

STORMWATER MANAGEMENT REPORT

FOR

NORTHERN ESSEX COMMUNITY COLLEGE
ATHLETIC FIELD RENOVATIONS

Submitted to:

City of Haverhill Conservation Commission
4 Summer St., Room 300
Haverhill, MA 01886

February 26, 2026

Prepared for:

Northern Essex Community College
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Prepared by:

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Report Summary

Checklist for Stormwater Report



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 8²
- Operation and Maintenance Plan required by Standard 9

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

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

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

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

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



Checklist for Stormwater Report

B. Stormwater Checklist and Certification

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

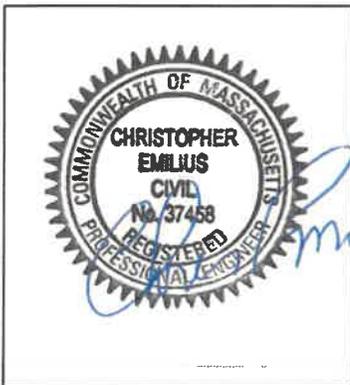
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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

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

Registered Professional Engineer's Certification

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

Registered Professional Engineer Block and Signature



Chris Emilius
Chris Emilius 2/26/26
Signature and Date

Checklist

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

- New development
- Redevelopment
- Mix of New Development and Redevelopment



Checklist for Stormwater Report

Checklist (continued)

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

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

Standard 1: No New Untreated Discharges

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



Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

- Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.
- Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.
- Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

- Soil Analysis provided.
- Required Recharge Volume calculation provided.
- Required Recharge volume reduced through use of the LID site Design Credits.
- Sizing the infiltration, BMPs is based on the following method: Check the method used.
 - Static
 - Simple Dynamic
 - Dynamic Field¹
- Runoff from all impervious areas at the site discharging to the infiltration BMP.
- Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.
- Recharge BMPs have been sized to infiltrate the Required Recharge Volume.
- Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:
 - Site is comprised solely of C and D soils and/or bedrock at the land surface
 - M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
 - Solid Waste Landfill pursuant to 310 CMR 19.000
 - Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.
- Calculations showing that the infiltration BMPs will drain in 72 hours are provided.
- Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

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



Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

- The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.
- Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

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

- Good housekeeping practices;
 - Provisions for storing materials and waste products inside or under cover;
 - Vehicle washing controls;
 - Requirements for routine inspections and maintenance of stormwater BMPs;
 - Spill prevention and response plans;
 - Provisions for maintenance of lawns, gardens, and other landscaped areas;
 - Requirements for storage and use of fertilizers, herbicides, and pesticides;
 - Pet waste management provisions;
 - Provisions for operation and management of septic systems;
 - Provisions for solid waste management;
 - Snow disposal and plowing plans relative to Wetland Resource Areas;
 - Winter Road Salt and/or Sand Use and Storage restrictions;
 - Street sweeping schedules;
 - Provisions for prevention of illicit discharges to the stormwater management system;
 - Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
 - Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
 - List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.
- A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.
 - Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:
 - is within the Zone II or Interim Wellhead Protection Area
 - is near or to other critical areas
 - is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
 - involves runoff from land uses with higher potential pollutant loads.
 - The Required Water Quality Volume is reduced through use of the LID site Design Credits.
 - Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.



Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

- The BMP is sized (and calculations provided) based on:
 - The ½" or 1" Water Quality Volume or
 - The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.
- The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.
- A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

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

- The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.
- The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted **prior to** the discharge of stormwater to the post-construction stormwater BMPs.
- The NPDES Multi-Sector General Permit does **not** cover the land use.
- LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.
- All exposure has been eliminated.
- All exposure has **not** been eliminated and all BMPs selected are on MassDEP LUHPPL list.
- The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

- The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.
- Critical areas and BMPs are identified in the Stormwater Report.



Checklist for Stormwater Report

Checklist (continued)

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

- The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:
 - Limited Project
 - Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
 - Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
 - Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
 - Bike Path and/or Foot Path
 - Redevelopment Project
 - Redevelopment portion of mix of new and redevelopment.
- Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.
- The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

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

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

- Narrative;
 - Construction Period Operation and Maintenance Plan;
 - Names of Persons or Entity Responsible for Plan Compliance;
 - Construction Period Pollution Prevention Measures;
 - Erosion and Sedimentation Control Plan Drawings;
 - Detail drawings and specifications for erosion control BMPs, including sizing calculations;
 - Vegetation Planning;
 - Site Development Plan;
 - Construction Sequencing Plan;
 - Sequencing of Erosion and Sedimentation Controls;
 - Operation and Maintenance of Erosion and Sedimentation Controls;
 - Inspection Schedule;
 - Maintenance Schedule;
 - Inspection and Maintenance Log Form.
- A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.



Checklist for Stormwater Report

Checklist (continued)

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

- The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has **not** been included in the Stormwater Report but will be submitted **before** land disturbance begins.
- The project is **not** covered by a NPDES Construction General Permit.
- The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.
- The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

- The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:
 - Name of the stormwater management system owners;
 - Party responsible for operation and maintenance;
 - Schedule for implementation of routine and non-routine maintenance tasks;
 - Plan showing the location of all stormwater BMPs maintenance access areas;
 - Description and delineation of public safety features;
 - Estimated operation and maintenance budget; and
 - Operation and Maintenance Log Form.
- The responsible party is **not** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:
 - A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
 - A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

- The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;
- An Illicit Discharge Compliance Statement is attached;
- NO Illicit Discharge Compliance Statement is attached but will be submitted **prior to** the discharge of any stormwater to post-construction BMPs.

This Stormwater Report has been prepared to demonstrate compliance with the Massachusetts Stormwater Management Standards in accordance with the Massachusetts Wetlands Protection Act Regulations (310 CMR 10.00).

Project Overview:

Northern Essex Community College is proposing the construction of new athletic fields for the campus located at 100 Elliot Street in Haverhill. The new track and fields will replace the existing athletic fields. Site improvements include the new track and fields, tennis courts, bathroom facility, and associated sidewalks and utilities.

Site Description:

The campus is located just north of Kenoza Lake at the intersection of Elliott Street and Kenoza Street, and contains 109 acres of land. Much of the site is developed as the existing campus with buildings, parking lots, roadways, walkways, and athletic fields. There are two wetland areas on the campus near the areas of proposed improvements, one to the west of the Sports and Fitness Center and one to the southeast across the access drive. Both wetlands tributary to Cottles Creek, downstream of Kenoza Lake. Much of the campus including the center wetland and most of the areas proposed for pavement and accessibility improvements is drained by an existing closed drainage system which outfalls to Cottles Creek. A small portion of the proposed improvements is located within the wetland resource area buffer zone.

The existing site has a 23ft grade change and generally slopes from the north to south towards wetlands located to the west and southeast of the proposed work, with an elevation of 136 in the north portion of the site to 113 in the wetlands to the south.

According to Federal Emergency Management Agency (FEMA) flood insurance rate maps (FIRM), the project area is designated as a Zone A. The project site can be found on the City of Haverhill, Massachusetts, Essex County, Community No. 250085, Panel No. 91 of 552, Map Number 25009C0091F, Effective Date July 3, 2012 (see **Figure 2**).

Existing soil conditions within the limits of the project were taken from the Essex County, Massachusetts soils maps published by the U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) in cooperation with the Massachusetts Agriculture Experiment Station (See **Figure 3**).

The following soil groups have been identified at the site:

52A: Freetown muck, 0 to 1 percent slopes. Hydrologic Soil Group B/D

67A: Leicester fine sandy loam, 0 to 3 percent slopes. Hydrologic Soil Group A/D

73A: Whitman fine sandy loam, 0 to 3 percent slopes. Hydrologic Soil Group D

305B: Paxton fine sandy loam, 3 to 8 percent slopes. Hydrologic Soil Group C

305C: Paxton fine sandy loam, 8 to 15 percent slopes. Hydrologic Soil Group C

305D: Paxton fine sandy loam, 15 to 25 percent slopes. Hydrologic Soil Group C

306B: Paxton fine sandy loam, 0 to 8 percent slopes, very stoney. Hydrologic Soil Group C

306C: Paxton fine sandy loam, 8 to 15 percent slopes, very stoney. Hydrologic Soil Group C

311B: Woodbridge fine sandy loam, 0 to 8 percent slopes, very stoney. Hydrologic Soil Group C/D

Geotechnical investigations were performed by GeoEngineers in July 2025 and February 2026. Six test pits were excavated in July 2025. A soil textural analysis was performed by licensed soil evaluator in locations where infiltration is proposed. Based on the analysis infiltration rates of 0.27 in/hr were used based on Rawls rates per MassDEP. Copies of these documents are included in the **Appendix**.

Selection of Storm Events:

The storm events have been compiled from National Oceanic and Atmospheric Administration (NOAA) Atlas 14 24-hour rainfall data and are as followed:

<u>Frequency (years)</u>	<u>Rainfall [24-hour event (inches)]</u>
2	3.23
10	5.12
25	6.30
100	8.12

Existing Drainage Conditions:

The project area is currently developed with the existing NECC campus and associated parking and athletic fields. The existing site has a 23ft grade change and generally slopes from the north to south towards wetlands located to the west and southeast of the proposed work, with an elevation of 136 in the north portion of the site to 113 in the wetlands to the south. Currently, the site is comprised of 4 drainage areas which discharge to 4 design points. **Figure 4** illustrates the existing drainage patterns on site.

Existing Conditions Hydrologic Data

Drainage Area	Discharge Location	Design Point	Area (Acres)	Curve Number	Time of Concentration (min)
EX1 East Track	Southeast Wetlands	DP-1	4.39	83	13.2
EX2 West Track	Southeast Wetlands	DP-1	7.00	84	13.4
EX3 Direct to Wetland	West Wetland	DP-2	2.15	78	15.7
EX4 Ballfield	Southeast Wetlands	DP-1	5.25	77	23.9

Proposed Drainage Conditions:

Figure 5 illustrates the proposed post-construction drainage conditions for the project. As shown, the site will be divided into 9 drainage areas that discharge to the 2 Design Points. The table below provides a summary of the proposed conditions hydrologic data.

Proposed Conditions Hydrologic Data

Drainage Area	Discharge Location	Design Point	Area (Acres)	Curve Number	Time of Concentration (min)
PR1A Track & Field East	Southeast Wetlands	DP-1	3.53	85	6
PR1B Tack & Field West	Southeast Wetlands	DP-1	2.12	87	6
PR2 North of Fields	Southeast Wetlands	DP-1	2.63	81	12.9
PR3A Baseball Field North	Southeast Wetlands	DP-1	2.45	82	6
PR3B Baseball Field South	Southeast Wetlands	DP-1	1.75	78	6
PR4 Fitness Center	Southeast Wetlands	DP-1	1.28	95	6
PR5 Tennis Courts	West Wetland	DP-2	0.68	94	6
PR6 Direct to Wetlands	West Wetland	DP-2	1.11	80	15.4
PR7 South of Fields	Southeast Wetlands	DP-1	3.26	75	13.8

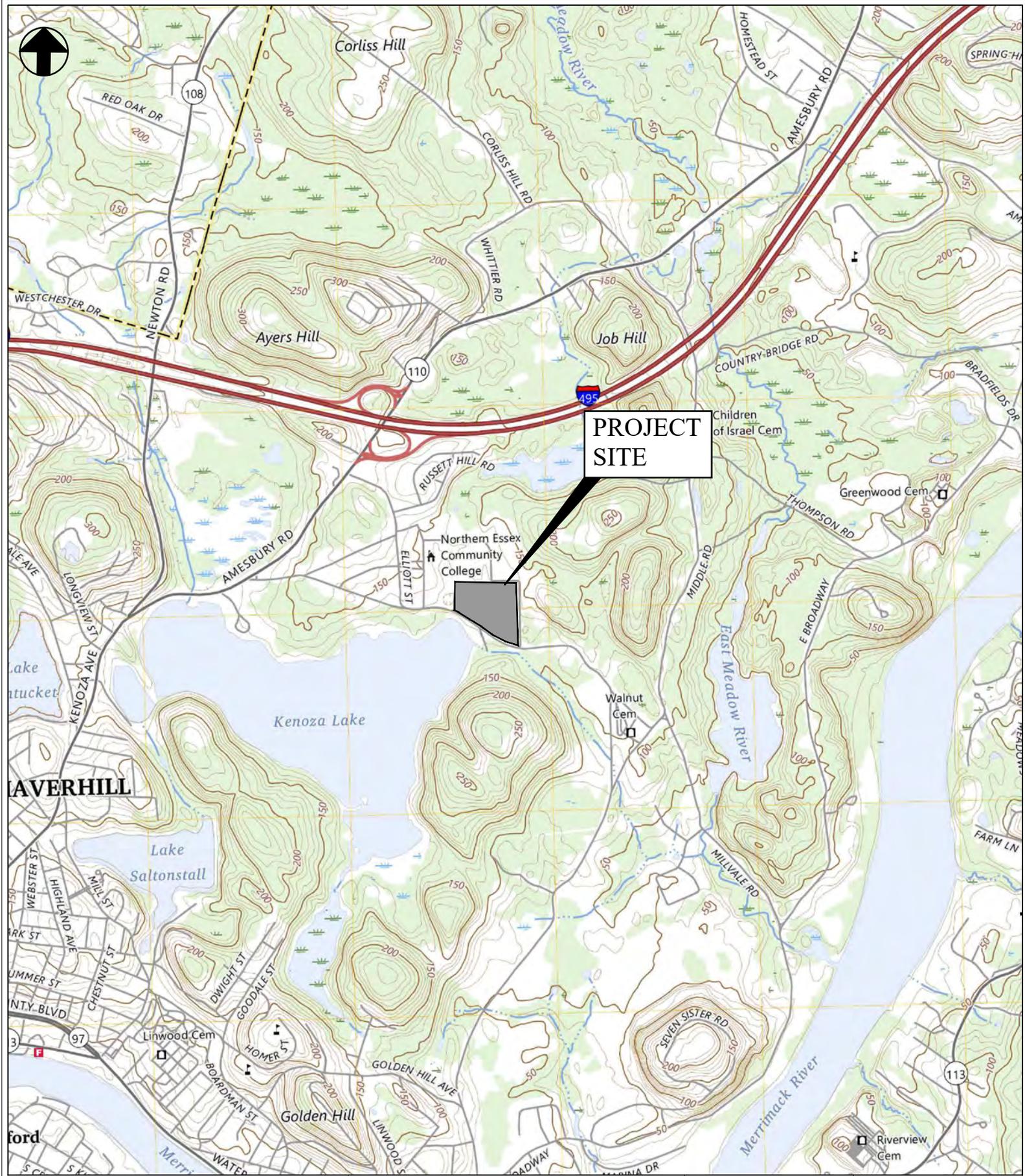
Stormwater Management Objectives:

The purpose of this analysis is to design a stormwater management system utilizing Best Management Practices (BMP's). Runoff coming from pavement and the building roof will be pretreated through infiltration trenches and gravel filtration before being discharged to meet with Massachusetts Department of Environmental Protection (MassDEP) stormwater management regulations for pretreatment and TSS removal. The proposed fields have been designed to allow stormwater runoff to infiltrate in order to meet Standards 3 and 4 for groundwater recharge volume and water quality volume

A duckbill valve will be installed in the outlet pipe that discharges to the extended detention basin as a back flow prevention device during larger storm events. This will prevent the proposed stormwater management system from surcharging.

Figures

Figure 1 - USGS Map



Project Civil Engineer
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Project Location
**NORTHERN ESSEX
 COMMUNITY COLLEGE**
 100 Elliot Street
 Haverhill, MA

SCALE: 1"=2000'
 DRAWN BY: CG
 CHECKED BY: CE
 ISSUED: 01.30.26
 REVISED:

**USGS
 MAP**

Figure 2 - FEMA Flood Map

National Flood Hazard Layer FIRMMette



71°3'9"W 42°47'59"N



71°2'31"W 42°47'33"N

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) <i>Zone A, V, A99</i>
		With BFE or Depth <i>Zone AE, AO, AH, VE, AR</i>
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile <i>Zone X</i>
		Future Conditions 1% Annual Chance Flood Hazard <i>Zone X</i>
		Area with Reduced Flood Risk due to Levee. See Notes. <i>Zone X</i>
		Area with Flood Risk due to Levee <i>Zone D</i>
OTHER AREAS		NO SCREEN Area of Minimal Flood Hazard <i>Zone X</i>
		Effective LOMRs
GENERAL STRUCTURES		Area of Undetermined Flood Hazard <i>Zone D</i>
		Channel, Culvert, or Storm Sewer
OTHER FEATURES		Levee, Dike, or Floodwall
		20.2 Cross Sections with 1% Annual Chance
		17.5 Water Surface Elevation
		Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary
		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
MAP PANELS		Digital Data Available
		No Digital Data Available
		Unmapped
		The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.



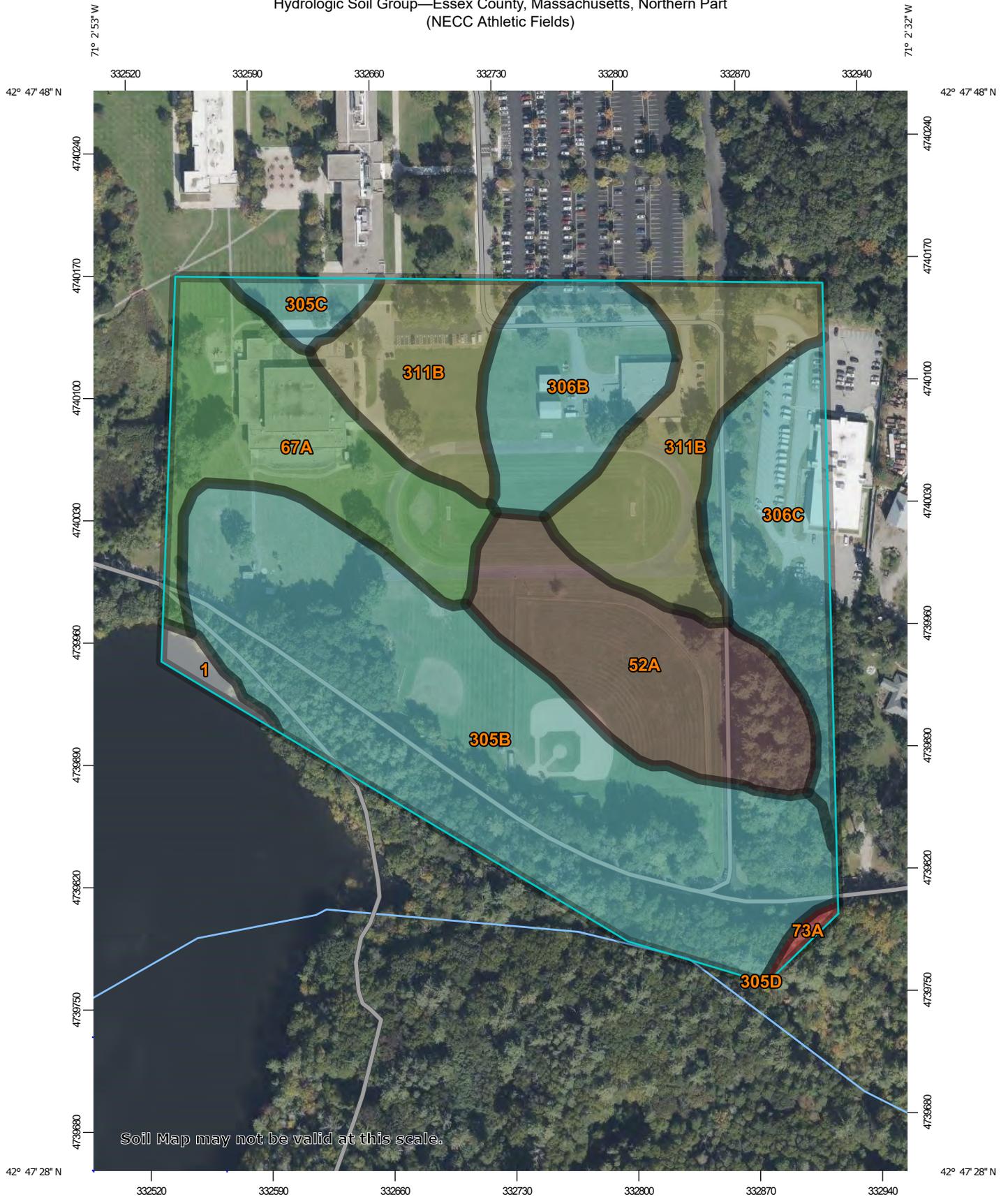
This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on **1/28/2026 at 4:44 PM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Figure 3 - NRCS Hydrologic Soil Groups

Hydrologic Soil Group—Essex County, Massachusetts, Northern Part
(NECC Athletic Fields)



Map Scale: 1:3,010 if printed on A portrait (8.5" x 11") sheet.



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

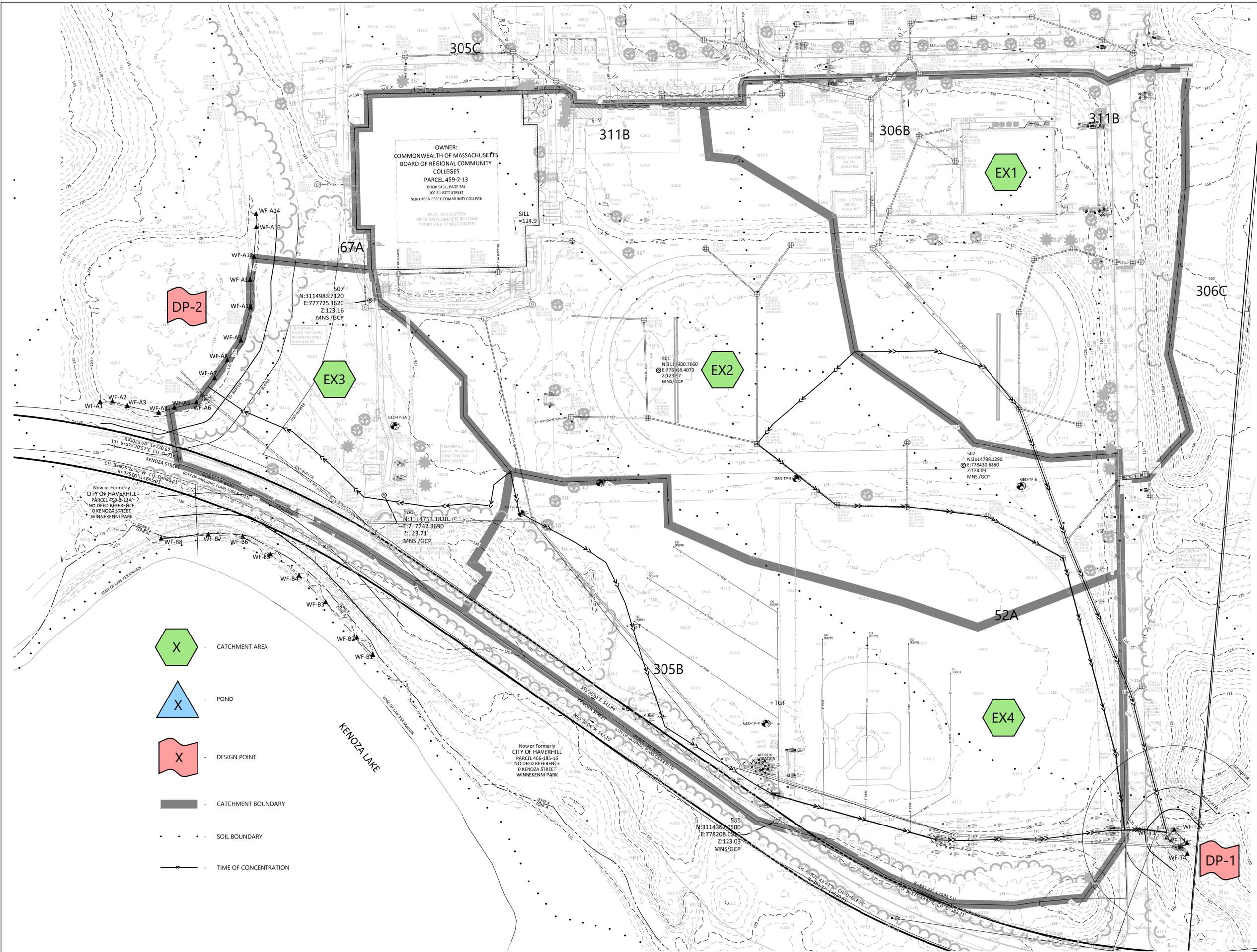


Natural Resources
Conservation Service

Web Soil Survey
National Cooperative Soil Survey

1/28/2026
Page 1 of 4

Figure 4 - Existing Conditions Drainage Plan



OWNER:
COMMONWEALTH OF MASSACHUSETTS
BOARD OF REGIONAL COMMUNITY
COLLEGES
PARCEL 459-2-13
BOOK 543, PAGE 264
100 FLUITY STREET
NORTHERN ESSEX COMMUNITY COLLEGE

Now or Formerly
GREATER NEWBURYPORT
OPPORTUNITIES, INC.
PARCEL 466-155-18-1
BOOK 30039, PAGE 515
671 KENOZA STREET

-  CATCHMENT AREA
-  POND
-  DESIGN POINT
-  CATCHMENT BOUNDARY
-  SOIL BOUNDARY
-  TIME OF CONCENTRATION

EXISTING CONDITIONS DRAINAGE PLAN
Northern Essex Community College
Haverhill, MA

PREPARED FOR
Jones Architecture

DATE: 02-26-2026

Brennan Consulting
ENGINEERING • TRANSPORTATION • SURVEYING
24 RAY AVENUE, BURLINGTON, MA
PHONE: (781) 273-3434 FAX: (781) 273-3430

SCALE: 1" = 50'

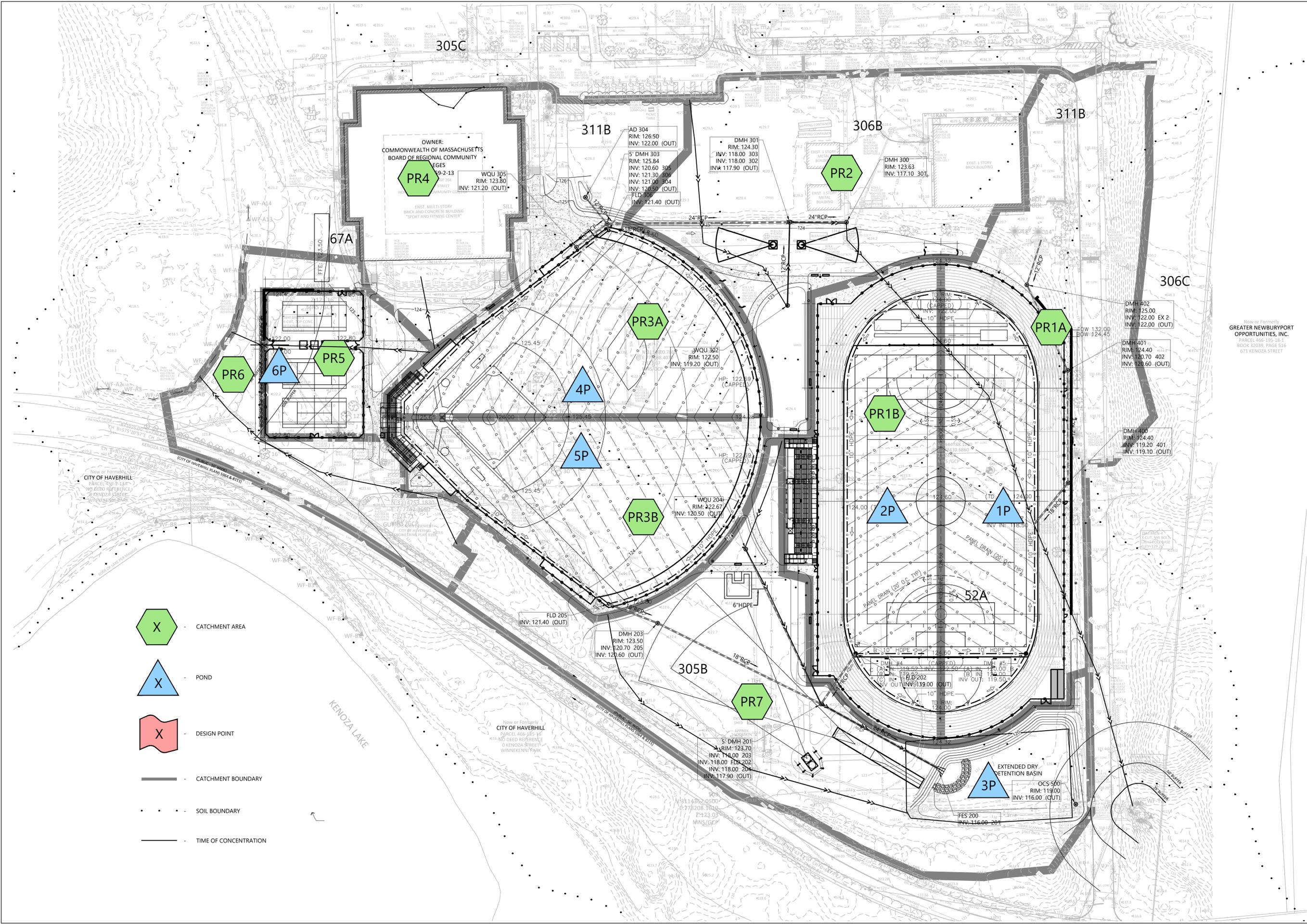
NO.	DATE	DESCRIPTION	BY

CHECKED BY: CE
DRAWN BY: CG

PROJECT 25527

F-4

Figure 5 - Proposed Conditions Drainage Plan



-  CATCHMENT AREA
-  POND
-  DESIGN POINT
-  CATCHMENT BOUNDARY
-  SOIL BOUNDARY
-  TIME OF CONCENTRATION

Now or Formerly
GREATER NEWBURYPORT
OPPORTUNITIES, INC.
PROJECT: 466-155-15-1
BOOK: 30039, PAGE 545
671 KENOZA STREET

PROPOSED CONDITIONS DRAINAGE PLAN
Northern Essex Community College
Haverhill, MA
PREPARED FOR
Jones Architecture

Brennan Consulting
ENGINEERING • TRANSPORTATION • SURVEYING
24 RAY AVENUE, BURLINGTON, MA
PHONE: (781) 273-3434 FAX: (781) 273-3430

NO.	DATE	DESCRIPTION	BY

CHECKED BY: CE
DRAWN BY: CG
PROJECT 25527
F-5

DATE: 02-26-2026

SCALE: 1" = 50'

Stormwater Management Standards

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

Response: The Best Management Practices (BMPs) included in the proposed stormwater management system have been designed in accordance with the Massachusetts Stormwater Handbook. Stormwater discharging from new outfalls will be pretreated through the use of infiltration trenches, gravel reservoirs below the fields and proprietary water quality units.

Standard 2: Stormwater management systems shall be designed so that the post-development peak discharge rates do not exceed pre-development peak discharge rates. This standard may be waived for discharges to land subject to coastal storm flowage as defined in 310 CMR 10.04.

Response: The rainfall-runoff response of the Site under existing and proposed conditions was analyzed for storm events with recurrence intervals of 2, 10, 25 and 100-years. The results of the analysis, as summarized in the table below, indicate that there is no increase in peak discharge rates between the existing and proposed conditions.

TOTAL PEAK FLOW SUMMARY FOR PROJECT SITE

		<u>2 Year</u>	<u>10 Year</u>	<u>25 Year</u>	<u>100 Year</u>
DP-1	Existing	21.08 cfs	43.23 cfs	57.54 cfs	79.79 cfs
	Proposed	16.80 cfs	25.28 cfs	29.87 cfs	36.80 cfs
DP-2	Existing	2.37 cfs	5.27 cfs	7.20 cfs	10.23 cfs
	Proposed	2.03 cfs	5.12 cfs	6.72 cfs	9.19 cfs

(See Existing and Proposed Conditions HydroCAD Analysis)

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

Response: The loss of groundwater recharge has been computed as prescribed in Standard 3 of the Stormwater Management Policy. Required recharge volumes were calculated by utilizing the depth of runoff corresponding to the soil type times the impervious areas covering that soil type at the post-development site.

Required Recharge Volume			
Hydrologic Group	Impervious Area	inches	Recharge Volume
A	0.0 sf	0.60	0.0 cf
B	0.0 sf	0.35	0.0 cf
C	89,167.3 sf	0.25	1,857.7 cf
D	134,426.2 sf	0.10	1,120.2 cf
Total	223,593.5 sf		2,977.9 cf
Provided Recharge Volume			
Baseball Field	26,491.8 cf		
Track Field	21,996.4 cf		
Total=	48,488.2 cf		

$$Time_{drawdown} = \frac{Rv}{(K)(Bottom\ Area)}$$

Where:

Rv = Storage Volume

K = Saturated Hydraulic Conductivity For "Static" and "Simple Dynamic" Methods, use Rawls Rate (see Table 2.3.3). For "Dynamic Field" Method, use 50% of the in-situ saturated hydraulic conductivity.

Bottom Area = Bottom Area of Recharge Structure²²

Baseball Field	
Rv=	26491.8 cf
K=	0.27 in/hr*
Bottom Area=	132459.0 sf
Time =	8.89 hours

Track Field	
Rv=	21996.4 cf
K=	0.27 in/hr*
Bottom Area=	109982.0 sf
Time =	8.89 hours

Standard 4: Stormwater management systems shall be designed to remove 80% of the average annual post-condition load of Total Suspended Solids (TSS). This standard is met when:

- a.) Suitable practices for source control and pollution prevention are identified in a long-term pollution prevention plan, and thereafter are implemented and maintained;
- b.) Structural stormwater best management practices are sized to capture the required water quality volume as determined in accordance with the Massachusetts Stormwater Handbook; and
- c.) Pretreatment is provided in accordance with the Massachusetts Stormwater Handbook.

The required water quality volume equals 1 inch of runoff times the total impervious area of the post-development project site and greater than 80% TSS removal prior to discharge to the infiltration BMP.

(See Water Quality and TSS Removal Calculations Sheet.)

Standard 5: For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable. If, through source control and/or pollution prevention, all land uses with higher potential pollutant loads cannot be completely protected from exposure to rain, snow melt and stormwater runoff, the proponent shall use the specific structural stormwater BMP's determined by the Department to be suitable for such uses as provided in the Massachusetts Stormwater Handbook. Stormwater discharges from land uses with higher potential pollutant loads shall also comply with the requirements of the Massachusetts Clean Waters Act, M.G.L.c. 21, ss 26-53 and the regulations promulgated thereunder at 314 CMR 3.00, 314 CMR 4.00 and 314 CMR 5.00.

The project is not a land use with higher potential pollutant loads.

Standard 6: *Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply and stormwater discharges near or to any other critical area require the use of the specific source control and pollution prevention measures and the specific structural stormwater best management practices determined by the Department to be suitable for managing discharges to such areas, as provided in the Massachusetts Stormwater Handbook. A discharge is near a critical area if there is a strong likelihood of a significant impact occurring to said area, taking into account site-specific factors. Stormwater discharges to Outstanding Resource Waters and Special Resource Waters shall be removed and set back from the receiving water or wetland and receive the highest and best practical method of treatment. A “storm water discharge” as defined in 314 CMR 3.04(2)(a)1. or (b) to an Outstanding Resource Water or Special Resource Water shall comply with 314 CMR 4.00. Stormwater discharge to a Zone I or Zone A are prohibited unless essential to the operation of the public water supply.*

A stormwater discharge within a Zone II or Interim Wellhead Protection Area or near or to an Outstanding Resource Water, a Special Resource Water, a bathing beach, shellfish growing area, or cold-water fishery requires the use of a treatment train that provides 80% TSS removal prior to discharge. With the exception of runoff from a non-metal roof, and runoff from metal roofs located outside the Zone II or Interim Wellhead Protection Area of a public water supply or an industrial site, the treatment train shall provide for at least 44% TSS removal prior to discharge to the infiltration structure. For discharges within a Zone II or Interim Wellhead Protection Area or near or to an Outstanding Resource Water, a Special Resource Water, a shellfish growing area, a bathing beach, or a cold-water fishery, the treatment BMPs must be designed to treat the required water quality volume, a volume equal to one inch times the total impervious surfaces at the post-development site.

The project does not discharge within a Zone II or Interim Wellhead Protection Area. The project meets MassDEP and city standards for TSS removal and Phosphorous Removal.

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

The project is not a redevelopment project and therefore will comply with all required standards.

Standard 8: A plan to control construction-related impacts, including erosion, sedimentation, and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plan) shall be developed and implemented.

The Project will disturb approximately 12.1 acres 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, the contractor will prepare and submit a Stormwater Pollution Prevention Plan (SWPPP) before land disturbance begins. Recommended construction period pollution prevention and erosion and sedimentation controls to be finalized in the SWPPP are included in the Appendix.

Standard 9: A Long-Term Operation and Maintenance (O&M) Plan shall be developed and maintained to ensure that stormwater management systems function as designed.

A long-term O&M Plan is attached as a separate document.

Standard 10: All illicit discharges to the stormwater management system are prohibited.

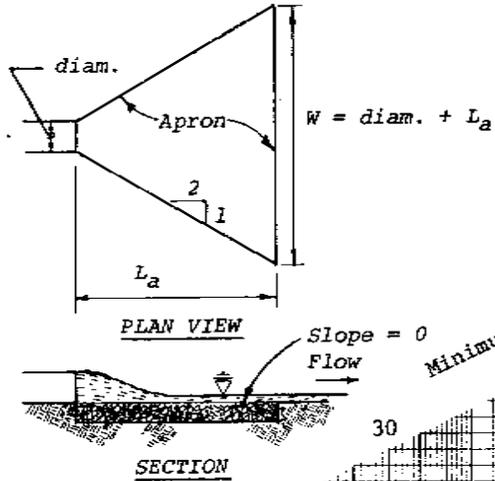
An Illicit Discharge Compliance Statement is attached as a separate document.

Appendix

Standard 1

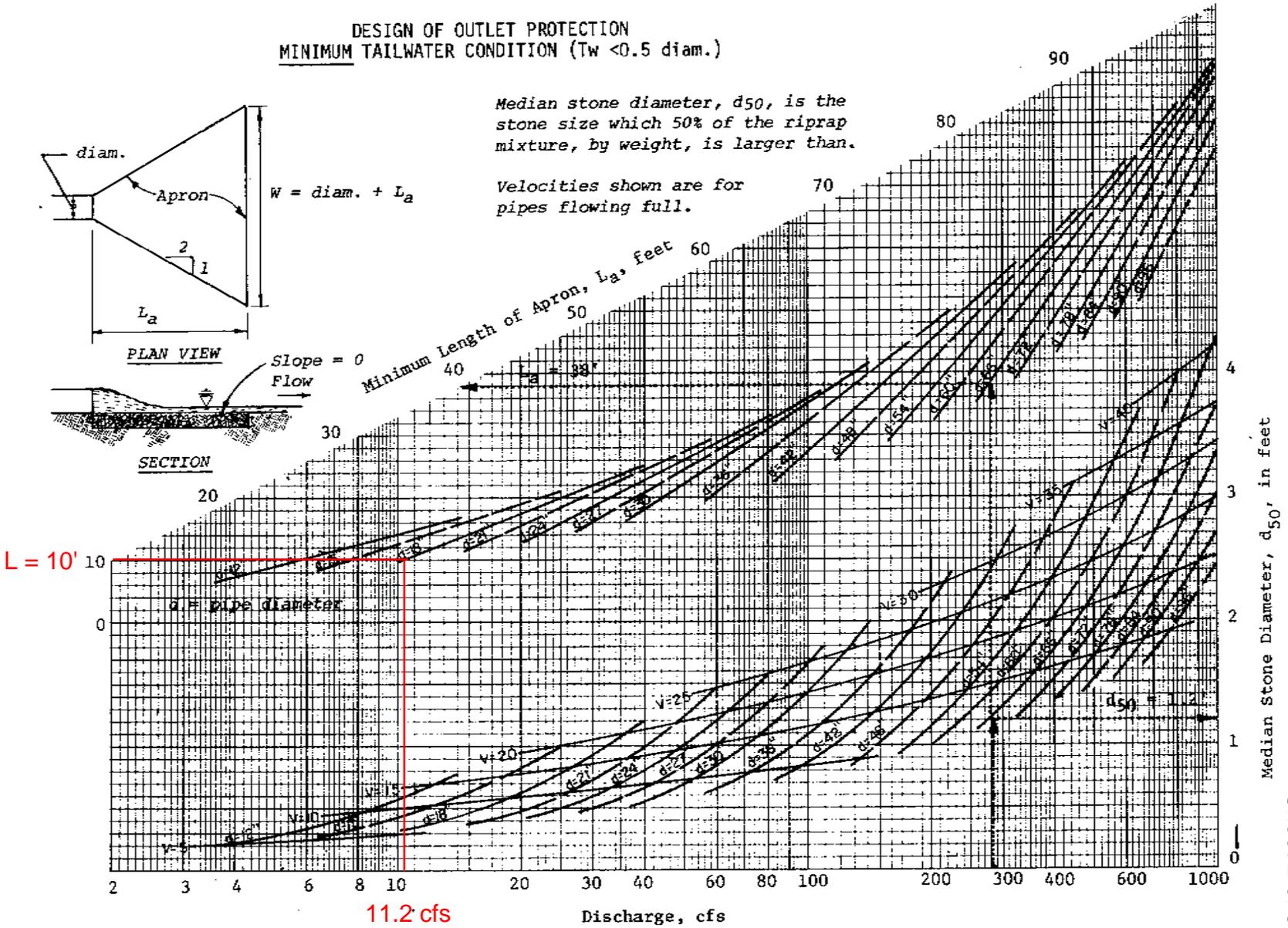
Rip Rap Sizing

DESIGN OF OUTLET PROTECTION
 MINIMUM TAILWATER CONDITION (Tw < 0.5 diam.)



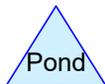
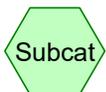
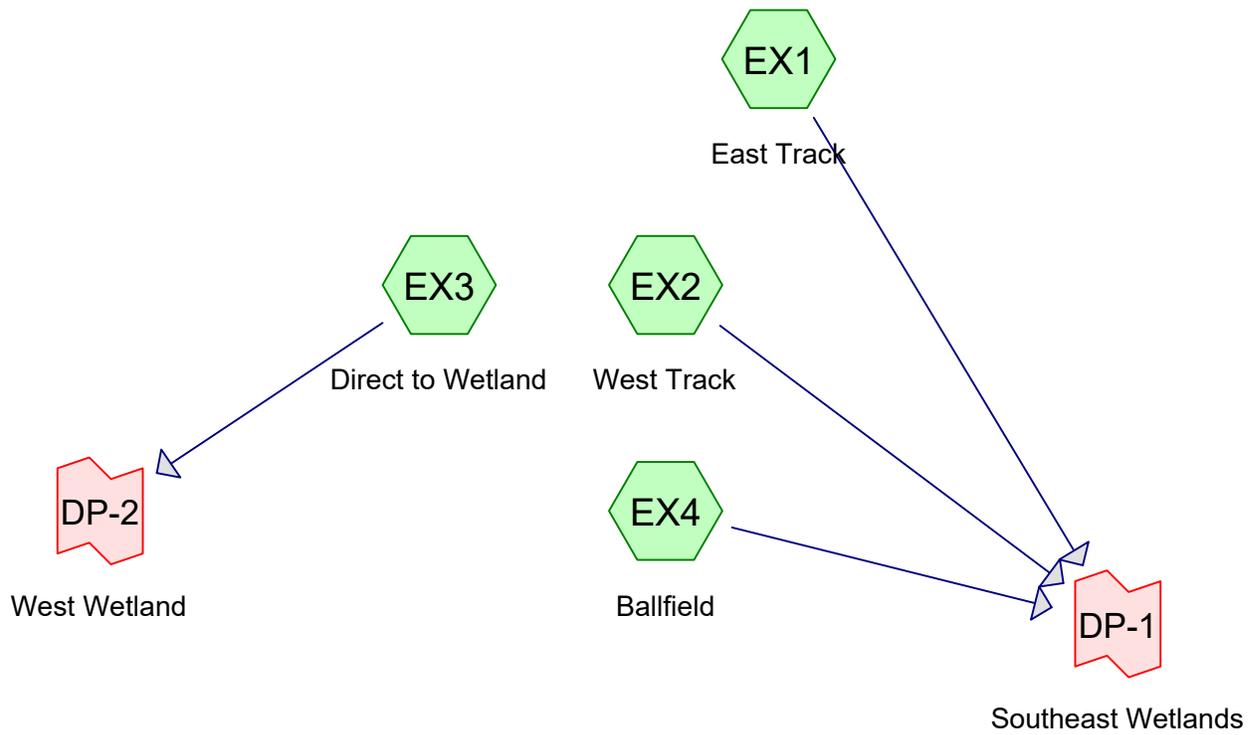
Median stone diameter, d_{50} , is the stone size which 50% of the riprap mixture, by weight, is larger than.

Velocities shown are for pipes flowing full.



Standard 2

Existing Conditions HydroCAD Analysis



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Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-yr	Type III 24-hr		Default	24.00	1	3.23	2
2	10-yr	Type III 24-hr		Default	24.00	1	5.12	2
3	25-yr	Type III 24-hr		Default	24.00	1	6.30	2
4	100-yr	Type III 24-hr		Default	24.00	1	8.12	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
6.397	74	>75% Grass cover, Good, HSG C (EX1, EX2, EX3, EX4)
7.426	80	>75% Grass cover, Good, HSG D (EX1, EX2, EX3, EX4)
1.545	98	Paved parking, HSG C (EX1, EX2, EX3, EX4)
1.340	98	Paved parking, HSG D (EX1, EX2, EX3, EX4)
0.022	98	Roofs, HSG C (EX2)
0.951	98	Roofs, HSG D (EX2)
0.900	70	Woods, Good, HSG C (EX3, EX4)
0.232	77	Woods, Good, HSG D (EX3)
18.813	81	TOTAL AREA

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
8.864	HSG C	EX1, EX2, EX3, EX4
9.949	HSG D	EX1, EX2, EX3, EX4
0.000	Other	
18.813		TOTAL AREA

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Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	6.397	7.426	0.000	13.823	>75% Grass cover, Good	EX1, EX2, EX3, EX4
0.000	0.000	1.545	1.340	0.000	2.885	Paved parking	EX1, EX2, EX3, EX4
0.000	0.000	0.022	0.951	0.000	0.973	Roofs	EX2
0.000	0.000	0.900	0.232	0.000	1.132	Woods, Good	EX3, EX4
0.000	0.000	8.864	9.949	0.000	18.813	TOTAL AREA	

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Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)	Node Name
1	EX1	0.00	0.00	530.0	0.0050	0.012	0.0	54.0	0.0	
2	EX2	0.00	0.00	783.0	0.0060	0.012	0.0	12.0	0.0	
3	EX4	0.00	0.00	201.0	0.0080	0.025	0.0	12.0	0.0	
4	EX4	0.00	0.00	68.0	0.0400	0.012	0.0	12.0	0.0	

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Type III 24-hr 2-yr Rainfall=3.23"

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

SubcatchmentEX1: East Track

Runoff Area=4.385 ac 29.99% Impervious Runoff Depth=1.63"
Flow Length=753' Tc=13.2 min CN=83 Runoff=6.65 cfs 0.597 af

SubcatchmentEX2: West Track

Runoff Area=6.994 ac 25.74% Impervious Runoff Depth=1.71"
Flow Length=942' Tc=13.4 min CN=84 Runoff=11.05 cfs 0.995 af

SubcatchmentEX3: Direct to Wetland

Runoff Area=2.152 ac 11.76% Impervious Runoff Depth=1.30"
Flow Length=431' Tc=15.7 min CN=78 Runoff=2.37 cfs 0.232 af

SubcatchmentEX4: Ballfield

Runoff Area=5.282 ac 9.28% Impervious Runoff Depth=1.23"
Flow Length=1,003' Tc=23.9 min CN=77 Runoff=4.64 cfs 0.543 af

Link DP-1: Southeast Wetlands

Inflow=21.08 cfs 2.135 af
Primary=21.08 cfs 2.135 af

Link DP-2: West Wetland

Inflow=2.37 cfs 0.232 af
Primary=2.37 cfs 0.232 af

Total Runoff Area = 18.813 ac Runoff Volume = 2.367 af Average Runoff Depth = 1.51"
79.49% Pervious = 14.955 ac 20.51% Impervious = 3.858 ac

Summary for Subcatchment EX1: East Track

Runoff = 6.65 cfs @ 12.19 hrs, Volume= 0.597 af, Depth= 1.63"
 Routed to Link DP-1 : Southeast Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2-yr Rainfall=3.23"

Area (ac)	CN	Description
1.527	74	>75% Grass cover, Good, HSG C
1.543	80	>75% Grass cover, Good, HSG D
0.791	98	Paved parking, HSG C
0.524	98	Paved parking, HSG D
0.000	98	Roofs, HSG C
0.000	98	Roofs, HSG D
0.000	70	Woods, Good, HSG C
0.000	77	Woods, Good, HSG D
4.385	83	Weighted Average
3.070		70.01% Pervious Area
1.315		29.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0120	0.11		Sheet Flow, Grass: Short n= 0.150 P2= 2.75"
4.9	173	0.0070	0.59		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.9	530	0.0050	9.47	150.64	Pipe Channel, 54" RCP 54.0" Round Area= 15.9 sf Perim= 14.1' r= 1.13' n= 0.012 Concrete pipe, finished
13.2	753	Total			

Summary for Subcatchment EX2: West Track

[47] Hint: Peak is 370% of capacity of segment #3

Runoff = 11.05 cfs @ 12.19 hrs, Volume= 0.995 af, Depth= 1.71"
 Routed to Link DP-1 : Southeast Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2-yr Rainfall=3.23"

Area (ac)	CN	Description
0.861	74	>75% Grass cover, Good, HSG C
4.333	80	>75% Grass cover, Good, HSG D
0.091	98	Paved parking, HSG C
0.736	98	Paved parking, HSG D
0.022	98	Roofs, HSG C
0.951	98	Roofs, HSG D
0.000	70	Woods, Good, HSG C
0.000	77	Woods, Good, HSG D
6.994	84	Weighted Average
5.194		74.26% Pervious Area
1.800		25.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0120	0.11		Sheet Flow, Grass: Short n= 0.150 P2= 2.75"
2.6	109	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
3.4	783	0.0060	3.81	2.99	Pipe Channel, 12" rcp 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
13.4	942	Total			

Summary for Subcatchment EX3: Direct to Wetland

Runoff = 2.37 cfs @ 12.23 hrs, Volume= 0.232 af, Depth= 1.30"
 Routed to Link DP-2 : West Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2-yr Rainfall=3.23"

Area (ac)	CN	Description
1.136	74	>75% Grass cover, Good, HSG C
0.336	80	>75% Grass cover, Good, HSG D
0.198	98	Paved parking, HSG C
0.055	98	Paved parking, HSG D
0.000	98	Roofs, HSG C
0.000	98	Roofs, HSG D
0.195	70	Woods, Good, HSG C
0.232	77	Woods, Good, HSG D
2.152	78	Weighted Average
1.899		88.24% Pervious Area
0.253		11.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	50	0.0220	0.14		Sheet Flow, Grass: Short n= 0.150 P2= 2.75"
3.0	88	0.0050	0.49		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.0	64	0.0030	1.11		Shallow Concentrated Flow, Paved Kv= 20.3 fps
5.4	177	0.0060	0.54		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.5	52	0.1040	1.61		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
15.7	431	Total			

Summary for Subcatchment EX4: Ballfield

[47] Hint: Peak is 280% of capacity of segment #4

Runoff = 4.64 cfs @ 12.35 hrs, Volume= 0.543 af, Depth= 1.23"
 Routed to Link DP-1 : Southeast Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2-yr Rainfall=3.23"

Area (ac)	CN	Description
2.873	74	>75% Grass cover, Good, HSG C
1.214	80	>75% Grass cover, Good, HSG D
0.465	98	Paved parking, HSG C
0.025	98	Paved parking, HSG D
0.000	98	Roofs, HSG C
0.000	98	Roofs, HSG D
0.705	70	Woods, Good, HSG C
0.000	77	Woods, Good, HSG D
5.282	77	Weighted Average
4.792		90.72% Pervious Area
0.490		9.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	50	0.0320	0.17		Sheet Flow, Grass: Short n= 0.150 P2= 2.75"
9.1	295	0.0060	0.54		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
5.4	183	0.0130	0.57		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
1.6	201	0.0080	2.11	1.66	Pipe Channel, 12" cmp 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.025 Corrugated metal
2.7	206	0.0070	1.25		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
0.1	68	0.0400	9.83	7.72	Pipe Channel, 12" rcp 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
23.9	1,003	Total			

Summary for Link DP-1: Southeast Wetlands

Inflow Area = 16.661 ac, 21.64% Impervious, Inflow Depth = 1.54" for 2-yr event
Inflow = 21.08 cfs @ 12.20 hrs, Volume= 2.135 af
Primary = 21.08 cfs @ 12.20 hrs, Volume= 2.135 af, Atten= 0%, Lag= 0.0 min

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

Summary for Link DP-2: West Wetland

Inflow Area = 2.152 ac, 11.76% Impervious, Inflow Depth = 1.30" for 2-yr event
Inflow = 2.37 cfs @ 12.23 hrs, Volume= 0.232 af
Primary = 2.37 cfs @ 12.23 hrs, Volume= 0.232 af, Atten= 0%, Lag= 0.0 min

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

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Type III 24-hr 10-yr Rainfall=5.12"

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

SubcatchmentEX1: East Track

Runoff Area=4.385 ac 29.99% Impervious Runoff Depth=3.28"
Flow Length=753' Tc=13.2 min CN=83 Runoff=13.35 cfs 1.200 af

