Drainage Report and Stormwater Management Plan

WINTER VALLEY RESIDENCES BUILDING 6

600 Canton Avenue, Milton MA

Milton, Massachusetts

Applicant
Winter Valley Residences, Inc.
600 Canton Avenue
Milton, MA 02186

Civil Engineer, Landscape Architect & Site Planner
DeVellis Zrein Inc.
PO Box 307
Foxboro, MA 02035
www.develliszrein.com

Architect
John V. Downie I Architect
285 Auburndale Avenue
Newton, MA 02466

November 4, 2022

1. Executive Summary

Winter Valley Residences, Inc, has submitted a Notice of Intent (NOI) for a proposed senior building to serve seniors and/or physically disabled (the Project) to be located at their existing residences at 600 Canton Avenue in Milton, Massachusetts.

The proposed project consists of the construction of one single building to provide 36 affordable housing units for seniors and/or the physically disabled to be situated on a 24.5-acre parcel of land (the “Site”). Along with the construction of the building, the site will include site improvements such as parking, landscaping, stormwater mitigation and underground utilities (the “Project”). The building will supplement 5 other existing buildings already in use.

The immediate site area for the Project is partially developed with existing parking and also partially wooded.

This report addresses the drainage characteristics of the proposed project with respect to current and future stormwater runoff. It qualifies and quantifies the drainage mitigation with respect to stormwater runoff volumes, runoff rates, and stormwater quality as well as the addressing sediment and runoff controls during and after the construction process.

DeVellis Zrein Inc. (DZI) has analyzed the pre-development and post-development conditions of the project site and developed a stormwater management plan to mitigate the impacts resulting from the proposed project. The proposed construction will increase the impervious surface area on-site and the stormwater management system has been designed to mitigate any increase in peak stormwater runoff to ensure that the post-development peak runoff rate from the site will be less than or equal to the existing peak runoff rates. The future stormwater runoff from the development area will be mitigated with drainage improvements such as a closed piping system with catch basins equipped with sumps and hoods and a storm water detention basin.

The future maintenance and upkeep of the site will be the responsibility of the owner. The stormwater design addresses ease of parking lot maintenance concerns while meeting the all of the state and town stormwater requirements and standards. Massachusetts Performance Standards and Regulations for Stormwater Management “Best Management Practices” have been exceeded.

The following narrative provides a description of both the existing and proposed site conditions, and the methodology for design and implementation of stormwater management systems for the project.

2. Existing Conditions

The project Site is approximately 24.5 acres in its entirety. The area of disturbance associated with this Project is 1.6 acres located at the southern end of the property behind Building 5.

The immediate site area for the Project is partially developed with existing parking and also partially wooded.

There is a bordering vegetated wetlands (state jurisdiction) located at the southeast corner of the site. There is an isolated wetland (local jurisdiction) located central to the Site. In September 2021 an ORAD was issued for the Site (attached) in response to an ANRAD filed in April 2021. There are no Estimated Habitat of Rare Wildlife, USGS Rivers or flood plain on the site.

The topography generally slopes from south to north. The elevation ranges from approximately 134-feet in the northern edge of the limit of disturbance to 127-feet at the southern edge of the limit of disturbance. The Site has municipal water, sewer, underground drainage and electric services.

Description of Contributing Area

The following is a brief description of the drainage area:

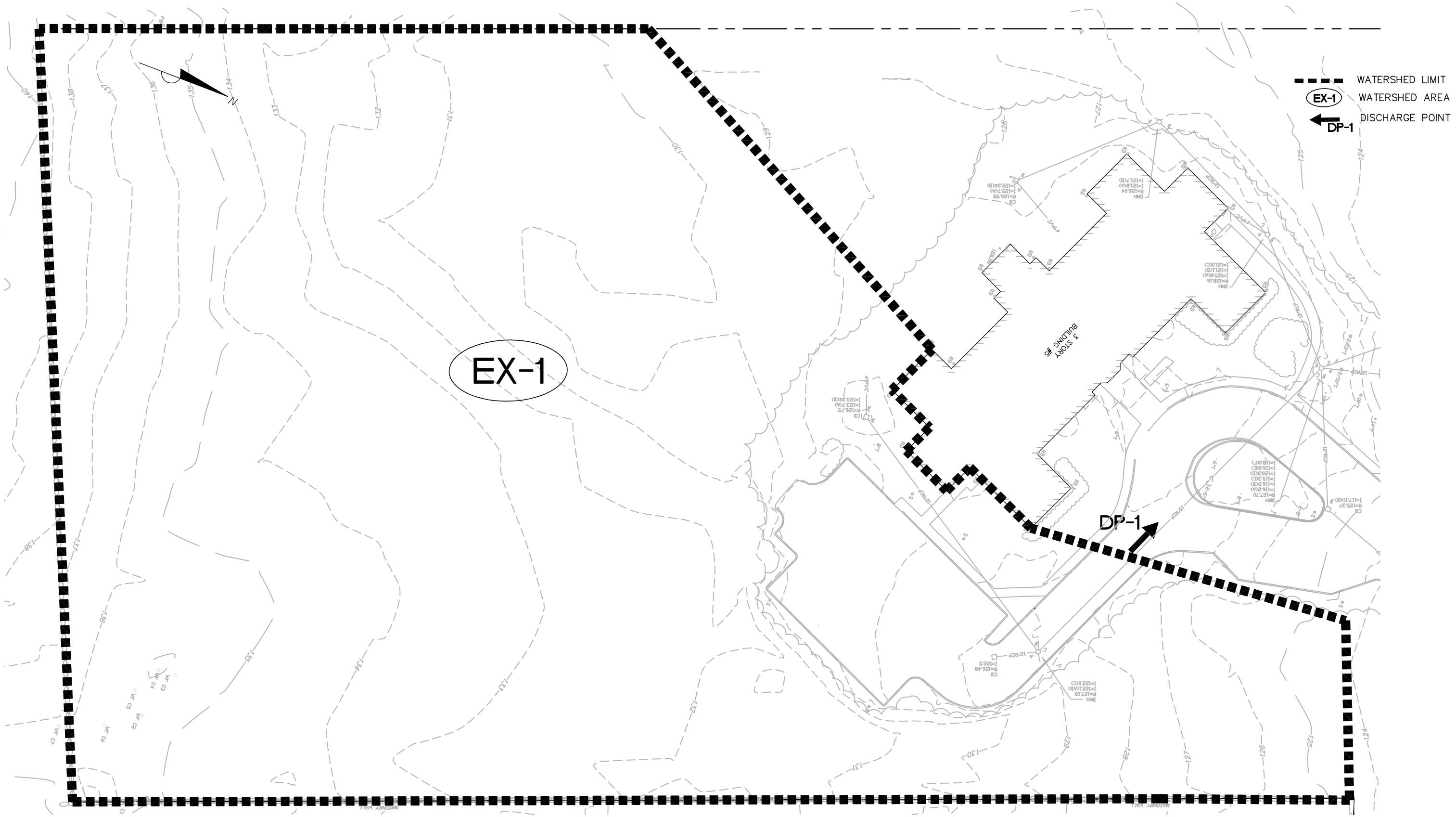
The analysis has been prepared to identify each existing drainage area and the design has been performed to maintain pre- and post- runoff conditions to each area.

The existing development area with respect to the drainage analysis is approximately 3 acres (Figure EX) and is categorized with 1 distinct watershed. Watershed EX-1 flows in a south to north direction across the design area.

For the purpose of this hydrologic analysis, the following assumptions were made:

- Whenever possible, the property line and/or an arbitrary line, outside the limit of proposed work are delineated as the watershed boundary.

- The total watershed area for the existing conditions is used as the comparison base for the watershed area in the proposed conditions.



Job #:			
Drawn by:	IAZ	Checked by:	
Date:	11.02.22		
Scale:	1" = 40'		

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Title: EXISTING WATERSHED MAP

Sketch No. EX

Project Name:
Winter Valley Residences
Milton, MA

Soil Conditions

The soils are defined by the Soil Conservation Services (SCS) Soil Survey of Norfolk and Suffolk Counties Massachusetts. The developable part of the site is comprised of one soil type, Woodbridge fine sandy loam, 0 to 8 percent slopes. See copy of the SCS Soils Survey included within this report.

The following table lists the soil designation, soil name and the soil group.

Table 1 - SCS Soil Types

Map Designation	Soil Name	Soil Group
312B	Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony	C/D

Soil Map—Norfolk and Suffolk Counties, Massachusetts
(600 Canton Avenue Milton)

Map Scale: 1:1,040 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 15 30 60 90

Feet
0 50 100 200 300

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

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Norfolk and Suffolk Counties, Massachusetts
Survey Area Data: Version 18, Sep 9, 2022

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.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
312B	Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony	3.8	100.0%
Totals for Area of Interest		**3.8**	**100.0%**

Existing Drainage Area Summary

The following table summarizes the existing drainage area, including the pertinent information used for the hydrologic analysis:

Existing Conditions Drainage Area - Characteristics

Drainage Area	**Area** (acres)	**Curve Number**	**Tc** (min.)
EX-1	3.05	78	13.2

Peak Discharge Runoff Rates

The existing peak flow rates, tributary to the drainage point, were calculated for the 2, 10, 25 and 100-year storm events in accordance with guidelines given in DEP's Stormwater Management Policy. Results are presented in the following section of this report. Refer to Existing Watershed Plan for a delineation of the watershed areas and their respective points of concentration.

3. Proposed Conditions

The proposed project consists of the construction of one building with associated access parking, landscaping, utility services and drainage improvements. The proposed stormwater management system will be designed to maintain the characteristics of the existing watersheds to the extent practicable. Runoff rates at the discharge point will remain at or below the existing peak flow rates.

The proposed development site will consist of 2 distinct watershed areas, PR-1A & PR-1B (Figure PR). Drainage area PR-1A consists of the building and majority of the new parking area and will drain into a closed drainage system consisting of Stormceptor water quality units, pipes, a forebay and a detention system with an outlet control system. Drainage area PR-1B consists of perimeter landscape areas and a small area of existing parking area and will drain towards the south in a similar manner as it does under existing conditions.

Proposed Drainage Area Summary

The following summarizes the proposed drainage areas, including the pertinent information used for the hydrologic analysis:

Proposed Conditions Drainage Area Characteristics Summary:

Drainage Area	Area (Acres)	Curve Number	T_c (min.)
PR-1A	1.49	87	6.0
PR-1B	1.56	67	10.2

Peak Discharge Runoff Rates

The proposed peak flow rates, tributary to the drainage point, were calculated for the 2, 10, 25 and 100-year storm events in accordance with guidelines given in DEP's Stormwater Management Policy. Results are presented in the following table. Refer to Proposed Watershed Plan for a delineation of the watershed areas and their respective points of concentration.

Summary of Results

As previously stated, the resultant post-development peak discharge rates for the discharge points are equal than the pre-development peak discharge rates. For the 2-year storm event there is a negligible 0.13 cfs increase in flow from the undetained portion with zero runoff entering from the basin. As the underlying soils have been evaluated using C criteria entirely rather than C/D soils as classified results in more of a runoff differential compared to pavement than occurs so the 0.13 cfs is negligent. The following table provides a summary of the pre and post development data. The following table demonstrates peak flows at the design points for each of the design storms has been met.

Peak Rates of Runoff:

Location	2-Year Storm		10-Year Storm		25-Year Storm		100-Year Storm	
	Exist (cfs)	**Prop** (cfs)	**Exist** (cfs)	**Prop** (cfs)	**Exist** (cfs)	**Prop** (cfs)	**Exist** (cfs)	**Prop** (cfs)
DP-1	1.03	1.16	3.21	2.69	5.09	4.43	7.58	6.70

4. Methodology and Design Criteria Hydrologic Model

The drainage analysis was performed using the Soil Conservation Service (SCS) TR-20 method and the drainage software HydroCAD 7.10, as developed by Applied Microcomputer Systems. Data used in the design is as follows:

Design Storms

Rainfall data for the 2, 10, 25 and 100- year frequency rainfall events (for a 24-hour precipitation) was taken from the Rainfall Frequency Atlas of the Unites States (TP-40). The following table outlines the rainfall used for the TR-20 method.

Rainfall Data

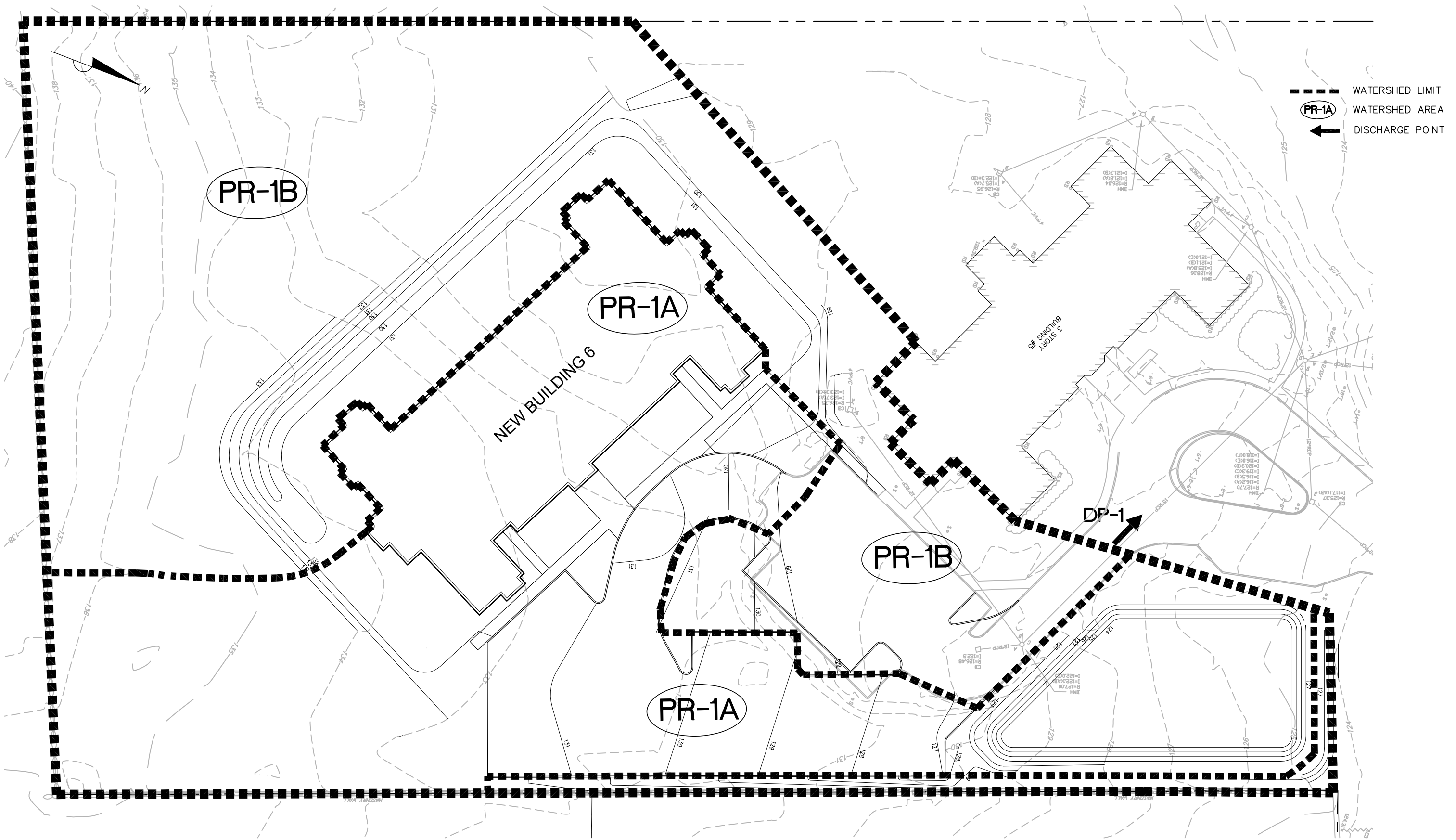
Storm Event	Rainfall
2-Year	3.2
10-Year	4.6
25-Year	5.6
100-Year	6.8

Time of Concentration

The 'time of concentration' (T_c) for each watershed was determined by finding the time necessary for runoff to travel from the hydraulically most distant point in the watershed to the point of concentration. The travel path was drawn based on the topography and the time was calculated using the TR-55 Method and HydroCAD. A minimum T_c of 6.0 minutes was used.

