

Stormwater Management Report

For the Proposed:

Existing FedEx Ground Hub Parking Expansion

Located at:

49 FedEx Drive
Middletown, Connecticut

Prepared for Submission to:

City of Middletown, Connecticut

February 19, 2021

Revised May 14, 2021

Prepared for:

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Executive Summary

This report has been prepared in support of an application for land use permits from the City of Middletown and the State of Connecticut for the proposed parking area expansion project of the existing FedEx Ground Hub at 49 FedEx Drive. The existing property is approximately 205 acres in size and is currently developed with a ±500,000 square foot distribution hub building and associated impervious paved parking and drive aisle areas. Proposed site improvements consist of paved employee and trailer parking area expansions, stormwater management utilities, fire water utilities, site lighting, and landscaping. The site is located in the Interstate Trade (IT) zone.

The subject parcel spans from Middle Street to Industrial Park Road. The site currently operates as a hub building for FedEx Ground Package Systems. This project is for minor modifications to the employee parking area and trailer parking areas on site for better utilization of the site and the operations of the user. The proposed development will provide an additional connection between the parking lot on Middle Street for employee vehicles only. There will be no additional tractor trailer trips or driveways needed.

The property is bordered by Industrial Park Road and Interstate 91 to the east, residential properties to the north and northwest, and commercial properties to the west and south. There are substantial wetlands located on the property associated with the Mattabesset River and Sawmill Brook, for which detail can be found within the Wetland Identification and Delineation Report. There are no known vernal pools on or adjacent to the proposed development. No direct impact to any wetland system is proposed, however work will occur within a very small portion of the 100' upland review area.

The property is partially located within a mapped area on the State of Connecticut Department of Energy and Environmental Protection (CTDEEP) Natural Diversity Database (NDDDB). The NDDDB has determined that all work associated with this project will not negatively impact any state-listed species. Portions of the site are located in FEMA designated zones Floodway AE, Floodplain AE (100-year floodplain), and Zone X (500-year floodplain) per the FEMA Flood Insurance Rate Map Number 09007C0102G for Middlesex County, Connecticut, map revised on August 28, 2008. A copy of the FEMA Flood Insurance Rate Map has been included in Appendix A for reference. No construction or disturbance is proposed in flood hazard areas.

The site generally slopes from the east and west toward Sawmill Brook which flows from south to north toward the Mattabesset River. Extensive stormwater management facilities have been installed onsite as part of the original hub building and parking area construction consisting of a series of underground stormwater detention systems and above ground stormwater management basins connected by underground stormwater piping. Site-wide stormwater quality has previously

been addressed through installation of best management practices (BMPs) sized by the appropriate water quality volume or water quality flow criteria. This proposed project will continue to utilize the BMPs currently installed on site, calculations have been provided to ensure that all structures are adequately sized to accept any increase in peak flow generated by additional impervious surfaces. Numerous BMPs have been incorporated into the project design to address stormwater quality and include various elements including deep sump hooded catch basins, hydrodynamic separators, and underground detention systems. These features will provide the minimum required 80% TSS removal as required in the CT Stormwater Quality Manual.

A HydroCAD model, using TR-55 methodology, was developed to evaluate the existing and proposed drainage conditions of the property. The results of the analyses demonstrate that there will be a decrease in peak stormwater runoff rates directed offsite to the south through the existing outbound lot underground detention system for the 2-, 10-, 25-year, and 100-year storms events under the developed site conditions. There will be a slight increase in peak flow of less than 1% greater than the existing condition peak flows directed to the north through the existing northern stormwater pond, this increase is negligible and will not pose any adverse impacts to the existing stormwater systems or downstream areas. The proposed stormwater management systems are designed to be in compliance with the current City of Middletown Regulations, the 2002 State of Connecticut Guidelines for Soil Erosion and Sediment Control, and the 2004 Connecticut Stormwater Quality Manual by the Connecticut Department of Environmental Protection (now the Connecticut Department of Energy and Environmental Protection – CTDEEP).

Existing Site Hydrologic Conditions and Drainage Patterns

General Site Information

The project parcel is currently developed, consisting of partially of impervious building and paved areas with considerable areas of lawn, and wooded groundcover remaining. There are formal stormwater management systems currently located on site which convey water to the Sawmill Brook and associated wetlands. No modifications to the existing stormwater management systems are proposed, and they will continue to function as they do currently with no adverse effects from the proposed construction. The drainage areas and design points analyzed encompass the areas of runoff that will be impacted by proposed construction.

The site soils identified by the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) consist of urban land in the employee lot area and a variety of silt loam and sandy loam soils in the area of the employee lot. Site soils have hydrologic soil group ratings of B, C, and D. Please refer to the USDA NRCS Hydrologic Soil Group Map included in Appendix A for additional information.

Existing Drainage Patterns

The existing hydrologically modeled drainage areas total 116.6 acres and are 61.4% impervious. Stormwater runoff from the development area is divided into three design points (DPs). A portion of the employee lot area sheet flows to the west into the Middle Street gutter (DP-1), the remaining portion is captured in the existing onsite employee lot stormwater management systems and directed to the exiting employee lot underground detention system. From the existing employee lot underground detention system, stormwater then flows to the east into the existing outbound lot underground detention system and eventually discharges to the Southern Wetland (DP-2). The existing outbound lot underground detention system also receives runoff from the majority of the building roof and paved trailer parking areas south of the building. Stormwater runoff from the northern site area drains to the north to the existing sediment forebay and stormwater pond system, and eventually discharges to the Northern Wetland (DP-3).

The following is a brief analysis of the drainage areas contributing to the existing design points as shown on the enclosed Existing Drainage Mapping (ED-1), in Appendix D.

Existing Drainage Area 10 (EDA-10): The Existing Drainage Area 10 collects stormwater from a 0.9-acre portion of the hydrologically modeled area and is 6.0% impervious. EDA-10 consists of the area of the employee lot site from which stormwater runoff flows offsite to the west into the

Middle Street Gutter (DP-1). This drainage area contains mainly of lawn surface cover with a small portion of impervious paved roadway.

Existing Drainage Area 20 (EDA-20): The Existing Drainage Area 20 collects stormwater from a 34.3-acre portion of the hydrologically modeled area and is 87.4% impervious. EDA-20 consists of the area south of the main hub building and the majority of the building roof area which drains to the existing outbound lot underground detention system, and eventually discharged to the Southern Wetland (DP-2). This drainage area contains mainly of impervious paved trailer lot and building roof area, with smaller areas of pervious lawn cover.

Existing Drainage Area 21 (EDA-21): The Existing Drainage Area 21 collects stormwater from a 6.3-acre portion of the hydrologically modeled area and is 70.9% impervious. EDA-21 consists of the area of the employee lot site from which stormwater runoff flows into the existing employee lot underground stormwater detention system, then into the existing outbound lot underground detention system, and eventually discharged to the Southern Wetland (DP-2). This drainage area contains mainly of paved drive aisle and parking surface with a smaller portion of lawn.

Existing Drainage Area 22 (EDA-22): The Existing Drainage Area 22 collects stormwater from a 16.7-acre portion of the hydrologically modeled area and is 38.1% impervious. EDA-22 consists of the offsite area southwest of the main hub site. Stormwater runoff from this parcel, developed with the Aetna Data Center building, flows to the east and is intercepted by FedEx stormwater facilities which drain to the existing outbound lot underground detention system, and eventually discharged to the Southern Wetland (DP-2). This drainage area contains mainly of pervious lawn cover with portions of impervious pavement and building roof area.

Existing Drainage Area 30 (EDA-30): The Existing Drainage Area 30 collects stormwater from a 34.0-acre portion of the hydrologically modeled area and is 80.8% impervious. EDA-30 consists of the area north of the main hub building and the remainder of the building roof area which drains to the existing northern sediment forebay and stormwater pond system, and eventually discharged to the Northern Wetland (DP-3). This drainage area contains mainly of impervious paved trailer lot and building roof area, with smaller areas of pervious lawn cover.

Existing Drainage Area 31 (EDA-31): The Existing Drainage Area 31 collects stormwater from an 8.2-acre portion of the hydrologically modeled area and is 32.7% impervious. EDA-31 consists of the area of the northern vehicle maintenance building site from which stormwater runoff flows to the existing northern sediment forebay and stormwater pond system, and eventually discharged to the Northern Wetland (DP-3). This drainage area contains mainly of pervious lawn cover with portions of impervious pavement and building roof area.

Existing Drainage Area 32 (EDA-32): The Existing Drainage Area 32 collects stormwater from a 2.5-acre portion of the hydrologically modeled area and is 5.9% impervious. EDA-32 consists of the area of the northern portion of site from which stormwater runoff flows directly into the existing sediment forebay and stormwater pond system discharging to the Northern Wetland (DP-3). This drainage area contains mainly of pervious lawn with portions of impervious pavement.

Existing Drainage Area 33 (EDA-33): The Existing Drainage Area 33 collects stormwater from a 6.2-acre portion of the hydrologically modeled area and is 4.9% impervious. EDA-33 consists of the area of the northern portion of site from which stormwater runoff bypasses the existing northern sediment forebay and flows into the stormwater pond system, which eventually discharges to the Northern Wetland (DP-3). This drainage area contains mainly of pervious lawn cover with portions of impervious pavement.

Existing Drainage Area 34 (EDA-34): The Existing Drainage Area 34 collects stormwater from a 7.5-acre portion of the hydrologically modeled area and is 1.3% impervious. EDA-34 consists of the area of the northern portion of site from which stormwater runoff flows directly into the stormwater pond system, and eventually discharged to the Northern Wetland (DP-3). This drainage area contains mainly of pervious lawn cover with portions of impervious pavement.

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

Drainage Area / Design Point		Area (acres)	Composite Curve Number	Time of Concentration (minutes)
EDA-10	Area to Middle Street	0.9	85	9.9
EDA-20	Area to Outbound Lot Detention	34.3	96	5.8
EDA-21	Area to Employee Lot Detention	6.3	94	8.2
EDA-22	Offsite Property to Outbound Lot	16.7	87	16.2
EDA-30	Inbound Lot to Sediment Forebay	34.0	95	17.7
EDA-31	Maintenance Area to Sed. Forebay	8.2	86	18.6
EDA-32	Area Direct to Sediment Forebay	2.5	81	13.3
EDA-33	Area Bypassing Forebay to Pond	6.2	80	15.2
EDA-34	Area Direct to Stormwater Pond	7.5	82	12.8

Table 2 – Pre-Development Conditions Peak Flows

Analysis Point	Peak Flow (cfs)			
	2-yr	10-yr	25-yr	100-yr
Design Point 1 – Middle Street Gutter	1.87	3.51	4.53	6.10
Design Point 2 – Southern Wetland	7.57	13.89	28.53	45.93
Design Point 3 – Northern Wetland	71.20	94.01	106.66	124.00

Developed Site Hydrologic Conditions and Drainage Patterns

The proposed hydrologically modeled drainage area totals 116.6 acres and is approximately 64.4% impervious. The existing site stormwater system will continue to provide stormwater detention and water quality improvements utilizing deep sump hooded catch basins, hydrodynamic separators, underground stormwater detention systems, and a sediment forebay. The outlet control structure for the existing outbound lot underground detention system will be modified to reduce the first outlet orifice diameter from 15" to 13" to attenuate increased peak flow from additional impervious surface in the 2, 10, 25, and 100-year storm events to the Southern Wetland (DP-2). A slight and negligible increase in peak flow directed to the Northern Wetland (DP-3) from the existing stormwater pond is anticipated.

The site modeling retained the same Design Points as the existing model. The following is a brief analysis of the proposed drainage areas contributing to the design points as shown on the enclosed Proposed Drainage Mapping (PD-1), in Appendix D

Proposed Drainage Area 100 (PDA-100): The Proposed Drainage Area 100 collects stormwater from a 0.9-acre portion of the hydrologically modeled area and is 9.8% impervious. PDA-100 consists of the area of the employee lot site from which stormwater runoff will continue to flow offsite to the west into the Middle Street Gutter (DP-1). This drainage area contains mainly of lawn surface cover with a small portion of impervious paved roadway.

Proposed Drainage Area 200 (PDA-200): The Proposed Drainage Area 200 collects stormwater from a 34.1-acre portion of the hydrologically modeled area and is 91.0% impervious. PDA-200 consists of the area south of the main hub building and the majority of the building roof area which will continue to drain to the existing outbound lot underground detention system, and eventually discharged to the Southern Wetland (DP-2). This drainage area contains mainly of impervious paved trailer lot and building roof area, with smaller areas of pervious lawn cover. This area contains additional impervious cover from the proposed outbound trailer lot expansion.

Proposed Drainage Area 210 (PDA-210): The Proposed Drainage Area 210 collects stormwater from a 6.12-acre portion of the hydrologically modeled area and is 73.9% impervious. PDA-210 consists of the area of the employee lot site from which stormwater runoff will continue to flow into the existing employee lot underground stormwater detention system, then into the existing outbound lot underground detention system, and eventually discharged to the Southern Wetland (DP-2). This drainage area contains mainly of paved drive aisle and parking surface with a smaller portion of lawn.

Proposed Drainage Area 211 (PDA-211): The Proposed Drainage Area 211 collects stormwater from a 0.4-acre portion of the hydrologically modeled area and is 83.4% impervious. PDA-211 consists of the area of the employee lot site from which stormwater runoff will bypass the existing employee lot underground stormwater detention system. Stormwater will flow through proposed hydrodynamic separator HDS-10 and then into the existing outbound lot underground detention system, and eventually discharged to the Southern Wetland (DP-2). This drainage area contains mainly of paved drive aisle and parking surface with a smaller portion of lawn. This area contains the majority of the additional impervious cover from the proposed employee lot expansion.

Proposed Drainage Area 220 (PDA-220): The Proposed Drainage Area 220 collects stormwater from a 16.7-acre portion of the hydrologically modeled area and is 38.1% impervious. PDA-220 consists of the offsite area southwest of the main hub site. Stormwater runoff from this parcel, developed with the Aetna Data Center building, flows to the east and is intercepted by FedEx stormwater facilities which drain to the existing outbound lot underground detention system, and eventually discharged to the Southern Wetland (DP-2). This drainage area contains mainly of pervious lawn cover with portions of impervious pavement and building roof area.

Proposed Drainage Area 300 (PDA-300): The Proposed Drainage Area 300 collects stormwater from a 34.0-acre portion of the hydrologically modeled area and is 87.1% impervious. PDA-300 consists of the area north of the main hub building and the remainder of the building roof area which will continue to drain to the existing northern sediment forebay and stormwater pond system, and eventually discharged to the Northern Wetland (DP-3). This drainage area contains mainly of impervious paved trailer lot and building roof area, with smaller areas of pervious lawn cover. This area contains additional impervious cover from the proposed inbound trailer lot expansion.

Proposed Drainage Area 310 (PDA-310): The Proposed Drainage Area 310 collects stormwater from an 8.2-acre portion of the hydrologically modeled area and is 32.7% impervious. PDA-310 consists of the area of the northern vehicle maintenance building site from which stormwater runoff flows to the existing northern sediment forebay and stormwater pond system, and eventually discharged to the Northern Wetland (DP-3). This drainage area contains mainly of pervious lawn cover with portions of impervious pavement and building roof area. This area is entirely unchanged from existing conditions.

Proposed Drainage Area 320 (PDA-320): The Proposed Drainage Area 320 collects stormwater from a 2.5-acre portion of the hydrologically modeled area and is 5.9% impervious. PDA-320 consists of the area of the northern portion of site from which stormwater runoff flows directly into the existing sediment forebay and stormwater pond system discharging to the Northern

Wetland (DP-3). This drainage area contains mainly of pervious lawn with portions of impervious pavement. This area is entirely unchanged from existing conditions.

Proposed Drainage Area 330 (PDA-330): The Proposed Drainage Area 330 collects stormwater from a 6.2-acre portion of the hydrologically modeled area and is 4.9% impervious. PDA-330 consists of the area of the northern portion of site from which stormwater runoff bypasses the existing northern sediment forebay and flows to the stormwater pond, which eventually discharges to the Northern Wetland (DP-3). This drainage area contains mainly of pervious lawn cover with portions of impervious pavement. This area is entirely unchanged from existing conditions.

Proposed Drainage Area 340 (PDA-340): The Proposed Drainage Area 340 collects stormwater from a 7.5-acre portion of the hydrologically modeled area and is 1.3% impervious. PDA-340 consists of the area of the northern portion of site from which stormwater runoff flows directly into the stormwater pond system, and eventually discharged to the Northern Wetland (DP-3). This drainage area contains mainly of pervious lawn cover with portions of impervious pavement. This area is entirely unchanged from existing conditions.

Table 3 – Post-Development (Proposed Conditions) Drainage Characteristics.

Drainage Area / Design Point		Area (acres)	Composite Curve Number	Time of Concentration (minutes)
PDA-100	Area to Middle Street	0.9	85	9.9
PDA-200	Area to Outbound Lot Detention	34.1	97	5.8
EDA-210	Area to Employee Lot Detention	6.1	94	8.2
PDA-211	Area to HDS-10	0.4	96	5.0
PDA-220	Offsite Property to Outbound Lot	16.7	87	16.2
PDA-300	Inbound Lot to Sediment Forebay	34.0	96	17.7
PDA-310	Maintenance Area to Sed. Forebay	8.2	86	18.6
PDA-320	Area Direct to Sediment Forebay	2.5	81	13.3
PDA-330	Area Bypassing Forebay to Pond	6.2	80	15.2
PDA-340	Area Direct to Stormwater Pond	7.5	82	12.8

Table 4 – Post-Development Conditions Peak Flows

Analysis Point	Peak Flow (cfs)			
	2-yr	10-yr	25-yr	100-yr
Design Point 1 – Middle Street Gutter	1.82	3.42	4.41	5.93
Design Point 2 – Southern Wetland	6.44	13.71	27.97	44.04
Design Point 3 – Northern Wetland	71.84	94.39	106.97	124.23

As Table 5 on the next page demonstrates, the proposed stormwater management systems designed for the proposed site development of the subject parcel will result in an overall reduction in the peak discharge of runoff for the 2, 10, 25 and 100-year design storms directed offsite to Design Points 1 and 2. Design Point 3 will receive a negligible increase in peak flow equal to less than 1% of the existing condition flows. The runoff from the proposed development will be captured in a closed drainage system, treated to remove at least 80% TSS. The CTDEEP standard Groundwater Recharge depths are 0.40, 0.25, 0.10 and 0.00 inches for soil grounds A, B, C and D respectively. The ponded volumes of the existing underground detention system and stormwater pond below the first orifice of the outlet control structures are greater than the groundwater recharge volumes required, see Appendix E for the calculations.

Table 5 – Existing vs Proposed Peak Rates of Runoff

	Peak Flow Rate in Cubic Feet per Second (c.f.s.)			
Drainage Area	2-yr	10-yr	25-yr	100-yr
Design Point 1 – Middle Street Gutter				
Existing	1.87	3.51	4.53	6.10
Proposed	1.82	3.42	4.41	5.93
Percent Change	-2.7%	-2.6%	-2.6%	-2.8%
Design Point 2 – Southern Wetland				
Existing	7.57	13.89	28.53	45.93
Proposed	6.44	13.71	27.97	44.04
Percent Change	-14.9%	-1.3%	-2.0%	-4.1%
Design Point 3 – Northern Wetland				
Existing	71.20	94.01	106.66	124.00
Proposed	71.84	94.39	106.97	124.23
Percent Change	+0.9%	+0.4%	+0.3%	+0.2%

Hydrologic Analysis Methodology

Hydrologic Modeling of Tributary Drainage Area

The 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 with rainfall depths per NOAA Atlas 14 and Antecedent Moisture Condition II for Middletown were used for the calculation of peak flow rates and volumes (see Table 6 below). The drainage areas, or sub-catchments as labeled by the program, are depicted

by hexagons on the attached drainage diagrams. Pre-development HydroCAD output can be found in Appendix B and Post-development HydroCAD output can be found in Appendix C.

Table 6 – Rainfall Depths per NOAA Atlas 14

Appendix B - 24-hour Rainfall

Return Period	24-hour Rainfall Depth
2-year	3.29"
10-year	5.18"
50-year	6.35"
100-year	8.16"

Stormwater Quality

Along with the reduction of peak stormwater discharge rates, an important element of the proposed drainage system is to improve the quality of stormwater discharge leaving the Property. Per the DEEP 2004 Stormwater Quality Manual “The pollutant reduction criterion is designed to improve the water quality of stormwater discharges by treating a prescribed water quality volume or associated peak flow, referred to as the water quality flow. Most treatment practices described in this Manual use a volume-based sizing criterion. The exceptions are grass drainage channels, proprietary stormwater treatment devices, and flow diversion structures, where a peak flow rate is utilized.” To adhere to the pollution reduction criteria of the manual, numerous Best Management Practices (BMPs) have been implemented in this design. The most basic preventive measure of the stormwater treatment train is to implement regular sweeping of the paved areas and annual cleaning of the catch basin sumps and hydrodynamic separators. The operation and maintenance manuals for each of the three applications will have a standard required pavement sweeping schedule.

All catch basins in new parking and/or paved areas will have a minimum of four-foot deep sumps to collect sediment carried in the runoff. Catch basins in grassed areas will also have four-foot deep sumps. The standard sump required by the CTDOT drainage manual is 2 feet. The additional 2 feet of sump depth will help to remove more sediment from the stormwater runoff. All catch basin outlets will be fitted with ‘hoods’ which remove floating debris and petroleum based contaminants as they float to the surface in the individual catch basin and are impounded in the structure so they can be properly removed during regular maintenance.

A proposed CTDOT approved hydrodynamic separator (HDS-10) will be installed downstream of the proposed employee lot expansion collection system prior to discharge into the existing

outbound lot underground stormwater detention system. This type of unit has been proven to improve stormwater quality and have been designed, analyzed and sized in “in-line” configuration based on the water quality flow (WQF) anticipated and per the 2004 Connecticut Stormwater Quality Manual. The “in-line” hydrodynamic separators have been proven to provide TSS removal rates in excess of the minimum 80%. Water quality flow treatment for the inbound and outbound trailer lot expansions will be provide through utilization of two existing HDS units installed on site. The inbound lot expansion runoff will flow through existing HDS-30 and the outbound lot expansion runoff will flow through existing HDS-20. Water quality flow requirements of all existing and proposed HDS units have been analyzed to confirm their compatibility with proposed flows or increased flow as a result of added impervious surface, please refer to the CTDEEP Water Quality Flow Calculations in Appendix E.

In addition to the WQF, the required sitewide water quality volume (WQV) will also be detained on site. 100% of the required WQV for additional impervious areas per the 2004 Connecticut Stormwater Quality Manual and per the CTDEEP General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities is detained in the ponded volumes beneath the lowest outlet control structure orifice of both the existing outbound lot underground detention system and the existing stormwater pond. Both of these storage structures were over-designed in the original phase of hub construction and contain additional volume to accommodate added runoff from impervious areas to be installed in this expansion project. WQV for the employee lot expansion and outbound lot expansion areas is provided within the existing outbound lot underground detention system. The WQV required for the inbound lot expansion is provided within the existing stormwater pond. Please refer to Appendix E for additional information on WQV and WQF calculations.

Summary

The post-development peak discharge rates to Design Points 1 and 2 for the developed site have been reduced for the 2, 10, 25 and 100-year storm events. The increase in peak flow to design point 3 is less than 1%. The proposed stormwater treatment train will provide clean stormwater discharge while ensuring improved TSS removal efficiency. This system will meet the stormwater quality requirements of the City of Middletown and the State of Connecticut for this project. All stormwater quality and flow requirements set forth in the 2004 CT Stormwater Quality Manual and the CTDEEP General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities will be met by proposed BMPs.

APPENDIX A

LOCATION MAPS

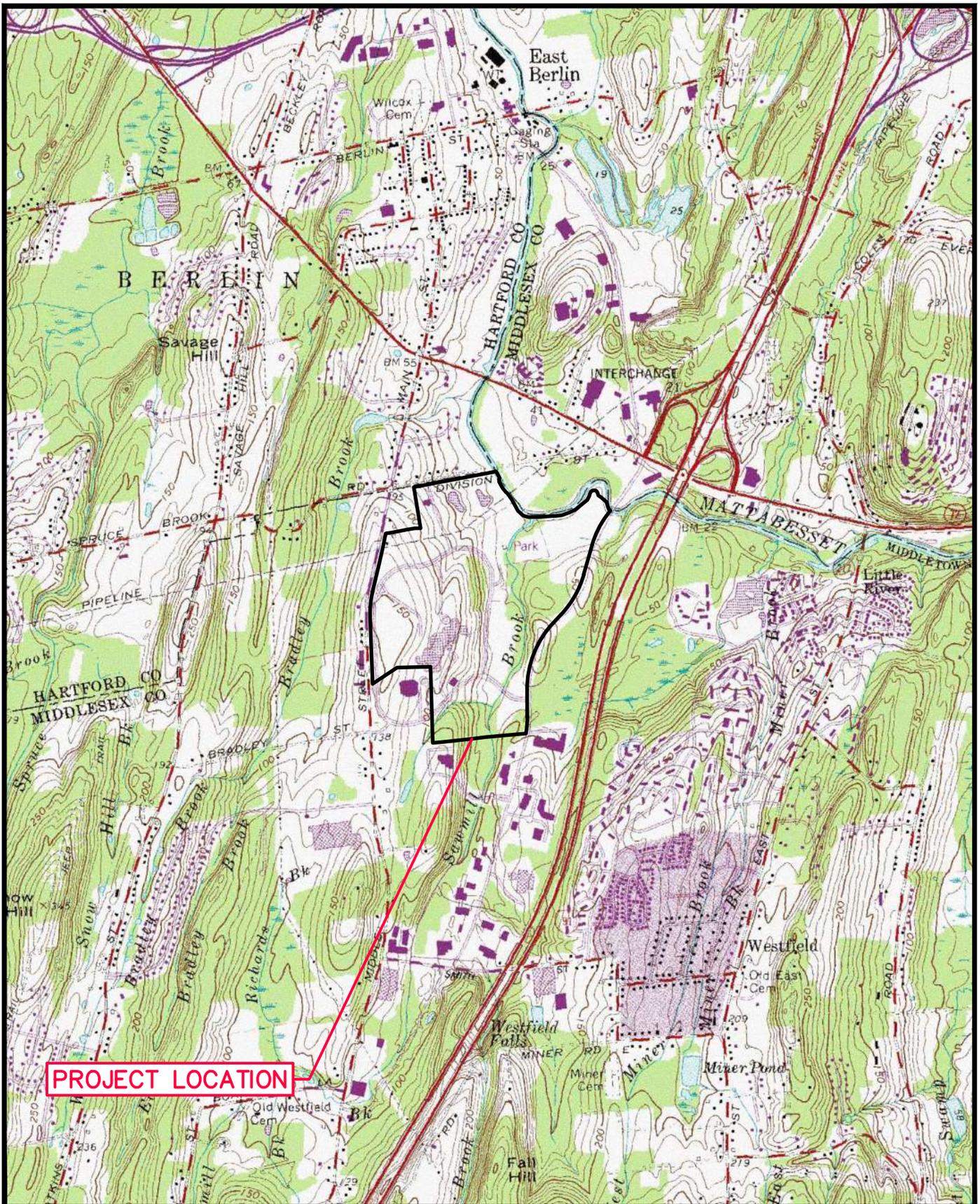
USGS Location Map

Aerial Location Map

NRCS Soil Survey Report

FEMA Federal Insurance Rate Map

NOAA Atlas 14 Storm Data



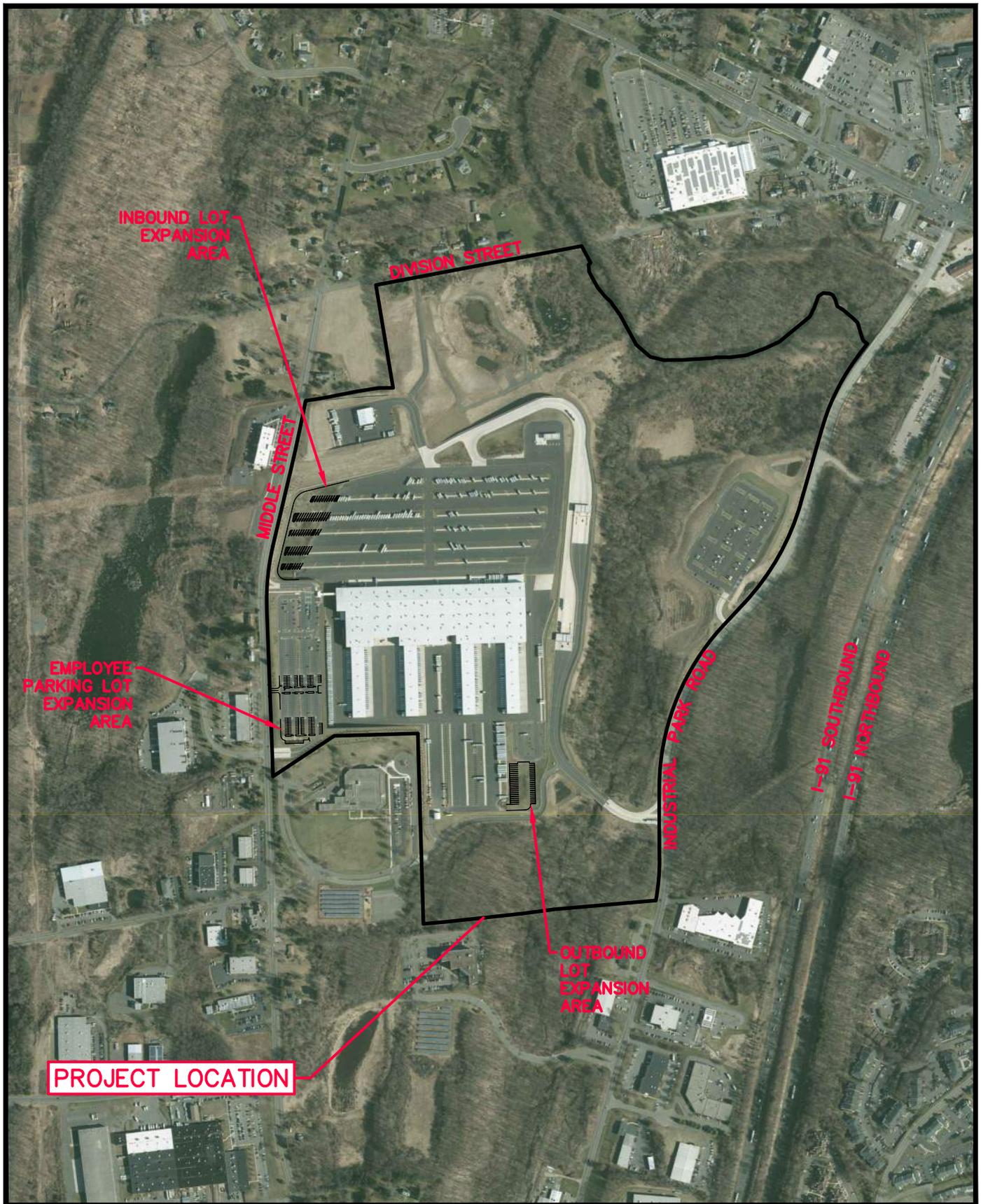
ARCHITECTURE
ENGINEERING
ENVIRONMENTAL
LAND SURVEYING

**EXISTING FEDEX HUB
PARKING EXPANSION**

49 FEDEX DRIVE
MIDDLETOWN, CONNECTICUT

Designed	C.J.L.
Drawn	C.J.L.
Checked	J.A.B.
Approved	M.J.B.
Scale	1"=2,000'
Project No.	2001507
Date	02/19/2021
CAD File	LOC200150701

FIGURE 1
USGS LOCATION MAP



MAP LEGEND

Area of Interest (AOI)		 C
Area of Interest (AOI)		 C/D
		 D
		 Not rated or not available
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		
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.

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: Aug 30, 2019—Oct 15, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
6	Wilbraham and Menlo soils, 0 to 8 percent slopes, extremely stony	C/D	34.0	8.4%
20A	Ellington silt loam, 0 to 5 percent slopes	B	2.8	0.7%
23A	Sudbury sandy loam, 0 to 5 percent slopes	B	3.6	0.9%
30A	Branford silt loam, 0 to 3 percent slopes	B	1.2	0.3%
30B	Branford silt loam, 3 to 8 percent slopes	B	8.1	2.0%
40A	Ludlow silt loam, 0 to 3 percent slopes	C	4.6	1.1%
40B	Ludlow silt loam, 3 to 8 percent slopes	C	31.4	7.8%
42C	Ludlow silt loam, 2 to 15 percent slopes, extremely stony	C	4.8	1.2%
77D	Cheshire-Holyoke complex, 15 to 35 percent slopes, very rocky	B	5.7	1.4%
87B	Wethersfield loam, 3 to 8 percent slopes	C	65.3	16.1%
87C	Wethersfield loam, 8 to 15 percent slopes	C	30.3	7.5%
87D	Wethersfield loam, 15 to 25 percent slopes	C	18.2	4.5%
88B	Wethersfield loam, 3 to 8 percent slopes, very stony	C	2.9	0.7%
102	Pootatuck fine sandy loam	B	15.6	3.8%
104	Bash silt loam	B/D	52.2	12.9%
306	Udorthents-Urban land complex	B	38.0	9.4%
307	Urban land	D	72.9	18.0%
308	Udorthents, smoothed	C	7.7	1.9%
W	Water		5.7	1.4%
Totals for Area of Interest			405.1	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

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The community map repository should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations (BFEs)** and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only to landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Connecticut State Plane (NAD83) Zone 0600. The **horizontal datum** was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of the FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at <http://www.ngs.noaa.gov> or contact the National Geodetic Survey at the following address:

NGS Information Services
 NOAA, NIMS12
 National Geodetic Survey
 SSMC-3, #9202
 1315 East-West Highway
 Silver Spring, MD 20910-3282

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit its website at <http://www.ngs.noaa.gov/>.

Base map information shown on this FIRM was provided in digital format by the Connecticut Department of Environmental Protection. This information was derived from digital orthophotos produced at a scale of 1:12,000 from aerial photography flown in 2004 supplemented with aerial photography from 2000.

This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at <http://www.nsc.fema.gov/>.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA website at <http://www.fema.gov/>.



LEGEND

- SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD**
- The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.
- ZONE A** No Base Flood Elevations determined.
 - ZONE AE** Base Flood Elevations determined.
 - ZONE AH** Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
 - ZONE AO** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
 - ZONE AR** Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently determined. Zone AR indicates that the former flood control system is being removed to provide protection from the 1% annual chance or greater flood.
 - ZONE A99** Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
 - ZONE V** Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
 - ZONE VE** Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.
- FLOODWAY AREAS IN ZONE AE**
- The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.
- OTHER FLOOD AREAS**
- ZONE X** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.
- OTHER AREAS**
- ZONE X** Areas determined to be outside the 0.2% annual chance floodplain.
 - ZONE D** Areas in which flood hazards are undetermined, but possible.
- COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS**
- OTHERWISE PROTECTED AREAS (OPAs)**
- CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.
- 1% annual chance floodplain boundary
 - 0.2% annual chance floodplain boundary
 - Floodway boundary
 - Zone D boundary
 - CBRS and OPA boundary
 - Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
 - Base Flood Elevation line and value; elevation in feet*
 - Base Flood Elevation value where uniform within zone; elevation in feet*
- * Referenced to the North American Vertical Datum of 1988 (NAVD 88)
- Cross section line
 - Transect line
 - Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
 - 1000-meter Universal Transverse Mercator grid, zone 18
 - 5000-foot grid; Connecticut State Plane coordinate system, (NAD83) Zone 0600, Lambert Conformal Conic
 - Bench mark (see explanation in Notes to Users section of this FIRM panel)
 - 1:5 River Mile
- MAP REPOSITORIES
 Refer to Map Repositories list on Map Index
- EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
 August 28, 2008
- EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
- For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.
- To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0102G

FIRM
FLOOD INSURANCE RATE MAP
MIDDLESEX COUNTY,
CONNECTICUT
(ALL JURISDICTIONS)

PANEL 102 OF 450
 (SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:	COMMUNITY	NUMBER	PANEL	SUFFIX
	CROMWELL TOWN OF	090123	0102	G
	MIDDLETOWN CITY OF	090088	0102	G

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER
09007C0102G

EFFECTIVE DATE
AUGUST 28, 2008

Federal Emergency Management Agency



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

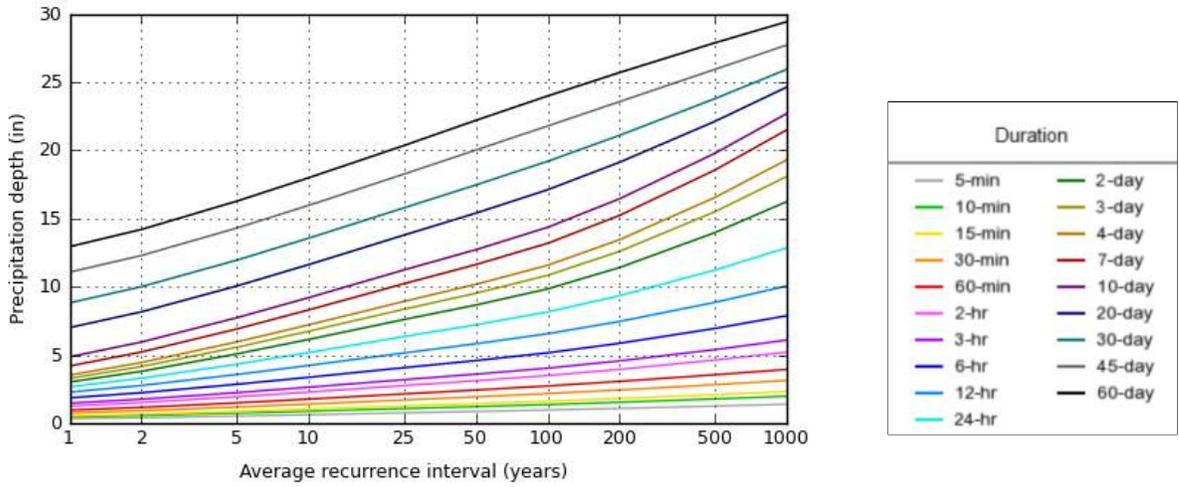
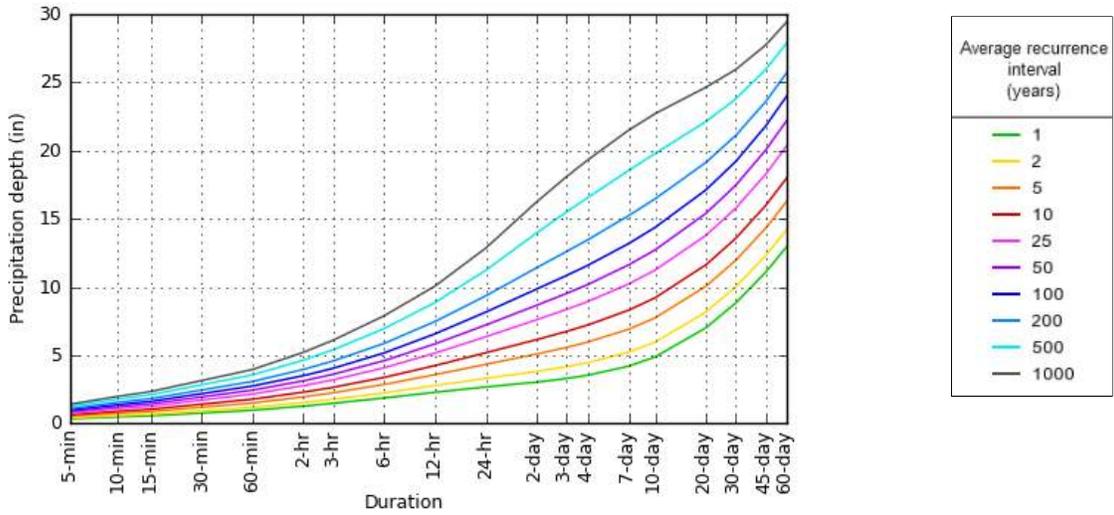
PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.329 (0.259-0.410)	0.402 (0.316-0.502)	0.521 (0.408-0.652)	0.620 (0.482-0.781)	0.756 (0.568-0.998)	0.858 (0.631-1.16)	0.965 (0.689-1.36)	1.08 (0.732-1.56)	1.25 (0.813-1.87)	1.39 (0.882-2.13)
10-min	0.467 (0.367-0.581)	0.570 (0.448-0.711)	0.739 (0.578-0.925)	0.879 (0.683-1.11)	1.07 (0.805-1.41)	1.22 (0.895-1.64)	1.37 (0.976-1.92)	1.54 (1.04-2.21)	1.78 (1.15-2.66)	1.97 (1.25-3.01)
15-min	0.549 (0.432-0.684)	0.670 (0.527-0.836)	0.868 (0.680-1.09)	1.03 (0.804-1.30)	1.26 (0.947-1.66)	1.43 (1.05-1.93)	1.61 (1.15-2.26)	1.81 (1.22-2.60)	2.09 (1.36-3.12)	2.32 (1.47-3.55)
30-min	0.752 (0.591-0.937)	0.914 (0.718-1.14)	1.18 (0.923-1.48)	1.40 (1.09-1.76)	1.70 (1.28-2.25)	1.93 (1.42-2.61)	2.17 (1.55-3.05)	2.44 (1.65-3.51)	2.82 (1.83-4.21)	3.13 (1.98-4.78)
60-min	0.955 (0.751-1.19)	1.16 (0.910-1.44)	1.49 (1.17-1.87)	1.77 (1.37-2.22)	2.15 (1.61-2.83)	2.43 (1.79-3.28)	2.73 (1.95-3.84)	3.07 (2.07-4.41)	3.55 (2.30-5.30)	3.94 (2.49-6.02)
2-hr	1.26 (1.00-1.56)	1.52 (1.20-1.88)	1.93 (1.53-2.40)	2.28 (1.79-2.85)	2.76 (2.10-3.63)	3.11 (2.32-4.19)	3.49 (2.53-4.91)	3.95 (2.68-5.65)	4.63 (3.01-6.88)	5.21 (3.31-7.90)
3-hr	1.47 (1.17-1.80)	1.76 (1.40-2.17)	2.24 (1.78-2.77)	2.64 (2.08-3.28)	3.19 (2.43-4.18)	3.59 (2.69-4.83)	4.03 (2.94-5.67)	4.57 (3.10-6.52)	5.39 (3.51-7.98)	6.10 (3.88-9.21)
6-hr	1.86 (1.49-2.27)	2.23 (1.79-2.73)	2.85 (2.28-3.50)	3.36 (2.67-4.16)	4.07 (3.13-5.30)	4.59 (3.46-6.14)	5.16 (3.78-7.22)	5.86 (4.00-8.31)	6.94 (4.54-10.2)	7.88 (5.03-11.8)
12-hr	2.27 (1.85-2.76)	2.77 (2.24-3.36)	3.57 (2.88-4.35)	4.23 (3.39-5.19)	5.15 (3.99-6.66)	5.82 (4.42-7.74)	6.56 (4.84-9.12)	7.46 (5.12-10.5)	8.86 (5.81-12.9)	10.1 (6.44-15.0)
24-hr	2.67 (2.18-3.21)	3.29 (2.69-3.97)	4.32 (3.52-5.23)	5.18 (4.18-6.30)	6.35 (4.97-8.18)	7.21 (5.52-9.54)	8.16 (6.08-11.3)	9.35 (6.44-13.1)	11.2 (7.39-16.3)	12.9 (8.25-19.1)
2-day	3.02 (2.49-3.61)	3.80 (3.13-4.55)	5.08 (4.17-6.10)	6.14 (5.01-7.42)	7.60 (6.00-9.77)	8.66 (6.71-11.5)	9.85 (7.44-13.7)	11.4 (7.88-15.9)	14.0 (9.23-20.2)	16.2 (10.5-23.9)
3-day	3.29 (2.73-3.91)	4.15 (3.44-4.95)	5.57 (4.59-6.66)	6.74 (5.53-8.11)	8.35 (6.63-10.7)	9.52 (7.41-12.6)	10.8 (8.23-15.1)	12.6 (8.72-17.5)	15.5 (10.3-22.3)	18.1 (11.7-26.6)
4-day	3.53 (2.94-4.18)	4.45 (3.70-5.28)	5.96 (4.93-7.10)	7.21 (5.93-8.65)	8.93 (7.11-11.4)	10.2 (7.94-13.4)	11.6 (8.82-16.1)	13.5 (9.33-18.6)	16.5 (11.0-23.7)	19.3 (12.5-28.3)
7-day	4.19 (3.52-4.94)	5.22 (4.38-6.16)	6.90 (5.76-8.18)	8.30 (6.88-9.90)	10.2 (8.19-13.0)	11.6 (9.11-15.2)	13.2 (10.1-18.1)	15.2 (10.6-20.9)	18.6 (12.3-26.5)	21.5 (13.9-31.3)
10-day	4.86 (4.10-5.71)	5.95 (5.01-7.00)	7.73 (6.48-9.12)	9.20 (7.66-10.9)	11.2 (9.02-14.1)	12.7 (9.98-16.5)	14.4 (10.9-19.5)	16.5 (11.5-22.5)	19.8 (13.2-28.1)	22.7 (14.7-33.0)
20-day	7.01 (5.97-8.17)	8.17 (6.94-9.53)	10.1 (8.51-11.8)	11.6 (9.77-13.7)	13.8 (11.1-17.1)	15.4 (12.1-19.6)	17.1 (12.9-22.7)	19.1 (13.5-25.9)	22.1 (14.8-31.2)	24.6 (16.0-35.5)
30-day	8.82 (7.55-10.2)	10.0 (8.55-11.6)	12.0 (10.2-13.9)	13.6 (11.5-15.9)	15.8 (12.8-19.4)	17.5 (13.7-21.9)	19.2 (14.5-25.1)	21.1 (14.9-28.5)	23.8 (16.0-33.4)	25.9 (16.9-37.3)
45-day	11.1 (9.53-12.8)	12.3 (10.6-14.2)	14.3 (12.2-16.6)	16.0 (13.6-18.7)	18.3 (14.8-22.2)	20.0 (15.8-24.9)	21.8 (16.4-28.1)	23.6 (16.8-31.6)	25.9 (17.5-36.2)	27.7 (18.1-39.7)
60-day	12.9 (11.2-14.9)	14.2 (12.3-16.4)	16.3 (14.0-18.8)	18.0 (15.3-21.0)	20.4 (16.6-24.6)	22.2 (17.5-27.4)	24.0 (18.0-30.7)	25.7 (18.3-34.4)	27.9 (18.9-38.8)	29.4 (19.2-42.0)

¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS). Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values. Please refer to NOAA Atlas 14 document for more information.

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PF graphical

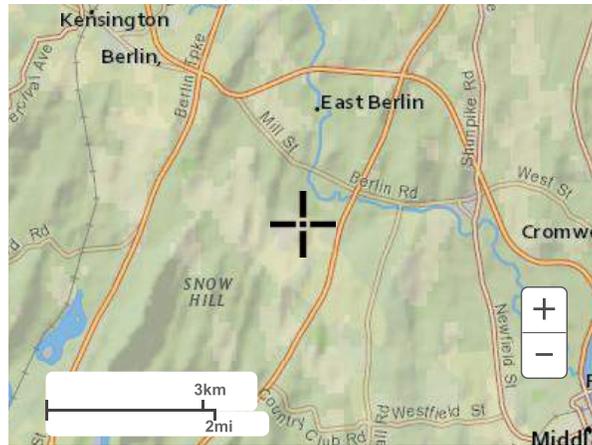
PDS-based depth-duration-frequency (DDF) curves
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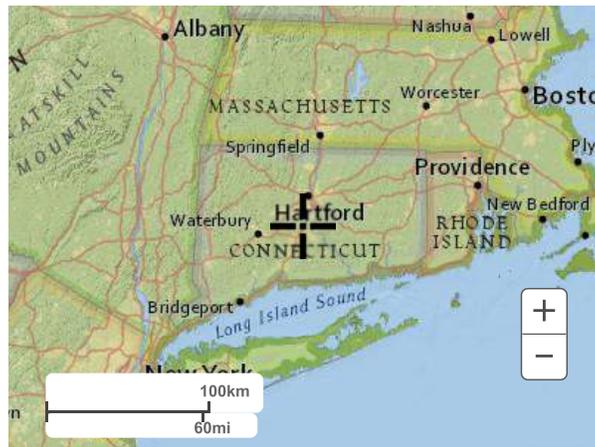
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Maps & aeriels

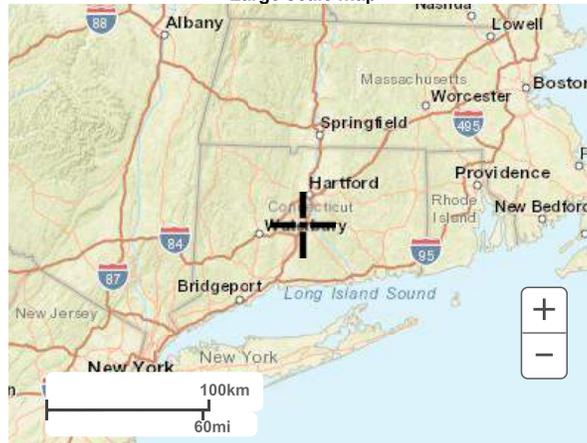
Small scale terrain



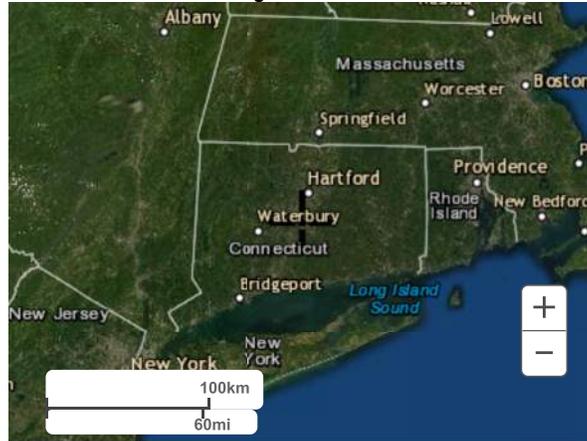
Large scale terrain



Large scale map



Large scale aerial



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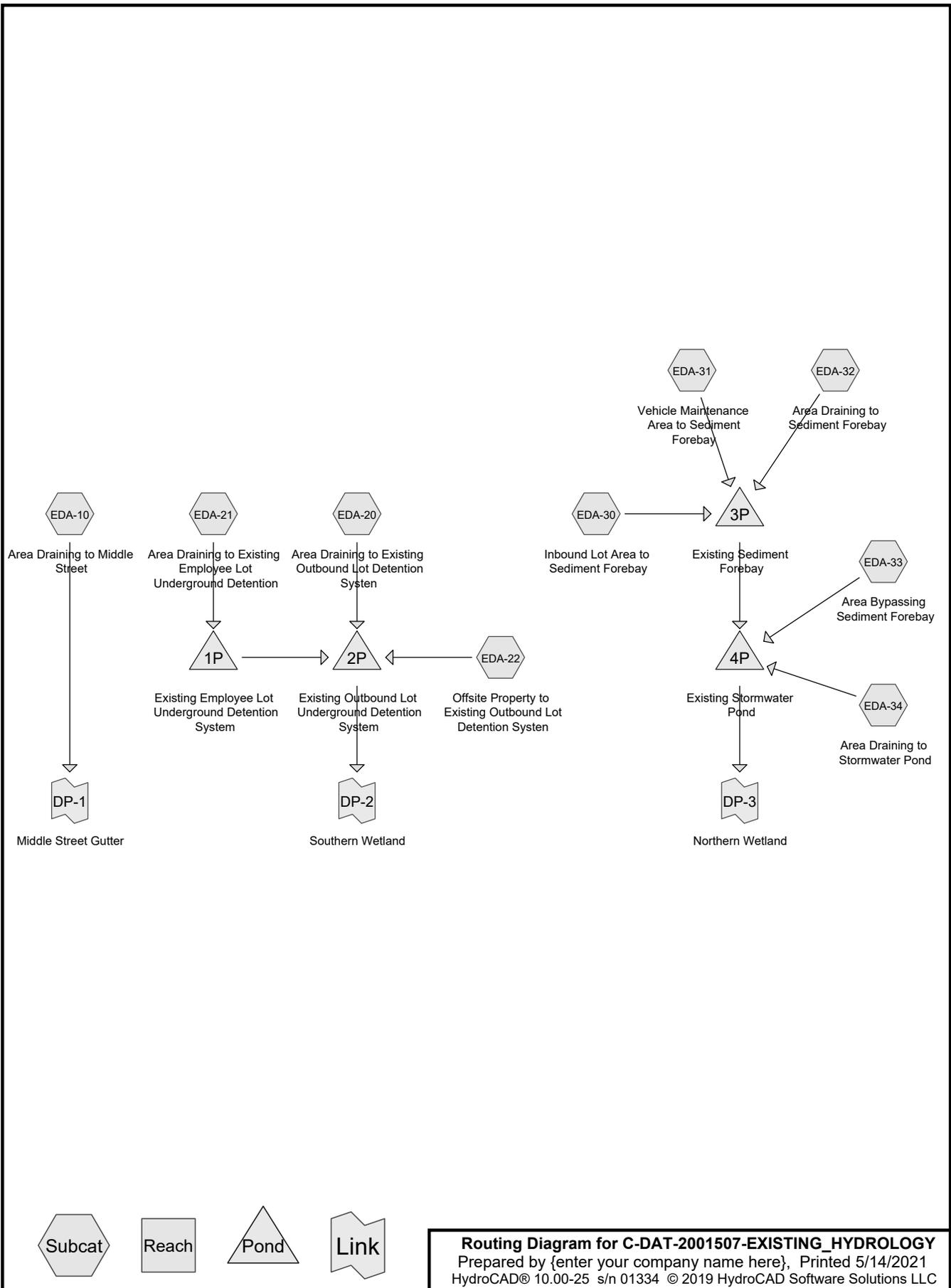
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 Silver Spring, MD 20910
 Questions?: HDSC.Questions@noaa.gov

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An Employee-Owned Company
Stormwater Management Report

APPENDIX B
PRE-DEVELOPMENT HYDROLOGY



Routing Diagram for C-DAT-2001507-EXISTING_HYDROLOGY
 Prepared by {enter your company name here}, Printed 5/14/2021
 HydroCAD® 10.00-25 s/n 01334 © 2019 HydroCAD Software Solutions LLC

C-DAT-2001507-EXISTING_HYD CT_Middletown_2001507_Depth 24-hr S1 2-yr Rainfall=3.29"

Prepared by {enter your company name here}

Printed 5/14/2021

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Page 2

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentEDA-10: Area Draining to Runoff Area=40,445 sf 6.03% Impervious Runoff Depth>1.83"
Flow Length=962' Tc=9.9 min CN=85 Runoff=1.87 cfs 6,164 cf

SubcatchmentEDA-20: Area Draining Runoff Area=1,494,428 sf 87.40% Impervious Runoff Depth>2.83"
Flow Length=1,796' Tc=5.8 min CN=96 Runoff=124.74 cfs 352,953 cf

SubcatchmentEDA-21: Area Draining to Runoff Area=274,555 sf 70.95% Impervious Runoff Depth>2.63"
Flow Length=815' Tc=8.2 min CN=94 Runoff=19.19 cfs 60,080 cf

SubcatchmentEDA-22: Offsite Property Runoff Area=725,636 sf 38.14% Impervious Runoff Depth>1.98"
Flow Length=1,389' Tc=16.2 min CN=87 Runoff=28.54 cfs 120,021 cf

SubcatchmentEDA-30: Inbound Lot Runoff Area=1,479,100 sf 80.75% Impervious Runoff Depth>2.72"
Flow Length=1,360' Tc=17.7 min CN=95 Runoff=72.85 cfs 335,403 cf

SubcatchmentEDA-31: Vehicle Runoff Area=356,183 sf 32.74% Impervious Runoff Depth>1.90"
Flow Length=964' Tc=18.6 min CN=86 Runoff=12.54 cfs 56,466 cf

SubcatchmentEDA-32: Area Draining to Runoff Area=110,770 sf 5.92% Impervious Runoff Depth>1.53"
Flow Length=370' Tc=13.3 min CN=81 Runoff=3.69 cfs 14,150 cf

SubcatchmentEDA-33: Area Bypassing Runoff Area=269,860 sf 4.93% Impervious Runoff Depth>1.46"
Flow Length=848' Slope=0.0700 '/' Tc=15.2 min CN=80 Runoff=7.96 cfs 32,909 cf

SubcatchmentEDA-34: Area Draining to Runoff Area=326,196 sf 1.29% Impervious Runoff Depth>1.60"
Flow Length=670' Tc=12.8 min CN=82 Runoff=11.63 cfs 43,593 cf

Pond 1P: Existing Employee Lot Peak Elev=127.18' Storage=30,302 cf Inflow=19.19 cfs 60,080 cf
Outflow=2.28 cfs 49,190 cf

Pond 2P: Existing Outbound Lot Peak Elev=88.27' Storage=318,959 cf Inflow=141.30 cfs 522,164 cf
Outflow=7.57 cfs 275,109 cf

Pond 3P: Existing Sediment Forebay Peak Elev=29.82' Storage=37,842 cf Inflow=88.63 cfs 406,019 cf
Outflow=87.74 cfs 376,081 cf

Pond 4P: Existing Stormwater Pond Peak Elev=27.89' Storage=45,051 cf Inflow=105.18 cfs 452,584 cf
Outflow=71.20 cfs 450,628 cf

Link DP-1: Middle Street Gutter Inflow=1.87 cfs 6,164 cf
Primary=1.87 cfs 6,164 cf

Link DP-2: Southern Wetland Inflow=7.57 cfs 275,109 cf
Primary=7.57 cfs 275,109 cf

Link DP-3: Northern Wetland Inflow=71.20 cfs 450,628 cf
Primary=71.20 cfs 450,628 cf

Total Runoff Area = 5,077,173 sf Runoff Volume = 1,021,740 cf Average Runoff Depth = 2.41"
38.64% Pervious = 1,961,952 sf 61.36% Impervious = 3,115,221 sf

Summary for Subcatchment EDA-10: Area Draining to Middle Street

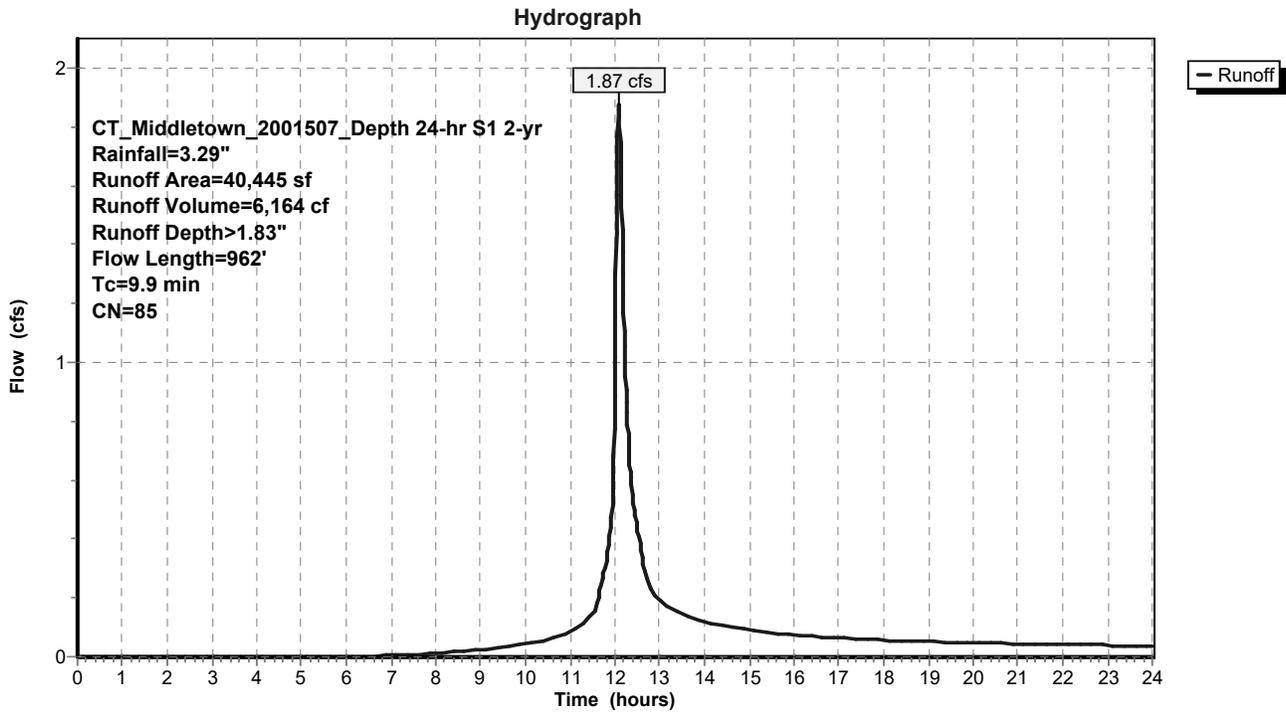
Runoff = 1.87 cfs @ 12.09 hrs, Volume= 6,164 cf, Depth> 1.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 2-yr Rainfall=3.29"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
0	79	50-75% Grass cover, Fair, HSG C
37,835	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
0	98	Paved parking, HSG C
2,440	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
0	96	Gravel surface, HSG C
170	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
40,445	85	Weighted Average
38,005		93.97% Pervious Area
2,440		6.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	28	0.1406	0.20		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
1.1	72	0.0120	1.06		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.29"
6.5	862	0.0120	2.22		Shallow Concentrated Flow, Paved Kv= 20.3 fps
9.9	962	Total			

Subcatchment EDA-10: Area Draining to Middle Street



Summary for Subcatchment EDA-20: Area Draining to Existing Outbound Lot Detention System

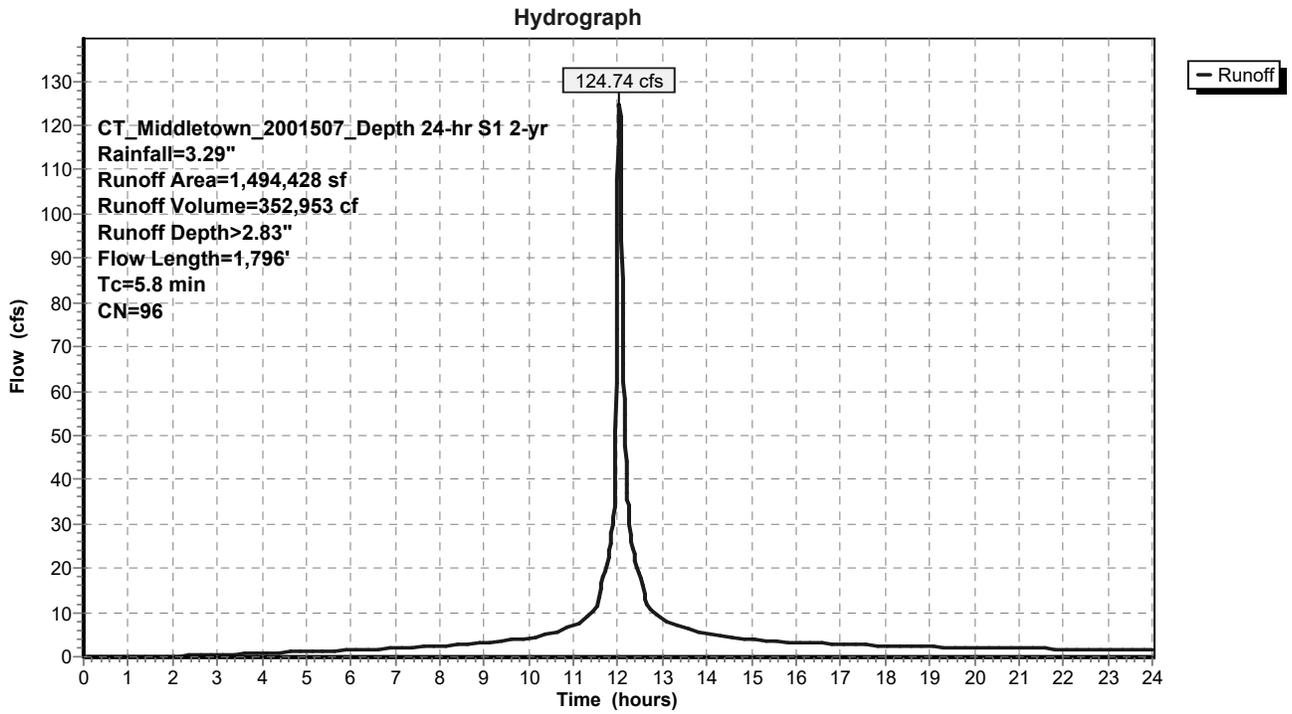
Runoff = 124.74 cfs @ 12.03 hrs, Volume= 352,953 cf, Depth> 2.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 2-yr Rainfall=3.29"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
102,141	79	50-75% Grass cover, Fair, HSG C
86,178	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
465,269	98	Paved parking, HSG C
840,840	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
0	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
1,494,428	96	Weighted Average
188,319		12.60% Pervious Area
1,306,109		87.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	100	0.0140	1.21		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.29"
1.2	176	0.0140	2.40		Shallow Concentrated Flow, Paved Kv= 20.3 fps
3.2	1,520	0.0100	7.80	24.51	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
5.8	1,796	Total			

Subcatchment EDA-20: Area Draining to Existing Outbound Lot Detention System



Summary for Subcatchment EDA-21: Area Draining to Existing Employee Lot Underground Detention

Runoff = 19.19 cfs @ 12.06 hrs, Volume= 60,080 cf, Depth> 2.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 2-yr Rainfall=3.29"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
0	79	50-75% Grass cover, Fair, HSG C
79,335	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
0	98	Paved parking, HSG C
194,785	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
0	96	Gravel surface, HSG C
435	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
274,555	94	Weighted Average
79,770		29.05% Pervious Area
194,785		70.95% Impervious Area

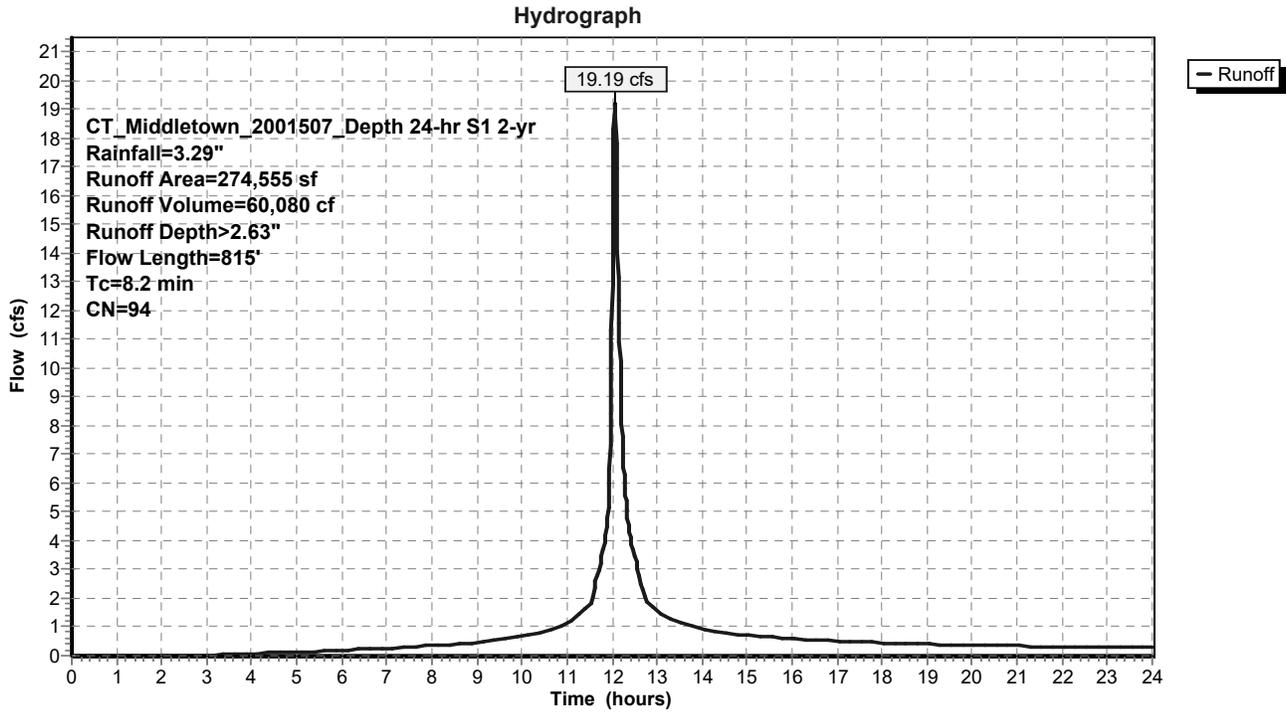
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.1	19	0.0160	0.08		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
1.1	81	0.0160	1.22		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.29"
1.1	164	0.0160	2.57		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.5	130	0.0050	4.03	4.95	Pipe Channel, 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012 Concrete pipe, finished
0.6	152	0.0050	4.55	8.05	Pipe Channel, 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.012 Concrete pipe, finished
0.3	108	0.0050	5.52	17.33	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
0.3	101	0.0050	5.52	17.33	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
0.1	38	0.0050	5.52	17.33	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
0.1	22	0.0050	7.23	51.09	Pipe Channel,

36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75'

n= 0.012 Concrete pipe, finished

8.2 815 Total

Subcatchment EDA-21: Area Draining to Existing Employee Lot Underground Detention



Summary for Subcatchment EDA-22: Offsite Property to Existing Outbound Lot Detention System

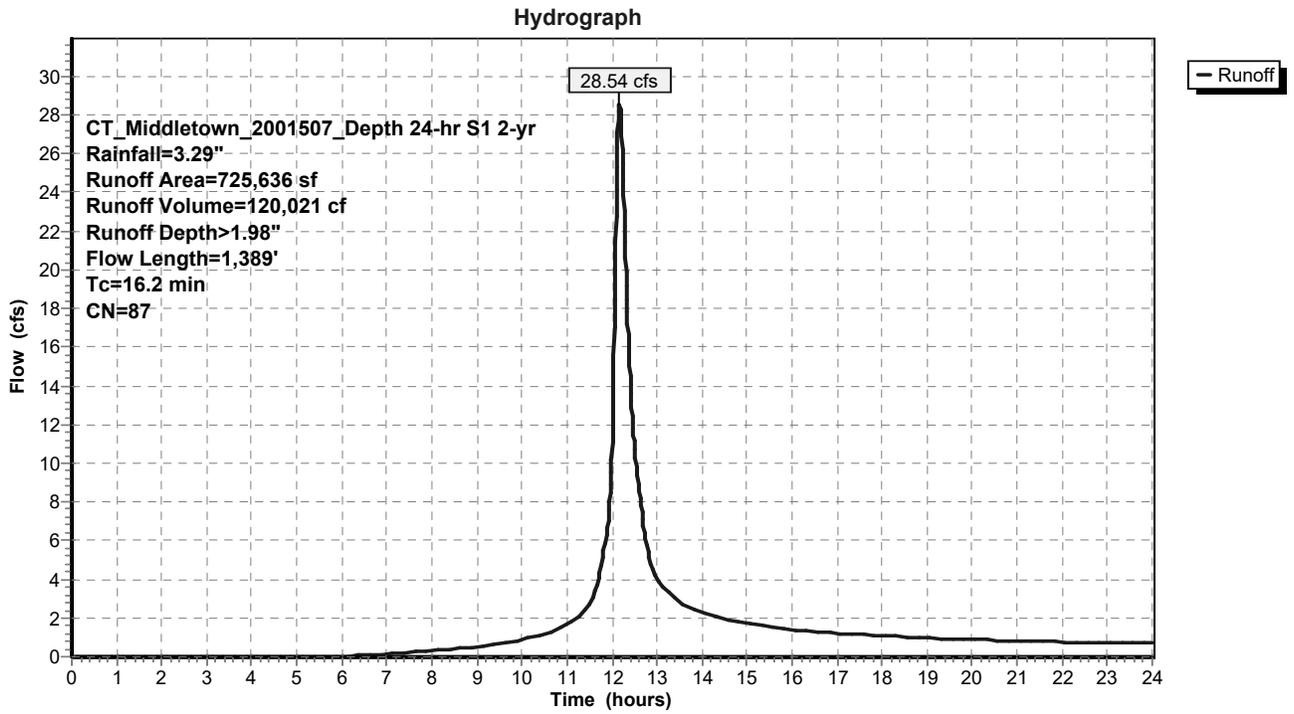
Runoff = 28.54 cfs @ 12.17 hrs, Volume= 120,021 cf, Depth> 1.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 2-yr Rainfall=3.29"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
218,535	79	50-75% Grass cover, Fair, HSG C
204,832	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
128,360	98	Paved parking, HSG C
148,395	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
0	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
25,514	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
725,636	87	Weighted Average
448,881		61.86% Pervious Area
276,755		38.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.1	100	0.0240	0.13		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
1.1	214	0.0374	3.11		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
2.0	1,075	0.0200	9.11	16.09	Pipe Channel, 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.012
16.2	1,389	Total			

Subcatchment EDA-22: Offsite Property to Existing Outbound Lot Detention System



Summary for Subcatchment EDA-30: Inbound Lot Area to Sediment Forebay

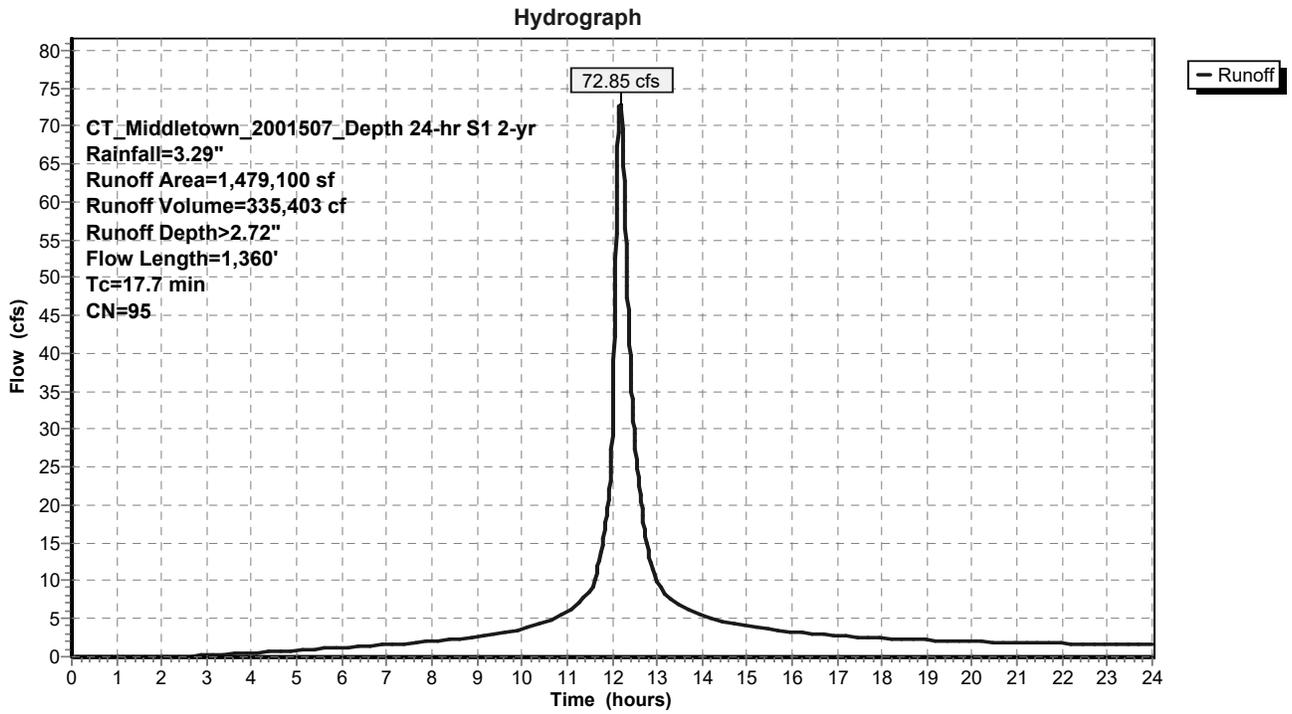
Runoff = 72.85 cfs @ 12.18 hrs, Volume= 335,403 cf, Depth> 2.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 2-yr Rainfall=3.29"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
119,543	79	50-75% Grass cover, Fair, HSG C
165,112	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
471,502	98	Paved parking, HSG C
722,943	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
0	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
1,479,100	95	Weighted Average
284,655		19.25% Pervious Area
1,194,445		80.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.2	80	0.0125	0.09		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
0.8	120	0.0150	2.49		Shallow Concentrated Flow, Paved Kv= 20.3 fps
2.7	1,160	0.0050	7.23	51.09	Pipe Channel, 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.012
17.7	1,360	Total			

Subcatchment EDA-30: Inbound Lot Area to Sediment Forebay



Summary for Subcatchment EDA-31: Vehicle Maintenance Area to Sediment Forebay

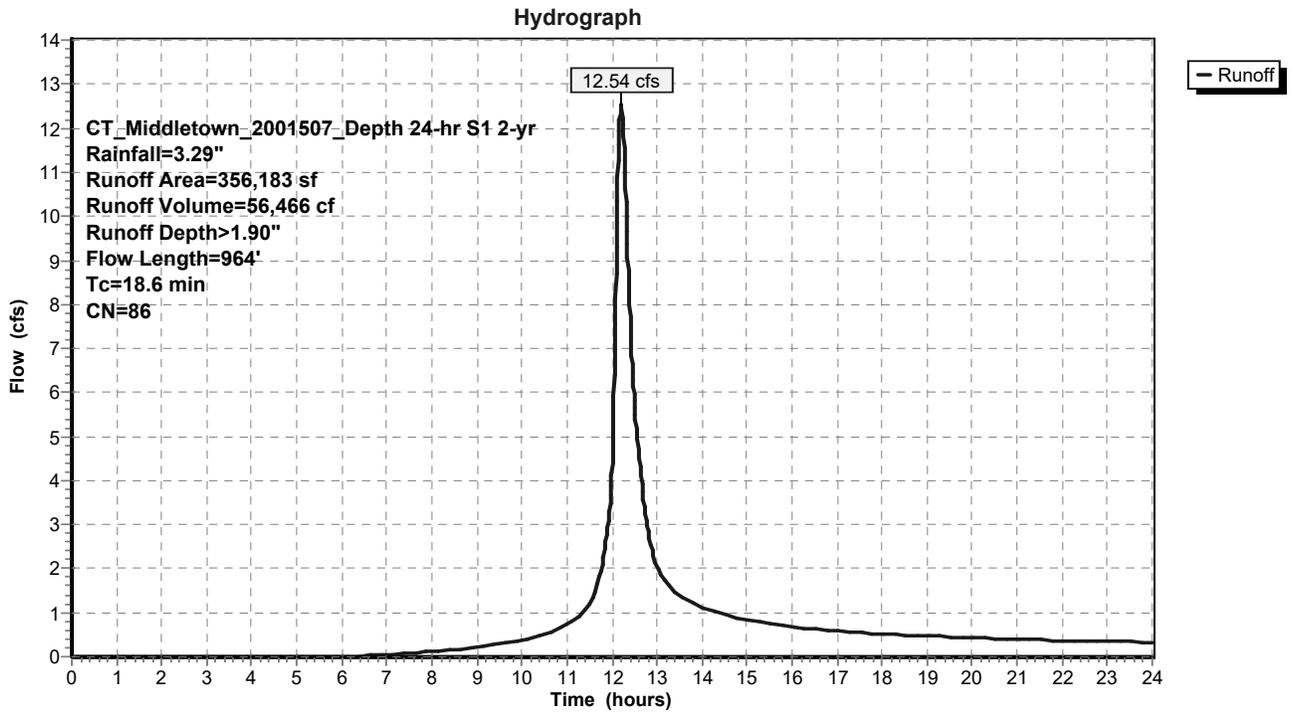
Runoff = 12.54 cfs @ 12.21 hrs, Volume= 56,466 cf, Depth> 1.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 2-yr Rainfall=3.29"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
153,724	79	50-75% Grass cover, Fair, HSG C
85,858	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
69,565	98	Paved parking, HSG C
47,036	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
0	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
356,183	86	Weighted Average
239,582		67.26% Pervious Area
116,601		32.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	60	0.0400	0.14		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
5.7	40	0.0300	0.12		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
5.3	541	0.0600	1.71		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.2	54	0.0050	4.03	4.95	Pipe Channel, 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012
0.1	122	0.0500	17.44	54.80	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
0.1	108	0.0400	15.60	49.02	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
0.1	39	0.0085	7.19	22.59	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
18.6	964	Total			

Subcatchment EDA-31: Vehicle Maintenance Area to Sediment Forebay



Summary for Subcatchment EDA-32: Area Draining to Sediment Forebay

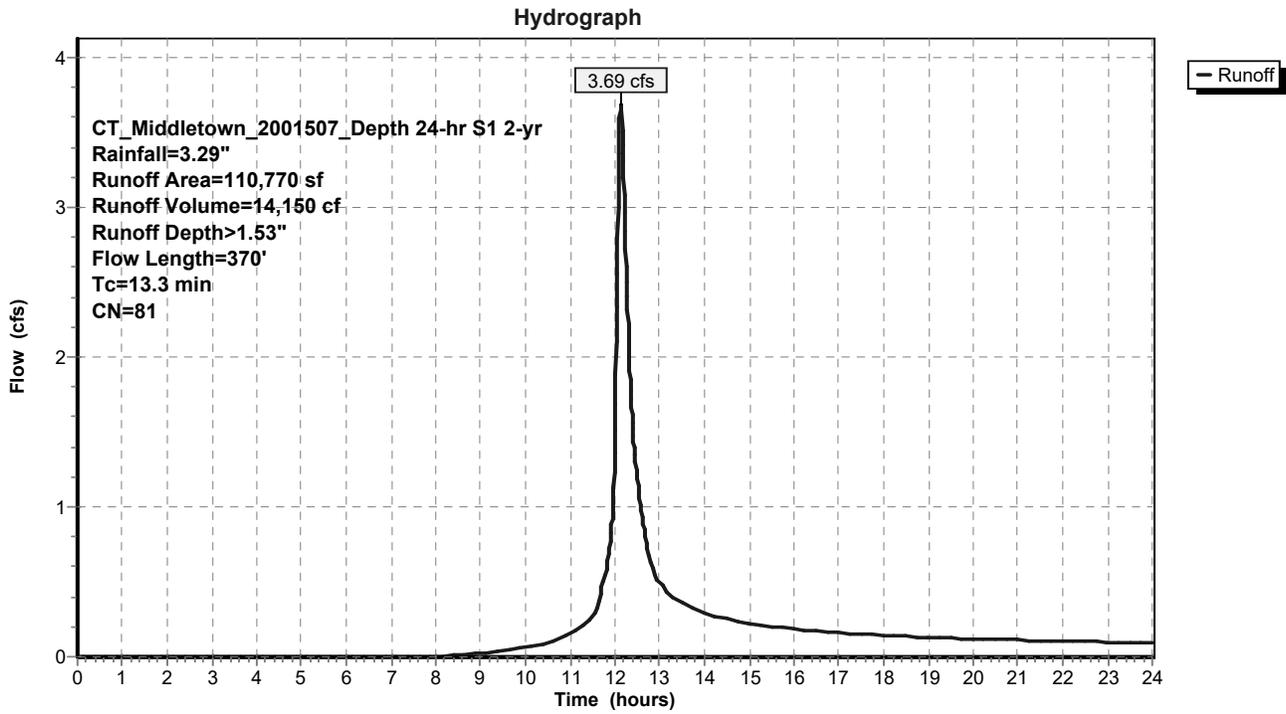
Runoff = 3.69 cfs @ 12.13 hrs, Volume= 14,150 cf, Depth> 1.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 2-yr Rainfall=3.29"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
98,913	79	50-75% Grass cover, Fair, HSG C
0	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
6,557	98	Paved parking, HSG C
0	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
5,300	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
110,770	81	Weighted Average
104,213		94.08% Pervious Area
6,557		5.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	100	0.0350	0.15		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
1.3	105	0.0350	1.31		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.7	165	0.3333	4.04		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
13.3	370	Total			

