughout the site, in this area, the ground in the center of the pond is el. 419.5, so ESHGW is el. 415.5, and the bottom of pond is set two feet above this at el. 417.5

Inflow Area =	2.128 ac,	86.24% Impervious,	Inflow Depth >	4.13"	for 10-yr event
Inflow =	9.47 cfs @	12.09 hrs, Volume=	0.732 af		
Outflow =	1.13 cfs @	12.70 hrs, Volume=	0.731 af,	Atten= 88%,	Lag= 36.6 min
Discarded =	1.13 cfs @	12.70 hrs, Volume=	0.731 af		
Secondary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af		

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Peak Elev= 419.81' @ 12.70 hrs Surf.Area= 5,909 sf Storage= 11,338 cf
Flood Elev= 422.34' Surf.Area= 7,945 sf Storage= 26,479 cf

Plug-Flow detention time= 79.0 min calculated for 0.731 af (100% of inflow)
Center-of-Mass det. time= 78.5 min (856.8 - 778.3)

Volume	Invert	Avail.Storage	Storage Description
#1	417.50'	26,479 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
417.50	3,691	237.5	0	0	3,691
418.00	4,431	256.5	2,028	2,028	4,448
420.00	6,080	293.7	10,468	12,495	6,167
422.00	7,945	331.3	13,983	26,479	8,139

Device	Routing	Invert	Outlet Devices
#1	Discarded	417.50'	**8.270 in/hr Exfiltration over Horizontal area**
#2	Secondary	421.00'	**8.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Discarded OutFlow Max=1.13 cfs @ 12.70 hrs HW=419.81' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 1.13 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=417.50' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Subcatchment 4S: Parking & Bldg Lot1

AREAS TO CB1,2,3 & LOT1 ROOF DRAIN

Runoff = 5.62 cfs @ 12.09 hrs, Volume= 0.410 af, Depth> 3.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Rainfall=6.00"

Area (sf)	CN	Description
12,000	98	Roofs, HSG A
27,642	98	Paved parking, HSG D
15,619	39	>75% Grass cover, Good, HSG A
55,261	81	Weighted Average
15,619		28.26% Pervious Area
39,642		71.74% Impervious Area

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

Summary for Subcatchment 5S: Parking & Bldg Lot2

Runoff = 11.73 cfs @ 12.09 hrs, Volume= 0.918 af, Depth> 5.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Rainfall=6.00"

	Area (sf)	CN	Description
*	29,772	98	Paved parking (CB7&8)
*	50,154	98	ROOF
	1,800	61	>75% Grass cover, Good, HSG B
	10,948	61	>75% Grass cover, Good, HSG B
	92,674	93	Weighted Average
	12,748		13.76% Pervious Area
	79,926		86.24% Impervious Area

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

Summary for Subcatchment 7S: NORTH PARKING AREA LOT2

AREAS TO CB5+CB6

Runoff = 3.55 cfs @ 12.09 hrs, Volume= 0.264 af, Depth> 4.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Rainfall=6.00"

Area (sf)	CN	Description
21,266	98	Paved parking, HSG A
10,077	61	>75% Grass cover, Good, HSG B
31,343	86	Weighted Average
10,077		32.15% Pervious Area
21,266		67.85% Impervious Area

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

Summary for Subcatchment 8S: ON-SITE to N. WETLAND

Runoff = 9.83 cfs @ 12.14 hrs, Volume= 0.851 af, Depth> 1.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Rainfall=6.00"

Area (sf)	CN	Description
8,984	30	Woods, Good, HSG A
194,313	55	Woods, Good, HSG B
50,360	77	Woods, Good, HSG D
253,657	58	Weighted Average
253,657		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	373	0.0844	0.69		**Lag/CN Method,**

Summary for Subcatchment 9S: ON-SITE to S. WETLAND

Runoff = 3.96 cfs @ 12.26 hrs, Volume= 0.496 af, Depth> 1.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Rainfall=6.00"

Area (sf)	CN	Description
59,838	30	Woods, Good, HSG A
151,191	55	Woods, Good, HSG B
4,686	77	Woods, Good, HSG D
27,297	55	Woods, Good, HSG B
243,012	49	Weighted Average
243,012		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.1	533	0.0841	0.59		**Lag/CN Method,**

Summary for Subcatchment 10S: ON-SITE SOUTH

Runoff = 0.15 cfs @ 12.54 hrs, Volume= 0.044 af, Depth> 0.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Rainfall=6.00"

Area (sf)	CN	Description
49,640	30	Woods, Good, HSG A
18,071	55	Woods, Good, HSG B
237	77	Woods, Good, HSG D
67,948	37	Weighted Average
67,948		100.00% Pervious Area

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

Summary for Subcatchment 17S: LOT1 TRUCK PARKING

AREA TO GRATE INLET WQU

Runoff = 2.03 cfs @ 12.09 hrs, Volume= 0.152 af, Depth> 4.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Rainfall=6.00"

Area (sf)	CN	Description
14,445	98	Paved parking, HSG A
3,154	39	>75% Grass cover, Good, HSG A
17,599	87	Weighted Average
3,154		17.92% Pervious Area
14,445		82.08% Impervious Area

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

Summary for Subcatchment 18S: OFF-SITE NORTH

Runoff = 79.35 cfs @ 12.90 hrs, Volume= 15.414 af, Depth> 1.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Rainfall=6.00"

	Area (ac)	CN	Description
*	13.700	80	Industrial developed
	76.800	55	Woods, Good, HSG B
	11.900	61	>75% Grass cover, Good, HSG B
	102.400	59	Weighted Average
	102.400		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
61.4	3,373	0.0590	0.91		**Lag/CN Method,**

Summary for Subcatchment 19S: OFF-SITE SOUTH

Runoff = 6.49 cfs @ 12.41 hrs, Volume= 0.829 af, Depth> 1.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Rainfall=6.00"

Area (sf)	CN	Description
211,161	55	Woods, Good, HSG B
37,264	77	Woods, Good, HSG D
248,425	58	Weighted Average
248,425		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.3	1,600	0.1030	1.02		**Lag/CN Method,**

Summary for Subcatchment 20S: OFF-SITE SOUTH

Runoff = 38.39 cfs @ 12.41 hrs, Volume= 4.902 af, Depth> 1.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Rainfall=6.00"

Area (sf)	CN	Description
1,248,574	55	Woods, Good, HSG B
220,337	77	Woods, Good, HSG D
1,468,911	58	Weighted Average
1,468,911		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.3	1,600	0.1030	1.02		**Lag/CN Method,**

Summary for Subcatchment 21S: OFF-SITE SOUTH

Runoff = 8.21 cfs @ 12.41 hrs, Volume= 1.048 af, Depth> 1.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Rainfall=6.00"

Area (sf)	CN	Description
267,034	55	Woods, Good, HSG B
47,124	77	Woods, Good, HSG D
314,158	58	Weighted Average
314,158		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.3	1,600	0.1030	1.02		**Lag/CN Method,**

Summary for Subcatchment 22S: most southerly culvert

Runoff = 10.57 cfs @ 12.41 hrs, Volume= 1.349 af, Depth> 1.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Rainfall=6.00"

Area (sf)	CN	Description
343,695	55	Woods, Good, HSG B
60,652	77	Woods, Good, HSG D
404,347	58	Weighted Average
404,347		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.3	1,600	0.1030	1.02		**Lag/CN Method,**

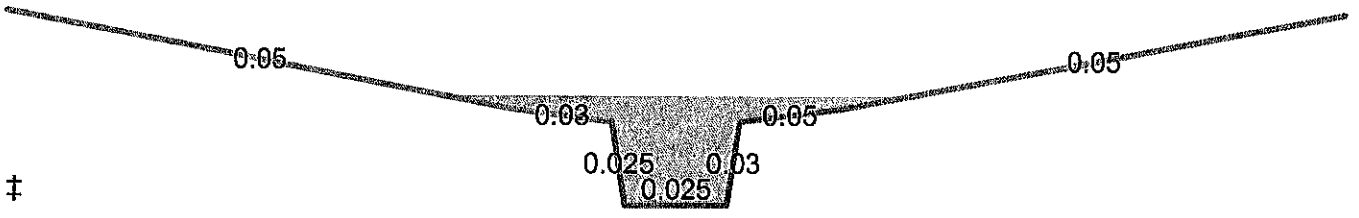
Summary for Reach 23R: 4' STREAM

Inflow Area = 115.599 ac, 1.07% Impervious, Inflow Depth > 1.67" for 25-yr event
Inflow = 82.27 cfs @ 13.00 hrs, Volume= 16.100 af, Incl. 0.30 cfs Inflow Loss
Outflow = 82.11 cfs @ 13.03 hrs, Volume= 16.086 af, Atten= 0%, Lag= 2.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 8.20 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 4.80 fps, Avg. Travel Time= 1.5 min

Peak Storage= 4,576 cf @ 13.02 hrs
Average Depth at Peak Storage= 1.70'
Bank-Full Depth= 3.00' Flow Area= 57.1 sf, Capacity= 394.92 cfs

Custom cross-section, Length= 421.0' Slope= 0.0190 '/' (101 Elevation Intervals)
Flow calculated by Manning's Subdivision method
Inlet Invert= 420.36', Outlet Invert= 412.34'



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Offset (feet)	Elevation (feet)	Chan.Depth (feet)	n	Description
0.00	3.00	0.00		
20.00	1.50	1.50	0.050	
24.00	1.30	1.70	0.030	Short grass
24.50	0.00	3.00	0.025	Earth, clean & winding
28.50	0.00	3.00	0.025	
29.00	1.30	1.70	0.030	
33.00	1.50	1.50	0.050	
53.00	3.00	0.00	0.050	

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	4.0	0	0.00
1.30	5.9	6.8	2,463	46.91
1.50	7.6	14.8	3,221	61.50
3.00	57.1	54.9	24,060	394.92

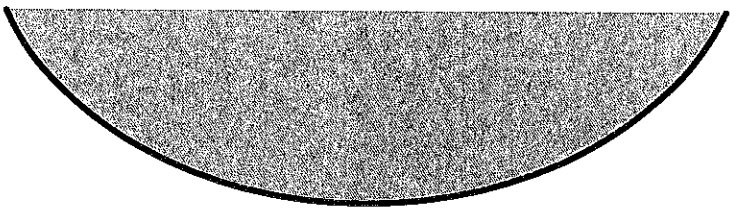
Summary for Reach 24R: NORTH STREAM(DP1)

Inflow Area = 114.330 ac, 0.29% Impervious, Inflow Depth > 1.73" for 25-yr event
Inflow = 82.91 cfs @ 12.93 hrs, Volume= 16.438 af, Incl. 0.30 cfs Inflow Loss
Outflow = 82.58 cfs @ 13.00 hrs, Volume= 16.407 af, Atten= 0%, Lag= 4.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.11 fps, Min. Travel Time= 2.3 min
Avg. Velocity = 3.71 fps, Avg. Travel Time= 3.1 min

Peak Storage= 11,238 cf @ 12.96 hrs
Average Depth at Peak Storage= 4.38'
Bank-Full Depth= 1.00' Flow Area= 2.7 sf, Capacity= 10.29 cfs

4.00' x 1.00' deep Parabolic Channel, n= 0.050 Mountain streams w/large boulders
Length= 695.0' Slope= 0.0348 '/'
Inlet Invert= 458.00', Outlet Invert= 433.82'



Summary for Reach 25R: SOUTH WETLAND (DP2)

Inflow Area = 175.801 ac, 2.03% Impervious, Inflow Depth > 1.63" for 25-yr event
Inflow = 104.41 cfs @ 12.89 hrs, Volume= 23.925 af
Outflow = 104.41 cfs @ 12.89 hrs, Volume= 23.925 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

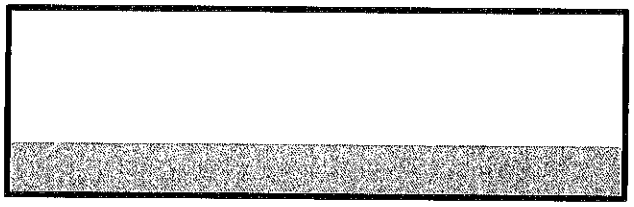
Summary for Reach 30R: PROPOSED BOX CULVERT

Inflow Area = 115.599 ac, 1.07% Impervious, Inflow Depth > 1.70" for 25-yr event
Inflow = 82.58 cfs @ 13.00 hrs, Volume= 16.407 af
Outflow = 82.57 cfs @ 13.00 hrs, Volume= 16.406 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 9.90 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 4.69 fps, Avg. Travel Time= 0.1 min

