Memorandum

To: Town of Leicester
Planning Board

Date: March 17, 2021

Project #: 14751.00

From: Luke Boucher, PE
Rachel Luna, PE

Re: Leicester Fire & EMS Headquarters Stormwater Improvements
Stormwater Memorandum
Site Plan Review Application

This Stormwater Management Memorandum has been prepared to show compliance with the Massachusetts Stormwater Management Standards in accordance with the Town of Leicester Planning Board Stormwater Regulations and the Site Plan Review Regulations.

Project Description

At the request of the Town of Leicester (the "Applicant"), Vanasse Hangen Brustlin, Inc ("VHB") conducted a review in January 2020 of the stormwater and drainage design and construction for the Fire and EMS Headquarters at 3 Paxton Street (the "Site"). The Site was constructed in 2017 on an undeveloped parcel of land. The existing stormwater management includes two infiltration basins, one in the northwest corner of the site (Infiltration Basin 1) and one to the south of the building (Infiltration Basin 2). The Town has reported standing water within the basins, even during dry periods. The resulting lack of available storage within the basins has resulted in the basins filling up and overflowing onto abutting properties during rainfall events.

The Applicant is proposing to retrofit the existing stormwater management system at the Site to alleviate the flooding on site and on abutting properties, herein as referred to as the "Project".

The Project is considered a redevelopment as it is a retrofit and should comply fully with Stormwater Standards 1, 7, 8, 9 & 10 and to the maximum extent practicable with Stormwater Standards 2 thru 6.

The Project is not located within any critical areas. Areas of temporary disturbance will be minimized to the maximum extent practicable and will be restored in place to their original conditions and stabilized to prevent future erosion and degradation. Construction controls and best practices will be implemented throughout the project site to avoid and minimize construction impacts to wetland resource areas.

Site Description

Soils

As a part of the initial review, VHB conducted three test pits outside of the infiltration basins on 11/14/2019 to observe in-situ soil conditions. Test pit logs are included in Appendix E. Below is a summary of the findings:

- VHB's licensed soil evaluator performed a NRCS field textural classification of the onsite soils in the soil horizon where infiltration was proposed and classified the soils from all three test pits as silty clay loam and silt loam. These soil textures are designated as Hydrologic Soil Group C and D, respectively, based on Table 2.3.3 in Vol. 3, Ch. 1 of the Massachusetts Stormwater Handbook. Based on this table, MassDEP recommends using an infiltration rate of 0.27 in/hr for silt loam and 0.06 in/hr for silty clay loam.

101 Walnut Street
PO Box 9151
Watertown, MA 02472-4026
P 617.924.1770

- VHB's licensed soil evaluator determined estimated seasonal high groundwater (ESHGW) adjacent to Infiltration Basin 2 to be at approximate Elevation 976.5, approximately 2.75-feet below ground, approximately 1.5-feet above the bottom of Infiltration Basin 2.
- VHB's licensed soil evaluator determined ESHGW near Infiltration Basin 1 to be at approximate Elevation 972.5, approximately 3.3-feet below ground, approximately 6.5-feet above the bottom of Infiltration Basin 1.
- Two falling head permeability tests were conducted by VHB, one adjacent to each of the infiltration basins. The permeability of the soils was calculated to be between 0.08 and 0.09 inches/hour. Per Vol. 3, Ch. 1 of the Massachusetts Stormwater Handbook, 50% of the in-situ permeability rate should be used for design purposes.

Proposed Improvements

Based on the soil information observed on the Site, VHB proposes raising the bottom of both the infiltration basins to be above the groundwater table and installing outlet control structures to manage the basin overflow, effectively converting the infiltration basins into detention basins. Infiltration Basin 2 (now Detention Basin 2) is to be retrofitted with an outlet control structure to discharge to the closed drainage on the Site. Infiltration Basin 1 (now Detention Basin 1) is expanded to create additional storage required to attenuate peak flows and has an outlet control structure that discharges to the closed drainage on Site. Two water quality units are proposed within the stormwater management system to provide additional water quality treatment prior to leaving the site. The closed drainage is routed through an abutting property via a proposed easement, out to Warren Avenue and Gleason Way through a proposed easement at 5 Gleason Way and eventually to a flared end outfall via easement at 14 Harberton Drive. The outfall is equipped with a riprap apron and level spreader to distribute the flow and dissipate velocities to the wooded area adjacent to Sargent Pond.

In addition to the basin modifications, VHB proposes to minimize the flows to the detention basins by collecting runoff from the upper parking lot, east of the building, via a new catch basin and connecting it to the municipal drainage system in Paxton Street. VHB also proposes re-routing a portion of the roof runoff from the drainage swale on the northern side of the Site to the municipal drainage system in Paxton Street. Diverting this flow will reduce the rate and quantity of flow tributary to the lower end of the Site, which will minimize the amount of earthwork required to create additional storage required in the basin in the northwest corner of the Site.

Massachusetts Department of Environmental Protection (MassDEP) – Stormwater Management Standards

As previously stated, the Project is a redevelopment and has been designed to comply fully with Stormwater Standards 1, 7, 8, 9 & 10 and to the maximum extent practicable for Stormwater Standards 2 thru 6.

Standard 1: No New Untreated Discharges or Erosion to Wetlands

The Project has been designed to comply with Standard 1.

101 Walnut Street
PO Box 9151
Watertown, MA 02472-4026
P 617.924.1770

The Best Management Practices (BMPs) included in the proposed stormwater management system have been designed in accordance with the Massachusetts Stormwater Handbook. Supporting information and computations demonstrating that no new untreated discharges will result from the Project are presented through compliance with Standards 4 through 6.

All proposed Project stormwater outlets and conveyances have been designed to not cause erosion or scour to wetlands or receiving waters. Outlets from closed drainage systems have been designed with flared end sections, stone protection, and a level spreader to dissipate discharge velocities and protect downgradient areas from erosion.

Computations and supporting information for the sizing and selection of materials used to protect from scour and erosion are included in Appendix C.

Standard 2: Peak Rate Attenuation

The Project is seeking relief under Stormwater Management Standard 7 and as such complies with Standard 2 to the maximum extent practicable.

VHB performed hydraulic and hydrologic calculations using HydroCAD 10.00-25 software and SCS TR-20 methodology to estimate attenuated peak flow rates. The calculations utilized 24-hour rainfall depths provided by the National Oceanic and Atmospheric Administration (NOAA) Atlas 14 for the Town of Leicester, Massachusetts. The rainfall-runoff response of the Site under existing and proposed conditions was analyzed for storm events with recurrence intervals of 2, 10, and 100 years. The results of the analysis, as summarized in Table 1 below, indicate that there is an increase in peak discharge rates between the existing and proposed conditions for Design Point 1.

Table 1: Peak Discharge Rates (cfs)

Design Point	2-year	10-year	100-year
Design Point 1: Sargent Pond			
Existing	10.63	16.79	62.10
Proposed	12.22	19.25	46.15
Design Point 2: Main Street			
Existing	0.80	1.64	3.80
Proposed	0.12	0.23	0.51

Supporting calculations for peak flow rate attenuation are included in Appendix C.

101 Walnut Street
PO Box 9151
Watertown, MA 02472-4026
P 617.924.1770

Standard 3: Stormwater Recharge

The Project is seeking relief under Stormwater Management Standard 7 and as such complies with Standard 3 to the maximum extent practicable.

The Site consists of low infiltrating soils (HSG C/D) and high groundwater table. As discussed in the soils section, the onsite soils have negligible capacity to infiltrate. As a result, infiltrating BMPs are not feasible for this Site.

Standard 4: Water Quality

The Project has been designed to comply with Standard 4.

The proposed stormwater management system implements two Water Quality Units that have been designed to provide a minimum of 80% TSS removal of stormwater runoff from proposed impervious surfaces.

As there are no Outstanding Resource Waters located near the project area, the required Water Quality Volume (WQV) was determined using 0.5 inches of rainfall. Massachusetts Stormwater Standards require a reduction in Total Suspended Solids (TSS) of 80%.

Supporting calculations for Water Quality treatment BMPs including BMP sizing and TSS removal are included in Appendix C.

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

The Project is not considered a land use with higher potential pollutant loads (LUHPPL).

Standard 6: Critical Areas

The Project will not discharge stormwater near or to a critical area.

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the Maximum Extent Practicable

The Project is a redevelopment and has been designed to comply with Stormwater Management Standards 2-6 to the maximum extent practicable. Standards 8-10 have been met completely.

101 Walnut Street
PO Box 9151
Watertown, MA 02472-4026
P 617.924.1770

Memorandum

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

The proposed project will disturb more than 1 acre of land and is therefore required to obtain coverage under the Environmental Protection Agency (EPA) National Pollutant Discharge Elimination System (NPDES) Construction General Permit. As required under this permit, a Stormwater Pollution Prevention Plan (SWPPP) will be developed and submitted by the contractor before land disturbance begins.

Standard 9: Operation and Maintenance Plan

In compliance with Standard 9, a Post Construction Stormwater Operation and Maintenance (O&M) Plan has been developed for the project. The O&M Plan is included in Appendix D as part of the Long-Term Pollution Prevention Plan.

Standard 10: Prohibition of Illicit Discharges

The Project does not have any known illicit connections. Any illicit connections to sanitary sewer or storm drainage structures found in the Project limit of work will be removed or incorporated into the Project. The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges.

Appendices:
Appendix A – Stormwater Checklist
Appendix B – Locus Map, Soil Map
Appendix C – Stormwater Calculations
Appendix D - Operation and Maintenance Plan and Long-Term Pollution Prevention Plan

101 Walnut Street
PO Box 9151
Watertown, MA 02472-4026
P 617.924.1770

Memorandum

Appendix A

Stormwater Checklist

■

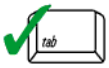
101 Walnut Street
PO Box 9151
Watertown, MA 02472-4026
P 617.924.1770

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

[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.

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.

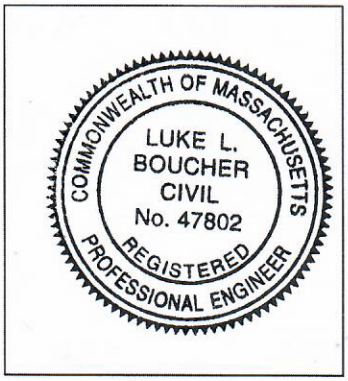
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the 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 Memorandum ~~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 Memorandum ~~Report~~ accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature



03/25/2021
Signature and Date

Checklist

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

☐ New development

☒ Redevelopment

☐ Mix of New Development and Redevelopment

Checklist (continued)

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

☒ No disturbance to any Wetland Resource Areas

☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)

☐ Reduced Impervious Area (Redevelopment Only)

☐ Minimizing disturbance to existing trees and shrubs

☐ LID Site Design Credit Requested:

- ☐ Credit 1
- ☐ Credit 2
- ☐ Credit 3

☐ Use of "country drainage" versus curb and gutter conveyance and pipe

☐ Bioretention Cells (includes Rain Gardens)

☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)

☐ Treebox Filter

☐ Water Quality Swale

☐ Grass Channel

☐ Green Roof

☐ Other (describe): _____

Standard 1: No New Untreated Discharges

☒ No new untreated discharges

☒ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth

☐ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Checklist (continued)

Standard 2: Peak Rate Attenuation (Maximum Extent Practicable)

☐ 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 (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 Memorandum and is included as an attachment to the Wetlands ~~Notice of Intent~~ Request for Determination of Applicability.

☐ 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 (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) – (N.A.)

☐ 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 – (N.A.)

☐ 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 Memorandum & NOI.

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 (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;~~ *included within the Long-Term Pollution Prevention Plan*.

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

Memorandum

Appendix B

Figures: Locus Map

■

101 Walnut Street
PO Box 9151
Watertown, MA 02472-4026
P 617.924.1770

\\vhb\gis\proj\Wat-EV\14751.00 SW Basin Eng Review\Project\Leicester_NOI_Figures_031221.aprx

0 175 350 700 Feet

Fire & EMS Headquarters Stormwater Improvements | Leicester, MA

Legend

Project Location

Figure 1 - Aerial Map

Source Info: USGS, MassGIS, VHB

Memorandum

Appendix C

Stormwater Calculations

101 Walnut Street
PO Box 9151
Watertown, MA 02472-4026
P 617.924.1770

Legend

SYMBOLS

- X — **DESIGN POINT**
- X — **DRAINAGE AREA DESIGNATION**
- X — **POND**

LINETYPES

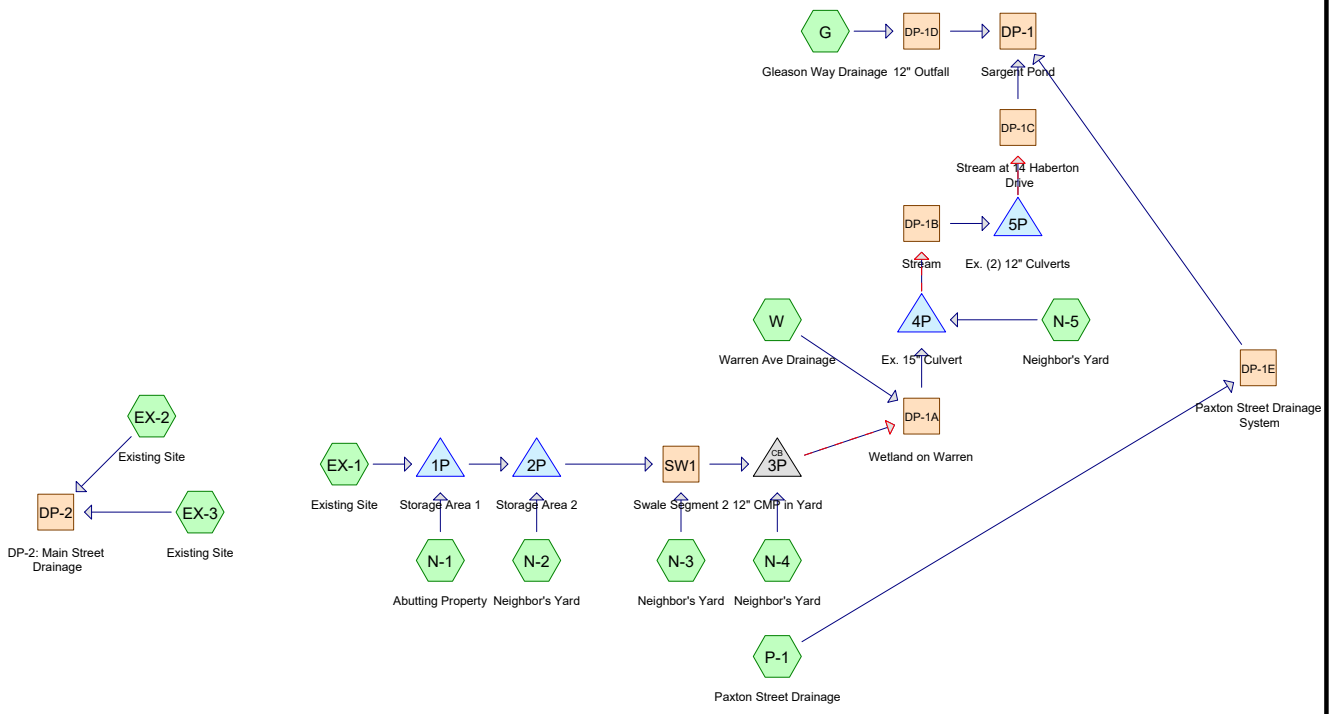
- **DRAINAGE AREA BOUNDARY**
- **TIME OF CONCENTRATION FLOW LINE**

0 75 150 Feet

Existing Drainage Conditions
LEICESTER FIRE & EMS HQ
STORMWATER IMPROVEMENTS
LEICESTER, MA

Figure 2

03/23/2021



Subcat Reach Pond Link

Routing Diagram for EX-Final-Rev3
Prepared by VHB, Printed 3/23/2021
HydroCAD® 10.10-5a s/n 01038 © 2020 HydroCAD Software Solutions LLC

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX-1: Existing Site Runoff Area=97,742 sf 8.31% Impervious Runoff Depth=1.17"
Flow Length=581' Tc=6.5 min CN=76 Runoff=2.87 cfs 9,497 cf

Subcatchment EX-2: Existing Site Runoff Area=18,946 sf 14.31% Impervious Runoff Depth=1.23"
Tc=2.3 min CN=77 Runoff=0.67 cfs 1,936 cf

Subcatchment EX-3: Existing Site Runoff Area=3,068 sf 28.85% Impervious Runoff Depth=1.48"
Tc=0.9 min CN=81 Runoff=0.14 cfs 380 cf

Subcatchment G: Gleason Way Drainage Runoff Area=131,625 sf 26.67% Impervious Runoff Depth=1.42"
Tc=6.0 min CN=80 Runoff=4.88 cfs 15,546 cf

Subcatchment N-1: Abutting Property Runoff Area=24,800 sf 0.00% Impervious Runoff Depth=0.94"
Tc=6.0 min CN=72 Runoff=0.57 cfs 1,947 cf

Subcatchment N-2: Neighbor's Yard Runoff Area=32,144 sf 0.00% Impervious Runoff Depth=0.94"
Tc=6.0 min CN=72 Runoff=0.74 cfs 2,524 cf

Subcatchment N-3: Neighbor's Yard Runoff Area=23,902 sf 0.00% Impervious Runoff Depth=0.94"
Tc=6.0 min CN=72 Runoff=0.55 cfs 1,876 cf

Subcatchment N-4: Neighbor's Yard Runoff Area=26,825 sf 0.00% Impervious Runoff Depth=0.94"
Tc=6.0 min CN=72 Runoff=0.62 cfs 2,106 cf

Subcatchment N-5: Neighbor's Yard Runoff Area=84,334 sf 0.00% Impervious Runoff Depth=0.94"
Tc=6.0 min CN=72 Runoff=1.95 cfs 6,621 cf

Subcatchment P-1: Paxton Street Runoff Area=15,242 sf 100.00% Impervious Runoff Depth=2.99"
Tc=6.0 min CN=98 Runoff=1.07 cfs 3,795 cf

Subcatchment W: Warren Ave Drainage Runoff Area=122,879 sf 15.10% Impervious Runoff Depth=1.29"
Tc=6.0 min CN=78 Runoff=4.10 cfs 13,189 cf

Reach DP-1: Sargent Pond Inflow=10.63 cfs 56,361 cf
Outflow=10.63 cfs 56,361 cf

Reach DP-1A: Wetland on Warren Inflow=7.25 cfs 30,399 cf
Outflow=7.25 cfs 30,399 cf

Reach DP-1B: Stream Inflow=5.45 cfs 37,020 cf
Outflow=5.45 cfs 37,020 cf

Reach DP-1C: Stream at 14 Haberton Drive Inflow=5.45 cfs 37,020 cf
Outflow=5.45 cfs 37,020 cf

Reach DP-1D: 12" Outfall Inflow=4.88 cfs 15,546 cf
Outflow=4.88 cfs 15,546 cf

Reach DP-1E: Paxton Street Drainage System Inflow=1.07 cfs 3,795 cf
Outflow=1.07 cfs 3,795 cf

Reach DP-2: DP-2: Main Street Drainage Inflow=0.80 cfs 2,315 cf
Outflow=0.80 cfs 2,315 cf

Reach SW1: Swale Segment 2 Avg. Flow Depth=0.46' Max Vel=0.91 fps Inflow=4.30 cfs 15,104 cf
n=0.080 L=145.0' S=0.0172 '/' Capacity=203.25 cfs Outflow=4.09 cfs 15,104 cf

Pond 1P: Storage Area 1 Peak Elev=965.78' Storage=353 cf Inflow=3.45 cfs 11,444 cf
Outflow=3.35 cfs 11,295 cf

Pond 2P: Storage Area 2 Peak Elev=962.64' Storage=1,160 cf Inflow=4.08 cfs 13,819 cf
Outflow=3.82 cfs 13,227 cf

Pond 3P: 12" CMP in Yard Peak Elev=956.15' Inflow=4.48 cfs 17,210 cf
Primary=0.00 cfs 0 cf Secondary=4.48 cfs 17,210 cf Outflow=4.48 cfs 17,210 cf

Pond 4P: Ex. 15" Culvert Peak Elev=954.37' Storage=3,466 cf Inflow=8.95 cfs 37,020 cf
Primary=5.45 cfs 37,020 cf Secondary=0.00 cfs 0 cf Outflow=5.45 cfs 37,020 cf

Pond 5P: Ex. (2) 12" Culverts Peak Elev=948.83' Storage=126 cf Inflow=5.45 cfs 37,020 cf
Primary=5.45 cfs 37,020 cf Secondary=0.00 cfs 0 cf Outflow=5.45 cfs 37,020 cf

Total Runoff Area = 581,507 sf Runoff Volume = 59,416 cf Average Runoff Depth = 1.23"
86.14% Pervious = 500,894 sf 13.86% Impervious = 80,613 sf

Summary for Subcatchment EX-1: Existing Site

Runoff = 2.87 cfs @ 12.10 hrs, Volume= 9,497 cf, Depth= 1.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.22"

Area (sf)	CN	Description
8,122	98	Paved parking, HSG C
89,620	74	>75% Grass cover, Good, HSG C
97,742	76	Weighted Average
89,620		91.69% Pervious Area
8,122		8.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	100	0.0400	1.82		**Sheet Flow, Sheet Flow, Parking Lot** Smooth surfaces n= 0.011 P2= 3.22"
0.1	30	0.0600	4.97		**Shallow Concentrated Flow, Shallow Concentrated Flow, Parkin** Paved Kv= 20.3 fps
0.8	111	0.1200	2.42		**Shallow Concentrated Flow, Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
4.7	340	0.0300	1.21		**Shallow Concentrated Flow, Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
6.5	581	Total			

Summary for Subcatchment EX-2: Existing Site

Runoff = 0.67 cfs @ 12.05 hrs, Volume= 1,936 cf, Depth= 1.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.22"

Area (sf)	CN	Description
2,711	98	Paved parking, HSG C
16,235	74	>75% Grass cover, Good, HSG C
18,946	77	Weighted Average
16,235		85.69% Pervious Area
2,711		14.31% Impervious Area

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

Summary for Subcatchment EX-3: Existing Site

Runoff = 0.14 cfs @ 12.02 hrs, Volume= 380 cf, Depth= 1.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.22"

Area (sf)	CN	Description
885	98	Paved parking, HSG C
2,183	74	>75% Grass cover, Good, HSG C
3,068	81	Weighted Average
2,183		71.15% Pervious Area
885		28.85% Impervious Area

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

Summary for Subcatchment G: Gleason Way Drainage

Runoff = 4.88 cfs @ 12.10 hrs, Volume= 15,546 cf, Depth= 1.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.22"

Area (sf)	CN	Description
35,103	98	Paved parking, HSG C
96,522	74	>75% Grass cover, Good, HSG C
131,625	80	Weighted Average
96,522		73.33% Pervious Area
35,103		26.67% Impervious Area

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

Summary for Subcatchment N-1: Abutting Property

Runoff = 0.57 cfs @ 12.10 hrs, Volume= 1,947 cf, Depth= 0.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.22"

Area (sf)	CN	Description
24,800	72	Woods/grass comb., Good, HSG C
24,800		100.00% Pervious Area

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

Summary for Subcatchment N-2: Neighbor's Yard

Runoff = 0.74 cfs @ 12.10 hrs, Volume= 2,524 cf, Depth= 0.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.22"

Area (sf)	CN	Description
32,144	72	Woods/grass comb., Good, HSG C
32,144		100.00% Pervious Area

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

Summary for Subcatchment N-3: Neighbor's Yard

Runoff = 0.55 cfs @ 12.10 hrs, Volume= 1,876 cf, Depth= 0.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.22"

Area (sf)	CN	Description
23,902	72	Woods/grass comb., Good, HSG C
23,902		100.00% Pervious Area

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

Summary for Subcatchment N-4: Neighbor's Yard

Runoff = 0.62 cfs @ 12.10 hrs, Volume= 2,106 cf, Depth= 0.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.22"

Area (sf)	CN	Description
26,825	72	Woods/grass comb., Good, HSG C
26,825		100.00% Pervious Area

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

Summary for Subcatchment N-5: Neighbor's Yard

Runoff = 1.95 cfs @ 12.10 hrs, Volume= 6,621 cf, Depth= 0.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.22"

Area (sf)	CN	Description
84,334	72	Woods/grass comb., Good, HSG C
84,334		100.00% Pervious Area

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

Summary for Subcatchment P-1: Paxton Street Drainage

Runoff = 1.07 cfs @ 12.09 hrs, Volume= 3,795 cf, Depth= 2.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.22"