Curve Numbers

Based on the cover type and hydrologic soil group, a weighted curve number (CN) was determined for each of the watersheds utilizing the SCS TR-55 method.



0' 20' 40' 80'

Job #:			
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DZI
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Title: PROPOSED WATERSHED MAP

Sketch No.
PR

Project Name:
Wiinter Valley Residences
Milton, MA

5. Department of Environmental Protection Stormwater Management Standards

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

The project does not propose any untreated stormwater into wetlands or waters of the Commonwealth. All proposed impervious surfaces will be collected and treated with a catch basin with a hood and sump, and sediment forebays and a detention system.

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

The project will reduce the post-development stormwater peak discharge rate below pre-development conditions via a detention basin.

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

The intent of this standard is to ensure that the infiltration volume of precipitation into the ground under post-development conditions is at least as much as the infiltration volume under pre-development conditions. Standard 3 requires the restoration of recharge, using infiltration measures and careful site design.

The project will provide groundwater recharge. The infiltration volume provided within the basin during the exfiltration process at the bottom of the basin during the flood routing duration of each storm.

The NRCS classifies soils into four hydrologic groups, A thru D, indicative of the minimum infiltration obtained for a soil after prolonged wetting. Group A soils have the lowest runoff potential and the highest infiltration rates, while Group D soils have the highest runoff potential and the lowest infiltration rates. The required recharge volume, the stormwater volume that must be infiltrated, was determined using existing site conditions and the infiltration rates set forth below.

Hydrologic Group Volume to Recharge (Total Impervious Area)	
Hydrologic Group	Volume to Recharge Total Impervious Area
A	0.60 inches of runoff
B	**0.35 inches of runoff**
C	**0.25 inches of runoff**
D	0.10 inches of runoff

The soils are defined by the Soil Conservation Services (SCS) Soil Survey of Norfolk and Suffolk Counties, Massachusetts. The site is comprised of one soil type, Woodbridge fine sandy loam, 0 to 8 percent slopes. Based on the mapping, it was determined that the developable areas fall within category C/D and the conservative approach of evaluating the soils as category C was used.

Standard 4: Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS).

This standard is met by this project:

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

The stormwater runoff from the proposed parking spaces will exceed the 80% TSS removal as the project is equipped with a catchbasins with a sump and hood, and a detention/infiltration basin.

A long-term Operation and Maintenance Plan associated with this project has been designed and is included within this report.

Standard 5: Regards land uses with higher potential pollutant loads:

This is Not Applicable.

Standard 6: Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply and stormwater discharges near or to any other critical area require the use of the specific source control and pollution prevention measures and the specific structural stormwater best management practices determined by the Department to be suitable for managing discharges to such areas, as provided in the Massachusetts Stormwater Handbook.

The project has met the requirements.

Standard 7: Regards redevelopment projects:

This project is not a redevelopment and meets all standards for new construction.

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

The Sediment and Erosion Control Plan SP-1 contains provisions for the construction related items such as silt fence, catch basin siltation controls, limits of disturbance, construction entrances and all related Erosion and Sedimentation notes and with Operation and Maintenance provisions for construction and post construction activities.

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

The Long-Term Operation and Maintenance Plan has been prepared within this report and referenced on the plans that include:

1. The routine and non-routine maintenance tasks to be undertaken after construction is complete and a schedule for implementing those tasks;

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

Standard 10 prohibits illicit discharges to stormwater management systems. By acceptance of this document, the Owner acknowledges that the stormwater management system is the system for conveying, treating, and infiltrating stormwater on-site, including stormwater best management practices and any pipes intended to transport stormwater to the groundwater, a surface water, or municipal separate storm sewer system. Illicit discharges to the stormwater management system are discharges that are not entirely comprised of stormwater. This document shall serve

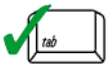
as the Illicit Discharge Compliance Statement verifying that no illicit discharges exist on the site and within the pollution prevention plan measures to prevent illicit discharges to the stormwater management system, including wastewater discharges and discharges of stormwater contaminated by contact with process wastes, raw materials, toxic pollutants, hazardous substances, oil, or grease.

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

Checklist for Stormwater Report

A. Introduction

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



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

The Stormwater Report must include:

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

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

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

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

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

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

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

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

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

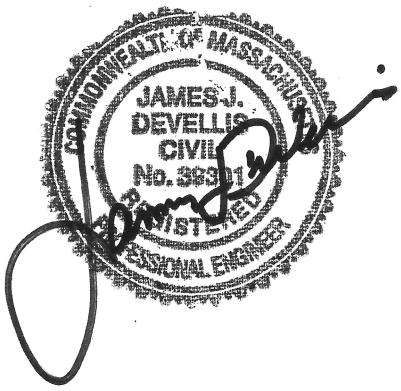
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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

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

Registered Professional Engineer's Certification

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

Registered Professional Engineer Block and Signature



James J. DeVellis

Nov 4, 2022

Signature and Date

Checklist

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

☒ New development

☐ Redevelopment

☐ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

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

☒ No disturbance to any Wetland Resource Areas

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

☐ Reduced Impervious Area (Redevelopment Only)

☐ Minimizing disturbance to existing trees and shrubs

☐ LID Site Design Credit Requested:

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

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

☐ Bioretention Cells (includes Rain Gardens)

☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)

☐ Treebox Filter

☐ Water Quality Swale

☐ Grass Channel

☐ Green Roof

☐ Other (describe): _____

Standard 1: No New Untreated Discharges

☒ No new untreated discharges

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

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

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

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

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

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

Standard 3: Recharge

☒ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

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

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

☐ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

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

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

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

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

☐ Site is comprised solely of C and D soils and/or bedrock at the land surface

☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000

☐ Solid Waste Landfill pursuant to 310 CMR 19.000

☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

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

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

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

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

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

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

Standard 4: Water Quality

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

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

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

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

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

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

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

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

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

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

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

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

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

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

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

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

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

☐ All exposure has been eliminated.

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

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

Standard 6: Critical Areas

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

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

Checklist for Stormwater Report

Checklist (continued)

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

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

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

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

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

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

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

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

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

Checklist for Stormwater Report

Checklist (continued)

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

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

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

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

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

Standard 9: Operation and Maintenance Plan

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

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

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

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

Standard 10: Prohibition of Illicit Discharges

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

☒ An Illicit Discharge Compliance Statement is attached;

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

6. Operation and Maintenance Plan

Introduction

DeVellis Zrein Inc. has prepared this report as a guide to establish maintenance protocol for the on-site drainage improvements serving the Proposes Retail and Office Building project. The goal of the Storm Water Operation and Maintenance Plan is not only to protect off-site wetlands and water resources abutting the site, but also to protect those resources in the region that may be affected by the activities at the site. The proposed site drainage improvements include:

- Stormceptor Water Quality Units;
- Drain pipe network;
- Detention System

The proposed water quality treatment measures will result in improved removal of the total suspended solids (TSS) load in runoff from the site for the proposed parking improvements as well as throughout the existing parking areas.

An effective drainage maintenance program will ensure that the removal of TSS from the stormwater runoff continues for the life of the facility. The Operation and Maintenance Plan will be implemented by the Owner of the property.

Source Control

The first tier of non-structural controls includes a comprehensive source control program of regular sweeping and maintenance of the stormwater management components.

Pavement Sweeping Program

While certain types of street sweepers are not effective for the removal of fine particulates and pollutants associated with them, most are quite effective for the removal of large quantities of sand, grit, and assorted inorganic and organic debris. Larger material carried in storm water poses an environmental threat not only by degrading aesthetics, but may also contribute pollutants as it degrades over time. In addition, larger materials may clog conveyance systems, reduce the efficiency and longevity of treatment systems and ultimately result in more maintenance downstream. The removal of contaminants directly from paved surfaces before contact with storm water is a valuable method for reducing pollutant loading in stormwater.

It is proposed that the parking and drive areas will be cleaned with a street sweeper on a semiannual basis with at least two sweepings per year or more often as required by the Conservation Commission if conditions require it. Sweeping at the end of the winter season is to remove sand applied during the winter which typically migrates to the edges of paved areas and once in the fall to remove debris and organics accumulated in the summer and fall seasons.

Stormceptor Water Quality Unit

The Stormceptors at the site will trap debris, sediments and floating contaminants, which are the largest constituents of urban runoff. The Stormceptors will be cleaned once per year or more often as required by the Conservation Commission if conditions require it. This practice in coordination with minimal use of sand and street sweeping comprises a multi-level source control approach that prevents sand/sediments and litter from exiting off-site and/or ultimately into the resource areas.

Detention System

The actual removal of sediments and associated pollutants and trash occurs only when inlets are cleaned out; therefore, regular maintenance is required. The stormwater that enters into the detention basin has been devoid of sediment due to the TSS removal within Stormceptors and further cleaned within the detention basin forebay.
The landscaping within the basin and side slopes shall be maintained to prevent erosion and sedimentation at all times.

The forebay shall be kept free of sediment and the rocks shall remain in place to prevent scouring.

During Construction

- Prior to construction, install tree protection and erosion and sediment control measures as shown on the plan and details.
- The site contractor shall inspect all sediment and erosion control structures after each rainfall event and at the end of the working day.
- All measures shall be maintained in good working order. If repair is necessary, it shall be initiated within 24 hours of inspection.
- Silt shall be removed from the silt fence if 3-inches or greater and as needed.
- Sediment shall be contained within the construction site and away from drainage structures.
- Damaged or deteriorated erosion control measures will be repaired immediately after identification
- The silt soxx shall be kept in close contact with the ground and reset as necessary.
- The contractor’s site superintendent will be responsible for inspection, maintenance and repair activities.
- All disturbed areas will be treated with 4” of topsoil and seed.
- Remove siltation controls upon completion of permanent vegetation over disturbed areas.
- A preconstruction meeting shall take place prior to construction and the contractor shall present a plan for vehicle entrance/exiting and vehicle washout areas. At the time of this report, there is no contractor involved in the project. It is the opinion of DeVellis Zrein, Inc. that it is in the best interest of the Town of Milton not to dictate the means and methods of the specific site

setup for the contractor, but rather require the contractor to provide this information prior to construction.

Post Construction

The following site performance requirements are to be established at the property.

- Inspect the perimeter landscaping annually, in the spring, for erosion of side slopes, embankments, and accumulated sediment. Necessary sediment removal, earth repair and/or reseeding shall be performed immediately upon identification.
- Clean the Stormceptors annually to remove accumulated sand, sediment, and floatable products. Dispose and transport accumulated sediment off-site in accordance with applicable local, state and federal guidelines and regulations.
- Remove accumulated leaves and debris from outlet openings as necessary.
- Routinely pick up and remove litter from the parking areas, islands and perimeter landscape area, in addition to pavement sweeping.
- Maintain the detention basin elevations, plantings and groundcover yearly and inspect after large storms.

Stormwater Management System Owner

This site is owned by the Winter Valley Residences, Inc. who will continue to perform site maintenance and operations.

Estimated Operations Budget

It is not anticipated that the stormwater maintenance required would be considered extraordinary. A yearly estimated operations budget for consideration to carry out the Operations and Maintenance Plan requirements is as follows:

- **$1000:** Inspect the perimeter landscaping annually, in the spring, for erosion of side slopes, embankments, and accumulated sediment. Necessary sediment
  removal, earth repair and/or reseeding shall be performed immediately upon identification.

- **$2000:** Clean all Stormceptors annually to remove accumulated sand, sediment, and floatable products. Dispose and transport accumulated sediment off-site in accordance with applicable local, state and federal guidelines and regulations. This should be incorporated into the owner's routine maintenance protocol.

- **$1000:** Remove accumulated leaves and debris from detention basin and forebay.

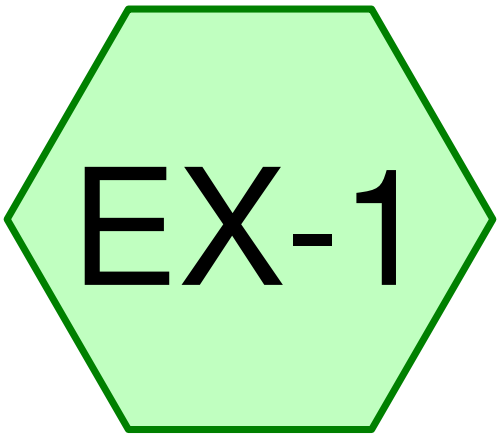
- **$1000:** Routinely pick up and remove litter from the parking areas, islands and perimeter landscape area, in addition to pavement sweeping.