Peak Storage= 250 cf @ 13.00 hrs
Average Depth at Peak Storage= 0.83'
Bank-Full Depth= 3.00' Flow Area= 30.0 sf, Capacity= 408.69 cfs

120.0" W x 36.0" H Box Pipe
n= 0.012
Length= 30.0' Slope= 0.0100 '/'
Inlet Invert= 419.30', Outlet Invert= 419.00'



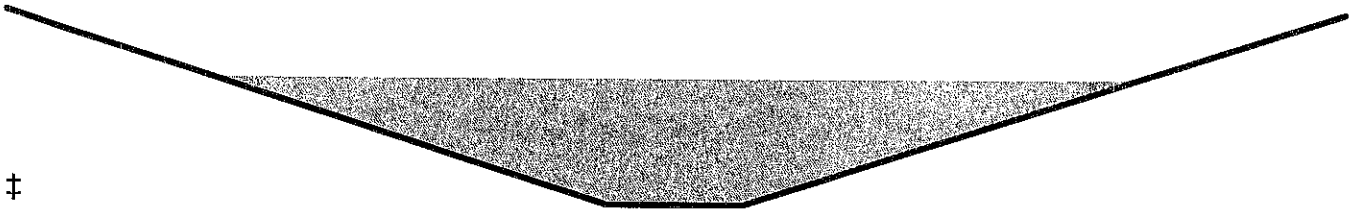
Summary for Reach 31R: 4' STREAM

Inflow Area = 108.103 ac, 0.00% Impervious, Inflow Depth > 1.77" for 25-yr event
Inflow = 81.85 cfs @ 12.89 hrs, Volume= 15.927 af, Incl. 0.30 cfs Inflow Loss
Outflow = 81.60 cfs @ 12.93 hrs, Volume= 15.902 af, Atten= 0%, Lag= 2.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.30 fps, Min. Travel Time= 1.5 min
Avg. Velocity = 3.08 fps, Avg. Travel Time= 2.6 min

Peak Storage= 7,432 cf @ 12.90 hrs
Average Depth at Peak Storage= 0.98'
Bank-Full Depth= 1.50' Flow Area= 33.0 sf, Capacity= 226.25 cfs

4.00' x 1.50' deep channel, n= 0.033 Stream, clean & straight
Side Slope Z-value= 12.0 '/' Top Width= 40.00'
Length= 482.0' Slope= 0.0301 '/'
Inlet Invert= 448.00', Outlet Invert= 433.50'



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Summary for Pond 11P: RETAINITS FOR LOT1

ESHGW is 6.0 ft. below natural grade om this area of the site where test holes were excavated. Test holes 1 and 2 are on natural ground of el. 427.97, so ESHGW is at el. 421.97, and the bottom of the pond has been set 4 ft. above that at el. 426.0

Inflow Area =	1.269 ac, 71.74% Impervious, Inflow Depth >	3.88"	for	25-yr event
Inflow =	5.62 cfs @	12.09 hrs, Volume=	0.410 af	
Outflow =	0.49 cfs @	11.60 hrs, Volume=	0.410 af,	Atten= 91%, Lag= 0.0 min
Discarded =	0.49 cfs @	11.60 hrs, Volume=	0.410 af	
Primary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 429.86' @ 13.12 hrs Surf.Area= 2,537 sf Storage= 7,072 cf
Flood Elev= 433.00' Surf.Area= 2,537 sf Storage= 11,722 cf

Plug-Flow detention time= 123.5 min calculated for 0.409 af (100% of inflow)
Center-of-Mass det. time= 122.6 min (933.6 - 811.0)

Volume	Invert	Avail.Storage	Storage Description
#1	426.00'	1,691 cf	**43.00'W x 59.00'L x 6.67'H Crushed Stone Envelope** 16,922 cf Overall - 12,693 cf Embedded = 4,228 cf x 40.0% Voids
#2	427.00'	9,945 cf	**retain_it retain_it 5.0'** x 35 Inside #1 Inside= 84.0"W x 60.0"H => 36.41 sf x 8.00'L = 291.3 cf Outside= 96.0"W x 68.0"H => 45.33 sf x 8.00'L = 362.7 cf 5 Rows adjusted for 249.4 cf perimeter wall
#3	432.66'	226 cf	**3.00'D x 8.00'H Vertical Cone/Cylinder** x 4 -Impervious
#4	427.00'	161 cf	**4.00'D x 12.80'H Vertical Cone/Cylinder** -Impervious
		12,024 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	426.00'	**8.270 in/hr Exfiltration over Horizontal area**
#2	Primary	432.50'	**12.0" Round Culvert** L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 432.50' / 427.50' S= 0.2000 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Discarded OutFlow Max=0.49 cfs @ 11.60 hrs HW=426.16' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.49 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=426.00' (Free Discharge)
↑**2=Culvert** (Controls 0.00 cfs)

Summary for Pond 13P: CULTEC2

ESHGW depth at Test Pit 8 is 60". Natural grade el. 416.25, so ESHGW el. 411.25. The bottom of the infiltration system is set e minimum of 4 ft. above at el. 415.25

Inflow Area =	0.720 ac, 67.85% Impervious, Inflow Depth >	4.41"	for	25-yr event
Inflow =	3.55 cfs @	12.09 hrs, Volume=	0.264 af	
Outflow =	0.41 cfs @	12.75 hrs, Volume=	0.264 af,	Atten= 88%, Lag= 39.8 min
Discarded =	0.40 cfs @	11.65 hrs, Volume=	0.264 af	
Primary =	0.01 cfs @	12.75 hrs, Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 418.80' @ 12.76 hrs Surf.Area= 2,088 sf Storage= 3,982 cf

Plug-Flow detention time= 72.8 min calculated for 0.264 af (100% of inflow)
Center-of-Mass det. time= 72.4 min (869.7 - 797.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	415.25'	2,297 cf	**38.67'W x 54.00'L x 3.54'H Field A** 7,395 cf Overall - 1,653 cf Embedded = 5,742 cf x 40.0% Voids
#2A	416.25'	1,653 cf	**Cultec R-150XLHD** x 60 Inside #1 Effective Size= 29.8"W x 18.0"H => 2.65 sf x 10.25'L = 27.2 cf Overall Size= 33.0"W x 18.5"H x 11.00'L with 0.75' Overlap Row Length Adjustment= +0.75' x 2.65 sf x 12 rows
#3	416.25'	82 cf	**4.00'D x 6.50'H Vertical Cone/Cylinder** -Impervious
		4,031 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	415.25'	**8.270 in/hr Exfiltration over Horizontal area**
#2	Primary	418.75'	**6.0" Round Culvert X 2.00** L= 80.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 418.75' / 416.00' S= 0.0344 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf

Discarded OutFlow Max=0.40 cfs @ 11.65 hrs HW=415.34' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.40 cfs)

Primary OutFlow Max=0.01 cfs @ 12.75 hrs HW=418.80' (Free Discharge)
↑**2=Culvert** (Inlet Controls 0.01 cfs @ 0.73 fps)

Summary for Pond 18P: CULTEC1

ESHGW is at a depth of 72" in Test Hole #4. Ground surface el, 436.72, so ESHGW el. 430.72. The bottom of the infiltration system is set a minimum of 4 feet above this at el. 435.0

Inflow Area =	0.404 ac, 82.08% Impervious, Inflow Depth > 4.51" for 25-yr event			
Inflow =	2.03 cfs @	12.09 hrs, Volume=	0.152 af	
Outflow =	0.27 cfs @	12.64 hrs, Volume=	0.152 af, Atten= 86%, Lag= 32.8 min	
Discarded =	0.27 cfs @	11.65 hrs, Volume=	0.152 af	
Primary =	0.00 cfs @	12.64 hrs, Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 437.52' @ 12.64 hrs Surf.Area= 1,422 sf Storage= 2,096 cf

Plug-Flow detention time= 51.4 min calculated for 0.152 af (100% of inflow)
Center-of-Mass det. time= 51.2 min (845.4 - 794.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	435.00'	1,574 cf	**26.33'W x 54.00'L x 3.54'H Field A** 5,036 cf Overall - 1,102 cf Embedded = 3,934 cf x 40.0% Voids
#2A	436.00'	1,102 cf	**Cultec R-150XLHD** x 40 Inside #1 Effective Size= 29.8"W x 18.0"H => 2.65 sf x 10.25'L = 27.2 cf Overall Size= 33.0"W x 18.5"H x 11.00'L with 0.75' Overlap Row Length Adjustment= +0.75' x 2.65 sf x 8 rows
		2,676 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	435.00'	**8.270 in/hr Exfiltration over Horizontal area**
#2	Primary	437.50'	**6.0" Round Culvert** L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 437.50' / 436.00' S= 0.0600 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf

Discarded OutFlow Max=0.27 cfs @ 11.65 hrs HW=435.04' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.27 cfs)

Primary OutFlow Max=0.00 cfs @ 12.64 hrs HW=437.52' (Free Discharge)
└**2=Culvert** (Inlet Controls 0.00 cfs @ 0.51 fps)

Summary for Pond 26P: CULVERT1

Inflow Area = 102.400 ac, 0.00% Impervious, Inflow Depth > 1.81" for 25-yr event
Inflow = 79.35 cfs @ 12.90 hrs, Volume= 15.414 af
Outflow = 79.35 cfs @ 12.90 hrs, Volume= 15.414 af, Atten= 0%, Lag= 0.0 min
Primary = 79.35 cfs @ 12.90 hrs, Volume= 15.414 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 454.37' @ 12.90 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	451.46'	**24.0" Round CMP_Round 24"** L= 62.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 451.46' / 450.46' S= 0.0161 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 3.14 sf
#2	Primary	454.01'	**105.0' long (Profile 5) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 2.79 2.93 3.06

Primary OutFlow Max=79.33 cfs @ 12.90 hrs HW=454.37' (Free Discharge)
├**1=CMP_Round 24"** (Barrel Controls 15.98 cfs @ 5.09 fps)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 63.36 cfs @ 1.67 fps)

Summary for Pond 27P: CULVERT4

Inflow Area = 7.212 ac, 0.00% Impervious, Inflow Depth > 1.74" for 25-yr event
Inflow = 8.21 cfs @ 12.41 hrs, Volume= 1.048 af
Outflow = 8.21 cfs @ 12.41 hrs, Volume= 1.048 af, Atten= 0%, Lag= 0.0 min
Primary = 8.21 cfs @ 12.41 hrs, Volume= 1.048 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 442.77' @ 12.41 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	441.30'	**12.0" Round RCP_Round 12"** L= 39.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 441.30' / 439.47' S= 0.0469 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Primary	442.71'	**102.0' long (Profile 5) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 2.79 2.93 3.06

Primary OutFlow Max=8.17 cfs @ 12.41 hrs HW=442.77' (Free Discharge)
↑—**1=RCP_Round 12"** (Inlet Controls 3.73 cfs @ 4.75 fps)
└—**2=Broad-Crested Rectangular Weir** (Weir Controls 4.44 cfs @ 0.70 fps)

Summary for Pond 28P: CULVERT2

Inflow Area = 5.703 ac, 0.00% Impervious, Inflow Depth > 1.74" for 25-yr event
Inflow = 6.49 cfs @ 12.41 hrs, Volume= 0.829 af
Outflow = 6.49 cfs @ 12.41 hrs, Volume= 0.829 af, Atten= 0%, Lag= 0.0 min
Primary = 6.49 cfs @ 12.41 hrs, Volume= 0.829 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 447.86' @ 12.40 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	444.77'	**12.0" Round RCP_Round 12"** L= 37.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 444.77' / 443.04' S= 0.0468 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Primary	447.85'	**134.0' long (Profile 5) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 2.79 2.93 3.06

Primary OutFlow Max=6.26 cfs @ 12.41 hrs HW=447.86' (Free Discharge)
↑—**1=RCP_Round 12"** (Inlet Controls 6.08 cfs @ 7.74 fps)
└—**2=Broad-Crested Rectangular Weir** (Weir Controls 0.17 cfs @ 0.22 fps)

Summary for Pond 29P: CULVERT 3

Inflow Area = 33.722 ac, 0.00% Impervious, Inflow Depth > 1.74" for 25-yr event
Inflow = 38.39 cfs @ 12.41 hrs, Volume= 4.902 af
Outflow = 38.39 cfs @ 12.41 hrs, Volume= 4.902 af, Atten= 0%, Lag= 0.0 min
Primary = 38.39 cfs @ 12.41 hrs, Volume= 4.902 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 443.79' @ 12.41 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	441.30'	**12.0" Round RCP_Round 12"** L= 37.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 441.30' / 439.47' S= 0.0495 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Primary	443.55'	**102.0' long (Profile 5) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 2.79 2.93 3.06

