

Stormwater Management Report

For the Proposed:

Multi-Use Development

Located at:

**404 & 412 Washington Avenue
North Haven, Connecticut**

Prepared for Submission to:

**Town of North Haven, Connecticut
Planning and Zoning Commission**

January 8, 2021

Prepared for:

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Executive Summary

This report has been prepared in support of a Site Plan and Special Permit application to the Town of North Haven by Connex Credit Union and Vigliotti Construction, for a proposed residential and bank development off of Washington Avenue (U.S. Route 5). There are two subject properties, 412 Washington Avenue, which is approximately 3.73 acres, and 404 Washington Avenue, which is approximately 4.04 acres. Both parcels are currently developed with a credit union at 412, and a banquet hall/event venue at 404. There are no existing wetlands on the subject property. The proposed redevelopment includes a lot line modification and construction of a shared driveway between the two parcels. The existing driveway at 412 will remain, but the southerly driveway at 404 will be removed. Proposed improvements on the 404 property also include construction of a three-story residential building and a single-story bank with a drive thru, with associated parking lots, drainage and utilities needed to support the development. The overall existing drainage onsite will be improved with the use of Best Management Practices (BMPs) for water quality and runoff management though treatment, detention, infiltration and outlet control.

To the west of the properties is Route 5. Across Route 5 are industrial and commercial developments. East of the properties are residential properties. South of the properties are a package store, an animal hospital and a school. North of the properties is a Goodwill facility.

Generally, the topography of the site is very flat, ranging from elevation ± 52 to ± 49 . There is a ditch that receives stormwater runoff from portions of Corey Road, Bassett Road and Robin Court to be conveyed through the site with a low elevation of ± 46 . Under the existing conditions, site stormwater is either collected by an on-site stormwater network that conveys the flow directly into the drainage network in Route 5 or discharges to the neighboring property to the southwest through an existing endwall. Some stormwater at the undeveloped portion of the site leaves the site by overland flow to the east.

A HydroCAD model, utilizing TR-55 methodology, was developed to evaluate the existing and proposed drainage conditions of the property. To mitigate the increase in impervious coverage on the site a subsurface plastic storage chamber infiltration system will be installed with outlet control to provide stormwater runoff rate control. The results of the analysis demonstrate that there will not be an increase in peak stormwater runoff rates for, the 2-, 10-, 25-, and 100-year storm events. Water Quality Best Management Practices (BMPs) have been incorporated into the project design to provide a minimum required 80% TSS removal. The majority of impervious area runoff will be captured by hooded catch basins with deep sumps, with the building runoff discharging to roof leaders. The stormwater runoff will then be conveyed through hydrodynamic separators prior to discharging from the site.

The proposed stormwater management system is designed to be in compliance with the Town of North Haven regulations and the 2004 Connecticut Stormwater Quality Manual as well as the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control.

Existing Conditions

General Existing Site Conditions

The existing site consists a credit union, with a parking expansion constructed within the last few years and a banquet hall/event venue. The property has associated parking and storm drainage from the existing development. The eastern portion of both properties, abutting the residential homes is wooded.

The site soils identified by the United States Department of Agriculture (USDA) Natural Resources Conservation Services (NRCS) are; Deerfield loamy fine sand – A, Penwood loamy sand – A, Deerfield-Urban land complex – A and Urban land – D. A copy of the USDA NRCS Hydrologic Soil Group Map is included in Appendix A.

Per the FEMA Flood Insurance Rate Map Number 09009C0312J for the Town of North Haven, Connecticut map, effective revision date: May 16, 2017, the site is located in the Flood Hazard Zone X (unshaded), area of minimal flood hazard. A copy of the FEMA Flood insurance rate map is included in Appendix A for reference.

Existing Drainage Conditions

The existing site drainage area that was analyzed for this project totals approximately 7 acres and has approximately 56.6% impervious ground cover. The existing stormwater management system onsite includes a series of catch basins and a detention/infiltration system. The 412 property basins connect to Route 5 to the west, a parking expansion was done since 2017 that utilized subsurface infiltration chambers to mitigate runoff from the expansion. The 404 property basins discharge at an endwall to the southwest of the property with no treatment prior to leaving the site. This network also receives stormwater runoff from portions of Corey Road, Bassett Road and Robin Court. The runoff is captured in the roadways and is discharges to the east of the property flowing westerly in a drainage ditch. It is then conveyed into the onsite collection system from the ditch with a headwall. Stormwater from the subject site flows in four drainage and sub-drainage areas, which are illustrated on the enclosed Existing Drainage Plan (ED-1) located in Appendix D. The areas consist of the proposed site disturbance area and surrounding areas to the west, southwest and a small portion of unimproved woodland to the east the discharge points for analysis these areas are labeled as points of interests (POIs) 1 through 3.

The following is a brief analysis of the existing points of interest as shown on the enclosed Existing Drainage Plan (ED-1), in Appendix D.

Existing Drainage Area 101 (EDA-101): This drainage area covers most of what is the 412 property, the site impervious surface that is captured by the stormwater network and a portion of the surrounding landscaping. In the EDA-101 drainage area, the stormwater runoff is collected by an on-site stormwater management system and is connected to the stormwater system in Route 5, this is point of interest 1 (POI-1).

Existing Drainage Area 102 (EDA-102): This drainage area consists of a wooded portion of the site to the northeast of the existing parking areas. In the EDA-102 drainage area, the stormwater runoff flows westerly overland to the existing parking area of the 412 property and is collected by the on-site stormwater management system that is connected to the stormwater system in Route 5 (POI-1).

Existing Drainage Area 200 (EDA-200): This drainage area covers most of what is the 404 property, the site impervious surface that is captured by the stormwater network and a portion of the surrounding landscaping and woodlands. In the EDA-200 drainage area, the stormwater runoff is collected by an on-site stormwater management system and discharges to an endwall at the southwest of the site, this is point of interest 2 (POI-2).

Existing Drainage Area 300 (EDA-300): This drainage area includes the runoff from an undeveloped portion of the 404 property, a wooded area to the east. Runoff from this portion flows overland to the east, this is a general point of interest 3 (POI-3). This area will remain unchanged in the proposed condition.

Table 1 below displays the overall size and hydraulic characteristics used to analyze the existing drainage areas.

Table 1 – Pre-Development (Existing Conditions) Drainage Characteristics

Drainage Area	Total Area SF	Composite Curve Number	Imperviousness Cover %	Time of Concentration Minutes
EDA-101	109,811	86	70.9%	6.0
EDA-100	19,085	36	0.0%	12.9
EDA-200	51,196	80	65.0%	8.0
EDA-300	30,339	36	0.0%	32.2

Proposed Conditions

General Proposed Site Conditions

The proposed development includes the construction of a residential building and a bank with associated roadways, parking, drainage and utilities necessary to support the development. A shared driveway will replace the existing northerly driveway of the 404 property. This driveway will be aligned with the site drive across from Route 5 at an existing signalized intersection. A portion of the 412 property will be acquired by the 404 property in order to support the parking needs of the residential building. Internally the bank and the residential building will have separate entrances, as well as the existing credit union building, off of the shared internal drive at the signalized intersection. There will be an overall decrease in impervious coverage on the site.

The overall existing drainage onsite will be improved through the use of Best Management Practices (BMPs) for water quality and runoff management through means of treatment, detention and outlet control.

Proposed Drainage Conditions

For the purposes of the drainage analysis and discussion, as well as to maintain existing drainage patterns to the maximum extent practical, the stormwater runoff points of interest for the proposed conditions analysis are the same as the points of interest analyzed in the existing conditions. The majority of the stormwater system on the 412 property will remain and operate as it does under existing conditions. The stormwater system on the 404 property will be replaced, the function of the proposed system will be similar, but the improvements will be designed to better treat the stormwater through hydro dynamic separators and water quality volume (WQV) infiltration. The increase in runoff from the impervious area expansion will be mitigated through subsurface detention and outlet control. The proposed development has been analyzed as four drainage and sub-drainage areas, which are illustrated on the enclosed Proposed Drainage Plan (PD-1) located in Appendix D. The proposed analysis includes a total of 7 acres and is approximately 55.8% impervious. The site stormwater management system will provide the necessary stormwater attenuation due to the increase in impervious surface through the installation of a subsurface detention system with outlet control as well as stormwater quality improvements compared to the existing system through the utilization of hydrodynamic separators and infiltration to the maximum extent practical. The BMPs have been designed in accordance with the 2004 Connecticut Stormwater Quality Manual.

The following is a brief analysis of the proposed drainage areas as shown on the enclosed Proposed Drainage Plan (PD-1), in Appendix D.

Proposed Drainage Area 100 (PDA-100): This drainage area covers most of what is the 412 property, the site impervious surface that is captured by the stormwater network and a portion of the surrounding landscaping. In the PDA-100 drainage area, the stormwater runoff is collected by an on-site stormwater management system and is connected to the stormwater system in Route 5 (POI-1).

Proposed Drainage Area 201 (PDA-201): This drainage area covers most of what is the 404 property, the site impervious surface that is captured by the stormwater network and a portion of the surrounding landscaping and woodlands. In the PDA-200 drainage area, the stormwater runoff is collected by an on-site stormwater management system. The runoff is treated with hydrodynamic separators prior to discharge to keep trash and suspended solids out of the system (proprietary system claims to meet 80% TSS removal). The runoff discharges to an endwall at the southwest of the site (POI-2).

Proposed Drainage Area 202 (PDA-202): This drainage area covers most of the proposed parking area in the northeast of the site and a portion of the surrounding landscaping and woodlands. The stormwater runoff is collected by an on-site stormwater management system and is routed to an underground stormwater detention basin. The basin system consists of polyethylene storage chambers encased in crushed stone. This system allows for maximum infiltration and groundwater recharge potential. Additionally, the system has been designed to retain and infiltrate the 1” water quality volume (WQV) for this drainage area. The runoff discharges to an endwall at the southwest of the site (POI-2).

Proposed Drainage Area 300 (PDA-300): This drainage area includes the runoff from an undeveloped portion of the 404 property, a wooded area to the east. Runoff from this portion flows overland to the east (POI-3). This area will remain unchanged in the proposed condition.

Table 2 below displays the overall size and hydraulic characteristics used to analyze the proposed drainage areas.

Table 2 – Post Development Drainage Characteristics

Drainage Area	Total Area SF	Composite Curve Number	Imperviousness Cover %	Time of Concentration Minutes
PDA-100	94,552	87	72.9%	6.0
PDA-201	153,282	76	55.2%	6.0
PDA-202	27,515	77	61.5%	9.7
PDA-300	30,339	36	0.0%	32.2

Stormwater Management

Stormwater Attenuation

A hydrologic analysis to determine peak stormwater discharge rates was performed using the HydroCAD stormwater modeling system computer program, version 10.00 developed by HydroCAD Software Solutions, LLC. Hydrographs for each watershed were developed using the SCS Synthetic Unit Hydrograph Method. Rainfall depths and distribution taken from the NOAA Atlas 14 for North Haven, Connecticut were used for the calculation of peak flow rates and are listed in Table 3. The drainage areas, or sub-drainage areas as labeled by the program, are depicted by hexagons on the attached drainage diagrams. Pre- and post-development HydroCAD output and details can be found in Appendix B.

Table 3 – Rainfall Depths per NOAA Atlas 14

Return Period	24-hour Rainfall Depth
2-year	3.48”
10-year	5.38”
25-year	6.56”
100-year	8.39”

The results of the analysis can be found in Table 4 below of the 2-, 10-, 25-, and 100-year storm events. With the use of a detention structure with outlet control the site proposed stormwater management system meets the requirements of the Town of North Haven Regulations as well as the 2004 Connecticut Stormwater Quality Manual at all discharge design point locations by not increasing peak runoff rates from the proposed developments at the site.

Table 4 – Existing vs Proposed Peak Rates of Runoff

Analysis Point	Peak Flows (CFS)			
	2-YR	10-YR	25-YR	100-YR
EDA-100	8.92	15.93	20.30	27.15
PDA-100	7.95	14.00	17.75	23.53
EDA-100	8.93	17.54	23.06	31.67
PDA-200	7.69	16.27	21.90	30.93
EDA-300	0.00	0.01	0.08	0.35
PDA-300	0.00	0.01	0.08	0.35

In addition to reducing the rate of runoff, the overall volume of stormwater runoff is also being reduced for the stormwater entering the system in Route 5 in order to comply with applicable Municipal Separate Storm Sewer System (MS4) requirements. For the discharge at POI-2, the volume is reduced for all storms except for the 100-year event. Table 5 below provides a comparison of the stormwater runoff volumes for the 2-, 10-, 25-, and 100-year storm events for POI-1 and POI-2.

Table 5 – Existing vs Proposed Runoff Volumes

Year Storm	Existing Volume of Stormwater Runoff (CF)		Proposed Volume of Stormwater Runoff (CF)	
	POI-1	POI-2	POI-1	POI-2
2	19,019	19,741	17,036	17,219
10	35,217	39,319	30,908	36,449
25	45,881	52,279	39,791	50,737
100	62,980	73,018	53,766	74,109

Stormwater Quality

Along with the reduction of peak storm water discharge rates, an important element of the proposed drainage system is to improve the quality of discharge leaving the property. BMPs for stormwater runoff quality have been implemented in this design, refer to Appendix C for details and calculations.

All catch basins in parking and/or paved areas will have a minimum of two-foot deep sumps to collect sediment carried in the runoff. In addition, all catch basin outlets will be fitted with ‘hoods’ which trap floating debris in the individual catch basin so they can be removed during regular maintenance. The lawn and landscaped areas can also provide a secondary level of filtration and infiltration. No quantifiable credit is given to this green space, but it can contribute to water quality.

Hydrodynamic separators will be installed downstream of the stormwater collection networks prior to discharging. This unit has been proven to improve storm water quality. The unit has been designed in an “in-line” configuration, which improves the efficiency and is sized to treat the Water Quality Flow (WQF) per the 2004 Connecticut Stormwater Quality Manual. The “in-line” hydrodynamic separators will provide for 80% total suspended solid removal from collected runoff meeting the Connecticut guidelines and applicable Town of North Haven regulations. Additionally, an underground detention system will retain and infiltrate at minimum the 1” WQV significantly reducing downstream pollutant load and meeting the Town of North Haven requirements for this system. Supporting water quality calculations can be found in Appendix C.

Soil Erosion and Sediment Control

A soil erosion and sediment control plan has been developed to protect the adjacent roadways, storm drainage systems, properties and wetland areas and any adjacent water course from sediment laden surface runoff and erosion.

Sediment control will be accomplished through rapid stabilization and by the installation of mechanical devices, including a temporary gravel construction entrance, silt fence and storm drain inlet protection. The proposed construction activities will be in accordance with policies and requirements of the 2002 Connecticut Guidelines for Sedimentation and Erosion Control, as amended as well as the applicable requirements of the Town of North Haven. Permanent stabilization will occur as quickly as possible with site-specific seeding mixtures and as required by local officials.

Structural practices utilized as part of this development will include:

1. Temporary Construction Entrance

A temporary construction entrance shall be installed at the stone construction entrance of the development. Mud and debris shall be washed from all construction vehicles and equipment before leaving the site. The sediment laden water will be diverted to a proposed sediment basin/trap. Water tanks will be used if public water is unavailable.

2. Silt Fence

Silt fence shall be installed downstream of disturbed areas to filter the sediment laden sheet flow.

3. Inlet Protection

All storm inlets existing and constructed, that could potentially receive sediment laden runoff will have silt sack and/or haybale protection installed until site stabilization is complete.

Conclusion

The stormwater design for the project development meets regulatory requirements and stormwater quality goals. The stormwater BMPs aid in keeping pollutants out of the adjacent roadways and properties and maximize the potential for groundwater recharge as well as attenuating peak flows by detaining stormwater for the most frequent storm events as practical. Stormwater quality is being addressed by water quality structures providing the minimum required 80% TSS removal as required in the CT Stormwater Manual. The proposed stormwater management system will meet the stormwater quality requirements of the State of Connecticut and the Town of North Haven while improving overall existing site drainage conditions.

APPENDIX A

DATA AND MAPPING

Figure 1A: USGS Location Map

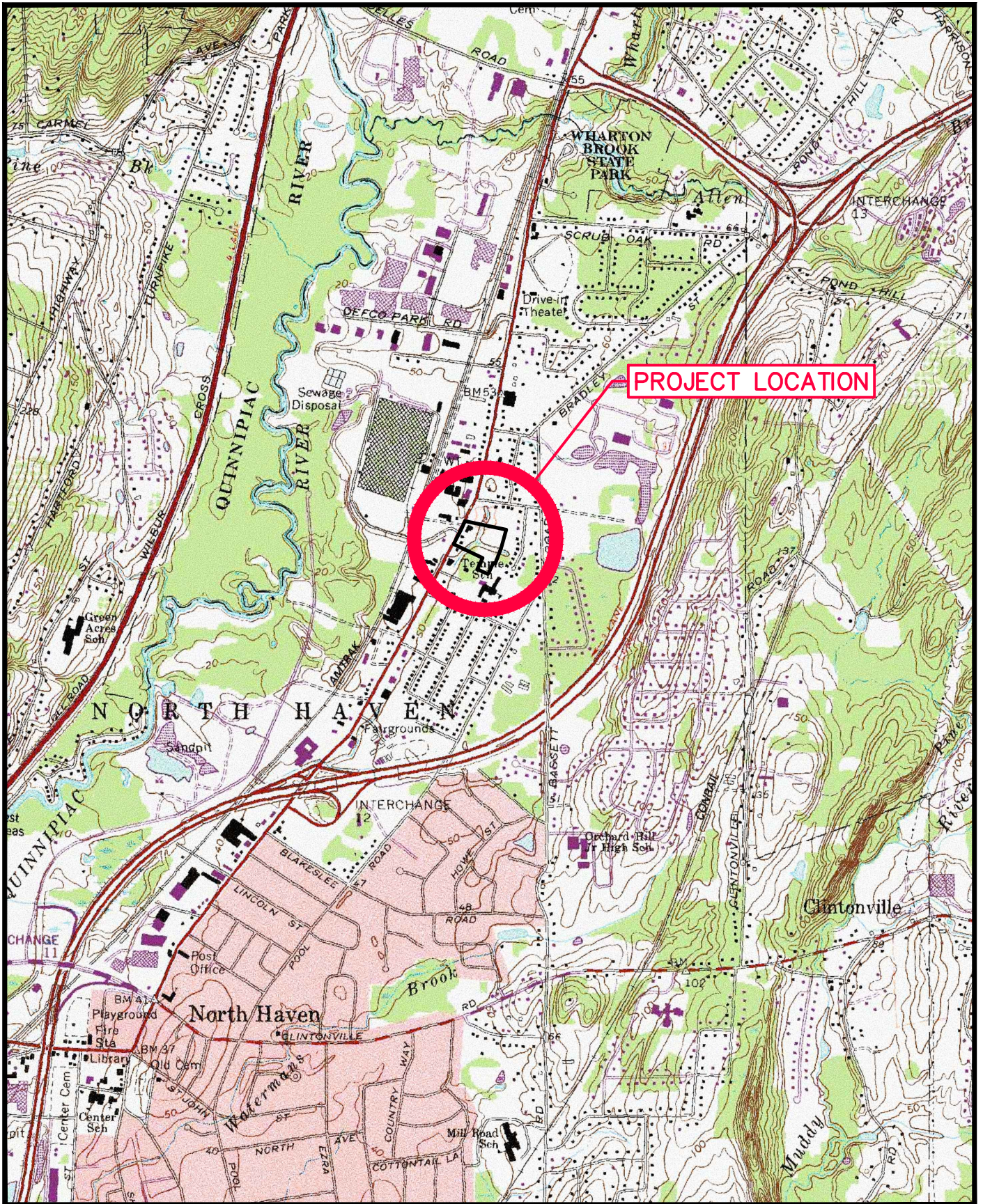
Figure 1B: Aerial Location Map

Figure 2A: NRCS Soil Survey Map with Hydrologic Soil Group Data

Figure 2B: NRCS Saturated Hydraulic Conductivity Soil Group Data

Figure 3: FEMA Federal Insurance Rate Map

Figure 4: NOAA Atlas 14 Storm Data



ARCHITECTURE
ENGINEERING
ENVIRONMENTAL
LAND SURVEYING

**PROPOSED
DEVELOPMENT**

404 & 412 WASHINGTON AVENUE
NORTH HAVEN, CONNECTICUT

Designed	N.A.N.
Drawn	N.A.N.
Checked	
Approved	
Scale	1"=2000'
Project No.	2001236
Date	01/08/2021
CAD File	LOC200123601

FIGURE 1A

USGS LOCATION MAP



PROJECT LOCATION

WASHINGTON AVENUE



ARCHITECTURE
ENGINEERING
ENVIRONMENTAL
LAND SURVEYING

PROPOSED DEVELOPMENT
404 & 412 WASHINGTON AVENUE
NORTH HAVEN, CONNECTICUT

Designed N.A.N.
Drawn N.A.N.
Checked N.A.N.
Approved N.A.N.
Scale 1"=200'
Project No. 2001236
Date 01/08/2021
CAD File LOC200123601

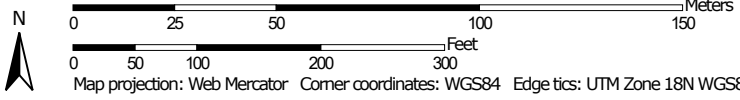
FIGURE 1B
AERIAL LOCATION MAP

Hydrologic Soil Group—State of Connecticut




Soil Map may not be valid at this scale.

Map Scale: 1:1,860 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 20, Jun 9, 2020

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

Date(s) aerial images were photographed: Jun 27, 2014—Jul 22, 2014

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
24A	Deerfield loamy fine sand, 0 to 3 percent slopes	A	0.8	5.7%
35A	Penwood loamy sand, 0 to 3 percent slopes	A	8.5	61.2%
224A	Deerfield-Urban land complex, 0 to 3 percent slopes	A	1.1	7.7%
307	Urban land	D	3.1	22.6%
308	Udorthents, smoothed	C	0.4	2.8%
Totals for Area of Interest			13.8	100.0%

Description

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

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

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

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

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

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

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

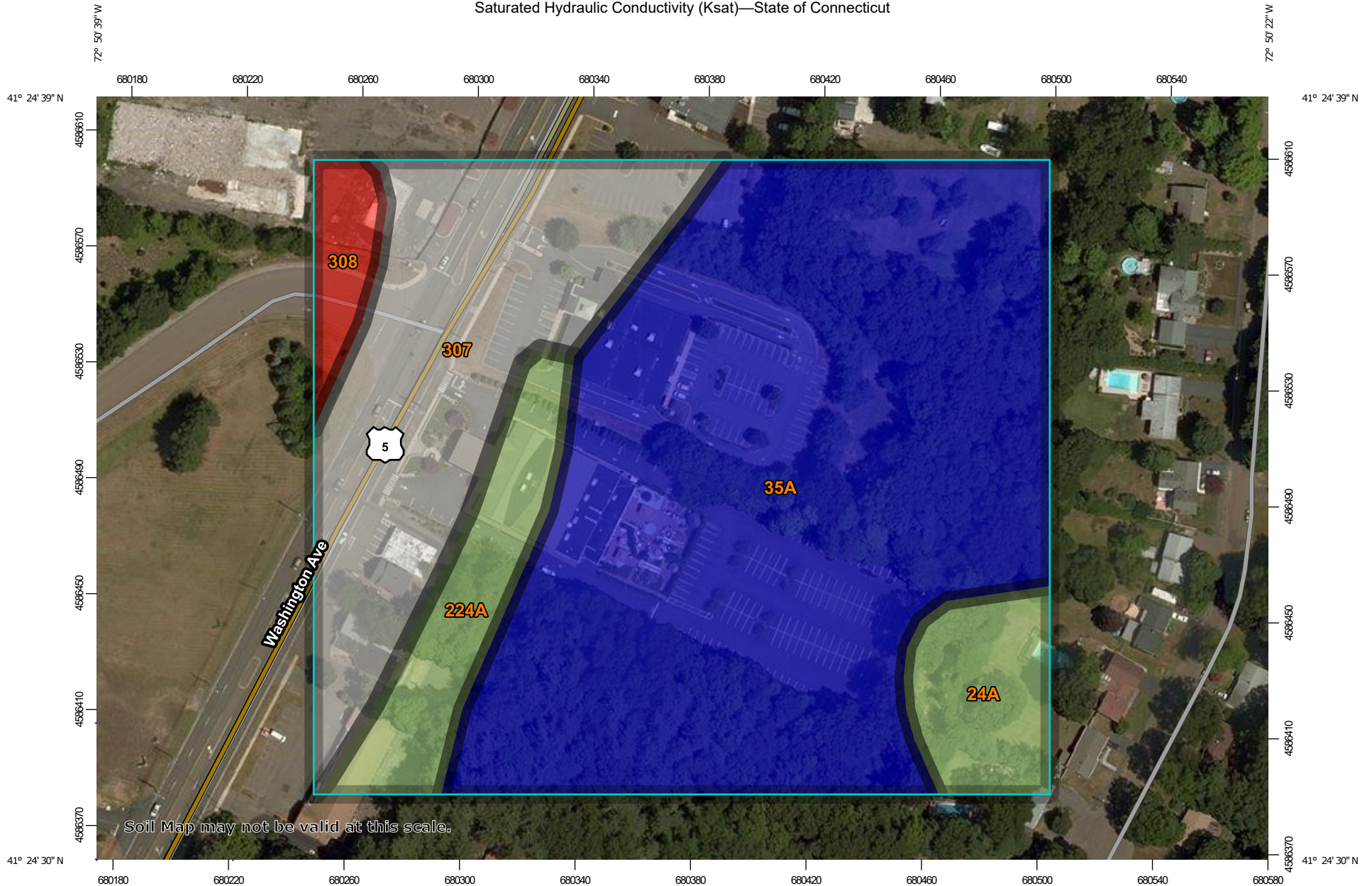
Rating Options

Aggregation Method: Dominant Condition

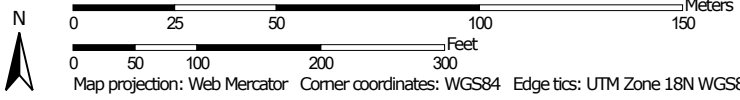
Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Saturated Hydraulic Conductivity (Ksat)—State of Connecticut

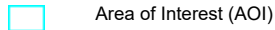


Map Scale: 1:1,860 if printed on A landscape (11" x 8.5") sheet.



MAP LEGEND

Area of Interest (AOI)



Area of Interest (AOI)

Background



Aerial Photography

Soils

Soil Rating Polygons



<= 28.0000



> 28.0000 and <= 100.0000



> 100.0000 and <= 141.0000



Not rated or not available

Soil Rating Lines



<= 28.0000



> 28.0000 and <= 100.0000



> 100.0000 and <= 141.0000



Not rated or not available

Soil Rating Points



<= 28.0000



> 28.0000 and <= 100.0000



> 100.0000 and <= 141.0000



Not rated or not available

Water Features



Streams and Canals

Transportation



Rails



Interstate Highways



US Routes



Major Roads



Local Roads

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 20, Jun 9, 2020

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

Date(s) aerial images were photographed: Jun 27, 2014—Jul 22, 2014

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.

Saturated Hydraulic Conductivity (Ksat)

Map unit symbol	Map unit name	Rating (micrometers per second)	Acres in AOI	Percent of AOI
24A	Deerfield loamy fine sand, 0 to 3 percent slopes	100.0000	0.8	5.7%
35A	Penwood loamy sand, 0 to 3 percent slopes	141.0000	8.5	61.2%
224A	Deerfield-Urban land complex, 0 to 3 percent slopes	100.0000	1.1	7.7%
307	Urban land		3.1	22.6%
308	Udorthents, smoothed	28.0000	0.4	2.8%
Totals for Area of Interest			13.8	100.0%

Description

Saturated hydraulic conductivity (Ksat) refers to the ease with which pores in a saturated soil transmit water. The estimates are expressed in terms of micrometers per second. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Saturated hydraulic conductivity is considered in the design of soil drainage systems and septic tank absorption fields.

For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

The numeric Ksat values have been grouped according to standard Ksat class limits.

Rating Options

Units of Measure: micrometers per second

Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Fastest

Interpret Nulls as Zero: No

Layer Options (Horizon Aggregation Method): Depth Range (Weighted Average)

Top Depth: 24

Bottom Depth: 72

Units of Measure: Inches

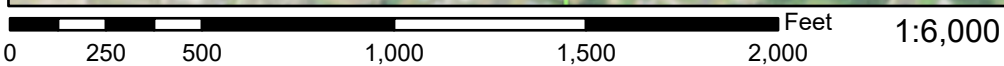
National Flood Hazard Layer FIRMette



72°50'52"W 41°24'49"N



USGS The National Map-Orthoimagery. Data refreshed October, 2020.



72°50'14"W 41°24'22"N

Legend

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

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



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 **1/8/2021 at 7:14 AM** 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.



POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

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

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.342 (0.267-0.427)	0.415 (0.323-0.518)	0.534 (0.414-0.668)	0.632 (0.487-0.796)	0.767 (0.573-1.01)	0.869 (0.636-1.18)	0.976 (0.694-1.37)	1.10 (0.738-1.58)	1.27 (0.825-1.90)	1.42 (0.897-2.16)
10-min	0.485 (0.378-0.605)	0.588 (0.457-0.733)	0.756 (0.586-0.947)	0.895 (0.690-1.13)	1.09 (0.812-1.44)	1.23 (0.901-1.67)	1.38 (0.984-1.95)	1.56 (1.05-2.24)	1.80 (1.17-2.70)	2.01 (1.27-3.07)
15-min	0.571 (0.444-0.711)	0.692 (0.538-0.863)	0.890 (0.689-1.12)	1.05 (0.812-1.33)	1.28 (0.955-1.69)	1.45 (1.06-1.96)	1.63 (1.16-2.29)	1.83 (1.23-2.64)	2.12 (1.38-3.17)	2.36 (1.49-3.61)
30-min	0.791 (0.616-0.986)	0.956 (0.744-1.19)	1.23 (0.951-1.54)	1.45 (1.12-1.83)	1.76 (1.32-2.33)	1.99 (1.46-2.70)	2.24 (1.59-3.15)	2.51 (1.69-3.62)	2.92 (1.89-4.36)	3.25 (2.06-4.96)
60-min	1.01 (0.787-1.26)	1.22 (0.950-1.52)	1.57 (1.21-1.96)	1.85 (1.43-2.33)	2.24 (1.68-2.96)	2.54 (1.86-3.43)	2.85 (2.03-4.01)	3.20 (2.15-4.61)	3.71 (2.40-5.55)	4.13 (2.62-6.32)
2-hr	1.33 (1.04-1.64)	1.59 (1.25-1.97)	2.03 (1.58-2.52)	2.38 (1.85-2.99)	2.88 (2.17-3.78)	3.25 (2.40-4.37)	3.64 (2.61-5.11)	4.10 (2.77-5.87)	4.77 (3.10-7.08)	5.33 (3.38-8.08)
3-hr	1.54 (1.22-1.90)	1.85 (1.45-2.28)	2.34 (1.84-2.90)	2.76 (2.15-3.44)	3.32 (2.51-4.35)	3.75 (2.78-5.03)	4.20 (3.02-5.87)	4.73 (3.20-6.74)	5.51 (3.59-8.16)	6.17 (3.93-9.33)
6-hr	1.96 (1.56-2.40)	2.35 (1.86-2.88)	2.99 (2.36-3.67)	3.51 (2.76-4.35)	4.24 (3.23-5.52)	4.78 (3.56-6.37)	5.36 (3.89-7.46)	6.05 (4.11-8.56)	7.07 (4.62-10.4)	7.94 (5.06-11.9)
12-hr	2.42 (1.94-2.94)	2.92 (2.34-3.56)	3.74 (2.98-4.57)	4.42 (3.50-5.43)	5.36 (4.10-6.93)	6.05 (4.54-8.02)	6.80 (4.96-9.41)	7.69 (5.25-10.8)	9.03 (5.93-13.2)	10.2 (6.51-15.2)
24-hr	2.84 (2.29-3.43)	3.48 (2.80-4.20)	4.51 (3.62-5.48)	5.38 (4.29-6.56)	6.56 (5.07-8.44)	7.43 (5.63-9.82)	8.39 (6.18-11.6)	9.56 (6.55-13.4)	11.4 (7.47-16.5)	12.9 (8.29-19.1)
2-day	3.19 (2.59-3.82)	3.97 (3.22-4.76)	5.25 (4.24-6.32)	6.30 (5.06-7.64)	7.76 (6.04-9.95)	8.82 (6.74-11.6)	10.0 (7.45-13.8)	11.5 (7.91-16.0)	13.9 (9.16-20.0)	16.0 (10.3-23.5)
3-day	3.46 (2.83-4.13)	4.32 (3.52-5.16)	5.73 (4.65-6.87)	6.89 (5.56-8.31)	8.49 (6.64-10.9)	9.66 (7.41-12.7)	11.0 (8.20-15.1)	12.6 (8.71-17.5)	15.3 (10.1-22.0)	17.7 (11.4-25.9)
4-day	3.71 (3.04-4.42)	4.63 (3.78-5.51)	6.12 (4.98-7.31)	7.35 (5.95-8.85)	9.06 (7.10-11.5)	10.3 (7.92-13.5)	11.7 (8.76-16.1)	13.5 (9.29-18.6)	16.3 (10.8-23.3)	18.8 (12.1-27.4)
7-day	4.43 (3.65-5.24)	5.44 (4.47-6.44)	7.09 (5.81-8.42)	8.45 (6.88-10.1)	10.3 (8.14-13.1)	11.7 (9.04-15.2)	13.2 (9.93-18.0)	15.1 (10.5-20.8)	18.1 (12.0-25.8)	20.8 (13.4-30.1)
10-day	5.14 (4.25-6.05)	6.20 (5.12-7.31)	7.94 (6.53-9.40)	9.37 (7.66-11.2)	11.4 (8.96-14.3)	12.8 (9.90-16.5)	14.4 (10.8-19.4)	16.4 (11.4-22.3)	19.4 (12.9-27.4)	22.0 (14.2-31.8)
20-day	7.33 (6.12-8.58)	8.48 (7.06-9.93)	10.3 (8.58-12.2)	11.9 (9.80-14.1)	14.0 (11.1-17.4)	15.6 (12.1-19.8)	17.3 (12.9-22.8)	19.2 (13.5-26.0)	22.0 (14.7-30.9)	24.3 (15.8-34.9)
30-day	9.17 (7.69-10.7)	10.4 (8.66-12.1)	12.3 (10.2-14.4)	13.9 (11.5-16.4)	16.1 (12.8-19.8)	17.8 (13.8-22.3)	19.5 (14.5-25.4)	21.3 (15.0-28.7)	23.9 (16.0-33.4)	25.9 (16.9-37.1)
45-day	11.5 (9.65-13.3)	12.7 (10.7-14.7)	14.7 (12.3-17.1)	16.3 (13.6-19.2)	18.6 (14.8-22.7)	20.4 (15.8-25.4)	22.1 (16.4-28.5)	23.9 (16.9-32.0)	26.2 (17.6-36.4)	27.9 (18.2-39.7)
60-day	13.4 (11.3-15.5)	14.6 (12.3-16.9)	16.7 (14.0-19.4)	18.4 (15.3-21.5)	20.7 (16.5-25.1)	22.5 (17.5-27.9)	24.3 (18.0-31.0)	26.0 (18.4-34.6)	28.1 (19.0-38.9)	29.5 (19.3-41.9)

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

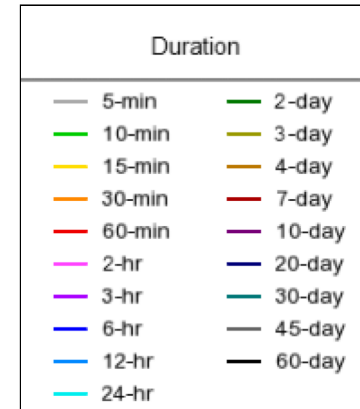
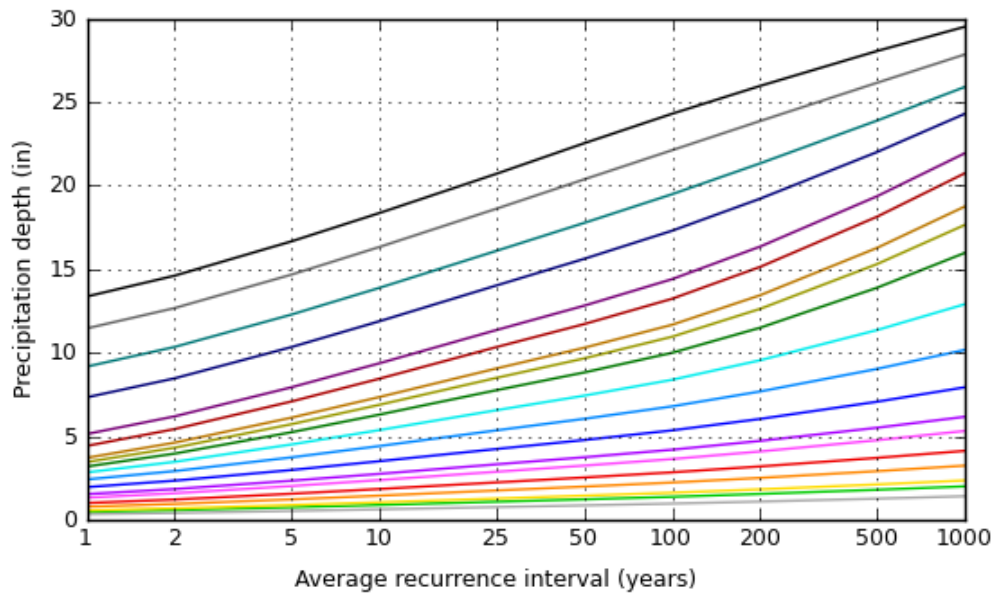
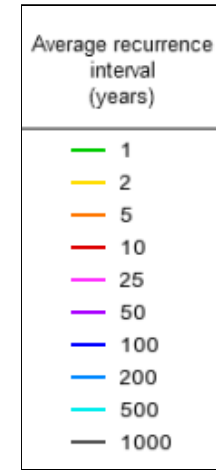
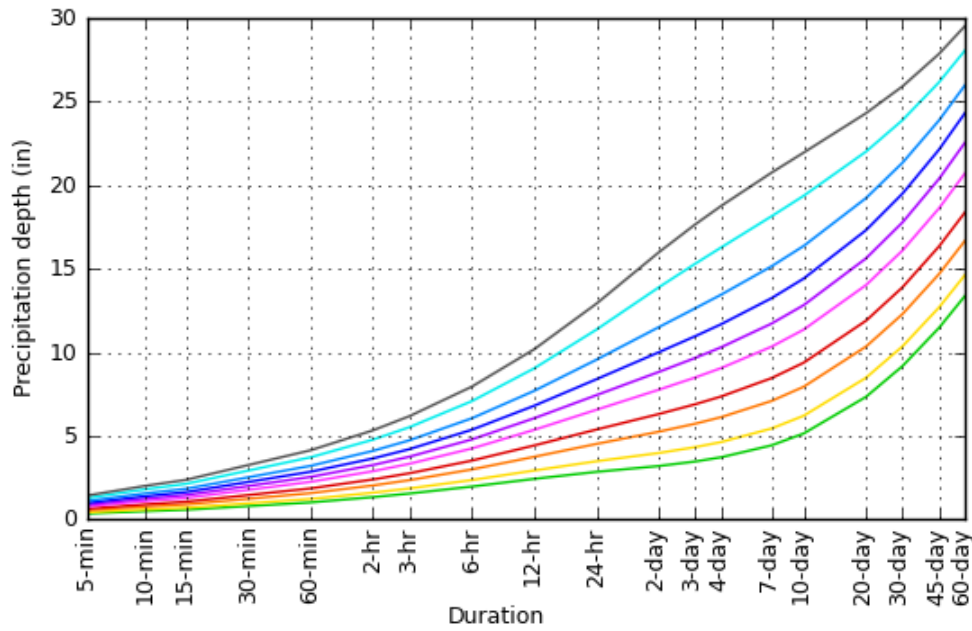
Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper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

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PF graphical

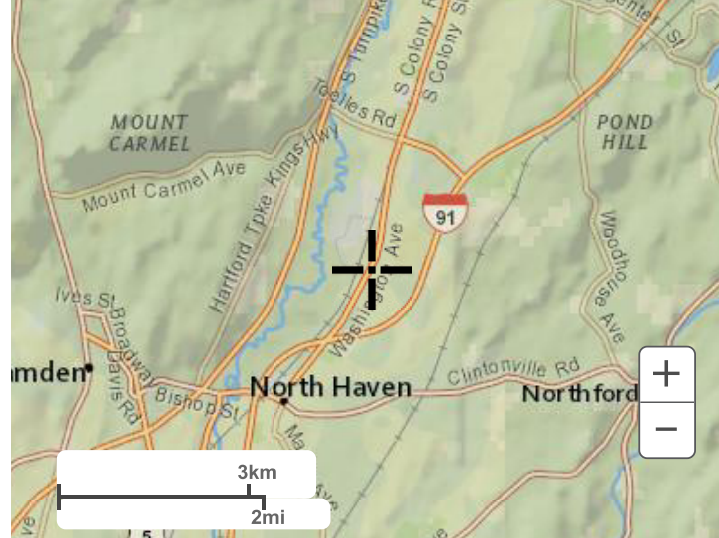
PDS-based depth-duration-frequency (DDF) curves
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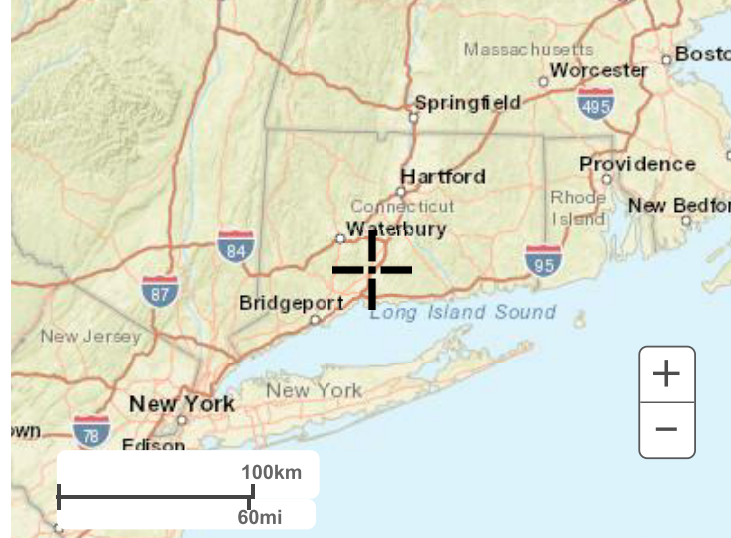
Small scale terrain



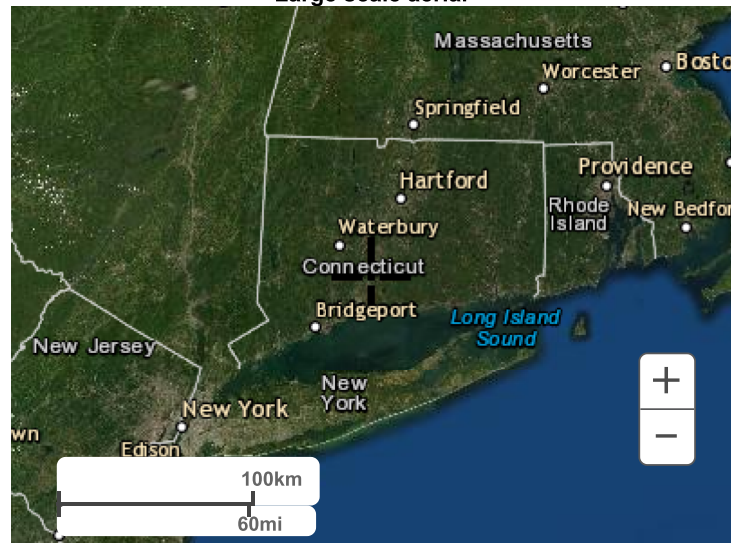
Large scale terrain



Large scale map



Large scale aerial



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POINT PRECIPITATION FREQUENCY ESTIMATES

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NOAA, National Weather Service, Silver Spring, Maryland

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

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour)¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	4.10 (3.20-5.12)	4.98 (3.88-6.22)	6.41 (4.97-8.02)	7.58 (5.84-9.55)	9.20 (6.88-12.2)	10.4 (7.63-14.1)	11.7 (8.33-16.5)	13.2 (8.86-19.0)	15.3 (9.90-22.8)	17.0 (10.8-26.0)
10-min	2.91 (2.27-3.63)	3.53 (2.74-4.40)	4.54 (3.52-5.68)	5.37 (4.14-6.77)	6.52 (4.87-8.62)	7.39 (5.41-9.99)	8.30 (5.90-11.7)	9.33 (6.28-13.4)	10.8 (7.01-16.2)	12.0 (7.62-18.4)
15-min	2.28 (1.78-2.84)	2.77 (2.15-3.45)	3.56 (2.76-4.46)	4.21 (3.25-5.31)	5.12 (3.82-6.76)	5.80 (4.24-7.84)	6.51 (4.63-9.16)	7.32 (4.92-10.5)	8.48 (5.50-12.7)	9.44 (5.98-14.4)
30-min	1.58 (1.23-1.97)	1.91 (1.49-2.39)	2.45 (1.90-3.07)	2.90 (2.24-3.66)	3.52 (2.63-4.65)	3.99 (2.92-5.39)	4.47 (3.18-6.30)	5.03 (3.39-7.25)	5.83 (3.78-8.72)	6.49 (4.11-9.92)
60-min	1.01 (0.787-1.26)	1.22 (0.950-1.52)	1.57 (1.21-1.96)	1.85 (1.43-2.33)	2.24 (1.68-2.96)	2.54 (1.86-3.43)	2.85 (2.03-4.01)	3.20 (2.15-4.61)	3.71 (2.40-5.55)	4.13 (2.62-6.32)
2-hr	0.664 (0.521-0.822)	0.796 (0.624-0.987)	1.01 (0.791-1.26)	1.19 (0.926-1.49)	1.44 (1.08-1.89)	1.62 (1.20-2.19)	1.82 (1.31-2.55)	2.05 (1.38-2.93)	2.38 (1.55-3.54)	2.66 (1.69-4.04)
3-hr	0.514 (0.405-0.633)	0.615 (0.484-0.759)	0.781 (0.612-0.967)	0.918 (0.716-1.14)	1.11 (0.836-1.45)	1.25 (0.924-1.67)	1.40 (1.01-1.96)	1.58 (1.07-2.25)	1.84 (1.20-2.72)	2.06 (1.31-3.11)
6-hr	0.327 (0.260-0.401)	0.392 (0.311-0.481)	0.498 (0.394-0.613)	0.587 (0.461-0.726)	0.708 (0.539-0.921)	0.798 (0.595-1.06)	0.895 (0.649-1.25)	1.01 (0.687-1.43)	1.18 (0.772-1.74)	1.33 (0.846-1.99)
12-hr	0.201 (0.161-0.244)	0.243 (0.194-0.295)	0.311 (0.247-0.379)	0.367 (0.290-0.451)	0.444 (0.340-0.575)	0.502 (0.377-0.665)	0.564 (0.412-0.781)	0.638 (0.436-0.898)	0.750 (0.492-1.10)	0.845 (0.540-1.26)
24-hr	0.118 (0.095-0.143)	0.145 (0.117-0.175)	0.188 (0.151-0.228)	0.224 (0.179-0.273)	0.273 (0.211-0.352)	0.310 (0.234-0.409)	0.349 (0.257-0.483)	0.398 (0.273-0.557)	0.473 (0.311-0.687)	0.538 (0.345-0.797)
2-day	0.066 (0.054-0.080)	0.083 (0.067-0.099)	0.109 (0.088-0.132)	0.131 (0.105-0.159)	0.162 (0.126-0.207)	0.184 (0.140-0.242)	0.208 (0.155-0.288)	0.240 (0.165-0.333)	0.289 (0.191-0.417)	0.333 (0.214-0.490)
3-day	0.048 (0.039-0.057)	0.060 (0.049-0.072)	0.080 (0.065-0.095)	0.096 (0.077-0.115)	0.118 (0.092-0.151)	0.134 (0.103-0.176)	0.152 (0.114-0.210)	0.175 (0.121-0.243)	0.213 (0.140-0.305)	0.245 (0.158-0.359)
4-day	0.039 (0.032-0.046)	0.048 (0.039-0.057)	0.064 (0.052-0.076)	0.077 (0.062-0.092)	0.094 (0.074-0.120)	0.107 (0.082-0.141)	0.122 (0.091-0.167)	0.140 (0.097-0.193)	0.170 (0.112-0.243)	0.195 (0.126-0.285)
7-day	0.026 (0.022-0.031)	0.032 (0.027-0.038)	0.042 (0.035-0.050)	0.050 (0.041-0.060)	0.062 (0.048-0.078)	0.070 (0.054-0.091)	0.079 (0.059-0.107)	0.090 (0.063-0.124)	0.108 (0.072-0.154)	0.124 (0.080-0.179)
10-day	0.021 (0.018-0.025)	0.026 (0.021-0.030)	0.033 (0.027-0.039)	0.039 (0.032-0.047)	0.047 (0.037-0.059)	0.053 (0.041-0.069)	0.060 (0.045-0.081)	0.068 (0.047-0.093)	0.081 (0.054-0.114)	0.091 (0.059-0.132)
20-day	0.015 (0.013-0.018)	0.018 (0.015-0.021)	0.022 (0.018-0.025)	0.025 (0.020-0.029)	0.029 (0.023-0.036)	0.033 (0.025-0.041)	0.036 (0.027-0.048)	0.040 (0.028-0.054)	0.046 (0.031-0.064)	0.051 (0.033-0.073)
30-day	0.013 (0.011-0.015)	0.014 (0.012-0.017)	0.017 (0.014-0.020)	0.019 (0.016-0.023)	0.022 (0.018-0.027)	0.025 (0.019-0.031)	0.027 (0.020-0.035)	0.030 (0.021-0.040)	0.033 (0.022-0.046)	0.036 (0.023-0.051)
45-day	0.011 (0.009-0.012)	0.012 (0.010-0.014)	0.014 (0.011-0.016)	0.015 (0.013-0.018)	0.017 (0.014-0.021)	0.019 (0.015-0.023)	0.020 (0.015-0.026)	0.022 (0.016-0.030)	0.024 (0.016-0.034)	0.026 (0.017-0.037)
60-day	0.009 (0.008-0.011)	0.010 (0.009-0.012)	0.012 (0.010-0.013)	0.013 (0.011-0.015)	0.014 (0.011-0.017)	0.016 (0.012-0.019)	0.017 (0.013-0.022)	0.018 (0.013-0.024)	0.019 (0.013-0.027)	0.020 (0.013-0.029)

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

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

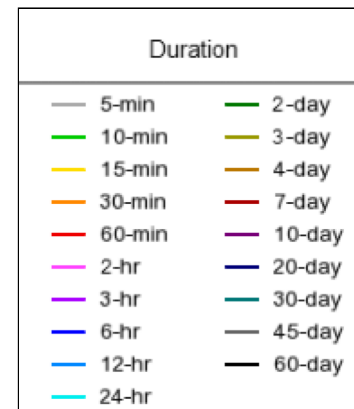
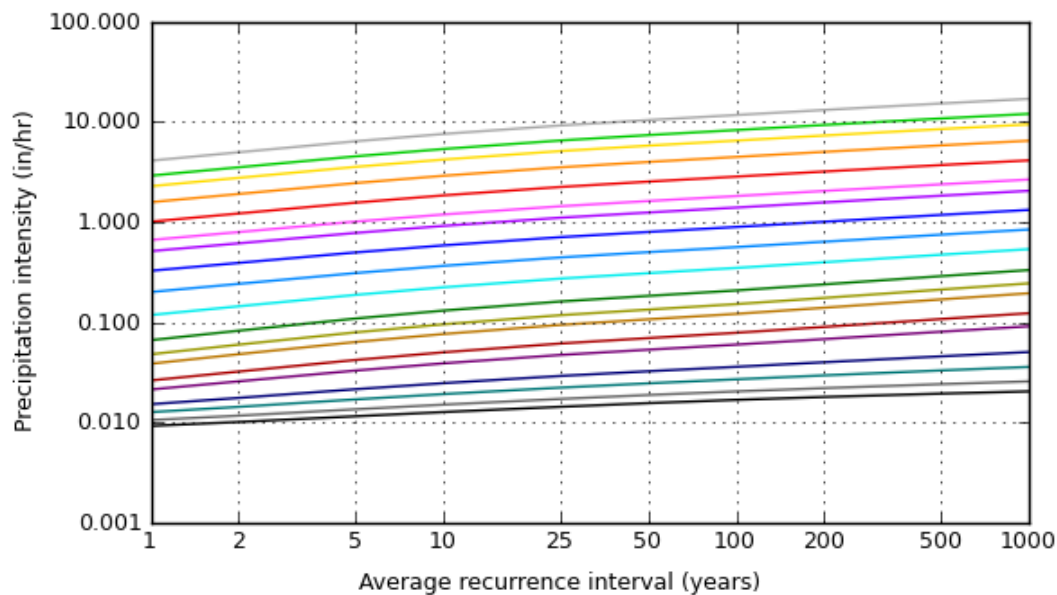
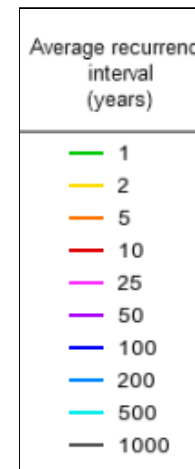
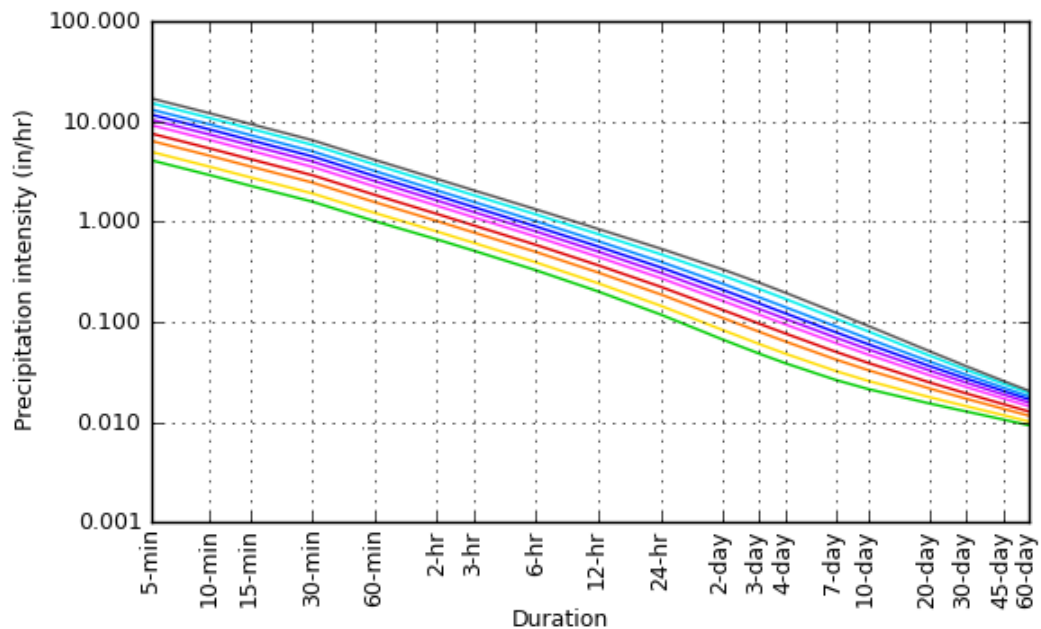
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PF graphical

PDS-based intensity-duration-frequency (IDF) curves

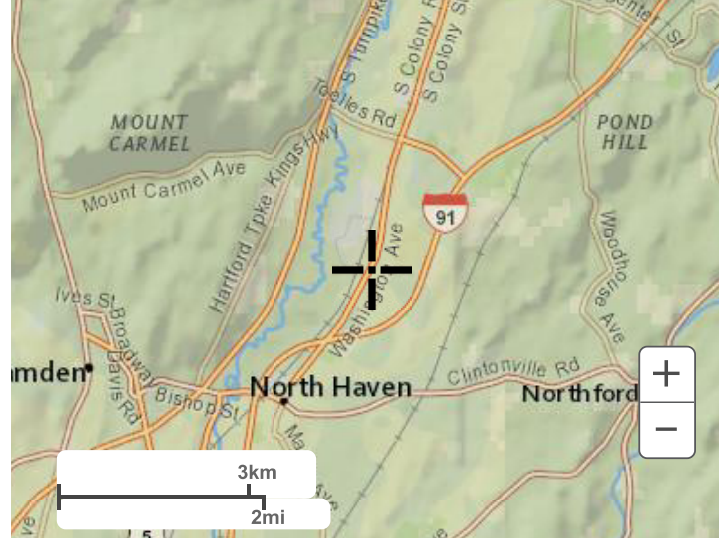
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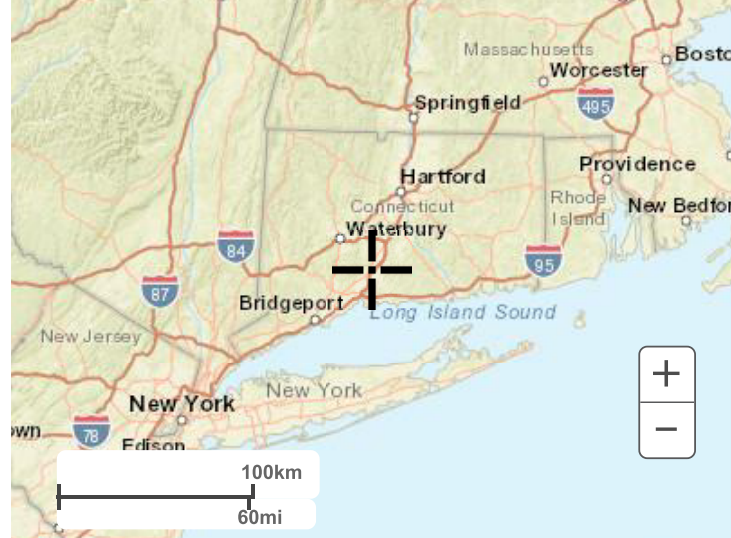
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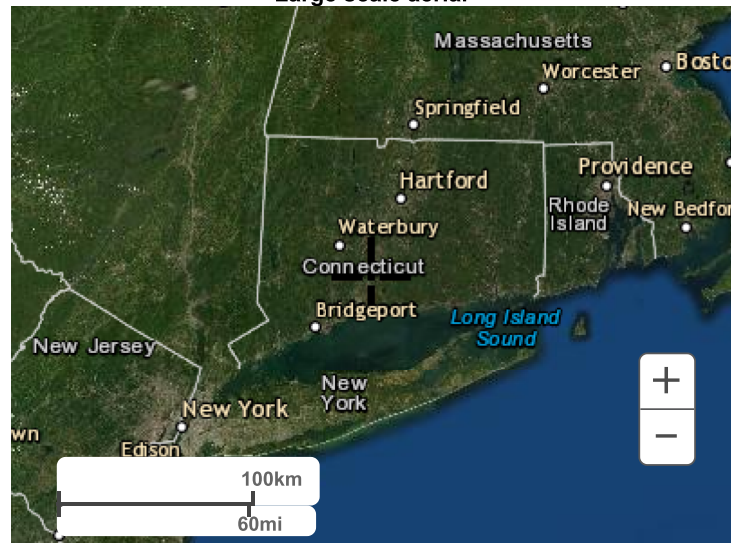
Large scale terrain



Large scale map



Large scale aerial



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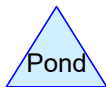
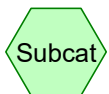
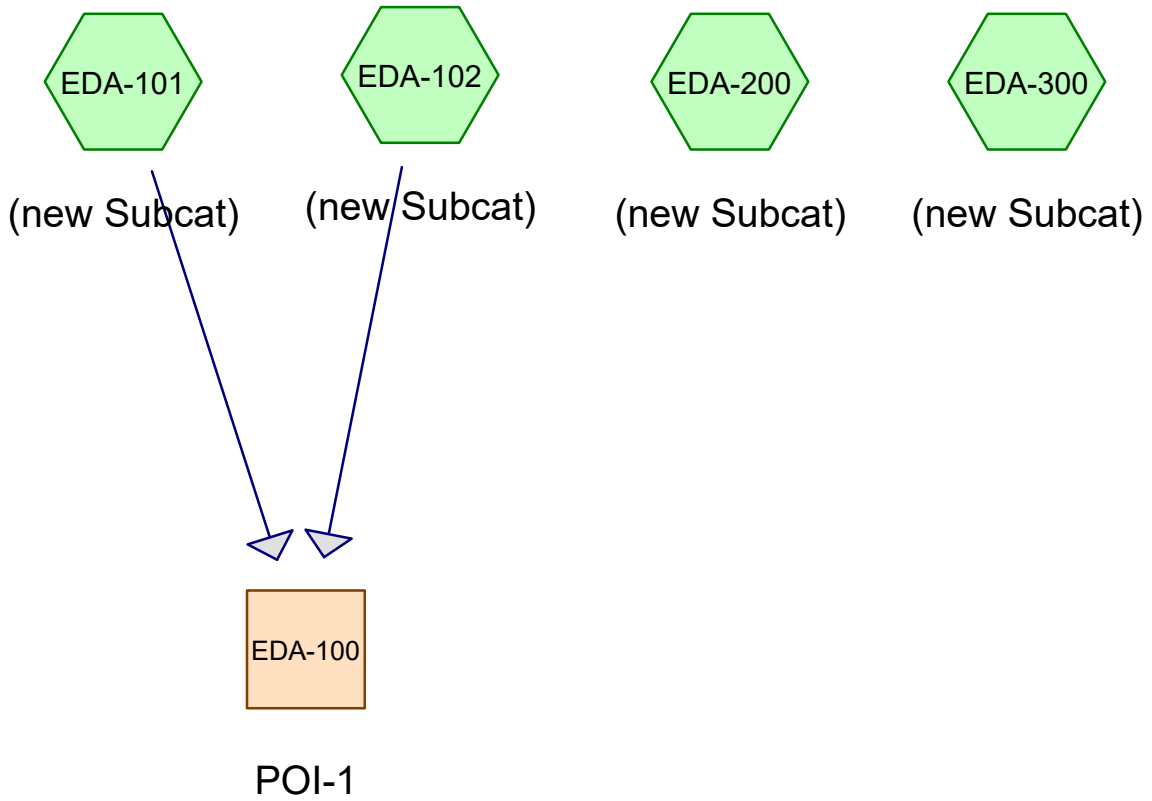
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APPENDIX B

HYDROLOGIC ANALYSIS

Pre-Development Hydrological Analysis (2-, 10-, 25- and 100-year storms)

Post-Development Hydrological Analyses (2-, 10-, 25- and 100-year storms)



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Area Listing (selected nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
49,548	49	50-75% Grass cover, Fair, HSG A (EDA-101, EDA-200, EDA-300)
9,645	84	50-75% Grass cover, Fair, HSG D (EDA-101, EDA-200)
173,140	98	Paved parking, HSG A (EDA-101, EDA-200)
72,896	36	Woods, Fair, HSG A (EDA-102, EDA-200, EDA-300)
459	79	Woods, Fair, HSG D (EDA-101)
305,688	75	TOTAL AREA

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Soil Listing (selected nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
295,584	HSG A	EDA-101, EDA-102, EDA-200, EDA-300
0	HSG B	
0	HSG C	
10,104	HSG D	EDA-101, EDA-200
0	Other	
305,688		TOTAL AREA

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Ground Covers (selected 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
49,548	0	0	9,645	0	59,193	50-75% Grass cover, Fair
173,140	0	0	0	0	173,140	Paved parking
72,896	0	0	459	0	73,355	Woods, Fair
295,584	0	0	10,104	0	305,688	TOTAL AREA

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Type II 24-hr 2-yr Rainfall=3.48"

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Time span=1.00-24.00 hrs, dt=0.05 hrs, 461 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentEDA-101: (new Subcat) Runoff Area=109,811 sf 70.92% Impervious Runoff Depth>2.08"
Tc=6.0 min CN=86 Runoff=8.92 cfs 19,019 cf

SubcatchmentEDA-102: (new Subcat) Runoff Area=19,085 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=155' Slope=0.0258 1/100 Tc=12.9 min CN=36 Runoff=0.00 cfs 0 cf

SubcatchmentEDA-200: (new Subcat) Runoff Area=146,453 sf 65.04% Impervious Runoff Depth>1.62"
Flow Length=174' Tc=8.0 min CN=80 Runoff=8.93 cfs 19,741 cf

SubcatchmentEDA-300: (new Subcat) Runoff Area=30,339 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=339' Tc=32.2 min CN=36 Runoff=0.00 cfs 0 cf

Reach EDA-100: POI-1 Inflow=8.92 cfs 19,019 cf
Outflow=8.92 cfs 19,019 cf

Total Runoff Area = 305,688 sf Runoff Volume = 38,760 cf Average Runoff Depth = 1.52"
43.36% Pervious = 132,548 sf 56.64% Impervious = 173,140 sf

