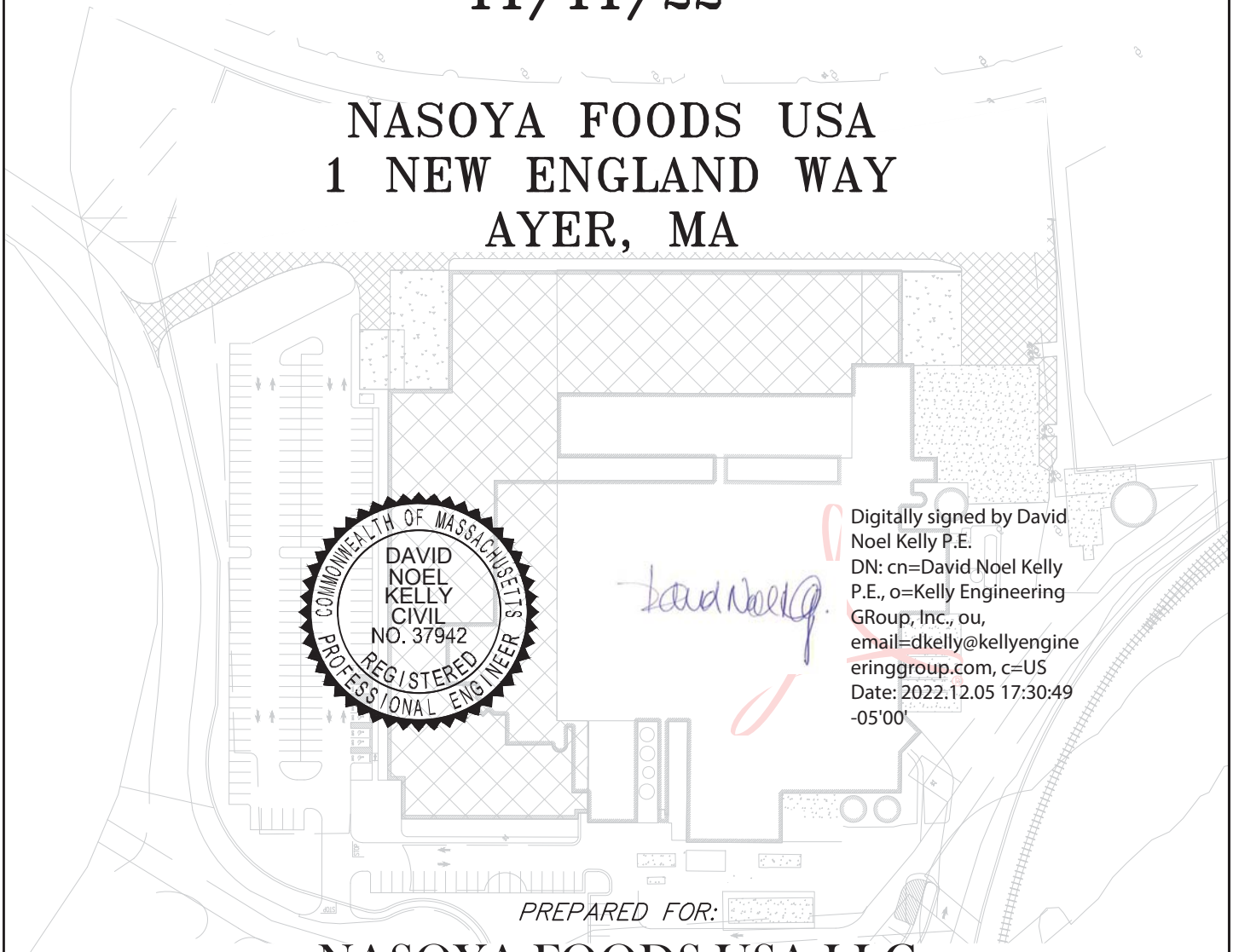
STORMWATER MANAGEMENT REPORT
11/11/22

NASOYA FOODS USA
1 NEW ENGLAND WAY
AYER, MA



COMMONWEALTH OF MASSACHUSETTS
DAVID NOEL KELLY
CIVIL
NO. 37942
REGISTERED PROFESSIONAL ENGINEER

Digitally signed by David Noel Kelly P.E.
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Date: 2022.12.05 17:30:49 -05'00'

PREPARED FOR:

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2315 MOORE AVE.
FULLERTON, CA 92833

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TABLE OF CONTENTS

INTRODUCTION

The purpose of this report is to analyze the pre-development and post-development drainage conditions for the proposed redevelopment project and to demonstrate that the project will have no negative impacts on the surrounding properties and resource areas. The design incorporates many best management practices recommended by the Massachusetts Stormwater Management Handbook and incorporates design standards recommended by the Town of Ayer Stormwater Management Regulations.

EXISTING SITE

The approximately 12 acre site is located at 1 Industrial Way, Ayer, MA. The property is bounded by Westford Road to the North, Industrial Way to the east, existing industrial developments to the south, industrial rail service tracks to southeast, and existing industrial development to the east.

Currently all runoff from the site drains to a series of catch basins and manholes that all drain into the Town of Ayer Drain Line that runs through the site within an easement. The Drain line conveys runoff from this site, Industrial Ave, and adjacent industrial sites, under the rail road tracks and into the wetlands. Runoff from the wetland area discharges under the MBTA rail tracks and ultimately enters Bennets Brook and Spectacle Pond approximately 2/3 of a mile from the site. We have reviewed the Town of Ayer Stormwater Management Program(SWMP), last revised June 2021 and the EPA My Waterways web site. Both Bennets Brook and Spectacle Pond listed 303(d) impaired. Bennets Brook is impared with Ecoli and Spectacle Pond is impared with multiple nonnative plants.

In order to model pre and post runoff characteristics the site is split into three water sheds based on the areas for redevelopment and discharge point to drainage easement.

Area 1 consists of the eastern portion of the site that consists of a wooded area close to Westford Road, Parking and a loading areas on the east side of the site. Runoff from this area enters the drainage easement in Industrial Ave through a 24" concrete pipe. This 24" pipe is Design Point #1. The eastern portion of the site is where the office and manufacturing areas of the facility will be expanded.

Area 2 Consist of Northern/North eastern part of the site and consists of wooded area close to Westford Road, the northerly portion of the existing building, and potion of the loading areas located on the west side of the site. Runoff from this area enters an existing catch basin that drains into the drainage easement in a 24" and 30" pipe. The last catch basin in this area is Design Point #2. This area of site will be expanded with the warehouse component of the addition and 6 loading docks.

Area 3 consists of the remaining portion of the existing building and site where little to not work is proposed. Runoff from this area enters the drainage easement between areas 1 and 2.

NRCS soils maps, geotechnical boring data, development plans from adjacent properties have been reviewed to assess hydrologic soils groups and to estimate seasonal high groundwater. The site is currently very active and confirmatory test pits will be performed prior to construction.

See Existing Drainage Exhibit in **Attachment A.**

PROPOSED SITE

The proposed redevelopment consists of a building expansion of 77,360+/- s.f., addition of 8 loading docks, reconfiguring the car parking lot, and the addition of one curb cut on Industrial Way.

A stormwater management system has been designed to comply with Massachusetts Department of Environmental Protection Standards for stormwater management and the Town of Ayer Stormwater Management Bylaw and its implementing Stormwater Regulations.

The Stormwater management system will incorporate many Best Management Practices (BMPs), which will include deep sump catch basins with water quality elbows, proprietary water quality devices, subsurface recharge systems, reduction of pavement surfaces, and an operations and maintenance program designed to treat, recharge, and mitigate stormwater runoff generated from the proposed development of the site.

See Proposed Conditions Drainage Exhibit in **Attachment B**.

STORMWATER MANAGEMENT STANDARDS

The following is a discussion of the Massachusetts Stormwater Management Standards

STANDARD 1: NO NEW UNTREATED DISCHARGES

The proposed project has been designed for no new untreated discharges from the site. The new and redeveloped pavement areas will be treated by proprietary water quality devices followed by subsurface recharge systems. As noted above the site drainage system ties into an existing drainage system so no new outfalls are proposed.

STANDARD 2: PEAK RATE ATTENUATION

Existing and developed sites were modeled using Hydraflow Hydrographs Extension for Autodesk Civil 3D Version 2020 by AutoDesk, Inc.. This computer software uses the TR55/TR20 tabular method of computing peak flows, hydrograph addition, and pond routing. The curve numbers for the existing conditions analysis were determined using soil survey maps which show hydrologic group B, D and unrated soils. See soil survey map and geotechnical boring logs in **Attachment E**. For the purposes of the proposed conditions analysis, a conservative estimate of time of concentration of 6 minutes was assumed for the proposed conditions analysis.

As can be seen from the summary chart below, the peak flows from the design storm on the site will be reduced as a result of this project. Peak flow mitigation will be provided within subsurface recharge systems.

The entire TR55 analysis is included in **Attachment A** (existing conditions) **and B** (proposed conditions) of this report.

STANDARD 3: RECHARGE

The project site contains hydrologic group B according to the NRCS soil maps and test pits conducted by North East Geotechnical, Inc.. Based on DEP guidelines for recharge, the required recharge volume for hydrologic group B soils is 0.35". The total increase in impervious area is 45,384 s.f. This includes a 75,377 s.f. building expansion and a reduction in pavement area of 29,993 s.f.

Under DEP Policy Required minimum dedicated Recharge Volume using the Static Method is = 45,384+/- s.f. X 0.35 in. X 1 ft/ 12 in. = 1,323 cubic feet

However, the redeveloped also require recharge to the maximum extent practical. The Town of Ayer Stormwater Regulations require 0.8 of dedicated recharge volume within redevelopment areas. The total impervious areas within the redevelopment area = 183,833 s.f.

Under the Town of Ayer Stormwater Mangement Regulations the required recharge volume is 183,833 s.f. x 0.8" x 1ft/12in = 12,255 cu. ft.

The dedicated recharge volume has been provided in the 3 subsurface recharge systems with a total of 13,602 cu.ft below the lowest invert. This is equivalent to 0.88" of volume of the redeveloped areas and 5.4" over the increase in impervious areas. Clearly this amount of recharge exceeds required by DEP requirement and meets the Town of Ayer Stormwater Management Bylaw and Regulations requirement of 0.8" inch of recharge volume for redevelopment. See **Attachment C** for recharge volumes and recharge calculations.

STANDARD 4: STORMWATER QUALITY

Stormwater runoff from the site will be enhanced by means of a number of Best Management Practices (BMP's), which have been designed to comply with the DEP Stormwater Management Guidelines. In order to achieve a Total Suspended Solids (TSS) removal rate of 80%, the following BMP's will be incorporated:

- Pavement sweeping and maintenance program
- Deep sump hooded catch basins
- Proprietary water quality devices
- Subsurface recharge chambers
- Reduction of Paved Surfaces

The total TSS removal is expected to be greater than 80%. See TSS Removal in **Attachment C**.

STANDARD 5: Land Uses with Higher Potential Pollutant Loads (LUHPPL's)

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

STANDARD 6: CRITICAL AREAS

The site is located within a Zone II aquifer and groundwater protection district and therefore requires 44% TSS removal prior to a recharge BMP.

STANDARD 7: REDEVELOPMENT

The proposed project is a redevelopment. See Redevelopment Checklist in Attachment E.

STANDARD 8: CONSTRUCTION PERIOD POLLUTION PREVENTION AND EROSION CONTROL

An erosion control plan is incorporated into the plan set. A detailed phasing plan will be established when a site contractor is consulted. At that time a construction phasing plan and the associated Stormwater Pollution Prevention Plan will be prepared and submitted to the Town of Ayer and the EPA prior to construction.

STANDARD 9: OPERATIONS AND MAINTENANCE PLAN

The Stormwater Management System Operation and Maintenance Plan and Long Term Pollution Prevention Plan, Operations and Maintenance Log, and BMP Location Map are provided in **Attachment C.**

CONCLUSION

An extensive stormwater management system has been designed for the project. The stormwater management system has been designed to comply with current (DEP) standards and will incorporate a number of Best Management Practices ("BMP's") that will ensure that the runoff will be treated prior to leaving the site.

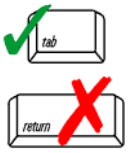
The construction of the stormwater management system will ensure that stormwater runoff from this site will be of high quality and that there will be no adverse impacts on surrounding properties or resource areas.

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

Checklist for Stormwater Report

A. Introduction

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



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

The Stormwater Report must include:

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

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

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

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

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

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

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

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

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

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

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

Registered Professional Engineer's Certification

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

Registered Professional Engineer Block and Signature

Digitally signed by David Noel Kelly P.E.
DN: cn=David Noel Kelly P.E., o=Kelly Engineering GRoup, Inc., ou, email=dkelly@kellyengineeringgroup.com, c=US
Date: 2022.12.05 17:31:21 -05'00'

Signature and Date

Checklist

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

☐ New development

☐ Redevelopment

☒ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

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

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

Standard 1: No New Untreated Discharges

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

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

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

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

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

Standard 3: Recharge

☒ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

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

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

☒ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

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

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

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

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

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

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

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

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

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

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

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

Standard 4: Water Quality

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

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

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

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

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

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

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

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

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

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

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

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

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

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

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

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

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

☐ All exposure has been eliminated.

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

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

Standard 6: Critical Areas

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

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

Checklist for Stormwater Report

Checklist (continued)

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

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

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

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

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

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

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

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

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

Checklist for Stormwater Report

Checklist (continued)

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

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

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

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

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

Standard 9: Operation and Maintenance Plan

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

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

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

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

Standard 10: Prohibition of Illicit Discharges

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

☒ An Illicit Discharge Compliance Statement is attached;

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

ILLICIT DISCHARGE STATEMENT

This statement has been prepared to comply with Stormwater Management Standard #10 as referenced in the Massachusetts Stormwater Handbook, Volume One, Chapter One, Page 25. This handbook has been issued by the Massachusetts Department of Environmental Protection for compliance with revised Regulations for Wetlands 310 CMR 10.00.

As detailed in the Site Development Plans accompanying this application this project will not involve any illicit discharge to the stormwater management system. Furthermore, to the best of my knowledge there are no illicit discharges to the stormwater management system of the existing site.

Owner and Responsible Party for Operating and Managing the site:

James King, Engineering Project Manager
Nasoya Foods USA, LLC
1 New England Way.
Ayer, MA 01432
714-515-0977

_____ _____

James Kim Date

RUNOFF SUMMARY

Peak Runoff Chart

Design Point #1(AREA 1)

Storm	Existing	Proposed	Difference
(yr, inches)	(cfs)	(cfs)	(cfs)
2,3.15	7.63	3.34	-4.29
10,4.85	15.62	12.32	-3.3
25,5.91	20.82	16.23	-4.59
50,6.70	24.74	19.48	-5.26
100,7.55	28.99	22.9	-6.09

Design Point #2(AREA 2)

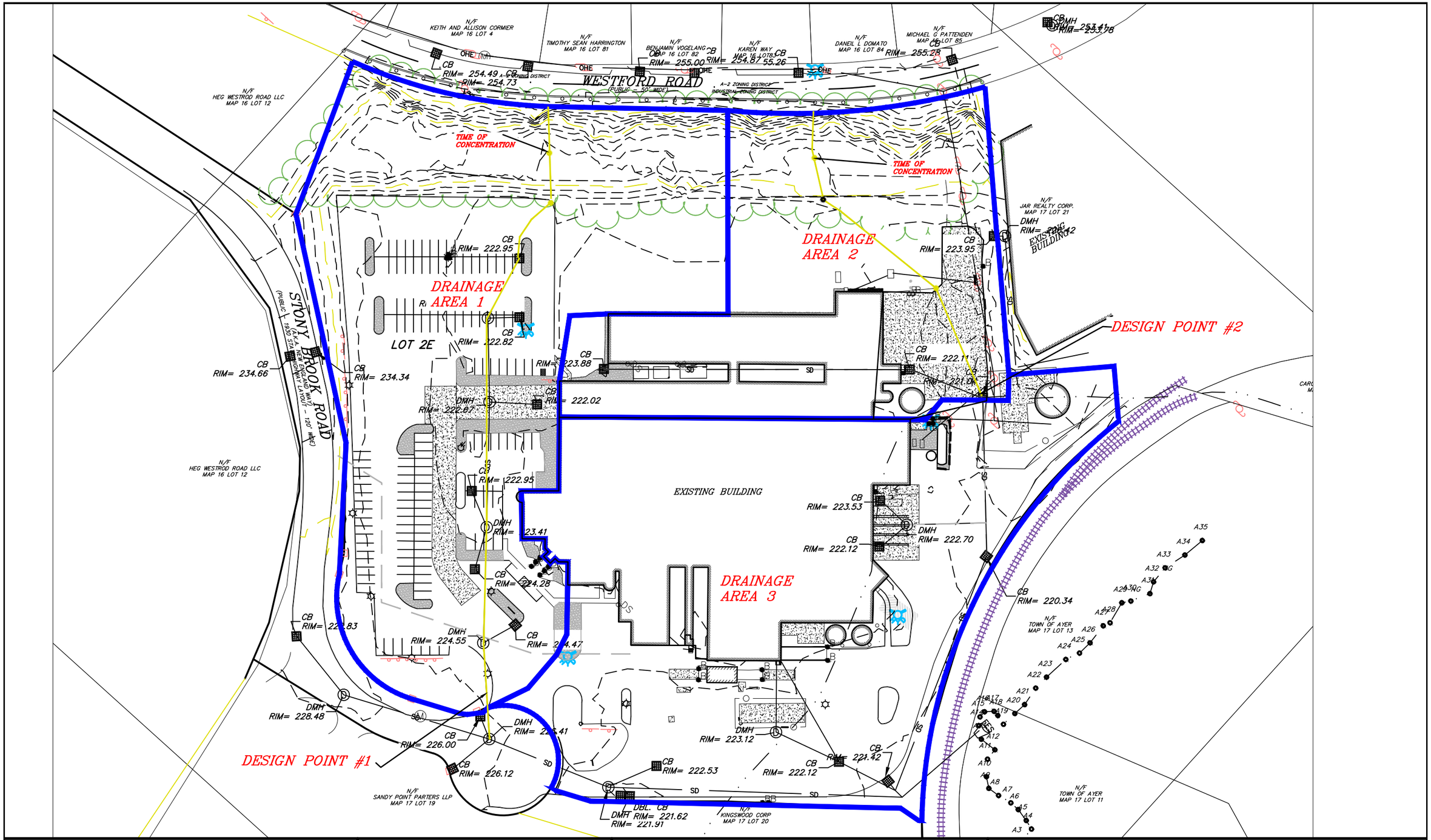
Storm	Existing	Proposed	Difference
(yr, inches)	(cfs)	(cfs)	(cfs)
2,3.15	3.43	3.43	0
10,4.85	7.78	5.94	-1.84
25,5.91	10.72	9.38	-1.34
50,6.70	12.96	12.02	-0.94
100,7.55	15.4	14.53	-0.87

Total Site Runoff

Storm	Existing	Proposed	Difference
(yr, inches)	(cfs)	(cfs)	(cfs)
2,3.13	24.89	15.81	-9.08
10,4.82	45.71	36.94	-8.77
25,5.87	59.15	49.42	-9.73
50,6.70	69.27	58.43	-10.84
100,7.50	80.19	68.28	-11.91

KELLY ENGINEERING GROUP, INC.
Zero Campanelli Drive-Braintree-MA 02184 Phone 781 843 4333

Attachment A
Existing Conditions



NASOYA FOODS USA
1 NEW ENGLAND WAY
AYER, MA

SCALE: 1"= 100'

DATE: 11/10/22

2022-108-EXDR

EXISTING DRAINAGE EXHIBIT

KELLY ENGINEERING GROUP
civil engineering consultants
0 Campanelli Drive, Braintree, MA 02184
Phone: 781-843-4333 www.kellyengineeringgroup.com

Runoff Curve Number and Runoff

Name: Nasoya Foods **By:** DAM **Date:** 11/10/22
Location : 1 New England Way, MA
Description: **Existing Conditions - Area 1**

Circle One: **Pre** or Post

Runoff Curve Number (CN):

Surface Description	Soil Name; hydrologic group; hydrologic condition	**CN**	s.f.	Product of CN x Area
Building		98	0	0
Impervious		98	112176	1.1E+07
Gravel	Hydrologic Group A	76	0	0
Wetlands	Flagged Wetlands	77	0	0
Grass	Hydrologic Group B; GOOD Condition	61	42192	2573712
Woods	Hydrologic Group A; Fair Condition	55	49077	2699235
		Totals =	203445.00	1.6E+07
		Acres =	4.6704545	

CN or C (weighted) = total product/total area = **80.0**

Reference: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service
U.S. Department of Agriculture, June 1986

Runoff Curve Number and Runoff

Name: Nasoya Foods **By:** DAM **Date:** 11/10/22
Location : 1 New England Way, MA
Description: **Existing Conditions - Area 2**

Circle One: **Pre** or Post

Runoff Curve Number (CN):

Surface Description	Soil Name; hydrologic group; hydrologic condition	**CN**	s.f.	Product of CN x Area
Building		98	33384	3271632
Impervious		98	17897	1753906
Gravel	Hydrologic Group A	76	0	0
Wetlands	Flagged Wetlands	77	0	0
Grass	Hydrologic Group B; GOOD Condition	61	34988	2134268
Woods	Hydrologic Group A; Fair Condition	55	32538	1789590
		Totals =	118807.00	8949396
		Acres =	2.7274334	

CN or C (weighted) = total product/total area = **75.3**

Reference: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service
U.S. Department of Agriculture, June 1986

Runoff Curve Number and Runoff

Name: Nasoya Foods **By:** DAM **Date:** 11/10/22
Location : 1 New England Way, MA
Description: **Existing Conditions - Area 3**

Circle One: **Pre** or Post

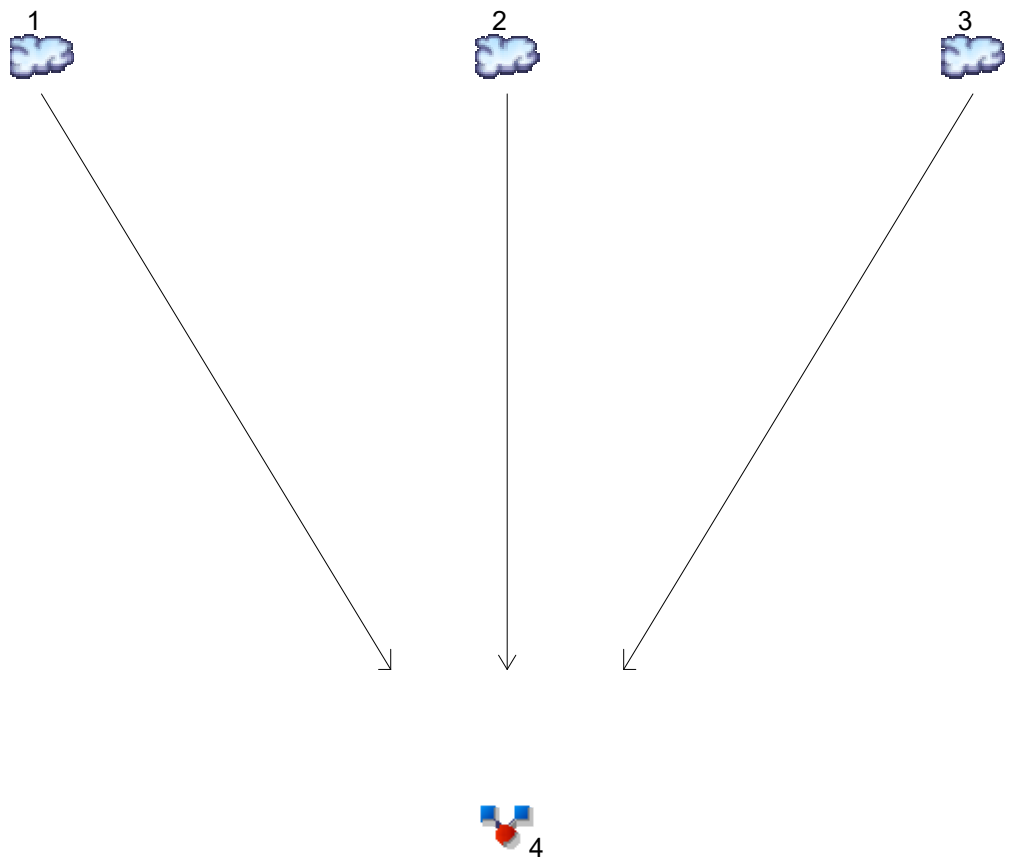
Runoff Curve Number (CN):

Surface Description	Soil Name; hydrologic group; hydrologic condition	**CN**	s.f.	Product of CN x Area
Building		98	84239	8255422
Impervious		98	102036	9999528
Gravel	Hydrologic Group A	76	0	0
Wetlands	Flagged Wetlands	77	0	0
Grass	Hydrologic Group B; GOOD Condition	61	21249	1296189
Woods	Hydrologic Group A; Fair Condition	55	0	0
		Totals =	207524.00	2E+07
		Acres =	4.7640955	

CN or C (weighted) = total product/total area = **94.2**

Reference: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service
U.S. Department of Agriculture, June 1986

Watershed Model Schematic



Legend

Hyd.	Origin	Description
1	SCS Runoff	Area 1
2	SCS Runoff	AREA 2
3	SCS Runoff	AREA 3
4	Combine	Total Site Runoff

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)							Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	------	-------	7.630	-------	-------	15.62	20.82	24.74	28.99	Area 1
2	SCS Runoff	------	-------	3.431	-------	-------	7.783	10.72	12.96	15.40	AREA 2
3	SCS Runoff	------	-------	13.89	-------	-------	22.45	27.73	31.64	35.84	AREA 3
4	Combine	1, 2, 3	-------	24.89	-------	-------	45.71	59.15	69.27	80.19	Total Site Runoff

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	7.630	1	725	23,729	------	------	------	Area 1
2	SCS Runoff	3.431	1	725	10,996	------	------	------	AREA 2
3	SCS Runoff	13.89	1	724	44,856	------	------	------	AREA 3
4	Combine	24.89	1	725	79,581	1, 2, 3	------	------	Total Site Runoff

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	15.62	1	725	48,145	------	------	------	Area 1
2	SCS Runoff	7.783	1	725	24,024	------	------	------	AREA 2
3	SCS Runoff	22.45	1	724	74,583	------	------	------	AREA 3
4	Combine	45.71	1	725	146,751	1, 2, 3	------	------	Total Site Runoff

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	20.82	1	725	64,522	------	------	------	Area 1
2	SCS Runoff	10.72	1	725	33,019	------	------	------	AREA 2
3	SCS Runoff	27.73	1	724	93,277	------	------	------	AREA 3
4	Combine	59.15	1	724	190,818	1, 2, 3	------	------	Total Site Runoff

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	24.74	1	725	77,069	------	------	------	Area 1
2	SCS Runoff	12.96	1	725	39,993	------	------	------	AREA 2
3	SCS Runoff	31.64	1	724	107,249	------	------	------	AREA 3
4	Combine	69.27	1	724	224,312	1, 2, 3	------	------	Total Site Runoff

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	28.99	1	724	90,803	------	------	------	Area 1
2	SCS Runoff	15.40	1	725	47,686	------	------	------	AREA 2
3	SCS Runoff	35.84	1	724	122,309	------	------	------	AREA 3
4	Combine	80.19	1	724	260,798	1, 2, 3	------	------	Total Site Runoff

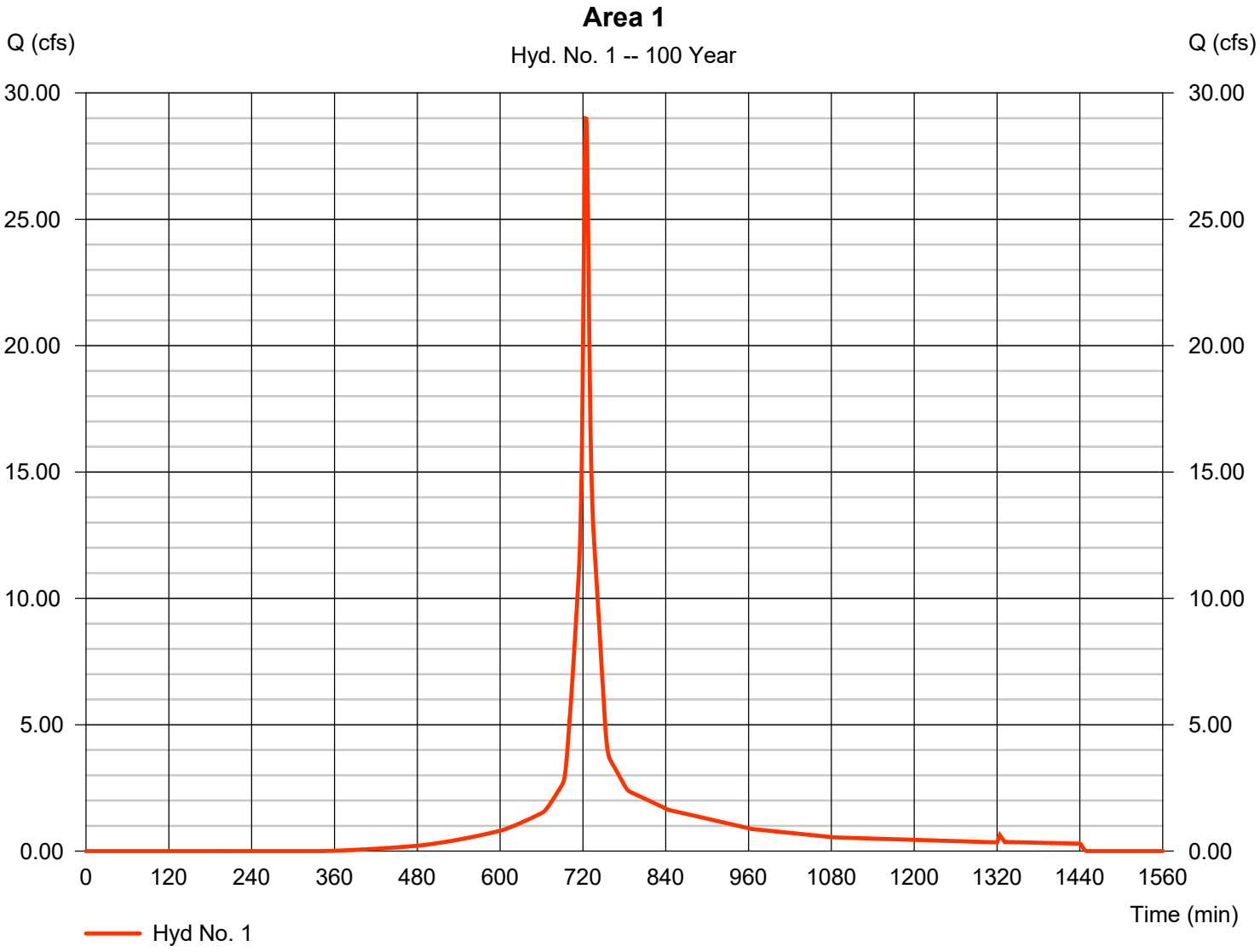
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Friday, 11 / 18 / 2022

Hyd. No. 1

Area 1

Hydrograph type	=	SCS Runoff	Peak discharge	=	28.99 cfs
Storm frequency	=	100 yrs	Time to peak	=	724 min
Time interval	=	1 min	Hyd. volume	=	90,803 cuft
Drainage area	=	4.671 ac	Curve number	=	79.9
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	5.90 min
Total precip.	=	7.55 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



TR55 Tc Worksheet

Hyd. No. 1

Area 1

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.400		0.011		0.011		
Flow length (ft)	= 50.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.15		0.00		0.00		
Land slope (%)	= 36.00		0.00		0.00		
Travel Time (min)	**= 3.91**	**+**	**0.00**	**+**	**0.00**	**=**	**3.91**
Shallow Concentrated Flow							
Flow length (ft)	= 88.00		73.00		0.00		
Watercourse slope (%)	= 16.00		1.80		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=6.45		2.73		0.00		
Travel Time (min)	**= 0.23**	**+**	**0.45**	**+**	**0.00**	**=**	**0.67**
Channel Flow							
X sectional flow area (sqft)	= 1.77		3.14		0.00		
Wetted perimeter (ft)	= 2.35		3.14		0.00		
Channel slope (%)	= 0.60		0.30		0.00		
Manning's n-value	= 0.013		0.013		0.015		
Velocity (ft/s)	=7.34						
			6.28				
					0.00		
Flow length (ft)	({0})301.0		231.0		0.0		
Travel Time (min)	**= 0.68**	**+**	**0.61**	**+**	**0.00**	**=**	**1.30**

Total Travel Time, Tc ..... 5.90 min

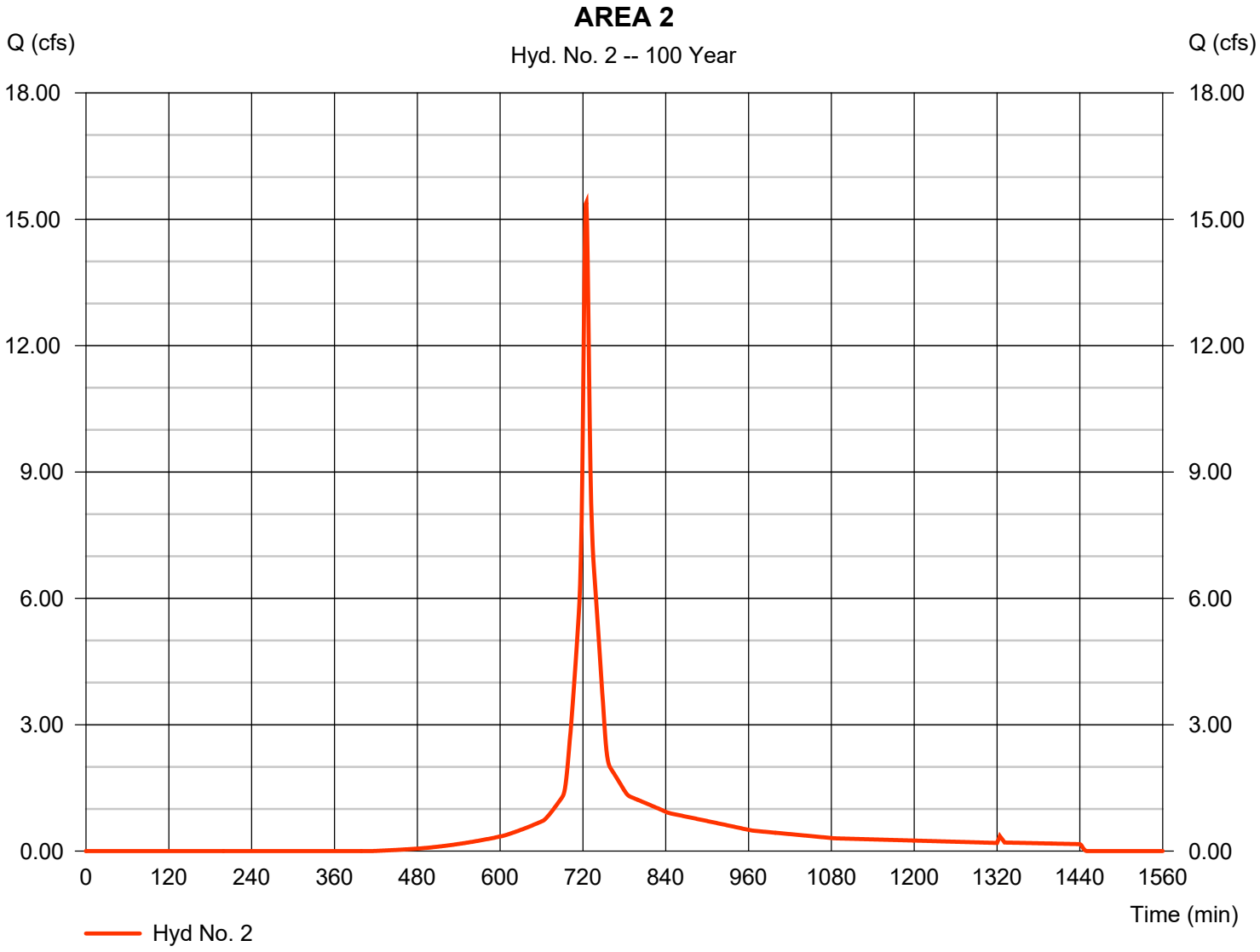
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Friday, 11 / 18 / 2022

Hyd. No. 2

AREA 2

Hydrograph type	= SCS Runoff	Peak discharge	= 15.40 cfs
Storm frequency	= 100 yrs	Time to peak	= 725 min
Time interval	= 1 min	Hyd. volume	= 47,686 cuft
Drainage area	= 2.727 ac	Curve number	= 75.3
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 6.10 min
Total precip.	= 7.55 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



TR55 Tc Worksheet

Hyd. No. 2

AREA 2

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.400		0.011		0.011		
Flow length (ft)	= 50.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.15		0.00		0.00		
Land slope (%)	= 40.00		0.00		0.00		
Travel Time (min)	**= 3.75**	**+**	**0.00**	**+**	**0.00**	**=**	**3.75**
Shallow Concentrated Flow							
Flow length (ft)	= 46.00		146.00		127.00		
Watercourse slope (%)	= 15.60		1.90		0.80		
Surface description	= Unpaved		Unpaved		Paved		
Average velocity (ft/s)	=6.37		2.22		1.82		
Travel Time (min)	**= 0.12**	**+**	**1.09**	**+**	**1.16**	**=**	**2.38**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 6.10 min

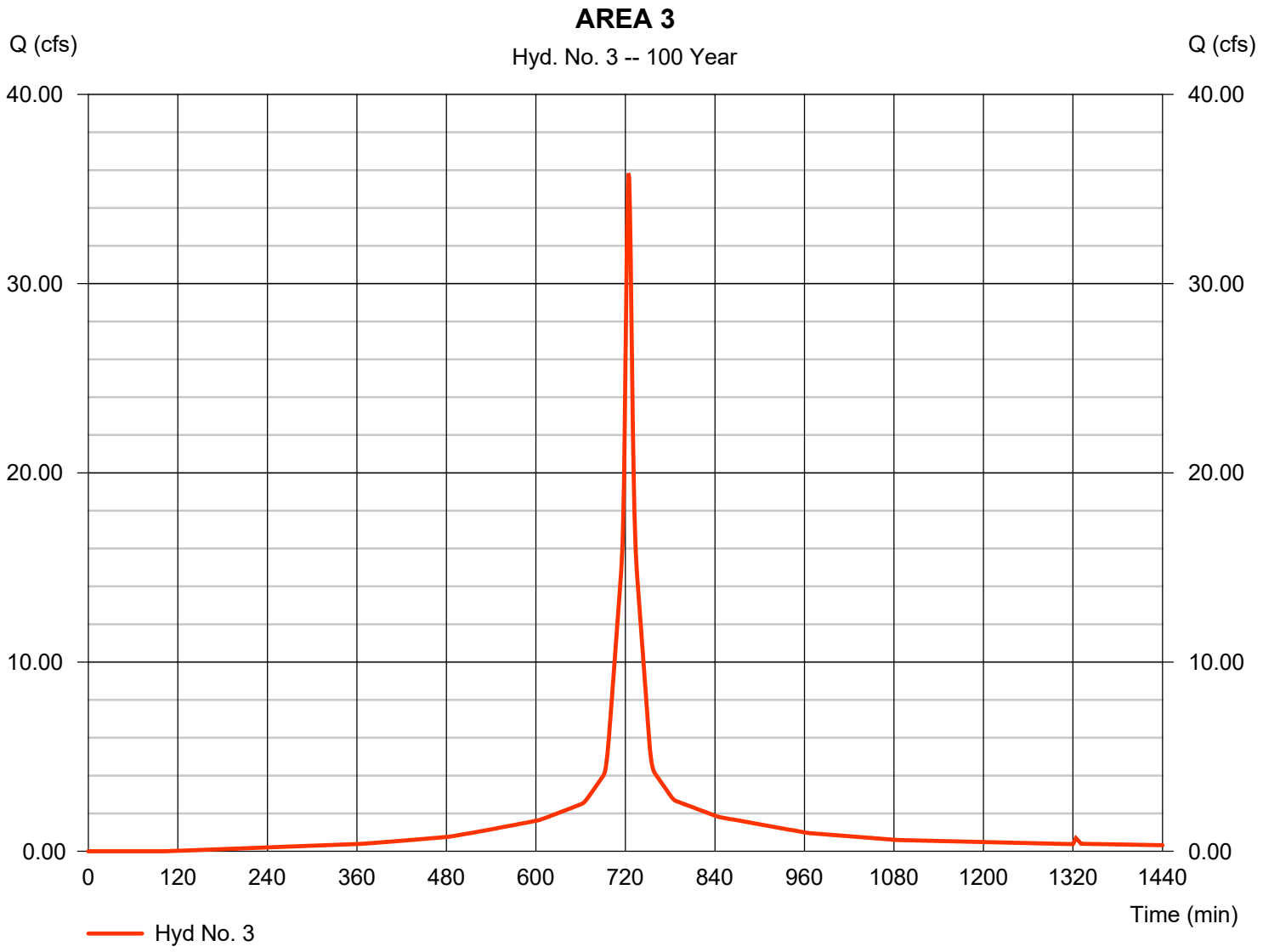
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Friday, 11 / 18 / 2022