SubcatchmentEX2: West Track

Runoff Area=6.994 ac 25.74% Impervious Runoff Depth=3.38"
Flow Length=942' Tc=13.4 min CN=84 Runoff=21.76 cfs 1.970 af

SubcatchmentEX3: Direct to Wetland

Runoff Area=2.152 ac 11.76% Impervious Runoff Depth=2.81"
Flow Length=431' Tc=15.7 min CN=78 Runoff=5.27 cfs 0.505 af

SubcatchmentEX4: Ballfield

Runoff Area=5.282 ac 9.28% Impervious Runoff Depth=2.72"
Flow Length=1,003' Tc=23.9 min CN=77 Runoff=10.53 cfs 1.199 af

Link DP-1: Southeast Wetlands

Inflow=43.23 cfs 4.369 af
Primary=43.23 cfs 4.369 af

Link DP-2: West Wetland

Inflow=5.27 cfs 0.505 af
Primary=5.27 cfs 0.505 af

Total Runoff Area = 18.813 ac Runoff Volume = 4.873 af Average Runoff Depth = 3.11"
79.49% Pervious = 14.955 ac 20.51% Impervious = 3.858 ac

Summary for Subcatchment EX1: East Track

Runoff = 13.35 cfs @ 12.18 hrs, Volume= 1.200 af, Depth= 3.28"
 Routed to Link DP-1 : Southeast Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-yr Rainfall=5.12"

Area (ac)	CN	Description
1.527	74	>75% Grass cover, Good, HSG C
1.543	80	>75% Grass cover, Good, HSG D
0.791	98	Paved parking, HSG C
0.524	98	Paved parking, HSG D
0.000	98	Roofs, HSG C
0.000	98	Roofs, HSG D
0.000	70	Woods, Good, HSG C
0.000	77	Woods, Good, HSG D
4.385	83	Weighted Average
3.070		70.01% Pervious Area
1.315		29.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0120	0.11		Sheet Flow, Grass: Short n= 0.150 P2= 2.75"
4.9	173	0.0070	0.59		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.9	530	0.0050	9.47	150.64	Pipe Channel, 54" RCP 54.0" Round Area= 15.9 sf Perim= 14.1' r= 1.13' n= 0.012 Concrete pipe, finished
13.2	753	Total			

Summary for Subcatchment EX2: West Track

[47] Hint: Peak is 728% of capacity of segment #3

Runoff = 21.76 cfs @ 12.18 hrs, Volume= 1.970 af, Depth= 3.38"
 Routed to Link DP-1 : Southeast Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-yr Rainfall=5.12"

Area (ac)	CN	Description
0.861	74	>75% Grass cover, Good, HSG C
4.333	80	>75% Grass cover, Good, HSG D
0.091	98	Paved parking, HSG C
0.736	98	Paved parking, HSG D
0.022	98	Roofs, HSG C
0.951	98	Roofs, HSG D
0.000	70	Woods, Good, HSG C
0.000	77	Woods, Good, HSG D
6.994	84	Weighted Average
5.194		74.26% Pervious Area
1.800		25.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0120	0.11		Sheet Flow, Grass: Short n= 0.150 P2= 2.75"
2.6	109	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
3.4	783	0.0060	3.81	2.99	Pipe Channel, 12" rcp 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
13.4	942	Total			

Summary for Subcatchment EX3: Direct to Wetland

Runoff = 5.27 cfs @ 12.22 hrs, Volume= 0.505 af, Depth= 2.81"
 Routed to Link DP-2 : West Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-yr Rainfall=5.12"

Area (ac)	CN	Description
1.136	74	>75% Grass cover, Good, HSG C
0.336	80	>75% Grass cover, Good, HSG D
0.198	98	Paved parking, HSG C
0.055	98	Paved parking, HSG D
0.000	98	Roofs, HSG C
0.000	98	Roofs, HSG D
0.195	70	Woods, Good, HSG C
0.232	77	Woods, Good, HSG D
2.152	78	Weighted Average
1.899		88.24% Pervious Area
0.253		11.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	50	0.0220	0.14		Sheet Flow, Grass: Short n= 0.150 P2= 2.75"
3.0	88	0.0050	0.49		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.0	64	0.0030	1.11		Shallow Concentrated Flow, Paved Kv= 20.3 fps
5.4	177	0.0060	0.54		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.5	52	0.1040	1.61		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
15.7	431	Total			

Summary for Subcatchment EX4: Ballfield

[47] Hint: Peak is 635% of capacity of segment #4

[47] Hint: Peak is 136% of capacity of segment #6

Runoff = 10.53 cfs @ 12.34 hrs, Volume= 1.199 af, Depth= 2.72"
 Routed to Link DP-1 : Southeast Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-yr Rainfall=5.12"

Area (ac)	CN	Description
2.873	74	>75% Grass cover, Good, HSG C
1.214	80	>75% Grass cover, Good, HSG D
0.465	98	Paved parking, HSG C
0.025	98	Paved parking, HSG D
0.000	98	Roofs, HSG C
0.000	98	Roofs, HSG D
0.705	70	Woods, Good, HSG C
0.000	77	Woods, Good, HSG D
5.282	77	Weighted Average
4.792		90.72% Pervious Area
0.490		9.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	50	0.0320	0.17		Sheet Flow, Grass: Short n= 0.150 P2= 2.75"
9.1	295	0.0060	0.54		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
5.4	183	0.0130	0.57		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
1.6	201	0.0080	2.11	1.66	Pipe Channel, 12" cmp 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.025 Corrugated metal
2.7	206	0.0070	1.25		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
0.1	68	0.0400	9.83	7.72	Pipe Channel, 12" rcp 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
23.9	1,003	Total			

Summary for Link DP-1: Southeast Wetlands

Inflow Area = 16.661 ac, 21.64% Impervious, Inflow Depth = 3.15" for 10-yr event
Inflow = 43.23 cfs @ 12.19 hrs, Volume= 4.369 af
Primary = 43.23 cfs @ 12.19 hrs, Volume= 4.369 af, Atten= 0%, Lag= 0.0 min

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

Summary for Link DP-2: West Wetland

Inflow Area = 2.152 ac, 11.76% Impervious, Inflow Depth = 2.81" for 10-yr event
Inflow = 5.27 cfs @ 12.22 hrs, Volume= 0.505 af
Primary = 5.27 cfs @ 12.22 hrs, Volume= 0.505 af, Atten= 0%, Lag= 0.0 min

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

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Type III 24-hr 25-yr Rainfall=6.30"

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

SubcatchmentEX1: East Track

Runoff Area=4.385 ac 29.99% Impervious Runoff Depth=4.37"
Flow Length=753' Tc=13.2 min CN=83 Runoff=17.64 cfs 1.597 af

SubcatchmentEX2: West Track

Runoff Area=6.994 ac 25.74% Impervious Runoff Depth=4.48"
Flow Length=942' Tc=13.4 min CN=84 Runoff=28.58 cfs 2.610 af

SubcatchmentEX3: Direct to Wetland

Runoff Area=2.152 ac 11.76% Impervious Runoff Depth=3.85"
Flow Length=431' Tc=15.7 min CN=78 Runoff=7.20 cfs 0.690 af

SubcatchmentEX4: Ballfield

Runoff Area=5.282 ac 9.28% Impervious Runoff Depth=3.74"
Flow Length=1,003' Tc=23.9 min CN=77 Runoff=14.47 cfs 1.647 af

Link DP-1: Southeast Wetlands

Inflow=57.54 cfs 5.854 af
Primary=57.54 cfs 5.854 af

Link DP-2: West Wetland

Inflow=7.20 cfs 0.690 af
Primary=7.20 cfs 0.690 af

Total Runoff Area = 18.813 ac Runoff Volume = 6.544 af Average Runoff Depth = 4.17"
79.49% Pervious = 14.955 ac 20.51% Impervious = 3.858 ac

Summary for Subcatchment EX1: East Track

Runoff = 17.64 cfs @ 12.18 hrs, Volume= 1.597 af, Depth= 4.37"
 Routed to Link DP-1 : Southeast Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-yr Rainfall=6.30"

Area (ac)	CN	Description
1.527	74	>75% Grass cover, Good, HSG C
1.543	80	>75% Grass cover, Good, HSG D
0.791	98	Paved parking, HSG C
0.524	98	Paved parking, HSG D
0.000	98	Roofs, HSG C
0.000	98	Roofs, HSG D
0.000	70	Woods, Good, HSG C
0.000	77	Woods, Good, HSG D
4.385	83	Weighted Average
3.070		70.01% Pervious Area
1.315		29.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0120	0.11		Sheet Flow, Grass: Short n= 0.150 P2= 2.75"
4.9	173	0.0070	0.59		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.9	530	0.0050	9.47	150.64	Pipe Channel, 54" RCP 54.0" Round Area= 15.9 sf Perim= 14.1' r= 1.13' n= 0.012 Concrete pipe, finished
13.2	753	Total			

Summary for Subcatchment EX2: West Track

[47] Hint: Peak is 956% of capacity of segment #3

Runoff = 28.58 cfs @ 12.18 hrs, Volume= 2.610 af, Depth= 4.48"
 Routed to Link DP-1 : Southeast Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-yr Rainfall=6.30"

Area (ac)	CN	Description
0.861	74	>75% Grass cover, Good, HSG C
4.333	80	>75% Grass cover, Good, HSG D
0.091	98	Paved parking, HSG C
0.736	98	Paved parking, HSG D
0.022	98	Roofs, HSG C
0.951	98	Roofs, HSG D
0.000	70	Woods, Good, HSG C
0.000	77	Woods, Good, HSG D
6.994	84	Weighted Average
5.194		74.26% Pervious Area
1.800		25.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0120	0.11		Sheet Flow, Grass: Short n= 0.150 P2= 2.75"
2.6	109	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
3.4	783	0.0060	3.81	2.99	Pipe Channel, 12" rcp 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
13.4	942	Total			

Summary for Subcatchment EX3: Direct to Wetland

Runoff = 7.20 cfs @ 12.21 hrs, Volume= 0.690 af, Depth= 3.85"
 Routed to Link DP-2 : West Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-yr Rainfall=6.30"

Area (ac)	CN	Description
1.136	74	>75% Grass cover, Good, HSG C
0.336	80	>75% Grass cover, Good, HSG D
0.198	98	Paved parking, HSG C
0.055	98	Paved parking, HSG D
0.000	98	Roofs, HSG C
0.000	98	Roofs, HSG D
0.195	70	Woods, Good, HSG C
0.232	77	Woods, Good, HSG D
2.152	78	Weighted Average
1.899		88.24% Pervious Area
0.253		11.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	50	0.0220	0.14		Sheet Flow, Grass: Short n= 0.150 P2= 2.75"
3.0	88	0.0050	0.49		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.0	64	0.0030	1.11		Shallow Concentrated Flow, Paved Kv= 20.3 fps
5.4	177	0.0060	0.54		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.5	52	0.1040	1.61		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
15.7	431	Total			

Summary for Subcatchment EX4: Ballfield

[47] Hint: Peak is 873% of capacity of segment #4

[47] Hint: Peak is 187% of capacity of segment #6

Runoff = 14.47 cfs @ 12.33 hrs, Volume= 1.647 af, Depth= 3.74"
 Routed to Link DP-1 : Southeast Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-yr Rainfall=6.30"

Area (ac)	CN	Description
2.873	74	>75% Grass cover, Good, HSG C
1.214	80	>75% Grass cover, Good, HSG D
0.465	98	Paved parking, HSG C
0.025	98	Paved parking, HSG D
0.000	98	Roofs, HSG C
0.000	98	Roofs, HSG D
0.705	70	Woods, Good, HSG C
0.000	77	Woods, Good, HSG D
5.282	77	Weighted Average
4.792		90.72% Pervious Area
0.490		9.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	50	0.0320	0.17		Sheet Flow, Grass: Short n= 0.150 P2= 2.75"
9.1	295	0.0060	0.54		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
5.4	183	0.0130	0.57		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
1.6	201	0.0080	2.11	1.66	Pipe Channel, 12" cmp 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.025 Corrugated metal
2.7	206	0.0070	1.25		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
0.1	68	0.0400	9.83	7.72	Pipe Channel, 12" rcp 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
23.9	1,003	Total			

Summary for Link DP-1: Southeast Wetlands

Inflow Area = 16.661 ac, 21.64% Impervious, Inflow Depth = 4.22" for 25-yr event
Inflow = 57.54 cfs @ 12.19 hrs, Volume= 5.854 af
Primary = 57.54 cfs @ 12.19 hrs, Volume= 5.854 af, Atten= 0%, Lag= 0.0 min

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

Summary for Link DP-2: West Wetland

Inflow Area = 2.152 ac, 11.76% Impervious, Inflow Depth = 3.85" for 25-yr event
Inflow = 7.20 cfs @ 12.21 hrs, Volume= 0.690 af
Primary = 7.20 cfs @ 12.21 hrs, Volume= 0.690 af, Atten= 0%, Lag= 0.0 min

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

25527-EX

Type III 24-hr 100-yr Rainfall=8.12"

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

SubcatchmentEX1: East Track

Runoff Area=4.385 ac 29.99% Impervious Runoff Depth=6.09"
Flow Length=753' Tc=13.2 min CN=83 Runoff=24.28 cfs 2.226 af

SubcatchmentEX2: West Track

Runoff Area=6.994 ac 25.74% Impervious Runoff Depth=6.21"
Flow Length=942' Tc=13.4 min CN=84 Runoff=39.10 cfs 3.620 af

SubcatchmentEX3: Direct to Wetland

Runoff Area=2.152 ac 11.76% Impervious Runoff Depth=5.50"
Flow Length=431' Tc=15.7 min CN=78 Runoff=10.23 cfs 0.987 af

SubcatchmentEX4: Ballfield

Runoff Area=5.282 ac 9.28% Impervious Runoff Depth=5.38"
Flow Length=1,003' Tc=23.9 min CN=77 Runoff=20.72 cfs 2.370 af

Link DP-1: Southeast Wetlands

Inflow=79.79 cfs 8.216 af
Primary=79.79 cfs 8.216 af

Link DP-2: West Wetland

Inflow=10.23 cfs 0.987 af
Primary=10.23 cfs 0.987 af

Total Runoff Area = 18.813 ac Runoff Volume = 9.203 af Average Runoff Depth = 5.87"
79.49% Pervious = 14.955 ac 20.51% Impervious = 3.858 ac

Summary for Subcatchment EX1: East Track

Runoff = 24.28 cfs @ 12.18 hrs, Volume= 2.226 af, Depth= 6.09"
 Routed to Link DP-1 : Southeast Wetlands

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

Area (ac)	CN	Description
1.527	74	>75% Grass cover, Good, HSG C
1.543	80	>75% Grass cover, Good, HSG D
0.791	98	Paved parking, HSG C
0.524	98	Paved parking, HSG D
0.000	98	Roofs, HSG C
0.000	98	Roofs, HSG D
0.000	70	Woods, Good, HSG C
0.000	77	Woods, Good, HSG D
4.385	83	Weighted Average
3.070		70.01% Pervious Area
1.315		29.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0120	0.11		Sheet Flow, Grass: Short n= 0.150 P2= 2.75"
4.9	173	0.0070	0.59		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.9	530	0.0050	9.47	150.64	Pipe Channel, 54" RCP 54.0" Round Area= 15.9 sf Perim= 14.1' r= 1.13' n= 0.012 Concrete pipe, finished
13.2	753	Total			

Summary for Subcatchment EX2: West Track

[47] Hint: Peak is 1308% of capacity of segment #3

Runoff = 39.10 cfs @ 12.18 hrs, Volume= 3.620 af, Depth= 6.21"
 Routed to Link DP-1 : Southeast Wetlands

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

Area (ac)	CN	Description
0.861	74	>75% Grass cover, Good, HSG C
4.333	80	>75% Grass cover, Good, HSG D
0.091	98	Paved parking, HSG C
0.736	98	Paved parking, HSG D
0.022	98	Roofs, HSG C
0.951	98	Roofs, HSG D
0.000	70	Woods, Good, HSG C
0.000	77	Woods, Good, HSG D
6.994	84	Weighted Average
5.194		74.26% Pervious Area
1.800		25.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0120	0.11		Sheet Flow, Grass: Short n= 0.150 P2= 2.75"
2.6	109	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
3.4	783	0.0060	3.81	2.99	Pipe Channel, 12" rcp 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
13.4	942	Total			

Summary for Subcatchment EX3: Direct to Wetland

Runoff = 10.23 cfs @ 12.21 hrs, Volume= 0.987 af, Depth= 5.50"
 Routed to Link DP-2 : West Wetland

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

Area (ac)	CN	Description
1.136	74	>75% Grass cover, Good, HSG C
0.336	80	>75% Grass cover, Good, HSG D
0.198	98	Paved parking, HSG C
0.055	98	Paved parking, HSG D
0.000	98	Roofs, HSG C
0.000	98	Roofs, HSG D
0.195	70	Woods, Good, HSG C
0.232	77	Woods, Good, HSG D
2.152	78	Weighted Average
1.899		88.24% Pervious Area
0.253		11.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	50	0.0220	0.14		Sheet Flow, Grass: Short n= 0.150 P2= 2.75"
3.0	88	0.0050	0.49		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.0	64	0.0030	1.11		Shallow Concentrated Flow, Paved Kv= 20.3 fps
5.4	177	0.0060	0.54		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.5	52	0.1040	1.61		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
15.7	431	Total			

Summary for Subcatchment EX4: Ballfield

[47] Hint: Peak is 1250% of capacity of segment #4

[47] Hint: Peak is 268% of capacity of segment #6

Runoff = 20.72 cfs @ 12.32 hrs, Volume= 2.370 af, Depth= 5.38"
 Routed to Link DP-1 : Southeast Wetlands

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

Area (ac)	CN	Description
2.873	74	>75% Grass cover, Good, HSG C
1.214	80	>75% Grass cover, Good, HSG D
0.465	98	Paved parking, HSG C
0.025	98	Paved parking, HSG D
0.000	98	Roofs, HSG C
0.000	98	Roofs, HSG D
0.705	70	Woods, Good, HSG C
0.000	77	Woods, Good, HSG D
5.282	77	Weighted Average
4.792		90.72% Pervious Area
0.490		9.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	50	0.0320	0.17		Sheet Flow, Grass: Short n= 0.150 P2= 2.75"
9.1	295	0.0060	0.54		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
5.4	183	0.0130	0.57		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
1.6	201	0.0080	2.11	1.66	Pipe Channel, 12" cmp 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.025 Corrugated metal
2.7	206	0.0070	1.25		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
0.1	68	0.0400	9.83	7.72	Pipe Channel, 12" rcp 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
23.9	1,003	Total			

Summary for Link DP-1: Southeast Wetlands

Inflow Area = 16.661 ac, 21.64% Impervious, Inflow Depth = 5.92" for 100-yr event
Inflow = 79.79 cfs @ 12.19 hrs, Volume= 8.216 af
Primary = 79.79 cfs @ 12.19 hrs, Volume= 8.216 af, Atten= 0%, Lag= 0.0 min

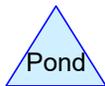
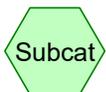
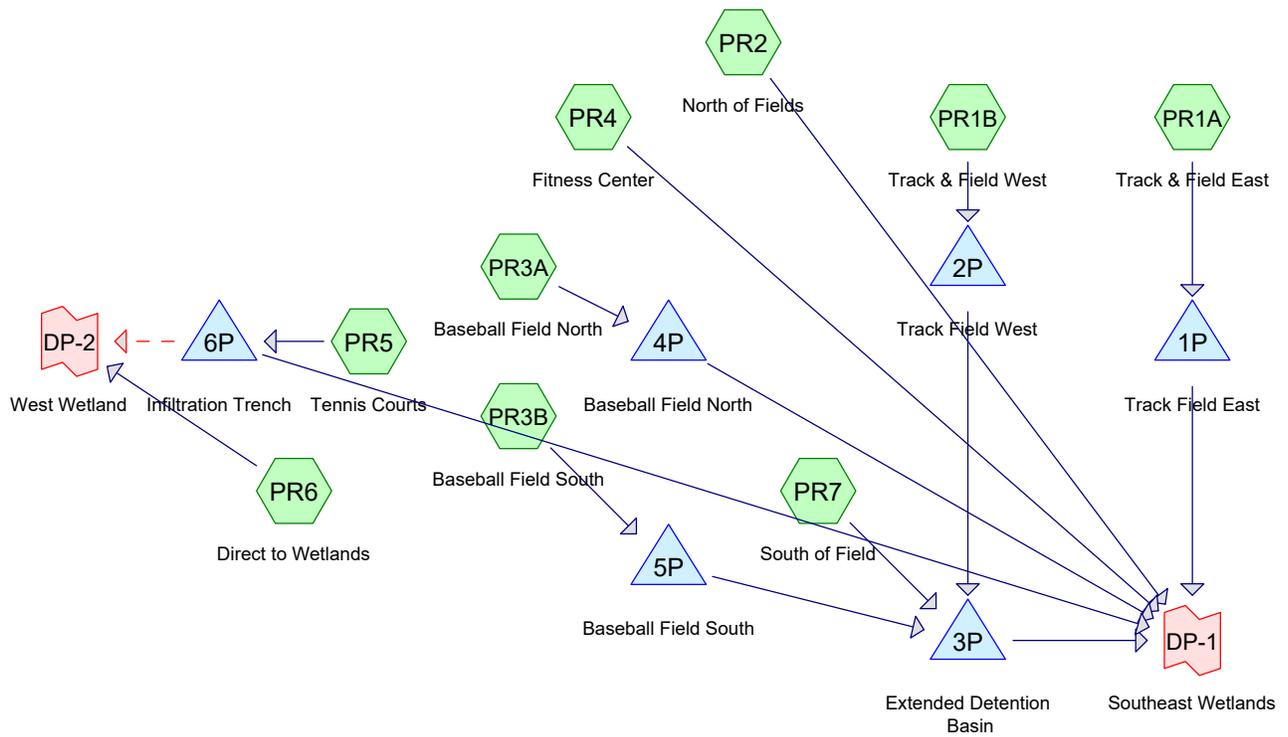
Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link DP-2: West Wetland

Inflow Area = 2.152 ac, 11.76% Impervious, Inflow Depth = 5.50" for 100-yr event
Inflow = 10.23 cfs @ 12.21 hrs, Volume= 0.987 af
Primary = 10.23 cfs @ 12.21 hrs, Volume= 0.987 af, Atten= 0%, Lag= 0.0 min

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

Proposed Conditions HydroCAD Analysis



Routing Diagram for 25527-PR
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Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-yr	Type III 24-hr		Default	24.00	1	3.23	2
2	10-yr	Type III 24-hr		Default	24.00	1	5.12	2
3	25-yr	Type III 24-hr		Default	24.00	1	6.30	2
4	100-yr	Type III 24-hr		Default	24.00	1	8.12	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
5.885	74	>75% Grass cover, Good, HSG C (PR1A, PR1B, PR2, PR3A, PR3B, PR4, PR5, PR6, PR7)
6.816	80	>75% Grass cover, Good, HSG D (PR1A, PR1B, PR2, PR3A, PR3B, PR4, PR5, PR6, PR7)
1.818	98	Paved parking, HSG C (PR1A, PR1B, PR2, PR3A, PR3B, PR4, PR5, PR6, PR7)
2.062	98	Paved parking, HSG D (PR1A, PR1B, PR2, PR3A, PR3B, PR4, PR5, PR6, PR7)
0.229	98	Roofs, HSG C (PR2, PR4, PR7)
1.024	98	Roofs, HSG D (PR2, PR4)
0.766	70	Woods, Good, HSG C (PR6, PR7)
0.218	77	Woods, Good, HSG D (PR6)
18.818	83	TOTAL AREA

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
8.698	HSG C	PR1A, PR1B, PR2, PR3A, PR3B, PR4, PR5, PR6, PR7
10.120	HSG D	PR1A, PR1B, PR2, PR3A, PR3B, PR4, PR5, PR6, PR7
0.000	Other	
18.818		TOTAL AREA

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Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	5.885	6.816	0.000	12.701	>75% Grass cover, Good	PR1A, PR1B, PR2, PR3A, PR3B, PR4, PR5, PR6, PR7
0.000	0.000	1.818	2.062	0.000	3.880	Paved parking	PR1A, PR1B, PR2, PR3A, PR3B, PR4, PR5, PR6, PR7
0.000	0.000	0.229	1.024	0.000	1.253	Roofs	PR2, PR4, PR7
0.000	0.000	0.766	0.218	0.000	0.984	Woods, Good	PR6, PR7
0.000	0.000	8.698	10.120	0.000	18.818	TOTAL AREA	

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Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)	Node Name
1	PR2	0.00	0.00	900.0	0.0060	0.012	0.0	54.0	0.0	
2	PR7	0.00	0.00	201.0	0.0080	0.025	0.0	12.0	0.0	
3	1P	120.00	119.00	50.0	0.0200	0.010	0.0	18.0	0.0	
4	1P	121.00	120.50	100.0	0.0050	0.010	0.0	12.0	0.0	
5	2P	120.00	119.00	50.0	0.0200	0.010	0.0	18.0	0.0	
6	2P	121.00	120.50	100.0	0.0050	0.010	0.0	12.0	0.0	
7	3P	116.00	115.48	15.0	0.0347	0.012	0.0	12.0	0.0	
8	4P	120.00	119.00	50.0	0.0200	0.010	0.0	18.0	0.0	
9	4P	121.00	120.50	100.0	0.0050	0.010	0.0	12.0	0.0	
10	5P	120.00	119.00	50.0	0.0200	0.010	0.0	18.0	0.0	
11	5P	121.00	120.50	100.0	0.0050	0.010	0.0	12.0	0.0	
12	6P	121.00	119.50	150.0	0.0100	0.010	0.0	4.0	0.0	

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Type III 24-hr 2-yr Rainfall=3.23"

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

SubcatchmentPR1A: Track & Field East Runoff Area=153,690 sf 30.95% Impervious Runoff Depth=1.78"
 Tc=6.0 min CN=85 Runoff=7.38 cfs 0.524 af

SubcatchmentPR1B: Track & Field West Runoff Area=92,528 sf 39.83% Impervious Runoff Depth=1.94"
 Tc=6.0 min CN=87 Runoff=4.83 cfs 0.344 af

SubcatchmentPR2: North of Fields Runoff Area=114,758 sf 25.76% Impervious Runoff Depth=1.49"
 Flow Length=1,155' Tc=12.9 min CN=81 Runoff=3.66 cfs 0.328 af

SubcatchmentPR3A: Baseball Field North Runoff Area=106,818 sf 13.51% Impervious Runoff Depth=1.56"
 Tc=6.0 min CN=82 Runoff=4.48 cfs 0.319 af

SubcatchmentPR3B: Baseball Field South Runoff Area=76,054 sf 9.42% Impervious Runoff Depth=1.30"
 Tc=6.0 min CN=78 Runoff=2.60 cfs 0.188 af

SubcatchmentPR4: Fitness Center Runoff Area=55,755 sf 81.17% Impervious Runoff Depth=2.67"
 Tc=6.0 min CN=95 Runoff=3.79 cfs 0.285 af

SubcatchmentPR5: Tennis Courts Runoff Area=29,682 sf 82.09% Impervious Runoff Depth=2.57"
 Tc=6.0 min CN=94 Runoff=1.97 cfs 0.146 af

SubcatchmentPR6: Direct to Wetlands Runoff Area=48,352 sf 20.49% Impervious Runoff Depth=1.43"
 Flow Length=398' Tc=15.4 min CN=80 Runoff=1.37 cfs 0.132 af

SubcatchmentPR7: South of Field Runoff Area=142,056 sf 5.95% Impervious Runoff Depth=1.11"
 Flow Length=474' Tc=13.8 min CN=75 Runoff=3.17 cfs 0.303 af

Pond 1P: Track Field East Peak Elev=122.03' Storage=722 cf Inflow=7.38 cfs 0.524 af
 Discarded=0.34 cfs 0.033 af Primary=5.32 cfs 0.492 af Outflow=5.67 cfs 0.524 af

Pond 2P: Track Field West Peak Elev=122.01' Storage=190 cf Inflow=4.83 cfs 0.344 af
 Discarded=0.30 cfs 0.021 af Primary=4.48 cfs 0.322 af Outflow=4.78 cfs 0.344 af

Pond 3P: Extended Detention Basin Peak Elev=117.35' Storage=16,581 cf Inflow=9.24 cfs 0.800 af
 Outflow=0.99 cfs 0.796 af

Pond 4P: Baseball Field North Peak Elev=122.01' Storage=209 cf Inflow=4.48 cfs 0.319 af
 Discarded=0.33 cfs 0.024 af Primary=4.09 cfs 0.296 af Outflow=4.42 cfs 0.319 af

Pond 5P: Baseball Field South Peak Elev=122.00' Storage=122 cf Inflow=2.60 cfs 0.188 af
 Discarded=0.19 cfs 0.014 af Primary=2.38 cfs 0.175 af Outflow=2.57 cfs 0.188 af

Pond 6P: Infiltration Trench Peak Elev=121.82' Storage=0.065 af Inflow=1.97 cfs 0.146 af
 Discarded=0.02 cfs 0.070 af Primary=0.27 cfs 0.066 af Secondary=0.68 cfs 0.010 af Outflow=0.96 cfs 0.146 af

Link DP-1: Southeast Wetlands Inflow=16.80 cfs 2.263 af
 Primary=16.80 cfs 2.263 af

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Type III 24-hr 2-yr Rainfall=3.23"

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Link DP-2: West Wetland

Inflow=2.03 cfs 0.142 af

Primary=2.03 cfs 0.142 af

Total Runoff Area = 18.818 ac Runoff Volume = 2.569 af Average Runoff Depth = 1.64"
72.72% Pervious = 13.685 ac 27.28% Impervious = 5.133 ac

Summary for Subcatchment PR1A: Track & Field East

Runoff = 7.38 cfs @ 12.09 hrs, Volume= 0.524 af, Depth= 1.78"
 Routed to Pond 1P : Track Field East

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2-yr Rainfall=3.23"

Area (sf)	CN	Description
21,850	74	>75% Grass cover, Good, HSG C
84,267	80	>75% Grass cover, Good, HSG D
9,742	98	Paved parking, HSG C
37,831	98	Paved parking, HSG D
0	98	Roofs, HSG C
0	98	Roofs, HSG D
0	70	Woods, Good, HSG C
0	77	Woods, Good, HSG D
153,690	85	Weighted Average
106,117		69.05% Pervious Area
47,573		30.95% Impervious Area

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

Summary for Subcatchment PR1B: Track & Field West

Runoff = 4.83 cfs @ 12.09 hrs, Volume= 0.344 af, Depth= 1.94"
 Routed to Pond 2P : Track Field West

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2-yr Rainfall=3.23"

Area (sf)	CN	Description
2,296	74	>75% Grass cover, Good, HSG C
53,380	80	>75% Grass cover, Good, HSG D
9,413	98	Paved parking, HSG C
27,439	98	Paved parking, HSG D
0	98	Roofs, HSG C
0	98	Roofs, HSG D
0	70	Woods, Good, HSG C
0	77	Woods, Good, HSG D
92,528	87	Weighted Average
55,676		60.17% Pervious Area
36,852		39.83% Impervious Area

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

Summary for Subcatchment PR2: North of Fields

Runoff = 3.66 cfs @ 12.18 hrs, Volume= 0.328 af, Depth= 1.49"
 Routed to Link DP-1 : Southeast Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2-yr Rainfall=3.23"

Area (sf)	CN	Description
60,546	74	>75% Grass cover, Good, HSG C
24,646	80	>75% Grass cover, Good, HSG D
17,396	98	Paved parking, HSG C
1,061	98	Paved parking, HSG D
7,942	98	Roofs, HSG C
3,167	98	Roofs, HSG D
0	70	Woods, Good, HSG C
0	77	Woods, Good, HSG D
114,758	81	Weighted Average
85,192		74.24% Pervious Area
29,566		25.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8	50	0.0080	0.10		Sheet Flow, Grass: Short n= 0.150 P2= 2.75"
2.7	205	0.0320	1.25		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.4	900	0.0060	10.38	165.02	Pipe Channel, 54.0" Round Area= 15.9 sf Perim= 14.1' r= 1.13' n= 0.012 Concrete pipe, finished
12.9	1,155	Total			

Summary for Subcatchment PR3A: Baseball Field North

Runoff = 4.48 cfs @ 12.09 hrs, Volume= 0.319 af, Depth= 1.56"
 Routed to Pond 4P : Baseball Field North

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2-yr Rainfall=3.23"

Area (sf)	CN	Description
10,897	74	>75% Grass cover, Good, HSG C
81,488	80	>75% Grass cover, Good, HSG D
1,799	98	Paved parking, HSG C
12,634	98	Paved parking, HSG D
0	98	Roofs, HSG C
0	98	Roofs, HSG D
0	70	Woods, Good, HSG C
0	77	Woods, Good, HSG D
106,818	82	Weighted Average
92,385		86.49% Pervious Area
14,433		13.51% Impervious Area

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

Summary for Subcatchment PR3B: Baseball Field South

Runoff = 2.60 cfs @ 12.09 hrs, Volume= 0.188 af, Depth= 1.30"
Routed to Pond 5P : Baseball Field South

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.23"

Table with 3 columns: Area (sf), CN, Description. Rows include land use types like Grass cover, Paved parking, and Woods with their respective CN values and descriptions.

Table with 6 columns: Tc (min), Length (feet), Slope (ft/ft), Velocity (ft/sec), Capacity (cfs), Description. Row 1: 6.0, Direct Entry,

Summary for Subcatchment PR4: Fitness Center

Runoff = 3.79 cfs @ 12.08 hrs, Volume= 0.285 af, Depth= 2.67"
 Routed to Link DP-1 : Southeast Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2-yr Rainfall=3.23"

Area (sf)	CN	Description
387	74	>75% Grass cover, Good, HSG C
10,114	80	>75% Grass cover, Good, HSG D
246	98	Paved parking, HSG C
2,643	98	Paved parking, HSG D
946	98	Roofs, HSG C
41,419	98	Roofs, HSG D
0	70	Woods, Good, HSG C
0	77	Woods, Good, HSG D
55,755	95	Weighted Average
10,501		18.83% Pervious Area
45,254		81.17% Impervious Area

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

Summary for Subcatchment PR5: Tennis Courts

Runoff = 1.97 cfs @ 12.08 hrs, Volume= 0.146 af, Depth= 2.57"
 Routed to Pond 6P : Infiltration Trench

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2-yr Rainfall=3.23"

Area (sf)	CN	Description
4,547	74	>75% Grass cover, Good, HSG C
769	80	>75% Grass cover, Good, HSG D
20,316	98	Paved parking, HSG C
4,050	98	Paved parking, HSG D
0	98	Roofs, HSG C
0	98	Roofs, HSG D
0	70	Woods, Good, HSG C
0	77	Woods, Good, HSG D
29,682	94	Weighted Average
5,316		17.91% Pervious Area
24,366		82.09% Impervious Area

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

Summary for Subcatchment PR6: Direct to Wetlands

Runoff = 1.37 cfs @ 12.22 hrs, Volume= 0.132 af, Depth= 1.43"
 Routed to Link DP-2 : West Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2-yr Rainfall=3.23"

Area (sf)	CN	Description
9,822	74	>75% Grass cover, Good, HSG C
11,294	80	>75% Grass cover, Good, HSG D
7,720	98	Paved parking, HSG C
2,189	98	Paved parking, HSG D
0	98	Roofs, HSG C
0	98	Roofs, HSG D
7,833	70	Woods, Good, HSG C
9,494	77	Woods, Good, HSG D
48,352	80	Weighted Average
38,443		79.51% Pervious Area
9,909		20.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	50	0.0780	0.11		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 2.75"
0.1	12	0.3330	2.89		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
1.1	105	0.0060	1.57		Shallow Concentrated Flow, Paved Kv= 20.3 fps
5.9	176	0.0050	0.49		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.6	55	0.1020	1.60		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
15.4	398	Total			

Summary for Subcatchment PR7: South of Field

[47] Hint: Peak is 191% of capacity of segment #4

Runoff = 3.17 cfs @ 12.20 hrs, Volume= 0.303 af, Depth= 1.11"
 Routed to Pond 3P : Extended Detention Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2-yr Rainfall=3.23"

Area (sf)	CN	Description
95,083	74	>75% Grass cover, Good, HSG C
12,977	80	>75% Grass cover, Good, HSG D
6,534	98	Paved parking, HSG C
820	98	Paved parking, HSG D
1,100	98	Roofs, HSG C
0	98	Roofs, HSG D
25,542	70	Woods, Good, HSG C
0	77	Woods, Good, HSG D
142,056	75	Weighted Average
133,602		94.05% Pervious Area
8,454		5.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	50	0.0200	0.14		Sheet Flow, Grass: Short n= 0.150 P2= 2.75"
0.3	23	0.0300	1.21		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
5.8	200	0.0130	0.57		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
1.6	201	0.0080	2.11	1.66	Pipe Channel, CMP_Round 12" 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.025 Corrugated metal
13.8	474	Total			

Summary for Pond 1P: Track Field East

Inflow Area = 3.528 ac, 30.95% Impervious, Inflow Depth = 1.78" for 2-yr event
 Inflow = 7.38 cfs @ 12.09 hrs, Volume= 0.524 af
 Outflow = 5.67 cfs @ 12.16 hrs, Volume= 0.524 af, Atten= 23%, Lag= 4.0 min
 Discarded = 0.34 cfs @ 12.04 hrs, Volume= 0.033 af
 Primary = 5.32 cfs @ 12.16 hrs, Volume= 0.492 af
 Routed to Link DP-1 : Southeast Wetlands

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 122.03' @ 12.16 hrs Surf.Area= 54,991 sf Storage= 722 cf

Plug-Flow detention time= 0.9 min calculated for 0.524 af (100% of inflow)
 Center-of-Mass det. time= 0.9 min (826.5 - 825.7)

Volume	Invert	Avail.Storage	Storage Description
#1	122.00'	21,932 cf	Custom Stage Data (Prismatic) Listed below (Recalc) 54,991 cf Overall - 160 cf Embedded = 54,831 cf x 40.0% Voids
#2	122.50'	160 cf	12.0" W x 1.0" H Box Pipe Storage x 16 Inside #1 L= 120.0'
22,092 cf			Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
122.00	54,991	0	0
123.00	54,991	54,991	54,991

Device	Routing	Invert	Outlet Devices
#1	Primary	120.00'	18.0" Round Culvert L= 50.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 120.00' / 119.00' S= 0.0200 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.77 sf
#2	Discarded	122.00'	0.270 in/hr Exfiltration over Surface area
#3	Device 1	121.00'	12.0" Round Culvert X 2.00 L= 100.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 121.00' / 120.50' S= 0.0050 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#4	Device 3	122.00'	50.000 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.34 cfs @ 12.04 hrs HW=122.01' (Free Discharge)
 ↑ **2=Exfiltration** (Exfiltration Controls 0.34 cfs)

Primary OutFlow Max=5.32 cfs @ 12.16 hrs HW=122.03' (Free Discharge)
 ↑ **1=Culvert** (Passes 5.32 cfs of 9.64 cfs potential flow)
 ↑ **3=Culvert** (Barrel Controls 5.32 cfs @ 4.08 fps)
 ↑ **4=Exfiltration** (Passes 5.32 cfs of 63.65 cfs potential flow)

Stage-Area-Storage for Pond 1P: Track Field East

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
122.00	54,991	0	122.52	54,991	11,461
122.01	54,991	220	122.53	54,991	11,693
122.02	54,991	440	122.54	54,991	11,924
122.03	54,991	660	122.55	54,991	12,156
122.04	54,991	880	122.56	54,991	12,387
122.05	54,991	1,100	122.57	54,991	12,619
122.06	54,991	1,320	122.58	54,991	12,850
122.07	54,991	1,540	122.59	54,991	13,074
122.08	54,991	1,760	122.60	54,991	13,294
122.09	54,991	1,980	122.61	54,991	13,514
122.10	54,991	2,200	122.62	54,991	13,734
122.11	54,991	2,420	122.63	54,991	13,954
122.12	54,991	2,640	122.64	54,991	14,174
122.13	54,991	2,860	122.65	54,991	14,394
122.14	54,991	3,079	122.66	54,991	14,614
122.15	54,991	3,299	122.67	54,991	14,834
122.16	54,991	3,519	122.68	54,991	15,054
122.17	54,991	3,739	122.69	54,991	15,274
122.18	54,991	3,959	122.70	54,991	15,493
122.19	54,991	4,179	122.71	54,991	15,713
122.20	54,991	4,399	122.72	54,991	15,933
122.21	54,991	4,619	122.73	54,991	16,153
122.22	54,991	4,839	122.74	54,991	16,373
122.23	54,991	5,059	122.75	54,991	16,593
122.24	54,991	5,279	122.76	54,991	16,813
122.25	54,991	5,499	122.77	54,991	17,033
122.26	54,991	5,719	122.78	54,991	17,253
122.27	54,991	5,939	122.79	54,991	17,473
122.28	54,991	6,159	122.80	54,991	17,693
122.29	54,991	6,379	122.81	54,991	17,913
122.30	54,991	6,599	122.82	54,991	18,133
122.31	54,991	6,819	122.83	54,991	18,353
122.32	54,991	7,039	122.84	54,991	18,573
122.33	54,991	7,259	122.85	54,991	18,793
122.34	54,991	7,479	122.86	54,991	19,013
122.35	54,991	7,699	122.87	54,991	19,233
122.36	54,991	7,919	122.88	54,991	19,453
122.37	54,991	8,139	122.89	54,991	19,673
122.38	54,991	8,359	122.90	54,991	19,893
122.39	54,991	8,579	122.91	54,991	20,113
122.40	54,991	8,799	122.92	54,991	20,333
122.41	54,991	9,019	122.93	54,991	20,553
122.42	54,991	9,238	122.94	54,991	20,773
122.43	54,991	9,458	122.95	54,991	20,993
122.44	54,991	9,678	122.96	54,991	21,213
122.45	54,991	9,898	122.97	54,991	21,433
122.46	54,991	10,118	122.98	54,991	21,652
122.47	54,991	10,338	122.99	54,991	21,872
122.48	54,991	10,558	123.00	54,991	22,092
122.49	54,991	10,778			
122.50	54,991	10,998			
122.51	54,991	11,230			

Summary for Pond 2P: Track Field West

[58] Hint: Peaked 0.51' above defined flood level

Inflow Area = 2.124 ac, 39.83% Impervious, Inflow Depth = 1.94" for 2-yr event
 Inflow = 4.83 cfs @ 12.09 hrs, Volume= 0.344 af
 Outflow = 4.78 cfs @ 12.10 hrs, Volume= 0.344 af, Atten= 1%, Lag= 0.7 min
 Discarded = 0.30 cfs @ 12.10 hrs, Volume= 0.021 af
 Primary = 4.48 cfs @ 12.10 hrs, Volume= 0.322 af
 Routed to Pond 3P : Extended Detention Basin

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 122.01' @ 12.10 hrs Surf.Area= 54,991 sf Storage= 190 cf
 Flood Elev= 121.50' Storage= 0 cf

Plug-Flow detention time= 0.7 min calculated for 0.344 af (100% of inflow)
 Center-of-Mass det. time= 0.7 min (819.1 - 818.5)

Volume	Invert	Avail.Storage	Storage Description
#1	122.00'	21,932 cf	Custom Stage Data (Prismatic) Listed below (Recalc) 54,991 cf Overall - 160 cf Embedded = 54,831 cf x 40.0% Voids
#2	122.50'	160 cf	12.0" W x 1.0" H Box Pipe Storage x 16 Inside #1 L= 120.0'
		22,092 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
122.00	54,991	0	0
123.00	54,991	54,991	54,991

Device	Routing	Invert	Outlet Devices
#1	Primary	120.00'	18.0" Round Culvert L= 50.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 120.00' / 119.00' S= 0.0200 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.77 sf
#2	Discarded	122.00'	0.270 in/hr Exfiltration over Surface area
#3	Device 1	121.00'	12.0" Round Culvert X 2.00 L= 100.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 121.00' / 120.50' S= 0.0050 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#4	Device 3	122.00'	50.000 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.34 cfs @ 12.10 hrs HW=122.01' (Free Discharge)
 ↳ **2=Exfiltration** (Exfiltration Controls 0.34 cfs)

Primary OutFlow Max=5.17 cfs @ 12.10 hrs HW=122.01' (Free Discharge)
 ↳ **1=Culvert** (Passes 5.17 cfs of 9.55 cfs potential flow)
 ↳ ↳ **3=Culvert** (Barrel Controls 5.17 cfs @ 4.06 fps)
 ↳ ↳ ↳ **4=Exfiltration** (Passes 5.17 cfs of 63.65 cfs potential flow)

Stage-Area-Storage for Pond 2P: Track Field West

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
122.00	54,991	0	122.52	54,991	11,461
122.01	54,991	220	122.53	54,991	11,693
122.02	54,991	440	122.54	54,991	11,924
122.03	54,991	660	122.55	54,991	12,156
122.04	54,991	880	122.56	54,991	12,387
122.05	54,991	1,100	122.57	54,991	12,619
122.06	54,991	1,320	122.58	54,991	12,850
122.07	54,991	1,540	122.59	54,991	13,074
122.08	54,991	1,760	122.60	54,991	13,294
122.09	54,991	1,980	122.61	54,991	13,514
122.10	54,991	2,200	122.62	54,991	13,734
122.11	54,991	2,420	122.63	54,991	13,954
122.12	54,991	2,640	122.64	54,991	14,174
122.13	54,991	2,860	122.65	54,991	14,394
122.14	54,991	3,079	122.66	54,991	14,614
122.15	54,991	3,299	122.67	54,991	14,834
122.16	54,991	3,519	122.68	54,991	15,054
122.17	54,991	3,739	122.69	54,991	15,274
122.18	54,991	3,959	122.70	54,991	15,493
122.19	54,991	4,179	122.71	54,991	15,713
122.20	54,991	4,399	122.72	54,991	15,933
122.21	54,991	4,619	122.73	54,991	16,153
122.22	54,991	4,839	122.74	54,991	16,373
122.23	54,991	5,059	122.75	54,991	16,593
122.24	54,991	5,279	122.76	54,991	16,813
122.25	54,991	5,499	122.77	54,991	17,033
122.26	54,991	5,719	122.78	54,991	17,253
122.27	54,991	5,939	122.79	54,991	17,473
122.28	54,991	6,159	122.80	54,991	17,693
122.29	54,991	6,379	122.81	54,991	17,913
122.30	54,991	6,599	122.82	54,991	18,133
122.31	54,991	6,819	122.83	54,991	18,353
122.32	54,991	7,039	122.84	54,991	18,573
122.33	54,991	7,259	122.85	54,991	18,793
122.34	54,991	7,479	122.86	54,991	19,013
122.35	54,991	7,699	122.87	54,991	19,233
122.36	54,991	7,919	122.88	54,991	19,453
122.37	54,991	8,139	122.89	54,991	19,673
122.38	54,991	8,359	122.90	54,991	19,893
122.39	54,991	8,579	122.91	54,991	20,113
122.40	54,991	8,799	122.92	54,991	20,333
122.41	54,991	9,019	122.93	54,991	20,553
122.42	54,991	9,238	122.94	54,991	20,773
122.43	54,991	9,458	122.95	54,991	20,993
122.44	54,991	9,678	122.96	54,991	21,213
122.45	54,991	9,898	122.97	54,991	21,433
122.46	54,991	10,118	122.98	54,991	21,652
122.47	54,991	10,338	122.99	54,991	21,872
122.48	54,991	10,558	123.00	54,991	22,092
122.49	54,991	10,778			
122.50	54,991	10,998			
122.51	54,991	11,230			

Summary for Pond 3P: Extended Detention Basin

Inflow Area = 7.131 ac, 16.89% Impervious, Inflow Depth = 1.35" for 2-yr event
 Inflow = 9.24 cfs @ 12.12 hrs, Volume= 0.800 af
 Outflow = 0.99 cfs @ 13.44 hrs, Volume= 0.796 af, Atten= 89%, Lag= 79.2 min
 Primary = 0.99 cfs @ 13.44 hrs, Volume= 0.796 af
 Routed to Link DP-1 : Southeast Wetlands

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 117.35' @ 13.44 hrs Surf.Area= 13,553 sf Storage= 16,581 cf

Plug-Flow detention time= 265.2 min calculated for 0.796 af (100% of inflow)
 Center-of-Mass det. time= 263.1 min (1,106.4 - 843.3)

Volume	Invert	Avail.Storage	Storage Description		
#1	116.00'	70,860 cf	Custom Stage Data (Irregular) Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
116.00	11,268	467.0	0	0	11,268
117.00	12,694	487.0	11,974	11,974	12,860
118.00	15,214	532.0	13,935	25,909	16,544
119.00	17,446	574.0	16,317	42,226	20,282
120.00	19,925	601.0	18,672	60,898	22,874
120.50	19,925	601.0	9,963	70,860	23,174

Device	Routing	Invert	Outlet Devices	
#1	Device 2	116.00'	6.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads	
#2	Primary	116.00'	12.0" Round Culvert L= 15.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 116.00' / 115.48' S= 0.0347 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf	
#3	Device 2	119.00'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads	

Primary OutFlow Max=0.99 cfs @ 13.44 hrs HW=117.35' (Free Discharge)
 ↳ **2=Culvert** (Passes 0.99 cfs of 3.49 cfs potential flow)
 ↳ ↳ **1=Orifice/Grate** (Orifice Controls 0.99 cfs @ 5.05 fps)
 ↳ ↳ ↳ **3=Orifice/Grate** (Controls 0.00 cfs)

Stage-Area-Storage for Pond 3P: Extended Detention Basin

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
116.00	11,268	0	118.60	16,535	35,431
116.05	11,337	565	118.65	16,647	36,260
116.10	11,407	1,134	118.70	16,760	37,096
116.15	11,476	1,706	118.75	16,874	37,936
116.20	11,546	2,281	118.80	16,987	38,783
116.25	11,617	2,860	118.85	17,101	39,635
116.30	11,687	3,443	118.90	17,216	40,493
116.35	11,757	4,029	118.95	17,331	41,357
116.40	11,828	4,619	119.00	17,446	42,226
116.45	11,899	5,212	119.05	17,566	43,101
116.50	11,970	5,809	119.10	17,686	43,983
116.55	12,042	6,409	119.15	17,807	44,870
116.60	12,113	7,013	119.20	17,929	45,764
116.65	12,185	7,620	119.25	18,050	46,663
116.70	12,257	8,231	119.30	18,172	47,569
116.75	12,330	8,846	119.35	18,295	48,480
116.80	12,402	9,464	119.40	18,418	49,398
116.85	12,475	10,086	119.45	18,541	50,322
116.90	12,548	10,712	119.50	18,665	51,252
116.95	12,621	11,341	119.55	18,789	52,189
117.00	12,694	11,974	119.60	18,914	53,131
117.05	12,815	12,612	119.65	19,039	54,080
117.10	12,936	13,255	119.70	19,164	55,035
117.15	13,057	13,905	119.75	19,290	55,996
117.20	13,180	14,561	119.80	19,416	56,964
117.25	13,303	15,223	119.85	19,543	57,938
117.30	13,426	15,891	119.90	19,670	58,918
117.35	13,550	16,566	119.95	19,797	59,905
117.40	13,675	17,246	120.00	19,925	60,898
117.45	13,800	17,933	120.05	19,925	61,894
117.50	13,925	18,626	120.10	19,925	62,890
117.55	14,052	19,326	120.15	19,925	63,887
117.60	14,179	20,032	120.20	19,925	64,883
117.65	14,306	20,744	120.25	19,925	65,879
117.70	14,434	21,462	120.30	19,925	66,875
117.75	14,563	22,187	120.35	19,925	67,872
117.80	14,692	22,918	120.40	19,925	68,868
117.85	14,821	23,656	120.45	19,925	69,864
117.90	14,952	24,401	120.50	19,925	70,860
117.95	15,083	25,152			
118.00	15,214	25,909			
118.05	15,322	26,672			
118.10	15,430	27,441			
118.15	15,539	28,215			
118.20	15,648	28,995			
118.25	15,758	29,780			
118.30	15,868	30,571			
118.35	15,978	31,367			
118.40	16,088	32,169			
118.45	16,200	32,976			
118.50	16,311	33,789			
118.55	16,423	34,607			

Summary for Pond 4P: Baseball Field North

[58] Hint: Peaked 0.51' above defined flood level

Inflow Area = 2.452 ac, 13.51% Impervious, Inflow Depth = 1.56" for 2-yr event
 Inflow = 4.48 cfs @ 12.09 hrs, Volume= 0.319 af
 Outflow = 4.42 cfs @ 12.10 hrs, Volume= 0.319 af, Atten= 1%, Lag= 0.8 min
 Discarded = 0.33 cfs @ 12.10 hrs, Volume= 0.024 af
 Primary = 4.09 cfs @ 12.10 hrs, Volume= 0.296 af
 Routed to Link DP-1 : Southeast Wetlands

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 122.01' @ 12.10 hrs Surf.Area= 66,230 sf Storage= 209 cf
 Flood Elev= 121.50' Storage= 0 cf

Plug-Flow detention time= 0.8 min calculated for 0.319 af (100% of inflow)
 Center-of-Mass det. time= 0.8 min (836.6 - 835.8)

Volume	Invert	Avail.Storage	Storage Description
#1	122.00'	26,428 cf	Custom Stage Data (Prismatic) Listed below (Recalc) 66,230 cf Overall - 160 cf Embedded = 66,070 cf x 40.0% Voids
#2	122.50'	160 cf	12.0" W x 1.0" H Box Pipe Storage x 16 Inside #1 L= 120.0'
		26,588 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
122.00	66,230	0	0
123.00	66,230	66,230	66,230