C-DAT-2001236-HYDRO

Type II 24-hr 2-yr Rainfall=3.48"

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Summary for Subcatchment EDA-101: (new Subcat)

Runoff = 8.92 cfs @ 11.97 hrs, Volume= 19,019 cf, Depth> 2.08"

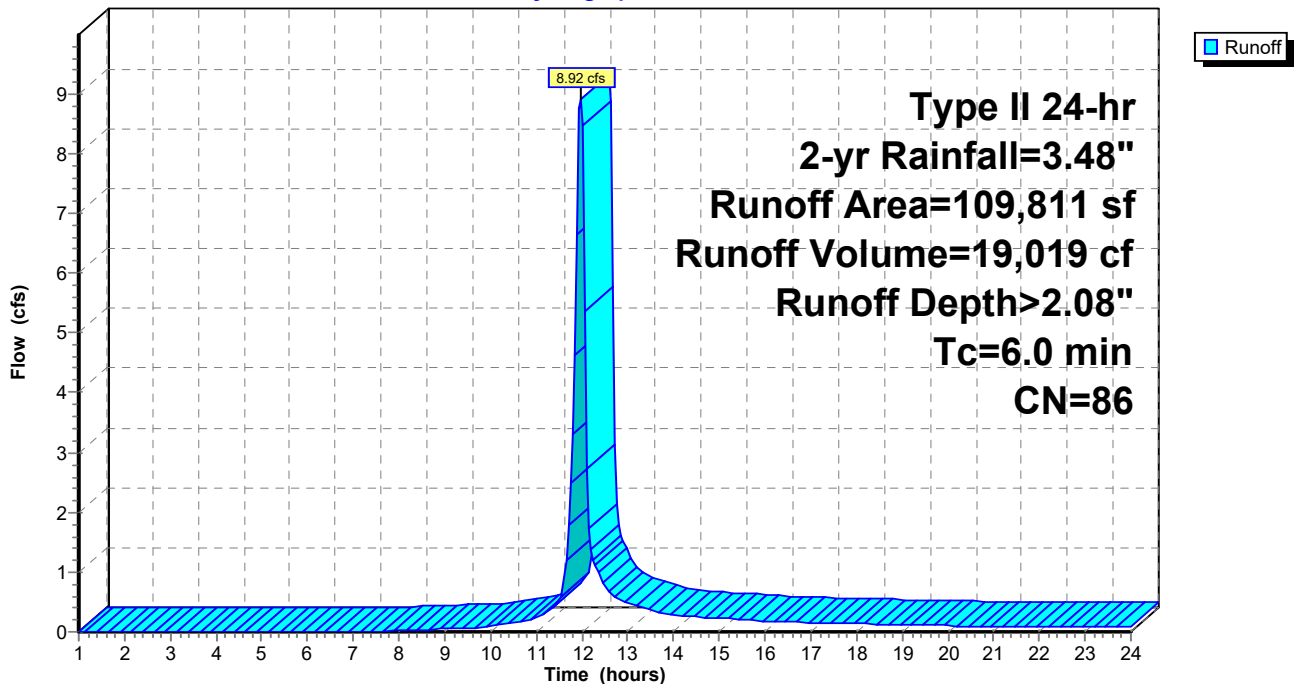
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.48"

Area (sf)	CN	Description
25,211	49	50-75% Grass cover, Fair, HSG A
6,258	84	50-75% Grass cover, Fair, HSG D
0	36	Woods, Fair, HSG A
459	79	Woods, Fair, HSG D
77,883	98	Paved parking, HSG A
109,811	86	Weighted Average
31,928		29.08% Pervious Area
77,883		70.92% Impervious Area

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

Subcatchment EDA-101: (new Subcat)

Hydrograph



C-DAT-2001236-HYDRO

Type II 24-hr 2-yr Rainfall=3.48"

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Summary for Subcatchment EDA-102: (new Subcat)

Runoff = 0.00 cfs @ 1.00 hrs, Volume= 0 cf, Depth= 0.00"

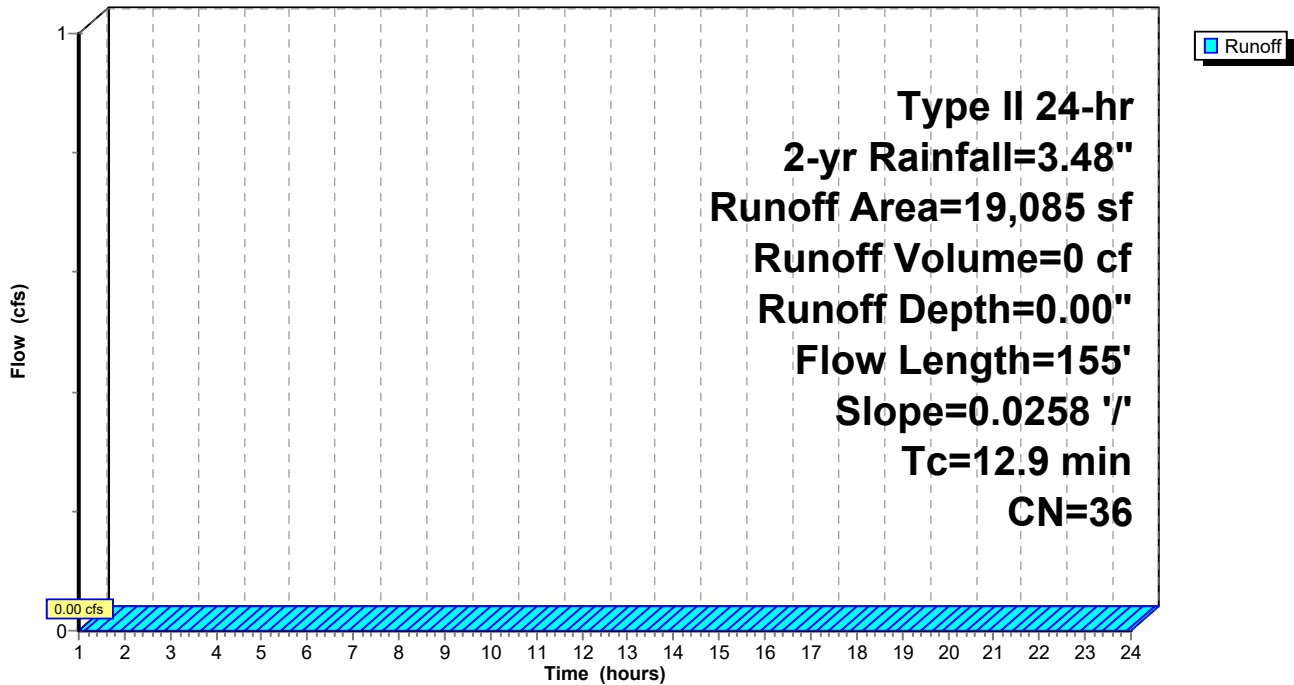
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.48"

Area (sf)	CN	Description
0	49	50-75% Grass cover, Fair, HSG A
0	84	50-75% Grass cover, Fair, HSG D
19,085	36	Woods, Fair, HSG A
0	79	Woods, Fair, HSG D
0	98	Paved parking, HSG A
19,085	36	Weighted Average
19,085		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.7	50	0.0258	0.08		Sheet Flow, sheet woods Woods: Light underbrush n= 0.400 P2= 3.48"
2.2	105	0.0258	0.80		Shallow Concentrated Flow, to pavement Woodland Kv= 5.0 fps
12.9	155	Total			

Subcatchment EDA-102: (new Subcat)

Hydrograph



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Type II 24-hr 2-yr Rainfall=3.48"

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Summary for Subcatchment EDA-200: (new Subcat)

Runoff = 8.93 cfs @ 12.00 hrs, Volume= 19,741 cf, Depth> 1.62"

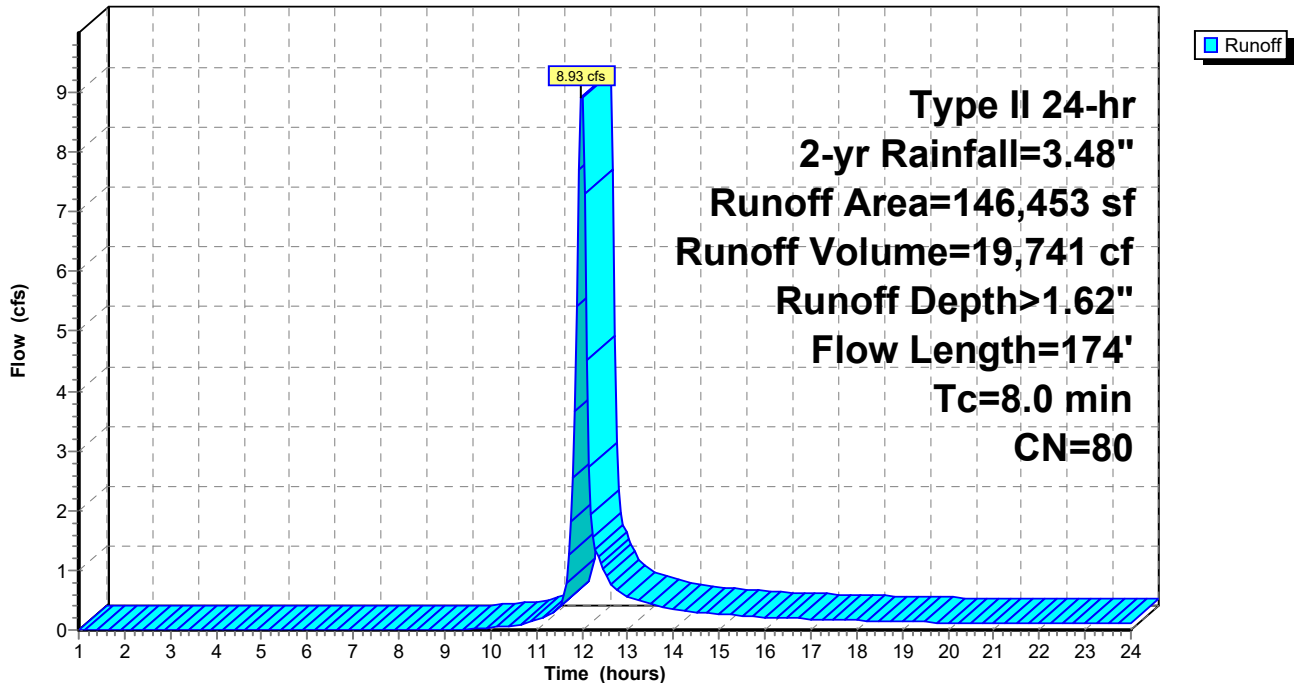
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.48"

Area (sf)	CN	Description
23,657	49	50-75% Grass cover, Fair, HSG A
3,387	84	50-75% Grass cover, Fair, HSG D
24,152	36	Woods, Fair, HSG A
0	79	Woods, Fair, HSG D
95,257	98	Paved parking, HSG A
146,453	80	Weighted Average
51,196		34.96% Pervious Area
95,257		65.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	41	0.0487	0.10		Sheet Flow, woods to pavement Woods: Light underbrush n= 0.400 P2= 3.48"
0.4	65	0.0153	2.51		Shallow Concentrated Flow, pavement Paved Kv= 20.3 fps
0.5	68	0.0129	2.31		Shallow Concentrated Flow, to cb Paved Kv= 20.3 fps
8.0	174	Total			

Subcatchment EDA-200: (new Subcat)

Hydrograph



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Type II 24-hr 2-yr Rainfall=3.48"

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Summary for Subcatchment EDA-300: (new Subcat)

Runoff = 0.00 cfs @ 1.00 hrs, Volume= 0 cf, Depth= 0.00"

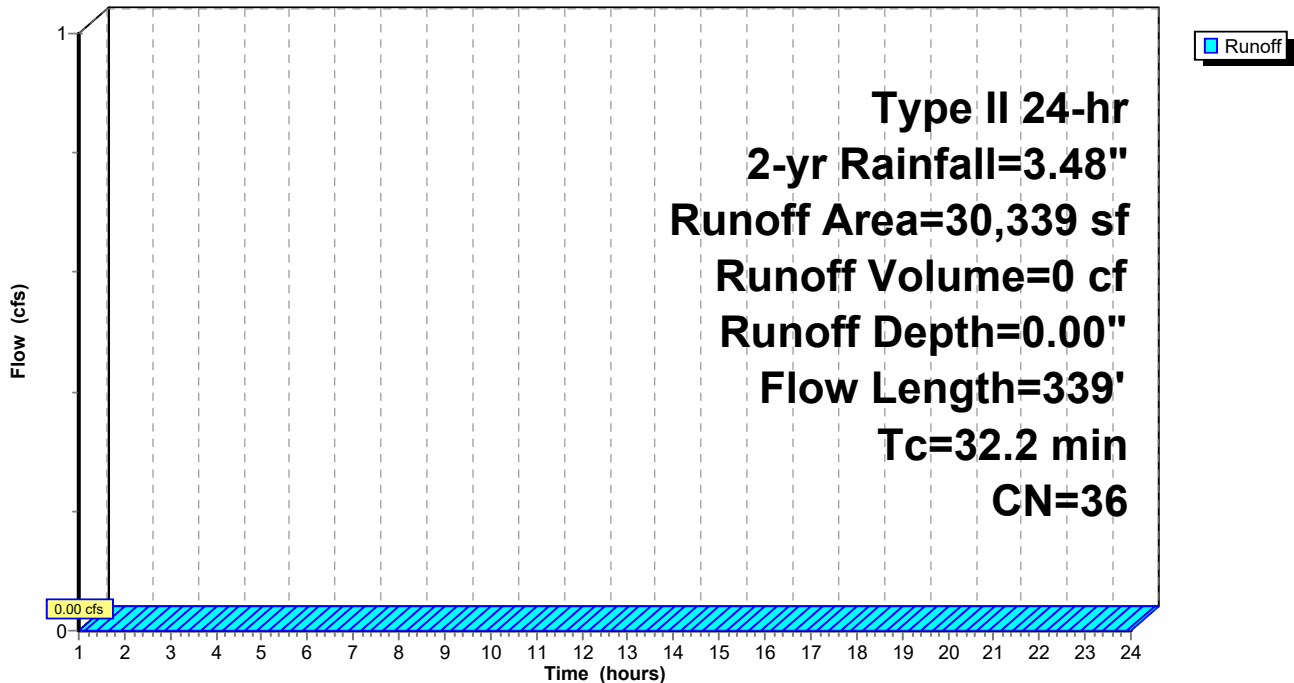
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.48"

Area (sf)	CN	Description
680	49	50-75% Grass cover, Fair, HSG A
0	84	50-75% Grass cover, Fair, HSG D
29,659	36	Woods, Fair, HSG A
0	79	Woods, Fair, HSG D
0	98	Paved parking, HSG A
30,339	36	Weighted Average
30,339		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.2	100	0.0100	0.06		Sheet Flow, woods Woods: Light underbrush n= 0.400 P2= 3.48"
5.0	239	0.0258	0.80		Shallow Concentrated Flow, woods Woodland Kv= 5.0 fps
32.2	339	Total			

Subcatchment EDA-300: (new Subcat)

Hydrograph



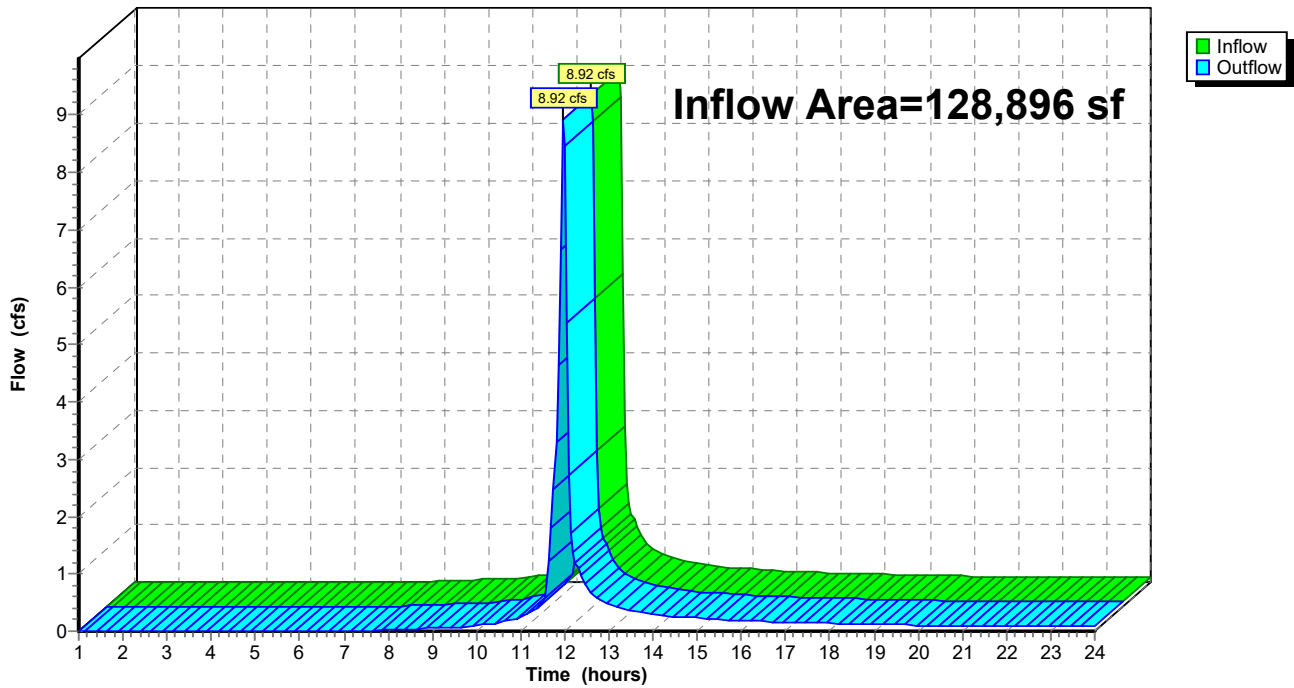
Summary for Reach EDA-100: POI-1

Inflow Area = 128,896 sf, 60.42% Impervious, Inflow Depth > 1.77" for 2-yr event
Inflow = 8.92 cfs @ 11.97 hrs, Volume= 19,019 cf
Outflow = 8.92 cfs @ 11.97 hrs, Volume= 19,019 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs

Reach EDA-100: POI-1

Hydrograph



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Type II 24-hr 10-yr Rainfall=5.38"

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Time span=1.00-24.00 hrs, dt=0.05 hrs, 461 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentEDA-101: (new Subcat) Runoff Area=109,811 sf 70.92% Impervious Runoff Depth>3.82"
Tc=6.0 min CN=86 Runoff=15.93 cfs 34,950 cf

SubcatchmentEDA-102: (new Subcat) Runoff Area=19,085 sf 0.00% Impervious Runoff Depth>0.17"
Flow Length=155' Slope=0.0258 '/' Tc=12.9 min CN=36 Runoff=0.01 cfs 267 cf

SubcatchmentEDA-200: (new Subcat) Runoff Area=146,453 sf 65.04% Impervious Runoff Depth>3.22"
Flow Length=174' Tc=8.0 min CN=80 Runoff=17.54 cfs 39,319 cf

SubcatchmentEDA-300: (new Subcat) Runoff Area=30,339 sf 0.00% Impervious Runoff Depth>0.16"
Flow Length=339' Tc=32.2 min CN=36 Runoff=0.01 cfs 417 cf

Reach EDA-100: POI-1 Inflow=15.93 cfs 35,217 cf
Outflow=15.93 cfs 35,217 cf

Total Runoff Area = 305,688 sf Runoff Volume = 74,953 cf Average Runoff Depth = 2.94"
43.36% Pervious = 132,548 sf 56.64% Impervious = 173,140 sf

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Type II 24-hr 10-yr Rainfall=5.38"

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Summary for Subcatchment EDA-101: (new Subcat)

Runoff = 15.93 cfs @ 11.97 hrs, Volume= 34,950 cf, Depth> 3.82"

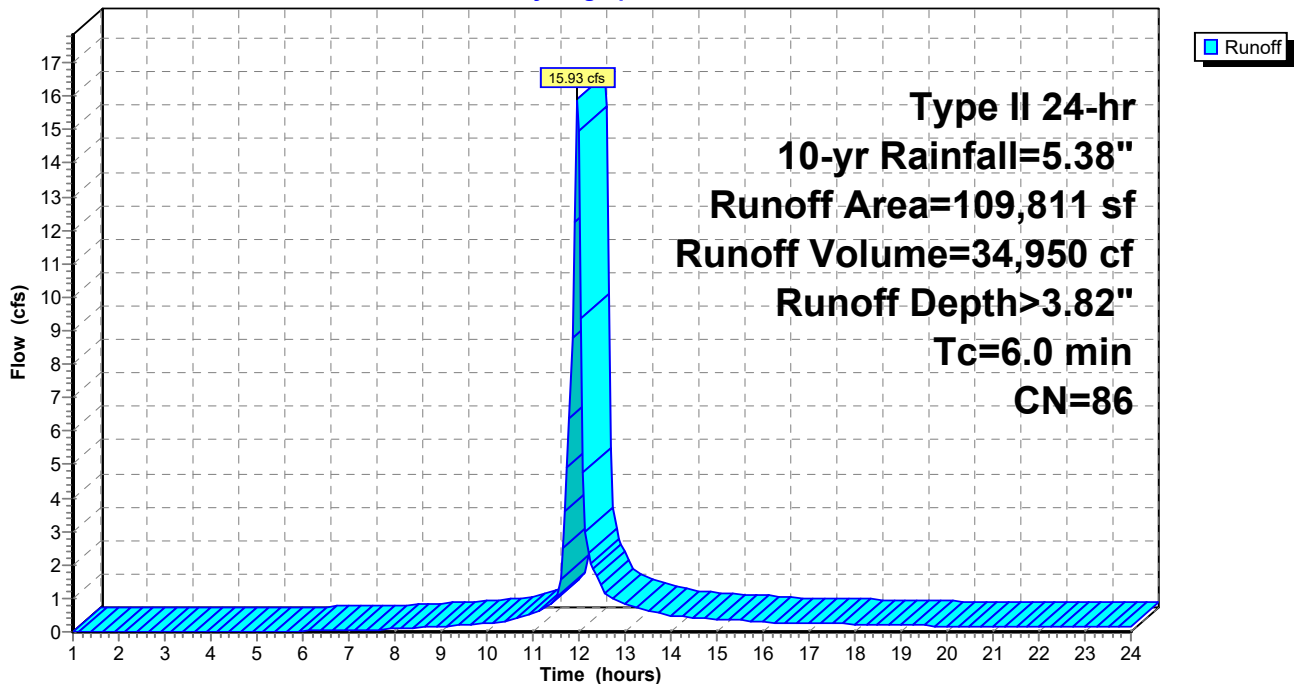
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=5.38"

Area (sf)	CN	Description
25,211	49	50-75% Grass cover, Fair, HSG A
6,258	84	50-75% Grass cover, Fair, HSG D
0	36	Woods, Fair, HSG A
459	79	Woods, Fair, HSG D
77,883	98	Paved parking, HSG A
109,811	86	Weighted Average
31,928		29.08% Pervious Area
77,883		70.92% Impervious Area

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

Subcatchment EDA-101: (new Subcat)

Hydrograph



Summary for Subcatchment EDA-102: (new Subcat)

Runoff = 0.01 cfs @ 12.97 hrs, Volume= 267 cf, Depth> 0.17"

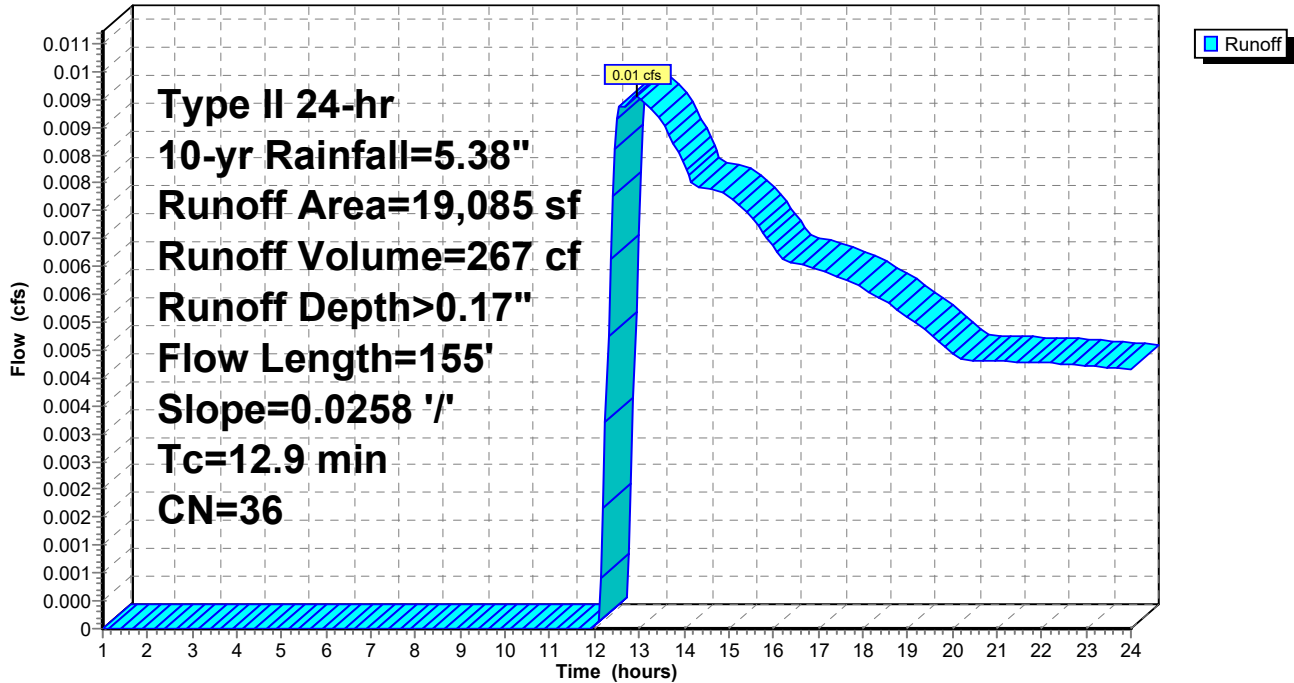
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
 Type II 24-hr 10-yr Rainfall=5.38"

Area (sf)	CN	Description
0	49	50-75% Grass cover, Fair, HSG A
0	84	50-75% Grass cover, Fair, HSG D
19,085	36	Woods, Fair, HSG A
0	79	Woods, Fair, HSG D
0	98	Paved parking, HSG A
19,085	36	Weighted Average
19,085		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.7	50	0.0258	0.08		Sheet Flow, sheet woods Woods: Light underbrush n= 0.400 P2= 3.48"
2.2	105	0.0258	0.80		Shallow Concentrated Flow, to pavement Woodland Kv= 5.0 fps
12.9	155	Total			

Subcatchment EDA-102: (new Subcat)

Hydrograph



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Type II 24-hr 10-yr Rainfall=5.38"

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Summary for Subcatchment EDA-200: (new Subcat)

Runoff = 17.54 cfs @ 11.99 hrs, Volume= 39,319 cf, Depth> 3.22"

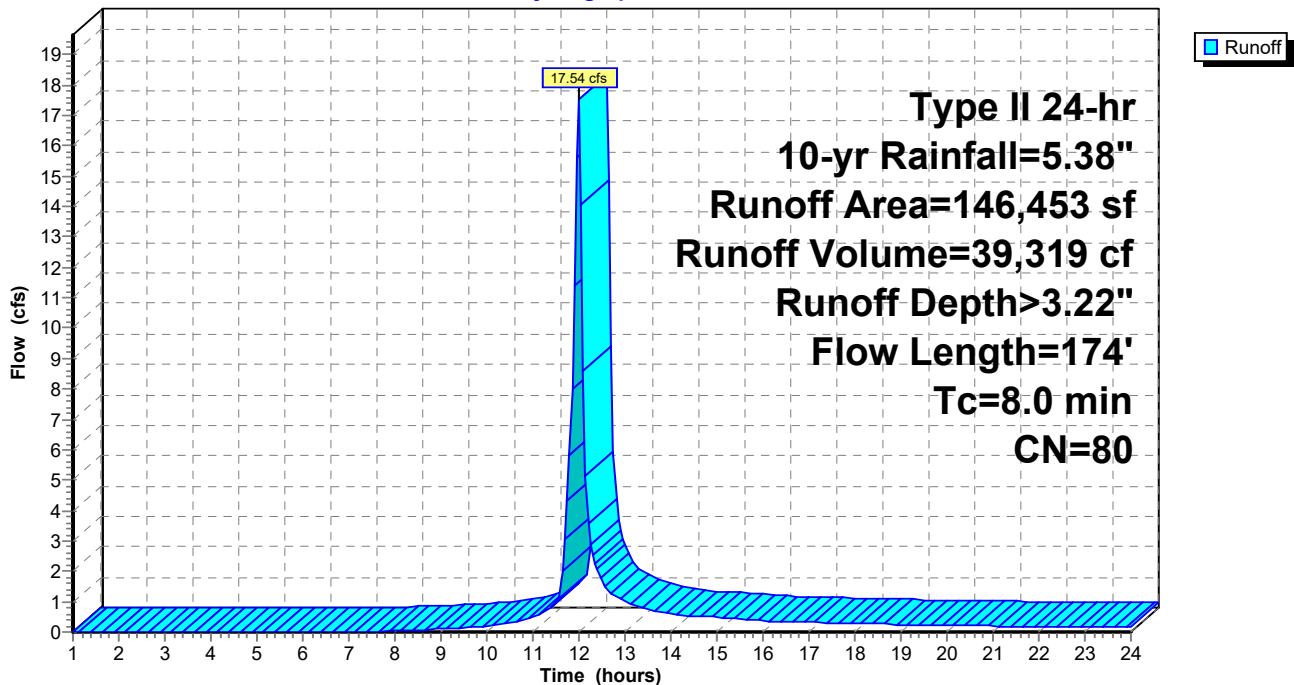
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=5.38"

Area (sf)	CN	Description
23,657	49	50-75% Grass cover, Fair, HSG A
3,387	84	50-75% Grass cover, Fair, HSG D
24,152	36	Woods, Fair, HSG A
0	79	Woods, Fair, HSG D
95,257	98	Paved parking, HSG A
146,453	80	Weighted Average
51,196		34.96% Pervious Area
95,257		65.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	41	0.0487	0.10		Sheet Flow, woods to pavement Woods: Light underbrush n= 0.400 P2= 3.48"
0.4	65	0.0153	2.51		Shallow Concentrated Flow, pavement Paved Kv= 20.3 fps
0.5	68	0.0129	2.31		Shallow Concentrated Flow, to cb Paved Kv= 20.3 fps
8.0	174	Total			

Subcatchment EDA-200: (new Subcat)

Hydrograph



Summary for Subcatchment EDA-300: (new Subcat)

Runoff = 0.01 cfs @ 13.37 hrs, Volume= 417 cf, Depth> 0.16"

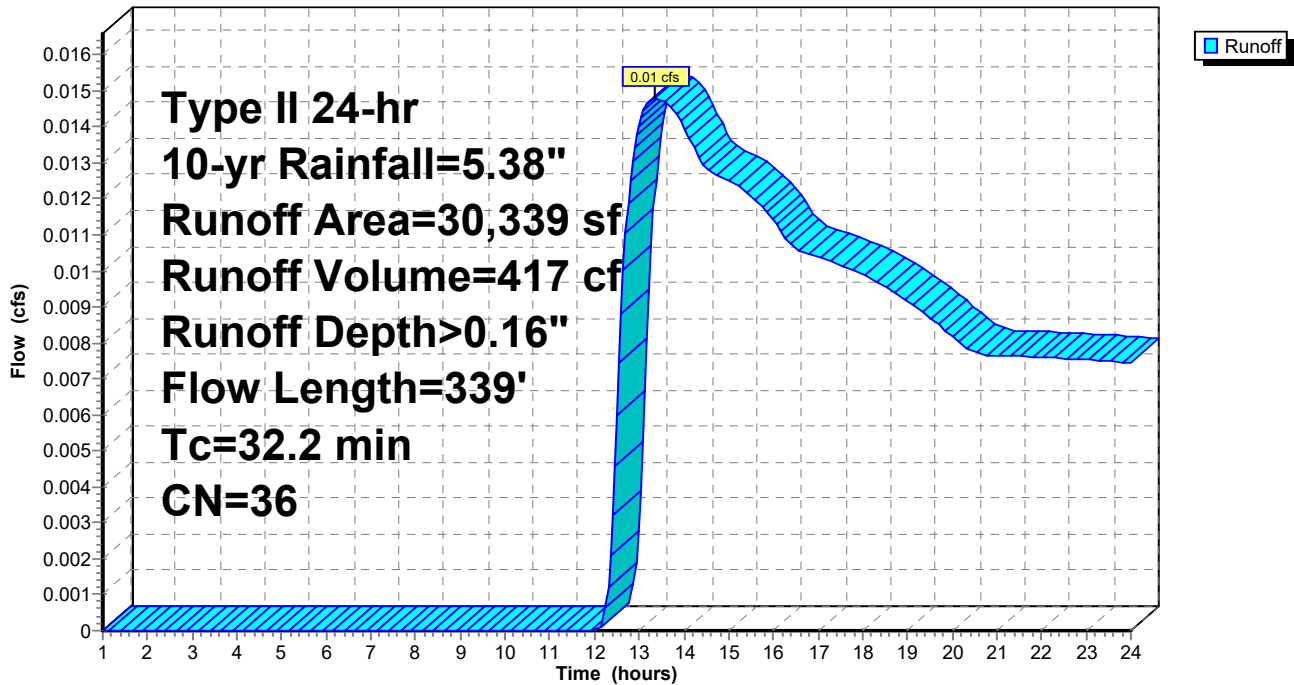
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=5.38"

