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EXISTING GRADE, INC.
Land Surveyors - Civil Engineers

*Storm Water
Drainage Report
for
10 & 16 Aphorp Street (Lots 1 & 2)
Proposed Duplex Site Plans
Worcester, Massachusetts*

Prepared for:

JV Realty
143 Maynard Street
Framingham, Massachusetts 01701

Prepared by:

Existing Grade, Inc.
62 Riedell Road
Douglas, Massachusetts 01516

February 18, 2024
EGI Project No. 1902



62 Riedell Road
Douglas, MA 01516
(508) 737-7920



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2. Introduction

Project Summary

The proponent, JV Realty, proposes to construct two duplex residential dwellings for the property located 10 & 16 Apthorp Street, Worcester MA. The proposed project will include the construction of two new duplex buildings with: bituminous concrete driveways, city utility connects for water, sewer, and gas, storm water management infrastructures inclusive of grass swales and rain gardens (bio-retention cells). The proposed project will be conducted per the Massachusetts Department of Environmental Protection requirements, Local Town and State bylaws, as well as using best management practices.

The property is listed by the City of Worcester Assessor's Department as parcels 32-024-00287-1 and 32-024-00287 and appears to lie within the Residential RL-7 zoning district based upon a review of the most recent City of Worcester Zoning Map. The property is located within the FEMA Flood Zone X Area based upon a review of FIRM Map 25027C0793E, Panel 793 of 1075, last revised July 04, 2011. Currently there is municipal water, sewer, as well as overhead electric telephone/ cable to service the property.

The properties addresses are recorded as 10 & 16 Apthorp Street, Worcester MA and abut Apthorp Street to the North and privately owned land to the South, East and West. Access to the site is proposed via a new driveway along Apthorp Street to the North. The existing site is comprised of a mix of wooded and grassed areas with one delineated wetland to the South and East of the parcel.

The Worcester County Soil Survey, issued by the US Department of Agriculture was referenced to determine the type and hydrologic group of the soils located on the property. The property is comprised of mostly hydrologic soil group D type soils.

Pre- and Post-Development Analysis

The pre- and post-development conditions were analyzed utilizing Hydrocad, a storm water modeling program, to model the hydrologic impacts of the proposed development on adjacent properties. The modeling program is based upon Soil Conservation Service's (SCS) Technical Release 55 (TR-55) and TR-20, programs to estimate the runoff and peak rates for small watersheds. As part of this analysis, two (2) separate models; one for the pre-development conditions, and one for post-development conditions were created and one (1) point of comparison, or Design Point, was analyzed. The Design Point as well as the Watershed areas and associated time of concentration paths (Tc), are shown on the pre and post-development watershed plans, which are located in this report.

The pre- and post development conditions were analyzed for the 2, 10, 25 and 100-year Type III storm events with a time span covering 24 hours. The rainfall intensities used for each storm event were taken from the NOAA Rainfall data viewer for Worcester County (appended to this report) and are defined as:

<i>Storm Event</i>	<i>Intensity (24-hr Duration (in))</i>
2-year	3.20
10-year	4.92
25-year	5.99
100-year	7.64

The Worcester County Soil Survey, issued by the US Department of Agriculture was referenced to determine the type and hydrologic group of the soils located on the property.

3. Compliance with Storm Water Management Standards

Standard 1: No New Untreated Discharges

The development is designed so that no new storm water conveyances do not discharge *untreated* pavement runoff into or cause erosion to wetland resource areas.

Standard 2: Peak Rate Attenuation

Pre- and Post Development storm water analysis calculations were performed for the 2, 10, 25 and 100-year Type III 24 hour storm events and a comparison of the peak rates at the design points for each storm event, under pre- and post-development conditions are summarized in the tables below:

<i>Storm Event</i>	<i>Design Point "DPI" (Wetlands)</i>	
	<i>Pre-Development</i>	<i>Post-Development</i>
2-year	1.07 cfs	0.54 cfs
10-year	2.10 cfs	1.83 cfs
25-year	2.76 cfs	2.35 cfs
100-year	3.79 cfs	3.59 cfs

The southern portion of the of the project (Design Point “DP1”) is used as the modeling point and is the defining boundary of the delineated wetland for the parcel.

As shown in the tables above, the peak rates of storm water runoff generated under post-development conditions will be less than the peak rates generated under pre-development conditions, which are achieved through the use of three rain gardens as well as grassed swales to direct storm water runoff throughout the parcel.

Complete runoff calculations for the 2, 10, 25 and 100-year Type III storm events including cover, soils types, area listings, and time of concentration paths for the pre-development conditions and post-development conditions are provided in Appendix A.

Standard 3: Groundwater Recharge

The groundwater recharge volume is not met due to the soil characteristics of the site being comprised of solely Hydrologic Soil Group ‘D’. The site will naturally recharge over the existing lawn and wooded areas, however this standard is exempt per the State of Massachusetts Stormwater Management Standards.

Standard 4: Water Quality

The storm water management system was designed with a treatment train consisting of rain gardens and grassed swales to facilitate the required removal of 80% Total Suspended Solids (TSS) as shown in Appendix B.

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

The proposed development is not a LUHPPL and therefore Standard 5 is not applicable.

Standard 6: Critical Areas

The proposed development does not discharge to a critical area and therefore Standard 6 is not applicable.

Standard 7: Redevelopment and Other Projects Subject to the Standards Only to the Maximum Extent Practicable

The proposed development is not a redevelopment and therefore Standard 7 is not applicable.

Standard 8: Constr. Period Pollution Prevention and Erosion & Sedimentation Control

A Construction Period Pollution Prevention, including an Erosion and Sedimentation Control Plan is provided in Appendix C.

Standard 9: Operation and Maintenance Plan

The Operation and Maintenance Plan is provided in Appendix D.

Standard 10: Prohibition of Illicit Discharges

There are no illicit discharges anticipated for the proposed development however measures to prevent illicit discharges will be included within the Long-Term Pollution Prevention Plan. Also, as required, an Illicit Discharge Compliance Statement will be submitted prior to the discharge of any storm water to the post-construction storm water Best Management Practices (BMPs).



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.

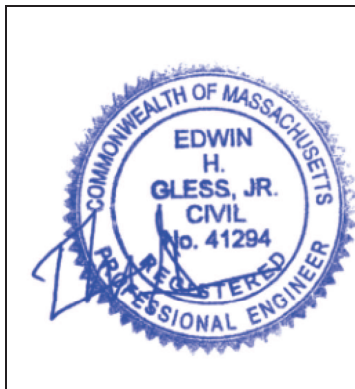
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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



Edwin Gless 02/18/2024
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

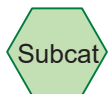
- The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;
- An Illicit Discharge Compliance Statement is attached;
- NO Illicit Discharge Compliance Statement is attached but will be submitted **prior to** the discharge of any stormwater to post-construction BMPs.

APPENDIX A

PRE-DEVELOPMENT



Pre-Developed to
Wetlands



1902_DRAINAGE-PRE

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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.704	82	Woods/grass comb., Fair, HSG D (E1)
0.704	82	TOTAL AREA

1902_DRAINAGE-PRE

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Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
0.704	HSG D	E1
0.000	Other	
0.704		TOTAL AREA

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Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.704	0.000	0.704	Woods/grass comb., Fair E1	
0.000	0.000	0.000	0.704	0.000	0.704	TOTAL AREA	

1902_DRAINAGE-PRE

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Worcester_Apthorp St

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

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Time span=5.00-24.00 hrs, dt=0.05 hrs, 381 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 E1: Pre-Developed Wetlands Runoff Area=30,659 sf 0.00% Impervious Runoff Depth>1.53"
Flow Length=234' Tc=10.7 min CN=82 Runoff=1.07 cfs 0.090 af

Total Runoff Area = 0.704 ac Runoff Volume = 0.090 af Average Runoff Depth = 1.53"
100.00% Pervious = 0.704 ac 0.00% Impervious = 0.000 ac

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Worcester_Apthorp St

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

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Summary for Subcatchment E1: Pre-Developed to Wetlands

Runoff = 1.07 cfs @ 12.16 hrs, Volume= 0.090 af, Depth> 1.53"

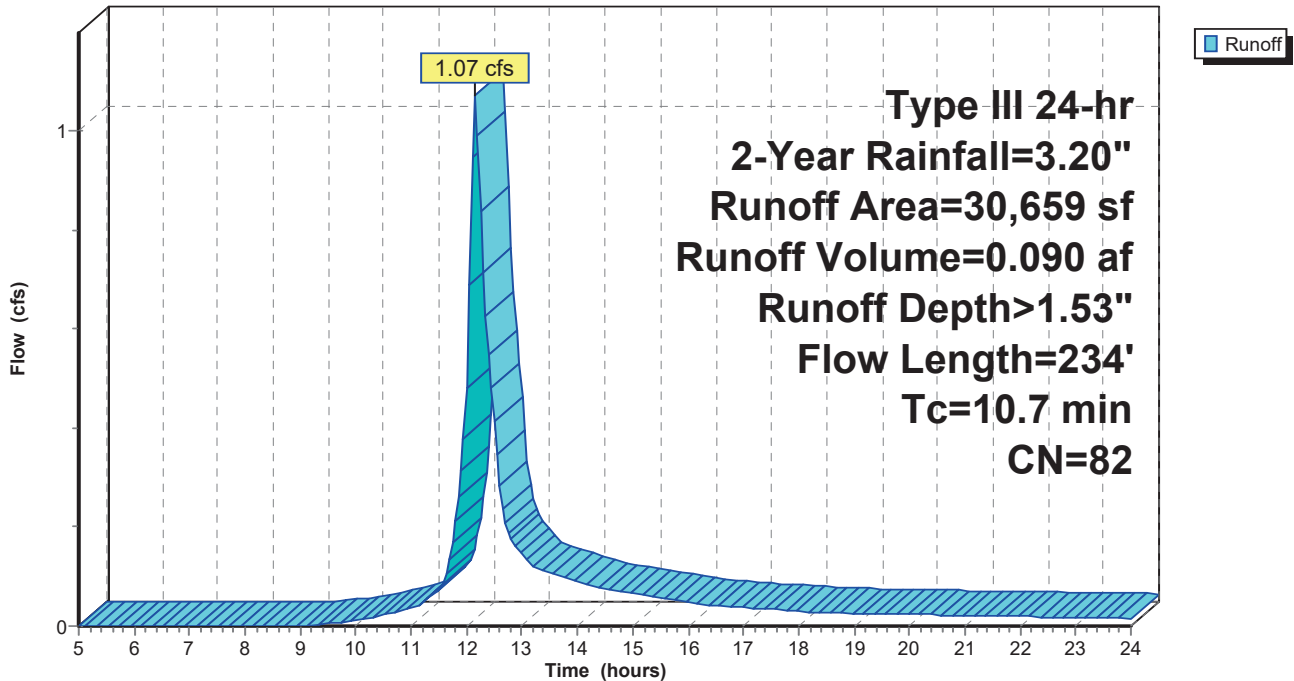
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
30,659	82	Woods/grass comb., Fair, HSG D
30,659		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	50	0.0360	0.09		Sheet Flow, A-B
1.3	184	0.0217	2.37		Woods: Light underbrush n= 0.400 P2= 3.43" Shallow Concentrated Flow, B-C
10.7	234	Total			Unpaved Kv= 16.1 fps

Subcatchment E1: Pre-Developed to Wetlands

Hydrograph



1902_DRAINAGE-PRE

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Worcester_Apthorp St

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

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Hydrograph for Subcatchment E1: Pre-Developed to Wetlands

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
5.00	0.18	0.00	0.00	18.25	2.98	1.37	0.03
5.25	0.19	0.00	0.00	18.50	2.99	1.37	0.03
5.50	0.21	0.00	0.00	18.75	3.01	1.38	0.03
5.75	0.22	0.00	0.00	19.00	3.02	1.39	0.03
6.00	0.23	0.00	0.00	19.25	3.03	1.40	0.03
6.25	0.24	0.00	0.00	19.50	3.04	1.41	0.03
6.50	0.26	0.00	0.00	19.75	3.05	1.42	0.02
6.75	0.27	0.00	0.00	20.00	3.06	1.43	0.02
7.00	0.29	0.00	0.00	20.25	3.07	1.44	0.02
7.25	0.31	0.00	0.00	20.50	3.08	1.44	0.02
7.50	0.33	0.00	0.00	20.75	3.09	1.45	0.02
7.75	0.34	0.00	0.00	21.00	3.10	1.46	0.02
8.00	0.36	0.00	0.00	21.25	3.11	1.47	0.02
8.25	0.39	0.00	0.00	21.50	3.12	1.47	0.02
8.50	0.41	0.00	0.00	21.75	3.13	1.48	0.02
8.75	0.44	0.00	0.00	22.00	3.14	1.49	0.02
9.00	0.47	0.00	0.00	22.25	3.15	1.50	0.02
9.25	0.50	0.00	0.00	22.50	3.16	1.50	0.02
9.50	0.53	0.00	0.01	22.75	3.16	1.51	0.02
9.75	0.57	0.01	0.01	23.00	3.17	1.51	0.02
10.00	0.60	0.01	0.01	23.25	3.18	1.52	0.02
10.25	0.65	0.02	0.02	23.50	3.19	1.53	0.02
10.50	0.69	0.03	0.02	23.75	3.19	1.53	0.02
10.75	0.74	0.04	0.03	24.00	3.20	1.54	0.02
11.00	0.80	0.05	0.04				
11.25	0.87	0.07	0.05				
11.50	0.95	0.10	0.07				
11.75	1.14	0.17	0.17				
12.00	1.60	0.40	0.48				
12.25	2.06	0.69	0.84				
12.50	2.25	0.82	0.41				
12.75	2.33	0.88	0.19				
13.00	2.40	0.93	0.14				
13.25	2.46	0.97	0.12				
13.50	2.51	1.00	0.11				
13.75	2.55	1.04	0.10				
14.00	2.60	1.07	0.09				
14.25	2.63	1.10	0.08				
14.50	2.67	1.12	0.08				
14.75	2.70	1.15	0.07				
15.00	2.73	1.17	0.07				
15.25	2.76	1.19	0.06				
15.50	2.79	1.22	0.06				
15.75	2.81	1.23	0.05				
16.00	2.84	1.25	0.05				
16.25	2.86	1.27	0.04				
16.50	2.87	1.28	0.04				
16.75	2.89	1.30	0.04				
17.00	2.91	1.31	0.04				
17.25	2.93	1.32	0.04				
17.50	2.94	1.33	0.03				
17.75	2.96	1.34	0.03				
18.00	2.97	1.36	0.03				

1902_DRAINAGE-PRE

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Worcester_Apthorp St
Type III 24-hr 10-Year Rainfall=4.92"

Page 8

Time span=5.00-24.00 hrs, dt=0.05 hrs, 381 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 E1: Pre-Developed Wetlands Runoff Area=30,659 sf 0.00% Impervious Runoff Depth>3.00"
Flow Length=234' Tc=10.7 min CN=82 Runoff=2.10 cfs 0.176 af

Total Runoff Area = 0.704 ac Runoff Volume = 0.176 af Average Runoff Depth = 3.00"
100.00% Pervious = 0.704 ac 0.00% Impervious = 0.000 ac

1902_DRAINAGE-PRE

Prepared by Existing Grade, Inc

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Worcester_Apthorp St
Type III 24-hr 10-Year Rainfall=4.92"

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Summary for Subcatchment E1: Pre-Developed to Wetlands

Runoff = 2.10 cfs @ 12.15 hrs, Volume= 0.176 af, Depth> 3.00"

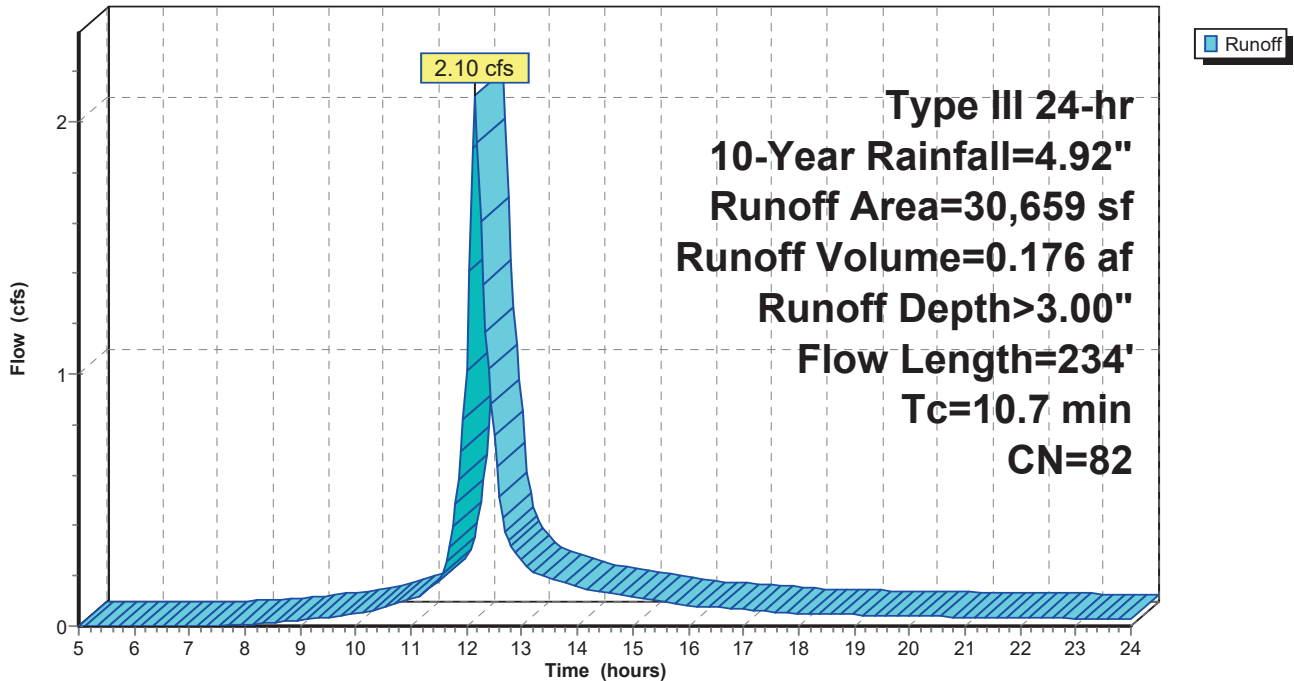
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.92"

Area (sf)	CN	Description
30,659	82	Woods/grass comb., Fair, HSG D
30,659		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	50	0.0360	0.09		Sheet Flow, A-B
1.3	184	0.0217	2.37		Woods: Light underbrush n= 0.400 P2= 3.43" Shallow Concentrated Flow, B-C
10.7	234	Total			Unpaved Kv= 16.1 fps

Subcatchment E1: Pre-Developed to Wetlands

Hydrograph



1902_DRAINAGE-PRE

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Worcester_Apthorp St
Type III 24-hr 10-Year Rainfall=4.92"

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Hydrograph for Subcatchment E1: Pre-Developed to Wetlands

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
5.00	0.28	0.00	0.00	18.25	4.59	2.71	0.05
5.25	0.30	0.00	0.00	18.50	4.60	2.73	0.05
5.50	0.32	0.00	0.00	18.75	4.62	2.74	0.05
5.75	0.33	0.00	0.00	19.00	4.64	2.76	0.05
6.00	0.35	0.00	0.00	19.25	4.66	2.78	0.04
6.25	0.37	0.00	0.00	19.50	4.68	2.79	0.04
6.50	0.40	0.00	0.00	19.75	4.69	2.81	0.04
6.75	0.42	0.00	0.00	20.00	4.71	2.82	0.04
7.00	0.45	0.00	0.00	20.25	4.72	2.83	0.04
7.25	0.47	0.00	0.00	20.50	4.74	2.85	0.04
7.50	0.50	0.00	0.00	20.75	4.75	2.86	0.04
7.75	0.53	0.00	0.01	21.00	4.77	2.87	0.04
8.00	0.56	0.01	0.01	21.25	4.78	2.89	0.04
8.25	0.59	0.01	0.01	21.50	4.80	2.90	0.04
8.50	0.63	0.02	0.01	21.75	4.81	2.91	0.03
8.75	0.67	0.02	0.02	22.00	4.83	2.92	0.03
9.00	0.72	0.03	0.02	22.25	4.84	2.93	0.03
9.25	0.76	0.04	0.03	22.50	4.85	2.95	0.03
9.50	0.82	0.06	0.04	22.75	4.86	2.96	0.03
9.75	0.87	0.07	0.04	23.00	4.88	2.97	0.03
10.00	0.93	0.09	0.05	23.25	4.89	2.98	0.03
10.25	0.99	0.11	0.06	23.50	4.90	2.99	0.03
10.50	1.07	0.14	0.07	23.75	4.91	3.00	0.03
10.75	1.14	0.17	0.09	24.00	4.92	3.01	0.03
11.00	1.23	0.21	0.11				
11.25	1.33	0.26	0.13				
11.50	1.47	0.33	0.18				
11.75	1.75	0.49	0.39				
12.00	2.46	0.97	1.02				
12.25	3.17	1.52	1.60				
12.50	3.45	1.74	0.76				
12.75	3.59	1.85	0.34				
13.00	3.69	1.94	0.26				
13.25	3.78	2.01	0.21				
13.50	3.85	2.08	0.19				
13.75	3.93	2.14	0.17				
14.00	3.99	2.19	0.16				
14.25	4.05	2.24	0.14				
14.50	4.10	2.29	0.14				
14.75	4.16	2.34	0.13				
15.00	4.20	2.38	0.12				
15.25	4.25	2.42	0.11				
15.50	4.29	2.45	0.10				
15.75	4.33	2.48	0.09				
16.00	4.36	2.51	0.08				
16.25	4.39	2.54	0.08				
16.50	4.42	2.57	0.07				
16.75	4.45	2.59	0.07				
17.00	4.47	2.61	0.07				
17.25	4.50	2.64	0.06				
17.50	4.52	2.66	0.06				
17.75	4.55	2.68	0.06				
18.00	4.57	2.69	0.05				

1902_DRAINAGE-PRE

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Worcester_Apthorp St
Type III 24-hr 25-Year Rainfall=5.99"

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Time span=5.00-24.00 hrs, dt=0.05 hrs, 381 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 E1: Pre-Developed Wetlands Runoff Area=30,659 sf 0.00% Impervious Runoff Depth>3.97"
Flow Length=234' Tc=10.7 min CN=82 Runoff=2.76 cfs 0.233 af

Total Runoff Area = 0.704 ac Runoff Volume = 0.233 af Average Runoff Depth = 3.97"
100.00% Pervious = 0.704 ac 0.00% Impervious = 0.000 ac

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Worcester_Apthorp St
Type III 24-hr 25-Year Rainfall=5.99"

Summary for Subcatchment E1: Pre-Developed to Wetlands

Runoff = 2.76 cfs @ 12.15 hrs, Volume= 0.233 af, Depth> 3.97"

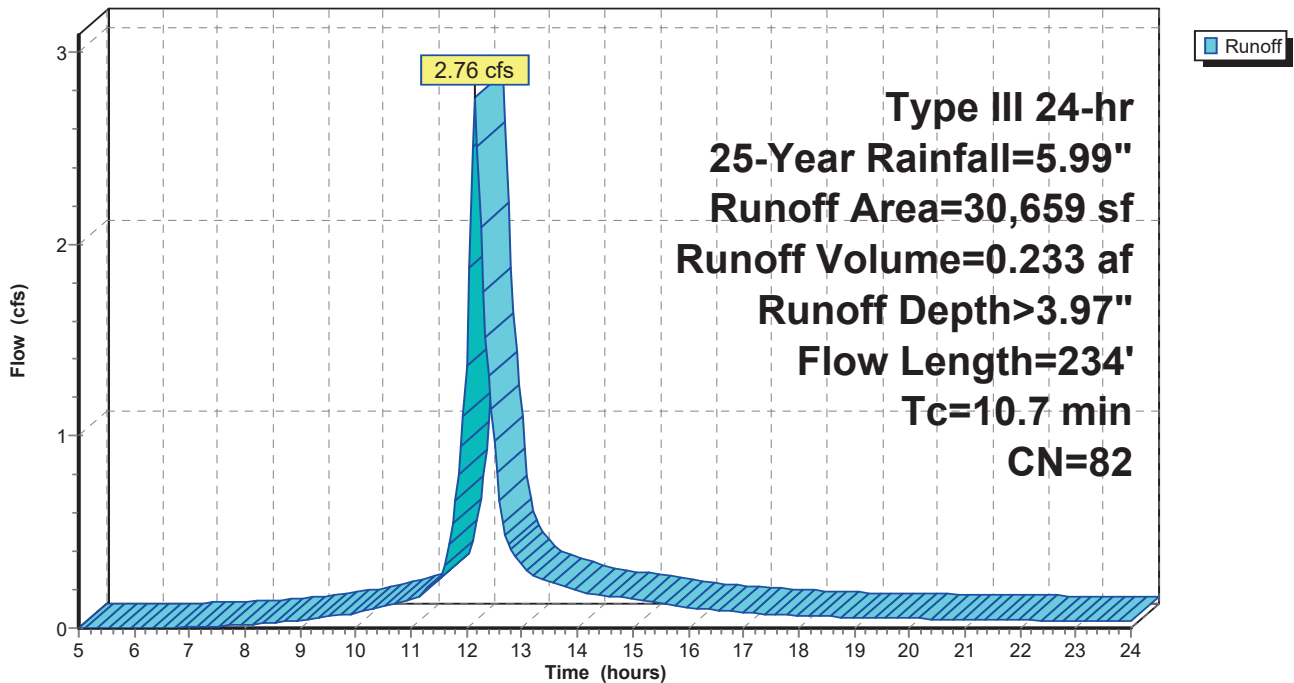
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.99"

Area (sf)	CN	Description
30,659	82	Woods/grass comb., Fair, HSG D
30,659		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	50	0.0360	0.09		Sheet Flow, A-B
1.3	184	0.0217	2.37		Woods: Light underbrush n= 0.400 P2= 3.43" Shallow Concentrated Flow, B-C
10.7	234	Total			Unpaved Kv= 16.1 fps

Subcatchment E1: Pre-Developed to Wetlands

Hydrograph



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Worcester_Apthorp St
Type III 24-hr 25-Year Rainfall=5.99"

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Hydrograph for Subcatchment E1: Pre-Developed to Wetlands

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
5.00	0.34	0.00	0.00	18.25	5.58	3.60	0.06
5.25	0.36	0.00	0.00	18.50	5.61	3.63	0.06
5.50	0.38	0.00	0.00	18.75	5.63	3.65	0.06
5.75	0.41	0.00	0.00	19.00	5.65	3.67	0.06
6.00	0.43	0.00	0.00	19.25	5.67	3.69	0.06
6.25	0.46	0.00	0.00	19.50	5.69	3.71	0.05
6.50	0.48	0.00	0.00	19.75	5.71	3.72	0.05
6.75	0.51	0.00	0.00	20.00	5.73	3.74	0.05
7.00	0.54	0.00	0.01	20.25	5.75	3.76	0.05
7.25	0.57	0.01	0.01	20.50	5.77	3.78	0.05
7.50	0.61	0.01	0.01	20.75	5.79	3.79	0.05
7.75	0.64	0.02	0.01	21.00	5.81	3.81	0.05
8.00	0.68	0.02	0.02	21.25	5.82	3.83	0.05
8.25	0.72	0.03	0.02	21.50	5.84	3.84	0.04
8.50	0.77	0.04	0.03	21.75	5.86	3.86	0.04
8.75	0.82	0.06	0.04	22.00	5.87	3.87	0.04
9.00	0.87	0.07	0.04	22.25	5.89	3.89	0.04
9.25	0.93	0.09	0.05	22.50	5.91	3.90	0.04
9.50	0.99	0.11	0.06	22.75	5.92	3.91	0.04
9.75	1.06	0.14	0.07	23.00	5.94	3.93	0.04
10.00	1.13	0.17	0.08	23.25	5.95	3.94	0.04
10.25	1.21	0.20	0.09	23.50	5.96	3.95	0.04
10.50	1.30	0.24	0.11	23.75	5.98	3.97	0.04
10.75	1.39	0.29	0.13	24.00	5.99	3.98	0.03
11.00	1.50	0.34	0.15				
11.25	1.62	0.42	0.19				
11.50	1.79	0.51	0.26				
11.75	2.13	0.73	0.55				
12.00	2.99	1.38	1.37				
12.25	3.86	2.09	2.09				
12.50	4.20	2.38	0.97				
12.75	4.37	2.52	0.44				
13.00	4.49	2.63	0.33				
13.25	4.60	2.72	0.27				
13.50	4.69	2.81	0.24				
13.75	4.78	2.88	0.22				
14.00	4.86	2.95	0.20				
14.25	4.93	3.02	0.18				
14.50	5.00	3.08	0.17				
14.75	5.06	3.13	0.16				
15.00	5.12	3.18	0.15				
15.25	5.17	3.23	0.14				
15.50	5.22	3.28	0.13				
15.75	5.27	3.32	0.12				
16.00	5.31	3.36	0.11				
16.25	5.35	3.39	0.10				
16.50	5.38	3.42	0.09				
16.75	5.42	3.45	0.09				
17.00	5.45	3.48	0.08				
17.25	5.48	3.51	0.08				
17.50	5.51	3.54	0.07				
17.75	5.53	3.56	0.07				
18.00	5.56	3.58	0.07				

1902_DRAINAGE-PRE

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Worcester_Apthorp St

Type III 24-hr 100-Year Rainfall=7.64"

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Time span=5.00-24.00 hrs, dt=0.05 hrs, 381 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 E1: Pre-Developed Wetlands Runoff Area=30,659 sf 0.00% Impervious Runoff Depth>5.51"
Flow Length=234' Tc=10.7 min CN=82 Runoff=3.79 cfs 0.323 af

Total Runoff Area = 0.704 ac Runoff Volume = 0.323 af Average Runoff Depth = 5.51"
100.00% Pervious = 0.704 ac 0.00% Impervious = 0.000 ac

1902_DRAINAGE-PRE

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Worcester_Apthorp St
Type III 24-hr 100-Year Rainfall=7.64"

Summary for Subcatchment E1: Pre-Developed to Wetlands

Runoff = 3.79 cfs @ 12.15 hrs, Volume= 0.323 af, Depth> 5.51"

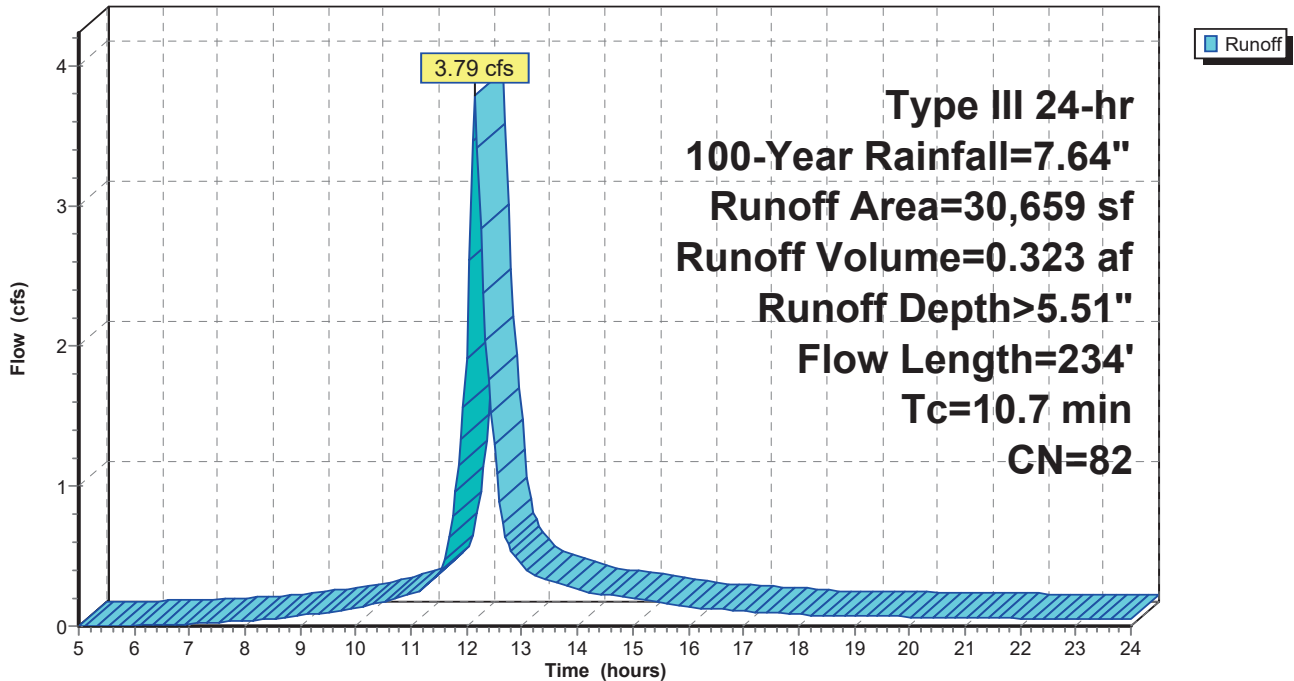
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.64"

Area (sf)	CN	Description
30,659	82	Woods/grass comb., Fair, HSG D
30,659		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	50	0.0360	0.09		Sheet Flow, A-B
1.3	184	0.0217	2.37		Woods: Light underbrush n= 0.400 P2= 3.43" Shallow Concentrated Flow, B-C
10.7	234	Total			Unpaved Kv= 16.1 fps

Subcatchment E1: Pre-Developed to Wetlands

Hydrograph



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Worcester_Apthorp St

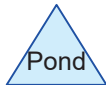
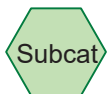
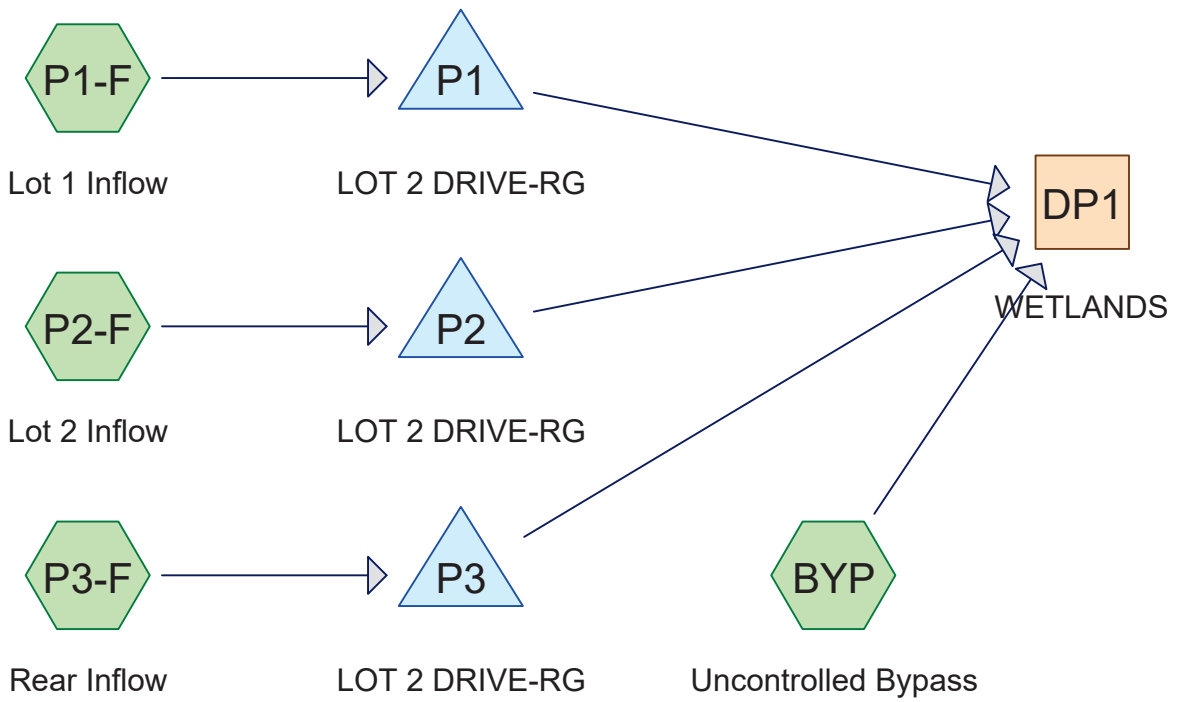
Type III 24-hr 100-Year Rainfall=7.64"

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Hydrograph for Subcatchment E1: Pre-Developed to Wetlands

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
5.00	0.43	0.00	0.00	18.25	7.12	5.03	0.08
5.25	0.46	0.00	0.00	18.50	7.15	5.06	0.08
5.50	0.49	0.00	0.00	18.75	7.18	5.08	0.08
5.75	0.52	0.00	0.00	19.00	7.21	5.11	0.08
6.00	0.55	0.01	0.01	19.25	7.23	5.14	0.07
6.25	0.58	0.01	0.01	19.50	7.26	5.16	0.07
6.50	0.62	0.01	0.01	19.75	7.29	5.19	0.07
6.75	0.65	0.02	0.02	20.00	7.31	5.21	0.07
7.00	0.69	0.03	0.02	20.25	7.34	5.23	0.07
7.25	0.73	0.03	0.02	20.50	7.36	5.25	0.06
7.50	0.78	0.04	0.03	20.75	7.38	5.28	0.06
7.75	0.82	0.06	0.03	21.00	7.41	5.30	0.06
8.00	0.87	0.07	0.04	21.25	7.43	5.32	0.06
8.25	0.92	0.09	0.05	21.50	7.45	5.34	0.06
8.50	0.98	0.11	0.05	21.75	7.47	5.36	0.06
8.75	1.04	0.13	0.07	22.00	7.49	5.38	0.06
9.00	1.11	0.16	0.08	22.25	7.51	5.40	0.05
9.25	1.19	0.19	0.09	22.50	7.53	5.42	0.05
9.50	1.27	0.23	0.10	22.75	7.55	5.44	0.05
9.75	1.35	0.27	0.12	23.00	7.57	5.45	0.05
10.00	1.44	0.32	0.13	23.25	7.59	5.47	0.05
10.25	1.54	0.37	0.15	23.50	7.61	5.49	0.05
10.50	1.65	0.43	0.18	23.75	7.62	5.50	0.05
10.75	1.78	0.51	0.20	24.00	7.64	5.52	0.04
11.00	1.91	0.59	0.23				
11.25	2.07	0.70	0.29				
11.50	2.28	0.84	0.38				
11.75	2.71	1.16	0.79				
12.00	3.82	2.05	1.92				
12.25	4.93	3.01	2.84				
12.50	5.36	3.41	1.30				
12.75	5.57	3.59	0.58				
13.00	5.73	3.74	0.44				
13.25	5.86	3.86	0.36				
13.50	5.99	3.97	0.32				
13.75	6.10	4.08	0.29				
14.00	6.20	4.17	0.26				
14.25	6.29	4.25	0.24				
14.50	6.37	4.33	0.23				
14.75	6.45	4.40	0.21				
15.00	6.53	4.47	0.20				
15.25	6.60	4.54	0.18				
15.50	6.66	4.60	0.17				
15.75	6.72	4.65	0.16				
16.00	6.77	4.70	0.14				
16.25	6.82	4.75	0.13				
16.50	6.86	4.79	0.12				
16.75	6.91	4.83	0.12				
17.00	6.95	4.87	0.11				
17.25	6.99	4.90	0.10				
17.50	7.02	4.94	0.10				
17.75	7.06	4.97	0.09				
18.00	7.09	5.00	0.09				