Device	Routing	Invert	Outlet Devices
#1	Primary	120.00'	18.0" Round Culvert L= 50.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 120.00' / 119.00' S= 0.0200 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.77 sf
#2	Discarded	122.00'	0.270 in/hr Exfiltration over Surface area
#3	Device 1	121.00'	12.0" Round Culvert X 2.00 L= 100.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 121.00' / 120.50' S= 0.0050 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#4	Device 3	122.00'	50.000 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.41 cfs @ 12.10 hrs HW=122.01' (Free Discharge)
 ↳ **2=Exfiltration** (Exfiltration Controls 0.41 cfs)

Primary OutFlow Max=5.17 cfs @ 12.10 hrs HW=122.01' (Free Discharge)
 ↳ **1=Culvert** (Passes 5.17 cfs of 9.54 cfs potential flow)
 ↳ ↳ **3=Culvert** (Barrel Controls 5.17 cfs @ 4.06 fps)
 ↳ ↳ ↳ **4=Exfiltration** (Passes 5.17 cfs of 76.66 cfs potential flow)

Stage-Area-Storage for Pond 4P: Baseball Field North

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
122.00	66,230	0	122.52	66,230	13,799
122.01	66,230	265	122.53	66,230	14,075
122.02	66,230	530	122.54	66,230	14,352
122.03	66,230	795	122.55	66,230	14,628
122.04	66,230	1,060	122.56	66,230	14,905
122.05	66,230	1,325	122.57	66,230	15,181
122.06	66,230	1,590	122.58	66,230	15,458
122.07	66,230	1,854	122.59	66,230	15,726
122.08	66,230	2,119	122.60	66,230	15,991
122.09	66,230	2,384	122.61	66,230	16,256
122.10	66,230	2,649	122.62	66,230	16,521
122.11	66,230	2,914	122.63	66,230	16,786
122.12	66,230	3,179	122.64	66,230	17,051
122.13	66,230	3,444	122.65	66,230	17,316
122.14	66,230	3,709	122.66	66,230	17,581
122.15	66,230	3,974	122.67	66,230	17,846
122.16	66,230	4,239	122.68	66,230	18,111
122.17	66,230	4,504	122.69	66,230	18,375
122.18	66,230	4,769	122.70	66,230	18,640
122.19	66,230	5,033	122.71	66,230	18,905
122.20	66,230	5,298	122.72	66,230	19,170
122.21	66,230	5,563	122.73	66,230	19,435
122.22	66,230	5,828	122.74	66,230	19,700
122.23	66,230	6,093	122.75	66,230	19,965
122.24	66,230	6,358	122.76	66,230	20,230
122.25	66,230	6,623	122.77	66,230	20,495
122.26	66,230	6,888	122.78	66,230	20,760
122.27	66,230	7,153	122.79	66,230	21,025
122.28	66,230	7,418	122.80	66,230	21,290
122.29	66,230	7,683	122.81	66,230	21,555
122.30	66,230	7,948	122.82	66,230	21,819
122.31	66,230	8,213	122.83	66,230	22,084
122.32	66,230	8,477	122.84	66,230	22,349
122.33	66,230	8,742	122.85	66,230	22,614
122.34	66,230	9,007	122.86	66,230	22,879
122.35	66,230	9,272	122.87	66,230	23,144
122.36	66,230	9,537	122.88	66,230	23,409
122.37	66,230	9,802	122.89	66,230	23,674
122.38	66,230	10,067	122.90	66,230	23,939
122.39	66,230	10,332	122.91	66,230	24,204
122.40	66,230	10,597	122.92	66,230	24,469
122.41	66,230	10,862	122.93	66,230	24,734
122.42	66,230	11,127	122.94	66,230	24,998
122.43	66,230	11,392	122.95	66,230	25,263
122.44	66,230	11,656	122.96	66,230	25,528
122.45	66,230	11,921	122.97	66,230	25,793
122.46	66,230	12,186	122.98	66,230	26,058
122.47	66,230	12,451	122.99	66,230	26,323
122.48	66,230	12,716	123.00	66,230	26,588
122.49	66,230	12,981			
122.50	66,230	13,246			
122.51	66,230	13,522			

Summary for Pond 5P: Baseball Field South

[58] Hint: Peaked 0.50' above defined flood level

Inflow Area = 1.746 ac, 9.42% Impervious, Inflow Depth = 1.30" for 2-yr event
 Inflow = 2.60 cfs @ 12.09 hrs, Volume= 0.188 af
 Outflow = 2.57 cfs @ 12.11 hrs, Volume= 0.188 af, Atten= 1%, Lag= 0.8 min
 Discarded = 0.19 cfs @ 12.11 hrs, Volume= 0.014 af
 Primary = 2.38 cfs @ 12.11 hrs, Volume= 0.175 af
 Routed to Pond 3P : Extended Detention Basin

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 122.00' @ 12.11 hrs Surf.Area= 66,230 sf Storage= 122 cf
 Flood Elev= 121.50' Storage= 0 cf

Plug-Flow detention time= 0.8 min calculated for 0.188 af (100% of inflow)
 Center-of-Mass det. time= 0.8 min (849.5 - 848.7)

Volume	Invert	Avail.Storage	Storage Description
#1	122.00'	26,428 cf	Custom Stage Data (Prismatic) Listed below (Recalc) 66,230 cf Overall - 160 cf Embedded = 66,070 cf x 40.0% Voids
#2	122.50'	160 cf	12.0" W x 1.0" H Box Pipe Storage x 16 Inside #1 L= 120.0'
		26,588 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
122.00	66,230	0	0
123.00	66,230	66,230	66,230

Device	Routing	Invert	Outlet Devices
#1	Primary	120.00'	18.0" Round Culvert L= 50.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 120.00' / 119.00' S= 0.0200 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.77 sf
#2	Discarded	122.00'	0.270 in/hr Exfiltration over Surface area
#3	Device 1	121.00'	12.0" Round Culvert X 2.00 L= 100.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 121.00' / 120.50' S= 0.0050 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#4	Device 3	122.00'	50.000 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.41 cfs @ 12.11 hrs HW=122.00' (Free Discharge)
 ↑ **2=Exfiltration** (Exfiltration Controls 0.41 cfs)

Primary OutFlow Max=5.15 cfs @ 12.11 hrs HW=122.00' (Free Discharge)
 ↑ **1=Culvert** (Passes 5.15 cfs of 9.53 cfs potential flow)
 ↑ **3=Culvert** (Barrel Controls 5.15 cfs @ 4.05 fps)
 ↑ **4=Exfiltration** (Passes 5.15 cfs of 76.66 cfs potential flow)

Stage-Area-Storage for Pond 5P: Baseball Field South

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
122.00	66,230	0	122.52	66,230	13,799
122.01	66,230	265	122.53	66,230	14,075
122.02	66,230	530	122.54	66,230	14,352
122.03	66,230	795	122.55	66,230	14,628
122.04	66,230	1,060	122.56	66,230	14,905
122.05	66,230	1,325	122.57	66,230	15,181
122.06	66,230	1,590	122.58	66,230	15,458
122.07	66,230	1,854	122.59	66,230	15,726
122.08	66,230	2,119	122.60	66,230	15,991
122.09	66,230	2,384	122.61	66,230	16,256
122.10	66,230	2,649	122.62	66,230	16,521
122.11	66,230	2,914	122.63	66,230	16,786
122.12	66,230	3,179	122.64	66,230	17,051
122.13	66,230	3,444	122.65	66,230	17,316
122.14	66,230	3,709	122.66	66,230	17,581
122.15	66,230	3,974	122.67	66,230	17,846
122.16	66,230	4,239	122.68	66,230	18,111
122.17	66,230	4,504	122.69	66,230	18,375
122.18	66,230	4,769	122.70	66,230	18,640
122.19	66,230	5,033	122.71	66,230	18,905
122.20	66,230	5,298	122.72	66,230	19,170
122.21	66,230	5,563	122.73	66,230	19,435
122.22	66,230	5,828	122.74	66,230	19,700
122.23	66,230	6,093	122.75	66,230	19,965
122.24	66,230	6,358	122.76	66,230	20,230
122.25	66,230	6,623	122.77	66,230	20,495
122.26	66,230	6,888	122.78	66,230	20,760
122.27	66,230	7,153	122.79	66,230	21,025
122.28	66,230	7,418	122.80	66,230	21,290
122.29	66,230	7,683	122.81	66,230	21,555
122.30	66,230	7,948	122.82	66,230	21,819
122.31	66,230	8,213	122.83	66,230	22,084
122.32	66,230	8,477	122.84	66,230	22,349
122.33	66,230	8,742	122.85	66,230	22,614
122.34	66,230	9,007	122.86	66,230	22,879
122.35	66,230	9,272	122.87	66,230	23,144
122.36	66,230	9,537	122.88	66,230	23,409
122.37	66,230	9,802	122.89	66,230	23,674
122.38	66,230	10,067	122.90	66,230	23,939
122.39	66,230	10,332	122.91	66,230	24,204
122.40	66,230	10,597	122.92	66,230	24,469
122.41	66,230	10,862	122.93	66,230	24,734
122.42	66,230	11,127	122.94	66,230	24,998
122.43	66,230	11,392	122.95	66,230	25,263
122.44	66,230	11,656	122.96	66,230	25,528
122.45	66,230	11,921	122.97	66,230	25,793
122.46	66,230	12,186	122.98	66,230	26,058
122.47	66,230	12,451	122.99	66,230	26,323
122.48	66,230	12,716	123.00	66,230	26,588
122.49	66,230	12,981			
122.50	66,230	13,246			
122.51	66,230	13,522			

Summary for Pond 6P: Infiltration Trench

Inflow Area = 0.681 ac, 82.09% Impervious, Inflow Depth = 2.57" for 2-yr event
 Inflow = 1.97 cfs @ 12.08 hrs, Volume= 0.146 af
 Outflow = 0.96 cfs @ 12.24 hrs, Volume= 0.146 af, Atten= 51%, Lag= 9.6 min
 Discarded = 0.02 cfs @ 7.41 hrs, Volume= 0.070 af
 Primary = 0.27 cfs @ 12.24 hrs, Volume= 0.066 af
 Routed to Link DP-1 : Southeast Wetlands
 Secondary = 0.68 cfs @ 12.24 hrs, Volume= 0.010 af
 Routed to Link DP-2 : West Wetland

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 121.82' @ 12.24 hrs Surf.Area= 0.057 ac Storage= 0.065 af

Plug-Flow detention time= 613.2 min calculated for 0.146 af (100% of inflow)
 Center-of-Mass det. time= 613.4 min (1,400.2 - 786.8)

Volume	Invert	Avail.Storage	Storage Description
#1	119.00'	0.069 af	5.00'W x 100.00'L x 3.00'H Prisma 0.172 af Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Secondary	121.80'	50.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)
#2	Discarded	119.00'	0.270 in/hr Exfiltration over Surface area
#3	Primary	121.00'	4.0" Round Culvert L= 150.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 121.00' / 119.50' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf
#4	Device 3	121.00'	50.000 in/hr Exfiltration over Wetted area above 121.00' Excluded Wetted area = 0.106 ac

Discarded OutFlow Max=0.02 cfs @ 7.41 hrs HW=119.03' (Free Discharge)
 ↳2=Exfiltration (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.27 cfs @ 12.24 hrs HW=121.82' (Free Discharge)
 ↳3=Culvert (Barrel Controls 0.27 cfs @ 3.08 fps)
 ↳4=Exfiltration (Passes 0.27 cfs of 1.00 cfs potential flow)

Secondary OutFlow Max=0.62 cfs @ 12.24 hrs HW=121.82' (Free Discharge)
 ↳1=Sharp-Crested Rectangular Weir(Weir Controls 0.62 cfs @ 0.51 fps)

Stage-Area-Storage for Pond 6P: Infiltration Trench

Elevation (feet)	Surface (acres)	Wetted (acres)	Storage (acre-feet)	Elevation (feet)	Surface (acres)	Wetted (acres)	Storage (acre-feet)
119.00	0.057	0.057	0.000	121.60	0.057	0.120	0.060
119.05	0.057	0.059	0.001	121.65	0.057	0.121	0.061
119.10	0.057	0.060	0.002	121.70	0.057	0.122	0.062
119.15	0.057	0.061	0.003	121.75	0.057	0.124	0.063
119.20	0.057	0.062	0.005	121.80	0.057	0.125	0.064
119.25	0.057	0.063	0.006	121.85	0.057	0.126	0.065
119.30	0.057	0.065	0.007	121.90	0.057	0.127	0.067
119.35	0.057	0.066	0.008	121.95	0.057	0.129	0.068
119.40	0.057	0.067	0.009	122.00	0.057	0.130	0.069
119.45	0.057	0.068	0.010				
119.50	0.057	0.069	0.011				
119.55	0.057	0.071	0.013				
119.60	0.057	0.072	0.014				
119.65	0.057	0.073	0.015				
119.70	0.057	0.074	0.016				
119.75	0.057	0.075	0.017				
119.80	0.057	0.077	0.018				
119.85	0.057	0.078	0.020				
119.90	0.057	0.079	0.021				
119.95	0.057	0.080	0.022				
120.00	0.057	0.081	0.023				
120.05	0.057	0.083	0.024				
120.10	0.057	0.084	0.025				
120.15	0.057	0.085	0.026				
120.20	0.057	0.086	0.028				
120.25	0.057	0.088	0.029				
120.30	0.057	0.089	0.030				
120.35	0.057	0.090	0.031				
120.40	0.057	0.091	0.032				
120.45	0.057	0.092	0.033				
120.50	0.057	0.094	0.034				
120.55	0.057	0.095	0.036				
120.60	0.057	0.096	0.037				
120.65	0.057	0.097	0.038				
120.70	0.057	0.098	0.039				
120.75	0.057	0.100	0.040				
120.80	0.057	0.101	0.041				
120.85	0.057	0.102	0.042				
120.90	0.057	0.103	0.044				
120.95	0.057	0.104	0.045				
121.00	0.057	0.106	0.046				
121.05	0.057	0.107	0.047				
121.10	0.057	0.108	0.048				
121.15	0.057	0.109	0.049				
121.20	0.057	0.110	0.051				
121.25	0.057	0.112	0.052				
121.30	0.057	0.113	0.053				
121.35	0.057	0.114	0.054				
121.40	0.057	0.115	0.055				
121.45	0.057	0.116	0.056				
121.50	0.057	0.118	0.057				
121.55	0.057	0.119	0.059				

Summary for Link DP-1: Southeast Wetlands

Inflow Area = 17.708 ac, 27.70% Impervious, Inflow Depth > 1.53" for 2-yr event
Inflow = 16.80 cfs @ 12.11 hrs, Volume= 2.263 af
Primary = 16.80 cfs @ 12.11 hrs, Volume= 2.263 af, Atten= 0%, Lag= 0.0 min

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

Summary for Link DP-2: West Wetland

Inflow Area = 1.110 ac, 20.49% Impervious, Inflow Depth = 1.53" for 2-yr event
Inflow = 2.03 cfs @ 12.24 hrs, Volume= 0.142 af
Primary = 2.03 cfs @ 12.24 hrs, Volume= 0.142 af, Atten= 0%, Lag= 0.0 min

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

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Type III 24-hr 10-yr Rainfall=5.12"

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

SubcatchmentPR1A: Track & Field East Runoff Area=153,690 sf 30.95% Impervious Runoff Depth=3.48"
 Tc=6.0 min CN=85 Runoff=14.23 cfs 1.023 af

SubcatchmentPR1B: Track & Field West Runoff Area=92,528 sf 39.83% Impervious Runoff Depth=3.68"
 Tc=6.0 min CN=87 Runoff=8.99 cfs 0.651 af

SubcatchmentPR2: North of Fields Runoff Area=114,758 sf 25.76% Impervious Runoff Depth=3.09"
 Flow Length=1,155' Tc=12.9 min CN=81 Runoff=7.65 cfs 0.679 af

SubcatchmentPR3A: Baseball Field North Runoff Area=106,818 sf 13.51% Impervious Runoff Depth=3.19"
 Tc=6.0 min CN=82 Runoff=9.13 cfs 0.651 af

SubcatchmentPR3B: Baseball Field South Runoff Area=76,054 sf 9.42% Impervious Runoff Depth=2.81"
 Tc=6.0 min CN=78 Runoff=5.76 cfs 0.409 af

SubcatchmentPR4: Fitness Center Runoff Area=55,755 sf 81.17% Impervious Runoff Depth=4.54"
 Tc=6.0 min CN=95 Runoff=6.24 cfs 0.484 af

SubcatchmentPR5: Tennis Courts Runoff Area=29,682 sf 82.09% Impervious Runoff Depth=4.43"
 Tc=6.0 min CN=94 Runoff=3.28 cfs 0.251 af

SubcatchmentPR6: Direct to Wetlands Runoff Area=48,352 sf 20.49% Impervious Runoff Depth=3.00"
 Flow Length=398' Tc=15.4 min CN=80 Runoff=2.92 cfs 0.277 af

SubcatchmentPR7: South of Field Runoff Area=142,056 sf 5.95% Impervious Runoff Depth=2.55"
 Flow Length=474' Tc=13.8 min CN=75 Runoff=7.59 cfs 0.692 af

Pond 1P: Track Field East Peak Elev=122.21' Storage=4,649 cf Inflow=14.23 cfs 1.023 af
 Discarded=0.34 cfs 0.061 af Primary=6.24 cfs 0.962 af Outflow=6.59 cfs 1.023 af

Pond 2P: Track Field West Peak Elev=122.07' Storage=1,438 cf Inflow=8.99 cfs 0.651 af
 Discarded=0.34 cfs 0.040 af Primary=5.52 cfs 0.611 af Outflow=5.87 cfs 0.652 af

Pond 3P: Extended Detention Basin Peak Elev=118.85' Storage=39,567 cf Inflow=17.27 cfs 1.683 af
 Outflow=1.52 cfs 1.679 af

Pond 4P: Baseball Field North Peak Elev=122.06' Storage=1,529 cf Inflow=9.13 cfs 0.651 af
 Discarded=0.41 cfs 0.048 af Primary=5.48 cfs 0.603 af Outflow=5.89 cfs 0.651 af

Pond 5P: Baseball Field South Peak Elev=122.01' Storage=274 cf Inflow=5.76 cfs 0.409 af
 Discarded=0.41 cfs 0.030 af Primary=5.18 cfs 0.379 af Outflow=5.60 cfs 0.409 af

Pond 6P: Infiltration Trench Peak Elev=121.87' Storage=0.066 af Inflow=3.28 cfs 0.251 af
 Discarded=0.02 cfs 0.073 af Primary=0.27 cfs 0.104 af Secondary=2.99 cfs 0.074 af Outflow=3.28 cfs 0.251 af

Link DP-1: Southeast Wetlands Inflow=25.28 cfs 4.511 af
 Primary=25.28 cfs 4.511 af

25527-PR

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Type III 24-hr 10-yr Rainfall=5.12"

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Link DP-2: West Wetland

Inflow=5.12 cfs 0.352 af

Primary=5.12 cfs 0.352 af

Total Runoff Area = 18.818 ac Runoff Volume = 5.119 af Average Runoff Depth = 3.26"
72.72% Pervious = 13.685 ac 27.28% Impervious = 5.133 ac

Summary for Subcatchment PR1A: Track & Field East

Runoff = 14.23 cfs @ 12.09 hrs, Volume= 1.023 af, Depth= 3.48"
 Routed to Pond 1P : Track Field East

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-yr Rainfall=5.12"

Area (sf)	CN	Description
21,850	74	>75% Grass cover, Good, HSG C
84,267	80	>75% Grass cover, Good, HSG D
9,742	98	Paved parking, HSG C
37,831	98	Paved parking, HSG D
0	98	Roofs, HSG C
0	98	Roofs, HSG D
0	70	Woods, Good, HSG C
0	77	Woods, Good, HSG D
153,690	85	Weighted Average
106,117		69.05% Pervious Area
47,573		30.95% Impervious Area

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

Summary for Subcatchment PR1B: Track & Field West

Runoff = 8.99 cfs @ 12.09 hrs, Volume= 0.651 af, Depth= 3.68"
 Routed to Pond 2P : Track Field West

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-yr Rainfall=5.12"

Area (sf)	CN	Description
2,296	74	>75% Grass cover, Good, HSG C
53,380	80	>75% Grass cover, Good, HSG D
9,413	98	Paved parking, HSG C
27,439	98	Paved parking, HSG D
0	98	Roofs, HSG C
0	98	Roofs, HSG D
0	70	Woods, Good, HSG C
0	77	Woods, Good, HSG D
92,528	87	Weighted Average
55,676		60.17% Pervious Area
36,852		39.83% Impervious Area

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

Summary for Subcatchment PR2: North of Fields

Runoff = 7.65 cfs @ 12.17 hrs, Volume= 0.679 af, Depth= 3.09"
 Routed to Link DP-1 : Southeast Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-yr Rainfall=5.12"

Area (sf)	CN	Description
60,546	74	>75% Grass cover, Good, HSG C
24,646	80	>75% Grass cover, Good, HSG D
17,396	98	Paved parking, HSG C
1,061	98	Paved parking, HSG D
7,942	98	Roofs, HSG C
3,167	98	Roofs, HSG D
0	70	Woods, Good, HSG C
0	77	Woods, Good, HSG D
114,758	81	Weighted Average
85,192		74.24% Pervious Area
29,566		25.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8	50	0.0080	0.10		Sheet Flow, Grass: Short n= 0.150 P2= 2.75"
2.7	205	0.0320	1.25		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.4	900	0.0060	10.38	165.02	Pipe Channel, 54.0" Round Area= 15.9 sf Perim= 14.1' r= 1.13' n= 0.012 Concrete pipe, finished
12.9	1,155	Total			

Summary for Subcatchment PR3A: Baseball Field North

Runoff = 9.13 cfs @ 12.09 hrs, Volume= 0.651 af, Depth= 3.19"
 Routed to Pond 4P : Baseball Field North

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-yr Rainfall=5.12"

Area (sf)	CN	Description
10,897	74	>75% Grass cover, Good, HSG C
81,488	80	>75% Grass cover, Good, HSG D
1,799	98	Paved parking, HSG C
12,634	98	Paved parking, HSG D
0	98	Roofs, HSG C
0	98	Roofs, HSG D
0	70	Woods, Good, HSG C
0	77	Woods, Good, HSG D
106,818	82	Weighted Average
92,385		86.49% Pervious Area
14,433		13.51% Impervious Area

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

Summary for Subcatchment PR3B: Baseball Field South

Runoff = 5.76 cfs @ 12.09 hrs, Volume= 0.409 af, Depth= 2.81"
 Routed to Pond 5P : Baseball Field South

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-yr Rainfall=5.12"

Area (sf)	CN	Description
50,918	74	>75% Grass cover, Good, HSG C
17,970	80	>75% Grass cover, Good, HSG D
6,012	98	Paved parking, HSG C
1,154	98	Paved parking, HSG D
0	98	Roofs, HSG C
0	98	Roofs, HSG D
0	70	Woods, Good, HSG C
0	77	Woods, Good, HSG D
76,054	78	Weighted Average
68,888		90.58% Pervious Area
7,166		9.42% Impervious Area

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

Summary for Subcatchment PR4: Fitness Center

Runoff = 6.24 cfs @ 12.08 hrs, Volume= 0.484 af, Depth= 4.54"
 Routed to Link DP-1 : Southeast Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-yr Rainfall=5.12"

Area (sf)	CN	Description
387	74	>75% Grass cover, Good, HSG C
10,114	80	>75% Grass cover, Good, HSG D
246	98	Paved parking, HSG C
2,643	98	Paved parking, HSG D
946	98	Roofs, HSG C
41,419	98	Roofs, HSG D
0	70	Woods, Good, HSG C
0	77	Woods, Good, HSG D
55,755	95	Weighted Average
10,501		18.83% Pervious Area
45,254		81.17% Impervious Area

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

Summary for Subcatchment PR5: Tennis Courts

Runoff = 3.28 cfs @ 12.08 hrs, Volume= 0.251 af, Depth= 4.43"
 Routed to Pond 6P : Infiltration Trench

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-yr Rainfall=5.12"

Area (sf)	CN	Description
4,547	74	>75% Grass cover, Good, HSG C
769	80	>75% Grass cover, Good, HSG D
20,316	98	Paved parking, HSG C
4,050	98	Paved parking, HSG D
0	98	Roofs, HSG C
0	98	Roofs, HSG D
0	70	Woods, Good, HSG C
0	77	Woods, Good, HSG D
29,682	94	Weighted Average
5,316		17.91% Pervious Area
24,366		82.09% Impervious Area

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

Summary for Subcatchment PR6: Direct to Wetlands

Runoff = 2.92 cfs @ 12.21 hrs, Volume= 0.277 af, Depth= 3.00"
 Routed to Link DP-2 : West Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-yr Rainfall=5.12"

Area (sf)	CN	Description
9,822	74	>75% Grass cover, Good, HSG C
11,294	80	>75% Grass cover, Good, HSG D
7,720	98	Paved parking, HSG C
2,189	98	Paved parking, HSG D
0	98	Roofs, HSG C
0	98	Roofs, HSG D
7,833	70	Woods, Good, HSG C
9,494	77	Woods, Good, HSG D
48,352	80	Weighted Average
38,443		79.51% Pervious Area
9,909		20.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	50	0.0780	0.11		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 2.75"
0.1	12	0.3330	2.89		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
1.1	105	0.0060	1.57		Shallow Concentrated Flow, Paved Kv= 20.3 fps
5.9	176	0.0050	0.49		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.6	55	0.1020	1.60		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
15.4	398	Total			

Summary for Subcatchment PR7: South of Field

[47] Hint: Peak is 458% of capacity of segment #4

Runoff = 7.59 cfs @ 12.19 hrs, Volume= 0.692 af, Depth= 2.55"
 Routed to Pond 3P : Extended Detention Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-yr Rainfall=5.12"

Area (sf)	CN	Description
95,083	74	>75% Grass cover, Good, HSG C
12,977	80	>75% Grass cover, Good, HSG D
6,534	98	Paved parking, HSG C
820	98	Paved parking, HSG D
1,100	98	Roofs, HSG C
0	98	Roofs, HSG D
25,542	70	Woods, Good, HSG C
0	77	Woods, Good, HSG D
142,056	75	Weighted Average
133,602		94.05% Pervious Area
8,454		5.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	50	0.0200	0.14		Sheet Flow, Grass: Short n= 0.150 P2= 2.75"
0.3	23	0.0300	1.21		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
5.8	200	0.0130	0.57		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
1.6	201	0.0080	2.11	1.66	Pipe Channel, CMP_Round 12" 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.025 Corrugated metal
13.8	474	Total			

Summary for Pond 1P: Track Field East

Inflow Area = 3.528 ac, 30.95% Impervious, Inflow Depth = 3.48" for 10-yr event
 Inflow = 14.23 cfs @ 12.09 hrs, Volume= 1.023 af
 Outflow = 6.59 cfs @ 12.26 hrs, Volume= 1.023 af, Atten= 54%, Lag= 10.5 min
 Discarded = 0.34 cfs @ 11.94 hrs, Volume= 0.061 af
 Primary = 6.24 cfs @ 12.26 hrs, Volume= 0.962 af
 Routed to Link DP-1 : Southeast Wetlands

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 122.21' @ 12.26 hrs Surf.Area= 54,991 sf Storage= 4,649 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 3.4 min (810.0 - 806.6)

Volume	Invert	Avail.Storage	Storage Description
#1	122.00'	21,932 cf	Custom Stage Data (Prismatic) Listed below (Recalc) 54,991 cf Overall - 160 cf Embedded = 54,831 cf x 40.0% Voids
#2	122.50'	160 cf	12.0" W x 1.0" H Box Pipe Storage x 16 Inside #1 L= 120.0'
22,092 cf			Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
122.00	54,991	0	0
123.00	54,991	54,991	54,991

Device	Routing	Invert	Outlet Devices
#1	Primary	120.00'	18.0" Round Culvert L= 50.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 120.00' / 119.00' S= 0.0200 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.77 sf
#2	Discarded	122.00'	0.270 in/hr Exfiltration over Surface area
#3	Device 1	121.00'	12.0" Round Culvert X 2.00 L= 100.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 121.00' / 120.50' S= 0.0050 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#4	Device 3	122.00'	50.000 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.34 cfs @ 11.94 hrs HW=122.01' (Free Discharge)
 ↳ **2=Exfiltration** (Exfiltration Controls 0.34 cfs)

Primary OutFlow Max=6.24 cfs @ 12.26 hrs HW=122.21' (Free Discharge)
 ↳ **1=Culvert** (Passes 6.24 cfs of 10.29 cfs potential flow)
 ↳ ↳ **3=Culvert** (Barrel Controls 6.24 cfs @ 4.17 fps)
 ↳ ↳ ↳ **4=Exfiltration** (Passes 6.24 cfs of 63.65 cfs potential flow)

Stage-Area-Storage for Pond 1P: Track Field East

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
122.00	54,991	0	122.52	54,991	11,461
122.01	54,991	220	122.53	54,991	11,693
122.02	54,991	440	122.54	54,991	11,924
122.03	54,991	660	122.55	54,991	12,156
122.04	54,991	880	122.56	54,991	12,387
122.05	54,991	1,100	122.57	54,991	12,619
122.06	54,991	1,320	122.58	54,991	12,850
122.07	54,991	1,540	122.59	54,991	13,074
122.08	54,991	1,760	122.60	54,991	13,294
122.09	54,991	1,980	122.61	54,991	13,514
122.10	54,991	2,200	122.62	54,991	13,734
122.11	54,991	2,420	122.63	54,991	13,954
122.12	54,991	2,640	122.64	54,991	14,174
122.13	54,991	2,860	122.65	54,991	14,394
122.14	54,991	3,079	122.66	54,991	14,614
122.15	54,991	3,299	122.67	54,991	14,834
122.16	54,991	3,519	122.68	54,991	15,054
122.17	54,991	3,739	122.69	54,991	15,274
122.18	54,991	3,959	122.70	54,991	15,493
122.19	54,991	4,179	122.71	54,991	15,713
122.20	54,991	4,399	122.72	54,991	15,933
122.21	54,991	4,619	122.73	54,991	16,153
122.22	54,991	4,839	122.74	54,991	16,373
122.23	54,991	5,059	122.75	54,991	16,593
122.24	54,991	5,279	122.76	54,991	16,813
122.25	54,991	5,499	122.77	54,991	17,033
122.26	54,991	5,719	122.78	54,991	17,253
122.27	54,991	5,939	122.79	54,991	17,473
122.28	54,991	6,159	122.80	54,991	17,693
122.29	54,991	6,379	122.81	54,991	17,913
122.30	54,991	6,599	122.82	54,991	18,133
122.31	54,991	6,819	122.83	54,991	18,353
122.32	54,991	7,039	122.84	54,991	18,573
122.33	54,991	7,259	122.85	54,991	18,793
122.34	54,991	7,479	122.86	54,991	19,013
122.35	54,991	7,699	122.87	54,991	19,233
122.36	54,991	7,919	122.88	54,991	19,453
122.37	54,991	8,139	122.89	54,991	19,673
122.38	54,991	8,359	122.90	54,991	19,893
122.39	54,991	8,579	122.91	54,991	20,113
122.40	54,991	8,799	122.92	54,991	20,333
122.41	54,991	9,019	122.93	54,991	20,553
122.42	54,991	9,238	122.94	54,991	20,773
122.43	54,991	9,458	122.95	54,991	20,993
122.44	54,991	9,678	122.96	54,991	21,213
122.45	54,991	9,898	122.97	54,991	21,433
122.46	54,991	10,118	122.98	54,991	21,652
122.47	54,991	10,338	122.99	54,991	21,872
122.48	54,991	10,558	123.00	54,991	22,092
122.49	54,991	10,778			
122.50	54,991	10,998			
122.51	54,991	11,230			

Summary for Pond 2P: Track Field West

[58] Hint: Peaked 0.57' above defined flood level

Inflow Area = 2.124 ac, 39.83% Impervious, Inflow Depth = 3.68" for 10-yr event
 Inflow = 8.99 cfs @ 12.09 hrs, Volume= 0.651 af
 Outflow = 5.87 cfs @ 12.18 hrs, Volume= 0.652 af, Atten= 35%, Lag= 5.5 min
 Discarded = 0.34 cfs @ 12.02 hrs, Volume= 0.040 af
 Primary = 5.52 cfs @ 12.18 hrs, Volume= 0.611 af
 Routed to Pond 3P : Extended Detention Basin

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 122.07' @ 12.18 hrs Surf.Area= 54,991 sf Storage= 1,438 cf
 Flood Elev= 121.50' Storage= 0 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 1.2 min (801.5 - 800.4)

Volume	Invert	Avail.Storage	Storage Description
#1	122.00'	21,932 cf	Custom Stage Data (Prismatic) Listed below (Recalc) 54,991 cf Overall - 160 cf Embedded = 54,831 cf x 40.0% Voids
#2	122.50'	160 cf	12.0" W x 1.0" H Box Pipe Storage x 16 Inside #1 L= 120.0'
		22,092 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
122.00	54,991	0	0
123.00	54,991	54,991	54,991

Device	Routing	Invert	Outlet Devices
#1	Primary	120.00'	18.0" Round Culvert L= 50.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 120.00' / 119.00' S= 0.0200 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.77 sf
#2	Discarded	122.00'	0.270 in/hr Exfiltration over Surface area
#3	Device 1	121.00'	12.0" Round Culvert X 2.00 L= 100.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 121.00' / 120.50' S= 0.0050 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#4	Device 3	122.00'	50.000 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.34 cfs @ 12.02 hrs HW=122.01' (Free Discharge)
 ↳ **2=Exfiltration** (Exfiltration Controls 0.34 cfs)

Primary OutFlow Max=5.52 cfs @ 12.18 hrs HW=122.07' (Free Discharge)
 ↳ **1=Culvert** (Passes 5.52 cfs of 9.76 cfs potential flow)
 ↳ ↳ **3=Culvert** (Barrel Controls 5.52 cfs @ 4.10 fps)
 ↳ ↳ ↳ **4=Exfiltration** (Passes 5.52 cfs of 63.65 cfs potential flow)

Stage-Area-Storage for Pond 2P: Track Field West

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
122.00	54,991	0	122.52	54,991	11,461
122.01	54,991	220	122.53	54,991	11,693
122.02	54,991	440	122.54	54,991	11,924
122.03	54,991	660	122.55	54,991	12,156
122.04	54,991	880	122.56	54,991	12,387
122.05	54,991	1,100	122.57	54,991	12,619
122.06	54,991	1,320	122.58	54,991	12,850
122.07	54,991	1,540	122.59	54,991	13,074
122.08	54,991	1,760	122.60	54,991	13,294
122.09	54,991	1,980	122.61	54,991	13,514
122.10	54,991	2,200	122.62	54,991	13,734
122.11	54,991	2,420	122.63	54,991	13,954
122.12	54,991	2,640	122.64	54,991	14,174
122.13	54,991	2,860	122.65	54,991	14,394
122.14	54,991	3,079	122.66	54,991	14,614
122.15	54,991	3,299	122.67	54,991	14,834
122.16	54,991	3,519	122.68	54,991	15,054
122.17	54,991	3,739	122.69	54,991	15,274
122.18	54,991	3,959	122.70	54,991	15,493
122.19	54,991	4,179	122.71	54,991	15,713
122.20	54,991	4,399	122.72	54,991	15,933
122.21	54,991	4,619	122.73	54,991	16,153
122.22	54,991	4,839	122.74	54,991	16,373
122.23	54,991	5,059	122.75	54,991	16,593
122.24	54,991	5,279	122.76	54,991	16,813
122.25	54,991	5,499	122.77	54,991	17,033
122.26	54,991	5,719	122.78	54,991	17,253
122.27	54,991	5,939	122.79	54,991	17,473
122.28	54,991	6,159	122.80	54,991	17,693
122.29	54,991	6,379	122.81	54,991	17,913
122.30	54,991	6,599	122.82	54,991	18,133
122.31	54,991	6,819	122.83	54,991	18,353
122.32	54,991	7,039	122.84	54,991	18,573
122.33	54,991	7,259	122.85	54,991	18,793
122.34	54,991	7,479	122.86	54,991	19,013
122.35	54,991	7,699	122.87	54,991	19,233
122.36	54,991	7,919	122.88	54,991	19,453
122.37	54,991	8,139	122.89	54,991	19,673
122.38	54,991	8,359	122.90	54,991	19,893
122.39	54,991	8,579	122.91	54,991	20,113
122.40	54,991	8,799	122.92	54,991	20,333
122.41	54,991	9,019	122.93	54,991	20,553
122.42	54,991	9,238	122.94	54,991	20,773
122.43	54,991	9,458	122.95	54,991	20,993
122.44	54,991	9,678	122.96	54,991	21,213
122.45	54,991	9,898	122.97	54,991	21,433
122.46	54,991	10,118	122.98	54,991	21,652
122.47	54,991	10,338	122.99	54,991	21,872
122.48	54,991	10,558	123.00	54,991	22,092
122.49	54,991	10,778			
122.50	54,991	10,998			
122.51	54,991	11,230			

Summary for Pond 3P: Extended Detention Basin

Inflow Area = 7.131 ac, 16.89% Impervious, Inflow Depth = 2.83" for 10-yr event
 Inflow = 17.27 cfs @ 12.14 hrs, Volume= 1.683 af
 Outflow = 1.52 cfs @ 14.00 hrs, Volume= 1.679 af, Atten= 91%, Lag= 111.6 min
 Primary = 1.52 cfs @ 14.00 hrs, Volume= 1.679 af
 Routed to Link DP-1 : Southeast Wetlands

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 118.85' @ 14.00 hrs Surf.Area= 17,092 sf Storage= 39,567 cf

Plug-Flow detention time= 349.2 min calculated for 1.679 af (100% of inflow)
 Center-of-Mass det. time= 347.7 min (1,171.1 - 823.4)

Volume	Invert	Avail.Storage	Storage Description		
#1	116.00'	70,860 cf	Custom Stage Data (Irregular) Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
116.00	11,268	467.0	0	0	11,268
117.00	12,694	487.0	11,974	11,974	12,860
118.00	15,214	532.0	13,935	25,909	16,544
119.00	17,446	574.0	16,317	42,226	20,282
120.00	19,925	601.0	18,672	60,898	22,874
120.50	19,925	601.0	9,963	70,860	23,174

Device	Routing	Invert	Outlet Devices	
#1	Device 2	116.00'	6.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads	
#2	Primary	116.00'	12.0" Round Culvert L= 15.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 116.00' / 115.48' S= 0.0347 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf	
#3	Device 2	119.00'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads	

Primary OutFlow Max=1.52 cfs @ 14.00 hrs HW=118.85' (Free Discharge)
 ↑ **2=Culvert** (Passes 1.52 cfs of 5.79 cfs potential flow)
 ↑ **1=Orifice/Grate** (Orifice Controls 1.52 cfs @ 7.76 fps)
 ↑ **3=Orifice/Grate** (Controls 0.00 cfs)

Stage-Area-Storage for Pond 3P: Extended Detention Basin

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
116.00	11,268	0	118.60	16,535	35,431
116.05	11,337	565	118.65	16,647	36,260
116.10	11,407	1,134	118.70	16,760	37,096
116.15	11,476	1,706	118.75	16,874	37,936
116.20	11,546	2,281	118.80	16,987	38,783
116.25	11,617	2,860	118.85	17,101	39,635
116.30	11,687	3,443	118.90	17,216	40,493
116.35	11,757	4,029	118.95	17,331	41,357
116.40	11,828	4,619	119.00	17,446	42,226
116.45	11,899	5,212	119.05	17,566	43,101
116.50	11,970	5,809	119.10	17,686	43,983
116.55	12,042	6,409	119.15	17,807	44,870
116.60	12,113	7,013	119.20	17,929	45,764
116.65	12,185	7,620	119.25	18,050	46,663
116.70	12,257	8,231	119.30	18,172	47,569
116.75	12,330	8,846	119.35	18,295	48,480
116.80	12,402	9,464	119.40	18,418	49,398
116.85	12,475	10,086	119.45	18,541	50,322
116.90	12,548	10,712	119.50	18,665	51,252
116.95	12,621	11,341	119.55	18,789	52,189
117.00	12,694	11,974	119.60	18,914	53,131
117.05	12,815	12,612	119.65	19,039	54,080
117.10	12,936	13,255	119.70	19,164	55,035
117.15	13,057	13,905	119.75	19,290	55,996
117.20	13,180	14,561	119.80	19,416	56,964
117.25	13,303	15,223	119.85	19,543	57,938
117.30	13,426	15,891	119.90	19,670	58,918
117.35	13,550	16,566	119.95	19,797	59,905
117.40	13,675	17,246	120.00	19,925	60,898
117.45	13,800	17,933	120.05	19,925	61,894
117.50	13,925	18,626	120.10	19,925	62,890
117.55	14,052	19,326	120.15	19,925	63,887
117.60	14,179	20,032	120.20	19,925	64,883
117.65	14,306	20,744	120.25	19,925	65,879
117.70	14,434	21,462	120.30	19,925	66,875
117.75	14,563	22,187	120.35	19,925	67,872
117.80	14,692	22,918	120.40	19,925	68,868
117.85	14,821	23,656	120.45	19,925	69,864
117.90	14,952	24,401	120.50	19,925	70,860
117.95	15,083	25,152			
118.00	15,214	25,909			
118.05	15,322	26,672			
118.10	15,430	27,441			
118.15	15,539	28,215			
118.20	15,648	28,995			
118.25	15,758	29,780			
118.30	15,868	30,571			
118.35	15,978	31,367			
118.40	16,088	32,169			
118.45	16,200	32,976			
118.50	16,311	33,789			
118.55	16,423	34,607			

Summary for Pond 4P: Baseball Field North

[58] Hint: Peaked 0.56' above defined flood level

Inflow Area = 2.452 ac, 13.51% Impervious, Inflow Depth = 3.19" for 10-yr event
 Inflow = 9.13 cfs @ 12.09 hrs, Volume= 0.651 af
 Outflow = 5.89 cfs @ 12.18 hrs, Volume= 0.651 af, Atten= 36%, Lag= 5.7 min
 Discarded = 0.41 cfs @ 12.02 hrs, Volume= 0.048 af
 Primary = 5.48 cfs @ 12.18 hrs, Volume= 0.603 af
 Routed to Link DP-1 : Southeast Wetlands

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 122.06' @ 12.18 hrs Surf.Area= 66,230 sf Storage= 1,529 cf
 Flood Elev= 121.50' Storage= 0 cf

Plug-Flow detention time= 1.5 min calculated for 0.651 af (100% of inflow)
 Center-of-Mass det. time= 1.4 min (816.7 - 815.3)

Volume	Invert	Avail.Storage	Storage Description
#1	122.00'	26,428 cf	Custom Stage Data (Prismatic) Listed below (Recalc) 66,230 cf Overall - 160 cf Embedded = 66,070 cf x 40.0% Voids
#2	122.50'	160 cf	12.0" W x 1.0" H Box Pipe Storage x 16 Inside #1 L= 120.0'
		26,588 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
122.00	66,230	0	0
123.00	66,230	66,230	66,230

Device	Routing	Invert	Outlet Devices
#1	Primary	120.00'	18.0" Round Culvert L= 50.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 120.00' / 119.00' S= 0.0200 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.77 sf
#2	Discarded	122.00'	0.270 in/hr Exfiltration over Surface area
#3	Device 1	121.00'	12.0" Round Culvert X 2.00 L= 100.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 121.00' / 120.50' S= 0.0050 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#4	Device 3	122.00'	50.000 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.41 cfs @ 12.02 hrs HW=122.01' (Free Discharge)
 ↳ **2=Exfiltration** (Exfiltration Controls 0.41 cfs)

Primary OutFlow Max=5.48 cfs @ 12.18 hrs HW=122.06' (Free Discharge)
 ↳ **1=Culvert** (Passes 5.48 cfs of 9.73 cfs potential flow)
 ↳ ↳ **3=Culvert** (Barrel Controls 5.48 cfs @ 4.10 fps)
 ↳ ↳ ↳ **4=Exfiltration** (Passes 5.48 cfs of 76.66 cfs potential flow)

Stage-Area-Storage for Pond 4P: Baseball Field North

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
122.00	66,230	0	122.52	66,230	13,799
122.01	66,230	265	122.53	66,230	14,075
122.02	66,230	530	122.54	66,230	14,352
122.03	66,230	795	122.55	66,230	14,628
122.04	66,230	1,060	122.56	66,230	14,905
122.05	66,230	1,325	122.57	66,230	15,181
122.06	66,230	1,590	122.58	66,230	15,458
122.07	66,230	1,854	122.59	66,230	15,726
122.08	66,230	2,119	122.60	66,230	15,991
122.09	66,230	2,384	122.61	66,230	16,256
122.10	66,230	2,649	122.62	66,230	16,521
122.11	66,230	2,914	122.63	66,230	16,786
122.12	66,230	3,179	122.64	66,230	17,051
122.13	66,230	3,444	122.65	66,230	17,316
122.14	66,230	3,709	122.66	66,230	17,581
122.15	66,230	3,974	122.67	66,230	17,846
122.16	66,230	4,239	122.68	66,230	18,111
122.17	66,230	4,504	122.69	66,230	18,375
122.18	66,230	4,769	122.70	66,230	18,640
122.19	66,230	5,033	122.71	66,230	18,905
122.20	66,230	5,298	122.72	66,230	19,170
122.21	66,230	5,563	122.73	66,230	19,435
122.22	66,230	5,828	122.74	66,230	19,700
122.23	66,230	6,093	122.75	66,230	19,965
122.24	66,230	6,358	122.76	66,230	20,230
122.25	66,230	6,623	122.77	66,230	20,495
122.26	66,230	6,888	122.78	66,230	20,760
122.27	66,230	7,153	122.79	66,230	21,025
122.28	66,230	7,418	122.80	66,230	21,290
122.29	66,230	7,683	122.81	66,230	21,555
122.30	66,230	7,948	122.82	66,230	21,819
122.31	66,230	8,213	122.83	66,230	22,084
122.32	66,230	8,477	122.84	66,230	22,349
122.33	66,230	8,742	122.85	66,230	22,614
122.34	66,230	9,007	122.86	66,230	22,879
122.35	66,230	9,272	122.87	66,230	23,144
122.36	66,230	9,537	122.88	66,230	23,409
122.37	66,230	9,802	122.89	66,230	23,674
122.38	66,230	10,067	122.90	66,230	23,939
122.39	66,230	10,332	122.91	66,230	24,204
122.40	66,230	10,597	122.92	66,230	24,469
122.41	66,230	10,862	122.93	66,230	24,734
122.42	66,230	11,127	122.94	66,230	24,998
122.43	66,230	11,392	122.95	66,230	25,263
122.44	66,230	11,656	122.96	66,230	25,528
122.45	66,230	11,921	122.97	66,230	25,793
122.46	66,230	12,186	122.98	66,230	26,058
122.47	66,230	12,451	122.99	66,230	26,323
122.48	66,230	12,716	123.00	66,230	26,588
122.49	66,230	12,981			
122.50	66,230	13,246			
122.51	66,230	13,522			

Summary for Pond 5P: Baseball Field South

[58] Hint: Peaked 0.51' above defined flood level

Inflow Area = 1.746 ac, 9.42% Impervious, Inflow Depth = 2.81" for 10-yr event
 Inflow = 5.76 cfs @ 12.09 hrs, Volume= 0.409 af
 Outflow = 5.60 cfs @ 12.11 hrs, Volume= 0.409 af, Atten= 3%, Lag= 1.3 min
 Discarded = 0.41 cfs @ 12.09 hrs, Volume= 0.030 af
 Primary = 5.18 cfs @ 12.11 hrs, Volume= 0.379 af
 Routed to Pond 3P : Extended Detention Basin

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 122.01' @ 12.11 hrs Surf.Area= 66,230 sf Storage= 274 cf
 Flood Elev= 121.50' Storage= 0 cf

Plug-Flow detention time= 0.8 min calculated for 0.409 af (100% of inflow)
 Center-of-Mass det. time= 0.8 min (826.8 - 826.0)

Volume	Invert	Avail.Storage	Storage Description
#1	122.00'	26,428 cf	Custom Stage Data (Prismatic) Listed below (Recalc) 66,230 cf Overall - 160 cf Embedded = 66,070 cf x 40.0% Voids
#2	122.50'	160 cf	12.0" W x 1.0" H Box Pipe Storage x 16 Inside #1 L= 120.0'
		26,588 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
122.00	66,230	0	0
123.00	66,230	66,230	66,230

Device	Routing	Invert	Outlet Devices
#1	Primary	120.00'	18.0" Round Culvert L= 50.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 120.00' / 119.00' S= 0.0200 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.77 sf
#2	Discarded	122.00'	0.270 in/hr Exfiltration over Surface area
#3	Device 1	121.00'	12.0" Round Culvert X 2.00 L= 100.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 121.00' / 120.50' S= 0.0050 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#4	Device 3	122.00'	50.000 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.41 cfs @ 12.09 hrs HW=122.01' (Free Discharge)
 ↳ **2=Exfiltration** (Exfiltration Controls 0.41 cfs)

Primary OutFlow Max=5.18 cfs @ 12.11 hrs HW=122.01' (Free Discharge)
 ↳ **1=Culvert** (Passes 5.18 cfs of 9.55 cfs potential flow)
 ↳ ↳ **3=Culvert** (Barrel Controls 5.18 cfs @ 4.06 fps)
 ↳ ↳ ↳ **4=Exfiltration** (Passes 5.18 cfs of 76.66 cfs potential flow)

Stage-Area-Storage for Pond 5P: Baseball Field South

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
122.00	66,230	0	122.52	66,230	13,799
122.01	66,230	265	122.53	66,230	14,075
122.02	66,230	530	122.54	66,230	14,352
122.03	66,230	795	122.55	66,230	14,628
122.04	66,230	1,060	122.56	66,230	14,905
122.05	66,230	1,325	122.57	66,230	15,181
122.06	66,230	1,590	122.58	66,230	15,458
122.07	66,230	1,854	122.59	66,230	15,726
122.08	66,230	2,119	122.60	66,230	15,991
122.09	66,230	2,384	122.61	66,230	16,256
122.10	66,230	2,649	122.62	66,230	16,521
122.11	66,230	2,914	122.63	66,230	16,786
122.12	66,230	3,179	122.64	66,230	17,051
122.13	66,230	3,444	122.65	66,230	17,316
122.14	66,230	3,709	122.66	66,230	17,581
122.15	66,230	3,974	122.67	66,230	17,846
122.16	66,230	4,239	122.68	66,230	18,111
122.17	66,230	4,504	122.69	66,230	18,375
122.18	66,230	4,769	122.70	66,230	18,640
122.19	66,230	5,033	122.71	66,230	18,905
122.20	66,230	5,298	122.72	66,230	19,170
122.21	66,230	5,563	122.73	66,230	19,435
122.22	66,230	5,828	122.74	66,230	19,700
122.23	66,230	6,093	122.75	66,230	19,965
122.24	66,230	6,358	122.76	66,230	20,230
122.25	66,230	6,623	122.77	66,230	20,495
122.26	66,230	6,888	122.78	66,230	20,760
122.27	66,230	7,153	122.79	66,230	21,025
122.28	66,230	7,418	122.80	66,230	21,290
122.29	66,230	7,683	122.81	66,230	21,555
122.30	66,230	7,948	122.82	66,230	21,819
122.31	66,230	8,213	122.83	66,230	22,084
122.32	66,230	8,477	122.84	66,230	22,349
122.33	66,230	8,742	122.85	66,230	22,614
122.34	66,230	9,007	122.86	66,230	22,879
122.35	66,230	9,272	122.87	66,230	23,144
122.36	66,230	9,537	122.88	66,230	23,409
122.37	66,230	9,802	122.89	66,230	23,674
122.38	66,230	10,067	122.90	66,230	23,939
122.39	66,230	10,332	122.91	66,230	24,204
122.40	66,230	10,597	122.92	66,230	24,469
122.41	66,230	10,862	122.93	66,230	24,734
122.42	66,230	11,127	122.94	66,230	24,998
122.43	66,230	11,392	122.95	66,230	25,263
122.44	66,230	11,656	122.96	66,230	25,528
122.45	66,230	11,921	122.97	66,230	25,793
122.46	66,230	12,186	122.98	66,230	26,058
122.47	66,230	12,451	122.99	66,230	26,323
122.48	66,230	12,716	123.00	66,230	26,588
122.49	66,230	12,981			
122.50	66,230	13,246			
122.51	66,230	13,522			

Summary for Pond 6P: Infiltration Trench

Inflow Area = 0.681 ac, 82.09% Impervious, Inflow Depth = 4.43" for 10-yr event
 Inflow = 3.28 cfs @ 12.08 hrs, Volume= 0.251 af
 Outflow = 3.28 cfs @ 12.09 hrs, Volume= 0.251 af, Atten= 0%, Lag= 0.3 min
 Discarded = 0.02 cfs @ 5.24 hrs, Volume= 0.073 af
 Primary = 0.27 cfs @ 12.09 hrs, Volume= 0.104 af
 Routed to Link DP-1 : Southeast Wetlands
 Secondary = 2.99 cfs @ 12.09 hrs, Volume= 0.074 af
 Routed to Link DP-2 : West Wetland

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 121.87' @ 12.09 hrs Surf.Area= 0.057 ac Storage= 0.066 af

Plug-Flow detention time= 380.9 min calculated for 0.251 af (100% of inflow)
 Center-of-Mass det. time= 381.2 min (1,154.0 - 772.8)