Hyd. No. 3

AREA 3

Hydrograph type	=	SCS Runoff	Peak discharge	=	35.84 cfs
Storm frequency	=	100 yrs	Time to peak	=	724 min
Time interval	=	1 min	Hyd. volume	=	122,309 cuft
Drainage area	=	4.764 ac	Curve number	=	94.2
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	6.00 min
Total precip.	=	7.55 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484

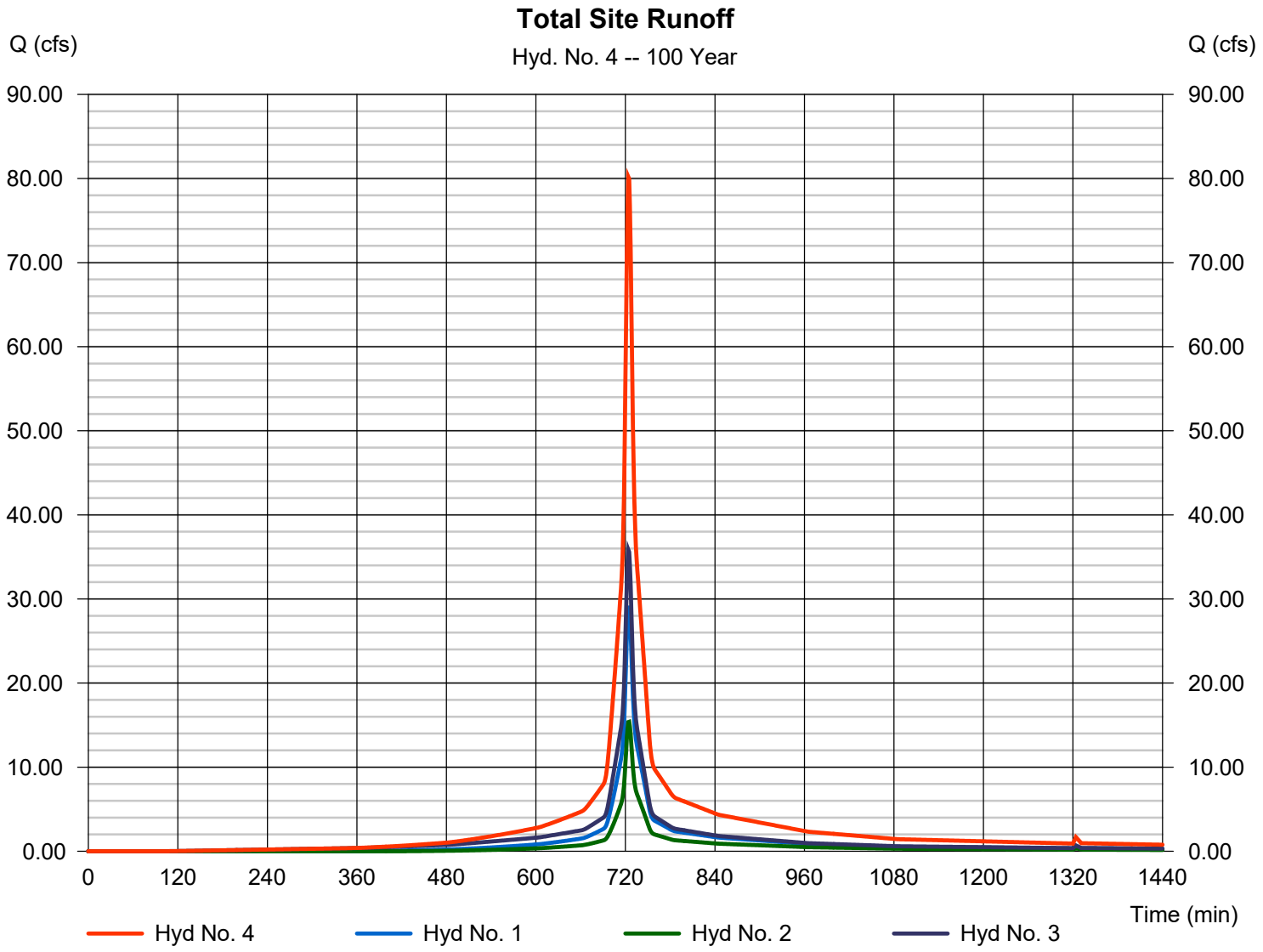


Hydrograph Report

Hyd. No. 4

Total Site Runoff

Hydrograph type	=	Combine	Peak discharge	=	80.19 cfs
Storm frequency	=	100 yrs	Time to peak	=	724 min
Time interval	=	1 min	Hyd. volume	=	260,798 cuft
Inflow hyds.	=	1, 2, 3	Contrib. drain. area	=	12.162 ac



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	--------
2	42.4120	9.2500	0.7886	--------
3	0.0000	0.0000	0.0000	--------
5	56.7673	11.0000	0.7948	--------
10	67.9290	12.0000	0.8012	--------
25	85.5668	13.2500	0.8118	--------
50	97.8027	13.7500	0.8148	--------
100	112.8269	14.5000	0.8222	--------

File name: Sample.IDF

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	5.22	4.12	3.43	2.96	2.61	2.35	2.14	1.96	1.82	1.70	1.59	1.50
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	6.27	5.05	4.26	3.70	3.29	2.97	2.71	2.49	2.32	2.16	2.03	1.92
10	7.02	5.71	4.84	4.23	3.76	3.40	3.11	2.87	2.66	2.49	2.34	2.21
25	8.10	6.65	5.68	4.98	4.44	4.02	3.68	3.39	3.16	2.95	2.78	2.62
50	8.98	7.40	6.34	5.56	4.97	4.50	4.12	3.81	3.54	3.31	3.11	2.94
100	9.81	8.13	6.98	6.14	5.49	4.98	4.56	4.22	3.92	3.67	3.45	3.26

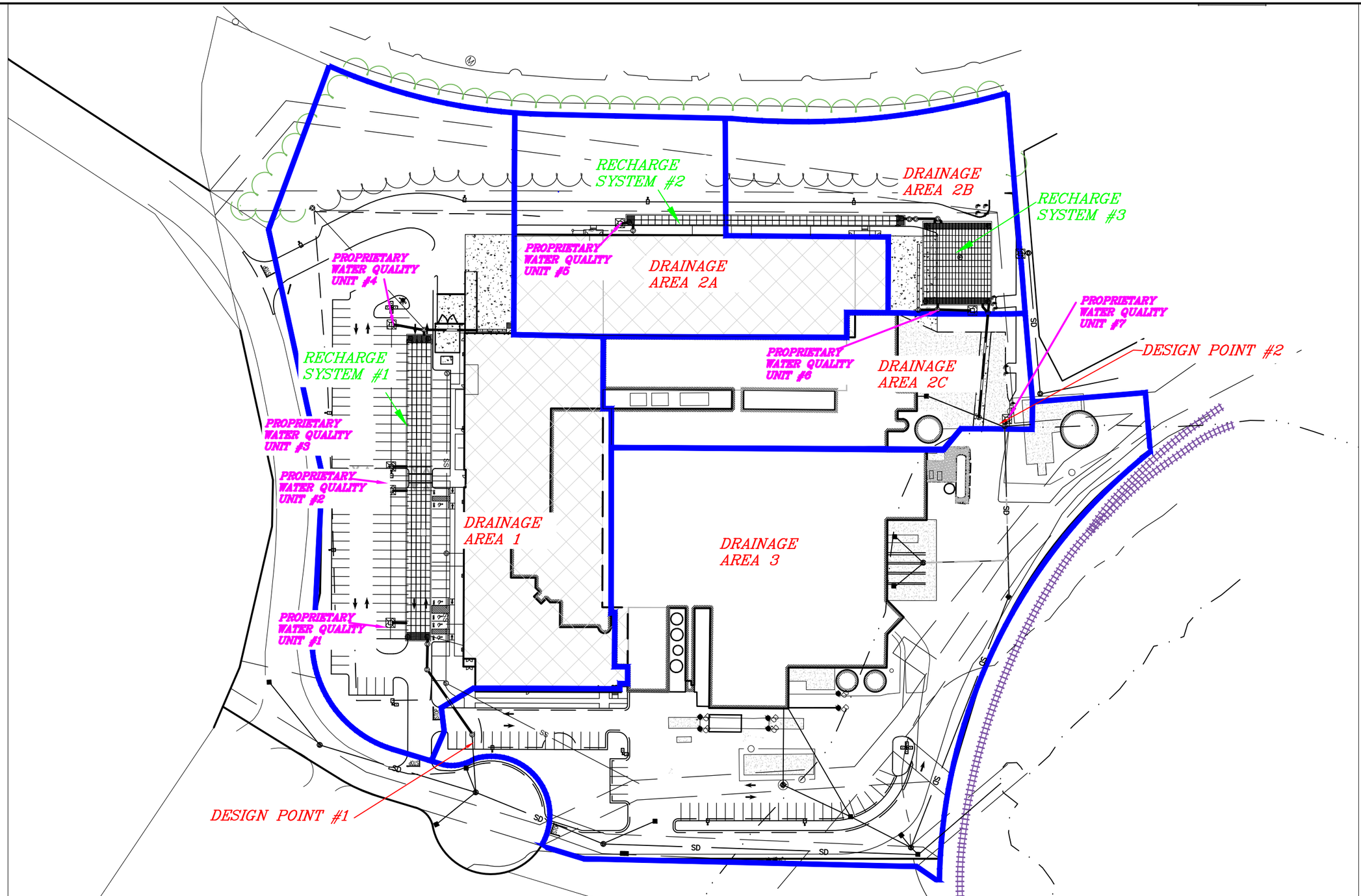
Tc = time in minutes. Values may exceed 60.

Precip. file name: Sample.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	2.50	3.15	0.00	3.30	4.85	5.91	6.70	7.55
SCS 6-Hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-1st	0.00	0.00	0.00	2.75	0.00	0.00	0.00	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	2.75	0.00	0.00	0.00	0.00
Custom	0.00	0.00	0.00	2.80	0.00	0.00	0.00	0.00

KELLY ENGINEERING GROUP, INC.
Zero Campanelli Drive-Braintree-MA 02184 Phone 781 843 4333

Attachment B
Proposed Conditions



NASOYA FOODS USA 1 NEW ENGLAND WAY AYER, MA	SCALE: 1"= 100' DATE: 11/15/22 2022-108-PRDR	PROPOSED DRAINAGE & BMP LOCATION EXHIBIT	KELLY ENGINEERING GROUP civil engineering consultants 0 Campanelli Drive, Braintree, MA 02184 Phone: 781-843-4333 www.kellyengineeringgroup.com

Runoff Curve Number and Runoff

Name: Nasoya Foods **By:** DAM **Date:** 11/10/22
Location : 1 New England Way, MA
Description: **Proposed Conditions - Area 1**

Circle One: Pre **or Post**

Runoff Curve Number (CN):

Surface Description	Soil Name; hydrologic group; hydrologic condition	**CN**	s.f.	Product of CN x Area
Building		98	53585	5251330
Impervious		98	68907	6752886
Gravel	Hydrologic Group A	76	0	0
Wetlands	Flagged Wetlands	77	0	0
Grass	Hydrologic Group B; GOOD Condition	61	27186	1658346
Woods	Hydrologic Group A; Fair Condition	55	21864	1202520
		Totals =	171542.00	1.5E+07
		Acres =	3.9380624	

CN or C (weighted) = total product/total area = **86.7**

Reference: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service
U.S. Department of Agriculture, June 1986

Runoff Curve Number and Runoff

Name: Nasoya Foods **By:** DAM **Date:** 11/10/22
Location : 1 New England Way, MA
Description: **Proposed Conditions - Area 2a**

Circle One: Pre **or Post**

Runoff Curve Number (CN):

Surface Description	Soil Name; hydrologic group; hydrologic condition	**CN**	s.f.	Product of CN x Area
Building		98	37700	3694600
Impervious		98	5280	517440
Gravel	Hydrologic Group A	76	0	0
Wetlands	Flagged Wetlands	77	0	0
Grass	Hydrologic Group B; GOOD Condition	61	5858	357338
Woods	Hydrologic Group A; Fair Condition	55	14944	821920
		Totals =	63782.00	5391298
		Acres =	1.4642332	

CN or C (weighted) = total product/total area = **84.5**

Reference: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service
U.S. Department of Agriculture, June 1986

Runoff Curve Number and Runoff

Name: Nasoya Foods **By:** DAM **Date:** 11/10/22
Location : 1 New England Way, MA
Description: **Proposed Conditions - Area 2b**

Circle One: Pre **or Post**

Runoff Curve Number (CN):

Surface Description	Soil Name; hydrologic group; hydrologic condition	**CN**	s.f.	Product of CN x Area
Building		98	0	0
Impervious		98	18361	1799378
Gravel	Hydrologic Group A	76	0	0
Wetlands	Flagged Wetlands	77	0	0
Grass	Hydrologic Group B; GOOD Condition	61	8254	503494
Woods	Hydrologic Group A; Fair Condition	55	20371	1120405
		Totals =	46986.00	3423277
		Acres =	1.0786501	

CN or C (weighted) = total product/total area = **72.9**

Reference: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service
U.S. Department of Agriculture, June 1986

Runoff Curve Number and Runoff

Name: Nasoya Foods **By:** DAM **Date:** 11/10/22
Location : 1 New England Way, MA
Description: **Proposed Conditions - Area 2c**

Circle One: Pre **or Post**

Runoff Curve Number (CN):

Surface Description	Soil Name; hydrologic group; hydrologic condition	**CN**	s.f.	Product of CN x Area
Building		98	30902	3028396
Impervious		98	15210	1490580
Gravel	Hydrologic Group A	76	0	0
Wetlands	Flagged Wetlands	77	0	0
Grass	Hydrologic Group B; GOOD Condition	61	5133	313113
Woods	Hydrologic Group A; Fair Condition	55	0	0
		Totals =	51245.00	4832089
		Acres =	1.17642332	

CN or C (weighted) = total product/total area = **94.3**

Reference: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service
U.S. Department of Agriculture, June 1986

Runoff Curve Number and Runoff

Name: Nasoya Foods **By:** DAM **Date:** 11/10/22
Location : 1 New England Way, MA
Description: **Proposed Conditions - Area 3**

Circle One: Pre **or Post**

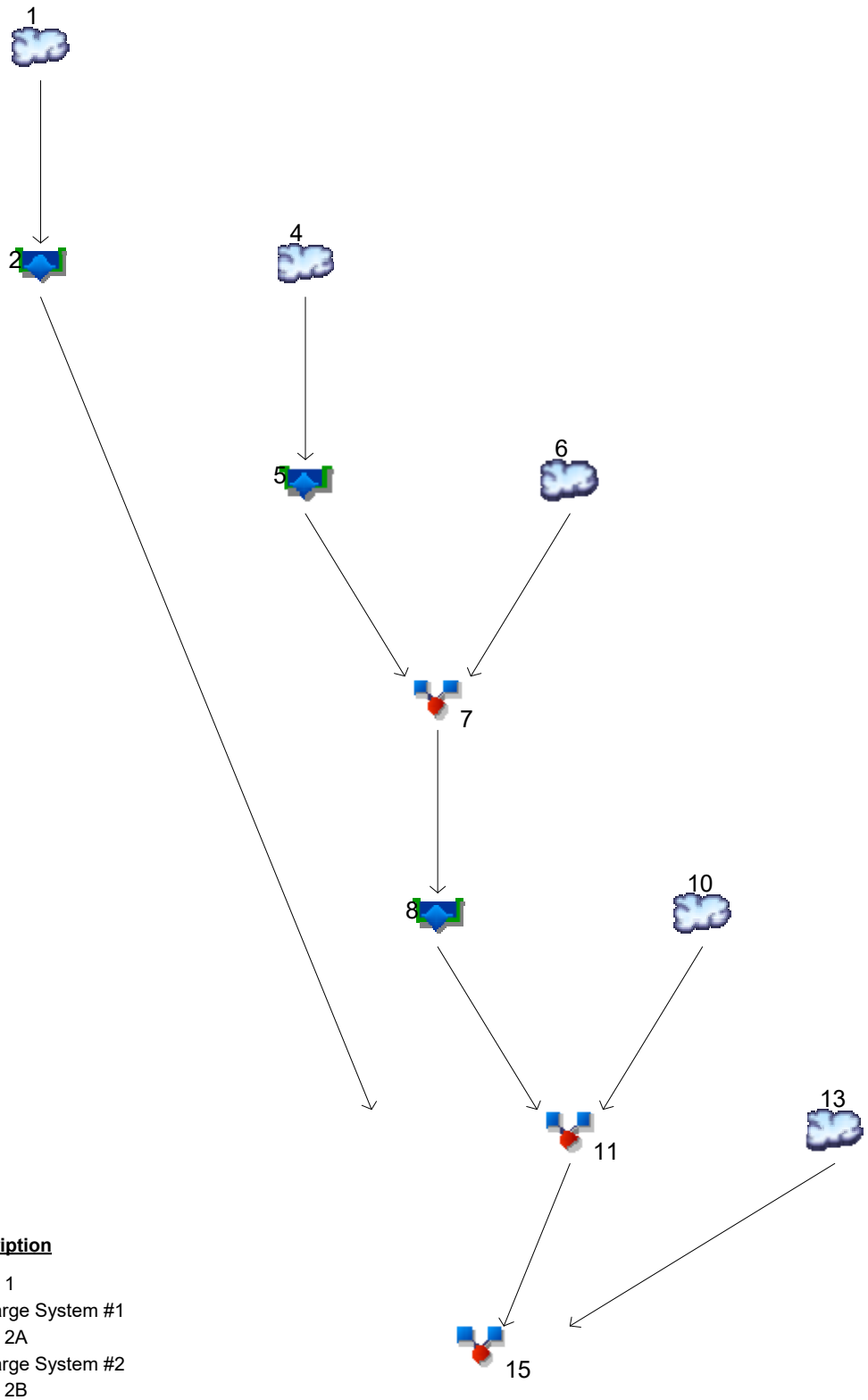
Runoff Curve Number (CN):

Surface Description	Soil Name; hydrologic group; hydrologic condition	**CN**	s.f.	Product of CN x Area
Building		98	30902	3028396
Impervious		98	15210	1490580
Gravel	Hydrologic Group A	76	0	0
Wetlands	Flagged Wetlands	77	0	0
Grass	Hydrologic Group B; GOOD Condition	61	5133	313113
Woods	Hydrologic Group A; Fair Condition	55	0	0
		Totals =	51245.00	4832089
		Acres =	1.17642332	

CN or C (weighted) = total product/total area = **94.3**

Reference: *Urban Hydrology for Small Watersheds*
Technical Release 55, Soil Conservation Service
U.S. Department of Agriculture, June 1986

Watershed Model Schematic



Legend

Hyd.	Origin	Description
1	SCS Runoff	AREA 1
2	Reservoir	Recharge System #1
4	SCS Runoff	AREA 2A
5	Reservoir	Recharge System #2
6	SCS Runoff	AREA 2B
7	Combine	Into Recharge System 3
8	Reservoir	Recharge System #3
10	SCS Runoff	AREA 2c
11	Combine	Total to Design Point #2
13	SCS Runoff	AREA 3
15	Combine	Total Site Runoff

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)							Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	------	-------	8.820	-------	-------	15.95	20.44	23.78	27.36	AREA 1
2	Reservoir	1	-------	3.340	-------	-------	12.32	16.23	19.48	22.90	Recharge System #1
4	SCS Runoff	------	-------	2.984	-------	-------	5.599	7.263	8.508	9.845	AREA 2A
5	Reservoir	4	-------	0.787	-------	-------	3.949	5.416	6.388	8.466	Recharge System #2
6	SCS Runoff	------	-------	1.160	-------	-------	2.806	3.938	4.808	5.762	AREA 2B
7	Combine	5, 6	-------	1.195	-------	-------	6.306	8.850	10.65	13.22	Into Recharge System 3
8	Reservoir	7	-------	0.443	-------	-------	3.204	5.375	6.790	8.449	Recharge System #3
10	SCS Runoff	------	-------	3.439	-------	-------	5.550	6.851	7.817	8.853	AREA 2c
11	Combine	8, 10	-------	3.439	-------	-------	5.936	9.376	12.02	14.53	Total to Design Point #2
13	SCS Runoff	------	-------	12.32	-------	-------	20.51	25.56	29.31	33.31	AREA 3
15	Combine	2, 11, 13,	-------	15.81	-------	-------	36.94	49.42	58.53	68.28	Total Site Runoff

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	8.820	1	725	27,225	------	------	------	AREA 1
2	Reservoir	3.340	1	740	18,921	1	221.27	11,430	Recharge System #1
4	SCS Runoff	2.984	1	725	9,193	------	------	------	AREA 2A
5	Reservoir	0.787	1	748	5,766	4	221.26	4,300	Recharge System #2
6	SCS Runoff	1.160	1	725	3,820	------	------	------	AREA 2B
7	Combine	1.195	1	744	9,586	5, 6	------	------	Into Recharge System 3
8	Reservoir	0.443	1	793	7,918	7	218.86	3,039	Recharge System #3
10	SCS Runoff	3.439	1	724	11,117	------	------	------	AREA 2c
11	Combine	3.439	1	724	19,034	8, 10	------	------	Total to Design Point #2
13	SCS Runoff	12.32	1	724	38,998	------	------	------	AREA 3
15	Combine	15.81	1	725	76,953	2, 11, 13,	------	------	Total Site Runoff

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	15.95	1	724	50,068	------	------	------	AREA 1
2	Reservoir	12.32	1	728	41,765	1	221.86	14,857	Recharge System #1
4	SCS Runoff	5.599	1	725	17,435	------	------	------	AREA 2A
5	Reservoir	3.949	1	729	14,008	4	221.86	5,641	Recharge System #2
6	SCS Runoff	2.806	1	725	8,706	------	------	------	AREA 2B
7	Combine	6.306	1	727	22,714	5, 6	------	------	Into Recharge System 3
8	Reservoir	3.204	1	745	21,046	7	219.45	6,025	Recharge System #3
10	SCS Runoff	5.550	1	724	18,459	------	------	------	AREA 2c
11	Combine	5.936	1	725	39,505	8, 10	------	------	Total to Design Point #2
13	SCS Runoff	20.51	1	724	66,674	------	------	------	AREA 3
15	Combine	36.94	1	725	147,944	2, 11, 13,	------	------	Total Site Runoff

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	20.44	1	724	64,847	------	------	------	AREA 1
2	Reservoir	16.23	1	728	56,543	1	222.12	16,206	Recharge System #1
4	SCS Runoff	7.263	1	724	22,825	------	------	------	AREA 2A
5	Reservoir	5.416	1	729	19,398	4	222.23	6,300	Recharge System #2
6	SCS Runoff	3.938	1	725	12,136	------	------	------	AREA 2B
7	Combine	8.850	1	726	31,534	5, 6	------	------	Into Recharge System 3
8	Reservoir	5.375	1	739	29,866	7	219.84	7,765	Recharge System #3
10	SCS Runoff	6.851	1	724	23,076	------	------	------	AREA 2c
11	Combine	9.376	1	726	52,942	8, 10	------	------	Total to Design Point #2
13	SCS Runoff	25.56	1	724	84,190	------	------	------	AREA 3
15	Combine	49.42	1	725	193,674	2, 11, 13,	------	------	Total Site Runoff

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	23.78	1	724	76,008	------	------	------	AREA 1
2	Reservoir	19.48	1	728	67,705	1	222.36	17,051	Recharge System #1
4	SCS Runoff	8.508	1	724	26,913	------	------	------	AREA 2A
5	Reservoir	6.388	1	729	23,485	4	222.55	6,719	Recharge System #2
6	SCS Runoff	4.808	1	725	14,814	------	------	------	AREA 2B
7	Combine	10.65	1	726	38,299	5, 6	------	------	Into Recharge System 3
8	Reservoir	6.790	1	738	36,631	7	220.16	8,966	Recharge System #3
10	SCS Runoff	7.817	1	724	26,526	------	------	------	AREA 2c
11	Combine	12.02	1	726	63,157	8, 10	------	------	Total to Design Point #2
13	SCS Runoff	29.31	1	724	97,311	------	------	------	AREA 3
15	Combine	58.53	1	726	228,173	2, 11, 13,	------	------	Total Site Runoff

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	27.36	1	724	88,115	------	------	------	AREA 1
2	Reservoir	22.90	1	728	79,811	1	222.60	17,870	Recharge System #1
4	SCS Runoff	9.845	1	724	31,359	------	------	------	AREA 2A
5	Reservoir	8.466	1	728	27,931	4	223.41	7,088	Recharge System #2
6	SCS Runoff	5.762	1	725	17,781	------	------	------	AREA 2B
7	Combine	13.22	1	728	45,712	5, 6	------	------	Into Recharge System 3
8	Reservoir	8.449	1	736	44,044	7	220.65	10,090	Recharge System #3
10	SCS Runoff	8.853	1	724	30,244	------	------	------	AREA 2c
11	Combine	14.53	1	726	74,289	8, 10	------	------	Total to Design Point #2
13	SCS Runoff	33.31	1	724	111,473	------	------	------	AREA 3
15	Combine	68.28	1	726	265,572	2, 11, 13,	------	------	Total Site Runoff

Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	--------
2	42.4120	9.2500	0.7886	--------
3	0.0000	0.0000	0.0000	--------
5	56.7673	11.0000	0.7948	--------
10	67.9290	12.0000	0.8012	--------
25	85.5668	13.2500	0.8118	--------
50	97.8027	13.7500	0.8148	--------
100	112.8269	14.5000	0.8222	--------

File name: Sample.IDF

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	5.22	4.12	3.43	2.96	2.61	2.35	2.14	1.96	1.82	1.70	1.59	1.50
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	6.27	5.05	4.26	3.70	3.29	2.97	2.71	2.49	2.32	2.16	2.03	1.92
10	7.02	5.71	4.84	4.23	3.76	3.40	3.11	2.87	2.66	2.49	2.34	2.21
25	8.10	6.65	5.68	4.98	4.44	4.02	3.68	3.39	3.16	2.95	2.78	2.62
50	8.98	7.40	6.34	5.56	4.97	4.50	4.12	3.81	3.54	3.31	3.11	2.94
100	9.81	8.13	6.98	6.14	5.49	4.98	4.56	4.22	3.92	3.67	3.45	3.26

Tc = time in minutes. Values may exceed 60.

Precip. file name: Sample.pcp

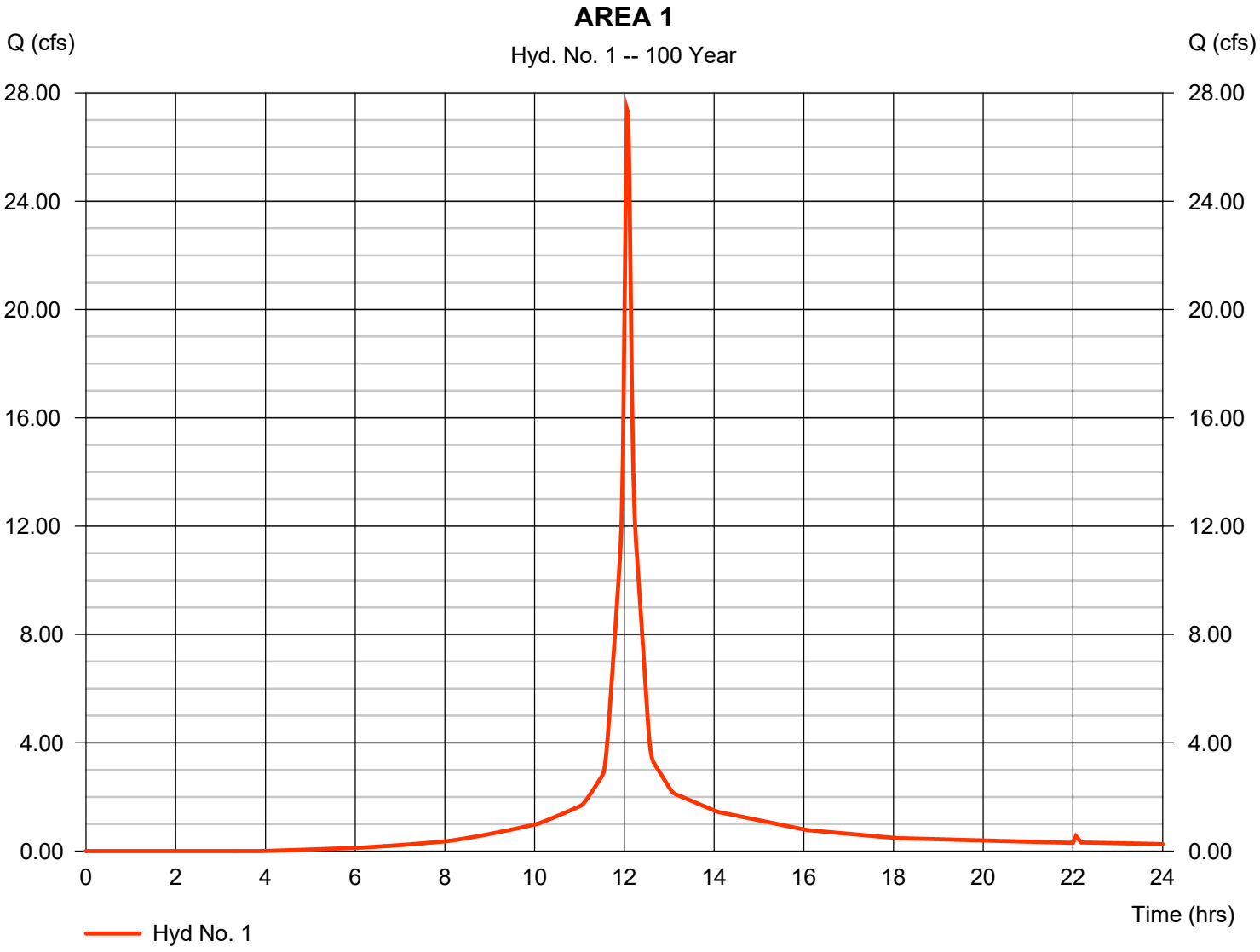
Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	2.50	3.15	0.00	3.30	4.85	5.91	6.70	7.55
SCS 6-Hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-1st	0.00	0.00	0.00	2.75	0.00	0.00	0.00	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	2.75	0.00	0.00	0.00	0.00
Custom	0.00	0.00	0.00	2.80	0.00	0.00	0.00	0.00

Hydrograph Report

Hyd. No. 1

AREA 1

Hydrograph type	=	SCS Runoff	Peak discharge	=	27.36 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.07 hrs
Time interval	=	1 min	Hyd. volume	=	88,115 cuft
Drainage area	=	3.938 ac	Curve number	=	86.7
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	6.00 min
Total precip.	=	7.55 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



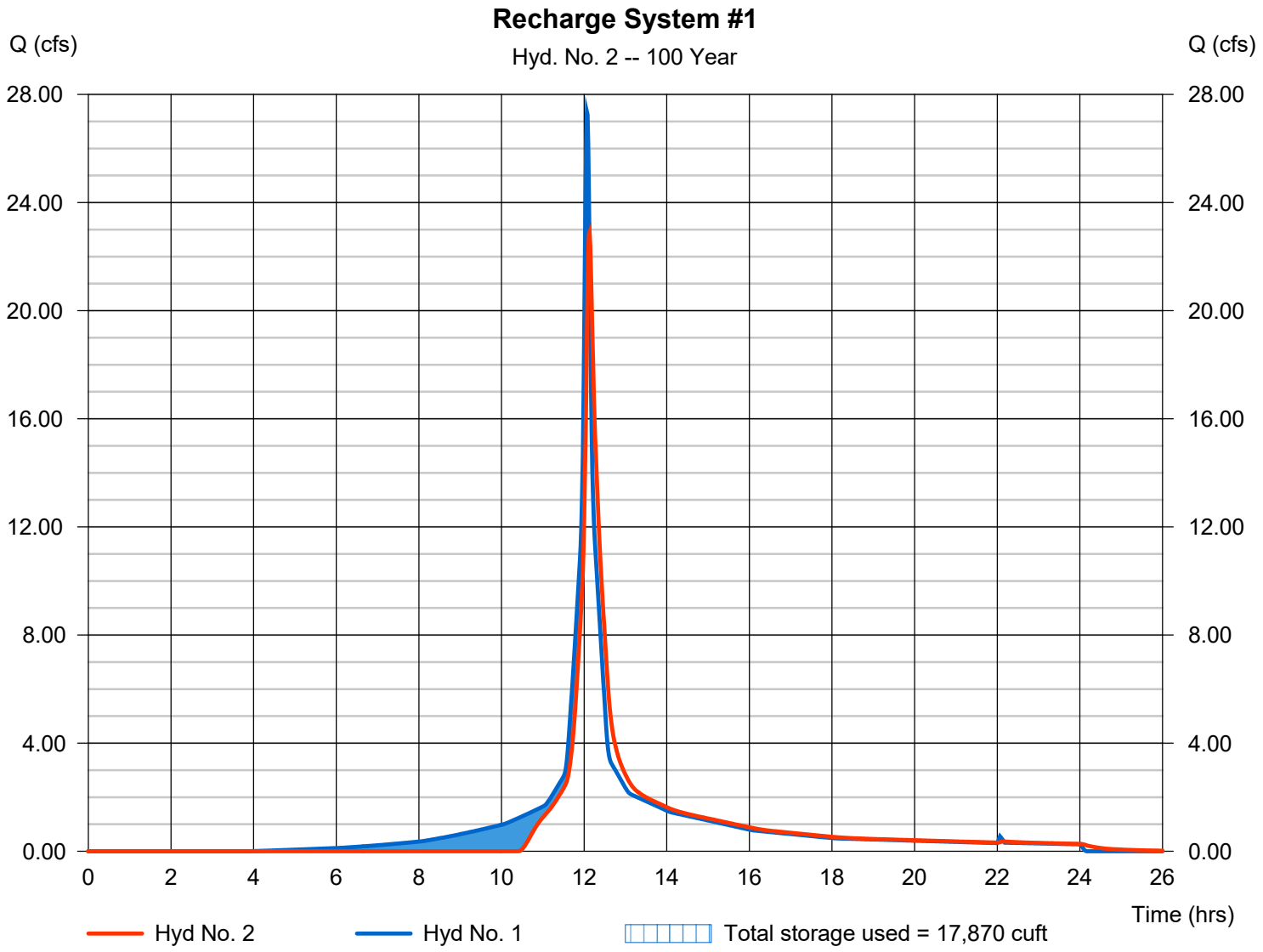
Hydrograph Report

Hyd. No. 2

Recharge System #1

Hydrograph type	=	Reservoir	Peak discharge	=	22.90 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.13 hrs
Time interval	=	1 min	Hyd. volume	=	79,811 cuft
Inflow hyd. No.	=	1 - AREA 1	Max. Elevation	=	222.60 ft
Reservoir name	=	RECHARGE 1	Max. Storage	=	17,870 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 11 / 16 / 2022

Pond No. 1 - RECHARGE 1

Pond Data

Pond storage is based on user-defined values

Culvert / Orifice Structures - Barrel Shape = Span = 2.54 x 4.33 ft, Barrel Len = 309.00 ft, No. Barrels = 5, Slope = 0.00%, Headers = No Encasement - Invert elev. = 219.30 ft, Width = 4.83 ft, Height = 3.54 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	219.30	n/a	0	0
0.35	219.65	n/a	1,057	1,057
0.71	220.01	n/a	1,891	2,948
1.06	220.36	n/a	2,460	5,408
1.42	220.72	n/a	2,415	7,824
1.77	221.07	n/a	2,338	10,162
2.12	221.42	n/a	2,223	12,385
2.48	221.78	n/a	2,056	14,440
2.83	222.13	n/a	1,801	16,242
3.19	222.49	n/a	1,279	17,521
3.54	222.84	n/a	1,057	18,578
3.55	222.85	n/a	372	18,950
4.00	223.30	n/a	50	19,000
5.00	224.30	n/a	50	19,050

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	0.00	0.00	0.00
Span (in)	= 15.00	0.00	0.00	0.00
No. Barrels	= 2	0	0	0
Invert El. (ft)	= 220.80	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

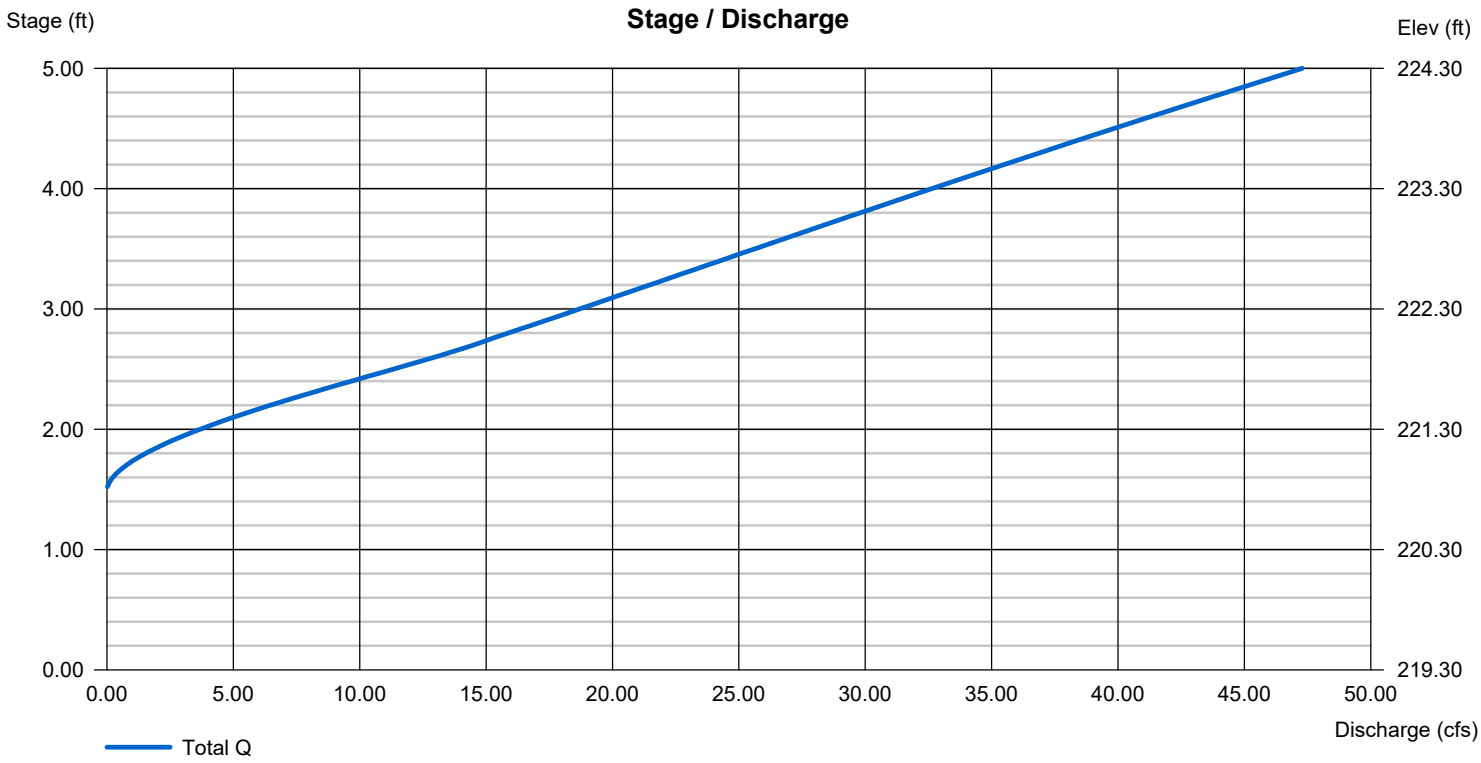
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 1.25	0.00	0.00	0.00
Crest El. (ft)	= 220.80	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