Appendix A –
Hydrologic Calculations and Drain Pipe Calculations

- Hydrologic Model - Existing Conditions
  Stormwater Runoff Area Calculations
  Existing Conditions Calculations
  2-Year Storm
  10-Year Storm
  25-Year Storm
  100-Year Storm

- Hydrologic Model - Proposed Conditions
  Stormwater Runoff Area Calculations
  Proposed Conditions Calculations
  2-Year Storm
  10-Year Storm
  25-Year Storm
  100-Year Storm

Hydrologic Model - Existing Conditions



EX-1

Subcat Reach Pond Link

Routing Diagram for Existing Conditions
Prepared by DeVellis Zrein, Inc, Printed 11/2/2022

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-year	Type III 24-hr		Default	24.00	1	3.20	2
2	10-year	Type III 24-hr		Default	24.00	1	4.60	2
3	25-Year	Type III 24-hr		Default	24.00	1	5.60	2
4	100-year	Type III 24-hr		Default	24.00	1	6.80	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.094	69	50-75% Grass cover, Fair, HSG C (EX-1)
0.203	98	Paved Areas, HSG C (EX-1)
2.754	60	Woods, Fair, HSG C (EX-1)
3.051	**63**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
3.051	HSG C	EX-1
0.000	HSG D	
0.000	Other	
3.051		**TOTAL AREA**

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	0.094	0.000	0.000	0.094	50-75% Grass cover, Fair	EX-1
0.000	0.000	0.203	0.000	0.000	0.203	Paved Areas	EX-1
0.000	0.000	2.754	0.000	0.000	2.754	Woods, Fair	EX-1
0.000	**0.000**	**3.051**	**0.000**	**0.000**	**3.051**	**TOTAL AREA**	

Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX-1: EX-1 Runoff Area=132,915 sf 6.64% Impervious Runoff Depth=0.52"
Flow Length=374' Tc=13.2 min CN=63 Runoff=1.03 cfs 0.132 af

Total Runoff Area = 3.051 ac Runoff Volume = 0.132 af Average Runoff Depth = 0.52"
93.36% Pervious = 2.849 ac 6.64% Impervious = 0.203 ac

Summary for Subcatchment EX-1: EX-1

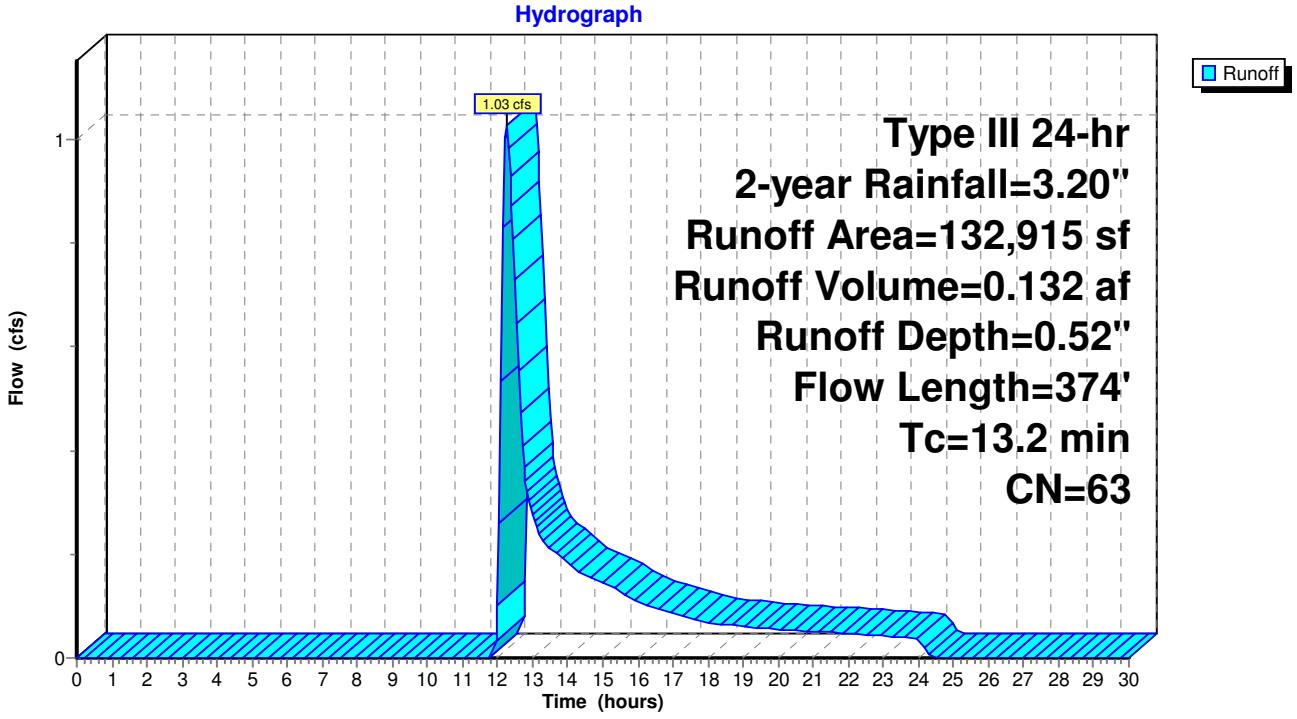
Runoff = 1.03 cfs @ 12.24 hrs, Volume= 0.132 af, Depth= 0.52"
Routed to nonexistent node DP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.20"

	Area (sf)	CN	Description
*	8,825	98	Paved Areas, HSG C
*	119,985	60	Woods, Fair, HSG C
*	4,105	69	50-75% Grass cover, Fair, HSG C
	132,915	63	Weighted Average
	124,090		93.36% Pervious Area
	8,825		6.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	30	0.0250	0.07		**Sheet Flow, T1** Woods: Light underbrush n= 0.400 P2= 3.20"
5.7	344	0.0400	1.00		**Shallow Concentrated Flow, T2** Woodland Kv= 5.0 fps
13.2	374	Total			

Subcatchment EX-1: EX-1



Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX-1: EX-1 Runoff Area=132,915 sf 6.64% Impervious Runoff Depth=1.26"
Flow Length=374' Tc=13.2 min CN=63 Runoff=3.21 cfs 0.321 af

Total Runoff Area = 3.051 ac Runoff Volume = 0.321 af Average Runoff Depth = 1.26"
93.36% Pervious = 2.849 ac 6.64% Impervious = 0.203 ac

Summary for Subcatchment EX-1: EX-1

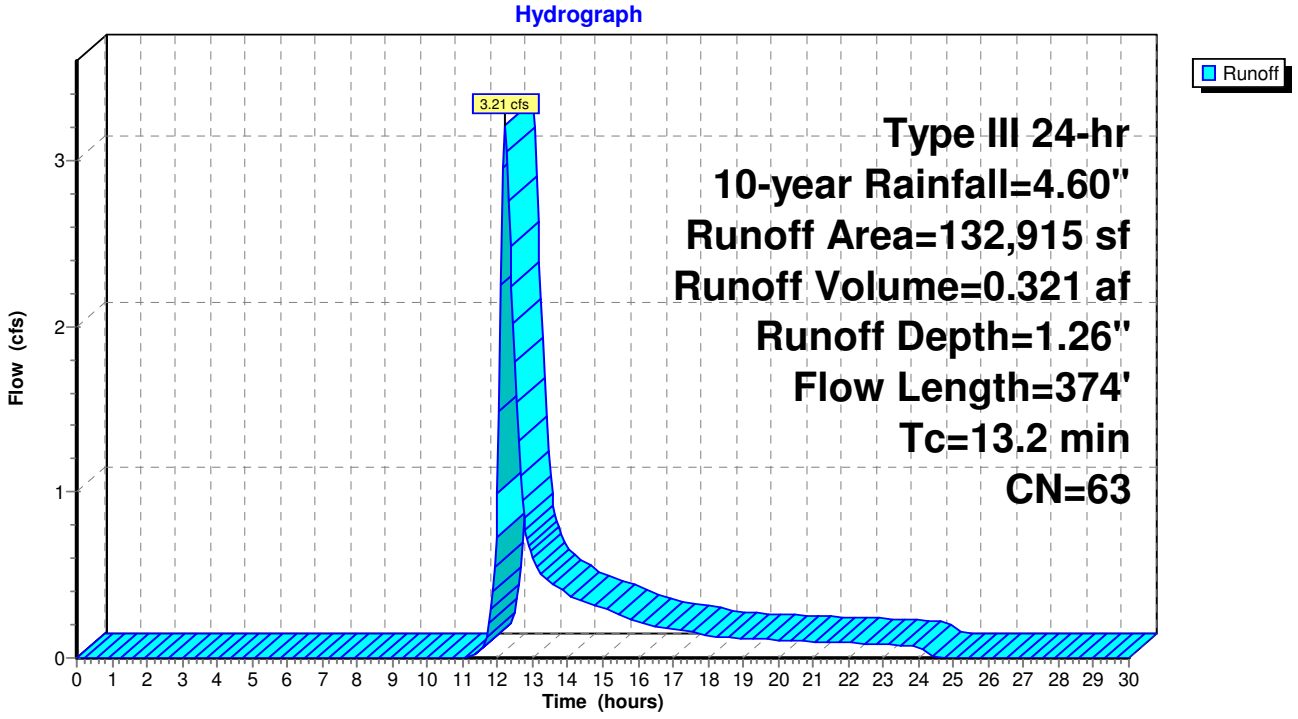
Runoff = 3.21 cfs @ 12.21 hrs, Volume= 0.321 af, Depth= 1.26"
Routed to nonexistent node DP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.60"

	Area (sf)	CN	Description
*	8,825	98	Paved Areas, HSG C
*	119,985	60	Woods, Fair, HSG C
*	4,105	69	50-75% Grass cover, Fair, HSG C
	132,915	63	Weighted Average
	124,090		93.36% Pervious Area
	8,825		6.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	30	0.0250	0.07		**Sheet Flow, T1** Woods: Light underbrush n= 0.400 P2= 3.20"
5.7	344	0.0400	1.00		**Shallow Concentrated Flow, T2** Woodland Kv= 5.0 fps
13.2	374	Total			

Subcatchment EX-1: EX-1



Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX-1: EX-1 Runoff Area=132,915 sf 6.64% Impervious Runoff Depth=1.90"
Flow Length=374' Tc=13.2 min CN=63 Runoff=5.09 cfs 0.484 af

Total Runoff Area = 3.051 ac Runoff Volume = 0.484 af Average Runoff Depth = 1.90"
93.36% Pervious = 2.849 ac 6.64% Impervious = 0.203 ac

Summary for Subcatchment EX-1: EX-1

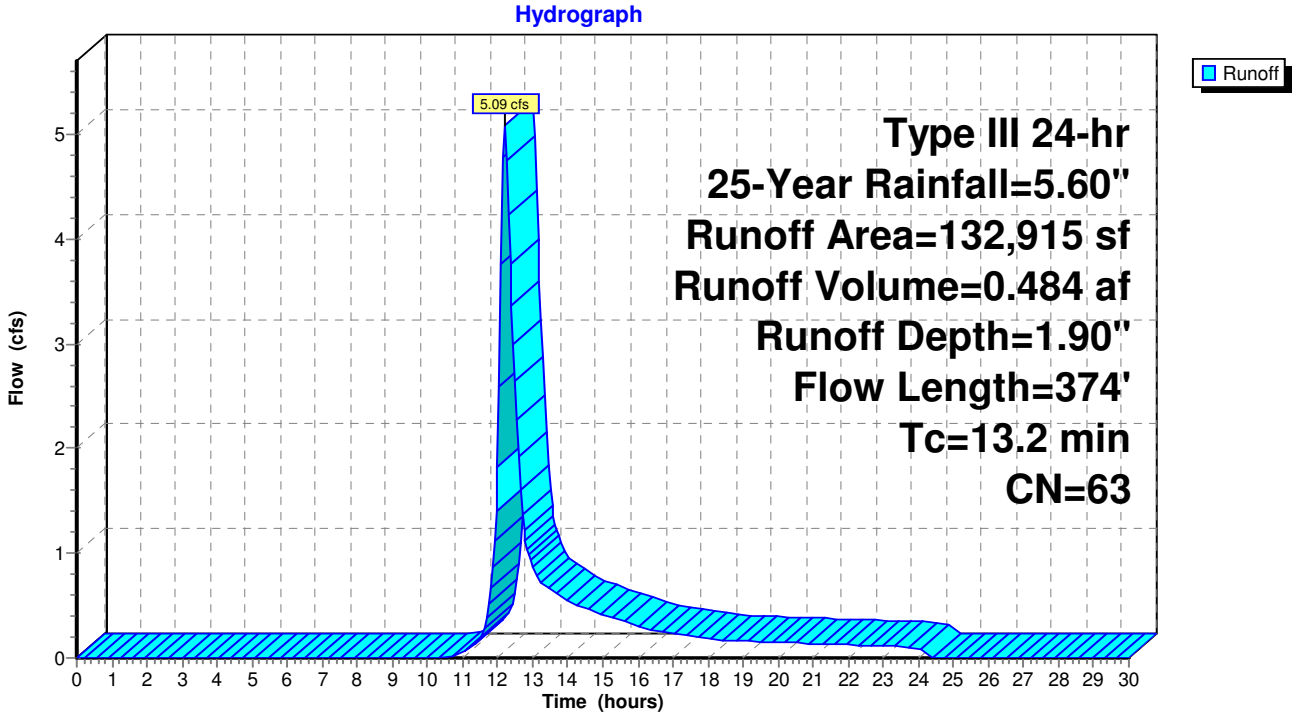
Runoff = 5.09 cfs @ 12.20 hrs, Volume= 0.484 af, Depth= 1.90"
Routed to nonexistent node DP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.60"

	Area (sf)	CN	Description
*	8,825	98	Paved Areas, HSG C
*	119,985	60	Woods, Fair, HSG C
*	4,105	69	50-75% Grass cover, Fair, HSG C
	132,915	63	Weighted Average
	124,090		93.36% Pervious Area
	8,825		6.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	30	0.0250	0.07		**Sheet Flow, T1** Woods: Light underbrush n= 0.400 P2= 3.20"
5.7	344	0.0400	1.00		**Shallow Concentrated Flow, T2** Woodland Kv= 5.0 fps
13.2	374	Total			

Subcatchment EX-1: EX-1



Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX-1: EX-1 Runoff Area=132,915 sf 6.64% Impervious Runoff Depth=2.75"
Flow Length=374' Tc=13.2 min CN=63 Runoff=7.58 cfs 0.700 af

Total Runoff Area = 3.051 ac Runoff Volume = 0.700 af Average Runoff Depth = 2.75"
93.36% Pervious = 2.849 ac 6.64% Impervious = 0.203 ac

Summary for Subcatchment EX-1: EX-1

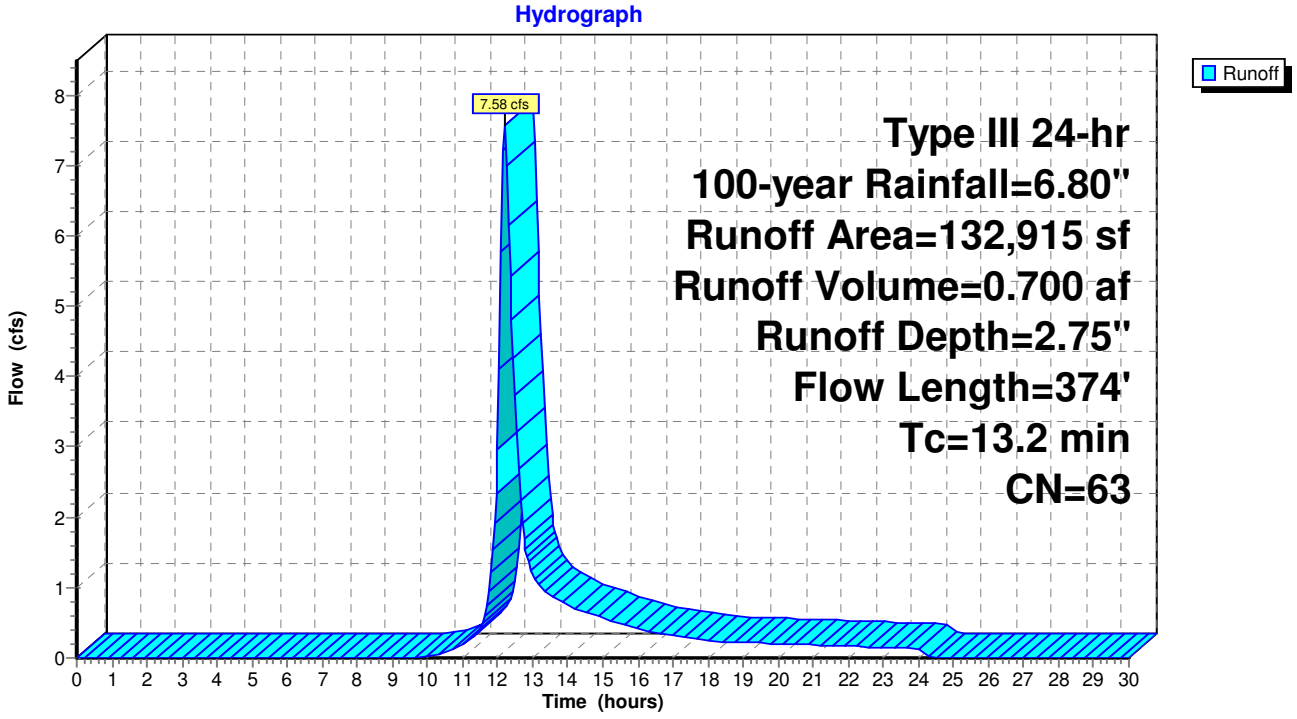
Runoff = 7.58 cfs @ 12.19 hrs, Volume= 0.700 af, Depth= 2.75"
Routed to nonexistent node DP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=6.80"