Area (sf)	CN	Description
15,242	98	Water Surface, HSG C
15,242		100.00% Impervious Area

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

Summary for Subcatchment W: Warren Ave Drainage

Runoff = 4.10 cfs @ 12.10 hrs, Volume= 13,189 cf, Depth= 1.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.22"

Area (sf)	CN	Description
18,550	98	Paved parking, HSG C
104,329	74	>75% Grass cover, Good, HSG C
122,879	78	Weighted Average
104,329		84.90% Pervious Area
18,550		15.10% Impervious Area

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

Summary for Reach DP-1: Sargent Pond

Inflow Area = 559,493 sf, 13.77% Impervious, Inflow Depth = 1.21" for 2-year event
Inflow = 10.63 cfs @ 12.10 hrs, Volume= 56,361 cf
Outflow = 10.63 cfs @ 12.10 hrs, Volume= 56,361 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-1A: Wetland on Warren

Inflow Area = 328,292 sf, 8.12% Impervious, Inflow Depth = 1.11" for 2-year event
Inflow = 7.25 cfs @ 12.16 hrs, Volume= 30,399 cf
Outflow = 7.25 cfs @ 12.16 hrs, Volume= 30,399 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-1B: Stream

Inflow Area = 412,626 sf, 6.46% Impervious, Inflow Depth = 1.08" for 2-year event
Inflow = 5.45 cfs @ 12.39 hrs, Volume= 37,020 cf
Outflow = 5.45 cfs @ 12.39 hrs, Volume= 37,020 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-1C: Stream at 14 Haberton Drive

Inflow Area = 412,626 sf, 6.46% Impervious, Inflow Depth = 1.08" for 2-year event
Inflow = 5.45 cfs @ 12.41 hrs, Volume= 37,020 cf
Outflow = 5.45 cfs @ 12.41 hrs, Volume= 37,020 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-1D: 12" Outfall

Inflow Area = 131,625 sf, 26.67% Impervious, Inflow Depth = 1.42" for 2-year event
Inflow = 4.88 cfs @ 12.10 hrs, Volume= 15,546 cf
Outflow = 4.88 cfs @ 12.10 hrs, Volume= 15,546 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-1E: Paxton Street Drainage System

Inflow Area = 15,242 sf,100.00% Impervious, Inflow Depth = 2.99" for 2-year event
Inflow = 1.07 cfs @ 12.09 hrs, Volume= 3,795 cf
Outflow = 1.07 cfs @ 12.09 hrs, Volume= 3,795 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-2: DP-2: Main Street Drainage

Inflow Area = 22,014 sf, 16.34% Impervious, Inflow Depth = 1.26" for 2-year event
Inflow = 0.80 cfs @ 12.04 hrs, Volume= 2,315 cf
Outflow = 0.80 cfs @ 12.04 hrs, Volume= 2,315 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

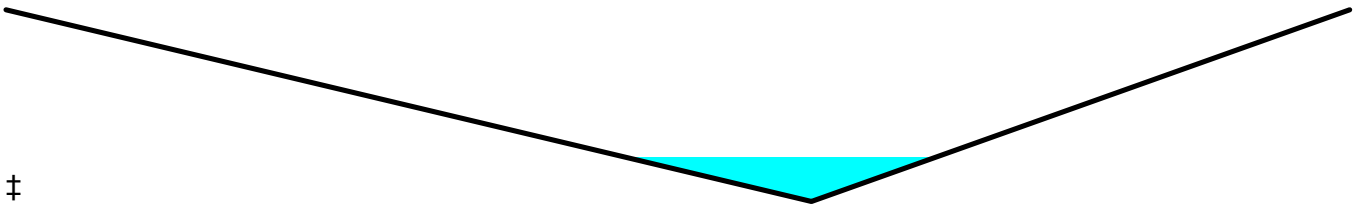
Summary for Reach SW1: Swale Segment 2

Inflow Area = 178,588 sf, 4.55% Impervious, Inflow Depth = 1.01" for 2-year event
Inflow = 4.30 cfs @ 12.14 hrs, Volume= 15,104 cf
Outflow = 4.09 cfs @ 12.22 hrs, Volume= 15,104 cf, Atten= 5%, Lag= 4.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.91 fps, Min. Travel Time= 2.6 min
Avg. Velocity = 0.38 fps, Avg. Travel Time= 6.4 min

Peak Storage= 651 cf @ 12.17 hrs
Average Depth at Peak Storage= 0.46' , Surface Width= 19.35'
Bank-Full Depth= 2.00' Flow Area= 83.4 sf, Capacity= 203.25 cfs

0.00' x 2.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 25.0 16.7 '/' Top Width= 83.40'
Length= 145.0' Slope= 0.0172 '/'
Inlet Invert= 962.50', Outlet Invert= 960.00'



‡

Summary for Pond 1P: Storage Area 1

Inflow Area = 122,542 sf, 6.63% Impervious, Inflow Depth = 1.12" for 2-year event
Inflow = 3.45 cfs @ 12.10 hrs, Volume= 11,444 cf
Outflow = 3.35 cfs @ 12.11 hrs, Volume= 11,295 cf, Atten= 3%, Lag= 0.6 min
Primary = 3.35 cfs @ 12.11 hrs, Volume= 11,295 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2

Peak Elev= 965.78' @ 12.11 hrs Surf.Area= 450 sf Storage= 353 cf

Plug-Flow detention time= 12.1 min calculated for 11,283 cf (99% of inflow)
Center-of-Mass det. time= 4.7 min (862.5 - 857.8)

Volume	Invert	Avail.Storage	Storage Description
#1	965.00'	1,350 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
965.00	450	0	0
967.00	450	900	900
968.00	450	450	1,350

Device	Routing	Invert	Outlet Devices
#1	Primary	965.33'	**4.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=3.25 cfs @ 12.11 hrs HW=965.78' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 3.25 cfs @ 1.82 fps)

Summary for Pond 2P: Storage Area 2

Inflow Area = 154,686 sf, 5.25% Impervious, Inflow Depth = 1.07" for 2-year event
Inflow = 4.08 cfs @ 12.11 hrs, Volume= 13,819 cf
Outflow = 3.82 cfs @ 12.15 hrs, Volume= 13,227 cf, Atten= 7%, Lag= 2.0 min
Primary = 3.82 cfs @ 12.15 hrs, Volume= 13,227 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 962.64' @ 12.15 hrs Surf.Area= 1,800 sf Storage= 1,160 cf

Plug-Flow detention time= 35.1 min calculated for 13,213 cf (96% of inflow)
Center-of-Mass det. time= 12.2 min (875.7 - 863.6)

Volume	Invert	Avail.Storage	Storage Description
#1	962.00'	3,600 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
962.00	1,800	0	0
963.00	1,800	1,800	1,800
964.00	1,800	1,800	3,600

Device	Routing	Invert	Outlet Devices
#1	Primary	962.33'	**8.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31

3.30 3.31 3.32

Primary OutFlow Max=3.78 cfs @ 12.15 hrs HW=962.64' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 3.78 cfs @ 1.51 fps)

Summary for Pond 3P: 12" CMP in Yard

Inflow Area = 205,413 sf, 3.95% Impervious, Inflow Depth = 1.01" for 2-year event
Inflow = 4.48 cfs @ 12.22 hrs, Volume= 17,210 cf
Outflow = 4.48 cfs @ 12.22 hrs, Volume= 17,210 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Secondary = 4.48 cfs @ 12.22 hrs, Volume= 17,210 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 956.15' @ 12.22 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	958.90'	**12.0" Round Culvert** L= 95.0' Square-edged headwall, Ke= 0.500 Inlet / Outlet Invert= 958.90' / 954.40' S= 0.0474 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 0.79 sf
#2	Secondary	956.00'	**30.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=956.00' (Free Discharge)
1=Culvert (Controls 0.00 cfs)

Secondary OutFlow Max=4.39 cfs @ 12.22 hrs HW=956.15' (Free Discharge)
2=Broad-Crested Rectangular Weir (Weir Controls 4.39 cfs @ 0.97 fps)

Summary for Pond 4P: Ex. 15" Culvert

Inflow Area = 412,626 sf, 6.46% Impervious, Inflow Depth = 1.08" for 2-year event
Inflow = 8.95 cfs @ 12.13 hrs, Volume= 37,020 cf
Outflow = 5.45 cfs @ 12.39 hrs, Volume= 37,020 cf, Atten= 39%, Lag= 15.2 min
Primary = 5.45 cfs @ 12.39 hrs, Volume= 37,020 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 954.37' @ 12.39 hrs Surf.Area= 6,946 sf Storage= 3,466 cf

Plug-Flow detention time= 3.1 min calculated for 36,981 cf (100% of inflow)
Center-of-Mass det. time= 3.1 min (870.0 - 866.9)

Volume	Invert	Avail.Storage	Storage Description
#1	952.00'	58,381 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
952.00	7	0	0
953.00	630	319	319
954.00	2,270	1,450	1,769
955.00	14,962	8,616	10,385
956.00	23,736	19,349	29,734
957.00	33,559	28,648	58,381

Device	Routing	Invert	Outlet Devices
#1	Primary	951.70'	**15.0" Round Culvert** L= 81.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 951.70' / 950.40' S= 0.0160 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 1.23 sf
#2	Secondary	956.00'	**100.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=5.45 cfs @ 12.39 hrs HW=954.37' (Free Discharge)
1=Culvert (Barrel Controls 5.45 cfs @ 4.44 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=952.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond 5P: Ex. (2) 12" Culverts

Inflow Area = 412,626 sf, 6.46% Impervious, Inflow Depth = 1.08" for 2-year event
Inflow = 5.45 cfs @ 12.39 hrs, Volume= 37,020 cf
Outflow = 5.45 cfs @ 12.41 hrs, Volume= 37,020 cf, Atten= 0%, Lag= 1.4 min
Primary = 5.45 cfs @ 12.41 hrs, Volume= 37,020 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 948.83' @ 12.41 hrs Surf.Area= 257 sf Storage= 126 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.1 min (870.1 - 870.0)

Volume	Invert	Avail.Storage	Storage Description
#1	948.00'	7,505 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
948.00	45	0	0
949.00	300	173	173
950.00	1,624	962	1,135
951.00	3,139	2,382	3,516
952.00	4,838	3,989	7,505

Device	Routing	Invert	Outlet Devices
#1	Primary	947.50'	**12.0" Round Culvert X 2.00** L= 37.4' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 947.50' / 945.70' S= 0.0481 '/' Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior, Flow Area= 0.79 sf
#2	Secondary	949.90'	**25.0' long x 25.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=5.44 cfs @ 12.41 hrs HW=948.83' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 5.44 cfs @ 3.47 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=948.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX-1: Existing Site Runoff Area=97,742 sf 8.31% Impervious Runoff Depth=2.40"
Flow Length=581' Tc=6.5 min CN=76 Runoff=6.11 cfs 19,583 cf

Subcatchment EX-2: Existing Site Runoff Area=18,946 sf 14.31% Impervious Runoff Depth=2.49"
Tc=2.3 min CN=77 Runoff=1.39 cfs 3,931 cf

Subcatchment EX-3: Existing Site Runoff Area=3,068 sf 28.85% Impervious Runoff Depth=2.84"
Tc=0.9 min CN=81 Runoff=0.26 cfs 727 cf

Subcatchment G: Gleason Way Drainage Runoff Area=131,625 sf 26.67% Impervious Runoff Depth=2.75"
Tc=6.0 min CN=80 Runoff=9.56 cfs 30,205 cf

Subcatchment N-1: Abutting Property Runoff Area=24,800 sf 0.00% Impervious Runoff Depth=2.08"
Tc=6.0 min CN=72 Runoff=1.34 cfs 4,289 cf

Subcatchment N-2: Neighbor's Yard Runoff Area=32,144 sf 0.00% Impervious Runoff Depth=2.08"
Tc=6.0 min CN=72 Runoff=1.74 cfs 5,559 cf

Subcatchment N-3: Neighbor's Yard Runoff Area=23,902 sf 0.00% Impervious Runoff Depth=2.08"
Tc=6.0 min CN=72 Runoff=1.30 cfs 4,134 cf

Subcatchment N-4: Neighbor's Yard Runoff Area=26,825 sf 0.00% Impervious Runoff Depth=2.08"
Tc=6.0 min CN=72 Runoff=1.45 cfs 4,639 cf

Subcatchment N-5: Neighbor's Yard Runoff Area=84,334 sf 0.00% Impervious Runoff Depth=2.08"
Tc=6.0 min CN=72 Runoff=4.57 cfs 14,585 cf

Subcatchment P-1: Paxton Street Runoff Area=15,242 sf 100.00% Impervious Runoff Depth=4.60"
Tc=6.0 min CN=98 Runoff=1.62 cfs 5,847 cf

Subcatchment W: Warren Ave Drainage Runoff Area=122,879 sf 15.10% Impervious Runoff Depth=2.58"
Tc=6.0 min CN=78 Runoff=8.35 cfs 26,382 cf

Reach DP-1: Sargent Pond Inflow=16.79 cfs 114,482 cf
Outflow=16.79 cfs 114,482 cf

Reach DP-1A: Wetland on Warren Inflow=16.78 cfs 63,844 cf
Outflow=16.78 cfs 63,844 cf

Reach DP-1B: Stream Inflow=6.43 cfs 78,430 cf
Outflow=6.43 cfs 78,430 cf

Reach DP-1C: Stream at 14 Haberton Drive Inflow=6.42 cfs 78,430 cf
Outflow=6.42 cfs 78,430 cf

Reach DP-1D: 12" Outfall Inflow=9.56 cfs 30,205 cf
Outflow=9.56 cfs 30,205 cf

Reach DP-1E: Paxton Street Drainage System Inflow=1.62 cfs 5,847 cf
Outflow=1.62 cfs 5,847 cf

Reach DP-2: DP-2: Main Street Drainage Inflow=1.64 cfs 4,658 cf
Outflow=1.64 cfs 4,658 cf

Reach SW1: Swale Segment 2 Avg. Flow Depth=0.63' Max Vel=1.13 fps Inflow=9.83 cfs 32,823 cf
n=0.080 L=145.0' S=0.0172 '/' Capacity=203.25 cfs Outflow=9.24 cfs 32,823 cf

Pond 1P: Storage Area 1 Peak Elev=966.08' Storage=485 cf Inflow=7.45 cfs 23,873 cf
Outflow=7.29 cfs 23,724 cf

Pond 2P: Storage Area 2 Peak Elev=962.87' Storage=1,559 cf Inflow=9.03 cfs 29,284 cf
Outflow=8.59 cfs 28,689 cf

Pond 3P: 12" CMP in Yard Peak Elev=956.26' Inflow=10.21 cfs 37,462 cf
Primary=0.00 cfs 0 cf Secondary=10.21 cfs 37,462 cf Outflow=10.21 cfs 37,462 cf

Pond 4P: Ex. 15" Culvert Peak Elev=955.43' Storage=17,721 cf Inflow=21.28 cfs 78,430 cf
Primary=6.43 cfs 78,430 cf Secondary=0.00 cfs 0 cf Outflow=6.43 cfs 78,430 cf

Pond 5P: Ex. (2) 12" Culverts Peak Elev=949.16' Storage=236 cf Inflow=6.43 cfs 78,430 cf
Primary=6.42 cfs 78,430 cf Secondary=0.00 cfs 0 cf Outflow=6.42 cfs 78,430 cf

Total Runoff Area = 581,507 sf Runoff Volume = 119,883 cf Average Runoff Depth = 2.47"
86.14% Pervious = 500,894 sf 13.86% Impervious = 80,613 sf

Summary for Subcatchment EX-1: Existing Site

Runoff = 6.11 cfs @ 12.10 hrs, Volume= 19,583 cf, Depth= 2.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.84"

Area (sf)	CN	Description
8,122	98	Paved parking, HSG C
89,620	74	>75% Grass cover, Good, HSG C
97,742	76	Weighted Average
89,620		91.69% Pervious Area
8,122		8.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	100	0.0400	1.82		**Sheet Flow, Sheet Flow, Parking Lot** Smooth surfaces n= 0.011 P2= 3.22"
0.1	30	0.0600	4.97		**Shallow Concentrated Flow, Shallow Concentrated Flow, Parkin** Paved Kv= 20.3 fps
0.8	111	0.1200	2.42		**Shallow Concentrated Flow, Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
4.7	340	0.0300	1.21		**Shallow Concentrated Flow, Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
6.5	581	Total			

Summary for Subcatchment EX-2: Existing Site

Runoff = 1.39 cfs @ 12.04 hrs, Volume= 3,931 cf, Depth= 2.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.84"

Area (sf)	CN	Description
2,711	98	Paved parking, HSG C
16,235	74	>75% Grass cover, Good, HSG C
18,946	77	Weighted Average
16,235		85.69% Pervious Area
2,711		14.31% Impervious Area

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

Summary for Subcatchment EX-3: Existing Site

Runoff = 0.26 cfs @ 12.01 hrs, Volume= 727 cf, Depth= 2.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.84"

Area (sf)	CN	Description
885	98	Paved parking, HSG C
2,183	74	>75% Grass cover, Good, HSG C
3,068	81	Weighted Average
2,183		71.15% Pervious Area
885		28.85% Impervious Area

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

Summary for Subcatchment G: Gleason Way Drainage

Runoff = 9.56 cfs @ 12.09 hrs, Volume= 30,205 cf, Depth= 2.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.84"

Area (sf)	CN	Description
35,103	98	Paved parking, HSG C
96,522	74	>75% Grass cover, Good, HSG C
131,625	80	Weighted Average
96,522		73.33% Pervious Area
35,103		26.67% Impervious Area

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

Summary for Subcatchment N-1: Abutting Property

Runoff = 1.34 cfs @ 12.10 hrs, Volume= 4,289 cf, Depth= 2.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.84"

Area (sf)	CN	Description
24,800	72	Woods/grass comb., Good, HSG C
24,800		100.00% Pervious Area

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

Summary for Subcatchment N-2: Neighbor's Yard

Runoff = 1.74 cfs @ 12.10 hrs, Volume= 5,559 cf, Depth= 2.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.84"

Area (sf)	CN	Description
32,144	72	Woods/grass comb., Good, HSG C
32,144		100.00% Pervious Area

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

Summary for Subcatchment N-3: Neighbor's Yard

Runoff = 1.30 cfs @ 12.10 hrs, Volume= 4,134 cf, Depth= 2.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.84"

Area (sf)	CN	Description
23,902	72	Woods/grass comb., Good, HSG C
23,902		100.00% Pervious Area

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

Summary for Subcatchment N-4: Neighbor's Yard

Runoff = 1.45 cfs @ 12.10 hrs, Volume= 4,639 cf, Depth= 2.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.84"

Area (sf)	CN	Description
26,825	72	Woods/grass comb., Good, HSG C
26,825		100.00% Pervious Area

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

Summary for Subcatchment N-5: Neighbor's Yard

Runoff = 4.57 cfs @ 12.10 hrs, Volume= 14,585 cf, Depth= 2.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.84"

Area (sf)	CN	Description
84,334	72	Woods/grass comb., Good, HSG C
84,334		100.00% Pervious Area

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

Summary for Subcatchment P-1: Paxton Street Drainage

Runoff = 1.62 cfs @ 12.09 hrs, Volume= 5,847 cf, Depth= 4.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.84"

Area (sf)	CN	Description
15,242	98	Water Surface, HSG C
15,242		100.00% Impervious Area

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

Summary for Subcatchment W: Warren Ave Drainage

Runoff = 8.35 cfs @ 12.09 hrs, Volume= 26,382 cf, Depth= 2.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.84"

Area (sf)	CN	Description
18,550	98	Paved parking, HSG C
104,329	74	>75% Grass cover, Good, HSG C
122,879	78	Weighted Average
104,329		84.90% Pervious Area
18,550		15.10% Impervious Area

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

Summary for Reach DP-1: Sargent Pond

Inflow Area = 559,493 sf, 13.77% Impervious, Inflow Depth = 2.46" for 10-year event
Inflow = 16.79 cfs @ 12.10 hrs, Volume= 114,482 cf
Outflow = 16.79 cfs @ 12.10 hrs, Volume= 114,482 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-1A: Wetland on Warren

Inflow Area = 328,292 sf, 8.12% Impervious, Inflow Depth = 2.33" for 10-year event
Inflow = 16.78 cfs @ 12.13 hrs, Volume= 63,844 cf
Outflow = 16.78 cfs @ 12.13 hrs, Volume= 63,844 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-1B: Stream

Inflow Area = 412,626 sf, 6.46% Impervious, Inflow Depth = 2.28" for 10-year event
Inflow = 6.43 cfs @ 12.54 hrs, Volume= 78,430 cf
Outflow = 6.43 cfs @ 12.54 hrs, Volume= 78,430 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-1C: Stream at 14 Haberton Drive

Inflow Area = 412,626 sf, 6.46% Impervious, Inflow Depth = 2.28" for 10-year event
Inflow = 6.42 cfs @ 12.60 hrs, Volume= 78,430 cf
Outflow = 6.42 cfs @ 12.60 hrs, Volume= 78,430 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-1D: 12" Outfall

Inflow Area = 131,625 sf, 26.67% Impervious, Inflow Depth = 2.75" for 10-year event
Inflow = 9.56 cfs @ 12.09 hrs, Volume= 30,205 cf
Outflow = 9.56 cfs @ 12.09 hrs, Volume= 30,205 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-1E: Paxton Street Drainage System

Inflow Area = 15,242 sf,100.00% Impervious, Inflow Depth = 4.60" for 10-year event
Inflow = 1.62 cfs @ 12.09 hrs, Volume= 5,847 cf
Outflow = 1.62 cfs @ 12.09 hrs, Volume= 5,847 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-2: DP-2: Main Street Drainage

Inflow Area = 22,014 sf, 16.34% Impervious, Inflow Depth = 2.54" for 10-year event
Inflow = 1.64 cfs @ 12.04 hrs, Volume= 4,658 cf
Outflow = 1.64 cfs @ 12.04 hrs, Volume= 4,658 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

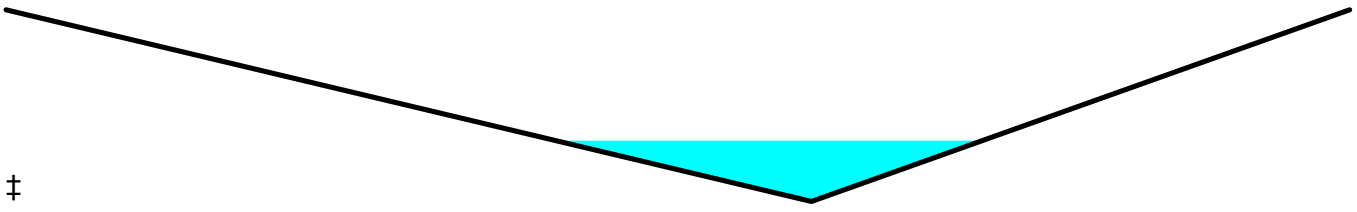
Summary for Reach SW1: Swale Segment 2

Inflow Area = 178,588 sf, 4.55% Impervious, Inflow Depth = 2.21" for 10-year event
Inflow = 9.83 cfs @ 12.12 hrs, Volume= 32,823 cf
Outflow = 9.24 cfs @ 12.19 hrs, Volume= 32,823 cf, Atten= 6%, Lag= 4.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.13 fps, Min. Travel Time= 2.1 min
Avg. Velocity = 0.43 fps, Avg. Travel Time= 5.6 min

Peak Storage= 1,213 cf @ 12.15 hrs
Average Depth at Peak Storage= 0.63' , Surface Width= 26.41'
Bank-Full Depth= 2.00' Flow Area= 83.4 sf, Capacity= 203.25 cfs

0.00' x 2.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 25.0 16.7 '/' Top Width= 83.40'
Length= 145.0' Slope= 0.0172 '/'
Inlet Invert= 962.50', Outlet Invert= 960.00'



‡

Summary for Pond 1P: Storage Area 1

Inflow Area = 122,542 sf, 6.63% Impervious, Inflow Depth = 2.34" for 10-year event
Inflow = 7.45 cfs @ 12.10 hrs, Volume= 23,873 cf
Outflow = 7.29 cfs @ 12.11 hrs, Volume= 23,724 cf, Atten= 2%, Lag= 0.4 min
Primary = 7.29 cfs @ 12.11 hrs, Volume= 23,724 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2

Peak Elev= 966.08' @ 12.11 hrs Surf.Area= 450 sf Storage= 485 cf

Plug-Flow detention time= 7.0 min calculated for 23,700 cf (99% of inflow)
Center-of-Mass det. time= 3.3 min (839.4 - 836.1)