Primary OutFlow Max=38.27 cfs @ 12.41 hrs HW=443.79' (Free Discharge)
↑—**1=RCP_Round 12"** (Inlet Controls 5.33 cfs @ 6.79 fps)
└—**2=Broad-Crested Rectangular Weir** (Weir Controls 32.94 cfs @ 1.36 fps)

Summary for Pond 30P: (new Pond)

Inflow Area =	9.283 ac,	0.00% Impervious,	Inflow Depth >	1.74" for 25-yr event
Inflow =	10.57 cfs @	12.41 hrs, Volume=	1.349 af	
Outflow =	10.57 cfs @	12.41 hrs, Volume=	1.349 af,	Atten= 0%, Lag= 0.0 min
Primary =	10.57 cfs @	12.41 hrs, Volume=	1.349 af	

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 431.75' @ 12.41 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	428.07'	**12.0" Round CMP_Round 12"** L= 50.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 428.07' / 425.62' S= 0.0490 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 0.79 sf
#2	Primary	431.67'	**90.0' long (Profile 5) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 2.79 2.93 3.06

Primary OutFlow Max=10.49 cfs @ 12.41 hrs HW=431.75' (Free Discharge)
↑—**1=CMP_Round 12"** (Barrel Controls 5.14 cfs @ 6.55 fps)
└—**2=Broad-Crested Rectangular Weir** (Weir Controls 5.35 cfs @ 0.77 fps)

Summary for Pond 32P: Surface Pond on south end

ESHGW is consistently 4 ft below natural ground throughout the site, in this area, the ground in the center of the pond is el. 419.5, so ESHGW is el. 415.5, and the bottom of pond is set two feet above this at el. 417.5

Inflow Area =	2.128 ac,	86.24% Impervious,	Inflow Depth >	5.18" for 25-yr event
Inflow =	11.73 cfs @	12.09 hrs, Volume=	0.918 af	
Outflow =	1.23 cfs @	12.82 hrs, Volume=	0.918 af,	Atten= 89%, Lag= 44.0 min
Discarded =	1.23 cfs @	12.82 hrs, Volume=	0.918 af	
Secondary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Peak Elev= 420.41' @ 12.82 hrs Surf.Area= 6,445 sf Storage= 15,084 cf
Flood Elev= 422.34' Surf.Area= 7,945 sf Storage= 26,479 cf

Plug-Flow detention time= 101.6 min calculated for 0.918 af (100% of inflow)
Center-of-Mass det. time= 101.1 min (873.7 - 772.5)

Volume	Invert	Avail.Storage	Storage Description
#1	417.50'	26,479 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
417.50	3,691	237.5	0	0	3,691
418.00	4,431	256.5	2,028	2,028	4,448
420.00	6,080	293.7	10,468	12,495	6,167
422.00	7,945	331.3	13,983	26,479	8,139

Device	Routing	Invert	Outlet Devices
#1	Discarded	417.50'	**8.270 in/hr Exfiltration over Horizontal area**
#2	Secondary	421.00'	**8.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Discarded OutFlow Max=1.23 cfs @ 12.82 hrs HW=420.41' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 1.23 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=417.50' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Subcatchment 4S: Parking & Bldg Lot1

AREAS TO CB1,2,3 & LOT1 ROOF DRAIN

Runoff = 7.76 cfs @ 12.09 hrs, Volume= 0.573 af, Depth> 5.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=7.66"

Area (sf)	CN	Description
12,000	98	Roofs, HSG A
27,642	98	Paved parking, HSG D
15,619	39	>75% Grass cover, Good, HSG A
55,261	81	Weighted Average
15,619		28.26% Pervious Area
39,642		71.74% Impervious Area

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

Summary for Subcatchment 5S: Parking & Bldg Lot2

Runoff = 15.20 cfs @ 12.09 hrs, Volume= 1.209 af, Depth> 6.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=7.66"

	Area (sf)	CN	Description
*	29,772	98	Paved parking (CB7&8)
*	50,154	98	ROOF
	1,800	61	>75% Grass cover, Good, HSG B
	10,948	61	>75% Grass cover, Good, HSG B
	92,674	93	Weighted Average
	12,748		13.76% Pervious Area
	79,926		86.24% Impervious Area

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

Summary for Subcatchment 7S: NORTH PARKING AREA LOT2

AREAS TO CB5+CB6

Runoff = 4.76 cfs @ 12.09 hrs, Volume= 0.360 af, Depth> 6.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=7.66"

Area (sf)	CN	Description
21,266	98	Paved parking, HSG A
10,077	61	>75% Grass cover, Good, HSG B
31,343	86	Weighted Average
10,077		32.15% Pervious Area
21,266		67.85% Impervious Area

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

Summary for Subcatchment 8S: ON-SITE to N. WETLAND

Runoff = 16.83 cfs @ 12.14 hrs, Volume= 1.389 af, Depth> 2.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=7.66"

Area (sf)	CN	Description
8,984	30	Woods, Good, HSG A
194,313	55	Woods, Good, HSG B
50,360	77	Woods, Good, HSG D
253,657	58	Weighted Average
253,657		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	373	0.0844	0.69		**Lag/CN Method,**

Summary for Subcatchment 9S: ON-SITE to S. WETLAND

Runoff = 8.39 cfs @ 12.24 hrs, Volume= 0.901 af, Depth> 1.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=7.66"

Area (sf)	CN	Description
59,838	30	Woods, Good, HSG A
151,191	55	Woods, Good, HSG B
4,686	77	Woods, Good, HSG D
27,297	55	Woods, Good, HSG B
243,012	49	Weighted Average
243,012		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.1	533	0.0841	0.59		**Lag/CN Method,**

Summary for Subcatchment 10S: ON-SITE SOUTH

Runoff = 0.63 cfs @ 12.38 hrs, Volume= 0.110 af, Depth> 0.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=7.66"

Area (sf)	CN	Description
49,640	30	Woods, Good, HSG A
18,071	55	Woods, Good, HSG B
237	77	Woods, Good, HSG D
67,948	37	Weighted Average
67,948		100.00% Pervious Area

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

Summary for Subcatchment 17S: LOT1 TRUCK PARKING

AREA TO GRATE INLET WQU

Runoff = 2.71 cfs @ 12.09 hrs, Volume= 0.206 af, Depth> 6.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=7.66"

Area (sf)	CN	Description
14,445	98	Paved parking, HSG A
3,154	39	>75% Grass cover, Good, HSG A
17,599	87	Weighted Average
3,154		17.92% Pervious Area
14,445		82.08% Impervious Area

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

Summary for Subcatchment 18S: OFF-SITE NORTH

Runoff = 134.05 cfs @ 12.88 hrs, Volume= 24.980 af, Depth> 2.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=7.66"

	Area (ac)	CN	Description
*	13.700	80	Industrial developed
	76.800	55	Woods, Good, HSG B
	11.900	61	>75% Grass cover, Good, HSG B
	102.400	59	Weighted Average
	102.400		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
61.4	3,373	0.0590	0.91		**Lag/CN Method,**

Summary for Subcatchment 19S: OFF-SITE SOUTH

Runoff = 11.11 cfs @ 12.39 hrs, Volume= 1.354 af, Depth> 2.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=7.66"

Area (sf)	CN	Description
211,161	55	Woods, Good, HSG B
37,264	77	Woods, Good, HSG D
248,425	58	Weighted Average
248,425		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.3	1,600	0.1030	1.02		**Lag/CN Method,**

Summary for Subcatchment 20S: OFF-SITE SOUTH

Runoff = 65.68 cfs @ 12.39 hrs, Volume= 8.009 af, Depth> 2.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=7.66"

Area (sf)	CN	Description
1,248,574	55	Woods, Good, HSG B
220,337	77	Woods, Good, HSG D
1,468,911	58	Weighted Average
1,468,911		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.3	1,600	0.1030	1.02		**Lag/CN Method,**

Summary for Subcatchment 21S: OFF-SITE SOUTH

Runoff = 14.05 cfs @ 12.39 hrs, Volume= 1.713 af, Depth> 2.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=7.66"

Area (sf)	CN	Description
267,034	55	Woods, Good, HSG B
47,124	77	Woods, Good, HSG D
314,158	58	Weighted Average
314,158		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.3	1,600	0.1030	1.02		**Lag/CN Method,**

Summary for Subcatchment 22S: most southerly culvert

Runoff = 18.08 cfs @ 12.39 hrs, Volume= 2.205 af, Depth> 2.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=7.66"

Area (sf)	CN	Description
343,695	55	Woods, Good, HSG B
60,652	77	Woods, Good, HSG D
404,347	58	Weighted Average
404,347		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.3	1,600	0.1030	1.02		**Lag/CN Method,**

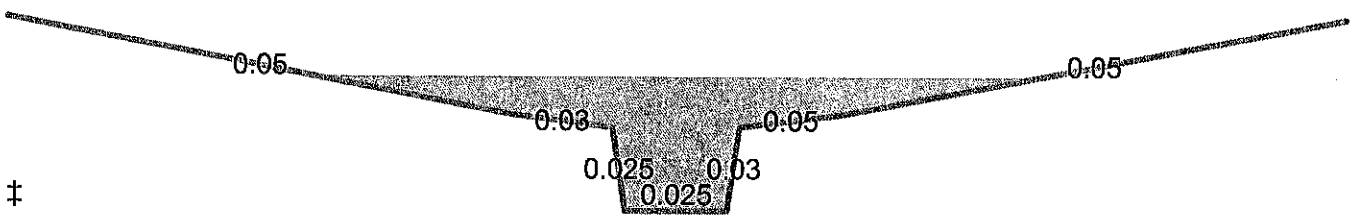
Summary for Reach 23R: 4' STREAM

Inflow Area = 115.599 ac, 1.07% Impervious, Inflow Depth > 2.77" for 100-yr event
Inflow = 139.63 cfs @ 12.96 hrs, Volume= 26.672 af, Incl. 0.30 cfs Inflow Loss
Outflow = 139.38 cfs @ 13.00 hrs, Volume= 26.652 af, Atten= 0%, Lag= 2.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 8.20 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 5.27 fps, Avg. Travel Time= 1.3 min

Peak Storage= 8,415 cf @ 12.98 hrs
Average Depth at Peak Storage= 2.09'
Bank-Full Depth= 3.00' Flow Area= 57.1 sf, Capacity= 394.92 cfs

Custom cross-section, Length= 421.0' Slope= 0.0190 '/' (101 Elevation Intervals)
Flow calculated by Manning's Subdivision method
Inlet Invert= 420.36', Outlet Invert= 412.34'



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Offset (feet)	Elevation (feet)	Chan.Depth (feet)	n	Description
0.00	3.00	0.00		
20.00	1.50	1.50	0.050	
24.00	1.30	1.70	0.030	Short grass
24.50	0.00	3.00	0.025	Earth, clean & winding
28.50	0.00	3.00	0.025	
29.00	1.30	1.70	0.030	
33.00	1.50	1.50	0.050	
53.00	3.00	0.00	0.050	

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	4.0	0	0.00
1.30	5.9	6.8	2,463	46.91
1.50	7.6	14.8	3,221	61.50
3.00	57.1	54.9	24,060	394.92

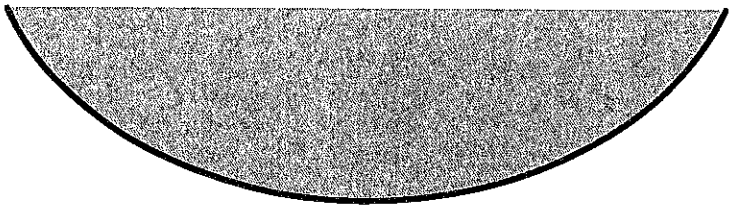
Summary for Reach 24R: NORTH STREAM(DP1)

Inflow Area = 114.330 ac, 0.29% Impervious, Inflow Depth > 2.84" for 100-yr event
Inflow = 140.46 cfs @ 12.89 hrs, Volume= 27.042 af, Incl. 0.30 cfs Inflow Loss
Outflow = 139.94 cfs @ 12.96 hrs, Volume= 26.999 af, Atten= 0%, Lag= 4.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.21 fps, Min. Travel Time= 2.2 min
Avg. Velocity = 3.98 fps, Avg. Travel Time= 2.9 min

Peak Storage= 18,683 cf @ 12.93 hrs
Average Depth at Peak Storage= 7.07'
Bank-Full Depth= 1.00' Flow Area= 2.7 sf, Capacity= 10.29 cfs

4.00' x 1.00' deep Parabolic Channel, n= 0.050 Mountain streams w/large boulders
Length= 695.0' Slope= 0.0348 '/'
Inlet Invert= 458.00', Outlet Invert= 433.82'