	Area (sf)	CN	Description
*	8,825	98	Paved Areas, HSG C
*	119,985	60	Woods, Fair, HSG C
*	4,105	69	50-75% Grass cover, Fair, HSG C
	132,915	63	Weighted Average
	124,090		93.36% Pervious Area
	8,825		6.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	30	0.0250	0.07		**Sheet Flow, T1** Woods: Light underbrush n= 0.400 P2= 3.20"
5.7	344	0.0400	1.00		**Shallow Concentrated Flow, T2** Woodland Kv= 5.0 fps
13.2	374	Total			

Subcatchment EX-1: EX-1



Existing Conditions
Prepared by DeVellis Zrein, Inc

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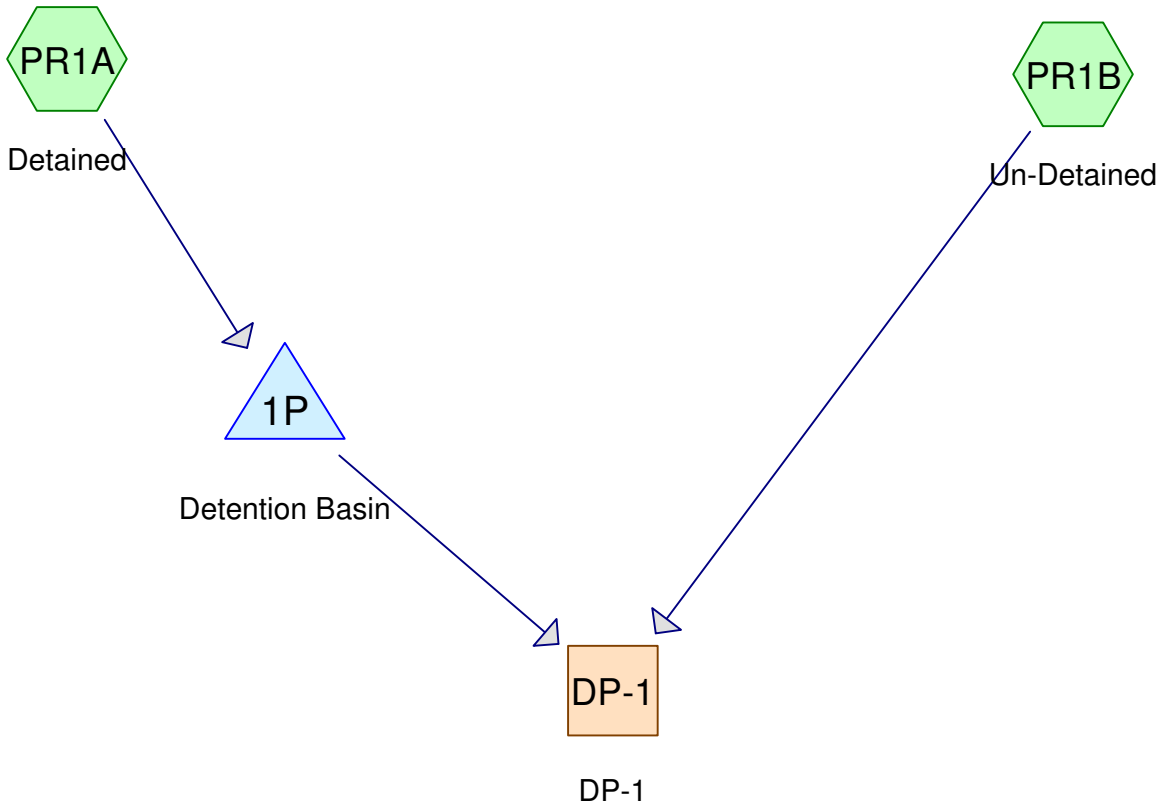
Hydrologic Model - Proposed Conditions



Subcat Reach Pond Link

Routing Diagram for Proposed Conditions
Prepared by DeVellis Zrein, Inc, Printed 11/2/2022

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-year	Type III 24-hr		Default	24.00	1	3.20	2
2	10-year	Type III 24-hr		Default	24.00	1	4.60	2
3	25-Year	Type III 24-hr		Default	24.00	1	5.60	2
4	100-year	Type III 24-hr		Default	24.00	1	6.80	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.651	61	>75% Grass cover, Good, HSG B (PR1B)
0.103	61	>75% Grass cover, Good, HSG C (PR1A)
0.186	98	Detention Basin (PR1A)
0.691	98	Paved parking and Building HSG C (PR1A)
0.134	98	Paved parking, HSG C (PR1B)
1.287	73	Woods, Fair, HSG C (PR1A, PR1B)
3.051	**78**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.651	HSG B	PR1B
2.214	HSG C	PR1A, PR1B
0.000	HSG D	
0.186	Other	PR1A
3.051		**TOTAL AREA**

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	0.651	0.103	0.000	0.000	0.754	>75% Grass cover, Good	PR1A, PR1B
0.000	0.000	0.000	0.000	0.186	0.186	Detention Basin	PR1A
0.000	0.000	0.134	0.000	0.000	0.134	Paved parking	PR1B
0.000	0.000	0.691	0.000	0.000	0.691	Paved parking and Building	PR1A
0.000	0.000	1.287	0.000	0.000	1.287	Woods, Fair	PR1A, PR1B
0.000	**0.651**	**2.214**	**0.000**	**0.186**	**3.051**	**TOTAL AREA**	

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 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 PR1A: Detained Runoff Area=64,963 sf 58.76% Impervious Runoff Depth=1.91"
Tc=6.0 min CN=87 Runoff=3.28 cfs 0.238 af

Subcatchment PR1B: Un-Detained Runoff Area=67,952 sf 8.57% Impervious Runoff Depth=0.83"
Flow Length=492' Tc=10.2 min CN=70 Runoff=1.16 cfs 0.108 af

Reach DP-1: DP-1 Inflow=1.16 cfs 0.144 af
Outflow=1.16 cfs 0.144 af

Pond 1P: Detention Basin Peak Elev=125.16' Storage=7,142 cf Inflow=3.28 cfs 0.238 af
Discarded=0.05 cfs 0.096 af Primary=0.07 cfs 0.036 af Outflow=0.12 cfs 0.132 af

Total Runoff Area = 3.051 ac Runoff Volume = 0.346 af Average Runoff Depth = 1.36"
66.90% Pervious = 2.041 ac 33.10% Impervious = 1.010 ac

Summary for Subcatchment PR1A: Detained

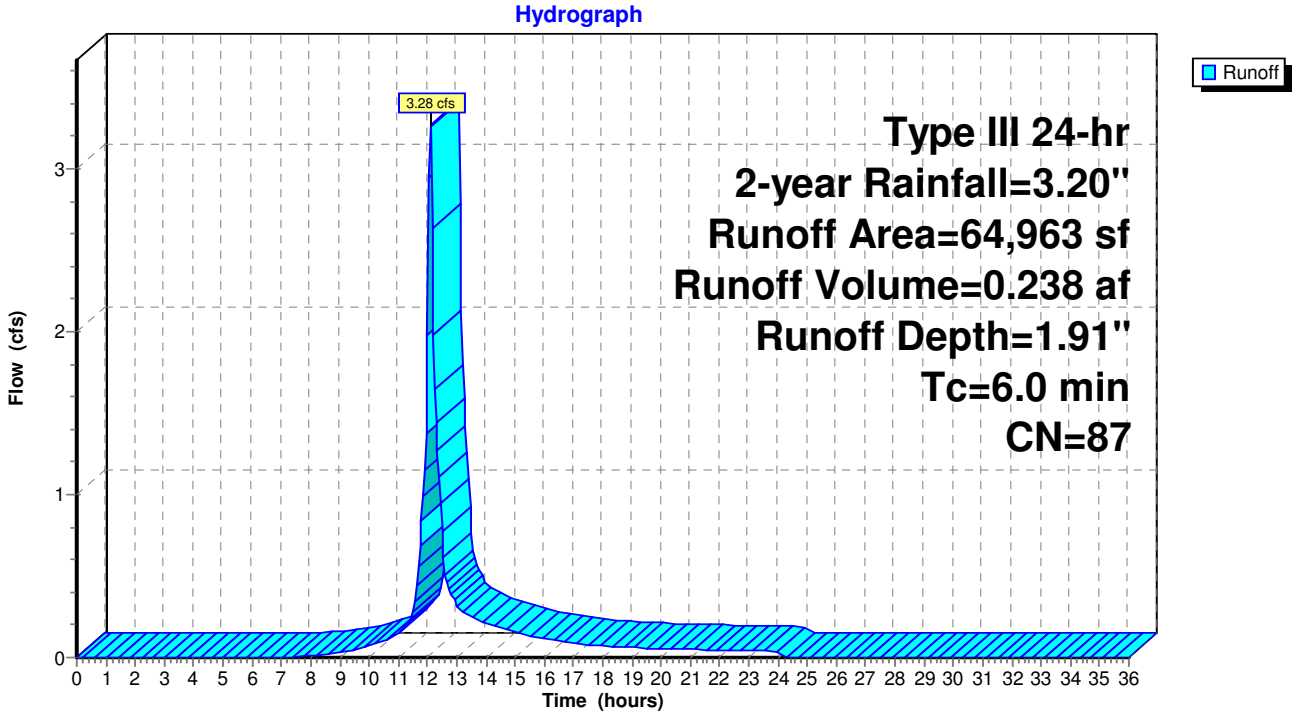
Runoff = 3.28 cfs @ 12.09 hrs, Volume= 0.238 af, Depth= 1.91"
Routed to Pond 1P : Detention Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.20"

	Area (sf)	CN	Description
*	30,079	98	Paved parking and Building HSG C
*	4,489	61	>75% Grass cover, Good, HSG C
*	8,093	98	Detention Basin
	22,302	73	Woods, Fair, HSG C
	64,963	87	Weighted Average
	26,791		41.24% Pervious Area
	38,172		58.76% Impervious Area

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

Subcatchment PR1A: Detained



Summary for Subcatchment PR1B: Un-Detained

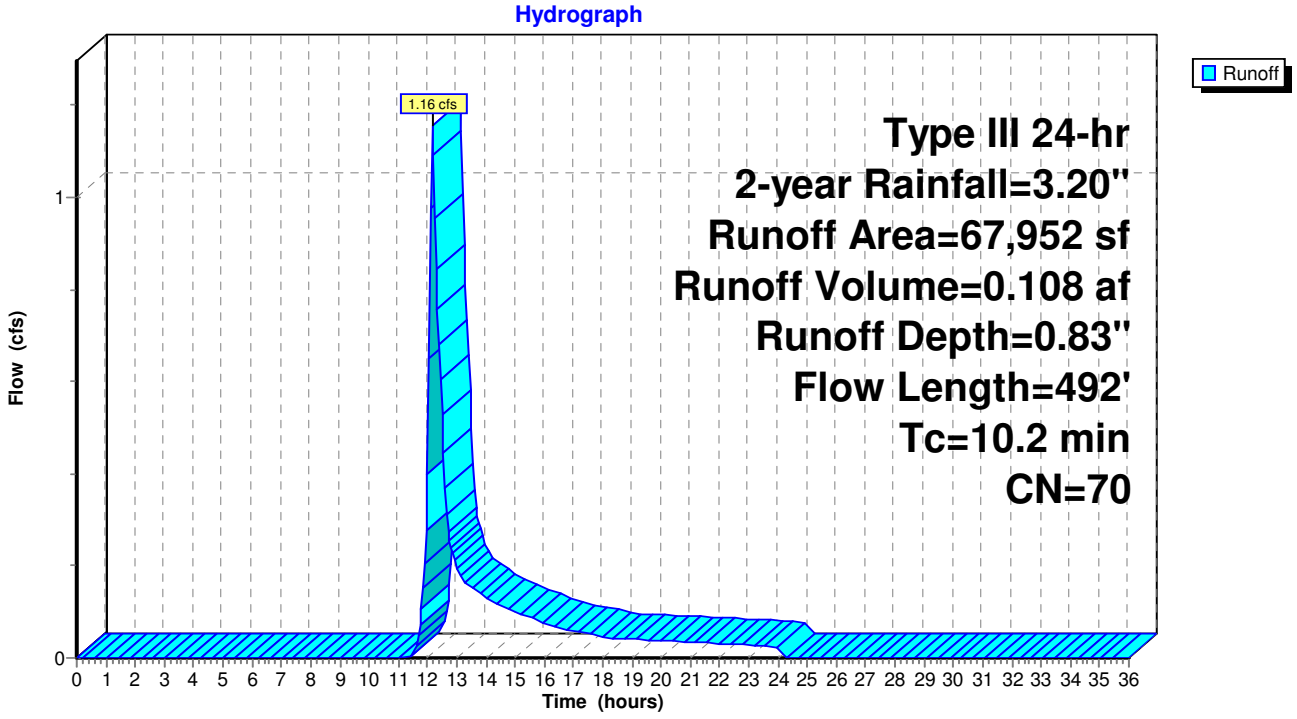
Runoff = 1.16 cfs @ 12.16 hrs, Volume= 0.108 af, Depth= 0.83"
Routed to Reach DP-1 : DP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.20"

Area (sf)	CN	Description
33,768	73	Woods, Fair, HSG C
28,359	61	>75% Grass cover, Good, HSG B
5,825	98	Paved parking, HSG C
67,952	70	Weighted Average
62,127		91.43% Pervious Area
5,825		8.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	25	0.0250	0.06		**Sheet Flow, T1** Woods: Light underbrush n= 0.400 P2= 3.20"
3.7	467	0.0200	2.12		**Shallow Concentrated Flow, T2** Grassed Waterway Kv= 15.0 fps
10.2	492	Total			

