

Proposed Commercial Development

1263 Hopmeadow Street
Simsbury, CT

PREPARED FOR

Prospect Enterprises, LLC
231 Farmington Avenue
Farmington, CT 06032

PREPARED BY



100 Great Meadow Road
Suite 200
Wethersfield, Connecticut
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May 2023





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Project Summary

Project Description

The Applicant, Prospect Enterprises LLC, is proposing to construct a commercial development including a 2,400 restaurant with drive thru, a 2,325 restaurant with drive thru, an 11,600sf retail building, and drive up ATM, along with all associated utilities, drive aisles, parking area, stormwater management facilities and landscaping to support this use.

Site Description

The ±4.5-acre Project Area (Site) is located at 1263 Hopmeadow Street and consists of four parcels (Assessor's Tax ID 105-403-017, -017R, -018, -020-1) in Simsbury, Connecticut (Figure 1). The Site is currently zoned B-2 General Business and is within Level A Aquifer Protection Zone.

Under existing conditions, the site, formerly a car dealership, contains vacant buildings surrounded by predominantly broken pavement surface. The site is primarily impervious (80%) surrounded by commercial developments to both the north (Big Y Supermarket) and south (Dunkin'). There is a vacant broken lot to the south (west of Dunkin') which borders the southern portion of the western half of the site. A residential apartment complex borders the site to the west which is buffered by mature trees. Hopmeadow Street (Route 202) borders the site to the East.

There is a grade change across the existing site, ranging from elevation 196 at the rear of the site, to elevation 175 at the street. Under existing conditions, the majority of the untreated stormwater runoff from the site flows overland into the Hopmeadow Street right of way.

From available data, the NRCS surface soils on the Site were classified as hydraulic group ratings of "D", indicating soils having a low infiltration rate when thoroughly wet. See Appendix B for NRCS Classification documentation. However, according to the report titled "Off Site Storm Drainage Analysis" prepared for the Big Y (neighboring property to the north), prepared by F.A. Hesketh & Associates, Inc., revised through April 26, 2013, the underlying soils are made up of sand and gravel which are highly permeable. In addition, a geotechnical



report prepared by GEI dated April 22, 2021 that collected test pit data from the rear portion of the parcel classified the soils as sand to sand with gravel and silt to silty sand. Since these documented sources identify the on-site soils as highly permeable (sandy), it would be justified to use a type "A" rating in the hydrologic analysis. To be conservative, for modeling purposes, the soil types were selected to be a type "B".

The project was designed to incorporate aspects of the Simsbury Stormwater Design Guidelines and the Connecticut Stormwater Quality Manual. Low impact development stormwater management techniques used will focus on decentralizing stormwater management areas and incorporate smaller stormwater management techniques to reduce peak runoff rates, maximize groundwater recharge and treatment for water quality. Stormwater quantity and quality measures within the site have been designed in most cases to meet the adjusted performance standard of 110% as required in Table 1.1 "Other Zones" of the Simsbury Stormwater Management Guidelines dated September 28, 2011 (exceptions stated herein).



Figure 1: Site Locus Map



Study Location Map
Commercial Development

Simsbury, CT

Figure 1

Existing Drainage Conditions

Under existing conditions, untreated stormwater runoff from the majority of the site flows overland towards the east and to the closed drainage system in Hopmeadow Street. The site generally slopes from the west to the east, from a peak elevation of 196 at the western property line, down to elevation 175 at the street line. The site is tiered with the lower eastern portion of the site at approximate elevation 177 and the upper western portion at elevation 195 with a steep central drive connecting the two tiers.

Hydrologic Information

For the existing conditions hydrologic analysis, the site was considered one large drainage area discharging to 1 design point, where peak discharge rates were evaluated (see Figure 2).

Drainage Area 1 - This ±5-acre area comprises the site area along with the surrounding area that discharges across the site. This area consists mainly of impervious cover with untreated stormwater flowing towards the eastern property line where it is captured by the catch basins in Hopmeadow Street (Design Point DP-1).

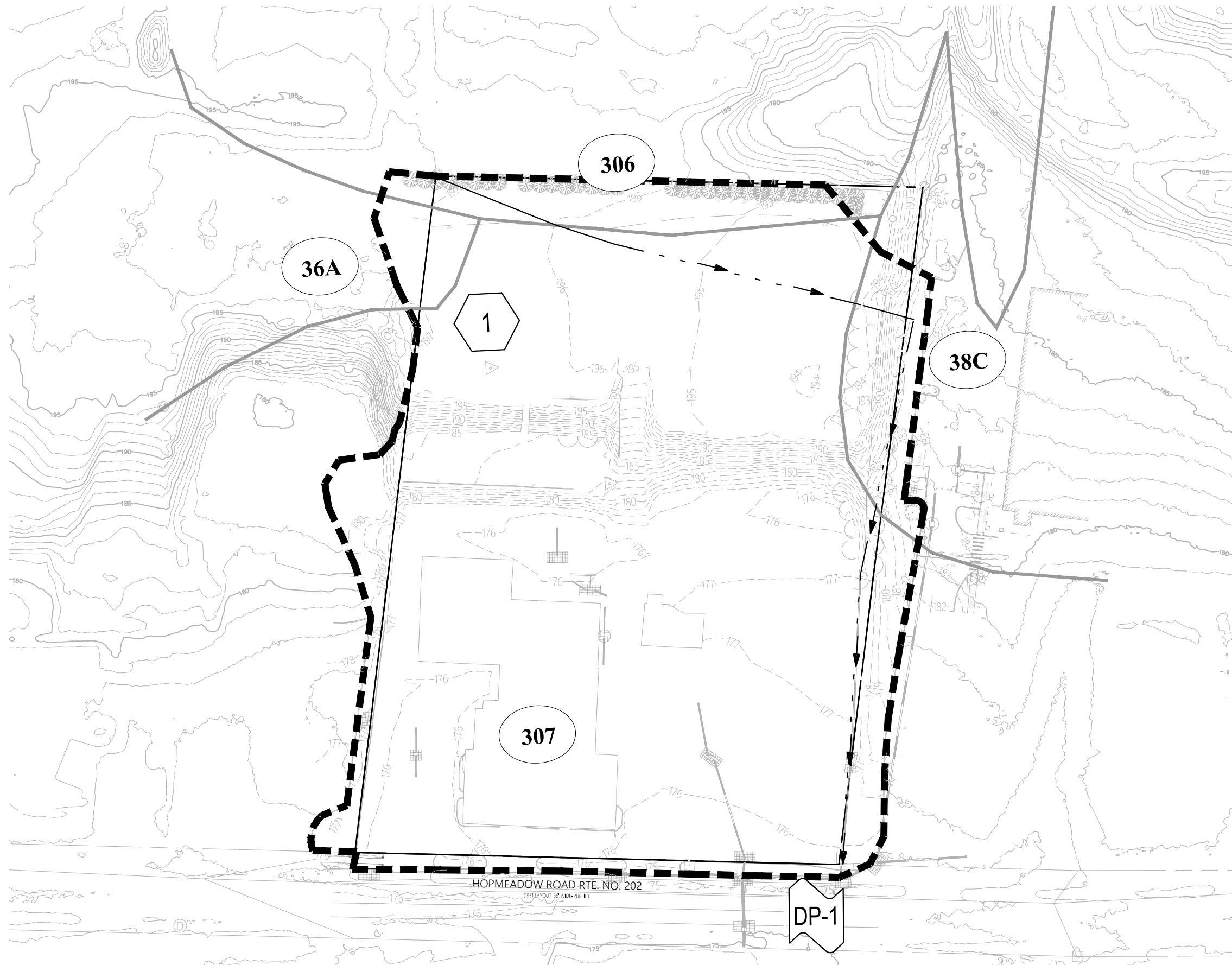
Table 1 summarizes the key hydrologic parameters used in the existing conditions analysis.

Table 1
Existing Conditions Hydrologic Data

<i>Drainage Area</i>	<i>Discharge Location</i>	<i>Design Point</i>	<i>Area (acres)</i>	<i>Curve Number</i>	<i>Time of Concentration (min)</i>
1	Hopmeadow Street	DP-1	5.0	88	23.8



Figure 2: Existing Drainage Areas



Legend

SYMBOLS



DESIGN POINT

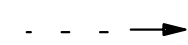


DRAINAGE AREA DESIGNATION

LINETYPES



DRAINAGE AREA BOUNDARY



TIME OF CONCENTRATION FLOW LINE



SOIL TYPE BOUNDARY

SCS SOIL CLASSIFICATIONS

36A

WINDSOR LOAMY SAND, 0 TO 3 SLOPES, HSG A

38C

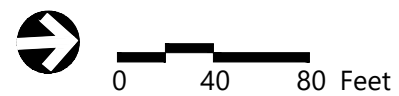
HINCKLEY LOAMY SAND, 0 TO 3 PERCENT SLOPES, HSG A

306

UDORTHENTS, URBAN LAND COMPLEX, HSG B

307

URBAN LAND, HSG D



Existing Drainage Conditions

Figure 2

Commercial Development
1263 Hopmeadow St, Simsbury CT

May 26, 2023

Proposed Drainage Conditions

Under proposed conditions, the Site has been designed to mimic existing conditions topography and drainage patterns. Stormwater best management practices (BMPs) and Low Impact Development (LID) are incorporated to the maximum extent practicable.

As shown on the Layout and Materials Site Plan, the site will consist of approximately 60% impervious surface.

Under proposed conditions, stormwater runoff from the majority of the site will be collected by deep sump hooded catch basins and conveyed through a hydrodynamic water quality unit providing pretreatment prior to discharging to the closed drainage system in Hopmeadow Street. An above ground rain garden at the southeast corner of the site will collect runoff from the southern portion of the property along with the roof runoff from the southern building. The rain garden as designed will infiltrate up to the 10-year storm event. The remaining two proposed buildings will direct their roof runoff to separate subsurface infiltration systems designed to infiltrate the 2-year storm event prior to connecting to the on-site closed drainage system.

Per the Simsbury Stormwater Guidelines, the site has been designed to meet water quality recharge volume requirements for 50% of the post development effective impervious area (see Appendix C for calculations).

Recharge Per Guidelines	Recharge Provided
1,855 c.f.	1,894 c.f.



Hydrologic Information

For the proposed conditions hydrologic analysis, the site was divided into three (3) drainage areas that drain to one design point as shown in the proposed conditions evaluation (see Figure 3).

Drainage Area 1 This drainage area consist of the majority of the site. Stormwater runoff is collected by catch basins with 4' sumps and piped through the closed drainage system to a hydrodynamic water quality unit prior to being discharged to the state closed drainage system in Hopmeadow Street (Design Point DP-1).

Drainage Area 2 This drainage area consists primarily of the pervious strip along the southern property line. Area from the southern adjacent property along with the roof runoff from the adjacent 2,400sf restaurant also contributes to this drainage area. Runoff from these portions of the site drain to an infiltration/rain garden designed to infiltrate up to the 10-year storm event. Overflow is captured by a catch basin and outlets to the on-site closed drainage system prior to discharging to the state closed drainage system in Hopmeadow Street (Design Point DP-1). The outlet elevation was set using the following parameters: ensuring the 2-year storm event would fully infiltrate, minimizing depth of the basin and attempting to ensure as close to 1' of freeboard as possible at the 100-year storm event.

Drainage Area 3 This area consists of the roof for the retail building. Roof runoff is collected by roof drains connected to an underground header pipe that disperses to an underground stormwater infiltration system (StormTech STC-740) designed to infiltrate up to the 2-year storm event. Stormwater that does not infiltrate is piped to the on-site closed drainage system that outlets to the closed drainage system in Hopmeadow Street (Design Point DP-1).

Drainage Area 4 This area consists of the roof for the northern restaurant building. Similar to Drainage Area 3, roof runoff is collected by roof drains connected to an underground header pipe that disperses to an underground stormwater infiltration system (StormTech STC-310) designed to infiltrate up to the 2-year storm event. Stormwater that does not infiltrate back is piped to the on-site closed drainage system that outlets to the closed drainage system in Hopmeadow Street (Design Point DP-1).

Table 2 summarizes the key hydrologic parameters for each drainage area used in the proposed conditions analysis.



Table 2
Proposed Conditions Hydrologic Data

<i>Drainage Area</i>	<i>Discharge Location</i>	<i>Design Point</i>	<i>Area (acres)</i>	<i>Curve Number</i>	<i>Time of Concentration (min)</i>
1	Hopmeadow Street	DP-1	4.14	83	19.4
2	Hopmeadow Street	DP-1	0.41	61	5
2A	Hopmeadow Street	DP-1	0.10	98	5
3	Hopmeadow Street	DP-1	0.27	98	5
4	Hopmeadow Street	DP-1	0.05	98	5

The drainage system has been designed with a treatment train including hooded catch basins with 4' sumps, hydrodynamic water quality units, infiltration systems, and an infiltration basin/rain garden. The proposed BMPs are consistent with those outlined in the Simsbury Stormwater BMP Selection Matrix outlined in Appendix C.

Details of the stormwater water management system features are as follows:

Water Quantity and Quality Control

Water quantity and quality control measures are outlined below. See Appendix E for details of the ongoing Stormwater Management System Long Term Operation and Maintenance Plan.

Source Control

A comprehensive source control program will be implemented at the site, which includes regular pavement sweeping, catch basin cleaning, and enclosure and maintenance of all dumpsters, compactors, and loading areas as well as trash and sediment removal from all LID stormwater features. Further discussion of the site maintenance is included in the Stormwater Management Long Term Operation and Maintenance Plan included in Appendix E.

Catch Basins with Sumps and Oil/debris Traps

Catch basins at the site are to be constructed with sumps (minimum 4-feet) and oil/debris traps (where applicable) to prevent the discharge of sediments and floating contaminants.



Water Quality Units

The hydrodynamic water quality unit will be a manhole-type structure which relies on flowing stormwater to swirl within the units, allowing sediment to settle by gravity efficiently removing total suspended solids (TSS) and freeing oil from the stormwater run-off. The units prevent the resuspension of settled material and allow for safe and easy removal of collected material. All stormwater that enters the closed drainage system will pass through a water quality unit before being directed to the primary treatment component.

Subsurface Infiltration Systems

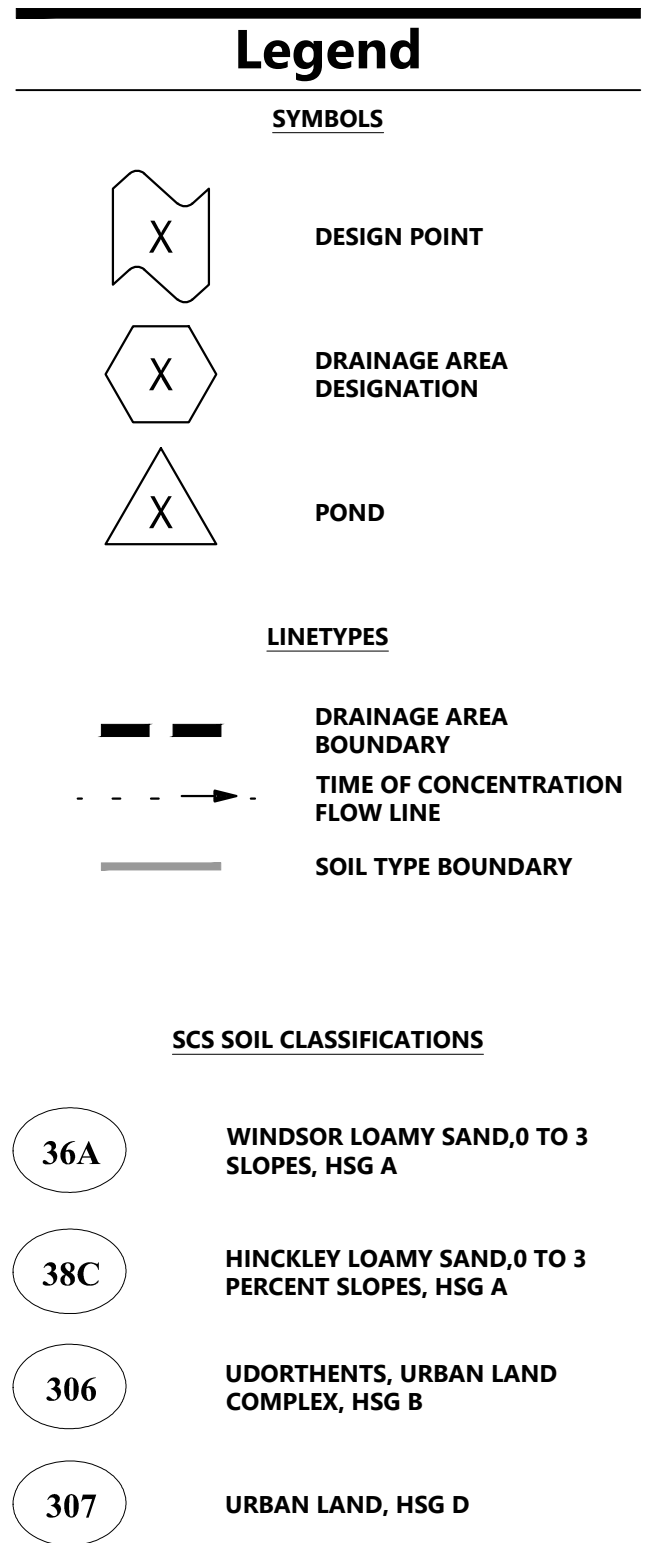
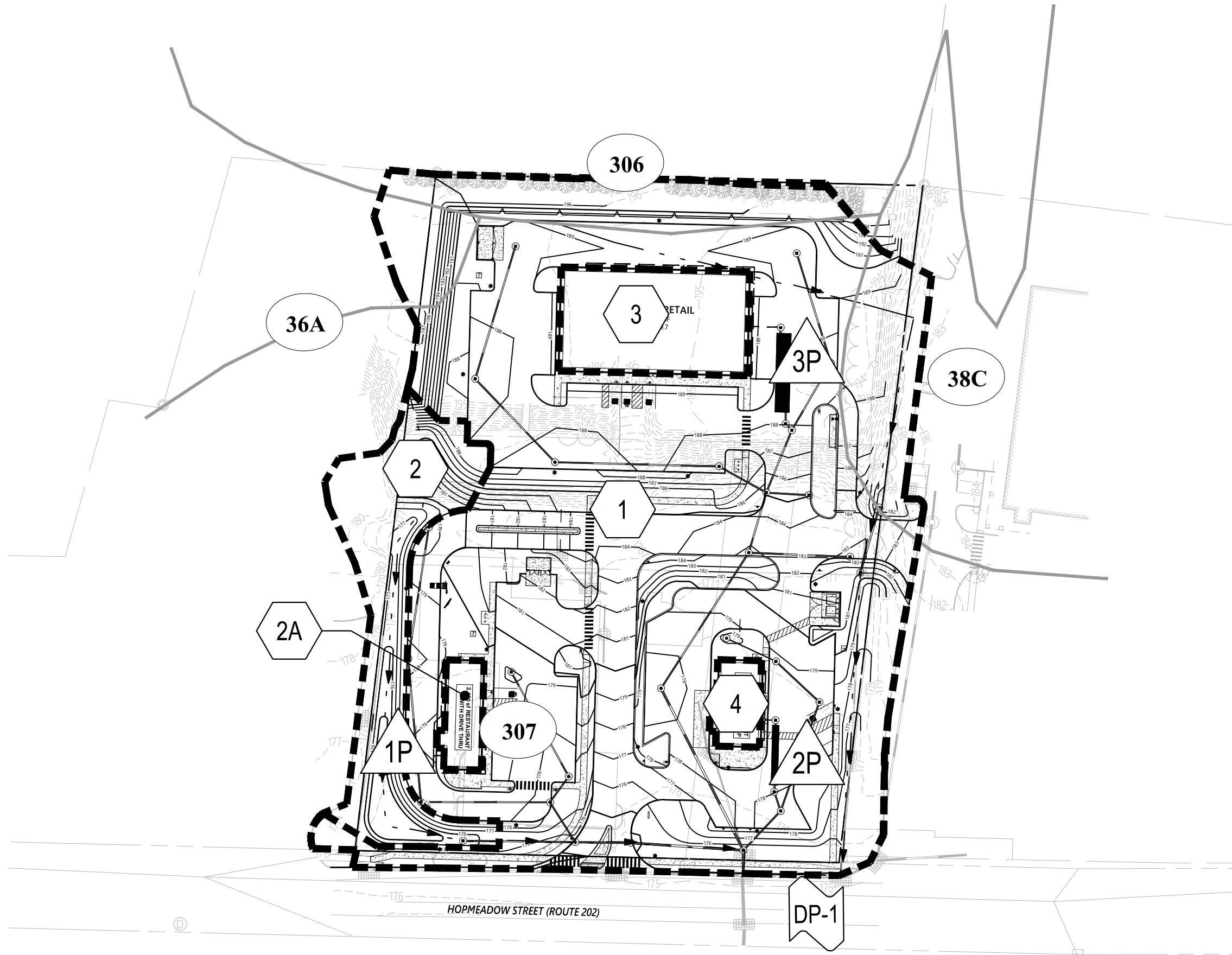
Two subsurface infiltration systems are independently designed to infiltrate runoff from the retail building (StormTech STC-740) and northern restaurant building (StormTech STC-310). The design of the chambers includes a permeable bottom that allows for exfiltration of the 2-year storm event prior to entering the closed drainage system.

Rain Garden

An above ground rain garden is located at the southeastern corner of the site along Hopmeadow Street. The basin is designed to infiltrate stormwater runoff up to the 10-year storm event. Overflow from the surface basin will flow into a catch basin and outlet to the closed on-site drainage system.



Figure 3: Proposed Drainage Areas



Hydrologic/Hydraulic Analysis

Hydrologic Analysis

The rainfall-runoff was evaluated for the 2, 10, 25, 50 and 100-year storm recurrence. Rainfall volumes used for this analysis were based on the National Weather Service NOAA Hydrometeorological Design Studies Center, Type III, 24-hour storm event for the town of Simsbury, CT. Rainfall volumes were 3.28, 5.28, 6.53, 7.44, 8.45 respectively. Runoff coefficients for the pre- and post- development conditions, as shown in the tables below were determined using NRCS Technical Release 55 (TR-55) methodology as provided in the HydroCAD reports found in Appendix F.

Peak rates have been reduced for all required storms (2, 10, 25, 50, 100-year storm events). In addition, the 2-, 10-, 25-year design storm events for the site have been reduced by an additional 10% as required in Table 1.1 "Other Zones" of the Simsbury Stormwater Management Guidelines dated September 28, 2011.

Table 3 presents a summary of the existing and proposed conditions peak discharge rates.

Table 3
Peak Discharge Rates (cfs*)

Design Point	2-year	10-year	25-year	50-year	100-year
Design Point 1: Hopmeadow Street					
Existing	7.5	14.1	18.1	21.1	24.4
Proposed	5.5	12.0	16.1	19.6	23.1

* Expressed in cubic feet per second



Hydraulic Analysis

The closed drainage system was designed for the 25-year storm event, in accordance with the Town of Simsbury Stormwater Management Guidelines.

Drainage pipes were sized using Manning's Equation for full-flow capacity and the Rational Method. Additionally, the performance of the system was analyzed using StormCAD, a HEC-22 based program. Pipe sizing calculations are included in Appendix C of this report.

Floodplain Information / Analysis

The site is located within FEMA Flood Zone X area of minimal flood hazard as shown on the FEMA Floodway Map, Panel No. 09003C0193F dated September 26, 2008 (included in Appendix B).



Appendix A:

Town of Simsbury Site Planning and Design Criteria Checklist

Conformance with the following criteria shall be initialed in the spaces provided by a registered Connecticut Professional Engineer. If site conditions partially or completely prevent implementation of any specific criteria, documentation demonstrating technical infeasibility must be provided.

Item #	Description	Verified	Technically Infeasible	Not Applicable	
Watershed	1.1	Development avoids sensitive natural resource areas and their buffers, including but not limited to: designated natural resource protection areas, riverfront buffers, steep slopes, wildlife habitats, and forests.	✓		
	1.2	Development and redevelopment is within Simsbury Center or other areas designated to be compact and walkable, including developments utilizing the Simsbury Center Code, Planned Area Development Designation, or other cluster development designs, or other compact and walkable areas as determined by Town Staff in order to concentrate development and minimize total impervious area in the watershed.			✓
	1.3	Public open space and recreation areas are designed as Special Detention Areas per Stormwater Article Section 1.2C to provide both public use and neighborhood-scale stormwater mitigation.			✓
	1.4	Neighborhood planning within Simsbury Center follows the general principles established in the Simsbury Center Watershed Planning and Design Framework.			✓
Neighborhood	2.1	An existing conditions plan is provided documenting sensitive natural resources including existing wetlands, streams, ponds, vernal pools, flood zones, soil types and infiltration rates, steep slopes, treelines and trees 12" caliper and greater, septic tanks and fields, and natural topography.	✓		
	2.2	Using the existing conditions plan as a guide, development is located to maximize preservation of contiguous natural sensitive areas.	✓		

	Item #	Description	Verified	Technically Infeasible	Not Applicable
Neighborhood (continued)	2.3	Using the existing conditions plan as a guide, development and stormwater management systems are located such that centralized volume mitigation and flood control such as detention/retention basins, if required, is located towards the edges of compact development areas or in adjacent open space.	✓		
	2.4	Community open space is sited in areas of well-draining soils, located in coordination with topography to receive stormwater runoff from new development, and designed as a Special Detention Area per Section 1.1.2C to provide neighborhood-scale stormwater infiltration and flood control.			✓
	2.5	Existing stands of mature trees are incorporated into the neighborhood and site design and preserved to the maximum extent practicable. Tree protection provisions are submitted as required by Landscaping Section 9.02.	✓		
	2.6	Development is alley-loaded and/or incorporates parking lots sited behind buildings.	✓		
	2.7	The neighborhood parking approach incorporates shared parking strategies, on-street parking, and centralized structured parking to minimize new impervious area.			✓
Green Streets	3.1	New thoroughfares and retrofit of existing thoroughfares meet Section 1.2B Water Quality and Quantity requirements.	✓ (some)		
	3.2	Thoroughfare and driveway pavement widths are the minimum required to accommodate public safety and emergency access.	✓		
	3.3	Rear lanes, alleys, emergency access lanes, on-street parking spaces, sidewalks, pedestrian and multi-use paths, and residential driveways are constructed of permeable materials using a section appropriate for structural and drainage requirements. In areas of poorly draining soils the permeable design may still provide water quality treatment as a “flow-through” condition with an underdrain.			✓

Item #	Description	Verified	Technically Infeasible	Not Applicable	
3.4	Street tree design incorporates stormwater management practices such as tree box filters to filter and infiltrate stormwater runoff from adjacent impervious areas.			✓	
3.5	Street trees are provided with adequate soil volume and structural soil design to support long-term root growth and tree canopy without excessive impact to utilities or sidewalks.			✓	
Site Design	4.1	Soil testing completed by a Certified Soil Scientist is enclosed, and development is planned such that new impervious surfaces are located on less permeable soils, maximizing preservation of undisturbed well-draining soils.	—		
	4.2	Infiltration BMPs are located in areas of well-draining soils.	✓		
	4.3	Building roof downspouts discharge runoff to vegetated areas. Credit for Self-Treating and/or Self-Retaining Areas may be applied per the requirements of Section 1.1.2B.	—		
	4.4	Runoff from impervious paved surfaces is directed towards vegetated areas for natural filtration and/or infiltration before conveyance offsite or into the storm drainage system. Credit for Self-Treating and/or Self-Retaining Areas may be applied per the requirements of Section 1.1.2B.	—		
	4.5	Driveways are the minimum required to accommodate public safety and emergency access. (Residential driveways providing access to parking areas serving three residences or less should be a maximum of 10 feet wide where practicable)	✓		
	4.6	Residential driveways serving three residences or less are shared wherever practicable.			✓
	4.7	When alleys are not utilized, “two-track” driveways are utilized for driveways serving three residences or less wherever practicable.			✓
	4.8	Tandem parking for single-family residential uses is incorporated wherever practicable.			✓

	Item #	Description	Verified	Technically Infeasible	Not Applicable
Parking Design	5.1	Preferably all new parking spaces, at least 50% of new parking spaces in excess of 10 parking spaces, and all parking spaces in excess of the amount required by this Ordinance shall be constructed of permeable materials with a minimum 8-inch crushed stone infiltration bed or as otherwise required by the Town Engineer. In areas of poorly draining soils the permeable design may still provide water quality treatment as a “flow-through” condition with an underdrain. All permeable pavement systems shall meet the requirements of Stormwater Article 1.2.B.7.	—		
	5.2	Signs marking permeable pavement and clearly listing applicable maintenance requirements shall be installed immediately adjacent to areas containing 5 or more permeable parking spaces, and a permeable pavement maintenance program shall be included as part of the Stormwater Operation and Maintenance Plan.	—		
	5.3	Parking lot islands and landscape buffer locations should be coordinated with topography and configured as depressed bioretention and/or natural swale systems.	—		
	5.4	Ten percent of parking spaces provided in excess of 10 spaces should be compact parking spaces.	—		
	5.5	Sites shall include bicycle racks allowing for a bicycle frame to be secured with at least two points of contact, See Parking Standards Section 9.01 for specific requirements.	✓		
BMP Design	6.1	Stormwater BMPs are designed per the requirements of the Connecticut Stormwater Quality Manual, latest version, or using alternate design methods approved by the Town Engineer.	✓		
	6.2	Stormwater BMPs for projects in Simsbury Center are selected according to transect zone and soil conditions per the BMP Selection Matrix Table.			✓
	6.3	Site landscaping design uses native plantings and xeriscaping strategies, and the area of ornamental lawn surface is minimized.	✓		

	Item #	Description	Verified	Technically Infeasible	Not Applicable
BMP Design (continued)	6.4	Rain barrels, cisterns, and/or other rainwater harvesting techniques to reuse rainwater for irrigation and other non-potable uses are incorporated into the site design.			✓
	6.5	Qualifying trees, with appropriate soil volume, structural soils, and/or root barriers as required, are incorporated into the parking and landscape design as stormwater BMPs (see Tree Impervious Area Credit Section 1.2B).	✓		
	6.6	An Erosion and Soil Sedimentation Control Plan conforming to the standards of Connecticut Guidelines for Soil Erosion and Sediment Control is included with the project design.	✓		
	6.7	Water quality and infiltration BMPs incorporate appropriate pretreatment per the Connecticut Stormwater Quality Manual, latest revision, or alternate designs approved by the Town Engineer	✓		
Maintenance	7.1	The site design accommodates maintenance access for all stormwater BMPs.	✓		
	7.2	Stormwater Operation and Maintenance Plan is included.	✓		
	7.3	Responsible Party for implementation, maintenance, and correction of stormwater treatment practices is designated including contact information.	✓		



Appendix B:

NRCS Soil Survey Information

FEMA Floodway Map

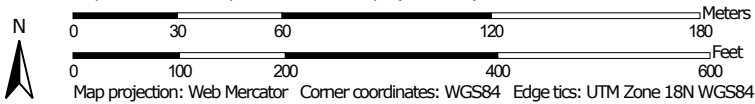


NRCS Soil Survey Information

Hydrologic Soil Group—State of Connecticut




Map Scale: 1:2,170 if printed on A landscape (11" x 8.5") sheet.



MAP LEGEND

Area of Interest (AOI)









 Area of Interest (AOI)

Soils

Soil Rating Polygons





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

Soil Rating Lines


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

Soil Rating Points






 A
 A/D
 B
 B/D

 C
 C/D
 D
 Not rated or not available


Water Features

 Streams and Canals

Transportation

 Rails
 Interstate Highways
 US Routes
 Major Roads
 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

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: State of Connecticut
 Survey Area Data: Version 21, Sep 7, 2021

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

Date(s) aerial images were photographed: Aug 24, 2019—Oct 24, 2019

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
34A	Merrimac fine sandy loam, 0 to 3 percent slopes	A	0.7	3.5%
36A	Windsor loamy sand, 0 to 3 percent slopes	A	1.4	7.0%
38C	Hinckley loamy sand, 3 to 15 percent slopes	A	1.9	10.0%
306	Udorthents-Urban land complex	B	4.2	21.9%
307	Urban land	D	11.2	57.6%
Totals for Area of Interest			19.4	100.0%

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher



FEMA Floodway Map

National Flood Hazard Layer FIRMMette



72°47'32"W 41°54'16"N



0 250 500 1,000 1,500 2,000 Feet 1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

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

<p>SPECIAL FLOOD HAZARD AREAS</p>	<p>Without Base Flood Elevation (BFE) <i>Zone A, V, A99</i></p> <p>With BFE or Depth <i>Zone AE, AO, AH, VE, AR</i></p> <p>Regulatory Floodway</p>
<p>OTHER AREAS OF FLOOD HAZARD</p>	<p>0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile <i>Zone X</i></p> <p>Future Conditions 1% Annual Chance Flood Hazard <i>Zone X</i></p> <p>Area with Reduced Flood Risk due to Levee. See Notes. <i>Zone X</i></p> <p>Area with Flood Risk due to Levee <i>Zone D</i></p>
<p>OTHER AREAS</p>	<p>NO SCREEN Area of Minimal Flood Hazard <i>Zone X</i></p> <p>Effective LOMRs</p> <p>Area of Undetermined Flood Hazard <i>Zone D</i></p>
<p>GENERAL STRUCTURES</p>	<p>Channel, Culvert, or Storm Sewer</p> <p>Levee, Dike, or Floodwall</p>
<p>OTHER FEATURES</p>	<p>Cross Sections with 1% Annual Chance Water Surface Elevation</p> <p>Coastal Transect</p> <p>Base Flood Elevation Line (BFE)</p> <p>Limit of Study</p> <p>Jurisdiction Boundary</p> <p>Coastal Transect Baseline</p> <p>Profile Baseline</p> <p>Hydrographic Feature</p>
<p>MAP PANELS</p>	<p>Digital Data Available</p> <p>No Digital Data Available</p> <p>Unmapped</p>

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

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

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 4/5/2022 at 4:04 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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



Appendix C:

Site/Block BMP Selection Matrix

Water Quality Unit Sizing

Recharge Calculations

StormCAD: Schematic

StormCAD: Conduit Table



Site/Block BMP Selection Matrix (Town of Simsbury)

Table 1.3: Site/Block BMP Selection Matrix											
	SC-1	SC-2	SC-3	SC-4	SC-5	CIV	OS	Other Zones	TSS	TP	TN
PAVING											
Compacted Earth									-	-	-
Crushed Stone/Shell									-	-	-
Standard Asphalt/Concrete Pavement									-	-	-
Pavers/Brick									-	-	-
Grassed Cellular Plastic/Concrete									-	-	-
Permeable Pavement ¹									90%	40%	40%
CONVEYANCE											
Stone/Riprap Swale											
Vegetated Bioswale									90%	30%	55%
Pipe ²									-	-	-
Shallow Stone/Cobble Channel									-	-	-
Shallow Masonry Trough									-	-	-
Engineered Sculpted Watercourse									-	-	-
RATE/VOLUME											
Dry Extended Detention Basin ³									50%	20%	25%
Wet Extended Detention Basin ³									80%	52%	31%
Special Detention Area									varies	varies	varies
Rain Barrel/Cistern									-	-	-
Stormwater Harvesting for Irrigation									-	-	-
Stormwater Harvesting for Building Uses							n/a		-	-	-
Underground Infiltration Trench/Drywell									90%	55%	40%
Underground Vault/Pipe/Cistern									20%	15%	5%
WATER QUALITY⁴											
Wet Vegetated System									85%	48%	30%
Gravel Vegetated System									86%	53%	55%
Organic/Sand Filter									86%	59%	32%
Bioretention									90%	30%	55%
Roof Downspout Disconnection							n/a		varies	varies	varies
Tree Box Filter									90%	30%	55%
Green Roof							n/a		90%	30%	55%
Flow-through Planter									90%	30%	55%
Forebay/Vegetated Filter Pretreatment									25%	-	-
Grass Channel Pretreatment									70%	24%	40%
Deep Sump Catch Basin Pretreatment									25%	-	-
Proprietary Hydrodynamic Devices									25%	-	-

Encouraged
 Allowed
 Not allowed without Town Engineer approval
 72% Median Pollutant Removal Efficiency (Percent)
 - No treatment
 ND No data



Water Quality Unit Sizing



Computations

Project:	<u>Proposed Commercial Dev</u>	Project #	<u>42810.00</u>
Location:	<u>Simsbury, Connecticut</u>	Sheet	<u>1 of 1</u>
Calculated by:	<u>KE</u>	Date:	<u>2/10/2023</u>
Checked by:	<u></u>	Date:	<u></u>
Title	<u>Water Quality Flow Calculations</u>		

WQU-1

Area Impervious:	2.671	Acres	
Total Area [A]:	4.174	Acres	
I:	64.00	%	
R:	0.63		
WQV:	0.22	Ac-ft	
Q:	0.63	Inches	
CN:	96		if >98, use 98
P:	1.00	inch	for water quality storms
Ia:	0.083		get from table 4-1, TR-55
Tc:	5.00	minutes	
qu:	700.00		get from exhibit 4-11, TR-55
WQF:	2.86	CFS	ANSWER



Recharge Calculations



Recharge Calculations

Project Name: Commercial Development	Proj. No.: 42810.0
Project Location: Simsbury, CT	Date: 2/21/2023
	Calculated by: KE
	Checked by: RS

Proposed Impervious Surface Summary

50% of Net Proposed Impervious Areas by Hydrologic Soil Group (HSG) in acres

Subcatchment	HSG A	HSG B	HSG C	HSG D	Total Area
TOTAL	0.00	1.33	0.0	0.0	1.3

Recharge Volume per Simsbury Stormwater Guidelines (Cubic Feet)

HSG	Area (acres)	Recharge Depth * (inches)	Volume (c.f.)
A	0.0	0.660	0
B	1.3	0.385	1,855
C	0.0	0.275	0
D	0.0	0.110	0
TOTAL			1,855

* Depth rate reflects 110% Per Town of Simsbury Recharge Requirements

Provided Recharge Volume (Cubic Feet)

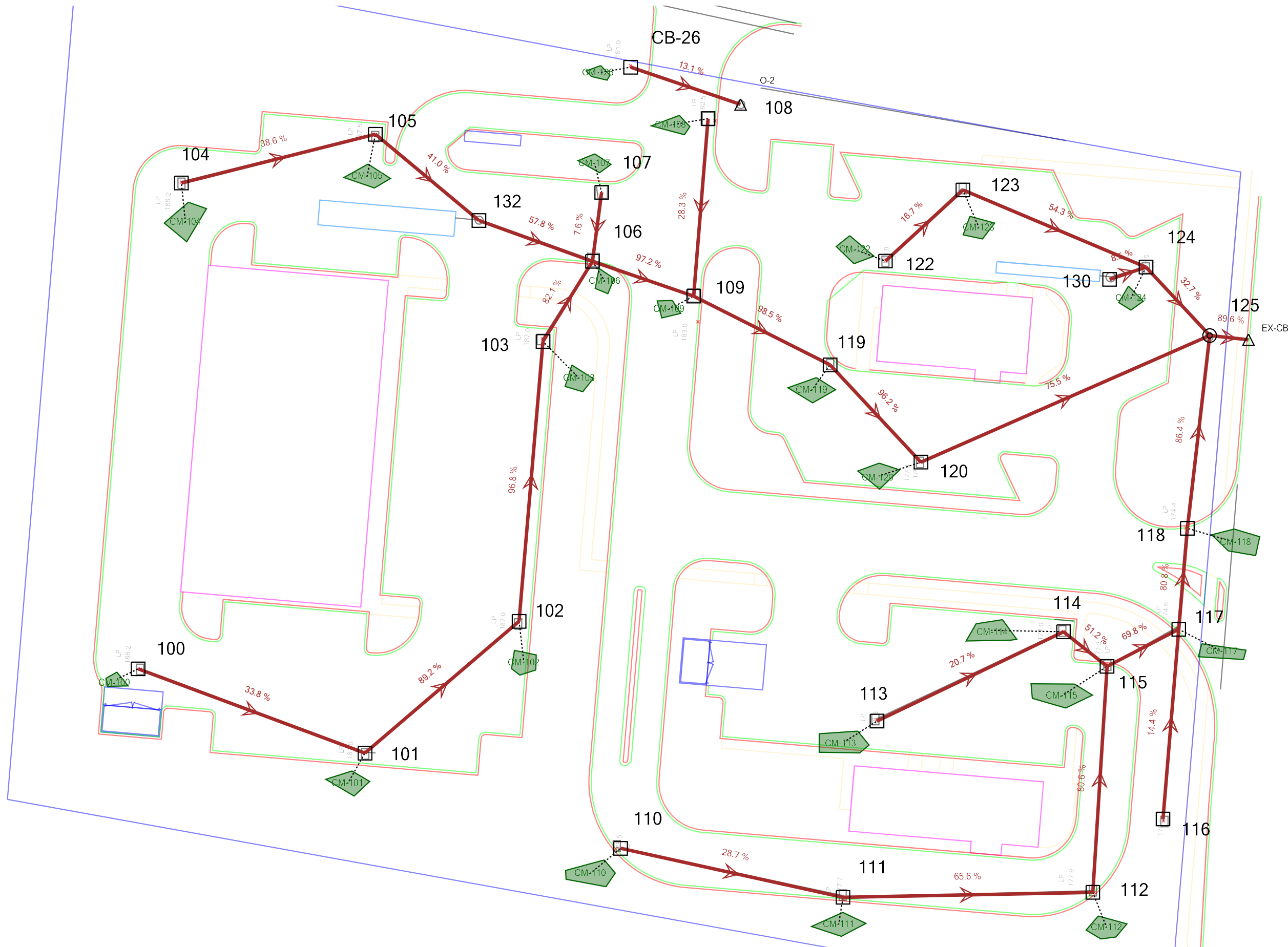
Volumes provided are storage at the 2-year storm events (See HydroCAD Report)

Rain Garden	413	
2p	1,263	
3P	218	
Total	1,894	c.f.