POST-DEVELOPMENT



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Page 2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.173	80	>75% Grass cover, Good, HSG D (P1-F, P3-F)
0.046	98	Paved parking, HSG D (P1-F, P2-F)
0.065	98	Roofs, HSG D (BYP, P3-F)
0.235	79	Woods, Fair, HSG D (BYP, P2-F)
0.184	79	Woods/grass comb., Good, HSG D (BYP)
0.704	82	TOTAL AREA

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Page 3

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
0.704	HSG D	BYP, P1-F, P2-F, P3-F
0.000	Other	
0.704		TOTAL AREA

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Page 4

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.173	0.000	0.173	>75% Grass cover, Good	P1-F, P3-F
0.000	0.000	0.000	0.046	0.000	0.046	Paved parking	P1-F, P2-F
0.000	0.000	0.000	0.065	0.000	0.065	Roofs	BYP, P3-F
0.000	0.000	0.000	0.235	0.000	0.235	Woods, Fair	BYP, P2-F
0.000	0.000	0.000	0.184	0.000	0.184	Woods/grass comb., Good	BYP
0.000	0.000	0.000	0.704	0.000	0.704	TOTAL AREA	

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

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Time span=5.00-24.00 hrs, dt=0.05 hrs, 381 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmenBYP: UncontrolledBypass Runoff Area=17,328 sf 8.22% Impervious Runoff Depth>1.47"
Flow Length=115' Tc=12.5 min CN=81 Runoff=0.54 cfs 0.049 af

SubcatchmenP1-F: Lot 1 Inflow Runoff Area=3,167 sf 27.31% Impervious Runoff Depth>1.76"
Flow Length=89' Tc=6.0 min CN=85 Runoff=0.15 cfs 0.011 af

SubcatchmenP2-F: Lot 2 Inflow Runoff Area=3,506 sf 32.37% Impervious Runoff Depth>1.75"
Flow Length=82' Tc=10.2 min CN=85 Runoff=0.14 cfs 0.012 af

SubcatchmenP3-F: Rear Inflow Runoff Area=6,658 sf 21.39% Impervious Runoff Depth>1.68"
Flow Length=131' Tc=14.7 min CN=84 Runoff=0.23 cfs 0.021 af

ReachDP1: WETLANDS Inflow=0.54 cfs 0.058 af
Outflow=0.54 cfs 0.058 af

Pond P1: LOT 2 DRIVE-RG Peak Elev=615.34' Storage=426 cf Inflow=0.15 cfs 0.011 af
Discarded=0.00 cfs 0.001 af Primary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.001 af

Pond P2: LOT 2 DRIVE-RG Peak Elev=615.47' Storage=475 cf Inflow=0.14 cfs 0.012 af
Discarded=0.00 cfs 0.001 af Primary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.001 af

Pond P3: LOT 2 DRIVE-RG Peak Elev=616.11' Storage=486 cf Inflow=0.23 cfs 0.021 af
Discarded=0.00 cfs 0.001 af Primary=0.09 cfs 0.009 af Outflow=0.09 cfs 0.010 af

Total Runoff Area = 0.704 ac Runoff Volume = 0.092 af Average Runoff Depth = 1.57"
84.19% Pervious = 0.593 ac 15.81% Impervious = 0.111 ac

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

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Summary for Subcatchment BYP: Uncontrolled Bypass

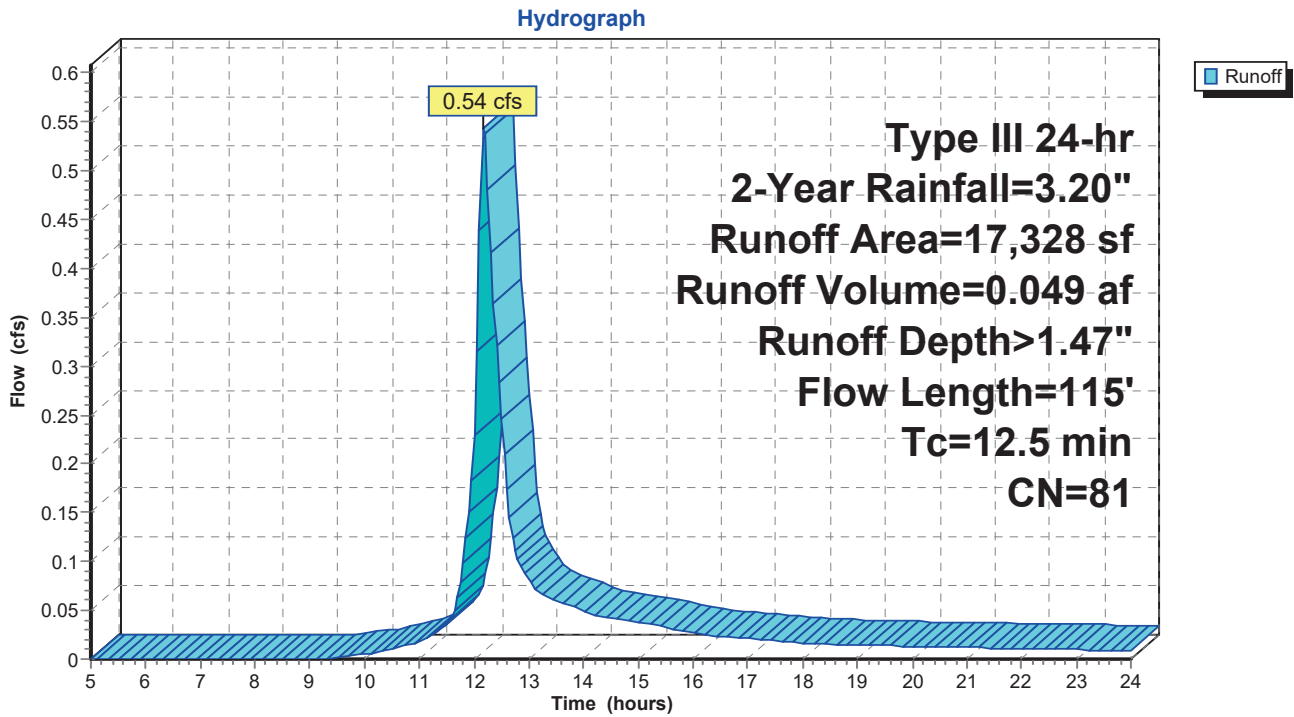
Runoff = 0.54 cfs @ 12.18 hrs, Volume= 0.049 af, Depth> 1.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
1,424	98	Roofs, HSG D
7,872	79	Woods, Fair, HSG D
8,032	79	Woods/grass comb., Good, HSG D
17,328	81	Weighted Average
15,904		91.78% Pervious Area
1,424		8.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	50	0.0200	0.07		Sheet Flow, A-B
					Grass: Bermuda n= 0.410 P2= 3.43"
0.3	65	0.0385	3.16		Shallow Concentrated Flow, B-C
					Unpaved Kv= 16.1 fps
12.5	115	Total			

Subcatchment BYP: Uncontrolled Bypass



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Worcester_Apthorp St

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

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Hydrograph for Subcatchment BYP: Uncontrolled Bypass

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
5.00	0.18	0.00	0.00	18.25	2.98	1.30	0.02
5.25	0.19	0.00	0.00	18.50	2.99	1.31	0.02
5.50	0.21	0.00	0.00	18.75	3.01	1.32	0.01
5.75	0.22	0.00	0.00	19.00	3.02	1.33	0.01
6.00	0.23	0.00	0.00	19.25	3.03	1.34	0.01
6.25	0.24	0.00	0.00	19.50	3.04	1.35	0.01
6.50	0.26	0.00	0.00	19.75	3.05	1.35	0.01
6.75	0.27	0.00	0.00	20.00	3.06	1.36	0.01
7.00	0.29	0.00	0.00	20.25	3.07	1.37	0.01
7.25	0.31	0.00	0.00	20.50	3.08	1.38	0.01
7.50	0.33	0.00	0.00	20.75	3.09	1.39	0.01
7.75	0.34	0.00	0.00	21.00	3.10	1.39	0.01
8.00	0.36	0.00	0.00	21.25	3.11	1.40	0.01
8.25	0.39	0.00	0.00	21.50	3.12	1.41	0.01
8.50	0.41	0.00	0.00	21.75	3.13	1.41	0.01
8.75	0.44	0.00	0.00	22.00	3.14	1.42	0.01
9.00	0.47	0.00	0.00	22.25	3.15	1.43	0.01
9.25	0.50	0.00	0.00	22.50	3.16	1.43	0.01
9.50	0.53	0.00	0.00	22.75	3.16	1.44	0.01
9.75	0.57	0.00	0.00	23.00	3.17	1.45	0.01
10.00	0.60	0.01	0.01	23.25	3.18	1.45	0.01
10.25	0.65	0.01	0.01	23.50	3.19	1.46	0.01
10.50	0.69	0.02	0.01	23.75	3.19	1.46	0.01
10.75	0.74	0.03	0.01	24.00	3.20	1.47	0.01
11.00	0.80	0.04	0.02				
11.25	0.87	0.06	0.02				
11.50	0.95	0.08	0.04				
11.75	1.14	0.15	0.08				
12.00	1.60	0.37	0.23				
12.25	2.06	0.64	0.48				
12.50	2.25	0.77	0.25				
12.75	2.33	0.82	0.11				
13.00	2.40	0.87	0.08				
13.25	2.46	0.91	0.07				
13.50	2.51	0.95	0.06				
13.75	2.55	0.98	0.05				
14.00	2.60	1.01	0.05				
14.25	2.63	1.04	0.05				
14.50	2.67	1.06	0.04				
14.75	2.70	1.09	0.04				
15.00	2.73	1.11	0.04				
15.25	2.76	1.13	0.04				
15.50	2.79	1.15	0.03				
15.75	2.81	1.17	0.03				
16.00	2.84	1.19	0.03				
16.25	2.86	1.20	0.02				
16.50	2.87	1.22	0.02				
16.75	2.89	1.23	0.02				
17.00	2.91	1.25	0.02				
17.25	2.93	1.26	0.02				
17.50	2.94	1.27	0.02				
17.75	2.96	1.28	0.02				
18.00	2.97	1.29	0.02				

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Worcester_Apthorp St

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

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Summary for Subcatchment P1-F: Lot 1 Inflow

Runoff = 0.15 cfs @ 12.09 hrs, Volume= 0.011 af, Depth> 1.76"

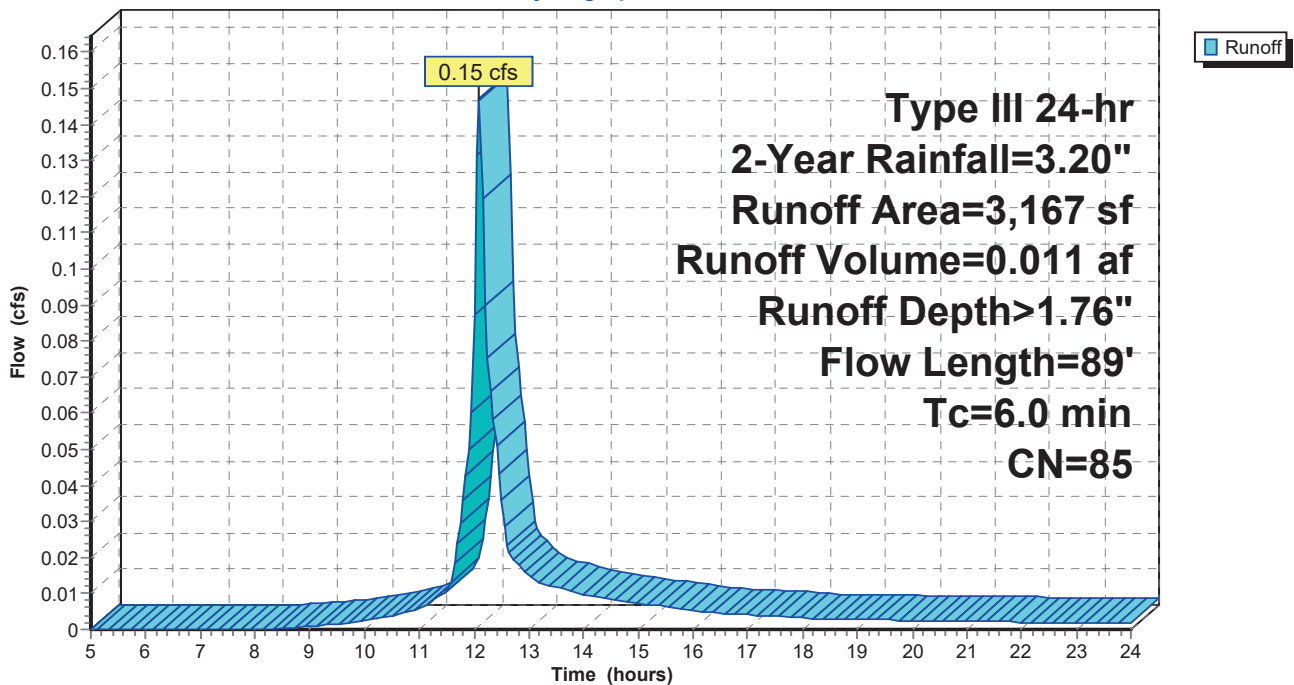
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
865	98	Paved parking, HSG D
2,302	80	>75% Grass cover, Good, HSG D
3,167	85	Weighted Average
2,302		72.69% Pervious Area
865		27.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.5	21	0.0425	0.08		Sheet Flow, A-B Grass: Bermuda n= 0.410 P2= 3.43"
0.9	29	0.0034	0.55		Sheet Flow, B-C Smooth surfaces n= 0.011 P2= 3.43"
0.6	39	0.0051	1.15		Shallow Concentrated Flow, C-D Unpaved Kv= 16.1 fps
6.0	89	Total			

Subcatchment P1-F: Lot 1 Inflow

Hydrograph



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Worcester_Apthorp St

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

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Hydrograph for Subcatchment P1-F: Lot 1 Inflow

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
5.00	0.18	0.00	0.00	18.25	2.98	1.57	0.00
5.25	0.19	0.00	0.00	18.50	2.99	1.58	0.00
5.50	0.21	0.00	0.00	18.75	3.01	1.59	0.00
5.75	0.22	0.00	0.00	19.00	3.02	1.60	0.00
6.00	0.23	0.00	0.00	19.25	3.03	1.61	0.00
6.25	0.24	0.00	0.00	19.50	3.04	1.62	0.00
6.50	0.26	0.00	0.00	19.75	3.05	1.63	0.00
6.75	0.27	0.00	0.00	20.00	3.06	1.64	0.00
7.00	0.29	0.00	0.00	20.25	3.07	1.65	0.00
7.25	0.31	0.00	0.00	20.50	3.08	1.66	0.00
7.50	0.33	0.00	0.00	20.75	3.09	1.67	0.00
7.75	0.34	0.00	0.00	21.00	3.10	1.67	0.00
8.00	0.36	0.00	0.00	21.25	3.11	1.68	0.00
8.25	0.39	0.00	0.00	21.50	3.12	1.69	0.00
8.50	0.41	0.00	0.00	21.75	3.13	1.70	0.00
8.75	0.44	0.00	0.00	22.00	3.14	1.71	0.00
9.00	0.47	0.01	0.00	22.25	3.15	1.71	0.00
9.25	0.50	0.01	0.00	22.50	3.16	1.72	0.00
9.50	0.53	0.02	0.00	22.75	3.16	1.73	0.00
9.75	0.57	0.02	0.00	23.00	3.17	1.73	0.00
10.00	0.60	0.03	0.00	23.25	3.18	1.74	0.00
10.25	0.65	0.04	0.00	23.50	3.19	1.75	0.00
10.50	0.69	0.05	0.00	23.75	3.19	1.75	0.00
10.75	0.74	0.07	0.00	24.00	3.20	1.76	0.00
11.00	0.80	0.09	0.01				
11.25	0.87	0.12	0.01				
11.50	0.95	0.15	0.01				
11.75	1.14	0.24	0.03				
12.00	1.60	0.52	0.09				
12.25	2.06	0.84	0.08				
12.50	2.25	0.98	0.04				
12.75	2.33	1.05	0.02				
13.00	2.40	1.10	0.01				
13.25	2.46	1.14	0.01				
13.50	2.51	1.18	0.01				
13.75	2.55	1.22	0.01				
14.00	2.60	1.25	0.01				
14.25	2.63	1.29	0.01				
14.50	2.67	1.31	0.01				
14.75	2.70	1.34	0.01				
15.00	2.73	1.37	0.01				
15.25	2.76	1.39	0.01				
15.50	2.79	1.41	0.01				
15.75	2.81	1.43	0.01				
16.00	2.84	1.45	0.01				
16.25	2.86	1.47	0.00				
16.50	2.87	1.48	0.00				
16.75	2.89	1.50	0.00				
17.00	2.91	1.51	0.00				
17.25	2.93	1.53	0.00				
17.50	2.94	1.54	0.00				
17.75	2.96	1.55	0.00				
18.00	2.97	1.56	0.00				

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Worcester_Apthorp St

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

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Summary for Subcatchment P2-F: Lot 2 Inflow

Runoff = 0.14 cfs @ 12.15 hrs, Volume= 0.012 af, Depth> 1.75"

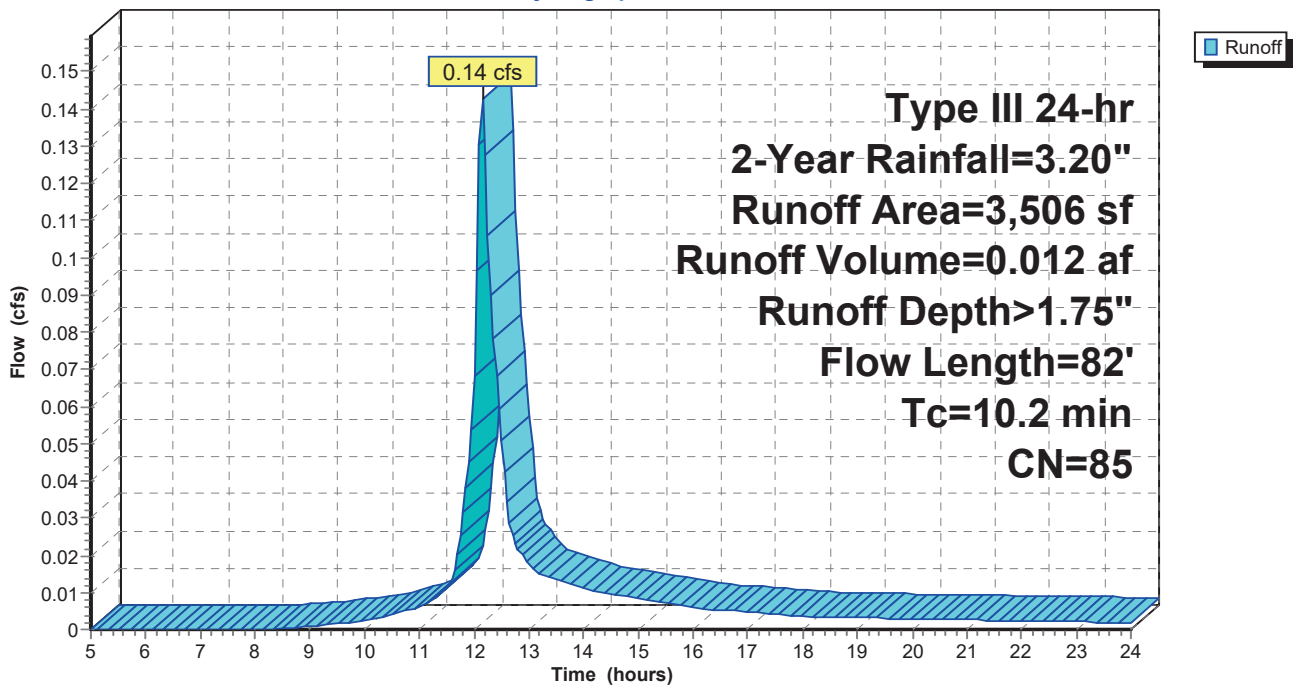
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
1,135	98	Paved parking, HSG D
2,371	79	Woods, Fair, HSG D
3,506	85	Weighted Average
2,371		67.63% Pervious Area
1,135		32.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0	48	0.0300	0.08		Sheet Flow, A-B
					Grass: Bermuda n= 0.410 P2= 3.43"
0.0	10	0.0386	3.99		Shallow Concentrated Flow, B-C
					Paved Kv= 20.3 fps
0.2	24	0.0208	2.32		Shallow Concentrated Flow,
					Unpaved Kv= 16.1 fps
10.2	82	Total			

Subcatchment P2-F: Lot 2 Inflow

Hydrograph



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

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Hydrograph for Subcatchment P2-F: Lot 2 Inflow

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
5.00	0.18	0.00	0.00	18.25	2.98	1.57	0.00
5.25	0.19	0.00	0.00	18.50	2.99	1.58	0.00
5.50	0.21	0.00	0.00	18.75	3.01	1.59	0.00
5.75	0.22	0.00	0.00	19.00	3.02	1.60	0.00
6.00	0.23	0.00	0.00	19.25	3.03	1.61	0.00
6.25	0.24	0.00	0.00	19.50	3.04	1.62	0.00
6.50	0.26	0.00	0.00	19.75	3.05	1.63	0.00
6.75	0.27	0.00	0.00	20.00	3.06	1.64	0.00
7.00	0.29	0.00	0.00	20.25	3.07	1.65	0.00
7.25	0.31	0.00	0.00	20.50	3.08	1.66	0.00
7.50	0.33	0.00	0.00	20.75	3.09	1.67	0.00
7.75	0.34	0.00	0.00	21.00	3.10	1.67	0.00
8.00	0.36	0.00	0.00	21.25	3.11	1.68	0.00
8.25	0.39	0.00	0.00	21.50	3.12	1.69	0.00
8.50	0.41	0.00	0.00	21.75	3.13	1.70	0.00
8.75	0.44	0.00	0.00	22.00	3.14	1.71	0.00
9.00	0.47	0.01	0.00	22.25	3.15	1.71	0.00
9.25	0.50	0.01	0.00	22.50	3.16	1.72	0.00
9.50	0.53	0.02	0.00	22.75	3.16	1.73	0.00
9.75	0.57	0.02	0.00	23.00	3.17	1.73	0.00
10.00	0.60	0.03	0.00	23.25	3.18	1.74	0.00
10.25	0.65	0.04	0.00	23.50	3.19	1.75	0.00
10.50	0.69	0.05	0.00	23.75	3.19	1.75	0.00
10.75	0.74	0.07	0.01	24.00	3.20	1.76	0.00
11.00	0.80	0.09	0.01				
11.25	0.87	0.12	0.01				
11.50	0.95	0.15	0.01				
11.75	1.14	0.24	0.03				
12.00	1.60	0.52	0.07				
12.25	2.06	0.84	0.11				
12.50	2.25	0.98	0.05				
12.75	2.33	1.05	0.02				
13.00	2.40	1.10	0.02				
13.25	2.46	1.14	0.01				
13.50	2.51	1.18	0.01				
13.75	2.55	1.22	0.01				
14.00	2.60	1.25	0.01				
14.25	2.63	1.29	0.01				
14.50	2.67	1.31	0.01				
14.75	2.70	1.34	0.01				
15.00	2.73	1.37	0.01				
15.25	2.76	1.39	0.01				
15.50	2.79	1.41	0.01				
15.75	2.81	1.43	0.01				
16.00	2.84	1.45	0.01				
16.25	2.86	1.47	0.01				
16.50	2.87	1.48	0.01				
16.75	2.89	1.50	0.00				
17.00	2.91	1.51	0.00				
17.25	2.93	1.53	0.00				
17.50	2.94	1.54	0.00				
17.75	2.96	1.55	0.00				
18.00	2.97	1.56	0.00				

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

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Summary for Subcatchment P3-F: Rear Inflow

Runoff = 0.23 cfs @ 12.21 hrs, Volume= 0.021 af, Depth> 1.68"

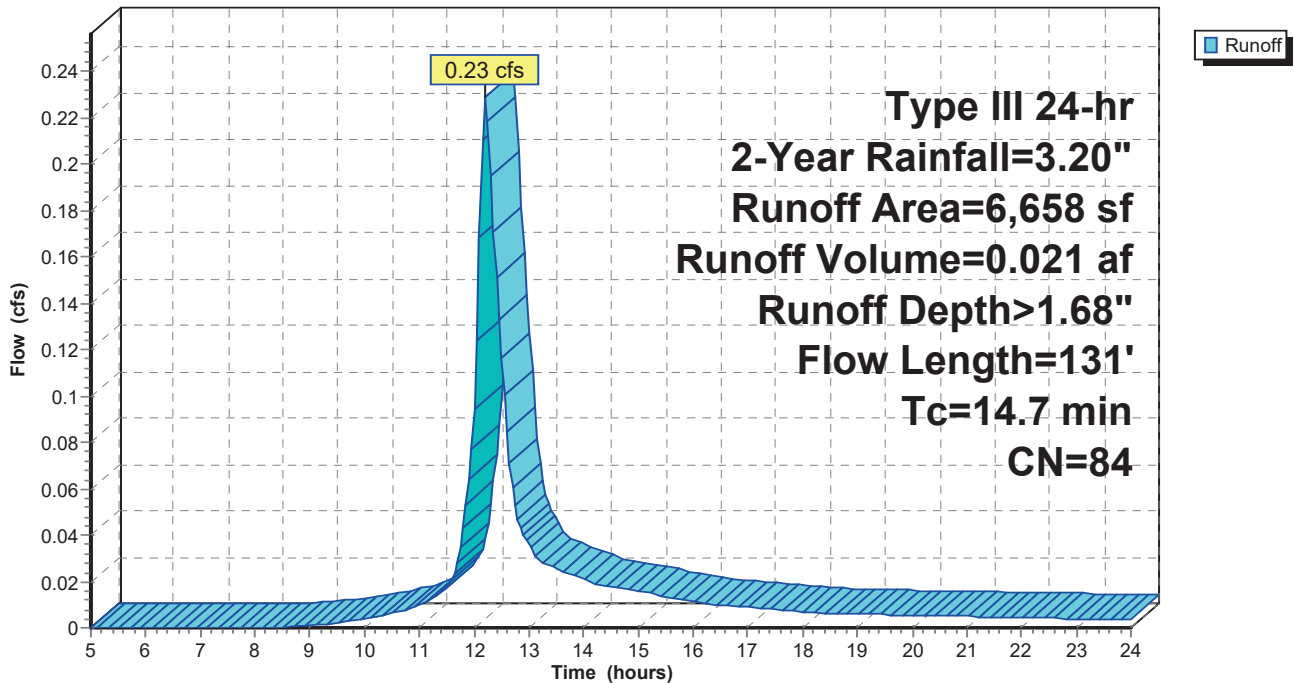
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
1,424	98	Roofs, HSG D
5,234	80	>75% Grass cover, Good, HSG D
6,658	84	Weighted Average
5,234		78.61% Pervious Area
1,424		21.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.0	50	0.0140	0.06		Sheet Flow, A-B
					Grass: Bermuda n= 0.410 P2= 3.43"
0.7	81	0.0148	1.96		Shallow Concentrated Flow, B-C
					Unpaved Kv= 16.1 fps
14.7	131	Total			

Subcatchment P3-F: Rear Inflow

Hydrograph



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

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Hydrograph for Subcatchment P3-F: Rear Inflow

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
5.00	0.18	0.00	0.00	18.25	2.98	1.50	0.01
5.25	0.19	0.00	0.00	18.50	2.99	1.51	0.01
5.50	0.21	0.00	0.00	18.75	3.01	1.52	0.01
5.75	0.22	0.00	0.00	19.00	3.02	1.53	0.01
6.00	0.23	0.00	0.00	19.25	3.03	1.54	0.01
6.25	0.24	0.00	0.00	19.50	3.04	1.55	0.01
6.50	0.26	0.00	0.00	19.75	3.05	1.56	0.01
6.75	0.27	0.00	0.00	20.00	3.06	1.57	0.01
7.00	0.29	0.00	0.00	20.25	3.07	1.58	0.01
7.25	0.31	0.00	0.00	20.50	3.08	1.58	0.01
7.50	0.33	0.00	0.00	20.75	3.09	1.59	0.01
7.75	0.34	0.00	0.00	21.00	3.10	1.60	0.00
8.00	0.36	0.00	0.00	21.25	3.11	1.61	0.00
8.25	0.39	0.00	0.00	21.50	3.12	1.62	0.00
8.50	0.41	0.00	0.00	21.75	3.13	1.62	0.00
8.75	0.44	0.00	0.00	22.00	3.14	1.63	0.00
9.00	0.47	0.00	0.00	22.25	3.15	1.64	0.00
9.25	0.50	0.01	0.00	22.50	3.16	1.64	0.00
9.50	0.53	0.01	0.00	22.75	3.16	1.65	0.00
9.75	0.57	0.02	0.00	23.00	3.17	1.66	0.00
10.00	0.60	0.02	0.00	23.25	3.18	1.66	0.00
10.25	0.65	0.03	0.00	23.50	3.19	1.67	0.00
10.50	0.69	0.04	0.01	23.75	3.19	1.68	0.00
10.75	0.74	0.06	0.01	24.00	3.20	1.68	0.00
11.00	0.80	0.08	0.01				
11.25	0.87	0.10	0.01				
11.50	0.95	0.13	0.02				
11.75	1.14	0.21	0.03				
12.00	1.60	0.48	0.09				
12.25	2.06	0.79	0.22				
12.50	2.25	0.92	0.12				
12.75	2.33	0.99	0.05				
13.00	2.40	1.04	0.04				
13.25	2.46	1.08	0.03				
13.50	2.51	1.12	0.03				
13.75	2.55	1.16	0.02				
14.00	2.60	1.19	0.02				
14.25	2.63	1.22	0.02				
14.50	2.67	1.25	0.02				
14.75	2.70	1.28	0.02				
15.00	2.73	1.30	0.02				
15.25	2.76	1.32	0.01				
15.50	2.79	1.34	0.01				
15.75	2.81	1.36	0.01				
16.00	2.84	1.38	0.01				
16.25	2.86	1.40	0.01				
16.50	2.87	1.41	0.01				
16.75	2.89	1.43	0.01				
17.00	2.91	1.44	0.01				
17.25	2.93	1.46	0.01				
17.50	2.94	1.47	0.01				
17.75	2.96	1.48	0.01				
18.00	2.97	1.49	0.01				

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

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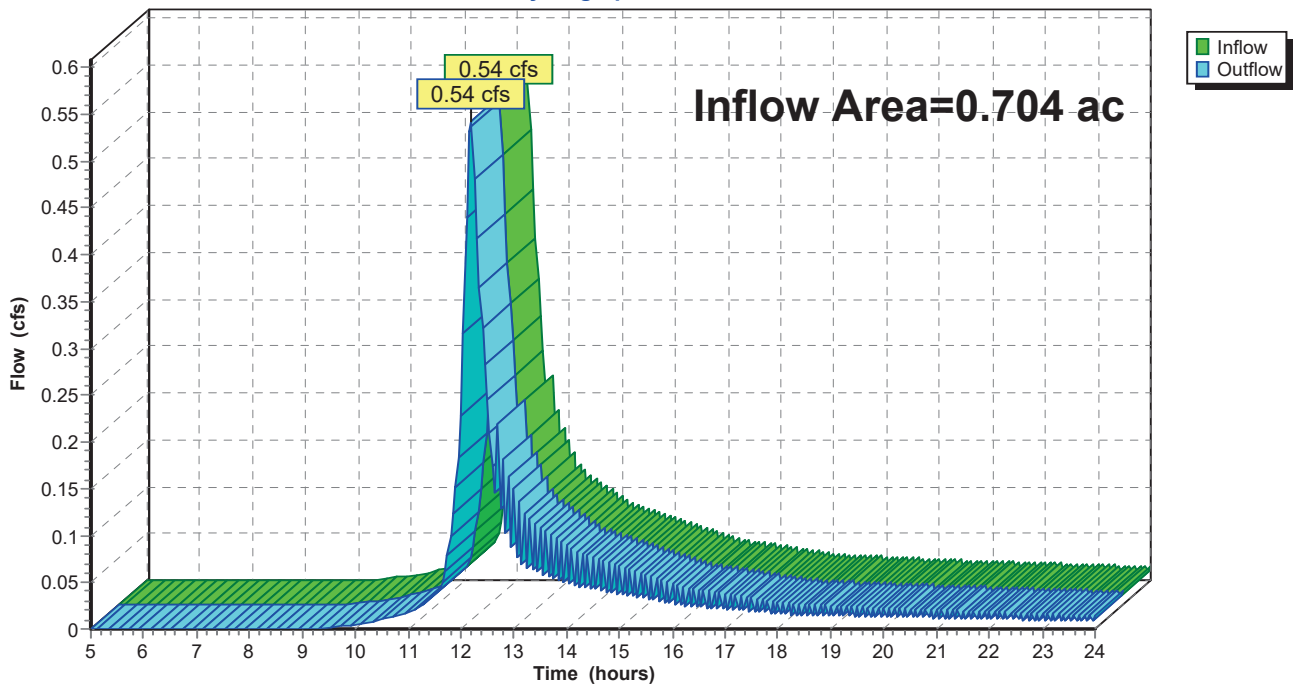
Summary for Reach DP1: WETLANDS

Inflow Area = 0.704 ac, 15.81% Impervious, Inflow Depth > 0.99" for 2-Year event
Inflow = 0.54 cfs @ 12.18 hrs, Volume= 0.058 af
Outflow = 0.54 cfs @ 12.18 hrs, Volume= 0.058 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs

Reach DP1: WETLANDS

Hydrograph



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

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Hydrograph for Reach DP1: WETLANDS

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
5.00	0.00		0.00	18.25	0.02		0.02
5.25	0.00		0.00	18.50	0.03		0.03
5.50	0.00		0.00	18.75	0.01		0.01
5.75	0.00		0.00	19.00	0.03		0.03
6.00	0.00		0.00	19.25	0.01		0.01
6.25	0.00		0.00	19.50	0.02		0.02
6.50	0.00		0.00	19.75	0.01		0.01
6.75	0.00		0.00	20.00	0.02		0.02
7.00	0.00		0.00	20.25	0.01		0.01
7.25	0.00		0.00	20.50	0.02		0.02
7.50	0.00		0.00	20.75	0.01		0.01
7.75	0.00		0.00	21.00	0.02		0.02
8.00	0.00		0.00	21.25	0.01		0.01
8.25	0.00		0.00	21.50	0.02		0.02
8.50	0.00		0.00	21.75	0.01		0.01
8.75	0.00		0.00	22.00	0.02		0.02
9.00	0.00		0.00	22.25	0.01		0.01
9.25	0.00		0.00	22.50	0.02		0.02
9.50	0.00		0.00	22.75	0.01		0.01
9.75	0.00		0.00	23.00	0.02		0.02
10.00	0.01		0.01	23.25	0.01		0.01
10.25	0.01		0.01	23.50	0.02		0.02
10.50	0.01		0.01	23.75	0.01		0.01
10.75	0.01		0.01	24.00	0.01		0.01
11.00	0.02		0.02				
11.25	0.02		0.02				
11.50	0.04		0.04				
11.75	0.08		0.08				
12.00	0.23		0.23				
12.25	0.48		0.48				
12.50	0.25		0.25				
12.75	0.13		0.13				
13.00	0.15		0.15				
13.25	0.07		0.07				
13.50	0.11		0.11				
13.75	0.05		0.05				
14.00	0.09		0.09				
14.25	0.05		0.05				
14.50	0.08		0.08				
14.75	0.04		0.04				
15.00	0.07		0.07				
15.25	0.04		0.04				
15.50	0.06		0.06				
15.75	0.03		0.03				
16.00	0.05		0.05				
16.25	0.02		0.02				
16.50	0.04		0.04				
16.75	0.02		0.02				
17.00	0.04		0.04				
17.25	0.02		0.02				
17.50	0.03		0.03				
17.75	0.02		0.02				
18.00	0.03		0.03				

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Worcester_Apthorp St

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

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Summary for Pond P1: LOT 2 DRIVE-RG

Inflow Area = 0.073 ac, 27.31% Impervious, Inflow Depth > 1.76" for 2-Year event
Inflow = 0.15 cfs @ 12.09 hrs, Volume= 0.011 af
Outflow = 0.00 cfs @ 24.00 hrs, Volume= 0.001 af, Atten= 99%, Lag= 714.4 min
Discarded = 0.00 cfs @ 24.00 hrs, Volume= 0.001 af
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 615.34' @ 24.00 hrs Surf.Area= 355 sf Storage= 426 cf

Plug-Flow detention time=378.5 min calculated for 0.001 af (8% of inflow)
Center-of-Mass det. time=190.7 min (1,016.2 - 825.5)

Volume	Invert	Avail.Storage	Storage Description		
#1	614.00'	486 cf	Custom Stage Data (Irregular) listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
614.00	285	80.1	0	0	285
615.50	364	86.0	486	486	432

Device	Routing	Invert	Outlet Devices
#1	Primary	616.00'	Custom Weir/Orifice, Cv= 2.62 (C= 3.28) Head (feet) 0.50 0.51 Width (feet) 6.00 6.00
#2	Discarded	614.00'	0.090 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 1.00'

Discarded OutFlow Max=0.00 cfs @ 24.00 hrs HW=615.34' (Free Discharge)
↑**2=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=614.00' (Free Discharge)
↑**1=Custom Weir/Orifice** (Controls 0.00 cfs)