Area (sf)	CN	Description
680	49	50-75% Grass cover, Fair, HSG A
0	84	50-75% Grass cover, Fair, HSG D
29,659	36	Woods, Fair, HSG A
0	79	Woods, Fair, HSG D
0	98	Paved parking, HSG A
30,339	36	Weighted Average
30,339		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.2	100	0.0100	0.06		Sheet Flow, woods Woods: Light underbrush n= 0.400 P2= 3.48"
5.0	239	0.0258	0.80		Shallow Concentrated Flow, woods Woodland Kv= 5.0 fps
32.2	339	Total			

Subcatchment EDA-300: (new Subcat)

Hydrograph



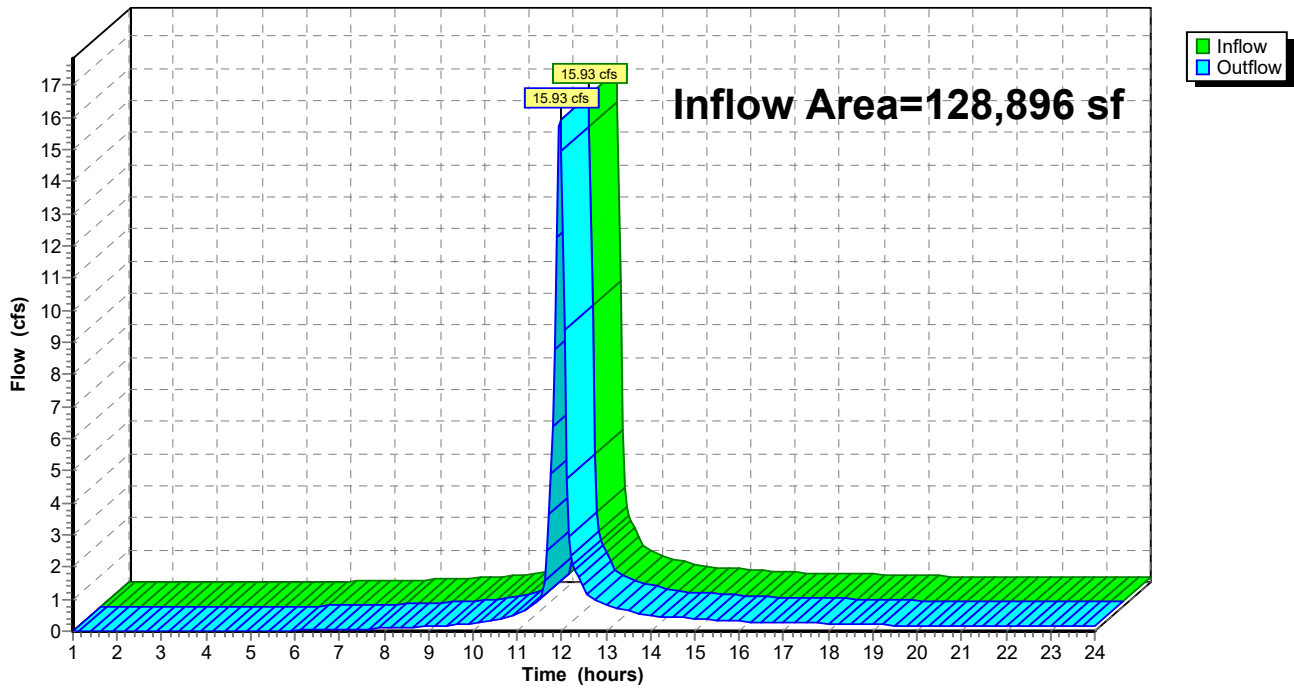
Summary for Reach EDA-100: POI-1

Inflow Area = 128,896 sf, 60.42% Impervious, Inflow Depth > 3.28" for 10-yr event
Inflow = 15.93 cfs @ 11.97 hrs, Volume= 35,217 cf
Outflow = 15.93 cfs @ 11.97 hrs, Volume= 35,217 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs

Reach EDA-100: POI-1

Hydrograph



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Type II 24-hr 25-yr Rainfall=6.56"

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Time span=1.00-24.00 hrs, dt=0.05 hrs, 461 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentEDA-101: (new Subcat) Runoff Area=109,811 sf 70.92% Impervious Runoff Depth>4.94"
Tc=6.0 min CN=86 Runoff=20.30 cfs 45,195 cf

SubcatchmentEDA-102: (new Subcat) Runoff Area=19,085 sf 0.00% Impervious Runoff Depth>0.43"
Flow Length=155' Slope=0.0258 '/' Tc=12.9 min CN=36 Runoff=0.08 cfs 685 cf

SubcatchmentEDA-200: (new Subcat) Runoff Area=146,453 sf 65.04% Impervious Runoff Depth>4.28"
Flow Length=174' Tc=8.0 min CN=80 Runoff=23.06 cfs 52,279 cf

SubcatchmentEDA-300: (new Subcat) Runoff Area=30,339 sf 0.00% Impervious Runoff Depth>0.43"
Flow Length=339' Tc=32.2 min CN=36 Runoff=0.08 cfs 1,075 cf

Reach EDA-100: POI-1 Inflow=20.30 cfs 45,881 cf
Outflow=20.30 cfs 45,881 cf

Total Runoff Area = 305,688 sf Runoff Volume = 99,234 cf Average Runoff Depth = 3.90"
43.36% Pervious = 132,548 sf 56.64% Impervious = 173,140 sf

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Type II 24-hr 25-yr Rainfall=6.56"

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Summary for Subcatchment EDA-101: (new Subcat)

Runoff = 20.30 cfs @ 11.96 hrs, Volume= 45,195 cf, Depth> 4.94"

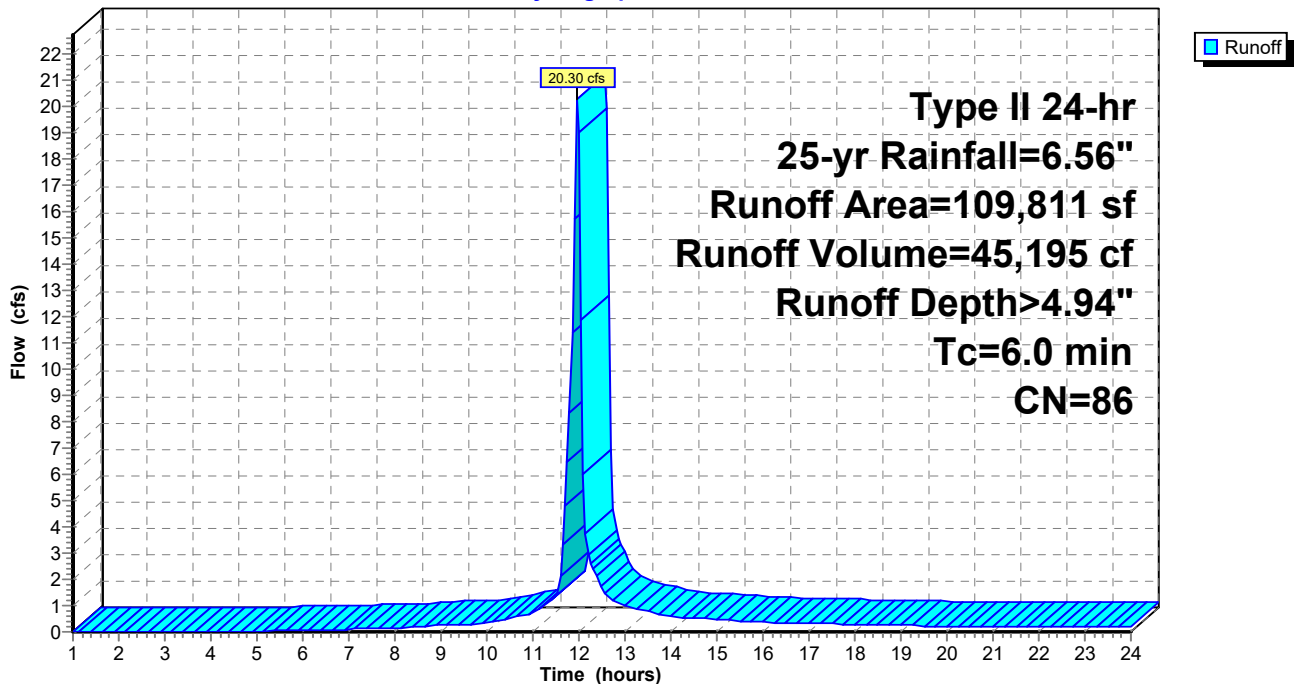
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=6.56"

Area (sf)	CN	Description
25,211	49	50-75% Grass cover, Fair, HSG A
6,258	84	50-75% Grass cover, Fair, HSG D
0	36	Woods, Fair, HSG A
459	79	Woods, Fair, HSG D
77,883	98	Paved parking, HSG A
109,811	86	Weighted Average
31,928		29.08% Pervious Area
77,883		70.92% Impervious Area

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

Subcatchment EDA-101: (new Subcat)

Hydrograph



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Type II 24-hr 25-yr Rainfall=6.56"

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Summary for Subcatchment EDA-102: (new Subcat)

Runoff = 0.08 cfs @ 12.13 hrs, Volume= 685 cf, Depth> 0.43"

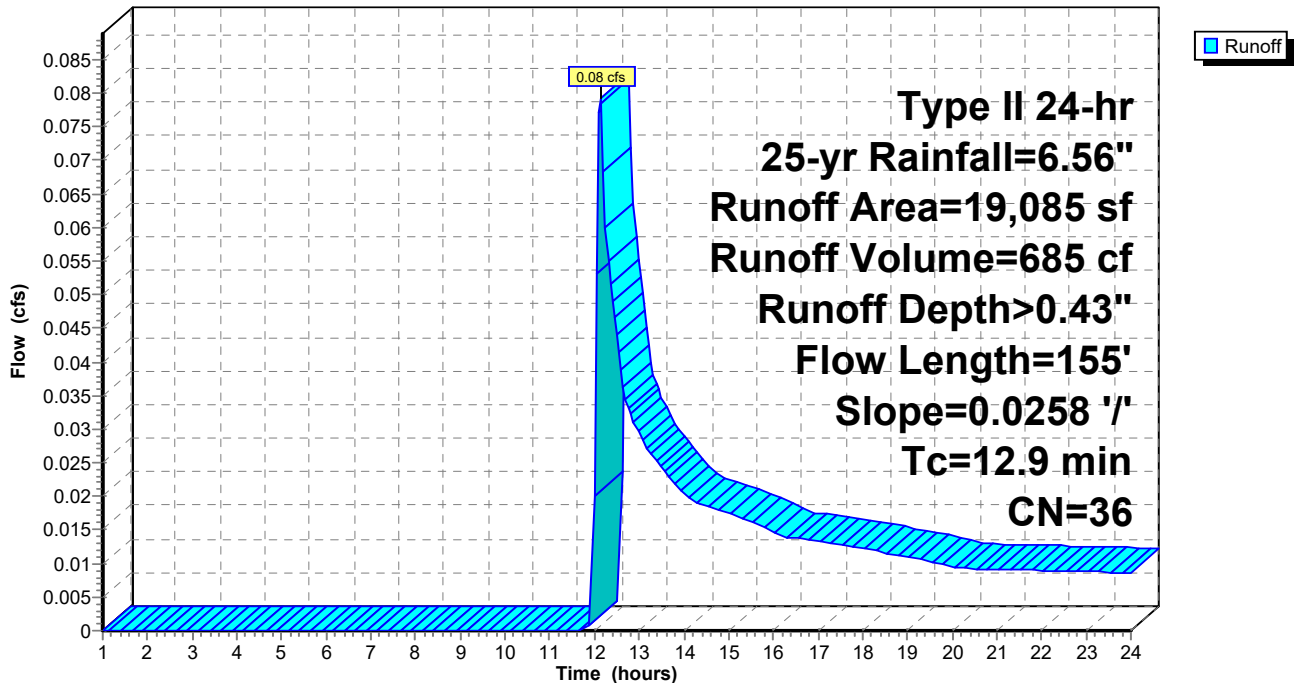
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=6.56"

Area (sf)	CN	Description
0	49	50-75% Grass cover, Fair, HSG A
0	84	50-75% Grass cover, Fair, HSG D
19,085	36	Woods, Fair, HSG A
0	79	Woods, Fair, HSG D
0	98	Paved parking, HSG A
19,085	36	Weighted Average
19,085		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.7	50	0.0258	0.08		Sheet Flow, sheet woods Woods: Light underbrush n= 0.400 P2= 3.48"
2.2	105	0.0258	0.80		Shallow Concentrated Flow, to pavement Woodland Kv= 5.0 fps
12.9	155	Total			

Subcatchment EDA-102: (new Subcat)

Hydrograph



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Type II 24-hr 25-yr Rainfall=6.56"

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Summary for Subcatchment EDA-200: (new Subcat)

Runoff = 23.06 cfs @ 11.99 hrs, Volume= 52,279 cf, Depth> 4.28"

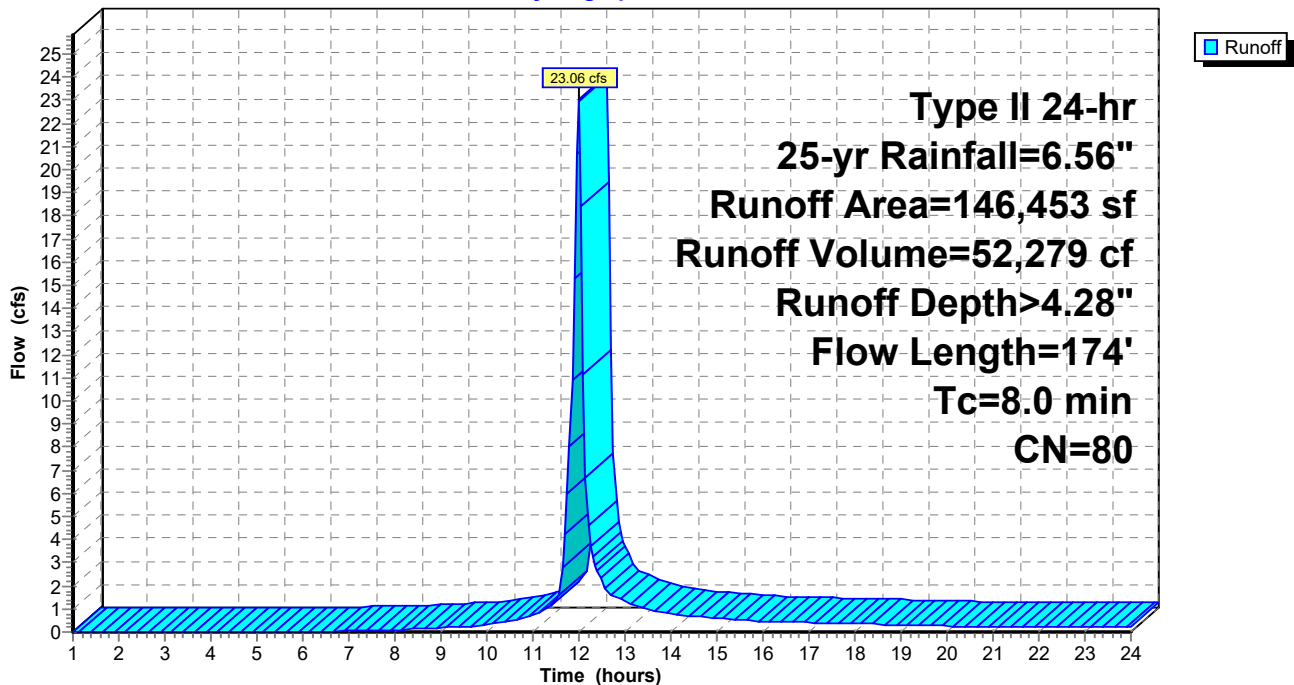
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=6.56"

Area (sf)	CN	Description
23,657	49	50-75% Grass cover, Fair, HSG A
3,387	84	50-75% Grass cover, Fair, HSG D
24,152	36	Woods, Fair, HSG A
0	79	Woods, Fair, HSG D
95,257	98	Paved parking, HSG A
146,453	80	Weighted Average
51,196		34.96% Pervious Area
95,257		65.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	41	0.0487	0.10		Sheet Flow, woods to pavement Woods: Light underbrush n= 0.400 P2= 3.48"
0.4	65	0.0153	2.51		Shallow Concentrated Flow, pavement Paved Kv= 20.3 fps
0.5	68	0.0129	2.31		Shallow Concentrated Flow, to cb Paved Kv= 20.3 fps
8.0	174	Total			

Subcatchment EDA-200: (new Subcat)

Hydrograph



C-DAT-2001236-HYDRO

Type II 24-hr 25-yr Rainfall=6.56"

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Summary for Subcatchment EDA-300: (new Subcat)

Runoff = 0.08 cfs @ 12.49 hrs, Volume= 1,075 cf, Depth> 0.43"

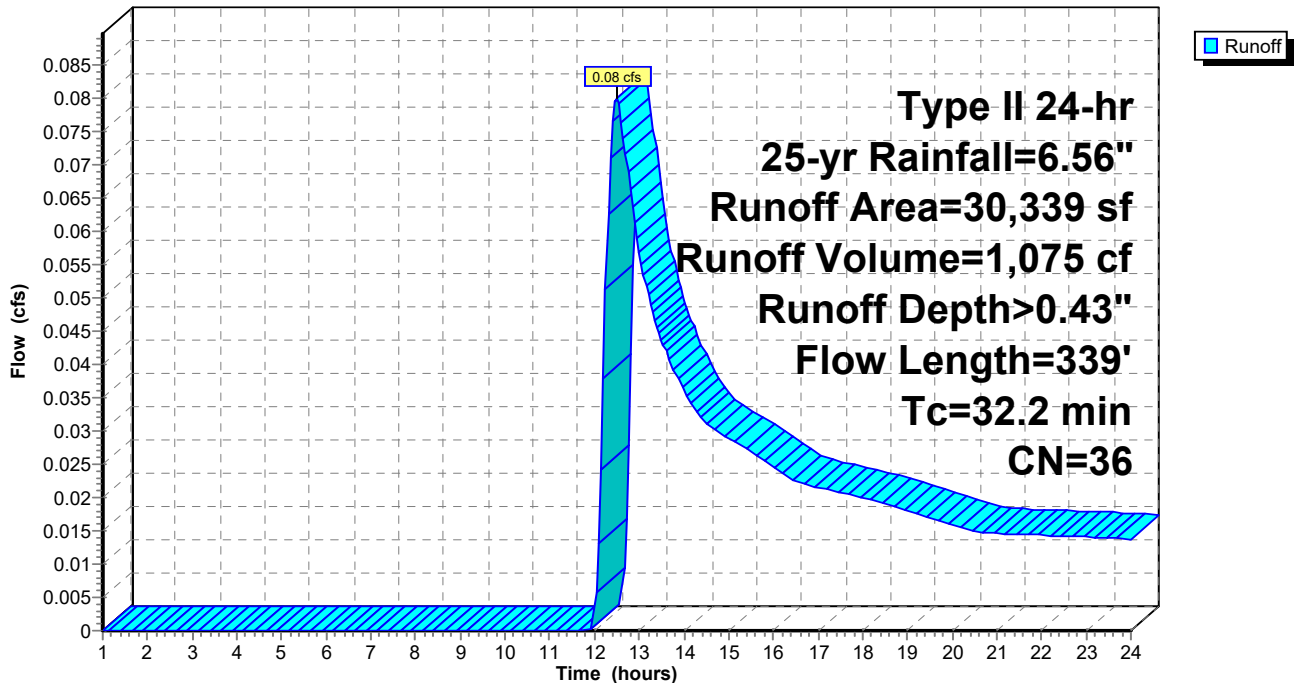
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=6.56"

Area (sf)	CN	Description
680	49	50-75% Grass cover, Fair, HSG A
0	84	50-75% Grass cover, Fair, HSG D
29,659	36	Woods, Fair, HSG A
0	79	Woods, Fair, HSG D
0	98	Paved parking, HSG A
30,339	36	Weighted Average
30,339		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.2	100	0.0100	0.06		Sheet Flow, woods Woods: Light underbrush n= 0.400 P2= 3.48"
5.0	239	0.0258	0.80		Shallow Concentrated Flow, woods Woodland Kv= 5.0 fps
32.2	339	Total			

Subcatchment EDA-300: (new Subcat)

Hydrograph



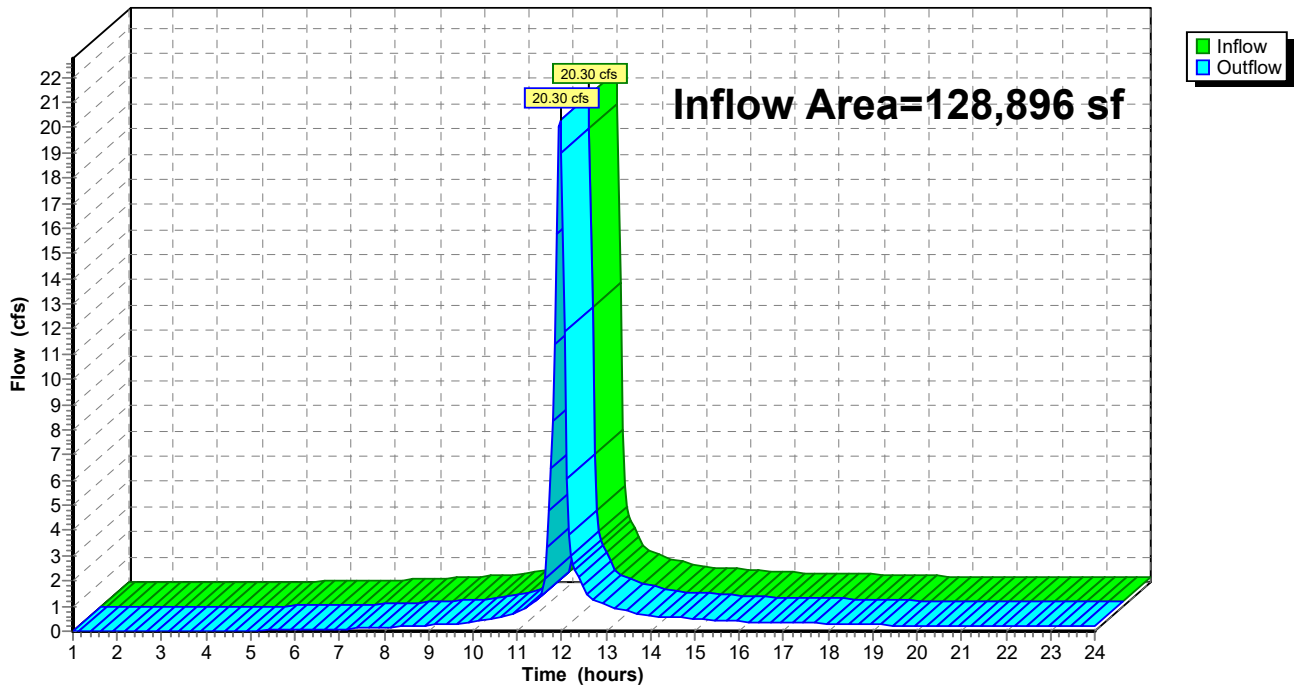
Summary for Reach EDA-100: POI-1

Inflow Area = 128,896 sf, 60.42% Impervious, Inflow Depth > 4.27" for 25-yr event
Inflow = 20.30 cfs @ 11.97 hrs, Volume= 45,881 cf
Outflow = 20.30 cfs @ 11.97 hrs, Volume= 45,881 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs

Reach EDA-100: POI-1

Hydrograph



C-DAT-2001236-HYDRO

Type II 24-hr 100-yr Rainfall=8.39"

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Summary for Subcatchment EDA-101: (new Subcat)

Runoff = 27.02 cfs @ 11.96 hrs, Volume= 61,346 cf, Depth> 6.70"

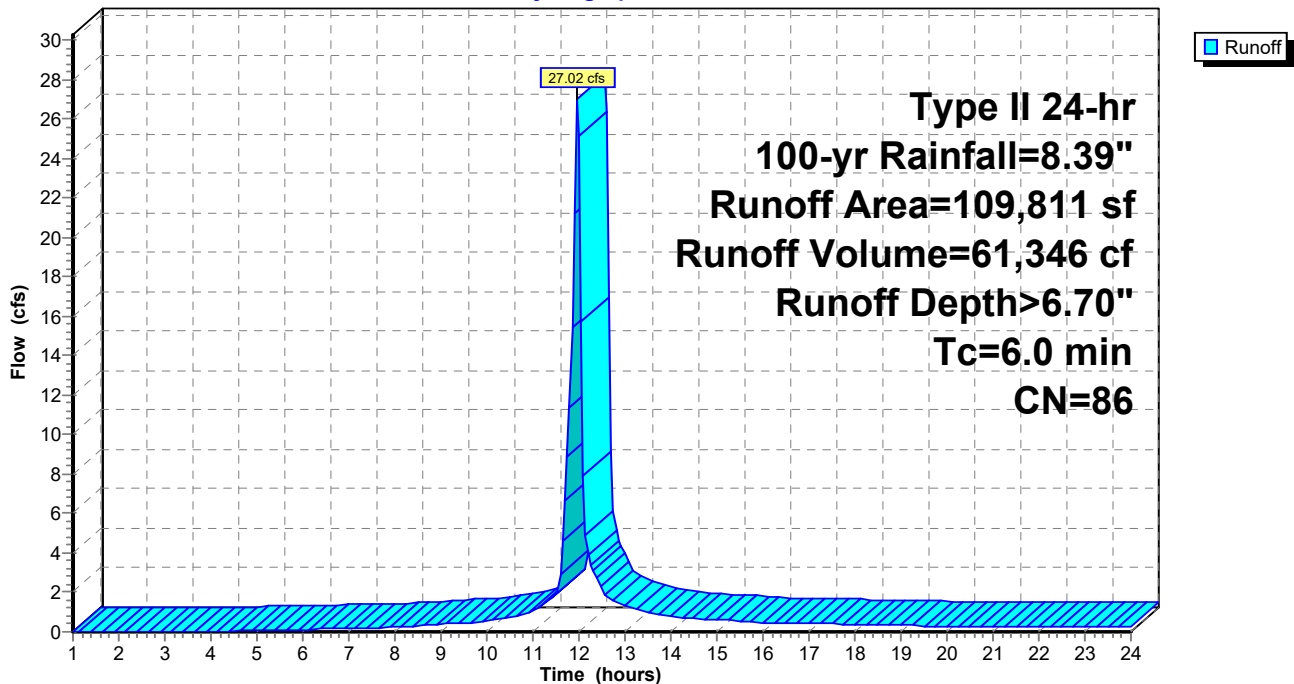
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=8.39"

Area (sf)	CN	Description
25,211	49	50-75% Grass cover, Fair, HSG A
6,258	84	50-75% Grass cover, Fair, HSG D
0	36	Woods, Fair, HSG A
459	79	Woods, Fair, HSG D
77,883	98	Paved parking, HSG A
109,811	86	Weighted Average
31,928		29.08% Pervious Area
77,883		70.92% Impervious Area

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

Subcatchment EDA-101: (new Subcat)

Hydrograph



C-DAT-2001236-HYDRO

Type II 24-hr 100-yr Rainfall=8.39"

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Summary for Subcatchment EDA-102: (new Subcat)

Runoff = 0.40 cfs @ 12.09 hrs, Volume= 1,634 cf, Depth> 1.03"

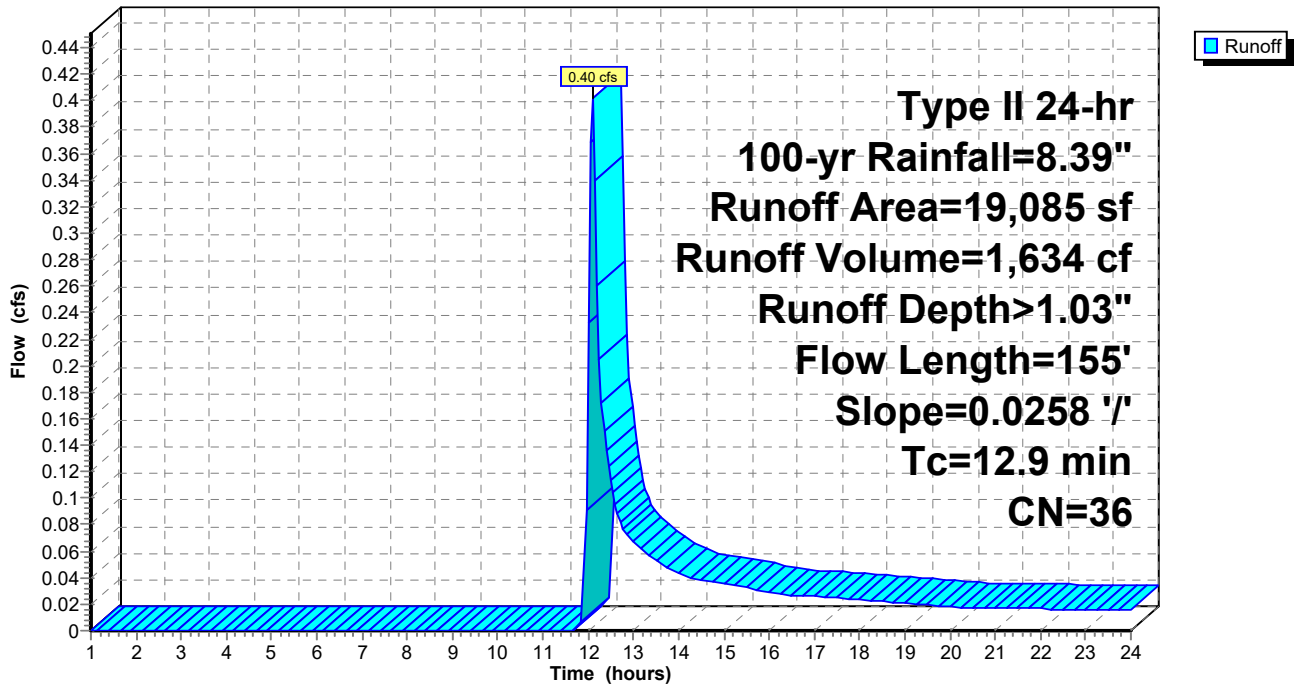
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=8.39"

Area (sf)	CN	Description
0	49	50-75% Grass cover, Fair, HSG A
0	84	50-75% Grass cover, Fair, HSG D
19,085	36	Woods, Fair, HSG A
0	79	Woods, Fair, HSG D
0	98	Paved parking, HSG A
19,085	36	Weighted Average
19,085		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.7	50	0.0258	0.08		Sheet Flow, sheet woods Woods: Light underbrush n= 0.400 P2= 3.48"
2.2	105	0.0258	0.80		Shallow Concentrated Flow, to pavement Woodland Kv= 5.0 fps
12.9	155	Total			

Subcatchment EDA-102: (new Subcat)

Hydrograph



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Type II 24-hr 100-yr Rainfall=8.39"

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Summary for Subcatchment EDA-200: (new Subcat)

Runoff = 31.67 cfs @ 11.99 hrs, Volume= 73,018 cf, Depth> 5.98"