StormCAD: Schematic

Scenario: Base





StormCAD: Conduit Table (25-year Storm Event)

FlexTable: Conduit Table

Label	Start Node	Invert (Start) (ft)	Stop Node	Invert (Stop) (ft)	Length (Scaled) (ft)	Slope (Calculated) (ft/ft)	Diameter (in)	Manning's n	Flow (cfs)	Velocity (ft/s)	Depth (Out) (ft)	Capacity (Full Flow) (cfs)	Flow / Capacity (Design) (%)	Cover (Start) (ft)	Cover (Stop) (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
CO-1	100	184.70	101	183.50	107.1	0.011	12.0	0.013	1.27	4.33	0.74	3.77	33.8	2.50	2.50	185.18	184.24
CO-2	101	183.50	102	183.00	89.7	0.006	12.0	0.013	2.37	3.83	0.79	2.66	89.2	2.50	3.00	184.24	183.79
CO-3	102	183.00	103	181.90	124.3	0.009	12.0	0.013	3.25	4.86	0.83	3.35	96.8	3.00	4.10	183.79	182.73
CO-4	103	181.90	106	181.20	41.6	0.017	12.0	0.013	3.79	6.57	0.98	4.62	82.1	4.10	2.80	182.73	182.18
CO-5	106	181.20	109	179.10	47.4	0.044	12.0	0.013	7.29	10.88	0.82	7.50	97.2	2.80	2.80	182.18	179.92
CO-6	119	174.90	120	173.80	58.9	0.019	15.0	0.013	8.49	8.19	1.28	8.83	96.2	2.75	2.35	176.04	175.08
CO-7	120	173.90	125	172.00	139.6	0.014	18.0	0.013	9.26	7.62	0.97	12.25	75.5	2.00	1.50	175.08	172.97
CO-9	125	171.00	EX-CB	170.50	17.3	0.029	18.0	0.013	16.01	11.44	1.24	17.87	89.6	2.50	2.50	172.43	171.74
CO-10	104	184.70	105	184.00	88.5	0.008	12.0	0.013	1.22	3.78	0.60	3.17	38.6	2.50	2.50	185.17	184.60
CO-11	105	184.00	132	182.90	59.6	0.018	12.0	0.013	1.99	5.85	0.82	4.84	41.0	2.50	3.10	184.60	183.72
CO-12	108	179.00	109	178.60	78.8	0.005	12.0	0.013	0.72	2.78	1.03	2.54	28.3	2.50	3.30	179.65	179.63
CO-13	123	174.50	124	174.00	87.9	0.006	12.0	0.013	1.46	3.49	0.51	2.69	54.3	2.50	2.50	175.02	174.51
CO-14	124	173.60	125	172.00	41.4	0.039	12.0	0.013	2.29	7.98	0.40	7.01	32.7	2.90	2.00	174.25	172.40
CO-15	110	175.00	111	174.20	100.8	0.008	12.0	0.013	0.91	3.49	0.59	3.17	28.7	2.50	2.50	175.40	174.79
CO-16	111	174.20	112	173.60	110.6	0.005	12.0	0.013	1.72	3.56	0.69	2.62	65.6	2.50	3.30	174.79	174.29
CO-17	112	173.60	115	173.10	100.1	0.005	12.0	0.013	2.03	3.57	0.86	2.52	80.6	3.30	3.20	174.29	173.96
CO-19	113	175.30	114	173.50	91.5	0.020	12.0	0.013	1.04	5.02	0.61	5.00	20.7	2.50	2.50	175.73	174.11
CO-18	109	178.60	119	174.90	67.6	0.055	12.0	0.013	8.21	10.45	1.14	8.33	98.5	3.30	3.00	179.63	176.04
CO-27	117	172.10	118	171.55	44.8	0.012	15.0	0.013	5.78	6.49	1.15	7.16	80.8	1.25	1.60	173.07	172.70
CO-28	118	171.55	125	171.00	85.9	0.006	18.0	0.013	7.27	5.35	1.43	8.41	86.4	1.35	2.50	172.70	172.43
CO-24	115	173.10	117	172.10	35.7	0.028	12.0	0.013	4.16	8.20	0.97	5.96	69.8	3.20	1.50	173.96	173.07
CO-25	122	175.40	123	174.50	46.6	0.019	12.0	0.013	0.83	4.68	0.52	4.95	16.7	2.50	2.50	175.78	175.02
CO-26	CB-26	177.50	O-2	175.90	51.4	0.031	12.0	0.013	0.82	5.54	0.24	6.29	13.1	2.50	4.40	177.88	176.14
CO-21	114	173.50	115	173.20	24.6	0.012	12.0	0.013	2.01	5.04	0.76	3.93	51.2	2.50	3.10	174.11	173.96
CO-31	107	181.50	106	181.20	30.8	0.010	12.0	0.013	0.27	2.65	0.98	3.52	7.6	2.50	2.80	182.18	182.18
CO-29	130	173.80	124	173.60	17.0	0.012	12.0	0.013	0.33	3.00	0.65	3.86	8.5	3.20	2.90	174.24	174.25
CO-30	116	172.90	117	172.10	84.2	0.010	12.0	0.013	0.50	3.14	0.97	3.47	14.4	1.60	1.50	173.19	173.07
CO-31	132	182.90	106	181.20	53.4	0.032	12.0	0.013	3.68	8.39	0.98	6.35	57.8	3.10	2.80	183.72	182.18



Appendix D:

Erosion and Sedimentation Control Measures



Erosion and Sedimentation Control Measures

The following erosion and sedimentation controls are for use during the earthwork and construction phases of the project. The following controls are provided as recommendations for the site contractor.

Silt Fencing

Silt fence will be installed around the limit of work as shown on the plans. In areas where high runoff velocities or high sediment loads are expected, straw barriers will be installed up-gradient of silt fencing. This semi-permeable barrier made of a synthetic porous fabric will provide additional protection. The silt fences and hay bale barrier will be replaced as determined by periodic field inspections.

Catch Basin Protection

Newly constructed and existing catch basins will be protected with silt sacks throughout construction.

Gravel and Construction Entrance/Exit

A temporary crushed-stone construction entrance/exit will be constructed. A cross slope will be placed in the entrance to direct runoff to a protected catch basin inlet or settling area. If deemed necessary after construction begins, a wash pad may be included to wash off vehicle wheels before leaving the project site.

Vegetative Slope Stabilization

Stabilization of open soil surfaces will be implemented within 14 days after grading or construction activities have temporarily or permanently ceased, unless there is sufficient snow cover to prohibit implementation. Vegetative slope stabilization will be used to minimize erosion on slopes of 3:1 or flatter. Annual grasses, such as annual rye, will be used to ensure rapid germination and production of root mass. Permanent stabilization will be completed with the planting of perennial grasses or legumes. Establishment of temporary and permanent vegetative cover may be established by hydro-seeding or sodding. A suitable topsoil, good seedbed preparation, and adequate lime, fertilizer and water will be provided for effective establishment of these vegetative stabilization methods. Mulch will also be used after



permanent seeding to protect soil from the impact of falling rain and to increase the capacity of the soil to absorb water.

Maintenance

- The contractor or subcontractor will be responsible for implementing each control shown on the Sedimentation and Erosion Control Plan. In accordance with EPA regulations, the contractor must sign a copy of a certification to verify that a plan has been prepared and that permit regulations are understood.
- The on-site contractor will inspect all sediment and erosion control structures periodically and after each rainfall event. Records of the inspections will be prepared and maintained on-site by the contractor.
- Silt shall be removed from behind barriers if greater than 6-inches deep or as needed.
- Damaged or deteriorated items will be repaired immediately after identification.
- Sediment that is collected in structures shall be disposed of properly and covered if stored on-site.
- Erosion control structures shall remain in place until all disturbed earth has been securely stabilized. After removal of structures, disturbed areas shall be regraded and stabilized as necessary.

The sedimentation and erosion control plan is included in project plan set; a reduced version and Erosion Control Maintenance checklist is included here for quick reference.



Construction Best Management Practices - Maintenance/Evaluation Checklist

Proposed Commercial Development– Simsbury, CT – 1263 Hopmeadow Street
Best Management Practices – Maintenance/ Evaluation Checklist

Construction Practices

Best Management Practice	Inspection Frequency	Date Inspected	Inspector	Minimum Maintenance and Key Items to Check	Cleaning/Repair Needed <input type="checkbox"/> yes <input type="checkbox"/> no (List Items)	Date of Cleaning/Repair	Performed by
Silt Fencing	Once per week or after a 1" or greater storm event						
Catch Basin Protection	Once per week or after a 1" or greater storm event						
Stabilized Construction Exit	Once per week or after a 1" or greater storm event						
Temporary Sediment Basin	Once per week or after a 1" or greater storm event						
Vegetated Slope Stabilization	Once per week or after a 1" or greater storm event						

Stormwater Control Manager _____



Appendix E:

Long Term Stormwater Operation and Maintenance Measures



Project Information

Site

Project Name: Proposed Commercial Development

Address or Locus: 200 Hopmeadow Street

City, State & Zip: Simsbury, CT

Developer

Client Name: Prospect Enterprises, LLC

Client Address: 231 Farmington Avenue

Client City, State & Zip: Farmington, CT 06032

Client Telephone No.: (860) 249-2242 Ext 102

Client Cell Phone:

Client E-Mail: g.nanni@theprospectco.com

Site Supervisor

Site Manager Name:

Site Manager Address:

Site Manager City, State & Zip:

Site Manager Telephone No.:

Site Manager Cell Phone:

Site Manager E-Mail:



Long Term Stormwater Maintenance Measures –

Per the Town of Simsbury, a 5-year period of yearly reporting of inspections/maintenance for the drainage system shall be submitted to the Planning Department.

The following maintenance program is proposed to ensure the continued effectiveness of the structural water quality controls previously described:

- Inspect stormwater basins once annually, in the spring, for cracking or erosion of side slopes, embankments, and accumulated sediment. Necessary sediment removal, earth repair, and/or reseeding will be performed immediately upon identification.
- Inspect sediment traps/forebays monthly for erosion of side slopes and accumulated sediment. Necessary sediment removal, earth repair and/or reseeding shall be performed immediately upon identification. Clean traps/forebays approximately four times per year or as needed.
- Clean all catch basins once annually to remove accumulated sand, sediment, and floatable products or as needed based on use.
- Paved areas will be swept, at a minimum, two (2) times per year.
- Routinely pick up and remove litter from the parking areas, islands and perimeter landscape areas in addition to regular pavement sweeping.
- Routinely inspect all dumpster and compactor locations for spills. Remove all trash litter from the enclosure and dispose of properly.

Pavement Systems

Standard Asphalt Pavement

- Sweep or vacuum standard asphalt pavement areas at least two times per year with a commercial cleaning unit and properly dispose of removed material.
- Recommended sweeping schedule:
 - Oct/Nov
 - Apr/May
- More frequent sweeping of paved surfaces will result in less accumulation in catch basins, less cleaning of subsurface structures, and less disposal costs.
- Check dumpster areas frequently for spillage and/or pavement staining and clean as necessary.



Structural Stormwater Management Devices

Catch Basins

- All catch basins shall be inspected and cleaned a minimum of at least once per year.
- Sediment (if more than six inches deep) and/or floatable pollutants shall be pumped from the basin and disposed of at an approved offsite facility in accordance with all applicable regulations.
- Any structural damage or other indication of malfunction will be reported to the site manager and repaired as necessary
- During colder periods, the catch basin grates must be kept free of snow and ice.
- During warmer periods, the catch basin grates must be kept free of leaves, litter, sand, and debris.

Subsurface Infiltration Systems

- The subsurface infiltration systems will be inspected at least once each year by removing the manhole/access port covers and determining the thickness of sediment that has accumulated in the sediment removal row.
- If sediment is more than six inches deep, it must be suspended via flushing with clean water and removed using a vactor truck.
- Manufacturer's specifications and instructions for cleaning the sediment removal row should be consulted.
- Emergency overflow pipes will be examined at least once each year and verified that no blockage has occurred.
- System will be observed after rainfalls to see if it is properly draining.

Structural Water Quality Devices

- FOLLOW MANUFACTURER'S INSTRUCTIONS ON O&M REQUIREMENTS AND METHODOLOGY
- Inspect devices monthly for the first three months after construction.
- After initial three month period, all water quality units are to be inspected at least four times per year and cleaned a minimum of at least once per year or when sediment reaches 8" in depth.
- Follow manufacturer instructions for inspection and cleaning and contact manufacturer if system is malfunctioning.

Stormwater Outfalls

- Inspect outfall locations monthly for the first three months after construction to ensure proper functioning and correct any areas that have settled or experienced washouts.



- Inspect outfalls annually after initial three month period.
- Annual inspections should be supplemented after large storms, when washouts may occur.
- Maintain vegetation around outfalls to prevent blockages at the outfall.
- Maintain rip rap pad below each outfall and replace any washouts.
- Remove and dispose of any trash or debris at the outfall.

Roof Drain Leaders

- Perform routine roof inspections quarterly.
- Keep roofs clean and free of debris.
- Keep roof drainage systems clear.
- Keep roof access limited to authorized personnel.
- Clean inlets draining to the subsurface bed twice per year as necessary.

Vegetated Stormwater Management Devices

Rain Garden (Infiltration Basin)

Initial Post-Construction Inspection

- Infiltration basins should be inspected after every major storm for the first few months to ensure proper stabilization and function.

Long-Term Maintenance

- The grass on the side slopes should be mowed, and grass clippings, organic matter, and accumulated trash and debris removed, at least twice during the growing season.
- Eroded or barren spots should be reseeded immediately after inspection to prevent additional erosion and accumulation of sediment.
- Sediment should be removed from the basin as necessary. Removal procedures should not take place until the floor of the basin is thoroughly dry.

Inspections and Cleaning

- Basins should be inspected at least once a year to ensure proper stabilization and function.
- Light equipment, which will not compact the underlying soil, should be used to remove the top layer.

Vegetated Areas Maintenance

Although not a structural component of the drainage system, the maintenance of vegetated areas may affect the functioning of stormwater management practices. This includes the health/density of vegetative cover and activities such as the



application and disposal of lawn and garden care products, disposal of leaves and yard trimmings.

- Inspect planted areas on a semi-annual basis and remove any litter.
- Maintain planted areas adjacent to pavement to prevent soil washout.
- Immediately clean any soil deposited on pavement.
- Re-seed bare areas; install appropriate erosion control measures when native soil is exposed or erosion channels are forming.
- Plant alternative mixture of grass species in the event of unsuccessful establishment.
- The grass vegetation should be cut to a height between three and four inches.



Long Term Best Management Practices Checklist

Proposed Commercial Development– Simsbury, CT – 1263 Hopmeadow Street

Best Management Practices – Maintenance/ Evaluation Checklist

Long Term Practices

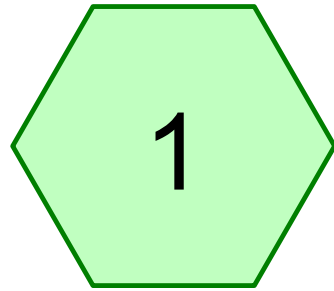
Best Management Practice	Inspection Frequency	Date Inspected	Inspector	Minimum Maintenance and Key Items to Check	Cleaning/Repair Needed <input type="checkbox"/> yes <input type="checkbox"/> no (List Items)	Date of Cleaning/Repair	Performed by
Street Sweeping	2x per year, preferably in late spring and late fall.						
Trash/Litter	Routinely pick up and remove litter from entire property as required.						
Catch Basins	Inspect annually. Clean annually or when sediment is greater than 6".						
Hydrodynamic Water Quality Unit	CHECK SPECIFIC MANUFACTURER'S INSTRUCTIONS ON O&M REQUIREMENTS AND METHODOLOGY. Recommendation: Inspect monthly for first 3 months. Inspect 4x per year and clean at least 1x per year or when sediment reaches 8".						
Dumpster Location	Routinely inspect all dumpster and compactor locations for spills. Remove all trash litter from the enclosure and dispose of properly.						
Rain Garden	Inspect after every major storm for the first 3 months. Side slopes and buffer shall be mowed/trash removed at least twice during growing season						
Underground Infiltration Systems	Inspect after every major storm for the first 3 months. Inspect at least once per year thereafter.						
Roof Drains	Inspect quarterly for cleanliness and debris-free.						
Vegetated Areas	Inspect bi-annually. Replant bare areas upon identification.						
Outfalls	Inspect monthly for the first 3 months. Inspect at least once per year thereafter.						

Stormwater Control Manager _____

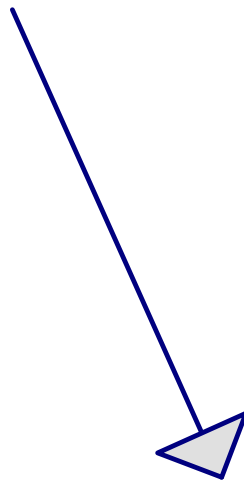


Appendix F:

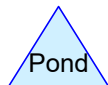
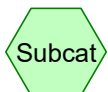
Hydrologic Analysis



Site



Hopmeadow



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Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-YEAR	Type III 24-hr		Default	24.00	1	3.28	2
2	10-YEAR	Type III 24-hr		Default	24.00	1	5.28	2
3	25-YEAR	Type III 24-hr		Default	24.00	1	6.53	2
4	50-YEAR	Type III 24-hr		Default	24.00	1	7.44	2
5	100-YEAR	Type III 24-hr		Default	24.00	1	8.45	2

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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.055	69	50-75% Grass cover, Fair, HSG B (1)
0.358	61	>75% Grass cover, Good, HSG B (1)
3.688	98	Paved parking, HSG B (1)
0.869	58	Woods/grass comb., Good, HSG B (1)
4.969	88	TOTAL AREA

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Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
4.969	HSG B	1
0.000	HSG C	
0.000	HSG D	
0.000	Other	
4.969		TOTAL AREA

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Page 5

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	0.055	0.000	0.000	0.000	0.055	50-75% Grass cover, Fair	1
0.000	0.358	0.000	0.000	0.000	0.358	>75% Grass cover, Good	1
0.000	3.688	0.000	0.000	0.000	3.688	Paved parking	1
0.000	0.869	0.000	0.000	0.000	0.869	Woods/grass comb., Good	1
0.000	4.969	0.000	0.000	0.000	4.969	TOTAL AREA	

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Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)
1	1	0.00	0.00	235.0	0.0208	0.011	0.0	12.0	0.0

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EXISTING CONDITIONS

Type III 24-hr 2-YEAR Rainfall=3.28"

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Time span=0.00-30.00 hrs, dt=0.02 hrs, 1501 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 1: Site

Runoff Area=4.969 ac 74.21% Impervious Runoff Depth=2.07"
Flow Length=811' Tc=23.8 min CN=88 Runoff=7.53 cfs 0.857 af

Link DP-1: Hopmeadow

Inflow=7.53 cfs 0.857 af
Primary=7.53 cfs 0.857 af

Total Runoff Area = 4.969 ac Runoff Volume = 0.857 af Average Runoff Depth = 2.07"
25.79% Pervious = 1.282 ac 74.21% Impervious = 3.688 ac

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EXISTING CONDITIONS

Type III 24-hr 2-YEAR Rainfall=3.28"

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Summary for Subcatchment 1: Site

[47] Hint: Peak is 124% of capacity of segment #6

Runoff = 7.53 cfs @ 12.33 hrs, Volume= 0.857 af, Depth= 2.07"
 Routed to Link DP-1 : Hopmeadow

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
 Type III 24-hr 2-YEAR Rainfall=3.28"

Area (ac)	CN	Description
0.055	69	50-75% Grass cover, Fair, HSG B
0.358	61	>75% Grass cover, Good, HSG B
3.688	98	Paved parking, HSG B
0.869	58	Woods/grass comb., Good, HSG B
4.969	88	Weighted Average
1.282		25.79% Pervious Area
3.688		74.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.1	50	0.0100	0.05		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.28"
1.6	48	0.0100	0.50		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
2.2	242	0.0085	1.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.2	40	0.3000	2.74		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
3.2	196	0.0410	1.01		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.5	235	0.0208	7.73	6.07	Pipe Channel, 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
23.8	811	Total			

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EXISTING CONDITIONS

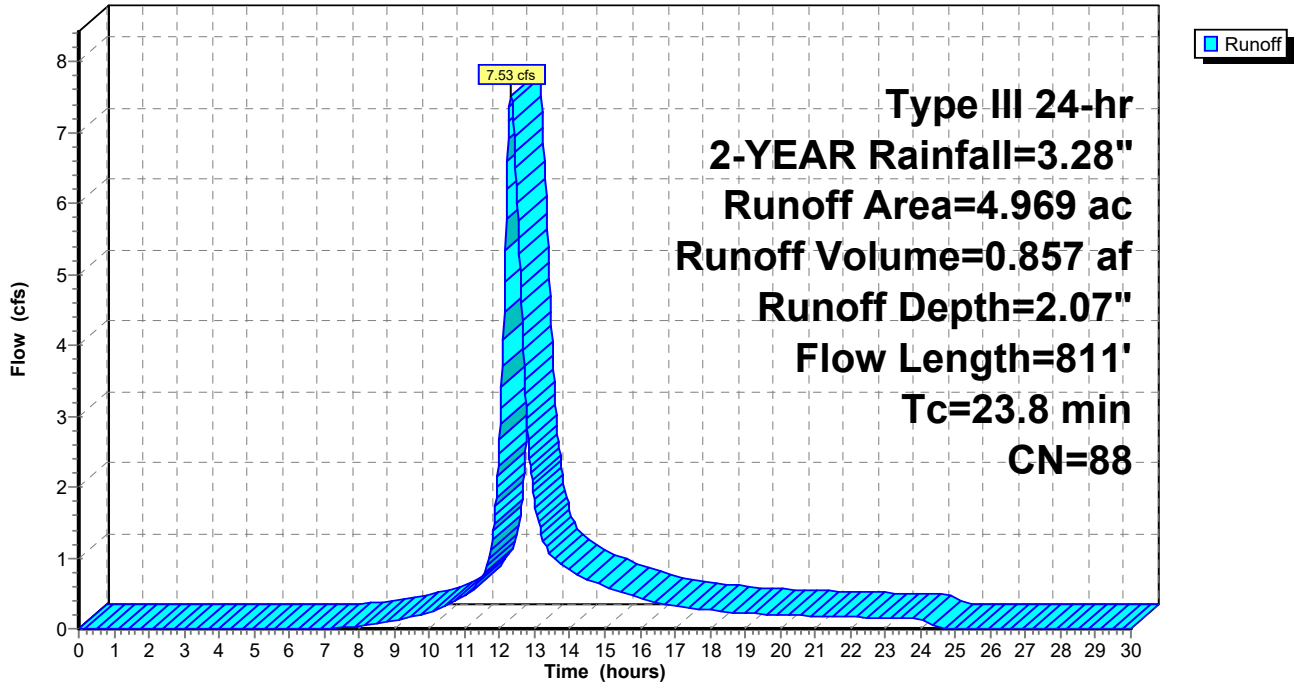
Type III 24-hr 2-YEAR Rainfall=3.28"

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Subcatchment 1: Site

Hydrograph



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EXISTING CONDITIONS

Type III 24-hr 2-YEAR Rainfall=3.28"

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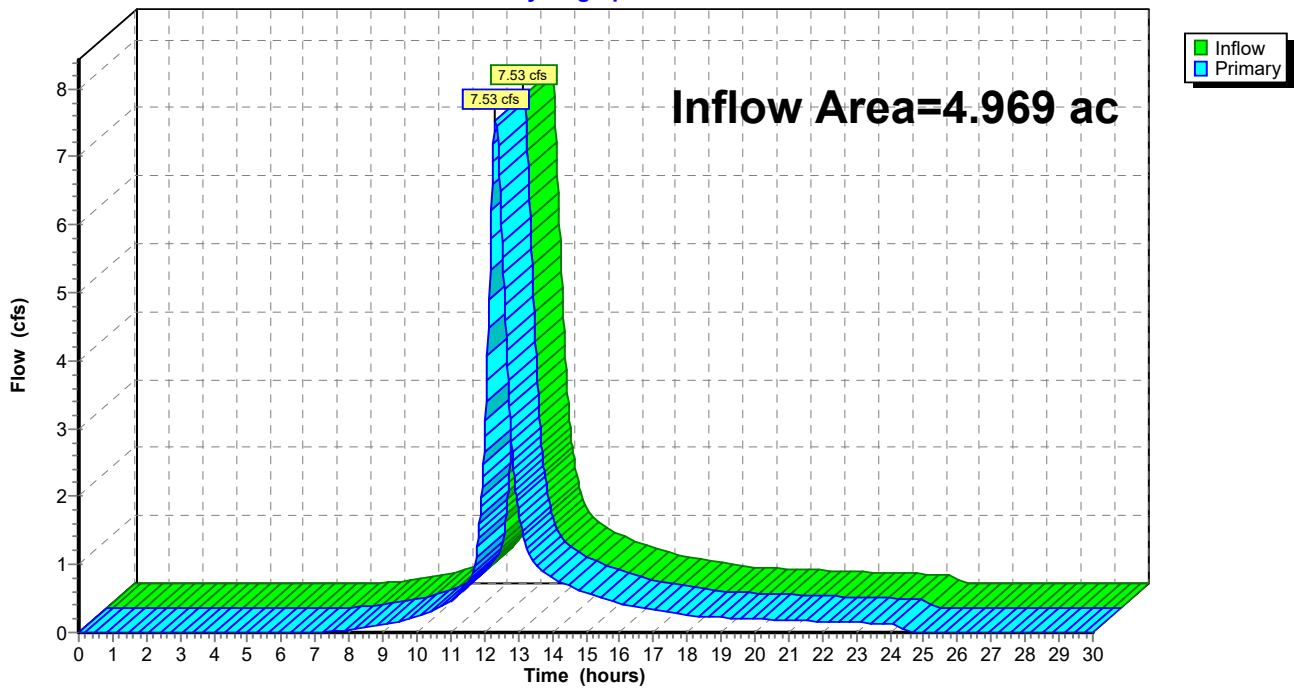
Summary for Link DP-1: Hopmeadow

Inflow Area = 4.969 ac, 74.21% Impervious, Inflow Depth = 2.07" for 2-YEAR event
Inflow = 7.53 cfs @ 12.33 hrs, Volume= 0.857 af
Primary = 7.53 cfs @ 12.33 hrs, Volume= 0.857 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs

Link DP-1: Hopmeadow

Hydrograph



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EXISTING CONDITIONS

Type III 24-hr 10-YEAR Rainfall=5.28"

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Time span=0.00-30.00 hrs, dt=0.02 hrs, 1501 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 1: Site

Runoff Area=4.969 ac 74.21% Impervious Runoff Depth=3.94"
Flow Length=811' Tc=23.8 min CN=88 Runoff=14.05 cfs 1.630 af

Link DP-1: Hopmeadow

Inflow=14.05 cfs 1.630 af
Primary=14.05 cfs 1.630 af

Total Runoff Area = 4.969 ac Runoff Volume = 1.630 af Average Runoff Depth = 3.94"
25.79% Pervious = 1.282 ac 74.21% Impervious = 3.688 ac

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EXISTING CONDITIONS

Type III 24-hr 10-YEAR Rainfall=5.28"

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Summary for Subcatchment 1: Site

[47] Hint: Peak is 231% of capacity of segment #6

Runoff = 14.05 cfs @ 12.32 hrs, Volume= 1.630 af, Depth= 3.94"
 Routed to Link DP-1 : Hopmeadow

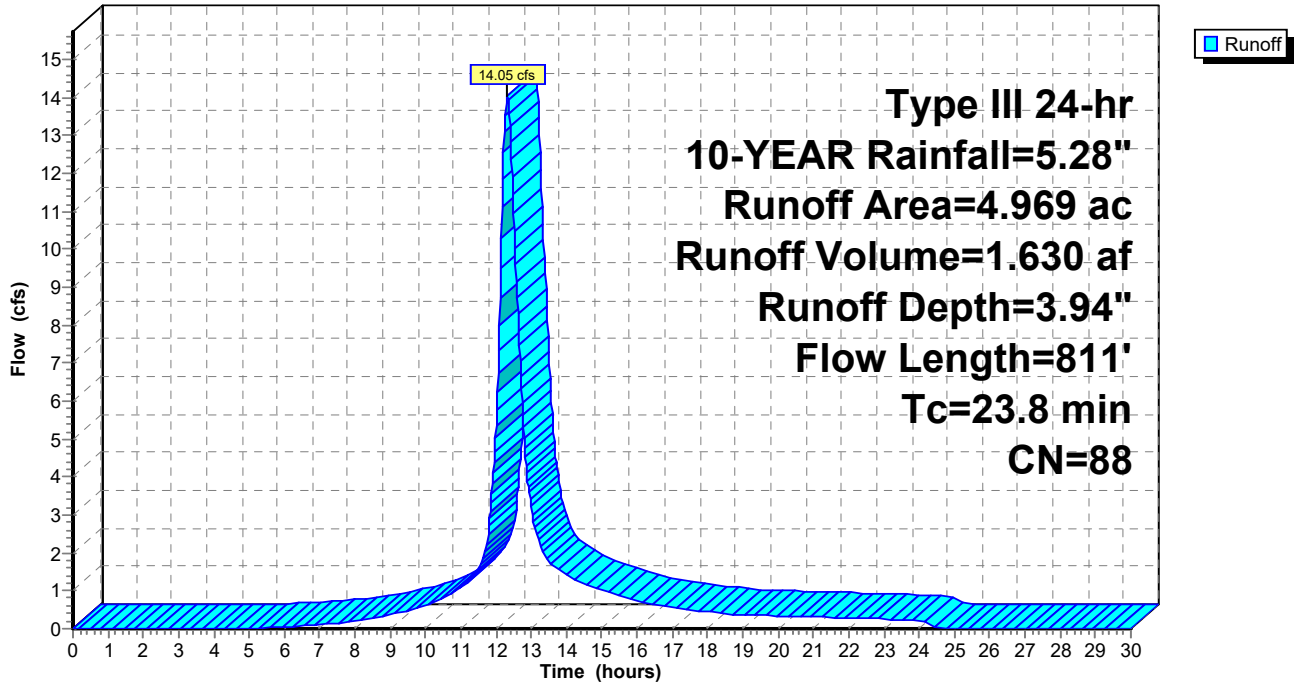
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
 Type III 24-hr 10-YEAR Rainfall=5.28"

Area (ac)	CN	Description
0.055	69	50-75% Grass cover, Fair, HSG B
0.358	61	>75% Grass cover, Good, HSG B
3.688	98	Paved parking, HSG B
0.869	58	Woods/grass comb., Good, HSG B
4.969	88	Weighted Average
1.282		25.79% Pervious Area
3.688		74.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.1	50	0.0100	0.05		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.28"
1.6	48	0.0100	0.50		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
2.2	242	0.0085	1.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.2	40	0.3000	2.74		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
3.2	196	0.0410	1.01		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.5	235	0.0208	7.73	6.07	Pipe Channel, 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
23.8	811	Total			

Subcatchment 1: Site

Hydrograph



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EXISTING CONDITIONS

Type III 24-hr 10-YEAR Rainfall=5.28"