1902_DRAINAGE-POST

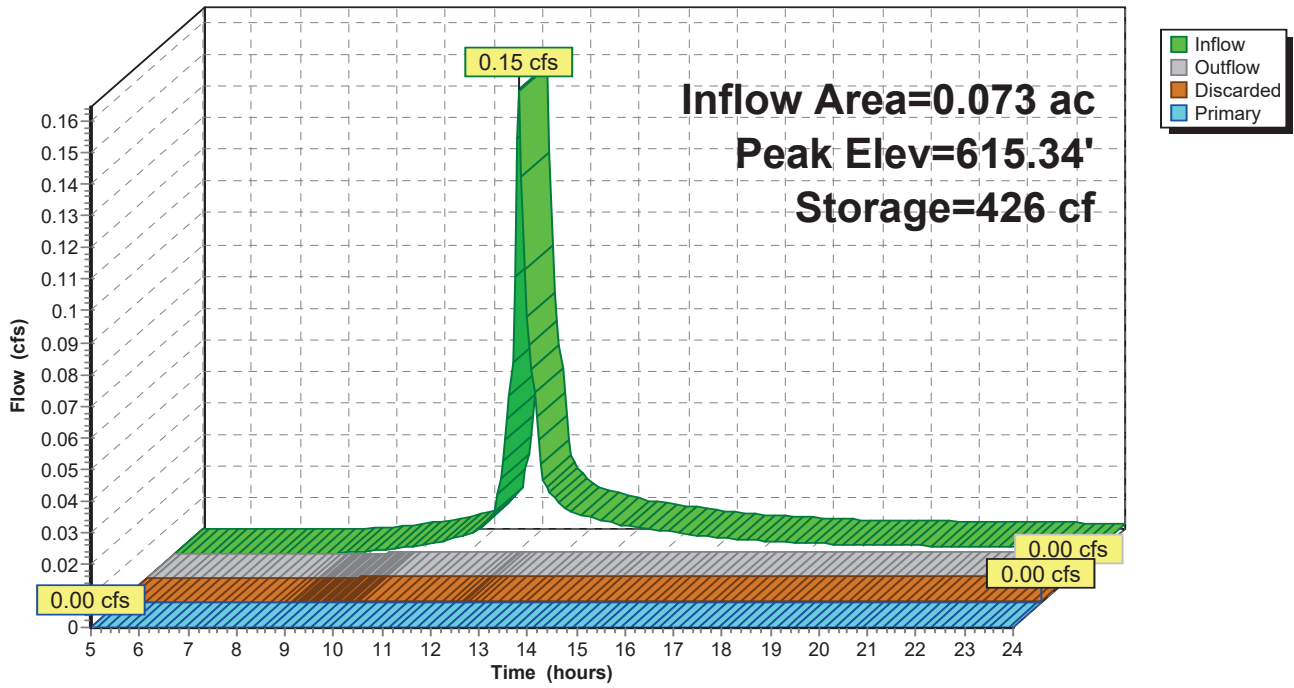
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Worcester_Apthorp St
Type III 24-hr 2-Year Rainfall=3.20"

Pond P1: LOT 2 DRIVE-RG

Hydrograph



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

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Hydrograph for Pond P1: LOT 2 DRIVE-RG

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
5.00	0.00	0	614.00	0.00	0.00	0.00
5.50	0.00	0	614.00	0.00	0.00	0.00
6.00	0.00	0	614.00	0.00	0.00	0.00
6.50	0.00	0	614.00	0.00	0.00	0.00
7.00	0.00	0	614.00	0.00	0.00	0.00
7.50	0.00	0	614.00	0.00	0.00	0.00
8.00	0.00	0	614.00	0.00	0.00	0.00
8.50	0.00	0	614.00	0.00	0.00	0.00
9.00	0.00	1	614.00	0.00	0.00	0.00
9.50	0.00	3	614.01	0.00	0.00	0.00
10.00	0.00	6	614.02	0.00	0.00	0.00
10.50	0.00	11	614.04	0.00	0.00	0.00
11.00	0.01	18	614.06	0.00	0.00	0.00
11.50	0.01	32	614.11	0.00	0.00	0.00
12.00	0.09	91	614.31	0.00	0.00	0.00
12.50	0.04	241	614.79	0.00	0.00	0.00
13.00	0.01	277	614.90	0.00	0.00	0.00
13.50	0.01	299	614.97	0.00	0.00	0.00
14.00	0.01	317	615.02	0.00	0.00	0.00
14.50	0.01	332	615.06	0.00	0.00	0.00
15.00	0.01	345	615.10	0.00	0.00	0.00
15.50	0.01	356	615.13	0.00	0.00	0.00
16.00	0.01	365	615.16	0.00	0.00	0.00
16.50	0.00	373	615.18	0.00	0.00	0.00
17.00	0.00	380	615.20	0.00	0.00	0.00
17.50	0.00	385	615.22	0.00	0.00	0.00
18.00	0.00	390	615.23	0.00	0.00	0.00
18.50	0.00	395	615.25	0.00	0.00	0.00
19.00	0.00	399	615.26	0.00	0.00	0.00
19.50	0.00	402	615.27	0.00	0.00	0.00
20.00	0.00	406	615.28	0.00	0.00	0.00
20.50	0.00	409	615.29	0.00	0.00	0.00
21.00	0.00	412	615.30	0.00	0.00	0.00
21.50	0.00	415	615.30	0.00	0.00	0.00
22.00	0.00	418	615.31	0.00	0.00	0.00
22.50	0.00	420	615.32	0.00	0.00	0.00
23.00	0.00	422	615.32	0.00	0.00	0.00
23.50	0.00	424	615.33	0.00	0.00	0.00
24.00	0.00	426	615.34	0.00	0.00	0.00

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Worcester_Apthorp St

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

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Summary for Pond P2: LOT 2 DRIVE-RG

Inflow Area = 0.080 ac, 32.37% Impervious, Inflow Depth > 1.75" for 2-Year event
Inflow = 0.14 cfs @ 12.15 hrs, Volume= 0.012 af
Outflow = 0.00 cfs @ 24.00 hrs, Volume= 0.001 af, Atten= 99%, Lag= 711.2 min
Discarded = 0.00 cfs @ 24.00 hrs, Volume= 0.001 af
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 615.47'@ 24.00 hrs Surf.Area= 362 sf Storage= 475 cf

Plug-Flow detention time=381.0 min calculated for 0.001 af (7% of inflow)
Center-of-Mass det. time=189.0 min (1,017.9 - 828.9)

Volume	Invert	Avail.Storage	Storage Description		
#1	614.00'	486 cf	Custom Stage Data (Irregular) listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
614.00	285	80.1	0	0	285
615.50	364	86.0	486	486	432

Device	Routing	Invert	Outlet Devices
#1	Primary	616.00'	Custom Weir/Orifice, Cv= 2.62 (C= 3.28) Head (feet) 0.50 0.51 Width (feet) 6.00 6.00
#2	Discarded	614.00'	0.090 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 1.00'

Discarded OutFlow Max=0.00 cfs @ 24.00 hrs HW=615.47' (Free Discharge)
↑2=Exfiltration (Controls 0.00 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=614.00' (Free Discharge)
↑1=Custom Weir/Orifice (Controls 0.00 cfs)

1902_DRAINAGE-POST

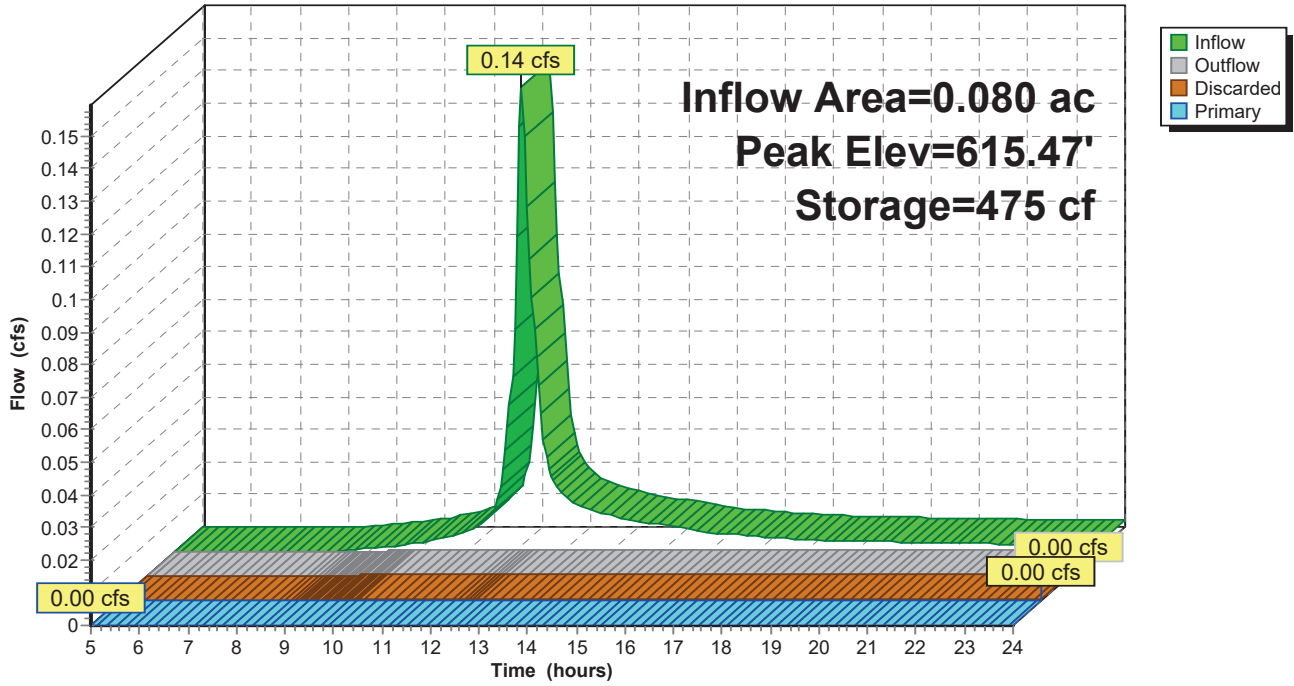
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Type III 24-hr 2-Year Rainfall=3.20"

Pond P2: LOT 2 DRIVE-RG

Hydrograph



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

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Hydrograph for Pond P2: LOT 2 DRIVE-RG

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
5.00	0.00	0	614.00	0.00	0.00	0.00
5.50	0.00	0	614.00	0.00	0.00	0.00
6.00	0.00	0	614.00	0.00	0.00	0.00
6.50	0.00	0	614.00	0.00	0.00	0.00
7.00	0.00	0	614.00	0.00	0.00	0.00
7.50	0.00	0	614.00	0.00	0.00	0.00
8.00	0.00	0	614.00	0.00	0.00	0.00
8.50	0.00	0	614.00	0.00	0.00	0.00
9.00	0.00	1	614.00	0.00	0.00	0.00
9.50	0.00	3	614.01	0.00	0.00	0.00
10.00	0.00	6	614.02	0.00	0.00	0.00
10.50	0.00	11	614.04	0.00	0.00	0.00
11.00	0.01	19	614.07	0.00	0.00	0.00
11.50	0.01	33	614.11	0.00	0.00	0.00
12.00	0.07	85	614.29	0.00	0.00	0.00
12.50	0.05	256	614.84	0.00	0.00	0.00
13.00	0.02	304	614.98	0.00	0.00	0.00
13.50	0.01	329	615.06	0.00	0.00	0.00
14.00	0.01	350	615.12	0.00	0.00	0.00
14.50	0.01	367	615.17	0.00	0.00	0.00
15.00	0.01	381	615.21	0.00	0.00	0.00
15.50	0.01	394	615.24	0.00	0.00	0.00
16.00	0.01	405	615.27	0.00	0.00	0.00
16.50	0.01	413	615.30	0.00	0.00	0.00
17.00	0.00	421	615.32	0.00	0.00	0.00
17.50	0.00	428	615.34	0.00	0.00	0.00
18.00	0.00	433	615.35	0.00	0.00	0.00
18.50	0.00	438	615.37	0.00	0.00	0.00
19.00	0.00	443	615.38	0.00	0.00	0.00
19.50	0.00	447	615.39	0.00	0.00	0.00
20.00	0.00	451	615.40	0.00	0.00	0.00
20.50	0.00	455	615.42	0.00	0.00	0.00
21.00	0.00	458	615.42	0.00	0.00	0.00
21.50	0.00	462	615.43	0.00	0.00	0.00
22.00	0.00	465	615.44	0.00	0.00	0.00
22.50	0.00	468	615.45	0.00	0.00	0.00
23.00	0.00	470	615.46	0.00	0.00	0.00
23.50	0.00	473	615.46	0.00	0.00	0.00
24.00	0.00	475	615.47	0.00	0.00	0.00

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

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Summary for Pond P3: LOT 2 DRIVE-RG

Inflow Area = 0.153 ac, 21.39% Impervious, Inflow Depth > 1.68" for 2-Year event
 Inflow = 0.23 cfs @ 12.21 hrs, Volume= 0.021 af
 Outflow = 0.09 cfs @ 12.70 hrs, Volume= 0.010 af, Atten= 59%, Lag= 29.7 min
 Discarded = 0.00 cfs @ 12.70 hrs, Volume= 0.001 af
 Primary = 0.09 cfs @ 12.70 hrs, Volume= 0.009 af

Routing by Stor-Ind method, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 616.11'@ 12.70 hrs Surf.Area= 364 sf Storage= 486 cf

Plug-Flow detention time=239.0 min calculated for 0.010 af (48% of inflow)
 Center-of-Mass det. time=123.2 min (959.1 - 835.9)

Volume	Invert	Avail.Storage	Storage Description			
#1	614.00'	486 cf	Custom Stage Data (Irregular) listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
614.00	285	80.1	0	0	285	
615.50	364	86.0	486	486	432	

Device	Routing	Invert	Outlet Devices
#1	Primary	616.00'	Custom Weir/Orifice, Cv= 2.62 (C= 3.28) Head (feet) 0.50 0.51 Width (feet) 6.00 6.00
#2	Discarded	614.00'	0.090 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 1.00'

Discarded OutFlow Max=0.00 cfs @ 12.70 hrs HW=616.11' (Free Discharge)
 ↑2=Exfiltration (Controls 0.00 cfs)

Primary OutFlow Max=0.09 cfs @ 12.70 hrs HW=616.10' (Free Discharge)
 ↑1=Custom Weir/Orifice(Orifice Controls 0.09 cfs @ 1.52 fps)

1902_DRAINAGE-POST

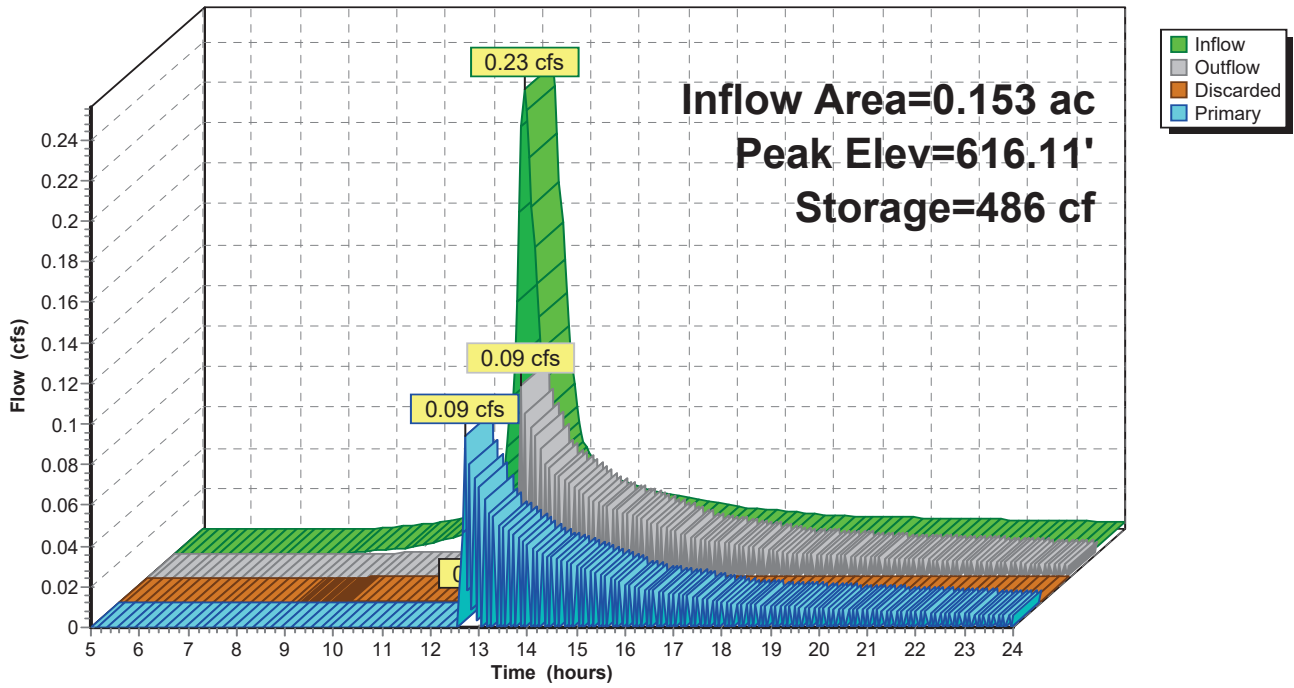
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Pond P3: LOT 2 DRIVE-RG

Hydrograph



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

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Hydrograph for Pond P3: LOT 2 DRIVE-RG

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
5.00	0.00	0	614.00	0.00	0.00	0.00
5.50	0.00	0	614.00	0.00	0.00	0.00
6.00	0.00	0	614.00	0.00	0.00	0.00
6.50	0.00	0	614.00	0.00	0.00	0.00
7.00	0.00	0	614.00	0.00	0.00	0.00
7.50	0.00	0	614.00	0.00	0.00	0.00
8.00	0.00	0	614.00	0.00	0.00	0.00
8.50	0.00	0	614.00	0.00	0.00	0.00
9.00	0.00	1	614.00	0.00	0.00	0.00
9.50	0.00	4	614.01	0.00	0.00	0.00
10.00	0.00	8	614.03	0.00	0.00	0.00
10.50	0.01	16	614.06	0.00	0.00	0.00
11.00	0.01	30	614.10	0.00	0.00	0.00
11.50	0.02	52	614.18	0.00	0.00	0.00
12.00	0.09	127	614.43	0.00	0.00	0.00
12.50	0.12	432	615.35	0.00	0.00	0.00
13.00	0.04	486	616.06	0.07	0.00	0.07
13.50	0.03	486	616.03	0.05	0.00	0.05
14.00	0.02	486	616.03	0.04	0.00	0.04
14.50	0.02	486	616.02	0.04	0.00	0.03
15.00	0.02	486	616.02	0.03	0.00	0.03
15.50	0.01	486	616.01	0.03	0.00	0.03
16.00	0.01	486	616.01	0.02	0.00	0.02
16.50	0.01	486	616.01	0.02	0.00	0.02
17.00	0.01	486	616.01	0.02	0.00	0.02
17.50	0.01	486	616.01	0.02	0.00	0.01
18.00	0.01	486	616.01	0.01	0.00	0.01
18.50	0.01	486	616.01	0.01	0.00	0.01
19.00	0.01	486	616.01	0.01	0.00	0.01
19.50	0.01	486	616.01	0.01	0.00	0.01
20.00	0.01	486	616.00	0.01	0.00	0.01
20.50	0.01	486	616.00	0.01	0.00	0.01
21.00	0.00	486	616.00	0.01	0.00	0.01
21.50	0.00	486	616.00	0.01	0.00	0.01
22.00	0.00	486	616.00	0.01	0.00	0.01
22.50	0.00	486	616.00	0.01	0.00	0.01
23.00	0.00	486	616.00	0.01	0.00	0.01
23.50	0.00	486	616.00	0.01	0.00	0.01
24.00	0.00	486	616.00	0.01	0.00	0.01

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Worcester_Apthorp St
Type III 24-hr 10-Year Rainfall=4.92"

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Time span=5.00-24.00 hrs, dt=0.05 hrs, 381 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmenBYP: UncontrolledBypass	Runoff Area=17,328 sf 8.22% Impervious Runoff Depth>2.91" Flow Length=115' Tc=12.5 min CN=81 Runoff=1.09 cfs 0.096 af
SubcatchmenP1-F: Lot 1 Inflow	Runoff Area=3,167 sf 27.31% Impervious Runoff Depth>3.29" Flow Length=89' Tc=6.0 min CN=85 Runoff=0.27 cfs 0.020 af
SubcatchmenP2-F: Lot 2 Inflow	Runoff Area=3,506 sf 32.37% Impervious Runoff Depth>3.29" Flow Length=82' Tc=10.2 min CN=85 Runoff=0.26 cfs 0.022 af
SubcatchmenP3-F: Rear Inflow	Runoff Area=6,658 sf 21.39% Impervious Runoff Depth>3.19" Flow Length=131' Tc=14.7 min CN=84 Runoff=0.43 cfs 0.041 af
ReachDP1: WETLANDS	Inflow=1.83 cfs 0.143 af Outflow=1.83 cfs 0.143 af
Pond P1: LOT 2 DRIVE-RG	Peak Elev=616.13' Storage=486 cf Inflow=0.27 cfs 0.020 af Discarded=0.00 cfs 0.001 af Primary=0.08 cfs 0.008 af Outflow=0.08 cfs 0.009 af
Pond P2: LOT 2 DRIVE-RG	Peak Elev=616.43' Storage=486 cf Inflow=0.26 cfs 0.022 af Discarded=0.00 cfs 0.001 af Primary=0.19 cfs 0.010 af Outflow=0.19 cfs 0.011 af
Pond P3: LOT 2 DRIVE-RG	Peak Elev=622.62' Storage=486 cf Inflow=0.43 cfs 0.041 af Discarded=0.00 cfs 0.001 af Primary=0.76 cfs 0.029 af Outflow=0.76 cfs 0.029 af

Total Runoff Area = 0.704 ac Runoff Volume = 0.179 af Average Runoff Depth = 3.05"
84.19% Pervious = 0.593 ac 15.81% Impervious = 0.111 ac

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Worcester_Apthorp St
Type III 24-hr 10-Year Rainfall=4.92"

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Summary for Subcatchment BYP: Uncontrolled Bypass

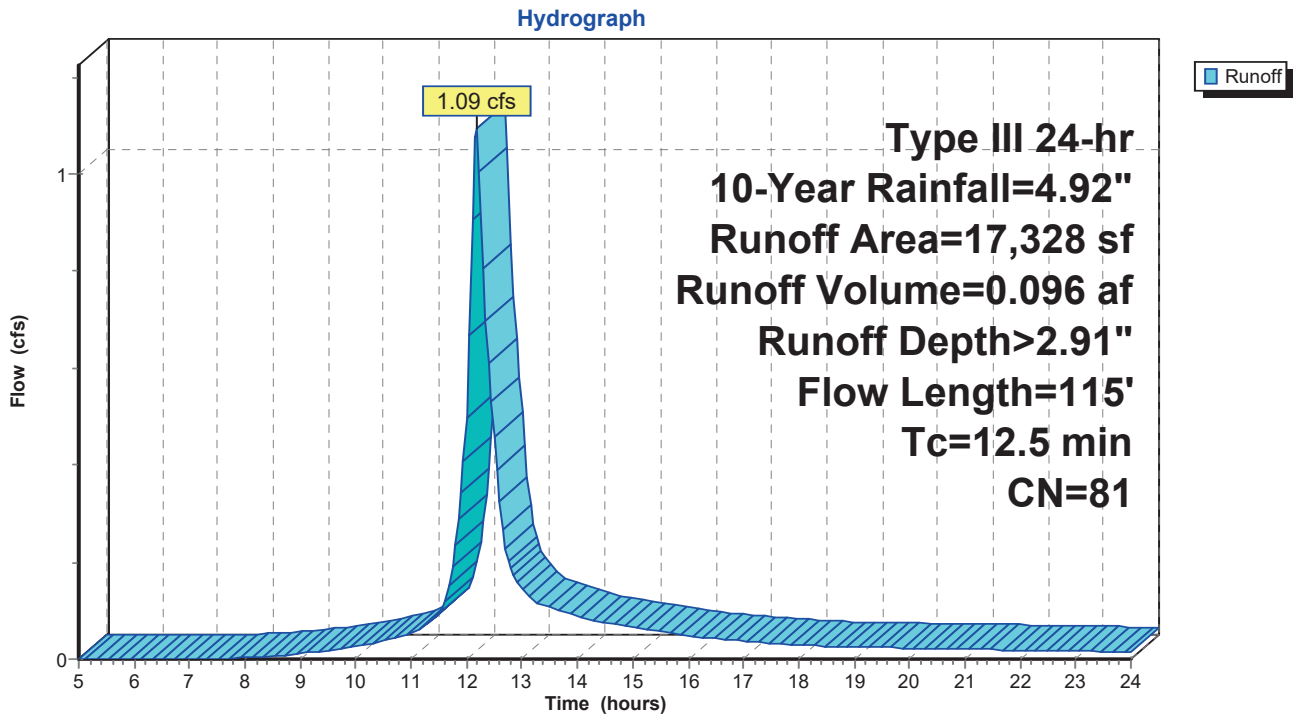
Runoff = 1.09 cfs @ 12.17 hrs, Volume= 0.096 af, Depth> 2.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.92"

Area (sf)	CN	Description
1,424	98	Roofs, HSG D
7,872	79	Woods, Fair, HSG D
8,032	79	Woods/grass comb., Good, HSG D
17,328	81	Weighted Average
15,904		91.78% Pervious Area
1,424		8.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	50	0.0200	0.07		Sheet Flow, A-B
					Grass: Bermuda n= 0.410 P2= 3.43"
0.3	65	0.0385	3.16		Shallow Concentrated Flow, B-C
					Unpaved Kv= 16.1 fps
12.5	115	Total			

Subcatchment BYP: Uncontrolled Bypass



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Worcester_Apthorp St
Type III 24-hr 10-Year Rainfall=4.92"

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Hydrograph for Subcatchment BYP: Uncontrolled Bypass

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
5.00	0.28	0.00	0.00	18.25	4.59	2.62	0.03
5.25	0.30	0.00	0.00	18.50	4.60	2.64	0.03
5.50	0.32	0.00	0.00	18.75	4.62	2.65	0.03
5.75	0.33	0.00	0.00	19.00	4.64	2.67	0.03
6.00	0.35	0.00	0.00	19.25	4.66	2.69	0.02
6.25	0.37	0.00	0.00	19.50	4.68	2.70	0.02
6.50	0.40	0.00	0.00	19.75	4.69	2.72	0.02
6.75	0.42	0.00	0.00	20.00	4.71	2.73	0.02
7.00	0.45	0.00	0.00	20.25	4.72	2.74	0.02
7.25	0.47	0.00	0.00	20.50	4.74	2.76	0.02
7.50	0.50	0.00	0.00	20.75	4.75	2.77	0.02
7.75	0.53	0.00	0.00	21.00	4.77	2.78	0.02
8.00	0.56	0.00	0.00	21.25	4.78	2.80	0.02
8.25	0.59	0.01	0.00	21.50	4.80	2.81	0.02
8.50	0.63	0.01	0.01	21.75	4.81	2.82	0.02
8.75	0.67	0.02	0.01	22.00	4.83	2.83	0.02
9.00	0.72	0.02	0.01	22.25	4.84	2.84	0.02
9.25	0.76	0.03	0.01	22.50	4.85	2.85	0.02
9.50	0.82	0.04	0.02	22.75	4.86	2.86	0.02
9.75	0.87	0.06	0.02	23.00	4.88	2.88	0.02
10.00	0.93	0.08	0.03	23.25	4.89	2.89	0.02
10.25	0.99	0.10	0.03	23.50	4.90	2.90	0.02
10.50	1.07	0.12	0.04	23.75	4.91	2.91	0.02
10.75	1.14	0.15	0.05	24.00	4.92	2.91	0.02
11.00	1.23	0.19	0.05				
11.25	1.33	0.23	0.07				
11.50	1.47	0.30	0.10				
11.75	1.75	0.45	0.19				
12.00	2.46	0.91	0.50				
12.25	3.17	1.45	0.94				
12.50	3.45	1.67	0.46				
12.75	3.59	1.78	0.20				
13.00	3.69	1.86	0.15				
13.25	3.78	1.93	0.12				
13.50	3.85	2.00	0.11				
13.75	3.93	2.06	0.10				
14.00	3.99	2.11	0.09				
14.25	4.05	2.16	0.08				
14.50	4.10	2.21	0.08				
14.75	4.16	2.25	0.07				
15.00	4.20	2.29	0.07				
15.25	4.25	2.33	0.06				
15.50	4.29	2.37	0.06				
15.75	4.33	2.40	0.05				
16.00	4.36	2.43	0.05				
16.25	4.39	2.45	0.04				
16.50	4.42	2.48	0.04				
16.75	4.45	2.50	0.04				
17.00	4.47	2.53	0.04				
17.25	4.50	2.55	0.04				
17.50	4.52	2.57	0.03				
17.75	4.55	2.59	0.03				
18.00	4.57	2.61	0.03				

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Worcester_Apthorp St
Type III 24-hr 10-Year Rainfall=4.92"

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Summary for Subcatchment P1-F: Lot 1 Inflow

Runoff = 0.27 cfs @ 12.09 hrs, Volume= 0.020 af, Depth> 3.29"

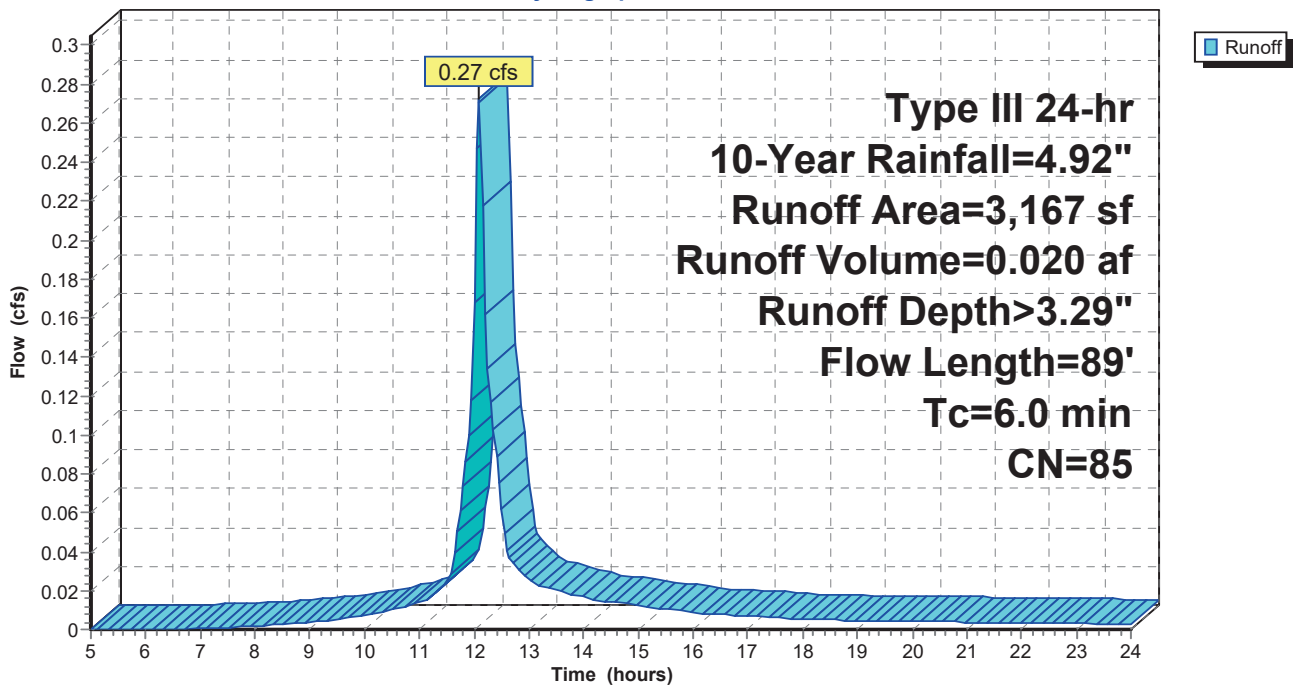
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.92"

Area (sf)	CN	Description
865	98	Paved parking, HSG D
2,302	80	>75% Grass cover, Good, HSG D
3,167	85	Weighted Average
2,302		72.69% Pervious Area
865		27.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.5	21	0.0425	0.08		Sheet Flow, A-B Grass: Bermuda n= 0.410 P2= 3.43"
0.9	29	0.0034	0.55		Sheet Flow, B-C Smooth surfaces n= 0.011 P2= 3.43"
0.6	39	0.0051	1.15		Shallow Concentrated Flow, C-D Unpaved Kv= 16.1 fps
6.0	89	Total			

Subcatchment P1-F: Lot 1 Inflow

Hydrograph



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Worcester_Apthorp St
Type III 24-hr 10-Year Rainfall=4.92"

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Hydrograph for Subcatchment P1-F: Lot 1 Inflow

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
5.00	0.28	0.00	0.00	18.25	4.59	2.99	0.01
5.25	0.30	0.00	0.00	18.50	4.60	3.00	0.01
5.50	0.32	0.00	0.00	18.75	4.62	3.02	0.00
5.75	0.33	0.00	0.00	19.00	4.64	3.04	0.00
6.00	0.35	0.00	0.00	19.25	4.66	3.05	0.00
6.25	0.37	0.00	0.00	19.50	4.68	3.07	0.00
6.50	0.40	0.00	0.00	19.75	4.69	3.08	0.00
6.75	0.42	0.00	0.00	20.00	4.71	3.10	0.00
7.00	0.45	0.00	0.00	20.25	4.72	3.11	0.00
7.25	0.47	0.01	0.00	20.50	4.74	3.13	0.00
7.50	0.50	0.01	0.00	20.75	4.75	3.14	0.00
7.75	0.53	0.02	0.00	21.00	4.77	3.16	0.00
8.00	0.56	0.02	0.00	21.25	4.78	3.17	0.00
8.25	0.59	0.03	0.00	21.50	4.80	3.18	0.00
8.50	0.63	0.04	0.00	21.75	4.81	3.19	0.00
8.75	0.67	0.05	0.00	22.00	4.83	3.21	0.00
9.00	0.72	0.06	0.00	22.25	4.84	3.22	0.00
9.25	0.76	0.08	0.00	22.50	4.85	3.23	0.00
9.50	0.82	0.10	0.01	22.75	4.86	3.24	0.00
9.75	0.87	0.12	0.01	23.00	4.88	3.25	0.00
10.00	0.93	0.14	0.01	23.25	4.89	3.26	0.00
10.25	0.99	0.17	0.01	23.50	4.90	3.27	0.00
10.50	1.07	0.20	0.01	23.75	4.91	3.28	0.00
10.75	1.14	0.24	0.01	24.00	4.92	3.29	0.00
11.00	1.23	0.29	0.01				
11.25	1.33	0.35	0.02				
11.50	1.47	0.43	0.02				
11.75	1.75	0.62	0.06				
12.00	2.46	1.15	0.17				
12.25	3.17	1.73	0.13				
12.50	3.45	1.98	0.06				
12.75	3.59	2.09	0.03				
13.00	3.69	2.18	0.03				
13.25	3.78	2.26	0.02				
13.50	3.85	2.33	0.02				
13.75	3.93	2.39	0.02				
14.00	3.99	2.45	0.02				
14.25	4.05	2.50	0.02				
14.50	4.10	2.55	0.01				
14.75	4.16	2.60	0.01				
15.00	4.20	2.64	0.01				
15.25	4.25	2.68	0.01				
15.50	4.29	2.72	0.01				
15.75	4.33	2.75	0.01				
16.00	4.36	2.78	0.01				
16.25	4.39	2.81	0.01				
16.50	4.42	2.84	0.01				
16.75	4.45	2.86	0.01				
17.00	4.47	2.89	0.01				
17.25	4.50	2.91	0.01				
17.50	4.52	2.93	0.01				
17.75	4.55	2.95	0.01				
18.00	4.57	2.97	0.01				

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Worcester_Apthorp St
Type III 24-hr 10-Year Rainfall=4.92"

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Summary for Subcatchment P2-F: Lot 2 Inflow

Runoff = 0.26 cfs @ 12.14 hrs, Volume= 0.022 af, Depth> 3.29"

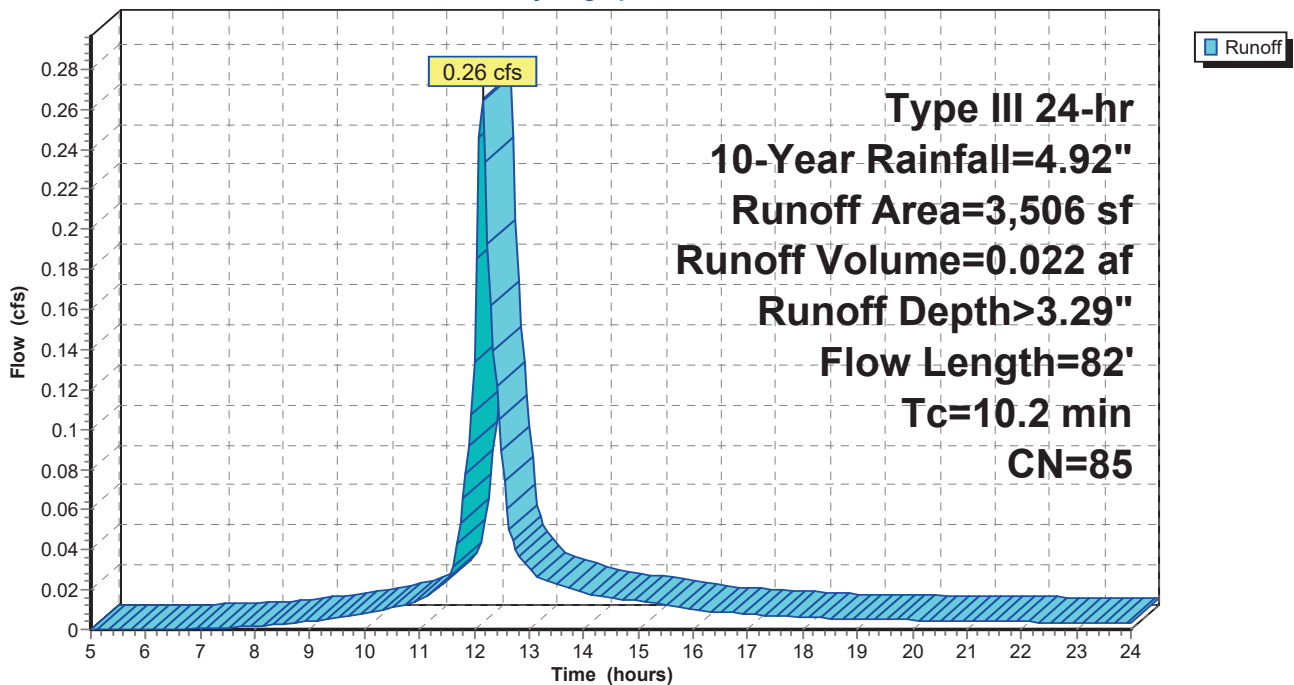
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.92"

Area (sf)	CN	Description
1,135	98	Paved parking, HSG D
2,371	79	Woods, Fair, HSG D
3,506	85	Weighted Average
2,371		67.63% Pervious Area
1,135		32.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0	48	0.0300	0.08		Sheet Flow, A-B
					Grass: Bermuda n= 0.410 P2= 3.43"
0.0	10	0.0386	3.99		Shallow Concentrated Flow, B-C
					Paved Kv= 20.3 fps
0.2	24	0.0208	2.32		Shallow Concentrated Flow,
					Unpaved Kv= 16.1 fps
10.2	82	Total			