Summary for Reach 25R: SOUTH WETLAND (DP2)

Inflow Area = 175.801 ac, 2.03% Impervious, Inflow Depth > 2.71" for 100-yr event
Inflow = 179.32 cfs @ 12.78 hrs, Volume= 39.685 af
Outflow = 179.32 cfs @ 12.78 hrs, Volume= 39.685 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

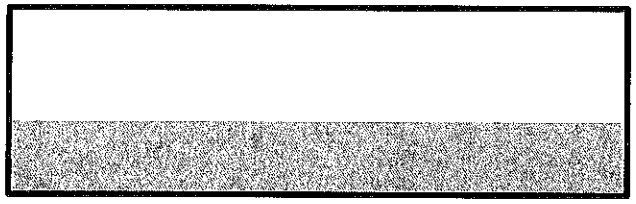
Summary for Reach 30R: PROPOSED BOX CULVERT

Inflow Area = 115.599 ac, 1.07% Impervious, Inflow Depth > 2.80" for 100-yr event
Inflow = 139.94 cfs @ 12.96 hrs, Volume= 26.999 af
Outflow = 139.93 cfs @ 12.96 hrs, Volume= 26.997 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 11.95 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 5.43 fps, Avg. Travel Time= 0.1 min

Peak Storage= 351 cf @ 12.96 hrs
Average Depth at Peak Storage= 1.17'
Bank-Full Depth= 3.00' Flow Area= 30.0 sf, Capacity= 408.69 cfs

120.0" W x 36.0" H Box Pipe
n= 0.012
Length= 30.0' Slope= 0.0100 '/'
Inlet Invert= 419.30', Outlet Invert= 419.00'



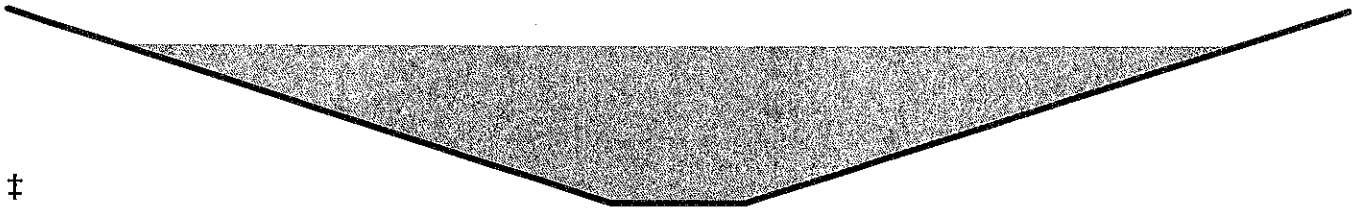
Summary for Reach 31R: 4' STREAM

Inflow Area = 108.103 ac, 0.00% Impervious, Inflow Depth > 2.89" for 100-yr event
Inflow = 138.34 cfs @ 12.86 hrs, Volume= 25.997 af, Incl. 0.30 cfs Inflow Loss
Outflow = 138.12 cfs @ 12.89 hrs, Volume= 25.964 af, Atten= 0%, Lag= 2.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.05 fps, Min. Travel Time= 1.3 min
Avg. Velocity = 3.39 fps, Avg. Travel Time= 2.4 min

Peak Storage= 11,009 cf @ 12.88 hrs
Average Depth at Peak Storage= 1.22'
Bank-Full Depth= 1.50' Flow Area= 33.0 sf, Capacity= 226.25 cfs

4.00' x 1.50' deep channel, n= 0.033 Stream, clean & straight
Side Slope Z-value= 12.0 '/' Top Width= 40.00'
Length= 482.0' Slope= 0.0301 '/'
Inlet Invert= 448.00', Outlet Invert= 433.50'



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Summary for Pond 11P: RETAINITS FOR LOT1

ESHGW is 6.0 ft. below natural grade om this area of the site where test holes were excavated. Test holes 1 and 2 are on natural ground of el. 427.97, so ESHGW is at el. 421.97, and the bottom of the pond has been set 4 ft. above that at el. 426.0

Inflow Area =	1.269 ac, 71.74% Impervious, Inflow Depth > 5.42"	for 100-yr event		
Inflow =	7.76 cfs @	12.09 hrs, Volume=	0.573 af	
Outflow =	0.49 cfs @	11.25 hrs, Volume=	0.572 af, Atten= 94%, Lag= 0.0 min	
Discarded =	0.49 cfs @	11.25 hrs, Volume=	0.572 af	
Primary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 431.78' @ 13.87 hrs Surf.Area= 2,537 sf Storage= 11,156 cf
Flood Elev= 433.00' Surf.Area= 2,537 sf Storage= 11,722 cf

Plug-Flow detention time= 206.7 min calculated for 0.570 af (100% of inflow)
Center-of-Mass det. time= 205.1 min (1,006.7 - 801.6)

Volume	Invert	Avail.Storage	Storage Description
#1	426.00'	1,691 cf	**43.00'W x 59.00'L x 6.67'H Crushed Stone Envelope** 16,922 cf Overall - 12,693 cf Embedded = 4,228 cf x 40.0% Voids
#2	427.00'	9,945 cf	**retain_it retain_it 5.0'** x 35 Inside #1 Inside= 84.0"W x 60.0"H => 36.41 sf x 8.00'L = 291.3 cf Outside= 96.0"W x 68.0"H => 45.33 sf x 8.00'L = 362.7 cf 5 Rows adjusted for 249.4 cf perimeter wall
#3	432.66'	226 cf	**3.00'D x 8.00'H Vertical Cone/Cylinder** x 4 -Impervious
#4	427.00'	161 cf	**4.00'D x 12.80'H Vertical Cone/Cylinder** -Impervious
		12,024 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	426.00'	**8.270 in/hr Exfiltration over Horizontal area**
#2	Primary	432.50'	**12.0" Round Culvert** L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 432.50' / 427.50' S= 0.2000 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Discarded OutFlow Max=0.49 cfs @ 11.25 hrs HW=426.15' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.49 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=426.00' (Free Discharge)
↑**2=Culvert** (Controls 0.00 cfs)

Summary for Pond 13P: CULTEC2

ESHGW depth at Test Pit 8 is 60". Natural grade el. 416.25, so ESHGW el. 411.25. The bottom of the infiltration system is set e minimum of 4 ft. above at el. 415.25

Inflow Area =	0.720 ac, 67.85% Impervious, Inflow Depth > 6.00"	for 100-yr event		
Inflow =	4.76 cfs @	12.09 hrs, Volume=	0.360 af	
Outflow =	2.92 cfs @	12.22 hrs, Volume=	0.359 af, Atten= 39%, Lag= 7.8 min	
Discarded =	0.40 cfs @	11.40 hrs, Volume=	0.312 af	
Primary =	2.52 cfs @	12.22 hrs, Volume=	0.048 af	

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 420.66' @ 12.22 hrs Surf.Area= 2,088 sf Storage= 4,005 cf

Plug-Flow detention time= 65.5 min calculated for 0.359 af (100% of inflow)
Center-of-Mass det. time= 65.2 min (853.9 - 788.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	415.25'	2,297 cf	**38.67'W x 54.00'L x 3.54'H Field A** 7,395 cf Overall - 1,653 cf Embedded = 5,742 cf x 40.0% Voids
#2A	416.25'	1,653 cf	**Cultec R-150XLHD** x 60 Inside #1 Effective Size= 29.8"W x 18.0"H => 2.65 sf x 10.25'L = 27.2 cf Overall Size= 33.0"W x 18.5"H x 11.00'L with 0.75' Overlap Row Length Adjustment= +0.75' x 2.65 sf x 12 rows
#3	416.25'	82 cf	**4.00'D x 6.50'H Vertical Cone/Cylinder** -Impervious
		4,031 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	415.25'	**8.270 in/hr Exfiltration over Horizontal area**
#2	Primary	418.75'	**6.0" Round Culvert X 2.00** L= 80.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 418.75' / 416.00' S= 0.0344 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf

Discarded OutFlow Max=0.40 cfs @ 11.40 hrs HW=415.33' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.40 cfs)

Primary OutFlow Max=2.21 cfs @ 12.22 hrs HW=420.37' (Free Discharge)
└**2=Culvert** (Inlet Controls 2.21 cfs @ 5.63 fps)

Summary for Pond 18P: CULTEC1

ESHGW is at a depth of 72" in Test Hole #4. Ground surface el, 436.72, so ESHGW el. 430.72. The bottom of the infiltration system is set a minimum of 4 feet above this at el. 435.0

Inflow Area =	0.404 ac, 82.08% Impervious, Inflow Depth > 6.11"		for 100-yr event	
Inflow =	2.71 cfs @	12.09 hrs, Volume=	0.206 af	
Outflow =	0.92 cfs @	12.38 hrs, Volume=	0.206 af,	Atten= 66%, Lag= 17.3 min
Discarded =	0.27 cfs @	11.50 hrs, Volume=	0.182 af	
Primary =	0.64 cfs @	12.38 hrs, Volume=	0.024 af	

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 438.21' @ 12.38 hrs Surf.Area= 1,422 sf Storage= 2,490 cf

Plug-Flow detention time= 49.3 min calculated for 0.205 af (100% of inflow)
Center-of-Mass det. time= 49.0 min (834.9 - 785.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	435.00'	1,574 cf	**26.33'W x 54.00'L x 3.54'H Field A** 5,036 cf Overall - 1,102 cf Embedded = 3,934 cf x 40.0% Voids
#2A	436.00'	1,102 cf	**Cultec R-150XLHD** x 40 Inside #1 Effective Size= 29.8"W x 18.0"H => 2.65 sf x 10.25'L = 27.2 cf Overall Size= 33.0"W x 18.5"H x 11.00'L with 0.75' Overlap Row Length Adjustment= +0.75' x 2.65 sf x 8 rows
		2,676 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	435.00'	**8.270 in/hr Exfiltration over Horizontal area**
#2	Primary	437.50'	**6.0" Round Culvert** L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 437.50' / 436.00' S= 0.0600 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf

Discarded OutFlow Max=0.27 cfs @ 11.50 hrs HW=435.04' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.27 cfs)

Primary OutFlow Max=0.64 cfs @ 12.38 hrs HW=438.21' (Free Discharge)
└**2=Culvert** (Inlet Controls 0.64 cfs @ 3.27 fps)

Summary for Pond 26P: CULVERT1

Inflow Area = 102.400 ac, 0.00% Impervious, Inflow Depth > 2.93" for 100-yr event
Inflow = 134.05 cfs @ 12.88 hrs, Volume= 24.980 af
Outflow = 134.05 cfs @ 12.88 hrs, Volume= 24.980 af, Atten= 0%, Lag= 0.0 min
Primary = 134.05 cfs @ 12.88 hrs, Volume= 24.980 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 454.55' @ 12.88 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	451.46'	**24.0" Round CMP_Round 24"** L= 62.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 451.46' / 450.46' S= 0.0161 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 3.14 sf
#2	Primary	454.01'	**105.0' long (Profile 5) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 2.79 2.93 3.06

Primary OutFlow Max=133.78 cfs @ 12.88 hrs HW=454.55' (Free Discharge)
├**1=CMP_Round 24"** (Barrel Controls 16.71 cfs @ 5.32 fps)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 117.07 cfs @ 2.06 fps)

Summary for Pond 27P: CULVERT4

Inflow Area = 7.212 ac, 0.00% Impervious, Inflow Depth > 2.85" for 100-yr event
Inflow = 14.05 cfs @ 12.39 hrs, Volume= 1.713 af
Outflow = 14.05 cfs @ 12.39 hrs, Volume= 1.713 af, Atten= 0%, Lag= 0.0 min
Primary = 14.05 cfs @ 12.39 hrs, Volume= 1.713 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 442.82' @ 12.39 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	441.30'	**12.0" Round RCP_Round 12"** L= 39.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 441.30' / 439.47' S= 0.0469 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Primary	442.71'	**102.0' long (Profile 5) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 2.79 2.93 3.06

Primary OutFlow Max=13.99 cfs @ 12.39 hrs HW=442.82' (Free Discharge)
↑—**1=RCP_Round 12"** (Inlet Controls 3.82 cfs @ 4.86 fps)
└—**2=Broad-Crested Rectangular Weir** (Weir Controls 10.17 cfs @ 0.92 fps)

Summary for Pond 28P: CULVERT2

Inflow Area = 5.703 ac, 0.00% Impervious, Inflow Depth > 2.85" for 100-yr event
Inflow = 11.11 cfs @ 12.39 hrs, Volume= 1.354 af
Outflow = 11.11 cfs @ 12.39 hrs, Volume= 1.354 af, Atten= 0%, Lag= 0.0 min
Primary = 11.11 cfs @ 12.39 hrs, Volume= 1.354 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 447.91' @ 12.39 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	444.77'	**12.0" Round RCP_Round 12"** L= 37.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 444.77' / 443.04' S= 0.0468 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Primary	447.85'	**134.0' long (Profile 5) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 2.79 2.93 3.06