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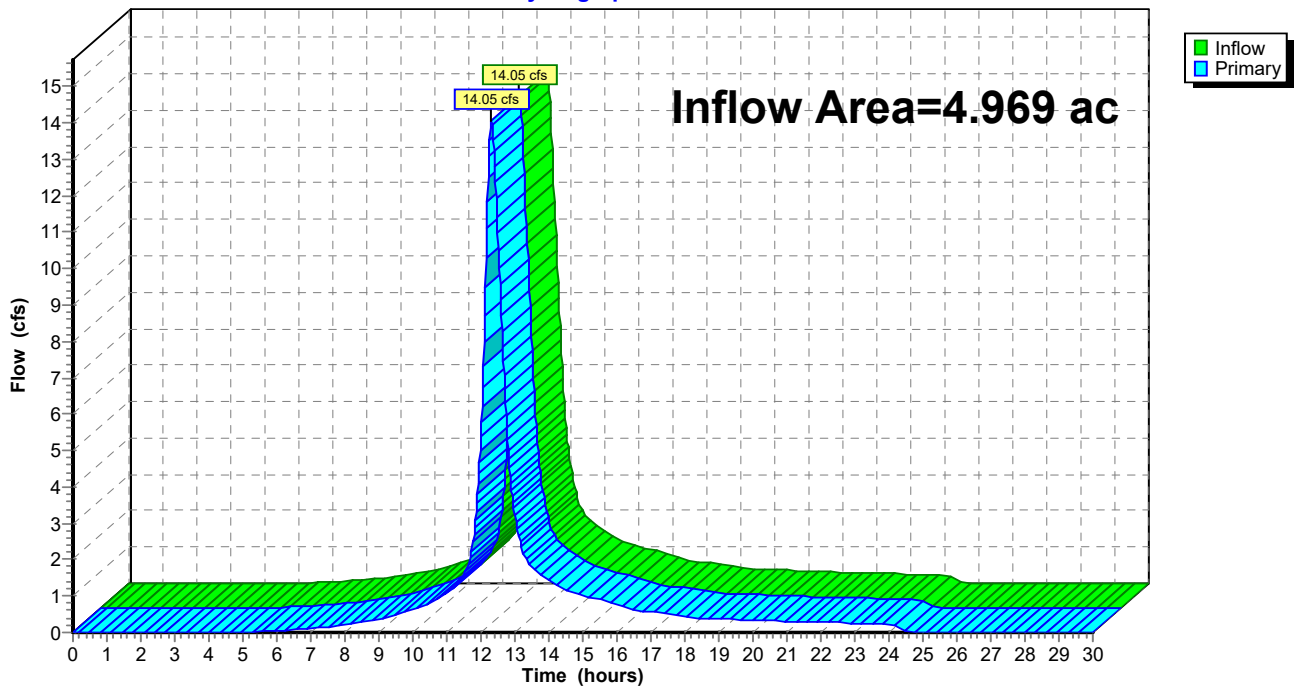
Summary for Link DP-1: Hopmeadow

Inflow Area = 4.969 ac, 74.21% Impervious, Inflow Depth = 3.94" for 10-YEAR event
Inflow = 14.05 cfs @ 12.32 hrs, Volume= 1.630 af
Primary = 14.05 cfs @ 12.32 hrs, Volume= 1.630 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs

Link DP-1: Hopmeadow

Hydrograph



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EXISTING CONDITIONS

Type III 24-hr 25-YEAR Rainfall=6.53"

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Time span=0.00-30.00 hrs, dt=0.02 hrs, 1501 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 1: Site

Runoff Area=4.969 ac 74.21% Impervious Runoff Depth=5.14"
Flow Length=811' Tc=23.8 min CN=88 Runoff=18.14 cfs 2.127 af

Link DP-1: Hopmeadow

Inflow=18.14 cfs 2.127 af
Primary=18.14 cfs 2.127 af

Total Runoff Area = 4.969 ac Runoff Volume = 2.127 af Average Runoff Depth = 5.14"
25.79% Pervious = 1.282 ac 74.21% Impervious = 3.688 ac

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EXISTING CONDITIONS

Type III 24-hr 25-YEAR Rainfall=6.53"

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Summary for Subcatchment 1: Site

[47] Hint: Peak is 299% of capacity of segment #6

Runoff = 18.14 cfs @ 12.31 hrs, Volume= 2.127 af, Depth= 5.14"
 Routed to Link DP-1 : Hopmeadow

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
 Type III 24-hr 25-YEAR Rainfall=6.53"

Area (ac)	CN	Description
0.055	69	50-75% Grass cover, Fair, HSG B
0.358	61	>75% Grass cover, Good, HSG B
3.688	98	Paved parking, HSG B
0.869	58	Woods/grass comb., Good, HSG B
4.969	88	Weighted Average
1.282		25.79% Pervious Area
3.688		74.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.1	50	0.0100	0.05		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.28"
1.6	48	0.0100	0.50		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
2.2	242	0.0085	1.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.2	40	0.3000	2.74		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
3.2	196	0.0410	1.01		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.5	235	0.0208	7.73	6.07	Pipe Channel, 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
23.8	811	Total			

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EXISTING CONDITIONS

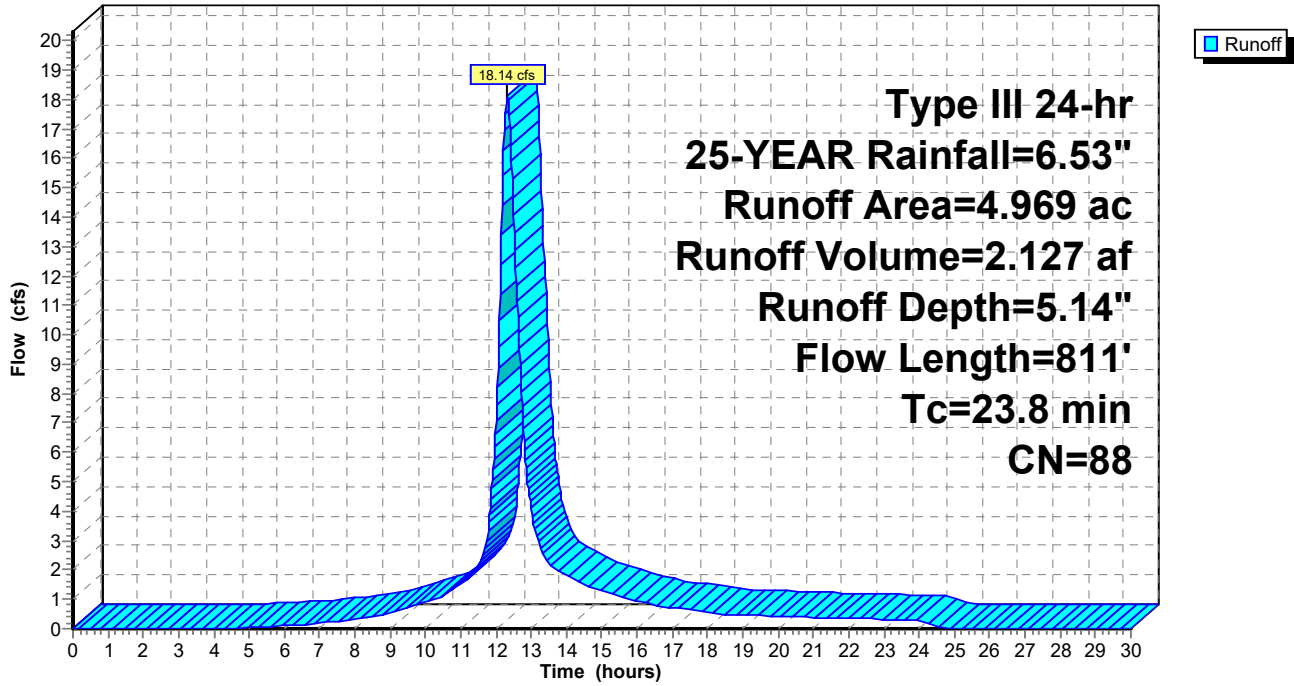
Type III 24-hr 25-YEAR Rainfall=6.53"

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Subcatchment 1: Site

Hydrograph



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EXISTING CONDITIONS

Type III 24-hr 25-YEAR Rainfall=6.53"

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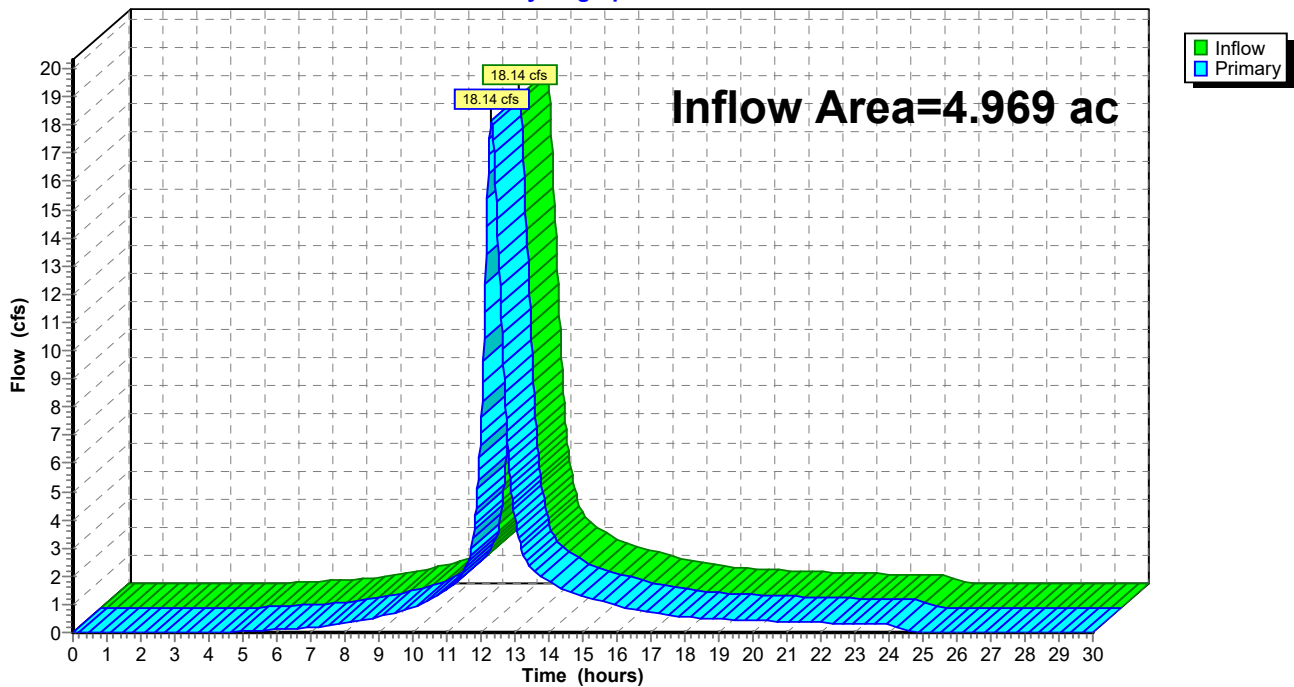
Summary for Link DP-1: Hopmeadow

Inflow Area = 4.969 ac, 74.21% Impervious, Inflow Depth = 5.14" for 25-YEAR event
Inflow = 18.14 cfs @ 12.31 hrs, Volume= 2.127 af
Primary = 18.14 cfs @ 12.31 hrs, Volume= 2.127 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs

Link DP-1: Hopmeadow

Hydrograph



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EXISTING CONDITIONS

Type III 24-hr 50-YEAR Rainfall=7.44"

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Time span=0.00-30.00 hrs, dt=0.02 hrs, 1501 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 1: Site

Runoff Area=4.969 ac 74.21% Impervious Runoff Depth=6.02"
Flow Length=811' Tc=23.8 min CN=88 Runoff=21.09 cfs 2.494 af

Link DP-1: Hopmeadow

Inflow=21.09 cfs 2.494 af
Primary=21.09 cfs 2.494 af

Total Runoff Area = 4.969 ac Runoff Volume = 2.494 af Average Runoff Depth = 6.02"
25.79% Pervious = 1.282 ac 74.21% Impervious = 3.688 ac

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EXISTING CONDITIONS

Type III 24-hr 50-YEAR Rainfall=7.44"

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Summary for Subcatchment 1: Site

[47] Hint: Peak is 347% of capacity of segment #6

Runoff = 21.09 cfs @ 12.31 hrs, Volume= 2.494 af, Depth= 6.02"
 Routed to Link DP-1 : Hopmeadow

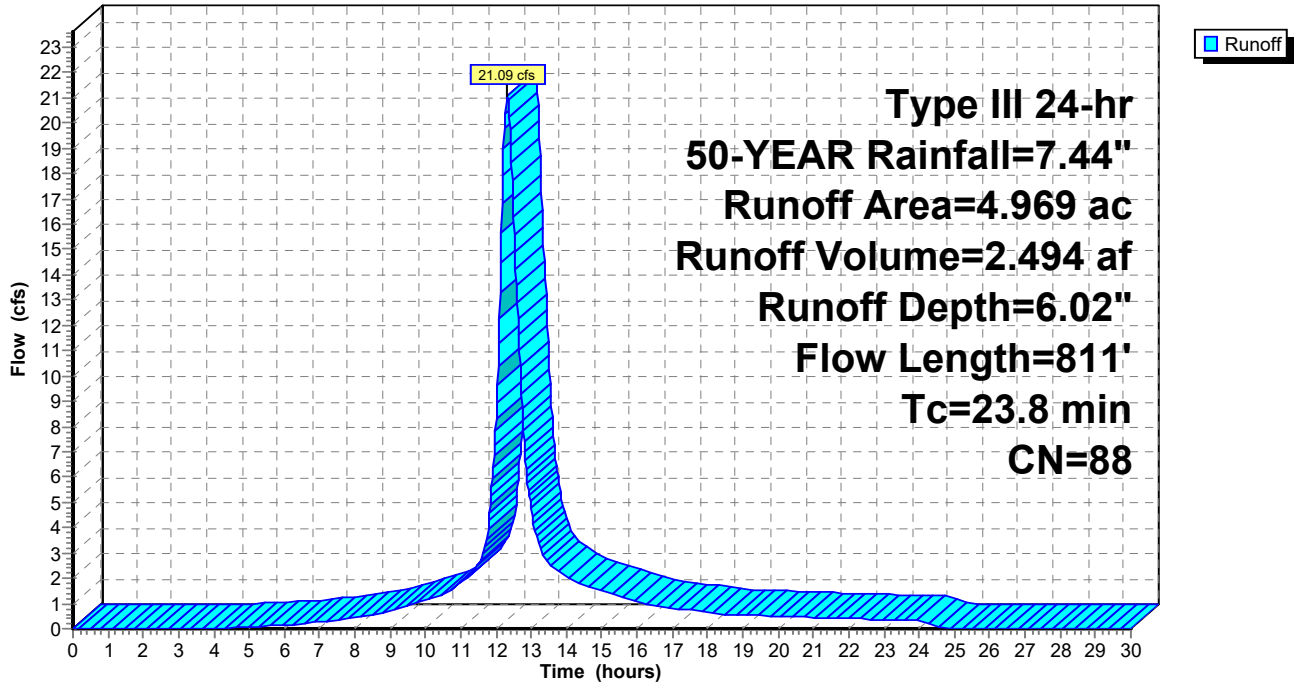
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
 Type III 24-hr 50-YEAR Rainfall=7.44"

Area (ac)	CN	Description
0.055	69	50-75% Grass cover, Fair, HSG B
0.358	61	>75% Grass cover, Good, HSG B
3.688	98	Paved parking, HSG B
0.869	58	Woods/grass comb., Good, HSG B
4.969	88	Weighted Average
1.282		25.79% Pervious Area
3.688		74.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.1	50	0.0100	0.05		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.28"
1.6	48	0.0100	0.50		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
2.2	242	0.0085	1.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.2	40	0.3000	2.74		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
3.2	196	0.0410	1.01		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.5	235	0.0208	7.73	6.07	Pipe Channel, 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
23.8	811	Total			

Subcatchment 1: Site

Hydrograph



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EXISTING CONDITIONS

Type III 24-hr 50-YEAR Rainfall=7.44"

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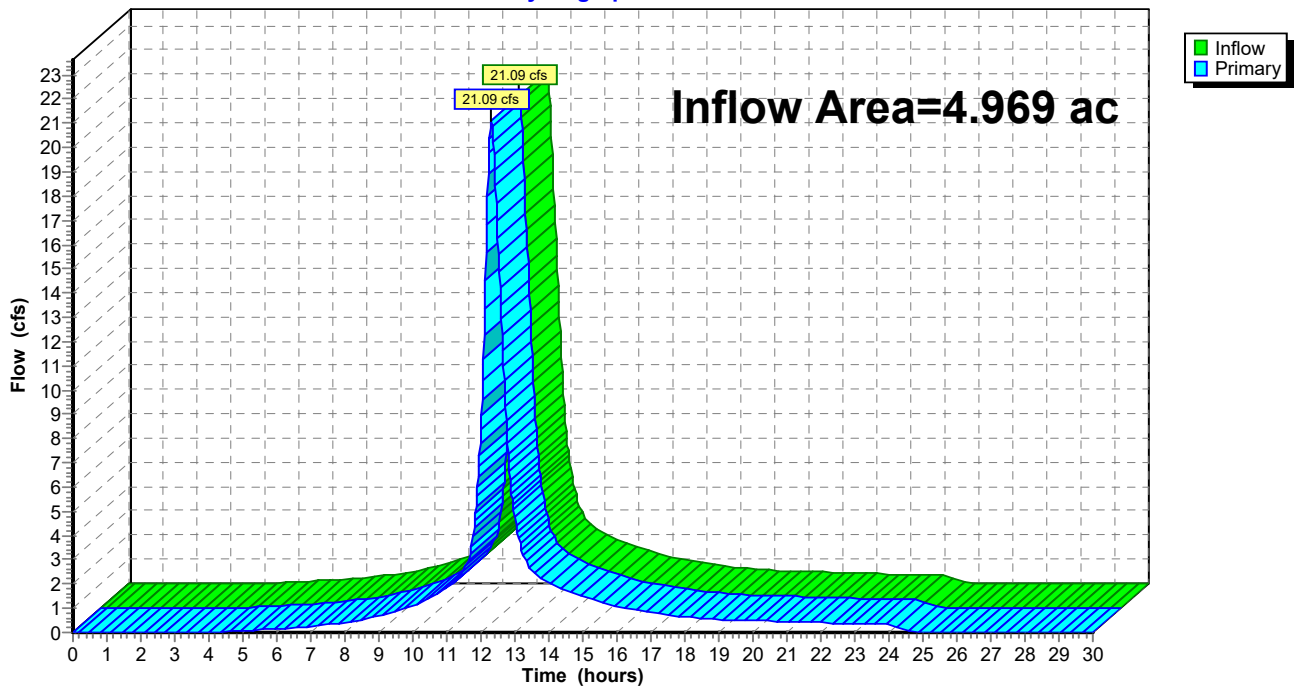
Summary for Link DP-1: Hopmeadow

Inflow Area = 4.969 ac, 74.21% Impervious, Inflow Depth = 6.02" for 50-YEAR event
Inflow = 21.09 cfs @ 12.31 hrs, Volume= 2.494 af
Primary = 21.09 cfs @ 12.31 hrs, Volume= 2.494 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs

Link DP-1: Hopmeadow

Hydrograph



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Type III 24-hr 100-YEAR Rainfall=8.45"

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Time span=0.00-30.00 hrs, dt=0.02 hrs, 1501 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 1: Site

Runoff Area=4.969 ac 74.21% Impervious Runoff Depth=7.01"
Flow Length=811' Tc=23.8 min CN=88 Runoff=24.38 cfs 2.902 af

Link DP-1: Hopmeadow

Inflow=24.38 cfs 2.902 af
Primary=24.38 cfs 2.902 af

Total Runoff Area = 4.969 ac Runoff Volume = 2.902 af Average Runoff Depth = 7.01"
25.79% Pervious = 1.282 ac 74.21% Impervious = 3.688 ac

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EXISTING CONDITIONS

Type III 24-hr 100-YEAR Rainfall=8.45"

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Summary for Subcatchment 1: Site

[47] Hint: Peak is 401% of capacity of segment #6

Runoff = 24.38 cfs @ 12.31 hrs, Volume= 2.902 af, Depth= 7.01"
 Routed to Link DP-1 : Hopmeadow

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
 Type III 24-hr 100-YEAR Rainfall=8.45"

Area (ac)	CN	Description
0.055	69	50-75% Grass cover, Fair, HSG B
0.358	61	>75% Grass cover, Good, HSG B
3.688	98	Paved parking, HSG B
0.869	58	Woods/grass comb., Good, HSG B
4.969	88	Weighted Average
1.282		25.79% Pervious Area
3.688		74.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.1	50	0.0100	0.05		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.28"
1.6	48	0.0100	0.50		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
2.2	242	0.0085	1.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.2	40	0.3000	2.74		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
3.2	196	0.0410	1.01		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.5	235	0.0208	7.73	6.07	Pipe Channel, 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
23.8	811	Total			

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EXISTING CONDITIONS

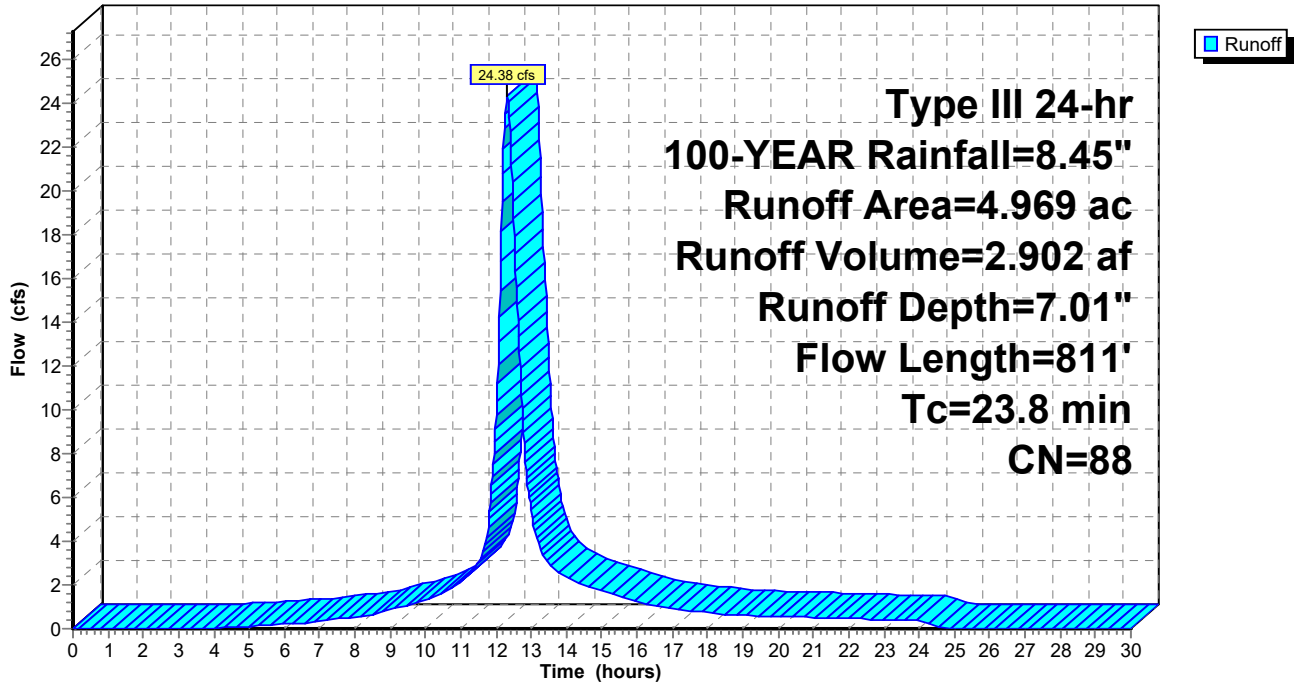
Type III 24-hr 100-YEAR Rainfall=8.45"

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Subcatchment 1: Site

Hydrograph



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EXISTING CONDITIONS

Type III 24-hr 100-YEAR Rainfall=8.45"

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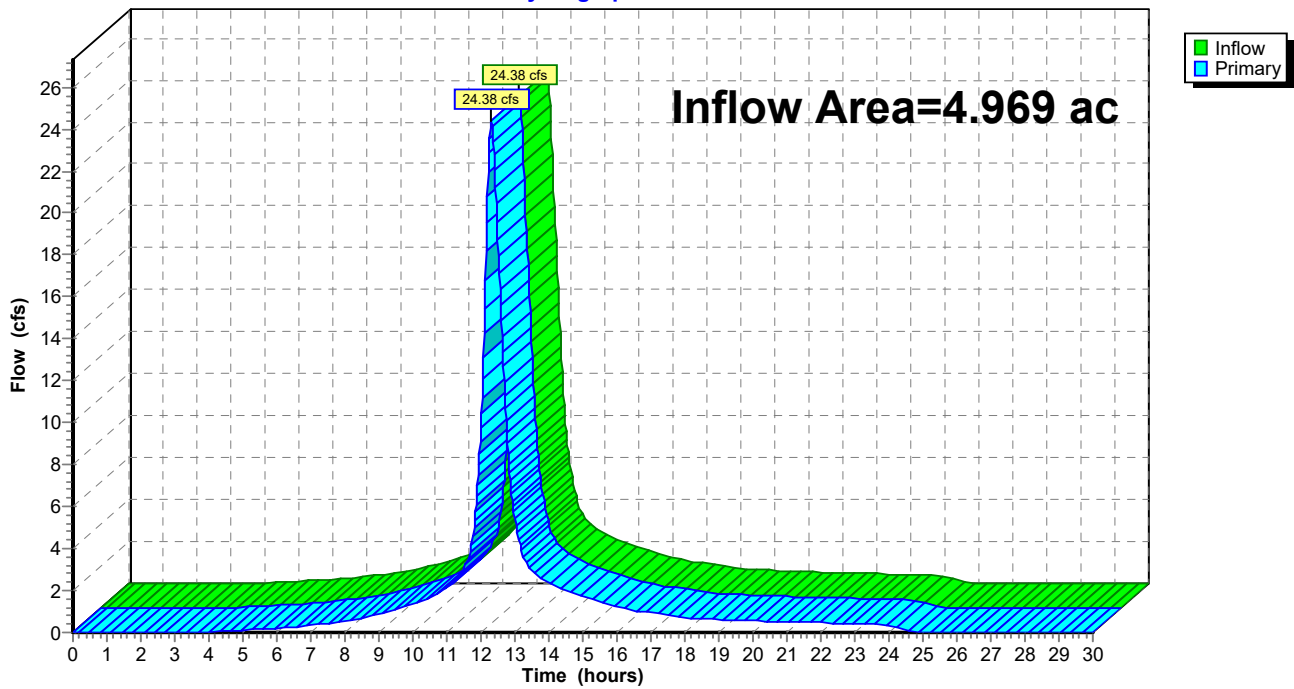
Summary for Link DP-1: Hopmeadow

Inflow Area = 4.969 ac, 74.21% Impervious, Inflow Depth = 7.01" for 100-YEAR event
Inflow = 24.38 cfs @ 12.31 hrs, Volume= 2.902 af
Primary = 24.38 cfs @ 12.31 hrs, Volume= 2.902 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs

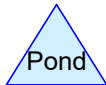
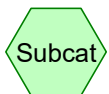
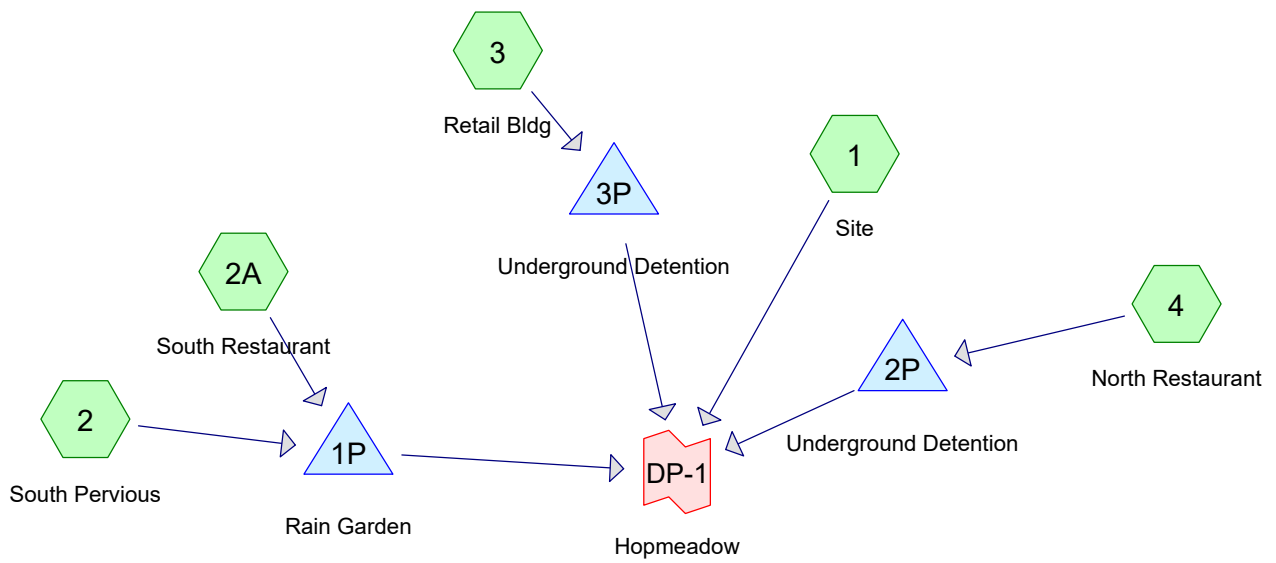
Link DP-1: Hopmeadow

Hydrograph





HydroCAD Analysis: Proposed Conditions



Routing Diagram for 42810.00 - PR
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Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-YEAR	Type III 24-hr		Default	24.00	1	3.28	2
2	10-YEAR	Type III 24-hr		Default	24.00	1	5.28	2
3	25-YEAR	Type III 24-hr		Default	24.00	1	6.53	2
4	50-YEAR	Type III 24-hr		Default	24.00	1	7.44	2
5	100-YEAR	Type III 24-hr		Default	24.00	1	8.45	2

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Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
4,356	98	(2A)
90,788	61	>75% Grass cover, Good, HSG B (1, 2)
121,268	98	Unconnected pavement, HSG B (1, 3, 4)
216,412	82	TOTAL AREA

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Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
212,056	HSG B	1, 2, 3, 4
0	HSG C	
0	HSG D	
4,356	Other	2A
216,412		TOTAL AREA

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Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover
0	0	0	0	4,356	4,356	
0	90,788	0	0	0	90,788	>75% Grass cover, Good
0	121,268	0	0	0	121,268	Unconnected pavement
0	212,056	0	0	4,356	216,412	TOTAL AREA

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Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)
1	1	0.00	0.00	752.0	0.0050	0.011	0.0	12.0	0.0
2	1P	172.90	172.10	86.0	0.0093	0.013	0.0	12.0	0.0

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PROPOSED CONDITIONS

Type III 24-hr 2-YEAR Rainfall=3.28"

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Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1: Site Runoff Area=4.141 ac 59.52% Impervious Runoff Depth=1.68"
 Flow Length=845' Tc=19.4 min CN=83 Runoff=5.54 cfs 25,180 cf

Subcatchment2: South Pervious Runoff Area=0.408 ac 0.00% Impervious Runoff Depth=0.48"
 Tc=5.0 min CN=61 Runoff=0.16 cfs 707 cf

Subcatchment2A: South Restaurant Runoff Area=0.100 ac 100.00% Impervious Runoff Depth=3.05"
 Tc=5.0 min CN=98 Runoff=0.33 cfs 1,106 cf

Subcatchment3: Retail Bldg Runoff Area=0.266 ac 100.00% Impervious Runoff Depth=3.05"
 Tc=5.0 min CN=98 Runoff=0.88 cfs 2,946 cf

Subcatchment4: North Restaurant Runoff Area=0.053 ac 100.00% Impervious Runoff Depth=3.05"
 Tc=5.0 min CN=98 Runoff=0.17 cfs 583 cf

Pond 1P: Rain Garden Peak Elev=174.86' Storage=413 cf Inflow=0.47 cfs 1,813 cf
 Discarded=0.10 cfs 1,813 cf Primary=0.00 cfs 0 cf Outflow=0.10 cfs 1,813 cf

Pond 2P: Underground Detention Peak Elev=176.08' Storage=0.005 af Inflow=0.17 cfs 583 cf
 Discarded=0.02 cfs 583 cf Primary=0.00 cfs 0 cf Outflow=0.02 cfs 583 cf

Pond 3P: Underground Detention Peak Elev=185.41' Storage=0.029 af Inflow=0.88 cfs 2,946 cf
 Discarded=0.05 cfs 2,905 cf Primary=0.02 cfs 41 cf Outflow=0.07 cfs 2,946 cf

Link DP-1: Hopmeadow Inflow=5.54 cfs 25,221 cf
 Primary=5.54 cfs 25,221 cf

Total Runoff Area = 216,412 sf Runoff Volume = 30,522 cf Average Runoff Depth = 1.69"
41.95% Pervious = 90,788 sf 58.05% Impervious = 125,624 sf

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PROPOSED CONDITIONS

Type III 24-hr 2-YEAR Rainfall=3.28"

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Summary for Subcatchment 1: Site

[47] Hint: Peak is 186% of capacity of segment #4

Runoff = 5.54 cfs @ 12.27 hrs, Volume= 25,180 cf, Depth= 1.68"
 Routed to Link DP-1 : Hopmeadow

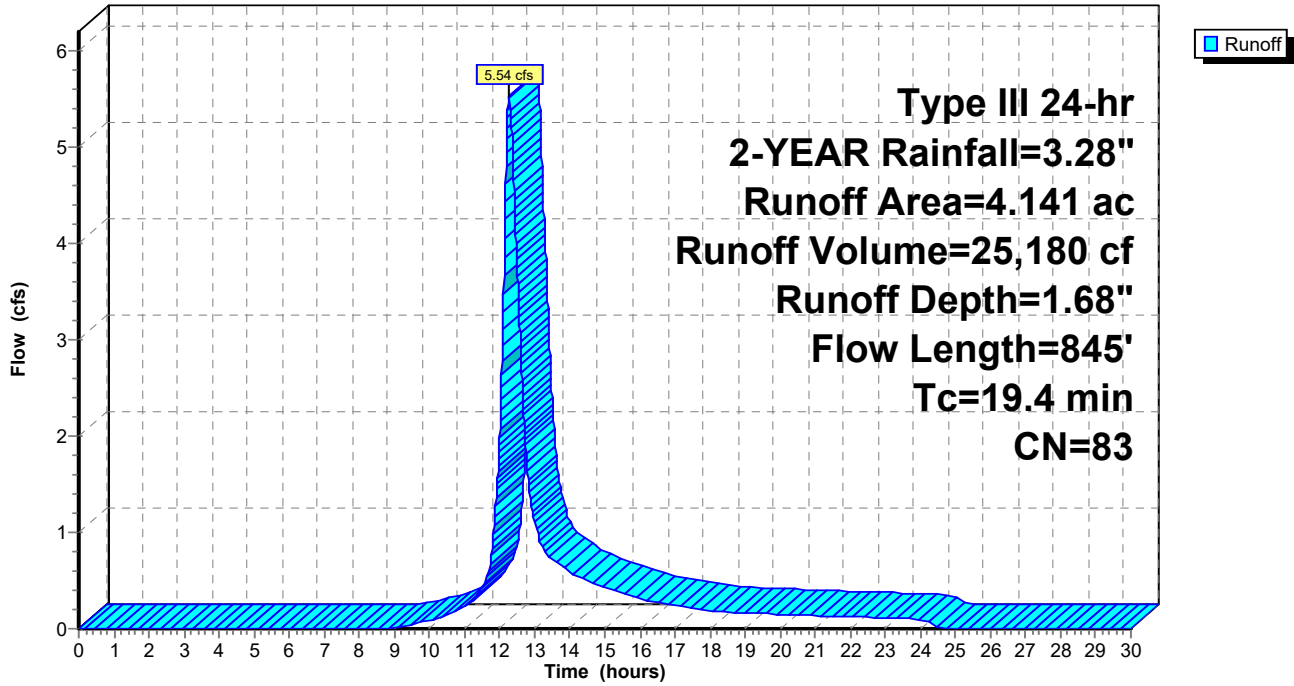
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2-YEAR Rainfall=3.28"

Area (ac)	CN	Description
1.676	61	>75% Grass cover, Good, HSG B
2.465	98	Unconnected pavement, HSG B
4.141	83	Weighted Average
1.676		40.48% Pervious Area
2.465		59.52% Impervious Area
2.465		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.9	35	0.0050	0.04		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.28"
0.1	25	0.2800	7.94		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
0.1	33	0.1000	6.42		Shallow Concentrated Flow, Paved Kv= 20.3 fps
3.3	752	0.0050	3.79	2.98	Pipe Channel, RCP_Round 12" 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
19.4	845	Total			

Subcatchment 1: Site

Hydrograph



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Type III 24-hr 2-YEAR Rainfall=3.28"

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Summary for Subcatchment 2: South Pervious

Runoff = 0.16 cfs @ 12.10 hrs, Volume= 707 cf, Depth= 0.48"
Routed to Pond 1P : Rain Garden