Subcatchment P2-F: Lot 2 Inflow

Hydrograph



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Type III 24-hr 10-Year Rainfall=4.92"

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Hydrograph for Subcatchment P2-F: Lot 2 Inflow

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
5.00	0.28	0.00	0.00	18.25	4.59	2.99	0.01
5.25	0.30	0.00	0.00	18.50	4.60	3.00	0.01
5.50	0.32	0.00	0.00	18.75	4.62	3.02	0.01
5.75	0.33	0.00	0.00	19.00	4.64	3.04	0.01
6.00	0.35	0.00	0.00	19.25	4.66	3.05	0.01
6.25	0.37	0.00	0.00	19.50	4.68	3.07	0.01
6.50	0.40	0.00	0.00	19.75	4.69	3.08	0.00
6.75	0.42	0.00	0.00	20.00	4.71	3.10	0.00
7.00	0.45	0.00	0.00	20.25	4.72	3.11	0.00
7.25	0.47	0.01	0.00	20.50	4.74	3.13	0.00
7.50	0.50	0.01	0.00	20.75	4.75	3.14	0.00
7.75	0.53	0.02	0.00	21.00	4.77	3.16	0.00
8.00	0.56	0.02	0.00	21.25	4.78	3.17	0.00
8.25	0.59	0.03	0.00	21.50	4.80	3.18	0.00
8.50	0.63	0.04	0.00	21.75	4.81	3.19	0.00
8.75	0.67	0.05	0.00	22.00	4.83	3.21	0.00
9.00	0.72	0.06	0.00	22.25	4.84	3.22	0.00
9.25	0.76	0.08	0.00	22.50	4.85	3.23	0.00
9.50	0.82	0.10	0.01	22.75	4.86	3.24	0.00
9.75	0.87	0.12	0.01	23.00	4.88	3.25	0.00
10.00	0.93	0.14	0.01	23.25	4.89	3.26	0.00
10.25	0.99	0.17	0.01	23.50	4.90	3.27	0.00
10.50	1.07	0.20	0.01	23.75	4.91	3.28	0.00
10.75	1.14	0.24	0.01	24.00	4.92	3.29	0.00
11.00	1.23	0.29	0.01				
11.25	1.33	0.35	0.02				
11.50	1.47	0.43	0.03				
11.75	1.75	0.62	0.05				
12.00	2.46	1.15	0.13				
12.25	3.17	1.73	0.19				
12.50	3.45	1.98	0.09				
12.75	3.59	2.09	0.04				
13.00	3.69	2.18	0.03				
13.25	3.78	2.26	0.03				
13.50	3.85	2.33	0.02				
13.75	3.93	2.39	0.02				
14.00	3.99	2.45	0.02				
14.25	4.05	2.50	0.02				
14.50	4.10	2.55	0.02				
14.75	4.16	2.60	0.02				
15.00	4.20	2.64	0.01				
15.25	4.25	2.68	0.01				
15.50	4.29	2.72	0.01				
15.75	4.33	2.75	0.01				
16.00	4.36	2.78	0.01				
16.25	4.39	2.81	0.01				
16.50	4.42	2.84	0.01				
16.75	4.45	2.86	0.01				
17.00	4.47	2.89	0.01				
17.25	4.50	2.91	0.01				
17.50	4.52	2.93	0.01				
17.75	4.55	2.95	0.01				
18.00	4.57	2.97	0.01				

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Type III 24-hr 10-Year Rainfall=4.92"

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Summary for Subcatchment P3-F: Rear Inflow

Runoff = 0.43 cfs @ 12.20 hrs, Volume= 0.041 af, Depth> 3.19"

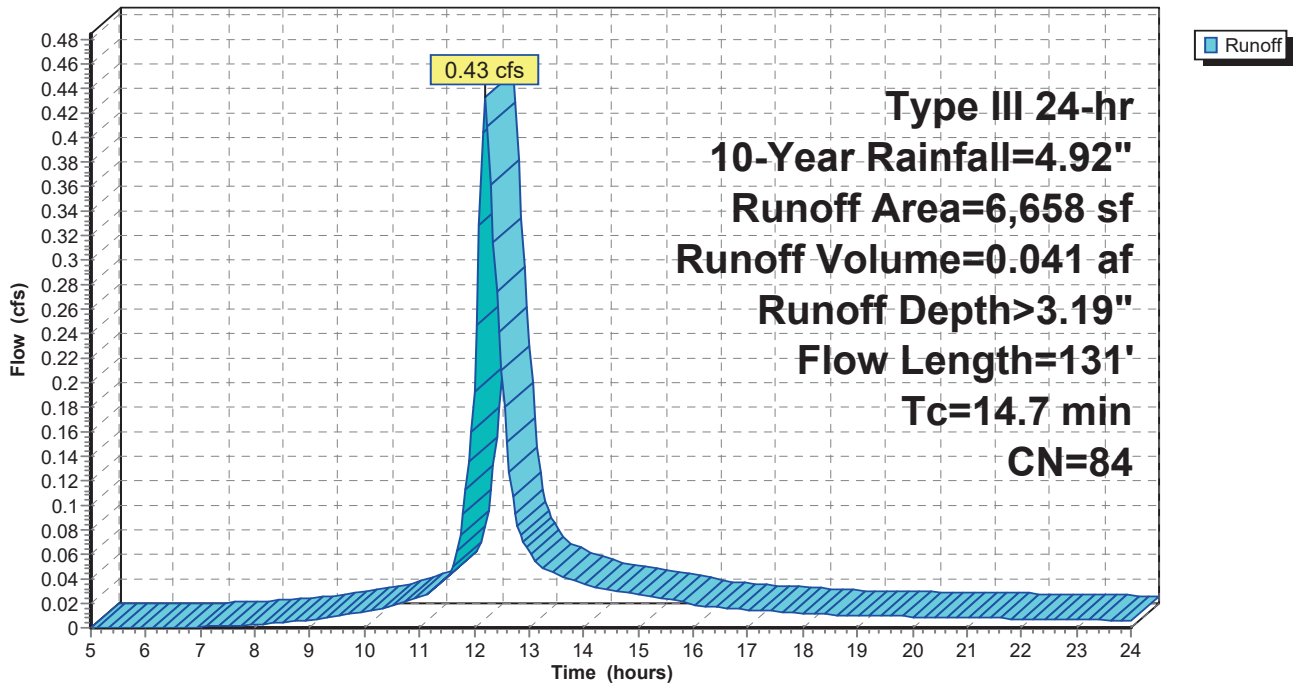
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.92"

Area (sf)	CN	Description
1,424	98	Roofs, HSG D
5,234	80	>75% Grass cover, Good, HSG D
6,658	84	Weighted Average
5,234		78.61% Pervious Area
1,424		21.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.0	50	0.0140	0.06		Sheet Flow, A-B
					Grass: Bermuda n= 0.410 P2= 3.43"
0.7	81	0.0148	1.96		Shallow Concentrated Flow, B-C
					Unpaved Kv= 16.1 fps
14.7	131	Total			

Subcatchment P3-F: Rear Inflow

Hydrograph



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Type III 24-hr 10-Year Rainfall=4.92"

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Hydrograph for Subcatchment P3-F: Rear Inflow

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
5.00	0.28	0.00	0.00	18.25	4.59	2.89	0.01
5.25	0.30	0.00	0.00	18.50	4.60	2.91	0.01
5.50	0.32	0.00	0.00	18.75	4.62	2.93	0.01
5.75	0.33	0.00	0.00	19.00	4.64	2.94	0.01
6.00	0.35	0.00	0.00	19.25	4.66	2.96	0.01
6.25	0.37	0.00	0.00	19.50	4.68	2.98	0.01
6.50	0.40	0.00	0.00	19.75	4.69	2.99	0.01
6.75	0.42	0.00	0.00	20.00	4.71	3.00	0.01
7.00	0.45	0.00	0.00	20.25	4.72	3.02	0.01
7.25	0.47	0.00	0.00	20.50	4.74	3.03	0.01
7.50	0.50	0.01	0.00	20.75	4.75	3.05	0.01
7.75	0.53	0.01	0.00	21.00	4.77	3.06	0.01
8.00	0.56	0.02	0.00	21.25	4.78	3.07	0.01
8.25	0.59	0.02	0.00	21.50	4.80	3.09	0.01
8.50	0.63	0.03	0.00	21.75	4.81	3.10	0.01
8.75	0.67	0.04	0.01	22.00	4.83	3.11	0.01
9.00	0.72	0.05	0.01	22.25	4.84	3.12	0.01
9.25	0.76	0.06	0.01	22.50	4.85	3.13	0.01
9.50	0.82	0.08	0.01	22.75	4.86	3.15	0.01
9.75	0.87	0.10	0.01	23.00	4.88	3.16	0.01
10.00	0.93	0.12	0.01	23.25	4.89	3.17	0.01
10.25	0.99	0.15	0.02	23.50	4.90	3.18	0.01
10.50	1.07	0.18	0.02	23.75	4.91	3.19	0.01
10.75	1.14	0.22	0.02	24.00	4.92	3.20	0.01
11.00	1.23	0.26	0.03				
11.25	1.33	0.32	0.03				
11.50	1.47	0.39	0.04				
11.75	1.75	0.57	0.08				
12.00	2.46	1.09	0.19				
12.25	3.17	1.66	0.41				
12.50	3.45	1.90	0.21				
12.75	3.59	2.01	0.09				
13.00	3.69	2.10	0.06				
13.25	3.78	2.17	0.05				
13.50	3.85	2.24	0.04				
13.75	3.93	2.31	0.04				
14.00	3.99	2.36	0.04				
14.25	4.05	2.41	0.03				
14.50	4.10	2.46	0.03				
14.75	4.16	2.51	0.03				
15.00	4.20	2.55	0.03				
15.25	4.25	2.59	0.03				
15.50	4.29	2.63	0.02				
15.75	4.33	2.66	0.02				
16.00	4.36	2.69	0.02				
16.25	4.39	2.72	0.02				
16.50	4.42	2.74	0.02				
16.75	4.45	2.77	0.02				
17.00	4.47	2.79	0.02				
17.25	4.50	2.82	0.01				
17.50	4.52	2.84	0.01				
17.75	4.55	2.86	0.01				
18.00	4.57	2.88	0.01				

1902_DRAINAGE-POST

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Worcester_Apthorp St
Type III 24-hr 10-Year Rainfall=4.92"

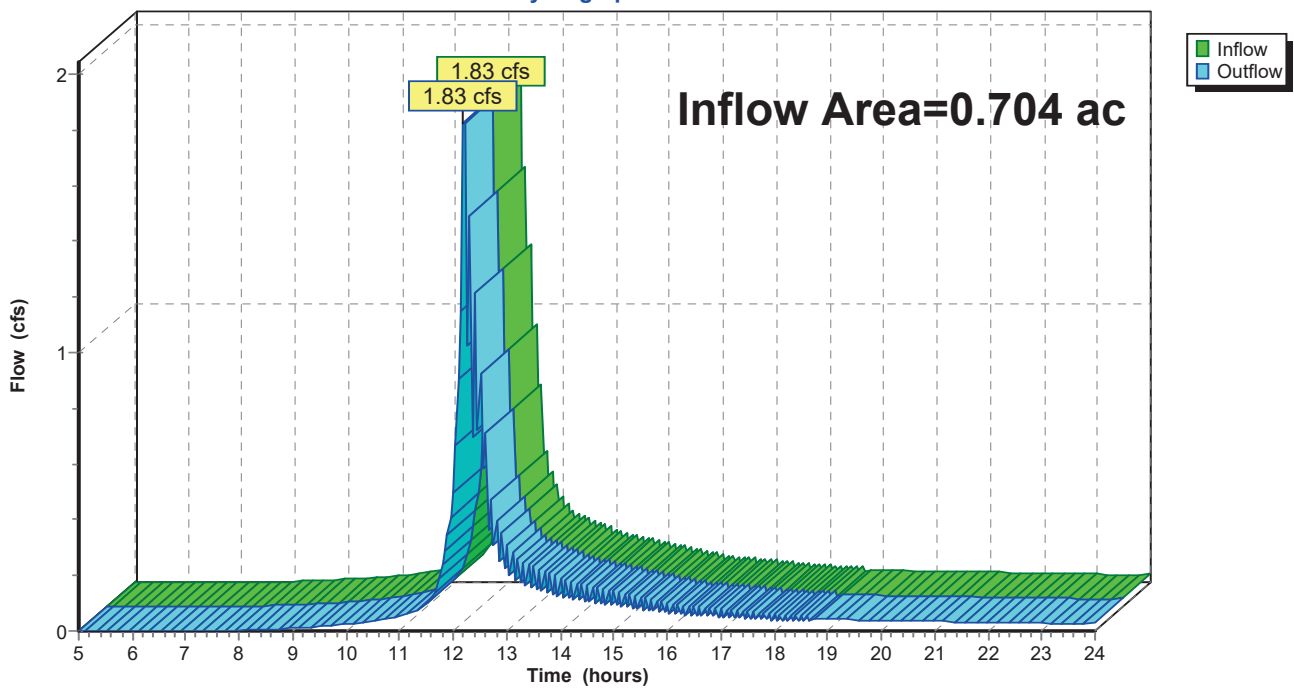
Summary for Reach DP1: WETLANDS

Inflow Area = 0.704 ac, 15.81% Impervious, Inflow Depth > 2.43" for 10-Year event
Inflow = 1.83 cfs @ 12.20 hrs, Volume= 0.143 af
Outflow = 1.83 cfs @ 12.20 hrs, Volume= 0.143 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs

Reach DP1: WETLANDS

Hydrograph



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Worcester_Apthorp St
Type III 24-hr 10-Year Rainfall=4.92"

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Hydrograph for Reach DP1: WETLANDS

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
5.00	0.00		0.00	18.25	0.04		0.04
5.25	0.00		0.00	18.50	0.06		0.06
5.50	0.00		0.00	18.75	0.04		0.04
5.75	0.00		0.00	19.00	0.05		0.05
6.00	0.00		0.00	19.25	0.03		0.03
6.25	0.00		0.00	19.50	0.05		0.05
6.50	0.00		0.00	19.75	0.03		0.03
6.75	0.00		0.00	20.00	0.05		0.05
7.00	0.00		0.00	20.25	0.03		0.03
7.25	0.00		0.00	20.50	0.04		0.04
7.50	0.00		0.00	20.75	0.03		0.03
7.75	0.00		0.00	21.00	0.04		0.04
8.00	0.00		0.00	21.25	0.03		0.03
8.25	0.00		0.00	21.50	0.04		0.04
8.50	0.01		0.01	21.75	0.03		0.03
8.75	0.01		0.01	22.00	0.04		0.04
9.00	0.01		0.01	22.25	0.02		0.02
9.25	0.01		0.01	22.50	0.04		0.04
9.50	0.02		0.02	22.75	0.02		0.02
9.75	0.02		0.02	23.00	0.03		0.03
10.00	0.03		0.03	23.25	0.02		0.02
10.25	0.03		0.03	23.50	0.03		0.03
10.50	0.04		0.04	23.75	0.02		0.02
10.75	0.05		0.05	24.00	0.03		0.03
11.00	0.05		0.05				
11.25	0.07		0.07				
11.50	0.10		0.10				
11.75	0.19		0.19				
12.00	0.50		0.50				
12.25	1.03		1.03				
12.50	0.93		0.93				
12.75	0.31		0.31				
13.00	0.31		0.31				
13.25	0.17		0.17				
13.50	0.23		0.23				
13.75	0.14		0.14				
14.00	0.19		0.19				
14.25	0.11		0.11				
14.50	0.16		0.16				
14.75	0.10		0.10				
15.00	0.14		0.14				
15.25	0.09		0.09				
15.50	0.12		0.12				
15.75	0.07		0.07				
16.00	0.10		0.10				
16.25	0.06		0.06				
16.50	0.09		0.09				
16.75	0.05		0.05				
17.00	0.08		0.08				
17.25	0.05		0.05				
17.50	0.07		0.07				
17.75	0.04		0.04				
18.00	0.06		0.06				

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Worcester_Apthorp St
Type III 24-hr 10-Year Rainfall=4.92"

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Summary for Pond P1: LOT 2 DRIVE-RG

Inflow Area = 0.073 ac, 27.31% Impervious, Inflow Depth > 3.29" for 10-Year event
 Inflow = 0.27 cfs @ 12.09 hrs, Volume= 0.020 af
 Outflow = 0.08 cfs @ 12.51 hrs, Volume= 0.009 af, Atten= 70%, Lag= 25.0 min
 Discarded = 0.00 cfs @ 12.50 hrs, Volume= 0.001 af
 Primary = 0.08 cfs @ 12.51 hrs, Volume= 0.008 af

Routing by Stor-Ind method, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 616.13'@ 12.52 hrs Surf.Area= 364 sf Storage= 486 cf

Plug-Flow detention time=248.8 min calculated for 0.009 af (44% of inflow)
 Center-of-Mass det. time=132.5 min (940.1 - 807.7)

Volume	Invert	Avail.Storage	Storage Description			
#1	614.00'	486 cf	Custom Stage Data (Irregular) listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
614.00	285	80.1	0	0	285	
615.50	364	86.0	486	486	432	

Device	Routing	Invert	Outlet Devices	
#1	Primary	616.00'	Custom Weir/Orifice, Cv= 2.62 (C= 3.28) Head (feet) 0.50 0.51 Width (feet) 6.00 6.00	
#2	Discarded	614.00'	0.090 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 1.00'	

Discarded OutFlow Max=0.00 cfs @ 12.50 hrs HW=616.08' (Free Discharge)
 ↑2=Exfiltration (Controls 0.00 cfs)

Primary OutFlow Max=0.08 cfs @ 12.51 hrs HW=616.07' (Free Discharge)
 ↑1=Custom Weir/Orifice(Orifice Controls 0.08 cfs @ 1.25 fps)

1902_DRAINAGE-POST

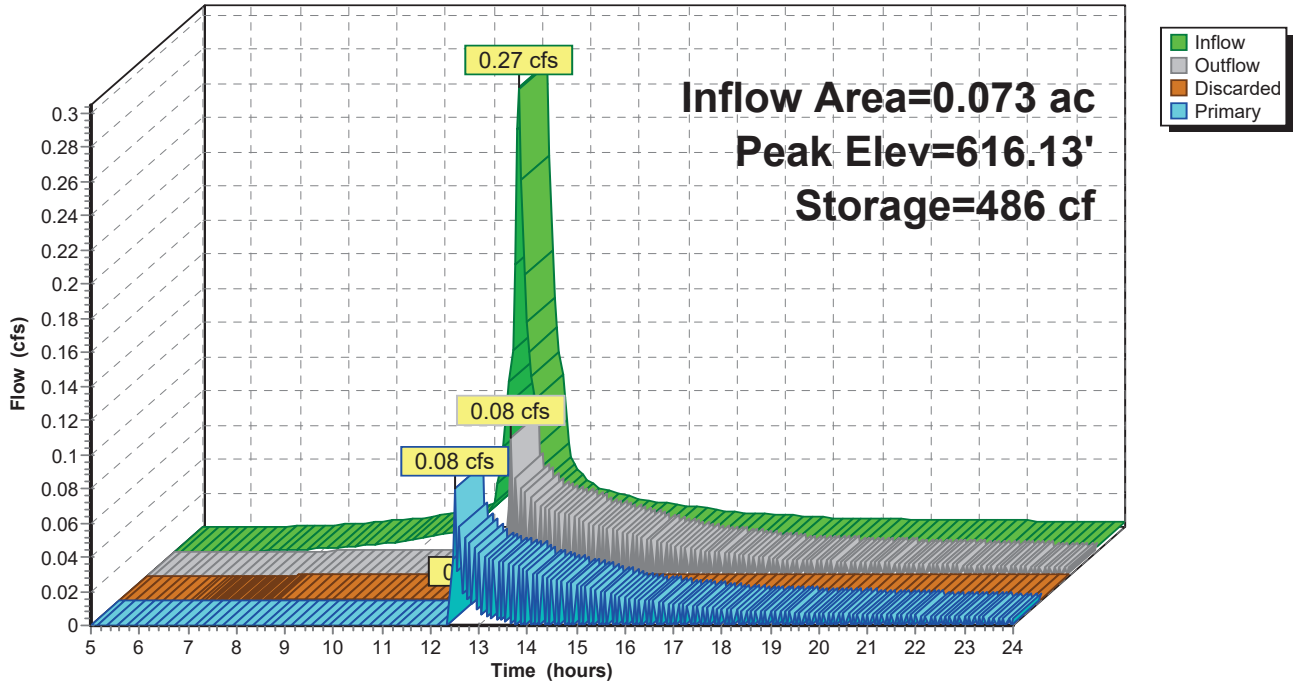
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Type III 24-hr 10-Year Rainfall=4.92"

Pond P1: LOT 2 DRIVE-RG

Hydrograph



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Worcester_Apthorp St
Type III 24-hr 10-Year Rainfall=4.92"

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Hydrograph for Pond P1: LOT 2 DRIVE-RG

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
5.00	0.00	0	614.00	0.00	0.00	0.00
5.50	0.00	0	614.00	0.00	0.00	0.00
6.00	0.00	0	614.00	0.00	0.00	0.00
6.50	0.00	0	614.00	0.00	0.00	0.00
7.00	0.00	1	614.00	0.00	0.00	0.00
7.50	0.00	2	614.01	0.00	0.00	0.00
8.00	0.00	4	614.01	0.00	0.00	0.00
8.50	0.00	7	614.03	0.00	0.00	0.00
9.00	0.00	12	614.04	0.00	0.00	0.00
9.50	0.01	19	614.07	0.00	0.00	0.00
10.00	0.01	30	614.10	0.00	0.00	0.00
10.50	0.01	44	614.15	0.00	0.00	0.00
11.00	0.01	65	614.22	0.00	0.00	0.00
11.50	0.02	97	614.33	0.00	0.00	0.00
12.00	0.17	218	614.72	0.00	0.00	0.00
12.50	0.06	486	616.08	0.08	0.00	0.08
13.00	0.03	486	616.03	0.04	0.00	0.04
13.50	0.02	486	616.02	0.04	0.00	0.04
14.00	0.02	486	616.02	0.03	0.00	0.03
14.50	0.01	486	616.02	0.03	0.00	0.03
15.00	0.01	486	616.01	0.02	0.00	0.02
15.50	0.01	486	616.01	0.02	0.00	0.02
16.00	0.01	486	616.01	0.02	0.00	0.02
16.50	0.01	486	616.01	0.01	0.00	0.01
17.00	0.01	486	616.01	0.01	0.00	0.01
17.50	0.01	486	616.01	0.01	0.00	0.01
18.00	0.01	486	616.00	0.01	0.00	0.01
18.50	0.01	486	616.00	0.01	0.00	0.01
19.00	0.00	486	616.00	0.01	0.00	0.01
19.50	0.00	486	616.00	0.01	0.00	0.01
20.00	0.00	486	616.00	0.01	0.00	0.01
20.50	0.00	486	616.00	0.01	0.00	0.01
21.00	0.00	486	616.00	0.01	0.00	0.01
21.50	0.00	486	616.00	0.01	0.00	0.01
22.00	0.00	486	616.00	0.01	0.00	0.01
22.50	0.00	486	616.00	0.01	0.00	0.01
23.00	0.00	486	616.00	0.01	0.00	0.00
23.50	0.00	486	616.00	0.01	0.00	0.00
24.00	0.00	486	616.00	0.00	0.00	0.00

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Worcester_Apthorp St
Type III 24-hr 10-Year Rainfall=4.92"

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Summary for Pond P2: LOT 2 DRIVE-RG

Inflow Area = 0.080 ac, 32.37% Impervious, Inflow Depth > 3.29" for 10-Year event
Inflow = 0.26 cfs @ 12.14 hrs, Volume= 0.022 af
Outflow = 0.19 cfs @ 12.45 hrs, Volume= 0.011 af, Atten= 27%, Lag= 18.2 min
Discarded = 0.00 cfs @ 12.45 hrs, Volume= 0.001 af
Primary = 0.19 cfs @ 12.45 hrs, Volume= 0.010 af

Routing by Stor-Ind method, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 616.43'@ 12.45 hrs Surf.Area= 364 sf Storage= 486 cf

Plug-Flow detention time=221.8 min calculated for 0.011 af (49% of inflow)
Center-of-Mass det. time=110.6 min (921.6 - 811.1)

Volume	Invert	Avail.Storage	Storage Description		
#1	614.00'	486 cf	Custom Stage Data (Irregular) listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
614.00	285	80.1	0	0	285
615.50	364	86.0	486	486	432

Device	Routing	Invert	Outlet Devices
#1	Primary	616.00'	Custom Weir/Orifice, Cv= 2.62 (C= 3.28) Head (feet) 0.50 0.51 Width (feet) 6.00 6.00
#2	Discarded	614.00'	0.090 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 1.00'

Discarded OutFlow Max=0.00 cfs @ 12.45 hrs HW=616.43' (Free Discharge)
↑**2=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=0.19 cfs @ 12.45 hrs HW=616.41' (Free Discharge)
↑**1=Custom Weir/Orifice** (Orifice Controls 0.19 cfs @ 3.13 fps)

1902_DRAINAGE-POST

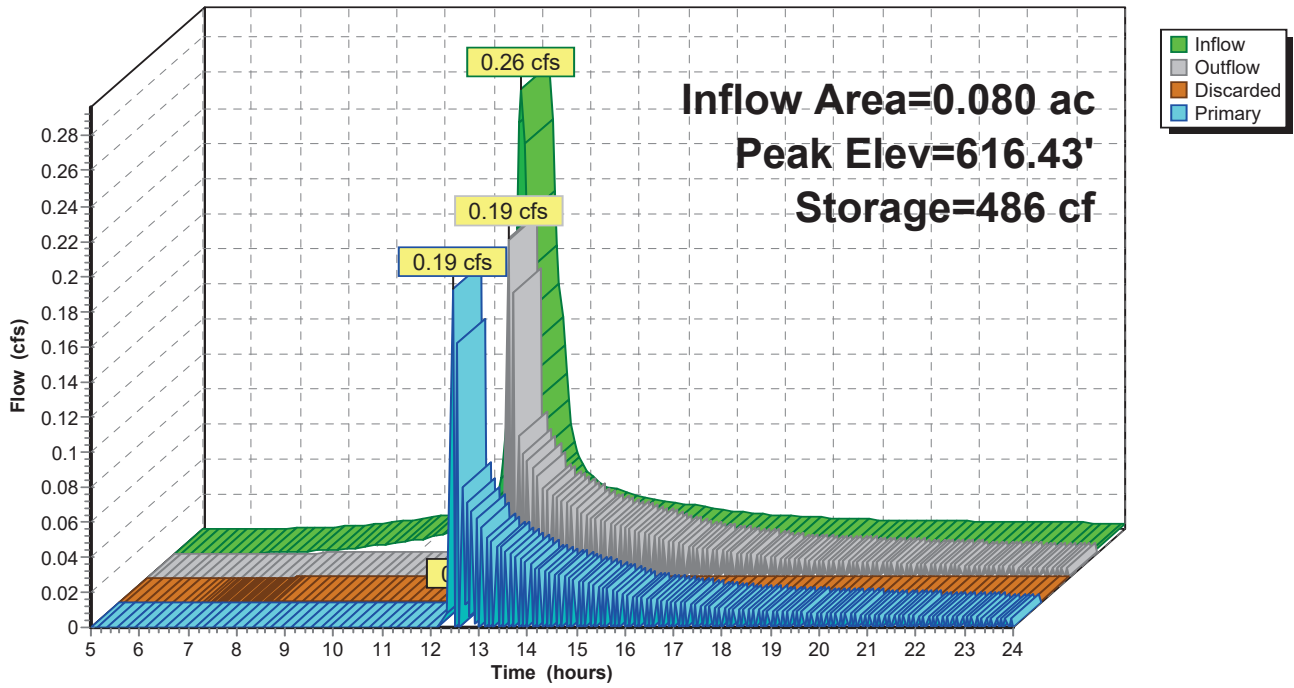
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Type III 24-hr 10-Year Rainfall=4.92"

Pond P2: LOT 2 DRIVE-RG

Hydrograph



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Worcester_Apthorp St
Type III 24-hr 10-Year Rainfall=4.92"

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Hydrograph for Pond P2: LOT 2 DRIVE-RG

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
5.00	0.00	0	614.00	0.00	0.00	0.00
5.50	0.00	0	614.00	0.00	0.00	0.00
6.00	0.00	0	614.00	0.00	0.00	0.00
6.50	0.00	0	614.00	0.00	0.00	0.00
7.00	0.00	1	614.00	0.00	0.00	0.00
7.50	0.00	2	614.01	0.00	0.00	0.00
8.00	0.00	4	614.02	0.00	0.00	0.00
8.50	0.00	7	614.03	0.00	0.00	0.00
9.00	0.00	13	614.04	0.00	0.00	0.00
9.50	0.01	21	614.07	0.00	0.00	0.00
10.00	0.01	32	614.11	0.00	0.00	0.00
10.50	0.01	47	614.16	0.00	0.00	0.00
11.00	0.01	69	614.24	0.00	0.00	0.00
11.50	0.03	102	614.35	0.00	0.00	0.00
12.00	0.13	210	614.70	0.00	0.00	0.00
12.50	0.09	486	616.00	0.00	0.00	0.00
13.00	0.03	485	615.50	0.00	0.00	0.00
13.50	0.02	485	615.50	0.00	0.00	0.00
14.00	0.02	486	615.50	0.00	0.00	0.00
14.50	0.02	486	615.50	0.00	0.00	0.00
15.00	0.01	486	615.50	0.00	0.00	0.00
15.50	0.01	486	615.50	0.00	0.00	0.00
16.00	0.01	486	615.50	0.00	0.00	0.00
16.50	0.01	486	615.50	0.00	0.00	0.00
17.00	0.01	486	615.50	0.00	0.00	0.00
17.50	0.01	486	615.50	0.00	0.00	0.00
18.00	0.01	486	615.50	0.00	0.00	0.00
18.50	0.01	486	615.50	0.00	0.00	0.00
19.00	0.01	486	615.50	0.00	0.00	0.00
19.50	0.01	486	615.50	0.00	0.00	0.00
20.00	0.00	486	615.50	0.00	0.00	0.00
20.50	0.00	486	615.50	0.00	0.00	0.00
21.00	0.00	486	615.50	0.00	0.00	0.00
21.50	0.00	486	615.50	0.00	0.00	0.00
22.00	0.00	486	615.50	0.00	0.00	0.00
22.50	0.00	486	615.50	0.00	0.00	0.00
23.00	0.00	486	615.50	0.00	0.00	0.00
23.50	0.00	486	615.50	0.00	0.00	0.00
24.00	0.00	486	615.50	0.00	0.00	0.00

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Worcester_Apthorp St
Type III 24-hr 10-Year Rainfall=4.92"

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Summary for Pond P3: LOT 2 DRIVE-RG

Inflow Area = 0.153 ac, 21.39% Impervious, Inflow Depth > 3.19" for 10-Year event
Inflow = 0.43 cfs @ 12.20 hrs, Volume= 0.041 af
Outflow = 0.76 cfs @ 12.20 hrs, Volume= 0.029 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 12.20 hrs, Volume= 0.001 af
Primary = 0.76 cfs @ 12.20 hrs, Volume= 0.029 af

Routing by Stor-Ind method, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 622.62'@ 12.20 hrs Surf.Area= 364 sf Storage= 486 cf

Plug-Flow detention time=139.2 min calculated for 0.029 af (72% of inflow)
Center-of-Mass det. time=51.5 min (869.2 - 817.7)

Volume	Invert	Avail.Storage	Storage Description		
#1	614.00'	486 cf	Custom Stage Data (Irregular) listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
614.00	285	80.1	0	0	285
615.50	364	86.0	486	486	432

Device	Routing	Invert	Outlet Devices
#1	Primary	616.00'	Custom Weir/Orifice, Cv= 2.62 (C= 3.28) Head (feet) 0.50 0.51 Width (feet) 6.00 6.00
#2	Discarded	614.00'	0.090 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 1.00'

Discarded OutFlow Max=0.00 cfs @ 12.20 hrs HW=622.61' (Free Discharge)
↑**2=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=0.76 cfs @ 12.20 hrs HW=622.60' (Free Discharge)
↑**1=Custom Weir/Orifice** (Orifice Controls 0.76 cfs @ 12.62 fps)

1902_DRAINAGE-POST

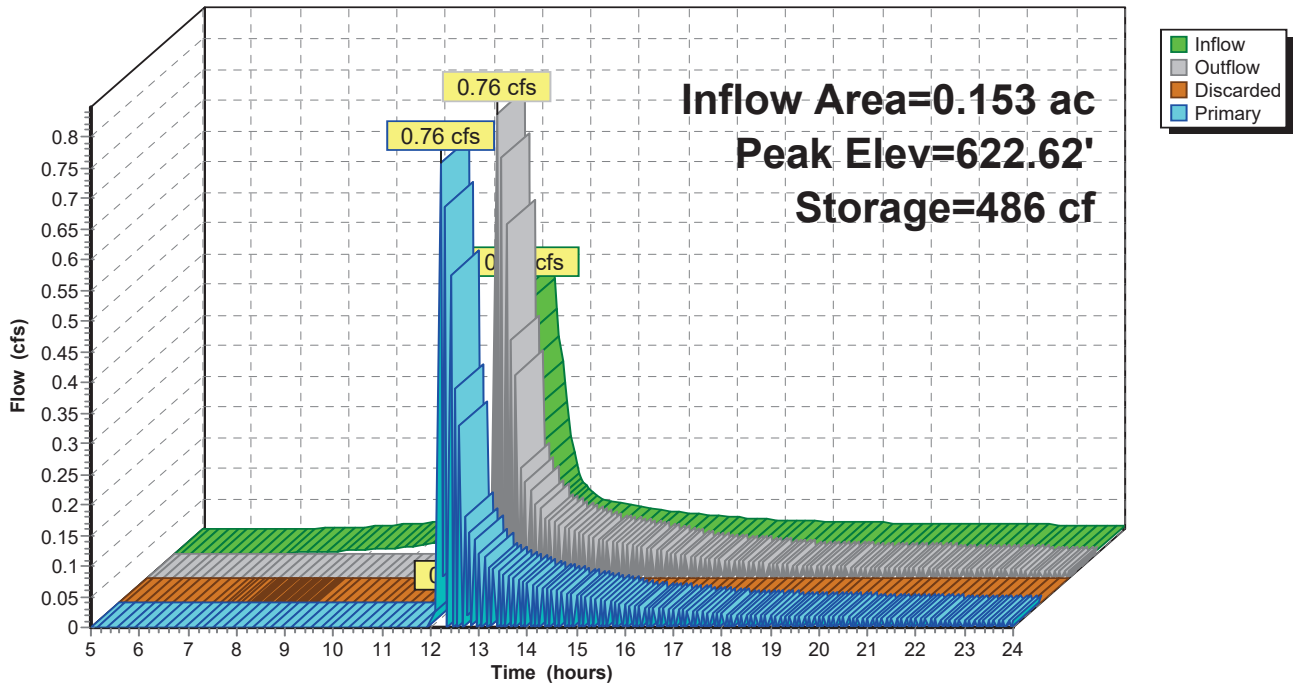
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Type III 24-hr 10-Year Rainfall=4.92"

Pond P3: LOT 2 DRIVE-RG

Hydrograph



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Type III 24-hr 10-Year Rainfall=4.92"

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Hydrograph for Pond P3: LOT 2 DRIVE-RG

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
5.00	0.00	0	614.00	0.00	0.00	0.00
5.50	0.00	0	614.00	0.00	0.00	0.00
6.00	0.00	0	614.00	0.00	0.00	0.00
6.50	0.00	0	614.00	0.00	0.00	0.00
7.00	0.00	1	614.00	0.00	0.00	0.00
7.50	0.00	2	614.01	0.00	0.00	0.00
8.00	0.00	6	614.02	0.00	0.00	0.00
8.50	0.00	12	614.04	0.00	0.00	0.00
9.00	0.01	21	614.07	0.00	0.00	0.00
9.50	0.01	34	614.12	0.00	0.00	0.00
10.00	0.01	53	614.18	0.00	0.00	0.00
10.50	0.02	80	614.27	0.00	0.00	0.00
11.00	0.03	118	614.40	0.00	0.00	0.00
11.50	0.04	174	614.58	0.00	0.00	0.00
12.00	0.19	335	615.07	0.00	0.00	0.00
12.50	0.21	486	617.74	0.39	0.00	0.39
13.00	0.06	486	616.17	0.12	0.00	0.12
13.50	0.04	486	616.09	0.09	0.00	0.09
14.00	0.04	486	616.07	0.07	0.00	0.07
14.50	0.03	486	616.06	0.06	0.00	0.06
15.00	0.03	486	616.05	0.05	0.00	0.05
15.50	0.02	486	616.04	0.05	0.00	0.04
16.00	0.02	486	616.03	0.04	0.00	0.04
16.50	0.02	486	616.02	0.03	0.00	0.03
17.00	0.02	486	616.02	0.03	0.00	0.03
17.50	0.01	486	616.02	0.03	0.00	0.03
18.00	0.01	486	616.01	0.02	0.00	0.02
18.50	0.01	486	616.01	0.02	0.00	0.02
19.00	0.01	486	616.01	0.02	0.00	0.02
19.50	0.01	486	616.01	0.02	0.00	0.02
20.00	0.01	486	616.01	0.02	0.00	0.02
20.50	0.01	486	616.01	0.02	0.00	0.02
21.00	0.01	486	616.01	0.02	0.00	0.02
21.50	0.01	486	616.01	0.02	0.00	0.01
22.00	0.01	486	616.01	0.01	0.00	0.01
22.50	0.01	486	616.01	0.01	0.00	0.01
23.00	0.01	486	616.01	0.01	0.00	0.01
23.50	0.01	486	616.01	0.01	0.00	0.01
24.00	0.01	486	616.01	0.01	0.00	0.01

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Worcester_Apthorp St
Type III 24-hr 25-Year Rainfall=5.99"

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Time span=5.00-24.00 hrs, dt=0.05 hrs, 381 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmenBYP: UncontrolledBypass Runoff Area=17,328 sf 8.22% Impervious Runoff Depth>3.87"
Flow Length=115' Tc=12.5 min CN=81 Runoff=1.45 cfs 0.128 af

SubcatchmenP1-F: Lot 1 Inflow Runoff Area=3,167 sf 27.31% Impervious Runoff Depth>4.29"
Flow Length=89' Tc=6.0 min CN=85 Runoff=0.35 cfs 0.026 af

SubcatchmenP2-F: Lot 2 Inflow Runoff Area=3,506 sf 32.37% Impervious Runoff Depth>4.29"
Flow Length=82' Tc=10.2 min CN=85 Runoff=0.34 cfs 0.029 af