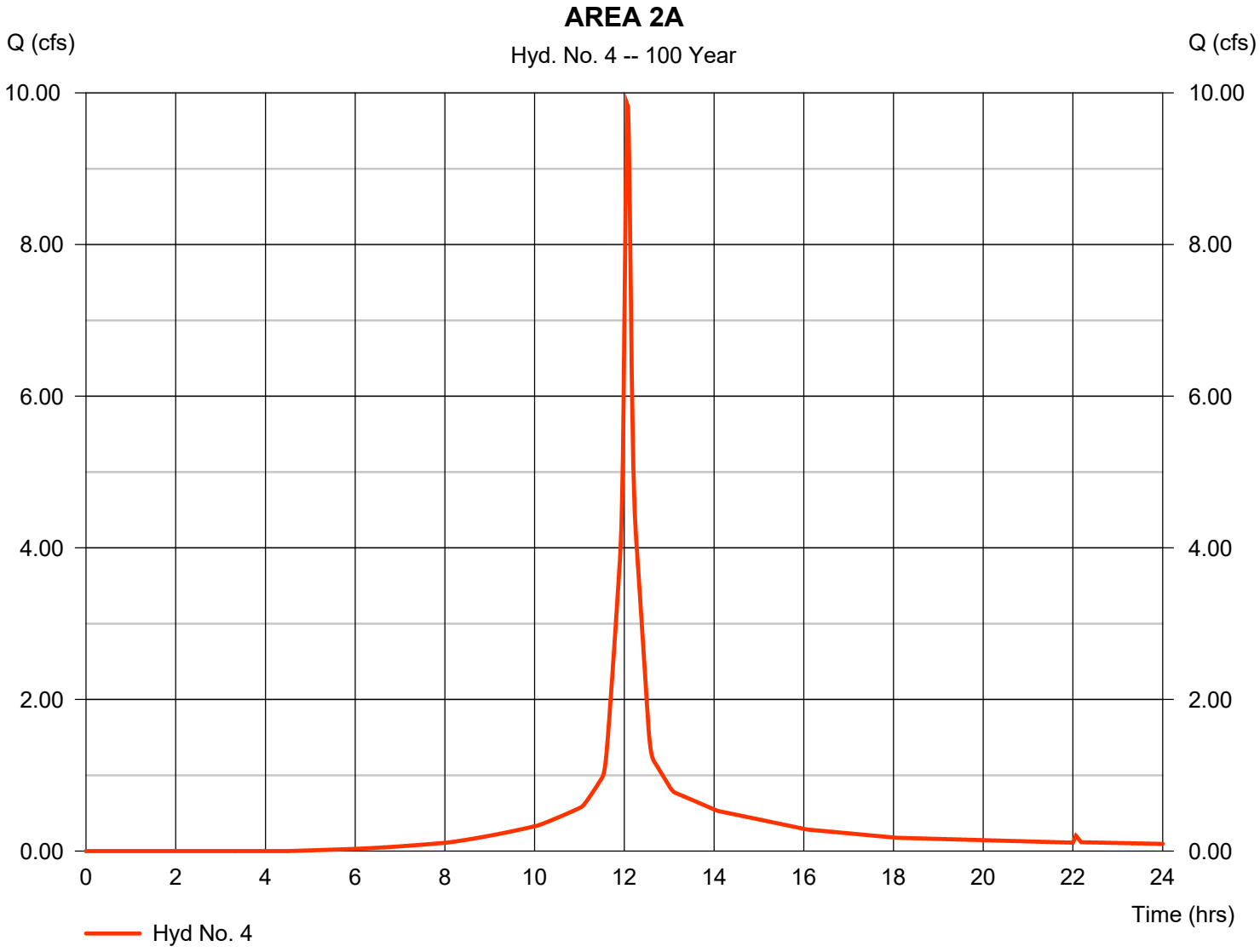


Hydrograph Report

Hyd. No. 4

AREA 2A

Hydrograph type	=	SCS Runoff	Peak discharge	=	9.845 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.07 hrs
Time interval	=	1 min	Hyd. volume	=	31,359 cuft
Drainage area	=	1.464 ac	Curve number	=	84.5
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	6.00 min
Total precip.	=	7.55 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



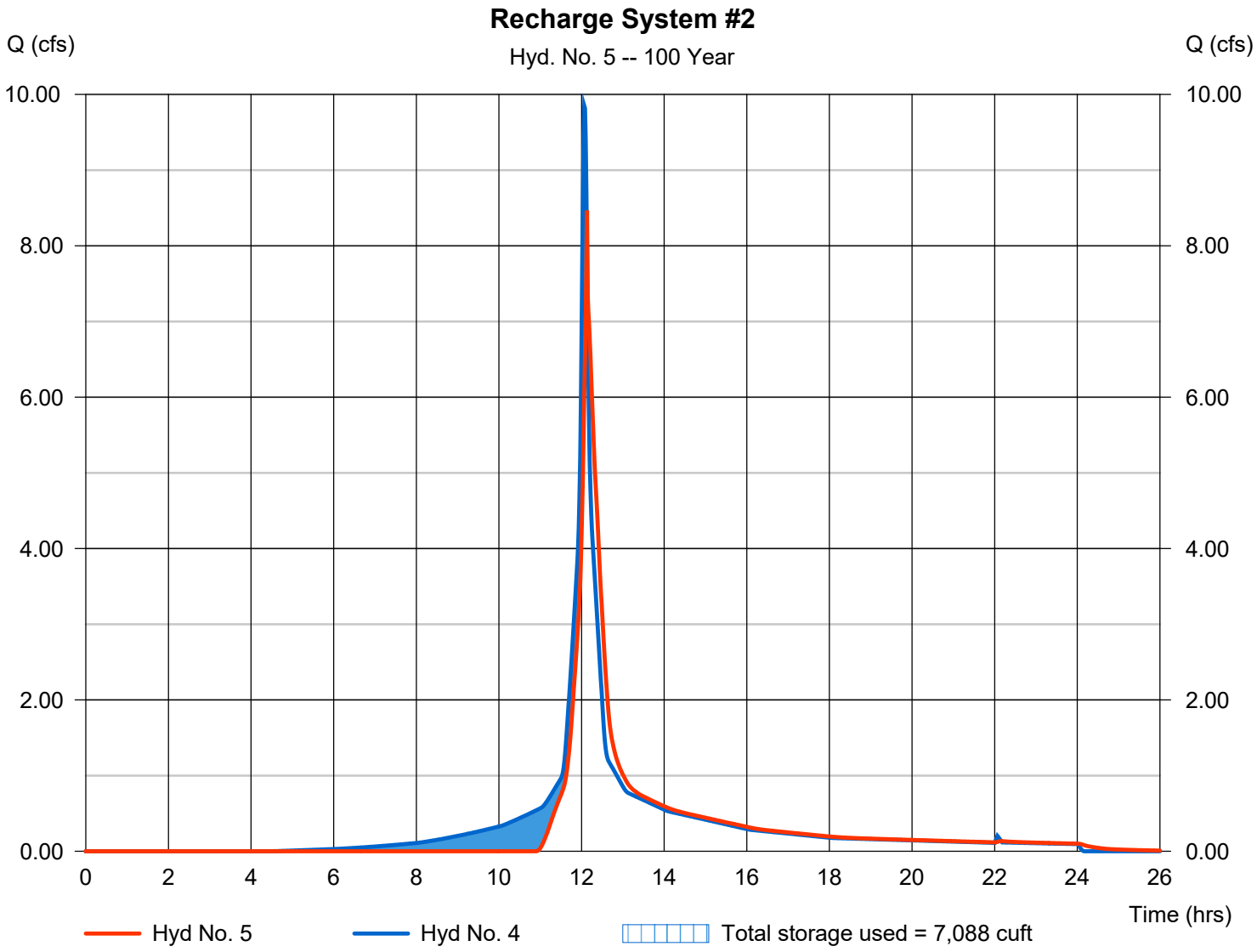
Hydrograph Report

Hyd. No. 5

Recharge System #2

Hydrograph type	=	Reservoir	Peak discharge	=	8.466 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.13 hrs
Time interval	=	1 min	Hyd. volume	=	27,931 cuft
Inflow hyd. No.	=	4 - AREA 2A	Max. Elevation	=	223.41 ft
Reservoir name	=	RECHARGE 2	Max. Storage	=	7,088 cuft

Storage Indication method used.



Pond Report

Pond No. 2 - RECHARGE 2

Pond Data

Pond storage is based on user-defined values

Riser - Inactive, Riser Span = 2.54 x 4.33 ft, Barrel Len = 283.50 ft, No. Barrels = 2, Slope = 0.00%, Headers = Yes
Encasement - Invert elev. = 219.30 ft, Width = 4.83 ft, Height = 3.54 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	219.30	n/a	0	0
0.35	219.65	n/a	401	401
0.71	220.01	n/a	718	1,119
1.06	220.36	n/a	934	2,052
1.42	220.72	n/a	917	2,969
1.77	221.07	n/a	887	3,856
2.12	221.42	n/a	844	4,700
2.48	221.78	n/a	780	5,480
2.83	222.13	n/a	684	6,164
3.19	222.49	n/a	486	6,649
3.54	222.84	n/a	401	7,050
3.55	222.85	n/a	10	7,060
4.00	223.30	n/a	25	7,085
5.00	224.30	n/a	25	7,110

Culvert / Orifice Structures

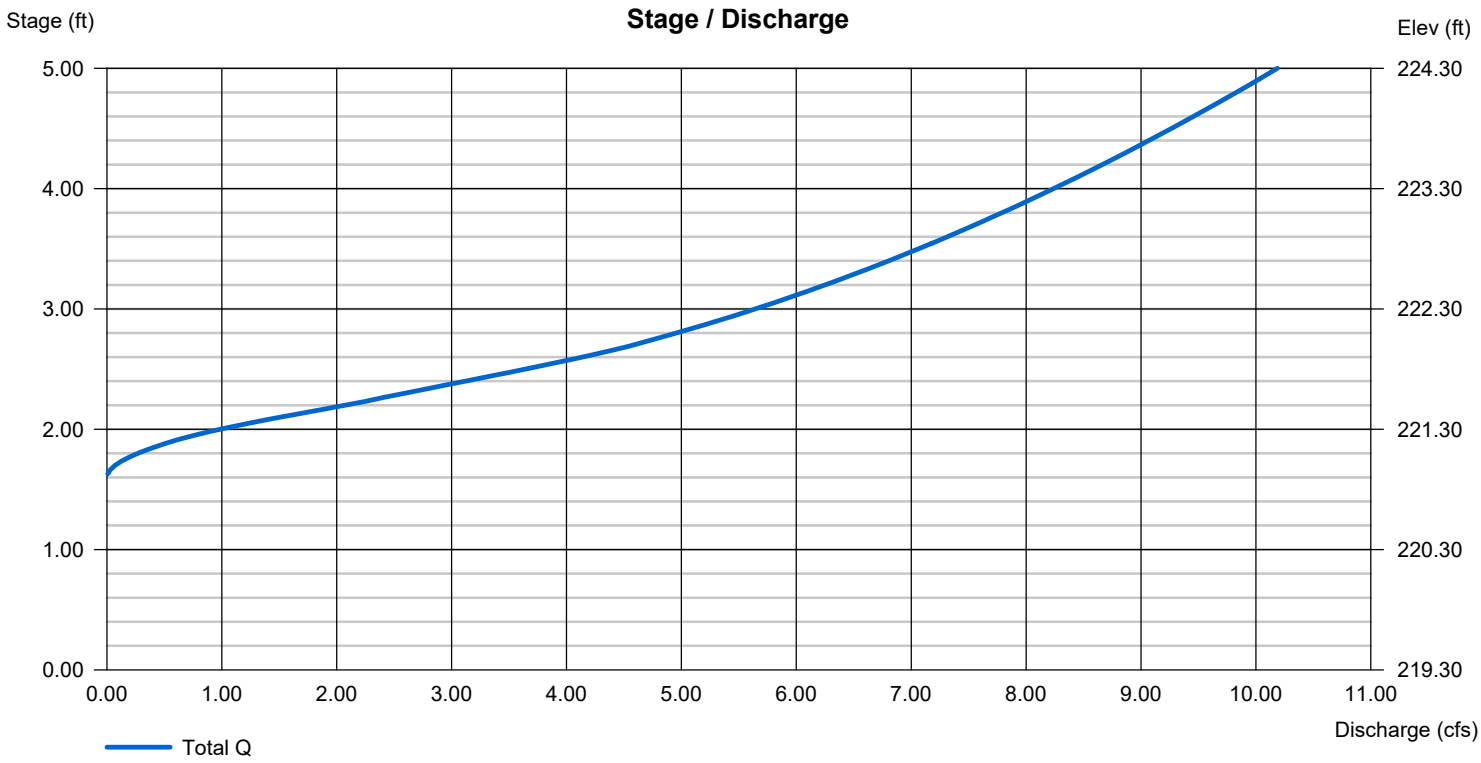
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 8.00	10.00	0.00	0.00
Span (in)	= 8.00	10.00	0.00	0.00
No. Barrels	= 2	1	0	0
Invert El. (ft)	= 220.90	221.20	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

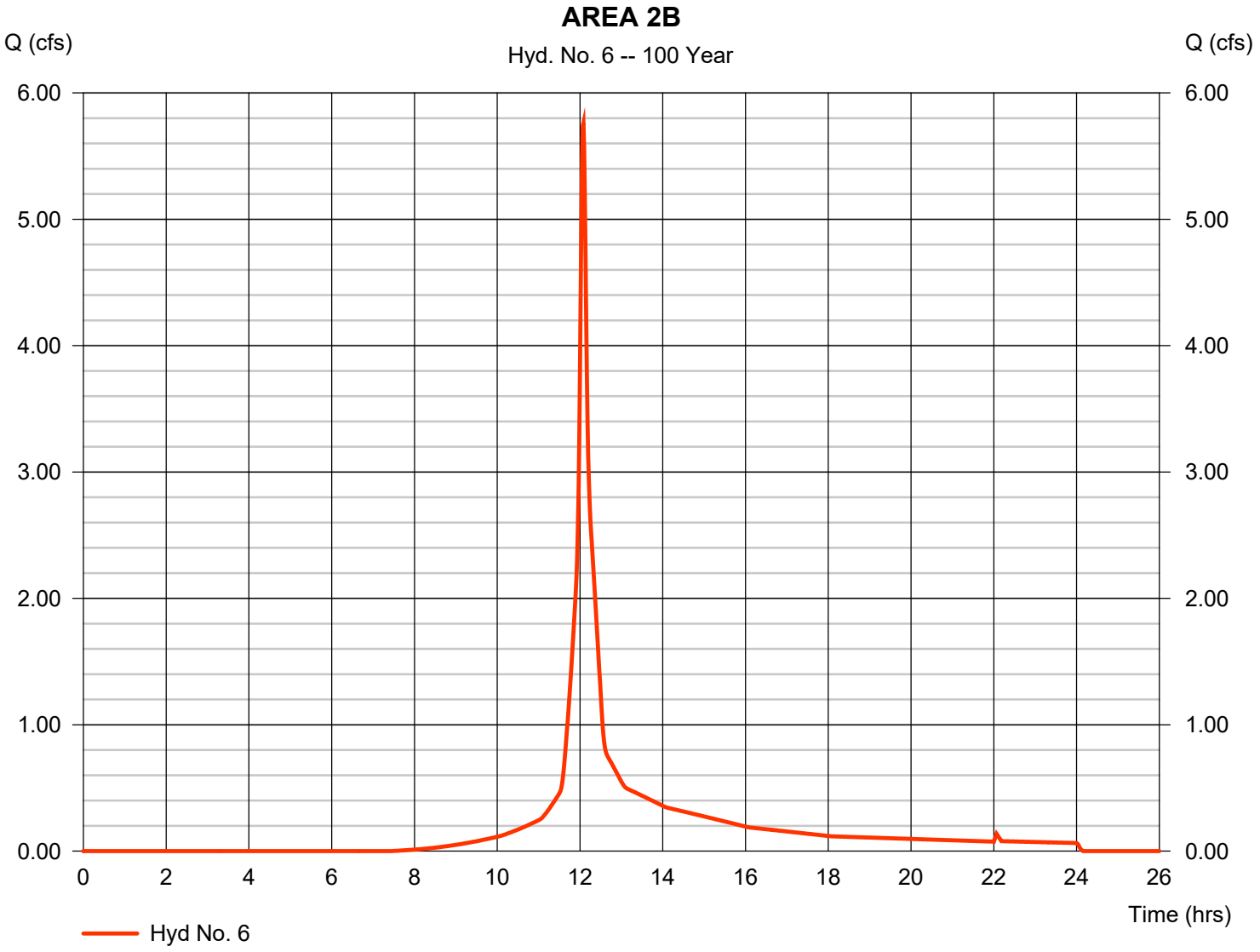


Hydrograph Report

Hyd. No. 6

AREA 2B

Hydrograph type	=	SCS Runoff	Peak discharge	=	5.762 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.08 hrs
Time interval	=	1 min	Hyd. volume	=	17,781 cuft
Drainage area	=	1.079 ac	Curve number	=	72.9
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	6.00 min
Total precip.	=	7.55 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484

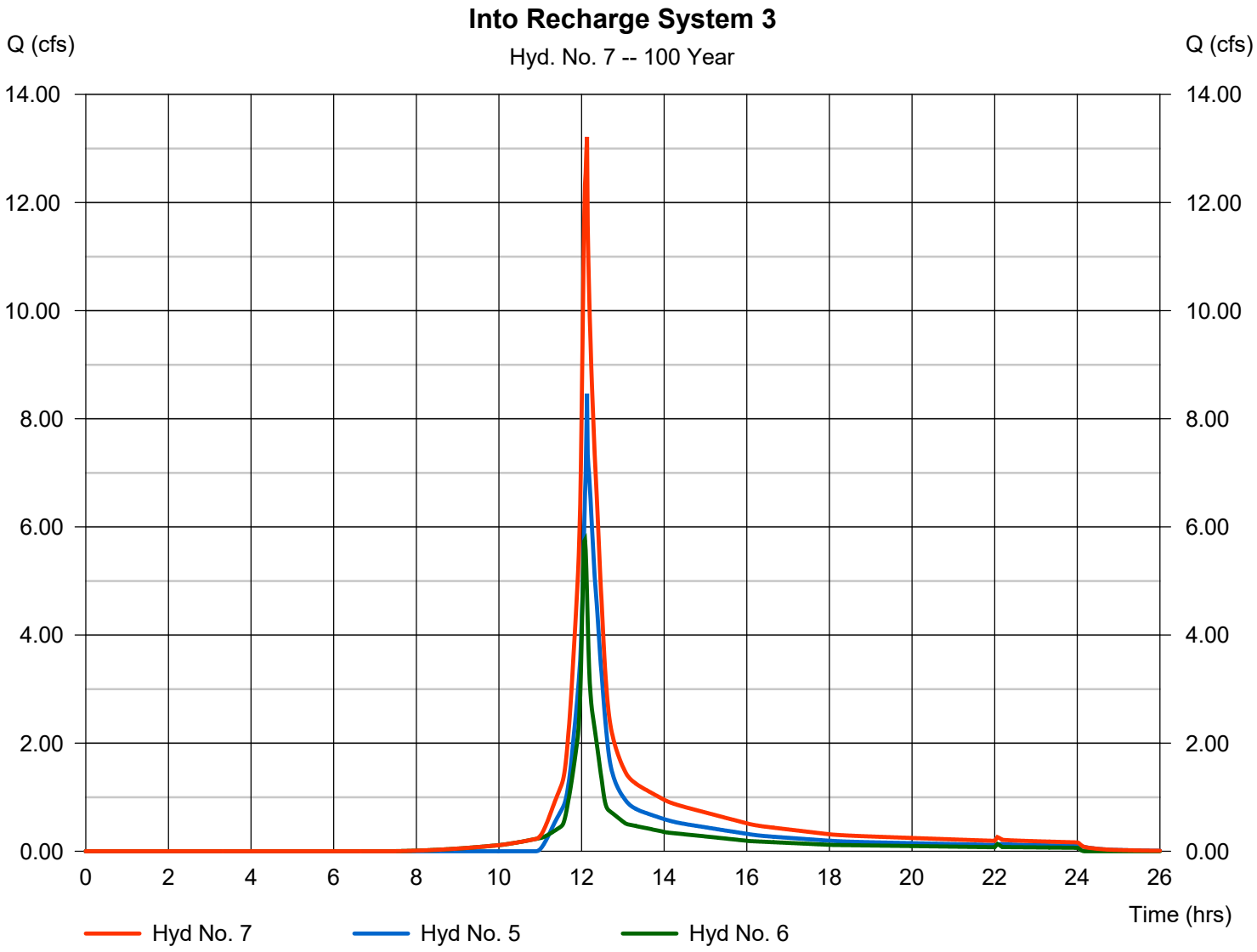


Hydrograph Report

Hyd. No. 7

Into Recharge System 3

Hydrograph type	= Combine	Peak discharge	= 13.22 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 45,712 cuft
Inflow hyds.	= 5, 6	Contrib. drain. area	= 1.079 ac



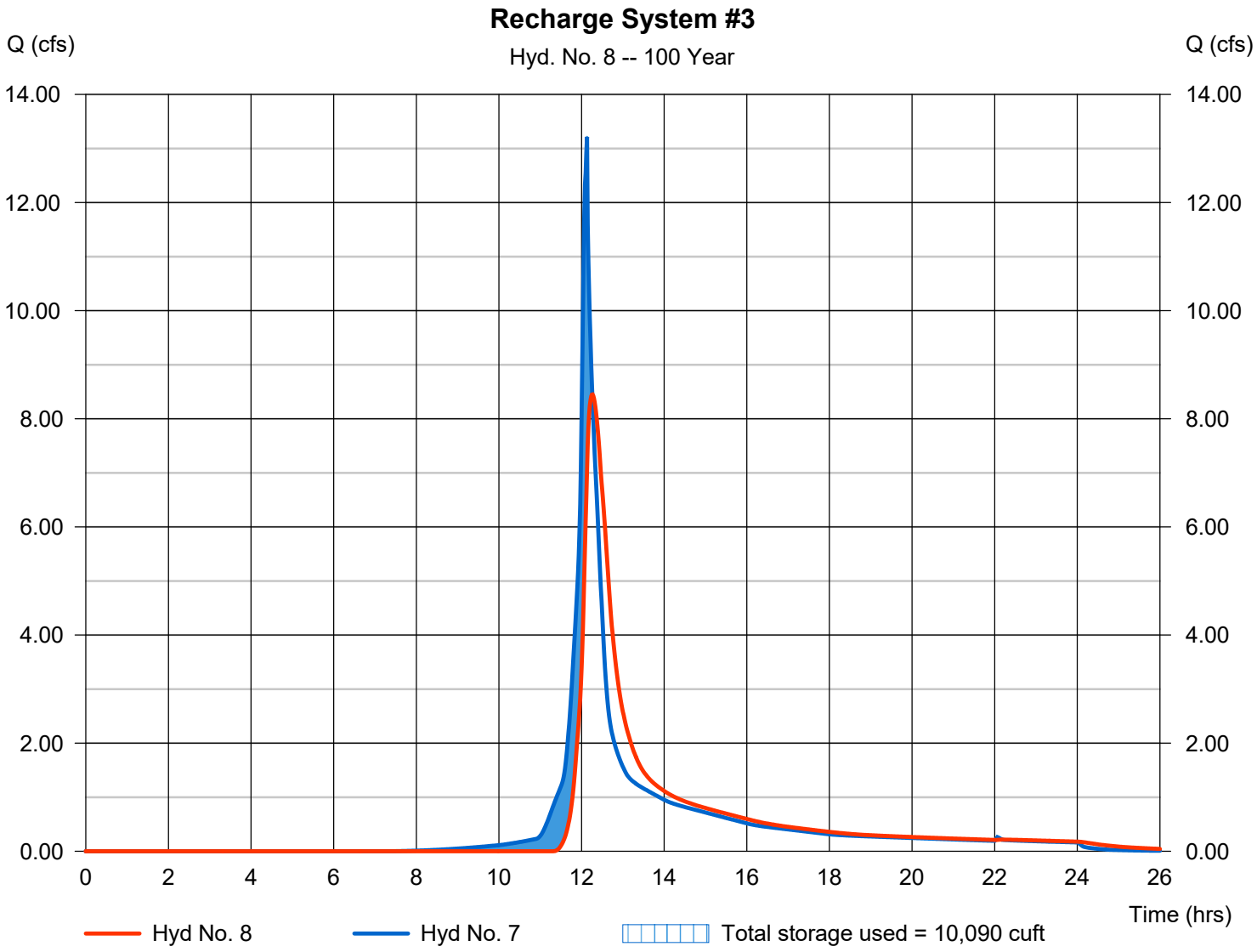
Hydrograph Report

Hyd. No. 8

Recharge System #3

Hydrograph type	=	Reservoir	Peak discharge	=	8.449 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.27 hrs
Time interval	=	1 min	Hyd. volume	=	44,044 cuft
Inflow hyd. No.	=	7 - Into Recharge System 3	Max. Elevation	=	220.65 ft
Reservoir name	=	RECHARGE 3	Max. Storage	=	10,090 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 11 / 16 / 2022

Pond No. 4 - RECHARGE 3

Pond Data

Pond storage is based on user-defined values.
UG Chambers -Invert elev. = 218.50 ft, Rise x Span = 1.71 x 3.00 ft, Barrel Len = 82.00 ft, No. Barrels = 21, Slope = 0.00%, Headers = No
Encasement -Invert elev. = 218.00 ft, Width = 3.25 ft, Height = 2.71 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	218.00	n/a	0	0
0.27	218.27	n/a	607	607
0.54	218.54	n/a	737	1,344
0.81	218.81	n/a	1,441	2,785
1.08	219.08	n/a	1,417	4,202
1.36	219.35	n/a	1,368	5,570
1.63	219.63	n/a	1,290	6,860
1.90	219.90	n/a	1,171	8,031
2.17	220.17	n/a	968	8,999
2.44	220.44	n/a	626	9,625
2.71	220.71	n/a	607	10,232
2.72	220.72	n/a	1	10,233
3.00	221.00	n/a	17	10,250
4.00	222.00	n/a	50	10,300
4.30	222.30	n/a	15	10,315

Culvert / Orifice Structures

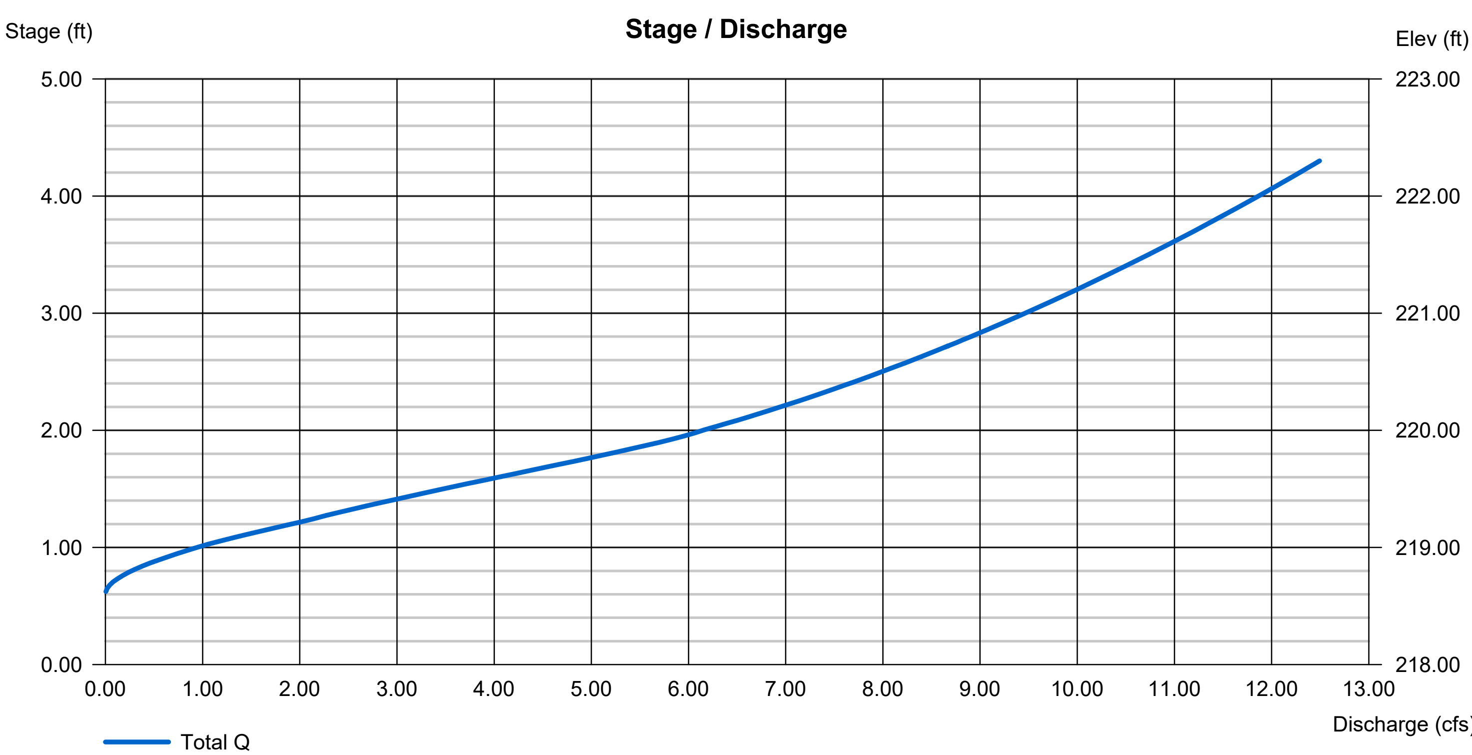
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 8.00	0.00	12.00	0.00
Span (in)	= 8.00	0.00	12.00	0.00
No. Barrels	= 2	0	1	0
Invert El. (ft)	= 218.60	0.00	219.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

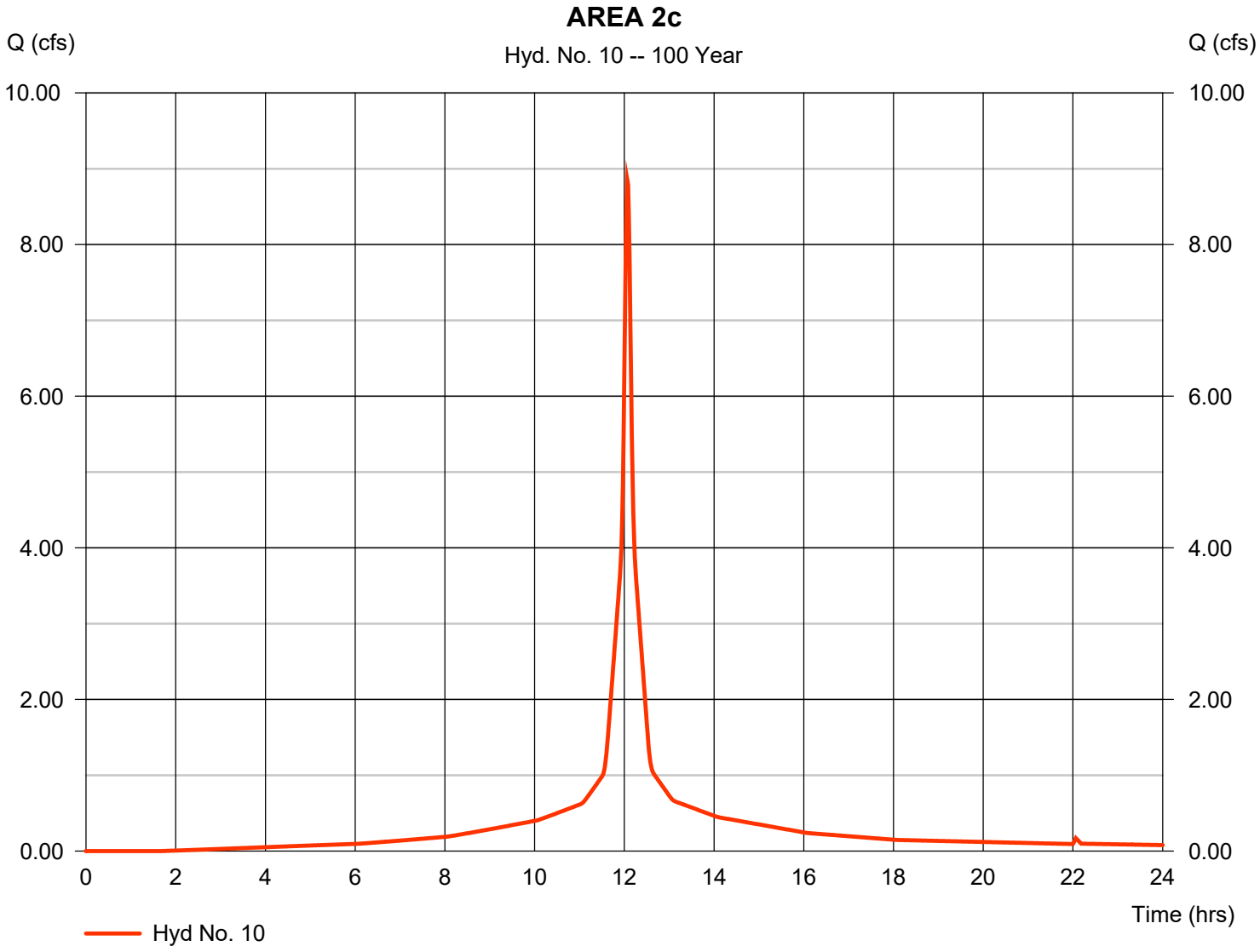


Hydrograph Report

Hyd. No. 10

AREA 2c

Hydrograph type	=	SCS Runoff	Peak discharge	=	8.853 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.07 hrs
Time interval	=	1 min	Hyd. volume	=	30,244 cuft
Drainage area	=	1.176 ac	Curve number	=	94.3
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	6.00 min
Total precip.	=	7.55 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484

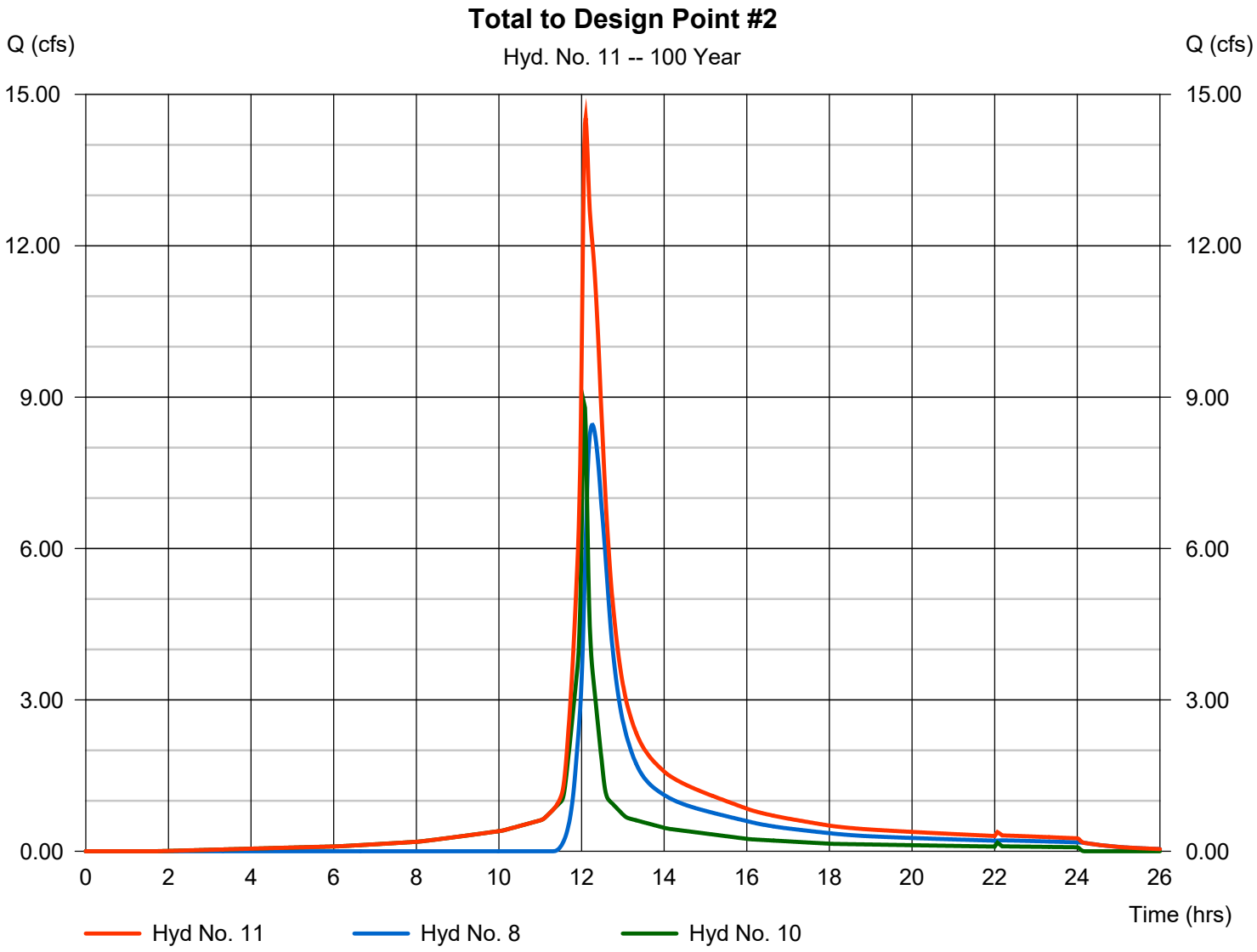


Hydrograph Report

Hyd. No. 11

Total to Design Point #2

Hydrograph type	= Combine	Peak discharge	= 14.53 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.10 hrs
Time interval	= 1 min	Hyd. volume	= 74,289 cuft
Inflow hyds.	= 8, 10	Contrib. drain. area	= 1.176 ac

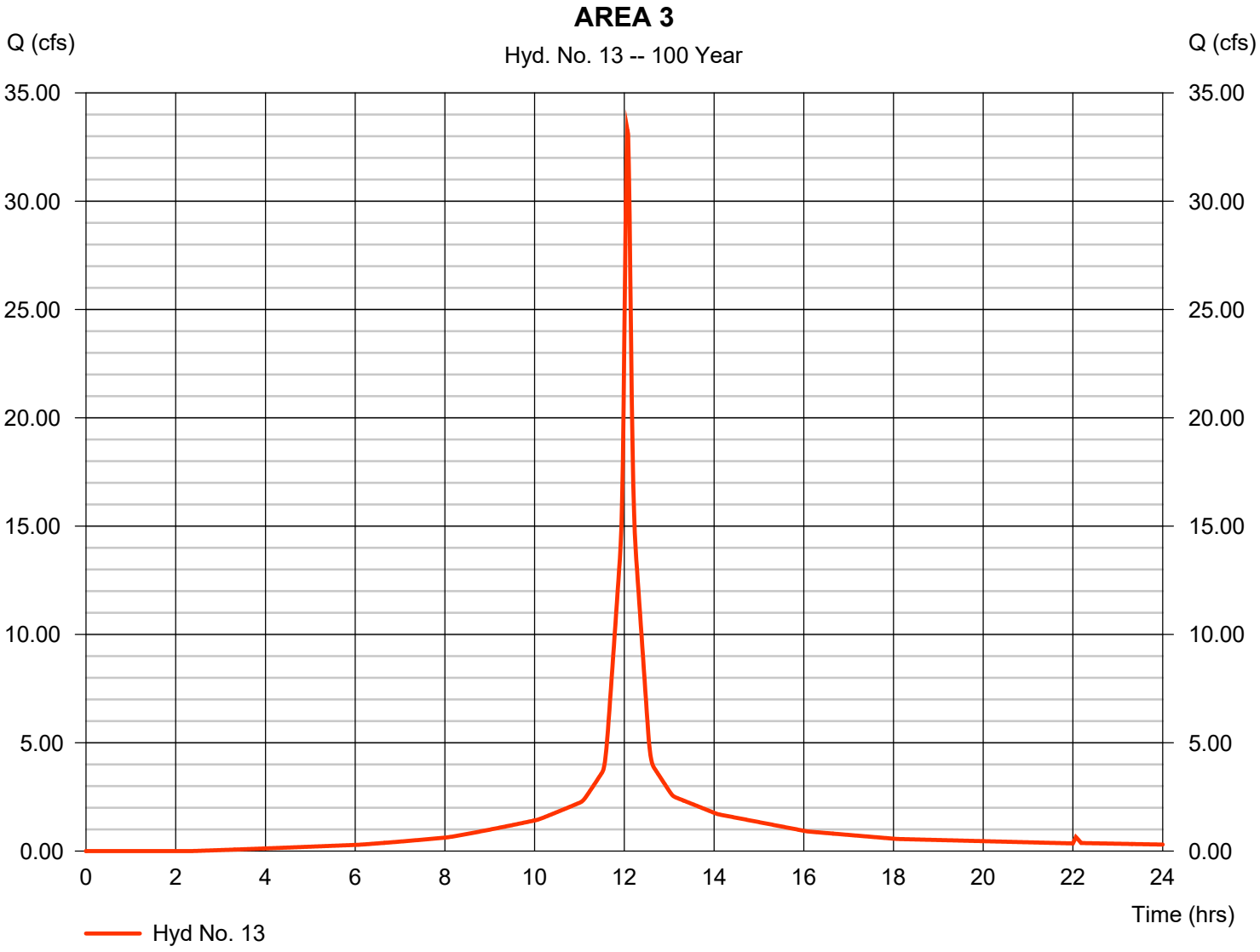


Hydrograph Report

Hyd. No. 13

AREA 3

Hydrograph type	=	SCS Runoff	Peak discharge	=	33.31 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.07 hrs
Time interval	=	1 min	Hyd. volume	=	111,473 cuft
Drainage area	=	4.505 ac	Curve number	=	92.1
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	6.00 min
Total precip.	=	7.55 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484

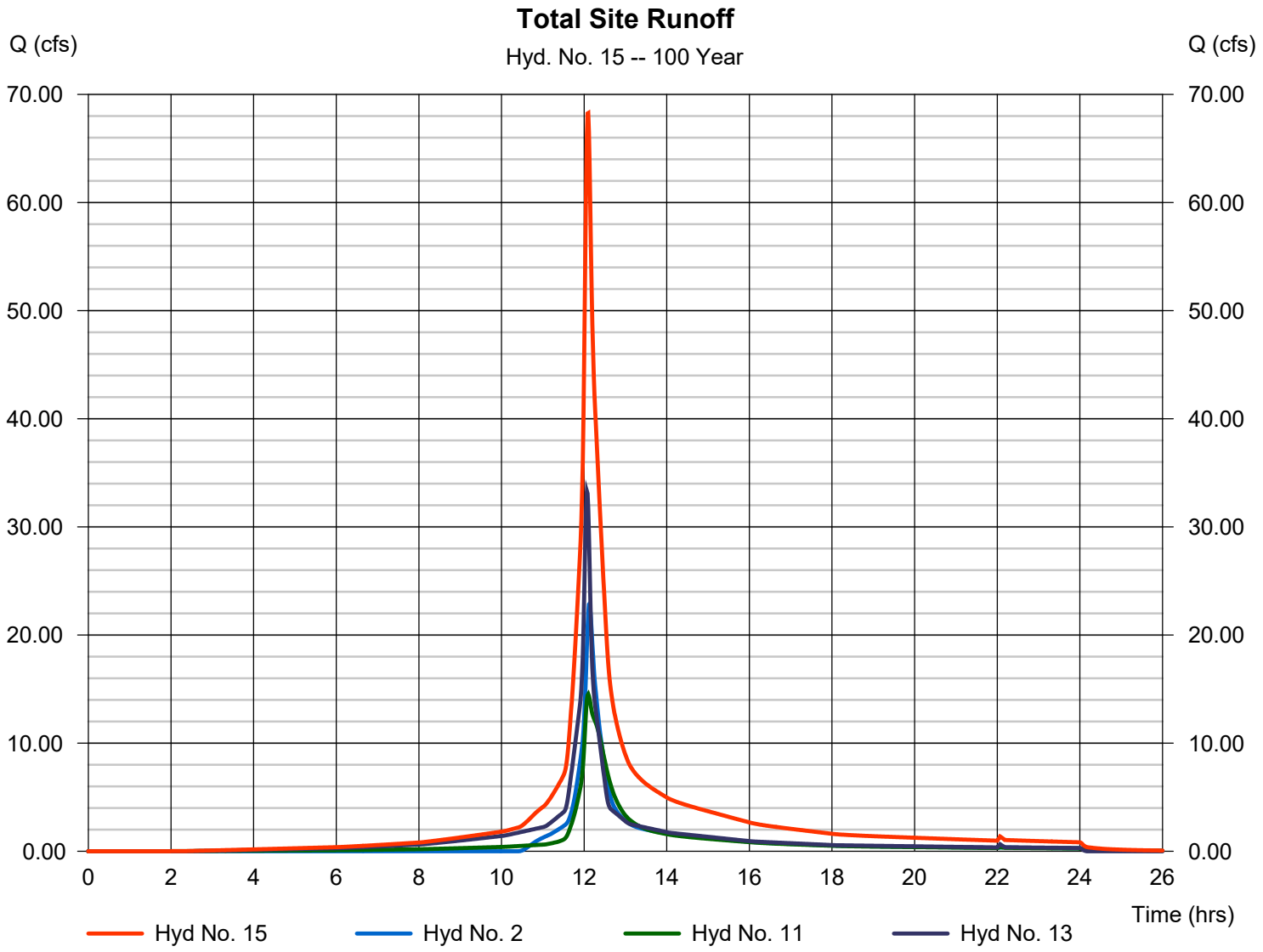


Hydrograph Report

Hyd. No. 15

Total Site Runoff

Hydrograph type	= Combine	Peak discharge	= 68.28 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.10 hrs
Time interval	= 1 min	Hyd. volume	= 265,572 cuft
Inflow hyds.	= 2, 11, 13	Contrib. drain. area	= 4.505 ac



KELLY ENGINEERING GROUP, INC.
Zero Campanelli Drive-Braintree-MA 02184 Phone 781 843 4333

Attachment C
Best Management Practices

RECHARGE SYSTEM CALCULATIONS(Static Method):

Total Site Impervious Areas:

Existing Impervious Area = 349,732 S.F.
Proposed Impervious Area= 395,116 S.F.
Increase in Impervious = 45,384 s.f.

