

Stormwater Management Report

Date: September 2024

Project: Multi-Family Development
9 & 13 Elton Street
Worcester, MA

Prepared For: Anthony Bianco
96 Middlesex Ave
Worcester, MA 01604

Locus Map:



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Stormwater quality and quantity calculations have been performed for 9 & 13 Elton Street to demonstrate compliance with MassDEP Stormwater Standards. The design complies to the extent practicable as the Project is a multi-family housing development with four or fewer units. The Project complies with other design criteria as enumerated in the Wetland Protection Regulations (310 CMR 10) and City of Worcester Wetlands Protection Ordinance. Prior to completion of this report, we attended an IRT meeting with City staff.

The subject Property is located at the end of Elton Street, a dead-end street running east from Boston Ave. The Property is made up of two parcels located on the south side of Elton Street that are currently undeveloped and primarily wooded. There is a diverse feel to the neighborhood, as there are many types of housing near the Property. The CSX / MBTA railroad right-of-way (ROW) runs along the eastern side of the property, coincident with a NHESP priority habitat corridor (PH 1145). The site was evaluated by Matthew Marro for wetlands. Mr. Marro delineated a bordering vegetated wetland (BVW; WF #1 - #22) starting a headwall within the unimproved portion of Elton Street and running easterly before turning southerly and clipping the northeastern corner of the Property, before continuing to the east and southeast within the railroad ROW.

The Property generally drains easterly and overland through the wooded area toward the railroad ROW. As mapped by the NRCS soil web website, the Property contains three soil types. The soils are mapped as: Chatfield-Hollis Rock outcrop (HSG B), Woodridge fine sandy loam (HSG C/D), and Paxton-Urban land complex (HSG C). Site specific soils testing by LDC staff confirmed the USDA/NRCS mapping in the area of the proposed development. There is a catch basin at the front of the Property along Elton Street, which collects street runoff and discharges to the north of the Property within the unimproved portion of Elton Street. There are no FEMA flood zones (FIRM 25027C0620E, eff. 7/4/2011) on or immediately adjacent to the Property.

The Applicant is seeking to develop the Property with a two-story, tri-plex with a footprint of 2,496± S.F. Along with the structure, there are other associated improvements including driveways, stormwater management BMP's, and power/telecom services.

This Report contains:

- A) MassDEP Stormwater Management Checklist
- B) Existing and Proposed Hydrologic Calculations (MassDEP Standards 1 & 2)
- C) Water Quality Calculations (MassDEP Standards 3, 4, 5, 6 & 7)
- D) Construction Period Pollution Prevention Plan, Long-Term Pollution Prevention Plan, Long-Term Operations & Maintenance Plan, and Illicit Discharge Statement (MassDEP Standards 8, 9 & 10)
- E) Soils Information
- F) FEMA Flood Map
- G) Existing Hydrology Map
- H) Proposed Hydrology Map

[https://ldcollaborative.sharepoint.com/sites/landdesigncollaborative/shared documents/_projects/24-0264 - worchester, 9 & 13 elton street/engineering/stormwater components/24-0264 ldc stormwater report.docx](https://ldcollaborative.sharepoint.com/sites/landdesigncollaborative/shared%20documents/_projects/24-0264%20-%20worchester,%209%20&%2013%20elton%20street/engineering/stormwater%20components/24-0264%20ldc%20stormwater%20report.docx)

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A) MassDEP Stormwater Management Checklist (8 pages)

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Checklist for Stormwater Report

A. Introduction

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



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

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.¹ This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8²
- Operation and Maintenance Plan required by Standard 9

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

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

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

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

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



Checklist for Stormwater Report

B. Stormwater Checklist and Certification

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

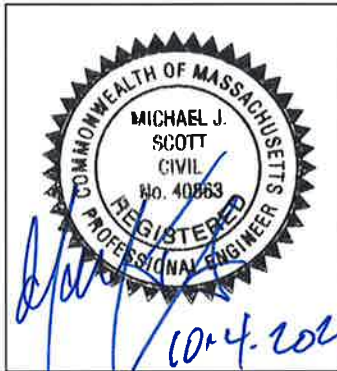
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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

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

Registered Professional Engineer's Certification

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

Registered Professional Engineer Block and Signature



Signature and Date

Checklist

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

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



Checklist for Stormwater Report

Checklist (continued)

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

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

Standard 1: No New Untreated Discharges

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



Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

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

Standard 3: Recharge

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

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



Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

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

Standard 4: Water Quality

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

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



Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

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

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

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

Standard 6: Critical Areas

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



Checklist for Stormwater Report

Checklist (continued)

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

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

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

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

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



Checklist for Stormwater Report

Checklist (continued)

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

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

Standard 9: Operation and Maintenance Plan

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

Standard 10: Prohibition of Illicit Discharges

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

B) Pre- and Post-Development Hydrologic Calculations (Standards 1 & 2)

Standard 1)

The Project is a multi-family development with four or fewer units and is therefore exempt from the Stormwater Standards. The stormwater system has been designed to mimic existing conditions to the extent practicable and infiltrate runoff during the 2-, 10- & 100-year storm events, collecting, treating and discharging stormwater into subsurface infiltration systems upgradient of the BVW. The proposed drainage system will mitigate water quality and quantity to match the existing conditions in that stormwater will be collected, treated, and discharged to one of the two proposed subsurface infiltration systems. Runoff from both paved areas will be pretreated as required via an area drain with a sump. The roof drains will collect and direct roof runoff through the pipe network (which includes area drains and Nyloplast drain basins) and route runoff to the subsurface recharge system.

Standard 2)

The Project is a multi-family development with four or fewer units and is therefore exempt from the Stormwater Standards. The Project results in new impervious surfaces. The proposed stormwater management system has been designed to mitigate stormwater runoff rates for the required storm events (refer to HydroCAD calculations), as summarized below.

E XY	Existing Conditions Features where “E” designates “Existing”; X designates the area or feature “name”; and Y designates the feature - a sub-catchment “S”, a basin/depression/pond/ “P”, a conveyance/reach “R”, or a point of interest/summation point/link “L”			
P XY	Proposed Conditions Features where “P” designates “Proposed”; X designates area or feature “name”; and Y designates the feature - a sub-catchment “S”, a basin/depression/pond/ “P”, a conveyance/reach “R”, or a point of interest/summation point/link “L”			
Rates				
Point of Interest	Storm Event / Runoff (cubic feet/second)			
	2-Year	10-Year	25-Year	100- Year
E 1L	0.3	0.8	1.1	1.7
P 1L	0.2	0.6	0.9	1.8
Volumes				
Point of Interest	Storm Event / Runoff (cubic feet)			
	2-Year	10-Year	25-Year	100-Year
E 1L	1,132	2,845	4,098	6,183
P 1L	835	2,215	3,306	5,015



NOAA Atlas 14, Volume 10, Version 3
Location name: Worcester, Massachusetts, USA*
Latitude: 42.2582°, Longitude: -71.7615°
Elevation: 499 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 & aeriels](#)

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	0.343 (0.271-0.428)	0.404 (0.319-0.506)	0.504 (0.397-0.634)	0.587 (0.459-0.742)	0.702 (0.530-0.929)	0.789 (0.582-1.07)	0.879 (0.627-1.24)	0.976 (0.661-1.42)	1.11 (0.723-1.68)	1.22 (0.772-1.88)
10-min	0.486 (0.384-0.607)	0.573 (0.452-0.717)	0.715 (0.563-0.898)	0.833 (0.652-1.05)	0.995 (0.751-1.32)	1.12 (0.825-1.51)	1.24 (0.888-1.75)	1.38 (0.936-2.01)	1.58 (1.02-2.37)	1.73 (1.09-2.66)
15-min	0.571 (0.452-0.714)	0.674 (0.532-0.843)	0.842 (0.662-1.06)	0.980 (0.767-1.24)	1.17 (0.884-1.55)	1.32 (0.970-1.78)	1.46 (1.04-2.06)	1.63 (1.10-2.36)	1.85 (1.20-2.79)	2.03 (1.29-3.13)
30-min	0.773 (0.612-0.966)	0.912 (0.721-1.14)	1.14 (0.898-1.43)	1.33 (1.04-1.68)	1.59 (1.20-2.10)	1.79 (1.32-2.42)	1.99 (1.42-2.80)	2.21 (1.50-3.21)	2.52 (1.64-3.79)	2.76 (1.75-4.26)
60-min	0.975 (0.772-1.22)	1.15 (0.910-1.44)	1.44 (1.13-1.81)	1.68 (1.31-2.12)	2.01 (1.52-2.66)	2.26 (1.66-3.05)	2.51 (1.79-3.54)	2.79 (1.89-4.05)	3.18 (2.07-4.80)	3.49 (2.21-5.38)
2-hr	1.23 (0.979-1.53)	1.46 (1.16-1.82)	1.85 (1.46-2.30)	2.16 (1.70-2.72)	2.60 (1.98-3.43)	2.93 (2.18-3.96)	3.27 (2.36-4.62)	3.67 (2.49-5.30)	4.26 (2.77-6.38)	4.74 (3.01-7.26)
3-hr	1.41 (1.12-1.74)	1.68 (1.34-2.08)	2.13 (1.70-2.65)	2.51 (1.98-3.14)	3.02 (2.31-3.98)	3.40 (2.55-4.60)	3.82 (2.77-5.38)	4.30 (2.92-6.18)	5.02 (3.28-7.50)	5.63 (3.58-8.60)
6-hr	1.77 (1.42-2.18)	2.13 (1.71-2.63)	2.73 (2.18-3.37)	3.22 (2.56-4.01)	3.90 (3.00-5.11)	4.40 (3.31-5.92)	4.94 (3.61-6.95)	5.60 (3.82-8.00)	6.58 (4.31-9.77)	7.42 (4.74-11.3)
12-hr	2.20 (1.78-2.70)	2.68 (2.16-3.28)	3.44 (2.77-4.23)	4.08 (3.26-5.05)	4.96 (3.83-6.46)	5.61 (4.24-7.50)	6.31 (4.64-8.82)	7.16 (4.90-10.2)	8.43 (5.53-12.4)	9.51 (6.09-14.3)
24-hr	2.62 (2.13-3.19)	3.20 (2.60-3.90)	4.15 (3.36-5.07)	4.94 (3.98-6.08)	6.03 (4.69-7.81)	6.83 (5.20-9.08)	7.70 (5.69-10.7)	8.75 (6.02-12.4)	10.4 (6.82-15.2)	11.7 (7.52-17.5)
2-day	2.97 (2.43-3.59)	3.65 (2.99-4.42)	4.76 (3.88-5.79)	5.69 (4.61-6.95)	6.96 (5.45-8.98)	7.90 (6.05-10.5)	8.92 (6.64-12.4)	10.2 (7.03-14.3)	12.1 (8.02-17.7)	13.8 (8.90-20.5)
3-day	3.22 (2.65-3.88)	3.96 (3.25-4.77)	5.16 (4.22-6.24)	6.15 (5.00-7.49)	7.52 (5.90-9.67)	8.53 (6.55-11.3)	9.63 (7.19-13.3)	11.0 (7.61-15.4)	13.1 (8.67-19.0)	14.9 (9.63-22.1)
4-day	3.46 (2.85-4.15)	4.22 (3.48-5.08)	5.48 (4.50-6.62)	6.52 (5.32-7.92)	7.96 (6.26-10.2)	9.02 (6.94-11.9)	10.2 (7.60-14.0)	11.6 (8.04-16.2)	13.8 (9.14-19.9)	15.7 (10.1-23.1)
7-day	4.13 (3.42-4.93)	4.96 (4.11-5.94)	6.32 (5.22-7.59)	7.45 (6.11-9.01)	9.01 (7.12-11.5)	10.2 (7.84-13.3)	11.4 (8.53-15.6)	12.9 (8.98-17.9)	15.2 (10.1-21.8)	17.1 (11.1-25.1)
10-day	4.79 (3.98-5.71)	5.66 (4.70-6.75)	7.08 (5.86-8.48)	8.26 (6.79-9.95)	9.88 (7.82-12.5)	11.1 (8.57-14.4)	12.4 (9.25-16.7)	13.9 (9.70-19.2)	16.1 (10.8-23.1)	18.0 (11.7-26.4)
20-day	6.83 (5.72-8.09)	7.75 (6.48-9.19)	9.26 (7.71-11.0)	10.5 (8.70-12.6)	12.2 (9.72-15.3)	13.5 (10.5-17.3)	14.9 (11.1-19.7)	16.3 (11.5-22.3)	18.3 (12.3-26.0)	19.9 (12.9-28.9)
30-day	8.54 (7.18-10.1)	9.49 (7.97-11.2)	11.0 (9.24-13.1)	12.3 (10.2-14.7)	14.1 (11.2-17.5)	15.5 (12.0-19.6)	16.9 (12.5-22.0)	18.2 (12.8-24.8)	20.0 (13.4-28.2)	21.3 (13.9-30.8)
45-day	10.7 (9.00-12.5)	11.6 (9.82-13.7)	13.3 (11.1-15.7)	14.6 (12.2-17.4)	16.5 (13.1-20.3)	17.9 (13.9-22.5)	19.3 (14.3-25.0)	20.6 (14.6-27.9)	22.1 (14.9-31.1)	23.2 (15.1-33.4)
60-day	12.4 (10.5-14.6)	13.5 (11.4-15.8)	15.1 (12.7-17.8)	16.5 (13.8-19.6)	18.4 (14.7-22.6)	20.0 (15.5-24.9)	21.4 (15.8-27.5)	22.6 (16.0-30.5)	24.0 (16.3-33.7)	24.9 (16.3-35.8)

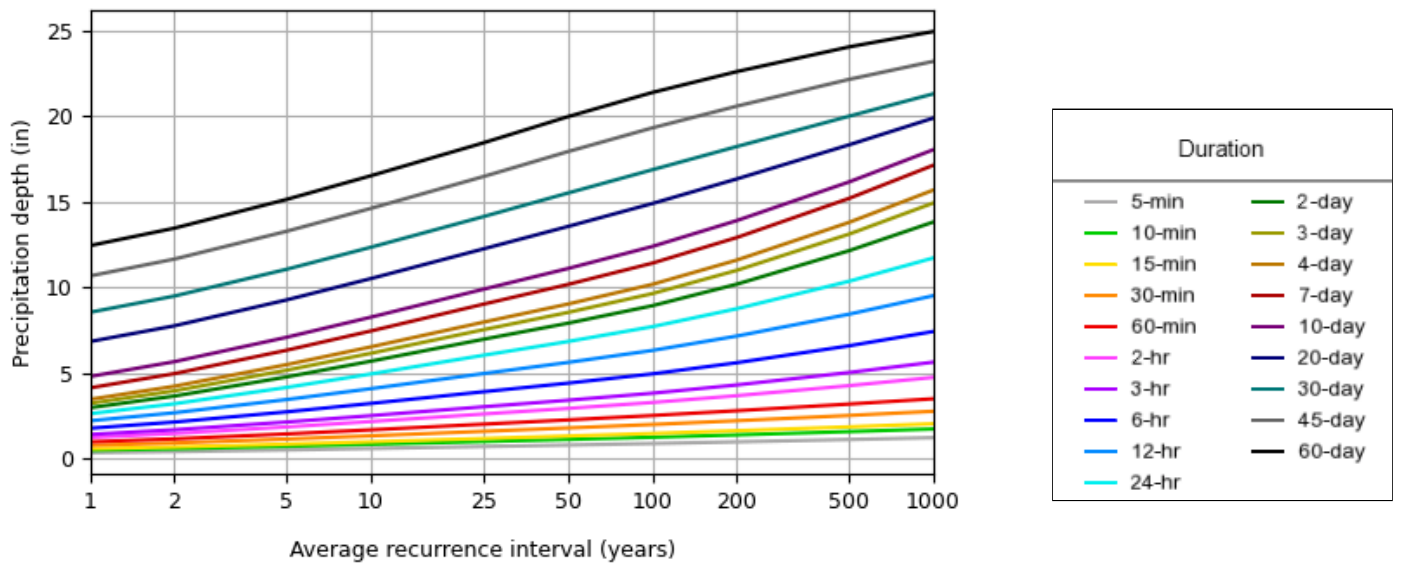
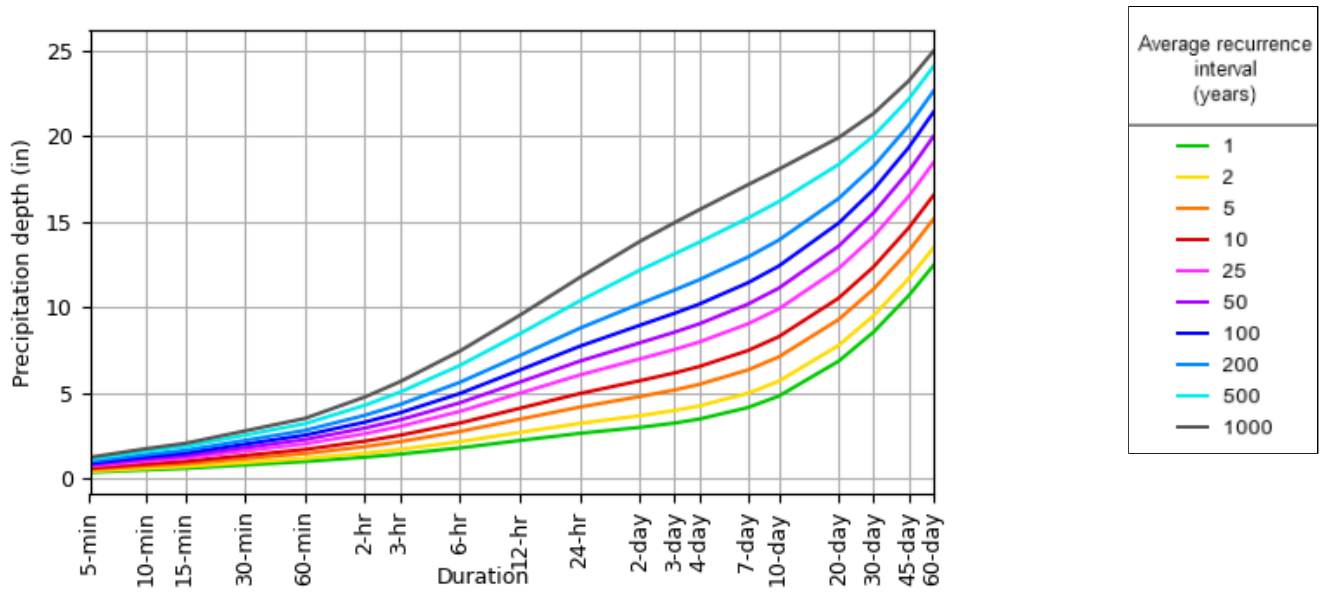
¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS). Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average 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

PDS-based depth-duration-frequency (DDF) curves

Latitude: 42.2582°, Longitude: -71.7615°



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Maps & aerials

Small scale terrain



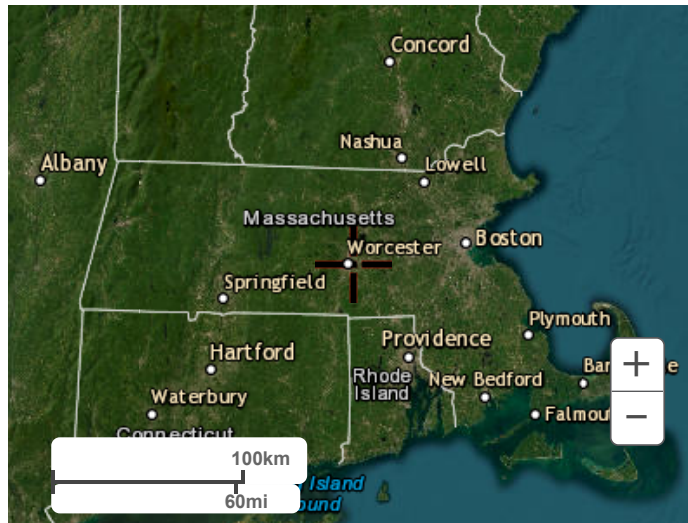
Large scale terrain



Large scale map



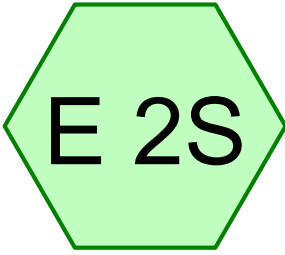
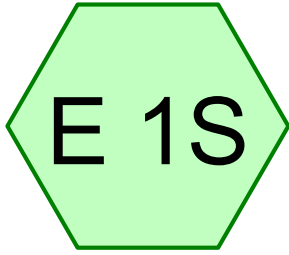
Large scale aerial



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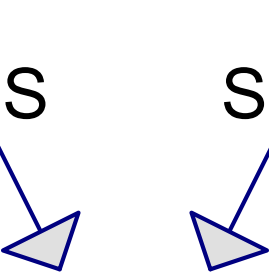
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[National Water Center](#)
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Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

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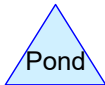
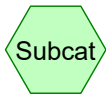


Subcat E 1S

Subcat E 2S



E 1L



24-0264 Existing

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Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year	Type III 24-hr		Default	24.00	1	3.20	2
2	10-Year	Type III 24-hr		Default	24.00	1	4.94	2
3	25-Year	Type III 24-hr		Default	24.00	1	6.03	2
4	100-Year	Type III 24-hr		Default	24.00	1	7.70	2

24-0264 Existing

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Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
486	48	Brush, Good, HSG B (E 1S)
380	65	Brush, Good, HSG C (E 1S, E 2S)
1,804	55	Woods, Good, HSG B (E 1S)
16,069	70	Woods, Good, HSG C (E 1S, E 2S)
18,739	68	TOTAL AREA

24-0264 Existing

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Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
2,290	HSG B	E 1S
16,449	HSG C	E 1S, E 2S
0	HSG D	
0	Other	
18,739		TOTAL AREA

24-0264 Existing

Type III 24-hr 2-Year Rainfall=3.20"

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Time span=0.00-96.00 hrs, dt=0.05 hrs, 1921 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E 1S: Subcat E 1S

Runoff Area=10,456 sf 0.00% Impervious Runoff Depth=0.64"
Flow Length=257' Tc=10.9 min CN=66 Runoff=0.1 cfs 560 cf

Subcatchment E 2S: Subcat E 2S

Runoff Area=8,283 sf 0.00% Impervious Runoff Depth=0.83"
Flow Length=188' Tc=7.4 min CN=70 Runoff=0.2 cfs 572 cf

Link E 1L: E 1L

Inflow=0.3 cfs 1,132 cf
Primary=0.3 cfs 1,132 cf

Total Runoff Area = 18,739 sf Runoff Volume = 1,132 cf Average Runoff Depth = 0.72"
100.00% Pervious = 18,739 sf 0.00% Impervious = 0 sf

24-0264 Existing

Type III 24-hr 2-Year Rainfall=3.20"

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Summary for Subcatchment E 1S: Subcat E 1S

Runoff = 0.1 cfs @ 12.18 hrs, Volume= 560 cf, Depth= 0.64"
 Routed to Link E 1L : E 1L

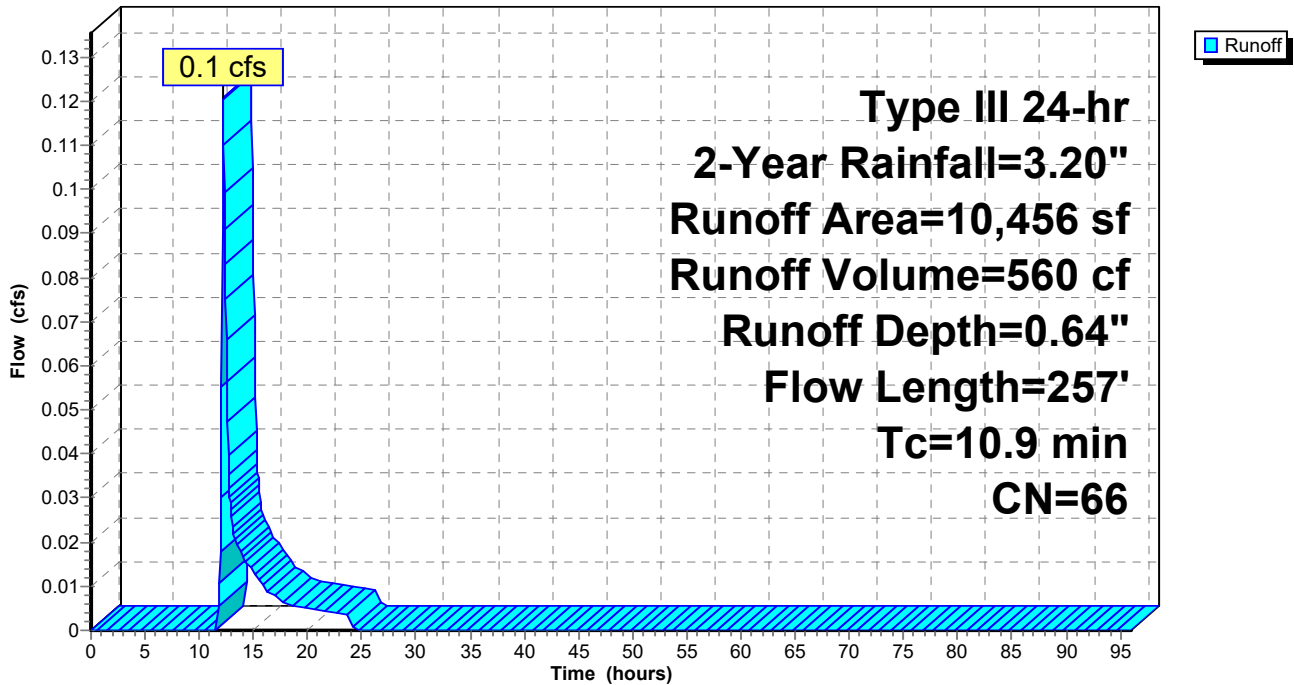
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
486	48	Brush, Good, HSG B
104	65	Brush, Good, HSG C
1,804	55	Woods, Good, HSG B
8,062	70	Woods, Good, HSG C
10,456	66	Weighted Average
10,456		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	50	0.0450	0.09		Sheet Flow, Upland 495.00-492.75
2.0	207	0.1150	1.70		Woods: Light underbrush n= 0.400 P2= 3.20"
					Shallow Concentrated Flow, Remainder of Flowpath 492.75-469.00
					Woodland Kv= 5.0 fps
10.9	257	Total			

Subcatchment E 1S: Subcat E 1S

Hydrograph



24-0264 Existing

Type III 24-hr 2-Year Rainfall=3.20"

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Summary for Subcatchment E 2S: Subcat E 2S

Runoff = 0.2 cfs @ 12.12 hrs, Volume= 572 cf, Depth= 0.83"
 Routed to Link E 1L : E 1L

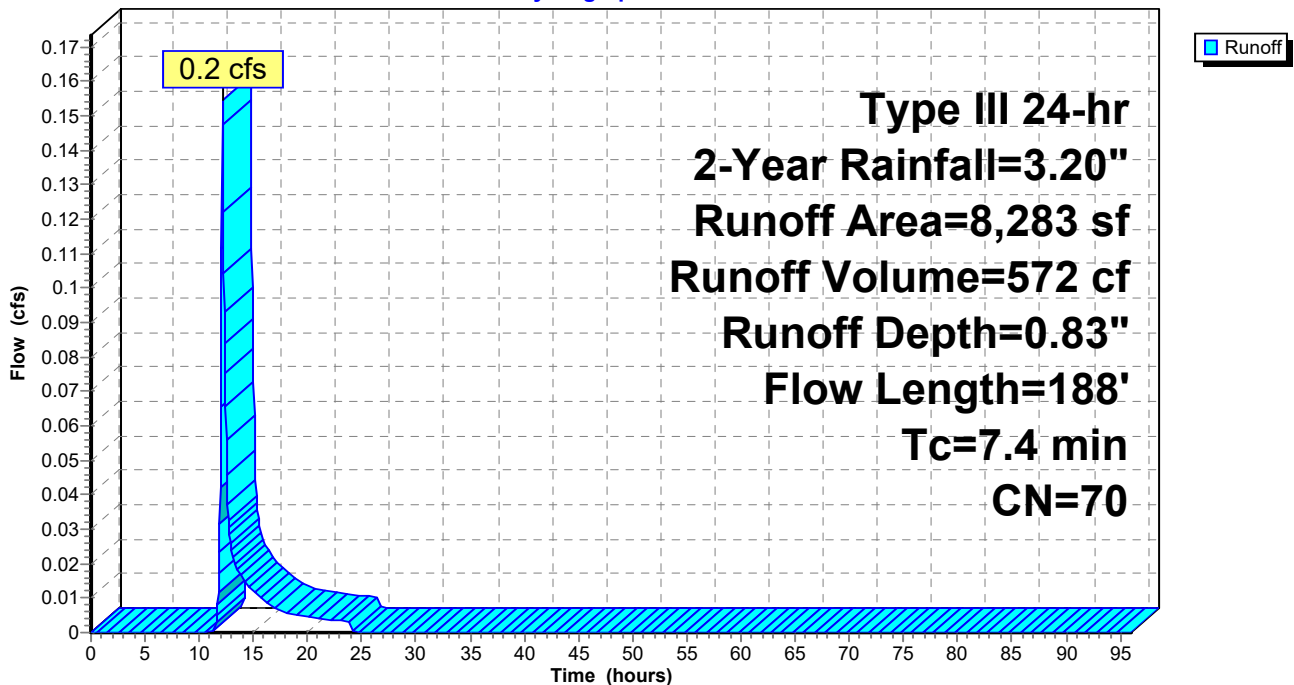
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
276	65	Brush, Good, HSG C
8,007	70	Woods, Good, HSG C
8,283	70	Weighted Average
8,283		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	50	0.1150	0.14		Sheet Flow, Upland 495.25-489.50 Woods: Light underbrush n= 0.400 P2= 3.20"
1.3	138	0.1270	1.78		Shallow Concentrated Flow, Remainder of Flowpath 489.50-472.00 Woodland Kv= 5.0 fps
7.4	188	Total			

Subcatchment E 2S: Subcat E 2S

Hydrograph



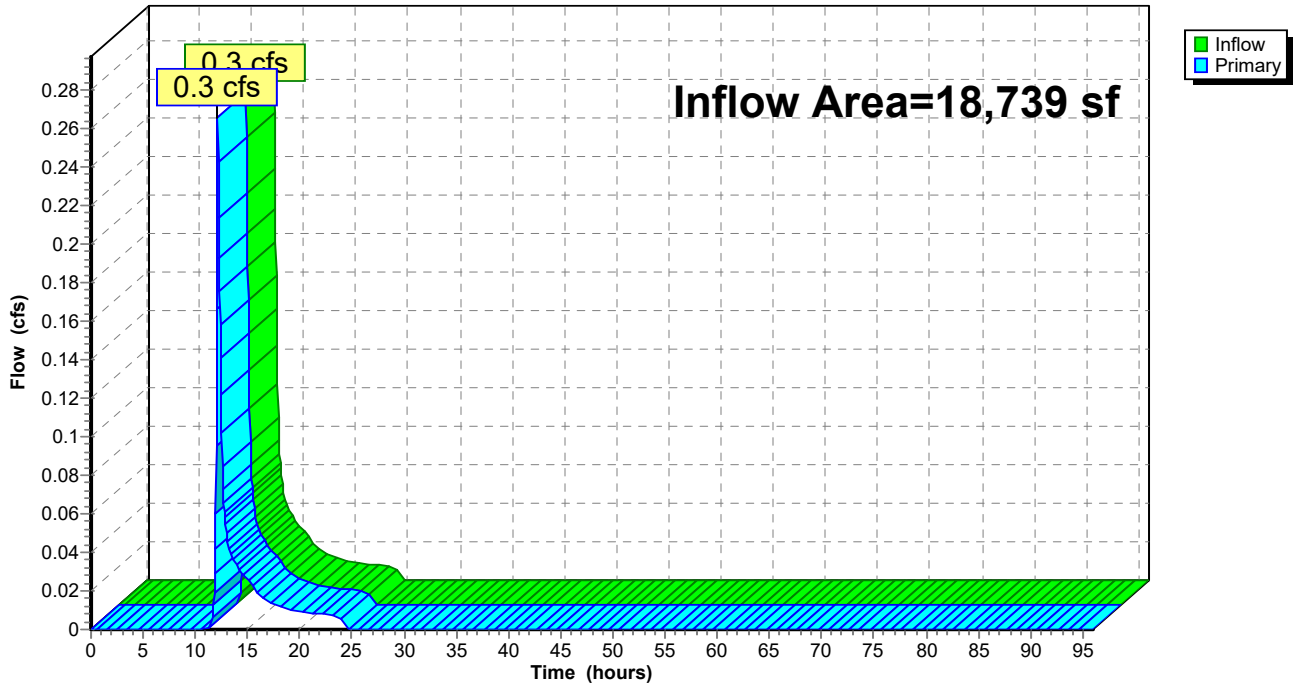
Summary for Link E 1L: E 1L

Inflow Area = 18,739 sf, 0.00% Impervious, Inflow Depth = 0.72" for 2-Year event
Inflow = 0.3 cfs @ 12.15 hrs, Volume= 1,132 cf
Primary = 0.3 cfs @ 12.15 hrs, Volume= 1,132 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs

Link E 1L: E 1L

Hydrograph



24-0264 Existing

Type III 24-hr 10-Year Rainfall=4.94"

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Time span=0.00-96.00 hrs, dt=0.05 hrs, 1921 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E 1S: Subcat E 1S

Runoff Area=10,456 sf 0.00% Impervious Runoff Depth=1.69"
Flow Length=257' Tc=10.9 min CN=66 Runoff=0.4 cfs 1,470 cf

Subcatchment E 2S: Subcat E 2S

Runoff Area=8,283 sf 0.00% Impervious Runoff Depth=1.99"
Flow Length=188' Tc=7.4 min CN=70 Runoff=0.4 cfs 1,375 cf