SubcatchmenP3-F: Rear Inflow Runoff Area=6,658 sf 21.39% Impervious Runoff Depth>4.18"
Flow Length=131' Tc=14.7 min CN=84 Runoff=0.56 cfs 0.053 af

ReachDP1: WETLANDS Inflow=2.35 cfs 0.200 af
Outflow=2.35 cfs 0.200 af

Pond P1: LOT 2 DRIVE-RG Peak Elev=617.51' Storage=486 cf Inflow=0.35 cfs 0.026 af
Discarded=0.00 cfs 0.001 af Primary=0.36 cfs 0.014 af Outflow=0.36 cfs 0.015 af

Pond P2: LOT 2 DRIVE-RG Peak Elev=617.18' Storage=486 cf Inflow=0.34 cfs 0.029 af
Discarded=0.00 cfs 0.001 af Primary=0.32 cfs 0.017 af Outflow=0.32 cfs 0.018 af

Pond P3: LOT 2 DRIVE-RG Peak Elev=622.51' Storage=486 cf Inflow=0.56 cfs 0.053 af
Discarded=0.00 cfs 0.001 af Primary=0.75 cfs 0.041 af Outflow=0.75 cfs 0.042 af

Total Runoff Area = 0.704 ac Runoff Volume = 0.236 af Average Runoff Depth = 4.03"
84.19% Pervious = 0.593 ac 15.81% Impervious = 0.111 ac

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Worcester_Apthorp St
Type III 24-hr 25-Year Rainfall=5.99"

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Summary for Subcatchment BYP: Uncontrolled Bypass

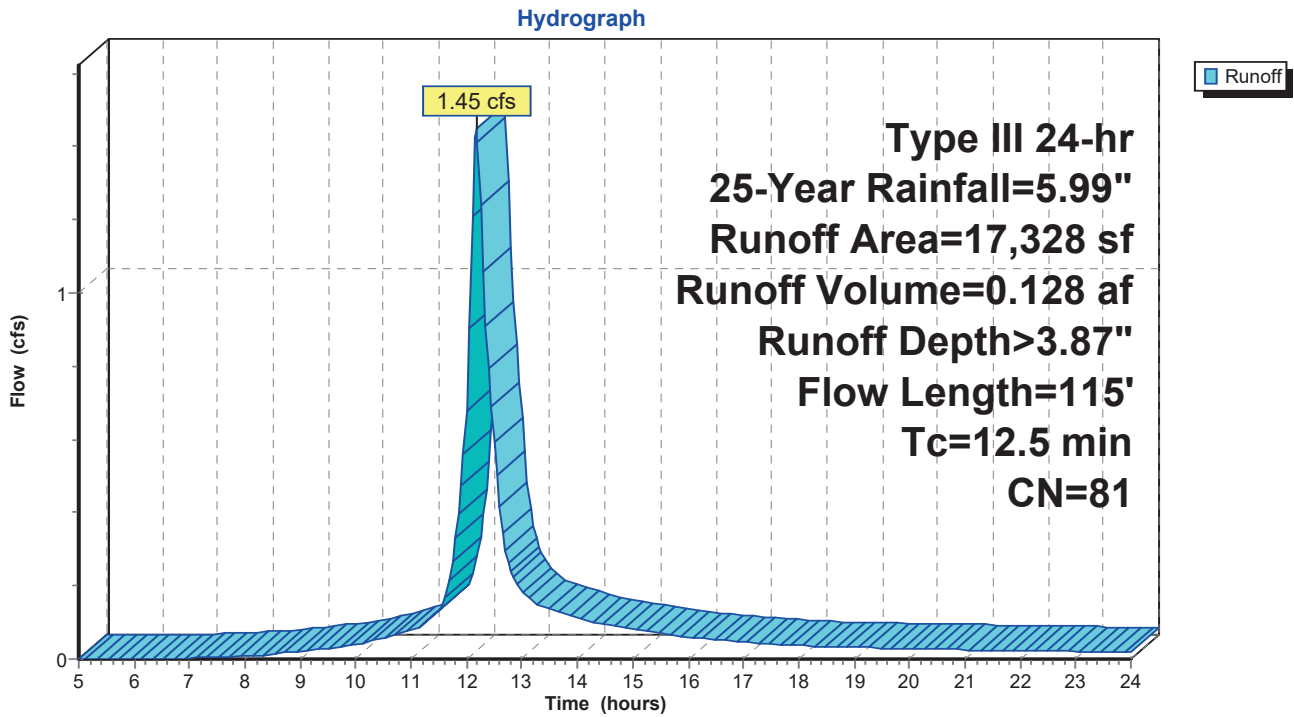
Runoff = 1.45 cfs @ 12.17 hrs, Volume= 0.128 af, Depth> 3.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.99"

Area (sf)	CN	Description
1,424	98	Roofs, HSG D
7,872	79	Woods, Fair, HSG D
8,032	79	Woods/grass comb., Good, HSG D
17,328	81	Weighted Average
15,904		91.78% Pervious Area
1,424		8.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	50	0.0200	0.07		Sheet Flow, A-B Grass: Bermuda n= 0.410 P2= 3.43"
0.3	65	0.0385	3.16		Shallow Concentrated Flow, B-C Unpaved Kv= 16.1 fps
12.5	115	Total			

Subcatchment BYP: Uncontrolled Bypass



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Worcester_Apthorp St
Type III 24-hr 25-Year Rainfall=5.99"

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Hydrograph for Subcatchment BYP: Uncontrolled Bypass

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
5.00	0.34	0.00	0.00	18.25	5.58	3.51	0.03
5.25	0.36	0.00	0.00	18.50	5.61	3.53	0.03
5.50	0.38	0.00	0.00	18.75	5.63	3.55	0.03
5.75	0.41	0.00	0.00	19.00	5.65	3.57	0.03
6.00	0.43	0.00	0.00	19.25	5.67	3.59	0.03
6.25	0.46	0.00	0.00	19.50	5.69	3.60	0.03
6.50	0.48	0.00	0.00	19.75	5.71	3.62	0.03
6.75	0.51	0.00	0.00	20.00	5.73	3.64	0.03
7.00	0.54	0.00	0.00	20.25	5.75	3.66	0.03
7.25	0.57	0.00	0.00	20.50	5.77	3.68	0.03
7.50	0.61	0.01	0.00	20.75	5.79	3.69	0.03
7.75	0.64	0.01	0.01	21.00	5.81	3.71	0.03
8.00	0.68	0.02	0.01	21.25	5.82	3.72	0.03
8.25	0.72	0.02	0.01	21.50	5.84	3.74	0.03
8.50	0.77	0.03	0.01	21.75	5.86	3.75	0.02
8.75	0.82	0.05	0.02	22.00	5.87	3.77	0.02
9.00	0.87	0.06	0.02	22.25	5.89	3.78	0.02
9.25	0.93	0.08	0.03	22.50	5.91	3.80	0.02
9.50	0.99	0.10	0.03	22.75	5.92	3.81	0.02
9.75	1.06	0.12	0.04	23.00	5.94	3.83	0.02
10.00	1.13	0.15	0.04	23.25	5.95	3.84	0.02
10.25	1.21	0.18	0.05	23.50	5.96	3.85	0.02
10.50	1.30	0.22	0.06	23.75	5.98	3.86	0.02
10.75	1.39	0.26	0.07	24.00	5.99	3.87	0.02
11.00	1.50	0.31	0.08				
11.25	1.62	0.38	0.10				
11.50	1.79	0.47	0.14				
11.75	2.13	0.69	0.27				
12.00	2.99	1.31	0.68				
12.25	3.86	2.01	1.24				
12.50	4.20	2.29	0.59				
12.75	4.37	2.43	0.26				
13.00	4.49	2.54	0.19				
13.25	4.60	2.63	0.15				
13.50	4.69	2.72	0.14				
13.75	4.78	2.79	0.13				
14.00	4.86	2.86	0.11				
14.25	4.93	2.92	0.10				
14.50	5.00	2.98	0.10				
14.75	5.06	3.04	0.09				
15.00	5.12	3.09	0.08				
15.25	5.17	3.14	0.08				
15.50	5.22	3.18	0.07				
15.75	5.27	3.22	0.07				
16.00	5.31	3.26	0.06				
16.25	5.35	3.29	0.06				
16.50	5.38	3.32	0.05				
16.75	5.42	3.36	0.05				
17.00	5.45	3.38	0.05				
17.25	5.48	3.41	0.04				
17.50	5.51	3.44	0.04				
17.75	5.53	3.46	0.04				
18.00	5.56	3.48	0.04				

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Worcester_Apthorp St
Type III 24-hr 25-Year Rainfall=5.99"

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Summary for Subcatchment P1-F: Lot 1 Inflow

Runoff = 0.35 cfs @ 12.09 hrs, Volume= 0.026 af, Depth> 4.29"

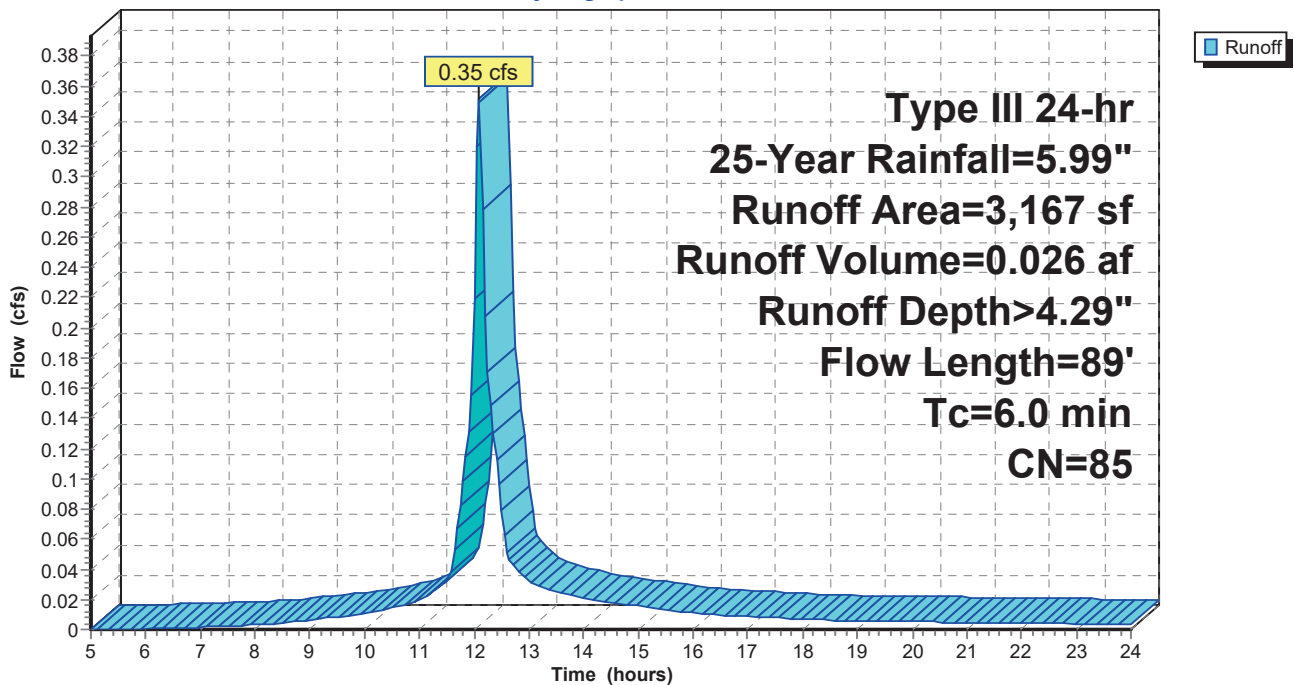
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.99"

Area (sf)	CN	Description
865	98	Paved parking, HSG D
2,302	80	>75% Grass cover, Good, HSG D
3,167	85	Weighted Average
2,302		72.69% Pervious Area
865		27.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.5	21	0.0425	0.08		Sheet Flow, A-B Grass: Bermuda n= 0.410 P2= 3.43"
0.9	29	0.0034	0.55		Sheet Flow, B-C Smooth surfaces n= 0.011 P2= 3.43"
0.6	39	0.0051	1.15		Shallow Concentrated Flow, C-D Unpaved Kv= 16.1 fps
6.0	89	Total			

Subcatchment P1-F: Lot 1 Inflow

Hydrograph



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Worcester_Apthorp St
Type III 24-hr 25-Year Rainfall=5.99"

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Hydrograph for Subcatchment P1-F: Lot 1 Inflow

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
5.00	0.34	0.00	0.00	18.25	5.58	3.91	0.01
5.25	0.36	0.00	0.00	18.50	5.61	3.93	0.01
5.50	0.38	0.00	0.00	18.75	5.63	3.95	0.01
5.75	0.41	0.00	0.00	19.00	5.65	3.97	0.01
6.00	0.43	0.00	0.00	19.25	5.67	3.99	0.01
6.25	0.46	0.01	0.00	19.50	5.69	4.01	0.01
6.50	0.48	0.01	0.00	19.75	5.71	4.03	0.01
6.75	0.51	0.01	0.00	20.00	5.73	4.05	0.01
7.00	0.54	0.02	0.00	20.25	5.75	4.07	0.01
7.25	0.57	0.02	0.00	20.50	5.77	4.09	0.01
7.50	0.61	0.03	0.00	20.75	5.79	4.10	0.01
7.75	0.64	0.04	0.00	21.00	5.81	4.12	0.00
8.00	0.68	0.05	0.00	21.25	5.82	4.14	0.00
8.25	0.72	0.06	0.00	21.50	5.84	4.15	0.00
8.50	0.77	0.08	0.00	21.75	5.86	4.17	0.00
8.75	0.82	0.10	0.01	22.00	5.87	4.18	0.00
9.00	0.87	0.12	0.01	22.25	5.89	4.20	0.00
9.25	0.93	0.14	0.01	22.50	5.91	4.21	0.00
9.50	0.99	0.17	0.01	22.75	5.92	4.23	0.00
9.75	1.06	0.20	0.01	23.00	5.94	4.24	0.00
10.00	1.13	0.24	0.01	23.25	5.95	4.26	0.00
10.25	1.21	0.28	0.01	23.50	5.96	4.27	0.00
10.50	1.30	0.33	0.01	23.75	5.98	4.28	0.00
10.75	1.39	0.39	0.02	24.00	5.99	4.29	0.00
11.00	1.50	0.45	0.02				
11.25	1.62	0.53	0.03				
11.50	1.79	0.64	0.03				
11.75	2.13	0.89	0.08				
12.00	2.99	1.58	0.22				
12.25	3.86	2.33	0.17				
12.50	4.20	2.64	0.08				
12.75	4.37	2.79	0.04				
13.00	4.49	2.90	0.03				
13.25	4.60	3.00	0.03				
13.50	4.69	3.09	0.03				
13.75	4.78	3.17	0.02				
14.00	4.86	3.24	0.02				
14.25	4.93	3.30	0.02				
14.50	5.00	3.36	0.02				
14.75	5.06	3.42	0.02				
15.00	5.12	3.48	0.02				
15.25	5.17	3.53	0.01				
15.50	5.22	3.57	0.01				
15.75	5.27	3.61	0.01				
16.00	5.31	3.65	0.01				
16.25	5.35	3.69	0.01				
16.50	5.38	3.72	0.01				
16.75	5.42	3.75	0.01				
17.00	5.45	3.78	0.01				
17.25	5.48	3.81	0.01				
17.50	5.51	3.84	0.01				
17.75	5.53	3.86	0.01				
18.00	5.56	3.89	0.01				

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Worcester_Apthorp St
Type III 24-hr 25-Year Rainfall=5.99"

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Summary for Subcatchment P2-F: Lot 2 Inflow

Runoff = 0.34 cfs @ 12.14 hrs, Volume= 0.029 af, Depth> 4.29"

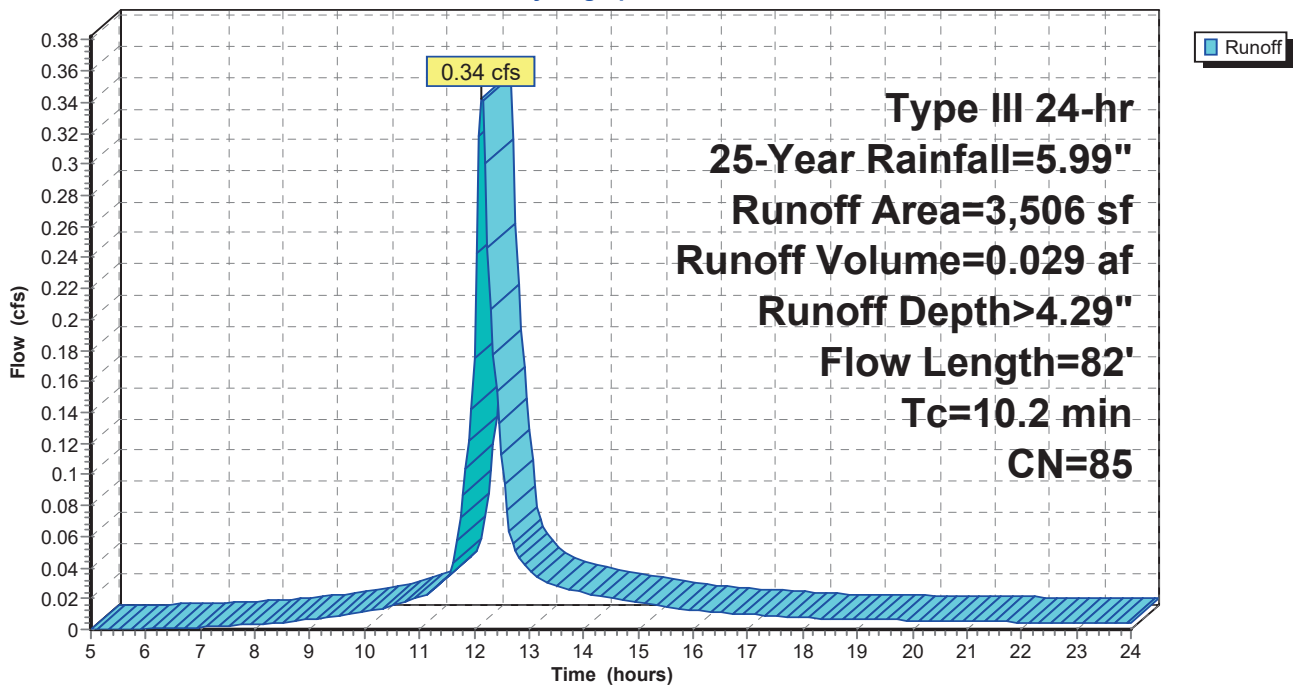
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.99"

Area (sf)	CN	Description
1,135	98	Paved parking, HSG D
2,371	79	Woods, Fair, HSG D
3,506	85	Weighted Average
2,371		67.63% Pervious Area
1,135		32.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0	48	0.0300	0.08		Sheet Flow, A-B
					Grass: Bermuda n= 0.410 P2= 3.43"
0.0	10	0.0386	3.99		Shallow Concentrated Flow, B-C
					Paved Kv= 20.3 fps
0.2	24	0.0208	2.32		Shallow Concentrated Flow,
					Unpaved Kv= 16.1 fps
10.2	82	Total			

Subcatchment P2-F: Lot 2 Inflow

Hydrograph



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Type III 24-hr 25-Year Rainfall=5.99"

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Hydrograph for Subcatchment P2-F: Lot 2 Inflow

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
5.00	0.34	0.00	0.00	18.25	5.58	3.91	0.01
5.25	0.36	0.00	0.00	18.50	5.61	3.93	0.01
5.50	0.38	0.00	0.00	18.75	5.63	3.95	0.01
5.75	0.41	0.00	0.00	19.00	5.65	3.97	0.01
6.00	0.43	0.00	0.00	19.25	5.67	3.99	0.01
6.25	0.46	0.01	0.00	19.50	5.69	4.01	0.01
6.50	0.48	0.01	0.00	19.75	5.71	4.03	0.01
6.75	0.51	0.01	0.00	20.00	5.73	4.05	0.01
7.00	0.54	0.02	0.00	20.25	5.75	4.07	0.01
7.25	0.57	0.02	0.00	20.50	5.77	4.09	0.01
7.50	0.61	0.03	0.00	20.75	5.79	4.10	0.01
7.75	0.64	0.04	0.00	21.00	5.81	4.12	0.01
8.00	0.68	0.05	0.00	21.25	5.82	4.14	0.01
8.25	0.72	0.06	0.00	21.50	5.84	4.15	0.01
8.50	0.77	0.08	0.00	21.75	5.86	4.17	0.01
8.75	0.82	0.10	0.01	22.00	5.87	4.18	0.00
9.00	0.87	0.12	0.01	22.25	5.89	4.20	0.00
9.25	0.93	0.14	0.01	22.50	5.91	4.21	0.00
9.50	0.99	0.17	0.01	22.75	5.92	4.23	0.00
9.75	1.06	0.20	0.01	23.00	5.94	4.24	0.00
10.00	1.13	0.24	0.01	23.25	5.95	4.26	0.00
10.25	1.21	0.28	0.01	23.50	5.96	4.27	0.00
10.50	1.30	0.33	0.02	23.75	5.98	4.28	0.00
10.75	1.39	0.39	0.02	24.00	5.99	4.29	0.00
11.00	1.50	0.45	0.02				
11.25	1.62	0.53	0.03				
11.50	1.79	0.64	0.03				
11.75	2.13	0.89	0.07				
12.00	2.99	1.58	0.18				
12.25	3.86	2.33	0.25				
12.50	4.20	2.64	0.11				
12.75	4.37	2.79	0.05				
13.00	4.49	2.90	0.04				
13.25	4.60	3.00	0.03				
13.50	4.69	3.09	0.03				
13.75	4.78	3.17	0.03				
14.00	4.86	3.24	0.02				
14.25	4.93	3.30	0.02				
14.50	5.00	3.36	0.02				
14.75	5.06	3.42	0.02				
15.00	5.12	3.48	0.02				
15.25	5.17	3.53	0.02				
15.50	5.22	3.57	0.02				
15.75	5.27	3.61	0.01				
16.00	5.31	3.65	0.01				
16.25	5.35	3.69	0.01				
16.50	5.38	3.72	0.01				
16.75	5.42	3.75	0.01				
17.00	5.45	3.78	0.01				
17.25	5.48	3.81	0.01				
17.50	5.51	3.84	0.01				
17.75	5.53	3.86	0.01				
18.00	5.56	3.89	0.01				

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Type III 24-hr 25-Year Rainfall=5.99"

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Summary for Subcatchment P3-F: Rear Inflow

Runoff = 0.56 cfs @ 12.20 hrs, Volume= 0.053 af, Depth> 4.18"

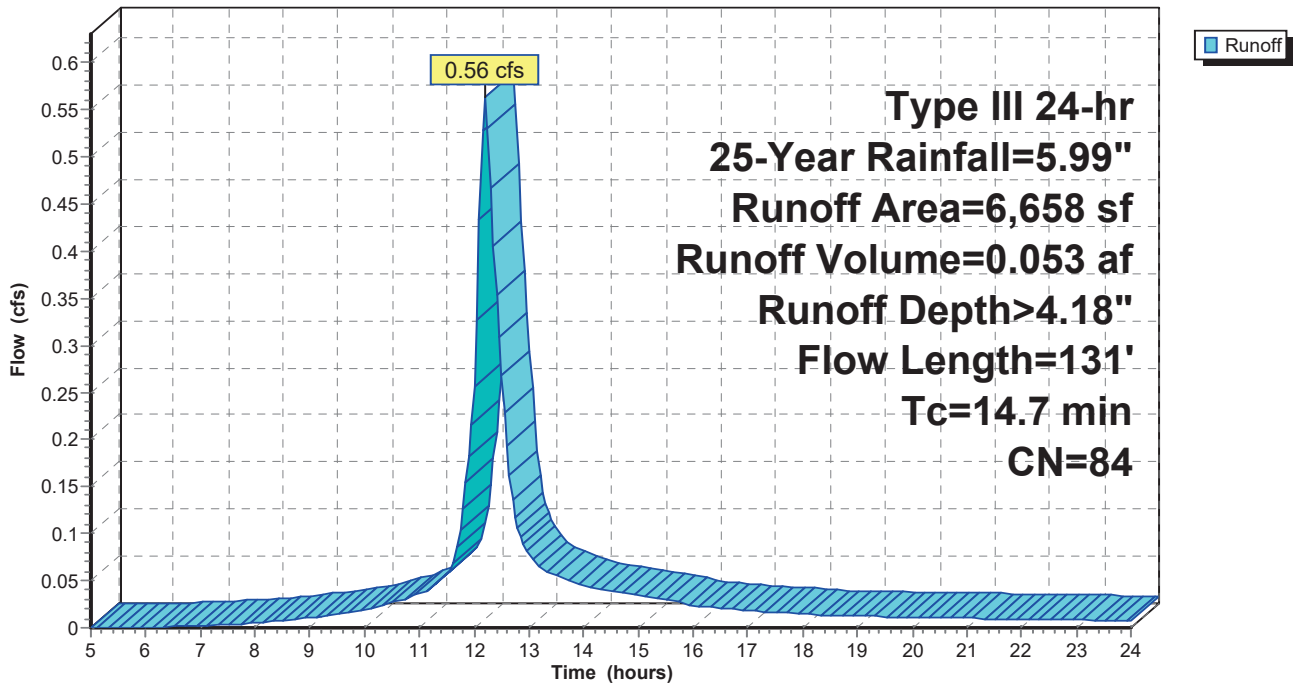
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.99"

Area (sf)	CN	Description
1,424	98	Roofs, HSG D
5,234	80	>75% Grass cover, Good, HSG D
6,658	84	Weighted Average
5,234		78.61% Pervious Area
1,424		21.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.0	50	0.0140	0.06		Sheet Flow, A-B
					Grass: Bermuda n= 0.410 P2= 3.43"
0.7	81	0.0148	1.96		Shallow Concentrated Flow, B-C
					Unpaved Kv= 16.1 fps
14.7	131	Total			

Subcatchment P3-F: Rear Inflow

Hydrograph



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Worcester_Apthorp St
Type III 24-hr 25-Year Rainfall=5.99"

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Hydrograph for Subcatchment P3-F: Rear Inflow

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
5.00	0.34	0.00	0.00	18.25	5.58	3.81	0.01
5.25	0.36	0.00	0.00	18.50	5.61	3.83	0.01
5.50	0.38	0.00	0.00	18.75	5.63	3.85	0.01
5.75	0.41	0.00	0.00	19.00	5.65	3.87	0.01
6.00	0.43	0.00	0.00	19.25	5.67	3.89	0.01
6.25	0.46	0.00	0.00	19.50	5.69	3.91	0.01
6.50	0.48	0.01	0.00	19.75	5.71	3.93	0.01
6.75	0.51	0.01	0.00	20.00	5.73	3.95	0.01
7.00	0.54	0.01	0.00	20.25	5.75	3.96	0.01
7.25	0.57	0.02	0.00	20.50	5.77	3.98	0.01
7.50	0.61	0.02	0.00	20.75	5.79	4.00	0.01
7.75	0.64	0.03	0.00	21.00	5.81	4.02	0.01
8.00	0.68	0.04	0.01	21.25	5.82	4.03	0.01
8.25	0.72	0.05	0.01	21.50	5.84	4.05	0.01
8.50	0.77	0.07	0.01	21.75	5.86	4.06	0.01
8.75	0.82	0.08	0.01	22.00	5.87	4.08	0.01
9.00	0.87	0.10	0.01	22.25	5.89	4.09	0.01
9.25	0.93	0.12	0.01	22.50	5.91	4.11	0.01
9.50	0.99	0.15	0.02	22.75	5.92	4.12	0.01
9.75	1.06	0.18	0.02	23.00	5.94	4.14	0.01
10.00	1.13	0.21	0.02	23.25	5.95	4.15	0.01
10.25	1.21	0.25	0.02	23.50	5.96	4.16	0.01
10.50	1.30	0.30	0.03	23.75	5.98	4.18	0.01
10.75	1.39	0.35	0.03	24.00	5.99	4.19	0.01
11.00	1.50	0.41	0.04				
11.25	1.62	0.49	0.04				
11.50	1.79	0.60	0.06				
11.75	2.13	0.84	0.10				
12.00	2.99	1.51	0.26				
12.25	3.86	2.25	0.53				
12.50	4.20	2.55	0.27				
12.75	4.37	2.70	0.12				
13.00	4.49	2.81	0.08				
13.25	4.60	2.90	0.06				
13.50	4.69	2.99	0.06				
13.75	4.78	3.07	0.05				
14.00	4.86	3.14	0.05				
14.25	4.93	3.21	0.04				
14.50	5.00	3.27	0.04				
14.75	5.06	3.32	0.04				
15.00	5.12	3.38	0.03				
15.25	5.17	3.43	0.03				
15.50	5.22	3.47	0.03				
15.75	5.27	3.51	0.03				
16.00	5.31	3.55	0.02				
16.25	5.35	3.59	0.02				
16.50	5.38	3.62	0.02				
16.75	5.42	3.65	0.02				
17.00	5.45	3.68	0.02				
17.25	5.48	3.71	0.02				
17.50	5.51	3.74	0.02				
17.75	5.53	3.76	0.02				
18.00	5.56	3.79	0.01				

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Worcester_Apthorp St
Type III 24-hr 25-Year Rainfall=5.99"

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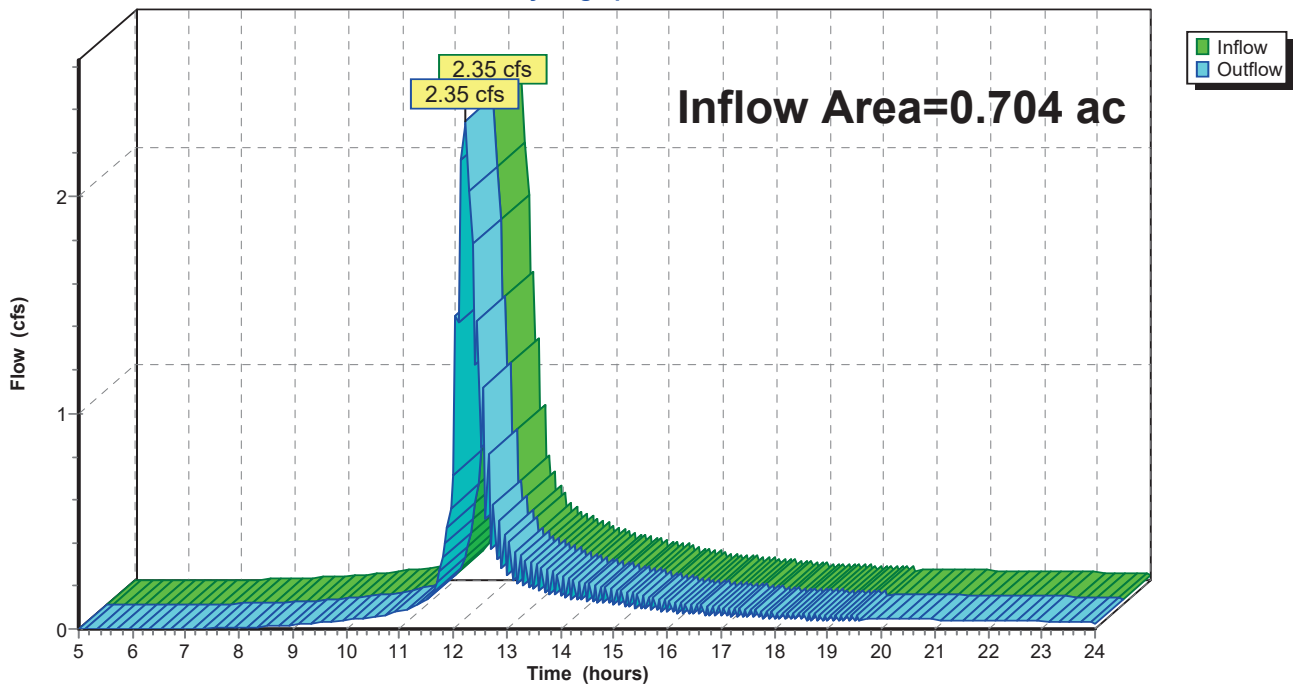
Summary for Reach DP1: WETLANDS

Inflow Area = 0.704 ac, 15.81% Impervious, Inflow Depth > 3.40" for 25-Year event
Inflow = 2.35 cfs @ 12.22 hrs, Volume= 0.200 af
Outflow = 2.35 cfs @ 12.22 hrs, Volume= 0.200 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs

Reach DP1: WETLANDS

Hydrograph



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Worcester_Apthorp St
Type III 24-hr 25-Year Rainfall=5.99"

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Hydrograph for Reach DP1: WETLANDS

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
5.00	0.00		0.00	18.25	0.07		0.07
5.25	0.00		0.00	18.50	0.04		0.04
5.50	0.00		0.00	18.75	0.07		0.07
5.75	0.00		0.00	19.00	0.04		0.04
6.00	0.00		0.00	19.25	0.07		0.07
6.25	0.00		0.00	19.50	0.04		0.04
6.50	0.00		0.00	19.75	0.06		0.06
6.75	0.00		0.00	20.00	0.04		0.04
7.00	0.00		0.00	20.25	0.06		0.06
7.25	0.00		0.00	20.50	0.04		0.04
7.50	0.00		0.00	20.75	0.06		0.06
7.75	0.01		0.01	21.00	0.03		0.03
8.00	0.01		0.01	21.25	0.05		0.05
8.25	0.01		0.01	21.50	0.03		0.03
8.50	0.01		0.01	21.75	0.05		0.05
8.75	0.02		0.02	22.00	0.03		0.03
9.00	0.02		0.02	22.25	0.05		0.05
9.25	0.03		0.03	22.50	0.03		0.03
9.50	0.03		0.03	22.75	0.05		0.05
9.75	0.04		0.04	23.00	0.03		0.03
10.00	0.04		0.04	23.25	0.04		0.04
10.25	0.05		0.05	23.50	0.03		0.03
10.50	0.06		0.06	23.75	0.04		0.04
10.75	0.07		0.07	24.00	0.02		0.02
11.00	0.08		0.08				
11.25	0.10		0.10				
11.50	0.14		0.14				
11.75	0.27		0.27				
12.00	0.71		0.71				
12.25	2.33		2.33				
12.50	0.84		0.84				
12.75	0.58		0.58				
13.00	0.25		0.25				
13.25	0.34		0.34				
13.50	0.19		0.19				
13.75	0.28		0.28				
14.00	0.15		0.15				
14.25	0.22		0.22				
14.50	0.13		0.13				
14.75	0.20		0.20				
15.00	0.11		0.11				
15.25	0.17		0.17				
15.50	0.10		0.10				
15.75	0.15		0.15				
16.00	0.08		0.08				
16.25	0.12		0.12				
16.50	0.07		0.07				
16.75	0.11		0.11				
17.00	0.06		0.06				
17.25	0.10		0.10				
17.50	0.06		0.06				
17.75	0.08		0.08				
18.00	0.05		0.05				

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Worcester_Apthorp St
Type III 24-hr 25-Year Rainfall=5.99"

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Summary for Pond P1: LOT 2 DRIVE-RG

Inflow Area = 0.073 ac, 27.31% Impervious, Inflow Depth > 4.29" for 25-Year event
Inflow = 0.35 cfs @ 12.09 hrs, Volume= 0.026 af
Outflow = 0.36 cfs @ 12.20 hrs, Volume= 0.015 af, Atten= 0%, Lag= 6.7 min
Discarded = 0.00 cfs @ 12.20 hrs, Volume= 0.001 af
Primary = 0.36 cfs @ 12.20 hrs, Volume= 0.014 af

Routing by Stor-Ind method, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 617.51'@ 12.20 hrs Surf.Area= 364 sf Storage= 486 cf

Plug-Flow detention time=191.3 min calculated for 0.015 af (57% of inflow)
Center-of-Mass det. time=86.9 min (887.1 - 800.2)

Volume	Invert	Avail.Storage	Storage Description		
#1	614.00'	486 cf	Custom Stage Data (Irregular) listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
614.00	285	80.1	0	0	285
615.50	364	86.0	486	486	432

Device	Routing	Invert	Outlet Devices
#1	Primary	616.00'	Custom Weir/Orifice, Cv= 2.62 (C= 3.28) Head (feet) 0.50 0.51 Width (feet) 6.00 6.00
#2	Discarded	614.00'	0.090 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 1.00'

Discarded OutFlow Max=0.00 cfs @ 12.20 hrs HW=617.50' (Free Discharge)
↑**2=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=0.36 cfs @ 12.20 hrs HW=617.48' (Free Discharge)
↑**1=Custom Weir/Orifice**(Orifice Controls 0.36 cfs @ 5.97 fps)

1902_DRAINAGE-POST

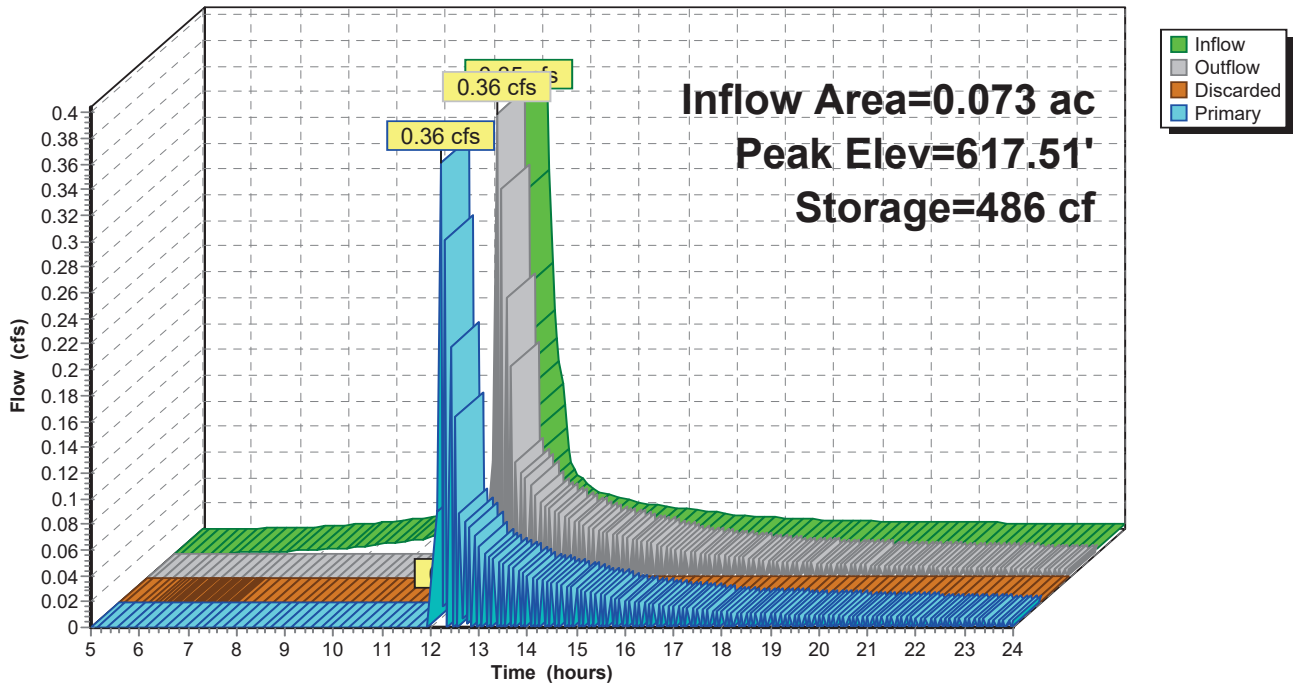
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Type III 24-hr 25-Year Rainfall=5.99"