Min Required Dedicated Recharge Volume = 45,384 s.f *0.35"/12 (MA DEP-HSG B Soils)
= 1,324 **cu.ft**

Required Dedicated Recharge Volume = 45,384 s.f *0.8"/12 (Ayer Stormwater Bylaw)
= 3,026 **cu.ft**

Recharge System #1(To Design Point #1)

Total Contributing Impervious Area(redeveloped) = 122,492 s.f.
Increase in impervious to Design Point #1= 10,316 s.f.

Min Required Dedicated Recharge Volume = 10,316 s.f *0.35"/12 (MA DEP-HSG B Soils)
= 301 **cu.ft**

Required Dedicated Recharge Volume = 122,492 s.f *0.8"/12 (Ayer Stormwater Bylaw)
= **8,166 cu.ft**

Provided Dedicated Recharge Volume **= 8,535** cu.ft. @ elevation 220.8

Drain Down Time
Bottom Contact Area = 7,995 s.f.
Recharge Rate = 7,995 s.f. * 1.03 in/hr *1/12 = 686 cu.ft/ hr
Drain Time for recharge volume = 8,535 cu.ft / 686 cu.ft/hr = **12 hours**

Recharge System #2 and #3(To Design Point #2-from watershed 2a and 2b)

Total Contributing Impervious Area (redeveloped) = 61,341 s.f.
Increase in Impervious = 35,068 S.F. (Note area #3+2c has reduction of 21,104 s.f. Impervious)

Min Required Dedicated Recharge Volume = 35,068 s.f *0.35"/12 (MA DEP-HSG B Soils)
= **1,023cu.ft**

Required Dedicated Recharge Volume = 61,341 s.f *0.8"/12 (Ayer Stormwater Bylaw)
= **4,089 cu.ft**

Provided Dedicated Recharge Volume **= 3,435** cu.ft. @ elevation 220.6(system 2)
Provided Dedicated Recharge Volume **= 1,632** cu.ft. @ elevation 218.6(system 3)
Provided Dedicated Recharge Volume **= 5,067** cu.ft.

Drain Down Time(System #2)
Bottom Contact Area = 3,165 s.f.
Recharge Rate = 3,165 s.f. * 1.03 in/hr *1/12 = 271 cu.ft/ hr
Drain Time for recharge volume = 3,435 cu.ft / 271 cu.ft/hr = **12.7 hours**

Drain Down Time(System #3)
Bottom Contact Area = 5,970 s.f.
Recharge Rate = 5,970 s.f. * 1.03 in/hr *1/12 = 512 cu.ft/ hr
Drain Time for recharge volume = 1,632 cu.ft / 512 cu.ft/hr = **3.2 hours**

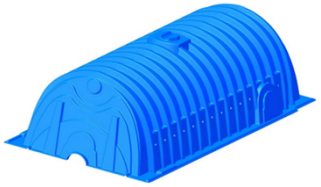
CULTEC Stormwater Design Calculator

Date:	November 01, 2022

Project Information:

Calculations Performed By:

RECHARGER 330XLHD



Recharger 330XLHD Chamber Specifications		
Height	30.5	inches
Width	52.0	inches
Length	8.50	feet
Installed Length	7.00	feet
Bare Chamber Volume	52.21	cu. feet
Installed Chamber Volume	79.26	cu. feet

Breakdown of Storage Provided by Recharger 330XLHD Stormwater System		
Within Chambers	11,542.80	cu. feet
Within Feed Connectors	-	cu. feet
Within Stone	6,709.37	cu. feet
Total Storage Provided	**18,252.2**	**cu. feet**
Total Storage Required	18000.00	cu. feet

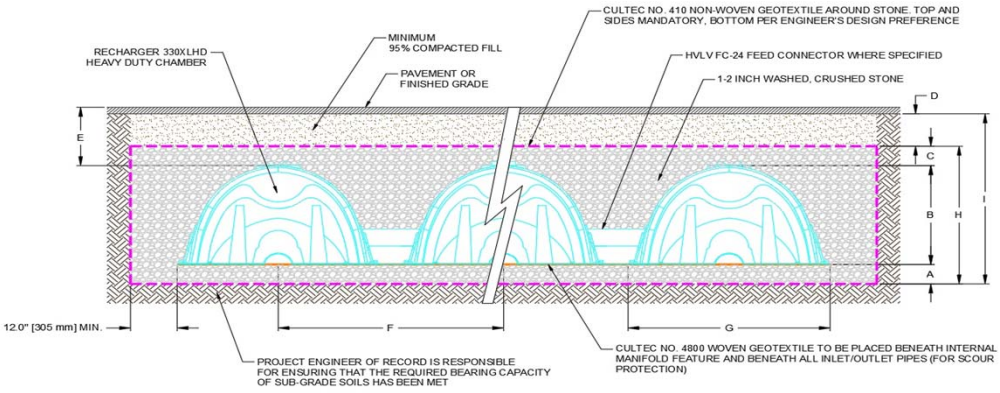
Materials List

Recharger 330XLHD			
Total Number of Chambers Required	**220**	**pieces**	
Separator Row Chambers	44	pieces	Separator Row Qty Included in Total
Starter Chambers	5	pieces	
Intermediate Chambers	210	pieces	
End Chambers	5	pieces	
HVLV FC-24 Feed Connectors	8	pieces	*Based on 2 Internal Manifolds*
CULTEC No. 410 Non-Woven Geotextile	2553	sq. yards	
CULTEC No. 4800 Woven Geotextile	376	feet	
Stone	621	cu. yards	

Bed Detail

Bed Layout Information		
Number of Rows Wide	5	pieces
Number of Chambers Long	44	pieces
Chamber Row Width	23.67	feet
Chamber Row Length	309.50	feet
Bed Width	25.67	feet
Bed Length	311.50	feet
Bed Area Required	7995.17	sq. feet
Length of Separator Row	309.50	feet

Bed detail for reference only. Not project specific. Not to scale.



Conceptual graphic only. Not job specific.

Cross Section Table Reference			
A	Depth of Stone Base	**6.0**	inches
B	Chamber Height	**30.5**	inches
C	Depth of Stone Above Units	**6.0**	inches
D	Depth of 95% Compacted Fill	**10.0**	inches
E	Max. Depth Allowed Above the Chamber	**12.00**	feet
F	Chamber Width	**52.0**	inches
G	Center to Center Spacing	**4.83**	feet
H	Effective Depth	**3.54**	feet
I	Bed Depth	**4.38**	feet

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Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Friday, 11 / 18 / 2022

Pond No. 1 - RECHARGE 1

Pond Data

Pond storage is based on user-defined values.

UG Chambers -Invert elev. = 219.30 ft, Rise x Span = 2.54 x 4.33 ft, Barrel Len = 309.00 ft, No. Barrels = 5, Slope = 0.00%, Headers = No
Encasement -Invert elev. = 219.30 ft, Width = 4.83 ft, Height = 3.54 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	219.30	n/a	0	0
0.35	219.65	n/a	1,057	1,057
0.71	220.01	n/a	1,891	2,948
1.06	220.36	n/a	2,460	5,408
1.42	220.72	n/a	2,415	7,824
1.77	221.07	n/a	2,338	10,162
2.12	221.42	n/a	2,223	12,385
2.48	221.78	n/a	2,056	14,440
2.83	222.13	n/a	1,801	16,242
3.19	222.49	n/a	1,279	17,521
3.54	222.84	n/a	1,057	18,578
3.55	222.85	n/a	372	18,950
4.00	223.30	n/a	50	19,000
5.00	224.30	n/a	50	19,050

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	0.00	0.00	0.00
Span (in)	= 15.00	0.00	0.00	0.00
No. Barrels	= 2	0	0	0
Invert El. (ft)	= 220.80	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 1.25	0.00	0.00	0.00
Crest El. (ft)	= 220.80	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	219.30	0.00	---	---	---	0.00	---	---	---	---	---	0.000
0.04	106	219.34	0.00	---	---	---	0.00	---	---	---	---	---	0.000
0.07	211	219.37	0.00	---	---	---	0.00	---	---	---	---	---	0.000
0.11	317	219.41	0.00	---	---	---	0.00	---	---	---	---	---	0.000
0.14	423	219.44	0.00	---	---	---	0.00	---	---	---	---	---	0.000
0.18	528	219.48	0.00	---	---	---	0.00	---	---	---	---	---	0.000
0.21	634	219.51	0.00	---	---	---	0.00	---	---	---	---	---	0.000
0.25	740	219.55	0.00	---	---	---	0.00	---	---	---	---	---	0.000
0.28	846	219.58	0.00	---	---	---	0.00	---	---	---	---	---	0.000
0.32	951	219.62	0.00	---	---	---	0.00	---	---	---	---	---	0.000
0.35	1,057	219.65	0.00	---	---	---	0.00	---	---	---	---	---	0.000
0.39	1,246	219.69	0.00	---	---	---	0.00	---	---	---	---	---	0.000
0.42	1,435	219.72	0.00	---	---	---	0.00	---	---	---	---	---	0.000
0.46	1,624	219.76	0.00	---	---	---	0.00	---	---	---	---	---	0.000
0.50	1,813	219.80	0.00	---	---	---	0.00	---	---	---	---	---	0.000
0.53	2,002	219.83	0.00	---	---	---	0.00	---	---	---	---	---	0.000
0.57	2,191	219.87	0.00	---	---	---	0.00	---	---	---	---	---	0.000
0.60	2,381	219.90	0.00	---	---	---	0.00	---	---	---	---	---	0.000
0.64	2,570	219.94	0.00	---	---	---	0.00	---	---	---	---	---	0.000
0.67	2,759	219.97	0.00	---	---	---	0.00	---	---	---	---	---	0.000
0.71	2,948	220.01	0.00	---	---	---	0.00	---	---	---	---	---	0.000
0.74	3,194	220.04	0.00	---	---	---	0.00	---	---	---	---	---	0.000
0.78	3,440	220.08	0.00	---	---	---	0.00	---	---	---	---	---	0.000
0.81	3,686	220.11	0.00	---	---	---	0.00	---	---	---	---	---	0.000
0.85	3,932	220.15	0.00	---	---	---	0.00	---	---	---	---	---	0.000
0.88	4,178	220.18	0.00	---	---	---	0.00	---	---	---	---	---	0.000
0.92	4,424	220.22	0.00	---	---	---	0.00	---	---	---	---	---	0.000
0.96	4,670	220.26	0.00	---	---	---	0.00	---	---	---	---	---	0.000
0.99	4,916	220.29	0.00	---	---	---	0.00	---	---	---	---	---	0.000

Continues on next page...

RECHARGE 1

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
1.03	5,162	220.33	0.00	---	---	---	0.00	---	---	---	---	---	0.000
1.06	5,408	220.36	0.00	---	---	---	0.00	---	---	---	---	---	0.000
1.10	5,650	220.40	0.00	---	---	---	0.00	---	---	---	---	---	0.000
1.13	5,891	220.43	0.00	---	---	---	0.00	---	---	---	---	---	0.000
1.17	6,133	220.47	0.00	---	---	---	0.00	---	---	---	---	---	0.000
1.20	6,374	220.50	0.00	---	---	---	0.00	---	---	---	---	---	0.000
1.24	6,616	220.54	0.00	---	---	---	0.00	---	---	---	---	---	0.000
1.27	6,858	220.57	0.00	---	---	---	0.00	---	---	---	---	---	0.000
1.31	7,099	220.61	0.00	---	---	---	0.00	---	---	---	---	---	0.000
1.35	7,341	220.65	0.00	---	---	---	0.00	---	---	---	---	---	0.000
1.38	7,582	220.68	0.00	---	---	---	0.00	---	---	---	---	---	0.000
1.42	7,824	220.72	0.00	---	---	---	0.00	---	---	---	---	---	0.000
1.45	8,057	220.75	0.00	---	---	---	0.00	---	---	---	---	---	0.000
1.49	8,291	220.79	0.00	---	---	---	0.00	---	---	---	---	---	0.000
1.52	8,525	220.82	0.01 ic	---	---	---	0.01	---	---	---	---	---	0.019
1.56	8,759	220.86	0.03 ic	---	---	---	0.06	---	---	---	---	---	0.091
1.59	8,993	220.89	0.09 ic	---	---	---	0.12	---	---	---	---	---	0.204
1.63	9,227	220.93	0.16 ic	---	---	---	0.19	---	---	---	---	---	0.354
1.66	9,460	220.96	0.26 ic	---	---	---	0.28	---	---	---	---	---	0.538
1.70	9,694	221.00	0.38 ic	---	---	---	0.37	---	---	---	---	---	0.753
1.73	9,928	221.03	0.53 ic	---	---	---	0.47	---	---	---	---	---	1.000
1.77	10,162	221.07	0.69 ic	---	---	---	0.58	---	---	---	---	---	1.276
1.81	10,384	221.11	0.88 ic	---	---	---	0.70	---	---	---	---	---	1.579
1.84	10,606	221.14	1.08 ic	---	---	---	0.83	---	---	---	---	---	1.907
1.88	10,829	221.18	1.30 ic	---	---	---	0.96	---	---	---	---	---	2.262
1.91	11,051	221.21	1.54 ic	---	---	---	1.10	---	---	---	---	---	2.641
1.95	11,273	221.25	1.80 ic	---	---	---	1.24	---	---	---	---	---	3.043
1.98	11,496	221.28	2.07 ic	---	---	---	1.39	---	---	---	---	---	3.464
2.02	11,718	221.32	2.36 ic	---	---	---	1.55	---	---	---	---	---	3.908
2.05	11,940	221.35	2.66 ic	---	---	---	1.71	---	---	---	---	---	4.369
2.09	12,162	221.39	2.97 ic	---	---	---	1.88	---	---	---	---	---	4.848
2.12	12,385	221.42	3.29 ic	---	---	---	2.05	---	---	---	---	---	5.346
2.16	12,590	221.46	3.64 ic	---	---	---	2.23	---	---	---	---	---	5.866
2.19	12,796	221.49	3.98 ic	---	---	---	2.41	---	---	---	---	---	6.393
2.23	13,001	221.53	4.33 ic	---	---	---	2.60	---	---	---	---	---	6.931
2.27	13,207	221.57	4.70 ic	---	---	---	2.79	---	---	---	---	---	7.486
2.30	13,413	221.60	5.06 ic	---	---	---	2.98	---	---	---	---	---	8.048
2.34	13,618	221.64	5.44 ic	---	---	---	3.18	---	---	---	---	---	8.621
2.37	13,824	221.67	5.81 ic	---	---	---	3.39	---	---	---	---	---	9.202
2.41	14,029	221.71	6.19 ic	---	---	---	3.60	---	---	---	---	---	9.789
2.44	14,235	221.74	6.57 ic	---	---	---	3.81	---	---	---	---	---	10.38
2.48	14,440	221.78	6.94 ic	---	---	---	4.03	---	---	---	---	---	10.97
2.51	14,621	221.81	7.31 ic	---	---	---	4.25	---	---	---	---	---	11.55
2.55	14,801	221.85	7.67 ic	---	---	---	4.47	---	---	---	---	---	12.14
2.58	14,981	221.88	8.02 ic	---	---	---	4.70	---	---	---	---	---	12.72
2.62	15,161	221.92	8.35 ic	---	---	---	4.93	---	---	---	---	---	13.29
2.65	15,341	221.96	8.67 ic	---	---	---	5.17	---	---	---	---	---	13.84
2.69	15,521	221.99	8.96 ic	---	---	---	5.41	---	---	---	---	---	14.37
2.73	15,701	222.03	9.21 ic	---	---	---	5.65	---	---	---	---	---	14.86
2.76	15,881	222.06	9.42 ic	---	---	---	5.90	---	---	---	---	---	15.32
2.80	16,061	222.10	9.68 ic	---	---	---	6.15	---	---	---	---	---	15.83
2.83	16,242	222.13	9.94 ic	---	---	---	6.40	---	---	---	---	---	16.33
2.87	16,369	222.17	10.18 ic	---	---	---	6.66	---	---	---	---	---	16.84
2.90	16,497	222.20	10.42 ic	---	---	---	6.92	---	---	---	---	---	17.34
2.94	16,625	222.24	10.66 ic	---	---	---	7.18	---	---	---	---	---	17.83
2.97	16,753	222.27	10.89 ic	---	---	---	7.45	---	---	---	---	---	18.33
3.01	16,881	222.31	11.11 ic	---	---	---	7.72	---	---	---	---	---	18.83
3.04	17,009	222.34	11.33 ic	---	---	---	7.99	---	---	---	---	---	19.32
3.08	17,137	222.38	11.55 ic	---	---	---	8.27	---	---	---	---	---	19.81
3.12	17,265	222.42	11.76 ic	---	---	---	8.54	---	---	---	---	---	20.30
3.15	17,393	222.45	11.97 ic	---	---	---	8.83	---	---	---	---	---	20.79
3.19	17,521	222.49	12.17 ic	---	---	---	9.11	---	---	---	---	---	21.28
3.22	17,627	222.52	12.37 ic	---	---	---	9.40	---	---	---	---	---	21.77
3.26	17,732	222.56	12.57 ic	---	---	---	9.69	---	---	---	---	---	22.26
3.29	17,838	222.59	12.77 ic	---	---	---	9.99	---	---	---	---	---	22.75
3.33	17,944	222.63	12.96 ic	---	---	---	10.28	---	---	---	---	---	23.24
3.36	18,049	222.66	13.15 ic	---	---	---	10.58	---	---	---	---	---	23.73
3.40	18,155	222.70	13.33 ic	---	---	---	10.89	---	---	---	---	---	24.22
3.43	18,261	222.73	13.52 ic	---	---	---	11.19	---	---	---	---	---	24.71
3.47	18,366	222.77	13.70 ic	---	---	---	11.50	---	---	---	---	---	25.20
3.50	18,472	222.80	13.88 ic	---	---	---	11.81	---	---	---	---	---	25.69
3.54	18,578	222.84	14.06 ic	---	---	---	12.13	---	---	---	---	---	26.18

Continues on next page...

RECHARGE 1

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
3.54	18,615	222.84	14.06 ic	---	---	---	12.14	---	---	---	---	---	26.20
3.54	18,652	222.84	14.07 ic	---	---	---	12.15	---	---	---	---	---	26.21
3.54	18,689	222.84	14.07 ic	---	---	---	12.16	---	---	---	---	---	26.23
3.54	18,727	222.84	14.08 ic	---	---	---	12.16	---	---	---	---	---	26.24
3.54	18,764	222.85	14.08 ic	---	---	---	12.17	---	---	---	---	---	26.25
3.55	18,801	222.85	14.09 ic	---	---	---	12.18	---	---	---	---	---	26.27
3.55	18,838	222.85	14.09 ic	---	---	---	12.19	---	---	---	---	---	26.28
3.55	18,876	222.85	14.10 ic	---	---	---	12.20	---	---	---	---	---	26.30
3.55	18,913	222.85	14.10 ic	---	---	---	12.21	---	---	---	---	---	26.31
3.55	18,950	222.85	14.11 ic	---	---	---	12.22	---	---	---	---	---	26.32
3.60	18,955	222.90	14.33 ic	---	---	---	12.62	---	---	---	---	---	26.95
3.64	18,960	222.94	14.54 ic	---	---	---	13.03	---	---	---	---	---	27.57
3.69	18,965	222.99	14.76 ic	---	---	---	13.44	---	---	---	---	---	28.20
3.73	18,970	223.03	14.97 ic	---	---	---	13.86	---	---	---	---	---	28.83
3.78	18,975	223.07	15.18 ic	---	---	---	14.28	---	---	---	---	---	29.46
3.82	18,980	223.12	15.38 ic	---	---	---	14.71	---	---	---	---	---	30.09
3.87	18,985	223.16	15.59 ic	---	---	---	15.14	---	---	---	---	---	30.73
3.91	18,990	223.21	15.79 ic	---	---	---	15.57	---	---	---	---	---	31.36
3.95	18,995	223.26	15.98 ic	---	---	---	16.01	---	---	---	---	---	32.00
4.00	19,000	223.30	16.18 ic	---	---	---	16.45	---	---	---	---	---	32.63
4.10	19,005	223.40	16.61 ic	---	---	---	17.45	---	---	---	---	---	34.06
4.20	19,010	223.50	17.02 ic	---	---	---	18.47	---	---	---	---	---	35.49
4.30	19,015	223.60	17.43 ic	---	---	---	19.50	---	---	---	---	---	36.93
4.40	19,020	223.70	17.82 ic	---	---	---	20.56	---	---	---	---	---	38.38
4.50	19,025	223.80	18.21 ic	---	---	---	21.63	---	---	---	---	---	39.84
4.60	19,030	223.90	18.59 ic	---	---	---	22.72	---	---	---	---	---	41.31
4.70	19,035	224.00	18.96 ic	---	---	---	23.83	---	---	---	---	---	42.79
4.80	19,040	224.10	19.33 ic	---	---	---	24.95	---	---	---	---	---	44.28
4.90	19,045	224.20	19.68 ic	---	---	---	26.10	---	---	---	---	---	45.78
5.00	19,050	224.30	20.04 ic	---	---	---	27.26	---	---	---	---	---	47.29

...End

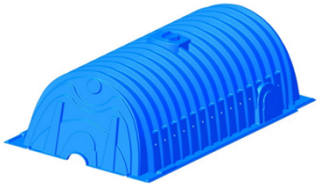
CULTEC Stormwater Design Calculator

Date:	November 02, 2022

Project Information:

Calculations Performed By:

RECHARGER 330XLHD



Recharger 330XLHD Chamber Specifications		
Height	30.5	inches
Width	52.0	inches
Length	8.50	feet
Installed Length	7.00	feet
Bare Chamber Volume	52.21	cu. feet
Installed Chamber Volume	79.26	cu. feet

Breakdown of Storage Provided by Recharger 330XLHD Stormwater System		
Within Chambers	4,199.42	cu. feet
Within Feed Connectors	-	cu. feet
Within Stone	2,805.05	cu. feet
Total Storage Provided	**7,004.5**	**cu. feet**
Total Storage Required	7000.00	cu. feet

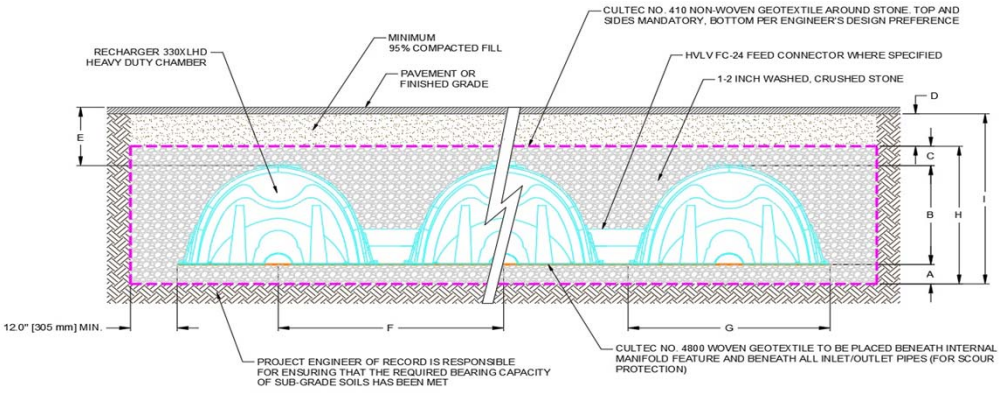
Materials List

Recharger 330XLHD			
Total Number of Chambers Required	**80**	**pieces**	
Separator Row Chambers	40	pieces	Separator Row Qty Included in Total
Starter Chambers	2	pieces	
Intermediate Chambers	76	pieces	
End Chambers	2	pieces	
HVLV FC-24 Feed Connectors	2	pieces	*Based on 2 Internal Manifolds*
CULTEC No. 410 Non-Woven Geotextile	1169	sq. yards	
CULTEC No. 4800 Woven Geotextile	318	feet	
Stone	260	cu. yards	

Bed Detail

Bed Layout Information		
Number of Rows Wide	2	pieces
Number of Chambers Long	40	pieces
Chamber Row Width	9.17	feet
Chamber Row Length	281.50	feet
Bed Width	11.17	feet
Bed Length	283.50	feet
Bed Area Required	3165.75	sq. feet
Length of Separator Row	281.50	feet

Bed detail for reference only. Not project specific. Not to scale.



Conceptual graphic only. Not job specific.

Cross Section Table Reference			
A	Depth of Stone Base	**6.0**	inches
B	Chamber Height	**30.5**	inches
C	Depth of Stone Above Units	**6.0**	inches
D	Depth of 95% Compacted Fill	**10.0**	inches
E	Max. Depth Allowed Above the Chamber	**12.00**	feet
F	Chamber Width	**52.0**	inches
G	Center to Center Spacing	**4.83**	feet
H	Effective Depth	**3.54**	feet
I	Bed Depth	**4.38**	feet

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Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Monday, 11 / 21 / 2022

Pond No. 2 - RECHARGE 2A

Pond Data

Pond storage is based on user-defined values

Orifice Riser - Invert elev. = 219.80 ft, Span = 2.54 x 4.33 ft, Barrel Len = 283.50 ft, No. Barrels = 2, Slope = 0.00%, Headers = Yes

Encasement - Invert elev. = 219.30 ft, Width = 4.83 ft, Height = 3.54 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	219.30	n/a	0	0
0.35	219.65	n/a	401	401
0.71	220.01	n/a	718	1,119
1.06	220.36	n/a	934	2,052
1.42	220.72	n/a	917	2,969
1.77	221.07	n/a	887	3,856
2.12	221.42	n/a	844	4,700
2.48	221.78	n/a	780	5,480
2.83	222.13	n/a	684	6,164
3.19	222.49	n/a	486	6,649
3.54	222.84	n/a	401	7,050
3.55	222.85	n/a	10	7,060
4.00	223.30	n/a	25	7,085
5.00	224.30	n/a	25	7,110

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 8.00	10.00	0.00	0.00
Span (in)	= 8.00	10.00	0.00	0.00
No. Barrels	= 2	1	0	0
Invert El. (ft)	= 220.90	221.20	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	219.30	0.00	0.00	---	---	---	---	---	---	---	---	0.000
0.04	40	219.34	0.00	0.00	---	---	---	---	---	---	---	---	0.000
0.07	80	219.37	0.00	0.00	---	---	---	---	---	---	---	---	0.000
0.11	120	219.41	0.00	0.00	---	---	---	---	---	---	---	---	0.000
0.14	160	219.44	0.00	0.00	---	---	---	---	---	---	---	---	0.000
0.18	201	219.48	0.00	0.00	---	---	---	---	---	---	---	---	0.000
0.21	241	219.51	0.00	0.00	---	---	---	---	---	---	---	---	0.000
0.25	281	219.55	0.00	0.00	---	---	---	---	---	---	---	---	0.000
0.28	321	219.58	0.00	0.00	---	---	---	---	---	---	---	---	0.000
0.32	361	219.62	0.00	0.00	---	---	---	---	---	---	---	---	0.000
0.35	401	219.65	0.00	0.00	---	---	---	---	---	---	---	---	0.000
0.39	473	219.69	0.00	0.00	---	---	---	---	---	---	---	---	0.000
0.42	545	219.72	0.00	0.00	---	---	---	---	---	---	---	---	0.000
0.46	616	219.76	0.00	0.00	---	---	---	---	---	---	---	---	0.000
0.50	688	219.80	0.00	0.00	---	---	---	---	---	---	---	---	0.000
0.53	760	219.83	0.00	0.00	---	---	---	---	---	---	---	---	0.000
0.57	832	219.87	0.00	0.00	---	---	---	---	---	---	---	---	0.000
0.60	903	219.90	0.00	0.00	---	---	---	---	---	---	---	---	0.000
0.64	975	219.94	0.00	0.00	---	---	---	---	---	---	---	---	0.000
0.67	1,047	219.97	0.00	0.00	---	---	---	---	---	---	---	---	0.000
0.71	1,119	220.01	0.00	0.00	---	---	---	---	---	---	---	---	0.000
0.74	1,212	220.04	0.00	0.00	---	---	---	---	---	---	---	---	0.000
0.78	1,305	220.08	0.00	0.00	---	---	---	---	---	---	---	---	0.000
0.81	1,399	220.11	0.00	0.00	---	---	---	---	---	---	---	---	0.000
0.85	1,492	220.15	0.00	0.00	---	---	---	---	---	---	---	---	0.000
0.88	1,586	220.18	0.00	0.00	---	---	---	---	---	---	---	---	0.000
0.92	1,679	220.22	0.00	0.00	---	---	---	---	---	---	---	---	0.000
0.96	1,772	220.26	0.00	0.00	---	---	---	---	---	---	---	---	0.000
0.99	1,866	220.29	0.00	0.00	---	---	---	---	---	---	---	---	0.000

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RECHARGE 2A

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
1.03	1,959	220.33	0.00	0.00	---	---	---	---	---	---	---	---	0.000
1.06	2,052	220.36	0.00	0.00	---	---	---	---	---	---	---	---	0.000
1.10	2,144	220.40	0.00	0.00	---	---	---	---	---	---	---	---	0.000
1.13	2,236	220.43	0.00	0.00	---	---	---	---	---	---	---	---	0.000
1.17	2,327	220.47	0.00	0.00	---	---	---	---	---	---	---	---	0.000
1.20	2,419	220.50	0.00	0.00	---	---	---	---	---	---	---	---	0.000
1.24	2,511	220.54	0.00	0.00	---	---	---	---	---	---	---	---	0.000
1.27	2,602	220.57	0.00	0.00	---	---	---	---	---	---	---	---	0.000
1.31	2,694	220.61	0.00	0.00	---	---	---	---	---	---	---	---	0.000
1.35	2,786	220.65	0.00	0.00	---	---	---	---	---	---	---	---	0.000
1.38	2,877	220.68	0.00	0.00	---	---	---	---	---	---	---	---	0.000
1.42	2,969	220.72	0.00	0.00	---	---	---	---	---	---	---	---	0.000
1.45	3,058	220.75	0.00	0.00	---	---	---	---	---	---	---	---	0.000
1.49	3,146	220.79	0.00	0.00	---	---	---	---	---	---	---	---	0.000
1.52	3,235	220.82	0.00	0.00	---	---	---	---	---	---	---	---	0.000
1.56	3,324	220.86	0.00	0.00	---	---	---	---	---	---	---	---	0.000
1.59	3,413	220.89	0.00	0.00	---	---	---	---	---	---	---	---	0.000
1.63	3,501	220.93	0.01 ic	0.00	---	---	---	---	---	---	---	---	0.006
1.66	3,590	220.96	0.03 ic	0.00	---	---	---	---	---	---	---	---	0.029
1.70	3,679	221.00	0.07 ic	0.00	---	---	---	---	---	---	---	---	0.070
1.73	3,768	221.03	0.13 ic	0.00	---	---	---	---	---	---	---	---	0.126
1.77	3,856	221.07	0.20 ic	0.00	---	---	---	---	---	---	---	---	0.198
1.81	3,941	221.11	0.28 ic	0.00	---	---	---	---	---	---	---	---	0.283
1.84	4,025	221.14	0.38 ic	0.00	---	---	---	---	---	---	---	---	0.380
1.88	4,109	221.18	0.49 ic	0.00	---	---	---	---	---	---	---	---	0.490
1.91	4,194	221.21	0.61 ic	0.00 ic	---	---	---	---	---	---	---	---	0.610
1.95	4,278	221.25	0.74 ic	0.01 ic	---	---	---	---	---	---	---	---	0.747
1.98	4,362	221.28	0.87 ic	0.03 ic	---	---	---	---	---	---	---	---	0.901
2.02	4,447	221.32	1.01 ic	0.06 ic	---	---	---	---	---	---	---	---	1.070
2.05	4,531	221.35	1.16 ic	0.09 ic	---	---	---	---	---	---	---	---	1.252
2.09	4,616	221.39	1.31 ic	0.14 ic	---	---	---	---	---	---	---	---	1.443
2.12	4,700	221.42	1.45 ic	0.19 ic	---	---	---	---	---	---	---	---	1.641
2.16	4,778	221.46	1.59 ic	0.25 ic	---	---	---	---	---	---	---	---	1.845
2.19	4,856	221.49	1.73 ic	0.32 ic	---	---	---	---	---	---	---	---	2.047
2.23	4,934	221.53	1.85 ic	0.39 ic	---	---	---	---	---	---	---	---	2.241
2.27	5,012	221.57	1.94 ic	0.47 ic	---	---	---	---	---	---	---	---	2.413
2.30	5,090	221.60	2.04 ic	0.56 ic	---	---	---	---	---	---	---	---	2.599
2.34	5,168	221.64	2.13 ic	0.65 ic	---	---	---	---	---	---	---	---	2.785
2.37	5,246	221.67	2.23 ic	0.75 ic	---	---	---	---	---	---	---	---	2.971
2.41	5,324	221.71	2.31 ic	0.84 ic	---	---	---	---	---	---	---	---	3.157
2.44	5,402	221.74	2.40 ic	0.94 ic	---	---	---	---	---	---	---	---	3.342
2.48	5,480	221.78	2.48 ic	1.05 ic	---	---	---	---	---	---	---	---	3.527
2.51	5,548	221.81	2.56 ic	1.15 ic	---	---	---	---	---	---	---	---	3.708
2.55	5,617	221.85	2.64 ic	1.25 ic	---	---	---	---	---	---	---	---	3.887
2.58	5,685	221.88	2.71 ic	1.35 ic	---	---	---	---	---	---	---	---	4.061
2.62	5,753	221.92	2.78 ic	1.45 ic	---	---	---	---	---	---	---	---	4.231
2.65	5,822	221.96	2.86 ic	1.54 ic	---	---	---	---	---	---	---	---	4.393
2.69	5,890	221.99	2.92 ic	1.62 ic	---	---	---	---	---	---	---	---	4.543
2.73	5,958	222.03	2.99 ic	1.69 ic	---	---	---	---	---	---	---	---	4.677
2.76	6,027	222.06	3.06 ic	1.75 ic	---	---	---	---	---	---	---	---	4.809
2.80	6,095	222.10	3.12 ic	1.82 ic	---	---	---	---	---	---	---	---	4.942
2.83	6,164	222.13	3.19 ic	1.89 ic	---	---	---	---	---	---	---	---	5.071
2.87	6,212	222.17	3.25 ic	1.95 ic	---	---	---	---	---	---	---	---	5.197
2.90	6,261	222.20	3.31 ic	2.01 ic	---	---	---	---	---	---	---	---	5.320
2.94	6,309	222.24	3.37 ic	2.07 ic	---	---	---	---	---	---	---	---	5.439
2.97	6,358	222.27	3.43 ic	2.13 ic	---	---	---	---	---	---	---	---	5.556
3.01	6,406	222.31	3.49 ic	2.18 ic	---	---	---	---	---	---	---	---	5.671
3.04	6,455	222.34	3.54 ic	2.24 ic	---	---	---	---	---	---	---	---	5.783
3.08	6,503	222.38	3.60 ic	2.29 ic	---	---	---	---	---	---	---	---	5.893
3.12	6,552	222.42	3.65 ic	2.35 ic	---	---	---	---	---	---	---	---	6.000
3.15	6,601	222.45	3.71 ic	2.40 ic	---	---	---	---	---	---	---	---	6.106
3.19	6,649	222.49	3.76 ic	2.45 ic	---	---	---	---	---	---	---	---	6.210
3.22	6,689	222.52	3.81 ic	2.50 ic	---	---	---	---	---	---	---	---	6.312
3.26	6,729	222.56	3.87 ic	2.55 ic	---	---	---	---	---	---	---	---	6.413
3.29	6,769	222.59	3.92 ic	2.59 ic	---	---	---	---	---	---	---	---	6.512
3.33	6,809	222.63	3.97 ic	2.64 ic	---	---	---	---	---	---	---	---	6.609
3.36	6,850	222.66	4.02 ic	2.69 ic	---	---	---	---	---	---	---	---	6.705
3.40	6,890	222.70	4.07 ic	2.73 ic	---	---	---	---	---	---	---	---	6.799
3.43	6,930	222.73	4.12 ic	2.78 ic	---	---	---	---	---	---	---	---	6.892
3.47	6,970	222.77	4.17 ic	2.82 ic	---	---	---	---	---	---	---	---	6.984
3.50	7,010	222.80	4.21 ic	2.86 ic	---	---	---	---	---	---	---	---	7.075
3.54	7,050	222.84	4.26 ic	2.90 ic	---	---	---	---	---	---	---	---	7.165

Continues on next page...