Link E 1L: E 1L

Inflow=0.8 cfs 2,845 cf
Primary=0.8 cfs 2,845 cf

Total Runoff Area = 18,739 sf Runoff Volume = 2,845 cf Average Runoff Depth = 1.82"
100.00% Pervious = 18,739 sf 0.00% Impervious = 0 sf

24-0264 Existing

Type III 24-hr 10-Year Rainfall=4.94"

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Summary for Subcatchment E 1S: Subcat E 1S

Runoff = 0.4 cfs @ 12.16 hrs, Volume= 1,470 cf, Depth= 1.69"
 Routed to Link E 1L : E 1L

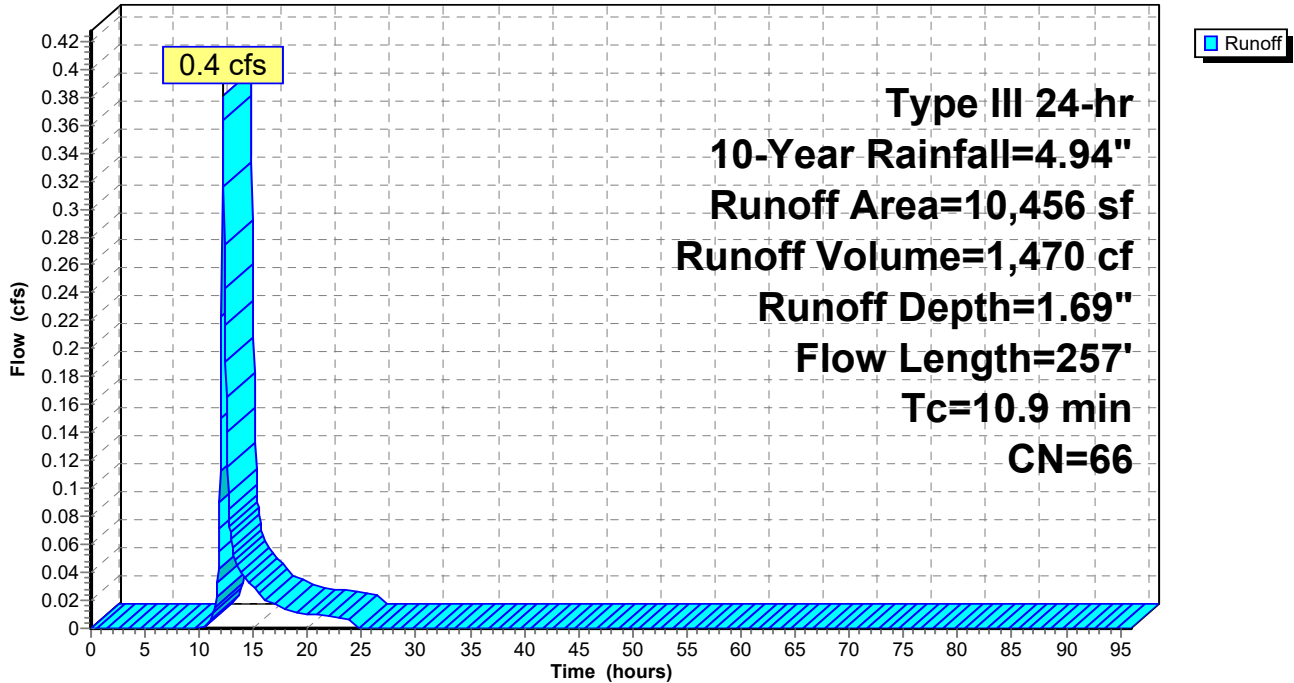
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-Year Rainfall=4.94"

Area (sf)	CN	Description
486	48	Brush, Good, HSG B
104	65	Brush, Good, HSG C
1,804	55	Woods, Good, HSG B
8,062	70	Woods, Good, HSG C
10,456	66	Weighted Average
10,456		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	50	0.0450	0.09		Sheet Flow, Upland 495.00-492.75
2.0	207	0.1150	1.70		Woods: Light underbrush n= 0.400 P2= 3.20"
					Shallow Concentrated Flow, Remainder of Flowpath 492.75-469.00
					Woodland Kv= 5.0 fps
10.9	257	Total			

Subcatchment E 1S: Subcat E 1S

Hydrograph



24-0264 Existing

Type III 24-hr 10-Year Rainfall=4.94"

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Summary for Subcatchment E 2S: Subcat E 2S

Runoff = 0.4 cfs @ 12.11 hrs, Volume= 1,375 cf, Depth= 1.99"
 Routed to Link E 1L : E 1L

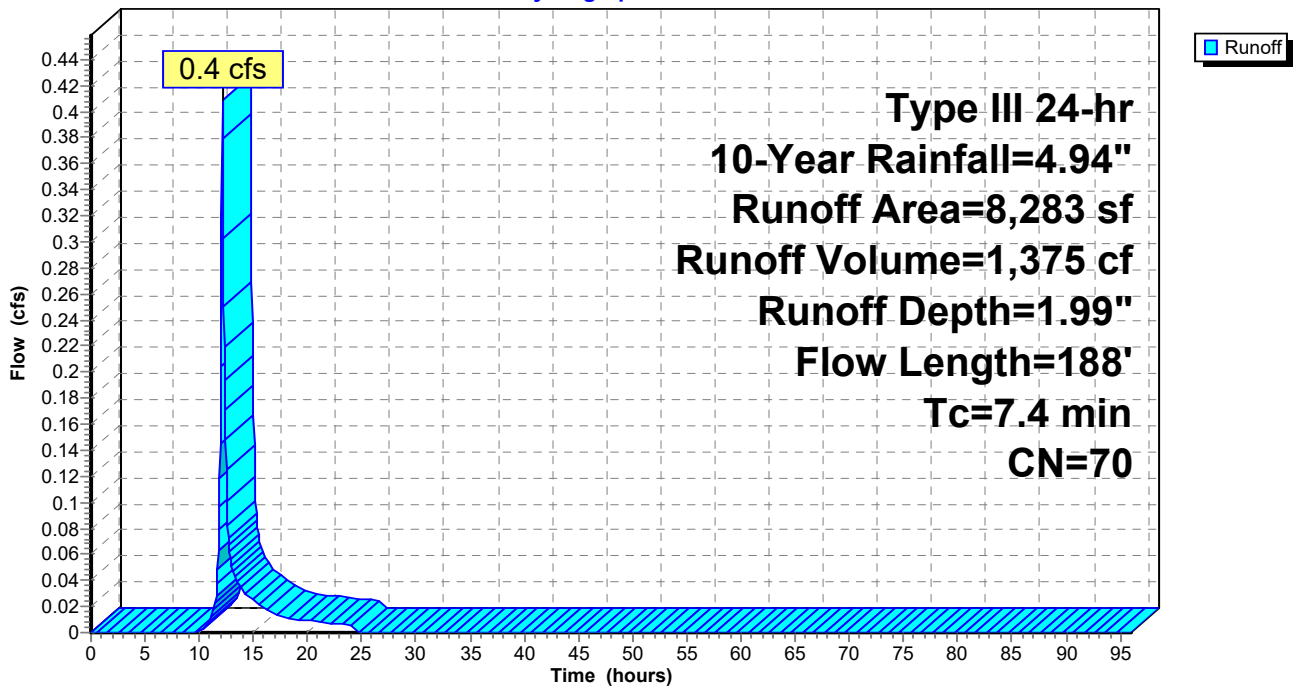
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-Year Rainfall=4.94"

Area (sf)	CN	Description
276	65	Brush, Good, HSG C
8,007	70	Woods, Good, HSG C
8,283	70	Weighted Average
8,283		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	50	0.1150	0.14		Sheet Flow, Upland 495.25-489.50 Woods: Light underbrush n= 0.400 P2= 3.20"
1.3	138	0.1270	1.78		Shallow Concentrated Flow, Remainder of Flowpath 489.50-472.00 Woodland Kv= 5.0 fps
7.4	188	Total			

Subcatchment E 2S: Subcat E 2S

Hydrograph



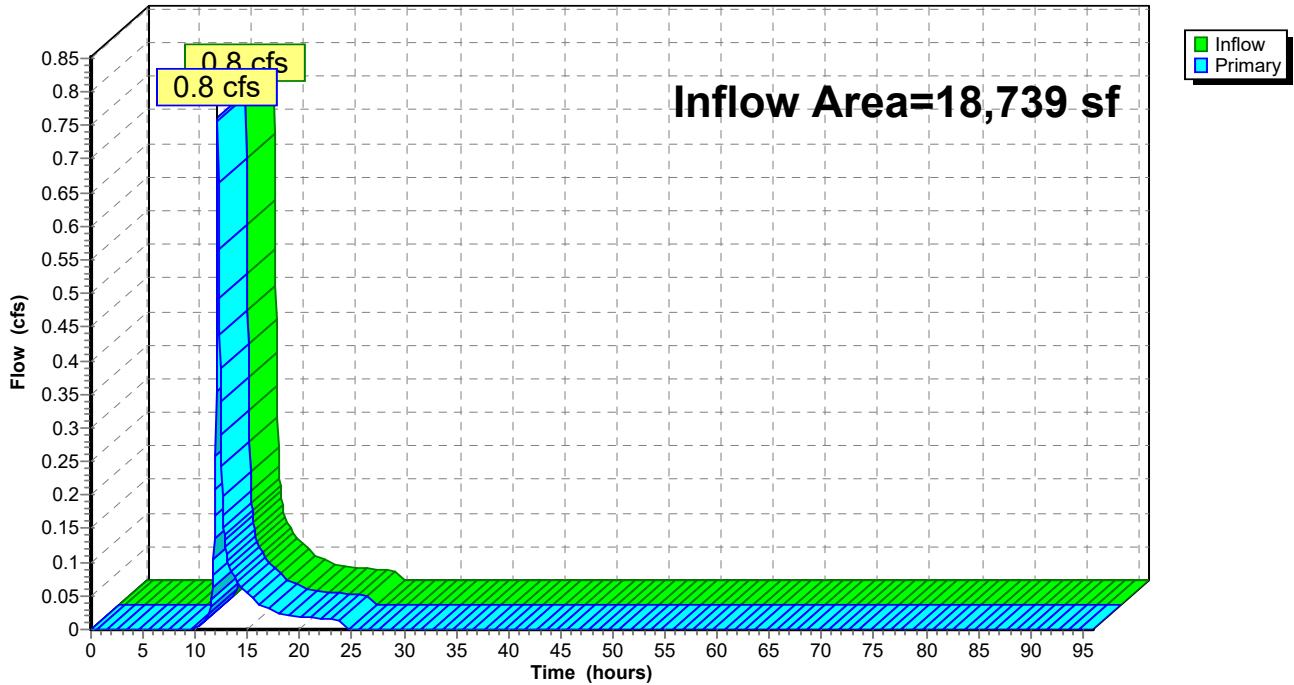
Summary for Link E 1L: E 1L

Inflow Area = 18,739 sf, 0.00% Impervious, Inflow Depth = 1.82" for 10-Year event
Inflow = 0.8 cfs @ 12.14 hrs, Volume= 2,845 cf
Primary = 0.8 cfs @ 12.14 hrs, Volume= 2,845 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs

Link E 1L: E 1L

Hydrograph



24-0264 Existing

Type III 24-hr 25-Year Rainfall=6.03"

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Time span=0.00-96.00 hrs, dt=0.05 hrs, 1921 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E 1S: Subcat E 1S

Runoff Area=10,456 sf 0.00% Impervious Runoff Depth=2.46"
Flow Length=257' Tc=10.9 min CN=66 Runoff=0.6 cfs 2,146 cf

Subcatchment E 2S: Subcat E 2S

Runoff Area=8,283 sf 0.00% Impervious Runoff Depth=2.83"
Flow Length=188' Tc=7.4 min CN=70 Runoff=0.6 cfs 1,953 cf

Link E 1L: E 1L

Inflow=1.1 cfs 4,098 cf
Primary=1.1 cfs 4,098 cf

Total Runoff Area = 18,739 sf Runoff Volume = 4,098 cf Average Runoff Depth = 2.62"
100.00% Pervious = 18,739 sf 0.00% Impervious = 0 sf

24-0264 Existing

Type III 24-hr 25-Year Rainfall=6.03"

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Summary for Subcatchment E 1S: Subcat E 1S

Runoff = 0.6 cfs @ 12.16 hrs, Volume= 2,146 cf, Depth= 2.46"
 Routed to Link E 1L : E 1L

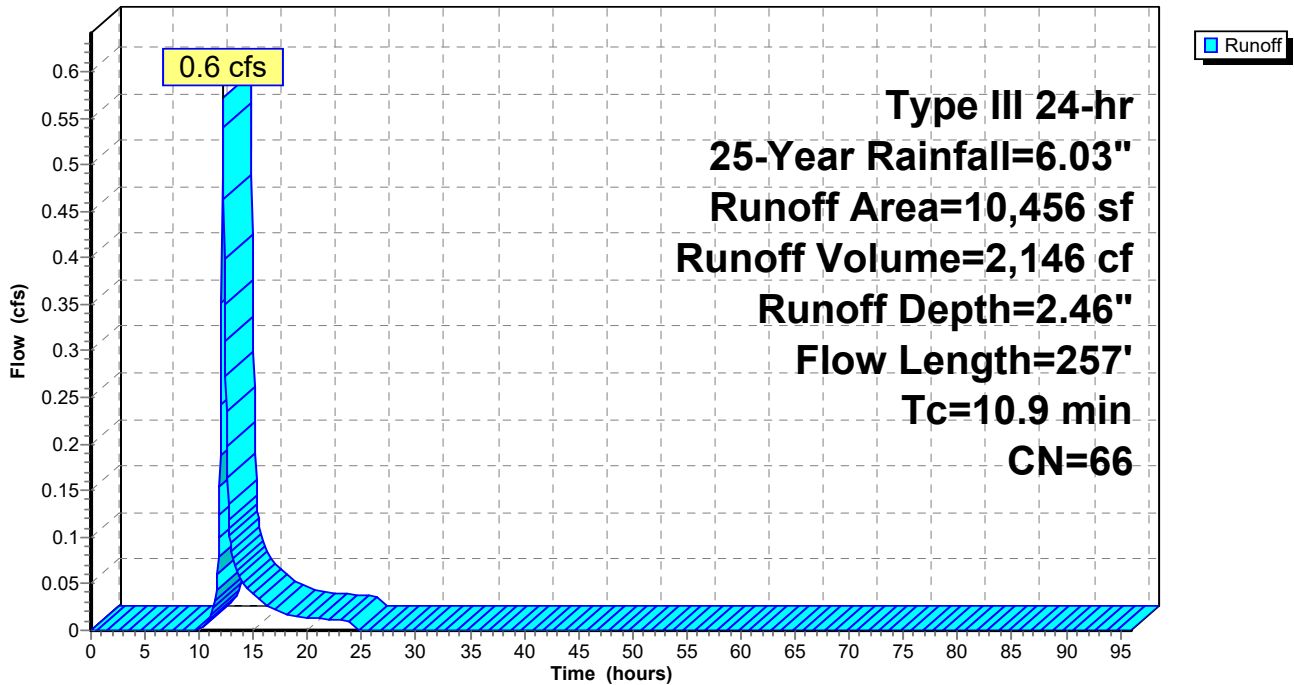
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25-Year Rainfall=6.03"

Area (sf)	CN	Description
486	48	Brush, Good, HSG B
104	65	Brush, Good, HSG C
1,804	55	Woods, Good, HSG B
8,062	70	Woods, Good, HSG C
10,456	66	Weighted Average
10,456		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	50	0.0450	0.09		Sheet Flow, Upland 495.00-492.75
					Woods: Light underbrush n= 0.400 P2= 3.20"
2.0	207	0.1150	1.70		Shallow Concentrated Flow, Remainder of Flowpath 492.75-469.00
					Woodland Kv= 5.0 fps
10.9	257	Total			

Subcatchment E 1S: Subcat E 1S

Hydrograph



24-0264 Existing

Type III 24-hr 25-Year Rainfall=6.03"

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Summary for Subcatchment E 2S: Subcat E 2S

Runoff = 0.6 cfs @ 12.11 hrs, Volume= 1,953 cf, Depth= 2.83"
 Routed to Link E 1L : E 1L

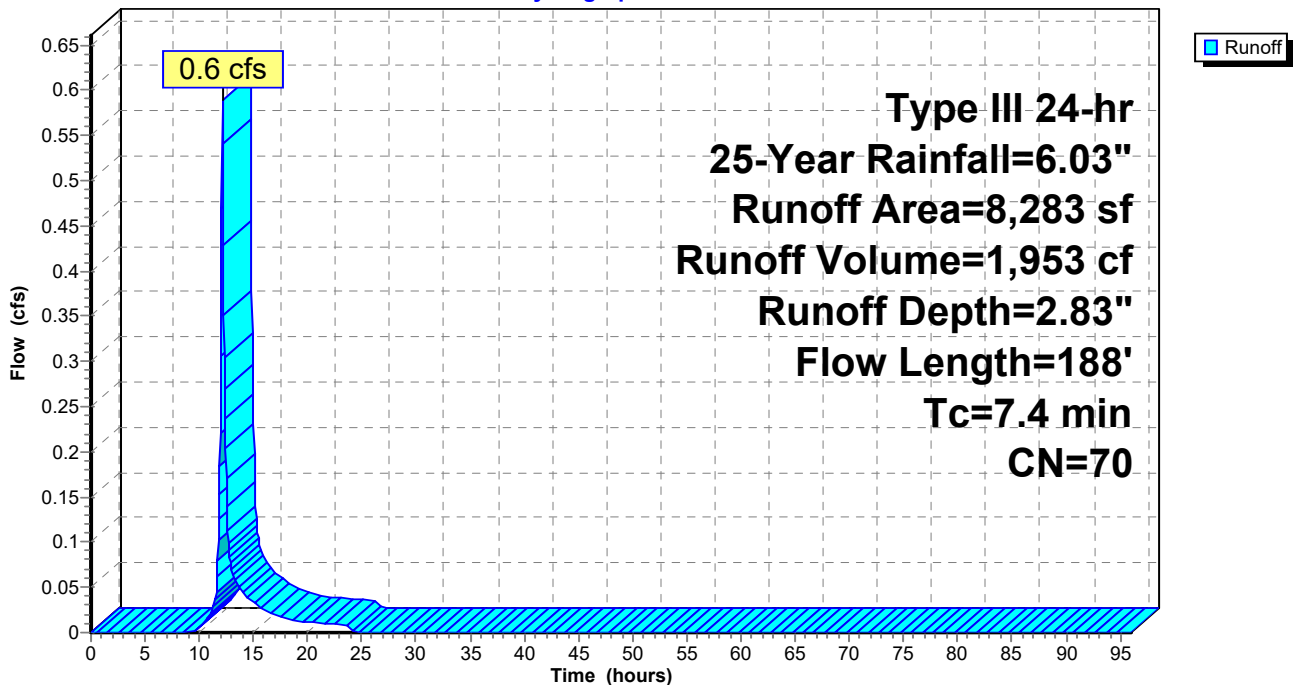
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25-Year Rainfall=6.03"

Area (sf)	CN	Description
276	65	Brush, Good, HSG C
8,007	70	Woods, Good, HSG C
8,283	70	Weighted Average
8,283		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	50	0.1150	0.14		Sheet Flow, Upland 495.25-489.50 Woods: Light underbrush n= 0.400 P2= 3.20"
1.3	138	0.1270	1.78		Shallow Concentrated Flow, Remainder of Flowpath 489.50-472.00 Woodland Kv= 5.0 fps
7.4	188	Total			

Subcatchment E 2S: Subcat E 2S

Hydrograph



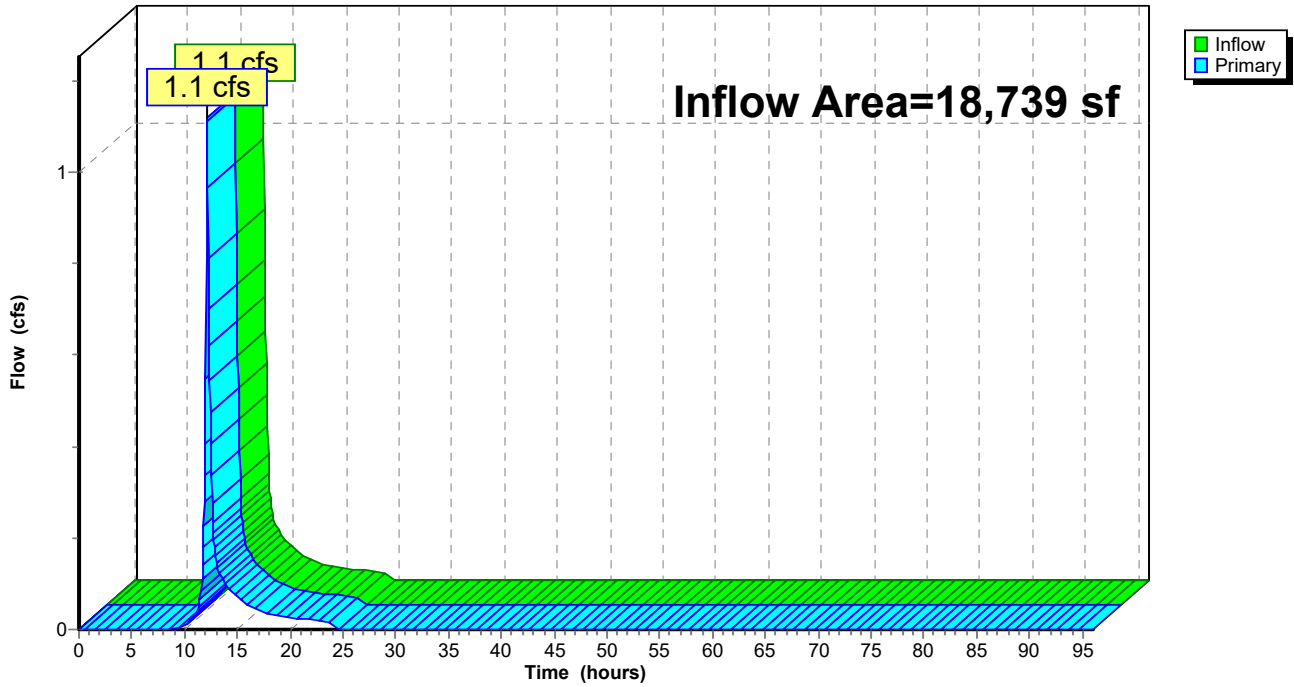
Summary for Link E 1L: E 1L

Inflow Area = 18,739 sf, 0.00% Impervious, Inflow Depth = 2.62" for 25-Year event
Inflow = 1.1 cfs @ 12.13 hrs, Volume= 4,098 cf
Primary = 1.1 cfs @ 12.13 hrs, Volume= 4,098 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs

Link E 1L: E 1L

Hydrograph



24-0264 Existing

Type III 24-hr 100-Year Rainfall=7.70"

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Time span=0.00-96.00 hrs, dt=0.05 hrs, 1921 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E 1S: Subcat E 1S

Runoff Area=10,456 sf 0.00% Impervious Runoff Depth=3.76"
Flow Length=257' Tc=10.9 min CN=66 Runoff=0.9 cfs 3,279 cf

Subcatchment E 2S: Subcat E 2S

Runoff Area=8,283 sf 0.00% Impervious Runoff Depth=4.21"
Flow Length=188' Tc=7.4 min CN=70 Runoff=0.9 cfs 2,904 cf

Link E 1L: E 1L

Inflow=1.7 cfs 6,183 cf
Primary=1.7 cfs 6,183 cf

Total Runoff Area = 18,739 sf Runoff Volume = 6,183 cf Average Runoff Depth = 3.96"
100.00% Pervious = 18,739 sf 0.00% Impervious = 0 sf

24-0264 Existing

Type III 24-hr 100-Year Rainfall=7.70"

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Summary for Subcatchment E 1S: Subcat E 1S

Runoff = 0.9 cfs @ 12.16 hrs, Volume= 3,279 cf, Depth= 3.76"
 Routed to Link E 1L : E 1L

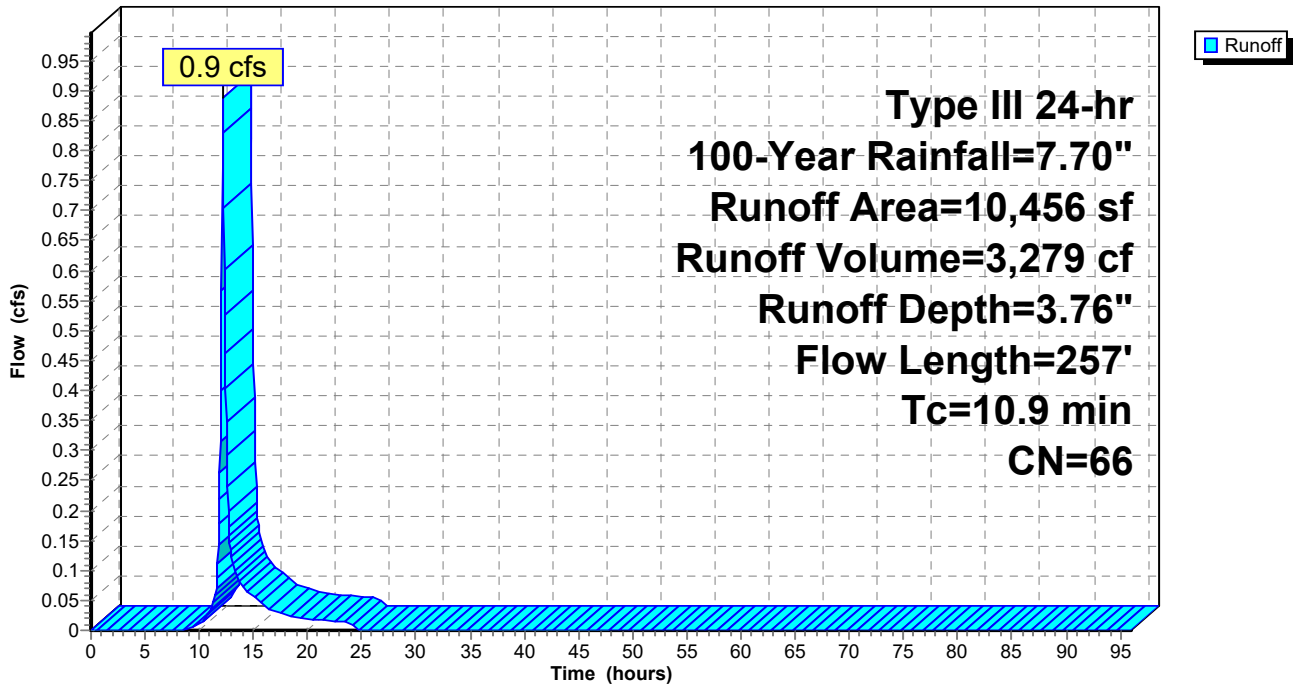
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-Year Rainfall=7.70"

Area (sf)	CN	Description
486	48	Brush, Good, HSG B
104	65	Brush, Good, HSG C
1,804	55	Woods, Good, HSG B
8,062	70	Woods, Good, HSG C
10,456	66	Weighted Average
10,456		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	50	0.0450	0.09		Sheet Flow, Upland 495.00-492.75
2.0	207	0.1150	1.70		Woods: Light underbrush n= 0.400 P2= 3.20"
					Shallow Concentrated Flow, Remainder of Flowpath 492.75-469.00
					Woodland Kv= 5.0 fps
10.9	257	Total			

Subcatchment E 1S: Subcat E 1S

Hydrograph



24-0264 Existing

Type III 24-hr 100-Year Rainfall=7.70"

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Summary for Subcatchment E 2S: Subcat E 2S

Runoff = 0.9 cfs @ 12.11 hrs, Volume= 2,904 cf, Depth= 4.21"
 Routed to Link E 1L : E 1L

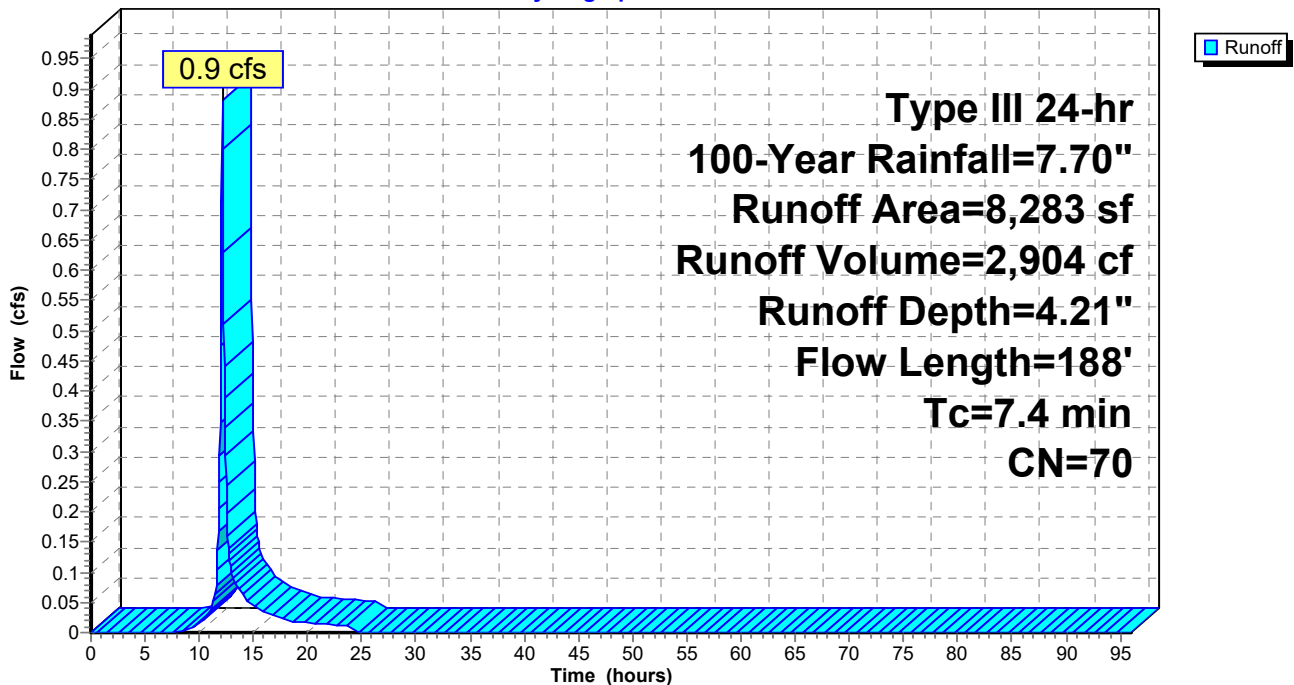
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-Year Rainfall=7.70"

Area (sf)	CN	Description
276	65	Brush, Good, HSG C
8,007	70	Woods, Good, HSG C
8,283	70	Weighted Average
8,283		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	50	0.1150	0.14		Sheet Flow, Upland 495.25-489.50 Woods: Light underbrush n= 0.400 P2= 3.20"
1.3	138	0.1270	1.78		Shallow Concentrated Flow, Remainder of Flowpath 489.50-472.00 Woodland Kv= 5.0 fps
7.4	188	Total			