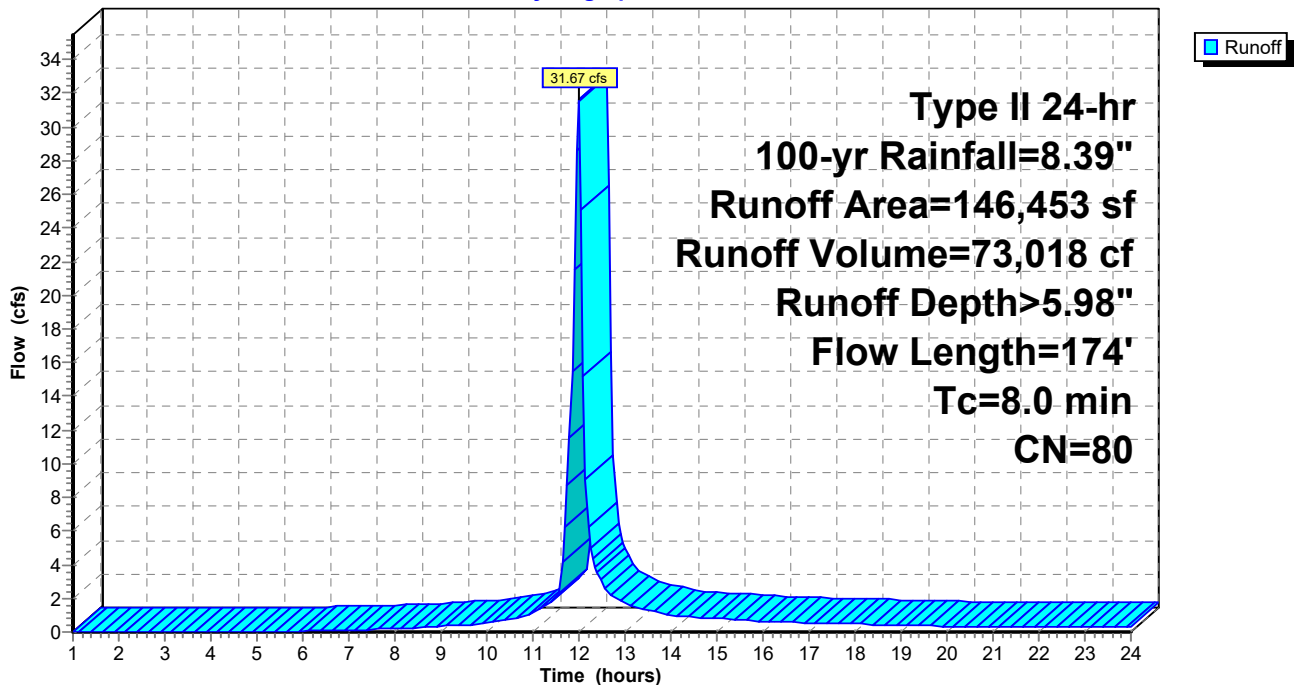
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=8.39"

Area (sf)	CN	Description
23,657	49	50-75% Grass cover, Fair, HSG A
3,387	84	50-75% Grass cover, Fair, HSG D
24,152	36	Woods, Fair, HSG A
0	79	Woods, Fair, HSG D
95,257	98	Paved parking, HSG A
146,453	80	Weighted Average
51,196		34.96% Pervious Area
95,257		65.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	41	0.0487	0.10		Sheet Flow, woods to pavement Woods: Light underbrush n= 0.400 P2= 3.48"
0.4	65	0.0153	2.51		Shallow Concentrated Flow, pavement Paved Kv= 20.3 fps
0.5	68	0.0129	2.31		Shallow Concentrated Flow, to cb Paved Kv= 20.3 fps
8.0	174	Total			

Subcatchment EDA-200: (new Subcat)

Hydrograph



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Type II 24-hr 100-yr Rainfall=8.39"

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Summary for Subcatchment EDA-300: (new Subcat)

Runoff = 0.35 cfs @ 12.37 hrs, Volume= 2,571 cf, Depth> 1.02"

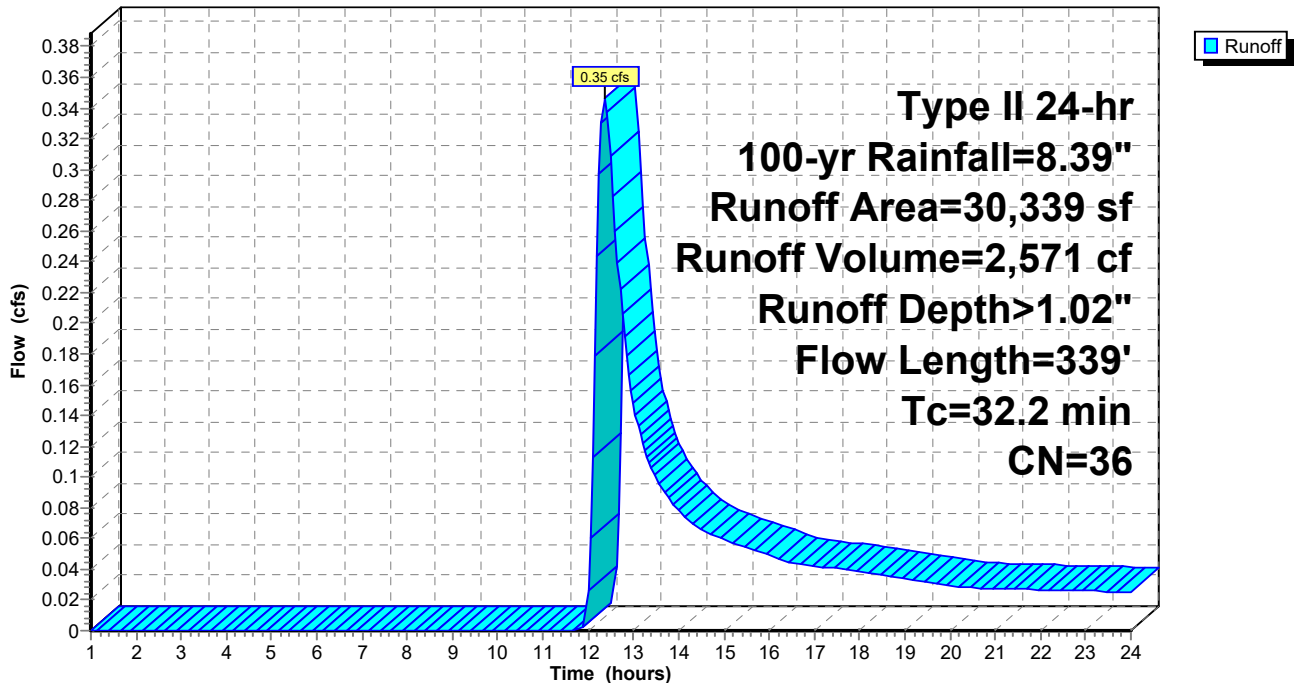
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=8.39"

Area (sf)	CN	Description
680	49	50-75% Grass cover, Fair, HSG A
0	84	50-75% Grass cover, Fair, HSG D
29,659	36	Woods, Fair, HSG A
0	79	Woods, Fair, HSG D
0	98	Paved parking, HSG A
30,339	36	Weighted Average
30,339		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.2	100	0.0100	0.06		Sheet Flow, woods Woods: Light underbrush n= 0.400 P2= 3.48"
5.0	239	0.0258	0.80		Shallow Concentrated Flow, woods Woodland Kv= 5.0 fps
32.2	339	Total			

Subcatchment EDA-300: (new Subcat)

Hydrograph



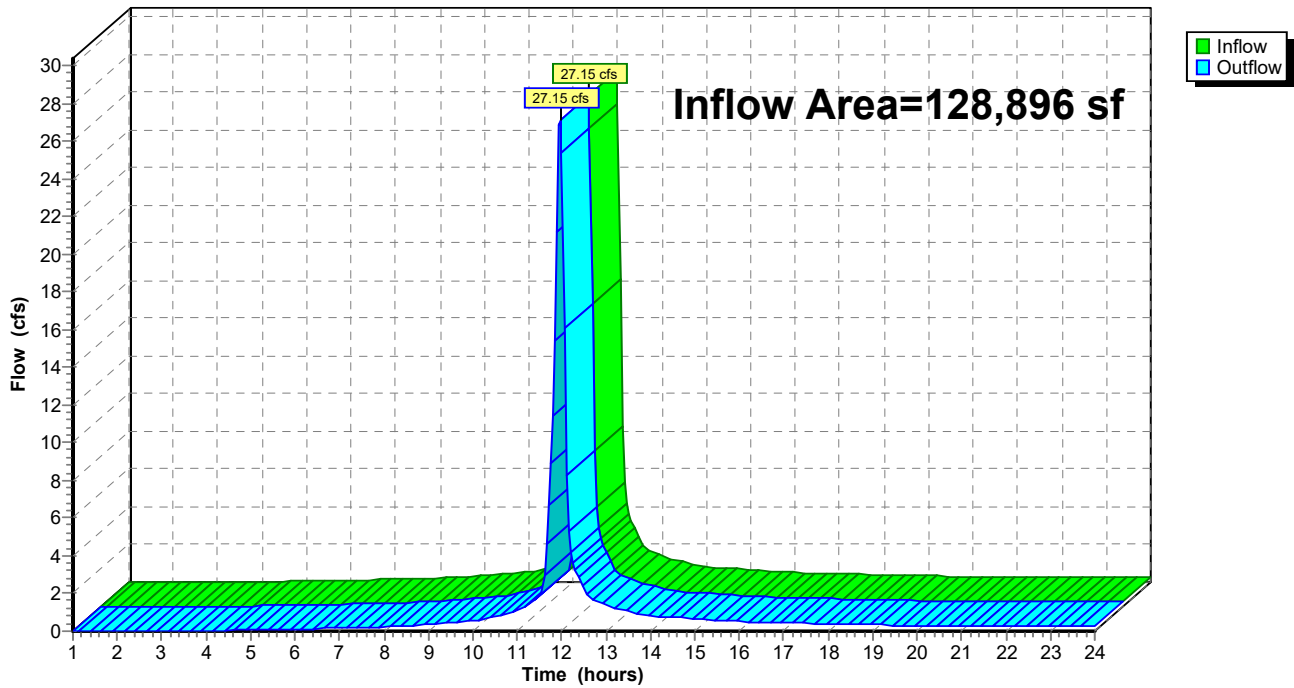
Summary for Reach EDA-100: POI-1

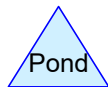
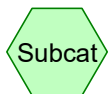
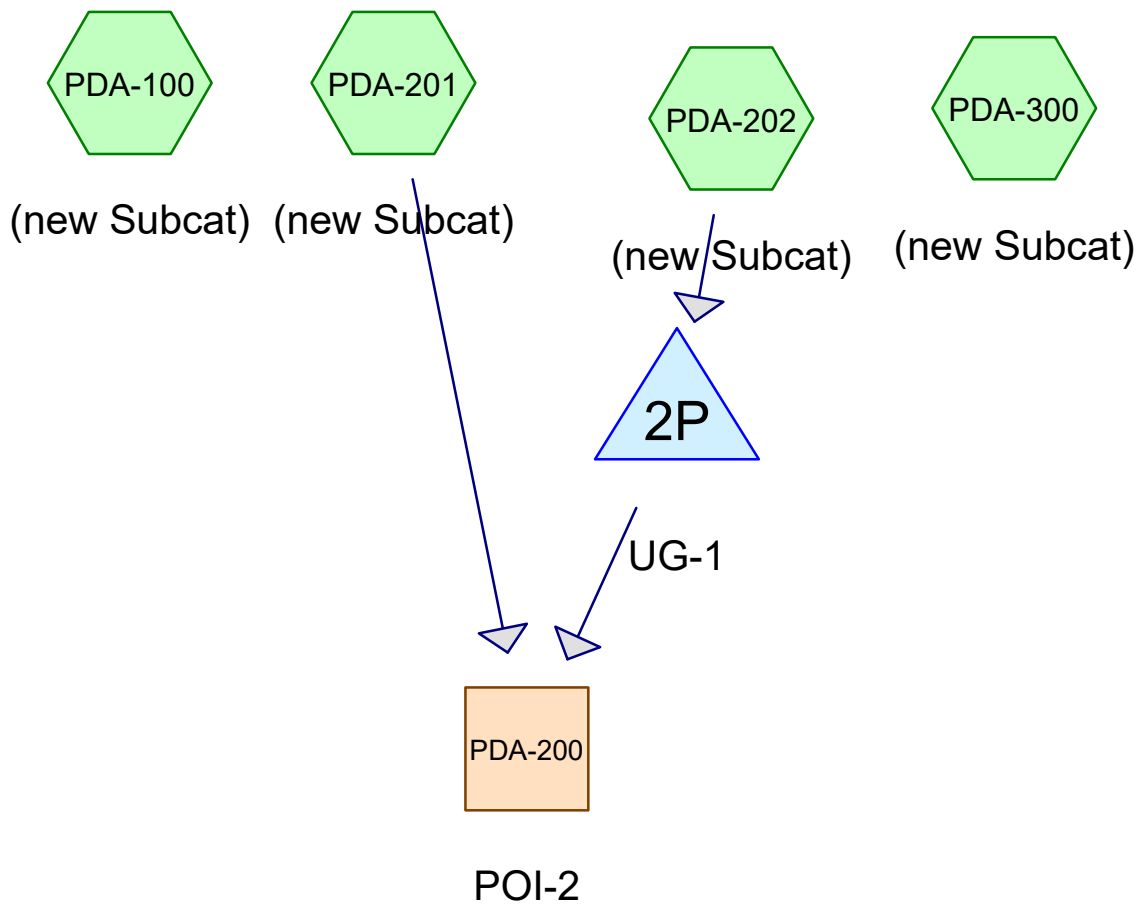
Inflow Area = 128,896 sf, 60.42% Impervious, Inflow Depth > 5.86" for 100-yr event
Inflow = 27.15 cfs @ 11.96 hrs, Volume= 62,980 cf
Outflow = 27.15 cfs @ 11.96 hrs, Volume= 62,980 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs

Reach EDA-100: POI-1

Hydrograph





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Area Listing (selected nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
77,141	49	50-75% Grass cover, Fair, HSG A (PDA-100, PDA-201, PDA-202, PDA-300)
10,274	84	50-75% Grass cover, Fair, HSG D (PDA-100, PDA-201)
170,502	98	Paved parking, HSG A (PDA-100, PDA-201, PDA-202)
47,771	36	Woods, Fair, HSG A (PDA-100, PDA-201, PDA-202, PDA-300)
305,688	75	TOTAL AREA

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Soil Listing (selected nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
295,414	HSG A	PDA-100, PDA-201, PDA-202, PDA-300
0	HSG B	
0	HSG C	
10,274	HSG D	PDA-100, PDA-201
0	Other	
305,688		TOTAL AREA

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Ground Covers (selected 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
77,141	0	0	10,274	0	87,415	50-75% Grass cover, Fair
170,502	0	0	0	0	170,502	Paved parking
47,771	0	0	0	0	47,771	Woods, Fair
295,414	0	0	10,274	0	305,688	TOTAL AREA

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Pipe Listing (selected nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	2P	46.29	46.20	10.0	0.0090	0.013	12.0	0.0	0.0

C-DAT-2001236-HYDRO

Type II 24-hr 2-yr Rainfall=3.48"

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Time span=1.00-24.00 hrs, dt=0.05 hrs, 461 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentPDA-100: (new Subcat) Runoff Area=94,552 sf 72.87% Impervious Runoff Depth>2.16"
Flow Length=82' Tc=6.0 min CN=87 Runoff=7.95 cfs 17,036 cf

SubcatchmentPDA-201: (new Subcat) Runoff Area=153,282 sf 55.24% Impervious Runoff Depth>1.35"
Flow Length=97' Tc=8.2 min CN=76 Runoff=7.69 cfs 17,219 cf

SubcatchmentPDA-202: (new Subcat) Runoff Area=27,515 sf 61.52% Impervious Runoff Depth>1.41"
Flow Length=122' Tc=9.7 min CN=77 Runoff=1.36 cfs 3,238 cf

SubcatchmentPDA-300: (new Subcat) Runoff Area=30,339 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=339' Tc=32.2 min CN=36 Runoff=0.00 cfs 0 cf

Reach PDA-200: POI-2 Inflow=7.69 cfs 17,219 cf
Outflow=7.69 cfs 17,219 cf

Pond 2P: UG-1 Peak Elev=45.17' Storage=1,001 cf Inflow=1.36 cfs 3,238 cf
Discarded=0.21 cfs 3,236 cf Primary=0.00 cfs 0 cf Outflow=0.21 cfs 3,236 cf

Total Runoff Area = 305,688 sf Runoff Volume = 37,493 cf Average Runoff Depth = 1.47"
44.22% Pervious = 135,186 sf 55.78% Impervious = 170,502 sf

C-DAT-2001236-HYDRO

Type II 24-hr 2-yr Rainfall=3.48"

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Summary for Subcatchment PDA-100: (new Subcat)

Runoff = 7.95 cfs @ 11.97 hrs, Volume= 17,036 cf, Depth> 2.16"

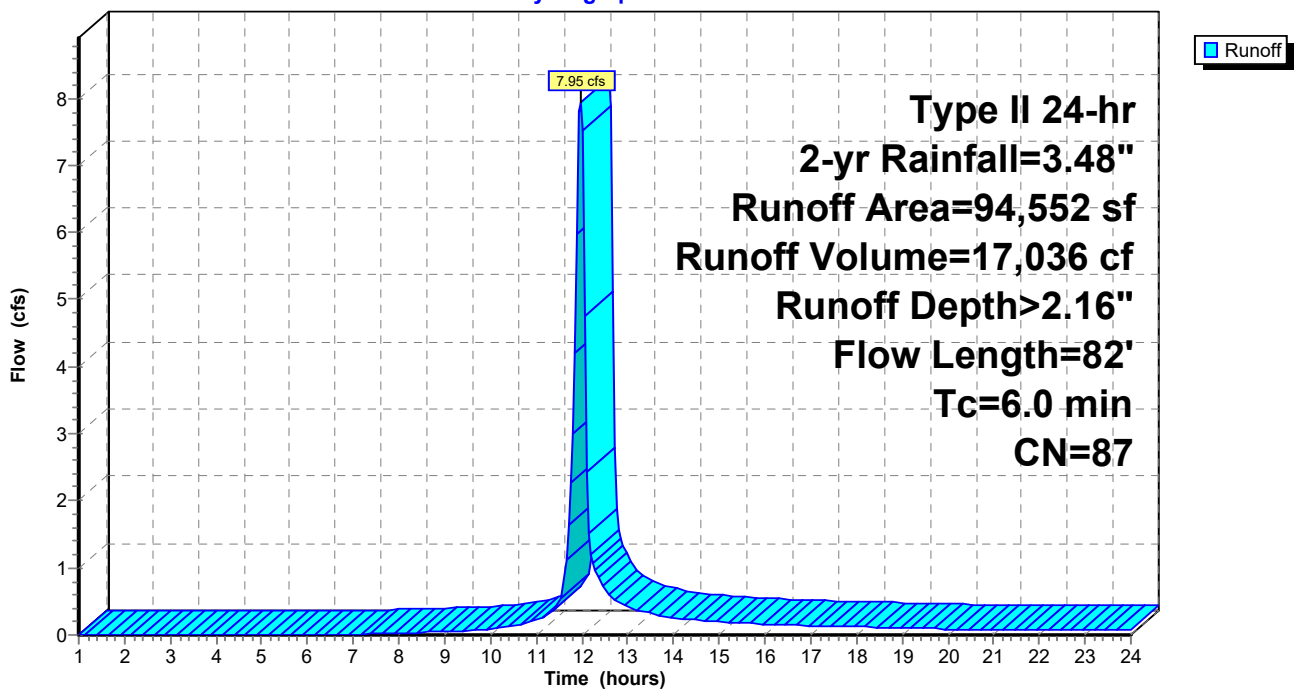
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.48"

Area (sf)	CN	Description
19,121	49	50-75% Grass cover, Fair, HSG A
6,034	84	50-75% Grass cover, Fair, HSG D
496	36	Woods, Fair, HSG A
0	79	Woods, Fair, HSG D
68,901	98	Paved parking, HSG A
94,552	87	Weighted Average
25,651		27.13% Pervious Area
68,901		72.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	55	0.0363	0.20		Sheet Flow, grass to pavement Grass: Short n= 0.150 P2= 3.48"
0.1	27	0.0560	4.80		Shallow Concentrated Flow, to cb Paved Kv= 20.3 fps
4.7	82	Total, Increased to minimum Tc = 6.0 min			

Subcatchment PDA-100: (new Subcat)

Hydrograph



C-DAT-2001236-HYDRO

Type II 24-hr 2-yr Rainfall=3.48"

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Summary for Subcatchment PDA-201: (new Subcat)

Runoff = 7.69 cfs @ 12.00 hrs, Volume= 17,219 cf, Depth> 1.35"

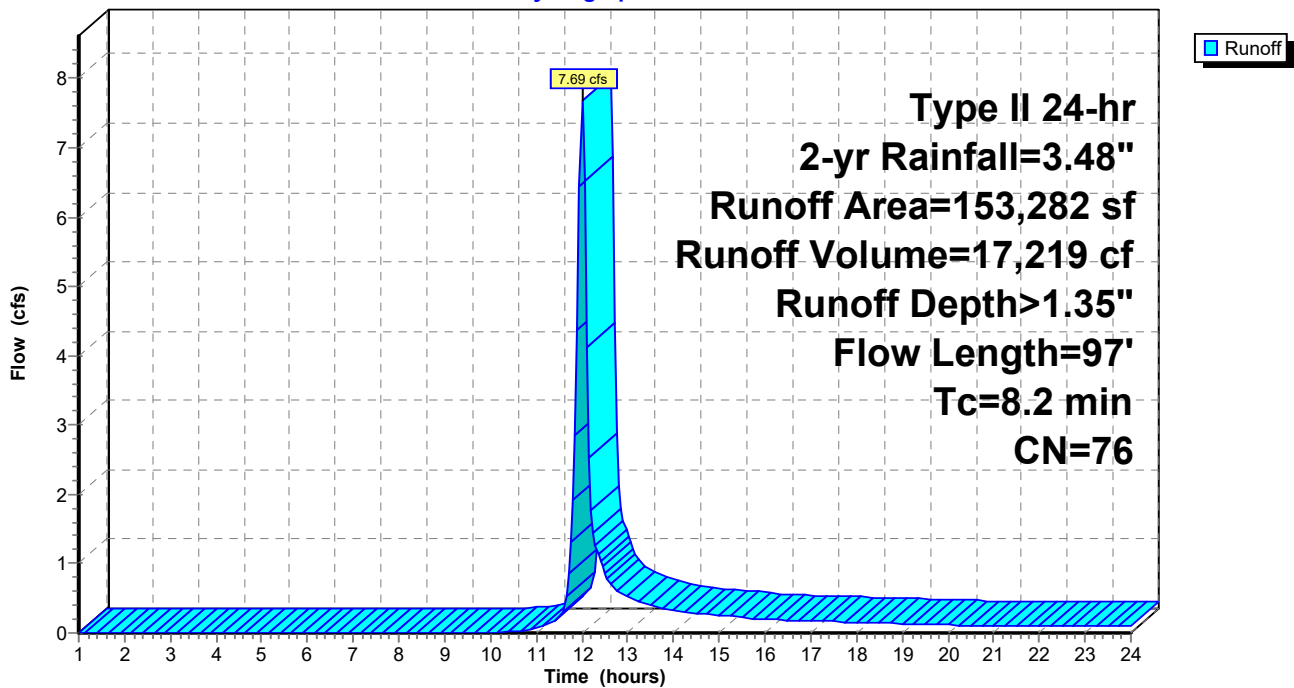
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.48"

Area (sf)	CN	Description
52,321	49	50-75% Grass cover, Fair, HSG A
4,240	84	50-75% Grass cover, Fair, HSG D
12,046	36	Woods, Fair, HSG A
0	79	Woods, Fair, HSG D
84,675	98	Paved parking, HSG A
153,282	76	Weighted Average
68,607		44.76% Pervious Area
84,675		55.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	41	0.0487	0.10		Sheet Flow, woods to grass Woods: Light underbrush n= 0.400 P2= 3.48"
1.1	56	0.0150	0.86		Shallow Concentrated Flow, grass Short Grass Pasture Kv= 7.0 fps
8.2	97	Total			

Subcatchment PDA-201: (new Subcat)

Hydrograph



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Type II 24-hr 2-yr Rainfall=3.48"

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Summary for Subcatchment PDA-202: (new Subcat)

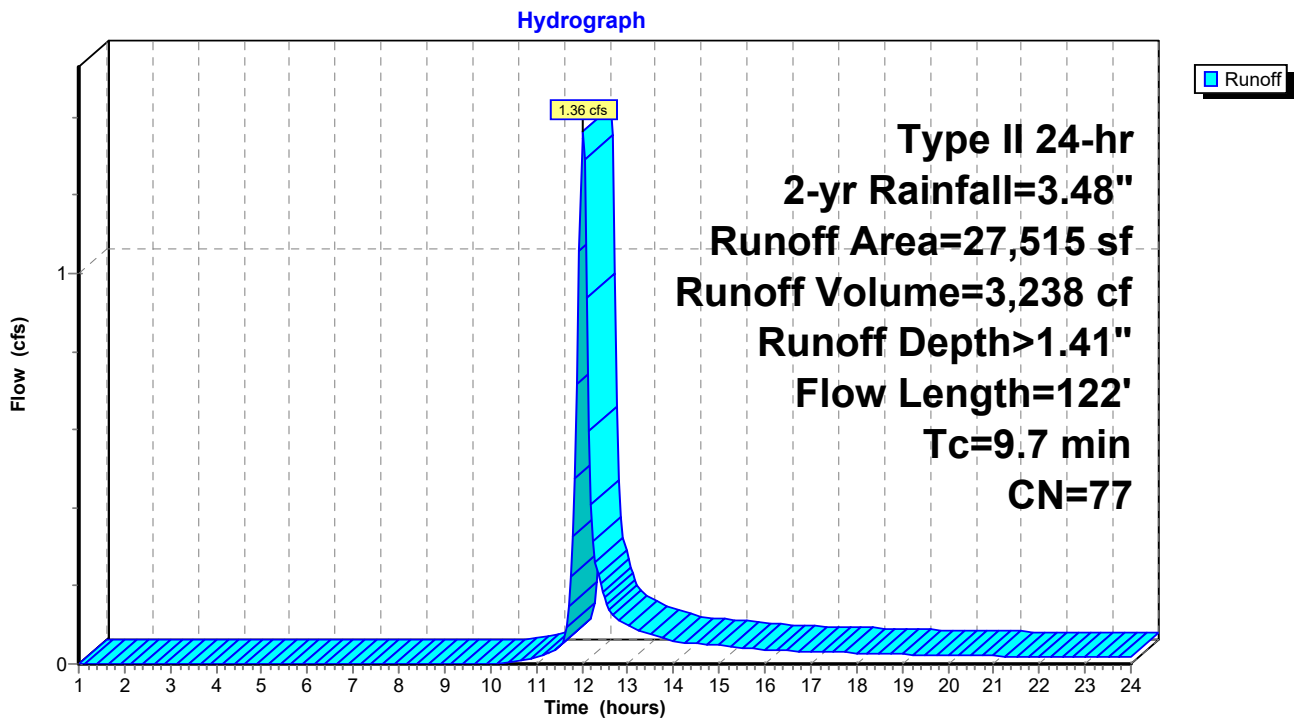
Runoff = 1.36 cfs @ 12.02 hrs, Volume= 3,238 cf, Depth> 1.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.48"

Area (sf)	CN	Description
5,019	49	50-75% Grass cover, Fair, HSG A
0	84	50-75% Grass cover, Fair, HSG D
5,570	36	Woods, Fair, HSG A
0	79	Woods, Fair, HSG D
16,926	98	Paved parking, HSG A
27,515	77	Weighted Average
10,589		38.48% Pervious Area
16,926		61.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	57	0.0487	0.10		Sheet Flow, woods to pavement Woods: Light underbrush n= 0.400 P2= 3.48"
0.5	65	0.0129	2.31		Shallow Concentrated Flow, to cb Paved Kv= 20.3 fps
9.7	122	Total			

Subcatchment PDA-202: (new Subcat)



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Type II 24-hr 2-yr Rainfall=3.48"

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Summary for Subcatchment PDA-300: (new Subcat)

Runoff = 0.00 cfs @ 1.00 hrs, Volume= 0 cf, Depth= 0.00"

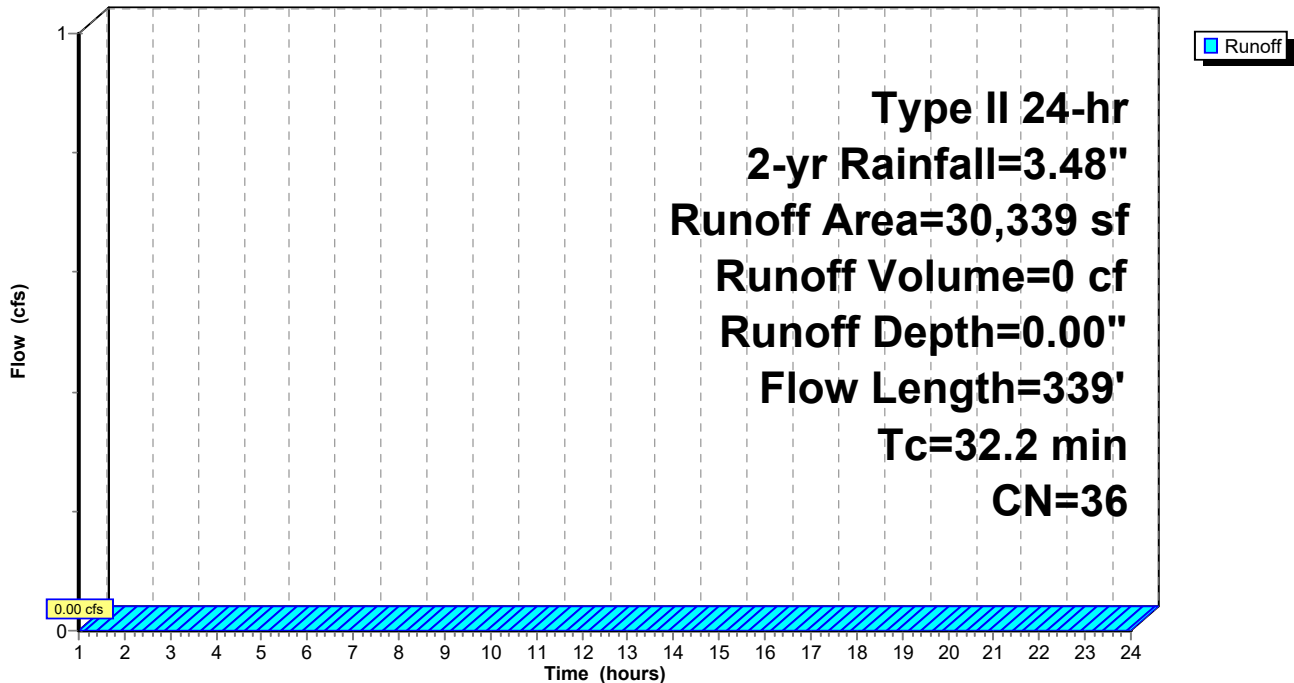
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.48"

Area (sf)	CN	Description
680	49	50-75% Grass cover, Fair, HSG A
0	84	50-75% Grass cover, Fair, HSG D
29,659	36	Woods, Fair, HSG A
0	79	Woods, Fair, HSG D
0	98	Paved parking, HSG A
30,339	36	Weighted Average
30,339		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.2	100	0.0100	0.06		Sheet Flow, woods Woods: Light underbrush n= 0.400 P2= 3.48"
5.0	239	0.0258	0.80		Shallow Concentrated Flow, woods Woodland Kv= 5.0 fps
32.2	339	Total			

Subcatchment PDA-300: (new Subcat)