Subcatchment PR1B: Un-Detained



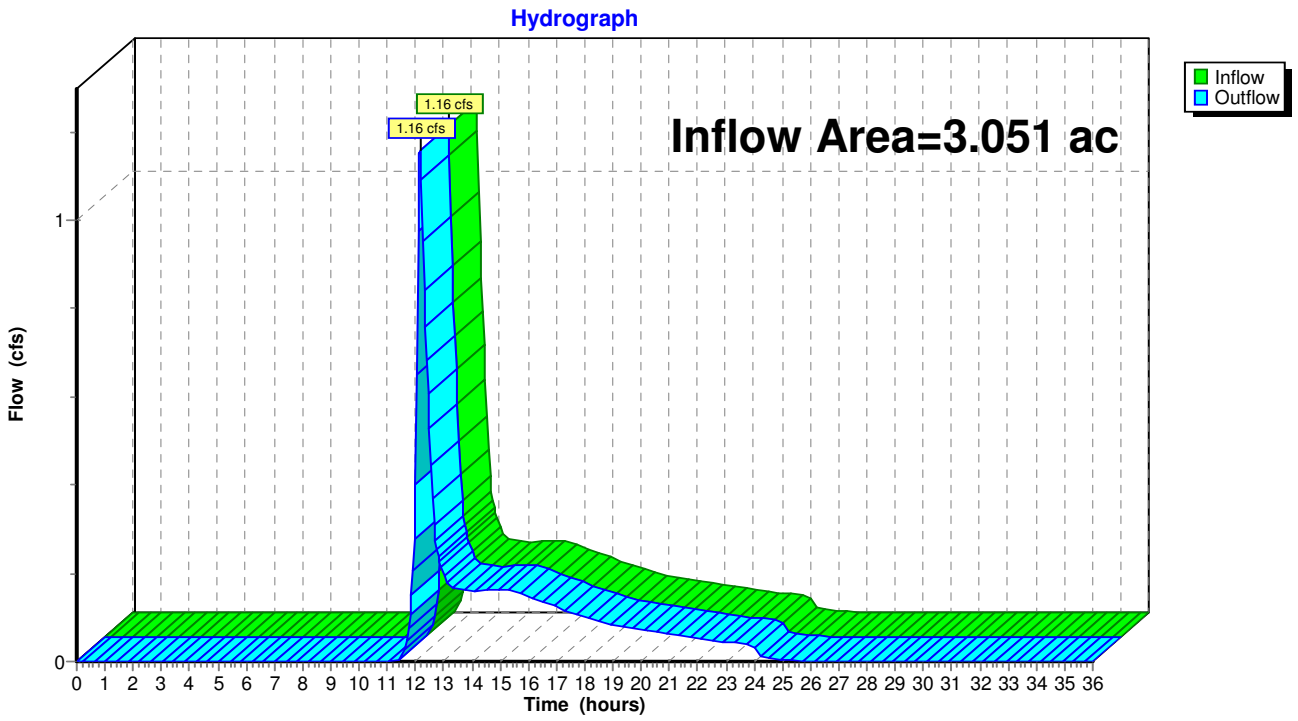
Summary for Reach DP-1: DP-1

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 3.051 ac, 33.10% Impervious, Inflow Depth = 0.57" for 2-year event
Inflow = 1.16 cfs @ 12.16 hrs, Volume= 0.144 af
Outflow = 1.16 cfs @ 12.16 hrs, Volume= 0.144 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Reach DP-1: DP-1



Summary for Pond 1P: Detention Basin

Inflow Area = 1.491 ac, 58.76% Impervious, Inflow Depth = 1.91" for 2-year event
Inflow = 3.28 cfs @ 12.09 hrs, Volume= 0.238 af
Outflow = 0.12 cfs @ 15.88 hrs, Volume= 0.132 af, Atten= 96%, Lag= 227.6 min
Discarded = 0.05 cfs @ 15.88 hrs, Volume= 0.096 af
Primary = 0.07 cfs @ 15.88 hrs, Volume= 0.036 af
Routed to Reach DP-1 : DP-1

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 125.16' @ 15.88 hrs Surf.Area= 6,559 sf Storage= 7,142 cf

Plug-Flow detention time= 574.1 min calculated for 0.132 af (55% of inflow)
Center-of-Mass det. time= 465.1 min (1,283.9 - 818.9)

Volume	Invert	Avail.Storage	Storage Description
#1	124.00'	20,415 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

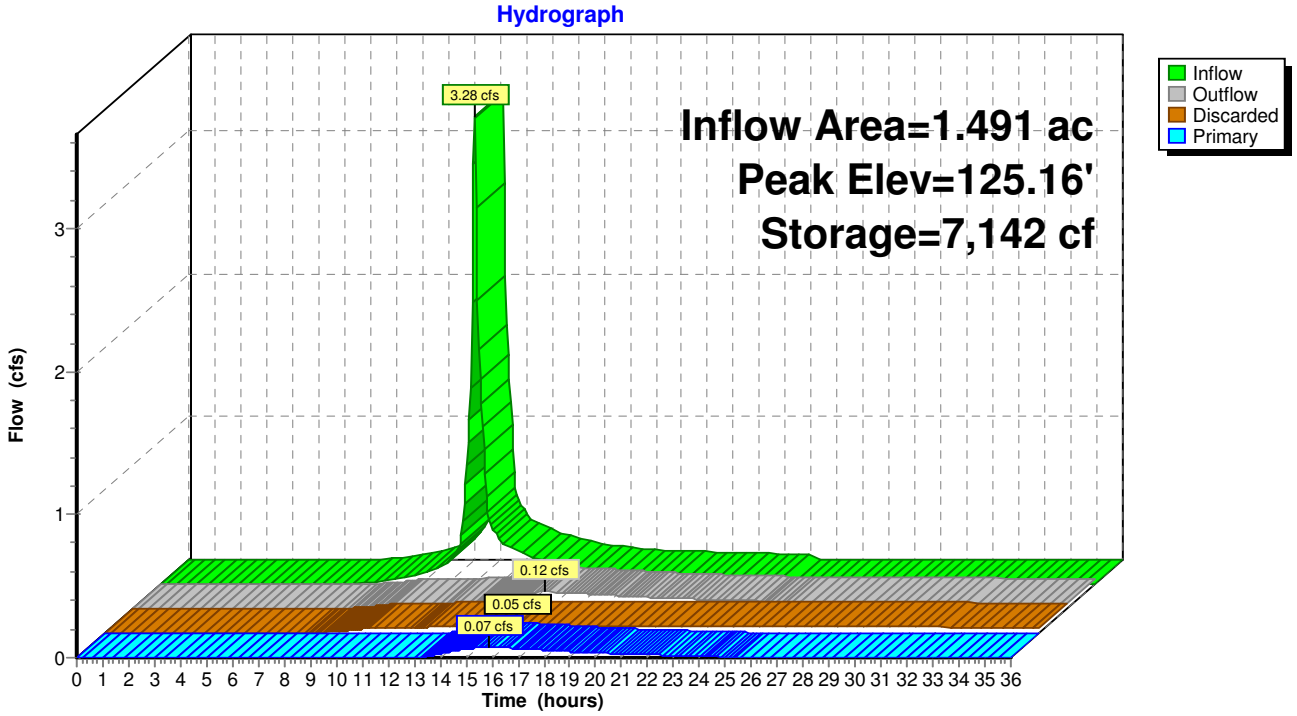
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
124.00	5,782	0	0
125.00	6,450	6,116	6,116
126.00	7,144	6,797	12,913
127.00	7,860	7,502	20,415

Device	Routing	Invert	Outlet Devices
#1	Discarded	124.00'	**0.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 114.00'
#2	Primary	125.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	125.25'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.05 cfs @ 15.88 hrs HW=125.16' (Free Discharge)
└**1=Exfiltration** (Controls 0.05 cfs)

Primary OutFlow Max=0.07 cfs @ 15.88 hrs HW=125.16' (Free Discharge)
├**2=Orifice/Grate** (Orifice Controls 0.07 cfs @ 1.35 fps)
└**3=Orifice/Grate** (Controls 0.00 cfs)

Pond 1P: Detention Basin



Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 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 PR1A: Detained Runoff Area=64,963 sf 58.76% Impervious Runoff Depth=3.19"
Tc=6.0 min CN=87 Runoff=5.38 cfs 0.397 af

Subcatchment PR1B: Un-Detained Runoff Area=67,952 sf 8.57% Impervious Runoff Depth=1.74"
Flow Length=492' Tc=10.2 min CN=70 Runoff=2.66 cfs 0.227 af

Reach DP-1: DP-1 Inflow=2.69 cfs 0.412 af
Outflow=2.69 cfs 0.412 af

Pond 1P: Detention Basin Peak Elev=125.48' Storage=9,289 cf Inflow=5.38 cfs 0.397 af
Discarded=0.05 cfs 0.102 af Primary=0.60 cfs 0.185 af Outflow=0.65 cfs 0.287 af

Total Runoff Area = 3.051 ac Runoff Volume = 0.624 af Average Runoff Depth = 2.45"
66.90% Pervious = 2.041 ac 33.10% Impervious = 1.010 ac

Summary for Subcatchment PR1A: Detained

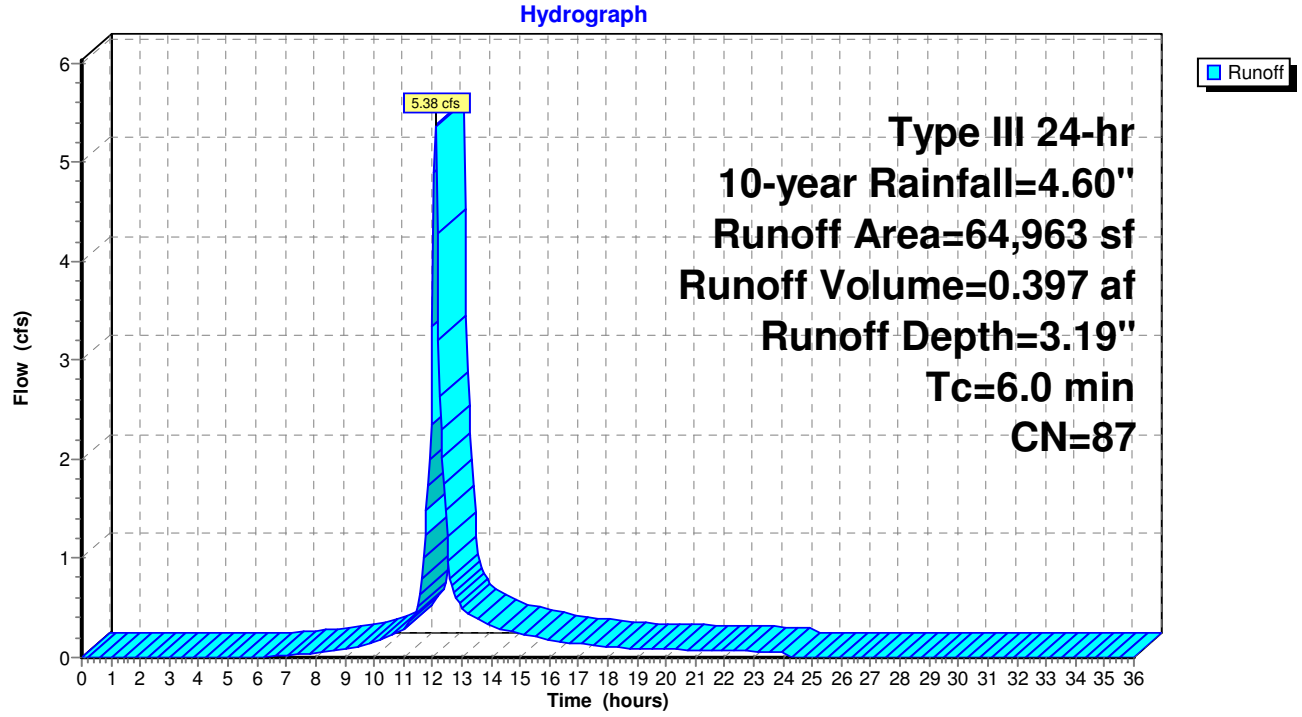
Runoff = 5.38 cfs @ 12.09 hrs, Volume= 0.397 af, Depth= 3.19"
Routed to Pond 1P : Detention Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.60"

	Area (sf)	CN	Description
*	30,079	98	Paved parking and Building HSG C
*	4,489	61	>75% Grass cover, Good, HSG C
*	8,093	98	Detention Basin
	22,302	73	Woods, Fair, HSG C
	64,963	87	Weighted Average
	26,791		41.24% Pervious Area
	38,172		58.76% Impervious Area

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

Subcatchment PR1A: Detained



Summary for Subcatchment PR1B: Un-Detained

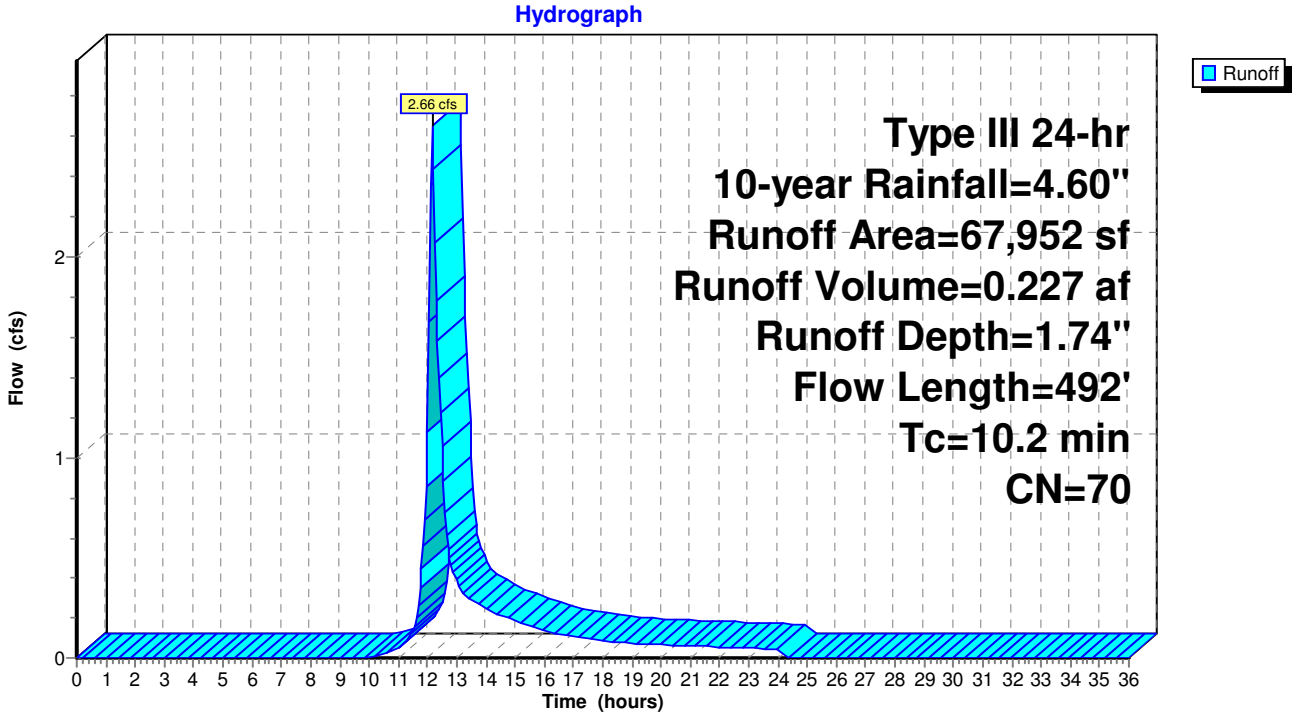
Runoff = 2.66 cfs @ 12.15 hrs, Volume= 0.227 af, Depth= 1.74"
Routed to Reach DP-1 : DP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.60"

Area (sf)	CN	Description
33,768	73	Woods, Fair, HSG C
28,359	61	>75% Grass cover, Good, HSG B
5,825	98	Paved parking, HSG C
67,952	70	Weighted Average
62,127		91.43% Pervious Area
5,825		8.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	25	0.0250	0.06		**Sheet Flow, T1** Woods: Light underbrush n= 0.400 P2= 3.20"
3.7	467	0.0200	2.12		**Shallow Concentrated Flow, T2** Grassed Waterway Kv= 15.0 fps
10.2	492	Total			