Subcatchment EDA-32: Area Draining to Sediment Forebay



Summary for Subcatchment EDA-33: Area Bypassing Sediment Forebay

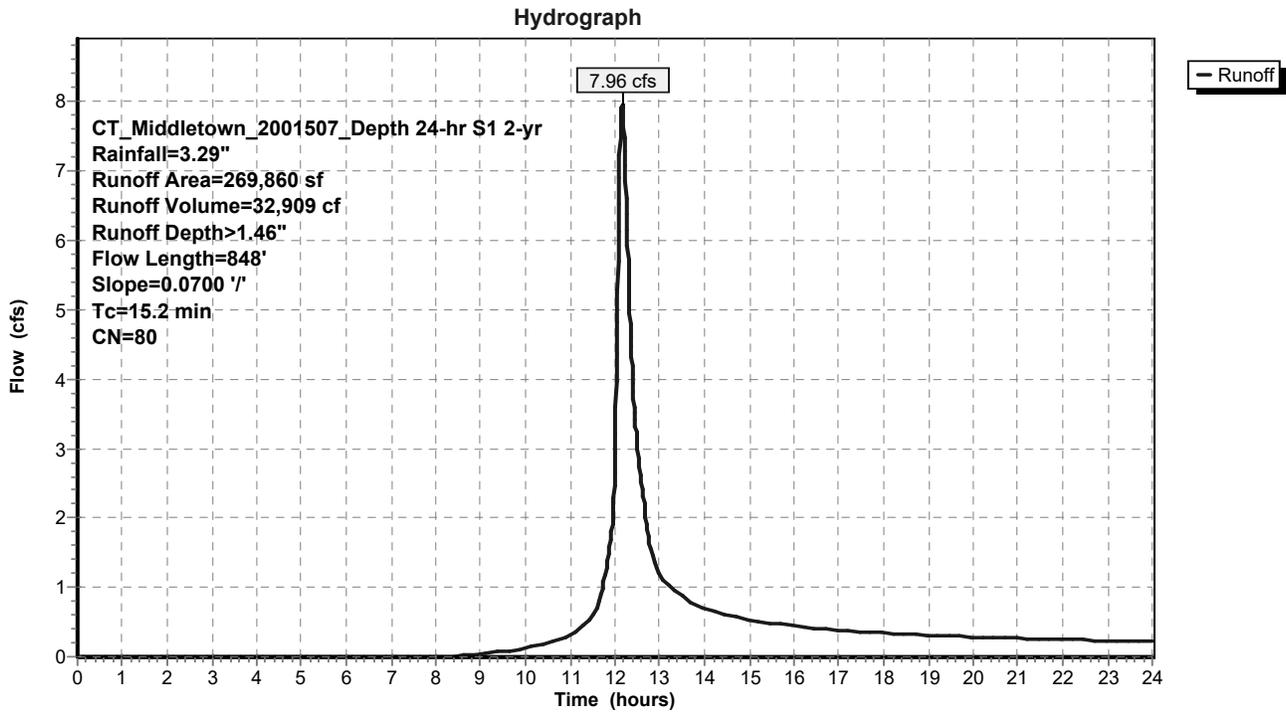
Runoff = 7.96 cfs @ 12.16 hrs, Volume= 32,909 cf, Depth> 1.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 2-yr Rainfall=3.29"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
232,381	79	50-75% Grass cover, Fair, HSG C
23,831	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
11,183	98	Paved parking, HSG C
2,124	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
341	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
269,860	80	Weighted Average
256,553		95.07% Pervious Area
13,307		4.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	100	0.0700	0.20		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
6.7	748	0.0700	1.85		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
15.2	848	Total			

Subcatchment EDA-33: Area Bypassing Sediment Forebay



Summary for Subcatchment EDA-34: Area Draining to Stormwater Pond

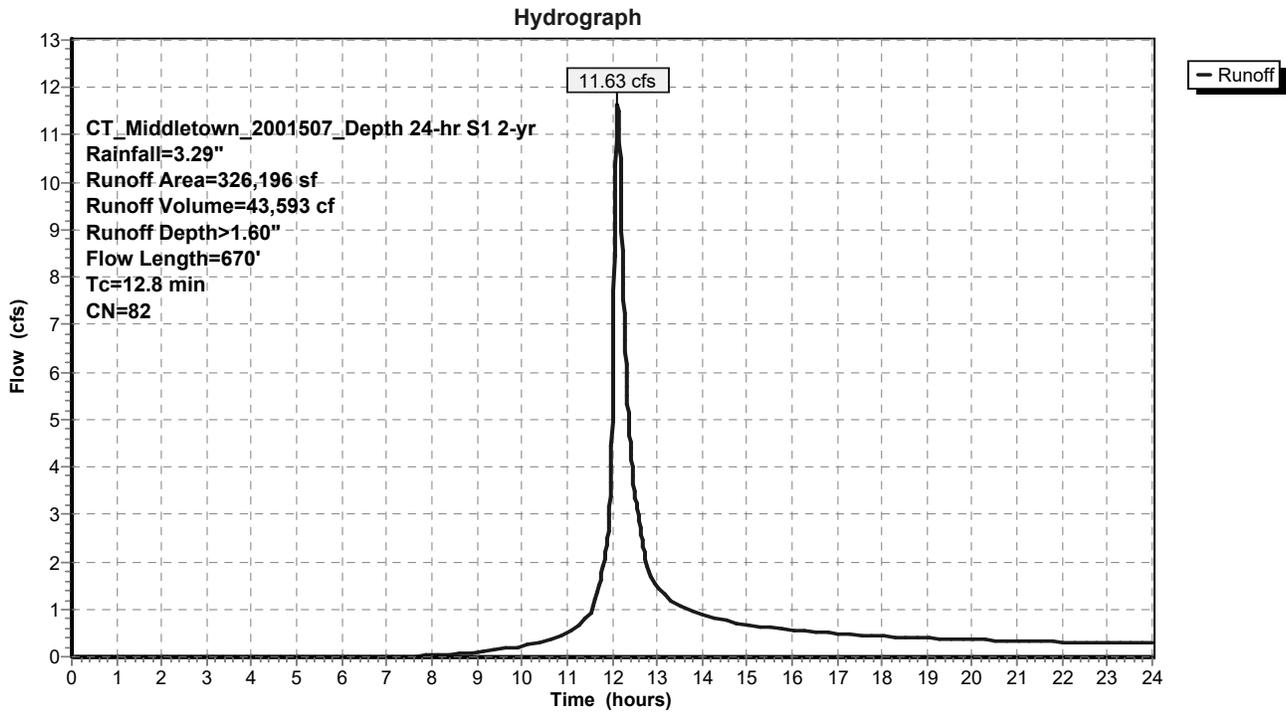
Runoff = 11.63 cfs @ 12.13 hrs, Volume= 43,593 cf, Depth> 1.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 2-yr Rainfall=3.29"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
269,284	79	50-75% Grass cover, Fair, HSG C
0	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
4,222	98	Paved parking, HSG C
0	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
10,850	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
5,025	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
36,815	98	Water Surface, 0% imp, HSG C
326,196	82	Weighted Average
321,974		98.71% Pervious Area
4,222		1.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	100	0.0700	0.20		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
4.3	570	0.1000	2.21		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
12.8	670	Total			

Subcatchment EDA-34: Area Draining to Stormwater Pond



Summary for Pond 1P: Existing Employee Lot Underground Detention System

Inflow Area = 274,555 sf, 70.95% Impervious, Inflow Depth > 2.63" for 2-yr event
 Inflow = 19.19 cfs @ 12.06 hrs, Volume= 60,080 cf
 Outflow = 2.28 cfs @ 12.66 hrs, Volume= 49,190 cf, Atten= 88%, Lag= 36.2 min
 Primary = 2.28 cfs @ 12.66 hrs, Volume= 49,190 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 127.18' @ 12.66 hrs Surf.Area= 11,725 sf Storage= 30,302 cf

Plug-Flow detention time= 232.7 min calculated for 49,170 cf (82% of inflow)
 Center-of-Mass det. time= 148.9 min (945.1 - 796.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	123.50'	2,345 cf	64.19'W x 182.67'L x 9.50'H Field A 111,387 cf Overall - 105,524 cf Embedded = 5,862 cf x 40.0% Voids
#2A	124.00'	83,580 cf	StormTrap ST2 DoubleTrap 8-0x 66 Inside #1 Inside= 101.7"W x 96.0"H => 61.09 sf x 15.40'L = 940.5 cf Outside= 101.7"W x 108.0"H => 76.31 sf x 15.40'L = 1,174.9 cf 66 Chambers in 6 Rows 50.88' x 169.35' Core + 6.66' Border = 64.19' x 182.67' System
		85,925 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	125.00'	24.0" Round Culvert L= 1,560.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 125.00' / 85.00' S= 0.0256 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#2	Device 1	125.00'	8.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	129.00'	12.0" Vert. Orifice/Grate C= 0.600
#4	Device 1	132.50'	3.0' long x 2.00' rise Sharp-Crested Rectangular Weir 2 End Contraction(s) 3.0' Crest Height

Primary OutFlow Max=2.28 cfs @ 12.66 hrs HW=127.18' (Free Discharge)

- 1=Culvert (Passes 2.28 cfs of 16.40 cfs potential flow)
- 2=Orifice/Grate (Orifice Controls 2.28 cfs @ 6.54 fps)
- 3=Orifice/Grate (Controls 0.00 cfs)
- 4=Sharp-Crested Rectangular Weir(Controls 0.00 cfs)

Pond 1P: Existing Employee Lot Underground Detention System - Chamber Wizard Field A

Chamber Model = StormTrapST2 DoubleTrap 8-0 (StormTrapST2 DoubleTrap®Type II+IV)

Inside= 101.7"W x 96.0"H => 61.09 sf x 15.40'L = 940.5 cf

Outside= 101.7"W x 108.0"H => 76.31 sf x 15.40'L = 1,174.9 cf

11 Chambers/Row x 15.40' Long = 169.35' Row Length +79.9" Border x 2 = 182.67' Base Length

6 Rows x 101.7" Wide + 79.9" Side Border x 2 = 64.19' Base Width

6.0" Base + 108.0" Chamber Height = 9.50' Field Height

66 Chambers x 940.5 cf + 21,503.9 cf Border = 83,579.7 cf Chamber Storage

66 Chambers x 1,174.9 cf + 27,981.2 cf Border = 105,524.2 cf Displacement

111,386.7 cf Field - 105,524.2 cf Chambers = 5,862.5 cf Stone x 40.0% Voids = 2,345.0 cf Stone Storage

Chamber Storage + Stone Storage = 85,924.7 cf = 1.973 af

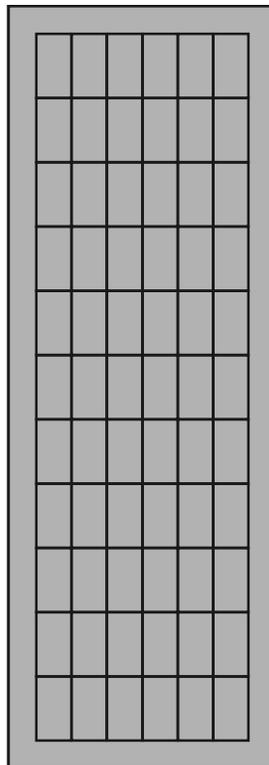
Overall Storage Efficiency = 77.1%

Overall System Size = 182.67' x 64.19' x 9.50'

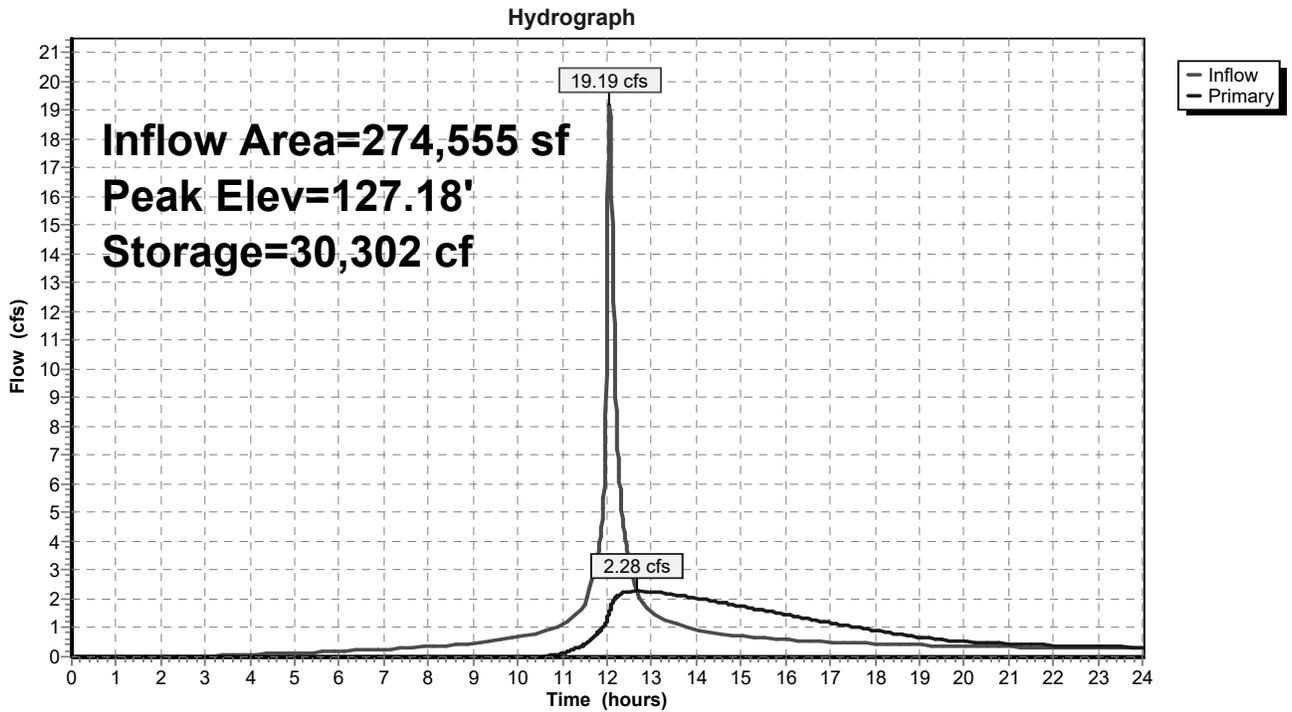
66 Chambers (plus border)

4,125.4 cy Field

217.1 cy Stone



Pond 1P: Existing Employee Lot Underground Detention System



Summary for Pond 2P: Existing Outbound Lot Underground Detention System

Inflow Area = 2,494,619 sf, 71.26% Impervious, Inflow Depth > 2.51" for 2-yr event
 Inflow = 141.30 cfs @ 12.04 hrs, Volume= 522,164 cf
 Outflow = 7.57 cfs @ 14.89 hrs, Volume= 275,109 cf, Atten= 95%, Lag= 171.4 min
 Primary = 7.57 cfs @ 14.89 hrs, Volume= 275,109 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 88.27' @ 14.89 hrs Surf.Area= 73,413 sf Storage= 318,959 cf

Plug-Flow detention time= 401.3 min calculated for 274,994 cf (53% of inflow)
 Center-of-Mass det. time= 252.9 min (1,061.6 - 808.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	82.50'	32,237 cf	183.90'W x 399.21'L x 13.33'H Field A 978,837 cf Overall - 898,245 cf Embedded = 80,592 cf x 40.0% Voids
#2A	83.50'	766,158 cf	StormTrap ST2 DoubleTrap 11-4x 500 Inside #1 Inside= 101.7"W x 136.0"H => 89.71 sf x 15.40'L = 1,381.1 cf Outside= 101.7"W x 148.0"H => 104.58 sf x 15.40'L = 1,610.0 cf 500 Chambers in 20 Rows 169.58' x 384.90' Core + 6.66' Border = 182.90' x 398.21' System
		798,395 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	86.00'	30.0" Round Culvert L= 120.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 86.00' / 85.50' S= 0.0042 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 4.91 sf
#2	Device 1	86.00'	15.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	91.00'	18.0" Vert. Orifice/Grate X 2 rows with 6.0" cc spacing C= 0.600
#4	Device 1	95.50'	3.0' long x 2.00' rise Sharp-Crested Rectangular Weir 2 End Contraction(s) 3.0' Crest Height

Primary OutFlow Max=7.57 cfs @ 14.89 hrs HW=88.27' (Free Discharge)

- 1=Culvert (Passes 7.57 cfs of 20.14 cfs potential flow)
- 2=Orifice/Grate (Orifice Controls 7.57 cfs @ 6.17 fps)
- 3=Orifice/Grate (Controls 0.00 cfs)
- 4=Sharp-Crested Rectangular Weir(Controls 0.00 cfs)

Pond 2P: Existing Outbound Lot Underground Detention System - Chamber Wizard Field A

Chamber Model = StormTrapST2 DoubleTrap 11-4 (StormTrapST2 DoubleTrap®Type I+III)

Inside= 101.7"W x 136.0"H => 89.71 sf x 15.40'L = 1,381.1 cf

Outside= 101.7"W x 148.0"H => 104.58 sf x 15.40'L = 1,610.0 cf

25 Chambers/Row x 15.40' Long = 384.90' Row Length +79.9" Border x 2 +6.0" End Stone x 2 = 399.21' Base Length

20 Rows x 101.7" Wide + 79.9" Side Border x 2 + 6.0" Side Stone x 2 = 183.90' Base Width

12.0" Base + 148.0" Chamber Height = 13.33' Field Height

500 Chambers x 1,381.1 cf + 75,595.3 cf Border = 766,157.9 cf Chamber Storage

500 Chambers x 1,610.0 cf + 93,224.3 cf Border = 898,244.6 cf Displacement

978,836.7 cf Field - 898,244.6 cf Chambers = 80,592.0 cf Stone x 40.0% Voids = 32,236.8 cf Stone Storage

Chamber Storage + Stone Storage = 798,394.7 cf = 18.329 af

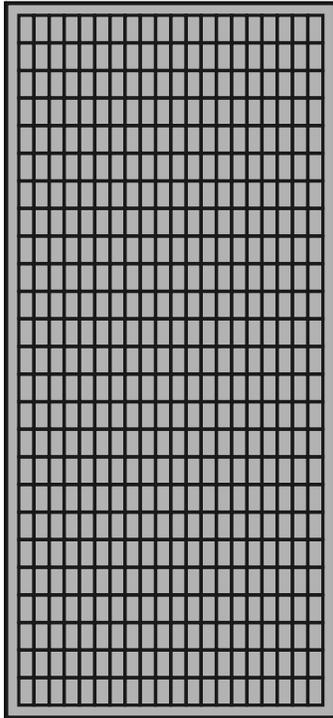
Overall Storage Efficiency = 81.6%

Overall System Size = 399.21' x 183.90' x 13.33'

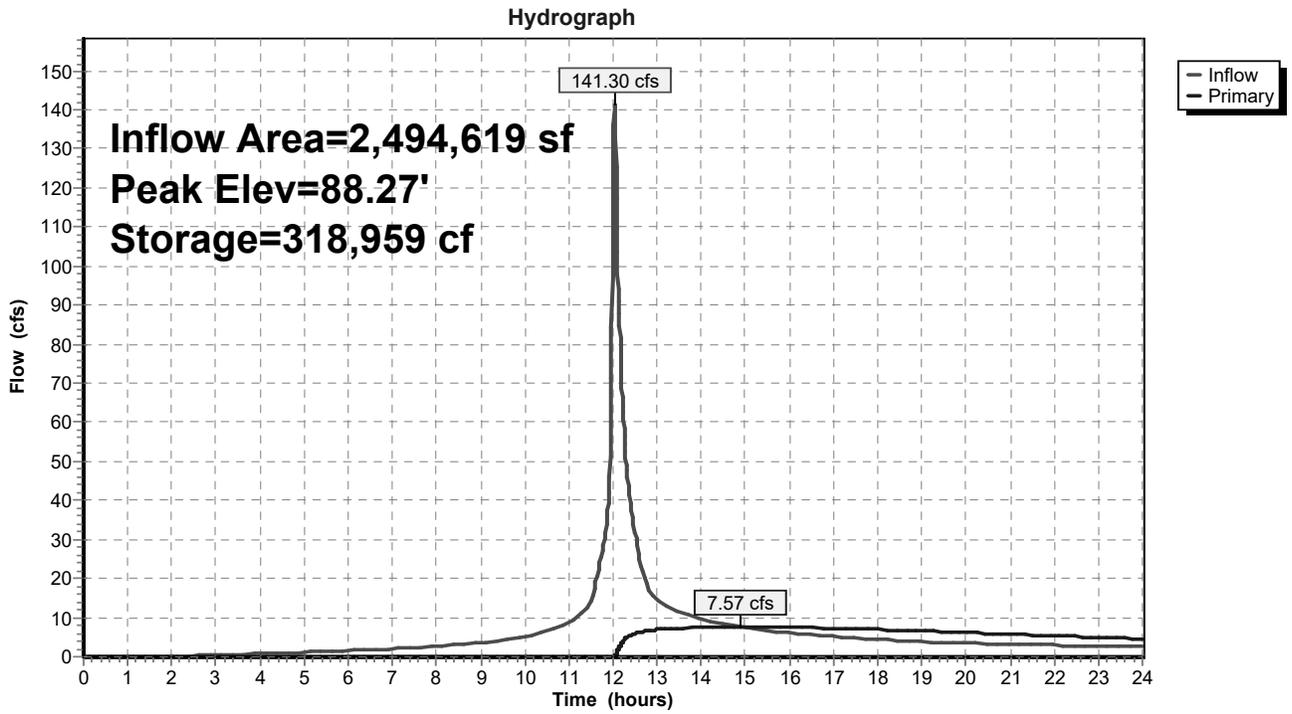
500 Chambers (plus border)

36,253.2 cy Field

2,984.9 cy Stone



Pond 2P: Existing Outbound Lot Underground Detention System



Summary for Pond 3P: Existing Sediment Forebay

Inflow Area = 1,946,053 sf, 67.71% Impervious, Inflow Depth > 2.50" for 2-yr event
 Inflow = 88.63 cfs @ 12.18 hrs, Volume= 406,019 cf
 Outflow = 87.74 cfs @ 12.21 hrs, Volume= 376,081 cf, Atten= 1%, Lag= 1.4 min
 Primary = 87.74 cfs @ 12.21 hrs, Volume= 376,081 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 4
 Peak Elev= 29.82' @ 12.21 hrs Surf.Area= 10,467 sf Storage= 37,842 cf

Plug-Flow detention time= 73.0 min calculated for 376,081 cf (93% of inflow)
 Center-of-Mass det. time= 32.0 min (837.6 - 805.6)

Volume	Invert	Avail.Storage	Storage Description
#1	24.00'	51,057 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
24.00	3,090	0	0
25.00	4,111	3,601	3,601
26.00	5,235	4,673	8,274
27.00	6,460	5,848	14,121
28.00	7,785	7,123	21,244
29.00	9,210	8,498	29,741
30.00	10,736	9,973	39,714
31.00	11,950	11,343	51,057

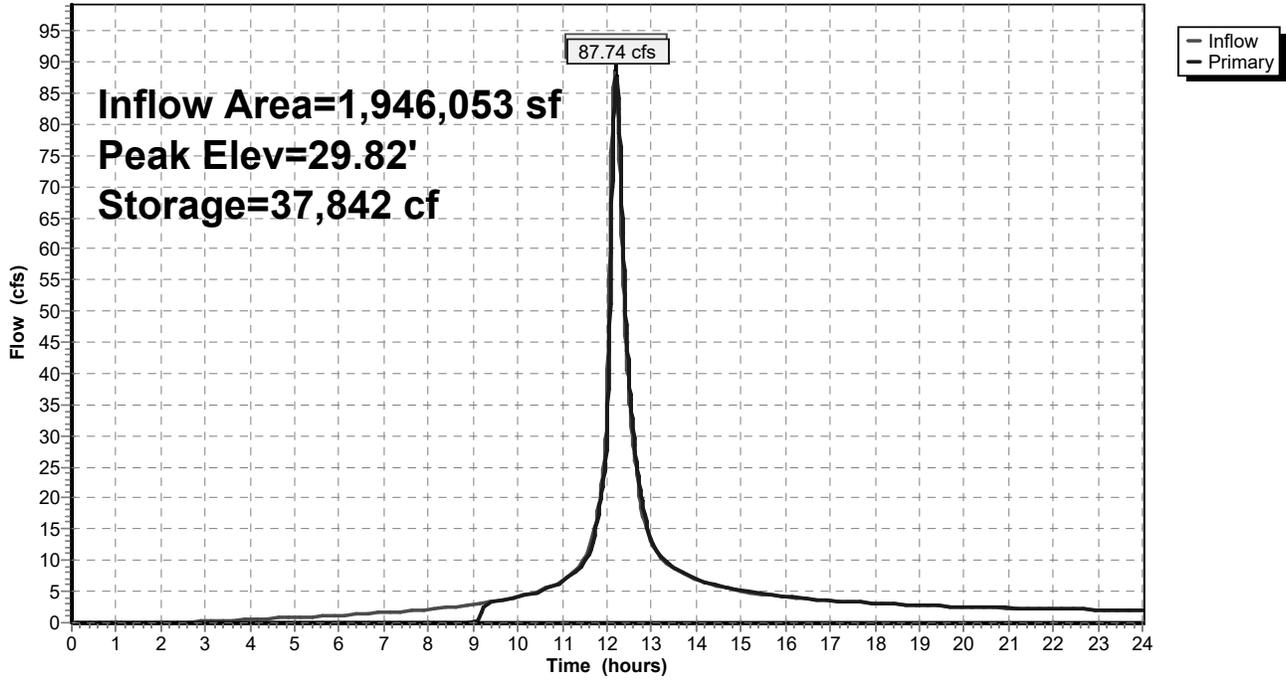
Device	Routing	Invert	Outlet Devices
#1	Primary	28.95'	40.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=87.67 cfs @ 12.21 hrs HW=29.82' (Free Discharge)

↑**1=Broad-Crested Rectangular Weir**(Weir Controls 87.67 cfs @ 2.51 fps)

Pond 3P: Existing Sediment Forebay

Hydrograph



Summary for Pond 4P: Existing Stormwater Pond

Inflow Area = 2,542,109 sf, 52.52% Impervious, Inflow Depth > 2.14" for 2-yr event
 Inflow = 105.18 cfs @ 12.19 hrs, Volume= 452,584 cf
 Outflow = 71.20 cfs @ 12.36 hrs, Volume= 450,628 cf, Atten= 32%, Lag= 9.8 min
 Primary = 71.20 cfs @ 12.36 hrs, Volume= 450,628 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 27.89' @ 12.36 hrs Surf.Area= 53,845 sf Storage= 45,051 cf

Plug-Flow detention time= 8.9 min calculated for 450,628 cf (100% of inflow)
 Center-of-Mass det. time= 6.4 min (848.7 - 842.3)

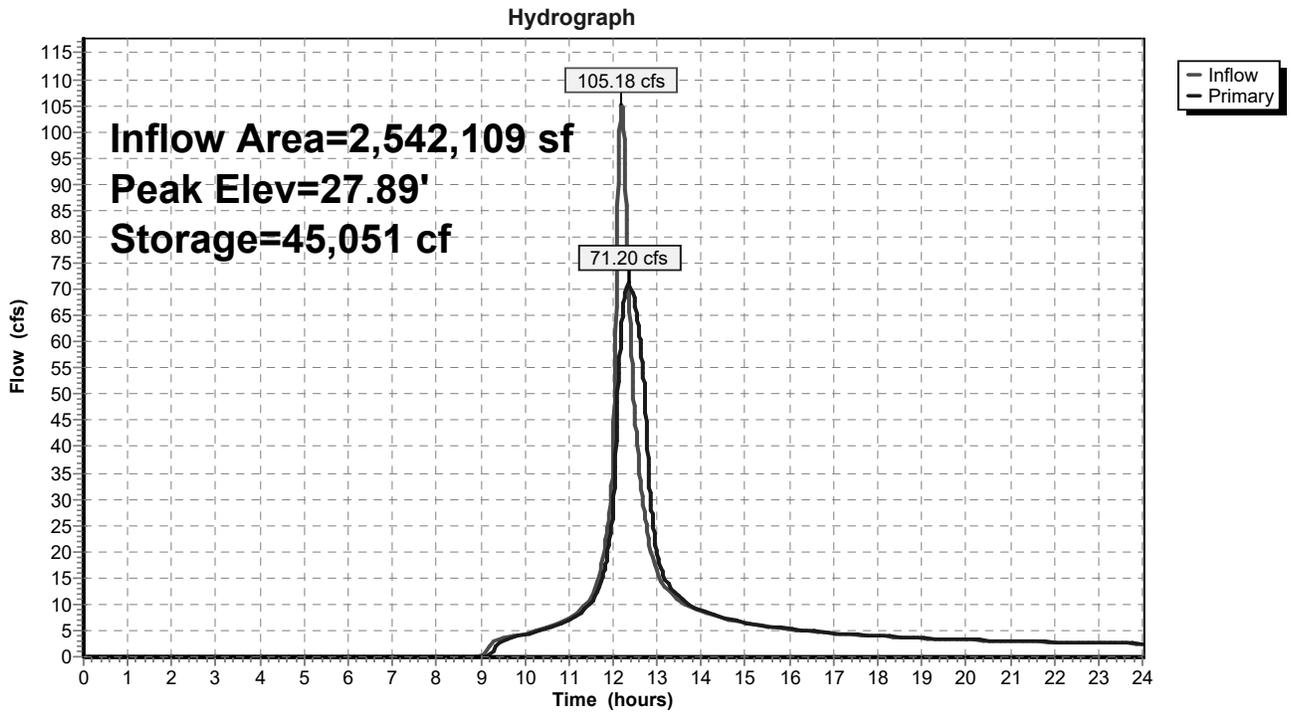
Volume	Invert	Avail.Storage	Storage Description
#1	24.00'	680,910 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
24.00	50	0	0
27.00	10,786	16,254	16,254
28.00	59,106	34,946	51,200
30.00	69,432	128,538	179,738
32.00	78,467	147,899	327,637
34.00	87,601	166,068	493,705
36.00	99,604	187,205	680,910

Device	Routing	Invert	Outlet Devices
#1	Primary	35.50'	70.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#2	Primary	24.50'	48.0" Vert. Orifice/Grate C= 0.600
#3	Primary	34.50'	2.0" Horiz. Orifice/Grate X 8.00 columns X 10 rows C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=71.21 cfs @ 12.36 hrs HW=27.89' (Free Discharge)

- 1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)
- 2=Orifice/Grate (Orifice Controls 71.21 cfs @ 6.27 fps)
- 3=Orifice/Grate (Controls 0.00 cfs)

Pond 4P: Existing Stormwater Pond

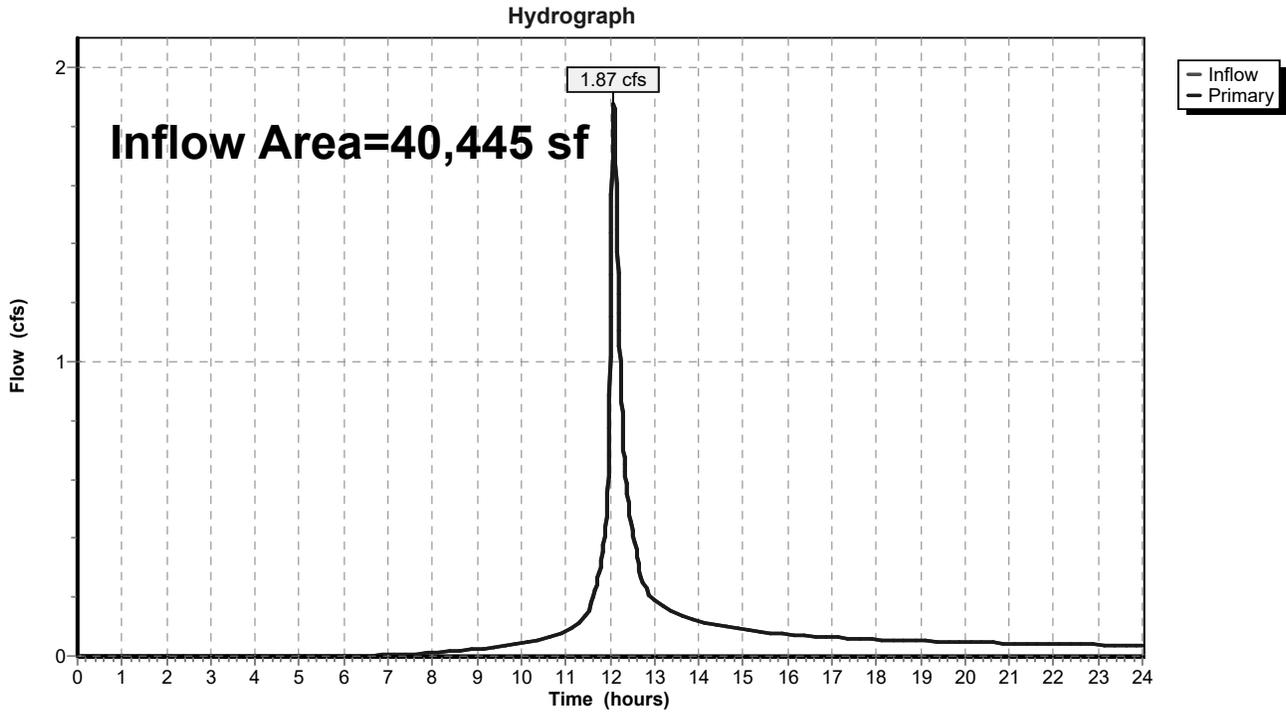


Summary for Link DP-1: Middle Street Gutter

Inflow Area = 40,445 sf, 6.03% Impervious, Inflow Depth > 1.83" for 2-yr event
Inflow = 1.87 cfs @ 12.09 hrs, Volume= 6,164 cf
Primary = 1.87 cfs @ 12.09 hrs, Volume= 6,164 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link DP-1: Middle Street Gutter

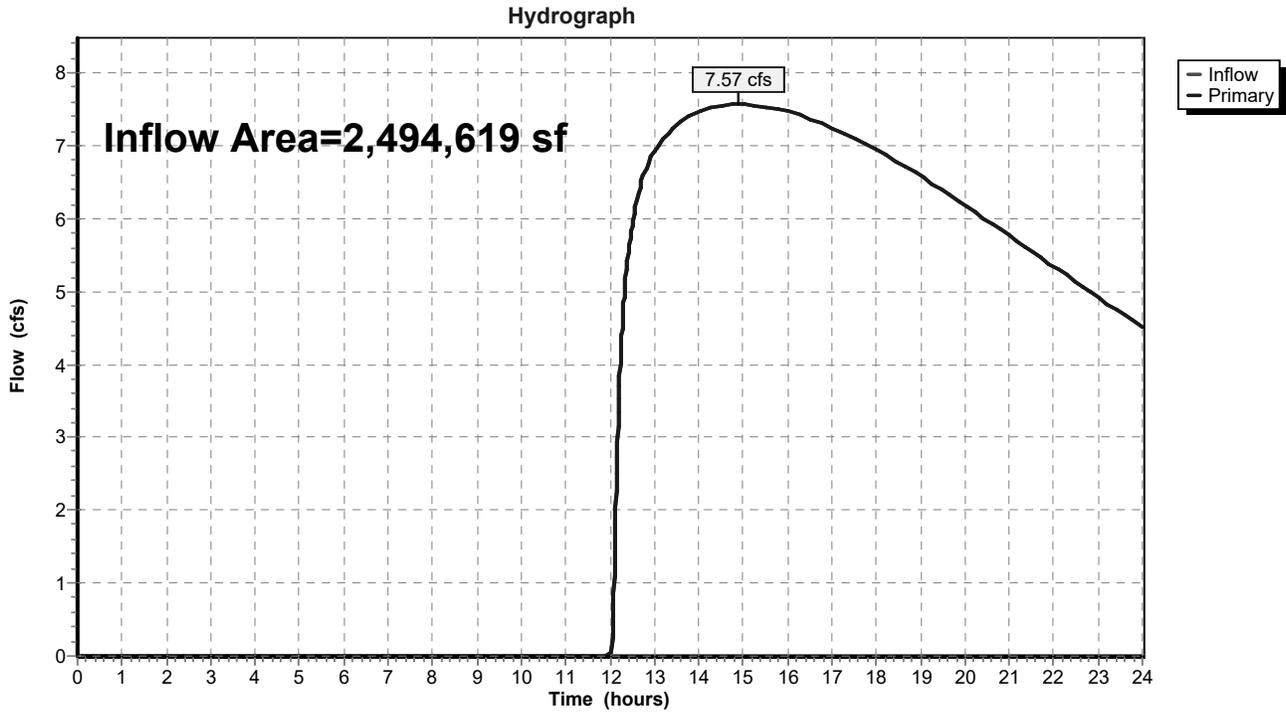


Summary for Link DP-2: Southern Wetland

Inflow Area = 2,494,619 sf, 71.26% Impervious, Inflow Depth > 1.32" for 2-yr event
Inflow = 7.57 cfs @ 14.89 hrs, Volume= 275,109 cf
Primary = 7.57 cfs @ 14.89 hrs, Volume= 275,109 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link DP-2: Southern Wetland



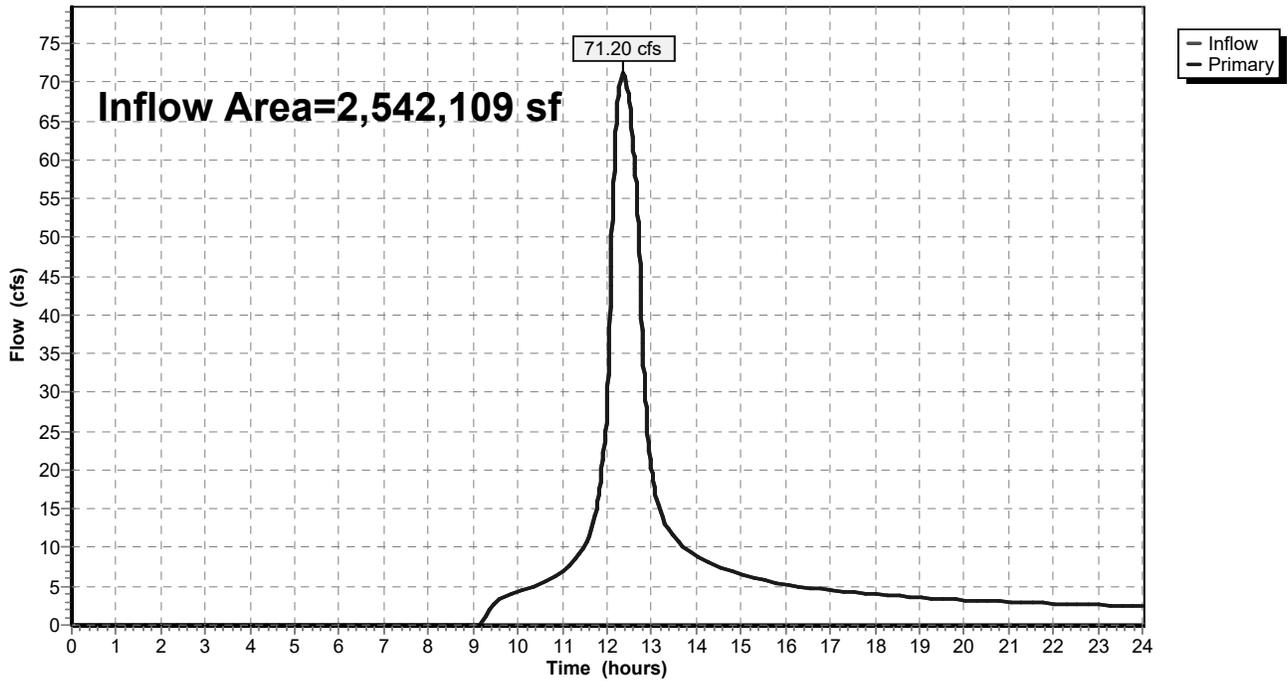
Summary for Link DP-3: Northern Wetland

Inflow Area = 2,542,109 sf, 52.52% Impervious, Inflow Depth > 2.13" for 2-yr event
Inflow = 71.20 cfs @ 12.36 hrs, Volume= 450,628 cf
Primary = 71.20 cfs @ 12.36 hrs, Volume= 450,628 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link DP-3: Northern Wetland

Hydrograph



C-DAT-2001507-EXISTING_HY CT_Middletown_2001507_Depth 24-hr S1 10-yr Rainfall=5.18"

Prepared by {enter your company name here}

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Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentEDA-10: Area Draining to Runoff Area=40,445 sf 6.03% Impervious Runoff Depth>3.52"
Flow Length=962' Tc=9.9 min CN=85 Runoff=3.51 cfs 11,880 cf

SubcatchmentEDA-20: Area Draining Runoff Area=1,494,428 sf 87.40% Impervious Runoff Depth>4.71"
Flow Length=1,796' Tc=5.8 min CN=96 Runoff=197.17 cfs 585,982 cf

SubcatchmentEDA-21: Area Draining to Runoff Area=274,555 sf 70.95% Impervious Runoff Depth>4.48"
Flow Length=815' Tc=8.2 min CN=94 Runoff=31.09 cfs 102,428 cf

SubcatchmentEDA-22: Offsite Property Runoff Area=725,636 sf 38.14% Impervious Runoff Depth>3.72"
Flow Length=1,389' Tc=16.2 min CN=87 Runoff=51.50 cfs 224,952 cf

SubcatchmentEDA-30: Inbound Lot Runoff Area=1,479,100 sf 80.75% Impervious Runoff Depth>4.58"
Flow Length=1,360' Tc=17.7 min CN=95 Runoff=116.25 cfs 564,315 cf

SubcatchmentEDA-31: Vehicle Runoff Area=356,183 sf 32.74% Impervious Runoff Depth>3.62"
Flow Length=964' Tc=18.6 min CN=86 Runoff=23.01 cfs 107,326 cf

SubcatchmentEDA-32: Area Draining to Runoff Area=110,770 sf 5.92% Impervious Runoff Depth>3.13"
Flow Length=370' Tc=13.3 min CN=81 Runoff=7.46 cfs 28,909 cf

SubcatchmentEDA-33: Area Bypassing Runoff Area=269,860 sf 4.93% Impervious Runoff Depth>3.04"
Flow Length=848' Slope=0.0700 '/' Tc=15.2 min CN=80 Runoff=16.39 cfs 68,267 cf

SubcatchmentEDA-34: Area Draining to Runoff Area=326,196 sf 1.29% Impervious Runoff Depth>3.23"
Flow Length=670' Tc=12.8 min CN=82 Runoff=23.02 cfs 87,742 cf

Pond 1P: Existing Employee Lot Peak Elev=128.89' Storage=48,261 cf Inflow=31.09 cfs 102,428 cf
Outflow=3.17 cfs 90,182 cf

Pond 2P: Existing Outbound Lot Peak Elev=91.43' Storage=533,229 cf Inflow=227.41 cfs 901,117 cf
Outflow=13.89 cfs 519,390 cf

Pond 3P: Existing Sediment Forebay Peak Elev=30.17' Storage=41,539 cf Inflow=145.83 cfs 700,550 cf
Outflow=144.63 cfs 670,338 cf

Pond 4P: Existing Stormwater Pond Peak Elev=28.91' Storage=107,394 cf Inflow=179.90 cfs 826,347 cf
Outflow=94.01 cfs 823,719 cf

Link DP-1: Middle Street Gutter Inflow=3.51 cfs 11,880 cf
Primary=3.51 cfs 11,880 cf

Link DP-2: Southern Wetland Inflow=13.89 cfs 519,390 cf
Primary=13.89 cfs 519,390 cf

Link DP-3: Northern Wetland Inflow=94.01 cfs 823,719 cf
Primary=94.01 cfs 823,719 cf

Total Runoff Area = 5,077,173 sf Runoff Volume = 1,781,802 cf Average Runoff Depth = 4.21"
38.64% Pervious = 1,961,952 sf 61.36% Impervious = 3,115,221 sf

Summary for Subcatchment EDA-10: Area Draining to Middle Street

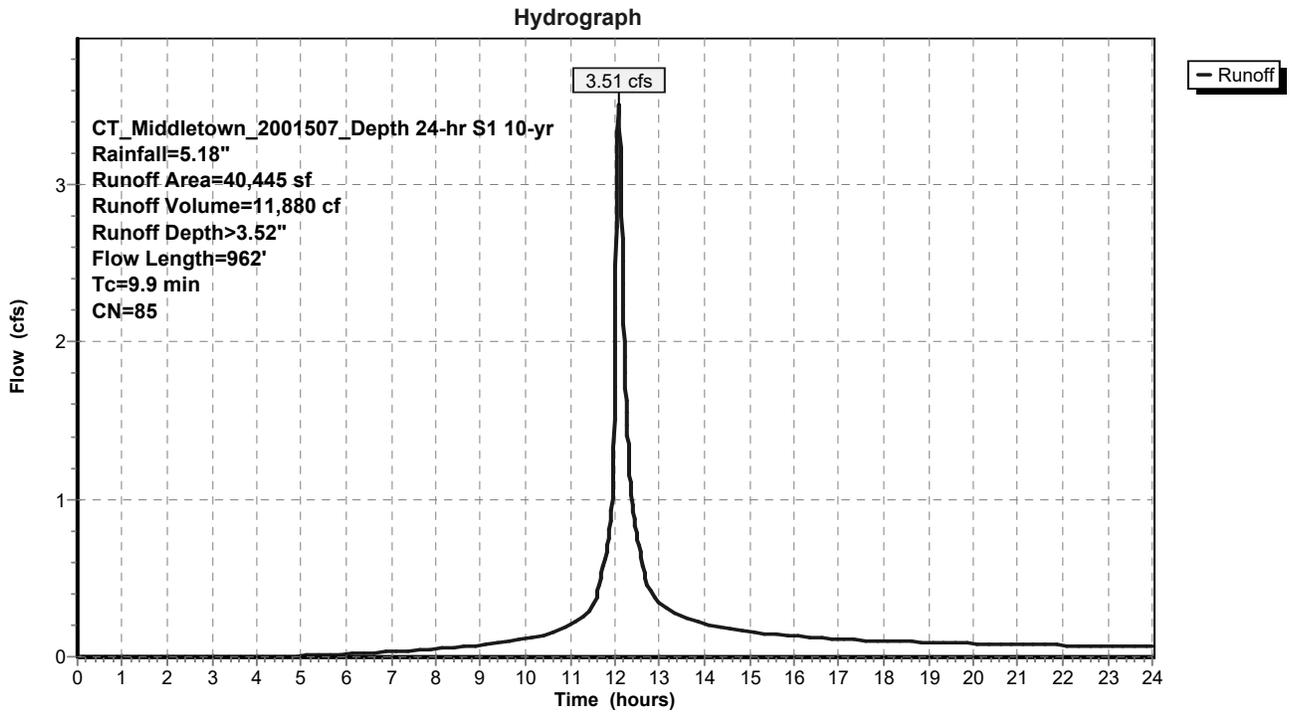
Runoff = 3.51 cfs @ 12.09 hrs, Volume= 11,880 cf, Depth> 3.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 10-yr Rainfall=5.18"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
0	79	50-75% Grass cover, Fair, HSG C
37,835	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
0	98	Paved parking, HSG C
2,440	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
0	96	Gravel surface, HSG C
170	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
40,445	85	Weighted Average
38,005		93.97% Pervious Area
2,440		6.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	28	0.1406	0.20		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
1.1	72	0.0120	1.06		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.29"
6.5	862	0.0120	2.22		Shallow Concentrated Flow, Paved Kv= 20.3 fps
9.9	962	Total			

Subcatchment EDA-10: Area Draining to Middle Street



Summary for Subcatchment EDA-20: Area Draining to Existing Outbound Lot Detention System

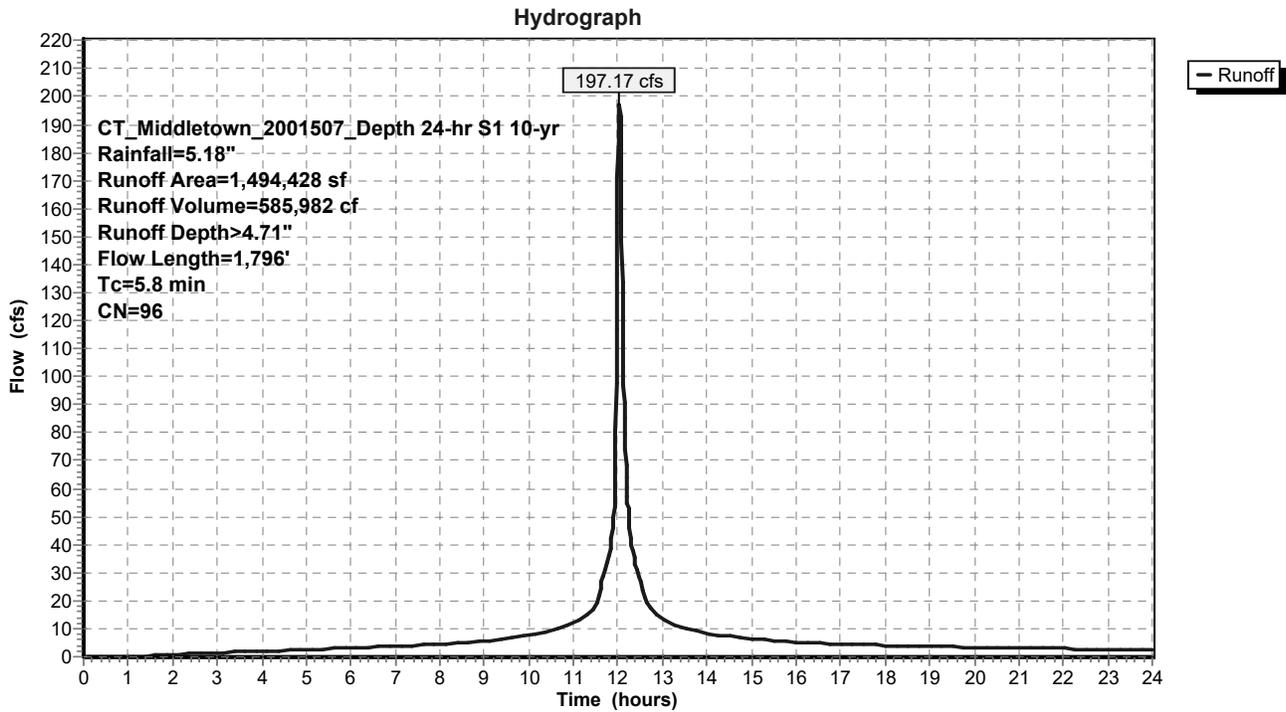
Runoff = 197.17 cfs @ 12.03 hrs, Volume= 585,982 cf, Depth> 4.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 10-yr Rainfall=5.18"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
102,141	79	50-75% Grass cover, Fair, HSG C
86,178	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
465,269	98	Paved parking, HSG C
840,840	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
0	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
1,494,428	96	Weighted Average
188,319		12.60% Pervious Area
1,306,109		87.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	100	0.0140	1.21		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.29"
1.2	176	0.0140	2.40		Shallow Concentrated Flow, Paved Kv= 20.3 fps
3.2	1,520	0.0100	7.80	24.51	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
5.8	1,796	Total			

Subcatchment EDA-20: Area Draining to Existing Outbound Lot Detention System



Summary for Subcatchment EDA-21: Area Draining to Existing Employee Lot Underground Detention

Runoff = 31.09 cfs @ 12.06 hrs, Volume= 102,428 cf, Depth> 4.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 10-yr Rainfall=5.18"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
0	79	50-75% Grass cover, Fair, HSG C
79,335	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
0	98	Paved parking, HSG C
194,785	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
0	96	Gravel surface, HSG C
435	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
274,555	94	Weighted Average
79,770		29.05% Pervious Area
194,785		70.95% Impervious Area

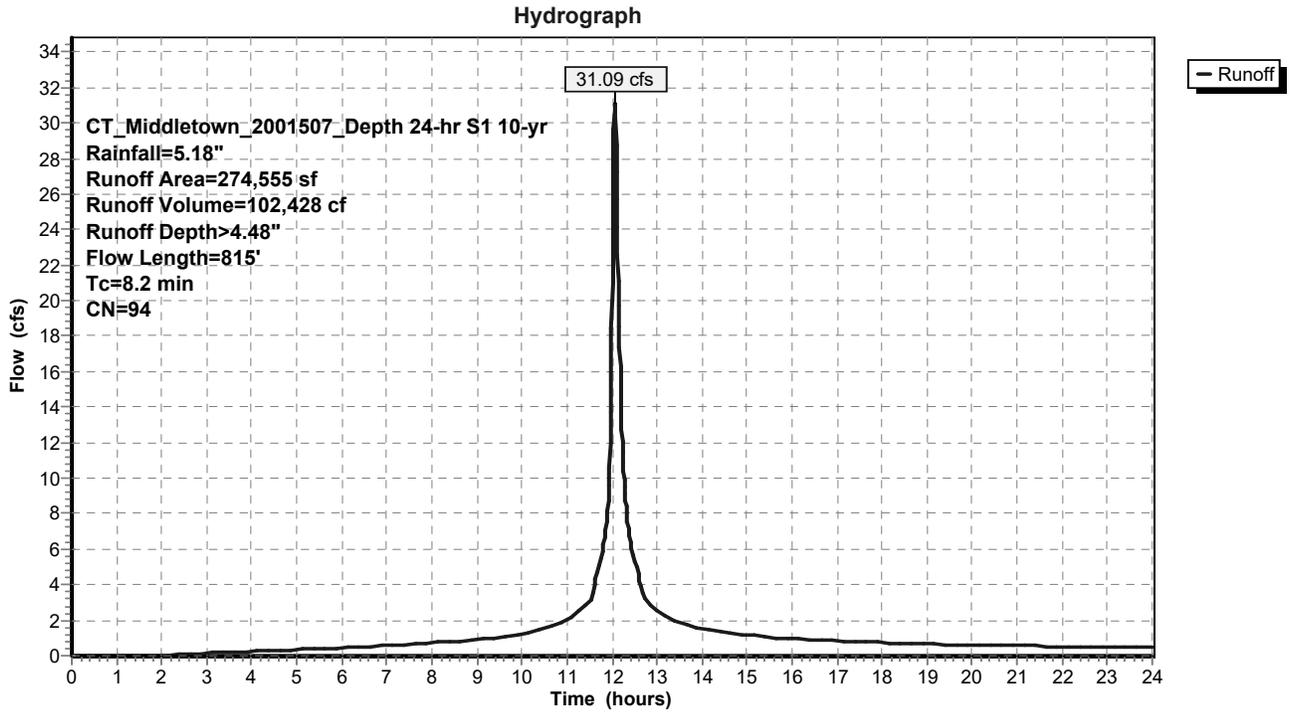
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.1	19	0.0160	0.08		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
1.1	81	0.0160	1.22		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.29"
1.1	164	0.0160	2.57		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.5	130	0.0050	4.03	4.95	Pipe Channel, 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012 Concrete pipe, finished
0.6	152	0.0050	4.55	8.05	Pipe Channel, 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.012 Concrete pipe, finished
0.3	108	0.0050	5.52	17.33	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
0.3	101	0.0050	5.52	17.33	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
0.1	38	0.0050	5.52	17.33	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
0.1	22	0.0050	7.23	51.09	Pipe Channel,

36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75'

n= 0.012 Concrete pipe, finished

8.2 815 Total

Subcatchment EDA-21: Area Draining to Existing Employee Lot Underground Detention



Summary for Subcatchment EDA-22: Offsite Property to Existing Outbound Lot Detention System

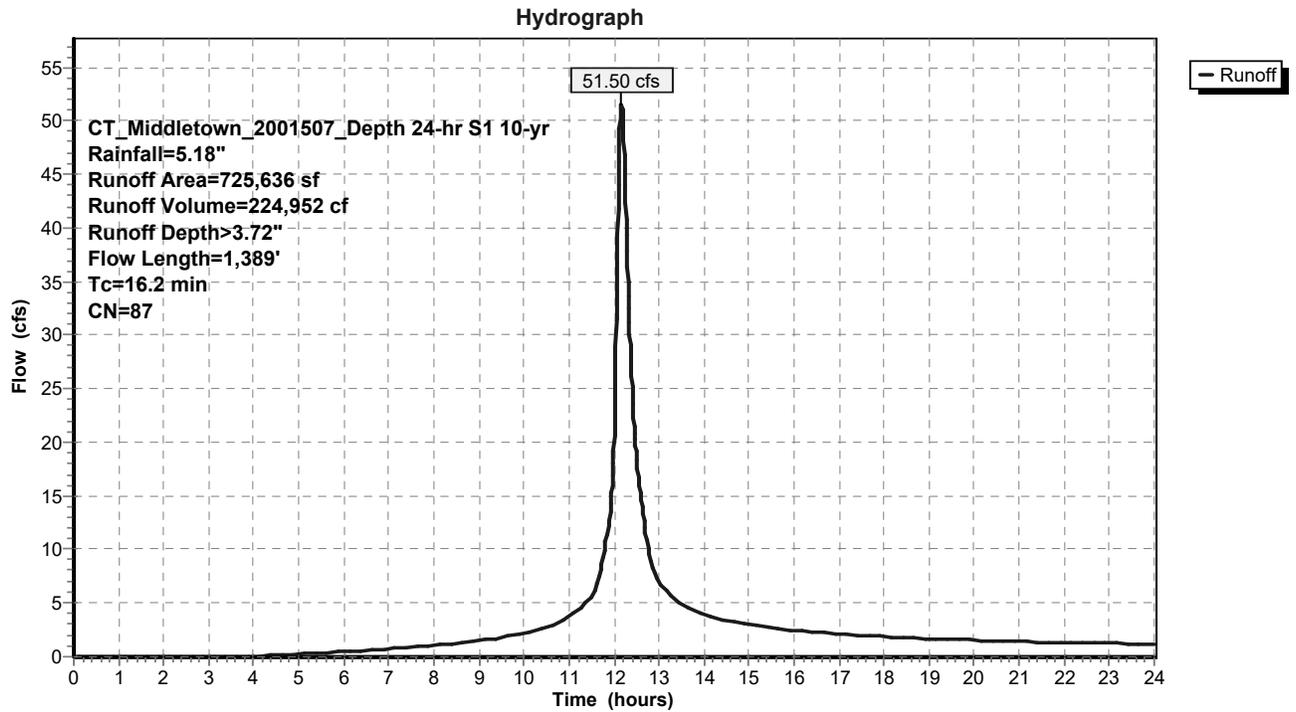
Runoff = 51.50 cfs @ 12.17 hrs, Volume= 224,952 cf, Depth> 3.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 10-yr Rainfall=5.18"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
218,535	79	50-75% Grass cover, Fair, HSG C
204,832	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
128,360	98	Paved parking, HSG C
148,395	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
0	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
25,514	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
725,636	87	Weighted Average
448,881		61.86% Pervious Area
276,755		38.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.1	100	0.0240	0.13		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
1.1	214	0.0374	3.11		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
2.0	1,075	0.0200	9.11	16.09	Pipe Channel, 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.012
16.2	1,389	Total			

Subcatchment EDA-22: Offsite Property to Existing Outbound Lot Detention System



Summary for Subcatchment EDA-30: Inbound Lot Area to Sediment Forebay

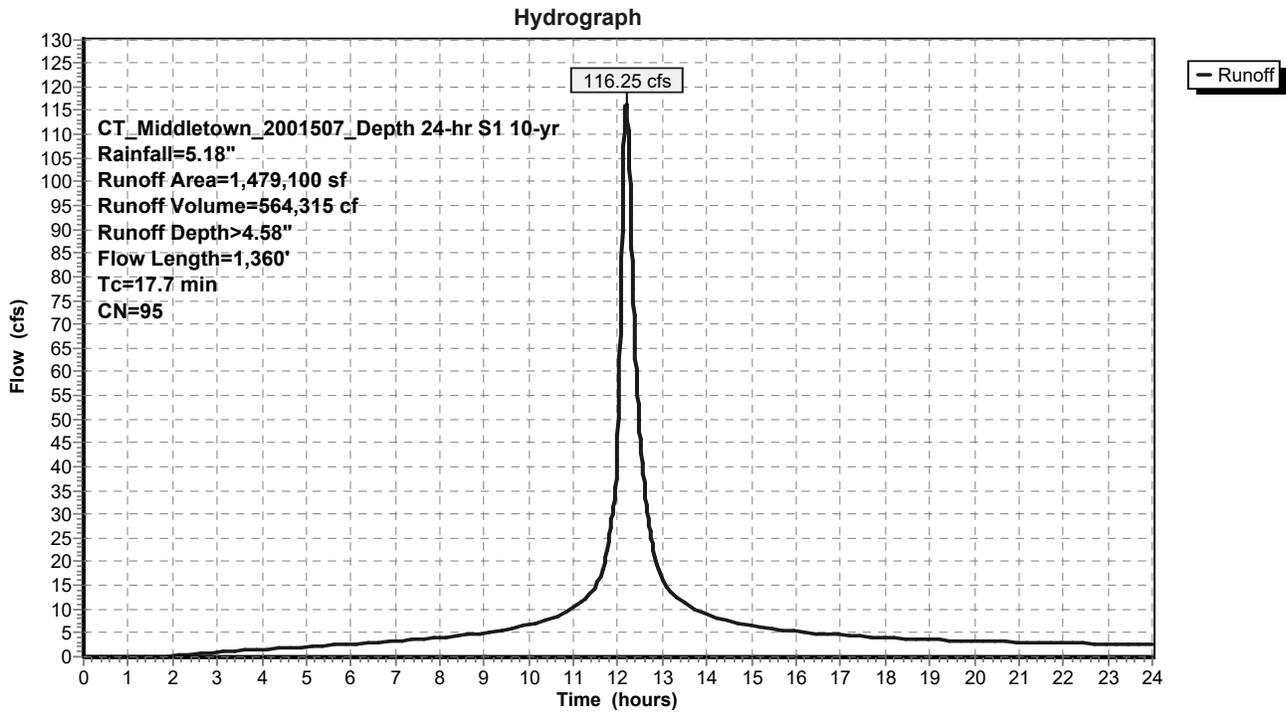
Runoff = 116.25 cfs @ 12.18 hrs, Volume= 564,315 cf, Depth> 4.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 10-yr Rainfall=5.18"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
119,543	79	50-75% Grass cover, Fair, HSG C
165,112	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
471,502	98	Paved parking, HSG C
722,943	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
0	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
1,479,100	95	Weighted Average
284,655		19.25% Pervious Area
1,194,445		80.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.2	80	0.0125	0.09		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
0.8	120	0.0150	2.49		Shallow Concentrated Flow, Paved Kv= 20.3 fps
2.7	1,160	0.0050	7.23	51.09	Pipe Channel, 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.012
17.7	1,360	Total			

Subcatchment EDA-30: Inbound Lot Area to Sediment Forebay



Summary for Subcatchment EDA-31: Vehicle Maintenance Area to Sediment Forebay

Runoff = 23.01 cfs @ 12.21 hrs, Volume= 107,326 cf, Depth> 3.62"

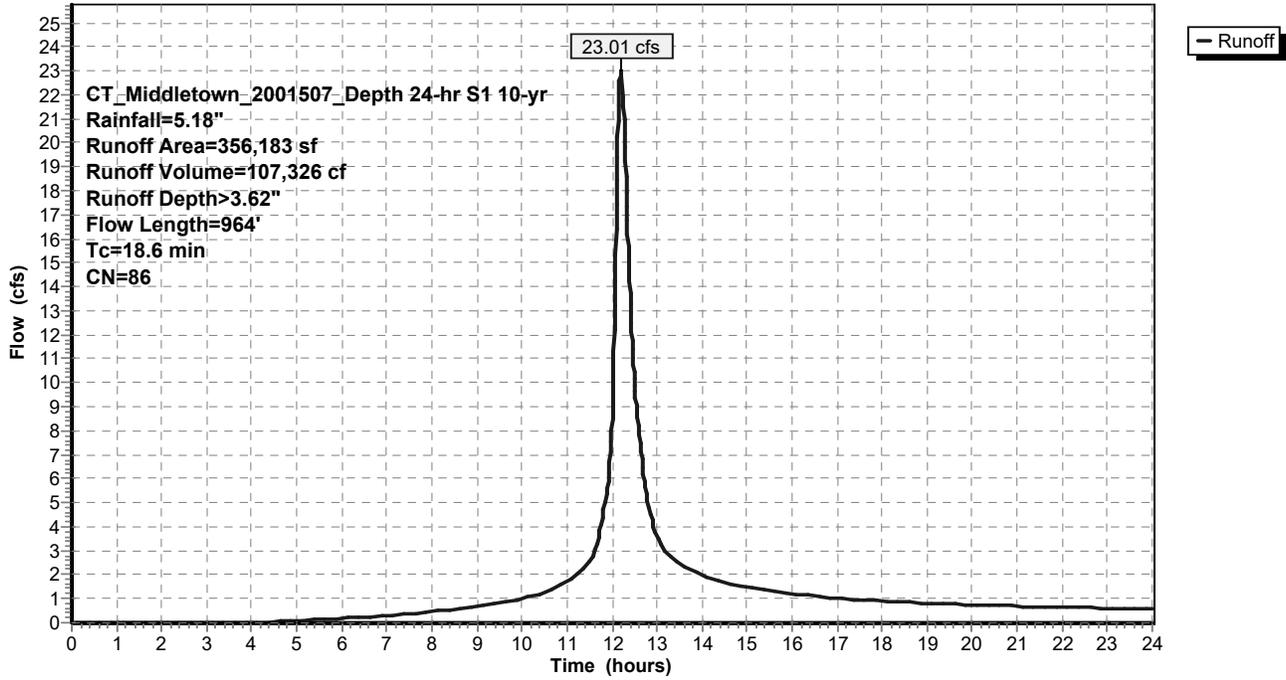
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 10-yr Rainfall=5.18"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
153,724	79	50-75% Grass cover, Fair, HSG C
85,858	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
69,565	98	Paved parking, HSG C
47,036	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
0	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
356,183	86	Weighted Average
239,582		67.26% Pervious Area
116,601		32.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	60	0.0400	0.14		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
5.7	40	0.0300	0.12		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
5.3	541	0.0600	1.71		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.2	54	0.0050	4.03	4.95	Pipe Channel, 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012
0.1	122	0.0500	17.44	54.80	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
0.1	108	0.0400	15.60	49.02	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
0.1	39	0.0085	7.19	22.59	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
18.6	964	Total			

Subcatchment EDA-31: Vehicle Maintenance Area to Sediment Forebay

Hydrograph



Summary for Subcatchment EDA-32: Area Draining to Sediment Forebay

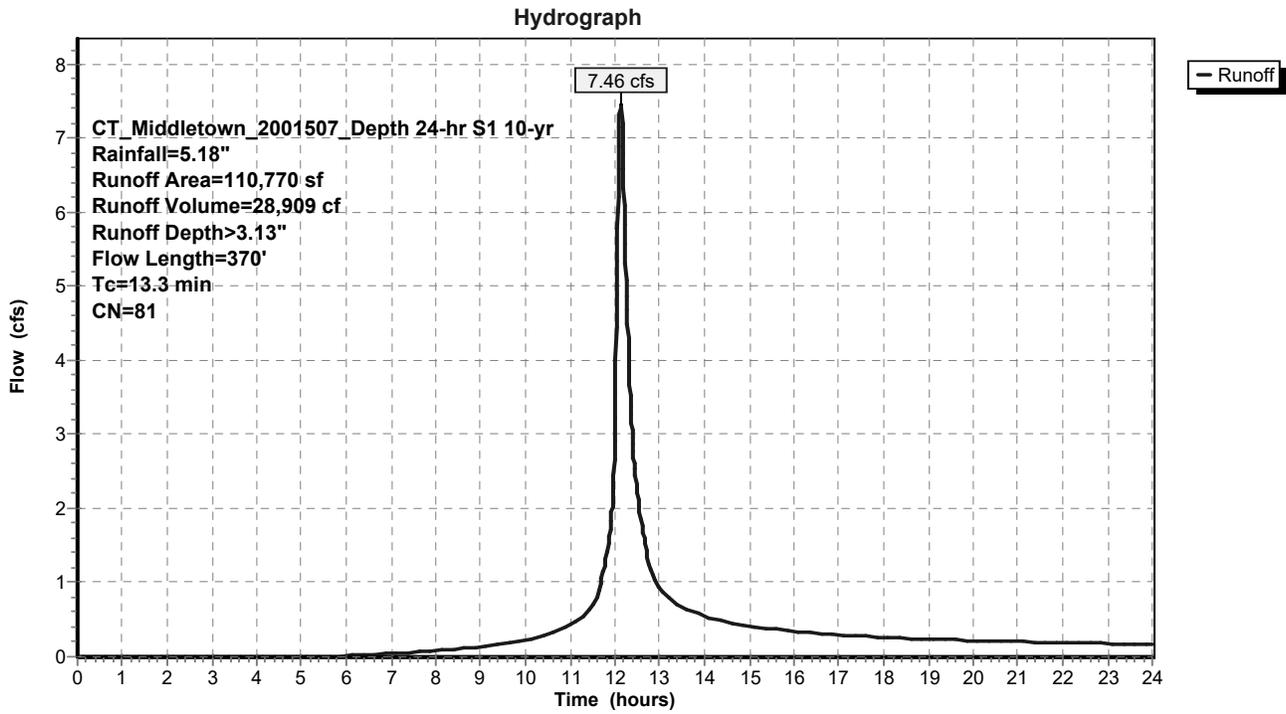
Runoff = 7.46 cfs @ 12.13 hrs, Volume= 28,909 cf, Depth> 3.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 10-yr Rainfall=5.18"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
98,913	79	50-75% Grass cover, Fair, HSG C
0	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
6,557	98	Paved parking, HSG C
0	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
5,300	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
110,770	81	Weighted Average
104,213		94.08% Pervious Area
6,557		5.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	100	0.0350	0.15		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
1.3	105	0.0350	1.31		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.7	165	0.3333	4.04		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
13.3	370	Total			

Subcatchment EDA-32: Area Draining to Sediment Forebay



Summary for Subcatchment EDA-33: Area Bypassing Sediment Forebay

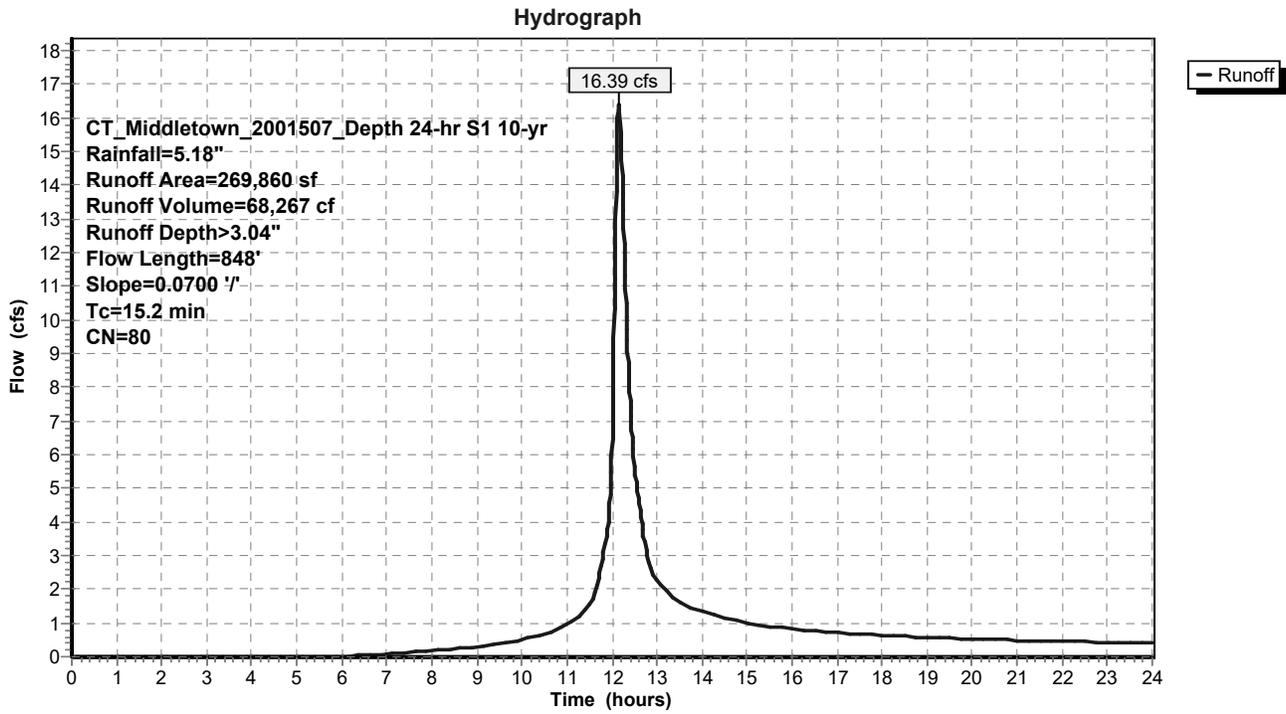
Runoff = 16.39 cfs @ 12.16 hrs, Volume= 68,267 cf, Depth> 3.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 10-yr Rainfall=5.18"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
232,381	79	50-75% Grass cover, Fair, HSG C
23,831	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
11,183	98	Paved parking, HSG C
2,124	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
341	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
269,860	80	Weighted Average
256,553		95.07% Pervious Area
13,307		4.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	100	0.0700	0.20		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
6.7	748	0.0700	1.85		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
15.2	848	Total			

Subcatchment EDA-33: Area Bypassing Sediment Forebay



Summary for Subcatchment EDA-34: Area Draining to Stormwater Pond

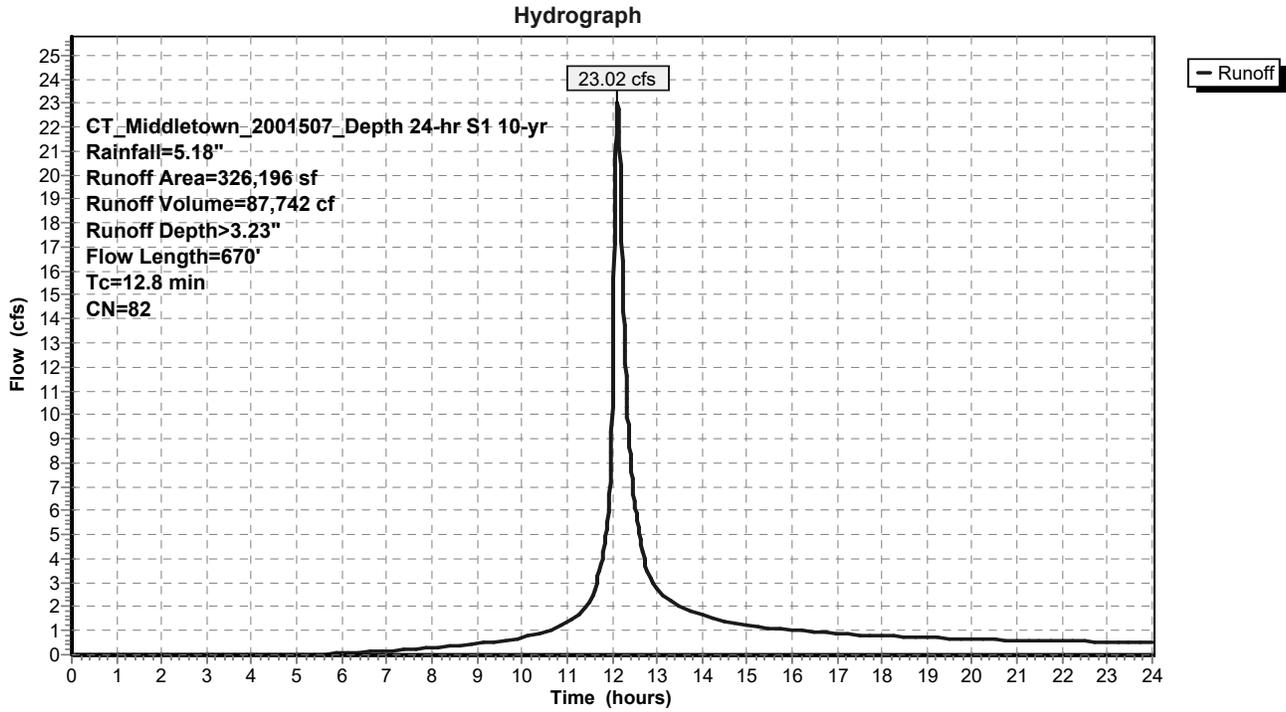
Runoff = 23.02 cfs @ 12.12 hrs, Volume= 87,742 cf, Depth> 3.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 10-yr Rainfall=5.18"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
269,284	79	50-75% Grass cover, Fair, HSG C
0	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
4,222	98	Paved parking, HSG C
0	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
10,850	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
5,025	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
36,815	98	Water Surface, 0% imp, HSG C
326,196	82	Weighted Average
321,974		98.71% Pervious Area
4,222		1.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	100	0.0700	0.20		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
4.3	570	0.1000	2.21		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
12.8	670	Total			

Subcatchment EDA-34: Area Draining to Stormwater Pond



Summary for Pond 1P: Existing Employee Lot Underground Detention System

Inflow Area = 274,555 sf, 70.95% Impervious, Inflow Depth > 4.48" for 10-yr event
 Inflow = 31.09 cfs @ 12.06 hrs, Volume= 102,428 cf
 Outflow = 3.17 cfs @ 12.75 hrs, Volume= 90,182 cf, Atten= 90%, Lag= 41.6 min
 Primary = 3.17 cfs @ 12.75 hrs, Volume= 90,182 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 128.89' @ 12.75 hrs Surf.Area= 11,725 sf Storage= 48,261 cf

Plug-Flow detention time= 231.8 min calculated for 90,182 cf (88% of inflow)
 Center-of-Mass det. time= 168.4 min (948.2 - 779.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	123.50'	2,345 cf	64.19'W x 182.67'L x 9.50'H Field A 111,387 cf Overall - 105,524 cf Embedded = 5,862 cf x 40.0% Voids
#2A	124.00'	83,580 cf	StormTrap ST2 DoubleTrap 8-0x 66 Inside #1 Inside= 101.7"W x 96.0"H => 61.09 sf x 15.40'L = 940.5 cf Outside= 101.7"W x 108.0"H => 76.31 sf x 15.40'L = 1,174.9 cf 66 Chambers in 6 Rows 50.88' x 169.35' Core + 6.66' Border = 64.19' x 182.67' System
		85,925 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	125.00'	24.0" Round Culvert L= 1,560.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 125.00' / 85.00' S= 0.0256 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#2	Device 1	125.00'	8.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	129.00'	12.0" Vert. Orifice/Grate C= 0.600
#4	Device 1	132.50'	3.0' long x 2.00' rise Sharp-Crested Rectangular Weir 2 End Contraction(s) 3.0' Crest Height

Primary OutFlow Max=3.17 cfs @ 12.75 hrs HW=128.89' (Free Discharge)

- 1=Culvert (Passes 3.17 cfs of 25.74 cfs potential flow)
- 2=Orifice/Grate (Orifice Controls 3.17 cfs @ 9.09 fps)
- 3=Orifice/Grate (Controls 0.00 cfs)
- 4=Sharp-Crested Rectangular Weir(Controls 0.00 cfs)

Pond 1P: Existing Employee Lot Underground Detention System - Chamber Wizard Field A

Chamber Model = StormTrapST2 DoubleTrap 8-0 (StormTrapST2 DoubleTrap®Type II+IV)

Inside= 101.7"W x 96.0"H => 61.09 sf x 15.40'L = 940.5 cf
Outside= 101.7"W x 108.0"H => 76.31 sf x 15.40'L = 1,174.9 cf

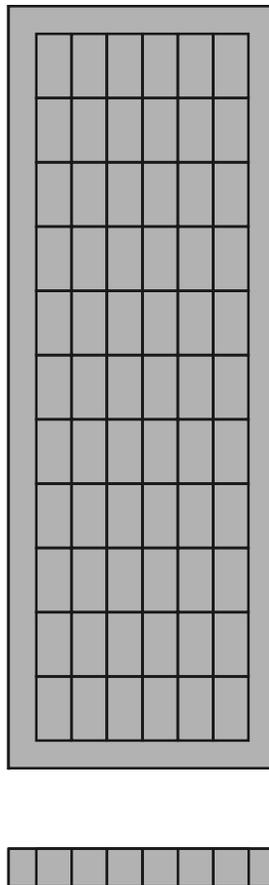
11 Chambers/Row x 15.40' Long = 169.35' Row Length +79.9" Border x 2 = 182.67' Base Length
6 Rows x 101.7" Wide + 79.9" Side Border x 2 = 64.19' Base Width
6.0" Base + 108.0" Chamber Height = 9.50' Field Height

66 Chambers x 940.5 cf + 21,503.9 cf Border = 83,579.7 cf Chamber Storage
66 Chambers x 1,174.9 cf + 27,981.2 cf Border = 105,524.2 cf Displacement

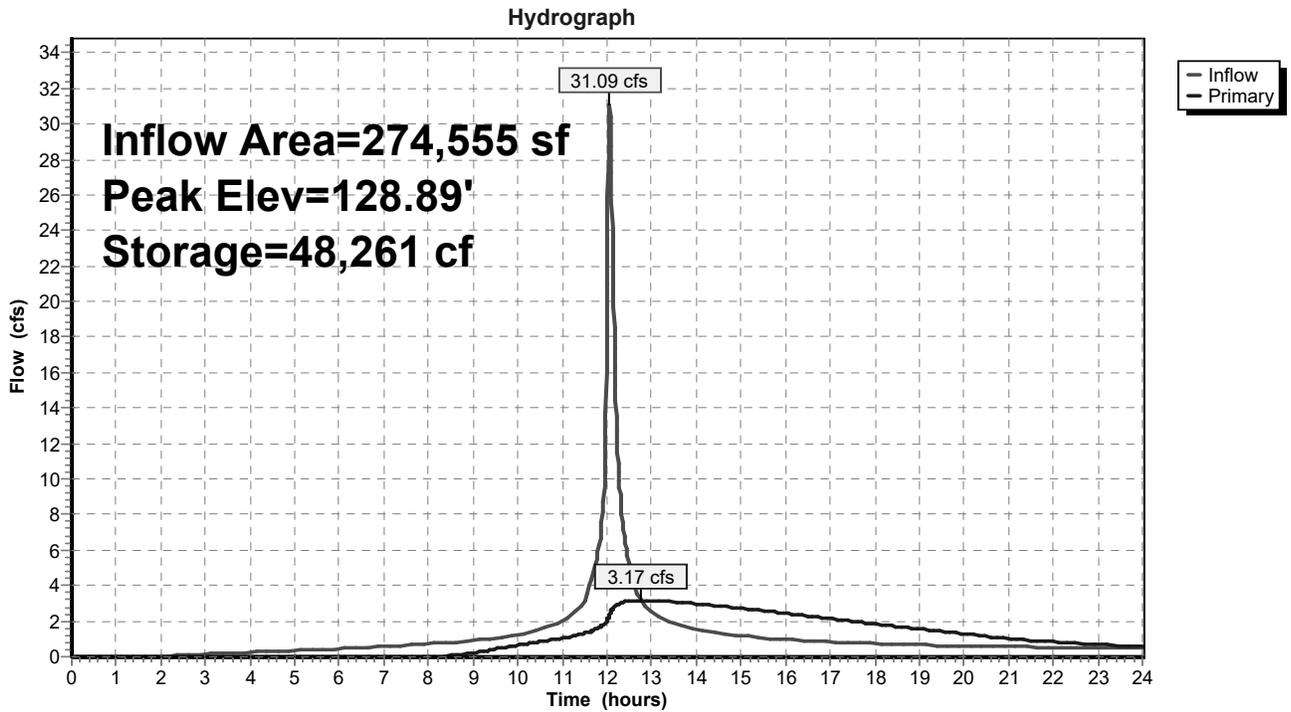
111,386.7 cf Field - 105,524.2 cf Chambers = 5,862.5 cf Stone x 40.0% Voids = 2,345.0 cf Stone Storage

Chamber Storage + Stone Storage = 85,924.7 cf = 1.973 af
Overall Storage Efficiency = 77.1%
Overall System Size = 182.67' x 64.19' x 9.50'

66 Chambers (plus border)
4,125.4 cy Field
217.1 cy Stone



Pond 1P: Existing Employee Lot Underground Detention System



Summary for Pond 2P: Existing Outbound Lot Underground Detention System

Inflow Area = 2,494,619 sf, 71.26% Impervious, Inflow Depth > 4.33" for 10-yr event
 Inflow = 227.41 cfs @ 12.04 hrs, Volume= 901,117 cf
 Outflow = 13.89 cfs @ 14.36 hrs, Volume= 519,390 cf, Atten= 94%, Lag= 139.6 min
 Primary = 13.89 cfs @ 14.36 hrs, Volume= 519,390 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 91.43' @ 14.36 hrs Surf.Area= 73,413 sf Storage= 533,229 cf

Plug-Flow detention time= 409.0 min calculated for 519,390 cf (58% of inflow)
 Center-of-Mass det. time= 261.6 min (1,058.4 - 796.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	82.50'	32,237 cf	183.90'W x 399.21'L x 13.33'H Field A 978,837 cf Overall - 898,245 cf Embedded = 80,592 cf x 40.0% Voids
#2A	83.50'	766,158 cf	StormTrap ST2 DoubleTrap 11-4x 500 Inside #1 Inside= 101.7"W x 136.0"H => 89.71 sf x 15.40'L = 1,381.1 cf Outside= 101.7"W x 148.0"H => 104.58 sf x 15.40'L = 1,610.0 cf 500 Chambers in 20 Rows 169.58' x 384.90' Core + 6.66' Border = 182.90' x 398.21' System
		798,395 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	86.00'	30.0" Round Culvert L= 120.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 86.00' / 85.50' S= 0.0042 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 4.91 sf
#2	Device 1	86.00'	15.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	91.00'	18.0" Vert. Orifice/Grate X 2 rows with 6.0" cc spacing C= 0.600
#4	Device 1	95.50'	3.0' long x 2.00' rise Sharp-Crested Rectangular Weir 2 End Contraction(s) 3.0' Crest Height

Primary OutFlow Max=13.87 cfs @ 14.36 hrs HW=91.43' (Free Discharge)

- 1=Culvert (Passes 13.87 cfs of 48.13 cfs potential flow)
- 2=Orifice/Grate (Orifice Controls 12.95 cfs @ 10.55 fps)
- 3=Orifice/Grate (Orifice Controls 0.92 cfs @ 2.22 fps)
- 4=Sharp-Crested Rectangular Weir(Controls 0.00 cfs)