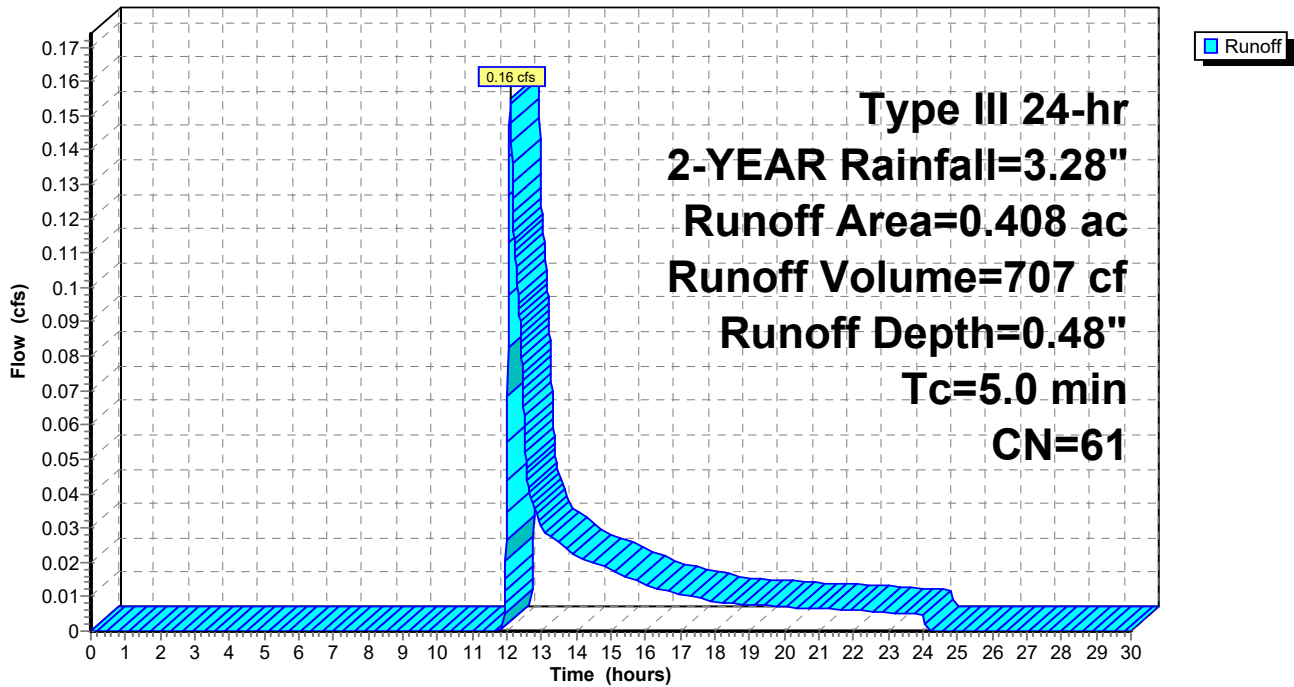
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YEAR Rainfall=3.28"

Area (ac)	CN	Description
0.408	61	>75% Grass cover, Good, HSG B
0.408		100.00% Pervious Area

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

Subcatchment 2: South Pervious

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Type III 24-hr 2-YEAR Rainfall=3.28"

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Summary for Subcatchment 2A: South Restaurant

Runoff = 0.33 cfs @ 12.07 hrs, Volume= 1,106 cf, Depth= 3.05"
Routed to Pond 1P : Rain Garden

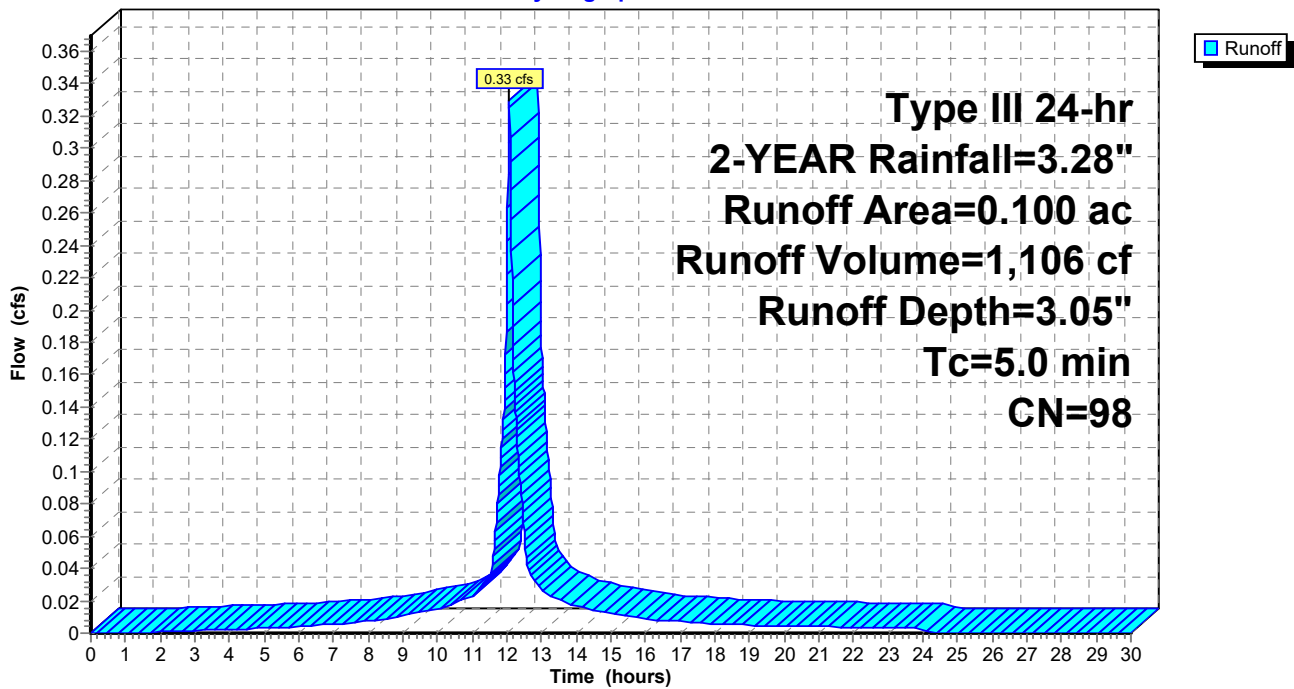
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YEAR Rainfall=3.28"

Area (ac)	CN	Description
* 0.100	98	
0.100		100.00% Impervious Area

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

Subcatchment 2A: South Restaurant

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Type III 24-hr 2-YEAR Rainfall=3.28"

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Summary for Subcatchment 3: Retail Bldg

Runoff = 0.88 cfs @ 12.07 hrs, Volume= 2,946 cf, Depth= 3.05"
Routed to Pond 3P : Underground Detention

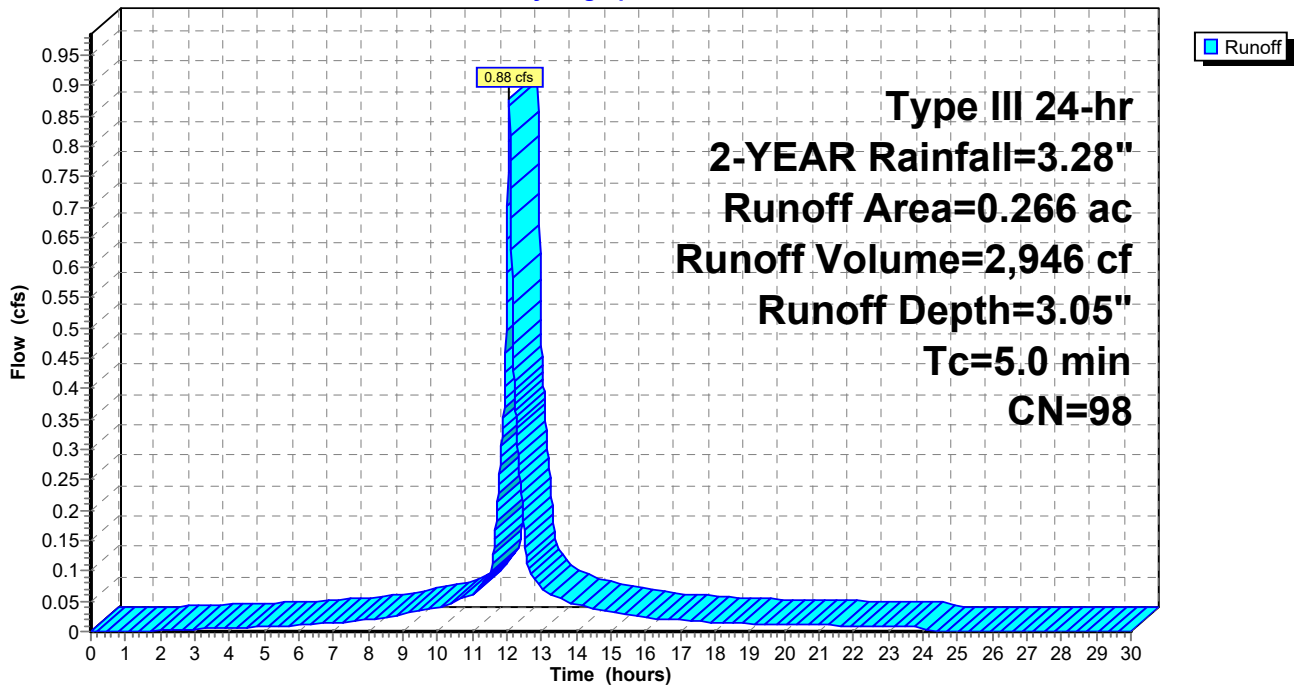
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YEAR Rainfall=3.28"

Area (ac)	CN	Description
0.266	98	Unconnected pavement, HSG B
0.266		100.00% Impervious Area
0.266		100.00% Unconnected

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

Subcatchment 3: Retail Bldg

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Type III 24-hr 2-YEAR Rainfall=3.28"

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Summary for Subcatchment 4: North Restaurant

Runoff = 0.17 cfs @ 12.07 hrs, Volume= 583 cf, Depth= 3.05"
Routed to Pond 2P : Underground Detention

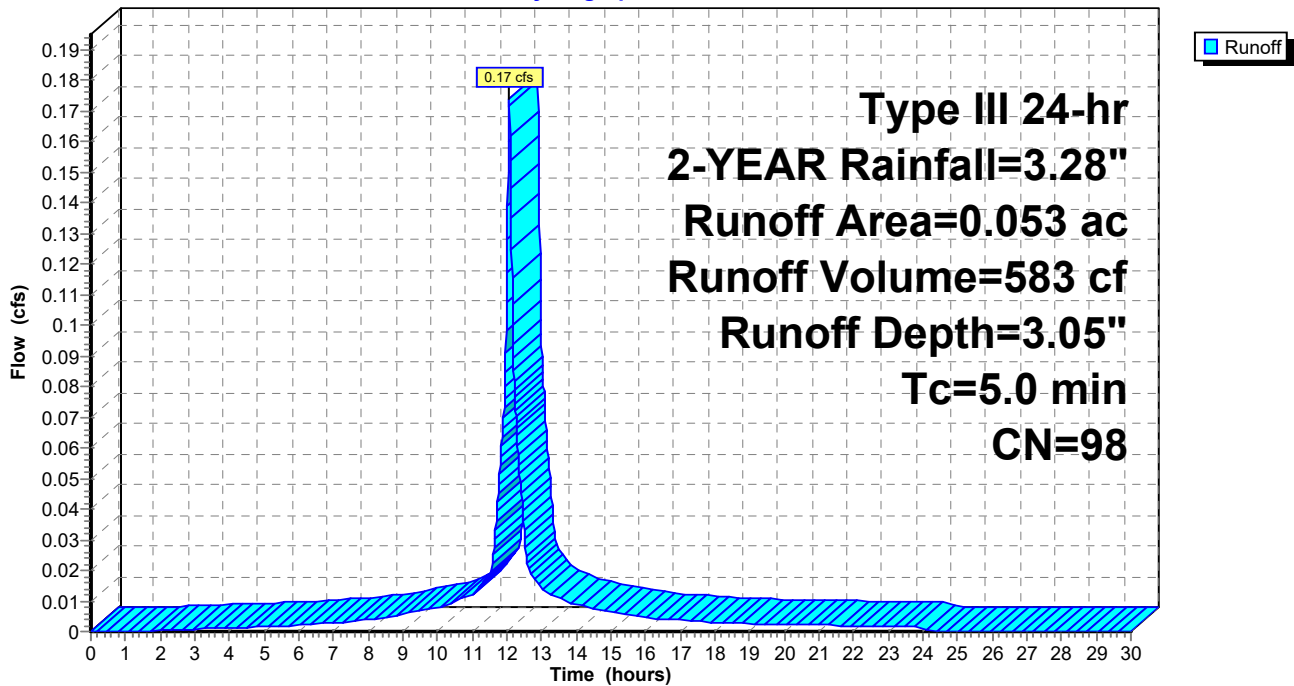
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YEAR Rainfall=3.28"

Area (ac)	CN	Description
0.053	98	Unconnected pavement, HSG B
0.053		100.00% Impervious Area
0.053		100.00% Unconnected

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

Subcatchment 4: North Restaurant

Hydrograph



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PROPOSED CONDITIONS

Type III 24-hr 2-YEAR Rainfall=3.28"

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Summary for Pond 1P: Rain Garden

Inflow Area = 22,128 sf, 19.69% Impervious, Inflow Depth = 0.98" for 2-YEAR event
 Inflow = 0.47 cfs @ 12.08 hrs, Volume= 1,813 cf
 Outflow = 0.10 cfs @ 12.55 hrs, Volume= 1,813 cf, Atten= 79%, Lag= 28.0 min
 Discarded = 0.10 cfs @ 12.55 hrs, Volume= 1,813 cf
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
 Routed to Link DP-1 : Hopmeadow

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Peak Elev= 174.86' @ 12.55 hrs Surf.Area= 1,418 sf Storage= 413 cf

Plug-Flow detention time= 28.4 min calculated for 1,812 cf (100% of inflow)
 Center-of-Mass det. time= 28.4 min (844.1 - 815.7)

Volume	Invert	Avail.Storage	Storage Description		
#1	174.50'	2,992 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)
174.50	883	160.0	0	0	883
175.00	1,655	263.0	624	624	4,352
176.00	3,161	430.0	2,368	2,992	13,568

Device	Routing	Invert	Outlet Devices
#1	Device 3	175.50'	19.4" x 36.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#2	Discarded	174.50'	3.000 in/hr Exfiltration over Surface area Phase-In= 0.01'
#3	Primary	172.90'	12.0" Round Culvert L= 86.0' CMP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 172.90' / 172.10' S= 0.0093 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Discarded OutFlow Max=0.10 cfs @ 12.55 hrs HW=174.86' (Free Discharge)

↑ **2=Exfiltration** (Exfiltration Controls 0.10 cfs)

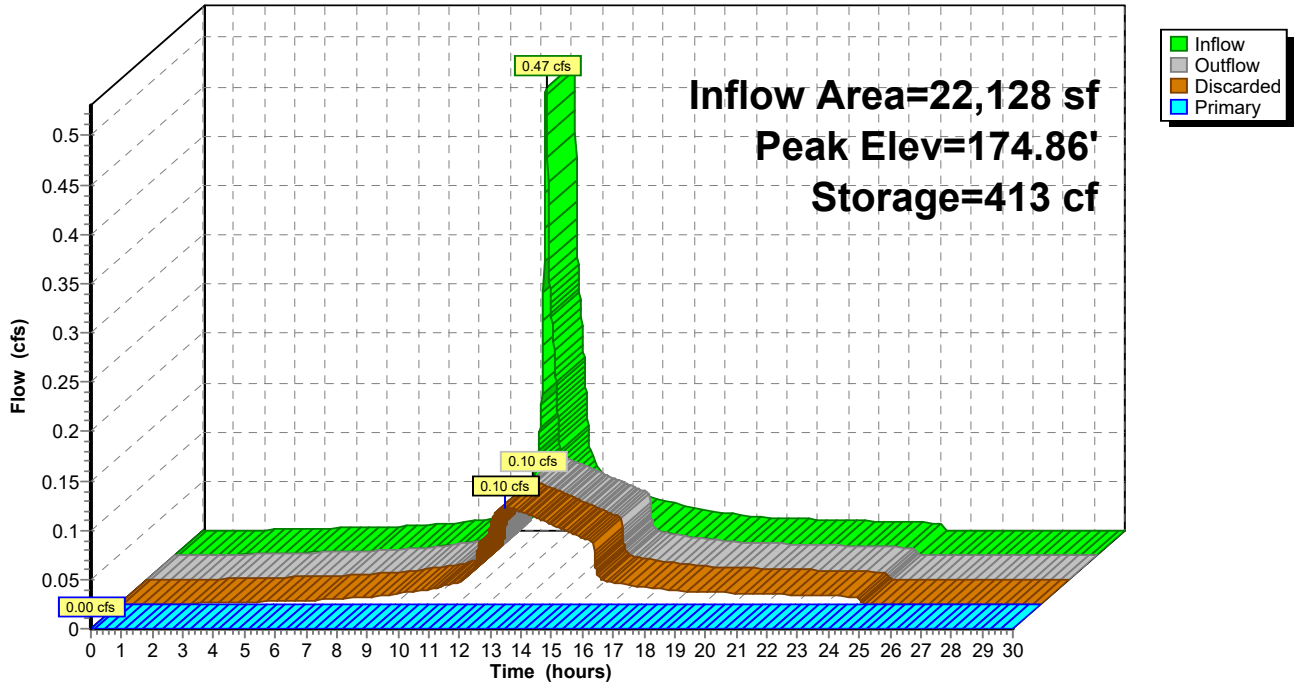
Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=174.50' (Free Discharge)

↑ **3=Culvert** (Passes 0.00 cfs of 3.50 cfs potential flow)

↑ **1=Orifice/Grate** (Controls 0.00 cfs)

Pond 1P: Rain Garden

Hydrograph



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Type III 24-hr 2-YEAR Rainfall=3.28"

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Summary for Pond 2P: Underground Detention

Inflow Area = 2,297 sf, 100.00% Impervious, Inflow Depth = 3.05" for 2-YEAR event
 Inflow = 0.17 cfs @ 12.07 hrs, Volume= 583 cf
 Outflow = 0.02 cfs @ 11.33 hrs, Volume= 583 cf, Atten= 91%, Lag= 0.0 min
 Discarded = 0.02 cfs @ 11.33 hrs, Volume= 583 cf
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
 Routed to Link DP-1 : Hopmeadow

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Peak Elev= 176.08' @ 12.90 hrs Surf.Area= 0.005 ac Storage= 0.005 af

Plug-Flow detention time= 90.6 min calculated for 583 cf (100% of inflow)
 Center-of-Mass det. time= 90.5 min (845.5 - 755.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	174.40'	0.004 af	4.83'W x 45.92'L x 2.33'H Field A 0.012 af Overall - 0.002 af Embedded = 0.010 af x 40.0% Voids
#2A	174.90'	0.002 af	ADS_StormTech SC-310 +Cap x 6 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap
		0.006 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	174.90'	12.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#2	Discarded	174.40'	3.000 in/hr Exfiltration over Surface area Phase-In= 0.01'
#3	Device 1	176.23'	4.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.02 cfs @ 11.33 hrs HW=174.42' (Free Discharge)
 ↑ **2=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=174.40' (Free Discharge)
 ↑ **1=Orifice/Grate** (Controls 0.00 cfs)
 ↑ **3=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

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Type III 24-hr 2-YEAR Rainfall=3.28"

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Pond 2P: Underground Detention - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-310 +Cap (ADS StormTech®SC-310 with cap length)

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

6 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 43.92' Row Length +12.0" End Stone x 2 = 45.92' Base Length

1 Rows x 34.0" Wide + 12.0" Side Stone x 2 = 4.83' Base Width

6.0" Stone Base + 16.0" Chamber Height + 6.0" Stone Cover = 2.33' Field Height

6 Chambers x 14.7 cf = 88.5 cf Chamber Storage

517.9 cf Field - 88.5 cf Chambers = 429.4 cf Stone x 40.0% Voids = 171.8 cf Stone Storage

Chamber Storage + Stone Storage = 260.2 cf = 0.006 af

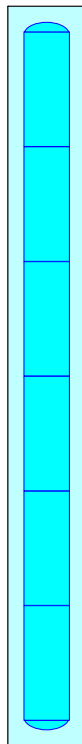
Overall Storage Efficiency = 50.2%

Overall System Size = 45.92' x 4.83' x 2.33'

6 Chambers

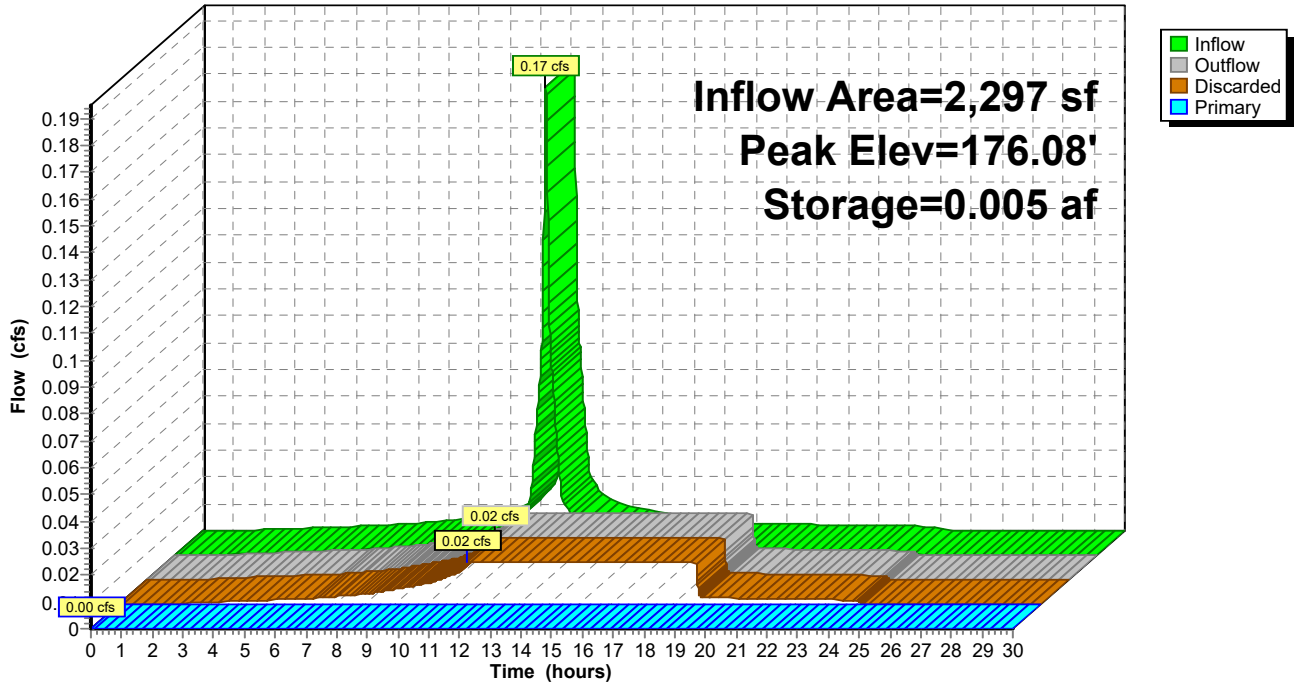
19.2 cy Field

15.9 cy Stone



Pond 2P: Underground Detention

Hydrograph



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Type III 24-hr 2-YEAR Rainfall=3.28"

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Summary for Pond 3P: Underground Detention

Inflow Area = 11,600 sf, 100.00% Impervious, Inflow Depth = 3.05" for 2-YEAR event
 Inflow = 0.88 cfs @ 12.07 hrs, Volume= 2,946 cf
 Outflow = 0.07 cfs @ 13.00 hrs, Volume= 2,946 cf, Atten= 92%, Lag= 56.0 min
 Discarded = 0.05 cfs @ 10.43 hrs, Volume= 2,905 cf
 Primary = 0.02 cfs @ 13.00 hrs, Volume= 41 cf
 Routed to Link DP-1 : Hopmeadow

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Peak Elev= 185.41' @ 13.00 hrs Surf.Area= 0.015 ac Storage= 0.029 af

Plug-Flow detention time= 215.1 min calculated for 2,945 cf (100% of inflow)
 Center-of-Mass det. time= 215.1 min (970.0 - 755.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	182.40'	0.015 af	11.00'W x 60.58'L x 3.50'H Field A 0.054 af Overall - 0.017 af Embedded = 0.037 af x 40.0% Voids
#2A	182.90'	0.017 af	ADS_StormTech SC-740 +Cap x 16 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 16 Chambers in 2 Rows
		0.032 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	182.90'	12.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#2	Discarded	182.40'	3.000 in/hr Exfiltration over Surface area Phase-In= 0.01'
#3	Device 1	185.40'	4.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.05 cfs @ 10.43 hrs HW=182.44' (Free Discharge)↑ **2=Exfiltration** (Exfiltration Controls 0.05 cfs)**Primary OutFlow** Max=0.02 cfs @ 13.00 hrs HW=185.41' (Free Discharge)↑ **1=Orifice/Grate** (Passes 0.02 cfs of 5.37 cfs potential flow)↑ **3=Broad-Crested Rectangular Weir** (Weir Controls 0.02 cfs @ 0.34 fps)

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Type III 24-hr 2-YEAR Rainfall=3.28"

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Pond 3P: Underground Detention - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

8 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 58.58' Row Length +12.0" End Stone x 2 = 60.58' Base Length

2 Rows x 51.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 11.00' Base Width

6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

16 Chambers x 45.9 cf = 735.0 cf Chamber Storage

2,332.2 cf Field - 735.0 cf Chambers = 1,597.2 cf Stone x 40.0% Voids = 638.9 cf Stone Storage

Chamber Storage + Stone Storage = 1,373.9 cf = 0.032 af

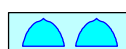
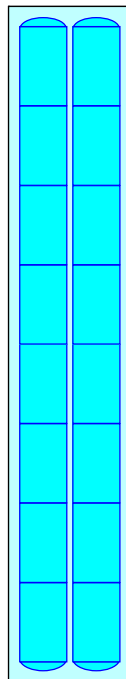
Overall Storage Efficiency = 58.9%

Overall System Size = 60.58' x 11.00' x 3.50'

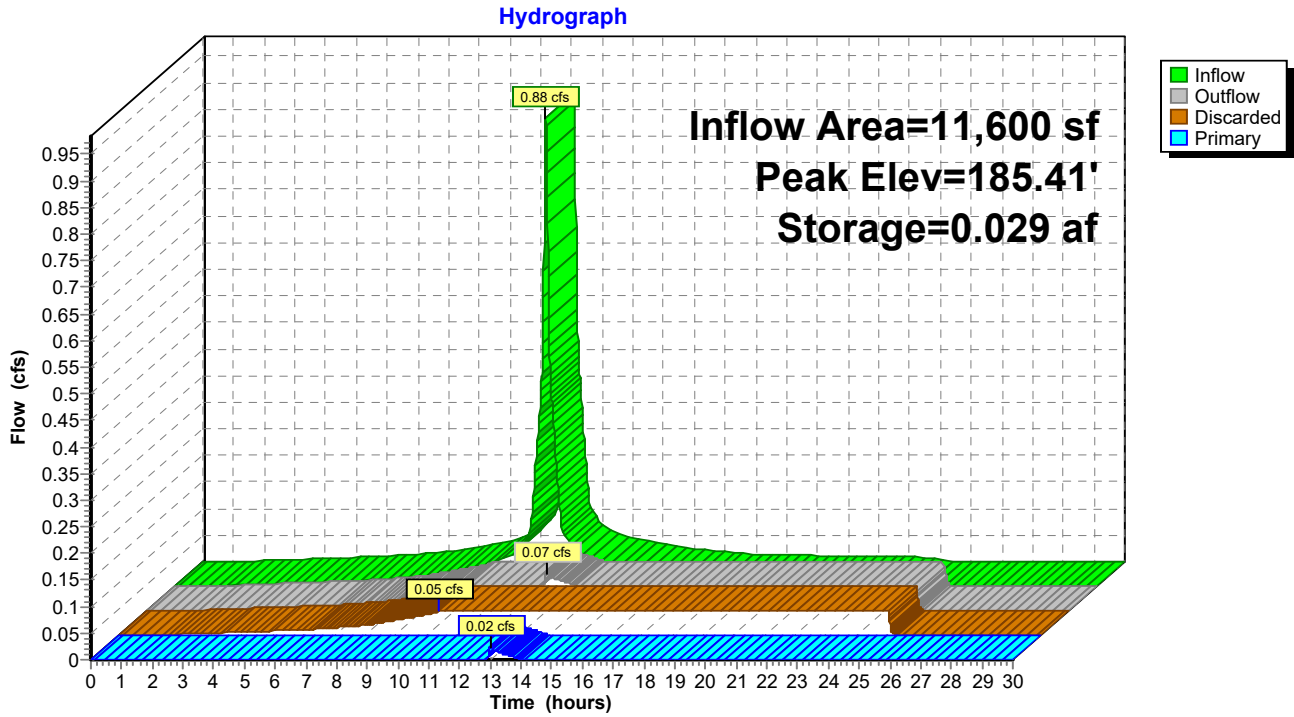
16 Chambers

86.4 cy Field

59.2 cy Stone



Pond 3P: Underground Detention



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Type III 24-hr 2-YEAR Rainfall=3.28"

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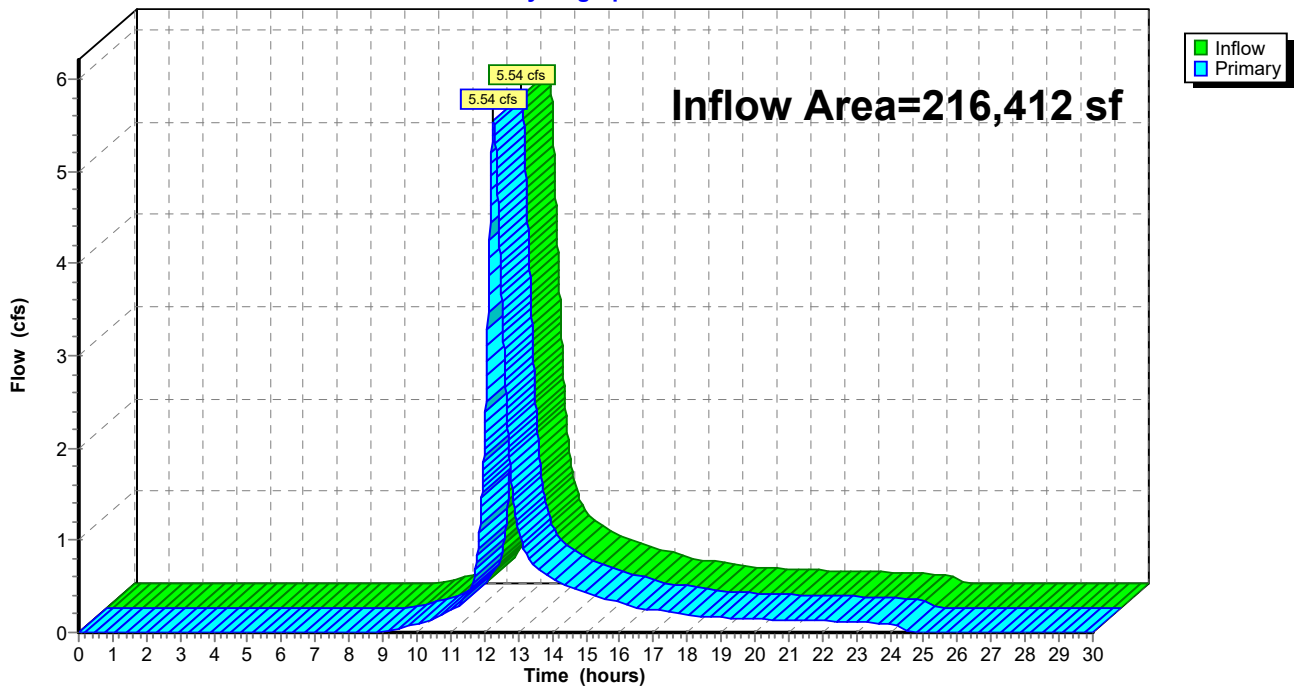
Summary for Link DP-1: Hopmeadow

Inflow Area = 216,412 sf, 58.05% Impervious, Inflow Depth = 1.40" for 2-YEAR event
Inflow = 5.54 cfs @ 12.27 hrs, Volume= 25,221 cf
Primary = 5.54 cfs @ 12.27 hrs, Volume= 25,221 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link DP-1: Hopmeadow

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Type III 24-hr 10-YEAR Rainfall=5.28"

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Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1: Site Runoff Area=4.141 ac 59.52% Impervious Runoff Depth=3.43"
 Flow Length=845' Tc=19.4 min CN=83 Runoff=11.33 cfs 51,538 cf

Subcatchment2: South Pervious Runoff Area=0.408 ac 0.00% Impervious Runoff Depth=1.54"
 Tc=5.0 min CN=61 Runoff=0.71 cfs 2,281 cf

Subcatchment2A: South Restaurant Runoff Area=0.100 ac 100.00% Impervious Runoff Depth=5.04"
 Tc=5.0 min CN=98 Runoff=0.54 cfs 1,831 cf

Subcatchment3: Retail Bldg Runoff Area=0.266 ac 100.00% Impervious Runoff Depth=5.04"
 Tc=5.0 min CN=98 Runoff=1.43 cfs 4,875 cf

Subcatchment4: North Restaurant Runoff Area=0.053 ac 100.00% Impervious Runoff Depth=5.04"
 Tc=5.0 min CN=98 Runoff=0.28 cfs 965 cf

Pond 1P: Rain Garden Peak Elev=175.40' Storage=1,384 cf Inflow=1.24 cfs 4,112 cf
 Discarded=0.15 cfs 4,112 cf Primary=0.00 cfs 0 cf Outflow=0.15 cfs 4,112 cf

Pond 2P: Underground Detention Peak Elev=176.31' Storage=0.005 af Inflow=0.28 cfs 965 cf
 Discarded=0.02 cfs 775 cf Primary=0.24 cfs 190 cf Outflow=0.26 cfs 965 cf

Pond 3P: Underground Detention Peak Elev=185.63' Storage=0.030 af Inflow=1.43 cfs 4,875 cf
 Discarded=0.05 cfs 3,517 cf Primary=1.28 cfs 1,358 cf Outflow=1.33 cfs 4,875 cf

Link DP-1: Hopmeadow Inflow=11.98 cfs 53,086 cf
 Primary=11.98 cfs 53,086 cf

Total Runoff Area = 216,412 sf Runoff Volume = 61,490 cf Average Runoff Depth = 3.41"
41.95% Pervious = 90,788 sf 58.05% Impervious = 125,624 sf

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Type III 24-hr 10-YEAR Rainfall=5.28"

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Summary for Subcatchment 1: Site

[47] Hint: Peak is 381% of capacity of segment #4

Runoff = 11.33 cfs @ 12.26 hrs, Volume= 51,538 cf, Depth= 3.43"
 Routed to Link DP-1 : Hopmeadow

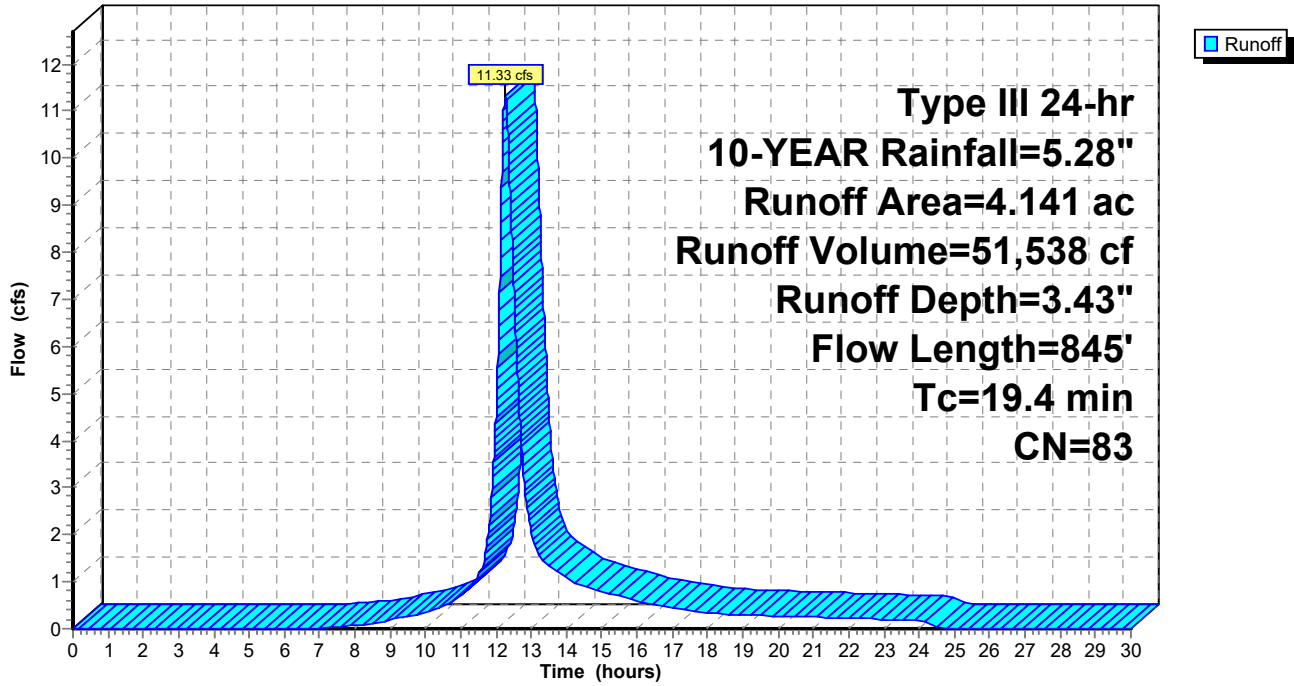
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-YEAR Rainfall=5.28"

Area (ac)	CN	Description
1.676	61	>75% Grass cover, Good, HSG B
2.465	98	Unconnected pavement, HSG B
4.141	83	Weighted Average
1.676		40.48% Pervious Area
2.465		59.52% Impervious Area
2.465		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.9	35	0.0050	0.04		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.28"
0.1	25	0.2800	7.94		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
0.1	33	0.1000	6.42		Shallow Concentrated Flow, Paved Kv= 20.3 fps
3.3	752	0.0050	3.79	2.98	Pipe Channel, RCP_Round 12" 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
19.4	845	Total			