Primary OutFlow Max=10.97 cfs @ 12.39 hrs HW=447.91' (Free Discharge)
↑—**1=RCP_Round 12"** (Inlet Controls 6.14 cfs @ 7.82 fps)
└—**2=Broad-Crested Rectangular Weir** (Weir Controls 4.83 cfs @ 0.65 fps)

Summary for Pond 29P: CULVERT 3

Inflow Area = 33.722 ac, 0.00% Impervious, Inflow Depth > 2.85" for 100-yr event
Inflow = 65.68 cfs @ 12.39 hrs, Volume= 8.009 af
Outflow = 65.68 cfs @ 12.39 hrs, Volume= 8.009 af, Atten= 0%, Lag= 0.0 min
Primary = 65.68 cfs @ 12.39 hrs, Volume= 8.009 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 443.90' @ 12.39 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	441.30'	**12.0" Round RCP_Round 12"** L= 37.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 441.30' / 439.47' S= 0.0495 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Primary	443.55'	**102.0' long (Profile 5) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 2.79 2.93 3.06

Primary OutFlow Max=65.46 cfs @ 12.39 hrs HW=443.90' (Free Discharge)
└**1=RCP_Round 12"** (Inlet Controls 5.49 cfs @ 6.98 fps)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 59.98 cfs @ 1.66 fps)

Summary for Pond 30P: (new Pond)

Inflow Area =	9.283 ac,	0.00% Impervious,	Inflow Depth >	2.85" for 100-yr event
Inflow =	18.08 cfs @	12.39 hrs, Volume=	2.205 af	
Outflow =	18.08 cfs @	12.39 hrs, Volume=	2.205 af,	Atten= 0%, Lag= 0.0 min
Primary =	18.08 cfs @	12.39 hrs, Volume=	2.205 af	

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 431.81' @ 12.39 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	428.07'	**12.0" Round CMP_Round 12"** L= 50.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 428.07' / 425.62' S= 0.0490 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 0.79 sf
#2	Primary	431.67'	**90.0' long (Profile 5) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 2.79 2.93 3.06

Primary OutFlow Max=17.97 cfs @ 12.39 hrs HW=431.81' (Free Discharge)
└**1=CMP_Round 12"** (Barrel Controls 5.17 cfs @ 6.58 fps)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 12.80 cfs @ 1.03 fps)

Summary for Pond 32P: Surface Pond on south end

ESHGW is consistently 4 ft below natural ground throughout the site, in this area, the ground in the center of the pond is el. 419.5, so ESHGW is el. 415.5, and the bottom of pond is set two feet above this at el. 417.5

Inflow Area =	2.128 ac,	86.24% Impervious,	Inflow Depth >	6.82" for 100-yr event
Inflow =	15.20 cfs @	12.09 hrs, Volume=	1.209 af	
Outflow =	2.71 cfs @	12.55 hrs, Volume=	1.208 af,	Atten= 82%, Lag= 27.5 min
Discarded =	1.37 cfs @	12.55 hrs, Volume=	1.161 af	
Secondary =	1.34 cfs @	12.55 hrs, Volume=	0.048 af	

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Peak Elev= 421.17' @ 12.55 hrs Surf.Area= 7,139 sf Storage= 20,205 cf
Flood Elev= 422.34' Surf.Area= 7,945 sf Storage= 26,479 cf

Plug-Flow detention time= 122.0 min calculated for 1.206 af (100% of inflow)
Center-of-Mass det. time= 121.3 min (887.3 - 766.0)

Volume	Invert	Avail.Storage	Storage Description
#1	417.50'	26,479 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

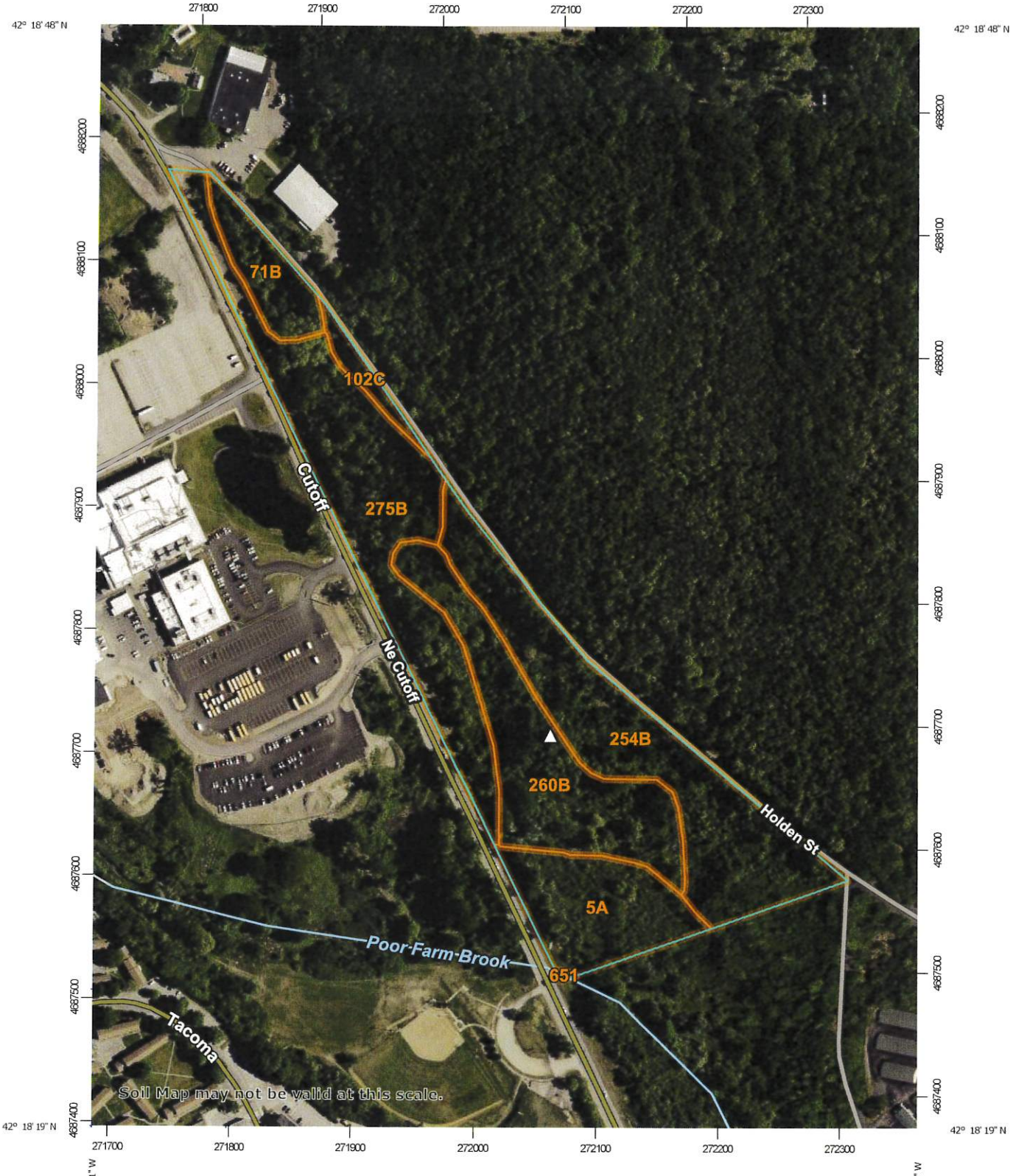
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
417.50	3,691	237.5	0	0	3,691
418.00	4,431	256.5	2,028	2,028	4,448
420.00	6,080	293.7	10,468	12,495	6,167
422.00	7,945	331.3	13,983	26,479	8,139

Device	Routing	Invert	Outlet Devices
#1	Discarded	417.50'	**8.270 in/hr Exfiltration over Horizontal area**
#2	Secondary	421.00'	**8.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Discarded OutFlow Max=1.37 cfs @ 12.55 hrs HW=421.17' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 1.37 cfs)

Secondary OutFlow Max=1.33 cfs @ 12.55 hrs HW=421.17' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Weir Controls 1.33 cfs @ 0.99 fps)

APPENDIX A



Map Scale: 1:4,360 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 200 400 800 1200

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

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

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: Worcester County, Massachusetts, Northeastern Part
Survey Area Data: Version 17, 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
5A	Saco silt loam, frequently ponded, 0 to 2 percent slopes, frequently flooded	2.7	12.4%
71B	Ridgebury fine sandy loam, 3 to 8 percent slopes, extremely stony	1.3	6.0%
102C	Chatfield-Hollis-Rock outcrop complex, 0 to 15 percent slopes	0.4	2.0%
254B	Merrimac fine sandy loam, 3 to 8 percent slopes	6.1	28.1%
260B	Sudbury fine sandy loam, 3 to 8 percent slopes	4.6	21.5%
275B	Agawam fine sandy loam, 3 to 8 percent slopes	6.5	29.9%
651	Udorthents, smoothed	0.0	0.1%
Totals for Area of Interest		**21.6**	**100.0%**

Commonwealth of Massachusetts
City/Town of SHREWSBURY

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

CHACHARONE MELETIOS D TRUSTEE
Owner Name

369-377 HOLDEN STREEET
Street Address

07 001000
Map/Lot #

SHREWSBURY
City

MA
State

01545
Zip Code

B. Site Information

1. (Check one) ☒ New Construction ☐ Upgrade

2. Soil Survey — Worcester County, MA,NE Part (Source); 254 B (Soil Map Unit); Merrimac FSL 3-8% Slopes (Soil Series)
   Outwash Terrace (Landform); None (Soil Limitations)
   Loamy glaciofluvial deposits derived from granite,schist and gneiss (Soil Parent material)

3. Surficial Geological Report — MA MAPPER (Year Published/Source); GLACIAL STRATIFIED DEPOSITS COARSE (Map Unit)

4. Flood Rate Insurance Map — Within a regulatory floodway? ☐ Yes ☒ No

5. Within a velocity zone? ☐ Yes ☒ No

6. Within a Mapped Wetland Area? ☐ Yes ☒ No — If yes, MassGIS Wetland Data Layer: N/A (Wetland Type)

7. Current Water Resource Conditions (USGS): 08/2023 (Month/Day/ Year) — Range: ☒ Above Normal ☐ Normal ☐ Below Normal

8. Other references reviewed: (Zone II, IWPA, Zone A, EEA Data Portal, etc.) N/A

Commonwealth of Massachusetts
City/Town of SHREWSBURY

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TH-1 (Hole #) | 08/22/2023 (Date) | 9:00AM (Time) | SUN 80 Degrees (Weather) | 42.30883 (Latitude) | -71.76551 (Longitude)

1. Land Use: COMMERCIAL (e.g., woodland, agricultural field, vacant lot, etc.) | WOODED (Vegetation) | FEW (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 0-3% (Slope (%))

Description of Location: UNDEVELOPED COMMERCIAL LOT

2. Soil Parent Material: OUTWASH | TERRACE (Landform) | ON SLOPE (Position on Landscape (SU, SH, BS, FS, TS, Plain))

3. Distances from: Open Water Body >200 feet | Drainage Way >100 feet | Wetlands >100 feet | Property Line >50 feet | Drinking Water Well >200 feet | Other N/A feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: N/A Depth to Weeping in Hole | 108" Depth to Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-12	Ap	FSL	10YR 3/2		Cnc : Dpl:				GRAN	FRIABLE	
12-34	Bw	FSL	10YR 4/6		Cnc : Dpl:				GRAN	FRIABLE	
34-51	C1	SAND	2.5Y 2/3		Cnc : Dpl:				SINGLE GRAIN	FRIABLE	FINE SAND
51-120	C2	SAND	2.5Y 3/3	72"	Cnc :10YR 4/5 Dpl: 2.5Y2/2	10	15	5	SAB	FIRM	
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes:
REDOX FAINT/SPARSE

Commonwealth of Massachusetts
City/Town of SHREWSBURY

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TH 2 (Hole #) | 08/22/23 (Date) | 9 AM (Time) | SUN 80 Degrees (Weather) | 42.30883 (Latitude) | -71.76551 (Longitude)

1. Land Use: COMMERCIAL (e.g., woodland, agricultural field, vacant lot, etc.) | WOODED (Vegetation) | FEW (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 0-3 % (Slope (%))