Pond 2P: Existing Outbound Lot Underground Detention System - Chamber Wizard Field A

Chamber Model = StormTrapST2 DoubleTrap 11-4 (StormTrapST2 DoubleTrap®Type I+III)

Inside= 101.7"W x 136.0"H => 89.71 sf x 15.40'L = 1,381.1 cf

Outside= 101.7"W x 148.0"H => 104.58 sf x 15.40'L = 1,610.0 cf

25 Chambers/Row x 15.40' Long = 384.90' Row Length +79.9" Border x 2 +6.0" End Stone x 2 = 399.21' Base Length

20 Rows x 101.7" Wide + 79.9" Side Border x 2 + 6.0" Side Stone x 2 = 183.90' Base Width

12.0" Base + 148.0" Chamber Height = 13.33' Field Height

500 Chambers x 1,381.1 cf + 75,595.3 cf Border = 766,157.9 cf Chamber Storage

500 Chambers x 1,610.0 cf + 93,224.3 cf Border = 898,244.6 cf Displacement

978,836.7 cf Field - 898,244.6 cf Chambers = 80,592.0 cf Stone x 40.0% Voids = 32,236.8 cf Stone Storage

Chamber Storage + Stone Storage = 798,394.7 cf = 18.329 af

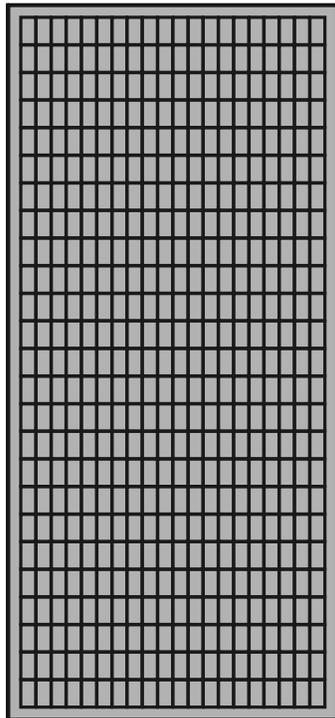
Overall Storage Efficiency = 81.6%

Overall System Size = 399.21' x 183.90' x 13.33'

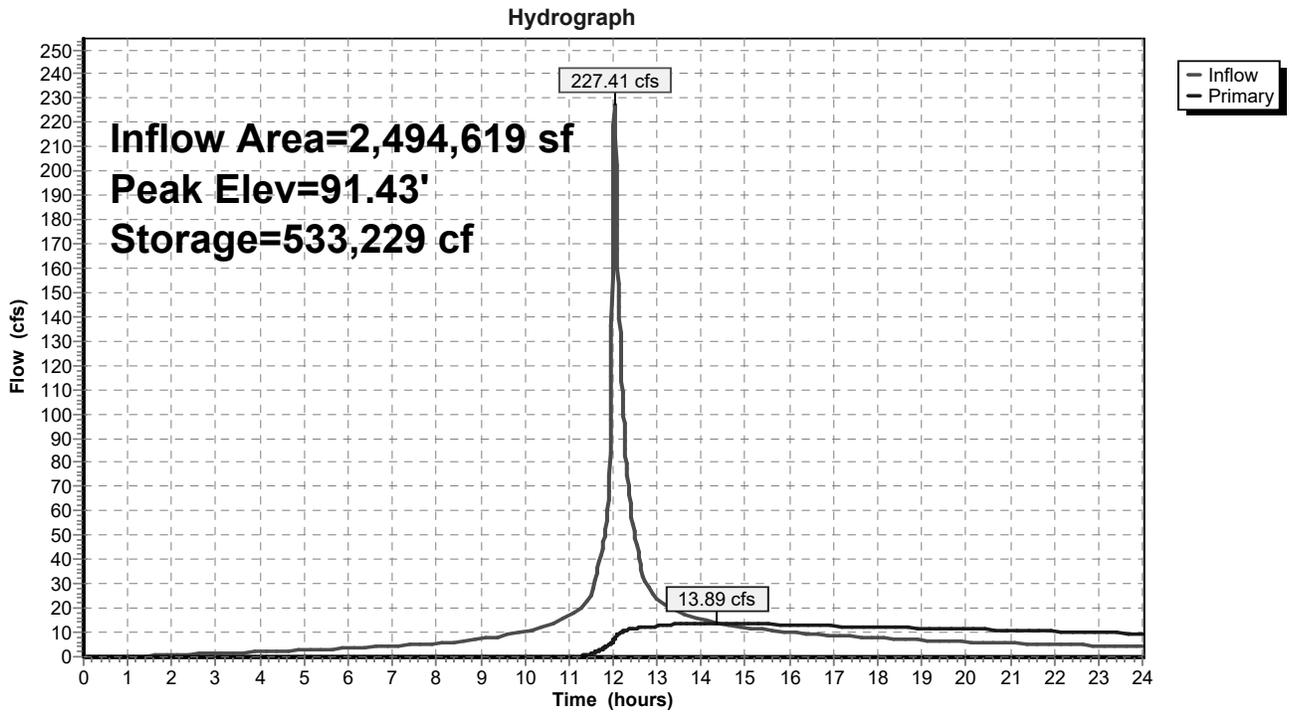
500 Chambers (plus border)

36,253.2 cy Field

2,984.9 cy Stone



Pond 2P: Existing Outbound Lot Underground Detention System



Summary for Pond 3P: Existing Sediment Forebay

Inflow Area = 1,946,053 sf, 67.71% Impervious, Inflow Depth > 4.32" for 10-yr event
 Inflow = 145.83 cfs @ 12.18 hrs, Volume= 700,550 cf
 Outflow = 144.63 cfs @ 12.20 hrs, Volume= 670,338 cf, Atten= 1%, Lag= 1.2 min
 Primary = 144.63 cfs @ 12.20 hrs, Volume= 670,338 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 4
 Peak Elev= 30.17' @ 12.20 hrs Surf.Area= 10,940 sf Storage= 41,539 cf

Plug-Flow detention time= 49.4 min calculated for 670,338 cf (96% of inflow)
 Center-of-Mass det. time= 23.5 min (813.7 - 790.2)

Volume	Invert	Avail.Storage	Storage Description
#1	24.00'	51,057 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

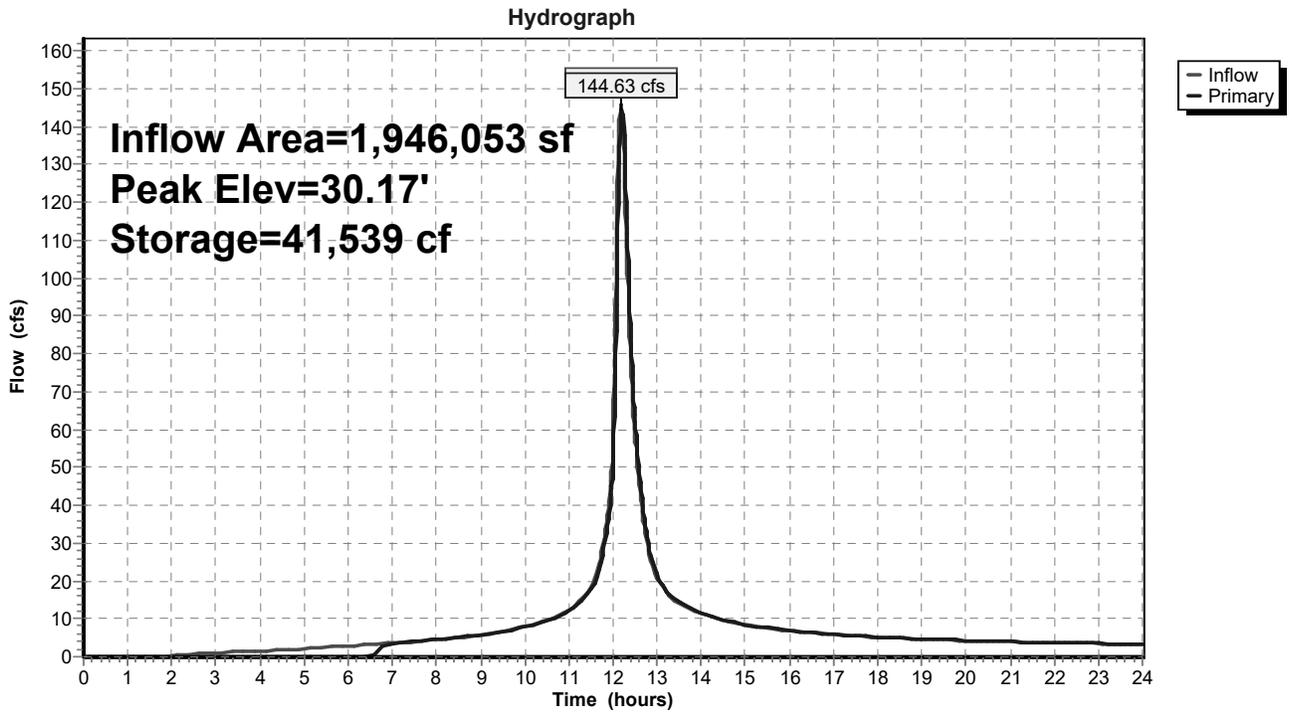
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
24.00	3,090	0	0
25.00	4,111	3,601	3,601
26.00	5,235	4,673	8,274
27.00	6,460	5,848	14,121
28.00	7,785	7,123	21,244
29.00	9,210	8,498	29,741
30.00	10,736	9,973	39,714
31.00	11,950	11,343	51,057

Device	Routing	Invert	Outlet Devices
#1	Primary	28.95'	40.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=144.58 cfs @ 12.20 hrs HW=30.17' (Free Discharge)

↑1=**Broad-Crested Rectangular Weir**(Weir Controls 144.58 cfs @ 2.97 fps)

Pond 3P: Existing Sediment Forebay



Summary for Pond 4P: Existing Stormwater Pond

Inflow Area = 2,542,109 sf, 52.52% Impervious, Inflow Depth > 3.90" for 10-yr event
 Inflow = 179.90 cfs @ 12.19 hrs, Volume= 826,347 cf
 Outflow = 94.01 cfs @ 12.42 hrs, Volume= 823,719 cf, Atten= 48%, Lag= 14.2 min
 Primary = 94.01 cfs @ 12.42 hrs, Volume= 823,719 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 28.91' @ 12.42 hrs Surf.Area= 63,826 sf Storage= 107,394 cf

Plug-Flow detention time= 10.5 min calculated for 823,376 cf (100% of inflow)
 Center-of-Mass det. time= 8.5 min (827.5 - 818.9)

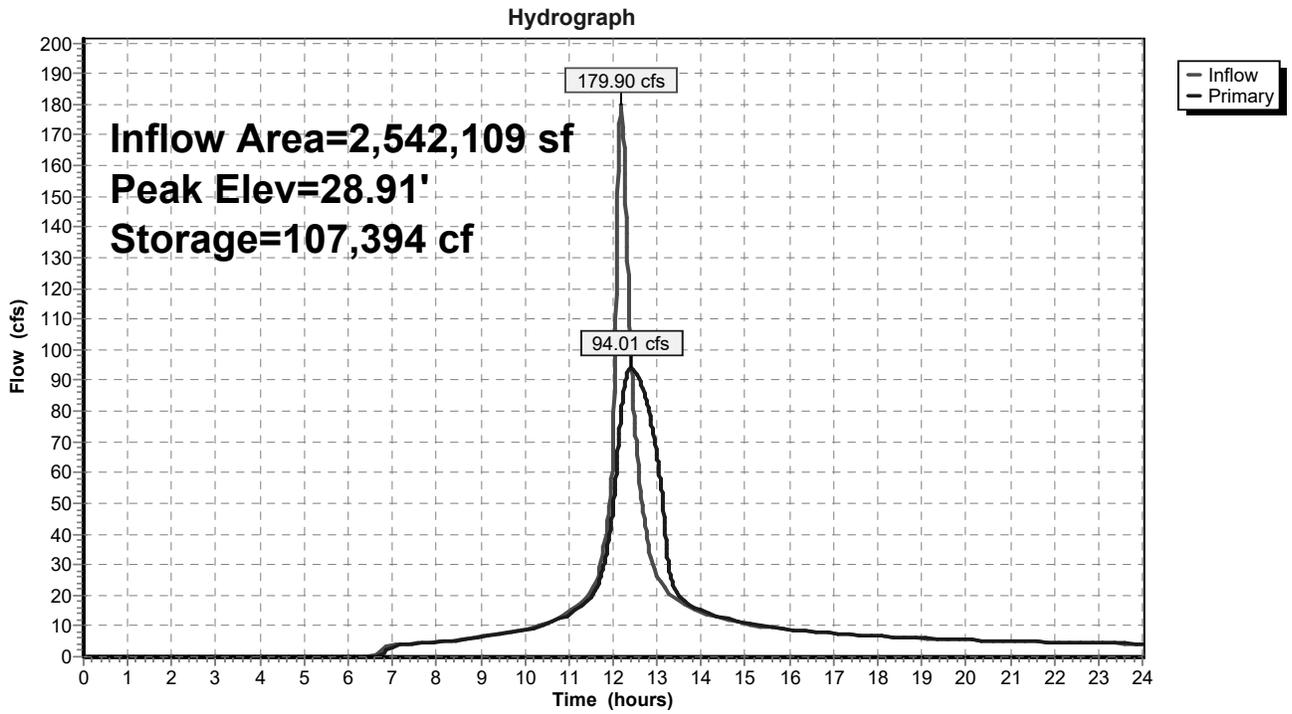
Volume	Invert	Avail.Storage	Storage Description
#1	24.00'	680,910 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
24.00	50	0	0
27.00	10,786	16,254	16,254
28.00	59,106	34,946	51,200
30.00	69,432	128,538	179,738
32.00	78,467	147,899	327,637
34.00	87,601	166,068	493,705
36.00	99,604	187,205	680,910

Device	Routing	Invert	Outlet Devices
#1	Primary	35.50'	70.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#2	Primary	24.50'	48.0" Vert. Orifice/Grate C= 0.600
#3	Primary	34.50'	2.0" Horiz. Orifice/Grate X 8.00 columns X 10 rows C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=94.01 cfs @ 12.42 hrs HW=28.91' (Free Discharge)

- 1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)
- 2=Orifice/Grate (Orifice Controls 94.01 cfs @ 7.48 fps)
- 3=Orifice/Grate (Controls 0.00 cfs)

Pond 4P: Existing Stormwater Pond

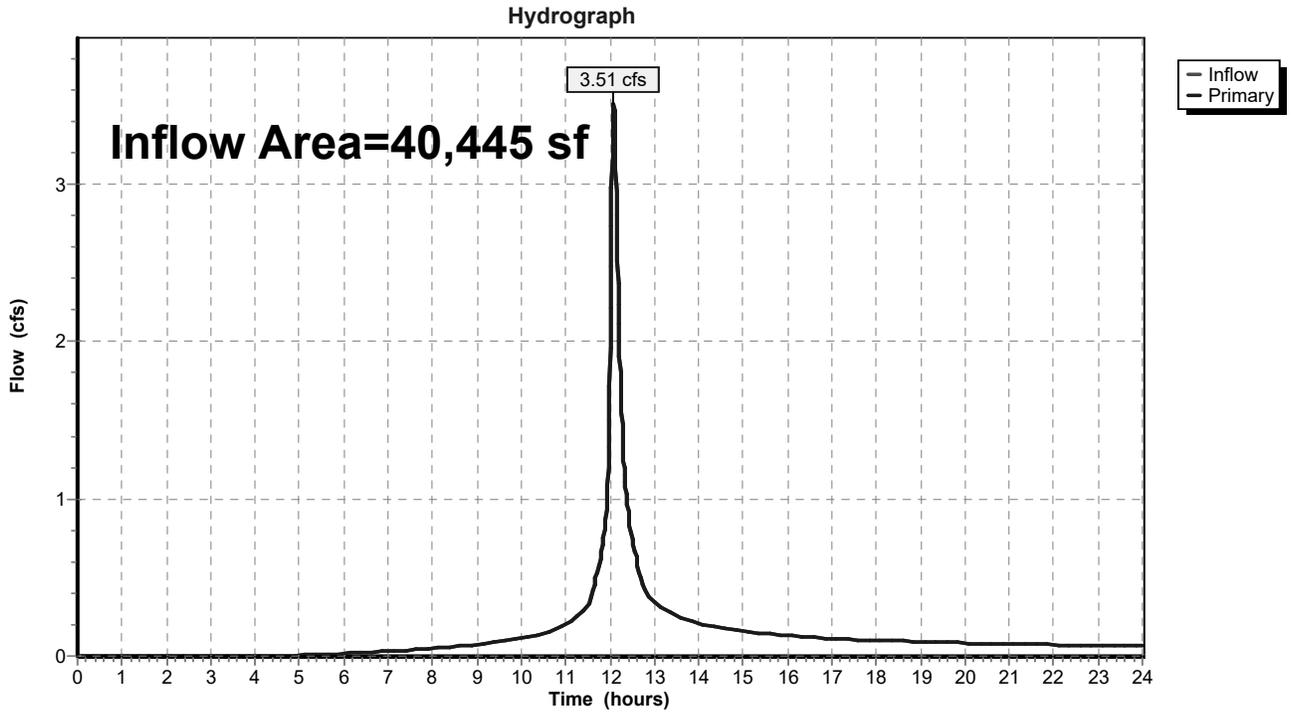


Summary for Link DP-1: Middle Street Gutter

Inflow Area = 40,445 sf, 6.03% Impervious, Inflow Depth > 3.52" for 10-yr event
Inflow = 3.51 cfs @ 12.09 hrs, Volume= 11,880 cf
Primary = 3.51 cfs @ 12.09 hrs, Volume= 11,880 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link DP-1: Middle Street Gutter



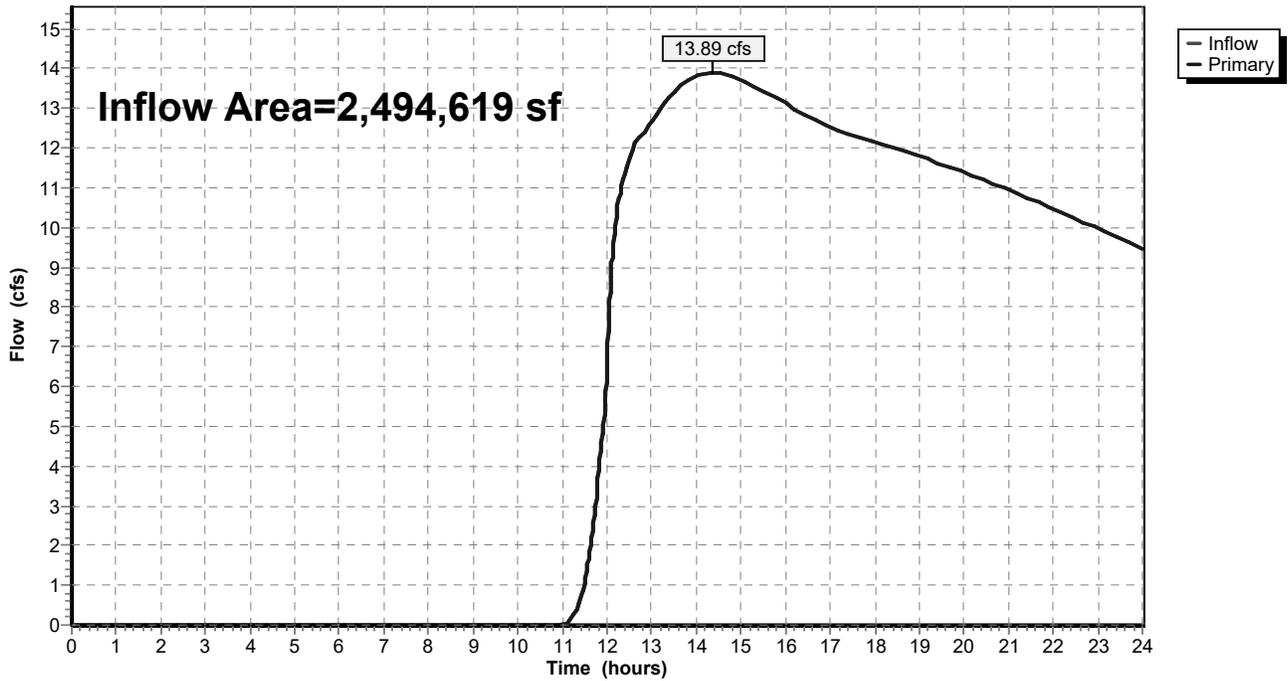
Summary for Link DP-2: Southern Wetland

Inflow Area = 2,494,619 sf, 71.26% Impervious, Inflow Depth > 2.50" for 10-yr event
Inflow = 13.89 cfs @ 14.36 hrs, Volume= 519,390 cf
Primary = 13.89 cfs @ 14.36 hrs, Volume= 519,390 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link DP-2: Southern Wetland

Hydrograph

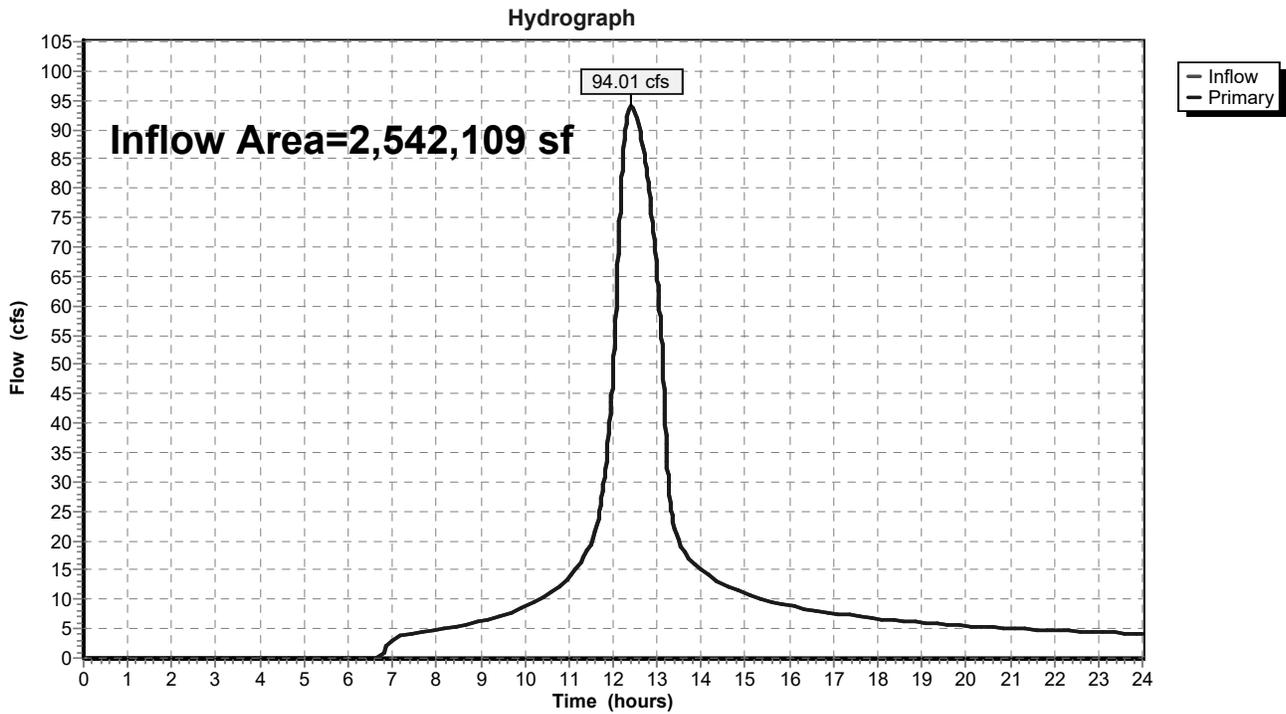


Summary for Link DP-3: Northern Wetland

Inflow Area = 2,542,109 sf, 52.52% Impervious, Inflow Depth > 3.89" for 10-yr event
Inflow = 94.01 cfs @ 12.42 hrs, Volume= 823,719 cf
Primary = 94.01 cfs @ 12.42 hrs, Volume= 823,719 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link DP-3: Northern Wetland



Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentEDA-10: Area Draining to Runoff Area=40,445 sf 6.03% Impervious Runoff Depth>4.62"
Flow Length=962' Tc=9.9 min CN=85 Runoff=4.53 cfs 15,574 cf

SubcatchmentEDA-20: Area Draining Runoff Area=1,494,428 sf 87.40% Impervious Runoff Depth>5.87"
Flow Length=1,796' Tc=5.8 min CN=96 Runoff=241.90 cfs 730,820 cf

SubcatchmentEDA-21: Area Draining to Runoff Area=274,555 sf 70.95% Impervious Runoff Depth>5.63"
Flow Length=815' Tc=8.2 min CN=94 Runoff=38.40 cfs 128,870 cf

SubcatchmentEDA-22: Offsite Property Runoff Area=725,636 sf 38.14% Impervious Runoff Depth>4.83"
Flow Length=1,389' Tc=16.2 min CN=87 Runoff=65.74 cfs 292,153 cf

SubcatchmentEDA-30: Inbound Lot Runoff Area=1,479,100 sf 80.75% Impervious Runoff Depth>5.74"
Flow Length=1,360' Tc=17.7 min CN=95 Runoff=142.95 cfs 706,895 cf

SubcatchmentEDA-31: Vehicle Runoff Area=356,183 sf 32.74% Impervious Runoff Depth>4.72"
Flow Length=964' Tc=18.6 min CN=86 Runoff=29.50 cfs 140,048 cf

SubcatchmentEDA-32: Area Draining to Runoff Area=110,770 sf 5.92% Impervious Runoff Depth>4.19"
Flow Length=370' Tc=13.3 min CN=81 Runoff=9.87 cfs 38,652 cf

SubcatchmentEDA-33: Area Bypassing Runoff Area=269,860 sf 4.93% Impervious Runoff Depth>4.08"
Flow Length=848' Slope=0.0700 1' Tc=15.2 min CN=80 Runoff=21.82 cfs 91,741 cf

SubcatchmentEDA-34: Area Draining to Runoff Area=326,196 sf 1.29% Impervious Runoff Depth>4.29"
Flow Length=670' Tc=12.8 min CN=82 Runoff=30.27 cfs 116,726 cf

Pond 1P: Existing Employee Lot Peak Elev=129.74' Storage=57,133 cf Inflow=38.40 cfs 128,870 cf
Outflow=5.37 cfs 115,474 cf

Pond 2P: Existing Outbound Lot Peak Elev=92.70' Storage=619,751 cf Inflow=280.52 cfs 1,138,447 cf
Outflow=28.53 cfs 712,937 cf

Pond 3P: Existing Sediment Forebay Peak Elev=30.37' Storage=43,719 cf Inflow=181.18 cfs 885,596 cf
Outflow=179.69 cfs 855,243 cf

Pond 4P: Existing Stormwater Pond Peak Elev=29.61' Storage=152,890 cf Inflow=226.33 cfs 1,063,711 cf
Outflow=106.66 cfs 1,060,699 cf

Link DP-1: Middle Street Gutter Inflow=4.53 cfs 15,574 cf
Primary=4.53 cfs 15,574 cf

Link DP-2: Southern Wetland Inflow=28.53 cfs 712,937 cf
Primary=28.53 cfs 712,937 cf

Link DP-3: Northern Wetland Inflow=106.66 cfs 1,060,699 cf
Primary=106.66 cfs 1,060,699 cf

Total Runoff Area = 5,077,173 sf Runoff Volume = 2,261,481 cf Average Runoff Depth = 5.35"
38.64% Pervious = 1,961,952 sf 61.36% Impervious = 3,115,221 sf

Summary for Subcatchment EDA-10: Area Draining to Middle Street

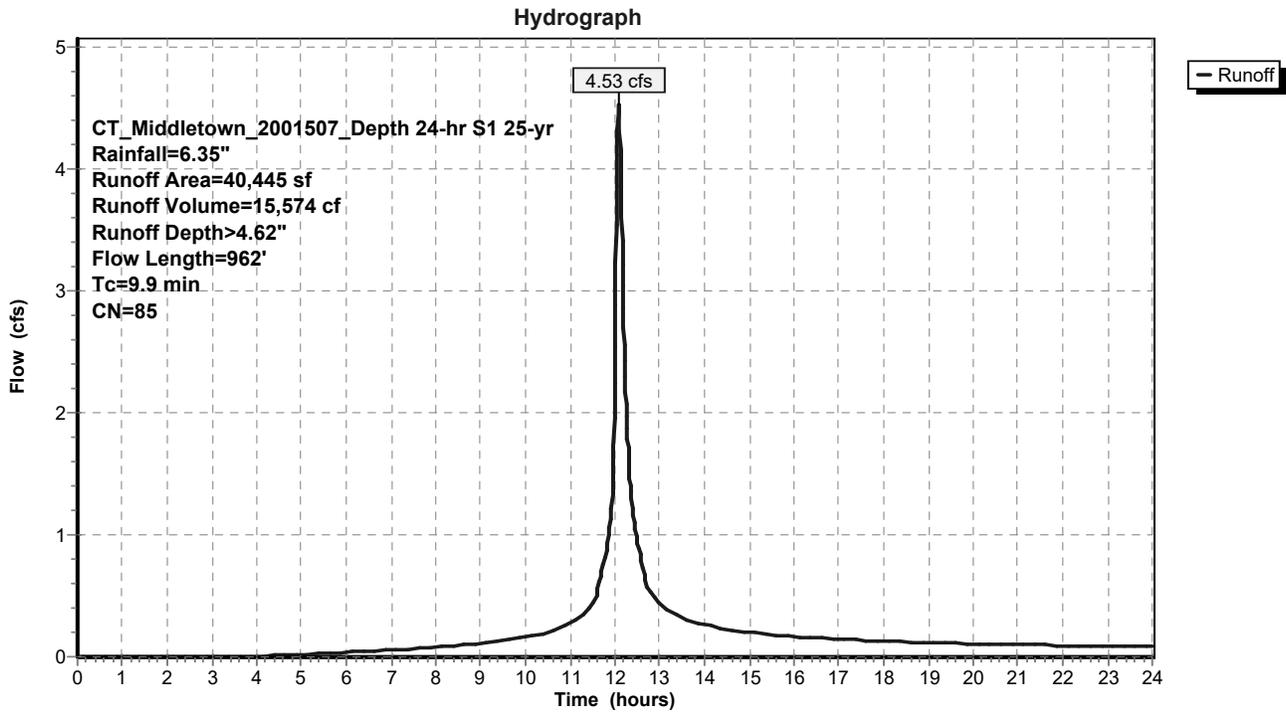
Runoff = 4.53 cfs @ 12.08 hrs, Volume= 15,574 cf, Depth> 4.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 25-yr Rainfall=6.35"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
0	79	50-75% Grass cover, Fair, HSG C
37,835	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
0	98	Paved parking, HSG C
2,440	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
0	96	Gravel surface, HSG C
170	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
40,445	85	Weighted Average
38,005		93.97% Pervious Area
2,440		6.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	28	0.1406	0.20		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
1.1	72	0.0120	1.06		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.29"
6.5	862	0.0120	2.22		Shallow Concentrated Flow, Paved Kv= 20.3 fps
9.9	962	Total			

Subcatchment EDA-10: Area Draining to Middle Street



Summary for Subcatchment EDA-20: Area Draining to Existing Outbound Lot Detention System

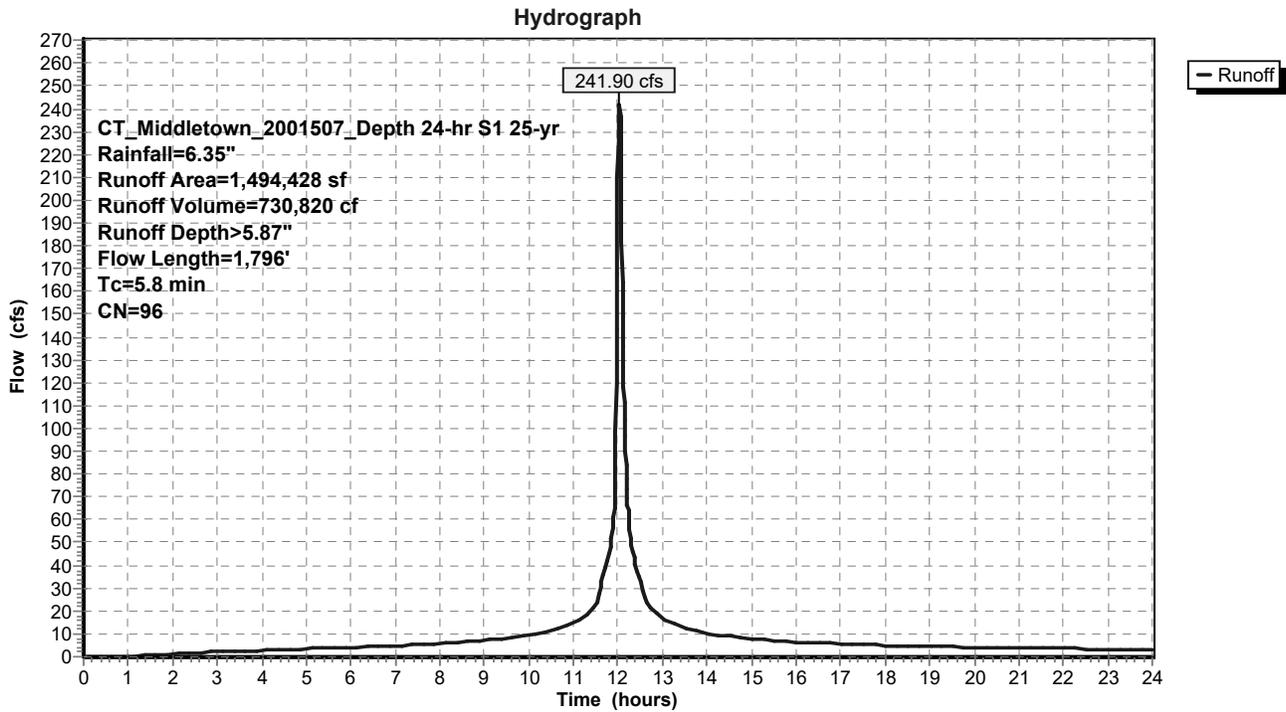
Runoff = 241.90 cfs @ 12.03 hrs, Volume= 730,820 cf, Depth> 5.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 25-yr Rainfall=6.35"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
102,141	79	50-75% Grass cover, Fair, HSG C
86,178	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
465,269	98	Paved parking, HSG C
840,840	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
0	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
1,494,428	96	Weighted Average
188,319		12.60% Pervious Area
1,306,109		87.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	100	0.0140	1.21		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.29"
1.2	176	0.0140	2.40		Shallow Concentrated Flow, Paved Kv= 20.3 fps
3.2	1,520	0.0100	7.80	24.51	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
5.8	1,796	Total			

Subcatchment EDA-20: Area Draining to Existing Outbound Lot Detention System



Summary for Subcatchment EDA-21: Area Draining to Existing Employee Lot Underground Detention

Runoff = 38.40 cfs @ 12.06 hrs, Volume= 128,870 cf, Depth> 5.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 25-yr Rainfall=6.35"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
0	79	50-75% Grass cover, Fair, HSG C
79,335	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
0	98	Paved parking, HSG C
194,785	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
0	96	Gravel surface, HSG C
435	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
274,555	94	Weighted Average
79,770		29.05% Pervious Area
194,785		70.95% Impervious Area

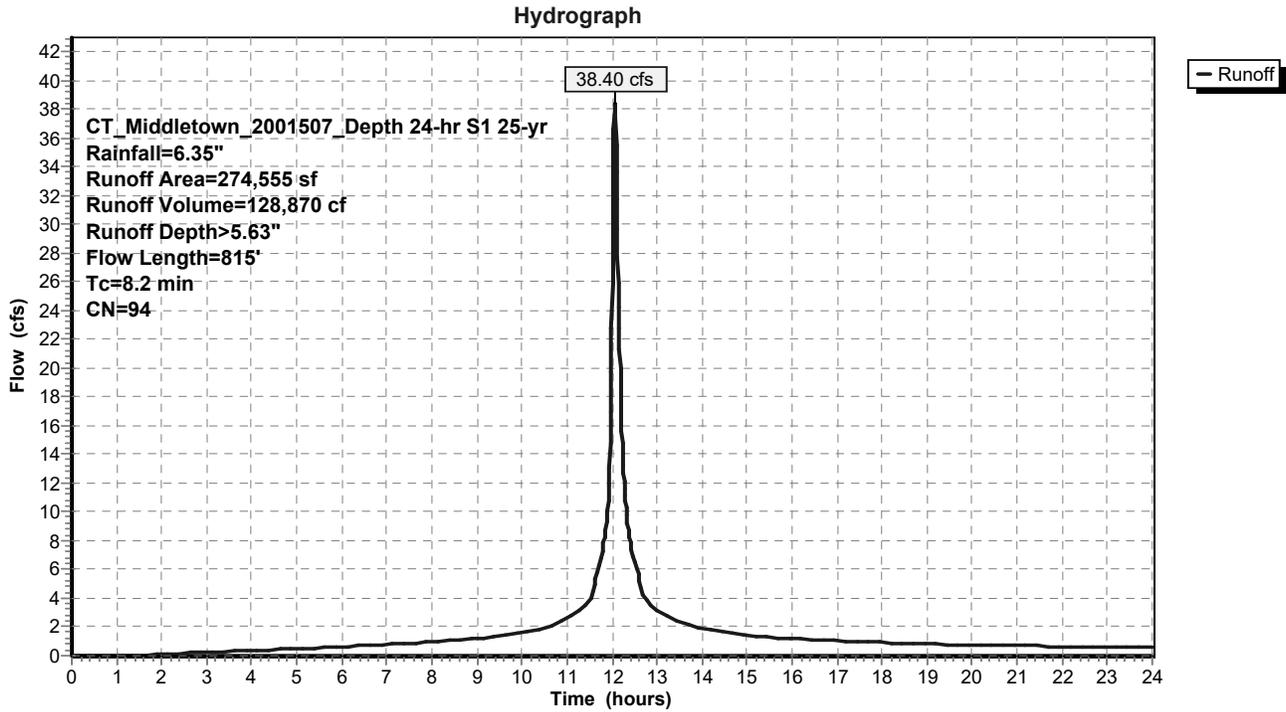
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.1	19	0.0160	0.08		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
1.1	81	0.0160	1.22		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.29"
1.1	164	0.0160	2.57		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.5	130	0.0050	4.03	4.95	Pipe Channel, 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012 Concrete pipe, finished
0.6	152	0.0050	4.55	8.05	Pipe Channel, 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.012 Concrete pipe, finished
0.3	108	0.0050	5.52	17.33	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
0.3	101	0.0050	5.52	17.33	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
0.1	38	0.0050	5.52	17.33	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
0.1	22	0.0050	7.23	51.09	Pipe Channel,

36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75'

n= 0.012 Concrete pipe, finished

8.2 815 Total

Subcatchment EDA-21: Area Draining to Existing Employee Lot Underground Detention



Summary for Subcatchment EDA-22: Offsite Property to Existing Outbound Lot Detention System

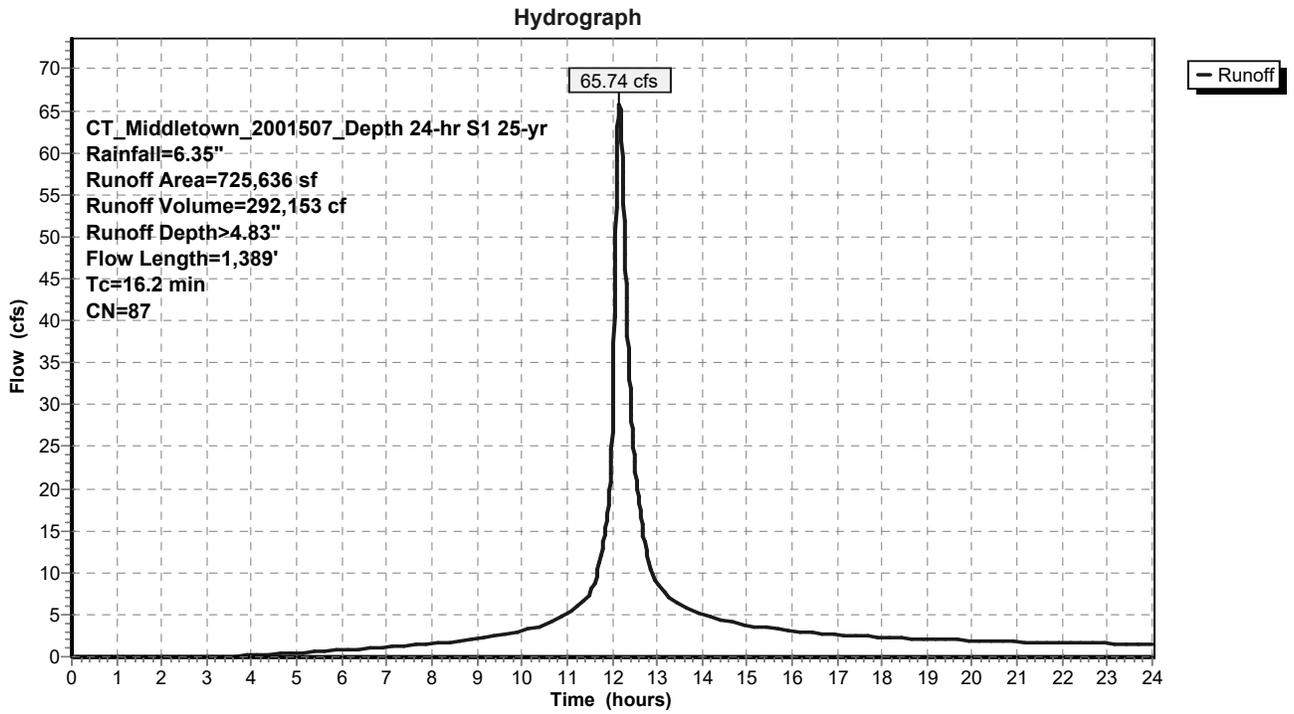
Runoff = 65.74 cfs @ 12.17 hrs, Volume= 292,153 cf, Depth> 4.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 25-yr Rainfall=6.35"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
218,535	79	50-75% Grass cover, Fair, HSG C
204,832	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
128,360	98	Paved parking, HSG C
148,395	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
0	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
25,514	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
725,636	87	Weighted Average
448,881		61.86% Pervious Area
276,755		38.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.1	100	0.0240	0.13		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
1.1	214	0.0374	3.11		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
2.0	1,075	0.0200	9.11	16.09	Pipe Channel, 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.012
16.2	1,389	Total			

Subcatchment EDA-22: Offsite Property to Existing Outbound Lot Detention System



Summary for Subcatchment EDA-30: Inbound Lot Area to Sediment Forebay

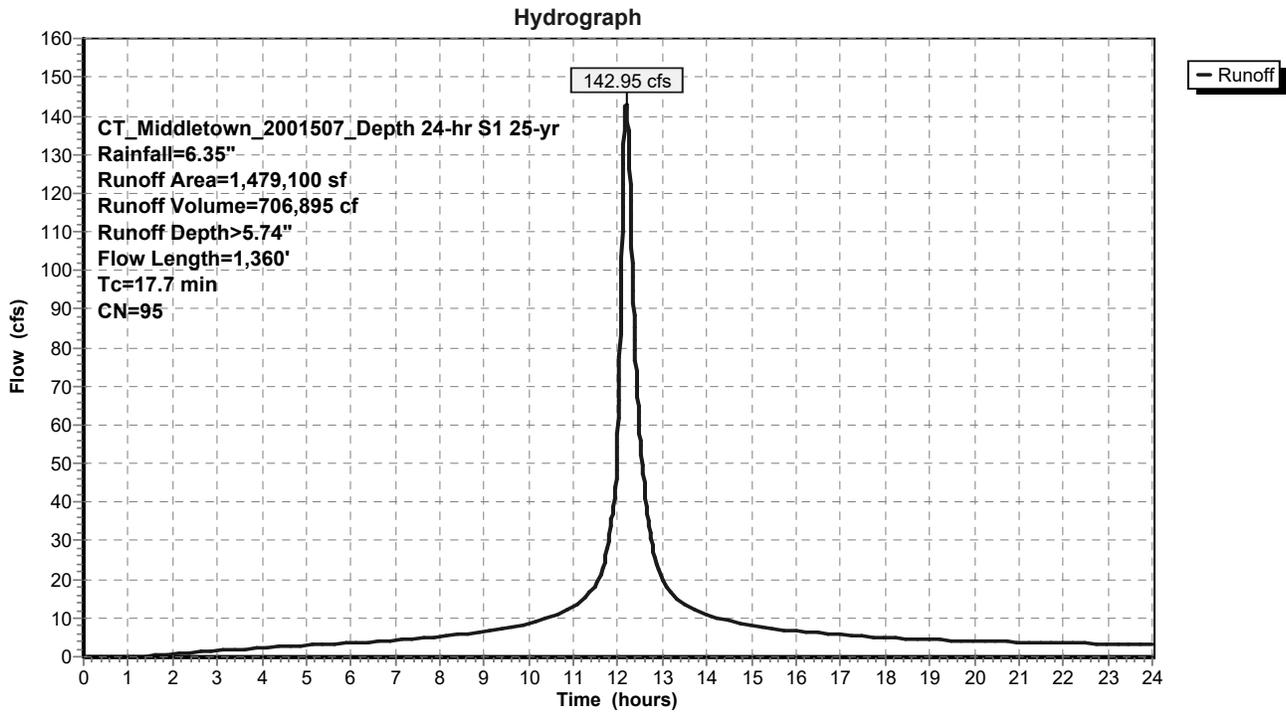
Runoff = 142.95 cfs @ 12.18 hrs, Volume= 706,895 cf, Depth> 5.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 25-yr Rainfall=6.35"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
119,543	79	50-75% Grass cover, Fair, HSG C
165,112	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
471,502	98	Paved parking, HSG C
722,943	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
0	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
1,479,100	95	Weighted Average
284,655		19.25% Pervious Area
1,194,445		80.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.2	80	0.0125	0.09		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
0.8	120	0.0150	2.49		Shallow Concentrated Flow, Paved Kv= 20.3 fps
2.7	1,160	0.0050	7.23	51.09	Pipe Channel, 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.012
17.7	1,360	Total			

Subcatchment EDA-30: Inbound Lot Area to Sediment Forebay



Summary for Subcatchment EDA-31: Vehicle Maintenance Area to Sediment Forebay

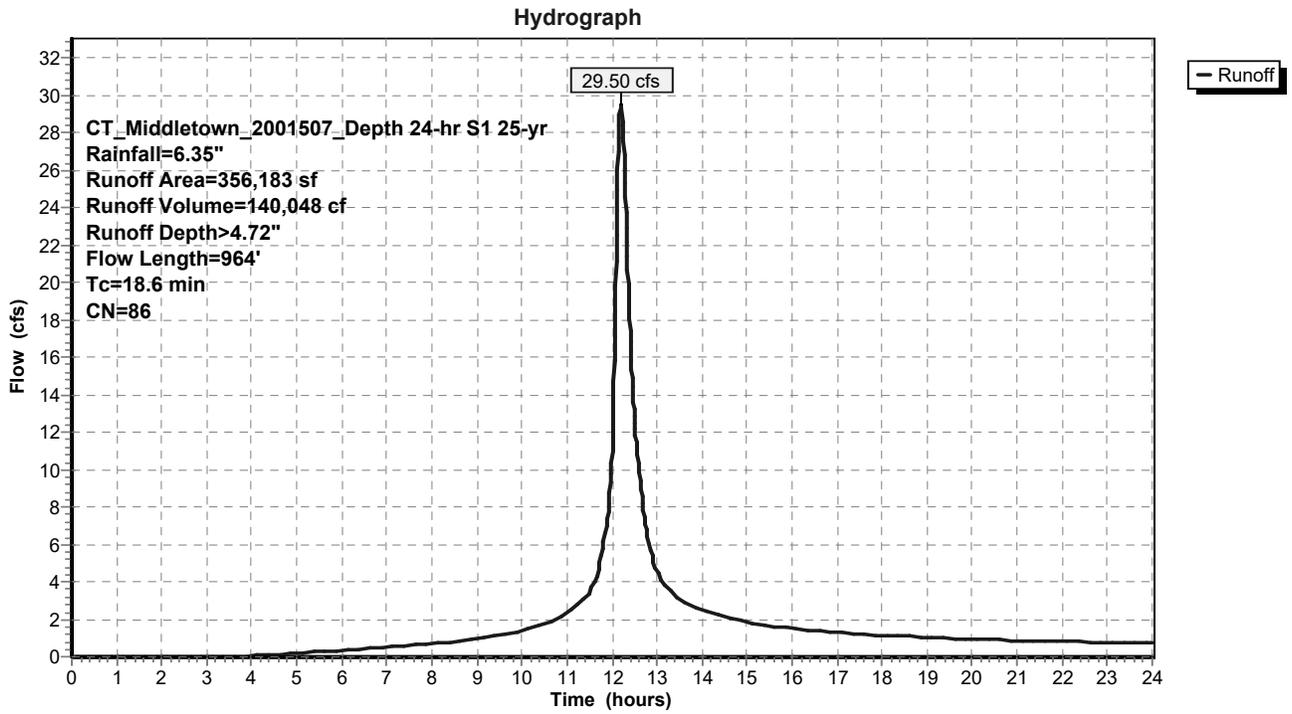
Runoff = 29.50 cfs @ 12.20 hrs, Volume= 140,048 cf, Depth> 4.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 25-yr Rainfall=6.35"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
153,724	79	50-75% Grass cover, Fair, HSG C
85,858	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
69,565	98	Paved parking, HSG C
47,036	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
0	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
356,183	86	Weighted Average
239,582		67.26% Pervious Area
116,601		32.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	60	0.0400	0.14		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
5.7	40	0.0300	0.12		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
5.3	541	0.0600	1.71		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.2	54	0.0050	4.03	4.95	Pipe Channel, 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012
0.1	122	0.0500	17.44	54.80	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
0.1	108	0.0400	15.60	49.02	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
0.1	39	0.0085	7.19	22.59	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
18.6	964	Total			

Subcatchment EDA-31: Vehicle Maintenance Area to Sediment Forebay



Summary for Subcatchment EDA-32: Area Draining to Sediment Forebay

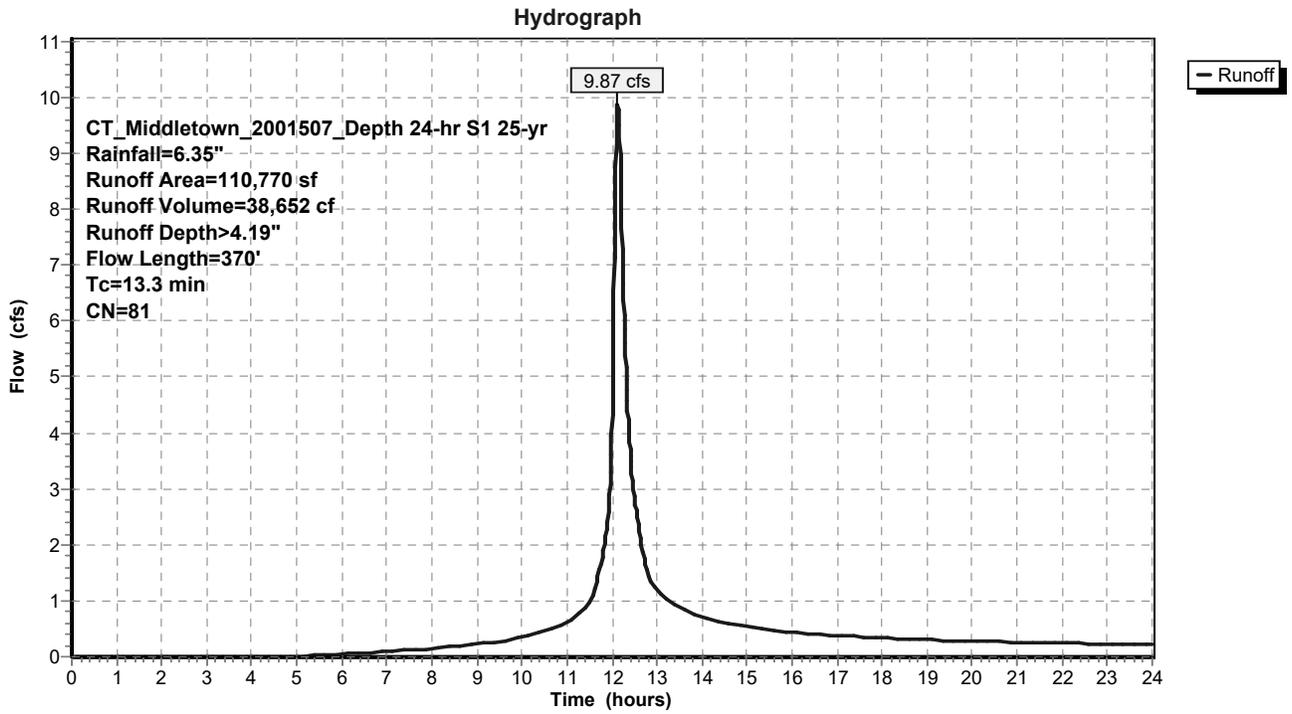
Runoff = 9.87 cfs @ 12.13 hrs, Volume= 38,652 cf, Depth> 4.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 25-yr Rainfall=6.35"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
98,913	79	50-75% Grass cover, Fair, HSG C
0	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
6,557	98	Paved parking, HSG C
0	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
5,300	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
110,770	81	Weighted Average
104,213		94.08% Pervious Area
6,557		5.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	100	0.0350	0.15		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
1.3	105	0.0350	1.31		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.7	165	0.3333	4.04		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
13.3	370	Total			

Subcatchment EDA-32: Area Draining to Sediment Forebay



Summary for Subcatchment EDA-33: Area Bypassing Sediment Forebay

Runoff = 21.82 cfs @ 12.16 hrs, Volume= 91,741 cf, Depth> 4.08"

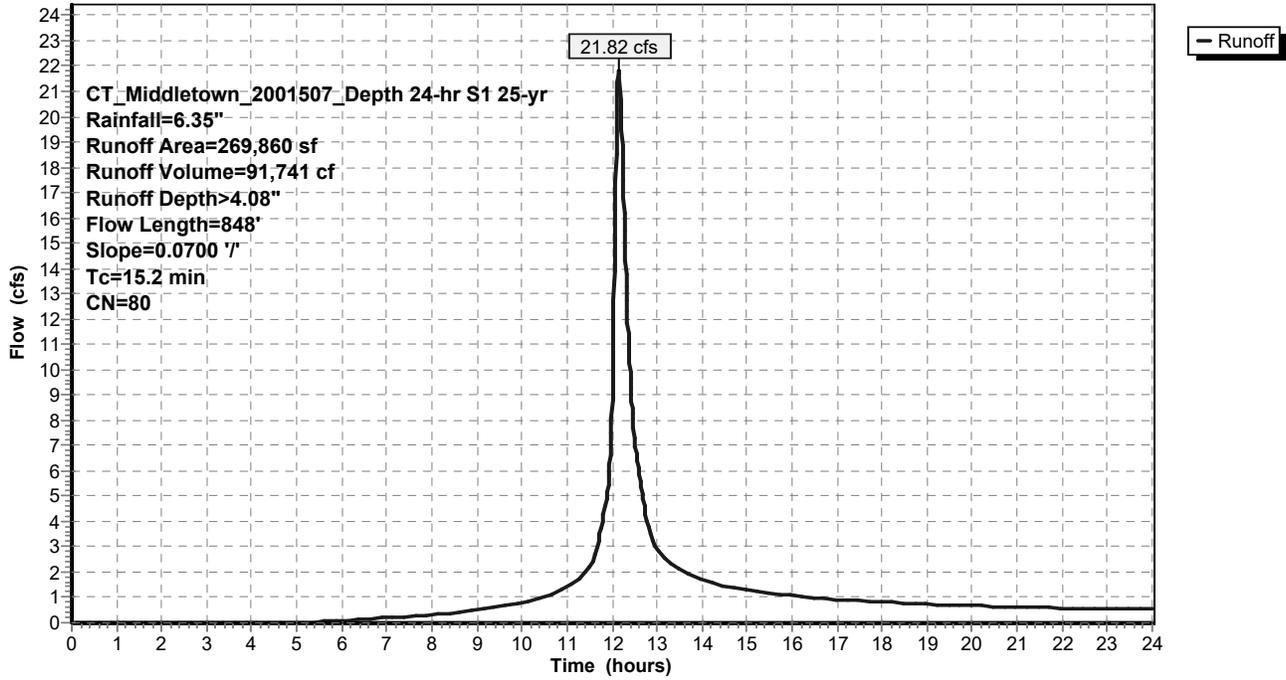
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 25-yr Rainfall=6.35"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
232,381	79	50-75% Grass cover, Fair, HSG C
23,831	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
11,183	98	Paved parking, HSG C
2,124	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
341	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
269,860	80	Weighted Average
256,553		95.07% Pervious Area
13,307		4.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	100	0.0700	0.20		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
6.7	748	0.0700	1.85		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
15.2	848	Total			

Subcatchment EDA-33: Area Bypassing Sediment Forebay

Hydrograph



Summary for Subcatchment EDA-34: Area Draining to Stormwater Pond

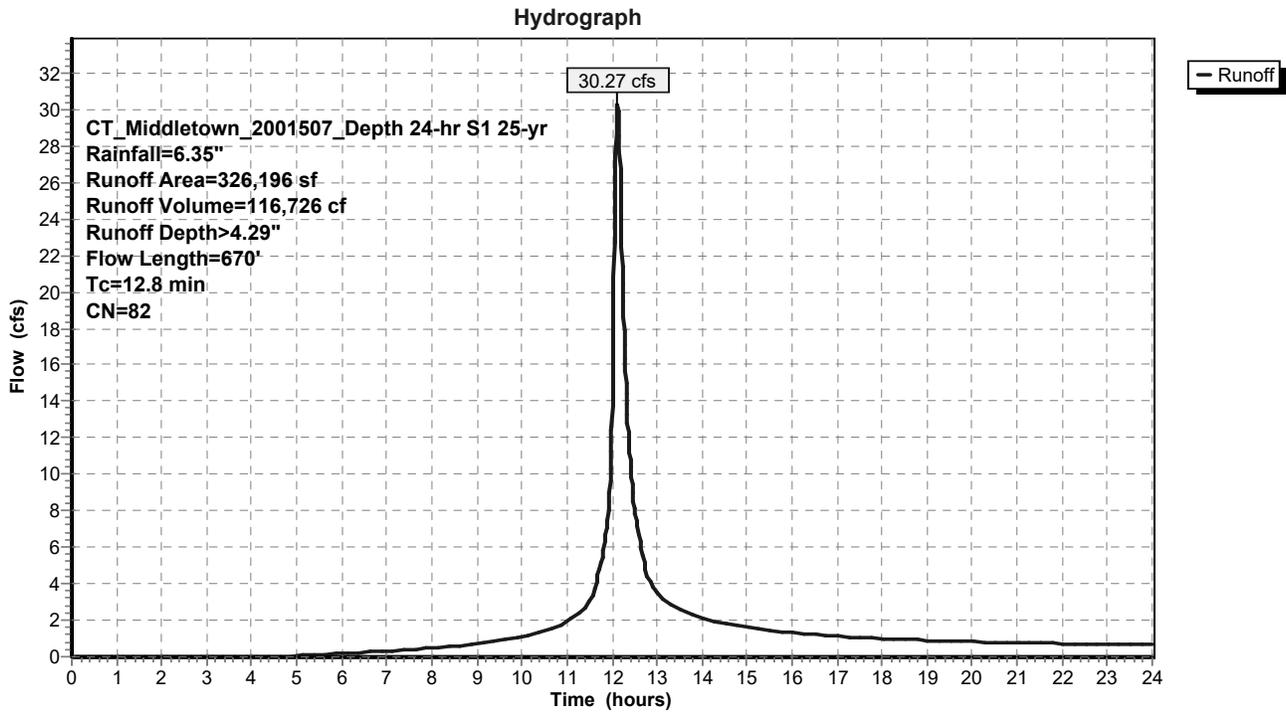
Runoff = 30.27 cfs @ 12.12 hrs, Volume= 116,726 cf, Depth> 4.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 25-yr Rainfall=6.35"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
269,284	79	50-75% Grass cover, Fair, HSG C
0	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
4,222	98	Paved parking, HSG C
0	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
10,850	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
5,025	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
36,815	98	Water Surface, 0% imp, HSG C
326,196	82	Weighted Average
321,974		98.71% Pervious Area
4,222		1.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	100	0.0700	0.20		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
4.3	570	0.1000	2.21		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
12.8	670	Total			

Subcatchment EDA-34: Area Draining to Stormwater Pond



Summary for Pond 1P: Existing Employee Lot Underground Detention System

Inflow Area = 274,555 sf, 70.95% Impervious, Inflow Depth > 5.63" for 25-yr event
 Inflow = 38.40 cfs @ 12.06 hrs, Volume= 128,870 cf
 Outflow = 5.37 cfs @ 12.60 hrs, Volume= 115,474 cf, Atten= 86%, Lag= 32.2 min
 Primary = 5.37 cfs @ 12.60 hrs, Volume= 115,474 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 129.74' @ 12.60 hrs Surf.Area= 11,725 sf Storage= 57,133 cf

Plug-Flow detention time= 221.4 min calculated for 115,426 cf (90% of inflow)
 Center-of-Mass det. time= 164.2 min (937.3 - 773.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	123.50'	2,345 cf	64.19'W x 182.67'L x 9.50'H Field A 111,387 cf Overall - 105,524 cf Embedded = 5,862 cf x 40.0% Voids
#2A	124.00'	83,580 cf	StormTrap ST2 DoubleTrap 8-0x 66 Inside #1 Inside= 101.7"W x 96.0"H => 61.09 sf x 15.40'L = 940.5 cf Outside= 101.7"W x 108.0"H => 76.31 sf x 15.40'L = 1,174.9 cf 66 Chambers in 6 Rows 50.88' x 169.35' Core + 6.66' Border = 64.19' x 182.67' System
		85,925 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	125.00'	24.0" Round Culvert L= 1,560.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 125.00' / 85.00' S= 0.0256 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#2	Device 1	125.00'	8.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	129.00'	12.0" Vert. Orifice/Grate C= 0.600
#4	Device 1	132.50'	3.0' long x 2.00' rise Sharp-Crested Rectangular Weir 2 End Contraction(s) 3.0' Crest Height

Primary OutFlow Max=5.37 cfs @ 12.60 hrs HW=129.74' (Free Discharge)

- 1=Culvert (Passes 5.37 cfs of 29.27 cfs potential flow)
- 2=Orifice/Grate (Orifice Controls 3.53 cfs @ 10.11 fps)
- 3=Orifice/Grate (Orifice Controls 1.84 cfs @ 2.94 fps)
- 4=Sharp-Crested Rectangular Weir(Controls 0.00 cfs)

Pond 1P: Existing Employee Lot Underground Detention System - Chamber Wizard Field A

Chamber Model = StormTrapST2 DoubleTrap 8-0 (StormTrapST2 DoubleTrap®Type II+IV)

Inside= 101.7"W x 96.0"H => 61.09 sf x 15.40'L = 940.5 cf
Outside= 101.7"W x 108.0"H => 76.31 sf x 15.40'L = 1,174.9 cf

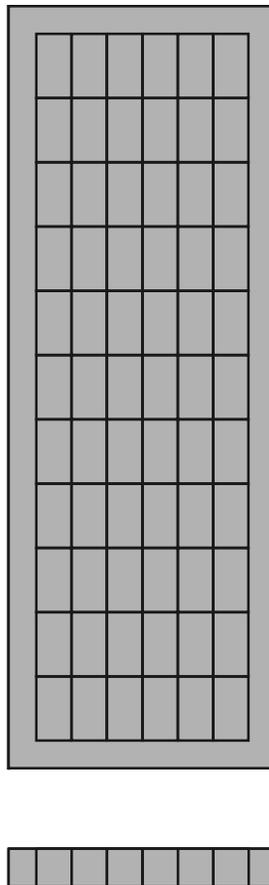
11 Chambers/Row x 15.40' Long = 169.35' Row Length +79.9" Border x 2 = 182.67' Base Length
6 Rows x 101.7" Wide + 79.9" Side Border x 2 = 64.19' Base Width
6.0" Base + 108.0" Chamber Height = 9.50' Field Height

66 Chambers x 940.5 cf + 21,503.9 cf Border = 83,579.7 cf Chamber Storage
66 Chambers x 1,174.9 cf + 27,981.2 cf Border = 105,524.2 cf Displacement

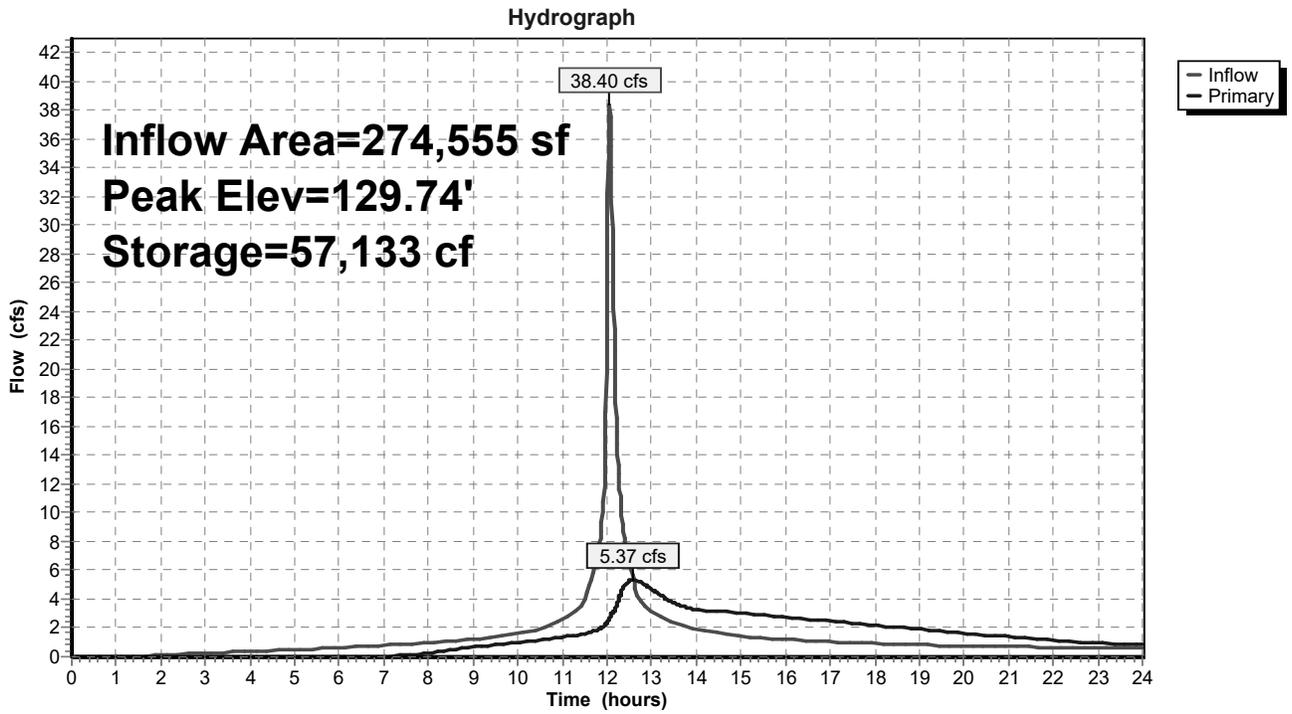
111,386.7 cf Field - 105,524.2 cf Chambers = 5,862.5 cf Stone x 40.0% Voids = 2,345.0 cf Stone Storage

Chamber Storage + Stone Storage = 85,924.7 cf = 1.973 af
Overall Storage Efficiency = 77.1%
Overall System Size = 182.67' x 64.19' x 9.50'

66 Chambers (plus border)
4,125.4 cy Field
217.1 cy Stone



Pond 1P: Existing Employee Lot Underground Detention System



Summary for Pond 2P: Existing Outbound Lot Underground Detention System

Inflow Area = 2,494,619 sf, 71.26% Impervious, Inflow Depth > 5.48" for 25-yr event
 Inflow = 280.52 cfs @ 12.04 hrs, Volume= 1,138,447 cf
 Outflow = 28.53 cfs @ 13.08 hrs, Volume= 712,937 cf, Atten= 90%, Lag= 62.4 min
 Primary = 28.53 cfs @ 13.08 hrs, Volume= 712,937 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 92.70' @ 13.08 hrs Surf.Area= 73,413 sf Storage= 619,751 cf

Plug-Flow detention time= 358.9 min calculated for 712,640 cf (63% of inflow)
 Center-of-Mass det. time= 219.5 min (1,010.1 - 790.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	82.50'	32,237 cf	183.90'W x 399.21'L x 13.33'H Field A 978,837 cf Overall - 898,245 cf Embedded = 80,592 cf x 40.0% Voids
#2A	83.50'	766,158 cf	StormTrap ST2 DoubleTrap 11-4x 500 Inside #1 Inside= 101.7"W x 136.0"H => 89.71 sf x 15.40'L = 1,381.1 cf Outside= 101.7"W x 148.0"H => 104.58 sf x 15.40'L = 1,610.0 cf 500 Chambers in 20 Rows 169.58' x 384.90' Core + 6.66' Border = 182.90' x 398.21' System
		798,395 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	86.00'	30.0" Round Culvert L= 120.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 86.00' / 85.50' S= 0.0042 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 4.91 sf
#2	Device 1	86.00'	15.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	91.00'	18.0" Vert. Orifice/Grate X 2 rows with 6.0" cc spacing C= 0.600
#4	Device 1	95.50'	3.0' long x 2.00' rise Sharp-Crested Rectangular Weir 2 End Contraction(s) 3.0' Crest Height

Primary OutFlow Max=28.53 cfs @ 13.08 hrs HW=92.70' (Free Discharge)

- 1=Culvert (Passes 28.53 cfs of 55.19 cfs potential flow)
- 2=Orifice/Grate (Orifice Controls 14.57 cfs @ 11.87 fps)
- 3=Orifice/Grate (Orifice Controls 13.96 cfs @ 4.25 fps)
- 4=Sharp-Crested Rectangular Weir(Controls 0.00 cfs)

Pond 2P: Existing Outbound Lot Underground Detention System - Chamber Wizard Field A

Chamber Model = StormTrapST2 DoubleTrap 11-4 (StormTrapST2 DoubleTrap®Type I+III)

Inside= 101.7"W x 136.0"H => 89.71 sf x 15.40'L = 1,381.1 cf

Outside= 101.7"W x 148.0"H => 104.58 sf x 15.40'L = 1,610.0 cf

25 Chambers/Row x 15.40' Long = 384.90' Row Length +79.9" Border x 2 +6.0" End Stone x 2 = 399.21' Base Length

20 Rows x 101.7" Wide + 79.9" Side Border x 2 + 6.0" Side Stone x 2 = 183.90' Base Width

12.0" Base + 148.0" Chamber Height = 13.33' Field Height

500 Chambers x 1,381.1 cf + 75,595.3 cf Border = 766,157.9 cf Chamber Storage

500 Chambers x 1,610.0 cf + 93,224.3 cf Border = 898,244.6 cf Displacement

978,836.7 cf Field - 898,244.6 cf Chambers = 80,592.0 cf Stone x 40.0% Voids = 32,236.8 cf Stone Storage

Chamber Storage + Stone Storage = 798,394.7 cf = 18.329 af

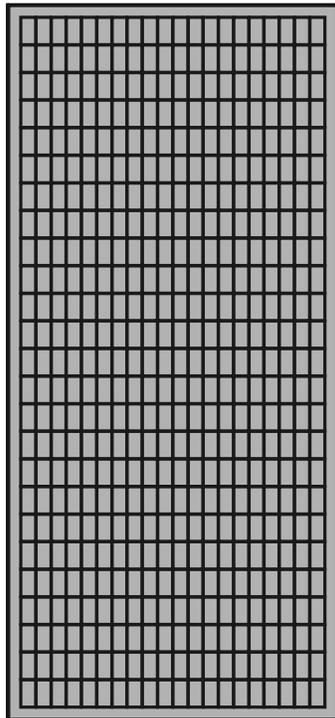
Overall Storage Efficiency = 81.6%

Overall System Size = 399.21' x 183.90' x 13.33'

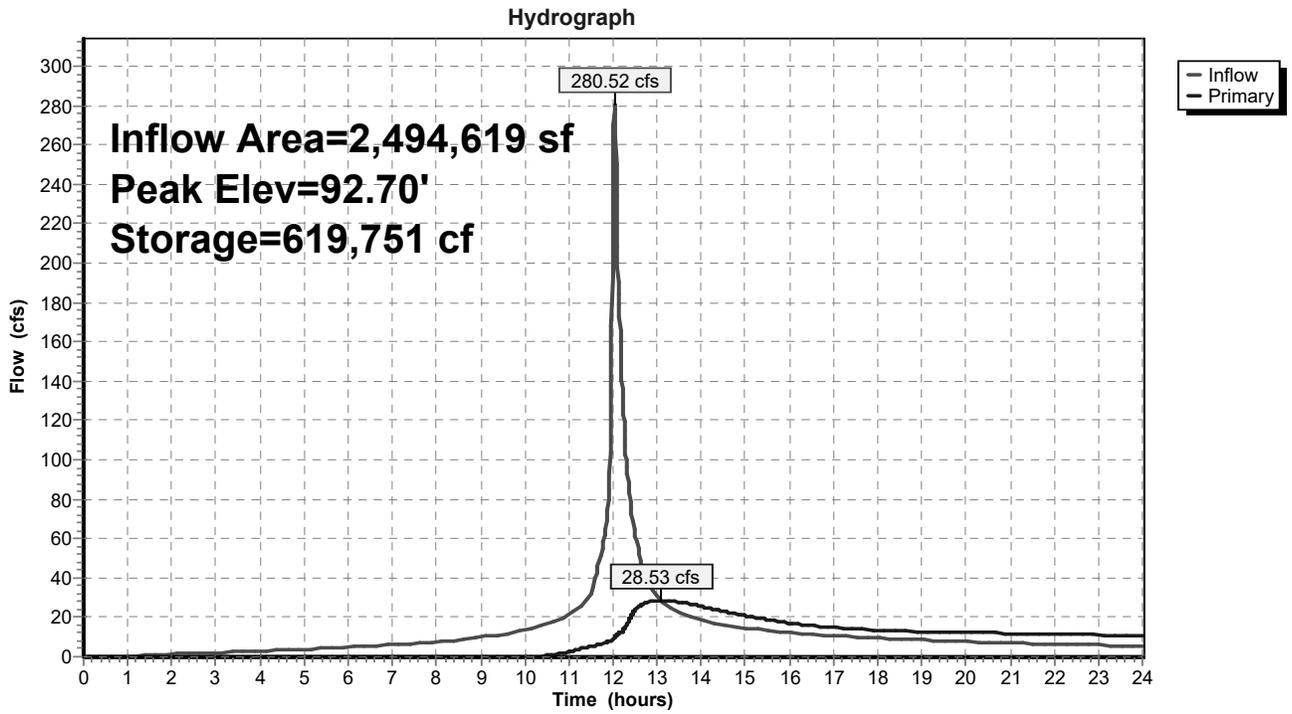
500 Chambers (plus border)

36,253.2 cy Field

2,984.9 cy Stone



Pond 2P: Existing Outbound Lot Underground Detention System



Summary for Pond 3P: Existing Sediment Forebay

Inflow Area = 1,946,053 sf, 67.71% Impervious, Inflow Depth > 5.46" for 25-yr event
 Inflow = 181.18 cfs @ 12.18 hrs, Volume= 885,596 cf
 Outflow = 179.69 cfs @ 12.20 hrs, Volume= 855,243 cf, Atten= 1%, Lag= 1.2 min
 Primary = 179.69 cfs @ 12.20 hrs, Volume= 855,243 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 4
 Peak Elev= 30.37' @ 12.20 hrs Surf.Area= 11,180 sf Storage= 43,719 cf

Plug-Flow detention time= 41.2 min calculated for 854,887 cf (97% of inflow)
 Center-of-Mass det. time= 20.1 min (803.9 - 783.7)

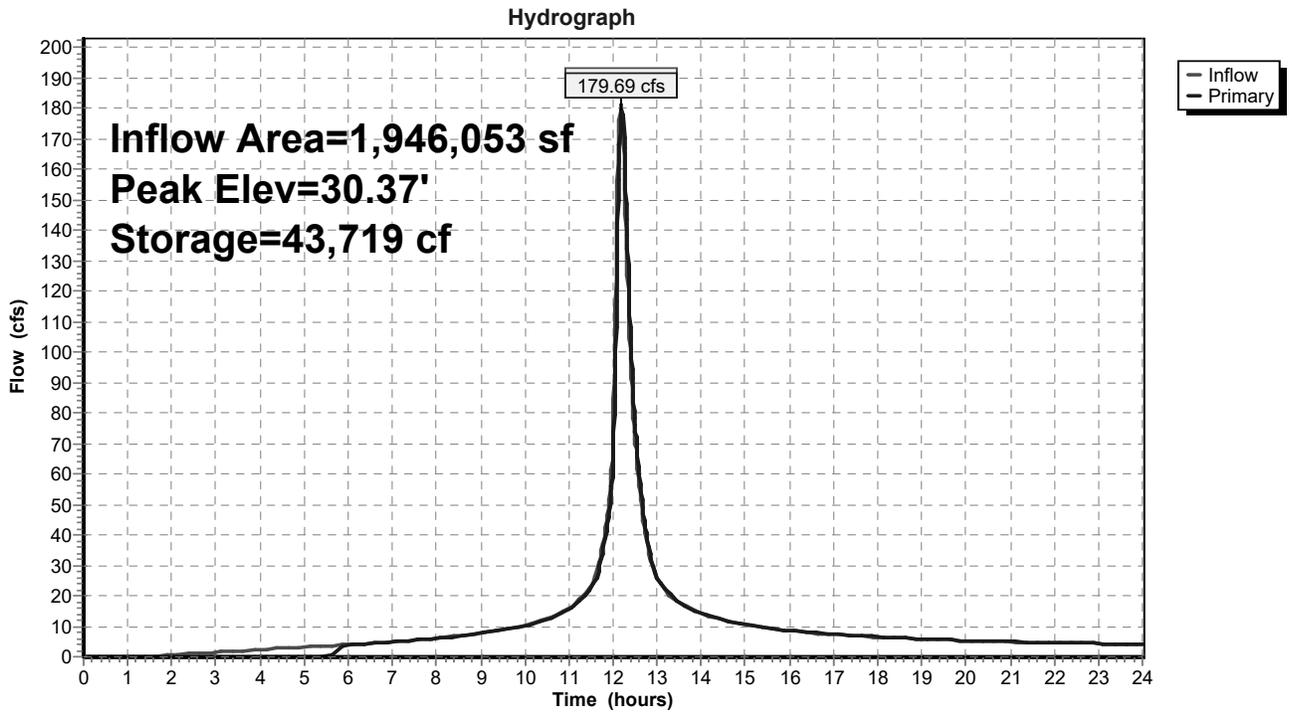
Volume	Invert	Avail.Storage	Storage Description
#1	24.00'	51,057 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
24.00	3,090	0	0
25.00	4,111	3,601	3,601
26.00	5,235	4,673	8,274
27.00	6,460	5,848	14,121
28.00	7,785	7,123	21,244
29.00	9,210	8,498	29,741
30.00	10,736	9,973	39,714
31.00	11,950	11,343	51,057

Device	Routing	Invert	Outlet Devices
#1	Primary	28.95'	40.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=179.69 cfs @ 12.20 hrs HW=30.37' (Free Discharge)

↑1=**Broad-Crested Rectangular Weir**(Weir Controls 179.69 cfs @ 3.17 fps)

Pond 3P: Existing Sediment Forebay



Summary for Pond 4P: Existing Stormwater Pond

Inflow Area = 2,542,109 sf, 52.52% Impervious, Inflow Depth > 5.02" for 25-yr event
 Inflow = 226.33 cfs @ 12.18 hrs, Volume= 1,063,711 cf
 Outflow = 106.66 cfs @ 12.45 hrs, Volume= 1,060,699 cf, Atten= 53%, Lag= 15.9 min
 Primary = 106.66 cfs @ 12.45 hrs, Volume= 1,060,699 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 29.61' @ 12.45 hrs Surf.Area= 67,406 sf Storage= 152,890 cf

Plug-Flow detention time= 11.7 min calculated for 1,060,699 cf (100% of inflow)
 Center-of-Mass det. time= 10.0 min (819.2 - 809.2)

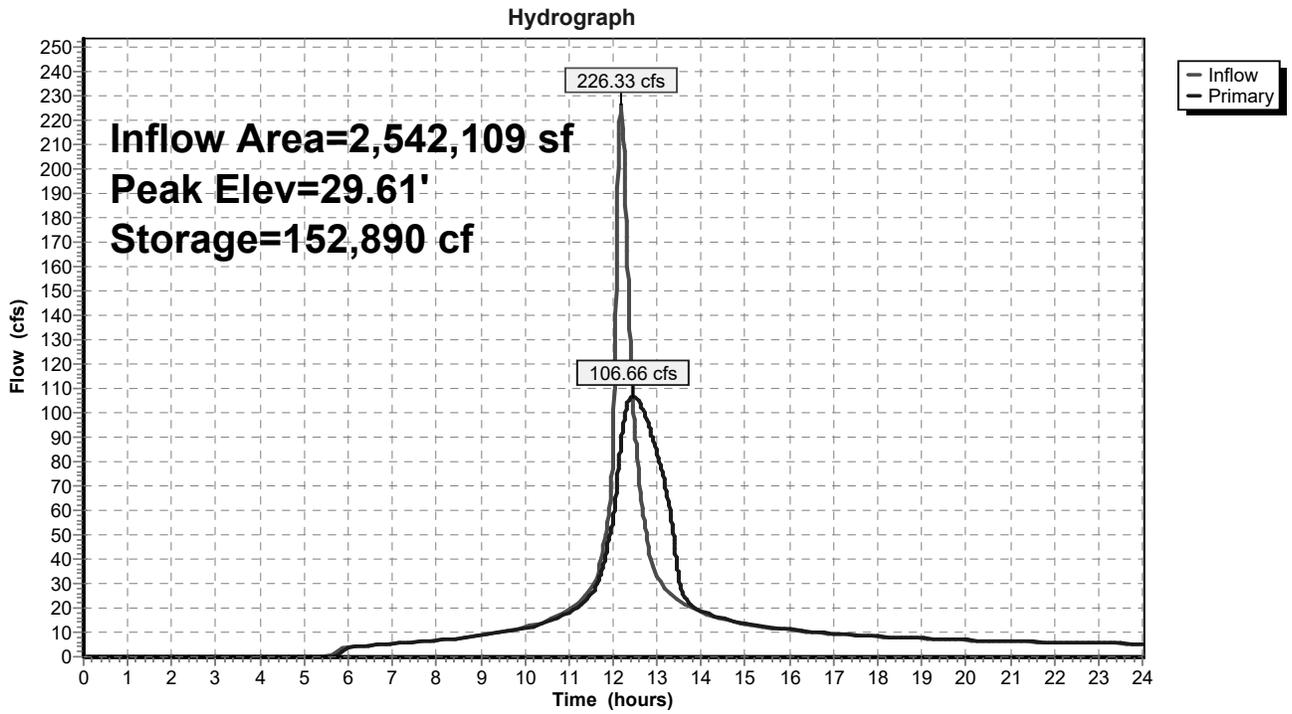
Volume	Invert	Avail.Storage	Storage Description
#1	24.00'	680,910 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
24.00	50	0	0
27.00	10,786	16,254	16,254
28.00	59,106	34,946	51,200
30.00	69,432	128,538	179,738
32.00	78,467	147,899	327,637
34.00	87,601	166,068	493,705
36.00	99,604	187,205	680,910

Device	Routing	Invert	Outlet Devices
#1	Primary	35.50'	70.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#2	Primary	24.50'	48.0" Vert. Orifice/Grate C= 0.600
#3	Primary	34.50'	2.0" Horiz. Orifice/Grate X 8.00 columns X 10 rows C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=106.66 cfs @ 12.45 hrs HW=29.61' (Free Discharge)

- 1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)
- 2=Orifice/Grate (Orifice Controls 106.66 cfs @ 8.49 fps)
- 3=Orifice/Grate (Controls 0.00 cfs)