Volume	Invert	Avail.Storage	Storage Description
#1	965.00'	1,350 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
965.00	450	0	0
967.00	450	900	900
968.00	450	450	1,350

Device	Routing	Invert	Outlet Devices
#1	Primary	965.33'	**4.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=7.18 cfs @ 12.11 hrs HW=966.07' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 7.18 cfs @ 2.43 fps)

Summary for Pond 2P: Storage Area 2

Inflow Area = 154,686 sf, 5.25% Impervious, Inflow Depth = 2.27" for 10-year event
Inflow = 9.03 cfs @ 12.10 hrs, Volume= 29,284 cf
Outflow = 8.59 cfs @ 12.12 hrs, Volume= 28,689 cf, Atten= 5%, Lag= 1.2 min
Primary = 8.59 cfs @ 12.12 hrs, Volume= 28,689 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 962.87' @ 12.12 hrs Surf.Area= 1,800 sf Storage= 1,559 cf

Plug-Flow detention time= 19.9 min calculated for 28,659 cf (98% of inflow)
Center-of-Mass det. time= 8.2 min (848.5 - 840.3)

Volume	Invert	Avail.Storage	Storage Description
#1	962.00'	3,600 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
962.00	1,800	0	0
963.00	1,800	1,800	1,800
964.00	1,800	1,800	3,600

Device	Routing	Invert	Outlet Devices
#1	Primary	962.33'	**8.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31

3.30 3.31 3.32

Primary OutFlow Max=8.33 cfs @ 12.12 hrs HW=962.85' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 8.33 cfs @ 1.98 fps)

Summary for Pond 3P: 12" CMP in Yard

Inflow Area = 205,413 sf, 3.95% Impervious, Inflow Depth = 2.19" for 10-year event
Inflow = 10.21 cfs @ 12.18 hrs, Volume= 37,462 cf
Outflow = 10.21 cfs @ 12.18 hrs, Volume= 37,462 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Secondary = 10.21 cfs @ 12.18 hrs, Volume= 37,462 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 956.26' @ 12.18 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	958.90'	**12.0" Round Culvert** L= 95.0' Square-edged headwall, Ke= 0.500 Inlet / Outlet Invert= 958.90' / 954.40' S= 0.0474 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 0.79 sf
#2	Secondary	956.00'	**30.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=956.00' (Free Discharge)
1=Culvert (Controls 0.00 cfs)

Secondary OutFlow Max=10.04 cfs @ 12.18 hrs HW=956.26' (Free Discharge)
2=Broad-Crested Rectangular Weir (Weir Controls 10.04 cfs @ 1.28 fps)

Summary for Pond 4P: Ex. 15" Culvert

Inflow Area = 412,626 sf, 6.46% Impervious, Inflow Depth = 2.28" for 10-year event
Inflow = 21.28 cfs @ 12.12 hrs, Volume= 78,430 cf
Outflow = 6.43 cfs @ 12.54 hrs, Volume= 78,430 cf, Atten= 70%, Lag= 25.6 min
Primary = 6.43 cfs @ 12.54 hrs, Volume= 78,430 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 955.43' @ 12.54 hrs Surf.Area= 18,777 sf Storage= 17,721 cf

Plug-Flow detention time= 16.6 min calculated for 78,348 cf (100% of inflow)
Center-of-Mass det. time= 16.6 min (859.5 - 842.9)

Volume	Invert	Avail.Storage	Storage Description
#1	952.00'	58,381 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
952.00	7	0	0
953.00	630	319	319
954.00	2,270	1,450	1,769
955.00	14,962	8,616	10,385
956.00	23,736	19,349	29,734
957.00	33,559	28,648	58,381

Device	Routing	Invert	Outlet Devices
#1	Primary	951.70'	**15.0" Round Culvert** L= 81.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 951.70' / 950.40' S= 0.0160 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 1.23 sf
#2	Secondary	956.00'	**100.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=6.43 cfs @ 12.54 hrs HW=955.43' (Free Discharge)
1=Culvert (Barrel Controls 6.43 cfs @ 5.24 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=952.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond 5P: Ex. (2) 12" Culverts

Inflow Area = 412,626 sf, 6.46% Impervious, Inflow Depth = 2.28" for 10-year event
Inflow = 6.43 cfs @ 12.54 hrs, Volume= 78,430 cf
Outflow = 6.42 cfs @ 12.60 hrs, Volume= 78,430 cf, Atten= 0%, Lag= 3.1 min
Primary = 6.42 cfs @ 12.60 hrs, Volume= 78,430 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 949.16' @ 12.60 hrs Surf.Area= 508 sf Storage= 236 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.3 min (859.9 - 859.5)

Volume	Invert	Avail.Storage	Storage Description
#1	948.00'	7,505 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
948.00	45	0	0
949.00	300	173	173
950.00	1,624	962	1,135
951.00	3,139	2,382	3,516
952.00	4,838	3,989	7,505

Device	Routing	Invert	Outlet Devices
#1	Primary	947.50'	**12.0" Round Culvert X 2.00** L= 37.4' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 947.50' / 945.70' S= 0.0481 '/' Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior, Flow Area= 0.79 sf
#2	Secondary	949.90'	**25.0' long x 25.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=6.42 cfs @ 12.60 hrs HW=949.16' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 6.42 cfs @ 4.09 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=948.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX-1: Existing Site Runoff Area=97,742 sf 8.31% Impervious Runoff Depth=5.81"
Flow Length=581' Tc=6.5 min CN=76 Runoff=14.64 cfs 47,307 cf

Subcatchment EX-2: Existing Site Runoff Area=18,946 sf 14.31% Impervious Runoff Depth=5.93"
Tc=2.3 min CN=77 Runoff=3.27 cfs 9,362 cf

Subcatchment EX-3: Existing Site Runoff Area=3,068 sf 28.85% Impervious Runoff Depth=6.41"
Tc=0.9 min CN=81 Runoff=0.58 cfs 1,640 cf

Subcatchment G: Gleason Way Drainage Runoff Area=131,625 sf 26.67% Impervious Runoff Depth=6.29"
Tc=6.0 min CN=80 Runoff=21.36 cfs 69,033 cf

Subcatchment N-1: Abutting Property Runoff Area=24,800 sf 0.00% Impervious Runoff Depth=5.32"
Tc=6.0 min CN=72 Runoff=3.47 cfs 11,000 cf

Subcatchment N-2: Neighbor's Yard Runoff Area=32,144 sf 0.00% Impervious Runoff Depth=5.32"
Tc=6.0 min CN=72 Runoff=4.50 cfs 14,258 cf

Subcatchment N-3: Neighbor's Yard Runoff Area=23,902 sf 0.00% Impervious Runoff Depth=5.32"
Tc=6.0 min CN=72 Runoff=3.35 cfs 10,602 cf

Subcatchment N-4: Neighbor's Yard Runoff Area=26,825 sf 0.00% Impervious Runoff Depth=5.32"
Tc=6.0 min CN=72 Runoff=3.76 cfs 11,898 cf

Subcatchment N-5: Neighbor's Yard Runoff Area=84,334 sf 0.00% Impervious Runoff Depth=5.32"
Tc=6.0 min CN=72 Runoff=11.81 cfs 37,407 cf

Subcatchment P-1: Paxton Street Runoff Area=15,242 sf 100.00% Impervious Runoff Depth=8.47"
Tc=6.0 min CN=98 Runoff=2.92 cfs 10,758 cf

Subcatchment W: Warren Ave Drainage Runoff Area=122,879 sf 15.10% Impervious Runoff Depth=6.05"
Tc=6.0 min CN=78 Runoff=19.30 cfs 61,960 cf

Reach DP-1: Sargent Pond Inflow=62.10 cfs 273,486 cf
Outflow=62.10 cfs 273,486 cf

Reach DP-1A: Wetland on Warren Inflow=43.37 cfs 156,287 cf
Outflow=43.37 cfs 156,287 cf

Reach DP-1B: Stream Inflow=44.68 cfs 193,695 cf
Outflow=44.68 cfs 193,695 cf

Reach DP-1C: Stream at 14 Haberton Drive Inflow=48.66 cfs 193,695 cf
Outflow=48.66 cfs 193,695 cf

Reach DP-1D: 12" Outfall Inflow=21.36 cfs 69,033 cf
Outflow=21.36 cfs 69,033 cf

Reach DP-1E: Paxton Street Drainage System Inflow=2.92 cfs 10,758 cf
Outflow=2.92 cfs 10,758 cf

Reach DP-2: DP-2: Main Street Drainage Inflow=3.80 cfs 11,002 cf
Outflow=3.80 cfs 11,002 cf

Reach SW1: Swale Segment 2 Avg. Flow Depth=0.90' Max Vel=1.42 fps Inflow=24.96 cfs 82,429 cf
n=0.080 L=145.0' S=0.0172 '/' Capacity=203.25 cfs Outflow=23.49 cfs 82,429 cf

Pond 1P: Storage Area 1 Peak Elev=966.60' Storage=719 cf Inflow=18.11 cfs 58,308 cf
Outflow=17.82 cfs 58,163 cf

Pond 2P: Storage Area 2 Peak Elev=963.28' Storage=2,297 cf Inflow=22.31 cfs 72,421 cf
Outflow=21.67 cfs 71,827 cf

Pond 3P: 12" CMP in Yard Peak Elev=956.48' Inflow=26.39 cfs 94,328 cf
Primary=0.00 cfs 0 cf Secondary=26.39 cfs 94,328 cf Outflow=26.39 cfs 94,328 cf

Pond 4P: Ex. 15" Culvert Peak Elev=956.27' Storage=36,481 cf Inflow=54.81 cfs 193,694 cf
Primary=7.10 cfs 154,031 cf Secondary=37.58 cfs 39,664 cf Outflow=44.68 cfs 193,695 cf

Pond 5P: Ex. (2) 12" Culverts Peak Elev=950.60' Storage=2,392 cf Inflow=44.68 cfs 193,695 cf
Primary=9.64 cfs 159,938 cf Secondary=39.02 cfs 33,758 cf Outflow=48.66 cfs 193,695 cf

Total Runoff Area = 581,507 sf Runoff Volume = 285,225 cf Average Runoff Depth = 5.89"
86.14% Pervious = 500,894 sf 13.86% Impervious = 80,613 sf

Summary for Subcatchment EX-1: Existing Site

Runoff = 14.64 cfs @ 12.10 hrs, Volume= 47,307 cf, Depth= 5.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.71"

Area (sf)	CN	Description
8,122	98	Paved parking, HSG C
89,620	74	>75% Grass cover, Good, HSG C
97,742	76	Weighted Average
89,620		91.69% Pervious Area
8,122		8.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	100	0.0400	1.82		**Sheet Flow, Sheet Flow, Parking Lot** Smooth surfaces n= 0.011 P2= 3.22"
0.1	30	0.0600	4.97		**Shallow Concentrated Flow, Shallow Concentrated Flow, Parkin** Paved Kv= 20.3 fps
0.8	111	0.1200	2.42		**Shallow Concentrated Flow, Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
4.7	340	0.0300	1.21		**Shallow Concentrated Flow, Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
6.5	581	Total			

Summary for Subcatchment EX-2: Existing Site

Runoff = 3.27 cfs @ 12.04 hrs, Volume= 9,362 cf, Depth= 5.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.71"

Area (sf)	CN	Description
2,711	98	Paved parking, HSG C
16,235	74	>75% Grass cover, Good, HSG C
18,946	77	Weighted Average
16,235		85.69% Pervious Area
2,711		14.31% Impervious Area

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

Summary for Subcatchment EX-3: Existing Site

Runoff = 0.58 cfs @ 12.01 hrs, Volume= 1,640 cf, Depth= 6.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.71"

Area (sf)	CN	Description
885	98	Paved parking, HSG C
2,183	74	>75% Grass cover, Good, HSG C
3,068	81	Weighted Average
2,183		71.15% Pervious Area
885		28.85% Impervious Area

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

Summary for Subcatchment G: Gleason Way Drainage

Runoff = 21.36 cfs @ 12.09 hrs, Volume= 69,033 cf, Depth= 6.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.71"

Area (sf)	CN	Description
35,103	98	Paved parking, HSG C
96,522	74	>75% Grass cover, Good, HSG C
131,625	80	Weighted Average
96,522		73.33% Pervious Area
35,103		26.67% Impervious Area

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

Summary for Subcatchment N-1: Abutting Property

Runoff = 3.47 cfs @ 12.09 hrs, Volume= 11,000 cf, Depth= 5.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.71"

Area (sf)	CN	Description
24,800	72	Woods/grass comb., Good, HSG C
24,800		100.00% Pervious Area

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

Summary for Subcatchment N-2: Neighbor's Yard

Runoff = 4.50 cfs @ 12.09 hrs, Volume= 14,258 cf, Depth= 5.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.71"

Area (sf)	CN	Description
32,144	72	Woods/grass comb., Good, HSG C
32,144		100.00% Pervious Area

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

Summary for Subcatchment N-3: Neighbor's Yard

Runoff = 3.35 cfs @ 12.09 hrs, Volume= 10,602 cf, Depth= 5.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.71"

Area (sf)	CN	Description
23,902	72	Woods/grass comb., Good, HSG C
23,902		100.00% Pervious Area

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

Summary for Subcatchment N-4: Neighbor's Yard

Runoff = 3.76 cfs @ 12.09 hrs, Volume= 11,898 cf, Depth= 5.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.71"

Area (sf)	CN	Description
26,825	72	Woods/grass comb., Good, HSG C
26,825		100.00% Pervious Area

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

Summary for Subcatchment N-5: Neighbor's Yard

Runoff = 11.81 cfs @ 12.09 hrs, Volume= 37,407 cf, Depth= 5.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.71"

Area (sf)	CN	Description
84,334	72	Woods/grass comb., Good, HSG C
84,334		100.00% Pervious Area

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

Summary for Subcatchment P-1: Paxton Street Drainage

Runoff = 2.92 cfs @ 12.09 hrs, Volume= 10,758 cf, Depth= 8.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.71"

Area (sf)	CN	Description
15,242	98	Water Surface, HSG C
15,242		100.00% Impervious Area

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

Summary for Subcatchment W: Warren Ave Drainage

Runoff = 19.30 cfs @ 12.09 hrs, Volume= 61,960 cf, Depth= 6.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.71"

Area (sf)	CN	Description
18,550	98	Paved parking, HSG C
104,329	74	>75% Grass cover, Good, HSG C
122,879	78	Weighted Average
104,329		84.90% Pervious Area
18,550		15.10% Impervious Area

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

Summary for Reach DP-1: Sargent Pond

Inflow Area = 559,493 sf, 13.77% Impervious, Inflow Depth = 5.87" for 100-year event
Inflow = 62.10 cfs @ 12.21 hrs, Volume= 273,486 cf
Outflow = 62.10 cfs @ 12.21 hrs, Volume= 273,486 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-1A: Wetland on Warren

Inflow Area = 328,292 sf, 8.12% Impervious, Inflow Depth = 5.71" for 100-year event
Inflow = 43.37 cfs @ 12.12 hrs, Volume= 156,287 cf
Outflow = 43.37 cfs @ 12.12 hrs, Volume= 156,287 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-1B: Stream

Inflow Area = 412,626 sf, 6.46% Impervious, Inflow Depth = 5.63" for 100-year event
Inflow = 44.68 cfs @ 12.21 hrs, Volume= 193,695 cf
Outflow = 44.68 cfs @ 12.21 hrs, Volume= 193,695 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-1C: Stream at 14 Haberton Drive

Inflow Area = 412,626 sf, 6.46% Impervious, Inflow Depth = 5.63" for 100-year event
Inflow = 48.66 cfs @ 12.21 hrs, Volume= 193,695 cf
Outflow = 48.66 cfs @ 12.21 hrs, Volume= 193,695 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-1D: 12" Outfall

Inflow Area = 131,625 sf, 26.67% Impervious, Inflow Depth = 6.29" for 100-year event
Inflow = 21.36 cfs @ 12.09 hrs, Volume= 69,033 cf
Outflow = 21.36 cfs @ 12.09 hrs, Volume= 69,033 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-1E: Paxton Street Drainage System

Inflow Area = 15,242 sf,100.00% Impervious, Inflow Depth = 8.47" for 100-year event
Inflow = 2.92 cfs @ 12.09 hrs, Volume= 10,758 cf
Outflow = 2.92 cfs @ 12.09 hrs, Volume= 10,758 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-2: DP-2: Main Street Drainage

Inflow Area = 22,014 sf, 16.34% Impervious, Inflow Depth = 6.00" for 100-year event
Inflow = 3.80 cfs @ 12.04 hrs, Volume= 11,002 cf
Outflow = 3.80 cfs @ 12.04 hrs, Volume= 11,002 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

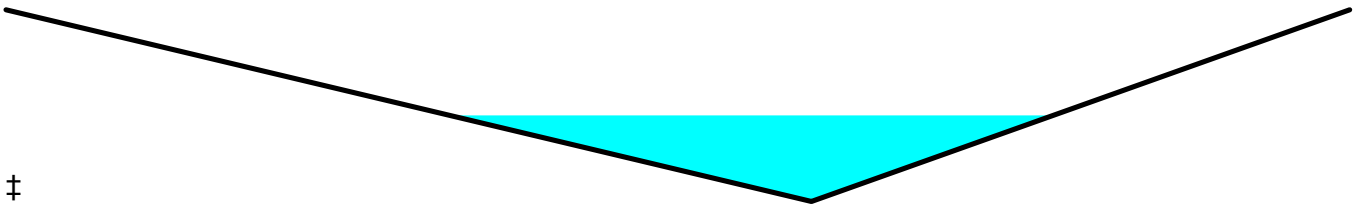
Summary for Reach SW1: Swale Segment 2

Inflow Area = 178,588 sf, 4.55% Impervious, Inflow Depth = 5.54" for 100-year event
Inflow = 24.96 cfs @ 12.11 hrs, Volume= 82,429 cf
Outflow = 23.49 cfs @ 12.16 hrs, Volume= 82,429 cf, Atten= 6%, Lag= 3.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.42 fps, Min. Travel Time= 1.7 min
Avg. Velocity = 0.52 fps, Avg. Travel Time= 4.7 min

Peak Storage= 2,438 cf @ 12.13 hrs
Average Depth at Peak Storage= 0.90' , Surface Width= 37.45'
Bank-Full Depth= 2.00' Flow Area= 83.4 sf, Capacity= 203.25 cfs

0.00' x 2.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 25.0 16.7 '/' Top Width= 83.40'
Length= 145.0' Slope= 0.0172 '/'
Inlet Invert= 962.50', Outlet Invert= 960.00'



‡

Summary for Pond 1P: Storage Area 1

Inflow Area = 122,542 sf, 6.63% Impervious, Inflow Depth = 5.71" for 100-year event
Inflow = 18.11 cfs @ 12.10 hrs, Volume= 58,308 cf
Outflow = 17.82 cfs @ 12.10 hrs, Volume= 58,163 cf, Atten= 2%, Lag= 0.2 min
Primary = 17.82 cfs @ 12.10 hrs, Volume= 58,163 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2

Peak Elev= 966.60' @ 12.10 hrs Surf.Area= 450 sf Storage= 719 cf

Plug-Flow detention time= 3.8 min calculated for 58,103 cf (100% of inflow)
Center-of-Mass det. time= 2.2 min (812.8 - 810.5)

Volume	Invert	Avail.Storage	Storage Description
#1	965.00'	1,350 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
965.00	450	0	0
967.00	450	900	900
968.00	450	450	1,350

Device	Routing	Invert	Outlet Devices
#1	Primary	965.33'	**4.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=17.78 cfs @ 12.10 hrs HW=966.60' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 17.78 cfs @ 3.51 fps)

Summary for Pond 2P: Storage Area 2

Inflow Area = 154,686 sf, 5.25% Impervious, Inflow Depth = 5.62" for 100-year event
Inflow = 22.31 cfs @ 12.10 hrs, Volume= 72,421 cf
Outflow = 21.67 cfs @ 12.11 hrs, Volume= 71,827 cf, Atten= 3%, Lag= 0.7 min
Primary = 21.67 cfs @ 12.11 hrs, Volume= 71,827 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 963.28' @ 12.11 hrs Surf.Area= 1,800 sf Storage= 2,297 cf

Plug-Flow detention time= 10.8 min calculated for 71,827 cf (99% of inflow)
Center-of-Mass det. time= 5.6 min (819.2 - 813.6)

Volume	Invert	Avail.Storage	Storage Description
#1	962.00'	3,600 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
962.00	1,800	0	0
963.00	1,800	1,800	1,800
964.00	1,800	1,800	3,600

Device	Routing	Invert	Outlet Devices
#1	Primary	962.33'	**8.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31

3.30 3.31 3.32

Primary OutFlow Max=21.21 cfs @ 12.11 hrs HW=963.26' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 21.21 cfs @ 2.84 fps)

Summary for Pond 3P: 12" CMP in Yard

Inflow Area = 205,413 sf, 3.95% Impervious, Inflow Depth = 5.51" for 100-year event
Inflow = 26.39 cfs @ 12.15 hrs, Volume= 94,328 cf
Outflow = 26.39 cfs @ 12.15 hrs, Volume= 94,328 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Secondary = 26.39 cfs @ 12.15 hrs, Volume= 94,328 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 956.48' @ 12.15 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	958.90'	**12.0" Round Culvert** L= 95.0' Square-edged headwall, Ke= 0.500 Inlet / Outlet Invert= 958.90' / 954.40' S= 0.0474 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 0.79 sf
#2	Secondary	956.00'	**30.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=956.00' (Free Discharge)
1=Culvert (Controls 0.00 cfs)

Secondary OutFlow Max=26.19 cfs @ 12.15 hrs HW=956.48' (Free Discharge)
2=Broad-Crested Rectangular Weir (Weir Controls 26.19 cfs @ 1.81 fps)

Summary for Pond 4P: Ex. 15" Culvert

Inflow Area = 412,626 sf, 6.46% Impervious, Inflow Depth = 5.63" for 100-year event
Inflow = 54.81 cfs @ 12.11 hrs, Volume= 193,694 cf
Outflow = 44.68 cfs @ 12.21 hrs, Volume= 193,695 cf, Atten= 18%, Lag= 6.1 min
Primary = 7.10 cfs @ 12.21 hrs, Volume= 154,031 cf
Secondary = 37.58 cfs @ 12.21 hrs, Volume= 39,664 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 956.27' @ 12.21 hrs Surf.Area= 26,381 sf Storage= 36,481 cf

Plug-Flow detention time= 25.8 min calculated for 193,493 cf (100% of inflow)
Center-of-Mass det. time= 25.8 min (841.5 - 815.7)

Volume	Invert	Avail.Storage	Storage Description
#1	952.00'	58,381 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
952.00	7	0	0
953.00	630	319	319
954.00	2,270	1,450	1,769
955.00	14,962	8,616	10,385
956.00	23,736	19,349	29,734
957.00	33,559	28,648	58,381

Device	Routing	Invert	Outlet Devices
#1	Primary	951.70'	**15.0" Round Culvert** L= 81.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 951.70' / 950.40' S= 0.0160 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 1.23 sf
#2	Secondary	956.00'	**100.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=7.09 cfs @ 12.21 hrs HW=956.26' (Free Discharge)
↑—**1=Culvert** (Barrel Controls 7.09 cfs @ 5.78 fps)

Secondary OutFlow Max=35.89 cfs @ 12.21 hrs HW=956.26' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 35.89 cfs @ 1.37 fps)

Summary for Pond 5P: Ex. (2) 12" Culverts

Inflow Area = 412,626 sf, 6.46% Impervious, Inflow Depth = 5.63" for 100-year event
Inflow = 44.68 cfs @ 12.21 hrs, Volume= 193,695 cf
Outflow = 48.66 cfs @ 12.21 hrs, Volume= 193,695 cf, Atten= 0%, Lag= 0.1 min
Primary = 9.64 cfs @ 12.22 hrs, Volume= 159,938 cf
Secondary = 39.02 cfs @ 12.21 hrs, Volume= 33,758 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 950.60' @ 12.22 hrs Surf.Area= 2,539 sf Storage= 2,392 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.7 min (842.1 - 841.5)