Subcatchment PR1B: Un-Detained



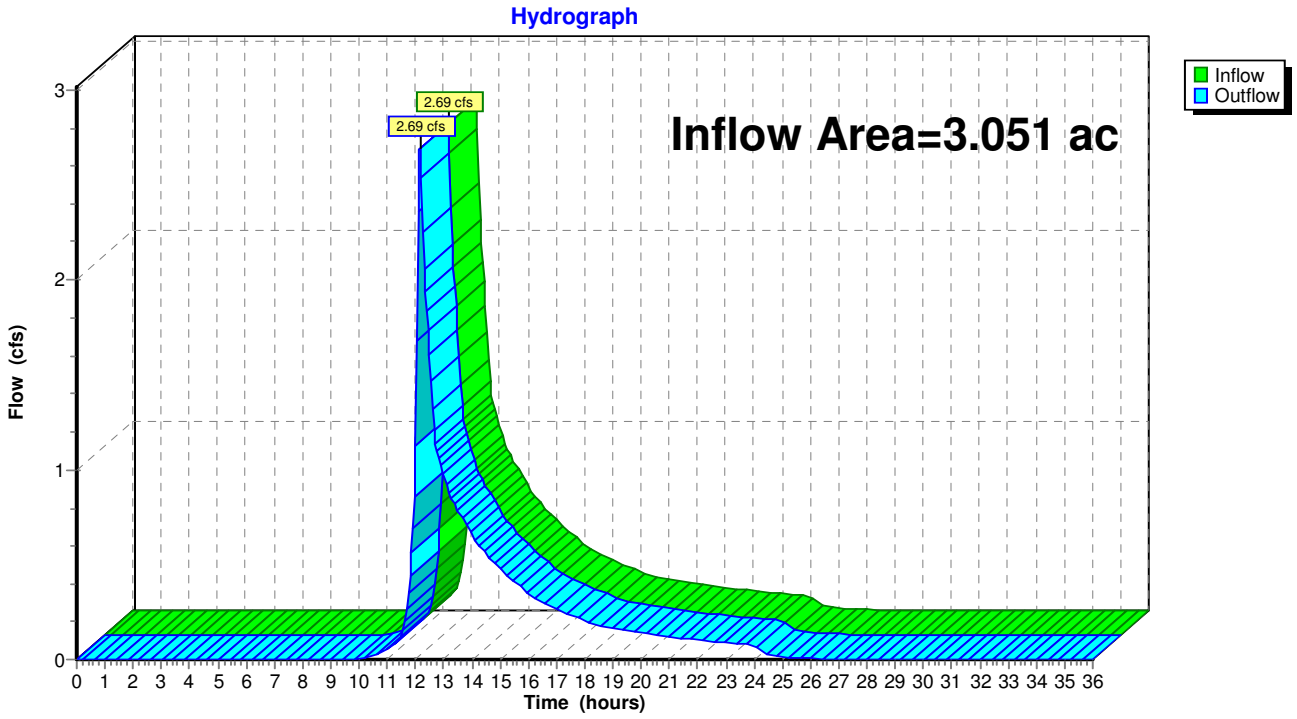
Summary for Reach DP-1: DP-1

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 3.051 ac, 33.10% Impervious, Inflow Depth = 1.62" for 10-year event
Inflow = 2.69 cfs @ 12.16 hrs, Volume= 0.412 af
Outflow = 2.69 cfs @ 12.16 hrs, Volume= 0.412 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Reach DP-1: DP-1



Summary for Pond 1P: Detention Basin

Inflow Area = 1.491 ac, 58.76% Impervious, Inflow Depth = 3.19" for 10-year event
Inflow = 5.38 cfs @ 12.09 hrs, Volume= 0.397 af
Outflow = 0.65 cfs @ 12.75 hrs, Volume= 0.287 af, Atten= 88%, Lag= 39.5 min
Discarded = 0.05 cfs @ 12.75 hrs, Volume= 0.102 af
Primary = 0.60 cfs @ 12.75 hrs, Volume= 0.185 af
Routed to Reach DP-1 : DP-1

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 125.48' @ 12.75 hrs Surf.Area= 6,783 sf Storage= 9,289 cf

Plug-Flow detention time= 356.0 min calculated for 0.286 af (72% of inflow)
Center-of-Mass det. time= 267.4 min (1,071.8 - 804.3)

Volume	Invert	Avail.Storage	Storage Description
#1	124.00'	20,415 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

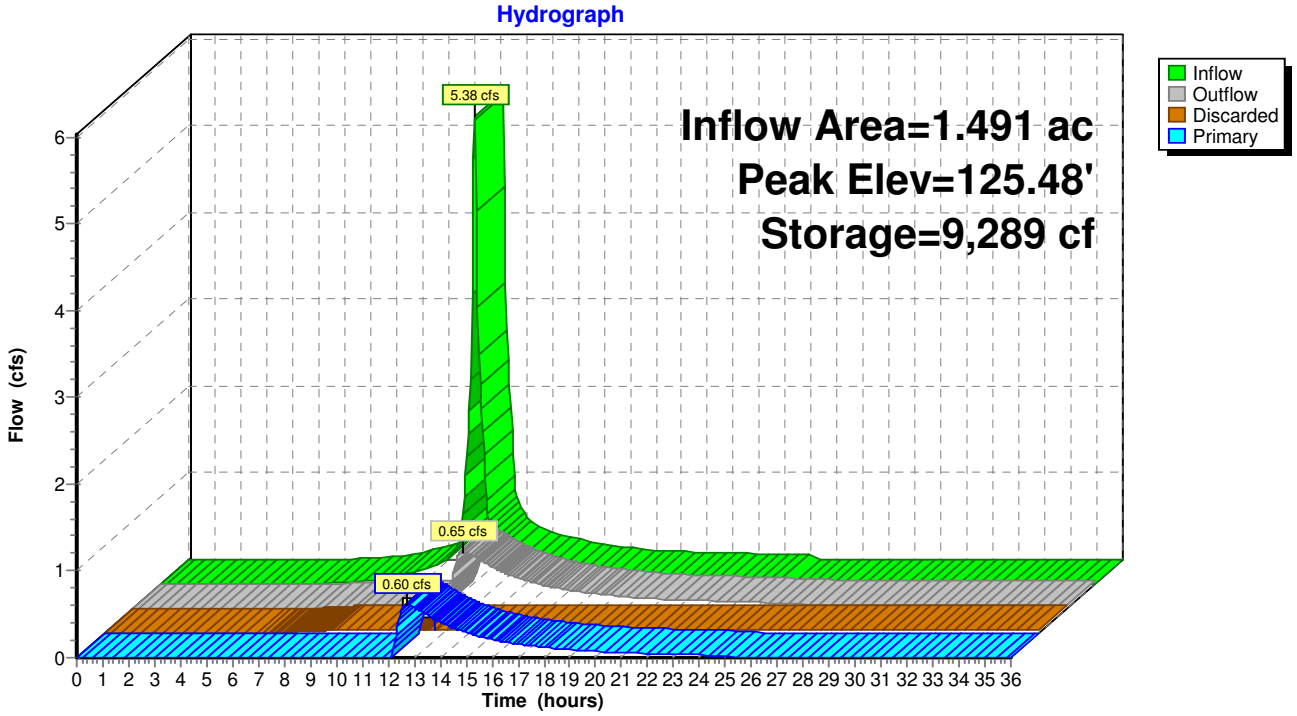
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
124.00	5,782	0	0
125.00	6,450	6,116	6,116
126.00	7,144	6,797	12,913
127.00	7,860	7,502	20,415

Device	Routing	Invert	Outlet Devices
#1	Discarded	124.00'	**0.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 114.00'
#2	Primary	125.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	125.25'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.05 cfs @ 12.75 hrs HW=125.48' (Free Discharge)
└**1=Exfiltration** (Controls 0.05 cfs)

Primary OutFlow Max=0.60 cfs @ 12.75 hrs HW=125.48' (Free Discharge)
├**2=Orifice/Grate** (Orifice Controls 0.46 cfs @ 2.36 fps)
└**3=Orifice/Grate** (Orifice Controls 0.14 cfs @ 1.63 fps)

Pond 1P: Detention Basin



Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 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 PR1A: Detained Runoff Area=64,963 sf 58.76% Impervious Runoff Depth=4.14"
Tc=6.0 min CN=87 Runoff=6.90 cfs 0.514 af

Subcatchment PR1B: Un-Detained Runoff Area=67,952 sf 8.57% Impervious Runoff Depth=2.49"
Flow Length=492' Tc=10.2 min CN=70 Runoff=3.87 cfs 0.324 af

Reach DP-1: DP-1 Inflow=4.43 cfs 0.621 af
Outflow=4.43 cfs 0.621 af

Pond 1P: Detention Basin Peak Elev=125.79' Storage=11,406 cf Inflow=6.90 cfs 0.514 af
Discarded=0.05 cfs 0.105 af Primary=1.20 cfs 0.297 af Outflow=1.25 cfs 0.402 af

Total Runoff Area = 3.051 ac Runoff Volume = 0.838 af Average Runoff Depth = 3.30"
66.90% Pervious = 2.041 ac 33.10% Impervious = 1.010 ac

Summary for Subcatchment PR1A: Detained

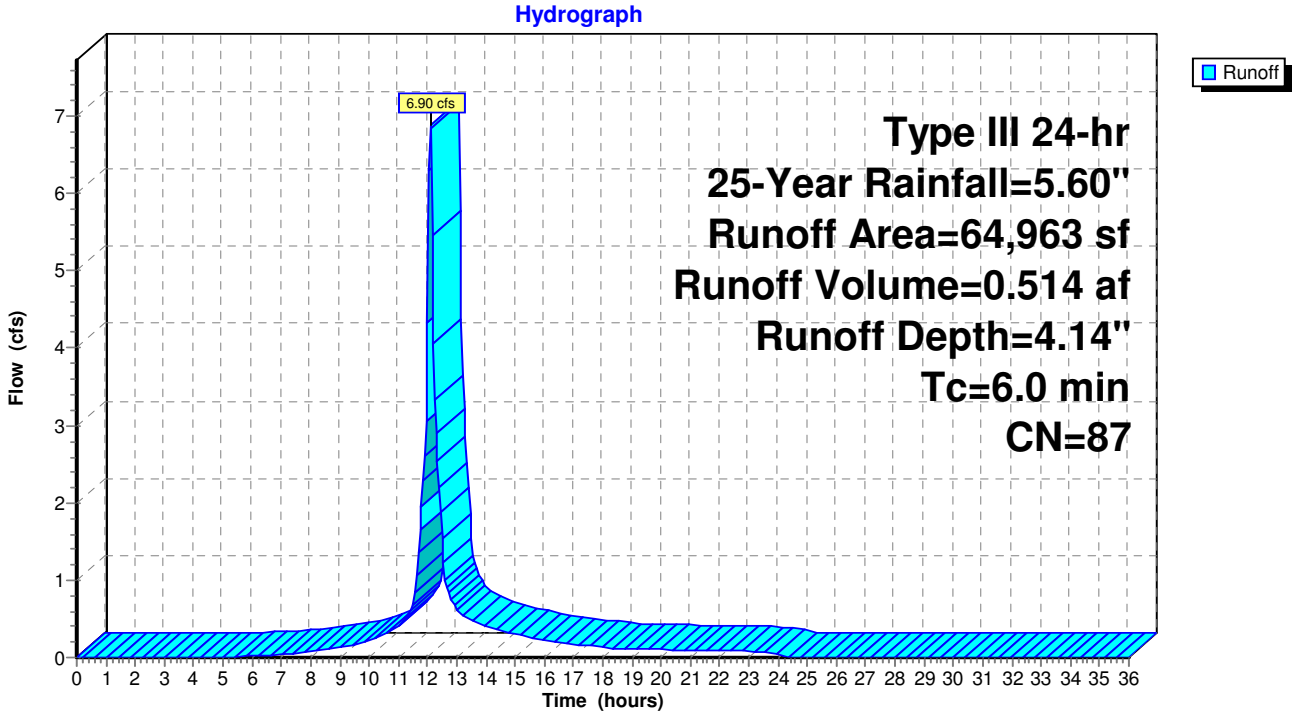
Runoff = 6.90 cfs @ 12.09 hrs, Volume= 0.514 af, Depth= 4.14"
Routed to Pond 1P : Detention Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.60"

	Area (sf)	CN	Description
*	30,079	98	Paved parking and Building HSG C
*	4,489	61	>75% Grass cover, Good, HSG C
*	8,093	98	Detention Basin
	22,302	73	Woods, Fair, HSG C
	64,963	87	Weighted Average
	26,791		41.24% Pervious Area
	38,172		58.76% Impervious Area

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

Subcatchment PR1A: Detained



Summary for Subcatchment PR1B: Un-Detained

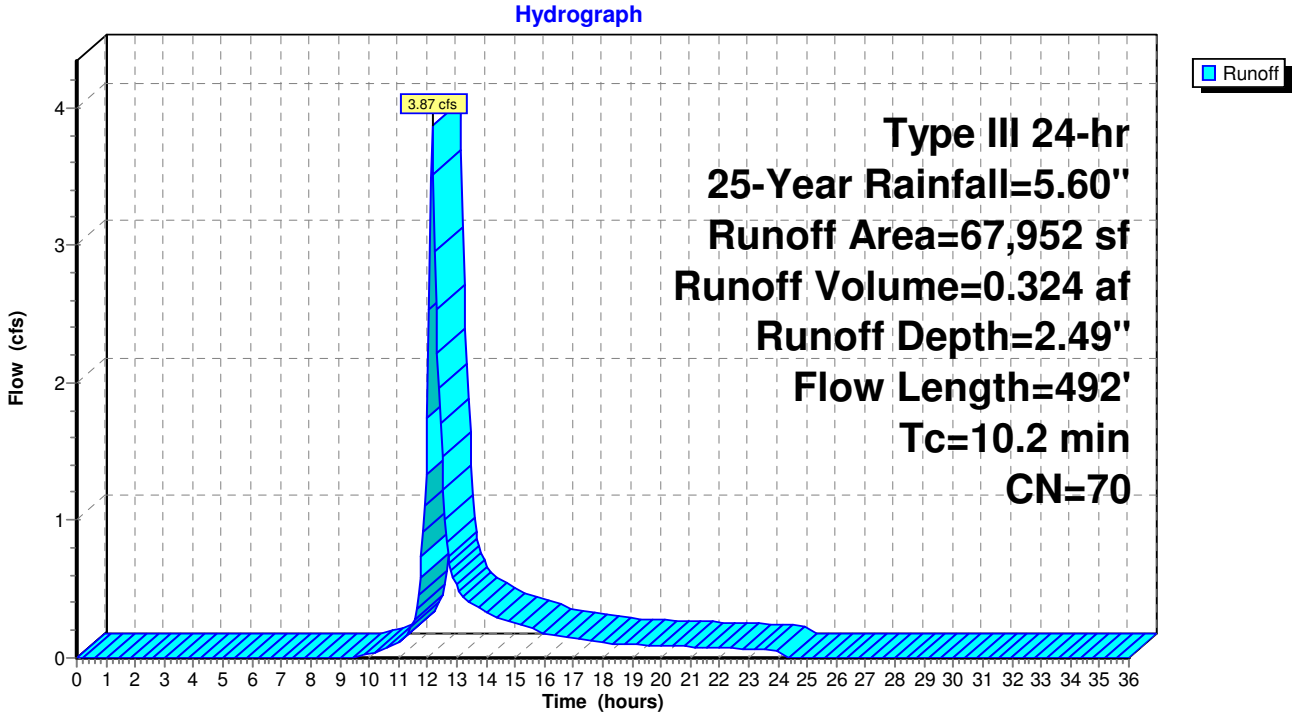
Runoff = 3.87 cfs @ 12.15 hrs, Volume= 0.324 af, Depth= 2.49"
Routed to Reach DP-1 : DP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.60"