Subcatchment 1: Site

Hydrograph



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PROPOSED CONDITIONS

Type III 24-hr 10-YEAR Rainfall=5.28"

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Summary for Subcatchment 2: South Pervious

Runoff = 0.71 cfs @ 12.08 hrs, Volume= 2,281 cf, Depth= 1.54"
Routed to Pond 1P : Rain Garden

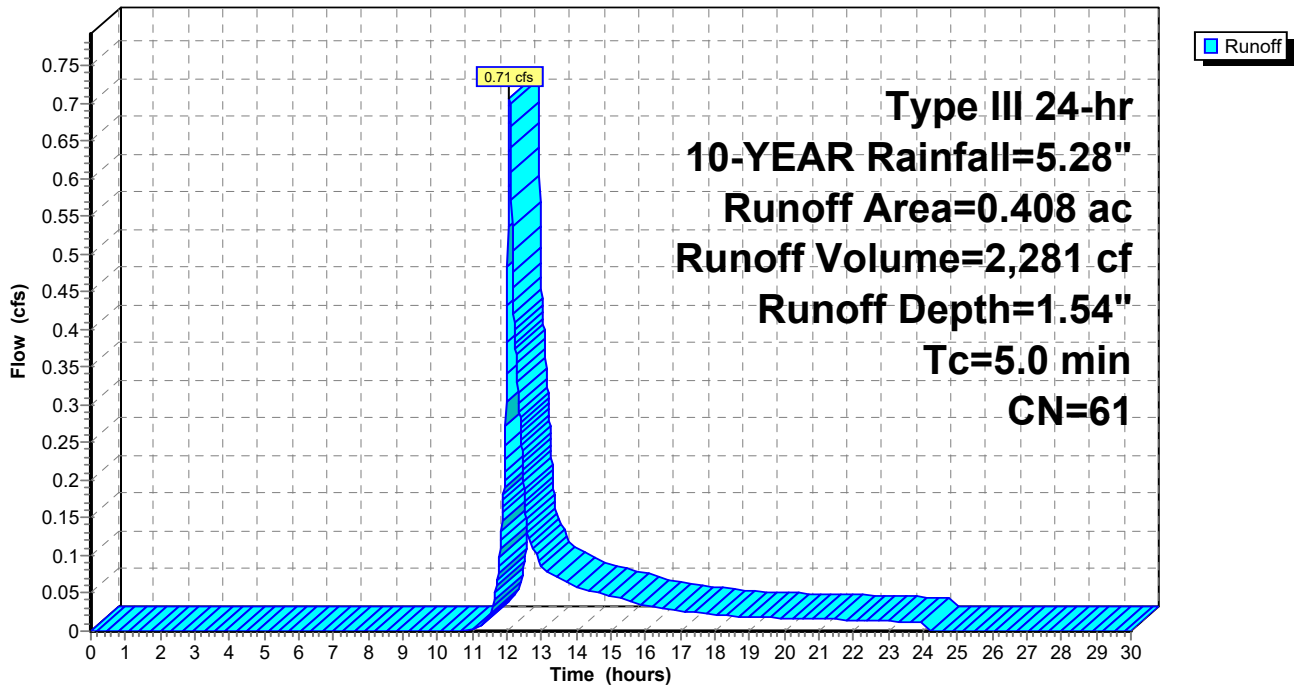
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YEAR Rainfall=5.28"

Area (ac)	CN	Description
0.408	61	>75% Grass cover, Good, HSG B
0.408		100.00% Pervious Area

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

Subcatchment 2: South Pervious

Hydrograph



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Type III 24-hr 10-YEAR Rainfall=5.28"

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Summary for Subcatchment 2A: South Restaurant

Runoff = 0.54 cfs @ 12.07 hrs, Volume= 1,831 cf, Depth= 5.04"
Routed to Pond 1P : Rain Garden

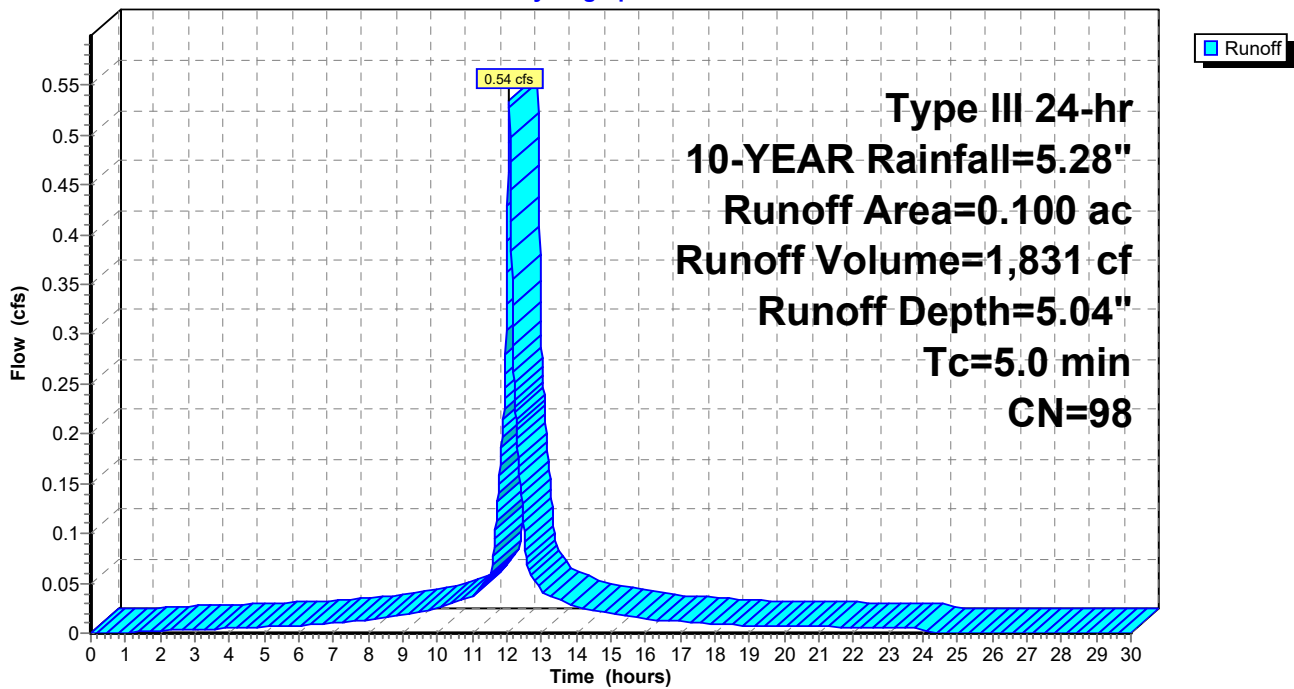
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YEAR Rainfall=5.28"

Area (ac)	CN	Description
* 0.100	98	
0.100		100.00% Impervious Area

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

Subcatchment 2A: South Restaurant

Hydrograph



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Type III 24-hr 10-YEAR Rainfall=5.28"

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Summary for Subcatchment 3: Retail Bldg

Runoff = 1.43 cfs @ 12.07 hrs, Volume= 4,875 cf, Depth= 5.04"
Routed to Pond 3P : Underground Detention

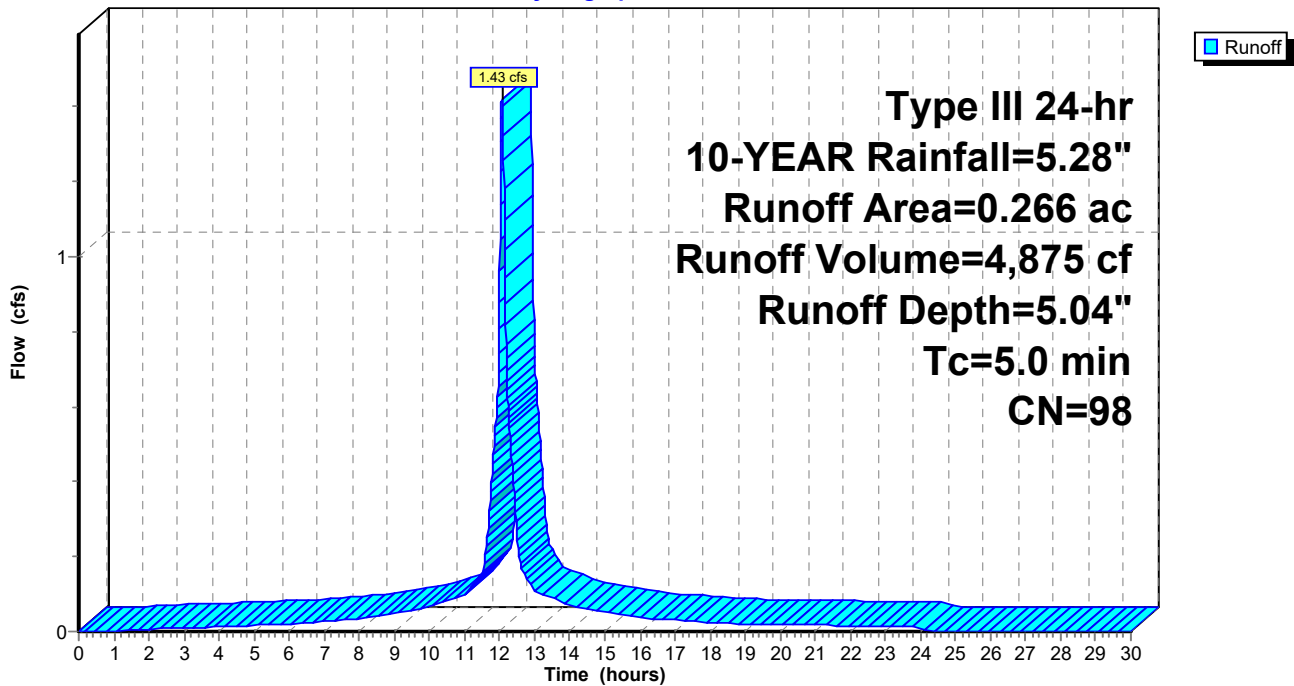
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YEAR Rainfall=5.28"

Area (ac)	CN	Description
0.266	98	Unconnected pavement, HSG B
0.266		100.00% Impervious Area
0.266		100.00% Unconnected

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

Subcatchment 3: Retail Bldg

Hydrograph



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Type III 24-hr 10-YEAR Rainfall=5.28"

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Summary for Subcatchment 4: North Restaurant

Runoff = 0.28 cfs @ 12.07 hrs, Volume= 965 cf, Depth= 5.04"
Routed to Pond 2P : Underground Detention

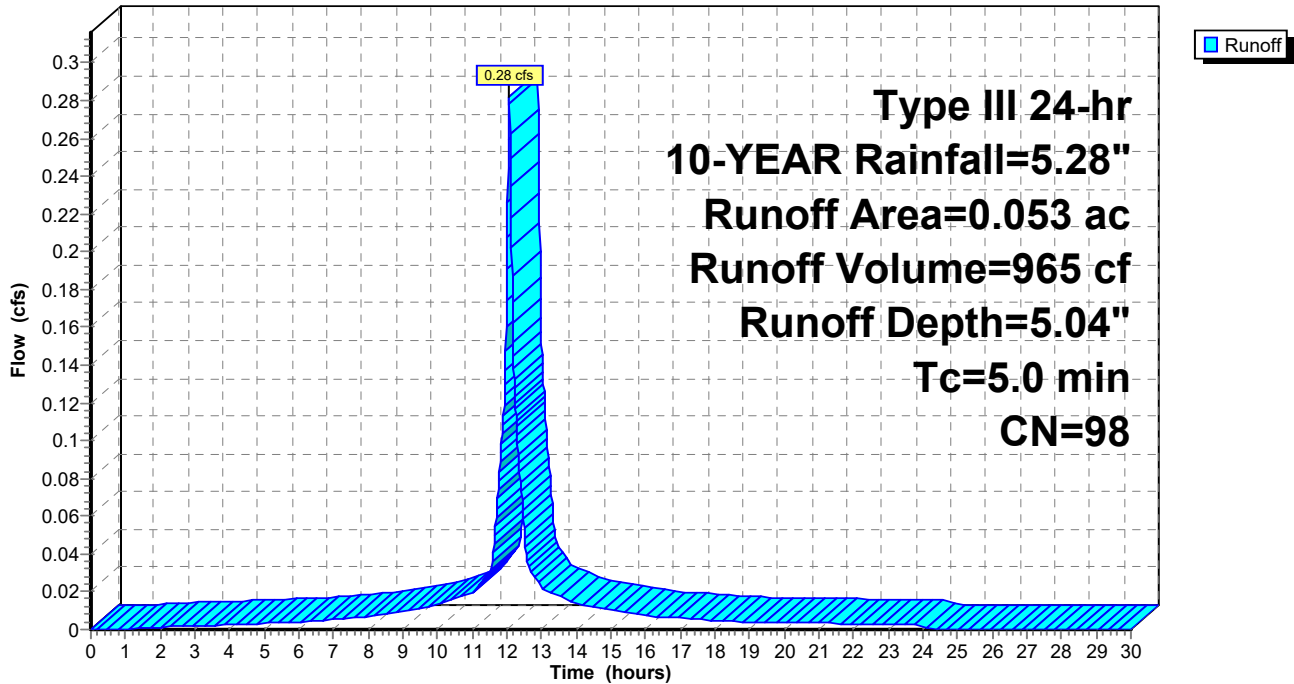
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YEAR Rainfall=5.28"

Area (ac)	CN	Description
0.053	98	Unconnected pavement, HSG B
0.053		100.00% Impervious Area
0.053		100.00% Unconnected

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

Subcatchment 4: North Restaurant

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Type III 24-hr 10-YEAR Rainfall=5.28"

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Summary for Pond 1P: Rain Garden

Inflow Area = 22,128 sf, 19.69% Impervious, Inflow Depth = 2.23" for 10-YEAR event
 Inflow = 1.24 cfs @ 12.08 hrs, Volume= 4,112 cf
 Outflow = 0.15 cfs @ 12.84 hrs, Volume= 4,112 cf, Atten= 88%, Lag= 45.4 min
 Discarded = 0.15 cfs @ 12.84 hrs, Volume= 4,112 cf
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
 Routed to Link DP-1 : Hopmeadow

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Peak Elev= 175.40' @ 12.84 hrs Surf.Area= 2,194 sf Storage= 1,384 cf

Plug-Flow detention time= 83.8 min calculated for 4,112 cf (100% of inflow)
 Center-of-Mass det. time= 83.8 min (897.4 - 813.5)

Volume	Invert	Avail.Storage	Storage Description		
#1	174.50'	2,992 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)
174.50	883	160.0	0	0	883
175.00	1,655	263.0	624	624	4,352
176.00	3,161	430.0	2,368	2,992	13,568

Device	Routing	Invert	Outlet Devices
#1	Device 3	175.50'	19.4" x 36.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#2	Discarded	174.50'	3.000 in/hr Exfiltration over Surface area Phase-In= 0.01'
#3	Primary	172.90'	12.0" Round Culvert L= 86.0' CMP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 172.90' / 172.10' S= 0.0093 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Discarded OutFlow Max=0.15 cfs @ 12.84 hrs HW=175.40' (Free Discharge)

↑ **2=Exfiltration** (Exfiltration Controls 0.15 cfs)

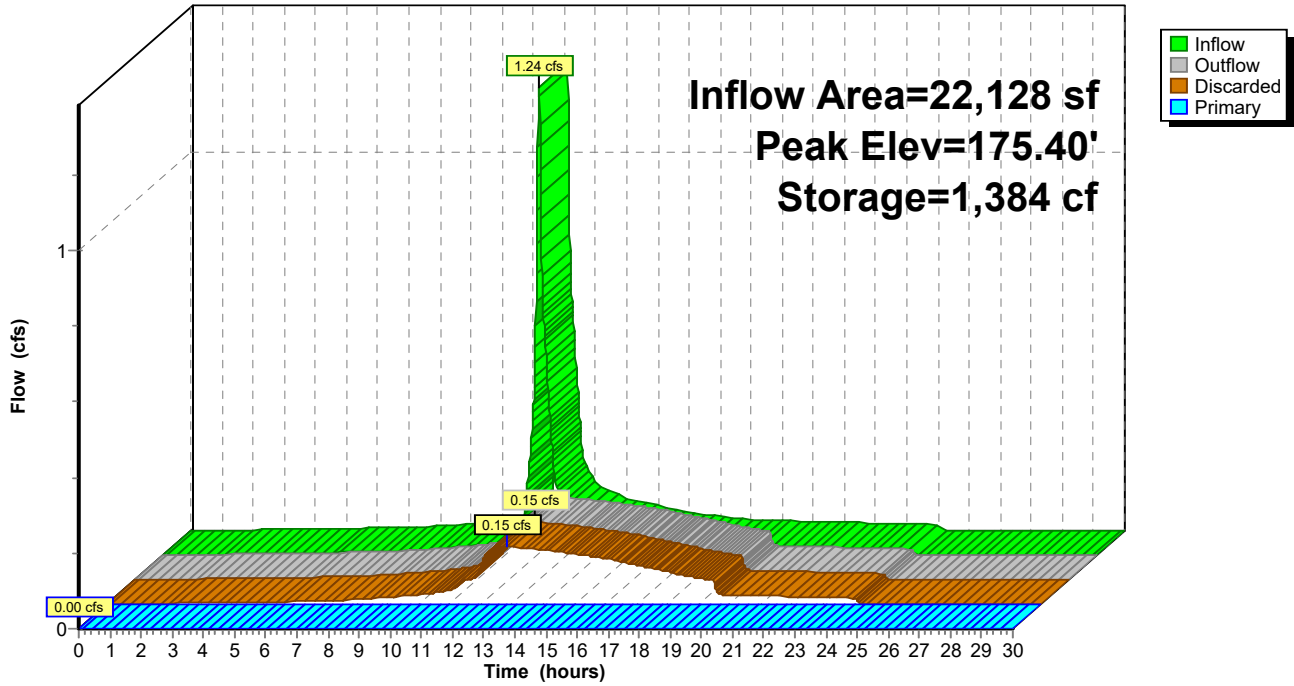
Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=174.50' (Free Discharge)

↑ **3=Culvert** (Passes 0.00 cfs of 3.50 cfs potential flow)

↑ **1=Orifice/Grate** (Controls 0.00 cfs)

Pond 1P: Rain Garden

Hydrograph



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Type III 24-hr 10-YEAR Rainfall=5.28"

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Summary for Pond 2P: Underground Detention

Inflow Area = 2,297 sf, 100.00% Impervious, Inflow Depth = 5.04" for 10-YEAR event
 Inflow = 0.28 cfs @ 12.07 hrs, Volume= 965 cf
 Outflow = 0.26 cfs @ 12.11 hrs, Volume= 965 cf, Atten= 9%, Lag= 2.6 min
 Discarded = 0.02 cfs @ 10.43 hrs, Volume= 775 cf
 Primary = 0.24 cfs @ 12.11 hrs, Volume= 190 cf
 Routed to Link DP-1 : Hopmeadow

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Peak Elev= 176.31' @ 12.11 hrs Surf.Area= 0.005 ac Storage= 0.005 af

Plug-Flow detention time= 83.3 min calculated for 965 cf (100% of inflow)
 Center-of-Mass det. time= 83.3 min (829.5 - 746.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	174.40'	0.004 af	4.83'W x 45.92'L x 2.33'H Field A 0.012 af Overall - 0.002 af Embedded = 0.010 af x 40.0% Voids
#2A	174.90'	0.002 af	ADS_StormTech SC-310 +Cap x 6 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap
		0.006 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	174.90'	12.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#2	Discarded	174.40'	3.000 in/hr Exfiltration over Surface area Phase-In= 0.01'
#3	Device 1	176.23'	4.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.02 cfs @ 10.43 hrs HW=174.42' (Free Discharge)
 ↑ **2=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.23 cfs @ 12.11 hrs HW=176.31' (Free Discharge)
 ↑ **1=Orifice/Grate** (Passes 0.23 cfs of 3.60 cfs potential flow)
 ↑ **3=Broad-Crested Rectangular Weir** (Weir Controls 0.23 cfs @ 0.77 fps)

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Type III 24-hr 10-YEAR Rainfall=5.28"

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Pond 2P: Underground Detention - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-310 +Cap (ADS StormTech®SC-310 with cap length)

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

6 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 43.92' Row Length +12.0" End Stone x 2 = 45.92' Base Length

1 Rows x 34.0" Wide + 12.0" Side Stone x 2 = 4.83' Base Width

6.0" Stone Base + 16.0" Chamber Height + 6.0" Stone Cover = 2.33' Field Height

6 Chambers x 14.7 cf = 88.5 cf Chamber Storage

517.9 cf Field - 88.5 cf Chambers = 429.4 cf Stone x 40.0% Voids = 171.8 cf Stone Storage

Chamber Storage + Stone Storage = 260.2 cf = 0.006 af

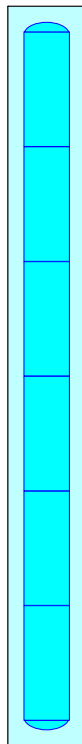
Overall Storage Efficiency = 50.2%

Overall System Size = 45.92' x 4.83' x 2.33'

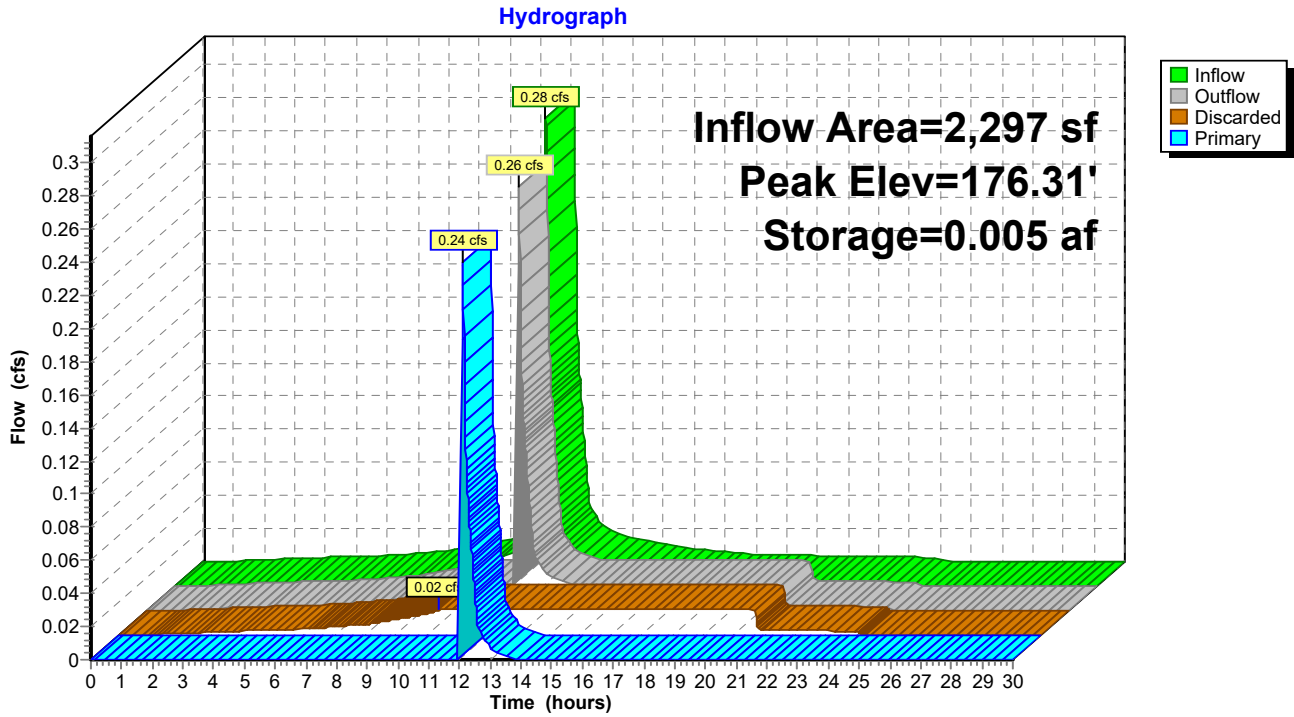
6 Chambers

19.2 cy Field

15.9 cy Stone



Pond 2P: Underground Detention



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PROPOSED CONDITIONS

Type III 24-hr 10-YEAR Rainfall=5.28"

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Summary for Pond 3P: Underground Detention

Inflow Area = 11,600 sf, 100.00% Impervious, Inflow Depth = 5.04" for 10-YEAR event
 Inflow = 1.43 cfs @ 12.07 hrs, Volume= 4,875 cf
 Outflow = 1.33 cfs @ 12.10 hrs, Volume= 4,875 cf, Atten= 7%, Lag= 2.0 min
 Discarded = 0.05 cfs @ 8.88 hrs, Volume= 3,517 cf
 Primary = 1.28 cfs @ 12.10 hrs, Volume= 1,358 cf
 Routed to Link DP-1 : Hopmeadow

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Peak Elev= 185.63' @ 12.10 hrs Surf.Area= 0.015 ac Storage= 0.030 af

Plug-Flow detention time= 166.9 min calculated for 4,873 cf (100% of inflow)
 Center-of-Mass det. time= 166.9 min (913.1 - 746.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	182.40'	0.015 af	11.00'W x 60.58'L x 3.50'H Field A 0.054 af Overall - 0.017 af Embedded = 0.037 af x 40.0% Voids
#2A	182.90'	0.017 af	ADS_StormTech SC-740 +Cap x 16 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 16 Chambers in 2 Rows
		0.032 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	182.90'	12.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#2	Discarded	182.40'	3.000 in/hr Exfiltration over Surface area Phase-In= 0.01'
#3	Device 1	185.40'	4.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.05 cfs @ 8.88 hrs HW=182.44' (Free Discharge)
 ↑**2=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=1.27 cfs @ 12.10 hrs HW=185.63' (Free Discharge)
 ↑**1=Orifice/Grate** (Passes 1.27 cfs of 5.65 cfs potential flow)
 ↑**3=Broad-Crested Rectangular Weir** (Weir Controls 1.27 cfs @ 1.36 fps)

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PROPOSED CONDITIONS

Type III 24-hr 10-YEAR Rainfall=5.28"

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Pond 3P: Underground Detention - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

8 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 58.58' Row Length +12.0" End Stone x 2 = 60.58' Base Length

2 Rows x 51.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 11.00' Base Width

6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

16 Chambers x 45.9 cf = 735.0 cf Chamber Storage

2,332.2 cf Field - 735.0 cf Chambers = 1,597.2 cf Stone x 40.0% Voids = 638.9 cf Stone Storage

Chamber Storage + Stone Storage = 1,373.9 cf = 0.032 af

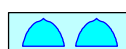
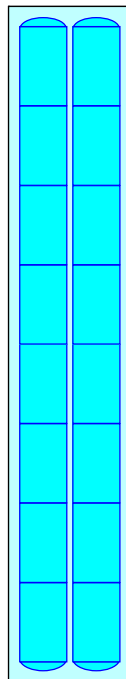
Overall Storage Efficiency = 58.9%

Overall System Size = 60.58' x 11.00' x 3.50'

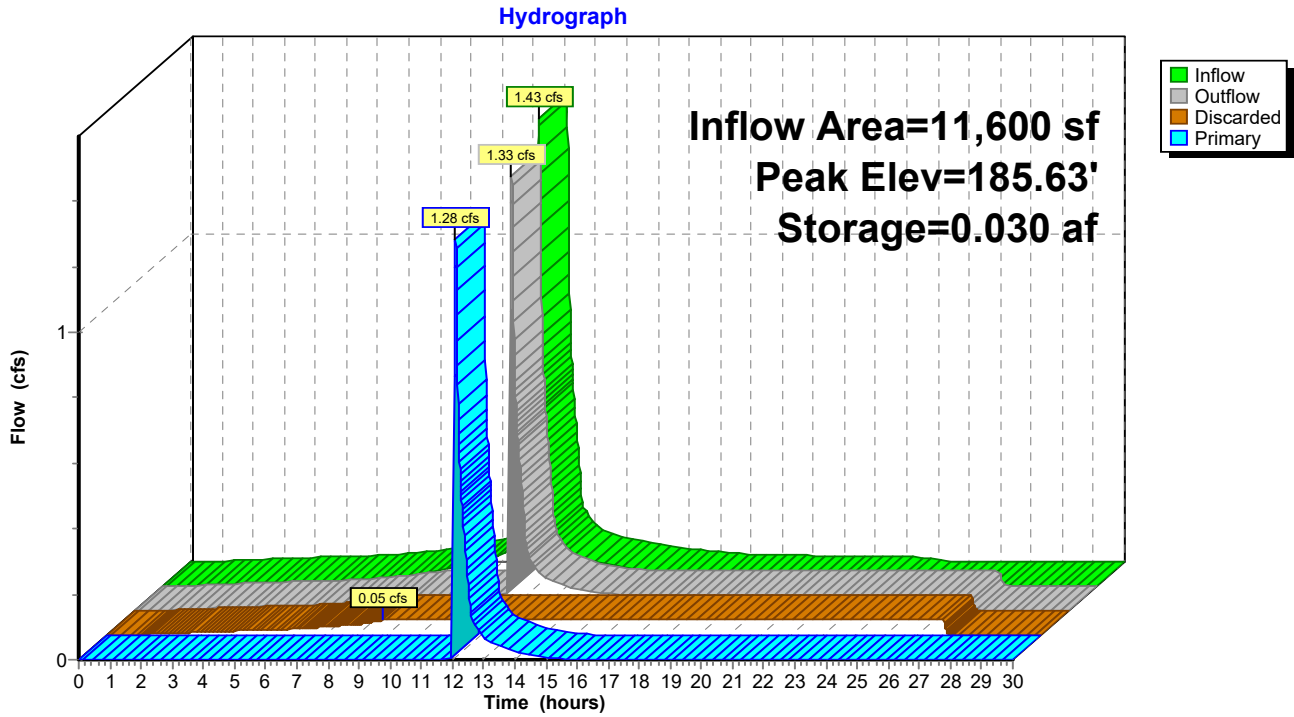
16 Chambers

86.4 cy Field

59.2 cy Stone



Pond 3P: Underground Detention



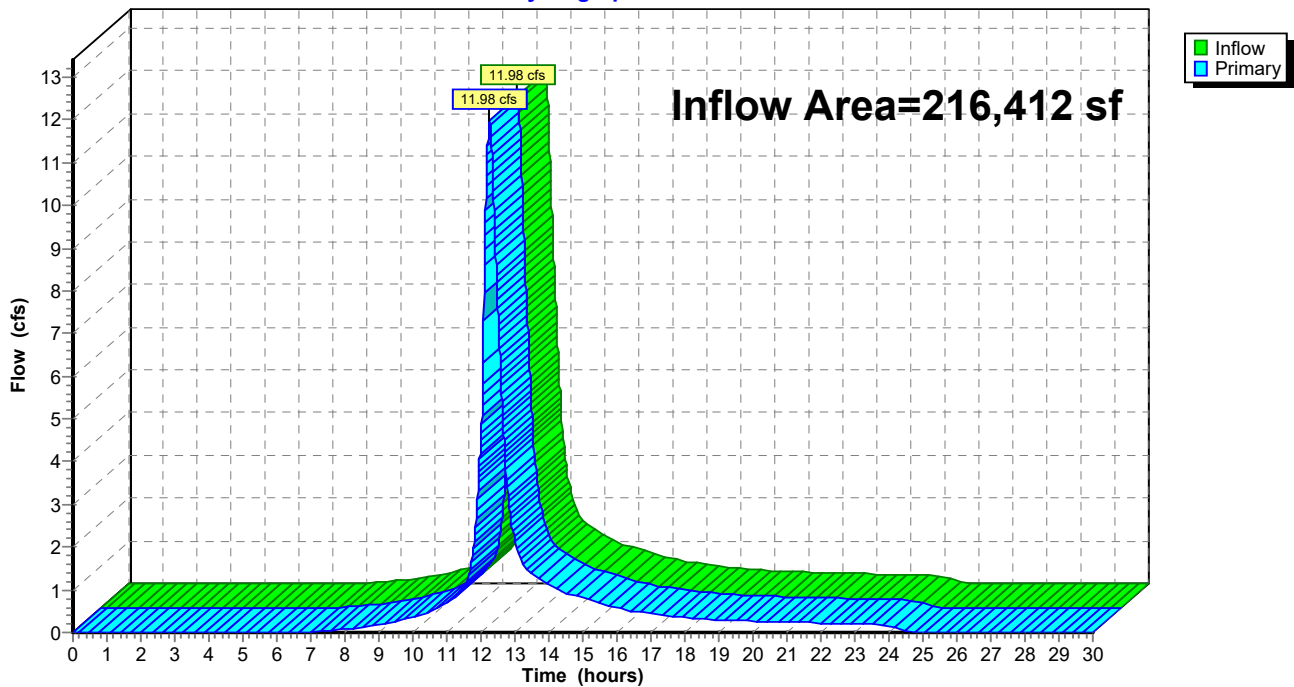
Summary for Link DP-1: Hopmeadow

Inflow Area = 216,412 sf, 58.05% Impervious, Inflow Depth = 2.94" for 10-YEAR event
Inflow = 11.98 cfs @ 12.26 hrs, Volume= 53,086 cf
Primary = 11.98 cfs @ 12.26 hrs, Volume= 53,086 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link DP-1: Hopmeadow

Hydrograph



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PROPOSED CONDITIONS

Type III 24-hr 25-YEAR Rainfall=6.53"

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Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1: Site Runoff Area=4.141 ac 59.52% Impervious Runoff Depth=4.59"
 Flow Length=845' Tc=19.4 min CN=83 Runoff=15.04 cfs 68,934 cf

Subcatchment2: South Pervious Runoff Area=0.408 ac 0.00% Impervious Runoff Depth=2.37"
 Tc=5.0 min CN=61 Runoff=1.14 cfs 3,507 cf

Subcatchment2A: South Restaurant Runoff Area=0.100 ac 100.00% Impervious Runoff Depth=6.29"
 Tc=5.0 min CN=98 Runoff=0.66 cfs 2,284 cf

Subcatchment3: Retail Bldg Runoff Area=0.266 ac 100.00% Impervious Runoff Depth=6.29"
 Tc=5.0 min CN=98 Runoff=1.77 cfs 6,082 cf

Subcatchment4: North Restaurant Runoff Area=0.053 ac 100.00% Impervious Runoff Depth=6.29"
 Tc=5.0 min CN=98 Runoff=0.35 cfs 1,204 cf

Pond 1P: Rain Garden Peak Elev=175.56' Storage=1,768 cf Inflow=1.80 cfs 5,791 cf
 Discarded=0.17 cfs 5,188 cf Primary=0.47 cfs 603 cf Outflow=0.64 cfs 5,791 cf

Pond 2P: Underground Detention Peak Elev=176.33' Storage=0.005 af Inflow=0.35 cfs 1,204 cf
 Discarded=0.02 cfs 865 cf Primary=0.33 cfs 339 cf Outflow=0.35 cfs 1,204 cf

Pond 3P: Underground Detention Peak Elev=185.68' Storage=0.030 af Inflow=1.77 cfs 6,082 cf
 Discarded=0.05 cfs 3,810 cf Primary=1.71 cfs 2,272 cf Outflow=1.76 cfs 6,082 cf

Link DP-1: Hopmeadow Inflow=16.06 cfs 72,148 cf
 Primary=16.06 cfs 72,148 cf

Total Runoff Area = 216,412 sf Runoff Volume = 82,010 cf Average Runoff Depth = 4.55"
41.95% Pervious = 90,788 sf 58.05% Impervious = 125,624 sf

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PROPOSED CONDITIONS

Type III 24-hr 25-YEAR Rainfall=6.53"

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Summary for Subcatchment 1: Site

[47] Hint: Peak is 505% of capacity of segment #4

Runoff = 15.04 cfs @ 12.26 hrs, Volume= 68,934 cf, Depth= 4.59"
 Routed to Link DP-1 : Hopmeadow