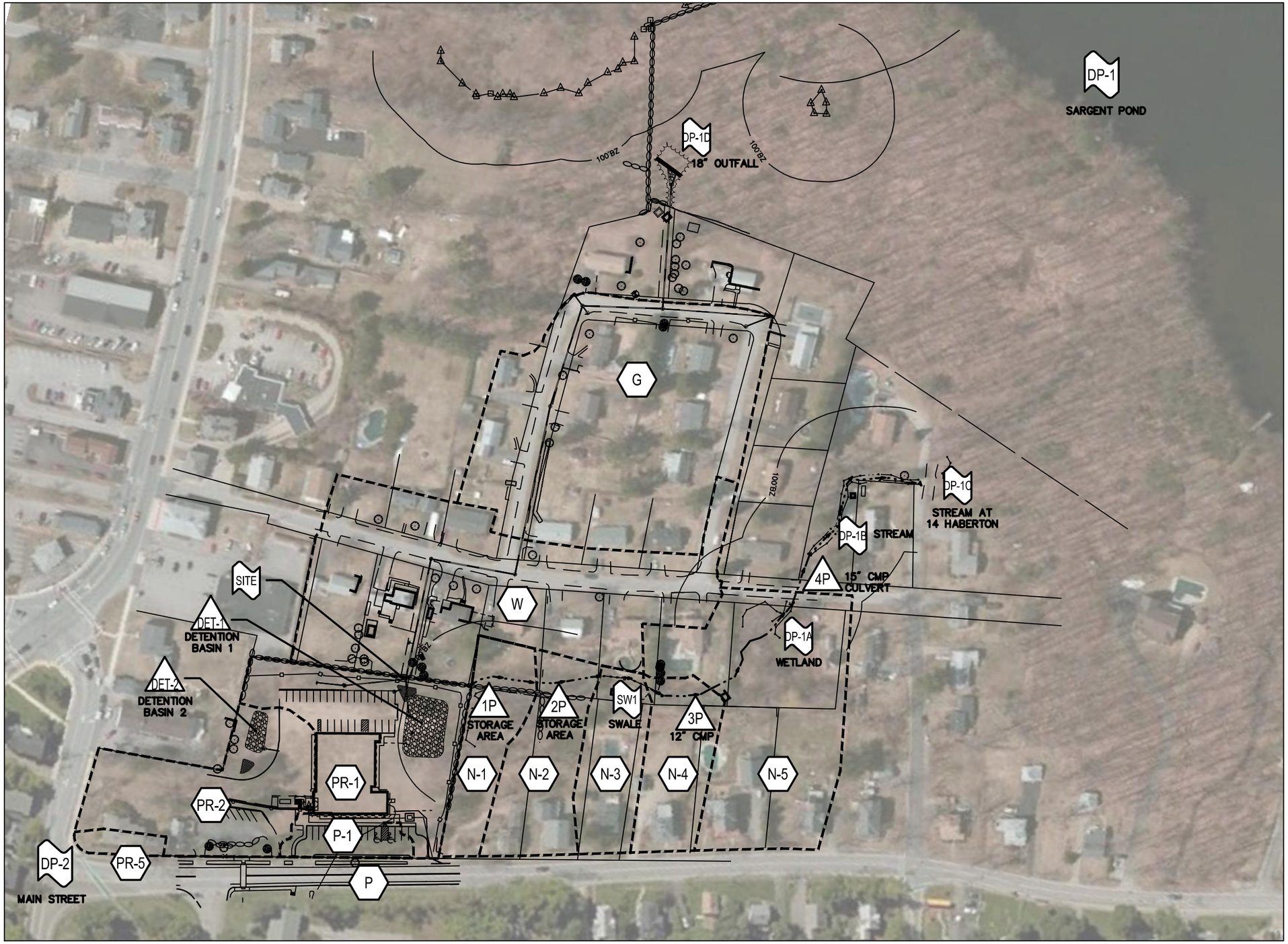
Volume	Invert	Avail.Storage	Storage Description
#1	948.00'	7,505 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
948.00	45	0	0
949.00	300	173	173
950.00	1,624	962	1,135
951.00	3,139	2,382	3,516
952.00	4,838	3,989	7,505

Device	Routing	Invert	Outlet Devices
#1	Primary	947.50'	**12.0" Round Culvert X 2.00** L= 37.4' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 947.50' / 945.70' S= 0.0481 '/' Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior, Flow Area= 0.79 sf
#2	Secondary	949.90'	**25.0' long x 25.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=9.54 cfs @ 12.22 hrs HW=950.55' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 9.54 cfs @ 6.07 fps)

Secondary OutFlow Max=35.39 cfs @ 12.21 hrs HW=950.55' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 35.39 cfs @ 2.17 fps)



Legend

SYMBOLS

- X — **DESIGN POINT**
- X — **DRAINAGE AREA DESIGNATION**
- X — **POND**

LINETYPES

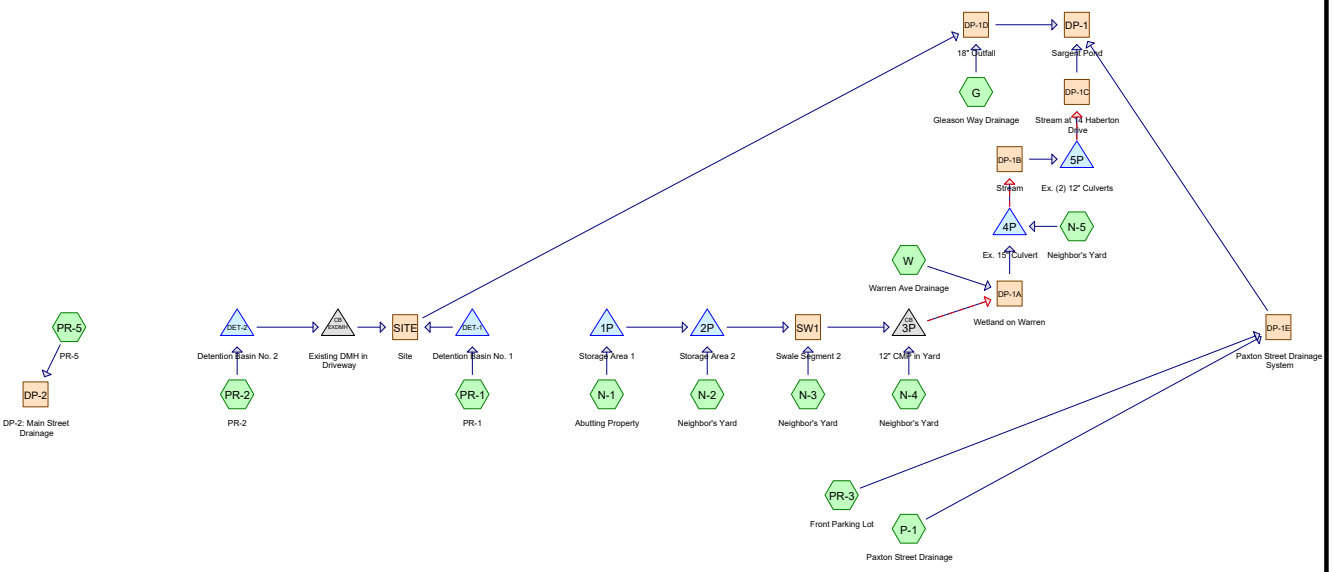
- **DRAINAGE AREA BOUNDARY**
- **TIME OF CONCENTRATION FLOW LINE**

0 75 150 Feet

Proposed Drainage Conditions
LEICESTER FIRE & EMS HQ
STORMWATER IMPROVEMENTS
LEICESTER, MA

Figure 3

03/23/2021



Subcat Reach Pond Link

Routing Diagram for PR-Design-Rev3
Prepared by VHB, Printed 3/23/2021
HydroCAD® 10.10-5a s/n 01038 © 2020 HydroCAD Software Solutions LLC

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment G: Gleason Way Drainage Runoff Area=131,625 sf 26.67% Impervious Runoff Depth=1.42"
Tc=6.0 min CN=80 Runoff=4.88 cfs 15,546 cf

Subcatchment N-1: Abutting Property Runoff Area=24,800 sf 0.00% Impervious Runoff Depth=0.94"
Tc=6.0 min CN=72 Runoff=0.57 cfs 1,947 cf

Subcatchment N-2: Neighbor's Yard Runoff Area=32,144 sf 0.00% Impervious Runoff Depth=0.94"
Tc=6.0 min CN=72 Runoff=0.74 cfs 2,524 cf

Subcatchment N-3: Neighbor's Yard Runoff Area=23,902 sf 0.00% Impervious Runoff Depth=0.94"
Tc=6.0 min CN=72 Runoff=0.55 cfs 1,876 cf

Subcatchment N-4: Neighbor's Yard Runoff Area=26,825 sf 0.00% Impervious Runoff Depth=0.94"
Tc=6.0 min CN=72 Runoff=0.62 cfs 2,106 cf

Subcatchment N-5: Neighbor's Yard Runoff Area=84,334 sf 0.00% Impervious Runoff Depth=0.94"
Tc=6.0 min CN=72 Runoff=1.95 cfs 6,621 cf

Subcatchment P-1: Paxton Street Runoff Area=15,242 sf 100.00% Impervious Runoff Depth=2.99"
Tc=6.0 min CN=98 Runoff=1.07 cfs 3,795 cf

Subcatchment PR-1: PR-1 Runoff Area=63,420 sf 47.78% Impervious Runoff Depth=1.77"
Tc=10.0 min CN=85 Runoff=2.62 cfs 9,379 cf

Subcatchment PR-2: PR-2 Runoff Area=38,817 sf 58.76% Impervious Runoff Depth=2.01"
Tc=6.0 min CN=88 Runoff=2.05 cfs 6,518 cf

Subcatchment PR-3: Front Parking Lot Runoff Area=14,496 sf 100.00% Impervious Runoff Depth=2.99"
Tc=6.0 min CN=98 Runoff=1.02 cfs 3,609 cf

Subcatchment PR-5: PR-5 Runoff Area=3,068 sf 28.85% Impervious Runoff Depth=1.48"
Tc=6.0 min CN=81 Runoff=0.12 cfs 380 cf

Subcatchment W: Warren Ave Drainage Runoff Area=122,896 sf 15.09% Impervious Runoff Depth=1.29"
Tc=6.0 min CN=78 Runoff=4.10 cfs 13,191 cf

Reach DP-1: Sargent Pond Inflow=12.06 cfs 66,321 cf
Outflow=12.06 cfs 66,321 cf

Reach DP-1A: Wetland on Warren Inflow=4.98 cfs 20,903 cf
Outflow=4.98 cfs 20,903 cf

Reach DP-1B: Stream Inflow=4.80 cfs 27,524 cf
Outflow=4.80 cfs 27,524 cf

Reach DP-1C: Stream at 14 Haberton Drive Inflow=4.79 cfs 27,524 cf
Outflow=4.79 cfs 27,524 cf

Reach DP-1D: 18" Outfall Inflow=5.57 cfs 31,394 cf
Outflow=5.57 cfs 31,394 cf

Reach DP-1E: Paxton Street Drainage System Inflow=2.08 cfs 7,403 cf
Outflow=2.08 cfs 7,403 cf

Reach DP-2: DP-2: Main Street Drainage Inflow=0.12 cfs 380 cf
Outflow=0.12 cfs 380 cf

Reach SITE: Site Inflow=1.05 cfs 15,848 cf
Outflow=1.05 cfs 15,848 cf

Reach SW1: Swale Segment 2 Avg. Flow Depth=0.28' Max Vel=0.66 fps Inflow=1.22 cfs 5,606 cf
n=0.080 L=145.0' S=0.0172 '/' Capacity=203.25 cfs Outflow=1.11 cfs 5,606 cf

Pond 1P: Storage Area 1 Peak Elev=965.47' Storage=210 cf Inflow=0.57 cfs 1,947 cf
Outflow=0.55 cfs 1,798 cf

Pond 2P: Storage Area 2 Peak Elev=962.45' Storage=802 cf Inflow=1.28 cfs 4,321 cf
Outflow=0.85 cfs 3,729 cf

Pond 3P: 12" CMP in Yard Peak Elev=956.07' Inflow=1.41 cfs 7,712 cf
Primary=0.00 cfs 0 cf Secondary=1.41 cfs 7,712 cf Outflow=1.41 cfs 7,712 cf

Pond 4P: Ex. 15" Culvert Peak Elev=953.76' Storage=1,269 cf Inflow=6.93 cfs 27,524 cf
Primary=4.80 cfs 27,524 cf Secondary=0.00 cfs 0 cf Outflow=4.80 cfs 27,524 cf

Pond 5P: Ex. (2) 12" Culverts Peak Elev=948.64' Storage=82 cf Inflow=4.80 cfs 27,524 cf
Primary=4.79 cfs 27,524 cf Secondary=0.00 cfs 0 cf Outflow=4.79 cfs 27,524 cf

Pond DET-1: Detention Basin No. 1 Peak Elev=973.86' Storage=3,405 cf Inflow=2.62 cfs 9,379 cf
Outflow=0.74 cfs 9,330 cf

Pond DET-2: Detention Basin No. 2 Peak Elev=978.81' Storage=2,636 cf Inflow=2.05 cfs 6,518 cf
Outflow=0.31 cfs 6,518 cf

Pond EXDMH: Existing DMH in Driveway Peak Elev=976.03' Inflow=0.31 cfs 6,518 cf
Outflow=0.31 cfs 6,518 cf

Total Runoff Area = 581,569 sf Runoff Volume = 67,491 cf Average Runoff Depth = 1.39"
76.38% Pervious = 444,184 sf 23.62% Impervious = 137,385 sf

Summary for Subcatchment G: Gleason Way Drainage

Runoff = 4.88 cfs @ 12.10 hrs, Volume= 15,546 cf, Depth= 1.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.22"

Area (sf)	CN	Description
35,103	98	Paved parking, HSG C
96,522	74	>75% Grass cover, Good, HSG C
131,625	80	Weighted Average
96,522		73.33% Pervious Area
35,103		26.67% Impervious Area

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

Summary for Subcatchment N-1: Abutting Property

Runoff = 0.57 cfs @ 12.10 hrs, Volume= 1,947 cf, Depth= 0.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.22"

Area (sf)	CN	Description
24,800	72	Woods/grass comb., Good, HSG C
24,800		100.00% Pervious Area

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

Summary for Subcatchment N-2: Neighbor's Yard

Runoff = 0.74 cfs @ 12.10 hrs, Volume= 2,524 cf, Depth= 0.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.22"

Area (sf)	CN	Description
32,144	72	Woods/grass comb., Good, HSG C
32,144		100.00% Pervious Area

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

Summary for Subcatchment N-3: Neighbor's Yard

Runoff = 0.55 cfs @ 12.10 hrs, Volume= 1,876 cf, Depth= 0.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.22"

Area (sf)	CN	Description
23,902	72	Woods/grass comb., Good, HSG C
23,902		100.00% Pervious Area

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

Summary for Subcatchment N-4: Neighbor's Yard

Runoff = 0.62 cfs @ 12.10 hrs, Volume= 2,106 cf, Depth= 0.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.22"

Area (sf)	CN	Description
26,825	72	Woods/grass comb., Good, HSG C
26,825		100.00% Pervious Area

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

Summary for Subcatchment N-5: Neighbor's Yard

Runoff = 1.95 cfs @ 12.10 hrs, Volume= 6,621 cf, Depth= 0.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.22"

Area (sf)	CN	Description
84,334	72	Woods/grass comb., Good, HSG C
84,334		100.00% Pervious Area

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

Summary for Subcatchment P-1: Paxton Street Drainage

Runoff = 1.07 cfs @ 12.09 hrs, Volume= 3,795 cf, Depth= 2.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.22"

Area (sf)	CN	Description
15,242	98	Water Surface, HSG C
15,242		100.00% Impervious Area

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

Summary for Subcatchment PR-1: PR-1

Runoff = 2.62 cfs @ 12.14 hrs, Volume= 9,379 cf, Depth= 1.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.22"

Area (sf)	CN	Description
30,301	98	Paved parking, HSG C
33,119	74	>75% Grass cover, Good, HSG C
63,420	85	Weighted Average
33,119		52.22% Pervious Area
30,301		47.78% Impervious Area

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

Summary for Subcatchment PR-2: PR-2

Runoff = 2.05 cfs @ 12.09 hrs, Volume= 6,518 cf, Depth= 2.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.22"

Area (sf)	CN	Description
17,698	98	Paved parking, HSG C
16,009	74	>75% Grass cover, Good, HSG C
5,110	98	Water Surface, HSG C
38,817	88	Weighted Average
16,009		41.24% Pervious Area
22,808		58.76% Impervious Area

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

Summary for Subcatchment PR-3: Front Parking Lot

Runoff = 1.02 cfs @ 12.09 hrs, Volume= 3,609 cf, Depth= 2.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.22"

Area (sf)	CN	Description
14,496	98	Paved parking, HSG C
14,496		100.00% Impervious Area

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

Summary for Subcatchment PR-5: PR-5

Runoff = 0.12 cfs @ 12.10 hrs, Volume= 380 cf, Depth= 1.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.22"

Area (sf)	CN	Description
885	98	Paved parking, HSG C
2,183	74	>75% Grass cover, Good, HSG C
3,068	81	Weighted Average
2,183		71.15% Pervious Area
885		28.85% Impervious Area

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

Summary for Subcatchment W: Warren Ave Drainage

Runoff = 4.10 cfs @ 12.10 hrs, Volume= 13,191 cf, Depth= 1.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.22"

Area (sf)	CN	Description
12,500	98	Paved parking, HSG C
40,596	74	>75% Grass cover, Good, HSG C
6,050	98	Paved parking, HSG C
63,750	74	>75% Grass cover, Good, HSG C
122,896	78	Weighted Average
104,346		84.91% Pervious Area
18,550		15.09% Impervious Area

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

Summary for Reach DP-1: Sargent Pond

Inflow Area = 578,501 sf, 23.60% Impervious, Inflow Depth = 1.38" for 2-year event
Inflow = 12.06 cfs @ 12.10 hrs, Volume= 66,321 cf
Outflow = 12.06 cfs @ 12.10 hrs, Volume= 66,321 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-1A: Wetland on Warren

Inflow Area = 230,567 sf, 8.05% Impervious, Inflow Depth = 1.09" for 2-year event
Inflow = 4.98 cfs @ 12.10 hrs, Volume= 20,903 cf
Outflow = 4.98 cfs @ 12.10 hrs, Volume= 20,903 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-1B: Stream

Inflow Area = 314,901 sf, 5.89% Impervious, Inflow Depth = 1.05" for 2-year event
Inflow = 4.80 cfs @ 12.22 hrs, Volume= 27,524 cf
Outflow = 4.80 cfs @ 12.22 hrs, Volume= 27,524 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-1C: Stream at 14 Haberton Drive

Inflow Area = 314,901 sf, 5.89% Impervious, Inflow Depth = 1.05" for 2-year event
Inflow = 4.79 cfs @ 12.24 hrs, Volume= 27,524 cf
Outflow = 4.79 cfs @ 12.24 hrs, Volume= 27,524 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-1D: 18" Outfall

Inflow Area = 233,862 sf, 37.72% Impervious, Inflow Depth = 1.61" for 2-year event
Inflow = 5.57 cfs @ 12.10 hrs, Volume= 31,394 cf
Outflow = 5.57 cfs @ 12.10 hrs, Volume= 31,394 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-1E: Paxton Street Drainage System

Inflow Area = 29,738 sf,100.00% Impervious, Inflow Depth = 2.99" for 2-year event
Inflow = 2.08 cfs @ 12.09 hrs, Volume= 7,403 cf
Outflow = 2.08 cfs @ 12.09 hrs, Volume= 7,403 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-2: DP-2: Main Street Drainage

Inflow Area = 3,068 sf, 28.85% Impervious, Inflow Depth = 1.48" for 2-year event
Inflow = 0.12 cfs @ 12.10 hrs, Volume= 380 cf
Outflow = 0.12 cfs @ 12.10 hrs, Volume= 380 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach SITE: Site

Inflow Area = 102,237 sf, 51.95% Impervious, Inflow Depth > 1.86" for 2-year event
Inflow = 1.05 cfs @ 12.57 hrs, Volume= 15,848 cf
Outflow = 1.05 cfs @ 12.57 hrs, Volume= 15,848 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

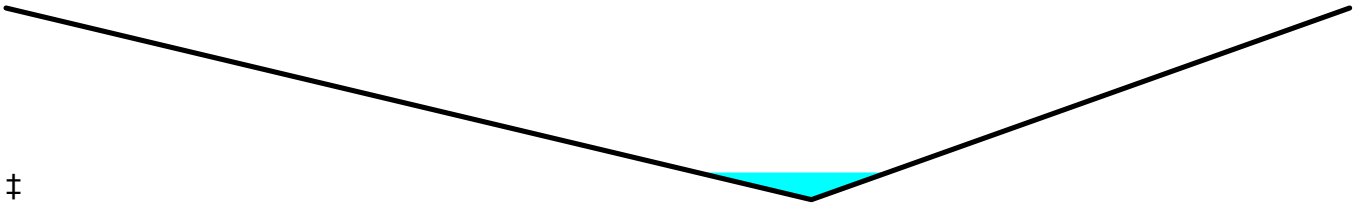
Summary for Reach SW1: Swale Segment 2

Inflow Area = 80,846 sf, 0.00% Impervious, Inflow Depth = 0.83" for 2-year event
Inflow = 1.22 cfs @ 12.22 hrs, Volume= 5,606 cf
Outflow = 1.11 cfs @ 12.35 hrs, Volume= 5,606 cf, Atten= 9%, Lag= 7.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.66 fps, Min. Travel Time= 3.6 min
Avg. Velocity = 0.31 fps, Avg. Travel Time= 7.8 min

Peak Storage= 244 cf @ 12.28 hrs
Average Depth at Peak Storage= 0.28' , Surface Width= 11.84'
Bank-Full Depth= 2.00' Flow Area= 83.4 sf, Capacity= 203.25 cfs

0.00' x 2.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 25.0 16.7 '/' Top Width= 83.40'
Length= 145.0' Slope= 0.0172 '/'
Inlet Invert= 962.50', Outlet Invert= 960.00'



‡

Summary for Pond 1P: Storage Area 1

Inflow Area = 24,800 sf, 0.00% Impervious, Inflow Depth = 0.94" for 2-year event
Inflow = 0.57 cfs @ 12.10 hrs, Volume= 1,947 cf
Outflow = 0.55 cfs @ 12.12 hrs, Volume= 1,798 cf, Atten= 5%, Lag= 1.3 min
Primary = 0.55 cfs @ 12.12 hrs, Volume= 1,798 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 965.47' @ 12.12 hrs Surf.Area= 450 sf Storage= 210 cf

Plug-Flow detention time= 55.5 min calculated for 1,798 cf (92% of inflow)
Center-of-Mass det. time= 16.5 min (884.9 - 868.3)

Volume	Invert	Avail.Storage	Storage Description
#1	965.00'	1,350 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
965.00	450	0	0
967.00	450	900	900
968.00	450	450	1,350

Device	Routing	Invert	Outlet Devices
#1	Primary	965.33'	**4.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=0.52 cfs @ 12.12 hrs HW=965.46' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 0.52 cfs @ 0.98 fps)

Summary for Pond 2P: Storage Area 2

Inflow Area = 56,944 sf, 0.00% Impervious, Inflow Depth = 0.91" for 2-year event
Inflow = 1.28 cfs @ 12.11 hrs, Volume= 4,321 cf
Outflow = 0.85 cfs @ 12.24 hrs, Volume= 3,729 cf, Atten= 34%, Lag= 7.5 min
Primary = 0.85 cfs @ 12.24 hrs, Volume= 3,729 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 962.45' @ 12.24 hrs Surf.Area= 1,800 sf Storage= 802 cf

Plug-Flow detention time= 95.3 min calculated for 3,729 cf (86% of inflow)

Center-of-Mass det. time= 32.5 min (907.7 - 875.2)

Volume	Invert	Avail.Storage	Storage Description
#1	962.00'	3,600 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
962.00	1,800	0	0
963.00	1,800	1,800	1,800
964.00	1,800	1,800	3,600

Device	Routing	Invert	Outlet Devices
#1	Primary	962.33'	**8.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=0.84 cfs @ 12.24 hrs HW=962.44' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 0.84 cfs @ 0.91 fps)

Summary for Pond 3P: 12" CMP in Yard

Inflow Area =	107,671 sf,	0.00% Impervious,	Inflow Depth =	0.86"	for 2-year event
Inflow =	1.41 cfs @	12.33 hrs, Volume=	7,712 cf		
Outflow =	1.41 cfs @	12.33 hrs, Volume=	7,712 cf,	Atten= 0%,	Lag= 0.0 min
Primary =	0.00 cfs @	0.00 hrs, Volume=	0 cf		
Secondary =	1.41 cfs @	12.33 hrs, Volume=	7,712 cf		