Hydrograph



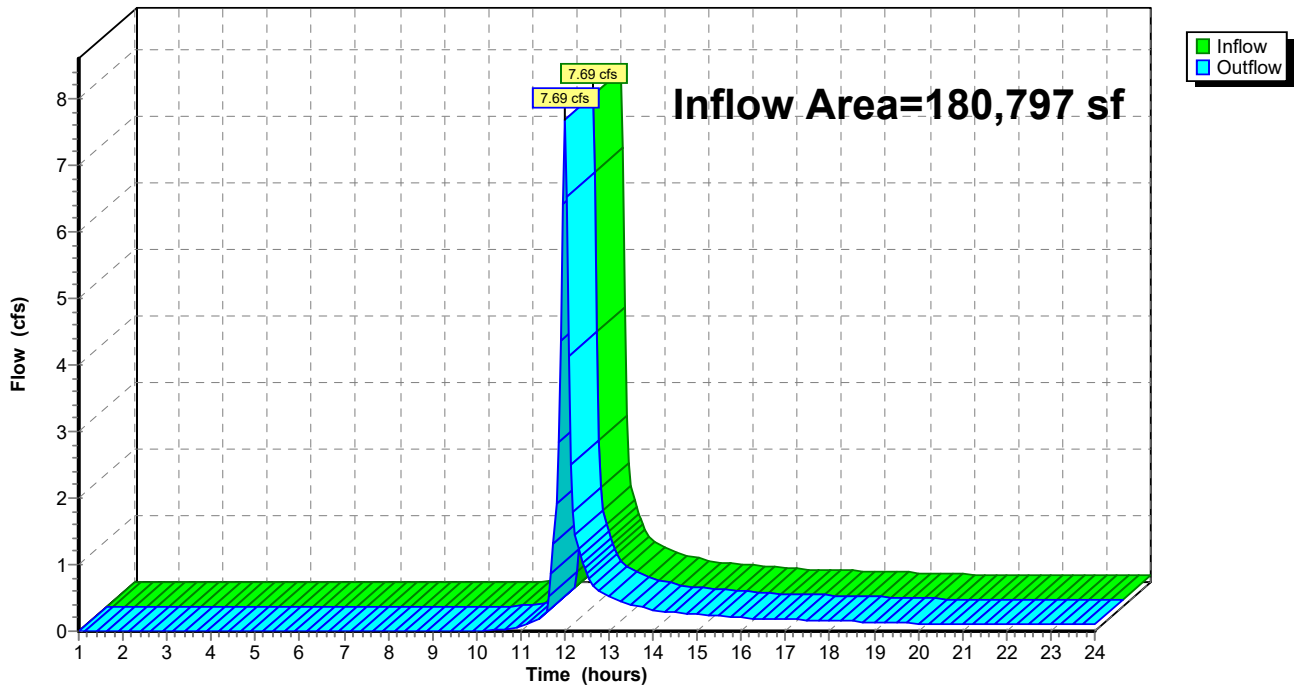
Summary for Reach PDA-200: POI-2

Inflow Area = 180,797 sf, 56.20% Impervious, Inflow Depth > 1.14" for 2-yr event
Inflow = 7.69 cfs @ 12.00 hrs, Volume= 17,219 cf
Outflow = 7.69 cfs @ 12.00 hrs, Volume= 17,219 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs

Reach PDA-200: POI-2

Hydrograph



Summary for Pond 2P: UG-1

Inflow Area = 27,515 sf, 61.52% Impervious, Inflow Depth > 1.41" for 2-yr event
 Inflow = 1.36 cfs @ 12.02 hrs, Volume= 3,238 cf
 Outflow = 0.21 cfs @ 11.80 hrs, Volume= 3,236 cf, Atten= 85%, Lag= 0.0 min
 Discarded = 0.21 cfs @ 11.80 hrs, Volume= 3,236 cf
 Primary = 0.00 cfs @ 1.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 45.17' @ 12.39 hrs Surf.Area= 1,823 sf Storage= 1,001 cf

Plug-Flow detention time= 31.4 min calculated for 3,236 cf (100% of inflow)
 Center-of-Mass det. time= 31.0 min (877.3 - 846.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	44.25'	1,563 cf	20.83'W x 87.50'L x 3.54'H Field A 6,456 cf Overall - 2,548 cf Embedded = 3,908 cf x 40.0% Voids
#2A	44.75'	2,548 cf	Cultec R-330XLHD x 48 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 4 rows
		4,111 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	44.25'	5.000 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	46.29'	12.0" Round Culvert L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 46.29' / 46.20' S= 0.0090 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Discarded OutFlow Max=0.21 cfs @ 11.80 hrs HW=44.30' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.21 cfs)

Primary OutFlow Max=0.00 cfs @ 1.00 hrs HW=44.25' (Free Discharge)

↑2=Culvert (Controls 0.00 cfs)

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Type II 24-hr 2-yr Rainfall=3.48"

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Pond 2P: UG-1 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)

Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf

Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap

Row Length Adjustment= +1.50' x 7.45 sf x 4 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

12 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 85.50' Row Length +12.0" End Stone x 2 = 87.50' Base Length

4 Rows x 52.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.83' Base Width

6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

48 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 4 Rows = 2,548.2 cf Chamber Storage

6,456.2 cf Field - 2,548.2 cf Chambers = 3,907.9 cf Stone x 40.0% Voids = 1,563.2 cf Stone Storage

Chamber Storage + Stone Storage = 4,111.4 cf = 0.094 af

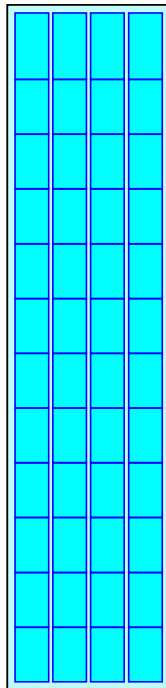
Overall Storage Efficiency = 63.7%

Overall System Size = 87.50' x 20.83' x 3.54'

48 Chambers

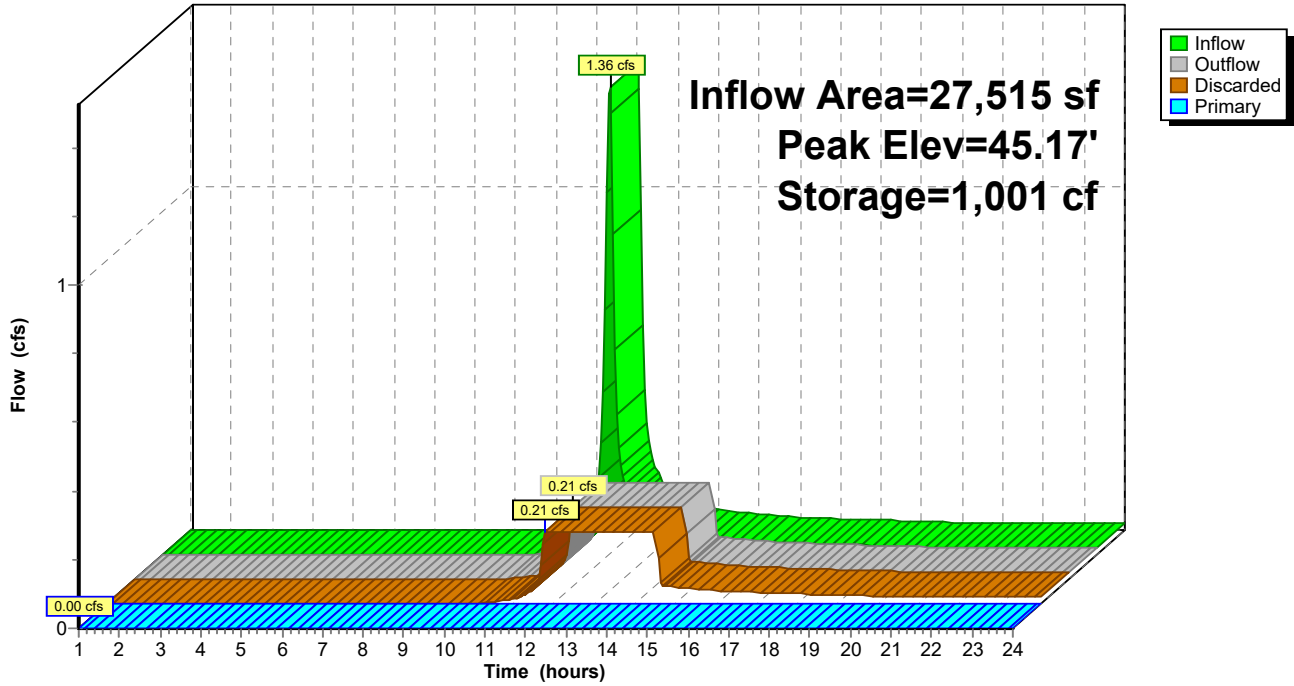
239.1 cy Field

144.7 cy Stone



Pond 2P: UG-1

Hydrograph



C-DAT-2001236-HYDRO

Type II 24-hr 10-yr Rainfall=5.38"

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Time span=1.00-24.00 hrs, dt=0.05 hrs, 461 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentPDA-100: (new Subcat) Runoff Area=94,552 sf 72.87% Impervious Runoff Depth>3.92"
Flow Length=82' Tc=6.0 min CN=87 Runoff=14.00 cfs 30,908 cf

SubcatchmentPDA-201: (new Subcat) Runoff Area=153,282 sf 55.24% Impervious Runoff Depth>2.85"
Flow Length=97' Tc=8.2 min CN=76 Runoff=16.27 cfs 36,363 cf

SubcatchmentPDA-202: (new Subcat) Runoff Area=27,515 sf 61.52% Impervious Runoff Depth>2.94"
Flow Length=122' Tc=9.7 min CN=77 Runoff=2.84 cfs 6,736 cf

SubcatchmentPDA-300: (new Subcat) Runoff Area=30,339 sf 0.00% Impervious Runoff Depth>0.16"
Flow Length=339' Tc=32.2 min CN=36 Runoff=0.01 cfs 417 cf

Reach PDA-200: POI-2 Inflow=16.27 cfs 36,449 cf
Outflow=16.27 cfs 36,449 cf

Pond 2P: UG-1 Peak Elev=46.40' Storage=2,788 cf Inflow=2.84 cfs 6,736 cf
Discarded=0.21 cfs 6,646 cf Primary=0.04 cfs 86 cf Outflow=0.25 cfs 6,732 cf

Total Runoff Area = 305,688 sf Runoff Volume = 74,423 cf Average Runoff Depth = 2.92"
44.22% Pervious = 135,186 sf 55.78% Impervious = 170,502 sf

C-DAT-2001236-HYDRO

Type II 24-hr 10-yr Rainfall=5.38"

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Summary for Subcatchment PDA-100: (new Subcat)

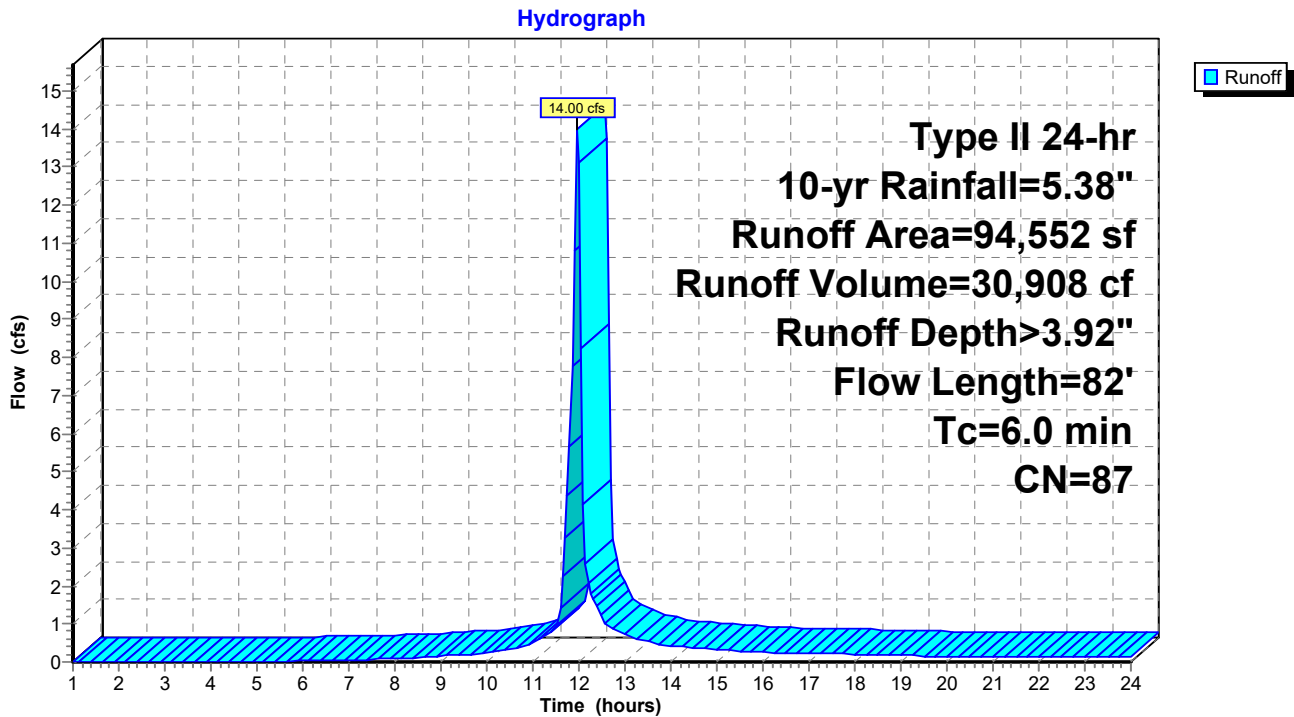
Runoff = 14.00 cfs @ 11.97 hrs, Volume= 30,908 cf, Depth> 3.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
 Type II 24-hr 10-yr Rainfall=5.38"

Area (sf)	CN	Description
19,121	49	50-75% Grass cover, Fair, HSG A
6,034	84	50-75% Grass cover, Fair, HSG D
496	36	Woods, Fair, HSG A
0	79	Woods, Fair, HSG D
68,901	98	Paved parking, HSG A
94,552	87	Weighted Average
25,651		27.13% Pervious Area
68,901		72.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	55	0.0363	0.20		Sheet Flow, grass to pavement Grass: Short n= 0.150 P2= 3.48"
0.1	27	0.0560	4.80		Shallow Concentrated Flow, to cb Paved Kv= 20.3 fps
4.7	82	Total, Increased to minimum Tc = 6.0 min			

Subcatchment PDA-100: (new Subcat)



C-DAT-2001236-HYDRO

Type II 24-hr 10-yr Rainfall=5.38"

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Summary for Subcatchment PDA-201: (new Subcat)

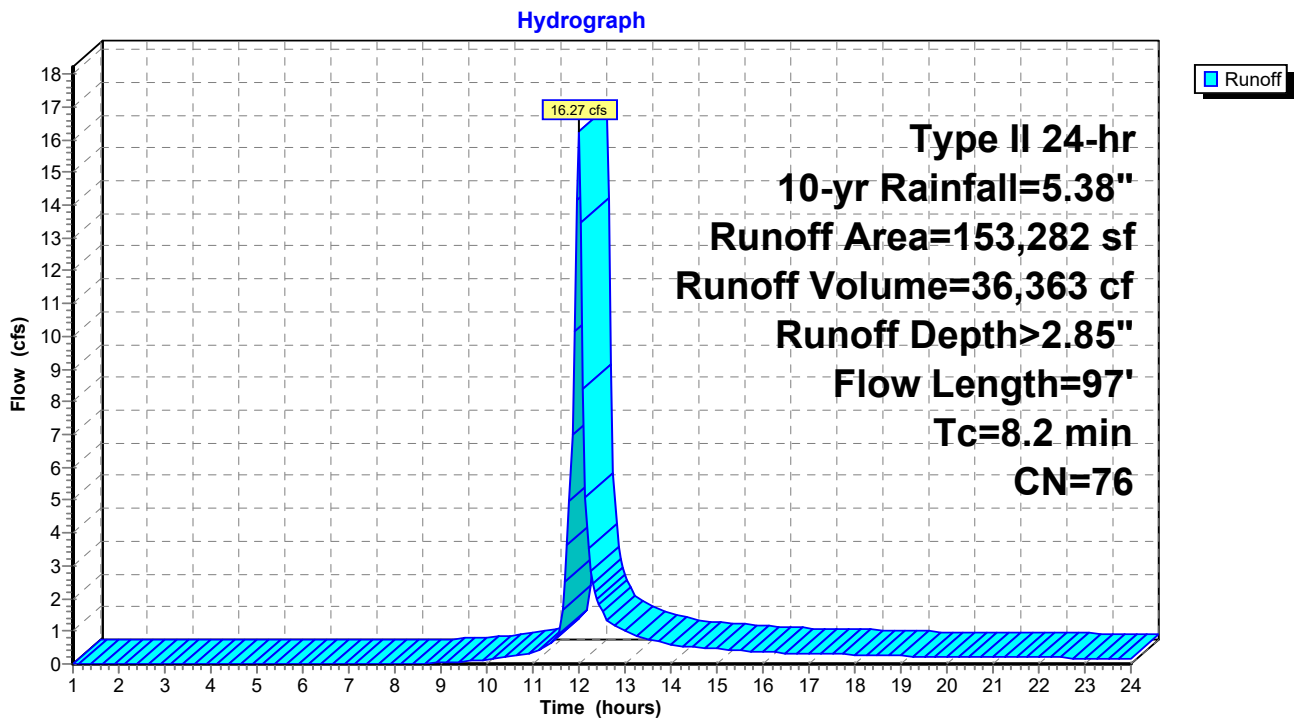
Runoff = 16.27 cfs @ 12.00 hrs, Volume= 36,363 cf, Depth> 2.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=5.38"

Area (sf)	CN	Description
52,321	49	50-75% Grass cover, Fair, HSG A
4,240	84	50-75% Grass cover, Fair, HSG D
12,046	36	Woods, Fair, HSG A
0	79	Woods, Fair, HSG D
84,675	98	Paved parking, HSG A
153,282	76	Weighted Average
68,607		44.76% Pervious Area
84,675		55.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	41	0.0487	0.10		Sheet Flow, woods to grass Woods: Light underbrush n= 0.400 P2= 3.48"
1.1	56	0.0150	0.86		Shallow Concentrated Flow, grass Short Grass Pasture Kv= 7.0 fps
8.2	97	Total			

Subcatchment PDA-201: (new Subcat)



C-DAT-2001236-HYDRO

Type II 24-hr 10-yr Rainfall=5.38"

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Summary for Subcatchment PDA-202: (new Subcat)

Runoff = 2.84 cfs @ 12.01 hrs, Volume= 6,736 cf, Depth> 2.94"

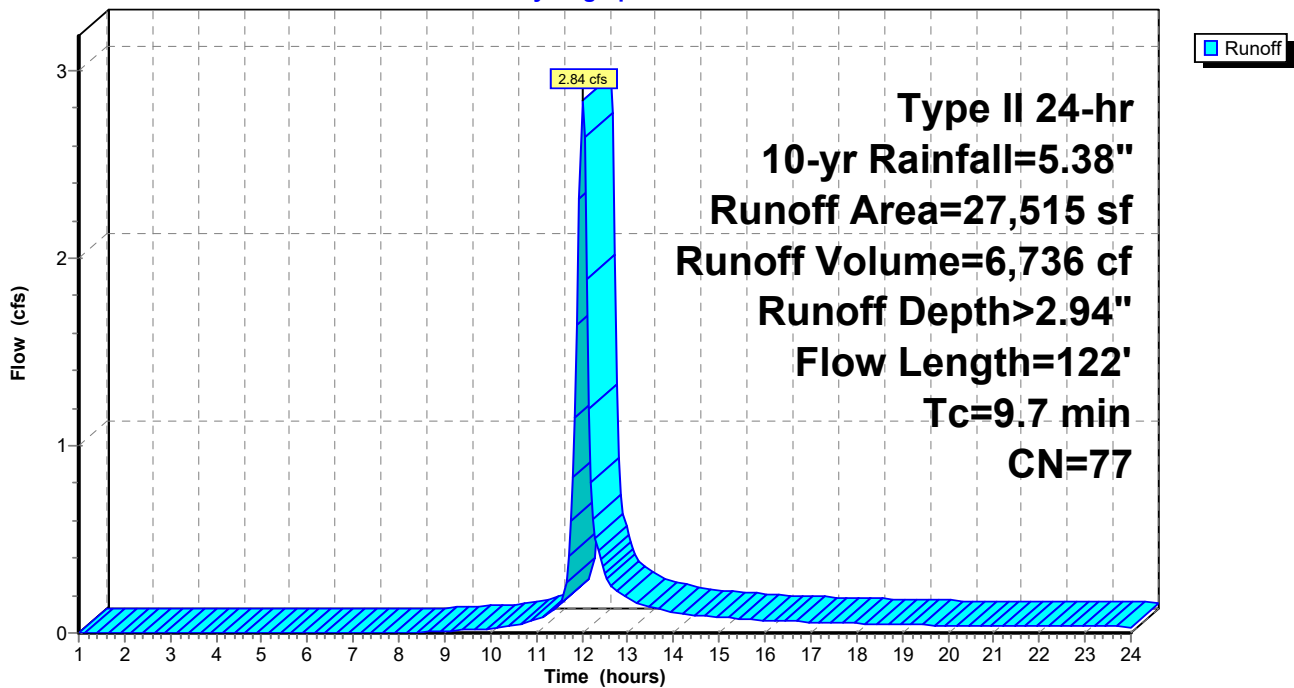
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=5.38"

Area (sf)	CN	Description
5,019	49	50-75% Grass cover, Fair, HSG A
0	84	50-75% Grass cover, Fair, HSG D
5,570	36	Woods, Fair, HSG A
0	79	Woods, Fair, HSG D
16,926	98	Paved parking, HSG A
27,515	77	Weighted Average
10,589		38.48% Pervious Area
16,926		61.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	57	0.0487	0.10		Sheet Flow, woods to pavement Woods: Light underbrush n= 0.400 P2= 3.48"
0.5	65	0.0129	2.31		Shallow Concentrated Flow, to cb Paved Kv= 20.3 fps
9.7	122	Total			

Subcatchment PDA-202: (new Subcat)

Hydrograph



C-DAT-2001236-HYDRO

Type II 24-hr 10-yr Rainfall=5.38"

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Summary for Subcatchment PDA-300: (new Subcat)

Runoff = 0.01 cfs @ 13.37 hrs, Volume= 417 cf, Depth> 0.16"

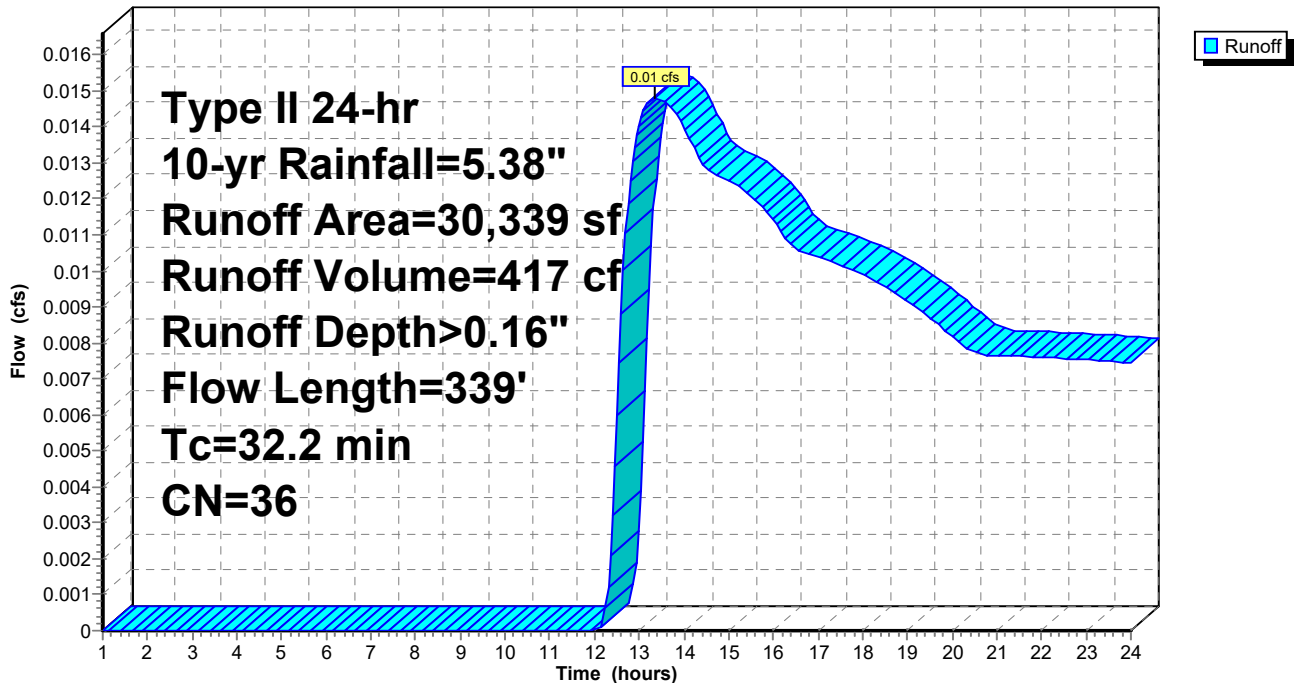
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=5.38"

Area (sf)	CN	Description
680	49	50-75% Grass cover, Fair, HSG A
0	84	50-75% Grass cover, Fair, HSG D
29,659	36	Woods, Fair, HSG A
0	79	Woods, Fair, HSG D
0	98	Paved parking, HSG A
30,339	36	Weighted Average
30,339		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.2	100	0.0100	0.06		Sheet Flow, woods Woods: Light underbrush n= 0.400 P2= 3.48"
5.0	239	0.0258	0.80		Shallow Concentrated Flow, woods Woodland Kv= 5.0 fps
32.2	339	Total			

Subcatchment PDA-300: (new Subcat)

Hydrograph



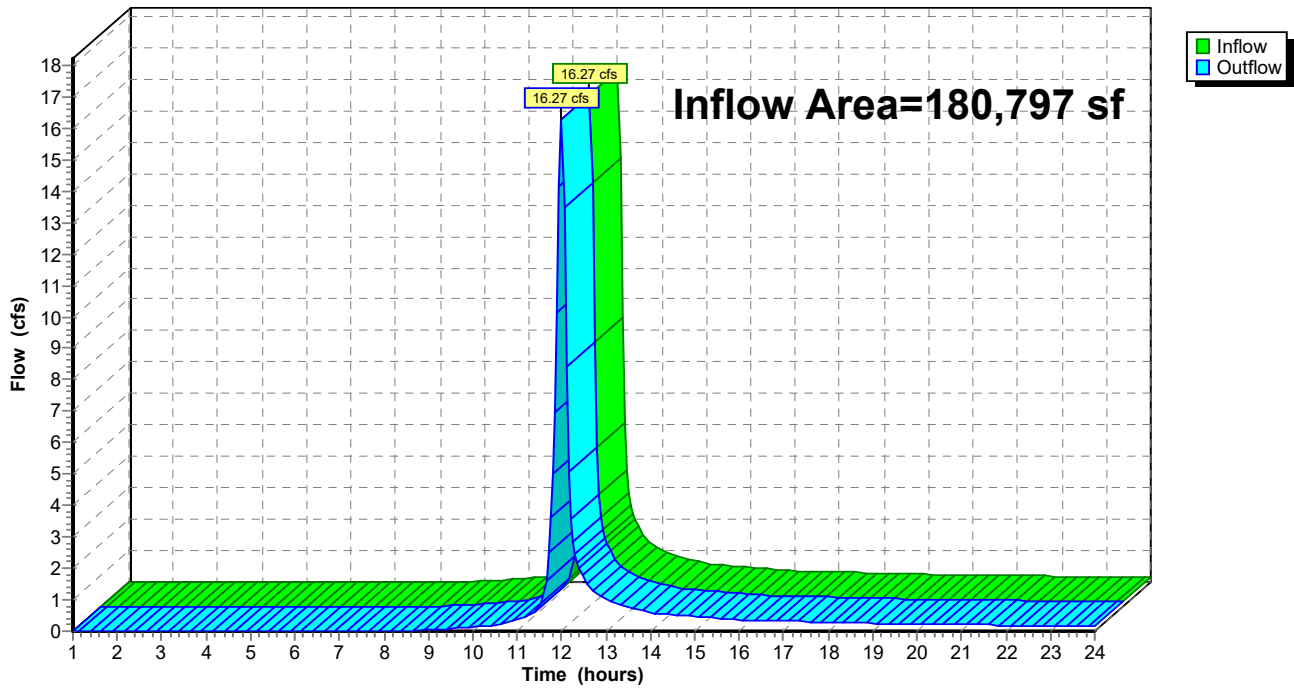
Summary for Reach PDA-200: POI-2

Inflow Area = 180,797 sf, 56.20% Impervious, Inflow Depth > 2.42" for 10-yr event
Inflow = 16.27 cfs @ 12.00 hrs, Volume= 36,449 cf
Outflow = 16.27 cfs @ 12.00 hrs, Volume= 36,449 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs

Reach PDA-200: POI-2

Hydrograph



Summary for Pond 2P: UG-1

Inflow Area = 27,515 sf, 61.52% Impervious, Inflow Depth > 2.94" for 10-yr event
 Inflow = 2.84 cfs @ 12.01 hrs, Volume= 6,736 cf
 Outflow = 0.25 cfs @ 12.64 hrs, Volume= 6,732 cf, Atten= 91%, Lag= 37.5 min
 Discarded = 0.21 cfs @ 11.65 hrs, Volume= 6,646 cf
 Primary = 0.04 cfs @ 12.64 hrs, Volume= 86 cf

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 46.40' @ 12.64 hrs Surf.Area= 1,823 sf Storage= 2,788 cf

Plug-Flow detention time= 105.9 min calculated for 6,717 cf (100% of inflow)
 Center-of-Mass det. time= 105.3 min (930.7 - 825.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	44.25'	1,563 cf	20.83'W x 87.50'L x 3.54'H Field A 6,456 cf Overall - 2,548 cf Embedded = 3,908 cf x 40.0% Voids
#2A	44.75'	2,548 cf	Cultec R-330XLHD x 48 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 4 rows
		4,111 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	44.25'	5.000 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	46.29'	12.0" Round Culvert L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 46.29' / 46.20' S= 0.0090 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Discarded OutFlow Max=0.21 cfs @ 11.65 hrs HW=44.29' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.21 cfs)

Primary OutFlow Max=0.04 cfs @ 12.64 hrs HW=46.40' (Free Discharge)

↑2=Culvert (Barrel Controls 0.04 cfs @ 1.30 fps)

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Type II 24-hr 10-yr Rainfall=5.38"

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Pond 2P: UG-1 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)

Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf

Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap

Row Length Adjustment= +1.50' x 7.45 sf x 4 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

12 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 85.50' Row Length +12.0" End Stone x 2 = 87.50' Base Length

4 Rows x 52.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.83' Base Width

6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

48 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 4 Rows = 2,548.2 cf Chamber Storage

6,456.2 cf Field - 2,548.2 cf Chambers = 3,907.9 cf Stone x 40.0% Voids = 1,563.2 cf Stone Storage

Chamber Storage + Stone Storage = 4,111.4 cf = 0.094 af

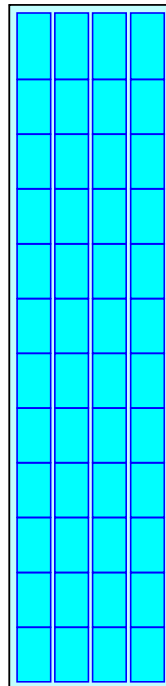
Overall Storage Efficiency = 63.7%

Overall System Size = 87.50' x 20.83' x 3.54'

48 Chambers

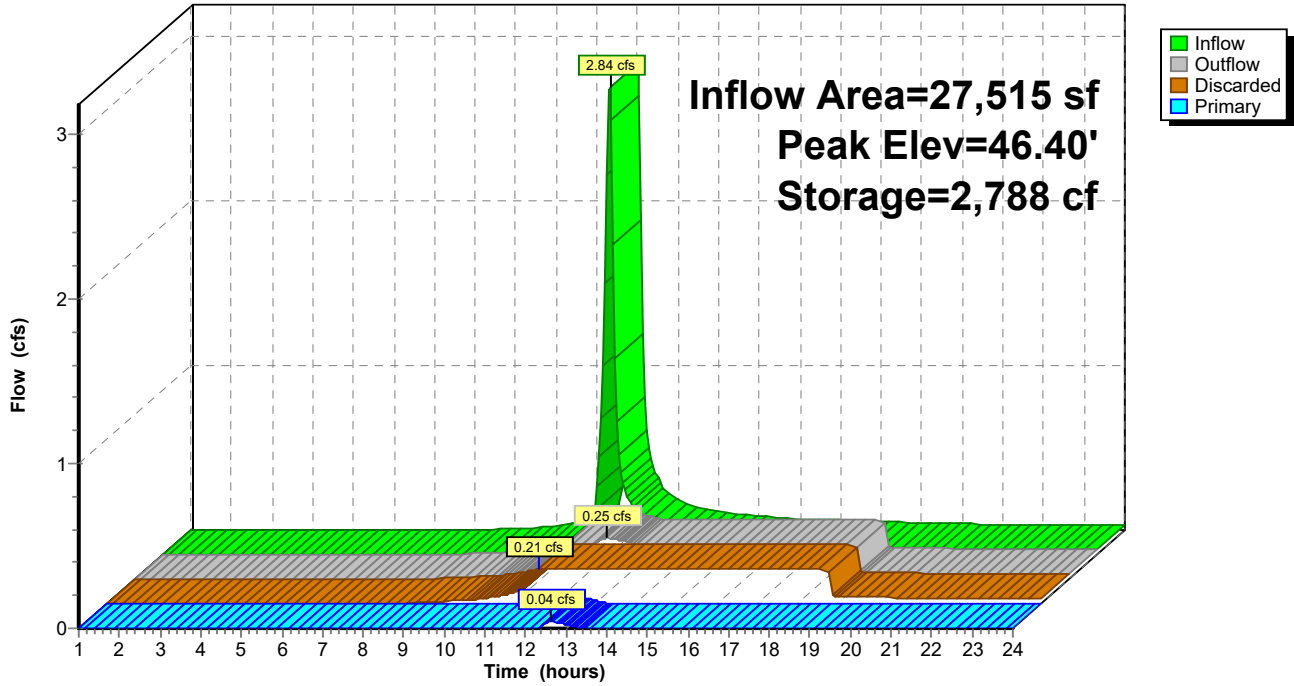
239.1 cy Field

144.7 cy Stone



Pond 2P: UG-1

Hydrograph



C-DAT-2001236-HYDRO

Type II 24-hr 25-yr Rainfall=6.56"