Pond 4P: Existing Stormwater Pond

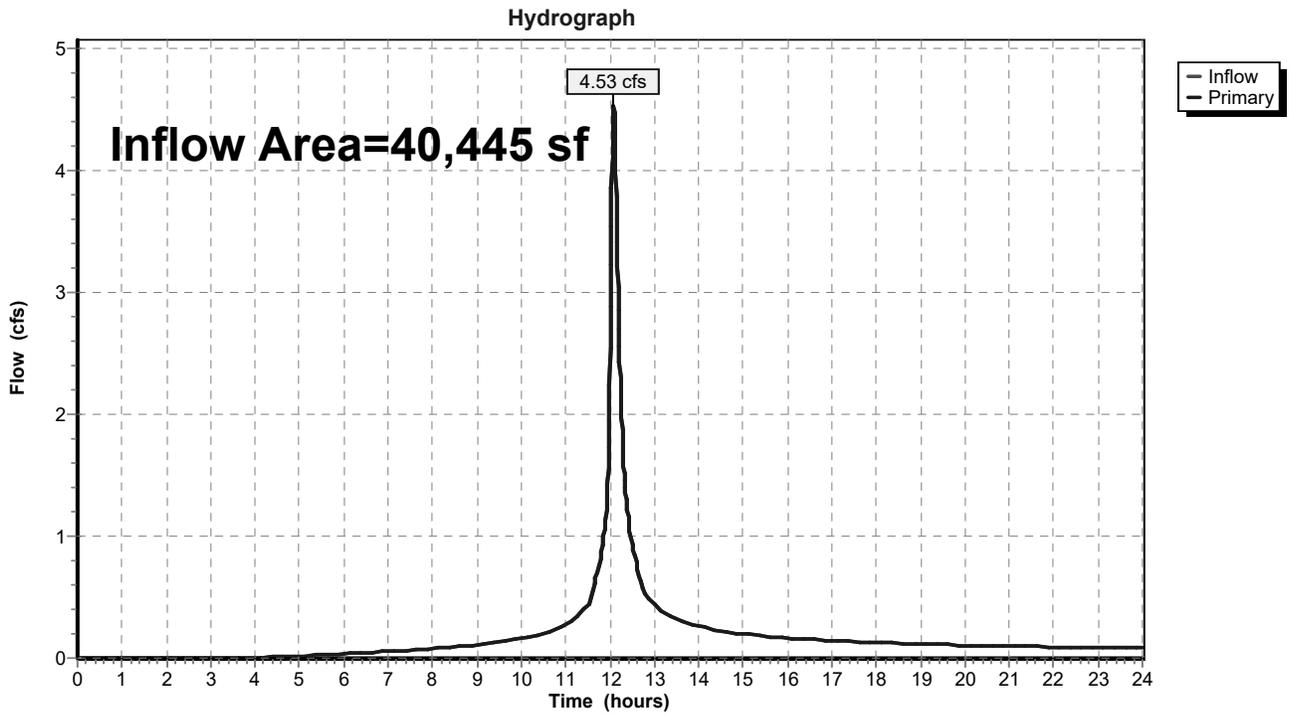


Summary for Link DP-1: Middle Street Gutter

Inflow Area = 40,445 sf, 6.03% Impervious, Inflow Depth > 4.62" for 25-yr event
Inflow = 4.53 cfs @ 12.08 hrs, Volume= 15,574 cf
Primary = 4.53 cfs @ 12.08 hrs, Volume= 15,574 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link DP-1: Middle Street Gutter



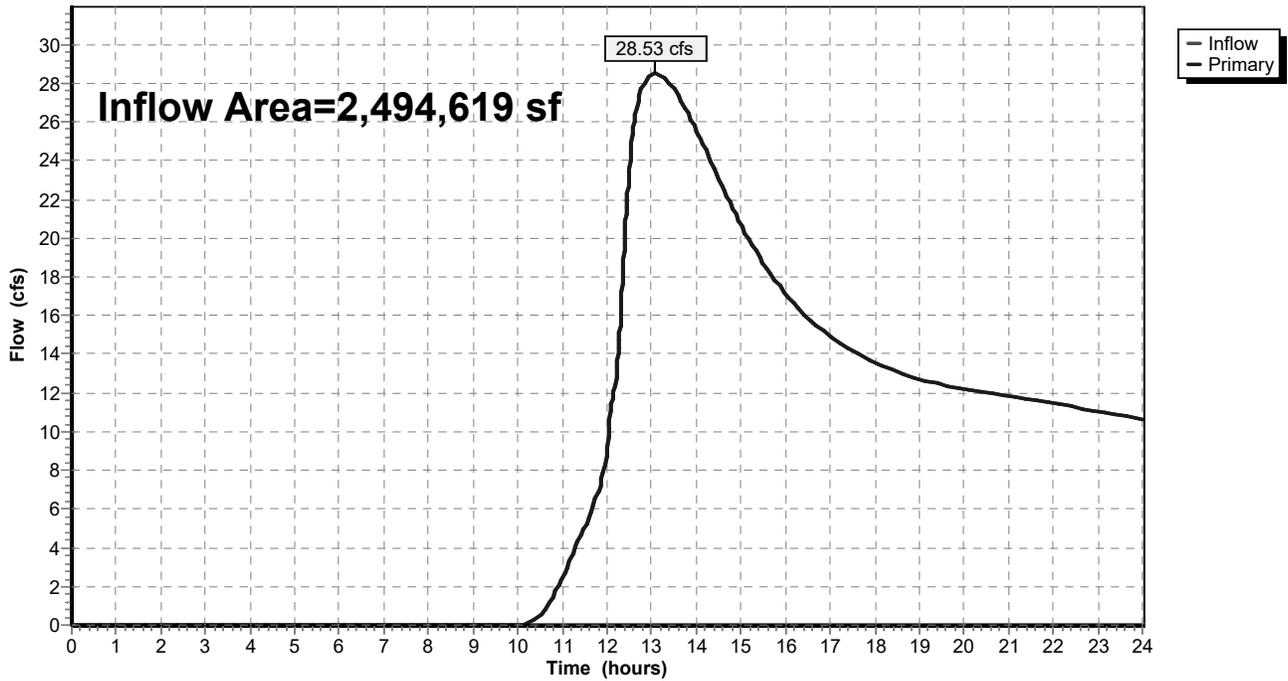
Summary for Link DP-2: Southern Wetland

Inflow Area = 2,494,619 sf, 71.26% Impervious, Inflow Depth > 3.43" for 25-yr event
Inflow = 28.53 cfs @ 13.08 hrs, Volume= 712,937 cf
Primary = 28.53 cfs @ 13.08 hrs, Volume= 712,937 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link DP-2: Southern Wetland

Hydrograph

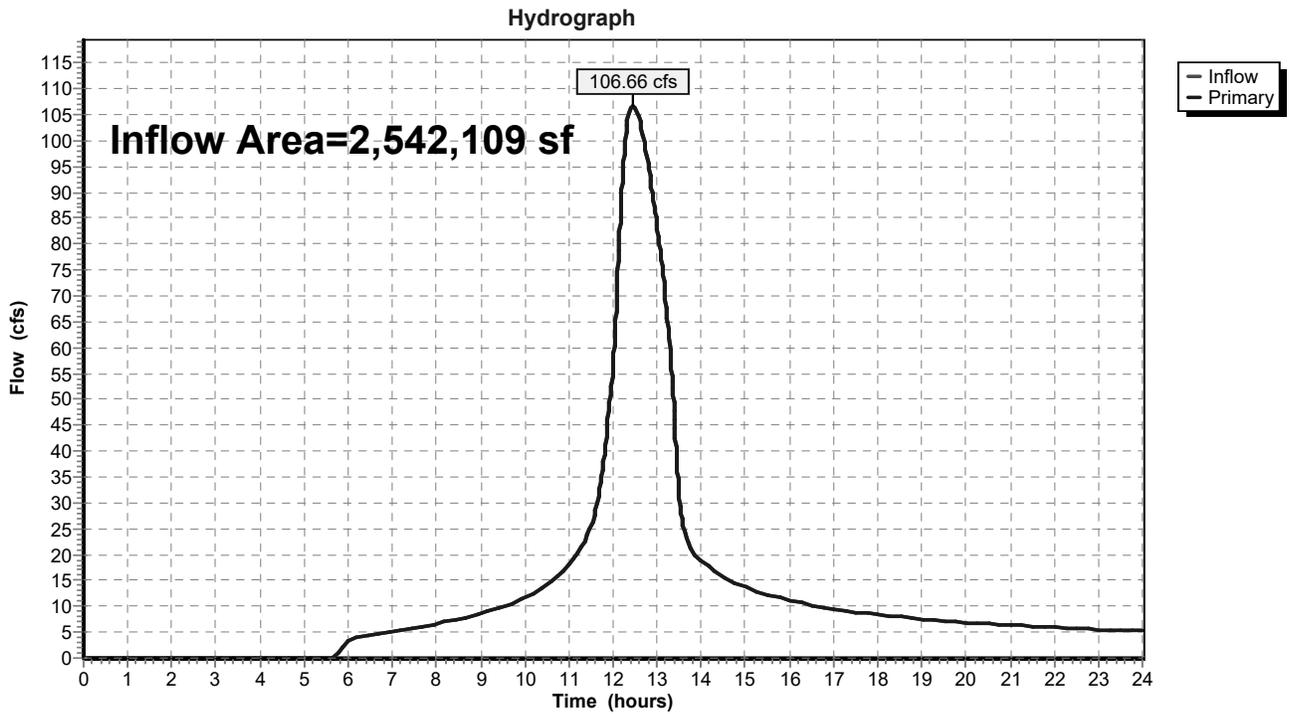


Summary for Link DP-3: Northern Wetland

Inflow Area = 2,542,109 sf, 52.52% Impervious, Inflow Depth > 5.01" for 25-yr event
Inflow = 106.66 cfs @ 12.45 hrs, Volume= 1,060,699 cf
Primary = 106.66 cfs @ 12.45 hrs, Volume= 1,060,699 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link DP-3: Northern Wetland



C-DAT-2001507-EXISTING_HYCT_Middletown_2001507_Depth 24-hr S1 100-yr Rainfall=8.16"

Prepared by {enter your company name here}

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Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentEDA-10: Area Draining to Runoff Area=40,445 sf 6.03% Impervious Runoff Depth>6.35"
Flow Length=962' Tc=9.9 min CN=85 Runoff=6.10 cfs 21,405 cf

SubcatchmentEDA-20: Area Draining Runoff Area=1,494,428 sf 87.40% Impervious Runoff Depth>7.67"
Flow Length=1,796' Tc=5.8 min CN=96 Runoff=310.25 cfs 955,254 cf

SubcatchmentEDA-21: Area Draining to Runoff Area=274,555 sf 70.95% Impervious Runoff Depth>7.43"
Flow Length=815' Tc=8.2 min CN=94 Runoff=49.54 cfs 169,922 cf

SubcatchmentEDA-22: Offsite Property Runoff Area=725,636 sf 38.14% Impervious Runoff Depth>6.58"
Flow Length=1,389' Tc=16.2 min CN=87 Runoff=87.40 cfs 397,730 cf

SubcatchmentEDA-30: Inbound Lot Runoff Area=1,479,100 sf 80.75% Impervious Runoff Depth>7.53"
Flow Length=1,360' Tc=17.7 min CN=95 Runoff=183.59 cfs 928,025 cf

SubcatchmentEDA-31: Vehicle Runoff Area=356,183 sf 32.74% Impervious Runoff Depth>6.45"
Flow Length=964' Tc=18.6 min CN=86 Runoff=39.42 cfs 191,573 cf

SubcatchmentEDA-32: Area Draining to Runoff Area=110,770 sf 5.92% Impervious Runoff Depth>5.87"
Flow Length=370' Tc=13.3 min CN=81 Runoff=13.59 cfs 54,195 cf

SubcatchmentEDA-33: Area Bypassing Runoff Area=269,860 sf 4.93% Impervious Runoff Depth>5.75"
Flow Length=848' Slope=0.0700 '/' Tc=15.2 min CN=80 Runoff=30.24 cfs 129,301 cf

SubcatchmentEDA-34: Area Draining to Runoff Area=326,196 sf 1.29% Impervious Runoff Depth>5.99"
Flow Length=670' Tc=12.8 min CN=82 Runoff=41.42 cfs 162,831 cf

Pond 1P: Existing Employee Lot Peak Elev=130.92' Storage=69,407 cf Inflow=49.54 cfs 169,922 cf
Outflow=8.48 cfs 154,154 cf

Pond 2P: Existing Outbound Lot Peak Elev=94.90' Storage=768,672 cf Inflow=361.58 cfs 1,507,138 cf
Outflow=45.93 cfs 1,036,791 cf

Pond 3P: Existing Sediment Forebay Peak Elev=30.65' Storage=46,908 cf Inflow=235.04 cfs 1,173,793 cf
Outflow=233.34 cfs 1,143,221 cf

Pond 4P: Existing Stormwater Pond Peak Elev=30.70' Storage=229,433 cf Inflow=297.69 cfs 1,435,353 cf
Outflow=124.00 cfs 1,431,762 cf

Link DP-1: Middle Street Gutter Inflow=6.10 cfs 21,405 cf
Primary=6.10 cfs 21,405 cf

Link DP-2: Southern Wetland Inflow=45.93 cfs 1,036,791 cf
Primary=45.93 cfs 1,036,791 cf

Link DP-3: Northern Wetland Inflow=124.00 cfs 1,431,762 cf
Primary=124.00 cfs 1,431,762 cf

Total Runoff Area = 5,077,173 sf Runoff Volume = 3,010,237 cf Average Runoff Depth = 7.11"
38.64% Pervious = 1,961,952 sf 61.36% Impervious = 3,115,221 sf

Summary for Subcatchment EDA-10: Area Draining to Middle Street

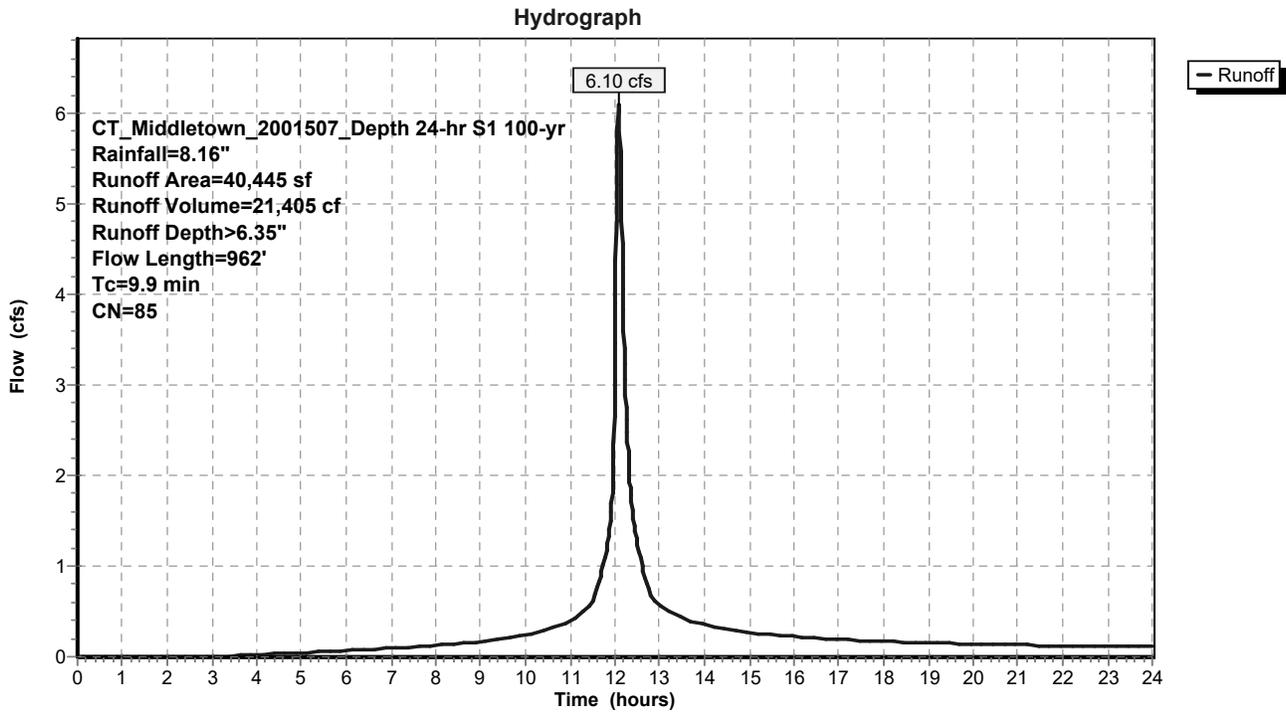
Runoff = 6.10 cfs @ 12.08 hrs, Volume= 21,405 cf, Depth> 6.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 100-yr Rainfall=8.16"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
0	79	50-75% Grass cover, Fair, HSG C
37,835	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
0	98	Paved parking, HSG C
2,440	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
0	96	Gravel surface, HSG C
170	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
40,445	85	Weighted Average
38,005		93.97% Pervious Area
2,440		6.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	28	0.1406	0.20		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
1.1	72	0.0120	1.06		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.29"
6.5	862	0.0120	2.22		Shallow Concentrated Flow, Paved Kv= 20.3 fps
9.9	962	Total			

Subcatchment EDA-10: Area Draining to Middle Street



Summary for Subcatchment EDA-20: Area Draining to Existing Outbound Lot Detention System

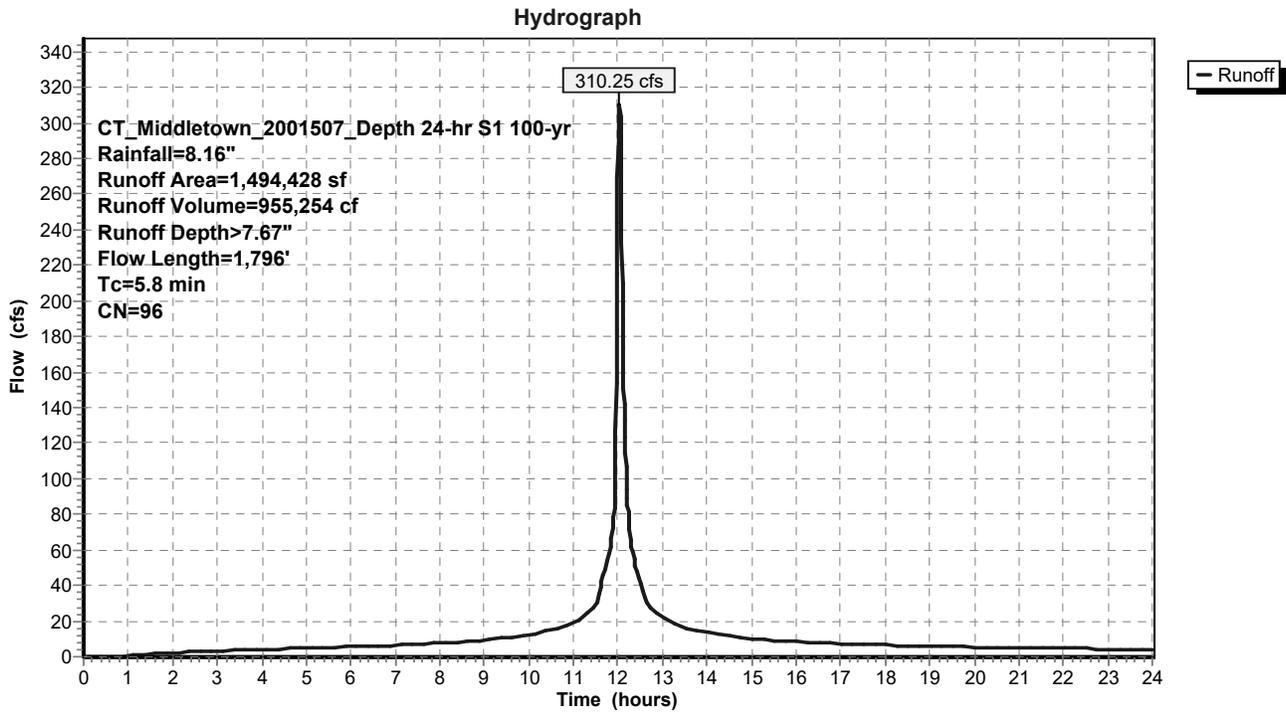
Runoff = 310.25 cfs @ 12.03 hrs, Volume= 955,254 cf, Depth> 7.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 100-yr Rainfall=8.16"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
102,141	79	50-75% Grass cover, Fair, HSG C
86,178	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
465,269	98	Paved parking, HSG C
840,840	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
0	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
1,494,428	96	Weighted Average
188,319		12.60% Pervious Area
1,306,109		87.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	100	0.0140	1.21		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.29"
1.2	176	0.0140	2.40		Shallow Concentrated Flow, Paved Kv= 20.3 fps
3.2	1,520	0.0100	7.80	24.51	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
5.8	1,796	Total			

Subcatchment EDA-20: Area Draining to Existing Outbound Lot Detention System



Summary for Subcatchment EDA-21: Area Draining to Existing Employee Lot Underground Detention

Runoff = 49.54 cfs @ 12.06 hrs, Volume= 169,922 cf, Depth> 7.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 100-yr Rainfall=8.16"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
0	79	50-75% Grass cover, Fair, HSG C
79,335	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
0	98	Paved parking, HSG C
194,785	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
0	96	Gravel surface, HSG C
435	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
274,555	94	Weighted Average
79,770		29.05% Pervious Area
194,785		70.95% Impervious Area

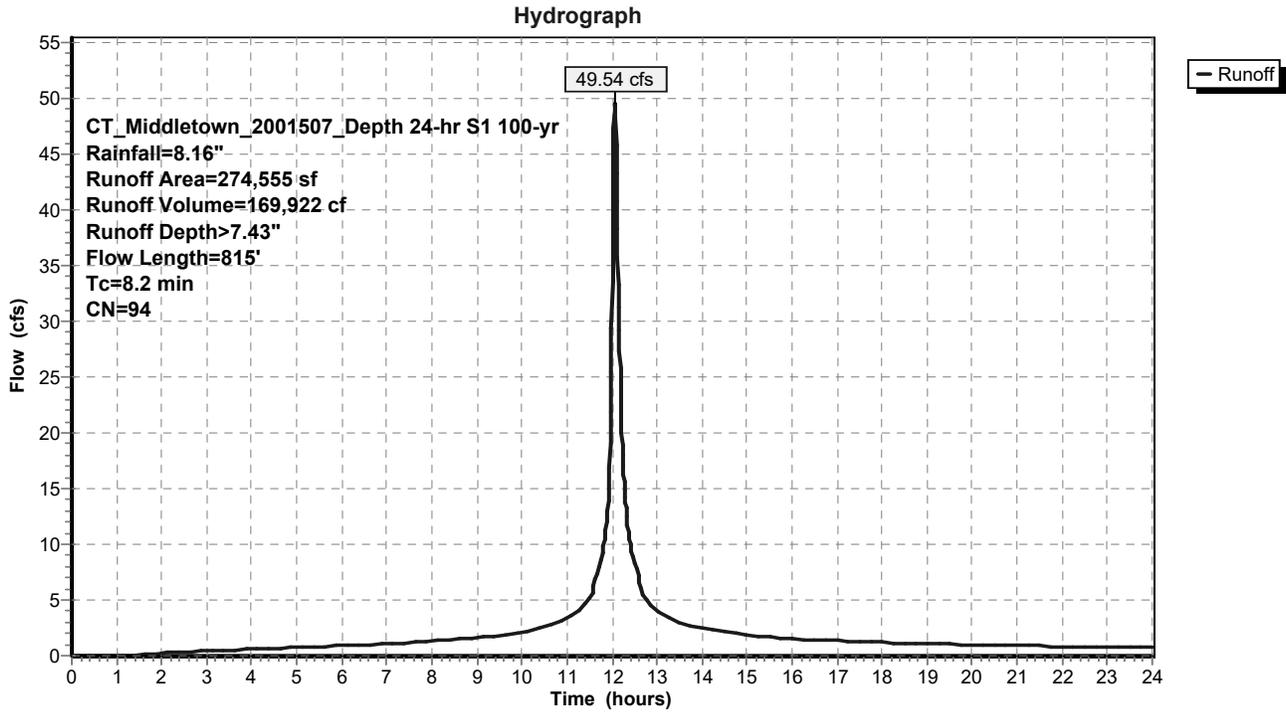
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.1	19	0.0160	0.08		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
1.1	81	0.0160	1.22		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.29"
1.1	164	0.0160	2.57		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.5	130	0.0050	4.03	4.95	Pipe Channel, 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012 Concrete pipe, finished
0.6	152	0.0050	4.55	8.05	Pipe Channel, 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.012 Concrete pipe, finished
0.3	108	0.0050	5.52	17.33	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
0.3	101	0.0050	5.52	17.33	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
0.1	38	0.0050	5.52	17.33	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
0.1	22	0.0050	7.23	51.09	Pipe Channel,

36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75'

n= 0.012 Concrete pipe, finished

8.2 815 Total

Subcatchment EDA-21: Area Draining to Existing Employee Lot Underground Detention



Summary for Subcatchment EDA-22: Offsite Property to Existing Outbound Lot Detention System

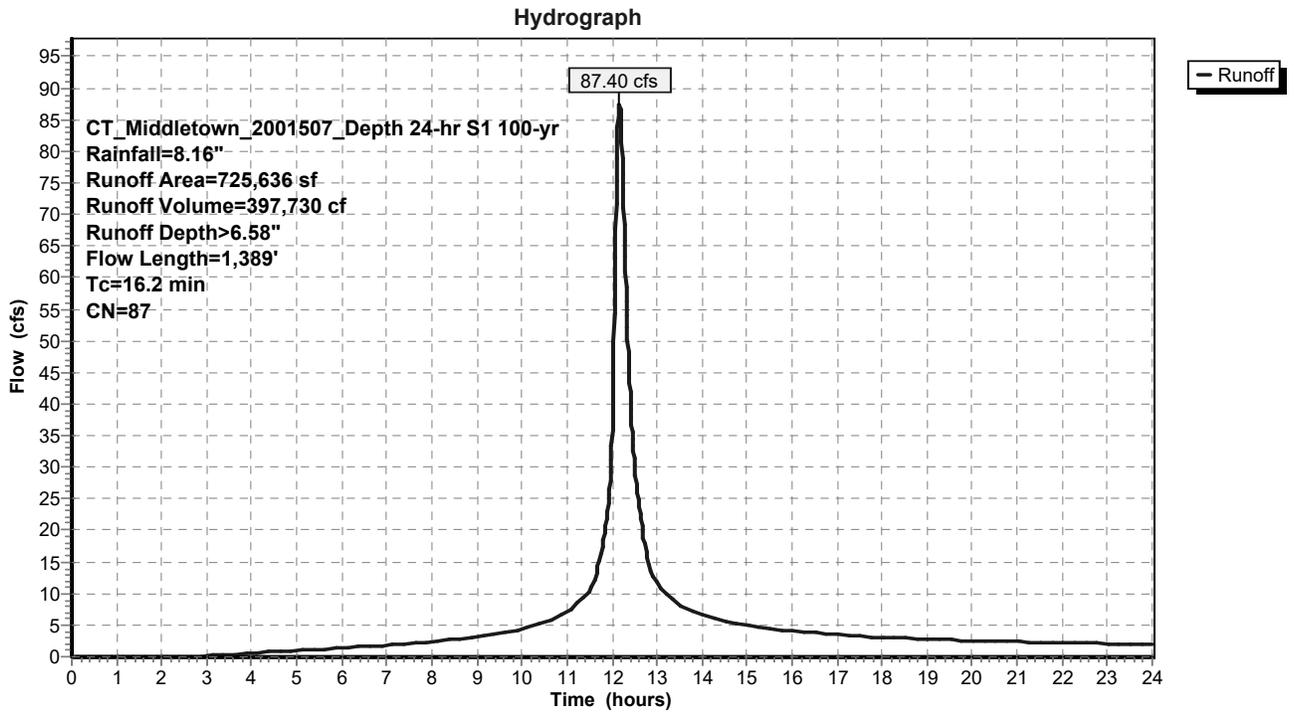
Runoff = 87.40 cfs @ 12.17 hrs, Volume= 397,730 cf, Depth> 6.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 100-yr Rainfall=8.16"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
218,535	79	50-75% Grass cover, Fair, HSG C
204,832	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
128,360	98	Paved parking, HSG C
148,395	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
0	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
25,514	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
725,636	87	Weighted Average
448,881		61.86% Pervious Area
276,755		38.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.1	100	0.0240	0.13		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
1.1	214	0.0374	3.11		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
2.0	1,075	0.0200	9.11	16.09	Pipe Channel, 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.012
16.2	1,389	Total			

Subcatchment EDA-22: Offsite Property to Existing Outbound Lot Detention System



Summary for Subcatchment EDA-30: Inbound Lot Area to Sediment Forebay

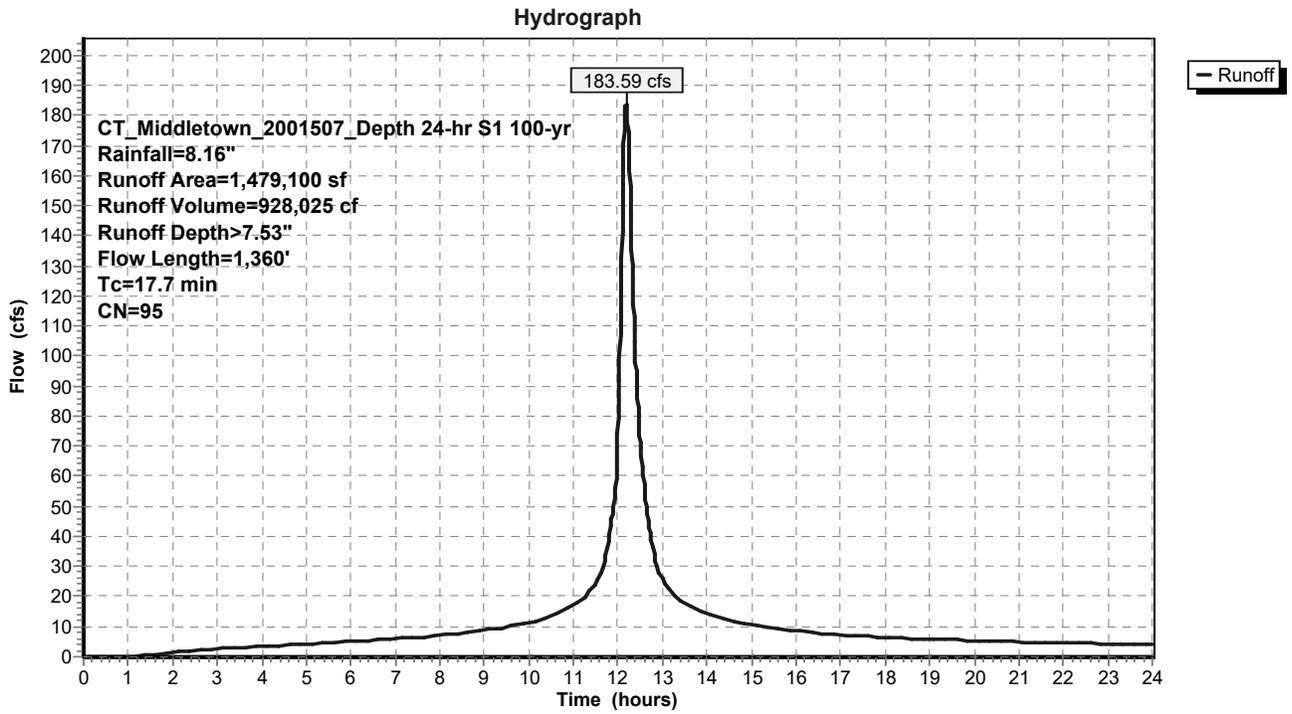
Runoff = 183.59 cfs @ 12.18 hrs, Volume= 928,025 cf, Depth> 7.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 100-yr Rainfall=8.16"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
119,543	79	50-75% Grass cover, Fair, HSG C
165,112	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
471,502	98	Paved parking, HSG C
722,943	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
0	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
1,479,100	95	Weighted Average
284,655		19.25% Pervious Area
1,194,445		80.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.2	80	0.0125	0.09		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
0.8	120	0.0150	2.49		Shallow Concentrated Flow, Paved Kv= 20.3 fps
2.7	1,160	0.0050	7.23	51.09	Pipe Channel, 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.012
17.7	1,360	Total			

Subcatchment EDA-30: Inbound Lot Area to Sediment Forebay



Summary for Subcatchment EDA-31: Vehicle Maintenance Area to Sediment Forebay

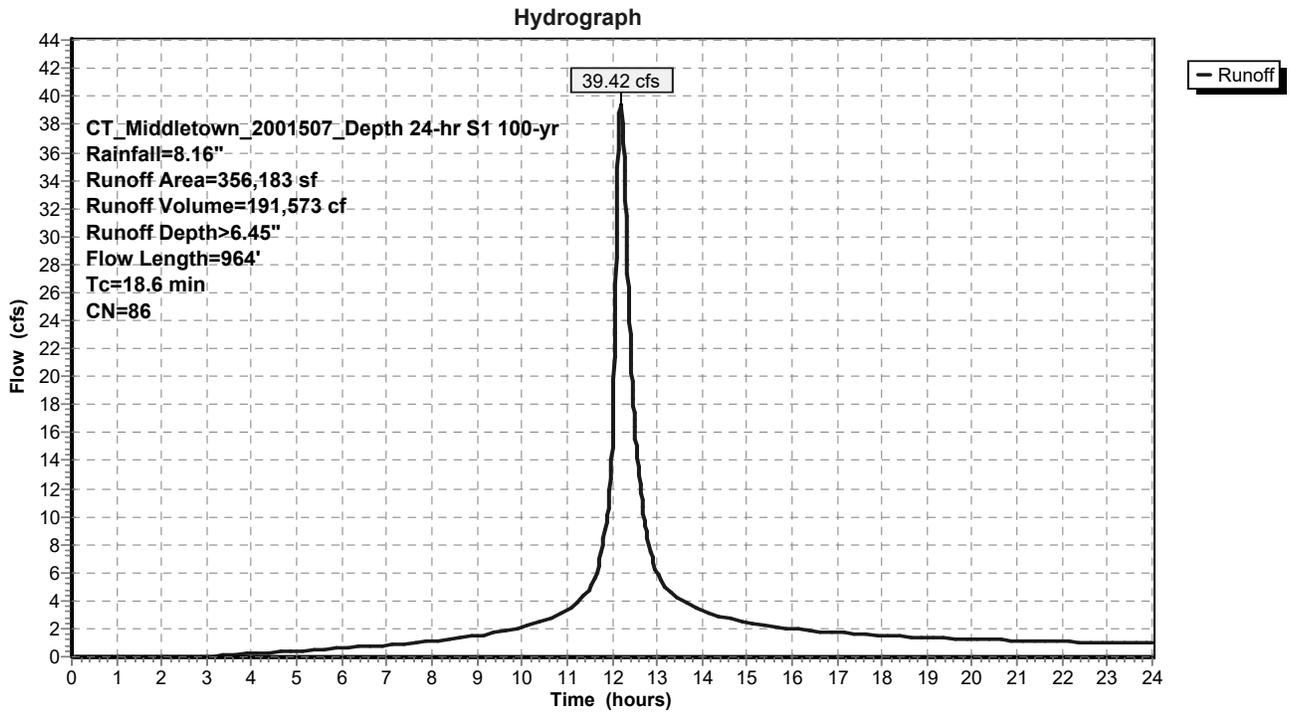
Runoff = 39.42 cfs @ 12.20 hrs, Volume= 191,573 cf, Depth> 6.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 100-yr Rainfall=8.16"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
153,724	79	50-75% Grass cover, Fair, HSG C
85,858	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
69,565	98	Paved parking, HSG C
47,036	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
0	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
356,183	86	Weighted Average
239,582		67.26% Pervious Area
116,601		32.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	60	0.0400	0.14		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
5.7	40	0.0300	0.12		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
5.3	541	0.0600	1.71		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.2	54	0.0050	4.03	4.95	Pipe Channel, 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012
0.1	122	0.0500	17.44	54.80	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
0.1	108	0.0400	15.60	49.02	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
0.1	39	0.0085	7.19	22.59	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
18.6	964	Total			

Subcatchment EDA-31: Vehicle Maintenance Area to Sediment Forebay



Summary for Subcatchment EDA-32: Area Draining to Sediment Forebay

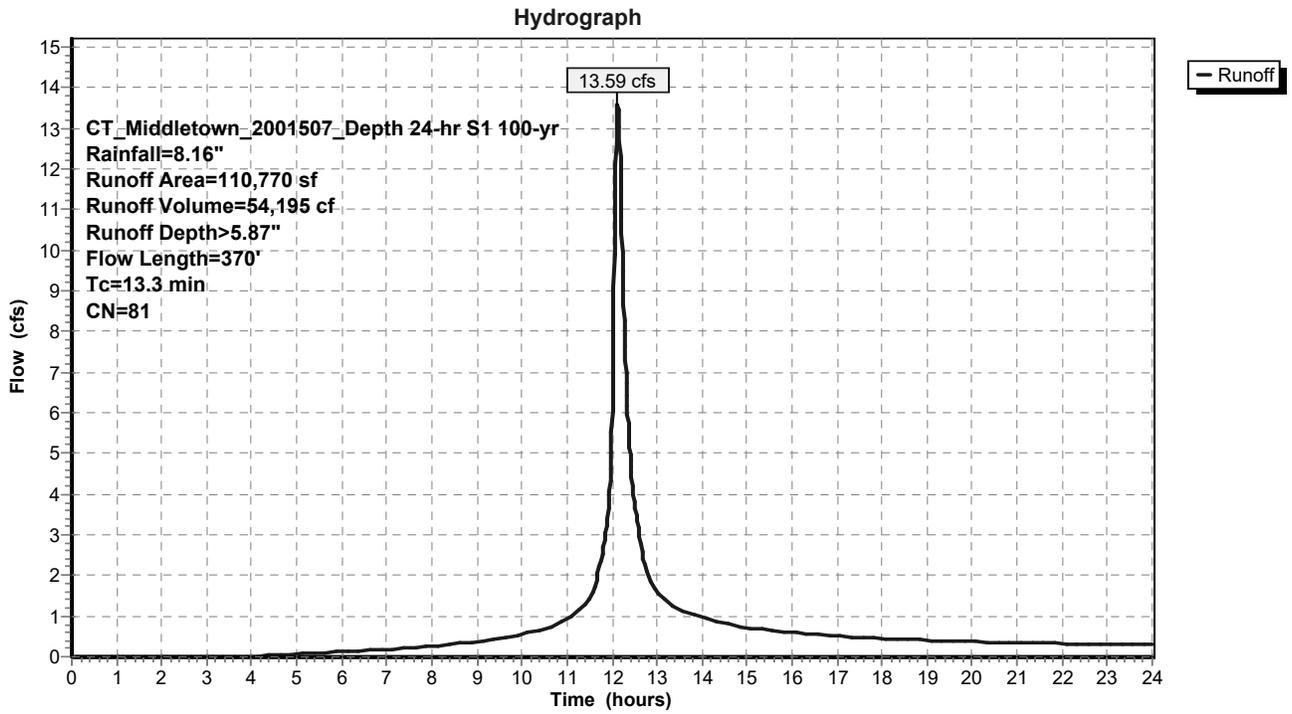
Runoff = 13.59 cfs @ 12.13 hrs, Volume= 54,195 cf, Depth> 5.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 100-yr Rainfall=8.16"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
98,913	79	50-75% Grass cover, Fair, HSG C
0	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
6,557	98	Paved parking, HSG C
0	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
5,300	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
110,770	81	Weighted Average
104,213		94.08% Pervious Area
6,557		5.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	100	0.0350	0.15		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
1.3	105	0.0350	1.31		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.7	165	0.3333	4.04		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
13.3	370	Total			

Subcatchment EDA-32: Area Draining to Sediment Forebay



Summary for Subcatchment EDA-33: Area Bypassing Sediment Forebay

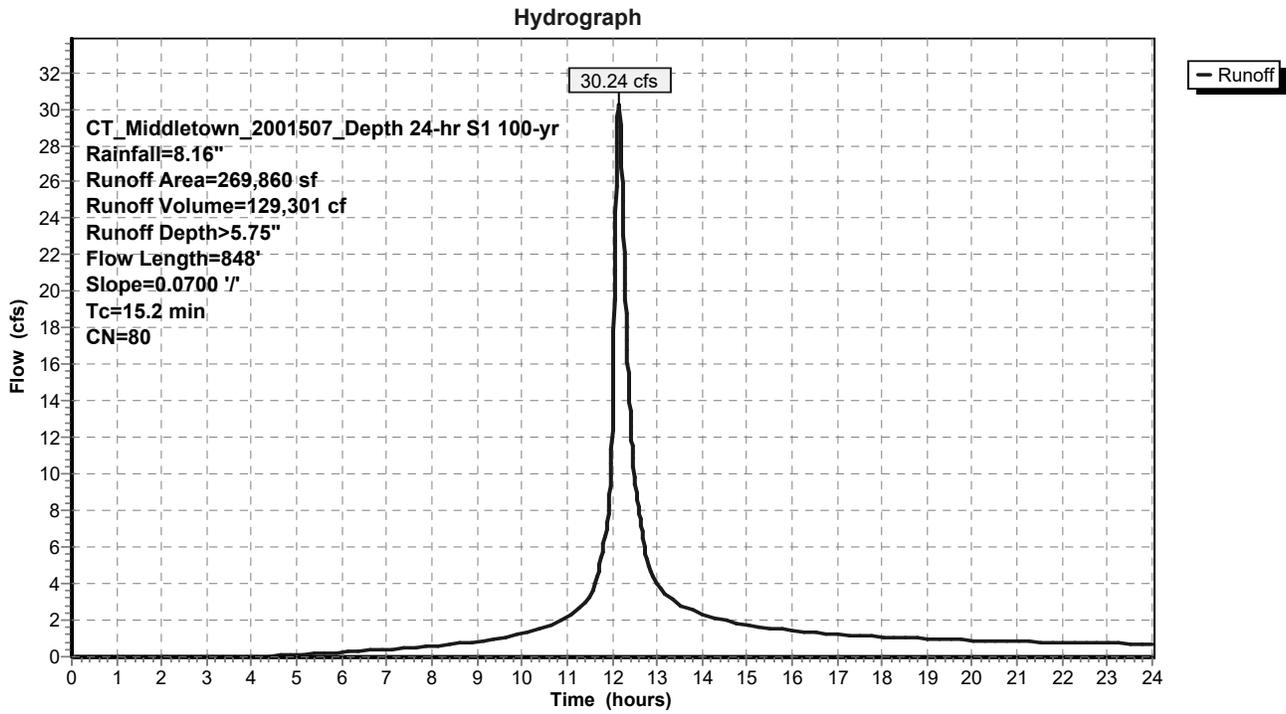
Runoff = 30.24 cfs @ 12.15 hrs, Volume= 129,301 cf, Depth> 5.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 100-yr Rainfall=8.16"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
232,381	79	50-75% Grass cover, Fair, HSG C
23,831	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
11,183	98	Paved parking, HSG C
2,124	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
341	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
269,860	80	Weighted Average
256,553		95.07% Pervious Area
13,307		4.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	100	0.0700	0.20		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
6.7	748	0.0700	1.85		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
15.2	848	Total			

Subcatchment EDA-33: Area Bypassing Sediment Forebay



Summary for Subcatchment EDA-34: Area Draining to Stormwater Pond

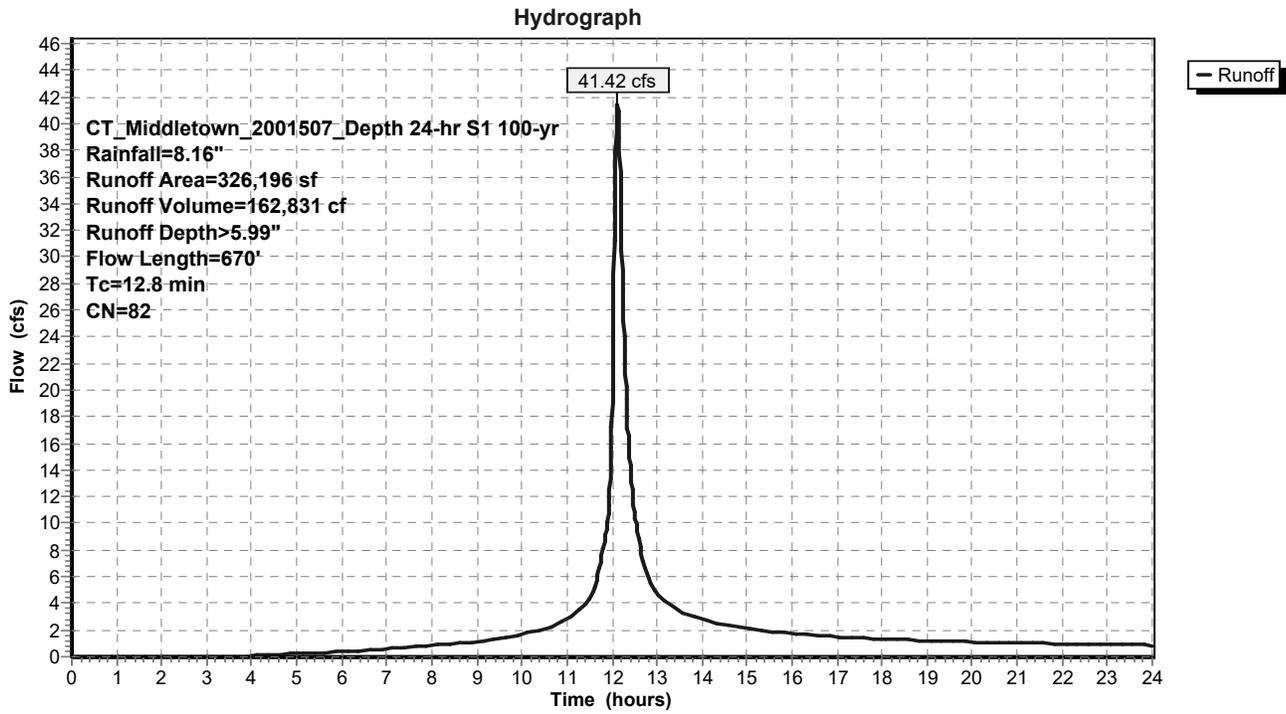
Runoff = 41.42 cfs @ 12.12 hrs, Volume= 162,831 cf, Depth> 5.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 100-yr Rainfall=8.16"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
269,284	79	50-75% Grass cover, Fair, HSG C
0	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
4,222	98	Paved parking, HSG C
0	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
10,850	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
5,025	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
36,815	98	Water Surface, 0% imp, HSG C
326,196	82	Weighted Average
321,974		98.71% Pervious Area
4,222		1.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	100	0.0700	0.20		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
4.3	570	0.1000	2.21		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
12.8	670	Total			

Subcatchment EDA-34: Area Draining to Stormwater Pond



Summary for Pond 1P: Existing Employee Lot Underground Detention System

Inflow Area = 274,555 sf, 70.95% Impervious, Inflow Depth > 7.43" for 100-yr event
 Inflow = 49.54 cfs @ 12.06 hrs, Volume= 169,922 cf
 Outflow = 8.48 cfs @ 12.49 hrs, Volume= 154,154 cf, Atten= 83%, Lag= 25.8 min
 Primary = 8.48 cfs @ 12.49 hrs, Volume= 154,154 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 130.92' @ 12.49 hrs Surf.Area= 11,725 sf Storage= 69,407 cf

Plug-Flow detention time= 199.7 min calculated for 154,154 cf (91% of inflow)
 Center-of-Mass det. time= 146.9 min (912.6 - 765.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	123.50'	2,345 cf	64.19'W x 182.67'L x 9.50'H Field A 111,387 cf Overall - 105,524 cf Embedded = 5,862 cf x 40.0% Voids
#2A	124.00'	83,580 cf	StormTrap ST2 DoubleTrap 8-0x 66 Inside #1 Inside= 101.7"W x 96.0"H => 61.09 sf x 15.40'L = 940.5 cf Outside= 101.7"W x 108.0"H => 76.31 sf x 15.40'L = 1,174.9 cf 66 Chambers in 6 Rows 50.88' x 169.35' Core + 6.66' Border = 64.19' x 182.67' System
		85,925 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	125.00'	24.0" Round Culvert L= 1,560.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 125.00' / 85.00' S= 0.0256 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#2	Device 1	125.00'	8.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	129.00'	12.0" Vert. Orifice/Grate C= 0.600
#4	Device 1	132.50'	3.0' long x 2.00' rise Sharp-Crested Rectangular Weir 2 End Contraction(s) 3.0' Crest Height

Primary OutFlow Max=8.48 cfs @ 12.49 hrs HW=130.92' (Free Discharge)

- 1=Culvert (Passes 8.48 cfs of 33.55 cfs potential flow)
- 2=Orifice/Grate (Orifice Controls 3.97 cfs @ 11.38 fps)
- 3=Orifice/Grate (Orifice Controls 4.50 cfs @ 5.74 fps)
- 4=Sharp-Crested Rectangular Weir(Controls 0.00 cfs)

Pond 1P: Existing Employee Lot Underground Detention System - Chamber Wizard Field A

Chamber Model = StormTrapST2 DoubleTrap 8-0 (StormTrapST2 DoubleTrap®Type II+IV)

Inside= 101.7"W x 96.0"H => 61.09 sf x 15.40'L = 940.5 cf

Outside= 101.7"W x 108.0"H => 76.31 sf x 15.40'L = 1,174.9 cf

11 Chambers/Row x 15.40' Long = 169.35' Row Length +79.9" Border x 2 = 182.67' Base Length

6 Rows x 101.7" Wide + 79.9" Side Border x 2 = 64.19' Base Width

6.0" Base + 108.0" Chamber Height = 9.50' Field Height

66 Chambers x 940.5 cf + 21,503.9 cf Border = 83,579.7 cf Chamber Storage

66 Chambers x 1,174.9 cf + 27,981.2 cf Border = 105,524.2 cf Displacement

111,386.7 cf Field - 105,524.2 cf Chambers = 5,862.5 cf Stone x 40.0% Voids = 2,345.0 cf Stone Storage

Chamber Storage + Stone Storage = 85,924.7 cf = 1.973 af

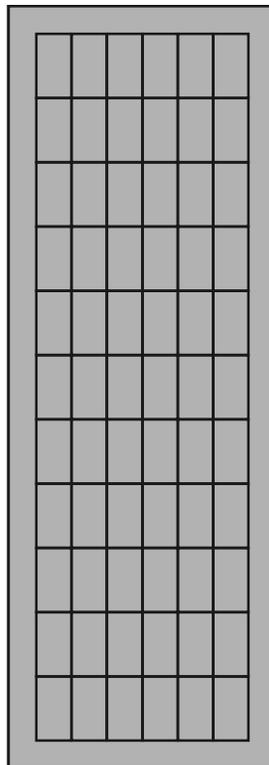
Overall Storage Efficiency = 77.1%

Overall System Size = 182.67' x 64.19' x 9.50'

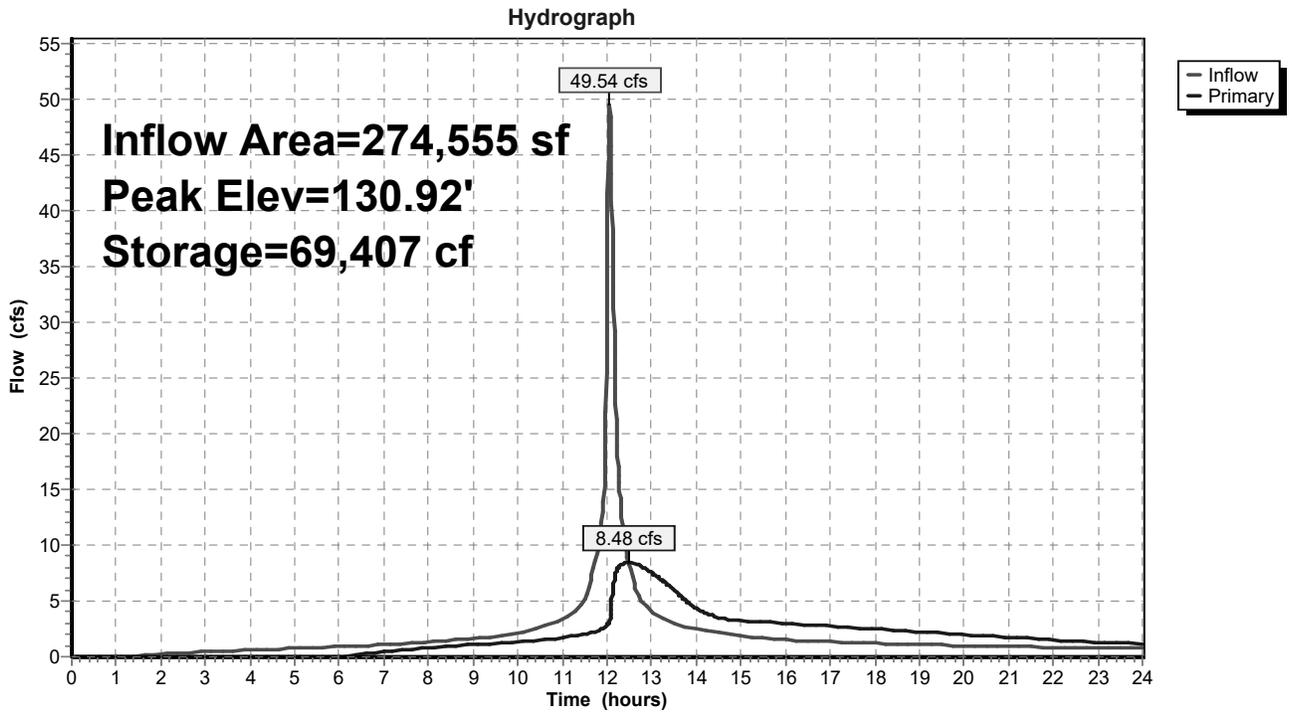
66 Chambers (plus border)

4,125.4 cy Field

217.1 cy Stone



Pond 1P: Existing Employee Lot Underground Detention System



Summary for Pond 2P: Existing Outbound Lot Underground Detention System

Inflow Area = 2,494,619 sf, 71.26% Impervious, Inflow Depth > 7.25" for 100-yr event
 Inflow = 361.58 cfs @ 12.04 hrs, Volume= 1,507,138 cf
 Outflow = 45.93 cfs @ 12.86 hrs, Volume= 1,036,791 cf, Atten= 87%, Lag= 49.1 min
 Primary = 45.93 cfs @ 12.86 hrs, Volume= 1,036,791 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 94.90' @ 12.86 hrs Surf.Area= 73,413 sf Storage= 768,672 cf

Plug-Flow detention time= 310.4 min calculated for 1,036,359 cf (69% of inflow)
 Center-of-Mass det. time= 183.5 min (965.6 - 782.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	82.50'	32,237 cf	183.90'W x 399.21'L x 13.33'H Field A 978,837 cf Overall - 898,245 cf Embedded = 80,592 cf x 40.0% Voids
#2A	83.50'	766,158 cf	StormTrap ST2 DoubleTrap 11-4x 500 Inside #1 Inside= 101.7"W x 136.0"H => 89.71 sf x 15.40'L = 1,381.1 cf Outside= 101.7"W x 148.0"H => 104.58 sf x 15.40'L = 1,610.0 cf 500 Chambers in 20 Rows 169.58' x 384.90' Core + 6.66' Border = 182.90' x 398.21' System
		798,395 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	86.00'	30.0" Round Culvert L= 120.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 86.00' / 85.50' S= 0.0042 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 4.91 sf
#2	Device 1	86.00'	15.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	91.00'	18.0" Vert. Orifice/Grate X 2 rows with 6.0" cc spacing C= 0.600
#4	Device 1	95.50'	3.0' long x 2.00' rise Sharp-Crested Rectangular Weir 2 End Contraction(s) 3.0' Crest Height

Primary OutFlow Max=45.93 cfs @ 12.86 hrs HW=94.90' (Free Discharge)

- 1=Culvert (Passes 45.93 cfs of 65.36 cfs potential flow)
- 2=Orifice/Grate (Orifice Controls 16.99 cfs @ 13.85 fps)
- 3=Orifice/Grate (Orifice Controls 28.94 cfs @ 8.19 fps)
- 4=Sharp-Crested Rectangular Weir(Controls 0.00 cfs)

Pond 2P: Existing Outbound Lot Underground Detention System - Chamber Wizard Field A

Chamber Model = StormTrapST2 DoubleTrap 11-4 (StormTrapST2 DoubleTrap®Type I+III)

Inside= 101.7"W x 136.0"H => 89.71 sf x 15.40'L = 1,381.1 cf

Outside= 101.7"W x 148.0"H => 104.58 sf x 15.40'L = 1,610.0 cf

25 Chambers/Row x 15.40' Long = 384.90' Row Length +79.9" Border x 2 +6.0" End Stone x 2 = 399.21' Base Length

20 Rows x 101.7" Wide + 79.9" Side Border x 2 + 6.0" Side Stone x 2 = 183.90' Base Width

12.0" Base + 148.0" Chamber Height = 13.33' Field Height

500 Chambers x 1,381.1 cf + 75,595.3 cf Border = 766,157.9 cf Chamber Storage

500 Chambers x 1,610.0 cf + 93,224.3 cf Border = 898,244.6 cf Displacement

978,836.7 cf Field - 898,244.6 cf Chambers = 80,592.0 cf Stone x 40.0% Voids = 32,236.8 cf Stone Storage

Chamber Storage + Stone Storage = 798,394.7 cf = 18.329 af

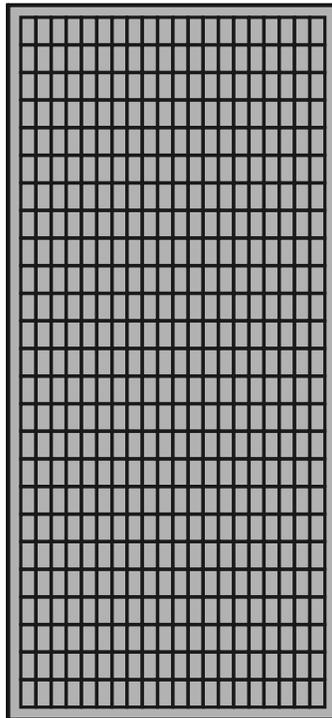
Overall Storage Efficiency = 81.6%

Overall System Size = 399.21' x 183.90' x 13.33'

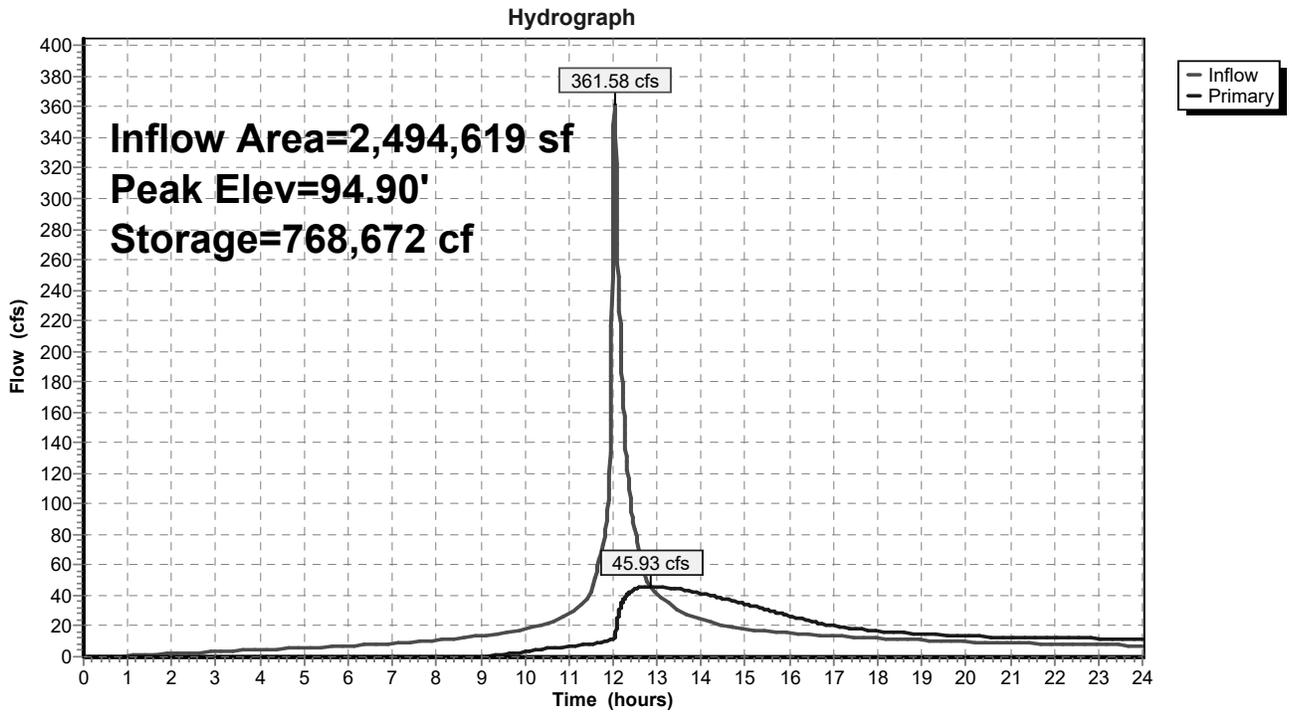
500 Chambers (plus border)

36,253.2 cy Field

2,984.9 cy Stone



Pond 2P: Existing Outbound Lot Underground Detention System



Summary for Pond 3P: Existing Sediment Forebay

Inflow Area = 1,946,053 sf, 67.71% Impervious, Inflow Depth > 7.24" for 100-yr event
 Inflow = 235.04 cfs @ 12.18 hrs, Volume= 1,173,793 cf
 Outflow = 233.34 cfs @ 12.20 hrs, Volume= 1,143,221 cf, Atten= 1%, Lag= 1.1 min
 Primary = 233.34 cfs @ 12.20 hrs, Volume= 1,143,221 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 4
 Peak Elev= 30.65' @ 12.20 hrs Surf.Area= 11,521 sf Storage= 46,908 cf

Plug-Flow detention time= 32.9 min calculated for 1,142,745 cf (97% of inflow)
 Center-of-Mass det. time= 16.5 min (792.9 - 776.5)

Volume	Invert	Avail.Storage	Storage Description
#1	24.00'	51,057 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

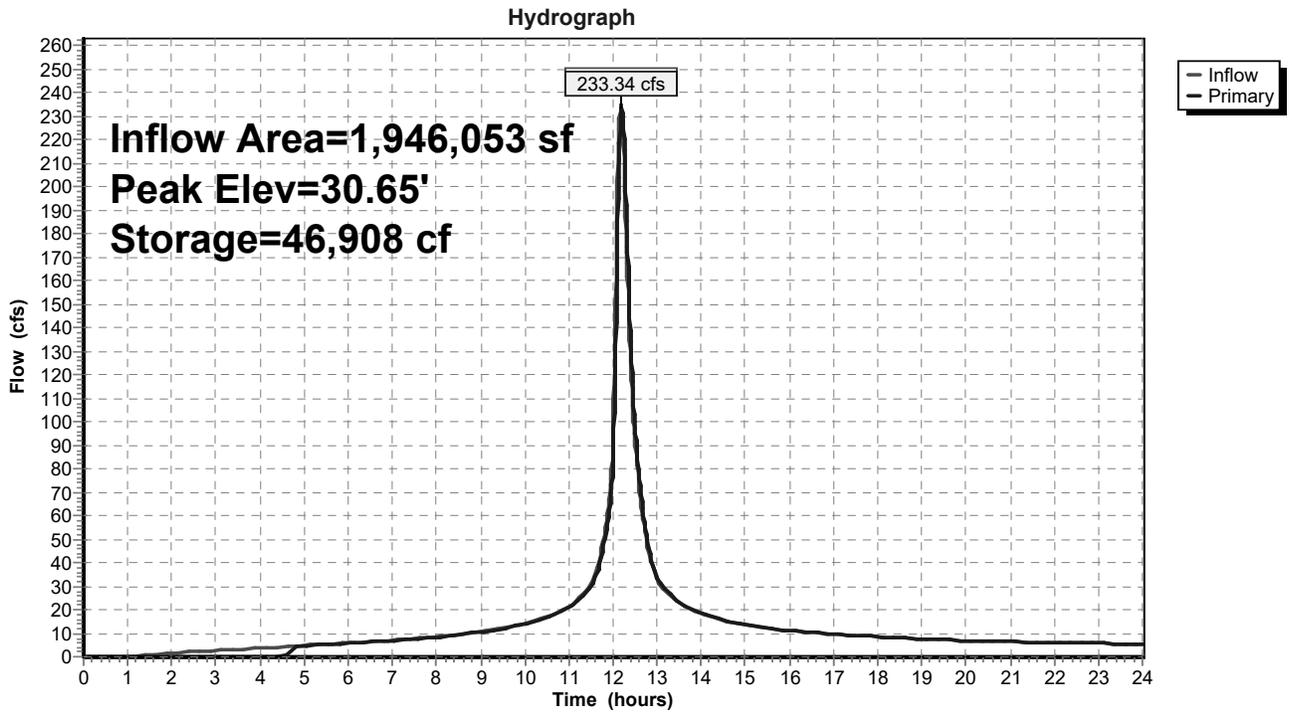
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
24.00	3,090	0	0
25.00	4,111	3,601	3,601
26.00	5,235	4,673	8,274
27.00	6,460	5,848	14,121
28.00	7,785	7,123	21,244
29.00	9,210	8,498	29,741
30.00	10,736	9,973	39,714
31.00	11,950	11,343	51,057

Device	Routing	Invert	Outlet Devices
#1	Primary	28.95'	40.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=233.25 cfs @ 12.20 hrs HW=30.65' (Free Discharge)

↑1=**Broad-Crested Rectangular Weir**(Weir Controls 233.25 cfs @ 3.44 fps)

Pond 3P: Existing Sediment Forebay



Summary for Pond 4P: Existing Stormwater Pond

Inflow Area = 2,542,109 sf, 52.52% Impervious, Inflow Depth > 6.78" for 100-yr event
 Inflow = 297.69 cfs @ 12.18 hrs, Volume= 1,435,353 cf
 Outflow = 124.00 cfs @ 12.48 hrs, Volume= 1,431,762 cf, Atten= 58%, Lag= 18.1 min
 Primary = 124.00 cfs @ 12.48 hrs, Volume= 1,431,762 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 30.70' @ 12.48 hrs Surf.Area= 72,593 sf Storage= 229,433 cf

Plug-Flow detention time= 13.8 min calculated for 1,431,762 cf (100% of inflow)
 Center-of-Mass det. time= 12.2 min (810.5 - 798.3)

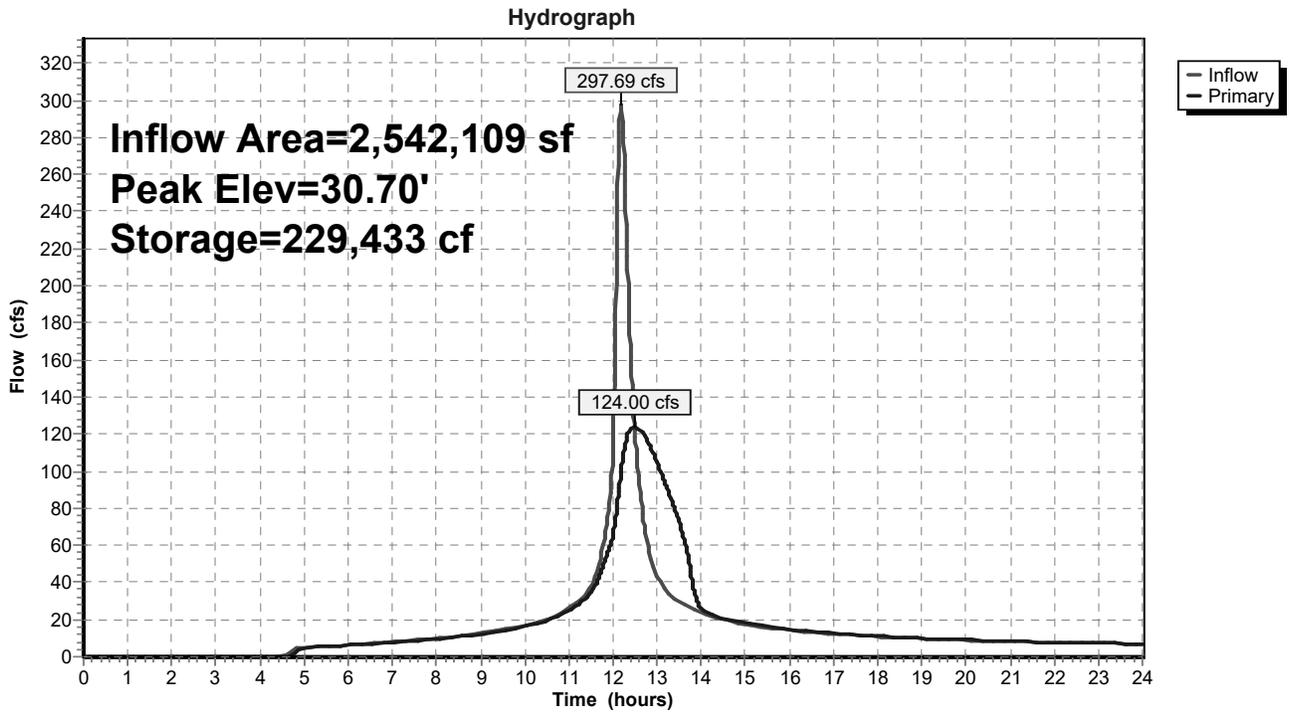
Volume	Invert	Avail.Storage	Storage Description
#1	24.00'	680,910 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
24.00	50	0	0
27.00	10,786	16,254	16,254
28.00	59,106	34,946	51,200
30.00	69,432	128,538	179,738
32.00	78,467	147,899	327,637
34.00	87,601	166,068	493,705
36.00	99,604	187,205	680,910

Device	Routing	Invert	Outlet Devices
#1	Primary	35.50'	70.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#2	Primary	24.50'	48.0" Vert. Orifice/Grate C= 0.600
#3	Primary	34.50'	2.0" Horiz. Orifice/Grate X 8.00 columns X 10 rows C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=124.00 cfs @ 12.48 hrs HW=30.70' (Free Discharge)

- 1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)
- 2=Orifice/Grate (Orifice Controls 124.00 cfs @ 9.87 fps)
- 3=Orifice/Grate (Controls 0.00 cfs)

Pond 4P: Existing Stormwater Pond

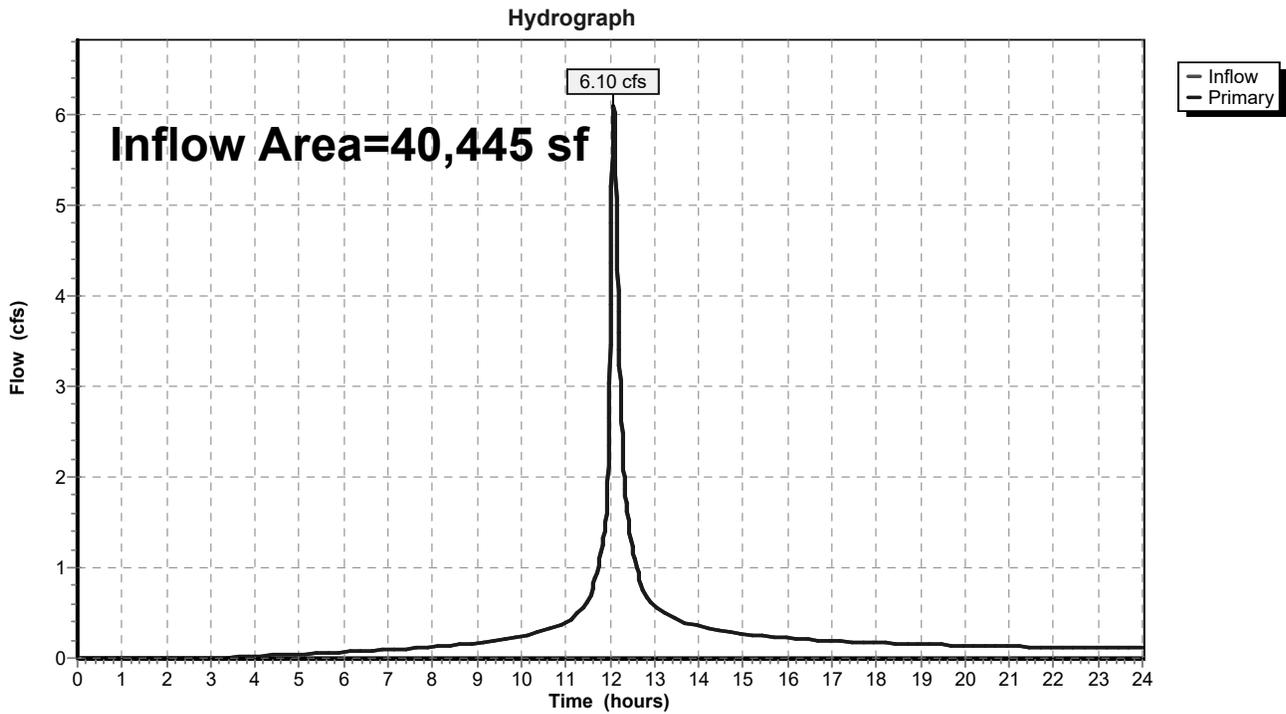


Summary for Link DP-1: Middle Street Gutter

Inflow Area = 40,445 sf, 6.03% Impervious, Inflow Depth > 6.35" for 100-yr event
Inflow = 6.10 cfs @ 12.08 hrs, Volume= 21,405 cf
Primary = 6.10 cfs @ 12.08 hrs, Volume= 21,405 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link DP-1: Middle Street Gutter



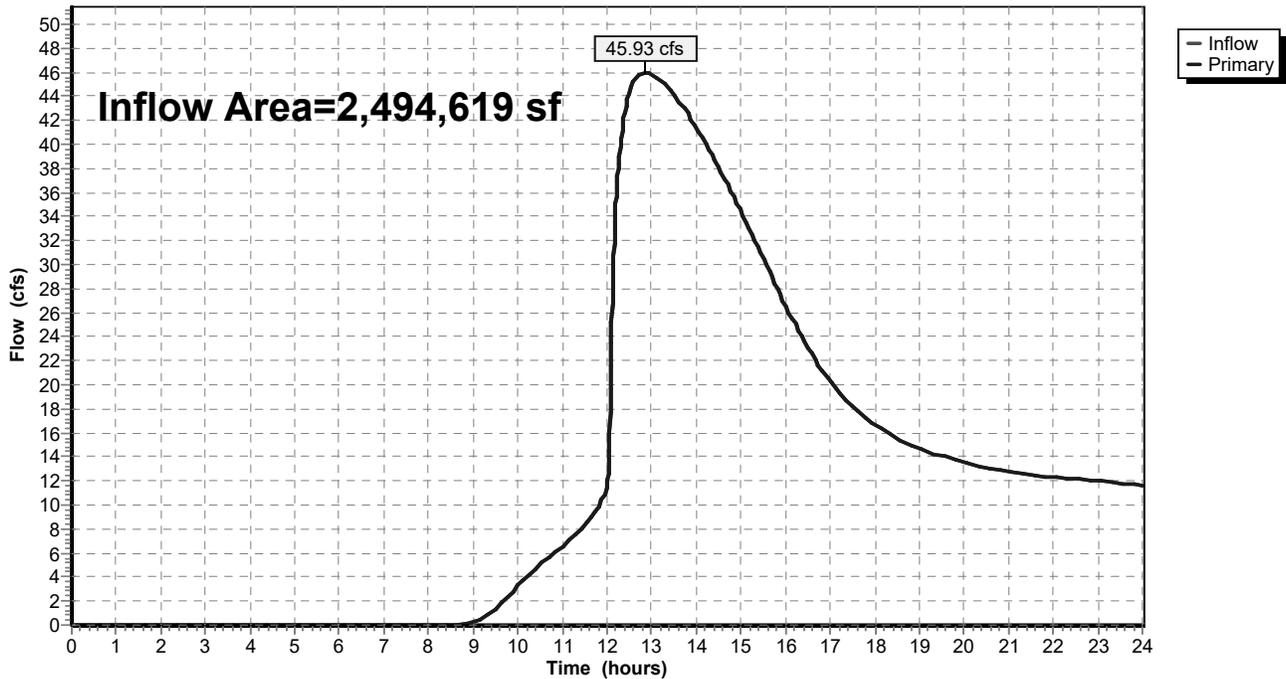
Summary for Link DP-2: Southern Wetland

Inflow Area = 2,494,619 sf, 71.26% Impervious, Inflow Depth > 4.99" for 100-yr event
Inflow = 45.93 cfs @ 12.86 hrs, Volume= 1,036,791 cf
Primary = 45.93 cfs @ 12.86 hrs, Volume= 1,036,791 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link DP-2: Southern Wetland

Hydrograph



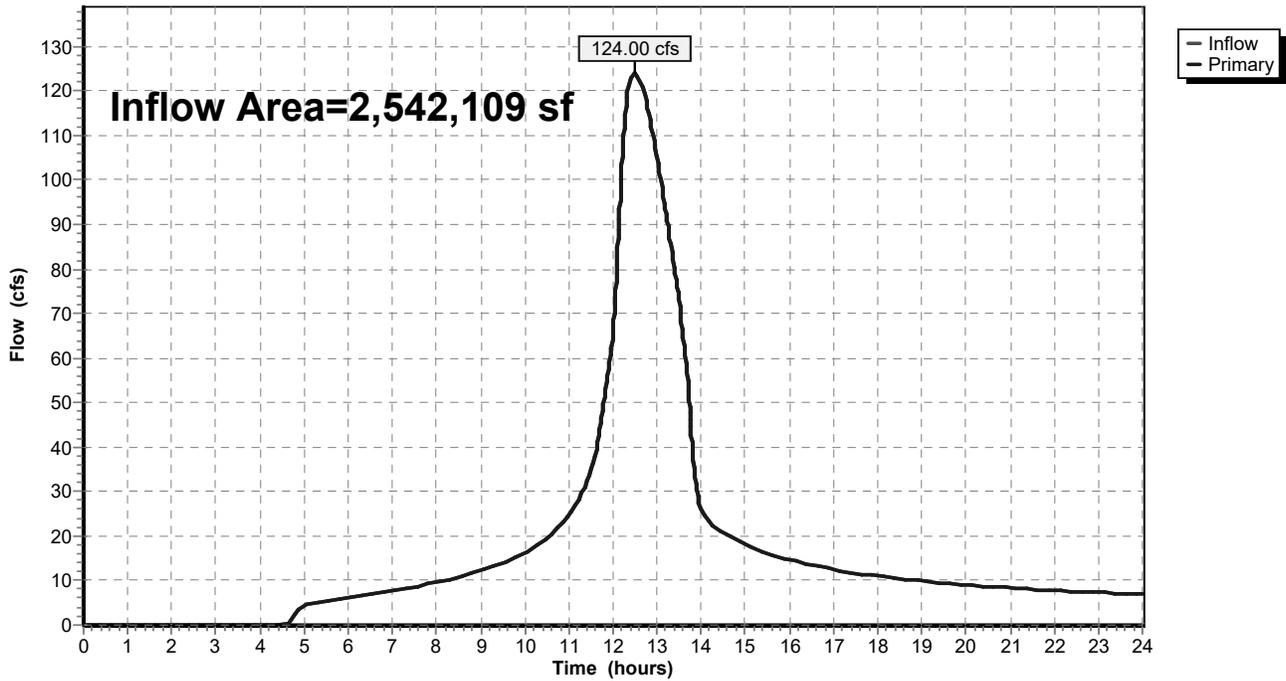
Summary for Link DP-3: Northern Wetland

Inflow Area = 2,542,109 sf, 52.52% Impervious, Inflow Depth > 6.76" for 100-yr event
Inflow = 124.00 cfs @ 12.48 hrs, Volume= 1,431,762 cf
Primary = 124.00 cfs @ 12.48 hrs, Volume= 1,431,762 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link DP-3: Northern Wetland

Hydrograph

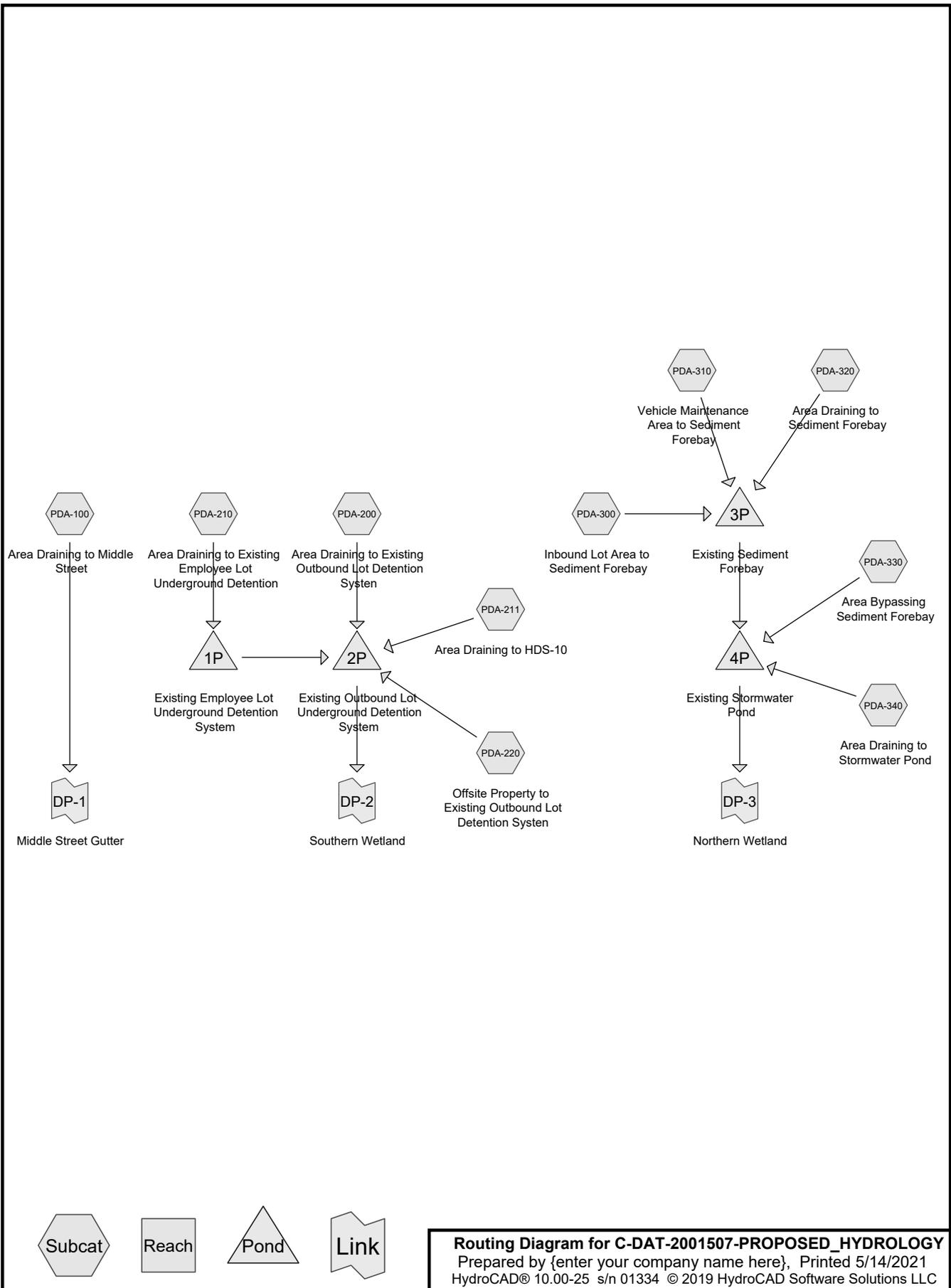




An Employee-Owned Company
Stormwater Management Report

APPENDIX C

POST-DEVELOPMENT HYDROLOGY



C-DAT-2001507-PROPOSED_HYCT_Middletown_2001507_Depth 24-hr S1 2-yr Rainfall=3.29"

Prepared by {enter your company name here}

Printed 5/14/2021

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Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentPDA-100: Area Draining to Runoff Area=39,350 sf 9.83% Impervious Runoff Depth>1.83"
Flow Length=962' Tc=9.9 min CN=85 Runoff=1.82 cfs 5,997 cf

SubcatchmentPDA-200: Area Draining Runoff Area=1,483,965 sf 90.90% Impervious Runoff Depth>2.94"
Flow Length=1,796' Tc=5.8 min CN=97 Runoff=126.26 cfs 363,834 cf

SubcatchmentPDA-210: Area Draining to Runoff Area=266,730 sf 73.87% Impervious Runoff Depth>2.63"
Flow Length=815' Tc=8.2 min CN=94 Runoff=18.64 cfs 58,367 cf

SubcatchmentPDA-211: Area Draining to Runoff Area=19,345 sf 83.46% Impervious Runoff Depth>2.83"
Tc=5.0 min CN=96 Runoff=1.69 cfs 4,570 cf

SubcatchmentPDA-220: Offsite Property Runoff Area=725,674 sf 38.14% Impervious Runoff Depth>1.98"
Flow Length=1,389' Tc=16.2 min CN=87 Runoff=28.55 cfs 120,027 cf

SubcatchmentPDA-300: Inbound Lot Runoff Area=1,479,100 sf 87.10% Impervious Runoff Depth>2.83"
Flow Length=1,360' Tc=17.7 min CN=96 Runoff=74.57 cfs 348,316 cf

SubcatchmentPDA-310: Vehicle Runoff Area=356,183 sf 32.74% Impervious Runoff Depth>1.90"
Flow Length=964' Tc=18.6 min CN=86 Runoff=12.54 cfs 56,466 cf

SubcatchmentPDA-320: Area Draining to Runoff Area=110,770 sf 5.92% Impervious Runoff Depth>1.53"
Flow Length=370' Tc=13.3 min CN=81 Runoff=3.69 cfs 14,150 cf

SubcatchmentPDA-330: Area Bypassing Runoff Area=269,860 sf 4.93% Impervious Runoff Depth>1.46"
Flow Length=848' Slope=0.0700 '/' Tc=15.2 min CN=80 Runoff=7.96 cfs 32,909 cf

SubcatchmentPDA-340: Area Draining to Runoff Area=326,196 sf 1.29% Impervious Runoff Depth>1.60"
Flow Length=670' Tc=12.8 min CN=82 Runoff=11.63 cfs 43,593 cf