   Description of Location: UNDEVELOPED COMMERCIAL LOT

2. Soil Parent Material: OUTWASH | TERRACE (Landform) | ON SLOPE (Position on Landscape (SU, SH, BS, FS, TS, Plain))

3. Distances from: Open Water Body >200 feet | Drainage Way >100 feet | Wetlands >100 feet | Property Line >50 feet | Drinking Water Well >200 feet | Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: N/A Depth to Weeping in Hole | 96" Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-12	Ap	FSL	10 YR 3/2		Cnc : Dpl:				GRAN.	FRIABLE	
12-32	Bw	FSL	10 YR 4/5		Cnc : Dpl:				GRAN.	FRIABLE	
32-48	C1	SAND	2.5 Y 2/3		Cnc : Dpl:				SINGLE GRAIN	FRIABLE	FINE SAND
48-120	C2	SAND	2.5Y 3/3	72"	Cnc :10YR 4/5 Dpl: 2.5Y 2/2	10	5	15	SAB	FIRM	
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes:
REDOX FAINT/ SPARSE

Commonwealth of Massachusetts
City/Town of SHREWSBURY

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TH-3 (Hole #) | 08/22/2023 (Date) | 9:00AM (Time) | SUN 80 Degrees (Weather) | 42.30883 (Latitude) | -71.76551 (Longitude)

1. Land Use: COMMERCIAL (e.g., woodland, agricultural field, vacant lot, etc.) | WOODED (Vegetation) | FEW (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 0-3% (Slope (%))

Description of Location: UNDEVELOPED COMMERCIAL LOT

2. Soil Parent Material: OUTWASH | TERRACE (Landform) | ON SLOPE (Position on Landscape (SU, SH, BS, FS, TS, Plain))

3. Distances from: Open Water Body >200 feet | Drainage Way >100 feet | Wetlands >100 feet | Property Line >50 feet | Drinking Water Well >200 feet | Other N/A feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: N/A Depth to Weeping in Hole | 120" Depth to Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-14	Ap	FSL	10YR 3/2		Cnc : Dpl:				GRAN	FRIABLE	
14-36	Bw	FSL	10YR 4/6		Cnc : Dpl:				GRAN	FRIABLE	
36-84	C1	SAND	2.5Y 2/3	72"	Cnc :10YR 4/5 Dpl: 2.5Y 2/2	10			SINGLE GRAIN	FRIABLE	FINE SAND
84-132	C2	SAND	2.5Y 3/3		Cnc : Dpl:			20	SAB	FIRM	
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes:
REDOX FAINT/SPARSE

Commonwealth of Massachusetts
City/Town of SHREWSBURY

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TH 4 (Hole #) | 08/22/23 (Date) | 9 AM (Time) | SUN 80 Degrees (Weather) | 42.30883 (Latitude) | -71.76551 (Longitude)

1. Land Use: COMMERCIAL (e.g., woodland, agricultural field, vacant lot, etc.) | WOODED (Vegetation) | FEW (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 0-3 % (Slope (%))

   Description of Location: UNDEVELOPED COMMERCIAL LOT

2. Soil Parent Material: OUTWASH | TERRACE (Landform) | ON SLOPE (Position on Landscape (SU, SH, BS, FS, TS, Plain))

3. Distances from: Open Water Body >200 feet | Drainage Way >100 feet | Wetlands >100 feet | Property Line >50 feet | Drinking Water Well >200 feet | Other _____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: N/A Depth to Weeping in Hole | 120" Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-13	Ap	FSL	10 YR 3/2		Cnc : Dpl:				GRAN.	FRIABLE	
13-36	Bw	FSL	10 YR 4/5		Cnc : Dpl:				GRAN.	FRIABLE	
36-84	C1	SAND	2.5 Y 2/3	72"	Cnc :10YR 4/5 Dpl: 2.5Y 2/3	10			SINGLE GRAIN	FRIABLE	FINE SAND
48-128	C2	SAND	2.5Y 3/3		Cnc : Dpl:			20	SAB	FIRM	
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes:
REDOX FAINT/ SPARSE

Commonwealth of Massachusetts
City/Town of SHREWSBURY

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used (Choose one):

	Obs. Hole #1	Obs. Hole #2
☒ Depth to soil redoximorphic features	72 inches	72 inches
☐ Depth to observed standing water in observation hole	_____ inches	_____ inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

_____ Index Well Number _____ Reading Date

$S_h = S_c - [S_r \times (OW_c - OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

   a. 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

   b. If yes, at what depth was it observed (exclude O, A, and E Horizons)? Upper boundary: 12 inches Lower boundary: 120 inches

   c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used (Choose one):

	Obs. Hole #3	Obs. Hole #4
☒ Depth to soil redoximorphic features	72 inches	72 inches
☐ Depth to observed standing water in observation hole	_____ inches	_____ inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

_____ Index Well Number _____ Reading Date

$S_h = S_c - [S_r \times (OW_c - OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

   a. 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

   b. If yes, at what depth was it observed (exclude O, A, and E Horizons)? Upper boundary: 12 inches Lower boundary: 120 inches

   c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches

Commonwealth of Massachusetts
City/Town of SHREWSBURY

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

Signature of Soil Evaluator

8/25/23
Date

JOHN M. MADEIROS #2849
Typed or Printed Name of Soil Evaluator / License #

6/30/25
Expiration Date of License

PHILIP LEGER
Name of Approving Authority Witness

BOARD OF HEALTH SHREWSBURY
Approving Authority

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.

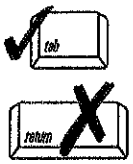
Field Diagrams: Use this area for field diagrams:

SEE DESIGN PLAN

Commonwealth of Massachusetts
City/Town of SHREWSBURY
Percolation Test
Form 12

Percolation test results must be submitted with the Soil Suitability Assessment for On-site Sewage Disposal. DEP has provided this form for use by local Boards of Health. Other forms may be used, but the information must be substantially the same as that provided here. Before using this form, check with the local Board of Health to determine the form they use.

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



A. Site Information

CHACHARONE MELETIOS D TRUSTEE
Owner Name

369-377 HOLDEN STREET
Street Address or Lot #

SHREWSBURY	MA	01545
City/Town	State	Zip Code

THOMPSON AND LISTON, INC.	508-869-6151
Contact Person (If different from Owner)	Telephone Number

B. Test Results

	8//22/23 Date	9AM Time	8/22/23 Date	10AM Time
Observation Hole #	P-1		P-2	
Depth of Perc	34-52"		35-53"	
Start Pre-Soak	9:51		10:57	
End Pre-Soak	UTS		UTS	
Time at 12"	UTS		UTS	
Time at 9"	UTS		UTS	
Time at 6"	UTS		UTS	
Time (9"-6")	UTS		UTS	
Rate (Min./Inch)	<2MPI		<2MPI	
	Test Passed: ☒ Test Failed: ☐		Test Passed: ☒ Test Failed: ☐	

JOHN M. MADEIROS #2849
Test Performed By:

PHILIP LEGER
Board of Health Witness

Comments:

ADDED 24 GALLONS UNABLE TO SATURATE (UTS)

Commonwealth of Massachusetts
City/Town of SHREWSBURY

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

CHACHARONE MELETIOS D TRUSTEE
Owner Name

369-377 HOLDEN STREEET
Street Address

07 001000
Map/Lot #

SHREWSBURY
City

MA
State

01545
Zip Code

B. Site Information

1. (Check one) ☒ New Construction ☐ Upgrade

2. Soil Survey — Worcester County, MA,NE Part (Source); 260 B (Soil Map Unit); Sudbury FSL 3-8% Slopes (Soil Series)

   DEPRESSION (Landform); None (Soil Limitations)

   Friable coarse-loamy eolian deposits over loose sandy glaciofluvial deposits
   Soil Parent material

3. Surficial Geological Report — MA MAPPER (Year Published/Source); GLACIAL STRATIFIED DEPOSITS (Map Unit)

4. Flood Rate Insurance Map — Within a regulatory floodway? ☐ Yes ☒ No

5. Within a velocity zone? ☐ Yes ☒ No

6. Within a Mapped Wetland Area? ☐ Yes ☒ No — If yes, MassGIS Wetland Data Layer: N/A (Wetland Type)

7. Current Water Resource Conditions (USGS): 08/2023 (Month/Day/ Year) — Range: ☒ Above Normal ☐ Normal ☐ Below Normal

8. Other references reviewed: (Zone II, IWPA, Zone A, EEA Data Portal, etc.) N/A

Commonwealth of Massachusetts
City/Town of SHREWSBURY

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TH-5 (Hole #) | 08/24/2023 (Date) | 9:00AM (Time) | SUN 80 Degrees (Weather) | 42.30790 (Latitude) | -71.76551 (Longitude)

1. Land Use: COMMERCIAL (e.g., woodland, agricultural field, vacant lot, etc.) | WOODED (Vegetation) | FEW (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 3-8% (Slope (%))

Description of Location: UNDEVELOPED COMMERCIAL LOT

2. Soil Parent Material: OUTWASH | DEPRESSION (Landform) | BOTTOM SLOPE (Position on Landscape (SU, SH, BS, FS, TS, Plain))

3. Distances from: Open Water Body >200 feet | Drainage Way >100 feet | Wetlands >100 feet | Property Line >50 feet | Drinking Water Well >200 feet | Other N/A feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: N/A Depth to Weeping in Hole | 78" Depth to Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-14	Ap	FSL	10YR 2/2		Cnc : Dpl:				GRAN	FRIABLE	
14-36	Bw	FSL	10YR 4/6		Cnc : Dpl:				GRAN	FRIABLE	
36-108	C	SAND	2.5Y 4/3	60"	Cnc :10YR 4/5 Dpl: 2.5Y 3/2	10	15	20	Massive	LOOSE	COARSE SAND
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes:
REDOX FAINT/SPARSE

Commonwealth of Massachusetts
City/Town of SHREWSBURY

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TH 6 (Hole #) | 08/24/23 (Date) | 9 AM (Time) | SUN 80 Degrees (Weather) | 42.30790 (Latitude) | -71.76588 (Longitude)

1. Land Use: COMMERCIAL (e.g., woodland, agricultural field, vacant lot, etc.) | WOODED (Vegetation) | FEW (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 0-3 % (Slope (%))

Description of Location: UNDEVELOPED COMMERCIAL LOT

2. Soil Parent Material: OUTWASH | DEPRESSION (Landform) | BOTTOM SLOPE (Position on Landscape (SU, SH, BS, FS, TS, Plain))

3. Distances from: Open Water Body >200 feet | Drainage Way >100 feet | Wetlands >100 feet | Property Line >50 feet | Drinking Water Well >200 feet | Other _____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: N/A Depth to Weeping in Hole | 78" Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-16	Ap	FSL	10 YR 3/2		Cnc : Dpl:				GRAN.	FRIABLE	
16-32	Bw	FSL	10 YR 4/5		Cnc : Dpl:				GRAN.	FRIABLE	
32-110	C	SAND	2.5 Y 2/3	60"	Cnc :10YR 4/5 Dpl: 2.5Y 3/3	10	15	20	Massive	LOOSE	COARSE SAND
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes:
REDOX FAINT/ SPARSE

Commonwealth of Massachusetts
City/Town of SHREWSBURY

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TH-7 (Hole #) | 08/24/2023 (Date) | 9:00AM (Time) | SUN 80 Degrees (Weather) | 42.30790 (Latitude) | -71.76551 (Longitude)

1. Land Use: COMMERCIAL (e.g., woodland, agricultural field, vacant lot, etc.) | WOODED (Vegetation) | FEW (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 3-8% (Slope (%))

Description of Location: UNDEVELOPED COMMERCIAL LOT

2. Soil Parent Material: OUTWASH | DEPRESSION (Landform) | BOTTOM SLOPE (Position on Landscape (SU, SH, BS, FS, TS, Plain))

3. Distances from: Open Water Body >200 feet | Drainage Way >100 feet | Wetlands >100 feet | Property Line >50 feet | Drinking Water Well >200 feet | Other N/A feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: N/A Depth to Weeping in Hole | 72" Depth to Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-14	Ap	FSL	10YR 2/2		Cnc : Dpl:				GRAN	FRIABLE	
14-32	Bw	FSL	10YR 4/6		Cnc : Dpl:				GRAN	FRIABLE	
32-108	C	SAND	2.5Y 4/3	60"	Cnc :10YR 4/5 Dpl: 2.5Y 3/2	10	15	20	Massive	LOOSE	COARSE SAND
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes:
REDOX FAINT/SPARSE

Commonwealth of Massachusetts
City/Town of SHREWSBURY

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TH 8 (Hole #) | 08/24/23 (Date) | 9 AM (Time) | SUN 80 Degrees (Weather) | 42.30790 (Latitude) | -71.76588 (Longitude)