Subcatchment E 2S: Subcat E 2S

Hydrograph



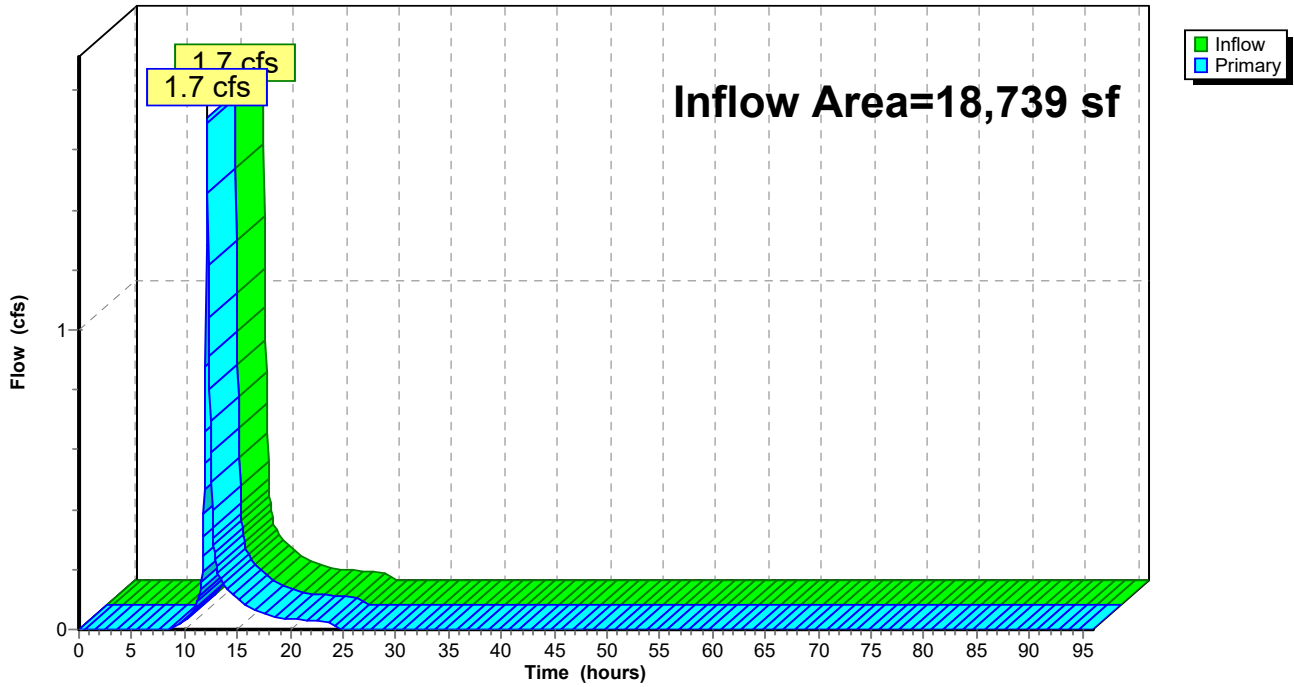
Summary for Link E 1L: E 1L

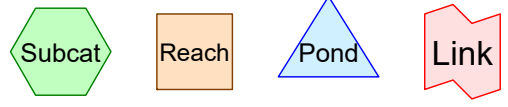
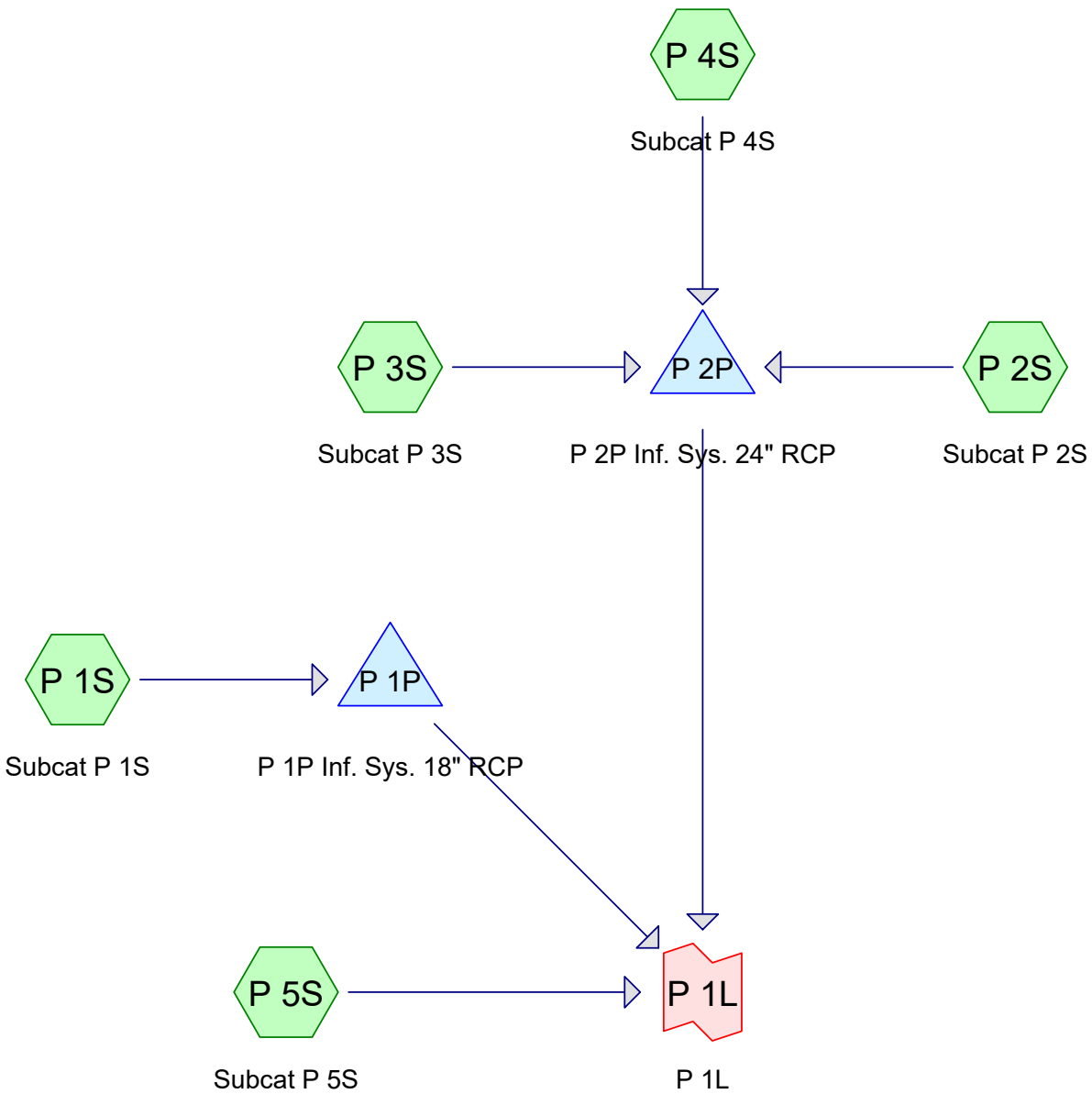
Inflow Area = 18,739 sf, 0.00% Impervious, Inflow Depth = 3.96" for 100-Year event
Inflow = 1.7 cfs @ 12.13 hrs, Volume= 6,183 cf
Primary = 1.7 cfs @ 12.13 hrs, Volume= 6,183 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs

Link E 1L: E 1L

Hydrograph





Routing Diagram for 24-0264 Proposed
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24-0264 Proposed

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Page 2

Area Listing (selected nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
386	61	>75% Grass cover, Good, HSG B (P 1S, P 5S)
7,128	74	>75% Grass cover, Good, HSG C (P 1S, P 2S, P 5S)
2,079	71	Meadow, non-grazed, HSG C (P 5S)
1,292	98	Paved parking, HSG B (P 1S)
216	98	Paved parking, HSG C (P 1S)
512	98	Roofs, HSG B (P 3S, P 4S)
2,073	98	Roofs, HSG C (P 3S, P 4S)
100	98	Unconnected pavement, HSG B (P 1S)
200	98	Unconnected pavement, HSG C (P 1S)
4,753	70	Woods, Good, HSG C (P 5S)
18,739	78	TOTAL AREA

24-0264 Proposed

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Page 3

Soil Listing (selected nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
2,290	HSG B	P 1S, P 3S, P 4S, P 5S
16,449	HSG C	P 1S, P 2S, P 3S, P 4S, P 5S
0	HSG D	
0	Other	
18,739		TOTAL AREA

24-0264 Proposed

Type III 24-hr 2-Year Rainfall=3.20"

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Time span=0.00-96.00 hrs, dt=0.04 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment P 1S: Subcat P 1S	Runoff Area=2,361 sf 76.58% Impervious Runoff Depth=2.17" Tc=6.0 min CN=90 Runoff=0.1 cfs 427 cf
Subcatchment P 2S: Subcat P 2S	Runoff Area=3,019 sf 0.00% Impervious Runoff Depth=1.04" Tc=6.0 min CN=74 Runoff=0.1 cfs 261 cf
Subcatchment P 3S: Subcat P 3S	Runoff Area=1,337 sf 100.00% Impervious Runoff Depth=2.97" Tc=6.0 min CN=98 Runoff=0.1 cfs 331 cf
Subcatchment P 4S: Subcat P 4S	Runoff Area=1,248 sf 100.00% Impervious Runoff Depth=2.97" Tc=6.0 min CN=98 Runoff=0.1 cfs 309 cf
Subcatchment P 5S: Subcat P 5S	Runoff Area=10,774 sf 0.00% Impervious Runoff Depth=0.93" Tc=6.0 min CN=72 Runoff=0.2 cfs 835 cf
Pond P 1P: P 1P Inf. Sys. 18" RCP	Peak Elev=489.64' Storage=196 cf Inflow=0.1 cfs 427 cf Discarded=0.0 cfs 427 cf Primary=0.0 cfs 0 cf Outflow=0.0 cfs 427 cf
Pond P 2P: P 2P Inf. Sys. 24" RCP	Peak Elev=475.75' Storage=566 cf Inflow=0.3 cfs 900 cf Discarded=0.0 cfs 900 cf Primary=0.0 cfs 0 cf Outflow=0.0 cfs 900 cf
Link P 1L: P 1L	Inflow=0.2 cfs 835 cf Primary=0.2 cfs 835 cf

**Total Runoff Area = 18,739 sf Runoff Volume = 2,162 cf Average Runoff Depth = 1.38"
76.56% Pervious = 14,346 sf 23.44% Impervious = 4,393 sf**

Summary for Subcatchment P 1S: Subcat P 1S

Runoff = 0.1 cfs @ 12.09 hrs, Volume= 427 cf, Depth= 2.17"
 Routed to Pond P 1P : P 1P Inf. Sys. 18" RCP

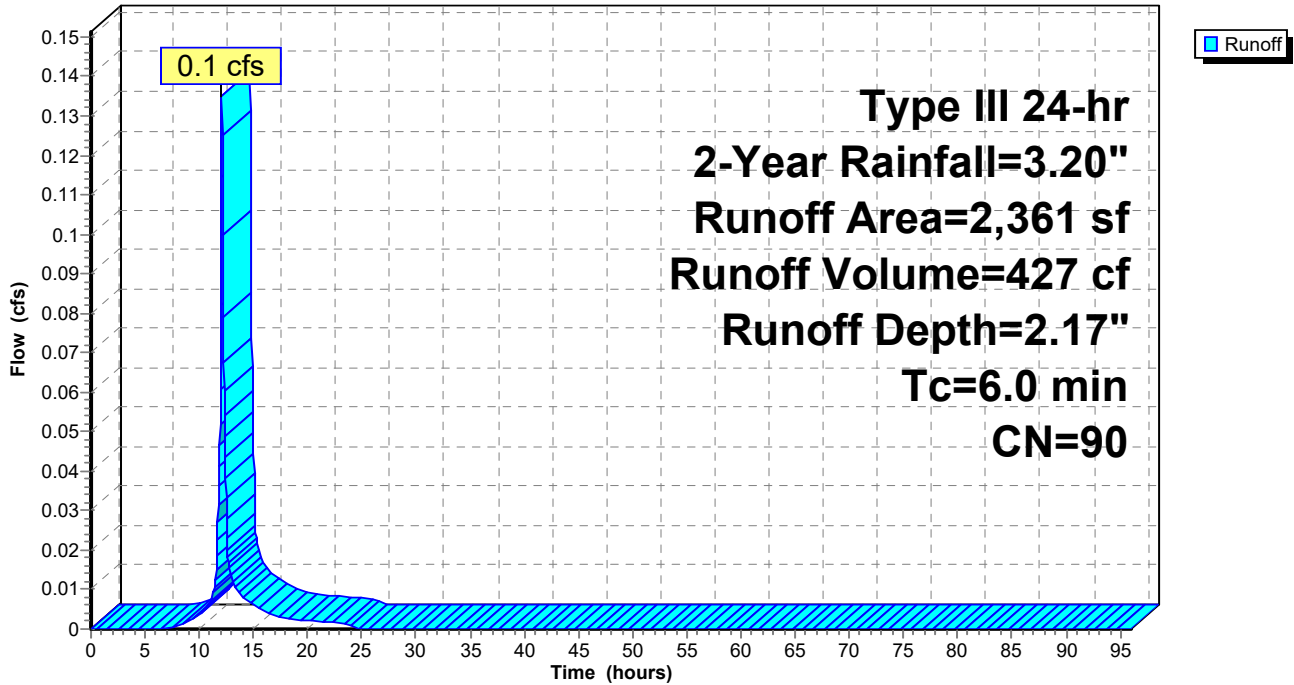
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs
 Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
349	61	>75% Grass cover, Good, HSG B
204	74	>75% Grass cover, Good, HSG C
1,292	98	Paved parking, HSG B
216	98	Paved parking, HSG C
100	98	Unconnected pavement, HSG B
200	98	Unconnected pavement, HSG C
2,361	90	Weighted Average
553		23.42% Pervious Area
1,808		76.58% Impervious Area
300		16.59% Unconnected

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

Subcatchment P 1S: Subcat P 1S

Hydrograph



24-0264 Proposed

Type III 24-hr 2-Year Rainfall=3.20"

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Summary for Subcatchment P 2S: Subcat P 2S

Runoff = 0.1 cfs @ 12.10 hrs, Volume= 261 cf, Depth= 1.04"
Routed to Pond P 2P : P 2P Inf. Sys. 24" RCP

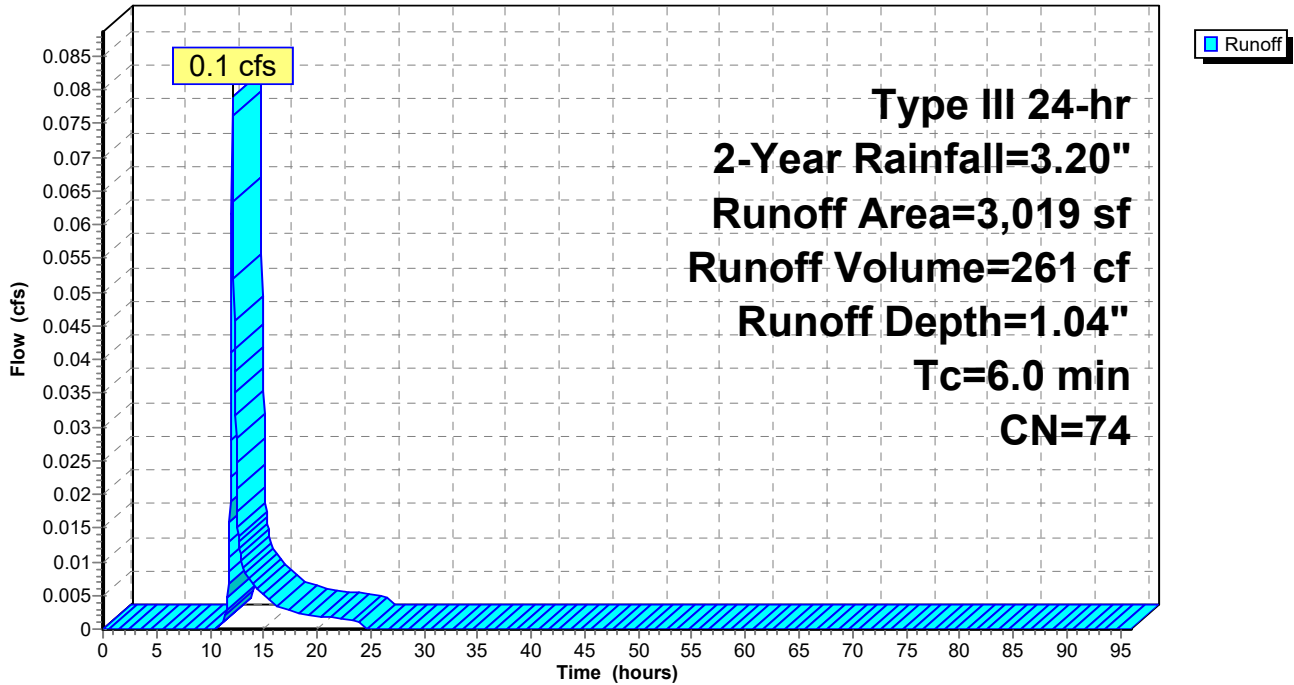
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
3,019	74	>75% Grass cover, Good, HSG C
3,019		100.00% Pervious Area

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

Subcatchment P 2S: Subcat P 2S

Hydrograph



Summary for Subcatchment P 3S: Subcat P 3S

Runoff = 0.1 cfs @ 12.08 hrs, Volume= 331 cf, Depth= 2.97"
 Routed to Pond P 2P : P 2P Inf. Sys. 24" RCP

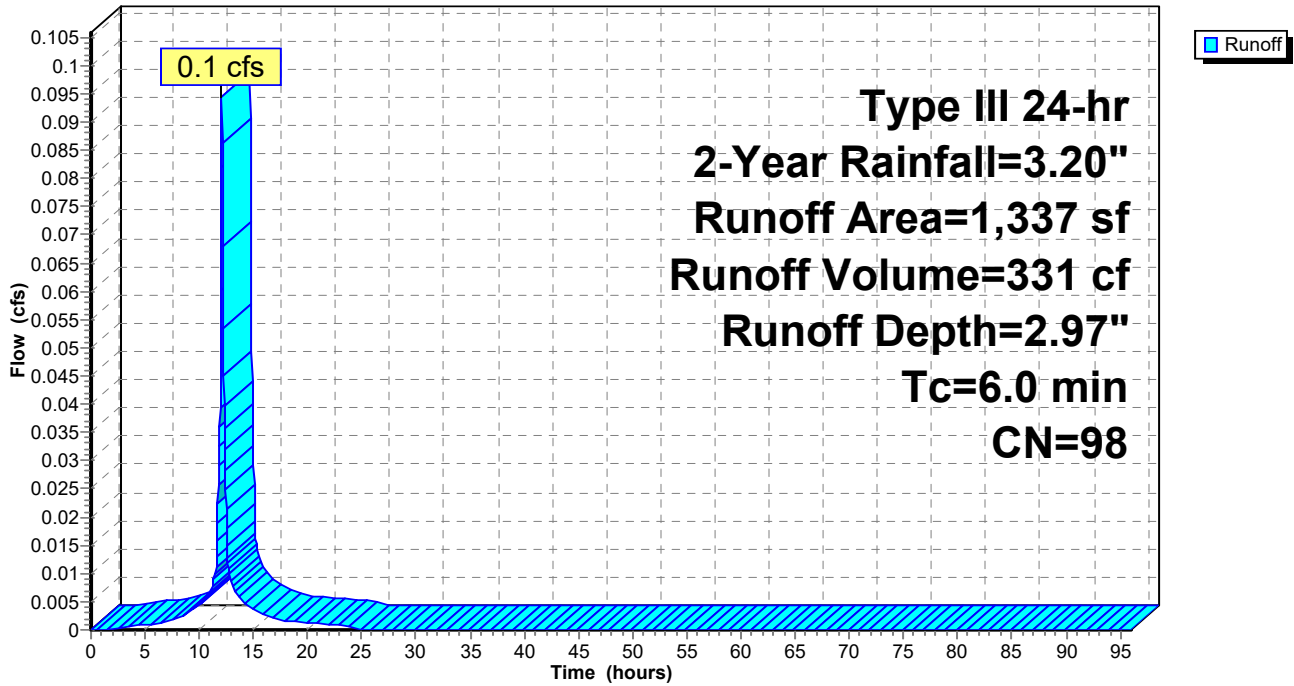
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs
 Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
456	98	Roofs, HSG B
881	98	Roofs, HSG C
1,337	98	Weighted Average
1,337		100.00% Impervious Area

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

Subcatchment P 3S: Subcat P 3S

Hydrograph



Summary for Subcatchment P 4S: Subcat P 4S

Runoff = 0.1 cfs @ 12.08 hrs, Volume= 309 cf, Depth= 2.97"
 Routed to Pond P 2P : P 2P Inf. Sys. 24" RCP

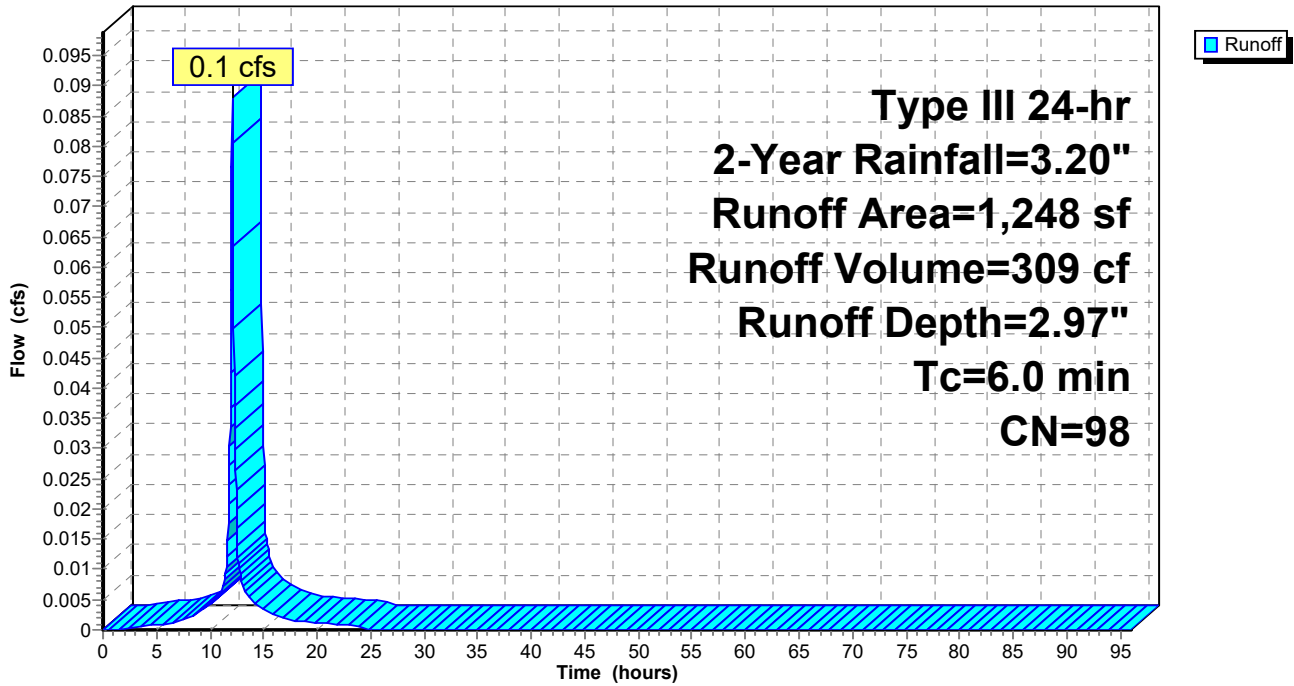
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs
 Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
56	98	Roofs, HSG B
1,192	98	Roofs, HSG C
1,248	98	Weighted Average
1,248		100.00% Impervious Area

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

Subcatchment P 4S: Subcat P 4S

Hydrograph



24-0264 Proposed

Type III 24-hr 2-Year Rainfall=3.20"

Prepared by Land Design Collaborative

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Summary for Subcatchment P 5S: Subcat P 5S

Runoff = 0.2 cfs @ 12.10 hrs, Volume= 835 cf, Depth= 0.93"
 Routed to Link P 1L : P 1L

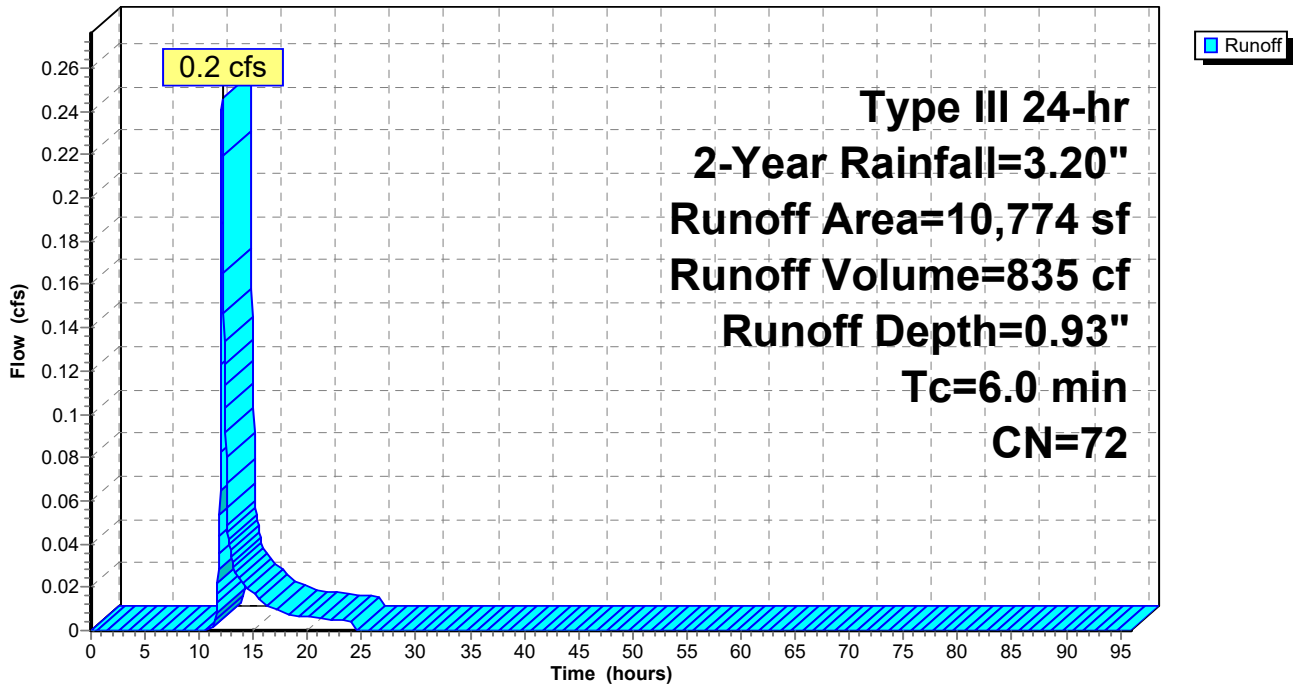
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs
 Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
37	61	>75% Grass cover, Good, HSG B
3,905	74	>75% Grass cover, Good, HSG C
4,753	70	Woods, Good, HSG C
2,079	71	Meadow, non-grazed, HSG C
10,774	72	Weighted Average
10,774		100.00% Pervious Area

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

Subcatchment P 5S: Subcat P 5S

Hydrograph



24-0264 Proposed

Type III 24-hr 2-Year Rainfall=3.20"

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Summary for Pond P 1P: P 1P Inf. Sys. 18" RCP

Inflow Area = 2,361 sf, 76.58% Impervious, Inflow Depth = 2.17" for 2-Year event
 Inflow = 0.1 cfs @ 12.09 hrs, Volume= 427 cf
 Outflow = 0.0 cfs @ 12.08 hrs, Volume= 427 cf, Atten= 94%, Lag= 0.0 min
 Discarded = 0.0 cfs @ 12.08 hrs, Volume= 427 cf
 Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf
 Routed to Link P 1L : P 1L

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs / 2
 Peak Elev= 489.64' @ 14.02 hrs Surf.Area= 338 sf Storage= 196 cf

Plug-Flow detention time= 226.6 min calculated for 426 cf (100% of inflow)
 Center-of-Mass det. time= 226.5 min (1,033.4 - 806.9)

Volume	Invert	Avail.Storage	Storage Description
#1	489.00'	1 cf	0.50'D x 1.33'H Vertical Cone/Cylinder x 2
#2	489.00'	170 cf	18.0" Round Pipe Storage x 3 Inside #3 L= 32.0'
#3	488.50'	270 cf	9.38'W x 36.00'L x 2.50'H Prismatic 844 cf Overall - 170 cf Embedded = 675 cf x 40.0% Voids
		440 cf	Total Available Storage

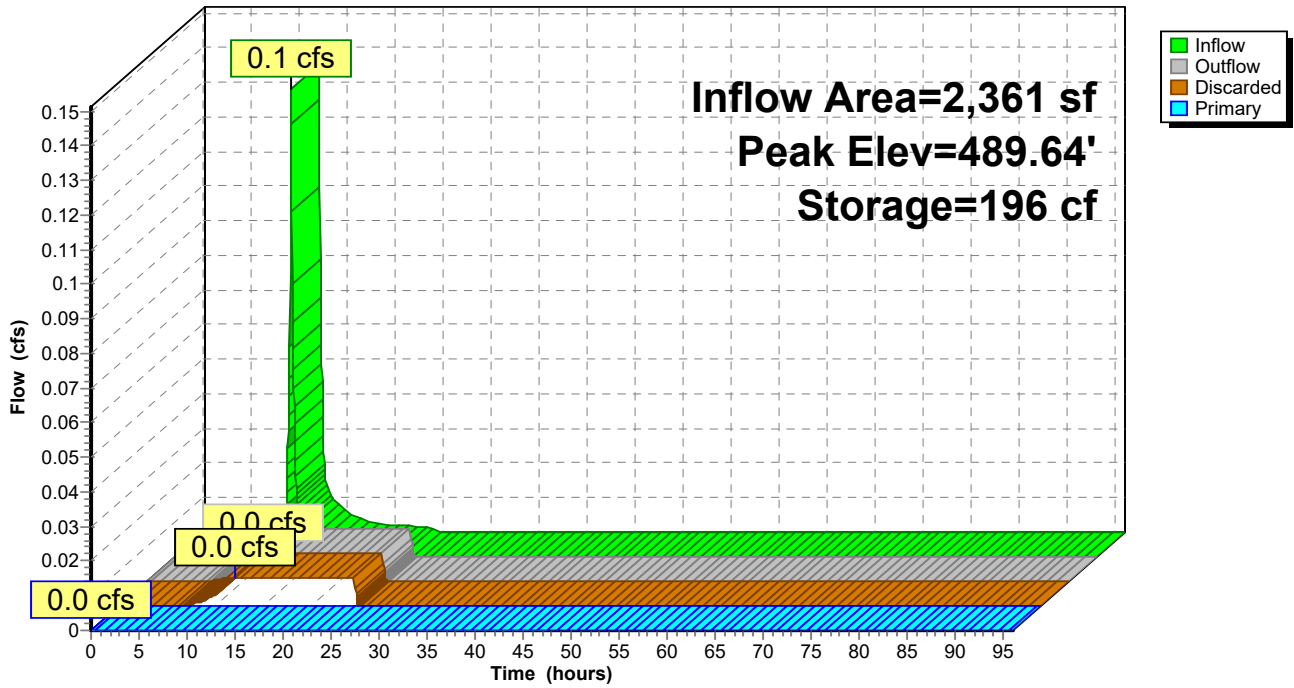
Device	Routing	Invert	Outlet Devices
#1	Primary	490.32'	16.0' long x 1.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32
#2	Discarded	488.50'	1.020 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.0 cfs @ 12.08 hrs HW=489.08' (Free Discharge)
 ↑**2=Exfiltration** (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=488.50' (Free Discharge)
 ↑**1=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Pond P 1P: P 1P Inf. Sys. 18" RCP

Hydrograph



24-0264 Proposed

Type III 24-hr 2-Year Rainfall=3.20"

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Summary for Pond P 2P: P 2P Inf. Sys. 24" RCP

Inflow Area = 5,604 sf, 46.13% Impervious, Inflow Depth = 1.93" for 2-Year event
 Inflow = 0.3 cfs @ 12.09 hrs, Volume= 900 cf
 Outflow = 0.0 cfs @ 11.84 hrs, Volume= 900 cf, Atten= 97%, Lag= 0.0 min
 Discarded = 0.0 cfs @ 11.84 hrs, Volume= 900 cf
 Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf
 Routed to Link P 1L : P 1L

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs / 2
 Peak Elev= 475.75' @ 17.21 hrs Surf.Area= 560 sf Storage= 566 cf

Plug-Flow detention time= 790.9 min calculated for 900 cf (100% of inflow)
 Center-of-Mass det. time= 791.2 min (1,578.3 - 787.0)

Volume	Invert	Avail.Storage	Storage Description
#1	474.50'	7 cf	0.75'D x 16.51'H Vertical Cone/Cylinder
#2	474.50'	440 cf	24.0" Round Pipe Storage x 4 Inside #3 L= 35.0'
#3	474.00'	496 cf	14.35'W x 39.00'L x 3.00'H Prismatic 1,679 cf Overall - 440 cf Embedded = 1,239 cf x 40.0% Voids
		943 cf	Total Available Storage

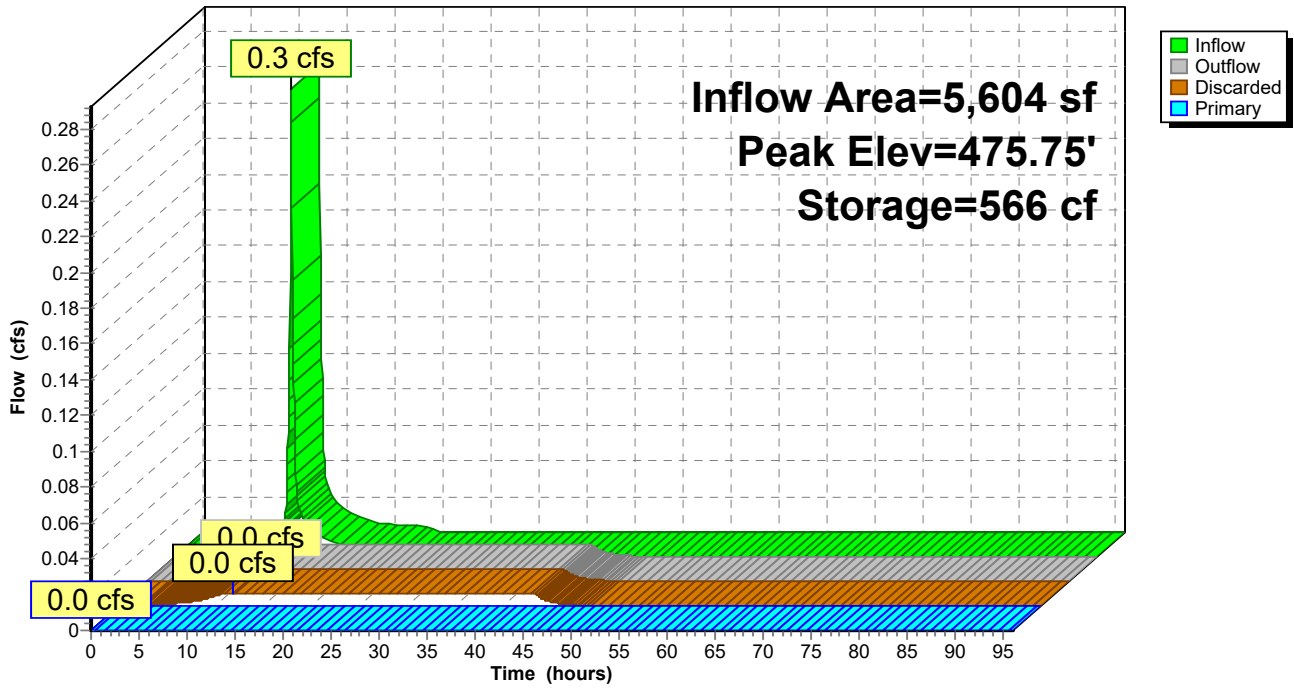
Device	Routing	Invert	Outlet Devices
#1	Primary	489.90'	8.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#2	Discarded	474.00'	0.520 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.0 cfs @ 11.84 hrs HW=474.51' (Free Discharge)
 ↑**2=Exfiltration** (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=474.00' (Free Discharge)
 ↑**1=Orifice/Grate** (Controls 0.0 cfs)