Volume	Invert	Avail.Storage	Storage Description
#1	119.00'	0.069 af	5.00'W x 100.00'L x 3.00'H Prismatoidx 5 0.172 af Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Secondary	121.80'	50.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)
#2	Discarded	119.00'	0.270 in/hr Exfiltration over Surface area
#3	Primary	121.00'	4.0" Round Culvert L= 150.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 121.00' / 119.50' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf
#4	Device 3	121.00'	50.000 in/hr Exfiltration over Wetted area above 121.00' Excluded Wetted area = 0.106 ac

Discarded OutFlow Max=0.02 cfs @ 5.24 hrs HW=119.03' (Free Discharge)
 ↳2=Exfiltration (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.27 cfs @ 12.09 hrs HW=121.87' (Free Discharge)
 ↳3=Culvert (Barrel Controls 0.27 cfs @ 3.11 fps)
 ↳4=Exfiltration (Passes 0.27 cfs of 1.06 cfs potential flow)

Secondary OutFlow Max=2.94 cfs @ 12.09 hrs HW=121.87' (Free Discharge)
 ↳1=Sharp-Crested Rectangular Weir(Weir Controls 2.94 cfs @ 0.86 fps)

Stage-Area-Storage for Pond 6P: Infiltration Trench

Elevation (feet)	Surface (acres)	Wetted (acres)	Storage (acre-feet)	Elevation (feet)	Surface (acres)	Wetted (acres)	Storage (acre-feet)
119.00	0.057	0.057	0.000	121.60	0.057	0.120	0.060
119.05	0.057	0.059	0.001	121.65	0.057	0.121	0.061
119.10	0.057	0.060	0.002	121.70	0.057	0.122	0.062
119.15	0.057	0.061	0.003	121.75	0.057	0.124	0.063
119.20	0.057	0.062	0.005	121.80	0.057	0.125	0.064
119.25	0.057	0.063	0.006	121.85	0.057	0.126	0.065
119.30	0.057	0.065	0.007	121.90	0.057	0.127	0.067
119.35	0.057	0.066	0.008	121.95	0.057	0.129	0.068
119.40	0.057	0.067	0.009	122.00	0.057	0.130	0.069
119.45	0.057	0.068	0.010				
119.50	0.057	0.069	0.011				
119.55	0.057	0.071	0.013				
119.60	0.057	0.072	0.014				
119.65	0.057	0.073	0.015				
119.70	0.057	0.074	0.016				
119.75	0.057	0.075	0.017				
119.80	0.057	0.077	0.018				
119.85	0.057	0.078	0.020				
119.90	0.057	0.079	0.021				
119.95	0.057	0.080	0.022				
120.00	0.057	0.081	0.023				
120.05	0.057	0.083	0.024				
120.10	0.057	0.084	0.025				
120.15	0.057	0.085	0.026				
120.20	0.057	0.086	0.028				
120.25	0.057	0.088	0.029				
120.30	0.057	0.089	0.030				
120.35	0.057	0.090	0.031				
120.40	0.057	0.091	0.032				
120.45	0.057	0.092	0.033				
120.50	0.057	0.094	0.034				
120.55	0.057	0.095	0.036				
120.60	0.057	0.096	0.037				
120.65	0.057	0.097	0.038				
120.70	0.057	0.098	0.039				
120.75	0.057	0.100	0.040				
120.80	0.057	0.101	0.041				
120.85	0.057	0.102	0.042				
120.90	0.057	0.103	0.044				
120.95	0.057	0.104	0.045				
121.00	0.057	0.106	0.046				
121.05	0.057	0.107	0.047				
121.10	0.057	0.108	0.048				
121.15	0.057	0.109	0.049				
121.20	0.057	0.110	0.051				
121.25	0.057	0.112	0.052				
121.30	0.057	0.113	0.053				
121.35	0.057	0.114	0.054				
121.40	0.057	0.115	0.055				
121.45	0.057	0.116	0.056				
121.50	0.057	0.118	0.057				
121.55	0.057	0.119	0.059				

Summary for Link DP-1: Southeast Wetlands

Inflow Area = 17.708 ac, 27.70% Impervious, Inflow Depth = 3.06" for 10-yr event
Inflow = 25.28 cfs @ 12.13 hrs, Volume= 4.511 af
Primary = 25.28 cfs @ 12.13 hrs, Volume= 4.511 af, Atten= 0%, Lag= 0.0 min

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

Summary for Link DP-2: West Wetland

Inflow Area = 1.110 ac, 20.49% Impervious, Inflow Depth = 3.80" for 10-yr event
Inflow = 5.12 cfs @ 12.12 hrs, Volume= 0.352 af
Primary = 5.12 cfs @ 12.12 hrs, Volume= 0.352 af, Atten= 0%, Lag= 0.0 min

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

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

SubcatchmentPR1A: Track & Field East Runoff Area=153,690 sf 30.95% Impervious Runoff Depth=4.59"
Tc=6.0 min CN=85 Runoff=18.56 cfs 1.348 af

SubcatchmentPR1B: Track & Field West Runoff Area=92,528 sf 39.83% Impervious Runoff Depth=4.80"
Tc=6.0 min CN=87 Runoff=11.59 cfs 0.851 af

SubcatchmentPR2: North of Fields Runoff Area=114,758 sf 25.76% Impervious Runoff Depth=4.16"
Flow Length=1,155' Tc=12.9 min CN=81 Runoff=10.23 cfs 0.913 af

SubcatchmentPR3A: Baseball Field North Runoff Area=106,818 sf 13.51% Impervious Runoff Depth=4.26"
Tc=6.0 min CN=82 Runoff=12.13 cfs 0.871 af

SubcatchmentPR3B: Baseball Field South Runoff Area=76,054 sf 9.42% Impervious Runoff Depth=3.85"
Tc=6.0 min CN=78 Runoff=7.86 cfs 0.559 af

SubcatchmentPR4: Fitness Center Runoff Area=55,755 sf 81.17% Impervious Runoff Depth=5.71"
Tc=6.0 min CN=95 Runoff=7.76 cfs 0.609 af

SubcatchmentPR5: Tennis Courts Runoff Area=29,682 sf 82.09% Impervious Runoff Depth=5.59"
Tc=6.0 min CN=94 Runoff=4.09 cfs 0.318 af

SubcatchmentPR6: Direct to Wetlands Runoff Area=48,352 sf 20.49% Impervious Runoff Depth=4.05"
Flow Length=398' Tc=15.4 min CN=80 Runoff=3.94 cfs 0.375 af

SubcatchmentPR7: South of Field Runoff Area=142,056 sf 5.95% Impervious Runoff Depth=3.54"
Flow Length=474' Tc=13.8 min CN=75 Runoff=10.58 cfs 0.962 af

Pond 1P: Track Field East Peak Elev=122.39' Storage=8,494 cf Inflow=18.56 cfs 1.348 af
Discarded=0.34 cfs 0.079 af Primary=6.48 cfs 1.270 af Outflow=6.82 cfs 1.348 af

Pond 2P: Track Field West Peak Elev=122.13' Storage=2,879 cf Inflow=11.59 cfs 0.851 af
Discarded=0.34 cfs 0.052 af Primary=5.89 cfs 0.799 af Outflow=6.23 cfs 0.850 af

Pond 3P: Extended Detention Basin Peak Elev=119.32' Storage=47,930 cf Inflow=21.79 cfs 2.279 af
Outflow=6.20 cfs 2.274 af

Pond 4P: Baseball Field North Peak Elev=122.12' Storage=3,255 cf Inflow=12.13 cfs 0.871 af
Discarded=0.41 cfs 0.063 af Primary=5.84 cfs 0.808 af Outflow=6.26 cfs 0.871 af

Pond 5P: Baseball Field South Peak Elev=122.04' Storage=934 cf Inflow=7.86 cfs 0.559 af
Discarded=0.41 cfs 0.041 af Primary=5.34 cfs 0.518 af Outflow=5.75 cfs 0.559 af

Pond 6P: Infiltration Trench Peak Elev=121.88' Storage=0.066 af Inflow=4.09 cfs 0.318 af
Discarded=0.02 cfs 0.074 af Primary=0.27 cfs 0.129 af Secondary=3.80 cfs 0.114 af Outflow=4.09 cfs 0.318 af

Link DP-1: Southeast Wetlands Inflow=29.87 cfs 6.003 af
Primary=29.87 cfs 6.003 af

25527-PR

Prepared by Brennan Consulting

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Type III 24-hr 25-yr Rainfall=6.30"

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Link DP-2: West Wetland

Inflow=6.72 cfs 0.489 af

Primary=6.72 cfs 0.489 af

Total Runoff Area = 18.818 ac Runoff Volume = 6.806 af Average Runoff Depth = 4.34"
72.72% Pervious = 13.685 ac 27.28% Impervious = 5.133 ac

Summary for Subcatchment PR1A: Track & Field East

Runoff = 18.56 cfs @ 12.09 hrs, Volume= 1.348 af, Depth= 4.59"
 Routed to Pond 1P : Track Field East

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-yr Rainfall=6.30"

Area (sf)	CN	Description
21,850	74	>75% Grass cover, Good, HSG C
84,267	80	>75% Grass cover, Good, HSG D
9,742	98	Paved parking, HSG C
37,831	98	Paved parking, HSG D
0	98	Roofs, HSG C
0	98	Roofs, HSG D
0	70	Woods, Good, HSG C
0	77	Woods, Good, HSG D
153,690	85	Weighted Average
106,117		69.05% Pervious Area
47,573		30.95% Impervious Area

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

Summary for Subcatchment PR1B: Track & Field West

Runoff = 11.59 cfs @ 12.09 hrs, Volume= 0.851 af, Depth= 4.80"
 Routed to Pond 2P : Track Field West

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-yr Rainfall=6.30"

Area (sf)	CN	Description
2,296	74	>75% Grass cover, Good, HSG C
53,380	80	>75% Grass cover, Good, HSG D
9,413	98	Paved parking, HSG C
27,439	98	Paved parking, HSG D
0	98	Roofs, HSG C
0	98	Roofs, HSG D
0	70	Woods, Good, HSG C
0	77	Woods, Good, HSG D
92,528	87	Weighted Average
55,676		60.17% Pervious Area
36,852		39.83% Impervious Area

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

Summary for Subcatchment PR2: North of Fields

Runoff = 10.23 cfs @ 12.17 hrs, Volume= 0.913 af, Depth= 4.16"
 Routed to Link DP-1 : Southeast Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-yr Rainfall=6.30"

Area (sf)	CN	Description
60,546	74	>75% Grass cover, Good, HSG C
24,646	80	>75% Grass cover, Good, HSG D
17,396	98	Paved parking, HSG C
1,061	98	Paved parking, HSG D
7,942	98	Roofs, HSG C
3,167	98	Roofs, HSG D
0	70	Woods, Good, HSG C
0	77	Woods, Good, HSG D
114,758	81	Weighted Average
85,192		74.24% Pervious Area
29,566		25.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8	50	0.0080	0.10		Sheet Flow, Grass: Short n= 0.150 P2= 2.75"
2.7	205	0.0320	1.25		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.4	900	0.0060	10.38	165.02	Pipe Channel, 54.0" Round Area= 15.9 sf Perim= 14.1' r= 1.13' n= 0.012 Concrete pipe, finished
12.9	1,155	Total			

Summary for Subcatchment PR3A: Baseball Field North

Runoff = 12.13 cfs @ 12.09 hrs, Volume= 0.871 af, Depth= 4.26"
 Routed to Pond 4P : Baseball Field North

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-yr Rainfall=6.30"

Area (sf)	CN	Description
10,897	74	>75% Grass cover, Good, HSG C
81,488	80	>75% Grass cover, Good, HSG D
1,799	98	Paved parking, HSG C
12,634	98	Paved parking, HSG D
0	98	Roofs, HSG C
0	98	Roofs, HSG D
0	70	Woods, Good, HSG C
0	77	Woods, Good, HSG D
106,818	82	Weighted Average
92,385		86.49% Pervious Area
14,433		13.51% Impervious Area

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

Summary for Subcatchment PR3B: Baseball Field South

Runoff = 7.86 cfs @ 12.09 hrs, Volume= 0.559 af, Depth= 3.85"
 Routed to Pond 5P : Baseball Field South

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-yr Rainfall=6.30"

Area (sf)	CN	Description
50,918	74	>75% Grass cover, Good, HSG C
17,970	80	>75% Grass cover, Good, HSG D
6,012	98	Paved parking, HSG C
1,154	98	Paved parking, HSG D
0	98	Roofs, HSG C
0	98	Roofs, HSG D
0	70	Woods, Good, HSG C
0	77	Woods, Good, HSG D
76,054	78	Weighted Average
68,888		90.58% Pervious Area
7,166		9.42% Impervious Area

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

Summary for Subcatchment PR4: Fitness Center

Runoff = 7.76 cfs @ 12.08 hrs, Volume= 0.609 af, Depth= 5.71"
 Routed to Link DP-1 : Southeast Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-yr Rainfall=6.30"

Area (sf)	CN	Description
387	74	>75% Grass cover, Good, HSG C
10,114	80	>75% Grass cover, Good, HSG D
246	98	Paved parking, HSG C
2,643	98	Paved parking, HSG D
946	98	Roofs, HSG C
41,419	98	Roofs, HSG D
0	70	Woods, Good, HSG C
0	77	Woods, Good, HSG D
55,755	95	Weighted Average
10,501		18.83% Pervious Area
45,254		81.17% Impervious Area

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

Summary for Subcatchment PR5: Tennis Courts

Runoff = 4.09 cfs @ 12.08 hrs, Volume= 0.318 af, Depth= 5.59"
 Routed to Pond 6P : Infiltration Trench

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-yr Rainfall=6.30"

Area (sf)	CN	Description
4,547	74	>75% Grass cover, Good, HSG C
769	80	>75% Grass cover, Good, HSG D
20,316	98	Paved parking, HSG C
4,050	98	Paved parking, HSG D
0	98	Roofs, HSG C
0	98	Roofs, HSG D
0	70	Woods, Good, HSG C
0	77	Woods, Good, HSG D
29,682	94	Weighted Average
5,316		17.91% Pervious Area
24,366		82.09% Impervious Area

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

Summary for Subcatchment PR6: Direct to Wetlands

Runoff = 3.94 cfs @ 12.20 hrs, Volume= 0.375 af, Depth= 4.05"
 Routed to Link DP-2 : West Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-yr Rainfall=6.30"

Area (sf)	CN	Description
9,822	74	>75% Grass cover, Good, HSG C
11,294	80	>75% Grass cover, Good, HSG D
7,720	98	Paved parking, HSG C
2,189	98	Paved parking, HSG D
0	98	Roofs, HSG C
0	98	Roofs, HSG D
7,833	70	Woods, Good, HSG C
9,494	77	Woods, Good, HSG D
48,352	80	Weighted Average
38,443		79.51% Pervious Area
9,909		20.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	50	0.0780	0.11		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 2.75"
0.1	12	0.3330	2.89		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
1.1	105	0.0060	1.57		Shallow Concentrated Flow, Paved Kv= 20.3 fps
5.9	176	0.0050	0.49		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.6	55	0.1020	1.60		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
15.4	398	Total			

Summary for Subcatchment PR7: South of Field

[47] Hint: Peak is 639% of capacity of segment #4

Runoff = 10.58 cfs @ 12.19 hrs, Volume= 0.962 af, Depth= 3.54"
 Routed to Pond 3P : Extended Detention Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-yr Rainfall=6.30"

Area (sf)	CN	Description
95,083	74	>75% Grass cover, Good, HSG C
12,977	80	>75% Grass cover, Good, HSG D
6,534	98	Paved parking, HSG C
820	98	Paved parking, HSG D
1,100	98	Roofs, HSG C
0	98	Roofs, HSG D
25,542	70	Woods, Good, HSG C
0	77	Woods, Good, HSG D
142,056	75	Weighted Average
133,602		94.05% Pervious Area
8,454		5.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	50	0.0200	0.14		Sheet Flow, Grass: Short n= 0.150 P2= 2.75"
0.3	23	0.0300	1.21		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
5.8	200	0.0130	0.57		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
1.6	201	0.0080	2.11	1.66	Pipe Channel, CMP_Round 12" 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.025 Corrugated metal
13.8	474	Total			

Summary for Pond 1P: Track Field East

Inflow Area = 3.528 ac, 30.95% Impervious, Inflow Depth = 4.59" for 25-yr event
 Inflow = 18.56 cfs @ 12.09 hrs, Volume= 1.348 af
 Outflow = 6.82 cfs @ 12.34 hrs, Volume= 1.348 af, Atten= 63%, Lag= 15.5 min
 Discarded = 0.34 cfs @ 11.84 hrs, Volume= 0.079 af
 Primary = 6.48 cfs @ 12.34 hrs, Volume= 1.270 af
 Routed to Link DP-1 : Southeast Wetlands

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 122.39' @ 12.34 hrs Surf.Area= 54,991 sf Storage= 8,494 cf

Plug-Flow detention time= 6.1 min calculated for 1.348 af (100% of inflow)
 Center-of-Mass det. time= 6.1 min (804.9 - 798.9)

Volume	Invert	Avail.Storage	Storage Description
#1	122.00'	21,932 cf	Custom Stage Data (Prismatic) Listed below (Recalc) 54,991 cf Overall - 160 cf Embedded = 54,831 cf x 40.0% Voids
#2	122.50'	160 cf	12.0" W x 1.0" H Box Pipe Storage x 16 Inside #1 L= 120.0'
22,092 cf			Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
122.00	54,991	0	0
123.00	54,991	54,991	54,991

Device	Routing	Invert	Outlet Devices
#1	Primary	120.00'	18.0" Round Culvert L= 50.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 120.00' / 119.00' S= 0.0200 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.77 sf
#2	Discarded	122.00'	0.270 in/hr Exfiltration over Surface area
#3	Device 1	121.00'	12.0" Round Culvert X 2.00 L= 100.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 121.00' / 120.50' S= 0.0050 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#4	Device 3	122.00'	50.000 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.34 cfs @ 11.84 hrs HW=122.01' (Free Discharge)
 ↳ **2=Exfiltration** (Exfiltration Controls 0.34 cfs)

Primary OutFlow Max=6.48 cfs @ 12.34 hrs HW=122.39' (Free Discharge)
 ↳ **1=Culvert** (Passes 6.48 cfs of 10.88 cfs potential flow)
 ↳ ↳ **3=Culvert** (Barrel Controls 6.48 cfs @ 4.12 fps)
 ↳ ↳ ↳ **4=Exfiltration** (Passes 6.48 cfs of 63.65 cfs potential flow)

Stage-Area-Storage for Pond 1P: Track Field East

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
122.00	54,991	0	122.52	54,991	11,461
122.01	54,991	220	122.53	54,991	11,693
122.02	54,991	440	122.54	54,991	11,924
122.03	54,991	660	122.55	54,991	12,156
122.04	54,991	880	122.56	54,991	12,387
122.05	54,991	1,100	122.57	54,991	12,619
122.06	54,991	1,320	122.58	54,991	12,850
122.07	54,991	1,540	122.59	54,991	13,074
122.08	54,991	1,760	122.60	54,991	13,294
122.09	54,991	1,980	122.61	54,991	13,514
122.10	54,991	2,200	122.62	54,991	13,734
122.11	54,991	2,420	122.63	54,991	13,954
122.12	54,991	2,640	122.64	54,991	14,174
122.13	54,991	2,860	122.65	54,991	14,394
122.14	54,991	3,079	122.66	54,991	14,614
122.15	54,991	3,299	122.67	54,991	14,834
122.16	54,991	3,519	122.68	54,991	15,054
122.17	54,991	3,739	122.69	54,991	15,274
122.18	54,991	3,959	122.70	54,991	15,493
122.19	54,991	4,179	122.71	54,991	15,713
122.20	54,991	4,399	122.72	54,991	15,933
122.21	54,991	4,619	122.73	54,991	16,153
122.22	54,991	4,839	122.74	54,991	16,373
122.23	54,991	5,059	122.75	54,991	16,593
122.24	54,991	5,279	122.76	54,991	16,813
122.25	54,991	5,499	122.77	54,991	17,033
122.26	54,991	5,719	122.78	54,991	17,253
122.27	54,991	5,939	122.79	54,991	17,473
122.28	54,991	6,159	122.80	54,991	17,693
122.29	54,991	6,379	122.81	54,991	17,913
122.30	54,991	6,599	122.82	54,991	18,133
122.31	54,991	6,819	122.83	54,991	18,353
122.32	54,991	7,039	122.84	54,991	18,573
122.33	54,991	7,259	122.85	54,991	18,793
122.34	54,991	7,479	122.86	54,991	19,013
122.35	54,991	7,699	122.87	54,991	19,233
122.36	54,991	7,919	122.88	54,991	19,453
122.37	54,991	8,139	122.89	54,991	19,673
122.38	54,991	8,359	122.90	54,991	19,893
122.39	54,991	8,579	122.91	54,991	20,113
122.40	54,991	8,799	122.92	54,991	20,333
122.41	54,991	9,019	122.93	54,991	20,553
122.42	54,991	9,238	122.94	54,991	20,773
122.43	54,991	9,458	122.95	54,991	20,993
122.44	54,991	9,678	122.96	54,991	21,213
122.45	54,991	9,898	122.97	54,991	21,433
122.46	54,991	10,118	122.98	54,991	21,652
122.47	54,991	10,338	122.99	54,991	21,872
122.48	54,991	10,558	123.00	54,991	22,092
122.49	54,991	10,778			
122.50	54,991	10,998			
122.51	54,991	11,230			

Summary for Pond 2P: Track Field West

[58] Hint: Peaked 0.63' above defined flood level

Inflow Area = 2.124 ac, 39.83% Impervious, Inflow Depth = 4.80" for 25-yr event
 Inflow = 11.59 cfs @ 12.09 hrs, Volume= 0.851 af
 Outflow = 6.23 cfs @ 12.21 hrs, Volume= 0.850 af, Atten= 46%, Lag= 7.6 min
 Discarded = 0.34 cfs @ 11.98 hrs, Volume= 0.052 af
 Primary = 5.89 cfs @ 12.21 hrs, Volume= 0.799 af
 Routed to Pond 3P : Extended Detention Basin

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 122.13' @ 12.21 hrs Surf.Area= 54,991 sf Storage= 2,879 cf
 Flood Elev= 121.50' Storage= 0 cf

Plug-Flow detention time= 2.2 min calculated for 0.850 af (100% of inflow)
 Center-of-Mass det. time= 2.1 min (795.1 - 793.0)

Volume	Invert	Avail.Storage	Storage Description
#1	122.00'	21,932 cf	Custom Stage Data (Prismatic) Listed below (Recalc) 54,991 cf Overall - 160 cf Embedded = 54,831 cf x 40.0% Voids
#2	122.50'	160 cf	12.0" W x 1.0" H Box Pipe Storage x 16 Inside #1 L= 120.0'
22,092 cf			Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
122.00	54,991	0	0
123.00	54,991	54,991	54,991

Device	Routing	Invert	Outlet Devices
#1	Primary	120.00'	18.0" Round Culvert L= 50.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 120.00' / 119.00' S= 0.0200 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.77 sf
#2	Discarded	122.00'	0.270 in/hr Exfiltration over Surface area
#3	Device 1	121.00'	12.0" Round Culvert X 2.00 L= 100.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 121.00' / 120.50' S= 0.0050 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#4	Device 3	122.00'	50.000 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.34 cfs @ 11.98 hrs HW=122.01' (Free Discharge)
 ↳ **2=Exfiltration** (Exfiltration Controls 0.34 cfs)

Primary OutFlow Max=5.89 cfs @ 12.21 hrs HW=122.13' (Free Discharge)
 ↳ **1=Culvert** (Passes 5.89 cfs of 10.00 cfs potential flow)
 ↳ ↳ **3=Culvert** (Barrel Controls 5.89 cfs @ 4.14 fps)
 ↳ ↳ ↳ **4=Exfiltration** (Passes 5.89 cfs of 63.65 cfs potential flow)

Stage-Area-Storage for Pond 2P: Track Field West

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
122.00	54,991	0	122.52	54,991	11,461
122.01	54,991	220	122.53	54,991	11,693
122.02	54,991	440	122.54	54,991	11,924
122.03	54,991	660	122.55	54,991	12,156
122.04	54,991	880	122.56	54,991	12,387
122.05	54,991	1,100	122.57	54,991	12,619
122.06	54,991	1,320	122.58	54,991	12,850
122.07	54,991	1,540	122.59	54,991	13,074
122.08	54,991	1,760	122.60	54,991	13,294
122.09	54,991	1,980	122.61	54,991	13,514
122.10	54,991	2,200	122.62	54,991	13,734
122.11	54,991	2,420	122.63	54,991	13,954
122.12	54,991	2,640	122.64	54,991	14,174
122.13	54,991	2,860	122.65	54,991	14,394
122.14	54,991	3,079	122.66	54,991	14,614
122.15	54,991	3,299	122.67	54,991	14,834
122.16	54,991	3,519	122.68	54,991	15,054
122.17	54,991	3,739	122.69	54,991	15,274
122.18	54,991	3,959	122.70	54,991	15,493
122.19	54,991	4,179	122.71	54,991	15,713
122.20	54,991	4,399	122.72	54,991	15,933
122.21	54,991	4,619	122.73	54,991	16,153
122.22	54,991	4,839	122.74	54,991	16,373
122.23	54,991	5,059	122.75	54,991	16,593
122.24	54,991	5,279	122.76	54,991	16,813
122.25	54,991	5,499	122.77	54,991	17,033
122.26	54,991	5,719	122.78	54,991	17,253
122.27	54,991	5,939	122.79	54,991	17,473
122.28	54,991	6,159	122.80	54,991	17,693
122.29	54,991	6,379	122.81	54,991	17,913
122.30	54,991	6,599	122.82	54,991	18,133
122.31	54,991	6,819	122.83	54,991	18,353
122.32	54,991	7,039	122.84	54,991	18,573
122.33	54,991	7,259	122.85	54,991	18,793
122.34	54,991	7,479	122.86	54,991	19,013
122.35	54,991	7,699	122.87	54,991	19,233
122.36	54,991	7,919	122.88	54,991	19,453
122.37	54,991	8,139	122.89	54,991	19,673
122.38	54,991	8,359	122.90	54,991	19,893
122.39	54,991	8,579	122.91	54,991	20,113
122.40	54,991	8,799	122.92	54,991	20,333
122.41	54,991	9,019	122.93	54,991	20,553
122.42	54,991	9,238	122.94	54,991	20,773
122.43	54,991	9,458	122.95	54,991	20,993
122.44	54,991	9,678	122.96	54,991	21,213
122.45	54,991	9,898	122.97	54,991	21,433
122.46	54,991	10,118	122.98	54,991	21,652
122.47	54,991	10,338	122.99	54,991	21,872
122.48	54,991	10,558	123.00	54,991	22,092
122.49	54,991	10,778			
122.50	54,991	10,998			
122.51	54,991	11,230			

Summary for Pond 3P: Extended Detention Basin

[79] Warning: Submerged Pond 2P Primary device # 1 OUTLET by 0.32'

[79] Warning: Submerged Pond 5P Primary device # 1 OUTLET by 0.32'

Inflow Area = 7.131 ac, 16.89% Impervious, Inflow Depth = 3.83" for 25-yr event
 Inflow = 21.79 cfs @ 12.19 hrs, Volume= 2.279 af
 Outflow = 6.20 cfs @ 12.61 hrs, Volume= 2.274 af, Atten= 72%, Lag= 24.9 min
 Primary = 6.20 cfs @ 12.61 hrs, Volume= 2.274 af
 Routed to Link DP-1 : Southeast Wetlands

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 119.32' @ 12.61 hrs Surf.Area= 18,221 sf Storage= 47,930 cf

Plug-Flow detention time= 314.2 min calculated for 2.274 af (100% of inflow)
 Center-of-Mass det. time= 313.0 min (1,128.7 - 815.7)

Volume	Invert	Avail.Storage	Storage Description
#1	116.00'	70,860 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
116.00	11,268	467.0	0	0	11,268
117.00	12,694	487.0	11,974	11,974	12,860
118.00	15,214	532.0	13,935	25,909	16,544
119.00	17,446	574.0	16,317	42,226	20,282
120.00	19,925	601.0	18,672	60,898	22,874
120.50	19,925	601.0	9,963	70,860	23,174

Device	Routing	Invert	Outlet Devices
#1	Device 2	116.00'	6.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#2	Primary	116.00'	12.0" Round Culvert L= 15.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 116.00' / 115.48' S= 0.0347 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#3	Device 2	119.00'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=6.35 cfs @ 12.61 hrs HW=119.32' (Free Discharge)

- ↑ **2=Culvert** (Inlet Controls 6.35 cfs @ 8.09 fps)
- ↑ **1=Orifice/Grate** (Passes < 1.66 cfs potential flow)
- ↑ **3=Orifice/Grate** (Passes < 4.73 cfs potential flow)

Stage-Area-Storage for Pond 3P: Extended Detention Basin

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
116.00	11,268	0	118.60	16,535	35,431
116.05	11,337	565	118.65	16,647	36,260
116.10	11,407	1,134	118.70	16,760	37,096
116.15	11,476	1,706	118.75	16,874	37,936
116.20	11,546	2,281	118.80	16,987	38,783
116.25	11,617	2,860	118.85	17,101	39,635
116.30	11,687	3,443	118.90	17,216	40,493
116.35	11,757	4,029	118.95	17,331	41,357
116.40	11,828	4,619	119.00	17,446	42,226
116.45	11,899	5,212	119.05	17,566	43,101
116.50	11,970	5,809	119.10	17,686	43,983
116.55	12,042	6,409	119.15	17,807	44,870
116.60	12,113	7,013	119.20	17,929	45,764
116.65	12,185	7,620	119.25	18,050	46,663
116.70	12,257	8,231	119.30	18,172	47,569
116.75	12,330	8,846	119.35	18,295	48,480
116.80	12,402	9,464	119.40	18,418	49,398
116.85	12,475	10,086	119.45	18,541	50,322
116.90	12,548	10,712	119.50	18,665	51,252
116.95	12,621	11,341	119.55	18,789	52,189
117.00	12,694	11,974	119.60	18,914	53,131
117.05	12,815	12,612	119.65	19,039	54,080
117.10	12,936	13,255	119.70	19,164	55,035
117.15	13,057	13,905	119.75	19,290	55,996
117.20	13,180	14,561	119.80	19,416	56,964
117.25	13,303	15,223	119.85	19,543	57,938
117.30	13,426	15,891	119.90	19,670	58,918
117.35	13,550	16,566	119.95	19,797	59,905
117.40	13,675	17,246	120.00	19,925	60,898
117.45	13,800	17,933	120.05	19,925	61,894
117.50	13,925	18,626	120.10	19,925	62,890
117.55	14,052	19,326	120.15	19,925	63,887
117.60	14,179	20,032	120.20	19,925	64,883
117.65	14,306	20,744	120.25	19,925	65,879
117.70	14,434	21,462	120.30	19,925	66,875
117.75	14,563	22,187	120.35	19,925	67,872
117.80	14,692	22,918	120.40	19,925	68,868
117.85	14,821	23,656	120.45	19,925	69,864
117.90	14,952	24,401	120.50	19,925	70,860
117.95	15,083	25,152			
118.00	15,214	25,909			
118.05	15,322	26,672			
118.10	15,430	27,441			
118.15	15,539	28,215			
118.20	15,648	28,995			
118.25	15,758	29,780			
118.30	15,868	30,571			
118.35	15,978	31,367			
118.40	16,088	32,169			
118.45	16,200	32,976			
118.50	16,311	33,789			
118.55	16,423	34,607			

Summary for Pond 4P: Baseball Field North

[58] Hint: Peaked 0.62' above defined flood level

Inflow Area = 2.452 ac, 13.51% Impervious, Inflow Depth = 4.26" for 25-yr event
 Inflow = 12.13 cfs @ 12.09 hrs, Volume= 0.871 af
 Outflow = 6.26 cfs @ 12.23 hrs, Volume= 0.871 af, Atten= 48%, Lag= 8.5 min
 Discarded = 0.41 cfs @ 11.98 hrs, Volume= 0.063 af
 Primary = 5.84 cfs @ 12.23 hrs, Volume= 0.808 af
 Routed to Link DP-1 : Southeast Wetlands

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 122.12' @ 12.23 hrs Surf.Area= 66,230 sf Storage= 3,255 cf
 Flood Elev= 121.50' Storage= 0 cf

Plug-Flow detention time= 2.6 min calculated for 0.871 af (100% of inflow)
 Center-of-Mass det. time= 2.5 min (809.6 - 807.0)

Volume	Invert	Avail.Storage	Storage Description
#1	122.00'	26,428 cf	Custom Stage Data (Prismatic) Listed below (Recalc) 66,230 cf Overall - 160 cf Embedded = 66,070 cf x 40.0% Voids
#2	122.50'	160 cf	12.0" W x 1.0" H Box Pipe Storage x 16 Inside #1 L= 120.0'
		26,588 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
122.00	66,230	0	0
123.00	66,230	66,230	66,230

Device	Routing	Invert	Outlet Devices
#1	Primary	120.00'	18.0" Round Culvert L= 50.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 120.00' / 119.00' S= 0.0200 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.77 sf
#2	Discarded	122.00'	0.270 in/hr Exfiltration over Surface area
#3	Device 1	121.00'	12.0" Round Culvert X 2.00 L= 100.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 121.00' / 120.50' S= 0.0050 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#4	Device 3	122.00'	50.000 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.41 cfs @ 11.98 hrs HW=122.01' (Free Discharge)
 ↳ **2=Exfiltration** (Exfiltration Controls 0.41 cfs)

Primary OutFlow Max=5.84 cfs @ 12.23 hrs HW=122.12' (Free Discharge)
 ↳ **1=Culvert** (Passes 5.84 cfs of 9.97 cfs potential flow)
 ↳ ↳ **3=Culvert** (Barrel Controls 5.84 cfs @ 4.14 fps)
 ↳ ↳ ↳ **4=Exfiltration** (Passes 5.84 cfs of 76.66 cfs potential flow)

Stage-Area-Storage for Pond 4P: Baseball Field North

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
122.00	66,230	0	122.52	66,230	13,799
122.01	66,230	265	122.53	66,230	14,075
122.02	66,230	530	122.54	66,230	14,352
122.03	66,230	795	122.55	66,230	14,628
122.04	66,230	1,060	122.56	66,230	14,905
122.05	66,230	1,325	122.57	66,230	15,181
122.06	66,230	1,590	122.58	66,230	15,458
122.07	66,230	1,854	122.59	66,230	15,726
122.08	66,230	2,119	122.60	66,230	15,991
122.09	66,230	2,384	122.61	66,230	16,256
122.10	66,230	2,649	122.62	66,230	16,521
122.11	66,230	2,914	122.63	66,230	16,786
122.12	66,230	3,179	122.64	66,230	17,051
122.13	66,230	3,444	122.65	66,230	17,316
122.14	66,230	3,709	122.66	66,230	17,581
122.15	66,230	3,974	122.67	66,230	17,846
122.16	66,230	4,239	122.68	66,230	18,111
122.17	66,230	4,504	122.69	66,230	18,375
122.18	66,230	4,769	122.70	66,230	18,640
122.19	66,230	5,033	122.71	66,230	18,905
122.20	66,230	5,298	122.72	66,230	19,170
122.21	66,230	5,563	122.73	66,230	19,435
122.22	66,230	5,828	122.74	66,230	19,700
122.23	66,230	6,093	122.75	66,230	19,965
122.24	66,230	6,358	122.76	66,230	20,230
122.25	66,230	6,623	122.77	66,230	20,495
122.26	66,230	6,888	122.78	66,230	20,760
122.27	66,230	7,153	122.79	66,230	21,025
122.28	66,230	7,418	122.80	66,230	21,290
122.29	66,230	7,683	122.81	66,230	21,555
122.30	66,230	7,948	122.82	66,230	21,819
122.31	66,230	8,213	122.83	66,230	22,084
122.32	66,230	8,477	122.84	66,230	22,349
122.33	66,230	8,742	122.85	66,230	22,614
122.34	66,230	9,007	122.86	66,230	22,879
122.35	66,230	9,272	122.87	66,230	23,144
122.36	66,230	9,537	122.88	66,230	23,409
122.37	66,230	9,802	122.89	66,230	23,674
122.38	66,230	10,067	122.90	66,230	23,939
122.39	66,230	10,332	122.91	66,230	24,204
122.40	66,230	10,597	122.92	66,230	24,469
122.41	66,230	10,862	122.93	66,230	24,734
122.42	66,230	11,127	122.94	66,230	24,998
122.43	66,230	11,392	122.95	66,230	25,263
122.44	66,230	11,656	122.96	66,230	25,528
122.45	66,230	11,921	122.97	66,230	25,793
122.46	66,230	12,186	122.98	66,230	26,058
122.47	66,230	12,451	122.99	66,230	26,323
122.48	66,230	12,716	123.00	66,230	26,588
122.49	66,230	12,981			
122.50	66,230	13,246			
122.51	66,230	13,522			

Summary for Pond 5P: Baseball Field South

[58] Hint: Peaked 0.54' above defined flood level

Inflow Area = 1.746 ac, 9.42% Impervious, Inflow Depth = 3.85" for 25-yr event
 Inflow = 7.86 cfs @ 12.09 hrs, Volume= 0.559 af
 Outflow = 5.75 cfs @ 12.16 hrs, Volume= 0.559 af, Atten= 27%, Lag= 4.4 min
 Discarded = 0.41 cfs @ 12.04 hrs, Volume= 0.041 af
 Primary = 5.34 cfs @ 12.16 hrs, Volume= 0.518 af
 Routed to Pond 3P : Extended Detention Basin

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 122.04' @ 12.16 hrs Surf.Area= 66,230 sf Storage= 934 cf
 Flood Elev= 121.50' Storage= 0 cf

Plug-Flow detention time= 1.0 min calculated for 0.559 af (100% of inflow)
 Center-of-Mass det. time= 1.0 min (818.1 - 817.1)

Volume	Invert	Avail.Storage	Storage Description
#1	122.00'	26,428 cf	Custom Stage Data (Prismatic) Listed below (Recalc) 66,230 cf Overall - 160 cf Embedded = 66,070 cf x 40.0% Voids
#2	122.50'	160 cf	12.0" W x 1.0" H Box Pipe Storage x 16 Inside #1 L= 120.0'
		26,588 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
122.00	66,230	0	0
123.00	66,230	66,230	66,230

Device	Routing	Invert	Outlet Devices
#1	Primary	120.00'	18.0" Round Culvert L= 50.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 120.00' / 119.00' S= 0.0200 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.77 sf
#2	Discarded	122.00'	0.270 in/hr Exfiltration over Surface area
#3	Device 1	121.00'	12.0" Round Culvert X 2.00 L= 100.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 121.00' / 120.50' S= 0.0050 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#4	Device 3	122.00'	50.000 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.41 cfs @ 12.04 hrs HW=122.01' (Free Discharge)
 ↳ **2=Exfiltration** (Exfiltration Controls 0.41 cfs)

Primary OutFlow Max=5.34 cfs @ 12.16 hrs HW=122.04' (Free Discharge)
 ↳ **1=Culvert** (Passes 5.34 cfs of 9.65 cfs potential flow)
 ↳ ↳ **3=Culvert** (Barrel Controls 5.34 cfs @ 4.08 fps)
 ↳ ↳ ↳ **4=Exfiltration** (Passes 5.34 cfs of 76.66 cfs potential flow)

Stage-Area-Storage for Pond 5P: Baseball Field South

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
122.00	66,230	0	122.52	66,230	13,799
122.01	66,230	265	122.53	66,230	14,075
122.02	66,230	530	122.54	66,230	14,352
122.03	66,230	795	122.55	66,230	14,628
122.04	66,230	1,060	122.56	66,230	14,905
122.05	66,230	1,325	122.57	66,230	15,181
122.06	66,230	1,590	122.58	66,230	15,458
122.07	66,230	1,854	122.59	66,230	15,726
122.08	66,230	2,119	122.60	66,230	15,991
122.09	66,230	2,384	122.61	66,230	16,256
122.10	66,230	2,649	122.62	66,230	16,521
122.11	66,230	2,914	122.63	66,230	16,786
122.12	66,230	3,179	122.64	66,230	17,051
122.13	66,230	3,444	122.65	66,230	17,316
122.14	66,230	3,709	122.66	66,230	17,581
122.15	66,230	3,974	122.67	66,230	17,846
122.16	66,230	4,239	122.68	66,230	18,111
122.17	66,230	4,504	122.69	66,230	18,375
122.18	66,230	4,769	122.70	66,230	18,640
122.19	66,230	5,033	122.71	66,230	18,905
122.20	66,230	5,298	122.72	66,230	19,170
122.21	66,230	5,563	122.73	66,230	19,435
122.22	66,230	5,828	122.74	66,230	19,700
122.23	66,230	6,093	122.75	66,230	19,965
122.24	66,230	6,358	122.76	66,230	20,230
122.25	66,230	6,623	122.77	66,230	20,495
122.26	66,230	6,888	122.78	66,230	20,760
122.27	66,230	7,153	122.79	66,230	21,025
122.28	66,230	7,418	122.80	66,230	21,290
122.29	66,230	7,683	122.81	66,230	21,555
122.30	66,230	7,948	122.82	66,230	21,819
122.31	66,230	8,213	122.83	66,230	22,084
122.32	66,230	8,477	122.84	66,230	22,349
122.33	66,230	8,742	122.85	66,230	22,614
122.34	66,230	9,007	122.86	66,230	22,879
122.35	66,230	9,272	122.87	66,230	23,144
122.36	66,230	9,537	122.88	66,230	23,409
122.37	66,230	9,802	122.89	66,230	23,674
122.38	66,230	10,067	122.90	66,230	23,939
122.39	66,230	10,332	122.91	66,230	24,204
122.40	66,230	10,597	122.92	66,230	24,469
122.41	66,230	10,862	122.93	66,230	24,734
122.42	66,230	11,127	122.94	66,230	24,998
122.43	66,230	11,392	122.95	66,230	25,263
122.44	66,230	11,656	122.96	66,230	25,528
122.45	66,230	11,921	122.97	66,230	25,793
122.46	66,230	12,186	122.98	66,230	26,058
122.47	66,230	12,451	122.99	66,230	26,323
122.48	66,230	12,716	123.00	66,230	26,588
122.49	66,230	12,981			
122.50	66,230	13,246			
122.51	66,230	13,522			

Summary for Pond 6P: Infiltration Trench

Inflow Area = 0.681 ac, 82.09% Impervious, Inflow Depth = 5.59" for 25-yr event
 Inflow = 4.09 cfs @ 12.08 hrs, Volume= 0.318 af
 Outflow = 4.09 cfs @ 12.09 hrs, Volume= 0.318 af, Atten= 0%, Lag= 0.2 min
 Discarded = 0.02 cfs @ 4.30 hrs, Volume= 0.074 af
 Primary = 0.27 cfs @ 12.09 hrs, Volume= 0.129 af
 Routed to Link DP-1 : Southeast Wetlands
 Secondary = 3.80 cfs @ 12.09 hrs, Volume= 0.114 af
 Routed to Link DP-2 : West Wetland

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 121.88' @ 12.09 hrs Surf.Area= 0.057 ac Storage= 0.066 af

Plug-Flow detention time= 312.8 min calculated for 0.318 af (100% of inflow)
 Center-of-Mass det. time= 313.1 min (1,080.4 - 767.2)

Volume	Invert	Avail.Storage	Storage Description
#1	119.00'	0.069 af	5.00'W x 100.00'L x 3.00'H Prisma 0.172 af Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Secondary	121.80'	50.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)
#2	Discarded	119.00'	0.270 in/hr Exfiltration over Surface area
#3	Primary	121.00'	4.0" Round Culvert L= 150.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 121.00' / 119.50' S= 0.0100' / Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf
#4	Device 3	121.00'	50.000 in/hr Exfiltration over Wetted area above 121.00' Excluded Wetted area = 0.106 ac

Discarded OutFlow Max=0.02 cfs @ 4.30 hrs HW=119.03' (Free Discharge)
 ↳2=Exfiltration (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.27 cfs @ 12.09 hrs HW=121.88' (Free Discharge)
 ↳3=Culvert (Barrel Controls 0.27 cfs @ 3.12 fps)
 ↳4=Exfiltration (Passes 0.27 cfs of 1.07 cfs potential flow)

Secondary OutFlow Max=3.79 cfs @ 12.09 hrs HW=121.88' (Free Discharge)
 ↳1=Sharp-Crested Rectangular Weir(Weir Controls 3.79 cfs @ 0.93 fps)

Stage-Area-Storage for Pond 6P: Infiltration Trench

Elevation (feet)	Surface (acres)	Wetted (acres)	Storage (acre-feet)	Elevation (feet)	Surface (acres)	Wetted (acres)	Storage (acre-feet)
119.00	0.057	0.057	0.000	121.60	0.057	0.120	0.060
119.05	0.057	0.059	0.001	121.65	0.057	0.121	0.061
119.10	0.057	0.060	0.002	121.70	0.057	0.122	0.062
119.15	0.057	0.061	0.003	121.75	0.057	0.124	0.063
119.20	0.057	0.062	0.005	121.80	0.057	0.125	0.064
119.25	0.057	0.063	0.006	121.85	0.057	0.126	0.065
119.30	0.057	0.065	0.007	121.90	0.057	0.127	0.067
119.35	0.057	0.066	0.008	121.95	0.057	0.129	0.068
119.40	0.057	0.067	0.009	122.00	0.057	0.130	0.069
119.45	0.057	0.068	0.010				
119.50	0.057	0.069	0.011				
119.55	0.057	0.071	0.013				
119.60	0.057	0.072	0.014				
119.65	0.057	0.073	0.015				
119.70	0.057	0.074	0.016				
119.75	0.057	0.075	0.017				
119.80	0.057	0.077	0.018				
119.85	0.057	0.078	0.020				
119.90	0.057	0.079	0.021				
119.95	0.057	0.080	0.022				
120.00	0.057	0.081	0.023				
120.05	0.057	0.083	0.024				
120.10	0.057	0.084	0.025				
120.15	0.057	0.085	0.026				
120.20	0.057	0.086	0.028				
120.25	0.057	0.088	0.029				
120.30	0.057	0.089	0.030				
120.35	0.057	0.090	0.031				
120.40	0.057	0.091	0.032				
120.45	0.057	0.092	0.033				
120.50	0.057	0.094	0.034				
120.55	0.057	0.095	0.036				
120.60	0.057	0.096	0.037				
120.65	0.057	0.097	0.038				
120.70	0.057	0.098	0.039				
120.75	0.057	0.100	0.040				
120.80	0.057	0.101	0.041				
120.85	0.057	0.102	0.042				
120.90	0.057	0.103	0.044				
120.95	0.057	0.104	0.045				
121.00	0.057	0.106	0.046				
121.05	0.057	0.107	0.047				
121.10	0.057	0.108	0.048				
121.15	0.057	0.109	0.049				
121.20	0.057	0.110	0.051				
121.25	0.057	0.112	0.052				
121.30	0.057	0.113	0.053				
121.35	0.057	0.114	0.054				
121.40	0.057	0.115	0.055				
121.45	0.057	0.116	0.056				
121.50	0.057	0.118	0.057				
121.55	0.057	0.119	0.059				

Summary for Link DP-1: Southeast Wetlands

Inflow Area = 17.708 ac, 27.70% Impervious, Inflow Depth = 4.07" for 25-yr event
Inflow = 29.87 cfs @ 12.13 hrs, Volume= 6.003 af
Primary = 29.87 cfs @ 12.13 hrs, Volume= 6.003 af, Atten= 0%, Lag= 0.0 min

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

Summary for Link DP-2: West Wetland

Inflow Area = 1.110 ac, 20.49% Impervious, Inflow Depth = 5.29" for 25-yr event
Inflow = 6.72 cfs @ 12.12 hrs, Volume= 0.489 af
Primary = 6.72 cfs @ 12.12 hrs, Volume= 0.489 af, Atten= 0%, Lag= 0.0 min

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

25527-PR

Type III 24-hr 100-yr Rainfall=8.12"

Prepared by Brennan Consulting

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

SubcatchmentPR1A: Track & Field East Runoff Area=153,690 sf 30.95% Impervious Runoff Depth=6.33"
 Tc=6.0 min CN=85 Runoff=25.22 cfs 1.861 af

SubcatchmentPR1B: Track & Field West Runoff Area=92,528 sf 39.83% Impervious Runoff Depth=6.57"
 Tc=6.0 min CN=87 Runoff=15.58 cfs 1.162 af

SubcatchmentPR2: North of Fields Runoff Area=114,758 sf 25.76% Impervious Runoff Depth=5.86"
 Flow Length=1,155' Tc=12.9 min CN=81 Runoff=14.26 cfs 1.286 af

SubcatchmentPR3A: Baseball Field North Runoff Area=106,818 sf 13.51% Impervious Runoff Depth=5.97"
 Tc=6.0 min CN=82 Runoff=16.77 cfs 1.221 af

SubcatchmentPR3B: Baseball Field South Runoff Area=76,054 sf 9.42% Impervious Runoff Depth=5.50"
 Tc=6.0 min CN=78 Runoff=11.14 cfs 0.801 af

SubcatchmentPR4: Fitness Center Runoff Area=55,755 sf 81.17% Impervious Runoff Depth=7.52"
 Tc=6.0 min CN=95 Runoff=10.08 cfs 0.802 af

SubcatchmentPR5: Tennis Courts Runoff Area=29,682 sf 82.09% Impervious Runoff Depth=7.40"
 Tc=6.0 min CN=94 Runoff=5.34 cfs 0.420 af

SubcatchmentPR6: Direct to Wetlands Runoff Area=48,352 sf 20.49% Impervious Runoff Depth=5.74"
 Flow Length=398' Tc=15.4 min CN=80 Runoff=5.53 cfs 0.531 af

SubcatchmentPR7: South of Field Runoff Area=142,056 sf 5.95% Impervious Runoff Depth=5.15"
 Flow Length=474' Tc=13.8 min CN=75 Runoff=15.36 cfs 1.400 af

Pond 1P: Track Field East Peak Elev=122.69' Storage=15,183 cf Inflow=25.22 cfs 1.861 af
 Discarded=0.34 cfs 0.104 af Primary=7.49 cfs 1.756 af Outflow=7.83 cfs 1.861 af

Pond 2P: Track Field West Peak Elev=122.26' Storage=5,719 cf Inflow=15.58 cfs 1.162 af
 Discarded=0.34 cfs 0.069 af Primary=6.39 cfs 1.094 af Outflow=6.73 cfs 1.163 af

Pond 3P: Extended Detention Basin Peak Elev=120.27' Storage=66,303 cf Inflow=27.42 cfs 3.236 af
 Outflow=7.34 cfs 3.231 af

Pond 4P: Baseball Field North Peak Elev=122.26' Storage=6,776 cf Inflow=16.77 cfs 1.221 af
 Discarded=0.41 cfs 0.086 af Primary=6.38 cfs 1.135 af Outflow=6.79 cfs 1.221 af

Pond 5P: Baseball Field South Peak Elev=122.10' Storage=2,641 cf Inflow=11.14 cfs 0.801 af
 Discarded=0.41 cfs 0.058 af Primary=5.72 cfs 0.742 af Outflow=6.13 cfs 0.801 af

Pond 6P: Infiltration Trench Peak Elev=121.90' Storage=0.067 af Inflow=5.34 cfs 0.420 af
 Discarded=0.02 cfs 0.075 af Primary=0.27 cfs 0.168 af Secondary=5.04 cfs 0.177 af Outflow=5.33 cfs 0.420 af

Link DP-1: Southeast Wetlands Inflow=36.80 cfs 8.379 af
 Primary=36.80 cfs 8.379 af

25527-PR

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Type III 24-hr 100-yr Rainfall=8.12"

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Link DP-2: West Wetland

Inflow=9.19 cfs 0.707 af

Primary=9.19 cfs 0.707 af

Total Runoff Area = 18.818 ac Runoff Volume = 9.483 af Average Runoff Depth = 6.05"
72.72% Pervious = 13.685 ac 27.28% Impervious = 5.133 ac

Summary for Subcatchment PR1A: Track & Field East

Runoff = 25.22 cfs @ 12.09 hrs, Volume= 1.861 af, Depth= 6.33"
 Routed to Pond 1P : Track Field East

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

Area (sf)	CN	Description
21,850	74	>75% Grass cover, Good, HSG C
84,267	80	>75% Grass cover, Good, HSG D
9,742	98	Paved parking, HSG C
37,831	98	Paved parking, HSG D
0	98	Roofs, HSG C
0	98	Roofs, HSG D
0	70	Woods, Good, HSG C
0	77	Woods, Good, HSG D
153,690	85	Weighted Average
106,117		69.05% Pervious Area
47,573		30.95% Impervious Area

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

Summary for Subcatchment PR1B: Track & Field West

Runoff = 15.58 cfs @ 12.08 hrs, Volume= 1.162 af, Depth= 6.57"
 Routed to Pond 2P : Track Field West

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

Area (sf)	CN	Description
2,296	74	>75% Grass cover, Good, HSG C
53,380	80	>75% Grass cover, Good, HSG D
9,413	98	Paved parking, HSG C
27,439	98	Paved parking, HSG D
0	98	Roofs, HSG C
0	98	Roofs, HSG D
0	70	Woods, Good, HSG C
0	77	Woods, Good, HSG D
92,528	87	Weighted Average
55,676		60.17% Pervious Area
36,852		39.83% Impervious Area

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

Summary for Subcatchment PR2: North of Fields

Runoff = 14.26 cfs @ 12.17 hrs, Volume= 1.286 af, Depth= 5.86"
 Routed to Link DP-1 : Southeast Wetlands