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 956.07' @ 12.33 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	958.90'	**12.0" Round Culvert** L= 95.0' Square-edged headwall, Ke= 0.500 Inlet / Outlet Invert= 958.90' / 954.40' S= 0.0474 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 0.79 sf
#2	Secondary	956.00'	**30.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=956.00' (Free Discharge)
↑—**1=Culvert** (Controls 0.00 cfs)

Secondary OutFlow Max=1.37 cfs @ 12.33 hrs HW=956.07' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 1.37 cfs @ 0.66 fps)

Summary for Pond 4P: Ex. 15" Culvert

Inflow Area = 314,901 sf, 5.89% Impervious, Inflow Depth = 1.05" for 2-year event
Inflow = 6.93 cfs @ 12.10 hrs, Volume= 27,524 cf
Outflow = 4.80 cfs @ 12.22 hrs, Volume= 27,524 cf, Atten= 31%, Lag= 7.3 min
Primary = 4.80 cfs @ 12.22 hrs, Volume= 27,524 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 953.76' @ 12.22 hrs Surf.Area= 1,875 sf Storage= 1,269 cf

Plug-Flow detention time= 1.2 min calculated for 27,495 cf (100% of inflow)
Center-of-Mass det. time= 1.2 min (867.5 - 866.2)

Volume	Invert	Avail.Storage	Storage Description
#1	952.00'	58,381 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
952.00	7	0	0
953.00	630	319	319
954.00	2,270	1,450	1,769
955.00	14,962	8,616	10,385
956.00	23,736	19,349	29,734
957.00	33,559	28,648	58,381

Device	Routing	Invert	Outlet Devices
#1	Primary	951.70'	**15.0" Round Culvert** L= 81.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 951.70' / 950.40' S= 0.0160 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 1.23 sf
#2	Secondary	956.00'	**100.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=4.79 cfs @ 12.22 hrs HW=953.75' (Free Discharge)
1=Culvert (Barrel Controls 4.79 cfs @ 3.90 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=952.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond 5P: Ex. (2) 12" Culverts

Inflow Area = 314,901 sf, 5.89% Impervious, Inflow Depth = 1.05" for 2-year event
Inflow = 4.80 cfs @ 12.22 hrs, Volume= 27,524 cf
Outflow = 4.79 cfs @ 12.24 hrs, Volume= 27,524 cf, Atten= 0%, Lag= 1.0 min
Primary = 4.79 cfs @ 12.24 hrs, Volume= 27,524 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Peak Elev= 948.64' @ 12.24 hrs Surf.Area= 209 sf Storage= 82 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.1 min (867.6 - 867.5)

Volume	Invert	Avail.Storage	Storage Description
#1	948.00'	7,505 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
948.00	45	0	0
949.00	300	173	173
950.00	1,624	962	1,135
951.00	3,139	2,382	3,516
952.00	4,838	3,989	7,505

Device	Routing	Invert	Outlet Devices
#1	Primary	947.50'	**12.0" Round Culvert X 2.00** L= 37.4' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 947.50' / 945.70' S= 0.0481 '/' Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior, Flow Area= 0.79 sf
#2	Secondary	949.90'	**25.0' long x 25.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=4.79 cfs @ 12.24 hrs HW=948.64' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 4.79 cfs @ 3.05 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=948.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DET-1: Detention Basin No. 1

Inflow Area = 63,420 sf, 47.78% Impervious, Inflow Depth = 1.77" for 2-year event
Inflow = 2.62 cfs @ 12.14 hrs, Volume= 9,379 cf
Outflow = 0.74 cfs @ 12.56 hrs, Volume= 9,330 cf, Atten= 72%, Lag= 24.9 min
Primary = 0.74 cfs @ 12.56 hrs, Volume= 9,330 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 973.86' @ 12.56 hrs Surf.Area= 4,265 sf Storage= 3,405 cf

Plug-Flow detention time= 98.2 min calculated for 9,330 cf (99% of inflow)
Center-of-Mass det. time= 94.9 min (924.5 - 829.5)

Volume	Invert	Avail.Storage	Storage Description
#1	973.00'	11,650 cf	**Detention Basin 1 (Prismatic)** Listed below (Recalc)
#2	972.00'	31 cf	**4.00'D x 2.50'H OCS 2**
		11,681 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
973.00	3,616	0	0
974.00	4,356	3,986	3,986
975.00	5,152	4,754	8,740
975.50	6,488	2,910	11,650

Device	Routing	Invert	Outlet Devices
#1	Primary	972.00'	**18.0" Round Culvert** L= 53.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 972.00' / 971.10' S= 0.0170 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#2	Device 1	974.50'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	973.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.74 cfs @ 12.56 hrs HW=973.86' (Free Discharge)
└**1=Culvert** (Passes 0.74 cfs of 8.96 cfs potential flow)
  ├**2=Orifice/Grate** (Controls 0.00 cfs)
  └**3=Orifice/Grate** (Orifice Controls 0.74 cfs @ 3.76 fps)

Summary for Pond DET-2: Detention Basin No. 2

Inflow Area = 38,817 sf, 58.76% Impervious, Inflow Depth = 2.01" for 2-year event
Inflow = 2.05 cfs @ 12.09 hrs, Volume= 6,518 cf
Outflow = 0.31 cfs @ 12.62 hrs, Volume= 6,518 cf, Atten= 85%, Lag= 31.5 min
Primary = 0.31 cfs @ 12.62 hrs, Volume= 6,518 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 978.81' @ 12.62 hrs Surf.Area= 1,748 sf Storage= 2,636 cf

Plug-Flow detention time= 103.4 min calculated for 6,511 cf (100% of inflow)
Center-of-Mass det. time= 104.0 min (918.8 - 814.8)

Volume	Invert	Avail.Storage	Storage Description
#1	977.00'	10,727 cf	**Detention Basin 2 (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
977.00	1,176	0	0
978.00	1,472	1,324	1,324
979.00	1,811	1,642	2,966
980.00	2,156	1,984	4,949
981.00	2,566	2,361	7,310
982.00	4,267	3,417	10,727

Device	Routing	Invert	Outlet Devices
#1	Primary	980.90'	**10.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65

			2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Primary	977.00'	**12.0" Round Culvert**
			L= 21.6' RCP, square edge headwall, Ke= 0.500
			Inlet / Outlet Invert= 977.00' / 975.80' S= 0.0556 '/' Cc= 0.900
			n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf
#3	Device 2	980.00'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600
			Limited to weir flow at low heads
#4	Device 2	977.00'	**3.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.31 cfs @ 12.62 hrs HW=978.81' (Free Discharge)
- **1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
- **2=Culvert** (Passes 0.31 cfs of 4.34 cfs potential flow)
  - **3=Orifice/Grate** (Controls 0.00 cfs)
  - **4=Orifice/Grate** (Orifice Controls 0.31 cfs @ 6.26 fps)

Summary for Pond EXDMH: Existing DMH in Driveway

Inflow Area = 38,817 sf, 58.76% Impervious, Inflow Depth = 2.01" for 2-year event
Inflow = 0.31 cfs @ 12.62 hrs, Volume= 6,518 cf
Outflow = 0.31 cfs @ 12.62 hrs, Volume= 6,518 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.31 cfs @ 12.62 hrs, Volume= 6,518 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 976.03' @ 12.62 hrs
Flood Elev= 979.35'

Device	Routing	Invert	Outlet Devices
#1	Primary	975.70'	**12.0" Round Culvert**
			L= 130.6' RCP, square edge headwall, Ke= 0.500
			Inlet / Outlet Invert= 975.70' / 975.00' S= 0.0054 '/' Cc= 0.900
			n= 0.015 Concrete sewer w/manholes & inlets, Flow Area= 0.79 sf
#2	Primary	979.35'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600
			Limited to weir flow at low heads

Primary OutFlow Max=0.31 cfs @ 12.62 hrs HW=976.03' (Free Discharge)
- **1=Culvert** (Barrel Controls 0.31 cfs @ 2.00 fps)
- **2=Orifice/Grate** (Controls 0.00 cfs)

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment G: Gleason Way Drainage Runoff Area=131,625 sf 26.67% Impervious Runoff Depth=2.75"
Tc=6.0 min CN=80 Runoff=9.56 cfs 30,205 cf

Subcatchment N-1: Abutting Property Runoff Area=24,800 sf 0.00% Impervious Runoff Depth=2.08"
Tc=6.0 min CN=72 Runoff=1.34 cfs 4,289 cf

Subcatchment N-2: Neighbor's Yard Runoff Area=32,144 sf 0.00% Impervious Runoff Depth=2.08"
Tc=6.0 min CN=72 Runoff=1.74 cfs 5,559 cf

Subcatchment N-3: Neighbor's Yard Runoff Area=23,902 sf 0.00% Impervious Runoff Depth=2.08"
Tc=6.0 min CN=72 Runoff=1.30 cfs 4,134 cf

Subcatchment N-4: Neighbor's Yard Runoff Area=26,825 sf 0.00% Impervious Runoff Depth=2.08"
Tc=6.0 min CN=72 Runoff=1.45 cfs 4,639 cf

Subcatchment N-5: Neighbor's Yard Runoff Area=84,334 sf 0.00% Impervious Runoff Depth=2.08"
Tc=6.0 min CN=72 Runoff=4.57 cfs 14,585 cf

Subcatchment P-1: Paxton Street Runoff Area=15,242 sf 100.00% Impervious Runoff Depth=4.60"
Tc=6.0 min CN=98 Runoff=1.62 cfs 5,847 cf

Subcatchment PR-1: PR-1 Runoff Area=63,420 sf 47.78% Impervious Runoff Depth=3.22"
Tc=10.0 min CN=85 Runoff=4.71 cfs 17,020 cf

Subcatchment PR-2: PR-2 Runoff Area=38,817 sf 58.76% Impervious Runoff Depth=3.52"
Tc=6.0 min CN=88 Runoff=3.52 cfs 11,377 cf

Subcatchment PR-3: Front Parking Lot Runoff Area=14,496 sf 100.00% Impervious Runoff Depth=4.60"
Tc=6.0 min CN=98 Runoff=1.54 cfs 5,561 cf

Subcatchment PR-5: PR-5 Runoff Area=3,068 sf 28.85% Impervious Runoff Depth=2.84"
Tc=6.0 min CN=81 Runoff=0.23 cfs 727 cf

Subcatchment W: Warren Ave Drainage Runoff Area=122,896 sf 15.09% Impervious Runoff Depth=2.58"
Tc=6.0 min CN=78 Runoff=8.36 cfs 26,386 cf

Reach DP-1: Sargent Pond Inflow=19.17 cfs 128,809 cf
Outflow=19.17 cfs 128,809 cf

Reach DP-1A: Wetland on Warren Inflow=12.25 cfs 44,264 cf
Outflow=12.25 cfs 44,264 cf

Reach DP-1B: Stream Inflow=6.05 cfs 58,849 cf
Outflow=6.05 cfs 58,849 cf

Reach DP-1C: Stream at 14 Haberton Drive Inflow=6.05 cfs 58,849 cf
Outflow=6.05 cfs 58,849 cf

Reach DP-1D: 18" Outfall Inflow=10.61 cfs 58,552 cf
Outflow=10.61 cfs 58,552 cf

Reach DP-1E: Paxton Street Drainage System Inflow=3.16 cfs 11,408 cf
Outflow=3.16 cfs 11,408 cf

Reach DP-2: DP-2: Main Street Drainage Inflow=0.23 cfs 727 cf
Outflow=0.23 cfs 727 cf

Reach SITE: Site Inflow=1.65 cfs 28,347 cf
Outflow=1.65 cfs 28,347 cf

Reach SW1: Swale Segment 2 Avg. Flow Depth=0.45' Max Vel=0.90 fps Inflow=4.03 cfs 13,238 cf
n=0.080 L=145.0' S=0.0172 '/' Capacity=203.25 cfs Outflow=3.78 cfs 13,238 cf

Pond 1P: Storage Area 1 Peak Elev=965.57' Storage=258 cf Inflow=1.34 cfs 4,289 cf
Outflow=1.30 cfs 4,140 cf

Pond 2P: Storage Area 2 Peak Elev=962.59' Storage=1,054 cf Inflow=3.03 cfs 9,700 cf
Outflow=2.79 cfs 9,105 cf

Pond 3P: 12" CMP in Yard Peak Elev=956.16' Inflow=4.72 cfs 17,878 cf
Primary=0.00 cfs 0 cf Secondary=4.72 cfs 17,878 cf Outflow=4.72 cfs 17,878 cf

Pond 4P: Ex. 15" Culvert Peak Elev=955.01' Storage=10,482 cf Inflow=16.78 cfs 58,849 cf
Primary=6.05 cfs 58,849 cf Secondary=0.00 cfs 0 cf Outflow=6.05 cfs 58,849 cf

Pond 5P: Ex. (2) 12" Culverts Peak Elev=949.03' Storage=181 cf Inflow=6.05 cfs 58,849 cf
Primary=6.05 cfs 58,849 cf Secondary=0.00 cfs 0 cf Outflow=6.05 cfs 58,849 cf

Pond DET-1: Detention Basin No. 1 Peak Elev=974.53' Storage=6,452 cf Inflow=4.71 cfs 17,020 cf
Outflow=1.24 cfs 16,970 cf

Pond DET-2: Detention Basin No. 2 Peak Elev=980.01' Storage=4,966 cf Inflow=3.52 cfs 11,377 cf
Outflow=0.45 cfs 11,377 cf

Pond EXDMH: Existing DMH in Driveway Peak Elev=976.10' Inflow=0.45 cfs 11,377 cf
Outflow=0.45 cfs 11,377 cf

Total Runoff Area = 581,569 sf Runoff Volume = 130,331 cf Average Runoff Depth = 2.69"
76.38% Pervious = 444,184 sf 23.62% Impervious = 137,385 sf

Summary for Subcatchment G: Gleason Way Drainage

Runoff = 9.56 cfs @ 12.09 hrs, Volume= 30,205 cf, Depth= 2.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.84"

Area (sf)	CN	Description
35,103	98	Paved parking, HSG C
96,522	74	>75% Grass cover, Good, HSG C
131,625	80	Weighted Average
96,522		73.33% Pervious Area
35,103		26.67% Impervious Area

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

Summary for Subcatchment N-1: Abutting Property

Runoff = 1.34 cfs @ 12.10 hrs, Volume= 4,289 cf, Depth= 2.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.84"

Area (sf)	CN	Description
24,800	72	Woods/grass comb., Good, HSG C
24,800		100.00% Pervious Area

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

Summary for Subcatchment N-2: Neighbor's Yard

Runoff = 1.74 cfs @ 12.10 hrs, Volume= 5,559 cf, Depth= 2.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.84"

Area (sf)	CN	Description
32,144	72	Woods/grass comb., Good, HSG C
32,144		100.00% Pervious Area

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

Summary for Subcatchment N-3: Neighbor's Yard

Runoff = 1.30 cfs @ 12.10 hrs, Volume= 4,134 cf, Depth= 2.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.84"

Area (sf)	CN	Description
23,902	72	Woods/grass comb., Good, HSG C
23,902		100.00% Pervious Area

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

Summary for Subcatchment N-4: Neighbor's Yard

Runoff = 1.45 cfs @ 12.10 hrs, Volume= 4,639 cf, Depth= 2.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.84"

Area (sf)	CN	Description
26,825	72	Woods/grass comb., Good, HSG C
26,825		100.00% Pervious Area

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

Summary for Subcatchment N-5: Neighbor's Yard

Runoff = 4.57 cfs @ 12.10 hrs, Volume= 14,585 cf, Depth= 2.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.84"

Area (sf)	CN	Description
84,334	72	Woods/grass comb., Good, HSG C
84,334		100.00% Pervious Area

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

Summary for Subcatchment P-1: Paxton Street Drainage

Runoff = 1.62 cfs @ 12.09 hrs, Volume= 5,847 cf, Depth= 4.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.84"

Area (sf)	CN	Description
15,242	98	Water Surface, HSG C
15,242		100.00% Impervious Area

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

Summary for Subcatchment PR-1: PR-1

Runoff = 4.71 cfs @ 12.14 hrs, Volume= 17,020 cf, Depth= 3.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.84"

Area (sf)	CN	Description
30,301	98	Paved parking, HSG C
33,119	74	>75% Grass cover, Good, HSG C
63,420	85	Weighted Average
33,119		52.22% Pervious Area
30,301		47.78% Impervious Area

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

Summary for Subcatchment PR-2: PR-2

Runoff = 3.52 cfs @ 12.09 hrs, Volume= 11,377 cf, Depth= 3.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.84"

Area (sf)	CN	Description
17,698	98	Paved parking, HSG C
16,009	74	>75% Grass cover, Good, HSG C
5,110	98	Water Surface, HSG C
38,817	88	Weighted Average
16,009		41.24% Pervious Area
22,808		58.76% Impervious Area

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

Summary for Subcatchment PR-3: Front Parking Lot

Runoff = 1.54 cfs @ 12.09 hrs, Volume= 5,561 cf, Depth= 4.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.84"

Area (sf)	CN	Description
14,496	98	Paved parking, HSG C
14,496		100.00% Impervious Area

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

Summary for Subcatchment PR-5: PR-5

Runoff = 0.23 cfs @ 12.09 hrs, Volume= 727 cf, Depth= 2.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.84"

Area (sf)	CN	Description
885	98	Paved parking, HSG C
2,183	74	>75% Grass cover, Good, HSG C
3,068	81	Weighted Average
2,183		71.15% Pervious Area
885		28.85% Impervious Area

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

Summary for Subcatchment W: Warren Ave Drainage

Runoff = 8.36 cfs @ 12.09 hrs, Volume= 26,386 cf, Depth= 2.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.84"

Area (sf)	CN	Description
12,500	98	Paved parking, HSG C
40,596	74	>75% Grass cover, Good, HSG C
6,050	98	Paved parking, HSG C
63,750	74	>75% Grass cover, Good, HSG C
122,896	78	Weighted Average
104,346		84.91% Pervious Area
18,550		15.09% Impervious Area

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

Summary for Reach DP-1: Sargent Pond

Inflow Area = 578,501 sf, 23.60% Impervious, Inflow Depth = 2.67" for 10-year event
Inflow = 19.17 cfs @ 12.10 hrs, Volume= 128,809 cf
Outflow = 19.17 cfs @ 12.10 hrs, Volume= 128,809 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-1A: Wetland on Warren

Inflow Area = 230,567 sf, 8.05% Impervious, Inflow Depth = 2.30" for 10-year event
Inflow = 12.25 cfs @ 12.11 hrs, Volume= 44,264 cf
Outflow = 12.25 cfs @ 12.11 hrs, Volume= 44,264 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-1B: Stream

Inflow Area = 314,901 sf, 5.89% Impervious, Inflow Depth = 2.24" for 10-year event
Inflow = 6.05 cfs @ 12.46 hrs, Volume= 58,849 cf
Outflow = 6.05 cfs @ 12.46 hrs, Volume= 58,849 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-1C: Stream at 14 Haberton Drive

Inflow Area = 314,901 sf, 5.89% Impervious, Inflow Depth = 2.24" for 10-year event
Inflow = 6.05 cfs @ 12.50 hrs, Volume= 58,849 cf
Outflow = 6.05 cfs @ 12.50 hrs, Volume= 58,849 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-1D: 18" Outfall

Inflow Area = 233,862 sf, 37.72% Impervious, Inflow Depth = 3.00" for 10-year event
Inflow = 10.61 cfs @ 12.09 hrs, Volume= 58,552 cf
Outflow = 10.61 cfs @ 12.09 hrs, Volume= 58,552 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-1E: Paxton Street Drainage System

Inflow Area = 29,738 sf,100.00% Impervious, Inflow Depth = 4.60" for 10-year event
Inflow = 3.16 cfs @ 12.09 hrs, Volume= 11,408 cf
Outflow = 3.16 cfs @ 12.09 hrs, Volume= 11,408 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-2: DP-2: Main Street Drainage

Inflow Area = 3,068 sf, 28.85% Impervious, Inflow Depth = 2.84" for 10-year event
Inflow = 0.23 cfs @ 12.09 hrs, Volume= 727 cf
Outflow = 0.23 cfs @ 12.09 hrs, Volume= 727 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach SITE: Site

Inflow Area = 102,237 sf, 51.95% Impervious, Inflow Depth > 3.33" for 10-year event
Inflow = 1.65 cfs @ 12.57 hrs, Volume= 28,347 cf
Outflow = 1.65 cfs @ 12.57 hrs, Volume= 28,347 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

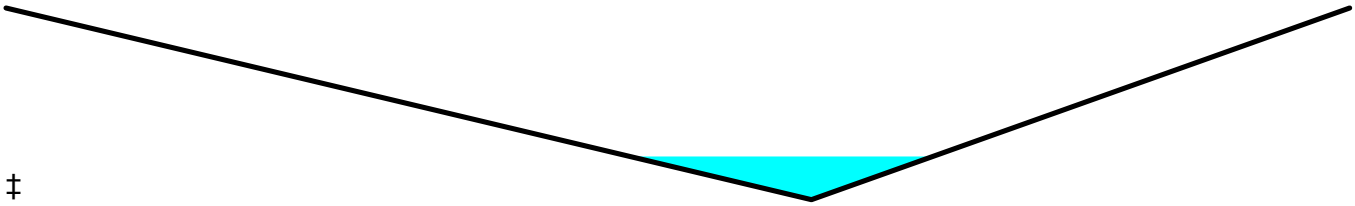
Summary for Reach SW1: Swale Segment 2

Inflow Area = 80,846 sf, 0.00% Impervious, Inflow Depth = 1.96" for 10-year event
Inflow = 4.03 cfs @ 12.12 hrs, Volume= 13,238 cf
Outflow = 3.78 cfs @ 12.21 hrs, Volume= 13,238 cf, Atten= 6%, Lag= 5.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.90 fps, Min. Travel Time= 2.7 min
Avg. Velocity = 0.35 fps, Avg. Travel Time= 6.9 min

Peak Storage= 613 cf @ 12.16 hrs
Average Depth at Peak Storage= 0.45' , Surface Width= 18.78'
Bank-Full Depth= 2.00' Flow Area= 83.4 sf, Capacity= 203.25 cfs

0.00' x 2.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 25.0 16.7 '/' Top Width= 83.40'
Length= 145.0' Slope= 0.0172 '/'
Inlet Invert= 962.50', Outlet Invert= 960.00'



‡

Summary for Pond 1P: Storage Area 1

Inflow Area = 24,800 sf, 0.00% Impervious, Inflow Depth = 2.08" for 10-year event
Inflow = 1.34 cfs @ 12.10 hrs, Volume= 4,289 cf
Outflow = 1.30 cfs @ 12.11 hrs, Volume= 4,140 cf, Atten= 4%, Lag= 0.9 min
Primary = 1.30 cfs @ 12.11 hrs, Volume= 4,140 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 965.57' @ 12.11 hrs Surf.Area= 450 sf Storage= 258 cf

Plug-Flow detention time= 28.9 min calculated for 4,140 cf (97% of inflow)
Center-of-Mass det. time= 9.6 min (853.8 - 844.2)

Volume	Invert	Avail.Storage	Storage Description
#1	965.00'	1,350 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
965.00	450	0	0
967.00	450	900	900
968.00	450	450	1,350

Device	Routing	Invert	Outlet Devices
#1	Primary	965.33'	**4.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=1.26 cfs @ 12.11 hrs HW=965.57' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 1.26 cfs @ 1.32 fps)

Summary for Pond 2P: Storage Area 2

Inflow Area = 56,944 sf, 0.00% Impervious, Inflow Depth = 2.04" for 10-year event
Inflow = 3.03 cfs @ 12.10 hrs, Volume= 9,700 cf
Outflow = 2.79 cfs @ 12.13 hrs, Volume= 9,105 cf, Atten= 8%, Lag= 2.0 min
Primary = 2.79 cfs @ 12.13 hrs, Volume= 9,105 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 962.59' @ 12.13 hrs Surf.Area= 1,800 sf Storage= 1,054 cf

Plug-Flow detention time= 48.2 min calculated for 9,095 cf (94% of inflow)

Center-of-Mass det. time= 16.2 min (864.5 - 848.3)

Volume	Invert	Avail.Storage	Storage Description
#1	962.00'	3,600 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
962.00	1,800	0	0
963.00	1,800	1,800	1,800
964.00	1,800	1,800	3,600

Device	Routing	Invert	Outlet Devices
#1	Primary	962.33'	**8.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=2.73 cfs @ 12.13 hrs HW=962.58' (Free Discharge)
↑**1=Broad-Crested Rectangular Weir** (Weir Controls 2.73 cfs @ 1.35 fps)