Pond P 2P: P 2P Inf. Sys. 24" RCP

Hydrograph



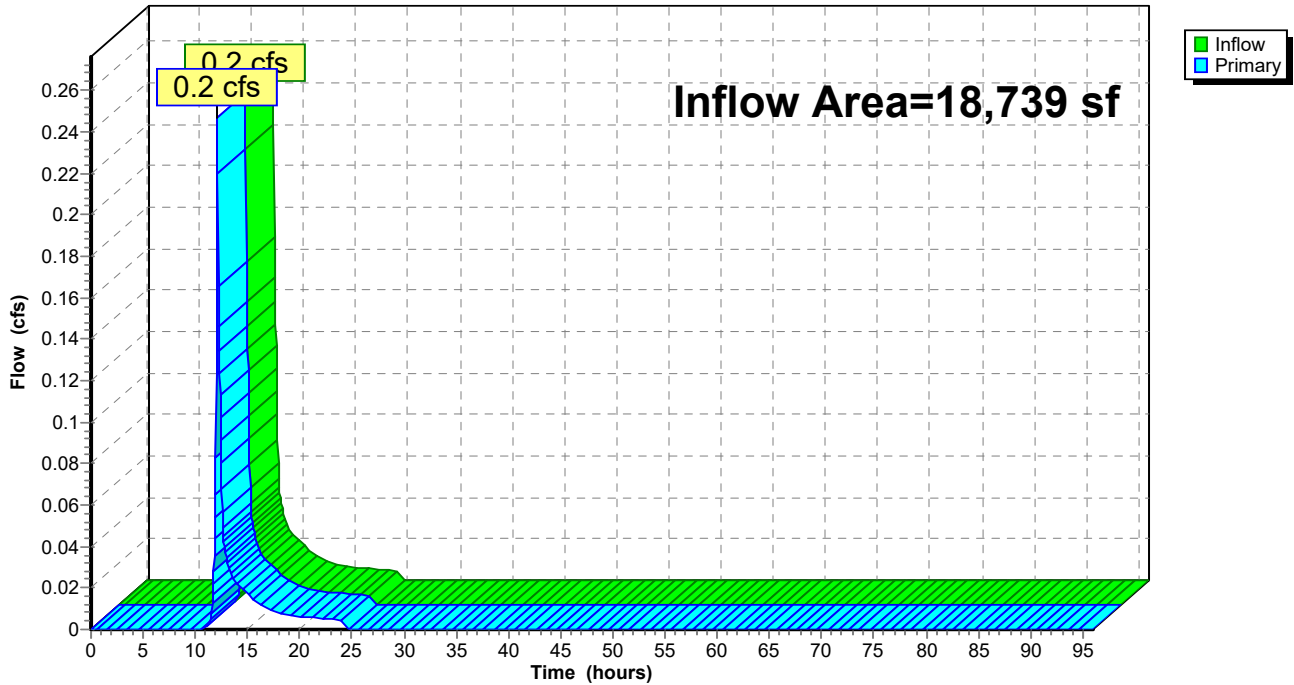
Summary for Link P 1L: P 1L

Inflow Area = 18,739 sf, 23.44% Impervious, Inflow Depth = 0.53" for 2-Year event
Inflow = 0.2 cfs @ 12.10 hrs, Volume= 835 cf
Primary = 0.2 cfs @ 12.10 hrs, Volume= 835 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs

Link P 1L: P 1L

Hydrograph



24-0264 Proposed

Type III 24-hr 10-Year Rainfall=4.94"

Prepared by Land Design Collaborative

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Time span=0.00-96.00 hrs, dt=0.04 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment P 1S: Subcat P 1S	Runoff Area=2,361 sf 76.58% Impervious Runoff Depth=3.82" Tc=6.0 min CN=90 Runoff=0.2 cfs 751 cf
Subcatchment P 2S: Subcat P 2S	Runoff Area=3,019 sf 0.00% Impervious Runoff Depth=2.32" Tc=6.0 min CN=74 Runoff=0.2 cfs 583 cf
Subcatchment P 3S: Subcat P 3S	Runoff Area=1,337 sf 100.00% Impervious Runoff Depth=4.70" Tc=6.0 min CN=98 Runoff=0.1 cfs 524 cf
Subcatchment P 4S: Subcat P 4S	Runoff Area=1,248 sf 100.00% Impervious Runoff Depth=4.70" Tc=6.0 min CN=98 Runoff=0.1 cfs 489 cf
Subcatchment P 5S: Subcat P 5S	Runoff Area=10,774 sf 0.00% Impervious Runoff Depth=2.15" Tc=6.0 min CN=72 Runoff=0.6 cfs 1,932 cf
Pond P 1P: P 1P Inf. Sys. 18" RCP	Peak Elev=490.33' Storage=343 cf Inflow=0.2 cfs 751 cf Discarded=0.0 cfs 670 cf Primary=0.0 cfs 82 cf Outflow=0.0 cfs 752 cf
Pond P 2P: P 2P Inf. Sys. 24" RCP	Peak Elev=489.96' Storage=942 cf Inflow=0.5 cfs 1,596 cf Discarded=0.0 cfs 1,370 cf Primary=0.0 cfs 201 cf Outflow=0.0 cfs 1,571 cf
Link P 1L: P 1L	Inflow=0.6 cfs 2,215 cf Primary=0.6 cfs 2,215 cf

**Total Runoff Area = 18,739 sf Runoff Volume = 4,279 cf Average Runoff Depth = 2.74"
76.56% Pervious = 14,346 sf 23.44% Impervious = 4,393 sf**

Summary for Subcatchment P 1S: Subcat P 1S

Runoff = 0.2 cfs @ 12.09 hrs, Volume= 751 cf, Depth= 3.82"
 Routed to Pond P 1P : P 1P Inf. Sys. 18" RCP

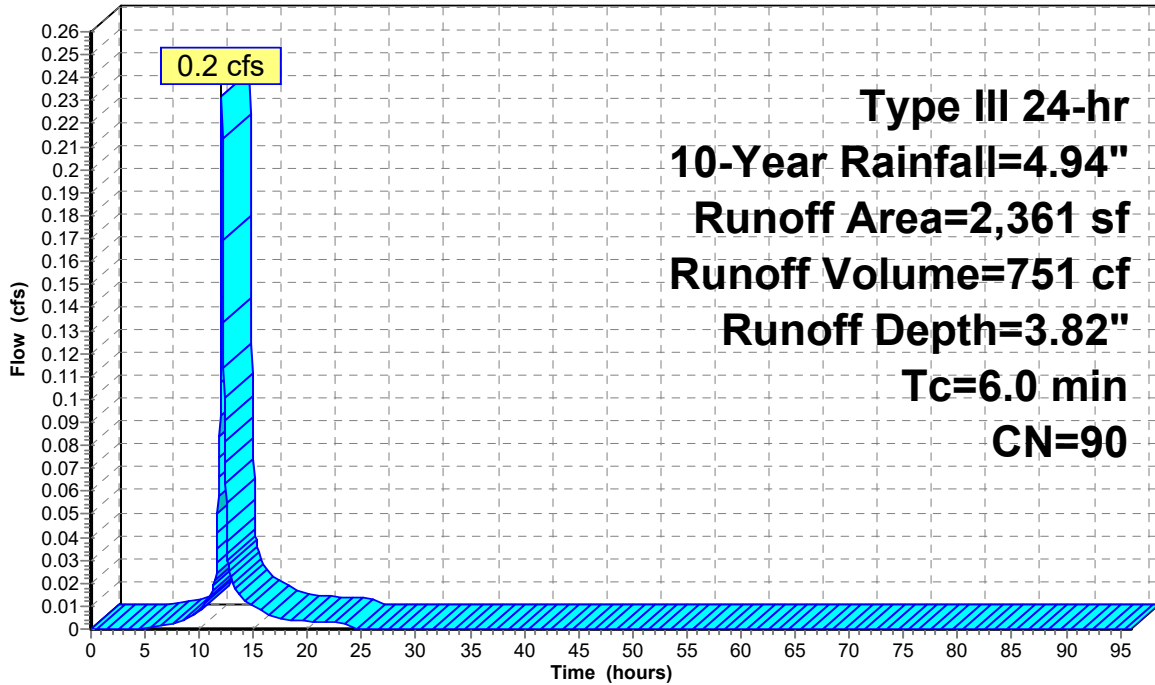
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs
 Type III 24-hr 10-Year Rainfall=4.94"

Area (sf)	CN	Description
349	61	>75% Grass cover, Good, HSG B
204	74	>75% Grass cover, Good, HSG C
1,292	98	Paved parking, HSG B
216	98	Paved parking, HSG C
100	98	Unconnected pavement, HSG B
200	98	Unconnected pavement, HSG C
2,361	90	Weighted Average
553		23.42% Pervious Area
1,808		76.58% Impervious Area
300		16.59% Unconnected

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

Subcatchment P 1S: Subcat P 1S

Hydrograph



Runoff

**Type III 24-hr
 10-Year Rainfall=4.94"
 Runoff Area=2,361 sf
 Runoff Volume=751 cf
 Runoff Depth=3.82"
 Tc=6.0 min
 CN=90**

Summary for Subcatchment P 2S: Subcat P 2S

Runoff = 0.2 cfs @ 12.09 hrs, Volume= 583 cf, Depth= 2.32"
 Routed to Pond P 2P : P 2P Inf. Sys. 24" RCP

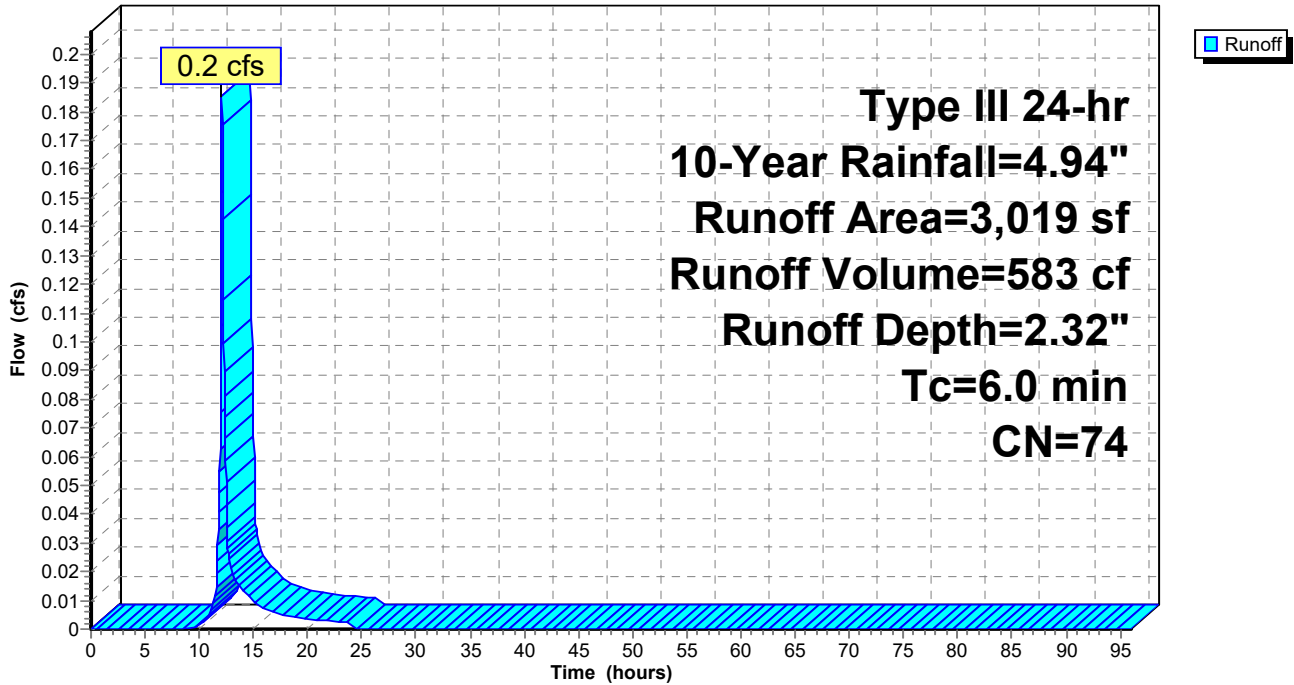
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs
 Type III 24-hr 10-Year Rainfall=4.94"

Area (sf)	CN	Description
3,019	74	>75% Grass cover, Good, HSG C
3,019		100.00% Pervious Area

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

Subcatchment P 2S: Subcat P 2S

Hydrograph



Summary for Subcatchment P 3S: Subcat P 3S

Runoff = 0.1 cfs @ 12.08 hrs, Volume= 524 cf, Depth= 4.70"
 Routed to Pond P 2P : P 2P Inf. Sys. 24" RCP

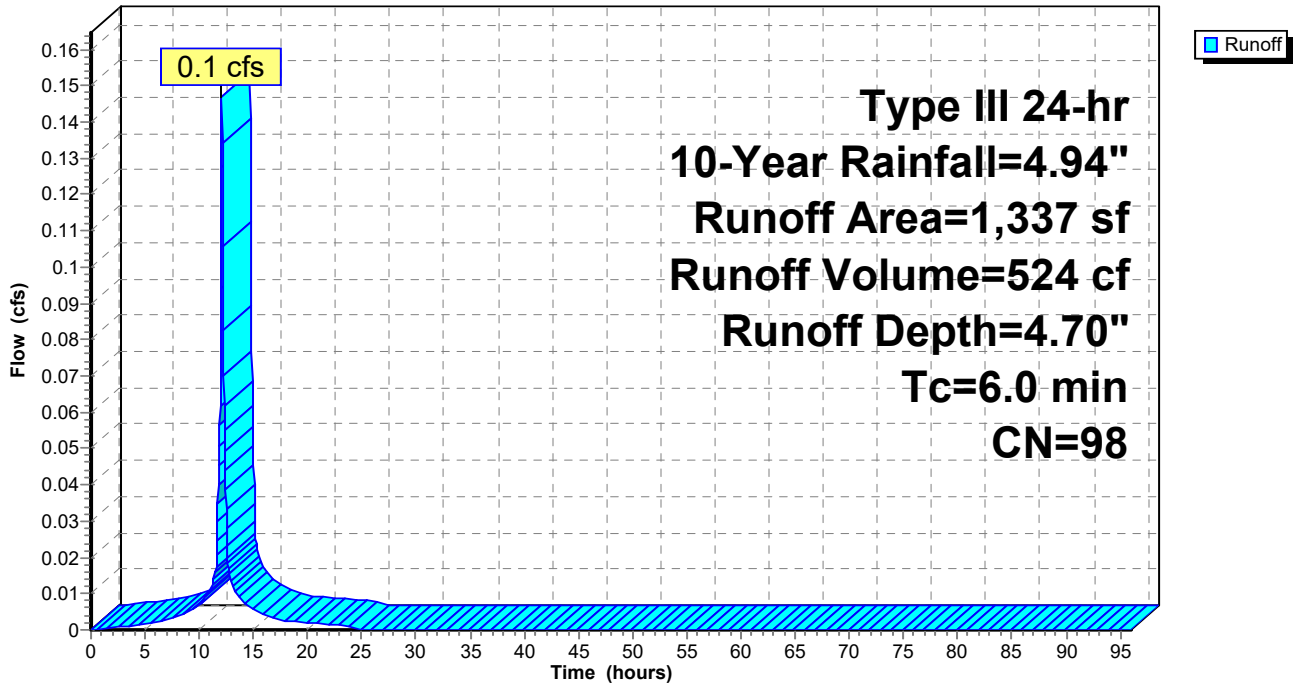
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs
 Type III 24-hr 10-Year Rainfall=4.94"

Area (sf)	CN	Description
456	98	Roofs, HSG B
881	98	Roofs, HSG C
1,337	98	Weighted Average
1,337		100.00% Impervious Area

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

Subcatchment P 3S: Subcat P 3S

Hydrograph



Summary for Subcatchment P 4S: Subcat P 4S

Runoff = 0.1 cfs @ 12.08 hrs, Volume= 489 cf, Depth= 4.70"
 Routed to Pond P 2P : P 2P Inf. Sys. 24" RCP

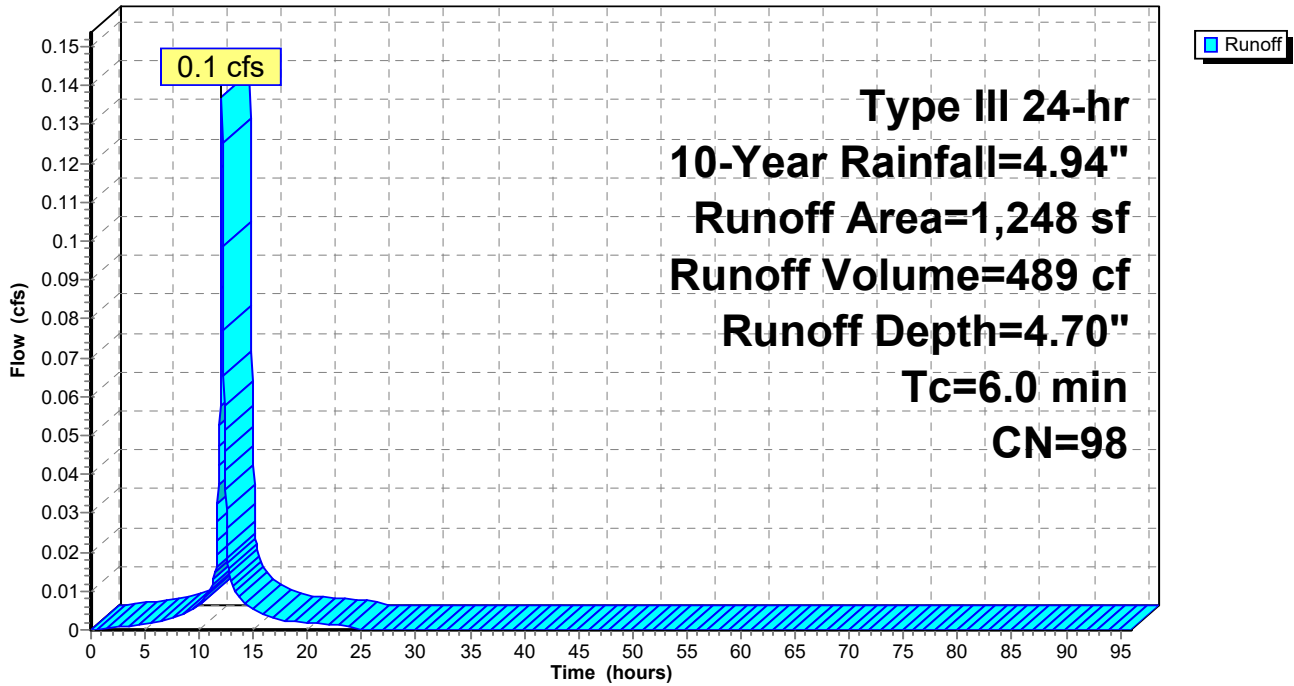
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs
 Type III 24-hr 10-Year Rainfall=4.94"

Area (sf)	CN	Description
56	98	Roofs, HSG B
1,192	98	Roofs, HSG C
1,248	98	Weighted Average
1,248		100.00% Impervious Area

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

Subcatchment P 4S: Subcat P 4S

Hydrograph



Summary for Subcatchment P 5S: Subcat P 5S

Runoff = 0.6 cfs @ 12.09 hrs, Volume= 1,932 cf, Depth= 2.15"
 Routed to Link P 1L : P 1L

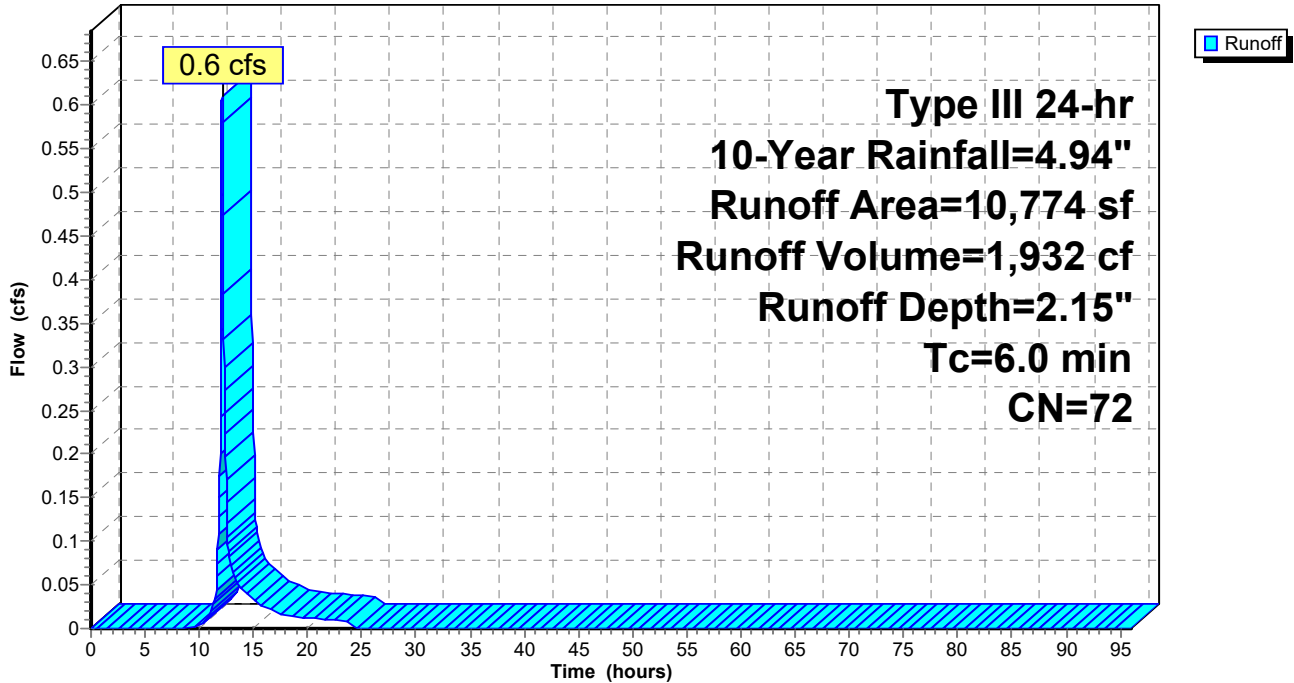
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs
 Type III 24-hr 10-Year Rainfall=4.94"

Area (sf)	CN	Description
37	61	>75% Grass cover, Good, HSG B
3,905	74	>75% Grass cover, Good, HSG C
4,753	70	Woods, Good, HSG C
2,079	71	Meadow, non-grazed, HSG C
10,774	72	Weighted Average
10,774		100.00% Pervious Area

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

Subcatchment P 5S: Subcat P 5S

Hydrograph



Summary for Pond P 1P: P 1P Inf. Sys. 18" RCP

Inflow Area = 2,361 sf, 76.58% Impervious, Inflow Depth = 3.82" for 10-Year event
 Inflow = 0.2 cfs @ 12.09 hrs, Volume= 751 cf
 Outflow = 0.0 cfs @ 12.55 hrs, Volume= 752 cf, Atten= 83%, Lag= 27.6 min
 Discarded = 0.0 cfs @ 11.84 hrs, Volume= 670 cf
 Primary = 0.0 cfs @ 12.55 hrs, Volume= 82 cf
 Routed to Link P 1L : P 1L

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs / 2
 Peak Elev= 490.33' @ 12.55 hrs Surf.Area= 338 sf Storage= 343 cf

Plug-Flow detention time= 360.4 min calculated for 751 cf (100% of inflow)
 Center-of-Mass det. time= 361.3 min (1,152.4 - 791.1)

Volume	Invert	Avail.Storage	Storage Description
#1	489.00'	1 cf	0.50'D x 1.33'H Vertical Cone/Cylinder x 2
#2	489.00'	170 cf	18.0" Round Pipe Storage x 3 Inside #3 L= 32.0'
#3	488.50'	270 cf	9.38'W x 36.00'L x 2.50'H Prismatic 844 cf Overall - 170 cf Embedded = 675 cf x 40.0% Voids
		440 cf	Total Available Storage

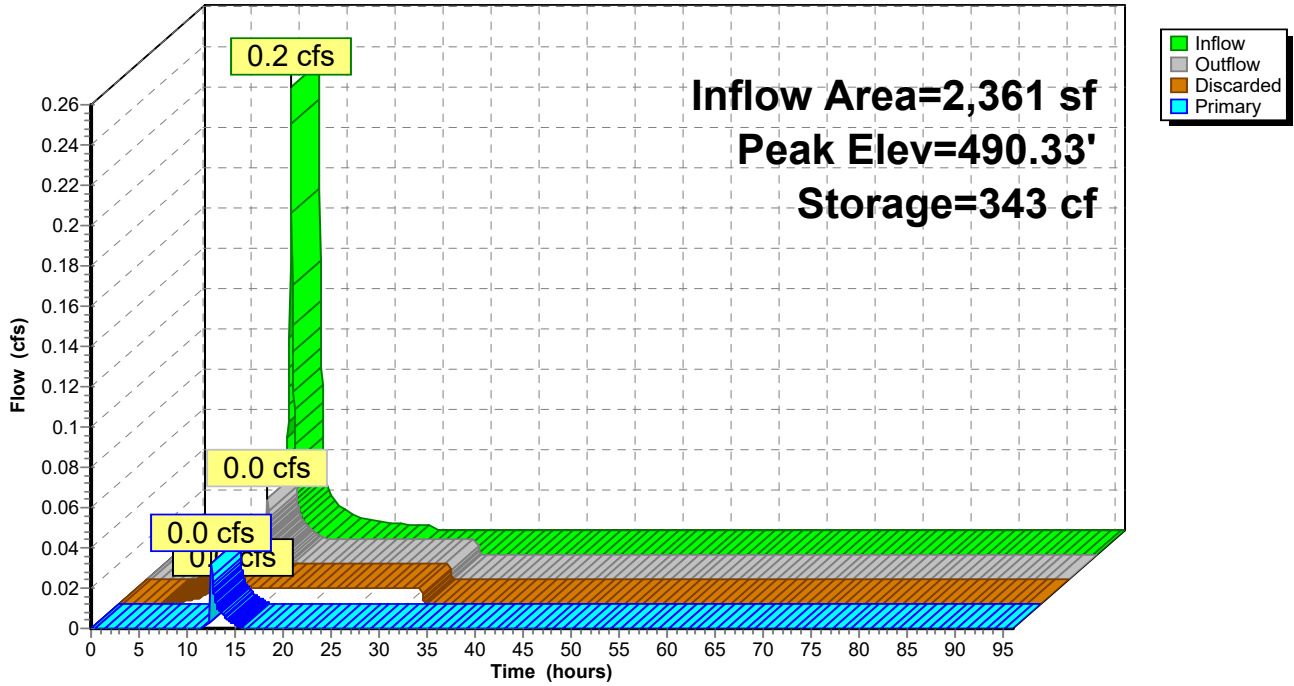
Device	Routing	Invert	Outlet Devices
#1	Primary	490.32'	16.0' long x 1.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32
#2	Discarded	488.50'	1.020 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.0 cfs @ 11.84 hrs HW=489.04' (Free Discharge)
 ↑**2=Exfiltration** (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=0.0 cfs @ 12.55 hrs HW=490.33' (Free Discharge)
 ↑**1=Broad-Crested Rectangular Weir** (Weir Controls 0.0 cfs @ 0.24 fps)

Pond P 1P: P 1P Inf. Sys. 18" RCP

Hydrograph



24-0264 Proposed

Type III 24-hr 10-Year Rainfall=4.94"

Prepared by Land Design Collaborative

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Summary for Pond P 2P: P 2P Inf. Sys. 24" RCP

Inflow Area = 5,604 sf, 46.13% Impervious, Inflow Depth = 3.42" for 10-Year event
 Inflow = 0.5 cfs @ 12.09 hrs, Volume= 1,596 cf
 Outflow = 0.0 cfs @ 13.85 hrs, Volume= 1,571 cf, Atten= 94%, Lag= 105.9 min
 Discarded = 0.0 cfs @ 11.08 hrs, Volume= 1,370 cf
 Primary = 0.0 cfs @ 13.85 hrs, Volume= 201 cf
 Routed to Link P 1L : P 1L

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs / 2
 Peak Elev= 489.96' @ 13.85 hrs Surf.Area= 560 sf Storage= 942 cf

Plug-Flow detention time= 1,136.8 min calculated for 1,570 cf (98% of inflow)
 Center-of-Mass det. time= 1,127.6 min (1,908.6 - 781.0)

Volume	Invert	Avail.Storage	Storage Description
#1	474.50'	7 cf	0.75'D x 16.51'H Vertical Cone/Cylinder
#2	474.50'	440 cf	24.0" Round Pipe Storage x 4 Inside #3 L= 35.0'
#3	474.00'	496 cf	14.35'W x 39.00'L x 3.00'H Prismatic 1,679 cf Overall - 440 cf Embedded = 1,239 cf x 40.0% Voids
		943 cf	Total Available Storage

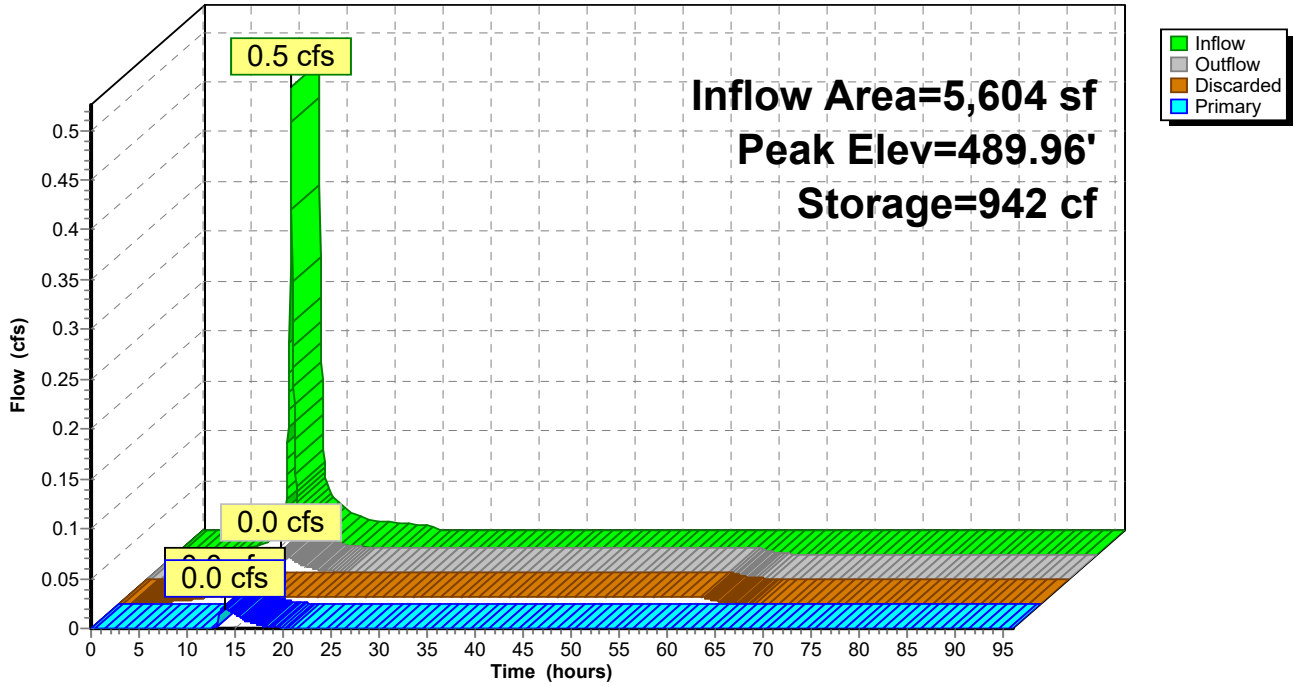
Device	Routing	Invert	Outlet Devices
#1	Primary	489.90'	8.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#2	Discarded	474.00'	0.520 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.0 cfs @ 11.08 hrs HW=474.51' (Free Discharge)
 ↑**2=Exfiltration** (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=0.0 cfs @ 13.85 hrs HW=489.96' (Free Discharge)
 ↑**1=Orifice/Grate** (Orifice Controls 0.0 cfs @ 0.85 fps)

Pond P 2P: P 2P Inf. Sys. 24" RCP

Hydrograph



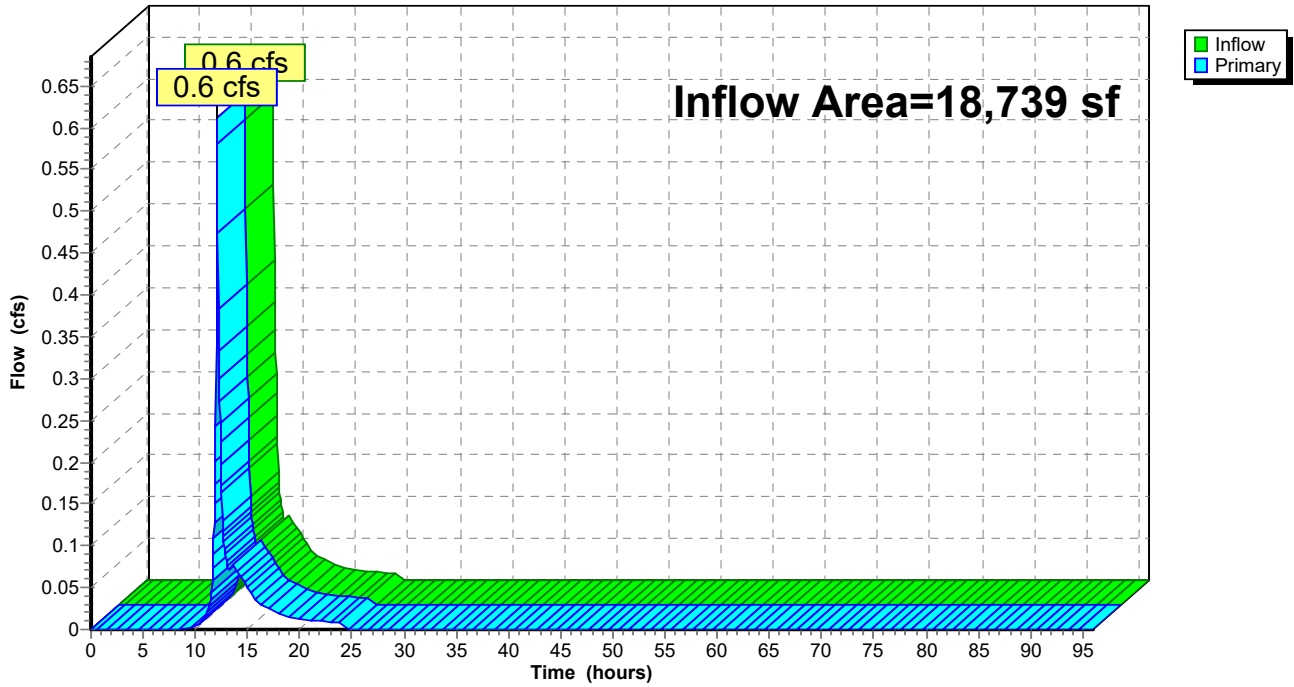
Summary for Link P 1L: P 1L

Inflow Area = 18,739 sf, 23.44% Impervious, Inflow Depth = 1.42" for 10-Year event
Inflow = 0.6 cfs @ 12.09 hrs, Volume= 2,215 cf
Primary = 0.6 cfs @ 12.09 hrs, Volume= 2,215 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs