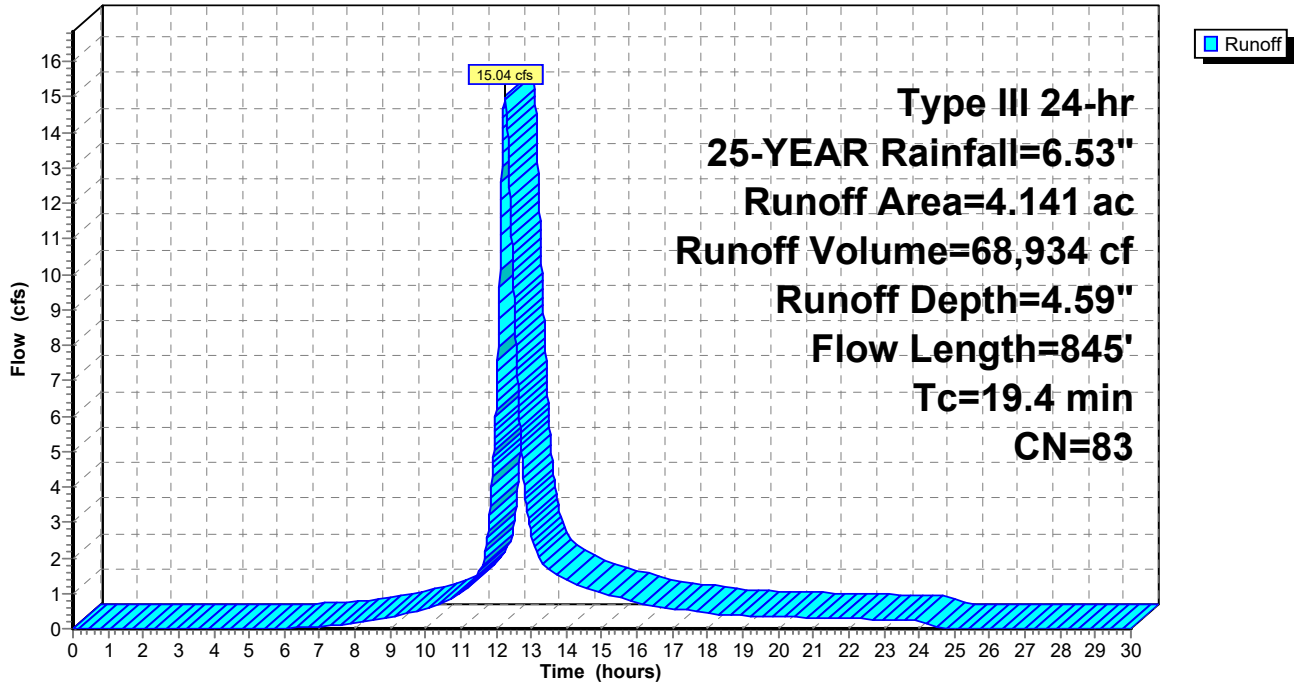
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-YEAR Rainfall=6.53"

Area (ac)	CN	Description
1.676	61	>75% Grass cover, Good, HSG B
2.465	98	Unconnected pavement, HSG B
4.141	83	Weighted Average
1.676		40.48% Pervious Area
2.465		59.52% Impervious Area
2.465		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.9	35	0.0050	0.04		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.28"
0.1	25	0.2800	7.94		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
0.1	33	0.1000	6.42		Shallow Concentrated Flow, Paved Kv= 20.3 fps
3.3	752	0.0050	3.79	2.98	Pipe Channel, RCP_Round 12" 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
19.4	845	Total			

Subcatchment 1: Site

Hydrograph



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Type III 24-hr 25-YEAR Rainfall=6.53"

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Summary for Subcatchment 2: South Pervious

Runoff = 1.14 cfs @ 12.08 hrs, Volume= 3,507 cf, Depth= 2.37"
Routed to Pond 1P : Rain Garden

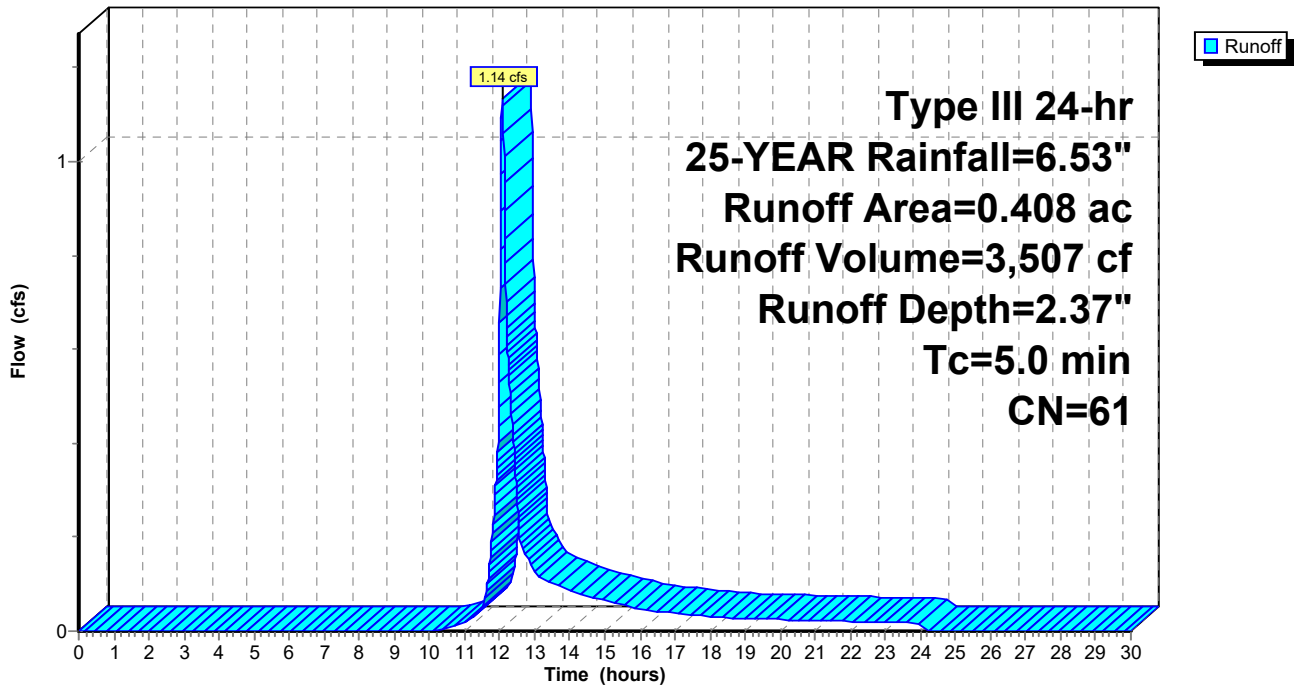
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YEAR Rainfall=6.53"

Area (ac)	CN	Description
0.408	61	>75% Grass cover, Good, HSG B
0.408		100.00% Pervious Area

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

Subcatchment 2: South Pervious

Hydrograph



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Type III 24-hr 25-YEAR Rainfall=6.53"

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Summary for Subcatchment 2A: South Restaurant

Runoff = 0.66 cfs @ 12.07 hrs, Volume= 2,284 cf, Depth= 6.29"
Routed to Pond 1P : Rain Garden

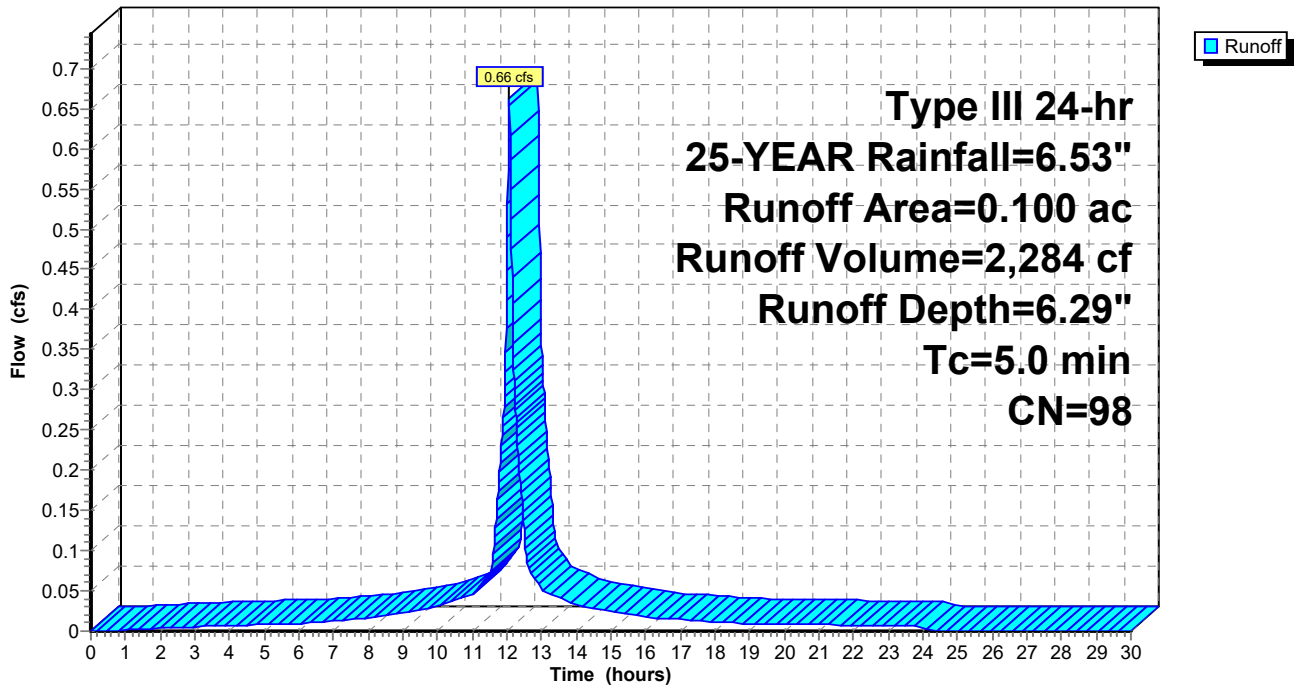
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YEAR Rainfall=6.53"

Area (ac)	CN	Description
* 0.100	98	
0.100		100.00% Impervious Area

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

Subcatchment 2A: South Restaurant

Hydrograph



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Type III 24-hr 25-YEAR Rainfall=6.53"

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Summary for Subcatchment 3: Retail Bldg

Runoff = 1.77 cfs @ 12.07 hrs, Volume= 6,082 cf, Depth= 6.29"
Routed to Pond 3P : Underground Detention

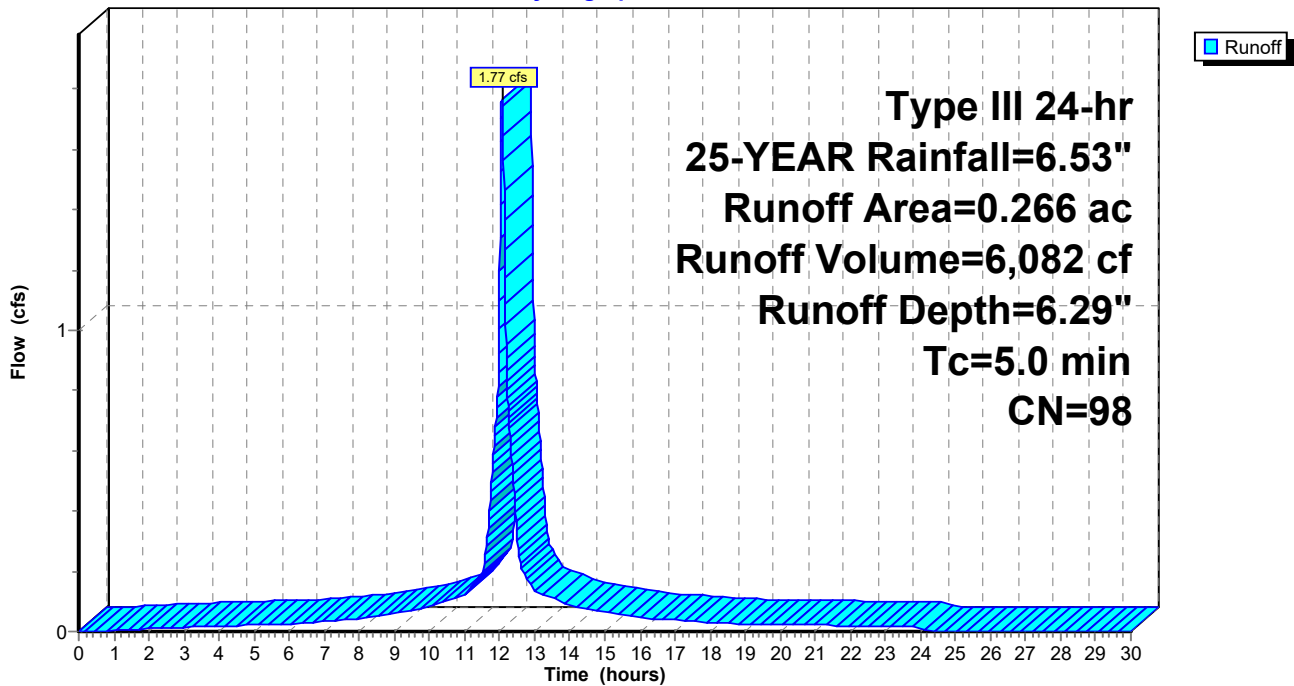
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YEAR Rainfall=6.53"

Area (ac)	CN	Description
0.266	98	Unconnected pavement, HSG B
0.266		100.00% Impervious Area
0.266		100.00% Unconnected

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

Subcatchment 3: Retail Bldg

Hydrograph



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PROPOSED CONDITIONS

Type III 24-hr 25-YEAR Rainfall=6.53"

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Summary for Subcatchment 4: North Restaurant

Runoff = 0.35 cfs @ 12.07 hrs, Volume= 1,204 cf, Depth= 6.29"
Routed to Pond 2P : Underground Detention

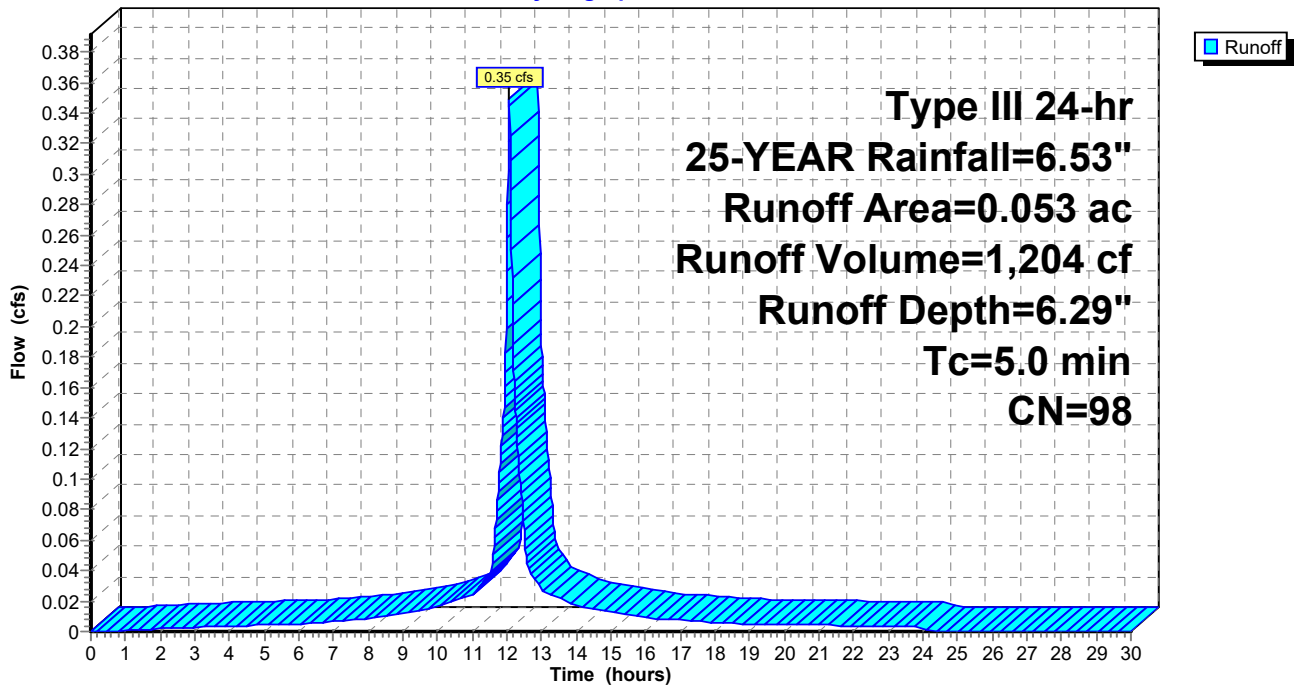
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YEAR Rainfall=6.53"

Area (ac)	CN	Description
0.053	98	Unconnected pavement, HSG B
0.053		100.00% Impervious Area
0.053		100.00% Unconnected

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

Subcatchment 4: North Restaurant

Hydrograph



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Type III 24-hr 25-YEAR Rainfall=6.53"

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Summary for Pond 1P: Rain Garden

Inflow Area = 22,128 sf, 19.69% Impervious, Inflow Depth = 3.14" for 25-YEAR event
 Inflow = 1.80 cfs @ 12.08 hrs, Volume= 5,791 cf
 Outflow = 0.64 cfs @ 12.37 hrs, Volume= 5,791 cf, Atten= 65%, Lag= 17.5 min
 Discarded = 0.17 cfs @ 12.37 hrs, Volume= 5,188 cf
 Primary = 0.47 cfs @ 12.37 hrs, Volume= 603 cf
 Routed to Link DP-1 : Hopmeadow

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Peak Elev= 175.56' @ 12.37 hrs Surf.Area= 2,442 sf Storage= 1,768 cf

Plug-Flow detention time= 89.5 min calculated for 5,789 cf (100% of inflow)
 Center-of-Mass det. time= 89.4 min (899.8 - 810.3)

Volume	Invert	Avail.Storage	Storage Description		
#1	174.50'	2,992 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)
174.50	883	160.0	0	0	883
175.00	1,655	263.0	624	624	4,352
176.00	3,161	430.0	2,368	2,992	13,568

Device	Routing	Invert	Outlet Devices
#1	Device 3	175.50'	19.4" x 36.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#2	Discarded	174.50'	3.000 in/hr Exfiltration over Surface area Phase-In= 0.01'
#3	Primary	172.90'	12.0" Round Culvert L= 86.0' CMP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 172.90' / 172.10' S= 0.0093 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Discarded OutFlow Max=0.17 cfs @ 12.37 hrs HW=175.56' (Free Discharge)

↑ **2=Exfiltration** (Exfiltration Controls 0.17 cfs)

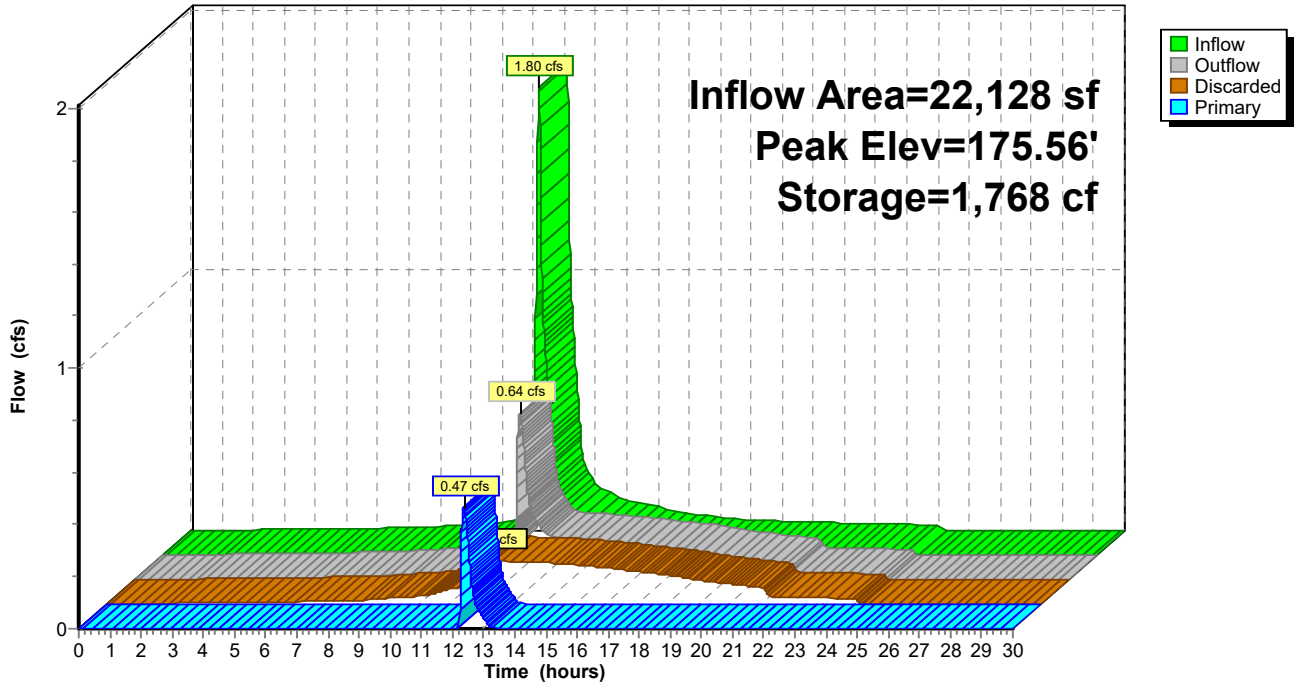
Primary OutFlow Max=0.47 cfs @ 12.37 hrs HW=175.56' (Free Discharge)

↑ **3=Culvert** (Passes 0.47 cfs of 4.71 cfs potential flow)

↑ **1=Orifice/Grate** (Weir Controls 0.47 cfs @ 0.81 fps)

Pond 1P: Rain Garden

Hydrograph



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Type III 24-hr 25-YEAR Rainfall=6.53"

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Summary for Pond 2P: Underground Detention

Inflow Area = 2,297 sf, 100.00% Impervious, Inflow Depth = 6.29" for 25-YEAR event
 Inflow = 0.35 cfs @ 12.07 hrs, Volume= 1,204 cf
 Outflow = 0.35 cfs @ 12.07 hrs, Volume= 1,204 cf, Atten= 0%, Lag= 0.3 min
 Discarded = 0.02 cfs @ 9.82 hrs, Volume= 865 cf
 Primary = 0.33 cfs @ 12.07 hrs, Volume= 339 cf
 Routed to Link DP-1 : Hopmeadow

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Peak Elev= 176.33' @ 12.07 hrs Surf.Area= 0.005 ac Storage= 0.005 af

Plug-Flow detention time= 77.1 min calculated for 1,204 cf (100% of inflow)
 Center-of-Mass det. time= 77.1 min (820.1 - 743.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	174.40'	0.004 af	4.83'W x 45.92'L x 2.33'H Field A 0.012 af Overall - 0.002 af Embedded = 0.010 af x 40.0% Voids
#2A	174.90'	0.002 af	ADS_StormTech SC-310 +Cap x 6 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap
		0.006 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	174.90'	12.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#2	Discarded	174.40'	3.000 in/hr Exfiltration over Surface area Phase-In= 0.01'
#3	Device 1	176.23'	4.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.02 cfs @ 9.82 hrs HW=174.42' (Free Discharge)
 ↑ **2=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.33 cfs @ 12.07 hrs HW=176.33' (Free Discharge)
 ↑ **1=Orifice/Grate** (Passes 0.33 cfs of 3.64 cfs potential flow)
 ↑ **3=Broad-Crested Rectangular Weir** (Weir Controls 0.33 cfs @ 0.87 fps)

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PROPOSED CONDITIONS

Type III 24-hr 25-YEAR Rainfall=6.53"

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Pond 2P: Underground Detention - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-310 +Cap (ADS StormTech®SC-310 with cap length)

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

6 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 43.92' Row Length +12.0" End Stone x 2 = 45.92' Base Length

1 Rows x 34.0" Wide + 12.0" Side Stone x 2 = 4.83' Base Width

6.0" Stone Base + 16.0" Chamber Height + 6.0" Stone Cover = 2.33' Field Height

6 Chambers x 14.7 cf = 88.5 cf Chamber Storage

517.9 cf Field - 88.5 cf Chambers = 429.4 cf Stone x 40.0% Voids = 171.8 cf Stone Storage

Chamber Storage + Stone Storage = 260.2 cf = 0.006 af

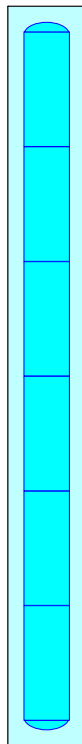
Overall Storage Efficiency = 50.2%

Overall System Size = 45.92' x 4.83' x 2.33'

6 Chambers

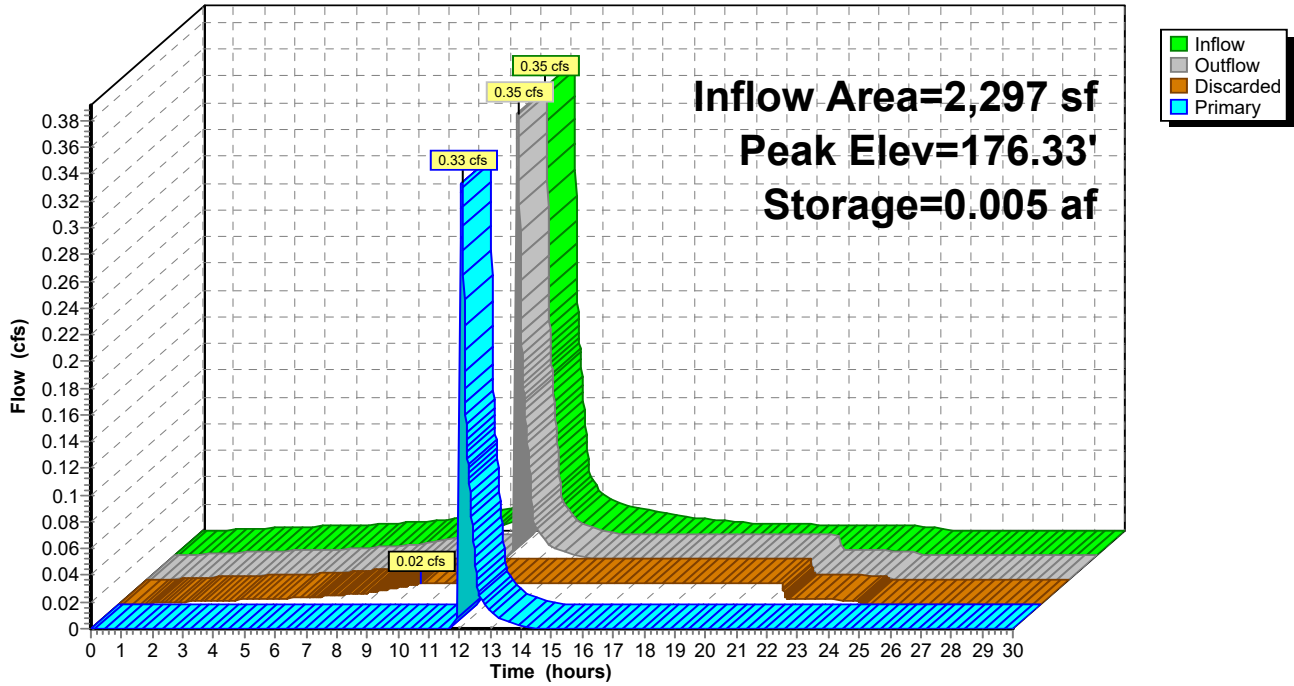
19.2 cy Field

15.9 cy Stone



Pond 2P: Underground Detention

Hydrograph



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PROPOSED CONDITIONS

Type III 24-hr 25-YEAR Rainfall=6.53"

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Summary for Pond 3P: Underground Detention

Inflow Area = 11,600 sf, 100.00% Impervious, Inflow Depth = 6.29" for 25-YEAR event
 Inflow = 1.77 cfs @ 12.07 hrs, Volume= 6,082 cf
 Outflow = 1.76 cfs @ 12.08 hrs, Volume= 6,082 cf, Atten= 1%, Lag= 0.5 min
 Discarded = 0.05 cfs @ 8.29 hrs, Volume= 3,810 cf
 Primary = 1.71 cfs @ 12.08 hrs, Volume= 2,272 cf
 Routed to Link DP-1 : Hopmeadow

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Peak Elev= 185.68' @ 12.08 hrs Surf.Area= 0.015 ac Storage= 0.030 af

Plug-Flow detention time= 149.8 min calculated for 6,080 cf (100% of inflow)
 Center-of-Mass det. time= 149.9 min (892.9 - 743.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	182.40'	0.015 af	11.00'W x 60.58'L x 3.50'H Field A 0.054 af Overall - 0.017 af Embedded = 0.037 af x 40.0% Voids
#2A	182.90'	0.017 af	ADS_StormTech SC-740 +Cap x 16 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 16 Chambers in 2 Rows
		0.032 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	182.90'	12.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#2	Discarded	182.40'	3.000 in/hr Exfiltration over Surface area Phase-In= 0.01'
#3	Device 1	185.40'	4.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.05 cfs @ 8.29 hrs HW=182.44' (Free Discharge)
 ↑ **2=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=1.71 cfs @ 12.08 hrs HW=185.68' (Free Discharge)
 ↑ **1=Orifice/Grate** (Passes 1.71 cfs of 5.71 cfs potential flow)
 ↑ **3=Broad-Crested Rectangular Weir** (Weir Controls 1.71 cfs @ 1.51 fps)

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Pond 3P: Underground Detention - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

8 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 58.58' Row Length +12.0" End Stone x 2 = 60.58' Base Length

2 Rows x 51.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 11.00' Base Width

6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

16 Chambers x 45.9 cf = 735.0 cf Chamber Storage

2,332.2 cf Field - 735.0 cf Chambers = 1,597.2 cf Stone x 40.0% Voids = 638.9 cf Stone Storage

Chamber Storage + Stone Storage = 1,373.9 cf = 0.032 af

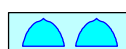
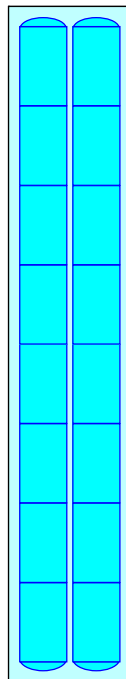
Overall Storage Efficiency = 58.9%

Overall System Size = 60.58' x 11.00' x 3.50'

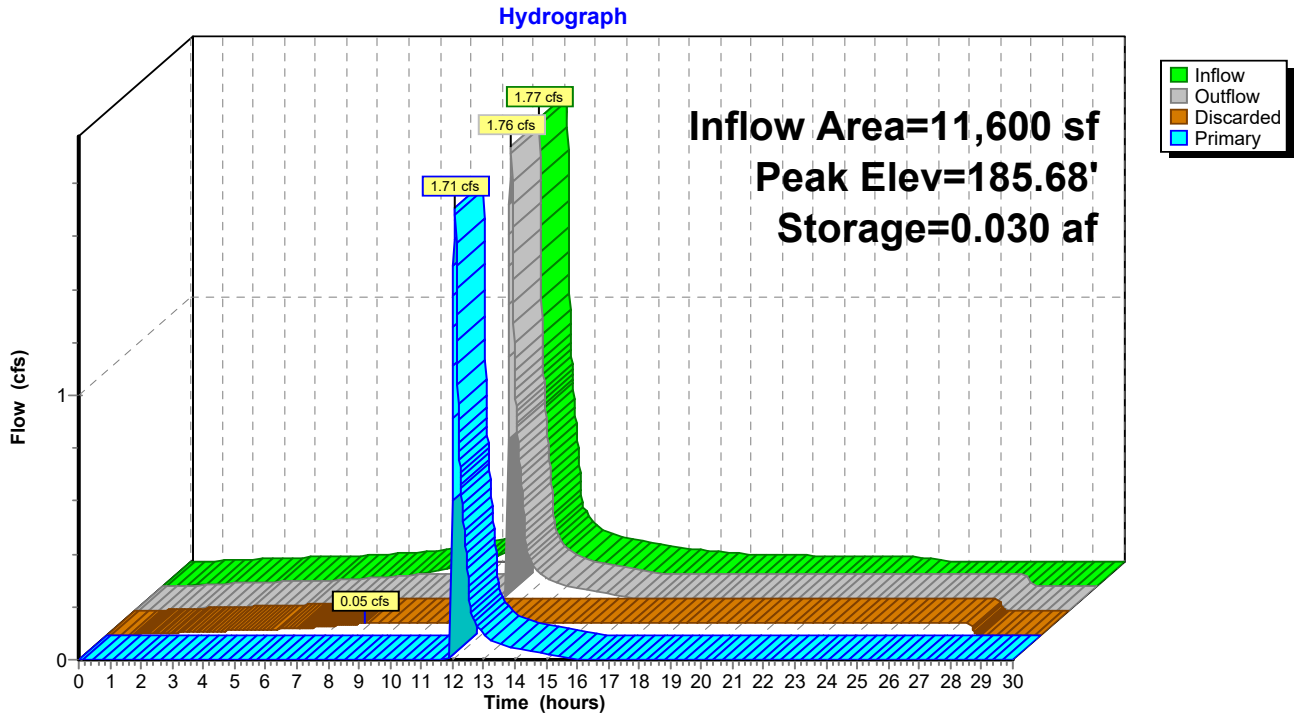
16 Chambers

86.4 cy Field

59.2 cy Stone



Pond 3P: Underground Detention



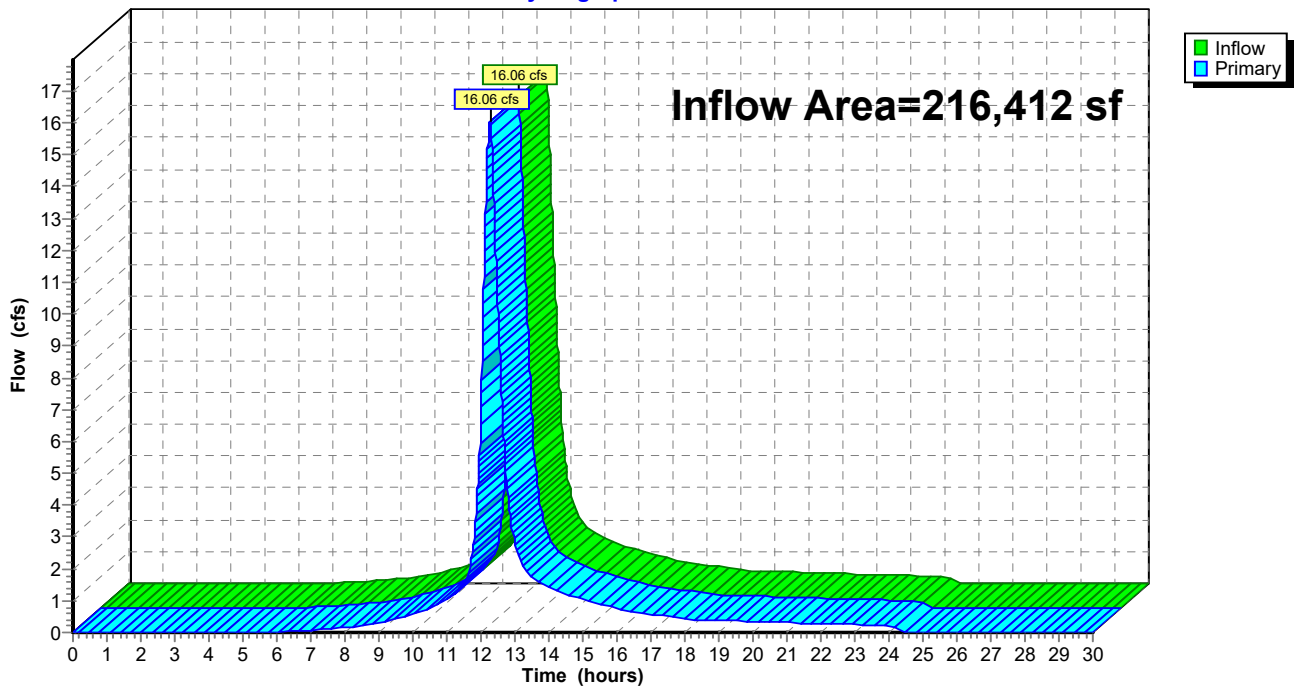
Summary for Link DP-1: Hopmeadow

Inflow Area = 216,412 sf, 58.05% Impervious, Inflow Depth = 4.00" for 25-YEAR event
Inflow = 16.06 cfs @ 12.27 hrs, Volume= 72,148 cf
Primary = 16.06 cfs @ 12.27 hrs, Volume= 72,148 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link DP-1: Hopmeadow

Hydrograph



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PROPOSED CONDITIONS

Type III 24-hr 50-YEAR Rainfall=7.44"

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Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1: Site Runoff Area=4.141 ac 59.52% Impervious Runoff Depth=5.44"
 Flow Length=845' Tc=19.4 min CN=83 Runoff=17.75 cfs 81,839 cf

Subcatchment2: South Pervious Runoff Area=0.408 ac 0.00% Impervious Runoff Depth=3.02"
 Tc=5.0 min CN=61 Runoff=1.47 cfs 4,478 cf

Subcatchment2A: South Restaurant Runoff Area=0.100 ac 100.00% Impervious Runoff Depth=7.20"
 Tc=5.0 min CN=98 Runoff=0.76 cfs 2,614 cf

Subcatchment3: Retail Bldg Runoff Area=0.266 ac 100.00% Impervious Runoff Depth=7.20"
 Tc=5.0 min CN=98 Runoff=2.01 cfs 6,961 cf

Subcatchment4: North Restaurant Runoff Area=0.053 ac 100.00% Impervious Runoff Depth=7.20"
 Tc=5.0 min CN=98 Runoff=0.40 cfs 1,378 cf

Pond 1P: Rain Garden Peak Elev=175.60' Storage=1,859 cf Inflow=2.23 cfs 7,092 cf
 Discarded=0.17 cfs 5,723 cf Primary=0.94 cfs 1,369 cf Outflow=1.11 cfs 7,092 cf

Pond 2P: Underground Detention Peak Elev=176.34' Storage=0.005 af Inflow=0.40 cfs 1,378 cf
 Discarded=0.02 cfs 920 cf Primary=0.38 cfs 458 cf Outflow=0.40 cfs 1,378 cf

Pond 3P: Underground Detention Peak Elev=185.71' Storage=0.030 af Inflow=2.01 cfs 6,961 cf
 Discarded=0.05 cfs 3,998 cf Primary=1.96 cfs 2,962 cf Outflow=2.00 cfs 6,961 cf