RECHARGE 2A

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
3.54	7,051	222.84	4.26 ic	2.91 ic	---	---	---	---	---	---	---	---	7.167
3.54	7,052	222.84	4.26 ic	2.91 ic	---	---	---	---	---	---	---	---	7.170
3.54	7,053	222.84	4.26 ic	2.91 ic	---	---	---	---	---	---	---	---	7.172
3.54	7,054	222.84	4.27 ic	2.91 ic	---	---	---	---	---	---	---	---	7.175
3.54	7,055	222.85	4.27 ic	2.91 ic	---	---	---	---	---	---	---	---	7.177
3.55	7,056	222.85	4.27 ic	2.91 ic	---	---	---	---	---	---	---	---	7.180
3.55	7,057	222.85	4.27 ic	2.91 ic	---	---	---	---	---	---	---	---	7.182
3.55	7,058	222.85	4.27 ic	2.91 ic	---	---	---	---	---	---	---	---	7.185
3.55	7,059	222.85	4.27 ic	2.92 ic	---	---	---	---	---	---	---	---	7.187
3.55	7,060	222.85	4.27 ic	2.92 ic	---	---	---	---	---	---	---	---	7.190
3.60	7,063	222.90	4.33 ic	2.97 ic	---	---	---	---	---	---	---	---	7.301
3.64	7,065	222.94	4.39 ic	3.02 ic	---	---	---	---	---	---	---	---	7.412
3.69	7,068	222.99	4.45 ic	3.07 ic	---	---	---	---	---	---	---	---	7.520
3.73	7,070	223.03	4.51 ic	3.12 ic	---	---	---	---	---	---	---	---	7.627
3.78	7,073	223.07	4.56 ic	3.17 ic	---	---	---	---	---	---	---	---	7.732
3.82	7,075	223.12	4.62 ic	3.22 ic	---	---	---	---	---	---	---	---	7.836
3.87	7,078	223.16	4.67 ic	3.27 ic	---	---	---	---	---	---	---	---	7.939
3.91	7,080	223.21	4.73 ic	3.31 ic	---	---	---	---	---	---	---	---	8.040
3.95	7,083	223.26	4.78 ic	3.36 ic	---	---	---	---	---	---	---	---	8.140
4.00	7,085	223.30	4.83 ic	3.41 ic	---	---	---	---	---	---	---	---	8.239
4.10	7,088	223.40	4.95 ic	3.51 ic	---	---	---	---	---	---	---	---	8.454
4.20	7,090	223.50	5.06 ic	3.60 ic	---	---	---	---	---	---	---	---	8.664
4.30	7,093	223.60	5.17 ic	3.70 ic	---	---	---	---	---	---	---	---	8.869
4.40	7,095	223.70	5.28 ic	3.79 ic	---	---	---	---	---	---	---	---	9.069
4.50	7,098	223.80	5.38 ic	3.88 ic	---	---	---	---	---	---	---	---	9.265
4.60	7,100	223.90	5.49 ic	3.97 ic	---	---	---	---	---	---	---	---	9.457
4.70	7,103	224.00	5.59 ic	4.05 ic	---	---	---	---	---	---	---	---	9.644
4.80	7,105	224.10	5.69 ic	4.14 ic	---	---	---	---	---	---	---	---	9.829
4.90	7,108	224.20	5.79 ic	4.22 ic	---	---	---	---	---	---	---	---	10.01
5.00	7,110	224.30	5.89 ic	4.30 ic	---	---	---	---	---	---	---	---	10.19

...End

CULTEC Stormwater Design Calculator

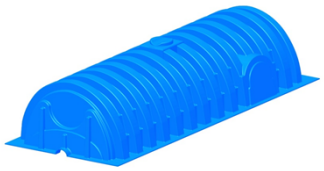
Date:	November 18, 2022

Project Information:

Calculations Performed By:

RECHARGER 180HD

Recharger 180HD Chamber Specifications		
Height	20.5	inches
Width	36.0	inches
Length	7.33	feet
Installed Length	6.33	feet
Bare Chamber Volume	21.84	cu. feet
Installed Chamber Volume	35.39	cu. feet



Breakdown of Storage Provided by Recharger 180HD Stormwater System		
Within Chambers	6,034.36	cu. feet
Within Feed Connectors	9.10	cu. feet
Within Stone	4,050.44	cu. feet
Total Storage Provided	**10,093.9**	**cu. feet**
Total Storage Required	10000.00	cu. feet

Materials List

Recharger 180HD		
Total Number of Chambers Required	**273**	**pieces**
Separator Row Chambers	13	pieces
Starter Chambers	21	pieces
Intermediate Chambers	231	pieces
End Chambers	21	pieces
HVLV FC-24 Feed Connectors	40	pieces
CULTEC No. 410 Non-Woven Geotextile	1775	sq. yards
CULTEC No. 4800 Woven Geotextile	228	feet
Stone	375	cu. yards

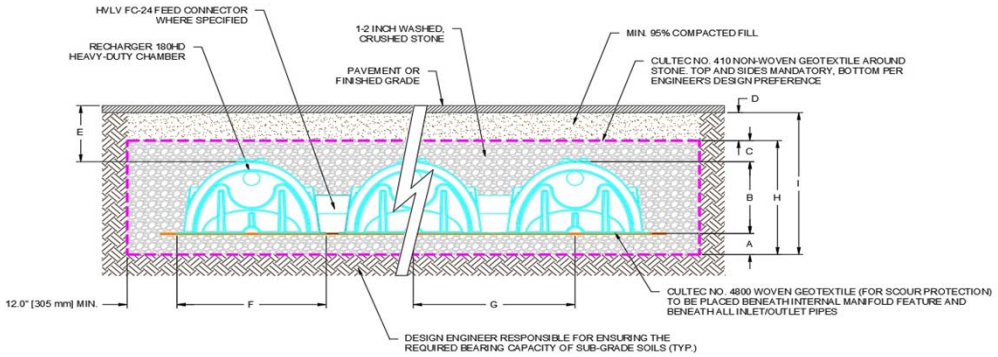
Separator Row Qty Included in Total

Based on 2 Internal Manifolds

Bed Detail

Bed Layout Information		
Number of Rows Wide	21	pieces
Number of Chambers Long	13	pieces
Chamber Row Width	68.00	feet
Chamber Row Length	83.29	feet
Bed Width	70.00	feet
Bed Length	85.29	feet
Bed Area Required	5970.30	sq. feet
Length of Separator Row	83.29	feet

Bed detail for reference only. Not project specific. Not to scale.



Conceptual graphic only. Not job specific.

Cross Section Table Reference			
A	Depth of Stone Base	**6.0**	inches
B	Chamber Height	**20.5**	inches
C	Depth of Stone Above Units	**6.0**	inches
D	Depth of 95% Compacted Fill	**8.0**	inches
E	Max. Depth Allowed Above the Chamber	**12.00**	feet
F	Chamber Width	**36.0**	inches
G	Center to Center Spacing	**3.25**	feet
H	Effective Depth	**2.71**	feet
I	Bed Depth	**3.38**	feet

Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 — Monday, 11 / 21 / 2022

Pond No. 4 - RECHARGE 3

Pond Data

Pond storage is based on user-defined values.

UG Chambers - Invert elev. = 218.50 ft, Rise x Span = 1.71 x 3.00 ft, Barrel Len = 82.00 ft, No. Barrels = 21, Slope = 0.00%, Headers = No

Encasement - Invert elev. = 218.00 ft, Width = 3.25 ft, Height = 2.71 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	218.00	n/a	0	0
0.27	218.27	n/a	607	607
0.54	218.54	n/a	737	1,344
0.81	218.81	n/a	1,441	2,785
1.08	219.08	n/a	1,417	4,202
1.36	219.35	n/a	1,368	5,570
1.63	219.63	n/a	1,290	6,860
1.90	219.90	n/a	1,171	8,031
2.17	220.17	n/a	968	8,999
2.44	220.44	n/a	626	9,625
2.71	220.71	n/a	607	10,232
2.72	220.72	n/a	1	10,233
3.00	221.00	n/a	17	10,250
4.00	222.00	n/a	50	10,300
4.30	222.30	n/a	15	10,315

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 8.00	0.00	12.00	0.00
Span (in)	= 8.00	0.00	12.00	0.00
No. Barrels	= 2	0	1	0
Invert El. (ft)	= 218.60	0.00	219.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	218.00	0.00	---	0.00	---	---	---	---	---	---	---	0.000
0.03	61	218.03	0.00	---	0.00	---	---	---	---	---	---	---	0.000
0.05	121	218.05	0.00	---	0.00	---	---	---	---	---	---	---	0.000
0.08	182	218.08	0.00	---	0.00	---	---	---	---	---	---	---	0.000
0.11	243	218.11	0.00	---	0.00	---	---	---	---	---	---	---	0.000
0.14	303	218.14	0.00	---	0.00	---	---	---	---	---	---	---	0.000
0.16	364	218.16	0.00	---	0.00	---	---	---	---	---	---	---	0.000
0.19	425	218.19	0.00	---	0.00	---	---	---	---	---	---	---	0.000
0.22	485	218.22	0.00	---	0.00	---	---	---	---	---	---	---	0.000
0.24	546	218.24	0.00	---	0.00	---	---	---	---	---	---	---	0.000
0.27	607	218.27	0.00	---	0.00	---	---	---	---	---	---	---	0.000
0.30	680	218.30	0.00	---	0.00	---	---	---	---	---	---	---	0.000
0.33	754	218.33	0.00	---	0.00	---	---	---	---	---	---	---	0.000
0.35	828	218.35	0.00	---	0.00	---	---	---	---	---	---	---	0.000
0.38	902	218.38	0.00	---	0.00	---	---	---	---	---	---	---	0.000
0.41	975	218.41	0.00	---	0.00	---	---	---	---	---	---	---	0.000
0.43	1,049	218.43	0.00	---	0.00	---	---	---	---	---	---	---	0.000
0.46	1,123	218.46	0.00	---	0.00	---	---	---	---	---	---	---	0.000
0.49	1,196	218.49	0.00	---	0.00	---	---	---	---	---	---	---	0.000
0.51	1,270	218.51	0.00	---	0.00	---	---	---	---	---	---	---	0.000
0.54	1,344	218.54	0.00	---	0.00	---	---	---	---	---	---	---	0.000
0.57	1,488	218.57	0.00	---	0.00	---	---	---	---	---	---	---	0.000
0.60	1,632	218.60	0.00	---	0.00	---	---	---	---	---	---	---	0.000
0.62	1,776	218.62	0.00 ic	---	0.00	---	---	---	---	---	---	---	0.004
0.65	1,920	218.65	0.02 ic	---	0.00	---	---	---	---	---	---	---	0.018
0.68	2,065	218.68	0.04 ic	---	0.00	---	---	---	---	---	---	---	0.043
0.70	2,209	218.70	0.08 ic	---	0.00	---	---	---	---	---	---	---	0.077
0.73	2,353	218.73	0.12 ic	---	0.00	---	---	---	---	---	---	---	0.121

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RECHARGE 3

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.76	2,497	218.76	0.17 ic	---	0.00	---	---	---	---	---	---	---	0.174
0.79	2,641	218.79	0.23 ic	---	0.00	---	---	---	---	---	---	---	0.234
0.81	2,785	218.81	0.30 ic	---	0.00	---	---	---	---	---	---	---	0.302
0.84	2,927	218.84	0.38 ic	---	0.00	---	---	---	---	---	---	---	0.378
0.87	3,069	218.87	0.46 ic	---	0.00	---	---	---	---	---	---	---	0.460
0.89	3,210	218.89	0.55 ic	---	0.00	---	---	---	---	---	---	---	0.550
0.92	3,352	218.92	0.64 ic	---	0.00	---	---	---	---	---	---	---	0.644
0.95	3,494	218.95	0.74 ic	---	0.00	---	---	---	---	---	---	---	0.742
0.98	3,635	218.98	0.85 ic	---	0.00	---	---	---	---	---	---	---	0.846
1.00	3,777	219.00	0.95 ic	---	0.00 ic	---	---	---	---	---	---	---	0.953
1.03	3,919	219.03	1.06 ic	---	0.00 ic	---	---	---	---	---	---	---	1.066
1.06	4,060	219.06	1.17 ic	---	0.01 ic	---	---	---	---	---	---	---	1.188
1.08	4,202	219.08	1.29 ic	---	0.03 ic	---	---	---	---	---	---	---	1.318
1.11	4,339	219.11	1.40 ic	---	0.05 ic	---	---	---	---	---	---	---	1.453
1.14	4,475	219.14	1.51 ic	---	0.08 ic	---	---	---	---	---	---	---	1.592
1.17	4,612	219.17	1.62 ic	---	0.12 ic	---	---	---	---	---	---	---	1.734
1.19	4,749	219.19	1.72 ic	---	0.16 ic	---	---	---	---	---	---	---	1.877
1.22	4,886	219.22	1.81 ic	---	0.20 ic	---	---	---	---	---	---	---	2.017
1.25	5,023	219.25	1.89 ic	---	0.25 ic	---	---	---	---	---	---	---	2.150
1.27	5,159	219.27	1.96 ic	---	0.31 ic	---	---	---	---	---	---	---	2.271
1.30	5,296	219.30	2.04 ic	---	0.37 ic	---	---	---	---	---	---	---	2.410
1.33	5,433	219.33	2.11 ic	---	0.44 ic	---	---	---	---	---	---	---	2.549
1.36	5,570	219.35	2.18 ic	---	0.51 ic	---	---	---	---	---	---	---	2.690
1.38	5,699	219.38	2.25 ic	---	0.58 ic	---	---	---	---	---	---	---	2.833
1.41	5,828	219.41	2.32 ic	---	0.66 ic	---	---	---	---	---	---	---	2.978
1.44	5,957	219.44	2.38 ic	---	0.74 ic	---	---	---	---	---	---	---	3.124
1.46	6,086	219.46	2.45 ic	---	0.83 ic	---	---	---	---	---	---	---	3.274
1.49	6,215	219.49	2.51 ic	---	0.91 ic	---	---	---	---	---	---	---	3.423
1.52	6,344	219.52	2.57 ic	---	1.01 ic	---	---	---	---	---	---	---	3.575
1.54	6,473	219.54	2.63 ic	---	1.10 ic	---	---	---	---	---	---	---	3.727
1.57	6,602	219.57	2.69 ic	---	1.20 ic	---	---	---	---	---	---	---	3.881
1.60	6,731	219.60	2.74 ic	---	1.29 ic	---	---	---	---	---	---	---	4.036
1.63	6,860	219.63	2.80 ic	---	1.40 ic	---	---	---	---	---	---	---	4.193
1.65	6,977	219.65	2.85 ic	---	1.50 ic	---	---	---	---	---	---	---	4.348
1.68	7,094	219.68	2.90 ic	---	1.60 ic	---	---	---	---	---	---	---	4.503
1.71	7,211	219.71	2.96 ic	---	1.70 ic	---	---	---	---	---	---	---	4.659
1.73	7,328	219.73	3.01 ic	---	1.80 ic	---	---	---	---	---	---	---	4.813
1.76	7,445	219.76	3.06 ic	---	1.91 ic	---	---	---	---	---	---	---	4.966
1.79	7,562	219.79	3.11 ic	---	2.01 ic	---	---	---	---	---	---	---	5.117
1.82	7,679	219.82	3.16 ic	---	2.11 ic	---	---	---	---	---	---	---	5.268
1.84	7,796	219.84	3.21 ic	---	2.21 ic	---	---	---	---	---	---	---	5.413
1.87	7,914	219.87	3.25 ic	---	2.30 ic	---	---	---	---	---	---	---	5.557
1.90	8,031	219.90	3.30 ic	---	2.40 ic	---	---	---	---	---	---	---	5.695
1.92	8,128	219.92	3.35 ic	---	2.48 ic	---	---	---	---	---	---	---	5.827
1.95	8,224	219.95	3.39 ic	---	2.56 ic	---	---	---	---	---	---	---	5.952
1.98	8,321	219.98	3.44 ic	---	2.63 ic	---	---	---	---	---	---	---	6.066
2.01	8,418	220.01	3.48 ic	---	2.69 ic	---	---	---	---	---	---	---	6.168
2.03	8,515	220.03	3.52 ic	---	2.76 ic	---	---	---	---	---	---	---	6.283
2.06	8,612	220.06	3.57 ic	---	2.83 ic	---	---	---	---	---	---	---	6.396
2.09	8,708	220.09	3.61 ic	---	2.90 ic	---	---	---	---	---	---	---	6.506
2.11	8,805	220.11	3.65 ic	---	2.96 ic	---	---	---	---	---	---	---	6.614
2.14	8,902	220.14	3.69 ic	---	3.03 ic	---	---	---	---	---	---	---	6.721
2.17	8,999	220.17	3.73 ic	---	3.09 ic	---	---	---	---	---	---	---	6.825
2.20	9,061	220.20	3.78 ic	---	3.15 ic	---	---	---	---	---	---	---	6.928
2.22	9,124	220.22	3.82 ic	---	3.21 ic	---	---	---	---	---	---	---	7.029
2.25	9,187	220.25	3.86 ic	---	3.27 ic	---	---	---	---	---	---	---	7.129
2.28	9,249	220.28	3.90 ic	---	3.33 ic	---	---	---	---	---	---	---	7.227
2.30	9,312	220.30	3.93 ic	---	3.39 ic	---	---	---	---	---	---	---	7.324
2.33	9,374	220.33	3.97 ic	---	3.45 ic	---	---	---	---	---	---	---	7.419
2.36	9,437	220.36	4.01 ic	---	3.50 ic	---	---	---	---	---	---	---	7.513
2.38	9,500	220.38	4.05 ic	---	3.56 ic	---	---	---	---	---	---	---	7.606
2.41	9,562	220.41	4.09 ic	---	3.61 ic	---	---	---	---	---	---	---	7.698
2.44	9,625	220.44	4.12 ic	---	3.66 ic	---	---	---	---	---	---	---	7.788
2.47	9,685	220.47	4.16 ic	---	3.72 ic	---	---	---	---	---	---	---	7.878
2.49	9,746	220.49	4.20 ic	---	3.77 ic	---	---	---	---	---	---	---	7.966
2.52	9,807	220.52	4.23 ic	---	3.82 ic	---	---	---	---	---	---	---	8.053
2.55	9,867	220.55	4.27 ic	---	3.87 ic	---	---	---	---	---	---	---	8.140
2.57	9,928	220.57	4.31 ic	---	3.92 ic	---	---	---	---	---	---	---	8.225
2.60	9,989	220.60	4.34 ic	---	3.97 ic	---	---	---	---	---	---	---	8.310
2.63	10,049	220.63	4.38 ic	---	4.02 ic	---	---	---	---	---	---	---	8.393
2.66	10,110	220.66	4.41 ic	---	4.07 ic	---	---	---	---	---	---	---	8.476
2.68	10,171	220.68	4.45 ic	---	4.11 ic	---	---	---	---	---	---	---	8.558

Continues on next page...

RECHARGE 3

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
2.71	10,232	220.71	4.48 ic	---	4.16 ic	---	---	---	---	---	---	---	8.639
2.71	10,232	220.71	4.48 ic	---	4.16 ic	---	---	---	---	---	---	---	8.642
2.71	10,232	220.71	4.48 ic	---	4.16 ic	---	---	---	---	---	---	---	8.645
2.71	10,232	220.71	4.48 ic	---	4.16 ic	---	---	---	---	---	---	---	8.648
2.71	10,232	220.71	4.49 ic	---	4.17 ic	---	---	---	---	---	---	---	8.651
2.72	10,232	220.71	4.49 ic	---	4.17 ic	---	---	---	---	---	---	---	8.654
2.72	10,232	220.72	4.49 ic	---	4.17 ic	---	---	---	---	---	---	---	8.657
2.72	10,233	220.72	4.49 ic	---	4.17 ic	---	---	---	---	---	---	---	8.660
2.72	10,233	220.72	4.49 ic	---	4.17 ic	---	---	---	---	---	---	---	8.663
2.72	10,233	220.72	4.49 ic	---	4.17 ic	---	---	---	---	---	---	---	8.666
2.72	10,233	220.72	4.49 ic	---	4.18 ic	---	---	---	---	---	---	---	8.669
2.75	10,235	220.75	4.53 ic	---	4.22 ic	---	---	---	---	---	---	---	8.752
2.78	10,236	220.78	4.56 ic	---	4.27 ic	---	---	---	---	---	---	---	8.834
2.80	10,238	220.80	4.60 ic	---	4.32 ic	---	---	---	---	---	---	---	8.915
2.83	10,240	220.83	4.63 ic	---	4.36 ic	---	---	---	---	---	---	---	8.995
2.86	10,242	220.86	4.67 ic	---	4.41 ic	---	---	---	---	---	---	---	9.075
2.89	10,243	220.89	4.70 ic	---	4.45 ic	---	---	---	---	---	---	---	9.154
2.92	10,245	220.92	4.73 ic	---	4.50 ic	---	---	---	---	---	---	---	9.232
2.94	10,247	220.94	4.77 ic	---	4.54 ic	---	---	---	---	---	---	---	9.310
2.97	10,248	220.97	4.80 ic	---	4.59 ic	---	---	---	---	---	---	---	9.387
3.00	10,250	221.00	4.83 ic	---	4.63 ic	---	---	---	---	---	---	---	9.463
3.10	10,255	221.10	4.95 ic	---	4.78 ic	---	---	---	---	---	---	---	9.730
3.20	10,260	221.20	5.06 ic	---	4.93 ic	---	---	---	---	---	---	---	9.990
3.30	10,265	221.30	5.17 ic	---	5.07 ic	---	---	---	---	---	---	---	10.24
3.40	10,270	221.40	5.28 ic	---	5.21 ic	---	---	---	---	---	---	---	10.49
3.50	10,275	221.50	5.38 ic	---	5.35 ic	---	---	---	---	---	---	---	10.73
3.60	10,280	221.60	5.49 ic	---	5.48 ic	---	---	---	---	---	---	---	10.97
3.70	10,285	221.70	5.59 ic	---	5.61 ic	---	---	---	---	---	---	---	11.20
3.80	10,290	221.80	5.69 ic	---	5.73 ic	---	---	---	---	---	---	---	11.43
3.90	10,295	221.90	5.79 ic	---	5.86 ic	---	---	---	---	---	---	---	11.65
4.00	10,300	222.00	5.89 ic	---	5.98 ic	---	---	---	---	---	---	---	11.86
4.03	10,302	222.03	5.91 ic	---	6.01 ic	---	---	---	---	---	---	---	11.93
4.06	10,303	222.06	5.94 ic	---	6.05 ic	---	---	---	---	---	---	---	11.99
4.09	10,305	222.09	5.97 ic	---	6.09 ic	---	---	---	---	---	---	---	12.06
4.12	10,306	222.12	6.00 ic	---	6.12 ic	---	---	---	---	---	---	---	12.12
4.15	10,308	222.15	6.03 ic	---	6.16 ic	---	---	---	---	---	---	---	12.18
4.18	10,309	222.18	6.06 ic	---	6.19 ic	---	---	---	---	---	---	---	12.25
4.21	10,311	222.21	6.08 ic	---	6.22 ic	---	---	---	---	---	---	---	12.31
4.24	10,312	222.24	6.11 ic	---	6.26 ic	---	---	---	---	---	---	---	12.37
4.27	10,314	222.27	6.14 ic	---	6.29 ic	---	---	---	---	---	---	---	12.43
4.30	10,315	222.30	6.17 ic	---	6.33 ic	---	---	---	---	---	---	---	12.49

...End

INSTRUCTIONS:

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: WQD #1

TSS Removal Calculation

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Pavement Sweeping	0.05	1.00	0.05	95.0%
Proprietory Device	0.92	0.95	0.87	7.6%
Subsurface Recharge	0.8	0.08	0.06	1.5%

Total TSS Removal = 98% to be Completed for

Project: 1 New England Way
Prepared By: DAM
Date: 11/15/2022

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

INSTRUCTIONS:

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: WQD #2

TSS Removal

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Pavement Sweeping	0.05	1.00	0.05	95.0%
Proprietory Device	0.93	0.95	0.88	6.7%
Subsurface Recharge	0.8	0.07	0.05	1.3%

Total TSS Removal = 99%

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

Project: 1 New England Way
Prepared By: DAM
Date: 11/15/2022

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

INSTRUCTIONS:

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: WQD #3

TSS Removal

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Pavement Sweeping	0.05	1.00	0.05	95.0%
Proprietory Device	0.94	0.95	0.89	5.7%
Subsurface Recharge	0.8	0.06	0.05	1.1%

Total TSS Removal = 99%

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

Project: 1 New England Way
Prepared By: DAM
Date: 11/15/2022

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

INSTRUCTIONS:

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: WQD #4

TSS Removal

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Pavement Sweeping	0.05	1.00	0.05	95.0%
Proprietory Device	0.9	0.95	0.86	9.5%
Subsurface Recharge	0.8	0.10	0.08	1.9%
	0	0.02	0.00	1.9%

Total TSS Removal = 98%

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

Project: 1 New England Way
Prepared By: DAM
Date: 11/15/2022

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

INSTRUCTIONS:

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: WQD #5

TSS Removal

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Pavement Sweeping	0.05	1.00	0.05	95.0%
Proprietory Device	0.95	0.95	0.90	4.8%
Subsurface Recharge	0.8	0.05	0.04	0.9%

Total TSS Removal = 99%

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

Project: 1 New England Way
Prepared By: DAM
Date: 11/15/2022

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

INSTRUCTIONS:

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: WQD #6

TSS Removal

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Pavement Sweeping	0.05	1.00	0.05	95.0%
Proprietory Device	0.92	0.95	0.87	7.6%
Subsurface Recharge	0.8	0.08	0.06	1.5%

Total TSS Removal = 98%

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

Project: 1 New England Way
Prepared By: DAM
Date: 11/15/2022

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

INSTRUCTIONS:

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: WQD #7

TSS Removal

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Pavement Sweeping	0.05	1.00	0.05	95.0%
Proprietory Device	0.92	0.95	0.87	7.6%
Subsurface Recharge	0.8	0.08	0.06	1.5%

Total TSS Removal = 98%

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

Project: 1 New England Way
Prepared By: DAM
Date: 11/15/2022

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

Project: 1 New England Way
Location: Ayer, MA
Prepared For: Kelly Engineering Group / Brandon Li

Purpose: To calculate the water quality flow rate (WQF) over a given site area. In this situation the WQF is derived from the first 1" of runoff from the contributing impervious surface.

Reference: Massachusetts Dept. of Environmental Protection Wetlands Program / United States Department of Agriculture Natural Resources Conservation Service TR-55 Manual

Procedure: Determine unit peak discharge using Figure 1 or 2. Figure 2 is in tabular form so is preferred. Using the tc, read the unit peak discharge (qu) from Figure 1 or Table in Figure 2. qu is expressed in the following units: cfs/mi^2/watershed inches (csm/in).

Compute Q Rate using the following equation:

$$Q = (qu)\ (A)\ (WQV)$$

where:

Q = flow rate associated with first 1" of runoff
qu = the unit peak discharge, in csm/in.
A = impervious surface drainage area (in square miles)
WQV = water quality volume in watershed inches (1" in this case)

Structure Name	Impv. (acres)	A (miles^2)	t_c (min)	t_c (hr)	WQV (in)	qu (csm/in.)	Q (cfs)
WQU #1	0.43	0.0006719	5.0	0.083	1.00	795.00	0.53
WQU #2	0.20	0.0003125	5.0	0.083	1.00	795.00	0.25
WQU #3	0.20	0.0003125	5.0	0.083	1.00	795.00	0.25
WQU #4	0.72	0.0011250	5.0	0.083	1.00	795.00	0.89
WQU #5	0.12	0.0001875	5.0	0.083	1.00	795.00	0.15
WQU #6	0.41	0.0006406	5.0	0.083	1.00	795.00	0.51
WQU #7	0.33	0.0005156	5.0	0.083	1.00	795.00	0.41

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD

1 NEW ENGLAND WAY
AYER, MA

Area	**0.43 ac**	Unit Site Designation	**WQU #1**
Weighted C	**0.9**	Rainfall Station #	**146**
t_c	**5 min**		
CDS Model	**2015-4**	CDS Treatment Capacity	**1.4 cfs**

Rainfall Intensity[1] (in/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (cfs)	Treated Flowrate (cfs)	Incremental Removal (%)
0.02	9.1%	9.1%	0.01	0.01	9.1
0.04	8.9%	18.0%	0.02	0.02	8.9
0.06	9.8%	27.7%	0.02	0.02	9.8
0.08	8.2%	35.9%	0.03	0.03	8.2
0.10	7.7%	43.6%	0.04	0.04	7.7
0.12	5.5%	49.1%	0.05	0.05	5.5
0.14	5.0%	54.2%	0.05	0.05	5.0
0.16	4.9%	59.1%	0.06	0.06	4.9
0.18	4.3%	63.4%	0.07	0.07	4.3
0.20	4.8%	68.2%	0.08	0.08	4.7
0.25	7.4%	75.6%	0.10	0.10	7.3
0.30	5.8%	81.5%	0.12	0.12	5.7
0.35	4.5%	85.9%	0.14	0.14	4.3
0.40	2.4%	88.3%	0.15	0.15	2.3
0.45	2.0%	90.3%	0.17	0.17	1.9
0.50	1.9%	92.1%	0.19	0.19	1.8
0.75	5.0%	97.1%	0.29	0.29	4.5
1.00	1.6%	98.7%	0.39	0.39	1.4
1.50	0.8%	99.5%	0.58	0.58	0.7
2.00	0.0%	99.5%	0.77	0.77	0.0
2.50	0.5%	100.0%	0.97	0.97	0.3
					98.2
				Removal Efficiency Adjustment[2] =	6.5%
				Predicted % Annual Rainfall Treated =	93.5%
				Predicted Net Annual Load Removal Efficiency =	**91.8%**

1 - Based on 10 years of hourly precipitation data from NCDC 6698, Providence WSO Airport, Kent County, RI
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

Brief Stormceptor Sizing Report - WQU #2

Project Information & Location			
Project Name	1 New England Way	**Project Number**	730643
City	Ayer	**State/ Province**	Massachusetts
Country	United States of America	**Date**	11/16/2022
Designer Information		**EOR Information (optional)**	
Name	Jim Lyons	**Name**	Dave Mackwell
Company	Contech Engineered Solutions	**Company**	Kelly Engineering Group
Phone #	413-246-5151	**Phone #**	781-843-4333
Email	jimlyons413@gmail.com	**Email**	dmackwell@kellyengineeringgroup.com

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 #2
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	97
STC 1200	97
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

Stormceptor®

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A QUIKRETE COMPANY

Sizing Details

Drainage Area	
Total Area (acres)	0.25
Imperviousness %	82.0

Rainfall	
Station Name	BIRCH HILL DAM
State/Province	Massachusetts
Station ID #	0666
Years of Records	58
Latitude	42°38'0"N
Longitude	72°7'0"W

Water Quality Objective	
TSS Removal (%)	80.0
Runoff Volume Capture (%)	
Oil Spill Capture Volume (Gal)	
Peak Conveyed Flow Rate (CFS)	
Water Quality Flow Rate (CFS)	0.25

Up Stream Storage	
Storage (ac-ft)	Discharge (cfs)
0.000	0.000

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

• 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=1WBC0O5EYX

Brief Stormceptor Sizing Report - WQU #3

Project Information & Location			
Project Name	1 New England Way	**Project Number**	730643
City	Ayer	**State/ Province**	Massachusetts
Country	United States of America	**Date**	11/16/2022
Designer Information		**EOR Information (optional)**	
Name	Jim Lyons	**Name**	Dave Mackwell
Company	Contech Engineered Solutions	**Company**	Kelly Engineering Group
Phone #	413-246-5151	**Phone #**	781-843-4333
Email	jimlyons413@gmail.com	**Email**	dmackwell@kellyengineeringgroup.com

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 #3
Target TSS Removal (%)	80
TSS Removal (%) Provided	94
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	94
STC 900	97
STC 1200	97
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

Total Area (acres)	0.25
Imperviousness %	79.3

Rainfall

Station Name	BIRCH HILL DAM
State/Province	Massachusetts
Station ID #	0666
Years of Records	58
Latitude	42°38'0"N
Longitude	72°7'0"W

Water Quality Objective

TSS Removal (%)	80.0
Runoff Volume Capture (%)	
Oil Spill Capture Volume (Gal)	
Peak Conveyed Flow Rate (CFS)	
Water Quality Flow Rate (CFS)	0.25

Up Stream Storage

Storage (ac-ft)	Discharge (cfs)
0.000	0.000

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

• 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=1WBC0O5EYX

CONTECH ENGINEERED SOLUTIONS

CDS TECHNOLOGIES

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD

1 NEW ENGLAND WAY
AYER, MA

Area	**0.72 ac**	Unit Site Designation	**WQU #4**
Weighted C	**0.9**	Rainfall Station #	**146**
t_c	**5 min**		
CDS Model	**2015-4**	CDS Treatment Capacity	**1.4 cfs**

Rainfall Intensity[1] (in/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (cfs)	Treated Flowrate (cfs)	Incremental Removal (%)
0.02	9.1%	9.1%	0.01	0.01	9.1
0.04	8.9%	18.0%	0.03	0.03	8.9
0.06	9.8%	27.7%	0.04	0.04	9.8
0.08	8.2%	35.9%	0.05	0.05	8.1
0.10	7.7%	43.6%	0.06	0.06	7.6
0.12	5.5%	49.1%	0.08	0.08	5.5
0.14	5.0%	54.2%	0.09	0.09	4.9
0.16	4.9%	59.1%	0.10	0.10	4.8
0.18	4.3%	63.4%	0.12	0.12	4.2
0.20	4.8%	68.2%	0.13	0.13	4.6
0.25	7.4%	75.6%	0.16	0.16	7.1
0.30	5.8%	81.5%	0.19	0.19	5.5
0.35	4.5%	85.9%	0.23	0.23	4.2
0.40	2.4%	88.3%	0.26	0.26	2.2
0.45	2.0%	90.3%	0.29	0.29	1.8
0.50	1.9%	92.1%	0.32	0.32	1.7
0.75	5.0%	97.1%	0.49	0.49	4.2
1.00	1.6%	98.7%	0.65	0.65	1.3
1.50	0.8%	99.5%	0.97	0.97	0.6
2.00	0.0%	99.5%	1.30	1.30	0.0
2.50	0.5%	100.0%	1.62	1.40	0.2
					96.4
				Removal Efficiency Adjustment[2] =	6.5%
				Predicted % Annual Rainfall Treated =	93.5%
				Predicted Net Annual Load Removal Efficiency =	**89.9%**

1 - Based on 10 years of hourly precipitation data from NCDC 6698, Providence WSO Airport, Kent County, RI
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

Brief Stormceptor Sizing Report - WQU #5

Project Information & Location			
Project Name	1 New England Way	**Project Number**	730643
City	Ayer	**State/ Province**	Massachusetts
Country	United States of America	**Date**	11/16/2022
Designer Information		**EOR Information (optional)**	
Name	Jim Lyons	**Name**	Dave Mackwell
Company	Contech Engineered Solutions	**Company**	Kelly Engineering Group
Phone #	413-246-5151	**Phone #**	781-843-4333
Email	jimlyons413@gmail.com	**Email**	dmackwell@kellyengineeringgroup.com

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 #5
Target TSS Removal (%)	80
TSS Removal (%) Provided	95
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	95
STC 900	97
STC 1200	97
STC 1800	98
STC 2400	98
STC 3600	99
STC 4800	99
STC 6000	99
STC 7200	99
STC 11000	100
STC 13000	100
STC 16000	100

Stormceptor®

CONTECH ENGINEERED SOLUTIONS
A FORTERRA COMPANY

Sizing Details

Drainage Area	
Total Area (acres)	0.58
Imperviousness %	20.4

Rainfall	
Station Name	BIRCH HILL DAM
State/Province	Massachusetts
Station ID #	0666
Years of Records	58
Latitude	42°38'0"N
Longitude	72°7'0"W

Water Quality Objective	
TSS Removal (%)	80.0
Runoff Volume Capture (%)	
Oil Spill Capture Volume (Gal)	
Peak Conveyed Flow Rate (CFS)	
Water Quality Flow Rate (CFS)	0.15

Up Stream Storage	
Storage (ac-ft)	Discharge (cfs)
0.000	0.000

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

• 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=1WBC0O5EYX

CONTECH ENGINEERED SOLUTIONS

CDS TECHNOLOGIES

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD

1 NEW ENGLAND WAY
AYER, MA

Area	**0.41 ac**	Unit Site Designation	**WQU #6**
Weighted C	**0.9**	Rainfall Station #	**146**
t_c	**5 min**		
CDS Model	**2015-4**	CDS Treatment Capacity	**1.4 cfs**

Rainfall Intensity[1] (in/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (cfs)	Treated Flowrate (cfs)	Incremental Removal (%)
0.02	9.1%	9.1%	0.01	0.01	9.1
0.04	8.9%	18.0%	0.01	0.01	8.9
0.06	9.8%	27.7%	0.02	0.02	9.8
0.08	8.2%	35.9%	0.03	0.03	8.2
0.10	7.7%	43.6%	0.04	0.04	7.7
0.12	5.5%	49.1%	0.04	0.04	5.5
0.14	5.0%	54.2%	0.05	0.05	5.0
0.16	4.9%	59.1%	0.06	0.06	4.9
0.18	4.3%	63.4%	0.07	0.07	4.3
0.20	4.8%	68.2%	0.07	0.07	4.7
0.25	7.4%	75.6%	0.09	0.09	7.3
0.30	5.8%	81.5%	0.11	0.11	5.7
0.35	4.5%	85.9%	0.13	0.13	4.3
0.40	2.4%	88.3%	0.15	0.15	2.3
0.45	2.0%	90.3%	0.17	0.17	1.9
0.50	1.9%	92.1%	0.18	0.18	1.8
0.75	5.0%	97.1%	0.28	0.28	4.6
1.00	1.6%	98.7%	0.37	0.37	1.4
1.50	0.8%	99.5%	0.55	0.55	0.7
2.00	0.0%	99.5%	0.74	0.74	0.0
2.50	0.5%	100.0%	0.92	0.92	0.3
					98.3
				Removal Efficiency Adjustment[2] =	6.5%
				Predicted % Annual Rainfall Treated =	93.5%
				Predicted Net Annual Load Removal Efficiency =	**91.9%**

1 - Based on 10 years of hourly precipitation data from NCDC 6698, Providence WSO Airport, Kent County, RI
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

CONTECH ENGINEERED SOLUTIONS

CDS TECHNOLOGIES

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD

1 NEW ENGLAND WAY
AYER, MA

Area	**0.33 ac**	Unit Site Designation	**WQU #7**
Weighted C	**0.9**	Rainfall Station #	**146**
t_c	**5 min**		
CDS Model	**2015-4**	CDS Treatment Capacity	**1.4 cfs**

Rainfall Intensity[1] (in/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (cfs)	Treated Flowrate (cfs)	Incremental Removal (%)
0.02	9.1%	9.1%	0.01	0.01	9.1
0.04	8.9%	18.0%	0.01	0.01	8.9
0.06	9.8%	27.7%	0.02	0.02	9.8
0.08	8.2%	35.9%	0.02	0.02	8.2
0.10	7.7%	43.6%	0.03	0.03	7.7
0.12	5.5%	49.1%	0.04	0.04	5.5
0.14	5.0%	54.2%	0.04	0.04	5.0
0.16	4.9%	59.1%	0.05	0.05	4.9
0.18	4.3%	63.4%	0.05	0.05	4.3
0.20	4.8%	68.2%	0.06	0.06	4.7
0.25	7.4%	75.6%	0.07	0.07	7.4
0.30	5.8%	81.5%	0.09	0.09	5.7
0.35	4.5%	85.9%	0.10	0.10	4.4
0.40	2.4%	88.3%	0.12	0.12	2.3
0.45	2.0%	90.3%	0.13	0.13	1.9
0.50	1.9%	92.1%	0.15	0.15	1.8
0.75	5.0%	97.1%	0.22	0.22	4.7
1.00	1.6%	98.7%	0.30	0.30	1.4
1.50	0.8%	99.5%	0.45	0.45	0.7
2.00	0.0%	99.5%	0.59	0.59	0.0
2.50	0.5%	100.0%	0.74	0.74	0.4
					98.8
				Removal Efficiency Adjustment[2] =	6.5%
				Predicted % Annual Rainfall Treated =	93.5%
				Predicted Net Annual Load Removal Efficiency =	**92.3%**

1 - Based on 10 years of hourly precipitation data from NCDC 6698, Providence WSO Airport, Kent County, RI
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

1 New England Way, Ayer MA

STORMWATER MANAGEMENT SYSTEM OPERATION AND MAINTENANCE PLAN & LONG-TERM POLLUTION PREVENTION PLAN

11/15/22

Prepared by:

KELLY ENGINEERING GROUP, INC.
Zero Campanelli Drive
Braintree, Massachusetts 02184

OWNER AND RESPONSIBLE PARTY:
Nasoya Foods LLC
1 New England Way
Ayer, MA 01732

Note: If ownership of this property changes then the new owner becomes the responsible party. The Owner may assign responsibility to a tenant on the property.

Introduction

Considerable time, effort and cost has been spent in the design and construction of the stormwater management system for this development. The stormwater management system consists of a number of Best Management Practices (BMP's). These BMP's combine to ensure that storm runoff from the site will not damage the sensitive environmental resources surrounding the site. In order to ensure that these BMP's operate as designed it is very important that the procedures in this operation and maintenance plan be followed. Most of these operation procedures require observation and measurement; however, at certain times more extensive maintenance measures may be needed. The following is an itemization of each of these BMP's and their maintenance needs.

The party responsible for maintenance should contract with a maintenance organization capable of performing the more extensive measures such as pumping of catch basin sumps, etc.

BMP No. 1 – Paved Road Surface/Parking Lot Area:

- Regularly pick up and remove litter from the parking lot area, landscaped islands and perimeter landscaped areas and water quality areas.