Link P 1L: P 1L

Hydrograph



24-0264 Proposed

Type III 24-hr 25-Year Rainfall=6.03"

Prepared by Land Design Collaborative

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Time span=0.00-96.00 hrs, dt=0.04 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment P 1S: Subcat P 1S	Runoff Area=2,361 sf 76.58% Impervious Runoff Depth=4.88" Tc=6.0 min CN=90 Runoff=0.3 cfs 959 cf
Subcatchment P 2S: Subcat P 2S	Runoff Area=3,019 sf 0.00% Impervious Runoff Depth=3.21" Tc=6.0 min CN=74 Runoff=0.3 cfs 808 cf
Subcatchment P 3S: Subcat P 3S	Runoff Area=1,337 sf 100.00% Impervious Runoff Depth=5.79" Tc=6.0 min CN=98 Runoff=0.2 cfs 645 cf
Subcatchment P 4S: Subcat P 4S	Runoff Area=1,248 sf 100.00% Impervious Runoff Depth=5.79" Tc=6.0 min CN=98 Runoff=0.2 cfs 602 cf
Subcatchment P 5S: Subcat P 5S	Runoff Area=10,774 sf 0.00% Impervious Runoff Depth=3.02" Tc=6.0 min CN=72 Runoff=0.9 cfs 2,709 cf
Pond P 1P: P 1P Inf. Sys. 18" RCP	Peak Elev=490.34' Storage=345 cf Inflow=0.3 cfs 959 cf Discarded=0.0 cfs 718 cf Primary=0.2 cfs 246 cf Outflow=0.2 cfs 964 cf
Pond P 2P: P 2P Inf. Sys. 24" RCP	Peak Elev=490.04' Storage=942 cf Inflow=0.6 cfs 2,055 cf Discarded=0.0 cfs 1,399 cf Primary=0.1 cfs 350 cf Outflow=0.1 cfs 1,750 cf
Link P 1L: P 1L	Inflow=0.9 cfs 3,306 cf Primary=0.9 cfs 3,306 cf

**Total Runoff Area = 18,739 sf Runoff Volume = 5,724 cf Average Runoff Depth = 3.67"
76.56% Pervious = 14,346 sf 23.44% Impervious = 4,393 sf**

Summary for Subcatchment P 1S: Subcat P 1S

Runoff = 0.3 cfs @ 12.09 hrs, Volume= 959 cf, Depth= 4.88"
 Routed to Pond P 1P : P 1P Inf. Sys. 18" RCP

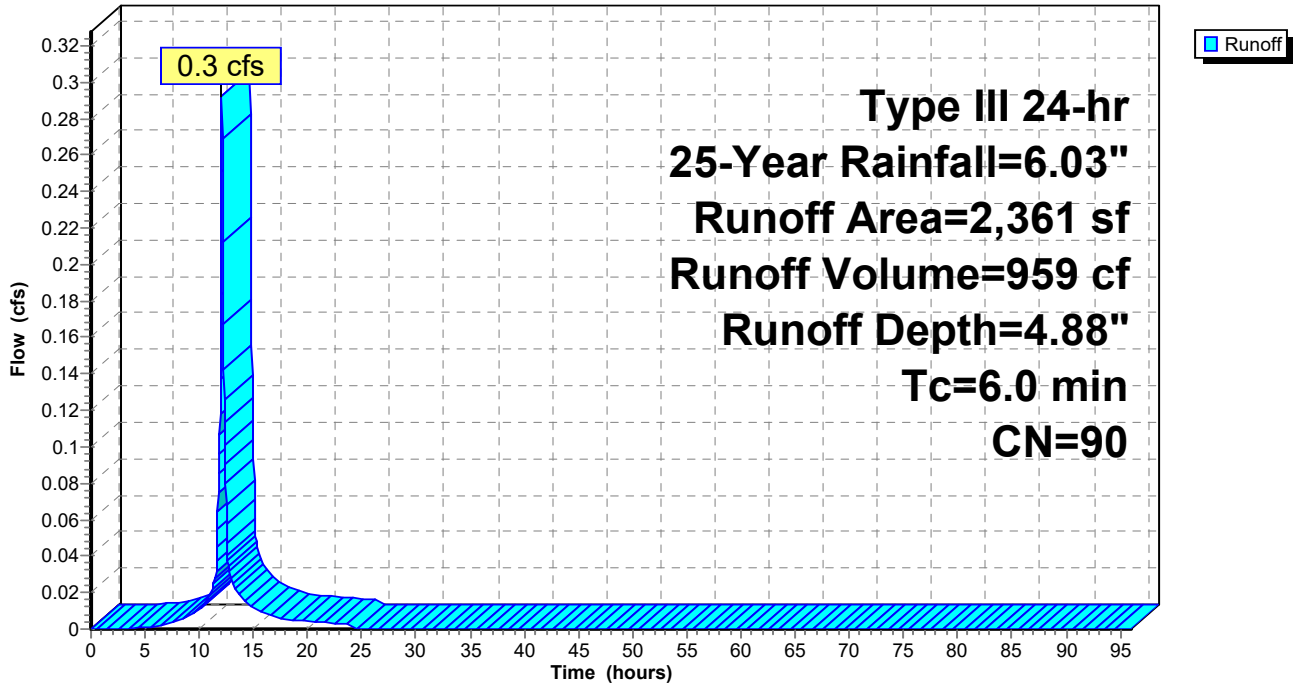
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs
 Type III 24-hr 25-Year Rainfall=6.03"

Area (sf)	CN	Description
349	61	>75% Grass cover, Good, HSG B
204	74	>75% Grass cover, Good, HSG C
1,292	98	Paved parking, HSG B
216	98	Paved parking, HSG C
100	98	Unconnected pavement, HSG B
200	98	Unconnected pavement, HSG C
2,361	90	Weighted Average
553		23.42% Pervious Area
1,808		76.58% Impervious Area
300		16.59% Unconnected

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

Subcatchment P 1S: Subcat P 1S

Hydrograph



Summary for Subcatchment P 2S: Subcat P 2S

Runoff = 0.3 cfs @ 12.09 hrs, Volume= 808 cf, Depth= 3.21"
 Routed to Pond P 2P : P 2P Inf. Sys. 24" RCP

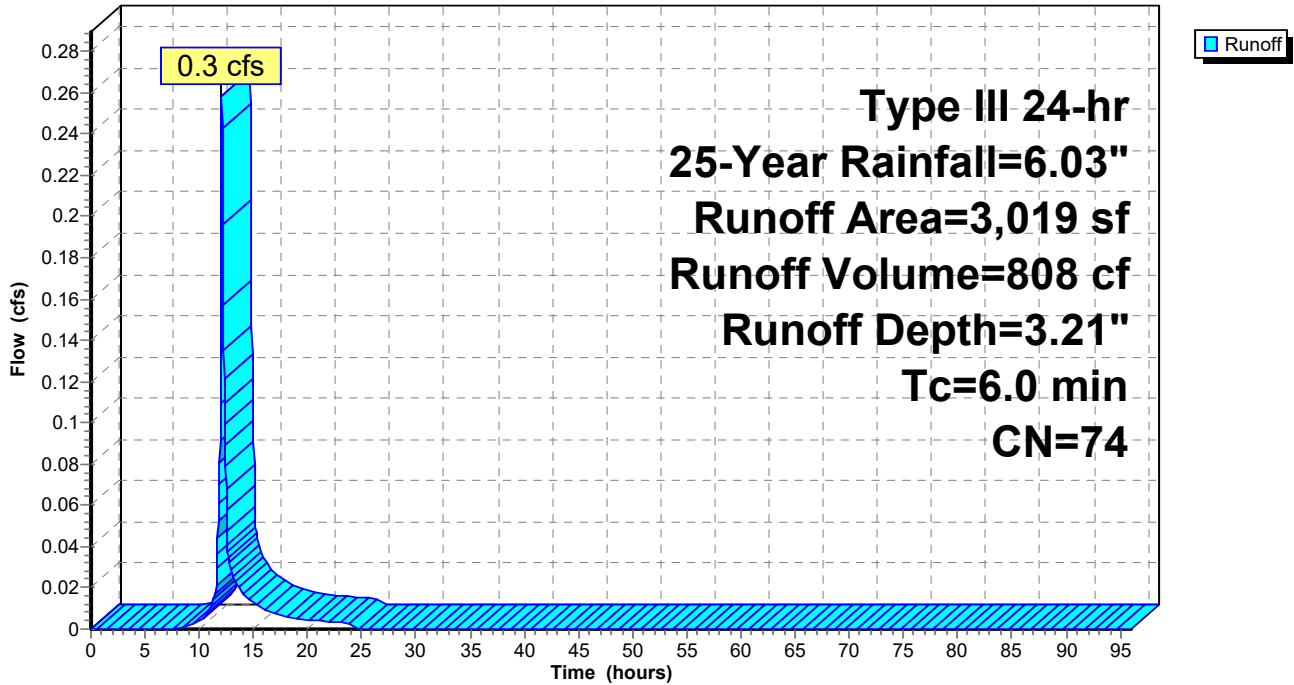
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs
 Type III 24-hr 25-Year Rainfall=6.03"

Area (sf)	CN	Description
3,019	74	>75% Grass cover, Good, HSG C
3,019		100.00% Pervious Area

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

Subcatchment P 2S: Subcat P 2S

Hydrograph



Summary for Subcatchment P 3S: Subcat P 3S

Runoff = 0.2 cfs @ 12.08 hrs, Volume= 645 cf, Depth= 5.79"
 Routed to Pond P 2P : P 2P Inf. Sys. 24" RCP

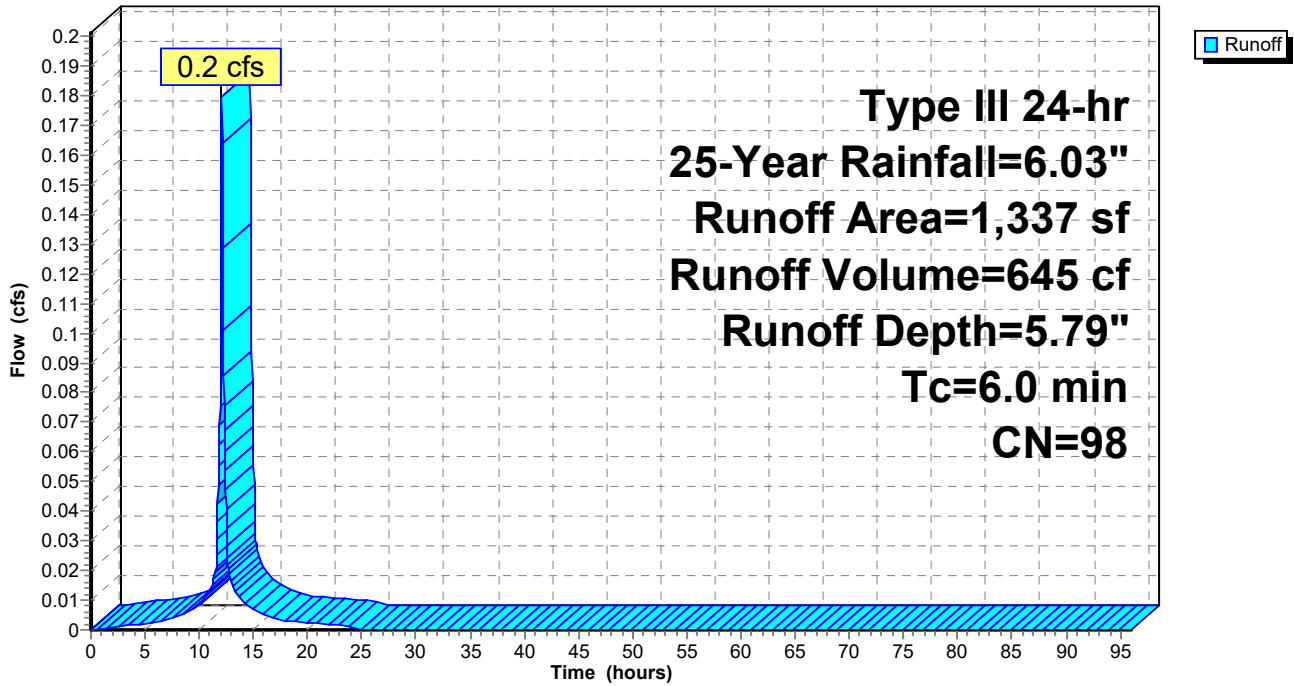
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs
 Type III 24-hr 25-Year Rainfall=6.03"

Area (sf)	CN	Description
456	98	Roofs, HSG B
881	98	Roofs, HSG C
1,337	98	Weighted Average
1,337		100.00% Impervious Area

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

Subcatchment P 3S: Subcat P 3S

Hydrograph



Summary for Subcatchment P 4S: Subcat P 4S

Runoff = 0.2 cfs @ 12.08 hrs, Volume= 602 cf, Depth= 5.79"
 Routed to Pond P 2P : P 2P Inf. Sys. 24" RCP

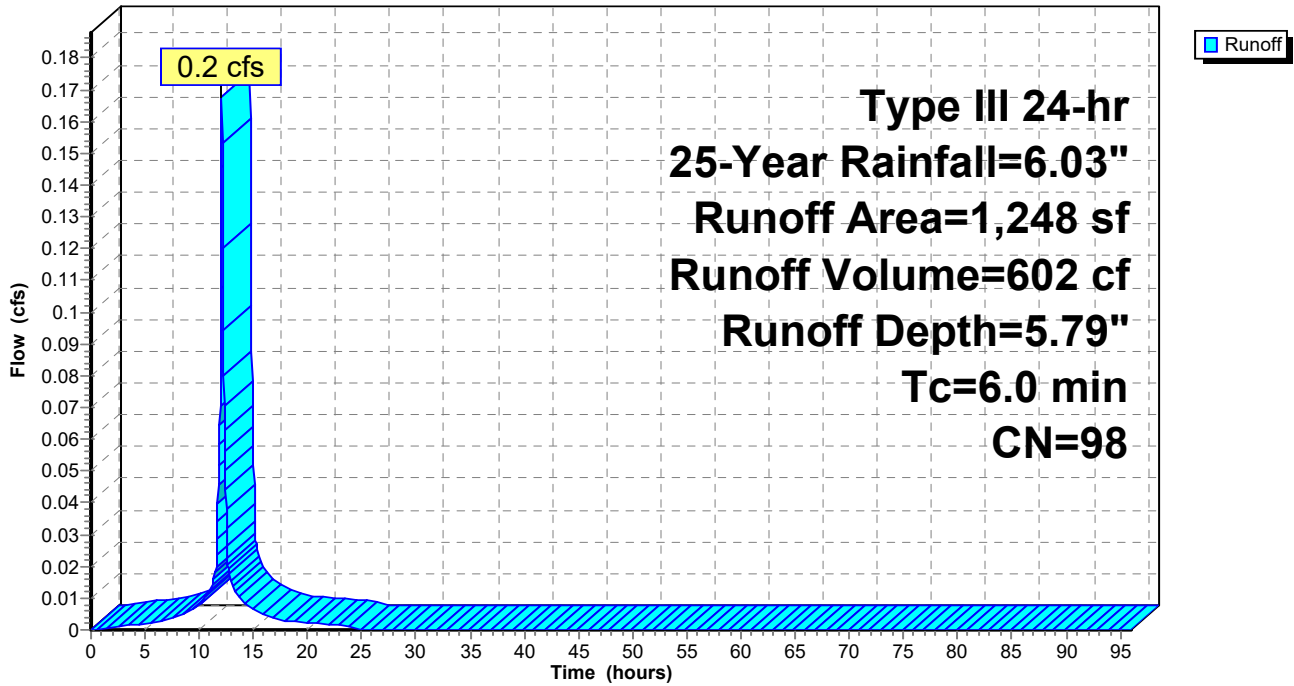
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs
 Type III 24-hr 25-Year Rainfall=6.03"

Area (sf)	CN	Description
56	98	Roofs, HSG B
1,192	98	Roofs, HSG C
1,248	98	Weighted Average
1,248		100.00% Impervious Area

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

Subcatchment P 4S: Subcat P 4S

Hydrograph



24-0264 Proposed

Type III 24-hr 25-Year Rainfall=6.03"

Prepared by Land Design Collaborative

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Summary for Subcatchment P 5S: Subcat P 5S

Runoff = 0.9 cfs @ 12.09 hrs, Volume= 2,709 cf, Depth= 3.02"
 Routed to Link P 1L : P 1L

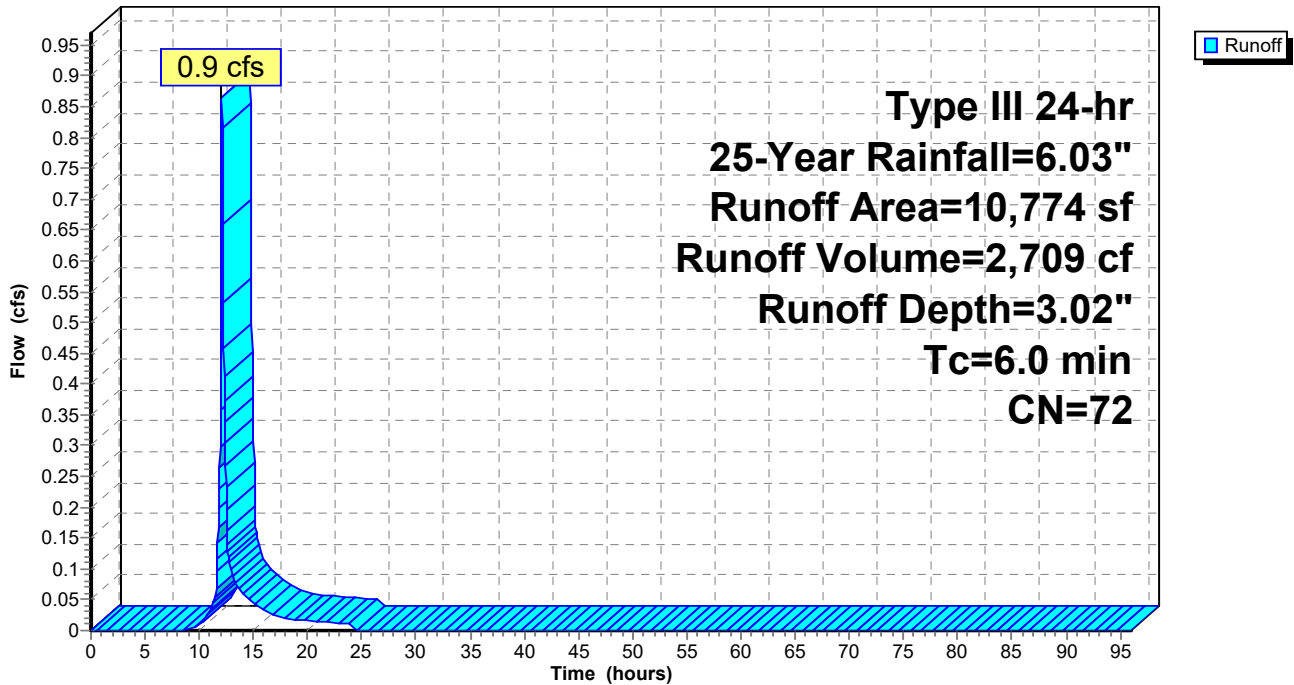
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs
 Type III 24-hr 25-Year Rainfall=6.03"

Area (sf)	CN	Description
37	61	>75% Grass cover, Good, HSG B
3,905	74	>75% Grass cover, Good, HSG C
4,753	70	Woods, Good, HSG C
2,079	71	Meadow, non-grazed, HSG C
10,774	72	Weighted Average
10,774		100.00% Pervious Area

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

Subcatchment P 5S: Subcat P 5S

Hydrograph



Summary for Pond P 1P: P 1P Inf. Sys. 18" RCP

Inflow Area = 2,361 sf, 76.58% Impervious, Inflow Depth = 4.88" for 25-Year event
 Inflow = 0.3 cfs @ 12.09 hrs, Volume= 959 cf
 Outflow = 0.2 cfs @ 12.22 hrs, Volume= 964 cf, Atten= 41%, Lag= 7.9 min
 Discarded = 0.0 cfs @ 11.64 hrs, Volume= 718 cf
 Primary = 0.2 cfs @ 12.22 hrs, Volume= 246 cf
 Routed to Link P 1L : P 1L

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs / 2
 Peak Elev= 490.34' @ 12.20 hrs Surf.Area= 338 sf Storage= 345 cf

Plug-Flow detention time= 302.5 min calculated for 959 cf (100% of inflow)
 Center-of-Mass det. time= 306.7 min (1,091.3 - 784.5)

Volume	Invert	Avail.Storage	Storage Description
#1	489.00'	1 cf	0.50'D x 1.33'H Vertical Cone/Cylinder x 2
#2	489.00'	170 cf	18.0" Round Pipe Storage x 3 Inside #3 L= 32.0'
#3	488.50'	270 cf	9.38'W x 36.00'L x 2.50'H Prismatic 844 cf Overall - 170 cf Embedded = 675 cf x 40.0% Voids
		440 cf	Total Available Storage

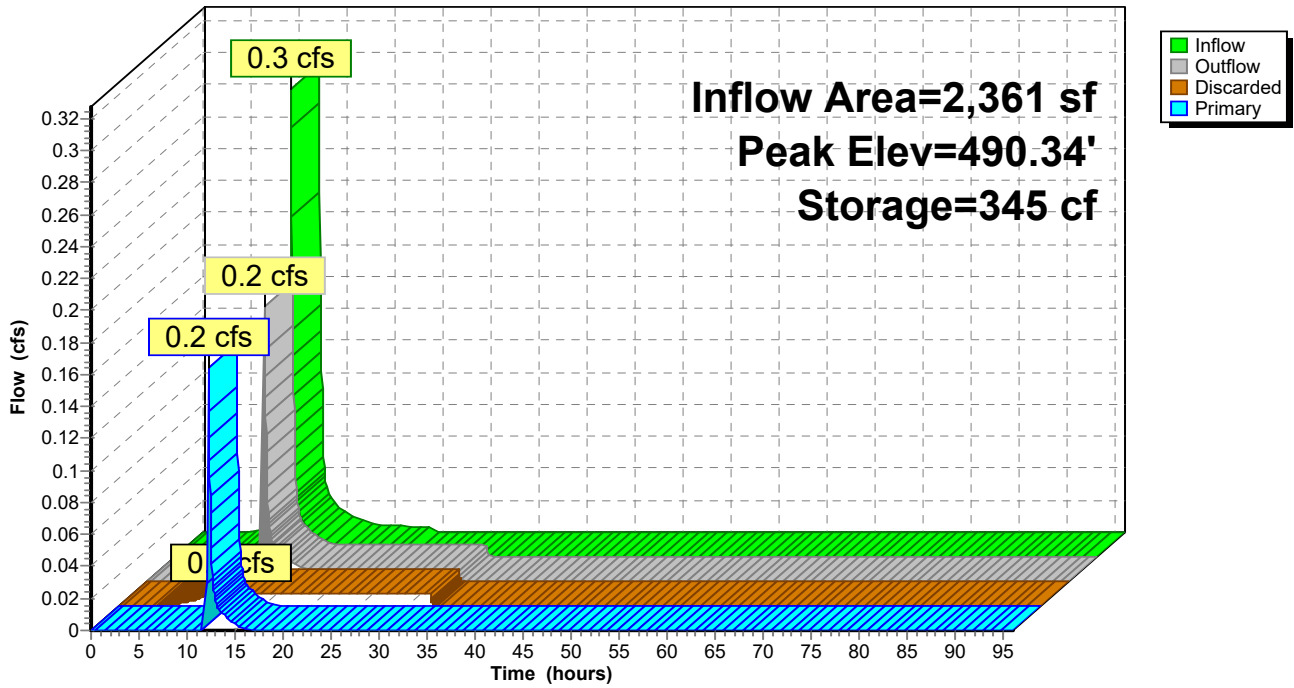
Device	Routing	Invert	Outlet Devices
#1	Primary	490.32'	16.0' long x 1.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32
#2	Discarded	488.50'	1.020 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.0 cfs @ 11.64 hrs HW=489.03' (Free Discharge)
 ↑**2=Exfiltration** (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=0.1 cfs @ 12.22 hrs HW=490.34' (Free Discharge)
 ↑**1=Broad-Crested Rectangular Weir** (Weir Controls 0.1 cfs @ 0.39 fps)

Pond P 1P: P 1P Inf. Sys. 18" RCP

Hydrograph



24-0264 Proposed

Type III 24-hr 25-Year Rainfall=6.03"

Prepared by Land Design Collaborative

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Summary for Pond P 2P: P 2P Inf. Sys. 24" RCP

Inflow Area = 5,604 sf, 46.13% Impervious, Inflow Depth = 4.40" for 25-Year event
 Inflow = 0.6 cfs @ 12.09 hrs, Volume= 2,055 cf
 Outflow = 0.1 cfs @ 12.33 hrs, Volume= 1,750 cf, Atten= 84%, Lag= 14.8 min
 Discarded = 0.0 cfs @ 10.40 hrs, Volume= 1,399 cf
 Primary = 0.1 cfs @ 12.33 hrs, Volume= 350 cf
 Routed to Link P 1L : P 1L

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs / 2
 Peak Elev= 490.04' @ 12.32 hrs Surf.Area= 560 sf Storage= 942 cf

Plug-Flow detention time= 1,103.5 min calculated for 1,749 cf (85% of inflow)
 Center-of-Mass det. time= 1,038.5 min (1,816.4 - 777.9)

Volume	Invert	Avail.Storage	Storage Description
#1	474.50'	7 cf	0.75'D x 16.51'H Vertical Cone/Cylinder
#2	474.50'	440 cf	24.0" Round Pipe Storage x 4 Inside #3 L= 35.0'
#3	474.00'	496 cf	14.35'W x 39.00'L x 3.00'H Prismatic 1,679 cf Overall - 440 cf Embedded = 1,239 cf x 40.0% Voids
		943 cf	Total Available Storage

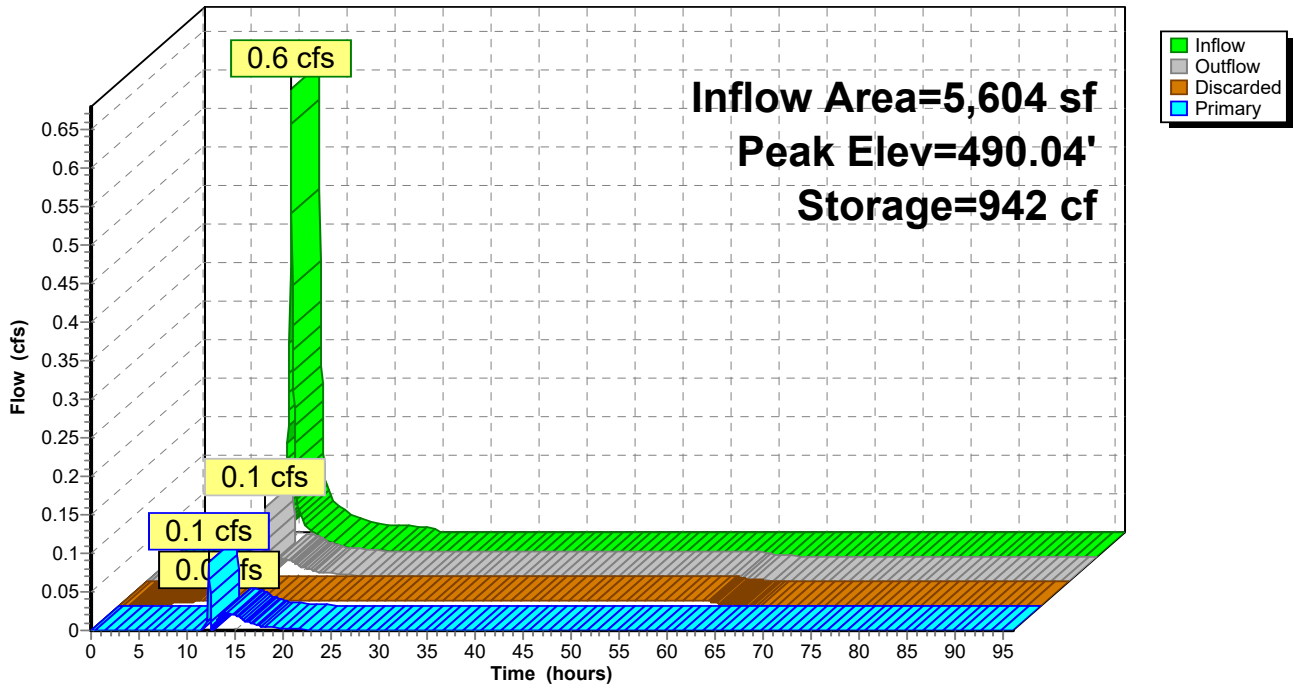
Device	Routing	Invert	Outlet Devices
#1	Primary	489.90'	8.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#2	Discarded	474.00'	0.520 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.0 cfs @ 10.40 hrs HW=474.50' (Free Discharge)
 ↑**2=Exfiltration** (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=0.1 cfs @ 12.33 hrs HW=490.03' (Free Discharge)
 ↑**1=Orifice/Grate** (Orifice Controls 0.1 cfs @ 1.25 fps)

Pond P 2P: P 2P Inf. Sys. 24" RCP

Hydrograph



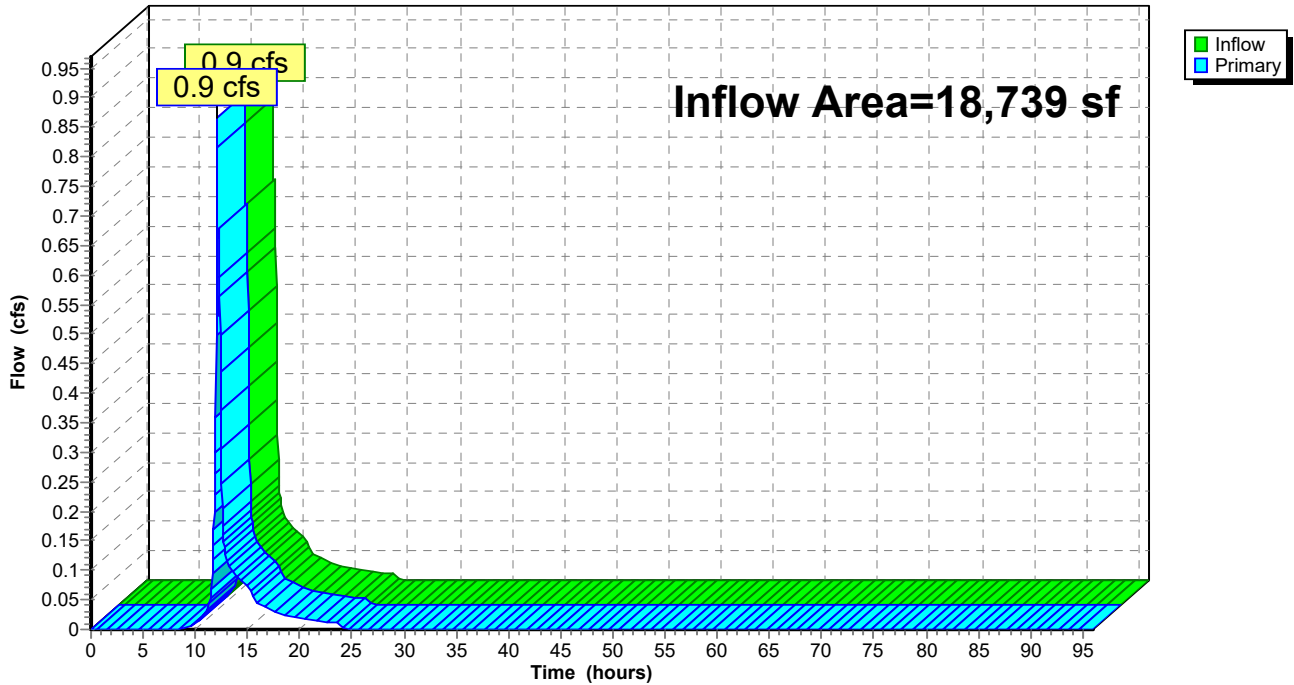
Summary for Link P 1L: P 1L

Inflow Area = 18,739 sf, 23.44% Impervious, Inflow Depth = 2.12" for 25-Year event
Inflow = 0.9 cfs @ 12.09 hrs, Volume= 3,306 cf
Primary = 0.9 cfs @ 12.09 hrs, Volume= 3,306 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs

Link P 1L: P 1L

Hydrograph



24-0264 Proposed

Type III 24-hr 100-Year Rainfall=7.70"