1. Land Use: COMMERCIAL (e.g., woodland, agricultural field, vacant lot, etc.) | WOODED (Vegetation) | FEW (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 0-3 % (Slope (%))

   Description of Location: UNDEVELOPED COMMERCIAL LOT

2. Soil Parent Material: OUTWASH | DEPRESSION (Landform) | BOTTOM SLOPE (Position on Landscape (SU, SH, BS, FS, TS, Plain))

3. Distances from: Open Water Body >200 feet | Drainage Way >100 feet | Wetlands >100 feet | Property Line >50 feet | Drinking Water Well >200 feet | Other _____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: N/A Depth to Weeping in Hole | 72" Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-12	Ap	FSL	10 YR 3/2		Cnc : Dpl:				GRAN.	FRIABLE	
12-33	Bw	FSL	10 YR 4/5		Cnc : Dpl:				GRAN.	FRIABLE	
33-110	C	SAND	2.5 Y 2/3	60"	Cnc :10YR 4/5 Dpl: 2.5Y 3/3	10	15	20	Massive	LOOSE	COARSE SAND
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes:
REDOX FAINT/ SPARSE

Commonwealth of Massachusetts
City/Town of SHREWSBURY

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used (Choose one):

	Obs. Hole #5	Obs. Hole #6
☒ Depth to soil redoximorphic features	60 inches	60 inches
☐ Depth to observed standing water in observation hole	_____ inches	_____ inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

_____ Index Well Number _____ Reading Date

$S_h = S_c - [S_r \times (OW_c - OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

   a. 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

   b. If yes, at what depth was it observed (exclude O, A, and E Horizons)? Upper boundary: 14 inches Lower boundary: 108 inches

   c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches

Commonwealth of Massachusetts
City/Town of SHREWSBURY

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used (Choose one):

	Obs. Hole #7	Obs. Hole #8
☒ Depth to soil redoximorphic features	60 inches	60 inches
☐ Depth to observed standing water in observation hole	_____ inches	_____ inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

_____ Index Well Number _____ Reading Date

$S_h = S_c - [S_r \times (OW_c - OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

   a. 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

   b. If yes, at what depth was it observed (exclude O, A, and E Horizons)? Upper boundary: 16 inches Lower boundary: 110 inches

   c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches

Commonwealth of Massachusetts
City/Town of SHREWSBURY

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

Signature of Soil Evaluator	8/25/23 Date
JOHN M. MADEIROS #2849 Typed or Printed Name of Soil Evaluator / License #	6/30/25 Expiration Date of License
PHILIP LEGER Name of Approving Authority Witness	BOARD OF HEALTH SHREWSBURY Approving Authority

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.

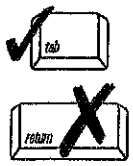
Field Diagrams: Use this area for field diagrams:

SEE DESIGN PLAN

Commonwealth of Massachusetts
City/Town of SHREWSBURY
Percolation Test
Form 12

Percolation test results must be submitted with the Soil Suitability Assessment for On-site Sewage Disposal. DEP has provided this form for use by local Boards of Health. Other forms may be used, but the information must be substantially the same as that provided here. Before using this form, check with the local Board of Health to determine the form they use.

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



A. Site Information

CHACHARONE MELETIOS D TRUSTEE
Owner Name

369-377 HOLDEN STREET
Street Address or Lot #

SHREWSBURY	MA	01545
City/Town	State	Zip Code

THOMPSON AND LISTON, INC.	508-869-6151
Contact Person (if different from Owner)	Telephone Number

B. Test Results

	8//24/23 Date	11AM Time	8/24/23 Date	11AM Time
Observation Hole #	P-3		P-4	
Depth of Perc	36-54"		33-51"	
Start Pre-Soak	11:00		11:40	
End Pre-Soak	UTS		UTS	
Time at 12"	UTS		UTS	
Time at 9"	UTS		UTS	
Time at 6"	UTS		UTS	
Time (9"-6")	UTS		UTS	
Rate (Min./Inch)	<2MPI		<2MPI	
	Test Passed: ☒ Test Failed: ☐		Test Passed: ☒ Test Failed: ☐	

JOHN M. MADEIROS #2849
Test Performed By:

PHILIP LEGER
Board of Health Witness

Comments:

ADDED 24 GALLONS UNABLE TO SATURATE (UTS)

APPENDIX B

Construction Sequence

369 Holden Street, Shrewsbury, MA
116 Northeast Cutoff, Worcester, MA

This sequence lays out the order in which construction shall occur based on our previous experience. We estimate construction for this project to begin on October 1, 2023 and we estimate the construction to last 12 months, however the duration of significant construction involving heavy machinery to last 30-60 days.

1. Identify and protect utilities as may be required.
2. Install and maintain through the term of construction, the erosion and sedimentation barriers between the work areas and the wetland resources, in the locations shown on the erosion control plan.
3. Install the site entrance mat from Holden Street as shown on the Details. Use this entrance for construction access until the culvert and driveway have been constructed at Northeast Cutoff.
4. Ensure that portions of the public street located near the proposed construction, are routinely swept throughout construction of the project.
5. Cut trees and remove topsoil to the limit of work line.
6. Stockpile topsoil and provide temporary stabilization of the piles.
7. Begin the grading work to import fill for the proposed buildings and parking areas indicated on the Grading Plan, including temporary slope stabilization measures as work proceeds.
8. Begin construction of the retaining walls, importing, and placing the geogrid-reinforced fill, as required by the engineered retaining wall plans.
9. Construct the building foundations when the appropriate elevation has been reached.
10. Construct the subsurface infiltration systems, and fence off the areas to prevent heavy equipment from over compacting the area, and to prevent illicit discharges.
11. Continue importing and placing fill.
12. Once a level working area has been constructed around the building perimeter, continue constructing the building structure.
13. Construct site improvements, which include but are not limited to the concrete pads, light pole bases, utility services, and disposing of all packaging and construction waste on a regular basis.
14. Any dumpsters on the site must be covered at the end of every work day.
15. Install the proposed drainage system as shown on the Grading Plan and Detail Sheets.
16. Install base gravel and base course of bituminous pavement as indicated on the proposed Site Plan.
17. Screen and spread loam.
18. Install plants and landscape improvements, curbing, walks.
19. Install final course of paving, light poles, and fencing.
20. If not already completed, install permanent ground stabilization measures, such as seed, sod, and bark mulch.

APPENDIX C

CONSTRUCTION PERIOD (SHORT TERM)
STORMWATER OPERATION & MAINTENANCE PROGRAM
September 5, 2023

Proposed Buildings for
115 Northeast Cutoff Realty Trust
369 Holden Street
Shrewsbury, Massachusetts

During Construction the contractor is responsible for the following inspection and maintenance. Inspections and resulting maintenance tasks shall be recorded in an Inspection Log that is kept on site and available for inspection by Town, State, and Federal officials.

Contractor Information:

Contractor/Operator: **Undetermined at this time**

Address: _____

Contact Name and Phone Number: _____

Email: _____

An emergency spill kit containing absorbent material should be kept in an area accessible to the equipment operators. An emergency spill kit can be purchased from an industrial supplier. If a spill of any harmful substance occurs on the surface, it shall be contained and cleaned up by the use of a dike or absorbent material. Employees should be instructed on the proper use and deployment of the spill kit.

1. Water tightness of catch basin sumps shall be tested and assured after installation.

2. Catch basins shall be protected from sedimentation through haybale filter dikes, filter fabric sacks, or other approved methods. At all times, sedimentation of the infiltration system shall be prohibited and prevented.

3. Catch basin grates shall be inspected monthly. Debris, sand, and accumulated trash shall be removed from inlets.

4. Catch basins shall be inspected bi-weekly and shall be cleaned out as necessary, when the siltsacks or sumps have accumulated one half (1/2) the original depth. If excessive oil, gasoline, or sediment is present, remove all liquid and solids from the sumps. If catch basins are regularly observed to have a sheen of petroleum product, install oil adsorbent materials that float on the surface Dispose of waste properly. Catch basin sumps shall be cleaned out quarterly. Catch basin traps shall be inspected after each cleaning, and any damage shall be repaired.

5. Drain manholes, Water Quality Units and the in ground detention infiltration system shall be inspected monthly and shall be cleaned out as necessary. Cleanout shall be recorded in the maintenance log. Dispose of waste properly. Engineer shall be notified of any evidence of sediment in the drain manholes.

6. The subsurface infiltration area must be kept free of sediment and shall not be used as a temporary settling area or for discharge of excavation dewatering.

7. The subsurface infiltration system shall be observed through the inspection port monthly for any sign of sediment laden water, backup, or contamination. Engineer shall be notified if any of these conditions are observed.

8. The owner's designee shall inspect the system, and the contractor shall clean all components as necessary (e.g. by removing the siltsacks, sediment, and sand) in order to turn over to the owner a clean and functioning system.

Construction Phase Site Inspection Report

General Information			
Project Name	369 Holden Street, Shrewsbury and 116 Northeast Cutoff, Worcester, MA		
NPDES Tracking No.		**Location**	369 Holden St, Shrewsbury
Date of Inspection		**Start/End Time**	
Inspector's Name(s)			
Inspector's Title(s)			
Inspector's Contact Information			
Inspector's Qualifications			
Describe present phase of construction			

Type of Inspection:
❑ Regular ❑ Pre-storm event ❑ During storm event ❑ Post-storm event

Weather Information

Has there been a storm event since the last inspection? ❑Yes ❑No
If yes, provide:
Storm Start Date & Time: Storm Duration (hrs): Approximate Amount of Precipitation (in):

Weather at time of this inspection?
❑ Clear ❑Cloudy ❑ Rain ❑ Sleet ❑ Fog ❑ Snowing ❑ High Winds
❑ Other: Temperature:

Have any discharges occurred since the last inspection? ❑Yes ❑No
If yes, describe:

Are there any discharges at the time of inspection? ❑Yes ❑No
If yes, describe:

Site-specific BMPs

- *Number the structural and non-structural BMPs identified in your SWPPP on your site map and list them below (add as many BMPs as necessary). Carry a copy of the numbered site map with you during your inspections. This list will ensure that you are inspecting all required BMPs at your site.*
- *Describe corrective actions initiated, date completed, and note the person that completed the work in the Corrective Action Log.*

	BMP	BMP Installed?	BMP Maintenance Required?	Corrective Action Needed and Notes
1	Silt fence and/or straw bale barriers	❑Yes ❑No	❑Yes ❑No	
2	Site entrance mat	❑Yes ❑No	❑Yes ❑No	
3	Temporary settling basins	❑Yes ❑No	❑Yes ❑No	
3	Det. Basin outlet control	❑Yes ❑No	❑Yes ❑No	
4	Drainage swales	❑Yes ❑No	❑Yes ❑No	
5	Hydrodynamic separator units	❑Yes ❑No	❑Yes ❑No	
6	Catch basins filterss	❑Yes ❑No	❑Yes ❑No	
7	Retaining walls	❑Yes ❑No	❑Yes ❑No	
8	Grassed slopes	❑Yes ❑No	❑Yes ❑No	
9	Pond 18 infiltration to the north of bldg. 1	❑Yes ❑No	❑Yes ❑No	
10	Pond 11 infiltration to	❑Yes ❑No	❑Yes ❑No	

	BMP	BMP Installed?	BMP Maintenance Required?	Corrective Action Needed and Notes
	the south of bldg. 1			
11	Pond 13 infiltration to the west of bldg. 2	❑Yes ❑No	❑Yes ❑No	
12	Culvert under the access driveway	❑Yes ❑No	❑Yes ❑No	
13	Permanent Slope Stabilization	❑Yes ❑No	❑Yes ❑No	
14	Base Course of Pavement	❑Yes ❑No	❑Yes ❑No	
15		❑Yes ❑No	❑Yes ❑No	
16		❑Yes ❑No	❑Yes ❑No	
17		❑Yes ❑No	❑Yes ❑No	
18		❑Yes ❑No	❑Yes ❑No	
19		❑Yes ❑No	❑Yes ❑No	
20		❑Yes ❑No	❑Yes ❑No	

Overall Site Issues

Below are some general site issues that should be assessed during inspections. Customize this list as needed for conditions at your site.