Pond 1P: Existing Employee Lot Peak Elev=127.10' Storage=29,522 cf Inflow=18.64 cfs 58,367 cf
Outflow=2.23 cfs 47,534 cf

Pond 2P: Existing Outbound Lot Peak Elev=88.65' Storage=344,820 cf Inflow=144.41 cfs 535,964 cf
Outflow=6.44 cfs 251,075 cf

Pond 3P: Existing Sediment Forebay Peak Elev=29.83' Storage=37,961 cf Inflow=90.35 cfs 418,933 cf
Outflow=89.45 cfs 388,990 cf

Pond 4P: Existing Stormwater Pond Peak Elev=27.91' Storage=46,268 cf Inflow=106.91 cfs 465,493 cf
Outflow=71.84 cfs 463,533 cf

Link DP-1: Middle Street Gutter Inflow=1.82 cfs 5,997 cf
Primary=1.82 cfs 5,997 cf

Link DP-2: Southern Wetland Inflow=6.44 cfs 251,075 cf
Primary=6.44 cfs 251,075 cf

Link DP-3: Northern Wetland

Inflow=71.84 cfs 463,533 cf
Primary=71.84 cfs 463,533 cf

Total Runoff Area = 5,077,173 sf Runoff Volume = 1,048,230 cf Average Runoff Depth = 2.48"
35.56% Pervious = 1,805,478 sf 64.44% Impervious = 3,271,695 sf

Summary for Subcatchment PDA-100: Area Draining to Middle Street

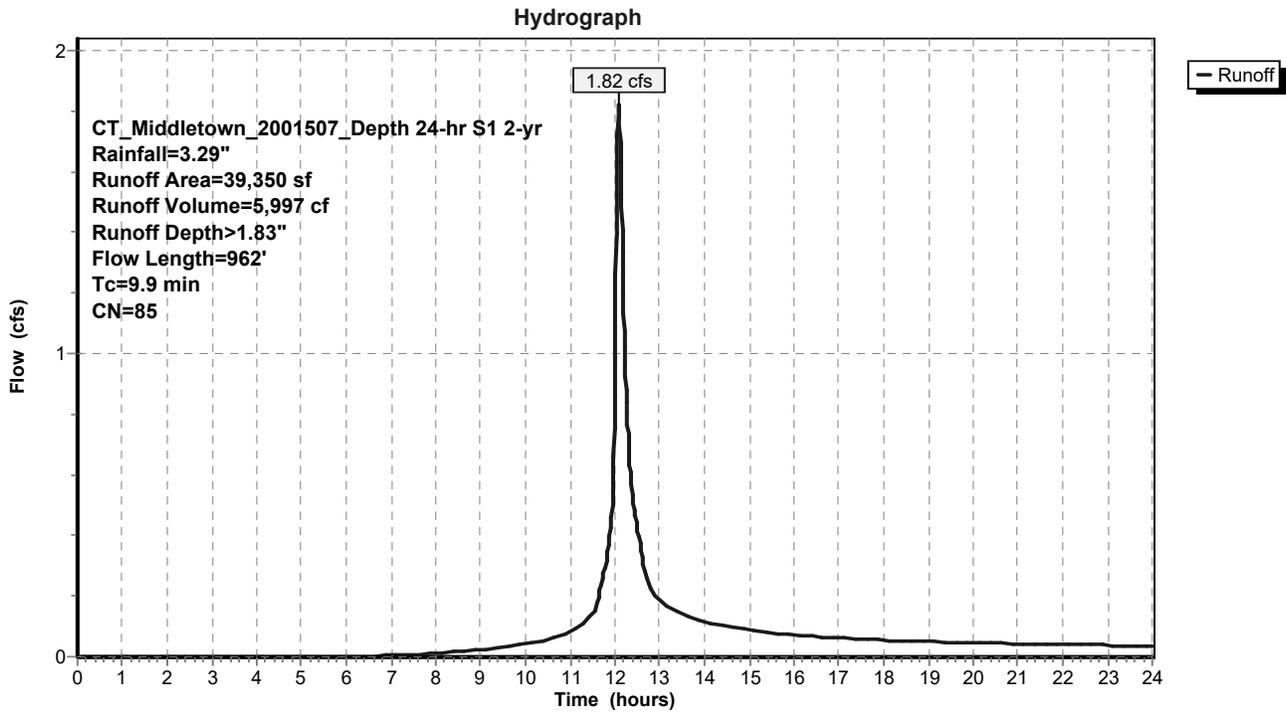
Runoff = 1.82 cfs @ 12.09 hrs, Volume= 5,997 cf, Depth> 1.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 2-yr Rainfall=3.29"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
0	79	50-75% Grass cover, Fair, HSG C
35,480	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
0	98	Paved parking, HSG C
3,870	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
0	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
39,350	85	Weighted Average
35,480		90.17% Pervious Area
3,870		9.83% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	28	0.1406	0.20		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
1.1	72	0.0120	1.06		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.29"
6.5	862	0.0120	2.22		Shallow Concentrated Flow, Paved Kv= 20.3 fps
9.9	962	Total			

Subcatchment PDA-100: Area Draining to Middle Street



Summary for Subcatchment PDA-200: Area Draining to Existing Outbound Lot Detention System

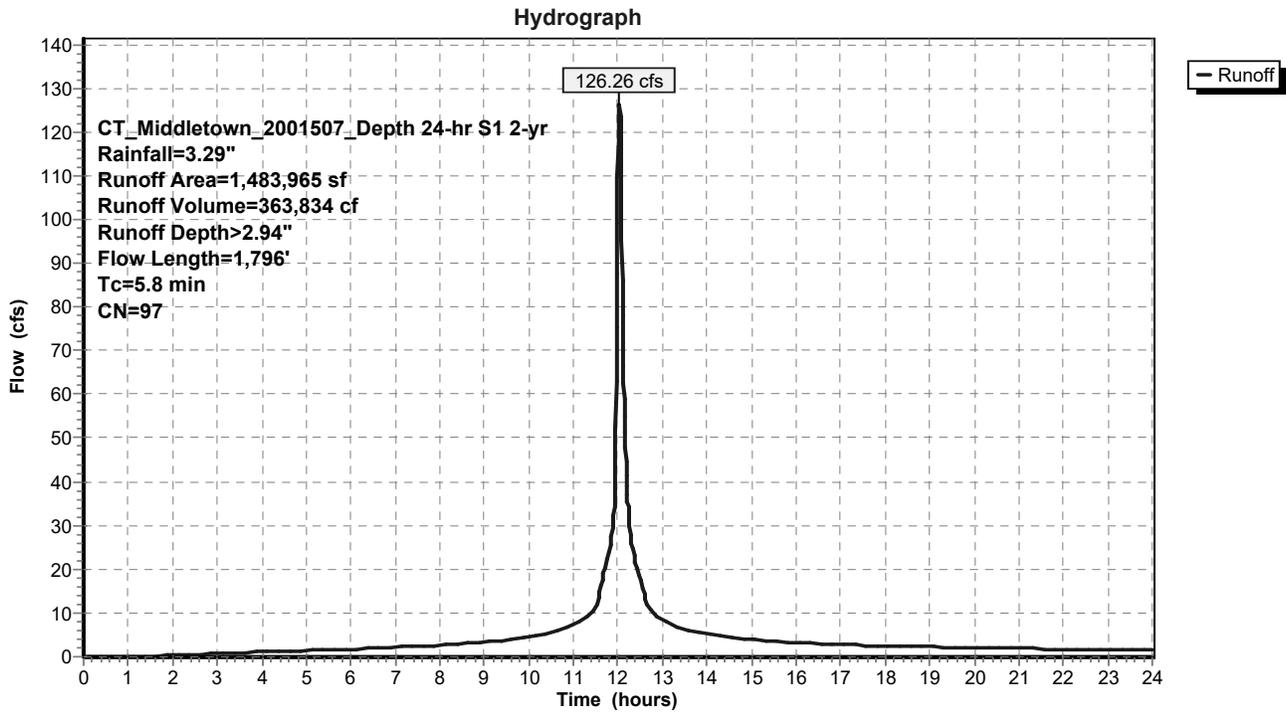
Runoff = 126.26 cfs @ 12.03 hrs, Volume= 363,834 cf, Depth> 2.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 2-yr Rainfall=3.29"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
60,335	79	50-75% Grass cover, Fair, HSG C
74,723	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
507,075	98	Paved parking, HSG C
841,832	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
0	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
1,483,965	97	Weighted Average
135,058		9.10% Pervious Area
1,348,907		90.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	100	0.0140	1.21		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.29"
1.2	176	0.0140	2.40		Shallow Concentrated Flow, Paved Kv= 20.3 fps
3.2	1,520	0.0100	7.80	24.51	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
5.8	1,796	Total			

Subcatchment PDA-200: Area Draining to Existing Outbound Lot Detention System



Summary for Subcatchment PDA-210: Area Draining to Existing Employee Lot Underground Detention

Runoff = 18.64 cfs @ 12.06 hrs, Volume= 58,367 cf, Depth> 2.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 2-yr Rainfall=3.29"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
0	79	50-75% Grass cover, Fair, HSG C
69,690	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
0	98	Paved parking, HSG C
197,040	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
0	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
266,730	94	Weighted Average
69,690		26.13% Pervious Area
197,040		73.87% Impervious Area

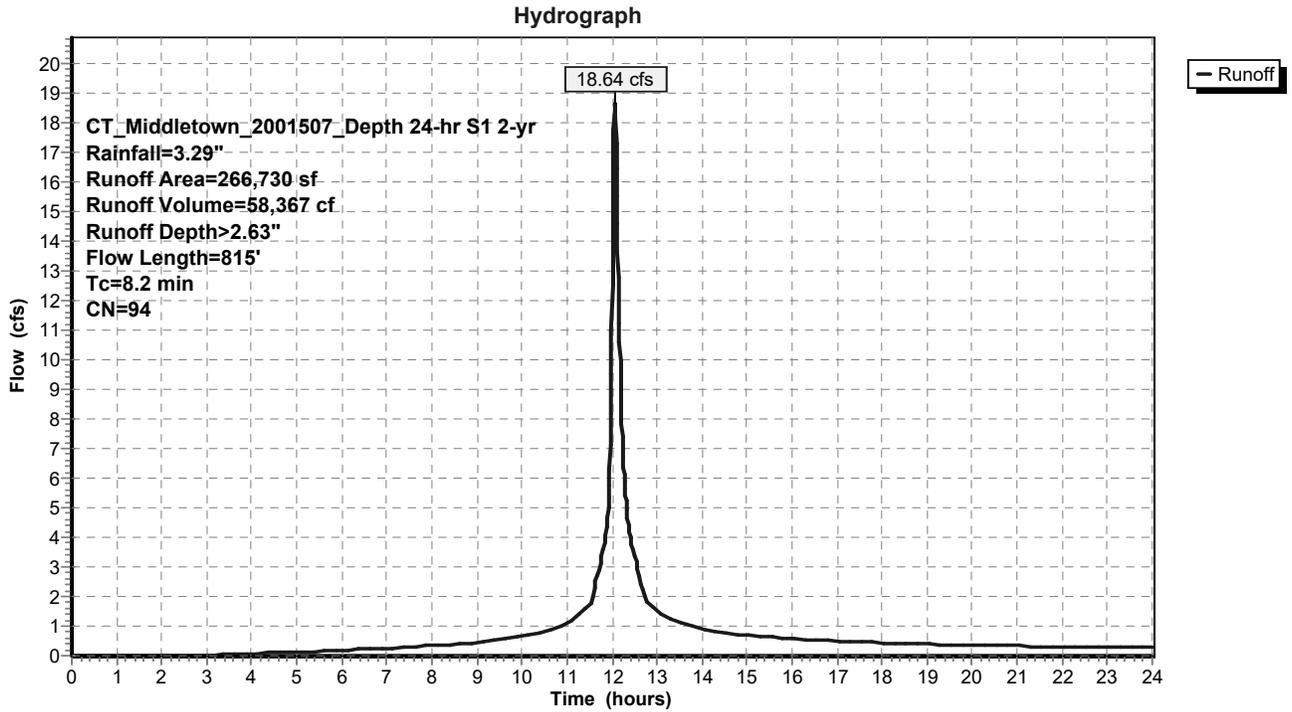
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.1	19	0.0160	0.08		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
1.1	81	0.0160	1.22		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.29"
1.1	164	0.0160	2.57		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.5	130	0.0050	4.03	4.95	Pipe Channel, 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012 Concrete pipe, finished
0.6	152	0.0050	4.55	8.05	Pipe Channel, 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.012 Concrete pipe, finished
0.3	108	0.0050	5.52	17.33	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
0.3	101	0.0050	5.52	17.33	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
0.1	38	0.0050	5.52	17.33	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
0.1	22	0.0050	7.23	51.09	Pipe Channel,

36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75'

n= 0.012 Concrete pipe, finished

8.2 815 Total

Subcatchment PDA-210: Area Draining to Existing Employee Lot Underground Detention



Summary for Subcatchment PDA-211: Area Draining to HDS-10

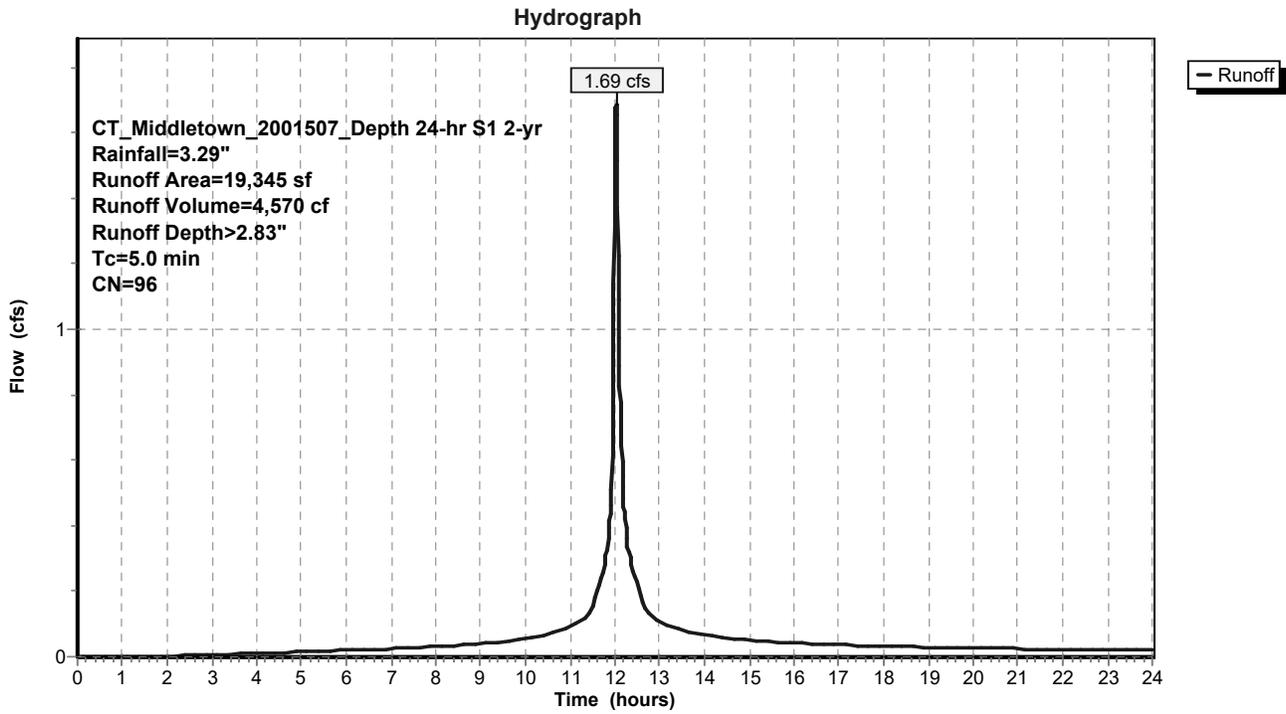
Runoff = 1.69 cfs @ 12.03 hrs, Volume= 4,570 cf, Depth> 2.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 2-yr Rainfall=3.29"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
0	79	50-75% Grass cover, Fair, HSG C
3,200	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
0	98	Paved parking, HSG C
16,145	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
0	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
19,345	96	Weighted Average
3,200		16.54% Pervious Area
16,145		83.46% Impervious Area

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

Subcatchment PDA-211: Area Draining to HDS-10



Summary for Subcatchment PDA-220: Offsite Property to Existing Outbound Lot Detention System

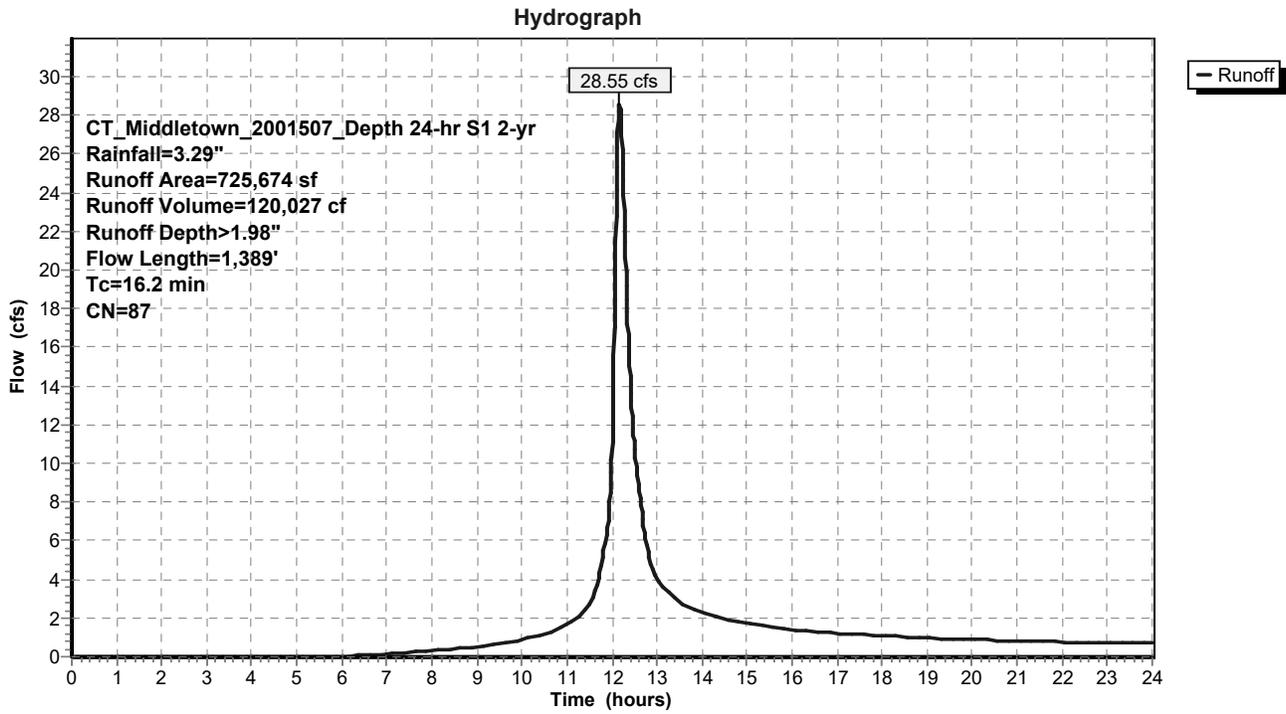
Runoff = 28.55 cfs @ 12.17 hrs, Volume= 120,027 cf, Depth> 1.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 2-yr Rainfall=3.29"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
218,535	79	50-75% Grass cover, Fair, HSG C
204,870	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
128,360	98	Paved parking, HSG C
148,395	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
0	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
25,514	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
725,674	87	Weighted Average
448,919		61.86% Pervious Area
276,755		38.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.1	100	0.0240	0.13		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
1.1	214	0.0374	3.11		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
2.0	1,075	0.0200	9.11	16.09	Pipe Channel, 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.012
16.2	1,389	Total			

Subcatchment PDA-220: Offsite Property to Existing Outbound Lot Detention System



Summary for Subcatchment PDA-300: Inbound Lot Area to Sediment Forebay

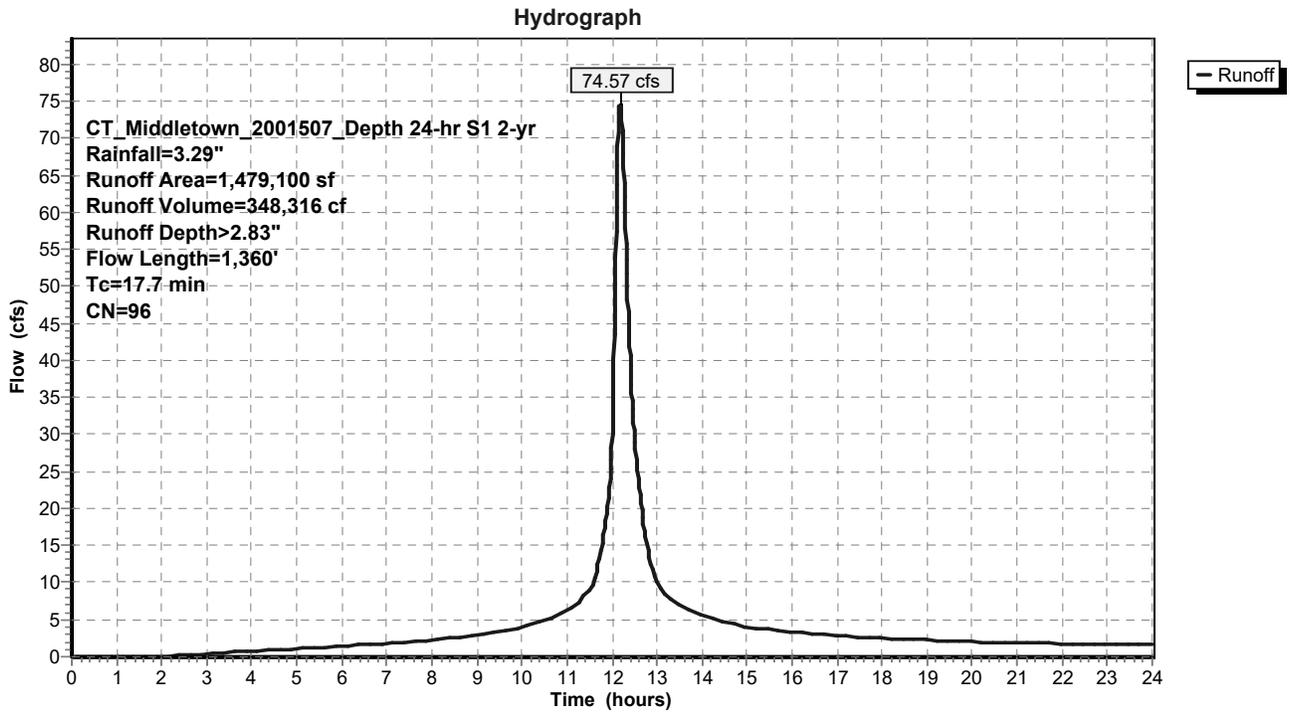
Runoff = 74.57 cfs @ 12.18 hrs, Volume= 348,316 cf, Depth> 2.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 2-yr Rainfall=3.29"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
119,543	79	50-75% Grass cover, Fair, HSG C
71,266	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
471,502	98	Paved parking, HSG C
816,789	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
0	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
1,479,100	96	Weighted Average
190,809		12.90% Pervious Area
1,288,291		87.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.2	80	0.0125	0.09		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
0.8	120	0.0150	2.49		Shallow Concentrated Flow, Paved Kv= 20.3 fps
2.7	1,160	0.0050	7.23	51.09	Pipe Channel, 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.012
17.7	1,360	Total			

Subcatchment PDA-300: Inbound Lot Area to Sediment Forebay



Summary for Subcatchment PDA-310: Vehicle Maintenance Area to Sediment Forebay

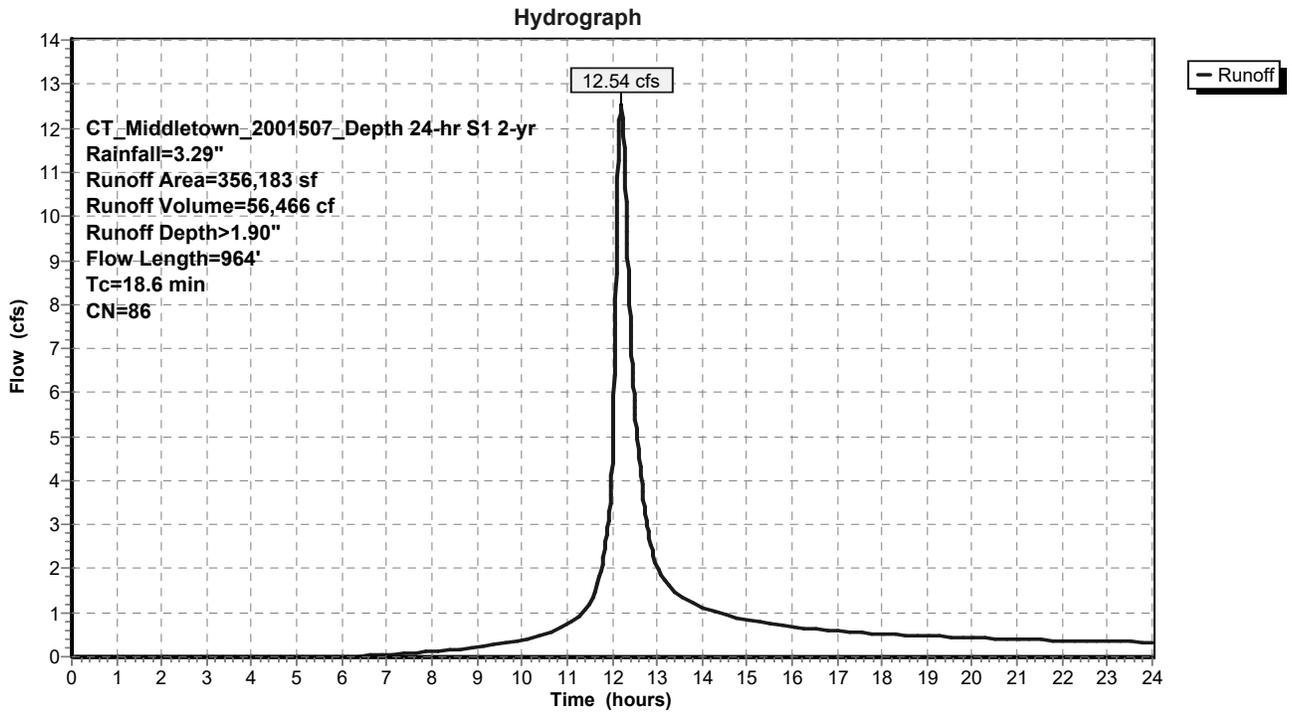
Runoff = 12.54 cfs @ 12.21 hrs, Volume= 56,466 cf, Depth> 1.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 2-yr Rainfall=3.29"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
153,724	79	50-75% Grass cover, Fair, HSG C
85,858	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
69,565	98	Paved parking, HSG C
47,036	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
0	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
356,183	86	Weighted Average
239,582		67.26% Pervious Area
116,601		32.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	60	0.0400	0.14		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
5.7	40	0.0300	0.12		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
5.3	541	0.0600	1.71		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.2	54	0.0050	4.03	4.95	Pipe Channel, 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012
0.1	122	0.0500	17.44	54.80	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
0.1	108	0.0400	15.60	49.02	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
0.1	39	0.0085	7.19	22.59	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
18.6	964	Total			

Subcatchment PDA-310: Vehicle Maintenance Area to Sediment Forebay



Summary for Subcatchment PDA-320: Area Draining to Sediment Forebay

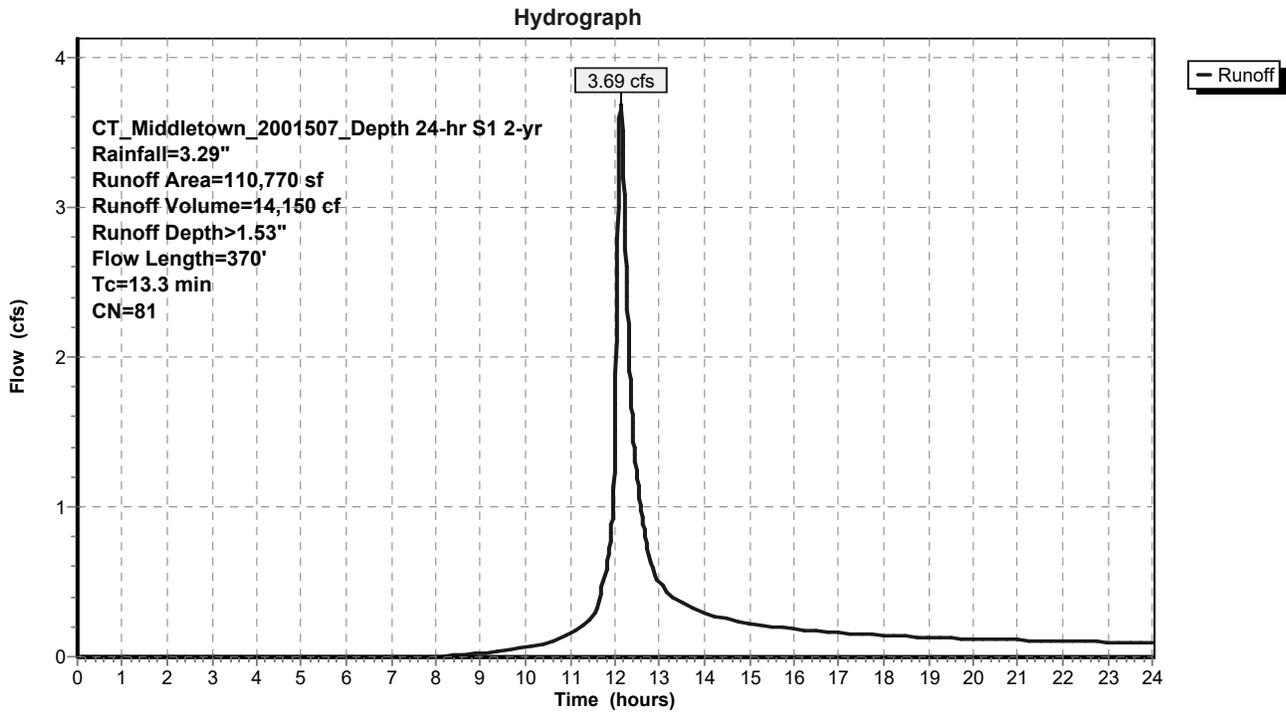
Runoff = 3.69 cfs @ 12.13 hrs, Volume= 14,150 cf, Depth> 1.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 2-yr Rainfall=3.29"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
98,913	79	50-75% Grass cover, Fair, HSG C
0	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
6,557	98	Paved parking, HSG C
0	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
5,300	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
110,770	81	Weighted Average
104,213		94.08% Pervious Area
6,557		5.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	100	0.0350	0.15		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
1.3	105	0.0350	1.31		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.7	165	0.3333	4.04		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
13.3	370	Total			

Subcatchment PDA-320: Area Draining to Sediment Forebay



Summary for Subcatchment PDA-330: Area Bypassing Sediment Forebay

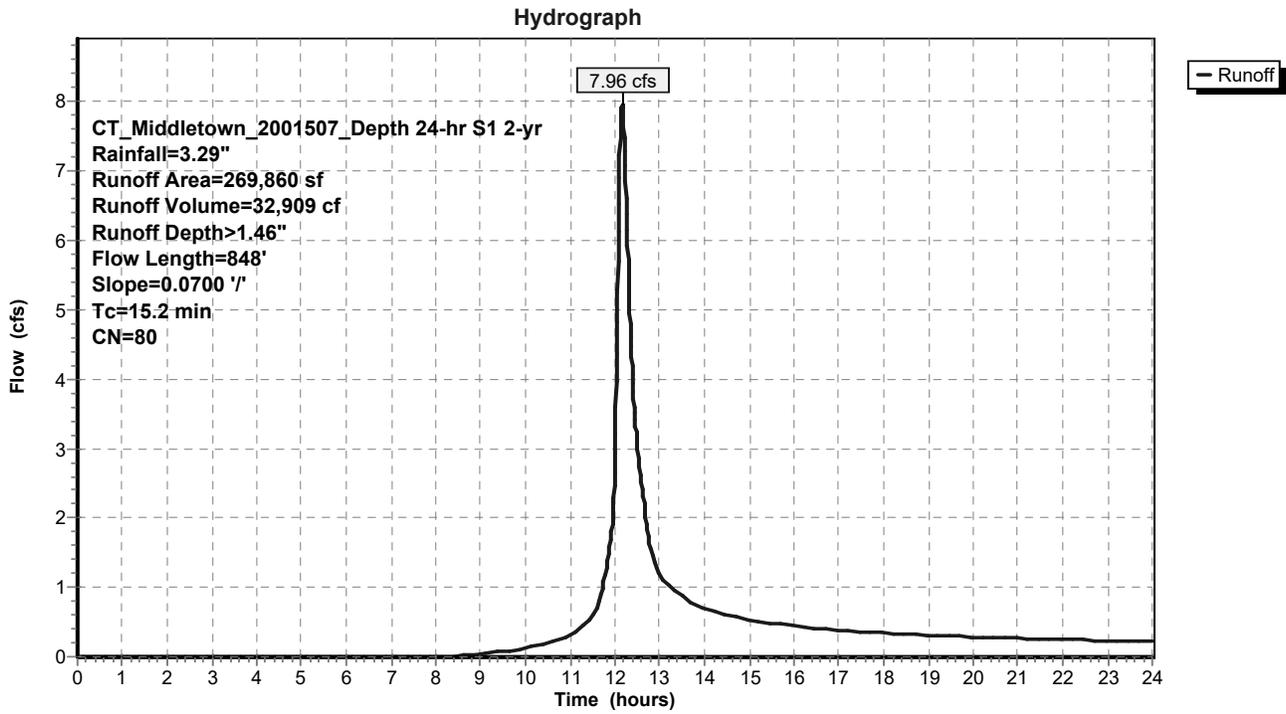
Runoff = 7.96 cfs @ 12.16 hrs, Volume= 32,909 cf, Depth> 1.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 2-yr Rainfall=3.29"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
232,381	79	50-75% Grass cover, Fair, HSG C
23,831	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
11,183	98	Paved parking, HSG C
2,124	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
341	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
269,860	80	Weighted Average
256,553		95.07% Pervious Area
13,307		4.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	100	0.0700	0.20		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
6.7	748	0.0700	1.85		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
15.2	848	Total			

Subcatchment PDA-330: Area Bypassing Sediment Forebay



Summary for Subcatchment PDA-340: Area Draining to Stormwater Pond

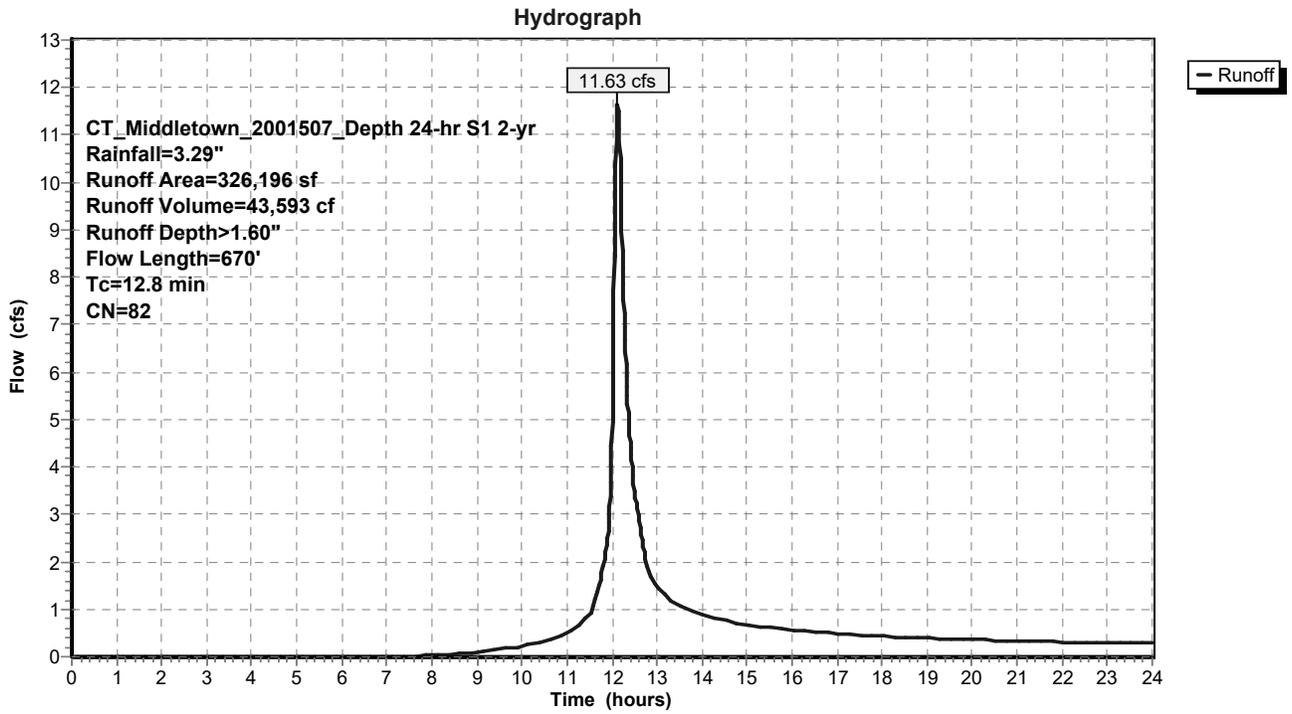
Runoff = 11.63 cfs @ 12.13 hrs, Volume= 43,593 cf, Depth> 1.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 2-yr Rainfall=3.29"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
269,284	79	50-75% Grass cover, Fair, HSG C
0	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
4,222	98	Paved parking, HSG C
0	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
10,850	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
5,025	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
36,815	98	Water Surface, 0% imp, HSG C
326,196	82	Weighted Average
321,974		98.71% Pervious Area
4,222		1.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	100	0.0700	0.20		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
4.3	570	0.1000	2.21		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
12.8	670	Total			

Subcatchment PDA-340: Area Draining to Stormwater Pond



Summary for Pond 1P: Existing Employee Lot Underground Detention System

Inflow Area = 266,730 sf, 73.87% Impervious, Inflow Depth > 2.63" for 2-yr event
 Inflow = 18.64 cfs @ 12.06 hrs, Volume= 58,367 cf
 Outflow = 2.23 cfs @ 12.66 hrs, Volume= 47,534 cf, Atten= 88%, Lag= 36.0 min
 Primary = 2.23 cfs @ 12.66 hrs, Volume= 47,534 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 127.10' @ 12.66 hrs Surf.Area= 11,725 sf Storage= 29,522 cf

Plug-Flow detention time= 233.6 min calculated for 47,534 cf (81% of inflow)
 Center-of-Mass det. time= 148.4 min (944.6 - 796.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	123.50'	2,345 cf	64.19'W x 182.67'L x 9.50'H Field A 111,387 cf Overall - 105,524 cf Embedded = 5,862 cf x 40.0% Voids
#2A	124.00'	83,580 cf	StormTrap ST2 DoubleTrap 8-0x 66 Inside #1 Inside= 101.7"W x 96.0"H => 61.09 sf x 15.40'L = 940.5 cf Outside= 101.7"W x 108.0"H => 76.31 sf x 15.40'L = 1,174.9 cf 66 Chambers in 6 Rows 50.88' x 169.35' Core + 6.66' Border = 64.19' x 182.67' System
		85,925 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	125.00'	24.0" Round Culvert L= 1,560.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 125.00' / 85.00' S= 0.0256 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#2	Device 1	125.00'	8.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	129.00'	12.0" Vert. Orifice/Grate C= 0.600
#4	Device 1	132.50'	3.0' long x 2.00' rise Sharp-Crested Rectangular Weir 2 End Contraction(s) 3.0' Crest Height

Primary OutFlow Max=2.23 cfs @ 12.66 hrs HW=127.10' (Free Discharge)

- 1=Culvert (Passes 2.23 cfs of 15.87 cfs potential flow)
- 2=Orifice/Grate (Orifice Controls 2.23 cfs @ 6.40 fps)
- 3=Orifice/Grate (Controls 0.00 cfs)
- 4=Sharp-Crested Rectangular Weir(Controls 0.00 cfs)

Pond 1P: Existing Employee Lot Underground Detention System - Chamber Wizard Field A

Chamber Model = StormTrapST2 DoubleTrap 8-0 (StormTrapST2 DoubleTrap®Type II+IV)

Inside= 101.7"W x 96.0"H => 61.09 sf x 15.40'L = 940.5 cf

Outside= 101.7"W x 108.0"H => 76.31 sf x 15.40'L = 1,174.9 cf

11 Chambers/Row x 15.40' Long = 169.35' Row Length +79.9" Border x 2 = 182.67' Base Length

6 Rows x 101.7" Wide + 79.9" Side Border x 2 = 64.19' Base Width

6.0" Base + 108.0" Chamber Height = 9.50' Field Height

66 Chambers x 940.5 cf + 21,503.9 cf Border = 83,579.7 cf Chamber Storage

66 Chambers x 1,174.9 cf + 27,981.2 cf Border = 105,524.2 cf Displacement

111,386.7 cf Field - 105,524.2 cf Chambers = 5,862.5 cf Stone x 40.0% Voids = 2,345.0 cf Stone Storage

Chamber Storage + Stone Storage = 85,924.7 cf = 1.973 af

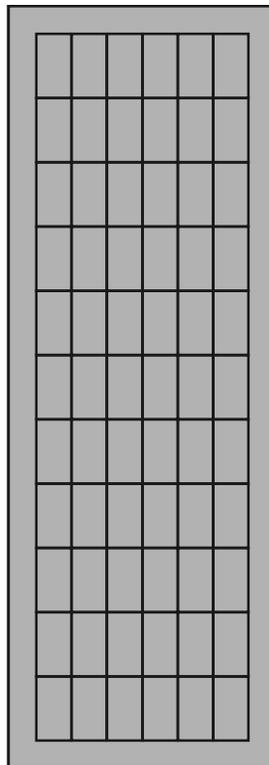
Overall Storage Efficiency = 77.1%

Overall System Size = 182.67' x 64.19' x 9.50'

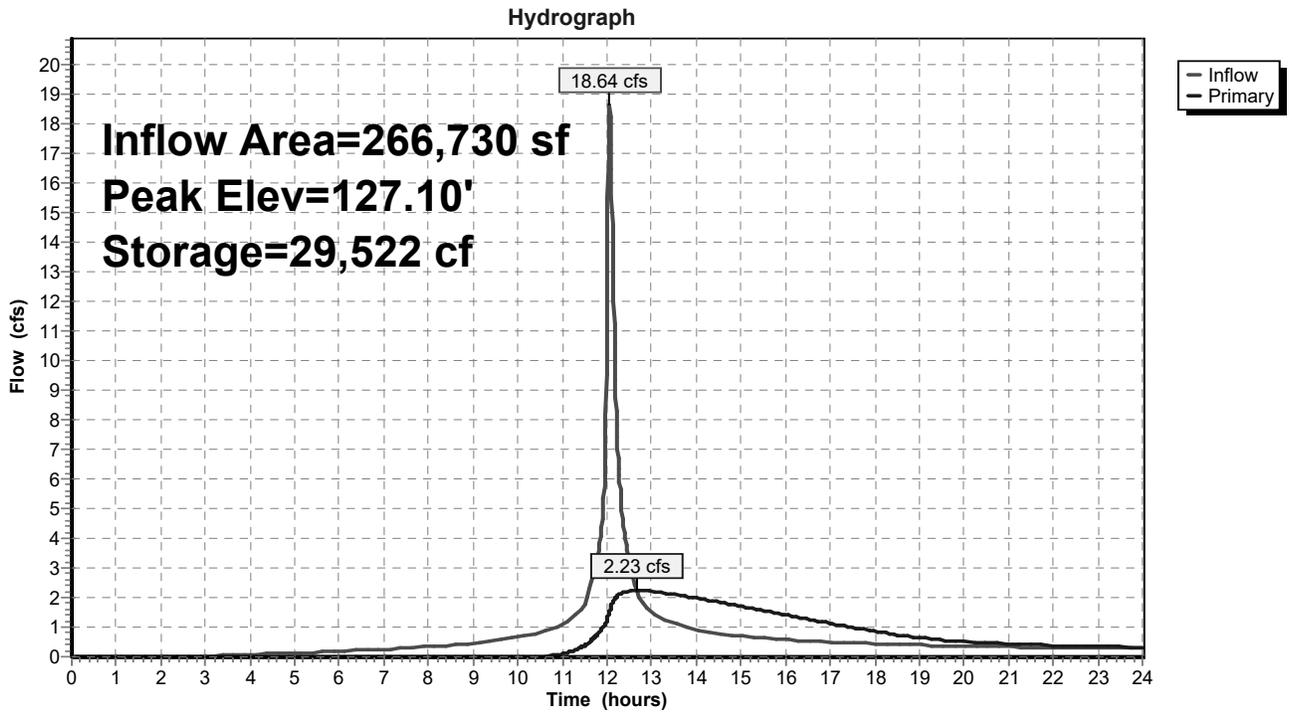
66 Chambers (plus border)

4,125.4 cy Field

217.1 cy Stone



Pond 1P: Existing Employee Lot Underground Detention System



Summary for Pond 2P: Existing Outbound Lot Underground Detention System

Inflow Area = 2,495,714 sf, 73.68% Impervious, Inflow Depth > 2.58" for 2-yr event
 Inflow = 144.41 cfs @ 12.04 hrs, Volume= 535,964 cf
 Outflow = 6.44 cfs @ 15.70 hrs, Volume= 251,075 cf, Atten= 96%, Lag= 219.5 min
 Primary = 6.44 cfs @ 15.70 hrs, Volume= 251,075 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 88.65' @ 15.70 hrs Surf.Area= 73,413 sf Storage= 344,820 cf

Plug-Flow detention time= 436.4 min calculated for 251,075 cf (47% of inflow)
 Center-of-Mass det. time= 274.9 min (1,075.7 - 800.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	82.50'	32,237 cf	183.90'W x 399.21'L x 13.33'H Field A 978,837 cf Overall - 898,245 cf Embedded = 80,592 cf x 40.0% Voids
#2A	83.50'	766,158 cf	StormTrap ST2 DoubleTrap 11-4x 500 Inside #1 Inside= 101.7"W x 136.0"H => 89.71 sf x 15.40'L = 1,381.1 cf Outside= 101.7"W x 148.0"H => 104.58 sf x 15.40'L = 1,610.0 cf 500 Chambers in 20 Rows 169.58' x 384.90' Core + 6.66' Border = 182.90' x 398.21' System
		798,395 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	86.00'	30.0" Round Culvert L= 120.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 86.00' / 85.50' S= 0.0042 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 4.91 sf
#2	Device 1	86.00'	13.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	91.00'	18.0" Vert. Orifice/Grate X 2 rows with 6.0" cc spacing C= 0.600
#4	Device 1	95.50'	3.0' long x 2.00' rise Sharp-Crested Rectangular Weir 2 End Contraction(s) 3.0' Crest Height

Primary OutFlow Max=6.44 cfs @ 15.70 hrs HW=88.65' (Free Discharge)

- 1=Culvert (Passes 6.44 cfs of 24.90 cfs potential flow)
- 2=Orifice/Grate (Orifice Controls 6.44 cfs @ 6.99 fps)
- 3=Orifice/Grate (Controls 0.00 cfs)
- 4=Sharp-Crested Rectangular Weir(Controls 0.00 cfs)

Pond 2P: Existing Outbound Lot Underground Detention System - Chamber Wizard Field A

Chamber Model = StormTrapST2 DoubleTrap 11-4 (StormTrapST2 DoubleTrap®Type I+III)

Inside= 101.7"W x 136.0"H => 89.71 sf x 15.40'L = 1,381.1 cf

Outside= 101.7"W x 148.0"H => 104.58 sf x 15.40'L = 1,610.0 cf

25 Chambers/Row x 15.40' Long = 384.90' Row Length +79.9" Border x 2 +6.0" End Stone x 2 = 399.21' Base Length

20 Rows x 101.7" Wide + 79.9" Side Border x 2 + 6.0" Side Stone x 2 = 183.90' Base Width

12.0" Base + 148.0" Chamber Height = 13.33' Field Height

500 Chambers x 1,381.1 cf + 75,595.3 cf Border = 766,157.9 cf Chamber Storage

500 Chambers x 1,610.0 cf + 93,224.3 cf Border = 898,244.6 cf Displacement

978,836.7 cf Field - 898,244.6 cf Chambers = 80,592.0 cf Stone x 40.0% Voids = 32,236.8 cf Stone Storage

Chamber Storage + Stone Storage = 798,394.7 cf = 18.329 af

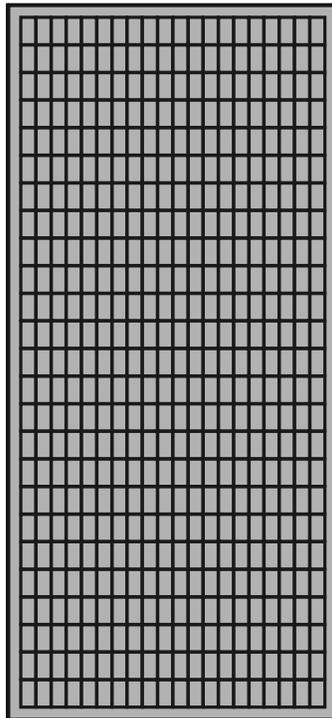
Overall Storage Efficiency = 81.6%

Overall System Size = 399.21' x 183.90' x 13.33'

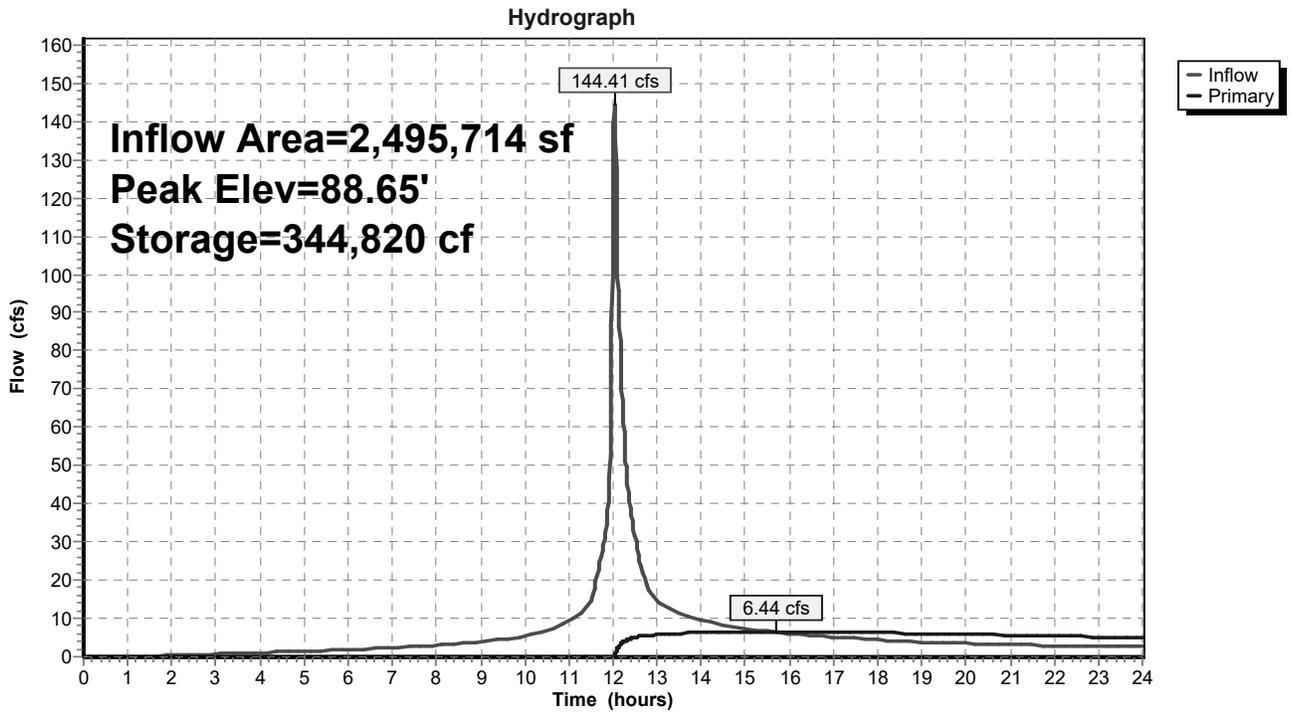
500 Chambers (plus border)

36,253.2 cy Field

2,984.9 cy Stone



Pond 2P: Existing Outbound Lot Underground Detention System



Summary for Pond 3P: Existing Sediment Forebay

Inflow Area = 1,946,053 sf, 72.53% Impervious, Inflow Depth > 2.58" for 2-yr event
 Inflow = 90.35 cfs @ 12.18 hrs, Volume= 418,933 cf
 Outflow = 89.45 cfs @ 12.21 hrs, Volume= 388,990 cf, Atten= 1%, Lag= 1.4 min
 Primary = 89.45 cfs @ 12.21 hrs, Volume= 388,990 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 4
 Peak Elev= 29.83' @ 12.21 hrs Surf.Area= 10,484 sf Storage= 37,961 cf

Plug-Flow detention time= 73.4 min calculated for 388,990 cf (93% of inflow)
 Center-of-Mass det. time= 33.1 min (831.3 - 798.3)

Volume	Invert	Avail.Storage	Storage Description
#1	24.00'	51,057 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

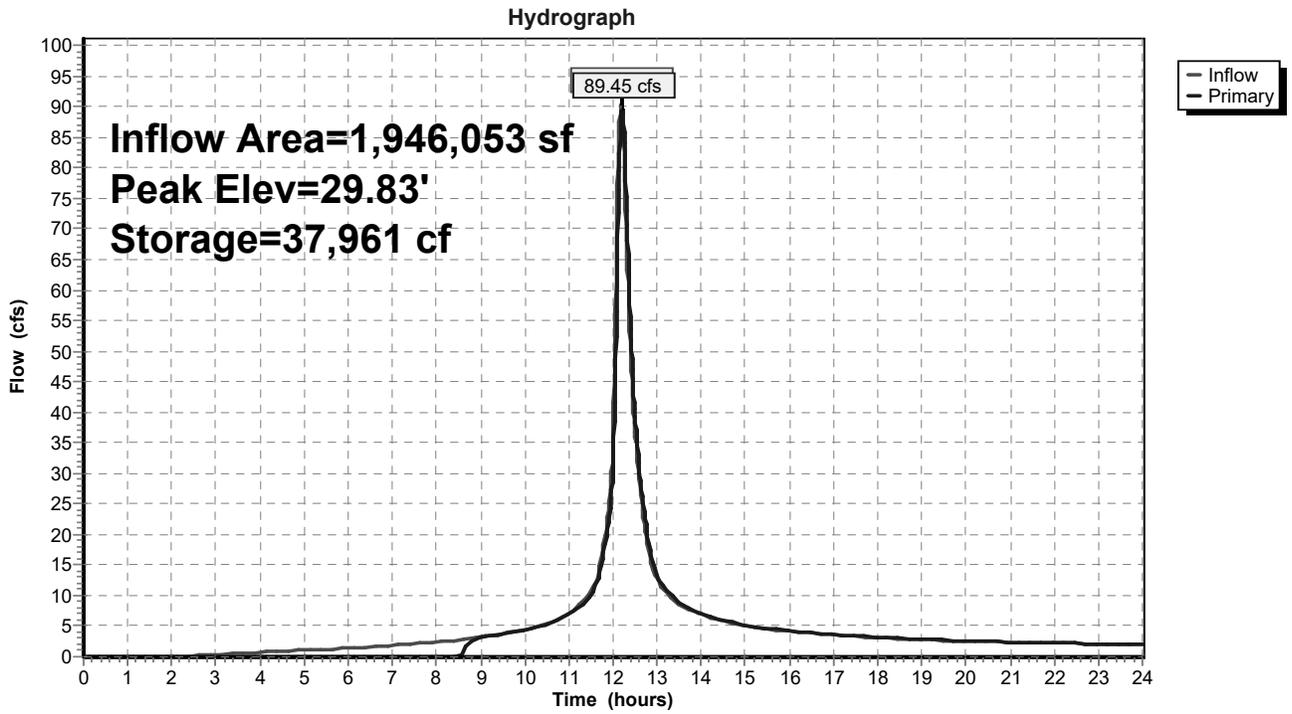
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
24.00	3,090	0	0
25.00	4,111	3,601	3,601
26.00	5,235	4,673	8,274
27.00	6,460	5,848	14,121
28.00	7,785	7,123	21,244
29.00	9,210	8,498	29,741
30.00	10,736	9,973	39,714
31.00	11,950	11,343	51,057

Device	Routing	Invert	Outlet Devices
#1	Primary	28.95'	40.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=89.36 cfs @ 12.21 hrs HW=29.83' (Free Discharge)

↑1=**Broad-Crested Rectangular Weir**(Weir Controls 89.36 cfs @ 2.53 fps)

Pond 3P: Existing Sediment Forebay



Summary for Pond 4P: Existing Stormwater Pond

Inflow Area = 2,542,109 sf, 56.21% Impervious, Inflow Depth > 2.20" for 2-yr event
 Inflow = 106.91 cfs @ 12.19 hrs, Volume= 465,493 cf
 Outflow = 71.84 cfs @ 12.36 hrs, Volume= 463,533 cf, Atten= 33%, Lag= 9.9 min
 Primary = 71.84 cfs @ 12.36 hrs, Volume= 463,533 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 27.91' @ 12.36 hrs Surf.Area= 54,926 sf Storage= 46,268 cf

Plug-Flow detention time= 9.0 min calculated for 463,533 cf (100% of inflow)
 Center-of-Mass det. time= 6.5 min (843.4 - 836.9)

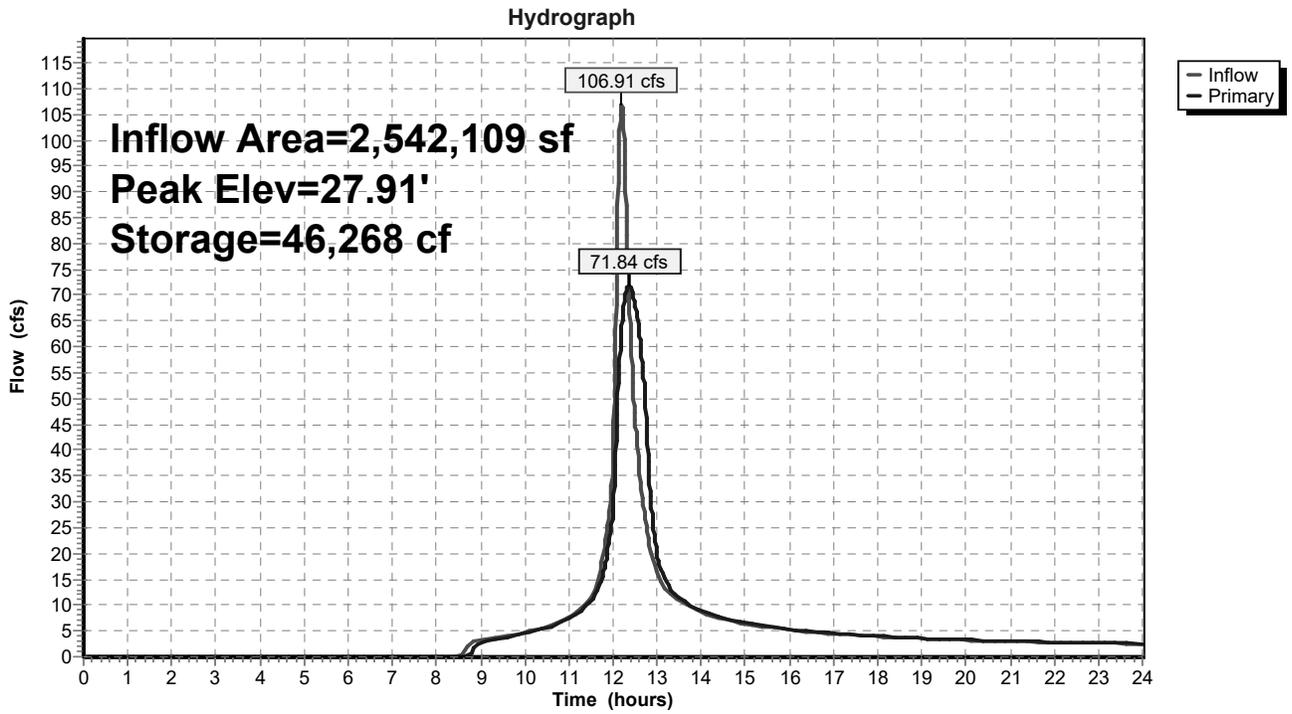
Volume	Invert	Avail.Storage	Storage Description
#1	24.00'	680,910 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
24.00	50	0	0
27.00	10,786	16,254	16,254
28.00	59,106	34,946	51,200
30.00	69,432	128,538	179,738
32.00	78,467	147,899	327,637
34.00	87,601	166,068	493,705
36.00	99,604	187,205	680,910

Device	Routing	Invert	Outlet Devices
#1	Primary	35.50'	70.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#2	Primary	24.50'	48.0" Vert. Orifice/Grate C= 0.600
#3	Primary	34.50'	2.0" Horiz. Orifice/Grate X 8.00 columns X 10 rows C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=71.85 cfs @ 12.36 hrs HW=27.91' (Free Discharge)

- 1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)
- 2=Orifice/Grate (Orifice Controls 71.85 cfs @ 6.29 fps)
- 3=Orifice/Grate (Controls 0.00 cfs)

Pond 4P: Existing Stormwater Pond

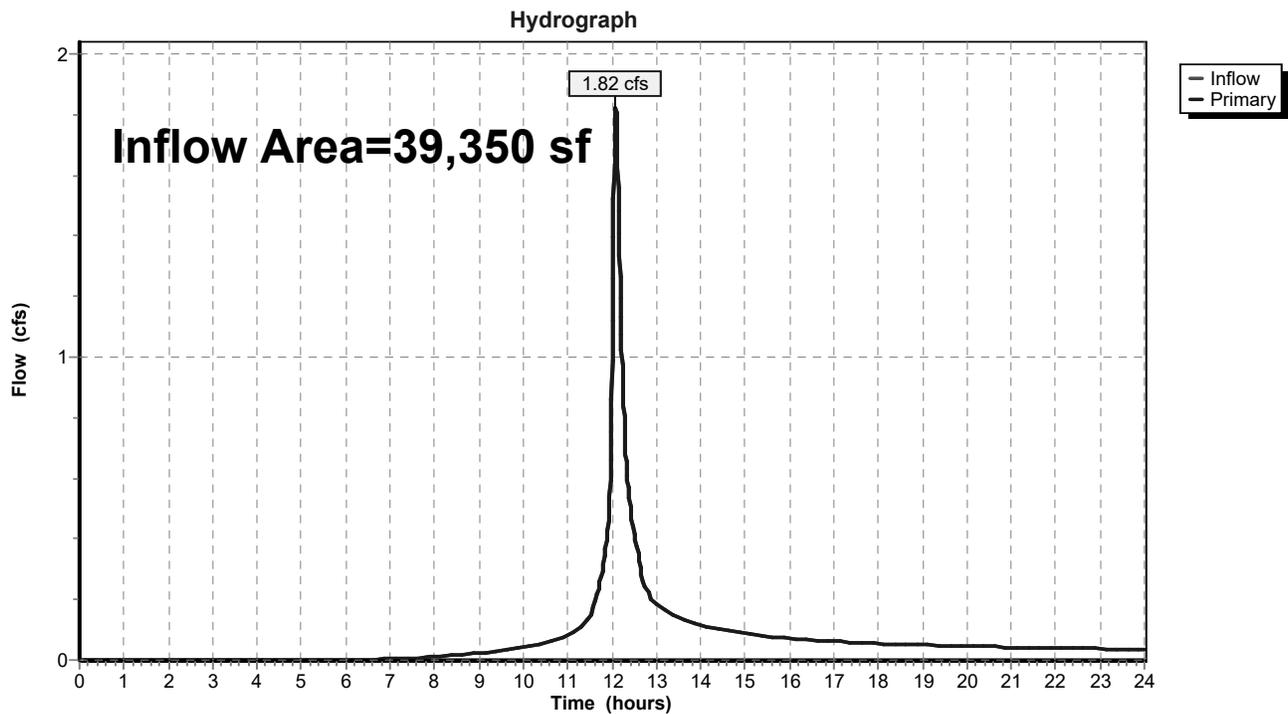


Summary for Link DP-1: Middle Street Gutter

Inflow Area = 39,350 sf, 9.83% Impervious, Inflow Depth > 1.83" for 2-yr event
Inflow = 1.82 cfs @ 12.09 hrs, Volume= 5,997 cf
Primary = 1.82 cfs @ 12.09 hrs, Volume= 5,997 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link DP-1: Middle Street Gutter

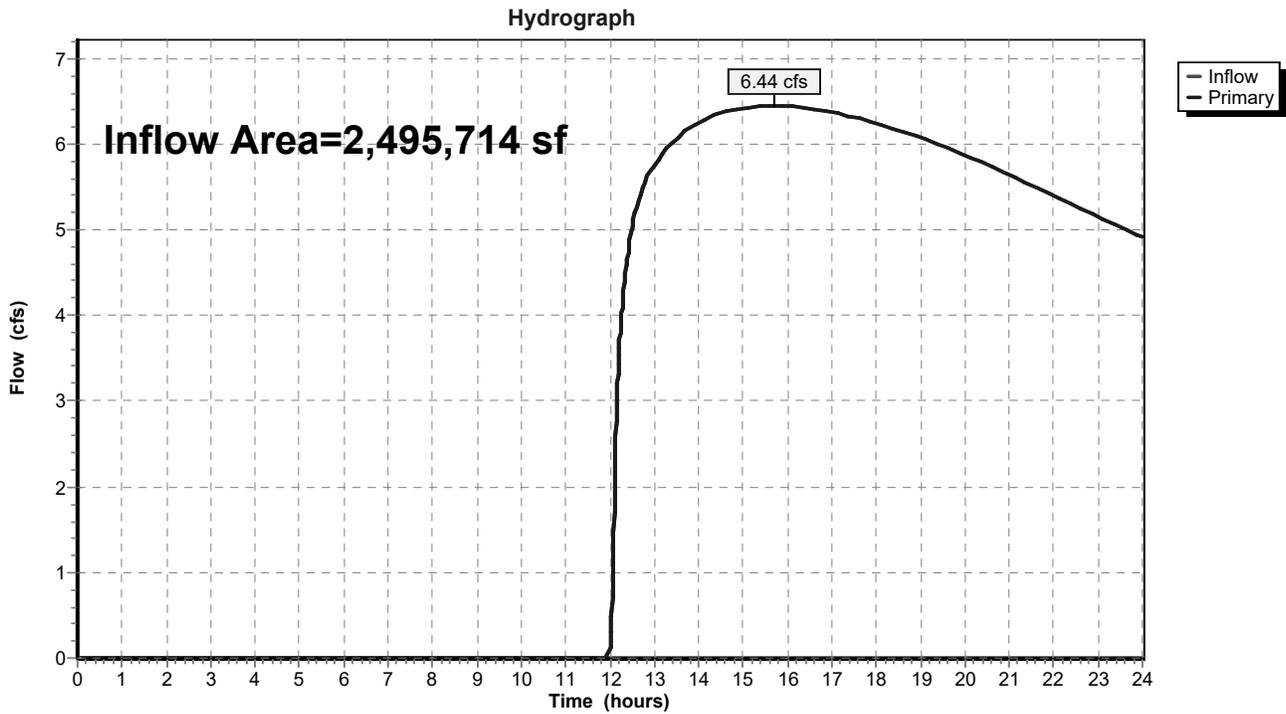


Summary for Link DP-2: Southern Wetland

Inflow Area = 2,495,714 sf, 73.68% Impervious, Inflow Depth > 1.21" for 2-yr event
Inflow = 6.44 cfs @ 15.70 hrs, Volume= 251,075 cf
Primary = 6.44 cfs @ 15.70 hrs, Volume= 251,075 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link DP-2: Southern Wetland

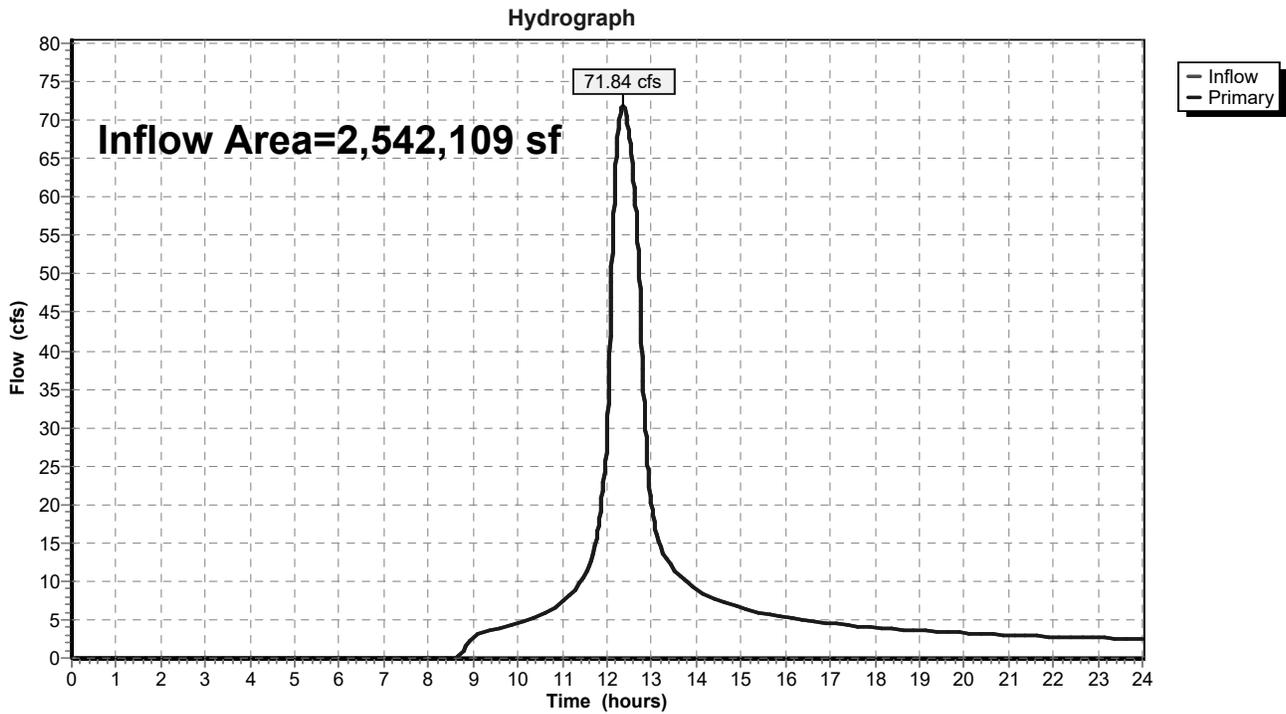


Summary for Link DP-3: Northern Wetland

Inflow Area = 2,542,109 sf, 56.21% Impervious, Inflow Depth > 2.19" for 2-yr event
Inflow = 71.84 cfs @ 12.36 hrs, Volume= 463,533 cf
Primary = 71.84 cfs @ 12.36 hrs, Volume= 463,533 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link DP-3: Northern Wetland



C-DAT-2001507-PROPOSED_HCT_Middletown_2001507_Depth 24-hr S1 10-yr Rainfall=5.18"

Prepared by {enter your company name here}

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Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentPDA-100: Area Draining to Runoff Area=39,350 sf 9.83% Impervious Runoff Depth>3.52"
Flow Length=962' Tc=9.9 min CN=85 Runoff=3.42 cfs 11,558 cf

SubcatchmentPDA-200: Area Draining Runoff Area=1,483,965 sf 90.90% Impervious Runoff Depth>4.82"
Flow Length=1,796' Tc=5.8 min CN=97 Runoff=197.56 cfs 596,099 cf

SubcatchmentPDA-210: Area Draining to Runoff Area=266,730 sf 73.87% Impervious Runoff Depth>4.48"
Flow Length=815' Tc=8.2 min CN=94 Runoff=30.20 cfs 99,509 cf

SubcatchmentPDA-211: Area Draining to Runoff Area=19,345 sf 83.46% Impervious Runoff Depth>4.71"
Tc=5.0 min CN=96 Runoff=2.67 cfs 7,587 cf

SubcatchmentPDA-220: Offsite Property Runoff Area=725,674 sf 38.14% Impervious Runoff Depth>3.72"
Flow Length=1,389' Tc=16.2 min CN=87 Runoff=51.50 cfs 224,964 cf

SubcatchmentPDA-300: Inbound Lot Runoff Area=1,479,100 sf 87.10% Impervious Runoff Depth>4.69"
Flow Length=1,360' Tc=17.7 min CN=96 Runoff=117.58 cfs 578,311 cf

SubcatchmentPDA-310: Vehicle Runoff Area=356,183 sf 32.74% Impervious Runoff Depth>3.62"
Flow Length=964' Tc=18.6 min CN=86 Runoff=23.01 cfs 107,326 cf

SubcatchmentPDA-320: Area Draining to Runoff Area=110,770 sf 5.92% Impervious Runoff Depth>3.13"
Flow Length=370' Tc=13.3 min CN=81 Runoff=7.46 cfs 28,909 cf

SubcatchmentPDA-330: Area Bypassing Runoff Area=269,860 sf 4.93% Impervious Runoff Depth>3.04"
Flow Length=848' Slope=0.0700 '/ Tc=15.2 min CN=80 Runoff=16.39 cfs 68,267 cf

SubcatchmentPDA-340: Area Draining to Runoff Area=326,196 sf 1.29% Impervious Runoff Depth>3.23"
Flow Length=670' Tc=12.8 min CN=82 Runoff=23.02 cfs 87,742 cf

Pond 1P: Existing Employee Lot Peak Elev=128.77' Storage=46,967 cf Inflow=30.20 cfs 99,509 cf
Outflow=3.12 cfs 87,383 cf

Pond 2P: Existing Outbound Lot Peak Elev=91.81' Storage=559,451 cf Inflow=230.34 cfs 916,033 cf
Outflow=13.71 cfs 464,605 cf

Pond 3P: Existing Sediment Forebay Peak Elev=30.18' Storage=41,622 cf Inflow=147.17 cfs 714,546 cf
Outflow=145.94 cfs 684,334 cf

Pond 4P: Existing Stormwater Pond Peak Elev=28.93' Storage=108,649 cf Inflow=181.22 cfs 840,343 cf
Outflow=94.39 cfs 837,712 cf

Link DP-1: Middle Street Gutter Inflow=3.42 cfs 11,558 cf
Primary=3.42 cfs 11,558 cf

Link DP-2: Southern Wetland Inflow=13.71 cfs 464,605 cf
Primary=13.71 cfs 464,605 cf

Link DP-3: Northern Wetland

Inflow=94.39 cfs 837,712 cf

Primary=94.39 cfs 837,712 cf

Total Runoff Area = 5,077,173 sf Runoff Volume = 1,810,272 cf Average Runoff Depth = 4.28"
35.56% Pervious = 1,805,478 sf 64.44% Impervious = 3,271,695 sf

Summary for Subcatchment PDA-100: Area Draining to Middle Street

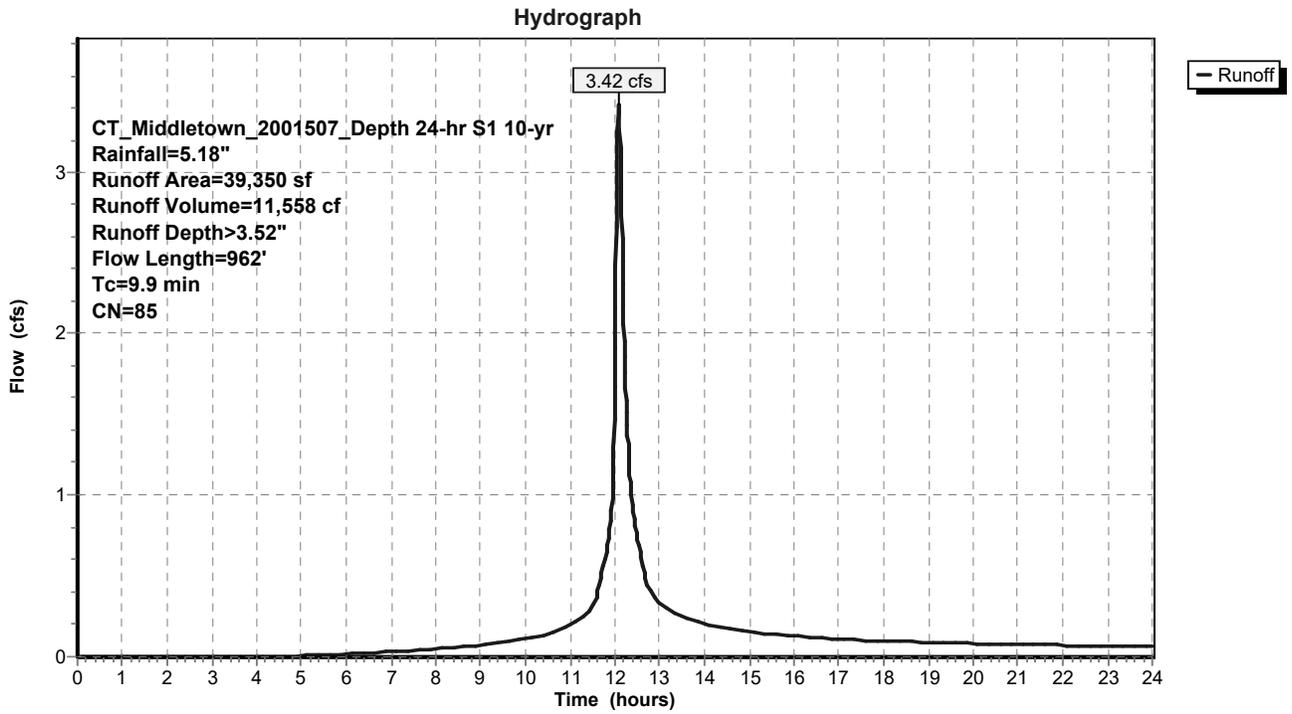
Runoff = 3.42 cfs @ 12.09 hrs, Volume= 11,558 cf, Depth> 3.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 10-yr Rainfall=5.18"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
0	79	50-75% Grass cover, Fair, HSG C
35,480	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
0	98	Paved parking, HSG C
3,870	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
0	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
39,350	85	Weighted Average
35,480		90.17% Pervious Area
3,870		9.83% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	28	0.1406	0.20		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
1.1	72	0.0120	1.06		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.29"
6.5	862	0.0120	2.22		Shallow Concentrated Flow, Paved Kv= 20.3 fps
9.9	962	Total			

Subcatchment PDA-100: Area Draining to Middle Street



Summary for Subcatchment PDA-200: Area Draining to Existing Outbound Lot Detention System

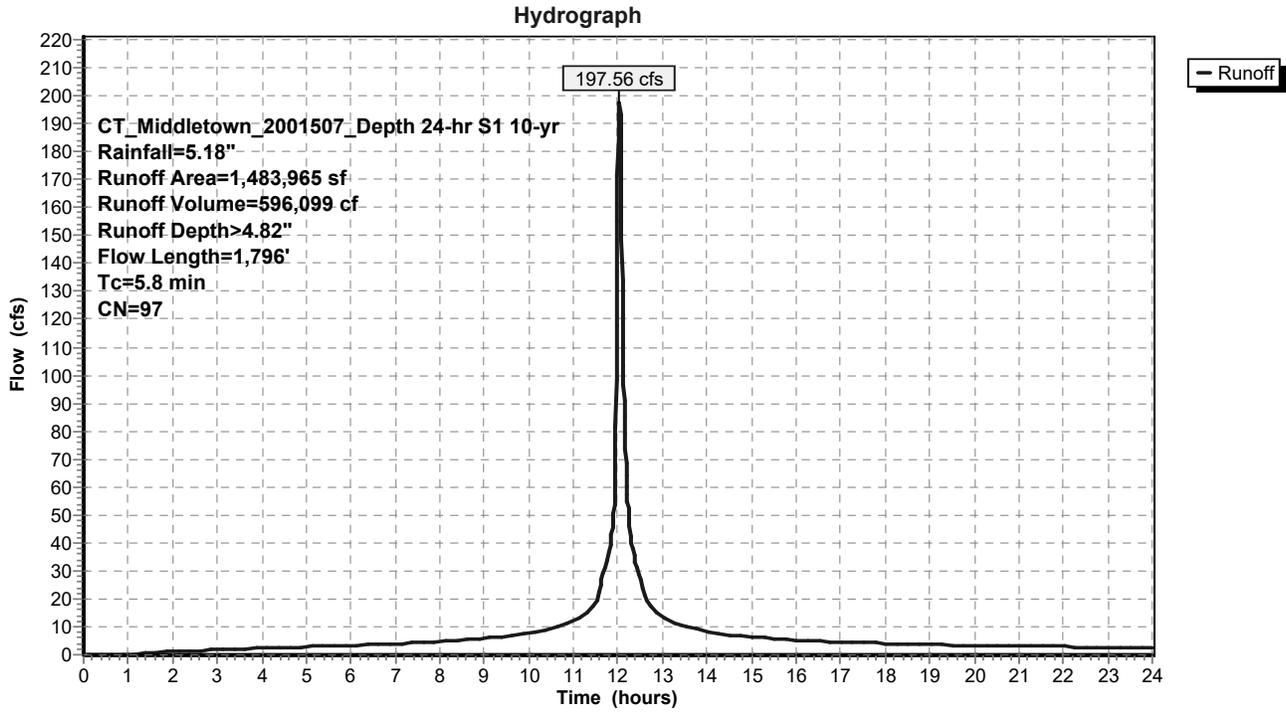
Runoff = 197.56 cfs @ 12.03 hrs, Volume= 596,099 cf, Depth> 4.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 10-yr Rainfall=5.18"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
60,335	79	50-75% Grass cover, Fair, HSG C
74,723	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
507,075	98	Paved parking, HSG C
841,832	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
0	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
1,483,965	97	Weighted Average
135,058		9.10% Pervious Area
1,348,907		90.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	100	0.0140	1.21		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.29"
1.2	176	0.0140	2.40		Shallow Concentrated Flow, Paved Kv= 20.3 fps
3.2	1,520	0.0100	7.80	24.51	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
5.8	1,796	Total			

Subcatchment PDA-200: Area Draining to Existing Outbound Lot Detention System



Summary for Subcatchment PDA-210: Area Draining to Existing Employee Lot Underground Detention

Runoff = 30.20 cfs @ 12.06 hrs, Volume= 99,509 cf, Depth> 4.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 10-yr Rainfall=5.18"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
0	79	50-75% Grass cover, Fair, HSG C
69,690	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
0	98	Paved parking, HSG C
197,040	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
0	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
266,730	94	Weighted Average
69,690		26.13% Pervious Area
197,040		73.87% Impervious Area

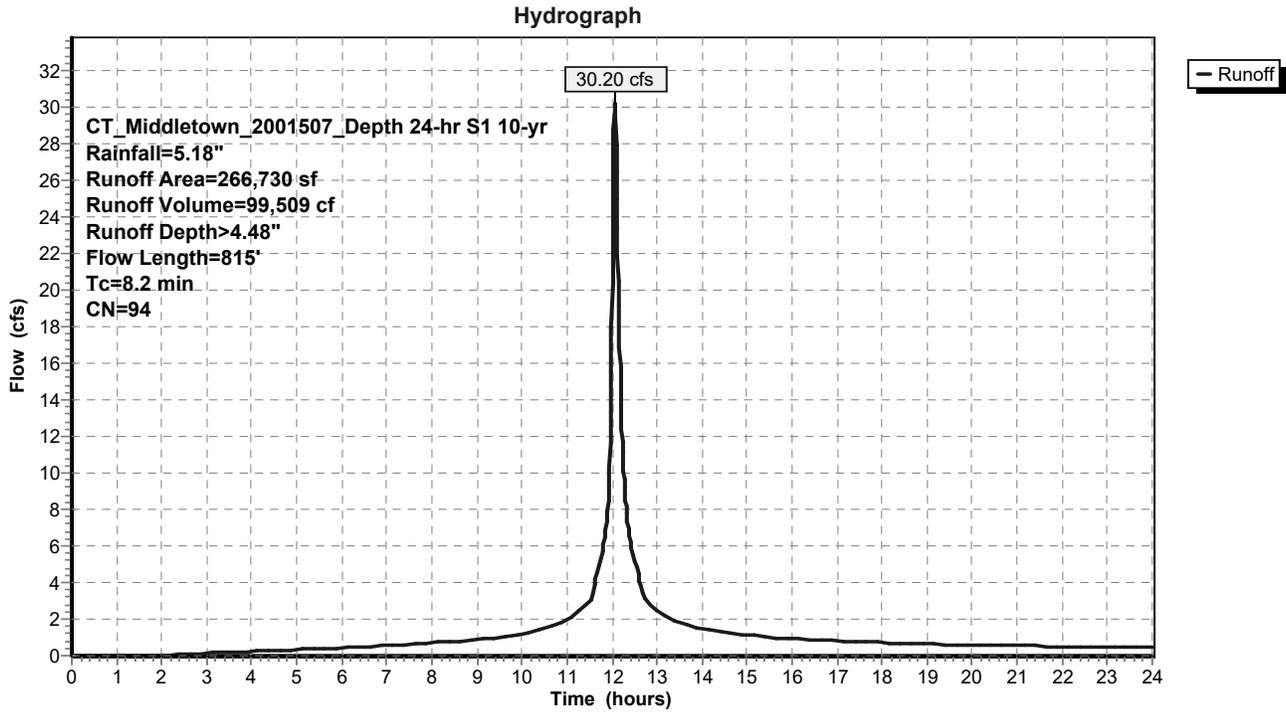
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.1	19	0.0160	0.08		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
1.1	81	0.0160	1.22		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.29"
1.1	164	0.0160	2.57		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.5	130	0.0050	4.03	4.95	Pipe Channel, 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012 Concrete pipe, finished
0.6	152	0.0050	4.55	8.05	Pipe Channel, 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.012 Concrete pipe, finished
0.3	108	0.0050	5.52	17.33	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
0.3	101	0.0050	5.52	17.33	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
0.1	38	0.0050	5.52	17.33	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
0.1	22	0.0050	7.23	51.09	Pipe Channel,