Prepared by Land Design Collaborative

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Time span=0.00-96.00 hrs, dt=0.04 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment P 1S: Subcat P 1S	Runoff Area=2,361 sf 76.58% Impervious Runoff Depth=6.51" Tc=6.0 min CN=90 Runoff=0.4 cfs 1,281 cf
Subcatchment P 2S: Subcat P 2S	Runoff Area=3,019 sf 0.00% Impervious Runoff Depth=4.66" Tc=6.0 min CN=74 Runoff=0.4 cfs 1,172 cf
Subcatchment P 3S: Subcat P 3S	Runoff Area=1,337 sf 100.00% Impervious Runoff Depth=7.46" Tc=6.0 min CN=98 Runoff=0.2 cfs 831 cf
Subcatchment P 4S: Subcat P 4S	Runoff Area=1,248 sf 100.00% Impervious Runoff Depth=7.46" Tc=6.0 min CN=98 Runoff=0.2 cfs 776 cf
Subcatchment P 5S: Subcat P 5S	Runoff Area=10,774 sf 0.00% Impervious Runoff Depth=4.43" Tc=6.0 min CN=72 Runoff=1.3 cfs 3,979 cf
Pond P 1P: P 1P Inf. Sys. 18" RCP	Peak Elev=490.37' Storage=350 cf Inflow=0.4 cfs 1,281 cf Discarded=0.0 cfs 778 cf Primary=0.5 cfs 521 cf Outflow=0.5 cfs 1,299 cf
Pond P 2P: P 2P Inf. Sys. 24" RCP	Peak Elev=490.18' Storage=942 cf Inflow=0.8 cfs 2,779 cf Discarded=0.0 cfs 1,426 cf Primary=0.3 cfs 514 cf Outflow=0.3 cfs 1,940 cf
Link P 1L: P 1L	Inflow=1.8 cfs 5,015 cf Primary=1.8 cfs 5,015 cf

Total Runoff Area = 18,739 sf Runoff Volume = 8,039 cf Average Runoff Depth = 5.15"
76.56% Pervious = 14,346 sf 23.44% Impervious = 4,393 sf

Summary for Subcatchment P 1S: Subcat P 1S

Runoff = 0.4 cfs @ 12.09 hrs, Volume= 1,281 cf, Depth= 6.51"
 Routed to Pond P 1P : P 1P Inf. Sys. 18" RCP

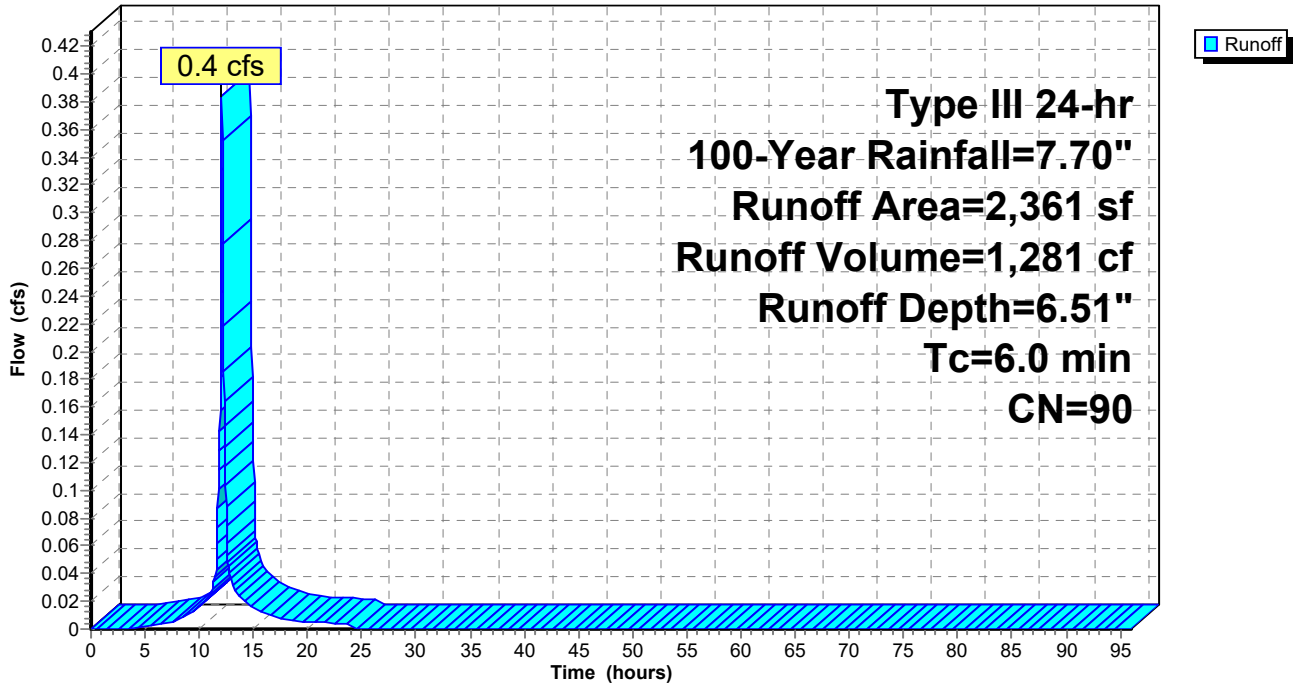
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs
 Type III 24-hr 100-Year Rainfall=7.70"

Area (sf)	CN	Description
349	61	>75% Grass cover, Good, HSG B
204	74	>75% Grass cover, Good, HSG C
1,292	98	Paved parking, HSG B
216	98	Paved parking, HSG C
100	98	Unconnected pavement, HSG B
200	98	Unconnected pavement, HSG C
2,361	90	Weighted Average
553		23.42% Pervious Area
1,808		76.58% Impervious Area
300		16.59% Unconnected

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

Subcatchment P 1S: Subcat P 1S

Hydrograph



Summary for Subcatchment P 2S: Subcat P 2S

Runoff = 0.4 cfs @ 12.09 hrs, Volume= 1,172 cf, Depth= 4.66"
 Routed to Pond P 2P : P 2P Inf. Sys. 24" RCP

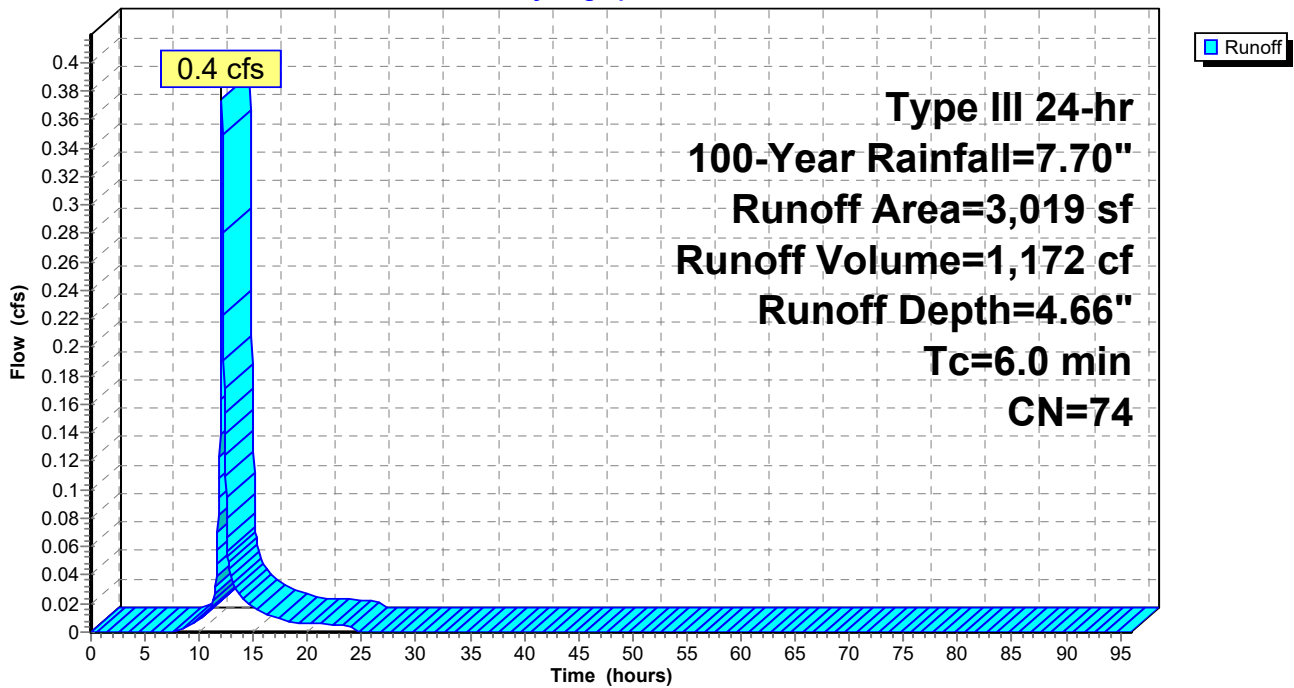
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs
 Type III 24-hr 100-Year Rainfall=7.70"

Area (sf)	CN	Description
3,019	74	>75% Grass cover, Good, HSG C
3,019		100.00% Pervious Area

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

Subcatchment P 2S: Subcat P 2S

Hydrograph



Summary for Subcatchment P 3S: Subcat P 3S

Runoff = 0.2 cfs @ 12.08 hrs, Volume= 831 cf, Depth= 7.46"
 Routed to Pond P 2P : P 2P Inf. Sys. 24" RCP

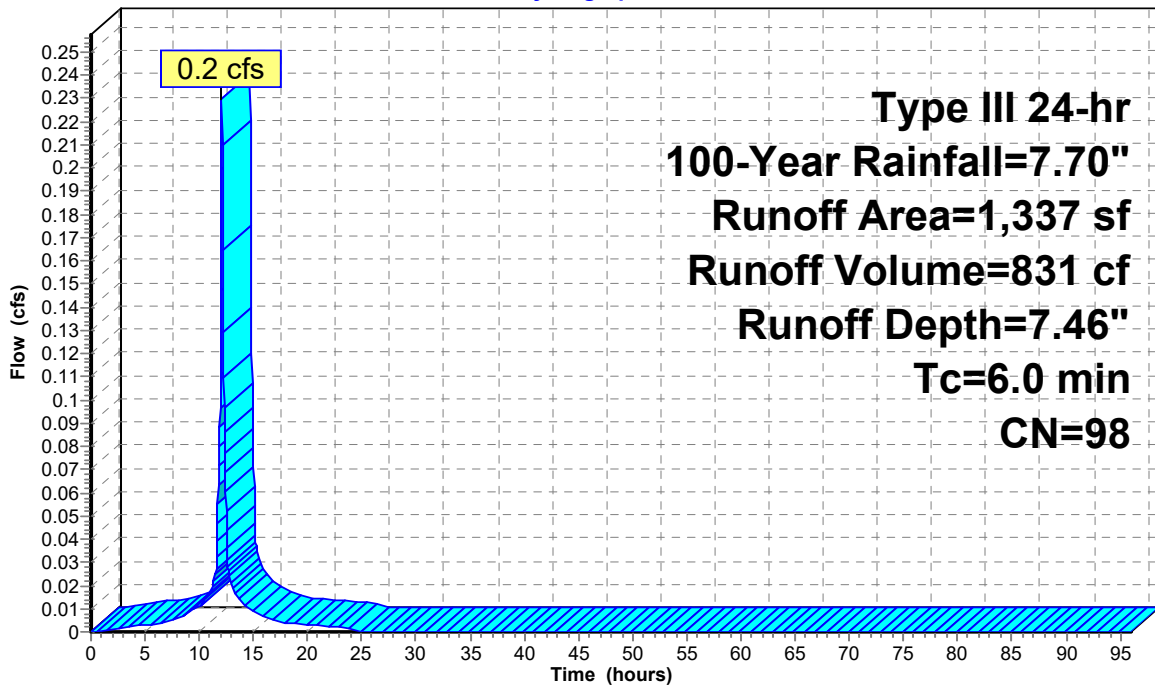
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs
 Type III 24-hr 100-Year Rainfall=7.70"

Area (sf)	CN	Description
456	98	Roofs, HSG B
881	98	Roofs, HSG C
1,337	98	Weighted Average
1,337		100.00% Impervious Area

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

Subcatchment P 3S: Subcat P 3S

Hydrograph



Runoff

**Type III 24-hr
 100-Year Rainfall=7.70"
 Runoff Area=1,337 sf
 Runoff Volume=831 cf
 Runoff Depth=7.46"
 Tc=6.0 min
 CN=98**

Summary for Subcatchment P 4S: Subcat P 4S

Runoff = 0.2 cfs @ 12.08 hrs, Volume= 776 cf, Depth= 7.46"
 Routed to Pond P 2P : P 2P Inf. Sys. 24" RCP

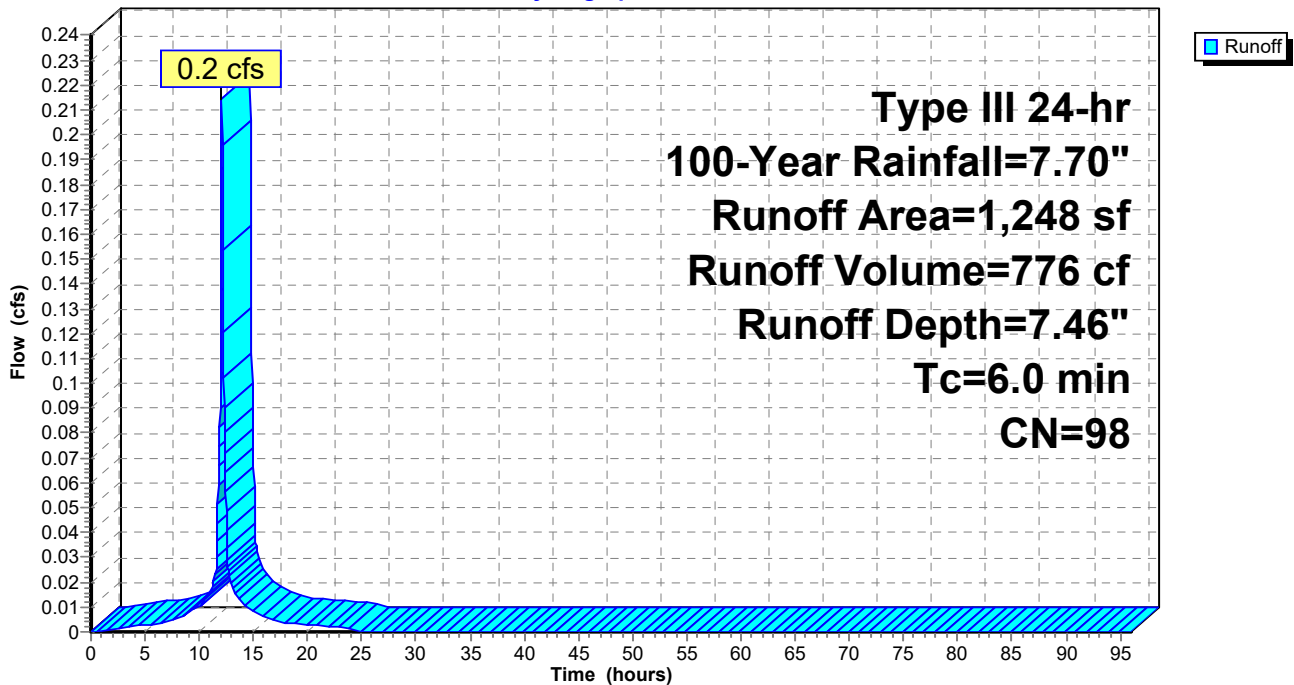
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs
 Type III 24-hr 100-Year Rainfall=7.70"

Area (sf)	CN	Description
56	98	Roofs, HSG B
1,192	98	Roofs, HSG C
1,248	98	Weighted Average
1,248		100.00% Impervious Area

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

Subcatchment P 4S: Subcat P 4S

Hydrograph



Summary for Subcatchment P 5S: Subcat P 5S

Runoff = 1.3 cfs @ 12.09 hrs, Volume= 3,979 cf, Depth= 4.43"
 Routed to Link P 1L : P 1L

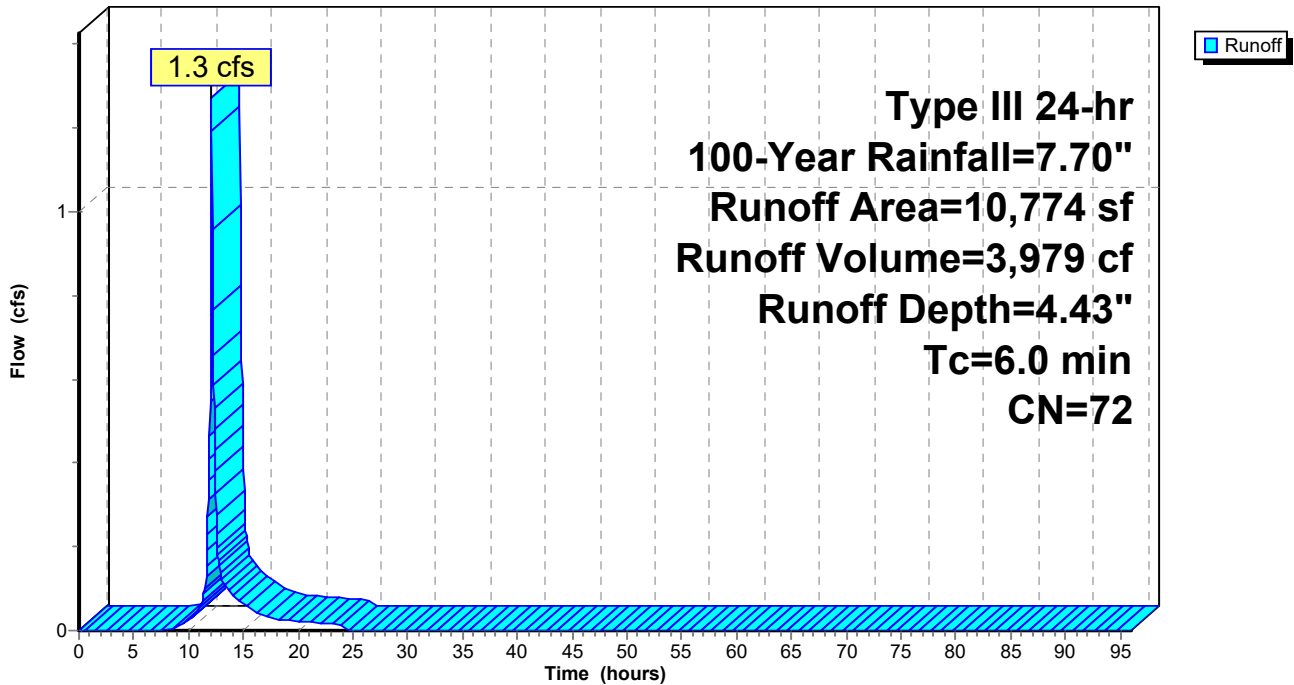
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs
 Type III 24-hr 100-Year Rainfall=7.70"

Area (sf)	CN	Description
37	61	>75% Grass cover, Good, HSG B
3,905	74	>75% Grass cover, Good, HSG C
4,753	70	Woods, Good, HSG C
2,079	71	Meadow, non-grazed, HSG C
10,774	72	Weighted Average
10,774		100.00% Pervious Area

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

Subcatchment P 5S: Subcat P 5S

Hydrograph



24-0264 Proposed

Type III 24-hr 100-Year Rainfall=7.70"

Prepared by Land Design Collaborative

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Summary for Pond P 1P: P 1P Inf. Sys. 18" RCP

Inflow Area = 2,361 sf, 76.58% Impervious, Inflow Depth = 6.51" for 100-Year event
 Inflow = 0.4 cfs @ 12.09 hrs, Volume= 1,281 cf
 Outflow = 0.5 cfs @ 12.09 hrs, Volume= 1,299 cf, Atten= 0%, Lag= 0.5 min
 Discarded = 0.0 cfs @ 11.04 hrs, Volume= 778 cf
 Primary = 0.5 cfs @ 12.09 hrs, Volume= 521 cf
 Routed to Link P 1L : P 1L

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs / 2
 Peak Elev= 490.37' @ 12.08 hrs Surf.Area= 338 sf Storage= 350 cf

Plug-Flow detention time= 237.8 min calculated for 1,280 cf (100% of inflow)
 Center-of-Mass det. time= 251.5 min (1,028.5 - 777.0)

Volume	Invert	Avail.Storage	Storage Description
#1	489.00'	1 cf	0.50'D x 1.33'H Vertical Cone/Cylinder x 2
#2	489.00'	170 cf	18.0" Round Pipe Storage x 3 Inside #3 L= 32.0'
#3	488.50'	270 cf	9.38'W x 36.00'L x 2.50'H Prismatic 844 cf Overall - 170 cf Embedded = 675 cf x 40.0% Voids
		440 cf	Total Available Storage

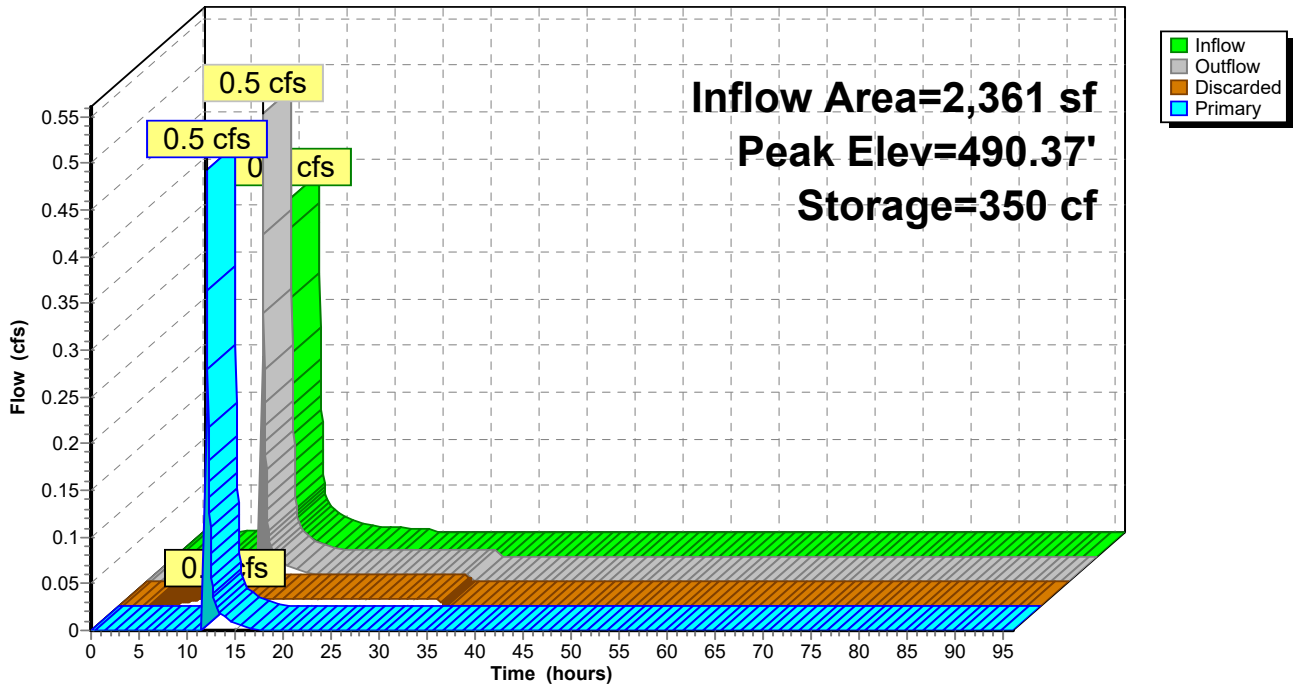
Device	Routing	Invert	Outlet Devices
#1	Primary	490.32'	16.0' long x 1.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32
#2	Discarded	488.50'	1.020 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.0 cfs @ 11.04 hrs HW=489.01' (Free Discharge)
 ↑**2=Exfiltration** (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=0.4 cfs @ 12.09 hrs HW=490.37' (Free Discharge)
 ↑**1=Broad-Crested Rectangular Weir** (Weir Controls 0.4 cfs @ 0.57 fps)

Pond P 1P: P 1P Inf. Sys. 18" RCP

Hydrograph



24-0264 Proposed

Type III 24-hr 100-Year Rainfall=7.70"

Prepared by Land Design Collaborative

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Summary for Pond P 2P: P 2P Inf. Sys. 24" RCP

Inflow Area = 5,604 sf, 46.13% Impervious, Inflow Depth = 5.95" for 100-Year event
 Inflow = 0.8 cfs @ 12.09 hrs, Volume= 2,779 cf
 Outflow = 0.3 cfs @ 12.13 hrs, Volume= 1,940 cf, Atten= 67%, Lag= 2.4 min
 Discarded = 0.0 cfs @ 9.52 hrs, Volume= 1,426 cf
 Primary = 0.3 cfs @ 12.13 hrs, Volume= 514 cf
 Routed to Link P 1L : P 1L

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs / 2
 Peak Elev= 490.18' @ 12.12 hrs Surf.Area= 560 sf Storage= 942 cf

Plug-Flow detention time= 1,054.3 min calculated for 1,940 cf (70% of inflow)
 Center-of-Mass det. time= 956.6 min (1,730.4 - 773.8)

Volume	Invert	Avail.Storage	Storage Description
#1	474.50'	7 cf	0.75'D x 16.51'H Vertical Cone/Cylinder
#2	474.50'	440 cf	24.0" Round Pipe Storage x 4 Inside #3 L= 35.0'
#3	474.00'	496 cf	14.35'W x 39.00'L x 3.00'H Prismatic
			1,679 cf Overall - 440 cf Embedded = 1,239 cf x 40.0% Voids
			943 cf Total Available Storage

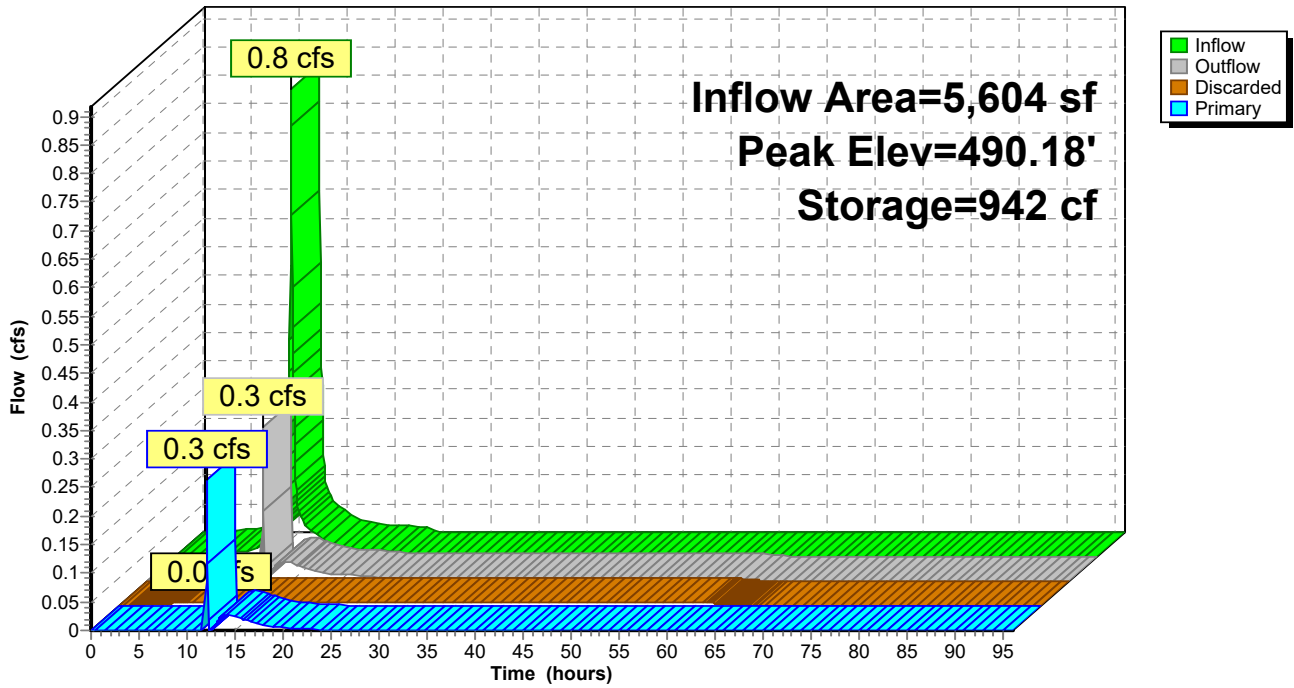
Device	Routing	Invert	Outlet Devices
#1	Primary	489.90'	8.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#2	Discarded	474.00'	0.520 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.0 cfs @ 9.52 hrs HW=474.51' (Free Discharge)
 ↑**2=Exfiltration** (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=0.2 cfs @ 12.13 hrs HW=490.16' (Free Discharge)
 ↑**1=Orifice/Grate** (Orifice Controls 0.2 cfs @ 1.75 fps)

Pond P 2P: P 2P Inf. Sys. 24" RCP

Hydrograph



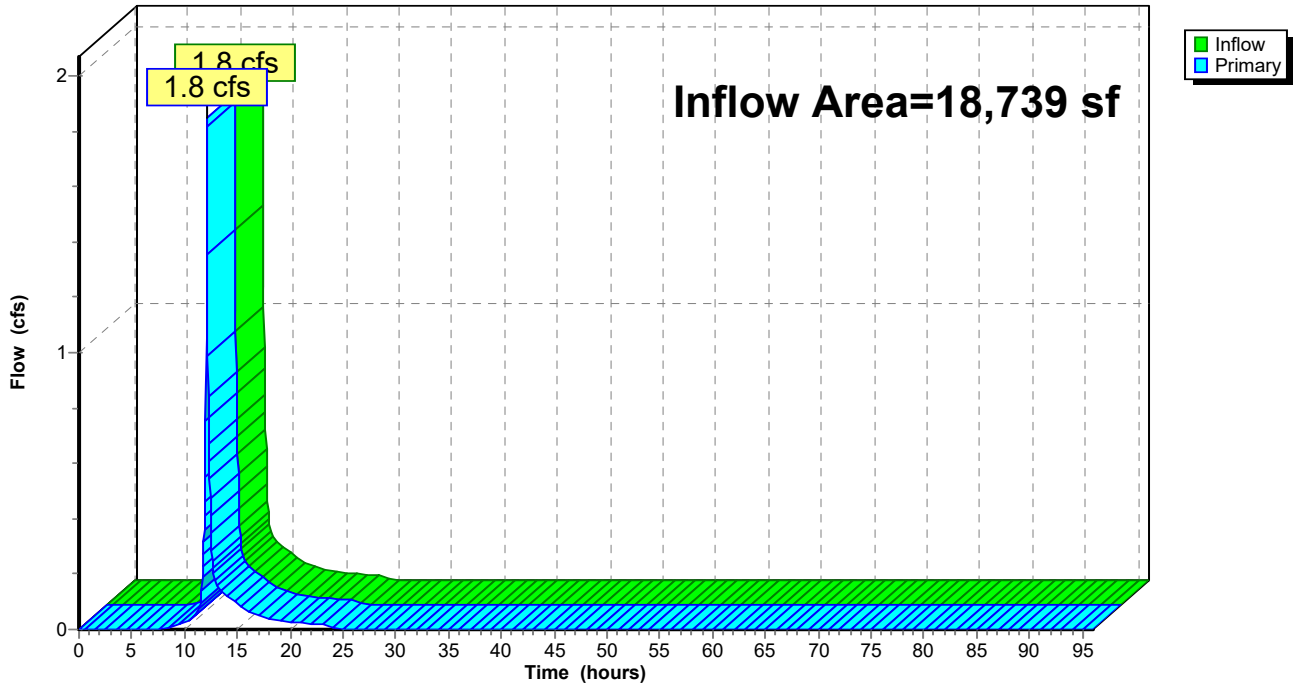
Summary for Link P 1L: P 1L

Inflow Area = 18,739 sf, 23.44% Impervious, Inflow Depth = 3.21" for 100-Year event
Inflow = 1.8 cfs @ 12.11 hrs, Volume= 5,015 cf
Primary = 1.8 cfs @ 12.11 hrs, Volume= 5,015 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.04 hrs

Link P 1L: P 1L

Hydrograph



No Information on This Page

C) Water Quality Calculations (Standards 3, 4, 5, 6 & 7)

The Project is a multi-family development with four or fewer units and is therefore exempt from the Stormwater Standards. The proposed stormwater management system is comprised of trench drains, area drains with sumps, Nyloplast drain basins with sumps, and two subsurface infiltration systems.

Standard 3)

The Project results in an increase in impervious area of about 4,393 S.F. and is thus required to provide 107 C.F. of recharge volume. The proposed system provides a recharge volume of 1,383 C.F. for the roofs and paved driveways, thereby meeting the recharge requirements. Stormwater runoff from the site is pretreated and then directed to the infiltration systems to provide recharge.

Standard 4)

The Project results in an increase in impervious area of about 4,393 s.f. and is thus required to provide 366 c.f. of water quality volume. The proposed system provides a water quality volume of 1,383 c.f. for the roofs and paved driveways, thereby meeting the water quality volume requirements. The site stormwater system provides water quality volume in the area drains with sumps, the Nyloplast drain basins with sumps, and lastly the subsurface stormwater infiltration systems.

Standard 5)

This standard is not applicable.

Standard 6)

This standard is not applicable.

Standard 7)

This standard is not applicable.

No Information on This Page

Critical Area - Yes or No No

	TSS Removal Rate	Starting TSS	Amount Removed	Remaining Load
BMP Name Sump	25%	100%	25%	75%
Infiltration	80%	75%	60%	15%
	0%	15%	0%	15%
	0%	15%	0%	15%
	0%	15%	0%	15%
		Total TSS Remaining:	15%	OK

No Information on This Page

Critical Area - Yes or No

No

Impervious Area	Area (S.F.)	Soil	Depth (inches)	Volume (C.F.)
P 1S	1,392	B	0.35	40.6
	416	C	0.25	8.7
P 2S	0	C		
P 3S	456	B	0.35	13.3
	881	C	0.25	18.4
P 4S	56	B	0.35	1.6
	1,192	C	0.25	24.8
P 5S	0	C		
Total Area	4,393 S.F.		Volume Required	107.4 C.F.