Pond P1: LOT 2 DRIVE-RG

Hydrograph



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Worcester_Apthorp St
Type III 24-hr 25-Year Rainfall=5.99"

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Hydrograph for Pond P1: LOT 2 DRIVE-RG

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
5.00	0.00	0	614.00	0.00	0.00	0.00
5.50	0.00	0	614.00	0.00	0.00	0.00
6.00	0.00	1	614.00	0.00	0.00	0.00
6.50	0.00	2	614.01	0.00	0.00	0.00
7.00	0.00	4	614.01	0.00	0.00	0.00
7.50	0.00	6	614.02	0.00	0.00	0.00
8.00	0.00	10	614.03	0.00	0.00	0.00
8.50	0.00	16	614.05	0.00	0.00	0.00
9.00	0.01	24	614.08	0.00	0.00	0.00
9.50	0.01	36	614.13	0.00	0.00	0.00
10.00	0.01	52	614.18	0.00	0.00	0.00
10.50	0.01	74	614.25	0.00	0.00	0.00
11.00	0.02	103	614.35	0.00	0.00	0.00
11.50	0.03	147	614.50	0.00	0.00	0.00
12.00	0.22	309	615.00	0.00	0.00	0.00
12.50	0.08	486	616.31	0.16	0.00	0.16
13.00	0.03	486	616.05	0.06	0.00	0.06
13.50	0.03	486	616.03	0.05	0.00	0.05
14.00	0.02	486	616.02	0.04	0.00	0.04
14.50	0.02	486	616.02	0.04	0.00	0.03
15.00	0.02	486	616.02	0.03	0.00	0.03
15.50	0.01	486	616.01	0.03	0.00	0.03
16.00	0.01	486	616.01	0.02	0.00	0.02
16.50	0.01	486	616.01	0.02	0.00	0.02
17.00	0.01	486	616.01	0.02	0.00	0.02
17.50	0.01	486	616.01	0.01	0.00	0.01
18.00	0.01	486	616.01	0.01	0.00	0.01
18.50	0.01	486	616.01	0.01	0.00	0.01
19.00	0.01	486	616.01	0.01	0.00	0.01
19.50	0.01	486	616.01	0.01	0.00	0.01
20.00	0.01	486	616.00	0.01	0.00	0.01
20.50	0.01	486	616.00	0.01	0.00	0.01
21.00	0.00	486	616.00	0.01	0.00	0.01
21.50	0.00	486	616.00	0.01	0.00	0.01
22.00	0.00	486	616.00	0.01	0.00	0.01
22.50	0.00	486	616.00	0.01	0.00	0.01
23.00	0.00	486	616.00	0.01	0.00	0.01
23.50	0.00	486	616.00	0.01	0.00	0.01
24.00	0.00	486	616.00	0.01	0.00	0.01

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Type III 24-hr 25-Year Rainfall=5.99"

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Summary for Pond P2: LOT 2 DRIVE-RG

Inflow Area = 0.080 ac, 32.37% Impervious, Inflow Depth > 4.29" for 25-Year event
Inflow = 0.34 cfs @ 12.14 hrs, Volume= 0.029 af
Outflow = 0.32 cfs @ 12.24 hrs, Volume= 0.018 af, Atten= 6%, Lag= 5.9 min
Discarded = 0.00 cfs @ 12.25 hrs, Volume= 0.001 af
Primary = 0.32 cfs @ 12.24 hrs, Volume= 0.017 af

Routing by Stor-Ind method, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 617.18'@ 12.24 hrs Surf.Area= 364 sf Storage= 486 cf

Plug-Flow detention time=176.3 min calculated for 0.018 af (61% of inflow)
Center-of-Mass det. time=75.9 min (879.6 - 803.6)

Volume	Invert	Avail.Storage	Storage Description		
#1	614.00'	486 cf	Custom Stage Data (Irregular) listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
614.00	285	80.1	0	0	285
615.50	364	86.0	486	486	432

Device	Routing	Invert	Outlet Devices
#1	Primary	616.00'	Custom Weir/Orifice, Cv= 2.62 (C= 3.28) Head (feet) 0.50 0.51 Width (feet) 6.00 6.00
#2	Discarded	614.00'	0.090 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 1.00'

Discarded OutFlow Max=0.00 cfs @ 12.25 hrs HW=617.17' (Free Discharge)
↑**2=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=0.30 cfs @ 12.24 hrs HW=617.07' (Free Discharge)
↑**1=Custom Weir/Orifice** (Orifice Controls 0.30 cfs @ 5.07 fps)

1902_DRAINAGE-POST

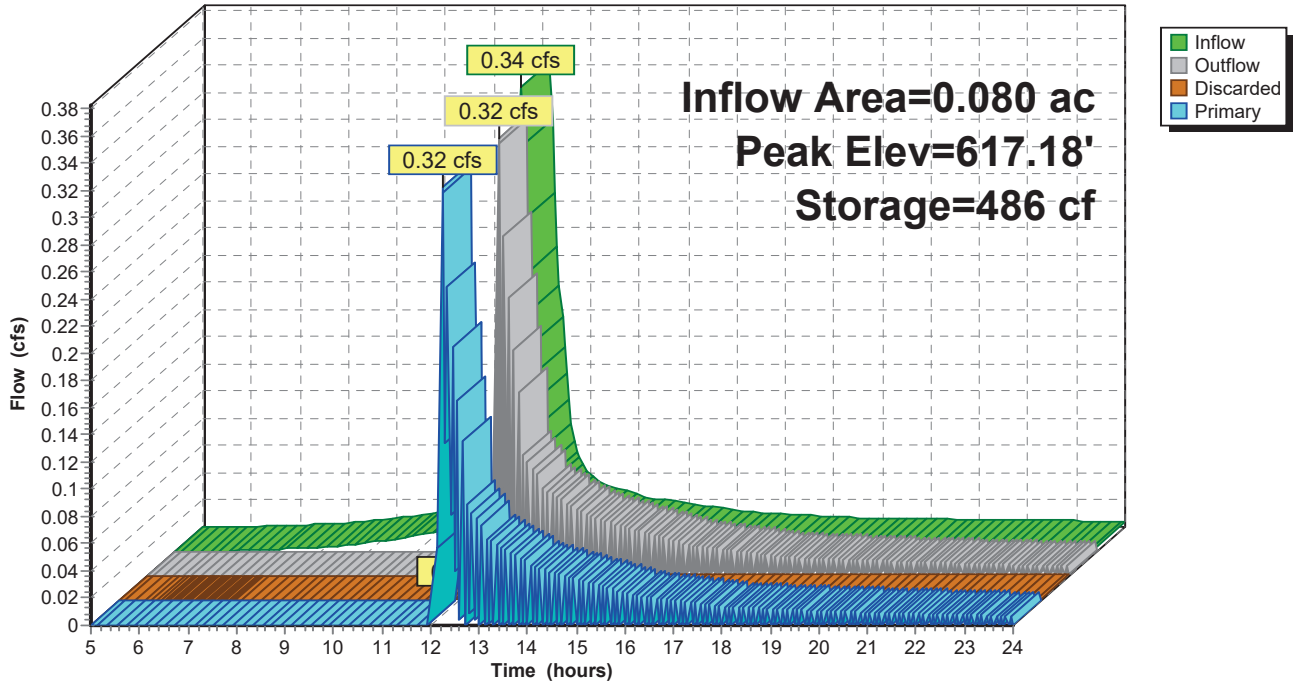
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Type III 24-hr 25-Year Rainfall=5.99"

Pond P2: LOT 2 DRIVE-RG

Hydrograph



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Type III 24-hr 25-Year Rainfall=5.99"

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Hydrograph for Pond P2: LOT 2 DRIVE-RG

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
5.00	0.00	0	614.00	0.00	0.00	0.00
5.50	0.00	0	614.00	0.00	0.00	0.00
6.00	0.00	1	614.00	0.00	0.00	0.00
6.50	0.00	2	614.01	0.00	0.00	0.00
7.00	0.00	4	614.01	0.00	0.00	0.00
7.50	0.00	6	614.02	0.00	0.00	0.00
8.00	0.00	10	614.04	0.00	0.00	0.00
8.50	0.00	17	614.06	0.00	0.00	0.00
9.00	0.01	26	614.09	0.00	0.00	0.00
9.50	0.01	39	614.13	0.00	0.00	0.00
10.00	0.01	56	614.19	0.00	0.00	0.00
10.50	0.02	79	614.27	0.00	0.00	0.00
11.00	0.02	110	614.37	0.00	0.00	0.00
11.50	0.03	156	614.52	0.00	0.00	0.00
12.00	0.18	301	614.97	0.00	0.00	0.00
12.50	0.11	486	616.03	0.04	0.00	0.04
13.00	0.04	486	615.50	0.00	0.00	0.00
13.50	0.03	486	615.50	0.00	0.00	0.00
14.00	0.02	485	615.50	0.00	0.00	0.00
14.50	0.02	486	615.50	0.00	0.00	0.00
15.00	0.02	485	615.50	0.00	0.00	0.00
15.50	0.02	486	615.50	0.00	0.00	0.00
16.00	0.01	485	615.50	0.00	0.00	0.00
16.50	0.01	486	615.50	0.00	0.00	0.00
17.00	0.01	486	615.50	0.00	0.00	0.00
17.50	0.01	486	615.50	0.00	0.00	0.00
18.00	0.01	486	615.50	0.00	0.00	0.00
18.50	0.01	486	615.50	0.00	0.00	0.00
19.00	0.01	486	615.50	0.00	0.00	0.00
19.50	0.01	486	615.50	0.00	0.00	0.00
20.00	0.01	486	615.50	0.00	0.00	0.00
20.50	0.01	486	615.50	0.00	0.00	0.00
21.00	0.01	486	615.50	0.00	0.00	0.00
21.50	0.01	486	615.50	0.00	0.00	0.00
22.00	0.00	486	615.50	0.00	0.00	0.00
22.50	0.00	486	615.50	0.00	0.00	0.00
23.00	0.00	486	615.50	0.00	0.00	0.00
23.50	0.00	486	615.50	0.00	0.00	0.00
24.00	0.00	486	615.50	0.00	0.00	0.00

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Type III 24-hr 25-Year Rainfall=5.99"

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Summary for Pond P3: LOT 2 DRIVE-RG

Inflow Area = 0.153 ac, 21.39% Impervious, Inflow Depth > 4.18" for 25-Year event
Inflow = 0.56 cfs @ 12.20 hrs, Volume= 0.053 af
Outflow = 0.75 cfs @ 12.25 hrs, Volume= 0.042 af, Atten= 0%, Lag= 3.0 min
Discarded = 0.00 cfs @ 12.25 hrs, Volume= 0.001 af
Primary = 0.75 cfs @ 12.25 hrs, Volume= 0.041 af

Routing by Stor-Ind method, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 622.51'@ 12.25 hrs Surf.Area= 364 sf Storage= 486 cf

Plug-Flow detention time=118.0 min calculated for 0.042 af (79% of inflow)
Center-of-Mass det. time=41.1 min (851.3 - 810.1)

Volume	Invert	Avail.Storage	Storage Description		
#1	614.00'	486 cf	Custom Stage Data (Irregular) listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
614.00	285	80.1	0	0	285
615.50	364	86.0	486	486	432

Device	Routing	Invert	Outlet Devices
#1	Primary	616.00'	Custom Weir/Orifice, Cv= 2.62 (C= 3.28) Head (feet) 0.50 0.51 Width (feet) 6.00 6.00
#2	Discarded	614.00'	0.090 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 1.00'

Discarded OutFlow Max=0.00 cfs @ 12.25 hrs HW=622.51' (Free Discharge)
↑**2=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=0.75 cfs @ 12.25 hrs HW=622.51' (Free Discharge)
↑**1=Custom Weir/Orifice** (Orifice Controls 0.75 cfs @ 12.53 fps)

1902_DRAINAGE-POST

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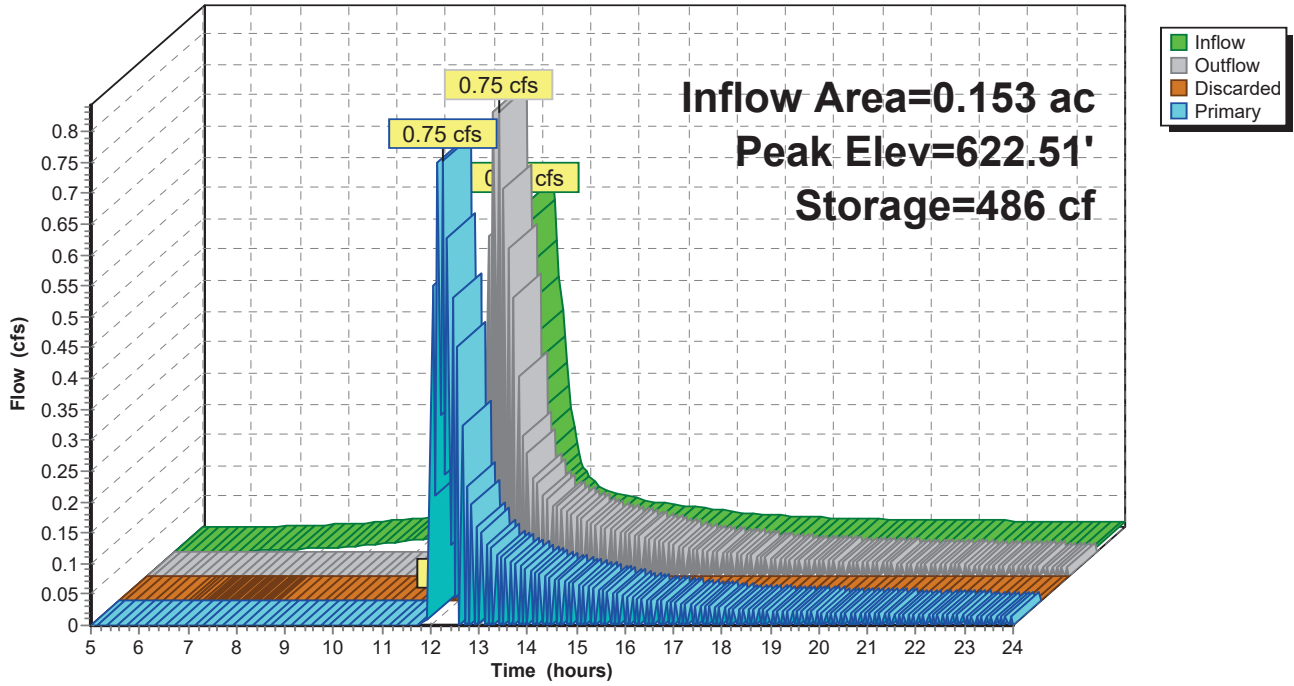
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Pond P3: LOT 2 DRIVE-RG

Hydrograph



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Type III 24-hr 25-Year Rainfall=5.99"

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Hydrograph for Pond P3: LOT 2 DRIVE-RG

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
5.00	0.00	0	614.00	0.00	0.00	0.00
5.50	0.00	0	614.00	0.00	0.00	0.00
6.00	0.00	0	614.00	0.00	0.00	0.00
6.50	0.00	2	614.01	0.00	0.00	0.00
7.00	0.00	5	614.02	0.00	0.00	0.00
7.50	0.00	10	614.03	0.00	0.00	0.00
8.00	0.01	17	614.06	0.00	0.00	0.00
8.50	0.01	28	614.10	0.00	0.00	0.00
9.00	0.01	43	614.15	0.00	0.00	0.00
9.50	0.02	66	614.23	0.00	0.00	0.00
10.00	0.02	96	614.33	0.00	0.00	0.00
10.50	0.03	135	614.46	0.00	0.00	0.00
11.00	0.04	190	614.63	0.00	0.00	0.00
11.50	0.06	269	614.88	0.00	0.00	0.00
12.00	0.26	486	616.03	0.03	0.00	0.03
12.50	0.27	486	616.04	0.05	0.00	0.04
13.00	0.08	486	616.00	0.00	0.00	0.00
13.50	0.06	485	615.50	0.00	0.00	0.00
14.00	0.05	485	615.50	0.00	0.00	0.00
14.50	0.04	486	615.50	0.00	0.00	0.00
15.00	0.03	485	615.50	0.00	0.00	0.00
15.50	0.03	486	615.50	0.00	0.00	0.00
16.00	0.02	485	615.50	0.00	0.00	0.00
16.50	0.02	486	615.50	0.00	0.00	0.00
17.00	0.02	486	615.50	0.00	0.00	0.00
17.50	0.02	486	615.50	0.00	0.00	0.00
18.00	0.01	486	615.50	0.00	0.00	0.00
18.50	0.01	486	615.50	0.00	0.00	0.00
19.00	0.01	486	615.50	0.00	0.00	0.00
19.50	0.01	486	615.50	0.00	0.00	0.00
20.00	0.01	486	615.50	0.00	0.00	0.00
20.50	0.01	486	615.50	0.00	0.00	0.00
21.00	0.01	486	615.50	0.00	0.00	0.00
21.50	0.01	486	615.50	0.00	0.00	0.00
22.00	0.01	486	615.50	0.00	0.00	0.00
22.50	0.01	486	615.50	0.00	0.00	0.00
23.00	0.01	486	615.50	0.00	0.00	0.00
23.50	0.01	486	615.50	0.00	0.00	0.00
24.00	0.01	486	615.50	0.00	0.00	0.00

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Worcester_Apthorp St
Type III 24-hr 100-Year Rainfall=7.64"

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Time span=5.00-24.00 hrs, dt=0.05 hrs, 381 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmenBYP: UncontrolledBypass Runoff Area=17,328 sf 8.22% Impervious Runoff Depth>5.39"
Flow Length=115' Tc=12.5 min CN=81 Runoff=2.00 cfs 0.179 af

SubcatchmenP1-F: Lot 1 Inflow Runoff Area=3,167 sf 27.31% Impervious Runoff Depth>5.86"
Flow Length=89' Tc=6.0 min CN=85 Runoff=0.47 cfs 0.036 af

SubcatchmenP2-F: Lot 2 Inflow Runoff Area=3,506 sf 32.37% Impervious Runoff Depth>5.86"
Flow Length=82' Tc=10.2 min CN=85 Runoff=0.46 cfs 0.039 af

SubcatchmenP3-F: Rear Inflow Runoff Area=6,658 sf 21.39% Impervious Runoff Depth>5.74"
Flow Length=131' Tc=14.7 min CN=84 Runoff=0.76 cfs 0.073 af

ReachDP1: WETLANDS Inflow=3.59 cfs 0.290 af
Outflow=3.59 cfs 0.290 af

Pond P1: LOT 2 DRIVE-RG Peak Elev=618.75' Storage=486 cf Inflow=0.47 cfs 0.036 af
Discarded=0.00 cfs 0.001 af Primary=0.51 cfs 0.023 af Outflow=0.51 cfs 0.024 af

Pond P2: LOT 2 DRIVE-RG Peak Elev=619.41' Storage=486 cf Inflow=0.46 cfs 0.039 af
Discarded=0.00 cfs 0.001 af Primary=0.55 cfs 0.027 af Outflow=0.55 cfs 0.028 af

Pond P3: LOT 2 DRIVE-RG Peak Elev=624.24' Storage=486 cf Inflow=0.76 cfs 0.073 af
Discarded=0.00 cfs 0.001 af Primary=0.85 cfs 0.061 af Outflow=0.85 cfs 0.062 af

Total Runoff Area = 0.704 ac Runoff Volume = 0.327 af Average Runoff Depth = 5.57"
84.19% Pervious = 0.593 ac 15.81% Impervious = 0.111 ac

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Worcester_Apthorp St
Type III 24-hr 100-Year Rainfall=7.64"

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Summary for Subcatchment BYP: Uncontrolled Bypass

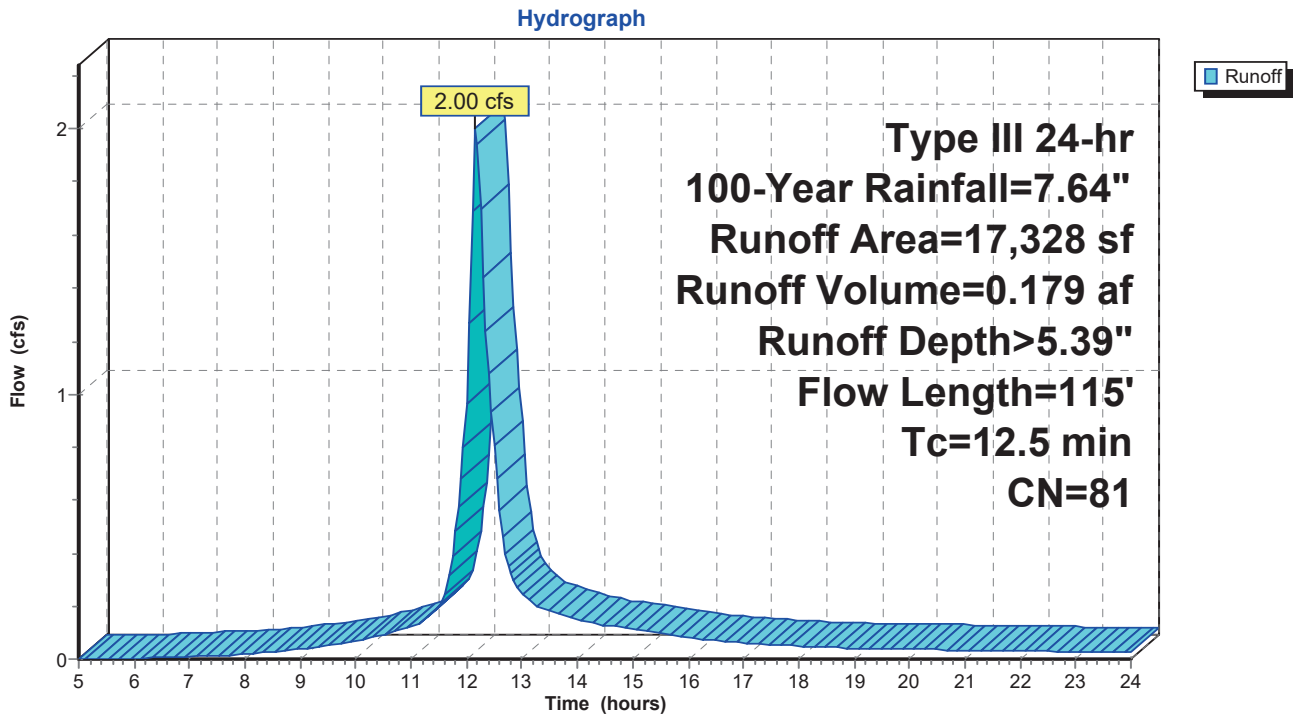
Runoff = 2.00 cfs @ 12.17 hrs, Volume= 0.179 af, Depth> 5.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.64"

Area (sf)	CN	Description
1,424	98	Roofs, HSG D
7,872	79	Woods, Fair, HSG D
8,032	79	Woods/grass comb., Good, HSG D
17,328	81	Weighted Average
15,904		91.78% Pervious Area
1,424		8.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	50	0.0200	0.07		Sheet Flow, A-B Grass: Bermuda n= 0.410 P2= 3.43"
0.3	65	0.0385	3.16		Shallow Concentrated Flow, B-C Unpaved Kv= 16.1 fps
12.5	115	Total			

Subcatchment BYP: Uncontrolled Bypass



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Worcester_Apthorp St

Type III 24-hr 100-Year Rainfall=7.64"

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Hydrograph for Subcatchment BYP: Uncontrolled Bypass

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
5.00	0.43	0.00	0.00	18.25	7.12	4.92	0.05
5.25	0.46	0.00	0.00	18.50	7.15	4.94	0.04
5.50	0.49	0.00	0.00	18.75	7.18	4.97	0.04
5.75	0.52	0.00	0.00	19.00	7.21	5.00	0.04
6.00	0.55	0.00	0.00	19.25	7.23	5.02	0.04
6.25	0.58	0.01	0.00	19.50	7.26	5.05	0.04
6.50	0.62	0.01	0.01	19.75	7.29	5.07	0.04
6.75	0.65	0.01	0.01	20.00	7.31	5.10	0.04
7.00	0.69	0.02	0.01	20.25	7.34	5.12	0.04
7.25	0.73	0.03	0.01	20.50	7.36	5.14	0.04
7.50	0.78	0.04	0.01	20.75	7.38	5.16	0.04
7.75	0.82	0.05	0.02	21.00	7.41	5.18	0.03
8.00	0.87	0.06	0.02	21.25	7.43	5.21	0.03
8.25	0.92	0.07	0.02	21.50	7.45	5.23	0.03
8.50	0.98	0.09	0.03	21.75	7.47	5.25	0.03
8.75	1.04	0.11	0.03	22.00	7.49	5.27	0.03
9.00	1.11	0.14	0.04	22.25	7.51	5.28	0.03
9.25	1.19	0.17	0.05	22.50	7.53	5.30	0.03
9.50	1.27	0.20	0.05	22.75	7.55	5.32	0.03
9.75	1.35	0.24	0.06	23.00	7.57	5.34	0.03
10.00	1.44	0.29	0.07	23.25	7.59	5.36	0.03
10.25	1.54	0.34	0.08	23.50	7.61	5.37	0.03
10.50	1.65	0.40	0.09	23.75	7.62	5.39	0.03
10.75	1.78	0.47	0.11	24.00	7.64	5.40	0.03
11.00	1.91	0.55	0.12				
11.25	2.07	0.65	0.15				
11.50	2.28	0.79	0.20				
11.75	2.71	1.10	0.39				
12.00	3.82	1.97	0.96				
12.25	4.93	2.92	1.70				
12.50	5.36	3.31	0.80				
12.75	5.57	3.49	0.35				
13.00	5.73	3.64	0.25				
13.25	5.86	3.76	0.20				
13.50	5.99	3.87	0.18				
13.75	6.10	3.97	0.17				
14.00	6.20	4.06	0.15				
14.25	6.29	4.15	0.14				
14.50	6.37	4.22	0.13				
14.75	6.45	4.30	0.12				
15.00	6.53	4.37	0.11				
15.25	6.60	4.43	0.10				
15.50	6.66	4.49	0.10				
15.75	6.72	4.54	0.09				
16.00	6.77	4.59	0.08				
16.25	6.82	4.64	0.07				
16.50	6.86	4.68	0.07				
16.75	6.91	4.72	0.07				
17.00	6.95	4.76	0.06				
17.25	6.99	4.79	0.06				
17.50	7.02	4.83	0.06				
17.75	7.06	4.86	0.05				
18.00	7.09	4.89	0.05				

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Worcester_Apthorp St
Type III 24-hr 100-Year Rainfall=7.64"

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Summary for Subcatchment P1-F: Lot 1 Inflow

Runoff = 0.47 cfs @ 12.09 hrs, Volume= 0.036 af, Depth> 5.86"

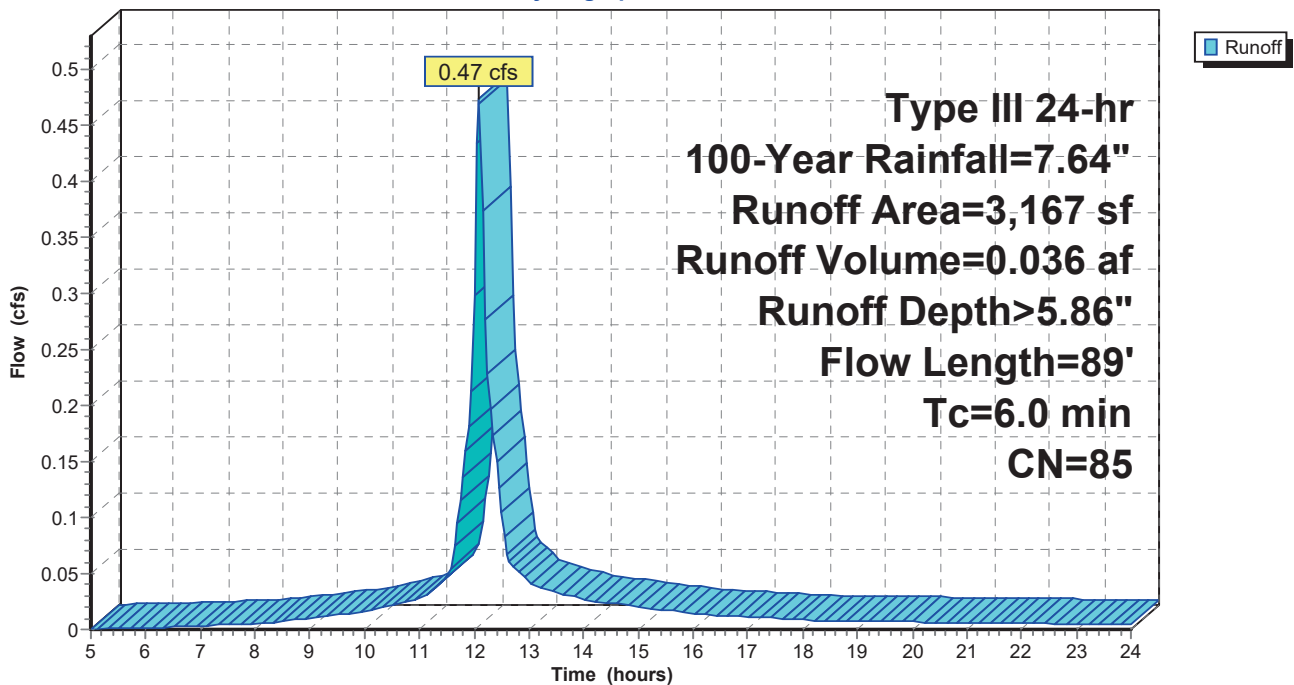
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.64"

Area (sf)	CN	Description
865	98	Paved parking, HSG D
2,302	80	>75% Grass cover, Good, HSG D
3,167	85	Weighted Average
2,302		72.69% Pervious Area
865		27.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.5	21	0.0425	0.08		Sheet Flow, A-B Grass: Bermuda n= 0.410 P2= 3.43"
0.9	29	0.0034	0.55		Sheet Flow, B-C Smooth surfaces n= 0.011 P2= 3.43"
0.6	39	0.0051	1.15		Shallow Concentrated Flow, C-D Unpaved Kv= 16.1 fps
6.0	89	Total			

Subcatchment P1-F: Lot 1 Inflow

Hydrograph



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Worcester_Apthorp St

Type III 24-hr 100-Year Rainfall=7.64"

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Hydrograph for Subcatchment P1-F: Lot 1 Inflow

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
5.00	0.43	0.00	0.00	18.25	7.12	5.37	0.01
5.25	0.46	0.01	0.00	18.50	7.15	5.40	0.01
5.50	0.49	0.01	0.00	18.75	7.18	5.42	0.01
5.75	0.52	0.01	0.00	19.00	7.21	5.45	0.01
6.00	0.55	0.02	0.00	19.25	7.23	5.48	0.01
6.25	0.58	0.03	0.00	19.50	7.26	5.50	0.01
6.50	0.62	0.03	0.00	19.75	7.29	5.53	0.01
6.75	0.65	0.04	0.00	20.00	7.31	5.55	0.01
7.00	0.69	0.05	0.00	20.25	7.34	5.57	0.01
7.25	0.73	0.07	0.00	20.50	7.36	5.60	0.01
7.50	0.78	0.08	0.00	20.75	7.38	5.62	0.01
7.75	0.82	0.10	0.00	21.00	7.41	5.64	0.01
8.00	0.87	0.12	0.01	21.25	7.43	5.66	0.01
8.25	0.92	0.14	0.01	21.50	7.45	5.68	0.01
8.50	0.98	0.16	0.01	21.75	7.47	5.71	0.01
8.75	1.04	0.19	0.01	22.00	7.49	5.73	0.01
9.00	1.11	0.23	0.01	22.25	7.51	5.74	0.01
9.25	1.19	0.27	0.01	22.50	7.53	5.76	0.01
9.50	1.27	0.31	0.01	22.75	7.55	5.78	0.01
9.75	1.35	0.36	0.01	23.00	7.57	5.80	0.01
10.00	1.44	0.42	0.02	23.25	7.59	5.82	0.01
10.25	1.54	0.48	0.02	23.50	7.61	5.83	0.00
10.50	1.65	0.55	0.02	23.75	7.62	5.85	0.00
10.75	1.78	0.64	0.02	24.00	7.64	5.87	0.00
11.00	1.91	0.73	0.03				
11.25	2.07	0.85	0.04				
11.50	2.28	1.00	0.05				
11.75	2.71	1.35	0.12				
12.00	3.82	2.30	0.30				
12.25	4.93	3.30	0.23				
12.50	5.36	3.71	0.10				
12.75	5.57	3.90	0.05				
13.00	5.73	4.05	0.04				
13.25	5.86	4.17	0.04				
13.50	5.99	4.29	0.03				
13.75	6.10	4.39	0.03				
14.00	6.20	4.49	0.03				
14.25	6.29	4.57	0.03				
14.50	6.37	4.65	0.02				
14.75	6.45	4.73	0.02				
15.00	6.53	4.80	0.02				
15.25	6.60	4.87	0.02				
15.50	6.66	4.93	0.02				
15.75	6.72	4.98	0.02				
16.00	6.77	5.03	0.01				
16.25	6.82	5.08	0.01				
16.50	6.86	5.12	0.01				
16.75	6.91	5.16	0.01				
17.00	6.95	5.20	0.01				
17.25	6.99	5.24	0.01				
17.50	7.02	5.28	0.01				
17.75	7.06	5.31	0.01				
18.00	7.09	5.34	0.01				

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Worcester_Apthorp St

Type III 24-hr 100-Year Rainfall=7.64"

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Summary for Subcatchment P2-F: Lot 2 Inflow

Runoff = 0.46 cfs @ 12.14 hrs, Volume= 0.039 af, Depth> 5.86"

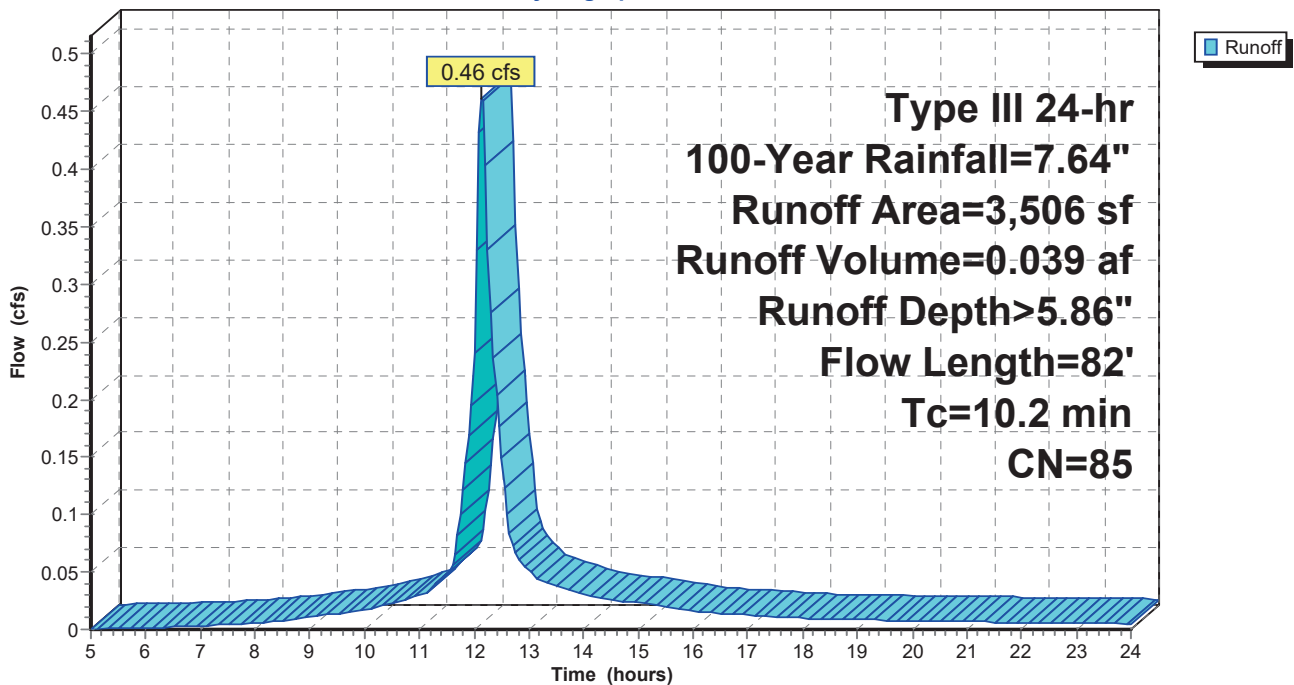
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.64"

Area (sf)	CN	Description
1,135	98	Paved parking, HSG D
2,371	79	Woods, Fair, HSG D
3,506	85	Weighted Average
2,371		67.63% Pervious Area
1,135		32.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0	48	0.0300	0.08		Sheet Flow, A-B
					Grass: Bermuda n= 0.410 P2= 3.43"
0.0	10	0.0386	3.99		Shallow Concentrated Flow, B-C
					Paved Kv= 20.3 fps
0.2	24	0.0208	2.32		Shallow Concentrated Flow,
					Unpaved Kv= 16.1 fps
10.2	82	Total			

Subcatchment P2-F: Lot 2 Inflow

Hydrograph



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Type III 24-hr 100-Year Rainfall=7.64"

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Hydrograph for Subcatchment P2-F: Lot 2 Inflow