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

Area (sf)	CN	Description
60,546	74	>75% Grass cover, Good, HSG C
24,646	80	>75% Grass cover, Good, HSG D
17,396	98	Paved parking, HSG C
1,061	98	Paved parking, HSG D
7,942	98	Roofs, HSG C
3,167	98	Roofs, HSG D
0	70	Woods, Good, HSG C
0	77	Woods, Good, HSG D
114,758	81	Weighted Average
85,192		74.24% Pervious Area
29,566		25.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8	50	0.0080	0.10		Sheet Flow, Grass: Short n= 0.150 P2= 2.75"
2.7	205	0.0320	1.25		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.4	900	0.0060	10.38	165.02	Pipe Channel, 54.0" Round Area= 15.9 sf Perim= 14.1' r= 1.13' n= 0.012 Concrete pipe, finished
12.9	1,155	Total			

Summary for Subcatchment PR3A: Baseball Field North

Runoff = 16.77 cfs @ 12.09 hrs, Volume= 1.221 af, Depth= 5.97"
 Routed to Pond 4P : Baseball Field North

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

Area (sf)	CN	Description
10,897	74	>75% Grass cover, Good, HSG C
81,488	80	>75% Grass cover, Good, HSG D
1,799	98	Paved parking, HSG C
12,634	98	Paved parking, HSG D
0	98	Roofs, HSG C
0	98	Roofs, HSG D
0	70	Woods, Good, HSG C
0	77	Woods, Good, HSG D
106,818	82	Weighted Average
92,385		86.49% Pervious Area
14,433		13.51% Impervious Area

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

Summary for Subcatchment PR3B: Baseball Field South

Runoff = 11.14 cfs @ 12.09 hrs, Volume= 0.801 af, Depth= 5.50"
 Routed to Pond 5P : Baseball Field South

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

Area (sf)	CN	Description
50,918	74	>75% Grass cover, Good, HSG C
17,970	80	>75% Grass cover, Good, HSG D
6,012	98	Paved parking, HSG C
1,154	98	Paved parking, HSG D
0	98	Roofs, HSG C
0	98	Roofs, HSG D
0	70	Woods, Good, HSG C
0	77	Woods, Good, HSG D
76,054	78	Weighted Average
68,888		90.58% Pervious Area
7,166		9.42% Impervious Area

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

Summary for Subcatchment PR4: Fitness Center

Runoff = 10.08 cfs @ 12.08 hrs, Volume= 0.802 af, Depth= 7.52"
 Routed to Link DP-1 : Southeast Wetlands

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

Area (sf)	CN	Description
387	74	>75% Grass cover, Good, HSG C
10,114	80	>75% Grass cover, Good, HSG D
246	98	Paved parking, HSG C
2,643	98	Paved parking, HSG D
946	98	Roofs, HSG C
41,419	98	Roofs, HSG D
0	70	Woods, Good, HSG C
0	77	Woods, Good, HSG D
55,755	95	Weighted Average
10,501		18.83% Pervious Area
45,254		81.17% Impervious Area

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

Summary for Subcatchment PR5: Tennis Courts

Runoff = 5.34 cfs @ 12.08 hrs, Volume= 0.420 af, Depth= 7.40"
 Routed to Pond 6P : Infiltration Trench

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

Area (sf)	CN	Description
4,547	74	>75% Grass cover, Good, HSG C
769	80	>75% Grass cover, Good, HSG D
20,316	98	Paved parking, HSG C
4,050	98	Paved parking, HSG D
0	98	Roofs, HSG C
0	98	Roofs, HSG D
0	70	Woods, Good, HSG C
0	77	Woods, Good, HSG D
29,682	94	Weighted Average
5,316		17.91% Pervious Area
24,366		82.09% Impervious Area

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

Summary for Subcatchment PR6: Direct to Wetlands

Runoff = 5.53 cfs @ 12.20 hrs, Volume= 0.531 af, Depth= 5.74"
 Routed to Link DP-2 : West Wetland

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

Area (sf)	CN	Description
9,822	74	>75% Grass cover, Good, HSG C
11,294	80	>75% Grass cover, Good, HSG D
7,720	98	Paved parking, HSG C
2,189	98	Paved parking, HSG D
0	98	Roofs, HSG C
0	98	Roofs, HSG D
7,833	70	Woods, Good, HSG C
9,494	77	Woods, Good, HSG D
48,352	80	Weighted Average
38,443		79.51% Pervious Area
9,909		20.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	50	0.0780	0.11		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 2.75"
0.1	12	0.3330	2.89		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
1.1	105	0.0060	1.57		Shallow Concentrated Flow, Paved Kv= 20.3 fps
5.9	176	0.0050	0.49		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.6	55	0.1020	1.60		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
15.4	398	Total			

Summary for Subcatchment PR7: South of Field

[47] Hint: Peak is 927% of capacity of segment #4

Runoff = 15.36 cfs @ 12.19 hrs, Volume= 1.400 af, Depth= 5.15"
 Routed to Pond 3P : Extended Detention Basin

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

Area (sf)	CN	Description
95,083	74	>75% Grass cover, Good, HSG C
12,977	80	>75% Grass cover, Good, HSG D
6,534	98	Paved parking, HSG C
820	98	Paved parking, HSG D
1,100	98	Roofs, HSG C
0	98	Roofs, HSG D
25,542	70	Woods, Good, HSG C
0	77	Woods, Good, HSG D
142,056	75	Weighted Average
133,602		94.05% Pervious Area
8,454		5.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	50	0.0200	0.14		Sheet Flow, Grass: Short n= 0.150 P2= 2.75"
0.3	23	0.0300	1.21		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
5.8	200	0.0130	0.57		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
1.6	201	0.0080	2.11	1.66	Pipe Channel, CMP_Round 12" 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.025 Corrugated metal
13.8	474	Total			

Summary for Pond 1P: Track Field East

Inflow Area = 3.528 ac, 30.95% Impervious, Inflow Depth = 6.33" for 100-yr event
 Inflow = 25.22 cfs @ 12.09 hrs, Volume= 1.861 af
 Outflow = 7.83 cfs @ 12.40 hrs, Volume= 1.861 af, Atten= 69%, Lag= 18.7 min
 Discarded = 0.34 cfs @ 11.74 hrs, Volume= 0.104 af
 Primary = 7.49 cfs @ 12.40 hrs, Volume= 1.756 af
 Routed to Link DP-1 : Southeast Wetlands

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 122.69' @ 12.40 hrs Surf.Area= 54,991 sf Storage= 15,183 cf

Plug-Flow detention time= 10.5 min calculated for 1.860 af (100% of inflow)
 Center-of-Mass det. time= 10.4 min (800.4 - 790.0)

Volume	Invert	Avail.Storage	Storage Description
#1	122.00'	21,932 cf	Custom Stage Data (Prismatic) Listed below (Recalc) 54,991 cf Overall - 160 cf Embedded = 54,831 cf x 40.0% Voids
#2	122.50'	160 cf	12.0" W x 1.0" H Box Pipe Storage x 16 Inside #1 L= 120.0'
22,092 cf			Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
122.00	54,991	0	0
123.00	54,991	54,991	54,991

Device	Routing	Invert	Outlet Devices
#1	Primary	120.00'	18.0" Round Culvert L= 50.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 120.00' / 119.00' S= 0.0200 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.77 sf
#2	Discarded	122.00'	0.270 in/hr Exfiltration over Surface area
#3	Device 1	121.00'	12.0" Round Culvert X 2.00 L= 100.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 121.00' / 120.50' S= 0.0050 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#4	Device 3	122.00'	50.000 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.34 cfs @ 11.74 hrs HW=122.01' (Free Discharge)
 ↳ **2=Exfiltration** (Exfiltration Controls 0.34 cfs)

Primary OutFlow Max=7.49 cfs @ 12.40 hrs HW=122.69' (Free Discharge)
 ↳ **1=Culvert** (Passes 7.49 cfs of 11.84 cfs potential flow)
 ↳ ↳ **3=Culvert** (Barrel Controls 7.49 cfs @ 4.77 fps)
 ↳ ↳ ↳ **4=Exfiltration** (Passes 7.49 cfs of 63.65 cfs potential flow)

Stage-Area-Storage for Pond 1P: Track Field East

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
122.00	54,991	0	122.52	54,991	11,461
122.01	54,991	220	122.53	54,991	11,693
122.02	54,991	440	122.54	54,991	11,924
122.03	54,991	660	122.55	54,991	12,156
122.04	54,991	880	122.56	54,991	12,387
122.05	54,991	1,100	122.57	54,991	12,619
122.06	54,991	1,320	122.58	54,991	12,850
122.07	54,991	1,540	122.59	54,991	13,074
122.08	54,991	1,760	122.60	54,991	13,294
122.09	54,991	1,980	122.61	54,991	13,514
122.10	54,991	2,200	122.62	54,991	13,734
122.11	54,991	2,420	122.63	54,991	13,954
122.12	54,991	2,640	122.64	54,991	14,174
122.13	54,991	2,860	122.65	54,991	14,394
122.14	54,991	3,079	122.66	54,991	14,614
122.15	54,991	3,299	122.67	54,991	14,834
122.16	54,991	3,519	122.68	54,991	15,054
122.17	54,991	3,739	122.69	54,991	15,274
122.18	54,991	3,959	122.70	54,991	15,493
122.19	54,991	4,179	122.71	54,991	15,713
122.20	54,991	4,399	122.72	54,991	15,933
122.21	54,991	4,619	122.73	54,991	16,153
122.22	54,991	4,839	122.74	54,991	16,373
122.23	54,991	5,059	122.75	54,991	16,593
122.24	54,991	5,279	122.76	54,991	16,813
122.25	54,991	5,499	122.77	54,991	17,033
122.26	54,991	5,719	122.78	54,991	17,253
122.27	54,991	5,939	122.79	54,991	17,473
122.28	54,991	6,159	122.80	54,991	17,693
122.29	54,991	6,379	122.81	54,991	17,913
122.30	54,991	6,599	122.82	54,991	18,133
122.31	54,991	6,819	122.83	54,991	18,353
122.32	54,991	7,039	122.84	54,991	18,573
122.33	54,991	7,259	122.85	54,991	18,793
122.34	54,991	7,479	122.86	54,991	19,013
122.35	54,991	7,699	122.87	54,991	19,233
122.36	54,991	7,919	122.88	54,991	19,453
122.37	54,991	8,139	122.89	54,991	19,673
122.38	54,991	8,359	122.90	54,991	19,893
122.39	54,991	8,579	122.91	54,991	20,113
122.40	54,991	8,799	122.92	54,991	20,333
122.41	54,991	9,019	122.93	54,991	20,553
122.42	54,991	9,238	122.94	54,991	20,773
122.43	54,991	9,458	122.95	54,991	20,993
122.44	54,991	9,678	122.96	54,991	21,213
122.45	54,991	9,898	122.97	54,991	21,433
122.46	54,991	10,118	122.98	54,991	21,652
122.47	54,991	10,338	122.99	54,991	21,872
122.48	54,991	10,558	123.00	54,991	22,092
122.49	54,991	10,778			
122.50	54,991	10,998			
122.51	54,991	11,230			

Summary for Pond 2P: Track Field West

[58] Hint: Peaked 0.76' above defined flood level

Inflow Area = 2.124 ac, 39.83% Impervious, Inflow Depth = 6.57" for 100-yr event
 Inflow = 15.58 cfs @ 12.08 hrs, Volume= 1.162 af
 Outflow = 6.73 cfs @ 12.27 hrs, Volume= 1.163 af, Atten= 57%, Lag= 11.4 min
 Discarded = 0.34 cfs @ 11.89 hrs, Volume= 0.069 af
 Primary = 6.39 cfs @ 12.27 hrs, Volume= 1.094 af
 Routed to Pond 3P : Extended Detention Basin

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 122.26' @ 12.27 hrs Surf.Area= 54,991 sf Storage= 5,719 cf
 Flood Elev= 121.50' Storage= 0 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 3.9 min (788.4 - 784.5)

Volume	Invert	Avail.Storage	Storage Description
#1	122.00'	21,932 cf	Custom Stage Data (Prismatic) Listed below (Recalc) 54,991 cf Overall - 160 cf Embedded = 54,831 cf x 40.0% Voids
#2	122.50'	160 cf	12.0" W x 1.0" H Box Pipe Storage x 16 Inside #1 L= 120.0'
		22,092 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
122.00	54,991	0	0
123.00	54,991	54,991	54,991

Device	Routing	Invert	Outlet Devices
#1	Primary	120.00'	18.0" Round Culvert L= 50.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 120.00' / 119.00' S= 0.0200 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.77 sf
#2	Discarded	122.00'	0.270 in/hr Exfiltration over Surface area
#3	Device 1	121.00'	12.0" Round Culvert X 2.00 L= 100.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 121.00' / 120.50' S= 0.0050 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#4	Device 3	122.00'	50.000 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.34 cfs @ 11.89 hrs HW=122.01' (Free Discharge)
 ↳ **2=Exfiltration** (Exfiltration Controls 0.34 cfs)

Primary OutFlow Max=6.39 cfs @ 12.27 hrs HW=122.26' (Free Discharge)
 ↳ **1=Culvert** (Passes 6.39 cfs of 10.46 cfs potential flow)
 ↳ ↳ **3=Culvert** (Barrel Controls 6.39 cfs @ 4.16 fps)
 ↳ ↳ ↳ **4=Exfiltration** (Passes 6.39 cfs of 63.65 cfs potential flow)

Stage-Area-Storage for Pond 2P: Track Field West

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
122.00	54,991	0	122.52	54,991	11,461
122.01	54,991	220	122.53	54,991	11,693
122.02	54,991	440	122.54	54,991	11,924
122.03	54,991	660	122.55	54,991	12,156
122.04	54,991	880	122.56	54,991	12,387
122.05	54,991	1,100	122.57	54,991	12,619
122.06	54,991	1,320	122.58	54,991	12,850
122.07	54,991	1,540	122.59	54,991	13,074
122.08	54,991	1,760	122.60	54,991	13,294
122.09	54,991	1,980	122.61	54,991	13,514
122.10	54,991	2,200	122.62	54,991	13,734
122.11	54,991	2,420	122.63	54,991	13,954
122.12	54,991	2,640	122.64	54,991	14,174
122.13	54,991	2,860	122.65	54,991	14,394
122.14	54,991	3,079	122.66	54,991	14,614
122.15	54,991	3,299	122.67	54,991	14,834
122.16	54,991	3,519	122.68	54,991	15,054
122.17	54,991	3,739	122.69	54,991	15,274
122.18	54,991	3,959	122.70	54,991	15,493
122.19	54,991	4,179	122.71	54,991	15,713
122.20	54,991	4,399	122.72	54,991	15,933
122.21	54,991	4,619	122.73	54,991	16,153
122.22	54,991	4,839	122.74	54,991	16,373
122.23	54,991	5,059	122.75	54,991	16,593
122.24	54,991	5,279	122.76	54,991	16,813
122.25	54,991	5,499	122.77	54,991	17,033
122.26	54,991	5,719	122.78	54,991	17,253
122.27	54,991	5,939	122.79	54,991	17,473
122.28	54,991	6,159	122.80	54,991	17,693
122.29	54,991	6,379	122.81	54,991	17,913
122.30	54,991	6,599	122.82	54,991	18,133
122.31	54,991	6,819	122.83	54,991	18,353
122.32	54,991	7,039	122.84	54,991	18,573
122.33	54,991	7,259	122.85	54,991	18,793
122.34	54,991	7,479	122.86	54,991	19,013
122.35	54,991	7,699	122.87	54,991	19,233
122.36	54,991	7,919	122.88	54,991	19,453
122.37	54,991	8,139	122.89	54,991	19,673
122.38	54,991	8,359	122.90	54,991	19,893
122.39	54,991	8,579	122.91	54,991	20,113
122.40	54,991	8,799	122.92	54,991	20,333
122.41	54,991	9,019	122.93	54,991	20,553
122.42	54,991	9,238	122.94	54,991	20,773
122.43	54,991	9,458	122.95	54,991	20,993
122.44	54,991	9,678	122.96	54,991	21,213
122.45	54,991	9,898	122.97	54,991	21,433
122.46	54,991	10,118	122.98	54,991	21,652
122.47	54,991	10,338	122.99	54,991	21,872
122.48	54,991	10,558	123.00	54,991	22,092
122.49	54,991	10,778			
122.50	54,991	10,998			
122.51	54,991	11,230			

Summary for Pond 3P: Extended Detention Basin

[79] Warning: Submerged Pond 2P Primary device # 1 INLET by 0.27'

[79] Warning: Submerged Pond 5P Primary device # 1 INLET by 0.27'

Inflow Area = 7.131 ac, 16.89% Impervious, Inflow Depth = 5.44" for 100-yr event
 Inflow = 27.42 cfs @ 12.19 hrs, Volume= 3.236 af
 Outflow = 7.34 cfs @ 12.80 hrs, Volume= 3.231 af, Atten= 73%, Lag= 36.6 min
 Primary = 7.34 cfs @ 12.80 hrs, Volume= 3.231 af
 Routed to Link DP-1 : Southeast Wetlands

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 120.27' @ 12.80 hrs Surf.Area= 19,925 sf Storage= 66,303 cf

Plug-Flow detention time= 262.6 min calculated for 3.231 af (100% of inflow)
 Center-of-Mass det. time= 261.7 min (1,068.8 - 807.1)

Volume	Invert	Avail.Storage	Storage Description			
#1	116.00'	70,860 cf	Custom Stage Data (Irregular) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
116.00	11,268	467.0	0	0	11,268	
117.00	12,694	487.0	11,974	11,974	12,860	
118.00	15,214	532.0	13,935	25,909	16,544	
119.00	17,446	574.0	16,317	42,226	20,282	
120.00	19,925	601.0	18,672	60,898	22,874	
120.50	19,925	601.0	9,963	70,860	23,174	

Device	Routing	Invert	Outlet Devices	
#1	Device 2	116.00'	6.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads	
#2	Primary	116.00'	12.0" Round Culvert L= 15.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 116.00' / 115.48' S= 0.0347 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf	
#3	Device 2	119.00'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads	

Primary OutFlow Max=7.34 cfs @ 12.80 hrs HW=120.27' (Free Discharge)

- ↑ **2=Culvert** (Inlet Controls 7.34 cfs @ 9.35 fps)
- ↑ **1=Orifice/Grate** (Passes < 1.90 cfs potential flow)
- ↑ **3=Orifice/Grate** (Passes < 21.72 cfs potential flow)

Stage-Area-Storage for Pond 3P: Extended Detention Basin

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
116.00	11,268	0	118.60	16,535	35,431
116.05	11,337	565	118.65	16,647	36,260
116.10	11,407	1,134	118.70	16,760	37,096
116.15	11,476	1,706	118.75	16,874	37,936
116.20	11,546	2,281	118.80	16,987	38,783
116.25	11,617	2,860	118.85	17,101	39,635
116.30	11,687	3,443	118.90	17,216	40,493
116.35	11,757	4,029	118.95	17,331	41,357
116.40	11,828	4,619	119.00	17,446	42,226
116.45	11,899	5,212	119.05	17,566	43,101
116.50	11,970	5,809	119.10	17,686	43,983
116.55	12,042	6,409	119.15	17,807	44,870
116.60	12,113	7,013	119.20	17,929	45,764
116.65	12,185	7,620	119.25	18,050	46,663
116.70	12,257	8,231	119.30	18,172	47,569
116.75	12,330	8,846	119.35	18,295	48,480
116.80	12,402	9,464	119.40	18,418	49,398
116.85	12,475	10,086	119.45	18,541	50,322
116.90	12,548	10,712	119.50	18,665	51,252
116.95	12,621	11,341	119.55	18,789	52,189
117.00	12,694	11,974	119.60	18,914	53,131
117.05	12,815	12,612	119.65	19,039	54,080
117.10	12,936	13,255	119.70	19,164	55,035
117.15	13,057	13,905	119.75	19,290	55,996
117.20	13,180	14,561	119.80	19,416	56,964
117.25	13,303	15,223	119.85	19,543	57,938
117.30	13,426	15,891	119.90	19,670	58,918
117.35	13,550	16,566	119.95	19,797	59,905
117.40	13,675	17,246	120.00	19,925	60,898
117.45	13,800	17,933	120.05	19,925	61,894
117.50	13,925	18,626	120.10	19,925	62,890
117.55	14,052	19,326	120.15	19,925	63,887
117.60	14,179	20,032	120.20	19,925	64,883
117.65	14,306	20,744	120.25	19,925	65,879
117.70	14,434	21,462	120.30	19,925	66,875
117.75	14,563	22,187	120.35	19,925	67,872
117.80	14,692	22,918	120.40	19,925	68,868
117.85	14,821	23,656	120.45	19,925	69,864
117.90	14,952	24,401	120.50	19,925	70,860
117.95	15,083	25,152			
118.00	15,214	25,909			
118.05	15,322	26,672			
118.10	15,430	27,441			
118.15	15,539	28,215			
118.20	15,648	28,995			
118.25	15,758	29,780			
118.30	15,868	30,571			
118.35	15,978	31,367			
118.40	16,088	32,169			
118.45	16,200	32,976			
118.50	16,311	33,789			
118.55	16,423	34,607			

Summary for Pond 4P: Baseball Field North

[58] Hint: Peaked 0.76' above defined flood level

Inflow Area = 2.452 ac, 13.51% Impervious, Inflow Depth = 5.97" for 100-yr event
 Inflow = 16.77 cfs @ 12.09 hrs, Volume= 1.221 af
 Outflow = 6.79 cfs @ 12.31 hrs, Volume= 1.221 af, Atten= 59%, Lag= 13.2 min
 Discarded = 0.41 cfs @ 11.88 hrs, Volume= 0.086 af
 Primary = 6.38 cfs @ 12.31 hrs, Volume= 1.135 af
 Routed to Link DP-1 : Southeast Wetlands

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 122.26' @ 12.31 hrs Surf.Area= 66,230 sf Storage= 6,776 cf
 Flood Elev= 121.50' Storage= 0 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 4.9 min (802.5 - 797.6)

Volume	Invert	Avail.Storage	Storage Description
#1	122.00'	26,428 cf	Custom Stage Data (Prismatic) Listed below (Recalc) 66,230 cf Overall - 160 cf Embedded = 66,070 cf x 40.0% Voids
#2	122.50'	160 cf	12.0" W x 1.0" H Box Pipe Storage x 16 Inside #1 L= 120.0'
		26,588 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
122.00	66,230	0	0
123.00	66,230	66,230	66,230

Device	Routing	Invert	Outlet Devices
#1	Primary	120.00'	18.0" Round Culvert L= 50.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 120.00' / 119.00' S= 0.0200 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.77 sf
#2	Discarded	122.00'	0.270 in/hr Exfiltration over Surface area
#3	Device 1	121.00'	12.0" Round Culvert X 2.00 L= 100.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 121.00' / 120.50' S= 0.0050 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#4	Device 3	122.00'	50.000 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.41 cfs @ 11.88 hrs HW=122.01' (Free Discharge)
 ↳ **2=Exfiltration** (Exfiltration Controls 0.41 cfs)

Primary OutFlow Max=6.38 cfs @ 12.31 hrs HW=122.26' (Free Discharge)
 ↳ **1=Culvert** (Passes 6.38 cfs of 10.44 cfs potential flow)
 ↳ ↳ **3=Culvert** (Barrel Controls 6.38 cfs @ 4.16 fps)
 ↳ ↳ ↳ **4=Exfiltration** (Passes 6.38 cfs of 76.66 cfs potential flow)

Stage-Area-Storage for Pond 4P: Baseball Field North

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
122.00	66,230	0	122.52	66,230	13,799
122.01	66,230	265	122.53	66,230	14,075
122.02	66,230	530	122.54	66,230	14,352
122.03	66,230	795	122.55	66,230	14,628
122.04	66,230	1,060	122.56	66,230	14,905
122.05	66,230	1,325	122.57	66,230	15,181
122.06	66,230	1,590	122.58	66,230	15,458
122.07	66,230	1,854	122.59	66,230	15,726
122.08	66,230	2,119	122.60	66,230	15,991
122.09	66,230	2,384	122.61	66,230	16,256
122.10	66,230	2,649	122.62	66,230	16,521
122.11	66,230	2,914	122.63	66,230	16,786
122.12	66,230	3,179	122.64	66,230	17,051
122.13	66,230	3,444	122.65	66,230	17,316
122.14	66,230	3,709	122.66	66,230	17,581
122.15	66,230	3,974	122.67	66,230	17,846
122.16	66,230	4,239	122.68	66,230	18,111
122.17	66,230	4,504	122.69	66,230	18,375
122.18	66,230	4,769	122.70	66,230	18,640
122.19	66,230	5,033	122.71	66,230	18,905
122.20	66,230	5,298	122.72	66,230	19,170
122.21	66,230	5,563	122.73	66,230	19,435
122.22	66,230	5,828	122.74	66,230	19,700
122.23	66,230	6,093	122.75	66,230	19,965
122.24	66,230	6,358	122.76	66,230	20,230
122.25	66,230	6,623	122.77	66,230	20,495
122.26	66,230	6,888	122.78	66,230	20,760
122.27	66,230	7,153	122.79	66,230	21,025
122.28	66,230	7,418	122.80	66,230	21,290
122.29	66,230	7,683	122.81	66,230	21,555
122.30	66,230	7,948	122.82	66,230	21,819
122.31	66,230	8,213	122.83	66,230	22,084
122.32	66,230	8,477	122.84	66,230	22,349
122.33	66,230	8,742	122.85	66,230	22,614
122.34	66,230	9,007	122.86	66,230	22,879
122.35	66,230	9,272	122.87	66,230	23,144
122.36	66,230	9,537	122.88	66,230	23,409
122.37	66,230	9,802	122.89	66,230	23,674
122.38	66,230	10,067	122.90	66,230	23,939
122.39	66,230	10,332	122.91	66,230	24,204
122.40	66,230	10,597	122.92	66,230	24,469
122.41	66,230	10,862	122.93	66,230	24,734
122.42	66,230	11,127	122.94	66,230	24,998
122.43	66,230	11,392	122.95	66,230	25,263
122.44	66,230	11,656	122.96	66,230	25,528
122.45	66,230	11,921	122.97	66,230	25,793
122.46	66,230	12,186	122.98	66,230	26,058
122.47	66,230	12,451	122.99	66,230	26,323
122.48	66,230	12,716	123.00	66,230	26,588
122.49	66,230	12,981			
122.50	66,230	13,246			
122.51	66,230	13,522			

Summary for Pond 5P: Baseball Field South

[58] Hint: Peaked 0.60' above defined flood level

Inflow Area = 1.746 ac, 9.42% Impervious, Inflow Depth = 5.50" for 100-yr event
 Inflow = 11.14 cfs @ 12.09 hrs, Volume= 0.801 af
 Outflow = 6.13 cfs @ 12.21 hrs, Volume= 0.801 af, Atten= 45%, Lag= 7.5 min
 Discarded = 0.41 cfs @ 12.00 hrs, Volume= 0.058 af
 Primary = 5.72 cfs @ 12.21 hrs, Volume= 0.742 af
 Routed to Pond 3P : Extended Detention Basin

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 122.10' @ 12.21 hrs Surf.Area= 66,230 sf Storage= 2,641 cf
 Flood Elev= 121.50' Storage= 0 cf

Plug-Flow detention time= 2.1 min calculated for 0.800 af (100% of inflow)
 Center-of-Mass det. time= 2.1 min (809.0 - 806.9)

Volume	Invert	Avail.Storage	Storage Description
#1	122.00'	26,428 cf	Custom Stage Data (Prismatic) Listed below (Recalc) 66,230 cf Overall - 160 cf Embedded = 66,070 cf x 40.0% Voids
#2	122.50'	160 cf	12.0" W x 1.0" H Box Pipe Storage x 16 Inside #1 L= 120.0'
		26,588 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
122.00	66,230	0	0
123.00	66,230	66,230	66,230

Device	Routing	Invert	Outlet Devices
#1	Primary	120.00'	18.0" Round Culvert L= 50.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 120.00' / 119.00' S= 0.0200 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.77 sf
#2	Discarded	122.00'	0.270 in/hr Exfiltration over Surface area
#3	Device 1	121.00'	12.0" Round Culvert X 2.00 L= 100.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 121.00' / 120.50' S= 0.0050 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#4	Device 3	122.00'	50.000 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.41 cfs @ 12.00 hrs HW=122.01' (Free Discharge)
 ↳ **2=Exfiltration** (Exfiltration Controls 0.41 cfs)

Primary OutFlow Max=5.72 cfs @ 12.21 hrs HW=122.10' (Free Discharge)
 ↳ **1=Culvert** (Passes 5.72 cfs of 9.89 cfs potential flow)
 ↳ ↳ **3=Culvert** (Barrel Controls 5.72 cfs @ 4.13 fps)
 ↳ ↳ ↳ **4=Exfiltration** (Passes 5.72 cfs of 76.66 cfs potential flow)

Stage-Area-Storage for Pond 5P: Baseball Field South

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
122.00	66,230	0	122.52	66,230	13,799
122.01	66,230	265	122.53	66,230	14,075
122.02	66,230	530	122.54	66,230	14,352
122.03	66,230	795	122.55	66,230	14,628
122.04	66,230	1,060	122.56	66,230	14,905
122.05	66,230	1,325	122.57	66,230	15,181
122.06	66,230	1,590	122.58	66,230	15,458
122.07	66,230	1,854	122.59	66,230	15,726
122.08	66,230	2,119	122.60	66,230	15,991
122.09	66,230	2,384	122.61	66,230	16,256
122.10	66,230	2,649	122.62	66,230	16,521
122.11	66,230	2,914	122.63	66,230	16,786
122.12	66,230	3,179	122.64	66,230	17,051
122.13	66,230	3,444	122.65	66,230	17,316
122.14	66,230	3,709	122.66	66,230	17,581
122.15	66,230	3,974	122.67	66,230	17,846
122.16	66,230	4,239	122.68	66,230	18,111
122.17	66,230	4,504	122.69	66,230	18,375
122.18	66,230	4,769	122.70	66,230	18,640
122.19	66,230	5,033	122.71	66,230	18,905
122.20	66,230	5,298	122.72	66,230	19,170
122.21	66,230	5,563	122.73	66,230	19,435
122.22	66,230	5,828	122.74	66,230	19,700
122.23	66,230	6,093	122.75	66,230	19,965
122.24	66,230	6,358	122.76	66,230	20,230
122.25	66,230	6,623	122.77	66,230	20,495
122.26	66,230	6,888	122.78	66,230	20,760
122.27	66,230	7,153	122.79	66,230	21,025
122.28	66,230	7,418	122.80	66,230	21,290
122.29	66,230	7,683	122.81	66,230	21,555
122.30	66,230	7,948	122.82	66,230	21,819
122.31	66,230	8,213	122.83	66,230	22,084
122.32	66,230	8,477	122.84	66,230	22,349
122.33	66,230	8,742	122.85	66,230	22,614
122.34	66,230	9,007	122.86	66,230	22,879
122.35	66,230	9,272	122.87	66,230	23,144
122.36	66,230	9,537	122.88	66,230	23,409
122.37	66,230	9,802	122.89	66,230	23,674
122.38	66,230	10,067	122.90	66,230	23,939
122.39	66,230	10,332	122.91	66,230	24,204
122.40	66,230	10,597	122.92	66,230	24,469
122.41	66,230	10,862	122.93	66,230	24,734
122.42	66,230	11,127	122.94	66,230	24,998
122.43	66,230	11,392	122.95	66,230	25,263
122.44	66,230	11,656	122.96	66,230	25,528
122.45	66,230	11,921	122.97	66,230	25,793
122.46	66,230	12,186	122.98	66,230	26,058
122.47	66,230	12,451	122.99	66,230	26,323
122.48	66,230	12,716	123.00	66,230	26,588
122.49	66,230	12,981			
122.50	66,230	13,246			
122.51	66,230	13,522			

Summary for Pond 6P: Infiltration Trench

Inflow Area = 0.681 ac, 82.09% Impervious, Inflow Depth = 7.40" for 100-yr event
 Inflow = 5.34 cfs @ 12.08 hrs, Volume= 0.420 af
 Outflow = 5.33 cfs @ 12.09 hrs, Volume= 0.420 af, Atten= 0%, Lag= 0.2 min
 Discarded = 0.02 cfs @ 3.36 hrs, Volume= 0.075 af
 Primary = 0.27 cfs @ 12.09 hrs, Volume= 0.168 af
 Routed to Link DP-1 : Southeast Wetlands
 Secondary = 5.04 cfs @ 12.09 hrs, Volume= 0.177 af
 Routed to Link DP-2 : West Wetland

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 121.90' @ 12.09 hrs Surf.Area= 0.057 ac Storage= 0.067 af

Plug-Flow detention time= 248.6 min calculated for 0.420 af (100% of inflow)
 Center-of-Mass det. time= 248.5 min (1,009.5 - 761.0)

Volume	Invert	Avail.Storage	Storage Description
#1	119.00'	0.069 af	5.00'W x 100.00'L x 3.00'H Prismatoid x 5 0.172 af Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Secondary	121.80'	50.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)
#2	Discarded	119.00'	0.270 in/hr Exfiltration over Surface area
#3	Primary	121.00'	4.0" Round Culvert L= 150.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 121.00' / 119.50' S= 0.0100 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf
#4	Device 3	121.00'	50.000 in/hr Exfiltration over Wetted area above 121.00' Excluded Wetted area = 0.106 ac

Discarded OutFlow Max=0.02 cfs @ 3.36 hrs HW=119.03' (Free Discharge)
 ↳2=Exfiltration (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.27 cfs @ 12.09 hrs HW=121.90' (Free Discharge)
 ↳3=Culvert (Barrel Controls 0.27 cfs @ 3.13 fps)
 ↳4=Exfiltration (Passes 0.27 cfs of 1.09 cfs potential flow)

Secondary OutFlow Max=4.99 cfs @ 12.09 hrs HW=121.90' (Free Discharge)
 ↳1=Sharp-Crested Rectangular Weir(Weir Controls 4.99 cfs @ 1.02 fps)

Stage-Area-Storage for Pond 6P: Infiltration Trench

Elevation (feet)	Surface (acres)	Wetted (acres)	Storage (acre-feet)	Elevation (feet)	Surface (acres)	Wetted (acres)	Storage (acre-feet)
119.00	0.057	0.057	0.000	121.60	0.057	0.120	0.060
119.05	0.057	0.059	0.001	121.65	0.057	0.121	0.061
119.10	0.057	0.060	0.002	121.70	0.057	0.122	0.062
119.15	0.057	0.061	0.003	121.75	0.057	0.124	0.063
119.20	0.057	0.062	0.005	121.80	0.057	0.125	0.064
119.25	0.057	0.063	0.006	121.85	0.057	0.126	0.065
119.30	0.057	0.065	0.007	121.90	0.057	0.127	0.067
119.35	0.057	0.066	0.008	121.95	0.057	0.129	0.068
119.40	0.057	0.067	0.009	122.00	0.057	0.130	0.069
119.45	0.057	0.068	0.010				
119.50	0.057	0.069	0.011				
119.55	0.057	0.071	0.013				
119.60	0.057	0.072	0.014				
119.65	0.057	0.073	0.015				
119.70	0.057	0.074	0.016				
119.75	0.057	0.075	0.017				
119.80	0.057	0.077	0.018				
119.85	0.057	0.078	0.020				
119.90	0.057	0.079	0.021				
119.95	0.057	0.080	0.022				
120.00	0.057	0.081	0.023				
120.05	0.057	0.083	0.024				
120.10	0.057	0.084	0.025				
120.15	0.057	0.085	0.026				
120.20	0.057	0.086	0.028				
120.25	0.057	0.088	0.029				
120.30	0.057	0.089	0.030				
120.35	0.057	0.090	0.031				
120.40	0.057	0.091	0.032				
120.45	0.057	0.092	0.033				
120.50	0.057	0.094	0.034				
120.55	0.057	0.095	0.036				
120.60	0.057	0.096	0.037				
120.65	0.057	0.097	0.038				
120.70	0.057	0.098	0.039				
120.75	0.057	0.100	0.040				
120.80	0.057	0.101	0.041				
120.85	0.057	0.102	0.042				
120.90	0.057	0.103	0.044				
120.95	0.057	0.104	0.045				
121.00	0.057	0.106	0.046				
121.05	0.057	0.107	0.047				
121.10	0.057	0.108	0.048				
121.15	0.057	0.109	0.049				
121.20	0.057	0.110	0.051				
121.25	0.057	0.112	0.052				
121.30	0.057	0.113	0.053				
121.35	0.057	0.114	0.054				
121.40	0.057	0.115	0.055				
121.45	0.057	0.116	0.056				
121.50	0.057	0.118	0.057				
121.55	0.057	0.119	0.059				

Summary for Link DP-1: Southeast Wetlands

Inflow Area = 17.708 ac, 27.70% Impervious, Inflow Depth = 5.68" for 100-yr event
Inflow = 36.80 cfs @ 12.14 hrs, Volume= 8.379 af
Primary = 36.80 cfs @ 12.14 hrs, Volume= 8.379 af, Atten= 0%, Lag= 0.0 min

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

Summary for Link DP-2: West Wetland

Inflow Area = 1.110 ac, 20.49% Impervious, Inflow Depth = 7.65" for 100-yr event
Inflow = 9.19 cfs @ 12.12 hrs, Volume= 0.707 af
Primary = 9.19 cfs @ 12.12 hrs, Volume= 0.707 af, Atten= 0%, Lag= 0.0 min

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

Standard 4

*Long Term Pollution Prevention Plan &
Operation and Maintenance Plan*

NECC Athletic Field Renovation

LONG TERM POLLUTION PREVENTION AND OPERATION AND MAINTENANCE PLAN

As required by Standards 4 and 9 of the Storm Water Management Handbook, this Long-Term Pollution Prevention and Operation and Maintenance Plan have been developed for source control and pollution prevention at the site after construction.

MAINTENANCE RESPONSIBILITY

The responsibility of the Long-Term Pollution Prevention and Operation and Maintenance Plan will be the responsibility of the Owner.

GOOD HOUSEKEEPING PRACTICES

The site to be kept clean of trash and debris at all times. Trash, junk, etc. is not to be left outside and will be subject to removal at the owner's expense.

REQUIREMENTS FOR ROUTINE INSPECTIONS AND MAINTENANCE OF STORM WATER BMPs

All storm water BMPs are to be inspected and maintained as follows:

Deep Sump Hooded Catch Basins

Regular maintenance is essential. Deep sump catch basins remain effective at removing pollutants only if they are cleaned out regularly. Inspect monthly and at the end of the foliage and snow removal seasons. Sediments shall be removed four times per year or whenever the depth of the deposits in the catch basin sump is greater than or equal to one foot from the bottom of the basin.

Drainage Manholes

Inspect drainage manhole locations monthly for the first three months after construction to ensure proper functioning and correct any areas that have settled or experienced washouts. Inspect drain manholes annually after initial three-month period. Annual inspections should be supplemented after large storms, when washouts may occur.

Detention Basin

- Detention basins should be inspected at least twice a year to ensure proper
- stabilization and function.
- Light equipment, which will not compact the underlying soil, should be used to remove the top layer. Inspect extended dry detention basins at least once per year to ensure that the basins are operating as intended.
- Inspect detention basins during and after major storms to
- determine if the basin is meeting the expected detention times.
- Examine the outlet structure for evidence of clogging or outflow release velocities that are greater than design flow. Potential problems that should be checked include: subsidence, erosion, cracking or tree growth on the embankment; damage to the emergency spillway; sediment accumulation around the outlet; inadequacy of the

inlet/outlet channel erosion control measures; changes in the condition of the pilot channel; and erosion within the basin and banks. Make any

- necessary repairs immediately.
- During inspections, note any changes to the extended dry detention basin or the contributing watershed, because these could affect basin performance.
- Mow the upper-stage, side slopes, embankment, and emergency spillway at least twice per year. Also remove trash and debris at this time.
- Remove sediment from the extended dry detention basin as necessary, but at least once every 5 years. Providing an on-site sediment disposal area will reduce the overall sediment removal costs.

Stormwater Outfalls

- Inspect outfall locations monthly for the first three months after construction to ensure proper functioning and correct any areas that have settled or experienced washouts.
- Inspect outfalls annually after initial three month period.
- Annual inspections should be supplemented after large storms, when washouts may occur.

Infiltration Trench

- Inspect and clean pretreatment BMPs every six months and after every major storm event (2 year return frequency). Check inlet and outlet pipes to determine if they are clogged. Remove accumulated sediment, trash, debris, leaves and grass clippings from mowing. Remove tree seedlings, before they become firmly established.
- Inspect the infiltration trench after the first several rainfall events, after all major storms, and on regularly scheduled dates every six months. If the top of the trench is grassed, it must be mowed on a seasonal basis. Grass height must be maintained to be no more than four inches. Routinely remove grass clippings leaves and accumulated sediment from the surface of the trench.

Contech STC 450i Water Quality Unit

The Contech STC 450i Water Quality Unit targets hydrocarbons and total suspended solids (TSS) in stormwater runoff. It improves water quality by removing contaminants through the gravitational settling of fine sediments and floatation of hydrocarbons while preventing the re-suspension or scour of previously captured pollutants. CDS Units shall be inspected monthly and maintained quarterly or as necessary.

PROVISIONS FOR MAINTENANCE OF LAWNS, GARDENS AND OTHER LANDSCAPE AREAS

Proper maintenance of vegetated areas can prevent the pollution of stormwater runoff by controlling the source of pollutants such as suspended sediments, excess nutrients, and chemicals from landscape care products. Practices that should be followed under the regular maintenance of the vegetated landscape include:

- Inspect planted areas on a semi-annual basis and remove any litter.
- Maintain planted areas adjacent to pavement to prevent soil washout.
- Immediately clean any soil deposited on pavement.
- Re-seed bare areas; install appropriate erosion control measures when native soil is exposed or erosion channels are forming.
- Plant alternative mixture of grass species in the event of unsuccessful establishment.
- The grass vegetation should be cut to a height between three and four inches.
- Pesticide/Herbicide Usage – No pesticides are to be used unless a single spot treatment is required for a specific control application.
- Fertilizer usage should be avoided. If deemed necessary, slow release fertilizer should be used. Fertilizer may be used to begin the establishment of vegetation in bare or damaged areas, but should not be applied on a regular basis unless necessary.
- Fertilizers shall be phosphorous free

SNOW DISPOSAL AND PLOWING

The purpose of the snow and snowmelt management plan is to provide guidelines regarding snow disposal site selection, site preparation and maintenance that are acceptable to the Department of Environmental Protection. For the areas that require snow removal, snow storage onsite will largely be accomplished by using pervious upland areas along the shoulder of the roadway as windrowed by plows. No snow shall be pushed into the detention ponds. Any excess snow will be trucked off-site.

- Avoid dumping of snow into any water body, including coastal, rivers, ponds, or wetlands. In addition to water quality impacts and flooding, snow disposed of in open water can cause navigational hazards when it freezes into ice blocks.
- Avoid disposing of snow on top of storm drain catch basins or in storm water basins. Snow combined with sand and debris may block a storm drainage system, causing localized flooding. A high volume of sand, sediment, and litter released from melting snow also may be quickly transported through the system into surface water.

SALT AND DEICING CHEMICALS

The amount of salt and deicing chemicals to be used on the site shall be reduced to the minimum amount needed to provide safe pedestrian and vehicular travel. The following practices should be followed to control the amount of salt and deicing materials that come into contact with stormwater runoff:

- Devices used for spreading salt and deicing chemicals should be capable of varying the rate of application based on the site specific conditions.

- Sand and salt should be stockpiled under covered storage facilities that prevent precipitation and adjacent runoff from coming in contact with the deicing materials

STREET SWEEPING SCHEDULES

There are three types of sweepers: Mechanical, Regenerative Air and Vacuum Filter.

1. Mechanical – Mechanical sweepers use brooms or rotary brushes to scour the pavement.
2. Regenerative Air – These sweepers blow air onto the road or parking lot surface, causing fines to rise where they are vacuumed.
3. Vacuum Filter – These sweepers remove fines along roads. Two general types of vacuum filter sweepers are available – wet and dry. The dry type uses a broom in combination with the vacuum. The wet type uses water for dust suppression.

Regardless of the type chosen, the efficiency of street sweeping is increased when sweepers are operated in tandem.

This project has not included street sweeping as part of the TSS removal calculations. However, it is recommended that street sweeping of the parking areas occur four times a year, including once after the spring snow melt.

REUSE AND DISPOSAL OF STREET SWEEPINGS

Once removed from paved surfaces, the sweepings must be handled and disposed of properly. Mass DEP's Bureau of Waste Prevention has issued a written policy regarding the reuse and disposal of street sweepings. These sweepings are regulated as a solid waste, and can be used in three ways:

- In one of the ways already approved by Mass DEP (e.g., daily cover in a landfill, additive to compost, fill in a public way)
- If approved under a Beneficial Use Determination
- Disposed in a landfill

TRAINING OF STAFF OR PERSONNEL INVOLVED WITH IMPLEMENTING LONG-TERM POLLUTION PREVENTION PLAN

The Long-Term Pollution Prevention Plan is to be implemented by property owner of the site. Trained and, if required, licensed Professionals are to be hired by the owner as applicable to implement the Long-Term Pollution Prevention Plan.

LIST OF EMERGENCY CONTACTS FOR IMPLEMENTING LONG-TERM POLLUTION PREVENTION PLAN

The Owner will be required to maintain an updated list of Emergency Contacts for the site. This list will be provided during construction.

POST CONSTRUCTION PHASE INSPECTION SCHEDULE AND EVALUATION CHECKLIST

Inspection Date	Inspector	BMP Inspected	Inspection Frequency Requirements	Comments	Recommendation	Follow-up Inspection Required (yes/no)
		Catch Basins	Monthly			
		Extended Dry Detention Basin	Monthly First Year Spring/Fall After			
		Contech STC 450i	Four Times a Year			
		Outfalls	Monthly First 3 Months Annually After			
		Trench Drain	Every 6 Months			

1. Refer to Massachusetts Stormwater Handbook Volume Two: Technical Handbook (February 2008) for recommendations regarding frequency for inspections and maintenance of specific BMP's.
2. Inspections to be conducted by a qualified professional such as an environmental scientists or civil engineer.
3. Limited or no use of sodium chloride salts, fertilizers or pesticides recommended.

Other Notes: (Include deviations from Conservation Commission Approvals, Planning Board Approvals and Approved Plans)

Water Quality Volume and Phosphorous Removal

Required Water Quality Volume

Total Imp Area = 116,963 sf

Runoff Depth= 1 in

WQV = Impervious Area x Runoff Depth = 116,963 sf x 1 in x (1 ft/12 in)

WQV = 9,747 cf

Provided Water Quality Volume

Baseball Field= 26,492 cf (Volume of gravel reservoir below panel drains)

Track Field= 21,996 cf (Volume of gravel reservoir below panel drains)

Inf Trench= 600 cf

WQV = 49,088 cf

Required TSS and Phosphorus Removal

Total Imp Area = 116,963 sf

Runoff Depth= 1 in

TSS & TP = Impervious Area x Runoff Depth = 116,963 sf x 1 in x (1 ft/12 in)

TSS & TP = 9,747 cf

Provided TSS and Phosphorus Removal

Baseball Field= 26,492 cf (Volume of gravel reservoir below panel drains)

Track Field= 21,996 cf (Volume of gravel reservoir below panel drains)

Inf Trench= 600 cf

TSS & TP = 49,088 cf

Total Suspended Solid (TSS Removal) Worksheets

INSTRUCTIONS:

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Version 1, Automated: Mar. 4, 2008

Location:

	B	C	D	E	F
	BMP ¹	TSS Removal Rate ¹	Starting TSS Load*	Amount Removed (C*D)	Remaining Load (D-E)
TSS Removal Calculation Worksheet	Infiltration Trench	0.80	1.00	0.80	0.20
		0.00	0.20	0.00	0.20
		0.00	0.20	0.00	0.20
		0.00	0.20	0.00	0.20
		0.00	0.20	0.00	0.20

Total TSS Removal =

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

Project:
 Prepared By:
 Date:

*Equals remaining load from previous BMP (E) which enters the BMP

INSTRUCTIONS:

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Version 1, Automated: Mar. 4, 2008

Location: PR1B - Tack & Field West

	B	C	D	E	F
	BMP ¹	TSS Removal Rate ¹	Starting TSS Load*	Amount Removed (C*D)	Remaining Load (D-E)
TSS Removal Calculation Worksheet	Infiltration Trench	0.80	1.00	0.80	0.20
	Extended Dry Detention Basin	0.50	0.20	0.10	0.10
		0.00	0.10	0.00	0.10
		0.00	0.10	0.00	0.10
		0.00	0.10	0.00	0.10

Total TSS Removal =

90%

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

Project: NECC Athletic Fields
 Prepared By: CG
 Date: 2/26/2026

*Equals remaining load from previous BMP (E) which enters the BMP

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

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

Location: PR2 - North of Field

TSS Removal Calculation Worksheet

A BMP ¹	B TSS Removal Rate ¹	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
WQU 302	0.98	1.00	0.98	0.02

Total TSS Removal =

98%

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

Project: NECC Athletic Fields
 Prepared By: CG
 Date: 02/26/2026

*Equals remaining load from previous BMP (E) which enters the BMP

INSTRUCTIONS:

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Version 1, Automated: Mar. 4, 2008

Location:

	B	C	D	E	F
	BMP ¹	TSS Removal Rate ¹	Starting TSS Load*	Amount Removed (C*D)	Remaining Load (D-E)
TSS Removal Calculation Worksheet	Infiltration Trench	0.80	1.00	0.80	0.20
		0.00	0.20	0.00	0.20
		0.00	0.20	0.00	0.20
		0.00	0.20	0.00	0.20
		0.00	0.20	0.00	0.20

Total TSS Removal =

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

Project:
 Prepared By:
 Date:

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
 1. From MassDEP Stormwater Handbook Vol. 1

INSTRUCTIONS:

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Version 1, Automated: Mar. 4, 2008

Location:

	B	C	D	E	F
	BMP ¹	TSS Removal Rate ¹	Starting TSS Load*	Amount Removed (C*D)	Remaining Load (D-E)
TSS Removal Calculation Worksheet	Infiltration Trench	0.80	1.00	0.80	0.20
	Extended Dry Detention Basin	0.50	0.20	0.10	0.10
		0.00	0.10	0.00	0.10
		0.00	0.10	0.00	0.10
		0.00	0.10	0.00	0.10

Total TSS Removal =

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

Project:
 Prepared By:
 Date:

*Equals remaining load from previous BMP (E) which enters the BMP

INSTRUCTIONS:

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Version 1, Automated: Mar. 4, 2008

Location:

	B	C	D	E	F
	BMP ¹	TSS Removal Rate ¹	Starting TSS Load*	Amount Removed (C*D)	Remaining Load (D-E)
TSS Removal Calculation Worksheet	Rain Garden	0.90	1.00	0.90	0.10
		0.00	0.10	0.00	0.10
		0.00	0.10	0.00	0.10
		0.00	0.10	0.00	0.10
		0.00	0.10	0.00	0.10

Total TSS Removal =

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

Project:
 Prepared By:
 Date:

*Equals remaining load from previous BMP (E) which enters the BMP

INSTRUCTIONS:

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Version 1, Automated: Mar. 4, 2008

Location: PR5 - Tennis Courts

	B	C	D	E	F
	BMP ¹	TSS Removal Rate ¹	Starting TSS Load*	Amount Removed (C*D)	Remaining Load (D-E)
TSS Removal Calculation Worksheet	Infiltration Trench	0.80	1.00	0.80	0.20
		0.00	0.20	0.00	0.20
		0.00	0.20	0.00	0.20
		0.00	0.20	0.00	0.20
		0.00	0.20	0.00	0.20

Total TSS Removal =

80%

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

Project: NECC Athletic Fields
 Prepared By: CG
 Date: 2/26/2026

*Equals remaining load from previous BMP (E) which enters the BMP

INSTRUCTIONS:

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Version 1, Automated: Mar. 4, 2008

Location:

TSS Removal Calculation Worksheet

B	C	D	E	F
BMP ¹	TSS Removal Rate ¹	Starting TSS Load*	Amount Removed (C*D)	Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	0.25	1.00	0.25	0.75
Infiltration Basin	0.80	0.75	0.60	0.15
	0.00	0.15	0.00	0.15
	0.00	0.15	0.00	0.15
	0.00	0.15	0.00	0.15

Total TSS Removal =

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

Project:
 Prepared By:
 Date:

*Equals remaining load from previous BMP (E) which enters the BMP

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

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

Location:

TSS Removal Calculation Worksheet

A BMP ¹	B TSS Removal Rate ¹	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
WQU 204	0.98	1.00	0.02	0.02
Extended Dry Detention Basin	0.50	0.02	0.01	0.01

Total TSS Removal =

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

Project:
 Prepared By:
 Date:

*Equals remaining load from previous BMP (E) which enters the BMP

STC 450i Sizing Reports

Brief Stormceptor Sizing Report - WQU 204

Project Information & Location			
Project Name	NECC Athletic Field Renovation	Project Number	894500
City	Haverhill	State/ Province	Massachusetts
Country	United States of America	Date	2/25/2026
Designer Information		EOR Information (optional)	
Name	David Adams	Name	
Company	Contech Engineered Solutions	Company	Brennan Consulting
Phone #	207-885-6191	Phone #	
Email	dadams@conteches.com	Email	

Stormwater Treatment Recommendation

The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	WQU 204
Target TSS Removal (%)	80
TSS Removal (%) Provided	98
Recommended Stormceptor Model	STC 450i

The recommended Stormceptor Model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

Stormceptor Sizing Summary	
Stormceptor Model	% TSS Removal Provided
STC 450i	98
STC 900	99
STC 1200	99
STC 1800	99
STC 2400	99
STC 3600	100
STC 4800	100
STC 6000	100
STC 7200	100
STC 11000	100
STC 13000	100
STC 16000	100

Sizing Details			
Drainage Area		Water Quality Objective	
Total Area (acres)	0.04	TSS Removal (%)	80.0
Imperviousness %	100.0	Runoff Volume Capture (%)	
Rainfall		Oil Spill Capture Volume (Gal)	
Station Name	BOSTON WSFO AP	Peak Conveyed Flow Rate (CFS)	
State/Province	Massachusetts	Water Quality Flow Rate (CFS)	
Station ID #	0770	Up Stream Storage	
Years of Records	58	Storage (ac-ft)	Discharge (cfs)
Latitude	42°21'38"N	0.000	0.000
Longitude	71°0'38"W	Up Stream Flow Diversion	
		Max. Flow to Stormceptor (cfs)	

Particle Size Distribution (PSD) The selected PSD defines TSS removal		
OK-110		
Particle Diameter (microns)	Distribution %	Specific Gravity
1.0	0.0	2.65
53.0	3.0	2.65
75.0	15.0	2.65
88.0	25.0	2.65
106.0	41.0	2.65
125.0	15.0	2.65
150.0	1.0	2.65
212.0	0.0	2.65

Notes
<ul style="list-style-type: none"> Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules. Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed. For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

For Stormceptor Specifications and Drawings Please Visit:
<https://www.conteches.com/technical-guides/search?filter=1WBC005EYX>

Brief Stormceptor Sizing Report - WQU 302

Project Information & Location			
Project Name	NECC Athletic Field Renovation	Project Number	894500
City	Haverhill	State/ Province	Massachusetts
Country	United States of America	Date	2/25/2026
Designer Information		EOR Information (optional)	
Name	David Adams	Name	
Company	Contech Engineered Solutions	Company	Brennan Consulting
Phone #	207-885-6191	Phone #	
Email	dadams@conteches.com	Email	

Stormwater Treatment Recommendation

The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	WQU 302
Target TSS Removal (%)	80
TSS Removal (%) Provided	98
Recommended Stormceptor Model	STC 450i

The recommended Stormceptor Model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

Stormceptor Sizing Summary	
Stormceptor Model	% TSS Removal Provided
STC 450i	98
STC 900	99
STC 1200	99
STC 1800	99
STC 2400	99
STC 3600	100
STC 4800	100
STC 6000	100
STC 7200	100
STC 11000	100
STC 13000	100
STC 16000	100

Sizing Details			
Drainage Area		Water Quality Objective	
Total Area (acres)	0.04	TSS Removal (%)	80.0
Imperviousness %	100.0	Runoff Volume Capture (%)	
Rainfall		Oil Spill Capture Volume (Gal)	
Station Name	BOSTON WSFO AP	Peak Conveyed Flow Rate (CFS)	
State/Province	Massachusetts	Water Quality Flow Rate (CFS)	
Station ID #	0770	Up Stream Storage	
Years of Records	58	Storage (ac-ft)	Discharge (cfs)
Latitude	42°21'38"N	0.000	0.000
Longitude	71°0'38"W	Up Stream Flow Diversion	
		Max. Flow to Stormceptor (cfs)	

Particle Size Distribution (PSD) The selected PSD defines TSS removal		
OK-110		
Particle Diameter (microns)	Distribution %	Specific Gravity
1.0	0.0	2.65
53.0	3.0	2.65
75.0	15.0	2.65
88.0	25.0	2.65
106.0	41.0	2.65
125.0	15.0	2.65
150.0	1.0	2.65
212.0	0.0	2.65

Notes
<ul style="list-style-type: none"> Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules. Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed. For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

For Stormceptor Specifications and Drawings Please Visit:
<https://www.conteches.com/technical-guides/search?filter=1WBC005EYX>

Brief Stormceptor Sizing Report - WQU 305

Project Information & Location			
Project Name	NECC Athletic Field Renovation	Project Number	894500
City	Haverhill	State/ Province	Massachusetts
Country	United States of America	Date	2/25/2026
Designer Information		EOR Information (optional)	
Name	David Adams	Name	
Company	Contech Engineered Solutions	Company	Brennan Consulting
Phone #	207-885-6191	Phone #	
Email	dadams@conteches.com	Email	

Stormwater Treatment Recommendation

The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	WQU 305
Target TSS Removal (%)	80
TSS Removal (%) Provided	93
Recommended Stormceptor Model	STC 450i

The recommended Stormceptor Model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

Stormceptor Sizing Summary	
Stormceptor Model	% TSS Removal Provided
STC 450i	93
STC 900	96
STC 1200	96
STC 1800	97
STC 2400	98
STC 3600	98
STC 4800	99
STC 6000	99
STC 7200	99
STC 11000	99
STC 13000	99
STC 16000	100

Sizing Details			
Drainage Area		Water Quality Objective	
Total Area (acres)	0.22	TSS Removal (%)	80.0
Imperviousness %	100.0	Runoff Volume Capture (%)	
Rainfall		Oil Spill Capture Volume (Gal)	
Station Name	BOSTON WSFO AP	Peak Conveyed Flow Rate (CFS)	
State/Province	Massachusetts	Water Quality Flow Rate (CFS)	
Station ID #	0770	Up Stream Storage	
Years of Records	58	Storage (ac-ft)	Discharge (cfs)
Latitude	42°21'38"N	0.000	0.000
Longitude	71°0'38"W	Up Stream Flow Diversion	
		Max. Flow to Stormceptor (cfs)	

Particle Size Distribution (PSD) The selected PSD defines TSS removal		
OK-110		
Particle Diameter (microns)	Distribution %	Specific Gravity
1.0	0.0	2.65
53.0	3.0	2.65
75.0	15.0	2.65
88.0	25.0	2.65
106.0	41.0	2.65
125.0	15.0	2.65
150.0	1.0	2.65
212.0	0.0	2.65

Notes
<ul style="list-style-type: none"> Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules. Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed. For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

For Stormceptor Specifications and Drawings Please Visit:
<https://www.conteches.com/technical-guides/search?filter=1WBC005EYX>

Standard 8

*Recommended Construction Period Pollution Prevention
and Erosion and Sedimentation Controls*

NECC ATHLETIC FIELDS RENOVATION

Recommended Construction Period Pollution Prevention and Erosion and Sedimentation Controls

The following erosion and sedimentation controls are for use during the earthwork and construction phases of the project. The following controls are provided as recommendations for the site contractor and do not constitute or replace the final Stormwater Pollution Prevention Plan that must be fully implemented by the Contractor and owner in Compliance with EPA NPDES regulations.