Capture Area Adjustment

To Recharge Facility	Area (S.F.)	Volume Required	C.F.
S101		107.4	C.F.

Volume Provided below lowest invert (Static Method)

BMP

P 1P 440.0 C.F. (See Stormwater Report)

P 2P 943.0 C.F. (See Stormwater Report)

Volume Provided: **1,383.0** C.F.

OK

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.

$$Rv = F \times \text{impervious area}$$

$$Rv = [(F_{\text{HSG "A"}}) (\text{Area}_1)] + [(F_{\text{HSG "B"}}) (\text{Area}_2)] + [(F_{\text{HSG "C"}}) (\text{Area}_3)] + [(F_{\text{HSG "D"}}) (\text{Area}_4)] \text{ Equation (2)}$$

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

$$Rv = 0.1605 \text{ acre-feet}$$

$$Rv = 0.1605 \text{ acre-feet} \times 43560 \text{ square feet/acre-feet} = 6,991 \text{ cubic feet or } 258.9 \text{ cubic yards}$$

Critical Area - Yes or No

Yes

Watershed (Subcatchment)	Impervious Area (S.F.)	Required Depth (inches)	Required Volume (C.F.)
P 1S	1,392	1.00	116.0
	416	1.00	34.7
P 2S	0		
P 3S	456	1.00	38.0
	881	1.00	73.4
P 4S	56	1.00	4.7
	1,192	1.00	99.3
P 5S	0		
Total Area:	4,393	Volume Required:	366.1

Volume Provided (per HydroCAD)

BMP

P 1P 440.0 C.F. (See Stormwater Report)

P 2P 943.0 C.F. (See Stormwater Report)

Volumes reported are below lowest invert (Static Method)

Volume Provided **1,383.0** C.F.

OK

No Information on This Page

D) Construction Period Pollution Prevention Plan, Long-Term
Pollution Prevention Plan, and Long-Term Operations &
Maintenance Plan (Standards 8, 9 & 10)

Standards 8 & 9)

Anthony Bianco is responsible for implementation of the Construction Period Pollution Prevention Plan, the Long-Term Operation & Maintenance Plan, and the Long-Term Pollution Prevention Plan for 9 & 13 Elton Street Worcester, Massachusetts.

The site work will result in less than one (1) acre of disturbance, and therefore the NPDES requirements of the Construction General Permit are not applicable and a SWPPP is not required.

The stormwater management system for 9 & 13 Elton Street is comprised of pervious areas, area drains, Nyloplast drain basins, and two subsurface infiltration systems. Only stormwater may be discharged through these facilities, there shall be no connections of floor drains and/or sanitary connections. Refer to the following pages for specific requirements to prevent pollution and the maintenance of the stormwater management system.

Standard 10)

No illicit connections to the stormwater management system are known or proposed. Sanitary wastewater will be discharged to an onsite sewage disposal pump system designed in accordance with 310 CMR 15 (Title 5) and discharged to the extended City service in Elton Street.

No Information on This Page

Construction Period Pollution Prevention Plan



Best Management Practice	Frequency Of Inspection	Maintenance (Inspect for these items) and Frequency (major storms being ½" of rain or more)	Inspection (Date) Maintenance (Yes/No)	Maintenance Performed (Date and Initial)
Natural Buffer	Daily	These areas are beyond the Limit of Work and are to be protected. Replace Limit of Work demarcation (flagging, berms/dikes, fencing or ECB's) when deteriorated. Should infringement into Natural Buffers occur, take corrective action immediately and implement mitigation measures (seeding, planting of native trees or shrubs) to restore Natural Buffers.		
Erosion Control Barriers (ECB)	Weekly and after major storms	Remove sediment before it has accumulated to one-half of the above-ground height of ECB's. Replace ECB's before they have deteriorated/decomposed to half their original height or every twelve (12) months, whichever comes first. Sediments to be removed and disposed of above the ECB line in an area to be stabilized later. Fabric to be disposed of offsite. Natural liners and wooden stakes may be left to decompose.		
Silt-sacks	Weekly and after major storms	Replace at least twice per year, or when sediment reaches two (2) inches in depth, or if flooding is observed. Dispose of materials offsite.		
Anti-tracking Pad	Daily	Replace at least once per year, or when effectiveness has diminished. Where sediment has been tracked-out offsite onto paved roads, sidewalks, or other paved areas offsite, remove the deposited sediment by the end of the same business day in which the track-out occurs or by the end of the next business day if track-out occurs on a non-business day. Remove the track-out by sweeping, shoveling, or vacuuming these surfaces, or by using other similarly effective means of sediment removal. Hosing or sweeping tracked-out sediment into any stormwater conveyance, storm drain inlet, or water of the U.S. (i.e., wetland or stream) is PROHIBITED.		
Equipment Storage and Refueling	Daily	Storage or refueling of construction equipment within one hundred (100) feet of any stormwater conveyance, storm drain inlet, or water of the U.S. (i.e., wetland or stream) is PROHIBITED. Spill kits shall be readily available on site if refueling is to occur. All materials shall be disposed of offsite.		
Soil Stockpiles	Weekly and after major storms	Locate Stockpiles away from stormwater channels and conveyances. Provide ECB or Stone Check Dams around Stockpiles. Stockpiles that will remain unused for more than a month should be seeded with a quick cover		

Best Management Practice	Frequency Of Inspection	Maintenance (Inspect for these items) and Frequency (major storms being ½" of rain or more)	Inspection (Date) Maintenance (Yes/No)	Maintenance Performed (Date and Initial)
Soil Stockpiles (Cont.'d)		crop such as Ryegrass (10-30 lbs./acres). Hosing or sweeping tracked-out sediment into any stormwater conveyance, storm drain inlet, or water of the U.S. (i.e., wetland or stream) is PROHIBITED.		
Sediment Basins	Weekly and after major storms	Remove floatables and any accumulated debris or as soon as observed. Remove accumulated sediment to maintain at least one-half of the design capacity and conduct all other appropriate maintenance to ensure the basin or impoundment remains in effective operating condition.		
Dust Control	Daily	Minimizing disturbed areas and rapid seeding/stabilization of disturbed areas is the preferred option. Water or an acceptable Dust Palliative should be used on haul roads to prevent dust from emanating and leaving the site or affecting Natural Buffers.		
Outlet & Channel Protection	Weekly and after major storm events	Observe slopes downgradient of Sediment Basins for stability, integrity, and erosion and repair immediately with seed or Turf Reinforcement Mat (TRM) and seed as necessary.		

Potential Source of Pollution	Protective Measures
-------------------------------	---------------------

Reportable Spill(s)	<ul style="list-style-type: none"> • The Responsible Party or its representative is obligated to notify appropriate authorities of any spills of hazardous/harmful materials. • Should a spill bypass a containment device – catch basin, water quality structure, berm, etc. – and impact a stormwater detention or retention facility, the Responsible Party shall clean-up, mitigate and/or restore the facility to its original condition.
Lawn/Landscape Maintenance	<ul style="list-style-type: none"> • Clippings and yard waste shall not be disposed of in stormwater management facilities or wetland resource areas. • Pesticides and fertilizers shall only be stored on site in approved containers within a structure. • Pesticides and fertilizers shall be applied at the proper time of year in the minimal effective quantity/concentration. They should not be applied when severe rainfall events are forecast. • Use drought-tolerant species to limit watering requirements, and mulch and compost to retain soil moisture. Irrigate at appropriate times of day - early morning and late evening – for the minimal period necessary to restore soil moisture. • Pet waste shall not be disposed of in stormwater management facilities or wetland resource areas.
De-icing	<ul style="list-style-type: none"> • Application rates of de-icing materials shall be the minimum acceptable to adequately treat storm-specific conditions. Multiple treatments are preferred to use of excessive quantities during the initial response. • De-icing materials may not be stored on site. • Non-toxic and inert materials (sand/gravel) are preferable in areas adjacent to stormwater management facilities and wetland resource areas. For general use, calcium magnesium acetate (CMA), calcium chloride and potassium acetate are preferable to sodium chloride.
Snow Removal	<ul style="list-style-type: none"> • Snow shall be piled in pervious areas where melt water can infiltrate (as designated on the plan). • Snow shall not be piled within one hundred (100) feet of a wetland resource area. • Snow shall not be piled on catch basins, swales, or in stormwater basins. • Management of snow shall not create a nuisance or hazard. The Responsible Party shall remove snow from site if adequate area on site is not available. • Sediments deposited in snow storage areas shall be removed each spring and disposed of offsite.

No Information on This Page

Responsible Party:

Anthony Bianco (initially), the Homeowners Association (eventually), or their assigns are responsible for implementation of the Long-Term Operation & Maintenance Plan and the Long-Term Pollution Prevention Plan for 9 & 13 Elton Street in Worcester, Massachusetts.

System Components:

The stormwater management system for 9 & 13 Elton Street in Worcester, Massachusetts is comprised of pervious areas, roof leaders, trench drains, area drains, Nyloplast drain basins, and two (2) subsurface infiltration systems with overflows. Only stormwater may be discharged through these facilities, there shall be no connections of floor drains and/or sanitary connections, and nothing shall be dumped into any of the system components. The stormwater system components are shown on the Site Plan.

Roof Leaders – These conveyances collect and direct roof runoff towards the downstream subsurface infiltration system (P 2P).

Trench Drains – These structures collect and direct driveway and excess roof runoff towards its corresponding downstream subsurface infiltration system (P 1P).

Area Drains/Nyloplast Drain Basins – These conveyances help collect and direct runoff towards the subsurface infiltration systems. Furthermore, each of these components will have grates or lids to access their respective sumps for cleaning.

Subsurface Infiltration Systems – subsurface infiltration systems meant to capture, retain, and infiltrate stormwater. Each stormwater system is embedded in a stone field meant to allow water to drain during periods of frozen ground or saturated conditions. These systems will require inspections to ensure they remain functioning. These systems are to be kept free of trash and debris. No yard waste and / or landscape maintenance clippings or brush shall be disposed of in these systems or its upstream components. No accessory structures are permitted in these areas.

Pervious Areas – open, vegetated (turf lawns or other grasses) areas over which stormwater runoff flows slowly and in a sheeting manner. These areas are to be kept free of trash and debris. No yard waste and/or landscape maintenance clippings or brush shall be disposed of in these areas. Residents may not store vehicles or other personal items in these areas. No accessory structures are permitted in these areas.

Grass Channels / Drainage Swales – shallow channels/swales lined with vegetation. Some may be lined with a turf reinforcement mat (TRM).

Outlet Protection – consists of stable vegetation and/or turf reinforcement mats (TRM).

Illicit Connections

No illicit connections to the stormwater management system are proposed or shall be installed during construction. No future connections to the stormwater system shall be allowed without permission of the Worcester Conservation Commission (Stormwater Permit Granting Authority) and other permit granting authorities. The proposed

Elton Street
9 & 13 Elton Street
Worcester, MA 01604
Anthony Bianco

Stormwater Management Long Term Operation & Maintenance Plan



multi-family development will be served by a wastewater (sewer) system, with a sewer service to each unit, a universal pump station onsite to lift sewage to the extended sewer main in Elton Street at the City's request.

Maintenance Schedule and Forms:

Refer to the following pages for specific requirements to prevent pollution and the maintenance of the stormwater management system.

Snow Storage / Removal:

Refer to the following pages for specific requirements on snow storage and removal.

Stormwater Management
 Long Term Operation
 & Maintenance Plan



Best Management Practice	Frequency Of Inspection	Maintenance (Inspect for these items) and Frequency	Inspection (Date) Maintenance (Yes/No)	Maintenance Performed (Date and Initial)
--------------------------	-------------------------	---	--	--

Street/Pavement Sweeping	Annually (March – April)	Annually (March – April). Paved areas to be swept of sediments, trash, and debris. Sediments to be removed and disposed off-site.		
Trench Drains	Quarterly	At least twice per year, or when sediment or debris reaches reaches six (6) inches in depth, or if flooding is observed. Remove floatables and sediment and dispose of off-site.		
Area Drains and Nyloplast Drain Basins with Sumps	Quarterly	At least twice per year, or when sediment reaches two (2) feet in depth, or if flooding is observed. Remove floatables and sediment and dispose of off-site.		
Subsurface Detention	Monthly for first three (3) months Quarterly and after major storm events	Twice per year or after major storm events. Camera inspection may be required. Remove debris and sediment at inlets and outlets by jetting or vacator truck. Debris and sediment must be disposed of off-site in accordance with Local, State, and Federal requirements.		
Pervious Areas/ Grassed Channel / Drainage Swale	Monthly (mowing) Annually	Mow monthly during growing season. Remove sediment annually and re-seed (if necessary). Repair erosion and re-seed when necessary. Turf reinforcement mat (TRM) or rock riprap may be required.		

No Information on This Page

E) Soils Information

No Information on This Page



Land Design Collaborative
 Chauncy Place
 45 Lyman Street, Suite 1
 Westborough, MA 01581

* Operator Notes a bigger Machine could move rocks/ledge we encountered. *

Soil Testing Field Worksheet

Date: 8/29/24 Weather: 70°F + Sunny
9:00am - 1:30pm
 Machine: Kubota u55-S Mini

Job #: 24-0264 Personnel: Wayne Belec, Principal
 Operator: Mark (Blair Construction)

TP #3 (Depth/Layer)	Notes (G/W, Redox, Modeling)
AH (0-11")	Sandy Loam
Bw (11-43")	Sandy Loam
C (43-50")	Fine Sandy Loam
Refusal @ 50"	
No G/W, weepage, mottling	

TP #2 (Depth/Layer)	Notes (G/W, Redox, Modeling)
AH (0-4")	Sandy Loam
Fill (4-23")	Med. Fine Sand
AH (23-39")	Sandy Loam
Bw (39-60")	Fine Sandy Loam
Redox @ one isolated location (25")	Refusal @ 60" No G/W, weepage

TP #1 (Depth/Layer)	Notes (G/W, Redox, Modeling)
AH (0-8")	Sandy Loam
Bw (8-27")	Fine Sandy Loam
Refusal @ 27"	
No G/W, weepage, mottling	

TP #6 (Depth/Layer)	Notes (G/W, Redox, Modeling)

TP #5 (Depth/Layer)	Notes (G/W, Redox, Modeling)
AH (0-8")	Sandy Loam
Bw (8-24")	Fine Sandy Loam
C (24-72")	Fine Sand
Refusal @ 72"	
No G/W, weepage, mottling	

TP #4 (Depth/Layer)	Notes (G/W, Redox, Modeling)
AH (0-8")	Sandy Loam
Bw (8-30")	Fine Sandy Loam
C (30-62")	Fine Sand
Refusal @ 62"	
No G/W, weepage, mottling	

TP #9 (Depth/Layer)	Notes (G/W, Redox, Modeling)

TP #8 (Depth/Layer)	Notes (G/W, Redox, Modeling)

TP #7 (Depth/Layer)	Notes (G/W, Redox, Modeling)

No Information on This Page



United States
Department of
Agriculture

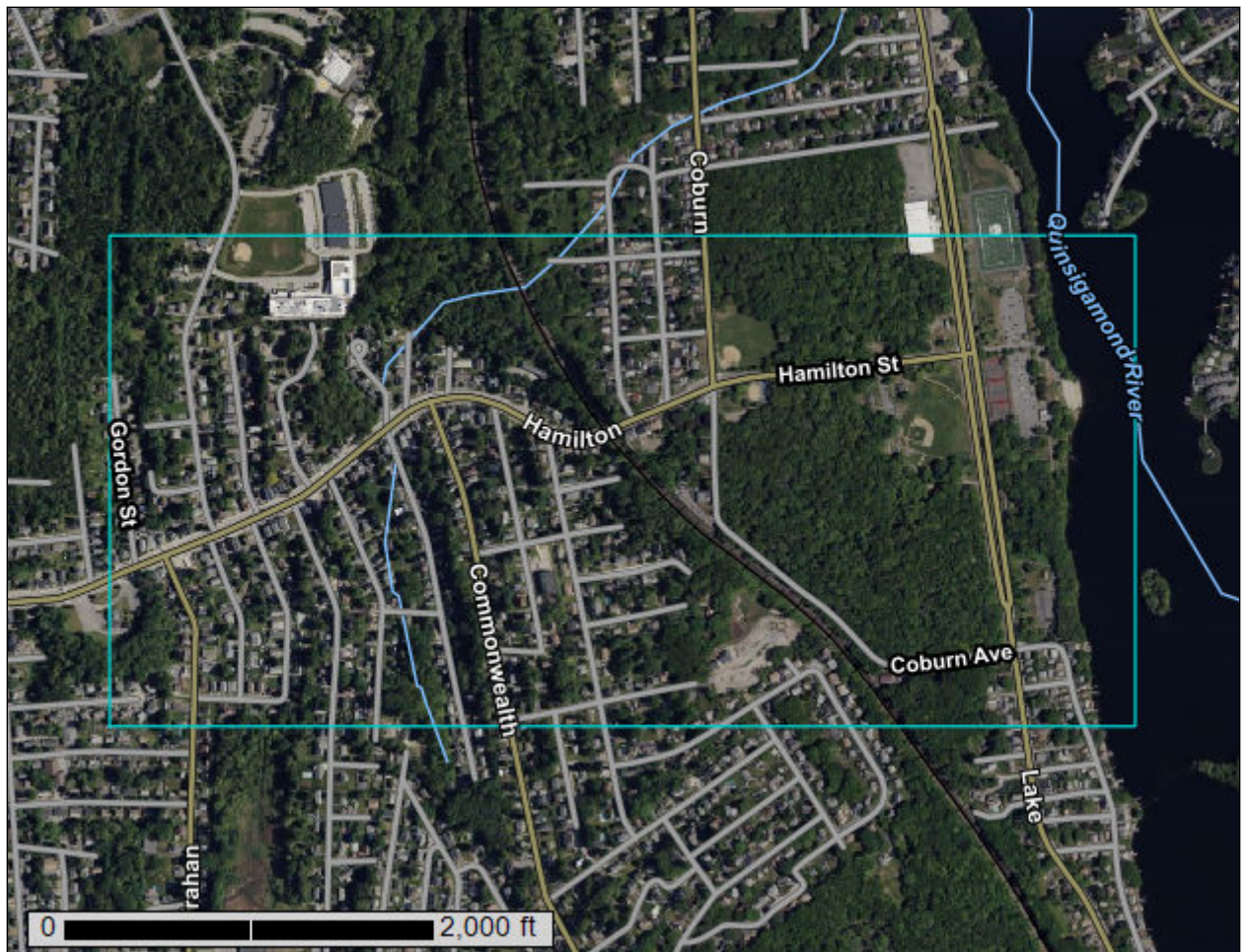
NRCS

Natural
Resources
Conservation
Service

A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for Worcester County, Massachusetts, Northeastern Part

9 & 13 Elton Street, Worcester,
MA



Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

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scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

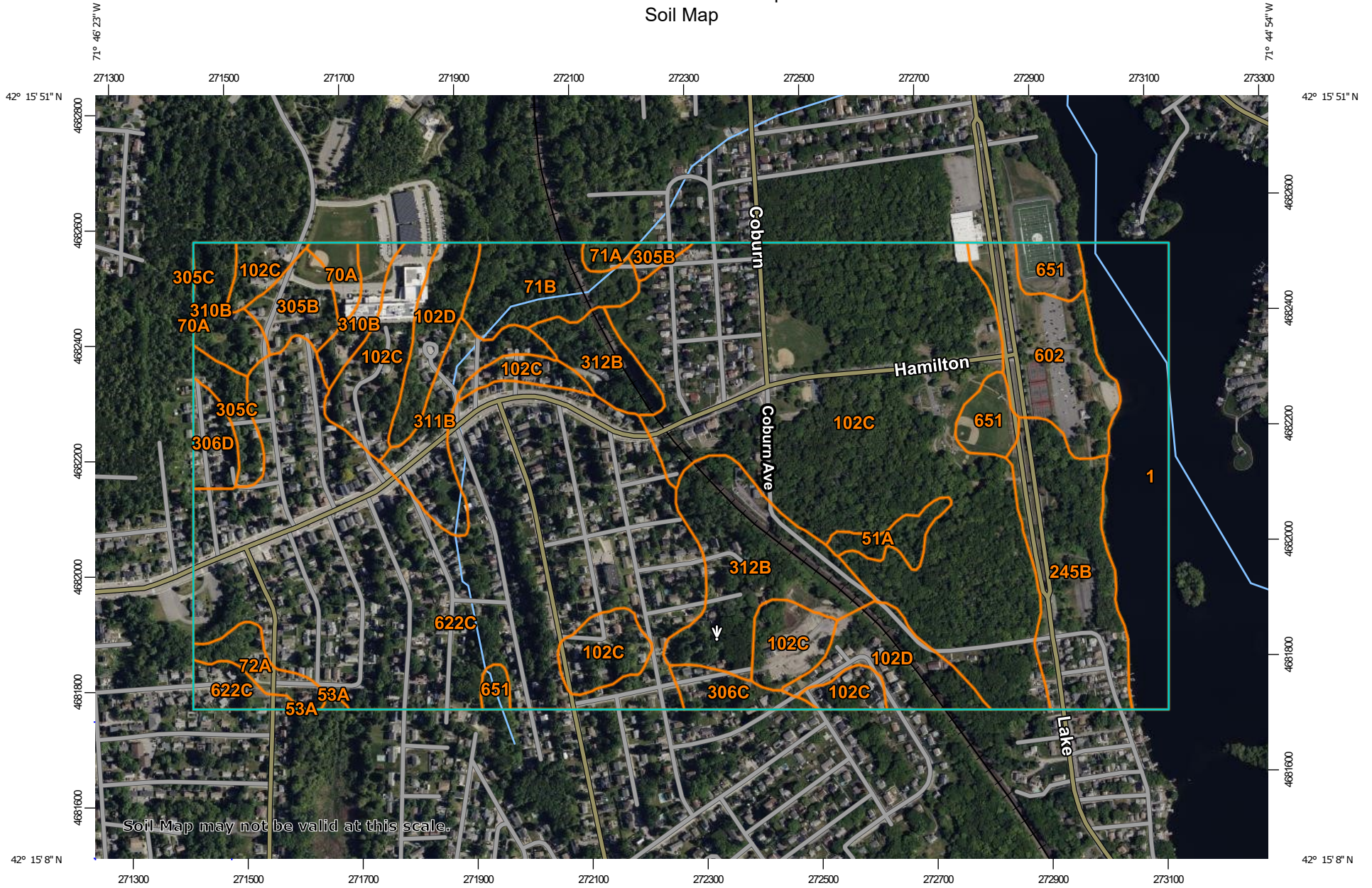
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identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

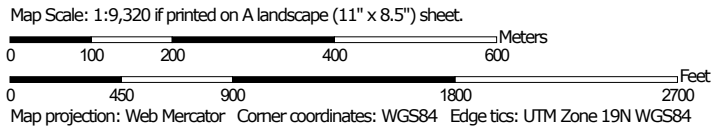
Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report Soil Map




Soil Map may not be valid at this scale.




MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)




















Soils







 Soil Map Unit Polygons

 Soil Map Unit Lines


 Soil Map Unit Points

Special Point Features






-  Blowout
-  Borrow Pit
-  Clay Spot
-  Closed Depression
-  Gravel Pit
-  Gravelly Spot
-  Landfill
-  Lava Flow
-  Marsh or swamp
-  Mine or Quarry
-  Miscellaneous Water
-  Perennial Water
-  Rock Outcrop
-  Saline Spot
-  Sandy Spot
-  Severely Eroded Spot
-  Sinkhole
-  Slide or Slip
-  Sodic Spot

-  Spoil Area
-  Stony Spot
-  Very Stony Spot
-  Wet Spot
-  Other
-  Special Line Features


Water Features

 Streams and Canals

Transportation

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

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

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

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

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

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

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

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

Soil Survey Area: Worcester County, Massachusetts, Northeastern Part
 Survey Area Data: Version 18, Sep 10, 2023

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

MAP LEGEND

MAP INFORMATION

imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
1	Water	21.2	6.2%
51A	Swansea muck, 0 to 1 percent slopes	2.4	0.7%
53A	Freetown muck, ponded, 0 to 1 percent slopes	0.2	0.1%
70A	Ridgebury fine sandy loam, 0 to 3 percent slopes	1.8	0.5%
71A	Ridgebury fine sandy loam, 0 to 3 percent slopes, extremely stony	0.9	0.3%
71B	Ridgebury fine sandy loam, 3 to 8 percent slopes, extremely stony	8.6	2.5%
72A	Whitman fine sandy loam, 0 to 3 percent slopes	3.1	0.9%
102C	Chatfield-Hollis-Rock outcrop complex, 0 to 15 percent slopes	106.7	31.3%
102D	Chatfield-Hollis-Rock outcrop complex, 15 to 35 percent slopes	13.1	3.8%
245B	Hinckley loamy sand, 3 to 8 percent slopes	17.2	5.1%
305B	Paxton fine sandy loam, 3 to 8 percent slopes	5.3	1.6%
305C	Paxton fine sandy loam, 8 to 15 percent slopes	2.9	0.8%
306C	Paxton fine sandy loam, 8 to 15 percent slopes, very stony	3.0	0.9%
306D	Paxton fine sandy loam, 15 to 25 percent slopes, very stony	2.9	0.9%
310B	Woodbridge fine sandy loam, 3 to 8 percent slopes	7.8	2.3%
311B	Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony	7.6	2.2%
312B	Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony	21.6	6.3%
602	Urban land	12.1	3.6%
622C	Paxton-Urban land complex, 8 to 15 percent slopes	95.9	28.2%
651	Udorthents, smoothed	6.2	1.8%
Totals for Area of Interest		340.6	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas

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shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Worcester County, Massachusetts, Northeastern Part

1—Water

Map Unit Setting

National map unit symbol: w3qb
Mean annual precipitation: 32 to 50 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

51A—Swansea muck, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2trl2
Elevation: 0 to 1,140 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Swansea and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Swansea

Setting

Landform: Bogs, swamps
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Highly decomposed organic material over loose sandy and gravelly glaciofluvial deposits

Typical profile

Oa1 - 0 to 24 inches: muck
Oa2 - 24 to 34 inches: muck
Cg - 34 to 79 inches: coarse sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)

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Depth to water table: About 0 to 6 inches
Frequency of flooding: Rare
Frequency of ponding: Frequent
Available water supply, 0 to 60 inches: Very high (about 16.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8w
Hydrologic Soil Group: B/D
Ecological site: F144AY043MA - Acidic Organic Wetlands
Hydric soil rating: Yes

Minor Components

Freetown

Percent of map unit: 10 percent
Landform: Bogs, swamps
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Scarboro

Percent of map unit: 5 percent
Landform: Drainageways, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope, tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Whitman

Percent of map unit: 5 percent
Landform: Drainageways, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

53A—Freetown muck, ponded, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2t2qc
Elevation: 0 to 1,140 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Freetown, ponded, and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Freetown, Ponded

Setting

Landform: Kettles, marshes, depressions, depressions, bogs, swamps

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Tread, dip

Down-slope shape: Concave

Across-slope shape: Concave

Parent material: Highly decomposed organic material

Typical profile

Oe - 0 to 2 inches: mucky peat

Oa - 2 to 79 inches: muck

Properties and qualities

Slope: 0 to 1 percent

Surface area covered with cobbles, stones or boulders: 0.0 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Very poorly drained

Runoff class: Negligible

*Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high
(0.14 to 14.17 in/hr)*

Depth to water table: About 0 to 6 inches

Frequency of flooding: Rare

Frequency of ponding: Frequent

Available water supply, 0 to 60 inches: Very high (about 19.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 5w

Hydrologic Soil Group: B/D

Ecological site: F144AY043MA - Acidic Organic Wetlands

Hydric soil rating: Yes

Minor Components

Scarboro

Percent of map unit: 5 percent

Landform: Drainageways, depressions

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Base slope, tread, dip

Down-slope shape: Concave

Across-slope shape: Concave

Hydric soil rating: Yes

Swansea, ponded

Percent of map unit: 5 percent

Landform: Bogs, swamps, marshes, depressions, depressions, kettles

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Tread, dip

Down-slope shape: Concave

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Across-slope shape: Concave
Hydric soil rating: Yes

Whitman, ponded

Percent of map unit: 5 percent
Landform: Depressions on ground moraines
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

70A—Ridgebury fine sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2w69f
Elevation: 0 to 1,480 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Ridgebury and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ridgebury

Setting

Landform: Ground moraines, hills, drumlins, depressions, drainageways
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Head slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 6 inches: fine sandy loam
Bw - 6 to 10 inches: sandy loam
Bg - 10 to 19 inches: gravelly sandy loam
Cd - 19 to 66 inches: gravelly sandy loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 15 to 35 inches to densic material
Drainage class: Poorly drained
Runoff class: Very high

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Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)

Depth to water table: About 0 to 6 inches

Frequency of flooding: None

Frequency of ponding: None

Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)

Available water supply, 0 to 60 inches: Low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 4w

Hydrologic Soil Group: D

Ecological site: F144AY009CT - Wet Till Depressions

Hydric soil rating: Yes

Minor Components

Woodbridge

Percent of map unit: 9 percent

Landform: Ground moraines, hills, drumlins

Landform position (two-dimensional): Summit, footslope

Landform position (three-dimensional): Base slope, crest

Down-slope shape: Convex

Across-slope shape: Linear

Hydric soil rating: No

Whitman

Percent of map unit: 5 percent

Landform: Hills, drainageways, drumlins, ground moraines, depressions

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Base slope

Down-slope shape: Concave

Across-slope shape: Concave

Hydric soil rating: Yes

Leicester

Percent of map unit: 1 percent

Landform: Ground moraines, hills, drainageways, depressions

Landform position (two-dimensional): Footslope, toeslope

Landform position (three-dimensional): Base slope

Down-slope shape: Concave, linear

Across-slope shape: Concave

Hydric soil rating: Yes

71A—Ridgebury fine sandy loam, 0 to 3 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: 2w69b

Elevation: 0 to 1,480 feet

Mean annual precipitation: 36 to 71 inches

Mean annual air temperature: 39 to 55 degrees F

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Frost-free period: 140 to 240 days

Farmland classification: Not prime farmland

Map Unit Composition

Ridgebury, extremely stony, and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ridgebury, Extremely Stony

Setting

Landform: Drumlins, depressions, ground moraines, hills, drainageways

Landform position (two-dimensional): Footslope, toeslope

Landform position (three-dimensional): Head slope, base slope

Down-slope shape: Concave

Across-slope shape: Concave

Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material

A - 1 to 6 inches: fine sandy loam

Bw - 6 to 10 inches: sandy loam

Bg - 10 to 19 inches: gravelly sandy loam

Cd - 19 to 66 inches: gravelly sandy loam

Properties and qualities

Slope: 0 to 3 percent

Surface area covered with cobbles, stones or boulders: 9.0 percent

Depth to restrictive feature: 15 to 35 inches to densic material

Drainage class: Poorly drained

Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)

Depth to water table: About 0 to 6 inches

Frequency of flooding: None

Frequency of ponding: None

Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)

Available water supply, 0 to 60 inches: Low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7s

Hydrologic Soil Group: D

Ecological site: F144AY009CT - Wet Till Depressions

Hydric soil rating: Yes

Minor Components

Woodbridge, extremely stony

Percent of map unit: 7 percent

Landform: Ground moraines, hills, drumlins

Landform position (two-dimensional): Summit, footslope

Landform position (three-dimensional): Base slope, crest

Down-slope shape: Convex

Across-slope shape: Linear

Hydric soil rating: No

Whitman, extremely stony

Percent of map unit: 7 percent
Landform: Depressions
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Paxton, extremely stony

Percent of map unit: 1 percent
Landform: Ground moraines, hills, drumlins
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

71B—Ridgebury fine sandy loam, 3 to 8 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: 2w69c
Elevation: 0 to 1,290 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Ridgebury, extremely stony, and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ridgebury, Extremely Stony

Setting

Landform: Drumlins, depressions, ground moraines, hills, drainageways
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Head slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 6 inches: fine sandy loam
Bw - 6 to 10 inches: sandy loam
Bg - 10 to 19 inches: gravelly sandy loam
Cd - 19 to 66 inches: gravelly sandy loam

Custom Soil Resource Report

Properties and qualities

Slope: 3 to 8 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 15 to 35 inches to densic material
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: F144AY009CT - Wet Till Depressions
Hydric soil rating: Yes

Minor Components

Woodbridge, extremely stony

Percent of map unit: 10 percent
Landform: Ground moraines, hills, drumlins
Landform position (two-dimensional): Summit, backslope, footslope
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Whitman, extremely stony

Percent of map unit: 8 percent
Landform: Depressions
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Paxton, extremely stony

Percent of map unit: 2 percent
Landform: Ground moraines, hills, drumlins
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

72A—Whitman fine sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2zggp
Elevation: 0 to 1,080 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Whitman and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Whitman

Setting

Landform: Drumlins, ground moraines, hills, drainageways, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Coarse-loamy lodgment till derived from granite and gneiss and/or schist

Typical profile

O_i - 0 to 1 inches: peat
A - 1 to 10 inches: fine sandy loam
B_g - 10 to 17 inches: gravelly fine sandy loam
C_{dg} - 17 to 61 inches: fine sandy loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 7 to 38 inches to densic material
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (K_{sat}): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: D
Ecological site: F144AY041MA - Very Wet Till Depressions

Custom Soil Resource Report

Hydric soil rating: Yes

Minor Components

Ridgebury

Percent of map unit: 10 percent

Landform: Ground moraines, hills, drainageways, drumlins, depressions

Landform position (two-dimensional): Footslope, toeslope

Landform position (three-dimensional): Head slope, base slope

Down-slope shape: Concave

Across-slope shape: Concave

Hydric soil rating: Yes

Scarboro

Percent of map unit: 6 percent

Landform: Outwash terraces, outwash deltas, drainageways, depressions

Landform position (three-dimensional): Tread

Down-slope shape: Concave

Across-slope shape: Concave

Hydric soil rating: Yes

Swansea

Percent of map unit: 3 percent

Landform: Marshes, bogs, swamps

Down-slope shape: Concave

Across-slope shape: Concave

Hydric soil rating: Yes

Woodbridge

Percent of map unit: 1 percent

Landform: Ground moraines, hills, drumlins

Landform position (two-dimensional): Summit, backslope, footslope

Landform position (three-dimensional): Crest, side slope

Down-slope shape: Concave

Across-slope shape: Linear

Hydric soil rating: No

102C—Chatfield-Hollis-Rock outcrop complex, 0 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2w69g