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Time span=1.00-24.00 hrs, dt=0.05 hrs, 461 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentPDA-100: (new Subcat) Runoff Area=94,552 sf 72.87% Impervious Runoff Depth>5.05"
Flow Length=82' Tc=6.0 min CN=87 Runoff=17.75 cfs 39,791 cf

SubcatchmentPDA-201: (new Subcat) Runoff Area=153,282 sf 55.24% Impervious Runoff Depth>3.86"
Flow Length=97' Tc=8.2 min CN=76 Runoff=21.90 cfs 49,326 cf

SubcatchmentPDA-202: (new Subcat) Runoff Area=27,515 sf 61.52% Impervious Runoff Depth>3.96"
Flow Length=122' Tc=9.7 min CN=77 Runoff=3.81 cfs 9,090 cf

SubcatchmentPDA-300: (new Subcat) Runoff Area=30,339 sf 0.00% Impervious Runoff Depth>0.43"
Flow Length=339' Tc=32.2 min CN=36 Runoff=0.08 cfs 1,075 cf

Reach PDA-200: POI-2 Inflow=21.90 cfs 50,737 cf
Outflow=21.90 cfs 50,737 cf

Pond 2P: UG-1 Peak Elev=46.85' Storage=3,339 cf Inflow=3.81 cfs 9,090 cf
Discarded=0.21 cfs 7,673 cf Primary=0.79 cfs 1,412 cf Outflow=1.00 cfs 9,085 cf

Total Runoff Area = 305,688 sf Runoff Volume = 99,282 cf Average Runoff Depth = 3.90"
44.22% Pervious = 135,186 sf 55.78% Impervious = 170,502 sf

Summary for Subcatchment PDA-100: (new Subcat)

Runoff = 17.75 cfs @ 11.96 hrs, Volume= 39,791 cf, Depth> 5.05"

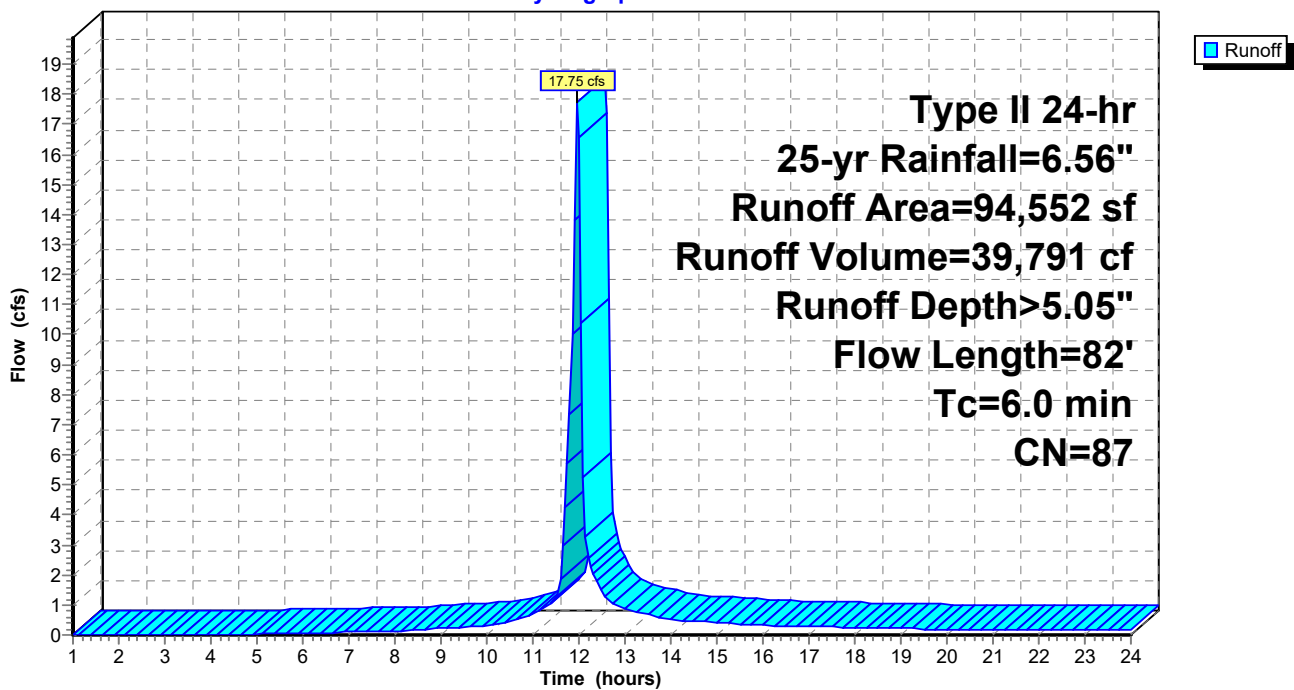
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=6.56"

Area (sf)	CN	Description
19,121	49	50-75% Grass cover, Fair, HSG A
6,034	84	50-75% Grass cover, Fair, HSG D
496	36	Woods, Fair, HSG A
0	79	Woods, Fair, HSG D
68,901	98	Paved parking, HSG A
94,552	87	Weighted Average
25,651		27.13% Pervious Area
68,901		72.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	55	0.0363	0.20		Sheet Flow, grass to pavement Grass: Short n= 0.150 P2= 3.48"
0.1	27	0.0560	4.80		Shallow Concentrated Flow, to cb Paved Kv= 20.3 fps
4.7	82	Total, Increased to minimum Tc = 6.0 min			

Subcatchment PDA-100: (new Subcat)

Hydrograph



C-DAT-2001236-HYDRO

Type II 24-hr 25-yr Rainfall=6.56"

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Summary for Subcatchment PDA-201: (new Subcat)

Runoff = 21.90 cfs @ 12.00 hrs, Volume= 49,326 cf, Depth> 3.86"

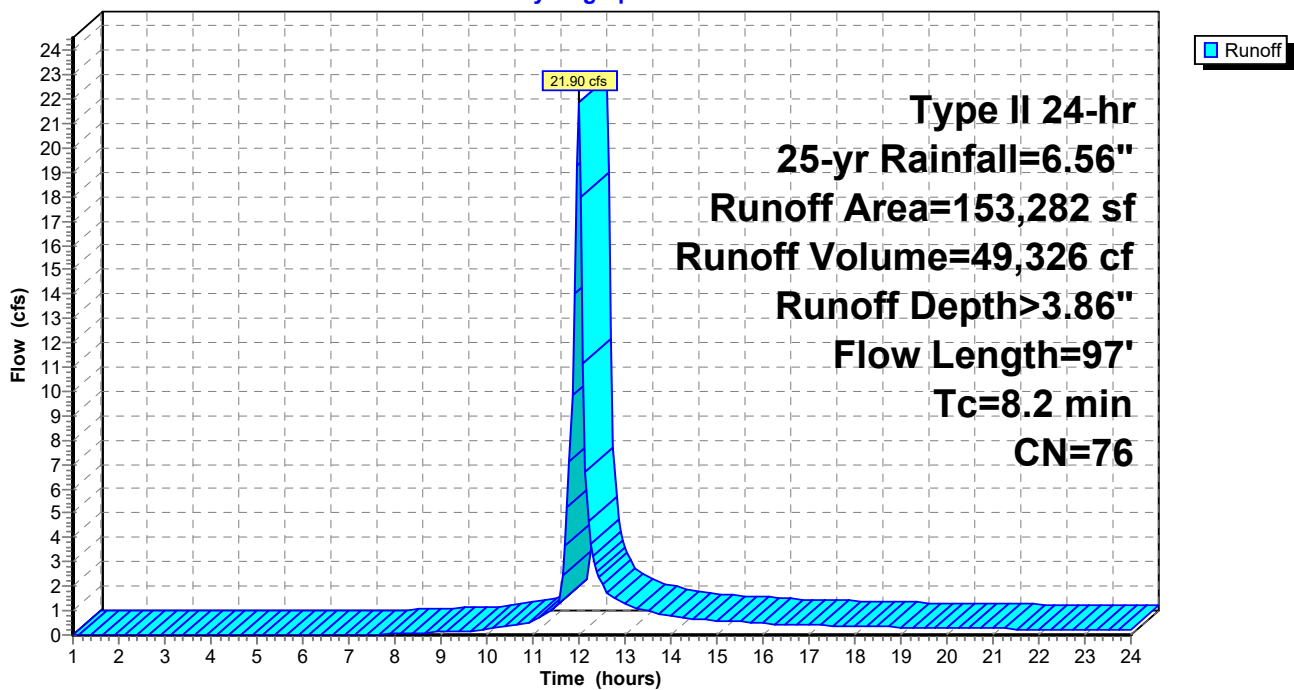
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=6.56"

Area (sf)	CN	Description
52,321	49	50-75% Grass cover, Fair, HSG A
4,240	84	50-75% Grass cover, Fair, HSG D
12,046	36	Woods, Fair, HSG A
0	79	Woods, Fair, HSG D
84,675	98	Paved parking, HSG A
153,282	76	Weighted Average
68,607		44.76% Pervious Area
84,675		55.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	41	0.0487	0.10		Sheet Flow, woods to grass Woods: Light underbrush n= 0.400 P2= 3.48"
1.1	56	0.0150	0.86		Shallow Concentrated Flow, grass Short Grass Pasture Kv= 7.0 fps
8.2	97	Total			

Subcatchment PDA-201: (new Subcat)

Hydrograph



C-DAT-2001236-HYDRO

Type II 24-hr 25-yr Rainfall=6.56"

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Summary for Subcatchment PDA-202: (new Subcat)

Runoff = 3.81 cfs @ 12.01 hrs, Volume= 9,090 cf, Depth> 3.96"

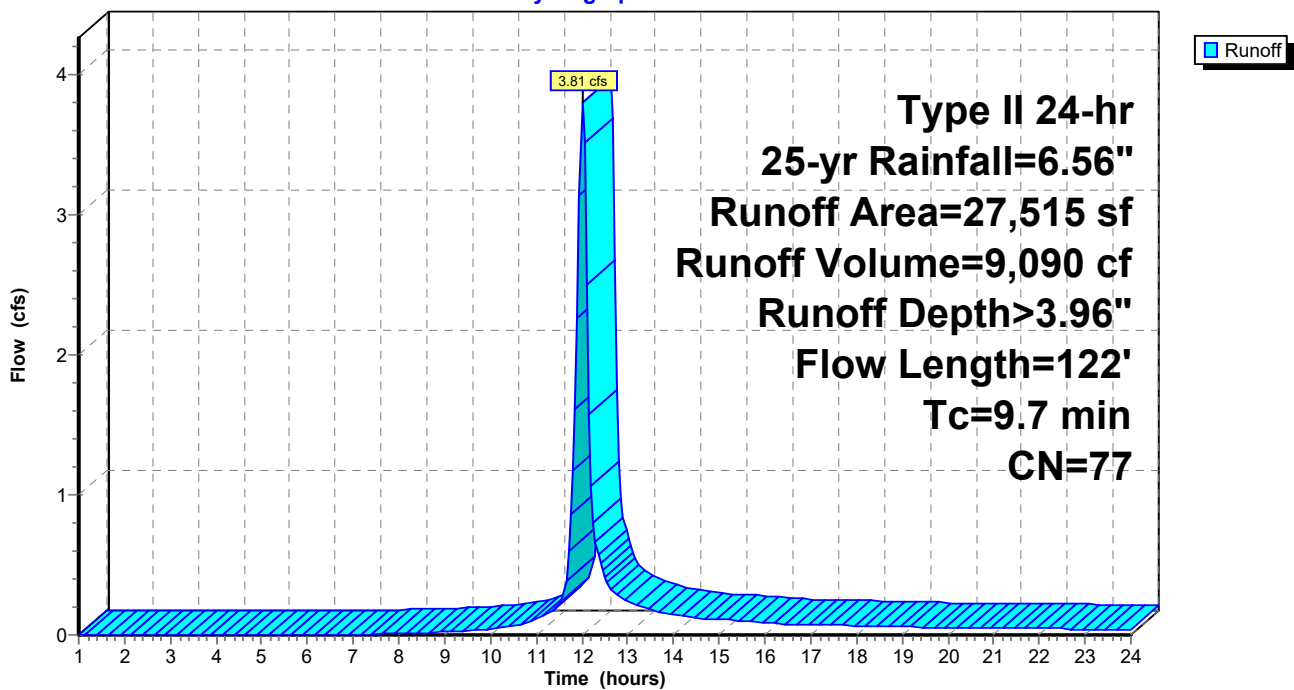
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=6.56"

Area (sf)	CN	Description
5,019	49	50-75% Grass cover, Fair, HSG A
0	84	50-75% Grass cover, Fair, HSG D
5,570	36	Woods, Fair, HSG A
0	79	Woods, Fair, HSG D
16,926	98	Paved parking, HSG A
27,515	77	Weighted Average
10,589		38.48% Pervious Area
16,926		61.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	57	0.0487	0.10		Sheet Flow, woods to pavement Woods: Light underbrush n= 0.400 P2= 3.48"
0.5	65	0.0129	2.31		Shallow Concentrated Flow, to cb Paved Kv= 20.3 fps
9.7	122	Total			

Subcatchment PDA-202: (new Subcat)

Hydrograph



C-DAT-2001236-HYDRO

Type II 24-hr 25-yr Rainfall=6.56"

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Summary for Subcatchment PDA-300: (new Subcat)

Runoff = 0.08 cfs @ 12.49 hrs, Volume= 1,075 cf, Depth> 0.43"

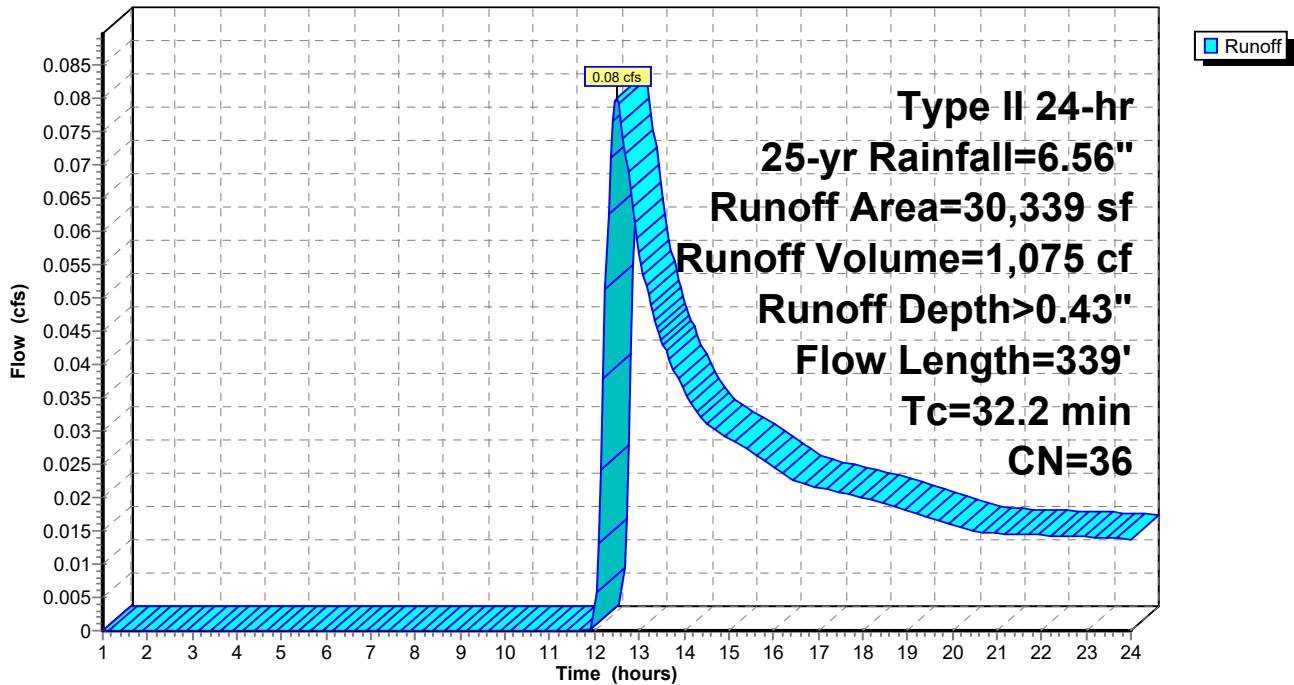
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=6.56"

Area (sf)	CN	Description
680	49	50-75% Grass cover, Fair, HSG A
0	84	50-75% Grass cover, Fair, HSG D
29,659	36	Woods, Fair, HSG A
0	79	Woods, Fair, HSG D
0	98	Paved parking, HSG A
30,339	36	Weighted Average
30,339		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.2	100	0.0100	0.06		Sheet Flow, woods Woods: Light underbrush n= 0.400 P2= 3.48"
5.0	239	0.0258	0.80		Shallow Concentrated Flow, woods Woodland Kv= 5.0 fps
32.2	339	Total			

Subcatchment PDA-300: (new Subcat)

Hydrograph



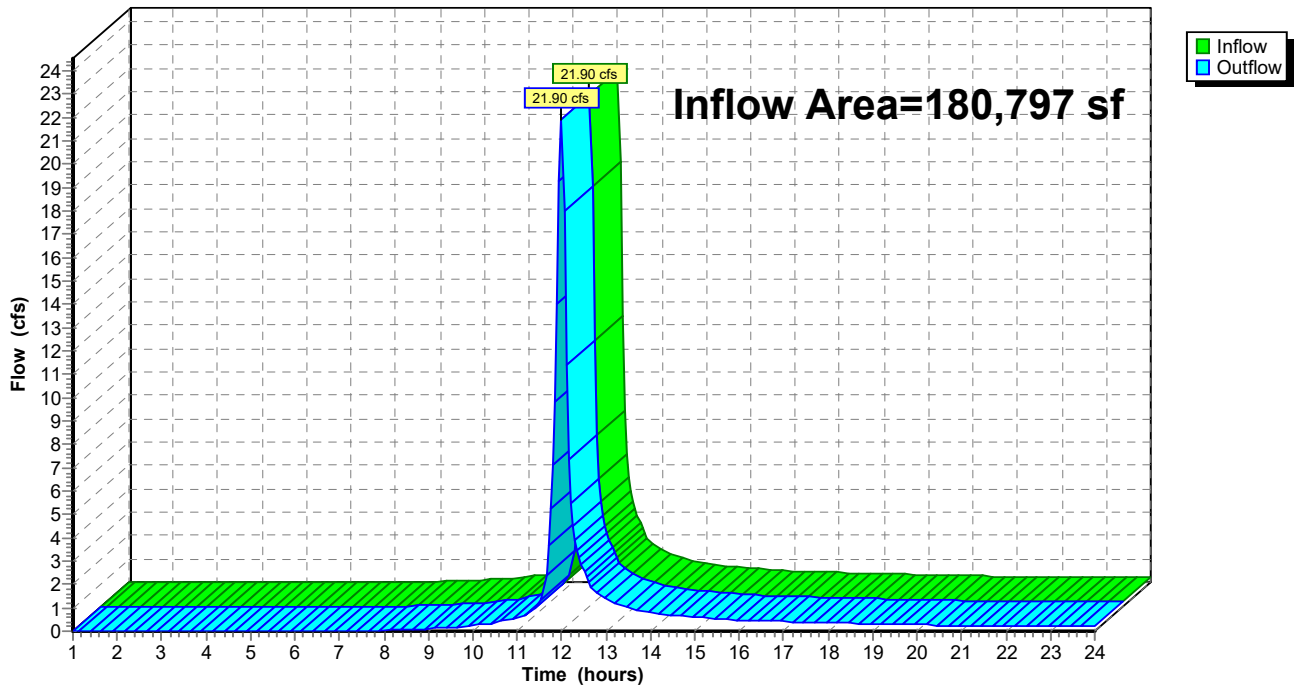
Summary for Reach PDA-200: POI-2

Inflow Area = 180,797 sf, 56.20% Impervious, Inflow Depth > 3.37" for 25-yr event
Inflow = 21.90 cfs @ 12.00 hrs, Volume= 50,737 cf
Outflow = 21.90 cfs @ 12.00 hrs, Volume= 50,737 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs

Reach PDA-200: POI-2

Hydrograph



Summary for Pond 2P: UG-1

Inflow Area = 27,515 sf, 61.52% Impervious, Inflow Depth > 3.96" for 25-yr event
 Inflow = 3.81 cfs @ 12.01 hrs, Volume= 9,090 cf
 Outflow = 1.00 cfs @ 12.22 hrs, Volume= 9,085 cf, Atten= 74%, Lag= 12.6 min
 Discarded = 0.21 cfs @ 11.55 hrs, Volume= 7,673 cf
 Primary = 0.79 cfs @ 12.22 hrs, Volume= 1,412 cf

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 46.85' @ 12.22 hrs Surf.Area= 1,823 sf Storage= 3,339 cf

Plug-Flow detention time= 96.2 min calculated for 9,065 cf (100% of inflow)
 Center-of-Mass det. time= 95.7 min (912.6 - 816.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	44.25'	1,563 cf	20.83'W x 87.50'L x 3.54'H Field A 6,456 cf Overall - 2,548 cf Embedded = 3,908 cf x 40.0% Voids
#2A	44.75'	2,548 cf	Cultec R-330XLHD x 48 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 4 rows
		4,111 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	44.25'	5.000 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	46.29'	12.0" Round Culvert L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 46.29' / 46.20' S= 0.0090 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Discarded OutFlow Max=0.21 cfs @ 11.55 hrs HW=44.29' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.21 cfs)

Primary OutFlow Max=0.77 cfs @ 12.22 hrs HW=46.84' (Free Discharge)

↑**2=Culvert** (Barrel Controls 0.77 cfs @ 2.53 fps)

C-DAT-2001236-HYDRO

Type II 24-hr 25-yr Rainfall=6.56"

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Pond 2P: UG-1 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)

Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf

Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap

Row Length Adjustment= +1.50' x 7.45 sf x 4 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

12 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 85.50' Row Length +12.0" End Stone x 2 = 87.50' Base Length

4 Rows x 52.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.83' Base Width

6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

48 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 4 Rows = 2,548.2 cf Chamber Storage

6,456.2 cf Field - 2,548.2 cf Chambers = 3,907.9 cf Stone x 40.0% Voids = 1,563.2 cf Stone Storage

Chamber Storage + Stone Storage = 4,111.4 cf = 0.094 af

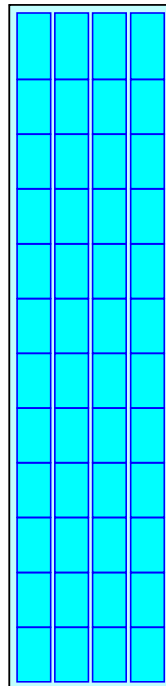
Overall Storage Efficiency = 63.7%

Overall System Size = 87.50' x 20.83' x 3.54'

48 Chambers

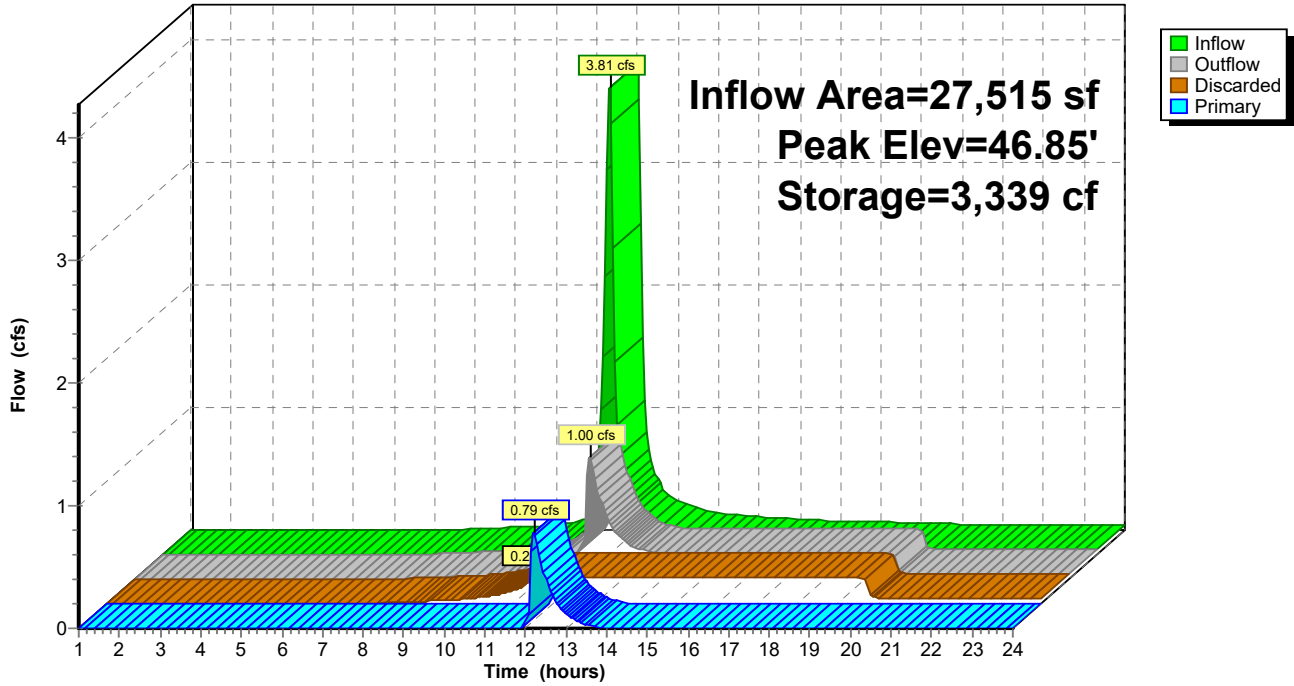
239.1 cy Field

144.7 cy Stone



Pond 2P: UG-1

Hydrograph



C-DAT-2001236-HYDRO

Type II 24-hr 100-yr Rainfall=8.39"

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Time span=1.00-24.00 hrs, dt=0.05 hrs, 461 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentPDA-100: (new Subcat) Runoff Area=94,552 sf 72.87% Impervious Runoff Depth>6.82"
Flow Length=82' Tc=6.0 min CN=87 Runoff=23.53 cfs 53,766 cf

SubcatchmentPDA-201: (new Subcat) Runoff Area=153,282 sf 55.24% Impervious Runoff Depth>5.51"
Flow Length=97' Tc=8.2 min CN=76 Runoff=30.80 cfs 70,323 cf

SubcatchmentPDA-202: (new Subcat) Runoff Area=27,515 sf 61.52% Impervious Runoff Depth>5.62"
Flow Length=122' Tc=9.7 min CN=77 Runoff=5.34 cfs 12,892 cf

SubcatchmentPDA-300: (new Subcat) Runoff Area=30,339 sf 0.00% Impervious Runoff Depth>1.02"
Flow Length=339' Tc=32.2 min CN=36 Runoff=0.35 cfs 2,571 cf

Reach PDA-200: POI-2 Inflow=30.93 cfs 74,109 cf
Outflow=30.93 cfs 74,109 cf

Pond 2P: UG-1 Peak Elev=47.67' Storage=4,023 cf Inflow=5.34 cfs 12,892 cf
Discarded=0.21 cfs 9,099 cf Primary=2.83 cfs 3,786 cf Outflow=3.05 cfs 12,885 cf

Total Runoff Area = 305,688 sf Runoff Volume = 139,553 cf Average Runoff Depth = 5.48"
44.22% Pervious = 135,186 sf 55.78% Impervious = 170,502 sf

C-DAT-2001236-HYDRO

Type II 24-hr 100-yr Rainfall=8.39"

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Summary for Subcatchment PDA-100: (new Subcat)

Runoff = 23.53 cfs @ 11.96 hrs, Volume= 53,766 cf, Depth> 6.82"

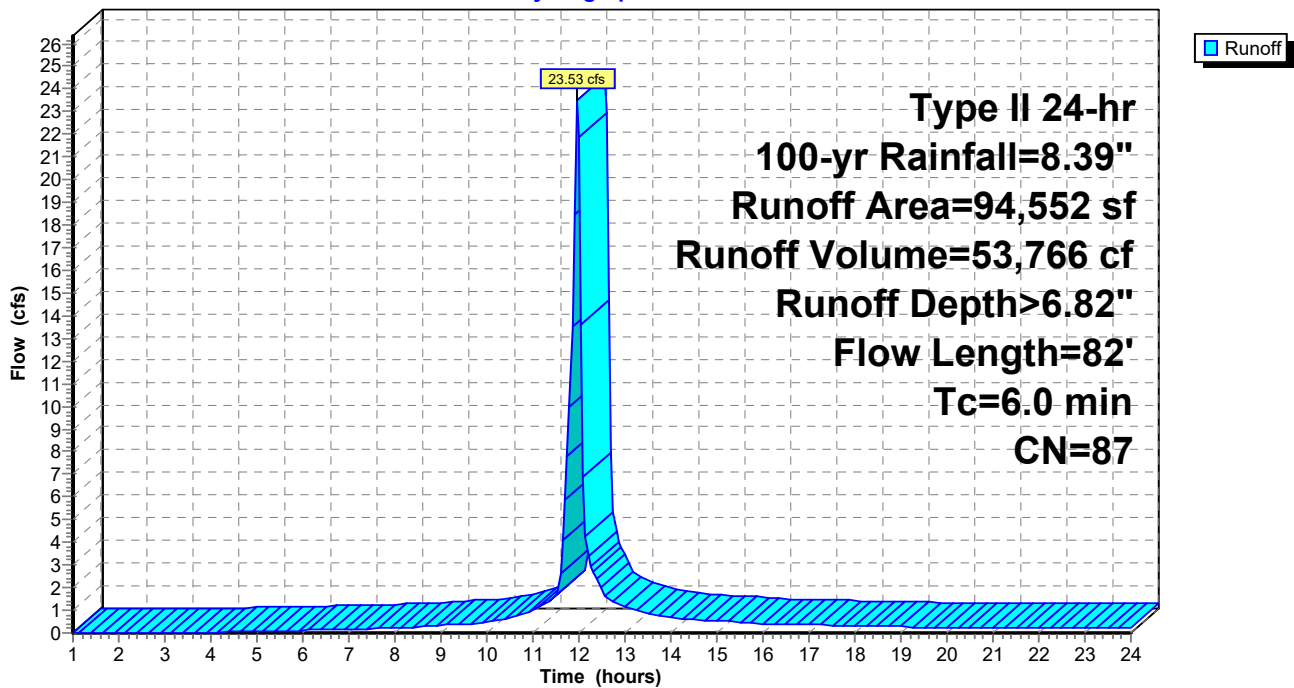
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=8.39"

Area (sf)	CN	Description
19,121	49	50-75% Grass cover, Fair, HSG A
6,034	84	50-75% Grass cover, Fair, HSG D
496	36	Woods, Fair, HSG A
0	79	Woods, Fair, HSG D
68,901	98	Paved parking, HSG A
94,552	87	Weighted Average
25,651		27.13% Pervious Area
68,901		72.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	55	0.0363	0.20		Sheet Flow, grass to pavement Grass: Short n= 0.150 P2= 3.48"
0.1	27	0.0560	4.80		Shallow Concentrated Flow, to cb Paved Kv= 20.3 fps
4.7	82	Total, Increased to minimum Tc = 6.0 min			

Subcatchment PDA-100: (new Subcat)

Hydrograph



C-DAT-2001236-HYDRO

Type II 24-hr 100-yr Rainfall=8.39"

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Summary for Subcatchment PDA-201: (new Subcat)

Runoff = 30.80 cfs @ 11.99 hrs, Volume= 70,323 cf, Depth> 5.51"