	BMP/activity	Implemented?	Maintenance Required?	Corrective Action Needed and Notes
1	Are all slopes and disturbed areas not actively being worked properly stabilized?	❑Yes ❑No	❑Yes ❑No	
2	Are natural resource areas (e.g., streams, wetlands, mature trees, etc.) protected with barriers or similar BMPs?	❑Yes ❑No	❑Yes ❑No	
3	Are perimeter controls and sediment barriers adequately installed (keyed into substrate) and maintained?	❑Yes ❑No	❑Yes ❑No	
4	Are discharge points and receiving waters free of any sediment deposits?	❑Yes ❑No	❑Yes ❑No	
5	Are storm drain inlets properly protected?	❑Yes ❑No	❑Yes ❑No	
6	Is the construction exit preventing sediment from being tracked into the street?	❑Yes ❑No	❑Yes ❑No	
7	Is trash/litter from work areas collected and placed in covered dumpsters?	❑Yes ❑No	❑Yes ❑No	

	BMP/activity	Implemented?	Maintenance Required?	Corrective Action Needed and Notes
8	Are washout facilities (e.g., paint, stucco, concrete) available, clearly marked, and maintained?	❑Yes ❑No	❑Yes ❑No	
9	Are vehicle and equipment fueling, cleaning, and maintenance areas free of spills, leaks, or any other deleterious material?	❑Yes ❑No	❑Yes ❑No	
10	Are materials that are potential stormwater contaminants stored inside or under cover?	❑Yes ❑No	❑Yes ❑No	
11	Are non-stormwater discharges (e.g., wash water, dewatering) properly controlled?	❑Yes ❑No	❑Yes ❑No	
12	(Other)	❑Yes ❑No	❑Yes ❑No	

Non-Compliance

Describe any incidents of non-compliance not described above:

CERTIFICATION STATEMENT

"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 am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Print name and title: _____

Signature: _____ **Date:** _____

POST CONSTRUCTION (LONG TERM)
STORMWATER OPERATION & MAINTENANCE PROGRAM
September 5, 2023

Proposed Buildings for
115 Northeast Cutoff Realty Trust
369 Holden Street
Shrewsbury, Massachusetts

Responsible Party:

115 Northeast Cutoff Realty Trust
1 West Boylston Street, Suite LL05, Worcester MA 01605
Contact: Mel Chacharone Phone: 508-853-5066

Upon completion of the project, the drainage system will be maintained by the responsible party as listed described above. In addition to the good housekeeping practices described below, and once the construction site has been fully stabilized, the owner should establish a schedule and keep a log of inspection and maintenance activities for the Stormwater BMPs described below:

Good Housekeeping Practices:

Solid Waste Management:

There will be no solid waste dumpster on the site. Office waste will be stored in closed receptacles (toters) within the building and will be picked up on a weekly basis. There shall no exposure of stormwater to solid waste.

Emergency Spill Kit

An important public safety component of a well-run site is having quick access to materials that will prevent any potential pollutants from spreading into the environment. An emergency spill kit containing absorbent material should be kept in an area accessible to the parking lot, for example inside the customer loading door. An emergency spill kit can be purchased from an industrial supplier. If a spill of any harmful substance occurs on the surface of the parking area, the catch basins shall be protected against contamination by the use of a dike or absorbent material. Employees should be instructed on the proper use and deployment of the spill kit.

Winter Conditions

1. Calcium Chloride (CaCl) usage in winter months shall be limited to the amount necessary to prevent sand from freezing. Sand shall be used sparingly but in sufficient quantity to maintain the parking and loading surface in a safe condition.

2. Sand and salt shall not be stored on site unless within covered containers.

Snow Plowing

1. In minor storms, snow will be plowed away from the building and stored along the edges of the paved surfaces, and in larger storms, snow will be piled in the two snow storage areas as shown on the landscape plan. An Exhibit is attached for reference.

2. Snow shall be pushed back to maintain open lines of sight along Holden Street from the driveway curb cuts at all times.

3. At no time may snow be pushed over the retaining walls or into the wetland resource areas.

4. It may become necessary to remove snow from the site when the pile areas are full. In these instances, the operator should inform the Conservation Commission of the site where snow will be disposed.

Landscape Maintenance:

Vegetated areas in the landscape will reduce erosion, encourage infiltration of rainwater, and keep stormwater clean. It is important to maintain the vegetated areas of the site.

1. Proper mowing is one of the most important ways to maintain a healthy lawn. Mow only when the grass is dry to get a clean cut and minimize the spread of disease. Mow grass to a height of 3". Mow frequently, cutting no more than 1/3 of the height of the grass at a time. Sharpen your mower blades after every 10 hours of mowing.

2. Grass clippings contain high amounts of nitrogen, a key ingredient in fertilizer. Make all attempts to use your grass clippings by leaving them on your lawn. If the grass clippings are not used, do not dispose of them near any wetlands and or water bodies and designate a place to compost them in an upland area.

3. If your lawn areas and plant material demand fertilizer then use organic or slow release fertilizers. Fertilize in the fall, but in coordination with weather patterns.

4. The best defense against pests within the grass is to use an Integrated Pest Management system which consists of beneficial insects (lady bugs, spiders, certain nemetodes and bacteria.)

5. Minimize watering the lawn areas. If needed water in the early morning and water deeply and infrequently.

6. If needed, the trees and shrubs shall be pruned but at a minimum of once a year.

Impervious Surface Maintenance:

Particles that collect on paved surfaces can contain materials that can inhibit water quality. Sweeping sand and debris from the parking lot is a good housekeeping measure that will remove gross pollutants, and should be undertaken a minimum of twice per year. DEP recommends frequent sweeping of parking lots in high traffic areas as an integral part of stormwater management.

1. The parking lots shall be swept at least twice a year.

2. Accumulated leaves and grass clippings shall also be removed from the impervious surfaces regularly, at a minimum of twice a year.

3. In the winter months, CaCl application shall be limited to the amount necessary to prevent sand from freezing. Sand shall be used sparingly but in sufficient quantity to maintain the parking and loading surface in a safe condition.

4. Cracking from expansion and contraction or large paved areas is to be expected. Cracks that develop should be sealed to prevent the infiltration and subsequent frost damage to the pavement. This will prolong the life of the paved surfaces.

5. It should be anticipated that the pavement will be resurfaced on a 20-25 year basis. If surfaces are substantially intact, milling and top coat would be the recommended course of action. If significant cracking, settling, or deterioration is evident, a full depth pavement removal and resurfacing can be anticipated be expected.

BMP Inspection and Maintenance

Catch Basins and Area Drains:

Environmental Safety: Catch basins with oil traps and deep sumps are the first line of defense to protect the environment by preventing pollutants from reaching water resources. Regular maintenance and cleaning of the catch basins is key to protecting water quality and can reduce the more expensive maintenance of other devices in the treatment train. Each catch basin has the capacity to hold over 25 gallons of floatables, such as oil, spilled fuel, or gross pollutants. It is important to inspect and clean the catch basins regularly to maintain their ability to keep the pollutants out of the ecosystem.

1. If excessive oil, gasoline, or sediment is present, remove all liquid and solids from the sumps. Absorbent products are available to attach to the interior of catch basins in order to absorb floatable petroleum products from sumps. If floatables are noted on a regular basis, these measures should be added to the catch basin sumps. Dispose of waste properly.

2. Catch basin grates shall be inspected on a monthly basis. Debris, sand, vegetation, and accumulated trash shall be removed and disposed of properly.

3. Catch Basin sumps shall be inspected on a monthly basis for the first year and quarterly thereafter, and will be cleaned upon the observance of spill of observable petroleum products, such as oil, coolant, or fuel. Dispose of waste properly.

4. If a spill of any harmful substance occurs on the surface of the parking area, the catch basin shall be protected against contamination by the use of a dike or absorbent material. Adequate quantities of absorbent material shall be stored in an accessible location. An emergency spill kit containing absorbent material should be kept in an area accessible to the parking lot.

5. In any case Catch Basin sumps shall be cleaned of sand and liquid at least twice per. Dispose of waste properly.

6. Catch basin traps shall be inspected after each cleaning, and any damaged shall be repaired.

Hydrodynamic Separators (CDS & Stormceptor Units):

Environmental Safety: The CDS, Stormceptor, or Hydroworks hydrodynamic separator units remove floatable trash, petroleum products, and sediments form the stormwater stream in order to prevent them from reaching the infiltration and groundwater resources. They must be inspected and cleaned periodically to be sure they are operating properly.

1. Separators shall be inspected at a minimum of two times a year (i.e. spring and fall).

2. The visual inspection should ascertain that the system components are in working order and that there are no blockages or obstructions to the inlet and or separation screen. Consult the manufacturer's maintenance manuals for mre specific means of observation and measurement.

3. If during the inspection, it is noticed that any of the internal components are damaged or missing, contact CONTECH 1-800-338-2211 if is one of their products.

4. The inspection should also identify evidence of vector infestation (mosquito larvae, for example) and accumulation of hydrocarbons, trash, and sediment in the system and the screen.

5. Pump out the systems and conduct the recommended maintenance when the inspections determine that level of sediment collection has reached 75% of capacity in the isolated sump and/or when an appreciable level of hydrocarbons and trash has accumulated.

6. A vactor truck is recommended for cleanout of the hydro units. Disposal of the material from the units should be in accordance with the local municipality's requirements.

7. Clean the treatment units during dry weather conditions when no flow is entering the system. Remove debris, sand, and accumulated trash from units' interior and remove the fines from the screen.

8. The screen of CDS products shall be power washed and the internal components of both units cleaned when the systems are pumped out.

9. The hydro units are confined spaces and only properly trained personnel possessing the proper training and possess the necessary safety equipment should enter the units. Confined spaces can contain odorless, colorless poison gas.

In Ground Infiltration/Retention System

The in ground retention system keeps the peak rate of flow of runoff from this project from exceeding the peak rate of flow of runoff to abutting properties in the predevelopment condition. It must be inspected to make sure that debris is not entering the piping system or storage chamber which might clog the outlet pipe outlet and to confirm the integrity of the system joints. Another benefit of the system is recharging the groundwater, so keeping the bottom surface of the chamber clear and sediment free is important to maintaining the recharge function of the system. It is important to inspect the system on a regular basis.

1. The in ground retention system shall be inspected twice per year at the inspection ports. Look for debris, either sediment or trash that may indicate the CDS units are not functioning correctly and that may clog the outlets.

2. The inspection should also include looking for any signs of deformation of the precast concrete chambers or HDPE chambers, particularly a break in connection at chamber unit joints. If water, trash, sediment or other material has been visibly deposited in the system, report this to the owner or property manager so that maintenance can be scheduled.

3. If maintenance is required of inlet or outlet pipes, use a high powered pressure nozzle with rear facing jets to wash away sediments and debris within the pipes and remove the sediment.

4. If, during the inspection, it is noticed that any components of the in ground detention system are damaged or missing, contact the owner, property manager and the manufacturer.

5. Subsurface Infiltration structures will be provided with inspection ports. These ports shall be opened and the structures inspected at least once per year through the inlet and outlet manholes and inspection ports. The underground pipe and stone area shall be inspected via observations through the inspection and observation ports. If water, trash, sediment, or any other material is visible in either port, report this to the property manager so that maintenance can be scheduled.

6. The in ground detention system is a confined space and only properly trained personnel possessing the proper training and possess the necessary safety equipment should enter the systems. Confined spaces can contain odorless, colorless poison gas.

Outlet Pipes (flared end pipe or headwall)

There is an overflow pipe from each stormwater system where regular discharge or overflows from large storms will be discharged to the surface. A Rip rap splash pad will be installed in these locations.

1. At least twice per year, inspect the pipe end to verify that the pipe is not blocked or displaced or shifted due to settlement.

2. Inspect the rip rap splash pad and reposition rocks if they have become displaced from high flows.

3. Remove invasive plants or saplings that may grow in the rip rap.

Stormwater Operation and Maintenance Program
Estimated Annual Budget:

Inspection Tasks:

Month:	$ 60
Quarter:	$ 200
Semi-annual:	$ 250
Inspection Subtotal	$ 2,020

Maintenance Tasks:

Month:	$ 200
Semi-annual:	$ 840
Annual:	$ 1,000
Maintenance Subtotal:	$ 3,980

Estimated Total: $ 6,000

ANNUAL RECORD OF INSPECTIONS

OWNER: 115 Northeast Cutoff Realty Trust

SITE ADDRESS: 369 Holden Street, Shrewsbury MA

INSPECTOR: **PHONE:**

DEVICES/ AREAS INSPECTED:

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
LANDSCAPING												
OBSERVATIONS												
IMPERVIOUS SURFACE												
OBSERVATIONS												
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
CATCH BASINS												
OBSERVATIONS												
HYDRODYNAMIC SEPARATORS												
OBSERVATIONS												
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
GROUND RECHARGE SYSTEMS												
OBSERVATIONS												
DISCHARGE PIPE & RIP RAP PAD												
OBSERVATIONS												
DETENTION BASIN AND RIP RAP SPILLWAY												
OBSERVATIONS												

ADDITIONAL NOTES: _____

_____

SIGNATURE: _____ **DATE:** _____