- The paved area is to be swept a minimum of two times per year, at least once during April and again during September with a high efficiency vacuum sweeper or a regenerative air sweeper. If a mechanical sweeper is used, the paved area is to be swept a minimum of once a month.

BMP No. 2 - Deep Sump Catch Basins:

- Basins are to be inspected 4 times per year.
  1. Verify that tees are secure and free-flowing.
  2. Measure depth of sediment below water line.

- Basins are to be cleaned whenever sediment and hydrocarbons are observed. Basins are to be cleaned a minimum of twice per year. One of these cleanings shall occur before April 15th of each year and one shall occur before September 15th of each year. Basins may be cleaned either using a clamshell or a vacuum pump.

- All liquid shall be pumped from the sump of each basin at least once per year.

- All sediments and hydrocarbons should be properly handled and disposed of, in accordance with local, state and federal guidelines and regulations.

Note: See catch basin detail for explanation of terms.

BMP No. 3 – Proprietary Separators:

Contech CDS:

- Twice a year inspect the Units to ensure that it is operating correctly and to measure the sediment depth using a "dip stick". The floatables should be removed and the sump cleaned when the sump is above 85% full. At least once a year, the unit should be pumped down and the screen carefully inspected for damage and to ensure that it is properly fastened. Ideally, the screen should be power washed for the inspection.

Stormceptors:

- Twice a year inspect the Units to ensure that it is operating correctly and to measure the sediment depth using a "dip stick" and the oil depth.

- Whenever the oil is observed, the entire liquid volume shall be pumped from the units. Oil is pumped through the 6" inspection/clean out pipe.

- For Stormceptor 450i, when the sediment depth is 8" or more the sediment shall be completely pumped from the stormceptor units. Sediment is pumped through the 24" opening.

- Sediment shall be pumped through the 24" opening when sediment depth indicates required maintenance. See Stormceptor Technical Manual for sediment depth requiring servicing.

If any problems are encountered, contact the manufacturer.

BMP No. 4 - Subsurface Recharge Systems:

- The inlet pipe and observation basin shall be inspected 4 times a year. Any accumulated debris shall be removed.

- Inspect recharge facilities following a rainfall event greater than 2.5 inches in a 24 hour period.

- If standing water is observed for more than 48 hours following a storm event, immediately retain a qualified professional to assess whether infiltration function has been lost and develop recommended corrective actions.

- **Inlet and outlet structures.**
  On a regular basis, the inlet pipe and outlet structure shall be checked for debris and removed as necessary to ensure unobstructed flow of water. Outlet structures should be inspected at least once annually by a qualified professional for structural integrity and for any conditions which could adversely affect their function.

- **Flared end section and rip rap**.
  Flared End Sections should be inspected at least once annually for any conditions which could adversely affect their function.

Snow Removal:

- There shall be no plowing or stock piling of snow within all resource areas without the prior written permission from state or local approving authority.
- Road salts and de-icing materials shall be stored on impervious pads and covered to protect from wind and precipitation.
- No de-icing materials shall be stored nor used within all resource areas and any area subject to the jurisdiction of local and state regulations without the prior written permission from state or local approving authority.
- No de-icing materials shall be stored within Zone I, Zone II, Zone A, and 200 feet from a river or estuary.

Storage and Use of Chemicals:

- No pesticides, herbicides, nor insecticides shall be stored nor used within all resource areas and any area subject to the jurisdiction of local and state regulations without the prior written permission from state or local approving authority.
- Chemical storage on site shall be limited. Any chemicals that must be stored shall be stored in a secure area in accordance with Local and State regulations.

Spill prevention response and containment:

- Containment – In the event of a discharge or spill of oil or another hazardous material, , the following procedures are to be followed to mitigate or prevent the release of hazardous waste;
    1. Secure the Area
    2. Halt / shut down the operation
    3. Keep unauthorized people away from the release area by using physical barriers (ie. caution tape)
    4. Determine the source material involved
    5. Refer to the 2020 Emergency Response Guidebook for properties of the material including any potential evacuation distances.
    6. Utilize appropriate chemical protective clothing
    7. Attempt to locate the source of the release and the extent of the contamination
    8. Undertake initial response actions to halt the release of oil or other material and contain its spread using absorbent materials, physical barriers, containment pail, etc.
    9. Look for storm drains, manhole covers and other vertical access points and dike off or dam to prevent material from entering these areas. Outlets to stormwater management ponds shall be plugged so that hazardous material do not enter resource areas.
    10. Take those actions to protect public health, safety and the environment that can be taken without compromising your safety or the safety of others.
    11. Initiate notification procedures. Notifications to local, State and Federal agencies (including National Emergency Response Center when applicable)
    - Local Police / Fire – 911
    - Municipal Department of Public Works: 978-772-8240 (Stormwater Hotline)
    - Applicable State authority: MASS DEP 1-888-304-1133
    - Environmental Contractor: Clean Harbors 1-800-645-8265
    - National Emergency Response Center (if release exceeds US DOT "reportable quantity" amount): 1-800-424-8802
    - CHEMTREC: 1-800-424-9300
    - AIG PIER 1-877-743-7669
    - Once the emergency response crew arrives at the scene, the following actions will be taken:
    - Material that has been released to impervious surface (ie. concrete or pavement) will be absorbed using a suitable absorbent such as Speedi Dry or diatomaceous earth. This material will then be containerized and sent to a fully licensed waste management facility for disposal.
    - Material that has reached any pervious surface such as soil will result in the remediation of the affected area to the extent that all contamination is removed. All material collected as a result of remediation will be containerized and sent for disposal at a fully licensed waste management facility. In addition, analytics will be conducted when necessary to determine if all contamination has been removed.
    - Prior to leaving any site, appropriate backfill will be used to replace any ground cover removed during the clean-up process.
    - Any damaged container involved in an accident will be placed into a suitable salvage drum and shipped to a fully licensed waste management facility for disposal.
- The first priority of any emergency response is life and health. If you do not have adequate information or personal protective equipment, do not approach the release.

Hazardous Waste:

- Hazardous Waste – All hazardous waste materials will be disposed of in the manner specified by local, state and/or federal regulations and by the manufacturer of such products.
- There shall be no illicit discharges to the stormwater management system.

Material and Waste Storage, Handling and Management:

- All waste materials will be collected and stored in a securely lidded metal dumpster from a solid waste management company licensed to do business by the state and the town. The dumpster will comply with all local and state solid waste management regulations.

Training for Long Term Pollution Prevention Plan:

- All staff or personnel involved and responsible for implementing the Stormwater Management System Operations and Maintenance Plan and the Long-Term Pollution Prevention Plan shall be properly trained as required under the DEP Stormwater Management Regulations. Training shall be documented with records kept with other stormwater maintenance records.

Lawn and Garden activities:

- There shall be no exterior storage of fertilizers, pesticides, herbicides, or insecticides. No pesticides, herbicides, nor insecticides shall be stored nor used within any resource areas its buffers, and any area subject to the jurisdiction of local and state regulations without the prior written permission from state or local approving authority.
- Fertilizers and pesticides shall be applied properly, sparingly, and outside any resource areas and its buffers.

To reduce the impact of fertilizers, consider the following tips;

- Don't fertilize before a rain storm.
- Consider using organic fertilizers. They release nutrients more slowly.
- Test soils before applying fertilizers. Some soils may not need fertilizers. A standard soil test costs $9.00. (Call the UMass Extension Soil Testing Lab at 413-545-2311 or download a soil test order form at http://www.umass.edu/plsoils/soiltest/.)

Illicit Discharges:

Illicit discharges that are not allowed to the stormwater management system include;

- wastewater discharges
- discharges of stormwater contaminated by contact with process wastes, raw materials, toxic pollutants, hazardous substances, oil, or grease

Allowable Non-Stormwater Discharges;

- 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.

Nasoya Foods LLC

PROJECT LOCATION: 1 New England Way, Ayer, MA

STORMWATER ANAGEMENT BEST MANAGEMENT PRACTICES - INSPECTION SCHEDULE AND EVALUATION CHECKLIST

Best Management Practice	Inspection Frequency (1)	Date I	Inspector	Minimum Maintenance and Key Items to Check (1)	Cleaning/Repair Needed yes__ no__ (list items)	Date of Cleaning /Repair	Perform ed By
Street Sweeping	4x per year			Vacuum sweeper			
Deep Sump and Hooded Catch Basins	4x per year			Remove sediment 1x per year or if >6”			
Outlet Control Structure	2x per year first year, annually thereafter			Inspect inlets and outlets			
Recharge Chambers	4x per year			Inspect after 2.5” rain in 24 hours, drain time less than 3 days			
CDS water Quality device	4x per year			Per manufacturer Requirements			
Stormceptor Water Quality Device				Per manufacturer Requirements			

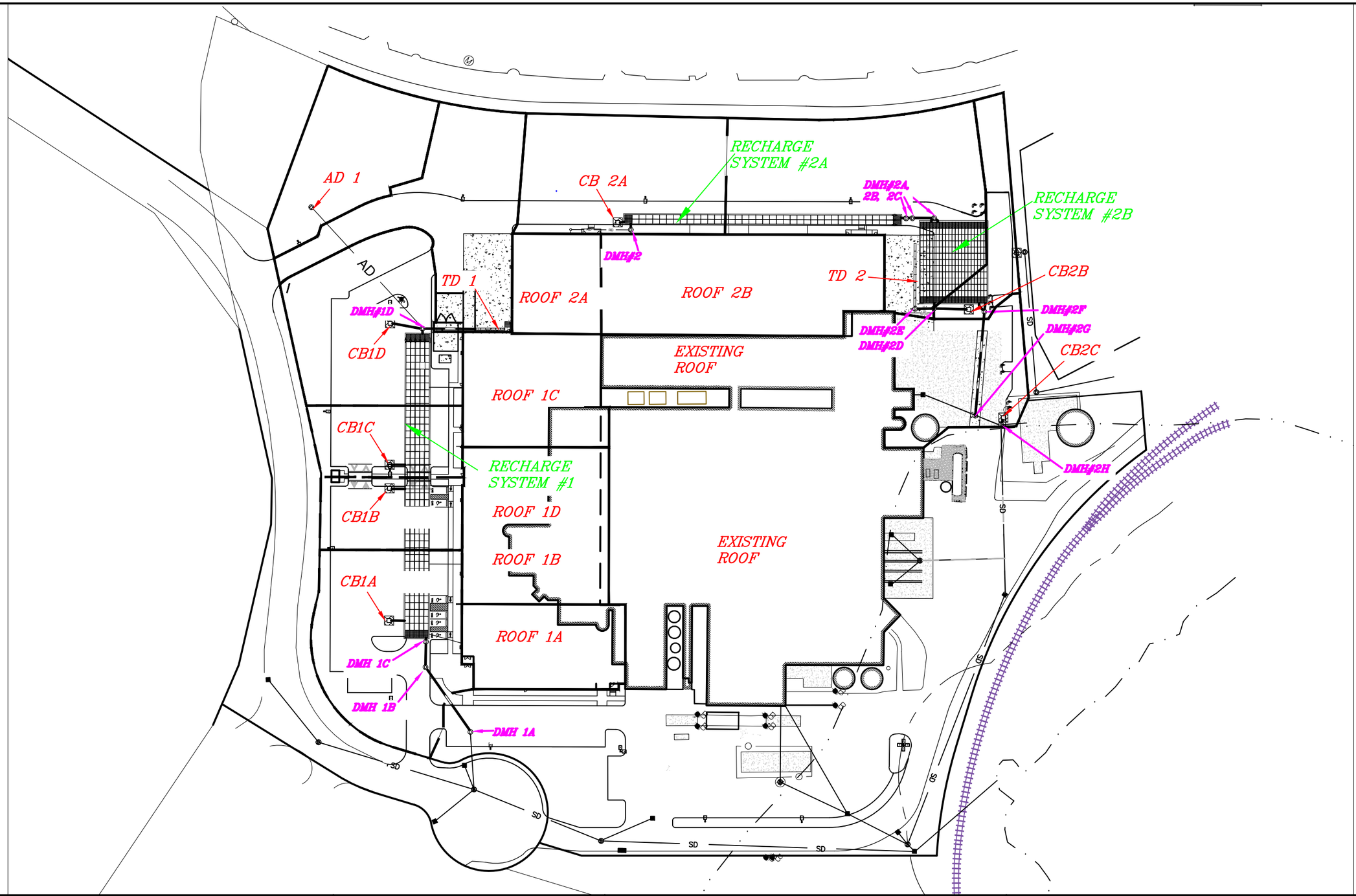
(1) Refer to the Operation and Maintenance Plan for recommendations regarding frequency of inspections and maintenance of specific BMP's.

recommendations regarding frequency for inspection and maintenance of specific BMPs.

Stormwater Control Manager/Environmental Monitor: **Stamp/Signature**

KELLY ENGINEERING GROUP, INC.
Zero Campanelli Drive-Braintree-MA 02184 Phone 781 843 4333

Attachment D
Pipe Sizing Calculations



NASOYA FOODS USA 1 NEW ENGLAND WAY AYER, MA	SCALE: 1"= 100' DATE: 11/15/22 2022-108-PRDR-PS	PIPE SIZING EXHIBIT	KELLY ENGINEERING GROUP civil engineering consultants 0 Campanelli Drive, Braintree, MA 02184 Phone: 781-843-4333 www.kellyengineeringgroup.com

RATIONAL METHOD CALCULATIONS

1 INDUSTRIAL WAY, AYER MA

11/10/22 25 year 5 min TC- Boston IDF curce in/hr s.f. acres cfs

Area	Impervious Area(s.f.)	Impervious Area (Acres)	Green (s.f.)	Green (acres)	C (Imp.)	i(Intensity)	C(green)	Total Area	Total Area (a	Q = CiA		
CB 1A	18,744	0.4303	8,707	0.1999	0.9	6	0.4	27,451	0.6302	2.80		
CB1B	8,802	0.2021	1,948	0.0447	0.9	6	0.4	10,750	0.2468	1.20		
CB1C	8,773	0.2014	2,288	0.0525	0.9	6	0.4	11,061	0.2539	1.21		
CB1D	14,876	0.3415	11,067	0.2541	0.9	6	0.4	25,943	0.5956	2.45		
TD 1	16,304	0.3743	9,202	0.2112	0.9	6	0.4	25,506	0.5855	2.53		
AD 1	0	0.0000	18,064	0.4147	0.9	6	0.4	18,064	0.4147	1.00		
R1A	14,100	0.3237	0	0.0000	0.9	6	0.4	14,100	0.3237	1.75		
R1B	11,950	0.2743	0	0.0000	0.9	6	0.4	11,950	0.2743	1.48		
R1C	11,950	0.2743	0	0.0000	0.9	6	0.4	11,950	0.2743	1.48		
R1D	16,718	0.3838	0	0.0000	0.9	6	0.4	16,718	0.3838	2.07		
R2A	9,236	0.2120	0	0.0000	0.9	6	0.4	9,236	0.2120	1.14		
CB 2A	5,150	0.1182	20,095	0.4613	0.9	6	0.4	25,245	0.5795	1.75		
R2B	28,632	0.6573	0	0.0000	0.9	6	0.4	28,632	0.6573	3.55	0.71	EACH DOWNSPOUT
TD 2	13,877	0.3186	25,283	0.5804	0.9	6	0.4	39,160	0.8990	3.11		
CB 2B	28,632	0.6573	3,358	0.0771	0.9	6	0.4	31,990	0.7344	3.73		
CB 2C	14,460	0.3320	1,700	0.0390	0.9	6	0.4	16,160	0.3710	1.89		

PIPE FLOW = LEAVING STRUCTURE		
Pipe	Q (In Pipe)	
CB 1A	2.803	
CB1B	1.198	
CB1C	1.214	
CB1D	2.454	
TD 1	2.528	
AD 1	0.995	
DMH 1D	5.977	
R1A	1.748	
R1B	1.481	
R1C	1.481	
R1D	2.072	
DMH1a-c	12.761	* 22.9 for 100 Yr. see Hydrographs
R2A	1.145	
CB 2A	1.746	
R2B	3.549	
DMH 2A-2C	6.440	* 8.47 for 100 Yr. see Hydrographs
TD 2	3.113	
CB2B	3.734	
DMH 2D	6.848	
DMH 2F	8.500	* 8.499 100 Yr. See Hydrographs

Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Nov 16 2022

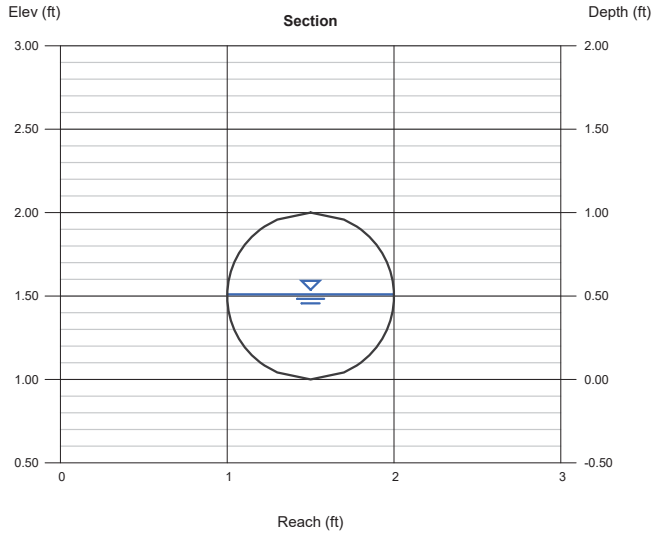
CB1A

Circular
Diameter (ft) = 1.00

Invert Elev (ft) = 1.00
Slope (%) = 2.00
N-Value = 0.012

Calculations
Compute by: Known Q
Known Q (cfs) = 2.80

Highlighted
Depth (ft) = 0.51
Q (cfs) = 2.800
Area (sqft) = 0.40
Velocity (ft/s) = 6.92
Wetted Perim (ft) = 1.59
Crit Depth, Yc (ft) = 0.72
Top Width (ft) = 1.00
EGL (ft) = 1.25



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Nov 16 2022

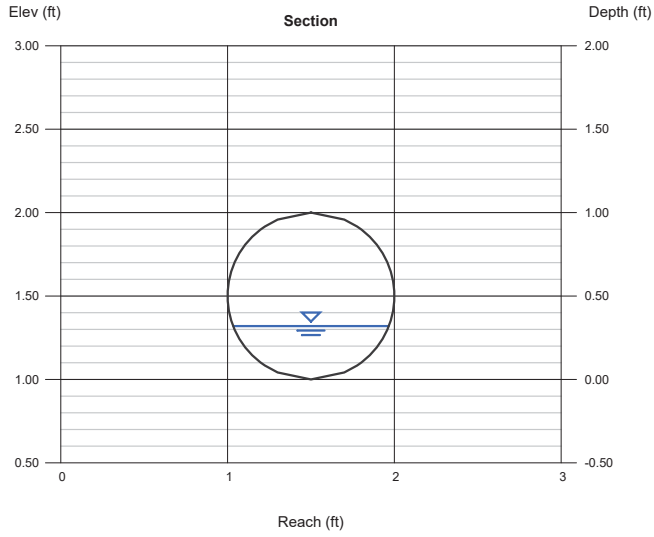
CB1C

Circular
Diameter (ft) = 1.00

Invert Elev (ft) = 1.00
Slope (%) = 2.00
N-Value = 0.012

Calculations
Compute by: Known Q
Known Q (cfs) = 1.21

Highlighted
Depth (ft) = 0.32
Q (cfs) = 1.210
Area (sqft) = 0.22
Velocity (ft/s) = 5.56
Wetted Perim (ft) = 1.20
Crit Depth, Yc (ft) = 0.47
Top Width (ft) = 0.93
EGL (ft) = 0.80



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Nov 16 2022

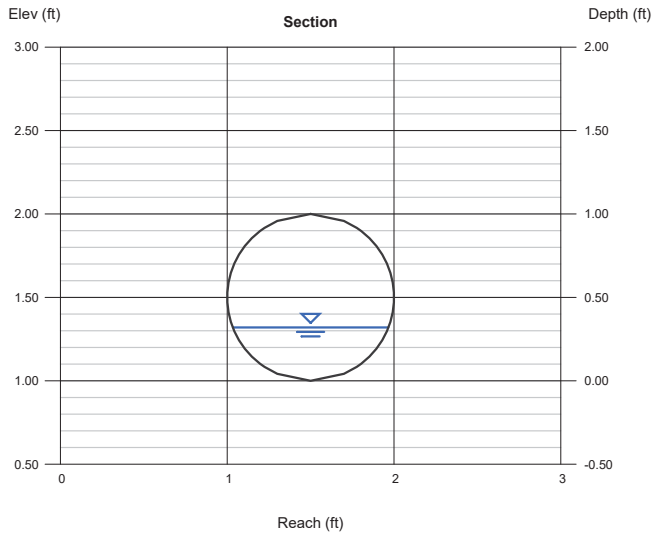
CB1B

Circular
Diameter (ft) = 1.00

Invert Elev (ft) = 1.00
Slope (%) = 2.00
N-Value = 0.012

Calculations
Compute by: Known Q
Known Q (cfs) = 1.20

Highlighted
Depth (ft) = 0.32
Q (cfs) = 1.200
Area (sqft) = 0.22
Velocity (ft/s) = 5.51
Wetted Perim (ft) = 1.20
Crit Depth, Yc (ft) = 0.46
Top Width (ft) = 0.93
EGL (ft) = 0.79



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Nov 16 2022

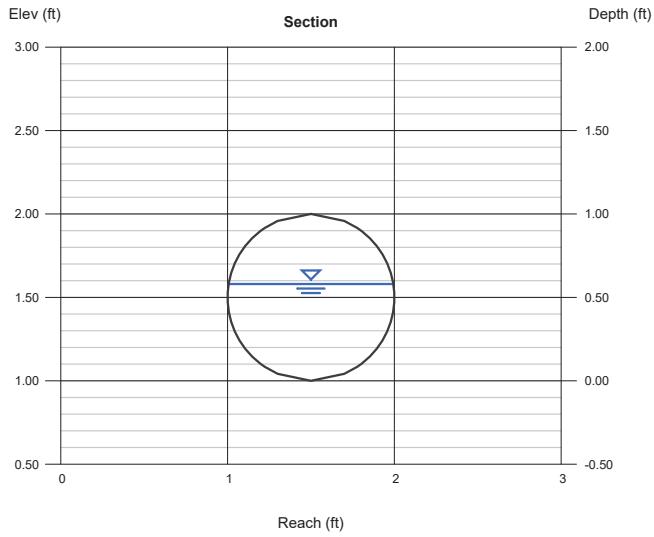
CB1D

Circular
Diameter (ft) = 1.00

Invert Elev (ft) = 1.00
Slope (%) = 1.00
N-Value = 0.012

Calculations
Compute by: Known Q
Known Q (cfs) = 2.45

Highlighted
Depth (ft) = 0.58
Q (cfs) = 2.450
Area (sqft) = 0.47
Velocity (ft/s) = 5.17
Wetted Perim (ft) = 1.73
Crit Depth, Yc (ft) = 0.67
Top Width (ft) = 0.99
EGL (ft) = 1.00



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Nov 16 2022

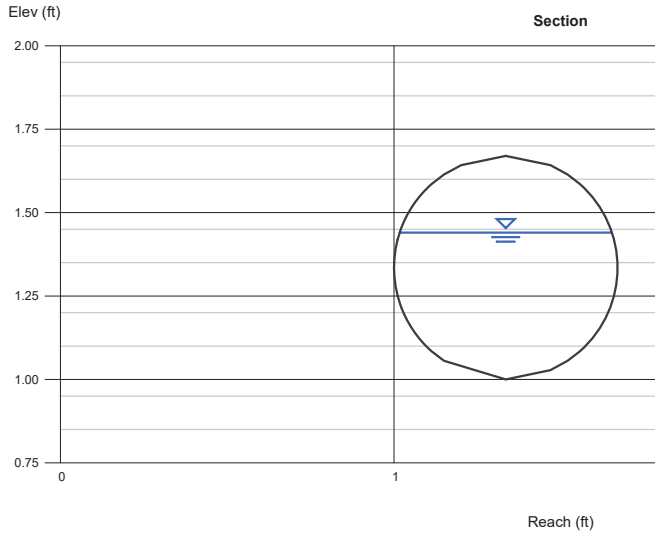
AD1

Circular
Diameter (ft) = 0.67

Invert Elev (ft) = 1.00
Slope (%) = 1.00
N-Value = 0.012

Calculations
Compute by: Known Q
Known Q (cfs) = 1.00

Highlighted
Depth (ft) = 0.44
Q (cfs) = 1.000
Area (sqft) = 0.25
Velocity (ft/s) = 4.07
Wetted Perim (ft) = 1.27
Crit Depth, Yc (ft) = 0.48
Top Width (ft) = 0.64
EGL (ft) = 0.70



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Nov 16 2022

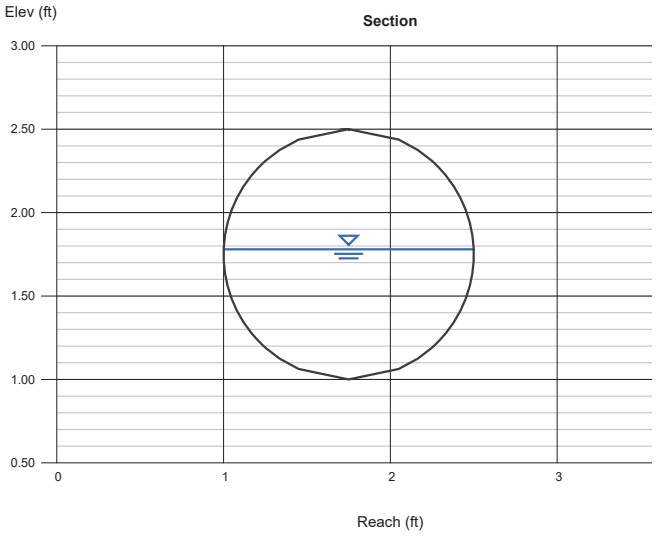
DMH1D

Circular
Diameter (ft) = 1.50

Invert Elev (ft) = 1.00
Slope (%) = 1.00
N-Value = 0.012

Calculations
Compute by: Known Q
Known Q (cfs) = 5.98

Highlighted
Depth (ft) = 0.78
Q (cfs) = 5.980
Area (sqft) = 0.93
Velocity (ft/s) = 6.41
Wetted Perim (ft) = 2.42
Crit Depth, Yc (ft) = 0.95
Top Width (ft) = 1.50
EGL (ft) = 1.42



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Nov 16 2022

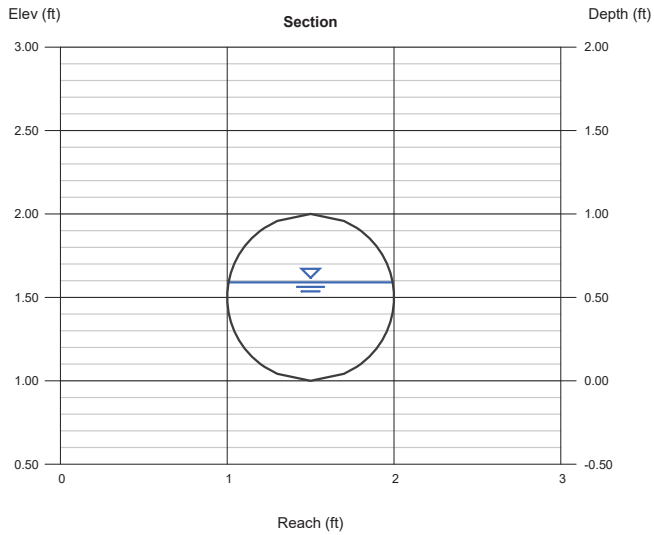
TD1

Circular
Diameter (ft) = 1.00

Invert Elev (ft) = 1.00
Slope (%) = 1.00
N-Value = 0.012

Calculations
Compute by: Known Q
Known Q (cfs) = 2.53

Highlighted
Depth (ft) = 0.59
Q (cfs) = 2.530
Area (sqft) = 0.48
Velocity (ft/s) = 5.23
Wetted Perim (ft) = 1.75
Crit Depth, Yc (ft) = 0.69
Top Width (ft) = 0.98
EGL (ft) = 1.02



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Nov 16 2022

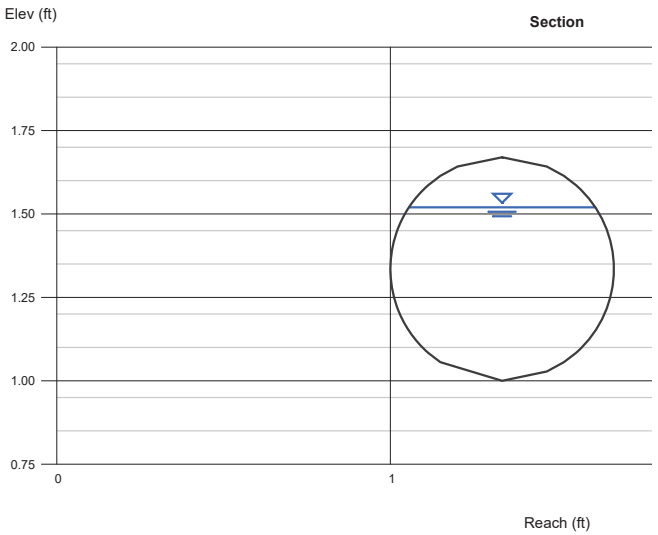
R1A

Circular
Diameter (ft) = 0.67

Invert Elev (ft) = 1.00
Slope (%) = 2.00
N-Value = 0.012

Calculations
Compute by: Known Q
Known Q (cfs) = 1.75

Highlighted
Depth (ft) = 0.52
Q (cfs) = 1.750
Area (sqft) = 0.29
Velocity (ft/s) = 5.95
Wetted Perim (ft) = 1.45
Crit Depth, Yc (ft) = 0.61
Top Width (ft) = 0.56
EGL (ft) = 1.07



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Nov 16 2022

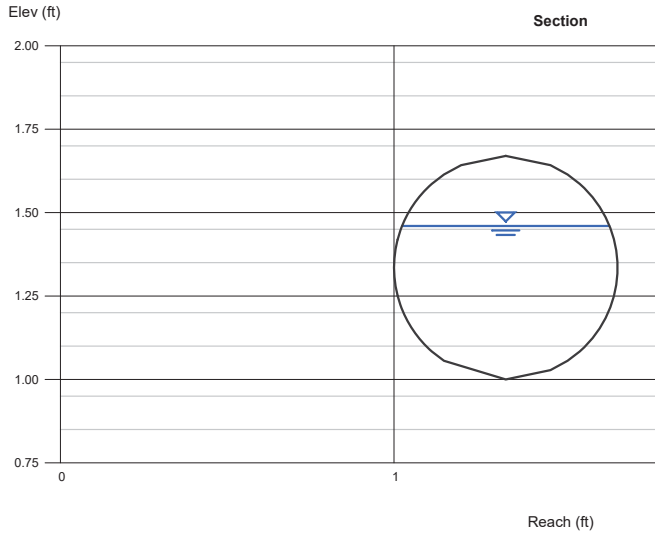
R1B , C

Circular
Diameter (ft) = 0.67

Invert Elev (ft) = 1.00
Slope (%) = 2.00
N-Value = 0.012

Calculations
Compute by: Known Q
Known Q (cfs) = 1.50

Highlighted
Depth (ft) = 0.46
Q (cfs) = 1.500
Area (sqft) = 0.26
Velocity (ft/s) = 5.81
Wetted Perim (ft) = 1.31
Crit Depth, Yc (ft) = 0.58
Top Width (ft) = 0.62
EGL (ft) = 0.98



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, Nov 21 2022

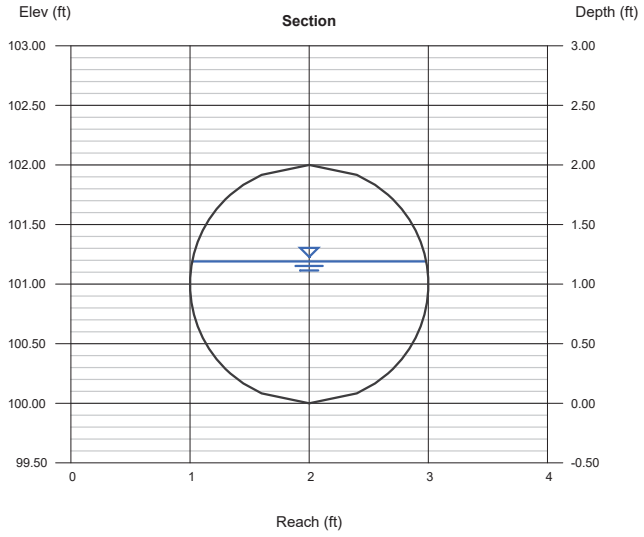
DMH 1A,B,C - 100 YEAR

Circular
Diameter (ft) = 2.00

Invert Elev (ft) = 100.00
Slope (%) = 2.00
N-Value = 0.012

Calculations
Compute by: Known Q
Known Q (cfs) = 22.90

Highlighted
Depth (ft) = 1.19
Q (cfs) = 22.90
Area (sqft) = 1.95
Velocity (ft/s) = 11.72
Wetted Perim (ft) = 3.53
Crit Depth, Yc (ft) = 1.71
Top Width (ft) = 1.96
EGL (ft) = 3.32



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Nov 16 2022

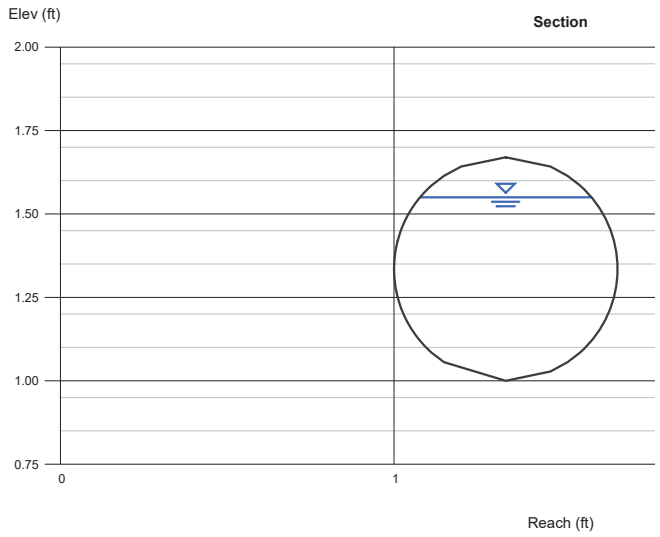
R1D

Circular
Diameter (ft) = 0.67

Invert Elev (ft) = 1.00
Slope (%) = 2.50
N-Value = 0.012

Calculations
Compute by: Known Q
Known Q (cfs) = 2.07

Highlighted
Depth (ft) = 0.55
Q (cfs) = 2.070
Area (sqft) = 0.31
Velocity (ft/s) = 6.68
Wetted Perim (ft) = 1.52
Crit Depth, Yc (ft) = 0.64
Top Width (ft) = 0.51
EGL (ft) = 1.24



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Nov 16 2022

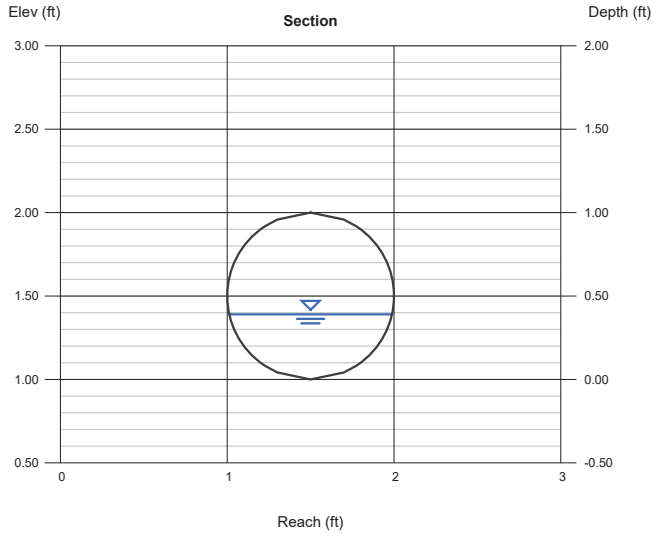
CB2A

Circular
Diameter (ft) = 1.00

Invert Elev (ft) = 1.00
Slope (%) = 2.00
N-Value = 0.012

Calculations
Compute by: Known Q
Known Q (cfs) = 1.75

Highlighted
Depth (ft) = 0.39
Q (cfs) = 1.750
Area (sqft) = 0.28
Velocity (ft/s) = 6.16
Wetted Perim (ft) = 1.35
Crit Depth, Yc (ft) = 0.57
Top Width (ft) = 0.98
EGL (ft) = 0.98



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Nov 16 2022

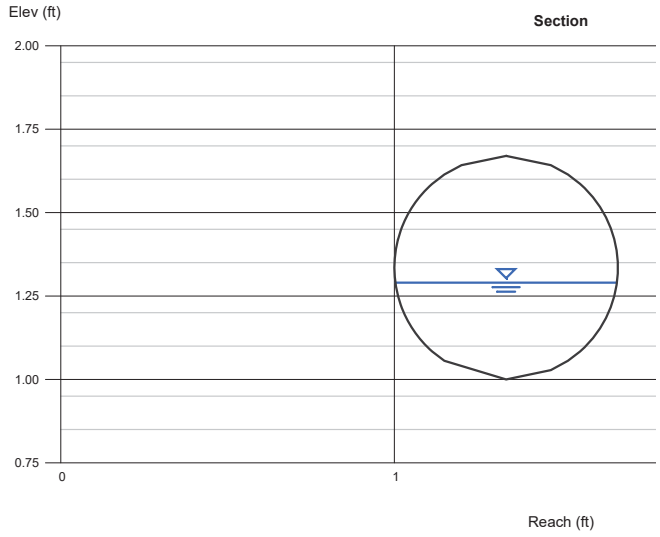
R2B

Circular
Diameter (ft) = 0.67

Invert Elev (ft) = 1.00
Slope (%) = 2.00
N-Value = 0.012

Calculations
Compute by: Known Q
Known Q (cfs) = 0.71

Highlighted
Depth (ft) = 0.29
Q (cfs) = 0.710
Area (sqft) = 0.15
Velocity (ft/s) = 4.83
Wetted Perim (ft) = 0.96
Crit Depth, Yc (ft) = 0.40
Top Width (ft) = 0.66
EGL (ft) = 0.65



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Nov 16 2022

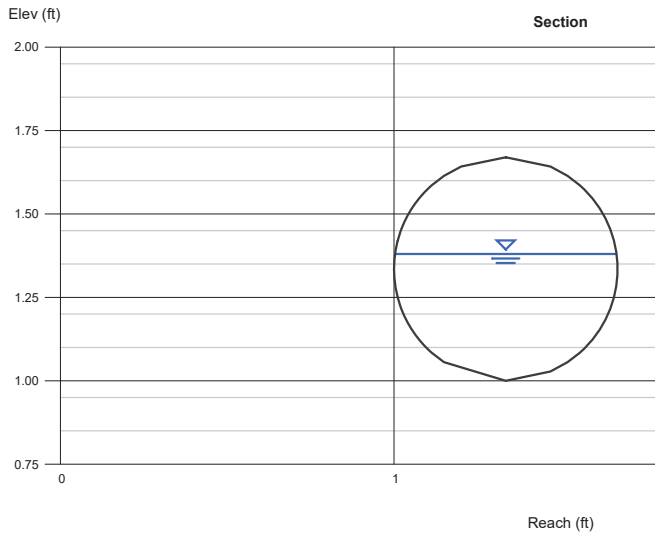
R2A

Circular
Diameter (ft) = 0.67

Invert Elev (ft) = 1.00
Slope (%) = 2.00
N-Value = 0.012

Calculations
Compute by: Known Q
Known Q (cfs) = 1.14

Highlighted
Depth (ft) = 0.38
Q (cfs) = 1.140
Area (sqft) = 0.21
Velocity (ft/s) = 5.50
Wetted Perim (ft) = 1.15
Crit Depth, Yc (ft) = 0.51
Top Width (ft) = 0.66
EGL (ft) = 0.85



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, Nov 21 2022

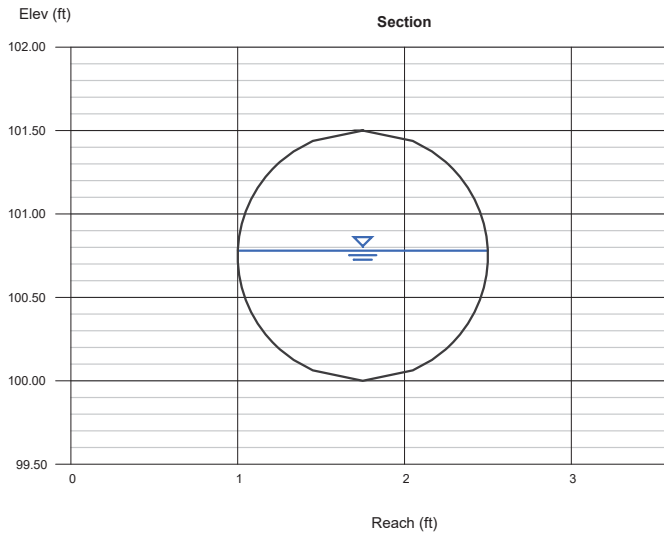
DMH2B-100 YEAR

Circular
Diameter (ft) = 1.50

Invert Elev (ft) = 100.00
Slope (%) = 2.00
N-Value = 0.012

Calculations
Compute by: Known Q
Known Q (cfs) = 8.50

Highlighted
Depth (ft) = 0.78
Q (cfs) = 8.500
Area (sqft) = 0.93
Velocity (ft/s) = 9.11
Wetted Perim (ft) = 2.42
Crit Depth, Yc (ft) = 1.13
Top Width (ft) = 1.50
EGL (ft) = 2.07