36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75'

n= 0.012 Concrete pipe, finished

8.2 815 Total

Subcatchment PDA-210: Area Draining to Existing Employee Lot Underground Detention



Summary for Subcatchment PDA-211: Area Draining to HDS-10

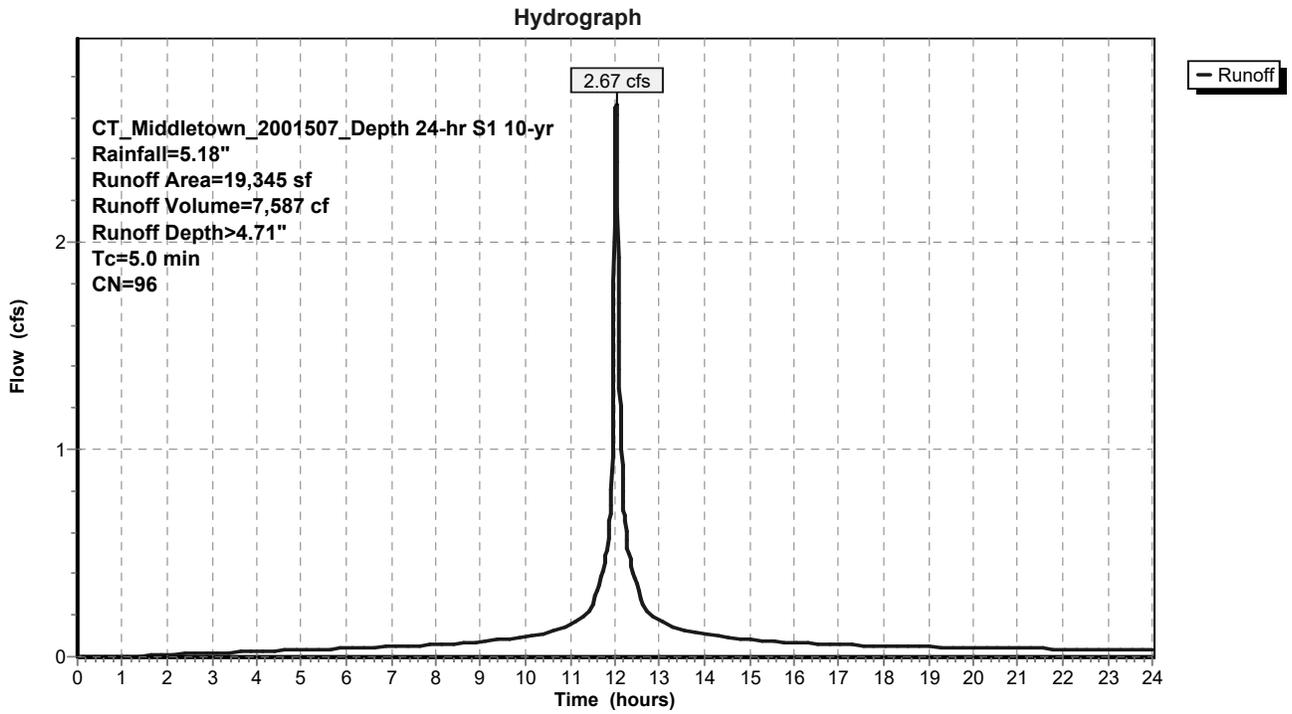
Runoff = 2.67 cfs @ 12.03 hrs, Volume= 7,587 cf, Depth> 4.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 10-yr Rainfall=5.18"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
0	79	50-75% Grass cover, Fair, HSG C
3,200	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
0	98	Paved parking, HSG C
16,145	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
0	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
19,345	96	Weighted Average
3,200		16.54% Pervious Area
16,145		83.46% Impervious Area

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

Subcatchment PDA-211: Area Draining to HDS-10



Summary for Subcatchment PDA-220: Offsite Property to Existing Outbound Lot Detention System

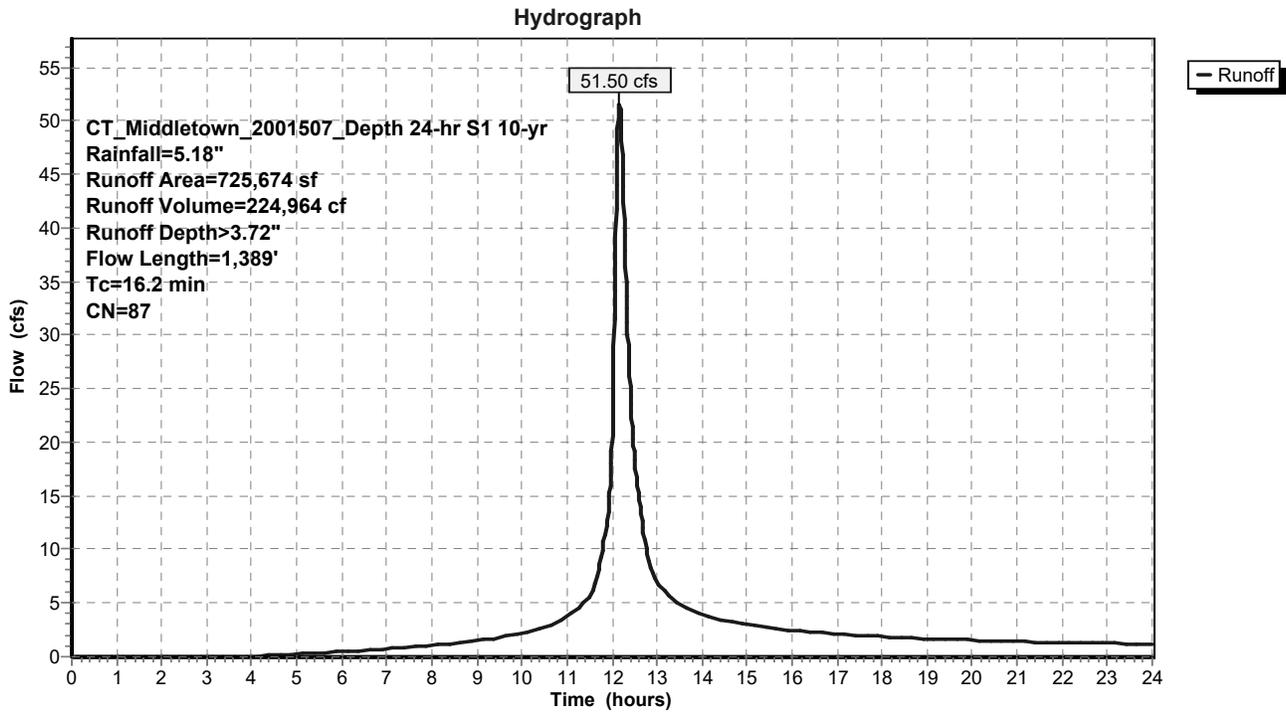
Runoff = 51.50 cfs @ 12.17 hrs, Volume= 224,964 cf, Depth> 3.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 10-yr Rainfall=5.18"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
218,535	79	50-75% Grass cover, Fair, HSG C
204,870	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
128,360	98	Paved parking, HSG C
148,395	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
0	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
25,514	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
725,674	87	Weighted Average
448,919		61.86% Pervious Area
276,755		38.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.1	100	0.0240	0.13		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
1.1	214	0.0374	3.11		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
2.0	1,075	0.0200	9.11	16.09	Pipe Channel, 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.012
16.2	1,389	Total			

Subcatchment PDA-220: Offsite Property to Existing Outbound Lot Detention System



Summary for Subcatchment PDA-300: Inbound Lot Area to Sediment Forebay

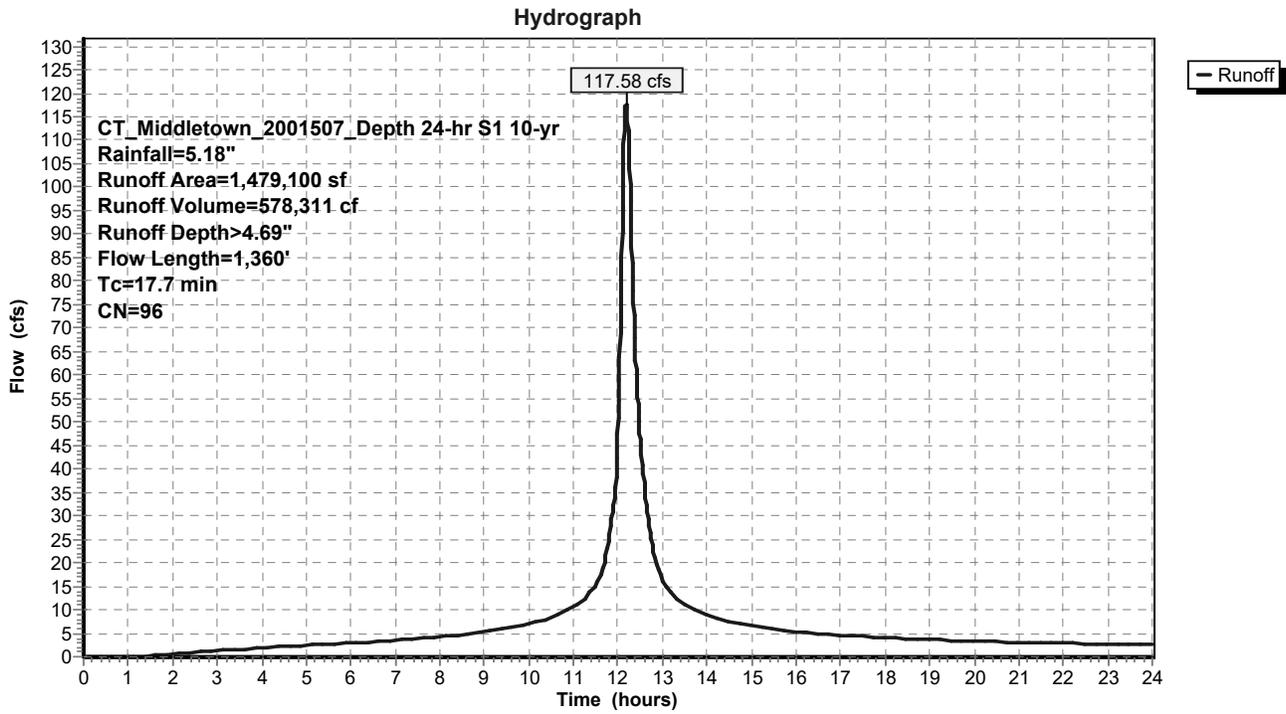
Runoff = 117.58 cfs @ 12.18 hrs, Volume= 578,311 cf, Depth> 4.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 10-yr Rainfall=5.18"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
119,543	79	50-75% Grass cover, Fair, HSG C
71,266	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
471,502	98	Paved parking, HSG C
816,789	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
0	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
1,479,100	96	Weighted Average
190,809		12.90% Pervious Area
1,288,291		87.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.2	80	0.0125	0.09		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
0.8	120	0.0150	2.49		Shallow Concentrated Flow, Paved Kv= 20.3 fps
2.7	1,160	0.0050	7.23	51.09	Pipe Channel, 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.012
17.7	1,360	Total			

Subcatchment PDA-300: Inbound Lot Area to Sediment Forebay



Summary for Subcatchment PDA-310: Vehicle Maintenance Area to Sediment Forebay

Runoff = 23.01 cfs @ 12.21 hrs, Volume= 107,326 cf, Depth> 3.62"

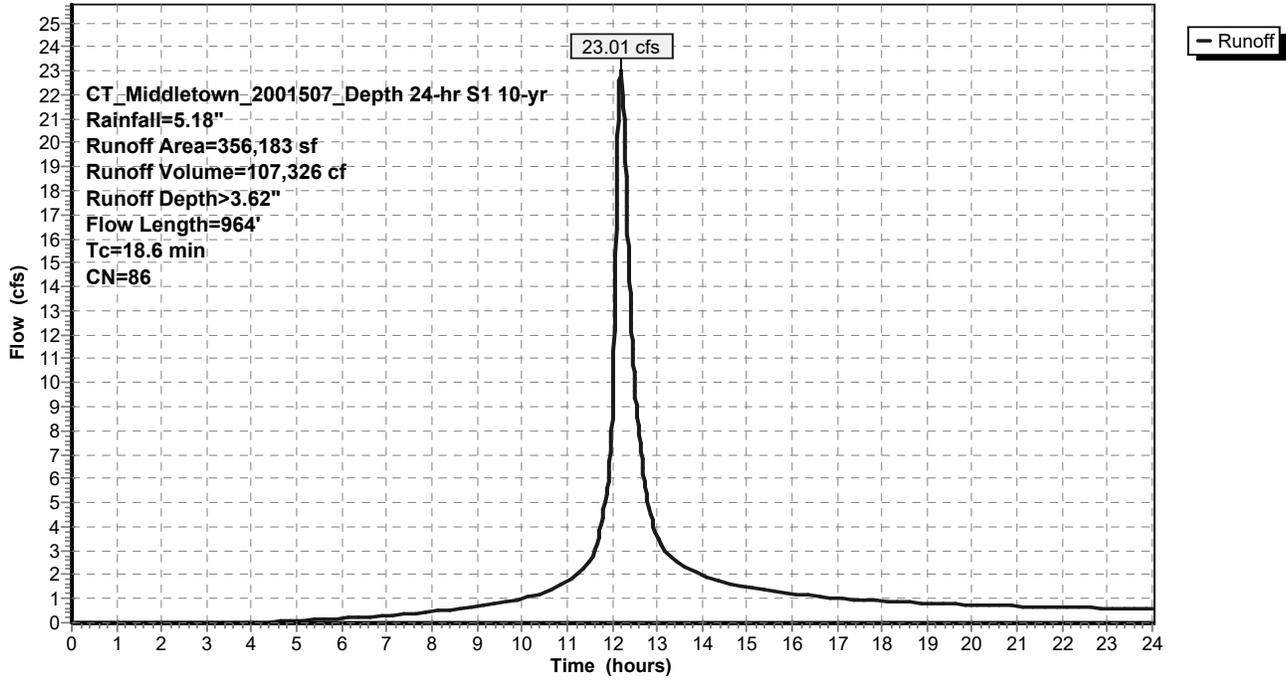
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 10-yr Rainfall=5.18"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
153,724	79	50-75% Grass cover, Fair, HSG C
85,858	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
69,565	98	Paved parking, HSG C
47,036	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
0	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
356,183	86	Weighted Average
239,582		67.26% Pervious Area
116,601		32.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	60	0.0400	0.14		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
5.7	40	0.0300	0.12		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
5.3	541	0.0600	1.71		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.2	54	0.0050	4.03	4.95	Pipe Channel, 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012
0.1	122	0.0500	17.44	54.80	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
0.1	108	0.0400	15.60	49.02	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
0.1	39	0.0085	7.19	22.59	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
18.6	964	Total			

Subcatchment PDA-310: Vehicle Maintenance Area to Sediment Forebay

Hydrograph



Summary for Subcatchment PDA-320: Area Draining to Sediment Forebay

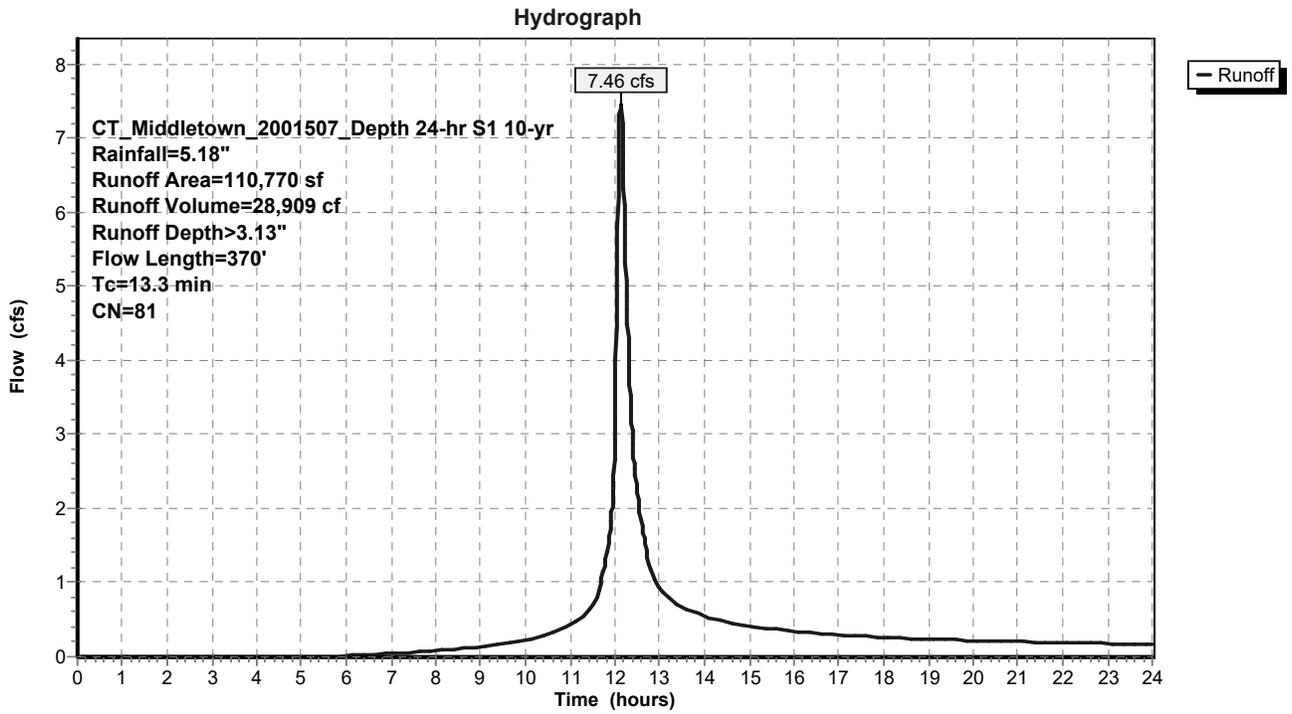
Runoff = 7.46 cfs @ 12.13 hrs, Volume= 28,909 cf, Depth> 3.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 10-yr Rainfall=5.18"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
98,913	79	50-75% Grass cover, Fair, HSG C
0	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
6,557	98	Paved parking, HSG C
0	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
5,300	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
110,770	81	Weighted Average
104,213		94.08% Pervious Area
6,557		5.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	100	0.0350	0.15		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
1.3	105	0.0350	1.31		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.7	165	0.3333	4.04		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
13.3	370	Total			

Subcatchment PDA-320: Area Draining to Sediment Forebay



Summary for Subcatchment PDA-330: Area Bypassing Sediment Forebay

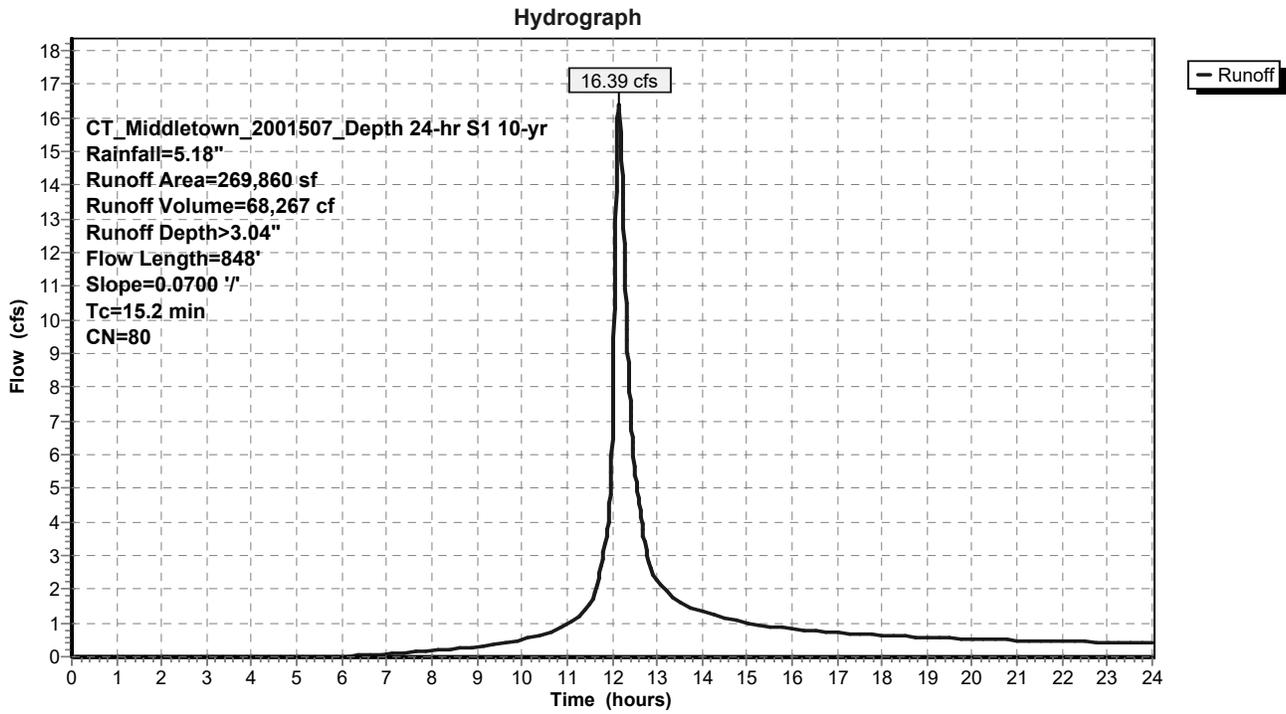
Runoff = 16.39 cfs @ 12.16 hrs, Volume= 68,267 cf, Depth> 3.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 10-yr Rainfall=5.18"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
232,381	79	50-75% Grass cover, Fair, HSG C
23,831	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
11,183	98	Paved parking, HSG C
2,124	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
341	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
269,860	80	Weighted Average
256,553		95.07% Pervious Area
13,307		4.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	100	0.0700	0.20		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
6.7	748	0.0700	1.85		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
15.2	848	Total			

Subcatchment PDA-330: Area Bypassing Sediment Forebay



Summary for Subcatchment PDA-340: Area Draining to Stormwater Pond

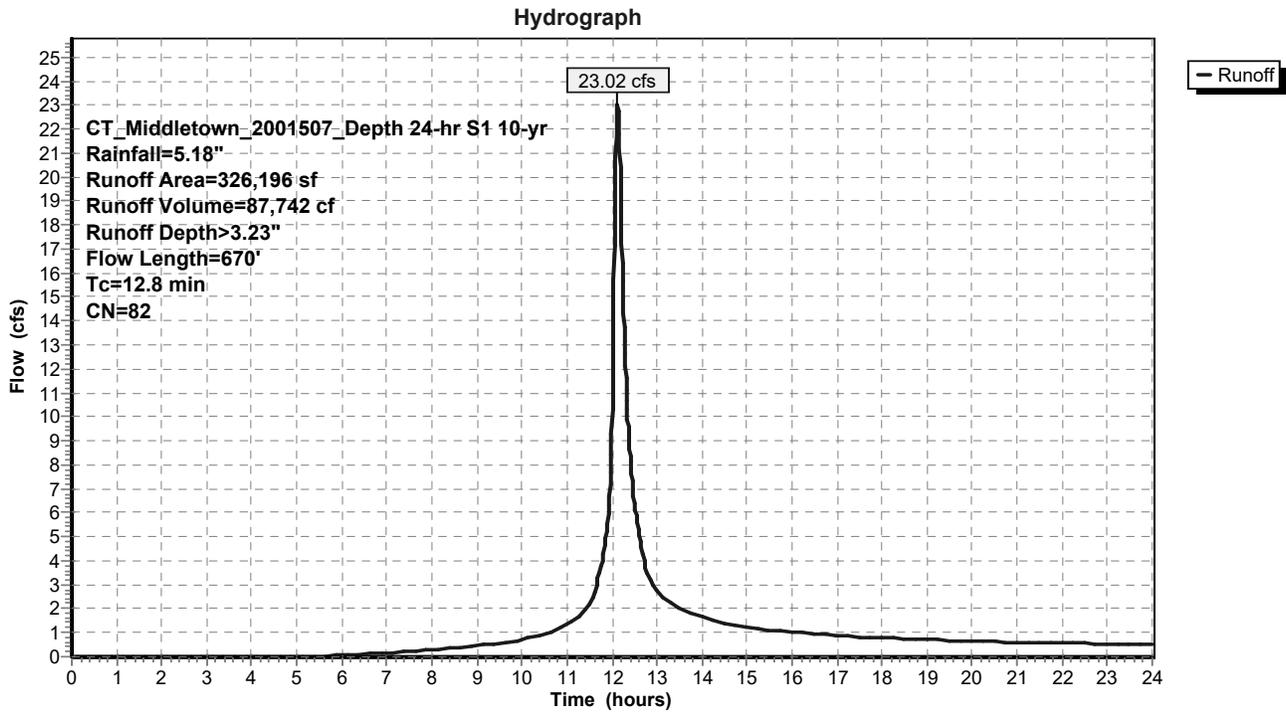
Runoff = 23.02 cfs @ 12.12 hrs, Volume= 87,742 cf, Depth> 3.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 10-yr Rainfall=5.18"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
269,284	79	50-75% Grass cover, Fair, HSG C
0	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
4,222	98	Paved parking, HSG C
0	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
10,850	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
5,025	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
36,815	98	Water Surface, 0% imp, HSG C
326,196	82	Weighted Average
321,974		98.71% Pervious Area
4,222		1.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	100	0.0700	0.20		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
4.3	570	0.1000	2.21		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
12.8	670	Total			

Subcatchment PDA-340: Area Draining to Stormwater Pond



Summary for Pond 1P: Existing Employee Lot Underground Detention System

Inflow Area = 266,730 sf, 73.87% Impervious, Inflow Depth > 4.48" for 10-yr event
 Inflow = 30.20 cfs @ 12.06 hrs, Volume= 99,509 cf
 Outflow = 3.12 cfs @ 12.74 hrs, Volume= 87,383 cf, Atten= 90%, Lag= 41.0 min
 Primary = 3.12 cfs @ 12.74 hrs, Volume= 87,383 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 128.77' @ 12.74 hrs Surf.Area= 11,725 sf Storage= 46,967 cf

Plug-Flow detention time= 231.6 min calculated for 87,383 cf (88% of inflow)
 Center-of-Mass det. time= 167.3 min (947.1 - 779.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	123.50'	2,345 cf	64.19'W x 182.67'L x 9.50'H Field A 111,387 cf Overall - 105,524 cf Embedded = 5,862 cf x 40.0% Voids
#2A	124.00'	83,580 cf	StormTrap ST2 DoubleTrap 8-0x 66 Inside #1 Inside= 101.7"W x 96.0"H => 61.09 sf x 15.40'L = 940.5 cf Outside= 101.7"W x 108.0"H => 76.31 sf x 15.40'L = 1,174.9 cf 66 Chambers in 6 Rows 50.88' x 169.35' Core + 6.66' Border = 64.19' x 182.67' System
		85,925 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	125.00'	24.0" Round Culvert L= 1,560.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 125.00' / 85.00' S= 0.0256 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#2	Device 1	125.00'	8.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	129.00'	12.0" Vert. Orifice/Grate C= 0.600
#4	Device 1	132.50'	3.0' long x 2.00' rise Sharp-Crested Rectangular Weir 2 End Contraction(s) 3.0' Crest Height

Primary OutFlow Max=3.12 cfs @ 12.74 hrs HW=128.77' (Free Discharge)

- 1=Culvert (Passes 3.12 cfs of 25.18 cfs potential flow)
- 2=Orifice/Grate (Orifice Controls 3.12 cfs @ 8.93 fps)
- 3=Orifice/Grate (Controls 0.00 cfs)
- 4=Sharp-Crested Rectangular Weir(Controls 0.00 cfs)

Pond 1P: Existing Employee Lot Underground Detention System - Chamber Wizard Field A

Chamber Model = StormTrapST2 DoubleTrap 8-0 (StormTrapST2 DoubleTrap®Type II+IV)

Inside= 101.7"W x 96.0"H => 61.09 sf x 15.40'L = 940.5 cf

Outside= 101.7"W x 108.0"H => 76.31 sf x 15.40'L = 1,174.9 cf

11 Chambers/Row x 15.40' Long = 169.35' Row Length +79.9" Border x 2 = 182.67' Base Length

6 Rows x 101.7" Wide + 79.9" Side Border x 2 = 64.19' Base Width

6.0" Base + 108.0" Chamber Height = 9.50' Field Height

66 Chambers x 940.5 cf + 21,503.9 cf Border = 83,579.7 cf Chamber Storage

66 Chambers x 1,174.9 cf + 27,981.2 cf Border = 105,524.2 cf Displacement

111,386.7 cf Field - 105,524.2 cf Chambers = 5,862.5 cf Stone x 40.0% Voids = 2,345.0 cf Stone Storage

Chamber Storage + Stone Storage = 85,924.7 cf = 1.973 af

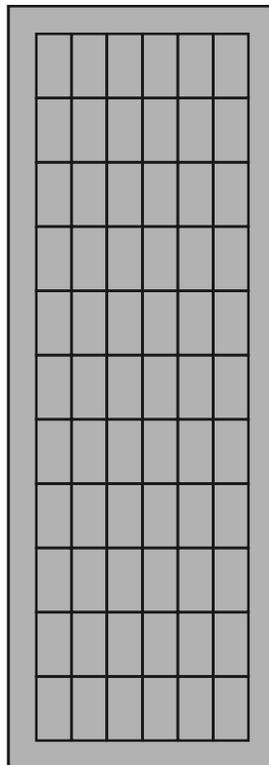
Overall Storage Efficiency = 77.1%

Overall System Size = 182.67' x 64.19' x 9.50'

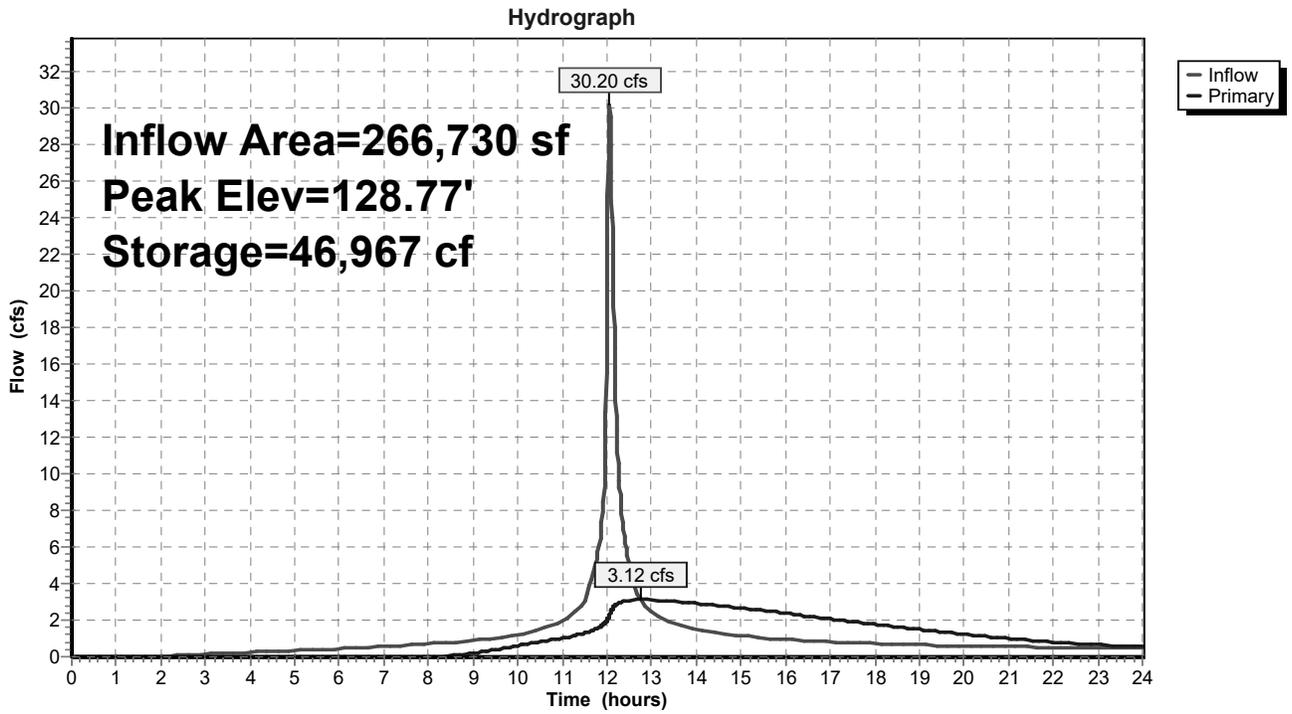
66 Chambers (plus border)

4,125.4 cy Field

217.1 cy Stone



Pond 1P: Existing Employee Lot Underground Detention System



Summary for Pond 2P: Existing Outbound Lot Underground Detention System

Inflow Area = 2,495,714 sf, 73.68% Impervious, Inflow Depth > 4.40" for 10-yr event
 Inflow = 230.34 cfs @ 12.04 hrs, Volume= 916,033 cf
 Outflow = 13.71 cfs @ 14.42 hrs, Volume= 464,605 cf, Atten= 94%, Lag= 143.0 min
 Primary = 13.71 cfs @ 14.42 hrs, Volume= 464,605 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 91.81' @ 14.42 hrs Surf.Area= 73,413 sf Storage= 559,451 cf

Plug-Flow detention time= 424.6 min calculated for 464,605 cf (51% of inflow)
 Center-of-Mass det. time= 262.0 min (1,052.5 - 790.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	82.50'	32,237 cf	183.90'W x 399.21'L x 13.33'H Field A 978,837 cf Overall - 898,245 cf Embedded = 80,592 cf x 40.0% Voids
#2A	83.50'	766,158 cf	StormTrap ST2 DoubleTrap 11-4x 500 Inside #1 Inside= 101.7"W x 136.0"H => 89.71 sf x 15.40'L = 1,381.1 cf Outside= 101.7"W x 148.0"H => 104.58 sf x 15.40'L = 1,610.0 cf 500 Chambers in 20 Rows 169.58' x 384.90' Core + 6.66' Border = 182.90' x 398.21' System
		798,395 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	86.00'	30.0" Round Culvert L= 120.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 86.00' / 85.50' S= 0.0042 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 4.91 sf
#2	Device 1	86.00'	13.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	91.00'	18.0" Vert. Orifice/Grate X 2 rows with 6.0" cc spacing C= 0.600
#4	Device 1	95.50'	3.0' long x 2.00' rise Sharp-Crested Rectangular Weir 2 End Contraction(s) 3.0' Crest Height

Primary OutFlow Max=13.70 cfs @ 14.42 hrs HW=91.81' (Free Discharge)

- 1=Culvert (Passes 13.70 cfs of 50.49 cfs potential flow)
- 2=Orifice/Grate (Orifice Controls 10.19 cfs @ 11.05 fps)
- 3=Orifice/Grate (Orifice Controls 3.51 cfs @ 2.82 fps)
- 4=Sharp-Crested Rectangular Weir(Controls 0.00 cfs)

Pond 2P: Existing Outbound Lot Underground Detention System - Chamber Wizard Field A

Chamber Model = StormTrapST2 DoubleTrap 11-4 (StormTrapST2 DoubleTrap®Type I+III)

Inside= 101.7"W x 136.0"H => 89.71 sf x 15.40'L = 1,381.1 cf

Outside= 101.7"W x 148.0"H => 104.58 sf x 15.40'L = 1,610.0 cf

25 Chambers/Row x 15.40' Long = 384.90' Row Length +79.9" Border x 2 +6.0" End Stone x 2 = 399.21' Base Length

20 Rows x 101.7" Wide + 79.9" Side Border x 2 + 6.0" Side Stone x 2 = 183.90' Base Width

12.0" Base + 148.0" Chamber Height = 13.33' Field Height

500 Chambers x 1,381.1 cf + 75,595.3 cf Border = 766,157.9 cf Chamber Storage

500 Chambers x 1,610.0 cf + 93,224.3 cf Border = 898,244.6 cf Displacement

978,836.7 cf Field - 898,244.6 cf Chambers = 80,592.0 cf Stone x 40.0% Voids = 32,236.8 cf Stone Storage

Chamber Storage + Stone Storage = 798,394.7 cf = 18.329 af

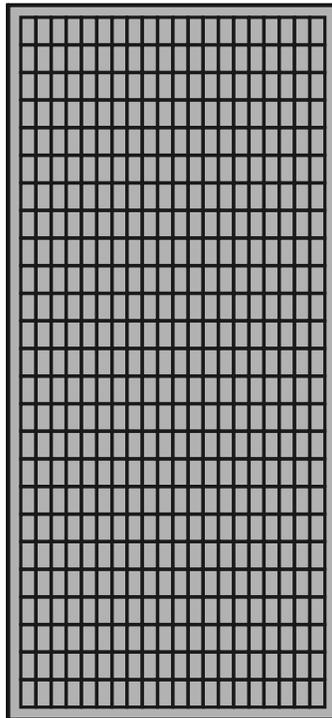
Overall Storage Efficiency = 81.6%

Overall System Size = 399.21' x 183.90' x 13.33'

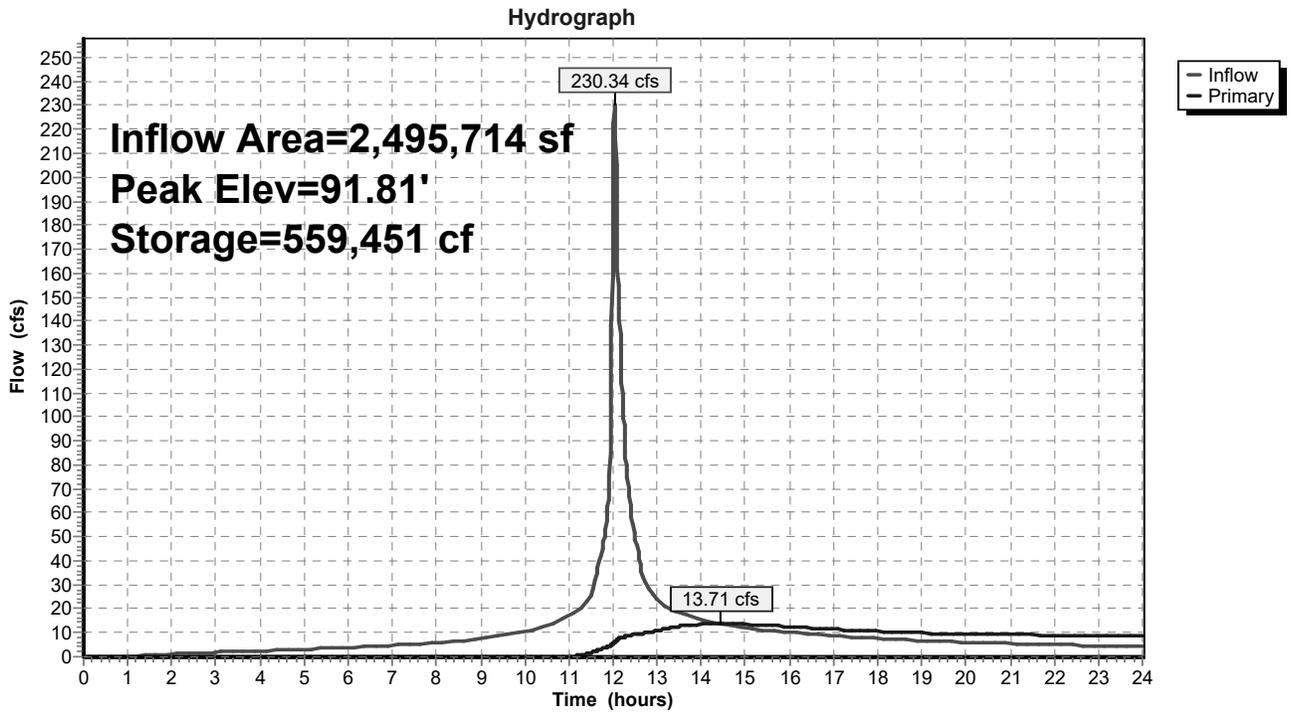
500 Chambers (plus border)

36,253.2 cy Field

2,984.9 cy Stone



Pond 2P: Existing Outbound Lot Underground Detention System



Summary for Pond 3P: Existing Sediment Forebay

Inflow Area = 1,946,053 sf, 72.53% Impervious, Inflow Depth > 4.41" for 10-yr event
 Inflow = 147.17 cfs @ 12.18 hrs, Volume= 714,546 cf
 Outflow = 145.94 cfs @ 12.20 hrs, Volume= 684,334 cf, Atten= 1%, Lag= 1.2 min
 Primary = 145.94 cfs @ 12.20 hrs, Volume= 684,334 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 4
 Peak Elev= 30.18' @ 12.20 hrs Surf.Area= 10,950 sf Storage= 41,622 cf

Plug-Flow detention time= 49.6 min calculated for 684,334 cf (96% of inflow)
 Center-of-Mass det. time= 24.0 min (808.2 - 784.3)

Volume	Invert	Avail.Storage	Storage Description
#1	24.00'	51,057 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

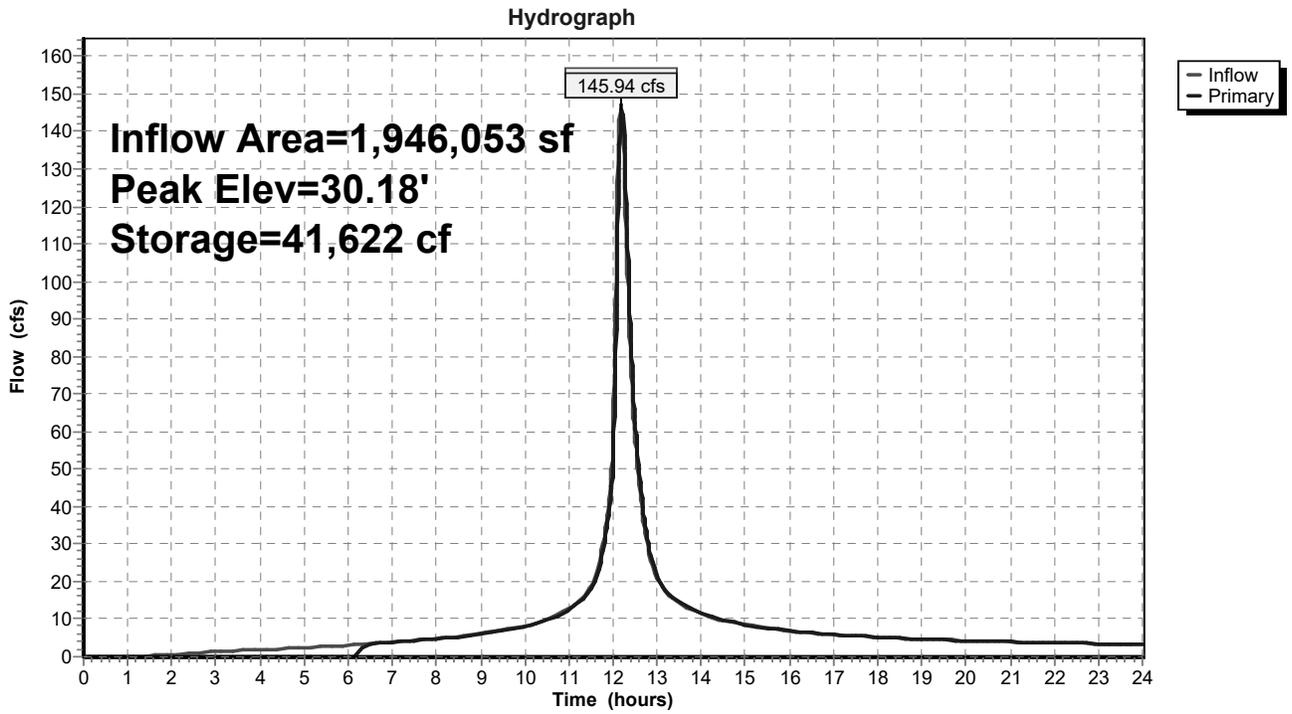
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
24.00	3,090	0	0
25.00	4,111	3,601	3,601
26.00	5,235	4,673	8,274
27.00	6,460	5,848	14,121
28.00	7,785	7,123	21,244
29.00	9,210	8,498	29,741
30.00	10,736	9,973	39,714
31.00	11,950	11,343	51,057

Device	Routing	Invert	Outlet Devices
#1	Primary	28.95'	40.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=145.89 cfs @ 12.20 hrs HW=30.18' (Free Discharge)

↑1=**Broad-Crested Rectangular Weir**(Weir Controls 145.89 cfs @ 2.98 fps)

Pond 3P: Existing Sediment Forebay



Summary for Pond 4P: Existing Stormwater Pond

Inflow Area = 2,542,109 sf, 56.21% Impervious, Inflow Depth > 3.97" for 10-yr event
 Inflow = 181.22 cfs @ 12.19 hrs, Volume= 840,343 cf
 Outflow = 94.39 cfs @ 12.42 hrs, Volume= 837,712 cf, Atten= 48%, Lag= 14.2 min
 Primary = 94.39 cfs @ 12.42 hrs, Volume= 837,712 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 28.93' @ 12.42 hrs Surf.Area= 63,928 sf Storage= 108,649 cf

Plug-Flow detention time= 10.5 min calculated for 837,712 cf (100% of inflow)
 Center-of-Mass det. time= 8.6 min (823.0 - 814.4)

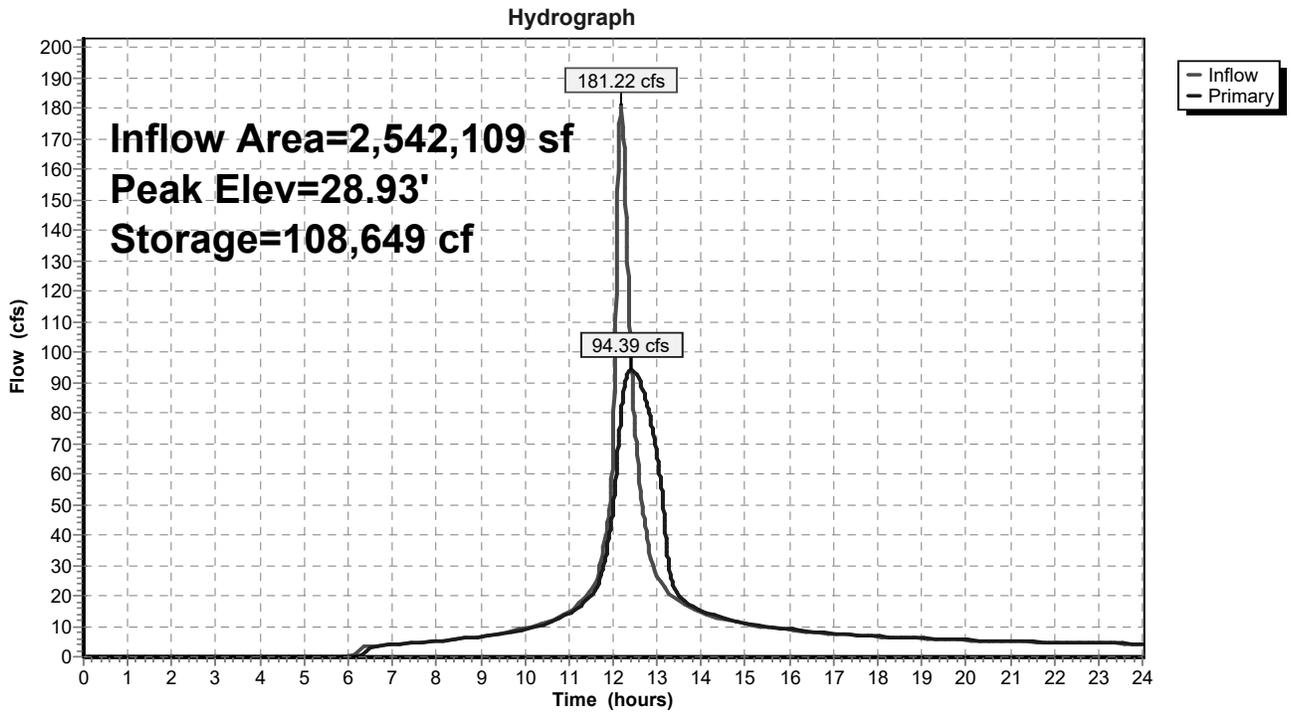
Volume	Invert	Avail.Storage	Storage Description
#1	24.00'	680,910 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
24.00	50	0	0
27.00	10,786	16,254	16,254
28.00	59,106	34,946	51,200
30.00	69,432	128,538	179,738
32.00	78,467	147,899	327,637
34.00	87,601	166,068	493,705
36.00	99,604	187,205	680,910

Device	Routing	Invert	Outlet Devices
#1	Primary	35.50'	70.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#2	Primary	24.50'	48.0" Vert. Orifice/Grate C= 0.600
#3	Primary	34.50'	2.0" Horiz. Orifice/Grate X 8.00 columns X 10 rows C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=94.39 cfs @ 12.42 hrs HW=28.93' (Free Discharge)

- 1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)
- 2=Orifice/Grate (Orifice Controls 94.39 cfs @ 7.51 fps)
- 3=Orifice/Grate (Controls 0.00 cfs)

Pond 4P: Existing Stormwater Pond

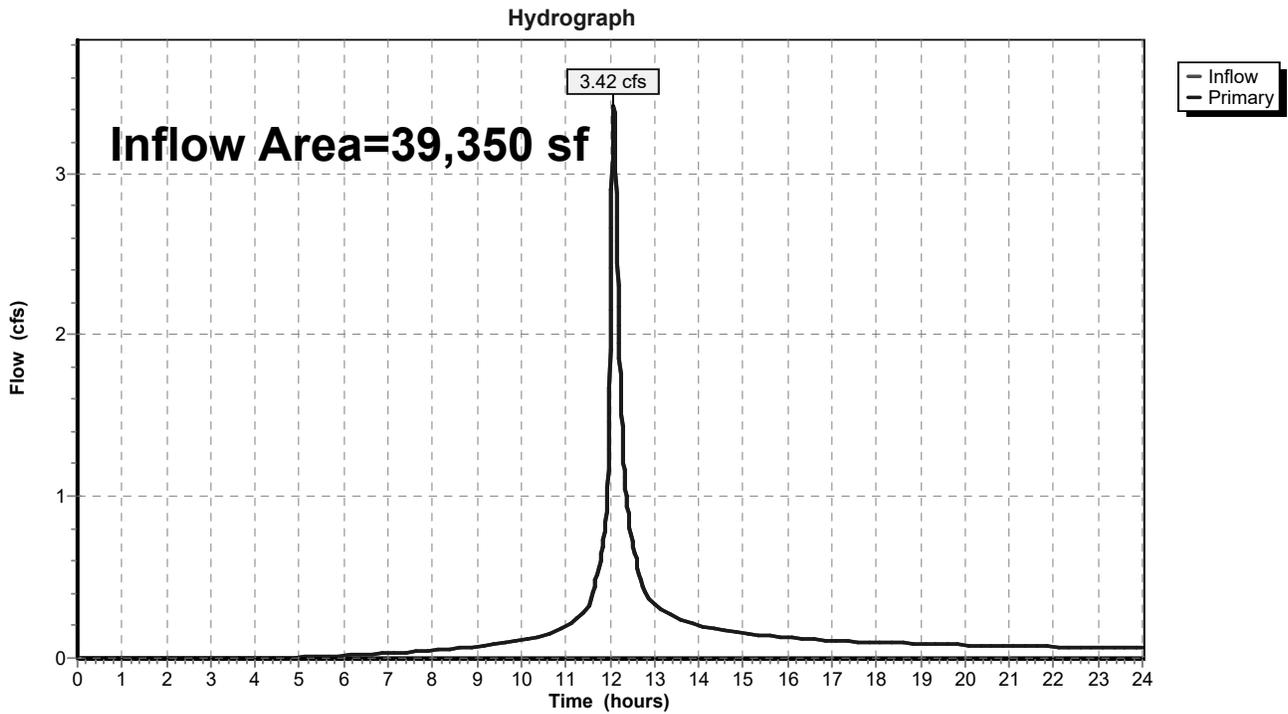


Summary for Link DP-1: Middle Street Gutter

Inflow Area = 39,350 sf, 9.83% Impervious, Inflow Depth > 3.52" for 10-yr event
Inflow = 3.42 cfs @ 12.09 hrs, Volume= 11,558 cf
Primary = 3.42 cfs @ 12.09 hrs, Volume= 11,558 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link DP-1: Middle Street Gutter



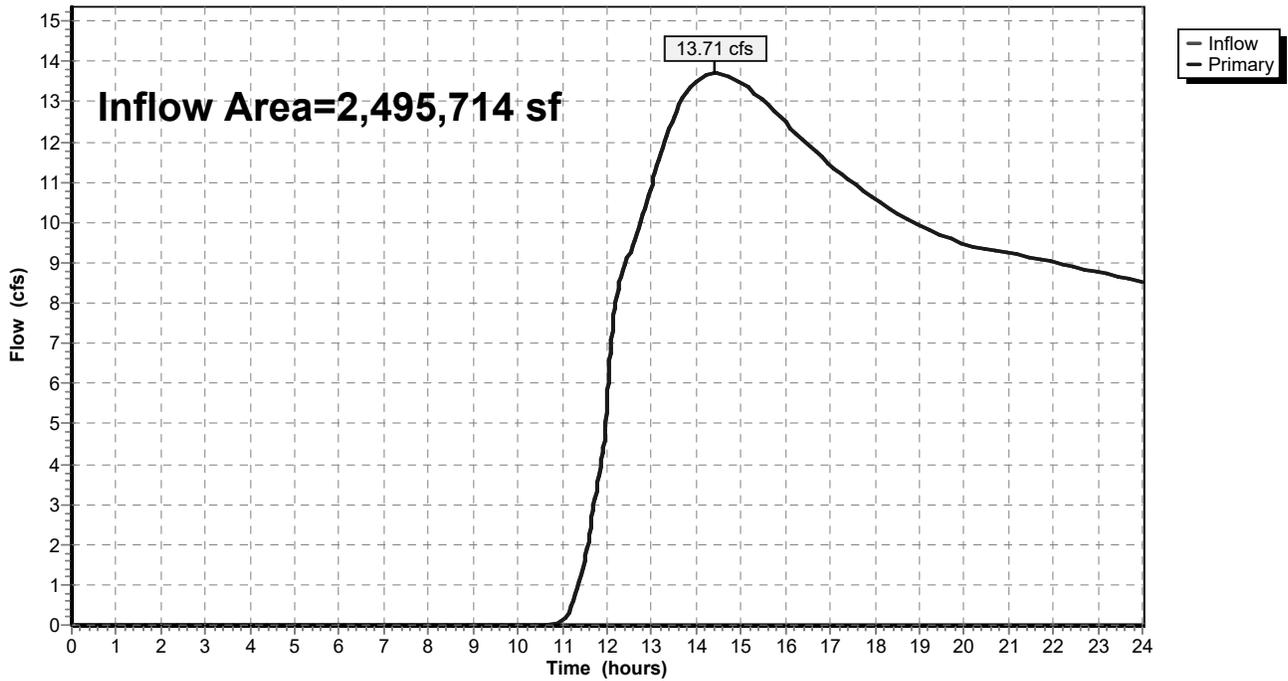
Summary for Link DP-2: Southern Wetland

Inflow Area = 2,495,714 sf, 73.68% Impervious, Inflow Depth > 2.23" for 10-yr event
Inflow = 13.71 cfs @ 14.42 hrs, Volume= 464,605 cf
Primary = 13.71 cfs @ 14.42 hrs, Volume= 464,605 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link DP-2: Southern Wetland

Hydrograph

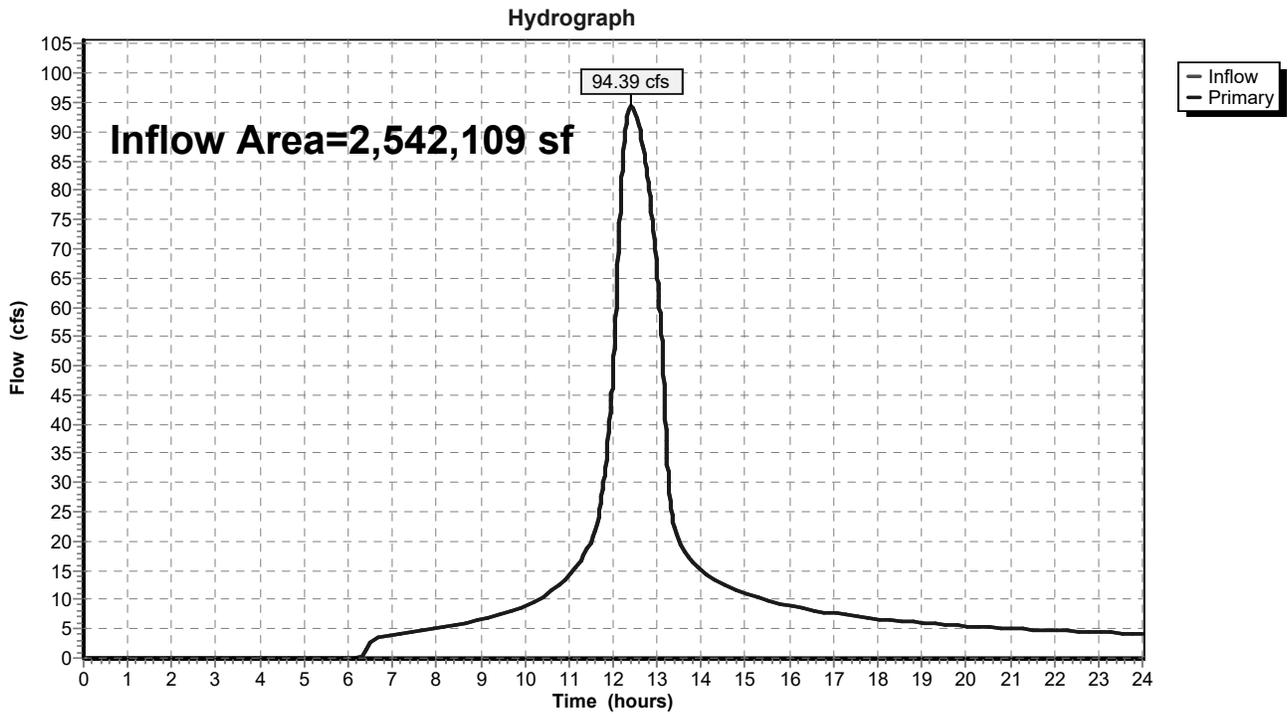


Summary for Link DP-3: Northern Wetland

Inflow Area = 2,542,109 sf, 56.21% Impervious, Inflow Depth > 3.95" for 10-yr event
Inflow = 94.39 cfs @ 12.42 hrs, Volume= 837,712 cf
Primary = 94.39 cfs @ 12.42 hrs, Volume= 837,712 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link DP-3: Northern Wetland



C-DAT-2001507-PROPOSED_HCT_Middletown_2001507_Depth 24-hr S1 25-yr Rainfall=6.35"

Prepared by {enter your company name here}

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Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentPDA-100: Area Draining to Runoff Area=39,350 sf 9.83% Impervious Runoff Depth>4.62"
Flow Length=962' Tc=9.9 min CN=85 Runoff=4.41 cfs 15,153 cf

SubcatchmentPDA-200: Area Draining Runoff Area=1,483,965 sf 90.90% Impervious Runoff Depth>5.99"
Flow Length=1,796' Tc=5.8 min CN=97 Runoff=241.73 cfs 740,218 cf

SubcatchmentPDA-210: Area Draining to Runoff Area=266,730 sf 73.87% Impervious Runoff Depth>5.63"
Flow Length=815' Tc=8.2 min CN=94 Runoff=37.31 cfs 125,197 cf

SubcatchmentPDA-211: Area Draining to Runoff Area=19,345 sf 83.46% Impervious Runoff Depth>5.87"
Tc=5.0 min CN=96 Runoff=3.27 cfs 9,462 cf

SubcatchmentPDA-220: Offsite Property Runoff Area=725,674 sf 38.14% Impervious Runoff Depth>4.83"
Flow Length=1,389' Tc=16.2 min CN=87 Runoff=65.74 cfs 292,169 cf

SubcatchmentPDA-300: Inbound Lot Runoff Area=1,479,100 sf 87.10% Impervious Runoff Depth>5.85"
Flow Length=1,360' Tc=17.7 min CN=96 Runoff=144.11 cfs 721,266 cf

SubcatchmentPDA-310: Vehicle Runoff Area=356,183 sf 32.74% Impervious Runoff Depth>4.72"
Flow Length=964' Tc=18.6 min CN=86 Runoff=29.50 cfs 140,048 cf

SubcatchmentPDA-320: Area Draining to Runoff Area=110,770 sf 5.92% Impervious Runoff Depth>4.19"
Flow Length=370' Tc=13.3 min CN=81 Runoff=9.87 cfs 38,652 cf

SubcatchmentPDA-330: Area Bypassing Runoff Area=269,860 sf 4.93% Impervious Runoff Depth>4.08"
Flow Length=848' Slope=0.0700 1' Tc=15.2 min CN=80 Runoff=21.82 cfs 91,741 cf

SubcatchmentPDA-340: Area Draining to Runoff Area=326,196 sf 1.29% Impervious Runoff Depth>4.29"
Flow Length=670' Tc=12.8 min CN=82 Runoff=30.27 cfs 116,726 cf

Pond 1P: Existing Employee Lot Peak Elev=129.64' Storage=56,070 cf Inflow=37.31 cfs 125,197 cf
Outflow=4.95 cfs 111,984 cf

Pond 2P: Existing Outbound Lot Peak Elev=92.98' Storage=638,677 cf Inflow=283.47 cfs 1,153,833 cf
Outflow=27.97 cfs 669,905 cf

Pond 3P: Existing Sediment Forebay Peak Elev=30.37' Storage=43,789 cf Inflow=182.34 cfs 899,967 cf
Outflow=180.84 cfs 869,614 cf

Pond 4P: Existing Stormwater Pond Peak Elev=29.63' Storage=154,104 cf Inflow=227.50 cfs 1,078,082 cf
Outflow=106.97 cfs 1,075,068 cf

Link DP-1: Middle Street Gutter Inflow=4.41 cfs 15,153 cf
Primary=4.41 cfs 15,153 cf

Link DP-2: Southern Wetland Inflow=27.97 cfs 669,905 cf
Primary=27.97 cfs 669,905 cf

Link DP-3: Northern Wetland

Inflow=106.97 cfs 1,075,068 cf

Primary=106.97 cfs 1,075,068 cf

Total Runoff Area = 5,077,173 sf Runoff Volume = 2,290,633 cf Average Runoff Depth = 5.41"
35.56% Pervious = 1,805,478 sf 64.44% Impervious = 3,271,695 sf

Summary for Subcatchment PDA-100: Area Draining to Middle Street

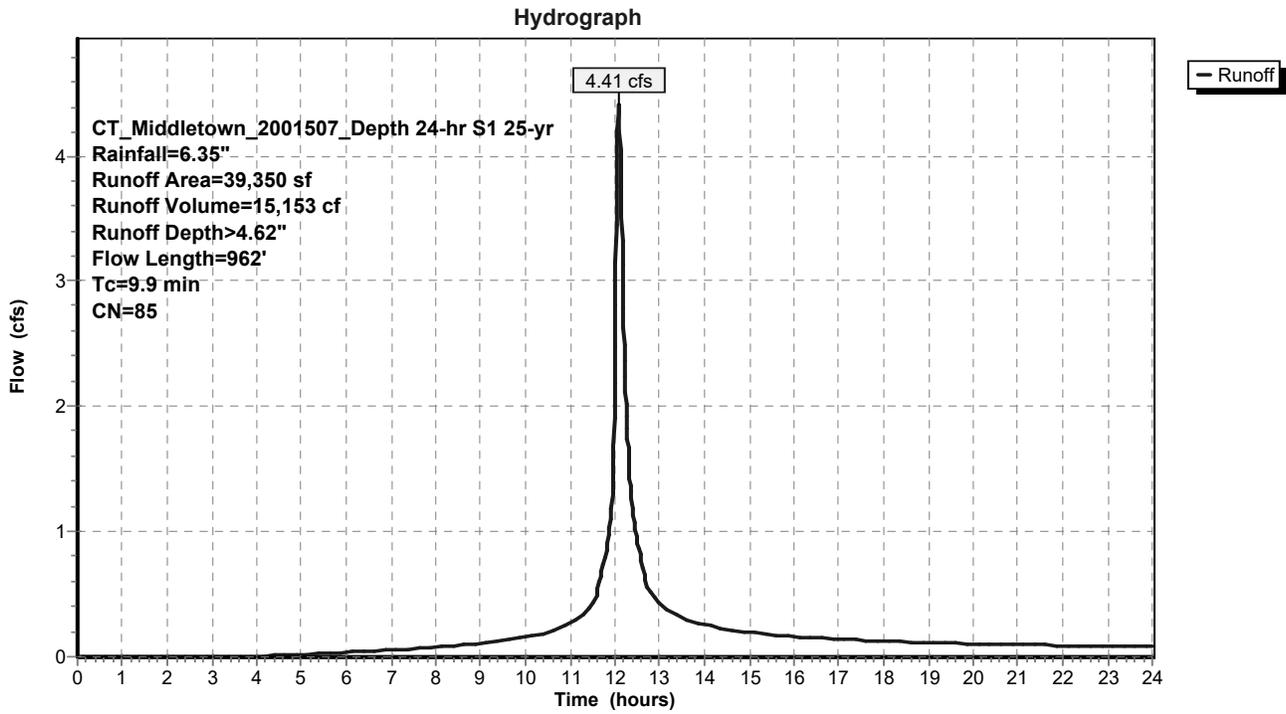
Runoff = 4.41 cfs @ 12.08 hrs, Volume= 15,153 cf, Depth> 4.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 25-yr Rainfall=6.35"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
0	79	50-75% Grass cover, Fair, HSG C
35,480	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
0	98	Paved parking, HSG C
3,870	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
0	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
39,350	85	Weighted Average
35,480		90.17% Pervious Area
3,870		9.83% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	28	0.1406	0.20		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
1.1	72	0.0120	1.06		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.29"
6.5	862	0.0120	2.22		Shallow Concentrated Flow, Paved Kv= 20.3 fps
9.9	962	Total			

Subcatchment PDA-100: Area Draining to Middle Street



Summary for Subcatchment PDA-200: Area Draining to Existing Outbound Lot Detention System

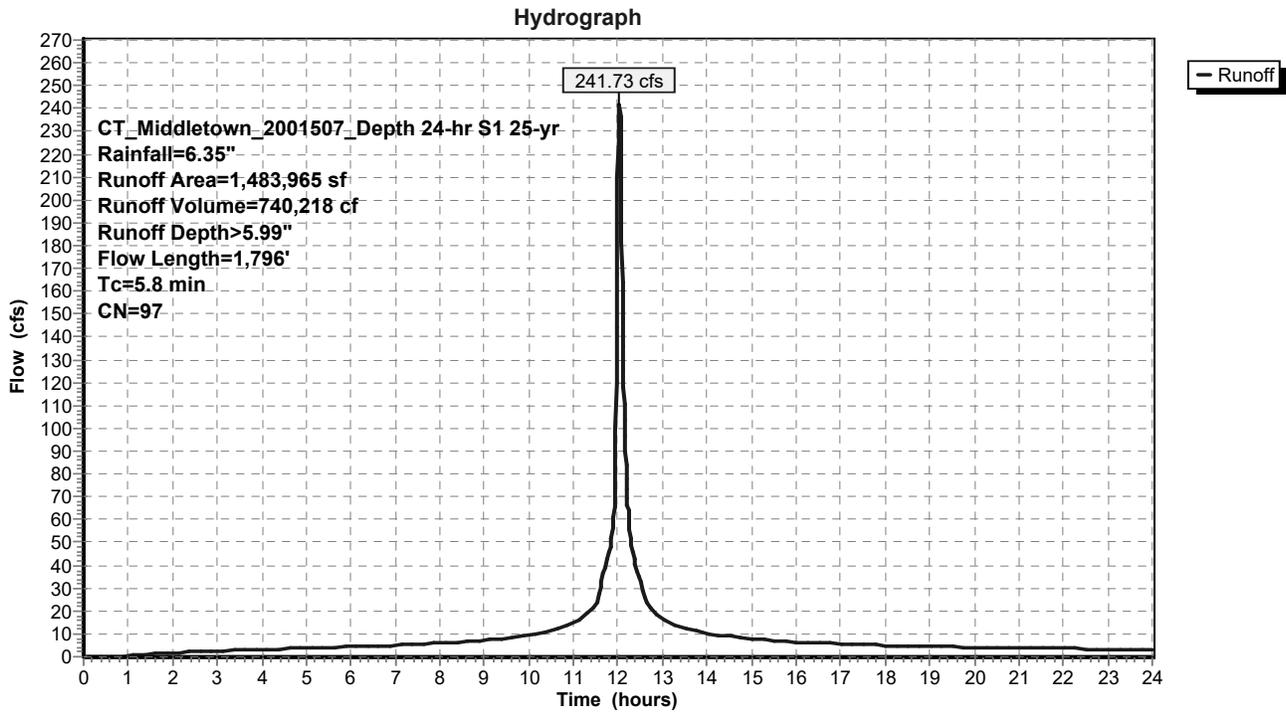
Runoff = 241.73 cfs @ 12.03 hrs, Volume= 740,218 cf, Depth> 5.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 25-yr Rainfall=6.35"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
60,335	79	50-75% Grass cover, Fair, HSG C
74,723	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
507,075	98	Paved parking, HSG C
841,832	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
0	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
1,483,965	97	Weighted Average
135,058		9.10% Pervious Area
1,348,907		90.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	100	0.0140	1.21		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.29"
1.2	176	0.0140	2.40		Shallow Concentrated Flow, Paved Kv= 20.3 fps
3.2	1,520	0.0100	7.80	24.51	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
5.8	1,796	Total			

Subcatchment PDA-200: Area Draining to Existing Outbound Lot Detention System



Summary for Subcatchment PDA-210: Area Draining to Existing Employee Lot Underground Detention

Runoff = 37.31 cfs @ 12.06 hrs, Volume= 125,197 cf, Depth> 5.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 25-yr Rainfall=6.35"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
0	79	50-75% Grass cover, Fair, HSG C
69,690	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
0	98	Paved parking, HSG C
197,040	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
0	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
266,730	94	Weighted Average
69,690		26.13% Pervious Area
197,040		73.87% Impervious Area

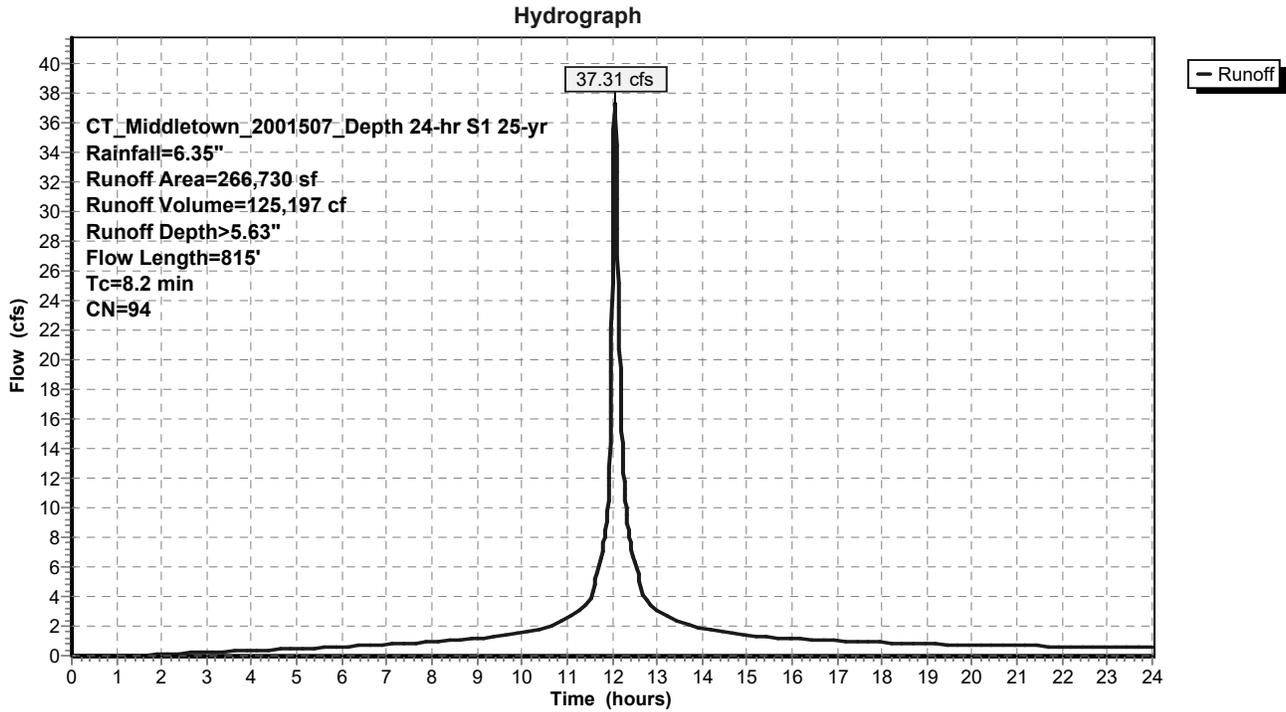
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.1	19	0.0160	0.08		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
1.1	81	0.0160	1.22		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.29"
1.1	164	0.0160	2.57		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.5	130	0.0050	4.03	4.95	Pipe Channel, 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012 Concrete pipe, finished
0.6	152	0.0050	4.55	8.05	Pipe Channel, 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.012 Concrete pipe, finished
0.3	108	0.0050	5.52	17.33	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
0.3	101	0.0050	5.52	17.33	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
0.1	38	0.0050	5.52	17.33	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
0.1	22	0.0050	7.23	51.09	Pipe Channel,

36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75'

n= 0.012 Concrete pipe, finished

8.2 815 Total

Subcatchment PDA-210: Area Draining to Existing Employee Lot Underground Detention



Summary for Subcatchment PDA-211: Area Draining to HDS-10

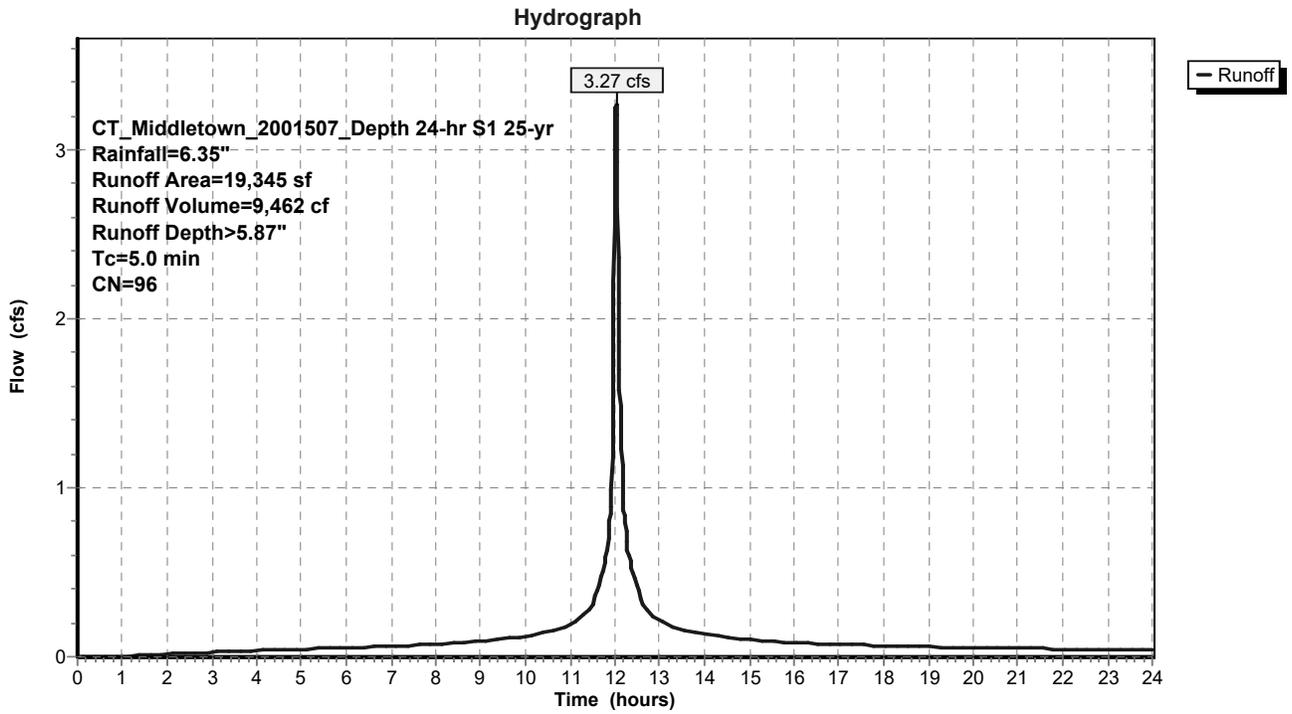
Runoff = 3.27 cfs @ 12.03 hrs, Volume= 9,462 cf, Depth> 5.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 25-yr Rainfall=6.35"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
0	79	50-75% Grass cover, Fair, HSG C
3,200	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
0	98	Paved parking, HSG C
16,145	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
0	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
19,345	96	Weighted Average
3,200		16.54% Pervious Area
16,145		83.46% Impervious Area

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

Subcatchment PDA-211: Area Draining to HDS-10



Summary for Subcatchment PDA-220: Offsite Property to Existing Outbound Lot Detention System

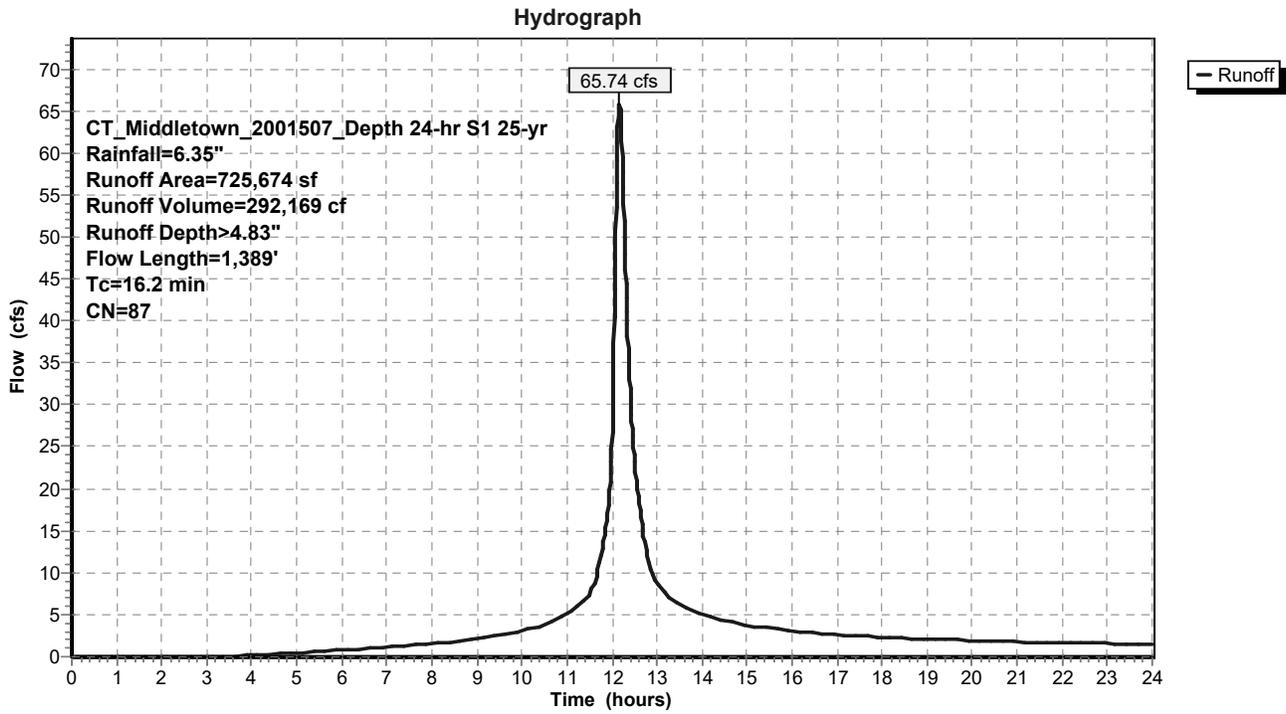
Runoff = 65.74 cfs @ 12.17 hrs, Volume= 292,169 cf, Depth> 4.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 25-yr Rainfall=6.35"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
218,535	79	50-75% Grass cover, Fair, HSG C
204,870	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
128,360	98	Paved parking, HSG C
148,395	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
0	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
25,514	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
725,674	87	Weighted Average
448,919		61.86% Pervious Area
276,755		38.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.1	100	0.0240	0.13		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
1.1	214	0.0374	3.11		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
2.0	1,075	0.0200	9.11	16.09	Pipe Channel, 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.012
16.2	1,389	Total			

Subcatchment PDA-220: Offsite Property to Existing Outbound Lot Detention System



Summary for Subcatchment PDA-300: Inbound Lot Area to Sediment Forebay

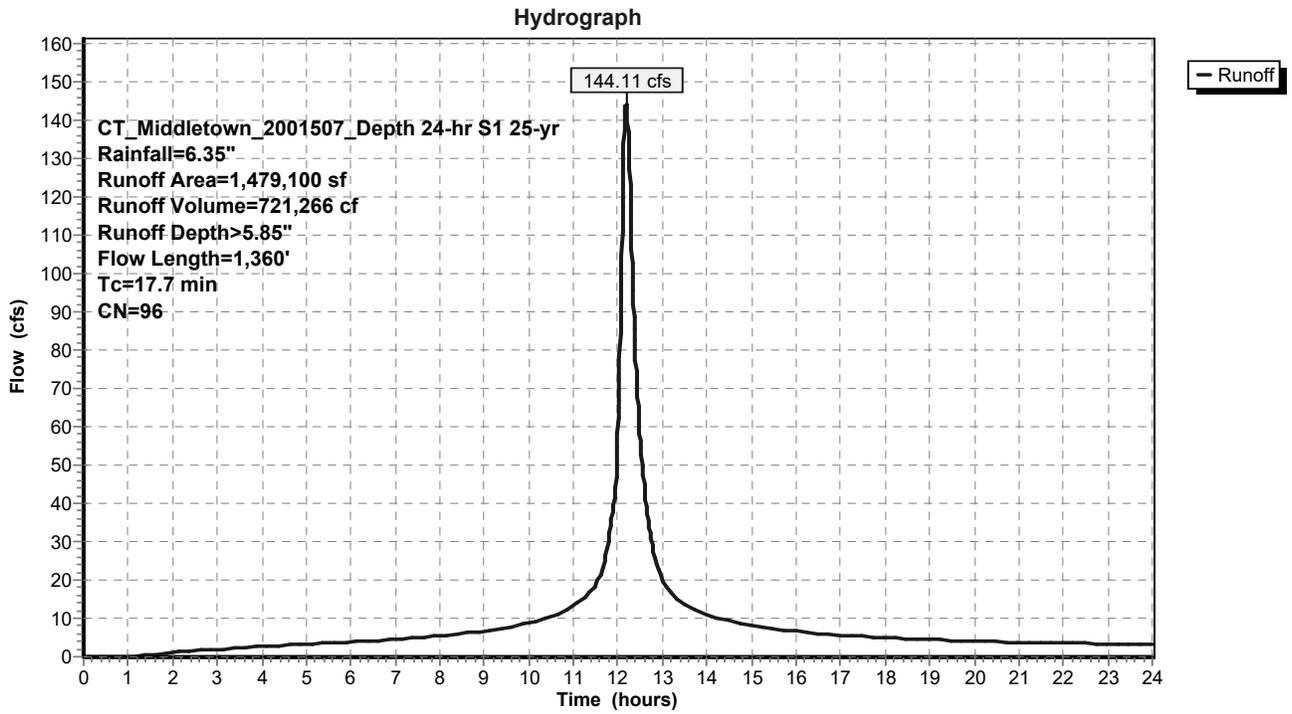
Runoff = 144.11 cfs @ 12.18 hrs, Volume= 721,266 cf, Depth> 5.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 25-yr Rainfall=6.35"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
119,543	79	50-75% Grass cover, Fair, HSG C
71,266	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
471,502	98	Paved parking, HSG C
816,789	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
0	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
1,479,100	96	Weighted Average
190,809		12.90% Pervious Area
1,288,291		87.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.2	80	0.0125	0.09		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
0.8	120	0.0150	2.49		Shallow Concentrated Flow, Paved Kv= 20.3 fps
2.7	1,160	0.0050	7.23	51.09	Pipe Channel, 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.012
17.7	1,360	Total			