Straw Wattles

Straw Wattles will be placed to trap sediment transported by runoff before it reaches the drainage system or leaves the construction site. Straw rolls will be set at least two inches into the existing ground to minimize undercutting by runoff.

Silt Fencing

In areas where high runoff velocities or high sediment loads are expected, straw wattles will be backed up with silt fencing. This semi-permeable barrier made of a synthetic porous fabric will provide additional protection. The silt fences and hay bale barrier will be replaced as determined by periodic field inspections.

Catch Basin Protection

Newly constructed and existing catch basins will be protected silt sacks throughout construction.

Gravel and Construction Entrance/Exit

A temporary crushed-stone construction entrance/exit will be constructed. A cross slope will be placed in the entrance to direct runoff to a protected catch basin inlet or settling area. If deemed necessary after construction begins, a wash pad may be included to wash off vehicle wheels before leaving the project site.

Temporary Sediment Basins

Temporary sediment basins will be designed either as excavations or bermed stormwater detention structures (depending on grading) that will retain runoff for a sufficient period of time to allow suspended soil particles to settle out prior to discharge. These temporary basins will be located based on construction needs as determined by the contractor and outlet devices will be designed to control velocity and sediment. Points of discharge from sediment basins will be stabilized to minimize erosion.

Slope Stabilization

Stabilization of open soil surfaces will be implemented within 14 days after grading or construction activities have temporarily or permanently ceased, unless there is sufficient snow cover to prohibit implementation. Jute Mesh will be used to minimize erosion on slopes of 3:1 or flatter. Permanent stabilization will be completed with the planting of perennial grasses or legumes. A suitable topsoil, good seedbed preparation, and adequate lime, fertilizer and water will be provided for effective establishment of these vegetative stabilization methods. Mulch will also be used after permanent seeding to protect soil from the impact of falling rain and to increase the capacity of the soil to absorb water.

Maintenance

- The contractor or subcontractor will be responsible for implementing each control shown on the Sedimentation and Erosion Control Plan. In accordance with EPA regulations, the contractor must sign a copy of a certification to verify that a plan has been prepared and that permit regulations are understood.
- The on-site contractor will inspect all sediment and erosion control structures periodically and after each rainfall event. Records of the inspections will be prepared and maintained on-site by the contractor.
- Silt shall be removed from behind barriers if greater than 6-inches deep or as needed.
- Damaged or deteriorated items will be repaired immediately after identification.
- The underside of hay bales should be kept in close contact with the earth and reset as necessary.
- Sediment that is collected in structures shall be disposed of properly and covered if stored on-site.
- Erosion control structures shall remain in place until all disturbed earth has been securely stabilized. After removal of structures, disturbed areas shall be regraded and stabilized as necessary.

The erosion and sediment control plan is included in project plan set.

Construction Practices Maintenance/Evaluation Checklist

Construction Practices Maintenance/ Evaluation Checklist

Inspection Performed By: _____

Date: _____

BMP	Inspection Frequency	Minimum Maintenance and Key Items to Check	Cleaning or Repair Needed (List Items)	Date of Cleaning/Repair	Performed By:
Straw Wattle/Silt Fence	Weekly and after 0.25-inch rainfall	<ul style="list-style-type: none"> • Sediment build up • Ripped/Torn Compost Filter Tube • Undermining of Compost Filter Tube • Broken bales or stakes 	<input type="checkbox"/> Yes <input type="checkbox"/> No		
Construction Entrance	Weekly and after 0.25-inch rainfall	<ul style="list-style-type: none"> • Filled voids • Runoff/sediments into street 	<input type="checkbox"/> Yes <input type="checkbox"/> No		
Silt Sack	Weekly and after 0.25-inch rainfall	<ul style="list-style-type: none"> • Clogged or sediment build-up at surface or in basin 	<input type="checkbox"/> Yes <input type="checkbox"/> No		
Vegetated Slope Stabilization	Weekly and after 0.25-inch rainfall		<input type="checkbox"/> Yes <input type="checkbox"/> No		

Standard 9

Operation and Maintenance Log

Drainage Operation and Maintenance Log

Site Maintenance Supervisor: _____ Date: _____

Routine Response to Rainfall Event ___ in Other _____

BMP	Frequency	Date Performed	Comments
Catch Basins and Drain Manholes	Monthly Inspections		
	Maintenance Quarterly and as necessary		
Stormceptor STC	Monthly for first 3 months/Bi-annually after		
	Maintenance Quarterly and as necessary		
Pavement Areas (parking, driveways, service areas)	Monthly Sweeping		
	Trash & Litter Removal as necessary		
Landscaped & Vegetated Areas	Maintenance as necessary		
Infiltration Trench	Bi-Annual Inspections		
Detention Basin*	Bi-Annual Inspections		
	Mow twice a year		

Inspection Form

***Inspect infiltration basin after each 1" rainfall for the first 3 months after construction.**

Contech STC 450i Maintenance Guide

Stormceptor[®] STC
Operation and Maintenance Guide



Stormceptor Design Notes

- Only the STC 450i is adaptable to function with a catch basin inlet and/or inline pipes.
- Only the Stormceptor models STC 450i to STC 7200 may accommodate multiple inlet pipes.

Inlet and outlet invert elevation differences are as follows:

Inlet and Outlet Pipe Invert Elevations Differences			
Inlet Pipe Configuration	STC 450i	STC 900 to STC 7200	STC 11000 to STC 16000
Single inlet pipe	3 in. (75 mm)	1 in. (25 mm)	3 in. (75 mm)
Multiple inlet pipes	3 in. (75 mm)	3 in. (75 mm)	Only one inlet pipe.

Maximum inlet and outlet pipe diameters:

Inlet/Outlet Configuration	Inlet Unit STC 450i	In-Line Unit STC 900 to STC 7200	Series* STC 11000 to STC 16000
Straight Through	24 inch (600 mm)	42 inch (1050 mm)	60 inch (1500 mm)
Bend (90 degrees)	18 inch (450 mm)	33 inch (825 mm)	33 inch (825 mm)

- The inlet and in-line Stormceptor units can accommodate turns to a maximum of 90 degrees.
- Minimum distance from top of grade to crown is 2 feet (0.6 m)
- Submerged conditions. A unit is submerged when the standing water elevation at the proposed location of the Stormceptor unit is greater than the outlet invert elevation during zero flow conditions. In these cases, please contact your local Stormceptor representative and provide the following information:
 - Top of grade elevation
 - Stormceptor inlet and outlet pipe diameters and invert elevations
 - Standing water elevation
 - Stormceptor head loss, $K = 1.3$ (for submerged condition, $K = 4$)



OPERATION AND MAINTENANCE GUIDE

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1. About Stormceptor

The Stormceptor® STC (Standard Treatment Cell) was developed by Imbrium™ Systems to address the growing need to remove and isolate pollution from the storm drain system before it enters the environment. The Stormceptor STC targets hydrocarbons and total suspended solids (TSS) in stormwater runoff. It improves water quality by removing contaminants through the gravitational settling of fine sediments and floatation of hydrocarbons while preventing the re-suspension or scour of previously captured pollutants.

The development of the Stormceptor STC revolutionized stormwater treatment, and created an entirely new category of environmental technology. Protecting thousands of waterways around the world, the Stormceptor System has set the standard for effective stormwater treatment.

1.1. Patent Information

The Stormceptor technology is protected by the following patents:

- Australia Patent No. 693,164 • 693,164 • 707,133 • 729,096 • 779401
- Austrian Patent No. 289647
- Canadian Patent No 2,009,208 • 2,137,942 • 2,175,277 • 2,180,305 • 2,180,383 • 2,206,338 • 2,327,768 (Pending)
- China Patent No 1168439
- Denmark DK 711879
- German DE 69534021
- Indonesian Patent No 16688
- Japan Patent No 9-11476 (Pending)
- Korea 10-2000-0026101 (Pending)
- Malaysia Patent No PI9701737 (Pending)
- New Zealand Patent No 314646
- United States Patent No 4,985,148 • 5,498,331 • 5,725,760 • 5,753,115 • 5,849,181 • 6,068,765 • 6,371,690
- Stormceptor OSR Patent Pending • Stormceptor LCS Patent Pending

2. Stormceptor Design Overview

2.1. Design Philosophy

The patented Stormceptor System has been designed to focus on the environmental objective of providing long-term pollution control. The unique and innovative Stormceptor design allows for continuous positive treatment of runoff during all rainfall events, while ensuring that all captured pollutants are retained within the system, even during intense storm events.

An integral part of the Stormceptor design is PCSWMM for Stormceptor - sizing software developed in conjunction with Computational Hydraulics Inc. (CHI) and internationally acclaimed expert, Dr. Bill James. Using local historical rainfall data and continuous simulation modeling, this software allows a Stormceptor unit to be designed for each individual site and the corresponding water quality objectives.

By using PCSWMM for Stormceptor, the Stormceptor System can be designed to remove a wide range of particles (typically from 20 to 2,000 microns), and can also be customized to remove a specific particle size distribution (PSD). The specified PSD should accurately reflect what is in the stormwater runoff to ensure the device is achieving the desired water quality objective. Since stormwater runoff contains small particles (less than 75 microns), it is important to design a treatment system to remove smaller particles in addition to coarse particles.

2.2. Benefits

The Stormceptor System removes free oil and suspended solids from stormwater, preventing spills and non-point source pollution from entering downstream lakes and rivers. The key benefits, capabilities and applications of the Stormceptor System are as follows:

- Provides continuous positive treatment during all rainfall events
- Can be designed to remove over 80% of the annual sediment load
- Removes a wide range of particles
- Can be designed to remove a specific particle size distribution (PSD)
- Captures free oil from stormwater
- Prevents scouring or re-suspension of trapped pollutants
- Pre-treatment to reduce maintenance costs for downstream treatment measures (ponds, swales, detention basins, filters)
- Groundwater recharge protection
- Spills capture and mitigation
- Simple to design and specify
- Designed to your local watershed conditions
- Small footprint to allow for easy retrofit installations
- Easy to maintain (vacuum truck)
- Multiple inlets can connect to a single unit
- Suitable as a bend structure
- Pre-engineered for traffic loading (minimum AASHTO HS-20)
- Minimal elevation drop between inlet and outlet pipes
- Small head loss
- Additional protection provided by an 18" (457 mm) fiberglass skirt below the top of the insert, for the containment of hydrocarbons in the event of a spill.

2.3. Environmental Benefit

Freshwater resources are vital to the health and welfare of their surrounding communities. There is increasing public awareness, government regulations and corporate commitment to reducing the pollution entering our waterways. A major source of this pollution originates from stormwater runoff from urban areas. Rainfall runoff carries oils, sediment and other contaminants from roads and parking lots discharging directly into our streams, lakes and coastal waterways.

The Stormceptor System is designed to isolate contaminants from getting into the natural environment. The Stormceptor technology provides protection for the environment from spills that occur at service stations and vehicle accident sites, while also removing contaminated sediment in runoff that washes from roads and parking lots.

3. Key Operation Features

3.1. Scour Prevention

A key feature of the Stormceptor System is its patented scour prevention technology. This innovation ensures pollutants are captured and retained during all rainfall events, even extreme storms. The Stormceptor System provides continuous positive treatment for all rainfall events, including intense storms. Stormceptor slows incoming runoff, controlling and reducing velocities in the lower chamber to create a non-turbulent environment that promotes free oils and floatable debris to rise and sediment to settle.

The patented scour prevention technology, the fiberglass insert, regulates flows into the lower chamber through a combination of a weir and orifice while diverting high energy flows away through the upper chamber to prevent scouring. Laboratory testing demonstrated no scouring when tested up to 125% of the unit's operating rate, with the unit loaded to 100% sediment capacity (NJDEP, 2005). Second, the depth of the lower chamber ensures the sediment storage zone is adequately separated from the path of flow in the lower chamber to prevent scouring.

3.2. Operational Hydraulic Loading Rate

Designers and regulators need to evaluate the treatment capacity and performance of manufactured stormwater treatment systems. A commonly used parameter is the "operational hydraulic loading rate" which originated as a design methodology for wastewater treatment devices.

Operational hydraulic loading rate may be calculated by dividing the flow rate into a device by its settling area. This represents the critical settling velocity that is the prime determinant to quantify the influent particle size and density captured by the device. PCSWMM for Stormceptor uses a similar parameter that is calculated by dividing the hydraulic detention time in the device by the fall distance of the sediment.

$$v_{sc} = \frac{H}{\theta_H} = \frac{Q}{A_s}$$

Where:

v_{sc} = critical settling velocity, ft/s (m/s)

H = tank depth, ft (m)

θ_H = hydraulic detention time, ft/s (m/s)

Q = volumetric flow rate, ft³/s (m³/s)

A_s = surface area, ft² (m²)

(Tchobanoglous, G. and Schroeder, E.D. 1987. Water Quality. Addison Wesley.)

Unlike designing typical wastewater devices, stormwater systems are designed for highly variable flow rates including intense peak flows. PCSWMM for Stormceptor incorporates all of the flows into its calculations, ensuring that the operational hydraulic loading rate is considered not only for one flow rate, but for all flows including extreme events.

3.3. Double Wall Containment

The Stormceptor System was conceived as a pollution identifier to assist with identifying illicit discharges. The fiberglass insert has a continuous skirt that lines the concrete barrel wall for a depth of 18 inches (457 mm) that provides double wall containment for hydrocarbons storage. This protective barrier ensures that toxic floatables do not migrate through the concrete wall into the surrounding soils.

4. Stormceptor Product Line

4.1. Stormceptor Models

A summary of Stormceptor models and capacities are listed in Table 1.

Table 1. Stormceptor Models

Stormceptor Model	Total Storage Volume U.S. Gal (L)	Hydrocarbon Storage Capacity U.S. Gal (L)	Maximum Sediment Capacity ft ³ (L)
STC 450i	470 (1,780)	86 (330)	46 (1,302)
STC 900	952 (3,600)	251 (950)	89 (2,520)
STC 1200	1,234 (4,670)	251 (950)	127 (3,596)
STC 1800	1,833 (6,940)	251 (950)	207 (5,861)
STC 2400	2,462 (9,320)	840 (3,180)	205 (5,805)
STC 3600	3,715 (1,406)	840 (3,180)	373 (10,562)
STC 4800	5,059 (1,950)	909 (3,440)	543 (15,376)
STC 6000	6,136 (23,230)	909 (3,440)	687 (19,453)
STC 7200	7,420 (28,090)	1,059 (4,010)	839 (23,757)
STC 11000	11,194 (42,370)	2,797 (10, 590)	1,086 (30,752)
STC 13000	13,348 (50,530)	2,797 (10, 590)	1,374 (38,907)
STC 16000	15,918 (60,260)	3,055 (11, 560)	1,677 (47,487)

NOTE: Storage volumes may vary slightly from region to region. For detailed information, contact your local Stormceptor representative.

4.2. Inline Stormceptor

The Inline Stormceptor, Figure 1, is the standard design for most stormwater treatment applications. The patented Stormceptor design allows the Inline unit to maintain continuous positive treatment of total suspended solids (TSS) year-round, regardless of flow rate. The Inline Stormceptor is composed of a precast concrete tank with a fiberglass insert situated at the invert of the storm sewer pipe, creating an upper chamber above the insert and a lower chamber below the insert.

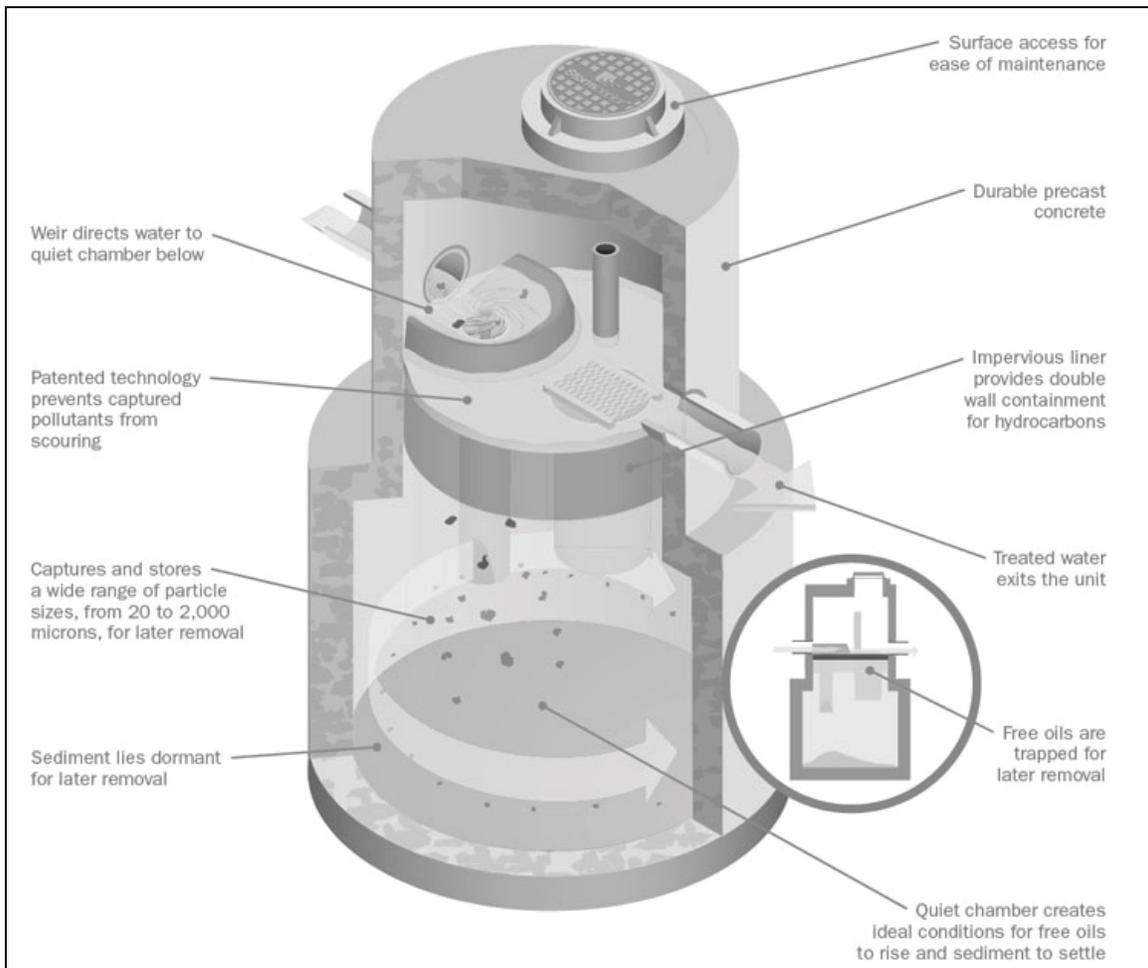


Figure 1. Inline Stormceptor

Operation

As water flows into the Stormceptor unit, it is slowed and directed to the lower chamber by a weir and drop tee. The stormwater enters the lower chamber, a non-turbulent environment, allowing free oils to rise and sediment to settle. The oil is captured underneath the fiberglass insert and shielded from exposure to the concrete walls by a fiberglass skirt. After the pollutants separate, treated water continues up a riser pipe, and exits the lower chamber on the downstream side of the weir before leaving the unit. During high flow events, the Stormceptor System's patented scour prevention technology ensures continuous pollutant removal and prevents re-suspension of previously captured pollutants.

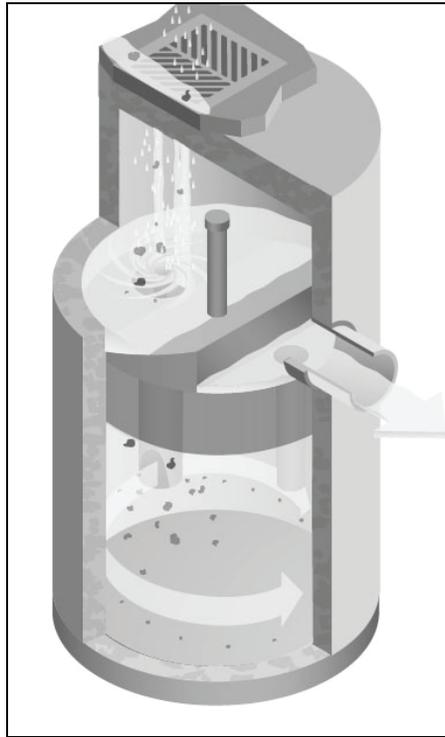


Figure 2. Inlet Stormceptor

4.3. Inlet Stormceptor

The Inlet Stormceptor System, Figure 2, was designed to provide protection for parking lots, loading bays, gas stations and other spill-prone areas. The Inlet Stormceptor is designed to remove sediment from stormwater introduced through a grated inlet, a storm sewer pipe, or both.

The Inlet Stormceptor design operates in the same manner as the Inline unit, providing continuous positive treatment, and ensuring that captured material is not re-suspended.

4.4. Series Stormceptor

Designed to treat larger drainage areas, the Series Stormceptor System, Figure 3, consists of two adjacent Stormceptor models that function in parallel. This design eliminates the need for additional structures and piping to reduce installation costs.



Figure 3. Series System

The Series Stormceptor design operates in the same manner as the Inline unit, providing continuous positive treatment, and ensuring that captured material is not re-suspended.

5. Sizing the Stormceptor System

The Stormceptor System is a versatile product that can be used for many different aspects of water quality improvement. While addressing these needs, there are conditions that the designer needs to be aware of in order to size the Stormceptor model to meet the demands of each individual site in an efficient and cost-effective manner.

PCSWMM for Stormceptor is the support tool used for identifying the appropriate Stormceptor model. In order to size a unit, it is recommended the user follow the seven design steps in the program. The steps are as follows:

STEP 1 – Project Details

The first step prior to sizing the Stormceptor System is to clearly identify the water quality objective for the development. It is recommended that a level of annual sediment (TSS) removal be identified and defined by a particle size distribution.

STEP 2 – Site Details

Identify the site development by the drainage area and the level of imperviousness. It is recommended that imperviousness be calculated based on the actual area of imperviousness based on paved surfaces, sidewalks and rooftops.

STEP 3 – Upstream Attenuation

The Stormceptor System is designed as a water quality device and is sometimes used in conjunction with onsite water quantity control devices such as ponds or underground detention systems. When possible, a greater benefit is typically achieved when installing a Stormceptor unit upstream of a detention facility. By placing the Stormceptor unit upstream of a detention structure, a benefit of less maintenance of the detention facility is realized.

STEP 4 – Particle Size Distribution

It is critical that the PSD be defined as part of the water quality objective. PSD is critical for the design of treatment system for a unit process of gravity settling and governs the size of a treatment system. A range of particle sizes has been provided and it is recommended that clays and silt-sized particles be considered in addition to sand and gravel-sized particles. Options and sample PSDs are provided in PCSWMM for Stormceptor. The default particle size distribution is the Fine Distribution, Table 2, option.

Table 2. Fine Distribution

Particle Size	Distribution	Specific Gravity
20	20%	1.3
60	20%	1.8
150	20%	2.2
400	20%	2.65
2000	20%	2.65

If the objective is the long-term removal of 80% of the total suspended solids on a given site, the PSD should be representative of the expected sediment on the site. For example, a system designed to remove 80% of coarse particles (greater than 75 microns) would provide relatively poor removal efficiency of finer particles that may be naturally prevalent in runoff from the site.

Since the small particle fraction contributes a disproportionately large amount of the total available particle surface area for pollutant adsorption, a system designed primarily for coarse particle capture will compromise water quality objectives.

STEP 5 – Rainfall Records

Local historical rainfall has been acquired from the U.S. National Oceanic and Atmospheric Administration, Environment Canada and regulatory agencies across North America. The rainfall data provided with PCSMM for Stormceptor provides an accurate estimation of small storm hydrology by modeling actual historical storm events including duration, intensities and peaks.

STEP 6 – Summary

At this point, the program may be executed to predict the level of TSS removal from the site. Once the simulation has completed, a table shall be generated identifying the TSS removal of each Stormceptor unit.

STEP 7 – Sizing Summary

Performance estimates of all Stormceptor units for the given site parameters will be displayed in a tabular format. The unit that meets the water quality objective, identified in Step 1, will be highlighted.

5.1. PCSWMM for Stormceptor

The Stormceptor System has been developed in conjunction with PCSWMM for Stormceptor as a technological solution to achieve water quality goals. Together, these two innovations model, simulate, predict and calculate the water quality objectives desired by a design engineer for TSS removal.

PCSWMM for Stormceptor is a proprietary sizing program which uses site specific inputs to a computer model to simulate sediment accumulation, hydrology and long-term total suspended solids removal. The model has been calibrated to field monitoring results from Stormceptor units that have been monitored in North America. The sizing methodology can be described by three processes:

1. Determination of real time hydrology
2. Buildup and wash off of TSS from impervious land areas
3. TSS transport through the Stormceptor (settling and discharge). The use of a calibrated model is the preferred method for sizing stormwater quality structures for the following reasons:
 - » The hydrology of the local area is properly and accurately incorporated in the sizing (distribution of flows, flow rate ranges and peaks, back-to-back storms, inter-event times)
 - » The distribution of TSS with the hydrology is properly and accurately considered in the sizing
 - » Particle size distribution is properly considered in the sizing
 - » The sizing can be optimized for TSS removal
 - » The cost benefit of alternate TSS removal criteria can be easily assessed
 - » The program assesses the performance of all Stormceptor models. Sizing may be selected based on a specific water quality outcome or based on the Maximum Extent Practicable

For more information regarding PCSWMM for Stormceptor, contact your local Stormceptor representative, or visit www.imbriumsystems.com to download a free copy of the program.

5.2. Sediment Loading Characteristics

The way in which sediment is transferred to stormwater can have a considerable effect on which type of system is implemented. On typical impervious surfaces (e.g. parking lots) sediment will build over time and wash off with the next rainfall. When rainfall patterns are examined, a short intense storm will have a higher concentration of sediment than a long slow drizzle. Together with rainfall data representing the site's typical rainfall patterns, sediment loading characteristics play a part in the correct sizing of a stormwater quality device.

Typical Sites

For standard site design of the Stormceptor System, PCSWMM for Stormceptor is utilized to accurately assess the unit's performance. As an integral part of the product's design, the program can be used to meet local requirements for total suspended solid removal. Typical installations of manufactured stormwater treatment devices would occur on areas such as paved parking lots or paved roads. These are considered "stable" surfaces which have non – erodible surfaces.

Unstable Sites

While standard sites consist of stable concrete or asphalt surfaces, sites such as gravel parking lots, or maintenance yards with stockpiles of sediment would be classified as "unstable". These types of sites do not exhibit first flush characteristics, are highly erodible and exhibit atypical sediment loading characteristics and must therefore be sized more carefully. Contact your local Stormceptor representative for assistance in selecting a proper unit sized for such unstable sites.

6. Spill Controls

When considering the removal of total petroleum hydrocarbons (TPH) from a storm sewer system there are two functions of the system: oil removal, and spill capture.

'Oil Removal' describes the capture of the minute volumes of free oil mobilized from impervious surfaces. In this instance relatively low concentrations, volumes and flow rates are considered. While the Stormceptor unit will still provide an appreciable oil removal function during higher flow events and/or with higher TPH concentrations, desired effluent limits may be exceeded under these conditions.

'Spill Capture' describes a manner of TPH removal more appropriate to recovery of a relatively high volume of a single phase deleterious liquid that is introduced to the storm sewer system over a relatively short duration. The two design criteria involved when considering this manner of introduction are overall volume and the specific gravity of the material. A standard Stormceptor unit will be able to capture and retain a maximum spill volume and a minimum specific gravity.

For spill characteristics that fall outside these limits, unit modifications are required. Contact your local Stormceptor Representative for more information.

One of the key features of the Stormceptor technology is its ability to capture and retain spills. While the standard Stormceptor System provides excellent protection for spill control, there are additional options to enhance spill protection if desired.

6.1. Oil Level Alarm

The oil level alarm is an electronic monitoring system designed to trigger a visual and audible alarm when a pre-set level of oil is reached within the lower chamber. As a standard, the oil

level alarm is designed to trigger at approximately 85% of the unit's available depth level for oil capture. The feature acts as a safeguard against spills caused by exceeding the oil storage capacity of the separator and eliminates the need for manual oil level inspection.

The oil level alarm installed on the Stormceptor insert is illustrated in Figure 4.

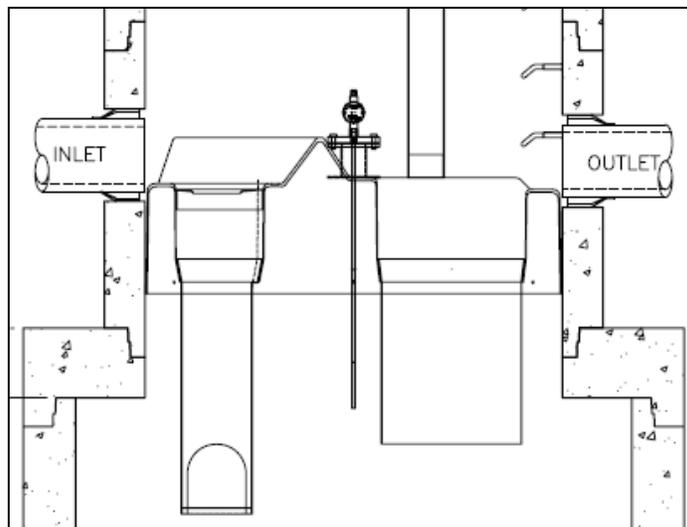


Figure 4. Oil level alarm

6.2. Increased Volume Storage Capacity

The Stormceptor unit may be modified to store a greater spill volume than is typically available. Under such a scenario, instead of installing a larger than required unit, modifications can be made to the recommended Stormceptor model to accommodate larger volumes. Contact your local Stormceptor representative for additional information and assistance for modifications.

7. Stormceptor Options

The Stormceptor System allows flexibility to incorporate to existing and new storm drainage infrastructure. The following section identifies considerations that should be reviewed when installing the system into a drainage network. For conditions that fall outside of the recommendations in this section, please contact your local Stormceptor representative for further guidance.

7.1. Installation Depth Minimum Cover

The minimum distance from the top of grade to the crown of the inlet pipe is 24 inches (600 mm). For situations that have a lower minimum distance, contact your local Stormceptor representative.

7.2. Maximum Inlet and Outlet Pipe Diameters

Maximum inlet and outlet pipe diameters are illustrated in Figure 5. Contact your local Stormceptor representative for larger pipe diameters

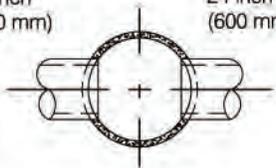
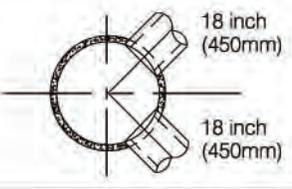
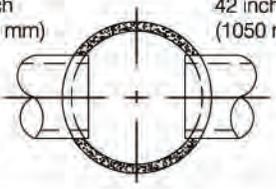
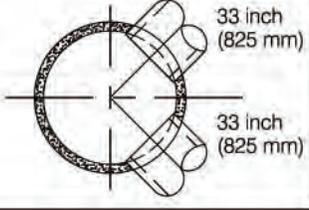
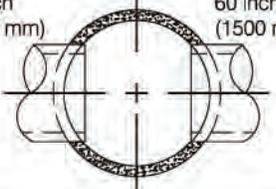
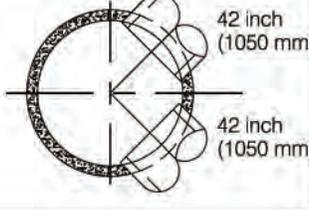
Upper Chamber Diameter	Maximum Pipe Diameters for Straight Through and 90° Bends (Based on Concrete Pipe)	
Inlet Stormceptor	24 inch (600 mm)  24 inch (600 mm)	 18 inch (450mm) 18 inch (450mm)
Inline Stormceptor	42 inch (1050 mm)  42 inch (1050 mm)	 33 inch (825 mm) 33 inch (825 mm)
Inline Stormceptor or Series Stormceptor	60 inch (1500 mm)  60 inch (1500 mm)	 42 inch (1050 mm) 42 inch (1050 mm)

Figure 5. Maximum pipe diameters for straight through and bend applications

*The bend should only be incorporated into the second structure (downstream structure) of the Series Stormceptor System

7.3. Bends

The Stormceptor System can be used to change horizontal alignment in the storm drain network up to a maximum of 90 degrees. Figure 6 illustrates the typical bend situations of the Stormceptor System. Bends should only be applied to the second structure (downstream structure) of the Series Stormceptor System.

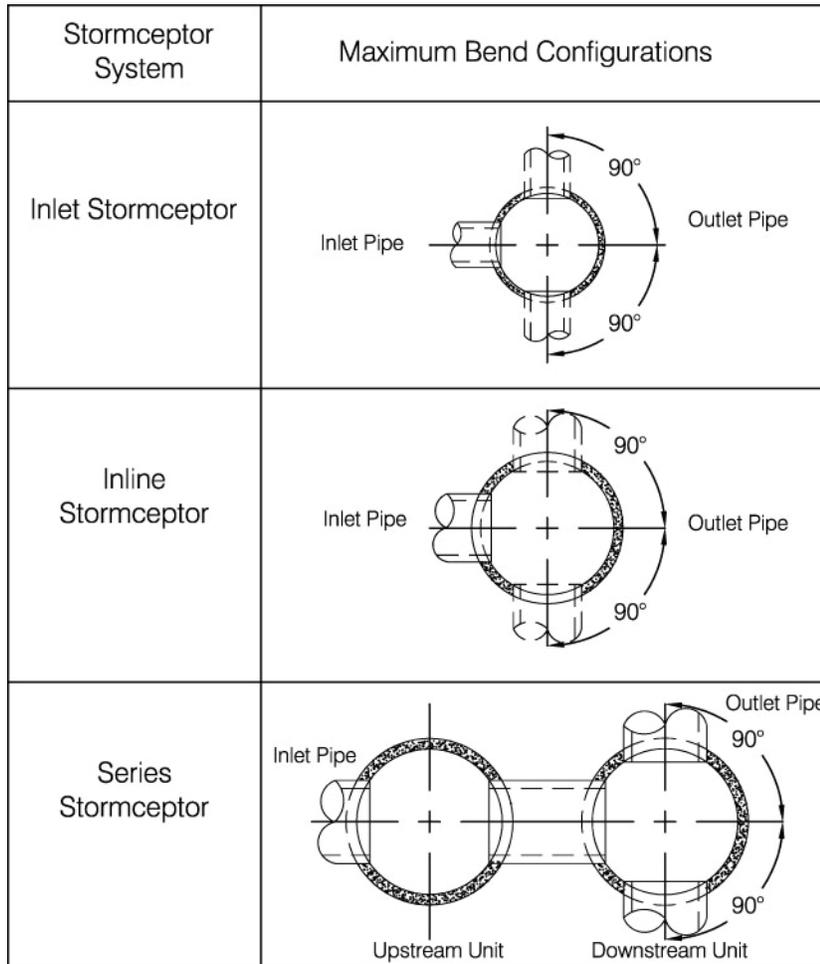


Figure 6. Maximum bend angles

7.4. Multiple Inlet Pipes

The Inlet and Inline Stormceptor System can accommodate two or more inlet pipes. The maximum number of inlet pipes that can be accommodated into a Stormceptor unit is a function of the number, alignment and diameter of the pipes and its effects on the structural integrity of the precast concrete. When multiple inlet pipes are used for new developments, each inlet pipe shall have an invert elevation 3 inches (75 mm) higher than the outlet pipe invert elevation.

7.5. Inlet/Outlet Pipe Invert Elevations

Recommended inlet and outlet pipe invert differences are listed in Table 3.

Table 3. Recommended Drops Between Inlet and Outlet Pipe Inverts

Number of Inlet Pipes	Inlet System	In-Line System	Series System
1	3 inches (75 mm)	1 inch (25 mm)	3 inches (75 mm)
>1	3 inches (75 mm)	3 inches (75 mm)	Not Applicable

7.6. Shallow Stormceptor

In cases where there may be restrictions to the depth of burial of storm sewer systems. In this situation, for selected Stormceptor models, the lower chamber components may be increased in diameter to reduce the overall depth of excavation required.

7.7. Customized Live Load

The Stormceptor system is typically designed for local highway truck loading (AASHTO HS- 20). When the project requires live loads greater than HS-20, the Stormceptor System may be customized structurally for a pre-specified live load. Contact your local Stormceptor representative for customized loading conditions.

7.8. Pre-treatment

The Stormceptor System may be sized to remove sediment and for spills control in conjunction with other stormwater BMPs to meet the water quality objective. For pretreatment applications, the Stormceptor System should be the first unit in a treatment train. The benefits of pre-treatment include the extension of the operational life (extension of maintenance frequency) of large stormwater management facilities, prevention of spills and lower total life-cycle maintenance cost.

7.9. Head loss

The head loss through the Stormceptor System is similar to a 60 degree bend at a manhole. The K value for calculating minor losses is approximately 1.3 (minor loss = $k \cdot 1.3v^2/2g$).

However, when a Submerged modification is applied to a Stormceptor unit, the corresponding K value is 4.

7.10. Submerged

The Submerged modification, Figure 7, allows the Stormceptor System to operate in submerged or partially submerged storm sewers. This configuration can be installed on all models of the Stormceptor System by modifying the fiberglass insert. A customized weir height and a secondary drop tee are added.

Submerged instances are defined as standing water in the storm drain system during zero flow conditions. In these instances, the following information is necessary for the proper design and application of submerged modifications:

- Stormceptor top of grade elevation
- Stormceptor outlet pipe invert elevation
- Standing water elevation

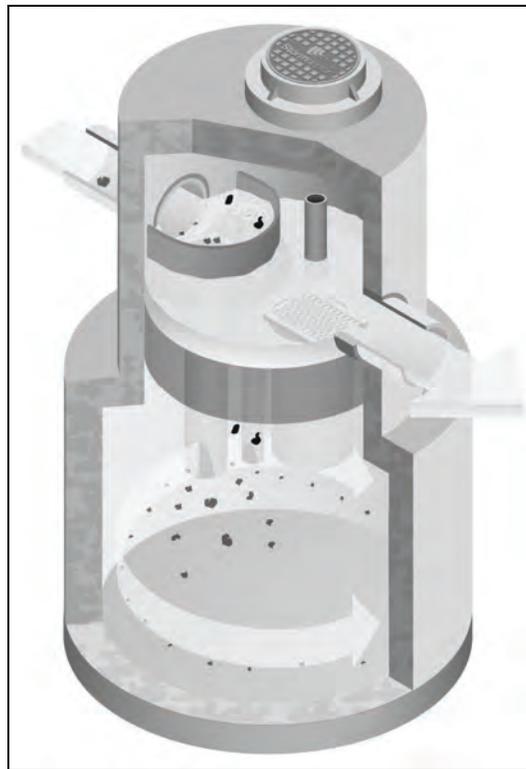


Figure 7. Submerged Stormceptor

8. Comparing Technologies

Designers have many choices available to achieve water quality goals in the treatment of stormwater runoff. Since many alternatives are available for use in stormwater quality treatment it is important to consider how to make an appropriate comparison between “approved alternatives”. The following is a guide to assist with the accurate comparison of differing technologies and performance claims.

8.1. Particle Size Distribution (PSD)

The most sensitive parameter to the design of a stormwater quality device is the selection of the design particle size. While it is recommended that the actual particle size distribution (PSD) for sites be measured prior to sizing, alternative values for particle size should be selected to represent what is likely to occur naturally on the site. A reasonable estimate of a particle size distribution likely to be found on parking lots or other impervious surfaces should consist of a wide range of particles such as 20 microns to 2,000 microns (Ontario MOE, 1994).

There is no absolute right particle size distribution or specific gravity and the user is cautioned to review the site location, characteristics, material handling practices and regulatory requirements when selecting a particle size distribution. When comparing technologies, designs using different PSDs will result in incomparable TSS removal efficiencies. The PSD of the TSS removed needs to be standard between two products to allow for an accurate comparison.

8.2. Scour Prevention

In order to accurately predict the performance of a manufactured treatment device, there must be confidence that it will perform under all conditions. Since rainfall patterns cannot be predicted, stormwater quality devices placed in storm sewer systems must be able to withstand extreme events, and ensure that all pollutants previously captured are retained in the system.

In order to have confidence in a system’s performance under extreme conditions, independent validation of scour prevention is essential when examining different technologies. Lack of independent verification of scour prevention should make a designer wary of accepting any product’s performance claims.

8.3. Hydraulics

Full scale laboratory testing has been used to confirm the hydraulics of the Stormceptor System. Results of lab testing have been used to physically design the Stormceptor System and the sewer pipes entering and leaving the unit. Key benefits of Stormceptor are:

- Low head loss (typical k value of 1.3)
- Minimal inlet/outlet invert elevation drop across the structure
- Use as a bend structure
- Accommodates multiple inlets

The adaptability of the treatment device to the storm sewer design infrastructure can affect the overall performance and cost of the site.

8.4. Hydrology

Stormwater quality treatment technologies need to perform under varying climatic conditions. These can vary from long low intensity rainfall to short duration, high intensity storms. Since a treatment device is expected to perform under all these conditions, it makes sense that any system’s design should accommodate those conditions as well.

Long-term continuous simulation evaluates the performance of a technology under the varying conditions expected in the climate of the subject site. Single, peak event design does not provide this information and is not equivalent to long-term simulation. Designers should request long-term simulation performance to ensure the technology can meet the long-term water quality objective.

9. Testing

The Stormceptor System has been the most widely monitored stormwater treatment technology in the world. Performance verification and monitoring programs are completed to the strictest standards and integrity. Since its introduction in 1990, numerous independent field tests and studies detailing the effectiveness of the Stormceptor System have been completed.

- Coventry University, UK – 97% removal of oil, 83% removal of sand and 73% removal of peat
- National Water Research Institute, Canada, - scaled testing for the development of the Stormceptor System identifying both TSS removal and scour prevention.
- New Jersey TARP Program – full scale testing of an STC 900 demonstrating 75% TSS removal of particles from 1 to 1000 microns. Scour testing completed demonstrated that the system does not scour. The New Jersey Department of Environmental Protection was followed.
- City of Indianapolis – full scale testing of an STC 900 demonstrating over 80% TSS removal of particles from 50 microns to 300 microns at 130% of the unit's operating rate. Scour testing completed demonstrated that the system does not scour.
- Westwood Massachusetts (1997), demonstrated >80% TSS removal
- Como Park (1997), demonstrated 76% TSS removal
- Ontario MOE SWAMP Program – 57% removal of 1 to 25 micron particles
- Laval Quebec – 50% removal of 1 to 25 micron particles

10. Installation

The installation of the concrete Stormceptor should conform in general to state highway, or local specifications for the installation of manholes. Selected sections of a general specification that are applicable are summarized in the following sections.

10.1. Excavation

Excavation for the installation of the Stormceptor should conform to state highway, or local specifications. Topsoil removed during the excavation for the Stormceptor should be stockpiled in designated areas and should not be mixed with subsoil or other materials.

Topsoil stockpiles and the general site preparation for the installation of the Stormceptor should conform to state highway or local specifications.

The Stormceptor should not be installed on frozen ground. Excavation should extend a minimum of 12 inches (300 mm) from the precast concrete surfaces plus an allowance for shoring and bracing where required. If the bottom of the excavation provides an unsuitable foundation additional excavation may be required.

In areas with a high water table, continuous dewatering may be required to ensure that the excavation is stable and free of water.

10.2. Backfilling

Backfill material should conform to state highway or local specifications. Backfill material should be placed in uniform layers not exceeding 12 inches (300mm) in depth and compacted to state highway or local specifications.

11. Stormceptor Construction Sequence

The concrete Stormceptor is installed in sections in the following sequence:

1. Aggregate base
2. Base slab
3. Lower chamber sections
4. Upper chamber section with fiberglass insert
5. Connect inlet and outlet pipes
6. Assembly of fiberglass insert components (drop tee, riser pipe, oil cleanout port and orifice plate)
7. Remainder of upper chamber
8. Frame and access cover

The precast base should be placed level at the specified grade. The entire base should be in contact with the underlying compacted granular material. Subsequent sections, complete with joint seals, should be installed in accordance with the precast concrete manufacturer's recommendations.

Adjustment of the Stormceptor can be performed by lifting the upper sections free of the excavated area, re-leveling the base and re-installing the sections. Damaged sections and gaskets should be repaired or replaced as necessary. Once the Stormceptor has been constructed, any lift holes must be plugged with mortar.

12. Maintenance

12.1. Health and Safety

The Stormceptor System has been designed considering safety first. It is recommended that confined space entry protocols be followed if entry to the unit is required. In addition, the fiberglass insert has the following health and safety features:

- Designed to withstand the weight of personnel
- A safety grate is located over the 24 inch (600 mm) riser pipe opening
- Ladder rungs can be provided for entry into the unit, if required

12.2. Maintenance Procedures

Maintenance of the Stormceptor system is performed using vacuum trucks. No entry into the unit is required for maintenance (in most cases). The vacuum service industry is a well-established sector of the service industry that cleans underground tanks, sewers and catch basins. Costs to clean a Stormceptor will vary based on the size of unit and transportation distances.

The need for maintenance can be determined easily by inspecting the unit from the surface. The depth of oil in the unit can be determined by inserting a dipstick in the oil inspection/cleanout port.

Similarly, the depth of sediment can be measured from the surface without entry into the Stormceptor via a dipstick tube equipped with a ball valve. This tube would be inserted through the riser pipe. Maintenance should be performed once the sediment depth exceeds the guideline values provided in the Table 4.

Table 4. Sediment Depths Indicating Required Servicing*

Particle Size	Specific Gravity
Model	Sediment Depth inches (mm)
450i	8 (200)
900	8 (200)
1200	10 (250)
1800	15 (381)
2400	12 (300)
3600	17 (430)
4800	15 (380)
6000	18 (460)
7200	15 (381)
11000	17 (380)
13000	20 (500)
16000	17 (380)
* based on 15% of the Stormceptor unit's total storage	

Although annual servicing is recommended, the frequency of maintenance may need to be increased or reduced based on local conditions (i.e. if the unit is filling up with sediment more quickly than projected, maintenance may be required semi-annually; conversely once the site has stabilized maintenance may only be required every two or three years).

Oil is removed through the oil inspection/cleanout port and sediment is removed through the riser pipe. Alternatively oil could be removed from the 24 inches (600 mm) opening if water is removed from the lower chamber to lower the oil level below the drop pipes.

The following procedures should be taken when cleaning out Stormceptor:

1. Check for oil through the oil cleanout port
2. Remove any oil separately using a small portable pump
3. Decant the water from the unit to the sanitary sewer, if permitted by the local regulating authority, or into a separate containment tank
4. Remove the sludge from the bottom of the unit using the vacuum truck
5. Re-fill Stormceptor with water where required by the local jurisdiction

12.3. Submerged Stormceptor

Careful attention should be paid to maintenance of the Submerged Stormceptor System. In cases where the storm drain system is submerged, there is a requirement to plug both the inlet and outlet pipes to economically clean out the unit.

12.4. Hydrocarbon Spills

The Stormceptor is often installed in areas where the potential for spills is great. The Stormceptor System should be cleaned immediately after a spill occurs by a licensed liquid waste hauler.

12.5. Disposal

Requirements for the disposal of material from the Stormceptor System are similar to that of any other stormwater Best Management Practice (BMP) where permitted. Disposal options for the sediment may range from disposal in a sanitary trunk sewer upstream of a sewage treatment plant, to disposal in a sanitary landfill site. Petroleum waste products collected in the Stormceptor (free oil/chemical/fuel spills) should be removed by a licensed waste management company.