Summary for Pond 3P: 12" CMP in Yard

Inflow Area =	107,671 sf,	0.00% Impervious,	Inflow Depth =	1.99"	for 10-year event
Inflow =	4.72 cfs @	12.19 hrs,	Volume=	17,878 cf	
Outflow =	4.72 cfs @	12.19 hrs,	Volume=	17,878 cf,	Atten= 0%, Lag= 0.0 min
Primary =	0.00 cfs @	0.00 hrs,	Volume=	0 cf	
Secondary =	4.72 cfs @	12.19 hrs,	Volume=	17,878 cf	

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 956.16' @ 12.19 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	958.90'	**12.0" Round Culvert** L= 95.0' Square-edged headwall, Ke= 0.500 Inlet / Outlet Invert= 958.90' / 954.40' S= 0.0474 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 0.79 sf
#2	Secondary	956.00'	**30.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=956.00' (Free Discharge)
↑**1=Culvert** (Controls 0.00 cfs)

Secondary OutFlow Max=4.66 cfs @ 12.19 hrs HW=956.16' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Weir Controls 4.66 cfs @ 0.99 fps)

Summary for Pond 4P: Ex. 15" Culvert

Inflow Area = 314,901 sf, 5.89% Impervious, Inflow Depth = 2.24" for 10-year event
Inflow = 16.78 cfs @ 12.11 hrs, Volume= 58,849 cf
Outflow = 6.05 cfs @ 12.46 hrs, Volume= 58,849 cf, Atten= 64%, Lag= 21.6 min
Primary = 6.05 cfs @ 12.46 hrs, Volume= 58,849 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 955.01' @ 12.46 hrs Surf.Area= 15,019 sf Storage= 10,482 cf

Plug-Flow detention time= 9.4 min calculated for 58,788 cf (100% of inflow)
Center-of-Mass det. time= 9.4 min (851.4 - 842.0)

Volume	Invert	Avail.Storage	Storage Description
#1	952.00'	58,381 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
952.00	7	0	0
953.00	630	319	319
954.00	2,270	1,450	1,769
955.00	14,962	8,616	10,385
956.00	23,736	19,349	29,734
957.00	33,559	28,648	58,381

Device	Routing	Invert	Outlet Devices
#1	Primary	951.70'	**15.0" Round Culvert** L= 81.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 951.70' / 950.40' S= 0.0160 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 1.23 sf
#2	Secondary	956.00'	**100.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=6.05 cfs @ 12.46 hrs HW=955.01' (Free Discharge)
1=Culvert (Barrel Controls 6.05 cfs @ 4.93 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=952.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond 5P: Ex. (2) 12" Culverts

Inflow Area = 314,901 sf, 5.89% Impervious, Inflow Depth = 2.24" for 10-year event
Inflow = 6.05 cfs @ 12.46 hrs, Volume= 58,849 cf
Outflow = 6.05 cfs @ 12.50 hrs, Volume= 58,849 cf, Atten= 0%, Lag= 1.9 min
Primary = 6.05 cfs @ 12.50 hrs, Volume= 58,849 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Peak Elev= 949.03' @ 12.50 hrs Surf.Area= 336 sf Storage= 181 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.2 min (851.6 - 851.4)

Volume	Invert	Avail.Storage	Storage Description
#1	948.00'	7,505 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
948.00	45	0	0
949.00	300	173	173
950.00	1,624	962	1,135
951.00	3,139	2,382	3,516
952.00	4,838	3,989	7,505

Device	Routing	Invert	Outlet Devices
#1	Primary	947.50'	**12.0" Round Culvert X 2.00** L= 37.4' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 947.50' / 945.70' S= 0.0481 '/' Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior, Flow Area= 0.79 sf
#2	Secondary	949.90'	**25.0' long x 25.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=6.05 cfs @ 12.50 hrs HW=949.03' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 6.05 cfs @ 3.85 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=948.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DET-1: Detention Basin No. 1

Inflow Area = 63,420 sf, 47.78% Impervious, Inflow Depth = 3.22" for 10-year event
Inflow = 4.71 cfs @ 12.14 hrs, Volume= 17,020 cf
Outflow = 1.24 cfs @ 12.57 hrs, Volume= 16,970 cf, Atten= 74%, Lag= 25.4 min
Primary = 1.24 cfs @ 12.57 hrs, Volume= 16,970 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 974.53' @ 12.57 hrs Surf.Area= 4,793 sf Storage= 6,452 cf

Plug-Flow detention time= 93.0 min calculated for 16,952 cf (100% of inflow)
Center-of-Mass det. time= 92.3 min (904.8 - 812.5)

Volume	Invert	Avail.Storage	Storage Description
#1	973.00'	11,650 cf	**Detention Basin 1 (Prismatic)** Listed below (Recalc)
#2	972.00'	31 cf	**4.00'D x 2.50'H OCS 2**
		11,681 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
973.00	3,616	0	0
974.00	4,356	3,986	3,986
975.00	5,152	4,754	8,740
975.50	6,488	2,910	11,650

Device	Routing	Invert	Outlet Devices
#1	Primary	972.00'	**18.0" Round Culvert** L= 53.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 972.00' / 971.10' S= 0.0170 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#2	Device 1	974.50'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	973.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.22 cfs @ 12.57 hrs HW=974.53' (Free Discharge)
└─**1=Culvert** (Passes 1.22 cfs of 11.36 cfs potential flow)
  ├─**2=Orifice/Grate** (Weir Controls 0.15 cfs @ 0.58 fps)
  └─**3=Orifice/Grate** (Orifice Controls 1.07 cfs @ 5.45 fps)

Summary for Pond DET-2: Detention Basin No. 2

Inflow Area = 38,817 sf, 58.76% Impervious, Inflow Depth = 3.52" for 10-year event
Inflow = 3.52 cfs @ 12.09 hrs, Volume= 11,377 cf
Outflow = 0.45 cfs @ 12.68 hrs, Volume= 11,377 cf, Atten= 87%, Lag= 35.7 min
Primary = 0.45 cfs @ 12.68 hrs, Volume= 11,377 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 980.01' @ 12.68 hrs Surf.Area= 2,159 sf Storage= 4,966 cf

Plug-Flow detention time= 139.6 min calculated for 11,377 cf (100% of inflow)
Center-of-Mass det. time= 139.3 min (938.3 - 799.1)

Volume	Invert	Avail.Storage	Storage Description
#1	977.00'	10,727 cf	**Detention Basin 2 (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
977.00	1,176	0	0
978.00	1,472	1,324	1,324
979.00	1,811	1,642	2,966
980.00	2,156	1,984	4,949
981.00	2,566	2,361	7,310
982.00	4,267	3,417	10,727

Device	Routing	Invert	Outlet Devices
#1	Primary	980.90'	**10.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65

2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

#2	Primary	977.00'	**12.0" Round Culvert** L= 21.6' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 977.00' / 975.80' S= 0.0556 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf
#3	Device 2	980.00'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	977.00'	**3.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.42 cfs @ 12.68 hrs HW=980.01' (Free Discharge)
- **1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
- **2=Culvert** (Passes 0.42 cfs of 5.99 cfs potential flow)
  - **3=Orifice/Grate** (Weir Controls 0.02 cfs @ 0.28 fps)
  - **4=Orifice/Grate** (Orifice Controls 0.40 cfs @ 8.17 fps)

Summary for Pond EXDMH: Existing DMH in Driveway

Inflow Area = 38,817 sf, 58.76% Impervious, Inflow Depth = 3.52" for 10-year event
Inflow = 0.45 cfs @ 12.68 hrs, Volume= 11,377 cf
Outflow = 0.45 cfs @ 12.68 hrs, Volume= 11,377 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.45 cfs @ 12.68 hrs, Volume= 11,377 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 976.10' @ 12.68 hrs
Flood Elev= 979.35'

Device	Routing	Invert	Outlet Devices
#1	Primary	975.70'	**12.0" Round Culvert** L= 130.6' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 975.70' / 975.00' S= 0.0054 '/' Cc= 0.900 n= 0.015 Concrete sewer w/manholes & inlets, Flow Area= 0.79 sf
#2	Primary	979.35'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.45 cfs @ 12.68 hrs HW=976.10' (Free Discharge)
- **1=Culvert** (Barrel Controls 0.45 cfs @ 2.22 fps)
- **2=Orifice/Grate** (Controls 0.00 cfs)

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment G: Gleason Way Drainage Runoff Area=131,625 sf 26.67% Impervious Runoff Depth=6.29"
Tc=6.0 min CN=80 Runoff=21.36 cfs 69,033 cf

Subcatchment N-1: Abutting Property Runoff Area=24,800 sf 0.00% Impervious Runoff Depth=5.32"
Tc=6.0 min CN=72 Runoff=3.47 cfs 11,000 cf

Subcatchment N-2: Neighbor's Yard Runoff Area=32,144 sf 0.00% Impervious Runoff Depth=5.32"
Tc=6.0 min CN=72 Runoff=4.50 cfs 14,258 cf

Subcatchment N-3: Neighbor's Yard Runoff Area=23,902 sf 0.00% Impervious Runoff Depth=5.32"
Tc=6.0 min CN=72 Runoff=3.35 cfs 10,602 cf

Subcatchment N-4: Neighbor's Yard Runoff Area=26,825 sf 0.00% Impervious Runoff Depth=5.32"
Tc=6.0 min CN=72 Runoff=3.76 cfs 11,898 cf

Subcatchment N-5: Neighbor's Yard Runoff Area=84,334 sf 0.00% Impervious Runoff Depth=5.32"
Tc=6.0 min CN=72 Runoff=11.81 cfs 37,407 cf

Subcatchment P-1: Paxton Street Runoff Area=15,242 sf 100.00% Impervious Runoff Depth=8.47"
Tc=6.0 min CN=98 Runoff=2.92 cfs 10,758 cf

Subcatchment PR-1: PR-1 Runoff Area=63,420 sf 47.78% Impervious Runoff Depth=6.90"
Tc=10.0 min CN=85 Runoff=9.76 cfs 36,467 cf

Subcatchment PR-2: PR-2 Runoff Area=38,817 sf 58.76% Impervious Runoff Depth=7.26"
Tc=6.0 min CN=88 Runoff=6.99 cfs 23,495 cf

Subcatchment PR-3: Front Parking Lot Runoff Area=14,496 sf 100.00% Impervious Runoff Depth=8.47"
Tc=6.0 min CN=98 Runoff=2.78 cfs 10,232 cf

Subcatchment PR-5: PR-5 Runoff Area=3,068 sf 28.85% Impervious Runoff Depth=6.41"
Tc=6.0 min CN=81 Runoff=0.51 cfs 1,640 cf

Subcatchment W: Warren Ave Drainage Runoff Area=122,896 sf 15.09% Impervious Runoff Depth=6.05"
Tc=6.0 min CN=78 Runoff=19.30 cfs 61,968 cf

Reach DP-1: Sargent Pond Inflow=46.48 cfs 296,323 cf
Outflow=46.48 cfs 296,323 cf

Reach DP-1A: Wetland on Warren Inflow=30.95 cfs 108,984 cf
Outflow=30.95 cfs 108,984 cf

Reach DP-1B: Stream Inflow=23.37 cfs 146,391 cf
Outflow=23.37 cfs 146,391 cf

Reach DP-1C: Stream at 14 Haberton Drive Inflow=24.96 cfs 146,391 cf
Outflow=24.96 cfs 146,391 cf

Reach DP-1D: 18" Outfall Inflow=32.06 cfs 128,942 cf
Outflow=32.06 cfs 128,942 cf

Reach DP-1E: Paxton Street Drainage System Inflow=5.70 cfs 20,990 cf
Outflow=5.70 cfs 20,990 cf

Reach DP-2: DP-2: Main Street Drainage Inflow=0.51 cfs 1,640 cf
Outflow=0.51 cfs 1,640 cf

Reach SITE: Site Inflow=13.56 cfs 59,910 cf
Outflow=13.56 cfs 59,910 cf

Reach SW1: Swale Segment 2 Avg. Flow Depth=0.65' Max Vel=1.15 fps Inflow=10.77 cfs 35,118 cf
n=0.080 L=145.0' S=0.0172 '/' Capacity=203.25 cfs Outflow=10.06 cfs 35,118 cf

Pond 1P: Storage Area 1 Peak Elev=965.79' Storage=355 cf Inflow=3.47 cfs 11,000 cf
Outflow=3.38 cfs 10,852 cf

Pond 2P: Storage Area 2 Peak Elev=962.82' Storage=1,476 cf Inflow=7.87 cfs 25,110 cf
Outflow=7.50 cfs 24,516 cf

Pond 3P: 12" CMP in Yard Peak Elev=956.31' Inflow=12.88 cfs 47,016 cf
Primary=0.00 cfs 0 cf Secondary=12.88 cfs 47,016 cf Outflow=12.88 cfs 47,016 cf

Pond 4P: Ex. 15" Culvert Peak Elev=956.15' Storage=33,525 cf Inflow=42.67 cfs 146,391 cf
Primary=7.01 cfs 129,811 cf Secondary=16.36 cfs 16,581 cf Outflow=23.37 cfs 146,391 cf

Pond 5P: Ex. (2) 12" Culverts Peak Elev=950.28' Storage=1,654 cf Inflow=23.37 cfs 146,391 cf
Primary=9.02 cfs 133,799 cf Secondary=15.94 cfs 12,592 cf Outflow=24.96 cfs 146,391 cf

Pond DET-1: Detention Basin No. 1 Peak Elev=974.92' Storage=8,367 cf Inflow=9.76 cfs 36,467 cf
Outflow=8.37 cfs 36,415 cf

Pond DET-2: Detention Basin No. 2 Peak Elev=980.40' Storage=5,845 cf Inflow=6.99 cfs 23,495 cf
Outflow=6.57 cfs 23,495 cf

Pond EXDMH: Existing DMH in Driveway Peak Elev=979.52' Inflow=6.57 cfs 23,495 cf
Outflow=6.57 cfs 23,495 cf

Total Runoff Area = 581,569 sf Runoff Volume = 298,758 cf Average Runoff Depth = 6.16"
76.38% Pervious = 444,184 sf 23.62% Impervious = 137,385 sf

Summary for Subcatchment G: Gleason Way Drainage

Runoff = 21.36 cfs @ 12.09 hrs, Volume= 69,033 cf, Depth= 6.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.71"

Area (sf)	CN	Description
35,103	98	Paved parking, HSG C
96,522	74	>75% Grass cover, Good, HSG C
131,625	80	Weighted Average
96,522		73.33% Pervious Area
35,103		26.67% Impervious Area

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

Summary for Subcatchment N-1: Abutting Property

Runoff = 3.47 cfs @ 12.09 hrs, Volume= 11,000 cf, Depth= 5.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.71"

Area (sf)	CN	Description
24,800	72	Woods/grass comb., Good, HSG C
24,800		100.00% Pervious Area

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

Summary for Subcatchment N-2: Neighbor's Yard

Runoff = 4.50 cfs @ 12.09 hrs, Volume= 14,258 cf, Depth= 5.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.71"

Area (sf)	CN	Description
32,144	72	Woods/grass comb., Good, HSG C
32,144		100.00% Pervious Area

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

Summary for Subcatchment N-3: Neighbor's Yard

Runoff = 3.35 cfs @ 12.09 hrs, Volume= 10,602 cf, Depth= 5.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.71"

Area (sf)	CN	Description
23,902	72	Woods/grass comb., Good, HSG C
23,902		100.00% Pervious Area

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

Summary for Subcatchment N-4: Neighbor's Yard

Runoff = 3.76 cfs @ 12.09 hrs, Volume= 11,898 cf, Depth= 5.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.71"

Area (sf)	CN	Description
26,825	72	Woods/grass comb., Good, HSG C
26,825		100.00% Pervious Area

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

Summary for Subcatchment N-5: Neighbor's Yard

Runoff = 11.81 cfs @ 12.09 hrs, Volume= 37,407 cf, Depth= 5.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.71"

Area (sf)	CN	Description
84,334	72	Woods/grass comb., Good, HSG C
84,334		100.00% Pervious Area

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

Summary for Subcatchment P-1: Paxton Street Drainage

Runoff = 2.92 cfs @ 12.09 hrs, Volume= 10,758 cf, Depth= 8.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.71"

Area (sf)	CN	Description
15,242	98	Water Surface, HSG C
15,242		100.00% Impervious Area

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

Summary for Subcatchment PR-1: PR-1

Runoff = 9.76 cfs @ 12.14 hrs, Volume= 36,467 cf, Depth= 6.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.71"

Area (sf)	CN	Description
30,301	98	Paved parking, HSG C
33,119	74	>75% Grass cover, Good, HSG C
63,420	85	Weighted Average
33,119		52.22% Pervious Area
30,301		47.78% Impervious Area

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

Summary for Subcatchment PR-2: PR-2

Runoff = 6.99 cfs @ 12.09 hrs, Volume= 23,495 cf, Depth= 7.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.71"

Area (sf)	CN	Description
17,698	98	Paved parking, HSG C
16,009	74	>75% Grass cover, Good, HSG C
5,110	98	Water Surface, HSG C
38,817	88	Weighted Average
16,009		41.24% Pervious Area
22,808		58.76% Impervious Area

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

Summary for Subcatchment PR-3: Front Parking Lot

Runoff = 2.78 cfs @ 12.09 hrs, Volume= 10,232 cf, Depth= 8.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.71"

Area (sf)	CN	Description
14,496	98	Paved parking, HSG C
14,496		100.00% Impervious Area

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

Summary for Subcatchment PR-5: PR-5

Runoff = 0.51 cfs @ 12.09 hrs, Volume= 1,640 cf, Depth= 6.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.71"

Area (sf)	CN	Description
885	98	Paved parking, HSG C
2,183	74	>75% Grass cover, Good, HSG C
3,068	81	Weighted Average
2,183		71.15% Pervious Area
885		28.85% Impervious Area

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

Summary for Subcatchment W: Warren Ave Drainage

Runoff = 19.30 cfs @ 12.09 hrs, Volume= 61,968 cf, Depth= 6.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.71"

Area (sf)	CN	Description
12,500	98	Paved parking, HSG C
40,596	74	>75% Grass cover, Good, HSG C
6,050	98	Paved parking, HSG C
63,750	74	>75% Grass cover, Good, HSG C
122,896	78	Weighted Average
104,346		84.91% Pervious Area
18,550		15.09% Impervious Area

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

Summary for Reach DP-1: Sargent Pond

Inflow Area = 578,501 sf, 23.60% Impervious, Inflow Depth = 6.15" for 100-year event
Inflow = 46.48 cfs @ 12.29 hrs, Volume= 296,323 cf
Outflow = 46.48 cfs @ 12.29 hrs, Volume= 296,323 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-1A: Wetland on Warren

Inflow Area = 230,567 sf, 8.05% Impervious, Inflow Depth = 5.67" for 100-year event
Inflow = 30.95 cfs @ 12.11 hrs, Volume= 108,984 cf
Outflow = 30.95 cfs @ 12.11 hrs, Volume= 108,984 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-1B: Stream

Inflow Area = 314,901 sf, 5.89% Impervious, Inflow Depth = 5.58" for 100-year event
Inflow = 23.37 cfs @ 12.29 hrs, Volume= 146,391 cf
Outflow = 23.37 cfs @ 12.29 hrs, Volume= 146,391 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-1C: Stream at 14 Haberton Drive

Inflow Area = 314,901 sf, 5.89% Impervious, Inflow Depth = 5.58" for 100-year event
Inflow = 24.96 cfs @ 12.31 hrs, Volume= 146,391 cf
Outflow = 24.96 cfs @ 12.31 hrs, Volume= 146,391 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-1D: 18" Outfall

Inflow Area = 233,862 sf, 37.72% Impervious, Inflow Depth = 6.62" for 100-year event
Inflow = 32.06 cfs @ 12.12 hrs, Volume= 128,942 cf
Outflow = 32.06 cfs @ 12.12 hrs, Volume= 128,942 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-1E: Paxton Street Drainage System

Inflow Area = 29,738 sf,100.00% Impervious, Inflow Depth = 8.47" for 100-year event
Inflow = 5.70 cfs @ 12.09 hrs, Volume= 20,990 cf
Outflow = 5.70 cfs @ 12.09 hrs, Volume= 20,990 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach DP-2: DP-2: Main Street Drainage

Inflow Area = 3,068 sf, 28.85% Impervious, Inflow Depth = 6.41" for 100-year event
Inflow = 0.51 cfs @ 12.09 hrs, Volume= 1,640 cf
Outflow = 0.51 cfs @ 12.09 hrs, Volume= 1,640 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Reach SITE: Site

Inflow Area = 102,237 sf, 51.95% Impervious, Inflow Depth = 7.03" for 100-year event
Inflow = 13.56 cfs @ 12.18 hrs, Volume= 59,910 cf
Outflow = 13.56 cfs @ 12.18 hrs, Volume= 59,910 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

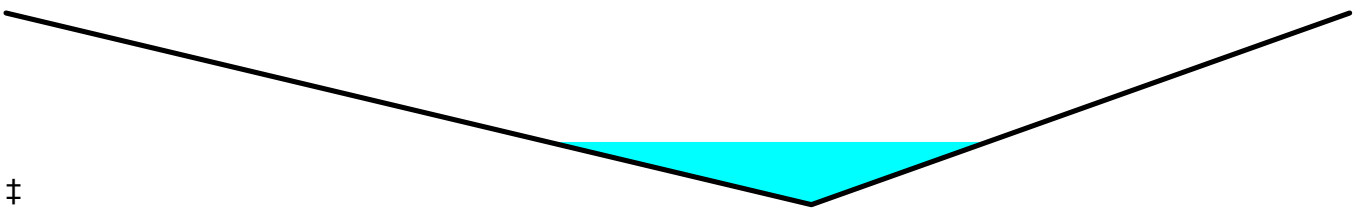
Summary for Reach SW1: Swale Segment 2

Inflow Area = 80,846 sf, 0.00% Impervious, Inflow Depth = 5.21" for 100-year event
Inflow = 10.77 cfs @ 12.11 hrs, Volume= 35,118 cf
Outflow = 10.06 cfs @ 12.17 hrs, Volume= 35,118 cf, Atten= 7%, Lag= 3.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.15 fps, Min. Travel Time= 2.1 min
Avg. Velocity = 0.42 fps, Avg. Travel Time= 5.7 min

Peak Storage= 1,290 cf @ 12.14 hrs
Average Depth at Peak Storage= 0.65' , Surface Width= 27.24'
Bank-Full Depth= 2.00' Flow Area= 83.4 sf, Capacity= 203.25 cfs

0.00' x 2.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 25.0 16.7 '/' Top Width= 83.40'
Length= 145.0' Slope= 0.0172 '/'
Inlet Invert= 962.50', Outlet Invert= 960.00'



‡

Summary for Pond 1P: Storage Area 1

Inflow Area = 24,800 sf, 0.00% Impervious, Inflow Depth = 5.32" for 100-year event
Inflow = 3.47 cfs @ 12.09 hrs, Volume= 11,000 cf
Outflow = 3.38 cfs @ 12.10 hrs, Volume= 10,852 cf, Atten= 3%, Lag= 0.6 min
Primary = 3.38 cfs @ 12.10 hrs, Volume= 10,852 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 965.79' @ 12.10 hrs Surf.Area= 450 sf Storage= 355 cf

Plug-Flow detention time= 14.4 min calculated for 10,852 cf (99% of inflow)
Center-of-Mass det. time= 6.2 min (823.2 - 817.0)

Volume	Invert	Avail.Storage	Storage Description
#1	965.00'	1,350 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
965.00	450	0	0
967.00	450	900	900
968.00	450	450	1,350

Device	Routing	Invert	Outlet Devices
#1	Primary	965.33'	**4.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=3.37 cfs @ 12.10 hrs HW=965.79' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 3.37 cfs @ 1.84 fps)

Summary for Pond 2P: Storage Area 2

Inflow Area = 56,944 sf, 0.00% Impervious, Inflow Depth = 5.29" for 100-year event
Inflow = 7.87 cfs @ 12.10 hrs, Volume= 25,110 cf
Outflow = 7.50 cfs @ 12.12 hrs, Volume= 24,516 cf, Atten= 5%, Lag= 1.2 min
Primary = 7.50 cfs @ 12.12 hrs, Volume= 24,516 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 962.82' @ 12.12 hrs Surf.Area= 1,800 sf Storage= 1,476 cf

Plug-Flow detention time= 24.1 min calculated for 24,490 cf (98% of inflow)

Center-of-Mass det. time= 10.3 min (830.0 - 819.7)

Volume	Invert	Avail.Storage	Storage Description
#1	962.00'	3,600 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
962.00	1,800	0	0
963.00	1,800	1,800	1,800
964.00	1,800	1,800	3,600