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Nov 16 2022

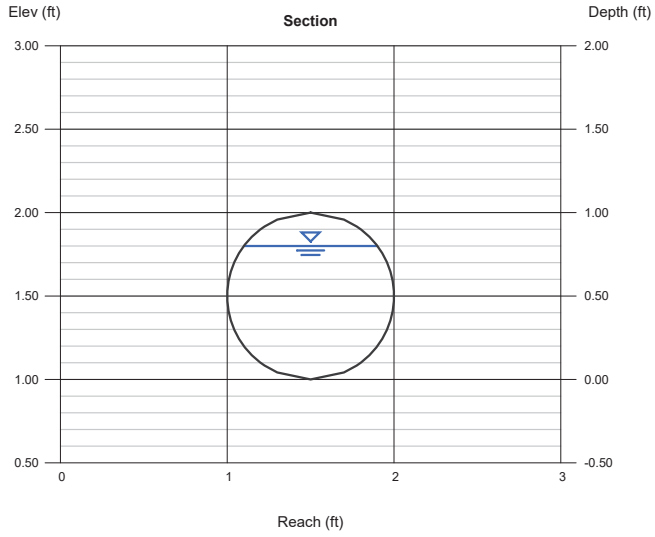
CB2B

Circular
Diameter (ft) = 1.00

Invert Elev (ft) = 1.00
Slope (%) = 1.00
N-Value = 0.012

Calculations
Compute by: Known Q
Known Q (cfs) = 3.73

Highlighted
Depth (ft) = 0.80
Q (cfs) = 3.730
Area (sqft) = 0.67
Velocity (ft/s) = 5.54
Wetted Perim (ft) = 2.22
Crit Depth, Yc (ft) = 0.83
Top Width (ft) = 0.80
EGL (ft) = 1.28



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Nov 16 2022

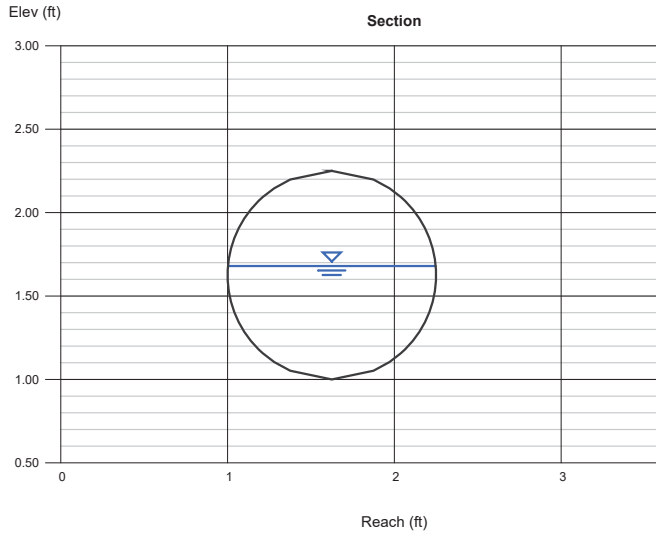
DMH2D

Circular
Diameter (ft) = 1.25

Invert Elev (ft) = 1.00
Slope (%) = 3.00
N-Value = 0.012

Calculations
Compute by: Known Q
Known Q (cfs) = 6.85

Highlighted
Depth (ft) = 0.68
Q (cfs) = 6.850
Area (sqft) = 0.68
Velocity (ft/s) = 10.03
Wetted Perim (ft) = 2.07
Crit Depth, Yc (ft) = 1.06
Top Width (ft) = 1.25
EGL (ft) = 2.24



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Nov 16 2022

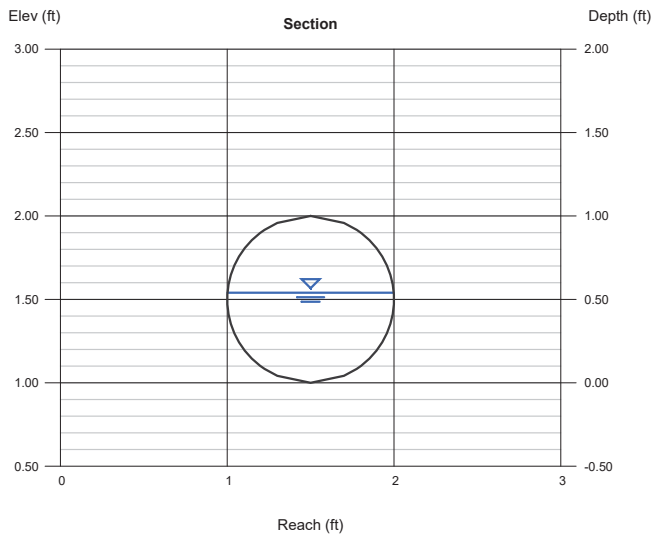
TD2

Circular
Diameter (ft) = 1.00

Invert Elev (ft) = 1.00
Slope (%) = 2.00
N-Value = 0.012

Calculations
Compute by: Known Q
Known Q (cfs) = 3.11

Highlighted
Depth (ft) = 0.54
Q (cfs) = 3.110
Area (sqft) = 0.43
Velocity (ft/s) = 7.15
Wetted Perim (ft) = 1.65
Crit Depth, Yc (ft) = 0.76
Top Width (ft) = 1.00
EGL (ft) = 1.34



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, Nov 21 2022

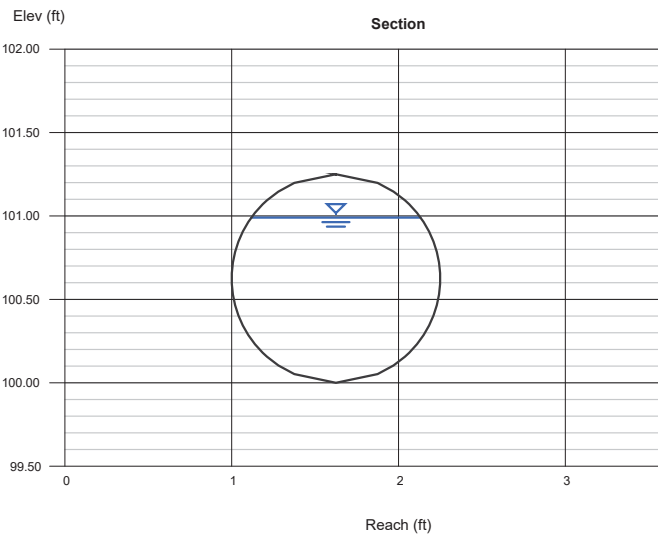
DMH 2F-100YEAR

Circular
Diameter (ft) = 1.25

Invert Elev (ft) = 100.00
Slope (%) = 1.60
N-Value = 0.012

Calculations
Compute by: Known Q
Known Q (cfs) = 8.50

Highlighted
Depth (ft) = 0.99
Q (cfs) = 8.500
Area (sqft) = 1.04
Velocity (ft/s) = 8.15
Wetted Perim (ft) = 2.74
Crit Depth, Yc (ft) = 1.14
Top Width (ft) = 1.01
EGL (ft) = 2.02



KELLY ENGINEERING GROUP, INC.
Zero Campanelli Drive-Braintree-MA 02184 Phone 781 843 4333

Attachment E
Supporting Documents

NOAA Atlas 14, Volume 10, Version 3
Location name: Ayer, Massachusetts, USA*
Latitude: 42.5626°, Longitude: -71.5335°
Elevation: 238.93 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.325** (0.257-0.408)	**0.385** (0.304-0.483)	**0.483** (0.380-0.609)	**0.564** (0.440-0.714)	**0.675** (0.510-0.889)	**0.759** (0.561-1.02)	**0.847** (0.608-1.18)	**0.949** (0.642-1.34)	**1.10** (0.713-1.60)	**1.22** (0.773-1.81)
10-min	**0.461** (0.364-0.578)	**0.545** (0.430-0.685)	**0.683** (0.536-0.860)	**0.798** (0.624-1.01)	**0.956** (0.722-1.26)	**1.07** (0.795-1.44)	**1.20** (0.861-1.67)	**1.34** (0.908-1.90)	**1.56** (1.01-2.26)	**1.73** (1.10-2.56)
15-min	**0.542** (0.428-0.680)	**0.641** (0.506-0.805)	**0.804** (0.632-1.01)	**0.939** (0.734-1.19)	**1.13** (0.850-1.48)	**1.26** (0.935-1.70)	**1.41** (1.01-1.96)	**1.58** (1.07-2.23)	**1.83** (1.19-2.66)	**2.04** (1.29-3.02)
30-min	**0.736** (0.582-0.924)	**0.872** (0.688-1.10)	**1.09** (0.860-1.38)	**1.28** (0.999-1.62)	**1.53** (1.16-2.02)	**1.72** (1.27-2.31)	**1.92** (1.38-2.67)	**2.15** (1.46-3.04)	**2.49** (1.62-3.63)	**2.78** (1.76-4.11)
60-min	**0.931** (0.735-1.17)	**1.10** (0.870-1.39)	**1.39** (1.09-1.74)	**1.62** (1.26-2.05)	**1.94** (1.47-2.55)	**2.18** (1.61-2.93)	**2.44** (1.75-3.38)	**2.73** (1.85-3.85)	**3.16** (2.05-4.60)	**3.51** (2.22-5.21)
2-hr	**1.17** (0.932-1.46)	**1.41** (1.12-1.76)	**1.80** (1.43-2.25)	**2.13** (1.67-2.67)	**2.57** (1.96-3.37)	**2.90** (2.17-3.89)	**3.26** (2.37-4.53)	**3.69** (2.50-5.17)	**4.34** (2.82-6.27)	**4.89** (3.11-7.19)
3-hr	**1.34** (1.07-1.66)	**1.63** (1.30-2.02)	**2.09** (1.67-2.60)	**2.48** (1.96-3.10)	**3.01** (2.31-3.94)	**3.41** (2.55-4.54)	**3.83** (2.80-5.32)	**4.35** (2.96-6.08)	**5.15** (3.36-7.41)	**5.84** (3.71-8.54)
6-hr	**1.70** (1.37-2.09)	**2.08** (1.67-2.55)	**2.68** (2.15-3.31)	**3.19** (2.54-3.95)	**3.88** (2.99-5.04)	**4.39** (3.32-5.83)	**4.95** (3.64-6.83)	**5.64** (3.85-7.81)	**6.70** (4.38-9.56)	**7.61** (4.85-11.0)
12-hr	**2.15** (1.75-2.63)	**2.62** (2.13-3.20)	**3.38** (2.73-4.14)	**4.01** (3.22-4.94)	**4.88** (3.79-6.28)	**5.53** (4.20-7.26)	**6.22** (4.59-8.50)	**7.08** (4.86-9.72)	**8.38** (5.51-11.9)	**9.51** (6.09-13.7)
24-hr	**2.58** (2.11-3.13)	**3.15** (2.58-3.82)	**4.08** (3.32-4.96)	**4.85** (3.93-5.92)	**5.91** (4.62-7.55)	**6.70** (5.12-8.73)	**7.55** (5.60-10.2)	**8.58** (5.92-11.7)	**10.2** (6.71-14.3)	**11.5** (7.41-16.5)
2-day	**2.94** (2.43-3.53)	**3.61** (2.98-4.34)	**4.71** (3.87-5.68)	**5.62** (4.59-6.81)	**6.88** (5.41-8.72)	**7.80** (6.01-10.1)	**8.81** (6.58-11.9)	**10.0** (6.96-13.6)	**12.0** (7.91-16.7)	**13.6** (8.77-19.3)
3-day	**3.22** (2.67-3.84)	**3.94** (3.26-4.71)	**5.11** (4.22-6.14)	**6.09** (4.99-7.34)	**7.43** (5.87-9.37)	**8.42** (6.51-10.9)	**9.50** (7.12-12.7)	**10.8** (7.51-14.6)	**12.8** (8.52-17.8)	**14.6** (9.42-20.6)
4-day	**3.47** (2.89-4.14)	**4.22** (3.51-5.03)	**5.44** (4.50-6.50)	**6.45** (5.30-7.75)	**7.84** (6.21-9.85)	**8.88** (6.87-11.4)	**9.99** (7.49-13.3)	**11.3** (7.90-15.2)	**13.4** (8.91-18.6)	**15.2** (9.82-21.4)
7-day	**4.18** (3.50-4.95)	**4.97** (4.16-5.88)	**6.25** (5.21-7.43)	**7.32** (6.06-8.74)	**8.79** (7.00-10.9)	**9.88** (7.68-12.5)	**11.1** (8.29-14.5)	**12.4** (8.69-16.6)	**14.5** (9.67-19.9)	**16.2** (10.5-22.7)
10-day	**4.85** (4.08-5.72)	**5.66** (4.76-6.68)	**6.99** (5.85-8.27)	**8.09** (6.72-9.62)	**9.61** (7.67-11.9)	**10.7** (8.35-13.5)	**11.9** (8.95-15.6)	**13.3** (9.34-17.6)	**15.3** (10.2-20.9)	**17.0** (11.0-23.6)
20-day	**6.86** (5.82-8.02)	**7.73** (6.55-9.04)	**9.15** (7.72-10.7)	**10.3** (8.65-12.2)	**12.0** (9.59-14.6)	**13.2** (10.3-16.4)	**14.5** (10.8-18.5)	**15.8** (11.1-20.7)	**17.6** (11.8-23.8)	**18.9** (12.3-26.2)
30-day	**8.52** (7.27-9.92)	**9.44** (8.04-11.0)	**10.9** (9.28-12.8)	**12.2** (10.3-14.3)	**13.9** (11.2-16.8)	**15.2** (11.9-18.7)	**16.5** (12.4-20.9)	**17.8** (12.6-23.3)	**19.5** (13.1-26.2)	**20.7** (13.5-28.4)
45-day	**10.6** (9.08-12.3)	**11.6** (9.91-13.4)	**13.2** (11.2-15.3)	**14.5** (12.3-17.0)	**16.3** (13.2-19.6)	**17.8** (13.9-21.7)	**19.2** (14.3-23.9)	**20.4** (14.5-26.5)	**21.9** (14.9-29.4)	**23.0** (15.0-31.4)
60-day	**12.3** (10.6-14.2)	**13.4** (11.5-15.4)	**15.1** (12.9-17.5)	**16.5** (14.0-19.2)	**18.4** (14.9-22.0)	**19.9** (15.7-24.2)	**21.4** (16.0-26.5)	**22.6** (16.2-29.3)	**24.1** (16.4-32.2)	**25.1** (16.4-34.1)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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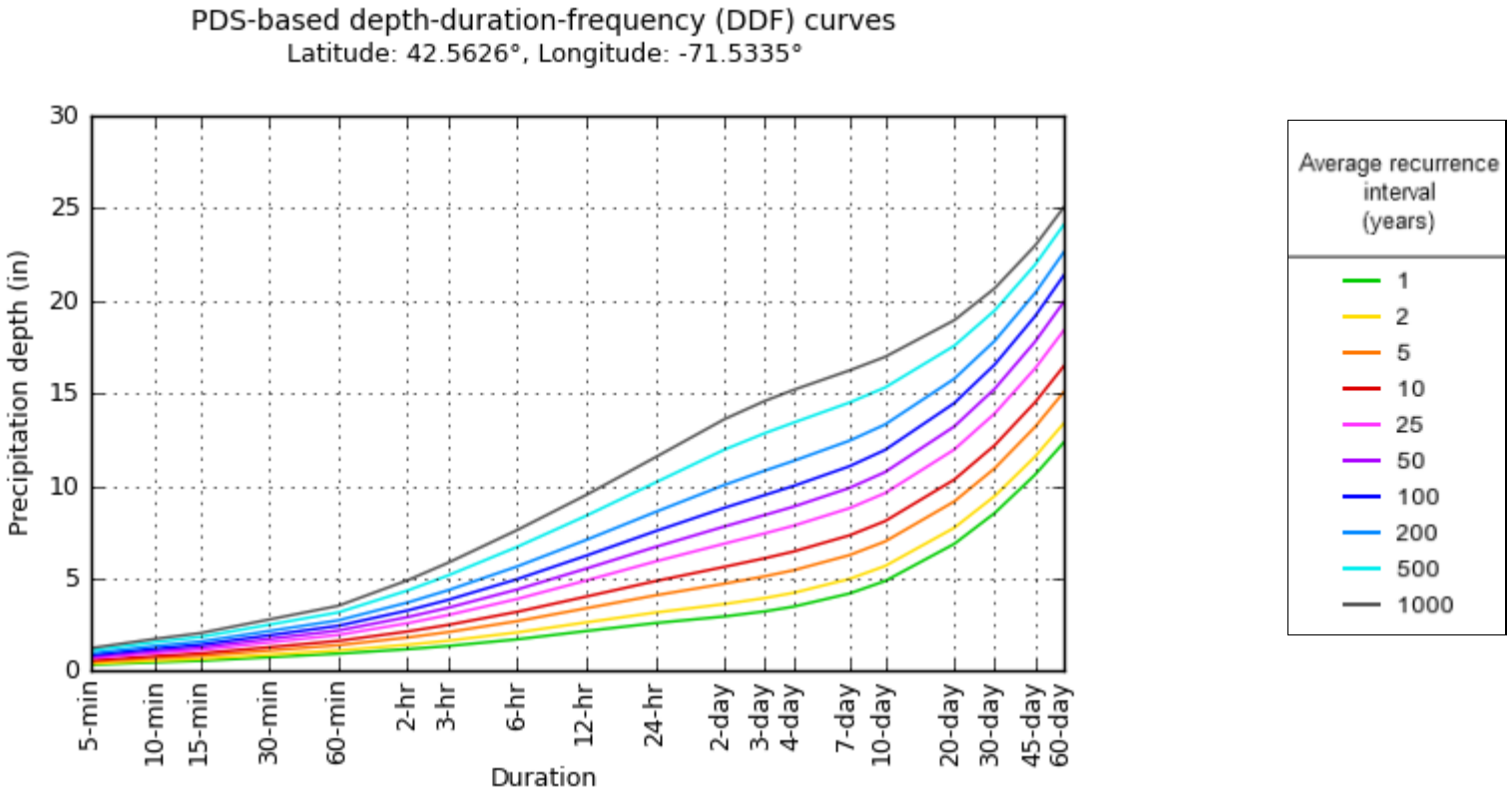
PF graphical



NOAA Atlas 14, Volume 10, Version 3 Created (GMT): Wed Oct 26 12:52:38 2022

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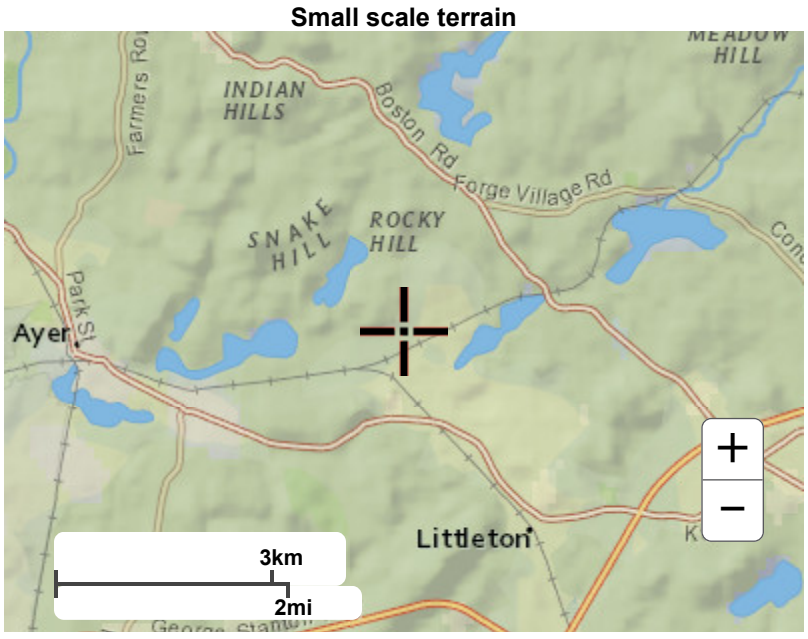
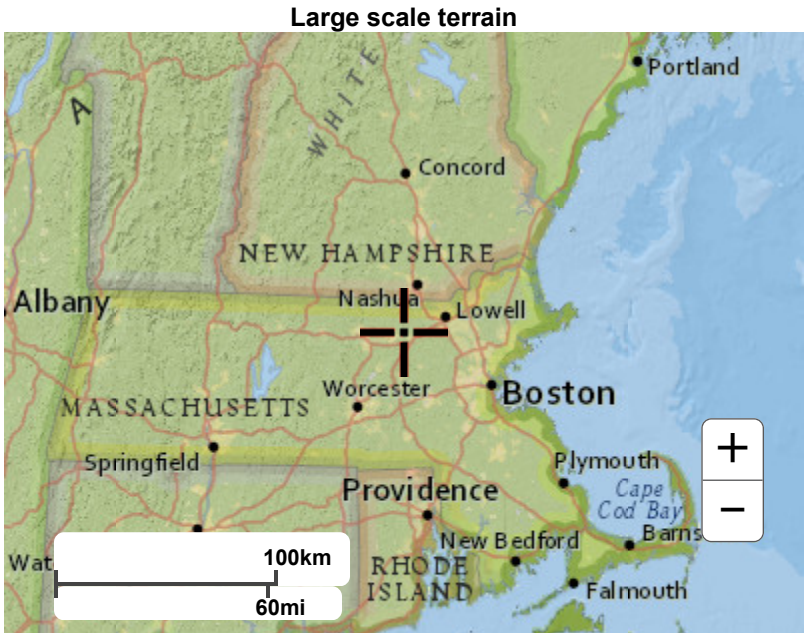
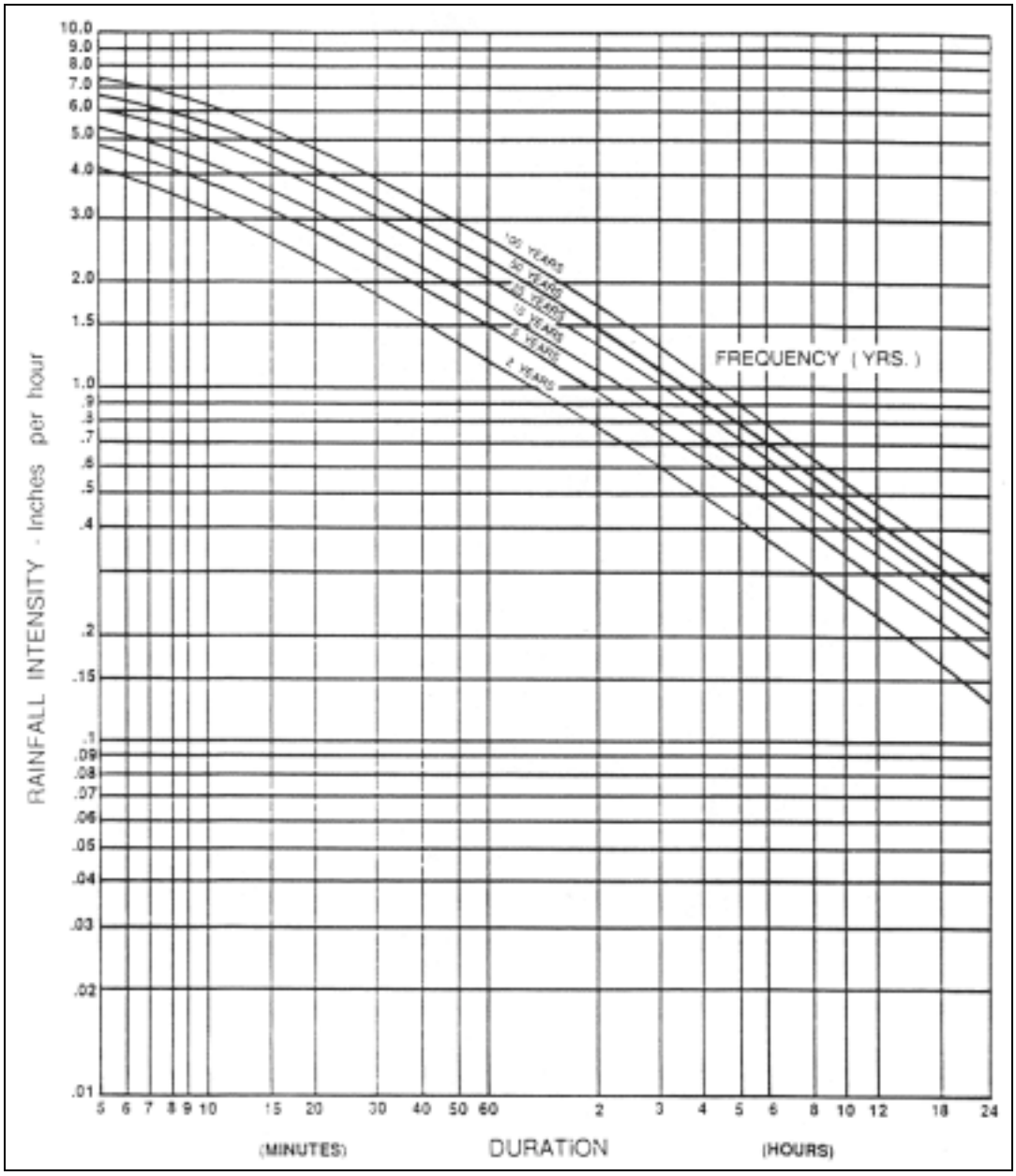
Maps & aerials

Small scale terrain



Large scale terrain





Intensity – Duration – Frequency
Curve for Boston, MA

Attention must be given to ensure consistency in units. In particular, the Target Depth Factors must be converted to feet.

NRCS HYDROLOGIC SOIL TYPE	APPROX. SOIL TEXTURE	TARGET DEPTH FACTOR (F)
A	sand	**0.6-inch**
B	loam	**0.35-inch**
C	silty loam	**0.25-inch**
D	clay	**0.1-inch**

Table 2.3.2: Recharge Target Depth by Hydrologic Soil Group

When a site contains multiple Hydrologic Soil Groups, determine the *Required Recharge Volume* for each impervious area by Hydrologic Soil Group and then add the volumes together.

Example: Assume a ten (10) acre site. 5.0 acres are proposed to be developed for a retail use. A section of the entrance roadway is to be bridged over a stream that is classified as land under water. As such, the bridging is subject to the Wetlands Protection Act Regulations, and the Stormwater Management Standards apply to stormwater runoff from all proposed roads, parking areas, and rooftops. Of the 5.0 acres proposed to be developed, 2 acres of impervious surfaces are proposed atop Hydrologic Soil Group (HSG) "A" soils, 1 acre of impervious surfaces atop HSG "B" soil, 1.5 acres of impervious surfaces atop HSG "C" soil, and 0.5 acres are proposed to be landscaped area. The remaining 5.0 acres, located on HSG "A" soil, are proposed to remain forested. Determine the *Required Recharge Volume*.

Solution: The *Required Recharge Volume* is determined only for the impervious surfaces. The 5.0-acre forested area and the 0.5-acre landscaped area are not impervious areas. Although converted from forest, landscaped area is pervious area for purposes of Standard 3. Use *Equation (1)* to determine the *Required Recharge Volume* for each Hydrologic Soil Group covered by impervious area. Add together the *Required Recharge Volumes* determined for each HSG.

Rv = F x impervious area

$Rv = [(F_{HSG\ "A"})\ (Area_1)] + [(F_{HSG\ "B"})\ (Area_2)] + [(F_{HSG\ "C"})(Area_3)] + [(F_{HSG\ "D"})(Area_4)]$ ***Equation (2)***

Rv = [(0.6-in/12)(2 acres)] + [(0.35-in/12)(1 acre)] + [(0.25-in/12)(1.5 acres)] + [(0.1-in/12)(0 acres)]

Rv = 0.1605 acre-feet

Rv = 0.1605 acre-feet x 43560 square feet/acre-feet = 6,991 cubic feet or *258.9 cubic yards*

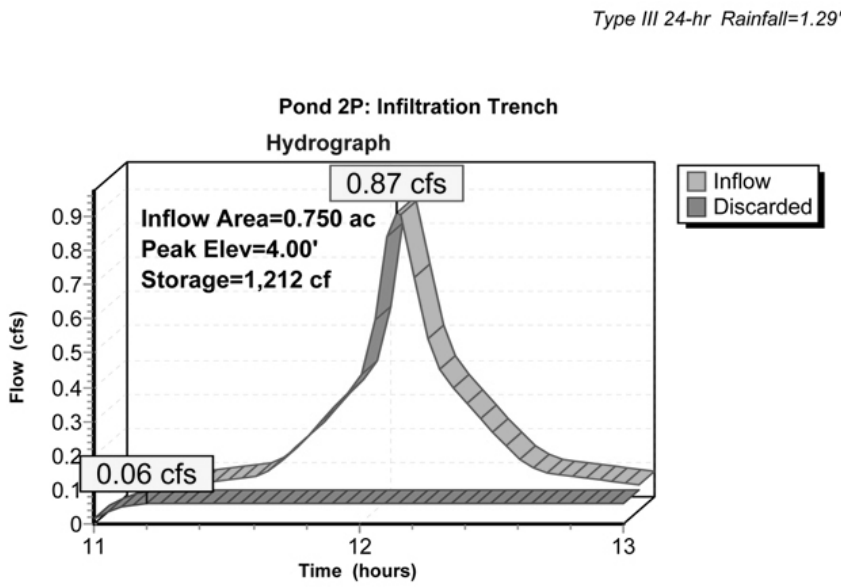
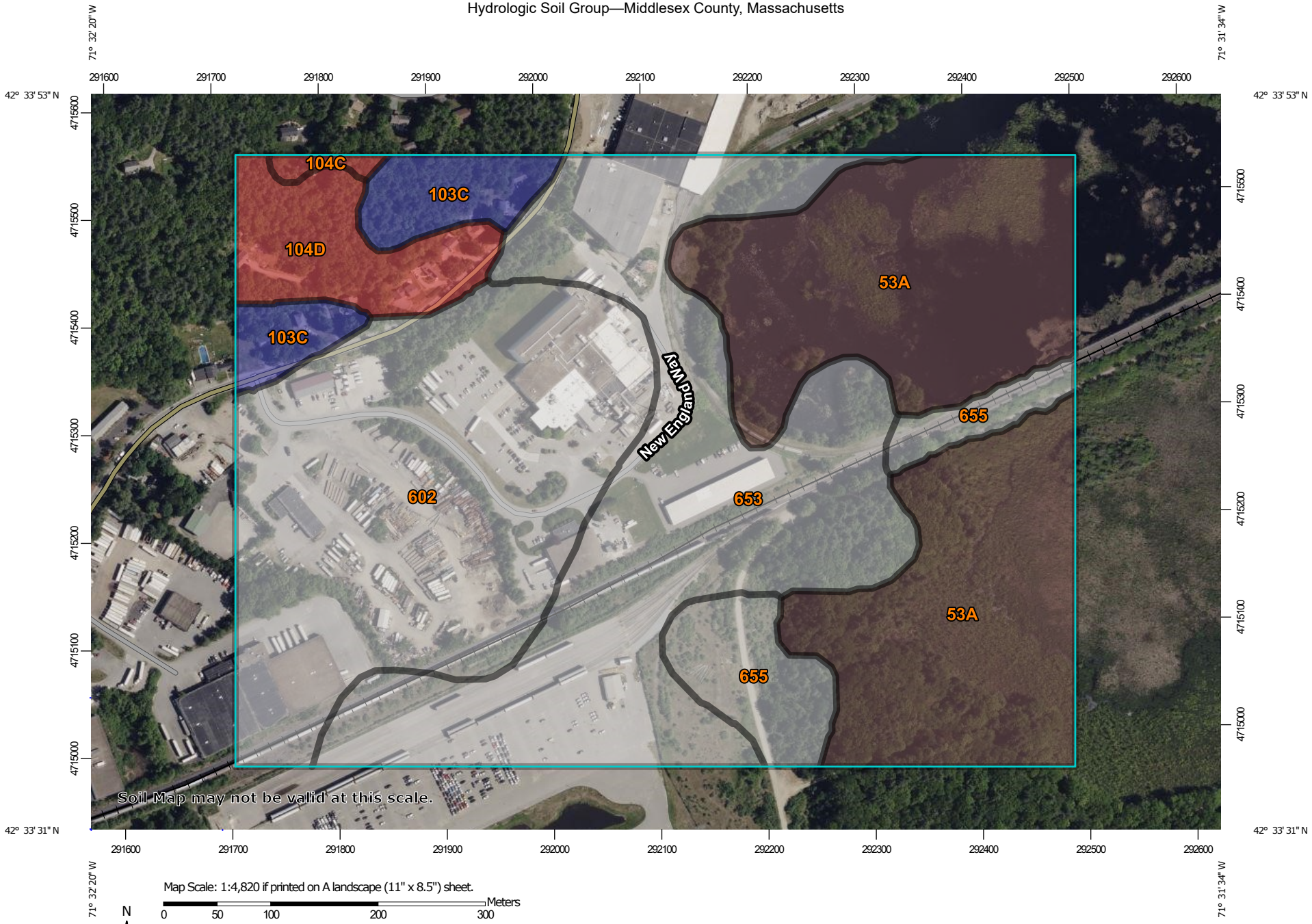


Table 2.3.3. 1982 Rawls Rates[18]

Texture Class	NRCS Hydrologic Soil Group (HSG)	Infiltration Rate Inches/Hour
Sand	A	8.27
Loamy Sand	A	2.41
Sandy Loam	B	1.02
Loam	B	0.52
Silt Loam	C	0.27
Sandy Clay Loam	C	0.17
Clay Loam	D	0.09
Silty Clay Loam	D	0.06
Sandy Clay	D	0.05
Silty Clay	D	0.04
Clay	D	0.02

[18] Rawls, Brakensiek and Saxton, 1982



Map Scale: 1:4,820 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 50 100 200 300

Feet
0 200 400 800 1200

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

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Middlesex County, Massachusetts
Survey Area Data: Version 21, Sep 2, 2021

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

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

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
53A	Freetown muck, ponded, 0 to 1 percent slopes	B/D	33.1	30.0%
103C	Charlton-Hollis-Rock outcrop complex, 8 to 15 percent slopes	B	4.6	4.2%
104C	Hollis-Rock outcrop-Charlton complex, 0 to 15 percent slopes	D	0.5	0.4%
104D	Hollis-Rock outcrop-Charlton complex, 15 to 25 percent slopes	D	5.7	5.2%
602	Urban land		29.7	26.9%
653	Udorthents, sandy		30.9	28.0%
655	Udorthents, wet substratum		5.9	5.4%
Totals for Area of Interest			**110.4**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

NOTES:

1. BASE MAP DEVELOPED FROM UNTITLED, UNDATED SITE PLAN ANNOTATED WITH PROPOSED BUILDING ADDITIONS, PROVIDED BY DACON CORPORATION.
2. TEST BORING LOCATIONS ESTABLISHED AT THE SITE BY NORTHEAST GEOTECHNICAL, INC. PERSONNEL USING TAPING AND PACING FROM EXISTING SITE FEATURES. EXPLORATION LOCATIONS SHOWN ON THIS PLAN SHOULD BE CONSIDERED APPROXIMATE.
3. TEST BORINGS OBSERVED AND LOGGED BY NORTHEAST GEOTECHNICAL, INC. PERSONNEL.

LEGEND:

TEST BORINGS PERFORMED BY DRILEX ENVIRONMENTAL, INC. OF AUBURN, MA ON AUGUST 29, 30 AND 31, 2022.

25'-0" MIN. FRONT SETBACK

295'-0"

120'-7 7/8"

27'-3 3/4"

FROM EASEMENT

215'-4 7/8"

B-5

B-6

B-8

B-9

ADDITION
±46,376 SF

100'-0"

B-4

B-7

B-1

B-2

B-3

B-3A

25'-0" MIN. SIDE SETBACK

LOADING

BUILDING HEIGHT 58'

BUILDING HEIGHT 40' MAX.

BUILDING HEIGHT 40' MAX.

EXISTING BUILDING
±133,239 SF.

ADDITION
±16,699 SF.

2ND FLOOR
ADDITION ± 7,382 SF

182'-9 1/4"

65'-10 3/4"

128'-6 3/4"

30'-0" MIN. REAR SETBACK

10'-2 3/8"

94'-11 1/8"

N

NORTHEAST GEOTECHNICAL, INC.	
PROPOSED NASOYA FOODS BUILDING ADDITIONS	
1 NEW ENGLAND WAY	AYER, MA
SUBSURFACE EXPLORATION LOCATION PLAN	

Project No.: O493.00	Drawn By: JJP	Reviewed By: G. OLSON, P.E.
Date: 9/3/2022	Scale: 1"=80'	Figure No.: 1

NORTHEAST GEOTECHNICAL, INC.

TEST BORING LOG

Project: Proposed Nasoya Foods Building Additions, 1 New England Way, Ayer, MA

Test Boring No.: B-1
Page: 1 of 1
File No.: O493.00
Reviewed By: Glenn Olson, P.E.

Boring Co.: Drilex Environmental, Inc.
Foreman: Chris Hogan
Boring Equipment: Mobile B-57 Truck-Mounted Drill Rig; 3¼-inch I.D. Hollow-Stem Augers; 2" O.D. Split Spoon, 140 lb. Auto Hammer

Date/Weather: 8-31-2022 / Clear 60s to 80s °F
Northeast Geotechnical Observer: Christian Rice, P.E.
Test Boring Location: See Subsurface Exploration Location Plan
Ground Surface Elevation: 225± feet
Depth to Water: 7± feet

	Sample Data						Strata Change	Sample Description
	No.	Depth	Pen.	Rec.	Blows per 6 in.	Rem.		
						1	Pavement, 0.3'±	3.5± inches BITUMINOUS CONCRETE
	S-1	0.5-2.5	24"	11"	5-11-7-11		Existing Fill	Medium dense, light brown, F/C SAND, some F/C Gravel, little (-) Silt, moist
	S-2	2.5-4.5	24"	18"	12-17-18-19			Dense, tan, F/M SAND, some Silt, trace F. Gravel, moist
5'							5'±	
	S-3	5-7'	24"	18"	5-7-5-6		Natural Silty Sand	Medium dense, tan, F/M SAND, some Silt, moist
	S-4	7-9'	24"	20"	5-5-4-4	2		Loose, tan, F/M SAND, some Silt, wet
10'	S-5	10-12'	24"	19"	2-2-3-3			Loose, tan, F/M SAND, some Silt, wet
15'							15'±	
	S-6	15-17'	24"	10"	4-9-16-12		Natural Silty Sand and Gravel	Medium dense, gray-brown, F/C SAND, some (+) F/C Gravel, little (+) Silt, wet
20'	S-7	20-22'	24"	12"	10-13-16-16			Medium dense, gray-brown, F/C SAND, some F/C Gravel, some Silt, wet
25'						3,4	25'±	
								Bottom of boring at 25± feet

Notes:
1) Augered to approximately 0.5± feet below ground surface (bgs) through existing pavement.
2) Groundwater encountered at 7± feet bgs while sampling.
3) Augered to 25± feet bgs. Attempted to sample but approximately 2± feet of soil blown into augers.
4) Boring terminated at 25± feet bgs.

Standard Penetration Resistance (Blows/Foot)	Density
0 -4	Very Loose
4 - 10	Loose
10 - 30	Med. Dense
30 - 50	Dense
50+	Very Dense

Abbreviations
F = Fine
M = Medium
C = Coarse
F/M = Fine to Medium
F/C = Fine to Coarse

Proportions Used
Trace (T) = 0 - 10%
Little (Li) = 10 - 20%
Some (So) = 20 - 35%
AND = 35-50%

NORTHEAST GEOTECHNICAL, INC.

TEST BORING LOG

Project: Proposed Nasoya Foods Building Additions, 1 New England Way, Ayer, MA

Test Boring No.: B-2
Page: 1 of 1
File No.: O493.00
Reviewed By: Glenn Olson, P.E.