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
5.00	0.43	0.00	0.00	18.25	7.12	5.37	0.01
5.25	0.46	0.01	0.00	18.50	7.15	5.40	0.01
5.50	0.49	0.01	0.00	18.75	7.18	5.42	0.01
5.75	0.52	0.01	0.00	19.00	7.21	5.45	0.01
6.00	0.55	0.02	0.00	19.25	7.23	5.48	0.01
6.25	0.58	0.03	0.00	19.50	7.26	5.50	0.01
6.50	0.62	0.03	0.00	19.75	7.29	5.53	0.01
6.75	0.65	0.04	0.00	20.00	7.31	5.55	0.01
7.00	0.69	0.05	0.00	20.25	7.34	5.57	0.01
7.25	0.73	0.07	0.00	20.50	7.36	5.60	0.01
7.50	0.78	0.08	0.00	20.75	7.38	5.62	0.01
7.75	0.82	0.10	0.01	21.00	7.41	5.64	0.01
8.00	0.87	0.12	0.01	21.25	7.43	5.66	0.01
8.25	0.92	0.14	0.01	21.50	7.45	5.68	0.01
8.50	0.98	0.16	0.01	21.75	7.47	5.71	0.01
8.75	1.04	0.19	0.01	22.00	7.49	5.73	0.01
9.00	1.11	0.23	0.01	22.25	7.51	5.74	0.01
9.25	1.19	0.27	0.01	22.50	7.53	5.76	0.01
9.50	1.27	0.31	0.01	22.75	7.55	5.78	0.01
9.75	1.35	0.36	0.02	23.00	7.57	5.80	0.01
10.00	1.44	0.42	0.02	23.25	7.59	5.82	0.01
10.25	1.54	0.48	0.02	23.50	7.61	5.83	0.01
10.50	1.65	0.55	0.02	23.75	7.62	5.85	0.01
10.75	1.78	0.64	0.03	24.00	7.64	5.87	0.01
11.00	1.91	0.73	0.03				
11.25	2.07	0.85	0.04				
11.50	2.28	1.00	0.05				
11.75	2.71	1.35	0.10				
12.00	3.82	2.30	0.24				
12.25	4.93	3.30	0.33				
12.50	5.36	3.71	0.15				
12.75	5.57	3.90	0.07				
13.00	5.73	4.05	0.05				
13.25	5.86	4.17	0.04				
13.50	5.99	4.29	0.04				
13.75	6.10	4.39	0.03				
14.00	6.20	4.49	0.03				
14.25	6.29	4.57	0.03				
14.50	6.37	4.65	0.03				
14.75	6.45	4.73	0.02				
15.00	6.53	4.80	0.02				
15.25	6.60	4.87	0.02				
15.50	6.66	4.93	0.02				
15.75	6.72	4.98	0.02				
16.00	6.77	5.03	0.02				
16.25	6.82	5.08	0.02				
16.50	6.86	5.12	0.01				
16.75	6.91	5.16	0.01				
17.00	6.95	5.20	0.01				
17.25	6.99	5.24	0.01				
17.50	7.02	5.28	0.01				
17.75	7.06	5.31	0.01				
18.00	7.09	5.34	0.01				

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Type III 24-hr 100-Year Rainfall=7.64"

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Summary for Subcatchment P3-F: Rear Inflow

Runoff = 0.76 cfs @ 12.20 hrs, Volume= 0.073 af, Depth> 5.74"

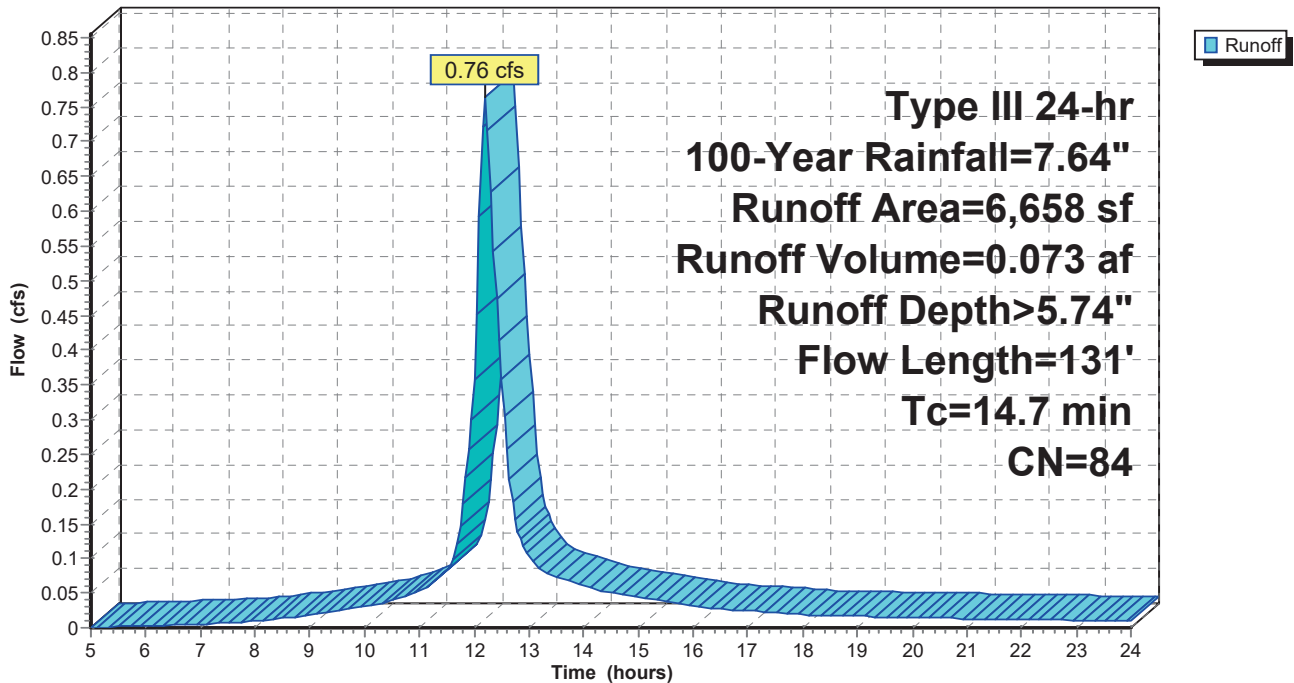
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.64"

Area (sf)	CN	Description
1,424	98	Roofs, HSG D
5,234	80	>75% Grass cover, Good, HSG D
6,658	84	Weighted Average
5,234		78.61% Pervious Area
1,424		21.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.0	50	0.0140	0.06		Sheet Flow, A-B
					Grass: Bermuda n= 0.410 P2= 3.43"
0.7	81	0.0148	1.96		Shallow Concentrated Flow, B-C
					Unpaved Kv= 16.1 fps
14.7	131	Total			

Subcatchment P3-F: Rear Inflow

Hydrograph



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Worcester_Apthorp St

Type III 24-hr 100-Year Rainfall=7.64"

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Hydrograph for Subcatchment P3-F: Rear Inflow

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
5.00	0.43	0.00	0.00	18.25	7.12	5.25	0.02
5.25	0.46	0.00	0.00	18.50	7.15	5.28	0.02
5.50	0.49	0.01	0.00	18.75	7.18	5.31	0.02
5.75	0.52	0.01	0.00	19.00	7.21	5.34	0.02
6.00	0.55	0.01	0.00	19.25	7.23	5.36	0.02
6.25	0.58	0.02	0.00	19.50	7.26	5.39	0.02
6.50	0.62	0.03	0.00	19.75	7.29	5.41	0.02
6.75	0.65	0.03	0.00	20.00	7.31	5.44	0.01
7.00	0.69	0.04	0.01	20.25	7.34	5.46	0.01
7.25	0.73	0.05	0.01	20.50	7.36	5.48	0.01
7.50	0.78	0.07	0.01	20.75	7.38	5.51	0.01
7.75	0.82	0.08	0.01	21.00	7.41	5.53	0.01
8.00	0.87	0.10	0.01	21.25	7.43	5.55	0.01
8.25	0.92	0.12	0.01	21.50	7.45	5.57	0.01
8.50	0.98	0.14	0.01	21.75	7.47	5.59	0.01
8.75	1.04	0.17	0.02	22.00	7.49	5.61	0.01
9.00	1.11	0.20	0.02	22.25	7.51	5.63	0.01
9.25	1.19	0.24	0.02	22.50	7.53	5.65	0.01
9.50	1.27	0.28	0.02	22.75	7.55	5.67	0.01
9.75	1.35	0.33	0.03	23.00	7.57	5.68	0.01
10.00	1.44	0.38	0.03	23.25	7.59	5.70	0.01
10.25	1.54	0.44	0.03	23.50	7.61	5.72	0.01
10.50	1.65	0.51	0.04	23.75	7.62	5.73	0.01
10.75	1.78	0.59	0.05	24.00	7.64	5.75	0.01
11.00	1.91	0.68	0.05				
11.25	2.07	0.79	0.06				
11.50	2.28	0.95	0.08				
11.75	2.71	1.28	0.15				
12.00	3.82	2.21	0.36				
12.25	4.93	3.20	0.72				
12.50	5.36	3.60	0.36				
12.75	5.57	3.79	0.16				
13.00	5.73	3.94	0.10				
13.25	5.86	4.07	0.08				
13.50	5.99	4.18	0.07				
13.75	6.10	4.29	0.07				
14.00	6.20	4.38	0.06				
14.25	6.29	4.47	0.05				
14.50	6.37	4.55	0.05				
14.75	6.45	4.62	0.05				
15.00	6.53	4.69	0.04				
15.25	6.60	4.76	0.04				
15.50	6.66	4.82	0.04				
15.75	6.72	4.87	0.04				
16.00	6.77	4.92	0.03				
16.25	6.82	4.97	0.03				
16.50	6.86	5.01	0.03				
16.75	6.91	5.05	0.03				
17.00	6.95	5.09	0.02				
17.25	6.99	5.13	0.02				
17.50	7.02	5.16	0.02				
17.75	7.06	5.20	0.02				
18.00	7.09	5.23	0.02				

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Worcester_Apthorp St
Type III 24-hr 100-Year Rainfall=7.64"

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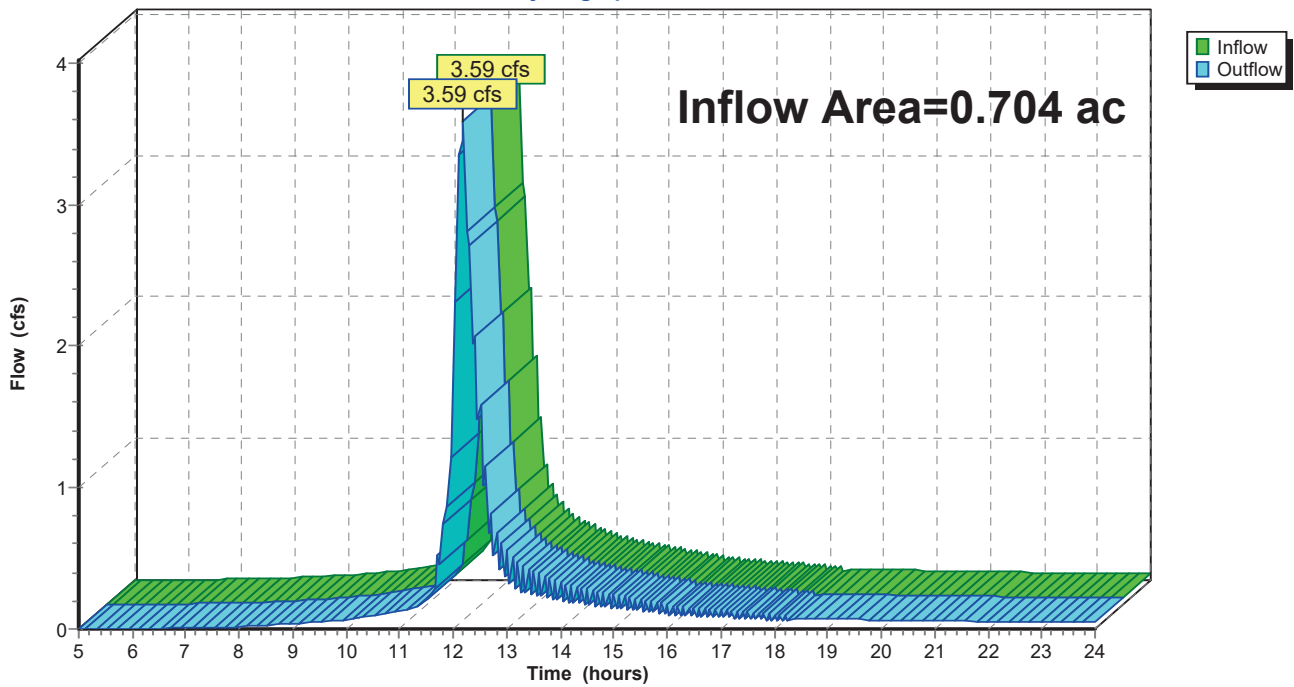
Summary for Reach DP1: WETLANDS

Inflow Area = 0.704 ac, 15.81% Impervious, Inflow Depth > 4.95" for 100-Year event
Inflow = 3.59 cfs @ 12.19 hrs, Volume= 0.290 af
Outflow = 3.59 cfs @ 12.19 hrs, Volume= 0.290 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs

Reach DP1: WETLANDS

Hydrograph



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Hydrograph for Reach DP1: WETLANDS

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)
5.00	0.00		0.00	18.25	0.06		0.06
5.25	0.00		0.00	18.50	0.09		0.09
5.50	0.00		0.00	18.75	0.06		0.06
5.75	0.00		0.00	19.00	0.09		0.09
6.00	0.00		0.00	19.25	0.06		0.06
6.25	0.00		0.00	19.50	0.09		0.09
6.50	0.01		0.01	19.75	0.05		0.05
6.75	0.01		0.01	20.00	0.08		0.08
7.00	0.01		0.01	20.25	0.05		0.05
7.25	0.01		0.01	20.50	0.08		0.08
7.50	0.01		0.01	20.75	0.05		0.05
7.75	0.02		0.02	21.00	0.07		0.07
8.00	0.02		0.02	21.25	0.04		0.04
8.25	0.02		0.02	21.50	0.07		0.07
8.50	0.03		0.03	21.75	0.04		0.04
8.75	0.03		0.03	22.00	0.07		0.07
9.00	0.04		0.04	22.25	0.04		0.04
9.25	0.05		0.05	22.50	0.06		0.06
9.50	0.05		0.05	22.75	0.04		0.04
9.75	0.06		0.06	23.00	0.06		0.06
10.00	0.07		0.07	23.25	0.04		0.04
10.25	0.08		0.08	23.50	0.06		0.06
10.50	0.09		0.09	23.75	0.03		0.03
10.75	0.11		0.11	24.00	0.05		0.05
11.00	0.12		0.12				
11.25	0.15		0.15				
11.50	0.20		0.20				
11.75	0.45		0.45				
12.00	1.40		1.40				
12.25	2.80		2.80				
12.50	1.58		1.58				
12.75	0.52		0.52				
13.00	0.55		0.55				
13.25	0.27		0.27				
13.50	0.41		0.41				
13.75	0.22		0.22				
14.00	0.33		0.33				
14.25	0.18		0.18				
14.50	0.28		0.28				
14.75	0.16		0.16				
15.00	0.24		0.24				
15.25	0.14		0.14				
15.50	0.21		0.21				
15.75	0.12		0.12				
16.00	0.17		0.17				
16.25	0.10		0.10				
16.50	0.15		0.15				
16.75	0.09		0.09				
17.00	0.13		0.13				
17.25	0.08		0.08				
17.50	0.12		0.12				
17.75	0.07		0.07				
18.00	0.10		0.10				

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Worcester_Apthorp St

Type III 24-hr 100-Year Rainfall=7.64"

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Summary for Pond P1: LOT 2 DRIVE-RG

Inflow Area = 0.073 ac, 27.31% Impervious, Inflow Depth > 5.86" for 100-Year event
 Inflow = 0.47 cfs @ 12.09 hrs, Volume= 0.036 af
 Outflow = 0.51 cfs @ 12.07 hrs, Volume= 0.024 af, Atten= 0%, Lag= 0.0 min
 Discarded = 0.00 cfs @ 12.05 hrs, Volume= 0.001 af
 Primary = 0.51 cfs @ 12.07 hrs, Volume= 0.023 af

Routing by Stor-Ind method, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 618.75' @ 12.07 hrs Surf.Area= 364 sf Storage= 486 cf

Plug-Flow detention time=155.7 min calculated for 0.024 af (69% of inflow)
 Center-of-Mass det. time=62.1 min (853.9 - 791.8)

Volume	Invert	Avail.Storage	Storage Description			
#1	614.00'	486 cf	Custom Stage Data (Irregular) listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
614.00	285	80.1	0	0	285	
615.50	364	86.0	486	486	432	

Device	Routing	Invert	Outlet Devices	
#1	Primary	616.00'	Custom Weir/Orifice, Cv= 2.62 (C= 3.28) Head (feet) 0.50 0.51 Width (feet) 6.00 6.00	
#2	Discarded	614.00'	0.090 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 1.00'	

Discarded OutFlow Max=0.00 cfs @ 12.05 hrs HW=618.45' (Free Discharge)
 ↑2=Exfiltration (Controls 0.00 cfs)

Primary OutFlow Max=0.45 cfs @ 12.07 hrs HW=618.35' (Free Discharge)
 ↑1=Custom Weir/Orifice (Orifice Controls 0.45 cfs @ 7.53 fps)

1902_DRAINAGE-POST

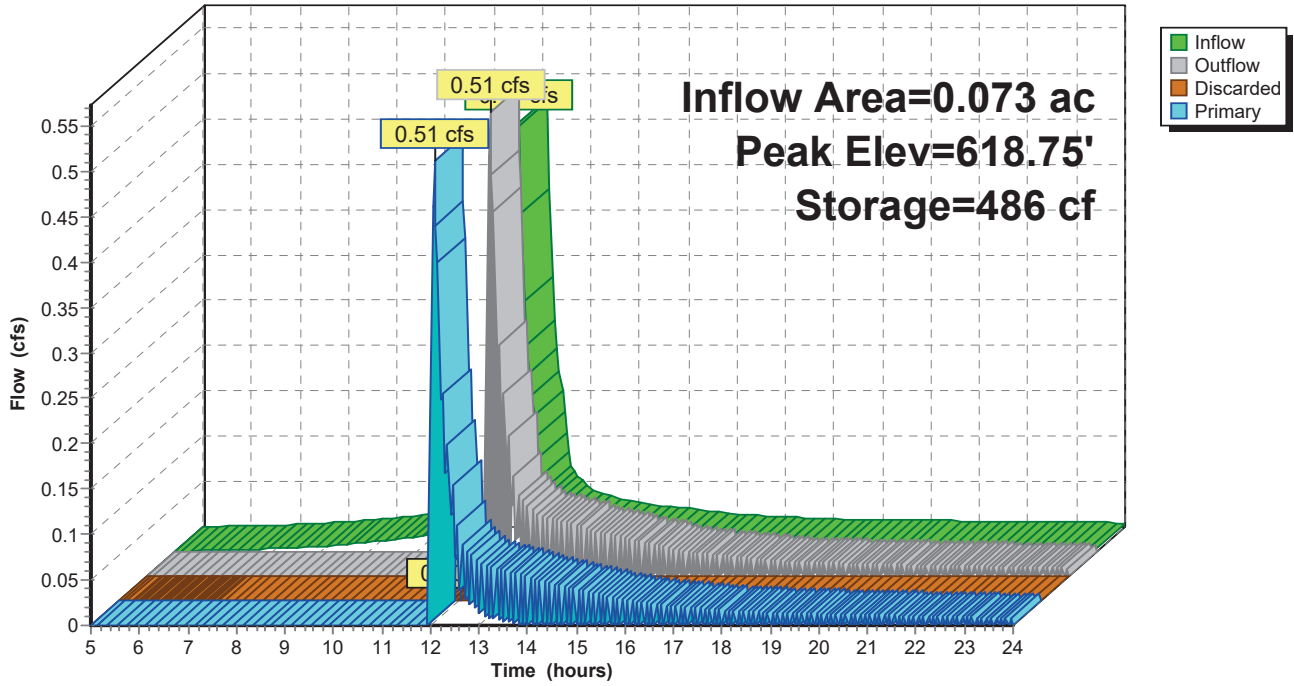
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Type III 24-hr 100-Year Rainfall=7.64"

Pond P1: LOT 2 DRIVE-RG

Hydrograph



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Type III 24-hr 100-Year Rainfall=7.64"

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Hydrograph for Pond P1: LOT 2 DRIVE-RG

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
5.00	0.00	0	614.00	0.00	0.00	0.00
5.50	0.00	2	614.01	0.00	0.00	0.00
6.00	0.00	4	614.01	0.00	0.00	0.00
6.50	0.00	7	614.02	0.00	0.00	0.00
7.00	0.00	11	614.04	0.00	0.00	0.00
7.50	0.00	17	614.06	0.00	0.00	0.00
8.00	0.01	25	614.09	0.00	0.00	0.00
8.50	0.01	35	614.12	0.00	0.00	0.00
9.00	0.01	50	614.17	0.00	0.00	0.00
9.50	0.01	70	614.24	0.00	0.00	0.00
10.00	0.02	96	614.33	0.00	0.00	0.00
10.50	0.02	128	614.43	0.00	0.00	0.00
11.00	0.03	172	614.57	0.00	0.00	0.00
11.50	0.05	236	614.78	0.00	0.00	0.00
12.00	0.30	461	615.43	0.00	0.00	0.00
12.50	0.10	486	616.07	0.08	0.00	0.08
13.00	0.04	486	616.01	0.01	0.00	0.01
13.50	0.03	486	616.00	0.01	0.00	0.00
14.00	0.03	485	615.50	0.00	0.00	0.00
14.50	0.02	486	615.50	0.00	0.00	0.00
15.00	0.02	485	615.50	0.00	0.00	0.00
15.50	0.02	486	615.50	0.00	0.00	0.00
16.00	0.01	485	615.50	0.00	0.00	0.00
16.50	0.01	486	615.50	0.00	0.00	0.00
17.00	0.01	486	615.50	0.00	0.00	0.00
17.50	0.01	486	615.50	0.00	0.00	0.00
18.00	0.01	486	615.50	0.00	0.00	0.00
18.50	0.01	486	615.50	0.00	0.00	0.00
19.00	0.01	486	615.50	0.00	0.00	0.00
19.50	0.01	486	615.50	0.00	0.00	0.00
20.00	0.01	486	615.50	0.00	0.00	0.00
20.50	0.01	486	615.50	0.00	0.00	0.00
21.00	0.01	486	615.50	0.00	0.00	0.00
21.50	0.01	486	615.50	0.00	0.00	0.00
22.00	0.01	486	615.50	0.00	0.00	0.00
22.50	0.01	486	615.50	0.00	0.00	0.00
23.00	0.01	486	615.50	0.00	0.00	0.00
23.50	0.00	486	615.50	0.00	0.00	0.00
24.00	0.00	486	615.50	0.00	0.00	0.00

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Summary for Pond P2: LOT 2 DRIVE-RG

Inflow Area = 0.080 ac, 32.37% Impervious, Inflow Depth > 5.86" for 100-Year event
 Inflow = 0.46 cfs @ 12.14 hrs, Volume= 0.039 af
 Outflow = 0.55 cfs @ 12.11 hrs, Volume= 0.028 af, Atten= 0%, Lag= 0.0 min
 Discarded = 0.00 cfs @ 12.10 hrs, Volume= 0.001 af
 Primary = 0.55 cfs @ 12.11 hrs, Volume= 0.027 af

Routing by Stor-Ind method, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 619.41'@ 12.10 hrs Surf.Area= 364 sf Storage= 486 cf

Plug-Flow detention time=146.1 min calculated for 0.028 af (72% of inflow)
 Center-of-Mass det. time=56.9 min (852.1 - 795.2)

Volume	Invert	Avail.Storage	Storage Description			
#1	614.00'	486 cf	Custom Stage Data (Irregular) listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
614.00	285	80.1	0	0	285	
615.50	364	86.0	486	486	432	

Device	Routing	Invert	Outlet Devices
#1	Primary	616.00'	Custom Weir/Orifice, Cv= 2.62 (C= 3.28) Head (feet) 0.50 0.51 Width (feet) 6.00 6.00
#2	Discarded	614.00'	0.090 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 1.00'

Discarded OutFlow Max=0.00 cfs @ 12.10 hrs HW=619.39' (Free Discharge)
 ↑2=Exfiltration (Controls 0.00 cfs)

Primary OutFlow Max=0.52 cfs @ 12.11 hrs HW=619.14' (Free Discharge)
 ↑1=Custom Weir/Orifice(Orifice Controls 0.52 cfs @ 8.70 fps)

1902_DRAINAGE-POST

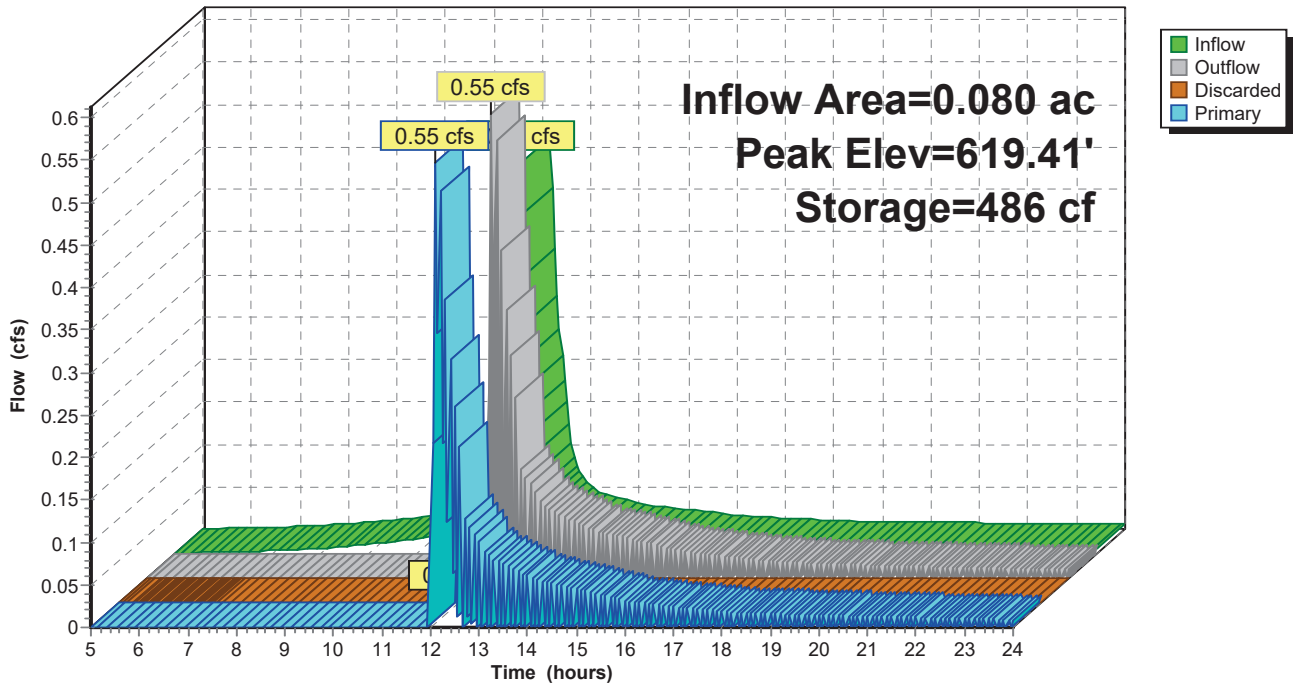
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Type III 24-hr 100-Year Rainfall=7.64"

Pond P2: LOT 2 DRIVE-RG

Hydrograph



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Type III 24-hr 100-Year Rainfall=7.64"

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Hydrograph for Pond P2: LOT 2 DRIVE-RG

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
5.00	0.00	0	614.00	0.00	0.00	0.00
5.50	0.00	2	614.01	0.00	0.00	0.00
6.00	0.00	4	614.01	0.00	0.00	0.00
6.50	0.00	7	614.02	0.00	0.00	0.00
7.00	0.00	12	614.04	0.00	0.00	0.00
7.50	0.00	18	614.06	0.00	0.00	0.00
8.00	0.01	26	614.09	0.00	0.00	0.00
8.50	0.01	38	614.13	0.00	0.00	0.00
9.00	0.01	54	614.19	0.00	0.00	0.00
9.50	0.01	75	614.26	0.00	0.00	0.00
10.00	0.02	103	614.35	0.00	0.00	0.00
10.50	0.02	138	614.46	0.00	0.00	0.00
11.00	0.03	184	614.61	0.00	0.00	0.00
11.50	0.05	251	614.82	0.00	0.00	0.00
12.00	0.24	454	615.41	0.00	0.00	0.00
12.50	0.15	486	616.79	0.26	0.00	0.26
13.00	0.05	486	616.12	0.10	0.00	0.10
13.50	0.04	486	616.07	0.07	0.00	0.07
14.00	0.03	486	616.05	0.06	0.00	0.06
14.50	0.03	486	616.04	0.05	0.00	0.05
15.00	0.02	486	616.03	0.05	0.00	0.05
15.50	0.02	486	616.03	0.04	0.00	0.04
16.00	0.02	486	616.02	0.03	0.00	0.03
16.50	0.01	486	616.02	0.03	0.00	0.03
17.00	0.01	486	616.01	0.03	0.00	0.02
17.50	0.01	486	616.01	0.02	0.00	0.02
18.00	0.01	486	616.01	0.02	0.00	0.02
18.50	0.01	486	616.01	0.02	0.00	0.02
19.00	0.01	486	616.01	0.02	0.00	0.02
19.50	0.01	486	616.01	0.02	0.00	0.02
20.00	0.01	486	616.01	0.02	0.00	0.01
20.50	0.01	486	616.01	0.01	0.00	0.01
21.00	0.01	486	616.01	0.01	0.00	0.01
21.50	0.01	486	616.01	0.01	0.00	0.01
22.00	0.01	486	616.01	0.01	0.00	0.01
22.50	0.01	486	616.01	0.01	0.00	0.01
23.00	0.01	486	616.01	0.01	0.00	0.01
23.50	0.01	486	616.00	0.01	0.00	0.01
24.00	0.01	486	616.00	0.01	0.00	0.01

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Summary for Pond P3: LOT 2 DRIVE-RG

Inflow Area = 0.153 ac, 21.39% Impervious, Inflow Depth > 5.74" for 100-Year event
Inflow = 0.76 cfs @ 12.20 hrs, Volume= 0.073 af
Outflow = 0.85 cfs @ 12.20 hrs, Volume= 0.062 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 12.20 hrs, Volume= 0.001 af
Primary = 0.85 cfs @ 12.20 hrs, Volume= 0.061 af

Routing by Stor-Ind method, Time Span= 5.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 624.24' @ 12.20 hrs Surf.Area= 364 sf Storage= 486 cf

Plug-Flow detention time=98.4 min calculated for 0.062 af (85% of inflow)
Center-of-Mass det. time=35.0 min (836.3 - 801.4)

Volume	Invert	Avail.Storage	Storage Description		
#1	614.00'	486 cf	Custom Stage Data (Irregular) listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
614.00	285	80.1	0	0	285
615.50	364	86.0	486	486	432

Device	Routing	Invert	Outlet Devices
#1	Primary	616.00'	Custom Weir/Orifice, Cv= 2.62 (C= 3.28) Head (feet) 0.50 0.51 Width (feet) 6.00 6.00
#2	Discarded	614.00'	0.090 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 1.00'

Discarded OutFlow Max=0.00 cfs @ 12.20 hrs HW=624.23' (Free Discharge)
↑**2=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=0.85 cfs @ 12.20 hrs HW=624.23' (Free Discharge)
↑**1=Custom Weir/Orifice** (Orifice Controls 0.85 cfs @ 14.09 fps)

1902_DRAINAGE-POST

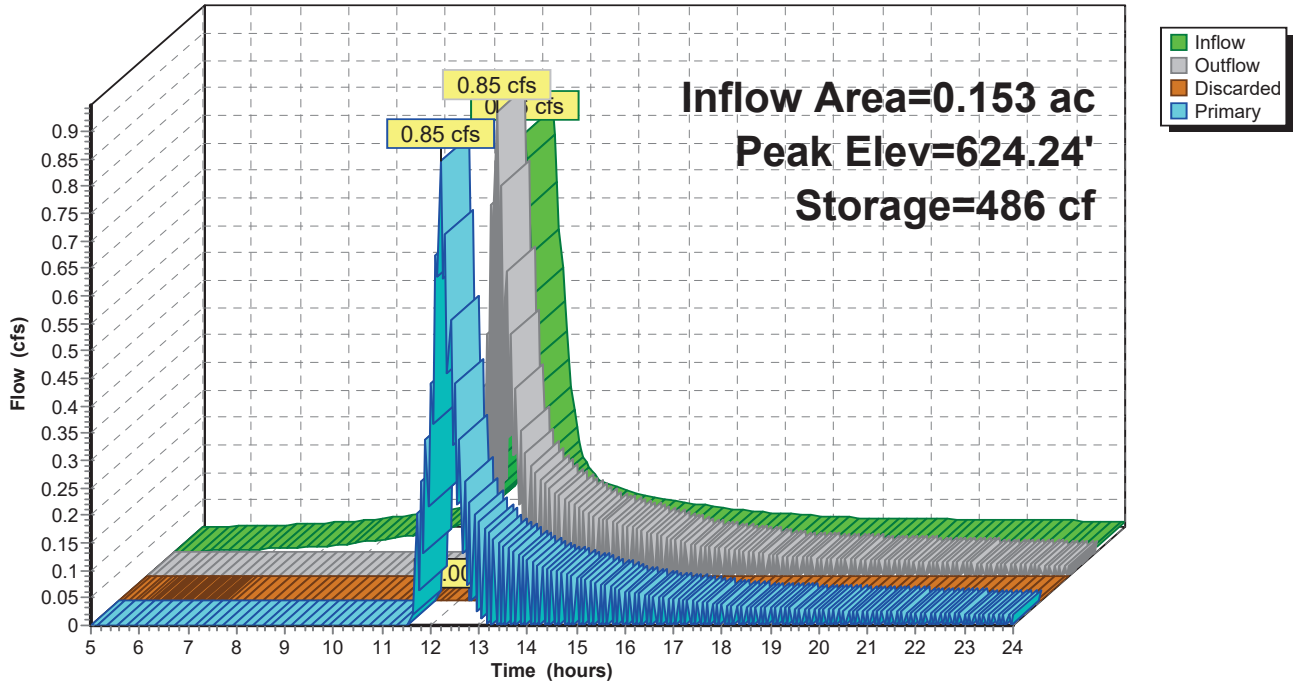
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Type III 24-hr 100-Year Rainfall=7.64"

Pond P3: LOT 2 DRIVE-RG

Hydrograph



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Type III 24-hr 100-Year Rainfall=7.64"

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Hydrograph for Pond P3: LOT 2 DRIVE-RG

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
5.00	0.00	0	614.00	0.00	0.00	0.00
5.50	0.00	2	614.01	0.00	0.00	0.00
6.00	0.00	5	614.02	0.00	0.00	0.00
6.50	0.00	10	614.04	0.00	0.00	0.00
7.00	0.01	18	614.06	0.00	0.00	0.00
7.50	0.01	29	614.10	0.00	0.00	0.00
8.00	0.01	44	614.15	0.00	0.00	0.00
8.50	0.01	63	614.22	0.00	0.00	0.00
9.00	0.02	91	614.31	0.00	0.00	0.00
9.50	0.02	129	614.43	0.00	0.00	0.00
10.00	0.03	177	614.59	0.00	0.00	0.00
10.50	0.04	239	614.78	0.00	0.00	0.00
11.00	0.05	322	615.03	0.00	0.00	0.00
11.50	0.08	438	615.37	0.00	0.00	0.00
12.00	0.36	486	618.24	0.44	0.00	0.44
12.50	0.36	486	618.23	0.44	0.00	0.44
13.00	0.10	486	616.41	0.19	0.00	0.19
13.50	0.07	486	616.25	0.15	0.00	0.14
14.00	0.06	486	616.17	0.12	0.00	0.12
14.50	0.05	486	616.12	0.10	0.00	0.10
15.00	0.04	486	616.09	0.09	0.00	0.09
15.50	0.04	486	616.08	0.08	0.00	0.07
16.00	0.03	486	616.06	0.06	0.00	0.06
16.50	0.03	486	616.05	0.05	0.00	0.05
17.00	0.02	486	616.04	0.05	0.00	0.05
17.50	0.02	486	616.04	0.04	0.00	0.04
18.00	0.02	486	616.03	0.04	0.00	0.04
18.50	0.02	486	616.03	0.03	0.00	0.03
19.00	0.02	486	616.02	0.03	0.00	0.03
19.50	0.02	486	616.02	0.03	0.00	0.03
20.00	0.01	486	616.02	0.03	0.00	0.03
20.50	0.01	486	616.02	0.03	0.00	0.03
21.00	0.01	486	616.02	0.03	0.00	0.03
21.50	0.01	486	616.02	0.03	0.00	0.02
22.00	0.01	486	616.01	0.02	0.00	0.02
22.50	0.01	486	616.01	0.02	0.00	0.02
23.00	0.01	486	616.01	0.02	0.00	0.02
23.50	0.01	486	616.01	0.02	0.00	0.02
24.00	0.01	486	616.01	0.02	0.00	0.02

APPENDIX B

Stormwater Recharge Volume Calculations

Site is comprised entirely of Hydrologic Soil Group D (HSG 'D') soils and is exempt from the groundwater recharge calculations per the State of Massachusetts Stormwater Management Standards.