Subcatchment PDA-300: Inbound Lot Area to Sediment Forebay



Summary for Subcatchment PDA-310: Vehicle Maintenance Area to Sediment Forebay

Runoff = 29.50 cfs @ 12.20 hrs, Volume= 140,048 cf, Depth> 4.72"

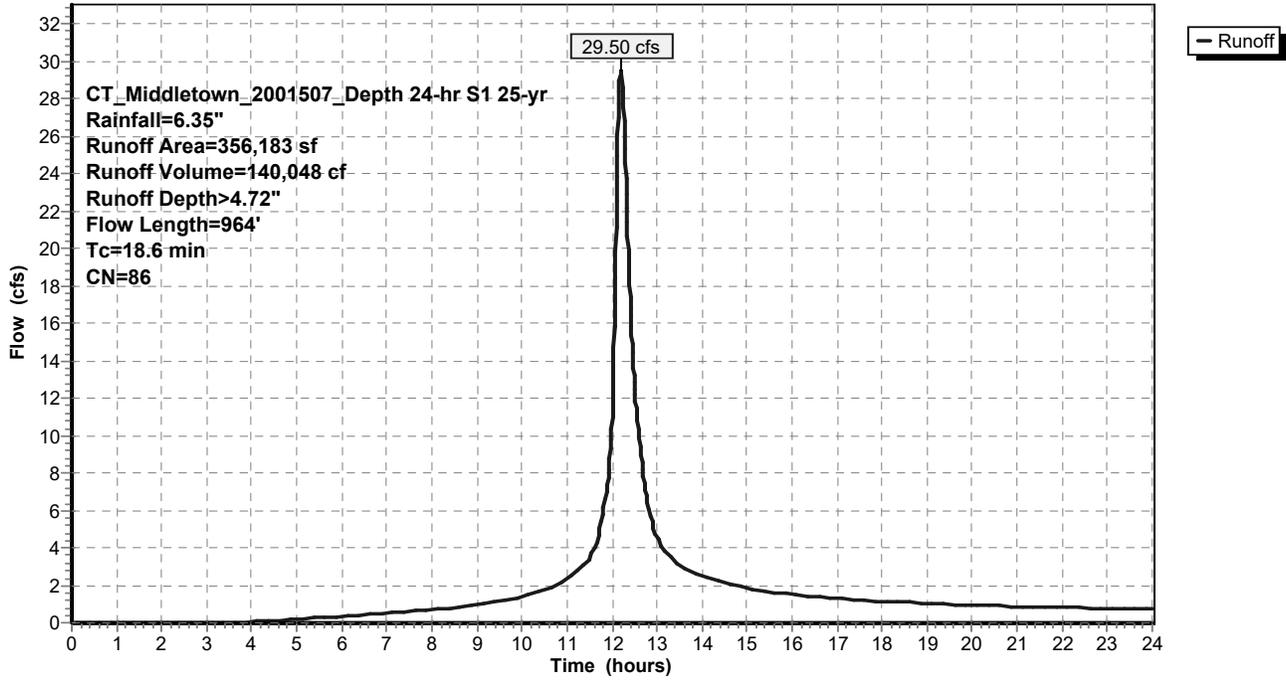
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 25-yr Rainfall=6.35"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
153,724	79	50-75% Grass cover, Fair, HSG C
85,858	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
69,565	98	Paved parking, HSG C
47,036	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
0	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
356,183	86	Weighted Average
239,582		67.26% Pervious Area
116,601		32.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	60	0.0400	0.14		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
5.7	40	0.0300	0.12		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
5.3	541	0.0600	1.71		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.2	54	0.0050	4.03	4.95	Pipe Channel, 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012
0.1	122	0.0500	17.44	54.80	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
0.1	108	0.0400	15.60	49.02	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
0.1	39	0.0085	7.19	22.59	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
18.6	964	Total			

Subcatchment PDA-310: Vehicle Maintenance Area to Sediment Forebay

Hydrograph



Summary for Subcatchment PDA-320: Area Draining to Sediment Forebay

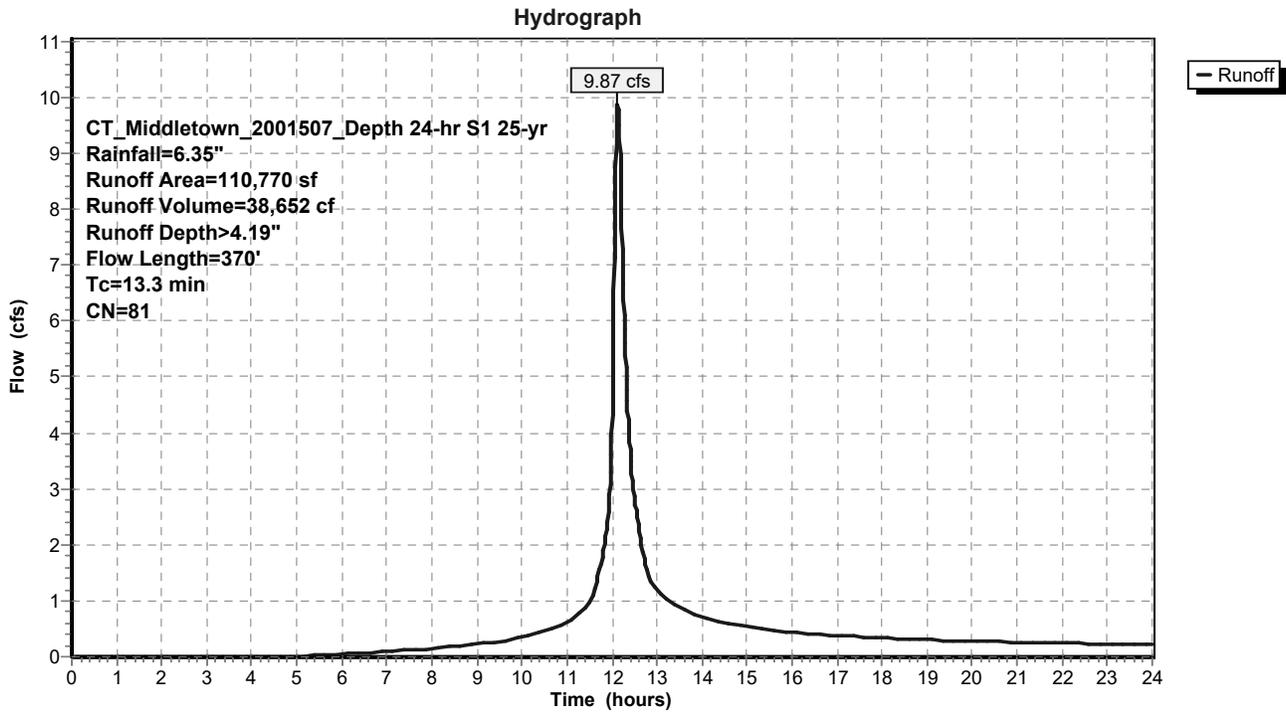
Runoff = 9.87 cfs @ 12.13 hrs, Volume= 38,652 cf, Depth> 4.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 25-yr Rainfall=6.35"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
98,913	79	50-75% Grass cover, Fair, HSG C
0	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
6,557	98	Paved parking, HSG C
0	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
5,300	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
110,770	81	Weighted Average
104,213		94.08% Pervious Area
6,557		5.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	100	0.0350	0.15		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
1.3	105	0.0350	1.31		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.7	165	0.3333	4.04		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
13.3	370	Total			

Subcatchment PDA-320: Area Draining to Sediment Forebay



Summary for Subcatchment PDA-330: Area Bypassing Sediment Forebay

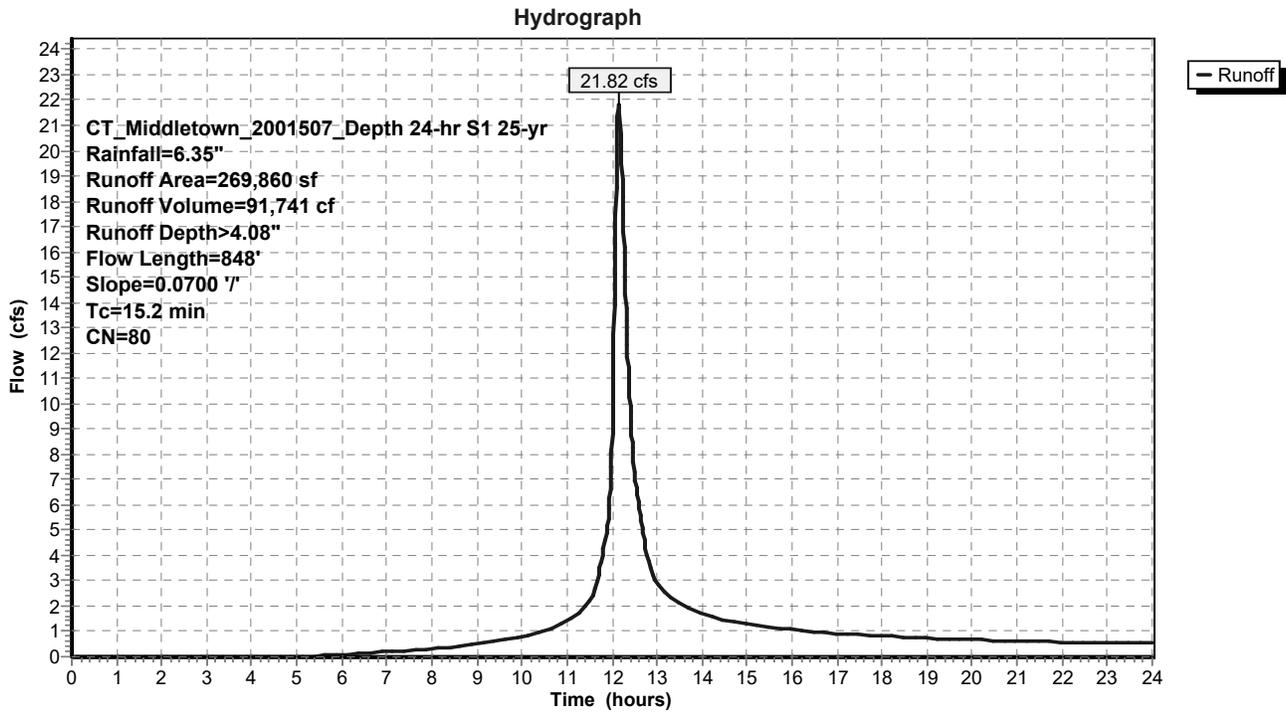
Runoff = 21.82 cfs @ 12.16 hrs, Volume= 91,741 cf, Depth> 4.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 25-yr Rainfall=6.35"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
232,381	79	50-75% Grass cover, Fair, HSG C
23,831	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
11,183	98	Paved parking, HSG C
2,124	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
341	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
269,860	80	Weighted Average
256,553		95.07% Pervious Area
13,307		4.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	100	0.0700	0.20		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
6.7	748	0.0700	1.85		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
15.2	848	Total			

Subcatchment PDA-330: Area Bypassing Sediment Forebay



Summary for Subcatchment PDA-340: Area Draining to Stormwater Pond

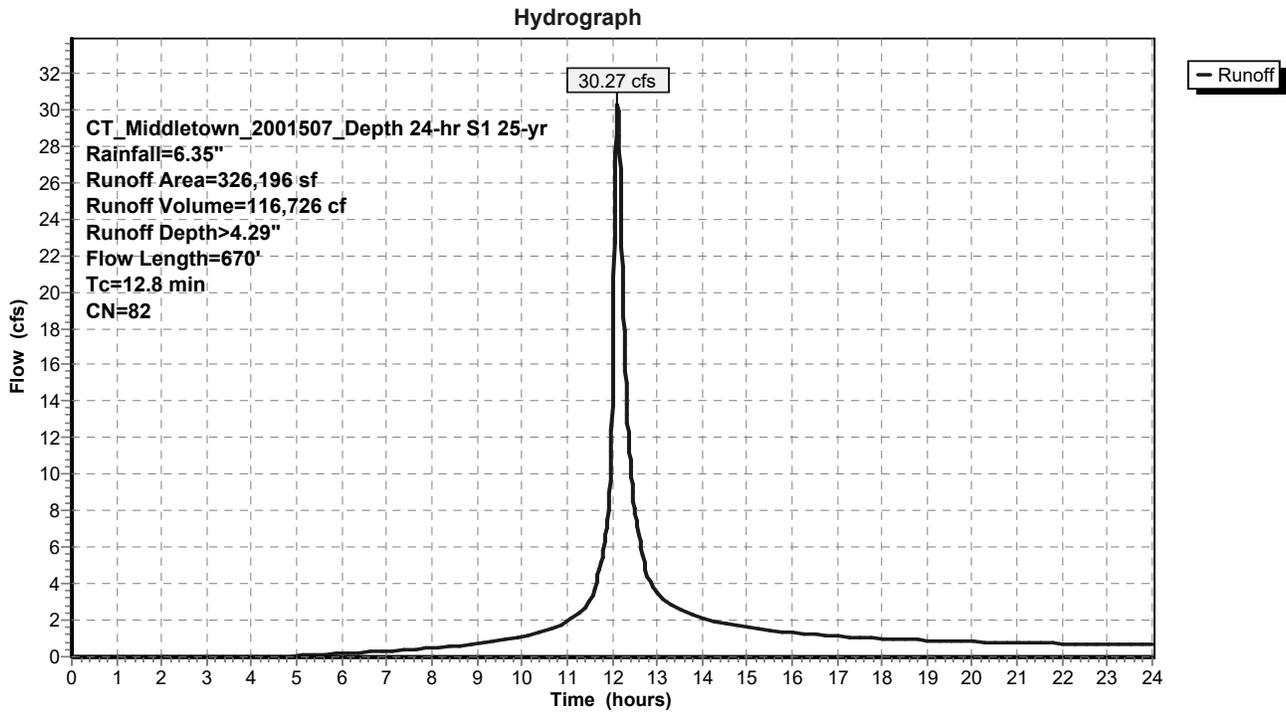
Runoff = 30.27 cfs @ 12.12 hrs, Volume= 116,726 cf, Depth> 4.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 25-yr Rainfall=6.35"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
269,284	79	50-75% Grass cover, Fair, HSG C
0	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
4,222	98	Paved parking, HSG C
0	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
10,850	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
5,025	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
36,815	98	Water Surface, 0% imp, HSG C
326,196	82	Weighted Average
321,974		98.71% Pervious Area
4,222		1.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	100	0.0700	0.20		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
4.3	570	0.1000	2.21		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
12.8	670	Total			

Subcatchment PDA-340: Area Draining to Stormwater Pond



Summary for Pond 1P: Existing Employee Lot Underground Detention System

Inflow Area = 266,730 sf, 73.87% Impervious, Inflow Depth > 5.63" for 25-yr event
 Inflow = 37.31 cfs @ 12.06 hrs, Volume= 125,197 cf
 Outflow = 4.95 cfs @ 12.62 hrs, Volume= 111,984 cf, Atten= 87%, Lag= 33.3 min
 Primary = 4.95 cfs @ 12.62 hrs, Volume= 111,984 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 129.64' @ 12.62 hrs Surf.Area= 11,725 sf Storage= 56,070 cf

Plug-Flow detention time= 224.0 min calculated for 111,937 cf (89% of inflow)
 Center-of-Mass det. time= 166.1 min (939.2 - 773.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	123.50'	2,345 cf	64.19'W x 182.67'L x 9.50'H Field A 111,387 cf Overall - 105,524 cf Embedded = 5,862 cf x 40.0% Voids
#2A	124.00'	83,580 cf	StormTrap ST2 DoubleTrap 8-0x 66 Inside #1 Inside= 101.7"W x 96.0"H => 61.09 sf x 15.40'L = 940.5 cf Outside= 101.7"W x 108.0"H => 76.31 sf x 15.40'L = 1,174.9 cf 66 Chambers in 6 Rows 50.88' x 169.35' Core + 6.66' Border = 64.19' x 182.67' System
		85,925 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	125.00'	24.0" Round Culvert L= 1,560.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 125.00' / 85.00' S= 0.0256 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#2	Device 1	125.00'	8.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	129.00'	12.0" Vert. Orifice/Grate C= 0.600
#4	Device 1	132.50'	3.0' long x 2.00' rise Sharp-Crested Rectangular Weir 2 End Contraction(s) 3.0' Crest Height

Primary OutFlow Max=4.94 cfs @ 12.62 hrs HW=129.64' (Free Discharge)

- 1=Culvert (Passes 4.94 cfs of 28.87 cfs potential flow)
- 2=Orifice/Grate (Orifice Controls 3.49 cfs @ 10.00 fps)
- 3=Orifice/Grate (Orifice Controls 1.45 cfs @ 2.73 fps)
- 4=Sharp-Crested Rectangular Weir(Controls 0.00 cfs)

Pond 1P: Existing Employee Lot Underground Detention System - Chamber Wizard Field A

Chamber Model = StormTrapST2 DoubleTrap 8-0 (StormTrapST2 DoubleTrap®Type II+IV)

Inside= 101.7"W x 96.0"H => 61.09 sf x 15.40'L = 940.5 cf

Outside= 101.7"W x 108.0"H => 76.31 sf x 15.40'L = 1,174.9 cf

11 Chambers/Row x 15.40' Long = 169.35' Row Length +79.9" Border x 2 = 182.67' Base Length

6 Rows x 101.7" Wide + 79.9" Side Border x 2 = 64.19' Base Width

6.0" Base + 108.0" Chamber Height = 9.50' Field Height

66 Chambers x 940.5 cf + 21,503.9 cf Border = 83,579.7 cf Chamber Storage

66 Chambers x 1,174.9 cf + 27,981.2 cf Border = 105,524.2 cf Displacement

111,386.7 cf Field - 105,524.2 cf Chambers = 5,862.5 cf Stone x 40.0% Voids = 2,345.0 cf Stone Storage

Chamber Storage + Stone Storage = 85,924.7 cf = 1.973 af

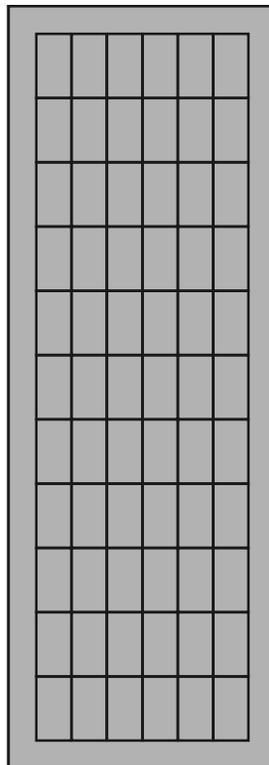
Overall Storage Efficiency = 77.1%

Overall System Size = 182.67' x 64.19' x 9.50'

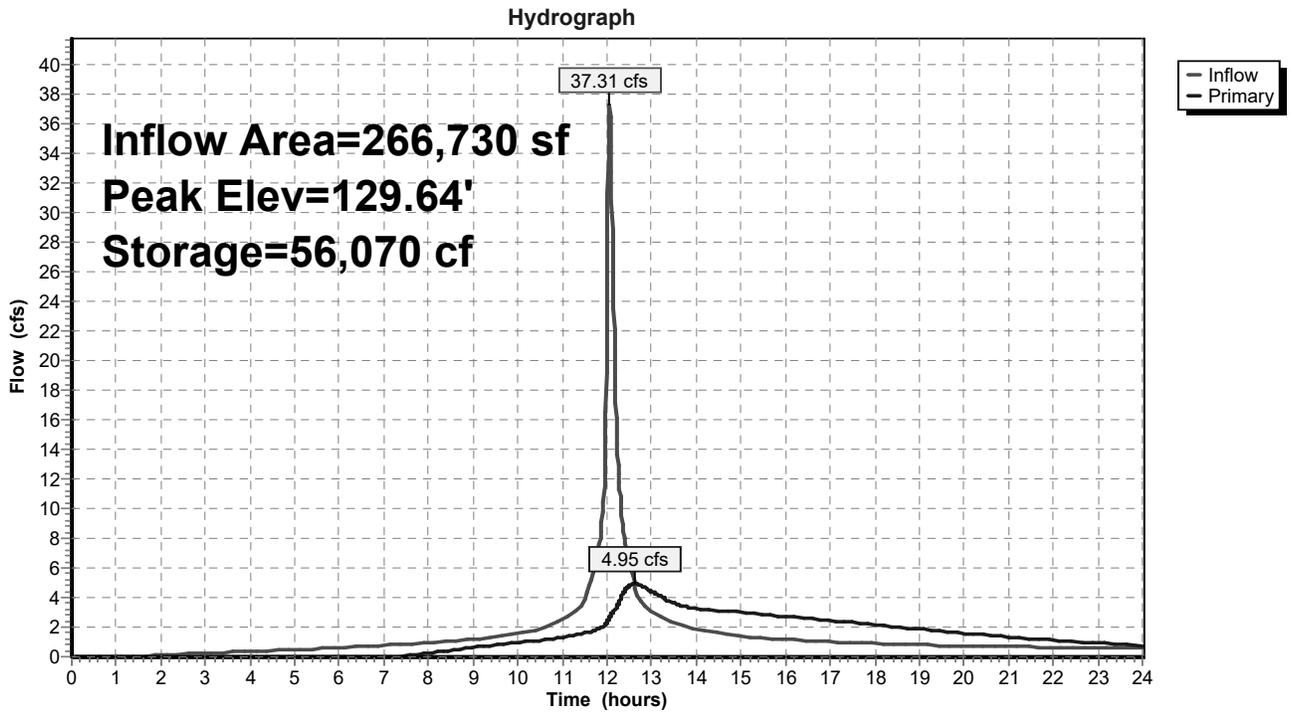
66 Chambers (plus border)

4,125.4 cy Field

217.1 cy Stone



Pond 1P: Existing Employee Lot Underground Detention System



Summary for Pond 2P: Existing Outbound Lot Underground Detention System

Inflow Area = 2,495,714 sf, 73.68% Impervious, Inflow Depth > 5.55" for 25-yr event
 Inflow = 283.47 cfs @ 12.04 hrs, Volume= 1,153,833 cf
 Outflow = 27.97 cfs @ 13.10 hrs, Volume= 669,905 cf, Atten= 90%, Lag= 63.8 min
 Primary = 27.97 cfs @ 13.10 hrs, Volume= 669,905 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 92.98' @ 13.10 hrs Surf.Area= 73,413 sf Storage= 638,677 cf

Plug-Flow detention time= 361.6 min calculated for 669,626 cf (58% of inflow)
 Center-of-Mass det. time= 211.8 min (997.1 - 785.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	82.50'	32,237 cf	183.90'W x 399.21'L x 13.33'H Field A 978,837 cf Overall - 898,245 cf Embedded = 80,592 cf x 40.0% Voids
#2A	83.50'	766,158 cf	StormTrap ST2 DoubleTrap 11-4x 500 Inside #1 Inside= 101.7"W x 136.0"H => 89.71 sf x 15.40'L = 1,381.1 cf Outside= 101.7"W x 148.0"H => 104.58 sf x 15.40'L = 1,610.0 cf 500 Chambers in 20 Rows 169.58' x 384.90' Core + 6.66' Border = 182.90' x 398.21' System
		798,395 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	86.00'	30.0" Round Culvert L= 120.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 86.00' / 85.50' S= 0.0042 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 4.91 sf
#2	Device 1	86.00'	13.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	91.00'	18.0" Vert. Orifice/Grate X 2 rows with 6.0" cc spacing C= 0.600
#4	Device 1	95.50'	3.0' long x 2.00' rise Sharp-Crested Rectangular Weir 2 End Contraction(s) 3.0' Crest Height

Primary OutFlow Max=28.00 cfs @ 13.10 hrs HW=92.98' (Free Discharge)

- 1=Culvert (Passes 28.00 cfs of 56.58 cfs potential flow)
- 2=Orifice/Grate (Orifice Controls 11.26 cfs @ 12.22 fps)
- 3=Orifice/Grate (Orifice Controls 16.74 cfs @ 4.74 fps)
- 4=Sharp-Crested Rectangular Weir(Controls 0.00 cfs)

Pond 2P: Existing Outbound Lot Underground Detention System - Chamber Wizard Field A

Chamber Model = StormTrapST2 DoubleTrap 11-4 (StormTrapST2 DoubleTrap®Type I+III)

Inside= 101.7"W x 136.0"H => 89.71 sf x 15.40'L = 1,381.1 cf

Outside= 101.7"W x 148.0"H => 104.58 sf x 15.40'L = 1,610.0 cf

25 Chambers/Row x 15.40' Long = 384.90' Row Length +79.9" Border x 2 +6.0" End Stone x 2 = 399.21' Base Length

20 Rows x 101.7" Wide + 79.9" Side Border x 2 + 6.0" Side Stone x 2 = 183.90' Base Width

12.0" Base + 148.0" Chamber Height = 13.33' Field Height

500 Chambers x 1,381.1 cf + 75,595.3 cf Border = 766,157.9 cf Chamber Storage

500 Chambers x 1,610.0 cf + 93,224.3 cf Border = 898,244.6 cf Displacement

978,836.7 cf Field - 898,244.6 cf Chambers = 80,592.0 cf Stone x 40.0% Voids = 32,236.8 cf Stone Storage

Chamber Storage + Stone Storage = 798,394.7 cf = 18.329 af

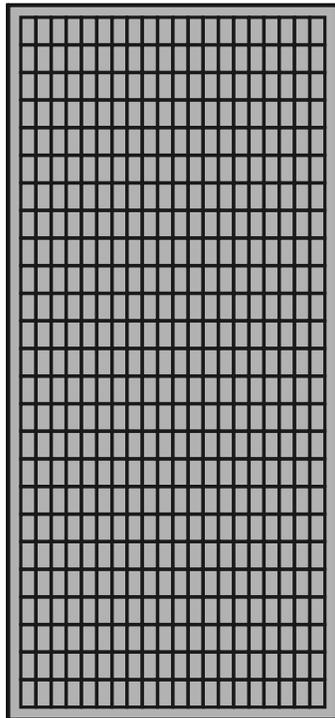
Overall Storage Efficiency = 81.6%

Overall System Size = 399.21' x 183.90' x 13.33'

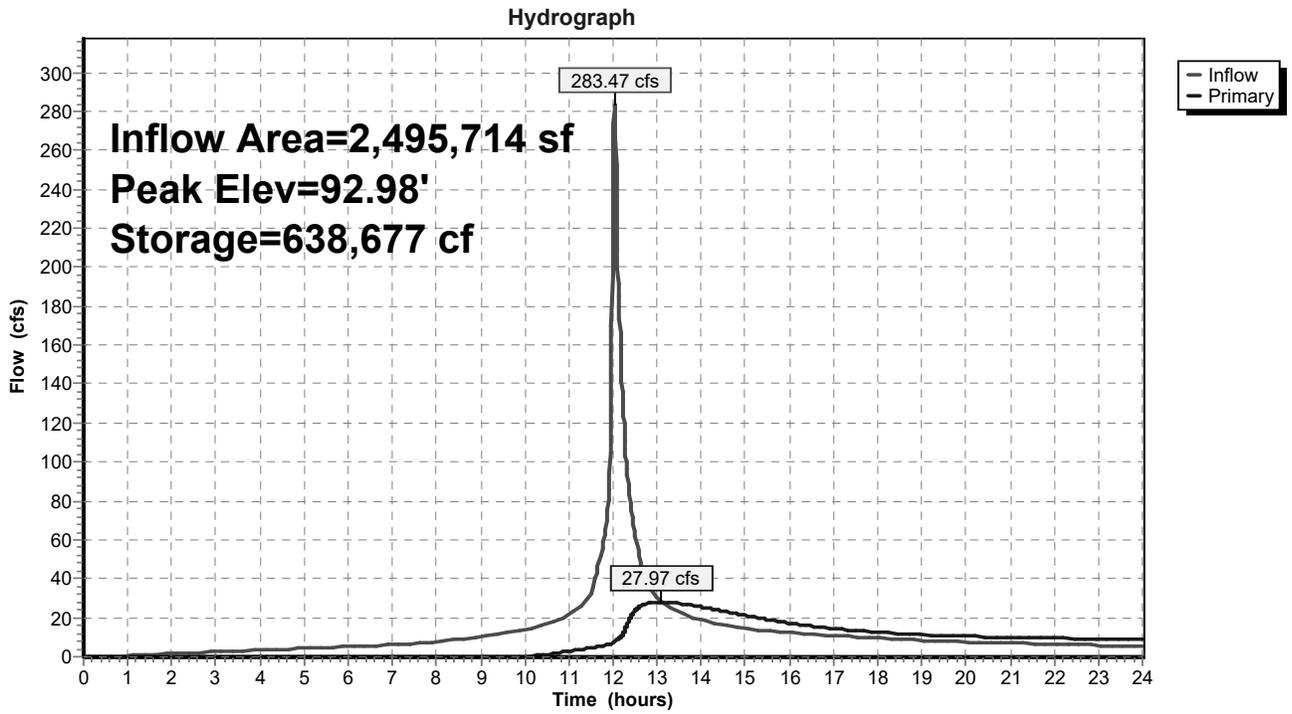
500 Chambers (plus border)

36,253.2 cy Field

2,984.9 cy Stone



Pond 2P: Existing Outbound Lot Underground Detention System



Summary for Pond 3P: Existing Sediment Forebay

Inflow Area = 1,946,053 sf, 72.53% Impervious, Inflow Depth > 5.55" for 25-yr event
 Inflow = 182.34 cfs @ 12.18 hrs, Volume= 899,967 cf
 Outflow = 180.84 cfs @ 12.20 hrs, Volume= 869,614 cf, Atten= 1%, Lag= 1.2 min
 Primary = 180.84 cfs @ 12.20 hrs, Volume= 869,614 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 4
 Peak Elev= 30.37' @ 12.20 hrs Surf.Area= 11,187 sf Storage= 43,789 cf

Plug-Flow detention time= 41.4 min calculated for 869,614 cf (97% of inflow)
 Center-of-Mass det. time= 20.4 min (798.9 - 778.5)

Volume	Invert	Avail.Storage	Storage Description
#1	24.00'	51,057 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

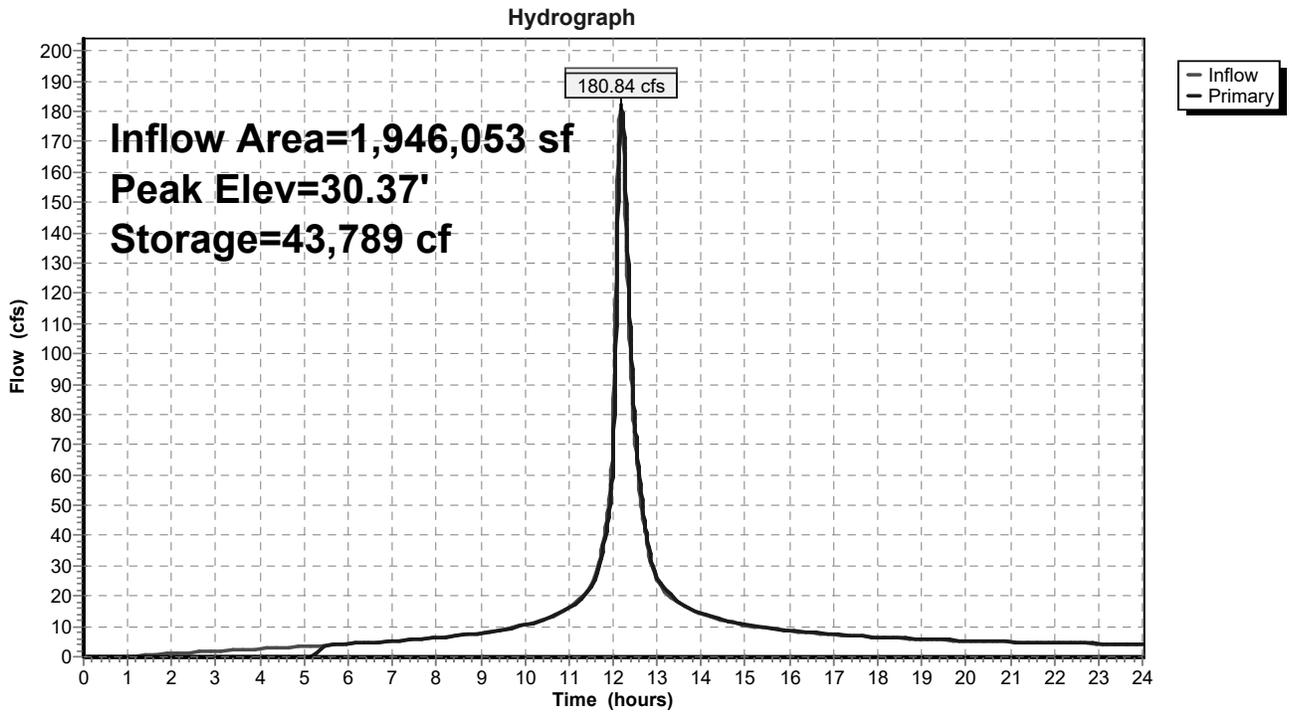
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
24.00	3,090	0	0
25.00	4,111	3,601	3,601
26.00	5,235	4,673	8,274
27.00	6,460	5,848	14,121
28.00	7,785	7,123	21,244
29.00	9,210	8,498	29,741
30.00	10,736	9,973	39,714
31.00	11,950	11,343	51,057

Device	Routing	Invert	Outlet Devices
#1	Primary	28.95'	40.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=180.84 cfs @ 12.20 hrs HW=30.37' (Free Discharge)

↑1=**Broad-Crested Rectangular Weir**(Weir Controls 180.84 cfs @ 3.18 fps)

Pond 3P: Existing Sediment Forebay



Summary for Pond 4P: Existing Stormwater Pond

Inflow Area = 2,542,109 sf, 56.21% Impervious, Inflow Depth > 5.09" for 25-yr event
 Inflow = 227.50 cfs @ 12.18 hrs, Volume= 1,078,082 cf
 Outflow = 106.97 cfs @ 12.45 hrs, Volume= 1,075,068 cf, Atten= 53%, Lag= 15.9 min
 Primary = 106.97 cfs @ 12.45 hrs, Volume= 1,075,068 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 29.63' @ 12.45 hrs Surf.Area= 67,499 sf Storage= 154,104 cf

Plug-Flow detention time= 11.7 min calculated for 1,075,068 cf (100% of inflow)
 Center-of-Mass det. time= 10.0 min (815.2 - 805.2)

Volume	Invert	Avail.Storage	Storage Description
#1	24.00'	680,910 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
24.00	50	0	0
27.00	10,786	16,254	16,254
28.00	59,106	34,946	51,200
30.00	69,432	128,538	179,738
32.00	78,467	147,899	327,637
34.00	87,601	166,068	493,705
36.00	99,604	187,205	680,910

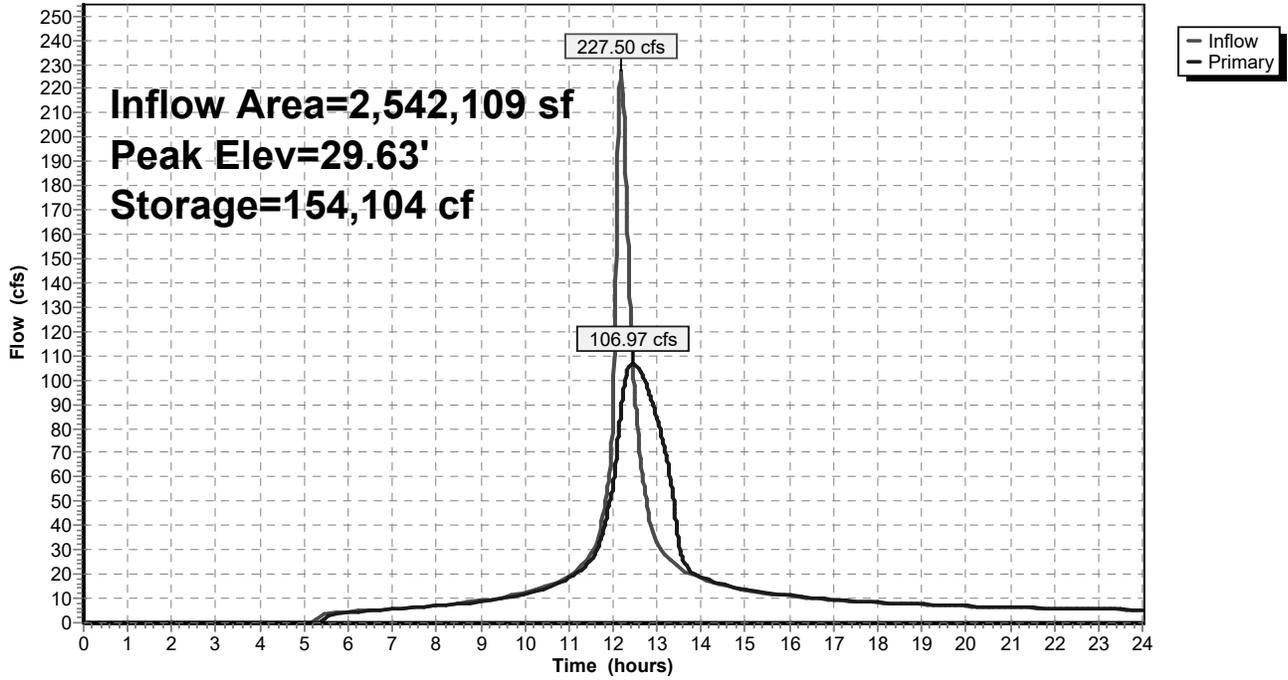
Device	Routing	Invert	Outlet Devices
#1	Primary	35.50'	70.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#2	Primary	24.50'	48.0" Vert. Orifice/Grate C= 0.600
#3	Primary	34.50'	2.0" Horiz. Orifice/Grate X 8.00 columns X 10 rows C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=106.97 cfs @ 12.45 hrs HW=29.63' (Free Discharge)

- 1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)
- 2=Orifice/Grate (Orifice Controls 106.97 cfs @ 8.51 fps)
- 3=Orifice/Grate (Controls 0.00 cfs)

Pond 4P: Existing Stormwater Pond

Hydrograph

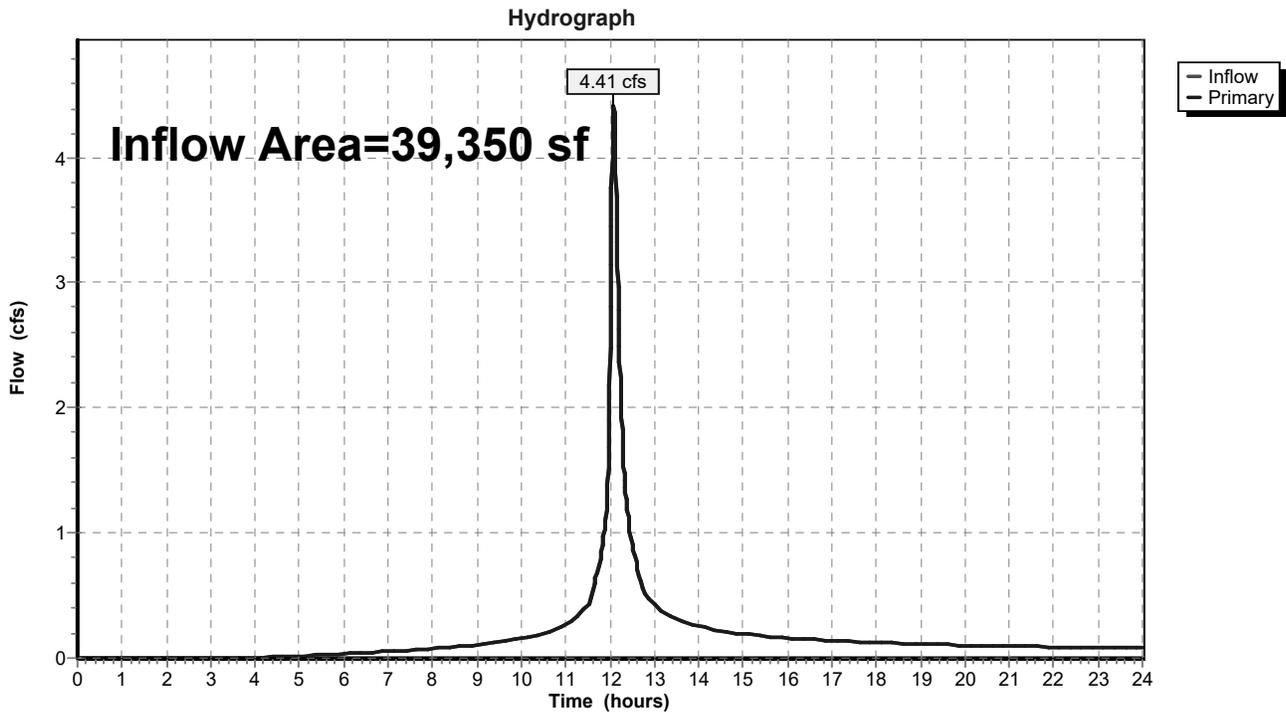


Summary for Link DP-1: Middle Street Gutter

Inflow Area = 39,350 sf, 9.83% Impervious, Inflow Depth > 4.62" for 25-yr event
Inflow = 4.41 cfs @ 12.08 hrs, Volume= 15,153 cf
Primary = 4.41 cfs @ 12.08 hrs, Volume= 15,153 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link DP-1: Middle Street Gutter



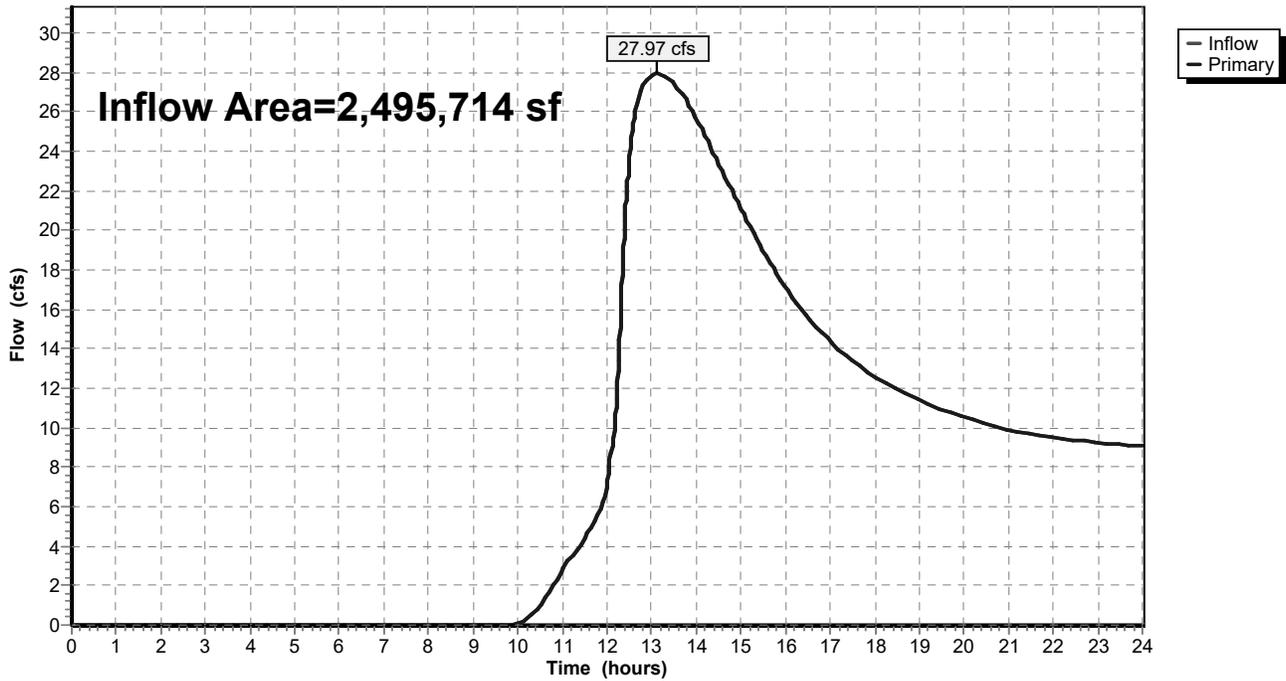
Summary for Link DP-2: Southern Wetland

Inflow Area = 2,495,714 sf, 73.68% Impervious, Inflow Depth > 3.22" for 25-yr event
Inflow = 27.97 cfs @ 13.10 hrs, Volume= 669,905 cf
Primary = 27.97 cfs @ 13.10 hrs, Volume= 669,905 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link DP-2: Southern Wetland

Hydrograph

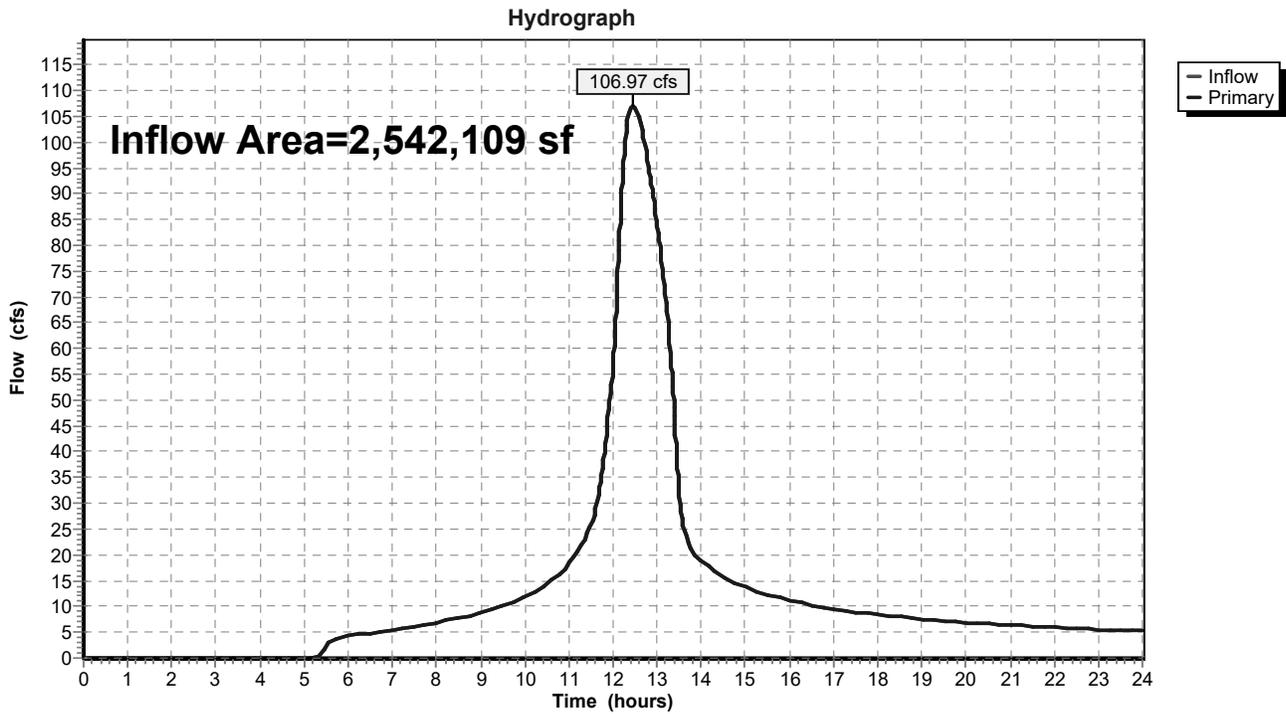


Summary for Link DP-3: Northern Wetland

Inflow Area = 2,542,109 sf, 56.21% Impervious, Inflow Depth > 5.07" for 25-yr event
Inflow = 106.97 cfs @ 12.45 hrs, Volume= 1,075,068 cf
Primary = 106.97 cfs @ 12.45 hrs, Volume= 1,075,068 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link DP-3: Northern Wetland



C-DAT-2001507-PROPOSED CT_Middletown_2001507_Depth 24-hr S1 100-yr Rainfall=8.16"

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Printed 5/14/2021

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Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentPDA-100: Area Draining to Runoff Area=39,350 sf 9.83% Impervious Runoff Depth>6.35"
Flow Length=962' Tc=9.9 min CN=85 Runoff=5.93 cfs 20,826 cf

SubcatchmentPDA-200: Area Draining Runoff Area=1,483,965 sf 90.90% Impervious Runoff Depth>7.79"
Flow Length=1,796' Tc=5.8 min CN=97 Runoff=309.33 cfs 963,380 cf

SubcatchmentPDA-210: Area Draining to Runoff Area=266,730 sf 73.87% Impervious Runoff Depth>7.43"
Flow Length=815' Tc=8.2 min CN=94 Runoff=48.12 cfs 165,079 cf

SubcatchmentPDA-211: Area Draining to Runoff Area=19,345 sf 83.46% Impervious Runoff Depth>7.67"
Tc=5.0 min CN=96 Runoff=4.19 cfs 12,368 cf

SubcatchmentPDA-220: Offsite Property Runoff Area=725,674 sf 38.14% Impervious Runoff Depth>6.58"
Flow Length=1,389' Tc=16.2 min CN=87 Runoff=87.40 cfs 397,751 cf

SubcatchmentPDA-300: Inbound Lot Runoff Area=1,479,100 sf 87.10% Impervious Runoff Depth>7.65"
Flow Length=1,360' Tc=17.7 min CN=96 Runoff=184.56 cfs 942,779 cf

SubcatchmentPDA-310: Vehicle Runoff Area=356,183 sf 32.74% Impervious Runoff Depth>6.45"
Flow Length=964' Tc=18.6 min CN=86 Runoff=39.42 cfs 191,573 cf

SubcatchmentPDA-320: Area Draining to Runoff Area=110,770 sf 5.92% Impervious Runoff Depth>5.87"
Flow Length=370' Tc=13.3 min CN=81 Runoff=13.59 cfs 54,195 cf

SubcatchmentPDA-330: Area Bypassing Runoff Area=269,860 sf 4.93% Impervious Runoff Depth>5.75"
Flow Length=848' Slope=0.0700 '/ Tc=15.2 min CN=80 Runoff=30.24 cfs 129,301 cf

SubcatchmentPDA-340: Area Draining to Runoff Area=326,196 sf 1.29% Impervious Runoff Depth>5.99"
Flow Length=670' Tc=12.8 min CN=82 Runoff=41.42 cfs 162,831 cf

Pond 1P: Existing Employee Lot Peak Elev=130.76' Storage=67,749 cf Inflow=48.12 cfs 165,079 cf
Outflow=8.16 cfs 149,637 cf

Pond 2P: Existing Outbound Lot Peak Elev=95.30' Storage=796,149 cf Inflow=364.66 cfs 1,523,136 cf
Outflow=44.04 cfs 1,007,837 cf

Pond 3P: Existing Sediment Forebay Peak Elev=30.65' Storage=46,962 cf Inflow=236.01 cfs 1,188,547 cf
Outflow=234.30 cfs 1,157,972 cf

Pond 4P: Existing Stormwater Pond Peak Elev=30.72' Storage=230,566 cf Inflow=298.67 cfs 1,450,104 cf
Outflow=124.23 cfs 1,446,511 cf

Link DP-1: Middle Street Gutter Inflow=5.93 cfs 20,826 cf
Primary=5.93 cfs 20,826 cf

Link DP-2: Southern Wetland Inflow=44.04 cfs 1,007,837 cf
Primary=44.04 cfs 1,007,837 cf

Link DP-3: Northern Wetland

Inflow=124.23 cfs 1,446,511 cf

Primary=124.23 cfs 1,446,511 cf

Total Runoff Area = 5,077,173 sf Runoff Volume = 3,040,083 cf Average Runoff Depth = 7.19"
35.56% Pervious = 1,805,478 sf 64.44% Impervious = 3,271,695 sf

Summary for Subcatchment PDA-100: Area Draining to Middle Street

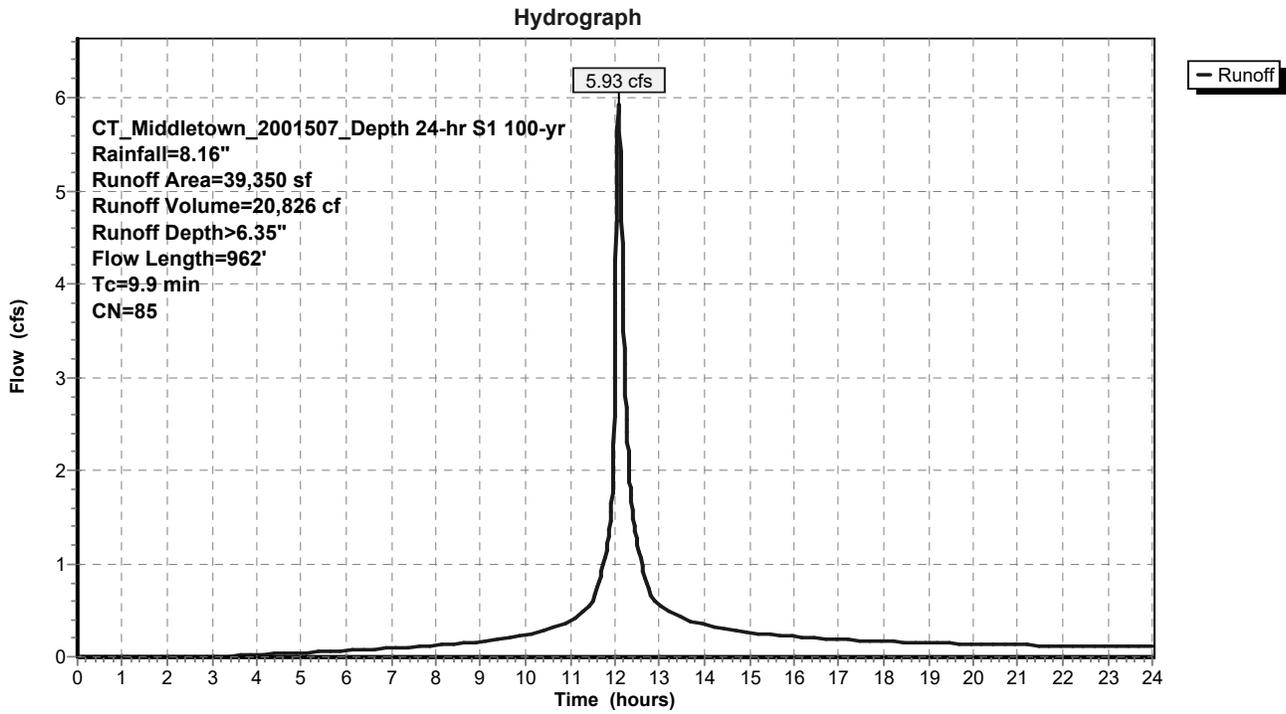
Runoff = 5.93 cfs @ 12.08 hrs, Volume= 20,826 cf, Depth> 6.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 100-yr Rainfall=8.16"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
0	79	50-75% Grass cover, Fair, HSG C
35,480	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
0	98	Paved parking, HSG C
3,870	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
0	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
39,350	85	Weighted Average
35,480		90.17% Pervious Area
3,870		9.83% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	28	0.1406	0.20		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
1.1	72	0.0120	1.06		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.29"
6.5	862	0.0120	2.22		Shallow Concentrated Flow, Paved Kv= 20.3 fps
9.9	962	Total			

Subcatchment PDA-100: Area Draining to Middle Street



Summary for Subcatchment PDA-200: Area Draining to Existing Outbound Lot Detention System

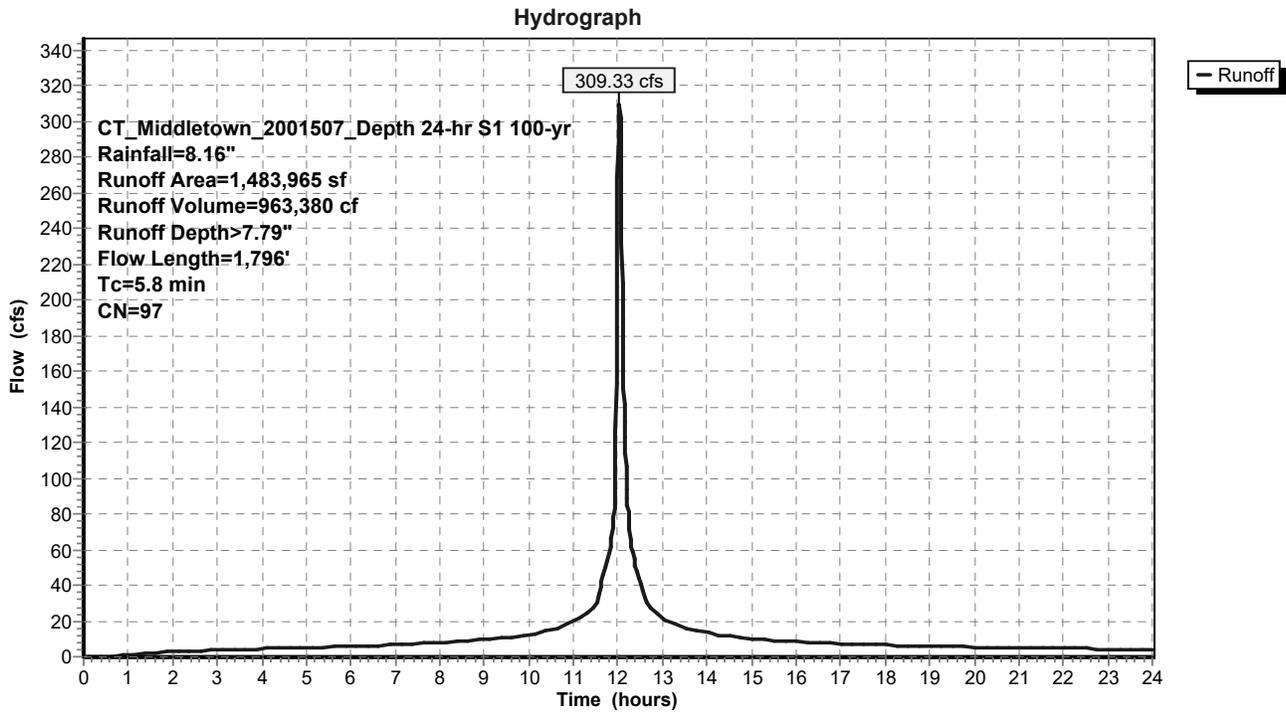
Runoff = 309.33 cfs @ 12.03 hrs, Volume= 963,380 cf, Depth> 7.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 100-yr Rainfall=8.16"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
60,335	79	50-75% Grass cover, Fair, HSG C
74,723	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
507,075	98	Paved parking, HSG C
841,832	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
0	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
1,483,965	97	Weighted Average
135,058		9.10% Pervious Area
1,348,907		90.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	100	0.0140	1.21		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.29"
1.2	176	0.0140	2.40		Shallow Concentrated Flow, Paved Kv= 20.3 fps
3.2	1,520	0.0100	7.80	24.51	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
5.8	1,796	Total			

Subcatchment PDA-200: Area Draining to Existing Outbound Lot Detention System



Summary for Subcatchment PDA-210: Area Draining to Existing Employee Lot Underground Detention

Runoff = 48.12 cfs @ 12.06 hrs, Volume= 165,079 cf, Depth> 7.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 100-yr Rainfall=8.16"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
0	79	50-75% Grass cover, Fair, HSG C
69,690	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
0	98	Paved parking, HSG C
197,040	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
0	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
266,730	94	Weighted Average
69,690		26.13% Pervious Area
197,040		73.87% Impervious Area

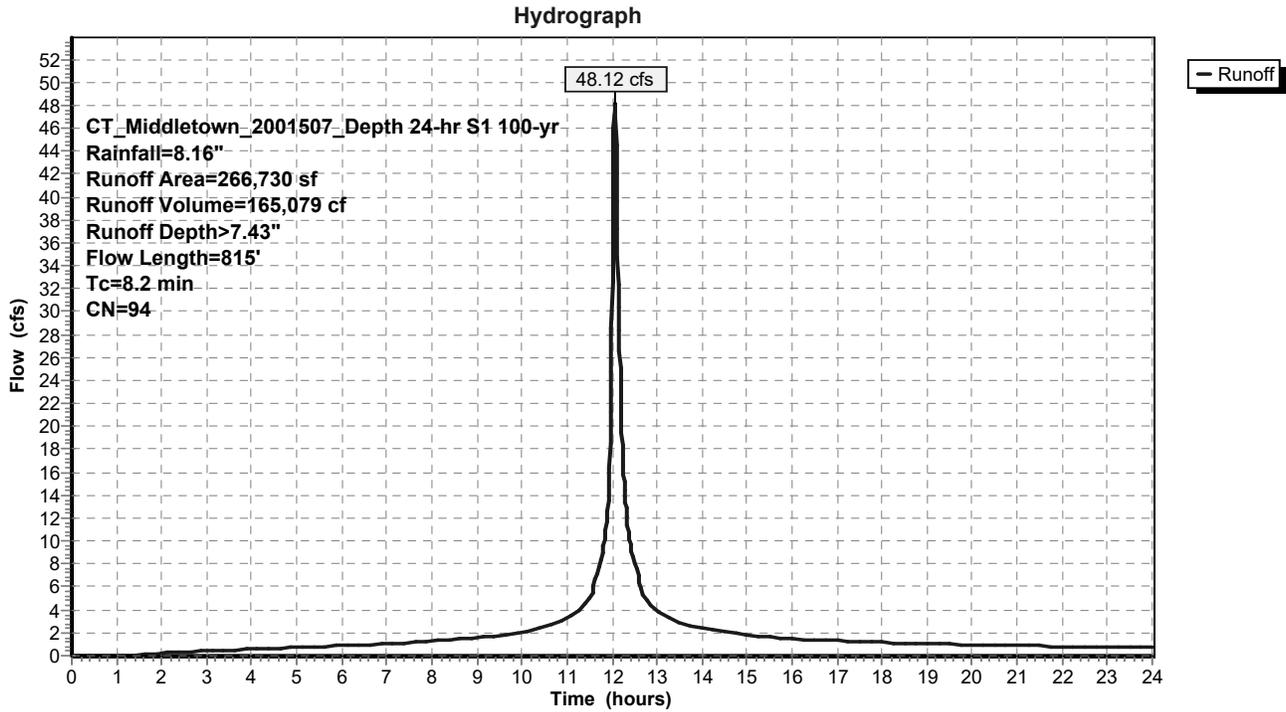
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.1	19	0.0160	0.08		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
1.1	81	0.0160	1.22		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.29"
1.1	164	0.0160	2.57		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.5	130	0.0050	4.03	4.95	Pipe Channel, 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012 Concrete pipe, finished
0.6	152	0.0050	4.55	8.05	Pipe Channel, 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.012 Concrete pipe, finished
0.3	108	0.0050	5.52	17.33	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
0.3	101	0.0050	5.52	17.33	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
0.1	38	0.0050	5.52	17.33	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
0.1	22	0.0050	7.23	51.09	Pipe Channel,

36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75'

n= 0.012 Concrete pipe, finished

8.2 815 Total

Subcatchment PDA-210: Area Draining to Existing Employee Lot Underground Detention



Summary for Subcatchment PDA-211: Area Draining to HDS-10

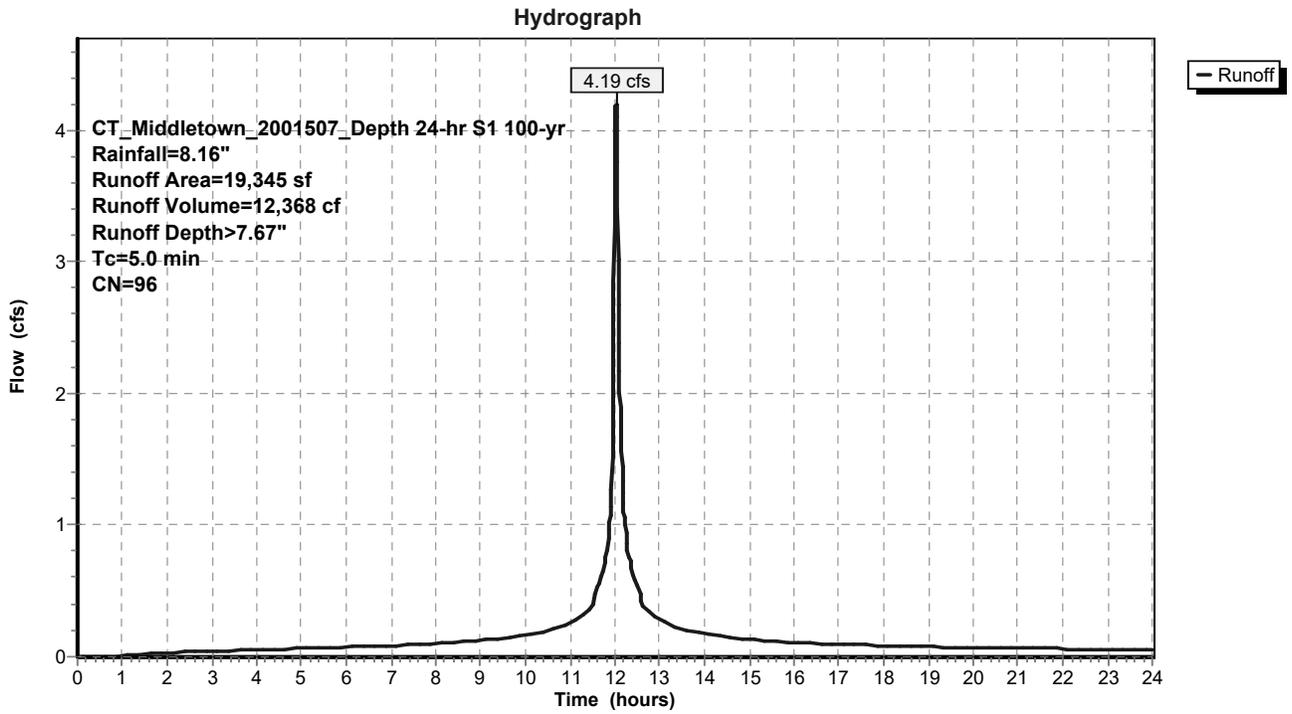
Runoff = 4.19 cfs @ 12.03 hrs, Volume= 12,368 cf, Depth> 7.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 100-yr Rainfall=8.16"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
0	79	50-75% Grass cover, Fair, HSG C
3,200	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
0	98	Paved parking, HSG C
16,145	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
0	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
19,345	96	Weighted Average
3,200		16.54% Pervious Area
16,145		83.46% Impervious Area

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

Subcatchment PDA-211: Area Draining to HDS-10



Summary for Subcatchment PDA-220: Offsite Property to Existing Outbound Lot Detention System

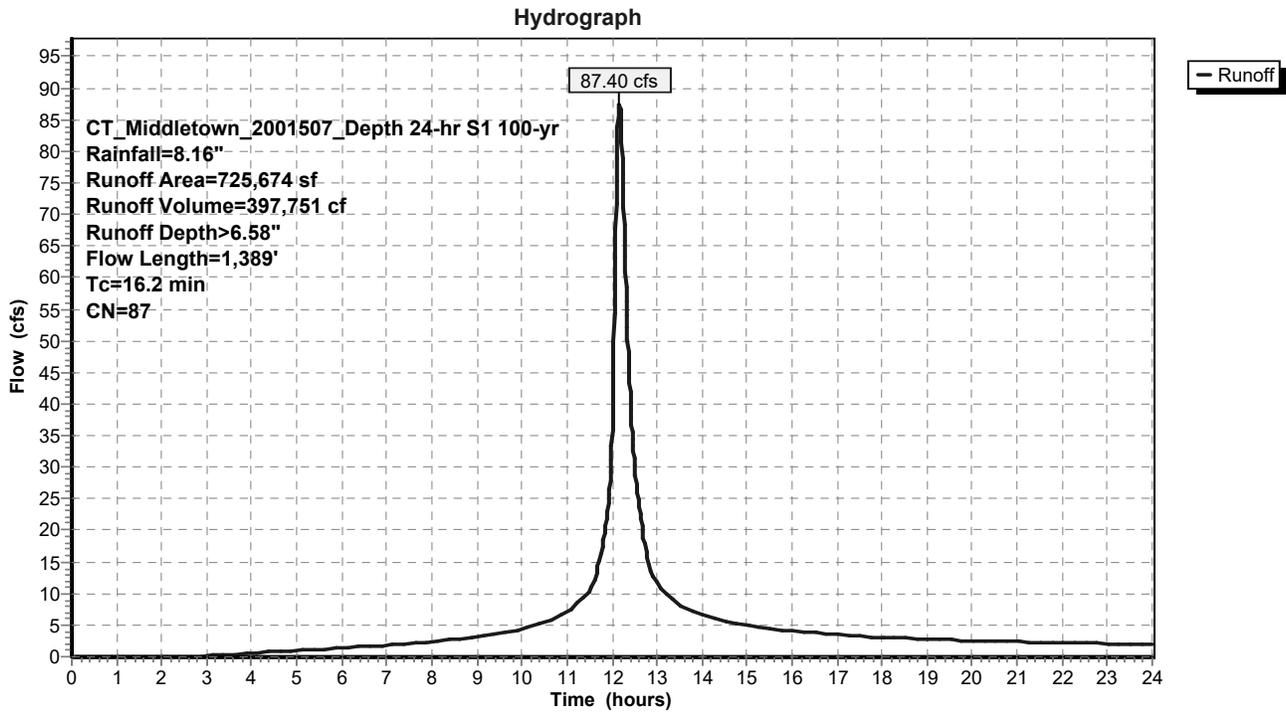
Runoff = 87.40 cfs @ 12.17 hrs, Volume= 397,751 cf, Depth> 6.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 100-yr Rainfall=8.16"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
218,535	79	50-75% Grass cover, Fair, HSG C
204,870	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
128,360	98	Paved parking, HSG C
148,395	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
0	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
25,514	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
725,674	87	Weighted Average
448,919		61.86% Pervious Area
276,755		38.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.1	100	0.0240	0.13		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
1.1	214	0.0374	3.11		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
2.0	1,075	0.0200	9.11	16.09	Pipe Channel, 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.012
16.2	1,389	Total			

Subcatchment PDA-220: Offsite Property to Existing Outbound Lot Detention System



Summary for Subcatchment PDA-300: Inbound Lot Area to Sediment Forebay

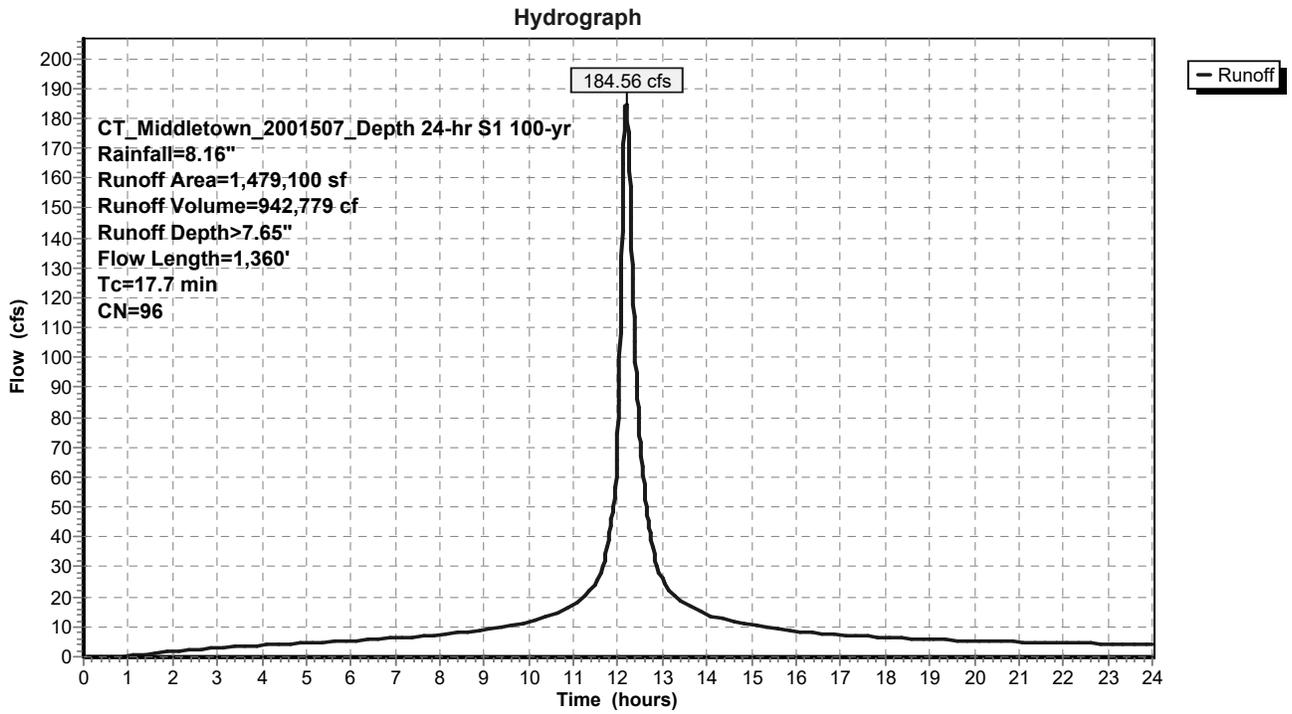
Runoff = 184.56 cfs @ 12.18 hrs, Volume= 942,779 cf, Depth> 7.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 100-yr Rainfall=8.16"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
119,543	79	50-75% Grass cover, Fair, HSG C
71,266	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
471,502	98	Paved parking, HSG C
816,789	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
0	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
1,479,100	96	Weighted Average
190,809		12.90% Pervious Area
1,288,291		87.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.2	80	0.0125	0.09		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
0.8	120	0.0150	2.49		Shallow Concentrated Flow, Paved Kv= 20.3 fps
2.7	1,160	0.0050	7.23	51.09	Pipe Channel, 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.012
17.7	1,360	Total			

Subcatchment PDA-300: Inbound Lot Area to Sediment Forebay



Summary for Subcatchment PDA-310: Vehicle Maintenance Area to Sediment Forebay

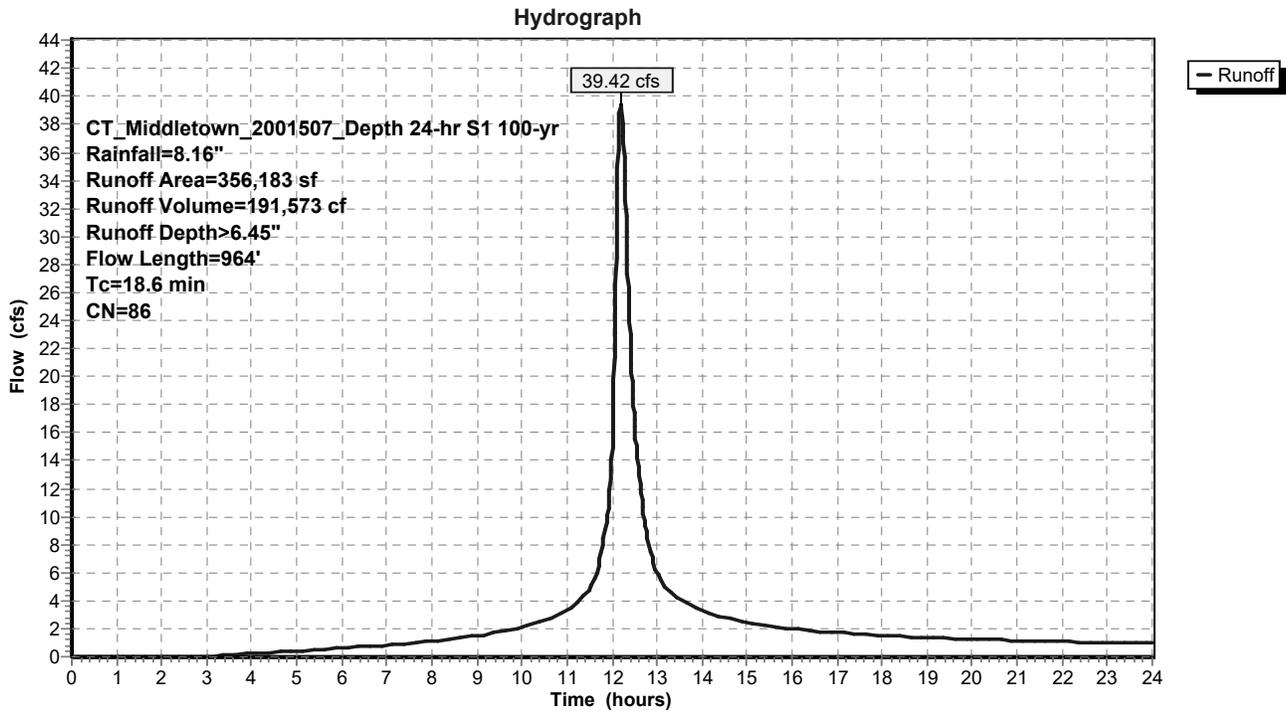
Runoff = 39.42 cfs @ 12.20 hrs, Volume= 191,573 cf, Depth> 6.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 100-yr Rainfall=8.16"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
153,724	79	50-75% Grass cover, Fair, HSG C
85,858	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
69,565	98	Paved parking, HSG C
47,036	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
0	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
356,183	86	Weighted Average
239,582		67.26% Pervious Area
116,601		32.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	60	0.0400	0.14		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
5.7	40	0.0300	0.12		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
5.3	541	0.0600	1.71		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.2	54	0.0050	4.03	4.95	Pipe Channel, 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.012
0.1	122	0.0500	17.44	54.80	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
0.1	108	0.0400	15.60	49.02	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
0.1	39	0.0085	7.19	22.59	Pipe Channel, 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
18.6	964	Total			

Subcatchment PDA-310: Vehicle Maintenance Area to Sediment Forebay



Summary for Subcatchment PDA-320: Area Draining to Sediment Forebay

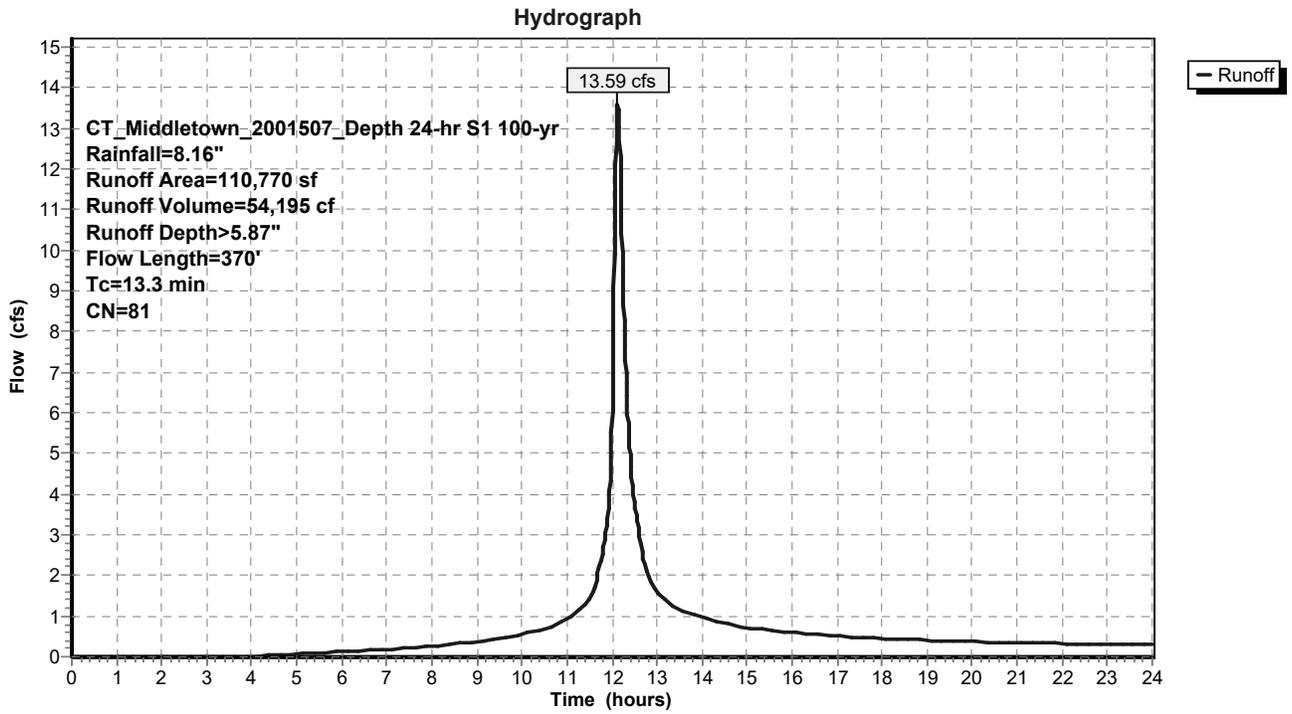
Runoff = 13.59 cfs @ 12.13 hrs, Volume= 54,195 cf, Depth> 5.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 100-yr Rainfall=8.16"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
98,913	79	50-75% Grass cover, Fair, HSG C
0	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
6,557	98	Paved parking, HSG C
0	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
5,300	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
110,770	81	Weighted Average
104,213		94.08% Pervious Area
6,557		5.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	100	0.0350	0.15		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
1.3	105	0.0350	1.31		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.7	165	0.3333	4.04		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
13.3	370	Total			

Subcatchment PDA-320: Area Draining to Sediment Forebay



Summary for Subcatchment PDA-330: Area Bypassing Sediment Forebay

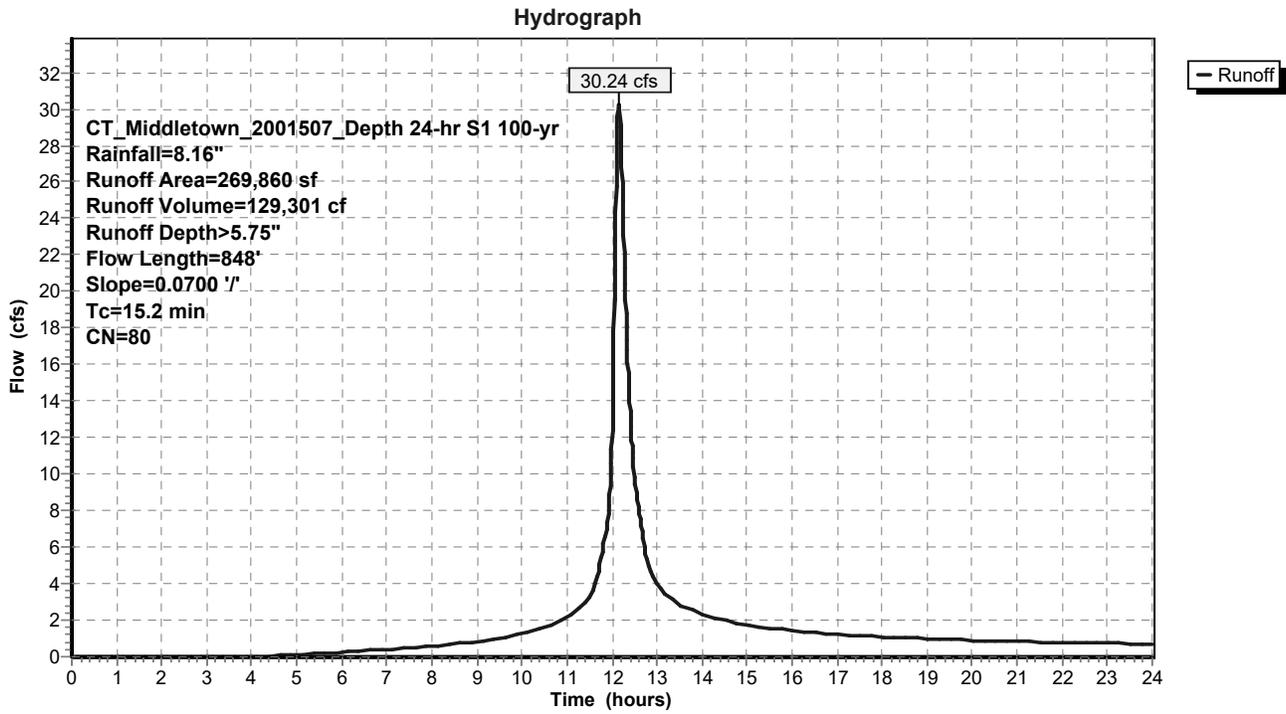
Runoff = 30.24 cfs @ 12.15 hrs, Volume= 129,301 cf, Depth> 5.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 100-yr Rainfall=8.16"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
232,381	79	50-75% Grass cover, Fair, HSG C
23,831	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
11,183	98	Paved parking, HSG C
2,124	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
341	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
0	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
269,860	80	Weighted Average
256,553		95.07% Pervious Area
13,307		4.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	100	0.0700	0.20		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
6.7	748	0.0700	1.85		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
15.2	848	Total			