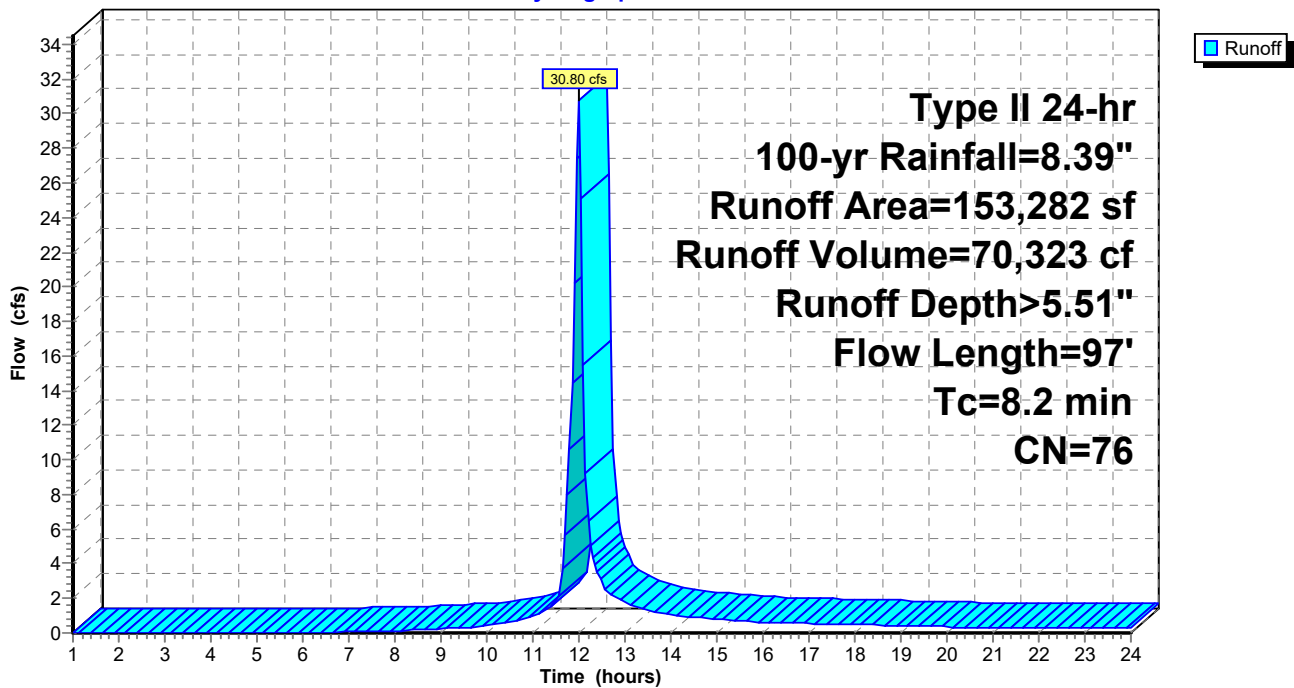
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
 Type II 24-hr 100-yr Rainfall=8.39"

Area (sf)	CN	Description
52,321	49	50-75% Grass cover, Fair, HSG A
4,240	84	50-75% Grass cover, Fair, HSG D
12,046	36	Woods, Fair, HSG A
0	79	Woods, Fair, HSG D
84,675	98	Paved parking, HSG A
153,282	76	Weighted Average
68,607		44.76% Pervious Area
84,675		55.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	41	0.0487	0.10		Sheet Flow, woods to grass Woods: Light underbrush n= 0.400 P2= 3.48"
1.1	56	0.0150	0.86		Shallow Concentrated Flow, grass Short Grass Pasture Kv= 7.0 fps
8.2	97	Total			

Subcatchment PDA-201: (new Subcat)

Hydrograph



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Type II 24-hr 100-yr Rainfall=8.39"

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Summary for Subcatchment PDA-202: (new Subcat)

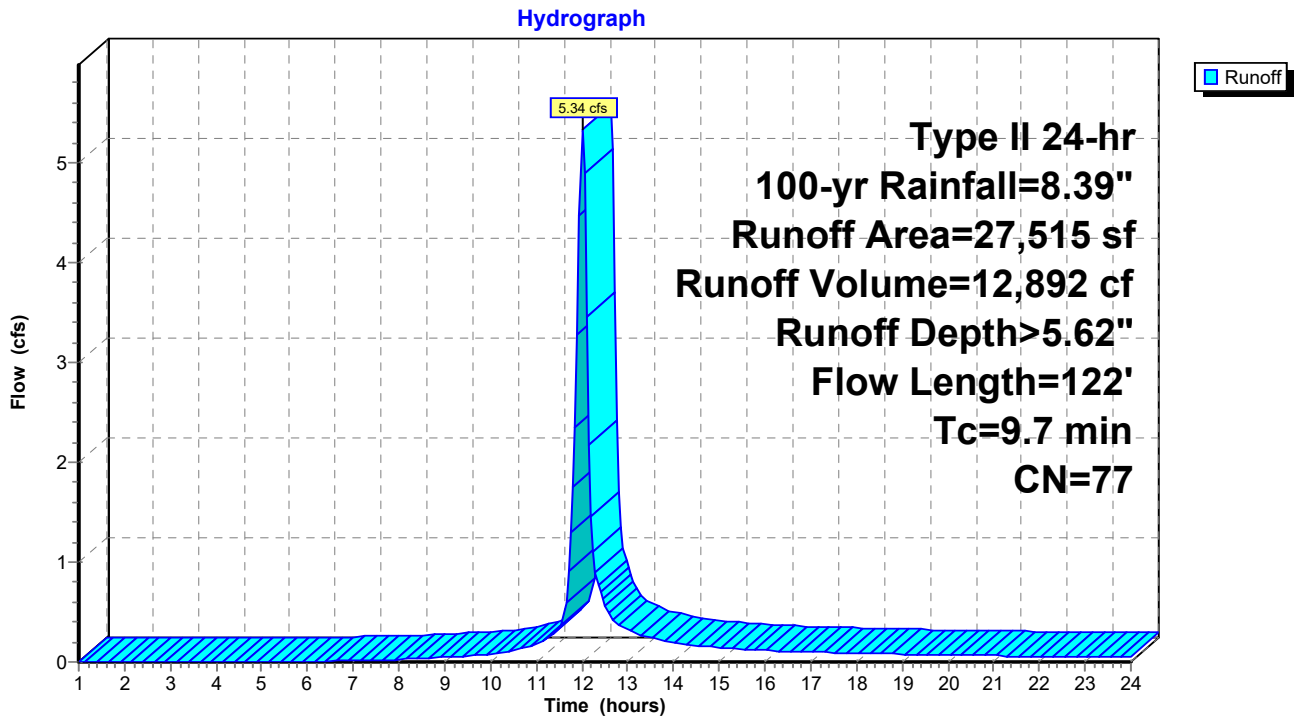
Runoff = 5.34 cfs @ 12.01 hrs, Volume= 12,892 cf, Depth> 5.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=8.39"

Area (sf)	CN	Description
5,019	49	50-75% Grass cover, Fair, HSG A
0	84	50-75% Grass cover, Fair, HSG D
5,570	36	Woods, Fair, HSG A
0	79	Woods, Fair, HSG D
16,926	98	Paved parking, HSG A
27,515	77	Weighted Average
10,589		38.48% Pervious Area
16,926		61.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	57	0.0487	0.10		Sheet Flow, woods to pavement Woods: Light underbrush n= 0.400 P2= 3.48"
0.5	65	0.0129	2.31		Shallow Concentrated Flow, to cb Paved Kv= 20.3 fps
9.7	122	Total			

Subcatchment PDA-202: (new Subcat)



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Type II 24-hr 100-yr Rainfall=8.39"

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Summary for Subcatchment PDA-300: (new Subcat)

Runoff = 0.35 cfs @ 12.37 hrs, Volume= 2,571 cf, Depth> 1.02"

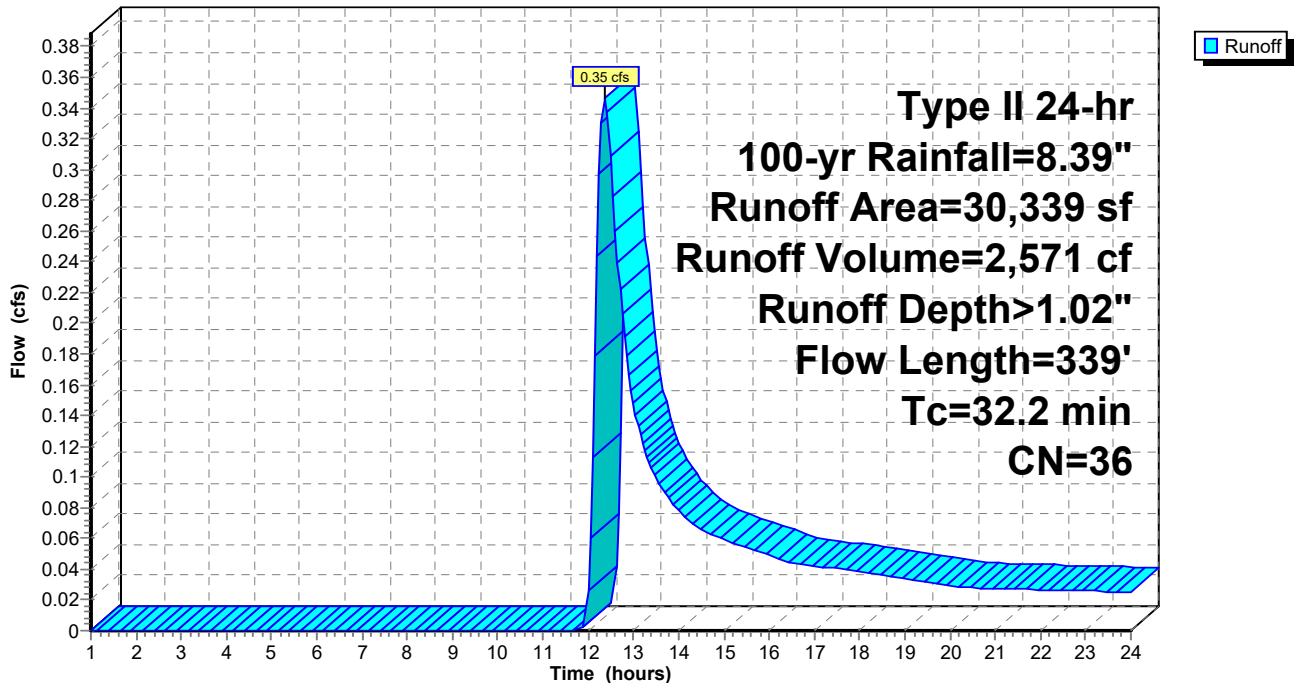
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=8.39"

Area (sf)	CN	Description
680	49	50-75% Grass cover, Fair, HSG A
0	84	50-75% Grass cover, Fair, HSG D
29,659	36	Woods, Fair, HSG A
0	79	Woods, Fair, HSG D
0	98	Paved parking, HSG A
30,339	36	Weighted Average
30,339		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.2	100	0.0100	0.06		Sheet Flow, woods Woods: Light underbrush n= 0.400 P2= 3.48"
5.0	239	0.0258	0.80		Shallow Concentrated Flow, woods Woodland Kv= 5.0 fps
32.2	339	Total			

Subcatchment PDA-300: (new Subcat)

Hydrograph



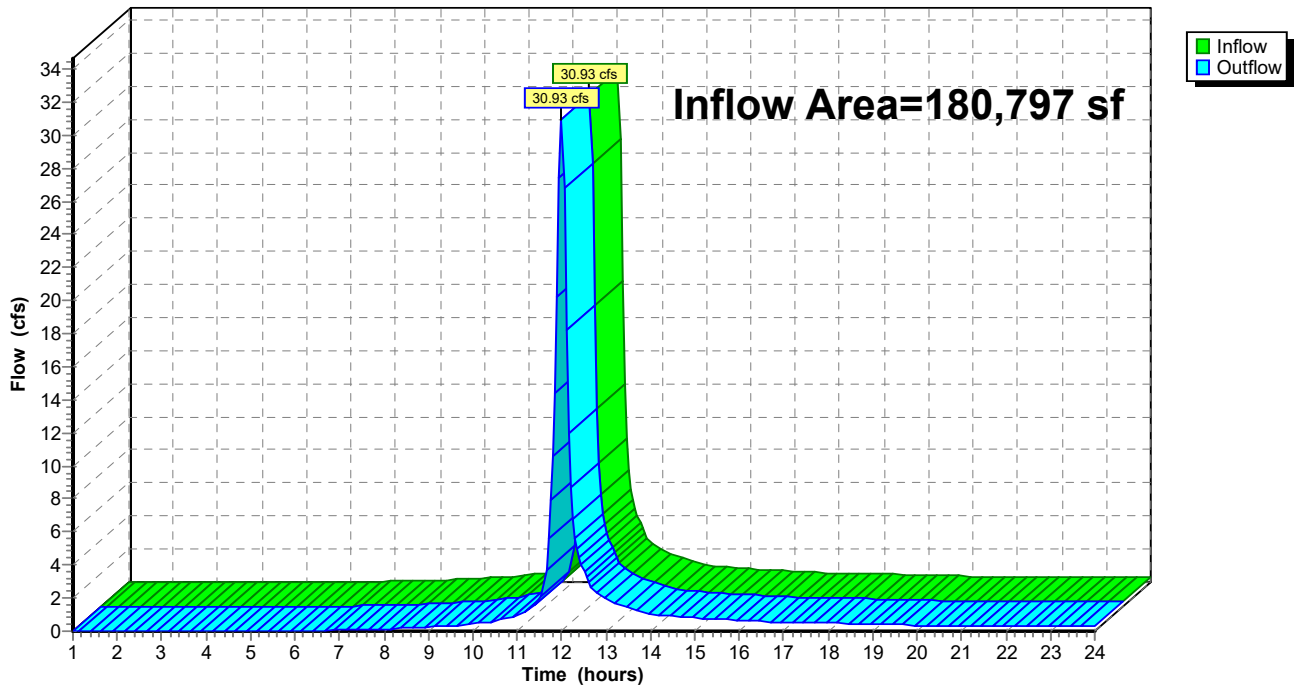
Summary for Reach PDA-200: POI-2

Inflow Area = 180,797 sf, 56.20% Impervious, Inflow Depth > 4.92" for 100-yr event
Inflow = 30.93 cfs @ 12.00 hrs, Volume= 74,109 cf
Outflow = 30.93 cfs @ 12.00 hrs, Volume= 74,109 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs

Reach PDA-200: POI-2

Hydrograph



Summary for Pond 2P: UG-1

Inflow Area = 27,515 sf, 61.52% Impervious, Inflow Depth > 5.62" for 100-yr event
 Inflow = 5.34 cfs @ 12.01 hrs, Volume= 12,892 cf
 Outflow = 3.05 cfs @ 12.12 hrs, Volume= 12,885 cf, Atten= 43%, Lag= 6.9 min
 Discarded = 0.21 cfs @ 11.20 hrs, Volume= 9,099 cf
 Primary = 2.83 cfs @ 12.12 hrs, Volume= 3,786 cf

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 47.67' @ 12.12 hrs Surf.Area= 1,823 sf Storage= 4,023 cf

Plug-Flow detention time= 84.2 min calculated for 12,858 cf (100% of inflow)
 Center-of-Mass det. time= 83.7 min (890.7 - 807.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	44.25'	1,563 cf	20.83'W x 87.50'L x 3.54'H Field A 6,456 cf Overall - 2,548 cf Embedded = 3,908 cf x 40.0% Voids
#2A	44.75'	2,548 cf	Cultec R-330XLHD x 48 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 4 rows
		4,111 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	44.25'	5.000 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	46.29'	12.0" Round Culvert L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 46.29' / 46.20' S= 0.0090 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Discarded OutFlow Max=0.21 cfs @ 11.20 hrs HW=44.29' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.21 cfs)

Primary OutFlow Max=2.71 cfs @ 12.12 hrs HW=47.61' (Free Discharge)

↑2=Culvert (Inlet Controls 2.71 cfs @ 3.45 fps)

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Type II 24-hr 100-yr Rainfall=8.39"

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Pond 2P: UG-1 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)

Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf

Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap

Row Length Adjustment= +1.50' x 7.45 sf x 4 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

12 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 85.50' Row Length +12.0" End Stone x 2 = 87.50' Base Length

4 Rows x 52.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.83' Base Width

6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

48 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 4 Rows = 2,548.2 cf Chamber Storage

6,456.2 cf Field - 2,548.2 cf Chambers = 3,907.9 cf Stone x 40.0% Voids = 1,563.2 cf Stone Storage

Chamber Storage + Stone Storage = 4,111.4 cf = 0.094 af

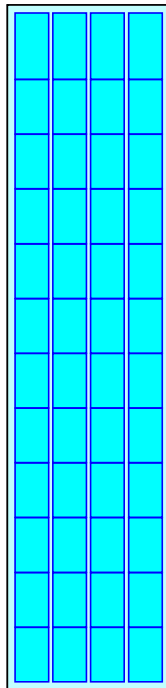
Overall Storage Efficiency = 63.7%

Overall System Size = 87.50' x 20.83' x 3.54'

48 Chambers

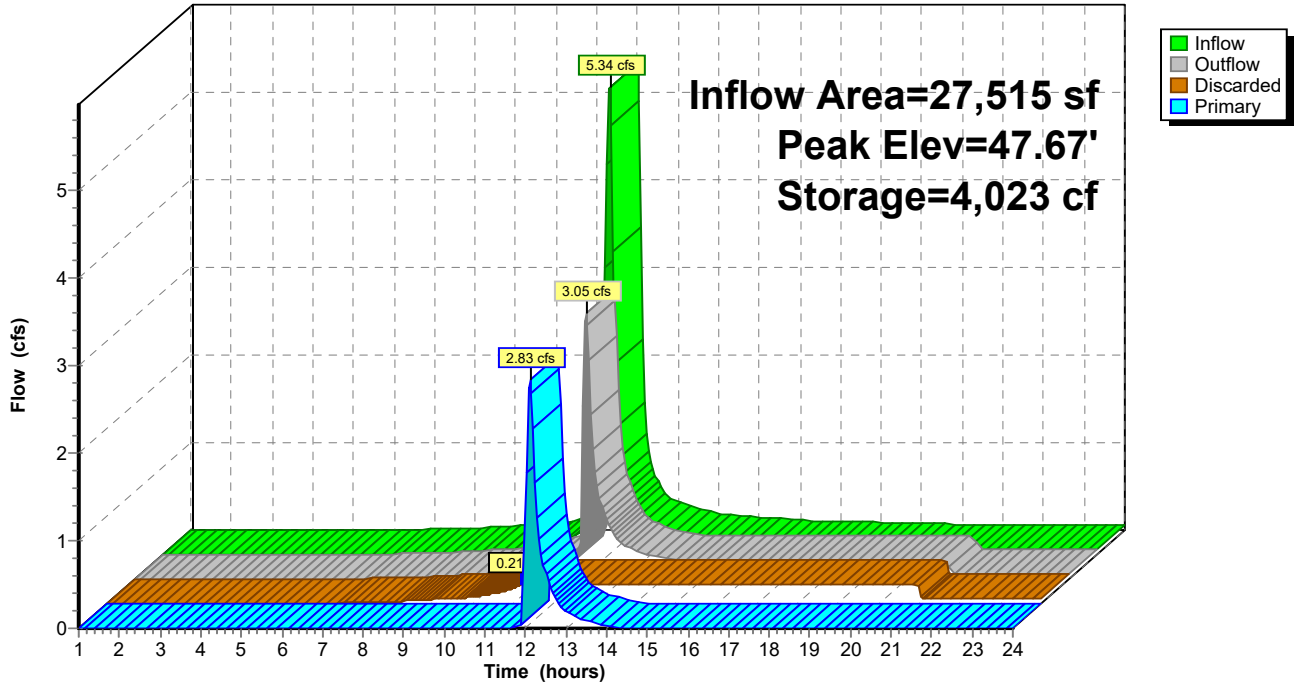
239.1 cy Field

144.7 cy Stone



Pond 2P: UG-1

Hydrograph



APPENDIX C

WATER QUALITY CALCULATIONS

Treatment Train Efficiency Worksheet

Water Quality Volume and Water Quality Flow Calculations

Pond Storage Tables

Best Management Practice (BMP) Treatment Train Efficiency Worksheet

Prepared for: Town of North Haven
 Proposed Development
 404 & 412 Washington Ave
 North Haven, Connecticut

Prepared by:
 BL Companies
 355 Research Parkway
 Meriden, Connecticut

Date prepared:
 January 8, 2021

Overall Site Treatment Train Efficiency

$$Et = [1 - (1 - E1)(1 - E2)(1 - E3)(1 - E4)(1 - E?)] * 100$$

<u>BMP</u>	<u>BMP Description</u>	<u>Type of Treatment</u>	<u>Efficiency Rate %</u>
E1	Deep Sump Hooded Catch Basin	Primary	25
E2	Hydrodynamic Separator**	Primary	80

Overall Treatment Train Efficiency (Et)=

85 % Total Suspended Solids (TSS) Removal

* 80% require per CT DEP
 ** Manufacturers claim 80% TSS removal
 *** Schueler 1996 & EPA 1993
 **** University of New Hampshire

Water Quality Volume (WQV) & Water Quality Flow (WQF) PDA-202

PROJECT Proposed Development
 DATE 1/8/2021
 ADDRESS 404 & 412 Washington Ave, North Haven, CT

WATER QUALITY VOLUME (WQV) CALCULATION

Area (A) = 27515.00 square feet
 Area (A) = 0.63 acres
 Area (A) = 0.00099 square miles
 Design Precipitation (P) = 1 inch
 % Impervious Cover (I) = 61.50
 Volumetric Runoff Coefficient (R) = 0.604

WQV =	0.032	ac-ft
	1383.77	cu-ft

WATER QUALITY FLOW (WQF) CALCULATION

RUNOFF CURVE NUMBER (CN)

Runoff Depth (Q) = 0.604 inches
 CN = 96 Figure 2-1 (SWQM)

TIME OF CONCENTRATION (Tc), 10 minute minimum

Tc = 9.7 min
 Tc = 0.16 hours

Initial Abstraction (I_a) = 0.083 Table 4-1 (SWQM)
 I_a/P Calculation = 0.083
 Unit Peak Discharge (q_u) = 625 Exhibit 4-111 (SWQM)

WQF =	0.37	cfs
--------------	-------------	------------

Summary for Pond 2P: UG-1

Inflow Area = 27,515 sf, 61.52% Impervious, Inflow Depth > 1.41" for 2-yr event
 Inflow = 1.36 cfs @ 12.02 hrs, Volume= 3,238 cf
 Outflow = 0.21 cfs @ 11.80 hrs, Volume= 3,236 cf, Atten= 85%, Lag= 0.0 min
 Discarded = 0.21 cfs @ 11.80 hrs, Volume= 3,236 cf
 Primary = 0.00 cfs @ 1.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 45.17' @ 12.39 hrs Surf.Area= 1,823 sf Storage= 1,001 cf

Plug-Flow detention time= 31.4 min calculated for 3,236 cf (100% of inflow)
 Center-of-Mass det. time= 31.0 min (877.3 - 846.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	44.25'	1,563 cf	20.83'W x 87.50'L x 3.54'H Field A 6,456 cf Overall - 2,548 cf Embedded = 3,908 cf x 40.0% Voids
#2A	44.75'	2,548 cf	Cultec R-330XLHD x 48 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 4 rows
		4,111 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	44.25'	5.000 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	46.29'	12.0" Round Culvert L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 46.29' / 46.20' S= 0.0090 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Discarded OutFlow Max=0.21 cfs @ 11.80 hrs HW=44.30' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.21 cfs)

Primary OutFlow Max=0.00 cfs @ 1.00 hrs HW=44.25' (Free Discharge)

↑2=Culvert (Controls 0.00 cfs)

C-DAT-2001236-HYDRO

Type II 24-hr 2-yr Rainfall=3.48"

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Pond 2P: UG-1 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)

Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf

Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap

Row Length Adjustment= +1.50' x 7.45 sf x 4 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

12 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 85.50' Row Length +12.0" End Stone x 2 = 87.50' Base Length

4 Rows x 52.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.83' Base Width

6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

48 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 4 Rows = 2,548.2 cf Chamber Storage

6,456.2 cf Field - 2,548.2 cf Chambers = 3,907.9 cf Stone x 40.0% Voids = 1,563.2 cf Stone Storage

Chamber Storage + Stone Storage = 4,111.4 cf = 0.094 af

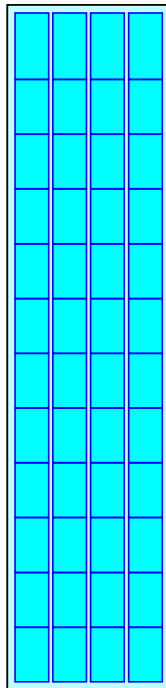
Overall Storage Efficiency = 63.7%

Overall System Size = 87.50' x 20.83' x 3.54'

48 Chambers

239.1 cy Field

144.7 cy Stone



Stage-Area-Storage for Pond 2P: UG-1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
44.25	1,823	0	46.85	1,823	3,344
44.30	1,823	36	46.90	1,823	3,399
44.35	1,823	73	46.95	1,823	3,452
44.40	1,823	109	47.00	1,823	3,502
44.45	1,823	146	47.05	1,823	3,550
44.50	1,823	182	47.10	1,823	3,595
44.55	1,823	219	47.15	1,823	3,638
44.60	1,823	255	47.20	1,823	3,678
44.65	1,823	292	47.25	1,823	3,716
44.70	1,823	328	47.30	1,823	3,753
44.75	1,823	365	47.35	1,823	3,789
44.80	1,823	442	47.40	1,823	3,826
44.85	1,823	519	47.45	1,823	3,862
44.90	1,823	596	47.50	1,823	3,899
44.95	1,823	672	47.55	1,823	3,935
45.00	1,823	749	47.60	1,823	3,972
45.05	1,823	825	47.65	1,823	4,008
45.10	1,823	901	47.70	1,823	4,045
45.15	1,823	978	47.75	1,823	4,081
45.20	1,823	1,054			
45.25	1,823	1,130			
45.30	1,823	1,206			
45.35	1,823	1,281			
45.40	1,823	1,356			
45.45	1,823	1,431			
45.50	1,823	1,505			
45.55	1,823	1,579			
45.60	1,823	1,653			
45.65	1,823	1,727			
45.70	1,823	1,800			
45.75	1,823	1,874			
45.80	1,823	1,947			
45.85	1,823	2,020			
45.90	1,823	2,093			
45.95	1,823	2,166			
46.00	1,823	2,238			
46.05	1,823	2,309			
46.10	1,823	2,380			
46.15	1,823	2,450			
46.20	1,823	2,519			
46.25	1,823	2,588			
46.30	1,823	2,656			
46.35	1,823	2,723			
46.40	1,823	2,790			
46.45	1,823	2,855			
46.50	1,823	2,920			
46.55	1,823	2,984			
46.60	1,823	3,047			
46.65	1,823	3,109			
46.70	1,823	3,170			
46.75	1,823	3,229			
46.80	1,823	3,287			



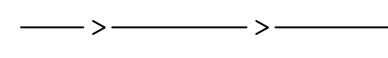



APPENDIX D

DRAINAGE MAPS

ED-1 – Existing Drainage Area Mapping

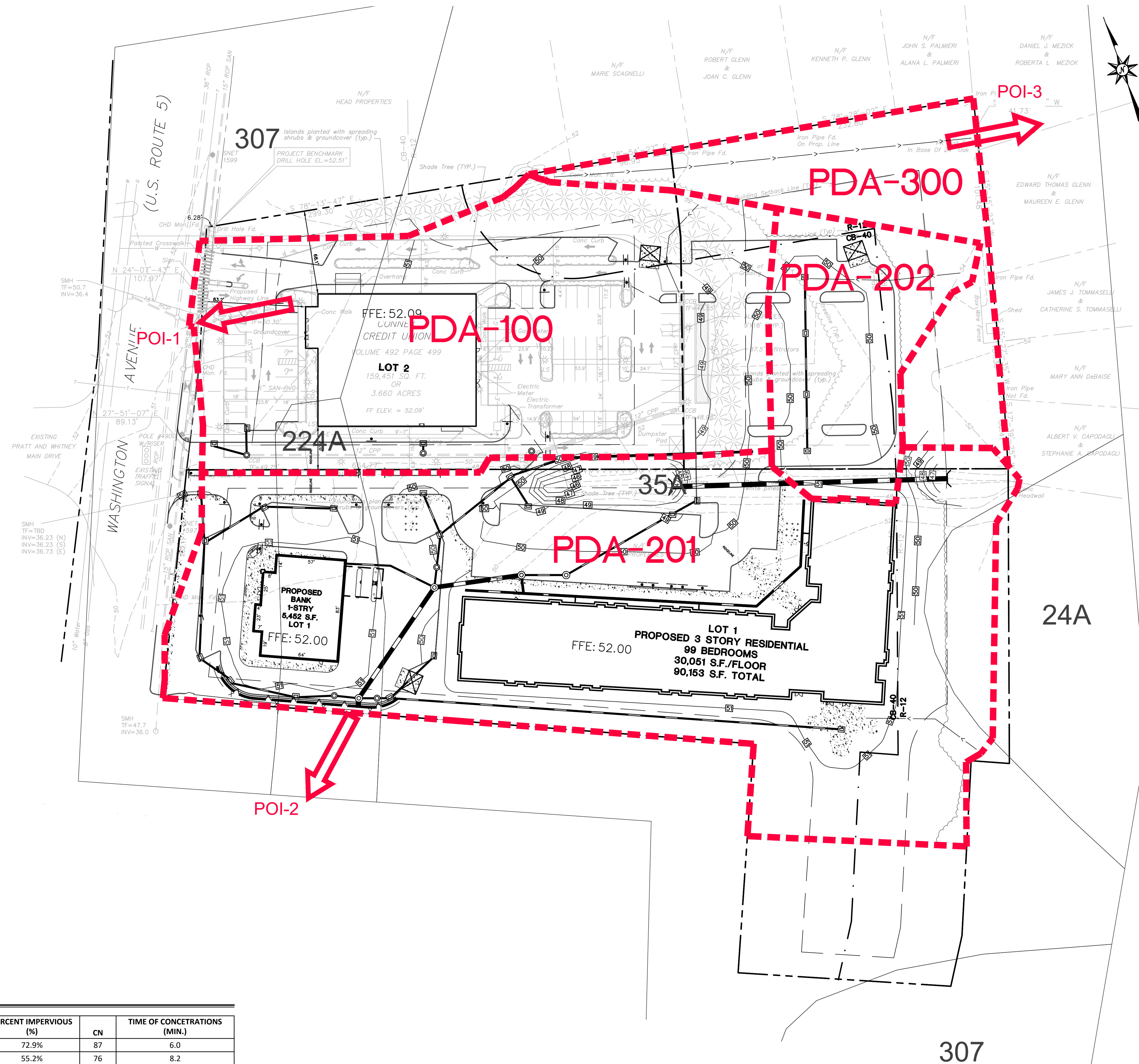
PD-1 – Proposed Drainage Area Mapping

LEGEND

-  PROPERTY LINE
-  EXISTING DRAINAGE AREA BOUNDARY
-  TIME OF CONCENTRATION FLOW PATH
-  POI-1 POINT OF INTEREST
-  CN CURVE NUMBER
-  Tc TIME OF CONCENTRATION

24A	DEERFIELD LOAMY FINE SAND, 0 TO 3 PERCENT SLOPES (HSG A)
35A	PENWOOD LOAMY SAND, 0 TO 3 PERCENT SLOPES (HSG A)
224A	DEERFIELD-URBAN LAND COMPLEX, 0 TO 3 PERCENT SLOPES (HSG A)
307	URBAN LAND (HSG D)
SOIL TYPE DELINEATION	

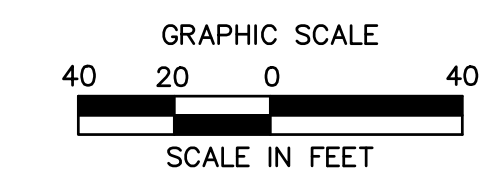
THE FOLLOWING IS CONSIDERED "IMPERVIOUS AREA": BITUMINOUS DRIVEWAYS, BITUMINOUS WALKS, BITUMINOUS CURB, CONCRETE DRIVEWAYS, CONCRETE WALKS, CONCRETE PADS, CONCRETE CURB AND BUILDINGS.



PROPOSED HYDROLOGY INFORMATION

DRAINAGE AREA	TOTAL AREA (S.F.)	IMPERVIOUS AREA (S.F.)	PERVIOUS AREA (S.F.)	PERCENT IMPERVIOUS (%)	CN	TIME OF CONCENTRATIONS (MIN.)
PDA-100	94,552	68,901	25,651	72.9%	87	6.0
PDA-201	153,282	84,675	68,607	55.2%	76	8.2
PDA-202	27,515	16,926	10,589	61.5%	77	9.7
PDA-300	30,339	0	30,339	0.0%	36	32.2

**FOR PERMITTING PURPOSES ONLY
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1/10/2021 - 1:00:00 PM - C:\Users\jld\OneDrive\Documents\200123601\DWG\PD1_1.PLOT.DWG

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