Link DP-1: Hopmeadow Inflow=19.59 cfs 86,628 cf
 Primary=19.59 cfs 86,628 cf

Total Runoff Area = 216,412 sf Runoff Volume = 97,270 cf Average Runoff Depth = 5.39"
41.95% Pervious = 90,788 sf 58.05% Impervious = 125,624 sf

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PROPOSED CONDITIONS

Type III 24-hr 50-YEAR Rainfall=7.44"

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Summary for Subcatchment 1: Site

[47] Hint: Peak is 596% of capacity of segment #4

Runoff = 17.75 cfs @ 12.26 hrs, Volume= 81,839 cf, Depth= 5.44"
 Routed to Link DP-1 : Hopmeadow

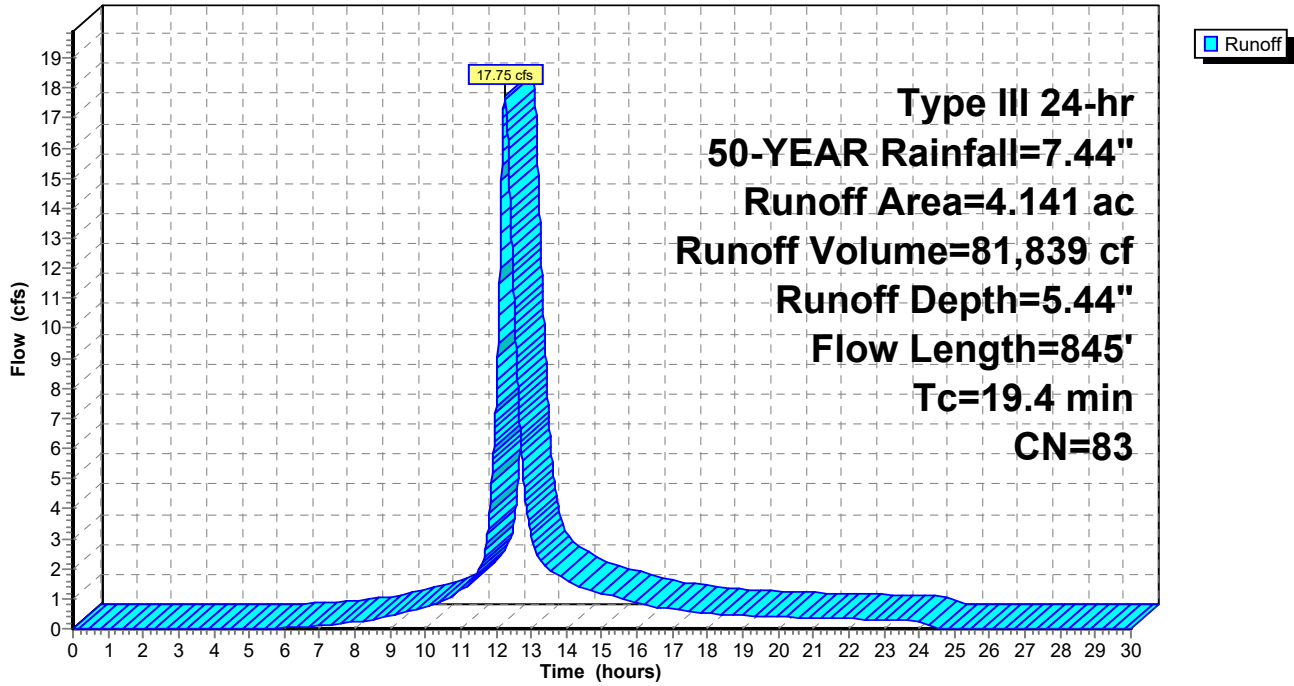
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Type III 24-hr 50-YEAR Rainfall=7.44"

Area (ac)	CN	Description
1.676	61	>75% Grass cover, Good, HSG B
2.465	98	Unconnected pavement, HSG B
4.141	83	Weighted Average
1.676		40.48% Pervious Area
2.465		59.52% Impervious Area
2.465		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.9	35	0.0050	0.04		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.28"
0.1	25	0.2800	7.94		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
0.1	33	0.1000	6.42		Shallow Concentrated Flow, Paved Kv= 20.3 fps
3.3	752	0.0050	3.79	2.98	Pipe Channel, RCP_Round 12" 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
19.4	845	Total			

Subcatchment 1: Site

Hydrograph



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Type III 24-hr 50-YEAR Rainfall=7.44"

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Summary for Subcatchment 2: South Pervious

Runoff = 1.47 cfs @ 12.08 hrs, Volume= 4,478 cf, Depth= 3.02"
Routed to Pond 1P : Rain Garden

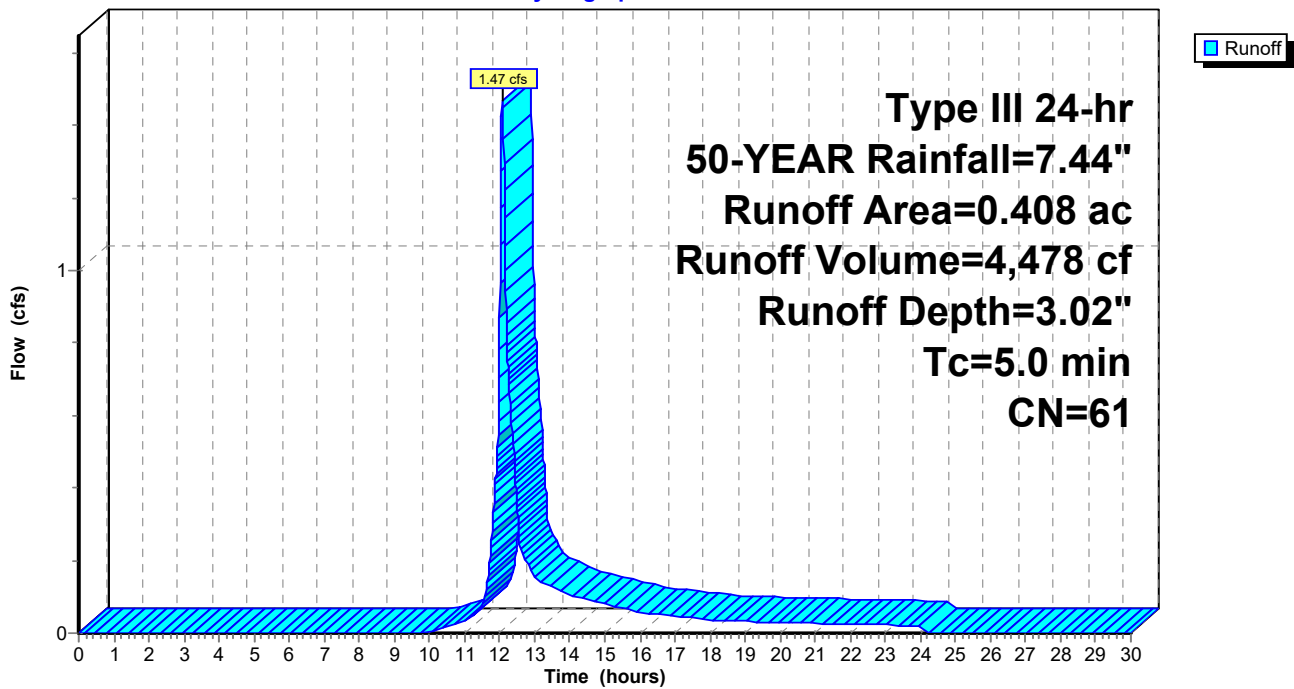
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-YEAR Rainfall=7.44"

Area (ac)	CN	Description
0.408	61	>75% Grass cover, Good, HSG B
0.408		100.00% Pervious Area

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

Subcatchment 2: South Pervious

Hydrograph



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Type III 24-hr 50-YEAR Rainfall=7.44"

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Summary for Subcatchment 2A: South Restaurant

Runoff = 0.76 cfs @ 12.07 hrs, Volume= 2,614 cf, Depth= 7.20"
Routed to Pond 1P : Rain Garden

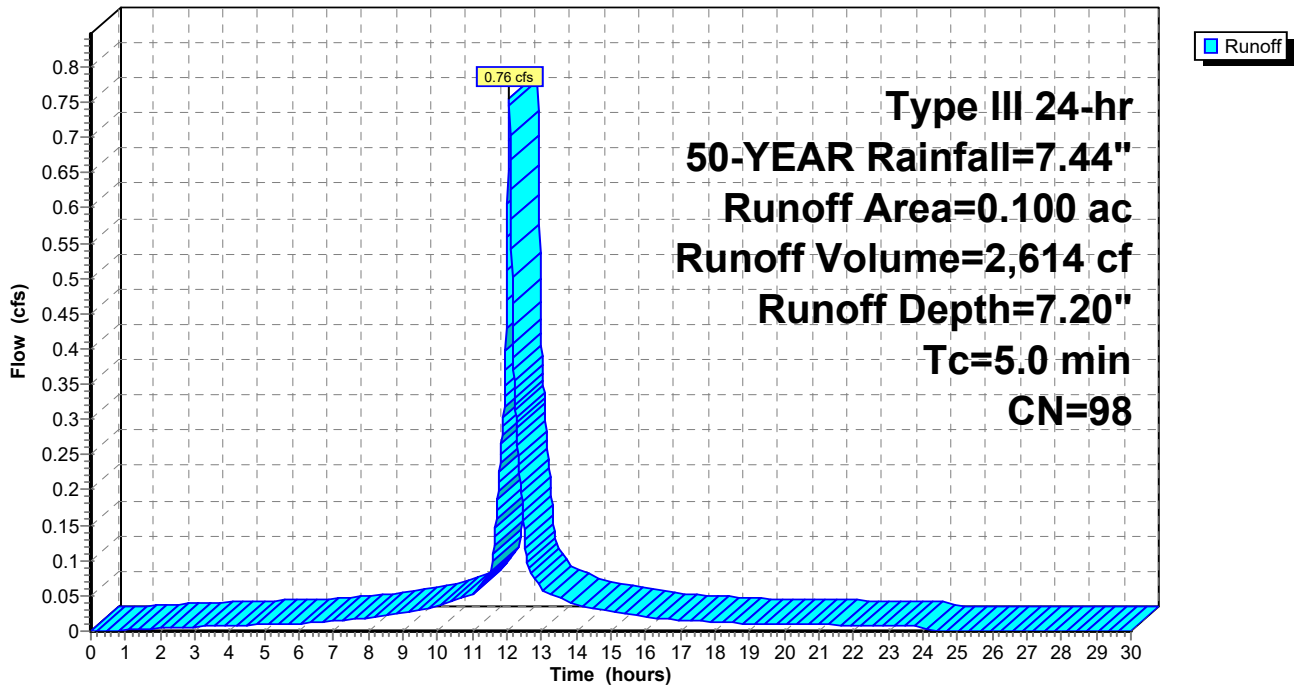
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-YEAR Rainfall=7.44"

Area (ac)	CN	Description
* 0.100	98	
0.100		100.00% Impervious Area

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

Subcatchment 2A: South Restaurant

Hydrograph



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PROPOSED CONDITIONS

Type III 24-hr 50-YEAR Rainfall=7.44"

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Summary for Subcatchment 3: Retail Bldg

Runoff = 2.01 cfs @ 12.07 hrs, Volume= 6,961 cf, Depth= 7.20"
Routed to Pond 3P : Underground Detention

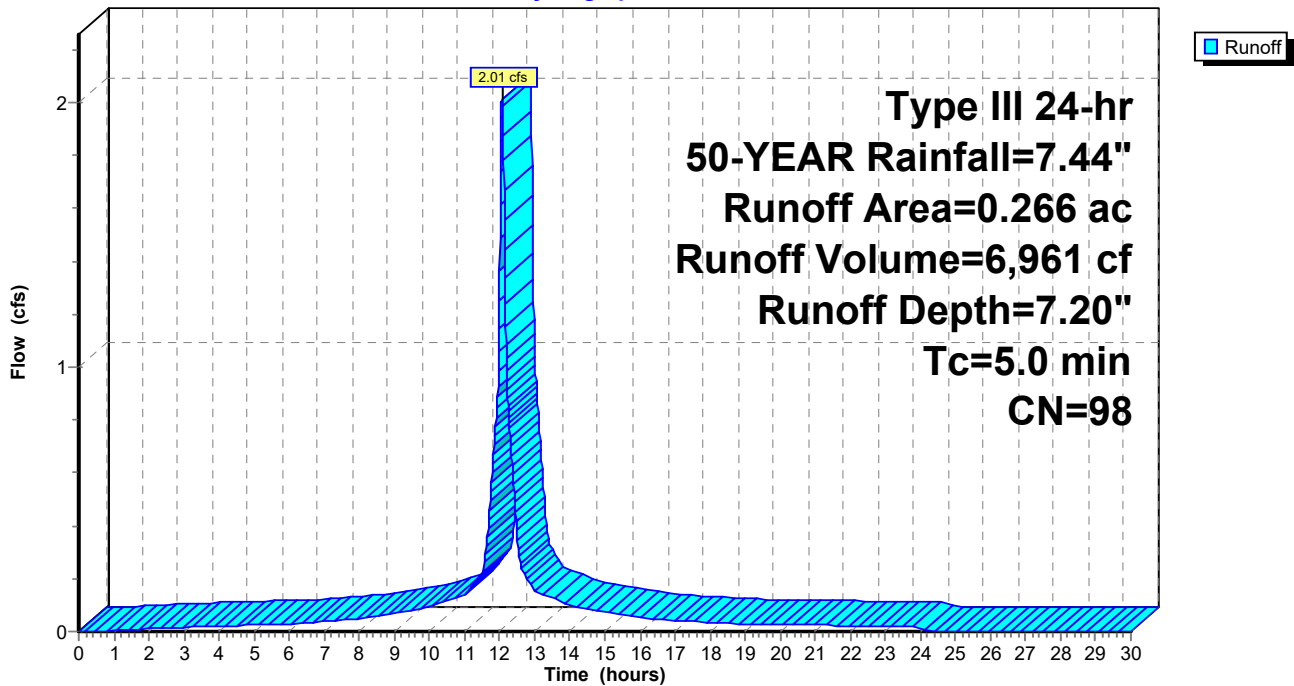
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-YEAR Rainfall=7.44"

Area (ac)	CN	Description
0.266	98	Unconnected pavement, HSG B
0.266		100.00% Impervious Area
0.266		100.00% Unconnected

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

Subcatchment 3: Retail Bldg

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Type III 24-hr 50-YEAR Rainfall=7.44"

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Summary for Subcatchment 4: North Restaurant

Runoff = 0.40 cfs @ 12.07 hrs, Volume= 1,378 cf, Depth= 7.20"
Routed to Pond 2P : Underground Detention

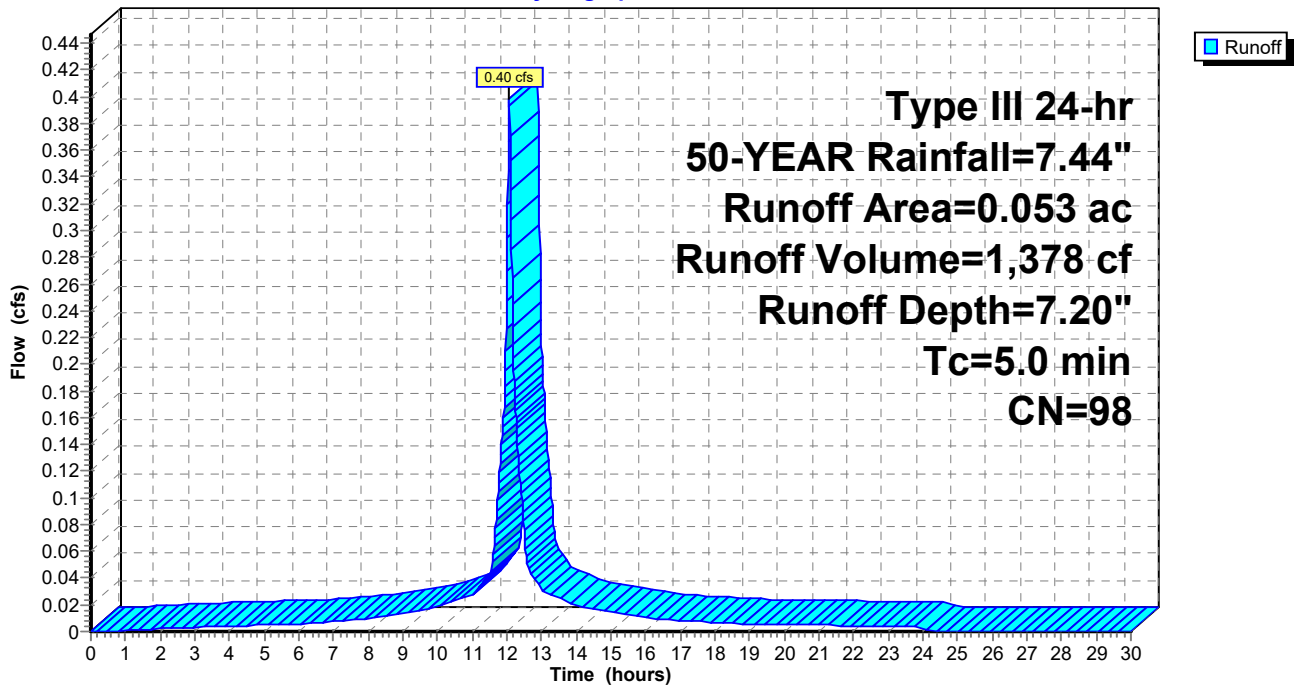
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-YEAR Rainfall=7.44"

Area (ac)	CN	Description
0.053	98	Unconnected pavement, HSG B
0.053		100.00% Impervious Area
0.053		100.00% Unconnected

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

Subcatchment 4: North Restaurant

Hydrograph



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Type III 24-hr 50-YEAR Rainfall=7.44"

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Summary for Pond 1P: Rain Garden

Inflow Area = 22,128 sf, 19.69% Impervious, Inflow Depth = 3.85" for 50-YEAR event
 Inflow = 2.23 cfs @ 12.08 hrs, Volume= 7,092 cf
 Outflow = 1.11 cfs @ 12.22 hrs, Volume= 7,092 cf, Atten= 50%, Lag= 8.8 min
 Discarded = 0.17 cfs @ 12.22 hrs, Volume= 5,723 cf
 Primary = 0.94 cfs @ 12.22 hrs, Volume= 1,369 cf
 Routed to Link DP-1 : Hopmeadow

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Peak Elev= 175.60' @ 12.22 hrs Surf.Area= 2,499 sf Storage= 1,859 cf

Plug-Flow detention time= 83.7 min calculated for 7,090 cf (100% of inflow)
 Center-of-Mass det. time= 83.6 min (891.6 - 807.9)

Volume	Invert	Avail.Storage	Storage Description		
#1	174.50'	2,992 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)
174.50	883	160.0	0	0	883
175.00	1,655	263.0	624	624	4,352
176.00	3,161	430.0	2,368	2,992	13,568

Device	Routing	Invert	Outlet Devices
#1	Device 3	175.50'	19.4" x 36.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#2	Discarded	174.50'	3.000 in/hr Exfiltration over Surface area Phase-In= 0.01'
#3	Primary	172.90'	12.0" Round Culvert L= 86.0' CMP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 172.90' / 172.10' S= 0.0093 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Discarded OutFlow Max=0.17 cfs @ 12.22 hrs HW=175.60' (Free Discharge)

↑ **2=Exfiltration** (Exfiltration Controls 0.17 cfs)

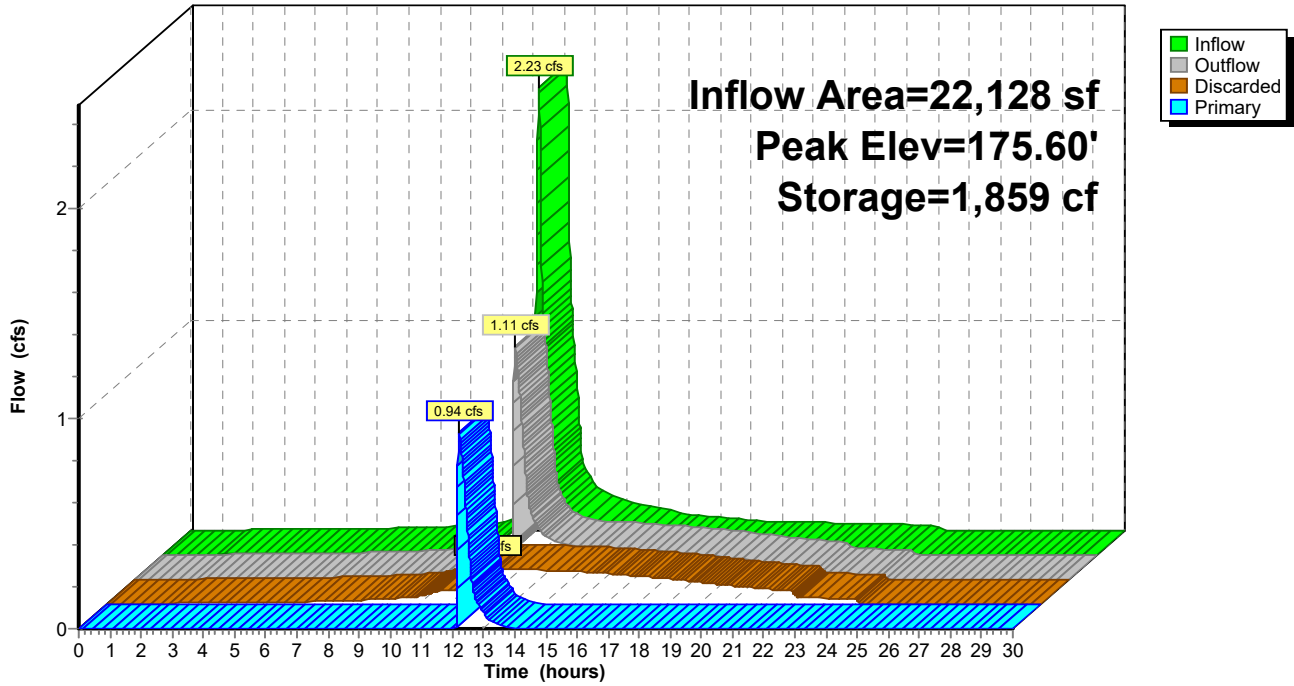
Primary OutFlow Max=0.94 cfs @ 12.22 hrs HW=175.60' (Free Discharge)

↑ **3=Culvert** (Passes 0.94 cfs of 4.75 cfs potential flow)

↑ **1=Orifice/Grate** (Weir Controls 0.94 cfs @ 1.03 fps)

Pond 1P: Rain Garden

Hydrograph



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PROPOSED CONDITIONS

Type III 24-hr 50-YEAR Rainfall=7.44"

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Summary for Pond 2P: Underground Detention

Inflow Area = 2,297 sf, 100.00% Impervious, Inflow Depth = 7.20" for 50-YEAR event
 Inflow = 0.40 cfs @ 12.07 hrs, Volume= 1,378 cf
 Outflow = 0.40 cfs @ 12.07 hrs, Volume= 1,378 cf, Atten= 0%, Lag= 0.3 min
 Discarded = 0.02 cfs @ 9.33 hrs, Volume= 920 cf
 Primary = 0.38 cfs @ 12.07 hrs, Volume= 458 cf
 Routed to Link DP-1 : Hopmeadow

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Peak Elev= 176.34' @ 12.07 hrs Surf.Area= 0.005 ac Storage= 0.005 af

Plug-Flow detention time= 73.7 min calculated for 1,378 cf (100% of inflow)
 Center-of-Mass det. time= 73.6 min (814.9 - 741.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	174.40'	0.004 af	4.83'W x 45.92'L x 2.33'H Field A 0.012 af Overall - 0.002 af Embedded = 0.010 af x 40.0% Voids
#2A	174.90'	0.002 af	ADS_StormTech SC-310 +Cap x 6 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap
		0.006 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	174.90'	12.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#2	Discarded	174.40'	3.000 in/hr Exfiltration over Surface area Phase-In= 0.01'
#3	Device 1	176.23'	4.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.02 cfs @ 9.33 hrs HW=174.42' (Free Discharge)
 ↑ **2=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.38 cfs @ 12.07 hrs HW=176.34' (Free Discharge)
 ↑ **1=Orifice/Grate** (Passes 0.38 cfs of 3.66 cfs potential flow)
 ↑ **3=Broad-Crested Rectangular Weir** (Weir Controls 0.38 cfs @ 0.91 fps)

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PROPOSED CONDITIONS

Type III 24-hr 50-YEAR Rainfall=7.44"

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Pond 2P: Underground Detention - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-310 +Cap (ADS StormTech®SC-310 with cap length)

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

6 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 43.92' Row Length +12.0" End Stone x 2 = 45.92' Base Length

1 Rows x 34.0" Wide + 12.0" Side Stone x 2 = 4.83' Base Width

6.0" Stone Base + 16.0" Chamber Height + 6.0" Stone Cover = 2.33' Field Height

6 Chambers x 14.7 cf = 88.5 cf Chamber Storage

517.9 cf Field - 88.5 cf Chambers = 429.4 cf Stone x 40.0% Voids = 171.8 cf Stone Storage

Chamber Storage + Stone Storage = 260.2 cf = 0.006 af

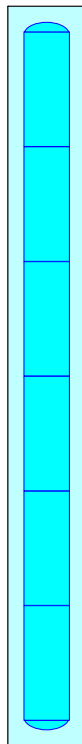
Overall Storage Efficiency = 50.2%

Overall System Size = 45.92' x 4.83' x 2.33'

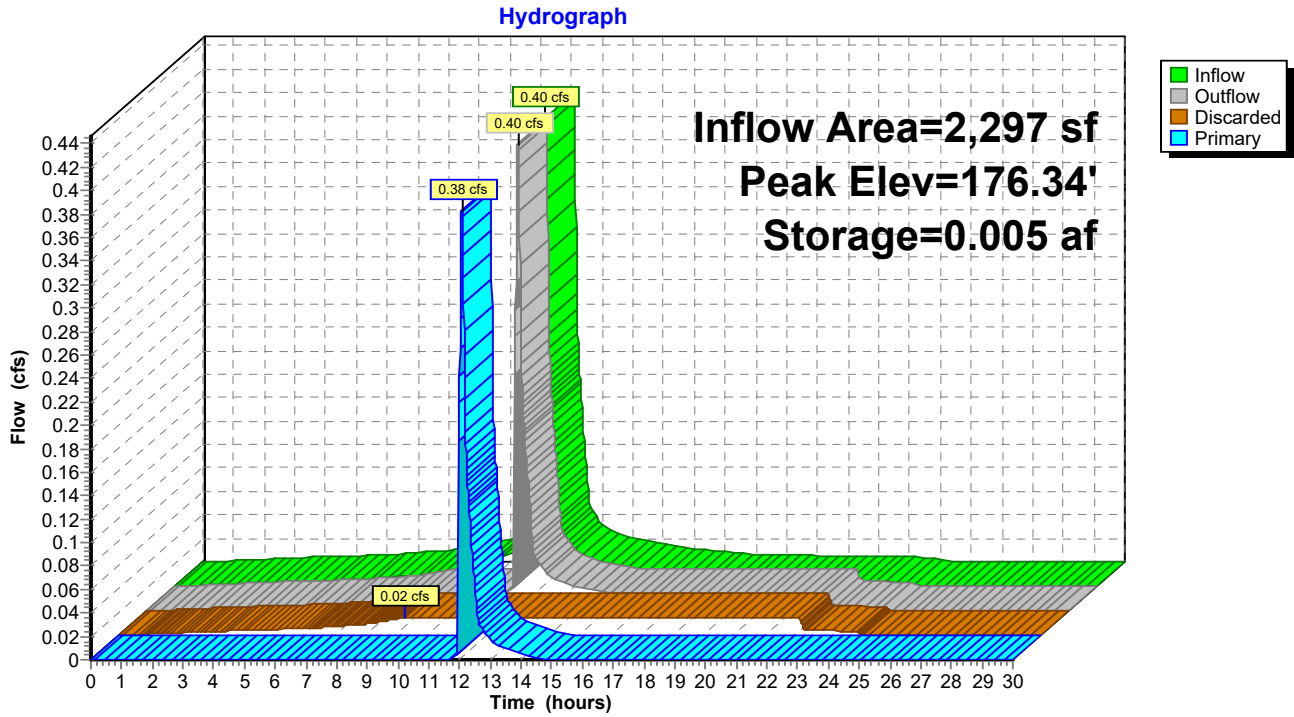
6 Chambers

19.2 cy Field

15.9 cy Stone



Pond 2P: Underground Detention



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PROPOSED CONDITIONS

Type III 24-hr 50-YEAR Rainfall=7.44"

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Summary for Pond 3P: Underground Detention

Inflow Area = 11,600 sf, 100.00% Impervious, Inflow Depth = 7.20" for 50-YEAR event
 Inflow = 2.01 cfs @ 12.07 hrs, Volume= 6,961 cf
 Outflow = 2.00 cfs @ 12.08 hrs, Volume= 6,961 cf, Atten= 1%, Lag= 0.5 min
 Discarded = 0.05 cfs @ 7.80 hrs, Volume= 3,998 cf
 Primary = 1.96 cfs @ 12.08 hrs, Volume= 2,962 cf
 Routed to Link DP-1 : Hopmeadow

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Peak Elev= 185.71' @ 12.08 hrs Surf.Area= 0.015 ac Storage= 0.030 af

Plug-Flow detention time= 140.6 min calculated for 6,958 cf (100% of inflow)
 Center-of-Mass det. time= 140.7 min (881.9 - 741.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	182.40'	0.015 af	11.00'W x 60.58'L x 3.50'H Field A 0.054 af Overall - 0.017 af Embedded = 0.037 af x 40.0% Voids
#2A	182.90'	0.017 af	ADS_StormTech SC-740 +Cap x 16 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 16 Chambers in 2 Rows
		0.032 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	182.90'	12.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#2	Discarded	182.40'	3.000 in/hr Exfiltration over Surface area Phase-In= 0.01'
#3	Device 1	185.40'	4.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.05 cfs @ 7.80 hrs HW=182.44' (Free Discharge)
 ↑ **2=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=1.95 cfs @ 12.08 hrs HW=185.71' (Free Discharge)
 ↑ **1=Orifice/Grate** (Passes 1.95 cfs of 5.74 cfs potential flow)
 ↑ **3=Broad-Crested Rectangular Weir** (Weir Controls 1.95 cfs @ 1.59 fps)

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PROPOSED CONDITIONS

Type III 24-hr 50-YEAR Rainfall=7.44"

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Pond 3P: Underground Detention - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

8 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 58.58' Row Length +12.0" End Stone x 2 = 60.58' Base Length

2 Rows x 51.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 11.00' Base Width

6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

16 Chambers x 45.9 cf = 735.0 cf Chamber Storage

2,332.2 cf Field - 735.0 cf Chambers = 1,597.2 cf Stone x 40.0% Voids = 638.9 cf Stone Storage

Chamber Storage + Stone Storage = 1,373.9 cf = 0.032 af

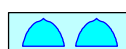
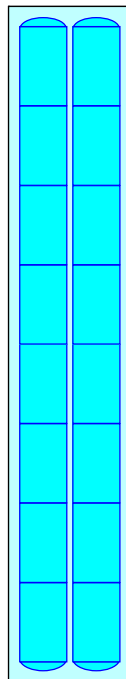
Overall Storage Efficiency = 58.9%

Overall System Size = 60.58' x 11.00' x 3.50'

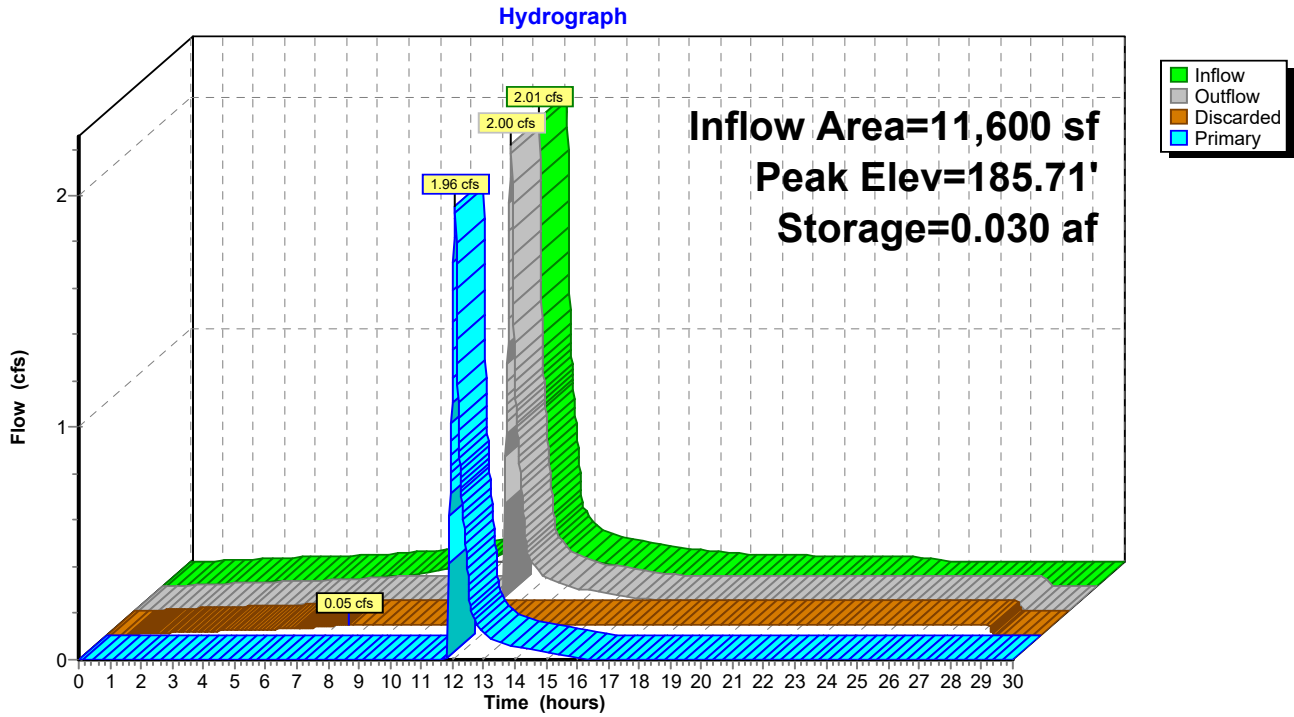
16 Chambers

86.4 cy Field

59.2 cy Stone



Pond 3P: Underground Detention



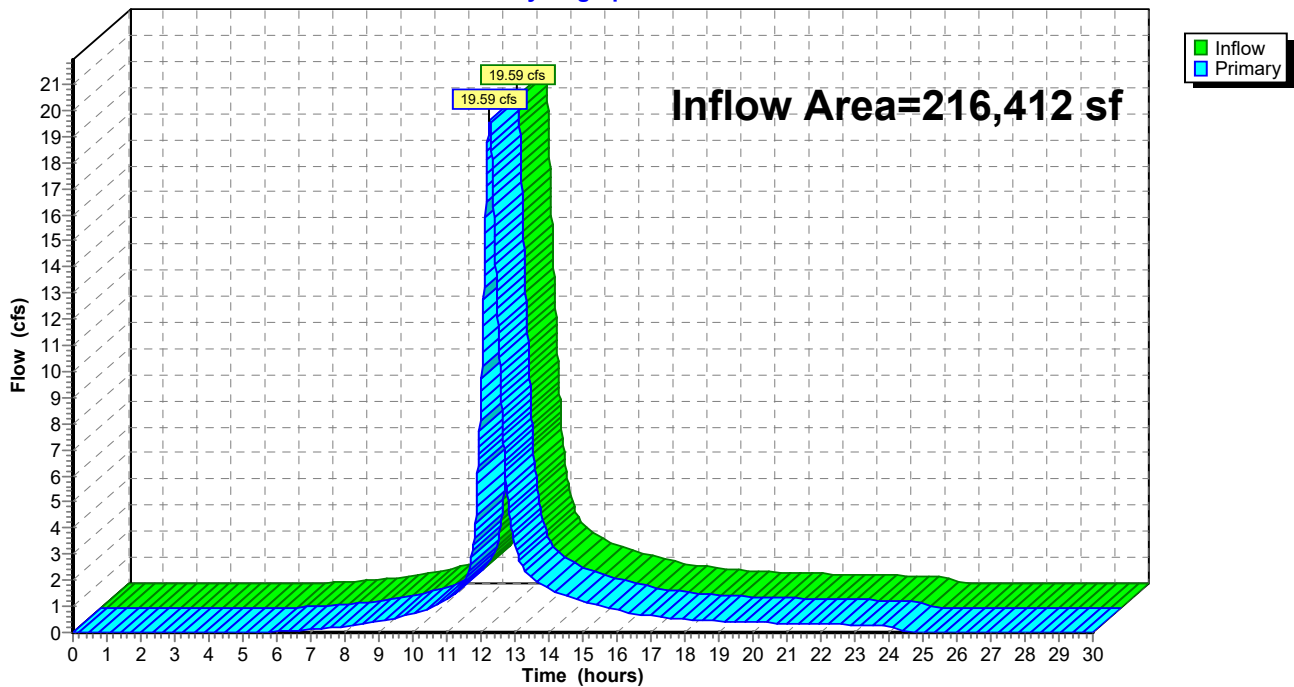
Summary for Link DP-1: Hopmeadow

Inflow Area = 216,412 sf, 58.05% Impervious, Inflow Depth = 4.80" for 50-YEAR event
Inflow = 19.59 cfs @ 12.26 hrs, Volume= 86,628 cf
Primary = 19.59 cfs @ 12.26 hrs, Volume= 86,628 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link DP-1: Hopmeadow