Area (sf)	CN	Description
33,768	73	Woods, Fair, HSG C
28,359	61	>75% Grass cover, Good, HSG B
5,825	98	Paved parking, HSG C
67,952	70	Weighted Average
62,127		91.43% Pervious Area
5,825		8.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	25	0.0250	0.06		**Sheet Flow, T1** Woods: Light underbrush n= 0.400 P2= 3.20"
3.7	467	0.0200	2.12		**Shallow Concentrated Flow, T2** Grassed Waterway Kv= 15.0 fps
10.2	492	Total			

Subcatchment PR1B: Un-Detained



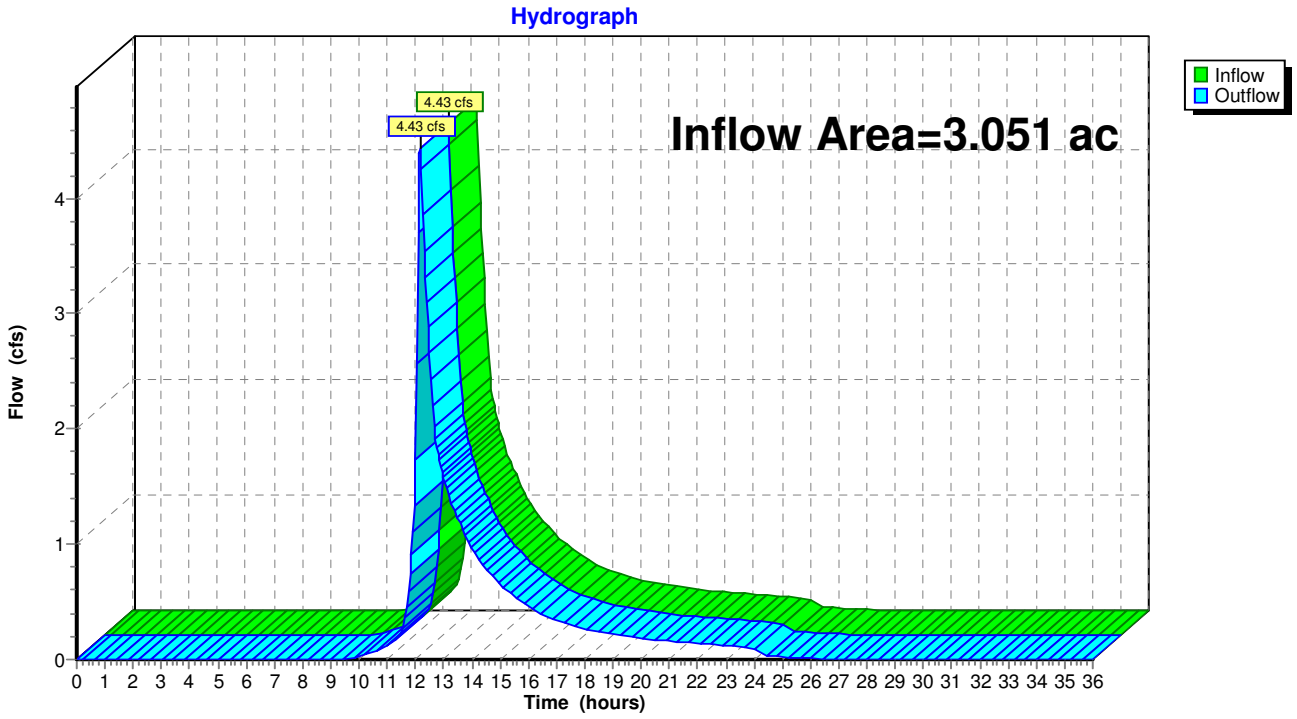
Summary for Reach DP-1: DP-1

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 3.051 ac, 33.10% Impervious, Inflow Depth = 2.44" for 25-Year event
Inflow = 4.43 cfs @ 12.17 hrs, Volume= 0.621 af
Outflow = 4.43 cfs @ 12.17 hrs, Volume= 0.621 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Reach DP-1: DP-1



Summary for Pond 1P: Detention Basin

Inflow Area = 1.491 ac, 58.76% Impervious, Inflow Depth = 4.14" for 25-Year event
Inflow = 6.90 cfs @ 12.09 hrs, Volume= 0.514 af
Outflow = 1.25 cfs @ 12.55 hrs, Volume= 0.402 af, Atten= 82%, Lag= 27.6 min
Discarded = 0.05 cfs @ 12.55 hrs, Volume= 0.105 af
Primary = 1.20 cfs @ 12.55 hrs, Volume= 0.297 af
Routed to Reach DP-1 : DP-1

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 125.79' @ 12.55 hrs Surf.Area= 6,996 sf Storage= 11,406 cf

Plug-Flow detention time= 289.7 min calculated for 0.402 af (78% of inflow)
Center-of-Mass det. time= 212.0 min (1,009.1 - 797.1)

Volume	Invert	Avail.Storage	Storage Description
#1	124.00'	20,415 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

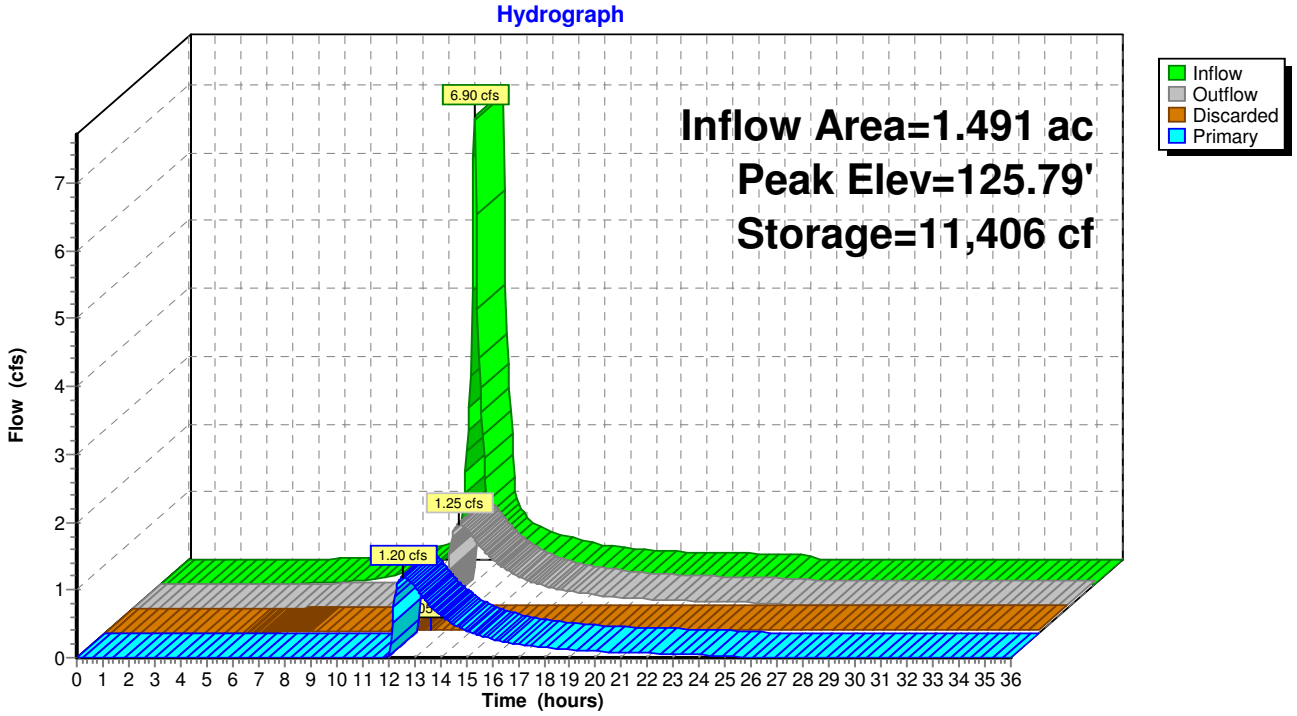
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
124.00	5,782	0	0
125.00	6,450	6,116	6,116
126.00	7,144	6,797	12,913
127.00	7,860	7,502	20,415

Device	Routing	Invert	Outlet Devices
#1	Discarded	124.00'	**0.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 114.00'
#2	Primary	125.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	125.25'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.05 cfs @ 12.55 hrs HW=125.79' (Free Discharge)
└**1=Exfiltration** (Controls 0.05 cfs)

Primary OutFlow Max=1.20 cfs @ 12.55 hrs HW=125.79' (Free Discharge)
├**2=Orifice/Grate** (Orifice Controls 0.69 cfs @ 3.53 fps)
└**3=Orifice/Grate** (Orifice Controls 0.51 cfs @ 2.58 fps)

Pond 1P: Detention Basin



Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 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 PR1A: Detained Runoff Area=64,963 sf 58.76% Impervious Runoff Depth=5.29"
Tc=6.0 min CN=87 Runoff=8.71 cfs 0.657 af

Subcatchment PR1B: Un-Detained Runoff Area=67,952 sf 8.57% Impervious Runoff Depth=3.45"
Flow Length=492' Tc=10.2 min CN=70 Runoff=5.42 cfs 0.449 af

Reach DP-1: DP-1 Inflow=6.70 cfs 0.884 af
Outflow=6.70 cfs 0.884 af

Pond 1P: Detention Basin Peak Elev=126.19' Storage=14,279 cf Inflow=8.71 cfs 0.657 af
Discarded=0.05 cfs 0.109 af Primary=1.70 cfs 0.435 af Outflow=1.76 cfs 0.544 af

Total Runoff Area = 3.051 ac Runoff Volume = 1.106 af Average Runoff Depth = 4.35"
66.90% Pervious = 2.041 ac 33.10% Impervious = 1.010 ac

Summary for Subcatchment PR1A: Detained

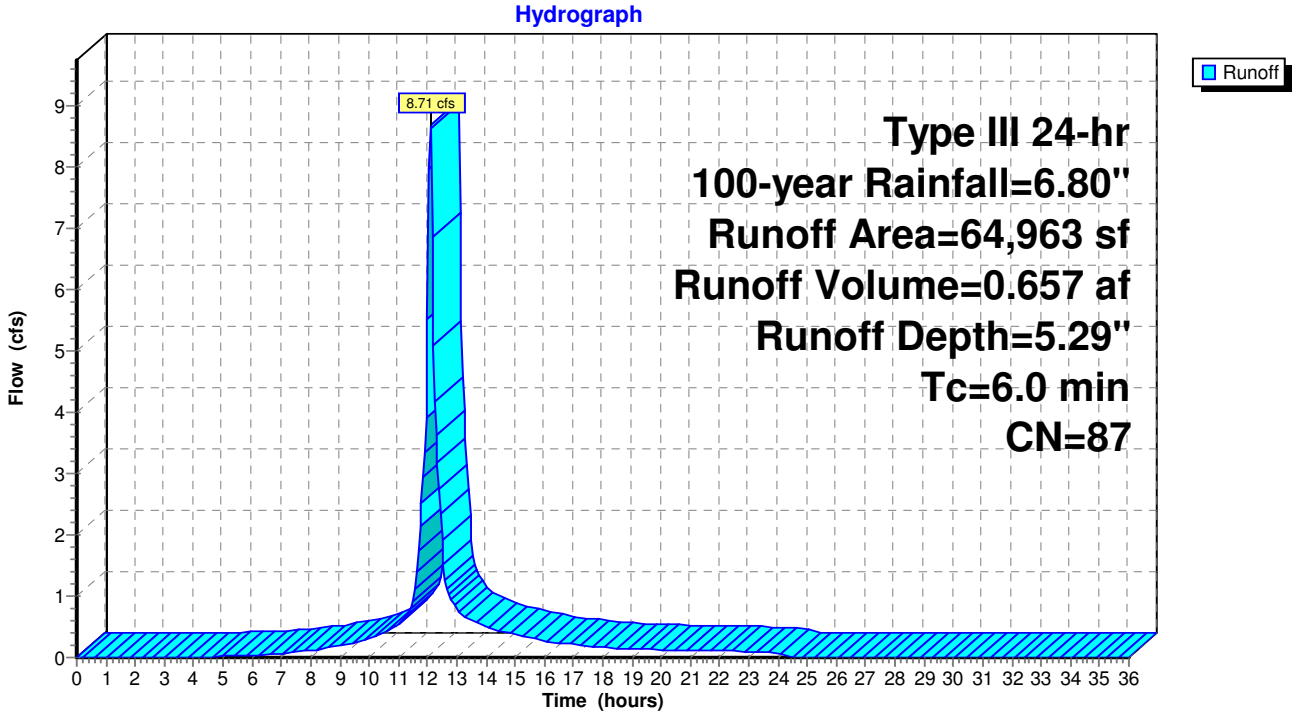
Runoff = 8.71 cfs @ 12.09 hrs, Volume= 0.657 af, Depth= 5.29"
Routed to Pond 1P : Detention Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=6.80"

	Area (sf)	CN	Description
*	30,079	98	Paved parking and Building HSG C
*	4,489	61	>75% Grass cover, Good, HSG C
*	8,093	98	Detention Basin
	22,302	73	Woods, Fair, HSG C
	64,963	87	Weighted Average
	26,791		41.24% Pervious Area
	38,172		58.76% Impervious Area