Boring Co.: Drilex Environmental, Inc.
Foreman: Chris Hogan
Boring Equipment: Mobile B-57 Truck-Mounted Drill Rig; 3¼-inch I.D. Hollow-Stem Augers; 2" O.D. Split Spoon, 140 lb. Auto Hammer

Date/Weather: 8-30-2022 / Clear, 70s to 90s °F
Northeast Geotechnical Observer: Christian Rice, P.E.
Test Boring Location: See Subsurface Exploration Location Plan
Ground Surface Elevation: 226± feet
Depth to Water: 9± feet

	Sample Data						Strata Change	Sample Description
	No.	Depth	Pen.	Rec.	Blows per 6 in.	Rem.		
						1	Pavement, 0.3'±	4± inches BITUMINOUS CONCRETE
	S-1	0.5-2.5	24"	18"	6-12-14-13		Existing Fill	Medium dense, tan, F/M SAND, little (-) Silt, trace F. Gravel, moist
	S-2	2.5-4.5	24"	17"	7-7-5-5			Medium dense, tan, F/M SAND, trace (+) Silt, trace (+) F. Gravel, moist
5'	S-3	5-7'	24"	18"	2-1-1-1			Very loose, tan, F/M SAND, trace Silt, trace F. Gravel, trace (-) Roots, moist
	S-4	7-9'	24"	17"	2-4-5-5			Loose, tan, F/C SAND, trace Silt, moist
							9'±	
10'						2	Natural Silt	
	S-5	10-12'	24"	15"	3-3-3-5			Loose, tan, SILT, trace (-) F. Sand, wet
15'	S-6	15-17'	24"	14"	3-5-4-3			Loose, tan, SILT, trace (-) F. Sand, wet
20'	S-7	20-22'	24"	10"	2-4-3-4			Loose, tan, SILT, trace (-) F. Sand, wet
25'							25'±	
	S-8	25-27'	24"	4"	3-7-8-10		Natural Silty Sand and Gravel	Medium dense, gray, F/C SAND and F/C GRAVEL, little (+) Silt, wet
	S-9	30-32'	24"	15"	5-12-16-15	3	32'±	Medium dense, gray, F/C SAND and F/C GRAVEL, some (-) Silt, wet

Notes:
1) Augered to approximately 0.5± feet below ground surface (bgs) through existing pavement.
2) Groundwater encountered at 9± feet bgs while drilling.
3) Boring terminated at 32± feet bgs.

Standard Penetration Resistance (Blows/Foot)	Density
0 -4	Very Loose
4 - 10	Loose
10 - 30	Med. Dense
30 - 50	Dense
50+	Very Dense

Abbreviations
F = Fine
M = Medium
C = Coarse
F/M = Fine to Medium
F/C = Fine to Coarse

Proportions Used
Trace (T) = 0 - 10%
Little (Li) = 10 - 20%
Some (So) = 20 - 35%
AND = 35-50%

NORTHEAST GEOTECHNICAL, INC.

TEST BORING LOG

Project: Proposed Nasoya Foods Building Additions, 1 New England Way, Ayer, MA

Test Boring No.: B-3
Page: 1 of 1
File No.: O493.00
Reviewed By: Glenn Olson, P.E.

Boring Co.: Drilex Environmental, Inc.
Foreman: Chris Hogan
Boring Equipment: Mobile B-57 Truck-Mounted Drill Rig; 3¼-inch I.D. Hollow-Stem Augers; 2" O.D. Split Spoon, 140 lb. Auto Hammer

Date/Weather: 8-29-2022 / Clear, 70s to 80s °F
Northeast Geotechnical Observer: Christian Rice, P.E.
Test Boring Location: See Subsurface Exploration Location Plan
Ground Surface Elevation: 224± feet
Depth to Water: None Observed

	Sample Data						Strata Change	Sample Description
	No.	Depth	Pen.	Rec.	Blows per 6 in.	Rem.		
						1	Pavement, 0.3'±	4± inches BITUMINOUS CONCRETE
	S-1	0.5-1.3'	9"	9"	5-50/3"	2,3	Existing Fill, 1.3'±	Brown, F/C SAND, some F/C Gravel, little (+) Silt, moist
								Bottom of boring at 1.3± feet
5'								
10'								
15'								
20'								
25'								

Notes:

1) Augered to approximately 0.5± feet below ground surface (bgs) through existing pavement.
2) Sampler and auger refusal at 1.3± feet bgs. Offset boring 5± feet southwest then drilled as B-3A (see B-3A test boring log).
3) Boring terminated at 1.3± feet bgs.

Standard Penetration Resistance (Blows/Foot)	Density
0 -4	Very Loose
4 - 10	Loose
10 - 30	Med. Dense
30 - 50	Dense
50+	Very Dense

Abbreviations
F = Fine
M = Medium
C = Coarse
F/M = Fine to Medium
F/C = Fine to Coarse

Proportions Used
Trace (T) = 0 - 10%
Little (Li) = 10 - 20%
Some (So) = 20 - 35%
AND = 35-50%

NORTHEAST GEOTECHNICAL, INC.

TEST BORING LOG

Project: Proposed Nasoya Foods Building Additions, 1 New England Way, Ayer, MA

Test Boring No.: B-3A
Page: 1 of 1
File No.: O493.00
Reviewed By: Glenn Olson, P.E.

Boring Co.: Drilex Environmental, Inc.
Foreman: Chris Hogan
Boring Equipment: Mobile B-57 Truck-Mounted Drill Rig; 3¼-inch I.D. Hollow-Stem Augers; 2" O.D. Split Spoon, 140 lb. Auto Hammer

Date/Weather: 8-29-22 to 8-30-22 / Clear, 70s to 80s °F
Northeast Geotechnical Observer: Christian Rice, P.E.
Test Boring Location: See Subsurface Exploration Location Plan
Ground Surface Elevation: 224± feet
Depth to Water: 6.5± feet

	Sample Data						Strata Change	Sample Description
	No.	Depth	Pen.	Rec.	Blows per 6 in.	Rem.		
							Pavement, 0.3'±	4± inches BITUMINOUS CONCRETE
	S-1	0.5-2.5	24"	17"	6-12-14-8		Existing Fill	Medium dense, brown, F/C SAND, some (+) F/C Gravel, some Silt, moist
	S-2	2.5-4.5	24"	13"	8-9-9-7			Medium dense, brown, F/C SAND, some F. Gravel, some (-) Silt, moist
5'	S-3A	5-6.5'	18"	6"	3-3-2		6.5'±	Loose, brown, F/C SAND, some (+) F/C Gravel, some Silt, moist
	S-3B	6.5-7'	6"	6"	4		Natural Silt	Light brown, SILT, trace (-) F. Sand, wet
	S-4	7-9'	24"	16"	6-6-7-8			Medium dense, light brown, SILT, trace (-) F. Sand, wet
10'	S-5	10-12'	24"	16"	2-3-3-3			Loose, light brown, SILT, trace (-) F. Sand, wet
	S-6	12-14'	24"	20"	2-3-4-4			Loose, light brown, SILT, trace (-) F. Sand, wet
15'	S-7	15-17'	24"	18"	1-4-4-6			Loose, light brown, SILT, trace (-) F. Sand, slight overall plasticity, wet
20'	S-8	20-22'	24"	16"	3-5-5-5			Loose to medium dense, light brown, SILT, trace (-) F. Sand, wet
25'	S-9A	25-25.5'	6"	6"	3		25.5'±	Gray-light brown-rust, SILT, trace F. Sand, wet
	S-9B	25.5-27'	18"	6"	4-4-5		Natural Sand	Loose, gray-brown, F/C SAND, little Silt, trace F. Gravel, wet
						3		
						4,5	30'±	

Notes:
1) Augered to approximately 0.5± feet below ground surface (bgs) through existing pavement.
2) Groundwater encountered at 6.5± feet bgs while sampling.
3) Drilling resistance increased at approximately 28± feet bgs.
4) Augered to 30± feet bgs. Attempted to sample but approximately 2± feet of soil was observed to have blown into augers.
5) Boring terminated at 30± feet bgs.

Standard Penetration Resistance (Blows/Foot)	Density
0 -4	Very Loose
4 - 10	Loose
10 - 30	Med. Dense
30 - 50	Dense
50+	Very Dense

Abbreviations
F = Fine
M = Medium
C = Coarse
F/M = Fine to Medium
F/C = Fine to Coarse

Proportions Used
Trace (T) = 0 - 10%
Little (Li) = 10 - 20%
Some (So) = 20 - 35%
AND = 35-50%

NORTHEAST GEOTECHNICAL, INC.

TEST BORING LOG

Project: Proposed Nasoya Foods Building Additions, 1 New England Way, Ayer, MA

Test Boring No.: B-4
Page: 1 of 1
File No.: O493.00
Reviewed By: Glenn Olson, P.E.

Boring Co.: Drilex Environmental, Inc.
Foreman: Chris Hogan
Boring Equipment: Mobile B-57 Truck-Mounted Drill Rig; 3¼-inch I.D. Hollow-Stem Augers; 2" O.D. Split Spoon, 140 lb. Auto Hammer

Date/Weather: 8-30-2022 / Clear, 70s to 90s °F
Northeast Geotechnical Observer: Christian Rice, P.E.
Test Boring Location: See Subsurface Exploration Location Plan
Ground Surface Elevation: 225± feet
Depth to Water: 9± feet

	Sample Data						Strata Change	Sample Description
	No.	Depth	Pen.	Rec.	Blows per 6 in.	Rem.		
	S-1A	0-0.6'	7"	7"	8		Topsoil Fill, 0.6'±	Dark brown, SILT and ROOTS, little F. Sand, moist
	S-1B	0.6-2'	17"	15"	10-10-10			Medium dense, tan, F/M SAND and SILT, trace F. Gravel, moist
	S-2A	2-3'	12"	8"	11-11			Tan, F/M SAND, little Silt, little F. Gravel, moist
	S-2B	3-4'	12"	6"	17-24			Gray-brown, F/C SAND and F/C GRAVEL, little Silt, moist
5'							Existing Fill	
	S-3	5-7'	24"	17"	15-16-14-10			Dense, gray-brown, F/C GRAVEL and F/C SAND, little (-) Silt, moist
	S-4	7-9'	24"	10"	23-11-11-11			Medium dense, gray-brown, F/C SAND and F/C GRAVEL, little (-) Silt, moist
							9'±	
10'						1		
	S-5	10-12'	24"	18"	3-3-4-7			Loose, light brown, SILT, trace (-) F. Sand, wet
15'								
	S-6	15-17'	24"	12"	4-5-6-6			Medium dense, light brown-tan, SILT, trace (-) F. Sand, wet
							Natural Silt	
20'								
	S-7	20-22'	24"	16"	3-4-3-5			Loose, light brown-tan, SILT, trace (-) F. Sand, wet
25'								
	S-8	25-27'	24"	13"	3-4-3-5			Loose, light brown-tan, SILT, trace (-) F. Sand, wet
							28'±	
						2	Nat. Silty Sand & Gravel, 32'±	
	S-9	30-32'	24"	10"	7-9-15-13	3		Medium dense, gray-brown, F/C SAND and F/C GRAVEL, little Silt, wet

Notes:

1) Groundwater encountered at 9± feet below ground surface (bgs) while drilling.
2) Drilling resistance increased at approximately 28± feet bgs.
3) Boring terminated at 32± feet bgs.

Standard Penetration Resistance (Blows/Foot)	Density
0 -4	Very Loose
4 - 10	Loose
10 - 30	Med. Dense
30 - 50	Dense
50+	Very Dense

Abbreviations
F = Fine
M = Medium
C = Coarse
F/M = Fine to Medium
F/C = Fine to Coarse
Proportions Used
Trace (T) = 0 - 10%
Little (Li) = 10 - 20%
Some (So) = 20 - 35%
AND = 35-50%

NORTHEAST GEOTECHNICAL, INC.

TEST BORING LOG

Project: Proposed Nasoya Foods Building Additions, 1 New England Way, Ayer, MA

Test Boring No.: B-5
Page: 1 of 1
File No.: O493.00
Reviewed By: Glenn Olson, P.E.

Boring Co.: Drilex Environmental, Inc.
Foreman: Chris Hogan
Boring Equipment: Mobile B-57 Truck-Mounted Drill Rig; 3¼-inch I.D. Hollow-Stem Augers; 2" O.D. Split Spoon, 140 lb. Auto Hammer

Date/Weather: 8-29-2022 / Clear, 70s to 80s °F
Northeast Geotechnical Observer: Christian Rice, P.E.
Test Boring Location: See Subsurface Exploration Location Plan
Ground Surface Elevation: 224± feet
Depth to Water: 8± feet

	Sample Data						Strata Change	Sample Description
	No.	Depth	Pen.	Rec.	Blows per 6 in.	Rem.		
						1	Pavement, 0.3'±	3± inches BITUMINOUS CONCRETE
	S-1	0.5-2.5	24"	17"	3-7-9-6		Existing Fill	M. dense, gray-brown, F/C SAND, some Silt, little F/C Gravel, trace Wood, moist
	S-2A	2.5-3'	6"	6"	13		3'±	Gray-brown, F/C SAND, some Silt, some F/C Gravel, moist
	S-2B	3-4.5'	18"	12"	38-31-30			Very dense, gray-tan, F/C SAND and F/C GRAVEL, little Silt, moist
5'								
	S-3	5-7'	24"	16"	9-7-15-14			Medium dense, gray-brown, F/C SAND and F/C GRAVEL, little (+) Silt, moist
	S-4	7-9'	24"	15"	14-10-8-11			Medium dense, gray-brown, F/C SAND and F/C GRAVEL, little (+) Silt, wet
						2		
10'								
	S-5	10-12'	24	3"	7-8-7-7		Natural Silty Sand and Gravel	Medium dense, gray-brown, F/C SAND and F/C GRAVEL, some Silt, wet
15'								
	S-6	15-17'	24"	6"	4-12-8-8			Medium dense, gray-brown, F/C GRAVEL and F/C SAND, little Silt, wet
						3		
20'								
	S-7	20-22'	24"	10"	13-20-34-36			Very dense, gray-brown, F/C SAND and F/C GRAVEL, some Silt, wet
						4	22'±	
25'								Bottom of boring at 22± feet

Notes:
1) Augered to approximately 0.5± feet below ground surface (bgs) through existing pavement.
2) Groundwater encountered at 8± feet bgs while sampling.
3) Drilling resistance increased at approximately 18± feet bgs.
4) Boring terminated at 22± feet bgs.

Standard Penetration Resistance (Blows/Foot)	Density
0 -4	Very Loose
4 - 10	Loose
10 - 30	Med. Dense
30 - 50	Dense
50+	Very Dense

Abbreviations
F = Fine
M = Medium
C = Coarse
F/M = Fine to Medium
F/C = Fine to Coarse
Proportions Used
Trace (T) = 0 - 10%
Little (Li) = 10 - 20%
Some (So) = 20 - 35%
AND = 35-50%

NORTHEAST GEOTECHNICAL, INC.

TEST BORING LOG

Project: Proposed Nasoya Foods Building Additions, 1 New England Way, Ayer, MA

Test Boring No.: B-6
Page: 1 of 1
File No.: O493.00
Reviewed By: Glenn Olson, P.E.

Boring Co.: Drilex Environmental, Inc.
Foreman: Chris Hogan
Boring Equipment: Mobile B-57 Truck-Mounted Drill Rig; 3¼-inch I.D. Hollow-Stem Augers; 2" O.D. Split Spoon, 140 lb. Auto Hammer

Date/Weather: 8-31-2022 / Clear 60s to 80s °F
Northeast Geotechnical Observer: Christian Rice, P.E.
Test Boring Location: See Subsurface Exploration Location Plan
Ground Surface Elevation: 224± feet
Depth to Water: 6.5± feet

	Sample Data						Strata Change	Sample Description
	No.	Depth	Pen.	Rec.	Blows per 6 in.	Rem.		
	S-1A	0-0.5'	6"	6"	6		Topsoil Fill, 0.5'±	Gray-brown, SILT and ROOTS, some F/M Sand, trace F. Gravel
	S-1B	0.5-1.5	12"	12"	16-16		Existing Fill	Gray-brown, F/C SAND, some Silt, little F/C Gravel, moist
	S-1C	1.5-2'	6"	6"	9		2'±	Tan, F/C SAND, some (-) F/C Gravel, trace Silt, moist
	S-2	2-4'	24"	12"	7-7-6-7		Natural Silty Sand	Medium dense, tan, F/M SAND, some Silt, trace (-) F. Gravel, moist
5'								
	S-3	5-7'	24"	16"	6-8-9-13			Medium dense, gray-tan-rust, F/M SAND and SILT, moist to wet
						1	7'±	
	S-4	7-9'	24"	14"	20-13-12-16			Medium dense, gray-brown, F/C SAND and F/C GRAVEL, some Silt, wet
10'								
	S-5	10-12'	24"	4"	5-10-7-7			Medium dense, gray-brown, F/C SAND and F/C GRAVEL, some (-) Silt, wet
							Natural Silty Sand and Gravel	
15'								
	S-6	15-17'	24"	9"	5-10-23-16			Dense, gray-brown, F/C SAND and F/C GRAVEL, little Silt, wet
20'								
	S-7	20-22'	24"	8"	12-13-13-17			Medium dense, gray-brown, F/C SAND and F/C GRAVEL, little (+) Silt, wet
						2	22'±	
25'								Bottom of boring at 22± feet

Notes:
1) Groundwater encountered at 6.5± feet below ground surface (bgs) while sampling.
2) Boring terminated at 22± feet bgs.

Standard Penetration Resistance (Blows/Foot)	Density
0 -4	Very Loose
4 - 10	Loose
10 - 30	Med. Dense
30 - 50	Dense
50+	Very Dense

Abbreviations
F = Fine
M = Medium
C = Coarse
F/M = Fine to Medium
F/C = Fine to Coarse

Proportions Used
Trace (T) = 0 - 10%
Little (Li) = 10 - 20%
Some (So) = 20 - 35%
AND = 35-50%

NORTHEAST GEOTECHNICAL, INC.

TEST BORING LOG

Project: Proposed Nasoya Foods Building Additions, 1 New England Way, Ayer, MA

Test Boring No.: B-7
Page: 1 of 1
File No.: O493.00
Reviewed By: Glenn Olson, P.E.

Boring Co.	Drilex Environmental, Inc.	Date/Weather:	8-30-2022 / Clear, 70s to 90s °F
Foreman:	Chris Hogan	Northeast Geotechnical Observer:	Christian Rice, P.E.
Boring Equipment:	Mobile B-57 Truck-Mounted Drill Rig	Test Boring Location:	See Subsurface Exploration Location Plan
	3¼-inch I.D. Hollow-Stem Augers	Ground Surface Elevation:	224± feet
	2" O.D. Split Spoon, 140 lb. Auto Hammer	Depth to Water:	6± feet

	Sample Data						Strata Change	Sample Description
	No.	Depth	Pen.	Rec.	Blows per 6 in.	Rem.		
	S-1A	0-0.3'	4"	4"	4		Topsoil Fill, 0.3'±	Dark brown, SILT and ROOTS, little F/M Sand, moist
	S-1B	0.3-2'	18"	11"	5-5-11		Existing Fill	Loose to med. dense, light brown, F/C SAND and F/C GRAVEL, little (-) Silt, moist
	S-2	2-4'	24"	16"	10-8-7-6			Medium dense, tan, F/M SAND, some (+) Silt, trace F. Gravel, moist
5'							5'±	
	S-3	5-7'	24"	10"	4-6-5-5	1	Natural Silty Sand and Gravel	Med. dense, light brown, F/C SAND and F/C GRAVEL, little Silt, wet
	S-4	7-9'	24"	17"	7-6-10-7			Med. dense, gray-brown, F/C SAND, some Silt, little F/C Gravel, wet
10'								
	S-5	10-12'	24"	18"	11-13-15-12			Medium dense, gray-brown, F/C SAND and F/C GRAVEL, some Silt, wet
15'								
	S-6	15-17'	24"	5"	3-8-14-26			Medium dense, gray-brown, F/C GRAVEL and F/C SAND, little (-) Silt, wet
20'								
	S-7	20-22'	24"	11"	5-9-14-14			Medium dense, gray-brown, F/C SAND and F/C GRAVEL, some (-) Silt, wet
						2	22'±	
25'								Bottom of boring at 22± feet

Notes:

1) Groundwater encountered at 6± feet below ground surface (bgs) while sampling.
2) Boring terminated at 22± feet bgs.

Standard Penetration Resistance (Blows/Foot)	Density
0 -4	Very Loose
4 - 10	Loose
10 - 30	Med. Dense
30 - 50	Dense
50+	Very Dense

Abbreviations
F = Fine
M = Medium
C = Coarse
F/M = Fine to Medium
F/C = Fine to Coarse

Proportions Used
Trace (T) = 0 - 10%
Little (Li) = 10 - 20%
Some (So) = 20 - 35%
AND = 35-50%

NORTHEAST GEOTECHNICAL, INC.

TEST BORING LOG

Project: Proposed Nasoya Foods Building Additions, 1 New England Way, Ayer, MA

Test Boring No.: B-8
Page: 1 of 1
File No.: O493.00
Reviewed By: Glenn Olson, P.E.

Boring Co.: Drilex Environmental, Inc.
Foreman: Chris Hogan
Boring Equipment: Mobile B-57 Truck-Mounted Drill Rig; 3¼-inch I.D. Hollow-Stem Augers; 2" O.D. Split Spoon, 140 lb. Auto Hammer

Date/Weather: 8-30-22 to 8-31-22 / Clear, 70s to 90s °F
Northeast Geotechnical Observer: Christian Rice, P.E.
Test Boring Location: See Subsurface Exploration Location Plan
Ground Surface Elevation: 224± feet
Depth to Water: 8.5± feet

	Sample Data						Strata Change	Sample Description
	No.	Depth	Pen.	Rec.	Blows per 6 in.	Rem.		
	S-1A	0-0.5'	6"	6"	5		Topsoil Fill, 0.5'±	Brown, SILT and ROOTS, some F/M Sand, trace F. Gravel
	S-1B	0.5-2'	18"	6"	10-17-33		Existing Fill, 2'±	Medium dense, tan, SILT, some F. Sand, trace (-) Roots, moist
	S-2	2-4'	24"	16"	26-29-25-27			Very dense, gray-tan, F/C SAND and F/C GRAVEL, little Silt, moist
5'	S-3	5-7'	24"	10"	6-14-17-15			Dense, gray-brown, F/C SAND and F/C GRAVEL, some (-) Silt, moist
	S-4	7-9'	24"	11"	30-25-41-29			Very dense, gray-brown, F/C GRAVEL and F/C SAND, little Silt, moist to wet
10'						1,2		
	S-5	10-12'	24"	8"	6-10-24-25		Natural Silty Sand and Gravel	Dense, gray-brown, F/C GRAVEL and F/C SAND, little Silt, wet
15'	S-6	15-17'	24"	7"	9-12-12-15			Medium dense, gray-brown, F/C SAND and F/C GRAVEL, little Silt, wet
20'	S-7	20-22'	24"	5"	17-11-13-16			
						3	22'±	Medium dense, gray-brown, F/C GRAVEL and F/C SAND, little Silt, wet
25'								Bottom of boring at 22± feet

Notes:
1) Groundwater encountered at 8.5± feet below ground surface (bgs) while sampling.
2) Auger grinding on probable cobbles and/or boulder(s) observed from approximately 8± to 9.5± feet bgs.
3) Boring terminated at 22± feet bgs.

Standard Penetration Resistance (Blows/Foot)	Density
0 -4	Very Loose
4 - 10	Loose
10 - 30	Med. Dense
30 - 50	Dense
50+	Very Dense

Abbreviations
F = Fine
M = Medium
C = Coarse
F/M = Fine to Medium
F/C = Fine to Coarse

Proportions Used
Trace (T) = 0 - 10%
Little (Li) = 10 - 20%
Some (So) = 20 - 35%
AND = 35-50%

NORTHEAST GEOTECHNICAL, INC.

TEST BORING LOG

Project: Proposed Nasoya Foods Building Additions, 1 New England Way, Ayer, MA

Test Boring No.: B-9
Page: 1 of 1
File No.: O493.00
Reviewed By: Glenn Olson, P.E.

Boring Co.: Drilex Environmental, Inc.
Foreman: Chris Hogan
Boring Equipment: Mobile B-57 Truck-Mounted Drill Rig; 3¼-inch I.D. Hollow-Stem Augers; 2" O.D. Split Spoon, 140 lb. Auto Hammer

Date/Weather: 8-31-2022 / Clear 60s to 80s °F
Northeast Geotechnical Observer: Christian Rice, P.E.
Test Boring Location: See Subsurface Exploration Location Plan
Ground Surface Elevation: 224± feet
Depth to Water: 9.5± feet

	Sample Data						Strata Change	Sample Description
	No.	Depth	Pen.	Rec.	Blows per 6 in.	Rem.		
	S-1A	0-0.5'	6"	6"	6		Topsoil Fill, 0.5'±	Brown, SILT and ROOTS, little F. Sand, moist
	S-1B	2-4'	24"	9"	10-20-22			Med. dense, tan, F/C SAND and SILT, some F. Gravel, trace wood, moist
	S-2	2-4'	24"	9"	17-13-15-16			Medium dense, gray-brown, F/C SAND and F/C GRAVEL, some Silt, moist
5'							Existing Fill	
	S-3	5-7'	24"	3"	2-2-4-5			Loose, gray-brown-black, F/C SAND, some Organic Silt, little F. Gravel, trace roots, moist
	S-4	7-9'	24"	2"	8-5-5-5			Loose to medium dense, Organic SILT, some F/C Sand, moist, piece of coarse Gravel blocking sampler tip
10'						1	9.5'±	
	S-5	10-12'	24"	12"	8-12-10-10			Medium dense, gray-brown, F/C GRAVEL and F/C SAND, little Silt, wet
15'							Natural Silty Sand and Gravel	
	S-6	15-17'	24"	11"	9-12-22-18			Dense, gray, F/C SAND and F/C GRAVEL, little Silt, wet
20'								
	S-7	20-22'	24"	6"	15-23-25-27			Dense, gray-brown, F/C GRAVEL and F/C SAND, little Silt, wet
						2	22'±	
25'								Bottom of boring at 22± feet

Notes:
1) Groundwater encountered at 9.5± feet below ground surface (bgs) while drilling.
2) Boring terminated at 22± feet bgs.

Standard Penetration Resistance (Blows/Foot)	Density
0 -4	Very Loose
4 - 10	Loose
10 - 30	Med. Dense
30 - 50	Dense
50+	Very Dense

Abbreviations
F = Fine
M = Medium
C = Coarse
F/M = Fine to Medium
F/C = Fine to Coarse

Proportions Used
Trace (T) = 0 - 10%
Little (Li) = 10 - 20%
Some (So) = 20 - 35%
AND = 35-50%

KELLY ENGINEERING GROUP
civil engineering consultants

REDEVELOPMENT CHECKLIST

Department of Environmental Protection's Stormwater Management Handbook Volume 2 Chapter 3 Checklist for Redevelopment Projects.

DEP Checklist is in regular text
Current Response is in Italics and in red

Existing Conditions

- On-site: For all redevelopment projects, proponents should document existing conditions, including a description of extent of impervious surfaces, soil types, existing land uses with higher potential pollutant loads, and current onsite stormwater management practices.

  Existing site conditions is fully described in the Existing Conditions Plan filed with the NOI.

- Watershed: Proponents should determine whether the project is located in a watershed or subwatershed, where flooding, low streamflow or poor water quality is an issue.

  As described in the Stormwater Management Summary (SMS) a portion of the site is located with the floodplain. However this area is not in the area of the redevelopment.

  As decribed in the SMS the site ultimately drains to Bennets Brook and Spectacle Pond approximately 3,500 ft from the site. These waterways are impaired by Ecoli and invasive plant species.

The Project

Is the project a redevelopment project? *(yes)*

- Maintenance and improvement of existing roadways *(no)*
- Development of rehabilitation, expansion or phased project on redeveloped site, or*(yes)*
- Remedial stormwater project *(no)*

For non-roadway projects, is any portion of the project outside the definition of redevelopment?

- Development of previously undeveloped area *(no)*
- Increase in impervious surface *(yes)*

If a component of the project is not a redevelopment project, the proponent shall use the checklist set forth below to document that at a minimum the proposed stormwater management system fully meets each Standard for that component. The proponent shall also document that the proposed stormwater management system meets the requirements of Standard 7 for the remainder of the project.

The Stormwater Management Standards

The redevelopment checklist reviews compliance with each of the Stormwater Management Standards in order.

Standard 1: (Untreated discharges)
No new stormwater conveyances (e.g., outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.
Same rule applies for new developments and redevelopments.

Full compliance with Standard 1 is required for new outfalls.

- What BMPs are proposed to ensure that all new discharges associated with the discharge are adequately treated?

  There will be no new discharge points.

- What BMPs are proposed to ensure that no new discharges cause erosion in wetlands or waters of the Commonwealth?

  There will be no new discharge points.

- Will the proposed discharge comply with all applicable requirements of the Massachusetts Clean Waters Act and the regulations promulgated thereunder at 314 CMR 3.00, 314 CMR 4.00 and 314 CMR 5.00?

  There will be no new discharge points.

Existing outfalls shall be brought into compliance with Standard 1 to the maximum extent practicable.

- Are there any existing discharges associated with the redevelopment project for which new treatment could be provided?

  The existing stormwater sytem consist primarily of catch basins and recharge chambers. A portion of the site drains directly to the wetlands via catch basins and manholes. Since this project entails just repaving with no changes to the impervious area no additional improvements are proposed other than an O and M plan.

  If so, the proponent shall specify the stormwater BMP retrofit measures that have been considered to ensure that the discharges are adequately treated and indicate the reasons for adopting or rejecting those measures. (See Section entitled “Retrofit of Existing BMPs”.)

  As described in the SMS all of the watersheds within the site will be improved. All redeveloped areas will meet new development standards, the areas that will not be redeveloped will be improved by reducing impervious surfaces and adhering to a Stormwater Management Operation and Maintenance Plan and Long Term Polution Prevention Plan.

- What BMPs have been considered to prevent erosion from existing stormwater discharges?

  As described in the SMS there are no outfalls dedicated to this site. Subsurface Retention systems will be used to reduce runoff rates and therefore reduce runoff rates at the existing outfall.

Standard 2: (Peak rate control and flood prevention)

Stormwater management systems must be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates. This Standard may be waived for land subject to coastal storm flowage.

Full compliance for any component that is not a redevelopment

Compliance to the Maximum Extent Practicable:

- Does the redevelopment design meet Standard 2, comparing post-development to pre-development conditions?
  Yes.
- If not, the applicant shall document an analysis of alternative approaches for meeting the Standard. (See Menu of Strategies to Reduce Runoff and Peak Flows and/or Increase Recharge Menu included at the end of this chapter.)
  N/A

Improvement of existing conditions:

- Does the project reduce the volume and/or rate of runoff to less than current estimated conditions? Has the applicant considered all the alternatives for reducing the volume and/or rate of runoff from the site? (See Menu.)
  Yes
- Is the project located within a watershed subject to damage by flooding during the 2-year or 10-year 24-hour storm event?
  No.
- If so, does the project design provide for attenuation of the 2-year and 10-year 24-hour storm event to less than current estimated conditions? Have measures been implemented to reduce the volume of runoff from the site resulting from the 2 year or 10 year 24 hour storm event? (See Menu.)
  See Runoff Summary
- Is the project located adjacent to a water body or watercourse subject to adverse impacts from flooding during the 100-year 24-hour storm event? If so, are portions of the site available to increase flood storage adjacent to existing Bordering Land Subject to Flooding (BLSF)?
  N/A
- Have measures been implemented to attenuate peak rates of discharge during the 100-year 24-hour storm event to less than the peak rates under current estimated conditions? Have measures been implemented to reduce the volume of runoff from the site resulting from the 100-year 24-hour storm event? (See Menu.)
  Yes

Standard 3: (Recharge to Ground water)

Loss of annual recharge to ground water shall be eliminated or minimized through the use of infiltration measures, including environmentally sensitive site design, low impact development techniques, best management practices, and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from the 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 Massachusettss Stormwater Handbook.

Full compliance for any component that is not a redevelopment

Compliance to the Maximum Extent Practicable:

- Does the redevelopment design meet Standard 3, comparing post-development to pre-development conditions?
  Yes.
- If not, the applicant shall document an analysis of alternative approaches for meeting the Standard?
- What soil types are present on the site? Is the site is comprised solely of C and D soils and bedrock at the land surface?
  See Stormwater Report.
- Does the project include sites where recharge is proposed at or adjacent to an area classified as contaminated, sites where contamination has been capped in place, sites that have an Activity and Use Limitation (AUL) that precludes inducing runoff to the groundwater, pursuant to MGL Chapter 21E and the Massachusetts Contingency Plan 310 CMR 40.0000; sites that are the location of a solid waste landfill as defined in 310 CMR 19.000; or sites where groundwater from the recharge location flows directly toward a solid waste landfill or 21E site?[1]
  No.
- Is the stormwater runoff from a land use with a higher potential pollutant load?
  No.
- Is the discharge to the ground located within the Zone II or Interim Wellhead Protection Area of a public water supply?
  Yes.
- Does the site have an infiltration rate greater than 2.4 inches per hour?
  No

Improvements to Existing Conditions:

- Does the project increase the required recharge volume over existing (developed) conditions? If so, can the project be redesigned to reduce the required recharge volume by decreasing impervious surfaces (make building higher, put parking under the building, narrower roads, sidewalks on only one side of street, etc.) or using low impact development techniques such as porous pavement?
  Yes, Parking Waiver and pavement removal.
- Is the project located within a basin or sub-basin that has been categorized as under high or medium stress by the Massachusetts Water Resources Commission, or where there is other evidence that there are rivers and streams experiencing low flow problems? If so, have measures been considered to replace the natural recharge lost as a result of the prior development? (See Menu.)
  No
- Has the applicant evaluated measures for reducing site runoff? (See Menu.)
  Yes

Standard 4: (80% TSS Removal)

Stormwater management systems must be designed to remove 80% of the average annual post-construction 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. Stormwater BMPs are sized to capture the required water quality volume determined in accordance with the Massachusetts Stormwater Handbook; and

c. Pretreatment is provided in accordance with the Massachusetts Stormwater Handbook.

Full compliance for any component that is not a redevelopment
Full compliance with the long-term pollution plan requirement for new developments and redevelopments.

- Has the proponent developed a long-term pollution plan that fully meets the requirements of Standard 4? *Yes.*
- Does the pollution prevention plan include the following source control measures?
    - Street sweeping *Yes*
    - Proper management of snow, salt, sand and other deicing chemicals *Yes*
    - Proper management of fertilizers, herbicides and pesticides *Yes*
    - Stabilization of existing eroding surfaces *N/A*

Compliance to the Maximum Extent Practicable for the other requirements:

- Does the redevelopment design provide for treatment of all runoff from existing (as well as new) impervious areas to achieve 80% TSS removal? If 80% TSS removal is not achieved, has the stormwater management system been designed to remove TSS to the maximum extent practicable? *Yes.*

- Have the proposed stormwater BMPs been properly sized to capture the prescribed runoff volume? *Yes*
    - One inch rule applies for discharge : Yes
        - within a Zone II or Interim Wellhead Protection Area Yes
        - near or to another critical area
        - from a land use with a higher potential pollutant load
        - to the ground where the infiltration rate is greater than 2.4 inches per hour

- Has adequate pretreatment been proposed? *Yes*
    - 44% TSS Removal Pretreatment Requirement applies if:
        - Stormwater runoff is from a land use with a higher potential pollutant load
        - Stormwater is discharged
            - To the ground within the Zone II or Interim Wellhead Protection Area of a Public Water Supply
            - To the ground with an infiltration rate greater than 2.4 inches per hour
            - Near or to an Outstanding Resource Water, Special Resource Water, Cold-Water Fishery, Shellfish Growing Area, or Bathing Beach

- If the stormwater BMPs do not meet all the requirements set forth above, the applicant shall document an analysis of alternative approaches for meeting the these requirements. (See Section on Retrofitting Existing BMPs (the "Retrofit Section").

See response above

Improvements to Existing Conditions:

- Have measures been provided to achieve at least partial compliance with the TSS removal standard? *Yes.*
- Have any of the best management practices in the Retrofit Section been considered? *(No)*
- Have any of the following pollution prevention measures been considered?
  - Reduction or elimination of winter sanding, where safe and prudent to do so *(Yes)*
  - Tighter controls over the application of fertilizers, herbicides, and pesticides *(Yes)*
  - Landscaping that reduces the need for fertilizer, herbicides and pesticides *(Yes)*
  - High frequency sweeping of paved surfaces using vacuum sweepers *(Yes)*
  - Improved catch basin cleaning *(Yes)*
  - Waterfowl control programs *(No)*
- Are there any discharges (new or existing) to impaired waters? If so, see TMDL section. *Yes, See above*

Standard 5 (Higher Potential Pollutant Loads (HPPL)

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, snow melt and stormwater runoff, the proponent shall use the specific stormwater BMPs determined by the Department to be suitable for such use 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, §§ 26-53, and the regulations promulgated thereunder at 314 CMR 3.00, 314 CMR 4.00 and 314 CMR 5.00.

Full compliance for any component that is not a redevelopment.

Full compliance with pollution prevention requirements for new developments and redevelopments.

(This Section is not Applicable)

Pollution Prevention

- Has the proponent considered any of the following operational source control measures?
  - Formation of a pollution prevention team,
  - Good housekeeping practices,
  - Preventive maintenance procedures,
  - Spill prevention and clean up,
  - Employee training, and
  - Regular inspection of pollutant sources.

- Has the proponent considered implementation of any of the following operational changes to reduce the quantity of pollutants on site?
  - Process changes,
  - Raw material changes,
  - Product changes, or
  - Recycling.

- Has the proponent considered making capital improvements to protect the land uses with higher potential pollutant loads from exposure to rain, snow, snow melt, and stormwater runoff?

    - Enclosing and/or covering pollutant sources (e.g. placing pollutant sources within a building or other enclosure, placing a roof over storage and working areas, placing tarps under pollutant source)

    - Installing a containment system with an emergency shutoff to contain spills?

    - Physically segregating the pollutant source to prevent run-on of uncontaminated stormwater?

Treatment

- If applicable, compliance with the treatment and pretreatment requirements of Standard 5 only to the Maximum Extent Practicable by directing the stormwater runoff from land uses with higher potential pollutant loads to appropriate stormwater BMPs?

    - Are the BMPs selected capable of removing the pollutants associated with the higher potential pollutant load land ("LUHPPL") use?

    - Is the land use likely to generate stormwater with high concentrations of oil and grease? If so has an oil grit separator, sand filter, filtering bioretention area or equivalent been proposed for pretreatment?

Improvement of Existing Conditions

- If the redevelopment converts a site from a non-LUHPPL use to a LUHPPL use, the applicant shall document how the stormwater BMPs shall be modified or replaced to come into compliance with Standard 5.

- What specific measures have been considered to offset the anticipated impacts of land uses with higher potential pollutant loads?

- If the redevelopment proposal is a brownfield project, the applicant shall demonstrate how the stormwater management measures have been designed to prevent mobilization or remobilization of soil and groundwater contamination. (See Brownfield section)

Other Requirements

- Does the discharge comply with all applicable requirements of the Massachusetts Clean Waters Act, 314 CMR 3.00, 314 CMR 4.00 and 314 CMR 5.00?

Standard 6 (Critical Areas)

Stormwater discharges to a Zone II or Interim Wellhead Protection Area of a public water supply and stormwater discharges near or any other critical area require the use of the specific source control and pollution prevention measures and the specific stormwater best management practices determined by the Department to be suitable for managing discharges to such area, 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 or Special Resource Waters shall be set back from the receiving water and receive the highest and best practical method of treatment. A "stormwater 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 3.00 and 314 CMR 4.00. Stormwater discharges to a Zone I or Zone A are prohibited unless essential to the operation of the public water supply.

Full compliance for component of project that is not a redevelopment
Full compliance with pollution prevention requirements for new developments and redevelopments.

See above. The project will improve existing conditions by installing bmp's, minimizing pavement, and instituting an O and M plan.

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If applicable, compliance to the Maximum Extent Practicable with the pretreatment and treatment requirements of Standard 6:

- Does the redevelopment project utilize the pretreatment, treatment and infiltration BMPs approved for discharges near or to critical areas?
- If the redevelopment project does not comply with Standard 6, the applicant shall document an analysis of alternative measures for meeting Standard 6. (See Section on Specific Redevelopment Projects.)

See above

Improvements to Existing Conditions:

- Have measures to protect critical areas been considered, including additional pollution prevention measures and structural and non-structural BMPs?

See above

Other Requirements

- Does the discharge comply with the Massachusetts Clean Waters Act, 314 CMR 3.00, 314 CMR 4.00, and 314 CMR 5.00?

See above

Standard 8: (Erosion, Sediment Control)

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

All redevelopment projects shall fully comply with Standard 8.

- Has the proponent submitted a construction period erosion, sedimentation and pollution prevention plan that meets the requirements of Standard 8? *(Yes)*

Standard 9: (Operation and Maintenance)

A long-term operation and maintenance plan must be developed and implemented to ensure that stormwater management systems function as designed.
All redevelopment projects shall fully comply with Standard 9.

- Has the proponent submitted a long-term Operation and Maintenance plan that meets the requirements of Standard 9? *(Yes)*

Standard 10 (Illicit Discharges)
All illicit discharges to the stormwater management system are prohibited.
All redevelopment projects shall fully comply with Standard 10.

- Are there any known or suspected illicit discharges to the stormwater management system at the redevelopment project site? *(No)*
- Has an illicit connection detection program been implemented using visual screening, dye or smoke testing? *(No)*
- Have an Illicit Discharge Compliance Statement and associated site map been submitted verifying that there are no illicit discharges to the stormwater management system at the site? *(Yes)*

Improvements to Existing Conditions:

- Once all illicit discharges are removed, has the proponent implemented any measures to prevent additional illicit discharges? *N/A*