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PROPOSED CONDITIONS

Type III 24-hr 100-YEAR Rainfall=8.45"

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Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1: Site Runoff Area=4.141 ac 59.52% Impervious Runoff Depth=6.41"
 Flow Length=845' Tc=19.4 min CN=83 Runoff=20.75 cfs 96,326 cf

Subcatchment2: South Pervious Runoff Area=0.408 ac 0.00% Impervious Runoff Depth=3.79"
 Tc=5.0 min CN=61 Runoff=1.86 cfs 5,615 cf

Subcatchment2A: South Restaurant Runoff Area=0.100 ac 100.00% Impervious Runoff Depth=8.21"
 Tc=5.0 min CN=98 Runoff=0.86 cfs 2,980 cf

Subcatchment3: Retail Bldg Runoff Area=0.266 ac 100.00% Impervious Runoff Depth=8.21"
 Tc=5.0 min CN=98 Runoff=2.29 cfs 7,936 cf

Subcatchment4: North Restaurant Runoff Area=0.053 ac 100.00% Impervious Runoff Depth=8.21"
 Tc=5.0 min CN=98 Runoff=0.45 cfs 1,571 cf

Pond 1P: Rain Garden Peak Elev=175.65' Storage=1,988 cf Inflow=2.72 cfs 8,595 cf
 Discarded=0.18 cfs 6,265 cf Primary=1.74 cfs 2,331 cf Outflow=1.92 cfs 8,595 cf

Pond 2P: Underground Detention Peak Elev=176.34' Storage=0.005 af Inflow=0.45 cfs 1,571 cf
 Discarded=0.02 cfs 975 cf Primary=0.44 cfs 596 cf Outflow=0.45 cfs 1,571 cf

Pond 3P: Underground Detention Peak Elev=185.73' Storage=0.031 af Inflow=2.29 cfs 7,936 cf
 Discarded=0.05 cfs 4,182 cf Primary=2.23 cfs 3,755 cf Outflow=2.28 cfs 7,936 cf

Link DP-1: Hopmeadow Inflow=23.07 cfs 103,007 cf
 Primary=23.07 cfs 103,007 cf

Total Runoff Area = 216,412 sf Runoff Volume = 114,429 cf Average Runoff Depth = 6.35"
41.95% Pervious = 90,788 sf 58.05% Impervious = 125,624 sf

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PROPOSED CONDITIONS

Type III 24-hr 100-YEAR Rainfall=8.45"

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Summary for Subcatchment 1: Site

[47] Hint: Peak is 697% of capacity of segment #4

Runoff = 20.75 cfs @ 12.26 hrs, Volume= 96,326 cf, Depth= 6.41"
 Routed to Link DP-1 : Hopmeadow

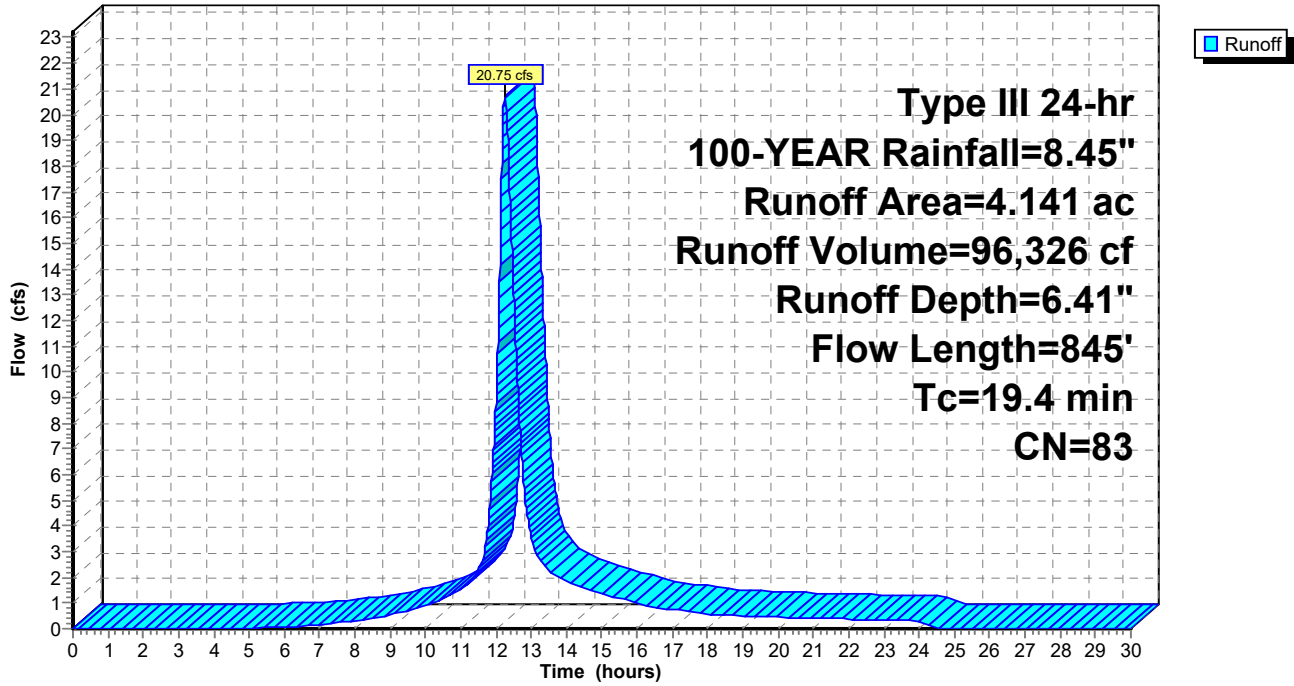
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-YEAR Rainfall=8.45"

Area (ac)	CN	Description
1.676	61	>75% Grass cover, Good, HSG B
2.465	98	Unconnected pavement, HSG B
4.141	83	Weighted Average
1.676		40.48% Pervious Area
2.465		59.52% Impervious Area
2.465		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.9	35	0.0050	0.04		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.28"
0.1	25	0.2800	7.94		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
0.1	33	0.1000	6.42		Shallow Concentrated Flow, Paved Kv= 20.3 fps
3.3	752	0.0050	3.79	2.98	Pipe Channel, RCP_Round 12" 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
19.4	845	Total			

Subcatchment 1: Site

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Type III 24-hr 100-YEAR Rainfall=8.45"

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Summary for Subcatchment 2: South Pervious

Runoff = 1.86 cfs @ 12.08 hrs, Volume= 5,615 cf, Depth= 3.79"
Routed to Pond 1P : Rain Garden

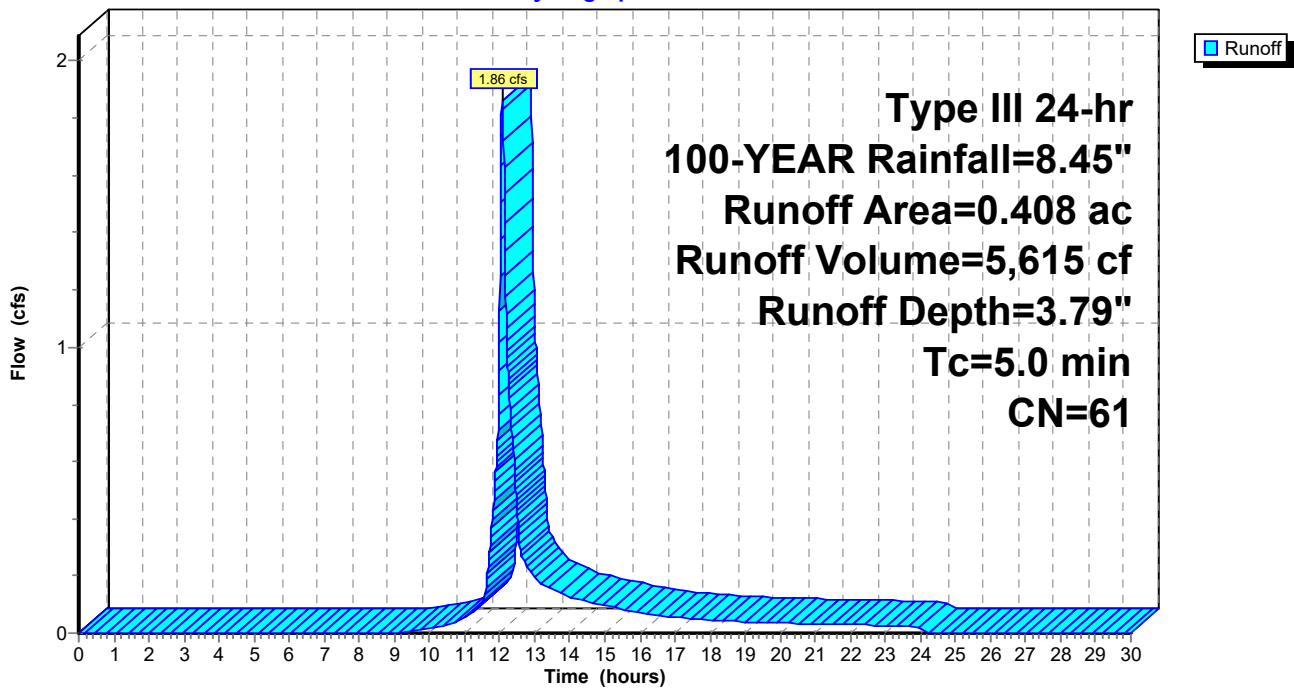
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YEAR Rainfall=8.45"

Area (ac)	CN	Description
0.408	61	>75% Grass cover, Good, HSG B
0.408		100.00% Pervious Area

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

Subcatchment 2: South Pervious

Hydrograph



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Type III 24-hr 100-YEAR Rainfall=8.45"

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Summary for Subcatchment 2A: South Restaurant

Runoff = 0.86 cfs @ 12.07 hrs, Volume= 2,980 cf, Depth= 8.21"
Routed to Pond 1P : Rain Garden

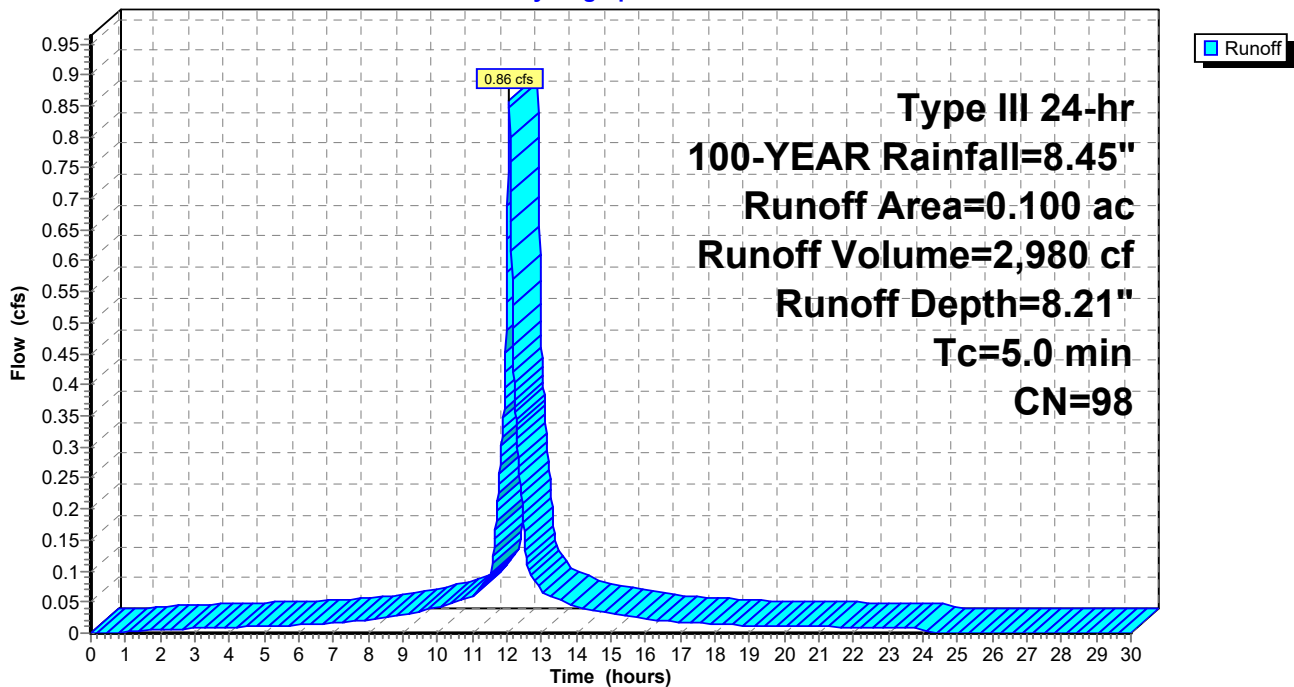
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YEAR Rainfall=8.45"

Area (ac)	CN	Description
* 0.100	98	
0.100		100.00% Impervious Area

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

Subcatchment 2A: South Restaurant

Hydrograph



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Type III 24-hr 100-YEAR Rainfall=8.45"

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Summary for Subcatchment 3: Retail Bldg

Runoff = 2.29 cfs @ 12.07 hrs, Volume= 7,936 cf, Depth= 8.21"
Routed to Pond 3P : Underground Detention

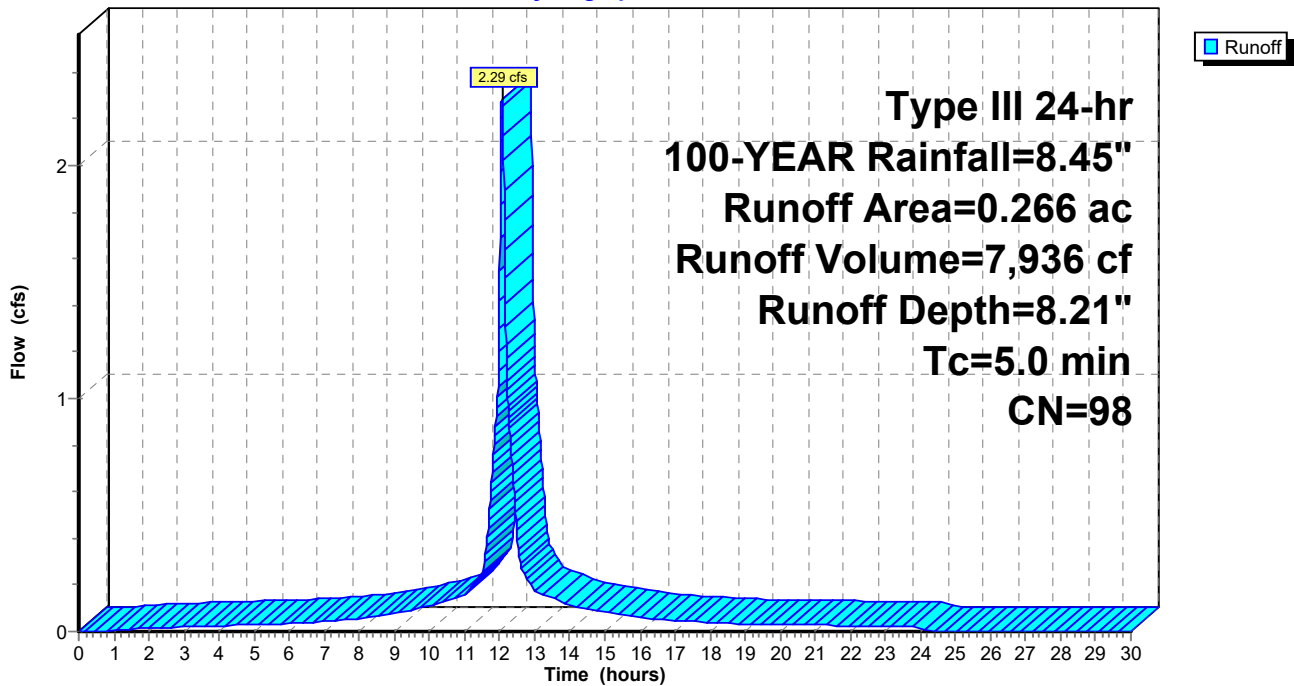
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YEAR Rainfall=8.45"

Area (ac)	CN	Description
0.266	98	Unconnected pavement, HSG B
0.266		100.00% Impervious Area
0.266		100.00% Unconnected

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

Subcatchment 3: Retail Bldg

Hydrograph



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Type III 24-hr 100-YEAR Rainfall=8.45"

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Summary for Subcatchment 4: North Restaurant

Runoff = 0.45 cfs @ 12.07 hrs, Volume= 1,571 cf, Depth= 8.21"
Routed to Pond 2P : Underground Detention

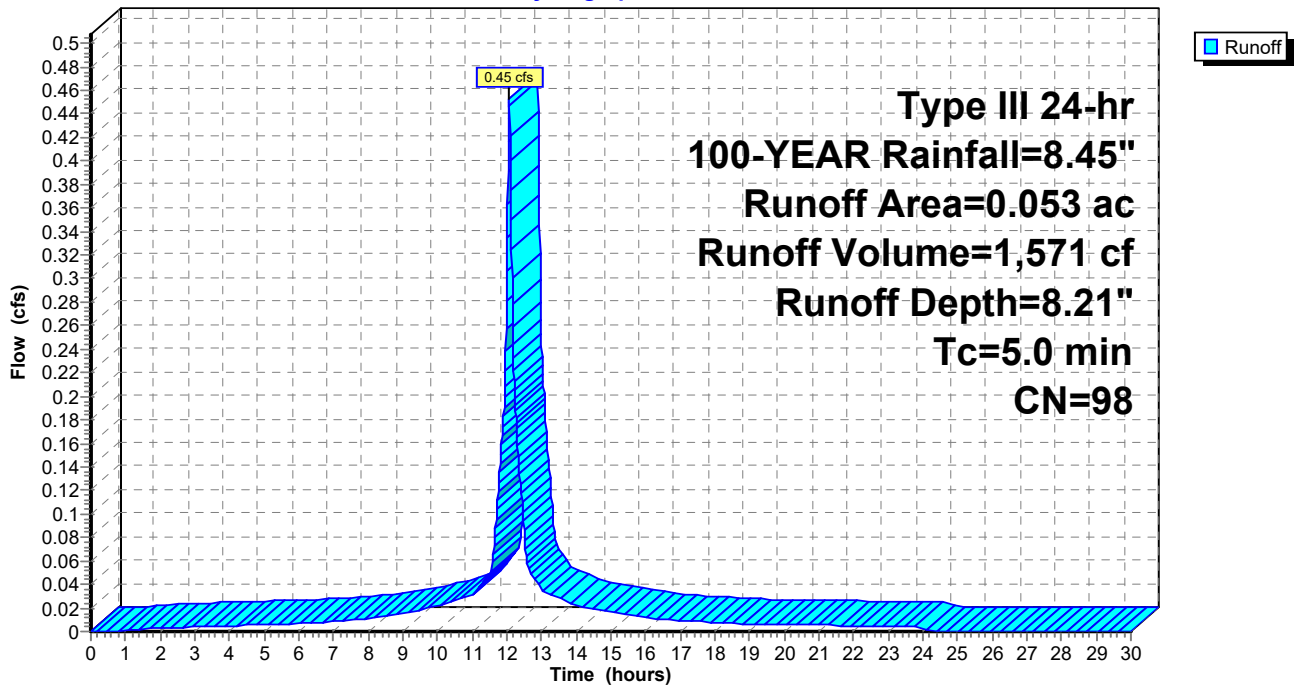
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YEAR Rainfall=8.45"

Area (ac)	CN	Description
0.053	98	Unconnected pavement, HSG B
0.053		100.00% Impervious Area
0.053		100.00% Unconnected

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

Subcatchment 4: North Restaurant

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PROPOSED CONDITIONS

Type III 24-hr 100-YEAR Rainfall=8.45"

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Summary for Pond 1P: Rain Garden

Inflow Area = 22,128 sf, 19.69% Impervious, Inflow Depth = 4.66" for 100-YEAR event
 Inflow = 2.72 cfs @ 12.07 hrs, Volume= 8,595 cf
 Outflow = 1.92 cfs @ 12.15 hrs, Volume= 8,595 cf, Atten= 29%, Lag= 4.5 min
 Discarded = 0.18 cfs @ 12.15 hrs, Volume= 6,265 cf
 Primary = 1.74 cfs @ 12.15 hrs, Volume= 2,331 cf
 Routed to Link DP-1 : Hopmeadow

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Peak Elev= 175.65' @ 12.15 hrs Surf.Area= 2,578 sf Storage= 1,988 cf

Plug-Flow detention time= 78.3 min calculated for 8,592 cf (100% of inflow)
 Center-of-Mass det. time= 78.2 min (883.6 - 805.3)

Volume	Invert	Avail.Storage	Storage Description			
#1	174.50'	2,992 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)	
174.50	883	160.0	0	0	883	
175.00	1,655	263.0	624	624	4,352	
176.00	3,161	430.0	2,368	2,992	13,568	

Device	Routing	Invert	Outlet Devices
#1	Device 3	175.50'	19.4" x 36.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#2	Discarded	174.50'	3.000 in/hr Exfiltration over Surface area Phase-In= 0.01'
#3	Primary	172.90'	12.0" Round Culvert L= 86.0' CMP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 172.90' / 172.10' S= 0.0093 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Discarded OutFlow Max=0.18 cfs @ 12.15 hrs HW=175.65' (Free Discharge)

↑ **2=Exfiltration** (Exfiltration Controls 0.18 cfs)

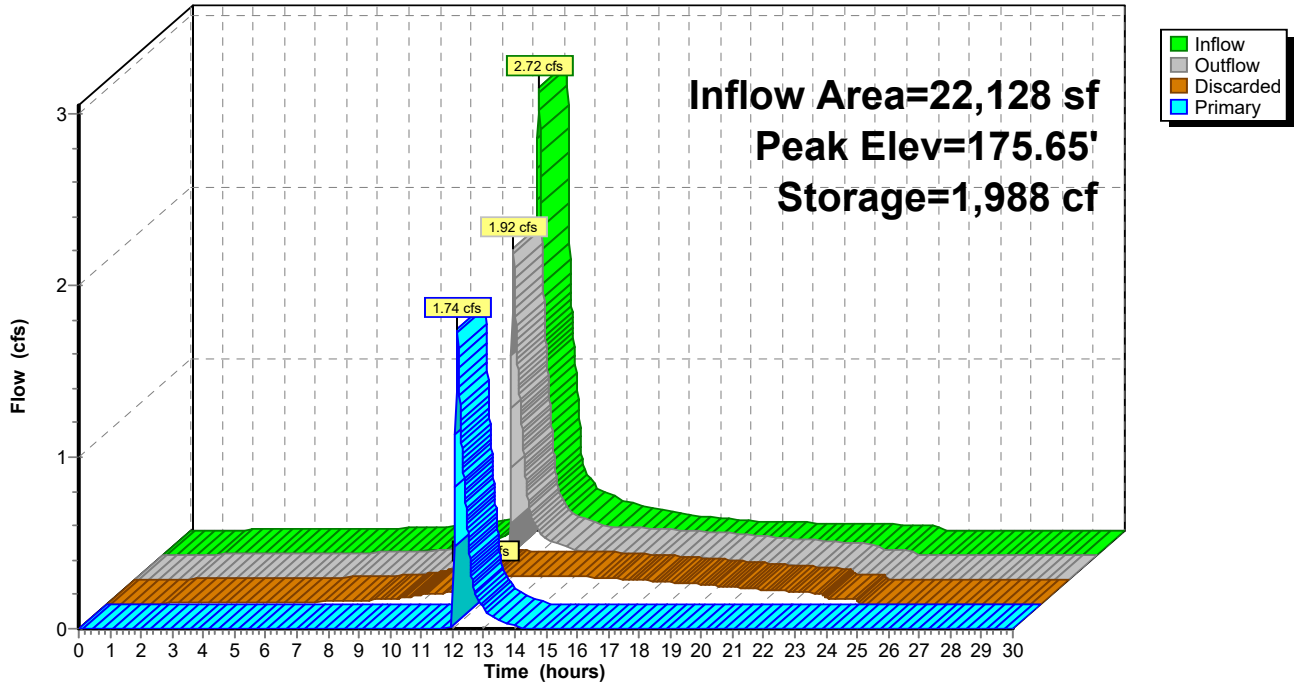
Primary OutFlow Max=1.74 cfs @ 12.15 hrs HW=175.65' (Free Discharge)

↑ **3=Culvert** (Passes 1.74 cfs of 4.80 cfs potential flow)

↑ **1=Orifice/Grate** (Weir Controls 1.74 cfs @ 1.26 fps)

Pond 1P: Rain Garden

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Type III 24-hr 100-YEAR Rainfall=8.45"

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Summary for Pond 2P: Underground Detention

Inflow Area = 2,297 sf, 100.00% Impervious, Inflow Depth = 8.21" for 100-YEAR event
 Inflow = 0.45 cfs @ 12.07 hrs, Volume= 1,571 cf
 Outflow = 0.45 cfs @ 12.07 hrs, Volume= 1,571 cf, Atten= 0%, Lag= 0.3 min
 Discarded = 0.02 cfs @ 8.91 hrs, Volume= 975 cf
 Primary = 0.44 cfs @ 12.07 hrs, Volume= 596 cf
 Routed to Link DP-1 : Hopmeadow

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Peak Elev= 176.34' @ 12.07 hrs Surf.Area= 0.005 ac Storage= 0.005 af

Plug-Flow detention time= 70.6 min calculated for 1,571 cf (100% of inflow)
 Center-of-Mass det. time= 70.6 min (810.2 - 739.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	174.40'	0.004 af	4.83'W x 45.92'L x 2.33'H Field A 0.012 af Overall - 0.002 af Embedded = 0.010 af x 40.0% Voids
#2A	174.90'	0.002 af	ADS_StormTech SC-310 +Cap x 6 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap
		0.006 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	174.90'	12.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#2	Discarded	174.40'	3.000 in/hr Exfiltration over Surface area Phase-In= 0.01'
#3	Device 1	176.23'	4.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.02 cfs @ 8.91 hrs HW=174.42' (Free Discharge)
 ↑ **2=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.43 cfs @ 12.07 hrs HW=176.34' (Free Discharge)
 ↑ **1=Orifice/Grate** (Passes 0.43 cfs of 3.68 cfs potential flow)
 ↑ **3=Broad-Crested Rectangular Weir** (Weir Controls 0.43 cfs @ 0.95 fps)

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PROPOSED CONDITIONS

Type III 24-hr 100-YEAR Rainfall=8.45"

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Pond 2P: Underground Detention - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-310 +Cap (ADS StormTech®SC-310 with cap length)

Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf

Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

6 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 43.92' Row Length +12.0" End Stone x 2 = 45.92' Base Length

1 Rows x 34.0" Wide + 12.0" Side Stone x 2 = 4.83' Base Width

6.0" Stone Base + 16.0" Chamber Height + 6.0" Stone Cover = 2.33' Field Height

6 Chambers x 14.7 cf = 88.5 cf Chamber Storage

517.9 cf Field - 88.5 cf Chambers = 429.4 cf Stone x 40.0% Voids = 171.8 cf Stone Storage

Chamber Storage + Stone Storage = 260.2 cf = 0.006 af

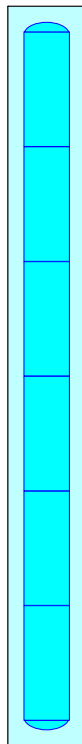
Overall Storage Efficiency = 50.2%

Overall System Size = 45.92' x 4.83' x 2.33'

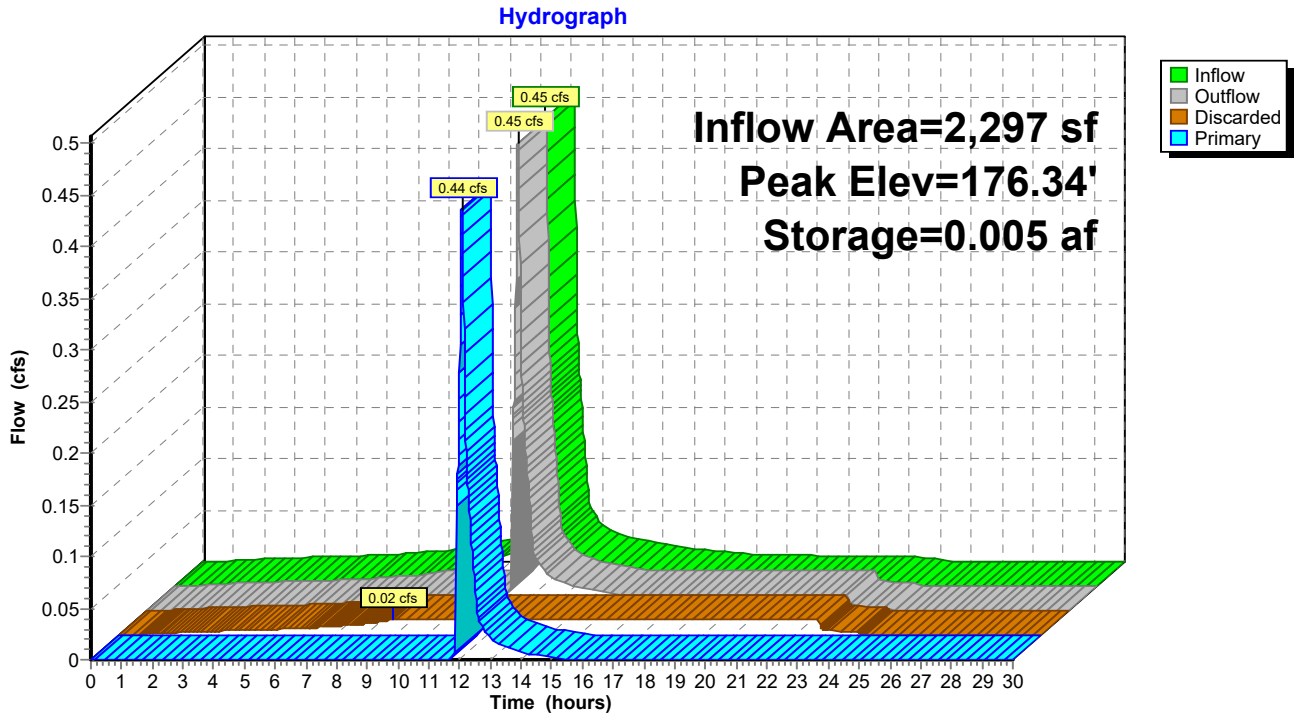
6 Chambers

19.2 cy Field

15.9 cy Stone



Pond 2P: Underground Detention



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PROPOSED CONDITIONS

Type III 24-hr 100-YEAR Rainfall=8.45"

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Summary for Pond 3P: Underground Detention

Inflow Area = 11,600 sf, 100.00% Impervious, Inflow Depth = 8.21" for 100-YEAR event
 Inflow = 2.29 cfs @ 12.07 hrs, Volume= 7,936 cf
 Outflow = 2.28 cfs @ 12.08 hrs, Volume= 7,936 cf, Atten= 0%, Lag= 0.4 min
 Discarded = 0.05 cfs @ 7.22 hrs, Volume= 4,182 cf
 Primary = 2.23 cfs @ 12.08 hrs, Volume= 3,755 cf
 Routed to Link DP-1 : Hopmeadow

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Peak Elev= 185.73' @ 12.08 hrs Surf.Area= 0.015 ac Storage= 0.031 af

Plug-Flow detention time= 132.2 min calculated for 7,934 cf (100% of inflow)
 Center-of-Mass det. time= 132.3 min (871.9 - 739.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	182.40'	0.015 af	11.00'W x 60.58'L x 3.50'H Field A 0.054 af Overall - 0.017 af Embedded = 0.037 af x 40.0% Voids
#2A	182.90'	0.017 af	ADS_StormTech SC-740 +Cap x 16 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 16 Chambers in 2 Rows
		0.032 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	182.90'	12.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#2	Discarded	182.40'	3.000 in/hr Exfiltration over Surface area Phase-In= 0.01'
#3	Device 1	185.40'	4.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.05 cfs @ 7.22 hrs HW=182.44' (Free Discharge)
 ↑ **2=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=2.23 cfs @ 12.08 hrs HW=185.73' (Free Discharge)
 ↑ **1=Orifice/Grate** (Passes 2.23 cfs of 5.78 cfs potential flow)
 ↑ **3=Broad-Crested Rectangular Weir** (Weir Controls 2.23 cfs @ 1.67 fps)

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PROPOSED CONDITIONS

Type III 24-hr 100-YEAR Rainfall=8.45"

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Pond 3P: Underground Detention - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

8 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 58.58' Row Length +12.0" End Stone x 2 = 60.58' Base Length

2 Rows x 51.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 11.00' Base Width

6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

16 Chambers x 45.9 cf = 735.0 cf Chamber Storage

2,332.2 cf Field - 735.0 cf Chambers = 1,597.2 cf Stone x 40.0% Voids = 638.9 cf Stone Storage

Chamber Storage + Stone Storage = 1,373.9 cf = 0.032 af

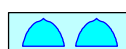
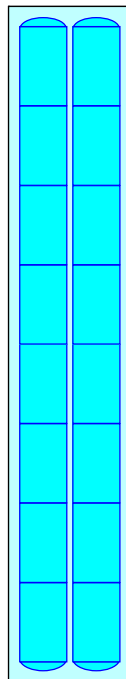
Overall Storage Efficiency = 58.9%

Overall System Size = 60.58' x 11.00' x 3.50'

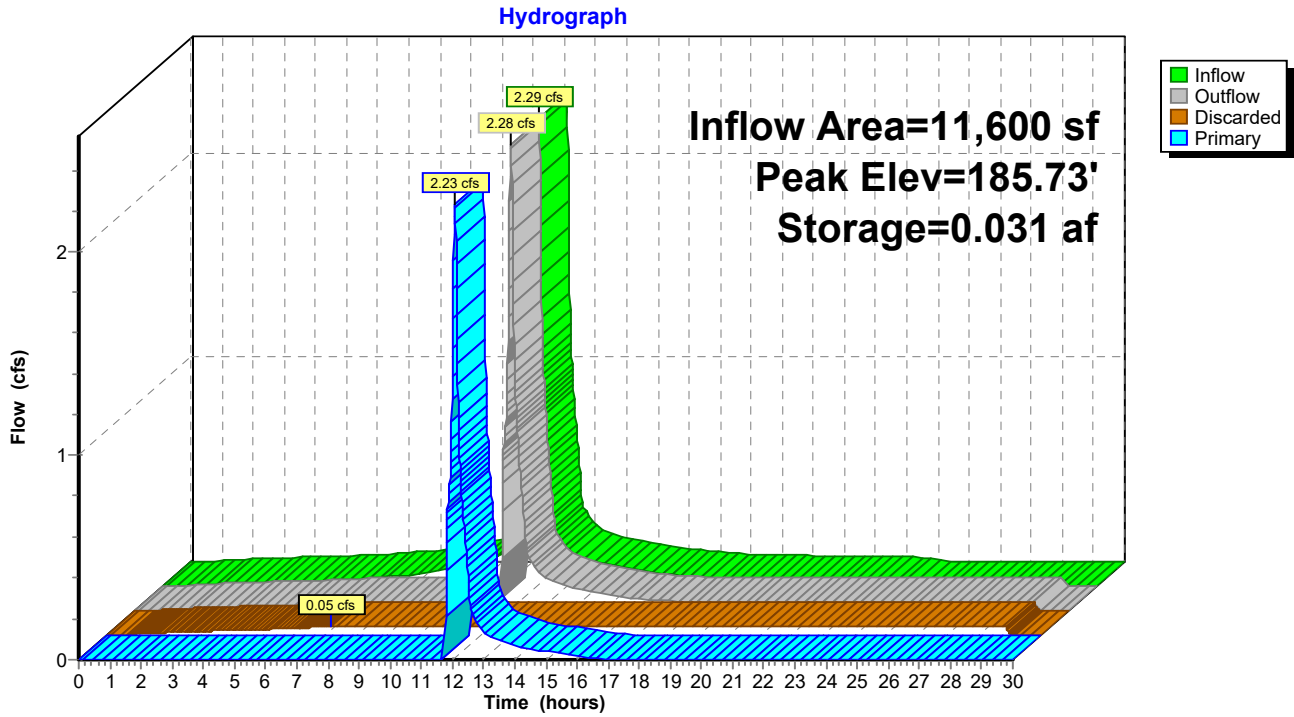
16 Chambers

86.4 cy Field

59.2 cy Stone



Pond 3P: Underground Detention



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PROPOSED CONDITIONS

Type III 24-hr 100-YEAR Rainfall=8.45"

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Summary for Link DP-1: Hopmeadow

Inflow Area = 216,412 sf, 58.05% Impervious, Inflow Depth = 5.71" for 100-YEAR event
Inflow = 23.07 cfs @ 12.25 hrs, Volume= 103,007 cf
Primary = 23.07 cfs @ 12.25 hrs, Volume= 103,007 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link DP-1: Hopmeadow

Hydrograph