Device	Routing	Invert	Outlet Devices
#1	Primary	962.33'	**8.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=7.29 cfs @ 12.12 hrs HW=962.81' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 7.29 cfs @ 1.90 fps)

Summary for Pond 3P: 12" CMP in Yard

Inflow Area =	107,671 sf,	0.00% Impervious,	Inflow Depth =	5.24"	for 100-year event
Inflow =	12.88 cfs @	12.15 hrs, Volume=	47,016 cf		
Outflow =	12.88 cfs @	12.15 hrs, Volume=	47,016 cf,	Atten= 0%,	Lag= 0.0 min
Primary =	0.00 cfs @	0.00 hrs, Volume=	0 cf		
Secondary =	12.88 cfs @	12.15 hrs, Volume=	47,016 cf		

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 956.31' @ 12.15 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	958.90'	**12.0" Round Culvert** L= 95.0' Square-edged headwall, Ke= 0.500 Inlet / Outlet Invert= 958.90' / 954.40' S= 0.0474 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 0.79 sf
#2	Secondary	956.00'	**30.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=956.00' (Free Discharge)
1=Culvert (Controls 0.00 cfs)

Secondary OutFlow Max=12.79 cfs @ 12.15 hrs HW=956.31' (Free Discharge)
2=Broad-Crested Rectangular Weir (Weir Controls 12.79 cfs @ 1.40 fps)

Summary for Pond 4P: Ex. 15" Culvert

Inflow Area = 314,901 sf, 5.89% Impervious, Inflow Depth = 5.58" for 100-year event
Inflow = 42.67 cfs @ 12.10 hrs, Volume= 146,391 cf
Outflow = 23.37 cfs @ 12.29 hrs, Volume= 146,391 cf, Atten= 45%, Lag= 11.3 min
Primary = 7.01 cfs @ 12.29 hrs, Volume= 129,811 cf
Secondary = 16.36 cfs @ 12.29 hrs, Volume= 16,581 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 956.15' @ 12.29 hrs Surf.Area= 25,256 sf Storage= 33,525 cf

Plug-Flow detention time= 27.0 min calculated for 146,239 cf (100% of inflow)
Center-of-Mass det. time= 26.9 min (842.1 - 815.1)

Volume	Invert	Avail.Storage	Storage Description
#1	952.00'	58,381 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
952.00	7	0	0
953.00	630	319	319
954.00	2,270	1,450	1,769
955.00	14,962	8,616	10,385
956.00	23,736	19,349	29,734
957.00	33,559	28,648	58,381

Device	Routing	Invert	Outlet Devices
#1	Primary	951.70'	**15.0" Round Culvert** L= 81.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 951.70' / 950.40' S= 0.0160 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 1.23 sf
#2	Secondary	956.00'	**100.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=7.01 cfs @ 12.29 hrs HW=956.15' (Free Discharge)
↑—**1=Culvert** (Barrel Controls 7.01 cfs @ 5.71 fps)

Secondary OutFlow Max=16.07 cfs @ 12.29 hrs HW=956.15' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 16.07 cfs @ 1.05 fps)

Summary for Pond 5P: Ex. (2) 12" Culverts

Inflow Area = 314,901 sf, 5.89% Impervious, Inflow Depth = 5.58" for 100-year event
Inflow = 23.37 cfs @ 12.29 hrs, Volume= 146,391 cf
Outflow = 24.96 cfs @ 12.31 hrs, Volume= 146,391 cf, Atten= 0%, Lag= 1.0 min
Primary = 9.02 cfs @ 12.31 hrs, Volume= 133,799 cf
Secondary = 15.94 cfs @ 12.31 hrs, Volume= 12,592 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Peak Elev= 950.28' @ 12.31 hrs Surf.Area= 2,052 sf Storage= 1,654 cf

Plug-Flow detention time= 0.6 min calculated for 146,239 cf (100% of inflow)
Center-of-Mass det. time= 0.6 min (842.7 - 842.1)

Volume	Invert	Avail.Storage	Storage Description
#1	948.00'	7,505 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
948.00	45	0	0
949.00	300	173	173
950.00	1,624	962	1,135
951.00	3,139	2,382	3,516
952.00	4,838	3,989	7,505

Device	Routing	Invert	Outlet Devices
#1	Primary	947.50'	**12.0" Round Culvert X 2.00** L= 37.4' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 947.50' / 945.70' S= 0.0481 '/' Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior, Flow Area= 0.79 sf
#2	Secondary	949.90'	**25.0' long x 25.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=9.00 cfs @ 12.31 hrs HW=950.27' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 9.00 cfs @ 5.73 fps)

Secondary OutFlow Max=15.39 cfs @ 12.31 hrs HW=950.27' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 15.39 cfs @ 1.65 fps)

Summary for Pond DET-1: Detention Basin No. 1

Inflow Area = 63,420 sf, 47.78% Impervious, Inflow Depth = 6.90" for 100-year event
Inflow = 9.76 cfs @ 12.14 hrs, Volume= 36,467 cf
Outflow = 8.37 cfs @ 12.21 hrs, Volume= 36,415 cf, Atten= 14%, Lag= 4.4 min
Primary = 8.37 cfs @ 12.21 hrs, Volume= 36,415 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 974.92' @ 12.21 hrs Surf.Area= 5,102 sf Storage= 8,367 cf

Plug-Flow detention time= 67.7 min calculated for 36,415 cf (100% of inflow)
Center-of-Mass det. time= 66.7 min (858.0 - 791.3)

Volume	Invert	Avail.Storage	Storage Description
#1	973.00'	11,650 cf	**Detention Basin 1 (Prismatic)** Listed below (Recalc)
#2	972.00'	31 cf	**4.00'D x 2.50'H OCS 2**
		11,681 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
973.00	3,616	0	0
974.00	4,356	3,986	3,986
975.00	5,152	4,754	8,740
975.50	6,488	2,910	11,650

Device	Routing	Invert	Outlet Devices
#1	Primary	972.00'	**18.0" Round Culvert** L= 53.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 972.00' / 971.10' S= 0.0170 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#2	Device 1	974.50'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	973.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=8.22 cfs @ 12.21 hrs HW=974.92' (Free Discharge)
└─**1=Culvert** (Passes 8.22 cfs of 12.52 cfs potential flow)
  ├─**2=Orifice/Grate** (Weir Controls 7.00 cfs @ 2.11 fps)
  └─**3=Orifice/Grate** (Orifice Controls 1.22 cfs @ 6.21 fps)

Summary for Pond DET-2: Detention Basin No. 2

Inflow Area = 38,817 sf, 58.76% Impervious, Inflow Depth = 7.26" for 100-year event
Inflow = 6.99 cfs @ 12.09 hrs, Volume= 23,495 cf
Outflow = 6.57 cfs @ 12.12 hrs, Volume= 23,495 cf, Atten= 6%, Lag= 2.2 min
Primary = 6.57 cfs @ 12.12 hrs, Volume= 23,495 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 980.40' @ 12.12 hrs Surf.Area= 2,320 sf Storage= 5,845 cf

Plug-Flow detention time= 102.9 min calculated for 23,471 cf (100% of inflow)
Center-of-Mass det. time= 103.4 min (882.8 - 779.5)

Volume	Invert	Avail.Storage	Storage Description
#1	977.00'	10,727 cf	**Detention Basin 2 (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
977.00	1,176	0	0
978.00	1,472	1,324	1,324
979.00	1,811	1,642	2,966
980.00	2,156	1,984	4,949
981.00	2,566	2,361	7,310
982.00	4,267	3,417	10,727

Device	Routing	Invert	Outlet Devices
#1	Primary	980.90'	**10.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65

2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

#2	Primary	977.00'	**12.0" Round Culvert** L= 21.6' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 977.00' / 975.80' S= 0.0556 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf
#3	Device 2	980.00'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	977.00'	**3.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=6.42 cfs @ 12.12 hrs HW=980.38' (Free Discharge)
- **1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
- **2=Culvert** (Inlet Controls 6.42 cfs @ 8.18 fps)
  - **3=Orifice/Grate** (Passes < 6.20 cfs potential flow)
  - **4=Orifice/Grate** (Passes < 0.43 cfs potential flow)

Summary for Pond EXDMH: Existing DMH in Driveway

Inflow Area = 38,817 sf, 58.76% Impervious, Inflow Depth = 7.26" for 100-year event
Inflow = 6.57 cfs @ 12.12 hrs, Volume= 23,495 cf
Outflow = 6.57 cfs @ 12.12 hrs, Volume= 23,495 cf, Atten= 0%, Lag= 0.0 min
Primary = 6.57 cfs @ 12.12 hrs, Volume= 23,495 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 979.52' @ 12.10 hrs
Flood Elev= 979.35'

Device	Routing	Invert	Outlet Devices
#1	Primary	975.70'	**12.0" Round Culvert** L= 130.6' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 975.70' / 975.00' S= 0.0054 '/' Cc= 0.900 n= 0.015 Concrete sewer w/manholes & inlets, Flow Area= 0.79 sf
#2	Primary	979.35'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=6.23 cfs @ 12.12 hrs HW=979.51' (Free Discharge)
- **1=Culvert** (Barrel Controls 4.48 cfs @ 5.70 fps)
- **2=Orifice/Grate** (Weir Controls 1.75 cfs @ 1.33 fps)

Hydrodynamic Separation Product Calculator

14751.00 Leicester Fire & EMS Headquarters Stormwater Improvements

CB-3

CDS 2015-4

Project Information					
Project Name	14751.00 Leicester Fire & EMS Headquarters Stormwater Improvements			**Option #**	A
Country	UNITED_STATES	**State**	Massachusetts	**City**	Holden

Contact Information			
First Name	Luke	**Last Name**	Boucher
Company	VHB	**Phone #**	617-607-6272
Email	lboucher@vhb.com		

Design Criteria					
Site Designation	CB-3			**Sizing Method**	Net Annual
Screening Required?	No	**Drainage Area (ac)**	0.70	**Peak Flow (cfs)**	3.61
Groundwater Depth (ft)	5 - 10	**Pipe Invert Depth (ft)**	0 - 5	**Bedrock Depth (ft)**	5 - 10
Multiple Inlets?	No	**Grate Inlet Required?**	Yes	**Pipe Size (in)**	12.00
Required Particle Size Distribution?	Yes	**90° between two inlets?**	N/A	**180° between inlet and outlet?**	No
Runoff Coefficient	0.90	**Rainfall Station**	70 - East Brimfield Lake, MA	**TC (Min)**	5

Treatment Selection					
Treatment Unit	CDS	**System Model**	2015-4		
Target Removal	80	**Particle Size Distribution (PSD)**	50	**Predicted Net Annual Removal**	89.80%

CONTECH ENGINEERED SOLUTIONS

Hydrodynamic Separation Product Calculator

14751.00 Leicester Fire & EMS Headquarters Stormwater Improvements

CB-3

CDS 2015-4

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION BASED ON THE RATIONAL RAINFALL METHOD								
Rainfall Intensity[1] (in/hr)	% Rainfall Volume[1]	Cumulative Rainfall Volume	Rainfall Volume Treated	Total Flowrate (cfs)	Treated Flowrate (cfs)	Operating Rate (%)	Removal Efficiency (%)	Incremental Removal (%)
0.0400	15.15%	15.15%	15.15%	0.0252	0.0252	3.60%	95.99%	14.54%
0.0800	24.57%	39.72%	24.57%	0.0504	0.0504	7.20%	94.76%	23.28%
0.1200	13.70%	53.42%	13.70%	0.0756	0.0756	10.80%	93.54%	12.81%
0.1600	9.41%	62.83%	9.41%	0.1008	0.1008	14.40%	92.31%	8.69%
0.2000	6.63%	69.46%	6.63%	0.1260	0.1260	18.00%	91.09%	6.04%
0.2400	5.24%	74.70%	5.24%	0.1512	0.1512	21.60%	89.86%	4.71%
0.2800	4.78%	79.48%	4.78%	0.1764	0.1764	25.20%	88.63%	4.24%
0.3200	3.14%	82.62%	3.14%	0.2016	0.2016	28.80%	87.41%	2.74%
0.3600	2.71%	85.33%	2.71%	0.2268	0.2268	32.40%	86.18%	2.34%
0.4000	2.10%	87.43%	2.10%	0.2520	0.2520	36.00%	84.96%	1.78%
0.4800	2.47%	89.90%	2.47%	0.3024	0.3024	43.20%	82.50%	2.04%
0.5600	2.02%	91.92%	2.02%	0.3528	0.3528	50.40%	80.05%	1.62%
0.6400	1.42%	93.34%	1.42%	0.4032	0.4032	57.60%	77.60%	1.10%
0.7200	1.00%	94.34%	1.00%	0.4536	0.4536	64.80%	75.15%	0.75%
0.8000	1.07%	95.41%	1.07%	0.5040	0.5040	72.00%	72.69%	0.78%
1.0000	1.65%	97.06%	1.65%	0.6300	0.6300	90.00%	66.56%	1.10%
1.2000	0.93%	97.99%	0.86%	0.7560	0.7000	100.00%	58.48%	0.54%
1.4000	0.60%	98.59%	0.48%	0.8820	0.7000	100.00%	50.13%	0.30%
1.6000	0.49%	99.08%	0.34%	1.0080	0.7000	100.00%	43.86%	0.21%
1.8000	0.48%	99.56%	0.30%	1.1340	0.7000	100.00%	38.99%	0.19%
								89.80%
							Removal Efficiency Adjustment[2] =	
							Predicted % Annual Rainfall Treated =	99.04%
							Predicted Net Annual Load Removal Efficiency =	89.80%
1 - Based on 14 years of 15-minute rainfall data from NCDC Station 2107, East Brimfield Lake, Worcester County, MA								
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.								

Hydrodynamic Separation Product Calculator

14751.00 Leicester Fire & EMS Headquarters Stormwater Improvements

DMH-6

CDS 2015-4

Project Information					
Project Name	14751.00 Leicester Fire & EMS Headquarters Stormwater Improvements			**Option #**	A
Country	UNITED_STATES	**State**	Massachusetts	**City**	Holden

Contact Information			
First Name	Luke	**Last Name**	Boucher
Company	VHB	**Phone #**	617-607-6272
Email	lboucher@vhb.com		

Design Criteria					
Site Designation	DMH-6			**Sizing Method**	Net Annual
Screening Required?	No	**Drainage Area (ac)**	0.89	**Peak Flow (cfs)**	2.34
Groundwater Depth (ft)	0 - 5	**Pipe Invert Depth (ft)**	0 - 5	**Bedrock Depth (ft)**	5 - 10
Multiple Inlets?	Yes	**Grate Inlet Required?**	No	**Pipe Size (in)**	12.00
Required Particle Size Distribution?	Yes	**90° between two inlets?**	No	**180° between inlet and outlet?**	No
Runoff Coefficient	0.90	**Rainfall Station**	70 - East Brimfield Lake, MA	**TC (Min)**	5

Treatment Selection					
Treatment Unit	CDS	**System Model**	2015-4		
Target Removal	80%	**Particle Size Distribution (PSD)**	50	**Predicted Net Annual Removal**	87.92%

CONTECH ENGINEERED SOLUTIONS

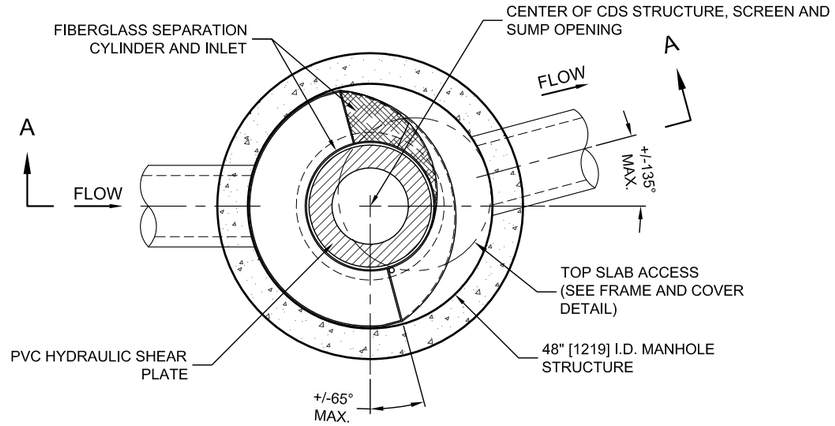
Hydrodynamic Separation Product Calculator

14751.00 Leicester Fire & EMS Headquarters Stormwater Improvements

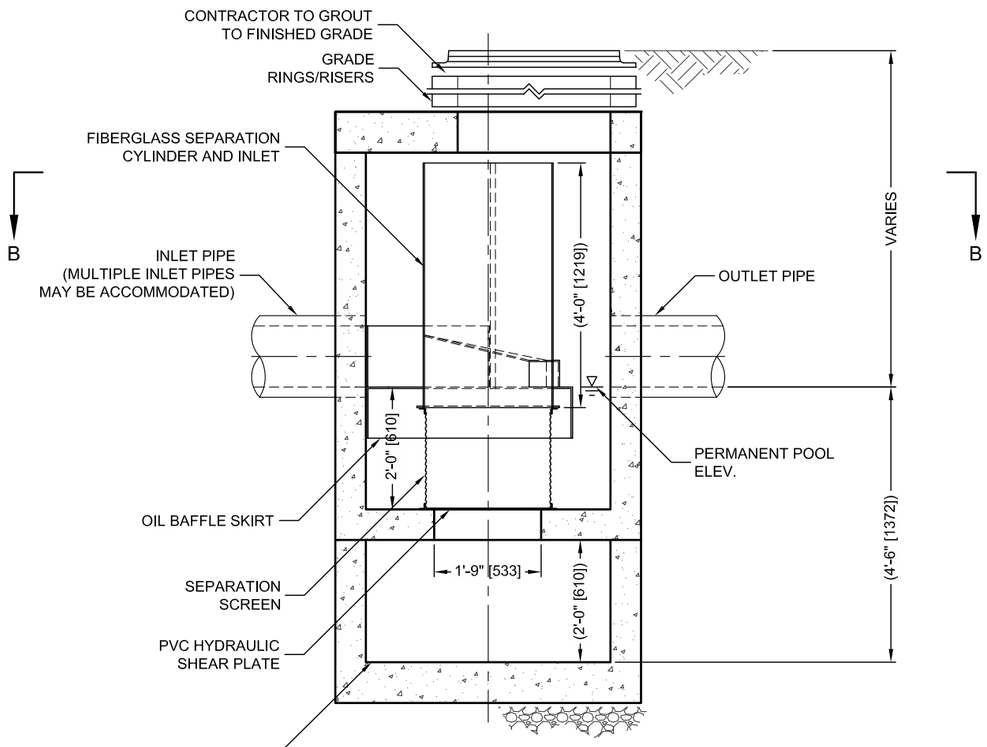
DMH-6

CDS 2015-4

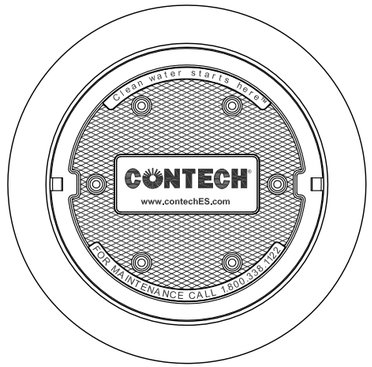
CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION BASED ON THE RATIONAL RAINFALL METHOD								
Rainfall Intensity[1] (in/hr)	% Rainfall Volume[1]	Cumulative Rainfall Volume	Rainfall Volume Treated	Total Flowrate (cfs)	Treated Flowrate (cfs)	Operating Rate (%)	Removal Efficiency (%)	Incremental Removal (%)
0.0400	15.15%	15.15%	15.15%	0.0320	0.0320	4.57%	95.66%	14.49%
0.0800	24.57%	39.72%	24.57%	0.0641	0.0641	9.16%	94.10%	23.12%
0.1200	13.70%	53.42%	13.70%	0.0961	0.0961	13.73%	92.54%	12.68%
0.1600	9.41%	62.83%	9.41%	0.1282	0.1282	18.31%	90.98%	8.56%
0.2000	6.63%	69.46%	6.63%	0.1602	0.1602	22.89%	89.42%	5.93%
0.2400	5.24%	74.70%	5.24%	0.1922	0.1922	27.46%	87.86%	4.60%
0.2800	4.78%	79.48%	4.78%	0.2243	0.2243	32.04%	86.30%	4.13%
0.3200	3.14%	82.62%	3.14%	0.2563	0.2563	36.61%	84.75%	2.66%
0.3600	2.71%	85.33%	2.71%	0.2884	0.2884	41.20%	83.18%	2.25%
0.4000	2.10%	87.43%	2.10%	0.3204	0.3204	45.77%	81.63%	1.71%
0.4800	2.47%	89.90%	2.47%	0.3845	0.3845	54.93%	78.51%	1.94%
0.5600	2.02%	91.92%	2.02%	0.4486	0.4486	64.09%	75.39%	1.52%
0.6400	1.42%	93.34%	1.42%	0.5126	0.5126	73.23%	72.28%	1.03%
0.7200	1.00%	94.34%	1.00%	0.5767	0.5767	82.39%	69.16%	0.69%
0.8000	1.07%	95.41%	1.07%	0.6408	0.6408	91.54%	66.04%	0.71%
1.0000	1.65%	97.06%	1.44%	0.8010	0.7000	100.00%	55.19%	0.91%
1.2000	0.93%	97.99%	0.68%	0.9612	0.7000	100.00%	46.00%	0.43%
1.4000	0.60%	98.59%	0.37%	1.1214	0.7000	100.00%	39.42%	0.24%
1.6000	0.49%	99.08%	0.27%	1.2816	0.7000	100.00%	34.50%	0.17%
1.8000	0.48%	99.56%	0.23%	1.4418	0.7000	100.00%	30.66%	0.15%
								87.92%
							Removal Efficiency Adjustment[2] =	
							Predicted % Annual Rainfall Treated =	98.40%
							Predicted Net Annual Load Removal Efficiency =	87.92%
1 - Based on 14 years of 15-minute rainfall data from NCDC Station 2107, East Brimfield Lake, Worcester County, MA								
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.								



PLAN VIEW B-B
N.T.S.



ELEVATION A-A
N.T.S.



FRAME AND COVER
(DIAMETER VARIES)
N.T.S.

CDS2015-4-C DESIGN NOTES

THE STANDARD CDS2015-4-C CONFIGURATION IS SHOWN. ALTERNATE CONFIGURATIONS ARE AVAILABLE AND ARE LISTED BELOW. SOME CONFIGURATIONS MAY BE COMBINED TO SUIT SITE REQUIREMENTS.

CONFIGURATION DESCRIPTION
GRATED INLET ONLY (NO INLET PIPE)
GRATED INLET WITH INLET PIPE OR PIPES
CURB INLET ONLY (NO INLET PIPE)
CURB INLET WITH INLET PIPE OR PIPES
SEPARATE OIL BAFFLE (SINGLE INLET PIPE REQUIRED FOR THIS CONFIGURATION)
SEDIMENT WEIR FOR NJDEP / NJCAT CONFORMING UNITS

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID	
WATER QUALITY FLOW RATE (CFS OR L/s)	*
PEAK FLOW RATE (CFS OR L/s)	*
RETURN PERIOD OF PEAK FLOW (YRS)	*
SCREEN APERTURE (2400 OR 4700)	*

PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	*	*	*
INLET PIPE 2	*	*	*
OUTLET PIPE	*	*	*

RIM ELEVATION	*

ANTI-FLOTATION BALLAST	WIDTH	HEIGHT
	*	*

NOTES/SPECIAL REQUIREMENTS:

* PER ENGINEER OF RECORD

GENERAL NOTES
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. DIMENSIONS MARKED WITH ( ) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
3. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.contechES.com
4. CDS WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
5. STRUCTURE SHALL MEET AASHTO HS20 AND CASTINGS SHALL MEET HS20 (AASHTO M 306) LOAD RATING, ASSUMING GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION.
6. PVC HYDRAULIC SHEAR PLATE IS PLACED ON SHELF AT BOTTOM OF SCREEN CYLINDER. REMOVE AND REPLACE AS NECESSARY DURING MAINTENANCE CLEANING.

INSTALLATION NOTES
A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE CDS MANHOLE STRUCTURE (LIFTING CLUTCHES PROVIDED).
C. CONTRACTOR TO ADD JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS, AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH PIPE INVERTS WITH ELEVATIONS SHOWN.
E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.