12.6. Oil Sheens

With a steady influx of water with high concentrations of oil, a sheen may be noticeable at the Stormceptor outlet. This may occur because a rainbow or sheen can be seen at very small oil concentrations (<10 mg/L). Stormceptor will remove over 98% of all free oil spills from storm sewer systems for dry weather or frequently occurring runoff events.

The appearance of a sheen at the outlet with high influent oil concentrations does not mean the unit is not working to this level of removal. In addition, if the influent oil is emulsified the Stormceptor will not be able to remove it. The Stormceptor is designed for free oil removal and not emulsified conditions.



SUPPORT

Drawings and specifications are available at www.ContechES.com.

Site-specific design support is available from our engineers.

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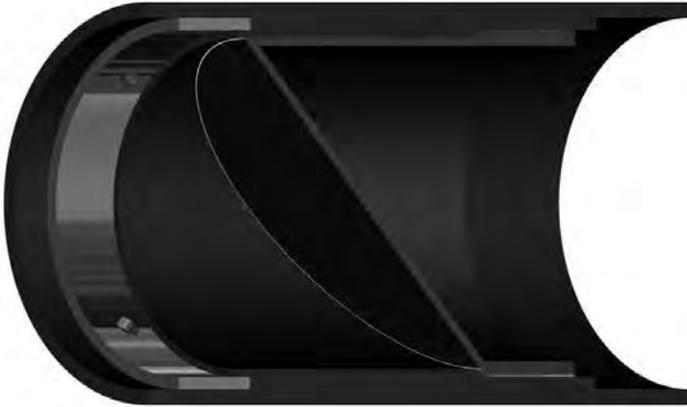
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Checkmate Maintenance Guide

CHECKMATE[®]

INLINE CHECK VALVES

INSTALLATION, OPERATION AND MAINTENANCE MANUAL



The revolutionary design of the CheckMate[®] Inline Check Valve provides superior backflow prevention and odor mitigation in stormwater, CSO and SSO outfalls. The CheckMate's[®] custom-engineered, all-rubber unibody design eliminates costly backflow from oceans, rivers and interceptors. The valve's unique elastomer fabric and wire reinforced design provides a proven record of maintenance-free performance, cost savings and results that no other inline check valve can match. The CheckMate[®] is built to suit all your site-specific and flow needs.

The CheckMate[®] has a 100% fabric and elastomer construction that eliminates corrosion problems. Because the CheckMate[®] is made with a unibody construction, there are no mechanical components that trap debris, corrode or fail.

The CheckMate[®] Valve's inherent flexibility virtually eliminates seating problems. The CheckMate[®] remains in the closed position until forward differential pressure opens it. The fabric-reinforced elastomer CheckMate[®] Valve seals around silt and small debris, preventing unwanted backflow.

The major advantage of the CheckMate[®] Valve is its extremely low headloss. The CheckMate[®] can open to a near full pipe diameter. This maximizes flow capacity of the outfall, which is particularly beneficial in low-lying areas where limited driving head is available.

Tideflex[®] Technologies recommends pinning all CheckMate[®] Valves for added security and stability. CheckMate's[®] effectively have a zero face-to-face dimension because they fit completely inside of the pipe. No modification of piping is required provided adequate pipe length exists.

IMPORTANT

Please take a moment to **review this manual**. The improper installation or use of this product may result in personal injury, product failure, or reduced product life. Tideflex[®] Technologies can accept NO liability resulting from the improper use or installation of this product. If you have any questions or problems, please call the customer service department at (412) 279-0044. We appreciate your comments. Thank you for choosing Tideflex[®] Technologies.

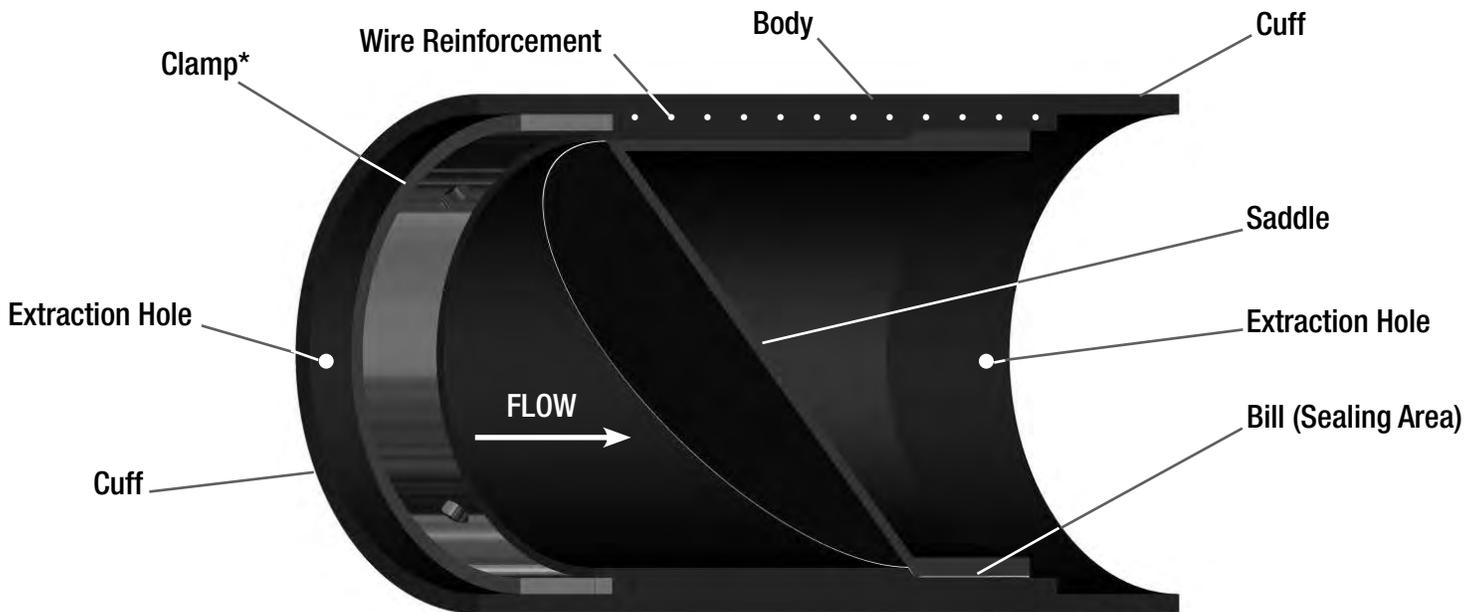
CheckMate® Installation Procedure

NEVER...
Install the valve at an angle

NEVER...
Use Sharp Tools on Rubber

NEVER...
Exceed Design Back Pressure

NEVER...
Install the Valve Backwards



*Clamps are installed in the upstream or downstream cuff, depending upon the application. The illustration above is shown clamped upstream.

CHECKMATE® INSTALLATION

1. Product Shipping

Valve sizes 2" - 18" are furnished with one clamp. Valves 20" - 60" ship with two clamps. 72" valves ship with three clamps.

NOTE: A clamp is installed on each end of the valve to keep the valve's shape during transit and storage. Once the installation orientation is determined the CheckMate® valve will be clamped from either the upstream or downstream side. **For valves with two or three clamps, they can be installed onto the same side of the valve and offset from each other, as illustrated in Figure 1.**

2. Unpacking & Lifting

Do not use sharp tools when unpacking this product as it may damage the valve.

For larger CheckMate® valves, the valve should be lifted with either a sling or with supports around the O.D. at each side of the valve to ease the installation procedure. Do not place an object through the valve in order to lift.

CAUTION: Do not try to bend, collapse or fold the valve in order to facilitate the installation as this will cause permanent damage and will not allow the valve to return to a fully round shape.

3. Inspection of Pipe I.D.

Check the inside diameter (I.D.) of the pipe section for rough or damaged areas. The inside surface should be uniform and relatively smooth. Long gouges or cracks in the pipe may allow water to pass and should be filled prior to installation. Do not attempt to install a CheckMate® in a smaller pipe I.D.

4. Pipe I.D. Measurements

The pipe I.D. is to be checked in the field. It should be a consistent diameter for the length of valve and should not be out of round. When there is a +/- tolerance on the pipe I.D., the CheckMate® Valve should be ordered to the smallest pipe I.D.. Then, rubber adhesive strip can be applied to both CheckMate® cuffs to build the cuff O.D. up to the actual pipe I.D. See procedure in #5.



Figure 1 – Clamps shown installed on the same side of valve

CheckMate® Rubber Adhesive Strip Build Up Procedure

5. Rubber Adhesive Strip Build up

When valve O.D. is smaller than the pipe I.D., one-sided rubber adhesive strip is used to build up the O.D. of both CheckMate® cuffs to the actual pipe I.D.

NOTICE: Clean and dry the exterior of the valve prior to beginning rubber adhesive strip build up procedure.



STEP A: Place the valve on a solid, flat surface with the clamped end hanging slightly over the edge of the surface.



STEP B: Slowly rotate the valve while firmly pressing the rubber adhesive strip onto itself in concentric layers until valve O.D. is equal to or a fraction smaller than pipe I.D.



STEP C: Repeat steps A and B on the opposite side of the valve to ensure uniformity of the CheckMate's® O.D. is consistent and matches the pipe I.D.



STEP D: Lubricate the valve and rubber adhesive strip surface. Slide valve into pipe. Ensure the area marked TOP is in the 12:00 position.



STEP E: Check O.D. of the valve to ensure it fits snugly into the I.D. of pipe. If loose, add another layer(s) of the rubber adhesive strip.



STEP F: Once in place, tighten the clamp to secure it against the pipe and compress the rubber adhesive strip.

CheckMate® Installation Procedure

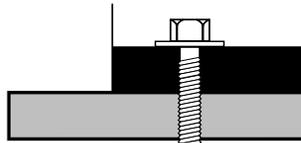
6. Preparation

The CheckMate® Valve uses expanding clamp(s) to exert pressure outwards on the walls of the valve to wedge it in place within the pipe. The walls of the pipe should be clean and free of debris prior to installation.

The valve should be inserted fully into the pipe so that no part of the cuff or bill extends outside the pipe. Ensure that the valve is not slanted at an angle with the bill pointing upwards or downwards. The valve centerline should be parallel to the pipe centerline.

Tidflex® Technologies recommends pinning the CheckMate® Valve on all installations. See below.

Four pre-drilled holes are provided in each expansion clamp. At least one clamp should be pinned. On exposed pipe, holes can be drilled through the valve and pipe, and a bolt run through secured with a nut. For buried pipe, silicon or similar sealant should be used to seal bolts.



7. Lubrication

The outside of the valve can be lubricated with a water-based lubricant prior to inserting the valve into the pipe. If the taping procedure has been used, the surface of the tape can be lubricate to aid insertion.

CAUTION: Do not use petroleum-based lubricants on this product or on the vulcanized rubber tape.

8. Plumb Lines and Arrows

The CheckMate® Valve arrives with a “top” arrow, “flow” arrow and plumb lines, marked in white, at the 12:00 and 6:00 position of the valve. Utilize this marking to orient the valve in the pipe, as well as to ensure the valve is oriented correctly in pipe section.

9. Valve Orientation

The CheckMate® Valve must be installed in a horizontal pipe. Valves 4” – 18” (nominal) are supplied with a single clamp. The clamp turnbuckle should be oriented at top dead center as delineated by the plumb line.

Valves 20” – 60” (nominal) are supplied with two clamps. The turnbuckles should be oriented 45° from the top center plumb line.

The 72” is supplied with three clamps. The turnbuckle for one clamp to be at top center. The other clamps to be 45° to each side of top center.

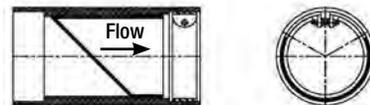
10. Insertion Into Pipe

Clamp to support the shape of the cuff should be hand tight and should be extended outward, but only tight enough to loosely keep the shape of the cuff during installation.

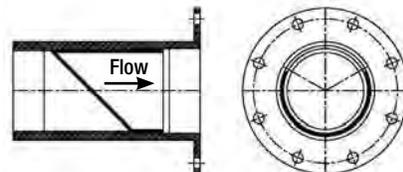
CAUTION: If you expand the clamp excessively at this step it will hinder or prevent the CheckMate® valve being fully inserted into the pipe.

CheckMate® Clamping Diagrams

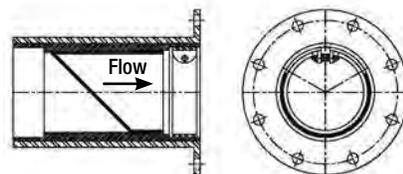
Downstream Clamp



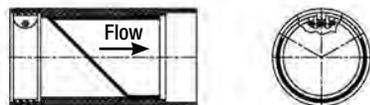
Downstream Flanged



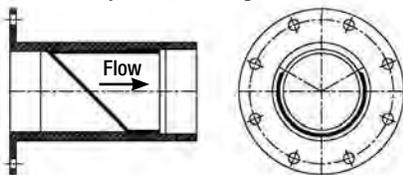
Downstream Flanged Thimble Insert



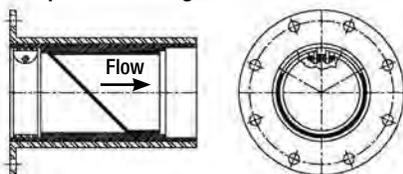
Upstream Clamp



Upstream Flanged



Upstream Flanged Thimble Insert



11. Pallet Push for Larger CheckMate® Valves

Larger CheckMate® valves can be pushed into the pipe utilizing the shipping pallet. The pallet should be placed perpendicular to the valve being inserted into the pipe. Then, with assistance from an excavator, push with consistent even force against the shipping pallet to insert the CheckMate® valve into the pipe.

See the image to the right for the suggested positioning and usage of the excavator's shovel assistance for larger-sized CheckMate® valves. Clamps must be installed to prevent damage to cuff.

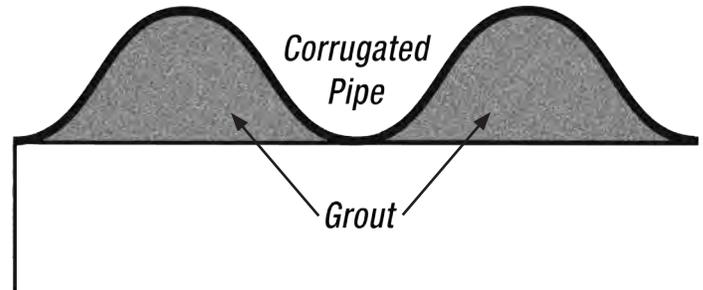


Pallet Push method for installing CheckMate® Valve

12. Corrugated Pipe and Smooth Wall (PVC, HDPE) Pipe Installation

For installation on corrugated pipe, it is recommended that the corrugations be filled with hydraulic cement (or similar material) that will provide a smooth I.D.

For smooth wall pipe, it is recommended that the valve be pinned.



CheckMates® can be made for any pipe I.D.
Built to fit in sizes from 3" to 78".

Flange shape and bolt pattern can be customized.
Flangeless thimble inserts are available.

CHECKMATE® VALVE											
	NOMINAL PIPE SIZE I.D.		OVERALL LENGTH*		NUMBER OF CLAMPS	CUFF DEPTH		BACK PRESSURE RATING**		WEIGHT	
	Inches	Millimeters	Inches	Millimeters		Inches	Millimeters	Feet	Meters	Lbs	Kg
Low Pressure	3	75	5.1	130	1	1.5	38	5	1.5	1.5	0.7
	4	100	7.9	201	1	1.5	38	5	1.5	1.5	0.7
Standard Pressure	3	75	5.1	130	1	1.5	38	85	26.0	3	1.4
	4	100	7.9	201	1	1.5	38	85	26.0	3	1.5
	5	125	9.5	241	1	1.5	38	83	25.3	4	2
	6	150	11.0	279	1	2.0	51	83	25.3	9	4
	7	175	12.8	325	1	2.0	51	79	24.1	11	5
	8	200	15.2	386	1	2.0	51	79	24.1	13	6
	9	225	15.4	391	1	2.0	51	75	22.9	17	8
	10	250	16.1	409	1	2.0	51	71	21.6	20	10
	12	300	19.8	503	1	2.0	51	68	20.1	37	17
	14	350	25.8	655	1	4.0	102	64	20.0	110	50
	16	400	28.6	726	1	4.0	102	60	18.3	133	52
	18	450	31.0	787	1	4.0	102	56	17.1	143	65
	20	500	42.1	1069	2	8.0	203	53	16.2	223	102
	24	600	47.5	1207	2	8.0	203	45	13.7	304	137
	30	750	54.9	1395	2	8.0	203	38	11.6	500	227
	36	900	62.3	1582	2	8.0	203	30	9.1	828	376
42	1050	70.6	1793	2	8.0	203	26	7.9	1423	646	
48	1200	79.0	2007	2	8.0	203	23	7.0	1801	817	
54	1350	86.4	2195	2	8.0	203	17	5.2	2700	1225	
60	1500	96.8	2459	2	9.0	229	15	4.6	3315	1504	
72	1800	119.0	3023	3	12.0	305	13	4.0	6100	2767	
78	1950	119.0	3023	3	12.0	305	13	4.0	7000	3176	

*Shorter lengths available.

**Back pressure measured from pipe invert.
Higher back pressure ratings available. Consult factory.

13. Flanged Valve Bolt Torques

The valve end with the rubber flange shall be installed using the backup rings provided. The sleeve split should be installed facing downstream, with the split in the vertical position.

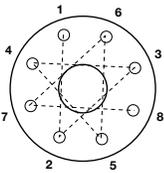
The installation bolt torque on the end flange bolts are listed in the table below.

RECOMMENDED MINIMUM BOLT TORQUE

Valve Size	Bolt Size	Torque (ft*lb.)
1"	1/2" - 13NC	20
1-1/2"	1/2" - 13NC	20
2"	5/8" - 11NC	30
2-1/2"	5/8" - 11NC	40
3"	5/8" - 11NC	40
4"	5/8" - 11NC	30
5"	3/4" - 10NC	40
6"	3/4" - 10NC	30
8"	3/4" - 10NC	40
10"	7/8" - 9NC	40
12"	7/8" - 9NC	50
14"	1" - 8NC	50
16"	1" - 8NC	50
18"	1-1/8" - 7NC	30
20"	1-1/8" - 7NC	30
24"	1-1/4" - 7NC	40
30"	1-1/4" - 7NC	30
36"	1-1/2" - 6NC	40
42"	1-1/2" - 6NC	50
48"	1-1/2" - 6NC	55
54"	1-3/4" - 5NC	60
60"	1-3/4" - 5NC	80
72"	1-3/4" - 5NC	100

Torque values are suggested minimum values.

Torque all flange bolts in a star pattern, first to 50% of tabulated values, then retorque to 100% of tabulated values. If greater torque is required, continue retorquing in increments of 50% of tabulated values. Use of a high quality anti-seize compound on all bolt threads is recommended.



Always use a "star" pattern when bolting a check valve.

Variables such as the surface finish on bolt threads, type of anti-seize compound used, and surface finish of the mating flanges all have an effect on the minimum torque required to obtain a leak-tight flange seal.

During installation you may need to retorque the flange bolts several times for a proper seal. This will overcome any leaks due to the cold flow of the rubber sleeve flange.

CheckMate® Installation Notes

1. It is important that the CheckMate® is installed level within the pipe. The CheckMate® may "gap open" if installed improperly.
2. The sealing area of the CheckMate® must have room to expand outwards, while bottom of the sealing area rises. The area around the sealing area must be kept free of debris to allow the bill to close in order for the valve to seal properly.
3. The CheckMate® effectively reduces the inside diameter of the pipe in which it is installed, creating a restriction. It may also create a "ledge" inside the pipe, causing standing water.
4. Back pressure in excess of the back pressure rating may cause valve failure.
5. Should the conditions that the CheckMate® was designed for change, (line pressure, back pressure, chemical compatibility) the performance of the valve may suffer.
6. CheckMate® Valves must be installed in true round pipe which is concentric across the entire length. Out of round pipe may cause the sealing area of the valve to distort and gap, which will cause the valve to leak.

MAINTENANCE

Inspection

Valves should occasionally be inspected for damage, wear, and buildup of debris. The frequency of the inspections should be determined by the severity of the service and the environment in which it operates.

The clamps should be checked for proper tension, and be sure that the inside of the valve is free of debris. Soft marine growth is normal on valves in submerged applications. Because hard marine growth such as barnacles will not bond well to the CheckMate®, they can be easily removed. Also insert pins to ensure they are tight.

STORAGE

If your CheckMate® is to be stored for a period of time prior to installation, the following storage guidelines will help to preserve the valve and assure a trouble-free installation:

1. Store in a clean, cool, dry location. Avoid exposure to light, electric motors, dirt, or chemicals.
2. Store valve vertically on floor or pallet.
3. Store valve to prevent other items from contacting check sleeve to prevent possible damage.
4. Store this manual with the valve, so that it is readily available at time of installation.

TROUBLESHOOTING GUIDE

Sleeve Inverted or Distorted

1. Excessive back pressure, water surge, or water hammer.

Leaking Around Perimeter of Valve

1. Tighten clamp.
2. Check for cracks and holes in surface of pipe.
3. If taped, check tape to ensure the pipe I.D. has been fully sealed

Backflow

1. Debris lodged inside bill.

TIDEFLEX® TECHNOLOGIES WARRANTY

WARRANTIES - REMEDIES - DISCLAIMERS - LIMITATION OF LIABILITY

Unless otherwise agreed to in writing signed by Tideflex® Technologies, all Products supplied by Tideflex® Technologies will be described in the specifications set forth on the face hereof.

THE WARRANTIES SET FORTH IN THIS PROVISION ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES WHETHER STATUTORY, EXPRESS OR IMPLIED (INCLUDING ALL WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE AND ALL WARRANTIES ARISING FROM COURSE OF DEALING OR USAGE OR TRADE).

Tideflex® Technologies Products are guaranteed for a period of one year from date of shipment, against defective workmanship and material only, when properly installed, operated and serviced in accordance with Tideflex® Technologies' recommendations. Replacement for items of Tideflex® Technologies manufacture will be made free of charge if proved to be defective within such year; but not claim for transportation, labor or consequential damages shall be allowed. We shall have the option of requiring the return of the defective product to our factory, with transportation charges prepaid, to establish the claim and our liability shall be limited to the repair or replacement of the defective product, F.O.B. our factory. Tideflex® Technologies will not assume costs incurred to remove or install defective products nor shall we incur back charges or liquidated damages as a result of warranty work. Tideflex® Technologies does not guarantee resistance to corrosion erosion, abrasion or other sources of failure, nor does Tideflex® Technologies guarantee a minimum length of service, or that the product shall be fit for any particular service. Failure of purchaser to give prompt written notice of any alleged defect under this guarantee forthwith upon its discovery, or use, and possession thereof after an attempt has been made and completed to remedy defects therein, or failure to return product or part for replacement as herein provided, or failure to install and operate said products and parts according to instructions furnished by Tideflex® Technologies, or failure to pay entire contract price when due, shall be a waiver by purchaser of all rights under these representations. All orders accepted shall be deemed accepted subject to this warranty which shall be exclusive of any other or previous warranty, and shall be the only effective guarantee or warranty binding on Tideflex® Technologies, anything on the contrary contained in purchaser's order, or represented by any agent or employee of Tideflex® Technologies in writing or otherwise, not withstanding implied warranties. TIDEFLEX® TECHNOLOGIES MAKES NO WARRANTY THAT THE PRODUCTS, AUXILIARIES AND PARTS ARE MERCHANTABILITY OR FIT FOR ANY PARTICULAR PURPOSE.



600 North Bell Avenue
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Web: www.tideflex.com

CheckMate® IOM 8/30/17

Standard 10

Illicit Discharge Statement

February 26, 2026

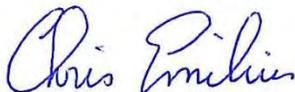
MassDEP Northeast Regional Office
150 Presidential Way, Woburn, MA 01801

Subject: **NECC Athletic Field Renovations – Illicit Discharge Statement**
100 Elliot Street
Haverhill, Massachusetts 01830

Illicit discharges to the stormwater management system are discharges that are not entirely comprised of stormwater. Notwithstanding the foregoing, an illicit discharge does not include discharges from the following activities or facilities: firefighting, water line flushing, landscape irrigation, uncontaminated groundwater, potable water sources, foundation drains, air conditioning condensation, footing drains, individual resident car washing, flows from riparian habitats and wetlands, dechlorinated water from swimming pools, water used for street washing and water used to clean residential buildings without detergents. In accordance with Standard 10 of the Massachusetts Stormwater Regulations, this project will not involve any illicit discharge to the stormwater management system.

Please feel free to contact me if you have any questions.

Sincerely yours,
Brennan Consulting



Chris Emilius, P.E.
Principal

Geotech Report

To: Ms. Sarah Tarbet ~ Jones Architecture, Inc.
From: Amy Blomeke, PE and Patrick Malone, PE, LSP ~ GeoEngineers USA, PC
Date: August 14, 2025
File: 28175-001-00
Subject: Subsurface Conditions Data Transmittal
Northern Essex Community College
Athletic Field Renovations
100 Elliot Street, Haverhill, Massachusetts

GeoEngineers USA, PC (GeoEngineers) has prepared this subsurface conditions data transmittal to Jones Architecture, Inc. (Jones; Client) to convey the results of the recent subsurface investigation performed in support of the proposed athletic fields renovations at Northern Essex Community College (NECC) located at 100 Elliot Street in Haverhill, Massachusetts (the Site).

This memorandum summarizes the subsurface investigation performed at the Site, and provides the Exploration Location Plan as Figure 1, geotechnical test pit exploration logs as Attachment A, and laboratory grain size data as Attachment B. This memorandum is subject to the Limitations described below and provided as Attachment C.

Project Understanding

We understand that the proposed athletic fields renovations include the installation of a new track and turf field along with a baseball field, tennis and pickleball courts, and a walking path in the vicinity of the existing field complex. The Site is located in the southeastern portion of NECC's Haverhill Campus. The Site is bounded by Kenoza Street followed by undeveloped/wooded land and Kenoza Lake to the south-southwest, NECC's campus to the north-northwest, and Opportunity Works and residences to the east-southeast. Existing Site grades range from approximately Elevation (El.) 123 and El. 124 feet. Ground surface elevations in this transmittal reference the North American Vertical Datum of 1988 (NAVD88).

Subsurface Investigation

On July 28, 2025, six (6) test pits were excavated by Machine Time, LLC (Machine Time) of Hudson, New Hampshire to depths of approximately five (5) to six (6) feet below ground surface (bgs), using a Bobcat E50 excavator.

The test pits were continuously monitored by a field representative from GeoEngineers, as well as a Massachusetts Approved Soil Evaluator (SE) from Brennan Consulting, Inc. (Brennan) of Burlington, Massachusetts. The SE Report is being prepared by Brennan under separate cover. The GeoEngineers field representative examined and classified the soils encountered in the field, obtained representative soil samples, observed groundwater conditions (if present), and prepared a detailed log of the explorations. Upon completion of the test pits, the excavations were backfilled with the excavated material in lifts and

compacted using the excavator bucket. The approximate locations of the test pits are shown in Figure 1. Logs of the test pits are provided in Attachment A.

GEOTECHNICAL LABORATORY ANALYSIS

GeoEngineers submitted one (1) sample from each test pit, for a total of six (6) soil samples, to Thielsch Engineering (Thielsch) of Cranston, Rhode Island for grain size analysis in accordance with ASTM D6913. The laboratory data reports are provided in Attachment B.

SUBSURFACE SOIL CONDITIONS

The following sections provide the general description of the subsurface conditions observed by GeoEngineers within the explorations. The subsurface conditions are summarized below from the ground surface down.

- **Topsoil and Subsoil:** Topsoil was encountered at the ground surface at each test pit location. The topsoil generally consists of poorly graded sand with variable amounts of silt and organics (roots). The topsoil was observed to be approximately 4 inches thick. Beneath the topsoil a discontinuous subsoil layer generally consisting of poorly graded sand with varying amounts of silt, gravel, and organics (roots) was encountered at test pit locations GEO-TP-3 through GEO-TP-6. The subsoil was observed to range from approximately 3 to 6 inches thick and extending to depths of approximately 6 to 10 inches bgs.
- **Fill:** Beneath the topsoil and/or subsoil, a discontinuous layer of granular fill was encountered at test pit locations GEO-TP-2 and GEO-TP-6. The fill was observed to range from approximately 0.7 to 5.3 feet thick and extending to depths ranging from approximately 1 to 6 feet bgs (test pit location GEO-TP-6 was terminated at 6 feet within the fill layer). The fill generally consisted of poorly graded sand with varying amounts of silt, gravel, and cobbles.
- **Natural Sand and Gravel:** With the exception of test pits GEO-TP-1A and GEO-TP-6, a deposit of natural sand and gravel was encountered beneath the fill and/or topsoil and subsoil layers. The sand and gravel stratum consists of fine to coarse sand and gravel with very little fines. The sand was observed to range from approximately 2.4 to 3.8 feet thick and extending to depths ranging from approximately 3.2 to 4.3 feet bgs.
- **Glacial Till:** The top of the glacial till deposit was encountered across the Site (except at GEO-TP-6) between approximately 0.3 and 4.3 feet bgs. The till consists of poorly graded sand and silty sand with varying amounts of fines, gravel, and cobbles. Significant cobbles and boulders were encountered in the till; therefore, cobbles and boulders should be anticipated to be frequent within this layer.

Standing and/or weeping groundwater was not observed within the test pits.

SUMMARY OF SOIL LABORATORY DATA AND INFILTRATION RATES

A summary of the soil samples submitted for laboratory grain size analysis is provided in the table below.

The laboratory soil description for each sample was reported as silt loam, which falls within the Natural Resources Conservation Service (NRCS) Hydrological Soil Group (HSG) C. Rawls et al. 1982 assigned hydraulic conductivity values to different soil types. The “Rawls Rates” are used in stormwater management

and hydrologic analyses to estimate infiltration rates, particularly in the context of recharge and sizing of infiltration practices. The Rawls Rate for HSG C is 0.27 inches per hour (in/hr).

TEST PIT ID	SAMPLE DEPTH (FEET BELOW GROUND SURFACE)	TEXTURE CLASSIFICATION	NRCS HYDROLOGICAL SOIL GROUP (HSG)	INFILTRATION RATE (INCHES/HOUR)
GEO-TP-1	1.2-6	Silt Loam	C	0.27
GEO-TP-2	3.5-5.5	Silt Loam	C	0.27
GEO-TP-3	3.3-5.3	Silt Loam	C	0.27
GEO-TP-4	0.5-4.3	Silt Loam	C	0.27
GEO-TP-5	3.2-5	Silt Loam	C	0.27
GEO-TP-6	0.7-3.7	Silt Loam	C	0.27

Please note that these rates are estimates and may not reflect the actual field conditions due to factors like compaction, organic matter content, and soil structure, which can significantly influence infiltration.

The laboratory data shows relatively consistent soil conditions across the site, which is in agreement with our field observations and test pit logs.

Limitations

We have prepared this memorandum for the exclusive use of Jones Architecture, Inc. This memorandum is not intended for use by others, unless explicitly noted in the Contract Agreement, and the information contained herein is not applicable to other sites. No other party may rely on the product of our services unless we agree in advance, and in writing, to such reliance. This is to provide our firm with reasonable protection against open-ended liability claims by third parties with whom there would otherwise be no contractual limits to their actions. Additional details of our limitations can be found in Attachment C.

Within the limitations of scope, schedule, and budget, our services were executed in accordance with generally accepted geotechnical practices in this area at the time this memorandum was prepared. No warranty or other conditions, expressed or implied, should be understood.

We trust this memorandum meets the project needs at this time. Please contact us at 617.749.9216 if you have any questions.

MLM:PRM:ACB:dt

Attachments:

Figure 1. Exploration Location Plan

Attachment A. Subsurface Exploration Logs

Figure A-1—Key to Exploration Logs

Figures A-2 through A-7—Logs of Test Pits

Attachment B. Geotechnical Laboratory Data Report

Attachment C. Limitations and Guidelines for Use

Disclaimer: Any electronic form, facsimile or hard copy of the original document (email, text, table, and/or figure), if provided, and any attachments are only a copy of the original document. The original document is stored by GeoEngineers USA, PC and will serve as the official document of record.

Figure

P:\28\28175001\CAD\00_Geotech\28175001.00_F01_Site Plan.dwg 2 Date Exported:7/30/2025 11:43 AM - by Lisa Witkowski



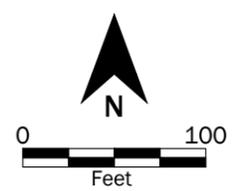
Legend

GEO-TP-1  Test Pit by GeoEngineers, July 2025

Source: Aerial from Microsoft Bing

Coordinate System: Massachusetts State Plane, Mainland Zone, NAD83, US Foot

Disclaimer: This figure was created for a specific purpose and project. Any use of this figure for any other project or purpose shall be at the user's sole risk and without liability to GeoEngineers. The locations of features shown may be approximate. GeoEngineers makes no warranty or representation as to the accuracy, completeness, or suitability of the figure, or data contained therein. The file containing this figure is a copy of a master document, the original of which is retained by GeoEngineers and is the official document of record.



Exploration Location Plan	
Northern Essex Community College Haverhill, Massachusetts	
GeoEngineers 	Figure 1

Attachment A
Subsurface Exploration Logs

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS <small>(LITTLE OR NO FINES)</small>		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES
		GRAVELS WITH FINES <small>(APPRECIABLE AMOUNT OF FINES)</small>		GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES
		GRAVELS WITH FINES <small>(APPRECIABLE AMOUNT OF FINES)</small>		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
	SAND AND SANDY SOILS	CLEAN SANDS <small>(LITTLE OR NO FINES)</small>		SW	WELL-GRADED SANDS, GRAVELLY SANDS
		SANDS WITH FINES <small>(APPRECIABLE AMOUNT OF FINES)</small>		SP	POORLY-GRADED SANDS, GRAVELLY SAND
		SANDS WITH FINES <small>(APPRECIABLE AMOUNT OF FINES)</small>		SM	SILTY SANDS, SAND - SILT MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS, ROCK FLOUR, CLAYEY SILTS WITH SLIGHT PLASTICITY
		LIQUID LIMIT LESS THAN 50		CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
		LIQUID LIMIT LESS THAN 50		OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS SILTY SOILS
		LIQUID LIMIT GREATER THAN 50		CH	INORGANIC CLAYS OF HIGH PLASTICITY
		LIQUID LIMIT GREATER THAN 50		OH	ORGANIC CLAYS AND SILTS OF MEDIUM TO HIGH PLASTICITY
HIGHLY ORGANIC SOILS			PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS	

NOTE: Multiple symbols are used to indicate borderline or dual soil classifications

Sampler Symbol Descriptions

	Modified California Sampler (6-inch sleeve) or Dames & Moore
	Standard Penetration Test (SPT)
	Shelby tube
	Piston
	Direct-Push
	Bulk or grab
	Continuous Coring

Blowcount is recorded for driven samplers as the number of blows required to advance sampler 12 inches (or distance noted). See exploration log for hammer weight and drop.

"P" indicates sampler pushed using the weight of the drill rig.

"WOH" indicates sampler pushed using the weight of the hammer.

NOTE: The reader must refer to the discussion in the report text and the logs of explorations for a proper understanding of subsurface conditions. Descriptions on the logs apply only at the specific exploration locations and at the time the explorations were made; they are not warranted to be representative of subsurface conditions at other locations or times.

ADDITIONAL MATERIAL SYMBOLS

SYMBOLS		TYPICAL DESCRIPTIONS
GRAPH	LETTER	
	AC	Asphalt Concrete
	CC	Cement Concrete
	CR	Crushed Rock/ Quarry Spalls
	SOD	Sod/Forest Duff
	TS	Topsoil

Groundwater Contact



Measured groundwater level in exploration, well, or piezometer



Measured free product in well or piezometer

Graphic Log Contact

Distinct contact between soil strata

Approximate contact between soil strata

Material Description Contact

Contact between geologic units

Contact between soil of the same geologic unit

Laboratory / Field Tests

%F	Percent fines
%G	Percent gravel
AL	Atterberg limits
CA	Chemical analysis
CP	Laboratory compaction test
CS	Consolidation test
DD	Dry density
DS	Direct shear
HA	Hydrometer analysis
MC	Moisture content
MD	Moisture content and dry density
Mohs	Mohs hardness scale
OC	Organic content
PM	Permeability or hydraulic conductivity
PI	Plasticity index
PL	Point load test
PP	Pocket penetrometer
SA	Sieve analysis
TX	Triaxial compression
UC	Unconfined compression
UU	Unconsolidated undrained triaxial compression
VS	Vane shear

Sheen Classification

NS	No Visible Sheen
SS	Slight Sheen
MS	Moderate Sheen
HS	Heavy Sheen

Key to Exploration Logs

Date Excavated	7/28/2025	Total Depth (ft)	6	Logged By	SJR	Excavator	Machine Time LLC	Groundwater not observed
				Checked By	PRM	Equipment	Bobcat E50 Excavator with Toothed Bucket	Caving not observed
Surface Elevation (ft) Vertical Datum	124 NAVD88	Easting (X) Northing (Y)	777757 3114841	Coordinate System Horizontal Datum	MA State Plane Mainland NAD83 (feet)			

Elevation (feet)	Depth (feet)	SAMPLE		Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
		Testing Sample	Sample Name Testing						
123	0	S-1			TS	Dark brown poorly graded fine to medium sand with silt and gravel, common roots (moist) (topsoil)			
	1	S-2			SP-SM	Brown poorly graded fine to medium sand with silt and gravel, some cobbles, some roots, few boulders (moist) (till)			
122	2				SP-SM	Brown poorly graded fine to medium sand with silt and gravel, some cobbles (moist) (till)			
121	3								Roots extend to approximately 2½ feet bgs
120	4	S-3							Weathered rock varve from approximately 3 to 3¼ feet bgs
119	5								
118	6								

Test pit terminated at approximately 6 feet bgs, no refusal encountered
 Encountered buried electrical marking tape at approximately 2.2 feet bgs in GEO-TP-1, offset approximately 10 feet to the north west to advance GEO-TP-1A

Notes: See Figure A-1 for explanation of symbols.
 The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to ½ foot.
 Coordinates Data Source: Horizontal approximated based on Other. Vertical approximated based on Topographic Survey.

Log of Test Pit GEO-TP-1A



Project: Northern Essex Community College
 Project Location: Haverhill, Massachusetts
 Project Number: 28175-001-00

Figure A-2
 Sheet 1 of 1

Date: 8/4/25 Path: F:\28175001\GINT\2817500100.GPJ DBLLibrary\Library\GEOUSA_DF_STD_US.GLB\GEB_TESTPIT_IP_GEOTEC_%F

Date Excavated	7/28/2025	Total Depth (ft)	5.5	Logged By	SJR	Excavator	Machine Time LLC	Groundwater not observed
				Checked By	PRM	Equipment	Bobcat E50 Excavator with Toothed Bucket	Caving not observed
Surface Elevation (ft) Vertical Datum	123 NAVD88	Easting (X) Northing (Y)	777906 3114729	Coordinate System Horizontal Datum	MA State Plane Mainland NAD83 (feet)			

Elevation (feet)	Depth (feet)	SAMPLE		Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
		Testing Sample	Sample Name Testing					
122	1	S-1		TS	Brown poorly graded fine to medium sand with silt and gravel, common roots (moist) (topsoil)			Roots extend to approximately 1 foot bgs
		S-2		SP-SM	Light brown poorly graded fine to medium sand with silt and gravel, some roots (moist) (fill)			
121	2	S-3		SP-SM	Brown poorly graded fine to medium sand with silt and gravel, few cobbles, few boulders (moist)			
120	3							Cobbles were angular, visually similar to weathered bedrock
119	4	S-4		SM	Gray silty fine to medium sand with gravel and few cobbles (moist) (till)			
118	5							

Test pit terminated at approximately 5.5 feet bgs, no refusal encountered

Notes: See Figure A-1 for explanation of symbols.
 The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 1/2 foot.
 Coordinates Data Source: Horizontal approximated based on Other. Vertical approximated based on Topographic Survey.

Log of Test Pit GEO-TP-2



Project: Northern Essex Community College
 Project Location: Haverhill, Massachusetts
 Project Number: 28175-001-00

Figure A-3
 Sheet 1 of 1

Date: 8/4/25 Path: F:\28175001\GINT\2817500100.GPJ DBLibrary\Library\GEOUSA_DF_STD_US.GLB\GEB_TESTPIT_IP_GEOTEC_%F

Date Excavated	7/28/2025	Total Depth (ft)	5.25	Logged By	SJR	Excavator	Machine Time LLC	Groundwater not observed
				Checked By	PRM	Equipment	Bobcat E50 Excavator with Toothed Bucket	Caving not observed
Surface Elevation (ft) Vertical Datum	124 NAVD88	Easting (X) Northing (Y)	778000 3114767	Coordinate System Horizontal Datum	MA State Plane Mainland NAD83 (feet)			

Elevation (feet)	Depth (feet)	SAMPLE		Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
		Testing Sample	Sample Name Testing					
123	0	S-1	TS	Light brown poorly graded fine to medium sand with silt and gravel, common roots (moist) (topsoil)			Roots extend to approximately 1 foot bgs	
	0.5	S-2	SP-SM	Light brown to orange-brown poorly graded fine to medium sand with silt and gravel, some roots (moist) (subsoil)				
	1		SM	Brown silty fine to medium sand with gravel (moist)				
122	2	S-3						
	3							
121	3.5		SM	Gray silty fine to medium sand with gravel and some cobbles (moist) (till)				
120	4							
119	5	S-4						

Test pit terminated at approximately 5.3 feet bgs, no refusal encountered

Notes: See Figure A-1 for explanation of symbols.
 The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 1/2 foot.
 Coordinates Data Source: Horizontal approximated based on Other. Vertical approximated based on Topographic Survey.

Log of Test Pit GEO-TP-3



Project: Northern Essex Community College
 Project Location: Haverhill, Massachusetts
 Project Number: 28175-001-00

Figure A-4
 Sheet 1 of 1

Date: 8/4/25 Path: F:\28175001\GINT\2817500100.GPJ DBLlibrary\library\GEOUSA_DF_STD_US.GLB\GEB_TESTPIT_IP_GEOTEC_%F

Date Excavated	7/28/2025	Total Depth (ft)	5.75	Logged By	SJR	Excavator	Machine Time LLC	Groundwater not observed
				Checked By	PRM	Equipment	Bobcat E50 Excavator with Toothed Bucket	Caving not observed
Surface Elevation (ft) Vertical Datum	124 NAVD88	Easting (X) Northing (Y)	778232 3114771	Coordinate System Horizontal Datum	MA State Plane Mainland NAD83 (feet)			

Elevation (feet)	Depth (feet)	SAMPLE		Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
		Testing Sample	Sample Name Testing						
123	1	S-1		[Graphic Log: Patterned area from 0 to 1 foot depth]	TS	Dark brown poorly graded fine to medium sand with silt and gravel, common roots (moist) (topsoil)			Roots extend to approximately 1 foot bgs
		S-2			SP-SM	Brown poorly graded fine to medium sand with silt and gravel, some cobbles, few roots (moist) (subsoil)			
		S-3			SP-SM		Brown poorly graded fine to medium sand with gravel and cobbles (moist)		
120	4								Pocket of gravel observed in one sidewall from approximately 1½ to 2 feet bgs
119	5	S-4			SM	Gray silty fine to medium sand with gravel (moist) (till)			

Test pit terminated at approximately 5.7 feet bgs, no refusal encountered

Notes: See Figure A-1 for explanation of symbols.
 The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to ½ foot.
 Coordinates Data Source: Horizontal approximated based on Other. Vertical approximated based on Topographic Survey.

Log of Test Pit GEO-TP-4



Project: Northern Essex Community College
 Project Location: Haverhill, Massachusetts
 Project Number: 28175-001-00

Figure A-5
 Sheet 1 of 1

Date: 8/4/25 Path: F:\28175001\GINT\2817500100.GPJ DBLibrary\Library\GEOUSA_DF_STD_US.GLB\GEB_TESTPIT_IP_GEOTEC_%F

Date Excavated	7/28/2025	Total Depth (ft)	5	Logged By	SJR	Excavator	Machine Time LLC	Groundwater not observed
				Checked By	PRM	Equipment	Bobcat E50 Excavator with Toothed Bucket	Caving not observed
Surface Elevation (ft) Vertical Datum	123 NAVD88	Easting (X) Northing (Y)	778210 3114485	Coordinate System Horizontal Datum	MA State Plane Mainland NAD83 (feet)			

Elevation (feet)	Depth (feet)	SAMPLE		Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
		Testing Sample	Sample Name Testing					
122	1		S-1	TS	Brown poorly graded fine to medium sand with silt and gravel, common roots (moist) (topsoil)			Roots extend to approximately 2 feet bgs
			S-2	SM	Brown silty fine to medium sand with gravel and few cobbles, some roots (moist) (subsoil)			
			S-3	SM	Brown silty fine to medium sand with gravel, some cobbles (moist)			
121	2							
120	3							
119	4		S-4	SM	Brown silty fine to medium sand with gravel and cobbles (moist) (till)			
118	5							

Test pit terminated at approximately 5 feet bgs, no refusal encountered

Notes: See Figure A-1 for explanation of symbols.
 The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 1/2 foot.
 Coordinates Data Source: Horizontal approximated based on Other. Vertical approximated based on Topographic Survey.

Log of Test Pit GEO-TP-5



Project: Northern Essex Community College
 Project Location: Haverhill, Massachusetts
 Project Number: 28175-001-00

Figure A-6
 Sheet 1 of 1

Date: 8/4/25 Path: F:\28175\001\GINT\2817500\00.GPJ DBL\Library\Library\GEOUSA_DF_STD_US.GLB\GEB_TESTPIT_IP_GEOTEC_%F

Date Excavated	7/28/2025	Total Depth (ft)	6	Logged By	SJR	Excavator	Machine Time LLC	Groundwater not observed
				Checked By	PRM	Equipment	Bobcat E50 Excavator with Toothed Bucket	Caving not observed
Surface Elevation (ft) Vertical Datum	124 NAVD88	Easting (X) Northing (Y)	778500 3114765	Coordinate System Horizontal Datum	MA State Plane Mainland NAD83 (feet)			

Elevation (feet)	Depth (feet)	SAMPLE		Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
		Testing Sample	Sample Name Testing						
123	0	S-1			TS	Brown poorly graded fine to medium sand with silt and gravel, common roots (moist) (topsoil)			
	0.5	S-2			SP-SM	Brown poorly graded fine to medium sand with silt and gravel, few cobbles, common roots (moist) (subsoil)			
	1				SP-SM	Brown poorly graded fine to medium sand with silt and gravel, some cobbles, few boulders, some roots (moist) (fill)			
122	2	S-3							
121	3								
120	4	S-4			SP-SM	Gray poorly graded fine to medium sand with silt and gravel, some cobbles, few roots (moist) (fill)			
119	5								
118	6								

Test pit terminated at approximately 6 feet bgs, no refusal encountered

Roots extend to approximately 6 feet bgs

Notes: See Figure A-1 for explanation of symbols.
 The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 1/2 foot.
 Coordinates Data Source: Horizontal approximated based on Other. Vertical approximated based on Topographic Survey.

Log of Test Pit GEO-TP-6



Project: Northern Essex Community College
 Project Location: Haverhill, Massachusetts
 Project Number: 28175-001-00

Figure A-7
 Sheet 1 of 1

Date: 8/4/25 Path: F:\28175\28175001\GINT\2817500100.GPJ DBLibrary\Library\GEOUSA_DF_STD_US.GLB\GEB_TESTPIT_IP_GEOTEC_%F

Attachment B
Geotechnical Laboratory Data Report



195 Frances Avenue
 Cranston RI, 02910
 Phone: (401)-467-6454
 Fax: (401)-467-2398
cts.thielsch.com
Let's Build a Solid Foundation

Client Information:
GeoEngineers
Boston, MA
978-870-7459
 Project Contact: Shannon Ring
 Collected By: Client

Project Information:
Northern Essex Community College
Haverhill, MA
 Project Number: 28175-001-00
 Summary Page: 1 of 1
 Report Date: 8/8/2025

LABORATORY TESTING DATA SHEET, Report No.: 7425-H-B004

Material Source	Sample ID	Depth (ft)	Laboratory No.	Identification Tests										Proctor / CBR / Permeability Tests							Laboratory Log and Soil Description	
				As Rcvd Moisture Content %	LL %	PL %	OD LL	Gravel %	Sand %	Fines %	Org. %	pH	9 _d MAX (pcf) W _{opt} (%)	9 _d MAX (pcf) W _{opt} (%) (Corr.)	Dry unit wt. (pcf)	Test Moisture Content %	Target Test Setup as % of Proctor	CBR @ 0.1"	CBR @ 0.2"	Permeability cm/sec		
				D2216	D4318			D6913			D2974	D4792	D1557									
Test Pit	GEO-TP-1 / S-3	1.2-6	25-S-B1584					5.0	22.0	73.0												Brown silt loam
Test Pit	GEO-TP-2 / S-4	3.5-5.5	25-S-B1585					34.3	23.2	42.5												Brown silt loam
Test Pit	GEO-TP-3 / S-4	3.3-5.3	23-S-B1586					37.0	21.3	41.7												Brown silt loam
Test Pit	GEO-TP-4 / S-3	0.5-4.3	25-S-B1587					23.7	23.2	53.1												Brown silt loam
Test Pit	GEO-TP-5 / S-4	3.2-5	25-S-B1588					29.1	27.4	43.5												Brown silt loam
Test Pit	GEO-TP-6 / S-3	0.7-3.7	27-S-B1589					60.3	10.3	29.4												Brown silt loam

Date Received: 8/1/2025

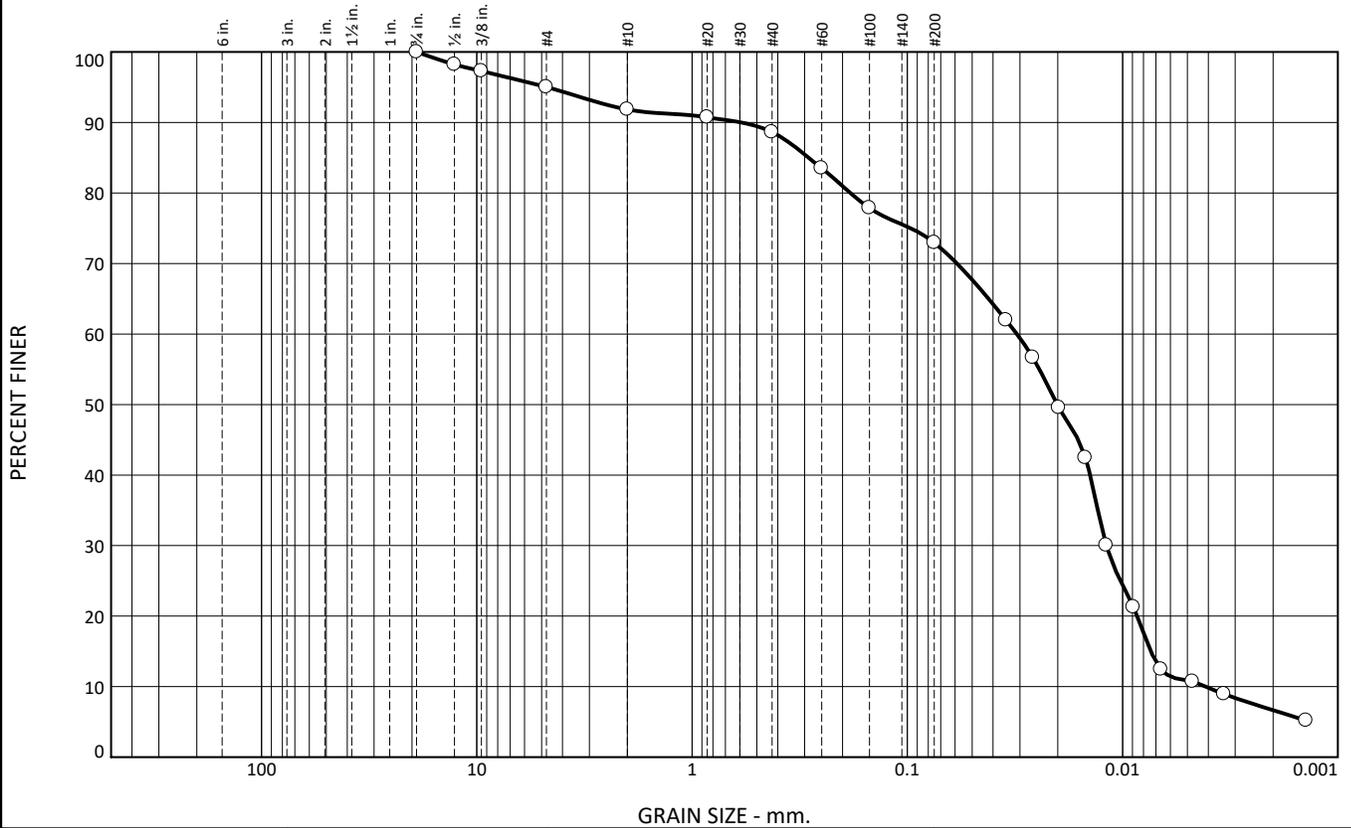
Reviewed By: *Ronnie LeBlanc*

Date Reviewed: 8/8/2025

This report only relates to items inspect and/or tested. No warranty, expressed or implied, is made.
 This report shall not be reproduced, except in full, without prior written approval from the Agency, as defined in ASTM E329.