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

Subcatchment PR1A: Detained



Summary for Subcatchment PR1B: Un-Detained

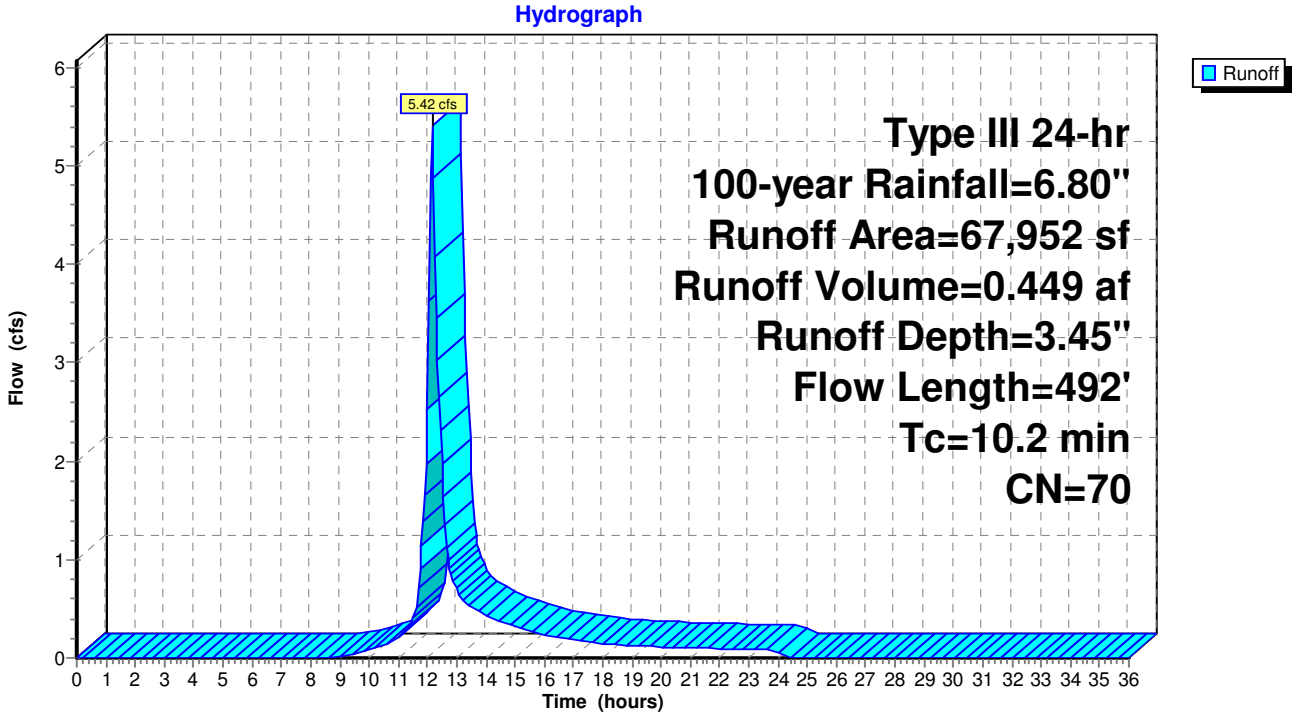
Runoff = 5.42 cfs @ 12.15 hrs, Volume= 0.449 af, Depth= 3.45"
Routed to Reach DP-1 : DP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=6.80"

Area (sf)	CN	Description
33,768	73	Woods, Fair, HSG C
28,359	61	>75% Grass cover, Good, HSG B
5,825	98	Paved parking, HSG C
67,952	70	Weighted Average
62,127		91.43% Pervious Area
5,825		8.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	25	0.0250	0.06		**Sheet Flow, T1** Woods: Light underbrush n= 0.400 P2= 3.20"
3.7	467	0.0200	2.12		**Shallow Concentrated Flow, T2** Grassed Waterway Kv= 15.0 fps
10.2	492	Total			

Subcatchment PR1B: Un-Detained



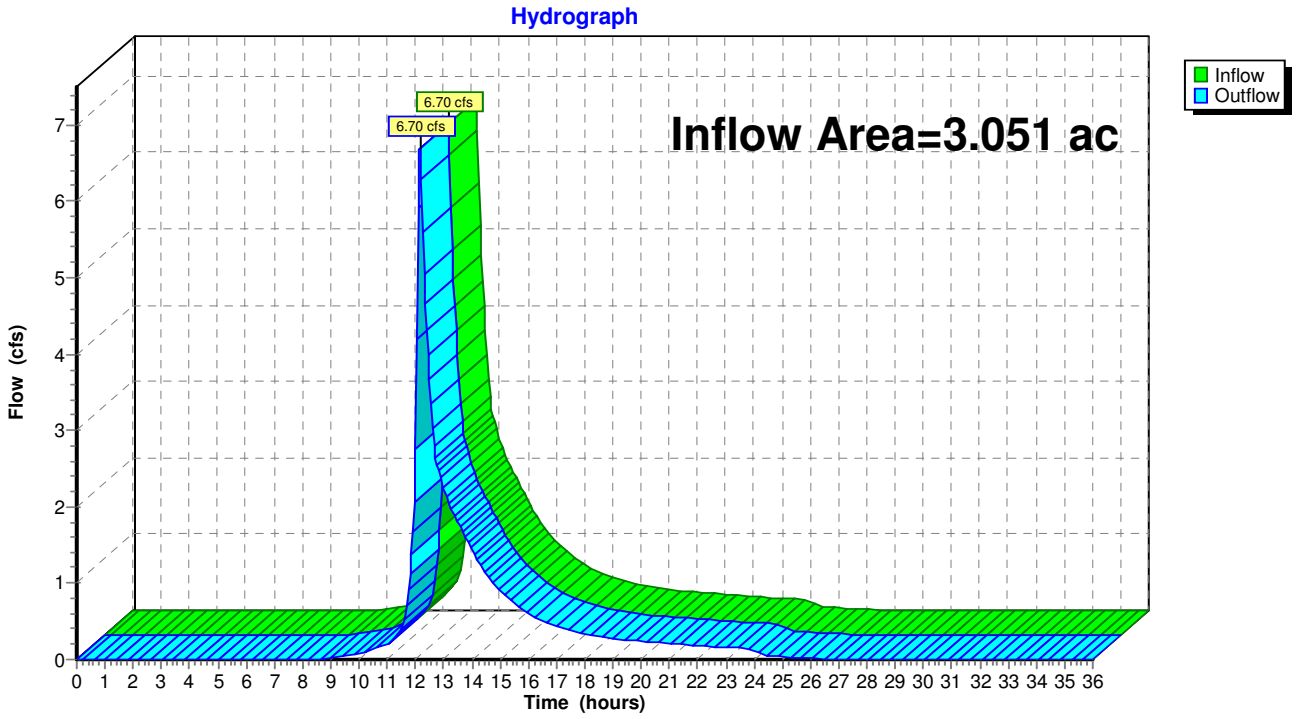
Summary for Reach DP-1: DP-1

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 3.051 ac, 33.10% Impervious, Inflow Depth = 3.48" for 100-year event
Inflow = 6.70 cfs @ 12.16 hrs, Volume= 0.884 af
Outflow = 6.70 cfs @ 12.16 hrs, Volume= 0.884 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Reach DP-1: DP-1



Summary for Pond 1P: Detention Basin

Inflow Area = 1.491 ac, 58.76% Impervious, Inflow Depth = 5.29" for 100-year event
Inflow = 8.71 cfs @ 12.09 hrs, Volume= 0.657 af
Outflow = 1.76 cfs @ 12.52 hrs, Volume= 0.544 af, Atten= 80%, Lag= 25.9 min
Discarded = 0.05 cfs @ 12.52 hrs, Volume= 0.109 af
Primary = 1.70 cfs @ 12.52 hrs, Volume= 0.435 af
Routed to Reach DP-1 : DP-1

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 126.19' @ 12.52 hrs Surf.Area= 7,280 sf Storage= 14,279 cf

Plug-Flow detention time= 249.2 min calculated for 0.544 af (83% of inflow)
Center-of-Mass det. time= 180.0 min (970.3 - 790.3)

Volume	Invert	Avail.Storage	Storage Description
#1	124.00'	20,415 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

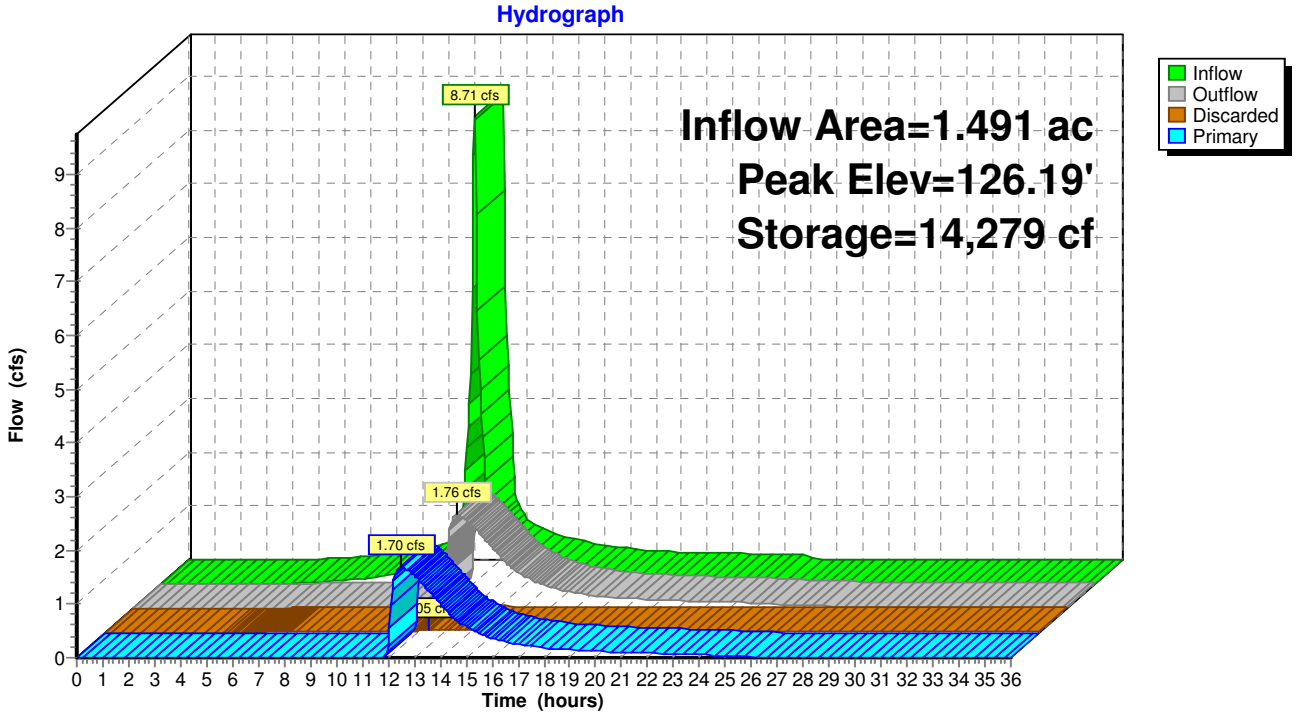
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
124.00	5,782	0	0
125.00	6,450	6,116	6,116
126.00	7,144	6,797	12,913
127.00	7,860	7,502	20,415

Device	Routing	Invert	Outlet Devices
#1	Discarded	124.00'	**0.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 114.00'
#2	Primary	125.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	125.25'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.05 cfs @ 12.52 hrs HW=126.19' (Free Discharge)
└**1=Exfiltration** (Controls 0.05 cfs)

Primary OutFlow Max=1.70 cfs @ 12.52 hrs HW=126.19' (Free Discharge)
├**2=Orifice/Grate** (Orifice Controls 0.92 cfs @ 4.66 fps)
└**3=Orifice/Grate** (Orifice Controls 0.78 cfs @ 3.99 fps)

Pond 1P: Detention Basin



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Appendix B –
Water Quality & TSS Calculations

The proposed design exceeds the Department of Environmental Protection requirements for Best Management Practices and water quality.

- TSS Removal Calculations
- Infiltration Volume Calculations
- Stormceptor Maintenance Information

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

Version 1, Automated: Mar. 4, 2008

Location: Winter Valley Residences Building 6

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Street Sweeping - 5%	0.05	1.00	0.05	0.95
Stormceptor 450i	0.80	0.95	0.76	0.19
Detention Basin	0.80	0.19	0.15	0.04
	0.00	0.04	0.00	0.04
	0.00	0.04	0.00	0.04

Total TSS Removal = 96%

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

Project: WINTER VALLY RESIDENCES BLDG 6
Prepared By: DeVellis Zrein, Inc.
Date: 4-Nov-22

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

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

DeVellis Zrein Inc.
Land Planning / Civil Engineering
PO Box 307
Foxboro MA 02035

Computations

Project	Winter Valley Residences Bldg 6	Project #	2G1S-455
Location	Milton MA	Sheet	1 of 1
Calculated by	*JJD*	Date	11/1/2022
Checked by	*TOG*	Date	11/1/2022
Title	Recharge Calculations		

Methodology MA Department of Environmental Protection (DEP) Stormwater Management (Volume One)

Design Criteria: Based on the Site Hydrologic Soil Group:

Hydrologic Soil Group	Volume to Recharge (x Total Imp. Area)
A	0.60 inches of runoff
B	0.35 inches of runoff
C	0.25 inches of runoff
D	0.10 inches of runoff

Recharge Area Required:

Existing Impervious areas = 0.203 acres
Proposed Impervious areas = 1.011 acres
Differential Impervious areas = 0.808 acres = 35,196 sq ft
Required recharge Volume = 35,196 sf x 0.25/12 = 734 cubic feet

Recharge Area Provided:

Evaluation of the infitration for the 2-year storm event that is exfiltrated into the ground separate from what is discharges through the outlet control structure
Exfiltration = 0.096 acre feet
(0.096 acre feet) x (43560 cu ft / acre feet) = 4181 cubuc feet

Required infiltration volumer = 734 cubic feet
Provided infiltration volumer = 4181 cubic feet
The infiltration requirment has been exceeded by a factor of 5+

Inspection and Maintenance. Easy. Convenient.

When it rains, oils, sediment and other contaminants are captured and contained by over 20,000 Stormceptor units operating worldwide. While Stormceptor's patented scour prevention technology ensures captured pollutants remain in the unit during all rainfall events, the accumulated pollutants must eventually be removed as part of a regular maintenance program.

If neglected, oil and sediment gradually build up and diminish any BMP's efficiency, harming the environment and leaving owners and operators vulnerable to fines, surcharges and bad publicity.

Maintenance is a must

Ease, frequency and cost of maintenance are often overlooked by specifiers when considering the merits of a stormwater treatment system. In reality, maintenance is fundamental to the long-term performance of any stormwater quality treatment device.

While regular maintenance is crucial, it shouldn't be complicated. An ongoing maintenance program with Stormceptor is convenient and practically effortless. With virtually no disruptions, you can concentrate on your core business.

Quick inspections

Inspections are easily carried out above ground from any standard surface access cover through a visual inspection of the orifice and drop tee components. A sludge judge and oil dip-stick are all that are needed for sediment and oil depth measurements.

Easy unit access

Maintenance is typically conducted from the same surface access cover, eliminating the need for confined space entry into the unit. Your site remains undisturbed, saving you time and money.

No muss, no fuss and fast

Maintenance is performed quickly and inexpensively with a standard vacuum truck. Servicing usually takes less than two hours, with no disruption to your site.

A complete stormwater management plan for Stormceptor extends beyond installation and performance to regular maintenance. It's the smart, cost-effective way to ensure your unit continues to remove more pollutants than any other separator for decades to come.

Stormceptor maintenance recommendations

- Units should be inspected post-construction, prior to being put into service.
- Inspect every six months for the first year of operation to determine the oil and sediment accumulation rate.
- In subsequent years, inspections can be based on first-year observations or local requirements.
- Cleaning is required once the sediment depth reaches 15% of storage capacity, (generally taking one year or longer). Local regulations for maintenance frequency may vary.
- Inspect the unit immediately after an oil, fuel or chemical spill.
- A licensed waste management company should remove captured petroleum waste products from any oil, chemical or fuel spills and dispose responsibly.

With over 20,000 units operating worldwide, Stormceptor performs and protects every day, in every storm.

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CANADA: (800) 565 4801

Appendix C –
Site Plans

Attached Separately: Site plans titled Site Plan Approval & Notice of Intent, Winter Valley Residences Building 6 at 600 Canton Avenue Milton, Massachusetts dated November 4, 2022 are the plans supporting this drainage analysis.

END OF DRAINAGE REPORT