Subcatchment PDA-330: Area Bypassing Sediment Forebay



Summary for Subcatchment PDA-340: Area Draining to Stormwater Pond

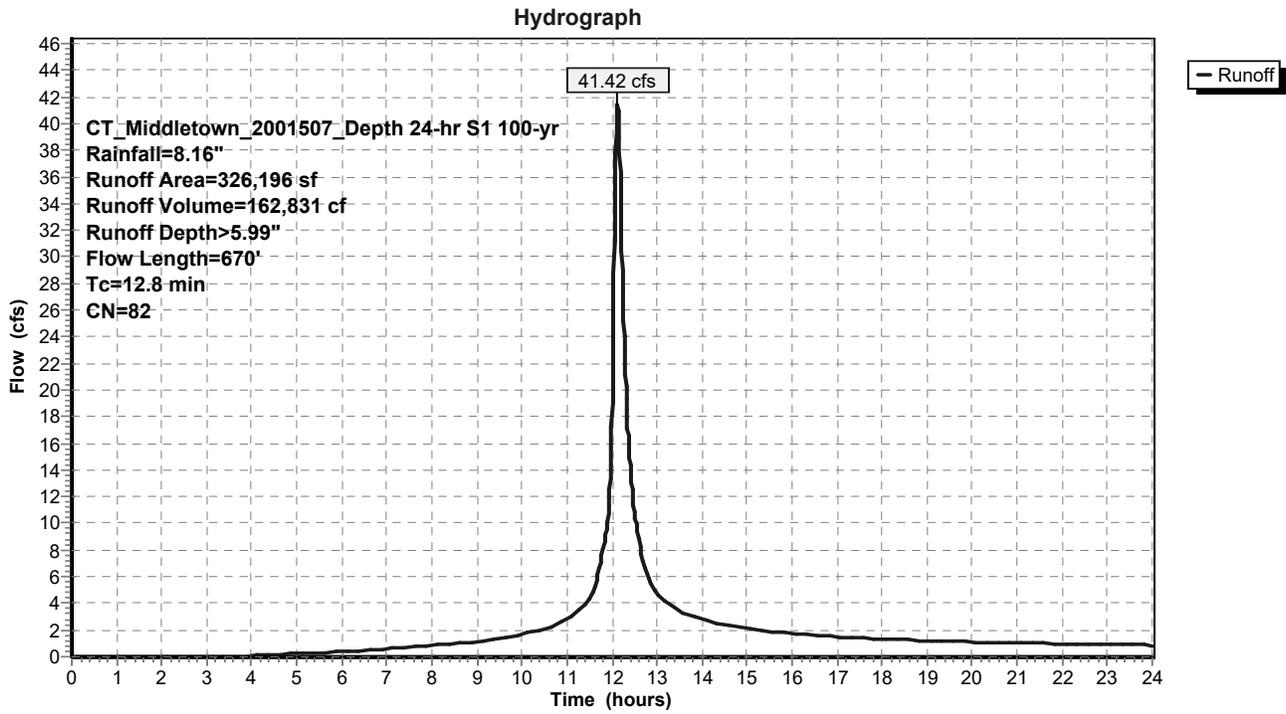
Runoff = 41.42 cfs @ 12.12 hrs, Volume= 162,831 cf, Depth> 5.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 CT_Middletown_2001507_Depth 24-hr S1 100-yr Rainfall=8.16"

Area (sf)	CN	Description
0	69	50-75% Grass cover, Fair, HSG B
269,284	79	50-75% Grass cover, Fair, HSG C
0	84	50-75% Grass cover, Fair, HSG D
0	98	Paved parking, HSG B
4,222	98	Paved parking, HSG C
0	98	Paved parking, HSG D
0	96	Gravel surface, HSG B
10,850	96	Gravel surface, HSG C
0	96	Gravel surface, HSG D
0	56	Brush, Fair, HSG B
0	70	Brush, Fair, HSG C
0	77	Brush, Fair, HSG D
0	60	Woods, Fair, HSG B
5,025	73	Woods, Fair, HSG C
0	79	Woods, Fair, HSG D
36,815	98	Water Surface, 0% imp, HSG C
326,196	82	Weighted Average
321,974		98.71% Pervious Area
4,222		1.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	100	0.0700	0.20		Sheet Flow, Grass: Dense n= 0.240 P2= 3.29"
4.3	570	0.1000	2.21		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
12.8	670	Total			

Subcatchment PDA-340: Area Draining to Stormwater Pond



Summary for Pond 1P: Existing Employee Lot Underground Detention System

Inflow Area = 266,730 sf, 73.87% Impervious, Inflow Depth > 7.43" for 100-yr event
 Inflow = 48.12 cfs @ 12.06 hrs, Volume= 165,079 cf
 Outflow = 8.16 cfs @ 12.50 hrs, Volume= 149,637 cf, Atten= 83%, Lag= 26.1 min
 Primary = 8.16 cfs @ 12.50 hrs, Volume= 149,637 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 130.76' @ 12.50 hrs Surf.Area= 11,725 sf Storage= 67,749 cf

Plug-Flow detention time= 201.9 min calculated for 149,637 cf (91% of inflow)
 Center-of-Mass det. time= 148.8 min (914.4 - 765.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	123.50'	2,345 cf	64.19'W x 182.67'L x 9.50'H Field A 111,387 cf Overall - 105,524 cf Embedded = 5,862 cf x 40.0% Voids
#2A	124.00'	83,580 cf	StormTrap ST2 DoubleTrap 8-0x 66 Inside #1 Inside= 101.7"W x 96.0"H => 61.09 sf x 15.40'L = 940.5 cf Outside= 101.7"W x 108.0"H => 76.31 sf x 15.40'L = 1,174.9 cf 66 Chambers in 6 Rows 50.88' x 169.35' Core + 6.66' Border = 64.19' x 182.67' System
		85,925 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	125.00'	24.0" Round Culvert L= 1,560.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 125.00' / 85.00' S= 0.0256 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#2	Device 1	125.00'	8.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	129.00'	12.0" Vert. Orifice/Grate C= 0.600
#4	Device 1	132.50'	3.0' long x 2.00' rise Sharp-Crested Rectangular Weir 2 End Contraction(s) 3.0' Crest Height

Primary OutFlow Max=8.16 cfs @ 12.50 hrs HW=130.76' (Free Discharge)

- 1=Culvert (Passes 8.16 cfs of 33.00 cfs potential flow)
- 2=Orifice/Grate (Orifice Controls 3.92 cfs @ 11.22 fps)
- 3=Orifice/Grate (Orifice Controls 4.25 cfs @ 5.41 fps)
- 4=Sharp-Crested Rectangular Weir(Controls 0.00 cfs)

Pond 1P: Existing Employee Lot Underground Detention System - Chamber Wizard Field A

Chamber Model = StormTrapST2 DoubleTrap 8-0 (StormTrapST2 DoubleTrap®Type II+IV)

Inside= 101.7"W x 96.0"H => 61.09 sf x 15.40'L = 940.5 cf
Outside= 101.7"W x 108.0"H => 76.31 sf x 15.40'L = 1,174.9 cf

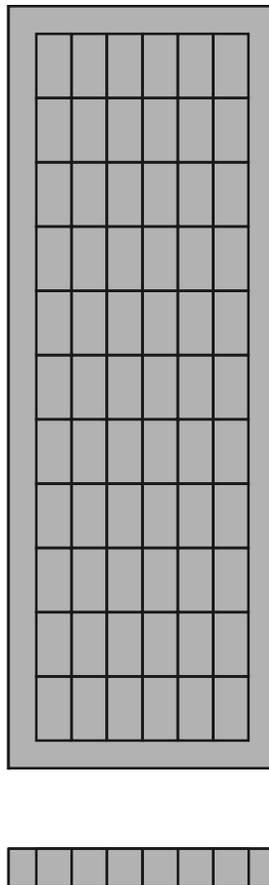
11 Chambers/Row x 15.40' Long = 169.35' Row Length +79.9" Border x 2 = 182.67' Base Length
6 Rows x 101.7" Wide + 79.9" Side Border x 2 = 64.19' Base Width
6.0" Base + 108.0" Chamber Height = 9.50' Field Height

66 Chambers x 940.5 cf + 21,503.9 cf Border = 83,579.7 cf Chamber Storage
66 Chambers x 1,174.9 cf + 27,981.2 cf Border = 105,524.2 cf Displacement

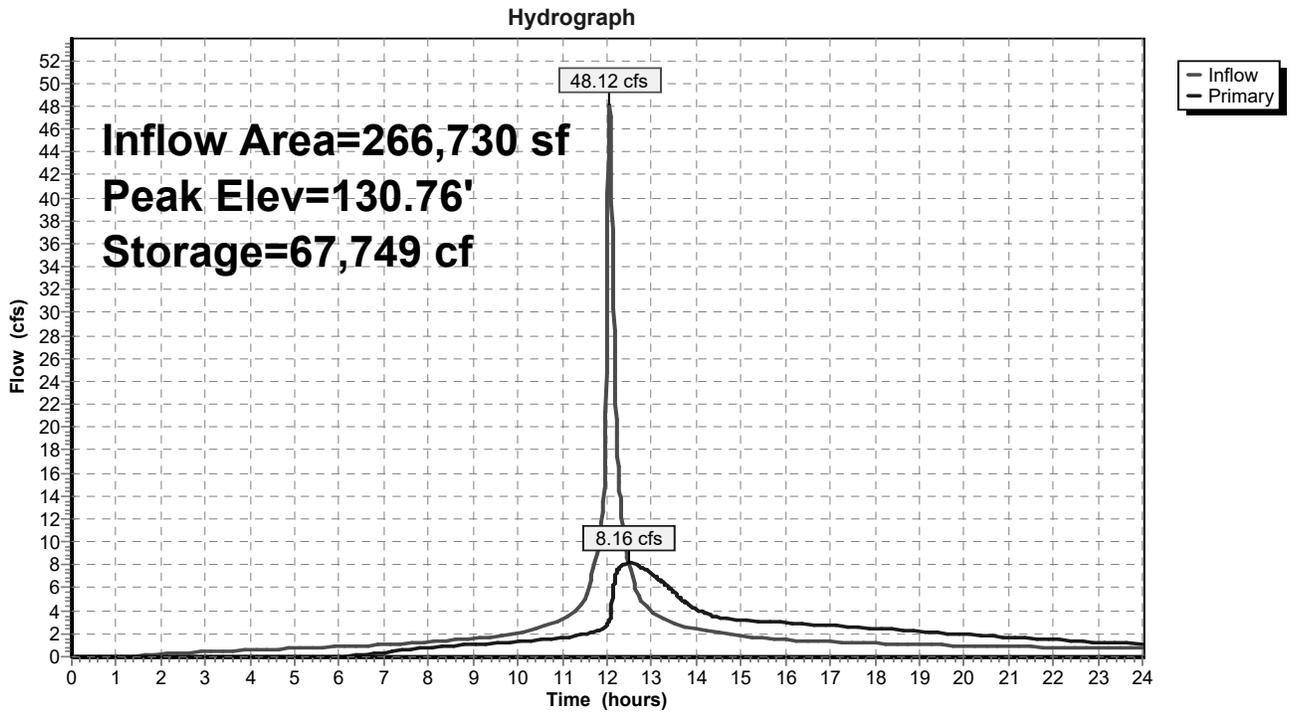
111,386.7 cf Field - 105,524.2 cf Chambers = 5,862.5 cf Stone x 40.0% Voids = 2,345.0 cf Stone Storage

Chamber Storage + Stone Storage = 85,924.7 cf = 1.973 af
Overall Storage Efficiency = 77.1%
Overall System Size = 182.67' x 64.19' x 9.50'

66 Chambers (plus border)
4,125.4 cy Field
217.1 cy Stone



Pond 1P: Existing Employee Lot Underground Detention System



Summary for Pond 2P: Existing Outbound Lot Underground Detention System

Inflow Area = 2,495,714 sf, 73.68% Impervious, Inflow Depth > 7.32" for 100-yr event
 Inflow = 364.66 cfs @ 12.04 hrs, Volume= 1,523,136 cf
 Outflow = 44.04 cfs @ 12.89 hrs, Volume= 1,007,837 cf, Atten= 88%, Lag= 51.4 min
 Primary = 44.04 cfs @ 12.89 hrs, Volume= 1,007,837 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 95.30' @ 12.89 hrs Surf.Area= 73,413 sf Storage= 796,149 cf

Plug-Flow detention time= 317.5 min calculated for 1,007,837 cf (66% of inflow)
 Center-of-Mass det. time= 183.6 min (961.2 - 777.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	82.50'	32,237 cf	183.90'W x 399.21'L x 13.33'H Field A 978,837 cf Overall - 898,245 cf Embedded = 80,592 cf x 40.0% Voids
#2A	83.50'	766,158 cf	StormTrap ST2 DoubleTrap 11-4x 500 Inside #1 Inside= 101.7"W x 136.0"H => 89.71 sf x 15.40'L = 1,381.1 cf Outside= 101.7"W x 148.0"H => 104.58 sf x 15.40'L = 1,610.0 cf 500 Chambers in 20 Rows 169.58' x 384.90' Core + 6.66' Border = 182.90' x 398.21' System
		798,395 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	86.00'	30.0" Round Culvert L= 120.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 86.00' / 85.50' S= 0.0042 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 4.91 sf
#2	Device 1	86.00'	13.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	91.00'	18.0" Vert. Orifice/Grate X 2 rows with 6.0" cc spacing C= 0.600
#4	Device 1	95.50'	3.0' long x 2.00' rise Sharp-Crested Rectangular Weir 2 End Contraction(s) 3.0' Crest Height

Primary OutFlow Max=44.04 cfs @ 12.89 hrs HW=95.30' (Free Discharge)

- 1=Culvert (Passes 44.04 cfs of 67.07 cfs potential flow)
- 2=Orifice/Grate (Orifice Controls 13.14 cfs @ 14.25 fps)
- 3=Orifice/Grate (Orifice Controls 30.90 cfs @ 8.74 fps)
- 4=Sharp-Crested Rectangular Weir(Controls 0.00 cfs)

Pond 2P: Existing Outbound Lot Underground Detention System - Chamber Wizard Field A

Chamber Model = StormTrapST2 DoubleTrap 11-4 (StormTrapST2 DoubleTrap®Type I+III)

Inside= 101.7"W x 136.0"H => 89.71 sf x 15.40'L = 1,381.1 cf

Outside= 101.7"W x 148.0"H => 104.58 sf x 15.40'L = 1,610.0 cf

25 Chambers/Row x 15.40' Long = 384.90' Row Length +79.9" Border x 2 +6.0" End Stone x 2 = 399.21' Base Length

20 Rows x 101.7" Wide + 79.9" Side Border x 2 + 6.0" Side Stone x 2 = 183.90' Base Width

12.0" Base + 148.0" Chamber Height = 13.33' Field Height

500 Chambers x 1,381.1 cf + 75,595.3 cf Border = 766,157.9 cf Chamber Storage

500 Chambers x 1,610.0 cf + 93,224.3 cf Border = 898,244.6 cf Displacement

978,836.7 cf Field - 898,244.6 cf Chambers = 80,592.0 cf Stone x 40.0% Voids = 32,236.8 cf Stone Storage

Chamber Storage + Stone Storage = 798,394.7 cf = 18.329 af

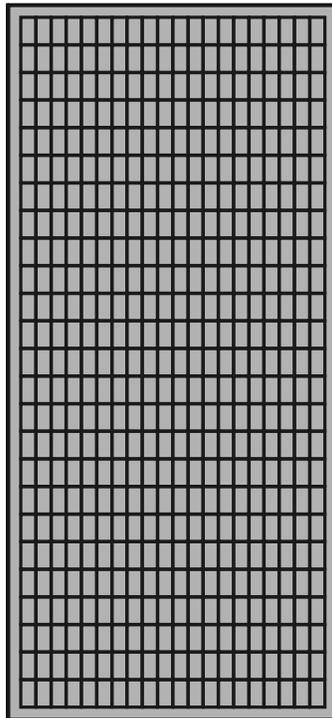
Overall Storage Efficiency = 81.6%

Overall System Size = 399.21' x 183.90' x 13.33'

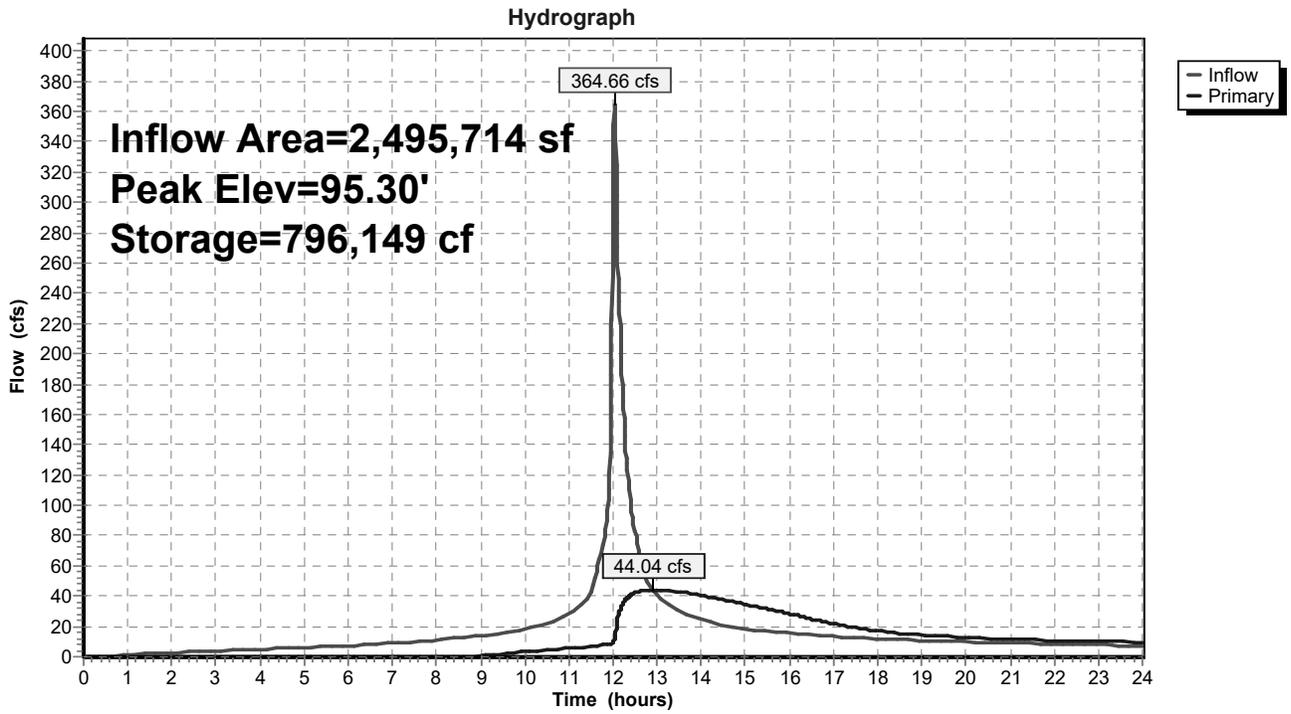
500 Chambers (plus border)

36,253.2 cy Field

2,984.9 cy Stone



Pond 2P: Existing Outbound Lot Underground Detention System



Summary for Pond 3P: Existing Sediment Forebay

Inflow Area = 1,946,053 sf, 72.53% Impervious, Inflow Depth > 7.33" for 100-yr event
 Inflow = 236.01 cfs @ 12.18 hrs, Volume= 1,188,547 cf
 Outflow = 234.30 cfs @ 12.20 hrs, Volume= 1,157,972 cf, Atten= 1%, Lag= 1.1 min
 Primary = 234.30 cfs @ 12.20 hrs, Volume= 1,157,972 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 4
 Peak Elev= 30.65' @ 12.20 hrs Surf.Area= 11,526 sf Storage= 46,962 cf

Plug-Flow detention time= 33.0 min calculated for 1,157,972 cf (97% of inflow)
 Center-of-Mass det. time= 16.6 min (788.6 - 771.9)

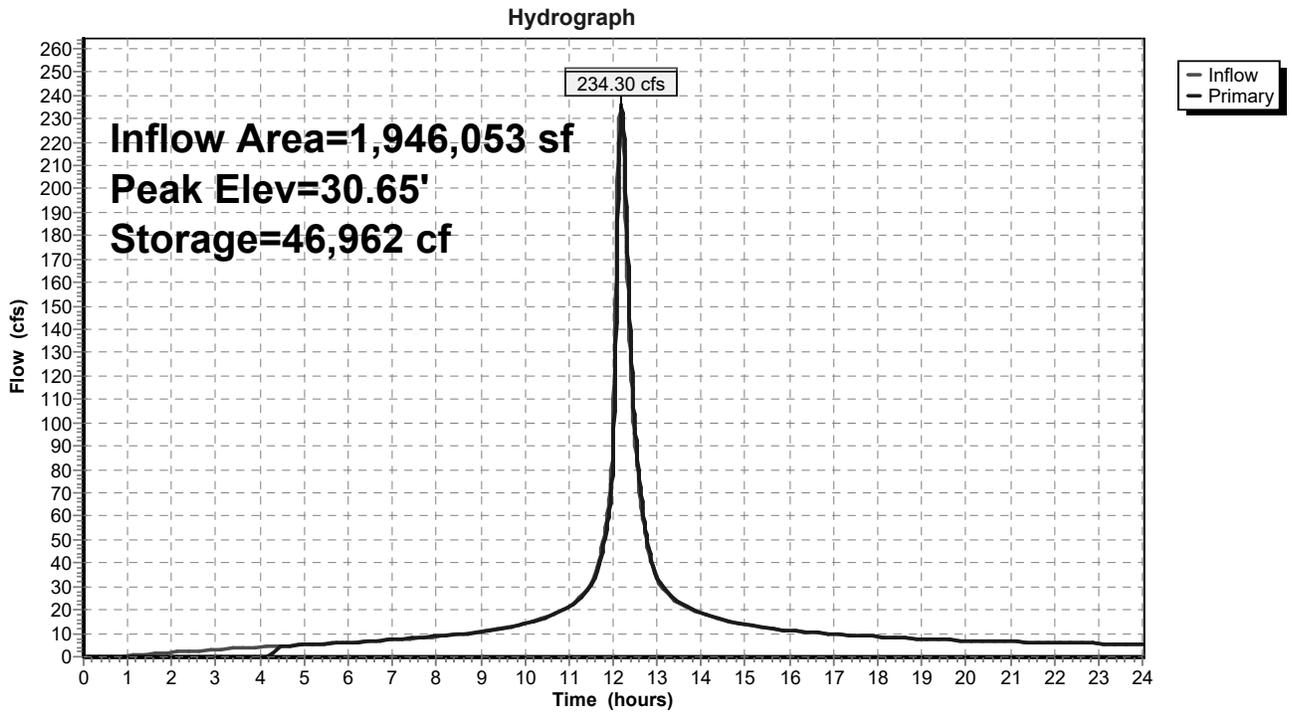
Volume	Invert	Avail.Storage	Storage Description
#1	24.00'	51,057 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
24.00	3,090	0	0
25.00	4,111	3,601	3,601
26.00	5,235	4,673	8,274
27.00	6,460	5,848	14,121
28.00	7,785	7,123	21,244
29.00	9,210	8,498	29,741
30.00	10,736	9,973	39,714
31.00	11,950	11,343	51,057

Device	Routing	Invert	Outlet Devices
#1	Primary	28.95'	40.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=234.21 cfs @ 12.20 hrs HW=30.65' (Free Discharge)

↑1=**Broad-Crested Rectangular Weir**(Weir Controls 234.21 cfs @ 3.44 fps)

Pond 3P: Existing Sediment Forebay



Summary for Pond 4P: Existing Stormwater Pond

Inflow Area = 2,542,109 sf, 56.21% Impervious, Inflow Depth > 6.85" for 100-yr event
 Inflow = 298.67 cfs @ 12.18 hrs, Volume= 1,450,104 cf
 Outflow = 124.23 cfs @ 12.48 hrs, Volume= 1,446,511 cf, Atten= 58%, Lag= 18.1 min
 Primary = 124.23 cfs @ 12.48 hrs, Volume= 1,446,511 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 30.72' @ 12.48 hrs Surf.Area= 72,664 sf Storage= 230,566 cf

Plug-Flow detention time= 13.8 min calculated for 1,445,909 cf (100% of inflow)
 Center-of-Mass det. time= 12.2 min (806.9 - 794.8)

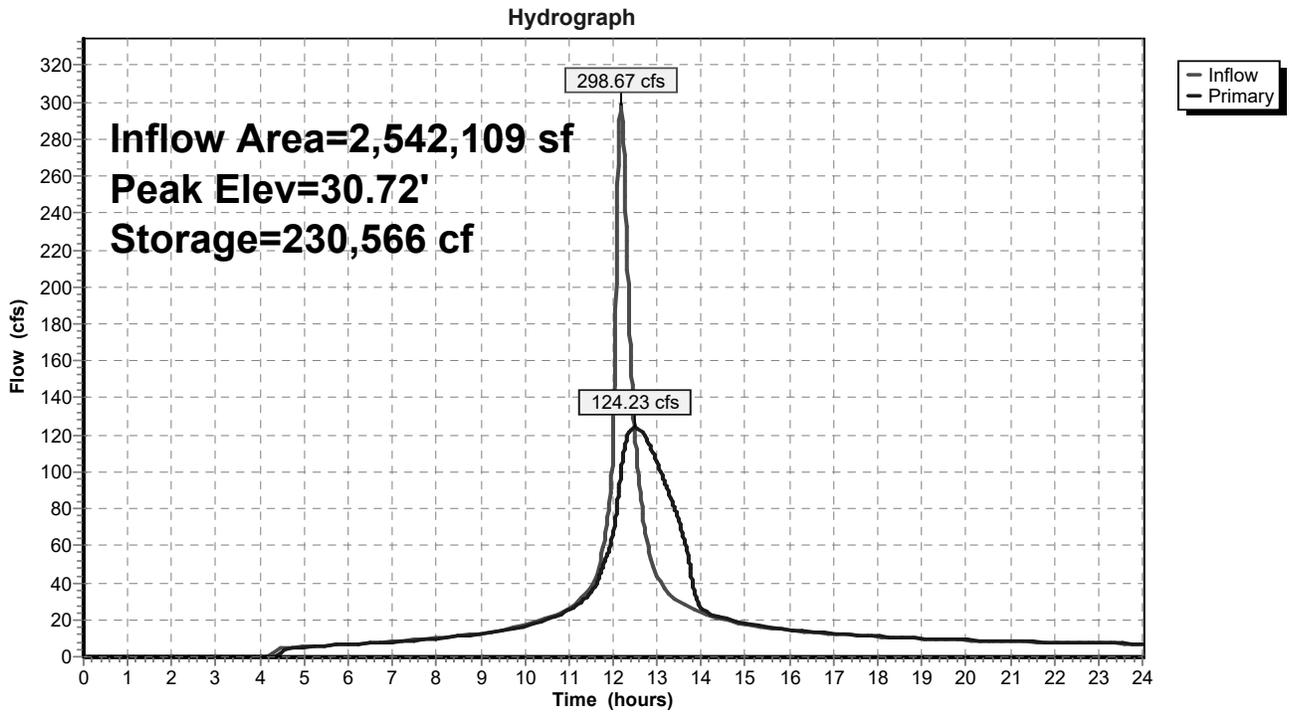
Volume	Invert	Avail.Storage	Storage Description
#1	24.00'	680,910 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
24.00	50	0	0
27.00	10,786	16,254	16,254
28.00	59,106	34,946	51,200
30.00	69,432	128,538	179,738
32.00	78,467	147,899	327,637
34.00	87,601	166,068	493,705
36.00	99,604	187,205	680,910

Device	Routing	Invert	Outlet Devices
#1	Primary	35.50'	70.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#2	Primary	24.50'	48.0" Vert. Orifice/Grate C= 0.600
#3	Primary	34.50'	2.0" Horiz. Orifice/Grate X 8.00 columns X 10 rows C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=124.23 cfs @ 12.48 hrs HW=30.72' (Free Discharge)

- 1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)
- 2=Orifice/Grate (Orifice Controls 124.23 cfs @ 9.89 fps)
- 3=Orifice/Grate (Controls 0.00 cfs)

Pond 4P: Existing Stormwater Pond

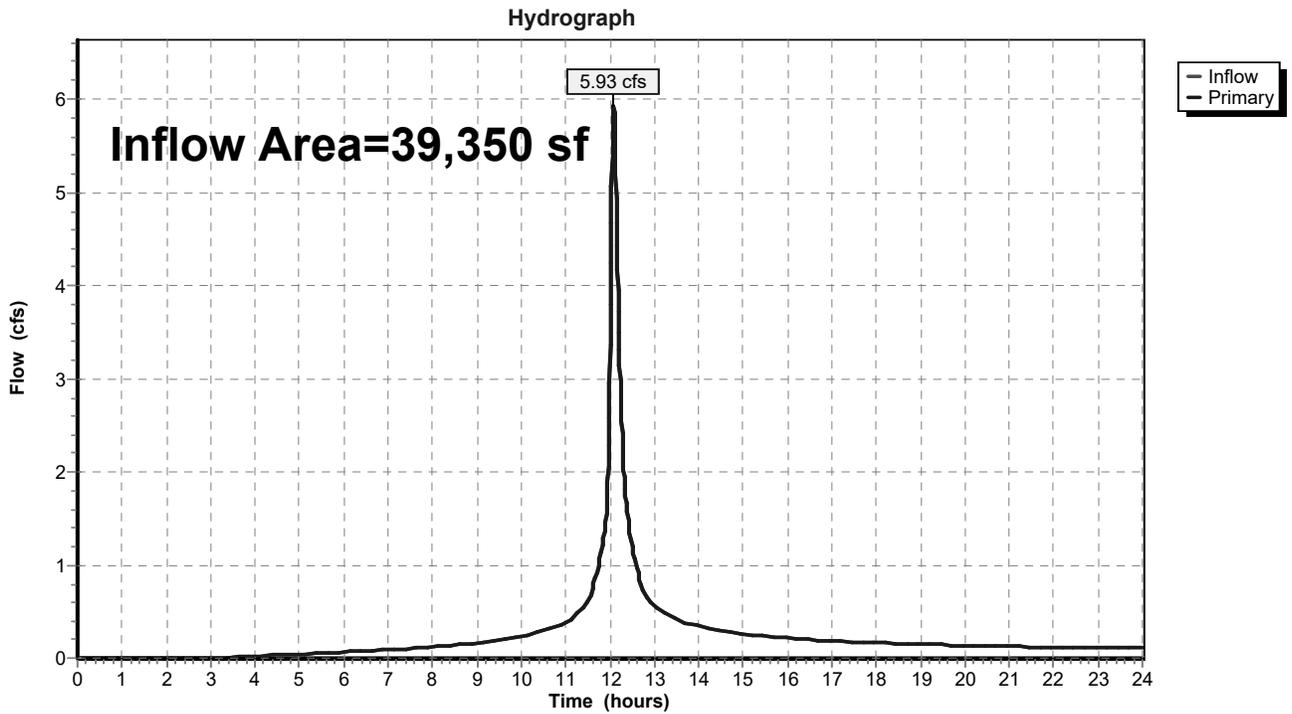


Summary for Link DP-1: Middle Street Gutter

Inflow Area = 39,350 sf, 9.83% Impervious, Inflow Depth > 6.35" for 100-yr event
Inflow = 5.93 cfs @ 12.08 hrs, Volume= 20,826 cf
Primary = 5.93 cfs @ 12.08 hrs, Volume= 20,826 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link DP-1: Middle Street Gutter



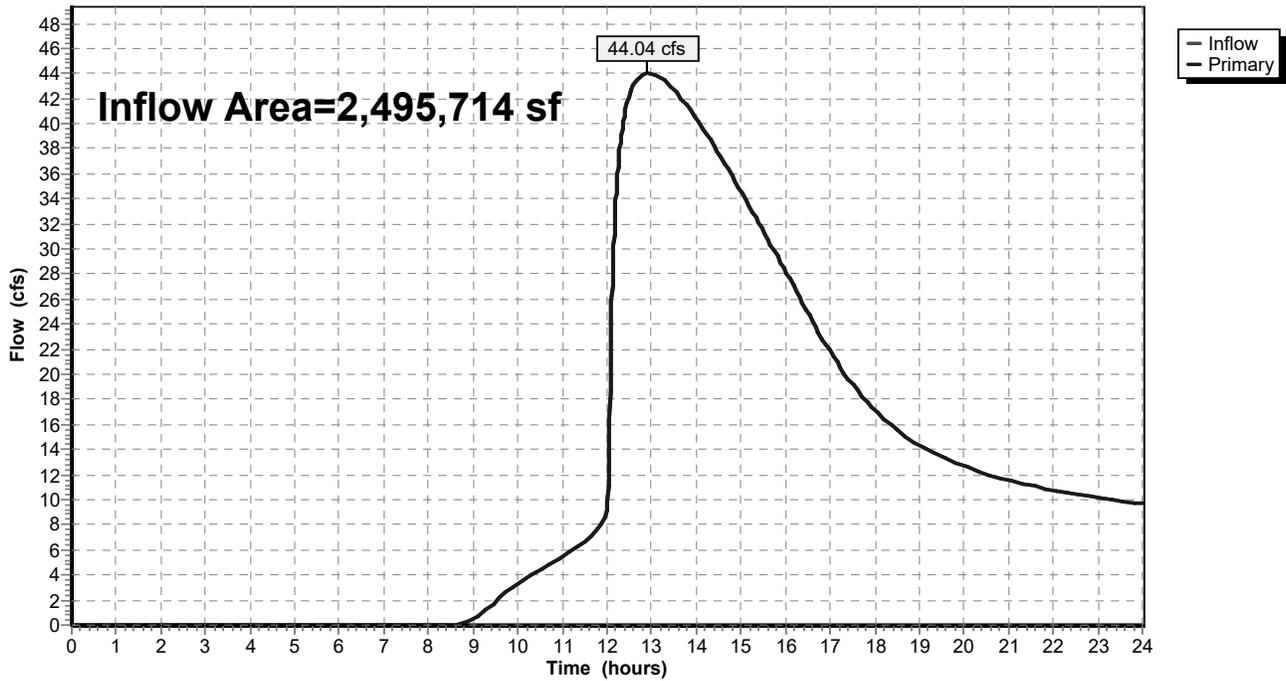
Summary for Link DP-2: Southern Wetland

Inflow Area = 2,495,714 sf, 73.68% Impervious, Inflow Depth > 4.85" for 100-yr event
Inflow = 44.04 cfs @ 12.89 hrs, Volume= 1,007,837 cf
Primary = 44.04 cfs @ 12.89 hrs, Volume= 1,007,837 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link DP-2: Southern Wetland

Hydrograph



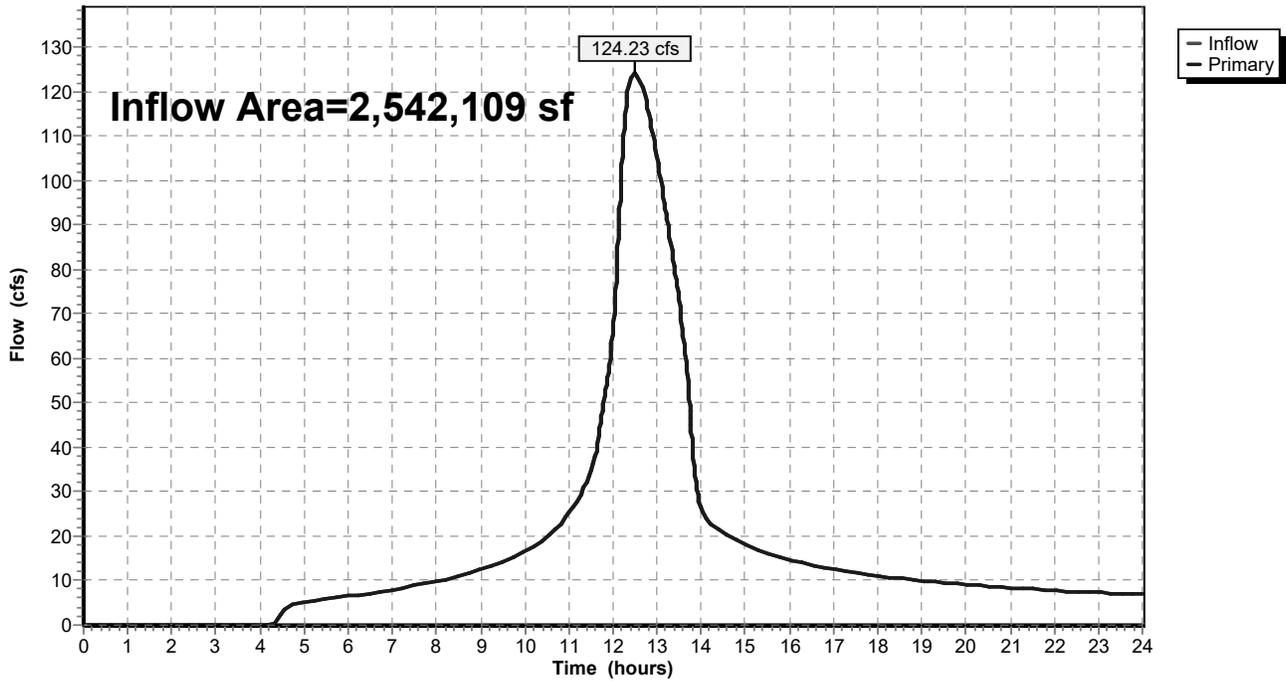
Summary for Link DP-3: Northern Wetland

Inflow Area = 2,542,109 sf, 56.21% Impervious, Inflow Depth > 6.83" for 100-yr event
Inflow = 124.23 cfs @ 12.48 hrs, Volume= 1,446,511 cf
Primary = 124.23 cfs @ 12.48 hrs, Volume= 1,446,511 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link DP-3: Northern Wetland

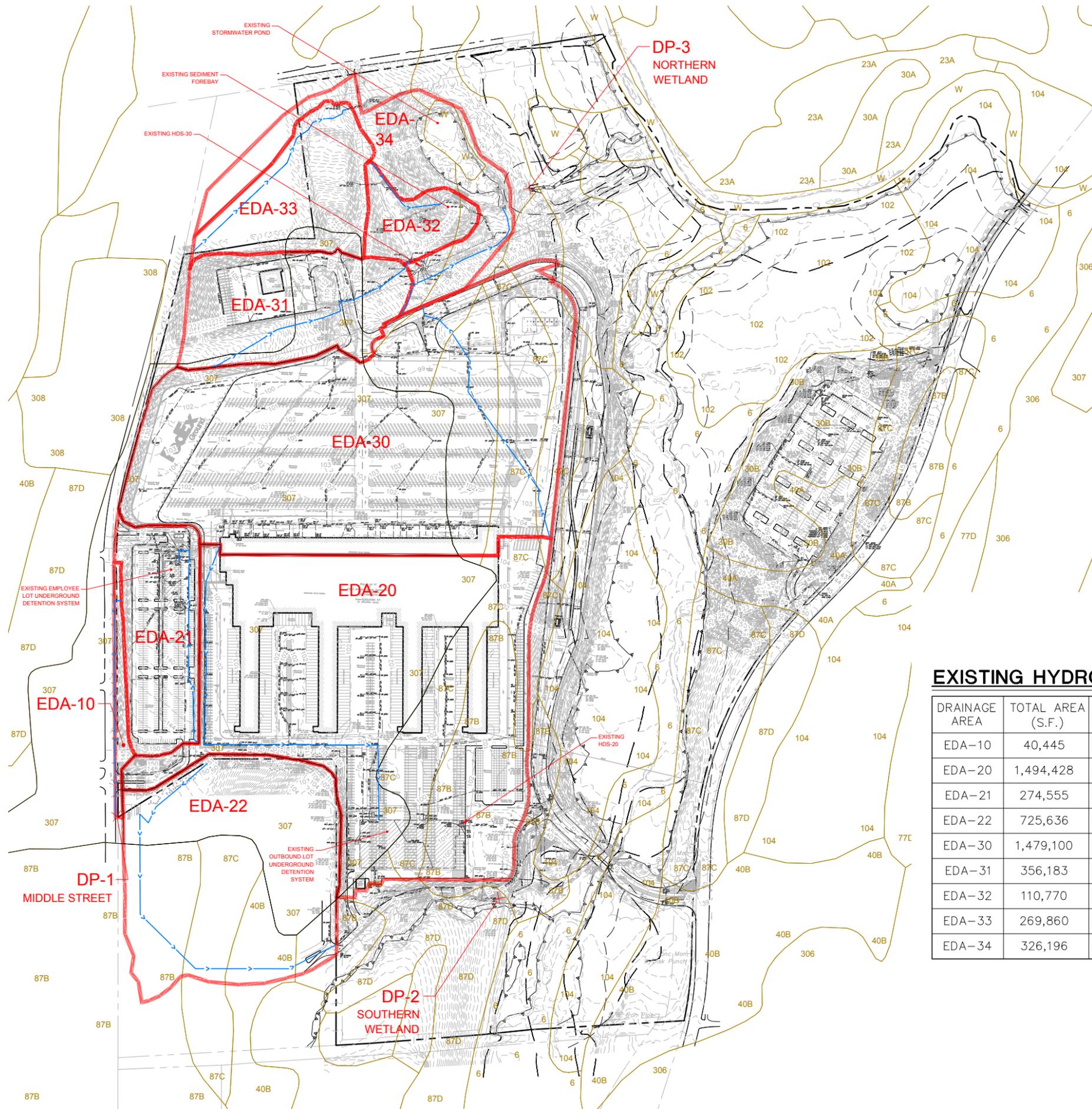
Hydrograph



APPENDIX D

DRAINAGE MAPS

Existing Drainage Mapping (ED-1)
Proposed Drainage Mapping (PD-1)
Grading and Drainage Plans

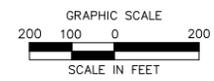


HYDROLOGY LEGEND

-  PROPERTY LINE
-  DRAINAGE AREA BOUNDARY
-  TIME OF CONCENTRATION FLOW PATH
-  SOIL TYPE BOUNDARY
-  SOIL TYPE DESIGNATION

EXISTING HYDROLOGY INFORMATION

DRAINAGE AREA	TOTAL AREA (S.F.)	IMPERVIOUS AREA (S.F.)	PERVIOUS AREA (S.F.)	PERCENT IMPERVIOUS (%)	CN	TIME OF CONCENTRATION (MIN.)
EDA-10	40,445	2,440	38,005	6.0%	85	9.9
EDA-20	1,494,428	1,306,109	188,319	87.4%	96	5.8
EDA-21	274,555	194,785	79,770	71.0%	94	8.2
EDA-22	725,636	276,755	448,881	38.1%	87	16.2
EDA-30	1,479,100	1,194,445	284,655	80.8%	95	17.7
EDA-31	356,183	116,601	239,582	32.7%	86	18.6
EDA-32	110,770	6,557	104,213	5.9%	81	13.3
EDA-33	269,860	13,307	256,553	4.9%	80	15.2
EDA-34	326,196	4,222	321,974	1.3%	82	12.8



REVISIONS

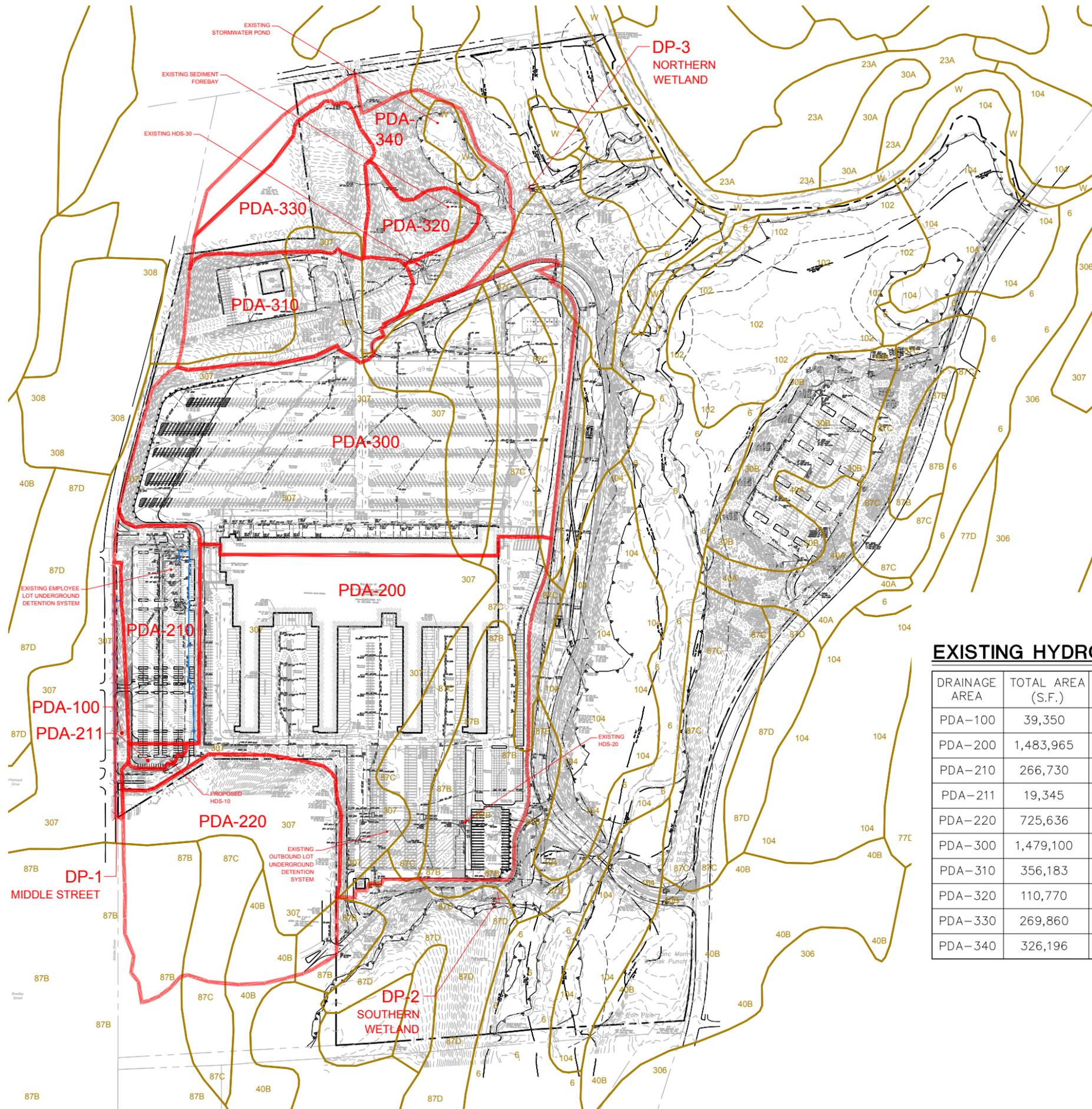
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Reviewed: J.A.B.
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Date: 05/14/2021
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EXISTING DRAINAGE MAPPING

Sheet No.

ED-1

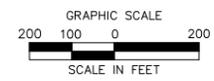


HYDROLOGY LEGEND

-  PROPERTY LINE
-  DRAINAGE AREA BOUNDARY
-  TIME OF CONCENTRATION FLOW PATH
-  SOIL TYPE BOUNDARY
-  SOIL TYPE DESIGNATION

EXISTING HYDROLOGY INFORMATION

DRAINAGE AREA	TOTAL AREA (S.F.)	IMPERVIOUS AREA (S.F.)	PERVIOUS AREA (S.F.)	PERCENT IMPERVIOUS (%)	CN	TIME OF CONCENTRATION (MIN.)
PDA-100	39,350	3,870	35,480	9.8%	85	9.9
PDA-200	1,483,965	1,348,907	135,058	90.9%	97	5.8
PDA-210	266,730	197,040	69,690	73.9%	94	8.2
PDA-211	19,345	16,145	3,200	83.5%	96	5.0
PDA-220	725,636	276,755	448,881	38.1%	87	16.2
PDA-300	1,479,100	1,288,291	190,809	87.1%	96	17.7
PDA-310	356,183	116,601	239,582	32.7%	86	18.6
PDA-320	110,770	6,557	104,213	5.9%	81	13.3
PDA-330	269,860	13,307	256,553	4.9%	80	15.2
PDA-340	326,196	4,222	321,974	1.3%	82	12.8

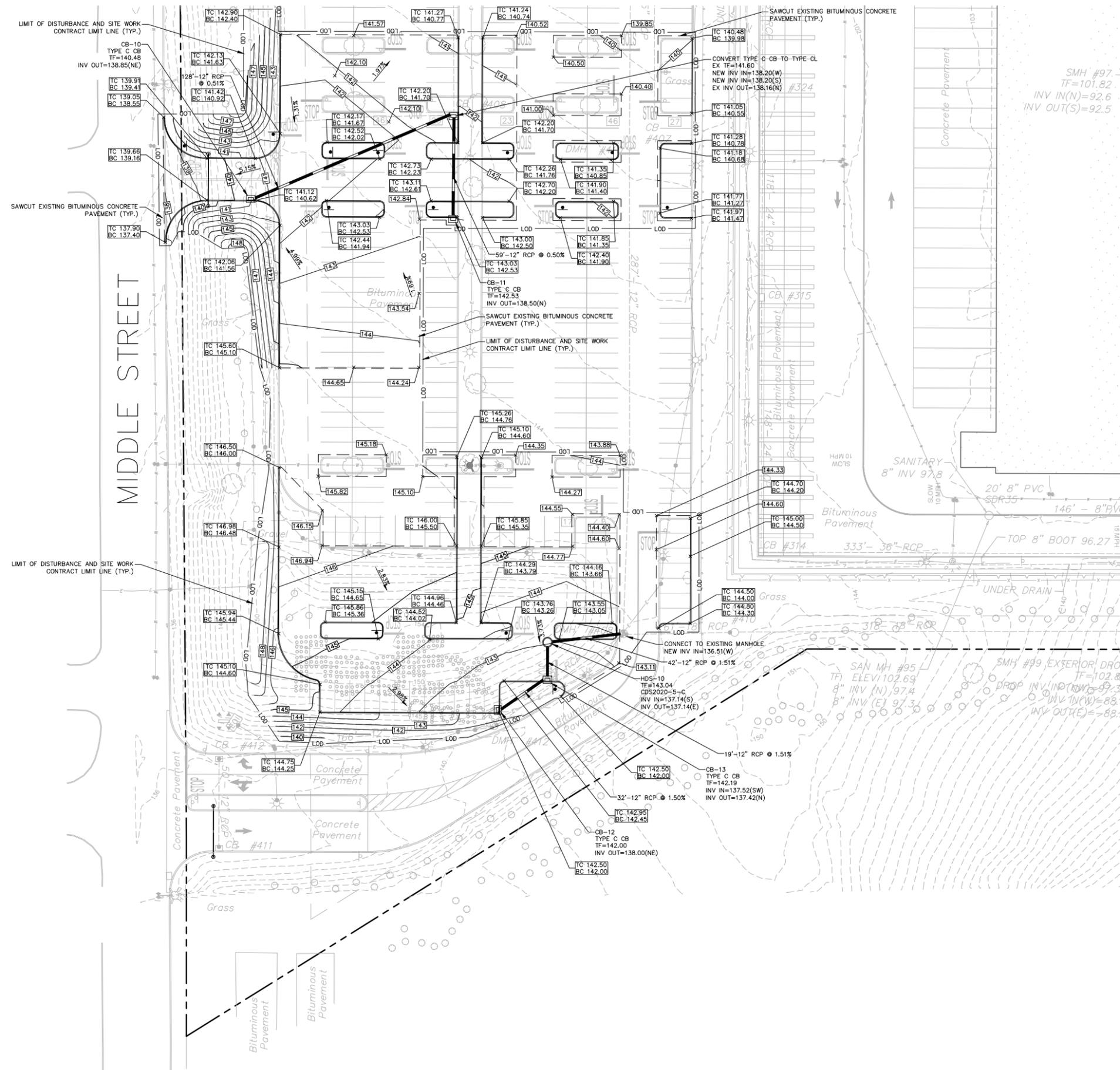


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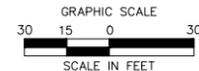
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Reviewed: J.A.B.
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Date: 05/14/2021
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Sheet No.:

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GRADING AND DRAINAGE LEGEND

- LOD
- PROPOSED TREE DRIP LINE AND LIMIT OF CLEARING AND GRUBBING
- SAWCUT LINE
- PROPOSED CONTOUR LINE (1' INTERVAL)
- EXISTING CONTOUR LINE (1' INTERVAL)
- PROPOSED SPOT GRADE
- SPOT GRADE ABBREVIATIONS:
BC BOTTOM OF CURB
TC TOP OF CURB
BL BOTTOM OF LIP
TL TOP OF LIP
BW BOTTOM OF WALL
TW TOP OF WALL
MEX MEET EXISTING CONDITION
- PROVIDE AND INSTALL STORM PIPE
- PROVIDE AND INSTALL TYPE C-L CATCH BASIN
- PROVIDE AND INSTALL TYPE C CATCH BASIN
- PROVIDE AND INSTALL DRAINAGE MANHOLE OR OUTLET CONTROL STRUCTURE
- PROVIDE AND INSTALL RIPRAP



NOT FOR CONSTRUCTION
FOR PERMITTING PURPOSES ONLY

REFER TO SHEET GN-1 FOR
SITE WORK GENERAL NOTES

PHILMACK
DRIVE

MIDDLE STREET

**EXISTING FEDEX GROUND HUB
HUB PARKING EXPANSION**
49 FEDEX DRIVE
MIDDLETOWN, CONNECTICUT

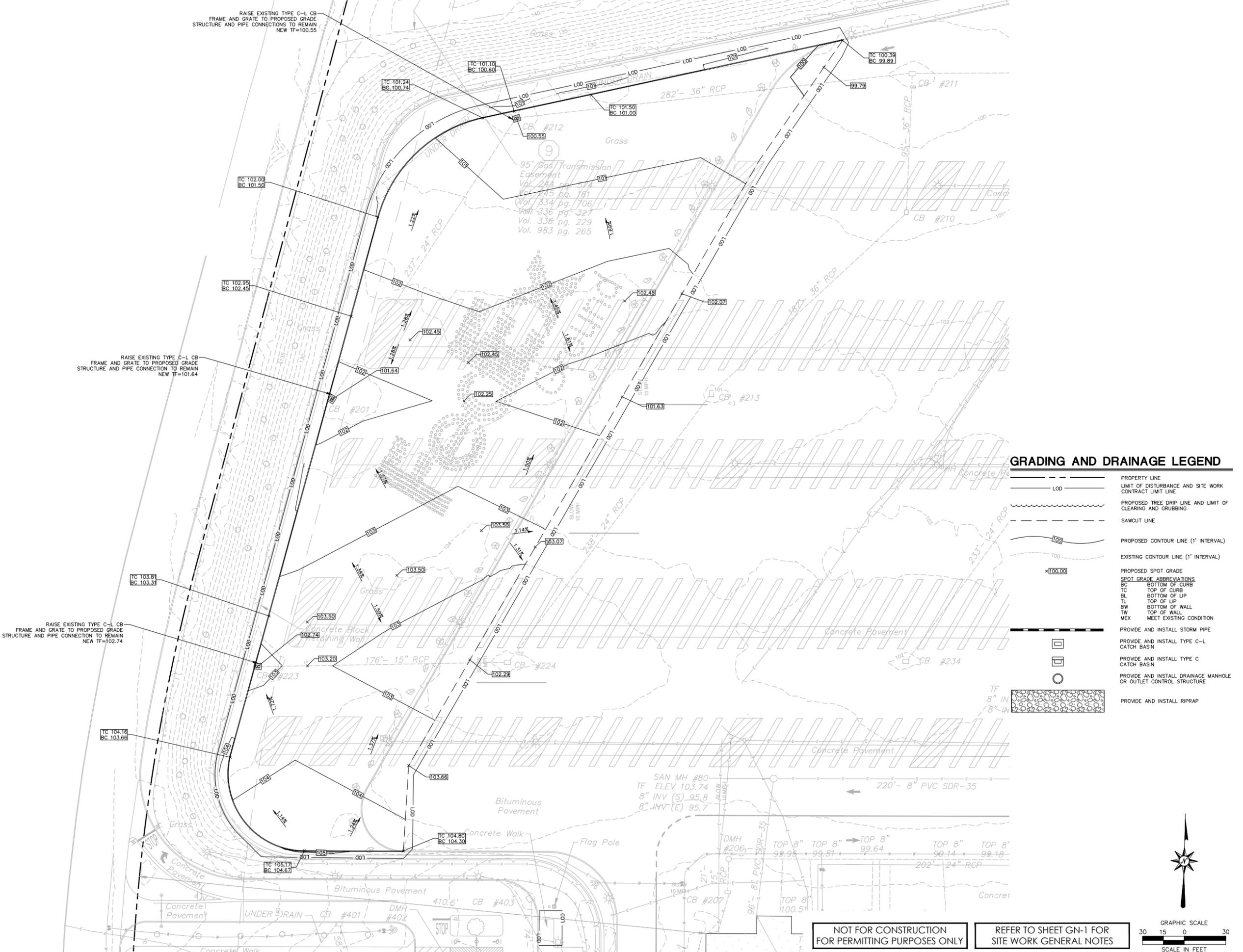
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GRADING AND DRAINAGE PLAN

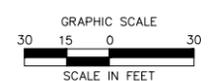
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GD-2



GRADING AND DRAINAGE LEGEND

---	PROPERTY LINE
---	LIMIT OF DISTURBANCE AND SITE WORK CONTRACT LIMIT LINE
---	PROPOSED TREE DRIP LINE AND LIMIT OF CLEARING AND GRUBBING
---	SAWCUT LINE
---	PROPOSED CONTOUR LINE (1' INTERVAL)
---	EXISTING CONTOUR LINE (1' INTERVAL)
x[100.00]	PROPOSED SPOT GRADE
BC	SPOT GRADE ABBREVIATIONS
TC	BOTTOM OF CURB
TL	TOP OF CURB
BL	BOTTOM OF LIP
TL	TOP OF LIP
BW	BOTTOM OF WALL
TW	TOP OF WALL
MEX	MEET EXISTING CONDITION
---	PROVIDE AND INSTALL STORM PIPE
□	PROVIDE AND INSTALL TYPE C-L CATCH BASIN
□	PROVIDE AND INSTALL TYPE C CATCH BASIN
○	PROVIDE AND INSTALL DRAINAGE MANHOLE OR OUTLET CONTROL STRUCTURE
○	PROVIDE AND INSTALL RIPRAP



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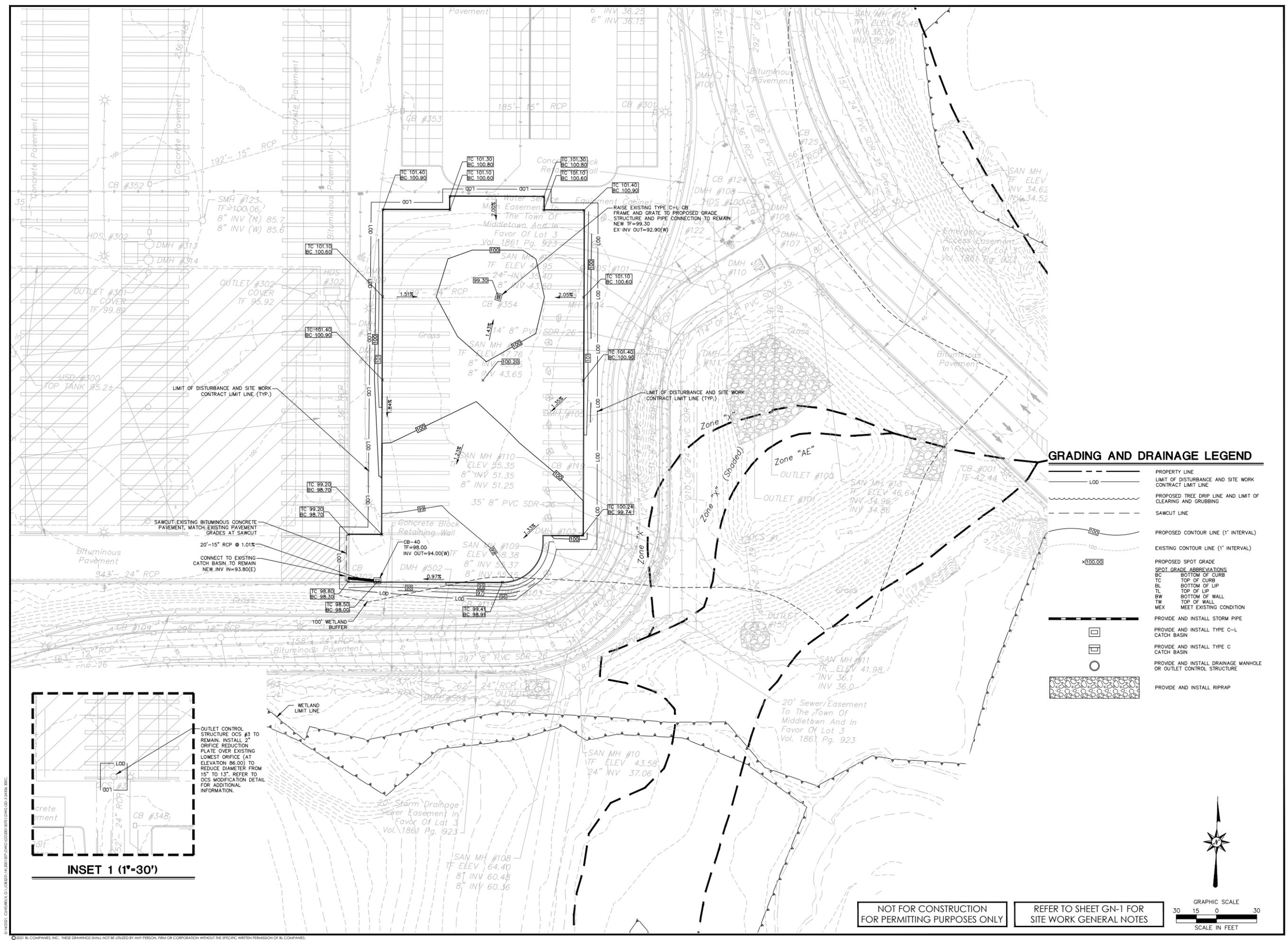
REFER TO SHEET GN-1 FOR
SITE WORK GENERAL NOTES

**EXISTING FEDEX GROUND HUB
HUB PARKING EXPANSION**
49 FEDEX DRIVE
MIDDLETOWN, CONNECTICUT

REV/ISS	Date	Desc.	ISSUED FOR
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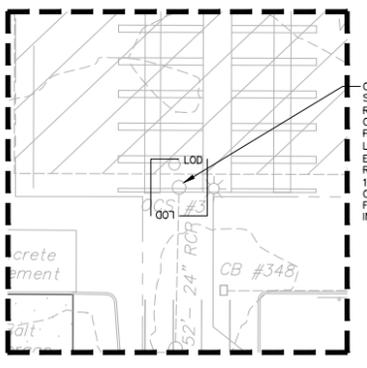
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Date	02/19/2021
CAD File:	GD200150701
Title	GRADING AND DRAINAGE PLAN
Sheet No.	

GD-3



GRADING AND DRAINAGE LEGEND

-  PROPERTY LINE
-  LIMIT OF DISTURBANCE AND SITE WORK CONTRACT LIMIT LINE
-  PROPOSED TREE DRIP LINE AND LIMIT OF CLEARING AND GRUBBING
-  SAWCUT LINE
-  PROPOSED CONTOUR LINE (1' INTERVAL)
-  EXISTING CONTOUR LINE (1' INTERVAL)
-  PROPOSED SPOT GRADE
- SPOT GRADE ABBREVIATIONS**
- BC BOTTOM OF CURB
- TC TOP OF CURB
- BL BOTTOM OF LIP
- TL TOP OF LIP
- BW BOTTOM OF WALL
- TW TOP OF WALL
- MEX MEET EXISTING CONDITION
-  PROVIDE AND INSTALL STORM PIPE
-  PROVIDE AND INSTALL TYPE C-L CATCH BASIN
-  PROVIDE AND INSTALL TYPE C CATCH BASIN
-  PROVIDE AND INSTALL DRAINAGE MANHOLE OR OUTLET CONTROL STRUCTURE
-  PROVIDE AND INSTALL RIPRAP

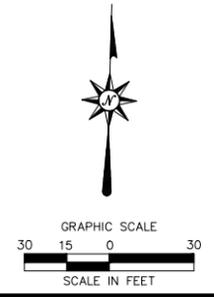


INSET 1 (1"=30')

OUTLET CONTROL STRUCTURE OCS #3 TO REMAIN. INSTALL 2" ORIFICE REDUCTION PLATE OVER EXISTING LOWEST ORIFICE (AT ELEVATION 86.00) TO REDUCE DIAMETER FROM 15" TO 13". REFER TO OCS MODIFICATION DETAIL FOR ADDITIONAL INFORMATION.

NOT FOR CONSTRUCTION
FOR PERMITTING PURPOSES ONLY

REFER TO SHEET GN-1 FOR
SITE WORK GENERAL NOTES



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APPENDIX E

CALCULATIONS

Treatment Train Efficiency Worksheets
CT DEEP Water Quality Volume Calculation
CT DEEP Water Quality Flow Calculation
CT DEEP Groundwater Recharge Calculations

Best Management Practice (BMP) Treatment Train Efficiency Worksheet

Prepared for:
FedEx Hub Parking Expansion
49 FedEx Drive
Middletown, Connecticut

Prepared by:
BL Companies
100 Constitution Plaza, 10th Floor
Hartford Connecticut

Date prepared:
February 19, 2021

Overall Site Treatment Train Efficiency

E _T =[(1-E ₁)(1-E ₂)(1-E ₃)(1-E ₄)(1-E _?)]*100	BMP	BMP Description	Type of Treatment	Efficiency Rate %
		E1	Impervious Surface Sweeping***	secondary (conventional)
	E2	Deep Sump and Hooded Catch Basin	Secondary	25
	E3	Hydrodynamic Separator**	Secondary	80

Overall Treatment Train Efficiency (E_T)= 87 % Total Suspended Solids (TSS) Removal

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

BMP	Type of Treatment	TSS Removal Rate	Starting TSS Load	Amount Removed	Remaining Load
		Impervious Surface Sweeping***	secondary (conventional)	0.10	1.00
Deep Sump and Hooded Catch Basin	Secondary	0.25	0.90	0.23	0.68
Hydrodynamic Separator **	Secondary	0.8	0.68	0.54	0.14

Overall Treatment Train Efficiency (%) 87

TSS Removal Rates (adapted from Schueler, 1996, & EPA, 1993)

BMP List	Design Rate	Range of Average TSS Removal Rates	Brief Design Requirements
Extended Detention Pond	70%	60-80%	Sediment forebay
Wet Pond (a)	70%	60-80%	Sediment forebay
Constructed Wetland (b)	80%	65-80%	Designed to infiltrate or retain
Water Quality Swale	70%	60-80%	Designed to infiltrate or retain
Infiltration Trench	80%	75-80%	Pretreatment critical
Infiltration Basin	80%	75-80% (predicted)	Pretreatment critical
Dry Well	80%	80% (predicted)	Roof top runoff (uncontaminated only)
Sand Filter (c)	80%	80%	Pretreatment
Organic Filter (d)	80%	80%+	Pretreatment
Water Quality Inlet	25%	15-35% w/ cleanout	Off-line only; 0.1" minimum Water Quality Volume (WQV) storage
Sediment Trap (Forebay)	25%	25% w/ cleanout	Storm flows for 2-year event must not cause erosion; 0.1" minimum WQV storage
Drainage Channel	25%	25%	Check dams; non-erosive for 2-yr.
Deep Sump and Hooded Catch Basin	25%	25% w/ cleanout	Deep sump general rule = 4 x pipe diameter or 4.0' for pipes 18" or less
Street Sweeping	10%	10%	Discretionary non-structural credit, must be part of approved plan

Water Quality Calculations

Determine Water Quality Volume

From CT 2004 Stormwater Quality Manual:

$$WQV = \frac{(I^a)(R)(A)}{12}$$

$$R = 0.05 + 0.009(I)$$

WQV = water quality volume (ac-ft)
 R = volumetric runoff coefficient
 I = percent impervious cover
 A = site area in acres

Area	ID	Total Area		Impervious Area		Impervious Cover	Volumetric Runoff Coefficient	Water Quality Volume (WQV)		Pre-Treatment Volume (10% of WQV)	Sediment Forebay Volume *	Water Quality Volume Provided
		ac	ft ²	ac	ft ²	%	R	acre-feet	ft ³	ft ³	ft ³	ft ³
Existing Outbound Lot Detention System	PDA-200, 210, 211, 220	57.294	2,495,714	42.214	1,838,847	73.68	0.713	3.404	148,278	14,828	N/A	160,362
Existing Stormwater Pond	PDA-300, 310, 320, 330	50.870	2,215,913	32.708	1,424,756	64.30	0.629	2.666	116,131	11,613	21,243	109,681
Total Site WQV Required =								264,409	Total Site WQV Provided =		270,043	

Note: The permanent pool volumes were derived from the Stage Volume worksheet in HydroCAD.

* Design volume requirements as defined in the 2004 Connecticut Stormwater Quality Manual by the Connecticut Department of Energy and Environmental Protection. The existing stormwater pond located at the north end of the site and the existing underground stormwater detention system installed in the outbound lot area contain surplus WQV storage available to achieve site-wide WQV in the proposed condition.

Sediment forebay minimum volume ≥ 10% of the area WQV

Water Quality Calculations

Determine Water Quality Flow

From CT 2004 Stormwater Quality Manual:

$$CN = \frac{1000}{\left[10 + 5P + 10Q - 10(Q^2 + 1.25QP)^{\frac{1}{2}} \right]}$$

$$Q = \frac{[WQV(acre - feet) \times [12(inches / foot)]]}{DrainageArea(acres)}$$

$$WQF = (q_u)(A)(Q)$$

CN = Runoff Curve Number

P = design precipitation, inches, (1" for water quality storm)

Q = runoff depth (in watershed inches)

T_c = time of concentration

I_a = Initial abstraction, inches, from Table 4-1, Chapter 4, TR-55

q_u = unit peak discharge,

WQF = water quality flow (cfs)

Hydrodynamic Separator	Total Area			Imp Area		Imp Cover	R	WQV	Q	P	CN	T _c		I _a	I _a /P	q _u *	WQF
	ft ²	ac	mi ²	ft ²	ac	%	-	acre-feet	in	in	-	mins	hours	in	-	cfs/mi ² /in	cfs
HDS-10	19,345	0.444	0.0007	16,145	0.371	83.56	0.802	0.03	0.81	1.00	98	5.0	0.08	0.041	0.041	650	0.37
HDS-20	170,715	3.919	0.0061	141,390	3.246	82.83	0.795	0.26	0.8	1.00	98	5.0	0.08	0.041	0.041	650	3.18
HDS-30	1,479,100	33.955	0.0531	1,288,291	29.575	87.10	0.834	2.36	0.83	1.00	98	17.7	0.3	0.041	0.041	495	21.8

Hydrodynamic Separator	HDS Unit	Required WQF	Unit Max. WQF
		cfs	cfs
HDS-10	CDS2020-5-C	0.37	2.00
HDS-20	Vortechs 3000	3.18	4.50
HDS-30	Vortechs 16000	21.80	25.00

* From Exhibit 4-III: Unit peak discharge (q_u) for SCS type III rainfall distribution, Urban Hydrology for Small Watersheds (TR-55), USDS< SCS, June 1986.

Groundwater Recharge Volume Calculations

Groundwater Recharge Volume

From CT 2004 Stormwater Quality Manual:

$$GVR = \frac{(D)(A)(I)}{12}$$

GRV Groundwater Recharge Volume (ac-ft)
 D = Depth of Runoff to be Recharged (table 7-4)
 A = site area in acres
 I = impervious cover (decimal)

	A				I				Site Imperviousness (Decimal) by NRCS Hydrologic Soil Group				GRV Required		Potential Recharge Pond Volumes Proposed		
	Total Site Area (AC)	Site Area by NRCS Hydrologic Soil Group				Impervious Cover by NRCS Hydrologic Soil Group				Site Imperviousness (Decimal) by NRCS Hydrologic Soil Group				(ac-ft)	(cu ft)	(ac-ft)	(cu ft)
		A	B	C	D	A	B	C	D	A	B	C	D				
Existing Outbound Lot Detention	57.29	0.00	0.00	21.58	35.72	0.00	0.00	14.59	27.63	0.00	0.00	0.68	0.77	0.122	5,295	3.681	160,362
Existing Stormwater Pond	50.87	0.00	0.00	26.84	24.03	0.00	0.00	12.83	19.88	0.00	0.00	0.25	0.83	0.056	2,457	2.518	109,681

Table from 2004 Connecticut Stormwater Quality Manual

**Table 7-4
Groundwater Recharge Depth**

NRCS Hydrologic Soil Group	Average Annual Recharge	Groundwater Recharge Depth (D)
A	18 inches/year	0.4 inches
B	12 inches/year	0.25 inches
C	6 inches/year	0.10 inches
D	3 inches/year	0 inches (waived)

NRCS Hydrologic Soil	Groundwater Recharge
A	0.40
B	0.25
C	0.10
D	0.00

Source: MADEP, 1997.
 NRCS – Natural Resources Conservation Service

APPENDIX F

STORMWATER SYSTEM
OPERATIONS AND MAINTENANCE PLAN

Appendix F:

**Stormwater System
Operations and Maintenance Plan**

For the Proposed:
Existing FedEx Ground Hub Parking Expansion

Located at:
49 FedEx Drive
Middletown, Connecticut

Prepared for Submission to:
City of Middletown, Connecticut

February 19, 2021
Revised May 14, 2021

Prepared for:
FedEx Ground Package System, Inc.
1000 FedEx Drive
Moon Township, PA 15108

Prepared by:



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BL Project Number: 2001507

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General Overview

The project parcel, located at 49 FedEx Drive in Middletown, CT, is approximately 205 acres in size and is currently developed with a ±500,000 square foot distribution hub building and associated impervious paved parking and drive aisle areas. The property is bordered by Industrial Park Road and Interstate 91 to the east, residential properties to the north and northwest, and commercial properties to the west and south. There are substantial wetlands located on the property associated with the Mattabeset River and Sawmill Brook, for which detail can be found within the Wetland Identification and Delineation Report. There are no known vernal pools on or adjacent to the proposed development. No direct impact to any wetland system is proposed, however work will occur within a portion of the 100' upland review area. Portions of the site are located in FEMA designated zones Floodway AE, Floodplain AE (100-year floodplain), and Zone X (500-year floodplain). No construction or disturbance is proposed in flood hazard areas. The site generally slopes from the east and west toward Sawmill Brook which flows from south to north toward the Mattabeset River. Extensive stormwater management facilities have been installed onsite as part of the original hub building and parking area construction consisting of a series of underground stormwater detention systems and above ground stormwater management basins connected by underground stormwater piping. Site-wide stormwater quality volume has previously been addressed through these installations. This proposed project will continue to utilize existing on site stormwater facilities which have additional capacity available to receive additional runoff from expanded impervious areas. Numerous Water Quality Best Management Practices (BMPs) have been incorporated into the project design and include various elements including deep sump hooded catch basins, hydrodynamic separators, and underground detention systems. Stormwater quality is being addressed by a formalized street sweeping program, deep sump and hooded outlet catch basins, and hydrodynamic separation units. These features will provide the minimum required 80% TSS removal as required in the CT Stormwater Quality Manual. The proposed system serves to provide water quality improvements, to maintain the stormwater discharge to the surrounding natural resources, and to recharge to the groundwater the increase in the stormwater volume as a result of the impervious cover for the 2, 10, 25 and 100-year storm events.

The following Operations and Maintenance Plan was prepared specifically for this proposed development in the City of Middletown, Connecticut. The Plan was developed to satisfy the requirements of the Connecticut Department of Energy and Environmental Protection's 2002 Connecticut Guidelines for Soil Erosion and Sediment Control.

Purpose & Goals

The purpose of this Manual is to ensure that the stormwater management components are operated in accordance with all approvals and permits. The primary goal is to inform all the property managers about how the system operates and what maintenance items are necessary to protect downstream wetlands and watercourses. The secondary goal is to provide a practical, efficient means of maintenance planning and record keeping to verify permit compliance.

Responsible Parties

The Property Owner will be responsible for implementing the Plan on the property.

Maintenance inspections shall be performed by a qualified professional.

Some utilities located on the site will be owned and maintained by various utility companies in accordance with their standards. The property owner may maintain the service connections.

List of Permits & Special Conditions

The project will receive several permits, which may contain special conditions that require compliance by the property owner and maintenance contractors. This permit may include the following:

- City of Middletown – Wetlands Permit, Site Plan Permit
- Connecticut Department of Transportation – OSTA Permit
- Connecticut Department of Energy and Environmental Protection – Stormwater General Permit

Maintenance Logs and Checklists

The property owner will keep a record of all maintenance procedures performed, date of inspection/ cleanings, etc. Copies of inspection reports and maintenance records shall be kept on-site.

Forms

The following forms will be developed for annual maintenance. Copies of the forms will be kept on-site as part of the Storm Water Management Plan.

- Annual Checklist
- Quarterly Checklist
- Monthly Checklist

Employee Training

The property owner will have an employee-training program, with annual up-dates, to ensure that the qualified employees charged with maintaining the buildings and grounds do so in accordance with the approved permit conditions. All employees that have maintenance duties will be adequately informed of their responsibilities.

Spill Control

In addition to the good housekeeping and material management practices discussed in the previous sections of this plan, the following practices will be followed for spill prevention and clean-up:

- Manufacturer's recommended methods for spill clean-up will be clearly posted and site personnel will be made aware of the procedures and the location of the information and clean-up supplies.
- Materials and equipment necessary for spill clean-up will be kept in the material storage area on-site. Equipment and materials will include but not be limited to: absorbent booms or mats, brooms, dust pans, mops, rags, gloves, goggles, sand, and plastic and metal trash containers specifically for this purpose.
- All spills will be cleaned immediately after discovery.
- The spill area will be kept well-ventilated and personnel will wear appropriate protective clothing to prevent injury from contact with hazardous substance.
- Spills of toxic or hazardous material, regardless of size, will be reported to the appropriate State or local government agency.
- If a spill occurs, this plan will be adjusted to include measures to prevent this type of spill from reoccurring and how to clean the spill if there is another one. A description of the spill, the cause, and the remediation measures will also be included.

A spill report shall be prepared by the property owner following each occurrence. The spill report shall present a description of the release, including quantity and type of material, date of spill, circumstances leading to the release, location of spill, response actions and personnel, documentation of notifications and corrective measures implemented to prevent reoccurrence.

The property owner shall identify an appropriately qualified and trained site employee involved with day-to-day site operations to be the spill prevention and clean-up coordinator. The name(s) of responsible spill personnel shall be posted on-site. Each employee shall be instructed that all spills are to be reported to the spill prevention and clean-up coordinator.

Storm Water Management

System Components

The storm water management system has several components that are shown on the Grading and Drainage Plans (GD-1 and GD-2), that perform various functions in treating storm water runoff:

Catch Basins and Manholes

The property owner is responsible for cleaning the catch basins and manholes on the property. A Connecticut Licensed hauler shall clean the sumps and dispose of removed sand legally. The road sand may be reused for winter sanding but may not be stored on-site. As part of the hauling contract, the hauler shall notify the property owner in writing where the material is being disposed.

Each catch basin shall be inspected every four months, with one inspection occurring during the month of April. Any debris occurring within one foot from the bottom of each sump shall be removed by Vacuum "Vactor" type of maintenance equipment.

During the inspection of each of the catch basin sumps, the hoods (where provided) on each of the outlet pipes shall also be observed for trash accumulation as well as overall condition. In the event that a hood is damaged or off the hanger, it shall be reset or repaired.

Hydrodynamic Separators (or approved equal)

The hydrodynamic separator manholes will be cleaned periodically during construction, and at the end of construction once the landscaped areas are fully stabilized.

For the first year of operation following construction, inspect each manhole once each month for the months of January, February, March and April, and once every four months thereafter. A graduated measuring device (stadia rod) shall be inserted into each grit chamber and measurements of any accumulations shall be recorded. Any debris, which has accumulated to within one foot of the water surface inside the grit chamber portion of each tank, shall be removed by vacuum "Vactor" type of equipment.

After the first year of operation, each manhole shall be inspected at a minimum, three times yearly with one inspection occurring in the month of April in the same manner as described above for the first season of operation. Any accumulations found to be occurring within one foot of the water surface shall be removed from the manhole and properly disposed off-site. Also, any floating material discovered during inspections shall be removed from the tank.

A detailed maintenance logbook shall be kept for each manhole. Information is to include, but not be limited to, the date of inspection, record of grit depth, condition of baffles, observation of any floatable, and date of cleaning performed.

Subsurface Stormwater Management Systems (Underground Detention Systems)

The underground detention systems shall be inspected every six months in the months of April and October. Each of the inspection ports provided shall be opened and visually checked from the surface. Observation of grit inside of the detention system shall be noted and any deposits found to be 2 inches or more, as measured from the invert of pipe, shall be cleaned and removed. Trash baskets (if installed) shall be inspected and cleaned of trapped debris and sediment. The underground detention system qualifies as a Confined Space under OSHA regulations, and any maintenance involving entry into the pipes should comply with OSHA Confined Space Entry Regulations.

Site Maintenance

Parking Lots

Parking lots and sidewalks shall be swept as necessary by the property owner, or at least once per year, to clean sediment, trash, and other debris. The property owner will sweep parking lots on the property in the spring to remove winter accumulations of road sand.

Landscaping

The management company retained by the property owner will maintain landscaped areas. Normally the landscaping maintenance will consist of pruning, mulching, planting, mowing lawns, raking leaves, etc. Use of fertilizers and pesticides will be controlled and limited to minimal amounts necessary for healthy landscape maintenance.

The lawn areas, once established, will be maintained at a typical height of 3 ½". This will allow the grass to be maintained with minimal impact from weeds and/or pests. The low-maintenance areas will be maintained as a meadow or allowed to revert back to natural conditions. Topsoil, brush, leaves, clippings, woodchips, mulch, equipment, and other material shall be stored off site.

Outdoor Storage

There will be no outdoor storage of hazardous chemicals, de-icing agents, fertilizer, pesticides, or herbicides anywhere around the buildings.

Deicing and Snow Removal & Storage

The use of clean sand may be used to aid traction in conjunction with salt and/or chemicals for deicing, snow melting and other related winter weather management. Snow shall be shoveled and plowed from sidewalk and parking areas as soon as practical during and after winter storms. Sand accumulation shall be removed from the site at the end of the winter season or appropriate time when seasonal snow has melted. Alternative deicing methods must be submitted prior to use onsite for review to the City of Middletown for approval.

MAINTENANCE SCHEDULE

During the First Year of Operation:		
Task:	Completion Date:	Manager's Initials:
JANUARY:		
Employee Training Program with Spill Program		
*Catch Basin and HDS Inspection		
*Subsurface Stormwater System Inspection		
FEBRUARY:		
*Catch Basin and HDS Inspection		
MARCH:		
*Catch Basin and HDS Inspection		
APRIL:		
*Catch Basin and HDS Inspection		
*Subsurface Stormwater System Inspection		
Sweeping of Paved Surfaces		
Shrub Fertilization		
Lawn Liming (if necessary)		
JUNE:		
*Catch Basin and HDS Inspection		
Sweeping of Paved Surfaces		
SEPTEMBER:		
*Subsurface Stormwater System Inspection		
Sweeping of Paved Surfaces		
Tree and Lawn Fertilization		
DECEMBER:		
*Catch Basin and HDS Inspection		
*Subsurface Stormwater System Inspection		
Sweeping of Paved Surfaces		

*NOTE: Use appropriate worksheet found in this plan to conduct the inspection.

After the First Year of Operation:

FOR YEAR _____

Task:		Completion Date:	Manager's Initials:
JANUARY:			
Employee Training Program with Spill Program			
APRIL:			
*Catch Basin and HDS Inspection			
*Subsurface Stormwater System Inspection			
Sweeping of Paved Surfaces			
Shrub Fertilization			
Lawn Liming (if necessary)			
JUNE:			
*Catch Basin and HDS Inspection			
Sweeping of Paved Surfaces			
SEPTEMBER:			
*Subsurface Stormwater System and Inspection			
Sweeping of Paved Surfaces			
Tree and Lawn Fertilization			
DECEMBER:			
*Catch Basin and HDS Inspection			
Sweeping of Paved Surfaces			

*NOTE: Use appropriate worksheet found in this plan to conduct the inspection.

CATCH BASIN / HDS INSPECTION LOG

Name of Inspector:

Date:

Catch Basin or HDS ID	Condition (circle one)		Debris above 1' within sump? (If yes then catch basin is to be cleaned)		Date of Catch Basin/Cleaning (if debris is greater than 1')		Condition of Hood (if applicable, remove trash/debris if necessary)	Comments:
	Excellent							
	Fair	Poor	Yes	No	Yes	No		
	Excellent							
	Fair	Poor	Yes	No	Yes	No		
	Excellent							
	Fair	Poor	Yes	No	Yes	No		
	Excellent							
	Fair	Poor	Yes	No	Yes	No		
	Excellent							
	Fair	Poor	Yes	No	Yes	No		
	Excellent							
	Fair	Poor	Yes	No	Yes	No		
	Excellent							
	Fair	Poor	Yes	No	Yes	No		
	Excellent							

On-site Procedures for Inspection and Maintenance of Catch Basin Inserts

- Secure traffic and pedestrian traffic with cones, barrels, etc.
- Clean surface area around each catch basin.
- Remove grates and set aside
- Clean grates, remove litter and debris that may be trapped within the grate
- Visually inspect condition of outlet hood and remove trash and debris from hood if necessary.
- Remove by vacator hose the debris that has been trapped in the trough area. Dispose of in accordance with local, state and federal regulatory agency requirements. Most debris that is captured in the trough or sump area will fall into the non-hazardous waste category.
- Visually inspect and check the condition of the trough area.
- Replace grate and lockdown as needed.
- Un-secure traffic control area.
- Complete service report and submit to facility owner.