CONTECH ENGINEERED SOLUTIONS LLC
www.contechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CDS2015-4-C
INLINE CDS
STANDARD DETAIL

Project: Leicester Fire EMS
Location: Leicester, MA
Calculated by: RPL

Project #14751.00
Sheet: 1 of 2
Date: 3/12/2020

Riprap Apron Sizing Calculation

1) Calculate full pipe flow velocity using Manning's Equation

D	1.5	ft
Rh	0.38	ft
A	1.77	sf
n	0.012	
INVus	936.4	ft
INVds	936	ft
L	23	ft
S	0.0174	ft/ft
Q	15.0	cfs
V	8.5	fps

$$Q = VA = \left(\frac{1.49}{n}\right) AR^{\frac{2}{3}}\sqrt{S} \quad [U.S.]$$

2) Calculate D50 using FHWA HEC-14 Equation 10.1 for riprap basin

Source: https://www.fhwa.dot.gov/engineering/hydraulics/pubs/06086/hec14.pdf (Page10-3)

Notes: 1) Iterate D50 size to balance equation
2) Brink outlet depth unknown so calculate for range from 0.5 feet to full pipe diameter
3) Assume low tailwater (TW/ye < 0.75)
4) Assume pool depth = 1 foot

hs	1	ft		
Co	1.4			
Vo	8.5	fps		
g	32.2	fps2		

Ye (ft)	0.5	1.25	2	
Hs/Ye	2.0	0.8	0.5	*<-Target value to balance equation*
Hs/Ye	2.0	0.8	0.5	*<-Calculated Value*
D50	0.16	0.4	0.55	ft

$$\frac{h_s}{y_e} = 0.86\left(\frac{D_{50}}{y_e}\right)^{-0.55}\left(\frac{V_o}{\sqrt{gy_e}}\right) - C_o \qquad (10.1)$$

where,

h_s = dissipator pool depth, m (ft)
y_e = equivalent brink (outlet) depth, m (ft)
D_{50} = median rock size by weight, m (ft)
C_o = tailwater parameter

The tailwater parameter, C_o, is defined as:

$$C_o = 1.4 \qquad TW/y_e < 0.75$$
$$C_o = 4.0(TW/y_e) - 1.6 \qquad 0.75 < TW/y_e < 1.0 \qquad (10.2)$$

Riprap Apron Sizing Calculation

$C_o = 2.4$ $1.0 < TW/y_e$

3) Calculate Dimensions of Apron using Figures 10.1 and 10.2, and Section 10.1 of HEC-14

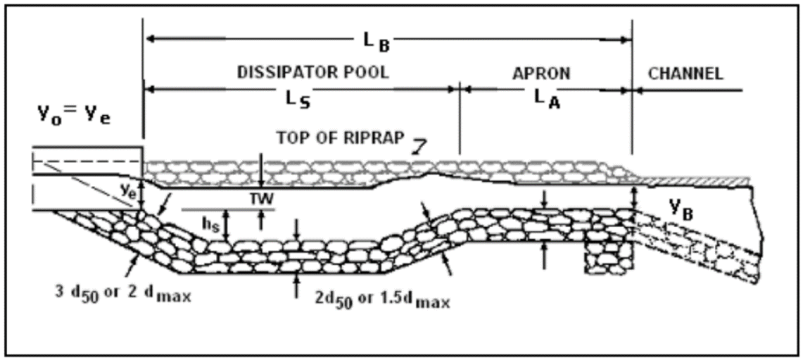


Figure 10.1. Profile of Riprap Basin

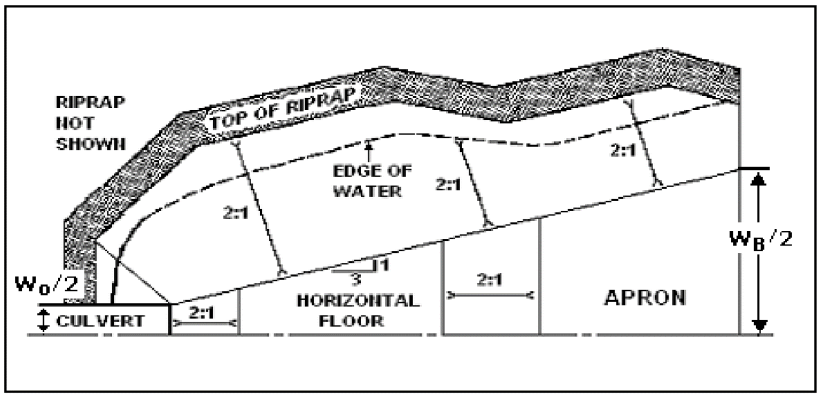


Figure 10.2. Half Plan of Riprap Basin

Hs / D50 > 2		Ls = 10hs =	10 ft
Hs =	1 ft	La = 5hs =	5 ft
D50 =	0.5 ft	Lb =	15 ft
Hs/D50=	2 **OK**	Wo =	1.5
		Wb = Wo + 2(Lb/3) =	12 ft

4) Conclusions and Recommendations

a) Based on the FHWA HEC-14 riprap equations our minimum recommend D50 = 0.50 feet (6 inches)
b) This analysis assumes full pipe flow and does not account for potential headwater conditions.
c) We recommend stone for pipe ends (M2.02.3) as a reasonable conservative scour countermeasure at the outfall given the assumptions made for this analysis.

Project: Leicester Fire EMS
Location: Leicester, MA
Calculated by: RPL

Project #14751.00
Sheet: 1 of 1
Date: 3/12/2020

Level Spreader Sizing Calculation

1) Calculate flow to the level spreader using the rational method for the first flush (1 in/hr)

$$Q_p = C \bullet I \bullet A$$

Where Q_p is peak flow (in cfs),
C is the Rational Runoff Coefficient (the higher the number the more runoff – as shown in Table 1),
I is rainfall intensity measured in terms of inches/hour;
A is watershed size in acres.

C = 0.49
A = 6.97 ac
I = 1 in/hr

Qp = 3.38 cfs

2) Use the Weir Equation and Continuity Equation to derive required level spreader length:

$$L = Q \div (X \bullet V)$$

Where X = "Equivalent" Water Height over Level Spreader (from Table 3, page 9)
V = 1.33 for grass and thicket, 0.67 for mulch, and 1.5 for gravel

Table 3. Maximum Velocities of Flow Across Level Spreader

Down Slope Ground Cover	Velocity at Level Spreader	"Equivalent" Water Height over Level Spreader, X
Grass	1.33 fps	0.058 ft
Gravel	1.5 fps	0.074 ft
Thicket (Shrubs, Grass)	1.33 fps	0.058 ft
Mulch (Trees/ Shrubs)	0.67 fps	0.015 ft

The downslope cover is proposed to be grass therefore:

X = 0.058 ft
V = 1.33 fps

L = 43.9 ft

SAY 45 ft

Source: *Hunt, W.F. et al. Designing Level Spreaders to Treat Stormwater Runoff. North Carolina State University, as presented at North Carolina Department of Transportation Level Spreader Workshop, February 19, 2001, Raleigh, NC.*

TSS Removal Calculation Worksheet

VHB, Inc..
101 Walnut Street
Post Office Box 9151
Watertown, MA 02471
P 617.924.1770

Project Name:	**Leicester Fire & EMS**	Sheet:	**1 of 1**
Project Number:	**14751.00**	Date:	**12-Mar-2021**
Location:	**Leicester, MA**	Computed by:	**RPL**
Discharge Point:	**DP-1: Sargent Pond**	Checked by:	
Drainage Area(s):	**PR-1, PR-2**		

A	B	C	D	E
BMP*	TSS Removal Rate*	Starting TSS Load**	Amount Removed (C*D)	Remaining Load (D-E)
Water Quality Unit	**80%**	**1.00**	**0.80**	**0.20**
	0%	**0.20**	**0.00**	**0.20**
	0%	**0.20**	**0.00**	**0.20**
	0%	**0.20**	**0.00**	**0.20**
	0%	**0.20**	**0.00**	**0.20**

* BMP and TSS Removal Rate Values from the MassDEP Stormwater Handbook Vol. 1.

** Equals remaining load from previous BMP (E)

Treatment Train TSS Removal = **80%**

Memorandum

Appendix D

Operation and Maintenance/ Long-Term Pollution Prevention Plan

101 Walnut Street
PO Box 9151
Watertown, MA 02472-4026
P 617.924.1770

Leicester Fire & EMS Stormwater Improvements
Leicester, Massachusetts
Stormwater Management System

Operation and Maintenance Plan (O&M)
and
Long-Term Pollution Prevention Plan (LTPPP)

March 2021

This Stormwater Management System Operation and Maintenance (O&M) Plan provides for the inspection and maintenance of structural Best Management Practices (BMPs) and for measures to prevent pollution associated with the stormwater management system proposed for the Fire & EMS Headquarters project in the Town of Leicester.

This document has been prepared in accordance with the requirements of the Stormwater Regulations included in the Massachusetts Wetlands Protection Act Regulations (310 CMR 10).

Responsible Party

The Town of Leicester DPW will be responsible for the maintenance of the Fire & EMS site, and associated stormwater management features, in accordance with Town standards.

Questions or concerns regarding maintenance activities may also be addressed to Town of Leicester DPW:

Town of Leicester DPW
59 Peter Salem Road
Leicester, MA 01524
Phone: (508) 892-7021

Maintenance Measures

The stormwater management system covered by this Operation and Maintenance Plan consists of the following components:

- Street Sweeping
- Deep-Sump, Hooded Catch Basins
- Detention Basins
- Riprap Apron
- Level Spreader

Maintenance of these components will be conducted in accordance with Town of Leicester DPW standard maintenance practices, as noted in the attached Operation and Maintenance table summarizing the pertinent inspection and maintenance activities.

If inspection indicates the need for major repairs of structural surfaces, the inspector should contact the Town of Leicester DPW to initiate procedures to effect repairs in accordance with Town of Leicester DPW standard construction practices.

Practices for Long-Term Pollution Prevention

In general, long-term pollution prevention and related maintenance activities will be conducted consistent with Town of Leicester DPW's NPDES Stormwater MS4 Permit.

For the facilities covered by this Operation and Maintenance Plan, long-term pollution prevention includes the following measures:

Litter Pick-up
The Town of Leicester DPW will conduct litter pick-up from the stormwater management facilities in conjunction with routine road maintenance activities.

Routine Inspection and Maintenance of Stormwater BMPs
The Town of Leicester DPW will conduct inspection and maintenance of the stormwater management practices in accordance with the information in Table 1.

Maintenance of Landscaped Areas
Routine mowing should be conducted according to standard Town of Leicester DPW practices. Town of Leicester DPW shall minimize use of fertilizers, herbicides, and pesticides for the maintenance of facilities covered by this plan. Use of fertilizers, herbicides, or pesticides may need to be reviewed and approved by the local Conservation Commission.

Snow and Ice Management
Snow and Ice Management shall be conducted according to standard Town of Leicester DPW practices.

Prohibition of Illicit Discharges
The DEP Stormwater Management Standards prohibit illicit discharges to the storm water management system. Illicit discharges are discharges that do not entirely consist of stormwater, except for certain specified non-stormwater discharges.

Discharges from the following activities are not considered illicit discharges:

firefighting	foundation drains
water line flushing	footing drains
landscape irrigation	individual resident car washing
uncontaminated groundwater	flows from riparian habitats and wetlands
potable water sources	dechlorinated water from swimming pools
water used to clean residential buildings without detergents	water used for street washing
	air conditioning condensation

There are no known or proposed illicit connections associated with this project. If a potential illicit discharge to the facilities covered by this plan is detected (e.g., dry weather flows at any pipe outlet, evidence of contamination of surface water discharge by non-stormwater sources), the Town of Leicester DPW shall be notified for assistance in determining the nature and source of the discharge, and for resolution through the DPW's IDDE program.

Table 1: Best Management Practices: Operation & Maintenance Measures

Best Management Practice	Sweep	Mow	Inspect	Clean	Repair
Street Sweeping	Annually	NA	NA	NA	NA
Deep-Sump, Hooded Catch Basins	NA	NA	Annually	ANI	ANI
Detention Basins	NA	NA	Annually	ANI	ANI
Riprap Apron	NA	NA	Annually	ANI	ANI
Level Spreader	NA	NA	Annually	ANI	ANI

NA = Not Applicable
ANI = As needed based on inspection

Memorandum

Appendix E

Test Pit Logs

■

101 Walnut Street
PO Box 9151
Watertown, MA 02472-4026
P 617.924.1770

DATE:	2019-11-14 - 9:00am
CLIENT:	Town of Leicester, MA
LOCATION:	Fire and EMS Headquarters, Town of Leicester
	In landscape Island Adjacent Parking Lot at Southwest Corner of site west of basin.
	Leicester, Massachusetts
VHB REP:	Dan Meegan, PE
CONTRACTOR:	Leicester DPW

LOCATION ID: TP-1

PROJECT:	14751.00
GRADE ELEV:	979.2' (Approximate)
MONITORING WELL ELEV:	N/A
TEST PIT BOTTOM ELEV:	973.1' (Approximate; 73" deep)
WEATHER:	Overcast, 20ºF
EQUIPMENT	Backhoe
ESHGW:	976.5' [(Depth of 33")by redox]
OBSERVED WATER TABLE:	975.8 [Depth of 41" (weeping)]

Sample/ Horizon	Depth (In.)	Soil Description	Color	Soil Texture (USDA)	Remarks
O	0" - 1"	Organics	N/A	Organics	
Ap	1"-10"	Fill layer of brown, massive, very friable loam.	Brown	Loam	Massive; V. Friable; Fill
B	11"-23"	Naturally occuring layer of brown, blocky, friable, silty clay loam with 5% gravel and some isolated rust colors not considered as redox.	Brown	Silty Clay Loam	5% Gravel; Blocky; Friable; Appears to be naturally occuring; Pockets of rust color not considered as redox.
Ab	23"-41"	Naturally occuring layer of brown, blocky, semi-firm-in-place, silty clay loam with 5% gravel. Redox Encountered.	Brown	Silty Clay Loam	5% Gravel; Blocky; SFIP; Appears to be naturally occuring; 5% mottling of 2.5 YR 3/6 redox & 10 YR 5/3 depletions witnessed at depth of 33".
B	41"-73"	Naturally occuring layer of brown, blocky, semi-firm-in-place, silt loam with 5% gravel. Groundwater encountered.	Brown	Silt Loam	5% Gravel; Blocky; SFIP; Appears to be naturally occuring. Groundwater witnessed weeping from sides of hole at depth of 41". Standing Groundwater in bottom of hole at depth of 72", filling up to depth of 70" after letting hole sit open for ~1 hour.

12 24 36 48 60 72 84 96

Observed Groundwater

Legend

F = Fine M = Medium C = Coarse
F/M = Fine to Medium F/C = Fine to Coarse
V. = Very Lt. = Light Dk. = Dark
Gr. = Grey Br. = Brown Yel. = Yellow Org. = Orange
U.S.C. Code = Unified Soil Classification

DATE: 2019-11-14 - 10:30am
CLIENT: Town of Leicester, MA
LOCATION: Fire and EMS Headquarters, Town of Leicester
3' From top of Rip-rap Apron on Southside of basin at Northwest corner of site.
Leicester, Massachusetts
VHB REP: Dan Meegan, PE
CONTRACTOR: Leicester DPW

LOCATION ID: TP-2

PROJECT: 14751.00
GRADE ELEV: 975.8' (Approximate)
MONITORING WELL ELEV: N/A
TEST PIT BOTTOM ELEV: 969.1' (Approximate; 80" deep)
WEATHER: Overcast, 20ºF
EQUIPMENT Backhoe
ESHGW: 972.5' [Depth of 40" (by redox)]
OBSERVED WATER TABLE: 970.0' [Depth of 70" (weeping)]

Sample/ Horizon	Depth (In.)	Soil Description	Color	Soil Texture (USDA)	Remarks
O	0" - 1"	Organics	N/A	Organics	
Ap	1"-10"	Fill layer of brown, massive, very friable loam.	Brown	Loam	Massive; V. Friable; Fill; Geotextile observed just below Ap layer
F1	10"-32"	Fill layer of Grayish-Brown, Blocky, Friable, Sandy Loam Fill with 5% Gravel.	Brown	Sandy Loam	5% Gravel; 5% Cobbles & Stones; Blocky; V. Friable; Appears to be fill and not naturally occuring.
Ab	32"-40"	Buried Topsoil Layer of Brown, Massive, Very Friable, Loam	Brown	Loam	Massive; V. Friable; Buried Topsoil
B	40"-54"	Buried topsoil layer of Brown, Blocky, Very Friable Loam with some roots. Redox Encountered.	Brown	Silt Loam	Blocky; SFIP; 2% Gravel; Appears naturally occuring; 5% mottling of 2.5 YR 4/8 redox & 2.5 YR 4/1 depletions witnessed at depth of 40".
C	54"-80"		Gr. Brown	Silt Loam	Blocky; SFIP; 1% Gravel; 1% Cobbles & Stones; Appears naturally occuring; Groundwater weeping into pit at depth of 70". Standing Groundwater at depth of 80".

12
24
36
48
60
72
84
96

Observed Groundwater

Legend
F = Fine M = Medium C = Coarse
F/M = Fine to Medium F/C = Fine to Coarse
V. = Very Lt. = Light Dk. = Dark
Gr. = Grey Br. = Brown Yel. = Yellow Org. = Orange
U.S.C. Code = Unified Soil Classification

DATE:	2019-11-14 - 12:00pm
CLIENT:	Town of Leicester, MA
LOCATION:	Fire and EMS Headquarters, Town of Leicester
	Top of slope at Easterly Side of Detention pond at Northwest corner of site
	Leicester, Massachusetts
VHB REP:	Dan Meegan, PE
CONTRACTOR:	Leicester DPW

LOCATION ID: TP-3

PROJECT:	14751.00
GRADE ELEV:	980.5' (Approximate)
MONITORING WELL ELEV:	N/A
TEST PIT BOTTOM ELEV:	966.5' (Approximate; 168" deep)
WEATHER:	Overcast, 20ºF
EQUIPMENT	Backhoe
ESHGW:	971.0' [Depth of 114" (by redox)]*
OBSERVED WATER TABLE:	968.5' [Depth of 144" (weeping)]*

Sample/ Horizon	Depth (In.)	Soil Description	Color	Soil Texture (USDA)	Remarks
O	0" - 1"	Organics	N/A	Organics	
Ap	1"-6"	Fill layer of brown, massive, very friable loam.	Brown	Loam	Massive; V. Friable; Fill
F1	6"-48"	Fill layer of Grayish-Brown, Blocky, Friable, Sandy Loam Fill with 5% Gravel.	Gr. Brown	Sandy Loam	5% Gravel; Block; Blocky; Friable; Appears to be fill and not naturally occuring.
Ab	48"-60"	Buried topsoil layer of Brown, Blocky, Very Friable Loam with some roots.	Brown	Loam	Blocky; V. Friable; Some Roots; Appears to be buried topsoil layer
F2	60"-96"	Previous fill layer of grayish-brown, semi-firm-in-place sandy loam with 5% gravel and 5% Cobbles and Stones.	Gr. Brown	Sandy Loam	Blocky; SFIP; 5% Gravel; 5% Cobbles & Stones; Appears to be previous Fill layer.
Ab2	96"-108"	Buried topsoil layer of Brown, Blocky, Friable Loam with many roots.	Brown	Loam	Blocky; Friable; Many Roots; Appears to be additional buried topsoil layer
C	108"-168"	Naturally occuring layer of blocky, semi-firm-in-place, Brown, Silty Clay Loam, with pockets of dense bluish-gray clay. Groundwater and redox encountered.	Brown with pockets of bluish gray	Silty Clay Loam	Blocky; SFIP; Pockets of bluish gray very dense clay; appears to be naturally occuring soill; 5% mottling of 2.5 YR 4/8 redox & 2.5 YR 4/1 depletions witnessed at depth of 114". Groundwater weeping into pit at depth of 144". Standing Groundwater at depth of 168".

Depth ticks: 12, 24, 36, 48, 60, 72, 84, 96, 108, 120, 132, 144, 156, 168

*Due to depth of testpit, observation of redox and weeping on sides of bottom of testpits, and these elevations should be assumed to be approximate.

Legend

F = Fine M = Medium C = Coarse
F/M = Fine to Medium F/C = Fine to Coarse
V. = Very Lt. = Light Dk. = Dark
Gr. = Grey Br. = Brown Yel. = Yellow Org. = Orange
U.S.C. Code = Unified Soil Classification

Observed Groundwater

DATE:	2020-01-09 - 11:30am	**LOCATION ID:**	**TP-4 (S-1)**
CLIENT:	Town of Leicester, MA	PROJECT:	14751.00
LOCATION:	Fire and EMS Headquarters, Town of Leicester	GRADE ELEV:	975.0' (Approximate)
	~6ft easterly of center of sump pump installed in Basin at southwest of site	MONITORING WELL ELEV:	N/A
	Leicester, Massachusetts	TEST PIT BOTTOM ELEV:	972.8' (Approximate; 26" deep)
VHB REP:	Dan Meegan, PE	WEATHER:	Partly Cloudy, 20ºF
CONTRACTOR:	Leicester DPW	EQUIPMENT	Sump Pump; jackhammer; hand shovels
		OBSERVED WATER TABLE:	974.7' [Bottom of Riprap]

Sample/ Horizon	Depth (In.)		Soil Description	Color	Soil Texture (USDA)	Remarks
Riprap ▽	4	0"-4"	Riprap for basin surface	N/A	N/A	Filter fabric encountered at bottom of riprap; Standing groundwater observed at bottom of riprap
C	8 12 16 20 24	4"-26"	Naturally occuring layer of brown, blocky, semi-firm-in-place, Sandy clay loam with 5% gravel. Soil was entirely within groundwater at time of sampling.*	Brown	Sandy Clay Loam	5% Gravel; Blocky; SFIP; Appears to be naturally occurring. Groundwater witnessed at interface of Riprap and natural underlying soil.

*Due to soils being completely saturated at the time of sampling, a field determination of soil texture could not be performed. A soil sample, refered to herein as (S-1) was taken at a depth of 26" and was allowed to dry for textural determination. It should be noted that the in-situ soils may have a higher silt content than the samples taken for textural analysis, as some of the silt may have been washed out since the samples were retrieved directly from groundwater.

Legend

F = Fine M = Medium C = Coarse
F/M = Fine to Medium F/C = Fine to Coarse
V. = Very Lt. = Light Dk. = Dark
Gr. = Grey Br. = Brown Yel. = Yellow Org. = Orange
U.S.C. Code = Unified Soil Classification

▽ Observed Groundwater

DATE:	2020-01-09 - 11:30am	**LOCATION ID:**	**TP-5 (S-2)**
CLIENT:	Town of Leicester, MA	PROJECT:	14751.00
LOCATION:	Fire and EMS Headquarters, Town of Leicester	GRADE ELEV:	966.0' (Approximate)
	~6ft south of center of sump pump installed in basin at the northwest corner of site	MONITORING WELL ELEV:	N/A
	Leicester, Massachusetts	TEST PIT BOTTOM ELEV:	963.8' (Approximate; 26" deep)
VHB REP:	Dan Meegan, PE	WEATHER:	Partly Cloudy, 20ºF
CONTRACTOR:	Leicester DPW	EQUIPMENT	Sump Pump; jackhammer; hand shevels
		OBSERVED WATER TABLE:	965.6' [Bottom of Riprap]

Sample/ Horizon	Depth (In.)		Soil Description	Color	Soil Texture (USDA)	Remarks
Riprap ▽	4	0"-4"	Riprap for basin surface	N/A	N/A	Filter fabric encountered at bottom of riprap; Standing groundwater observed at bottom of riprap
C	8 12 16 20 24	4"-26"	Naturally occuring layer of brown, blocky, semi-firm-in-place, Clay loam. Soil was entirely within groundwater at time of sampling.*	Brown	Clay Loam	Blocky; SFIP; Appears to be naturally occurring. Groundwater witnessed at interface of Riprap and natural underlying soil.

*Due to soils being completely saturated at the time of sampling, a field determination of soil texture could not be performed. A soil sample, refered to herein as (S-2) was taken at a depth of 26" and was allowed to dry for textural determination. It should be noted that the in-situ soils may have a higher silt content than the samples taken for textural analysis, as some of the silt may have been washed out since the samples were retrieved directly from groundwater.

Legend

F = Fine M = Medium C = Coarse
F/M = Fine to Medium F/C = Fine to Coarse
V. = Very Lt. = Light Dk. = Dark
Gr. = Grey Br. = Brown Yel. = Yellow Org. = Orange
U.S.C. Code = Unified Soil Classification

▽ Observed Groundwater