Elevation: 0 to 1,540 feet

Mean annual precipitation: 36 to 71 inches

Mean annual air temperature: 39 to 55 degrees F

Frost-free period: 140 to 240 days

Farmland classification: Not prime farmland

Map Unit Composition

Chatfield, extremely stony, and similar soils: 39 percent

Hollis, extremely stony, and similar soils: 26 percent

Rock outcrop: 17 percent

Custom Soil Resource Report

Minor components: 18 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Chatfield, Extremely Stony

Setting

Landform: Ridges, hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest
Down-slope shape: Convex
Across-slope shape: Linear, convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

O_i - 0 to 1 inches: slightly decomposed plant material
A - 1 to 2 inches: fine sandy loam
B_w - 2 to 30 inches: gravelly fine sandy loam
2R - 30 to 40 inches: bedrock

Properties and qualities

Slope: 0 to 15 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 20 to 41 inches to lithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (K_{sat}): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Description of Hollis, Extremely Stony

Setting

Landform: Ridges, hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest
Down-slope shape: Convex
Across-slope shape: Linear, convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

O_i - 0 to 2 inches: slightly decomposed plant material
A - 2 to 7 inches: gravelly fine sandy loam
B_w - 7 to 16 inches: gravelly fine sandy loam
2R - 16 to 26 inches: bedrock

Custom Soil Resource Report

Properties and qualities

Slope: 0 to 15 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 8 to 23 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Very low (about 2.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: F144AY033MA - Shallow Dry Till Uplands
Hydric soil rating: No

Description of Rock Outcrop

Setting

Parent material: Igneous and metamorphic rock

Properties and qualities

Slope: 0 to 15 percent
Depth to restrictive feature: 0 inches to lithic bedrock
Runoff class: Very high

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components

Charlton, extremely stony

Percent of map unit: 12 percent
Landform: Ridges, hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Sutton, extremely stony

Percent of map unit: 3 percent
Landform: Hills, ground moraines
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Paxton, extremely stony

Percent of map unit: 2 percent
Landform: Ground moraines, hills, drumlins
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

Leicester, extremely stony

Percent of map unit: 1 percent
Landform: Ground moraines, hills, drainageways, depressions
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave, linear
Across-slope shape: Concave
Hydric soil rating: Yes

102D—Chatfield-Hollis-Rock outcrop complex, 15 to 35 percent slopes

Map Unit Setting

National map unit symbol: 2w69h
Elevation: 0 to 1,540 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Chatfield, extremely stony, and similar soils: 35 percent
Hollis, extremely stony, and similar soils: 30 percent
Rock outcrop: 20 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Chatfield, Extremely Stony

Setting

Landform: Ridges, hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest
Down-slope shape: Convex
Across-slope shape: Linear, convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Custom Soil Resource Report

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 2 inches: fine sandy loam
Bw - 2 to 30 inches: gravelly fine sandy loam
2R - 30 to 40 inches: bedrock

Properties and qualities

Slope: 15 to 35 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 20 to 41 inches to lithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Description of Hollis, Extremely Stony

Setting

Landform: Ridges, hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest
Down-slope shape: Convex
Across-slope shape: Linear, convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 7 inches: gravelly fine sandy loam
Bw - 7 to 16 inches: gravelly fine sandy loam
2R - 16 to 26 inches: bedrock

Properties and qualities

Slope: 15 to 35 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 8 to 23 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)

Custom Soil Resource Report

Available water supply, 0 to 60 inches: Very low (about 2.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7s

Hydrologic Soil Group: D

Ecological site: F144AY033MA - Shallow Dry Till Uplands

Hydric soil rating: No

Description of Rock Outcrop

Setting

Landform: Ridges, hills

Parent material: Igneous and metamorphic rock

Typical profile

R - 0 to 79 inches: bedrock

Properties and qualities

Slope: 15 to 35 percent

Depth to restrictive feature: 0 inches to lithic bedrock

Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)

Available water supply, 0 to 60 inches: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8

Hydrologic Soil Group: D

Hydric soil rating: No

Minor Components

Charlton, extremely stony

Percent of map unit: 7 percent

Landform: Ridges, hills

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Side slope

Down-slope shape: Convex, linear

Across-slope shape: Convex

Hydric soil rating: No

Leicester, extremely stony

Percent of map unit: 4 percent

Landform: Ground moraines, hills, drainageways, depressions

Landform position (two-dimensional): Footslope, toeslope

Landform position (three-dimensional): Base slope

Down-slope shape: Concave, linear

Across-slope shape: Concave

Hydric soil rating: Yes

Paxton, extremely stony

Percent of map unit: 2 percent

Landform: Hills, drumlins, ground moraines

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Side slope

Down-slope shape: Convex, linear

Custom Soil Resource Report

Across-slope shape: Linear, convex
Hydric soil rating: No

Sutton, extremely stony

Percent of map unit: 2 percent
Landform: Ground moraines, hills
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

245B—Hinckley loamy sand, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2svm8
Elevation: 0 to 1,430 feet
Mean annual precipitation: 36 to 53 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 250 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Hinckley and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hinckley

Setting

Landform: Outwash deltas, outwash terraces, kames, kame terraces, moraines, eskers, outwash plains
Landform position (two-dimensional): Summit, shoulder, backslope, footslope
Landform position (three-dimensional): Nose slope, side slope, base slope, crest, riser, tread
Down-slope shape: Concave, convex, linear
Across-slope shape: Convex, linear, concave
Parent material: Sandy and gravelly glaciofluvial deposits derived from gneiss and/or granite and/or schist

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 8 inches: loamy sand
Bw1 - 8 to 11 inches: gravelly loamy sand
Bw2 - 11 to 16 inches: gravelly loamy sand
BC - 16 to 19 inches: very gravelly loamy sand
C - 19 to 65 inches: very gravelly sand

Custom Soil Resource Report

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Very low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: A
Ecological site: F144AY022MA - Dry Outwash
Hydric soil rating: No

Minor Components

Windsor

Percent of map unit: 8 percent
Landform: Outwash deltas, outwash terraces, moraines, eskers, kames, outwash plains, kame terraces
Landform position (two-dimensional): Summit, shoulder, backslope, footslope
Landform position (three-dimensional): Nose slope, side slope, base slope, crest, riser, tread
Down-slope shape: Concave, convex, linear
Across-slope shape: Convex, linear, concave
Hydric soil rating: No

Sudbury

Percent of map unit: 5 percent
Landform: Outwash deltas, outwash terraces, moraines, outwash plains, kame terraces
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Head slope, side slope, base slope, tread
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: No

Agawam

Percent of map unit: 2 percent
Landform: Outwash deltas, outwash terraces, moraines, eskers, kames, outwash plains, kame terraces
Landform position (two-dimensional): Summit, shoulder, backslope, footslope
Landform position (three-dimensional): Nose slope, side slope, base slope, crest, riser, tread
Down-slope shape: Concave, convex, linear
Across-slope shape: Convex, linear, concave
Hydric soil rating: No

305B—Paxton fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2t2qp
Elevation: 0 to 1,570 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Paxton and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Paxton

Setting

Landform: Ground moraines, drumlins, hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Ap - 0 to 8 inches: fine sandy loam
Bw1 - 8 to 15 inches: fine sandy loam
Bw2 - 15 to 26 inches: fine sandy loam
Cd - 26 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 18 to 39 inches to densic material
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 18 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: C
Ecological site: F144AY007CT - Well Drained Dense Till Uplands

Custom Soil Resource Report

Hydric soil rating: No

Minor Components

Woodbridge

Percent of map unit: 9 percent

Landform: Ground moraines, drumlins, hills

Landform position (two-dimensional): Summit, backslope, footslope

Landform position (three-dimensional): Side slope

Down-slope shape: Concave

Across-slope shape: Linear

Hydric soil rating: No

Ridgebury

Percent of map unit: 6 percent

Landform: Depressions, ground moraines, hills, drainageways

Landform position (two-dimensional): Toeslope, backslope, footslope

Landform position (three-dimensional): Base slope, head slope, dip

Down-slope shape: Concave

Across-slope shape: Concave

Hydric soil rating: Yes

Charlton

Percent of map unit: 5 percent

Landform: Hills

Down-slope shape: Linear

Across-slope shape: Linear

Hydric soil rating: No

305C—Paxton fine sandy loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2w66y

Elevation: 0 to 1,320 feet

Mean annual precipitation: 36 to 71 inches

Mean annual air temperature: 39 to 55 degrees F

Frost-free period: 140 to 240 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Paxton and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Paxton

Setting

Landform: Ground moraines, hills, drumlins

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Side slope

Down-slope shape: Convex, linear

Custom Soil Resource Report

Across-slope shape: Convex

Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Ap - 0 to 8 inches: fine sandy loam

Bw1 - 8 to 15 inches: fine sandy loam

Bw2 - 15 to 26 inches: fine sandy loam

Cd - 26 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 8 to 15 percent

Depth to restrictive feature: 20 to 39 inches to densic material

Drainage class: Well drained

Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)

Depth to water table: About 18 to 37 inches

Frequency of flooding: None

Frequency of ponding: None

Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)

Available water supply, 0 to 60 inches: Low (about 4.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3e

Hydrologic Soil Group: C

Ecological site: F144AY007CT - Well Drained Dense Till Uplands

Hydric soil rating: No

Minor Components

Charlton

Percent of map unit: 7 percent

Landform: Hills

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Side slope

Down-slope shape: Convex

Across-slope shape: Convex

Hydric soil rating: No

Woodbridge

Percent of map unit: 6 percent

Landform: Hills, drumlins, ground moraines

Landform position (two-dimensional): Summit, backslope, footslope

Landform position (three-dimensional): Side slope

Down-slope shape: Concave

Across-slope shape: Linear

Hydric soil rating: No

Ridgebury

Percent of map unit: 2 percent

Landform: Drumlins, drainageways, depressions, ground moraines, hills

Landform position (two-dimensional): Footslope, toeslope

Landform position (three-dimensional): Head slope, base slope

Down-slope shape: Concave, linear

Across-slope shape: Concave, linear

Hydric soil rating: Yes

306C—Paxton fine sandy loam, 8 to 15 percent slopes, very stony

Map Unit Setting

National map unit symbol: 2w677

Elevation: 0 to 1,330 feet

Mean annual precipitation: 36 to 71 inches

Mean annual air temperature: 39 to 55 degrees F

Frost-free period: 140 to 240 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Paxton, very stony, and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Paxton, Very Stony

Setting

Landform: Ground moraines, hills, drumlins

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Side slope

Down-slope shape: Convex, linear

Across-slope shape: Linear, convex

Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material

A - 2 to 10 inches: fine sandy loam

Bw1 - 10 to 17 inches: fine sandy loam

Bw2 - 17 to 28 inches: fine sandy loam

Cd - 28 to 67 inches: gravelly fine sandy loam

Properties and qualities

Slope: 8 to 15 percent

Surface area covered with cobbles, stones or boulders: 1.6 percent

Depth to restrictive feature: 20 to 43 inches to densic material

Drainage class: Well drained

Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)

Depth to water table: About 18 to 37 inches

Frequency of flooding: None

Frequency of ponding: None

Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)

Available water supply, 0 to 60 inches: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Custom Soil Resource Report

Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: C
Ecological site: F144AY007CT - Well Drained Dense Till Uplands
Hydric soil rating: No

Minor Components

Woodbridge, very stony

Percent of map unit: 8 percent
Landform: Hills, drumlins, ground moraines
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Charlton, very stony

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Ridgebury, very stony

Percent of map unit: 2 percent
Landform: Drumlins, depressions, ground moraines, hills, drainageways
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Head slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

306D—Paxton fine sandy loam, 15 to 25 percent slopes, very stony

Map Unit Setting

National map unit symbol: 2w67h
Elevation: 0 to 1,400 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Paxton, very stony, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Paxton, Very Stony

Setting

Landform: Ground moraines, hills, drumlins
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 10 inches: fine sandy loam
Bw1 - 10 to 17 inches: fine sandy loam
Bw2 - 17 to 28 inches: fine sandy loam
Cd - 28 to 67 inches: gravelly fine sandy loam

Properties and qualities

Slope: 15 to 25 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 20 to 43 inches to densic material
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 18 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: C
Ecological site: F144AY007CT - Well Drained Dense Till Uplands
Hydric soil rating: No

Minor Components

Woodbridge, very stony

Percent of map unit: 5 percent
Landform: Hills, drumlins, ground moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Charlton, very stony

Percent of map unit: 4 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex

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Across-slope shape: Convex

Hydric soil rating: No

Ridgebury, very stony

Percent of map unit: 1 percent

Landform: Drumlins, depressions, ground moraines, hills, drainageways

Landform position (two-dimensional): Footslope, toeslope

Landform position (three-dimensional): Head slope, base slope

Down-slope shape: Concave

Across-slope shape: Concave

Hydric soil rating: Yes

310B—Woodbridge fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2t2ql

Elevation: 0 to 1,470 feet

Mean annual precipitation: 36 to 71 inches

Mean annual air temperature: 39 to 55 degrees F

Frost-free period: 140 to 240 days

Farmland classification: All areas are prime farmland

Map Unit Composition

Woodbridge, fine sandy loam, and similar soils: 82 percent

Minor components: 18 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Woodbridge, Fine Sandy Loam

Setting

Landform: Ground moraines, drumlins, hills

Landform position (two-dimensional): Summit, backslope, footslope

Landform position (three-dimensional): Side slope

Down-slope shape: Concave

Across-slope shape: Linear

Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Ap - 0 to 7 inches: fine sandy loam

Bw1 - 7 to 18 inches: fine sandy loam

Bw2 - 18 to 30 inches: fine sandy loam

Cd - 30 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 3 to 8 percent

Depth to restrictive feature: 20 to 39 inches to densic material

Drainage class: Moderately well drained

Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)

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Depth to water table: About 18 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Ecological site: F144AY037MA - Moist Dense Till Uplands
Hydric soil rating: No

Minor Components

Paxton

Percent of map unit: 10 percent
Landform: Drumlins, ground moraines, hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Ridgebury

Percent of map unit: 8 percent
Landform: Depressions, ground moraines, hills, drainageways
Landform position (two-dimensional): Toeslope, backslope, footslope
Landform position (three-dimensional): Base slope, head slope, dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

311B—Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony

Map Unit Setting

National map unit symbol: 2t2qr
Elevation: 0 to 1,440 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Woodbridge, very stony, and similar soils: 82 percent
Minor components: 18 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Woodbridge, Very Stony

Setting

Landform: Ground moraines, hills, drumlins
Landform position (two-dimensional): Summit, backslope, footslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 9 inches: fine sandy loam
Bw1 - 9 to 20 inches: fine sandy loam
Bw2 - 20 to 32 inches: fine sandy loam
Cd - 32 to 67 inches: gravelly fine sandy loam

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 20 to 43 inches to densic material
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 19 to 27 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: C/D
Ecological site: F144AY037MA - Moist Dense Till Uplands
Hydric soil rating: No

Minor Components

Paxton, very stony

Percent of map unit: 10 percent
Landform: Ground moraines, hills, drumlins
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

Ridgebury, very stony

Percent of map unit: 8 percent
Landform: Hills, drainageways, drumlins, depressions, ground moraines
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Head slope, base slope
Down-slope shape: Concave

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Across-slope shape: Concave
Hydric soil rating: Yes

312B—Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: 2t2qs
Elevation: 0 to 1,580 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Woodbridge, extremely stony, and similar soils: 82 percent
Minor components: 18 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Woodbridge, Extremely Stony

Setting

Landform: Ground moraines, hills, drumlins
Landform position (two-dimensional): Summit, backslope, footslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 9 inches: fine sandy loam
Bw1 - 9 to 20 inches: fine sandy loam
Bw2 - 20 to 32 inches: fine sandy loam
Cd - 32 to 67 inches: gravelly fine sandy loam

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 20 to 43 inches to densic material
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 19 to 27 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.0 inches)

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Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C/D
Ecological site: F144AY037MA - Moist Dense Till Uplands
Hydric soil rating: No

Minor Components

Paxton, extremely stony

Percent of map unit: 10 percent
Landform: Ground moraines, hills, drumlins
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

Ridgebury, extremely stony

Percent of map unit: 8 percent
Landform: Hills, drainageways, drumlins, depressions, ground moraines
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Head slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

602—Urban land

Map Unit Setting

National map unit symbol: w3q8
Mean annual precipitation: 32 to 50 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Setting

Parent material: Excavated and filled land

622C—Paxton-Urban land complex, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2w67n
Elevation: 0 to 1,030 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Paxton and similar soils: 45 percent
Urban land: 35 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Paxton

Setting

Landform: Ground moraines, hills, drumlins
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Ap - 0 to 8 inches: fine sandy loam
Bw1 - 8 to 15 inches: fine sandy loam
Bw2 - 15 to 26 inches: fine sandy loam
Cd - 26 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 20 to 39 inches to densic material
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 18 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: F144AY007CT - Well Drained Dense Till Uplands

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Hydric soil rating: No

Description of Urban Land

Typical profile

M - 0 to 10 inches: cemented material

Properties and qualities

Slope: 8 to 15 percent

Depth to restrictive feature: 0 inches to manufactured layer

Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)

Available water supply, 0 to 60 inches: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8

Hydrologic Soil Group: D

Hydric soil rating: Unranked

Minor Components

Udorthents

Percent of map unit: 9 percent

Down-slope shape: Linear

Across-slope shape: Linear

Hydric soil rating: No

Canton

Percent of map unit: 7 percent

Landform: Hills

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Side slope

Down-slope shape: Convex, linear

Across-slope shape: Convex

Hydric soil rating: No

Woodbridge

Percent of map unit: 3 percent

Landform: Ground moraines, hills, drumlins

Landform position (two-dimensional): Summit, backslope, footslope

Landform position (three-dimensional): Crest, side slope

Down-slope shape: Concave

Across-slope shape: Linear

Hydric soil rating: No

Ridgebury

Percent of map unit: 1 percent

Landform: Drumlins, depressions, ground moraines, hills, drainageways

Landform position (two-dimensional): Footslope, toeslope

Landform position (three-dimensional): Head slope, base slope

Down-slope shape: Concave, linear

Across-slope shape: Concave, linear

Hydric soil rating: Yes

651—Udorthents, smoothed

Map Unit Setting

National map unit symbol: w3q6

Elevation: 180 to 1,020 feet

Mean annual precipitation: 32 to 50 inches

Mean annual air temperature: 45 to 50 degrees F

Frost-free period: 145 to 240 days

Farmland classification: Not prime farmland

Map Unit Composition

Udorthents and similar soils: 80 percent

Urban land: 20 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udorthents

Setting

Parent material: Made land over firm loamy basal till

Properties and qualities

Slope: 0 to 3 percent

Depth to restrictive feature: More than 80 inches

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

References

- American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.
- American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.
- Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.
- Federal Register. July 13, 1994. Changes in hydric soils of the United States.
- Federal Register. September 18, 2002. Hydric soils of the United States.
- Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.
- National Research Council. 1995. Wetlands: Characteristics and boundaries.
- Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262
- Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577
- Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580
- Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.
- United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.
- United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374
- United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084>

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United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

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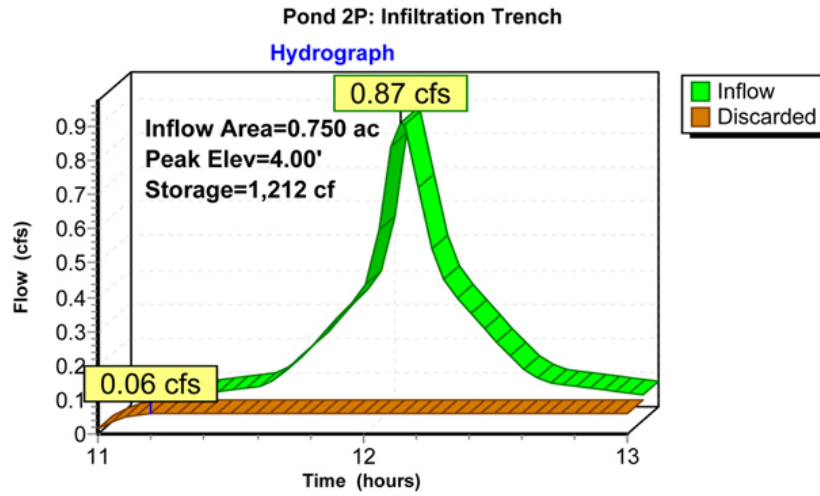


Table 2.3.3. 1982 Rawls Rates¹⁸

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

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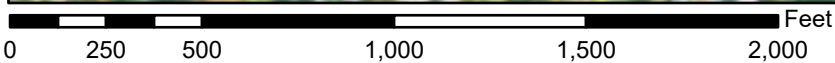
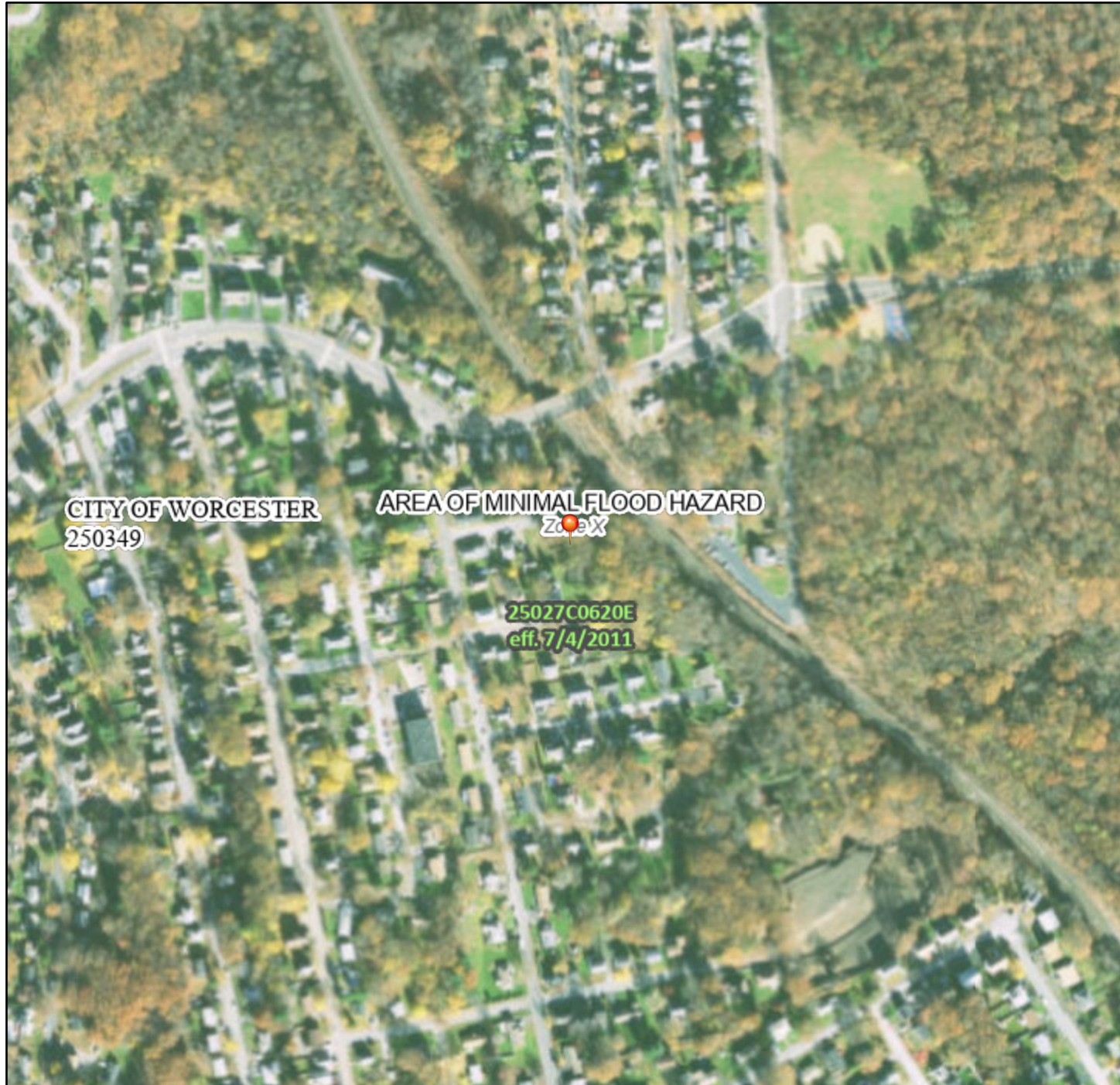
F) FEMA Flood Map

No Information on This Page

National Flood Hazard Layer FIRMMette



71°45'58"W 42°15'42"N



1:6,000

71°45'21"W 42°15'16"N

Basemap Imagery Source: USGS National Map 2023

Legend

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

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



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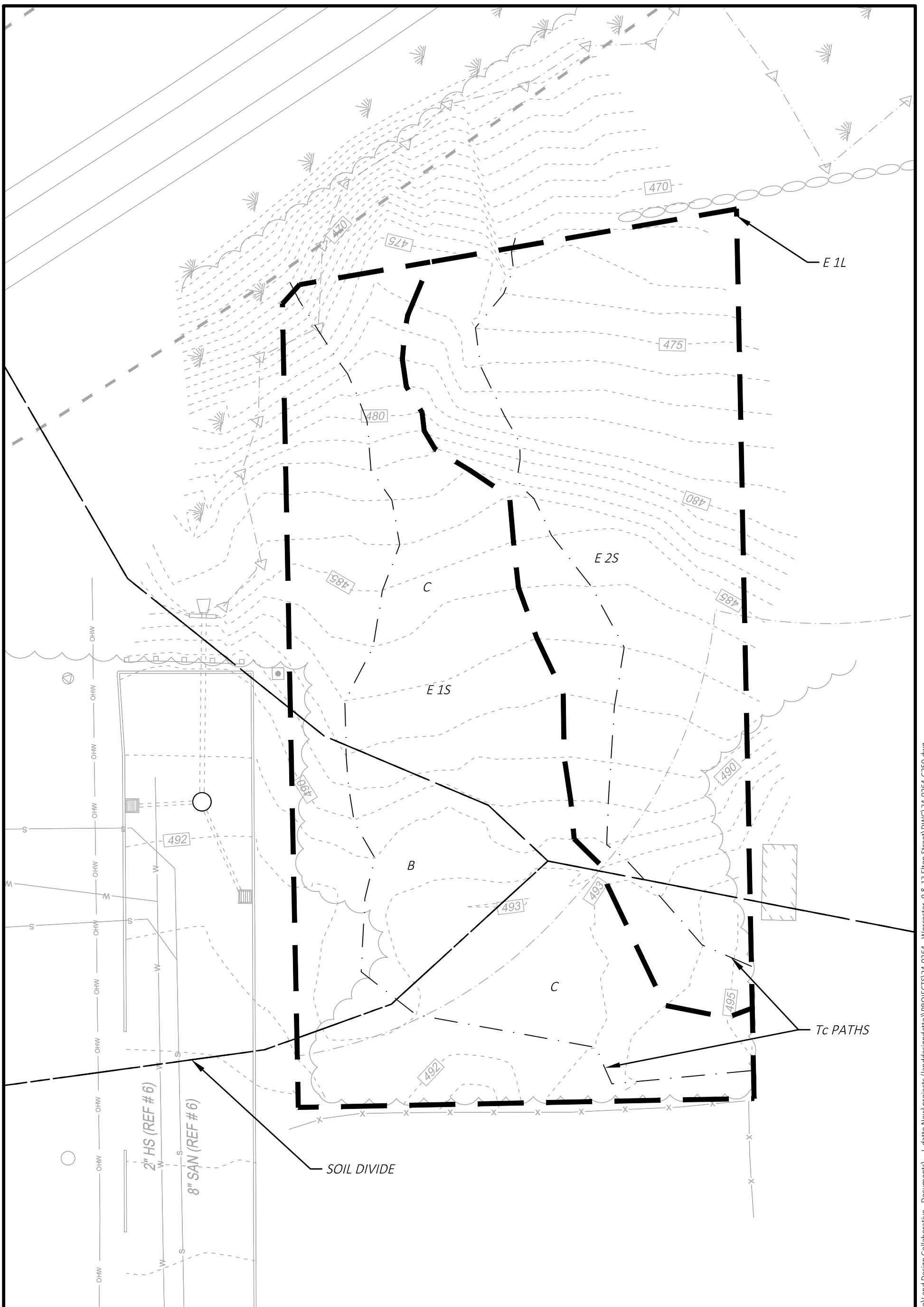
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G) Existing Watershed Map

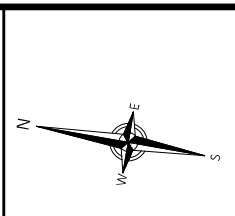
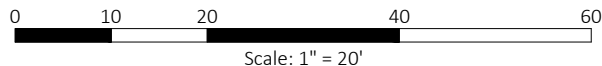
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Project Title:
 Single-Family, Tri-Plex
 Building
 9 & 13 Elton Street
 Worcester, MA 01604
 (Worcester County)

Sheet Title:
 Existing
 Drainage
 9 & 13 Elton Street
 Worcester, MA 01604
 (Worcester County)

Date: September 2024 Project No.: 24-0264 Reference Plan No.: C-250 Drawn By: ESM Checked By: MJS



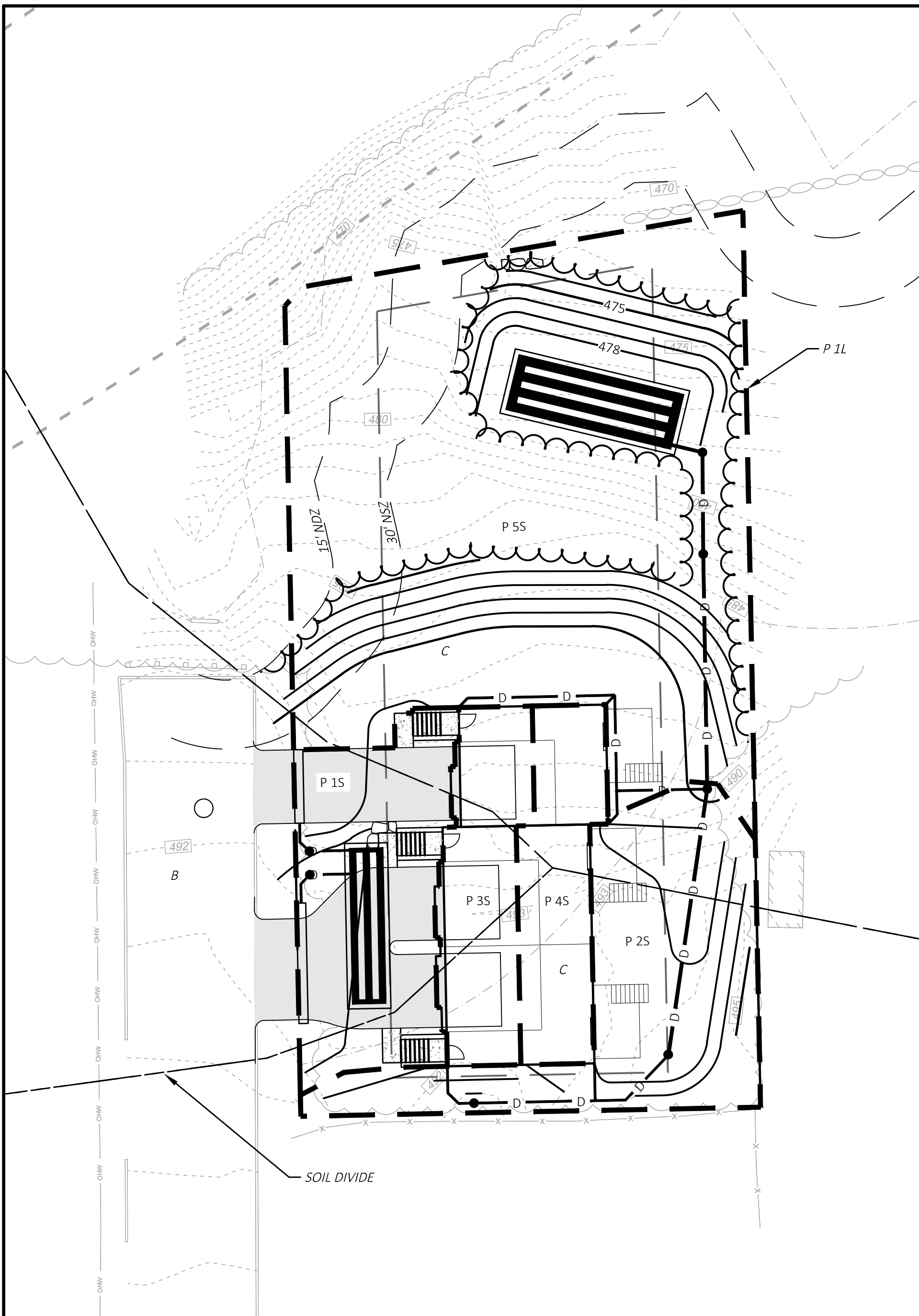
G-2

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 Westborough, MA 01581
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H) Proposed Watershed Map

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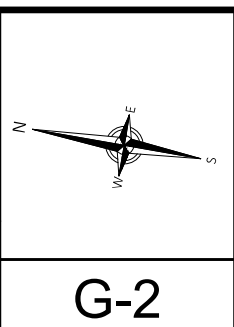


Project Title:
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 9 & 13 Elton Street
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Date: September 2024 Project No.: 24-0264 Reference Plan No.: C-250 Drawn By: ESM Checked By: MJS

0 10 20 40 60
 Scale: 1" = 20'



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