INSTRUCTIONS:

Version 1, Automated: Mar. 4, 2008

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

Location: 10 & 16 Apthorp Street, Worcester

	B	C	D	E	F
	BMP ¹	TSS Removal Rate ¹	Starting TSS Load*	Amount Removed (C*D)	Remaining Load (D-E)
TSS Removal Calculation Worksheet	Bioretention Area	0.90	1.00	0.90	0.10
		0.00	0.10	0.00	0.10
		0.00	0.10	0.00	0.10
		0.00	0.10	0.00	0.10
		0.00	0.10	0.00	0.10

Total TSS Removal =

90%

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

Project: 1902
 Prepared By: Zachary Gless
 Date: 2/15/2024

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

Water Quality Volume Calculations

Subcatchment P1

Area Impervious $A_i = 3,424$ sf (0.0786 ac)

Roofs: 0.0327 Acres

Paved Parking/Driveways: 0.0459 Acres

TOTAL: 0.0786 Acres

$WQV_{req} = 1.0'' \times A_i = 1.0'' \times 1\text{ft}/12'' \times 3,424$ sf = 285.33 cf

$WQV_{req} = 285$ cf

$WQV_{Provided} = 1,458$ cf (Rain Gardens)

$WQV_{Provided} 1,458\text{cf} > WQV_{req} 285$ cf : OK

Type III 24-hr Rainfall=1.29"

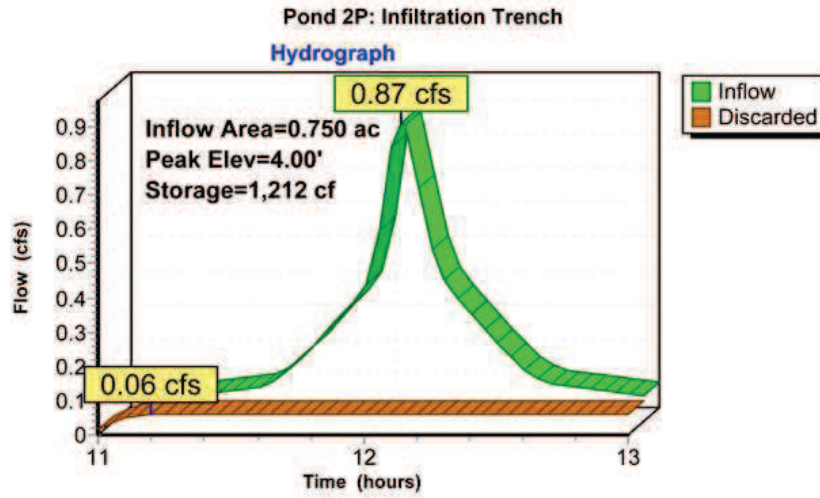


Table 2.3.3. 1982 Rawls Rates¹⁸

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



NOAA Atlas 14, Volume 10, Version 3
 Location name: Worcester, Massachusetts, USA*
 Latitude: 42.3315°, Longitude: -71.7904°
 Elevation: 622 ft**



* source: ESRI Maps
 ** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

[PF_tabular](#) | [PF_graphical](#) | [Maps & aerials](#)

PF tabular

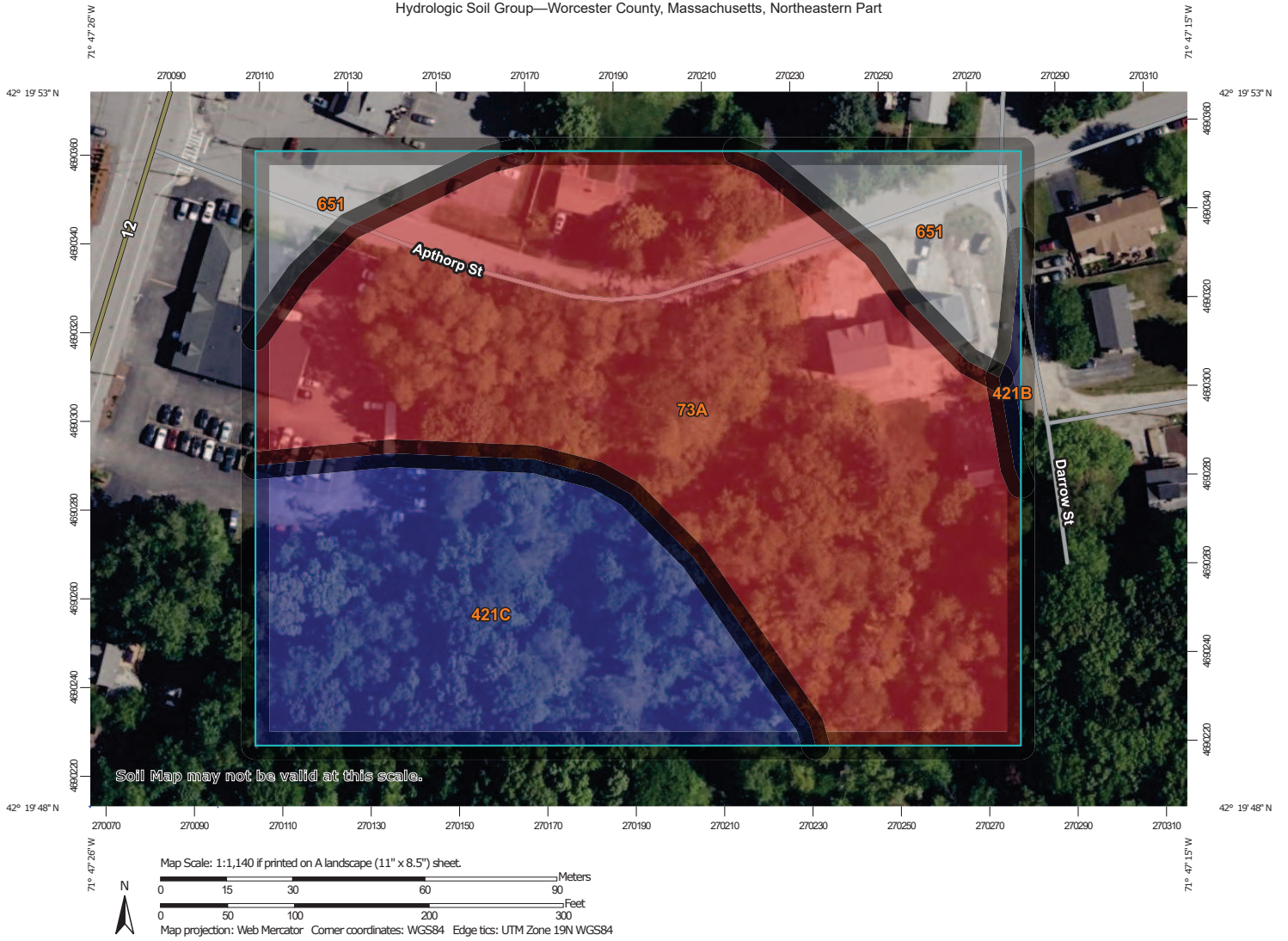
PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches) ¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.348 (0.274-0.434)	0.406 (0.320-0.508)	0.501 (0.393-0.628)	0.581 (0.454-0.733)	0.690 (0.520-0.909)	0.773 (0.570-1.04)	0.859 (0.611-1.20)	0.951 (0.643-1.37)	1.08 (0.700-1.61)	1.18 (0.746-1.80)
10-min	0.493 (0.389-0.615)	0.575 (0.454-0.719)	0.710 (0.557-0.890)	0.823 (0.643-1.04)	0.978 (0.737-1.29)	1.10 (0.807-1.47)	1.22 (0.866-1.70)	1.35 (0.910-1.93)	1.53 (0.992-2.28)	1.67 (1.06-2.54)
15-min	0.579 (0.457-0.723)	0.677 (0.534-0.846)	0.836 (0.657-1.05)	0.968 (0.756-1.22)	1.15 (0.867-1.52)	1.29 (0.948-1.73)	1.43 (1.02-2.00)	1.58 (1.07-2.28)	1.80 (1.17-2.68)	1.96 (1.24-2.99)
30-min	0.779 (0.615-0.972)	0.912 (0.719-1.14)	1.13 (0.886-1.42)	1.31 (1.02-1.65)	1.56 (1.17-2.05)	1.74 (1.28-2.35)	1.94 (1.38-2.70)	2.15 (1.45-3.08)	2.43 (1.58-3.63)	2.66 (1.68-4.05)
60-min	0.979 (0.772-1.22)	1.15 (0.904-1.43)	1.42 (1.12-1.78)	1.65 (1.29-2.08)	1.96 (1.48-2.58)	2.20 (1.62-2.96)	2.44 (1.74-3.41)	2.71 (1.83-3.89)	3.07 (1.99-4.58)	3.36 (2.12-5.11)
2-hr	1.23 (0.976-1.52)	1.46 (1.16-1.81)	1.83 (1.45-2.28)	2.14 (1.68-2.68)	2.56 (1.95-3.37)	2.88 (2.14-3.87)	3.22 (2.32-4.51)	3.61 (2.45-5.16)	4.18 (2.72-6.20)	4.66 (2.96-7.06)
3-hr	1.40 (1.12-1.73)	1.67 (1.34-2.07)	2.12 (1.68-2.63)	2.49 (1.96-3.10)	2.99 (2.29-3.92)	3.37 (2.52-4.52)	3.77 (2.74-5.28)	4.26 (2.89-6.06)	4.98 (3.25-7.36)	5.59 (3.56-8.43)
6-hr	1.77 (1.42-2.17)	2.13 (1.71-2.61)	2.72 (2.18-3.35)	3.21 (2.55-3.98)	3.88 (2.98-5.06)	4.38 (3.30-5.85)	4.92 (3.60-6.86)	5.57 (3.80-7.88)	6.56 (4.29-9.63)	7.41 (4.73-11.1)
12-hr	2.21 (1.79-2.69)	2.68 (2.17-3.26)	3.44 (2.78-4.21)	4.07 (3.26-5.01)	4.94 (3.83-6.40)	5.59 (4.23-7.42)	6.29 (4.62-8.70)	7.12 (4.88-10.0)	8.38 (5.50-12.2)	9.46 (6.05-14.1)
24-hr	2.63 (2.15-3.18)	3.20 (2.61-3.88)	4.14 (3.36-5.03)	4.92 (3.97-6.01)	5.99 (4.67-7.70)	6.79 (5.17-8.94)	7.64 (5.65-10.5)	8.67 (5.97-12.1)	10.2 (6.74-14.8)	11.6 (7.42-17.1)
2-day	2.96 (2.44-3.55)	3.63 (2.98-4.36)	4.72 (3.87-5.70)	5.63 (4.58-6.83)	6.88 (5.40-8.80)	7.80 (5.99-10.2)	8.81 (6.56-12.1)	10.0 (6.94-13.9)	11.9 (7.89-17.2)	13.6 (8.73-19.9)
3-day	3.21 (2.65-3.83)	3.93 (3.24-4.70)	5.10 (4.20-6.13)	6.08 (4.97-7.35)	7.43 (5.86-9.46)	8.42 (6.49-11.0)	9.50 (7.11-13.0)	10.8 (7.51-15.0)	12.9 (8.54-18.5)	14.7 (9.46-21.4)
4-day	3.44 (2.85-4.10)	4.19 (3.47-5.00)	5.43 (4.48-6.50)	6.45 (5.29-7.77)	7.86 (6.22-9.98)	8.90 (6.88-11.6)	10.0 (7.52-13.7)	11.4 (7.94-15.8)	13.6 (9.01-19.4)	15.4 (9.96-22.5)
7-day	4.10 (3.42-4.86)	4.92 (4.10-5.84)	6.26 (5.20-7.45)	7.37 (6.08-8.83)	8.90 (7.07-11.2)	10.0 (7.78-13.0)	11.3 (8.45-15.2)	12.7 (8.88-17.4)	15.0 (9.97-21.3)	16.9 (10.9-24.5)
10-day	4.76 (3.99-5.62)	5.62 (4.70-6.64)	7.01 (5.85-8.32)	8.17 (6.77-9.75)	9.77 (7.78-12.2)	11.0 (8.51-14.1)	12.2 (9.17-16.3)	13.7 (9.59-18.7)	15.9 (10.6-22.5)	17.8 (11.5-25.7)
20-day	6.80 (5.75-7.97)	7.71 (6.51-9.05)	9.19 (7.73-10.8)	10.4 (8.70-12.3)	12.1 (9.69-15.0)	13.4 (10.4-16.9)	14.7 (11.0-19.3)	16.1 (11.4-21.8)	18.1 (12.1-25.4)	19.6 (12.8-28.2)
30-day	8.52 (7.23-9.94)	9.45 (8.02-11.0)	11.0 (9.27-12.9)	12.3 (10.3-14.5)	14.0 (11.2-17.2)	15.4 (12.0-19.2)	16.7 (12.4-21.6)	18.0 (12.8-24.2)	19.8 (13.3-27.6)	21.0 (13.7-30.1)
45-day	10.6 (9.08-12.4)	11.6 (9.90-13.5)	13.2 (11.2-15.4)	14.5 (12.2-17.1)	16.3 (13.2-19.9)	17.8 (13.9-22.1)	19.2 (14.3-24.5)	20.4 (14.5-27.3)	21.9 (14.8-30.4)	22.9 (15.0-32.6)
60-day	12.4 (10.6-14.4)	13.4 (11.5-15.6)	15.1 (12.8-17.6)	16.4 (13.9-19.3)	18.3 (14.8-22.2)	19.8 (15.5-24.5)	21.2 (15.8-27.0)	22.4 (16.0-29.9)	23.8 (16.1-33.0)	24.7 (16.2-35.0)

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

Hydrologic Soil Group—Worcester County, Massachusetts, Northeastern Part



MAP LEGEND

Area of Interest (AOI)		 C
 Area of Interest (AOI)		 C/D
Soils		 D
Soil Rating Polygons		 Not rated or not available
 A		Water Features
 A/D		 Streams and Canals
 B		Transportation
 B/D		 Rails
 C		 Interstate Highways
 C/D		 US Routes
 D		 Major Roads
 Not rated or not available		 Local Roads
Soil Rating Lines		Background
 A		 Aerial Photography
 A/D		
 B		
 B/D		
 C		
 C/D		
 D		
 Not rated or not available		
Soil Rating Points		
 A		
 A/D		
 B		
 B/D		

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
73A	Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony	D	3.4	59.4%
421B	Canton fine sandy loam, 0 to 8 percent slopes, very stony	B	0.0	0.5%
421C	Canton fine sandy loam, 8 to 15 percent slopes, very stony	B	1.7	29.1%
651	Udorthents, smoothed		0.6	10.9%
Totals for Area of Interest			5.8	100.0%

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

APPENDIX C

***Construction Period Pollution Prevention
and
Erosion and Sedimentation Control Plan
for
10 & 16 Apthorp Street
Proposed Duplex Site Design
Worcester, Massachusetts***

Prepared for:

JV Realty
143 Maynard Street
Framingham, Massachusetts 01701

Prepared by:

Existing Grade, Inc.
62 Riedell Road
Douglas, Massachusetts 01516

February 18, 2024
EGI Project No. 1902

TABLE OF CONTENTS

- 1. Introduction**
- 2. Project Narrative**
- 3. Erosion and Sedimentation Control Best Management Practices (BMPs)**
- 4. Construction Sequencing Plan**

1. Introduction

The erosion and sediment produced by the construction of the proposed development will be controlled on the property utilizing Erosion and Sedimentation Control Best Management Practices (BMPs). These practices are shown in detail on the Proposed Site Plans prepared by Existing Grade, Inc. These plans shall be hereinafter referred to as the "Site Plans".

The party responsible for the implementation, routine inspections and maintenance of the Erosion and Sedimentation Control BMPs shall be the Owner:

JV Realty
Framingham, Massachusetts

2. Project Narrative

The proponent, JV Realty, proposes to construct two duplex residential dwellings for the property located 10 & 16 Apthorp Street, Worcester MA. The proposed project will include the construction of two new duplex buildings with: bituminous concrete driveways, city utility connects for water, sewer, and gas, storm water management infrastructures inclusive of grass swales and rain gardens (bio-retention cells). The proposed project will be conducted per the Massachusetts Department of Environmental Protection requirements, Local Town and State bylaws, as well as using best management practices.

The property is listed by the City of Worcester Assessor's Department as parcels 32-024-00287-1 and 32-024-00287 and appears to lie within the Residential RL-7 zoning district based upon a review of the most recent City of Worcester Zoning Map. The property is located within the FEMA Flood Zone X Area based upon a review of FIRM Map 25027C0793E, Panel 793 of 1075, last revised July 04, 2011. Currently there is municipal water, sewer, as well as overhead electric telephone/ cable to service the property.

The properties addresses are recorded as 10 & 16 Apthorp Street, Worcester MA and abut Apthorp Street to the North and privately owned land to the South, East and West. Access to the site is proposed via a new driveway along Apthorp Street to the North. The existing site is comprised of a mix of wooded and grassed areas with one delineated wetland to the South and East of the parcel.

The Worcester County Soil Survey, issued by the US Department of Agriculture was referenced to determine the type and hydrologic group of the soils located on the property. The property is comprised of mostly hydrologic soil group D type soils.

3. *Erosion and Sedimentation Control Best Management Practices (BMPs)*

A. Sediment Fence/Straw Wattle Barrier Controls

A sediment fence/straw wattle barrier combination will be constructed along disturbed downward slopes, along the limit of work boundary and other locations as shown on the Site Plans. The sediment fence portion will be up gradient of the straw wattle. This control BMP shall be installed prior to any disturbance on the property.

Specifications

Sediment fence shall be Amoco woven polypropylene 1198 or approved equivalent.

Installation Requirements

1. Straw wattle shall be installed as directed by the owner's representative in accordance to manufacturer's Installation Guidelines, Staking Pattern Guide, and CAD details. The extent of straw wattle shall be as shown on the project drawings.
2. Straw wattle should be installed to intercept water flow and collect sediment on site. They may be placed over bare soil or on top of erosion control blankets. Straw wattles are typically installed in a 2 inch trench with the ends of the wattle facing upstream.
3. They shall be secured to the subgrade by wood stakes every four lineal feet across the length of the straw wattle. The stakes shall be driven through the center of the straw wattle only and driven into the ground a minimum of 24 inches.
4. Straw wattle installed in a swale or channel bottom shall allow the installation to continue up the slopes three feet above the anticipated high water mark and perpendicular to the flow of water.
5. The sediment fence shall be installed up gradient of the hay bale in accordance with the detail as shown on the Site Plans.
6. Spacing of straw wattle shall be such that the elevation of the bottom of the straw wattle upstream will be equal to the elevation of the top of the straw wattle downstream.
7. Straw wattle shall remain in place until fully established vegetation and root systems are present.

8. The sediment fence shall be installed to the up gradient side of the support net in a continuous length with a minimum of twelve (12) inches of the fence placed along the bottom and down gradient face of the trench. Break joints in the sediment fence shall be overlapped in accordance with the detail as shown on the Site Plans with care taken to avoid break joints in low points along the barrier line.
9. The sediment fence/straw wattle barrier shall be entrench and backfilled. The trench should be excavated to a width of the proposed straw wattle width plus six (6) inches and to a depth between four (4) to six (6) inches. After the installation of the barrier, the barrier shall be backfilled with the down gradient fill conforming to the existing ground level and the up gradient fill built up a minimum of four (4) inches against the barrier.
10. The barriers should be removed when they have served their usefulness, but not before all upslope areas have been permanently stabilized and permission to remove the barrier has been approved by the Town of Auburn Conservation Commission.

Inspection and Maintenance

1. The sediment fence/straw wattle barrier shall be inspected weekly and after every rainfall event of one (1) inch or greater and at least daily during prolonged storm events.
2. Inspect the barrier system for any signs of down gradient erosion or breakout, sediment fence tears, depth of sediment and integrity of the barrier anchor system. All deficiencies shall be repaired or replaced immediately or over burden of sediment shall be removed.
3. The sediment deposits shall be removed after every storm event to reduce pressure on the barrier system and to provide adequate storage volume for the next storm event. Care shall be taken to avoid undermining the barrier system during removal operations.

B. Construction Entrance

A stabilized construction entrance shall be installed at the proposed development entrance off of the existing parking lot. The construction entrance shall be installed immediately after any clearing/grubbing operations and all cut/fill activities, required to provide access to the proposed site, has been completed. The purpose of the construction entrance is to keep mud and sediment from being tracked off of the construction site and into the existing parking lot. The construction entrance shall be constructed in accordance with the detail and shown on the Site Plans.

Specifications

Filter fabric shall be Mirafi 140 N or approved equivalent.

Stone shall be in accordance with the Massachusetts Highway Department Specifications.

Installation Requirements

1. Grade construction entrance to produce positive drainage toward temporary sedimentation controls on the property.
2. Stone for the construction entrance shall consist of one (1) to two (2) inch stone fill placed on the graded base.
3. The minimal length of the construction entrance should extend onto the site a minimum of fifty (50) feet and should have a width equal to the full width of the proposed roadway or twenty (20) feet, whichever is greater.
4. Place filter fabric shall be between the stone fill and the earth surface below to reduce the migration of soil particles from the underlying soil into the stone and vice versa.

Inspection and Maintenance

1. The construction entrance and sediment disposal area shall be inspected weekly and after every rainfall event of one (1) inch or greater.
2. Mud and sediment, tracked or washed onto public roads, shall be immediately removed by sweeping.
3. Provide periodic topdressing with additional stone to maintain the entrance in a condition that will prevent tracking or flowing of sediment onto public roads.

C. Temporary Sediment Basins

The Contractor shall construct temporary sediment basins where required to filter out sediment from stormwater until the permanent drainage system is functioning properly. The temporary sediment basins shall be lined with sediment fence/straw wattle barrier controls. All stormwater runoff from disturbed areas shall be directed toward the temporary sediment basins prior to discharging from the site.

Installation Requirements

1. The sediment basins should be located as close to the sediment source as possible.
2. The sediment basins shall have a minimum length to width ratio of 2:1 and shall have minimum side slopes of 3:1.
3. The bottom of the sediment basin shall be lined with gravel/stone.
4. The sediment basin shall have a minimum storage volume of 3,600 cubic feet for each acre of disturbed drainage area.

Inspection and Maintenance

1. The sediment basins shall be inspected weekly and after every rainfall event of one (1) inch or greater.
2. Inspect the sediment basin for and settlement, seepage and erosion damage. All deficiencies shall be repaired or replaced immediately.
3. Remove and properly dispose of sediment when it accumulates to one-half ($\frac{1}{2}$) of the basin design volume. All trash and other debris shall be removed from the sediment basin on weekly basis.
4. Remove and replace gravel/stone when sediment basin does not drain properly.

D. Temporary Drainage Swales

The Contractor shall construct temporary drainage swales to transport stormwater runoff from the disturbed areas of the site to the temporary sediment basins. Check dams shall be utilized along the temporary drainage swales.

Installation Requirements

1. The temporary drainage swales cross-section shall be constructed with a top width between two (2) to four (4) feet and a minimum height of one and on-half ($1\frac{1}{2}$) feet. The side slopes of the swale shall be between 2:1 and 4:1.
2. The maximum channel grade shall be one and on-half ($1\frac{1}{2}$) percent and shall have a positive grade to the outlet.

3. The stormwater runoff shall outlet through check dams and into temporary sediment basins.

Inspection and Maintenance

1. The temporary drainage swales shall be inspected weekly and after every rainfall event of one (1) inch or greater.
2. Inspect the drainage swales for construction induced damage, settlement and erosion damage. All deficiencies shall be repaired or replaced immediately.
3. Remove and properly dispose of sediment when it accumulates into the flow area. All trash and other debris shall be removed from the drainage swale on weekly basis.

E. Temporary Check Dam

The Contractor shall install temporary check dams along the temporary drainage swales to lower the runoff velocities of stormwater flows to reduce erosion and promoting the settlement of sediments.

Installation Requirements

1. Check dams shall be constructed of anchored hay bales or other approved means with a small sump located immediately upstream of the check dam.
2. The hay bales shall be either wire or nylon bound or string-tied. String-tied bales shall be installed so that the bindings are orientated around the sides, rather than along the tops and bottoms, to prevent the deterioration of the bindings.
3. Each hay bale shall be anchored with a minimum of two (2) wood stakes or steel rebar with the first anchor driven toward the previously laid hay bale to force bales together. The anchors shall be driven deep enough into the ground to securely anchor the bales or to a minimum of eighteen (18) inches.
4. All gaps between hay bales shall be filled by wedging with straw, to prevent water from escaping between the bales, and should be done with care in order not to separate the hay bales.
5. The maximum spacing between check dams shall be that the toe of the up gradient dam is at the same elevation as the top of the down gradient dam.

Inspection and Maintenance

1. The check dams shall be inspected weekly and after every rainfall event of one (1) inch or greater.
2. Inspect the check dams for damage and erosion damage. All deficiencies shall be repaired or replaced immediately.
3. Remove and properly dispose of sediment when it accumulates to a depth of one-half the dam height. All trash and other debris shall be removed from the check dam sump on weekly basis.

F. Drainage System Inlet Protection

The Contractor shall install Siltsack or approved equivalent at catch basin grate locations to allow the drainage system to be utilized before final site stabilized as long as the infiltration basin is constructed and stabilized.

Specifications

Siltsack by ACF Environmental, Inc.

Installation Requirements

1. Siltsack should be installed at all catch basin grate locations in accordance with the manufacturer recommendations and specifications.

Inspection and Maintenance

1. Siltsacks shall be inspected weekly and after every rainfall event of one (1) inch or greater.
2. Inspect the siltsack for damage. All deficiencies shall be repaired or replaced immediately.
3. Remove and properly dispose of sediment when it accumulates to a depth of one-half the siltsack storage volume.

4. *Construction Sequencing Plan*

Anticipated Construction Schedule

1. Demarcate the proposed limit of work as well as trees and other buffer zone areas for protection.
2. Hold a pre-construction meeting a minimum of one (1) week prior to the start of construction.
3. Notify Dig-Safe to demarcate all underground utilities prior to start of construction.
4. Install sediment fence/straw wattle barrier at locations indicated on the Site Plans.
5. Construct all temporary drainage swales to collect and divert stormwater runoff from undisturbed areas of the site to bypass construction area.
6. Clear and construct temporary construction entrance.
7. Clear and grub all areas associated with the construction of the development.
8. Excavate topsoil and subsoil from cut areas, install erosion control barriers and stockpile soil on site. Consideration should be given to locating soil stockpiles on the up gradient side of disturbed areas, where possible, to act as temporary diversions.
9. Fill areas in twelve (12) inch lifts and compact to 95% standard proctor. Install slope protection or retaining walls with reinforcement, where required.
10. Rough grade the site.
11. Construct temporary drainage swales with check dams along the sides of the proposed roadway as well as all temporary sediment basins.
12. Install Proposed Foundations.
13. Construct fine grading of site.
14. Install closed drainage system and other utilities. Install Siltsack or approved equivalent at all catch basin grate locations.

15. Complete final grading of roadway with gravel sub base. Add additional erosion control measures as necessary.
16. After site is stabilized, remove all temporary measures and install permanent vegetation on all disturbed areas

APPENDIX D

POST-CONSTRUCTION
STORM WATER OPERATIONS
AND
MAINTENANCE PLAN

GENERAL NOTES

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROPER INSPECTION AND MAINTENANCE OF ALL STORMWATER AND EROSION CONTROL FACILITIES UNTIL THE PROJECT CONSTRUCTION IS COMPLETED. THE CONTRACTOR SHALL CLEAN ALL COMPONENTS OF THE STORM WATER MANAGEMENT SYSTEM AND SWEEP ALL PAVED AREAS AT THE COMPLETION OF CONSTRUCTION, IMMEDIATELY PRIOR TO TURNING OVER OPERATION AND MAINTENANCE RESPONSIBILITY TO THE OWNER.
2. UPON COMPLETION OF CONSTRUCTION, THE OPERATION AND MAINTENANCE OF ALL COMPONENTS OF THE STORMWATER MANAGEMENT SYSTEM WILL BE THE RESPONSIBILITY OF THE OWNER:

JV Realty

143 Maynard Street
Framingham, Massachusetts 01701

3. DISPOSAL OF ACCUMULATED SEDIMENT AND HYDROCARBONS TO BE IN ACCORDANCE WITH APPLICABLE LOCAL, STATE AND FEDERAL GUIDELINES AND REGULATIONS.

EROSION CONTROL BMPs

STREET SWEEPING:

All paved areas should be swept twice a month during construction and two times per year during the early spring and late fall seasons after construction.

RAIN GARDENS:

Per the Massachusetts Stormwater Management Standards, the typical Boi-Retention Maintenance Schedule is as follows:

Bioretention Maintenance Schedule		
<i>Activity</i>	<i>Time of Year</i>	<i>Frequency</i>
Inspect & remove trash	Year round	Monthly
Mulch	Spring	Annually
Remove dead vegetation	Fall or Spring	Annually
Replace dead vegetation	Spring	Annually
Prune	Spring or Fall	Annually
Replace entire media & all vegetation	Late Spring/early Summer	As needed*

Premature failure of bioretention areas is a significant issue caused by lack of regular maintenance. Ensuring long-term maintenance involves sustained public education and deed restrictions or covenants for privately owned cells. Bioretention areas require careful attention while plants are being established and seasonal landscaping maintenance thereafter.

In many cases, a landscaping contractor working elsewhere on the site can complete maintenance tasks. Inspect pretreatment devices and bioretention cells regularly for sediment build-up, structural damage, and standing water.

Inspect soil and repair eroded areas monthly. Re-mulch void areas as needed. Remove litter and debris monthly. Treat diseased vegetation as needed. Remove and replace dead vegetation twice per year (spring and fall).

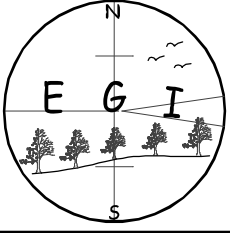
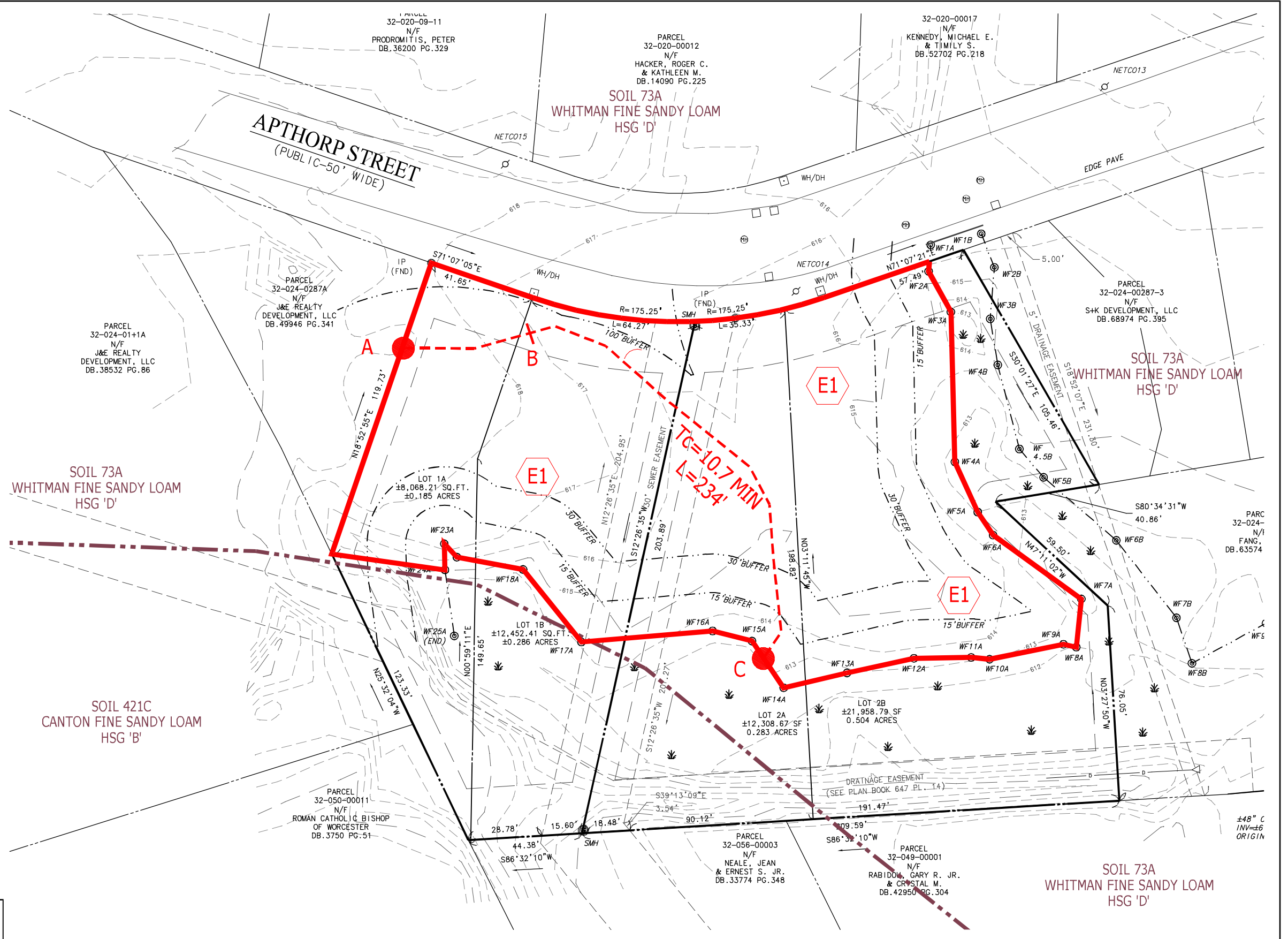
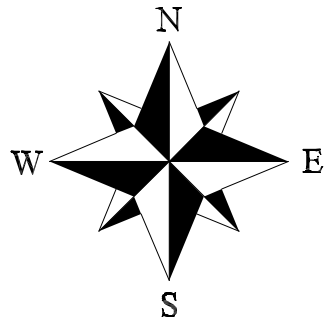
Proper selection of plant species and support during establishment of vegetation should minimize—if not eliminate—the need for fertilizers and pesticides. Remove invasive species as needed to prevent these species from spreading into the bioretention area. Replace mulch every two years, in the early spring. Upon failure, excavate bioretention area, scarify bottom and sides, replace filter fabric and soil, replant, and mulch. A summary of maintenance activities can be found above.

Because the soil medium filters contaminants from runoff, the cation exchange capacity of the soil media will eventually be exhausted. When the cation exchange capacity of the soil media decreases, change the soil media to prevent contaminants from migrating to the groundwater, or from being discharged via an underdrain outlet. Using small shrubs and plants instead of larger trees will make it easier to replace the media with clean material when needed.

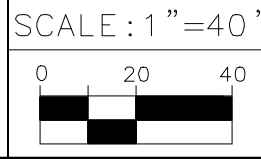
Plant maintenance is critical. Concentrated salts in roadway runoff may kill plants, necessitating removal of dead vegetation each spring and replanting. The operation and maintenance plan must include measures to make sure the plants are maintained.

This is particularly true in residential subdivisions, where the operation and maintenance plan may assign each homeowner the legal responsibility to maintain a bioretention cell or rain garden on his or her property. Including the requirement in the property deed for new subdivisions may alert residential property owners to their legal responsibilities regarding the bioretention cells constructed on their lot.

APPENDIX E



Existing Grade Inc.
 Surveyors & Civil Engineers
 62 Riedell Road
 Douglas, MA 01516
 508-694-6501 Ph/Fax

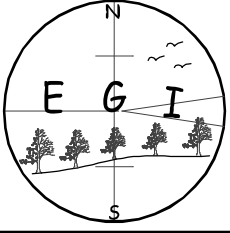
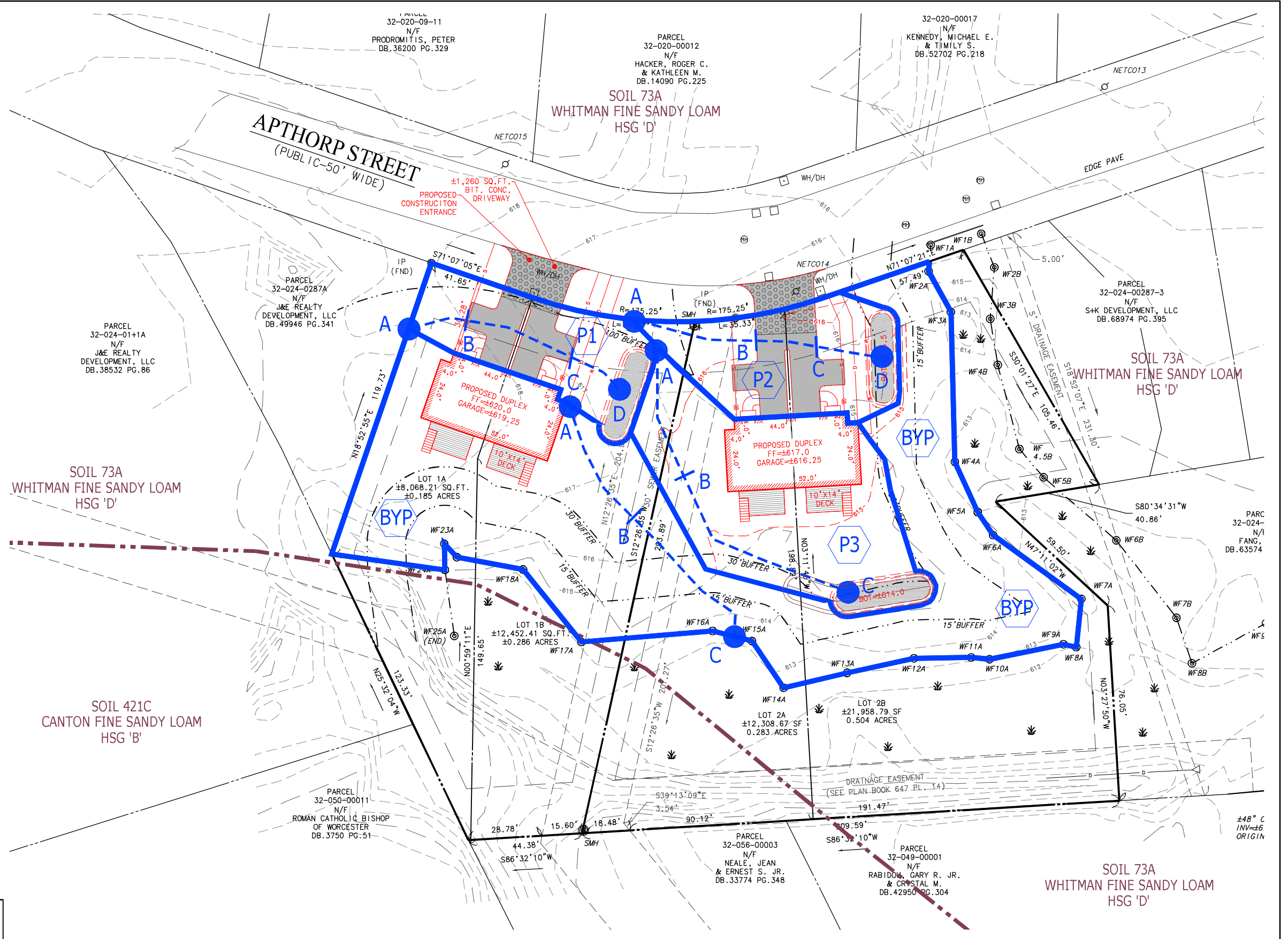
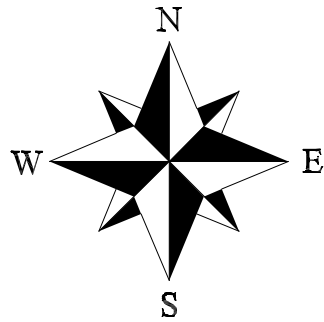


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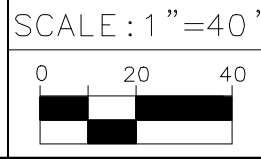
CLIENT
 JV REALTY
 143 MAYNARD STREET
 FRAMINGHAM, MASSACHUSETTS 01701

PRE-DEVELOPMENT DRAINAGE
 FOR
 LOTS 1-2 APTHORP STREET
 WORCESTER, MASSACHUSETTS

PROJECT NO.
 1902
 DATE: 02/15/24
 SHEET NO.
 1 OF 1



Existing Grade Inc.
 Surveyors & Civil Engineers
 62 Riedell Road
 Douglas, MA 01516
 508-694-6501 Ph/Fax



#	DATE	REVISIONS

CLIENT
 JV REALTY
 143 MAYNARD STREET
 FRAMINGHAM, MASSACHUSETTS 01701

POST-DEVELOPMENT DRAINAGE
 FOR
 LOTS 1-2 APthorp STREET
 WORCESTER, MASSACHUSETTS

PROJECT NO.
 1902
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