These results are for the exclusive use of the client for whom they were obtained. This report only relates to items inspected and/or tested. No warranty, expressed or implied, is made.

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	5.0	3.2	3.2	15.6	66.4	6.6

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100.0		
1/2"	98.2		
3/8"	97.3		
#4	95.0		
#10	91.8		
#20	90.7		
#40	88.6		
#60	83.5		
#100	77.9		
#200	73.0		
0.0348 mm.	62.0		
0.0261 mm.	56.6		
0.0198 mm.	49.6		
0.0149 mm.	42.4		
0.0119 mm.	30.0		
0.0089 mm.	21.3		
0.0066 mm.	12.4		
0.0047 mm.	10.7		
0.0034 mm.	8.9		
0.0014 mm.	5.2		

* (no specification provided)

Soil Description

Brown silt loam

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D₉₀= 0.5882 D₈₅= 0.2874 D₆₀= 0.0310
D₅₀= 0.0201 D₃₀= 0.0119 D₁₅= 0.0074
D₁₀= 0.0041 C_u= 7.52 C_c= 1.11

Classification

USCS= ML AASHTO= A-4(0)

Remarks

Sample visually classified as non-plastic. Sample could not be rolled to 1/4".

Source of Sample: Test Pit Depth: 1.2-6
Sample Number: GEO-TP-1 / S-3

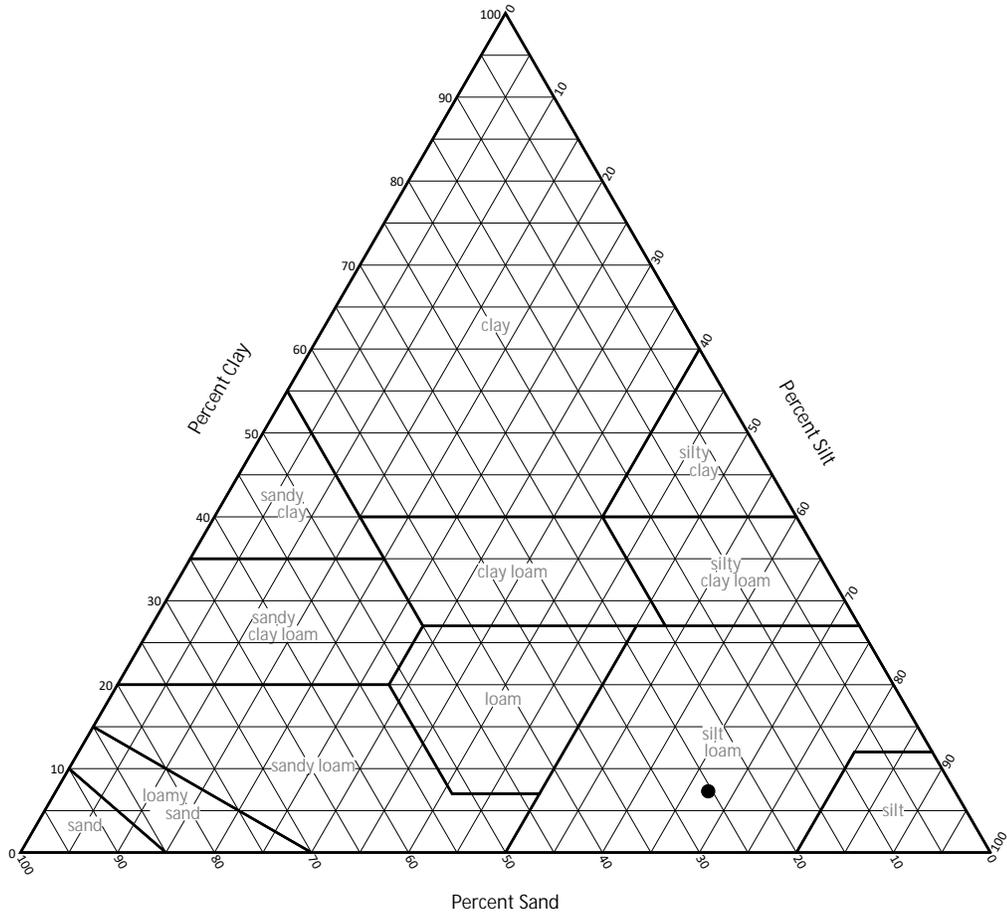
Date: 8.8.2025

Thielsch Engineering Inc. Cranston, RI	Client: GeoEngineers, Inc. Project: Northern Essex Community College Haverhill, MA Project No: 28175-001-00
Figure 25-S-B1584	

Tested By: SF Checked By: Michael Collins

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USDA Soil Classification



SOIL DATA							
	Source	Sample No.	Depth	Percentages From Material Passing a #10 Sieve			Classification
				Sand	Silt	Clay	
●	Test Pit	GEO-TP-1 / S-3	1.2-6	25.4	67.4	7.2	Silt loam

Thielsch Engineering Inc.

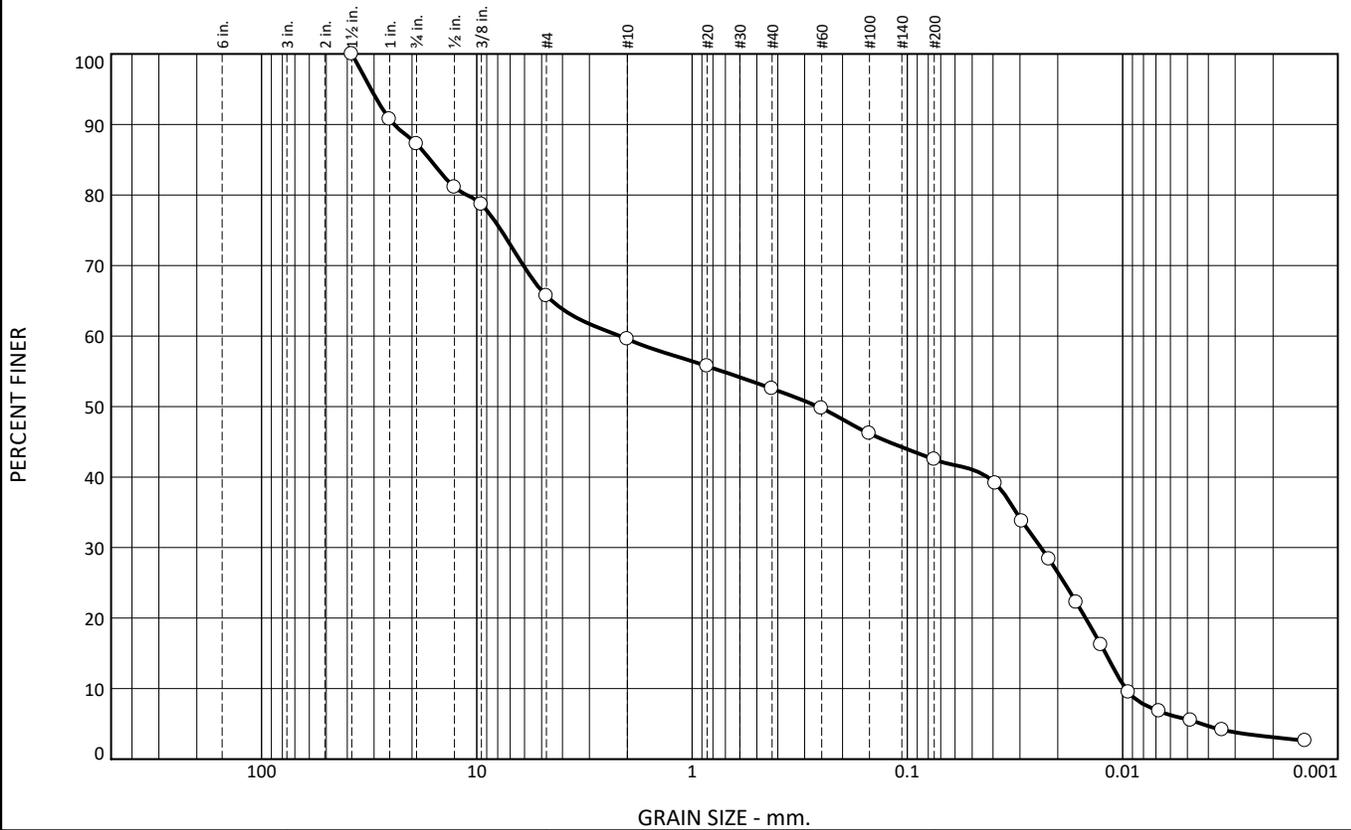
Cranston, RI

Client: GeoEngineers, Inc.
Project: Northern Essex Community College
Haverhill, MA
Project No.: 28175-001-00

Figure USDA-B1584

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Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	12.8	21.5	6.1	7.1	10.0	39.4	3.1

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 1/2"	100.0		
1"	90.7		
3/4"	87.2		
1/2"	81.1		
3/8"	78.7		
#4	65.7		
#10	59.6		
#20	55.7		
#40	52.5		
#60	49.7		
#100	46.2		
#200	42.5		
0.0390 mm.	39.1		
0.0293 mm.	33.7		
0.0219 mm.	28.3		
0.0164 mm.	22.2		
0.0126 mm.	16.2		
0.0094 mm.	9.5		
0.0068 mm.	6.8		
0.0048 mm.	5.5		
0.0034 mm.	4.1		
0.0014 mm.	2.6		

* (no specification provided)

Soil Description

Brown silt loam

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D₉₀= 24.2537 D₈₅= 16.4554 D₆₀= 2.1592
D₅₀= 0.2606 D₃₀= 0.0239 D₁₅= 0.0120
D₁₀= 0.0097 C_u= 222.95 C_c= 0.03

Classification

USCS= GM AASHTO= A-4(0)

Remarks

Sample visually classified as non-plastic. Sample could not be rolled to 1/4".

Source of Sample: Test Pit Depth: 3.5-5.5
Sample Number: GEO-TP-2 / S-4

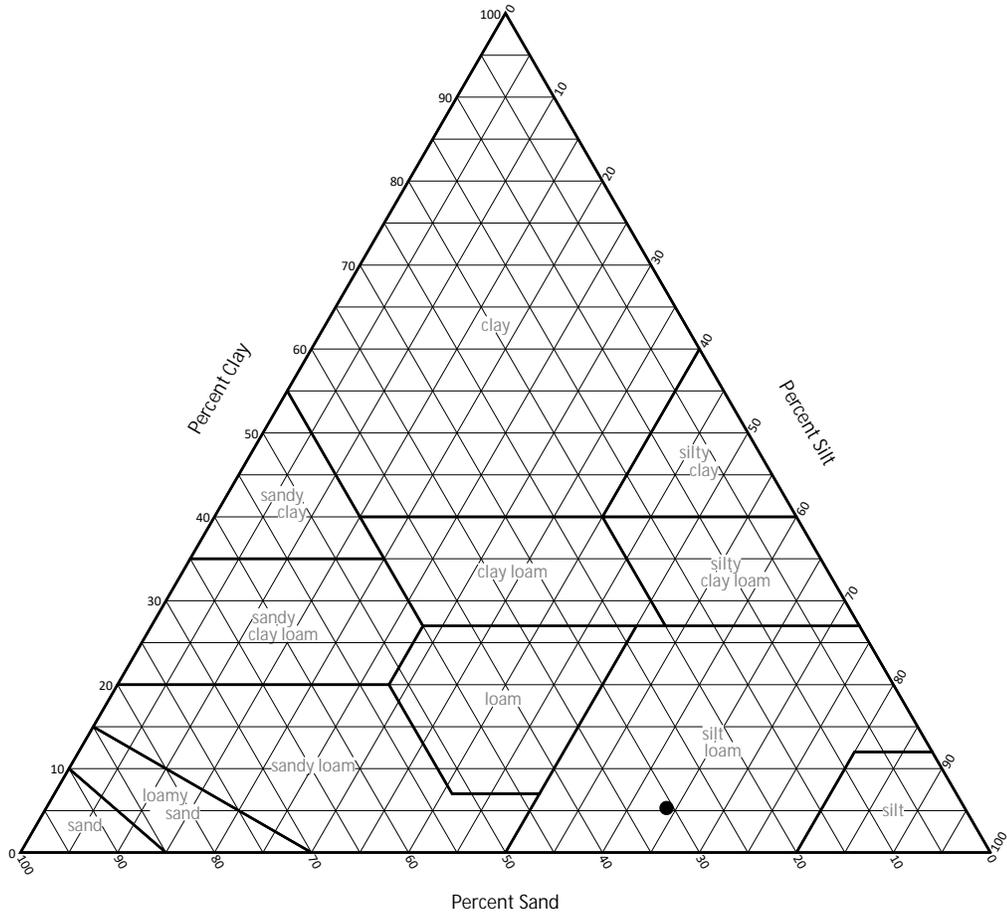
Date: 8.8.2025

Thielsch Engineering Inc. Cranston, RI	Client: GeoEngineers, Inc. Project: Northern Essex Community College Haverhill, MA Project No: 28175-001-00
Figure 25-S-B1585	

Tested By: MA Checked By: Michael Collins

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USDA Soil Classification



SOIL DATA							
	Source	Sample No.	Depth	Percentages From Material Passing a #10 Sieve			Classification
				Sand	Silt	Clay	
●	Test Pit	GEO-TP-2 / S-4	3.5-5.5	30.7	64.1	5.2	Silt loam

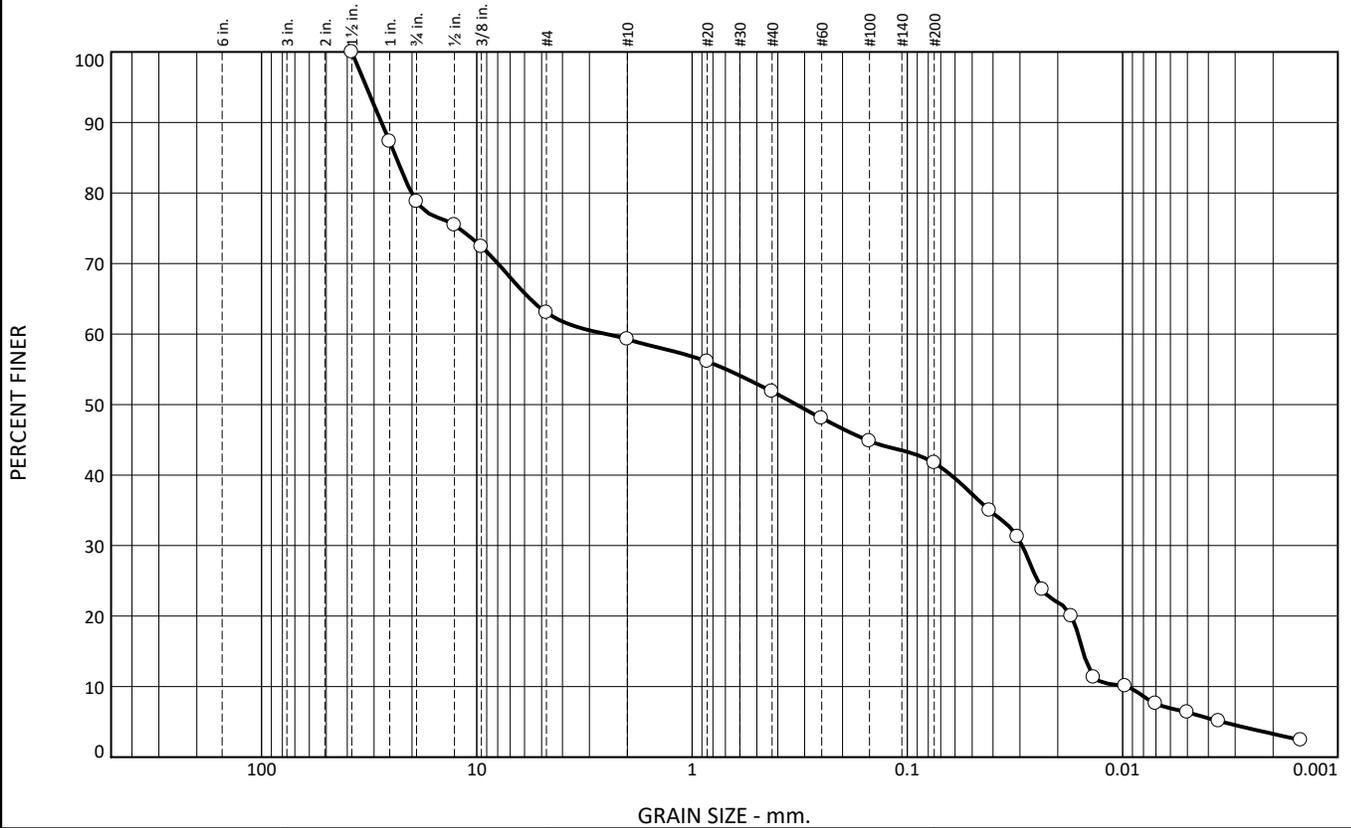
Thielsch Engineering Inc.

Cranston, RI

Client: GeoEngineers, Inc.
Project: Northern Essex Community College
Haverhill, MA
Project No.: 28175-001-00

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Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	21.2	15.8	3.7	7.5	10.1	38.4	3.3

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 1/2"	100.0		
1"	87.3		
3/4"	78.8		
1/2"	75.5		
3/8"	72.4		
#4	63.0		
#10	59.3		
#20	56.1		
#40	51.8		
#60	48.1		
#100	44.8		
#200	41.7		
0.0415 mm.	35.0		
0.0308 mm.	31.2		
0.0236 mm.	23.7		
0.0173 mm.	20.0		
0.0136 mm.	11.3		
0.0097 mm.	10.1		
0.0070 mm.	7.6		
0.0050 mm.	6.4		
0.0036 mm.	5.1		
0.0015 mm.	2.4		

* (no specification provided)

Soil Description

Brown silt loam

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D₉₀= 27.7229 D₈₅= 23.6388 D₆₀= 2.4998
D₅₀= 0.3277 D₃₀= 0.0292 D₁₅= 0.0153
D₁₀= 0.0096 C_u= 261.61 C_c= 0.04

Classification

USCS= GM AASHTO= A-4(0)

Remarks

Sample visually classified as non-plastic. Sample could not be rolled to 1/4".

Source of Sample: Test Pit Depth: 3.3-5.3
Sample Number: GEO-TP-3 / S-4

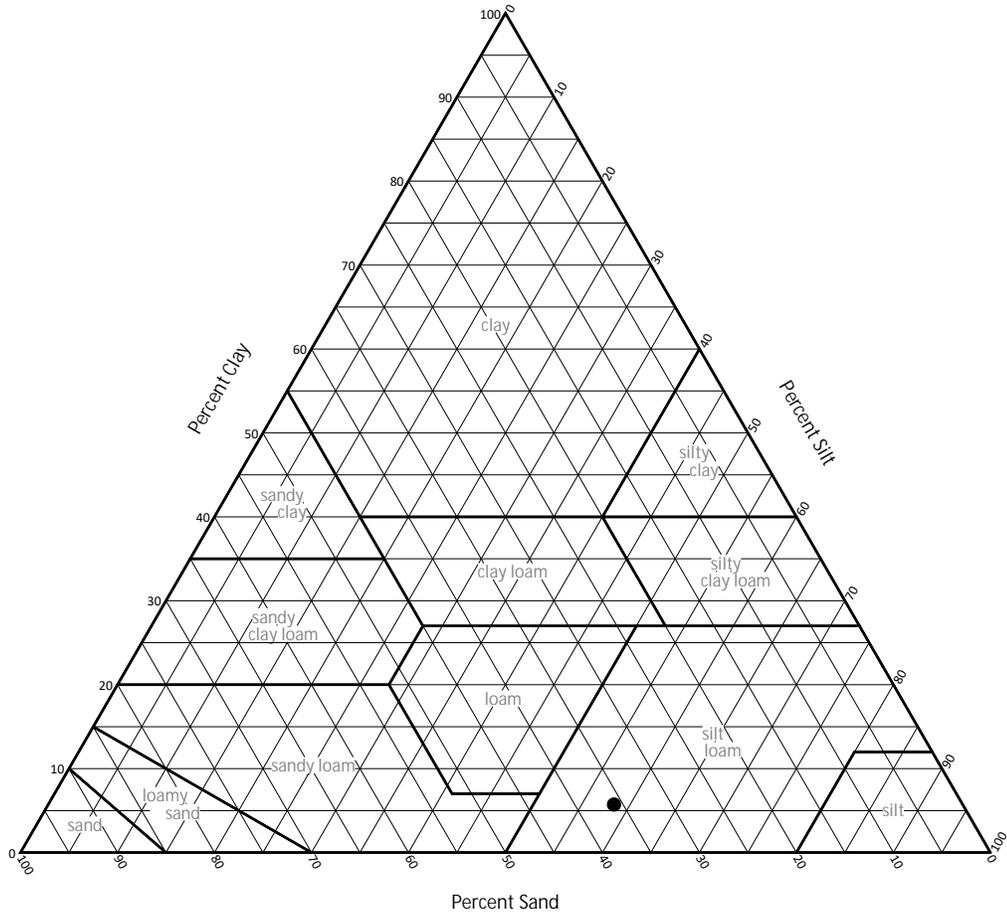
Date: 8.8.2025

Thielsch Engineering Inc. Cranston, RI	Client: GeoEngineers, Inc. Project: Northern Essex Community College Haverhill, MA Project No: 28175-001-00
Figure 25-S-B1586	

Tested By: MA Checked By: Michael Collins

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USDA Soil Classification



SOIL DATA							
	Source	Sample No.	Depth	Percentages From Material Passing a #10 Sieve			Classification
				Sand	Silt	Clay	
●	Test Pit	GEO-TP-3 / S-4	3.3-5.3	35.9	58.5	5.6	Silt loam

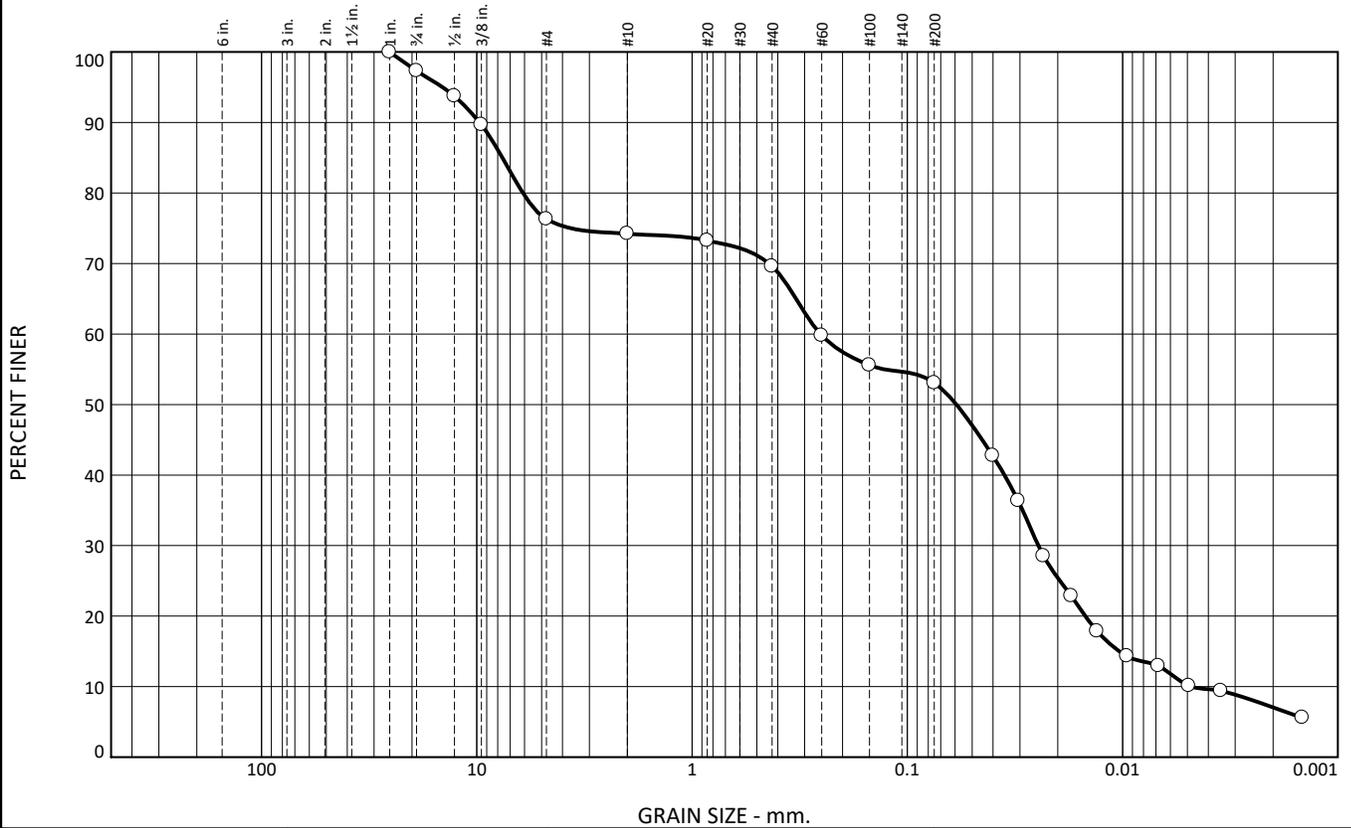
Thielsch Engineering Inc.

Cranston, RI

Client: GeoEngineers, Inc.
Project: Northern Essex Community College
Haverhill, MA
Project No.: 28175-001-00

These results are for the exclusive use of the client for whom they were obtained. This report only relates to items inspected and/or tested. No warranty, expressed or implied, is made.

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	2.7	21.0	2.1	4.6	16.5	46.1	7.0

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	97.3		
1/2"	93.7		
3/8"	89.7		
#4	76.3		
#10	74.2		
#20	73.2		
#40	69.6		
#60	59.8		
#100	55.6		
#200	53.1		
0.0402 mm.	42.8		
0.0305 mm.	36.4		
0.0233 mm.	28.5		
0.0173 mm.	22.9		
0.0132 mm.	17.9		
0.0096 mm.	14.3		
0.0068 mm.	12.9		
0.0049 mm.	10.1		
0.0035 mm.	9.4		
0.0015 mm.	5.6		

* (no specification provided)

Soil Description

Brown silt loam

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D₉₀= 9.7151 D₈₅= 7.6041 D₆₀= 0.2535
D₅₀= 0.0592 D₃₀= 0.0247 D₁₅= 0.0104
D₁₀= 0.0048 C_u= 52.72 C_c= 0.50

Classification

USCS= ML AASHTO= A-4(0)

Remarks

Sample visually classified as non-plastic. Sample could not be rolled to 1/4".

Source of Sample: Test Pit Depth: 0.5-4.3
Sample Number: GEO-TP-4 / S-3

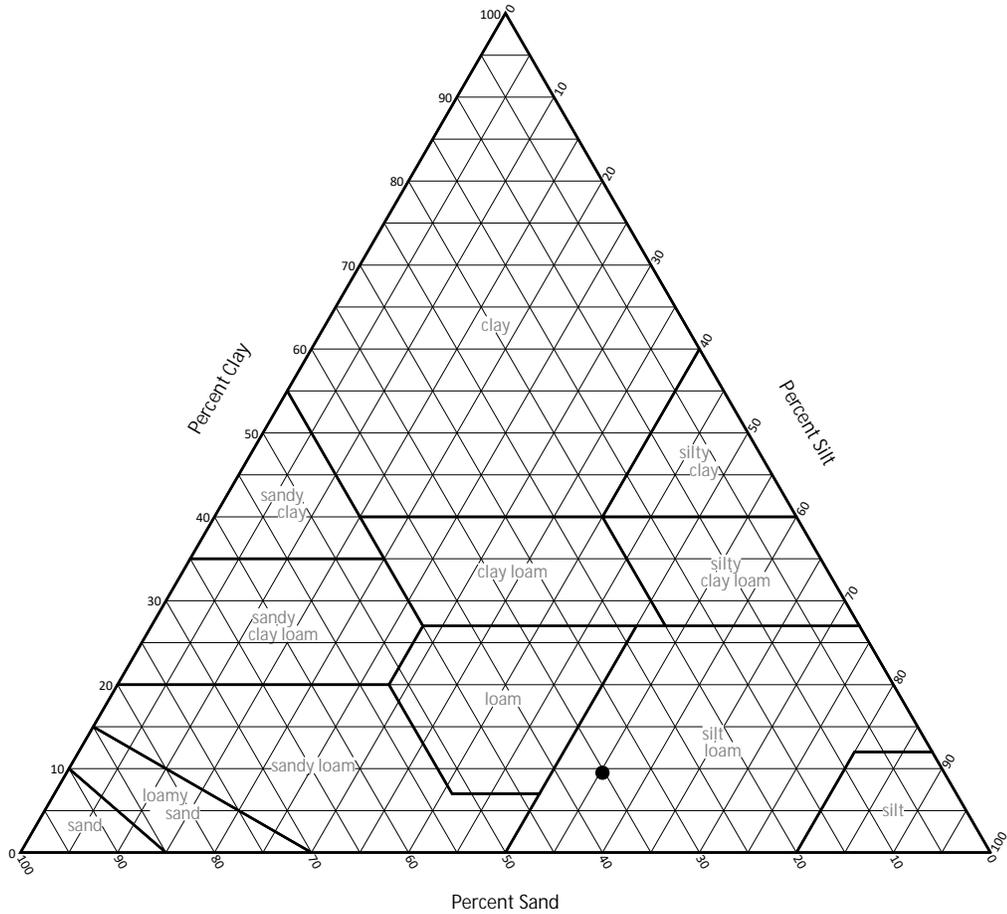
Date: 8.8.2025

Thielsch Engineering Inc. Cranston, RI	Client: GeoEngineers, Inc. Project: Northern Essex Community College Haverhill, MA Project No: 28175-001-00
Figure 25-S-B1587	

Tested By: MA Checked By: Michael Collins

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USDA Soil Classification



SOIL DATA							
	Source	Sample No.	Depth	Percentages From Material Passing a #10 Sieve			Classification
				Sand	Silt	Clay	
●	Test Pit	GEO-TP-4 / S-3	0.5-4.3	35.2	55.4	9.4	Silt loam

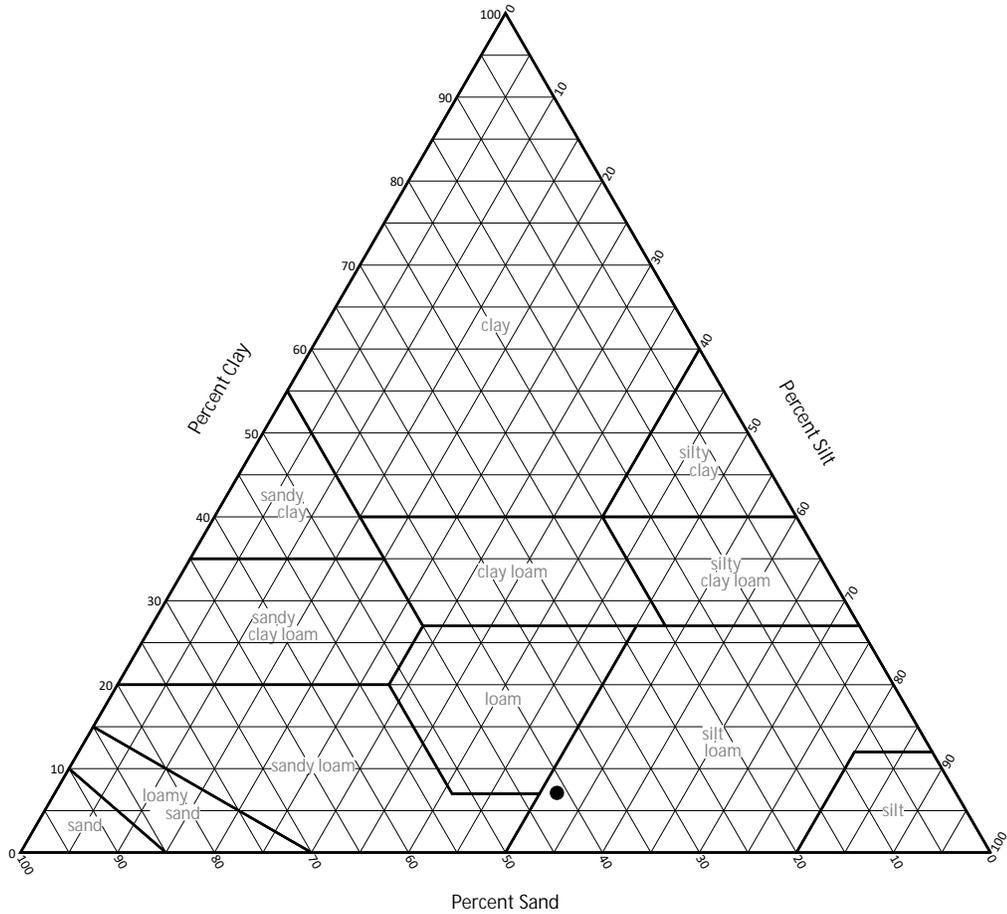
Thielsch Engineering Inc.

Cranston, RI

Client: GeoEngineers, Inc.
 Project: Northern Essex Community College
 Haverhill, MA
 Project No.: 28175-001-00

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USDA Soil Classification



SOIL DATA							
	Source	Sample No.	Depth	Percentages From Material Passing a #10 Sieve			Classification
				Sand	Silt	Clay	
●	Test Pit	GEO-TP-5 / S-4	3.2-5	41.1	51.9	7.0	Silt loam

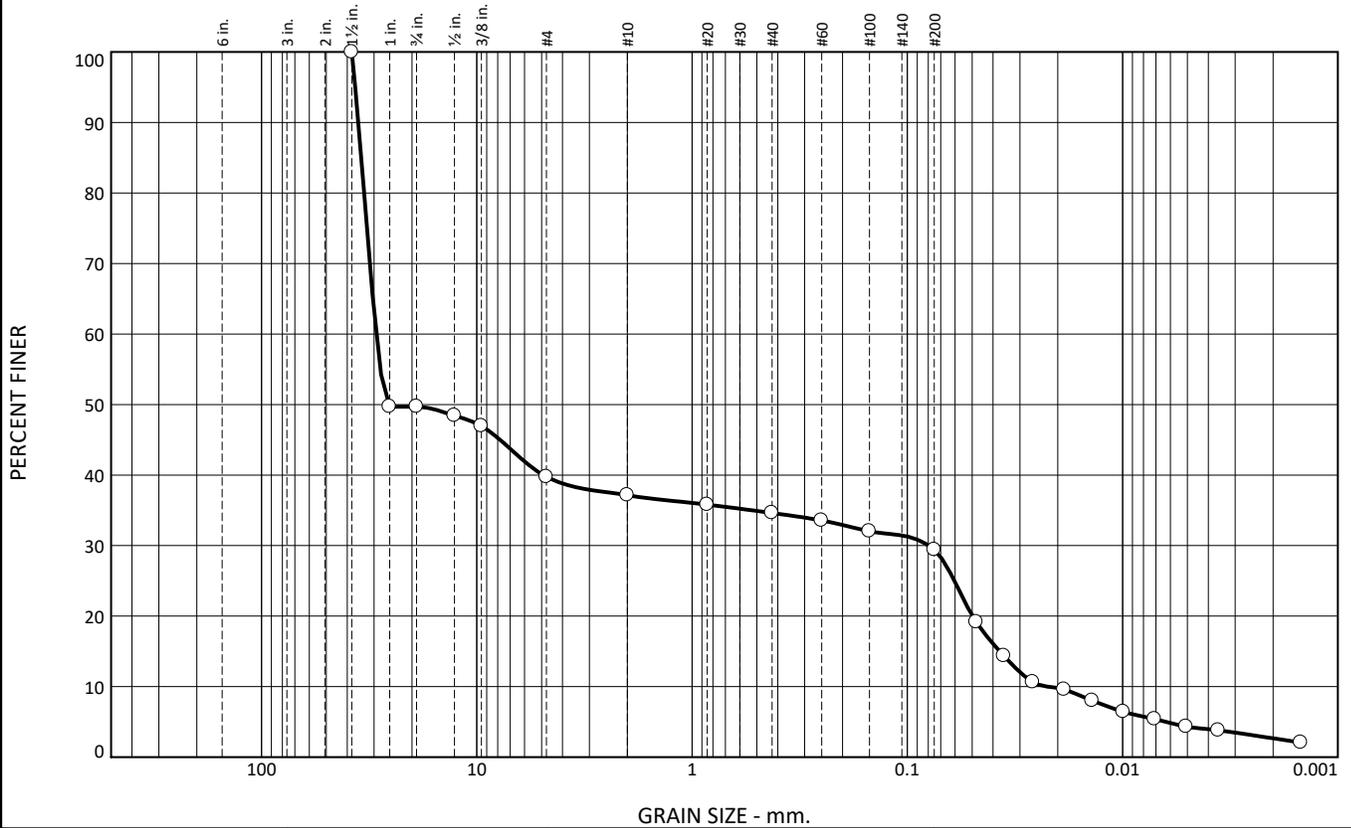
Thielsch Engineering Inc.

Cranston, RI

Client: GeoEngineers, Inc.
Project: Northern Essex Community College
Haverhill, MA
Project No.: 28175-001-00

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Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	50.3	10.0	2.5	2.6	5.2	26.7	2.7

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 1/2"	100.0		
1"	49.7		
3/4"	49.7		
1/2"	48.4		
3/8"	47.0		
#4	39.7		
#10	37.2		
#20	35.8		
#40	34.6		
#60	33.6		
#100	32.0		
#200	29.4		
0.0478 mm.	19.1		
0.0356 mm.	14.4		
0.0262 mm.	10.6		
0.0187 mm.	9.6		
0.0139 mm.	8.0		
0.0099 mm.	6.4		
0.0071 mm.	5.4		
0.0051 mm.	4.3		
0.0036 mm.	3.8		
0.0015 mm.	2.1		

* (no specification provided)

Soil Description

Brown silt loam

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D₉₀= 35.5071 D₈₅= 34.4132 D₆₀= 29.3039
D₅₀= 25.9800 D₃₀= 0.0796 D₁₅= 0.0372
D₁₀= 0.0224 C_u= 1310.87 C_c= 0.01

Classification

USCS= GM AASHTO= A-2-4(0)

Remarks

Source of Sample: Test Pit Depth: 0.7-3.7
Sample Number: GEO-TP-6 / S-3

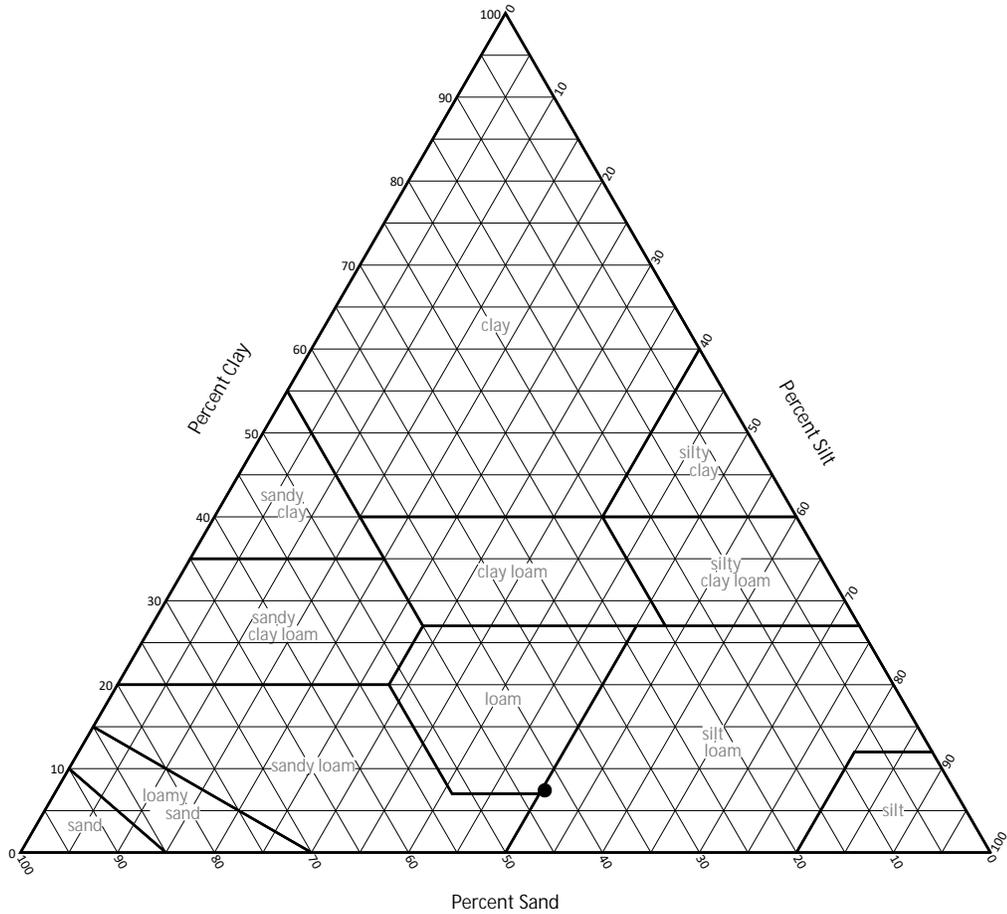
Date: 8.8.2025

Thielsch Engineering Inc. Cranston, RI	Client: GeoEngineers, Inc. Project: Northern Essex Community College Haverhill, MA Project No: 28175-001-00
Figure 25-S-B1589	

Tested By: MA Checked By: Michael Collins

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USDA Soil Classification



SOIL DATA							
	Source	Sample No.	Depth	Percentages From Material Passing a #10 Sieve			Classification
				Sand	Silt	Clay	
●	Test Pit	GEO-TP-6 / S-3	0.7-3.7	42.2	50.5	7.3	Silt loam

Thielsch Engineering Inc.

Cranston, RI

Client: GeoEngineers, Inc.
 Project: Northern Essex Community College
 Haverhill, MA
 Project No.: 28175-001-00

Figure USDA-B1589

Attachment C
Limitations and Guidelines for Use

Attachment C

Limitations and Guidelines For Use¹

This attachment provides information to help you manage your risks with respect to the use of this report.

READ THESE PROVISIONS CLOSELY

It is important to recognize that the geoscience practices (geotechnical engineering, geology, and environmental science) rely on professional judgment and opinion to a greater extent than other engineering and natural science disciplines, where more precise and/or readily observable data may exist. To help clients better understand how this difference pertains to our services, GeoEngineers includes the following explanatory “limitations” provisions in its reports. Please confer with GeoEngineers if you need to know more how these “Report Limitations and Guidelines for Use” apply to your project or site.

GEOTECHNICAL SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES, PERSONS, AND PROJECTS

This report has been prepared for Jones Architecture, Inc., for the proposed renovations of the athletic fields at Northern Essex Community College (NECC) located at 100 Elliot Street in Haverhill, Massachusetts, specifically identified in the report. The information contained herein is not applicable to other sites or projects.

GeoEngineers structures its services to meet the specific needs of its clients. No party other than the party to whom this report is addressed may rely on the product of our services unless we agree to such reliance in advance and in writing. Within the limitations of the agreed scope of services for the Project, and its schedule and budget, our services have been executed in accordance with our Agreement with Jones Architecture, Inc. dated June 20, 2025, and generally accepted geotechnical practices in this area at the time this report was prepared. We do not authorize, and will not be responsible for, the use of this report for any purposes or projects other than those identified in the report.

A GEOTECHNICAL ENGINEERING OR GEOLOGIC REPORT IS BASED ON A UNIQUE SET OF PROJECT-SPECIFIC FACTORS

This report has been prepared for the proposed renovations of the athletic fields at Northern Essex Community College (NECC) located at 100 Elliot Street in Haverhill, Massachusetts. GeoEngineers considered a number of unique, project-specific factors when establishing the scope of services for this project and report. Unless GeoEngineers specifically indicates otherwise, it is important not to rely on this report if it was:

- Not prepared for you,
- Not prepared for your project,
- Not prepared for the specific site explored, or

¹ Developed based on material provided by GBA, GeoProfessional Business Association; www.geoprofessional.org.

- Completed before important project changes were made.

For example, changes that can affect the applicability of this report include those that affect:

- The function of the proposed structure;
- Elevation, configuration, location, orientation, or weight of the proposed structure;
- Composition of the design team; or
- Project ownership.

If changes occur after the date of this report, GeoEngineers cannot be responsible for any consequences of such changes in relation to this report unless we have been given the opportunity to review our interpretations and recommendations. Based on that review, we can provide written modifications or confirmation, as appropriate.

ENVIRONMENTAL CONCERNS ARE NOT COVERED

Unless environmental services were specifically included in our scope of services, this report does not provide any environmental findings, conclusions, or recommendations, including but not limited to, the likelihood of encountering underground storage tanks or regulated contaminants.

SUBSURFACE CONDITIONS CAN CHANGE

This geotechnical or geologic report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by man-made events such as construction on or adjacent to the site, new information or technology that becomes available subsequent to the report date, or by natural events such as floods, earthquakes, slope instability or groundwater fluctuations. If more than a few months have passed since issuance of our report or work product, or if any of the described events may have occurred, please contact GeoEngineers before applying this report for its intended purpose so that we may evaluate whether changed conditions affect the continued reliability or applicability of our conclusions and recommendations.

TOPSOIL

For the purposes of this report, we consider topsoil to consist of generally fine-grained soil with an appreciable amount of organic matter based on visual examination and to be unsuitable for direct support of the proposed improvements. However, the organic content and other mineralogical and gradational characteristics used to evaluate the suitability of soil for use in landscaping and agricultural purposes was not determined, nor considered in our analyses. Therefore, the information and recommendations in this report and our logs and descriptions should not be used as a basis for estimating the volume of topsoil available for such purposes.

GEOTECHNICAL AND GEOLOGIC FINDINGS ARE PROFESSIONAL OPINIONS

Our interpretations of subsurface conditions are based on field observations from widely spaced sampling locations at the site. Site exploration identifies the specific subsurface conditions only at those points where subsurface tests are conducted or samples are taken. GeoEngineers reviewed field and laboratory data and then applied its professional judgment to render an informed opinion about subsurface conditions at

other locations. Actual subsurface conditions may differ, sometimes significantly, from the opinions presented in this report. Our report, conclusions and interpretations are not a warranty of the actual subsurface conditions.

GEOTECHNICAL ENGINEERING REPORT RECOMMENDATIONS ARE NOT FINAL

We have developed the following recommendations based on data gathered from subsurface investigation(s). These investigations sample just a small percentage of a site to create a snapshot of the subsurface conditions elsewhere on the site. Such sampling on its own cannot provide a complete and accurate view of subsurface conditions for the entire site. Therefore, the recommendations included in this report are preliminary and should not be considered final. GeoEngineers' recommendations can be finalized only by observing actual subsurface conditions revealed during construction. GeoEngineers cannot assume responsibility or liability for the recommendations in this report if we do not perform construction observation.

We recommend that you allow sufficient monitoring, testing and consultation during construction by GeoEngineers to confirm that the conditions encountered are consistent with those indicated by the explorations, to provide recommendations for design changes if the conditions revealed during the work differ from those anticipated, and to evaluate whether earthwork activities are completed in accordance with our recommendations. Retaining GeoEngineers for construction observation for this project is the most effective means of managing the risks associated with unanticipated conditions. If another party performs field observation and confirms our expectations, the other party must take full responsibility for both the observations and recommendations. Please note, however, that another party would lack our project-specific knowledge and resources.

A GEOTECHNICAL ENGINEERING OR GEOLOGIC REPORT COULD BE SUBJECT TO MISINTERPRETATION

Misinterpretation of this report by members of the design team or by contractors can result in costly problems. GeoEngineers can help reduce the risks of misinterpretation by conferring with appropriate members of the design team after submitting the report, reviewing pertinent elements of the design team's plans and specifications, participating in pre-bid and preconstruction conferences, and providing construction observation.

DO NOT REDRAW THE EXPLORATION LOGS

Geotechnical engineers and geologists prepare final test pit logs based upon their interpretation of field logs and laboratory data. The logs included in a geotechnical engineering or geologic report should never be redrawn for inclusion in architectural or other design drawings. Photographic or electronic reproduction is acceptable, but separating logs from the report can create a risk of misinterpretation.

GIVE CONTRACTORS A COMPLETE REPORT AND GUIDANCE

To help reduce the risk of problems associated with unanticipated subsurface conditions, GeoEngineers recommends giving contractors the complete geotechnical engineering or geologic report, including these "Report Limitations and Guidelines for Use." When providing the report, you should preface it with a clearly written letter of transmittal that:

- Advises contractors that the report was not prepared for purposes of bid development and that its accuracy is limited; and
- Encourages contractors to conduct additional study to obtain the specific types of information they need or prefer.

CONTRACTORS ARE RESPONSIBLE FOR SITE SAFETY ON THEIR OWN CONSTRUCTION PROJECTS

Our geotechnical recommendations are not intended to direct the contractor's procedures, methods, schedule, or management of the work site. The contractor is solely responsible for job site safety and for managing construction operations to minimize risks to on-site personnel and adjacent properties.

BIOLOGICAL POLLUTANTS

GeoEngineers' Scope of Work specifically excludes the investigation, detection, prevention, or assessment of the presence of Biological Pollutants. Accordingly, this report does not include any interpretations, recommendations, findings, or conclusions regarding the detecting, assessing, preventing or abating of Biological Pollutants, and no conclusions or inferences should be drawn regarding Biological Pollutants as they may relate to this project. The term "Biological Pollutants" includes, but is not limited to, molds, fungi, spores, bacteria, and viruses, and/or any of their byproducts.

A Client that desires these specialized services is advised to obtain them from a consultant who offers services in this specialized field.

INFORMATION PROVIDED BY OTHERS

GeoEngineers has relied upon certain data or information provided or compiled by others in the performance of our services. Although we use sources that we reasonably believe to be trustworthy, GeoEngineers cannot warrant or guarantee the accuracy or completeness of information provided or compiled by others.



Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

Owner Name

Street Address

Map/Lot #

City

State

Zip Code

B. Site Information

1. (Check one) [] New Construction [] Upgrade [] Repair

2. Soil Survey Available? [] Yes [] No If yes: Source Soil Map Unit

Soil Name

Soil Limitations

Geologic/Parent Material

Landform

3. Surficial Geological Report Available? [] Yes [] No If yes: Year Published/Source Publication Scale Map Unit

4. Flood Rate Insurance Map

Above the 500-year flood boundary? [] Yes [] No Within the 100-year flood boundary? [] Yes [] No If Yes, continue to #5.

5. Within a velocity zone? [] Yes [] No

6. Within a Mapped Wetland Area? [] Yes [] No

MassGIS Wetland Data Layer: Wetland Type

7. Current Water Resource Conditions (USGS): Range: [] Above Normal [] Normal [] Below Normal Month/Year

8. Other references reviewed:



Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: _____

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			

Additional Notes:



Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: _____

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			

Additional Notes:



Commonwealth of Massachusetts

City/Town of _____

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: _____

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Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

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Commonwealth of Massachusetts

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: _____

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Additional Notes:



Commonwealth of Massachusetts

City/Town of _____

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: _____

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			Depth	Color	Percent		Gravel	Cobbles & Stones			

Additional Notes:

Pipe Sizing

				NECC Athletic Field Renovations (25-yr Storm)					PREPARED BY : BRENNAN CONSULTING				
									JOB NO 25527	BY: CG	DATE: 2/26/2026		
Outlet Structure	Drainage Area (acres)	Rainfall Intensity (in/hr)	Rational Coefficient	Peak Discharge (cfs)	Outlet Pipe Size (in)	Pipe Area (sf)	Wetted Perimeter (ft)	Hydraulic Radius (ft)	Manning's n	Pipe Slope (ft/ft)	Velocity (ft/s)	Capacity (cfs)	Peak Discharge (cfs)
WQU 305	0.38	6.3	0.66	1.56	12	0.787	3.14	0.251	0.012	0.01230	5.46	4.30	1.56
AD 304	0.35	6.3	0.30	0.66	12	0.787	3.14	0.251	0.012	0.02320	7.50	5.90	0.66
FLD 306	N/A	6.3	N/A	5.84	18	1.771	4.71	0.376	0.012	0.01700	8.41	14.89	5.84
DMH 303	N/A	6.3	N/A	8.06	24	3.149	6.28	0.501	0.012	0.01130	8.30	26.15	8.06
WQU 302	0.89	6.3	0.33	1.83	12	0.787	3.14	0.251	0.012	0.02210	7.32	5.76	1.83
DMH 301	N/A	6.3	N/A	9.89	24	3.149	6.28	0.501	0.012	0.01020	7.89	24.84	9.89
FLD 205	N/A	6.3	0.87	5.34	18	1.771	4.71	0.376	0.012	0.01090	6.73	11.92	5.34
WQU 204	0.18	6.3	0.42	0.48	12	0.787	3.14	0.251	0.012	0.00660	4.00	3.15	0.48
DMH 203	N/A	6.3	N/A	5.82	18	1.771	4.71	0.376	0.012	0.01110	6.79	12.03	5.82
FLD 202	N/A	6.3	N/A	5.89	18	1.771	4.71	0.376	0.012	0.01350	7.49	13.27	5.89
DMH 201	N/A	6.3	N/A	11.71	24	3.149	6.28	0.501	0.012	0.01270	8.80	27.72	11.71
EX 2	0.76	6.3	0.50	2.41	12	0.787	3.14	0.251	0.012	0.03490	9.19	7.24	2.41
DMH 402	0.76	6.3	N/A	2.41	12	0.787	3.14	0.251	0.012	0.01120	5.21	4.10	2.41
DMH 401	0.76	6.3	N/A	2.41	12	0.787	3.14	0.251	0.012	0.01020	4.97	3.91	2.41
DMH 400	1.16	6.3	0.57	4.15	12	0.787	3.14	0.251	0.012	0.01250	5.50	4.33	4.15